Part 4 of 19 of Appendices for Resource Report No. 13 LNG

I.2 - Seismic Engineering Report

Document Number:	Description:	Revision:	Appendix:
USAL-FG-GRHAZ-00-002016-008	LNG Facilities Seismic Engineering Report	Rev 0	Public

Confidential

LNG FACILITIES SEISMIC ENGINEERING REPORT

USAL-FG-GRZZZ-00-002016-008

Rev	Date	Revision Description	Originator	Reviewer / Endorser	Response Code	Approver
A	28-Oct-16	Issued for Review	S. Giannakos / J. Sowers	A. Younan	2	M. Ilankatharan / O. El Menchawi / P. Hogan
0	16-Dec-16	Issued for Use	S. Giannakos / J. Sowers			M. Ilankatharan / O. El Menchawi / P. Hogan

Document Control No.	Country	Facility	Originator	Discipline	Type	Sub-Type	Location	Sequence	Identifier
	US	AL	FG	G	R	ZZZ	00	002016	008

FUGRO CONSULTANTS, INC.

LNG FACILITIES SEISMIC ENGINEERING REPORT

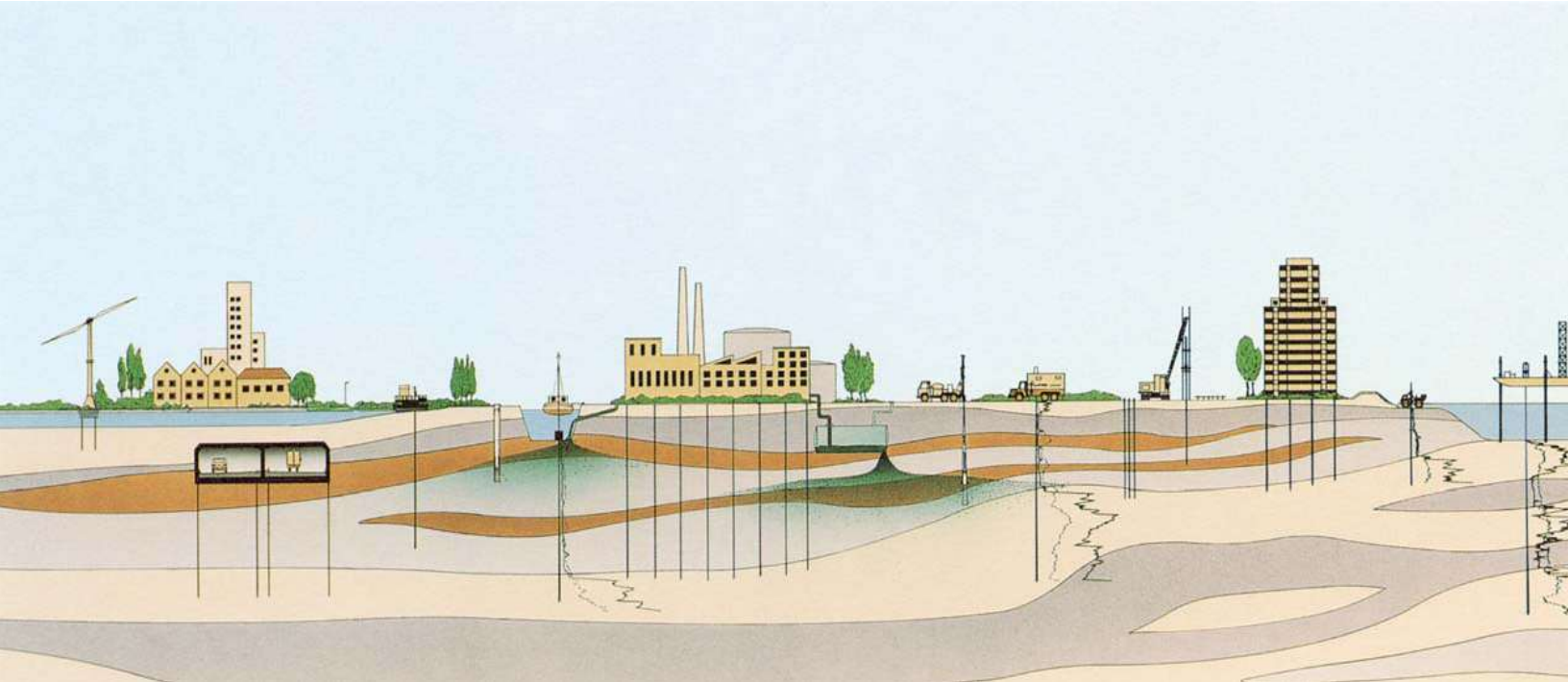
ALASKA LNG PROJECT

NIKISKI, ALASKA

AKLNG DOCUMENT NO. USAL-FG-GRZZZ-00-002016-008

REPORT NO. 04.10160001-9
EXXONMOBIL ALASKA LNG LLC (EMALL)
HOUSTON, TEXAS

Rev	Date	Revision Description	Originator	Reviewer	Approver
A	28-Oct-16	Issued for Review	S. Giannakos / J. Sowers	A. Younan	M. Ilankatharan / O. El Menchawi / P. Hogan
0	16-Dec-16	Issued for Use	S. Giannakos / J. Sowers		M. Ilankatharan / O. El Menchawi / P. Hogan



6100 Hillcroft (77081)
Houston, Texas 77274
Tel: (713) 369-5400
P.O Box 740010

Fax: (713) 369-5518

AKLNG Document No. USAL-FG-GRZZZ-00-002016-008
Fugro Report No. 04.10160001-9
December 16, 2016

ExxonMobil Alaska LNG LLC (EMALL)
10613 W. Sam Houston Pkwy N, Suite 500
Houston, Texas 77064

Attention: Patrick Wong
Geotechnical Engineer/Technical POC

LNG Facilities Seismic Engineering Report
Alaska LNG Project
Nikiski, Alaska

Dear Mr. Wong:

Fugro Consultants, Inc. (Fugro) is pleased to present this final report of our Seismic Engineering Analyses and Tsunamic Hazard Assessment for the investigations at the Alaska LNG facilities located in Nikiski, Alaska. Our services were authorized under Service Work Order No. AKLNG-FUG-US-005 Rev 0, dated March 2, 2016 in accordance with the Service Agreement No. A2275592 between Fugro and ExxonMobil Global Services Company, dated October 29, 2012. Fugro has been performing the geophysical and geotechnical site investigation (G&G) for the proposed AKLNG Project since August 2014.

This report presents our findings and recommendations from the seismic hazard as well as the liquefaction potential analyses conducted for the Alaska LNG Project, and the findings of the Tsunami hazard evaluation.

We appreciate the opportunity to be of service to EMALL. Please call us at (713) 369-5400 if you have any questions or comments concerning this report, or when we may be of further assistance.

Sincerely,
FUGRO CONSULTANTS, INC.

TBPE Firm Registration No. 299

Spyros Giannakos, Ph.D., P.E.
Senior Project Engineer

Joshua Goodman, P.G, C.E.G.
Senior Project Geologist

Mahadevan Ilankatharan, Ph.D., P.E.
Associate Engineer

Janet M. Sowers, Ph.D., P.G.
Associate Geologist

Osman El Menchawi, Ph.D., P.E, G.E.
Principal Geotechnical Engineer

Phillip Hogan, C.E.G., Ph.D.
Senior Principal Marine Engineering Geologist

Copies Submitted: Aconex Document Control System

TABLE OF CONTENTS

Page

1.0 INTRODUCTION 1-1
- 1.1 Project Description 1-1
- 1.2 Work Authorization 1-5
- 1.3 Scope and Organization 1-5
- 1.4 Limitations of this Study 1-6
- 1.5 Summary and Findings 1-6
  - 1.5.1 Re-evaluation of Seismic Hazard 1-6
  - 1.5.2 Assessment of Liquefaction Hazard for Onshore Area 1-7
  - 1.5.3 Assessment of Liquefaction Hazard for Nearshore Area 1-8
  - 1.5.4 Assessment of Tsunami Hazard 1-9

2.0 RE-EVALUATION OF SEISMIC HAZARD 2-1
- 2.1 Introduction 2-1
- 2.2 Faults, Folds, or Other Geologic Structures Within a 5-mile Radius of the Site 2-1
  - 2.2.1 Seismic Source Model Evaluation 2-2
- 2.3 Site Characterization and Input Shear Wave Velocity for PSHA 2-3
- 2.4 Summary 2-4

3.0 ASSESSMENT OF LIQUEFACTION HAZARD FOR ONSHORE AREA 3-1
- 3.1 Introduction 3-1
- 3.2 Liquefaction Hazard Assessment for Coarse-Grained Soils 3-1
  - 3.2.1 Evaluation of Seismically Induced Cyclic Demand 3-2
  - 3.2.2 Cyclic Resistance to Liquefaction from SPT Data 3-3
  - 3.2.3 Ground Water Levels 3-3
  - 3.2.4 Liquefaction Triggering Hazard Assessment 3-7
  - 3.2.5 Evaluation of Liquefaction-Induced Reconsolidation Settlements 3-11
- 3.3 Liquefaction Hazard Assessment for Fine-Grained Soils 3-12
- 3.4 Summary 3-15

4.0 ASSESSMENT OF LIQUEFACTION HAZARD FOR NEARSHORE AREA 4-1
- 4.1 Introduction 4-1
- 4.2 Liquefaction Hazard Assessment for Coarse-Grained Soils 4-1
  - 4.2.1 Cyclic Resistance to Liquefaction from SPT Data 4-1
  - 4.2.2 Liquefaction Triggering Hazard Assessment 4-2
  - 4.2.3 Evaluation of Liquefaction-Induced Reconsolidation Settlements 4-4
- 4.3 Liquefaction Hazard Assessment for Fine-Grained Soils 4-5
- 4.4 Summary 4-6

5.0 ASSESSMENT OF TSUNAMI HAZARD 5-1
- 5.1 Introduction 5-1
- 5.2 Background and Scope 5-1
- 5.3 Methodology 5-2

5.4 Results 5-3
5.5 Discussion and Recommendations 5-5
6.0 CONCLUSIONS 6-1
6.1 Re-evaluation of Seismic Hazard 6-1
6.2 Assessment of Liquefaction Hazard 6-1
6.2.1 Onshore Area 6-1
6.2.1.1 Findings for the Onshore Area 6-1
6.2.1.2 Summary for the Onshore Area 6-2
6.2.2 Nearshore Area 6-2
6.2.2.1 Findings for the Nearshore Area 6-2
6.2.2.2 Summary for the Nearshore Area 6-3
6.3 Assessment of Tsunami Hazard 6-4
7.0 REFERENCES 7-1

TABLES

Page

Table 1.1: Summary of Fugro Reports Developed for 2016 G&G Site Investigation**Error! Bookmark not defined.**

Table 3.1: Earthquake Scenarios for Liquefaction Evaluation Analyses of the Onshore Area 3-2

Table 3.2: Assumed Groundwater Depth per Boring for the Liquefaction Evaluations.....3-4

Table 3.3: SPT-based Liquefaction Triggering Hazard Assessment According to NCEER (Youd et al. 2001) and Boulanger and Idriss (2014): Depths of Potentially Liquefiable Localized Soil Pockets for the Onshore Borings and the Existing Elevations for Both OBE and SSE / MCE Levels per NFPA 59A 2006.....3-8

Table 3.4: SPT-based Liquefaction Triggering Hazard Assessment According to NCEER (Youd et al., 2001) and Boulanger and Idriss (2014): Depths of Potentially Liquefiable Localized Soil Pockets for the Onshore Borings and the Proposed Elevations for Both OBE and SSE / MCE Levels per NFPA 59A 2006.....3-10

Table 3.5: Liquefaction Triggering Assessment of Fine-grained Soils for Onshore Locations According to Bray and Sancio (2006) 3-14

Table 4.1: Earthquake Scenarios for Liquefaction Evaluation Analyses of the Nearshore Area 4-1

Table 4.2: SPT-based Liquefaction Triggering Hazard Assessment According to NCEER (Youd et al., 2001) and Boulanger and Idriss (2014): Depths of Potentially Liquefiable Localized Soil Pockets for the Nearshore Borings for Both OBE and SSE / MCE Levels per NFPA 59A 2006 4-3

Table 4.3: Liquefaction Triggering Assessment of Fine-grained Soils for Nearshore Locations According to Bray and Sancio (2006) 4-6

Table 5.1: Vertical Datums for Nikiski, Alaska 5-2

Table 5.2: Maximum Tsunami Crest Elevation for Each Landslide Scenario 5-4

Table 5.3: Minimum Tsunami Crest Elevation for Each Landslide Scenario 5-5

ILLUSTRATIONS

	Plate
Vicinity Map	1
Overall Site Plan	2
Plan of Explorations	3
Plan of Borings	4
Regional Fault Map	5
Cook Inlet Fault-cored Fold Source Model	6
Folds and Faults Mapped from Seismic Reflection Data	7
Conceptual Cross Section of Upper Cook Inlet Basin at the Latitude of the Site	8
Summary of Shear Wave Velocity Data Obtained from Downhole Seismic Shear Wave . Velocity Tests in the Onshore and Nearshore Project Area During 2014, 2015 and 2016 Field Explorations	9
Estimated Cumulative Settlement, Onshore Locations – OBE Level	10
Estimated Cumulative Settlement, Onshore Locations – SSE/MCE Level	11
Estimated Cumulative Settlement, Onshore Locations, Proposed Elevation – OBE Level	12
Estimated Cumulative Settlement, Onshore Locations, Proposed Elevation – SSE/MCE Level	13
Liquefaction Triggering Assessment of Fine-Grained Soils for Onshore Locations (2014 and 2015 Field Explorations) - Bray and Sancio (2006)	14
Liquefaction Triggering Assessment of Fine-Grained Soils for Onshore Locations (2016 Field Explorations) - Bray and Sancio (2006)	15
Nearshore Subsurface, Liquefaction Profile A-A', OBE Level (NCEER, 2001)	16
Nearshore Subsurface, Liquefaction Profile A-A', OBE Level (Boulanger and Idriss, 2014)	17
Nearshore Subsurface, Liquefaction Profile B-B', OBE Level (NCEER, 2001)	18
Nearshore Subsurface, Liquefaction Profile B-B', OBE Level (Boulanger and Idriss, 2014)	19
Nearshore Subsurface, Liquefaction Profile C-C', OBE Level (NCEER, 2001)	20
Nearshore Subsurface, Liquefaction Profile C-C', OBE Level (Boulanger and Idriss, 2014)	21
Nearshore Subsurface, Liquefaction Profile A-A', MCE Level (NCEER, 2001)	22
Nearshore Subsurface, Liquefaction Profile A-A', MCE Level (Boulanger and Idriss, 2014)	23
Nearshore Subsurface, Liquefaction Profile B-B', MCE Level (NCEER, 2001)	24
Nearshore Subsurface, Liquefaction Profile B-B', MCE Level (Boulanger and Idriss, 2014)	25
Nearshore Subsurface, Liquefaction Profile C-C', MCE Level (NCEER, 2001)	26
Nearshore Subsurface, Liquefaction Profile C-C', MCE Level (Boulanger and Idriss, 2014)	27
Estimated Cumulative Settlement, Nearshore Locations – OBE Level	28
Estimated Cumulative Settlement, Nearshore Locations – SSE/MCE Level	29
Liquefaction Triggering Assessment of Fine-Grained Soils for Nearshore Locations - Bray and Sancio (2006)	30
Location of Modeled Submarine Landslide	31

Location of Tsunami Observation Points, 2015 and 2016 32
Modeled Tsunami Wave Heights, Points A, B, C, and D 33
Modeled Tsunami Wave Heights, Points 1, 2, and 3 34
Schematic Cross Section Showing Maximum Tsunami Crest and Proposed Marine Trestle..... 35

APPENDICES

Appendix A. SPT-based Liquefaction Potential Evaluations Per NFPA 59A 2006 and ASCE 7-05 for Onshore Borings ..... A

Appendix B. SSE / MCEG Level Liquefaction Potential Evaluations Per NFPA 59A 2013 and ASCE 7-10 for Onshore Borings ..... B

Appendix C. SPT-based Liquefaction Potential Evaluations Per NFPA 59A 2006 and ASCE 7-05 for Onshore Borings, Proposed Elevation C

Appendix D. SSE / MCEG Level Liquefaction Potential Evaluations Per NFPA 59A 2013 and ASCE 7-10 for Onshore Borings, Proposed Elevation ..... D

Appendix E. SPT-based Liquefaction Potential Evaluations Per NFPA 59A 2006 and ASCE 7-05 for Nearshore Borings ..... E

Appendix F. SSE / MCEG Level Liquefaction Potential Evaluations Per NFPA 59A 2013 and ASCE 7-10 for Nearshore Borings ..... F

Appendix G. Cook Inlet Tsunami Hazard Assessment Addendum: Tsunami-tidal Current Interactions, October 27, 2016, by Clayton Hiles and Roy Walters & Cook InletTsunami Hazard Assessment, April 23, 2015, by Clayton Hiles and Roy Walters ..... G

1.0 INTRODUCTION

1.1 Project Description

The Alaska Gasline Development Corporation, BP Alaska LNG LLC, ConocoPhillips Alaska LNG Company, and ExxonMobil Alaska LNG LLC (Applicants) plan to construct one integrated liquefied natural gas (LNG) Project (Project) with interdependent facilities for the purpose of liquefying supplies of natural gas from Alaska, in particular from the Point Thomson Unit (PTU) and Prudhoe Bay Unit (PBU) production fields on the Alaska North Slope (North Slope), for export in foreign commerce and opportunities for in-state deliveries of natural gas.

The Natural Gas Act (NGA), 15 U.S.C. § 717a(11) (2006), and Federal Energy Regulatory Commission (FERC) regulations, 18 C.F.R. § 153.2(d) (2014), define "LNG terminal" to include "all natural gas facilities located onshore or in State waters that are used to receive, unload, load, store, transport, gasify, liquefy, or process natural gas that is ... exported to a foreign country from the United States." With respect to this Project, the "LNG Terminal" includes the following: a liquefaction facility (Liquefaction Facility) in Southcentral Alaska; an approximately 804-mile gas pipeline (Mainline); a gas treatment plant (GTP) on the North Slope; an approximately 62-mile gas transmission line connecting the GTP to the PTU gas production facility (PTU Gas Transmission Line or PTTL); and an approximately 1-mile gas transmission line connecting the GTP to the PBU gas production facility (PBU Gas Transmission Line or PBTL). All of these facilities are essential to export natural gas in foreign commerce.

The new Liquefaction Facility would be constructed on the eastern shore of Cook Inlet just south of the existing Agrium fertilizer plant on the Kenai Peninsula, approximately 3 miles southwest of Nikiski and 8.5 miles north of Kenai (Plate 1). The Liquefaction Facility would include the structures, equipment, underlying access rights, and all other associated systems for final processing and liquefaction of natural gas, as well as storage and loading of LNG, including terminal facilities and auxiliary marine vessels used to support Marine Terminal operations (excluding LNG carriers [LNGCs]). The Liquefaction Facility would include three liquefaction trains combining to process up to approximately 20 million metric tons per annum (MMTPA) of LNG. Two 240,000-cubic-meter tanks would be constructed to store the LNG. The Liquefaction Facility would be capable of accommodating two LNG carriers. The size of LNGCs that the Liquefaction Facility would accommodate would range between 125,000–216,000-cubic-meter vessels.

EMALL contracted Fugro to investigate the site conditions of the onshore LNG facilities, marine LNG Terminal, and marine pipeline corridors. Overview of overall project facilities described above are presented on Plate 2. Completed onshore explorations and the proposed LNG Facilities plant layout are presented on Plate 3. This report documents the seismic engineering analyses and tsunami hazard assessment for the investigations during the 2016 G&G program at the Alaska LNG site (Site) near Nikiski, Alaska (see Plate 1).

A list of the reports (including the superseded reports) that are generated by Fugro as part of the 2014, 2015 and 2016 G&G programs are presented in Table 1.1. A copy of Table 1.1 is also separately submitted to AKLNG under document number USAL-FG-BRCTL-00-000001-000.

Table 1.1: Summary of Fugro Reports Developed for 2014, 2015 and 2016 G&G Programs

G&G Program	Report Title (Superseded Reports in Gray)	AKLNG Document Number	Fugro Report Number
2014	Project Execution Plan for 2014 Onshore and Marine G&G	USAL-FG-GPZZZ-00-000001-000	04.10140094-1
	Geologic Mapping Report	USAL-FG-GRZZZ-00-000001-000	04.10140094-2
	Marine Survey Report Pipeline Corridor Route 1	USAP-FG-GRZZZ-10-000001-000	04.10140094-3
	Marine Survey Report Pipeline Corridor Route 2	USAP-FG-GRZZZ-10-000002-000	04.10140094-4
	Marine Survey Report Nearshore LNG Facilities and Approach Channel	USAL-FG-GRZZZ-90-000003-000	04.10140094-5
	Probabilistic Seismic Hazard Analysis Report(1)	USAL-FG-GRHAZ-00-000001-000	04.10140094-6
	Geophysical Survey Report	USAL-FG-GRZZZ-00-000002-000	04.10140094-7
	Geotechnical Data Report Onshore LNG Facilities	USAL-FG-GRZZZ-00-000003-000	04.10140094-8
	Geologic Hazard Report(2)	USAL-FG-GRHAZ-00-000002-000	04.10140094-9
	Hydrogeologic Report(3)	USAL-FG-GRZZZ-00-000004-000	04.10140094-10
	Groundwater Monitoring Well Installation Report	USAL-FG-GRZZZ-00-000007-000	04.10140094-10A
	Liquefaction Potential Evaluation Report(4)	USAL-FG-GRZZZ-00-000005-000	04.10140094-11
	Integrated Site Characterization and Engineering Report(5)	USAL-FG-GRZZZ-00-000006-000	04.10140094-12
2015	Project Execution Plan for 2015 Onshore and Marine G&G Program	USAL-FG-GPZZZ-00-000002-000	04.10140334-1
	LNG Facilities Onshore Geologic Field Mapping Report	USAL-FG-GRZZZ-00-002015-004	04.10140334-2
	Pipeline Marine Geophysical Survey Report - Route 1	USAP-FG-GRZZZ-10-002015-013	04.10140334-3
	Pipeline Marine Geophysical Survey Report - Route 2	USAP-FG-GRZZZ-10-002015-014	04.10140334-4

G&G Program	Report Title (Superseded Reports in Gray)	AKLNG Document Number	Fugro Report Number
2015	LNG Facilities Marine Geophysical Survey Report	USAL-FG-GRZZZ-90-002015-010	04.10140334-5
	LNG Facilities Probabilistic Seismic Hazard Analysis (PSHA) Report(1)	USAL-FG-GRHAZ-00-002015-001	04.10140334-6
	LNG Facilities Onshore Geophysical Survey Report	USAL-FG-GRZZZ-00-002015-005	04.10140334-7
	LNG Facilities Onshore Geotechnical Data Report	USAL-FG-GRZZZ-00-002015-006	04.10140334-8
	LNG Facilities Marine Geotechnical Data Report	USAL-FG-GRZZZ-90-002015-011	04.10140334-9
	LNG Facilities Geologic Hazard Report(2)	USAL-FG-GRHAZ-00-002015-002	04.10140334-10
	LNG Facilities Onshore Groundwater Monitoring Well Installation Report	USAL-FG-GRZZZ-00-002015-007	04.10140334-11
	LNG Facilities Onshore Hydrogeologic Report(3)	USAL-FG-GRZZZ-00-002015-008	04.10140334-12
	LNG Facilities Seismic Engineering Report(4)	USAL-FG-GRZZZ-00-002015-003	04.10140334-13
	LNG Facilities Onshore Integrated Site Characterization and Geotechnical Engineering Report(5)	USAL-FG-GRZZZ-00-002015-009	04.10140334-14
	LNG Facilities Marine Integrated Site Characterization and Geotechnical Engineering Report	USAL-FG-GRZZZ-90-002015-012	04.10140334-15
2016	Project Execution Plan for 2016 Onshore and Marine G&G Program	USAL-FG-GPZZZ-00-002016-001	04.10160001-1
	LNG Facilities Groundwater Quality Sampling and Testing Report – Event 1	USAL-FG-GRZZZ-00-002016-003	04.10160001-2
	LNG Facilities Groundwater Quality Sampling and Testing Report – Event 2	USAL-FG-GRZZZ-00-002016-004	04.10160001-3
	LNG Facilities Aquifer Pump Test Well and Groundwater Observation Well Installation Report	USAL-FG-GRZZZ-00-002016-002	04.10160001-4
	LNG Facilities Onshore Geotechnical Data Report	USAL-FG-GRZZZ-00-002016-001	04.10160001-5
	LNG Facilities Onshore Hydrogeologic Report(3)	USAL-FG-GRZZZ-00-002016-007	04.10160001-8

G&G Program	Report Title (Superseded Reports in Gray)	AKLNG Document Number	Fugro Report Number
2016	LNG Facilities Seismic Engineering Report[4]	USAL-FG-GRZZZ-00-002016-008	04.10160001-9
	Pipeline Marine Shallow Geotechnical Report	USAP-FG-GRZZZ-10-002016-011	04.10160001-10
	LNG Facilities Marine Survey Report	USAL-FG-GRZZZ-90-002016-010	04.10160001-11
	LNG Facilities Onshore Integrated Site Characterization and Geotechnical Engineering Report[5]	USAL-FG-GRZZZ-00-002016-009	04.10160001-12
	LNG Facilities Rigs Tenders Wharf Siltation Survey Report	USAL-FG-CRZZZ-90-002016-001	04.10160001-13

Notes: [1] Fugro Report No. 04.10140334-6 supersedes Fugro Report No. 04.10140094-6.
[2] Fugro Report No. 04.10140334-10 supersedes Fugro Report No. 04.10140094-9.
[3] Fugro Report No. 04.10160001-8 supersedes Fugro Report Nos. 04.10140094-10 and 04.10140334-12.
[4] Fugro Report No. 04.10160001-9 supersedes Fugro Report Nos. 04.10140094-11 and 04.10140334-13.
[5] Fugro Report No. 04.10160001-12 supersedes Fugro Report Nos. 04.10140094-12 and 04.10140334-14.

In 2015, Fugro Consultants Inc. (Fugro) performed Probabilistic Seismic Hazard Analyses (PSHA) to develop ground motion criteria for the planned onshore and nearshore facilities per the requirements of National Fire Protection Agency (NFPA 59A 2006) and ASCE 7-05, the results of which are presented in the PSHA report (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001). Those results were used in 2015 to conduct liquefaction potential evaluation for the onshore and the nearshore areas (Fugro Report No. 04.10140334-13, AKLNG Document No. USAL-FG-GRZZZ-00-002015-003). A screening level liquefaction hazard evaluation was conducted for the Liquefaction Facility based on the evaluation of available geotechnical data from: (1) 25 onshore borings from 2014 field investigations presented in the Geotechnical Data report (Fugro Report No. 04.10140094-8, AKLNG Document No. USAL-FG-GRZZZ-00-000003-000), (2) 62 onshore borings from 2015 field investigations presented in the Onshore Geotechnical Data report (Fugro Report No. 04.10140334-8, AKLNG Document No. USAL-FG-GRZZZ-00-002015-006), and (3) 25 nearshore borings performed during 2015 field investigations and presented in the Marine Geotechnical Data report (Fugro Report No. 04.10140334-9, AKLNG Document No. USAL-FG-GRZZZ-90-002015-011). The locations of the borings for the 2014 and 2015 field explorations are shown in Plate 4.

The 2016 field investigations included 43 additional onshore borings and 9 downhole seismic shear wave velocity logging, also shown in Plate 4, which are presented in the 2016 Onshore Geotechnical Data report (Fugro Report No. 04.10160001-5, AKLNG Document No. USAL-FG-GRZZZ-00-002016-001). The current seismic engineering report includes:

- Update on assessment of hazards associated with faults, folds, or other geologic structures within a 5-mile radius of the site (Section 2.1).
- Evaluation of the additional data for the site characterization and recommendations for additional work related to the PSHA and/or performing advanced seismic slope stability analysis (Section 2.2).
- Update the liquefaction hazard assessment (Sections 3 and 4).
- Assessment of hazards associated with tsunami sources, impacts, and wave heights (Section 5).

For the liquefaction triggering hazard assessment, results per the requirements of NFPA 59A 2006 and ASCE 7-05 are presented in the main text of the report. Additionally, liquefaction potential evaluations were also performed for the onshore and nearshore areas per the requirements of NFPA 59A 2013 and ASCE 7-10, per the request of EMALL. The results for the NFPA 59A 2013 / ASCE 7-10 evaluations are presented in Appendices B, D, and F of this report. Therefore, this report presents comprehensive liquefaction triggering hazard assessment results and supersedes all previous Seismic Engineering reports.

1.2 Work Authorization

The work was authorized under contract to ExxonMobil Alaska LNG LLC (EMALL), under work Order No. AKLNG-FUG-US-005 Rev 0, Agreement number A2275592, effective March 2, 2016.

1.3 Scope and Organization

Fugro conducted earthquake engineering studies to estimate the severity of ground motions that may affect the future onshore and nearshore structures which will be developed as a part of the LNG project and to evaluate soil liquefaction potential in the onshore and nearshore areas. Fugro's scope of work for the seismic hazard analyses included the following tasks:

- Task 1 – Reevaluation of the Seismic Hazard;
- Task 2 – Liquefaction Potential Evaluations;
- Task 3 – Tsunami Hazard Assessment; and
- Task 4 – Reporting.

This report represents the deliverable described under Task 4 and describes the work completed under Tasks 1 to 3. Results for the pseudo-static slope stability analyses for the project site are presented in the corresponding Onshore Integrated Report (Fugro Report No. 04.10160001-12, AKLNG Document No. USAL-FG-GRZZZ-00-002016-009) and the Marine Integrated Report (Fugro Report No. 04.10140334-15, AKLNG Document No. USAL-FG-GRZZZ-00-002015-012) and the two dimensional dynamic slope stability analyses are also presented in the Onshore Integrated Report (Fugro Report No. 04.10160001-12, AKLNG

Document No. USAL-FG-GRZZZ-00-002016-009). The design levels and input ground motions for these analyses and results are still valid and no update is required.

1.4 Limitations of this Study

This report has been prepared solely to assist EMALL, and the engineering team members in the design of the onshore and nearshore facilities of the project. The results herein apply to the specific locations mentioned and are not applicable to other locations.

Seismic hazard analysis and liquefaction potential evaluations are a dynamic, rapidly evolving field of earthquake engineering. It is likely that the standard of practice in the project region for these services will evolve over the next few years. In addition, new information regarding fault extent, geometry, and activity may also become available. Consequently, the results presented in this study should be reviewed if new data become available during the design of the project.

This report has been prepared for the exclusive use of EMALL, and its agents for the specific application to the proposed onshore and nearshore facilities of the LNG project in Nikiski, Alaska. In our opinion, the findings, conclusions, professional opinions, and recommendations presented herein were prepared in accordance with generally accepted current seismic hazard geotechnical engineering practice.

Although information contained in this report may be of some use for other purposes, it may not contain sufficient information for other parties or uses. If any changes are made to the project as described in this report, the conclusions and recommendations in this report shall not be considered valid unless the changes are reviewed and the conclusions and recommendations of this report are modified or validated in writing by Fugro.

1.5 Summary and Findings

1.5.1 Re-evaluation of Seismic Hazard

- New data from the 2016 field investigations support the conclusions of the 2015 reports regarding faults, folds, and other geologic structures within a 5-mile radius of the site.
- The estimated time-averaged shear wave velocities (V_{s30}) at the ground surface for the 35 onshore downhole measurements are in the range of 686 ft./s (209 m/s) to 1183 ft./s (360 m/s), with an average of approximately 938 ft./s (286 m/s). This value is similar to the average estimated V_{s30} at the ground surface (approximately 912 ft./s ; 278 m/s) for the onshore area used in the 2015 PSHA (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001).
- The results of: (a) the probabilistic seismic hazard analyses presented in the 2015 PSHA Report (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001), (b) the liquefaction potential evaluations for the onshore and nearshore

facilities in the 2015 Seismic Engineering report (Fugro Report No. 04.10140334-13, AKLNG Document No. USAL-FG-GRZZZ-00-002015-003), (c) the pseudostatic slope stability analyses in the 2015 Onshore Integrated Report (Fugro Report No. 04.10140334-14, AKLNG Document No. USAL-FG-GRZZZ-00-002015-009) and the 2015 Marine Integrated Report (Fugro Report No. 04.10140334-15, AKLNG Document No. USAL-FG-GRZZZ-00-002015-012), and (d) the two dimensional dynamic slope stability analyses for the LNG bluff area presented in the Addendum to 2015 LNG Facilities Onshore Integrated Site Characterization and Engineering Report (Alaska LNG Project - Project Addendum No.1, AKLNG Document No. USAL-FG-GRZZZ-00-002015-018) are still valid. Hence no updates are required for those analyses.

1.5.2 Assessment of Liquefaction Hazard for Onshore Area

- Liquefaction potential evaluation was conducted in accordance with the requirements of both NFPA 59A 2006 and ASCE 7-05 for the onshore area. Per NFPA 59A 2006 requirements, liquefaction triggering hazard assessment was performed for the OBE and the SSE shaking levels. OBE corresponds to a 475-year return period event. SSE requirements are the same as the MCE requirements per ASCE 7-05. Liquefaction triggering hazard assessment using the NCEER (Youd et al., 2001) and the Boulanger and Idriss (2014) empirical relationships was performed for the 130 onshore borings. Based on these evaluations, generally, continuous potentially liquefiable soil layers were not identified at the site except surficial granular soils in the top 3 feet at the beach area (borings B-117, B-120, B-121, B-122, B-123, B-124, B-125, B-126, B-127, B-190 and B-191) which are expected to liquefy for both OBE and SSE shaking levels. Especially for beach boring B-191, the extent of liquefaction is expected to reach up to 10 ft. depth. For the rest of borings, limited and localized liquefaction is estimated during the OBE and SSE shaking levels. For example, sublayers of coarse-grained soils (sand with gravel) in the depth range of approximately 20 to 25 feet were found to be potentially liquefiable in borings B-28 and B-39 (6 and 4 feet thick, respectively), for both SSE and OBE events, however these borings are located outside the locations of the planned structures. Some localized pockets of potentially liquefiable coarse-grained soils were also identified in borings B-17, B-43, B-50, B-61, B-64, B-67, B-76, B-146, B-160 and B-166. The measured SPT blowcount values in these sublayers range between approximately 14 to 37. In addition, boring B-176 which is close to the coast and located on the alternative heavy haul road area north from the project site, contains a potentially liquefiable soil layer from approximately 18 to 34 ft. depth.
- Liquefaction-induced reconsolidation settlements are estimated in the range of approximately 0 to 0.5 inches for the onshore borings during both the OBE and the SSE / MCE shaking level, with negligible estimated settlements at most locations as shown in Plates 10 and 11, respectively. The estimated settlements are in the range of 0.8 to 1.8 inches for borings B-28, B-39, B-61, and B-76. However, these borings are located outside the locations of the planned structures. The estimated settlements for boring B-176 are higher than 3 inches, but boring B-176 is located on the alternative heavy haul road area north from the project site. The estimated settlements at the beach area (borings B-117, B-

120, B-121, B-122, B-123, B-124, B-125, B-126, B-127, B-190 and B-191) are in the range of 0.6 to 1.9 inches during both the OBE and the SSE / MCE shaking. However, these values will be reduced significantly if the top 3 feet surficial granular soils at the beach area are dredged or densified.

- Liquefaction triggering hazard assessment was also performed for OBE and SSE shaking levels per NFPA 59A 2013 requirements. OBE requirements are the same as the NFPA 59A 2006 requirements. SSE requirements are the same as ASCE 7-10 MCE_G requirements. SPT-based liquefaction results for SSE / MCE_G event for coarse-grained soil are presented in Appendix B. Results are similar to the SSE / MCE event per NFPA 59A 2006 specified above.
- Additionally, liquefaction potential evaluations were performed for the onshore area for the proposed elevations at each onshore boring as presented on Table 3.2. These analyses assume the same $(N_1)_{60}$ blowcounts (SPT blowcounts corrected to energy ratio of 60% and an effective overburden stress of 1 atm) as the existing elevation conditions and that the additional fill required to reach the proposed elevations is unlikely to liquefy. The liquefaction evaluation results obtained for the existing and proposed site-grade elevations are similar.
- A screening assessment of the liquefaction susceptibility of fine-grained soils for the onshore borings was performed based on the procedures of Bray and Sancio (2006). Results showed that some sublayers classified as sandy silts (ML) and lean clays (CL) might be susceptible to liquefaction. However, these layers are thin and discontinuous and hence, soil liquefaction will likely be localized and discontinuous if it occurs.

1.5.3 Assessment of Liquefaction Hazard for Nearshore Area

- Liquefaction potential evaluation was conducted in accordance with the requirements of both NFPA 59A 2006 and ASCE 7-05 for the nearshore area. Per NFPA 59A 2006 requirements, liquefaction hazard assessment was performed for OBE and SSE shaking levels. OBE corresponds to a 475-year return period event. SSE requirements are the same as the MCE requirements per ASCE 7-05. Liquefaction triggering hazard assessment using the NCEER (Youd et al., 2001) and the Boulanger and Idriss (2014) empirical relationships was performed for the 25 nearshore borings. Based on these evaluations, in general, potentially liquefiable soil layers are encountered at approximately the top 2 to 10 ft. in the nearshore area. Limited and localized liquefaction is estimated during the OBE and SSE shaking levels in the depth range of approximately 10 to 50 feet in borings MB-08, MB-09, MB-12, MB-26, and MB-31. The expected dredging at the top part of borings MB-03, MB-05, MB-08, MB-09 and MB-28 up to an elevation of approximately -30 ft. (MLLW) will remove some potentially liquefiable near-surface soils from borings MB-03 and MB-28.
- Liquefaction-induced reconsolidation settlements are estimated in the range of approximately 0 to 0.5 inches for both the OBE and the SSE / MCE shaking level for most nearshore borings. The estimated settlements are estimated in the range of 0.5 and 1.0 inches for borings MB-02, MB-14, MB-16, MB-17, MB-19, MB-20 and MB-21. Typically, higher (> 1 inch) settlements were estimated for borings MB-04, MB-12, and MB-28. Within the proposed construction area, settlements are generally less than 0.5 inch.

- A liquefaction hazard assessment was also performed for OBE and SSE shaking levels per NFPA 59A 2013 requirements. OBE requirements are the same as the NFPA 59A 2006 requirements. SSE requirements are the same as ASCE 7-10 MCE_G requirements. SPT-based liquefaction results for SSE / MCE_G event for coarse-grained soil are presented in Appendix F. Results are similar to the SSE / MCE event per NFPA 59A 2006 specified above.
- A screening assessment of the liquefaction susceptibility of fine-grained soils for the nearshore borings was performed based on the procedures of Bray and Sancio (2006). Results showed that some sublayers classified as sandy silts (ML) and lean clays (CL) might be susceptible to liquefaction. However, these layers are thin and discontinuous and hence, soil liquefaction will likely be localized and discontinuous if it occurs.

1.5.4 Assessment of Tsunami Hazard

- Tsunami modeling conducted in 2015 demonstrated that the most significant potential source of tsunami at the site is a submarine landslide within the Cook Inlet (Appendix G and 2015 Geologic Hazard report, Fugro Report No. 04.10140334-9, AKLNG Document No. USAL- FG-GRHAZ-00-002015-002). Initial modeling predicted unacceptably high wave crests relative to the proposed marine LNG facilities.
- The 2016 tsunami hazard assessment included new tsunami modeling of the previously modeled submarine landslide scenario to account for the effects of tidal currents in the Cook Inlet and to better estimate important parameters such as ambient tide level, landslide mass density, and rheology.
- The results of the simulations show that the inclusion of tidal currents in the model have little effect on the modeled wave height.
- Adjustments in landslide mass density and rheology together have a significant effect on the wave heights at the site. The new model adjusts the mass density from 1800 to 1600 kg/m^3, and uses a mixture rheology to more appropriately model the viscosity of the landslide mass.
- The resulting peak wave crest height is reduced by 3 to 6 feet (9 to 15 percent) at the seven observation sites relative to the 2015 model. The peak crest elevation at the loading platform (28.9 ft. MLLW) is below the bottom of the pile cap (42 ft. MLLW).
- The results of this study constitute a deterministic evaluation. Further analysis may be conducted in the next engineering phase to refine predicted run-up elevations.

2.0 RE-EVALUATION OF SEISMIC HAZARD

2.1 Introduction

In 2014, Fugro had performed PSHA (Fugro Report No. 04.10140094-6, AKLNG Document No. USAL-FG-GRHAZ-00-000001-000) using a V_{s30} of 900 ft./s (275 m/s) to develop ground motions at the ground surface for the onshore areas, per the requirements of NFPA 59A 2006 / ASCE 7-05 and NFPA 59A 2013 / ASCE 7-10.

Additional geotechnical explorations and geophysical investigation were performed at the location of the onshore and nearshore facilities for 2015 (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001). In addition, the seismotectonic model used in the 2014 PSHA was refined based primarily on additional geophysical data collected and industry data reviewed in 2015. Based on the review of data obtained from the 2015 geophysical investigation and other available data sources, the refined site-specific seismotectonic model included an updated characterization of local faults within a 5-mile radius of project facilities. Therefore, the 2015 report presents updated design ground motion criteria and supersedes all previous ground motion evaluation reports. PSHA was conducted using a time-weighted average shear velocity in the upper 30 meters (V_{s30}) of 885 ft./s (270 m/s) to develop ground motions at the ground surface in the onshore and nearshore locations per NFPA 59A 2006 / ASCE 7-05 and NFPA 59A 2013 / ASCE 7-10.

During the 2016 field explorations, additional data were collected and are used herein to evaluate if the 2015 PSHA needs to be updated.

2.2 Faults, Folds, or Other Geologic Structures Within a 5-mile Radius of the Site

A comprehensive evaluation of seismic sources within the 5-mile site radius, including faults, folds and other geologic structures, was conducted for the 2015 onshore and marine geotechnical and geophysical investigation program. The evaluation was based on available information, and data collected during the 2014 and 2015 field programs. Key information for the evaluation of geologic structure and seismic sources included project-collected onshore and marine seismic reflection data, existing industry seismic reflection data, field geologic mapping, topographic and lineament analysis, shallow geophysical surveys, and interpretation of borehole stratigraphy. The results of the evaluation are incorporated into the seismic source model documented in the PSHA (Fugro Report No. 04.10140094-6, AKLNG Document No. USAL-FG-GRHAZ-00-000001-000).

New data from the 2016 field investigations support the conclusions of the 2015 reports regarding faults, folds, and other geologic structures. Relevant 2016 data include 43 additional onshore geotechnical boreholes, 4 groundwater observation wells, 3 aquifer pump test wells, and groundwater monitoring data (Plate 3). These data do not require changes to the seismic

source model, as they penetrate the Pleistocene glacial deposits only, and do not provide new insights into the geometry of the underlying Tertiary strata which were shown by the 2015 seismic reflection data to be planar, continuous, and unfaulted.

The 2016 borehole data add detail to the stratigraphic understanding of the late Pleistocene glacial sediments. They confirm the conclusion that the boundary between the overlying Killey glacial outwash sediments and the underlying Moosehorn subestuarine deposits is transitional and marked by one to several clay beds in a zone up to 10 feet thick. They also support the conclusion that the top of the Moosehorn deposits may locally exhibit non-tectonic erosion and deformation due to glacial and fluvial processes.

Section 2.2.1 below summarizes the seismic source model as presented in the 2015 report, and evaluates it against any new information.

2.2.1 Seismic Source Model Evaluation

Fugro developed a seismic source model (SSM) for use in a probabilistic seismic hazard analysis (PSHA) for Pre-FEED investigations at the Alaska LNG facilities located in Nikiski, Alaska. Results of the SSM were presented in the PSHA report (Fugro Report No. 04.10140094-6, AKLNG Document No. USAL-FG-GRHAZ-00-000001-000). The SSM considered all potential sources of strong ground motion within a 200-kilometer radius (124 miles) of the site, and included a review of known faults and historical seismicity (Plate 5).

The model identified four seismotectonic elements:

- A subduction zone or slab interface (i.e., the Aleutian Megathrust) between the Pacific Plate and overriding crustal blocks;
- Intraslab mechanisms within the subducting Pacific Plate;
- Shallow crustal faults embedded within the Upper Cook Inlet Basin and adjacent mountain ranges; and
- Upper crustal shallow seismicity that overlies the down-going Pacific Plate.

Information used to develop the SSM included public-domain, peer-reviewed scientific literature, geospatial data and historical seismicity records for southeast Alaska. In addition, Fugro evaluated industry's deep (depths greater than 10,000 feet) 2D seismic reflection profiles and project-acquired seismic reflection data within an approximately 1,280-km^2 (500-mi^2) area centered over the site (Plates 6 and 7). These geophysical data were used to constrain the subsurface location, geometry and structural style of blind faults within the Upper Cook Inlet region (Plate 6), and to identify areas where near-surface tectonic deformation is absent within 5 miles of the site (Plate 8).

Based on review of the data from the 2016 field exploration program, there is no justification to modify or discard any of the results or conclusions of the SSM. First, the newly-acquired data do not show positive evidence for new seismogenic faults, folds, or other structures within a 5-mile radius of the site. Second, the 2016 subsurface drilling and sampling activities were restricted to near-surface Pleistocene deposits. Thus, these data do not provide additional information on the underlying Tertiary strata, whose geometry formed the basis for the site structural model used in the SSM.

2.3 Site Characterization and Input Shear Wave Velocity for PSHA

In 2015 PSHA report (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001), subsurface conditions at the project site were characterized by means of: (1) 8 onshore borings from the 2014 field investigations which included downhole seismic shear wave velocity logging and presented in the Geotechnical Data report (Fugro Report No. 04.10140094-8, AKLNG Document No. USAL-FG-GRZZZ-00-000003-000), (2) 18 onshore borings from the 2015 field investigations which included downhole seismic shear wave velocity logging and presented in the Onshore Geotechnical Data report (Fugro Report No. 04.10140334-8, AKLNG Document No. USAL-FG-GRZZZ-00-002015-006), (3) 9 nearshore borings from the 2015 field investigations which included downhole seismic shear wave velocity logging and presented in the Marine Geotechnical Data report (Fugro Report No. 04.10140334-9, AKLNG Document No. USAL-FG-GRZZZ-90-002015-011), and (4) Interferometric Multichannel Analysis of Surface Waves (IMASW) data presented in the Onshore Geophysical Survey Report (Fugro Report No. 04.10140334-7, AKLNG Document No. USAL-FG-GRZZZ-00-002015-005).

Downhole seismic shear wave velocity logging results are re-evaluated herein to include the 9 onshore borings from the 2016 field investigations which included downhole seismic shear wave velocity logging and presented in the Onshore Geotechnical Data report (Fugro Report No. 04.10160001-5, AKLNG Document No. USAL-FG-GRZZZ-00-002016-001). Based on the available data (field logs and boring logs of 130 onshore and 25 nearshore borings performed at the project site), the subsurface conditions generally consist of sandy gravel to gravelly sand in the top approximately 25 ft. depth, underlain by poorly graded sand to a depth of approximately 65 ft. Interlayered sandy/clayey deposits were typically found at deeper depths (>65 ft.). A detailed description of subsurface conditions in the onshore areas is provided in the 2016 Onshore Geotechnical Data report (Fugro Report No. 04.10160001-5, AKLNG Document No. USAL-FG-GRZZZ-00-002016-001) and the 2015 Marine Geotechnical Data Report (Fugro Report No. 04.10140334-9, AKLNG Document No. USAL-FG-GRZZZ-90-002015-011) for the project. Plate 9 presents a summary of measured shear wave velocity data obtained from the 35 downhole seismic shear wave velocity tests in the onshore project area and the 9 downhole seismic shear wave velocity tests in the nearshore project area. Estimated time-averaged shear wave velocities (V_{s30}) at the ground surface, for the 35 onshore downhole measurements are in the range of 686 ft./s (209 m/s) to 1183 ft./s (360 m/s), with an average of approximately 938

ft./s (286 m/s). It is noted that all 9 downhole measurements from the 2016 field explorations are within range of the measurements from the 2014 and the 2015 field explorations. For comparison purposes, the average estimated V_{s30} at the ground surface for the onshore area from the 2015 PSHA (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001) was approximately 912 ft./s (278 m/s). Similarly, for the 9 nearshore downhole measurements, the estimated time-averaged shear wave velocities (V_{s30}), at the ground surface are in the range of 817 ft./s (249 m/s) to 941 ft./s (287 m/s), with an average of approximately 875 ft./s (267 m/s). No new nearshore borings were performed during the 2016 field explorations.

2.4 Summary

Based on the 2016 evaluation of the faults within the 5-mile radius of the site and the site classification mentioned above, the results of the probabilistic seismic hazard analyses presented in the 2015 PSHA Report (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001) for the onshore as well as nearshore area with a time-weighted average shear wave velocity of 885 ft./s (270 m/s) in the top 100 feet (30 m) below the ground surface are still valid. Hence, no update is required for the previous PSHA.

3.0 ASSESSMENT OF LIQUEFACTION HAZARD FOR ONSHORE AREA

3.1 Introduction

Liquefaction is a dramatic loss of strength that can occur in saturated coarse-grained soils during seismic shaking and results from increased pore-water pressure and reduced effective stress. The primary susceptible soil type is clean sands, although recent studies (e.g., Bray and Sancio, 2006) have also shown liquefaction can occur in fine-grained soils such as low-plasticity silts. The consequences of soil liquefaction can be severe and may result in significant damage to structures. Liquefaction-induced effects include ground settlement and differential settlement of structures, slope failure and lateral spreading, loss of foundation bearing capacity, loss of lateral support on deep foundations, drag loads and down-drag on deep foundations, kinematically-induced demands and uplift of light initially buried structures.

The susceptibility of a saturated granular soil to liquefaction is a function of the gradation, density, aging/cementation, and fines content of the soil. The resistance to liquefaction increases with respective increases in: a) distribution of grain size, b) soil density, c) aging/cementation, d) fines content, and e) plasticity characteristics of the fines.

This section presents a summary of the procedures adopted and the results from the liquefaction potential evaluation for the onshore area from the 2014, 2015 and 2016 field explorations based on the design levels presented in the PSHA (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001).

3.2 Liquefaction Hazard Assessment for Coarse-Grained Soils

The 130 onshore borings (Plate 4) encountered soils classified as primarily coarse-grained materials (e.g. sands with silt and gravel [SW-SM]) that are potentially vulnerable to liquefaction. A liquefaction triggering hazard assessment was conducted based on the SPT-based procedures proposed by NCEER (Youd et al., 2001) and Boulanger and Idriss (2014).

The liquefaction analyses presented herein are based on:

- Cyclic stress ratio (CSR) evaluated from the earthquake parameters based on ground motion evaluations presented in the Probabilistic Seismic Hazard Analysis Report (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001), and
- Cyclic resistance of the soil layers evaluated from standard penetration test data (SPT) available from the onshore explorations.

The Peak Ground Acceleration (PGA) and earthquake magnitude are used to estimate the seismically induced demand or cyclic stress ratio (CSR), and the SPT data are used to evaluate the liquefaction resistance or cyclic resistance ratio (CRR) in the soil layers. The factor of safety

(FOS) against liquefaction is then calculated as the ratio of the CRR to the CSR (FOS = CRR/CSR).

The liquefaction triggering hazard evaluation was conducted in accordance with the requirements of NFPA 59A 2006 and ASCE 7-05 codes. NFPA 59A 2006 requires ground motions to be developed for Operation Basis Event (OBE) and Safe Shutdown Event (SSE). OBE corresponds to 475-year return period. SSE requirements are the same as ASCE 7-05 Maximum Considered Earthquake (MCE) requirements. The majority of the hazard based on the deaggregation from the Probabilistic Seismic Hazard Analysis Report (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001) derives from the intraslab earthquakes for both the OBE and the SSE / MCE events. Earthquake magnitude M_w 8.0 was considered for both OBE and the SSE / MCE events per NFPA 59A 2006. The Peak Ground Acceleration (PGA) estimated at the ground surface from the PSHA is 0.53 g and 0.90 g for OBE and SSE/MCE events, respectively (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001). These PGA values were used for the liquefaction evaluations (Table 3.1).

Table 3.1: Earthquake Scenarios for Liquefaction Evaluation Analyses of the Onshore Area

EQ Event	PGA (g)	Magnitude
OBE	0.53	8.0
SSE / MCE	0.90	8.0

3.2.1 Evaluation of Seismically Induced Cyclic Demand

In liquefaction triggering evaluations, the seismic demand is expressed by means of the earthquake induced cyclic stress ratio (CSR)

$$CSR = 0.65 \cdot \frac{\sigma_{vo}}{\sigma'_{vo}} \cdot \frac{a_{\max}}{g} \cdot r_d \qquad (3\text{-}1)$$

where: σ_{vo} and σ'_{vo} are the vertical total and effective stress, respectively; a_{max} is the peak ground acceleration; and r_d is a depth varying acceleration reduction factor.

The magnitude of the seismically induced shear stresses was estimated according to NCEER (Youd et al., 2001) and Boulanger and Idriss (2014) procedures through the estimation of the Cyclic Stress Ratio (CSR) using the equations proposed by each method for the estimation of the stress reduction coefficient, r_d.

The estimated earthquake and depth-specific CSR is converted to a reference magnitude of 7.5 and effective vertical effective stress of 1 atm by means of the magnitude scaling factor (MSF) and overburden correction factor (K_σ) as shown in the following equation.

$$CSR_{M=7.5,\sigma'=1atm} = CSR \cdot \frac{1}{MSF} \cdot \frac{1}{K_\sigma} \quad (3\text{-}2)$$

For example, if the controlling magnitude event is greater than the reference magnitude of 7.5, a MSF less than 1 is applied to increase the equivalent cyclic stress ratio due to the higher number of cycles imparted by the larger magnitude event. As tabulated in Table 3.1, a controlling magnitude of 8.0 was used in the liquefaction potential evaluation.

Magnitude scaling factors (MSF) were estimated using the two procedures. The calculated CSR values were multiplied by the appropriate magnitude weighting factor to obtain equivalent CSR for a reference magnitude 7.5 earthquake ($CSR_{7.5}$). Magnitude 7.5 earthquakes are estimated to produce about 15 equivalent cycles of uniform loading.

3.2.2 Cyclic Resistance to Liquefaction from SPT Data

The evaluation of the liquefaction resistance of cohesionless layers from SPT data from the borings was based on the empirical procedures recommended by NCEER (Youd et al., 2001) and Boulanger and Idriss (2014). Correction factors proposed by the two methods were applied on the SPT N values measured in the field to derive the N_{60} values. The N_{60} values were corrected for overburden [$(N_1)_{60}$] and for fines content using the procedures outlined in the two methods. The laboratory fine content test data from borings presented in the 2014, 2015 and 2016 Onshore Geotechnical Data reports were used in the evaluations.

3.2.3 Ground Water Levels

The ground water levels change within the onshore development area. Ground water level readings from 2014, 2015 and 2016 field investigations and monitoring wells presented in the Onshore Hydrogeologic reports were used to develop ground water level contours for the onshore development area. For conservatism, liquefaction potential evaluations were conducted using idealized ground water contours generally developed from the 2015 and 2016 Onshore Hydrogeologic reports taking into consideration an additional 4ft for the seasonal fluctuation. Table 3.2 shows the existing site-grade elevation at each boring location per NAVD88 and the assumed groundwater depth for each onshore boring used for liquefaction potential evaluation. Table 3.2 also shows the proposed site-grade elevation at each boring location provided in Plates 16 and 17 of the 2015 Onshore Integrated Site Characterization and Geotechnical Engineering report (Fugro Report No. 04.10140334-14, AKLNG Document No. USAL-FG-GRZZZ-00-002015-009) and the assumed groundwater depth for the proposed site-grade elevation.

Table 3.2: Assumed Groundwater Depth per Boring for the Liquefaction Evaluations

Boring	Existing Site-grade Elevation (ft., NAVD88)	Assumed Depth to Groundwater Table for Existing Site-grade Elevation (ft., NAVD88)	Proposed Site-grade Elevation[1] per Boring (ft., NAVD88)	Assumed Depth to Groundwater Table for Proposed Site-grade Elevation (ft., NAVD88)
B-9	132.25	43	130.97	42
B-10	132.80	37	129.94	34
B-11	136.36	37	136.74	38
B-14	133.40	37	122.00	26
B-15	122.96	63	122.06	62
B-17	131.21	42	122.00	33
B-18	131.25	32	131.83	33
B-23	124.63	81	124.00	80
B-24	120.40	61	124.00	65
B-26	125.54	37	122.00	33
B-27	124.35	28	122.00	26
B-28	118.89	17	118.66	17
B-32	122.99	33	116.00	26
B-34	111.83	28	116.00	32
B-36	111.70	41	116.00	45
B-37	106.27	17	116.00	27
B-38	123.47	24	123.45	24
B-39	95.51	20	116.00	40
B-40	120.84	27	114.19	20
B-42	118.85	30	109.31	20
B-43	121.14	17	121.49	17
B-45	109.09	40	116.00	47
B-47	119.73	71	124.00	75
B-49	127.76	49	128.12	49
B-50	131.66	43	132.04	43
B-60	135.49	41	135.51	42
B-61	137.69	42	137.27	41
B-62	127.33	58	125.70	57
B-64	133.91	40	133.48	39
B-66	127.44	63	127.42	63
B-67	124.49	55	126.78	58
B-68	122.52	69	95.02	41
B-69	123.86	65	105.36	46
B-71	116.20	42	124.00	50
B-72	135.28	36	134.75	36
B-73	121.78	68	71.98	18

Boring	Existing Site-grade Elevation (ft., NAVD88)	Assumed Depth to Groundwater Table for Existing Site-grade Elevation (ft., NAVD88)	Proposed Site-grade Elevation[1] per Boring (ft., NAVD88)	Assumed Depth to Groundwater Table for Proposed Site-grade Elevation (ft., NAVD88)
B-74	111.80	38	125.00	51
B-75	130.05	48	122.00	40
B-76	130.47	27	130.22	27
B-77	116.01	62	34.51	0
B-78	118.09	59	126.19	67
B-79	123.61	50	125.00	51
B-80	130.85	42	122.00	33
B-81	128.79	30	122.00	23
B-82	118.68	15	118.80	15
B-83	125.40	61	124.00	60
B-84	126.69	48	125.00	46
B-85	119.50	71	124.00	75
B-86	124.85	56	124.00	55
B-87	107.12	23	125.00	41
B-88	93.98	5	125.00	36
B-89	126.64	33	116.00	22
B-90	110.48	36	125.00	51
B-91	117.20	63	124.00	70
B-92	118.03	56	124.00	62
B-93	118.69	37	116.00	34
B-94	127.39	23	126.80	23
B-95	96.73	28	116.00	47
B-96	97.65	14	116.00	32
B-97	109.47	60	116.00	67
B-98	122.67	54	116.00	47
B-99	123.82	27	114.08	17
B-101	94.98	11	116.00	32
B-102	97.95	24	116.00	42
B-104	95.22	11	116.00	32
B-105	95.40	11	115.04	31
B-107	96.91	23	97.08	23
B-110	117.07	43	117.06	43
B-112	116.41	57	115.45	56
B-113	112.53	39	112.40	38
B-114	114.99	61	114.99	61
B-117	14.92	0	16.58	0
B-120	15.41	0	18.02	0

Boring	Existing Site-grade Elevation (ft., NAVD88)	Assumed Depth to Groundwater Table for Existing Site-grade Elevation (ft., NAVD88)	Proposed Site-grade Elevation[1] per Boring (ft., NAVD88)	Assumed Depth to Groundwater Table for Proposed Site-grade Elevation (ft., NAVD88)
B-121	16.43	0	42.03	0
B-122	16.53	0	23.50	0
B-123	15.78	0	23.83	0
B-124	13.68	0	28.86	0
B-125	14.43	0	27.26	0
B-126	14.43	0	21.43	0
B-127	14.66	0	20.41	0
B-131	133.25	39	133.52	40
B-132	122.74	59	124.00	60
B-133	125.63	57	125.66	57
B-135	112.66	59	112.66	59
B-136	15.95	12	15.95	12
B-137	116.64	63	117.79	64
B-138	103.33	16	116.00	29
B-146	111.74	46	125.00	59
B-147	119.69	57	125.00	62
B-148	122.26	57	125.00	60
B-149	126.30	58	125.00	57
B-150	110.97	45	125.00	59
B-151	125.85	52	125.00	51
B-152	125.79	49	125.00	48
B-153	126.81	52	125.00	50
B-154	127.46	49	125.00	47
B-155	126.76	49	125.00	47
B-156	124.84	49	125.00	49
B-157	124.51	45	125.00	45
B-158	120.63	44	125.00	48
B-159	118.84	39	125.00	45
B-160	115.35	36	125.00	46
B-161	105.03	28	125.00	48
B-162	111.45	35	125.00	48
B-163	104.85	24	125.00	44
B-164	105.43	26	125.00	46
B-165	103.54	42	125.00	63
B-166	100.68	29	125.00	54
B-167	111.91	51	116.00	55
B-168	118.89	49	116.00	46

Boring	Existing Site-grade Elevation (ft., NAVD88)	Assumed Depth to Groundwater Table for Existing Site-grade Elevation (ft., NAVD88)	Proposed Site-grade Elevation[1] per Boring (ft., NAVD88)	Assumed Depth to Groundwater Table for Proposed Site-grade Elevation (ft., NAVD88)
B-169	122.82	58	116.00	51
B-170	123.01	48	116.00	41
B-171	116.53	38	116.00	38
B-172	119.91	35	116.00	31
B-173	121.02	37	116.00	32
B-176	27.14	20	27.14	20
B-177	29.39	20	29.39	20
B-178	34.20	20	34.20	20
B-179	43.66	30	43.66	30
B-180	77.76	40	77.76	40
B-181	87.19	40	87.19	40
B-182	85.60	40	85.60	40
B-183	98.76	40	98.76	40
B-189	119.97	60	116.00	56
B-190	20.56	2	19.00	0
B-191	20.50	0	27.00	0
B-192	123.19	63	125.00	65
B-195	119.97	54	125.00	60
B-197	122.74	59	125.00	61
B-198	117.99	50	125.00	57

[1] Proposed elevations based on Plates 16 and 17 of the 2015 Onshore Integrated Site Characterization and Geotechnical Engineering report (Fugro Report No. 04.10140334-14, AKLNG Document No. USAL-FG-GRZZZ-00-002015-009)

3.2.4 Liquefaction Triggering Hazard Assessment

Appendix A presents the liquefaction triggering hazard assessment results based on the SPT-based procedures proposed by NCEER (Youd et. al., 2001) and Boulanger and Idriss (2014) for the onshore borings and the existing elevations for the OBE and the SSE / MCE events per NFPA 59A 2006. Results are presented for the shallowest 80 ft. of each exploration and the safety factor is provided for the cases where it is less than two. Results are not shown for depths greater than 80 feet given the limitations of the simplified, empirical methods, which are calibrated to case history data that are, in general, available down to about 50-ft depth. In addition, the uncertainty of the shear stress reduction coefficient with depth r_d increases for depths higher than approximately 70 ft. Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata. Per the driller's log in the 2015 Onshore Geotechnical Data report (Fugro Report No. 04.10140334-8, AKLNG Document No. USAL-FG-GRZZZ-00-002015-006), the blow counts from sample S-15 of boring B-88 and S-23 of boring B-122 were removed as unreliable. Table 3.3 summarizes the depths of

potentially liquefiable soil for the onshore borings and the existing elevations based on the results of the liquefaction triggering hazard assessment conducted using the SPT-based procedures proposed by NCEER (Youd et. al. 2001) and Boulanger and Idriss (2014).

Table 3.3: SPT-based Liquefaction Triggering Hazard Assessment According to NCEER (Youd et al. 2001) and Boulanger and Idriss (2014): Depths of Potentially Liquefiable Localized Soil Pockets for the Onshore Borings and the Existing Elevations for Both OBE and SSE / MCE Levels per NFPA 59A 2006

EQ Event	Boring	Depth (ft.)	Elevation (ft., NAVD88)	Measured SPT-N
OBE and SSE / MCE	B-17	56.5	74.7	36
	B-28	17.0	101.9	24
		20.0	98.9	17
		22.0	96.9	14
	B-39	20.0	75.5	24
		22.0	73.5	27
		46.5	49.0	26
	B-43	19.5	101.6	22
	B-50	59.0	72.7	34
		61.5	70.2	37
	B-61	59.0	78.7	28
	B-64	59.0	74.9	34
	B-67	59.0	65.5	31
	B-76	49.0	81.5	24
	B-117	1.0	13.9	6
	B-120	1.0	14.4	4
	B-121	1.0	15.4	4
		2.0	14.4	11
	B-122	1.0	15.5	3
	B-123	1.0	14.8	7
		2.0	13.8	18
	B-124	1.0	12.7	7
	B-125	1.0	13.4	5
		2.0	12.4	7
	B-126	1.0	13.4	9
		2.0	12.4	9
	B-127	1.0	13.7	3
		2.0	12.7	18
	B-146	49.5	62.2	34
	B-160	49.5	65.9	32
	B-166	44.5	56.2	30

EQ Event	Boring	Depth (ft.)	Elevation (ft., NAVD88)	Measured SPT-N
OBE and SSE / MCE	B-172	64.5	55.4	33
	B-176	20.5	6.6	6
		24.5	2.6	3
		29.5	-2.4	7
	B-190	1.0	19.6	6
		2.5	18.1	9
	B-191	1.0	19.5	7
		2.5	18.0	21
		4.5	16.0	20
		7.0	13.5	12
		9.5	11.0	17

As presented in Table 3.3, in general, continuous potentially liquefiable soil layers were not identified at the site except for the top 3 feet of surficial granular soils at the beach area (borings B-117, B-120, B-121, B-122, B-123, B-124, B-125, B-126, B-127, B-190 and B-191) which are expected to liquefy for both OBE and SSE shaking levels. For beach boring B-191, the extent of liquefaction is expected to reach 10 ft. depth. For the rest of the borings, limited and localized liquefaction is estimated during the OBE and SSE shaking levels. For example, sublayers of coarse-grained soils (sand with gravel) in the depth range of approximately 20 to 25 feet were found to be potentially liquefiable in borings B-28 and B-39 (6 and 4 feet thick, respectively), for both SSE and OBE events, however these borings are located outside the area of the planned structures. Some localized pockets of potentially liquefiable coarse-grained soils were also identified in borings B-17, B-43, B-50, B-61, B-64, B-67, B-76, B-146, B-160 and B-166. The measured SPT blow count values in these sublayers range between approximately 14 to 37. Also, boring B-176, which is close to the coast and located on the alternative heavy haul road area north from the project site, contains a potentially liquefiable soil layer from approximately 18 to 34 ft. depth.

Additionally, liquefaction triggering hazard assessment was also performed for the onshore area for OBE and SSE shaking levels per the requirements of NFPA 59A 2013 and ASCE 7-10, per the request of EMALL. SPT-based liquefaction potential results per NFPA 59A 2013 and ASCE 7-10 are presented in Appendix B. Results per NFPA 59A 2013 requirements are similar to those per NFPA 59A 2006 requirements.

Similarly, liquefaction triggering hazard assessment was also performed for the onshore area for the proposed elevations (i.e., Plates 16 and 17 of the 2015 Onshore Integrated Site Characterization and Geotechnical Engineering report, Fugro Report No. 04.10140334-14, AKLNG Document No. USAL-FG-GRZZZ-00-002015-009) at each onshore boring as presented on Table 3.2. These analyses assume the same $(N_1)_{60}$ blow counts (SPT blow counts corrected to energy ratio of 60% and an effective overburden stress of 1 atm) as the existing elevation

conditions and that the additional fill required to reach the proposed elevations is unlikely to liquefy. SPT-based liquefaction triggering hazard assessment results per NFPA 59A 2006 and ASCE 7-05 for the proposed site-grade elevations at each boring are presented in Appendix C. Table 3.4 summarizes the depths of potentially liquefiable soil for the onshore borings using the proposed site-grade elevations based on the results of the liquefaction triggering hazard. As shown in Tables 3.3 and 3.4, the liquefaction triggering hazard assessment results obtained using the existing and proposed site-grade elevations are similar. Similar results for the onshore borings at the proposed elevation per NFPA 59A 2013 and ASCE 7-10 are presented in Appendix D.

Table 3.4: SPT-based Liquefaction Triggering Hazard Assessment According to NCEER (Youd et al., 2001) and Boulanger and Idriss (2014): Depths of Potentially Liquefiable Localized Soil Pockets for the Onshore Borings and the Proposed Elevations for Both OBE and SSE / MCE Levels per NFPA 59A 2006

EQ Event	Boring	Depth (ft.)	Elevation (ft., NAVD88)	Measured SPT-N
OBE and SSE / MCE	B-17	47.3	74.7	36
	B-28	16.8	101.9	24
		19.8	98.9	17
		21.8	96.9	14
	B-39	40.5	75.5	24
		42.5	73.5	27
		67.0	49.0	26
	B-43	19.9	101.6	22
	B-50	59.4	72.7	34
		61.9	70.2	37
	B-61	58.6	78.7	28
	B-64	58.6	74.9	34
	B-67	61.3	65.5	31
	B-76	48.8	81.5	24
	B-117	2.7	13.9	6
	B-120	3.6	14.4	4
	B-121	26.6	15.4	4
		27.6	14.4	11
	B-122	8.0	15.5	3
	B-123	9.1	14.8	7
		10.1	13.8	18
	B-124	16.2	12.7	7
	B-125	13.8	13.4	5
		14.8	12.4	7
	B-126	8.0	13.4	9

EQ Event	Boring	Depth (ft.)	Elevation (ft., NAVD88)	Measured SPT-N
OBE and SSE / MCE		9.0	12.4	9
	B-127	6.7	13.7	3
		7.8	12.7	18
	B-146	62.8	62.2	34
	B-160	59.2	65.9	32
	B-166	66.4	56.2	30
	B-172	60.6	55.4	33
	B-176	20.5	6.6	6
		24.5	2.6	3
		29.5	-2.4	7
	B-190	0.9	18.1	9
	B-191	7.5	19.5	7
		9.0	18.0	21
		11.0	16.0	20
		13.5	13.5	12
		16.0	11.0	17

3.2.5 Evaluation of Liquefaction-Induced Reconsolidation Settlements

The consequences of one-dimensional post-liquefaction reconsolidation settlement depend on the spatial distribution of liquefied zones and the type of structure being evaluated. For pile foundations, the settling ground might induce significant down-drag loads on the piles, which is an aspect that should be considered in designing piles for use in areas of liquefaction. For spread footings, the discontinuous pockets of liquefied sand beneath a building on spread footings could cause an erratic pattern of ground surface settlement (Idriss and Boulanger, 2008). The worst scenario in this case is the occurrence of a liquefied pocket immediately below one spread footing that subsequently settles significantly while an adjacent spread footing hardly settles at all. Such a scenario produces the worst estimate of differential settlement for the spread footings of the structure, which is what mostly affects the performance of the structure, and the potential for such settlement must be considered in design. The consequences of one-dimensional settlement may, however, be largely mitigated by the presence of a thick non-liquefied layer above the liquefied soils (Ishihara, 1985). A thick non-liquefied layer between the footings of the building and the liquefied stratum may act as a bridging layer that arches or redistributes stresses and therefore results in more uniform ground surface settlement. In this manner, a well-constructed building on shallow foundations may settle slightly but not suffer any damage, because the differential settlement is small.

Estimates of post-liquefaction reconsolidation settlements are computed using the procedure suggested by Ishihara and Yoshimine (1992) and described in Idriss and Boulanger (2008). Plates 10 and 11 present the liquefaction-induced reconsolidation settlements for OBE and SSE

shaking levels per NFPA 59A 2006 and ASCE 7-05. Liquefaction-induced reconsolidation settlements are in the range of approximately 0 to 0.5 inches during both the OBE and the SSE / MCE shaking level, with negligible estimated settlements at most locations. The estimated settlements are in the range of 0.8 to 1.8 inches for borings B-28, B-39, B-61, and B-76. However, these borings are located outside the locations of the planned structures. The estimated settlements for boring B-176 are higher than 3 inches, but boring B-176 is located on the alternative heavy haul road area north of the project site. The estimated settlements at the beach area (borings B-117, B-120, B-121, B-122, B-123, B-124, B-125, B-126, B-127, B-190 and B-191) are in the range of 0.6 to 1.9 inches during both the OBE and the SSE / MCE shaking. However, these values will be reduced significantly if the top 3 feet of surficial granular soils at the beach area are dredged or densified. Similar results per NFPA 59A 2013 and ASCE 7-10 are presented in Appendix B (Plate B.261). The estimated settlements (apart from boring B-176) are below the 3-inch threshold, after which FERC (2007) requires that either structures are supported on piles or ground improvement is performed to mitigate the liquefaction hazard. In the onshore area explored away from the beach, and due to the generally discontinuous liquefaction hazard encountered, lateral spreading hazard is not expected to occur.

Additionally, estimates of post-liquefaction reconsolidation settlements for the onshore borings at the proposed elevations for OBE and SSE shaking levels per NFPA 59A 2006 and ASCE 7-05 are presented on Plates 12 and 13. In general, the liquefaction-induced reconsolidation settlements estimated using the proposed site-grade elevations are similar to those of the existing elevations. Similar results per NFPA 59A 2013 and ASCE 7-10 are presented in Appendix D (Plate D.261).

3.3 Liquefaction Hazard Assessment for Fine-Grained Soils

In addition to the coarse-grained materials, fine-grained soils (e.g. lean clay and silt) were encountered in the onshore borings. A screening assessment of the liquefaction potential of fine-grained soils was performed based on the procedures of Bray and Sancio (2006). Although silts and clays of low plasticity may be susceptible to liquefaction if in a loose, saturated state, the consequences of liquefaction may be very different from those resulting from loose, saturated sands. As Bray and Sancio (2006) state, liquefaction of fine-grained soils is typically manifested as a transient loss of shear strength instead of a permanent loss of shear strength (i.e., cyclic mobility with limited flow deformation). Hence, their seismic response is less likely to cause large deformations such as found in liquefaction-induced lateral spreads involving saturated, loose clean sands. Plate 14 for the 2014 and 2015 field explorations and Plate 15 for the 2016 field explorations show a chart of Plasticity Index (PI) versus water content normalized by Liquid Limit (w_c/LL) for the onshore samples up to 80 ft. depth and below the water table elevation presented in Table 3.2. Also shown are zones where soils are classified based on liquefaction susceptibility per Bray and Sancio (2006):

- Susceptible to liquefaction (PI<12, w_c>0.85LL), and
- Moderately susceptible to liquefaction (12<PI<18, w_c>0.8LL)

Results from Plate 7 are tabulated in Table 3.5. One sample each from borings B-23, B-60, B-69, B-81, B-89, B-90, B-93, B-105, B-125, B-146, B-149, B-153, B-156, B-157, B-159, B-161, B-162, B-170, B-171 and B-191 and two samples from borings B-114, B-151, B-159 and B-172 are estimated to be susceptible to liquefaction. Similarly, one sample each from borings B-10, B-14, B-17, B-39, B-75, B-83, B-88, B-97, B-105, B-125, B-146, B-148, B-150, B-152, B-155, B-160, B-164, B-169 B-170, B-171 and B-195 and two samples from borings B-80, B-152, B-161 and B-163, and B-191 are estimated to be moderately susceptible to liquefaction. These samples are retrieved at depths higher than 50 ft. below ground surface and are classified as lean clay with sand (CL) and low plasticity silts (ML). However, due to the deep depth of these sublayers, their impact at the ground surface will likely be small. Two samples in beach boring B-124 are estimated to be susceptible to liquefaction at approximately 36 and 63 feet depth, and one sample as moderately susceptible to liquefaction at 32 feet depth. One sample in the boring B-163 classified as lean clay (CL) is estimated to be susceptible to liquefaction at approximately 46 feet depth but the corresponding SPT values are high. Similarly, one sample in boring B-164 is also estimated to be susceptible to liquefaction at 41 feet depth, but is classified as silty sand (SM) and the SPT-based liquefaction assessment procedure showed no liquefaction hazard for this sample. One sample in beach boring B-125 is estimated to be susceptible to liquefaction at 26 feet depth and is classified as silt with sand (ML). Also, one sample in beach boring B-190 is estimated to be susceptible to liquefaction at 48 feet depth and is classified as lean clay with silt (CL). One sample in beach boring B-126 is also estimated to be susceptible to liquefaction at 36 feet depth, but is classified as silty sand (SM) and the SPT-based liquefaction assessment procedure showed no liquefaction hazard for this sample. One sample in beach boring B-43 is estimated to be susceptible to liquefaction at 45 feet depth and is classified as silty clay (CL-ML). The SPT-based liquefaction assessment procedure at this boring showed that the existence of another liquefiable layer at 17 feet depth, but this boring is located at the perimeter of the area of interest for the project site. One sample in B-113 at 46.5 ft. depth and one sample in B-127 at 41 ft. depth are classified as moderately susceptible to liquefaction. Overall, these layers are thin and discontinuous and hence, soil liquefaction across the onshore area explored will likely be localized and discontinuous if it occurs.

Table 3.5: Liquefaction Triggering Assessment of Fine-grained Soils for Onshore Locations According to Bray and Sancio (2006)

Susceptible to Liquefaction		Moderately Susceptible to Liquefaction	
Boring	Depth (ft.)	Boring	Depth (ft.)
B-23	70.2	B-10	73.2
B-43	45.0	B-14	75.8
B-60	72.5	B-17	73.0
B-69	76.0	B-39	50.0
B-81	67.8	B-75	69.9
B-89	72.0	B-80	67.2
B-90	59.9	B-80	74.5
B-93	56.0	B-83	65.8
B-105	72.4	B-88	71.9
B-114	66.0	B-97	66.0
B-114	67.7	B-105	77.5
B-124	36.0	B-113	46.5
B-124	36.1	B-124	32.0
B-124	63.1	B-125	61.0
B-125	26.0	B-127	41.0
B-126	36.0	B-146	49.5
B-146	65.5	B-146	80.0
B-149	76.0	B-148	65.5
B-151	61.0	B-150	59.5
B-151	67.0	B-152	66.0
B-153	67.4	B-152	70.1
B-156	65.8	B-155	70.9
B-157	71.8	B-160	70.5
B-159	56.0	B-161	61.0
B-159	77.3	B-161	71.0
B-161	66.0	B-163	61.0
B-162	56.0	B-163	63.0
B-163	46.0	B-164	61.0
B-164	41.0	B-169	71.0
B-164	71.0	B-170	69.0
B-170	67.6	B-171	51.0
B-171	56.0	B-190	71.0
B-172	71.0	B-191	63.0
B-172	75.3	B-191	71.0
B-190	47.5	B-195	65.3
B-191	76.0		

3.4 Summary

The liquefaction potential evaluation for the onshore area was performed using the 2014, 2015 and 2016 field explorations based on the design levels presented in the PSHA (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001). Based on the above findings for the onshore location, it can be concluded that:

- In general, no continuous liquefiable soil layers are encountered across the site for the onshore plant location for the OBE and SSE shaking levels.
- The surficial granular soil in the top 3 feet at the beach area is expected to liquefy (borings B-117, B-120, B-121, B-122, B-123, B-124, B-125, B-126, B-127, B-190 and B-191) for both OBE and SSE shaking levels. Especially for beach boring B-191, the extent of liquefaction is expected to reach 10 ft. depth. Consideration should be given to mitigate the potentially liquefiable surficial granular soils at the beach area (dredged or densified). Otherwise, the liquefaction effect should be considered when designing the retaining walls, foundation of structures and pavements located in the beach area.
- Some localized pockets of susceptible to liquefaction fine-grained soils identified in the onshore area are very thin and discontinuous and hence, soil liquefaction across the onshore area explored will likely be localized and discontinuous if it occurs.
- Boring B-176, which is close to the coast and located on the alternative heavy haul road area north from the project site, contains a potentially liquefiable soil layer from approximately 18 to 34 ft. depth. Consideration should be given to mitigate the potentially liquefiable surficial granular soils at this location, otherwise liquefaction effects (such as differential settlements on the heavy haul road and downdrag loads on pile foundations) are expected around boring B-176 and should be addressed in the design.
- Liquefaction-induced reconsolidation settlements are estimated to be generally small for both OBE and SSE levels and (apart from boring B-176) are below the FERC threshold value (above which mitigation actions are mandated) for the onshore area.

4.0 ASSESSMENT OF LIQUEFACTION HAZARD FOR NEARSHORE AREA

4.1 Introduction

This section presents a summary of the procedures adopted and the results from the liquefaction potential evaluation for the nearshore area based on the 2015 field investigations presented in the 2015 Marine Geotechnical Data report (Fugro Report No. 04.10140334-9, AKLNG Document No. USAL-FG-GRZZZ-90-002015-011).

4.2 Liquefaction Hazard Assessment for Coarse-Grained Soils

The 25 nearshore borings (Plate 4) have been identified with soils classified as primarily coarse-grained materials (e.g. sands with silt and gravel [SW-SM]) that are potentially vulnerable to liquefaction. A liquefaction triggering hazard assessment was conducted based on the SPT-based procedures proposed by NCEER (Youd et al., 2001) and Boulanger and Idriss (2014).

The liquefaction triggering hazard evaluation was conducted in accordance with the requirements of NFPA 59A 2006 and ASCE 7-05 codes. NFPA 59A 2006 requires ground motions to be developed for Operation Basis Event (OBE) and Safe Shutdown Event (SSE). OBE corresponds to 475-year return period. SSE requirements are the same as ASCE 7-05 Maximum Considered Earthquake (MCE) requirements. The majority of the hazard based on the deaggregation from the Probabilistic Seismic Hazard Analysis Report (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001) derives from the intraslab earthquakes for both the OBE and the SSE / MCE events. Earthquake magnitude M_w 8.0 was considered for both OBE and the SSE / MCE events per NFPA 59A 2006. The Peak Ground Acceleration (PGA) estimated at the ground surface from the PSHA is 0.53 g and 0.90 g for OBE and SSE/MCE events, respectively (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001). Those PGA values were used for the liquefaction evaluations (Table 4.1).

Table 4.1: Earthquake Scenarios for Liquefaction Evaluation Analyses of the Nearshore Area

EQ Event	PGA (g)	Magnitude
OBE	0.53	8.0
SSE / MCE	0.90	8.0

4.2.1 Cyclic Resistance to Liquefaction from SPT Data

The evaluation of the liquefaction resistance of cohesionless layers from SPT data from the borings was based on the empirical procedures recommended by NCEER (Youd et al., 2001) and Boulanger and Idriss (2014). Correction factors proposed by the two methods were applied on the SPT N values measured in the field to derive the N_{60} values. The correction factors for

hammer efficiency were based on the results of the hammer efficiency calibration tests performed for the hammers used for the explorations as described in the Marine Geotechnical Data report (Fugro Report No. 04.10140334-9, AKLNG Document No. USAL-FG-GRZZZ-90-002015-011). The N_{60} values were corrected for overburden [$(N_1)_{60}$] and for fines content using the procedures outlined in the two methods. The laboratory fine content test data from borings presented in the Marine Geotechnical Data report (Fugro Report No. 04.10140334-9, AKLNG Document No. USAL-FG-GRZZZ-90-002015-011) were used in the evaluations.

4.2.2 Liquefaction Triggering Hazard Assessment

Appendix E presents the liquefaction triggering assessment results based on the SPT-based procedures proposed by NCEER (Youd et. al., 2001) and Boulanger and Idriss (2014) for the nearshore borings and the existing elevations for the OBE and the SSE / MCE events per NFPA 59A 2006. Results are presented for the shallowest 80 ft. of each exploration and the safety factor is provided for the cases where it is less than two. Results are not shown for depths greater than 80 feet given the limitations of the simplified, empirical methods, which are calibrated to case history data that are, in general, available down to about 50-ft depth. In addition, the uncertainty of the shear stress reduction coefficient with depth r_d increases for depths higher than approximately 70 ft. Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata. Per the driller's log in the Marine Geotechnical Data report (Fugro Report No. 04.10140334-9, AKLNG Document No. USAL-FG-GRZZZ-90-002015-011), the blow counts from sample S-7 of boring MB-04 and S-4 of boring MB-15 were removed as unreliable.

Liquefaction triggering assessment results are presented along A-A' through C-C' cross-section profiles (Plate 4) covering the nearshore project area. Plates 16 through 21 present the boring logs along with the liquefaction assessment profiles based on NCEER (Youd et al., 2001) and Boulanger and Idriss (2014) for the OBE event. Similar results are presented on Plates 22 through 27 for the SSE / MCE event, while similar results are presented on Appendix F (Plates F.51 through F.56) for the SSE / MCE_G event. Table 4.2 summarizes the depths of potentially liquefiable soil for the nearshore borings based on the results of the liquefaction triggering hazard assessment conducted using the SPT-based procedures proposed by Boulanger and Idriss (2014) and NCEER (Youd et. al., 2001).

Table 4.2: SPT-based Liquefaction Triggering Hazard Assessment According to NCEER (Youd et al., 2001) and Boulanger and Idriss (2014): Depths of Potentially Liquefiable Localized Soil Pockets for the Nearshore Borings for Both OBE and SSE / MCE Levels per NFPA 59A 2006

EQ Event	Boring	Depth (ft.)	Measured SPT-N
OBE and SSE / MCE	MB-02	0.5	18
		2.5	19
	MB-03	0.5	13
	MB-04	3.3	13
		8.2	4
		13.1	21
	MB-06	9.8	15
	MB-08	37.7	21
	MB-09	16.4	20
		18.9	24
	MB-12	2.5	16
		7.4	18
		14.8	24
		22.2	28
	MB-13	0.5	16
	MB-14	7.4	12
	MB-15	7.4	25
	MB-16	0.5	11
		7.4	18
	MB-17	0.5	5
		2.5	16
	MB-19	4.9	18
		7.4	23
		9.8	16
	MB-20	0.5	21
		2.5	19
	MB-21	0.5	6
		2.5	21
	MB-26	12.3	15
	MB-27	2.5	20
	MB-28	0.5	2
		2.5	12
		7.4	20
	MB-31	2.5	23
		49.9	28

As presented in Table 4.2, in general, potentially liquefiable soil layers are encountered at the top 2 to 10 ft. at the nearshore area (borings MB-02, MB-03, MB-04, MB-06, MB-13, MB-14, MB-15, MB-16, MB-17, MB-19, MB-20, MB-21, MB-26, MB-27, MB-28 and MB-31). Based on the Marine Integrated Site Characterization and Geotechnical Engineering report (Fugro Report No. 04.10140334-15, AKLNG Document No. USAL-FG-GRZZZ-00-002015-012) dredging is expected to take place at the top part of borings MB-03, MB-05, MB-08, MB-09 and MB-28 down to an elevation of approximately -30 ft. (MLLW) which will remove some potentially liquefiable near-surface soils from borings MB-03 and MB-28. Limited and localized liquefaction is estimated during the OBE and SSE shaking levels for greater depths. Some localized pockets of potentially liquefiable coarse-grained soils were also identified in borings MB-08, MB-26, and MB-31. The measured SPT blow count values in these sublayers range between approximately 15 to 28 and they seem to be affected by the presence of lean clay at the sampler. Boring MB-12 which is potentially liquefiable at the top 22 ft. consists of clayey sand with gravel and loose sand with wood fragments. In addition, boring MB-09 which is potentially liquefiable from 15 to 20 ft. depth consists of clayey sand with 50% fines content.

Additionally, liquefaction potential evaluations were also performed for the nearshore area for OBE and SSE shaking levels per the requirements of NFPA 59A 2013 and ASCE 7-10, per the request of EMALL. SPT-based liquefaction potential results per NFPA 59A 2013 and ASCE 7-10 are presented in Appendix F. Results per NFPA 59A 2013 requirements are similar those per NFPA 59A 2006 requirements.

4.2.3 Evaluation of Liquefaction-Induced Reconsolidation Settlements

Estimates of post-liquefaction reconsolidation settlements are computed using the procedure suggested by Ishihara and Yoshimine (1992) and described in Idriss and Boulanger (2008). Plates 28 and 29 present the liquefaction-induced reconsolidation settlements for OBE and SSE shaking levels per NFPA 59A 2006 and ASCE 7-05. Liquefaction-induced reconsolidation settlements are estimated in the range of approximately 0 to 0.5 inches during both the OBE and the SSE / MCE shaking level for borings MB-03, MB-05, MB-06, MB-08, MB-09, MB-13, MB-15, MB-18, MB-22, MB-23, MB-24, MB-25, MB-26, MB-27 and MB-31. Liquefaction-induced reconsolidation settlements are estimated in the range of 0.5 and 1.0 inches during both the OBE and the SSE / MCE shaking level for borings MB-02, MB-14, MB-16, MB-17, MB-19, MB-20 and MB-21. Liquefaction-induced reconsolidation settlements for borings MB-12, MB-28 and MB-04 are expected to be higher than 1 inch for both the OBE and the SSE / MCE shaking level. Similar results per NFPA 59A 2013 and ASCE 7-10 are presented in Appendix F. The estimated settlements are below the 3-inch threshold, after which FERC (2007) requires that either structures are supported on piles or ground improvement is performed to mitigate the liquefaction hazard.

4.3 Liquefaction Hazard Assessment for Fine-Grained Soils

In addition to the coarse-grained materials, fine-grained soils (e.g. lean clay and silt) were encountered in the nearshore borings. A screening assessment of the liquefaction potential of fine-grained soils was performed based on the procedures of Bray and Sancio (2006). Although silts and clays of low plasticity may be susceptible to liquefaction if in a loose, saturated state, the consequences of liquefaction may be very different from those resulting from loose, saturated sands. As Bray and Sancio (2006) state, liquefaction of fine-grained soils is typically manifested as a transient loss of shear strength instead of a permanent loss of shear strength (i.e., cyclic mobility with limited flow deformation). Hence, their seismic response is less likely to cause large deformations such as found in liquefaction-induced lateral spreads involving saturated, loose clean sands. Plate 30 shows a chart of Plasticity Index (PI) versus water content normalized by Liquid Limit (w_c/LL) for the nearshore samples up to 80 ft. depth. Also shown are zones where soils are classified based on liquefaction susceptibility per Bray and Sancio (2006):

- Susceptible to liquefaction (PI<12, w_c>0.85LL), and
- Moderately susceptible to liquefaction (12<PI<18, w_c>0.8LL)

Results from Plate 2 are tabulated in Table 4.3. One sample from boring MB-4 and two samples from boring MB-27 are estimated to be moderately susceptible to liquefaction. Similarly, one sample each from borings MB-3, MB-8, MB-9, MB-13, and MB-16 are estimated to be moderately susceptible to liquefaction. These samples are retrieved at depths higher than 50 ft. below ground surface and are classified as sandy silt (ML) and lean clays (CL). However, due to the deep depth of these sublayers, its impact at the ground surface will likely be small. Three samples in boring MB-21 are estimated to be susceptible to liquefaction at approximately 30 to 45 feet depth and are classified as silty sand (SM) to sandy silty (ML) with relatively low plasticity (approximately 49 to 52% fines content). Three samples in boring MB-09 are estimated to be moderately susceptible to liquefaction at approximately 11, 22 and 42 feet depth and are classified as sandy lean clay to lean clay with sand (CL). The SPT-based liquefaction assessment procedure at this boring showed that the existence of another potentially liquefiable layer at approximately 15 to 20 ft. depth which consists of clayey sand with 50% fines content. One sample in MB-13 is susceptible to liquefaction at 20 ft. depth and one sample at 29 ft. depth is classified as moderately susceptible to liquefaction within the same sandy lean clay layer ranging from 18 to 34 ft. depth. Some localized pockets of susceptible to liquefaction fine-grained soils were also identified in borings MB-03, MB-04, MB-05, MB-06, MB-14, MB-18 and MB-24. Overall, these layers are very thin and discontinuous and hence soil liquefaction, will likely be localized and discontinuous if it occurs.

Table 4.3: Liquefaction Triggering Assessment of Fine-grained Soils for Nearshore Locations According to Bray and Sancio (2006)

Susceptible to Liquefaction		Moderately Susceptible to Liquefaction	
Boring	**Depth (ft.)**	**Boring**	**Depth (ft.)**
MB-3	40.7	MB-4	64.3
MB-3	50.2	MB-5	5.2
MB-4	45.3	MB-5	1.2
MB-5	24.8	MB-8	19.7
MB-6	2.0	MB-9	11.3
MB-6	41.3	MB-9	22.3
MB-8	63.0	MB-9	42.2
MB-9	52.0	MB-13	29.0
MB-13	20.0	MB-17	27.2
MB-13	70.4	MB-18	0.2
MB-14	16.7	MB-21	13
MB-16	57.3	MB-27	61.8
MB-18	26.0	MB-27	72.8
MB-21	31.5		
MB-21	36.1		
MB-21	45.9		
MB-24	18.5		

4.4 Summary

Based on the above findings for the nearshore location, it can be concluded that:

- In general, potentially liquefiable soil layers are mainly encountered within the top 10 ft. at the nearshore area for the OBE and SSE shaking levels. Limited and localized liquefaction is estimated for greater depths during these shaking levels. Consideration should be given to mitigate the potentially liquefiable surficial granular soils at the nearshore area. Otherwise, the liquefaction effect should be considered when designing the retaining walls and foundation of structures located in the nearshore area.
- Some localized pockets of susceptible to liquefaction fine-grained soils identified in the nearshore area are very thin and discontinuous and hence, soil liquefaction will likely be localized and discontinuous if it occurs.
- Liquefaction-induced reconsolidation settlements for both OBE and SSE levels are estimated to be below the 3-inch FERC threshold value (above which mitigation actions are mandated) for the nearshore area.

5.0 ASSESSMENT OF TSUNAMI HAZARD

5.1 Introduction

An updated tsunami hazard assessment was conducted as part of the AKLNG 2016 program. This assessment included new tsunami modelling of the previously-modelled submarine landslide scenario to account for the effects of tidal currents in the Cook Inlet, as well as new 'observation points' for presentation of analysis results. The methods and results are summarized and discussed herein. Detailed information on the modelling methodology, calculations, and results can be found in Appendix G which includes the 2015 Cook Inlet tsunami hazard assessment based on the 2014 field explorations, and the 2016 Cook Inlet tsunami hazard assessment update.

5.2 Background and Scope

The previous deterministic tsunami hazard assessment prepared by Fugro in the LNG Facilities Geologic Hazard Report (Fugro Report No. 04.10140334-10, AKLNG Document No. USAL-FG-GRHAZ-00-002015-002 and Appendix G herein) showed that submarine landslides within the Cook Inlet are the dominant source of tsunami that could potentially impact the LNG facilities. These landslides would likely be triggered by earthquake-induced strong ground motions acting on this steep submarine slope. For a very large submarine landslide, calculated wave heights could potentially reach 20 ft. above ambient tide level. This wave height does not reach the elevation of the onshore LNG facilities, but has the potential to impact the Marine Terminal and to accelerate erosion of the coastal bluff.

The 2015 modelling provided results for hypothetical landslides originating on the steep west margin of Gompertz Channel, a large tidal channel in the Cook Inlet whose axis is about midway between the East and West Forelands (Plate 31). Bathymetry data for the channel show geomorphic evidence suggesting landslides have occurred previously along both the west and east margins of the channel. The west margin was chosen as the source for the hypothetical landslides based on its greater steepness and its orientation facing toward the site, maximizing the effect of directivity. Tsunami modelling was conducted for three landslide scenarios: (1) a very large landslide involving the entire width of the slope, (2) a smaller landslide involving the northern third of the slope, and (3) a smaller landslide involving the southern two-thirds of the slope. Each landslide was modelled at ambient tide conditions of mean sea level (MSL) and highest astronomical tide (HAT) (Table 5.1). The effects of tidal currents were not included in the model. Density of the slide mass was estimated to be 1800 kg/m^3 based on the literature, and no corrections were made for internal stress parameters within the slide mass.

The 2015 simulation of the submarine landslide was based on conservative worst-case scenarios that included a large landslide volume, high landslide mass density, and fluid rheology. These simulations did not account for tidal currents. This approach assumed that further work

would not be needed if the maximum tsunami heights were acceptable. Given that the previous results were marginal in that regard, the 2016 simulations seek to include more detailed information to make better estimates of key variables.

Table 5.1: Vertical Datums for Nikiski, Alaska

Datum	Abbreviation	Height above MLLW (ft.)
Highest Astronomical Tide	HAT	25.61
Mean Higher High Water	MHHW	20.58
Mean High Water	MHW	19.86
Mean Sea Level	MSL	11.29
North American Vertical Datum 88	NAVD88	7.32
Mean Low Water	MLW	2.14
Mean Lower Low Water	MLLW	0.00
Lowest Astronomical Tide	LAT	-5.78

Data from NOAA (2016d) for Station No. 9455760, Nikiski, Alaska

This 2016 scope was developed in response to telephone discussions of September 9, 2016 between AKLNG, Fugro, and CH2M Hill, regarding the results of the 2015 deterministic tsunami hazard assessment (Fugro Report No. 04.10140334-10, AKLNG Document No. USAL-FG-GRHAZ-00-002015-002). The modelled maximum wave height at HAT was considered a potential hazard to the Marine Terminal substructure and associated topsides. The conclusion of the discussion was to refine and update the 2015 deterministic analysis by accounting for tidal currents in the model.

The scope for the 2016 deterministic tsunami modelling was to re-run the model for the large submarine landslide scenario and include the effects of crossing tidal currents on the modelled wave heights. In addition, sensitivity analyses were run to examine the effects of the choice of landslide mass density and internal stress parameters.

Methodology including a review of inputs and assumptions is briefly described in Section 5.3. Final results are presented for the deterministic worst-case submarine landslide in Section 5.4, accompanied by tables and figures that show the effects of varying each key parameter. In Section 5.5, a recommended model is chosen, discussions of uncertainties follow, and ideas for reducing uncertainties are presented.

5.3 Methodology

Key inputs to the 2016 modelling not included in the 2015 analysis are tidal current data, improved estimates of landslide mass density based on relevant project data, and a more realistic characterization of rheologic properties. Tidal current data were provided by CH2MHill,

based on a regional hydrodynamic model developed for AKLNG. These data simulate the highest, lowest, and MSL elevations along a line drawn between the East Foreland and West Foreland. The local water depth, surface elevation, current velocity, current magnitude and direction were extracted along that line, using DHI MIKE 21 software. The geometry and extent of the submarine landslide modelled in 2015 remained unchanged in the 2016 model.

The tsunami wave crest height was modelled at seven observation points including points 1, 2, and 3 modelled in 2015 (Plate 32). Four additional observation points were established in collaboration with CH2MHill as shown on Plate 32. They include point A at the south end of the berth area, point B in the materials off-loading area, point C near the Rig Tenders Dock, and point D on the beach at the end of the trestle.

A description of the computations and software used for the 2015 tsunami modelling is presented in Appendix G (Appendix A of the LNG Facilities Geologic Hazard Report, Fugro Report No. 04.10140334-10, AKLNG Document No. USAL-FG-GRHAZ-00-002015-002). Modifications to the modelling made in 2016 are also detailed in Appendix G of this report.

5.4 Results

The results of the simulations are summarized in Tables 5.2 and 5.3. Each line in the table represents a different combination of ambient tide level, inclusion or exclusion of tidal currents, landslide mass density value, and rheology. For example, the combination used in the 2015 model was no tidal currents, mass density of 1800 kg/m^3, and fluid rheology. The maximum wave heights are shown on Table 5.2, and the minimum wave trough elevation is shown on Table 5.3.

The results of the simulations show that the inclusion of tidal currents in the model had little effect on the modelled wave height. The phase speed of the wave in the channel is about 10 times greater than the speed of the currents, and the currents run approximately perpendicular to the direction of propagation. Therefore, the propagation of the wave is not significantly affected. The time for propagation of the tsunami from the channel to the site is only approximately 10 minutes. The primary effects of the tidal currents are a delay in the arrival of the wave of less than 30 seconds and modification of the trailing waves.

The adjustments in landslide mass density and rheology have a greater effect on the wave heights at the site. A reduction of the mass density from 1800 to 1600 kg/m^3, and use of a mixture rheology to more appropriately model the viscosity of the landslide mass, result in significant reductions in the wave crest height. The two adjustments, together with the inclusion of tidal currents, comprise the recommended combination used for the 2016 tsunami modelling.

The recommended combination for the 2016 tsunami modelling is indicated in bold in Tables 5.2 and 5.3. This combination is illustrated graphically in Plates 33 and 34 and is compared with the 2015 model. In each plate, the top panel graphs the time evolution of the tsunami wave using the 2015 simulation, and the bottom panel shows a comparable graph using the preferred 2016 simulation. The peak wave crest is three to six feet lower in the 2016 recommended model relative to the 2015 model for the seven observation points. Additional time series models for other combinations of input parameters can be found in Appendix G.

The modelled maximum wave crest elevation along the proposed marine trestle is illustrated schematically in Plate 35. The wave crest is everywhere lower than the pile cap on the trestle. Observation points A and D, in map view on Plate 32, are shown in profile view on Plate 35. At observation point A (the proposed marine loading berth area) the modelled peak crest elevation of 28.9 ft. MLLW (Table 5-2) is 13 ft. lower than the bottom of the pile cap elevation of 42 ft. MLLW (Plate 35).

Table 5.2: Maximum Tsunami Crest Elevation for Each Landslide Scenario

Tide		Landslide		Maximum Elevation (ft., MLLW) at Observation Point:						
Ambient level	**Currents modeled?**	**Mass Density (kg/m³)**	**Rheology**	**1**	**2**	**3**	**A**	**B**	**C**	**D**
LAT	no	1800	fluid	dry	dry	dry	-0.1	3.9	12.1	dry
LAT	no	1800	mix	dry	dry	dry	-1.3	1.9	9.8	dry
LAT	no	1600	fluid	dry	dry	dry	-0.8	2.7	10.9	dry
LAT	no	1600	mix	dry	dry	dry	-1.7	1.2	8.8	dry
LAT	yes	1800	fluid	dry	dry	dry	-0.4	3.4	11.8	dry
LAT	yes	1800	mix	dry	dry	dry	-1.4	1.5	9.5	dry
LAT	yes	1600	fluid	dry	dry	dry	-1.0	2.3	10.6	dry
LAT	**yes**	**1600**	**mix**	**dry**	**dry**	**dry**	**-1.9**	**0.9**	**8.5**	**dry**
HAT	no	1800	fluid	42.5	43.9	39.7	31.9	36.7	42.0	42.8
HAT	no	1800	mix	39.3	40.4	36.5	30.7	33.9	39.0	40.5
HAT	no	1600	fluid	40.8	42.0	37.8	31.1	35.2	40.2	41.4
HAT	no	1600	mix	37.2	38.4	35.5	29.9	32.7	37.8	39.4
HAT	yes	1800	fluid	42.2	44.3	38.8	31.8	36.7	40.5	42.7
HAT	yes	1800	mix	38.2	39.8	36.1	29.9	33.9	37.9	40.5
HAT	yes	1600	fluid	40.1	41.7	37.2	30.5	35.2	39.0	41.4
HAT	**yes**	**1600**	**mix**	**36.3**	**37.9**	**35.4**	**28.9**	**32.8**	**36.4**	**39.0**
MSL	no	1800	fluid	29.1	28.3	25.8	17.6	22.4	26.9	30.0
MSL	no	1800	mix	26.6	26.1	22.1	16.5	20.1	24.7	27.4
MSL	no	1600	fluid	27.7	27.1	24.0	16.9	21.0	25.6	28.7
MSL	no	1600	mix	25.2	24.9	20.9	15.9	19.1	23.6	26.4

Table 5.3: Minimum Tsunami Crest Elevation for Each Landslide Scenario

Tide		Landslide		Minimum Elevation (ft., MLLW) at Observation Point:						
Ambient level	Currents modeled?	Mass Density (kg/m³)	Rheology	1	2	3	A	B	C	D
LAT	no	1800	fluid	dry	dry	dry	-10.1	-17.7	-13.6	dry
LAT	no	1800	mix	dry	dry	dry	-9.9	-16.8	-13.2	dry
LAT	no	1600	fluid	dry	dry	dry	-10.0	-17.2	-13.4	dry
LAT	no	1600	mix	dry	dry	dry	-9.7	-16.1	-12.9	dry
LAT	yes	1800	fluid	dry	dry	dry	-9.8	-16.6	-12.3	dry
LAT	yes	1800	mix	dry	dry	dry	-9.7	-15.7	-15.2	dry
LAT	yes	1600	fluid	dry	dry	dry	-9.7	-16.3	-12.8	dry
LAT	**yes**	**1600**	**mix**	**dry**	**dry**	**dry**	**-9.4**	**-15.1**	**-14.7**	**dry**
HAT	no	1800	fluid	dry	10.9	12.7	19.2	12.9	8.6	12.2
HAT	no	1800	mix	dry	11.8	12.9	20.1	13.6	11.4	12.2
HAT	no	1600	fluid	dry	12.0	13.2	19.6	13.8	9.5	12.2
HAT	no	1600	mix	dry	12.9	13.8	20.5	14.6	12.9	12.2
HAT	yes	1800	fluid	dry	12.8	14.2	19.4	14.4	9.1	12.9
HAT	yes	1800	mix	dry	13.4	14.8	20.3	14.9	10.6	12.2
HAT	yes	1600	fluid	dry	13.1	14.7	19.6	15.0	10.0	14.1
HAT	**yes**	**1600**	**mix**	**dry**	**14.8**	**15.8**	**20.6**	**15.8**	**12.2**	**15.2**
MSL	no	1800	fluid	dry	dry	dry	6.0	-1.3	-2.0	dry
MSL	no	1800	mix	dry	dry	dry	6.6	-0.4	-1.9	dry
MSL	no	1600	fluid	dry	dry	dry	6.1	-0.4	-2.0	dry
MSL	**no**	**1600**	**mix**	**dry**	**dry**	**dry**	**7.1**	**0.6**	**-0.4**	**dry**

5.5 Discussion and Recommendations

The 2015 tsunami modelling was very conservative and was intended to put an upper bound on possible tsunami wave heights. The 2016 effort represents an attempt to better estimate a few important parameters of the hypothetical submarine landslide and the tsunami it would generate. Other factors, out of the scope of this study, may merit examination and re-evaluation in future studies. Landslide geometry, thickness, and extent have perhaps the strongest influence on the size of the resultant tsunami. The modelled landslide is very large compared with landslide morphological features interpreted based on the bathymetry, yet it remains credible. Additional literature review and slope stability analysis may be helpful in understanding the likelihood of such a landslide.

The results of this study constitute a deterministic evaluation. Further analysis may be conducted in the next engineering phase to refine predicted run-up elevations.

6.0 CONCLUSIONS

6.1 Re-evaluation of Seismic Hazard

Based on the 2016 data collected, it can be concluded that:

- The 2015 conclusion that there are no tectonic surface faults within the 5-mile site radius remains unchanged by the results of the 2016 field investigations.
- The estimated time-averaged shear wave velocities (V_{s30}) at the ground surface for the 35 onshore downhole measurements are in the range of 686 ft./s (209 m/s) to 1183 ft./s (360 m/s), with an average of approximately 938 ft./s (286 m/s). This value is similar to the average estimated V_{s30} at the ground surface (approximately 912 ft./s ; 278 m/s) for the onshore area used in the 2015 PSHA (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001).
- The results of the probabilistic seismic hazard analyses presented in the 2015 PSHA Report (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001) for the onshore as well as nearshore area with a time-weighted average shear wave velocity of 885 ft./s (270 m/s) at the ground surface are still valid. Hence, no update is required.

6.2 Assessment of Liquefaction Hazard

6.2.1 Onshore Area

6.2.1.1 Findings for the Onshore Area

- The screening-level liquefaction potential evaluations suggest that liquefaction will be limited and localized in the onshore locations within the project area during the OBE and SSE shaking levels, except for the top 3 feet of surficial soils at beach area (borings B-117, B-120, B-121, B-122, B-123, B-124, B-125, B-126, B-127, B-190 and B-191), which are expected to liquefy for both the OBE and SSE shaking levels. For beach boring B-191, the extent of liquefaction is expected to reach up to 10 ft. depth. In general, continuous potentially liquefiable soil layers were not identified at the site. Some localized pockets of potentially liquefiable coarse-grained soils were also identified in borings B-17, B-28, B-39, B-43, B-50, B-61, B-64, B-67, B-76, B-146, B-160 and B-166 mainly for soil layers classified as sand with gravel. Also, boring B-176 which is close to the coast and located on the alternative heavy haul road area north from the project site, contains a potentially liquefiable soil layer from approximately 18 to 34 ft. depth.
- Liquefaction-induced reconsolidation settlements are in the range of approximately 0 to 0.5 inches for the onshore borings during both the OBE and the SSE / MCE shaking level, with negligible estimated settlements at most locations. The estimated settlements are in the range of 0.8 to 1.8 inches for borings B-28, B-39, B-61, and B-76. However, these borings are located outside the locations of the planned structures. The estimated settlements for boring B-176 are higher than 3 inches, but boring B-176 is located on the alternative heavy

haul road area north from the project site. The estimated settlements at the beach area (borings B-117, B-120, B-121, B-122, B-123, B-124, B-125, B-126, B-127, B-190 and B-191) are in the range of 0.6 to 1.9 inches during both the OBE and the SSE / MCE shaking. However, these values will be reduced significantly if the top 3 feet of surficial granular soils at the beach area are dredged or densified. The estimated settlements (apart from boring B-176) are below the 3-inch threshold after which FERC (2007) requires that either structures are supported on piles or ground improvement is performed to mitigate the liquefaction hazard.

- Regarding the fine-grained soils encountered at the onshore borings, few sparse layers are susceptible to liquefaction on the onshore area. However, these layers are very thin and discontinuous and hence soil liquefaction, will likely be localized and discontinuous if it occurs.

6.2.1.2 Summary for the Onshore Area

Based on the above findings for the onshore location, it can be concluded that:

- In general, no continuous liquefiable soil layers across the site for the onshore plant location for the OBE and SSE shaking levels.
- The surficial granular soil in the top 3 feet at the beach area is expected to liquefy (borings B-117, B-120, B-121, B-122, B-123, B-124, B-125, B-126, B-127, B-190 and B-191) for both OBE and SSE shaking levels. Especially for beach boring B-191, the extent of liquefaction is expected to reach 10 ft. depth. Consideration should be given to mitigate the potentially liquefiable surficial granular soils at the beach area (dredged or densified). Otherwise, the liquefaction effect should be considered when designing the retaining walls, foundation of structures and pavements located in the beach area.
- Some localized pockets of susceptible to liquefaction fine-grained soils identified in the onshore area are very thin and discontinuous and hence, soil liquefaction across the onshore area explored will likely be localized and discontinuous if it occurs.
- Boring B-176, which is close to the coast and located on the alternative heavy haul road area north from the project site, contains a potentially liquefiable soil layer from approximately 18 to 34 ft. depth. Consideration should be given to mitigate the potentially liquefiable surficial granular soils at this location, otherwise liquefaction effects (such as differential settlements on the heavy haul road and downdrag loads on pile foundations) are expected around boring B-176 and should be addressed in the design.
- Liquefaction-induced reconsolidation settlements are estimated to be generally small for both OBE and SSE levels and (apart from boring B-176) are below the FERC threshold value (above which mitigation actions are mandated) for the onshore area.

6.2.2 Nearshore Area

6.2.2.1 Findings for the Nearshore Area

The liquefaction evaluations suggest that liquefaction can occur at several locations in the nearshore borings within the project area during the OBE and SSE shaking levels. In general,

potentially liquefiable soil layers are encountered at the top 2 to 10 ft. at the nearshore area (borings MB-02, MB-03, MB-04, MB-06, MB-13, MB-14, MB-15, MB-16, MB-17, MB-19, MB-20, MB-21, MB-26, MB-27, MB-28 and MB-31). Based on the Marine Integrated Site Characterization and Geotechnical Engineering report (Fugro Report No. 04.10140334-15, AKLNG Document No. USAL-FG-GRZZZ-00-002015-012) dredging is expected to take place at the top part of borings MB-03, MB-05, MB-08, MB-09 and MB-28 down to an elevation of approximately -30 ft. (MLLW) which will remove some potentially liquefiable near-surface soils from borings MB-03 and MB-28. Limited and localized liquefaction is estimated during the OBE and SSE shaking levels for greater depths. Some localized pockets of potentially liquefiable coarse-grained soils were also identified in borings MB-08, MB-26, and MB-31. Boring MB-12, which is potentially liquefiable at the top 22 ft., consists of clayey sand with gravel and loose sand with wood fragments. In addition, boring MB-09 which is potentially liquefiable from 15 to 20 ft. depth consists of clayey sand with 50% fines content.

Liquefaction-induced reconsolidation settlements are in the range of approximately 0 to 0.5 inches during both the OBE and the SSE / MCE shaking level for borings MB-03, MB-05, MB-06, MB-08, MB-09, MB-13, MB-15, MB-18, MB-22, MB-23, MB-24, MB-25, MB-26, MB-27 and MB-31. Liquefaction-induced reconsolidation settlements are in the range of 0.5 and 1.0 inches during both the OBE and the SSE / MCE shaking level for borings MB-02, MB-14, MB-16, MB-17, MB-19, MB-20 and MB-21. Liquefaction-induced reconsolidation settlements for borings MB-12, MB-28 and MB-04 are expected to be higher than 1 inch for both the OBE and the SSE / MCE shaking level.

Regarding the fine-grained soils encountered at the nearshore borings, few sparse samples are susceptible to liquefaction on the nearshore area at medium to large depths (30 to 60 feet). But, these layers are very thin and discontinuous and hence soil liquefaction, will likely be localized and discontinuous if it occurs.

6.2.2.2 Summary for the Nearshore Area

Based on the above findings for the nearshore location, it can be concluded that:

- In general, potentially liquefiable soil layers are mainly encountered within the top 10 ft. at the nearshore area for the OBE and SSE shaking levels. Limited and localized liquefaction is estimated for greater depths during these shaking levels. Consideration should be given to mitigate the potentially liquefiable surficial granular soils at the nearshore area. Otherwise, the liquefaction effect should be considered when designing the retaining walls and foundation of structures located in the nearshore area.
- Some localized pockets of susceptible to liquefaction fine-grained soils identified in the nearshore area are very thin and discontinuous and hence, soil liquefaction will likely be localized and discontinuous if it occurs.

- Liquefaction-induced reconsolidation settlements for both OBE and SSE levels are estimated to be below the 3-inch FERC threshold value (above which mitigation actions are mandated) for the nearshore area.

6.3 Assessment of Tsunami Hazard

An updated tsunami hazard assessment was conducted as part of the AKLNG 2016 program which included new tsunami modelling of the previously modelled submarine landslide scenario to account for the effects of tidal currents in the Cook Inlet. The 2015 tsunami modelling was very conservative (Appendix G and 2015 Geologic Hazard report, Fugro Report No. 04.10140094-9, AKLNG Document No. USAL- FG-GRHAZ-00-000002-000) and was intended to put an upper bound on the possible wave heights, while the present 2016 effort represents an attempt to better estimate a few important parameters (such as ambient tide level, inclusion or exclusion of tidal currents, landslide mass density value, and rheology) controlling the submarine landslide and the tsunami it generates. Based on these results:

- The inclusion of tidal currents in the model has little effect on the modeled wave height.
- Adjustments in landslide mass density and rheology together have a significant effect on the wave heights at the site.
- The new model adjusts the mass density from 1800 to 1600 kg/m^3, and uses a mixture rheology to more appropriately model the viscosity of the landslide mass. The resulting peak wave crest height is reduced by 3 to 6 feet (9 to 15 percent) at the seven observation sites relative to the 2015 model. At observation point A (the proposed marine loading berth area) the modelled peak crest elevation of 28.9 ft. MLLW is 13 ft. lower than the bottom of the pile cap elevation of 42 ft. MLLW.
- The results of this study constitute a deterministic evaluation. Further analysis may be conducted in the next engineering phase to refine predicted run-up elevations.

7.0 REFERENCES

American Society of Civil Engineers, 2006, ASCE Standard 7-05 – Minimum Design Loads for Buildings and Other Structures, ASCE 7-05

American Society of Civil Engineers, 2010, ASCE Standard 7-10 – Minimum Design Loads for Buildings and Other Structures, ASCE 7-10.

Boulanger, R.W., and Idriss, I.M., 2014, CPT and SPT based Liquefaction Triggering Procedures, Report No UCD/CGM-14/01, Center for Geotechnical Modeling, Department of Civil and Environmental Engineering, University of California, Davis, California, April

Bray, J.D., and Sancio, R.B., 2006, Assessment of the Liquefaction Susceptibility of Fine-grained Soils, Journal of Geotechnical and Geoenvironmental Engineering, 132(9), pp. 1165-1177.

Federal Energy Regulation Commission (FERC), 2007, Draft Seismic Design Guidelines and Data Submittal Requirements for LNFG Facilities, Office of Energy Projects, Washington D.C.

Fugro Consultants, Inc. (Fugro), 2015a, Geotechnical Data Report Onshore LNG Facilities, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10140094-8, AKLNG Document No. USAL-FG-GRZZZ-00-000003-000.

Fugro Consultants, Inc. (Fugro), 2015b, Probabilistic Seismic Hazard Analysis Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10140094-6, USAL-FG-GRHAZ-00-000001-000.

Fugro Consultants, Inc. (Fugro), 2015c, Geologic Hazard Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04. 10140094-9, USAL- FG-GRHAZ-00-000002-000

Fugro Consultants, Inc. (Fugro), 2016a, LNG Facilities Onshore & Marine Probabilistic Seismic Hazard Analysis (PSHA) Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001.

Fugro Consultants, Inc. (Fugro), 2016b, LNG Facilities Onshore Geotechnical Data Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10140334-8, AKLNG Document No. USAL-FG-GRZZZ-00-002015-006.

Fugro Consultants, Inc. (Fugro), 2016c, LNG Facilities Marine Geotechnical Data Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10140334-9, AKLNG Document No. USAL-FG-GRZZZ-90-002015-011.

Fugro Consultants, Inc. (Fugro), 2016d, LNG Facilities Onshore Hydrogeologic Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10140334-12, AKLNG Document No. USAL-FG-GRZZZ-00-002015-008.

Fugro Consultants, Inc. (Fugro), 2016e, LNG Facilities Onshore Integrated Site Characterization and Geotechnical Engineering Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10140334-14, AKLNG Document No. USAL-FG-GRZZZ-00-002015-009.

Fugro Consultants, Inc. (Fugro), 2016f, LNG Facilities Marine Integrated Site Characterization and Geotechnical Engineering Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10140334-15, AKLNG Document No. USAL-FG-GRZZZ-00-002015-012.

Fugro Consultants, Inc. (Fugro), 2016g, LNG Facilities Seismic Engineering Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10140334-13, AKLNG Document No. USAL-FG-GRZZZ-00-002015-003.

Fugro Consultants, Inc. (Fugro), 2016h, LNG Facilities Onshore Geophysical Survey Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10140334-7, AKLNG Document No. USAL-FG-GRZZZ-00-002015-005.

Fugro Consultants, Inc. (Fugro), 2016i, LNG Facilities Geologic Hazard Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10140334-10, AKLNG Document No. USAL-FG-GRHAZ-00-002015-002.

Fugro Consultants, Inc. (Fugro), 2016j, Two-Dimensional Dynamic Slope Stability Analyses, Addendum to LNG Facilities Onshore Integrated Site Characterization and Engineering Report, Alaska LNG Project, Nikiski, Alaska, AKLNG Document No. USAL-FG-GRZZZ-00-002015-018.

Fugro Consultants, Inc. (Fugro), 2016k, Project Execution Plan for 2016 Onshore and Marine G&G Program, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10160001-1, AKLNG Document No. USAL-FG-GPZZZ-00-002016-001.

Fugro Consultants, Inc. (Fugro), 2016l, LNG Facilities Groundwater Quality Sampling and Testing Report - Event 1, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10160001-2, AKLNG Document No. USAL-FG-GRZZZ-00-002016-003.

Fugro Consultants, Inc. (Fugro), 2016m, LNG Facilities Groundwater Quality Sampling and Testing Report - Event 2, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10160001-3, AKLNG Document No. USAL-FG-GRZZZ-00-002016-004.

Fugro Consultants, Inc. (Fugro), 2016n, LNG Facilities Aquifer Pump Test Well and Groundwater Observation Well Installation Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10160001-4, AKLNG Document No. USAL-FG-GRZZZ-00-002016-002.

Fugro Consultants, Inc. (Fugro), 2016o, LNG Facilities Onshore Geotechnical Data Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10160001-5, AKLNG Document No. USAL-FG-GRZZZ-00-002016-001.

Fugro Consultants, Inc. (Fugro), 2016p, LNG Facilities Onshore Hydrogeologic Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10160001-8, AKLNG Document No. USAL-FG-GRZZZ-00-002016-007.

Fugro Consultants, Inc. (Fugro), 2016q, LNG Facilities Seismic Engineering Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10160001-9, AKLNG Document No. USAL-FG-GRZZZ-00-002016-008.

Fugro Consultants, Inc. (Fugro), 2016r, Pipeline Marine Shallow Geotechnical Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10160001-10, AKLNG Document No. USAP-FG-GRZZZ-10-002016-011.

Fugro Consultants, Inc. (Fugro), 2016s, LNG Facilities Marine Survey Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10160001-11, AKLNG Document No. USAL-FG-GRZZZ-90-002016-010.

Fugro Consultants, Inc. (Fugro), 2016t, LNG Facilities Rigs Tenders Wharf Siltation Survey Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10160001-13, AKLNG Document No. USAL-FG-CRZZZ-90-002016-001.

Fugro Consultants, Inc. (Fugro), 2016u, A Roadmap to Fugro G&G Reports Covering Site Investigation Campaigns in 2014, 2015 & 2016, Alaska LNG Project, Nikiski, Alaska, AKLNG Document No. USAL-FG-BRCTL-00-000001-000.

Fugro Consultants, Inc. (Fugro), 2017, LNG Facilities Onshore Integrated Site Characterization and Geotechnical Engineering Report, Alaska LNG Project, Nikiski, Alaska, Report No. 04.10160001-12, AKLNG Document No. USAL-FG-GRZZZ-00-002016-009.

Idriss I. M., and Boulanger R. W. 2008, Soil Liquefaction During Earthquakes, Earthquake Engineering Research Institute.

Ishihara, K., 1985, Stability of natural deposits during earthquakes, in Proceedings, 11th International Conference on Soil Mechanics and Foundation Engineering, San Francisco, A. A. Balkema, Rotterdam, pp. 321–376.

Ishihara K., and Yoshimine M., 1992, Evaluation of Settlements in Sand Deposits Following Liquefaction During Earthquakes, Soils and Foundations, 32 (1), pp 173-188.

International Code Council, Inc., 2012, 2012 International Building Code (IBC).

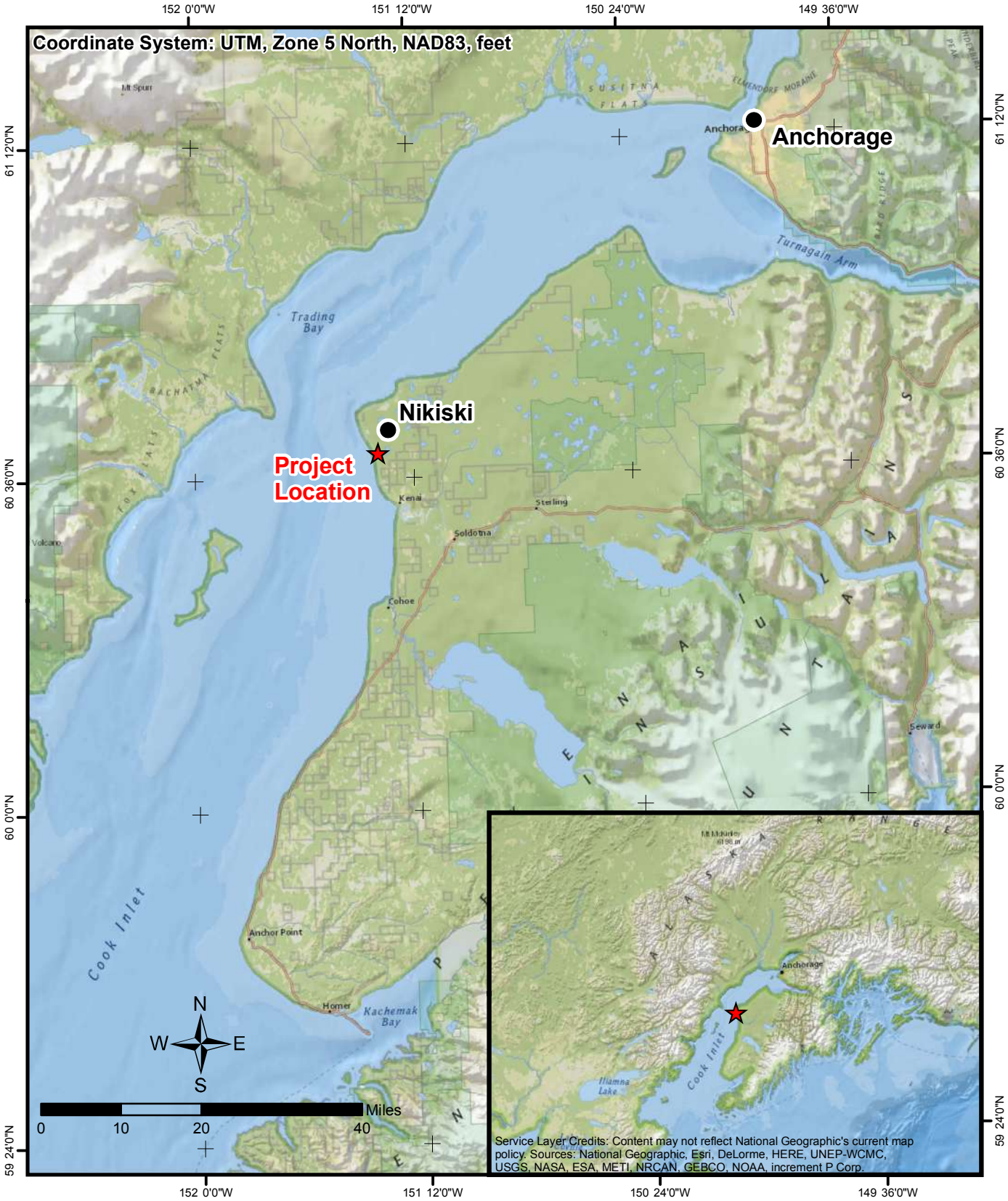
National Fire Protection Association (NPFA), 2006, Standard for the production, storage, and handling of liquefied natural gas (LNG), NFPA 59A, 2006 Edition.

National Fire Protection Association (NFPA), 2013, Standard for the Production, Storage, and Handling of Liquefied Natural Gas (LNG), NFPA 59A.

National Oceanic and Atmospheric Administration (NOAA), 2016, Tides and Currents, Datums for 9455760, Nikiski, AK, https://tidesandcurrents.noaa.gov/datums.html?id=9455760, accessed August 25, 2016.

Youd, T.L., Idriss, I.M., Andrus, R.D., Arango, I., Castro, G., Christian, J.T., Dobry, R., Finn, W.D.L., Harder Jr, L.F., Hynes, M.E., Ishihara, K., Koester, J.P., Liao, S.S.C., Marcuson III, W.F., Martin, G.R., Mitchell, J.K., Moriwaki, Y., Power, M.S., Robertson, P.K., Seed, R.B., Stokoe II, K.H., 2001, Liquefaction Resistance of Soils: Summary Report from the 1996 NCEER and 1998 NCEER/NSF Workshops on Evaluation of Liquefaction Resistance of Soils, Journal of Geotechnical and Geoenvironmental Engineering, Vol. 127, No.10, pp. 817 – 833.

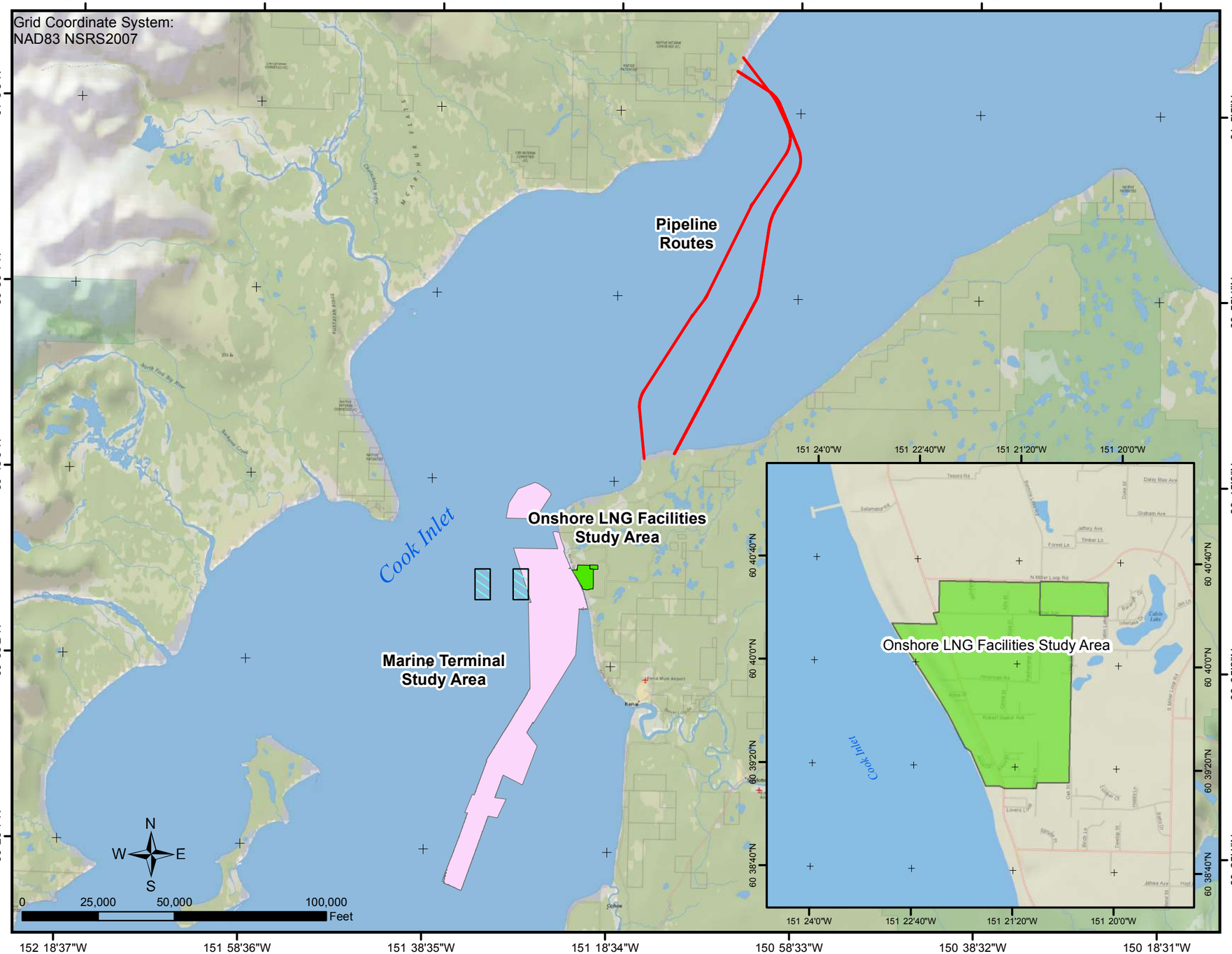
ILLUSTRATIONS

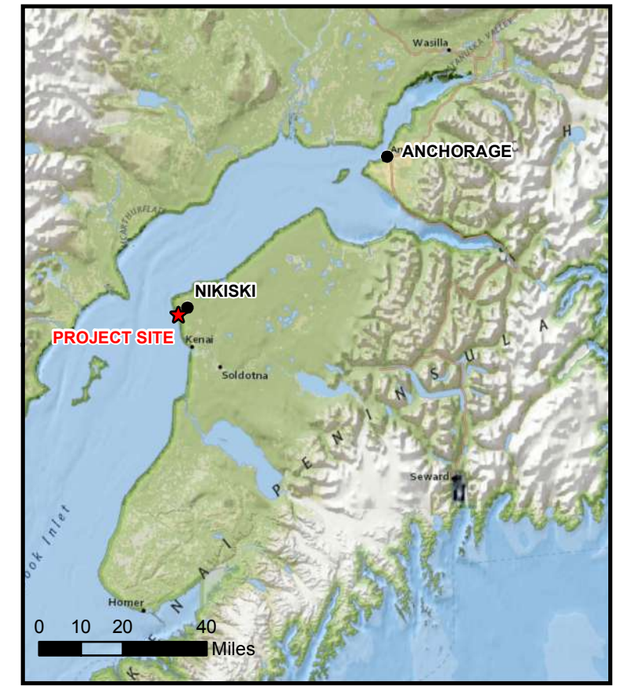


VICINITY MAP
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE 1

R:\04100\2014 Projects\04.10140094 - AKLNG\05_GIS\Outputs\03_PROGRESS\VicinityMap\MXD\20141208_VicinityMap.mxd, 5/4/2016, kimk





KEY MAP

LEGEND

- Onshore LNG Facilities Study Area
- Marine Terminal Study Area
- Dredge Disposal Area
- Pipeline Routes

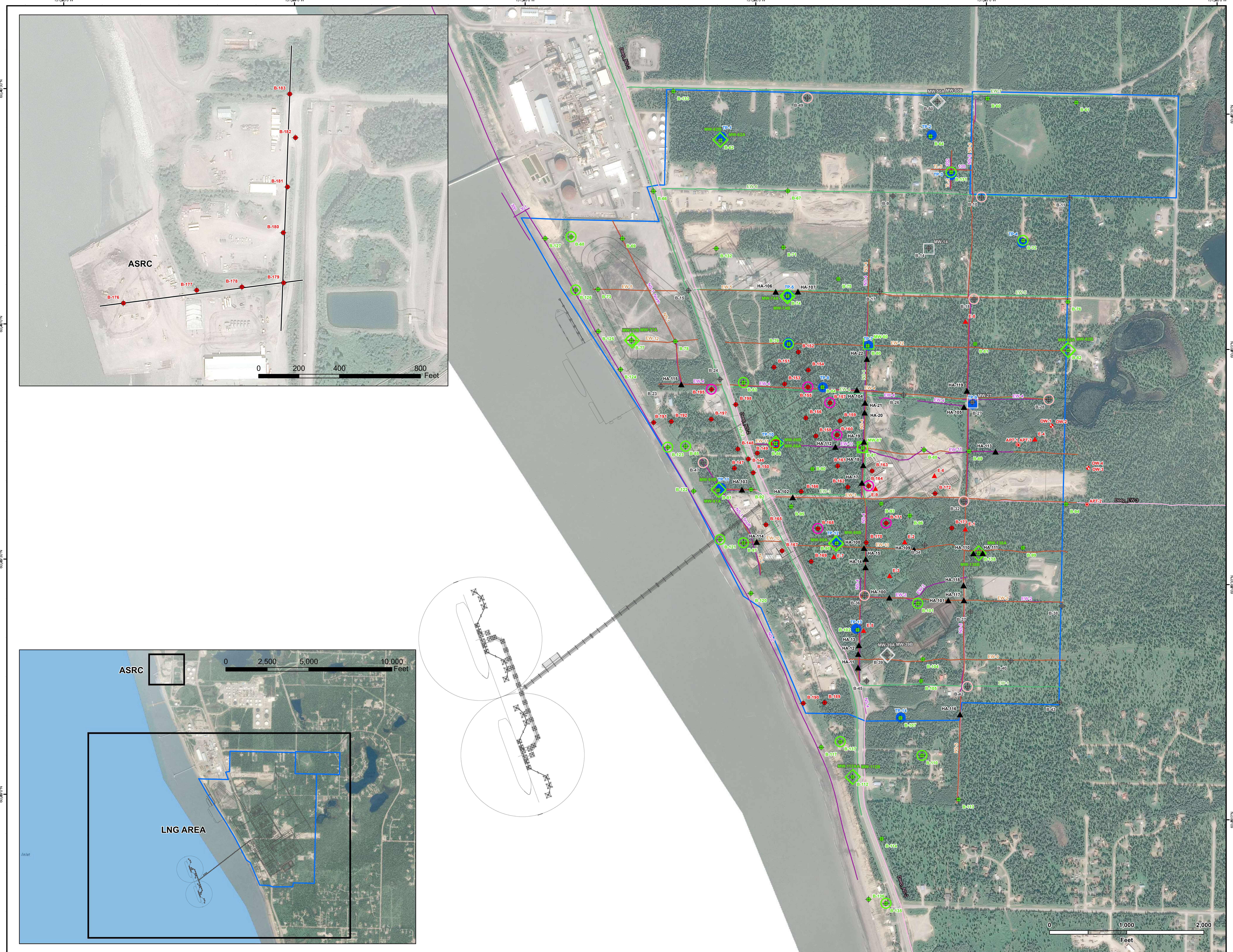
NOTE:

1. Onshore LNG Facilities Study Area boundary provided by AKLNG.

OVERALL SITE PLAN
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE 2

R:\04100\2016 Projects\0001-0099\04.10160001 - AKLNG\07_GIS\Outputs\01_REPORTS\2016_09_26_DataReport\MXD\Plate-02_OverallSiteMap.mxd, 10/27/2016, kimk



LEGEND

Onshore LNG Facilities Study Area

GEOTECHNICAL EXPLORATIONS

- Boring (2016)
- Boring (2015)
- Boring (2014)
- APT Well (2016)
- Observation Well (2016)
- VES Location (2016)
- Hand Auger (2015)
- Test Pit (2015)
- Monitoring Well - Shallow (2016)
- Monitoring Well - Shallow (2015)
- Monitoring Well - Shallow&Deep (2015)
- Monitoring Well - Shallow (2014)
- Monitoring Well - Shallow&Deep (2014)
- Downhole Geophysics (2016)
- Downhole Geophysics (2015)
- Downhole Geophysics (2014)

GEOPHYSICAL SURVEY LINES

- Deep Seismic (2015)
- ERT (2015)
- Shallow Seismic (2015)
- Shallow Seismic (2014)

Borings	As-Built Elevation (NAVD88, ft)	Depth, ft	As-Built Coordinates (NAD83 - NSRS2007)		DH(1)	MW(2)	TP(3)	Borings	As-Built Elevation (NAVD88, ft)	Depth, ft	As-Built Coordinates (NAD83 - NSRS2007)		DH(1)	MW(2)	TP(3)
			Longitude, deg	Latitude, deg							Longitude, deg	Latitude, deg			
B-9	132.25	100.50	-151.35640930	60.67185419				B-105	95.54	101.00	-151.35368353	60.65469558			
B-10	132.80	103.00	-151.35002130	60.67188199	1			B-107	96.04	101.00	-151.35545580	60.65337380			1
B-11	136.36	101.30	-151.34366490	60.67192943				B-110	117.07	155.70	-151.35348741	60.65205636	1		
B-14	133.40	110.70	-151.35375740	60.67003682		1		B-112	109.09	101.00	-151.35846843	60.65124872		2	
B-15	122.96	101.00	-151.37105710	60.66836028				B-113	112.53	113.50	-151.35080438	60.65052782			
B-17	131.21	101.50	-151.35723250	60.66845974				B-114	114.99	126.00	-151.35629452	60.64907498			
B-18	131.25	101.50	-151.35041260	60.66826252	1			B-117	7.60	99.30	-151.36078845	60.65228123			
B-23	124.63	186.50	-151.37288540	60.66494561				B-120	15.41	101.00	-151.36601528	60.65771551			
B-24	120.40	101.00	-151.36864010	60.66523854				B-121	16.38	120.40	-151.36825549	60.65946757	1		
B-26	125.54	100.50	-151.35535980	60.66481307				B-122	16.52	101.00	-151.37037895	60.66120614			
B-27	124.35	101.50	-151.35039120	60.66461107		1		B-123	15.78	139.00	-151.37209000	60.66279044	1		
B-28	118.89	103.00	-151.34486220	60.66475620	1			B-124	13.68	78.50	-151.37584730	60.66551173			
B-32	122.99	101.50	-151.35084730	60.66109265	1			B-125	14.43	101.00	-151.37751496	60.66684480			
B-34	111.83	101.00	-151.35361470	60.65951893				B-126	14.43	127.00	-151.37914509	60.66831013	1		
B-36	111.70	103.00	-151.35789050	60.65768300	1			B-127	15.98	101.00	-151.38141047	60.67012169			
B-37	106.27	27.00	-151.35022180	60.65717918				B-131	133.25	91.00	-151.35225744	60.67274798	1		1
B-38	123.47	151.30	-151.34359640	60.65746298				B-132	122.90	111.00	-151.36911316	60.66986806			
B-39	95.51	151.50	-151.35615280	60.65559414		2		B-133	125.63	105.50	-151.37244708	60.67540767			
B-40	120.84	101.50	-151.34721580	60.65547709				B-135	112.66	150.50	-151.35586806	60.64679349	1		
B-42	118.85	101.50	-151.35029920	60.65453131	1			B-136	13.42	94.00	-151.35727753	60.64689374			
B-43	121.14	102.80	-151.34362450	60.65405368				B-137	116.64	115.50	-151.35941780	60.65248997	1		
B-45	109.09	101.50	-151.35759480	60.65465742				B-138	103.22	146.00	-151.34969539	60.65926678		2	
B-47	119.73	151.00	-151.36972090	60.66227016	1			B-146	111.74	217.30	-151.36648264	60.66243655	1		
B-49	127.76	101.50	-151.36274610	60.67526763	1			B-147	119.69	200.30	-151.36747798	60.66209855			
B-50	131.66	151.50	-151.35335930	60.67524580		2		B-148	122.26	206.10	-151.36726271	60.66278039			
B-60	135.49	81.00	-151.34970518	60.67539889				B-149	126.30	223.00	-151.36585008	60.66265279			
B-61	137.58	96.00	-151.34332584	60.67530860				B-150	110.97	200.20	-151.36610352	60.66195569			
B-62	127.66	101.30	-151.36898112	60.67372335		2	1	B-151	125.85	201.00	-151.36476522	60.66571099			
B-64	133.91	86.00	-151.35383276	60.67397590			1	B-152	125.79	150.40	-151.36303312	60.66626550			
B-66	127.44	105.00	-151.37372952	60.67185480				B-153	126.81	150.60	-151.36397783	60.66511871			
B-67	124.49	110.50	-151.36405465	60.67196390				B-154	127.46	151.00	-151.36228714	60.66562743			
B-68	122.47	202.00	-151.37961780	60.67016196	1			B-155	126.76	151.00	-151.36228399	60.66502805	1		
B-69	123.86	105.50	-151.37590717	60.67015134				B-156	124.84	151.00	-151.36239760	60.66393399			
B-71	116.20	101.00	-151.36427266	60.66996116				B-157	124.51	151.00	-151.36066599	60.66448827	1		
B-72	135.28	86.30	-151.34710070	60.67027771	1		1	B-158	120.63	150.50	-151.36163461	60.66329807			
B-73	122.34	111.00	-151.37753990	60.66852118				B-159	118.84	150.30	-151.35991084	60.66385187			
B-74	111.99	151.00	-151.36389233	60.66824205	1	2	1	B-160	115.35	150.20	-151.36011160	60.66335236	1		
B-75	129.87	101.50	-151.36028017	60.66890221				B-161	105.03	156.00	-151.36001832	60.66225349			
B-76	130.47	101.00	-151.34362252	60.66829367				B-162	111.45	151.00	-151.35926363	60.66151597			
B-77	116.01	202.00	-151.37510864	60.66654928	1	2		B-163	104.85	150.90	-151.35752400	60.66210614			
B-78	118.09	101.00	-151.37192900	60.66654928				B-164	105.43	151.00	-151.35773753	60.66157129	1		
B-79	123.61	101.00	-151.36374290	60.66653811	1		1	B-165	103.54	150.30	-151.36510331	60.66011521			
B-80	130.85	100.50	-151.35803312	60.66653133		1	1	B-166	100.68	150.70	-151.36262002	60.66132084			
B-81	128.79	106.00	-151.35027766	60.66667672				B-167	111.91	150.30	-151.36390727	60.65921073			
B-82	116.34	150.50	-151.34337253	60.66650909		2	1	B-168	118.89	176.00	-151.36134711	60.66001705	1		
B-83	126.03	106.00	-151.36693500	60.66514200	1			B-169	122.82	151.00	-151.36179473	60.65885340			
B-84	127.53	100.80	-151.36123975	60.66503400			1	B-170	123.01	171.00	-151.35783392	60.65955956			
B-85	119.50	202.00	-151.37102452	60.66284303				B-171	116.53	151.00	-151.35643036	60.66026570	1		
B-86	124.85	101.00	-151.36453497	60.66300368	1	3	1	B-172	119.91	160.50	-151.35294376	60.66135351			
B-87	106.46	96.30	-151.35823947	60.66291477	1	1		B-173	121.02	171.00	-151.35167947	60.66013946			
B-88	93.98	101.30	-151.35380723	60.66288908				B-176	27.14	210.20	-151.39778916	60.68727972	1		
B-89	126.64	101.30	-151.35055076	60.66287057				B-177	29.39	51.00	-151.39577948	60.68747575			
B-90	110.48	101.00	-151.36189643	60.66213101				B-178	34.20	51.00	-151.39453464	60.68753301			
B-91	117.54	100.60	-151.36864403	60.66129503		2	1	B-179	43.66	51.00	-151.39339076	60.68760076			
B-92	118.03	99.80	-151.36624365	60.66135905				B-180	77.76	76.00	-151.39342768	60.68827819			
B-93	118.69	101.00	-151.35681706	60.66095091				B-181	87.19	76.50	-151.39334051	60.68889704			
B-94	127.39	101.00	-151.34346988	60.66106965				B-182	85.60	50.50	-151.39314642	60.68956559			
B-95	96.73	101.00	-151.36332415	60.66078281				B-183	98.76	101.10	-151.39333025	60.69015403			
B-96	97.65	101.00	-151.35473390	60.66054881				B-189	119.97	201.00	-151.36061126	60.65385926			
B-97	109.47	203.00	-151.36669900	60.65946066	1			B-190	20.56	97.10	-151.36215168	60.65382001			
B-98	115.67	101.00	-151.35997475	60.65951243		2	1	B-191	20.50	114.20	-151.37337267	60.66365831			
B-99	123.82	151.00	-151.34652491	60.65948995				B-192	123.19	239.30	-151.37209739	60.66371093			
B-101	94.98	152.00	-151.35402409	60.65744590	1			B-195	119.97	226.00	-151.36924661	60.66487249	1		
B-102	97.95	101.00	-151.35833603	60.65645887			1	B-197	122.74	249.60	-151.36922005	60.66381855			
B-104	95.22	105.90	-151.35258202	60.65547421				B-198	117.99	300.50	-151.36747007	60.66435767			

Notes:

(1)DH = Downhole Seismic Test
(2)MW = Monitoring Well
(3)TP = Test Pit

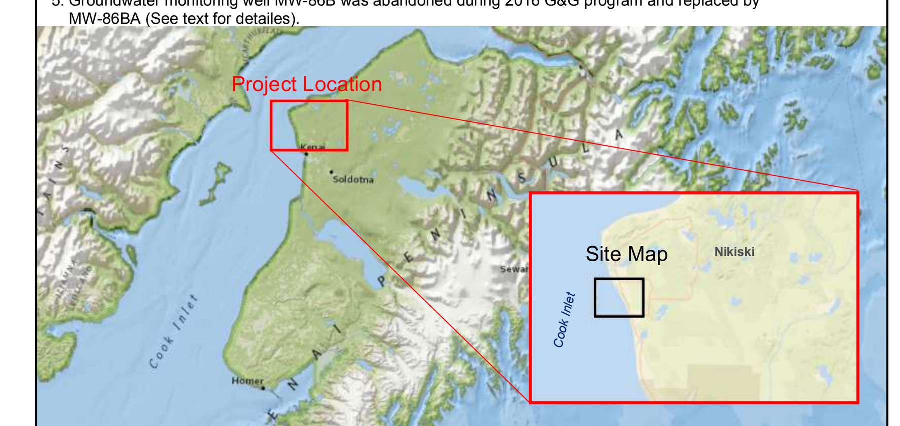
Monitoring Wells	As-Built Elevation (NAVD88, ft)	Depth, ft	As-Built Coordinates (NAD83 - NSRS2007)	
			Longitude, deg	Latitude, deg
MW-14	133.70	56.00	-151.35376440	60.67001489
MW-27	124.30	57.00	-151.35037410	60.66459539
MW-39A	95.50	147.00	-151.35615710	60.65557926
MW-39B	95.30	40.00	-151.35613450	60.65560508
MW-50A	132.60	146.00	-151.35331470	60.67523060
MW-50B	132.20	55.50	-151.35336650	60.67526072
MW-62A	127.36	145.40	-151.36900760	60.67372740
MW-62B	127.63	47.00	-151.36896370	60.67373020
MW-74A	111.70	159.00	-151.36390300	60.66825110
MW-74B	111.53	81.00	-151.36390170	60.66822290
MW-77A	116.31	146.00	-151.37507200	60.66655740
MW-77B	116.25	61.00	-151.37506340	60.66654210
MW-80	130.99	61.70	-151.35796510	60.66660890
MW-82A	118.58	150.00	-151.34354410	60.66651740
MW-82B	119.22	52.00	-151.34358260	60.66654600
MW-86A	124.44	146.00	-151.36452040	60.66301340
MW-86B	124.48	42.00	-151.36451240	60.66299700
MW-87	106.91	52.50	-151.35826080	60.66293920
MW-91A	117.27	146.00	-151.36859480	60.66133530
MW-91B	117.31	64.00	-151.36858380	60.66131500
MW-98A	122.17	116.00	-151.36000880	60.65949110
MW-98B	122.26	43.00	-151.36003290	60.65952300
MW-112AA	115.55	119.00	-151.35844950	60.65126000
MW-112B	115.76	61.00	-151.35847780	60.65124200
MW-138A	103.22	146.80	-151.34969540	60.65926680
MW-138B	103.33	43.30	-151.34973370	60.65927620
APT-1	117.09	138.00	-151.34706092	60.66315390
APT-2	126.99	137.00	-151.34195457	60.66107404
APT-3	115.83	437.00	-151.34698760	60.66312928
OW-1	109.56	79.00	-151.34463703	60.66385170
OW-2	109.09	150.00	-151.34460741	60.66382579
OW-3	128.26	70.00	-151.34191656	60.66235654
OW-4	128.29	137.00	-151.34194479	60.66238108
MW-86BA	124.73	66.00	-151.36456512	60.66299257

Hand Augers	As-Built Elevation (NAVD88, ft)	Depth, ft	As-Built Coordinates (NAD83 - NSRS2007)	
			Longitude, deg	Latitude, deg
HA-11	104.53	2.8	-151.3582393	60.65512561
HA-12	93.98	4.3	-151.3582455	60.65560946
HA-13	97.62	2.3	-151.3582056	60.65592101
HA-14	121.19	1.6	-151.3578491	60.65868729
HA-15	121.09	3.2	-151.3578434	60.65898341
HA-17	116.12	2.5	-151.3582332	60.66167632
HA-18	108.69	5.5	-151.3581713	60.66230348
HA-19	106.92	6.9	-151.3581512	60.66313564
HA-20	119.04	2.6	-151.3581436	60.66416493
HA-21	123.32	2.8	-151.3581355	60.66451619
HA-22	130.06	2.8	-151.3580616	60.66606764
HA-100	97.71	4.3	-151.3560797	60.65762929
HA-101	88.78	2.0	-151.3518266	60.65757639
HA-102	104.23	4.0	-151.3632097	60.6611113
HA-103	117.69	3.0	-151.3668833	60.66134432
HA-104	124.01	3.8	-151.3587445	60.6649634
HA-105	124.7	2.2	-151.3509738	60.66444029
HA-106	118.92	1.8	-151.3647449	60.66838243
HA-107	118.88	3.7	-151.3631376	60.66840602
HA-108	123.01	1.5	-151.3579906	60.65936729
HA-109	111.12	1.5	-151.3543773	60.65935399
HA-110	100.45	4.0	-151.3500841	60.65926121
HA-111	102.15	2.0	-151.3494033	60.65927181
HA-112	106.13	2.0	-151.3602101	60.662931
HA-113	125.64	2.4	-151.3486347	60.66288061
HA-114	105.52	2.7	-151.365746	60.65950795
HA-115	121.16	3.3	-151.371427	60.6650298
HA-116	109.59	5.0	-151.350813	60.65354365
HA-117	90.06	3.0	-151.3507027	60.65758828
HA-118	94.46	2.0	-151.3507445	60.65811632
HA-119	123.19	2.0	-151.350797	60.66501537

Test Pits	As-Built Elevation (NAVD88, ft)	Depth, ft	As-Built Coordinates (NAD83 - NSRS2007)	
			Longitude, deg	Latitude, deg
TP-01	127.2	8	-151.36890605	60.67382958
TP-02	133.08	8	-151.35371804	60.67405024
TP-03	134.43	5	-151.35223907	60.67264108
TP-04	134.56	8	-151.34703124	60.67029871
TP-05	111.72	8	-151.36376102	60.66825015
TP-06	122.7	8	-151.36376305	60.66658642
TP-07	130.61	8	-151.35798402	60.66653967
TP-08	127.05	8	-151.36120253	60.66502775
TP-09	123.74	8	-151.35036700	60.66453403
TP-10	124.36	8	-151.36432332	60.66300351
TP-11	117.18	8	-151.36840024	60.66138217
TP-12	122.53	8	-151.35995040	60.65957943
TP-13	97.98	8	-151.35843823	60.65650048
TP-14	97.02	11	-151.35507881	60.65339243

Notes:

1. Base imagery provided by EXP Geomatics (EXP).
2. Onshore LNG Facilities Study Area provided by AKLNG.
3. Onshore Facilities plot plan is provided by CB&I/CHIYODA on drawings USAL-CB-LDLAY-00-000003-000 Rev.6 dated June 30, 2016.
4. As-built coordinates of exploration locations provided by JOA Surveying Services, Inc. (2014) and McLane Consulting, Inc. (2015, 2016).
5. Groundwater monitoring well MW-86B was abandoned during 2016 G&G program and replaced by MW-86BA (See text for detailes).



This document may only be used for the purpose for which it was commissioned and in accordance with the terms of engagement for that commission. Unauthorized use of this document in any form whatsoever is prohibited.

GEODETIC INFORMATION

PROJECTION:	Transverse_Mercator
FALSE EASTING:	1640416.666666666
FALSE NORTHING:	0.0
CENTRAL MERIDIAN:	-150.0
SCALE FACTOR:	0.9999
LATITUDE OF ORIGIN:	54.0
LINEAR UNIT:	US Foot
SPHEROID:	GRS 1980
SEMI-MAJOR AXIS:	6,378,137.000
SEMI-MINOR AXIS:	6,356,752.314140356
INVERSE FLATTENING:	298.257222101

N / W / E / S

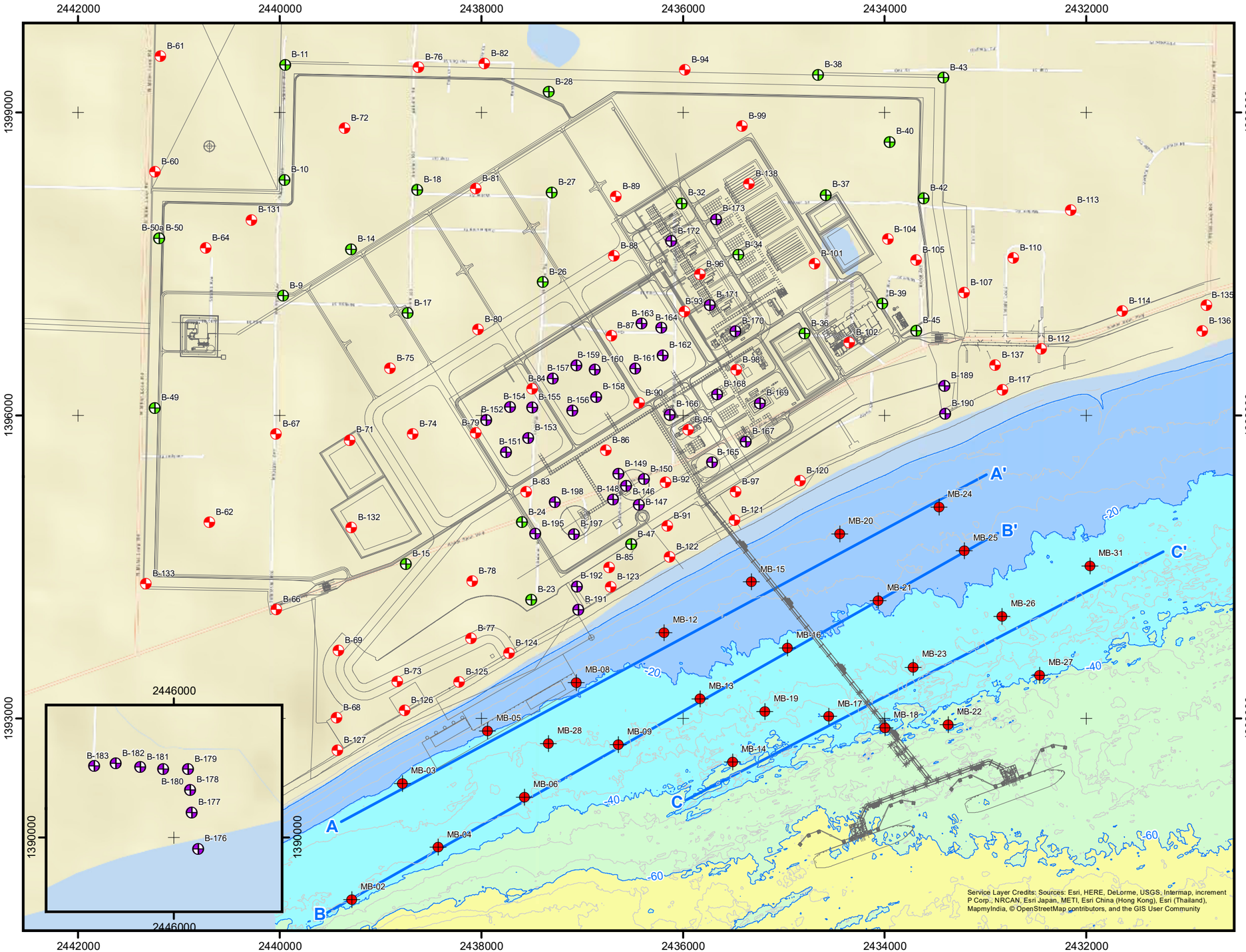
Coordinate Grid: NAD 1983 (NSRS 2007), Degrees Minutes Seconds

FUGRO CONSULTANTS, INC.
6100 Hillcroft Ave.
Houston, Texas 77081
Tel: 713.369.5400
Fax: 713.369.5518
www.fugroconsultants.com

PLANT LAYOUT
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

REV NO:	DATE:	DESCRIPTION:	DRAWN:	CHKD:	APPR:
0	11/10/2016	Onshore LNG Facilities Plan of Exploration	KIMK	BB	

JOB NUMBER: 04.10160001-9 DRAWING NO: PLATE 3



LEGEND

- Nearshore Borings (2015)
- Onshore Borings (2014)
- Onshore Borings (2015)
- Onshore Borings (2016)
- Cross Sections

BATHYMETRY (MLLW, Feet)

Source: Multibeam (Fugro, 2014)

- Major contour interval is 20 feet.
- Minor contour interval is 5 feet.
- -79.9 - -60ft
- -59.9 - -40ft
- -39.9 - -20ft
- -19.9 - 0ft

Coordinate Grid: Alaska State Plane, Zone 4
NAD83, NSRS 2007, Feet

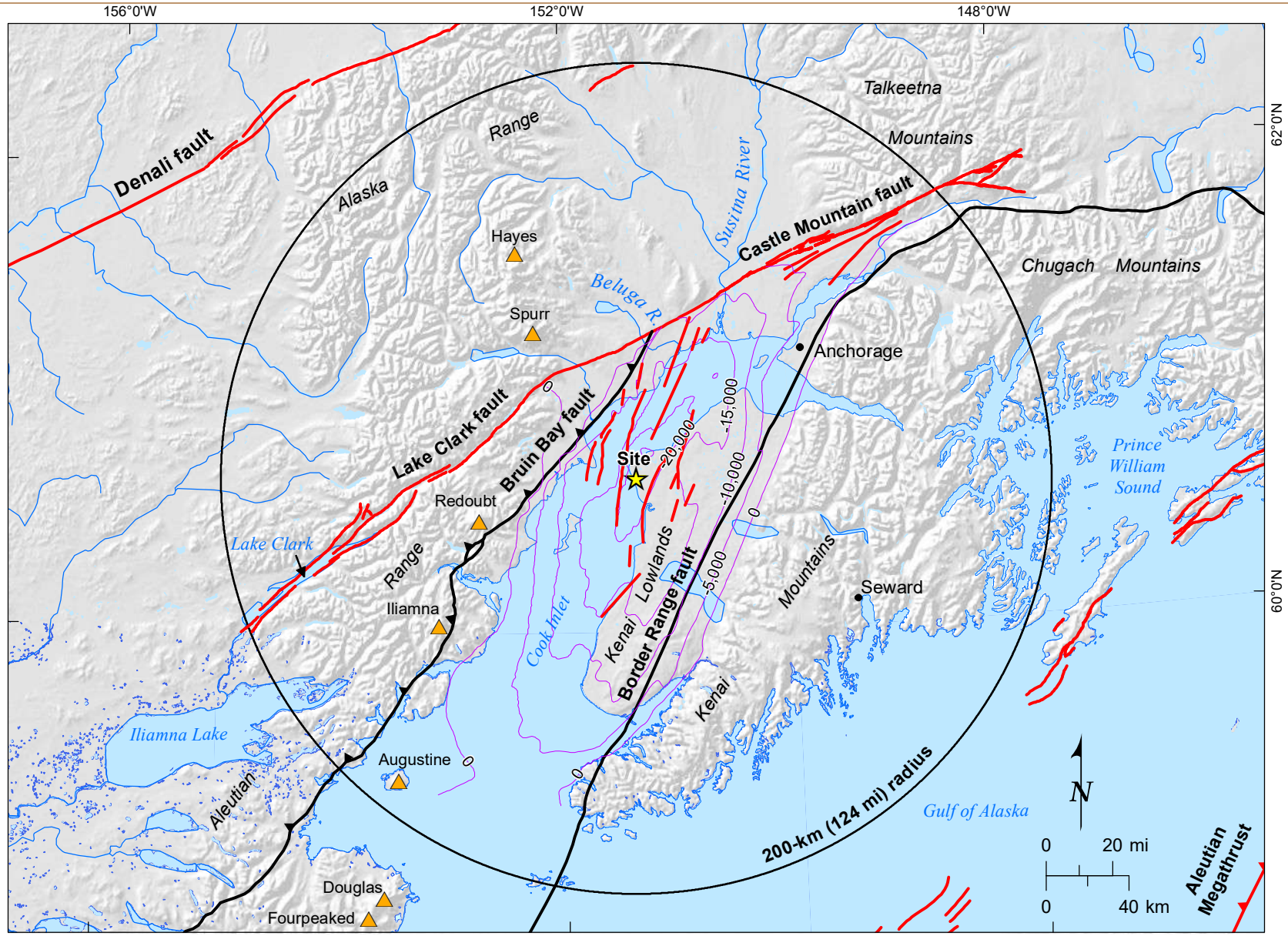
N

1:12,000

0 500 1,000 2,000 Feet

PLAN OF BORINGS
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2016\04.10160001_AKLNG_Phase3\05_GIS\Outputs\2016_10_19_SeismicReport_Ph3\mxd\Plate04_PlanofBorings.mxd, 10/21/2016, c.dean

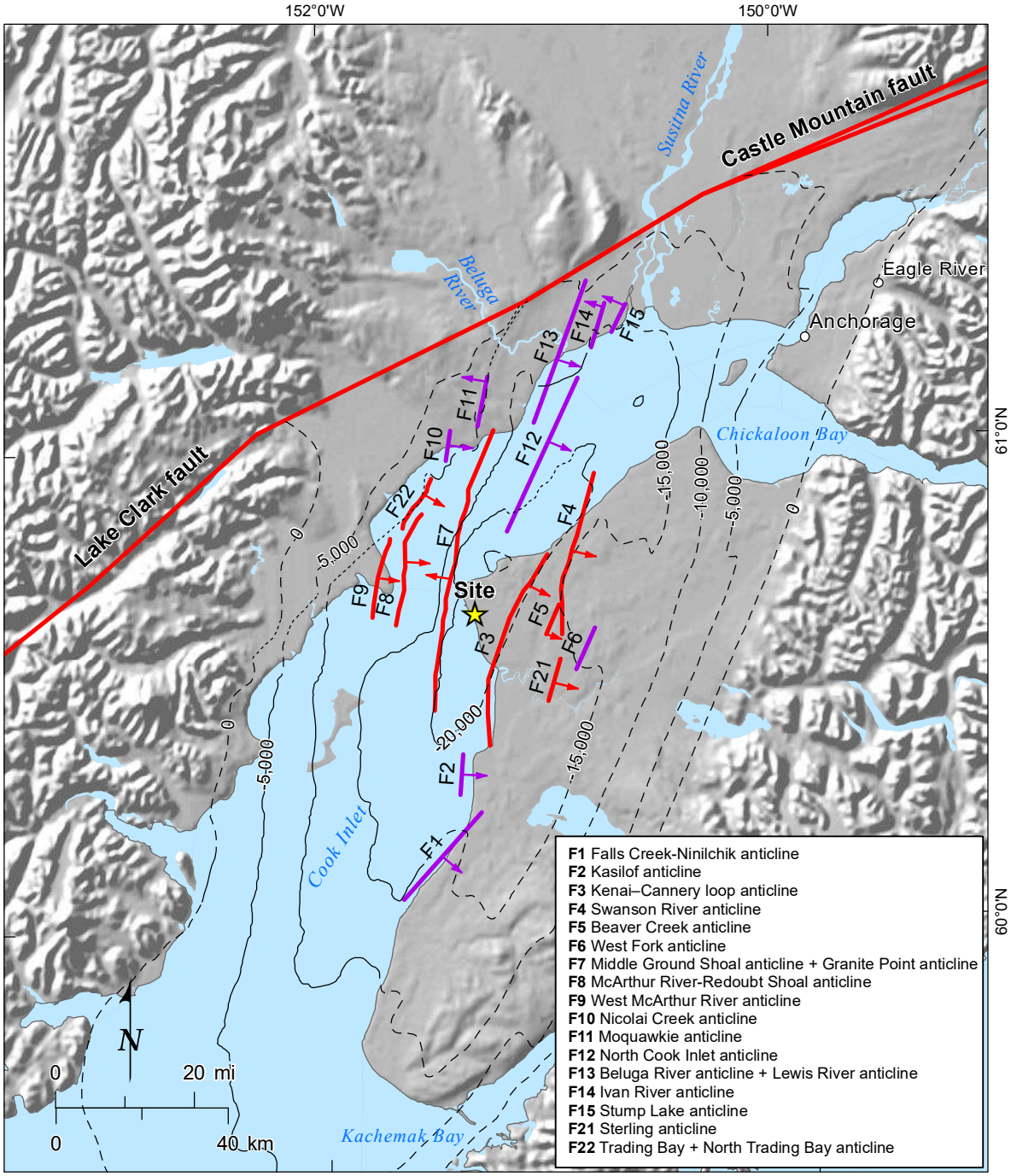


Legend

- Pre-Quaternary fault (Plafker et al., 1994)
- Quaternary-active fault, Koehler et al. (2012), and this study
- Volcanoes
- 15,000 Depth of Cook Inlet Basin, 5,000-foot contours (modified from Schellenbaum et al., 2010)

REGIONAL FAULT MAP
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE 5



Legend

Modeled Surface Projection of Blind Fault Tip-Line

F3 Based on mapping of seismic reflection data; arrow shows direction of dip

F1 Based on Koehler (2012); arrow shows direction of dip

Depth of Cook Inlet Basin, 5,000-foot Contours (modified from Schellenbaum et al., 2010)

Dashed where approximate

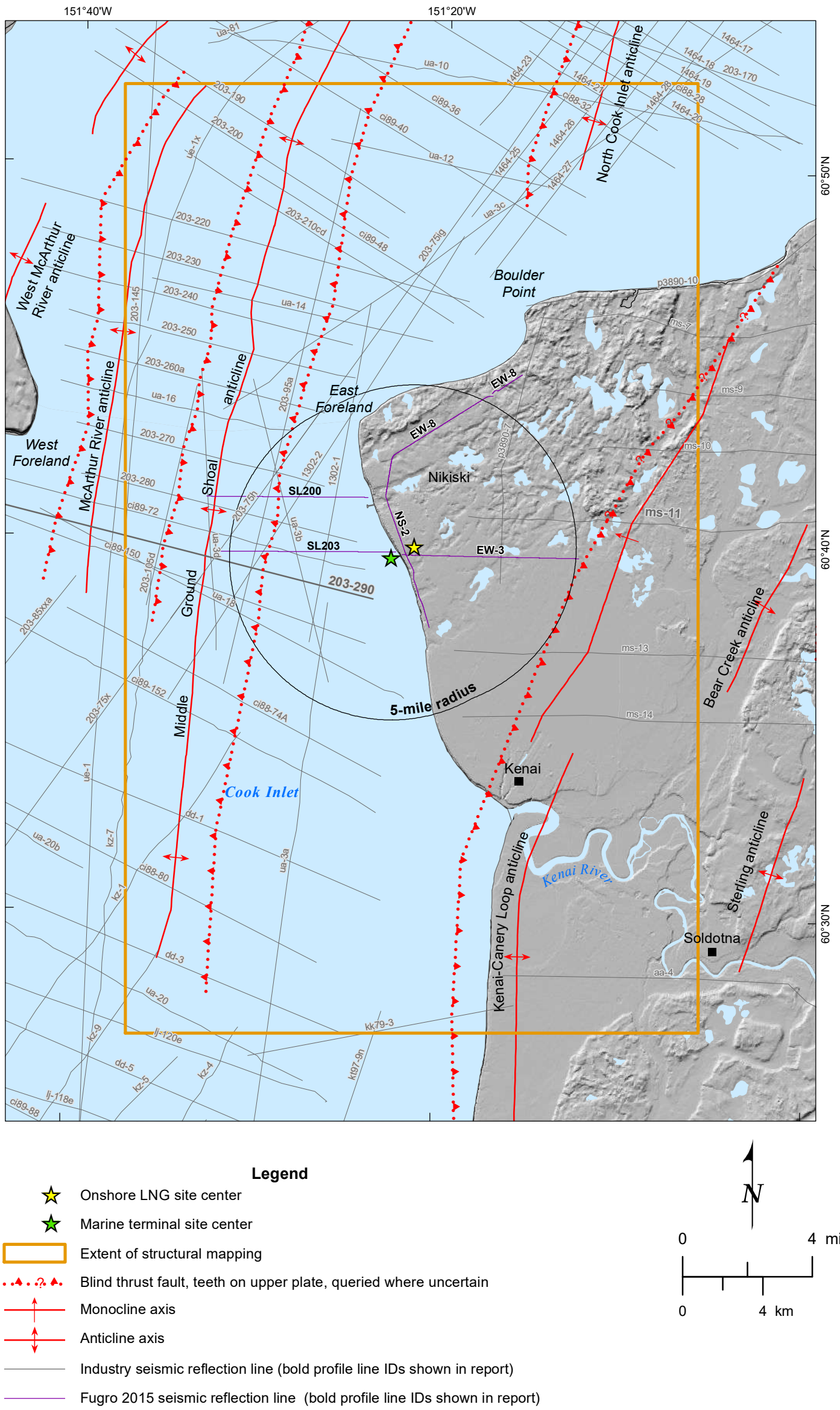
Solid where well located

Interpolated

COOK INLET FAULT-CORED FOLD SOURCE MODEL

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

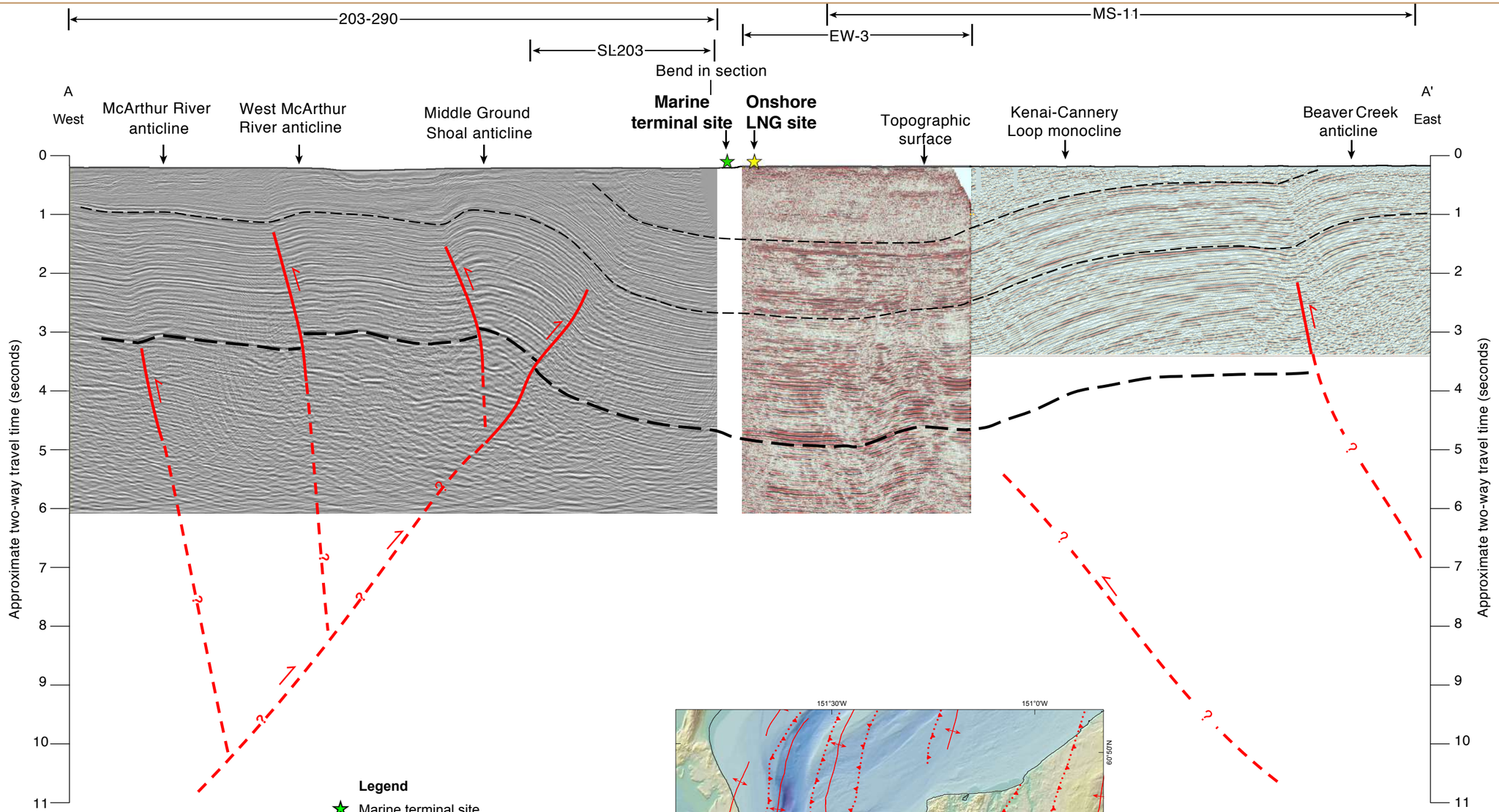
PLATE 6



FOLDS AND FAULTS MAPPED FROM SEISMIC REFLECTION DATA

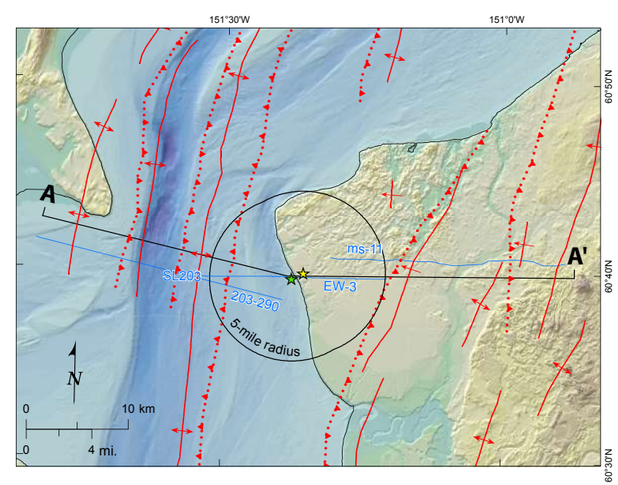
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE 7



Legend

- Marine terminal site
- Site center
- Structural form line within undifferentiated Tertiary units
- Top of Mesozoic basement
- Faults; dashed where inferred

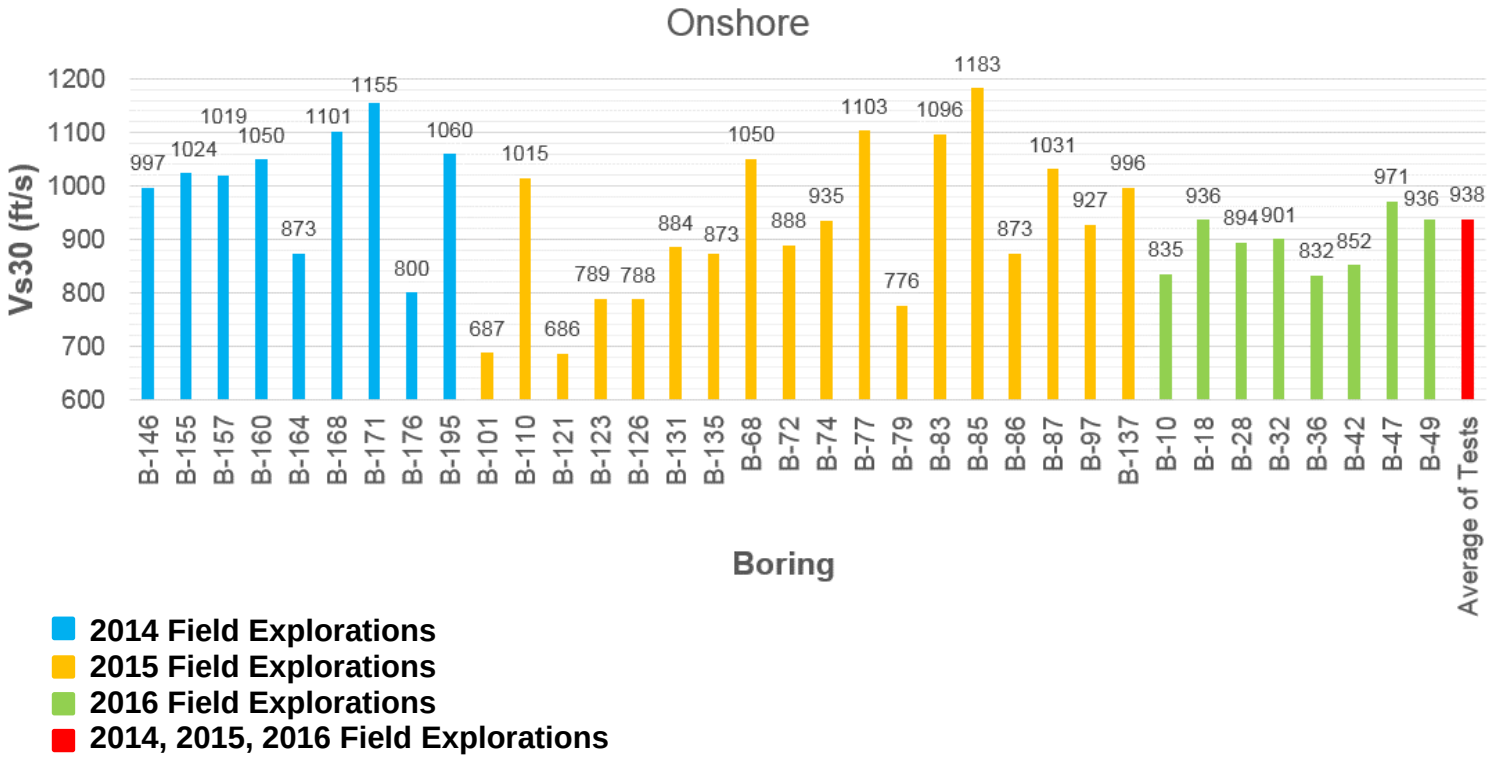


The information contained herein is ConocoPhillips "independent information," as defined in the June 30 2014 Alaska LNG Project Pre-FEED Joint Venture Agreement ("Pre-FEED JVA"), and is provided to Lead Party subject to the Pre-FEED JVA solely for the purpose of geohazard analysis, including probabilistic seismic hazard analysis, to support the Alaska LNG project's FERC filings.

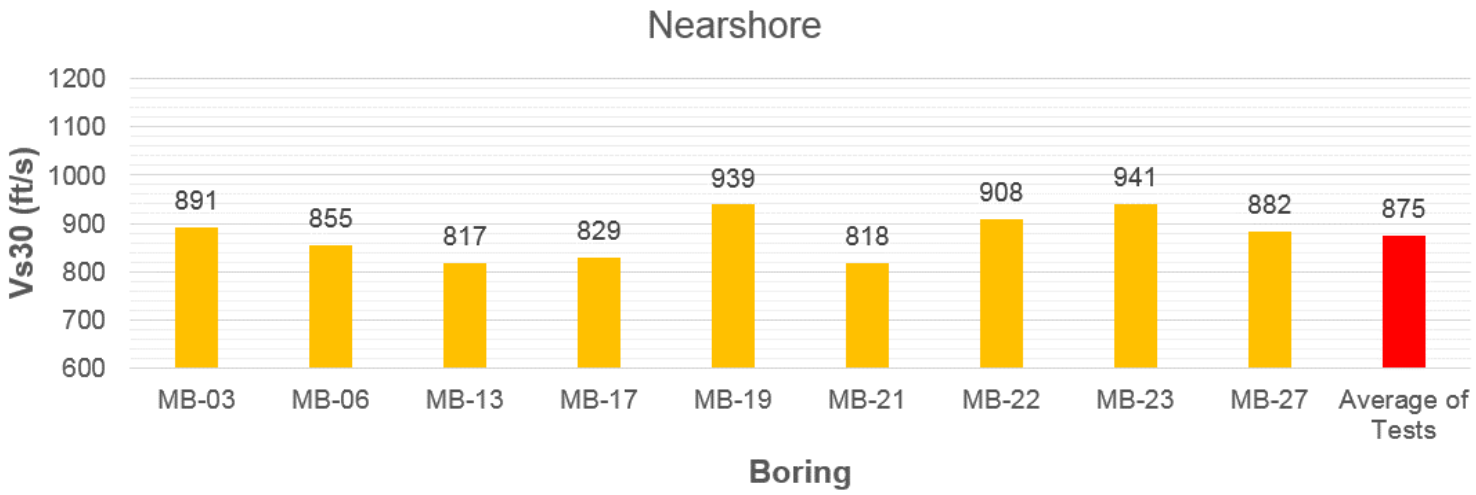
Notes:
1.For conceptual purposes only.
2. Horizontal and vertical are not to scale.

CONCEPTUAL CROSS SECTION OF UPPER COOK INLET BASIN AT THE LATITUDE OF THE SITE
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE 8

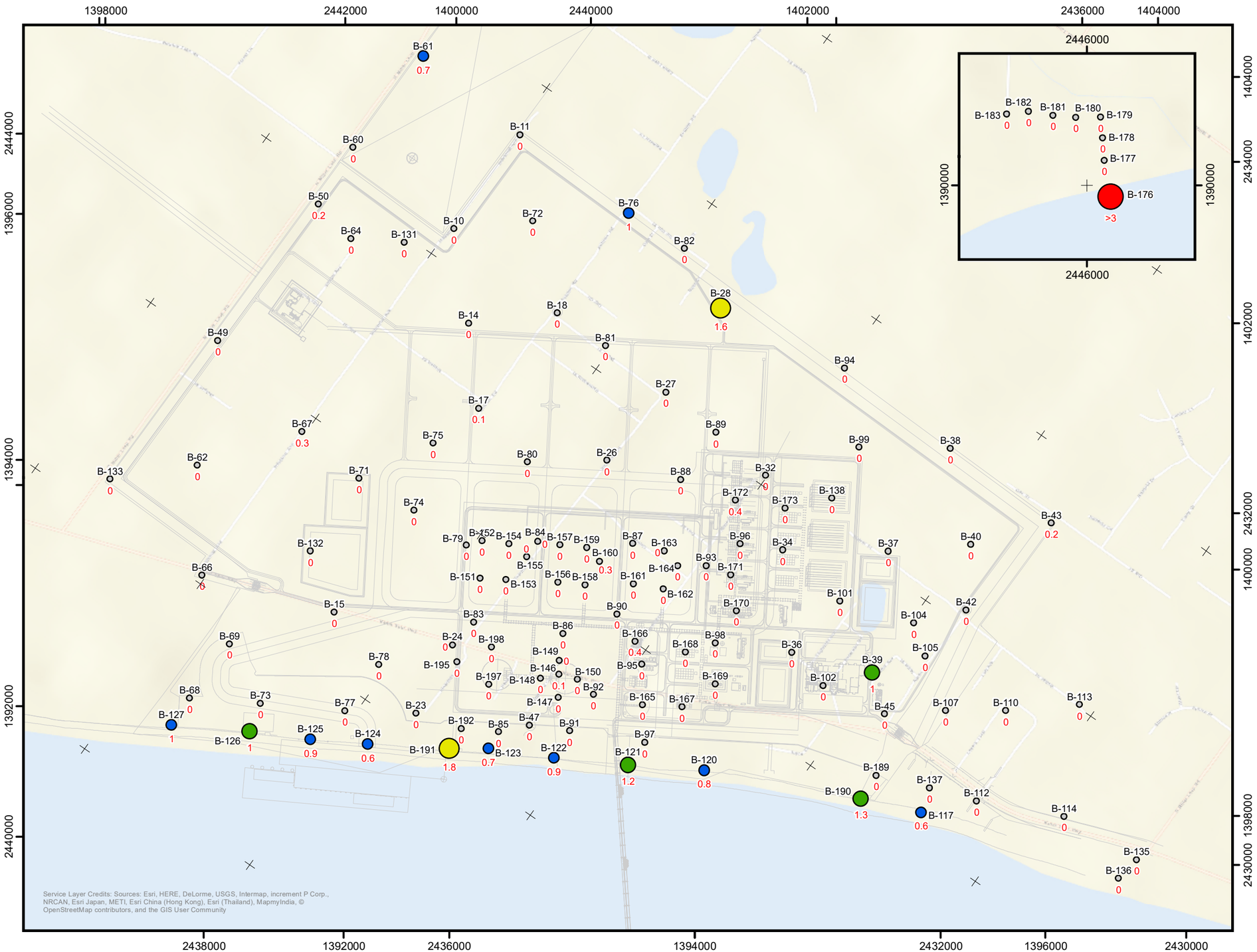


2014 Field Explorations
2015 Field Explorations
2016 Field Explorations
2014, 2015, 2016 Field Explorations



SUMMARY OF SHEAR WAVE VELOCITY DATA OBTAINED FROM DOWNHOLE SEISMIC SHEAR WAVE VELOCITY TESTS IN THE ONSHORE AND NEARSHORE PROJECT AREA DURING 2014, 2015 AND 2016 FIELD EXPLORATIONS

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



Legend

Estimated Cumulative Settlement (in)

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 3
- > 3

Site Layout

B-02 / 0.9 — Boring location with boring name and settlement in Inches

Note: OBE Level per NFPA 59A 2006 (M=8.0, PGA=0.53g), Boulanger and Idriss (2014), existing elevation

Coordinate System: Alaska State Plane, Zone 4, NAD83, NSRS 2007, Feet

N

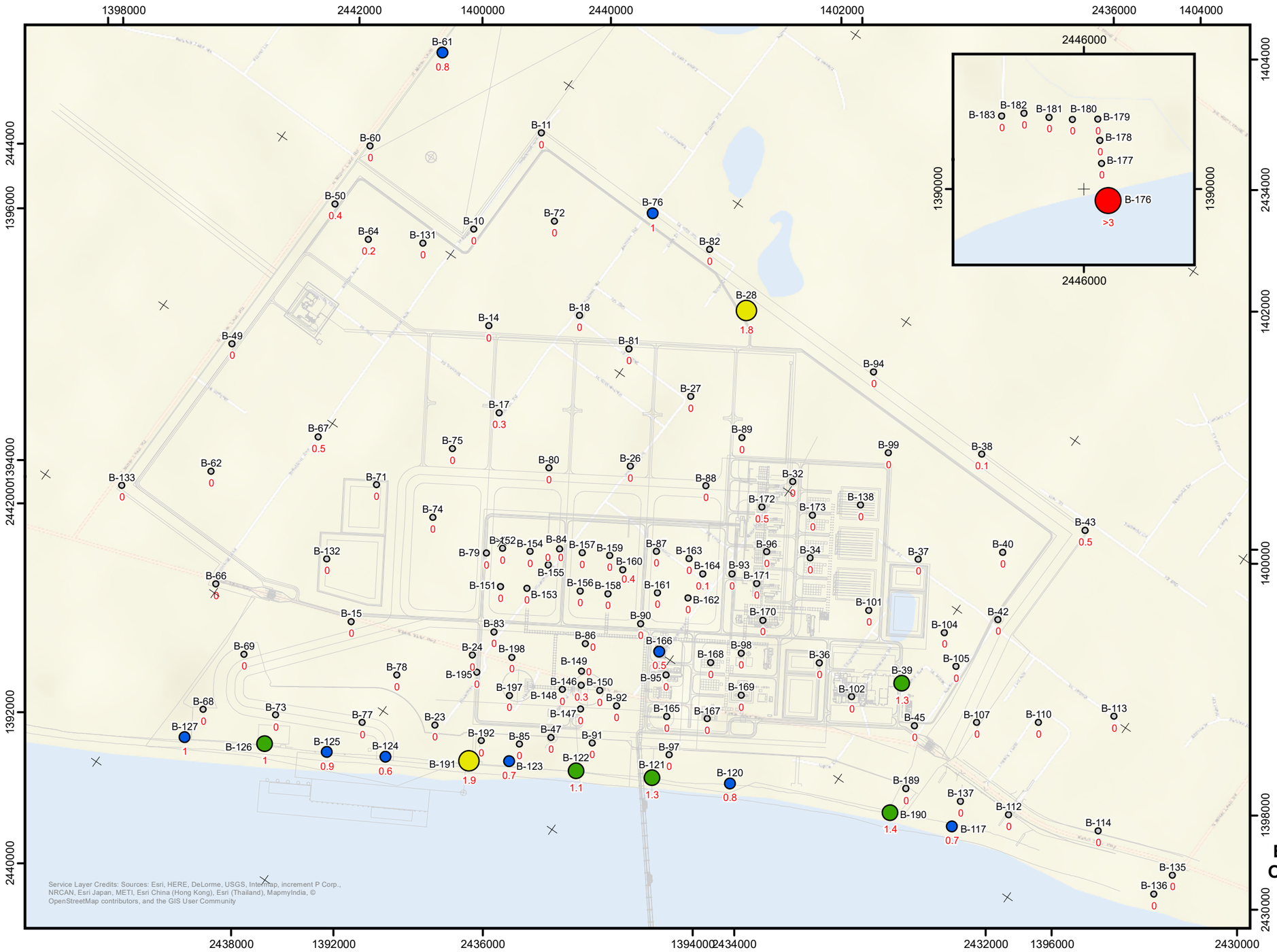
1:12,000

0 375 750 1,500 Feet

ESTIMATED CUMULATIVE SETTLEMENT
ONSHORE LOCATIONS - OBE LEVEL
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE 10

Y:\Jobdocs\04_2016\04.10160001_AKLNG_Phase3\05_GIS\Outputs\2016_10_19_SeismicReport_Ph3\mxd\Plate07_Settlement_Onshore_OBE.mxd, 10/21/2016, c.dean



Legend

Estimated Cumulative Settlement (in)

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 3
- > 3

Site Layout

B-02 / 0.9 — Boring location with boring name and settlement in Inches

Note: SSE Level per NFPA 59A 2006 / MCE level per ASCE 7-05 (M=8.0, PGA=0.90g), Boulanger and Idriss (2014), existing elevation

Coordinate System: Alaska State Plane, Zone 4, NAD83, NSRS 2007, Feet

N

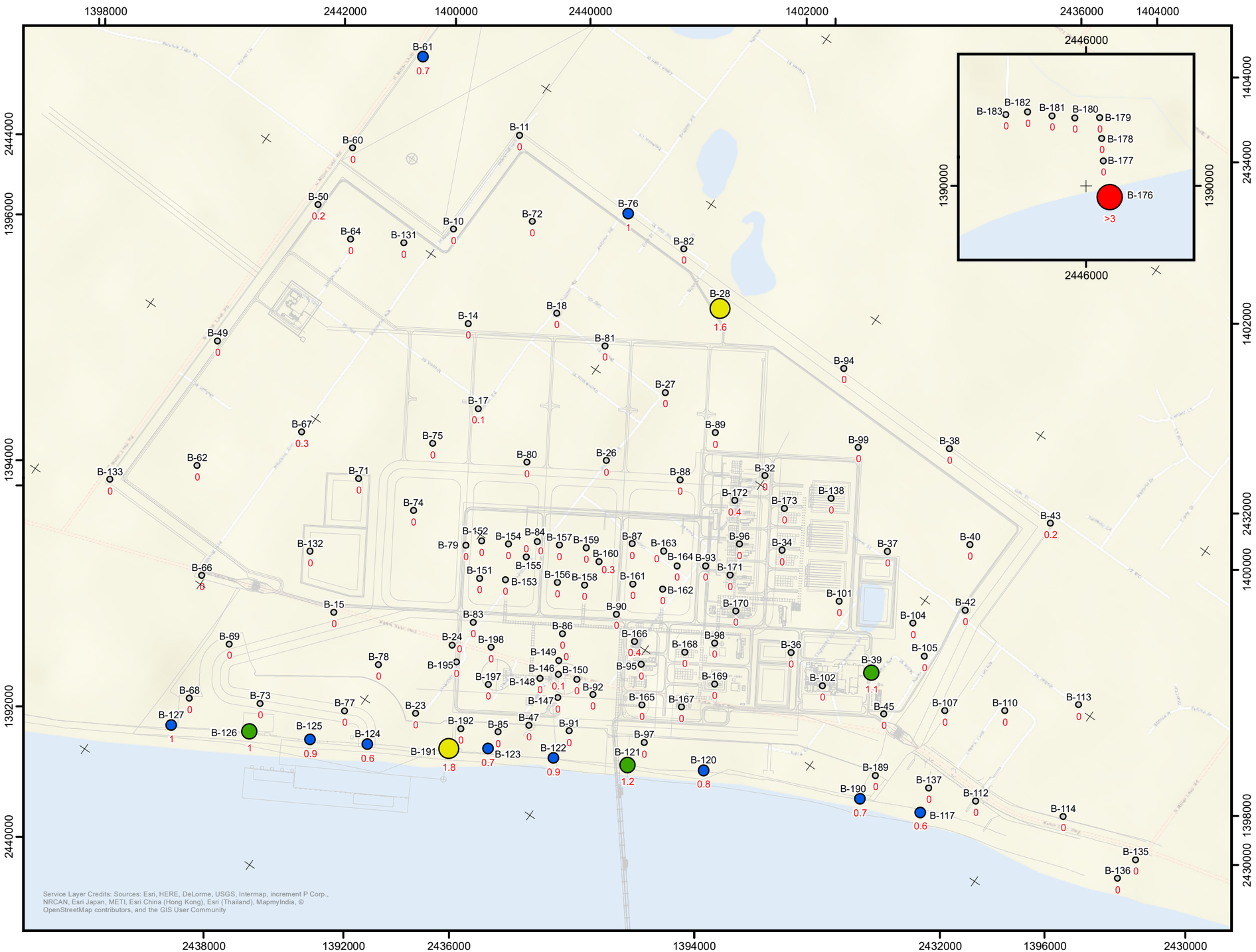
1:12,000

0 375 750 1,500 Feet

ESTIMATED CUMULATIVE SETTLEMENT ONSHORE LOCATIONS - SSE/MCE LEVEL

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2016\04.10160001_AKLNG_Phase3\05_GIS\Outputs\2016_10_19_SeismicReport_Ph3\mxd\Plate08_Settlement_Onshore_MCE.mxd, 10/21/2016, c.dean



Legend

Estimated Cumulative Settlement (in)

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 3
- > 3

Site Layout

B-02 — Boring location with boring name and settlement in Inches
0.9

Note: OBE Level per NFPA 59A 2006 (M=8.0, PGA=0.53g), Boulanger and Idriss (2014), Proposed Elevation

Coordinate System: Alaska State Plane, Zone 4, NAD83, NSRS 2007, Feet

N

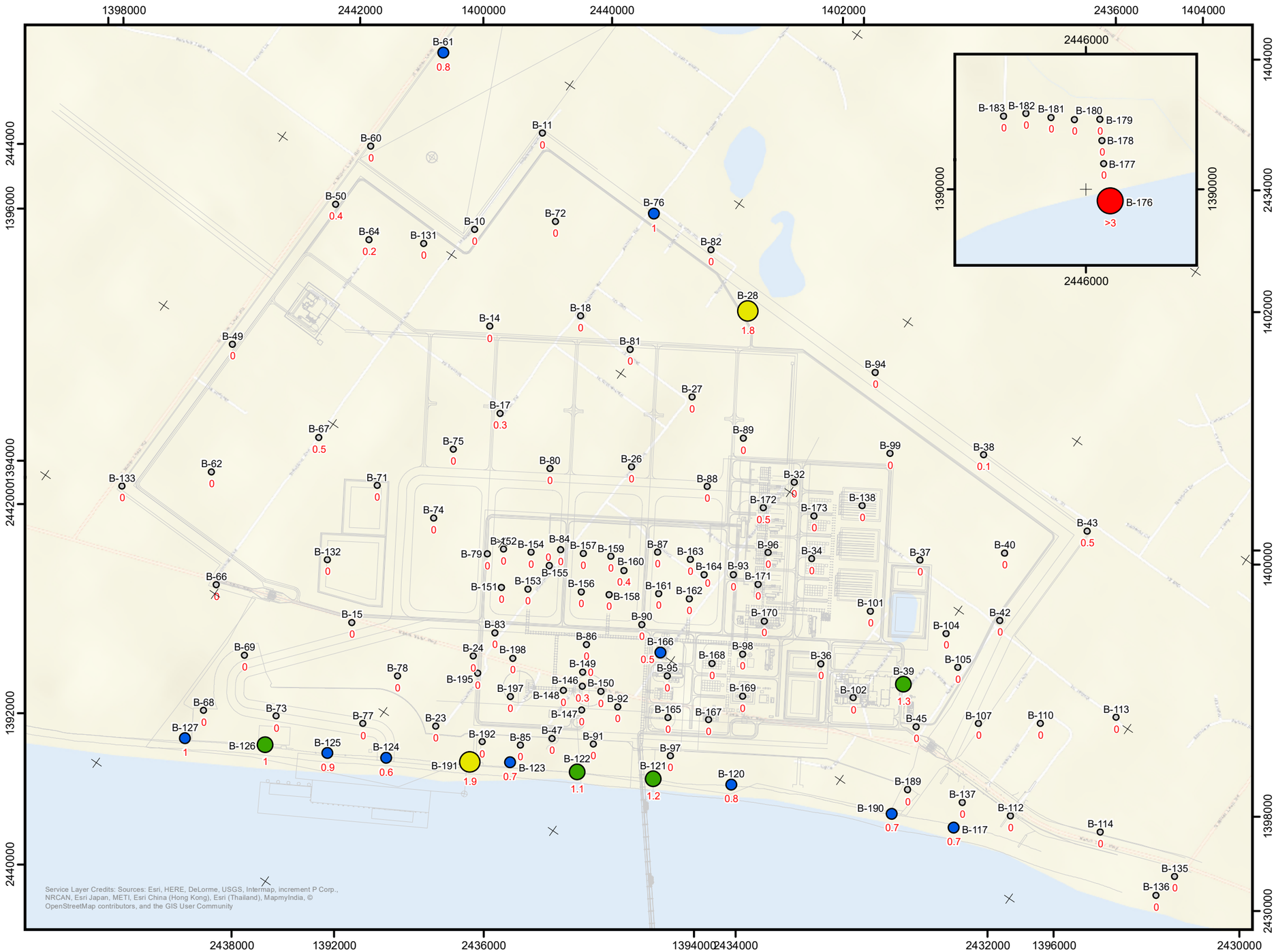
1:12,000

0 375 750 1,500 Feet

ESTIMATED CUMULATIVE SETTLEMENT
ONSHORE LOCATIONS
PROPOSED ELEVATION
OBE LEVEL

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2016\04.10160001_AKLNG_Phase3\05_GIS\Outputs\2016_10_19_SeismicReport_Ph3\mxd\Plate09_Settlement_Onshore_wLoads_OBE.mxd, 10/21/2016, c.dean



Legend

Estimated Cumulative Settlement (in)

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 3
- > 3

Site Layout

B-02
0.9
Boring location with boring name and settlement in Inches

Note: SSE Level per NFPA 59A 2006 / MCE level per ASCE 7-05 (M=8.0, PGA=0.90g), Boulanger and Idriss (2014), Proposed Elevation

Coordinate System: Alaska State Plane, Zone 4, NAD83, NSRS 2007, Feet

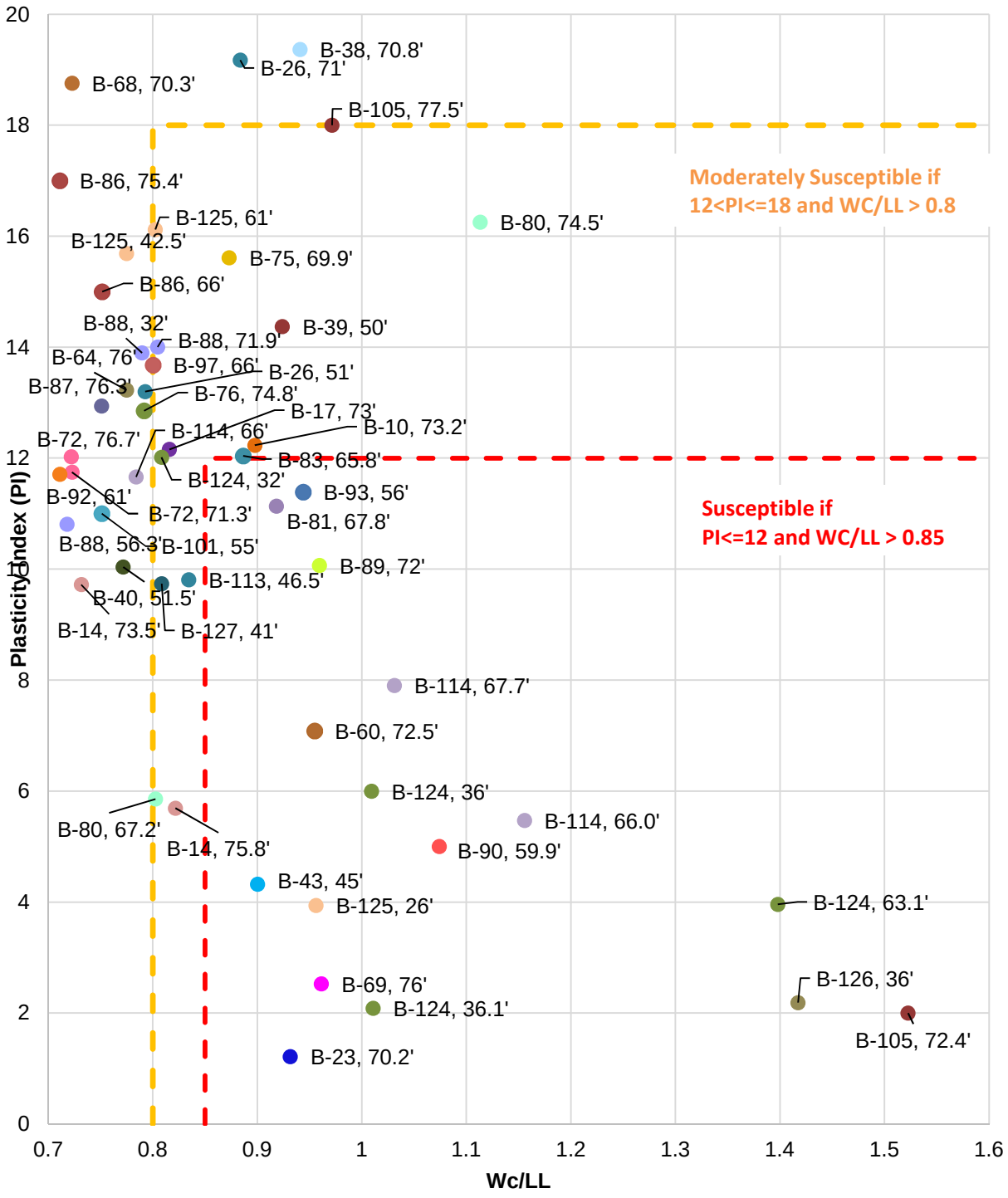
N

1:12,000

0 375 750 1,500 Feet

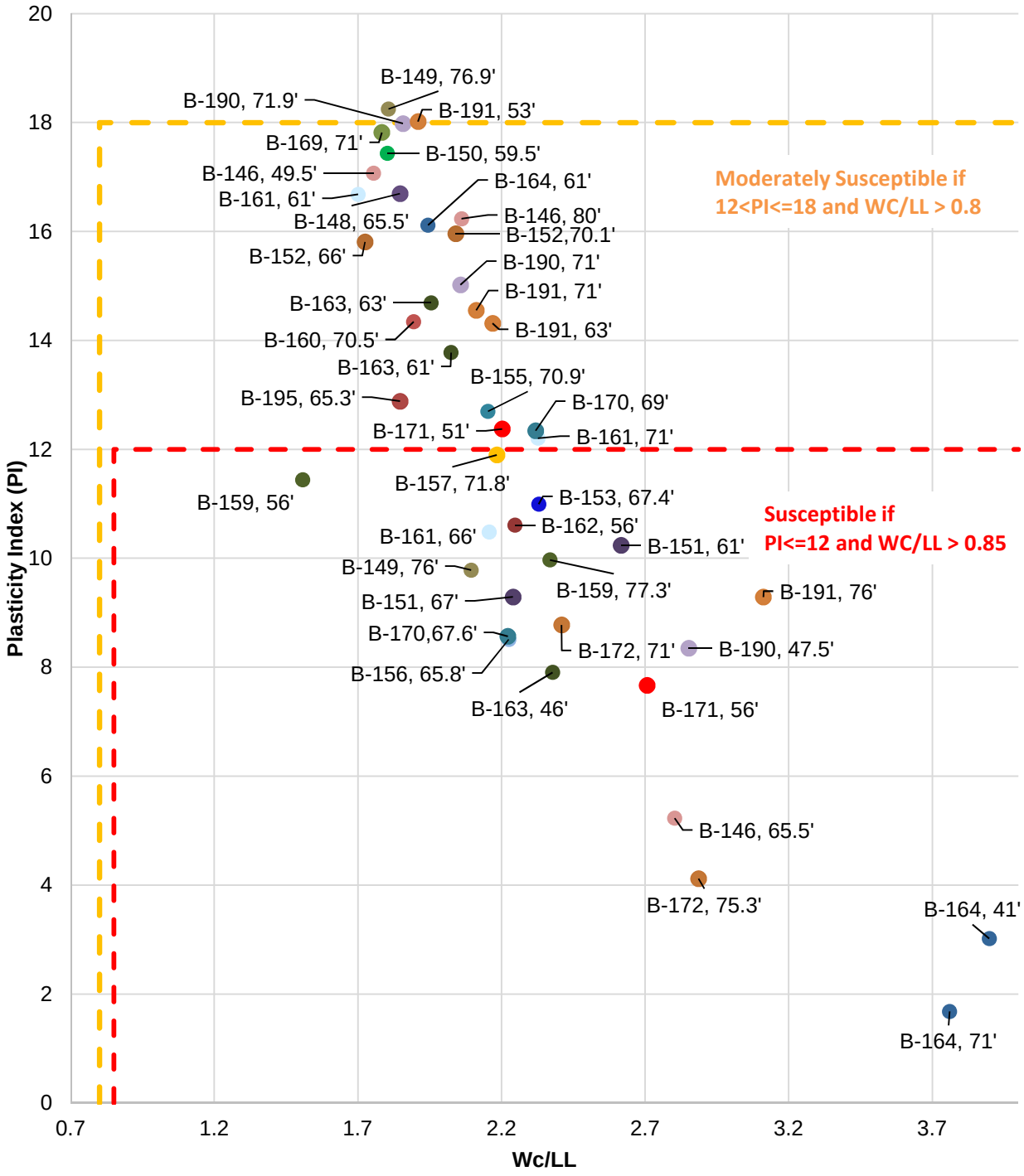
ESTIMATED CUMULATIVE SETTLEMENT
ONSHORE LOCATIONS
PROPOSED ELEVATION
SSE/MCE LEVEL
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2016\04.10160001_AKLNG_Phase3\05_GIS\Outputs\2016_10_19_SeismicReport_Ph3\mxd\Plate10_Settlement_Onshore_wLoads_MCE.mxd, 10/21/2016, c.dean



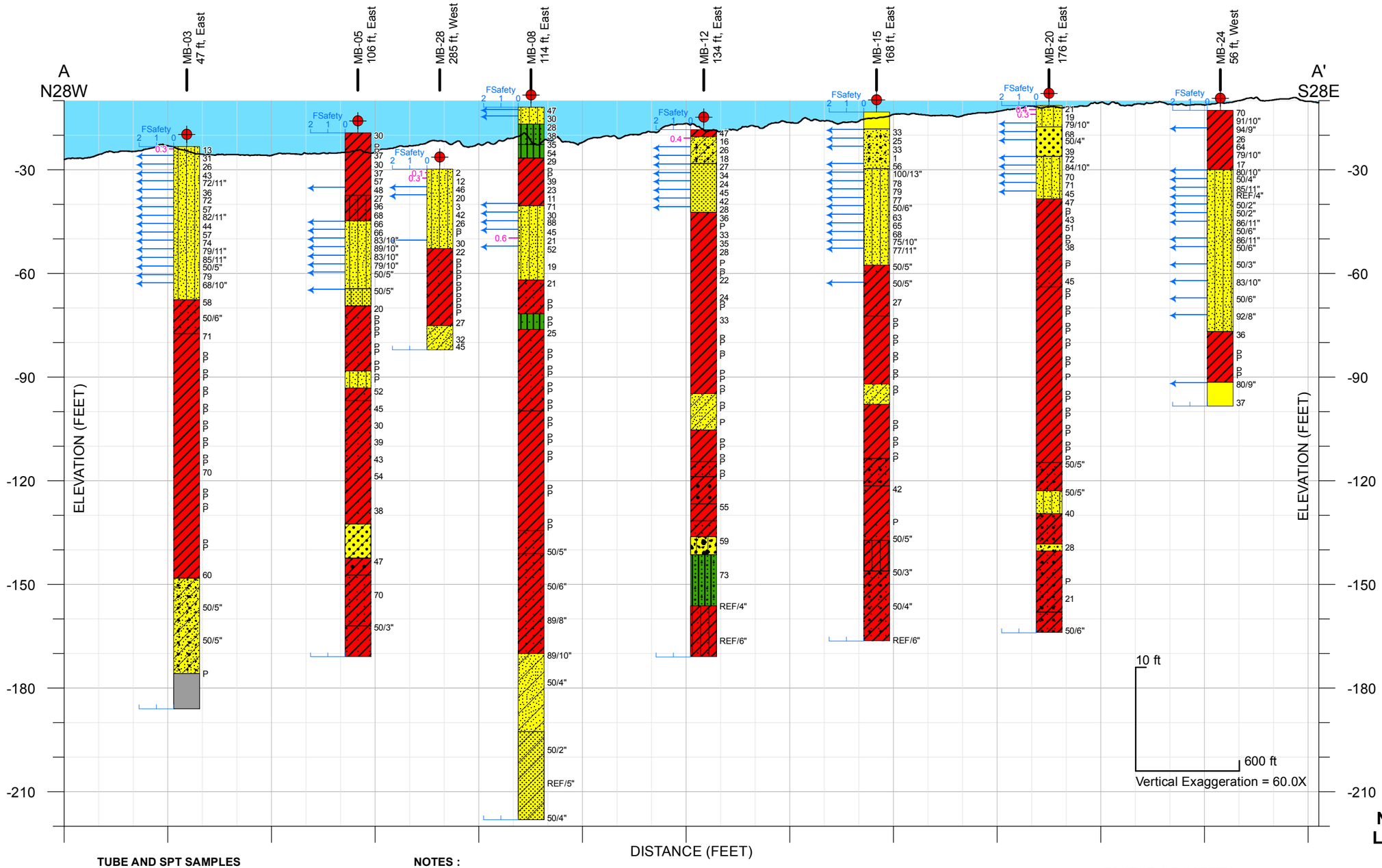
LIQUEFACTION TRIGGERING ASSESSMENT OF FINE-GRAINED SOILS FOR ONSHORE LOCATIONS (2014 AND 2015 FIELD EXPLORATIONS) - BRAY AND SANCIO (2006)

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



LIQUEFACTION TRIGGERING ASSESSMENT OF FINE-GRAINED SOILS FOR ONSHORE LOCATIONS (2016 FIELD EXPLORATIONS) - BRAY AND SANCIO (2006)

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- SILT with Sand (ML)
- Sandy, Gravelly SILT (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Well-Graded SAND with Clay (SW-SC)
- Well-Graded SAND with Silt (SW-SM)
- Gravelly Well-Graded SAND (SW)
- Clayey SAND (SC)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Poorly-Graded GRAVEL (GP)
- Poorly-Graded GRAVEL with Clay (GP-GC)
- Well-Graded GRAVEL (GW)
- Well-Graded GRAVEL with Silt (GW-GM)
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

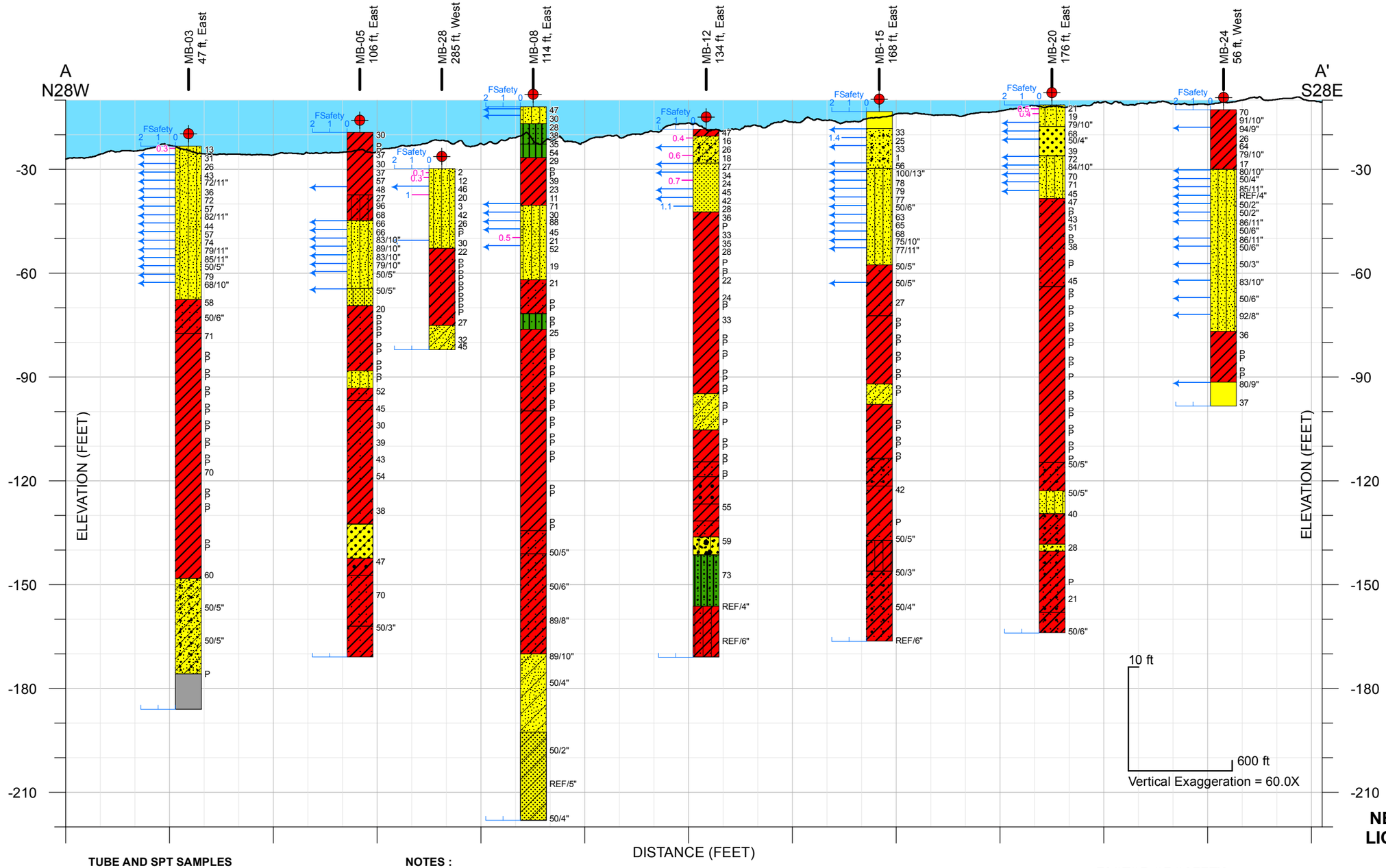
1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 4 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

FACTOR OF SAFETY

- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE A-A'
OBE LEVEL
(NCEER, 2001)
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate08_ProfA_OBE_NCEER.mxd, 6/15/2016, ticci



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- SILT with Sand (ML)
- Sandy, Gravelly SILT (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Well-Graded SAND with Clay (SW-SC)
- Well-Graded SAND with Silt (SW-SM)
- Gravelly Well-Graded SAND (SW)
- Clayey SAND (SC)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Poorly-Graded GRAVEL (GP)
- Poorly-Graded GRAVEL with Clay (GP-GC)
- Well-Graded GRAVEL (GW)
- Well-Graded GRAVEL with Silt (GW-GM)
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 4 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

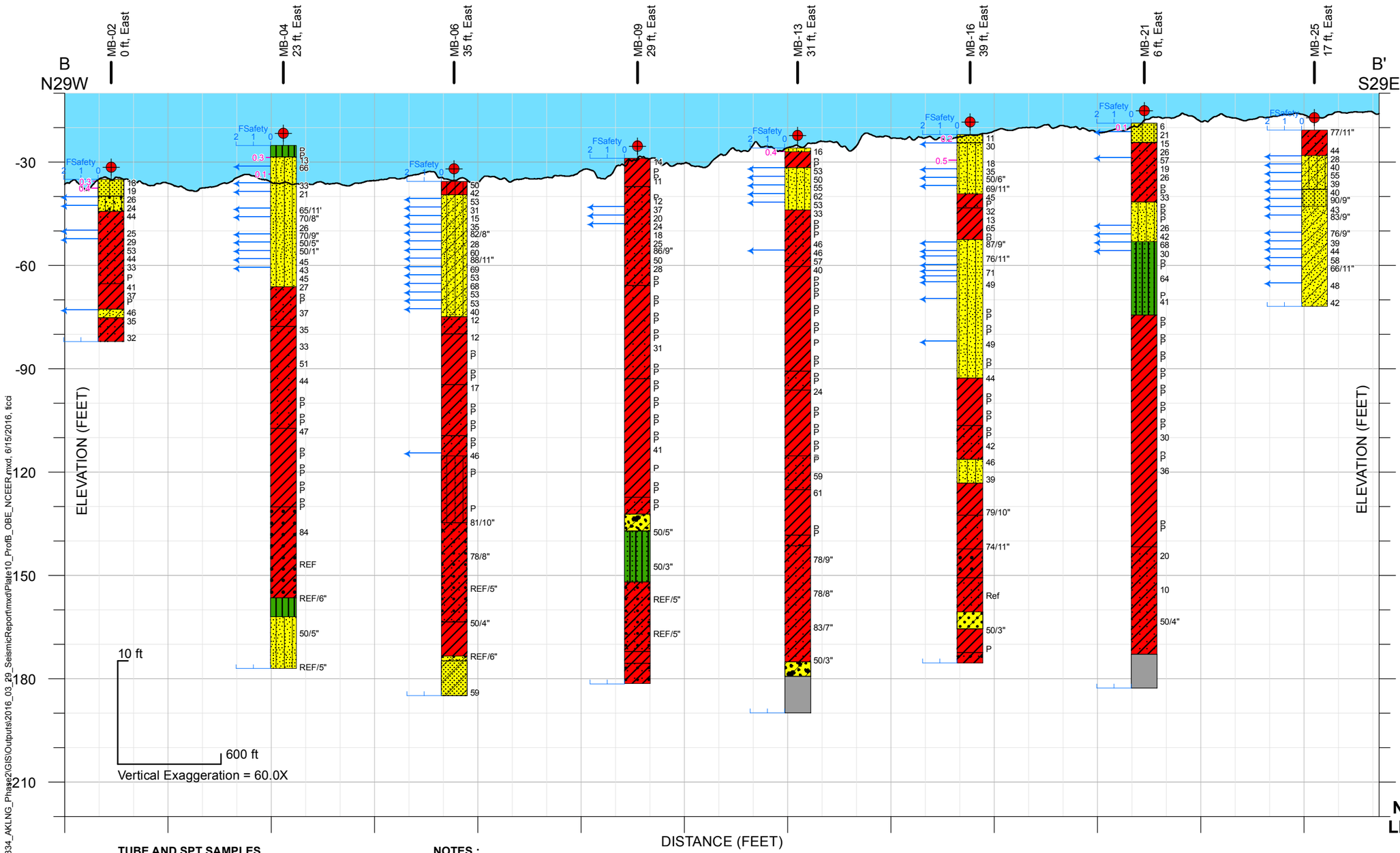
FACTOR OF SAFETY

- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE A-A'
OBE LEVEL
(BOULANGER AND IDRISS, 2014)

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate09-ProfA_OBE_BI2014.mxd, 6/15/2016, ticci



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY (CL-ML)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Clayey SAND (SC)
- Clayey to Silty SAND (SC-SM)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Gravelly Silty SAND (SM)
- Poorly-Graded GRAVEL with Clay (GP-GC)
- Well-Graded GRAVEL with Clay (GW-GC)
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

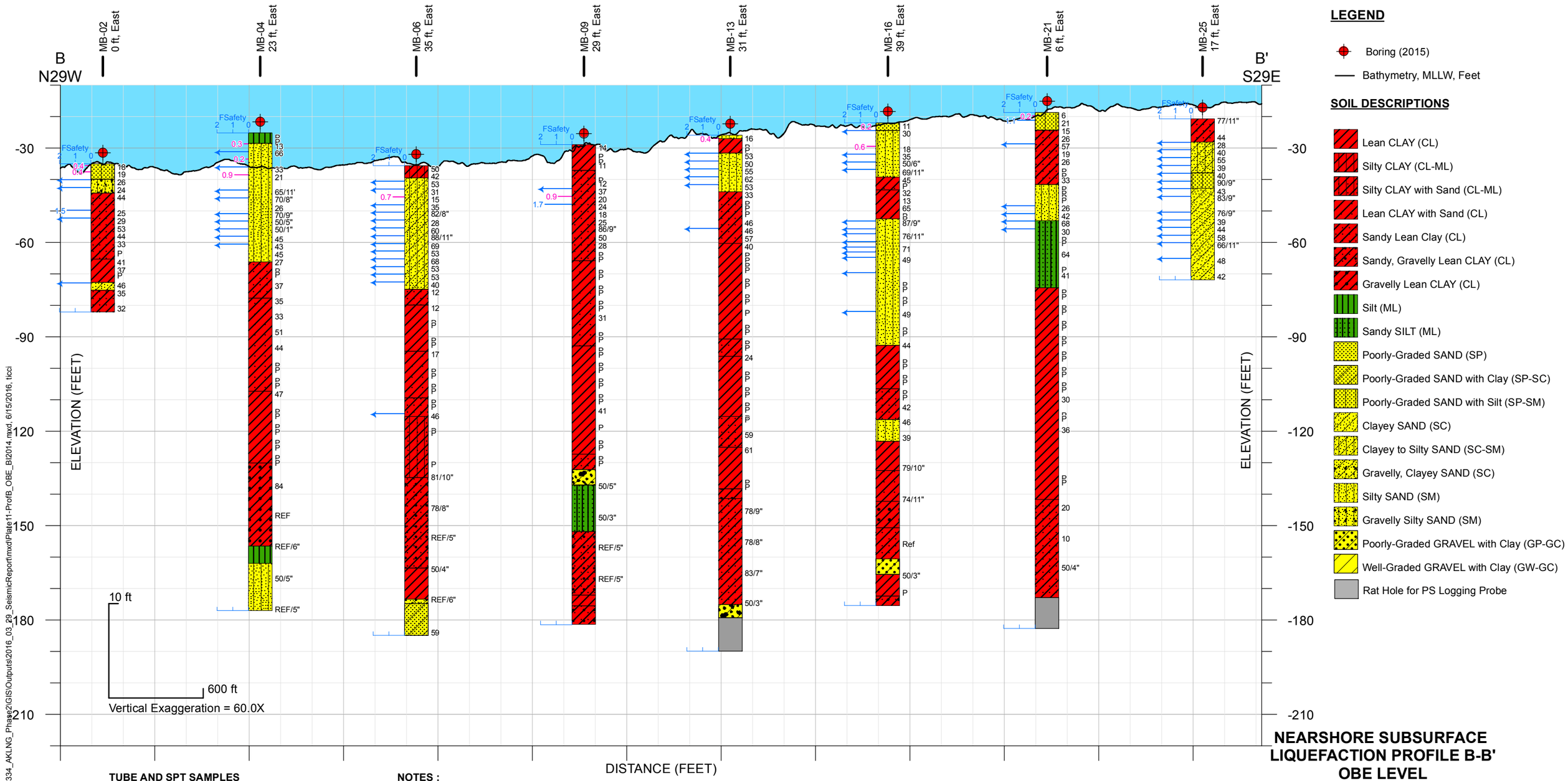
1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 4 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

FACTOR OF SAFETY

- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE B-B'
OBE LEVEL
(NCEER, 2001)
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate10_ProfB_OBE_NCEER.mxd, 6/15/2016, ticci



TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

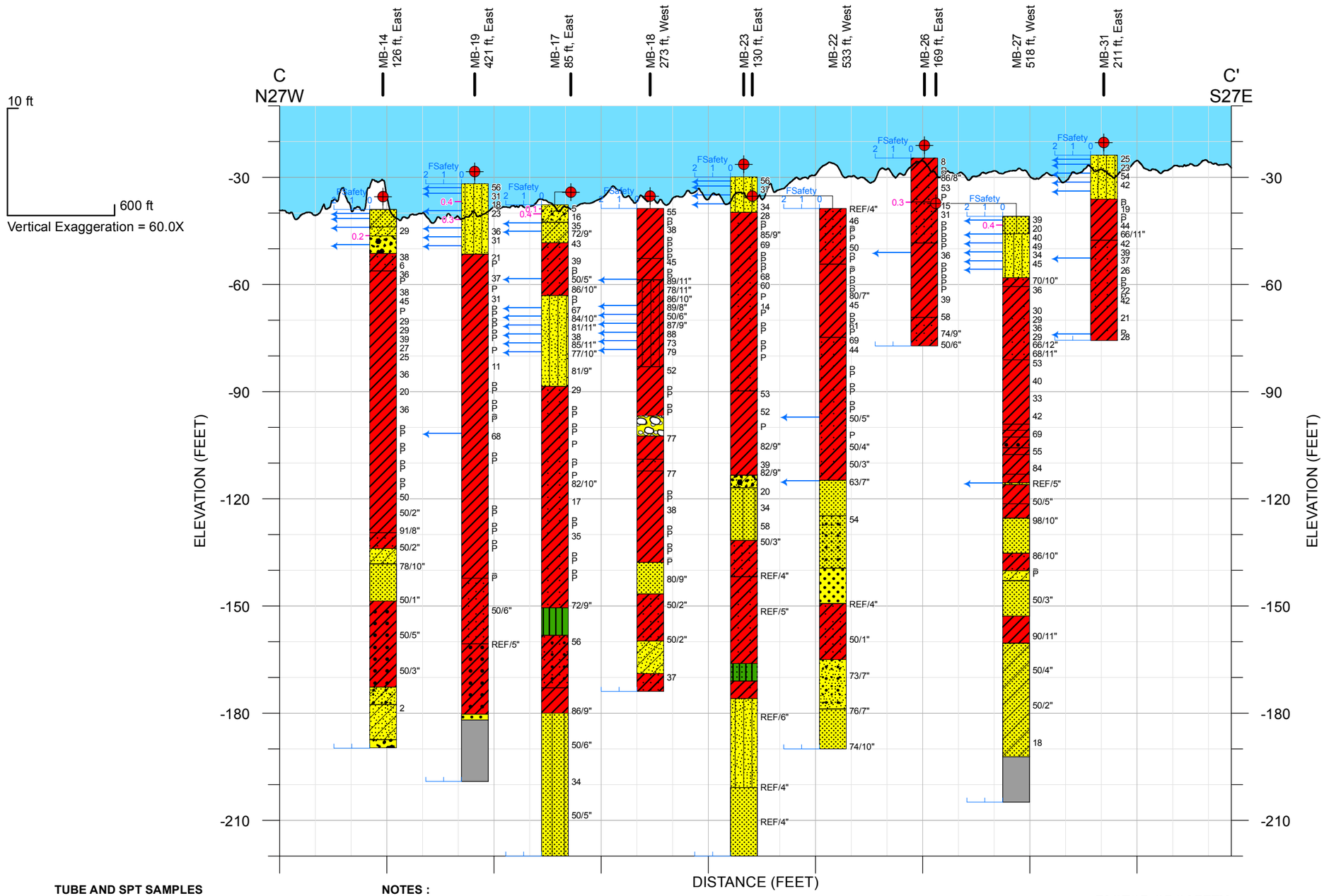
1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 4 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

FACTOR OF SAFETY

0.2 — Factor of Safety < 1
1.4 — Factor of Safety > 2 and <= 1
← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE B-B'
OBE LEVEL
(BOULANGER AND IDRISS, 2014)
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate11-ProfB_OBE_BI2014.mxd, 6/15/2016, ticci



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Gravelly Poorly-Graded SAND (SP)
- Gravelly Well-Graded SAND (SW)
- Clayey SAND (SC)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Poorly-Graded GRAVEL (GP)
- Well-Graded GRAVEL (GW)
- Sandy, Clayey GRAVEL (GC)
- Cobble
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

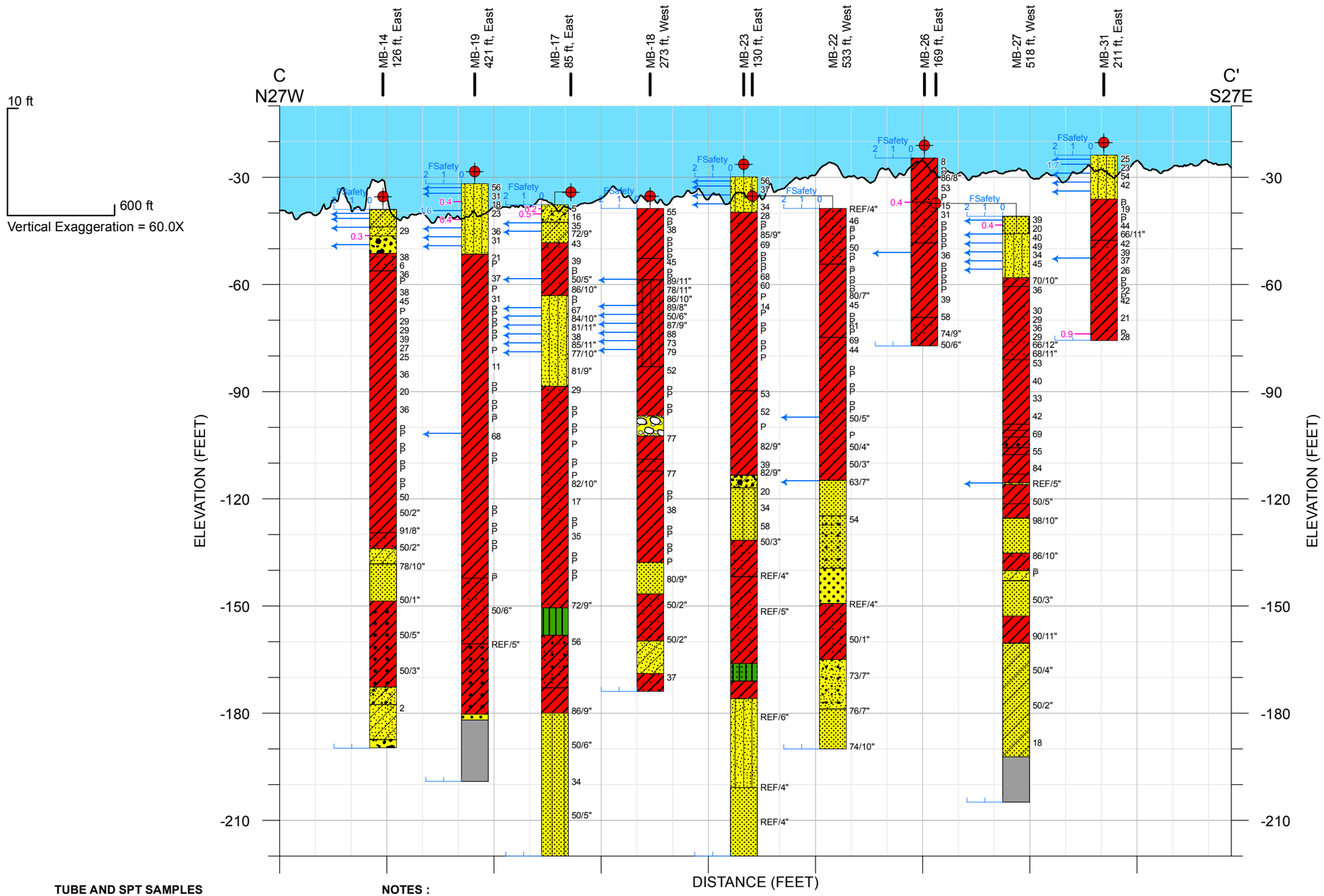
1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 4 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

FACTOR OF SAFETY

- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE C-C'
OBE LEVEL
(NCEER, 2001)
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate12_ProfC_OBE_NCEER.mxd, 6/15/2016, ticci



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Gravelly Poorly-Graded SAND (SP)
- Gravelly Well-Graded SAND (SW)
- Clayey SAND (SC)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Poorly-Graded GRAVEL (GP)
- Well-Graded GRAVEL (GW)
- Sandy, Clayey GRAVEL (GC)
- Cobble
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

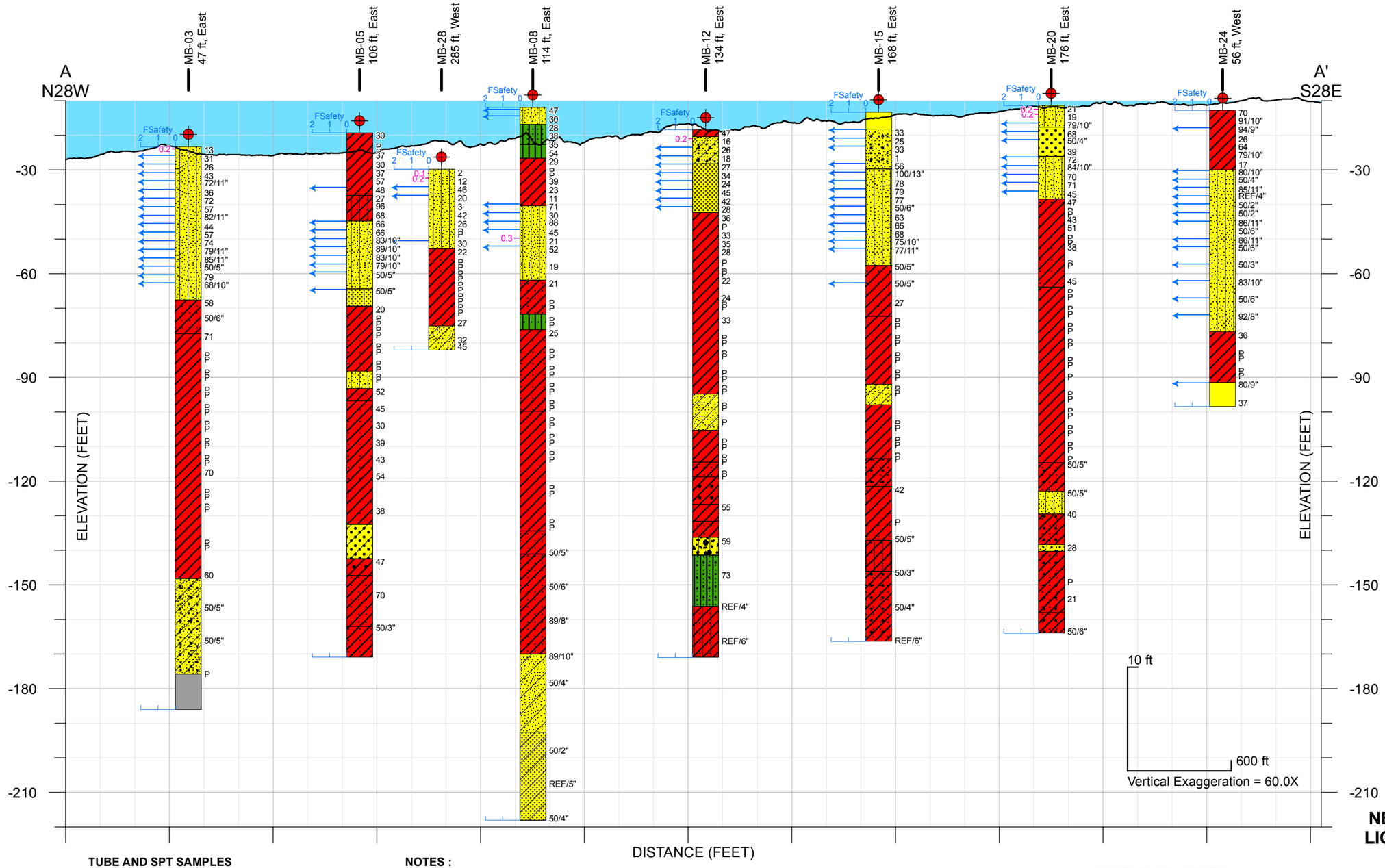
1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 4 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

FACTOR OF SAFETY

- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE C-C'
OBE LEVEL
(BOULANGER AND IDRISS, 2014)
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate13-ProfC_OBE_BI2014.mxd, 6/15/2016, ticci



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- SILT with Sand (ML)
- Sandy, Gravelly SILT (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Well-Graded SAND with Clay (SW-SC)
- Well-Graded SAND with Silt (SW-SM)
- Gravelly Well-Graded SAND (SW)
- Clayey SAND (SC)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Poorly-Graded GRAVEL (GP)
- Poorly-Graded GRAVEL with Clay (GP-GC)
- Well-Graded GRAVEL (GW)
- Well-Graded GRAVEL with Silt (GW-GM)
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 4 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

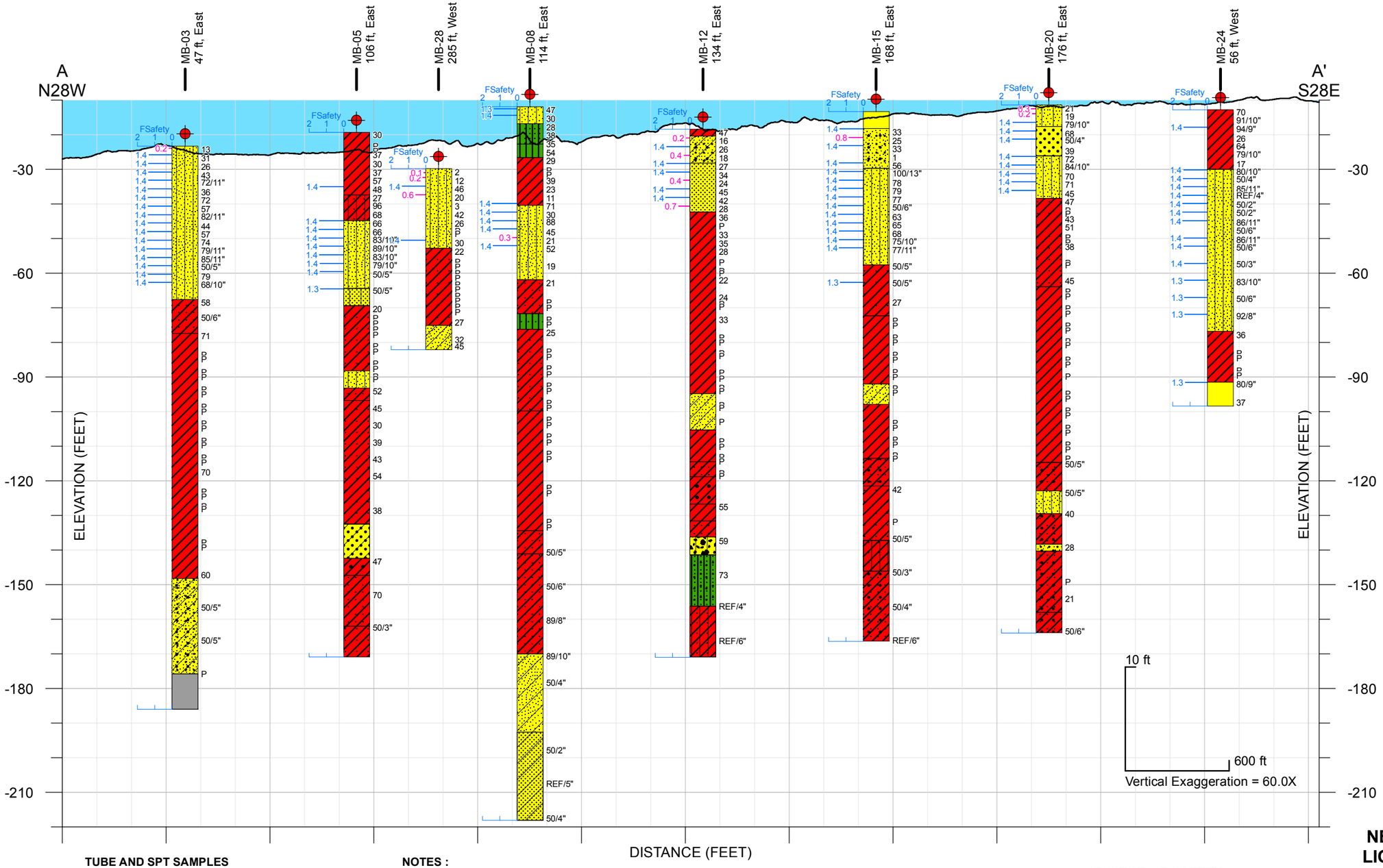
FACTOR OF SAFETY

- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE A-A'
MCE LEVEL
(NCEER, 2001)

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate14_ProfA_MCE_NCEER.mxd, 6/15/2016, ticci



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- SILT with Sand (ML)
- Sandy, Gravelly SILT (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Well-Graded SAND with Clay (SW-SC)
- Well-Graded SAND with Silt (SW-SM)
- Gravelly Well-Graded SAND (SW)
- Clayey SAND (SC)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Poorly-Graded GRAVEL (GP)
- Poorly-Graded GRAVEL with Clay (GP-GC)
- Well-Graded GRAVEL (GW)
- Well-Graded GRAVEL with Silt (GW-GM)
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 4 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

FACTOR OF SAFETY

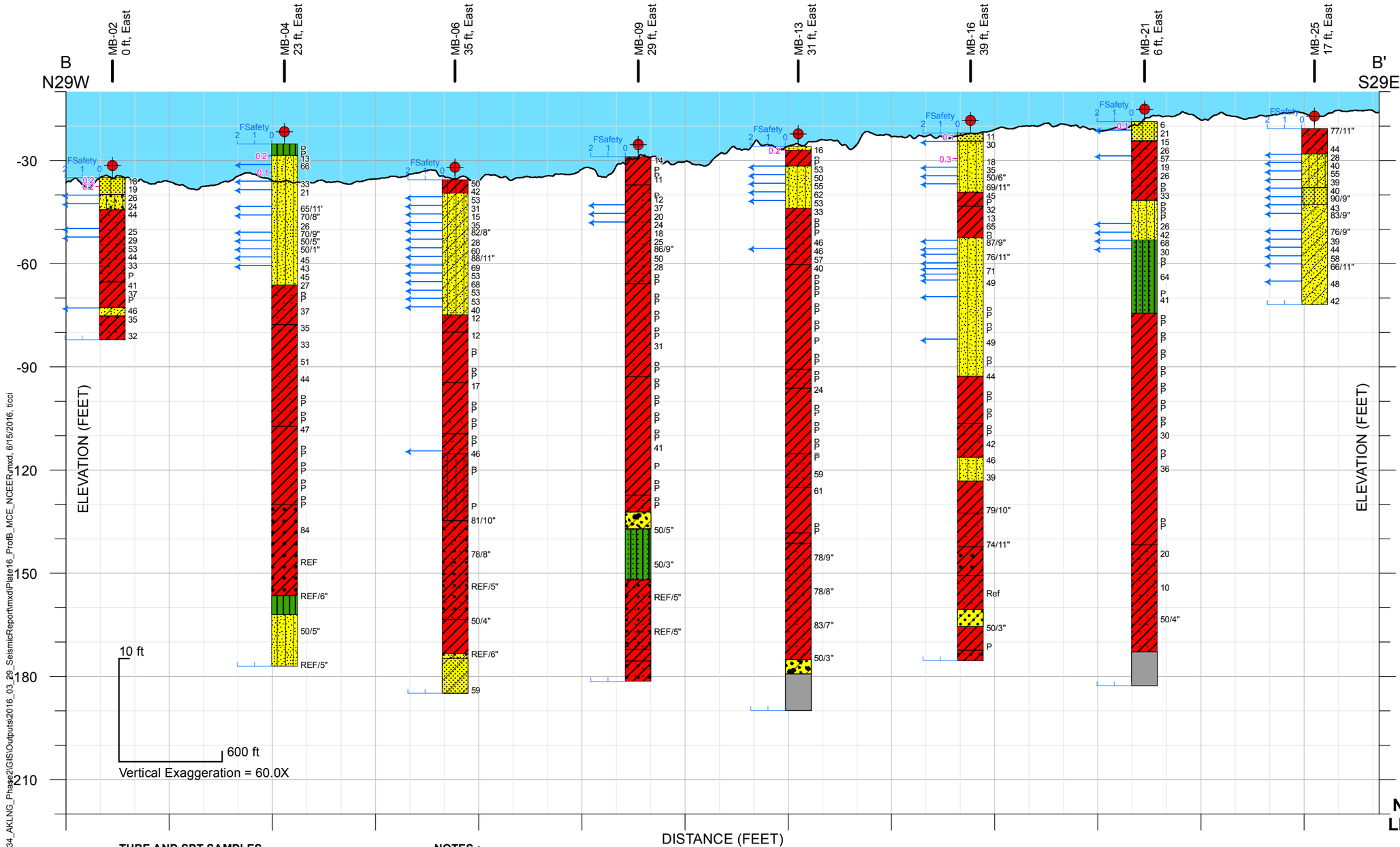
- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE A-A' MCE LEVEL (BOULANGER AND IDRISS, 2014)

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE 23

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate15_ProfA_MCE_BI2014.mxd, 6/15/2016, ticci



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY (CL-ML)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Clayey SAND (SC)
- Clayey to Silty SAND (SC-SM)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Gravelly Silty SAND (SM)
- Poorly-Graded GRAVEL with Clay (GP-GC)
- Well-Graded GRAVEL with Clay (GW-GC)
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

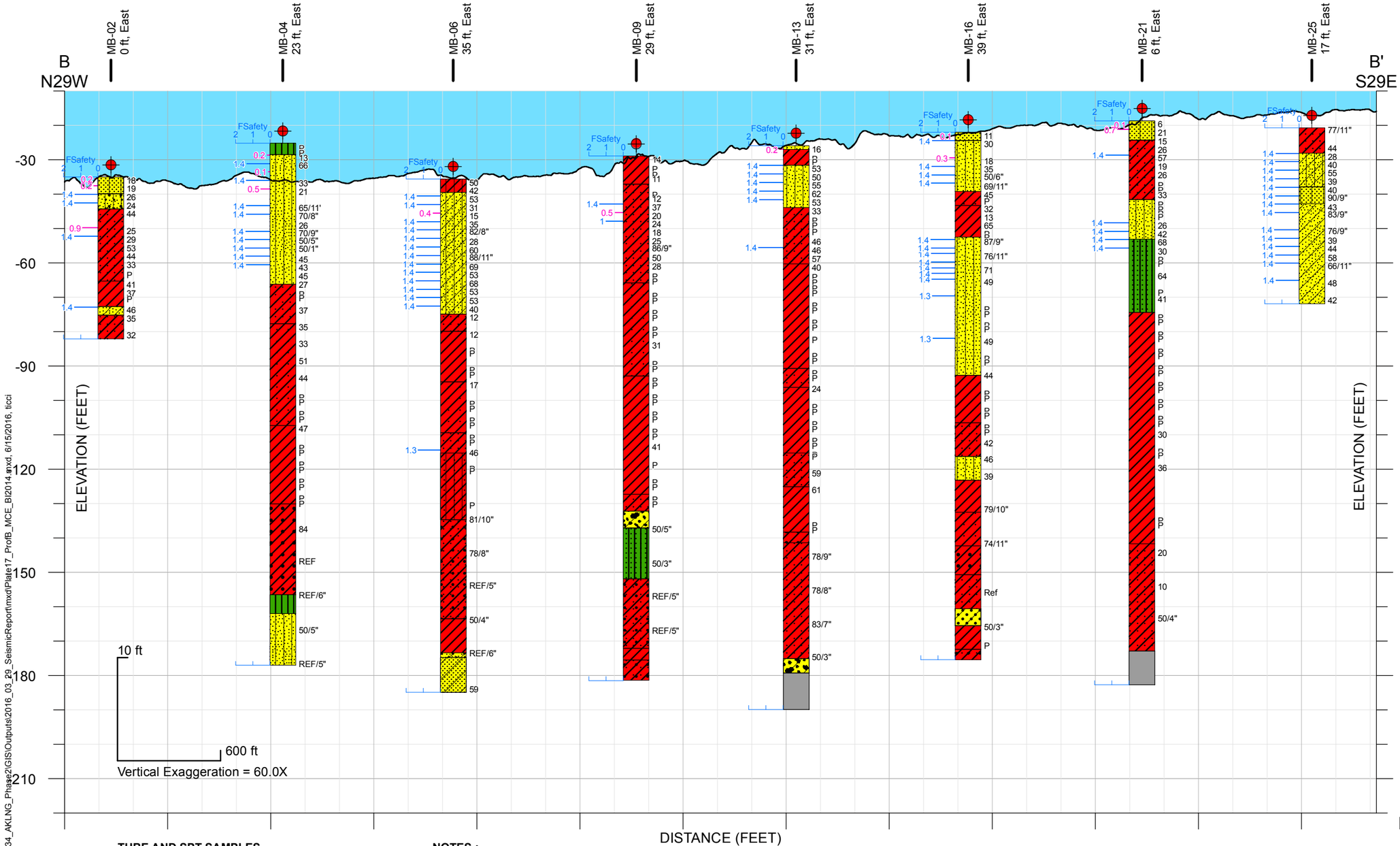
1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 4 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

FACTOR OF SAFETY

- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE B-B'
MCE LEVEL
(NCEER, 2001)
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate16_ProfB_MCE_NCEER.mxd, 6/15/2016, ticci



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY (CL-ML)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Clayey SAND (SC)
- Clayey to Silty SAND (SC-SM)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Gravelly Silty SAND (SM)
- Poorly-Graded GRAVEL with Clay (GP-GC)
- Well-Graded GRAVEL with Clay (GW-GC)
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 4 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

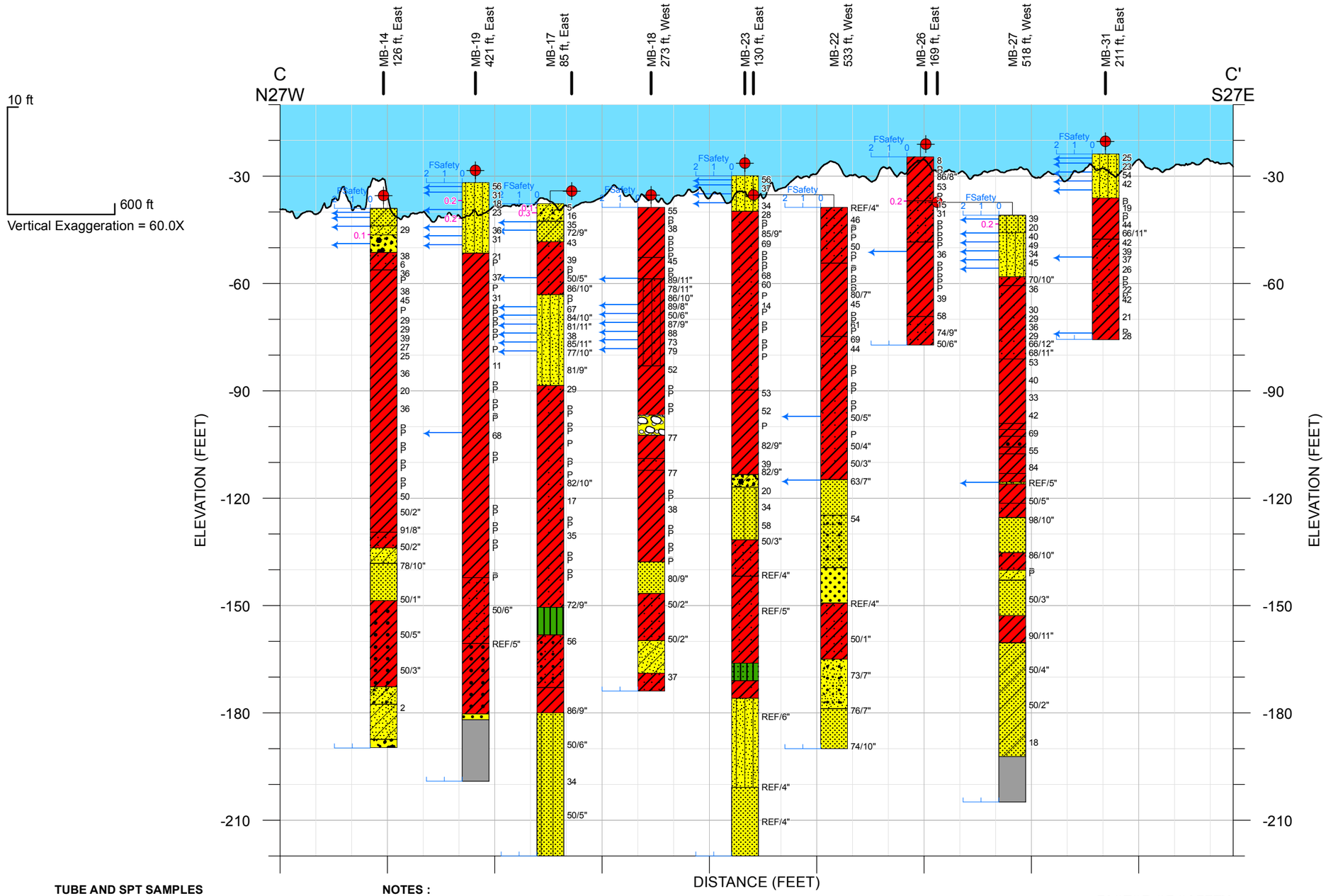
FACTOR OF SAFETY

- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE B-B' MCE LEVEL (BOULANGER AND IDRISS, 2014)

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate17_ProfB_MCE_BI2014.mxd, 6/15/2016, ticci



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Gravelly Poorly-Graded SAND (SP)
- Gravelly Well-Graded SAND (SW)
- Clayey SAND (SC)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Poorly-Graded GRAVEL (GP)
- Well-Graded GRAVEL (GW)
- Sandy, Clayey GRAVEL (GC)
- Cobble
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

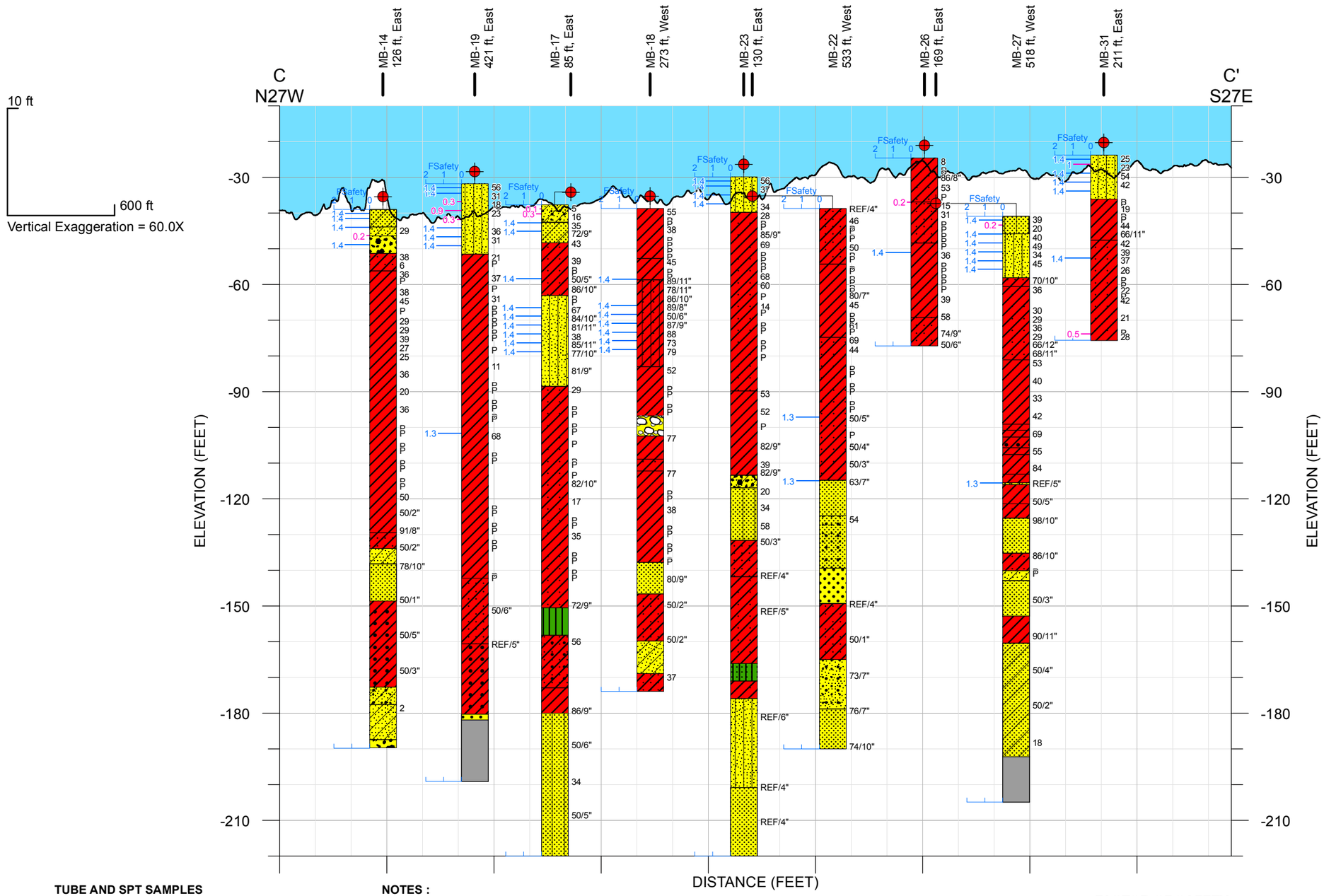
1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 4 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

FACTOR OF SAFETY

- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE C-C'
MCE LEVEL
(NCEER, 2001)
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate18_ProfC_MCE_NCEER.mxd, 6/15/2016, ticci



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Gravelly Poorly-Graded SAND (SP)
- Gravelly Well-Graded SAND (SW)
- Clayey SAND (SC)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Poorly-Graded GRAVEL (GP)
- Well-Graded GRAVEL (GW)
- Sandy, Clayey GRAVEL (GC)
- Cobble
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

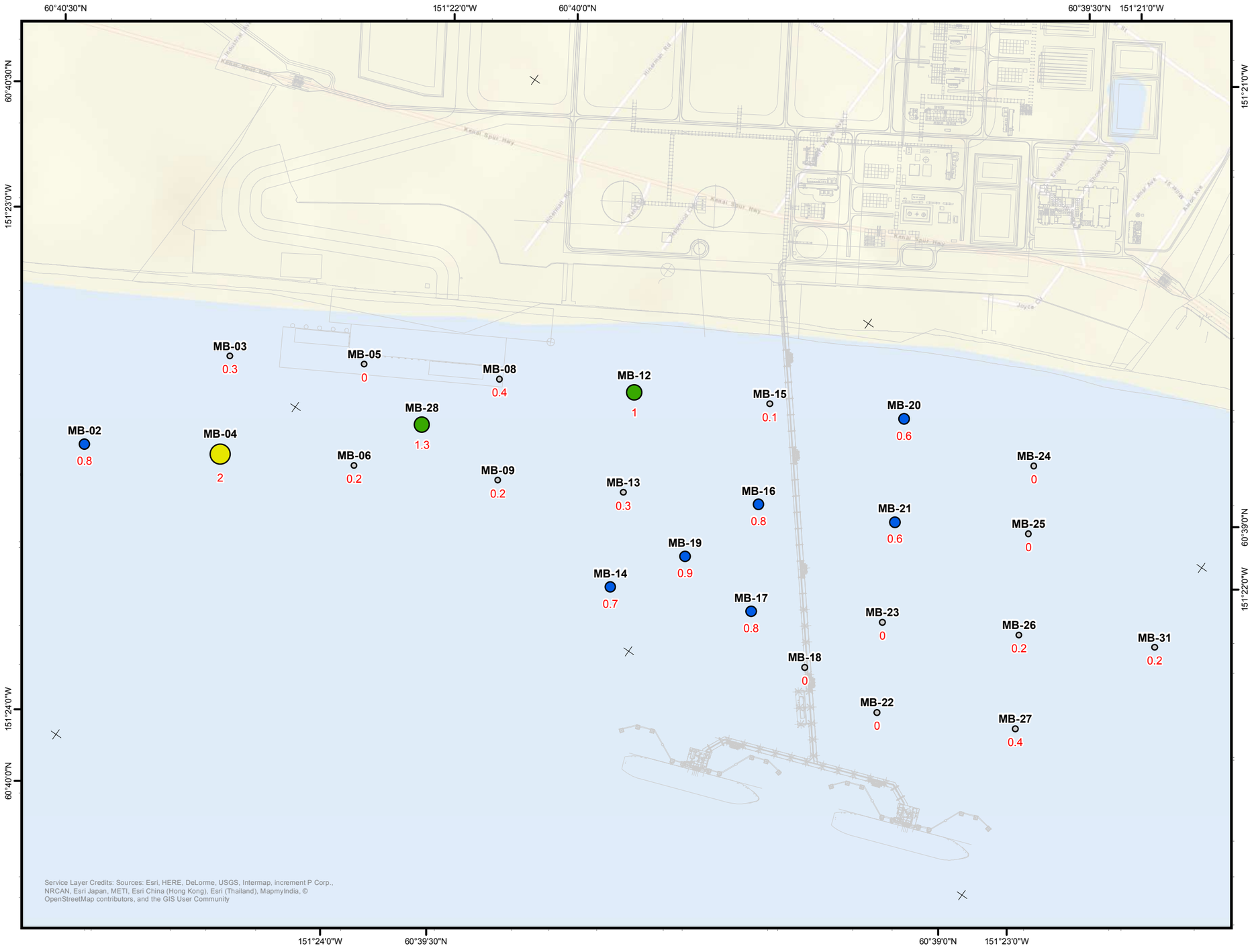
1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 4 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

FACTOR OF SAFETY

- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE C-C'
MCE LEVEL
(BOULANGER AND IDRISS, 2014)
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate19_ProfC_MCE_BI2014.mxd, 6/15/2016, ticci



Legend

Estimated Cumulative Settlement (in)

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 3
- > 3

Site Layout

MB-02 / 0.9 — Boring location with boring name and settlement in Inches

Note: OBE Level per NFPA 59A 2006 (M=8.0, PGA=0.53g), Boulanger and Idriss (2014), existing elevation

Coordinate System: Alaska State Plane, Zone 4, NAD83, NSRS 2007, Feet

N

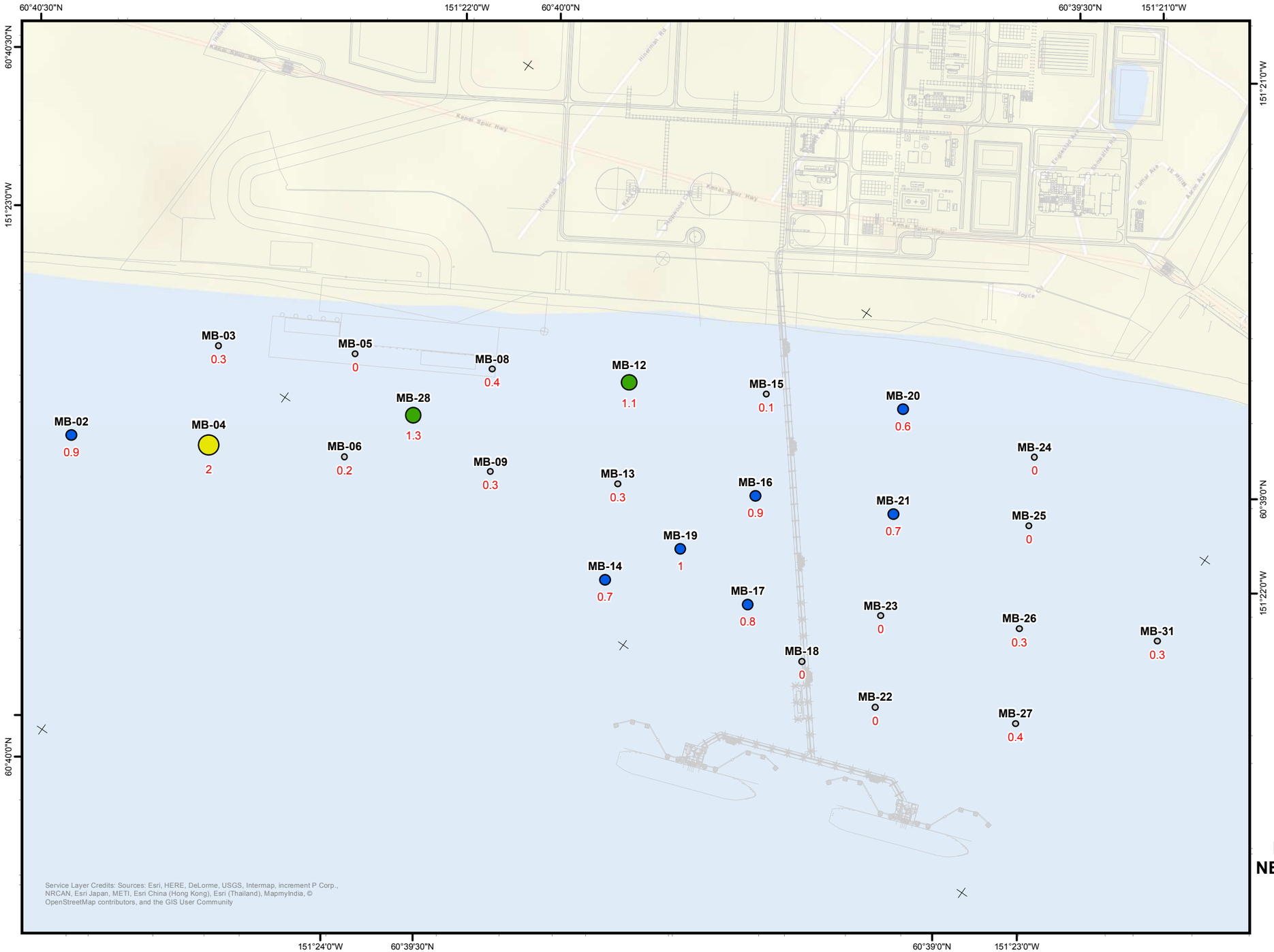
1:9,000

0 375 750 1,500 Feet

ESTIMATED CUMULATIVE SETTLEMENT
NEARSHORE LOCATIONS - OBE LEVEL
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE 28

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate20_Settlement_Nearshore_OBE.mxd, 6/15/2016, ticci



Legend

Estimated Cumulative Settlement (in)

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 3
- > 3

Site Layout

MB-02 / 0.9 — Boring location with boring name and settlement in Inches

Note: SSE Level per NFPA 59A 2006 / MCE level per ASCE 7-05 (M=8.0, PGA=0.90g), Boulanger and Idriss (2014), existing elevation

Coordinate System: Alaska State Plane, Zone 4, NAD83, NSRS 2007, Feet

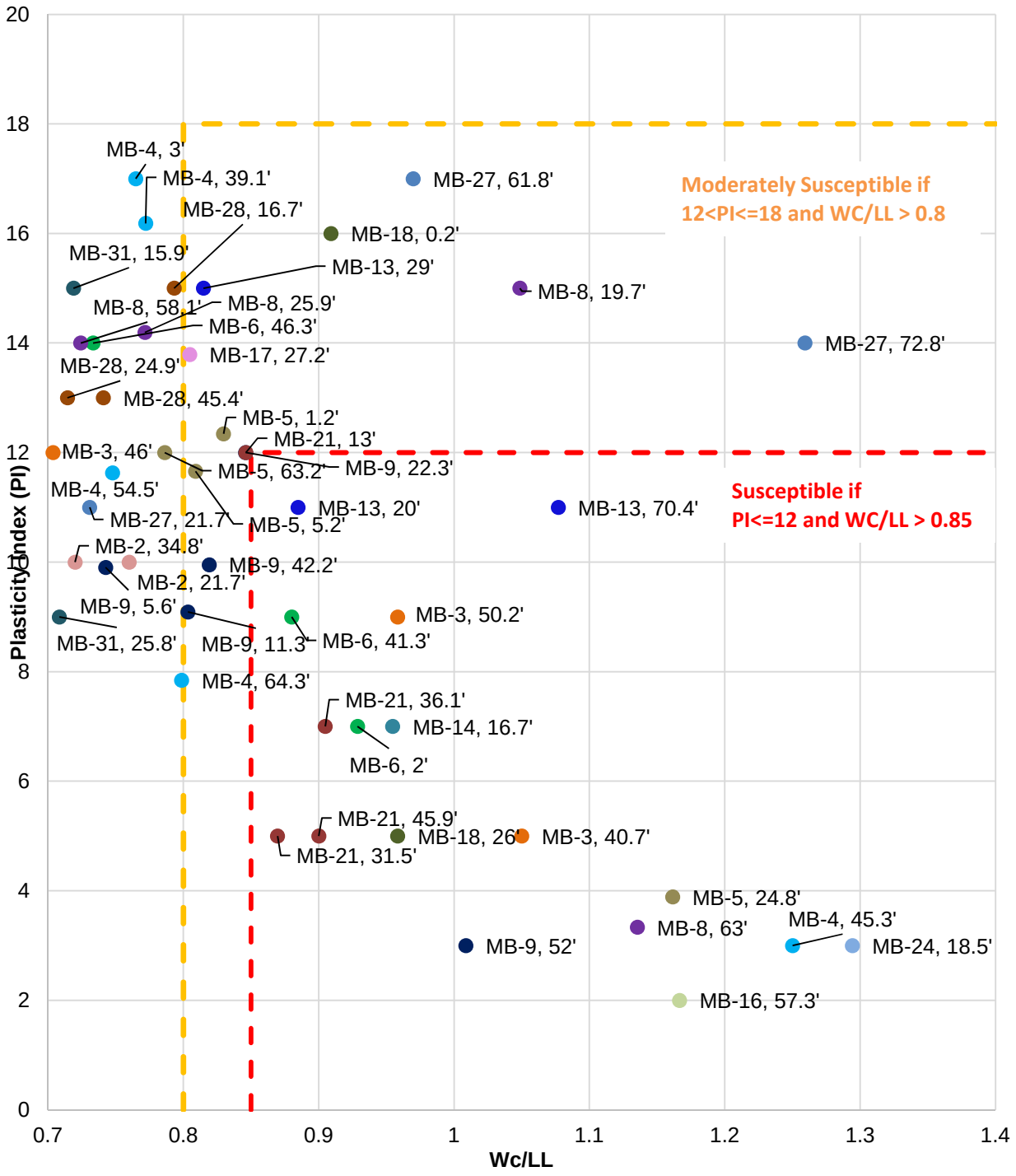
N

1:9,000

0 375 750 1,500 Feet

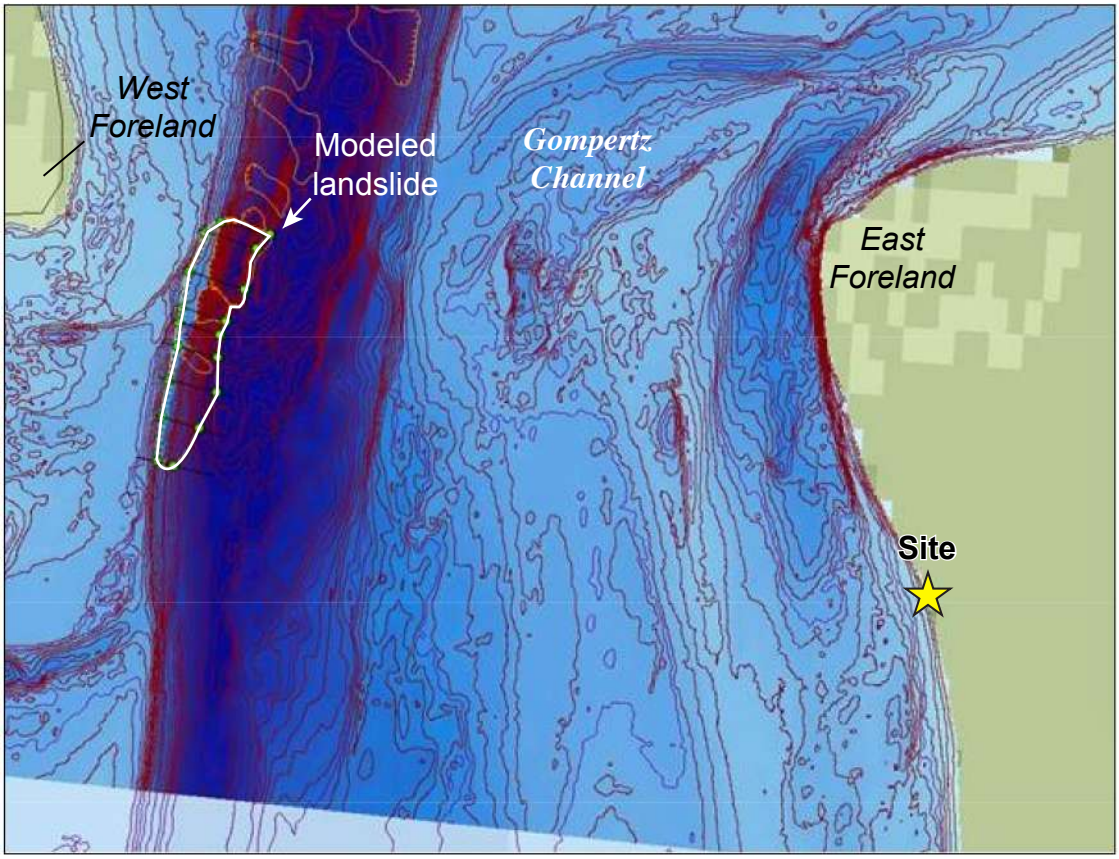
ESTIMATED CUMULATIVE SETTLEMENT
NEARSHORE LOCATIONS - SSE/MCE LEVEL
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdcs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate21_Settlement_Nearshore_MCE.mxd, 6/15/2016, liccl



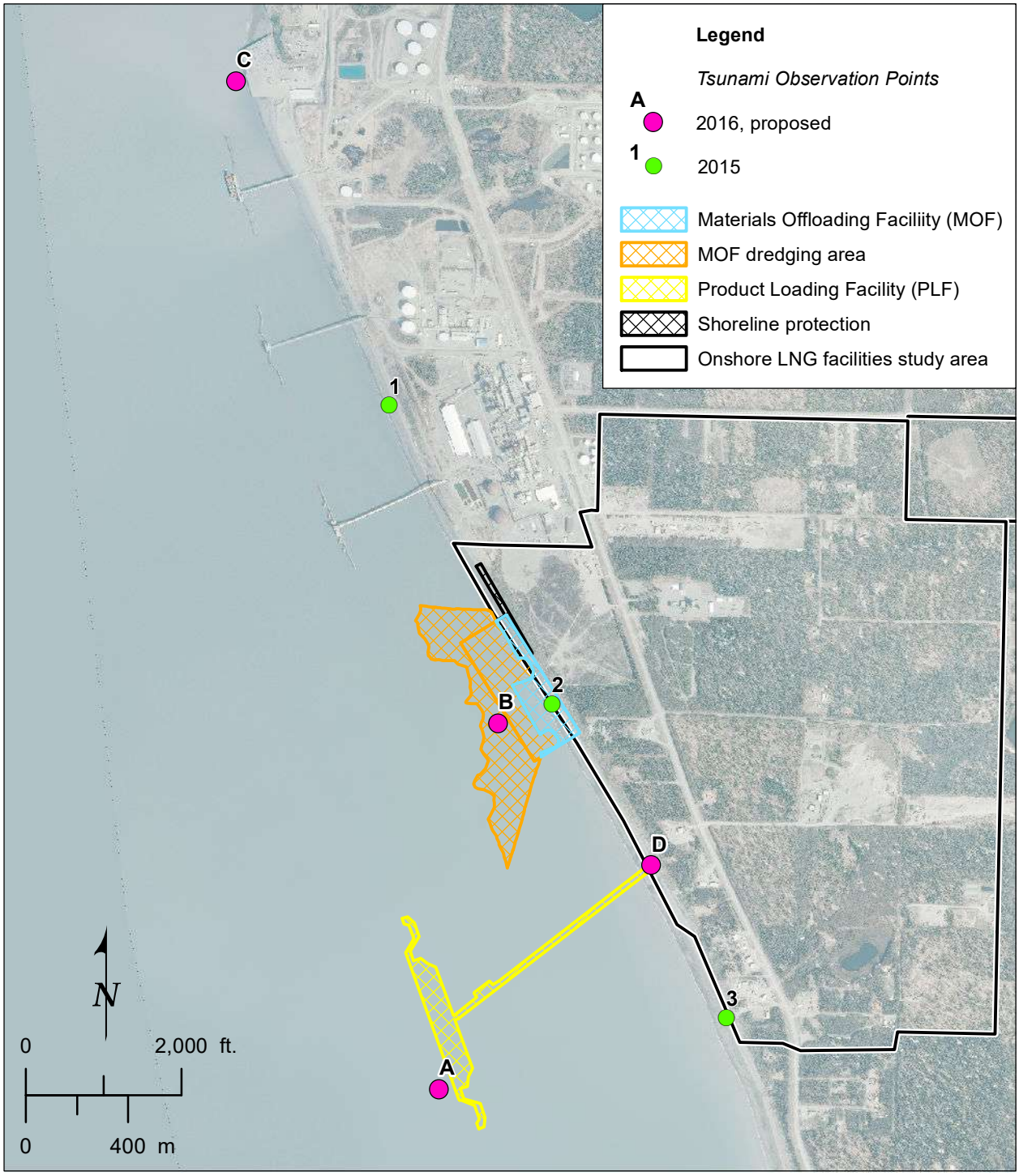
LIQUEFACTION TRIGGERING ASSESSMENT OF FINE-GRAINED SOILS FOR NEARSHORE LOCATIONS - BRAY AND SANCIO (2006)

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



LOCATION OF MODELED SUBMARINE LANDSLIDE
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

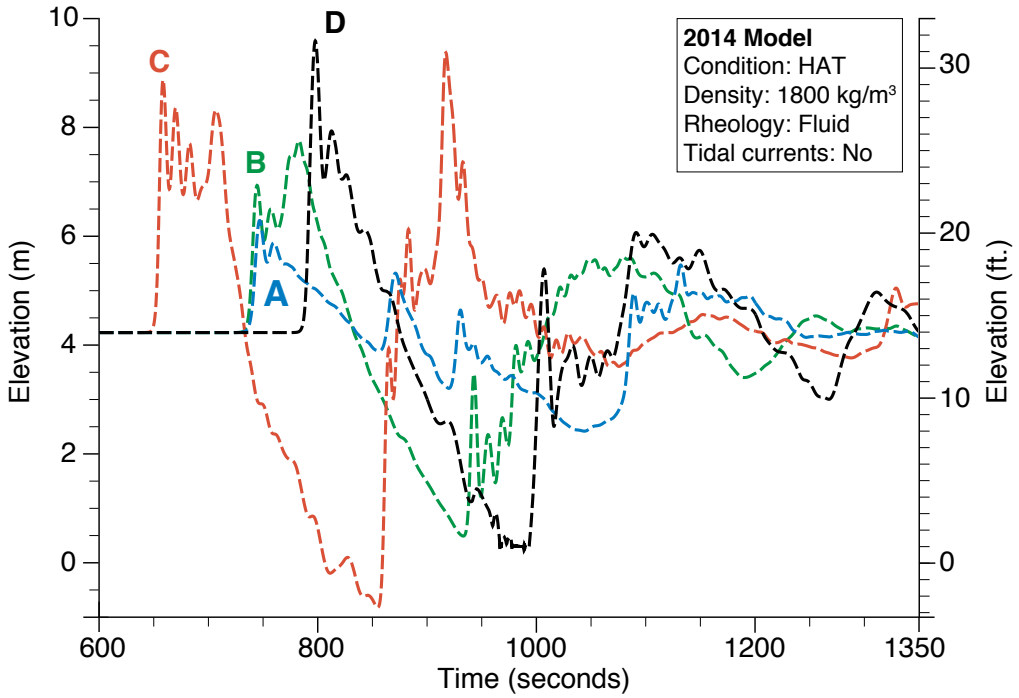
PLATE 31

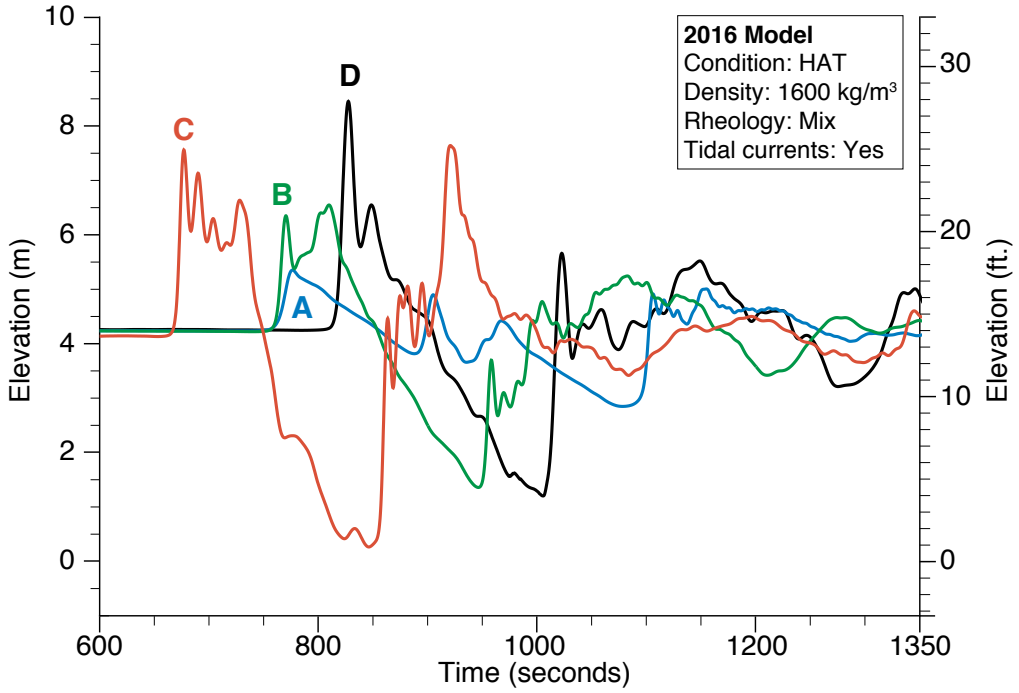


TSUNAMI OBSERVATION POINTS, 2015 AND 2016

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE 32

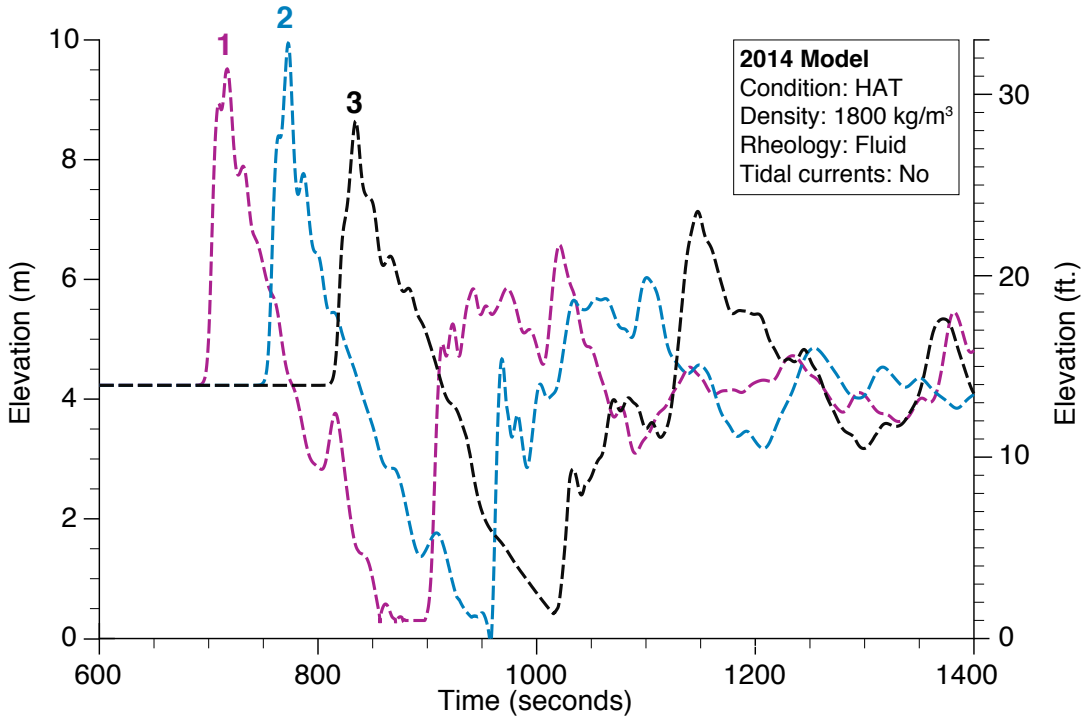


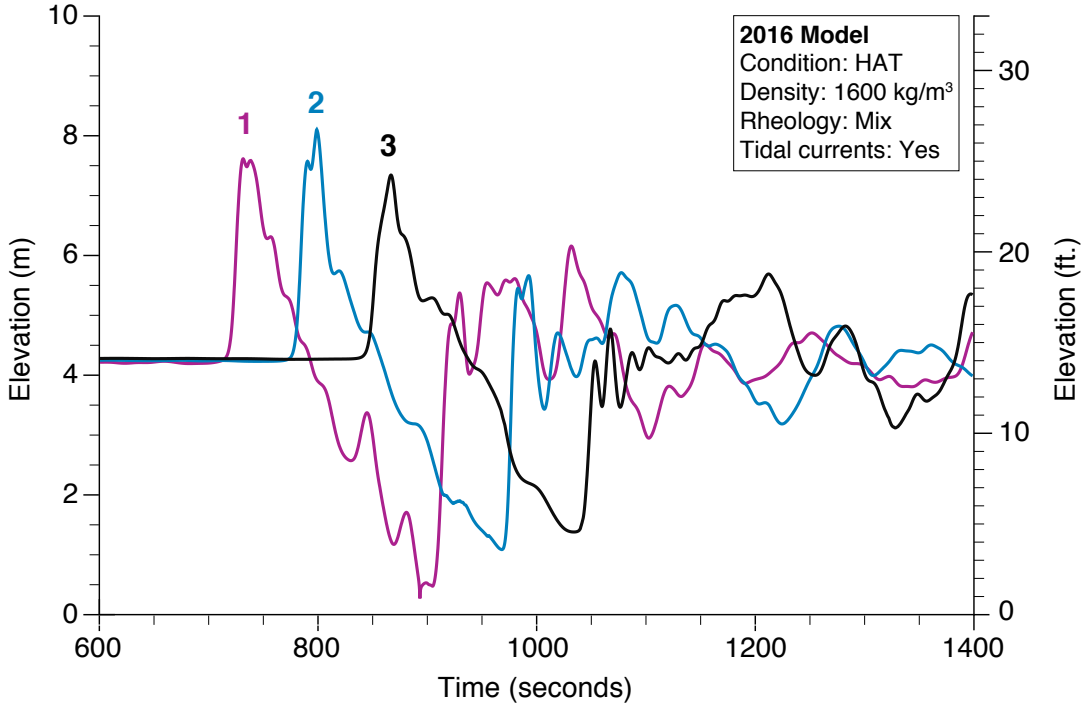


MODELED TSUNAMI WAVE HEIGHTS, POINTS A, B, C AND D

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

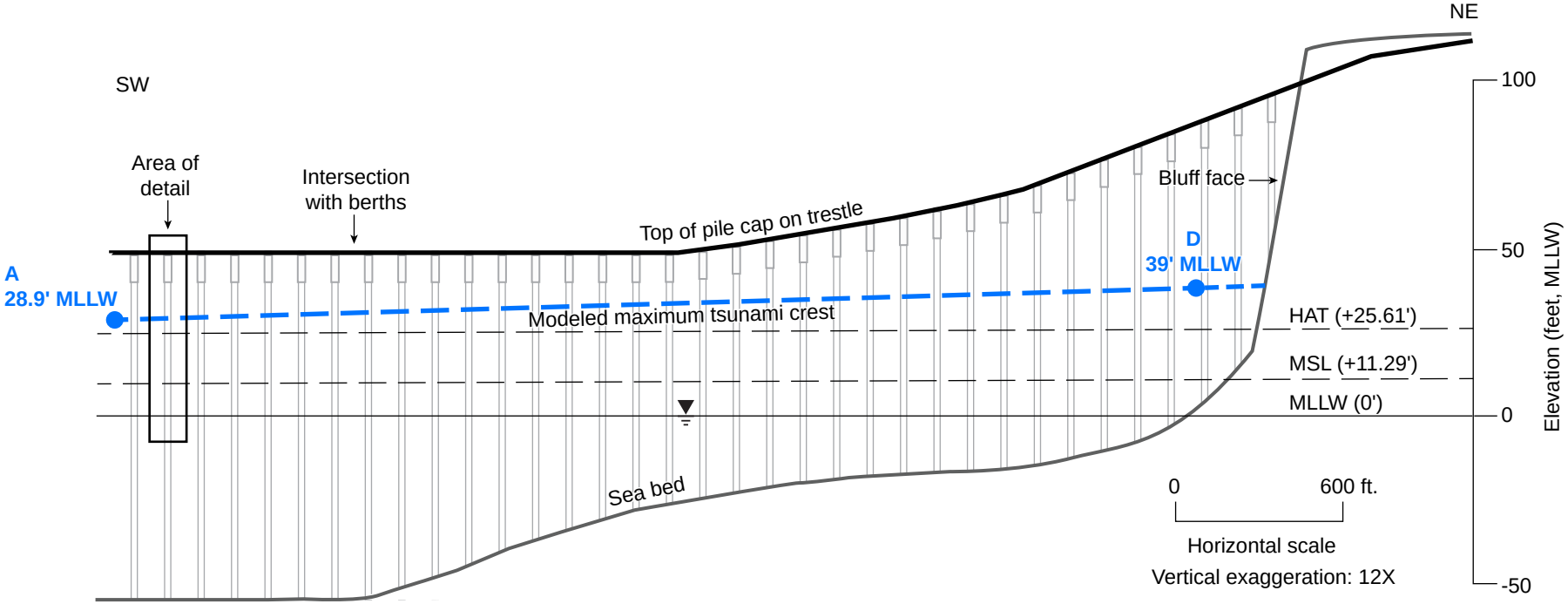
PLATE 33



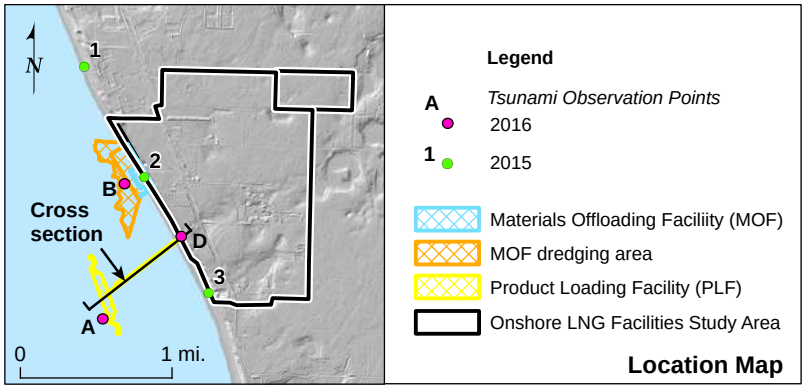


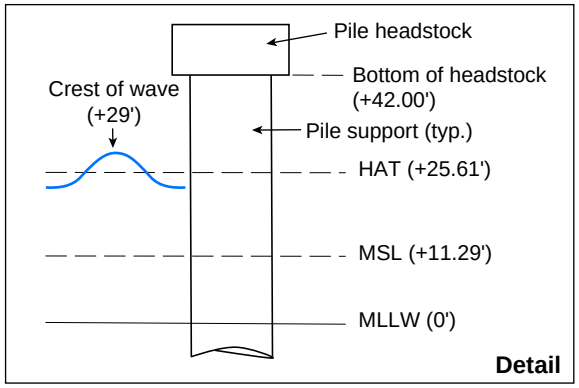
MODELED TSUNAMI WAVE HEIGHTS, POINTS 1, 2, AND 3
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE 34



Notes:
1. Trestle based on drawings USAL-CH-JDFND-90-000020-003, -006, and -007, dated 27-May-2015.
2. The following formula is used for conversion between MLLW and NAVD88 datums: Elevation, in ft (MLLW) = Elevation, in ft (NAVD88) + 7.32 ft





SCHEMATIC CROSS SECTION SHOWING MAXIMUM TSUNAMI CREST AND PROPOSED MARINE TRESTLE

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE 35

APPENDIX A

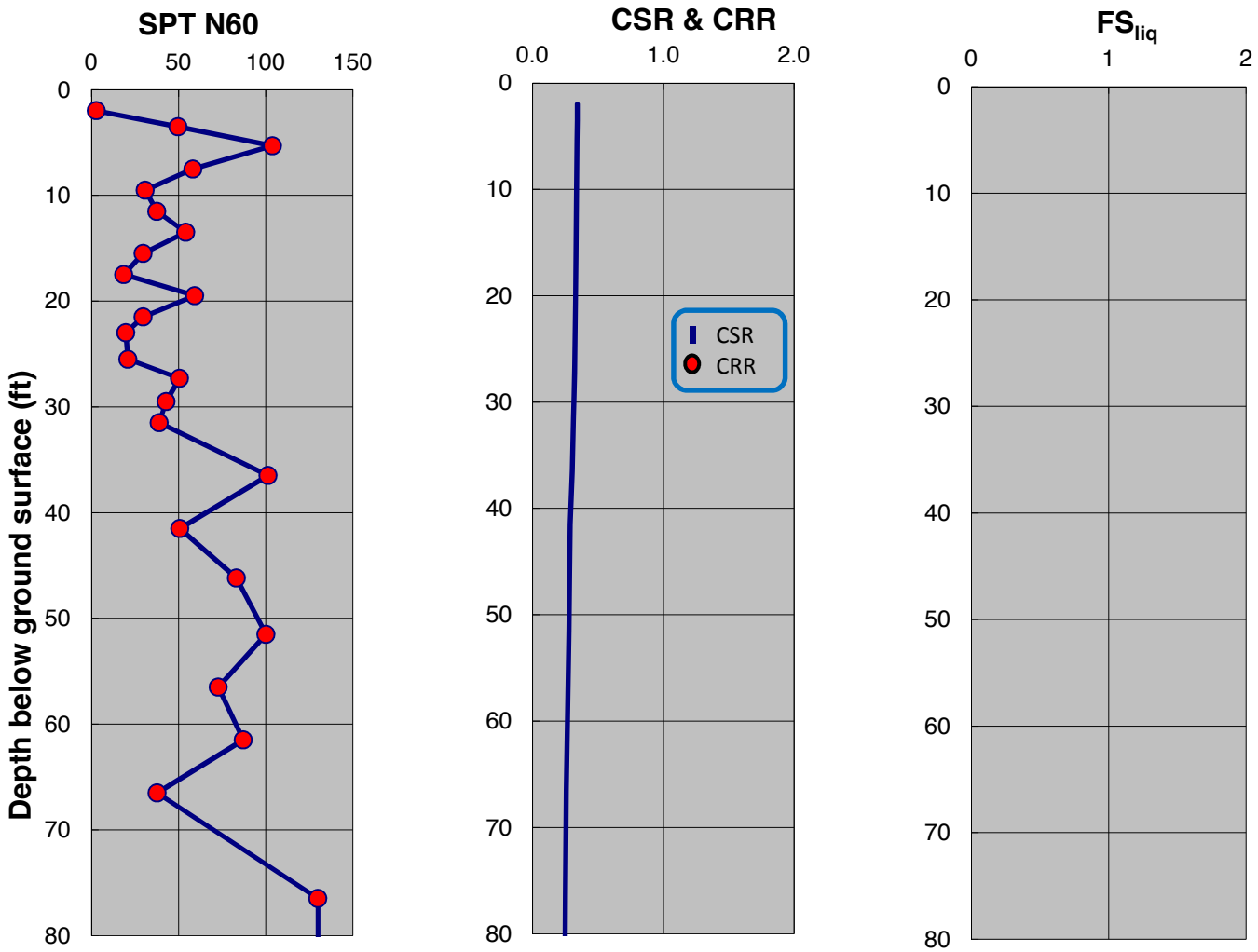
SPT-BASED LIQUEFACTION POTENTIAL EVALUATIONS PER NFPA 59A 2006 AND ASCE 7-05 FOR ONSHORE BORINGS

APPENDIX A

SPT-BASED LIQUEFACTION POTENTIAL EVALUATIONS PER NFPA 59A 2006 AND ASCE 7-05 FOR ONSHORE BORINGS

A.1 Liquefaction Triggering Hazard Assessment per NFPA 59A 2006

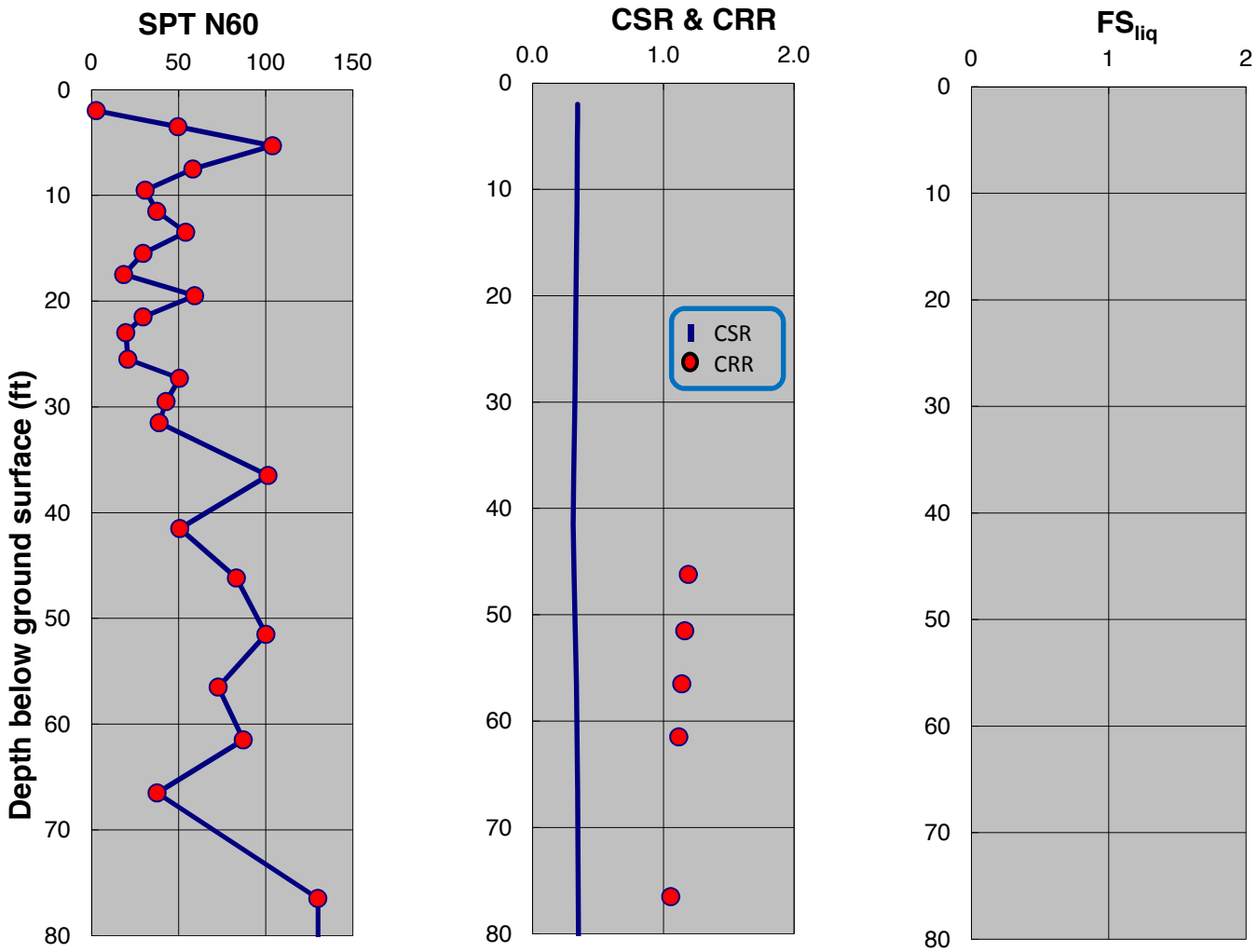
This appendix presents the liquefaction triggering hazard assessment results based on the SPT-based procedures proposed by NCEER (Youd et. al., 2001) and Boulanger and Idriss (2014) for the onshore borings and the existing elevations for the OBE and the SSE / MCE events per NFPA 59A 2006. Results are presented for the shallowest 80 ft. of each exploration and the safety factor is provided for the cases where it is less than two. Results are not shown for depths greater than 80 feet given the limitations of the simplified, empirical methods, which are calibrated to case history data that are, in general, available down to about 50-ft depth. In addition, the uncertainty of the shear stress reduction coefficient with depth r_d increases for depths higher than approximately 70 ft. Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata. Per the driller's log in the Onshore Geotechnical Data report (Fugro Report No. 04.10140334-8, AKLNG Document No. USAL-FG-GRZZZ-00-002015-006), the blow counts from sample S-15 of boring B-88 and S-23 of boring B-122 were removed as unreliable.



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-9 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

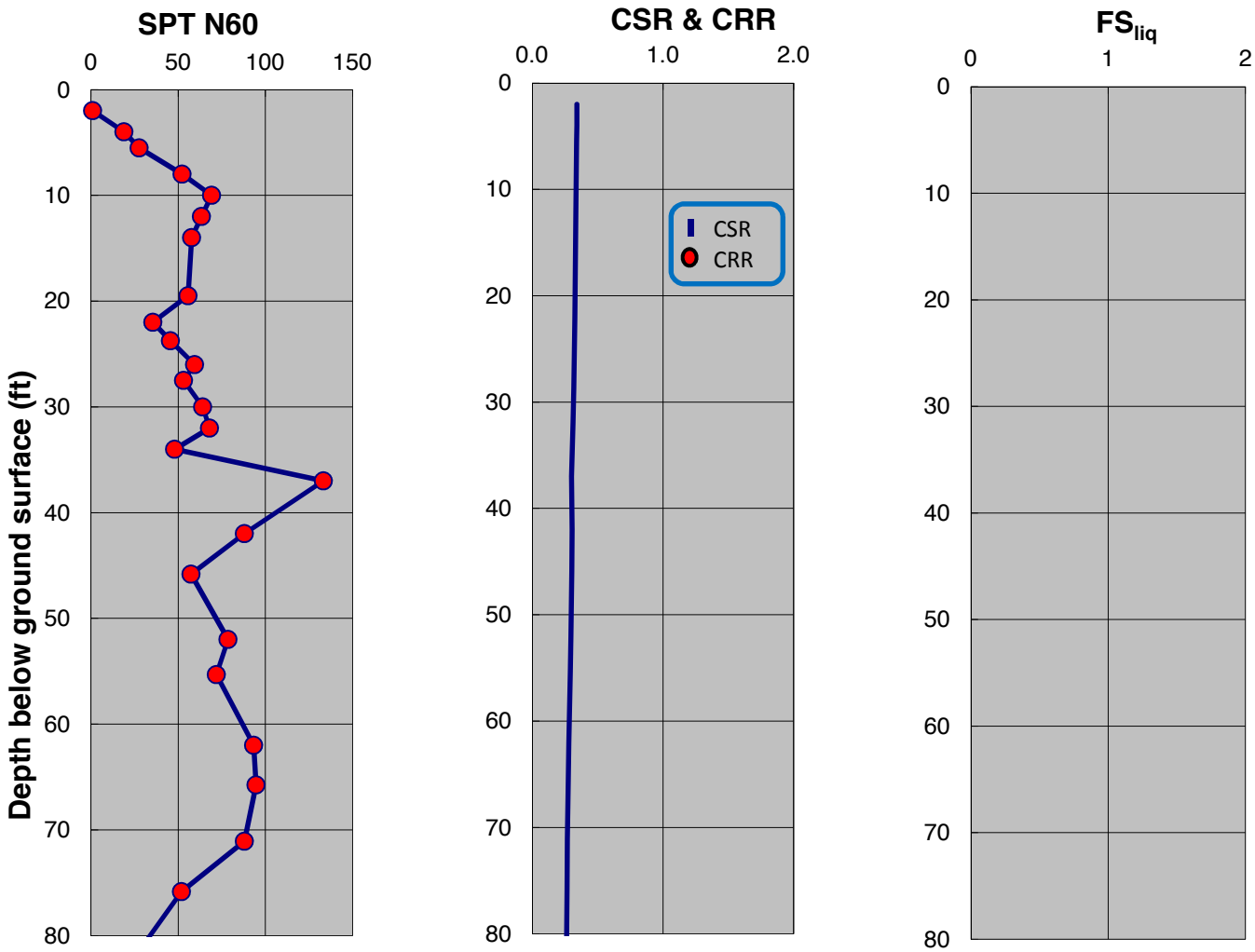
PLATE A.1



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-9 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

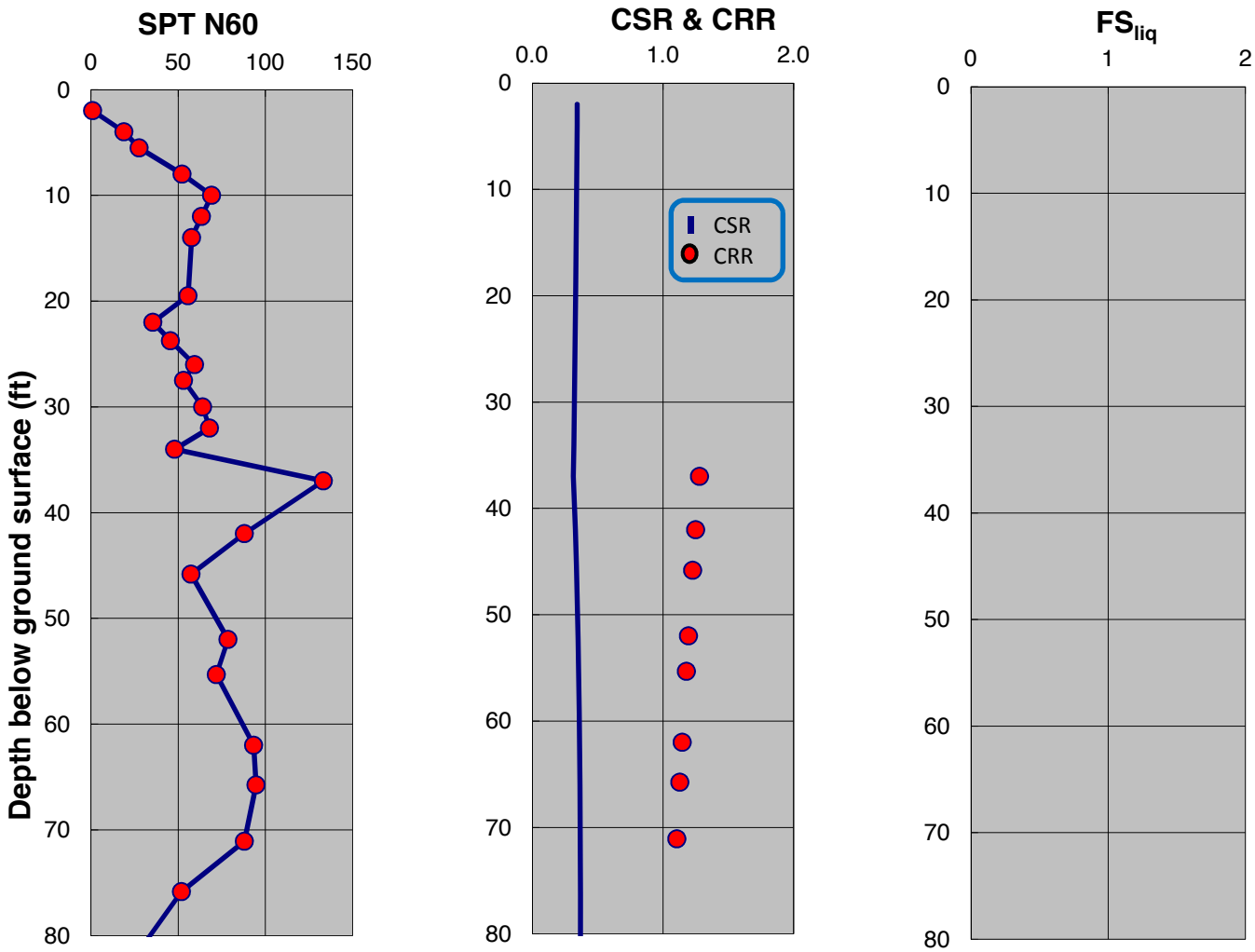
PLATE A.2



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-10 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

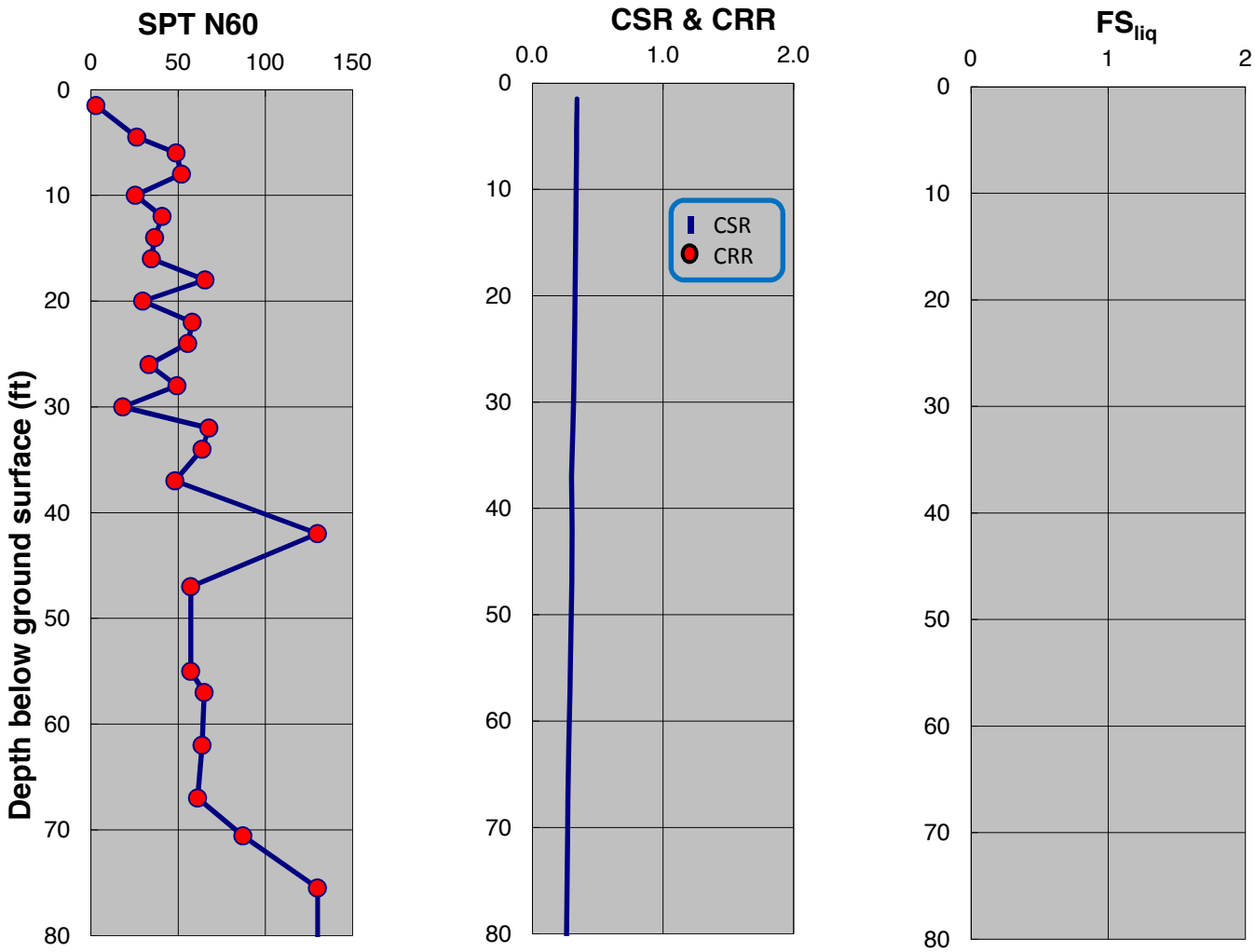
PLATE A.3



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-10 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

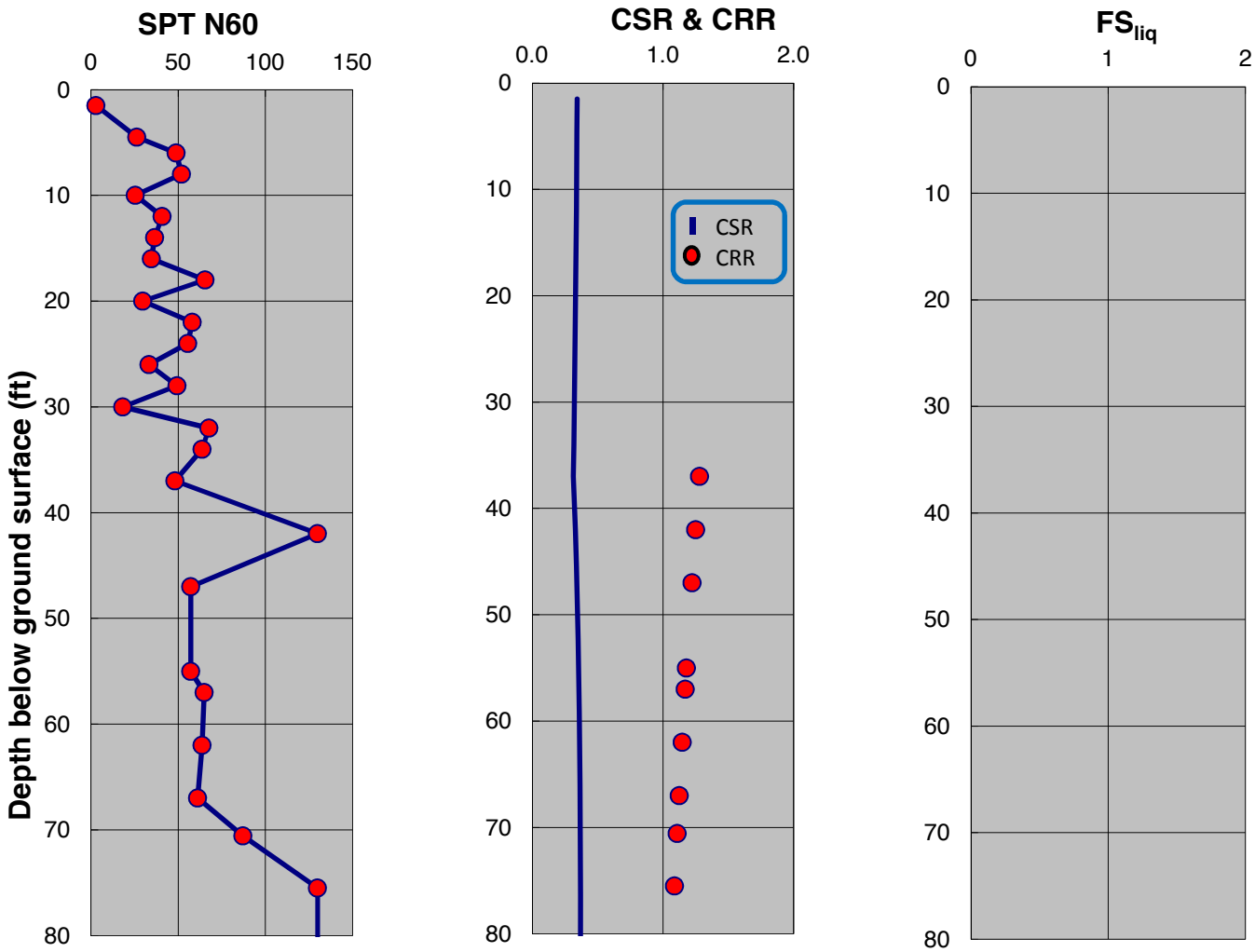
PLATE A.4



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-11 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

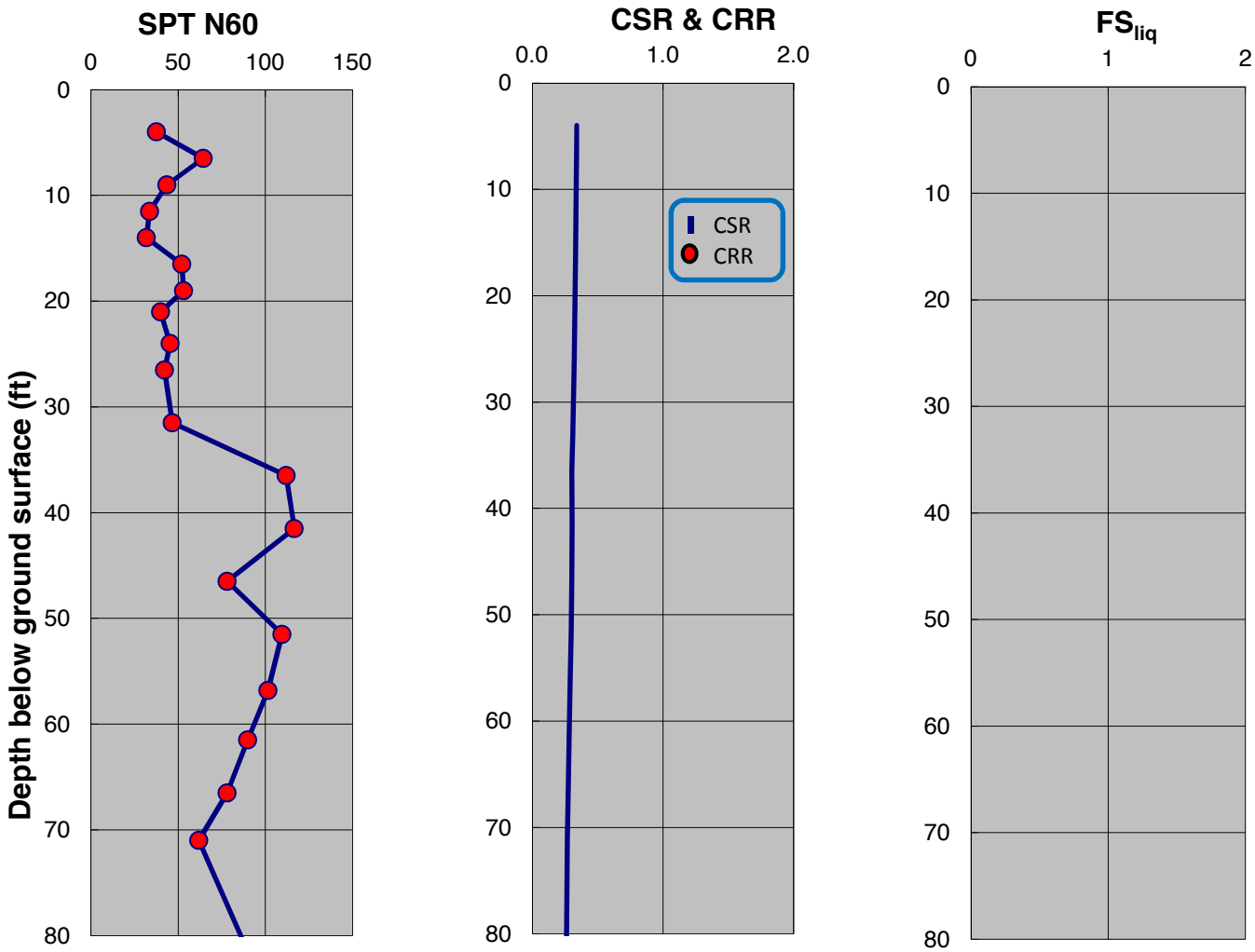
PLATE A.5



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-11 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

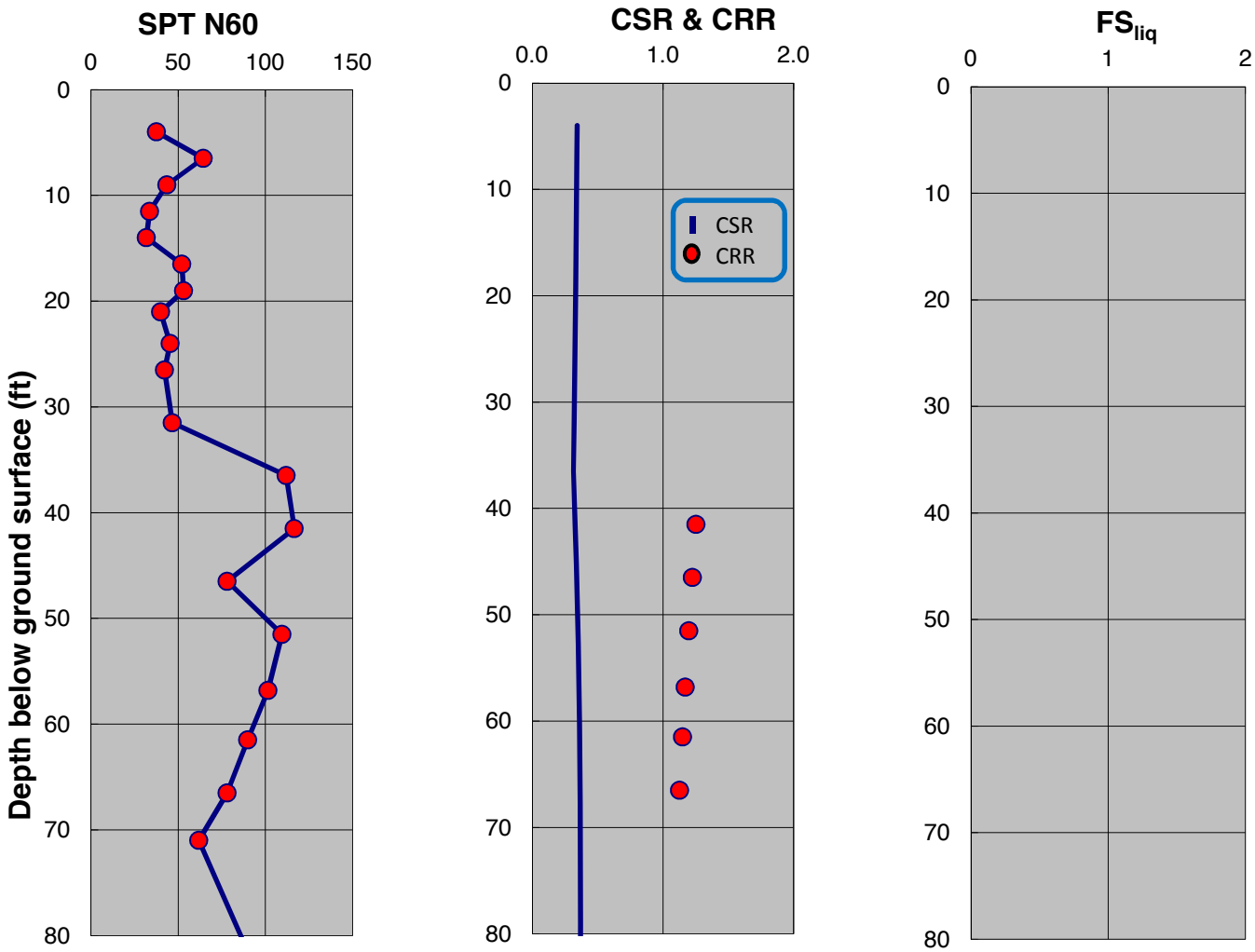
PLATE A.6



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-14 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

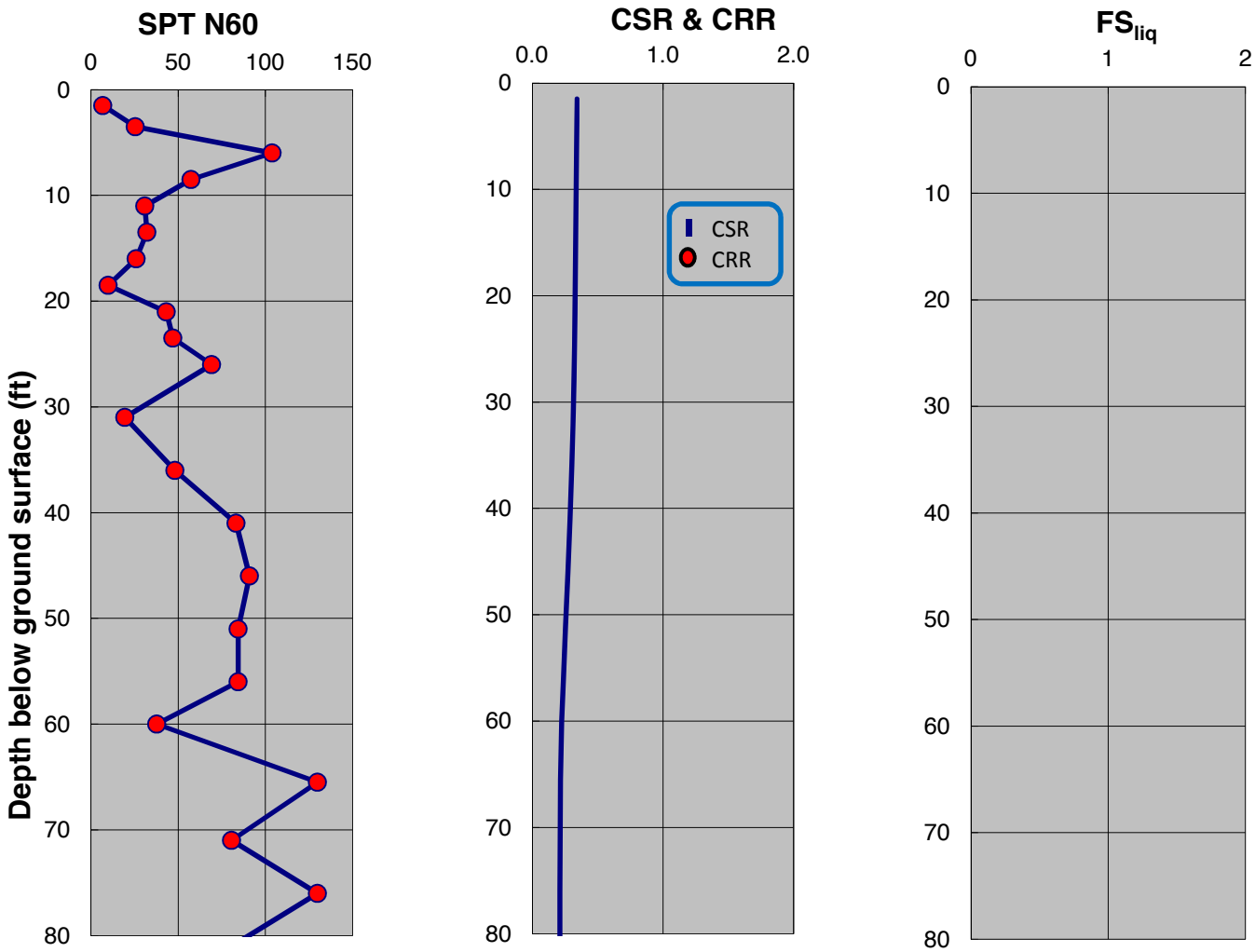
PLATE A.7



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-14 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

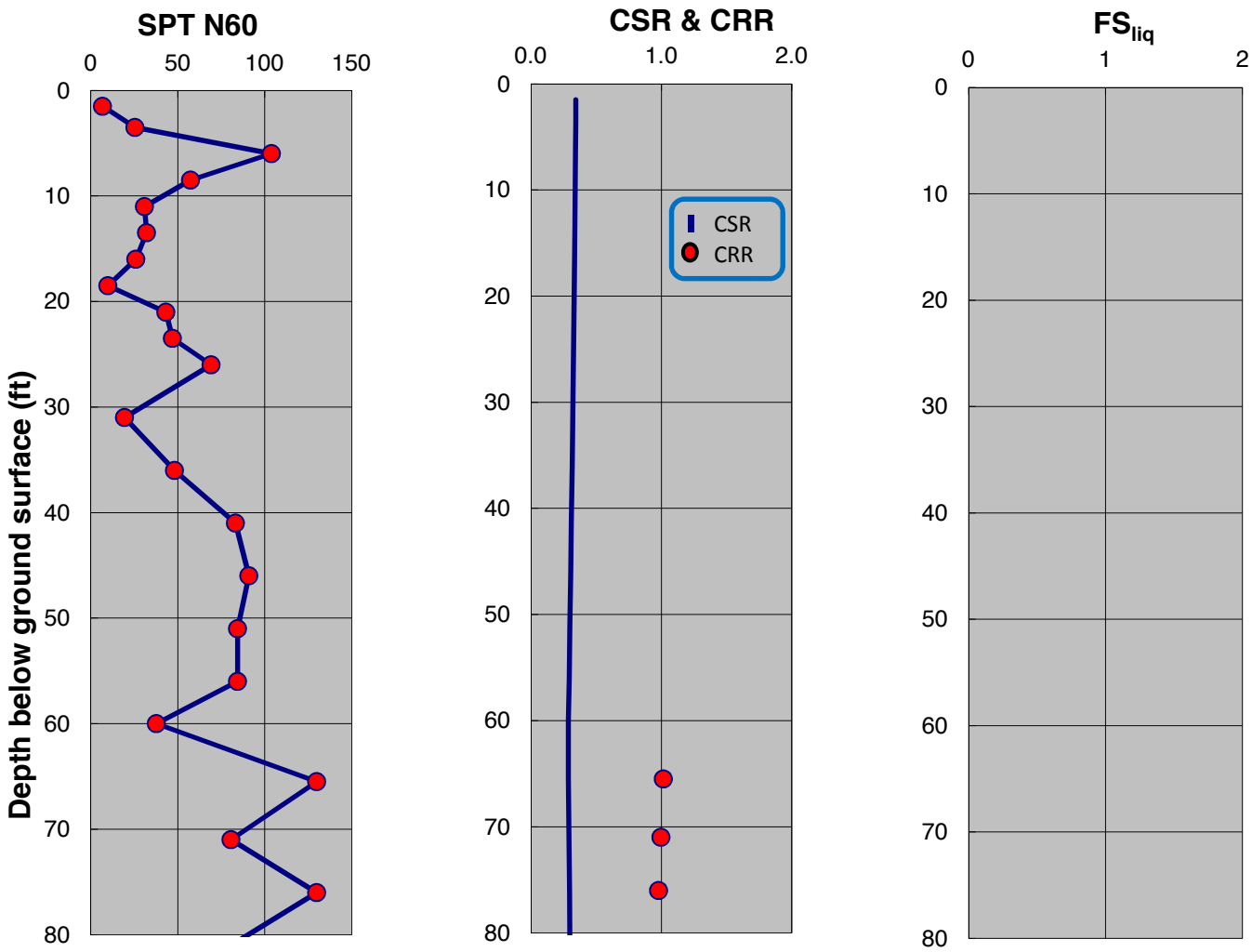
PLATE A.8



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-15 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

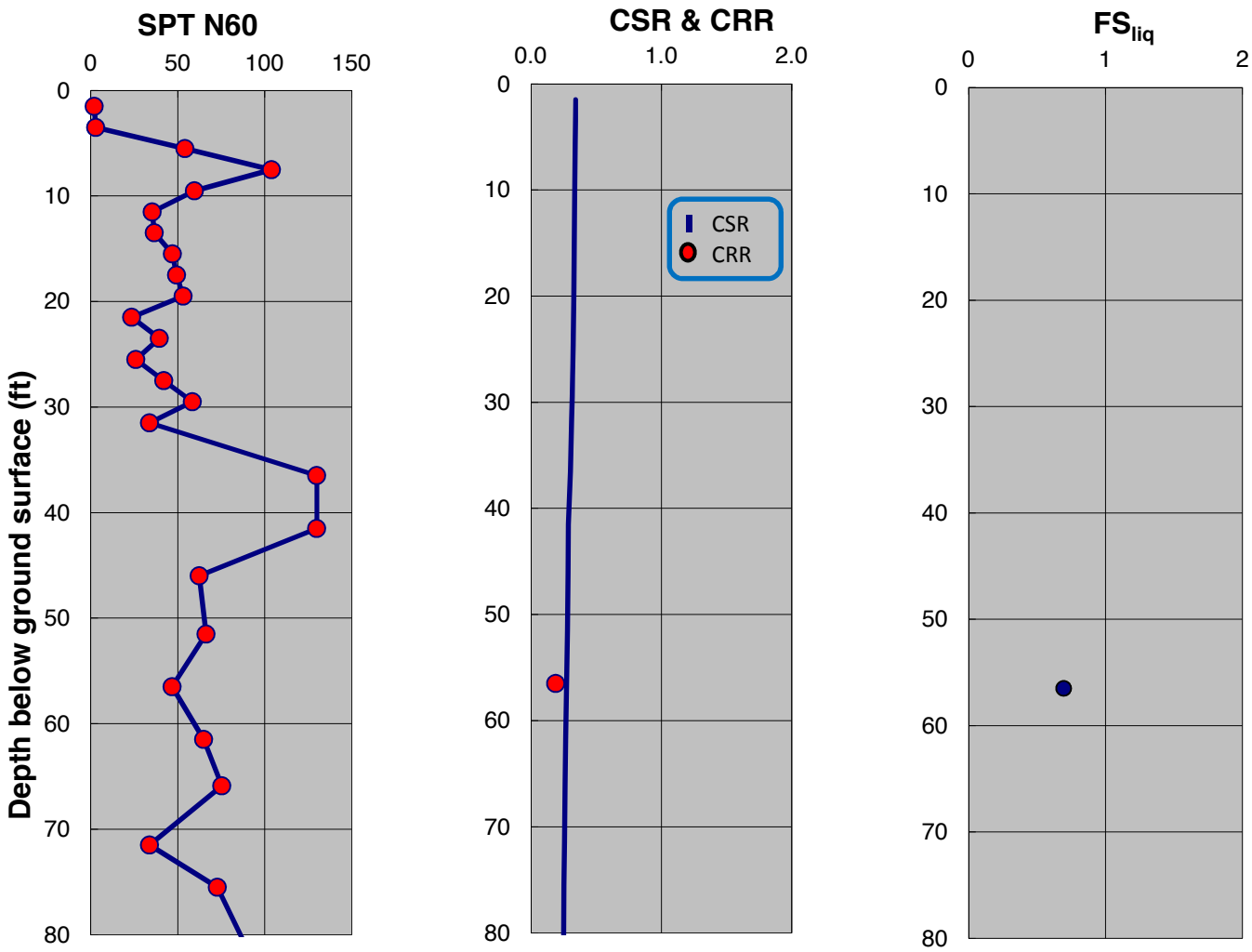
PLATE A.9



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-15 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

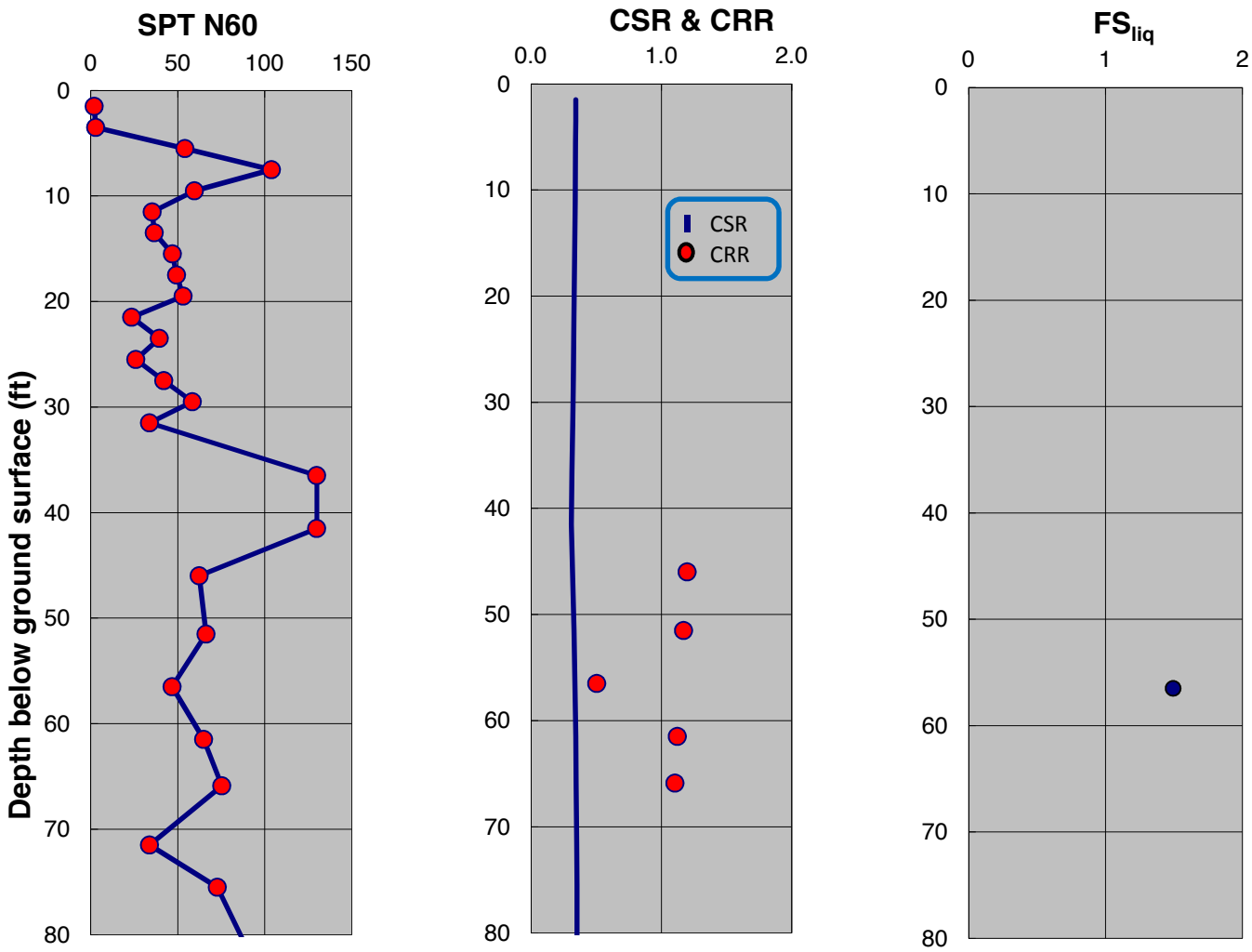
PLATE A.10



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-17 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

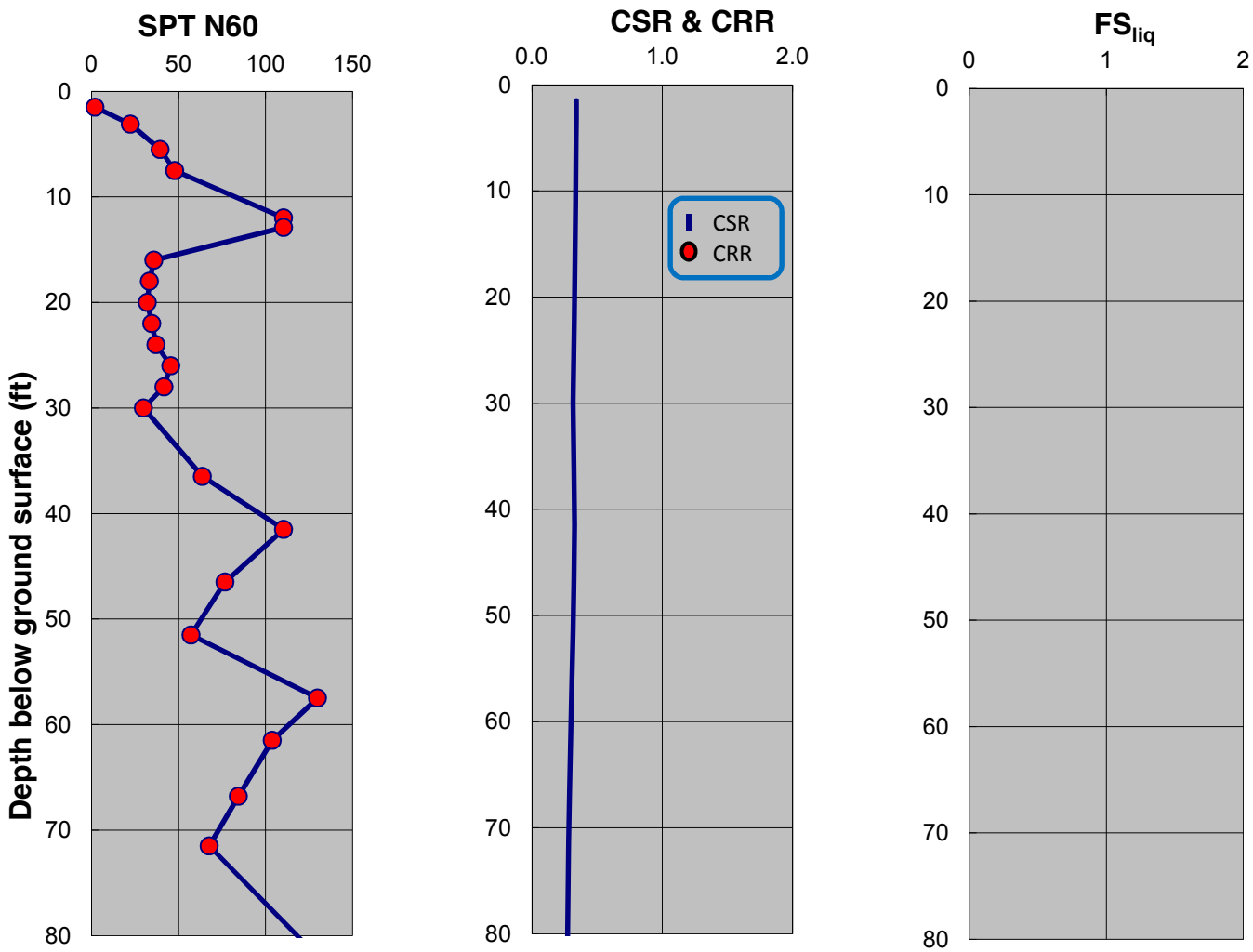
PLATE A.11



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-17 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

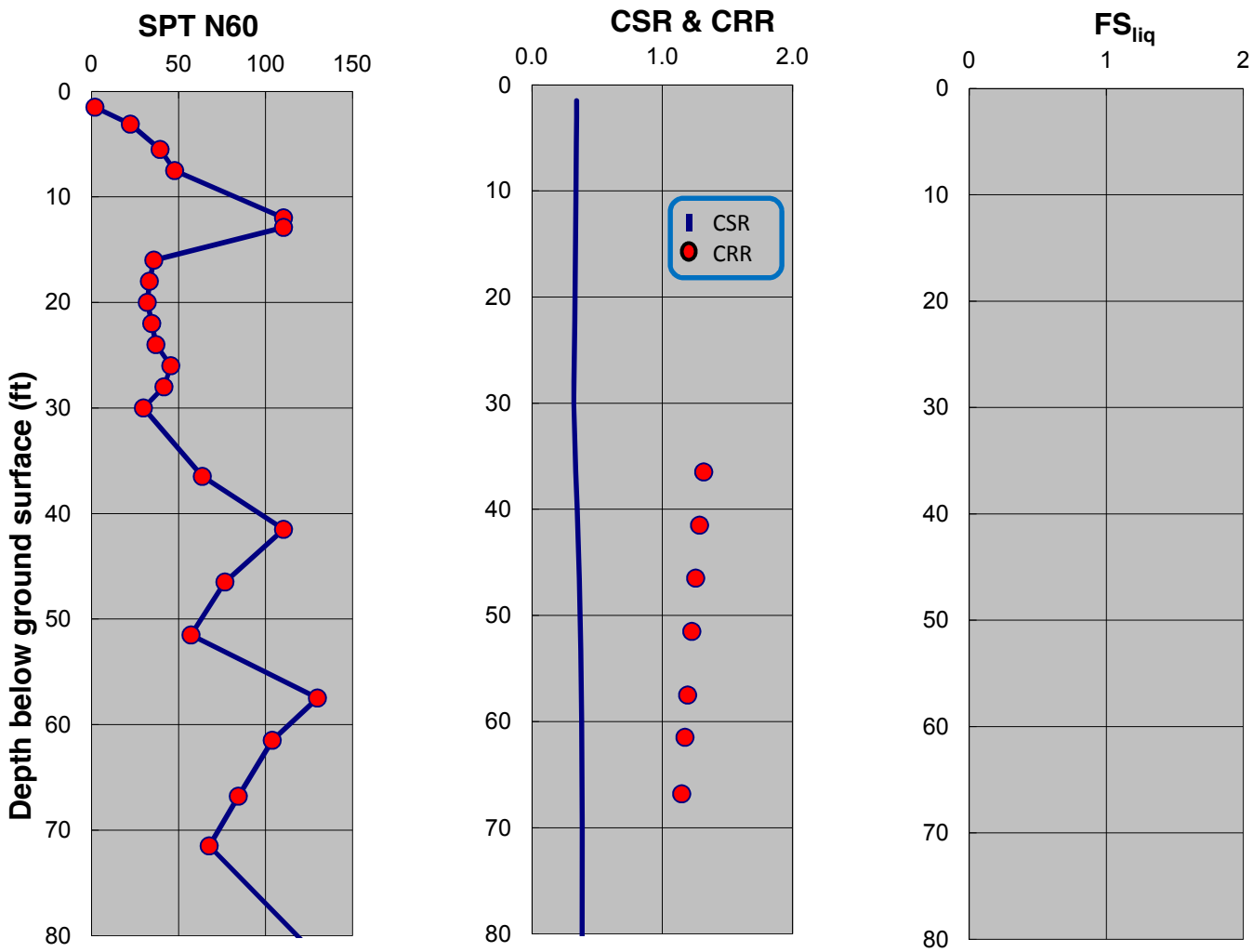
PLATE A.12



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-18 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

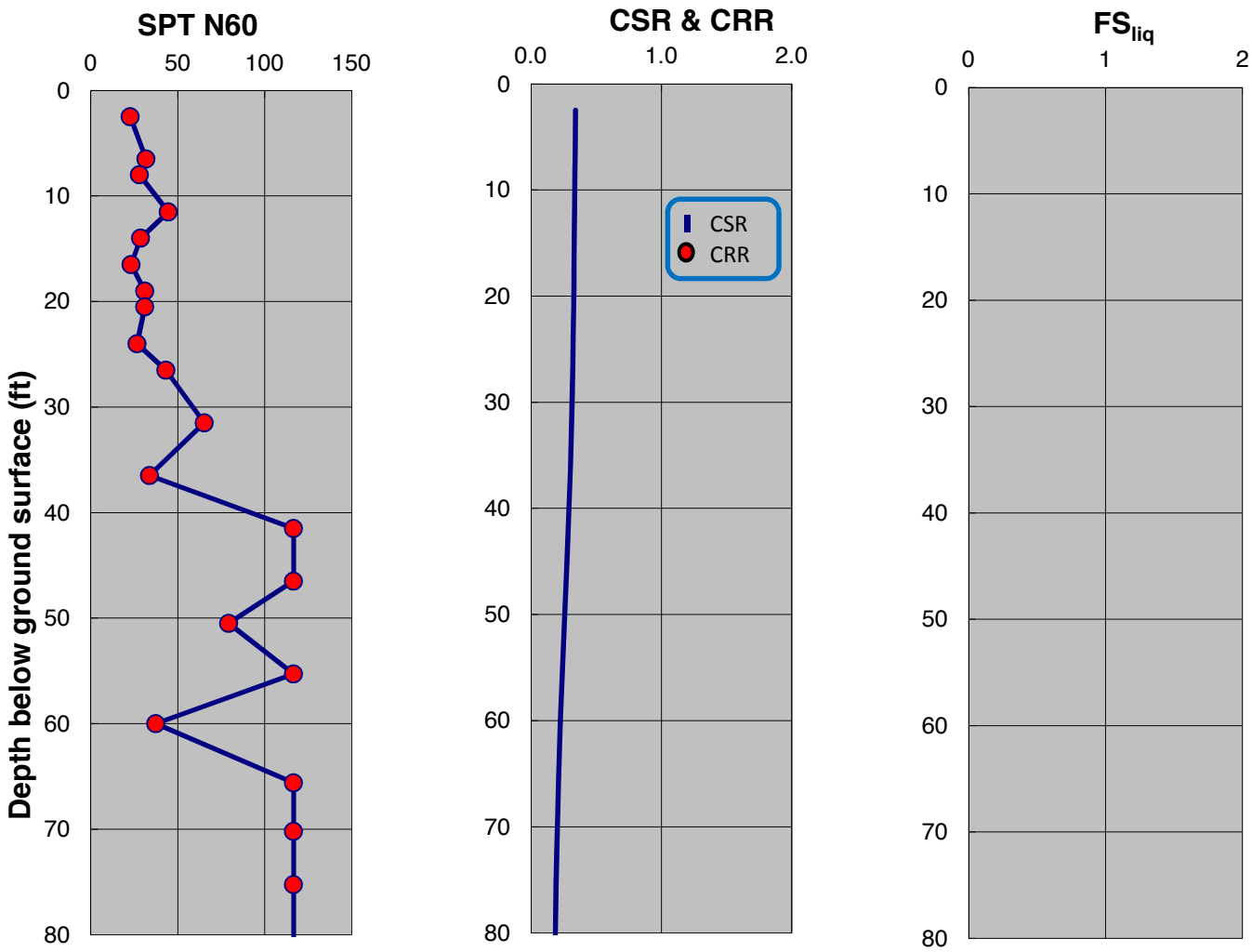
PLATE A.13



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-18 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

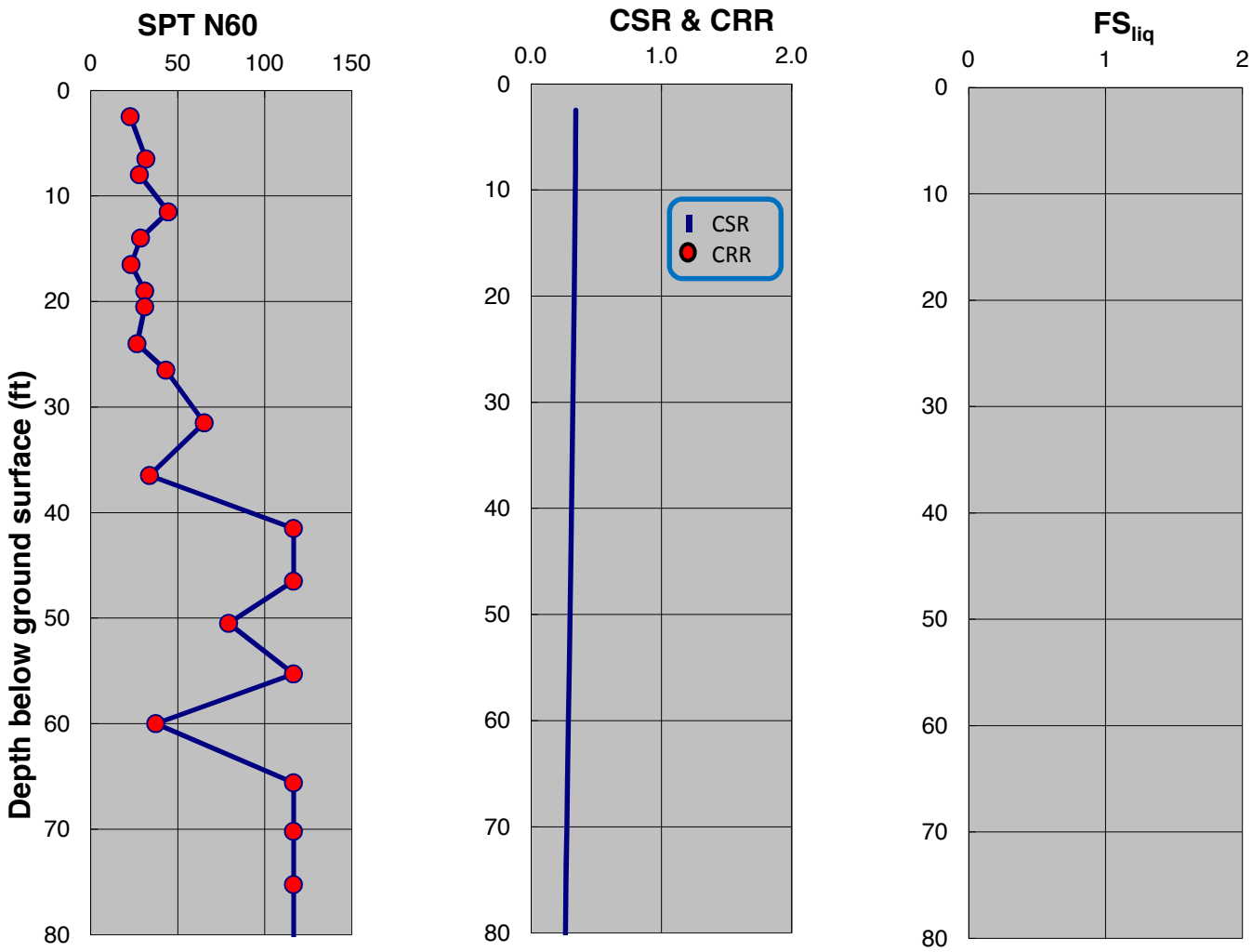
PLATE A.14



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-23 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

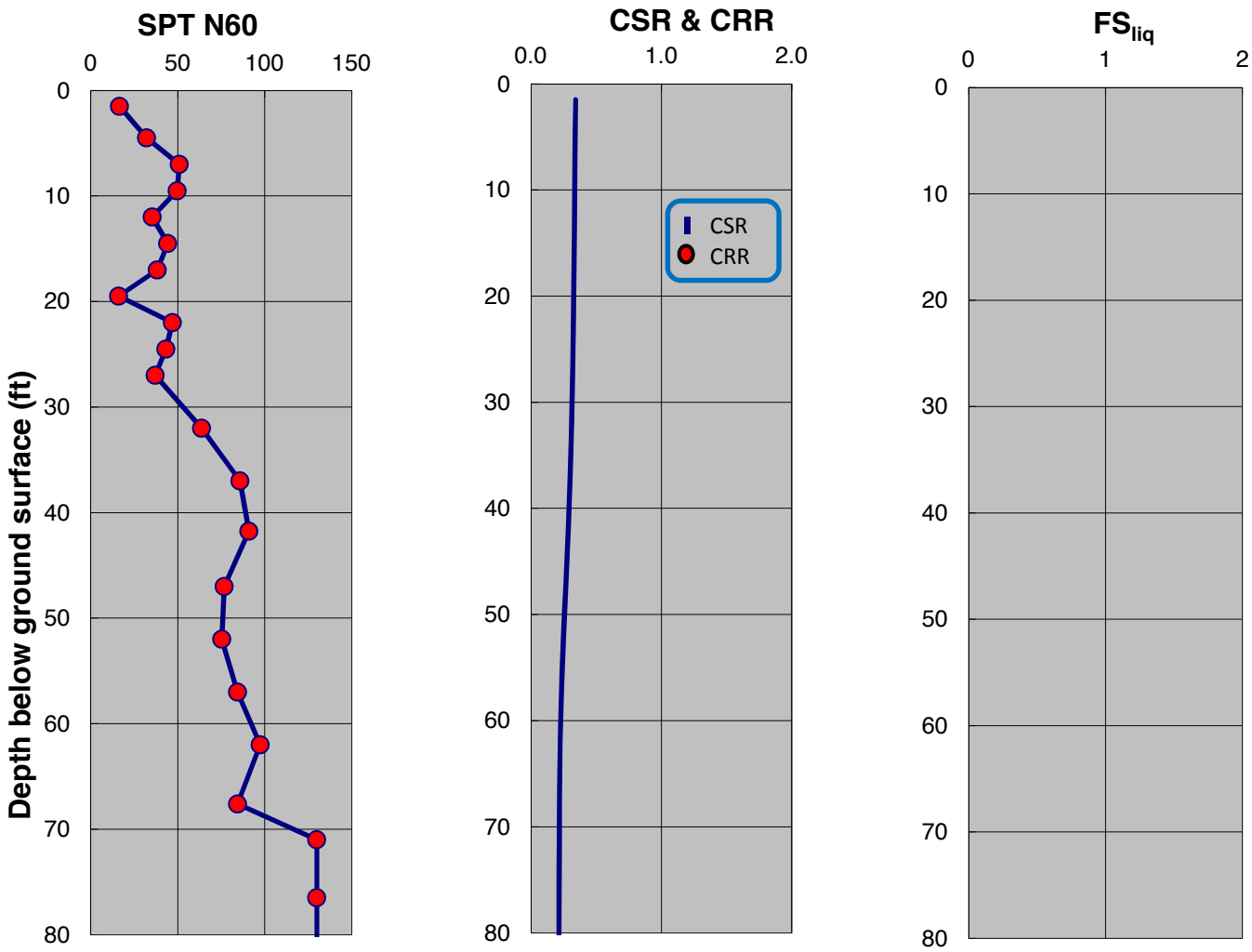
PLATE A.15



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-23 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

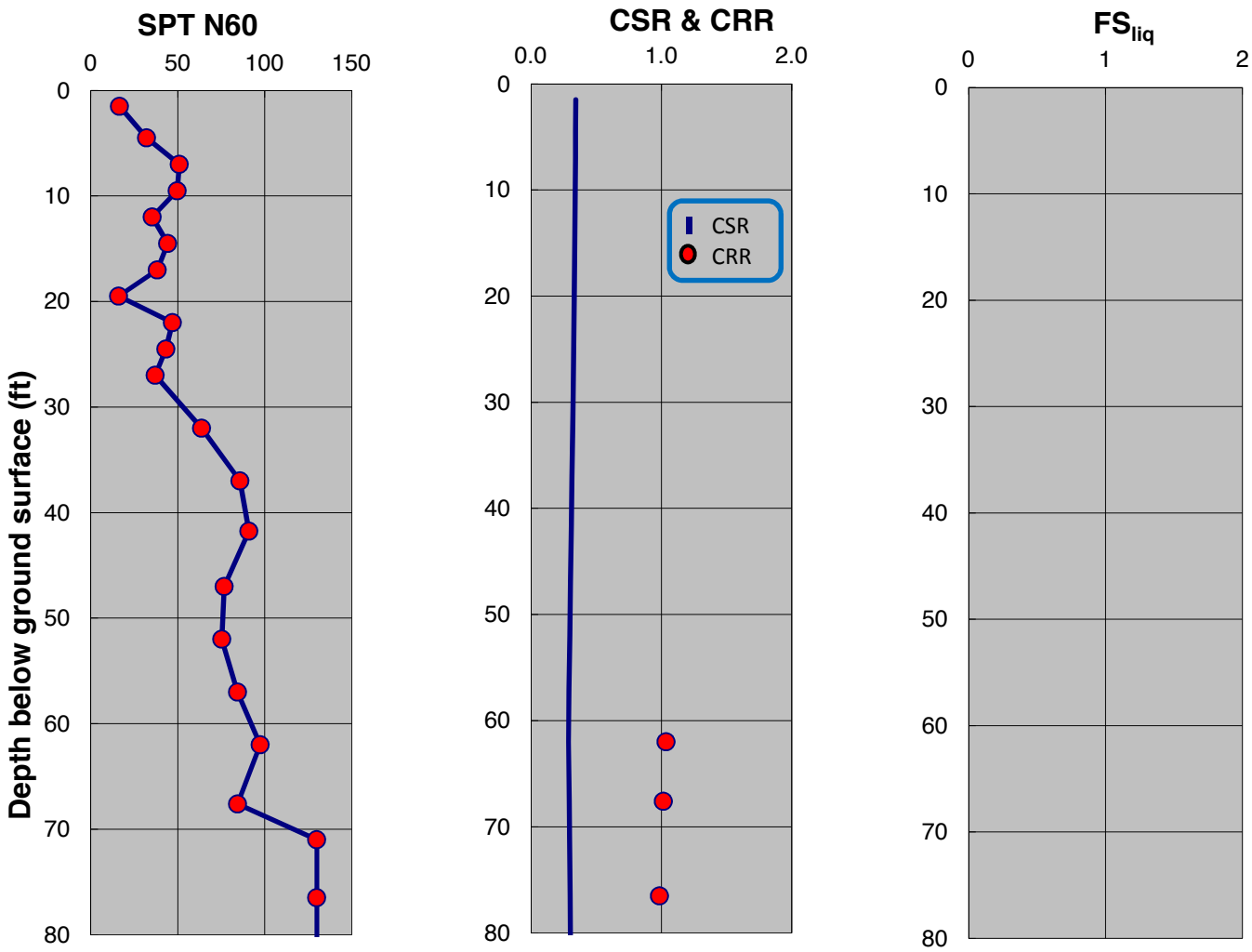
PLATE A.16



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-24 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

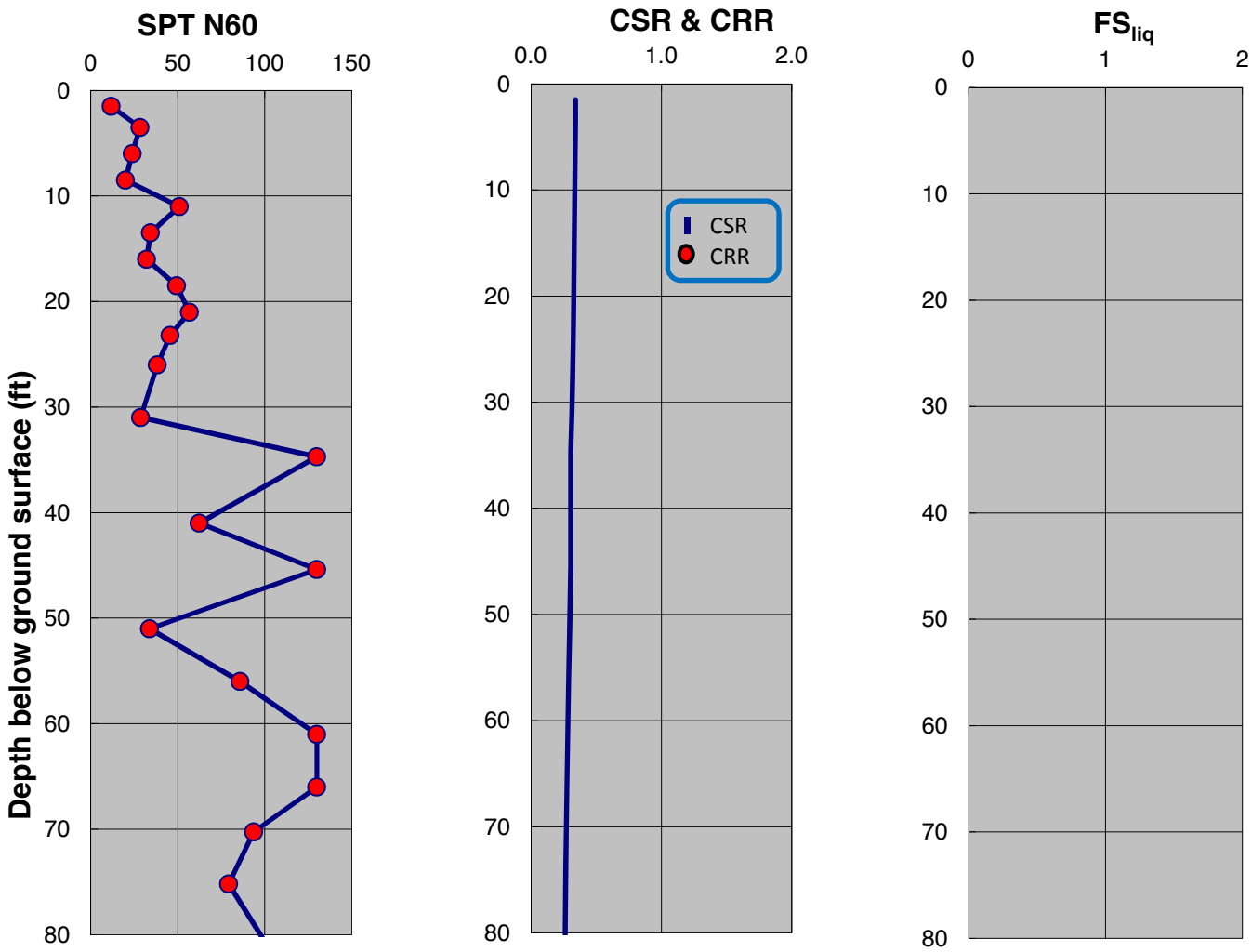
PLATE A.17



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-24 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

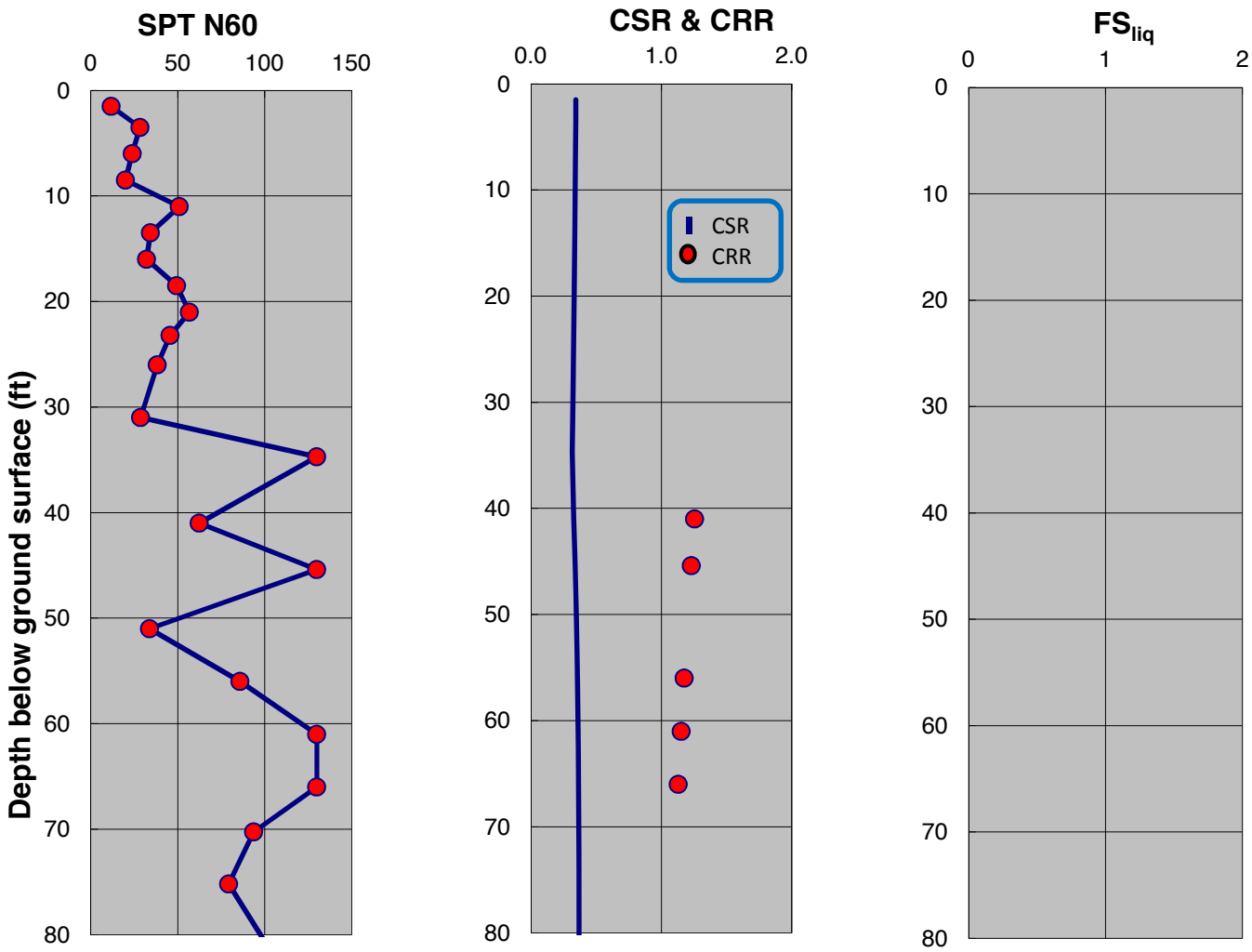
PLATE A.18



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-26 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

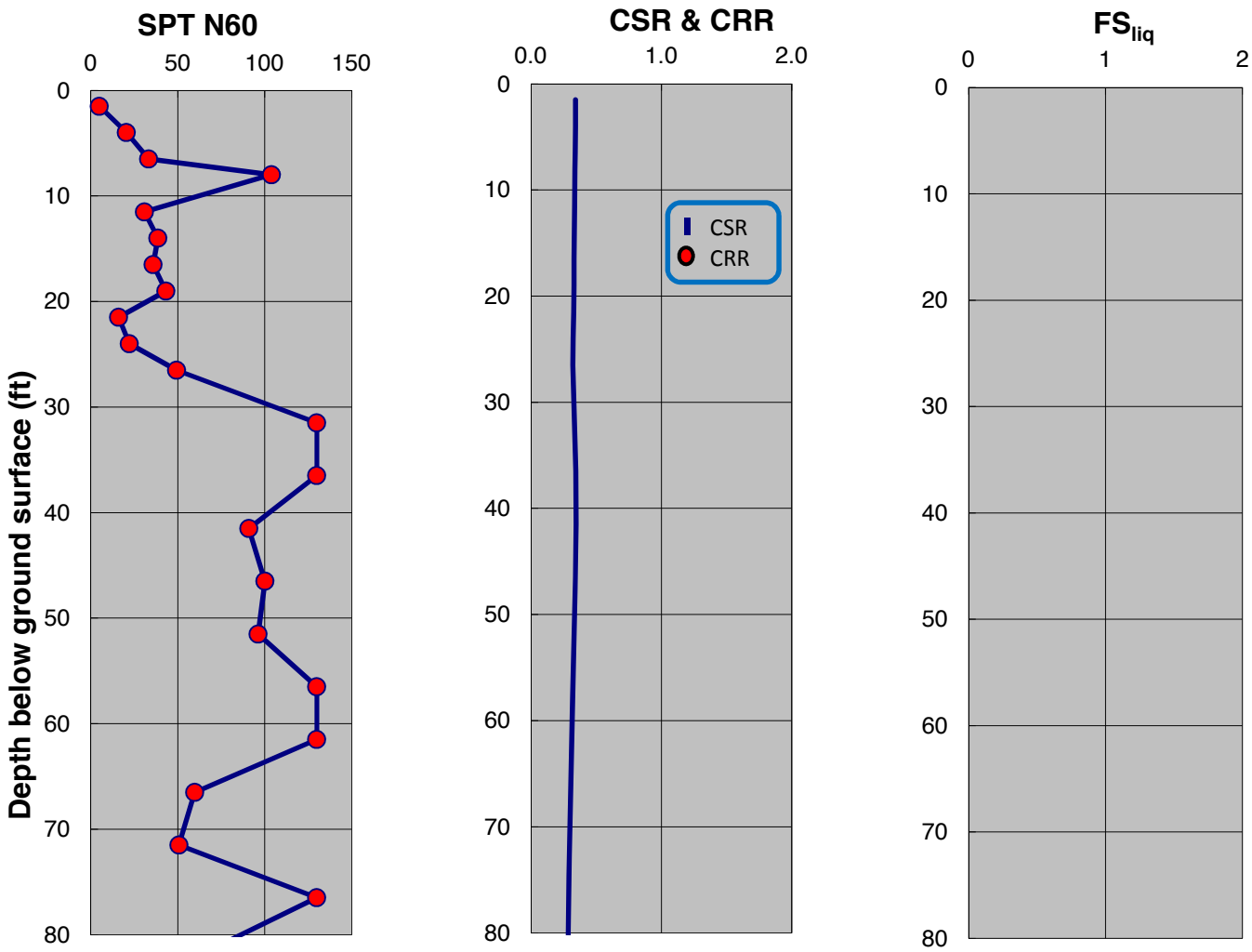
PLATE A.19



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-26 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

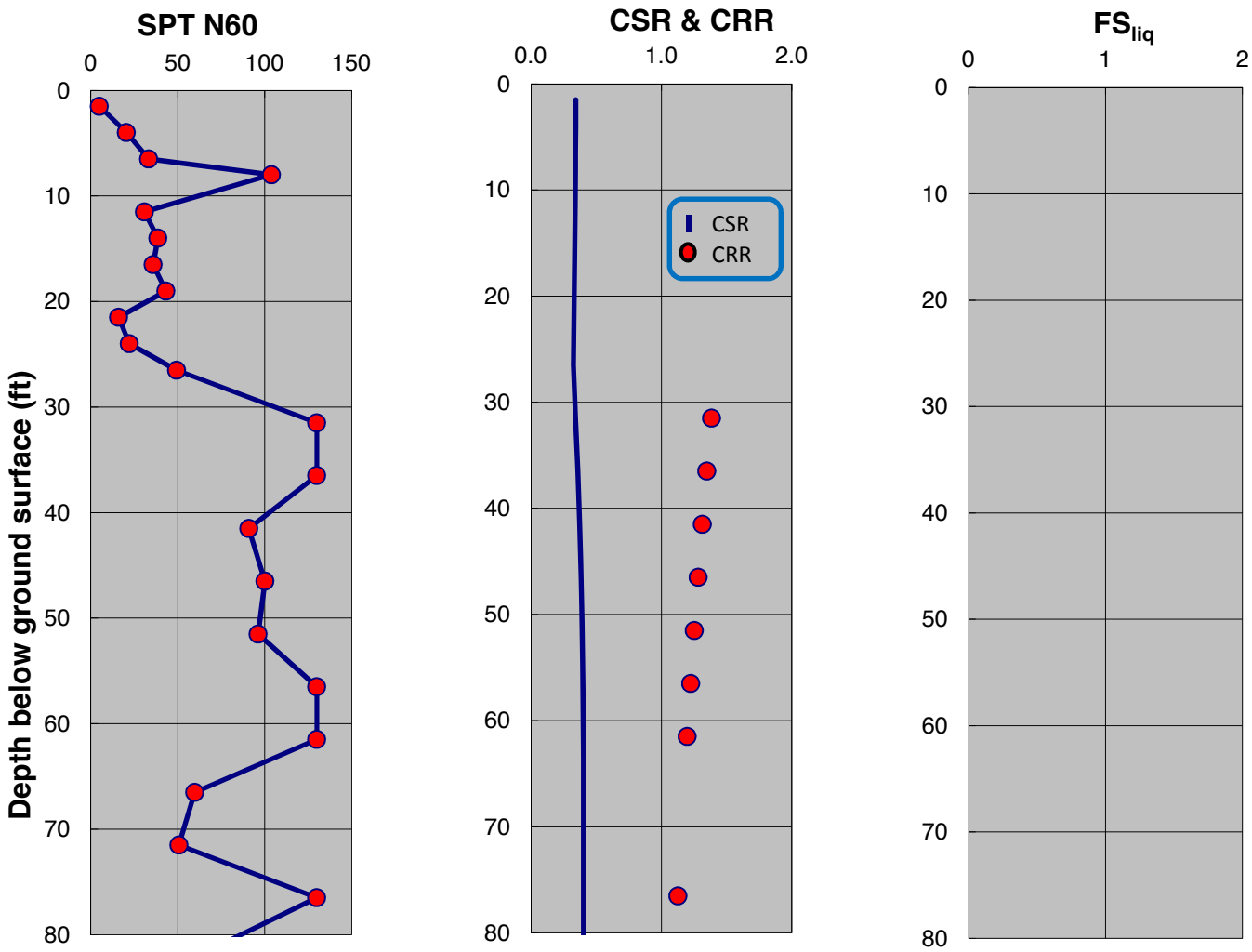
PLATE A.20



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-27 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

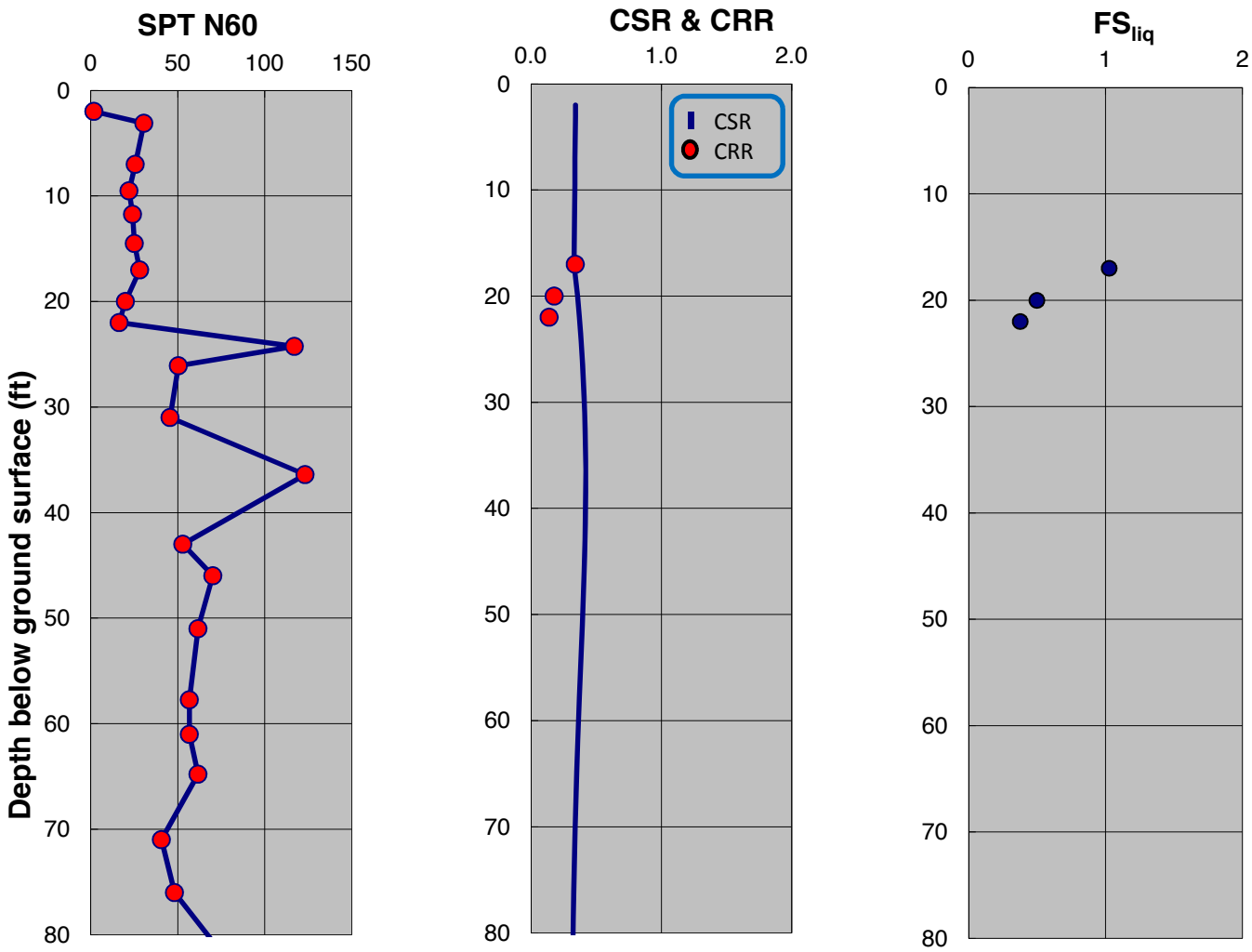
PLATE A.21



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-27 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

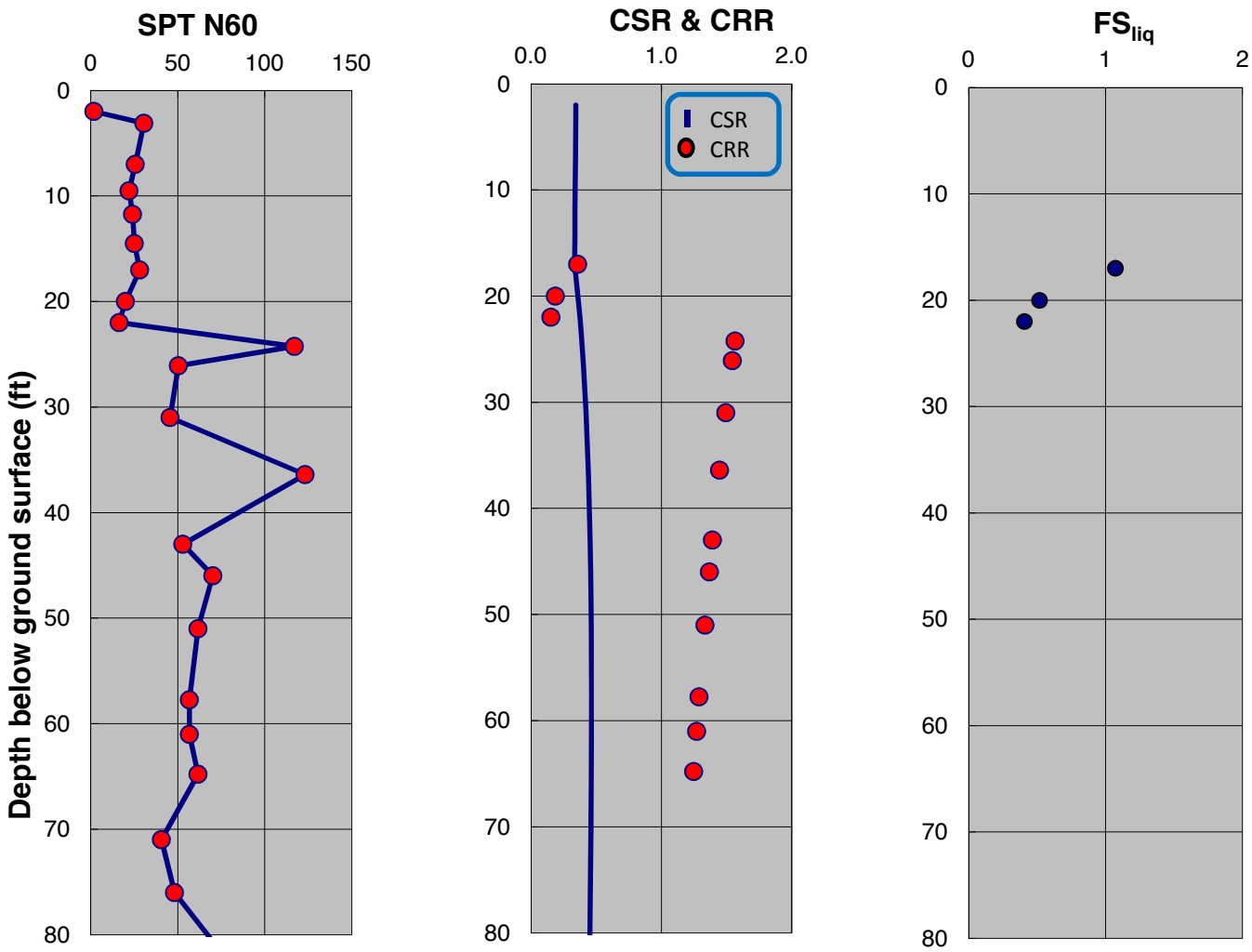
PLATE A.22



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-28 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

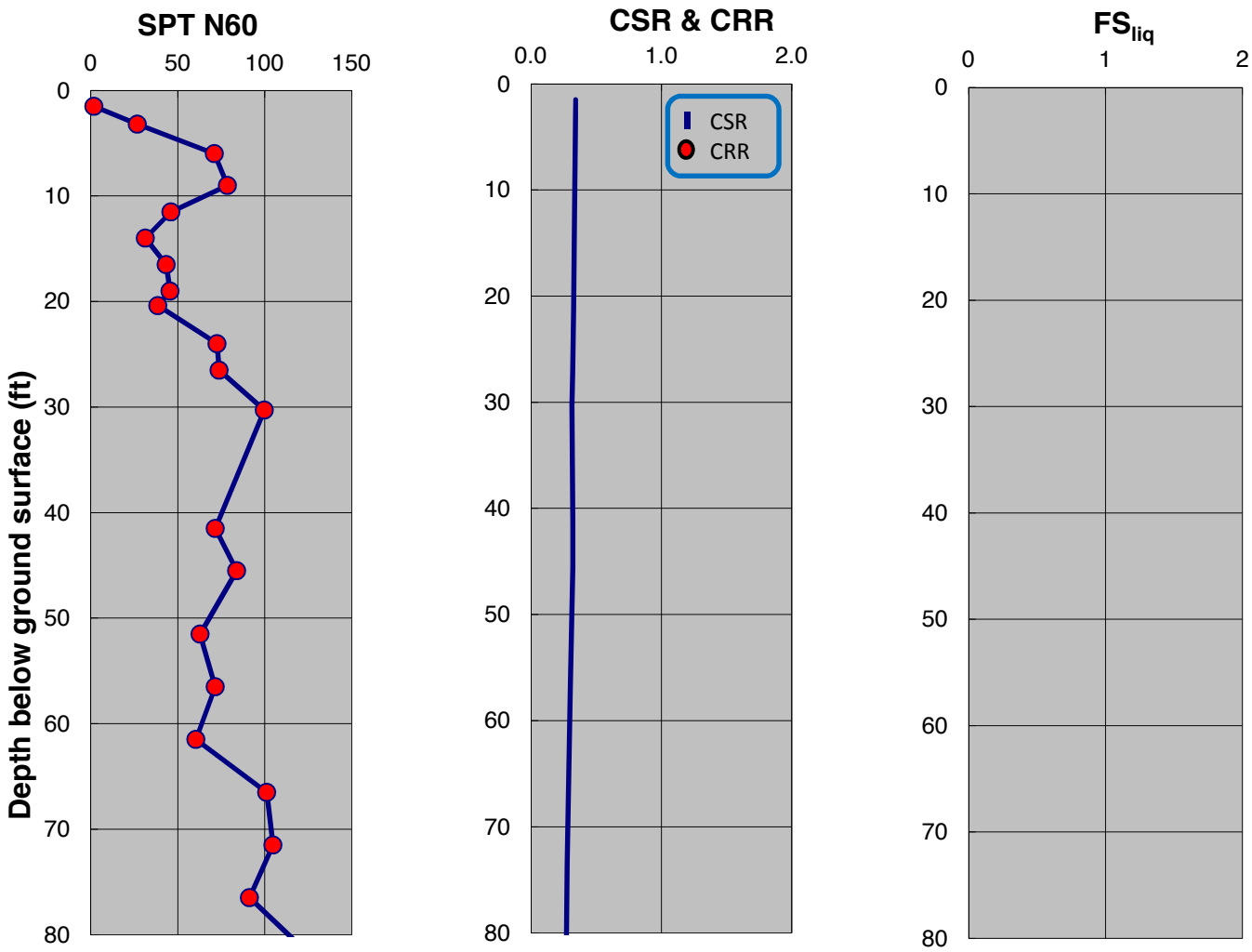
PLATE A.23



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-28 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

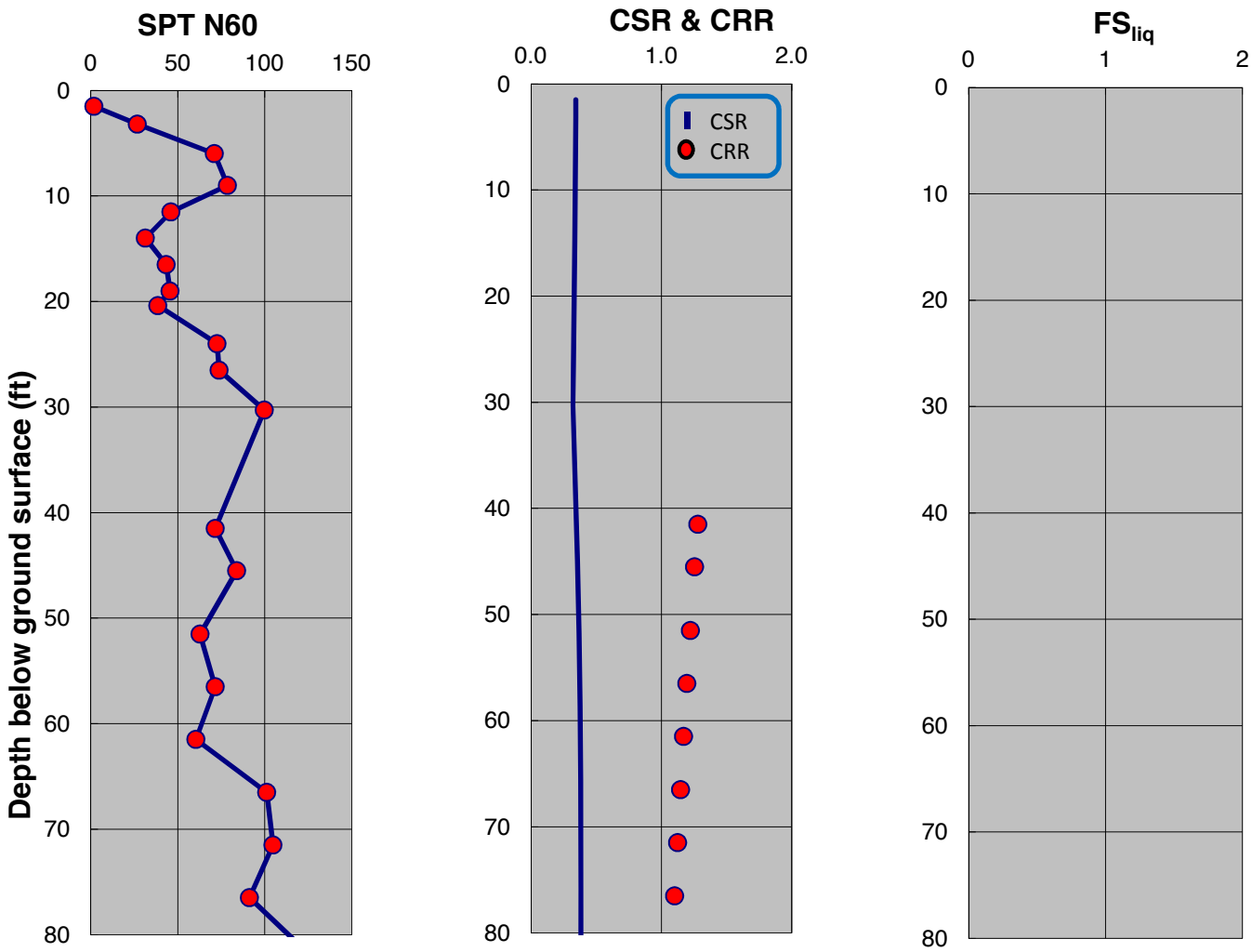
PLATE A.24



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-32 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

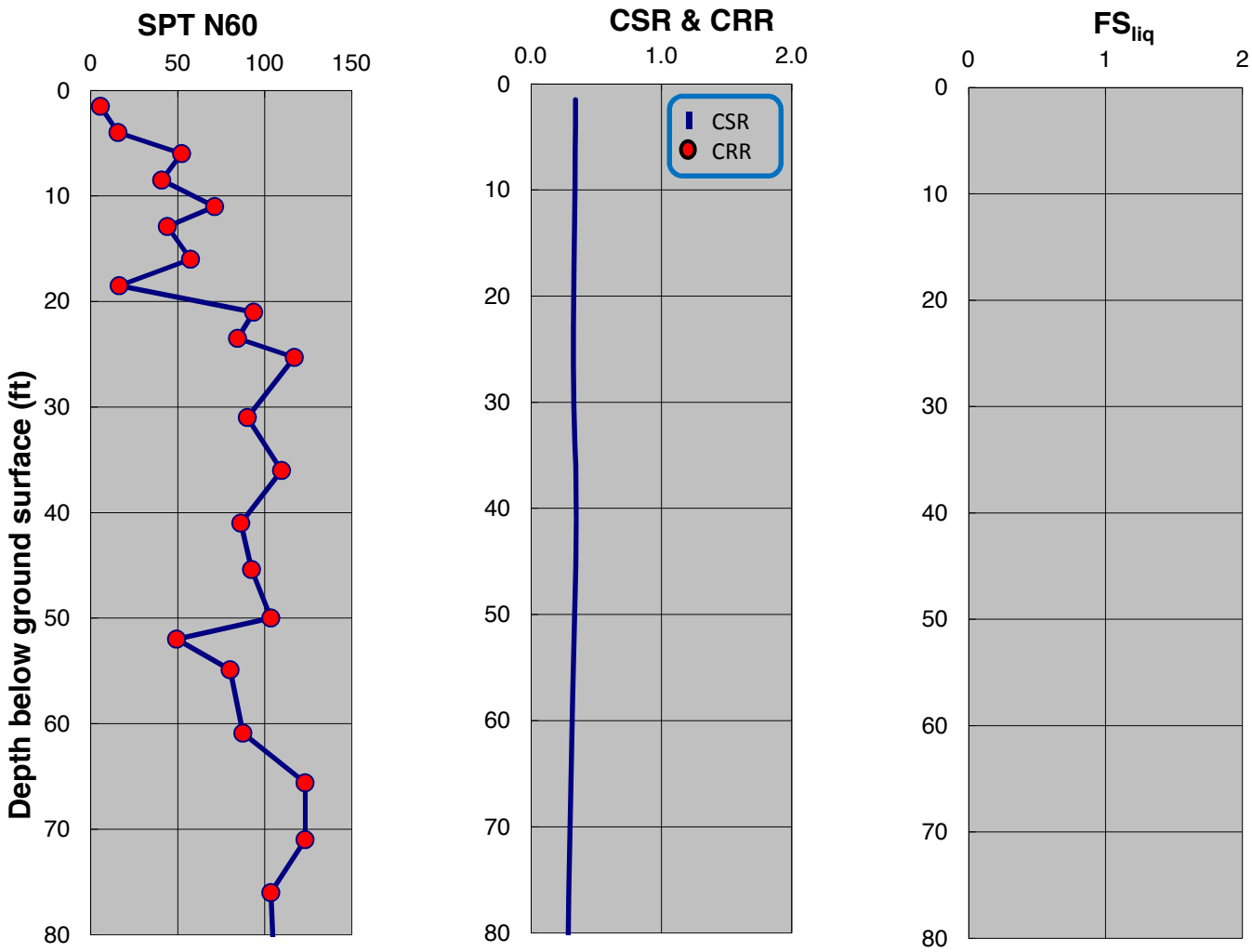
PLATE A.25



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-32 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

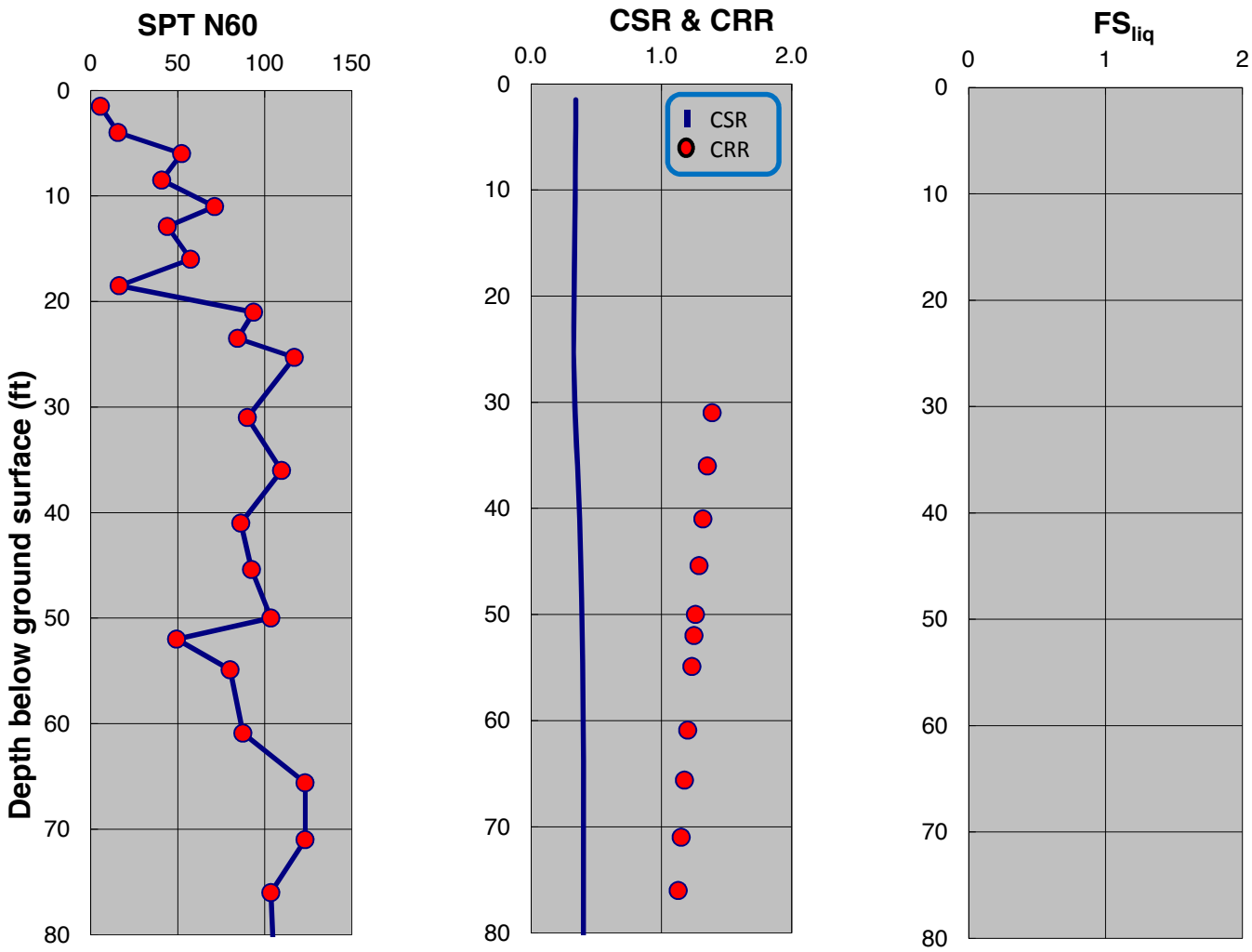
PLATE A.26



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-34 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

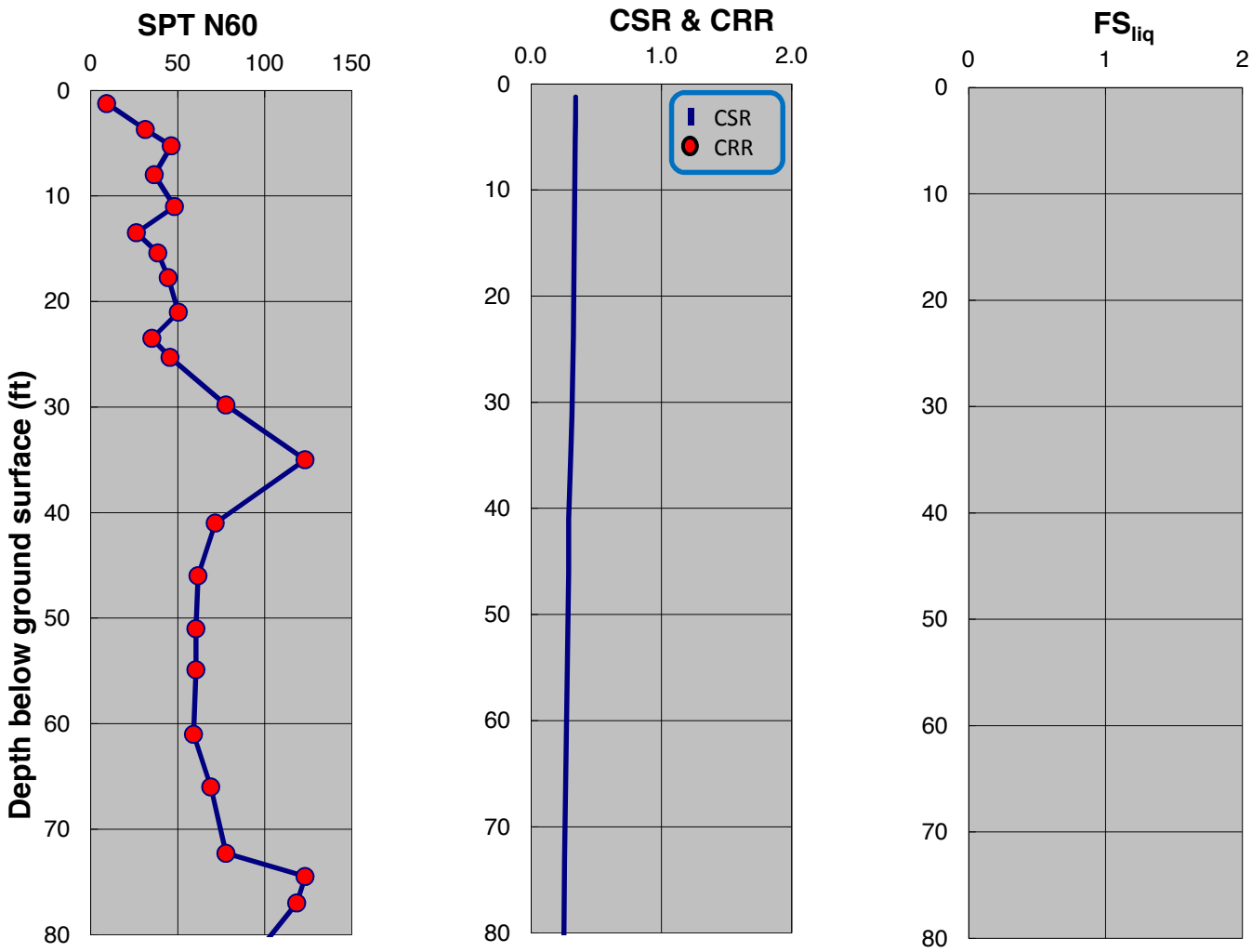
PLATE A.27



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-34 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

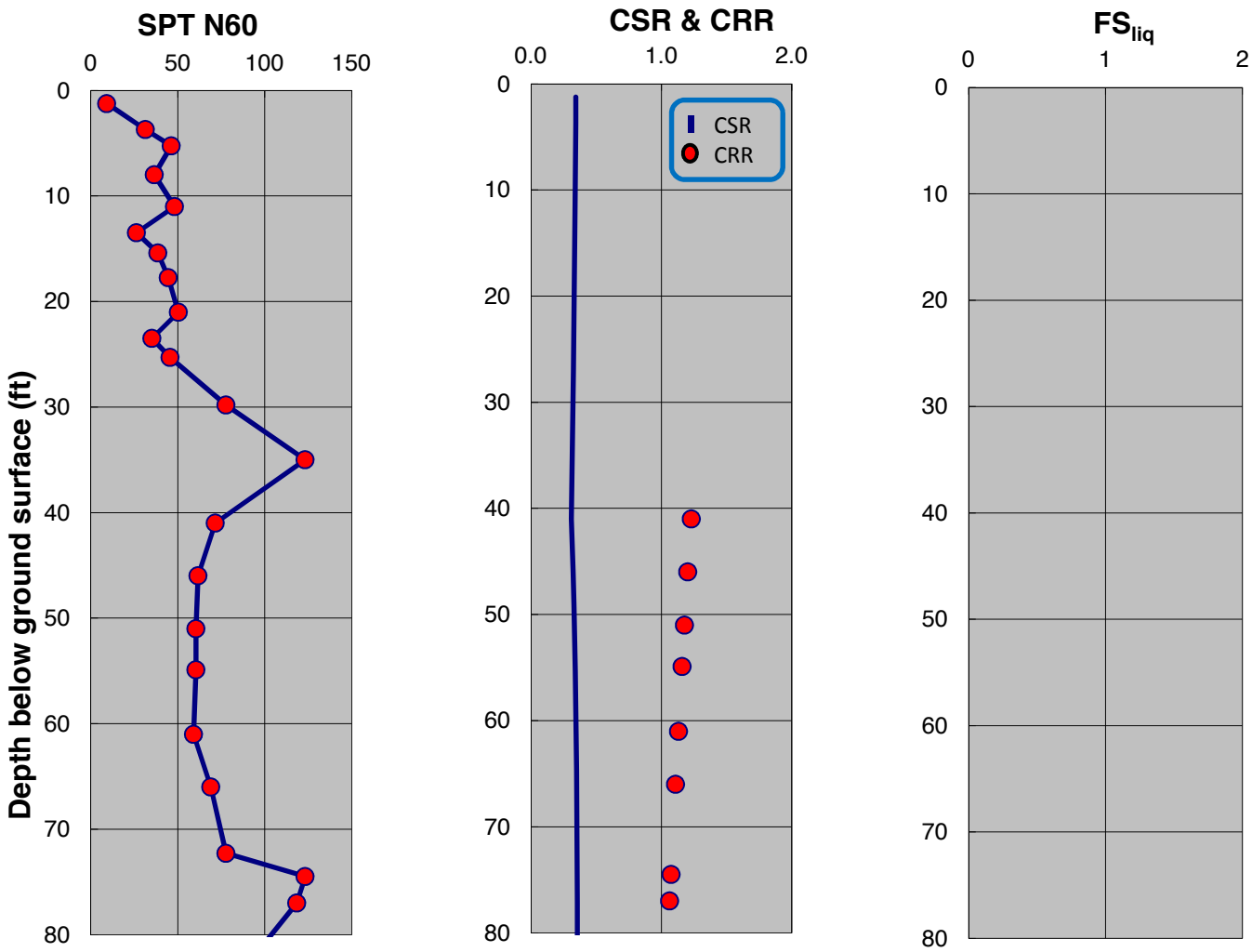
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.28



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-36 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

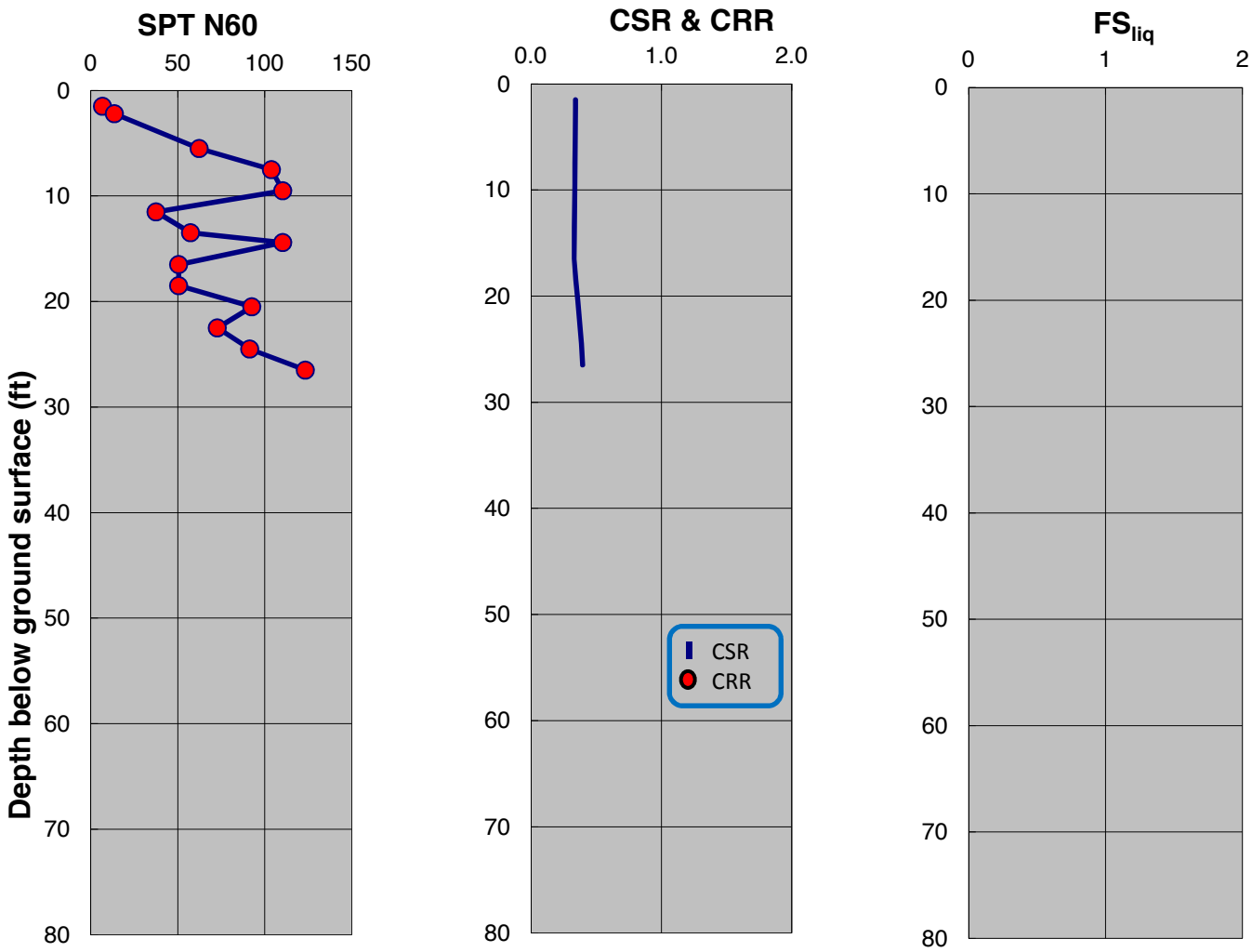
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-36 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

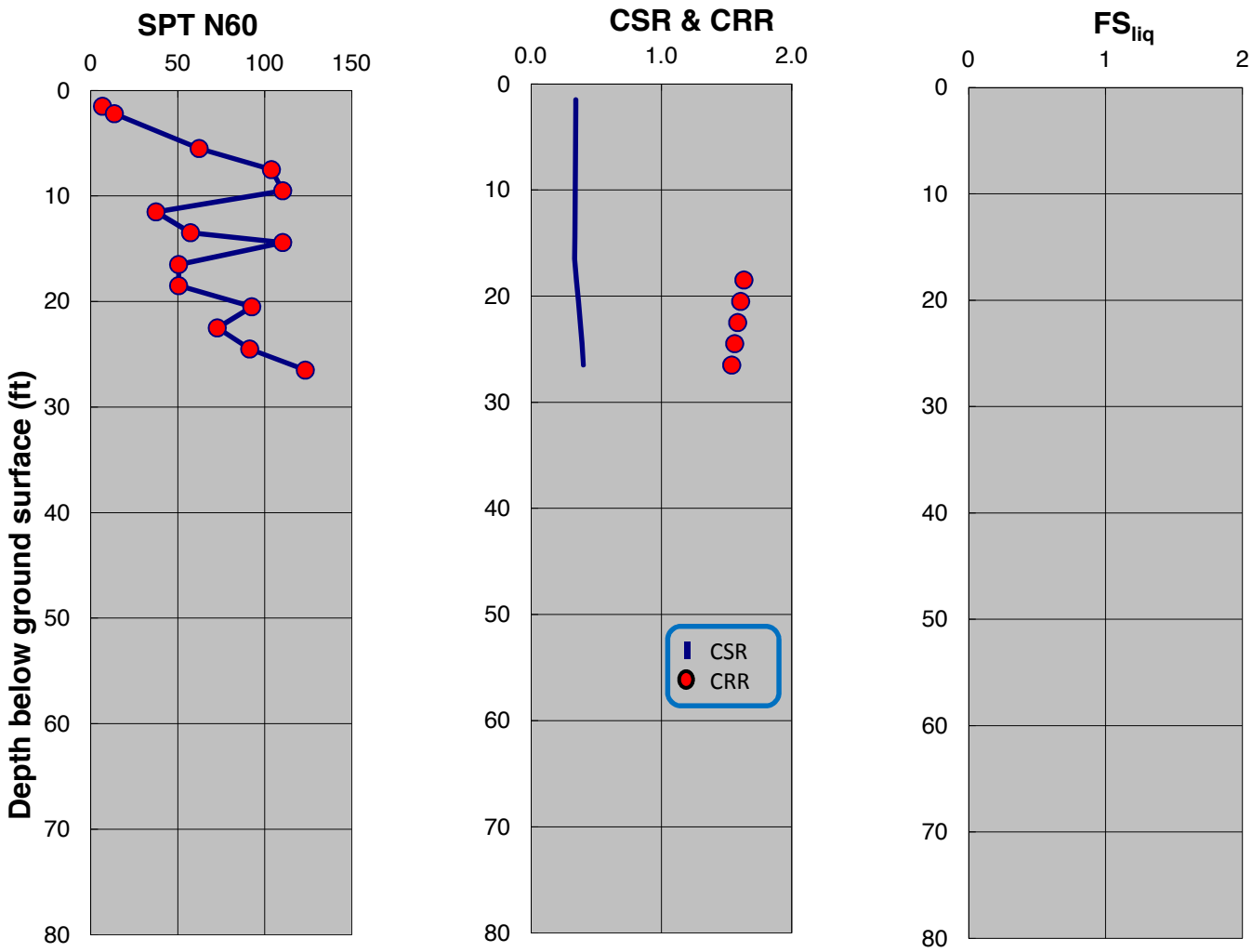
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.30



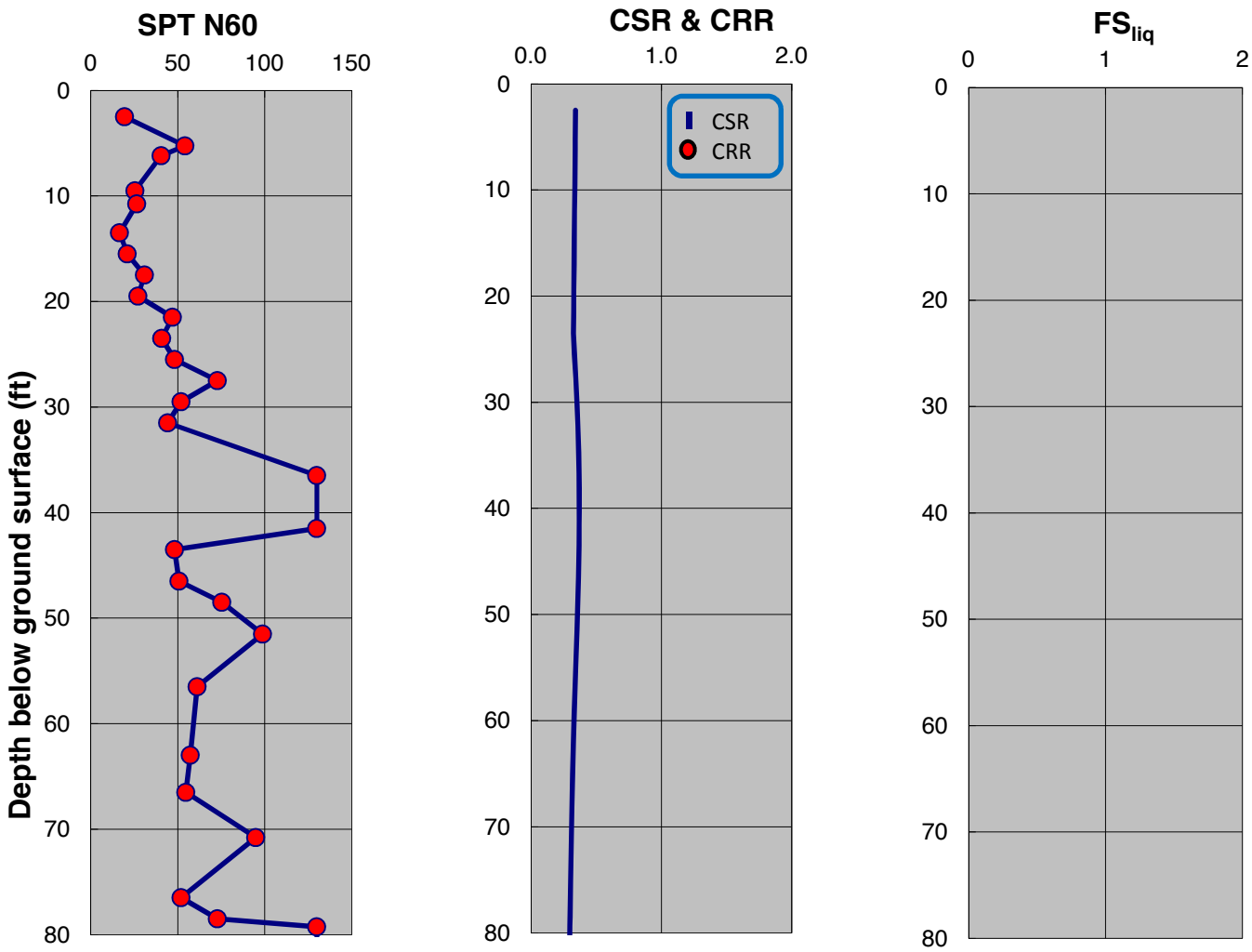
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-37 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



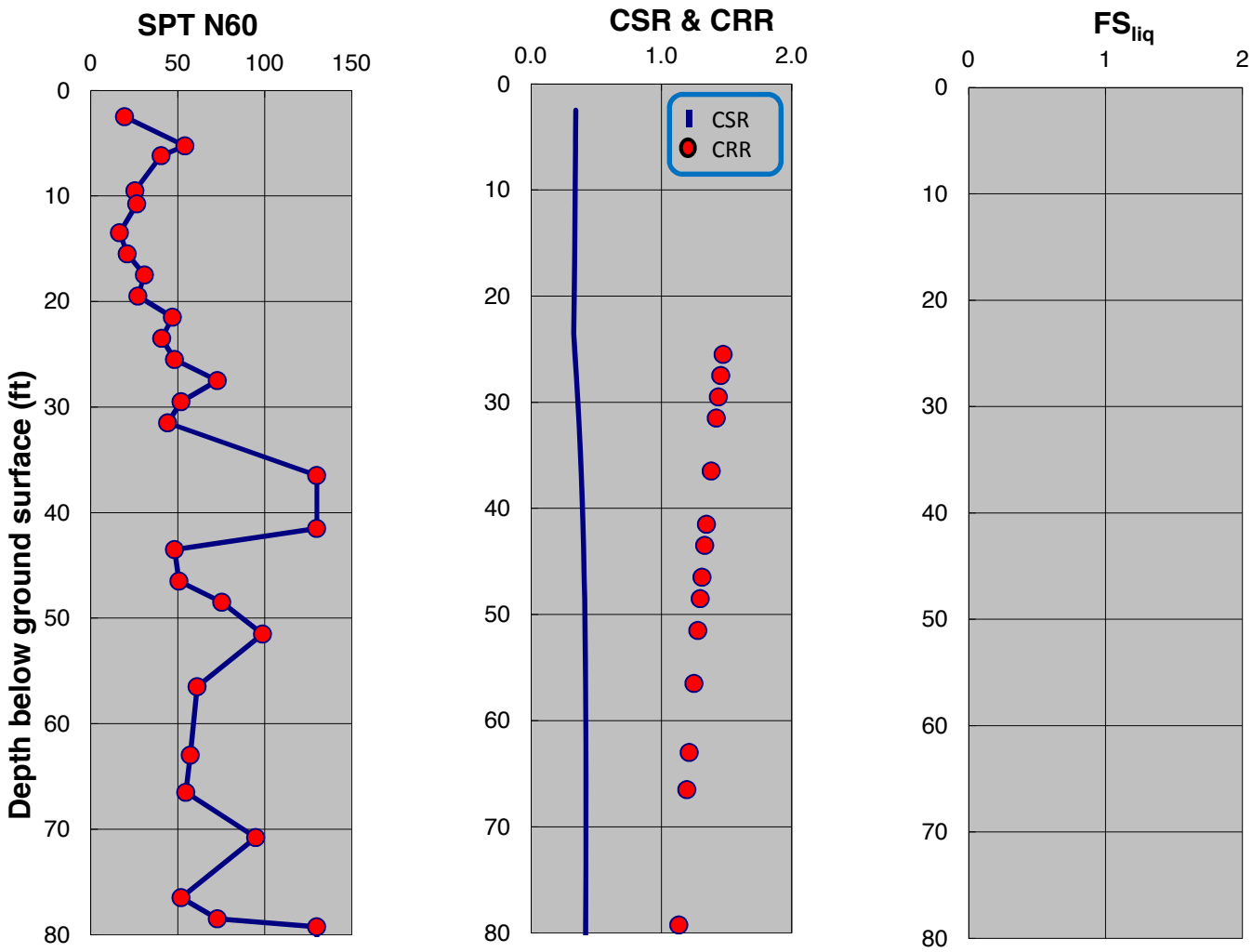
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-37 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-38 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

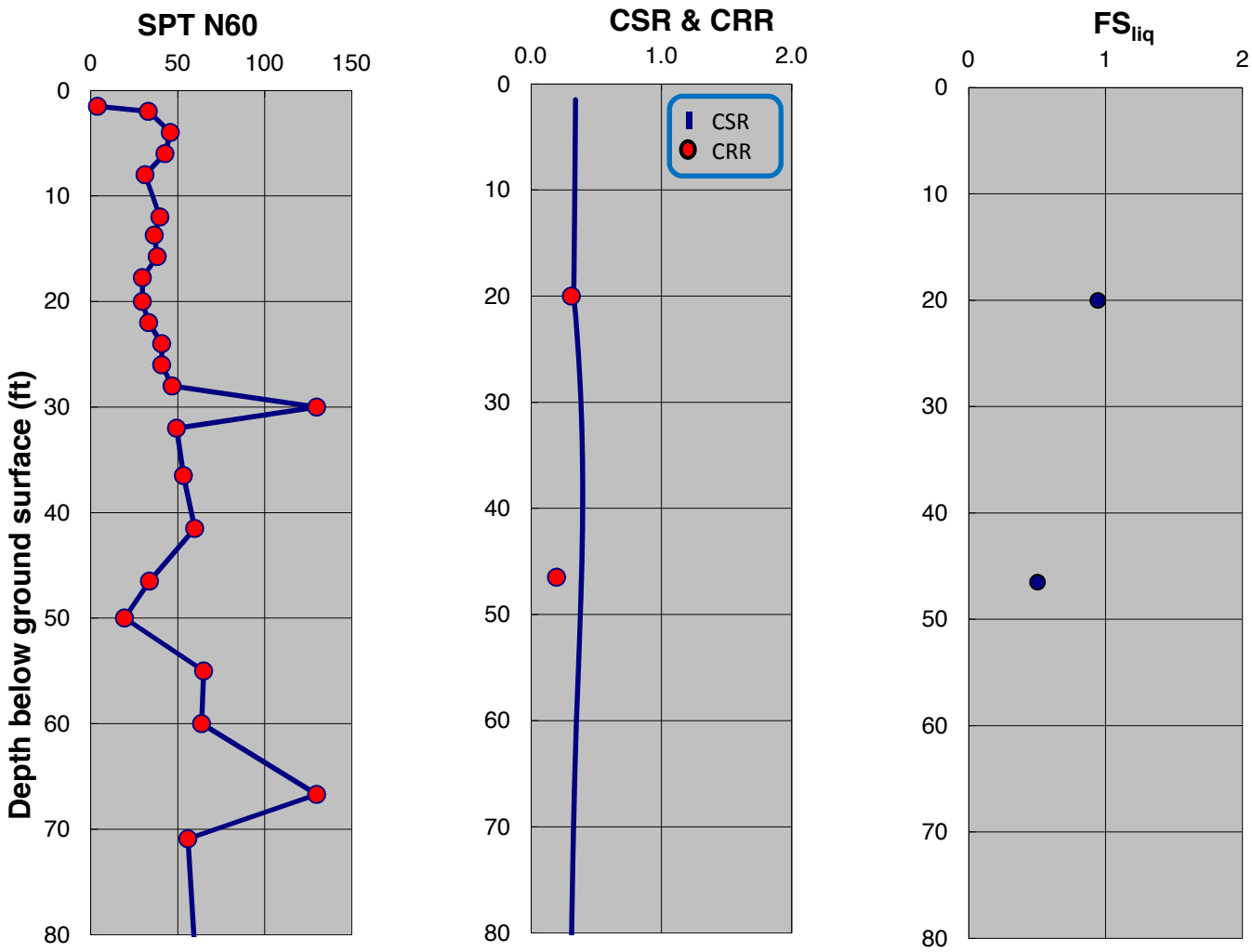
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-38 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

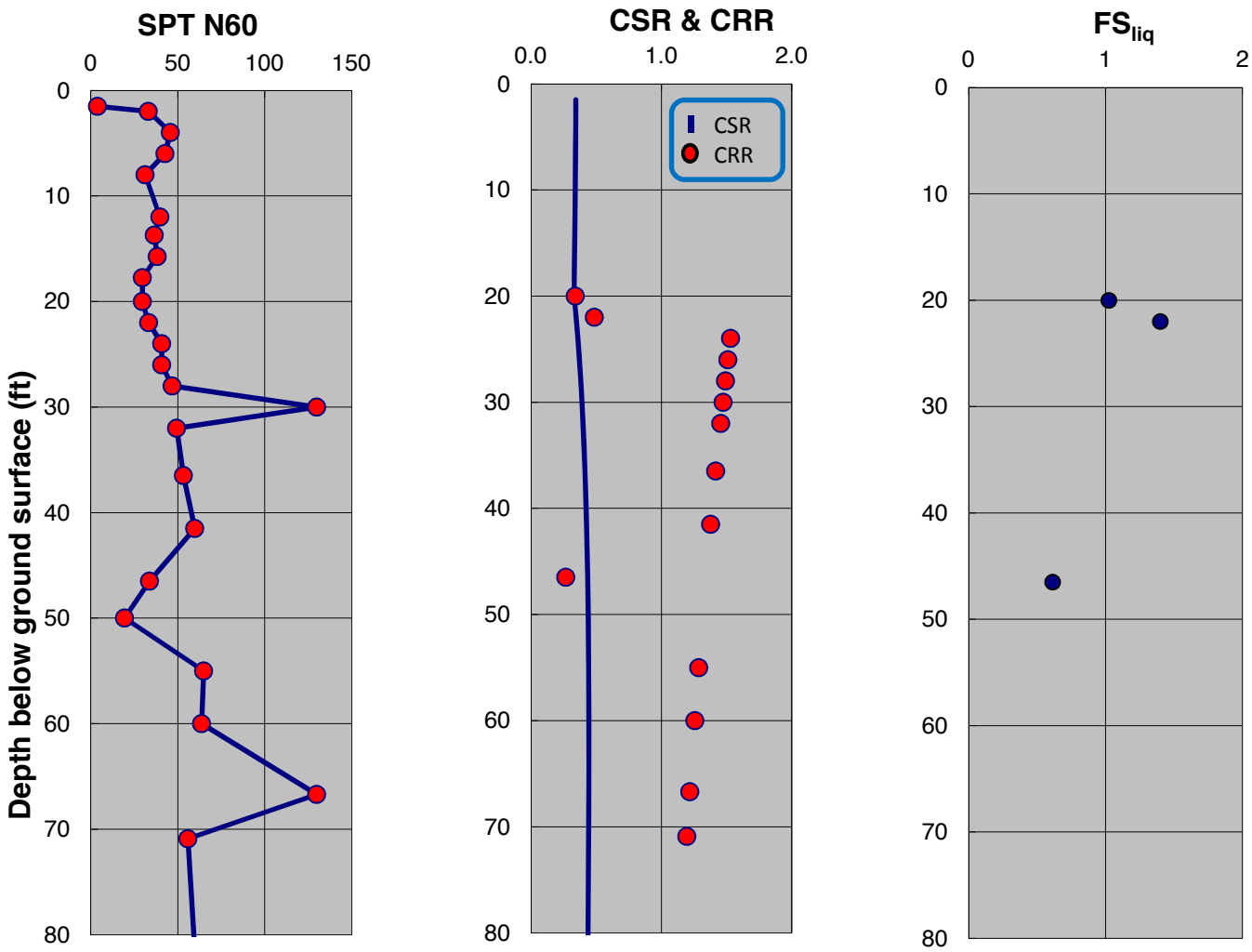
PLATE A.34



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-39 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

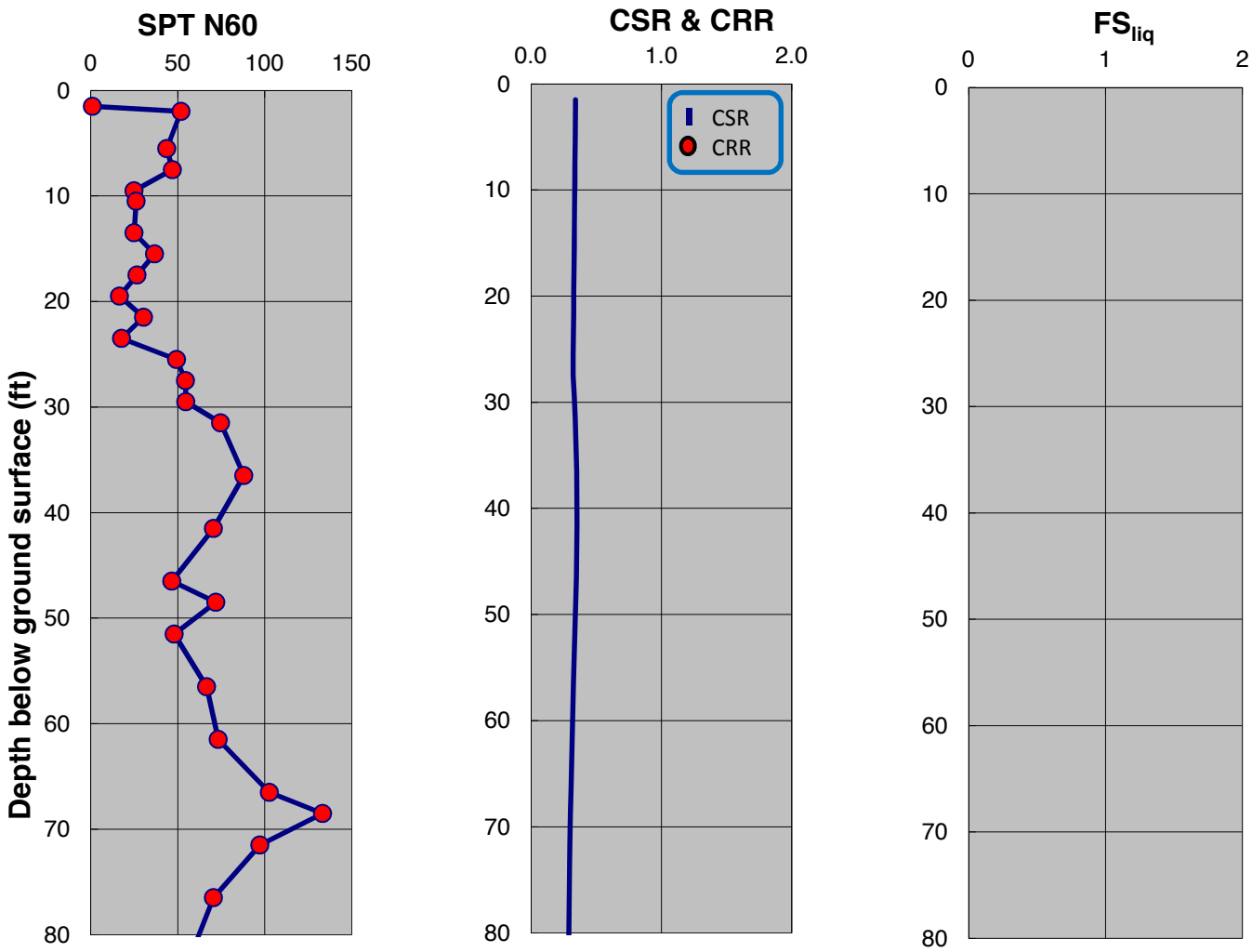
PLATE A.35



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-39 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

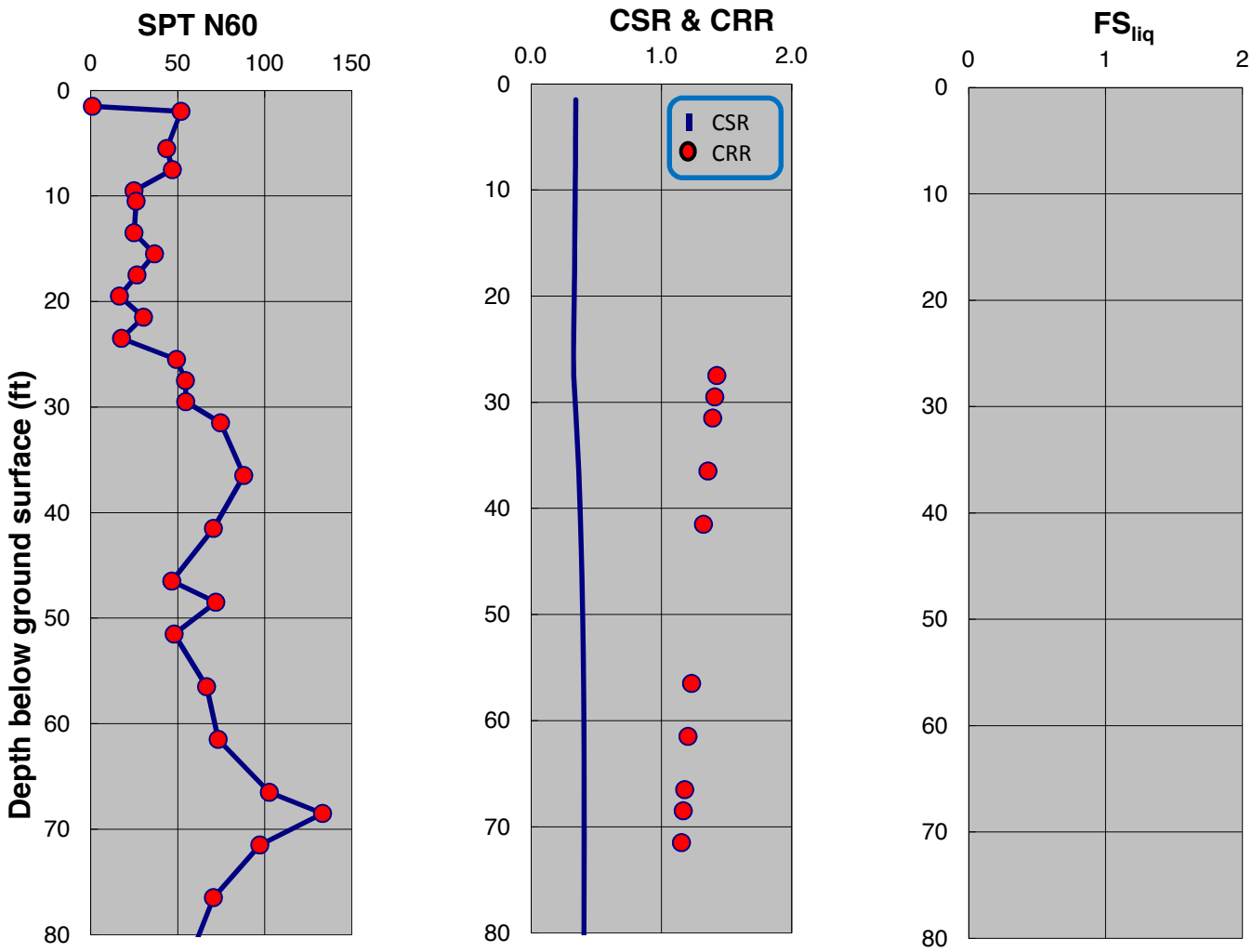
PLATE A.36



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-40 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

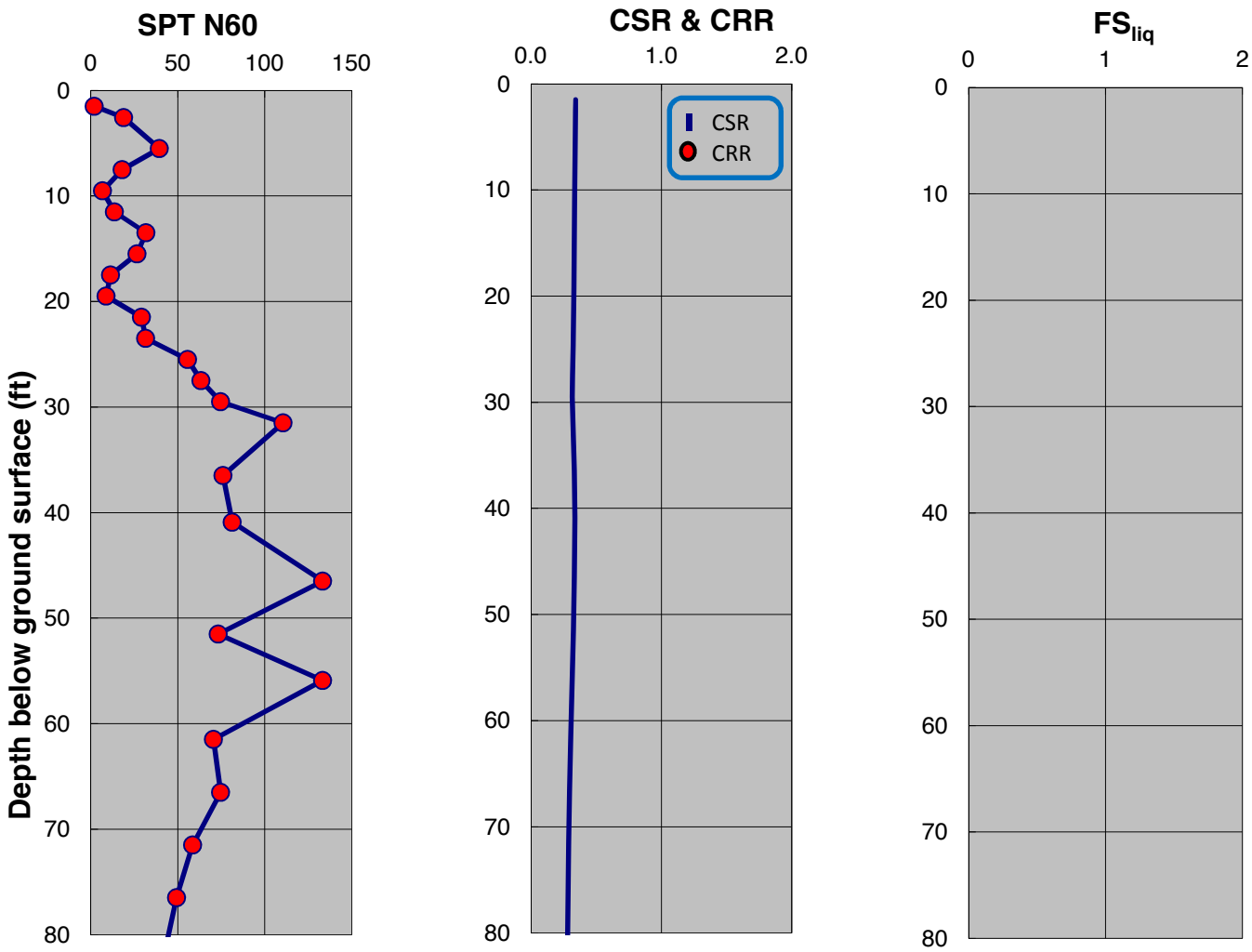
PLATE A.37



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-40 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

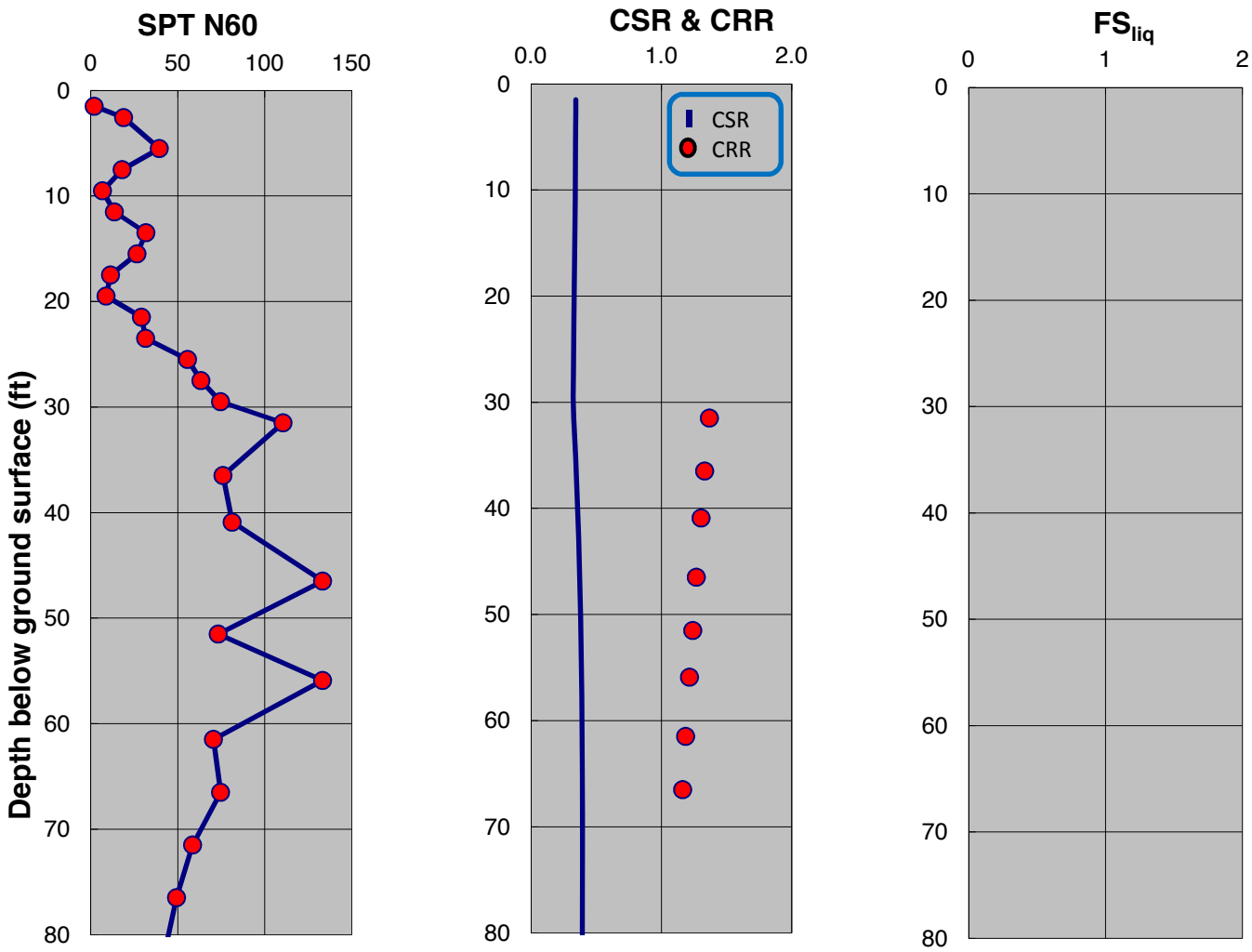
PLATE A.38



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-42 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

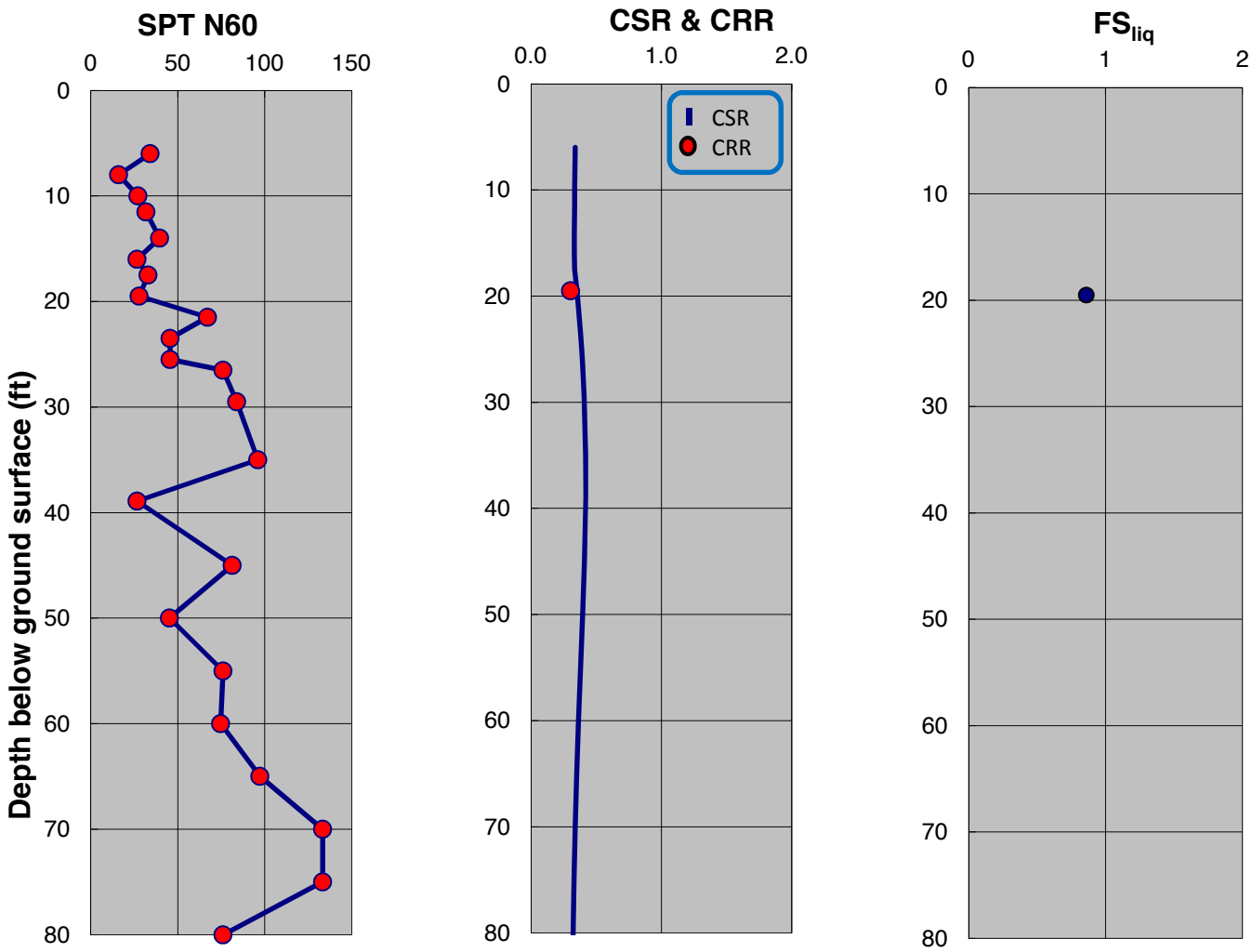
PLATE A.39



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-42 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

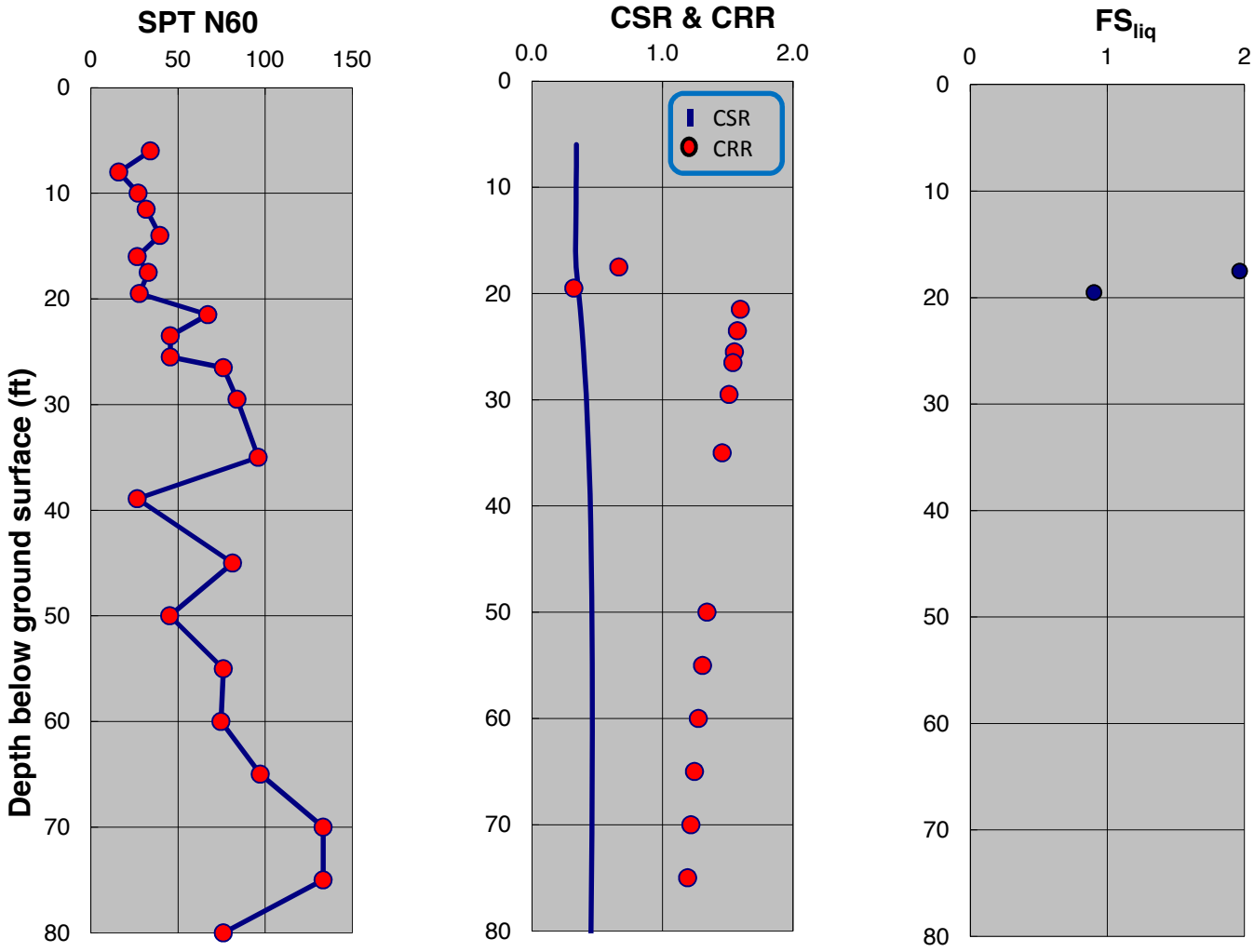
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.40



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-43 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

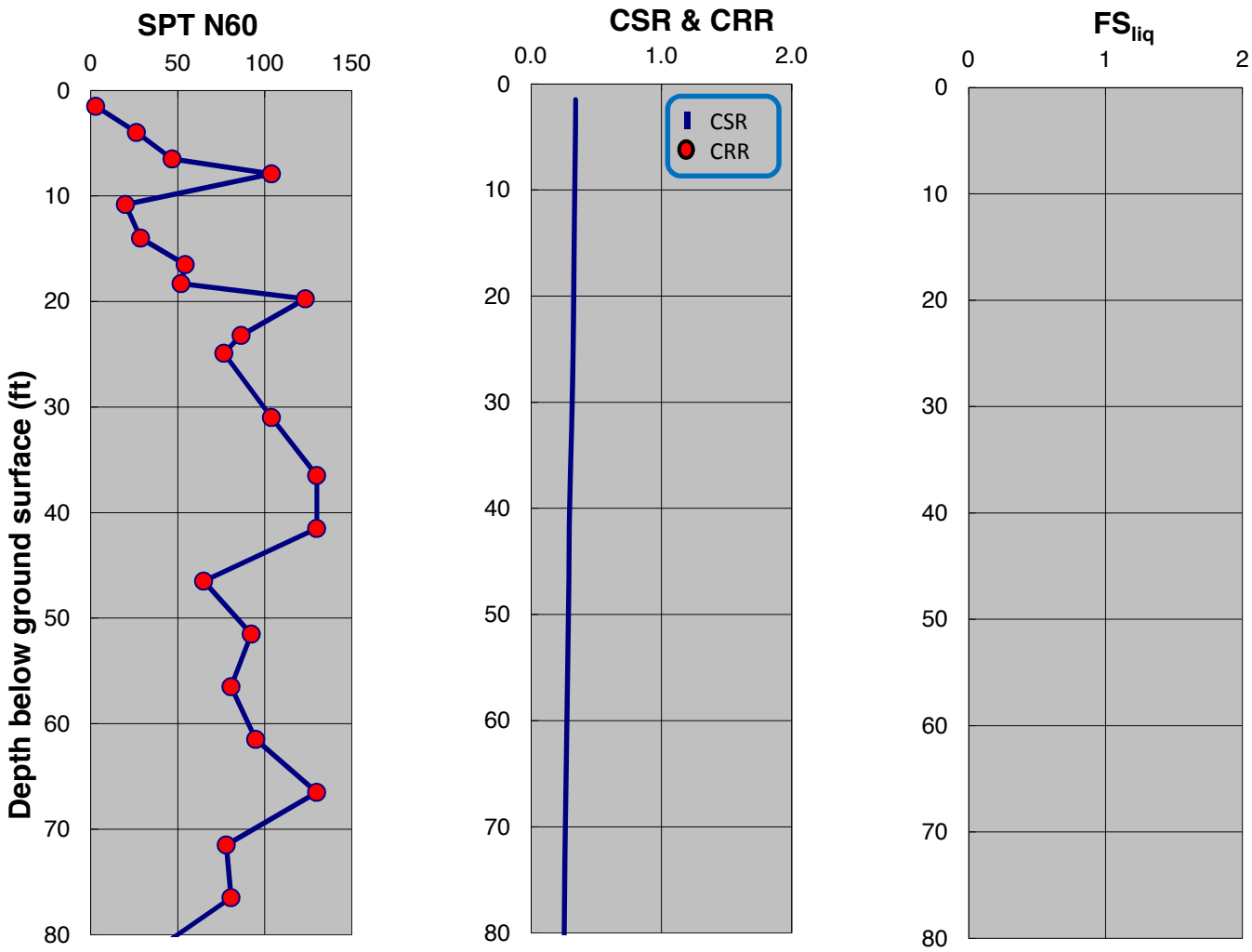
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-43 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

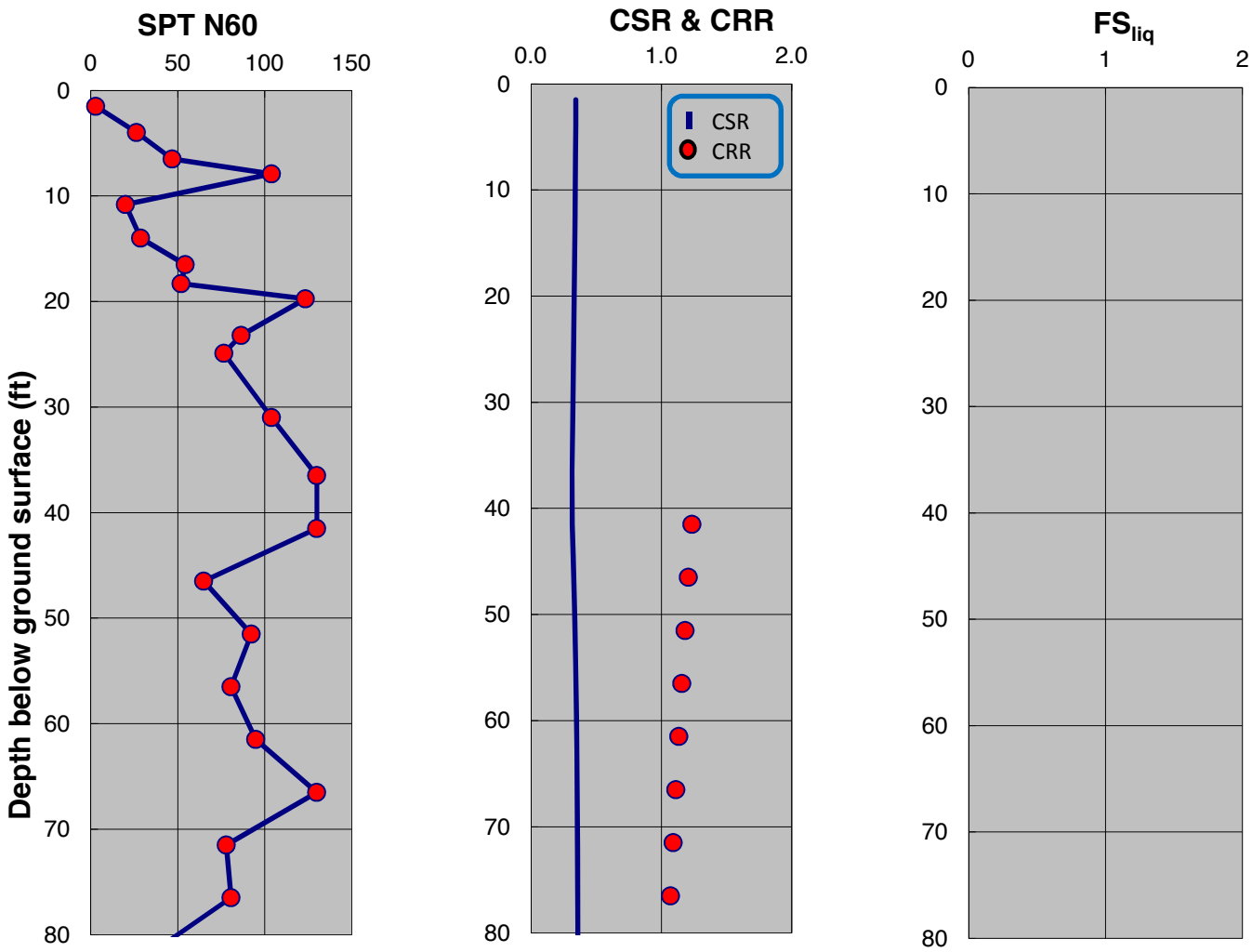
PLATE A.42



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-45 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

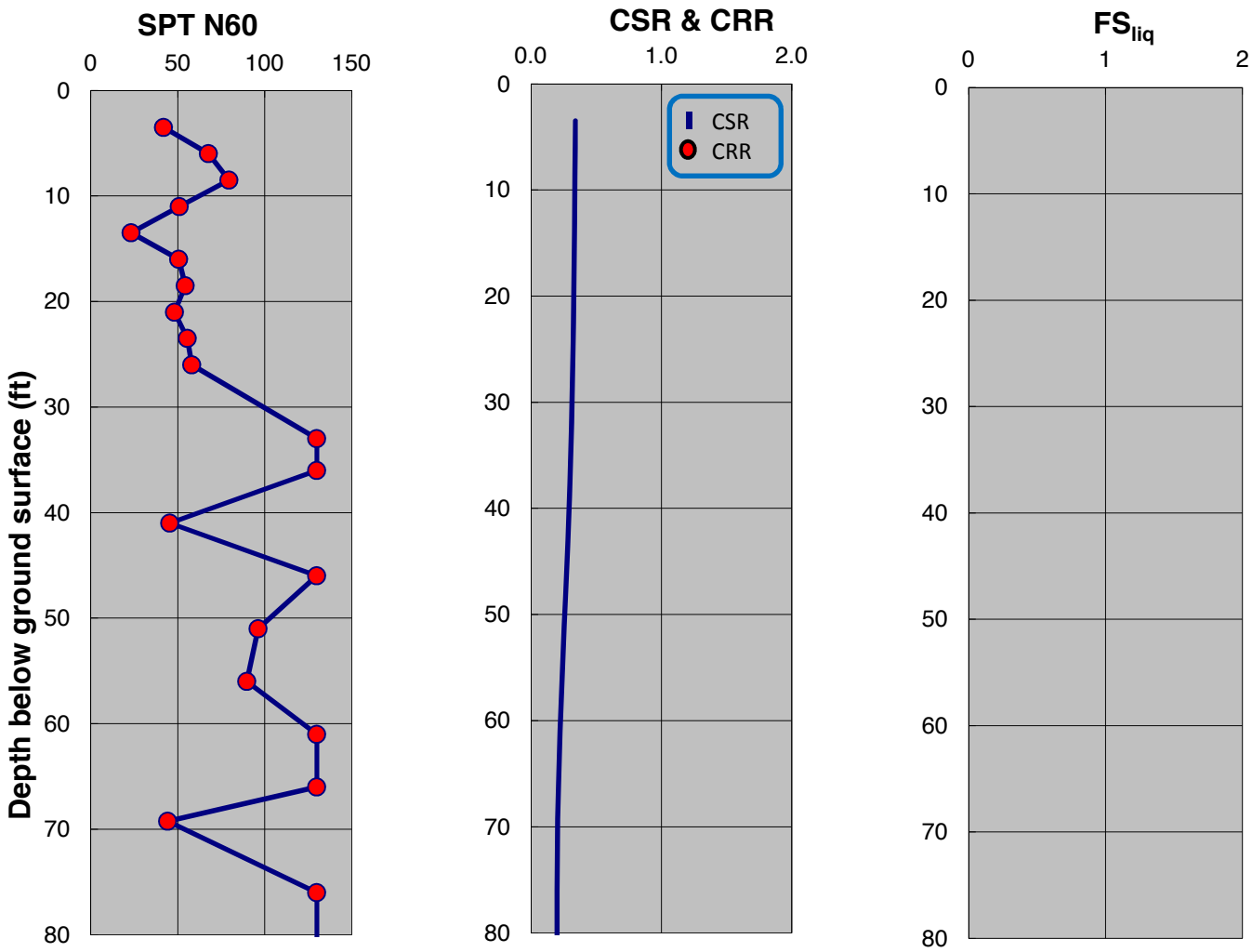
PLATE A.43



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-45 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

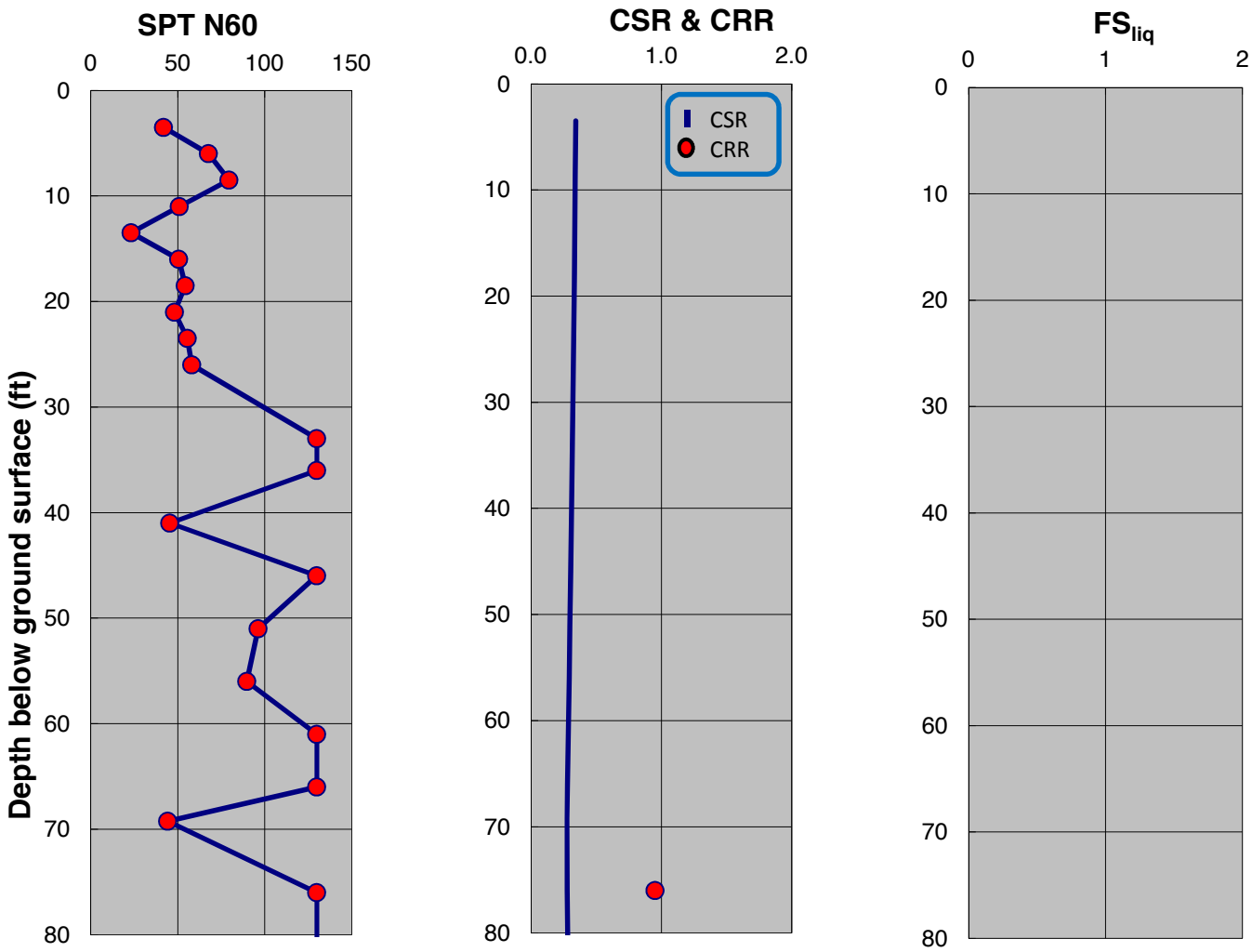
PLATE A.44



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-47 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

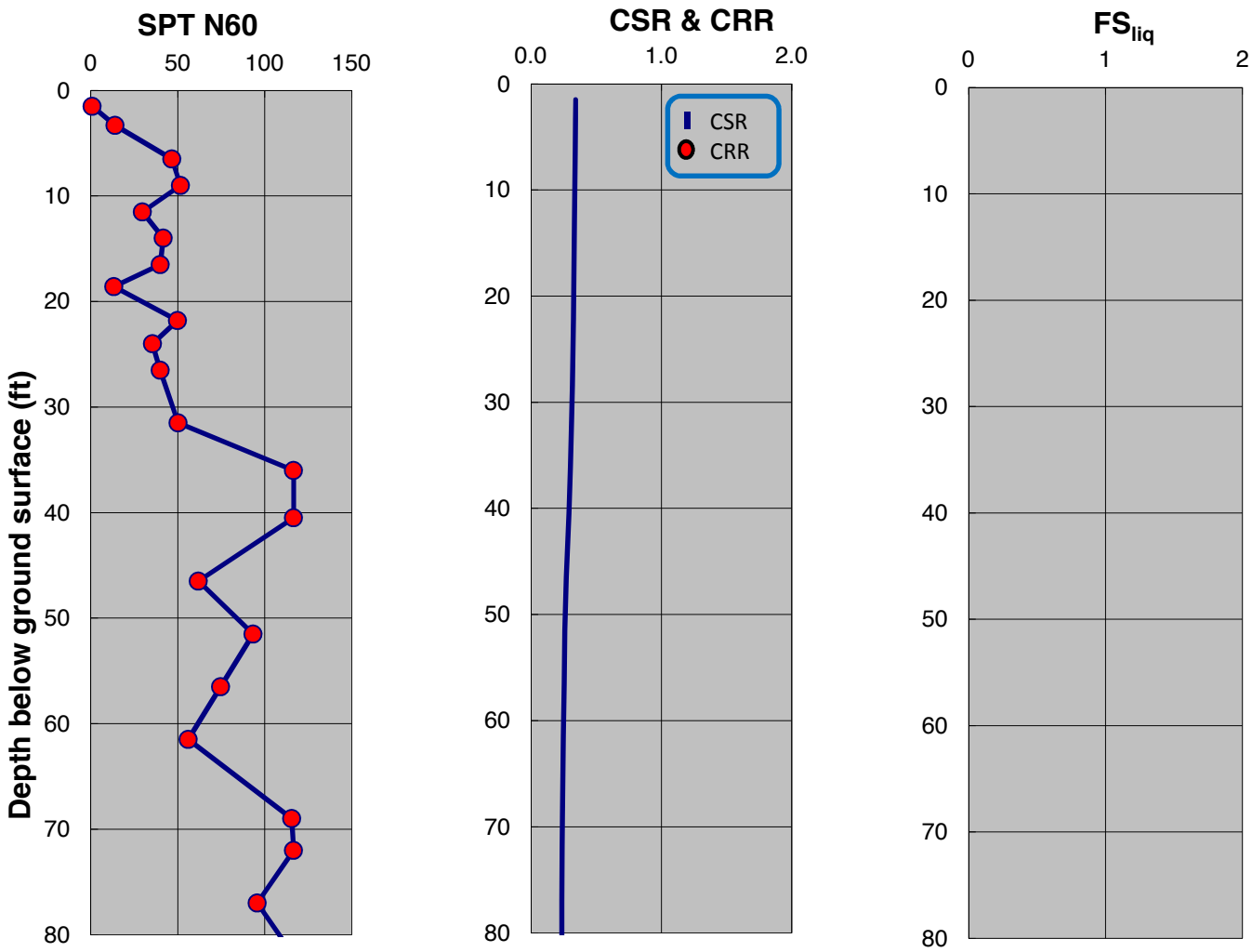
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.45



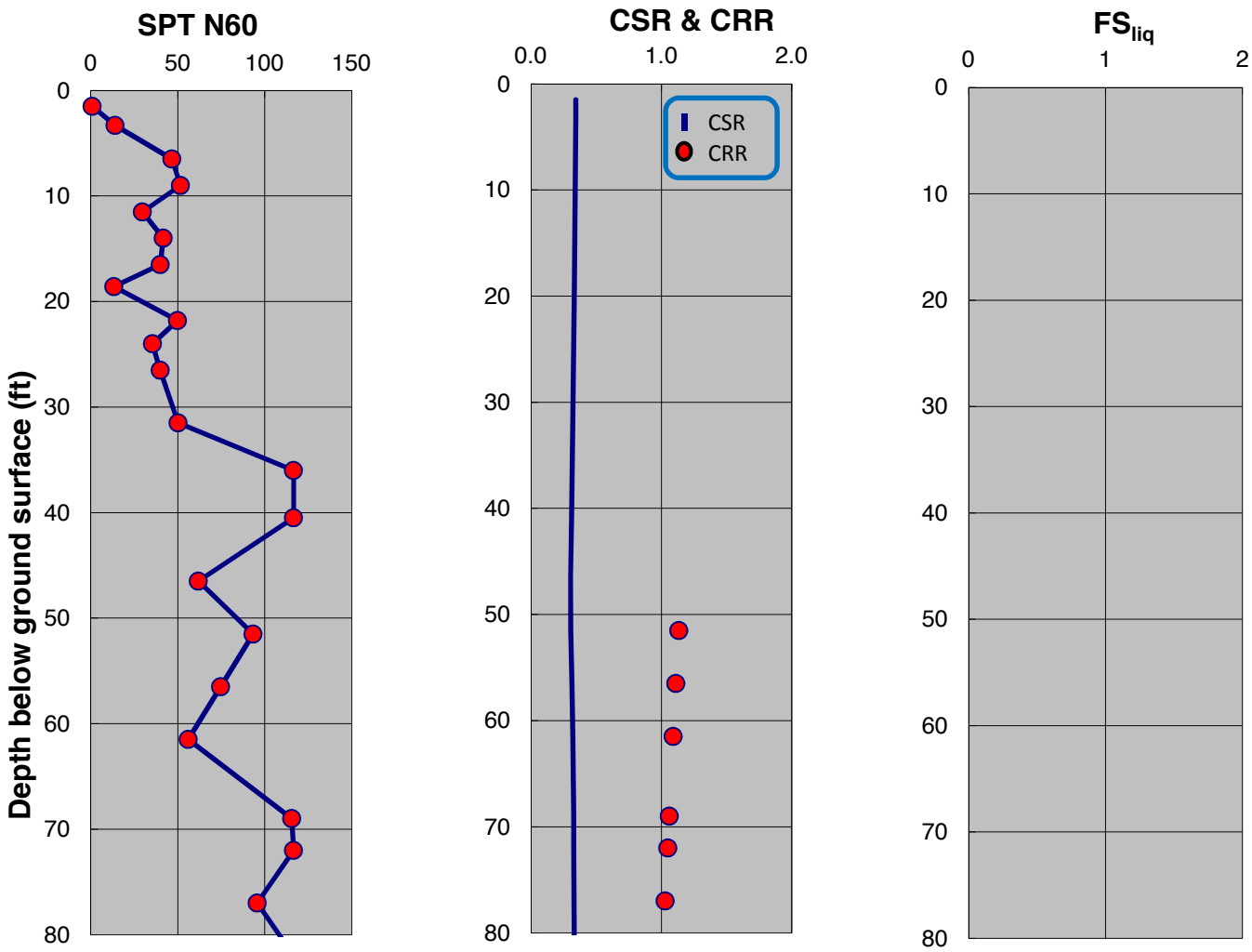
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-47 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-49 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

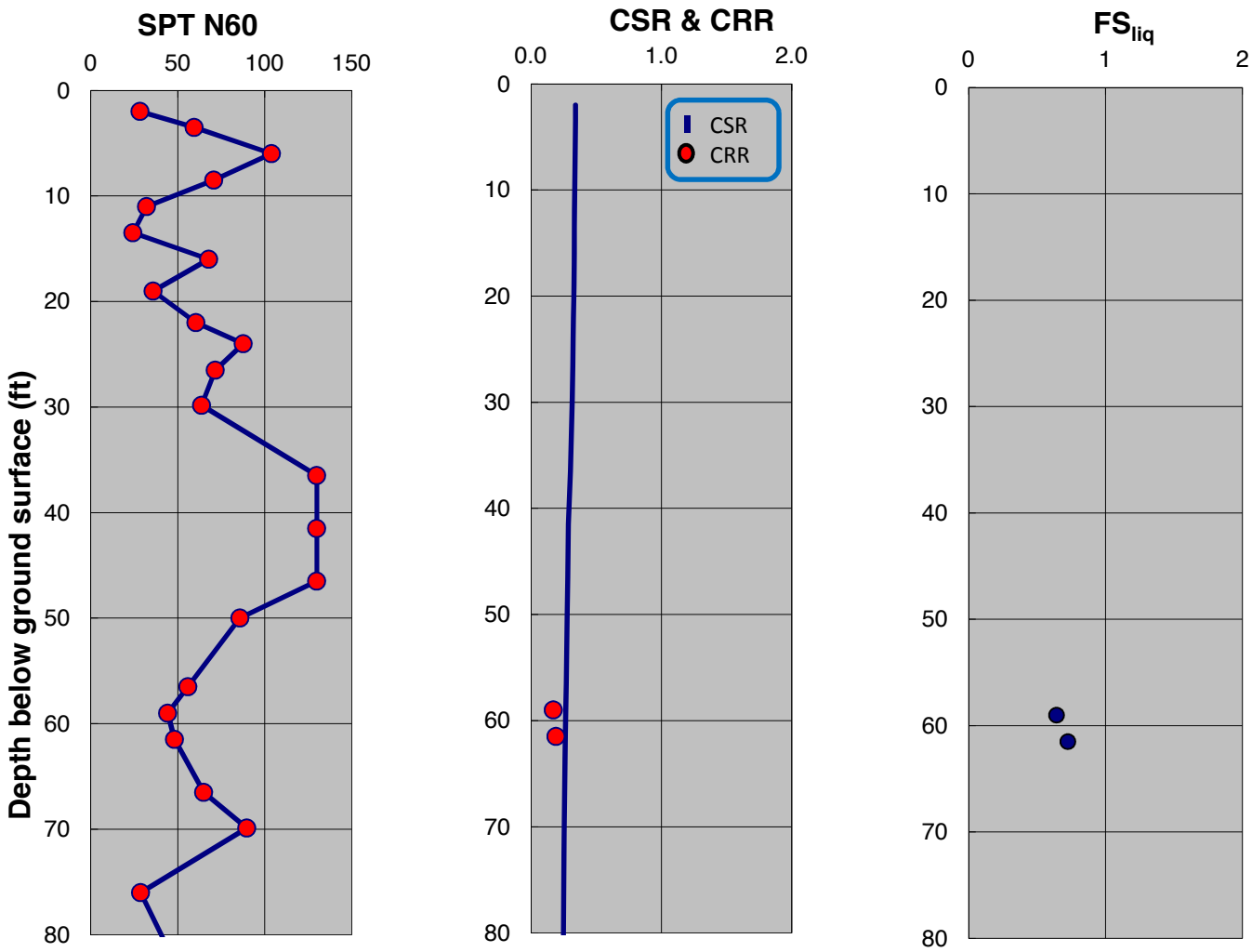
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-49 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

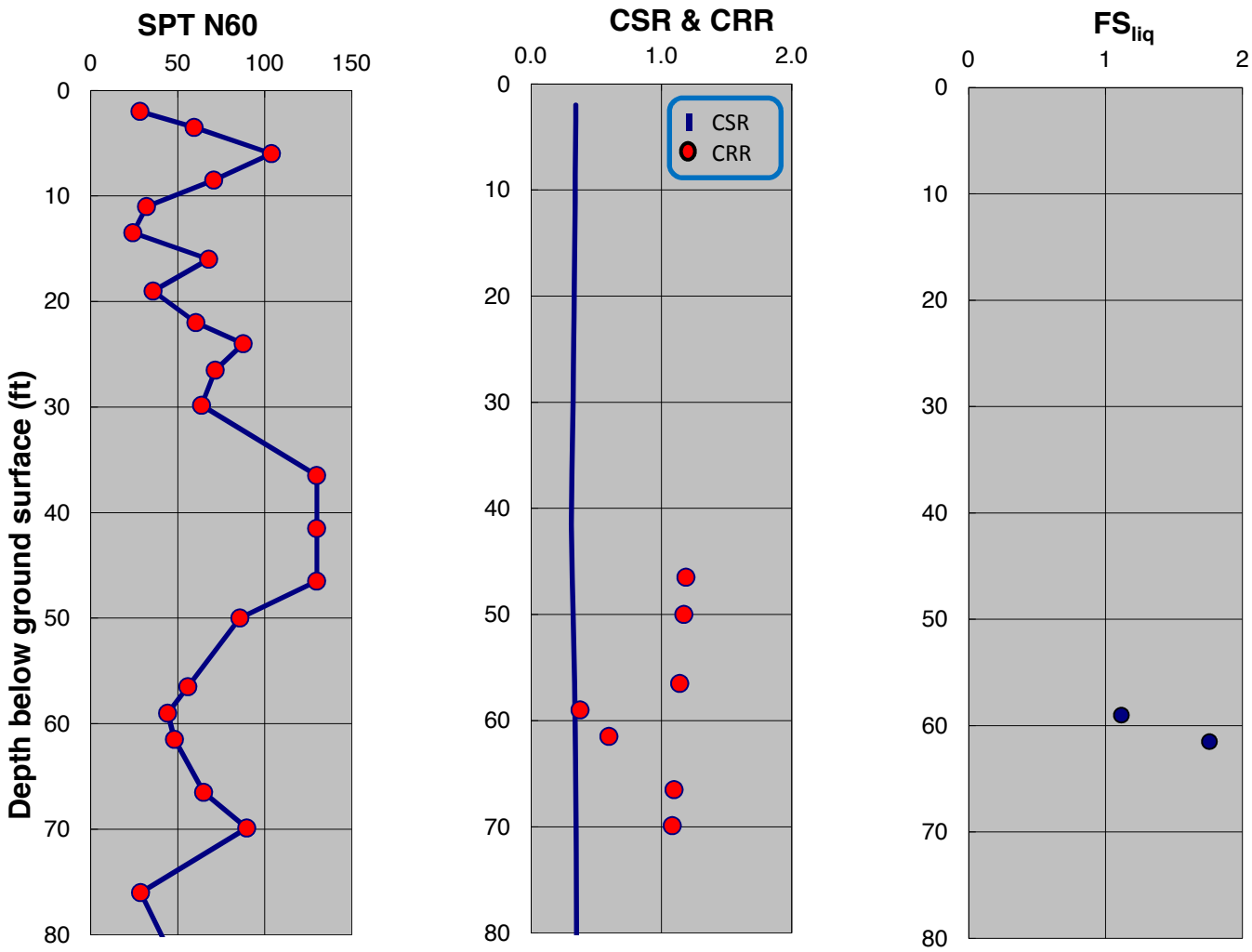
PLATE A.48



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-50 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

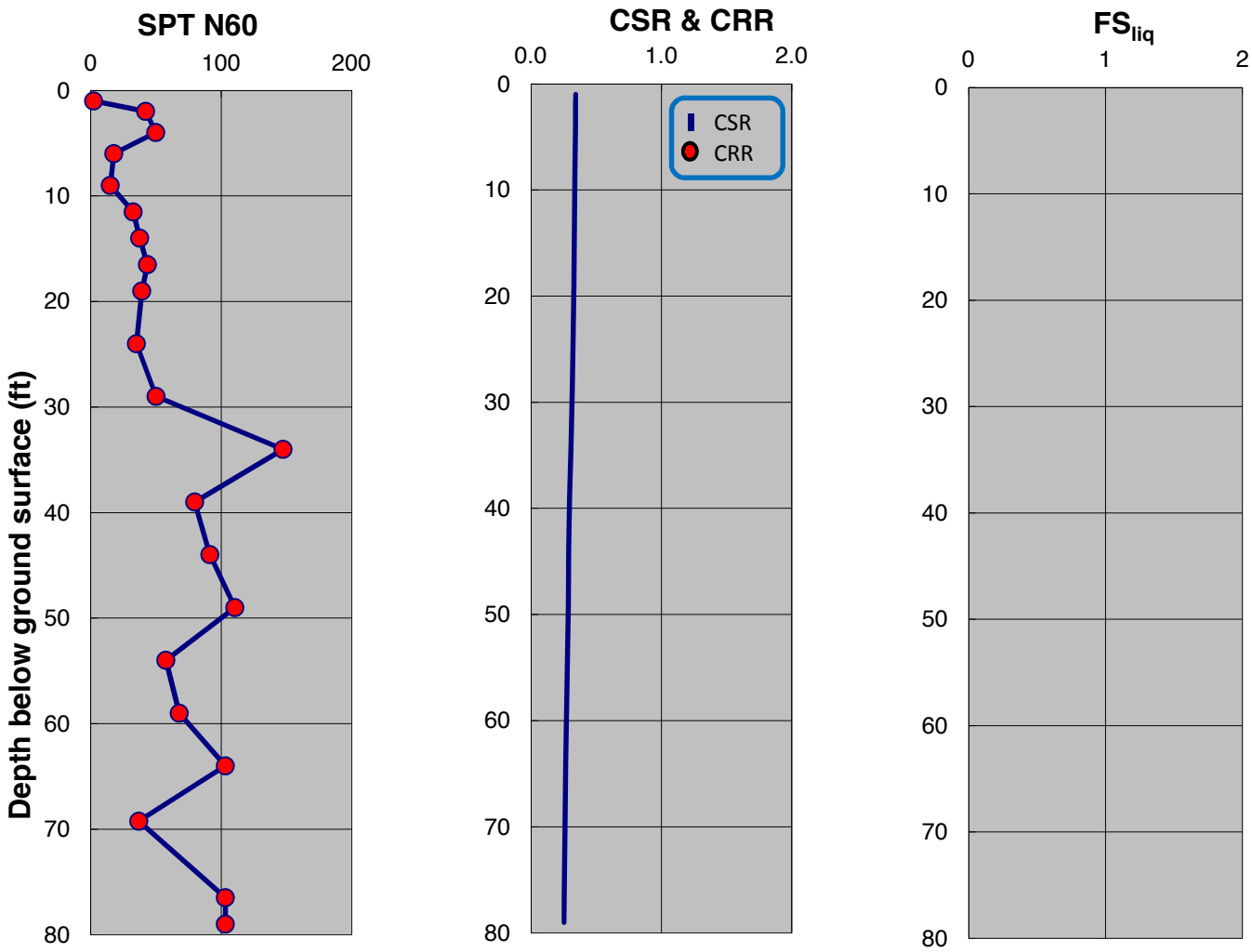
PLATE A.49



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-50 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

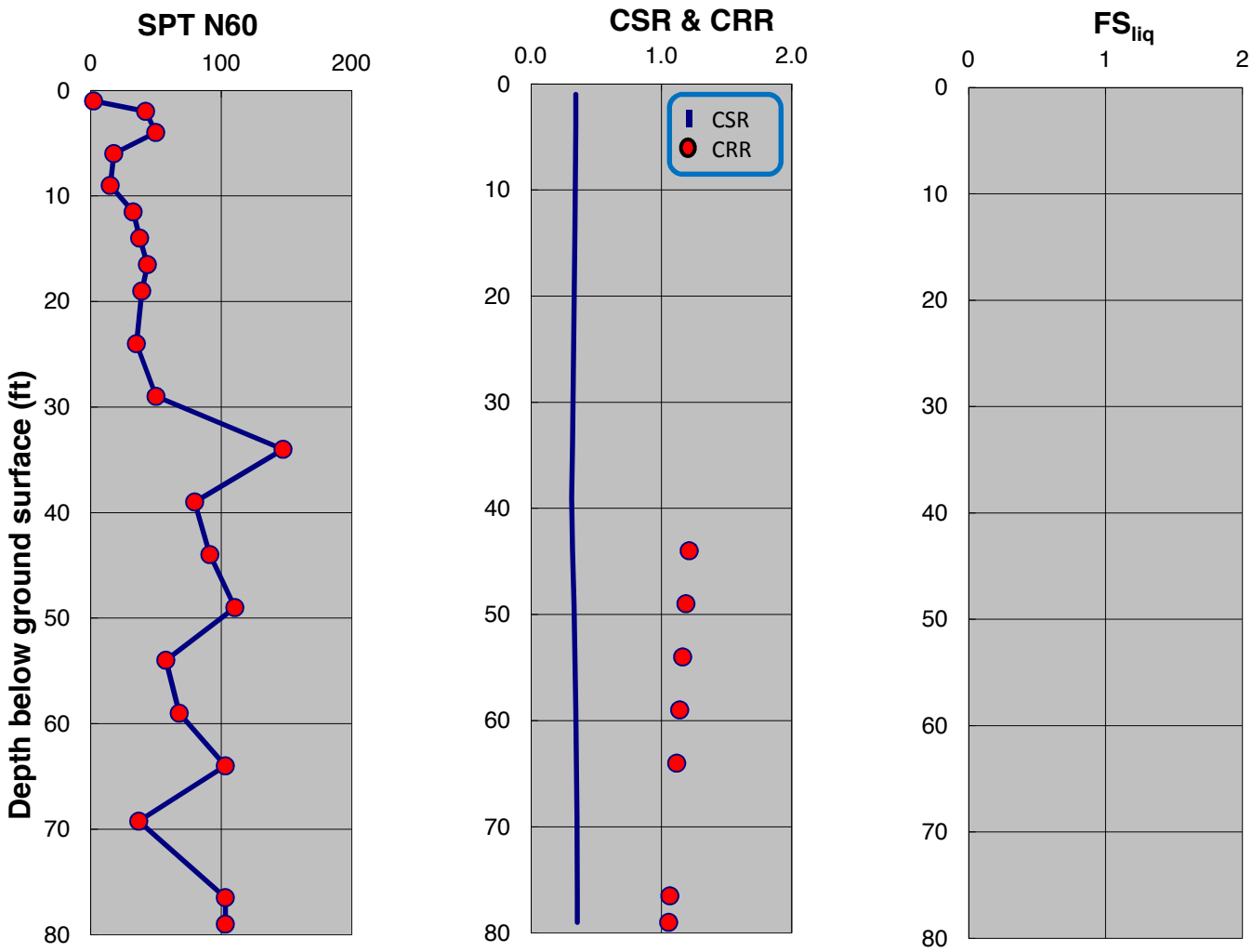
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.50



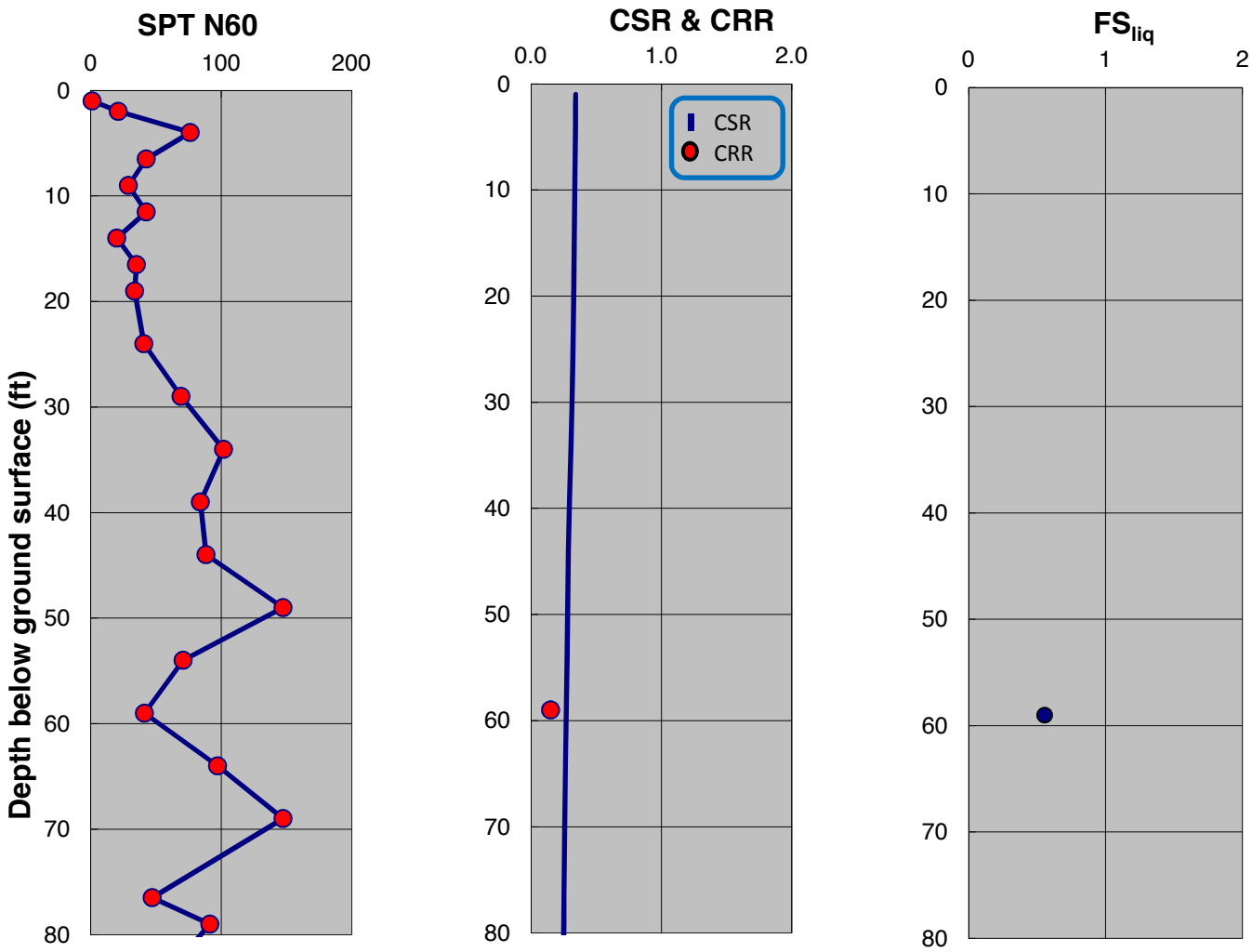
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-60 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-60 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

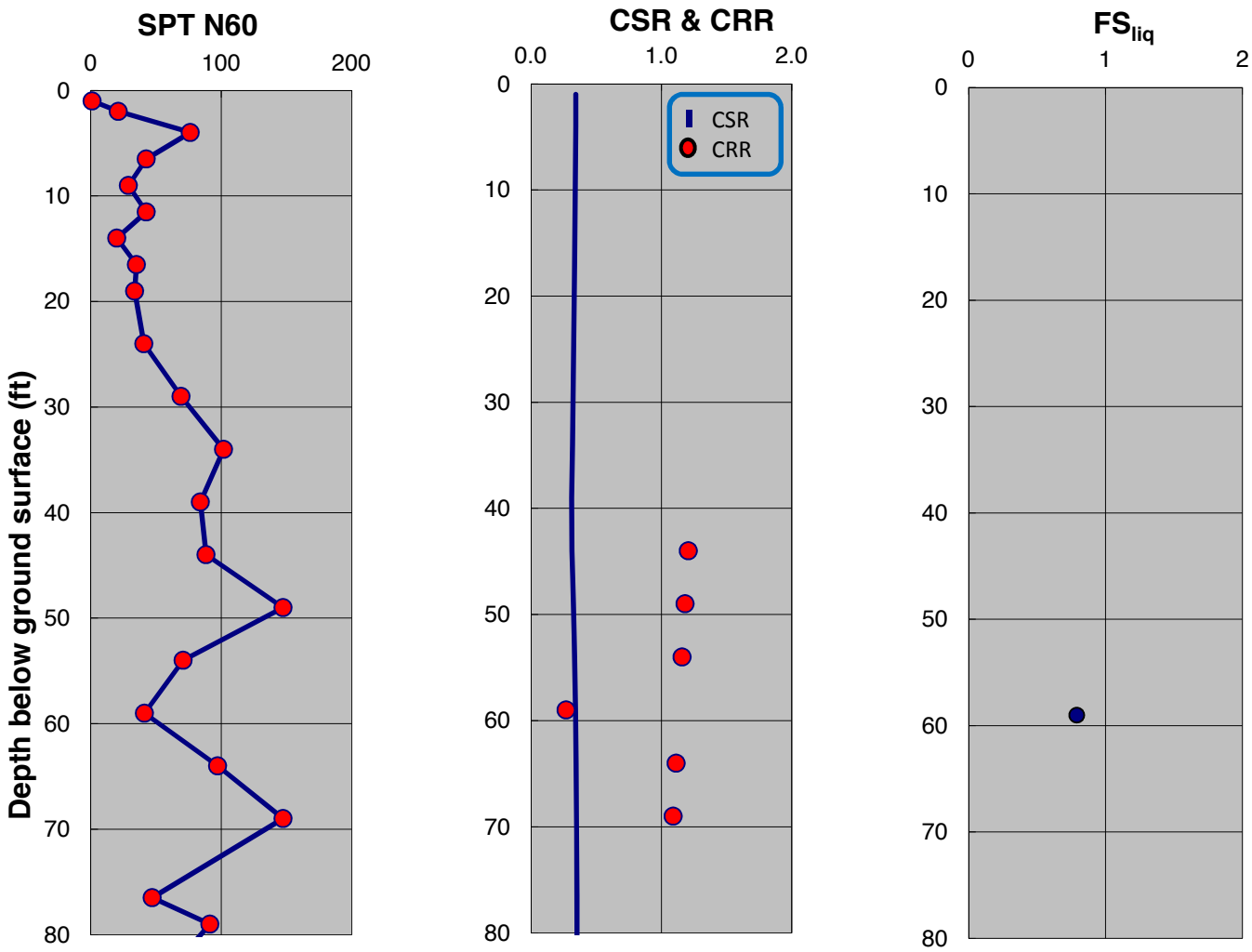
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-61 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

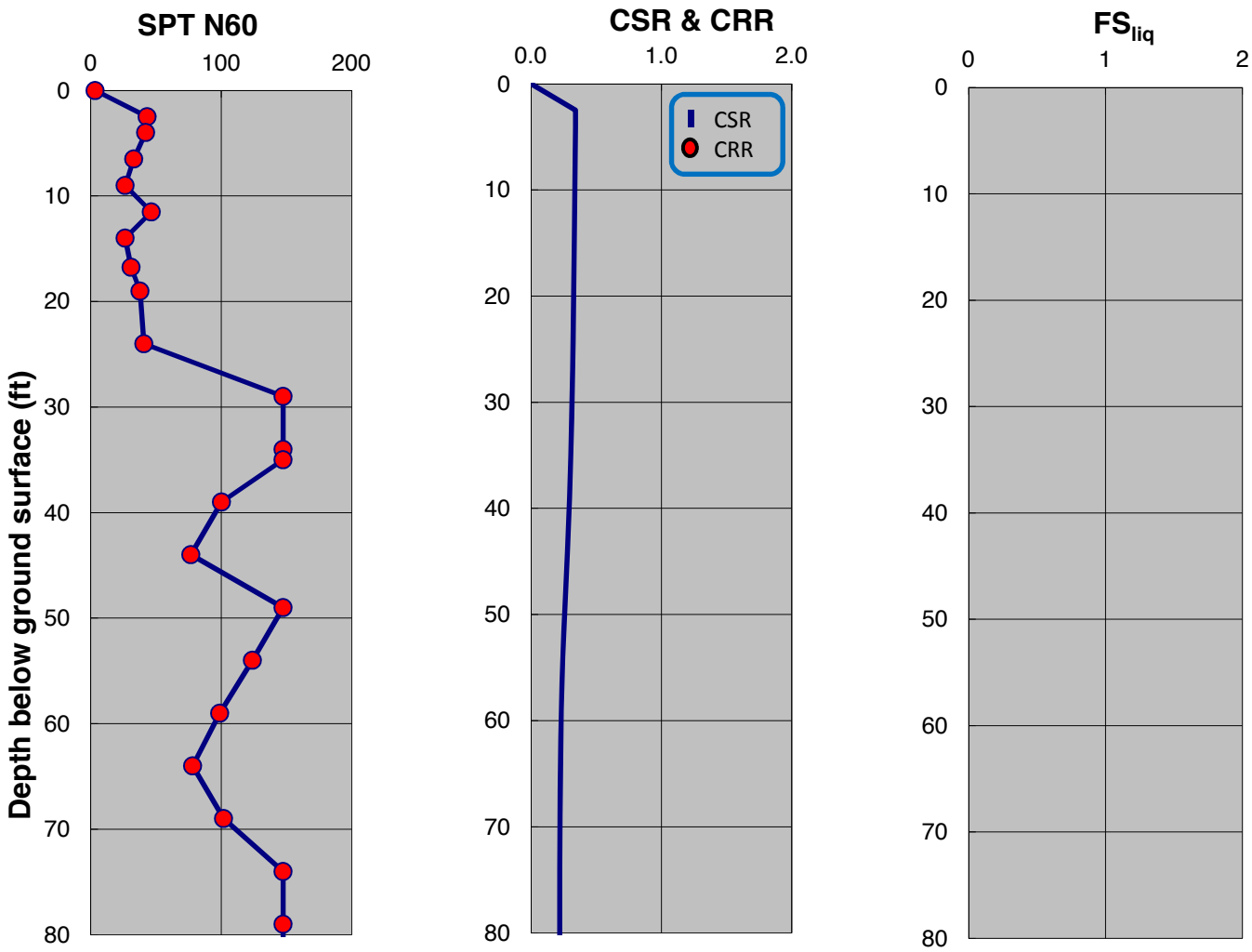
PLATE A.53



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-61 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

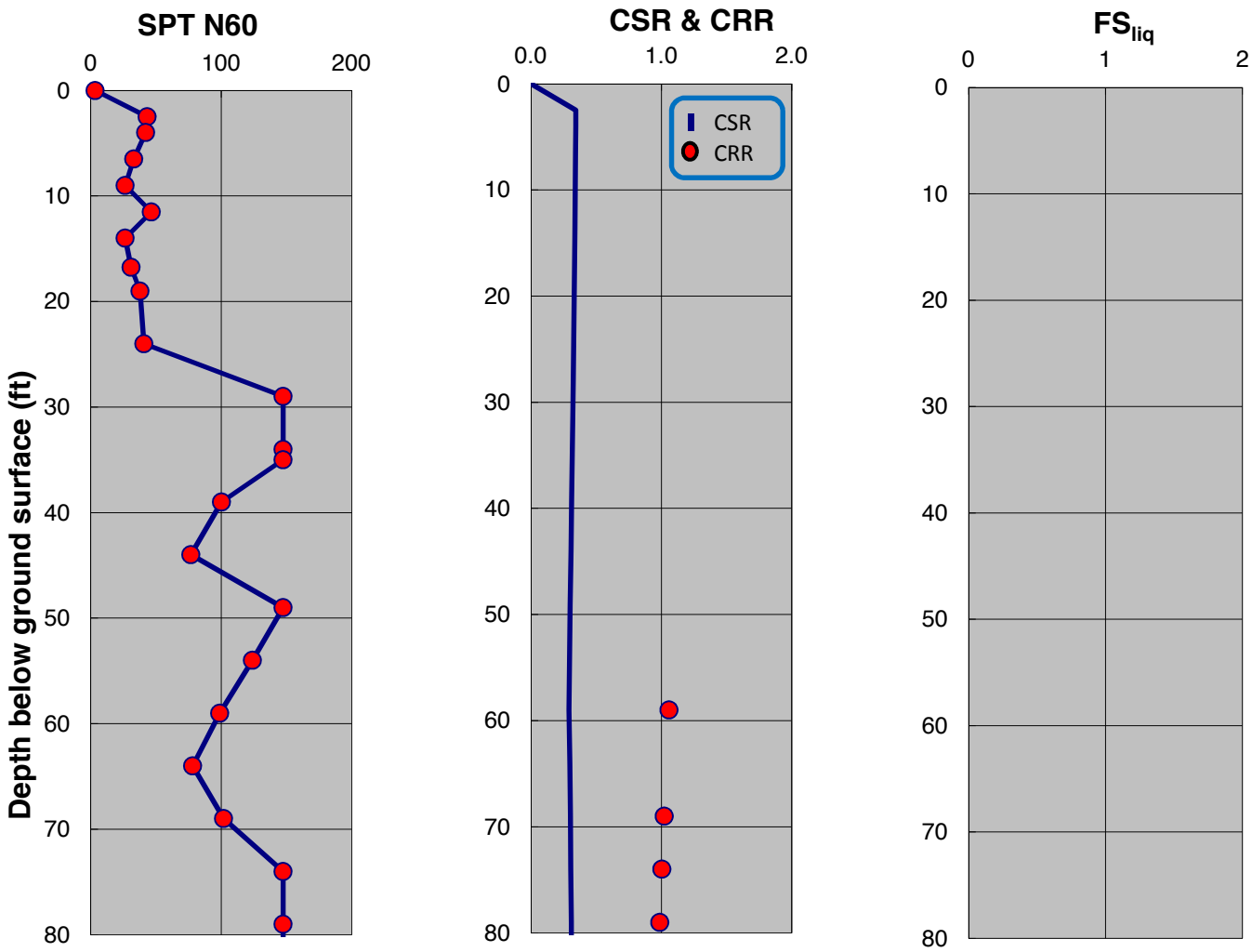
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.54



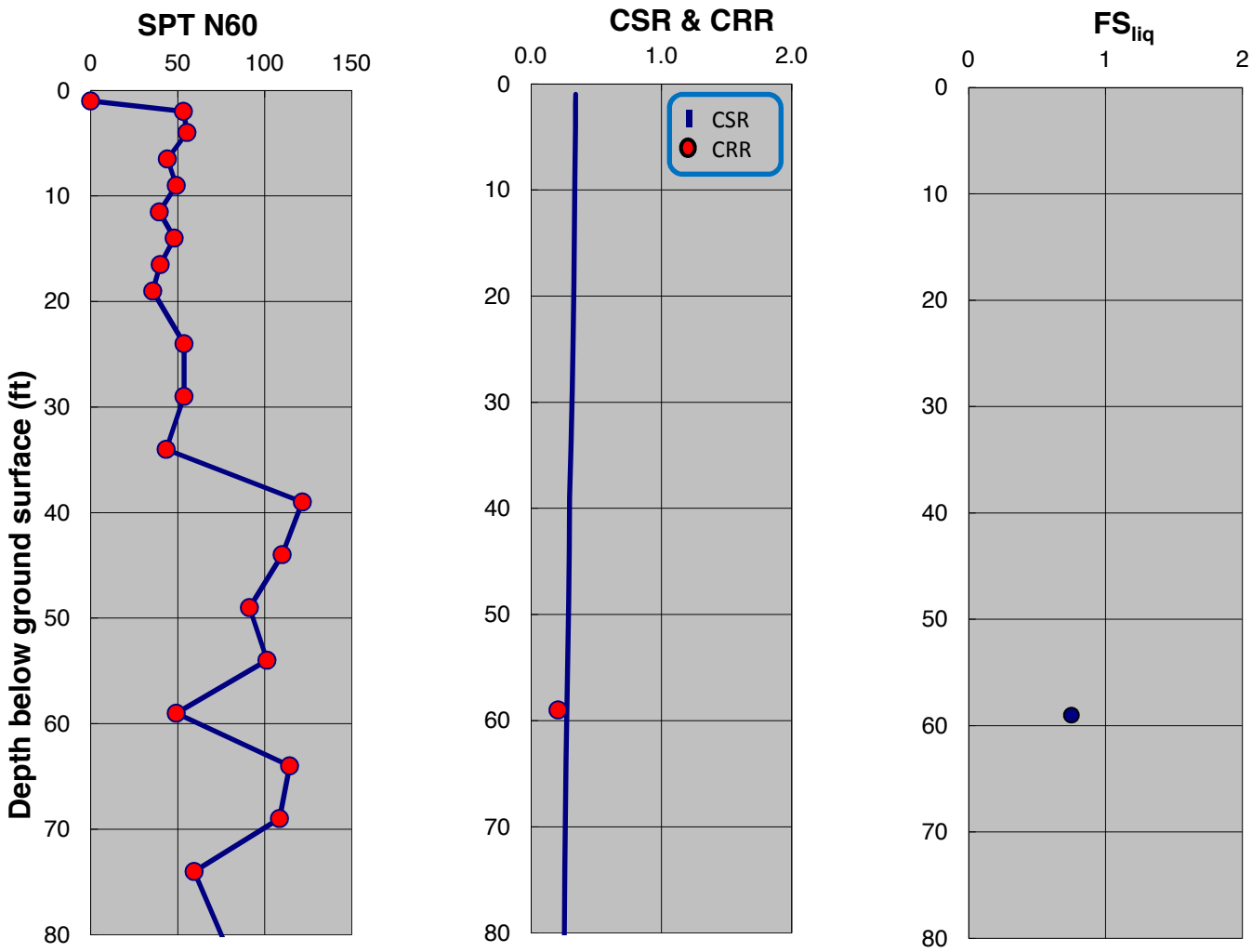
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-62 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-62 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

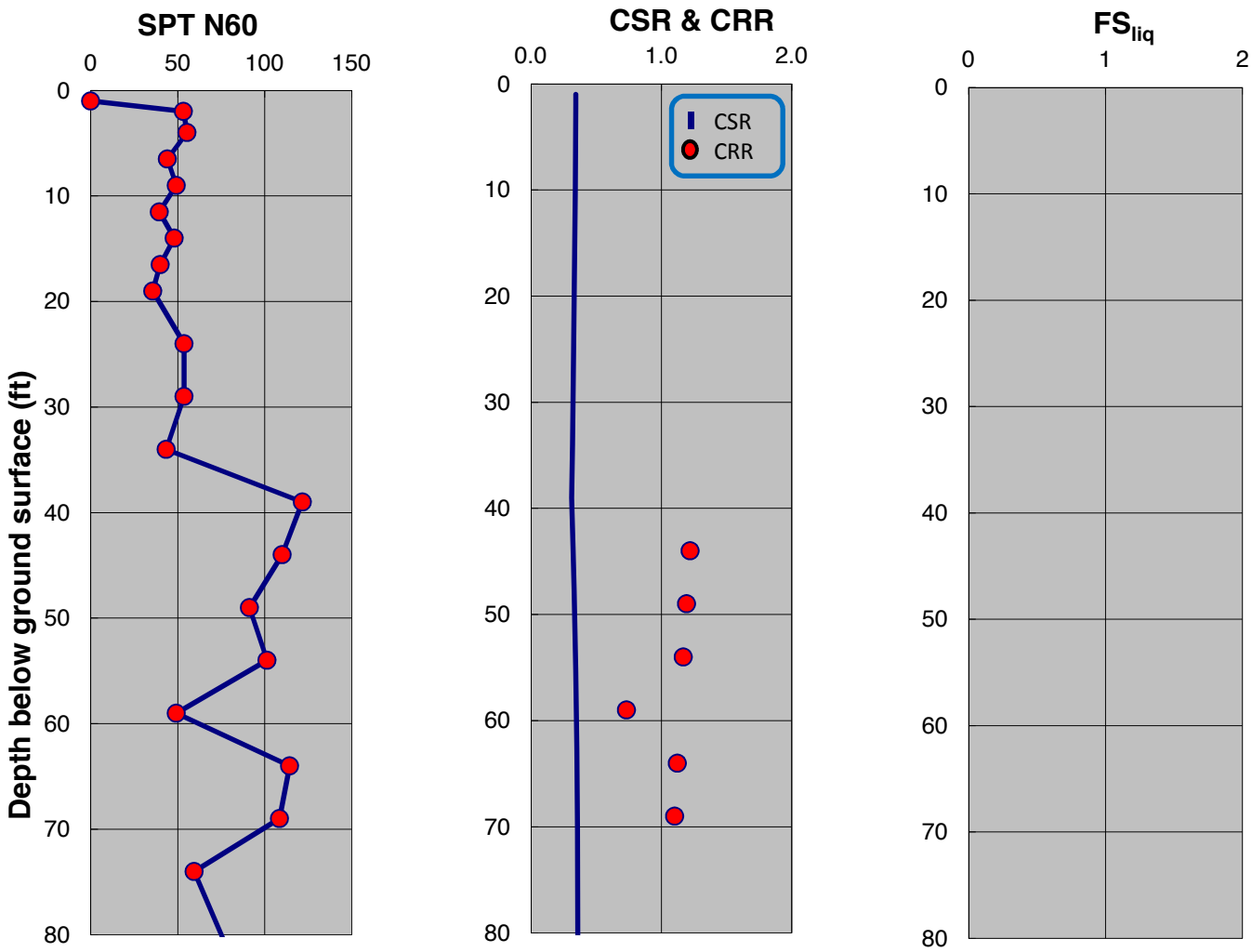
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-64 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

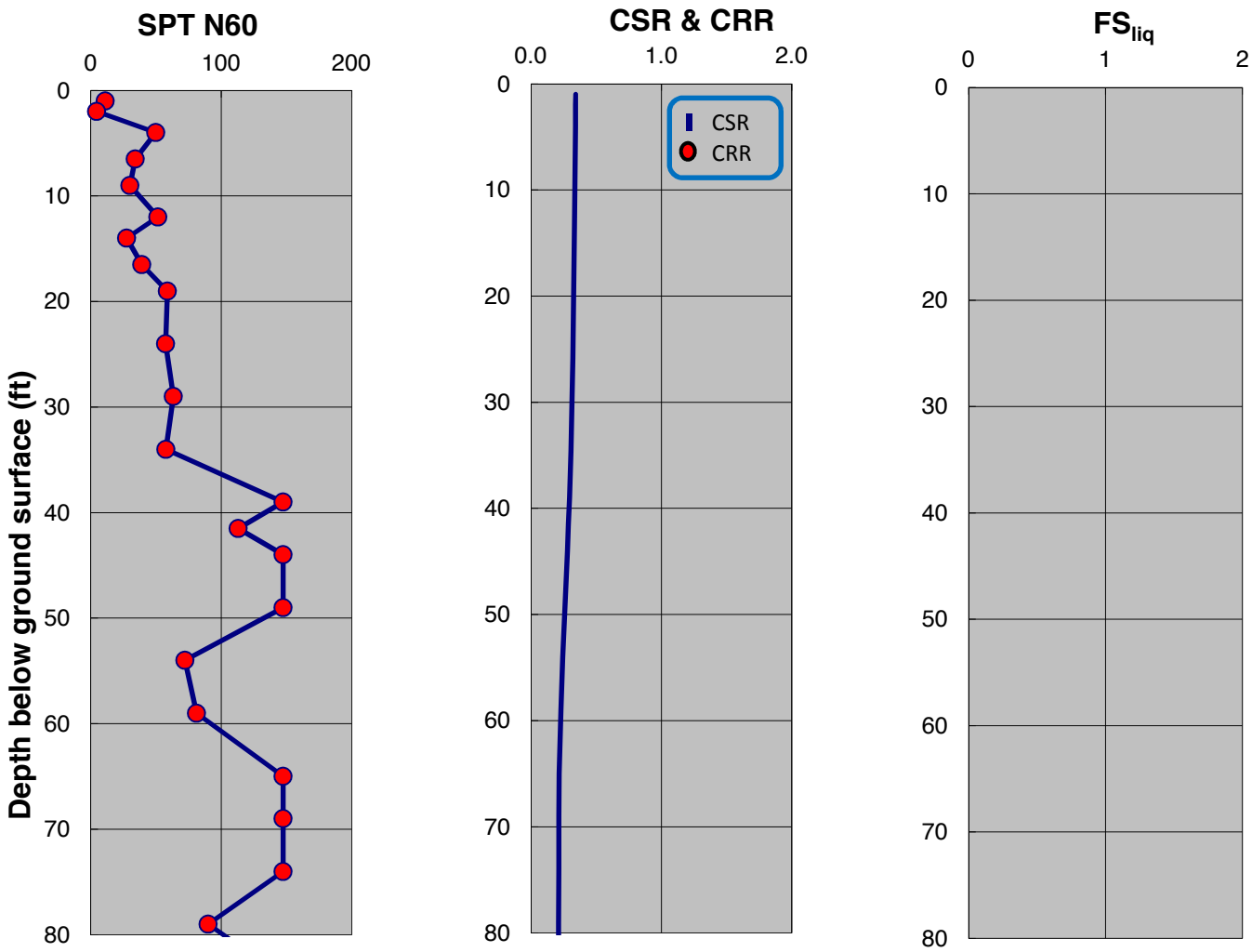
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.57



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-64 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

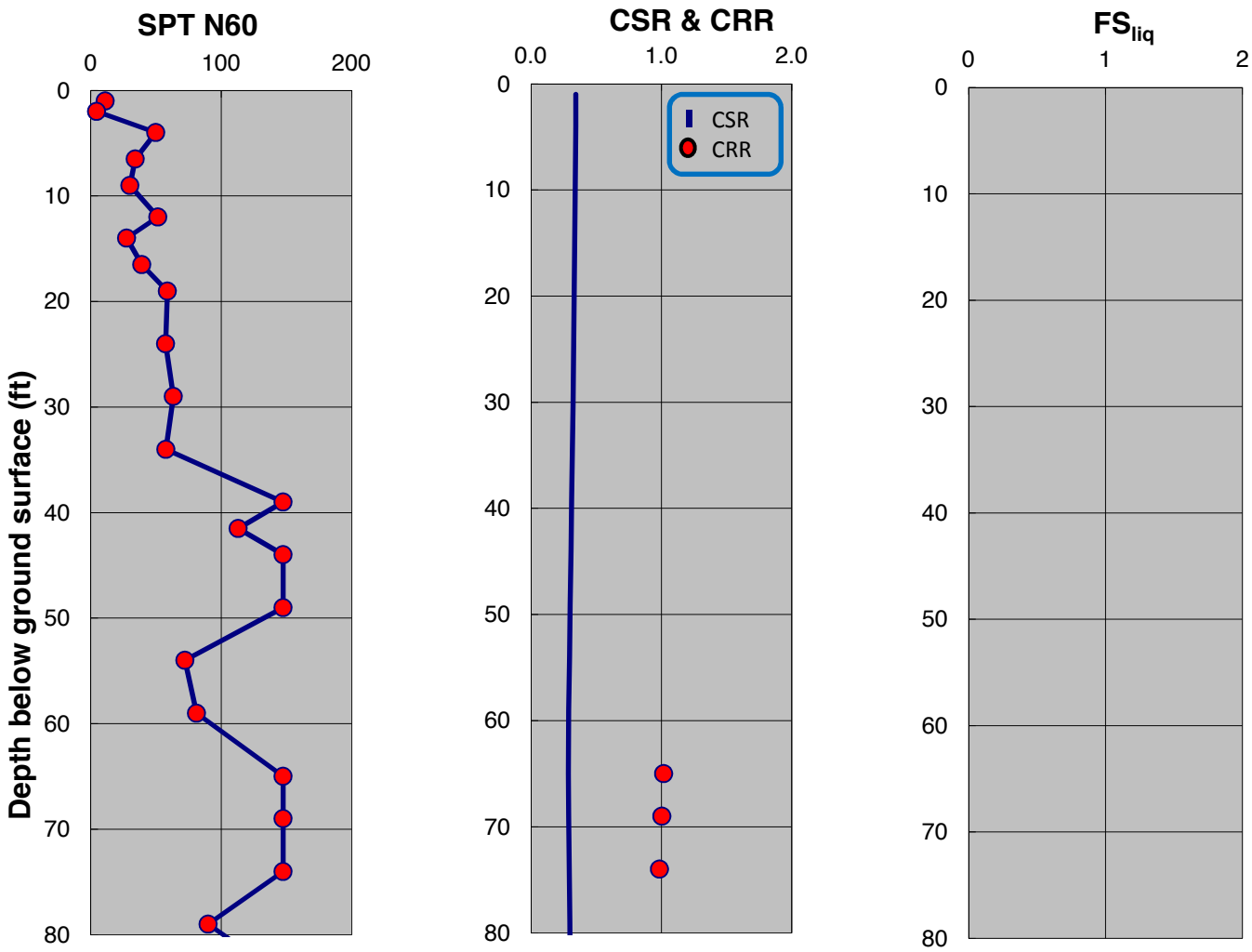
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-66 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

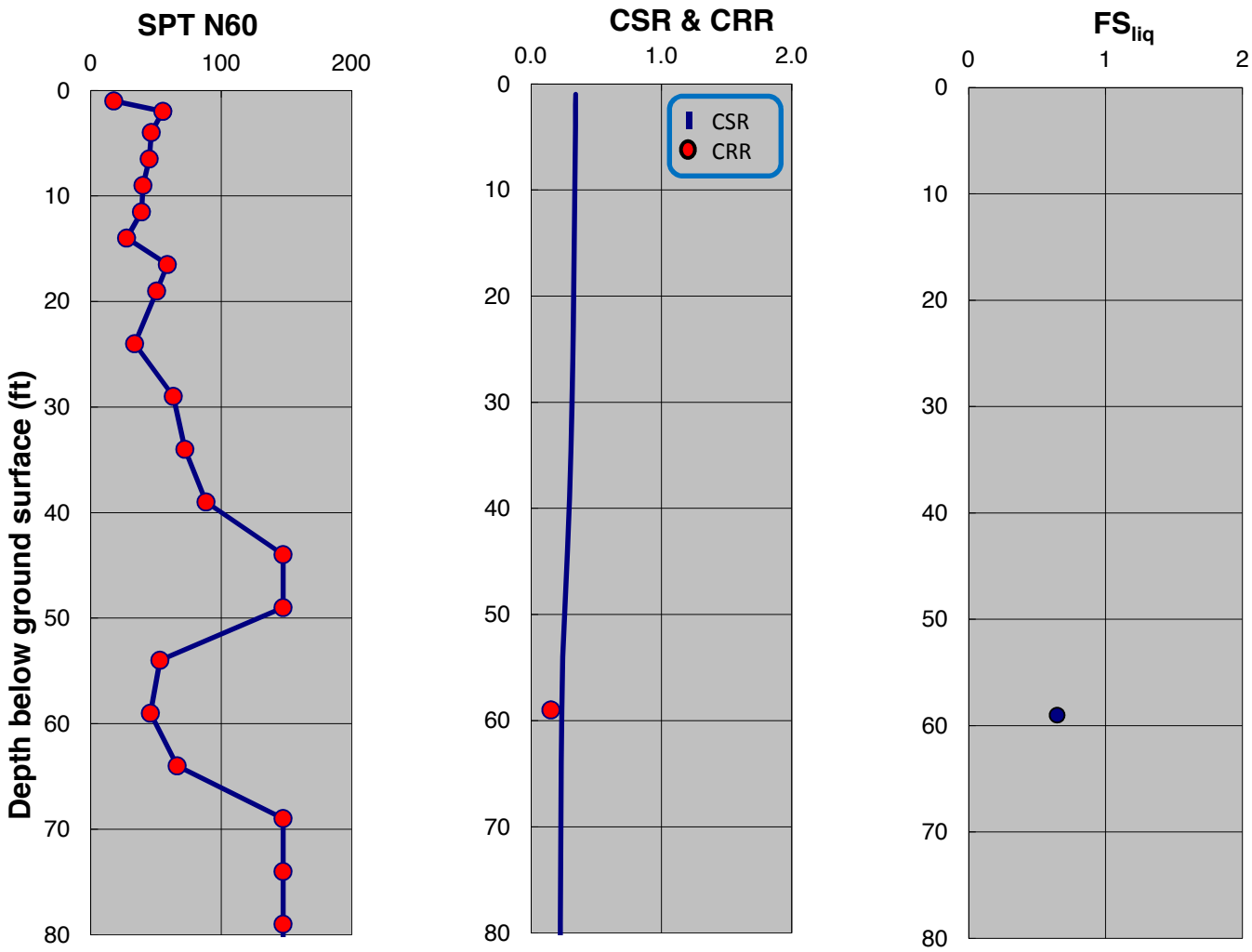
PLATE A.59



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-66 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

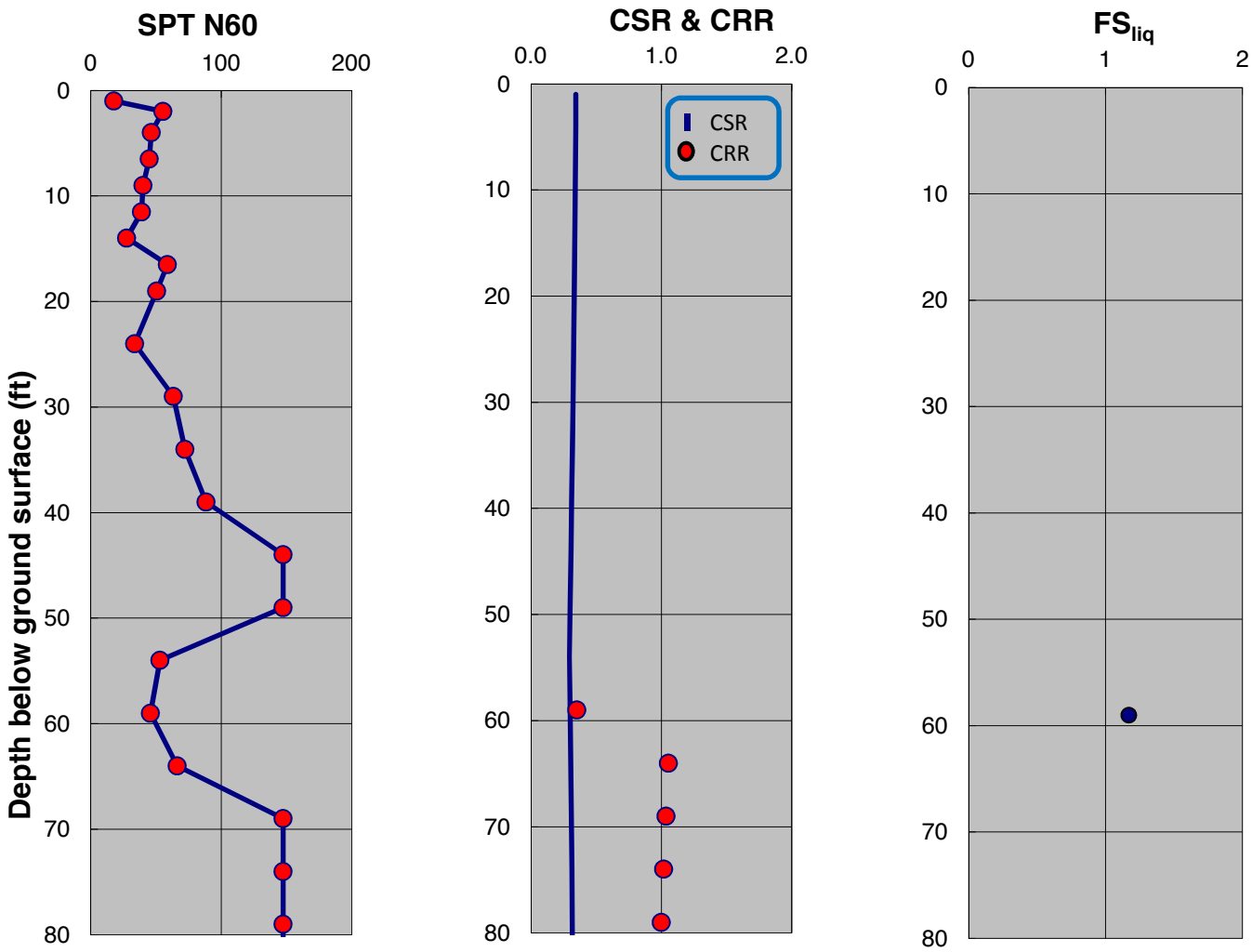
PLATE A.60



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-67 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

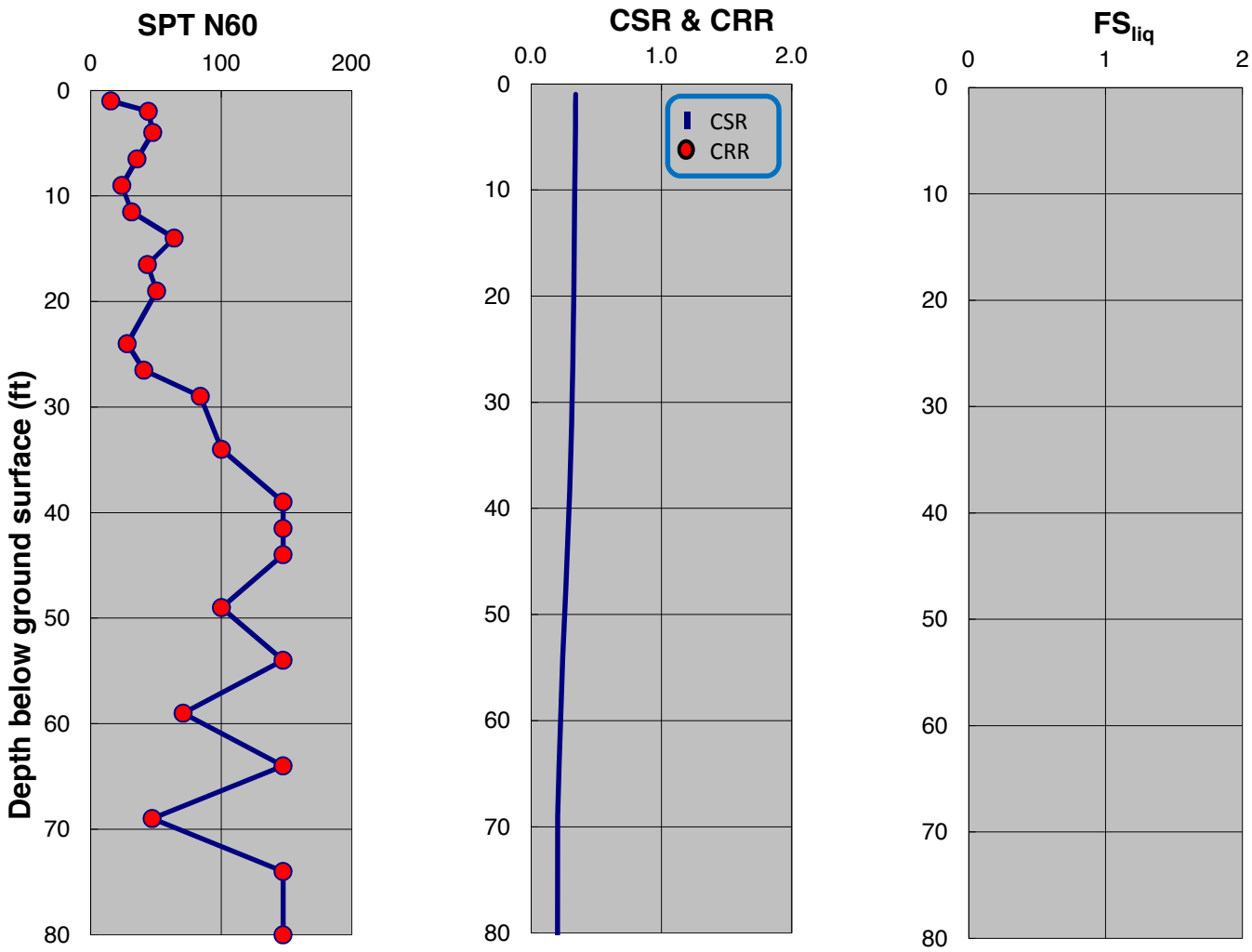
PLATE A.61



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-67 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

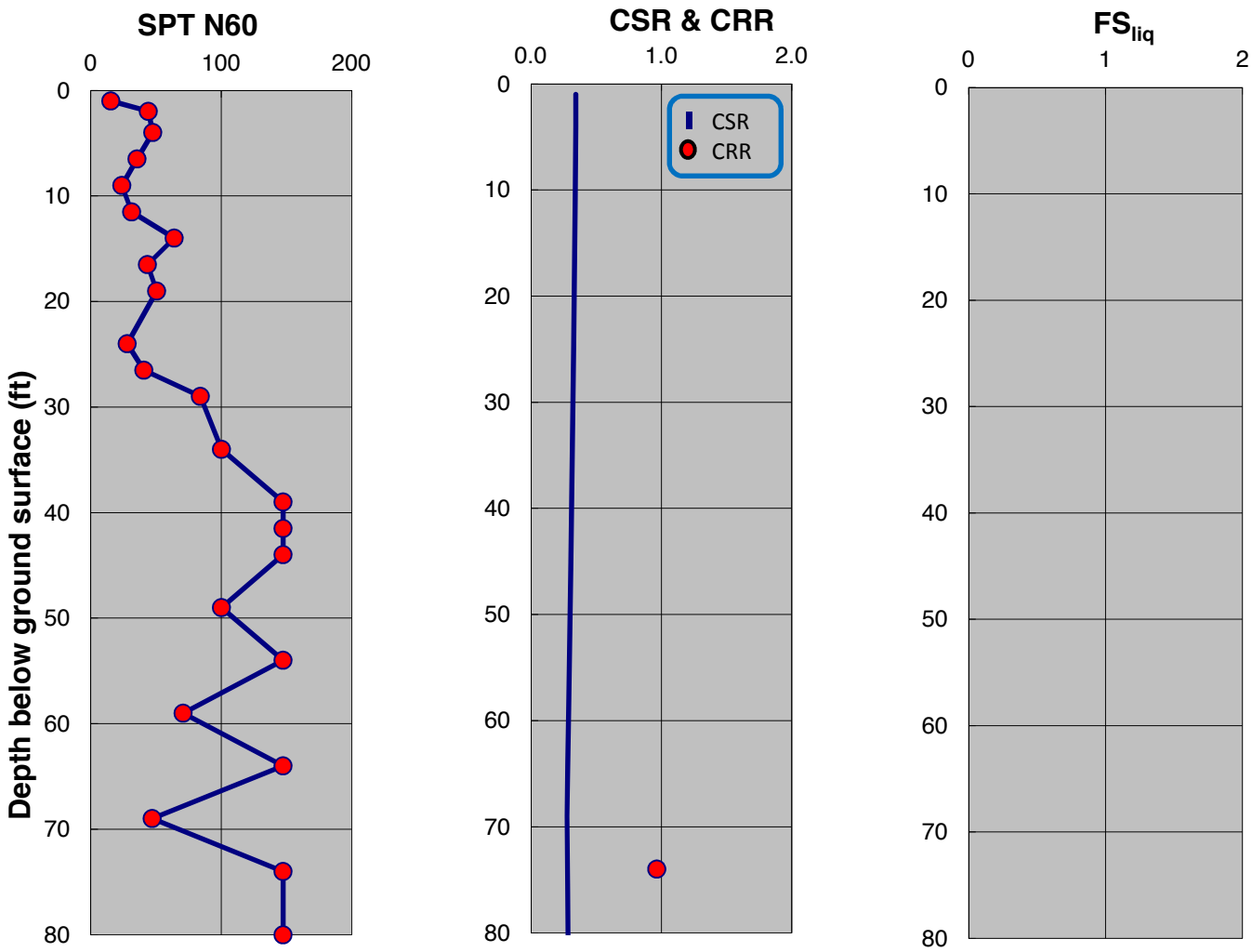
PLATE A.62



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-68 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

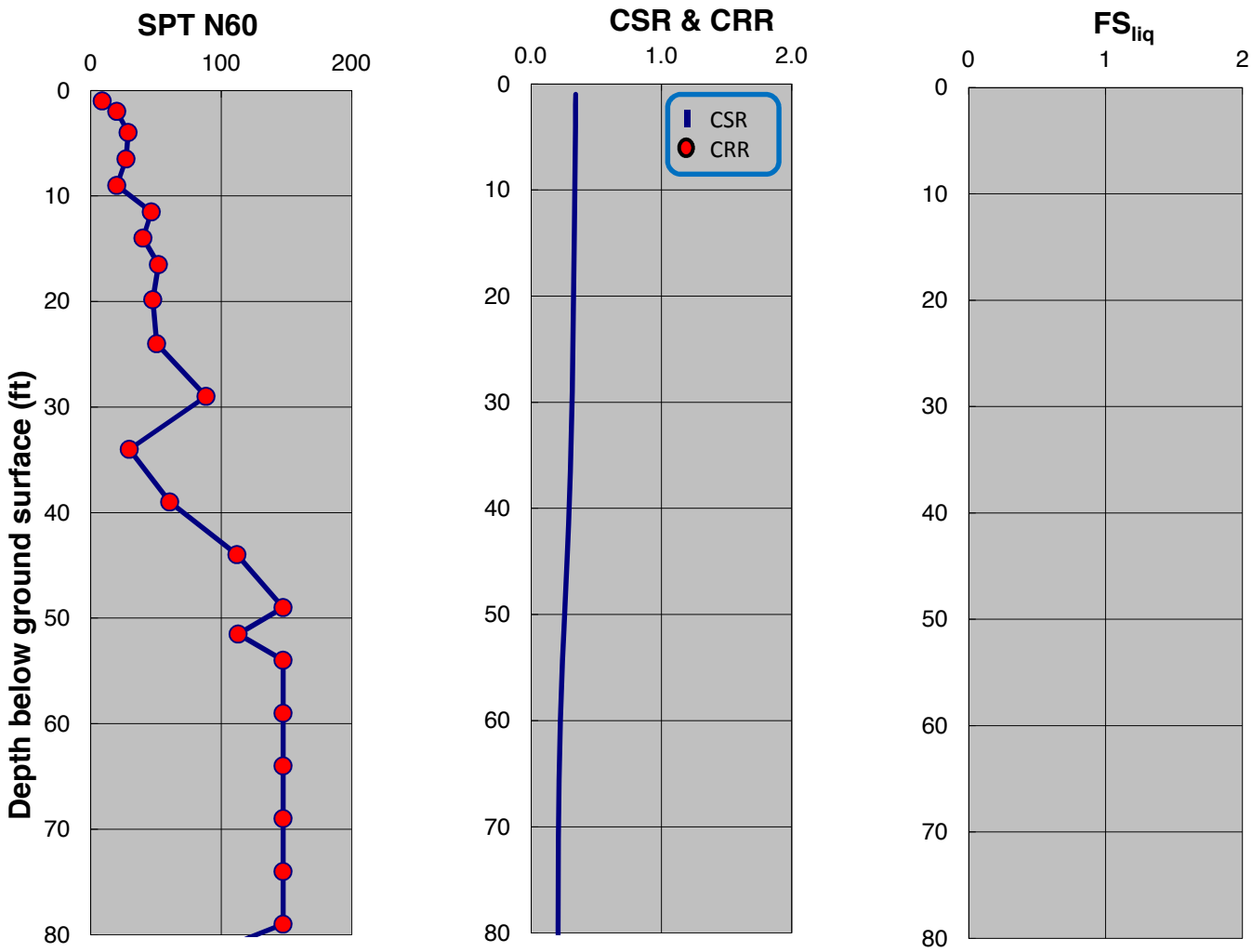
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.63



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-68 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

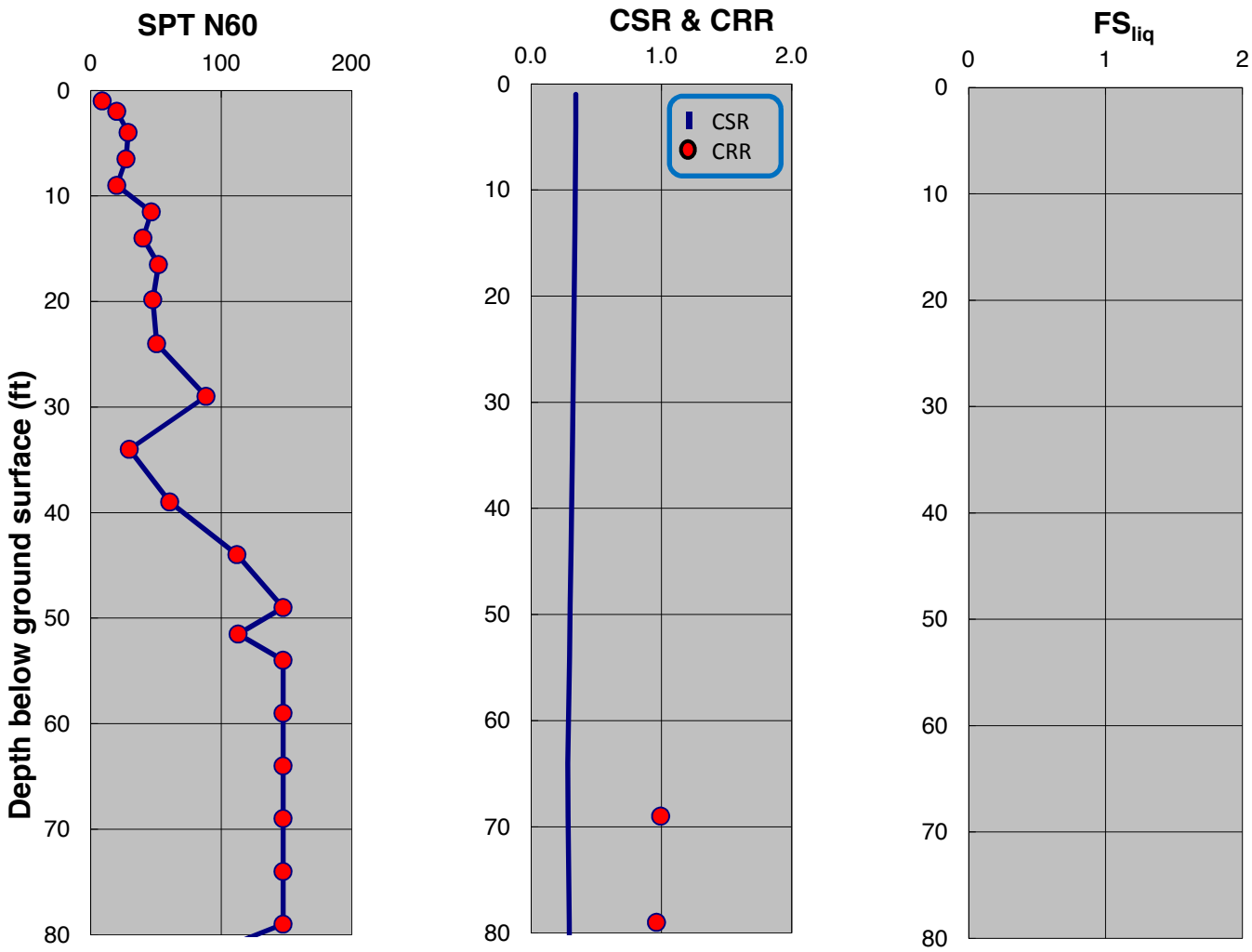
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-69 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

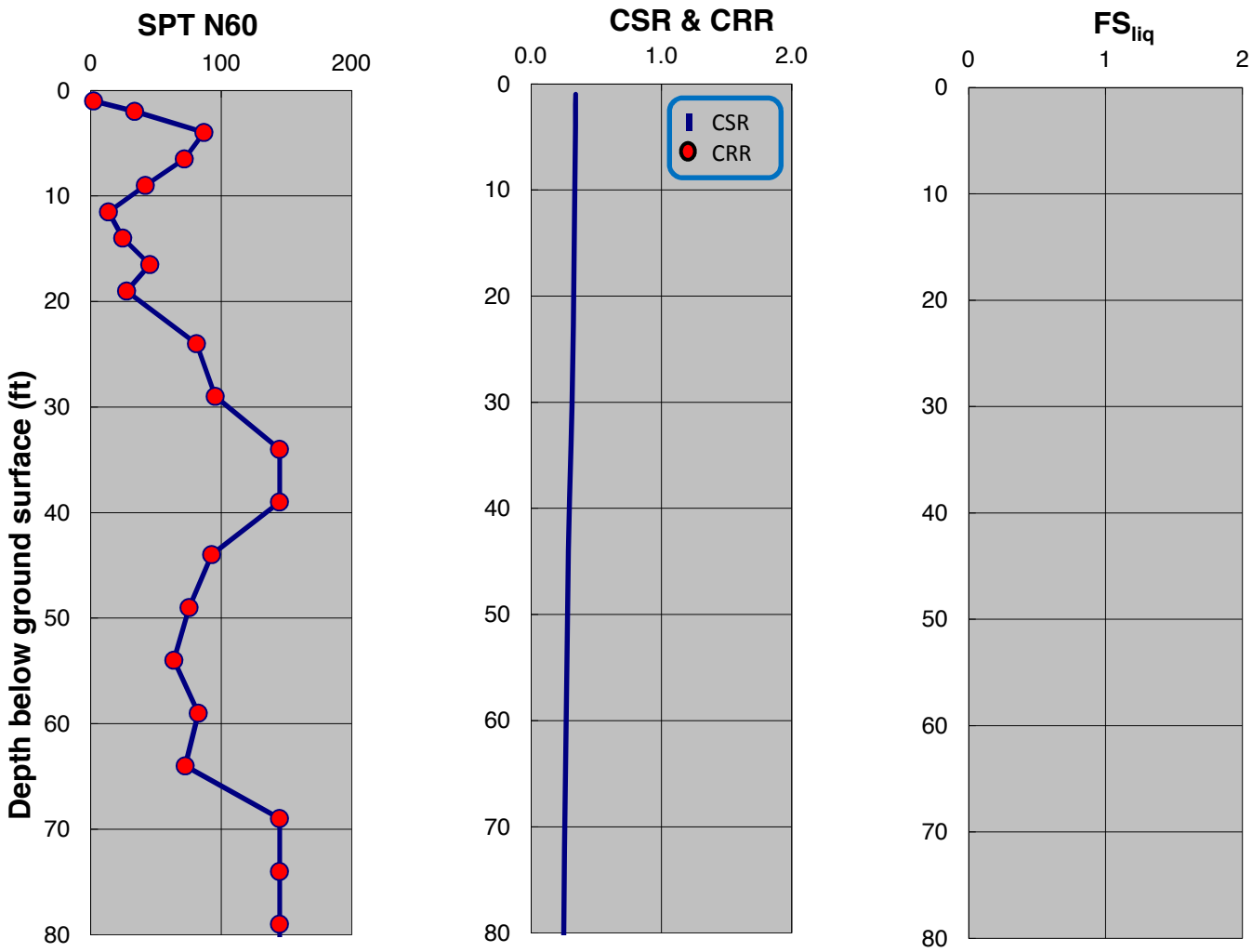
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.65



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-69 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

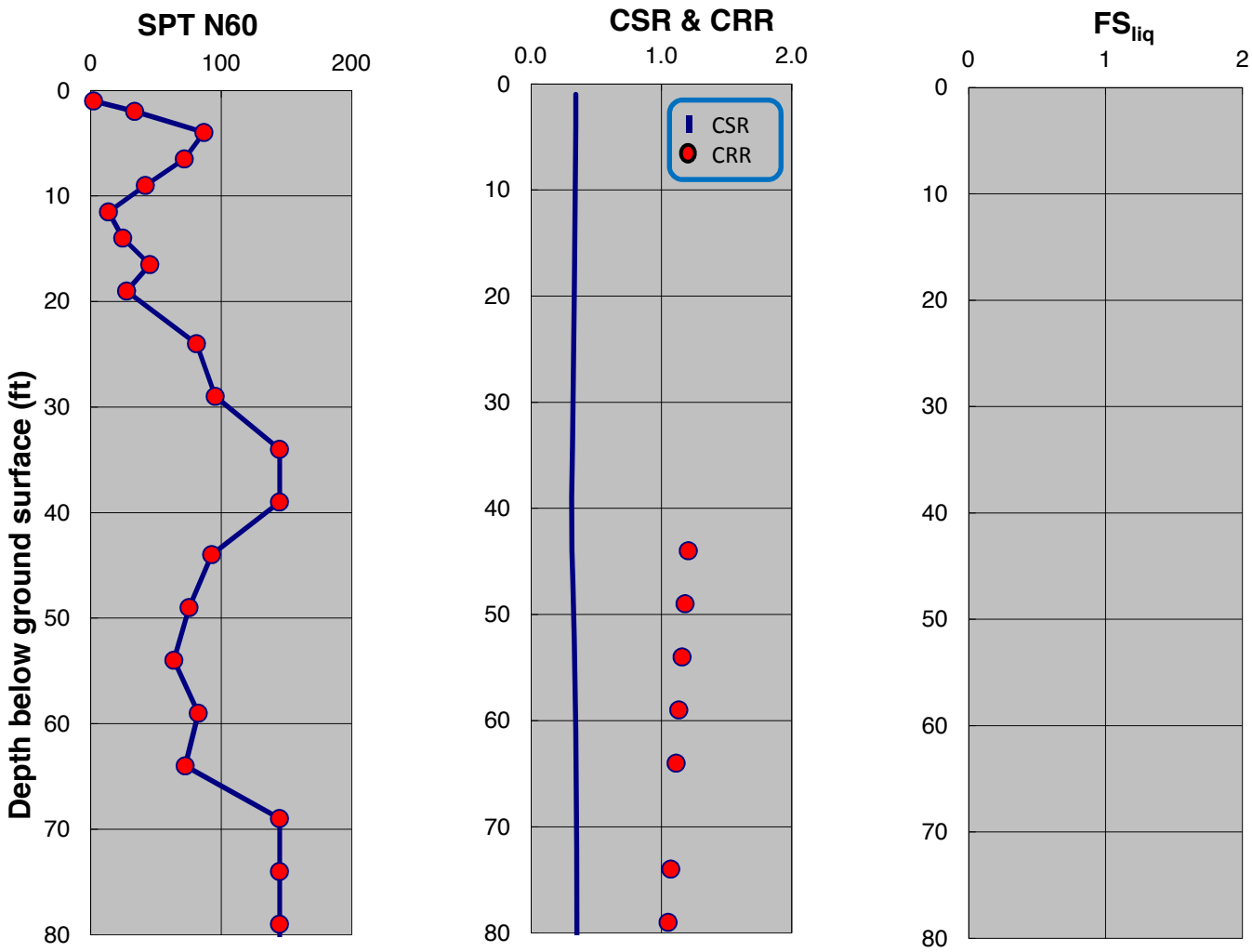
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-71 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

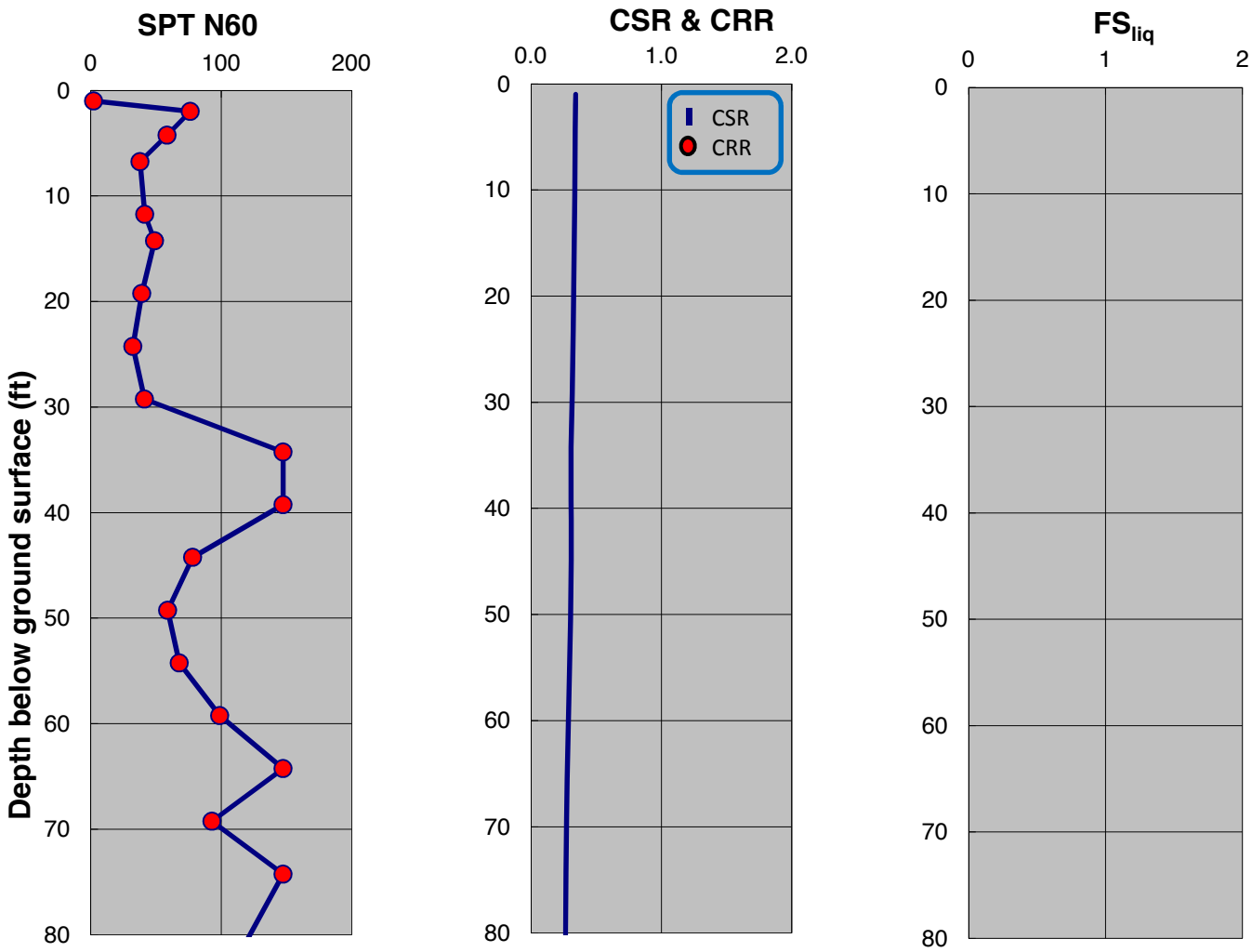
PLATE A.67



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-71 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

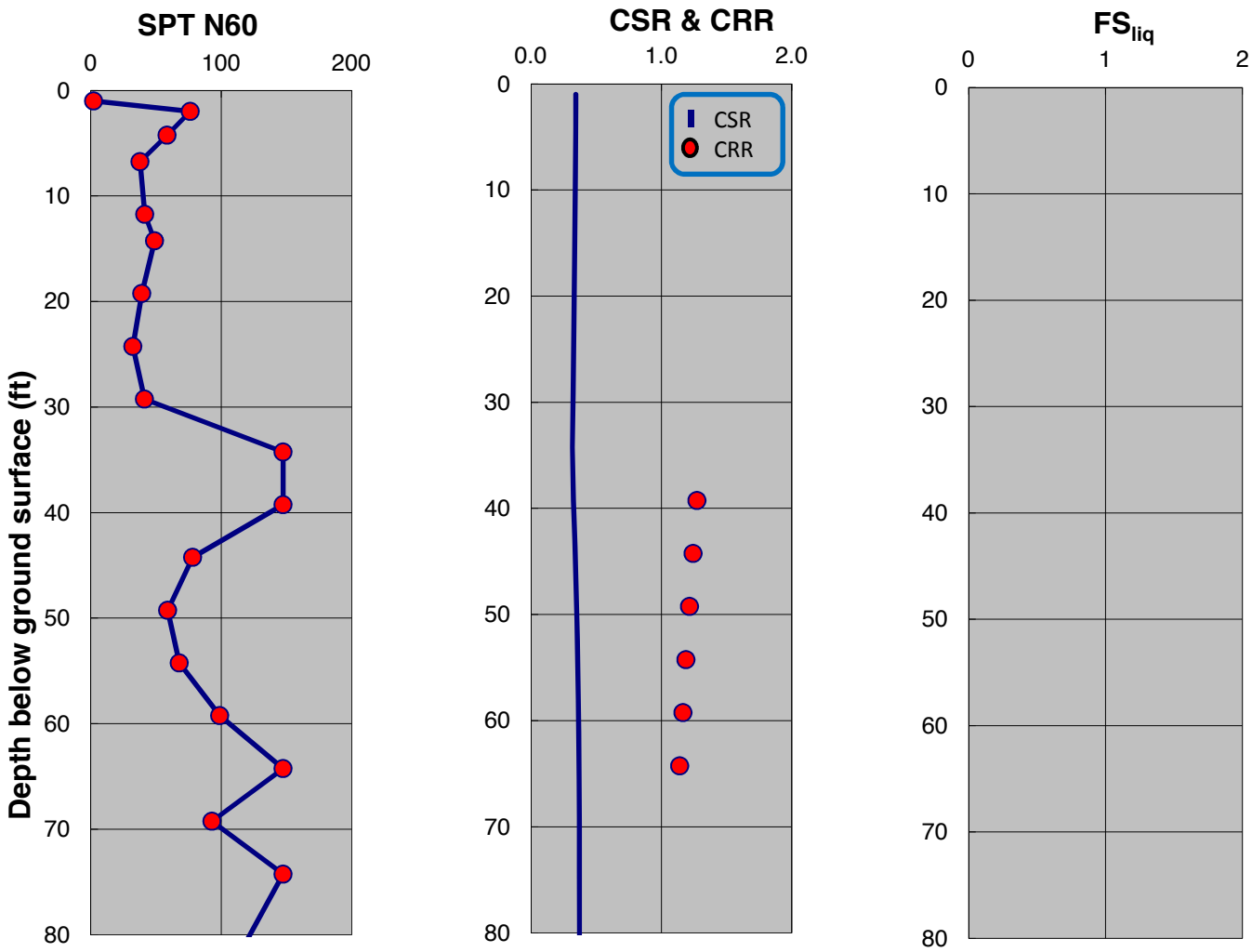
PLATE A.68



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-72 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

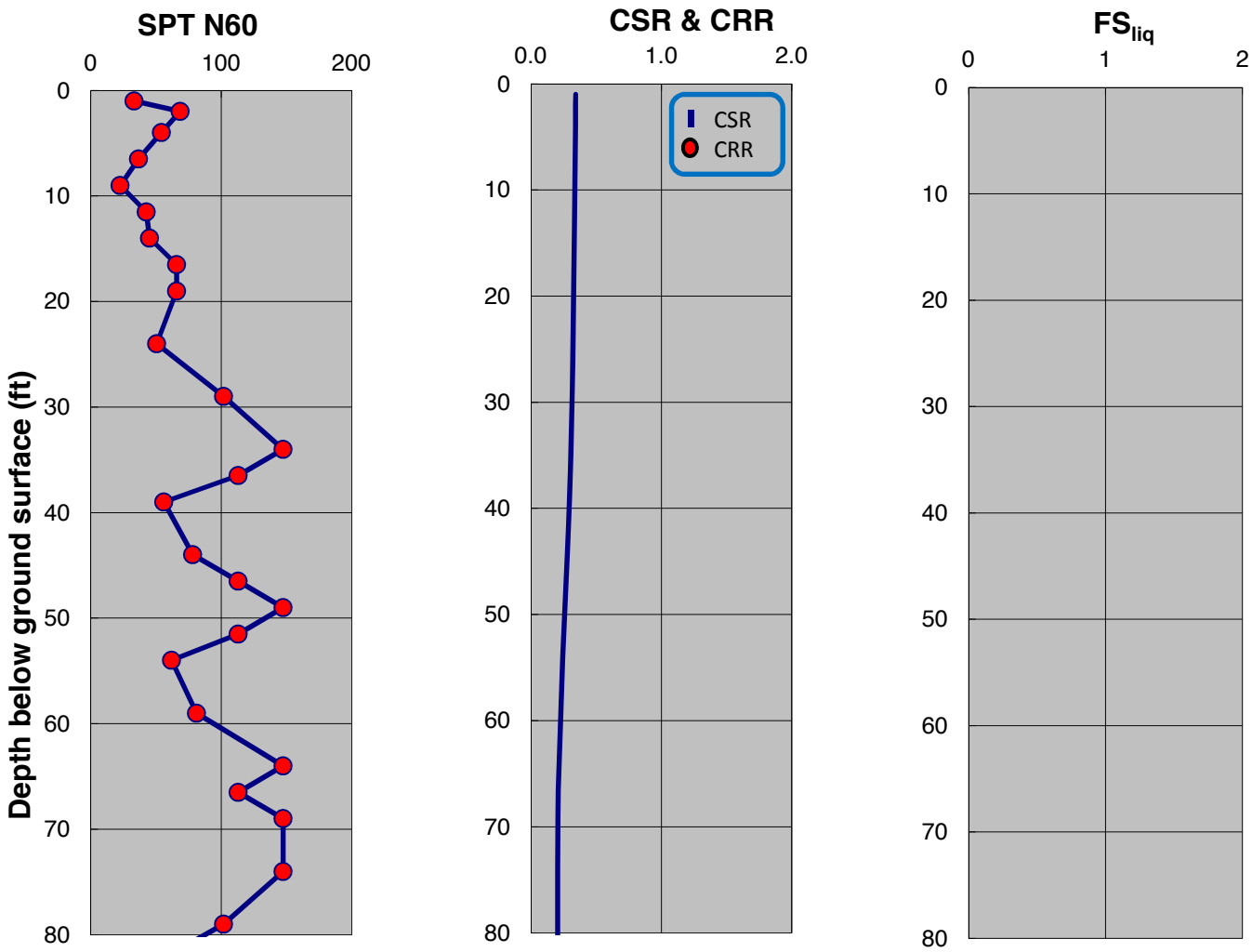
PLATE A.69



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-72 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

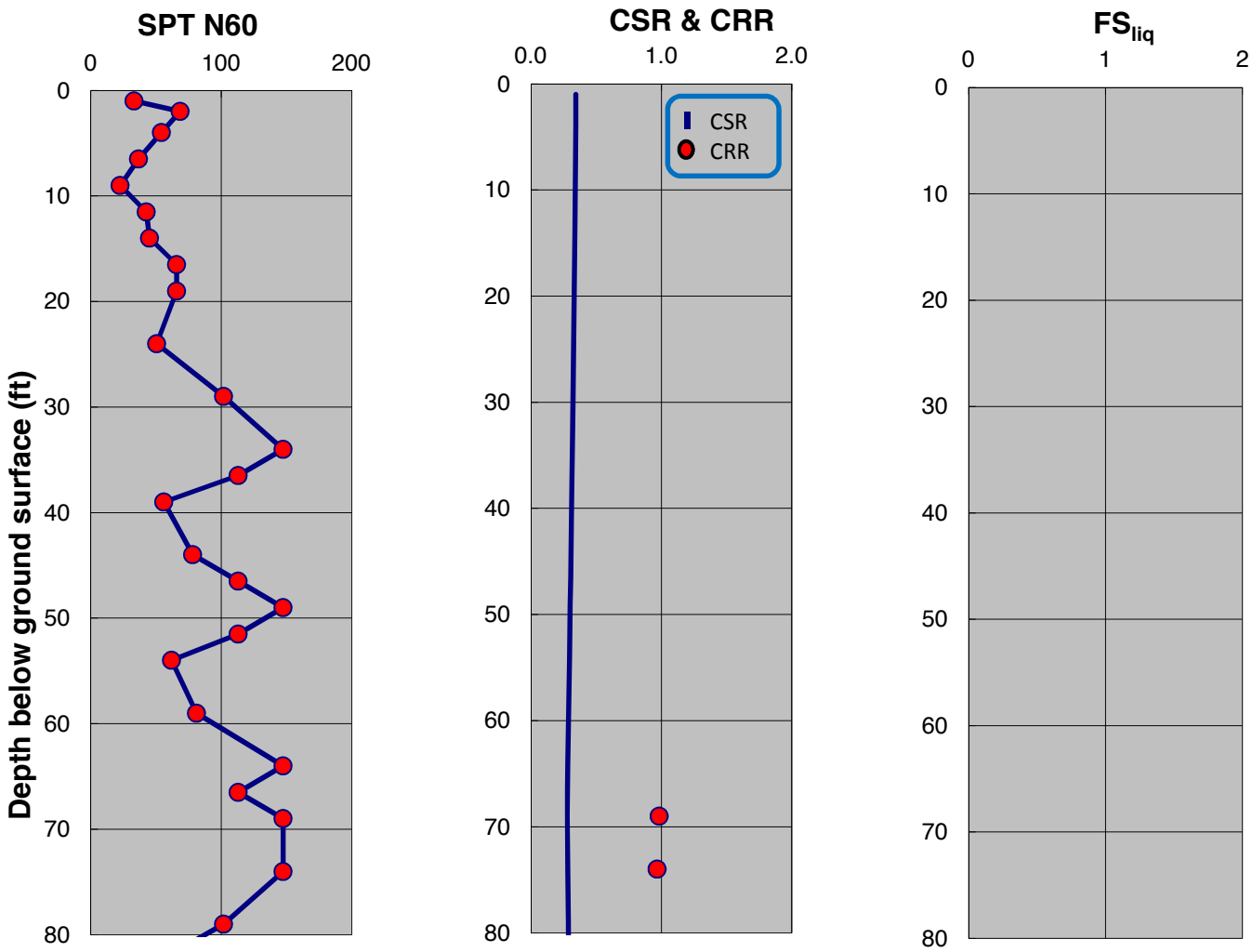
PLATE A.70



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-73 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

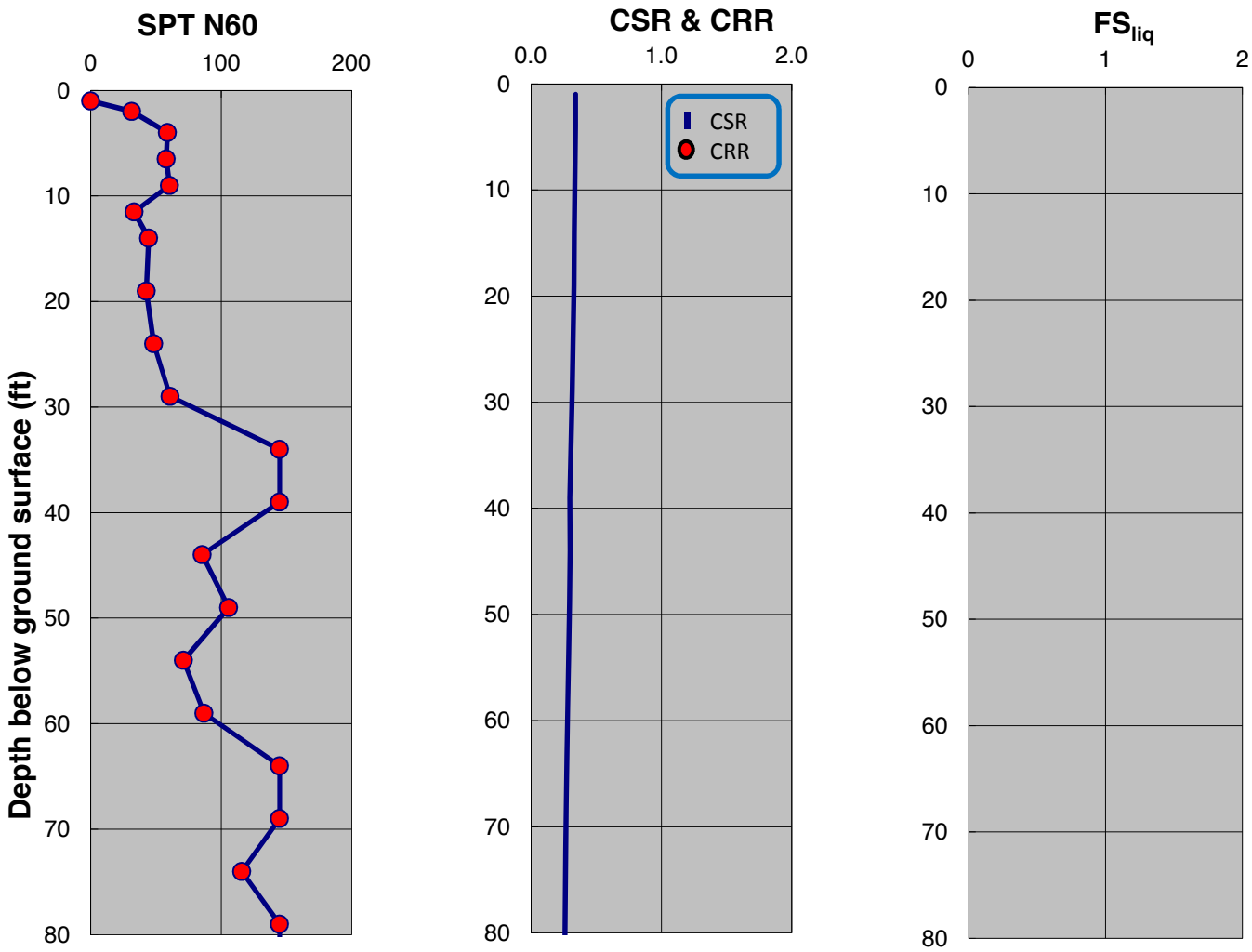
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.71



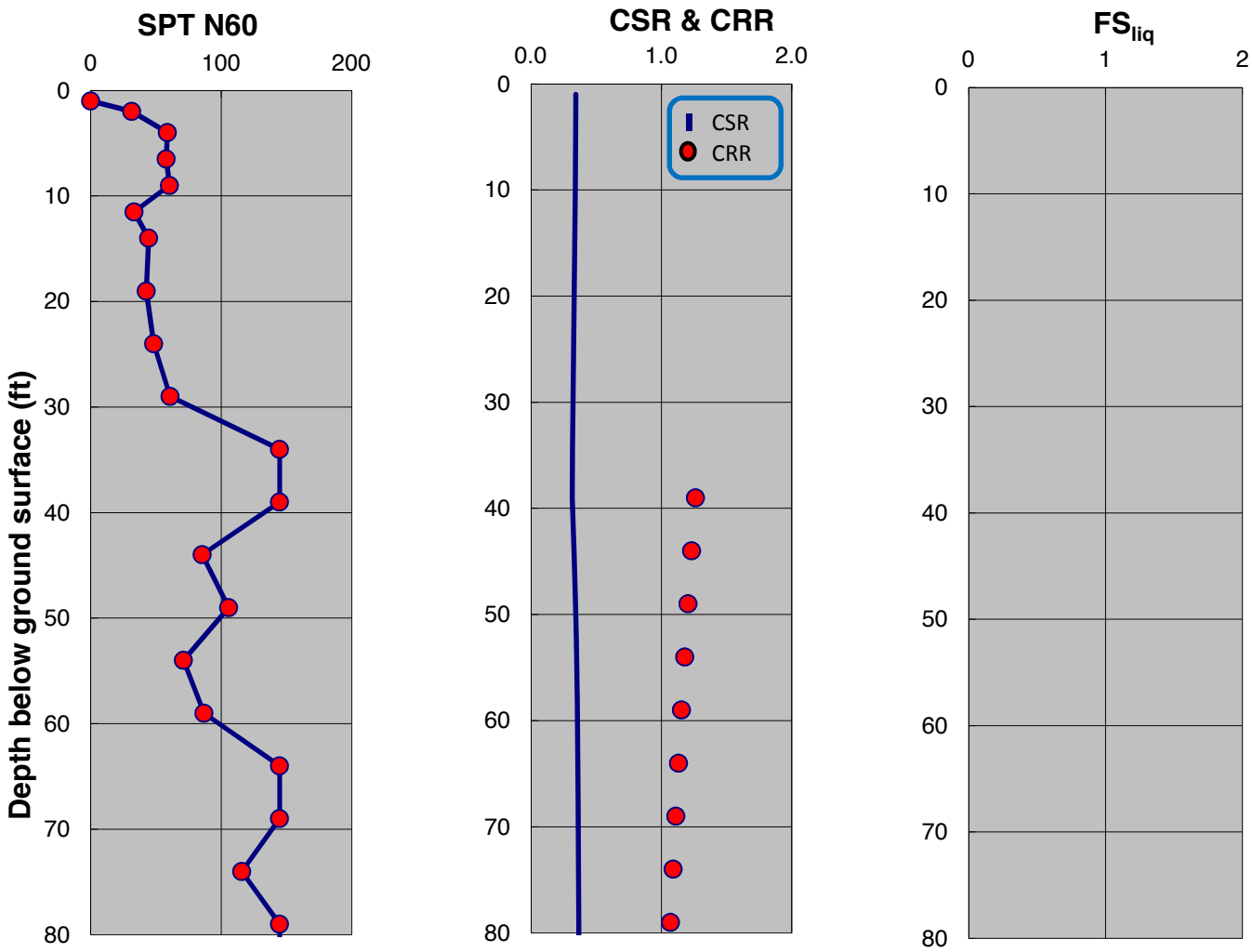
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-73 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-74 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

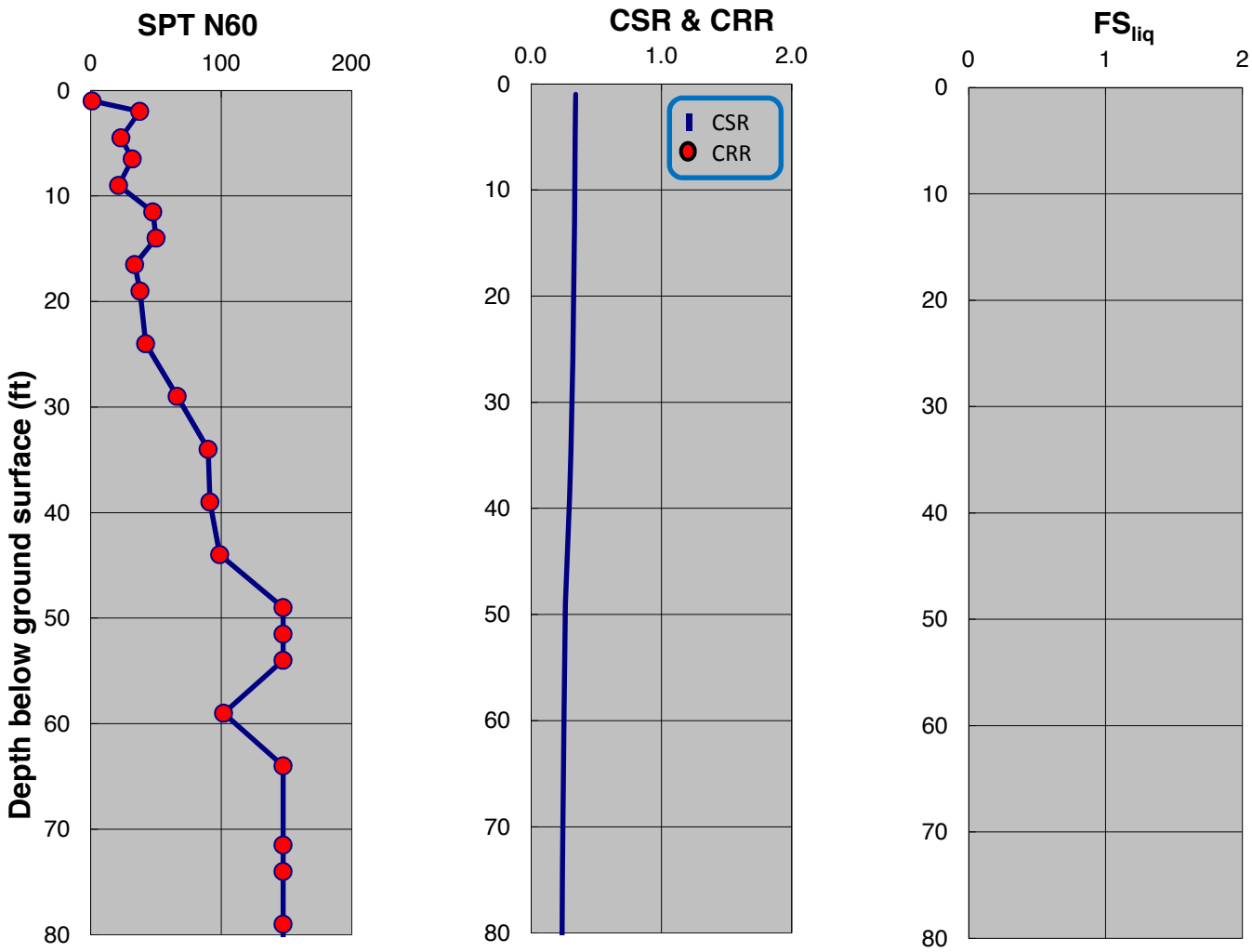
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-74 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

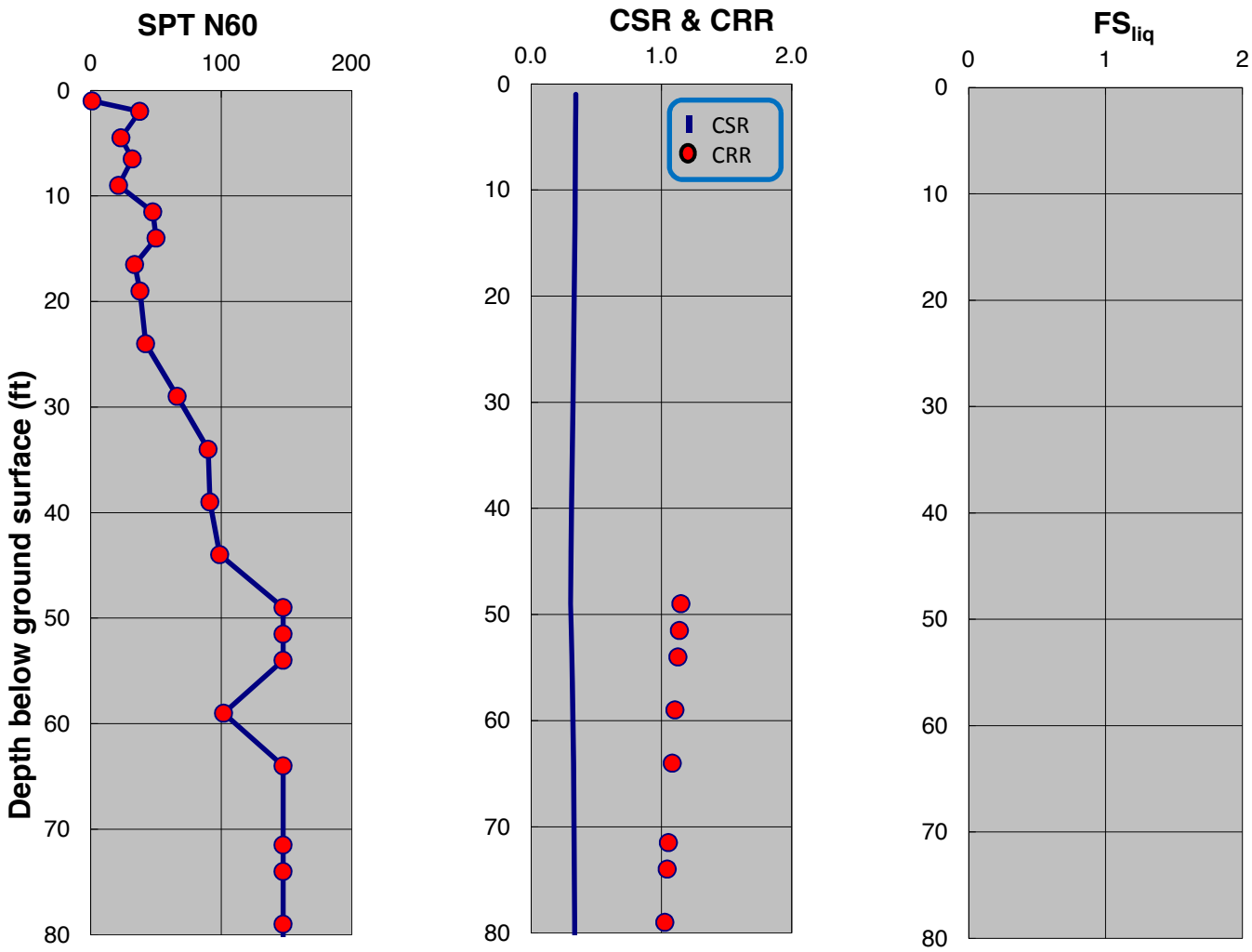
PLATE A.74



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-75 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

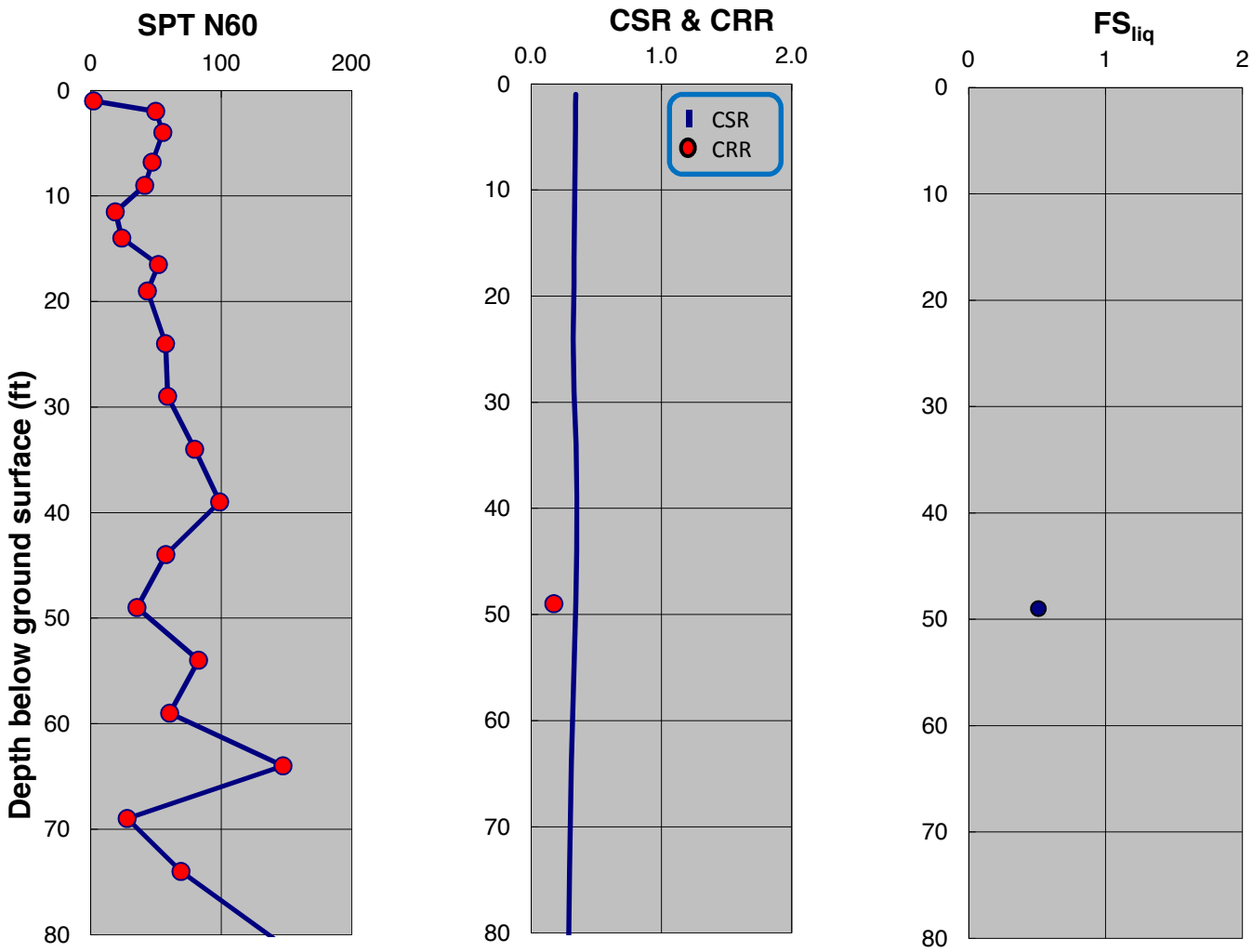
PLATE A.75



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-75 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

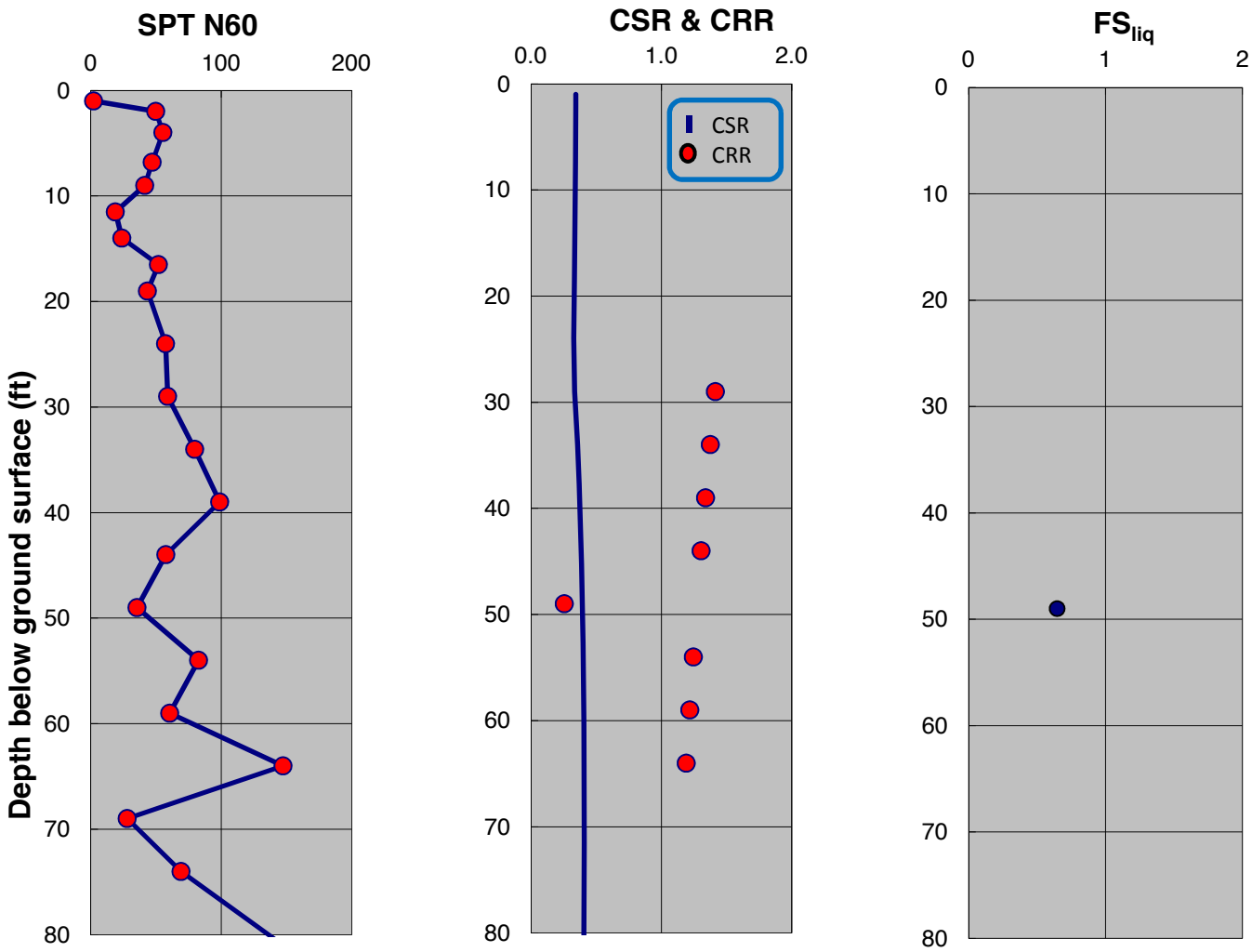
PLATE A.76



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-76 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

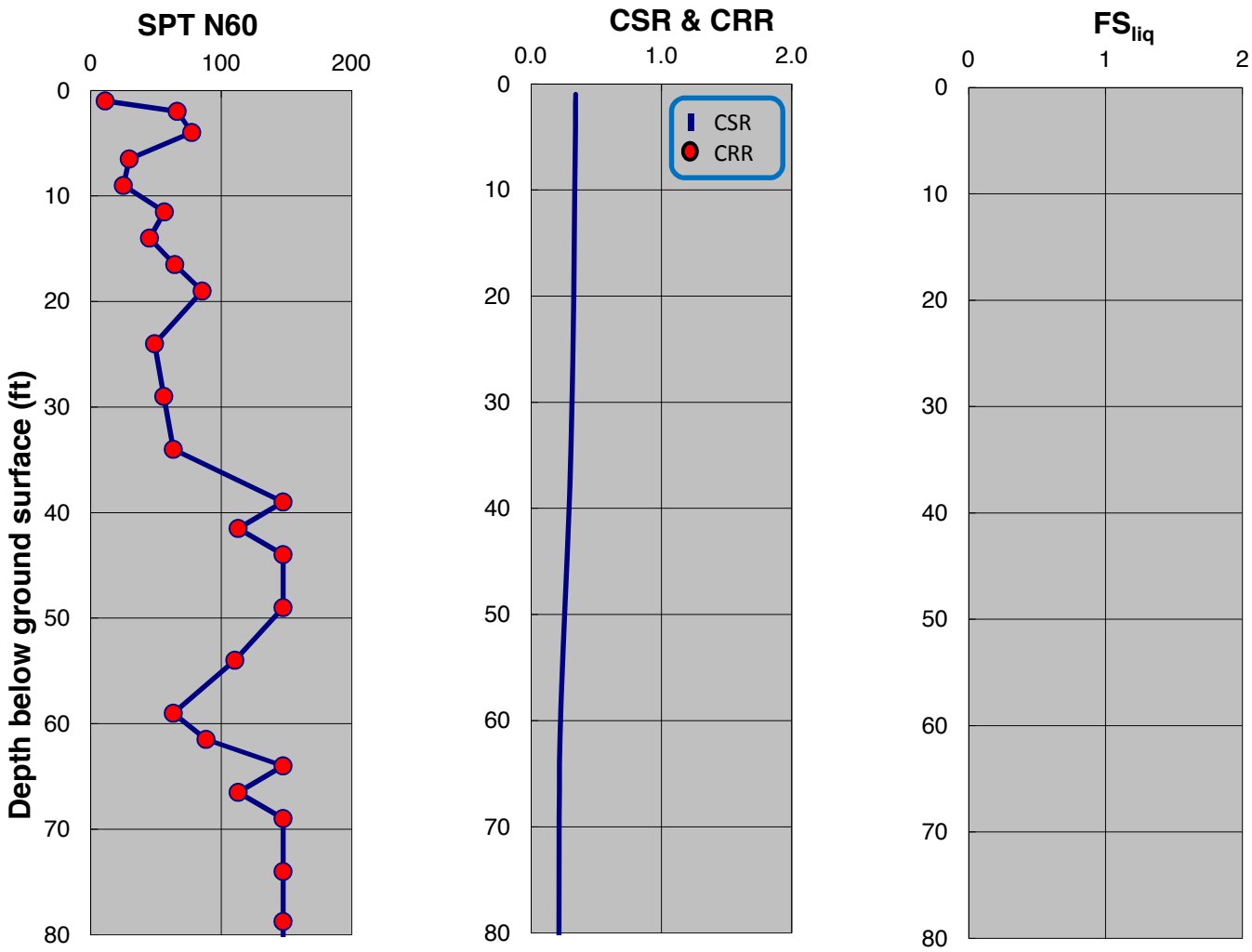
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.77



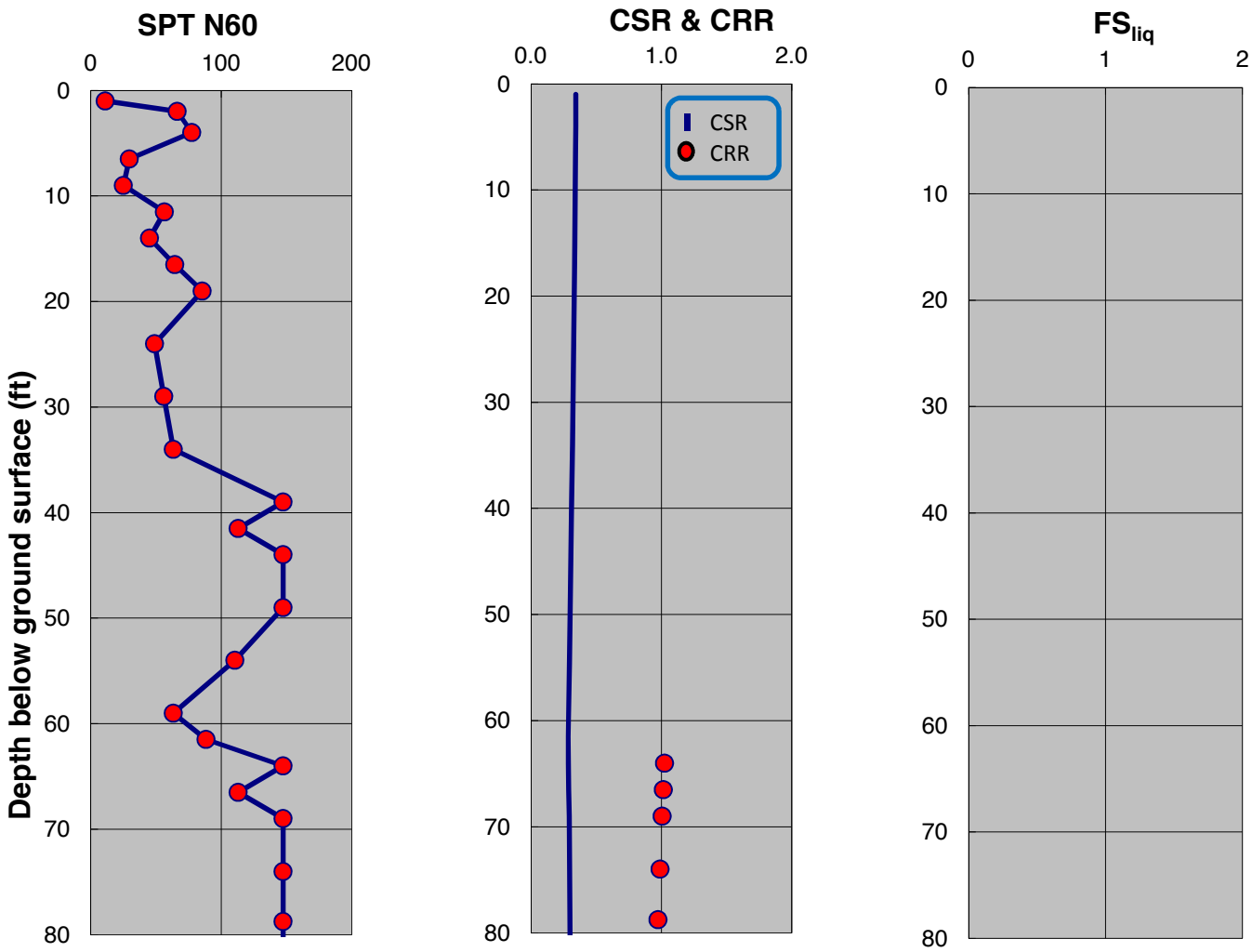
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-76 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



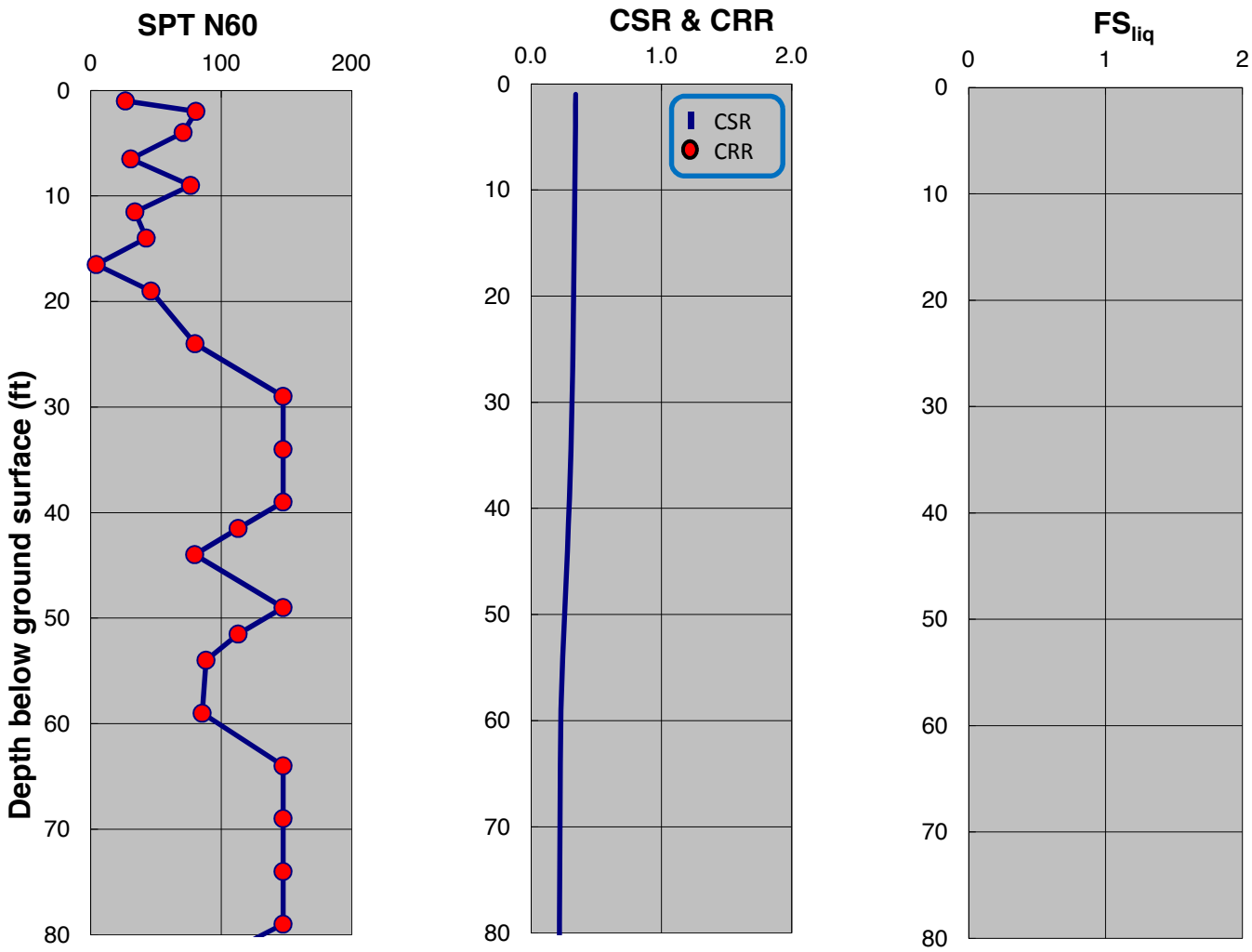
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-77 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-77 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

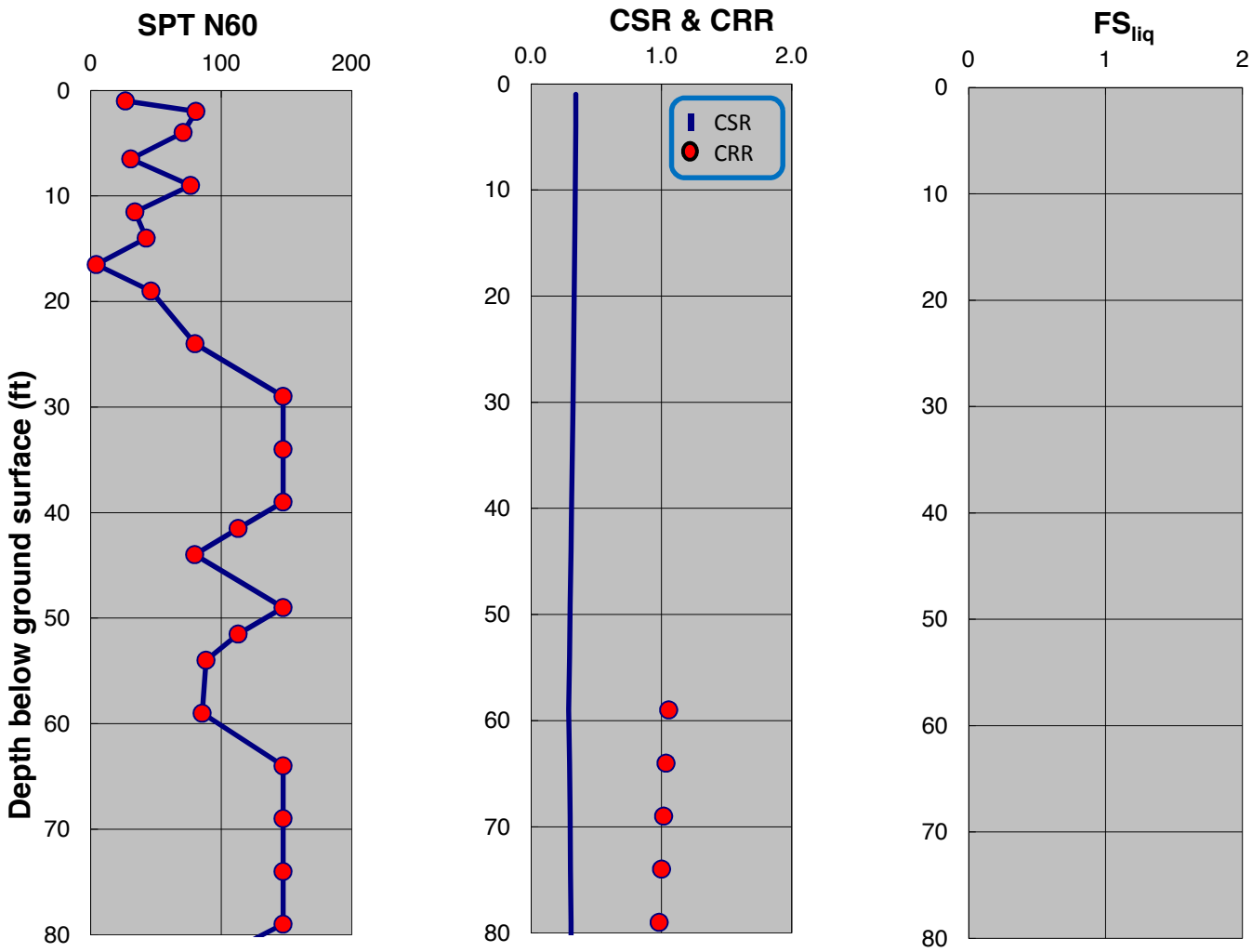
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-78 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

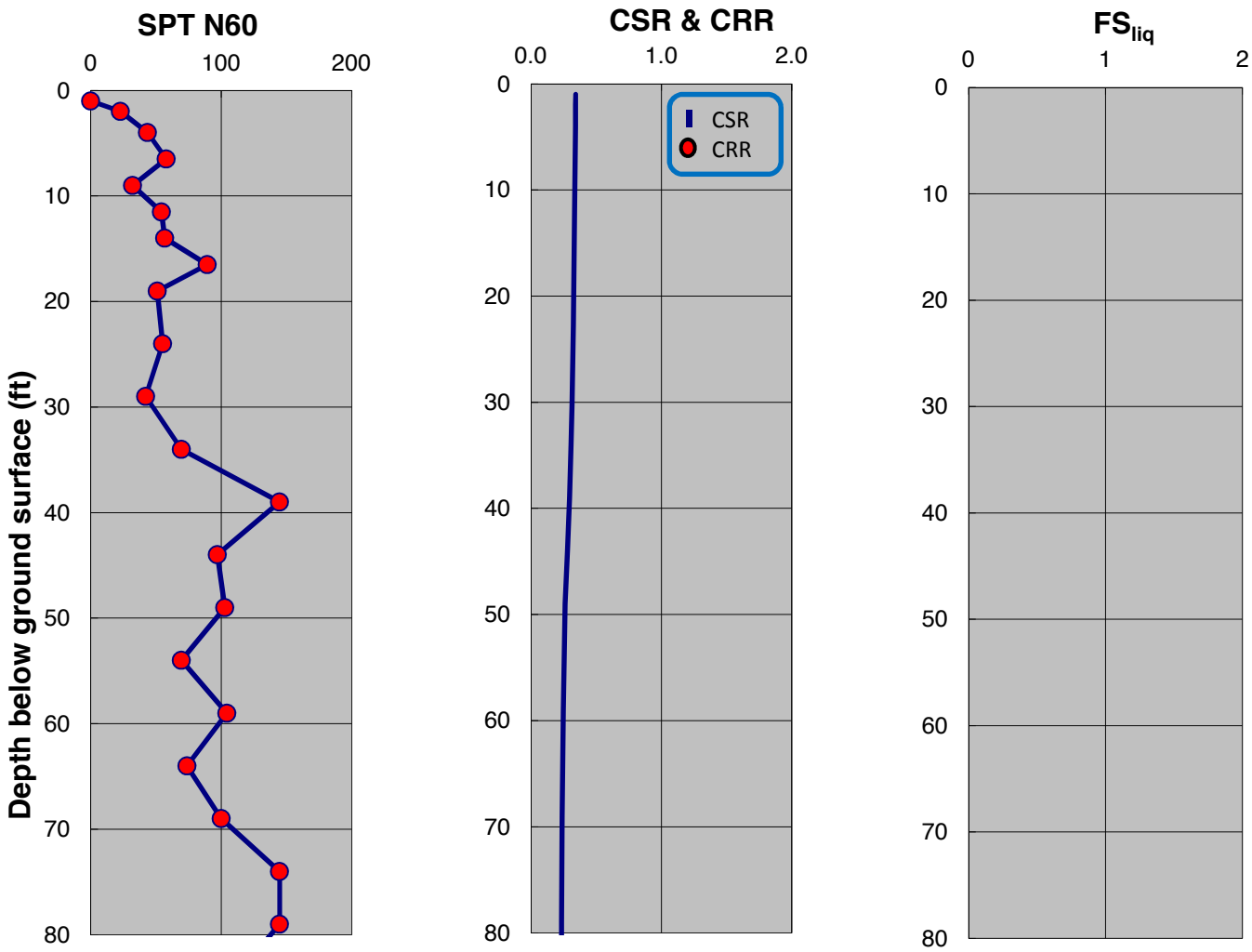
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.81



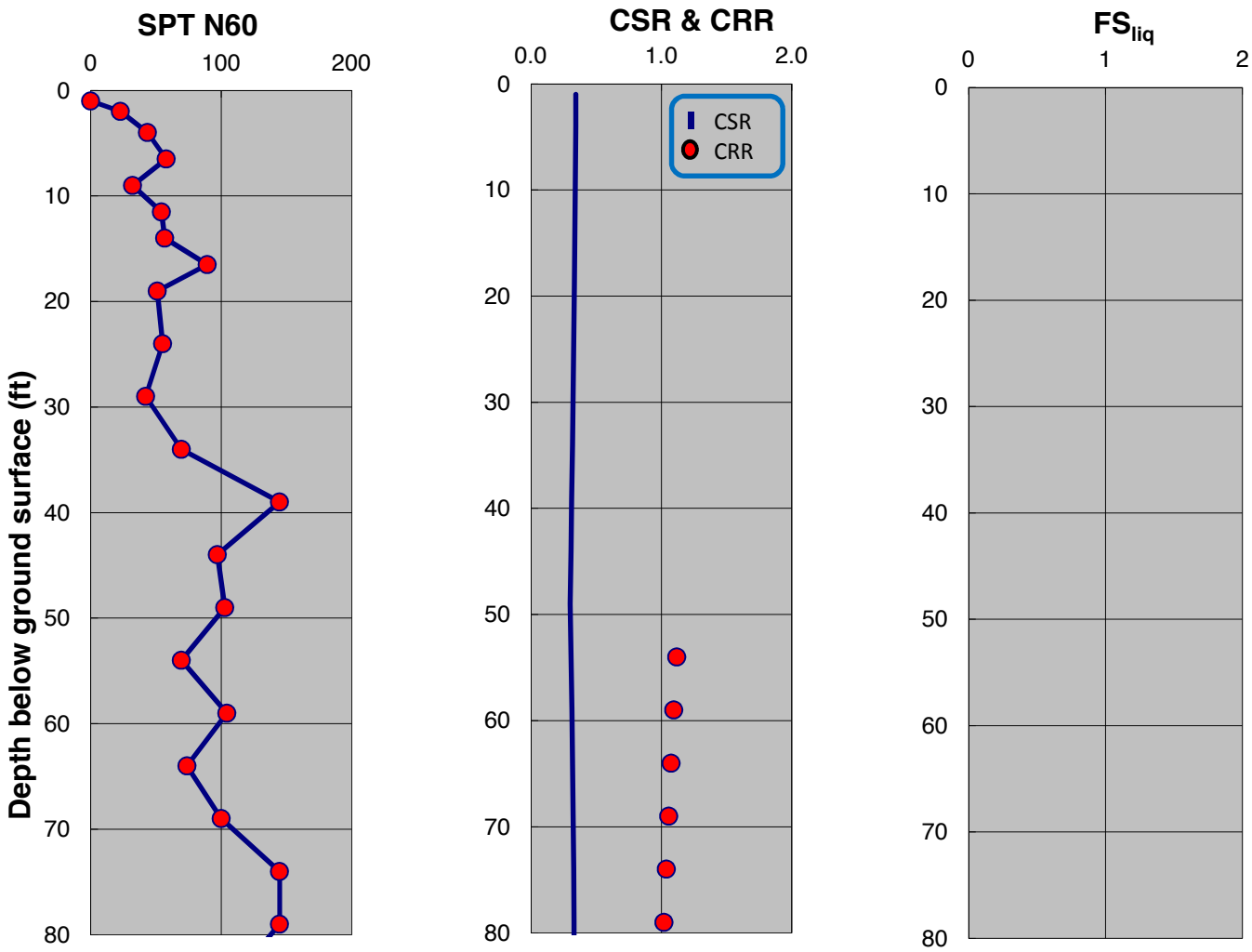
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-78 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



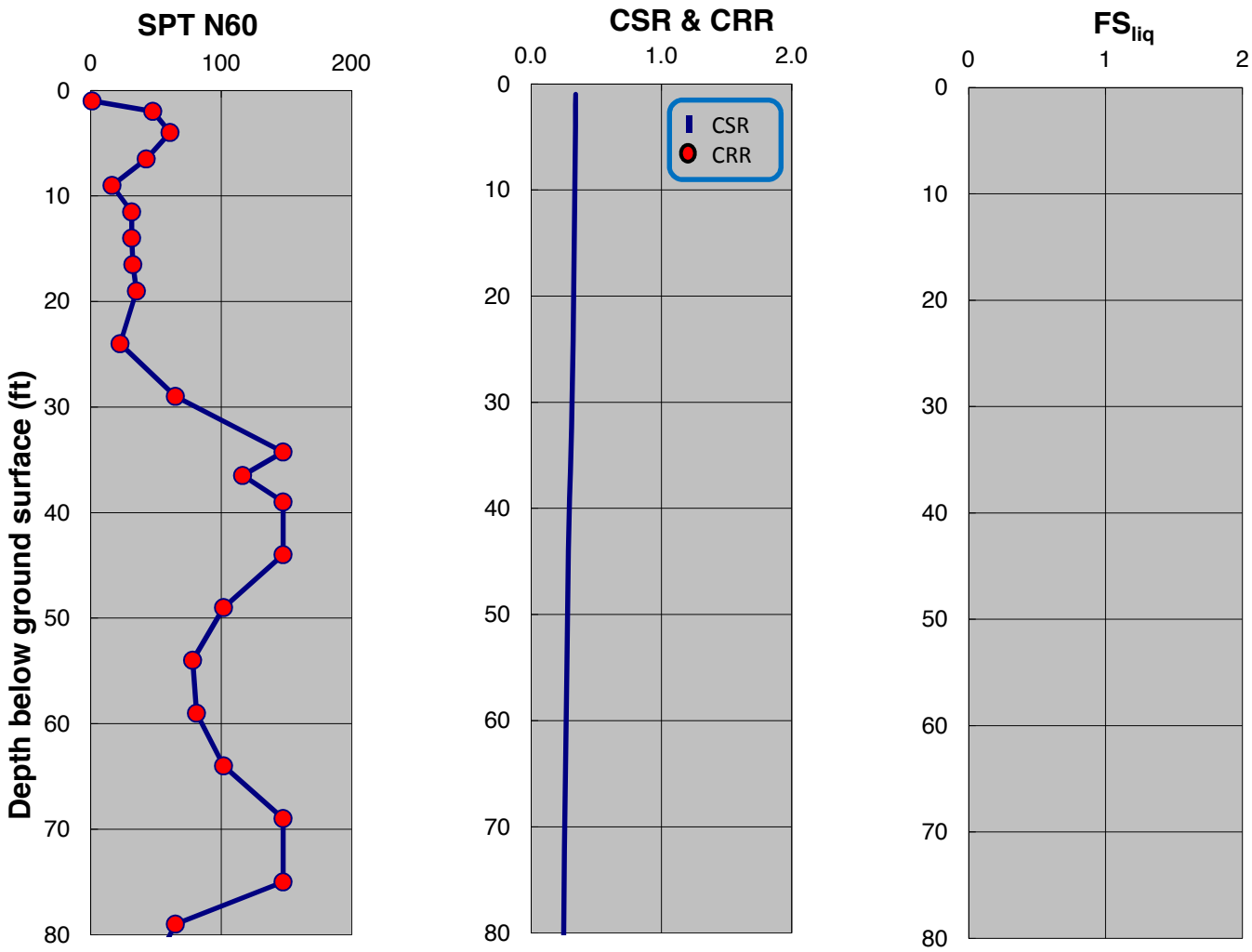
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-79 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-79 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

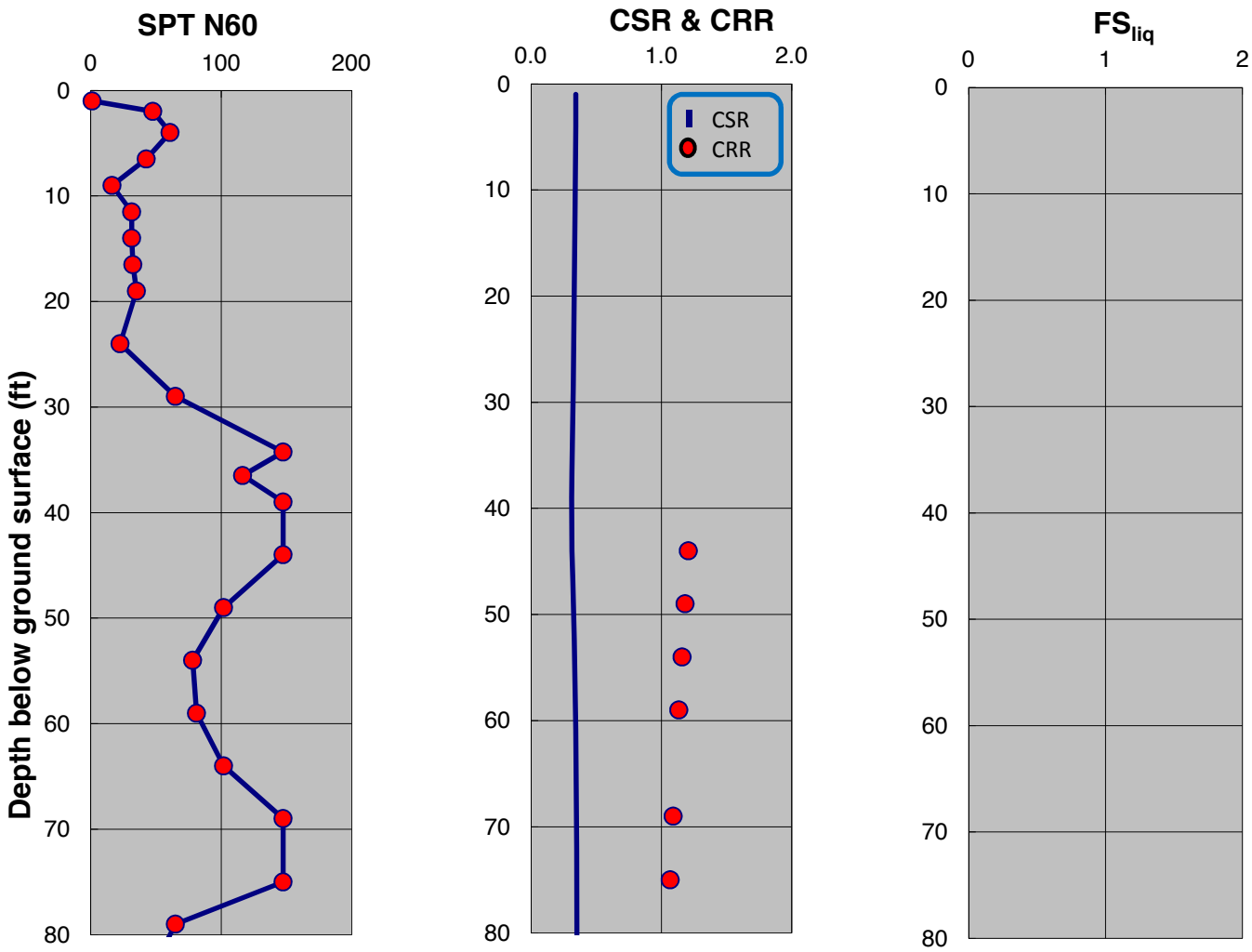
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-80 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

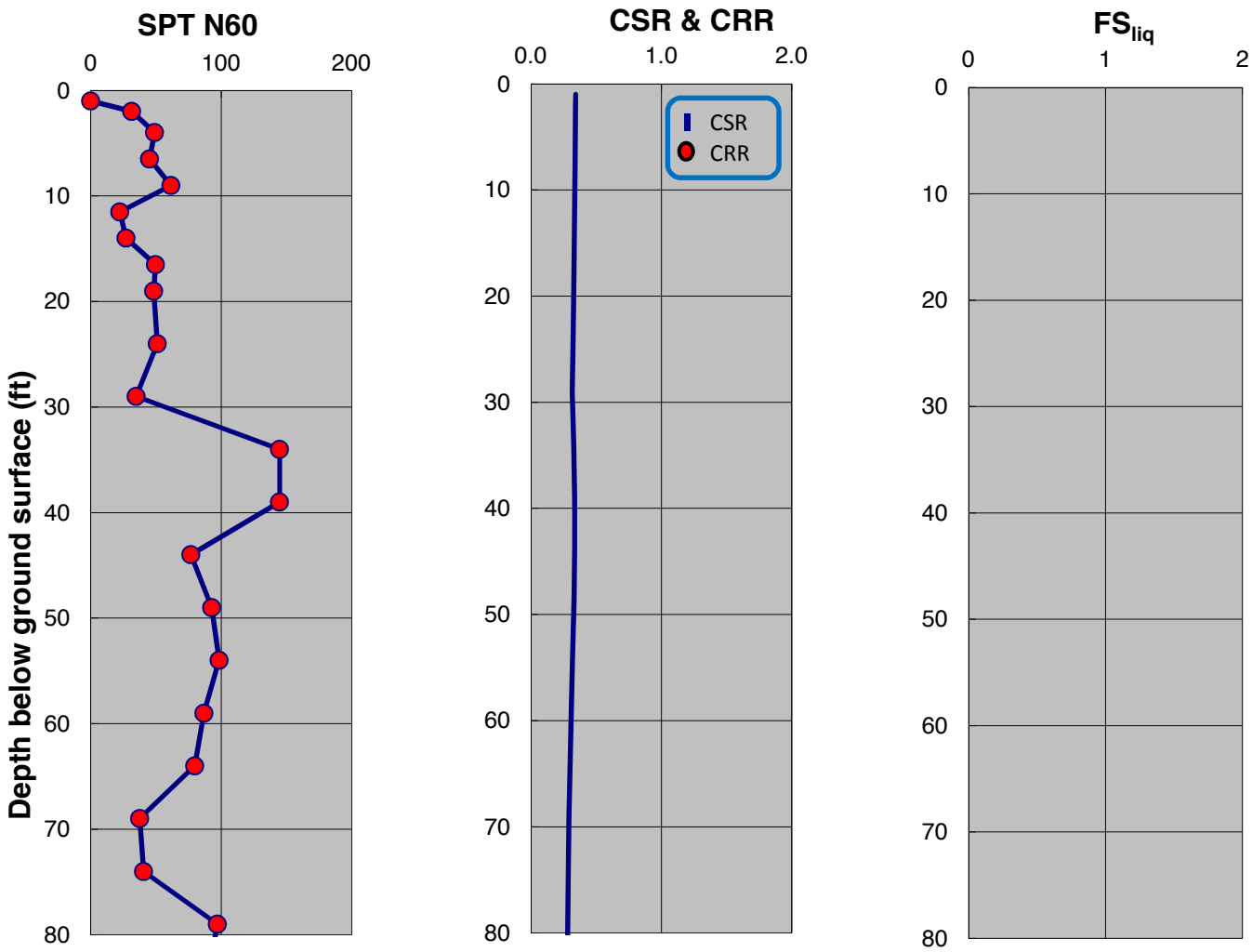
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.85



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-80 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

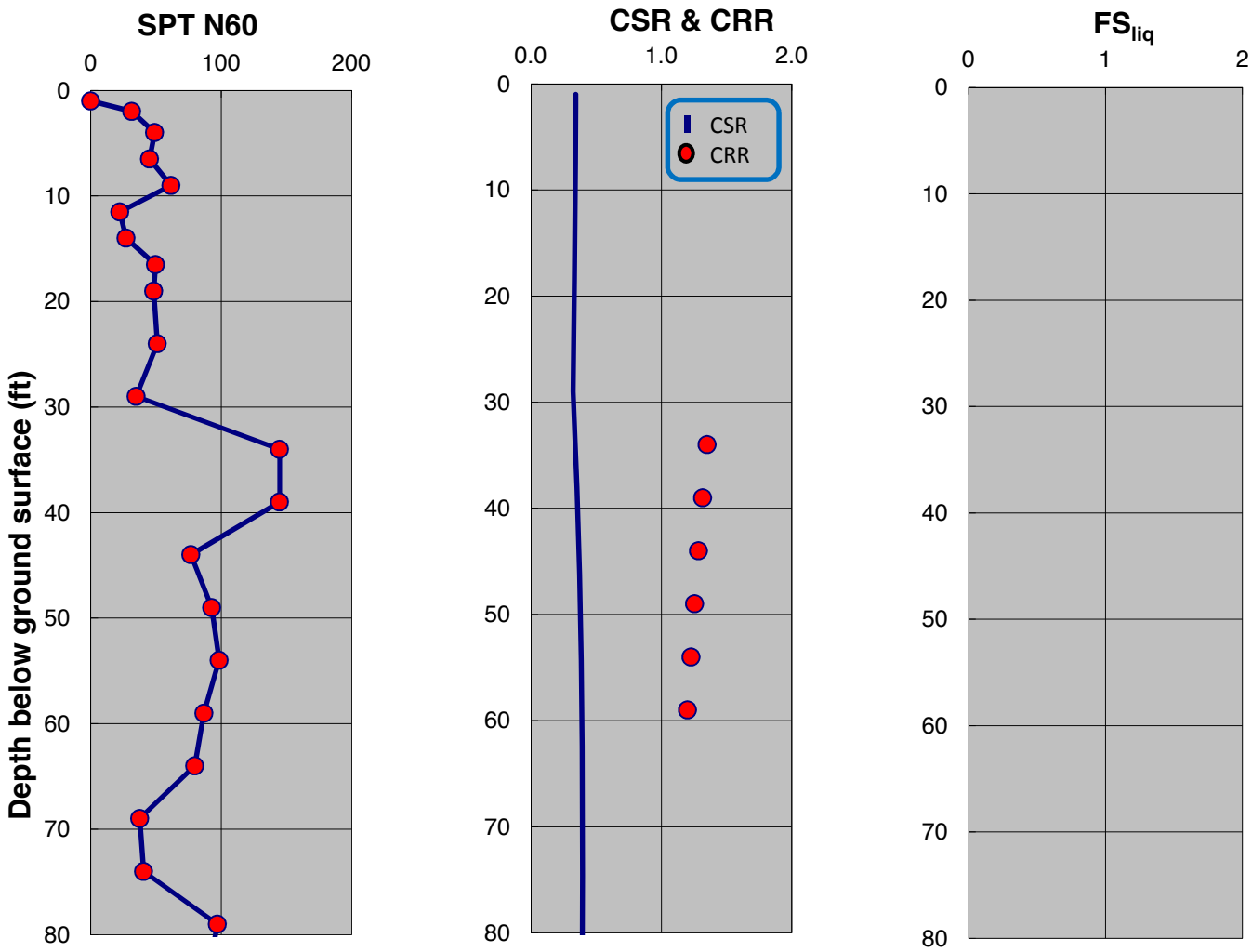
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-81 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

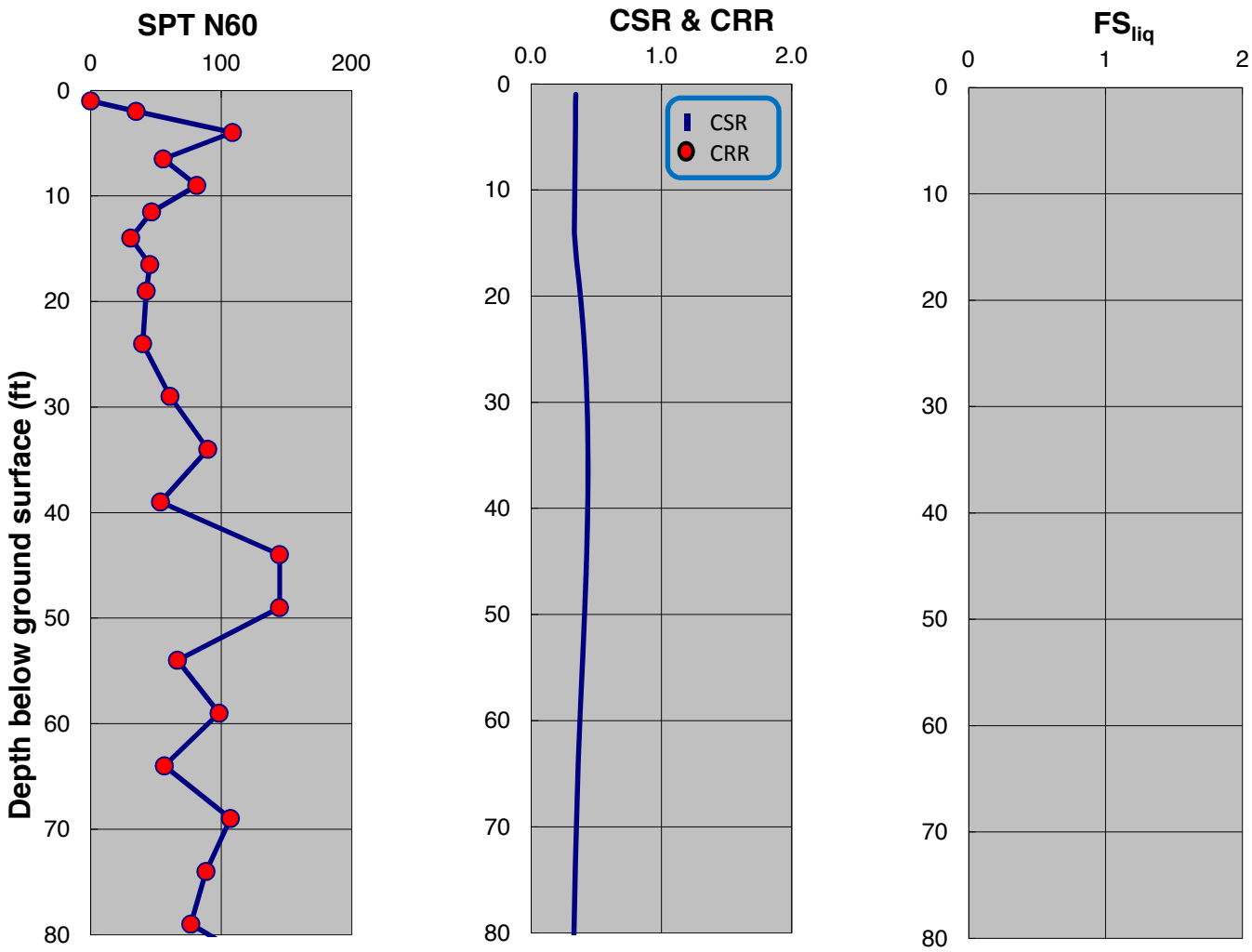
PLATE A.87



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-81 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

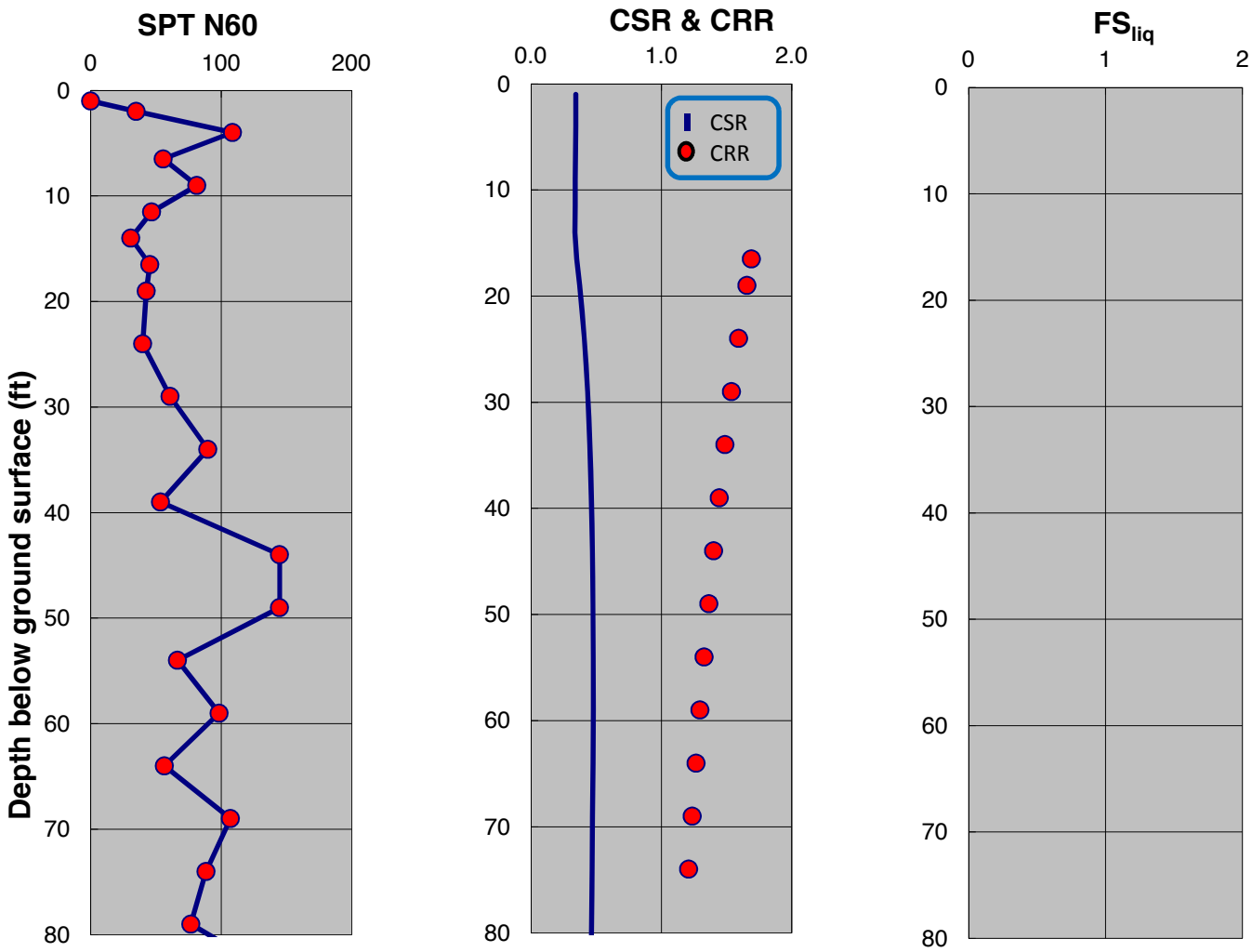
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.88



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-82 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

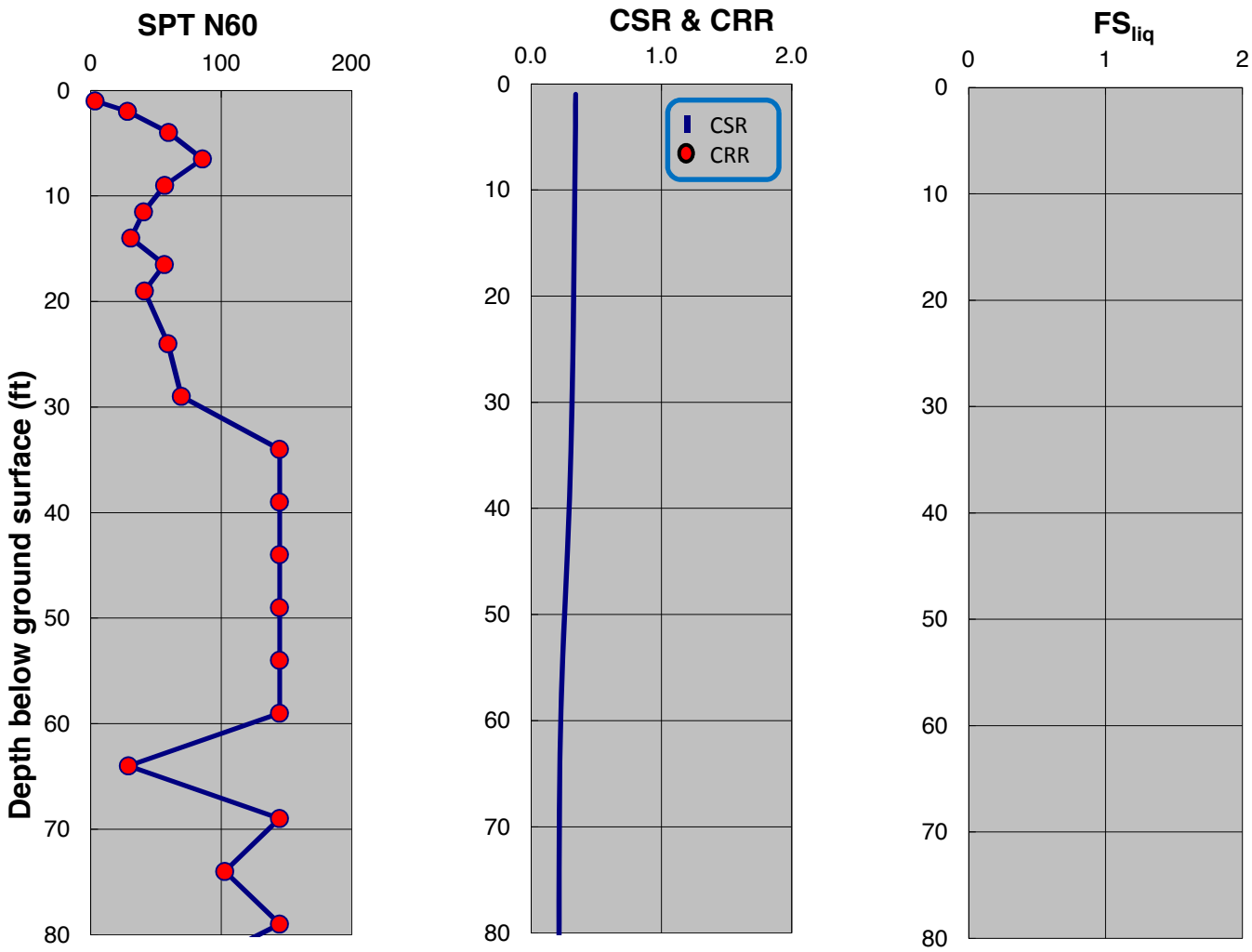
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-82 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

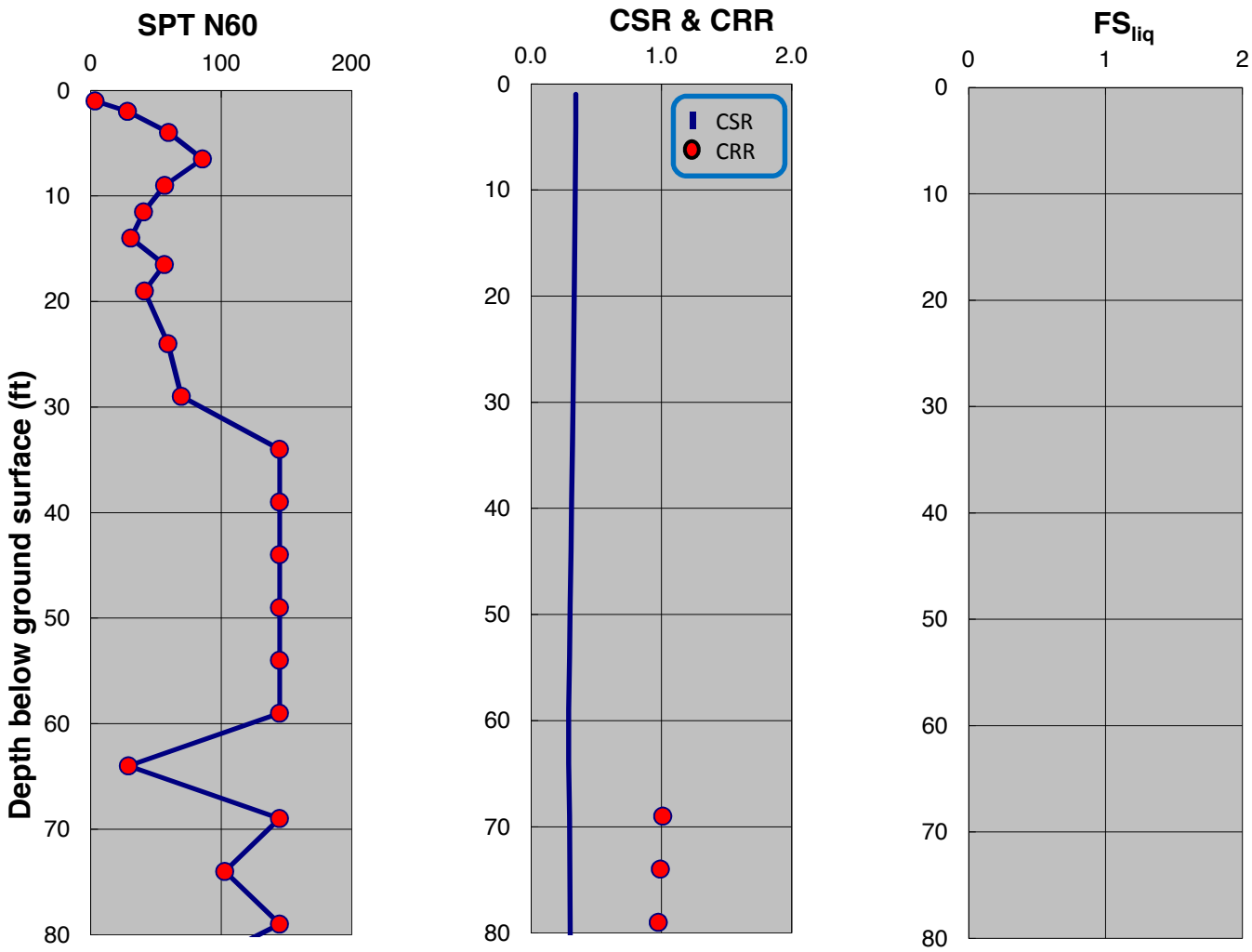
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.90



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-83 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

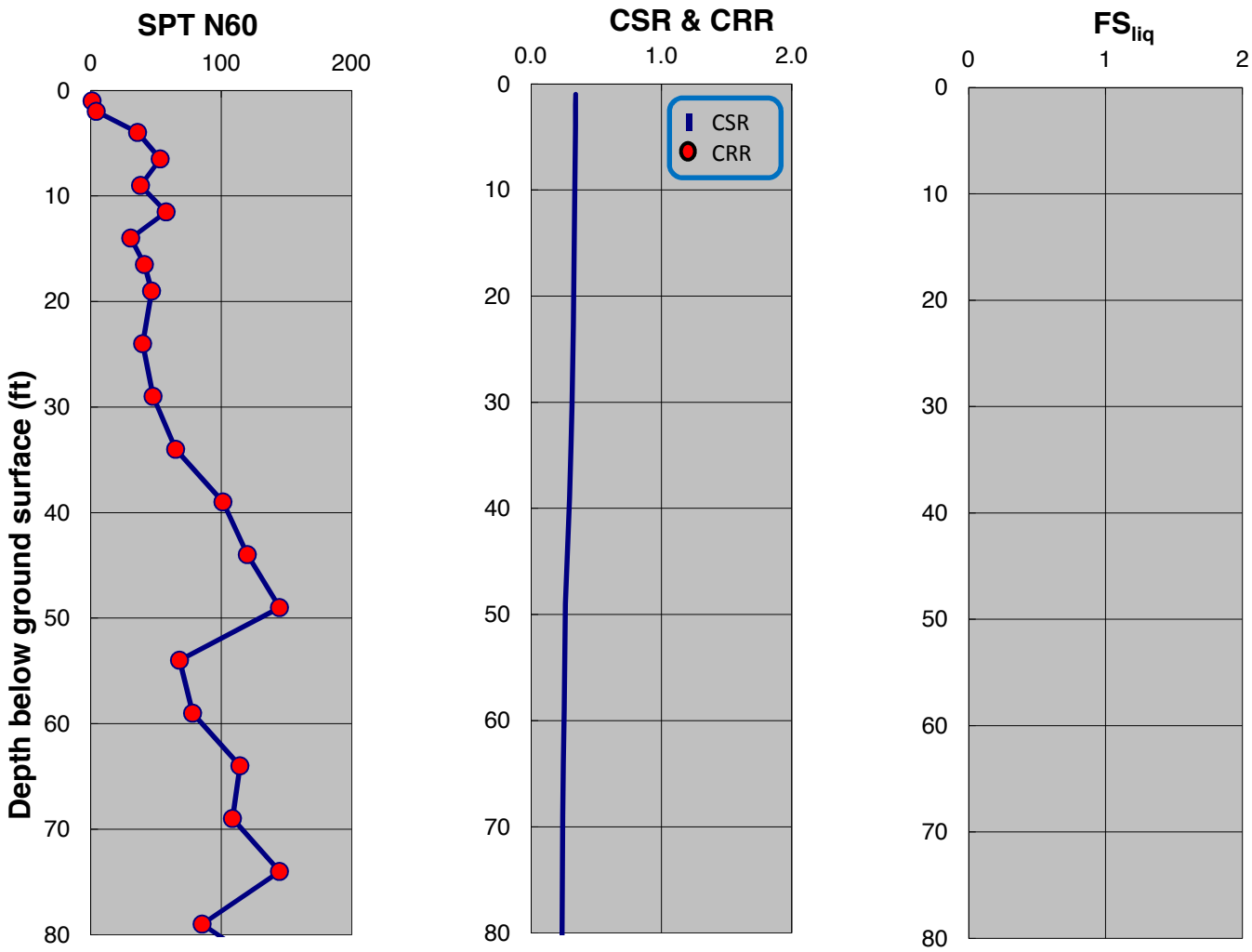
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-83 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

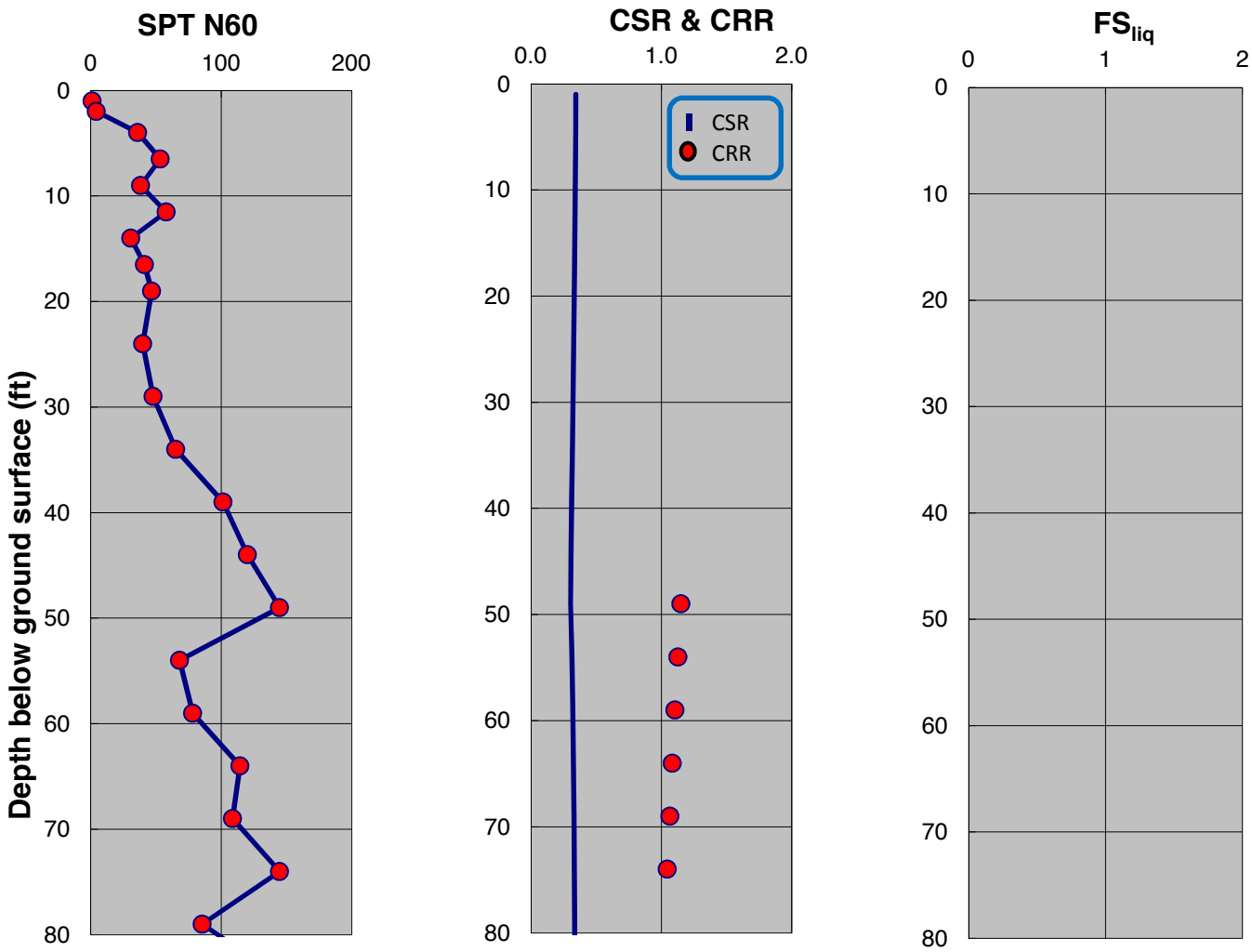
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.92



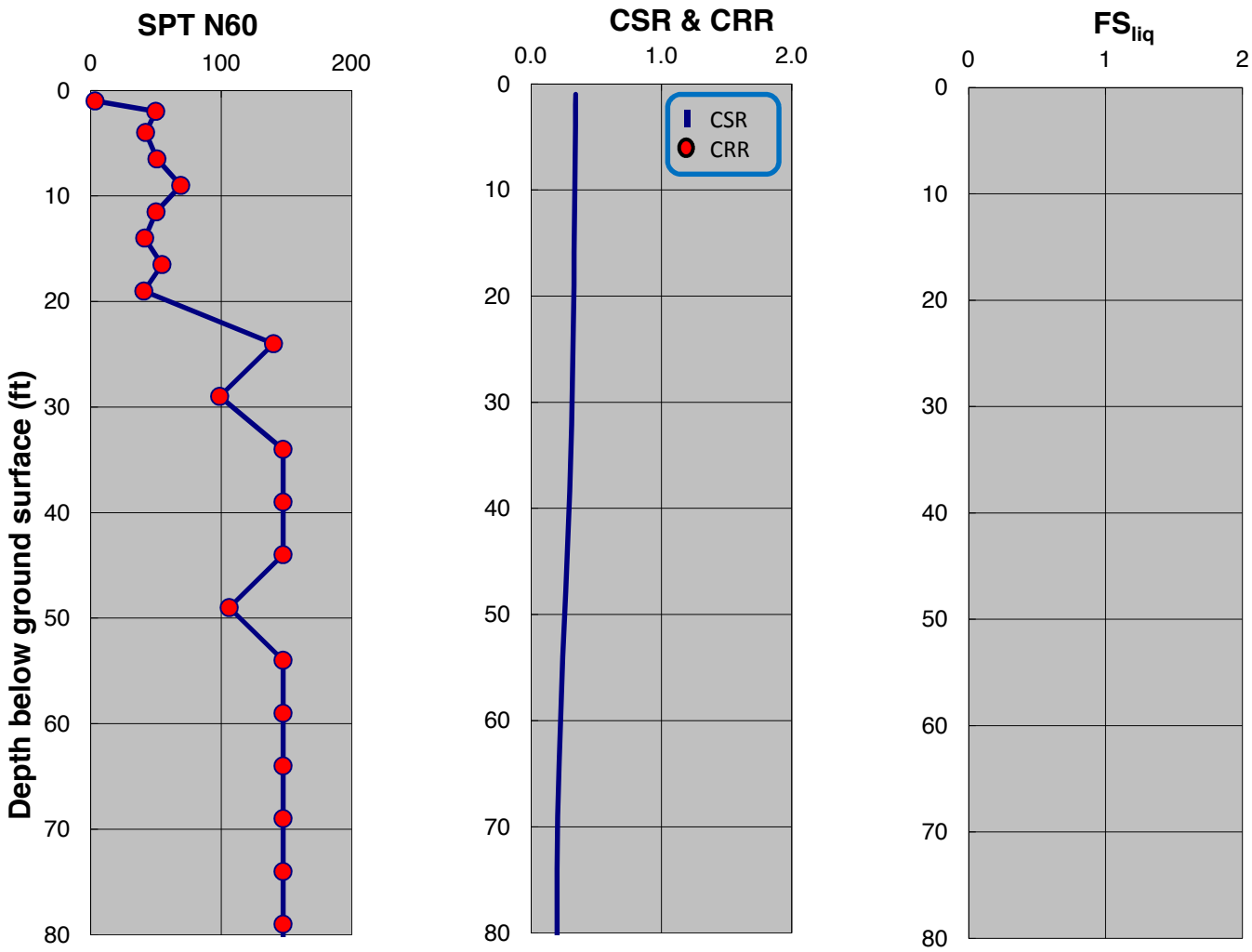
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-84 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-84 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

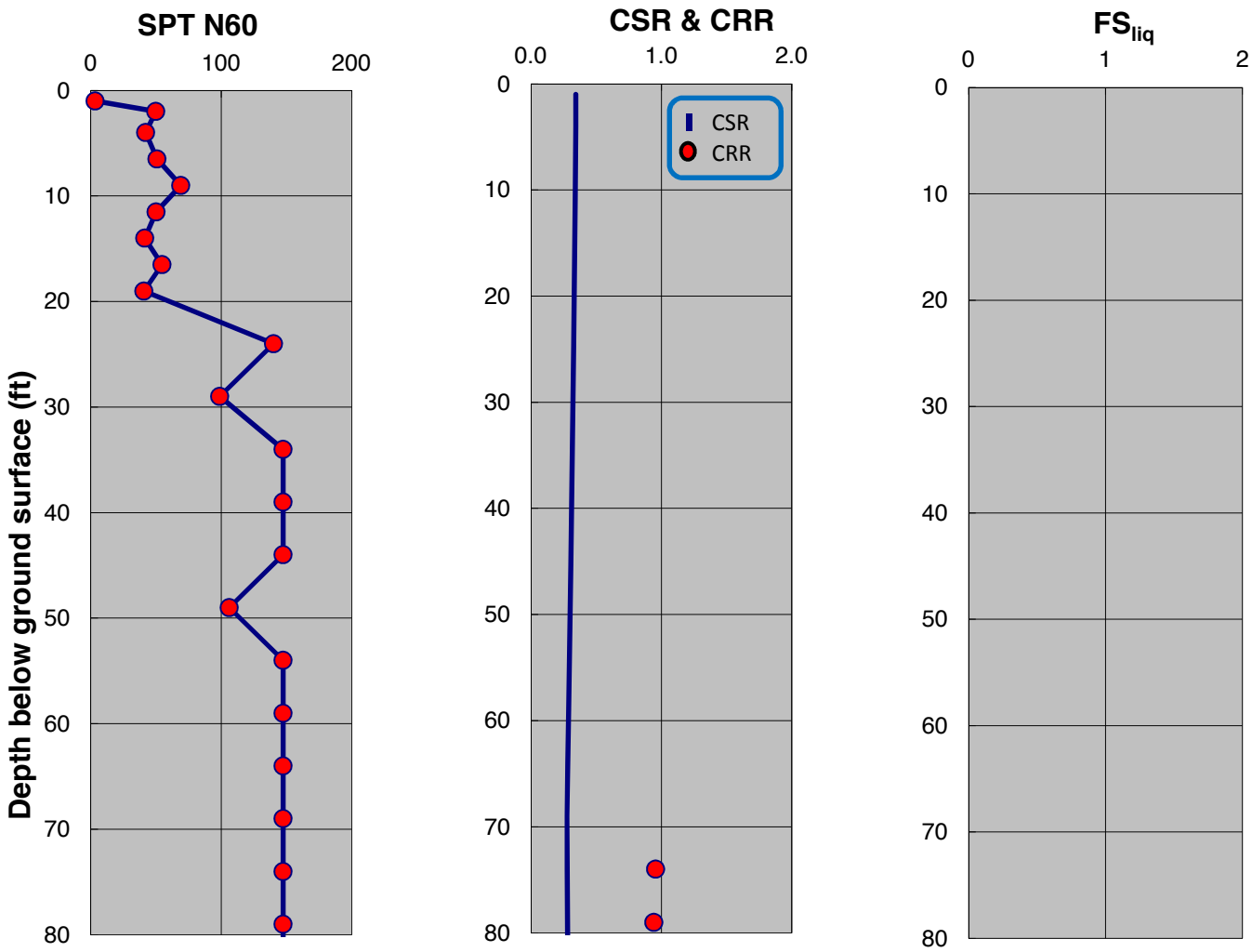
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-85 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

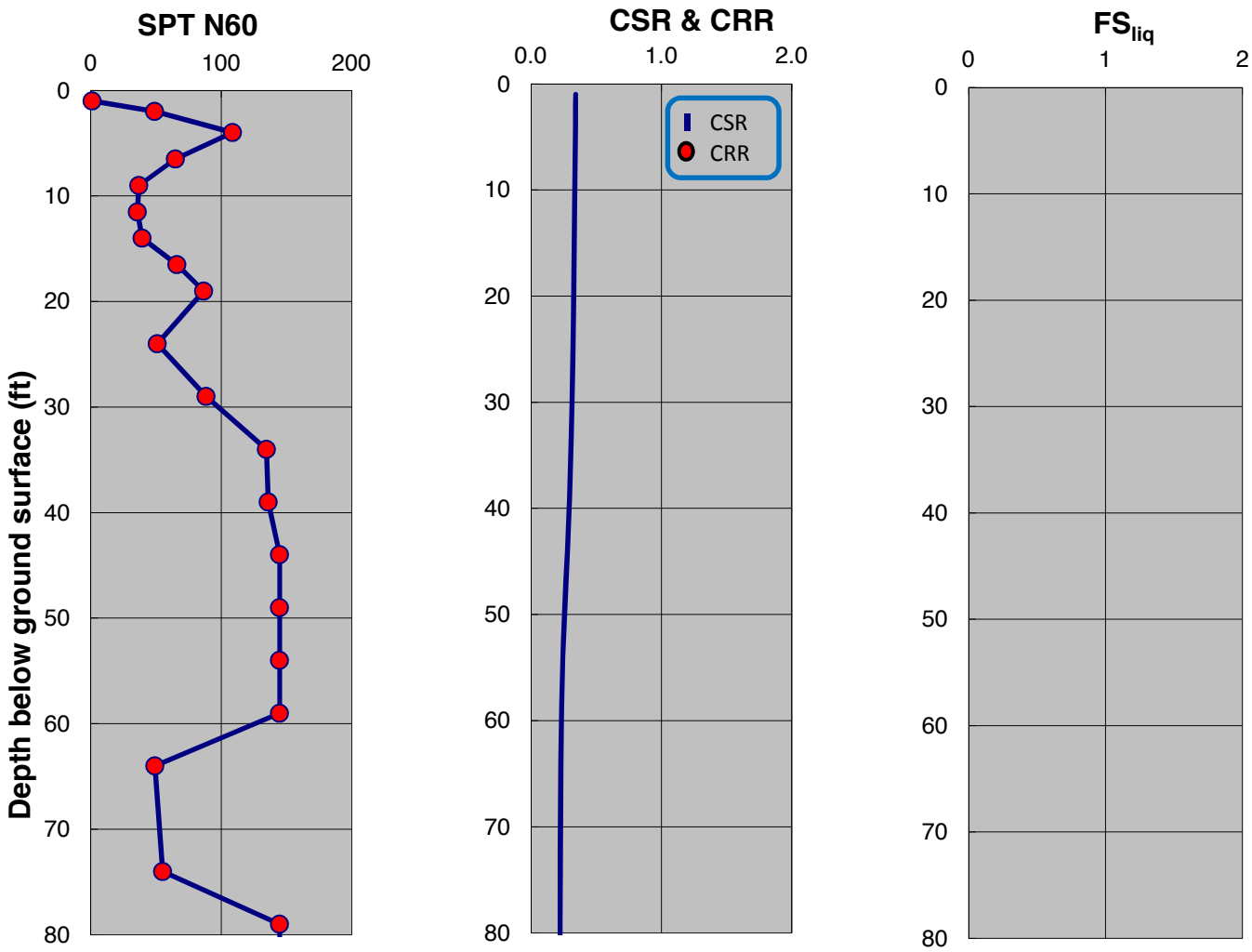
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.95



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-85 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

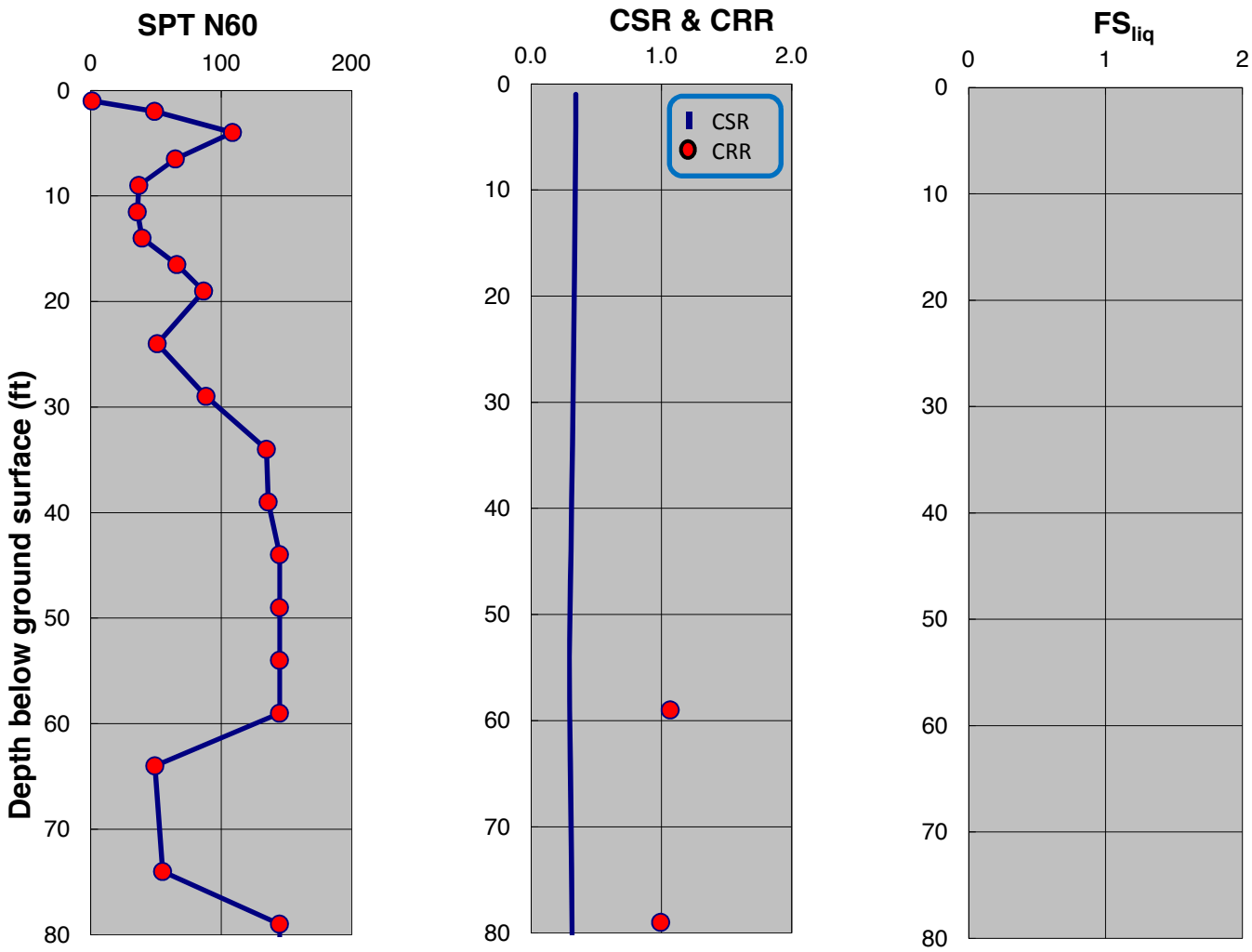
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-86 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

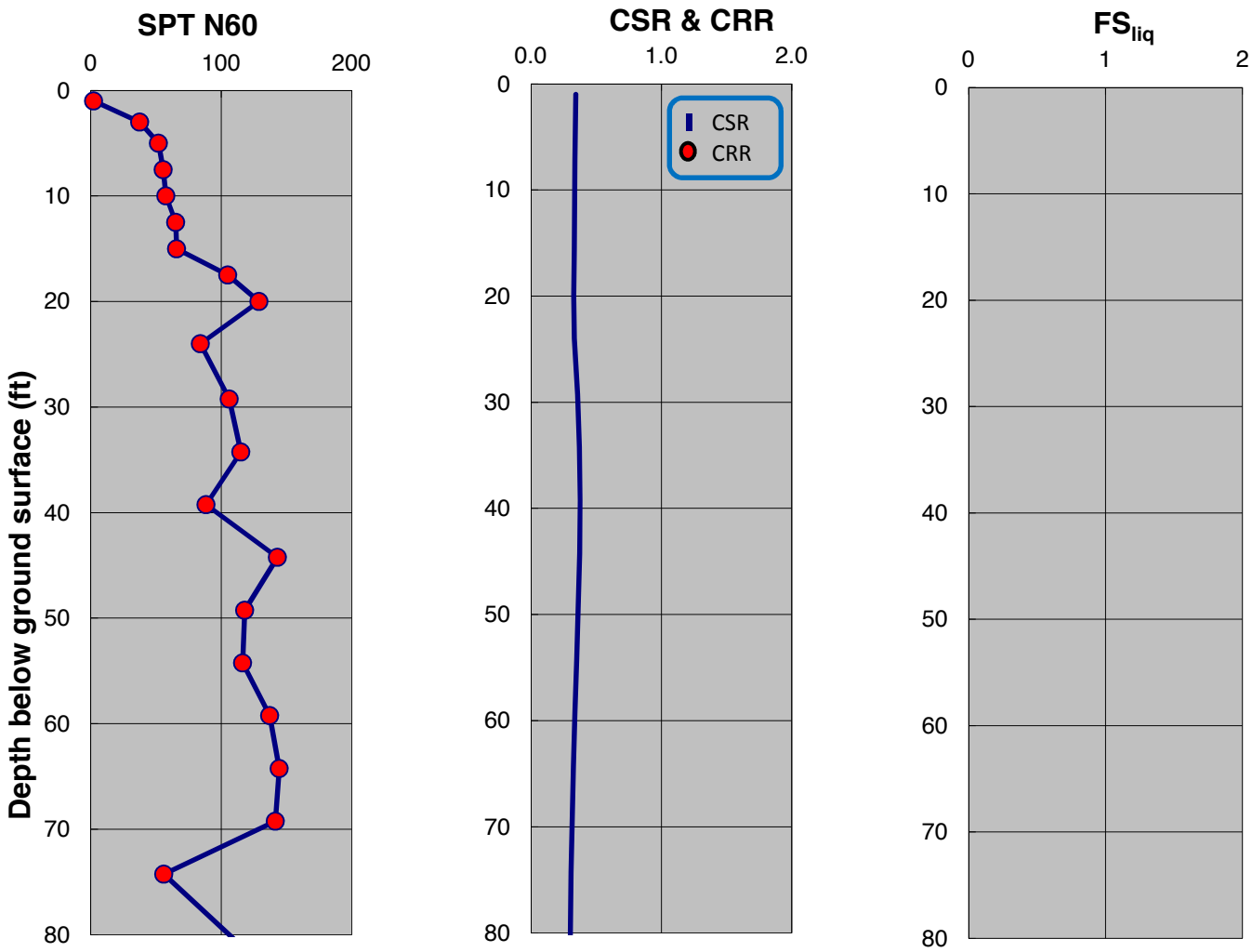
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.97



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-86 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

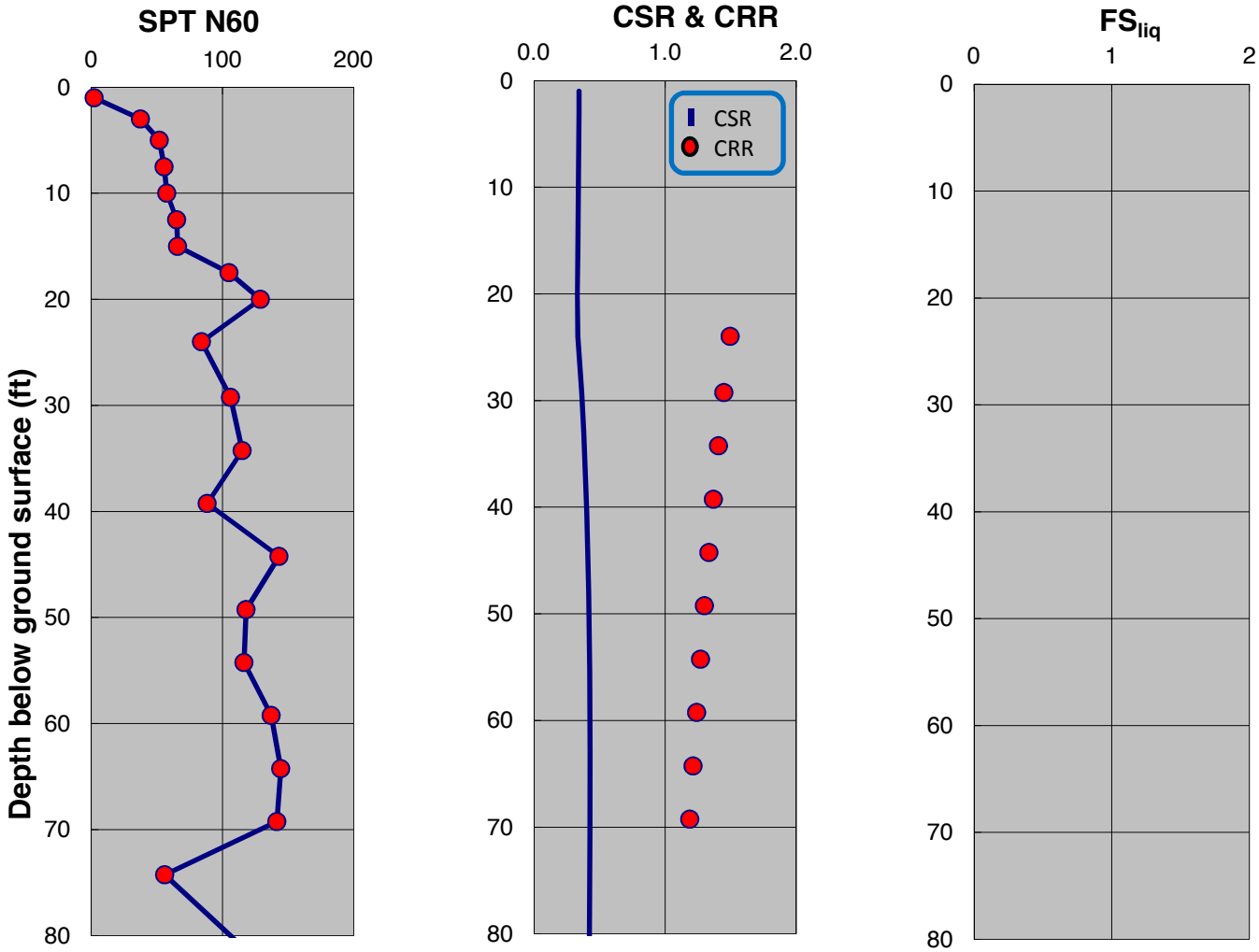
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-87 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

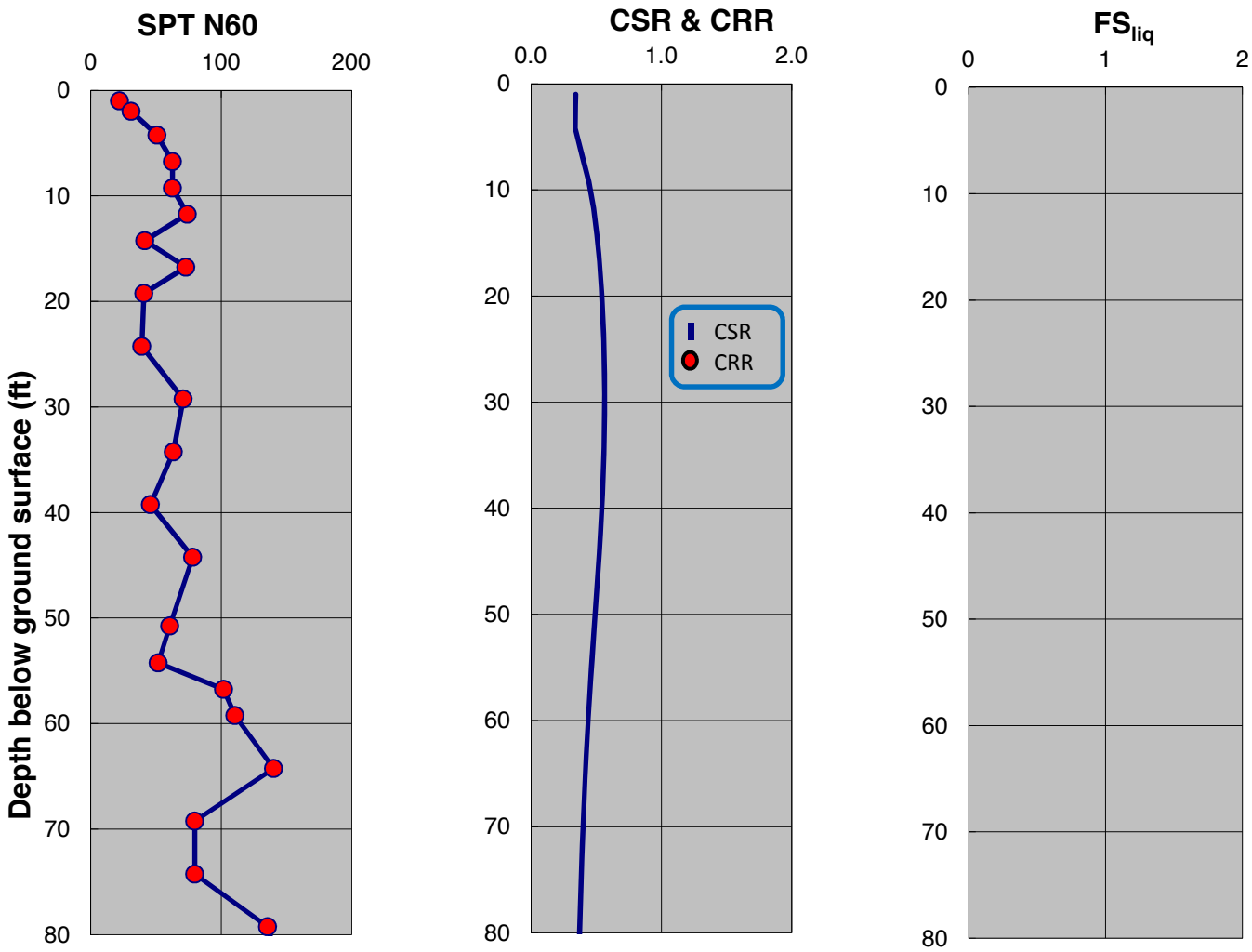
PLATE A.99



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-87 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

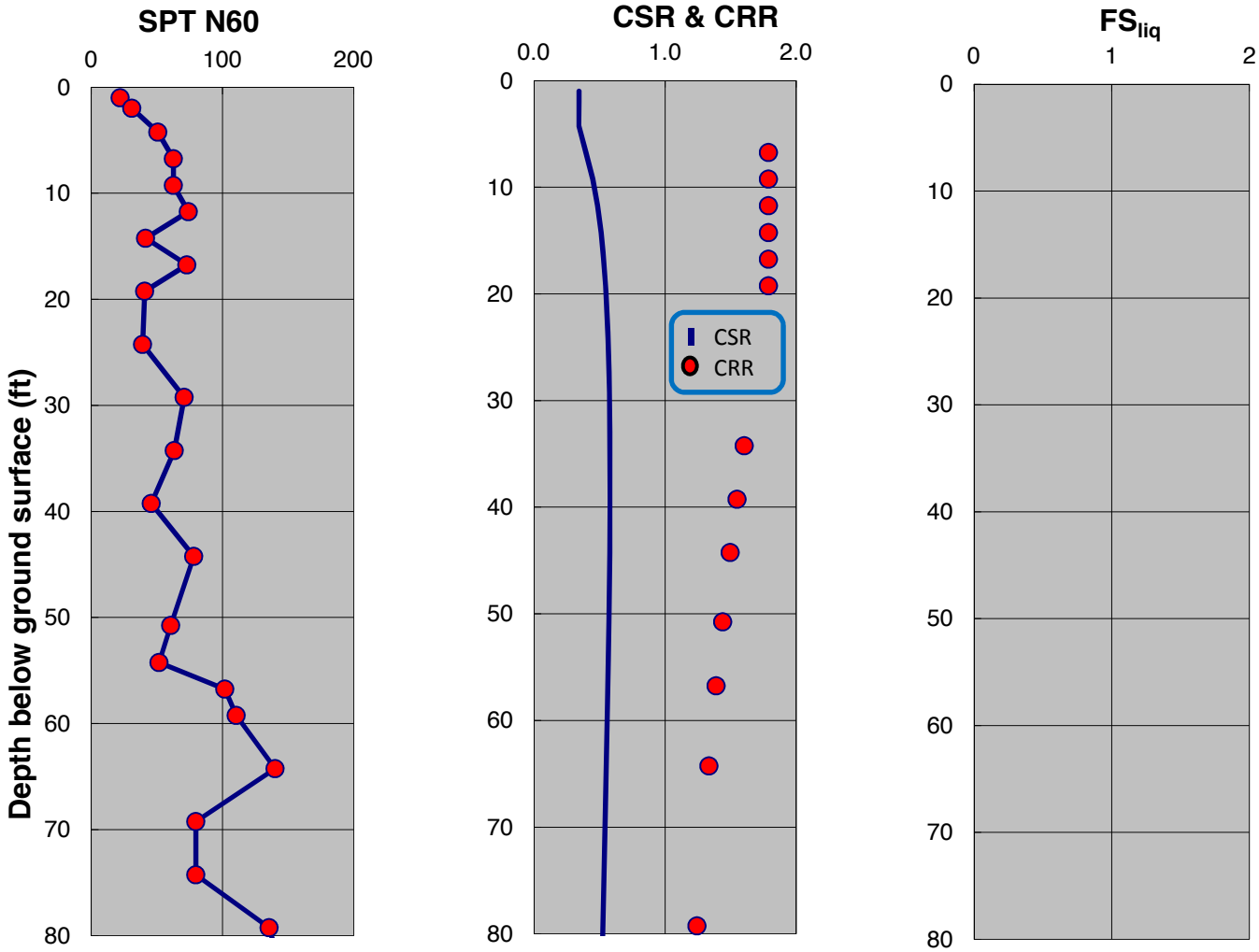
PLATE A.100



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-88 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

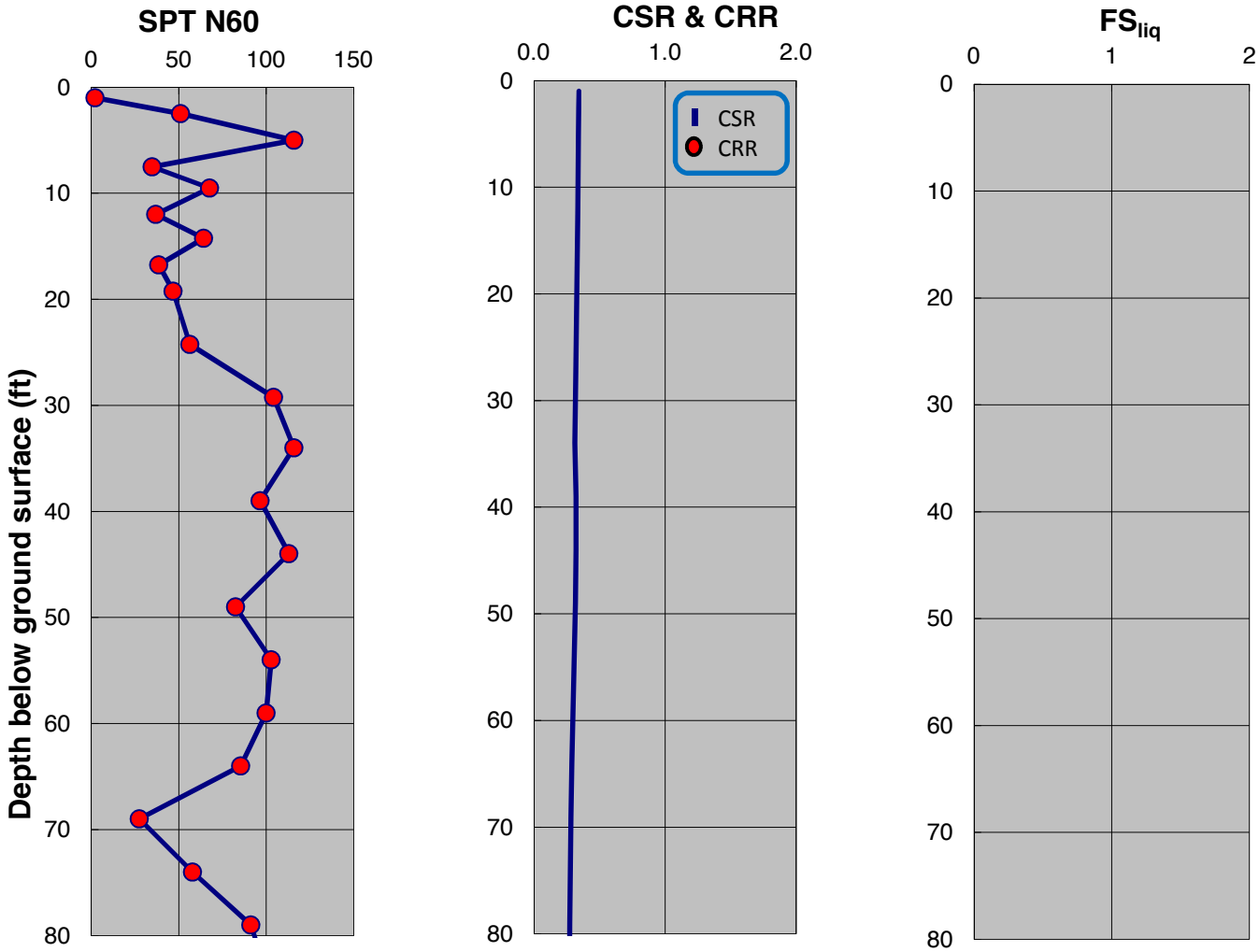
PLATE A.101



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-88 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

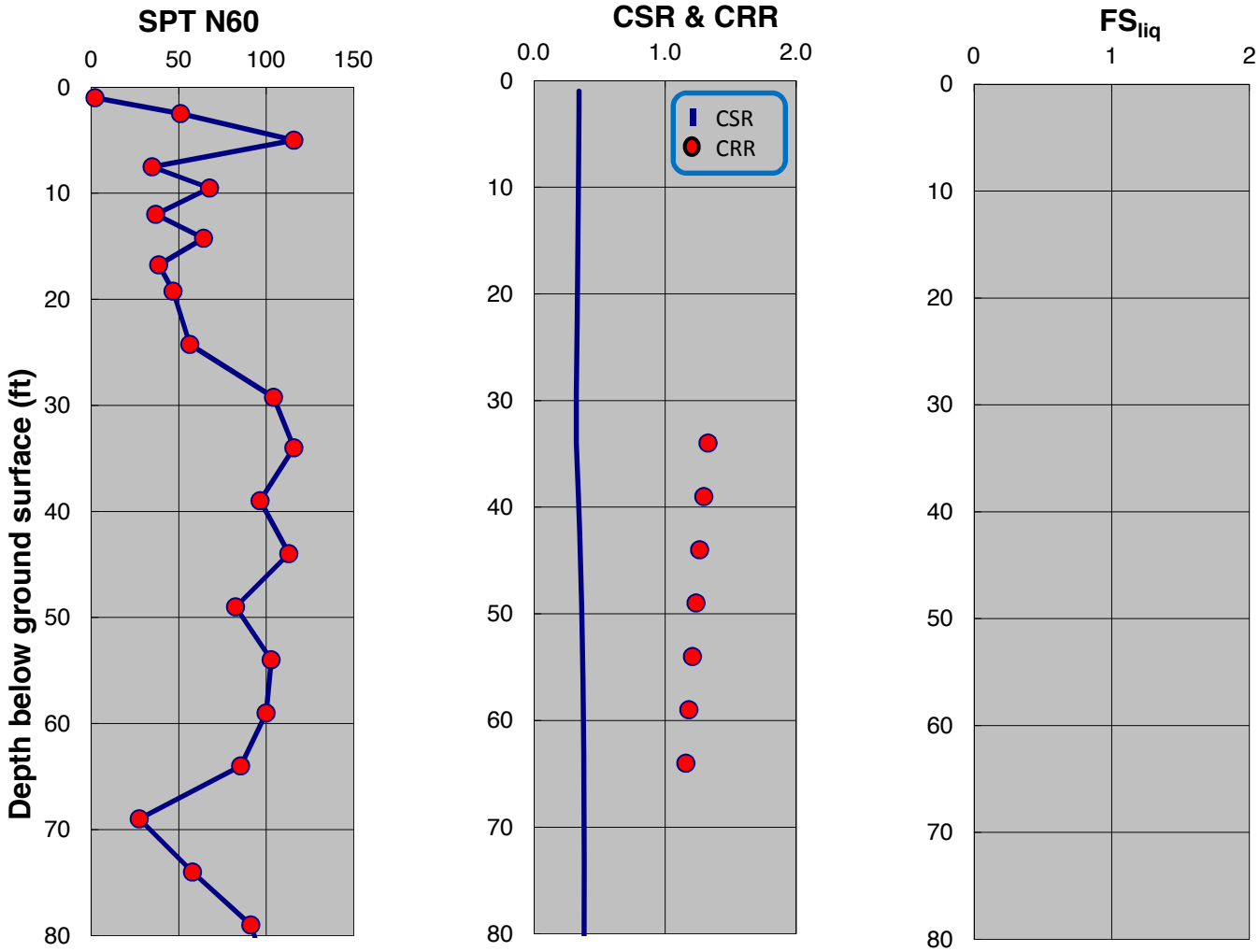
PLATE A.102



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-89 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

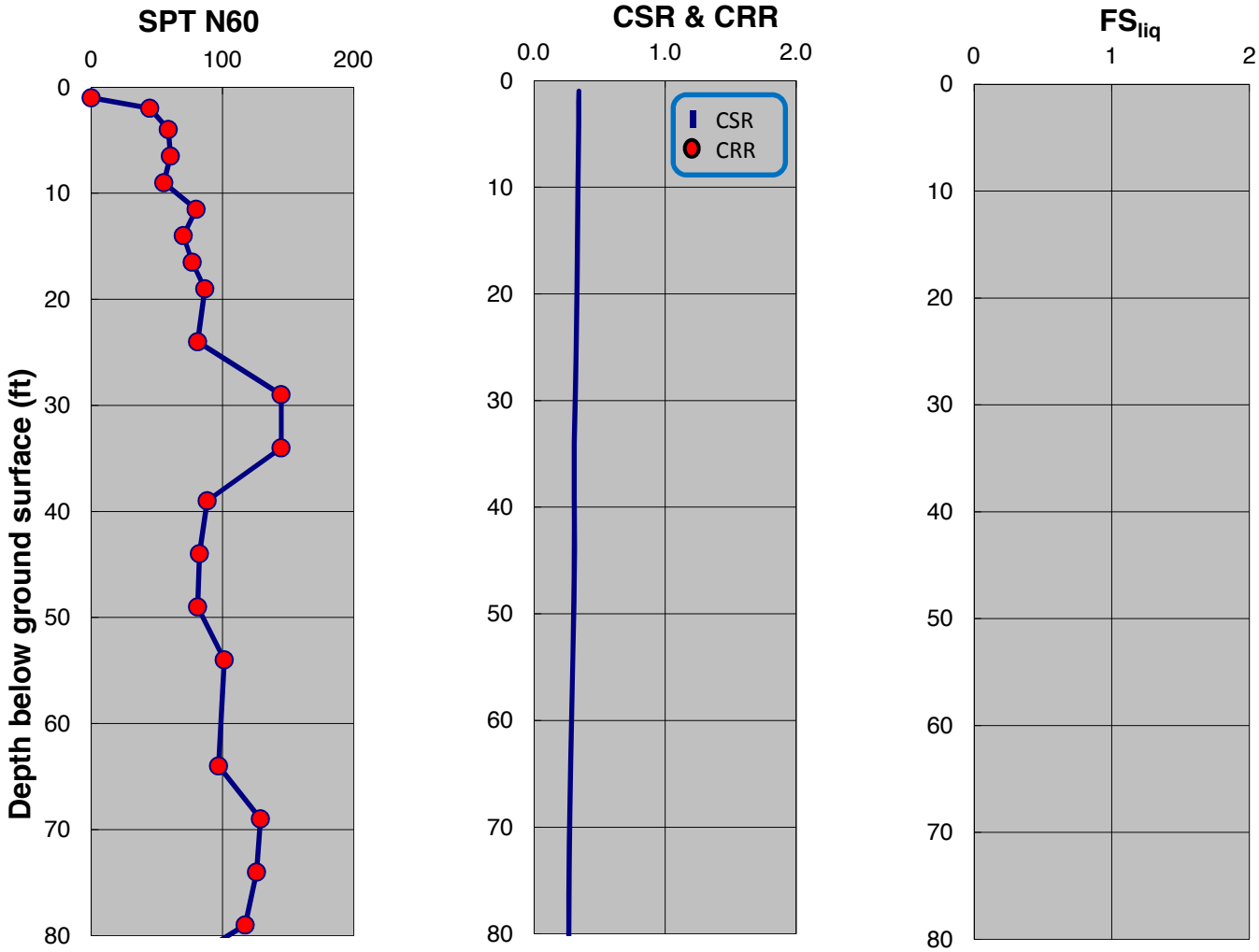
PLATE A.103



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-89 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

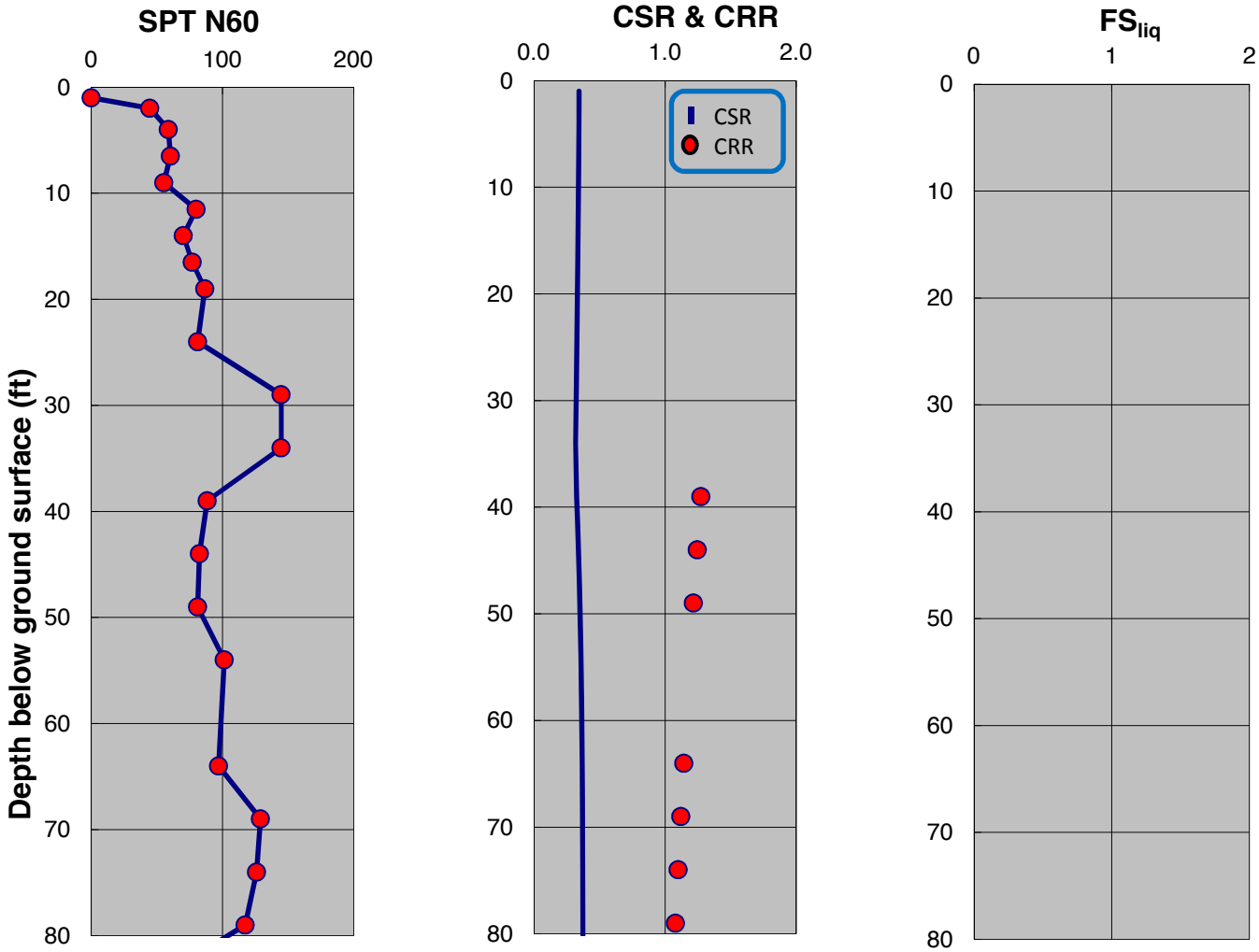
PLATE A.104



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-90 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

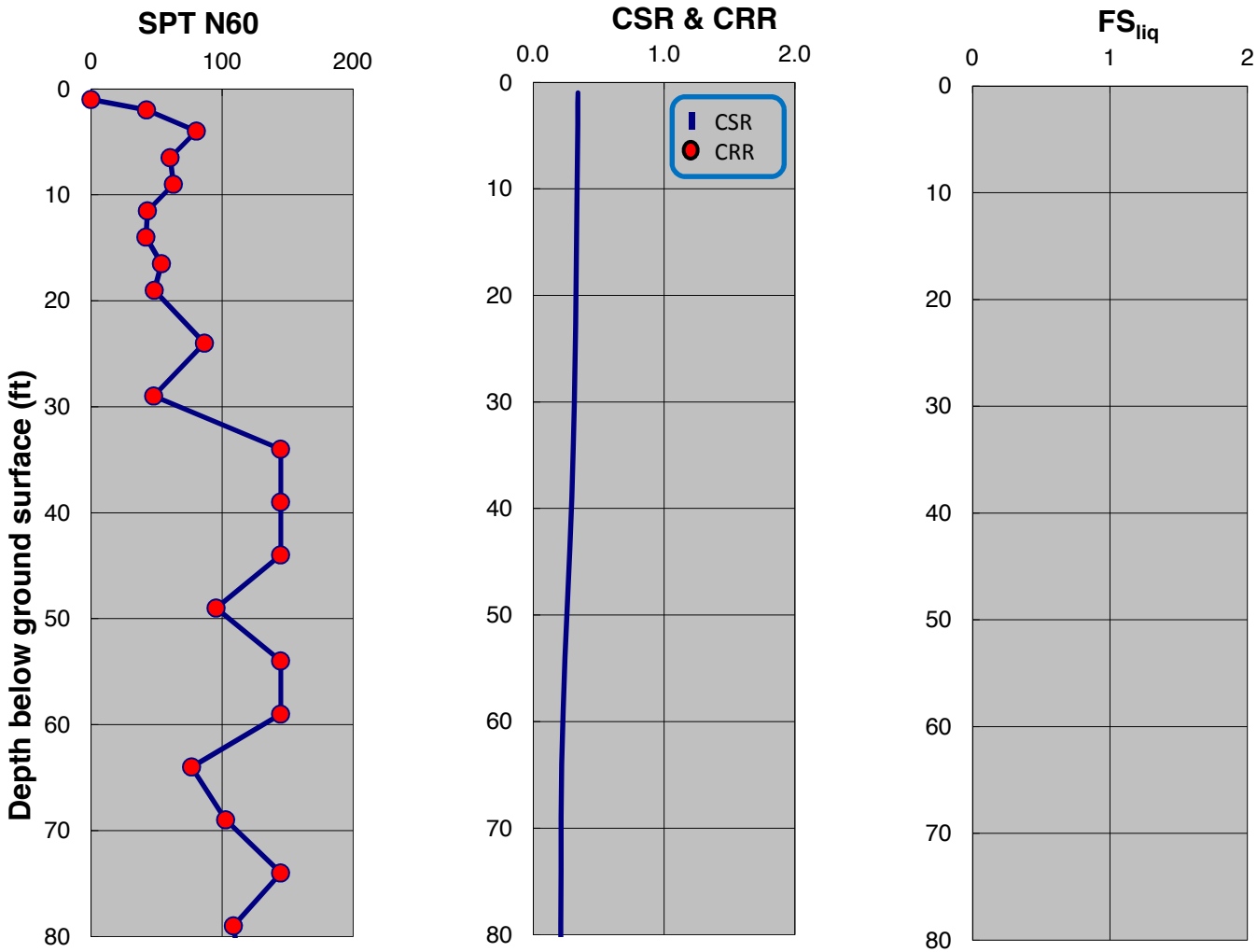
PLATE A.105



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-90 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

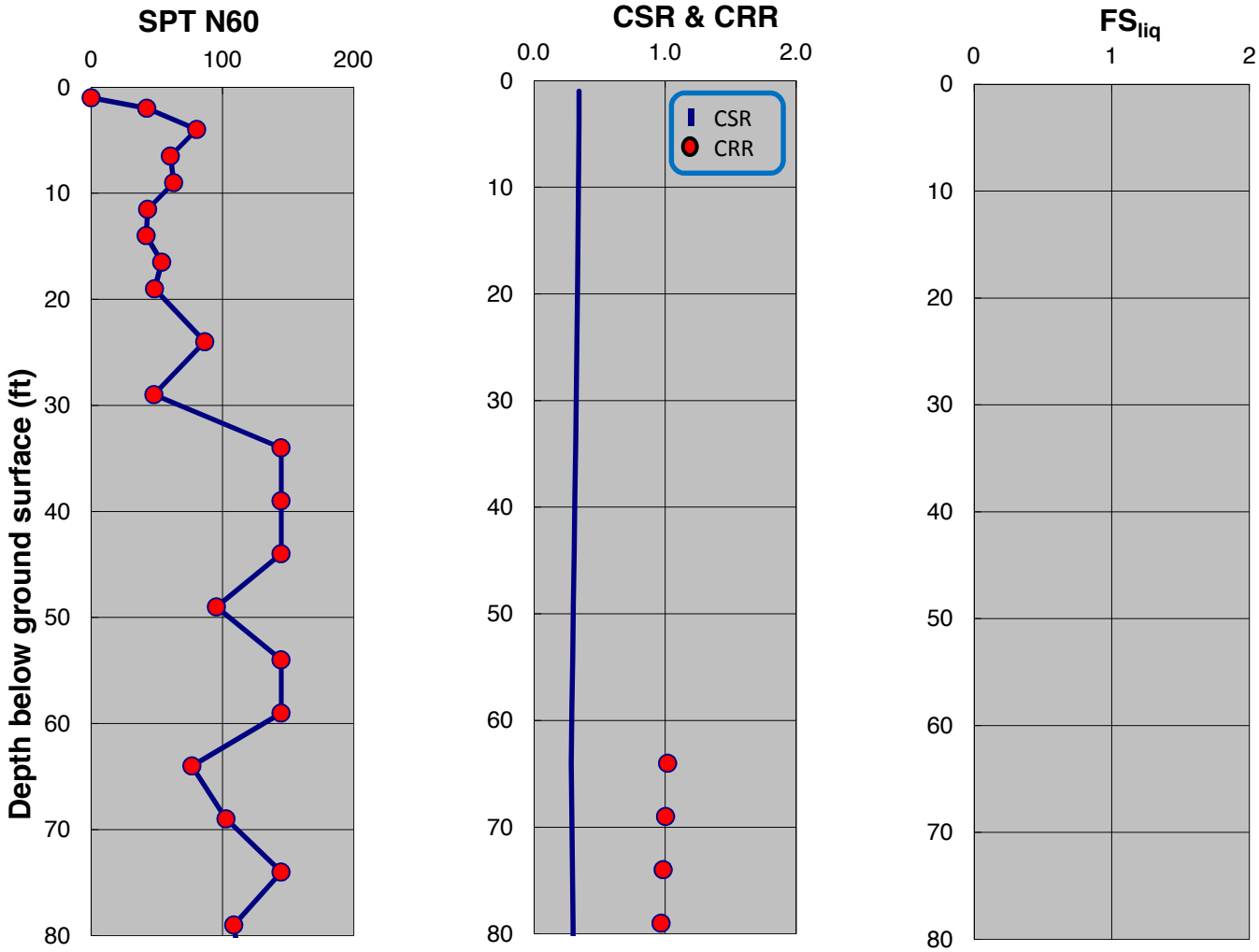
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.106



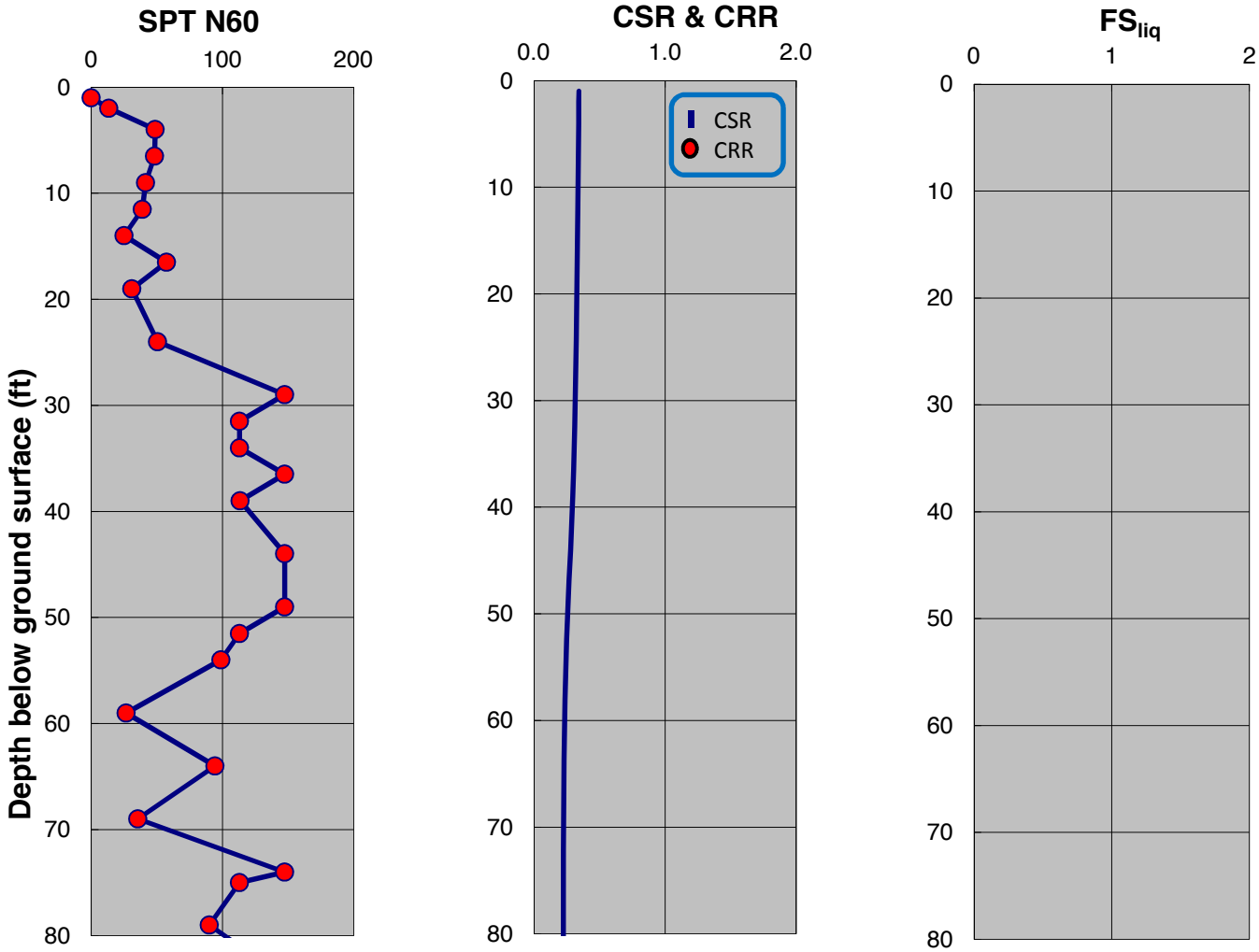
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-91 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-91 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

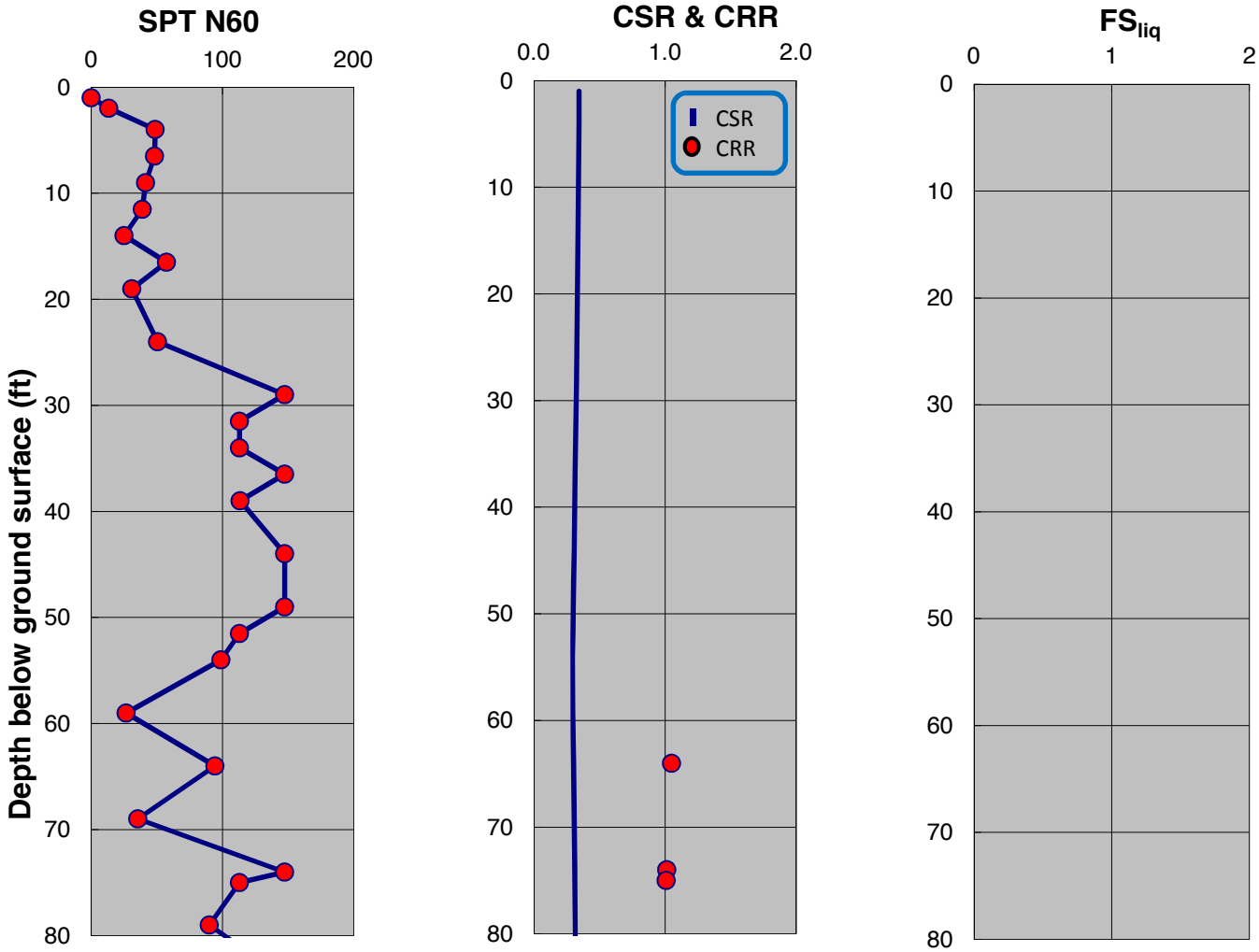
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-92 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

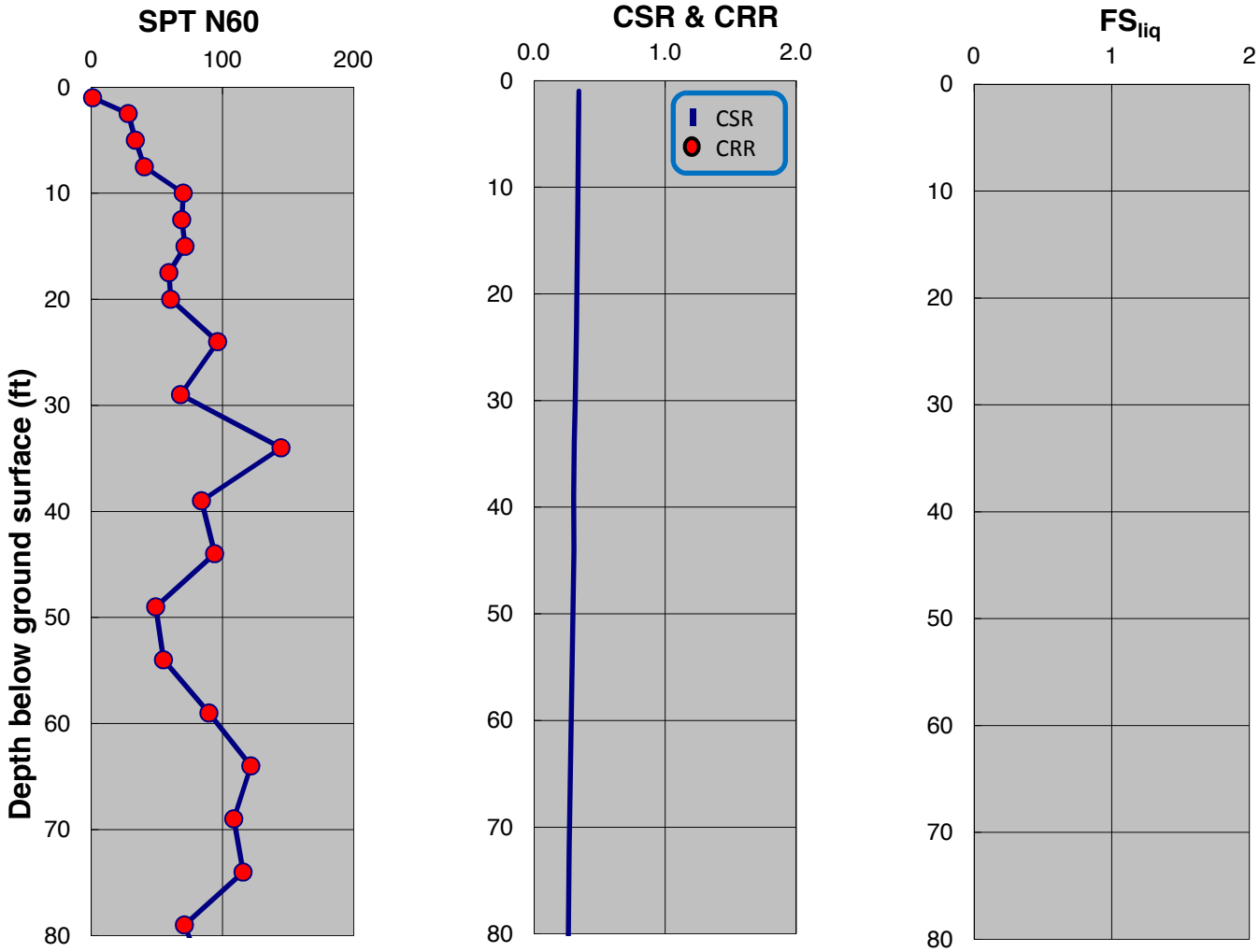
PLATE A.109



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-92 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

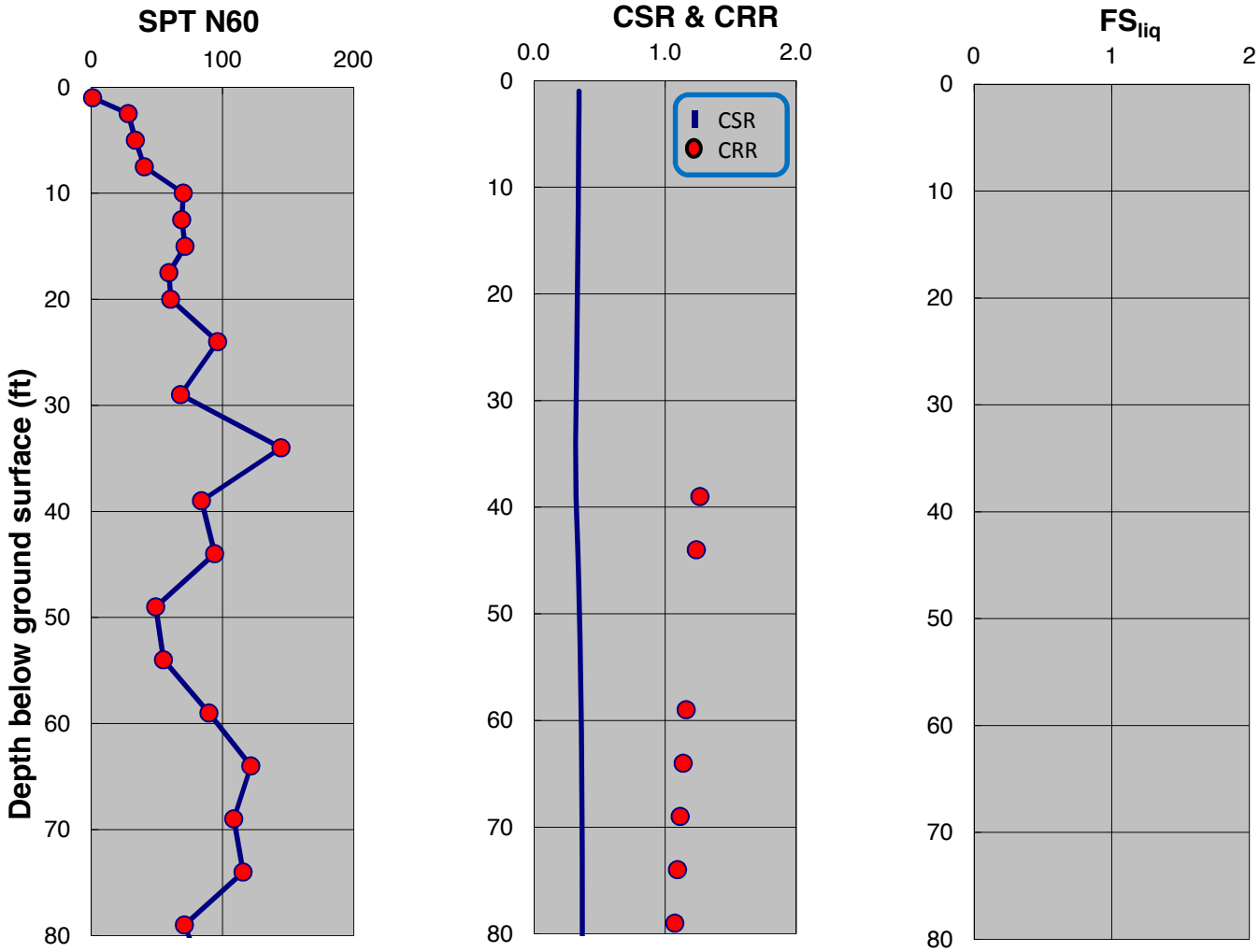
PLATE A.110



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-93 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

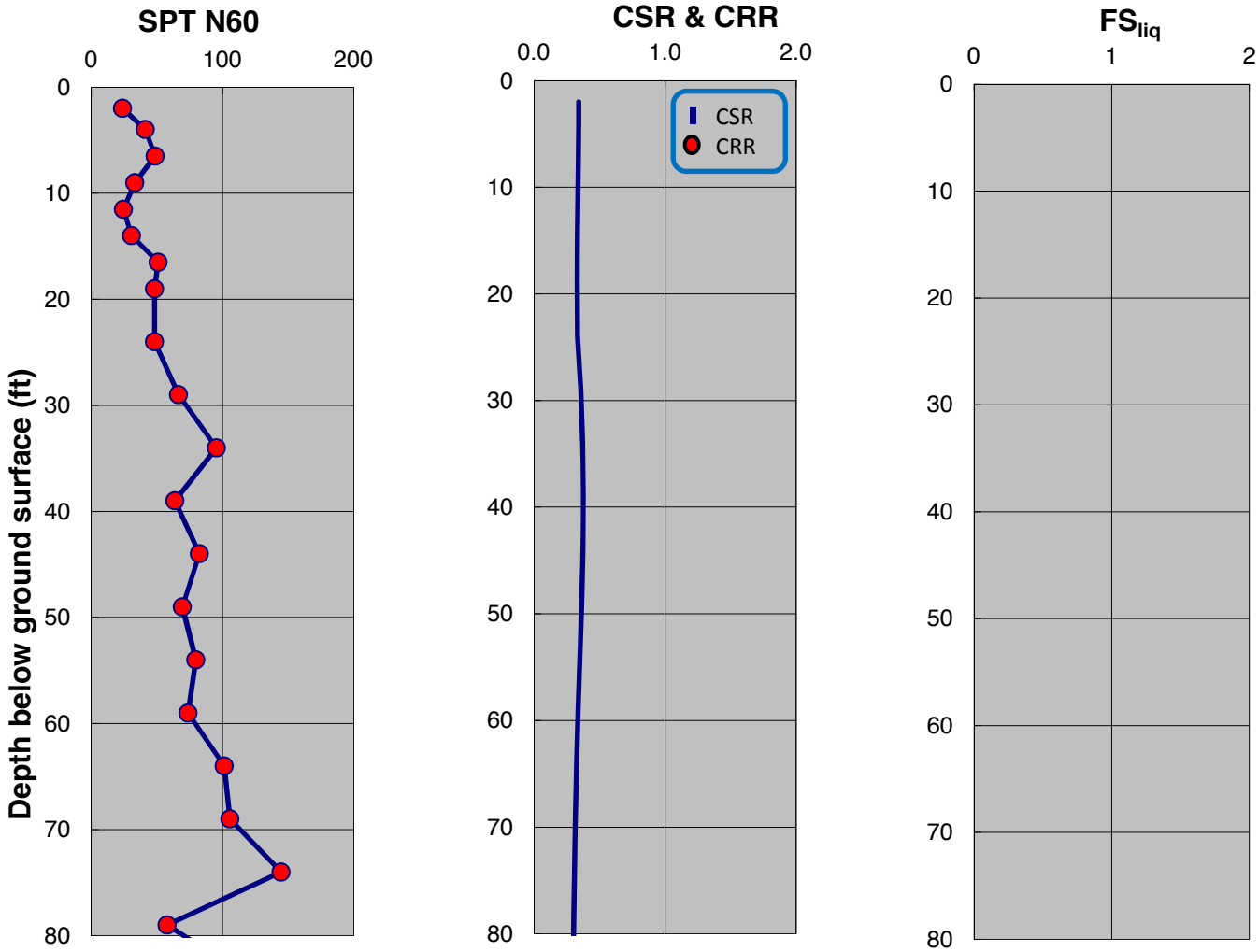
PLATE A.111



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-93 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

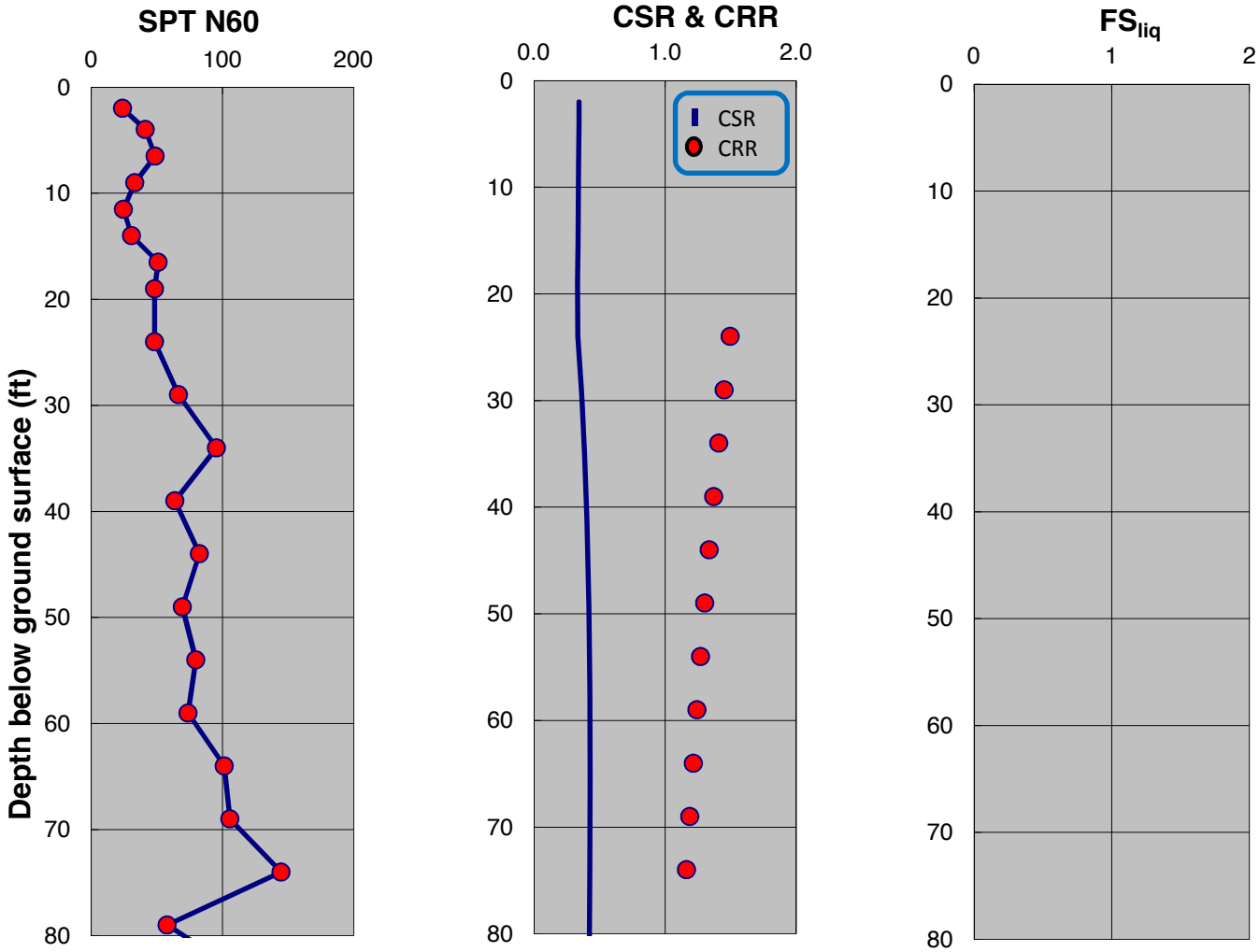
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.112



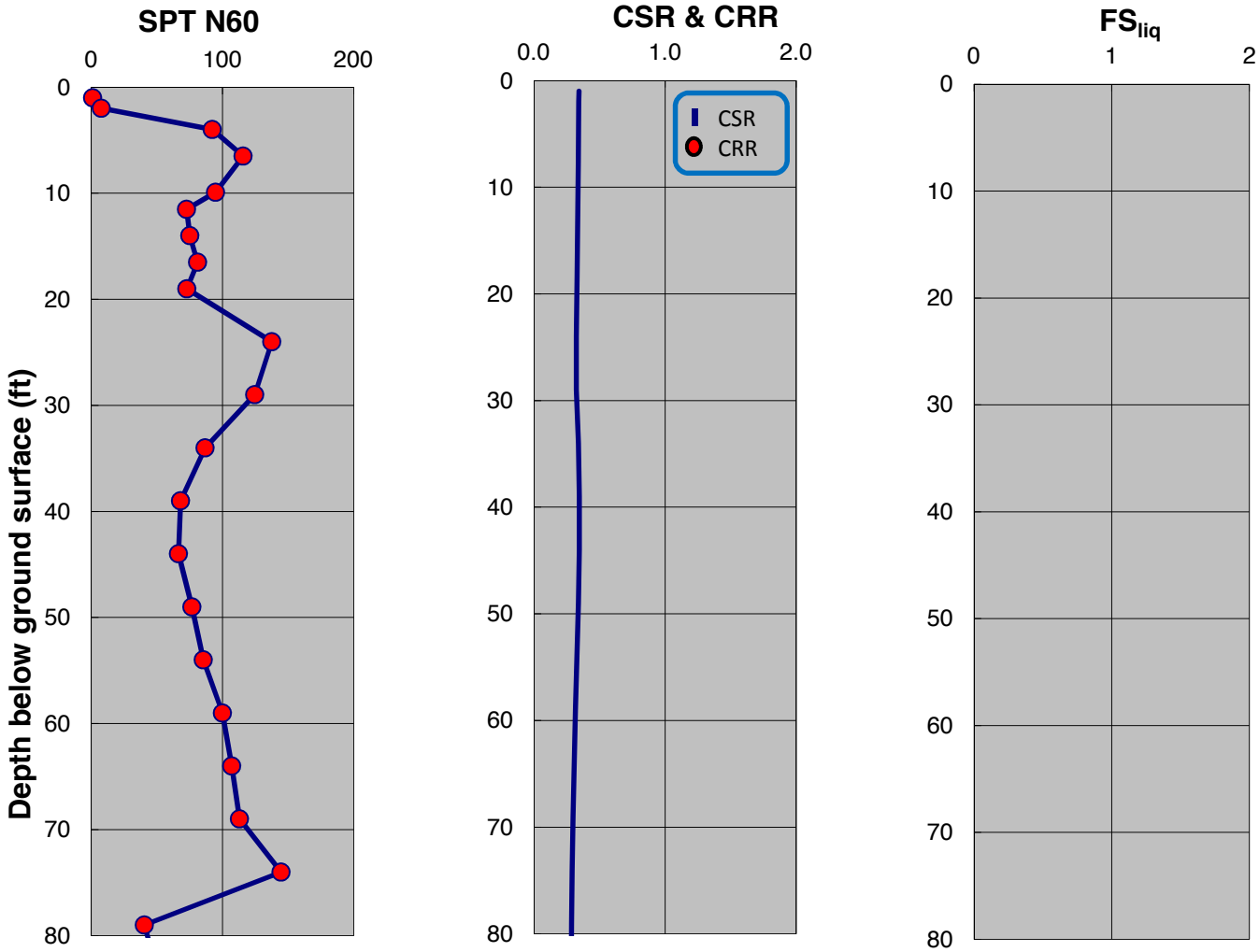
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-94 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-94 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

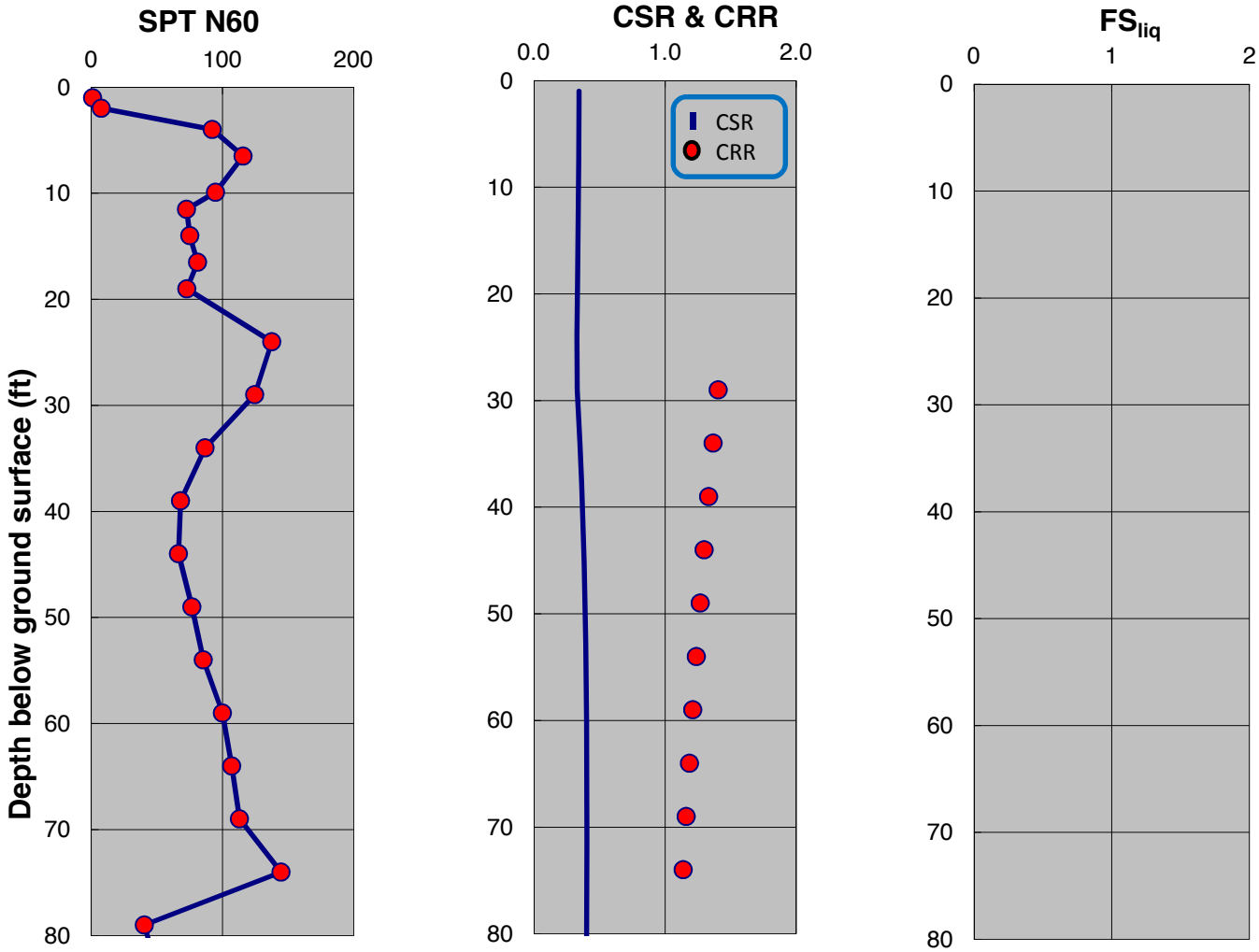
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-95 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

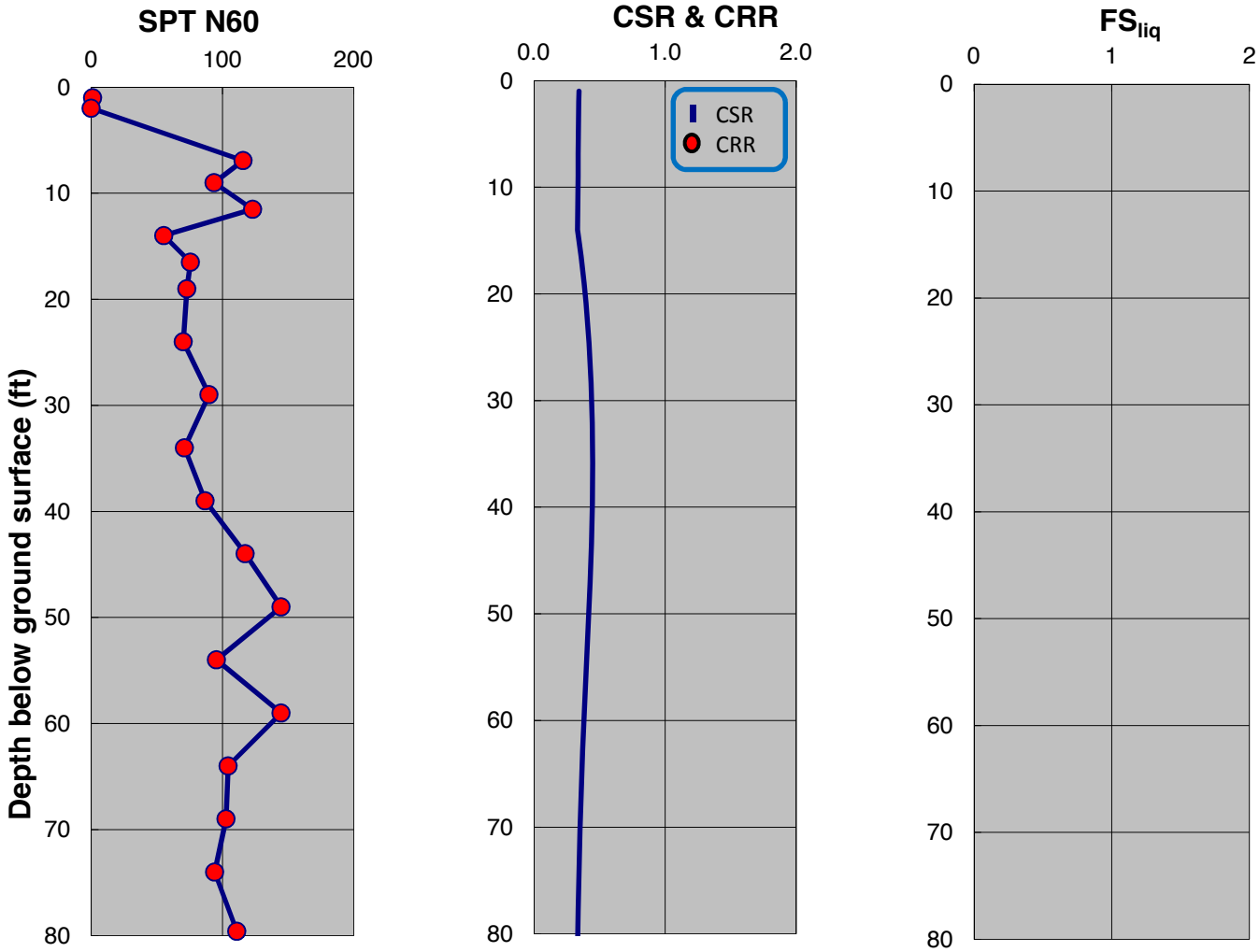
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.115



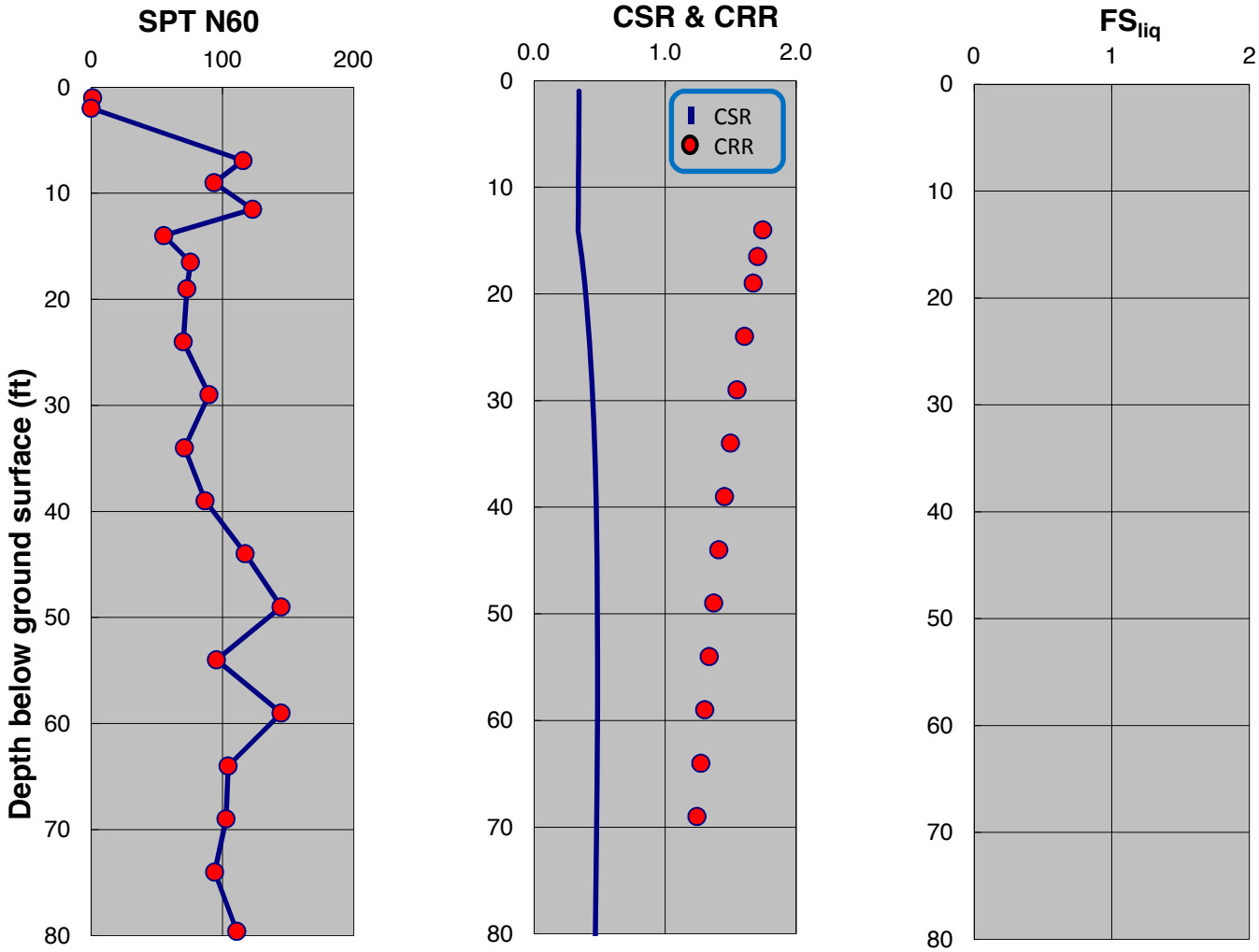
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-95 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



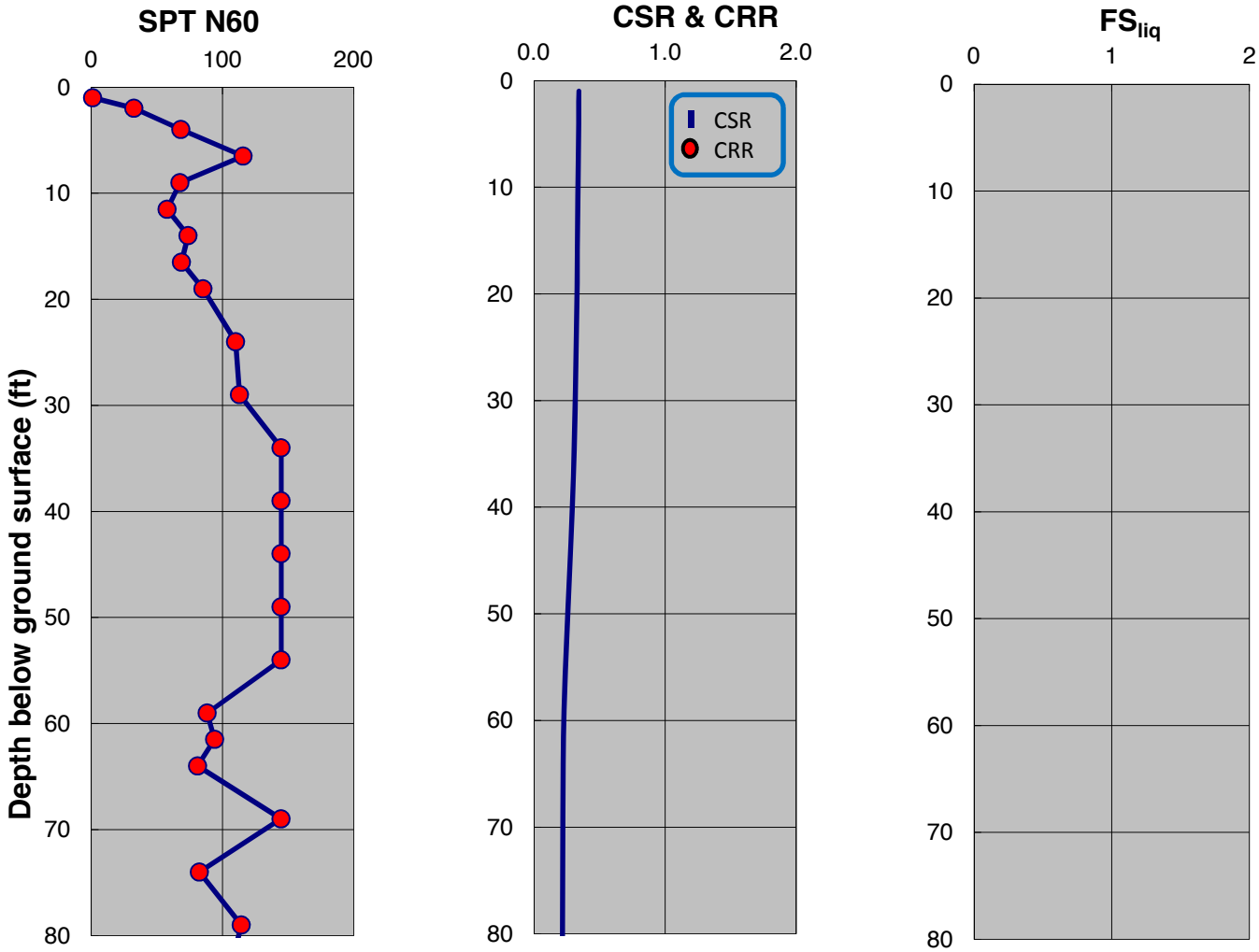
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-96 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



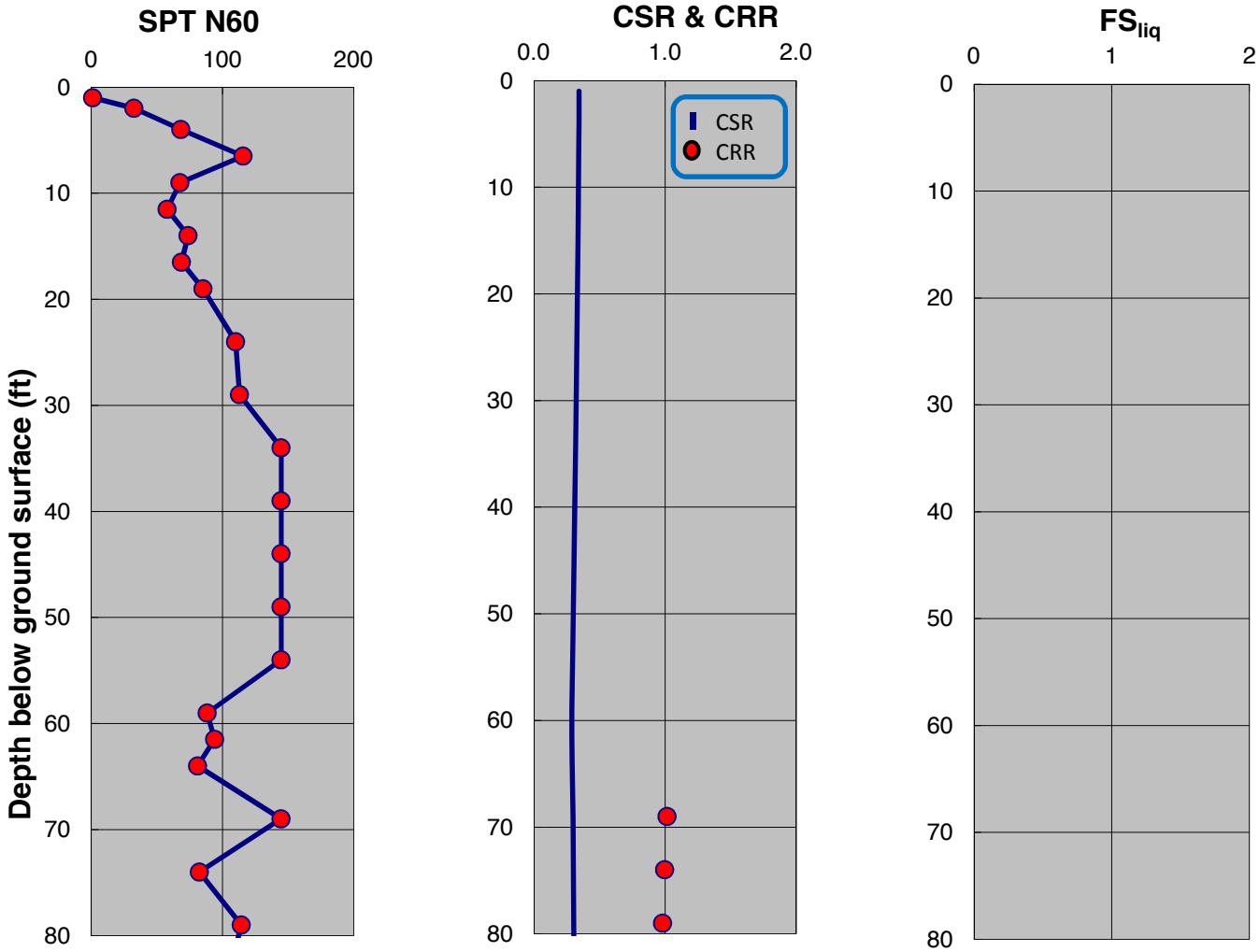
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-96 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-97 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

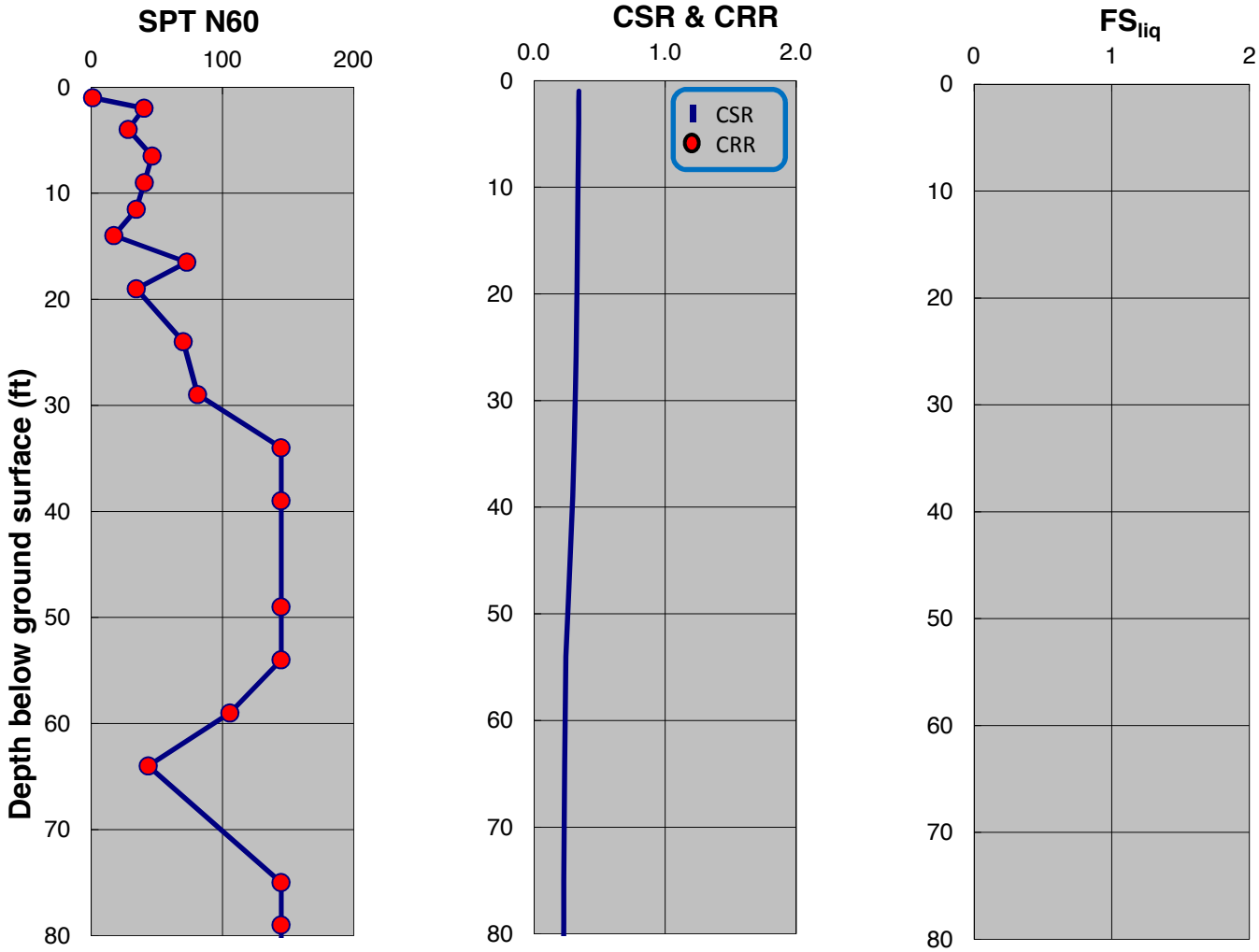
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-97 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

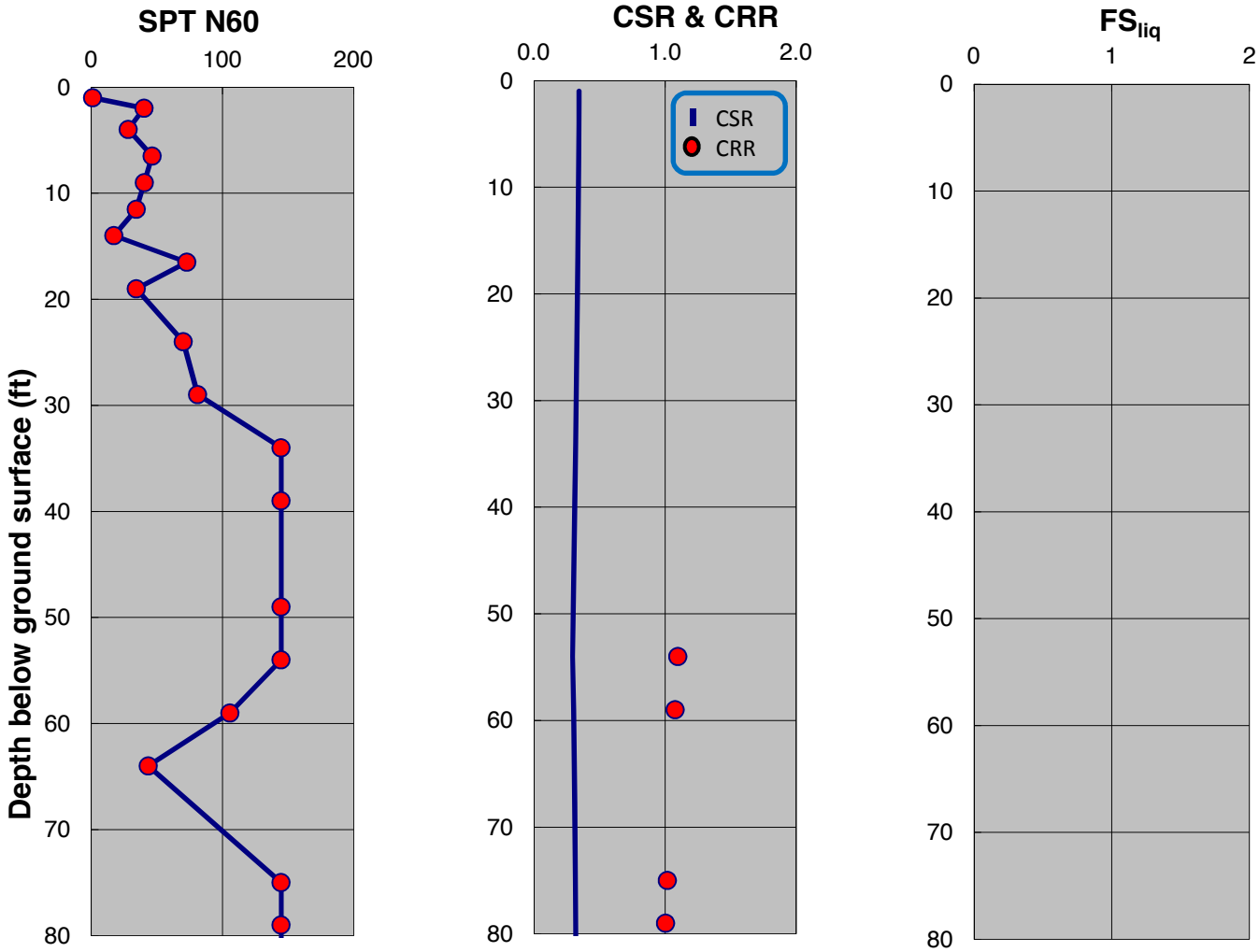
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.120



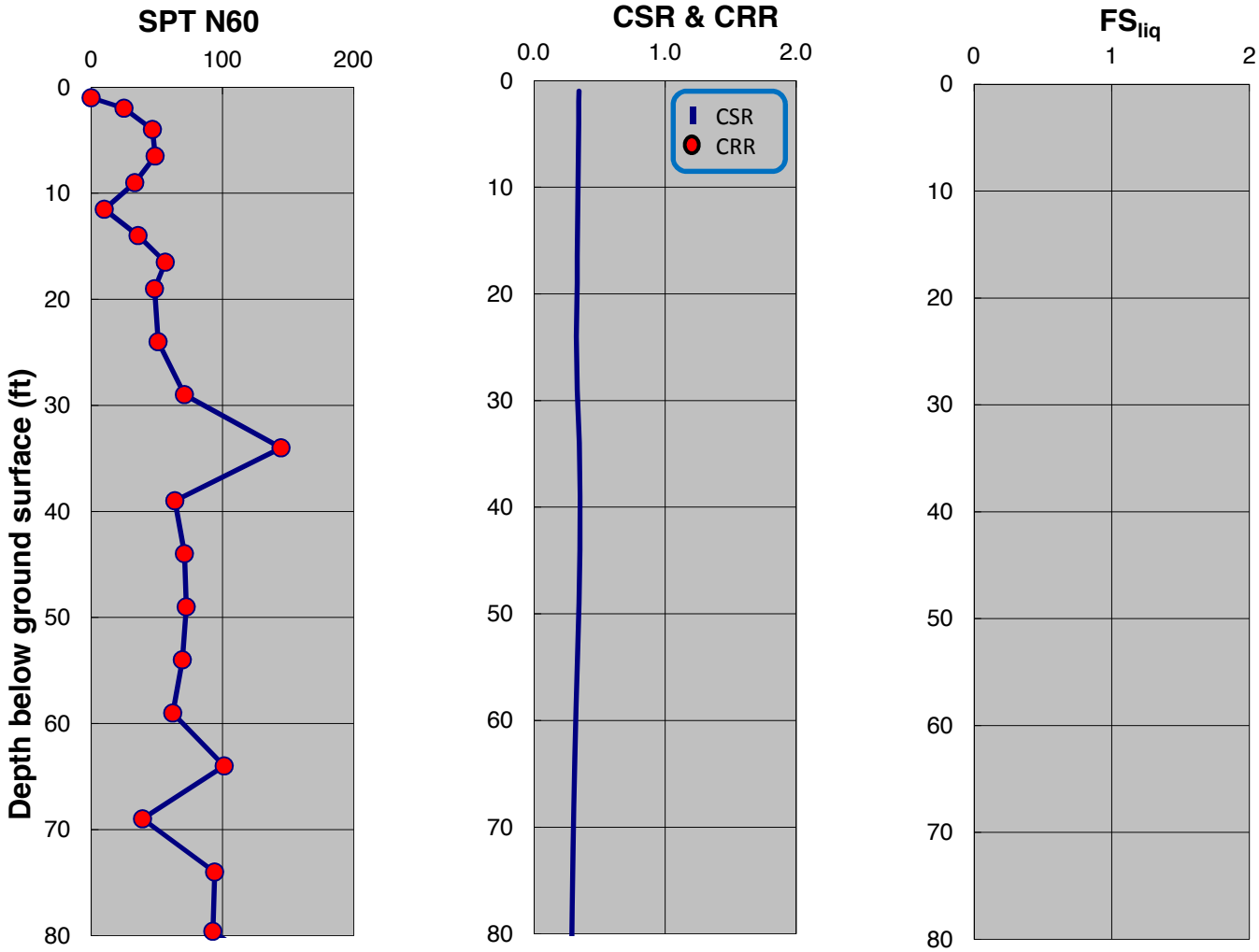
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-98 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



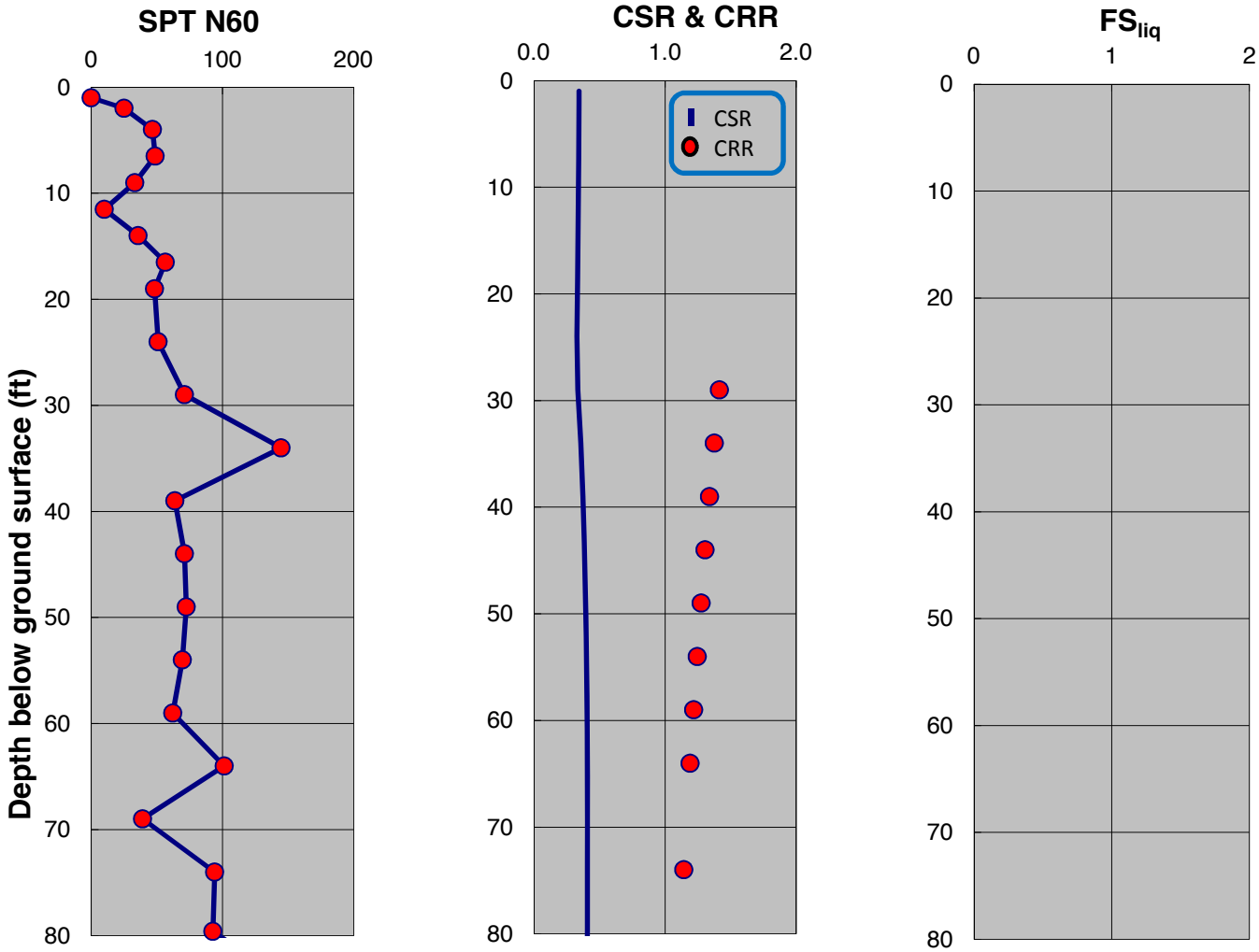
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-98 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



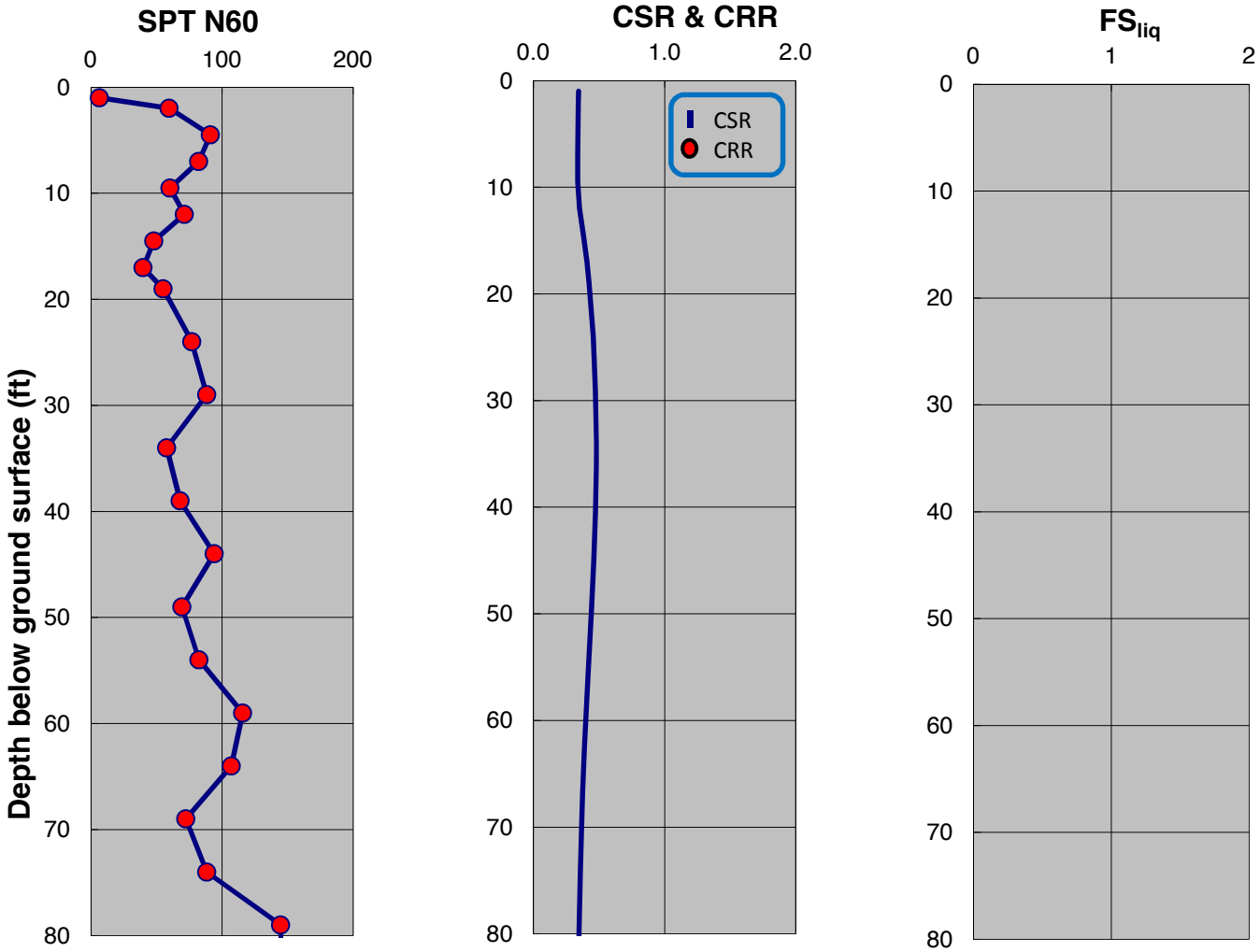
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-99 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



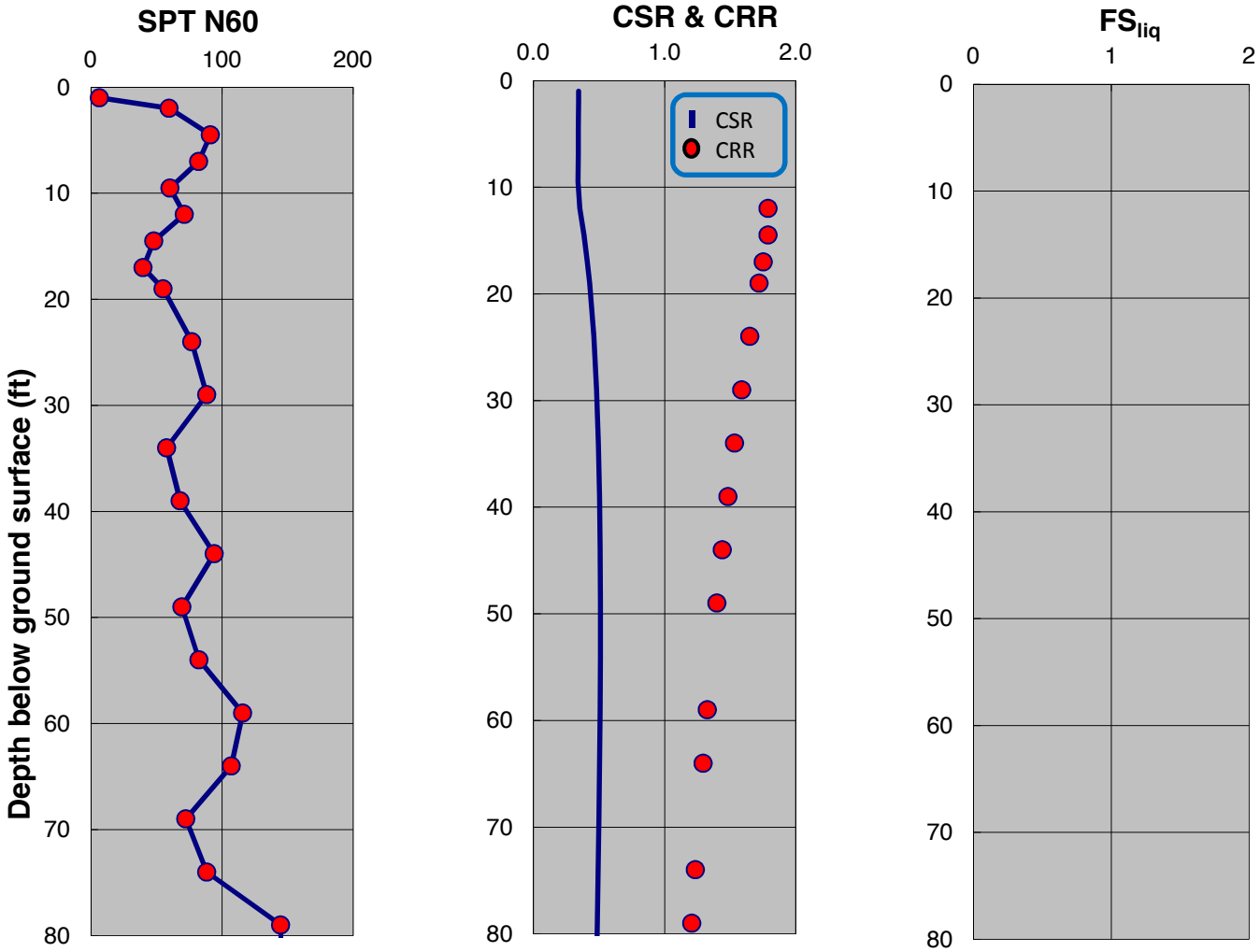
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-99 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



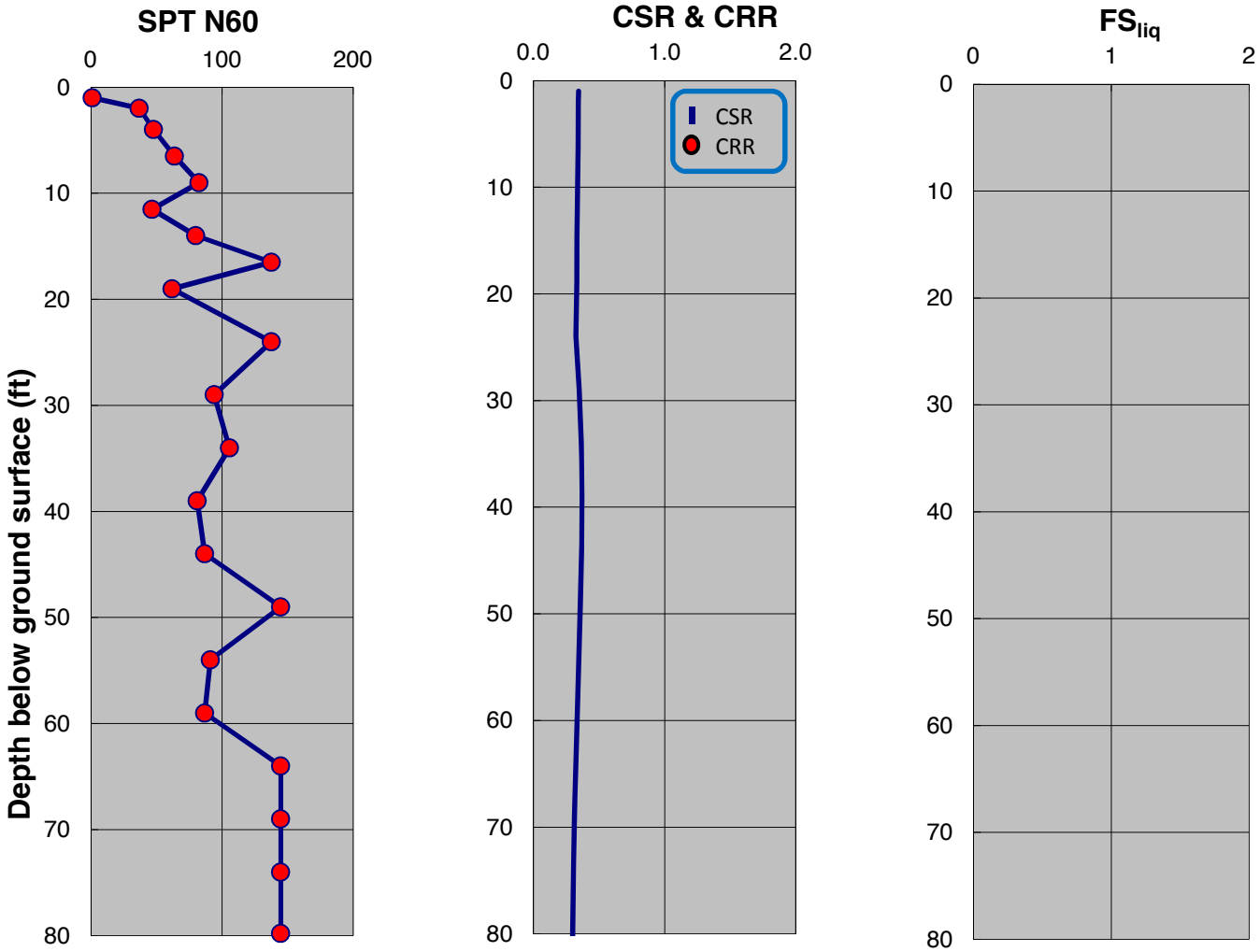
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-101 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



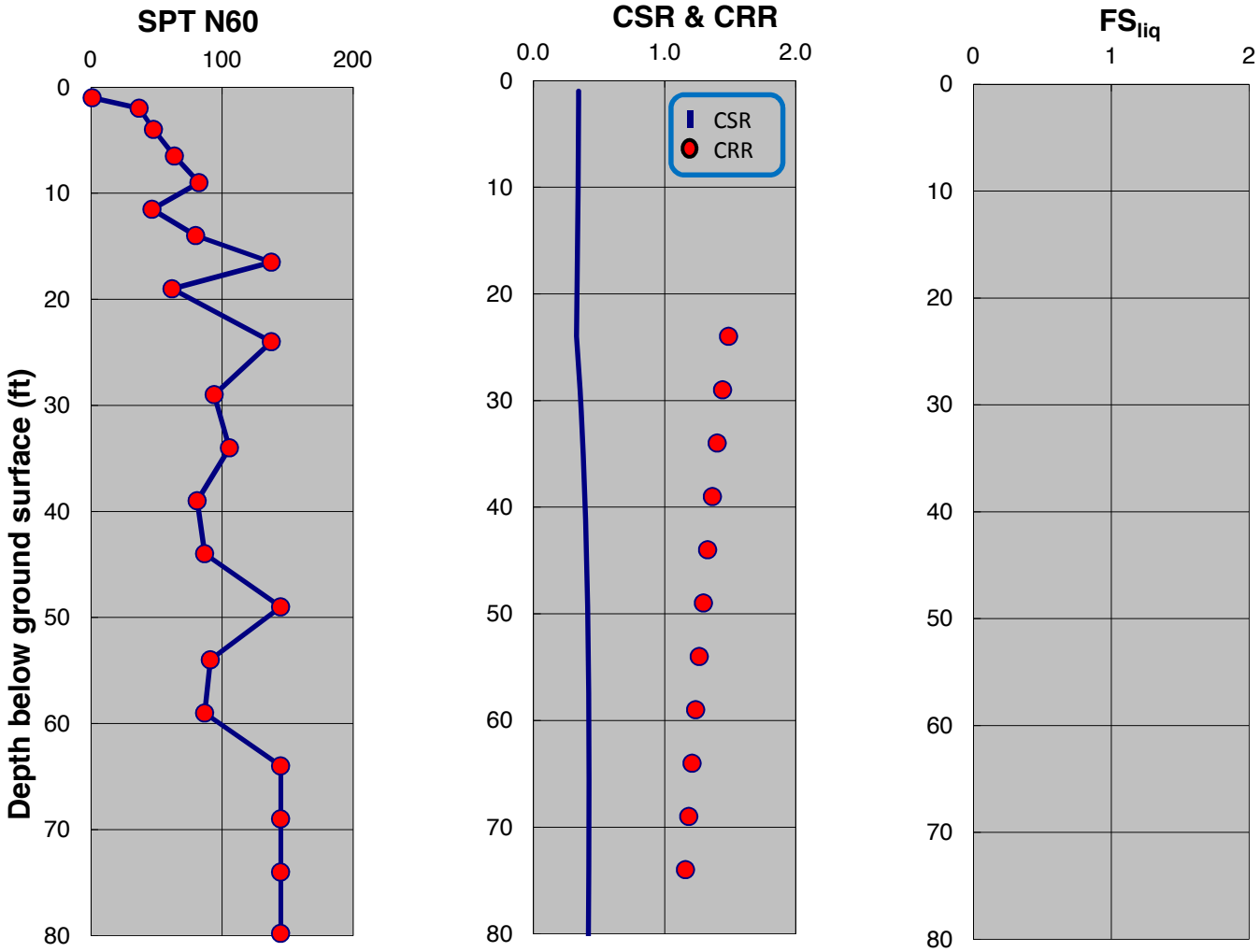
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-101 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



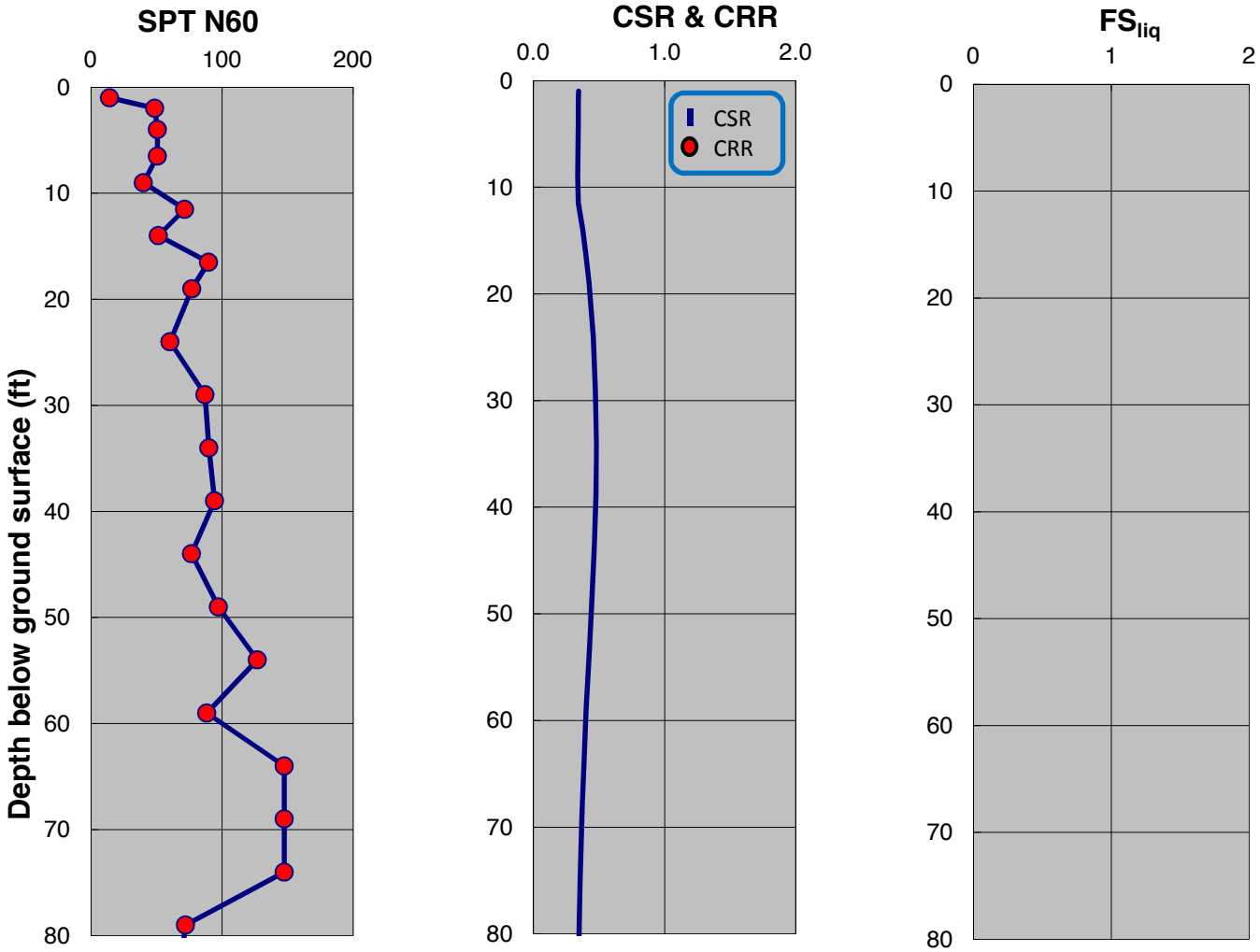
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-102 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



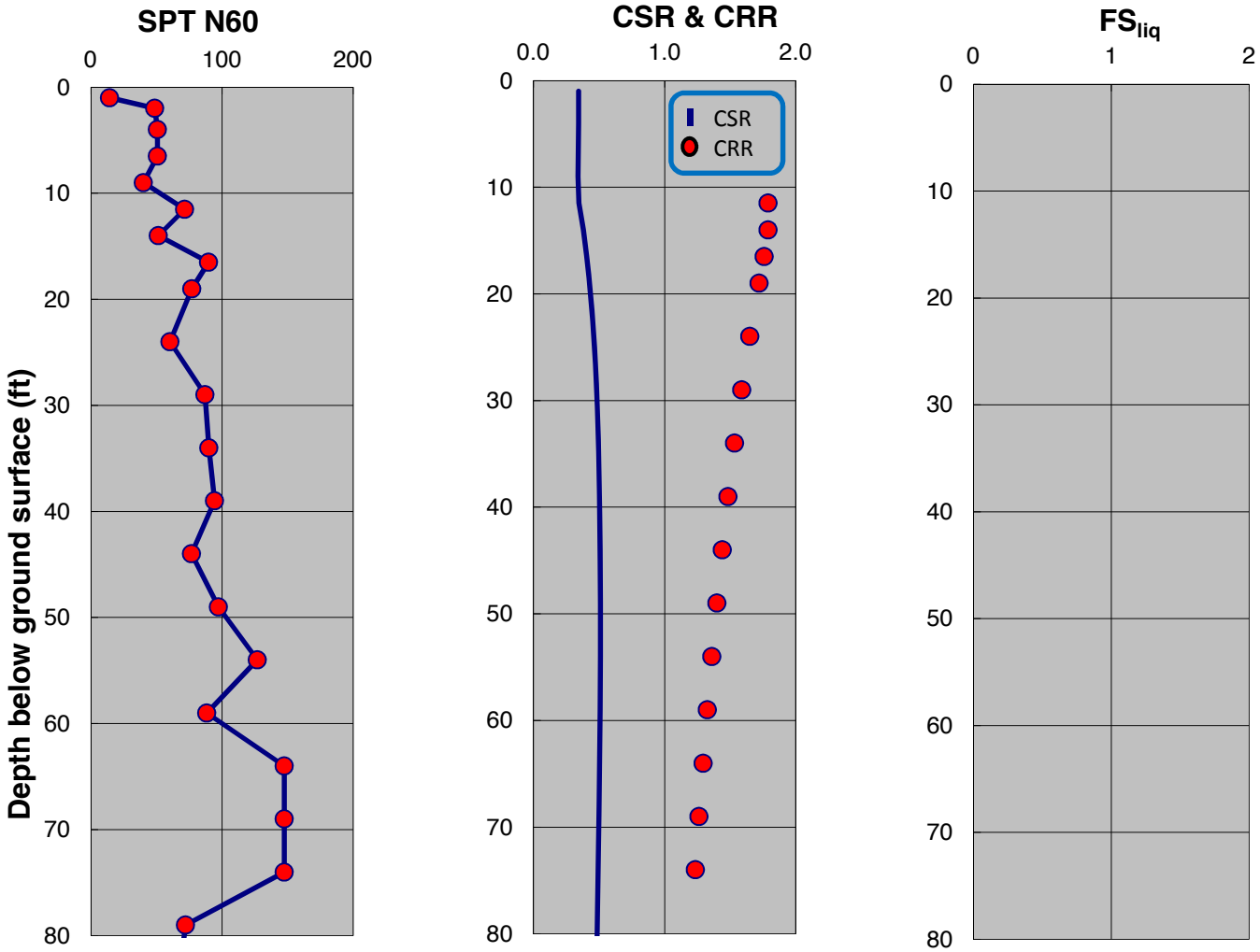
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-102 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-104 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

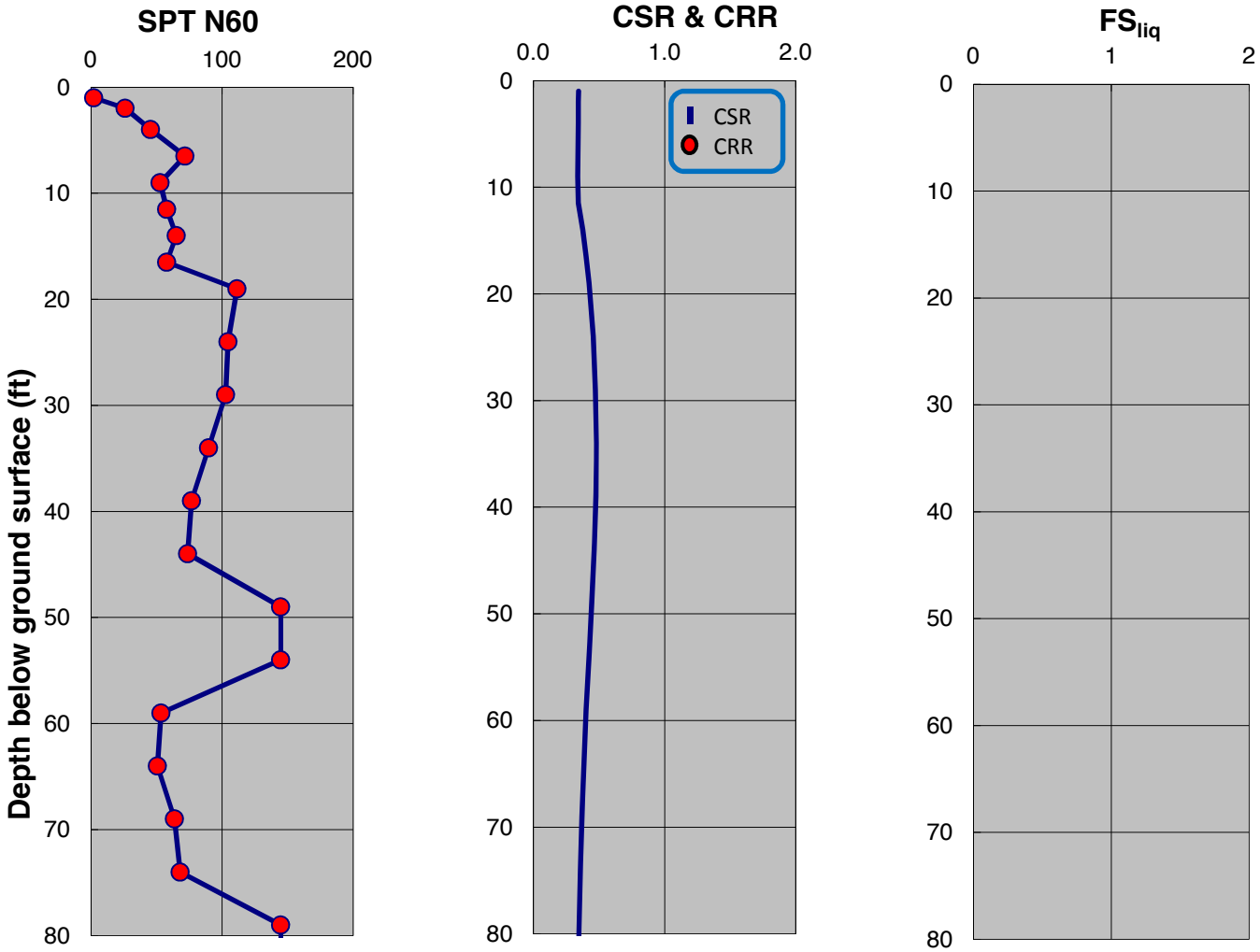
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-104 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

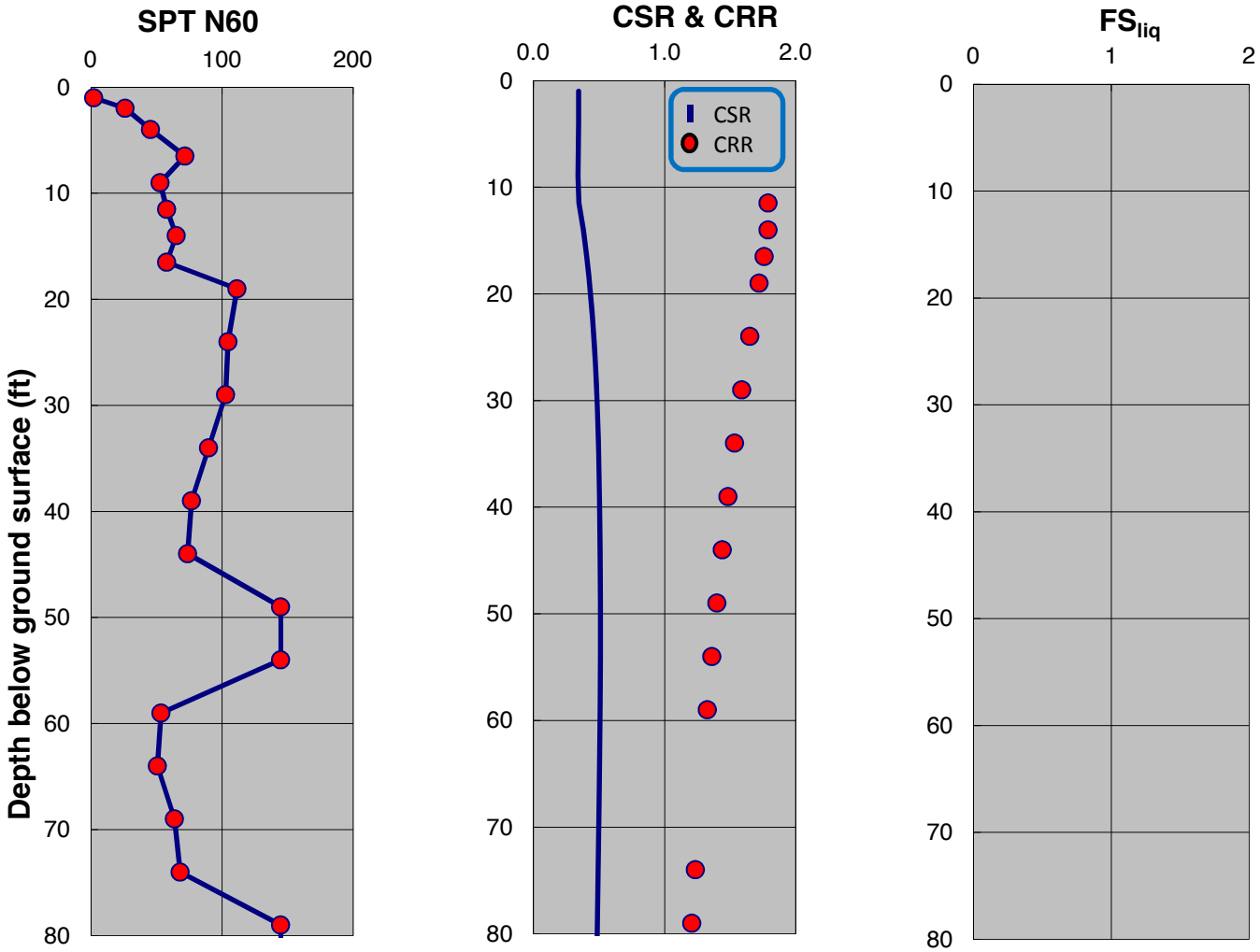
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.130



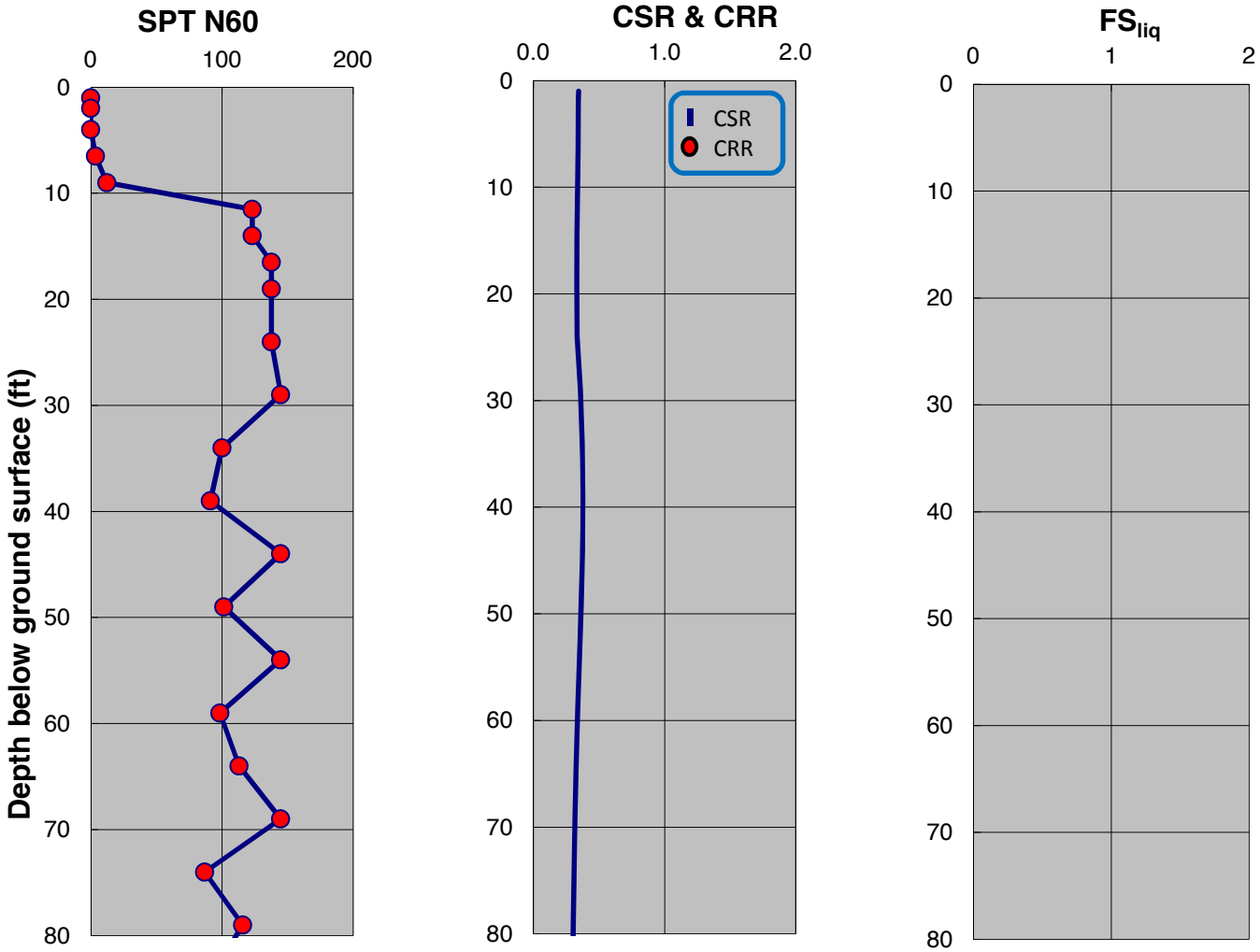
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-105 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-105 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

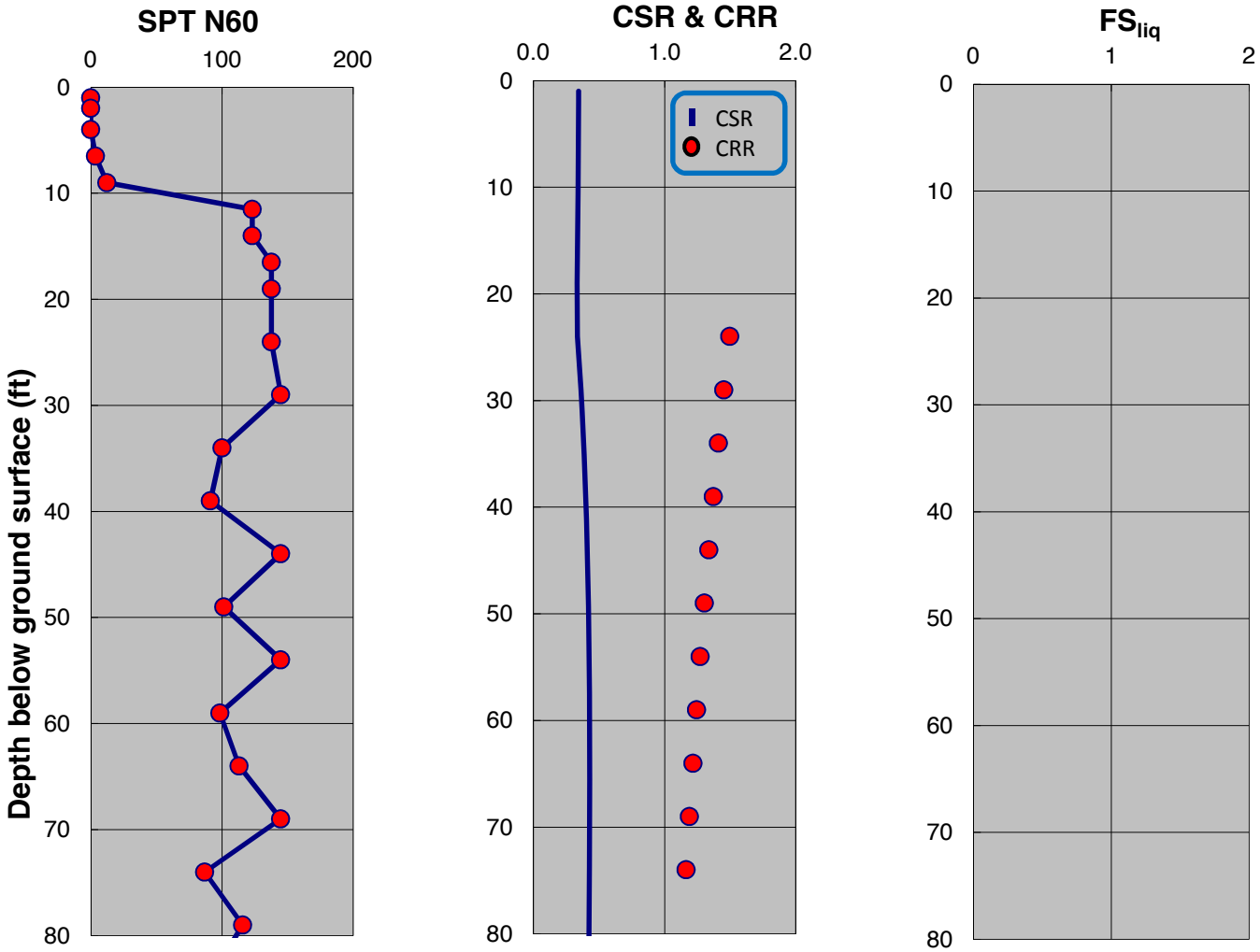
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-107 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

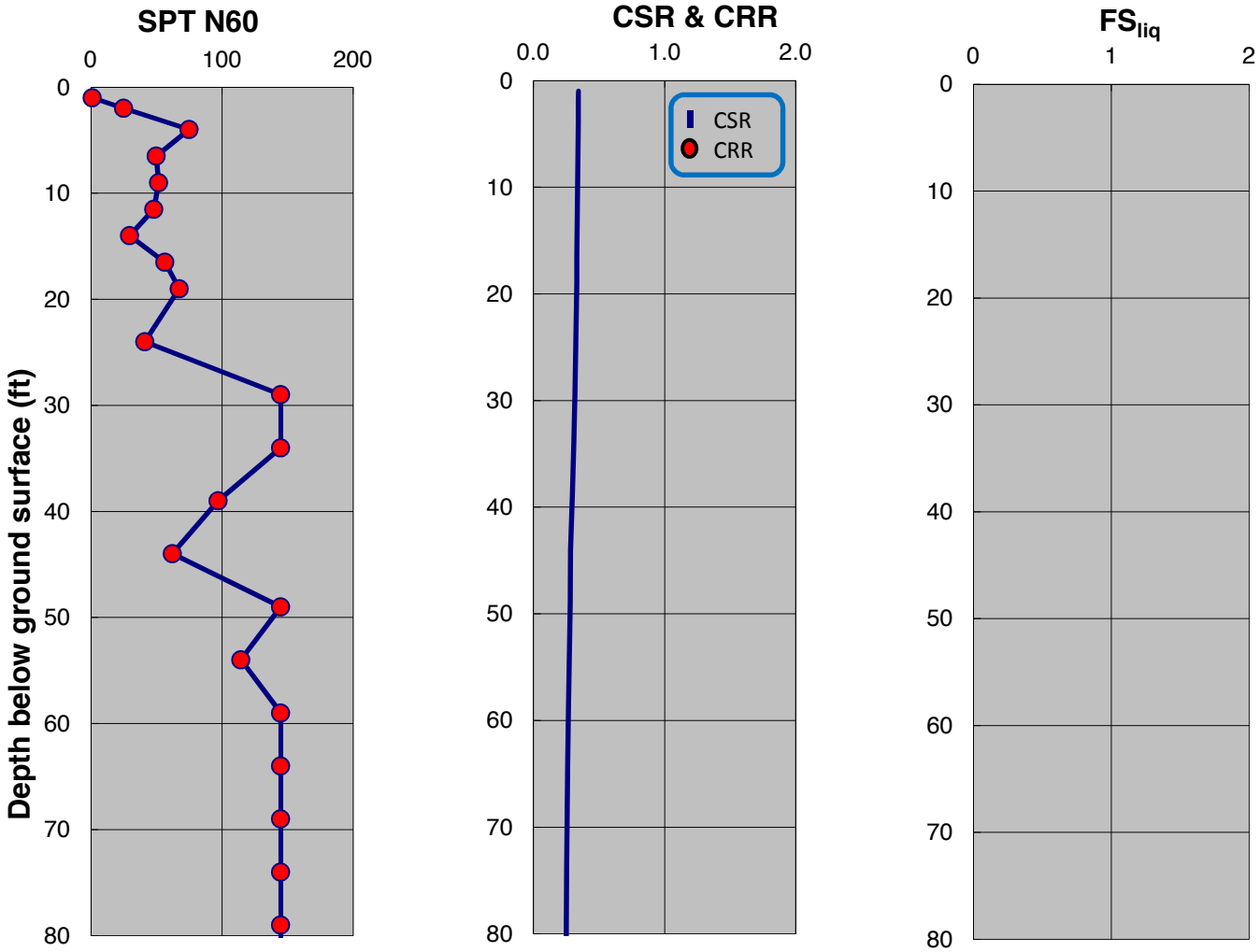
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.133



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-107 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

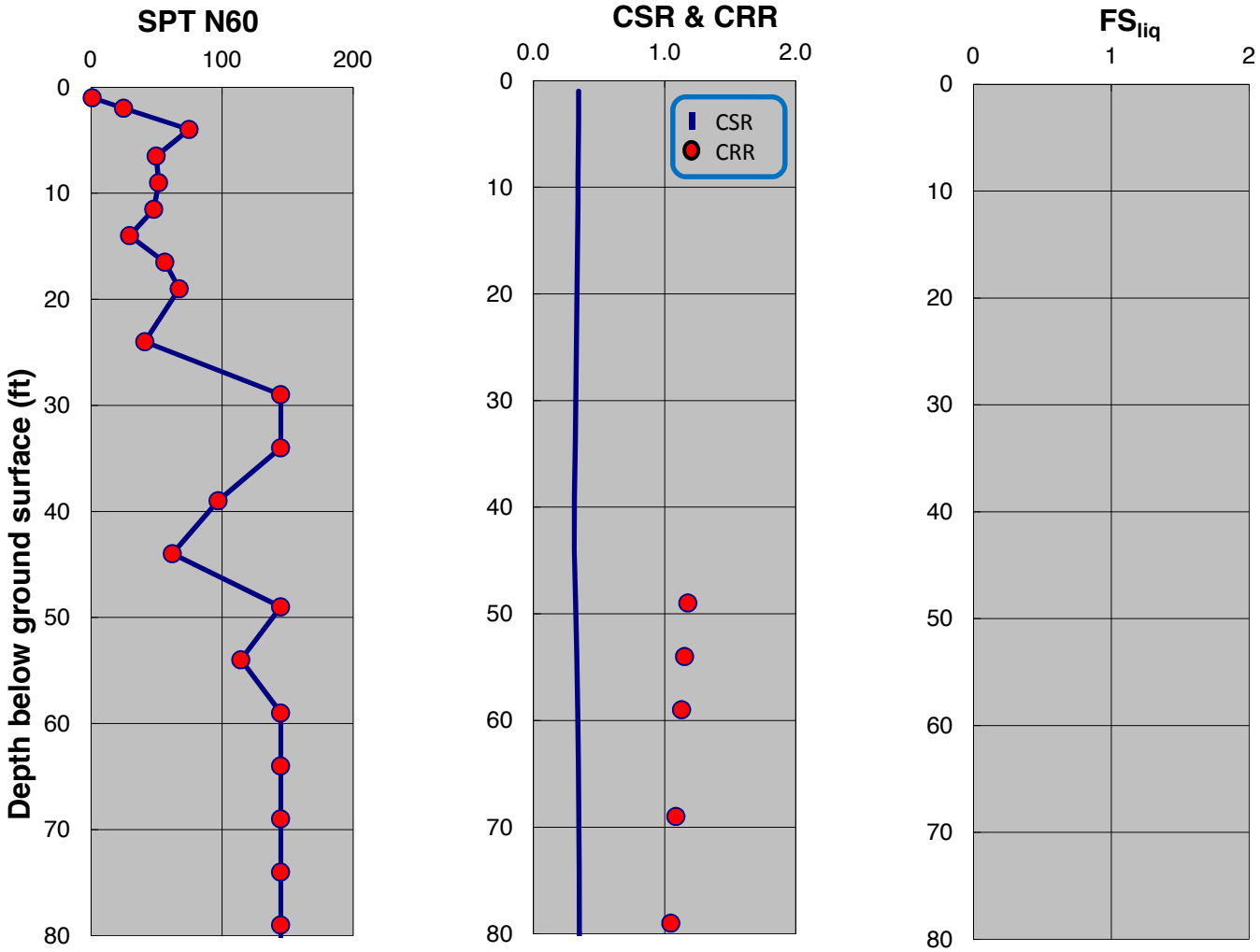
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-110 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

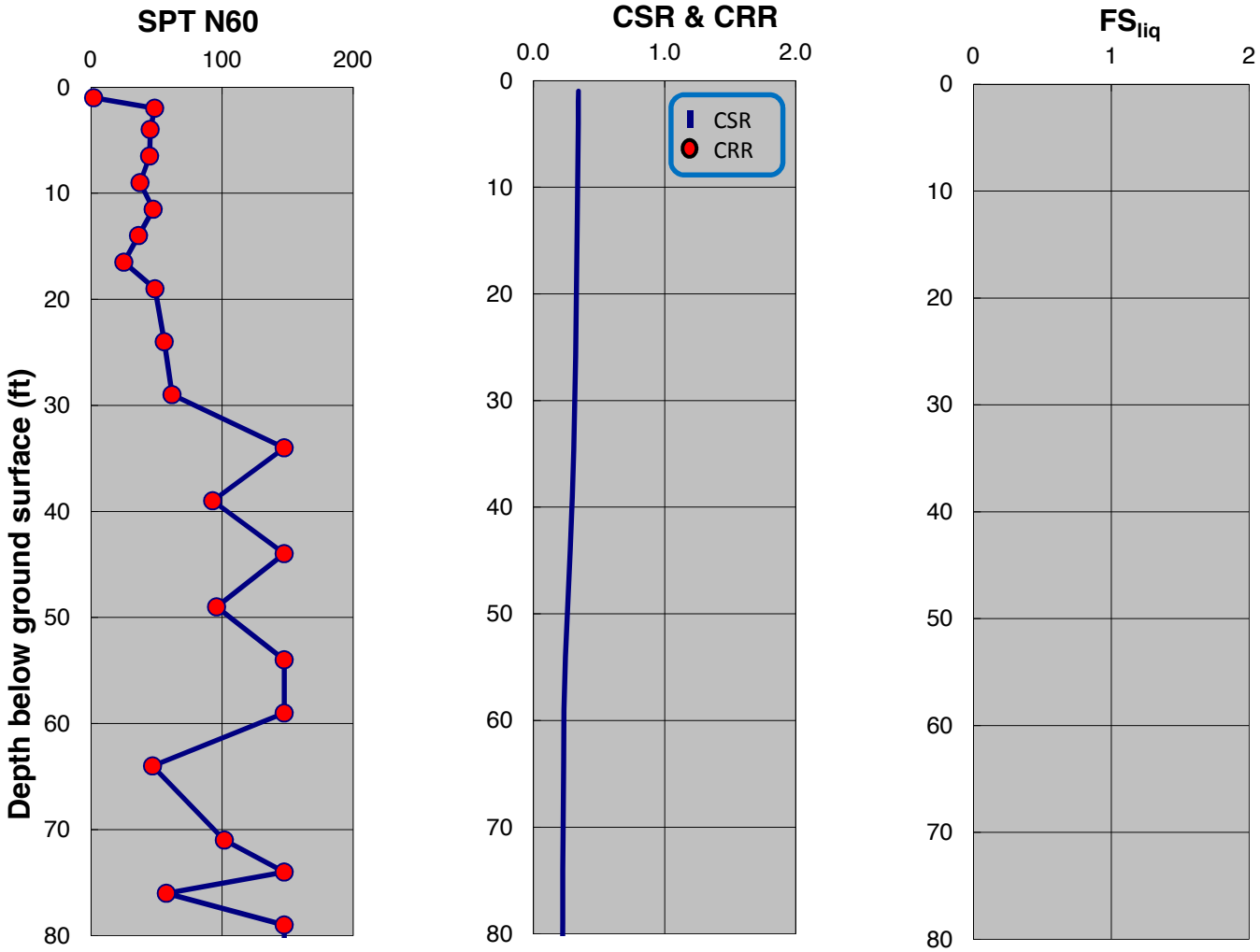
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.135



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-110 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

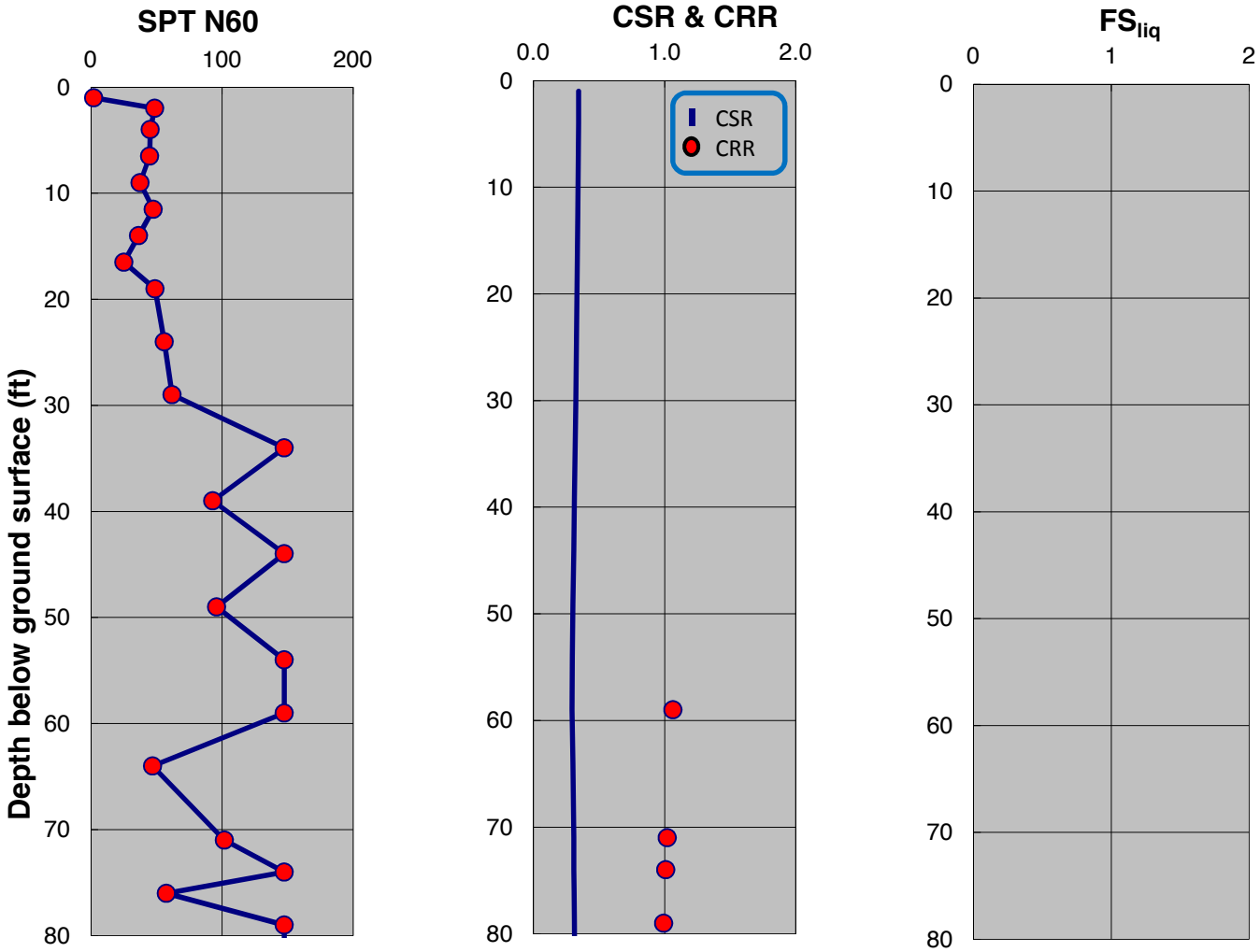
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-112 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

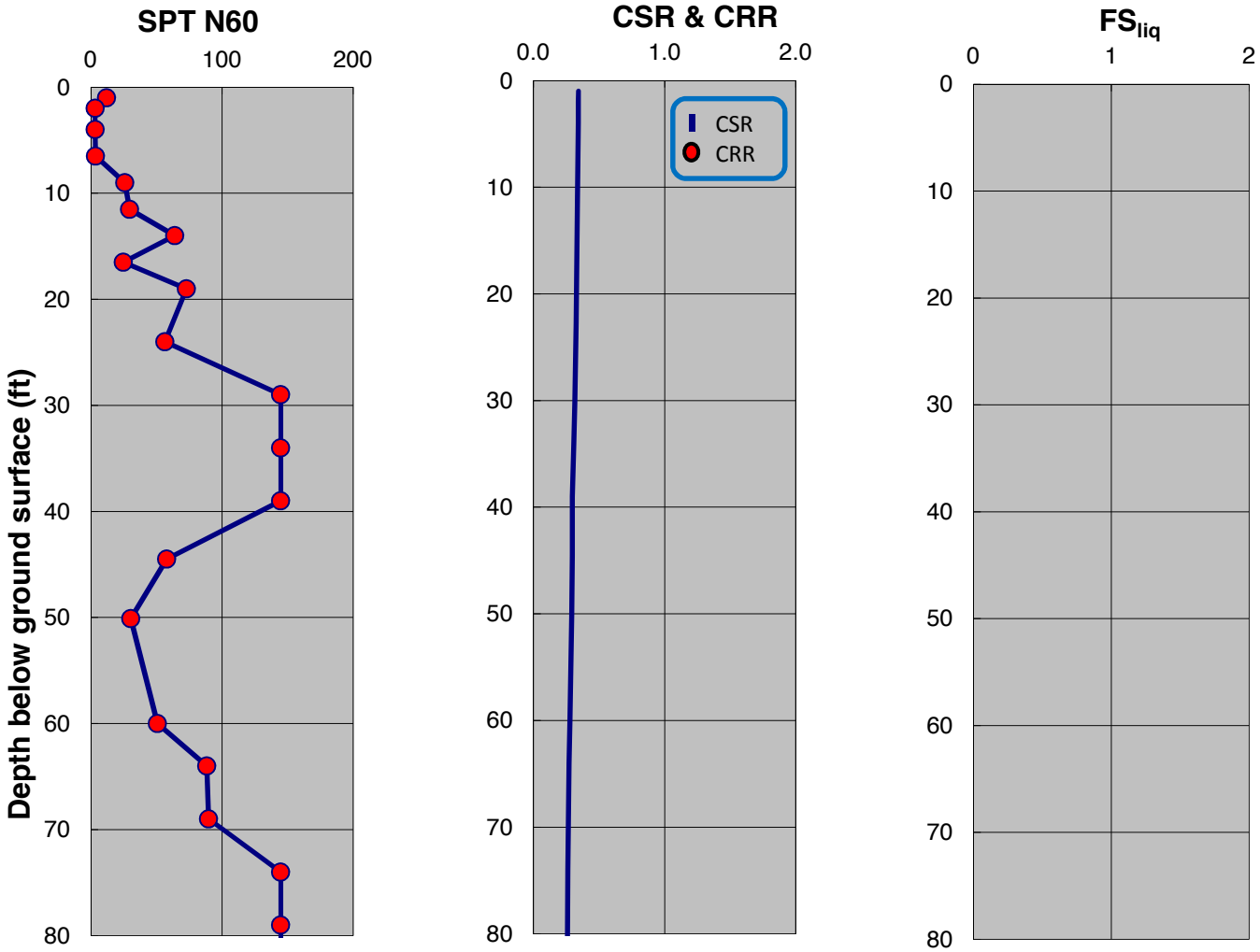
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.137



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-112 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

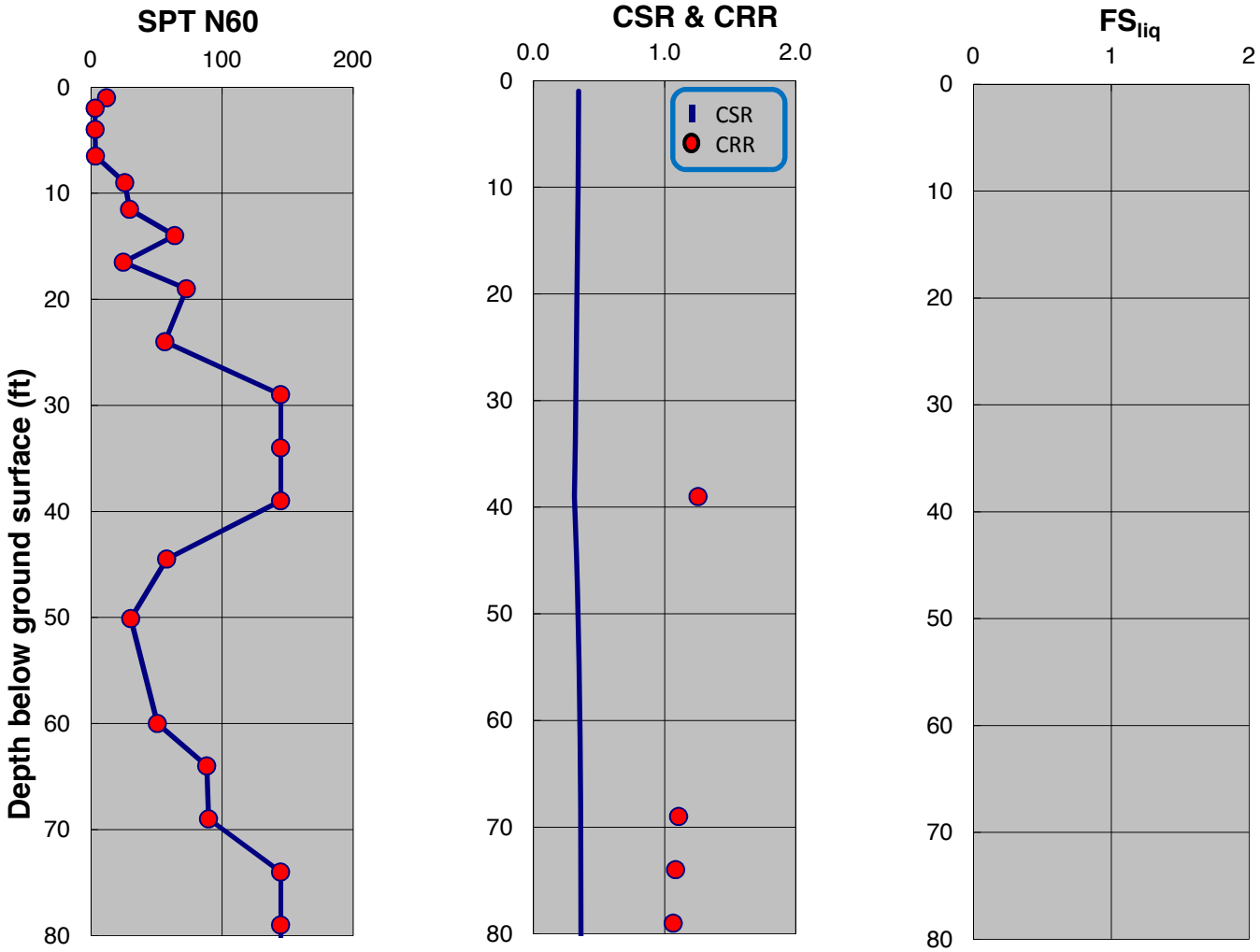
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-113 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

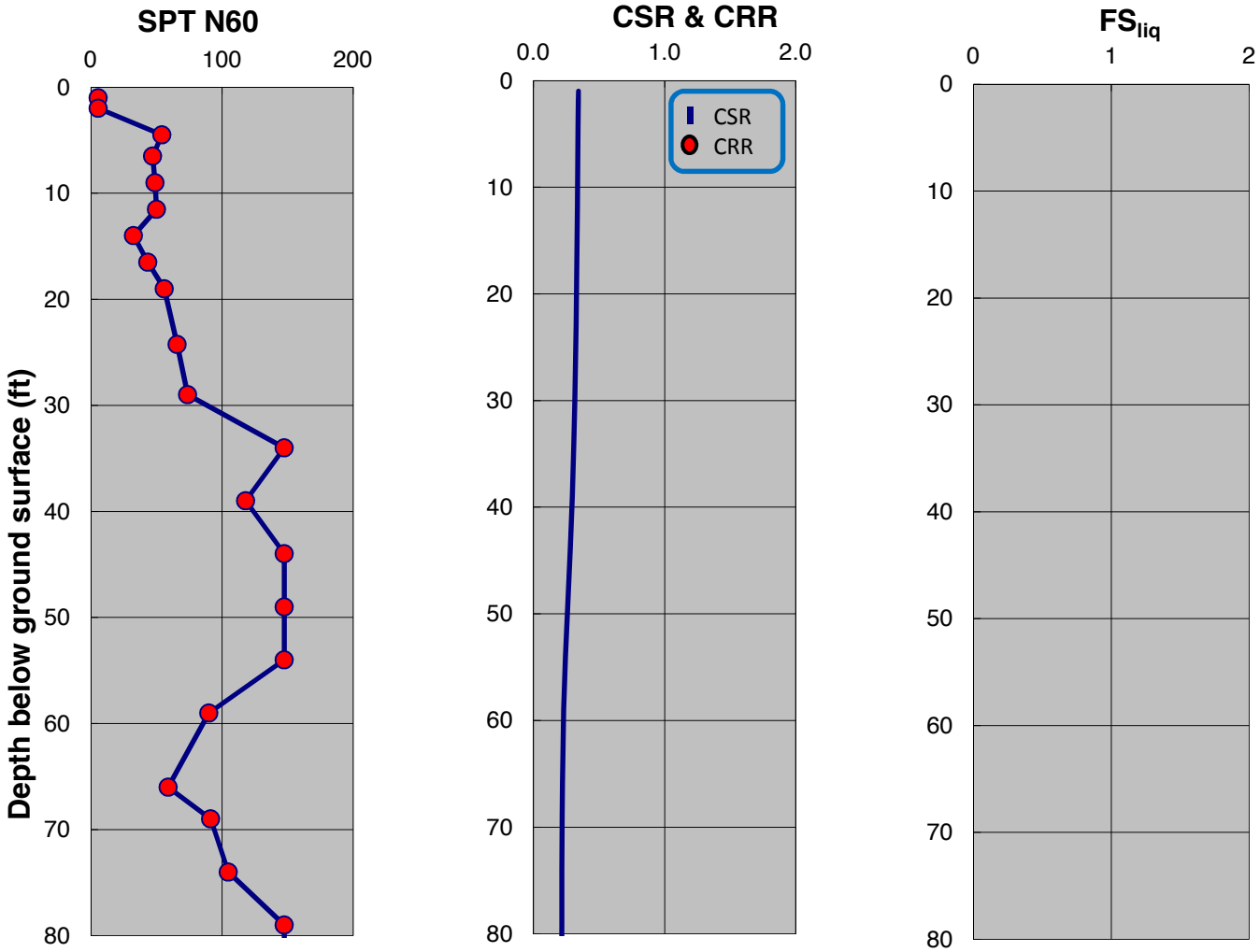
PLATE A.139



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-113 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

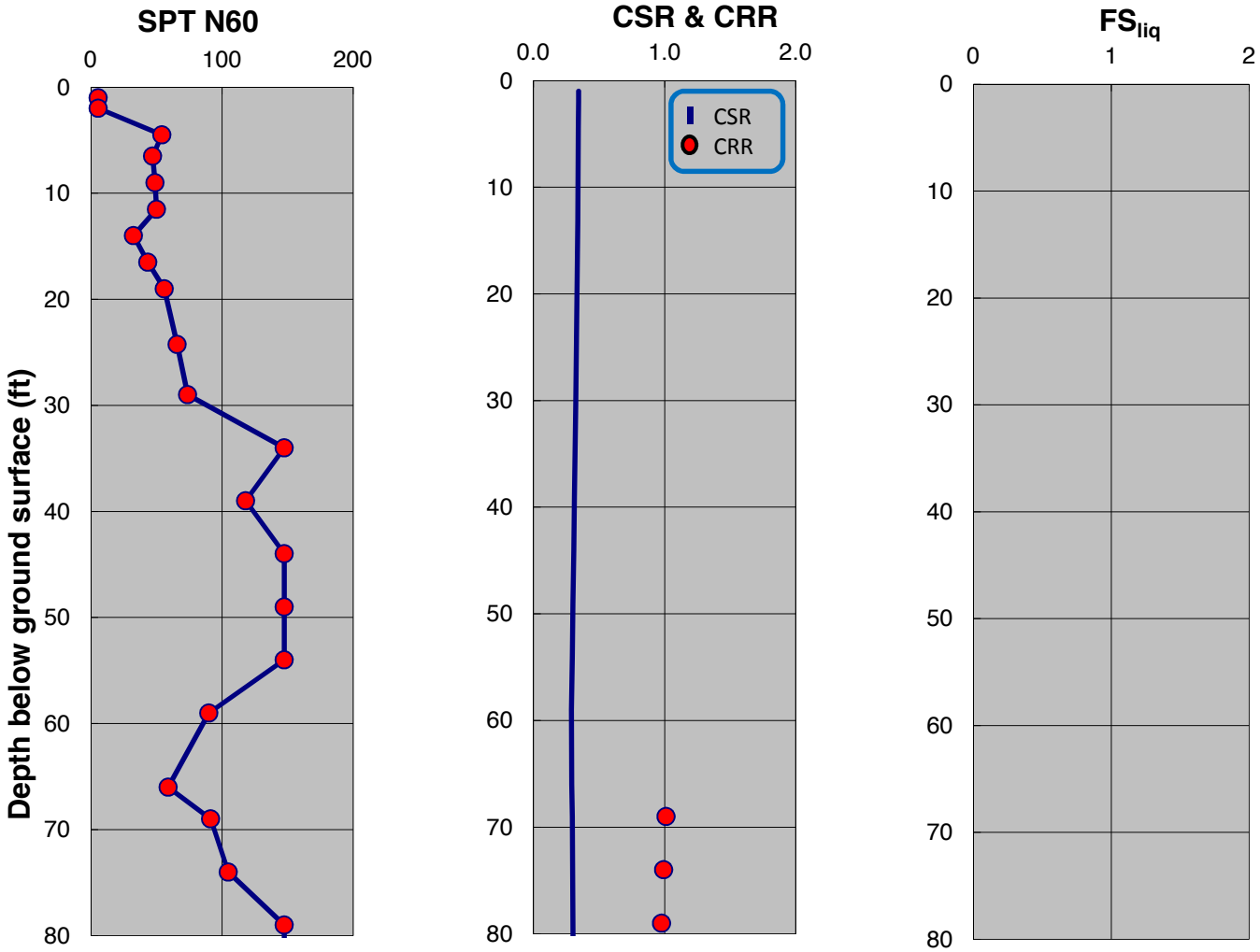
PLATE A.140



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-114 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

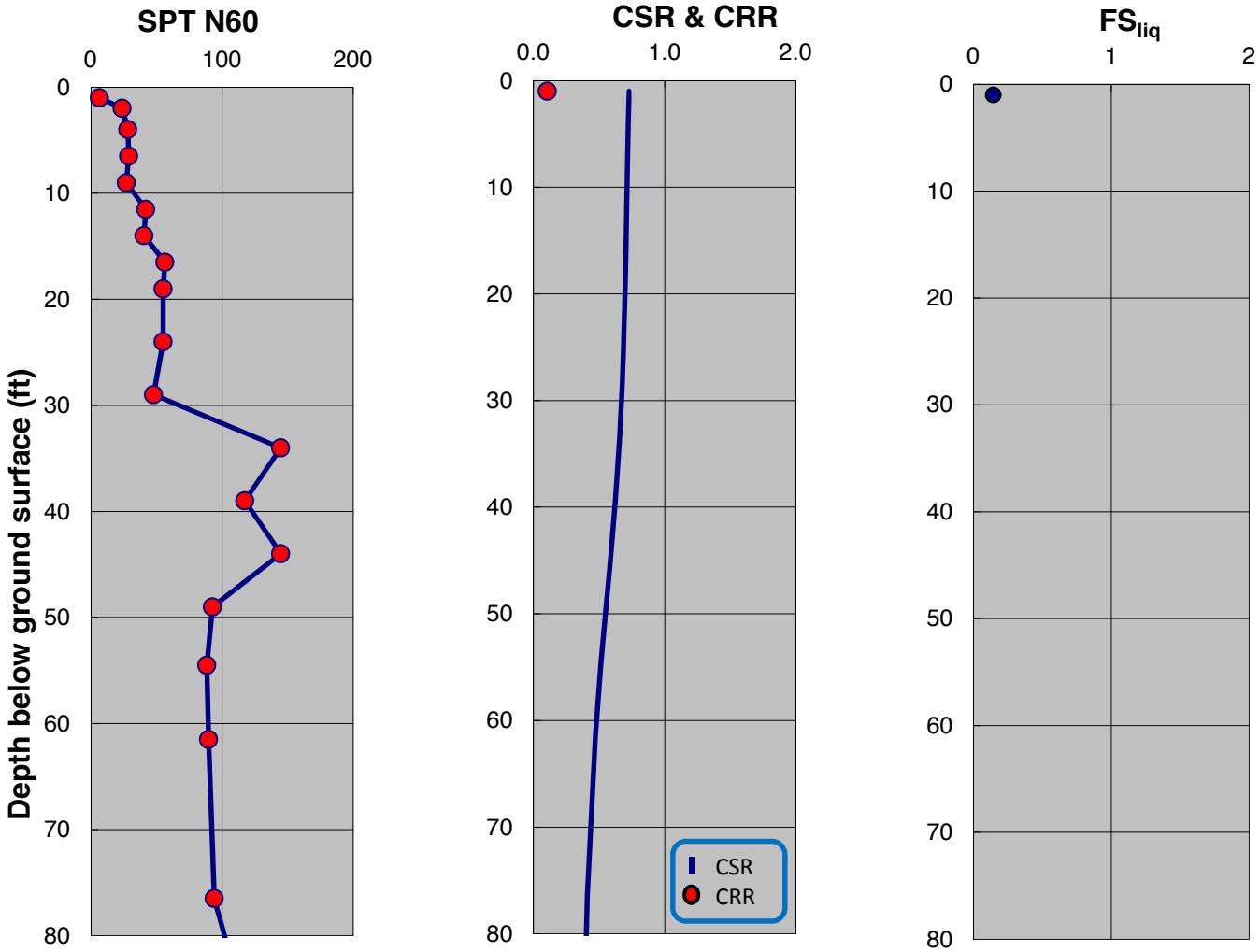
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.141



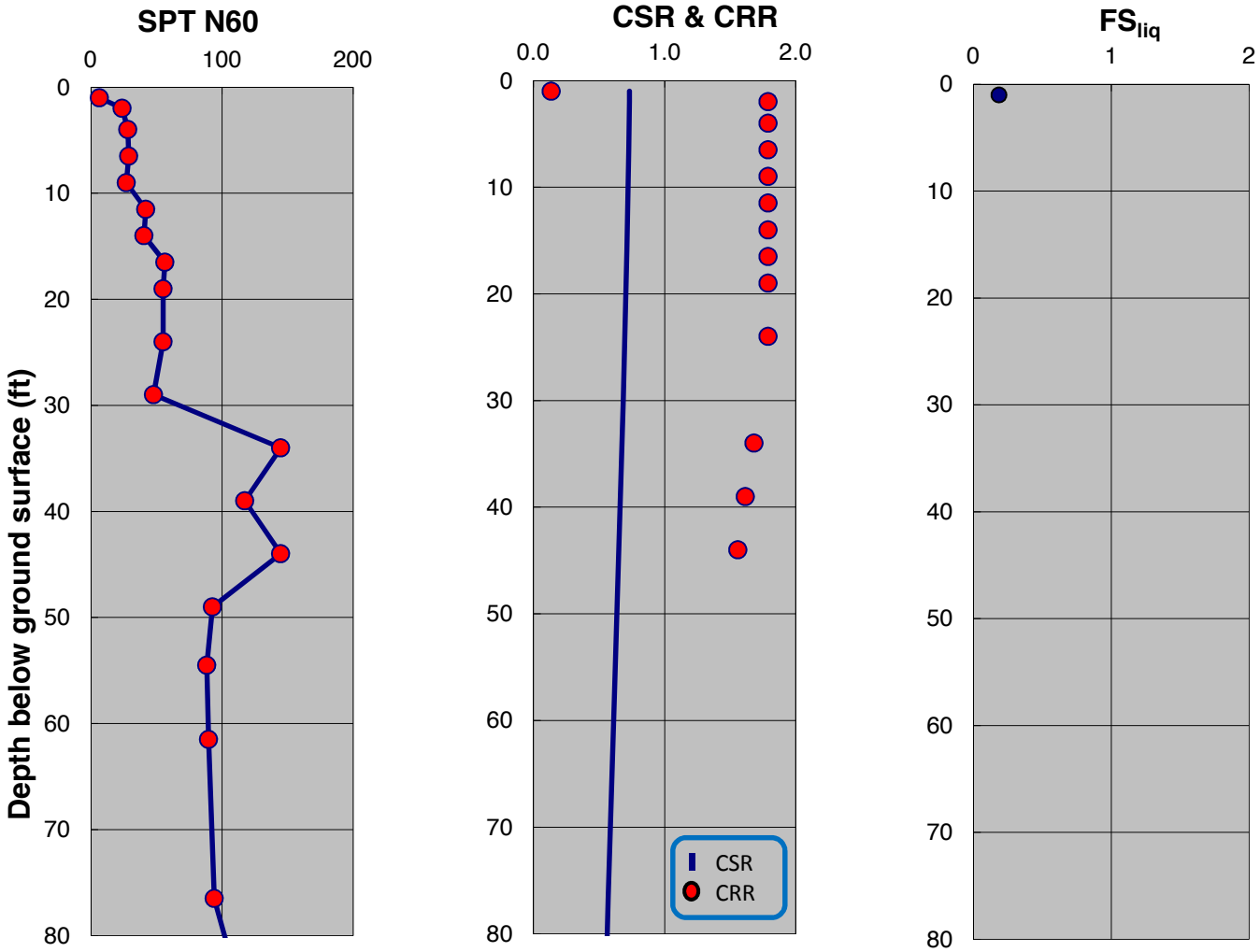
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-114 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



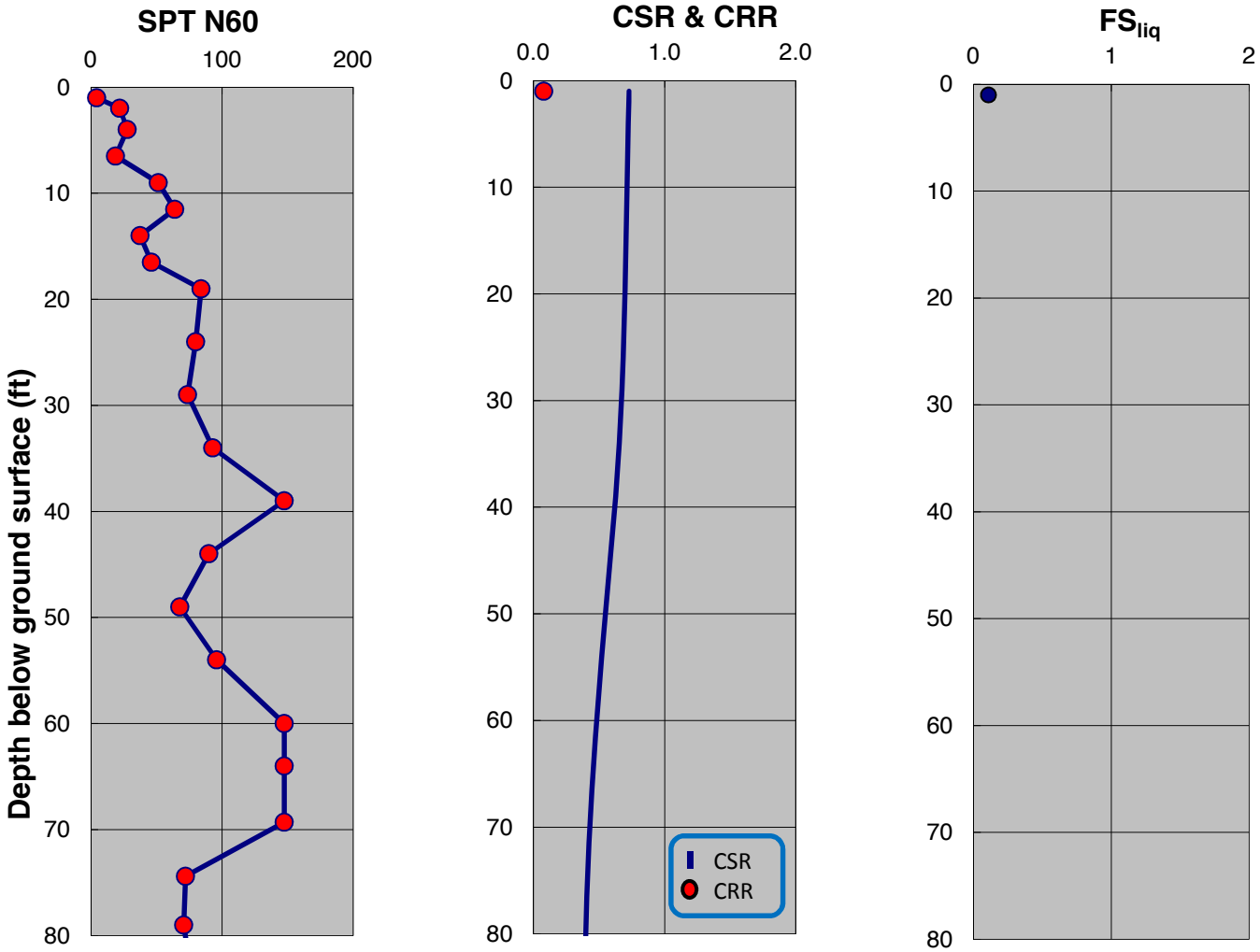
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-117 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-117 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

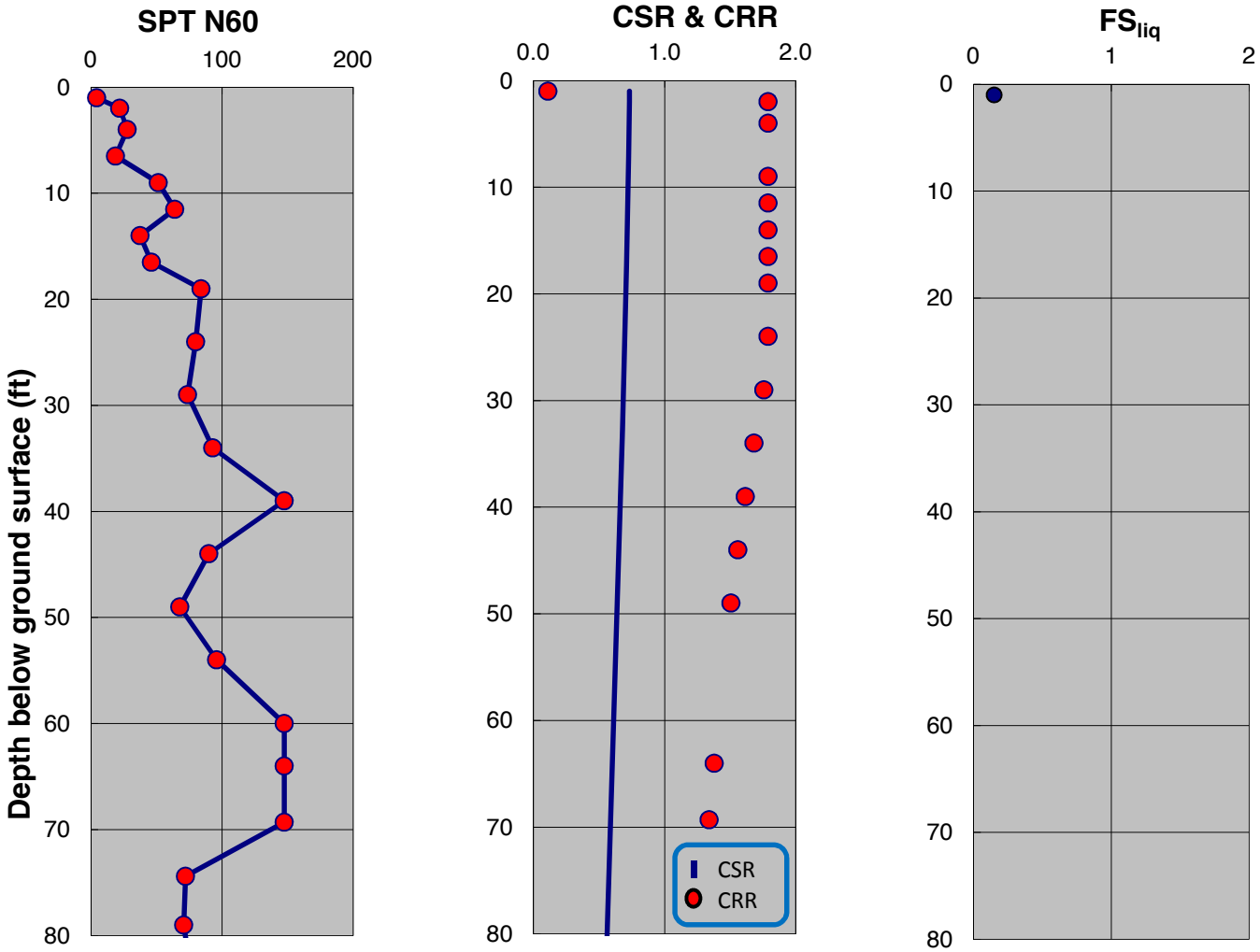
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-120 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

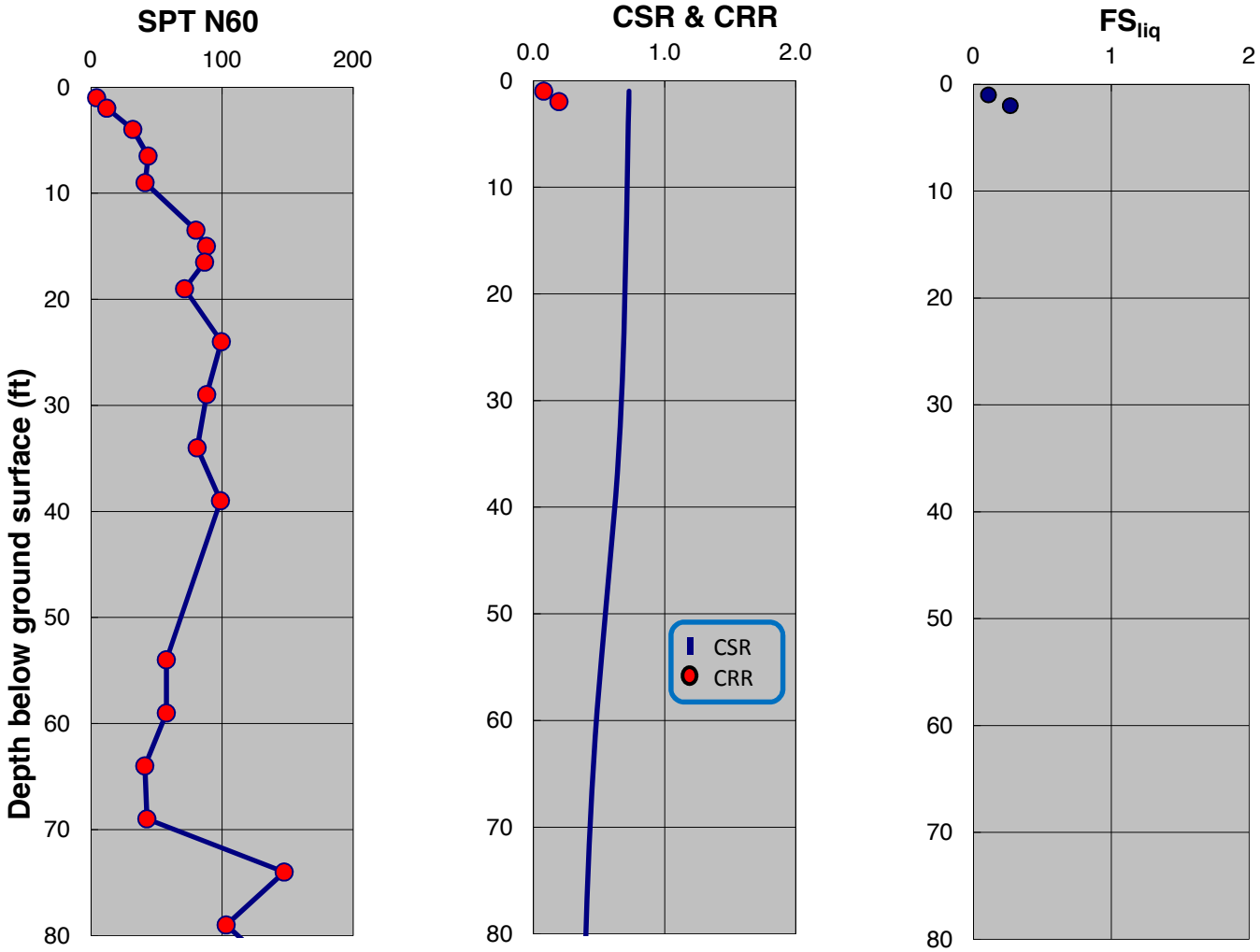
PLATE A.145



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-120 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

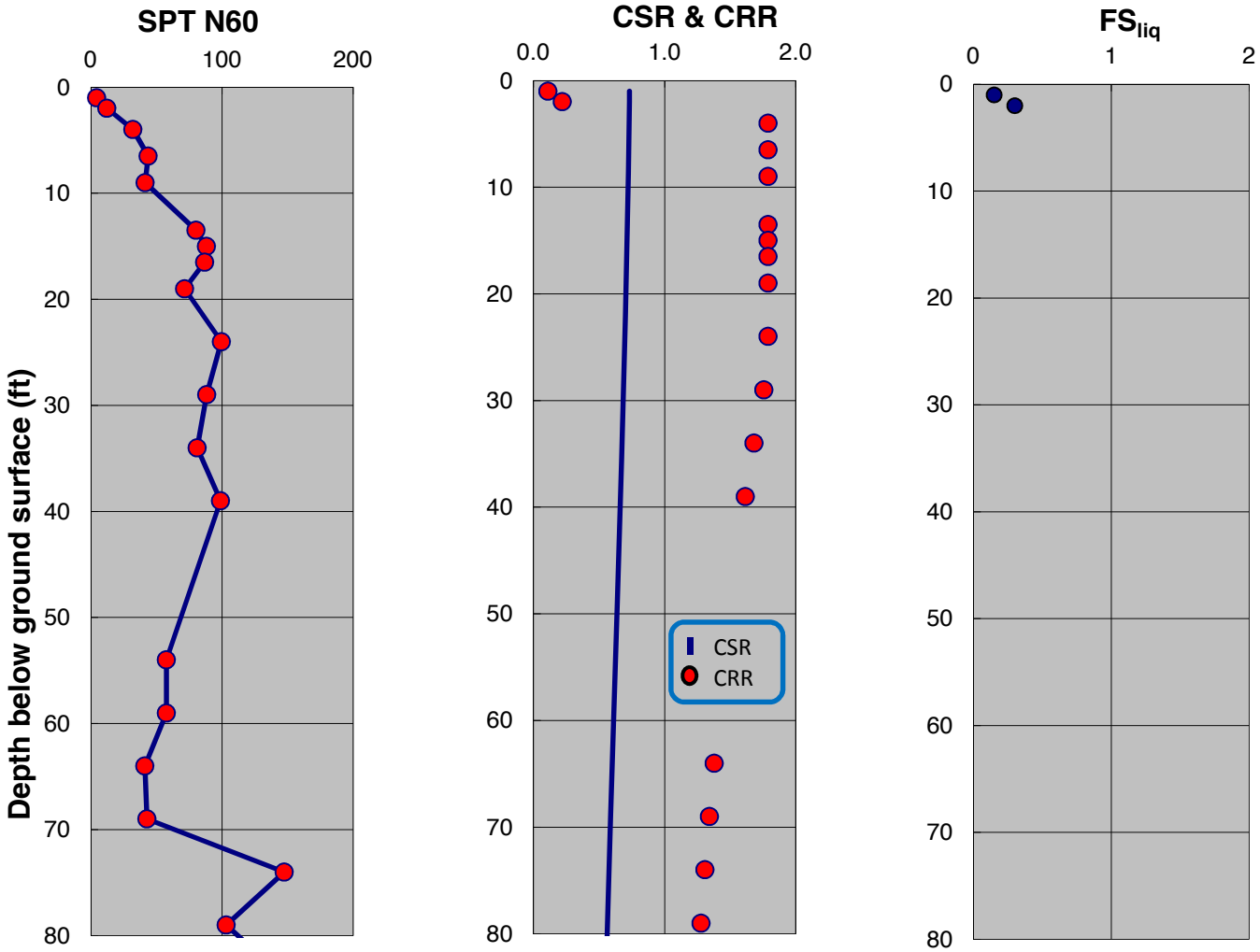
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.146



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-121 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

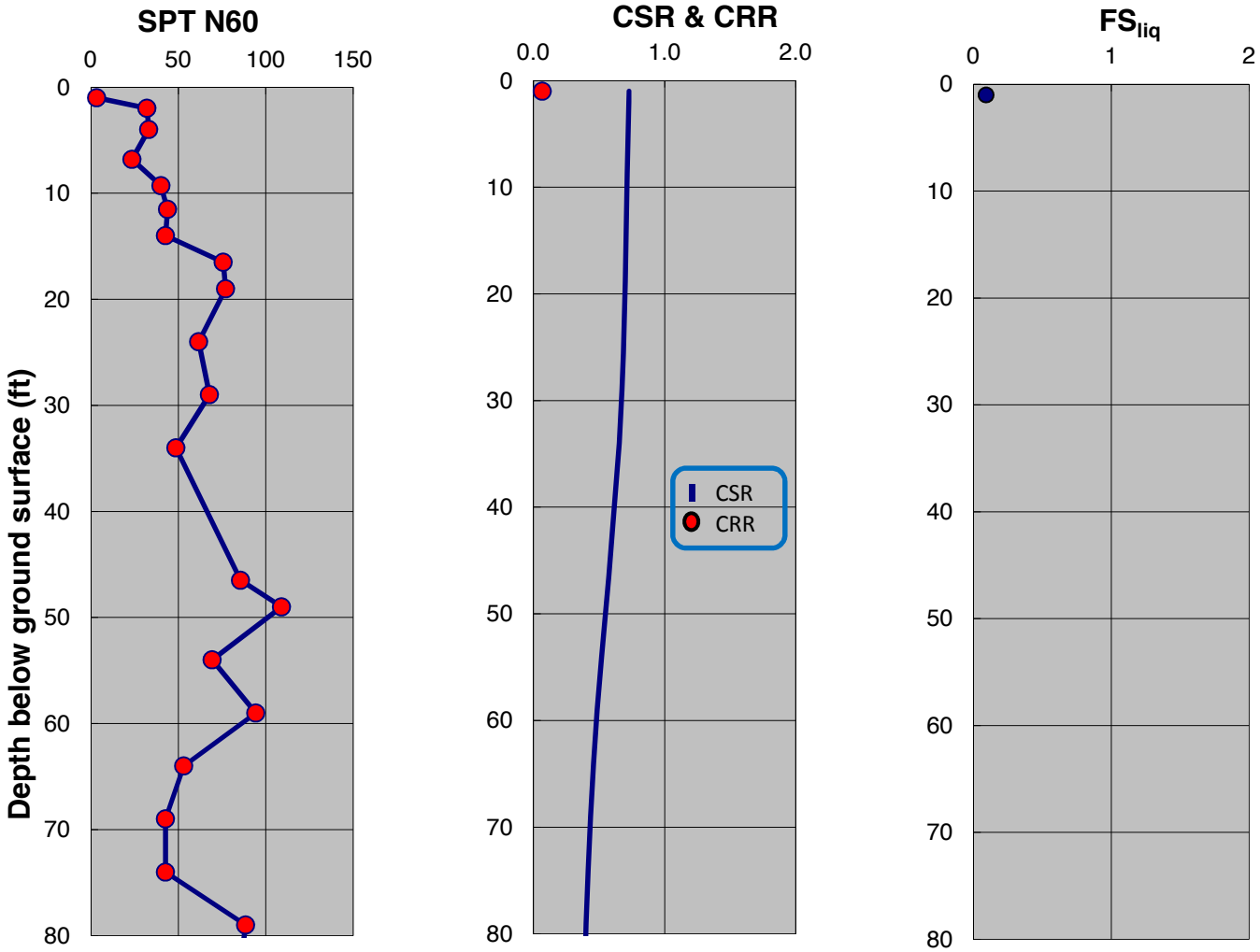
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-121 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

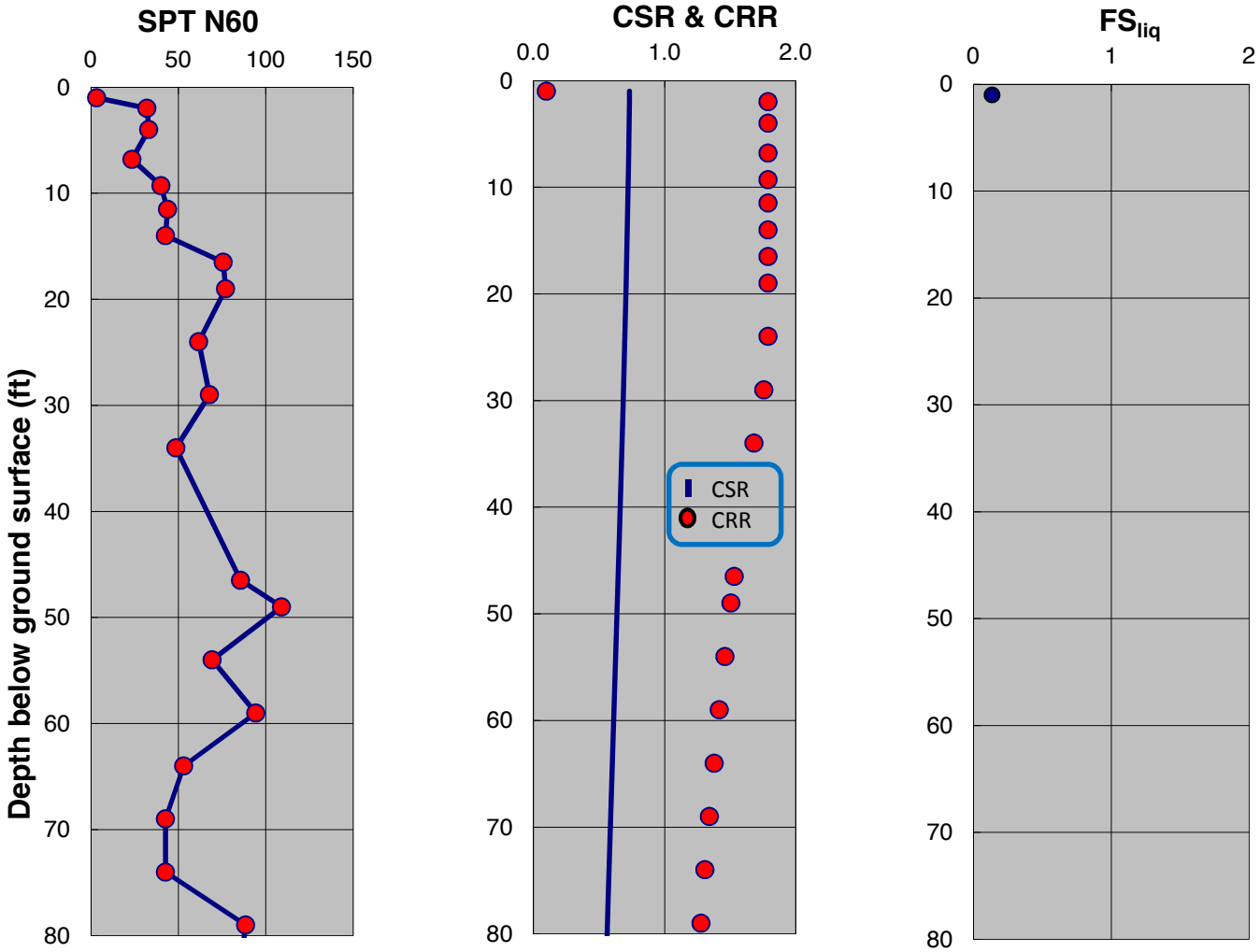
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.148



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-122 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

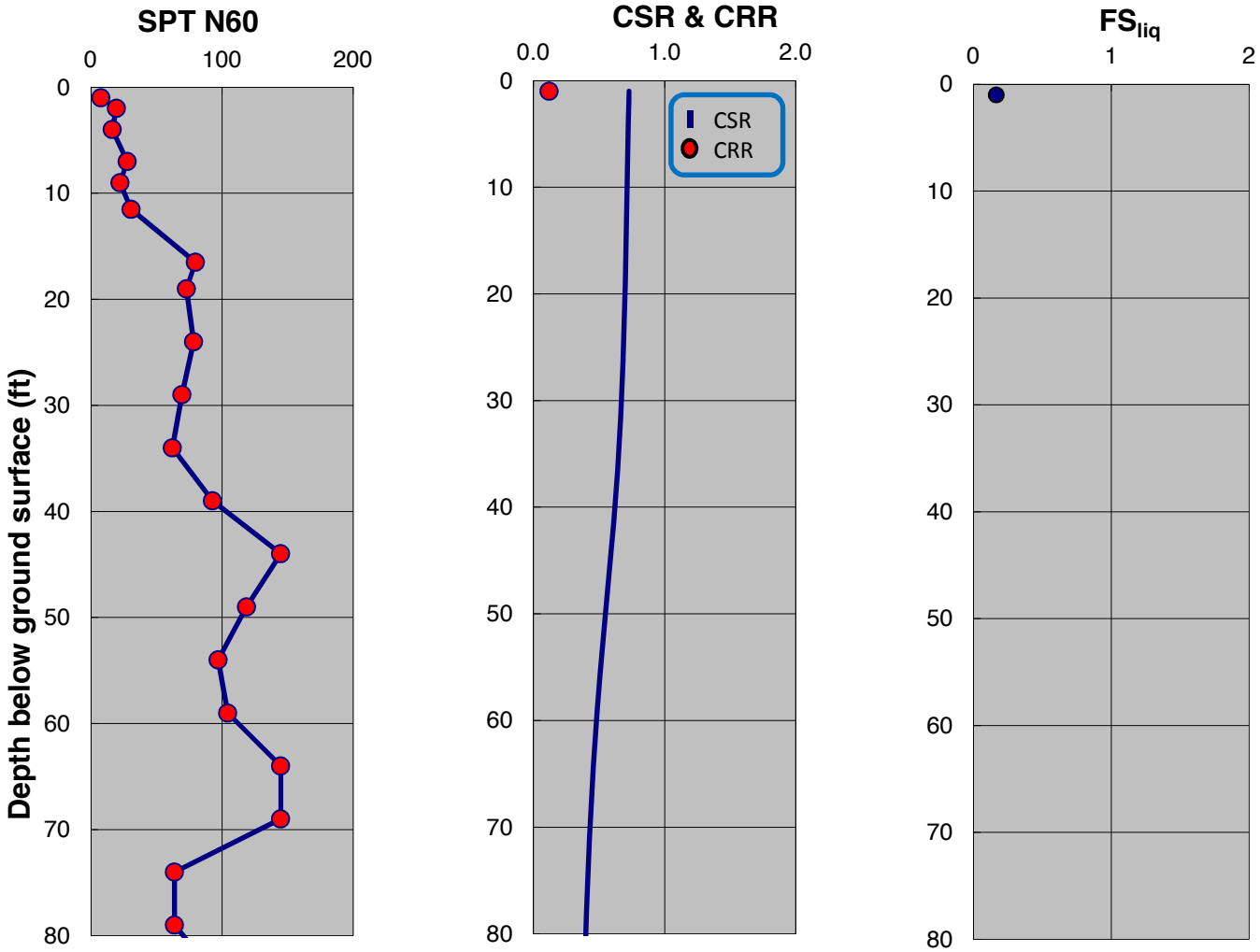
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-122 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

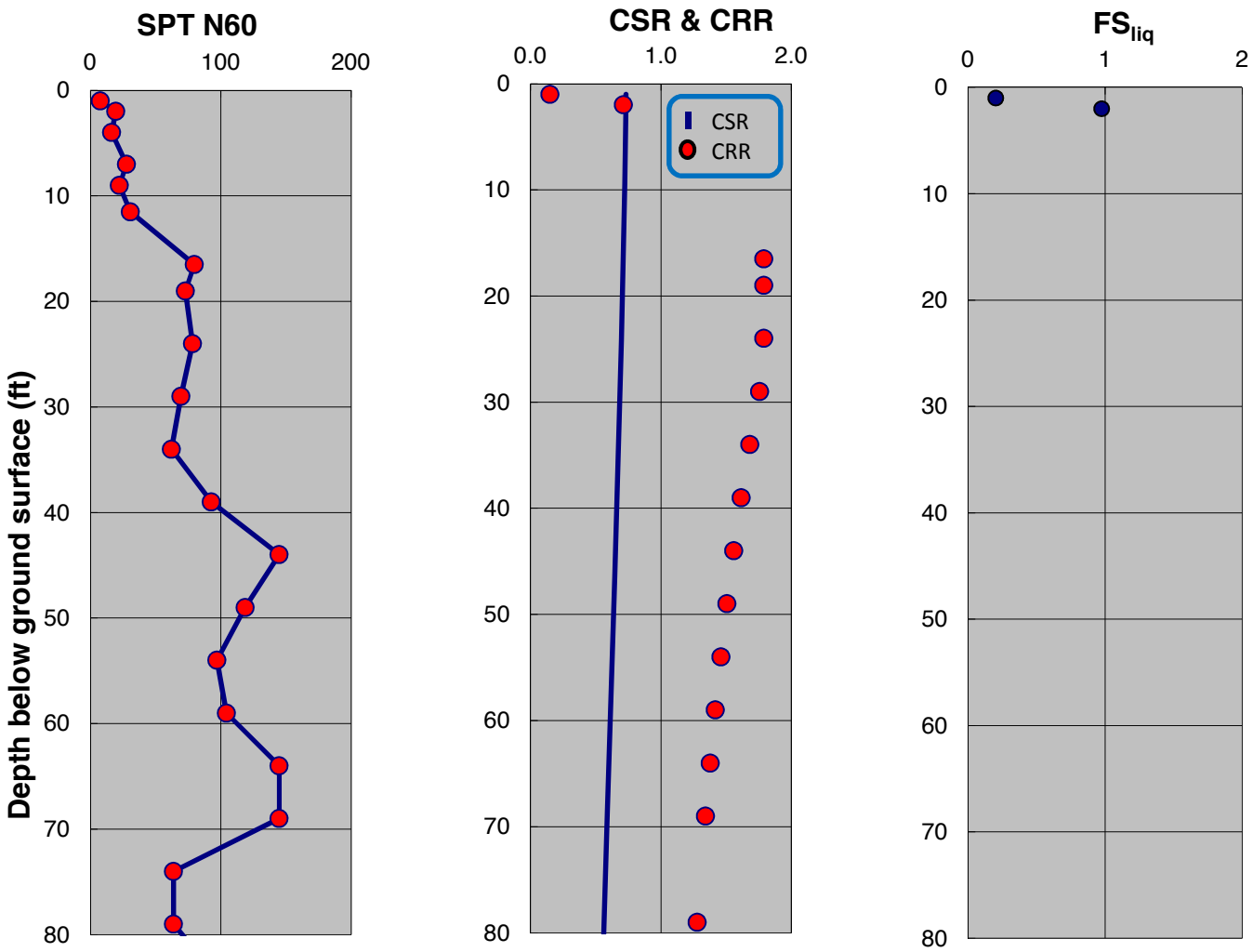
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.150



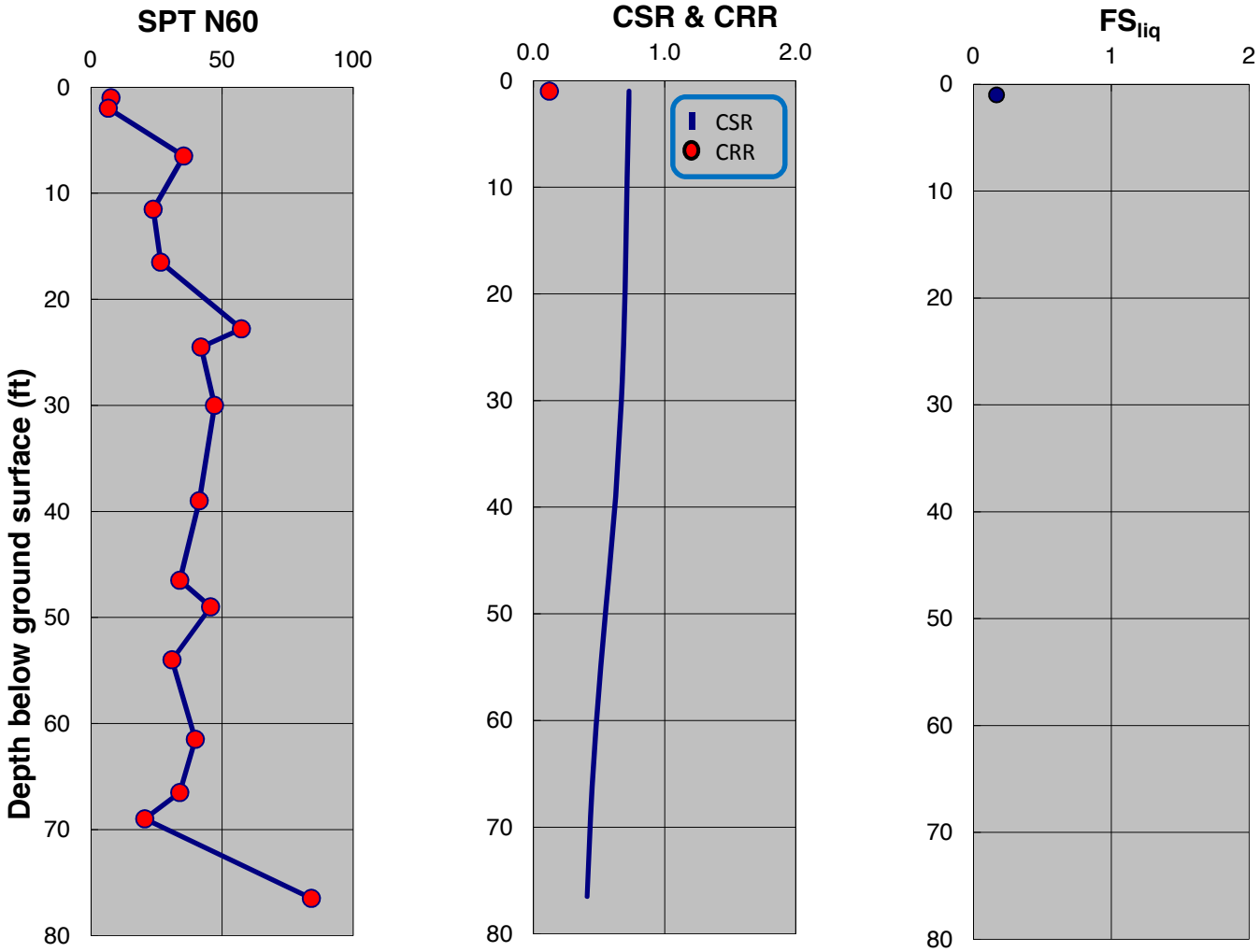
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-123 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



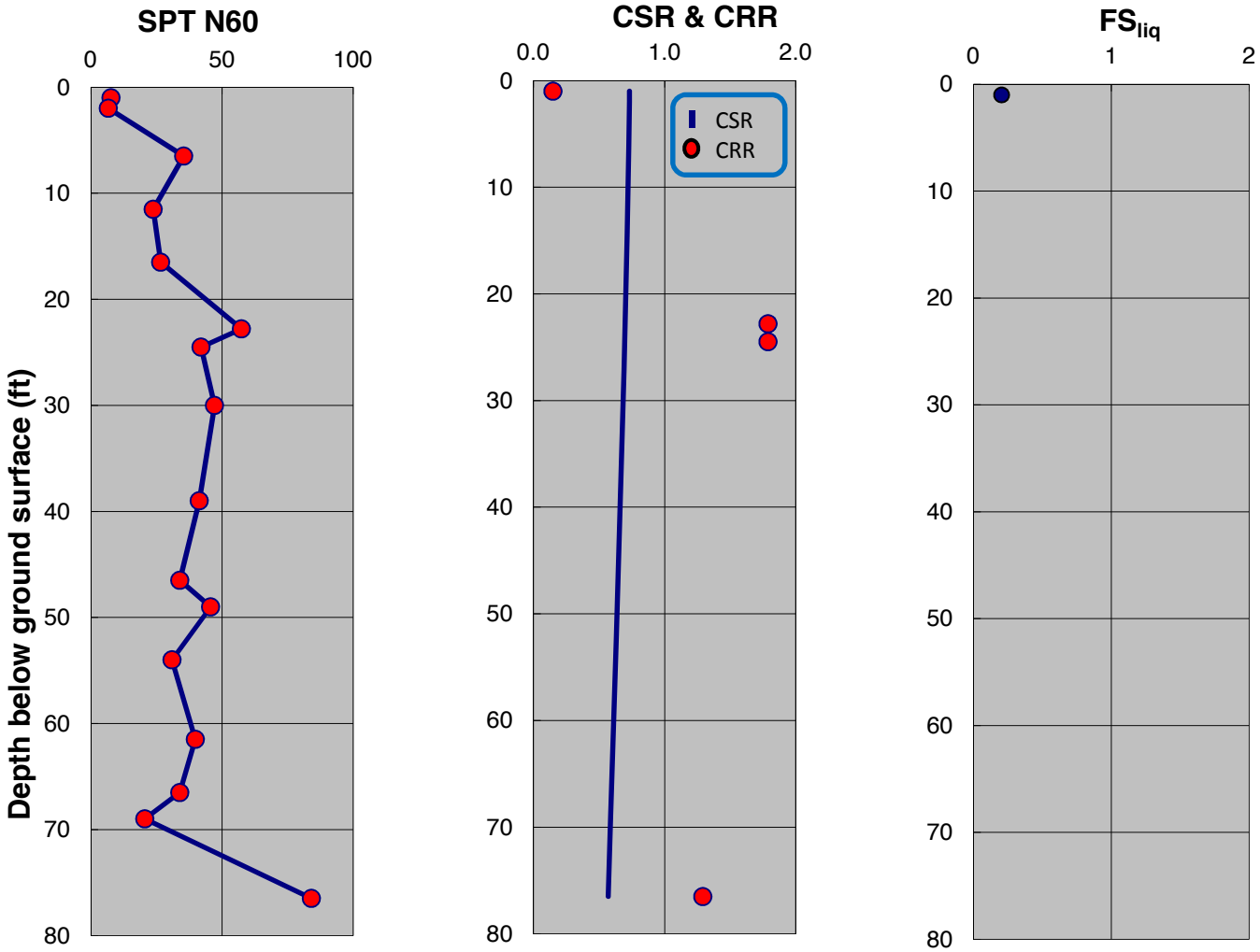
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-123 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



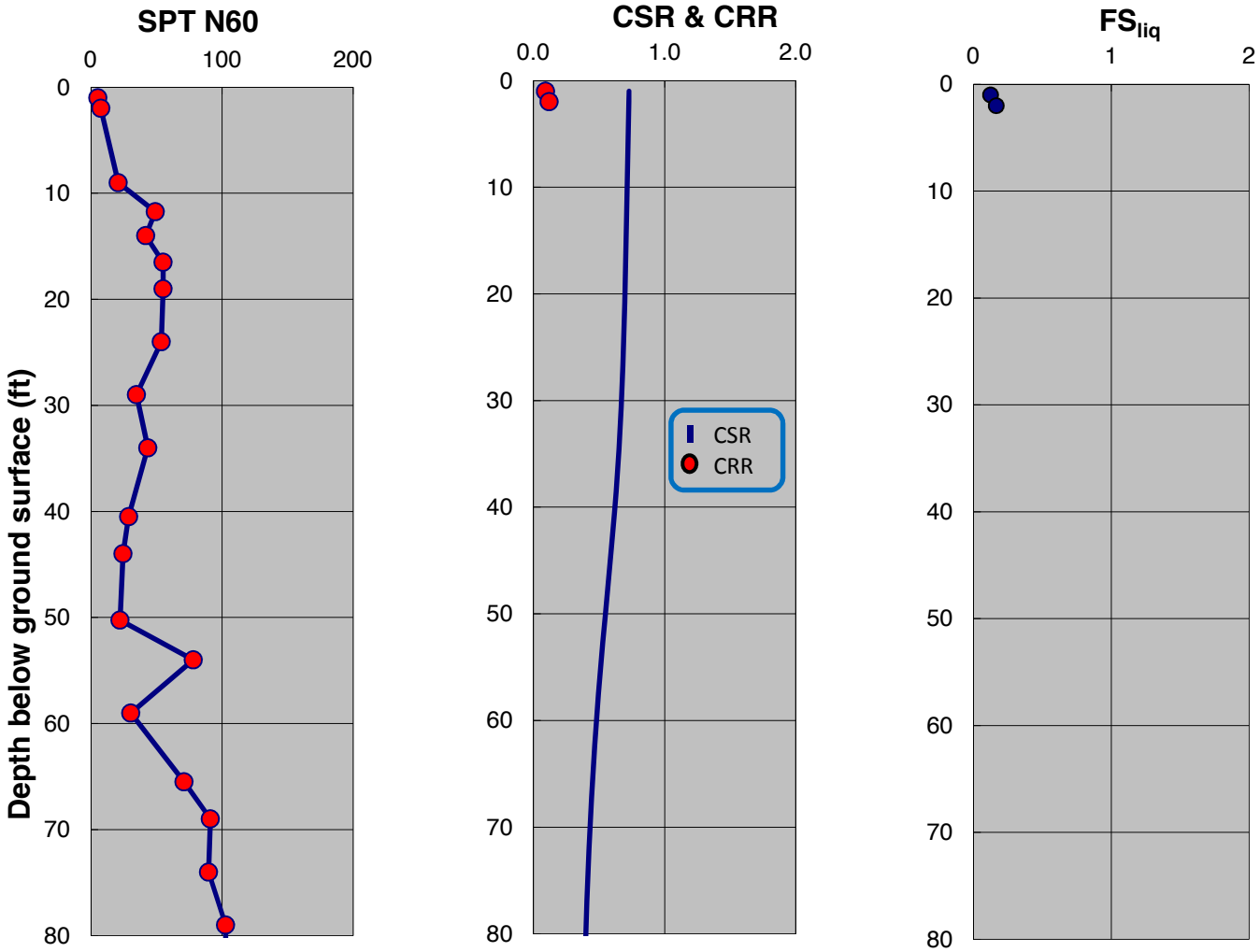
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-124 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



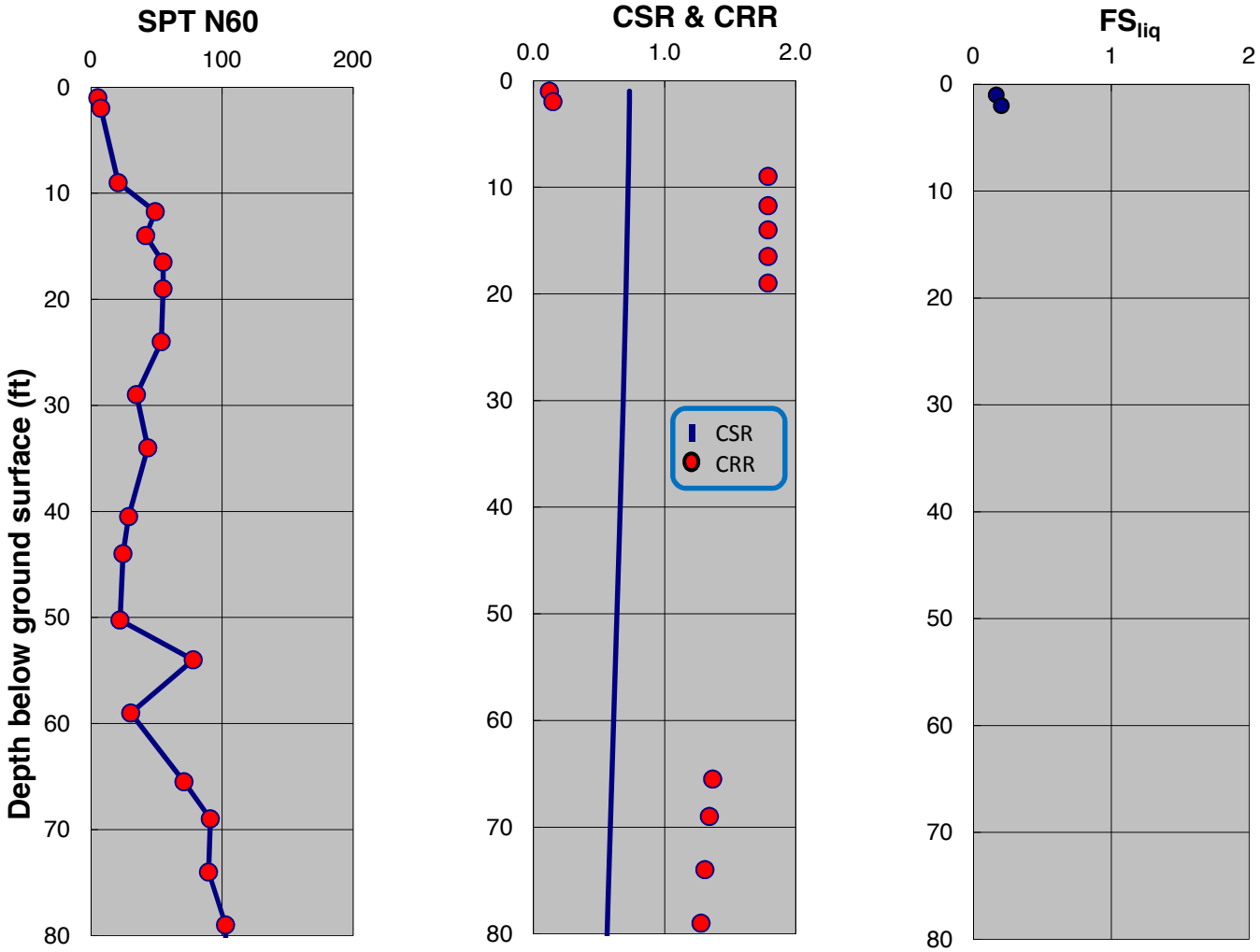
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-124 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



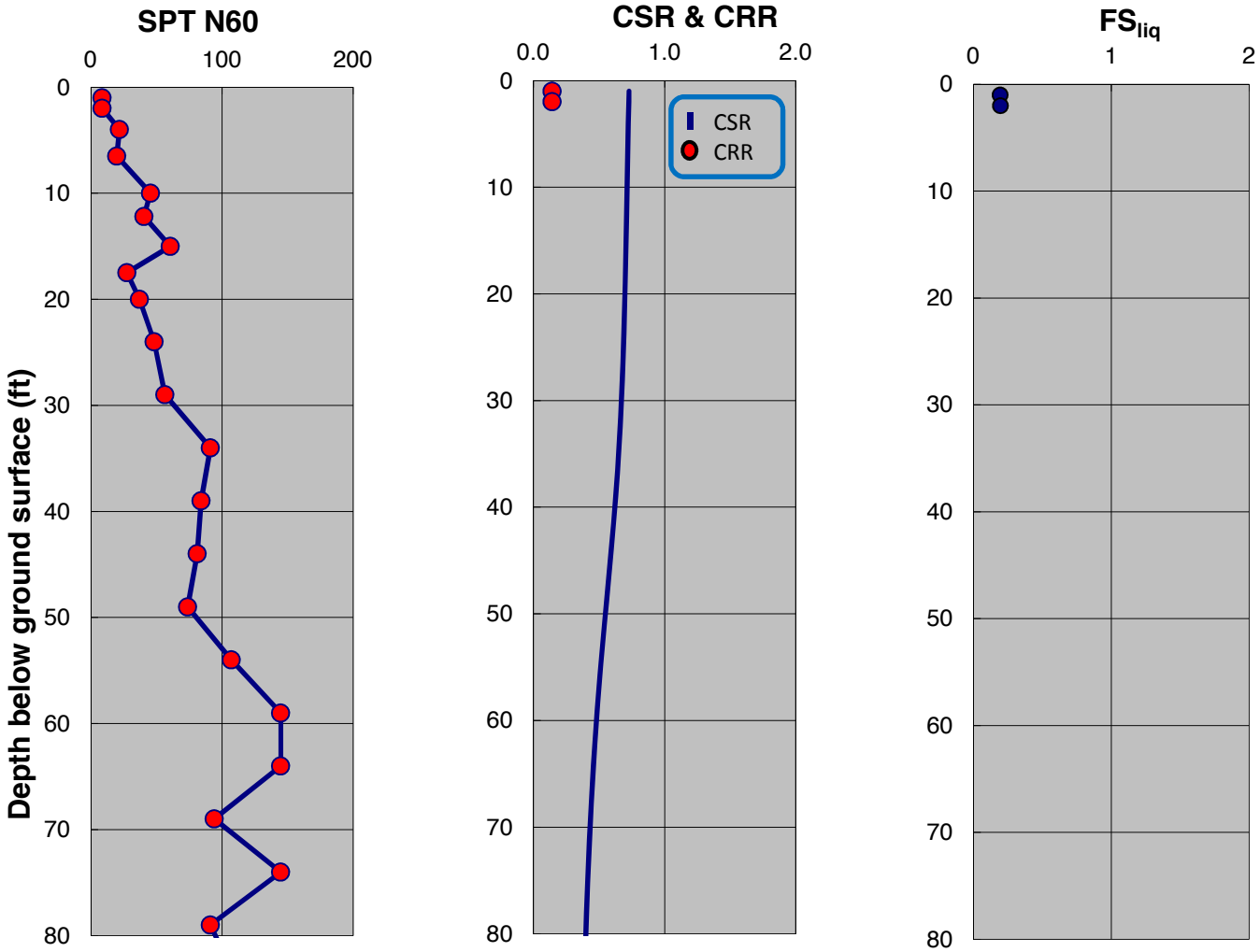
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-125 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-125 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

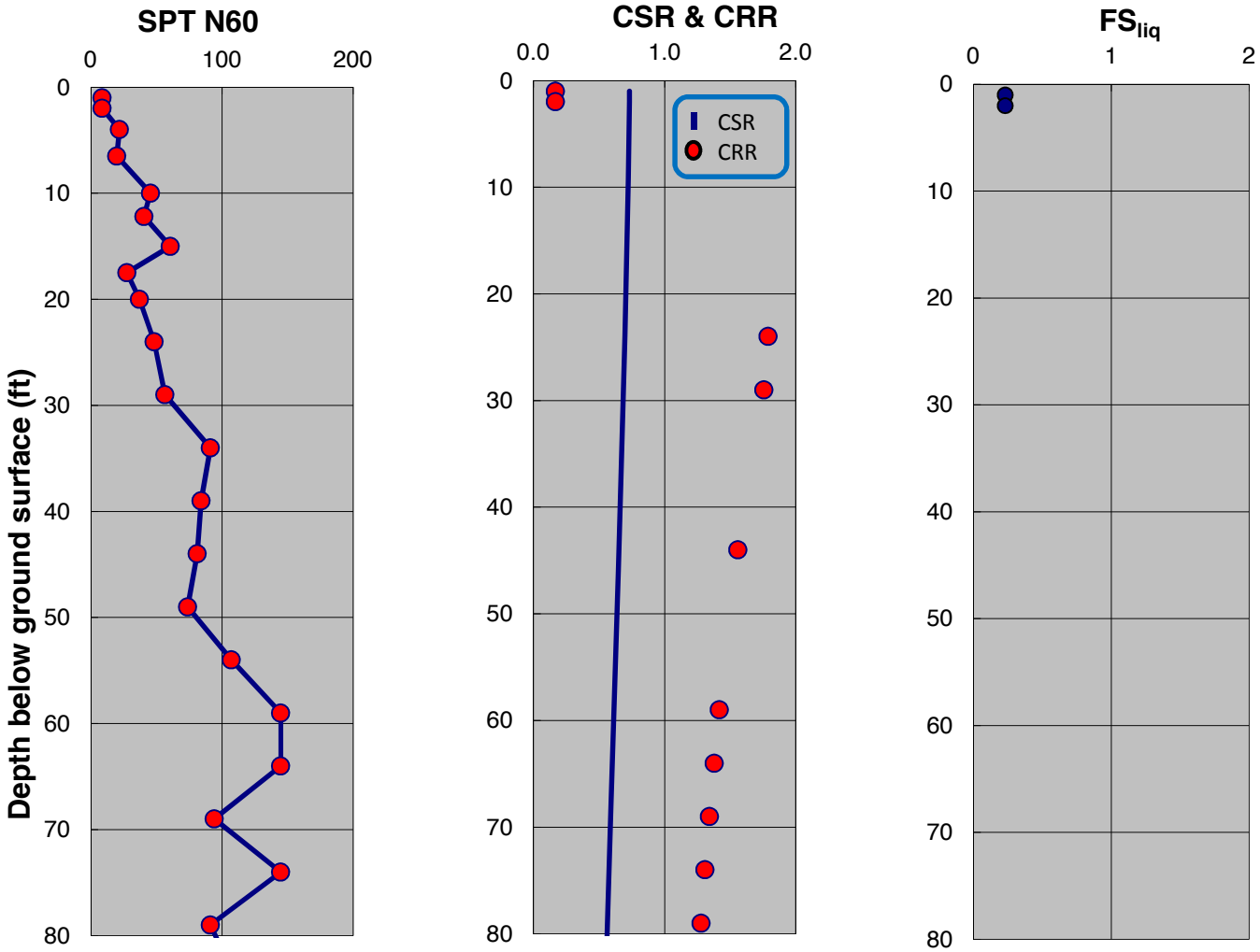
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-126 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

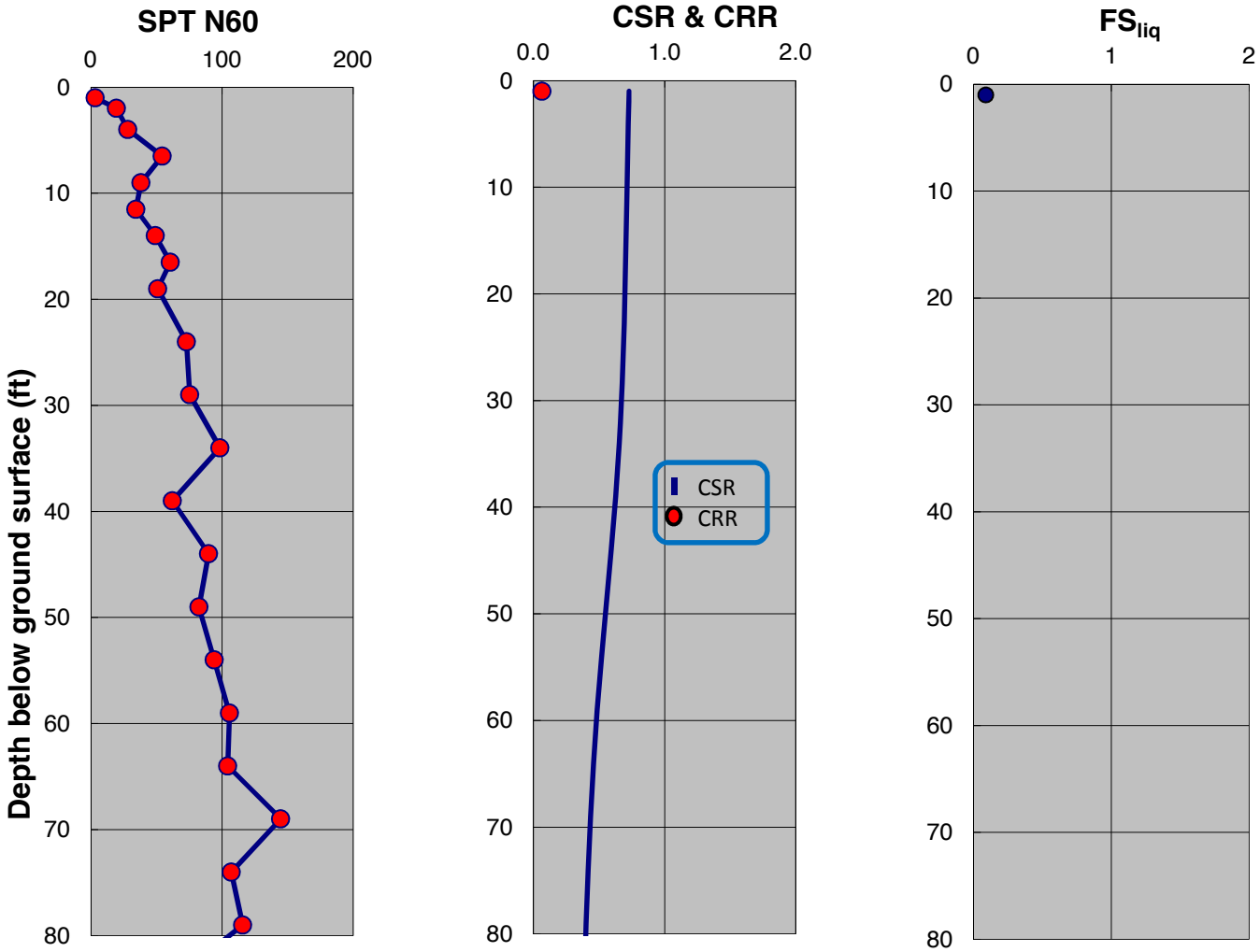
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.157



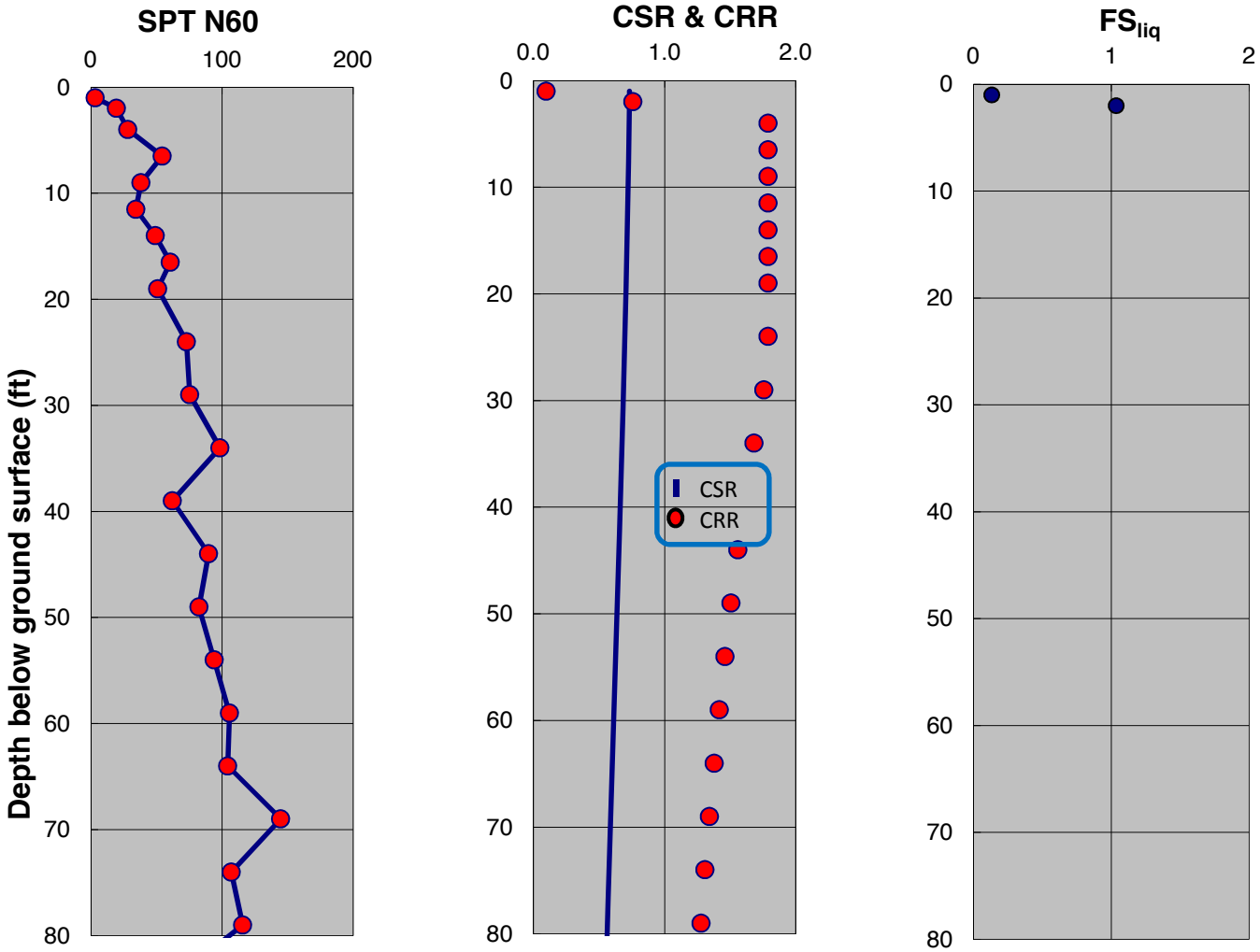
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-126 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-127 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

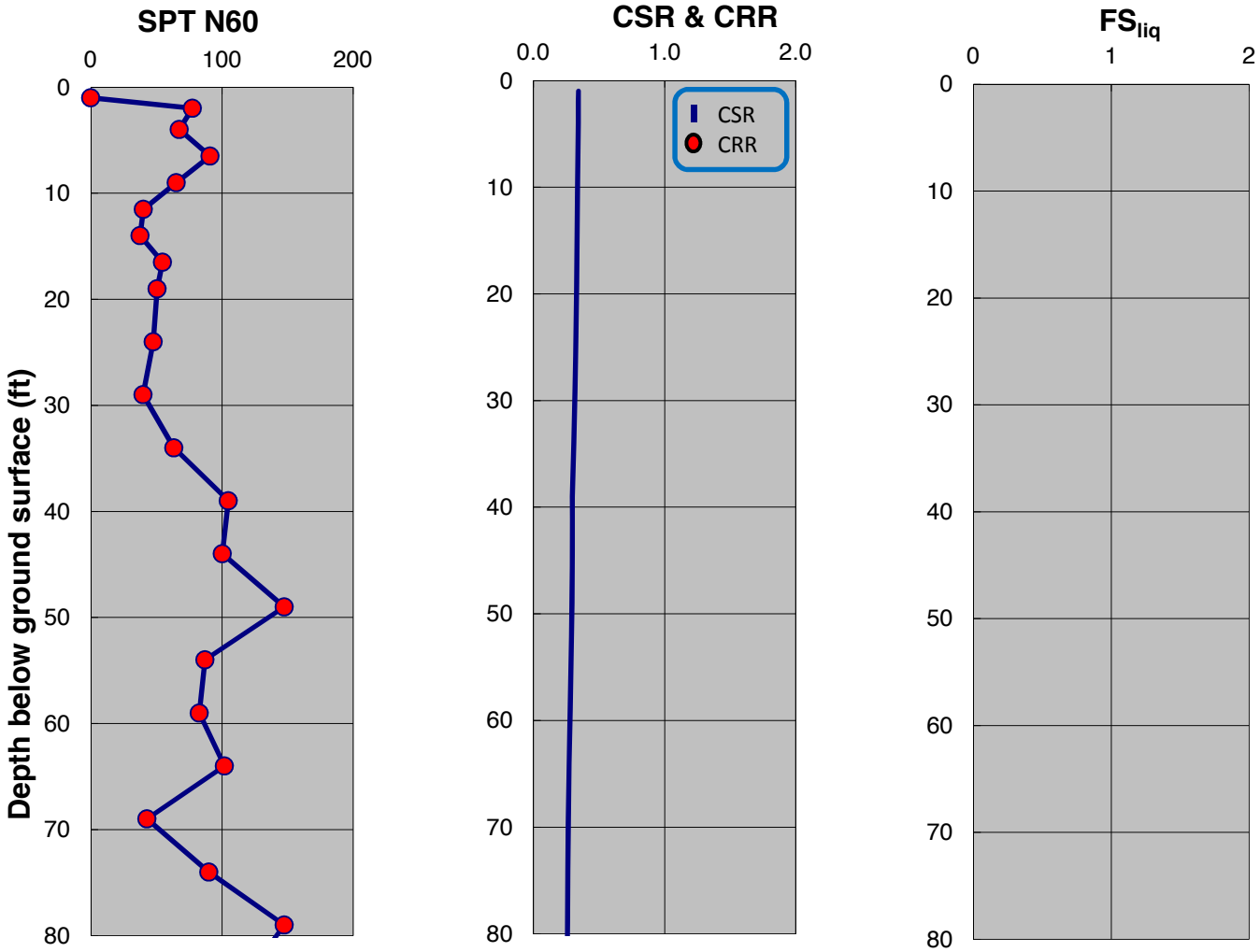
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-127 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

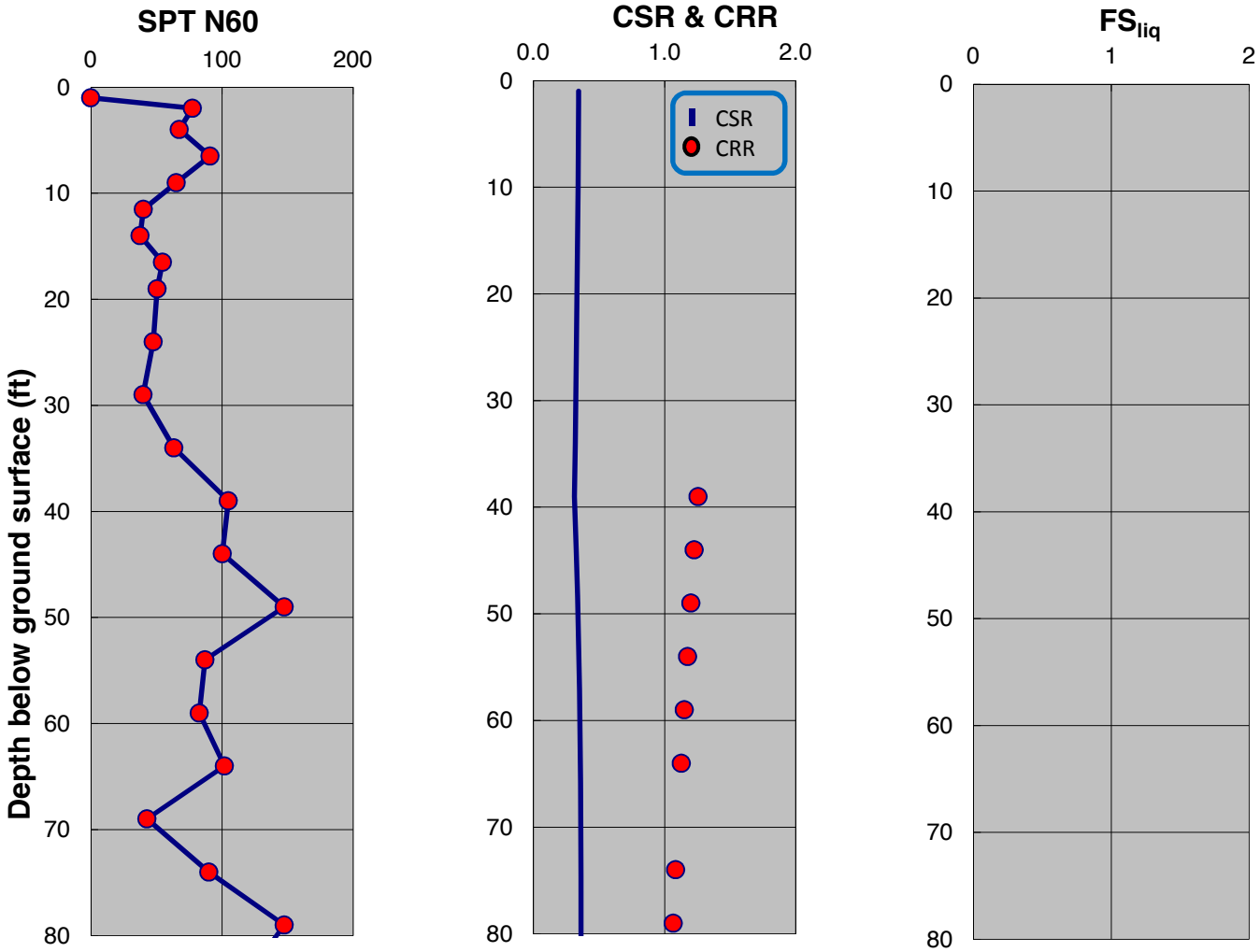
PLATE A.160



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-131 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

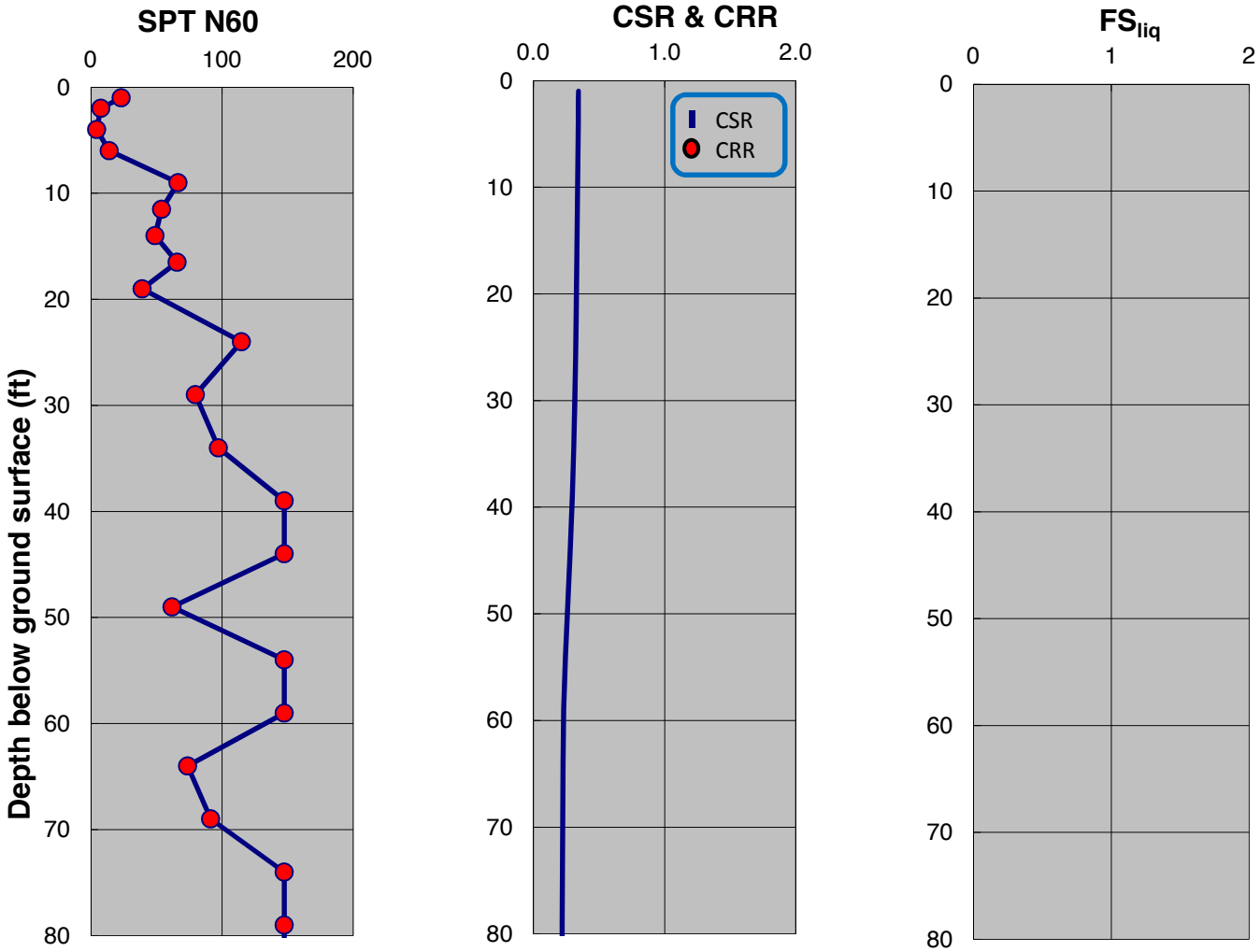
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.161



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-131 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

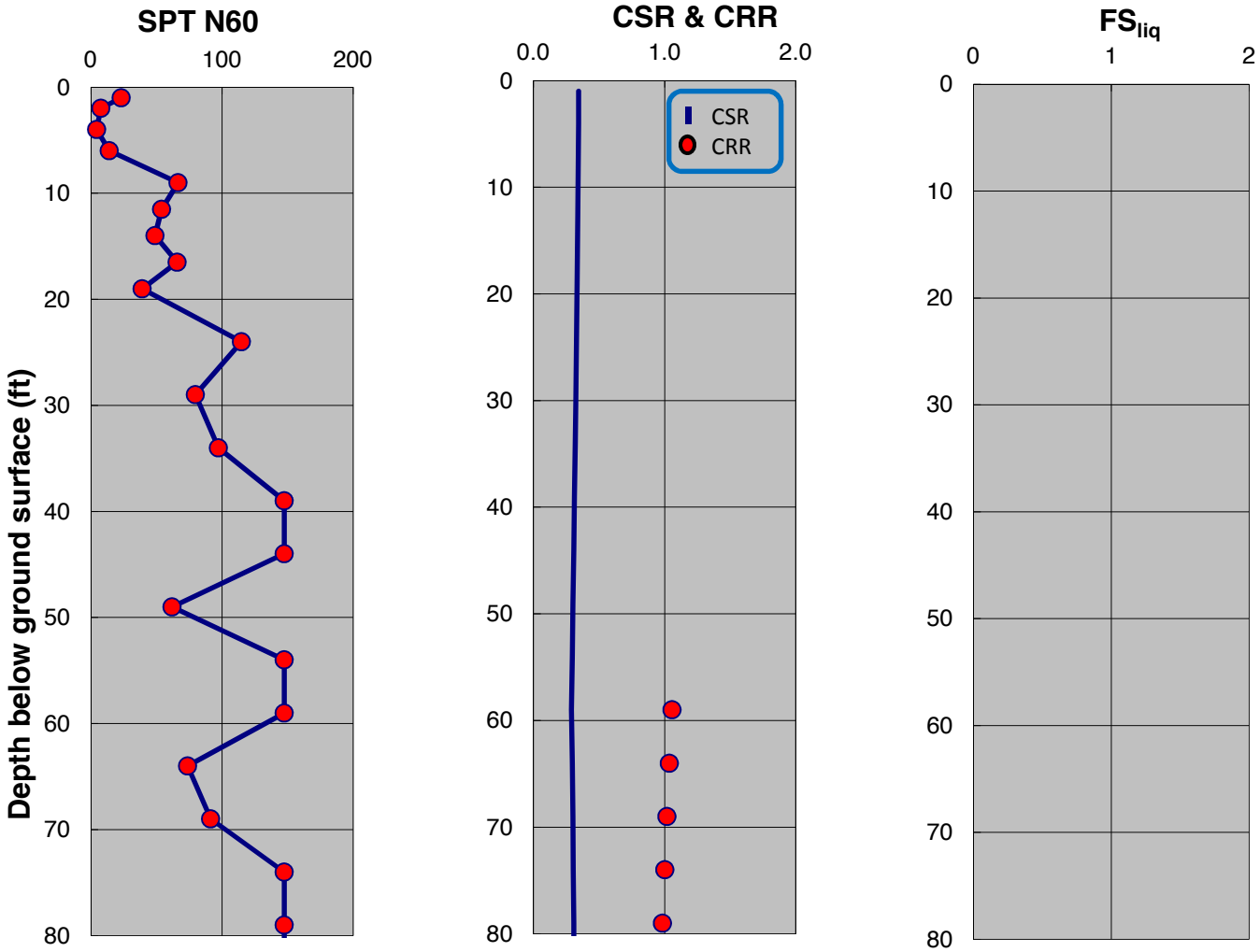
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-132 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

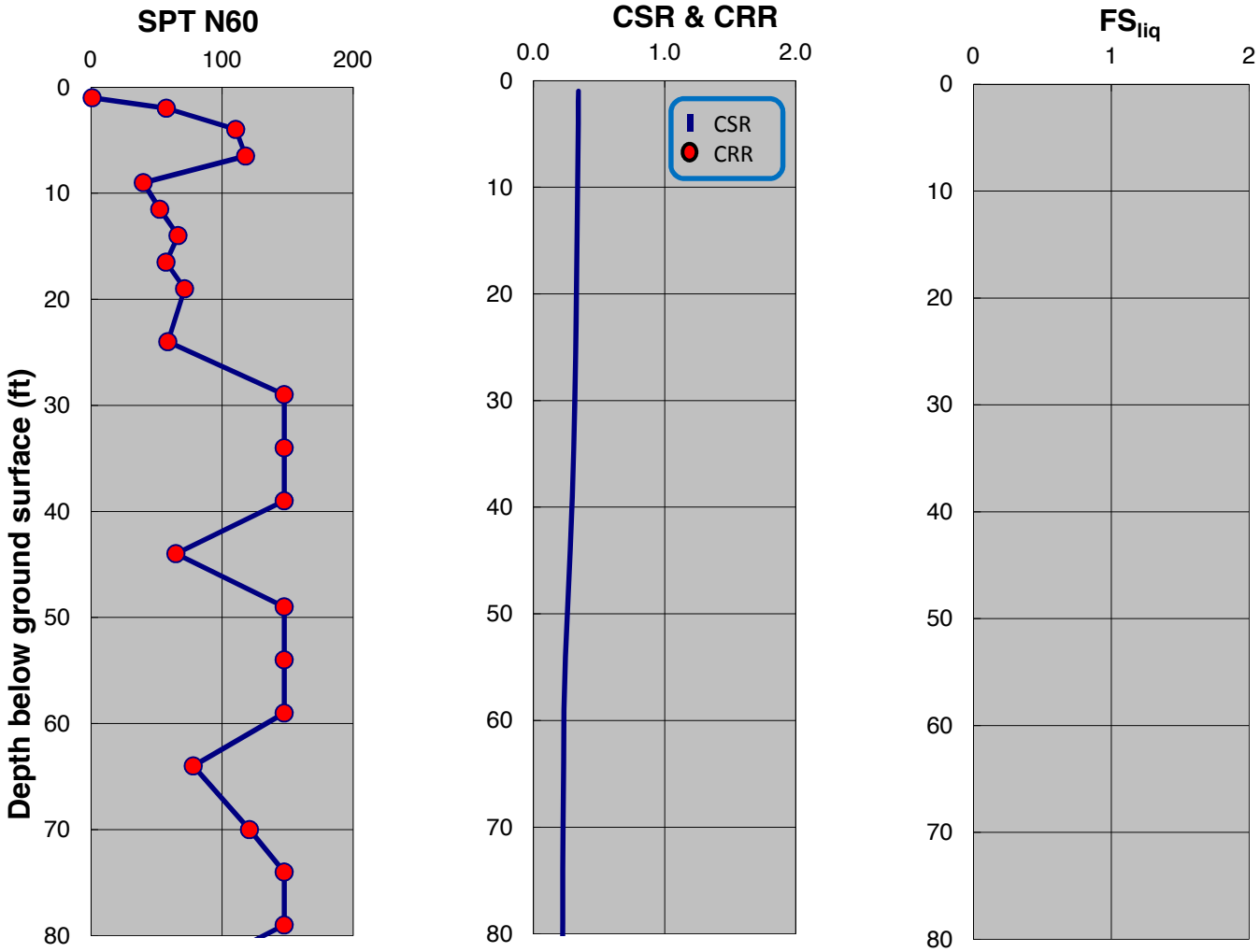
PLATE A.163



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-132 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

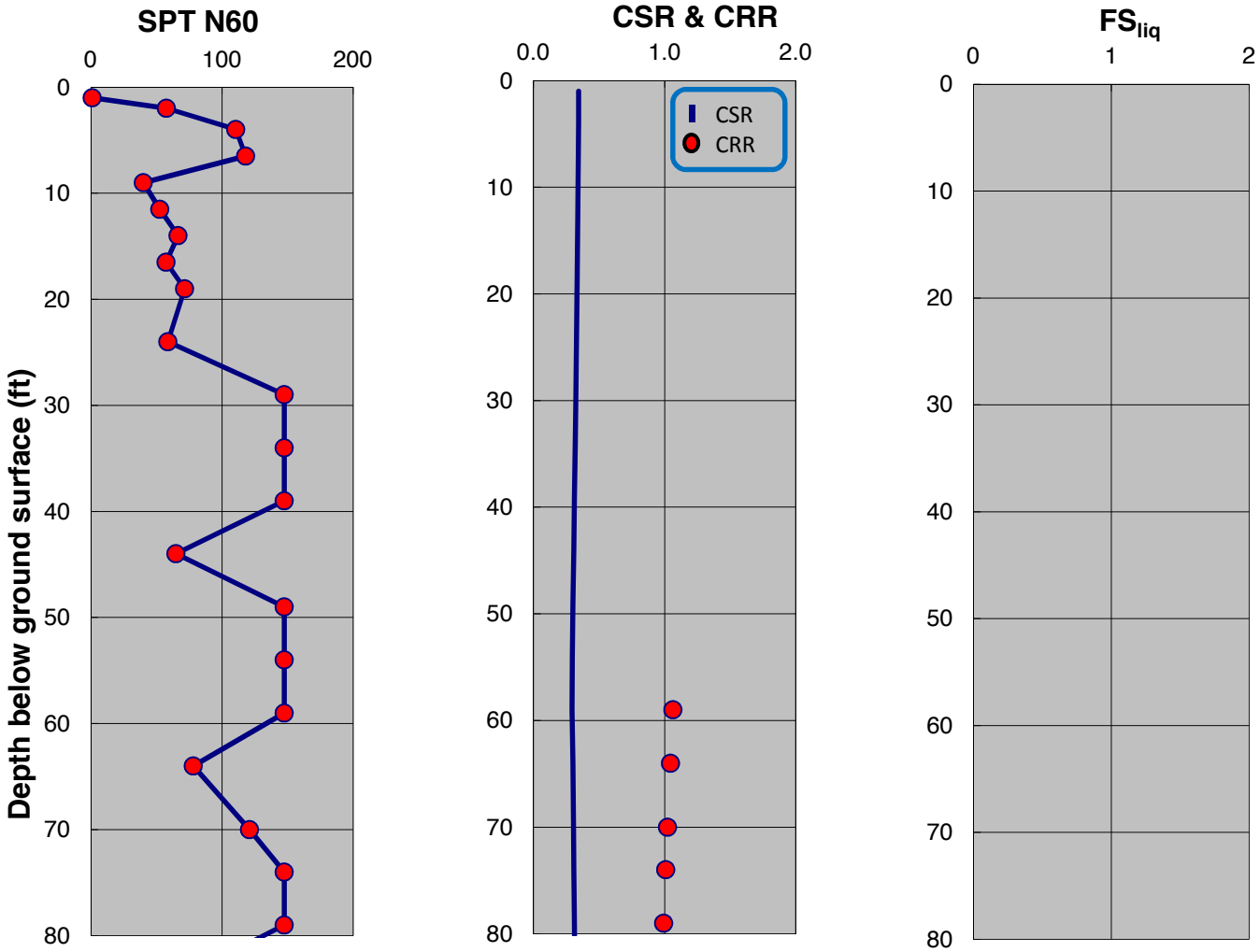
PLATE A.164



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-133 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

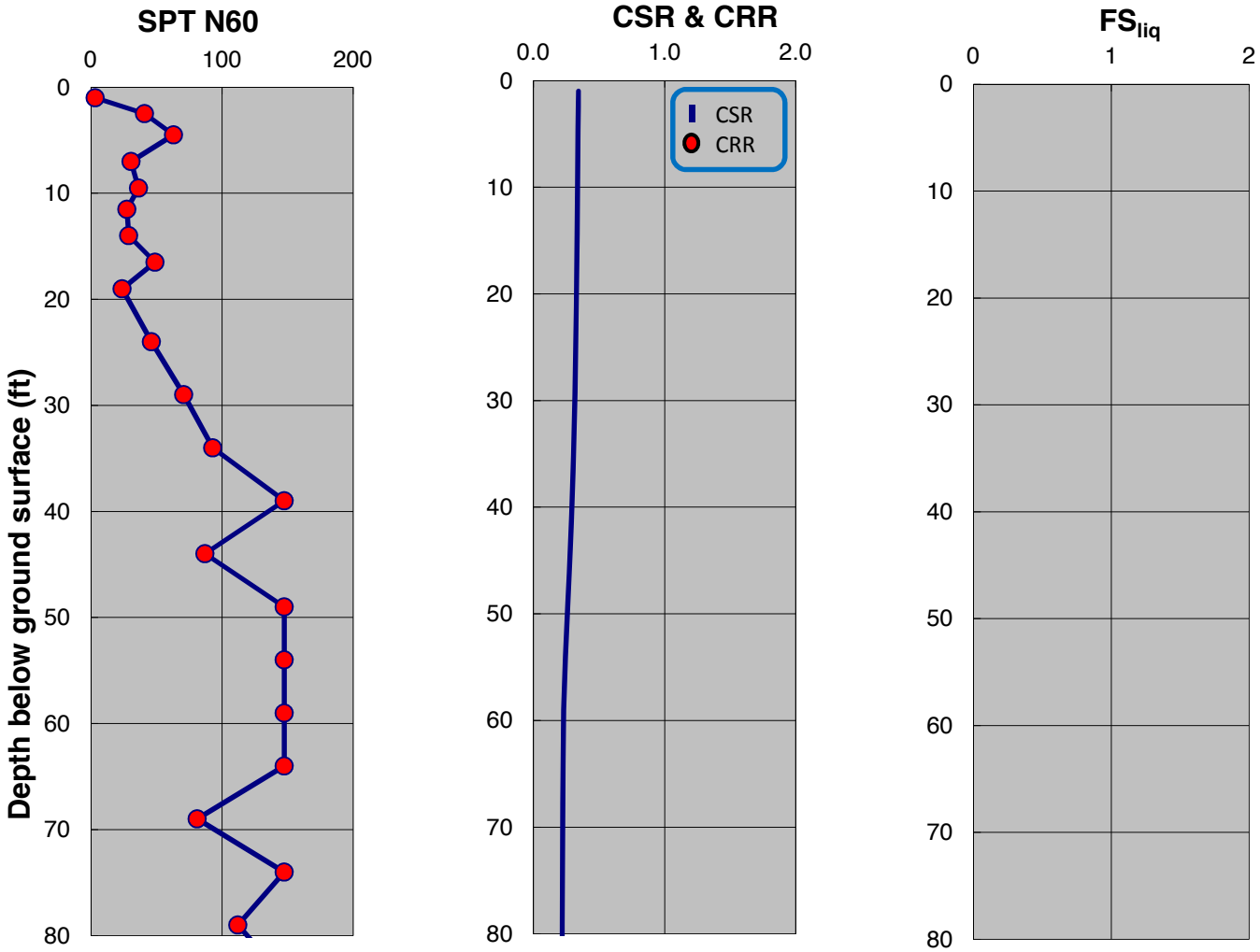
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.165



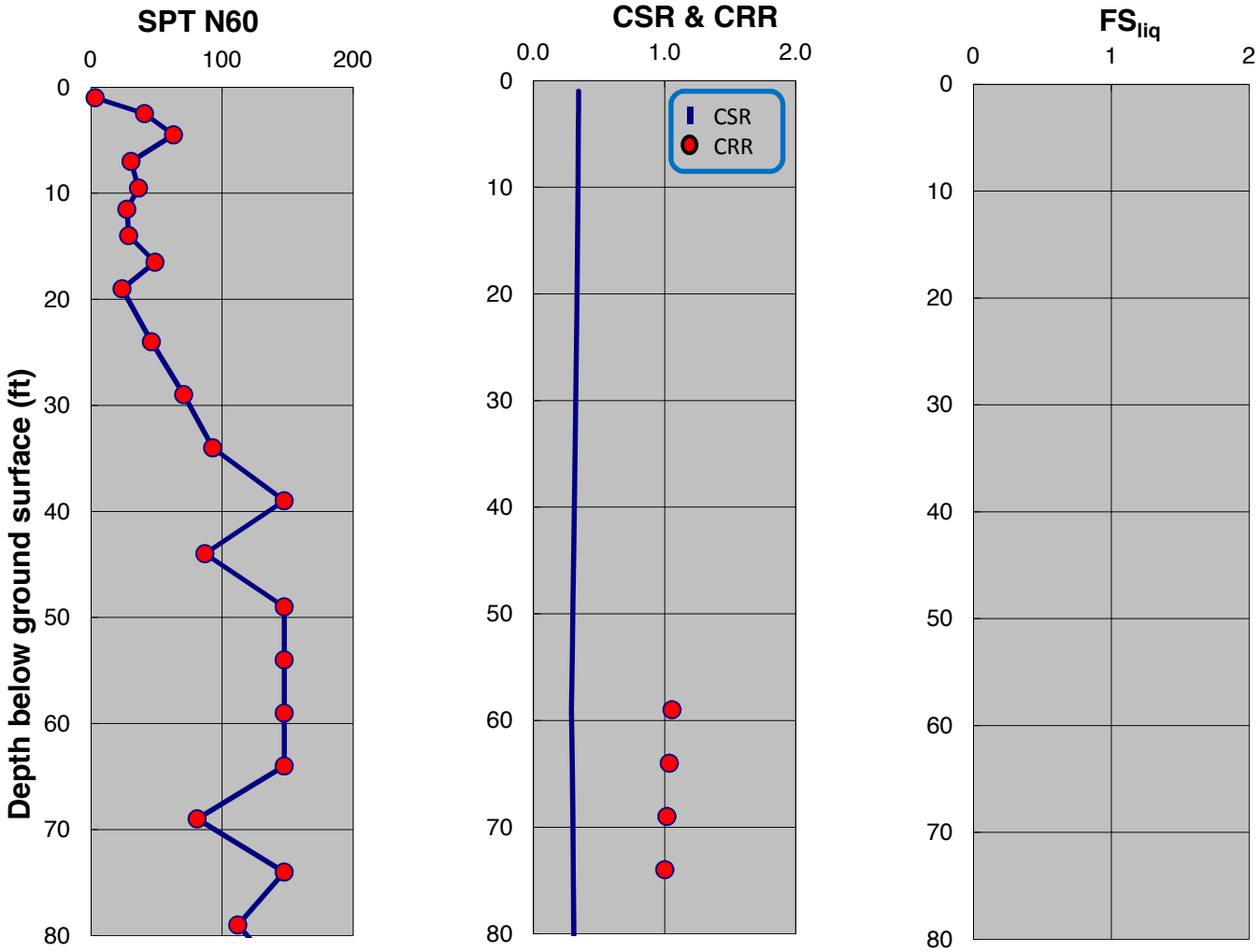
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-133 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



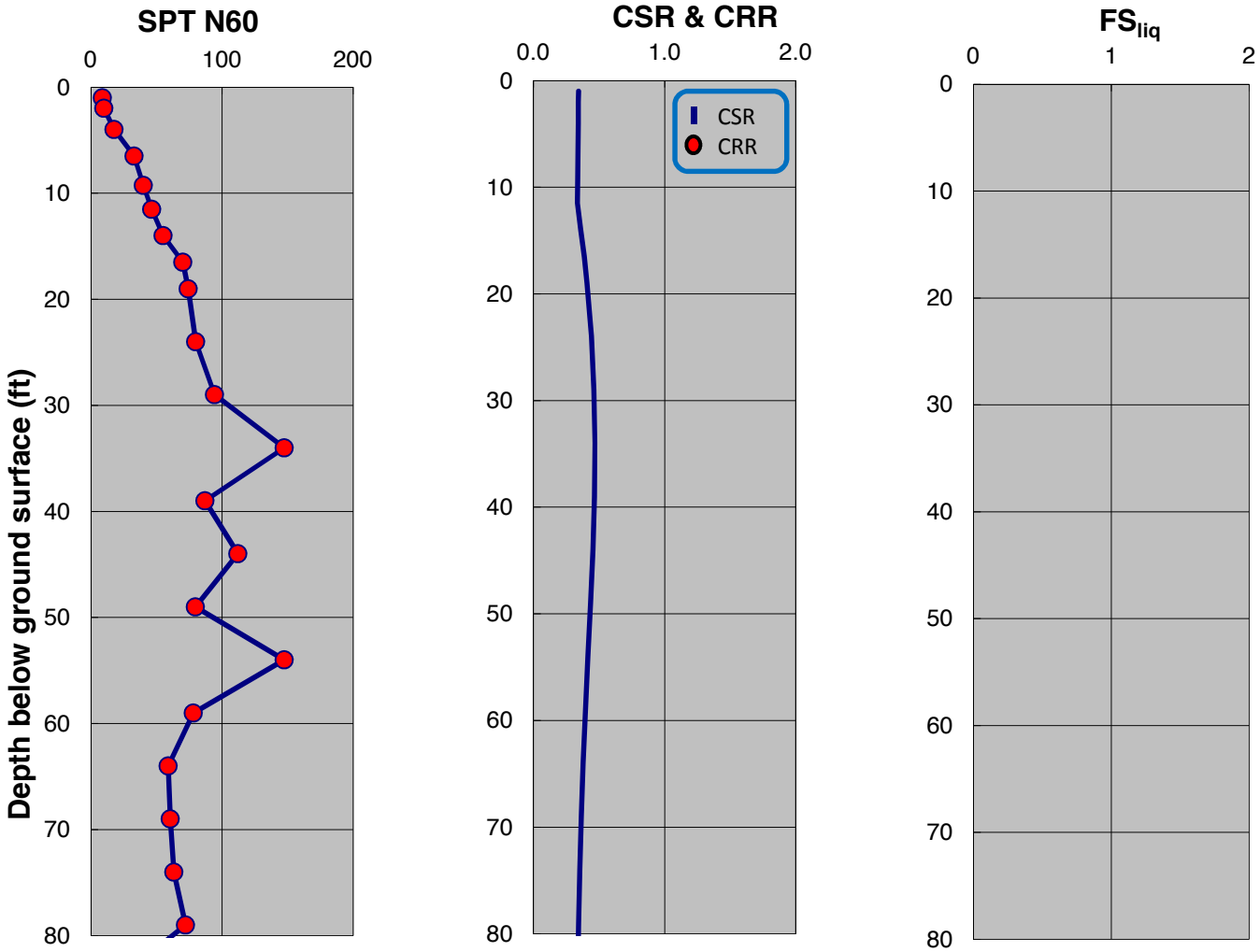
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-135 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-135 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

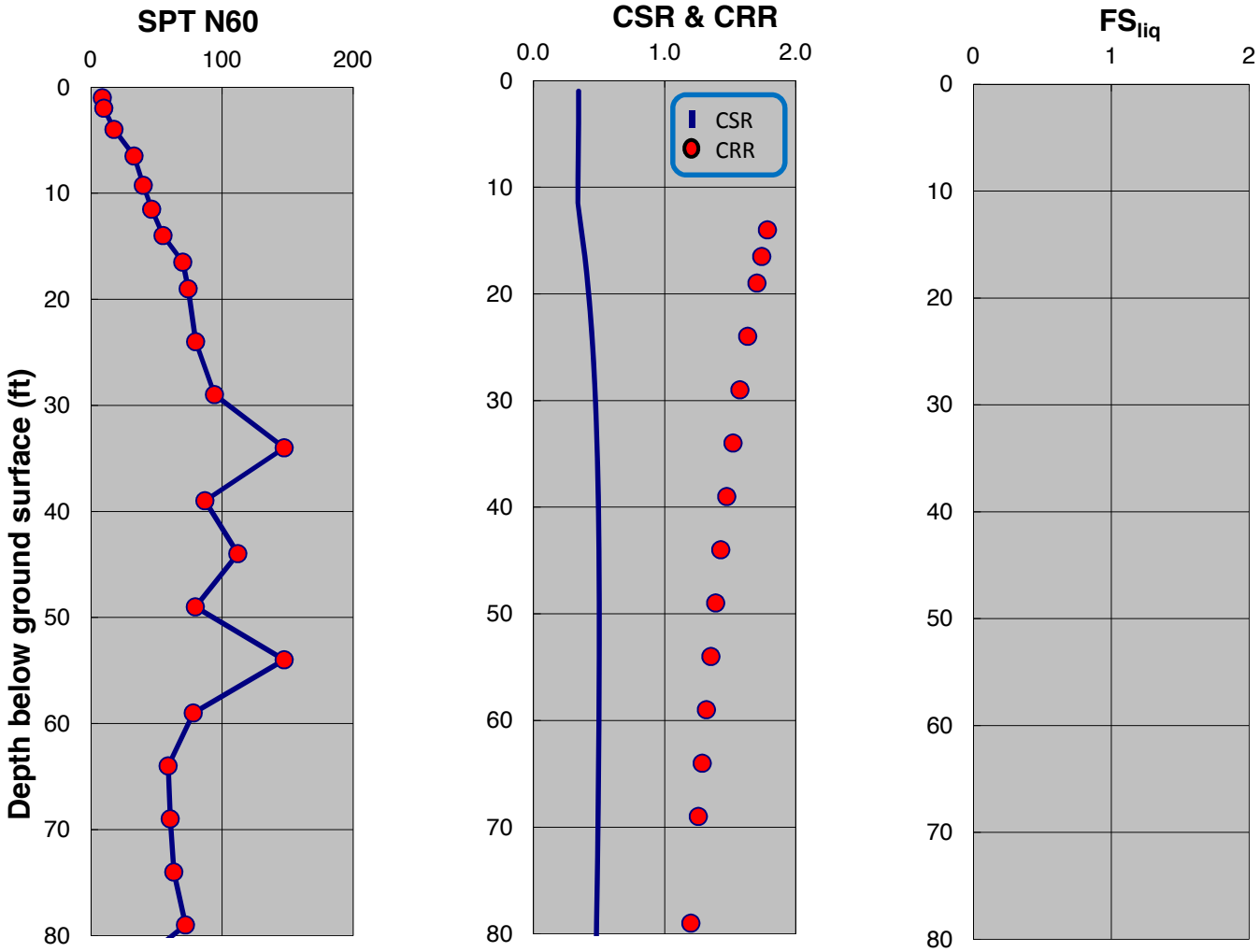
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-136 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

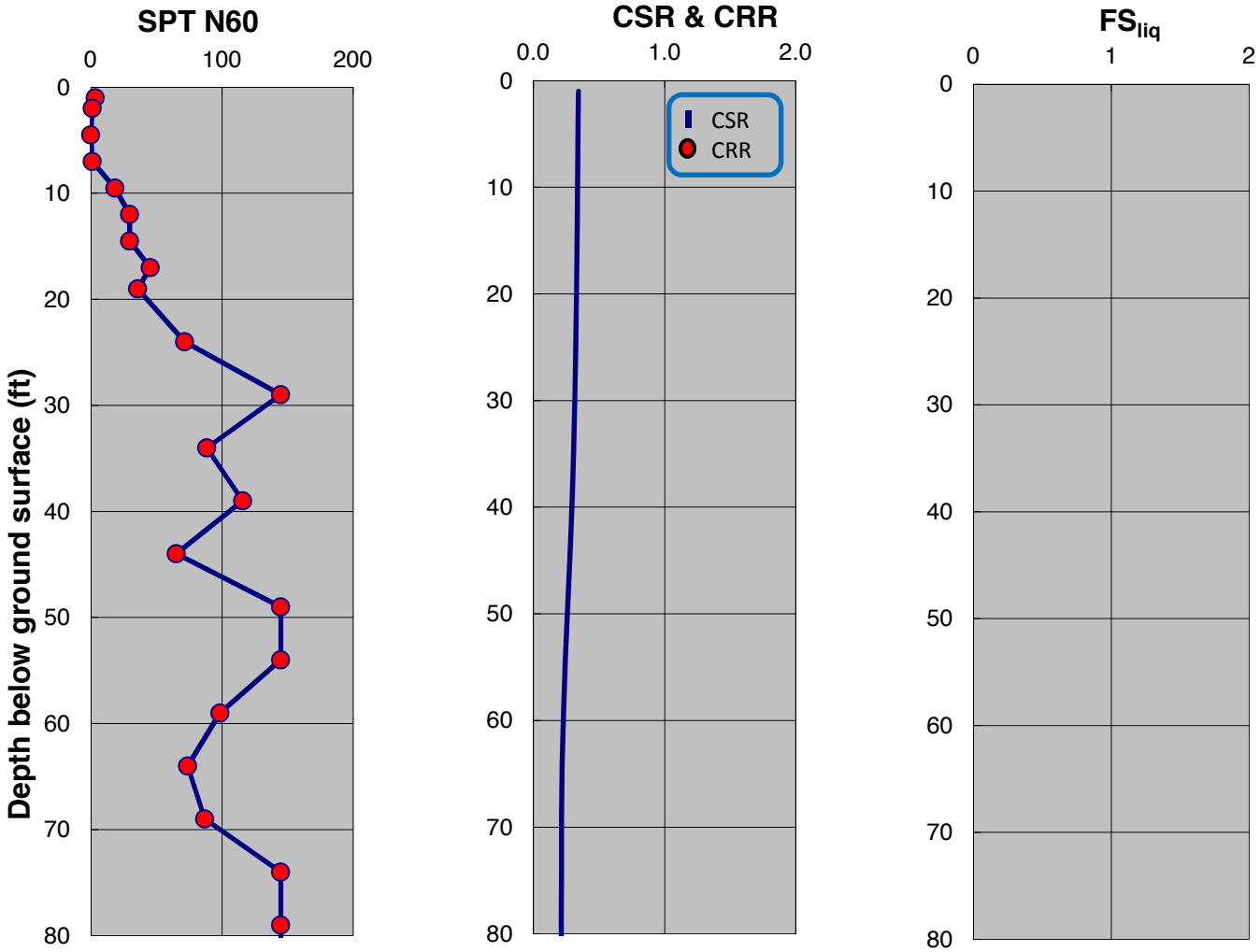
PLATE A.169



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-136 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

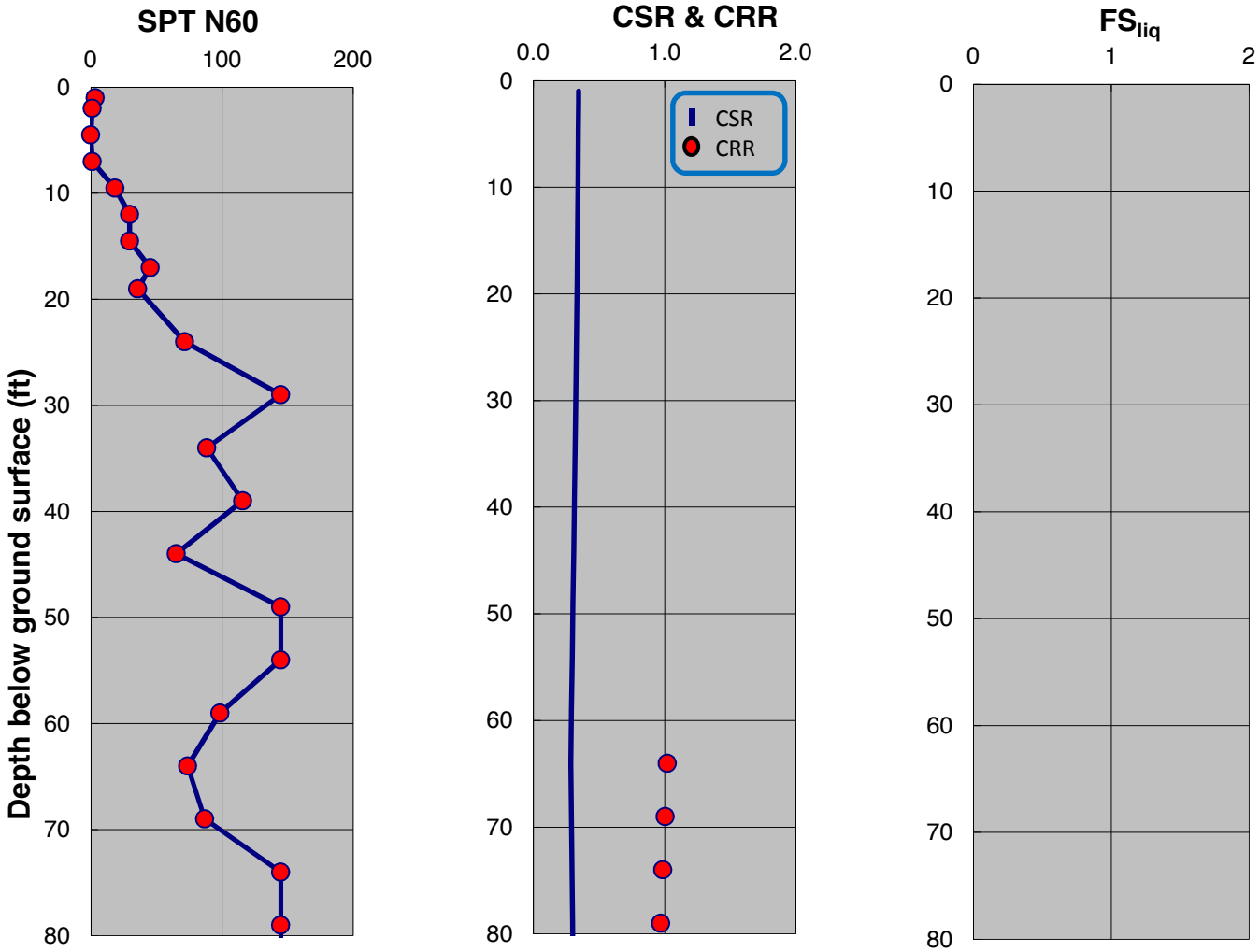
PLATE A.170



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-137 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

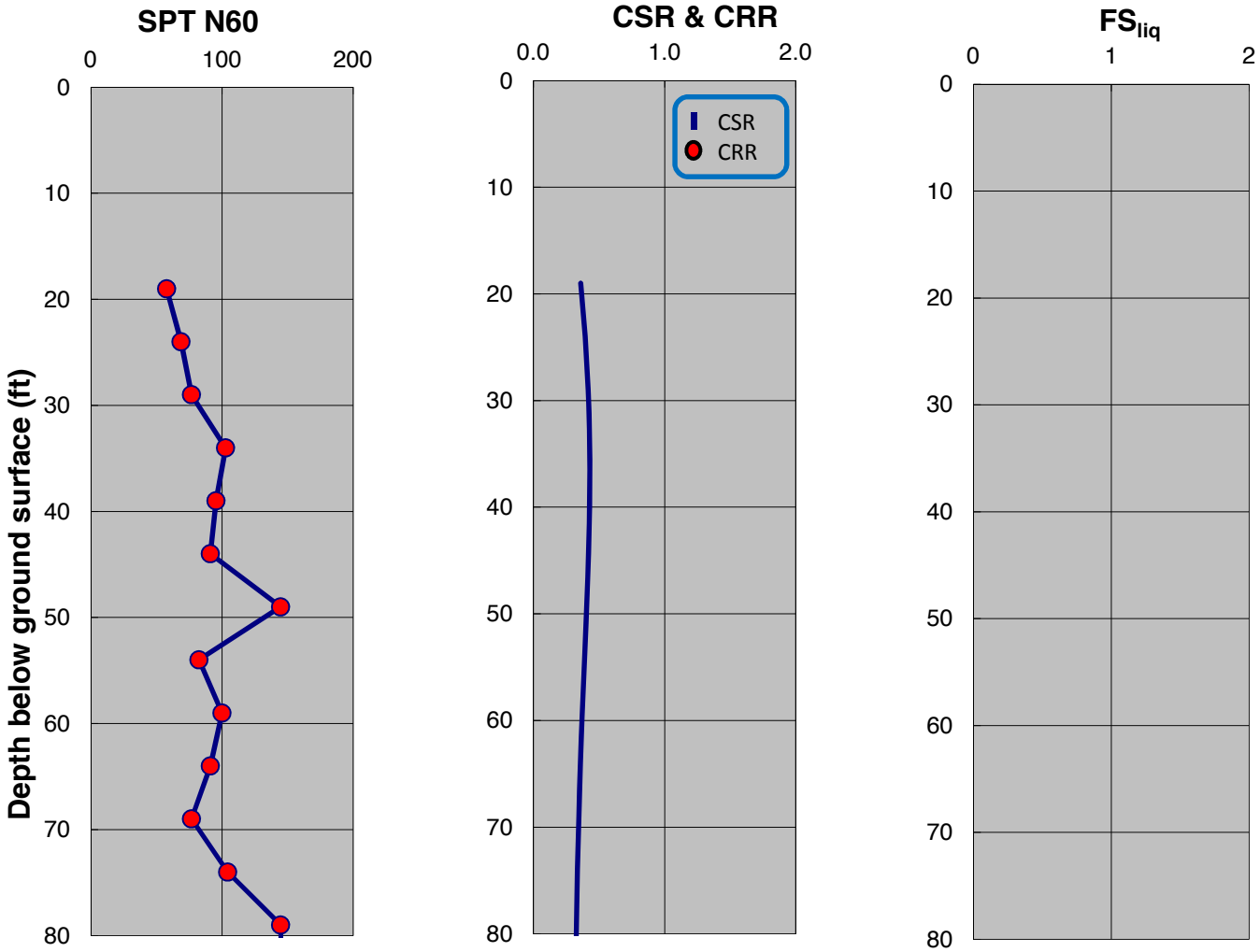
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.171



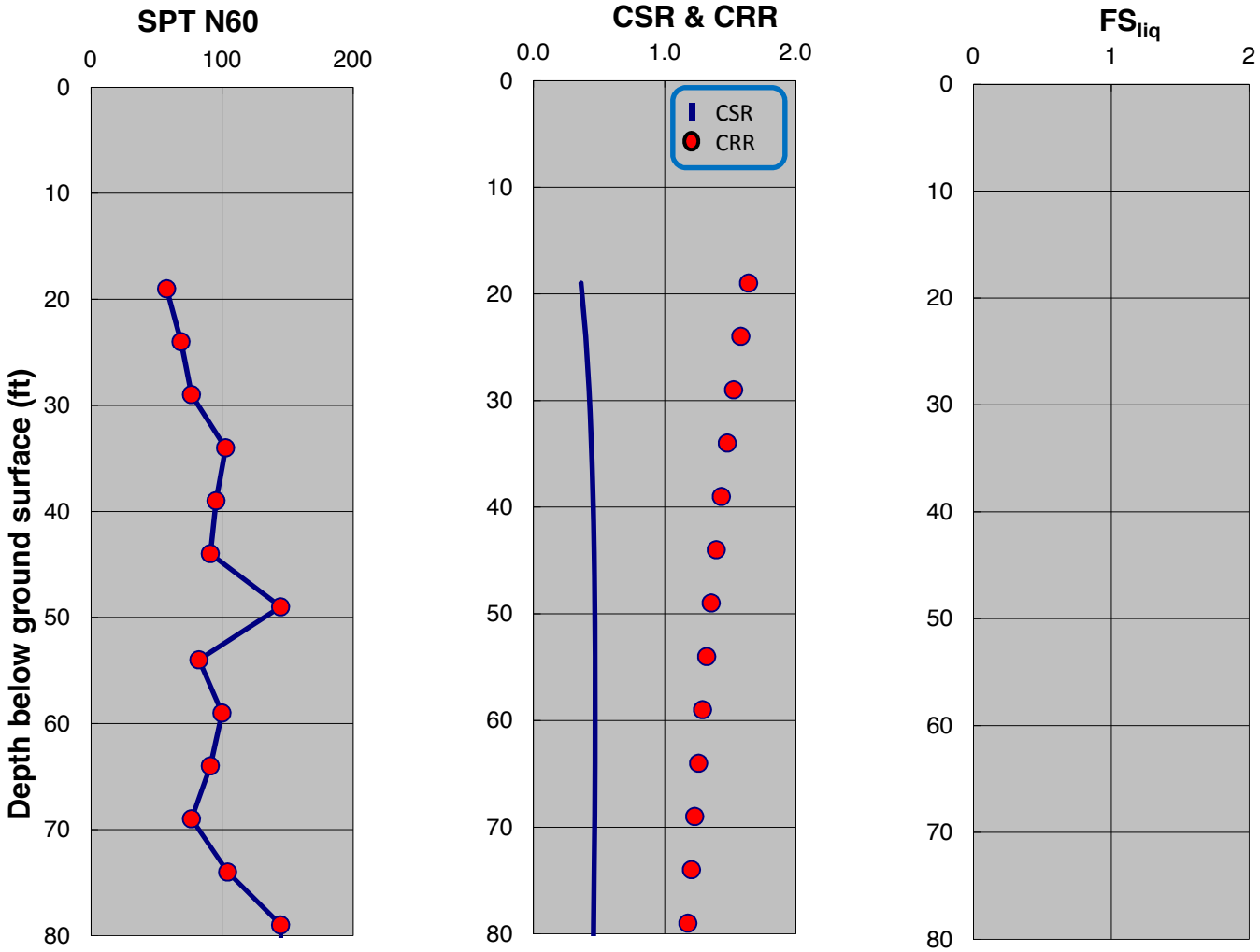
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-137 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



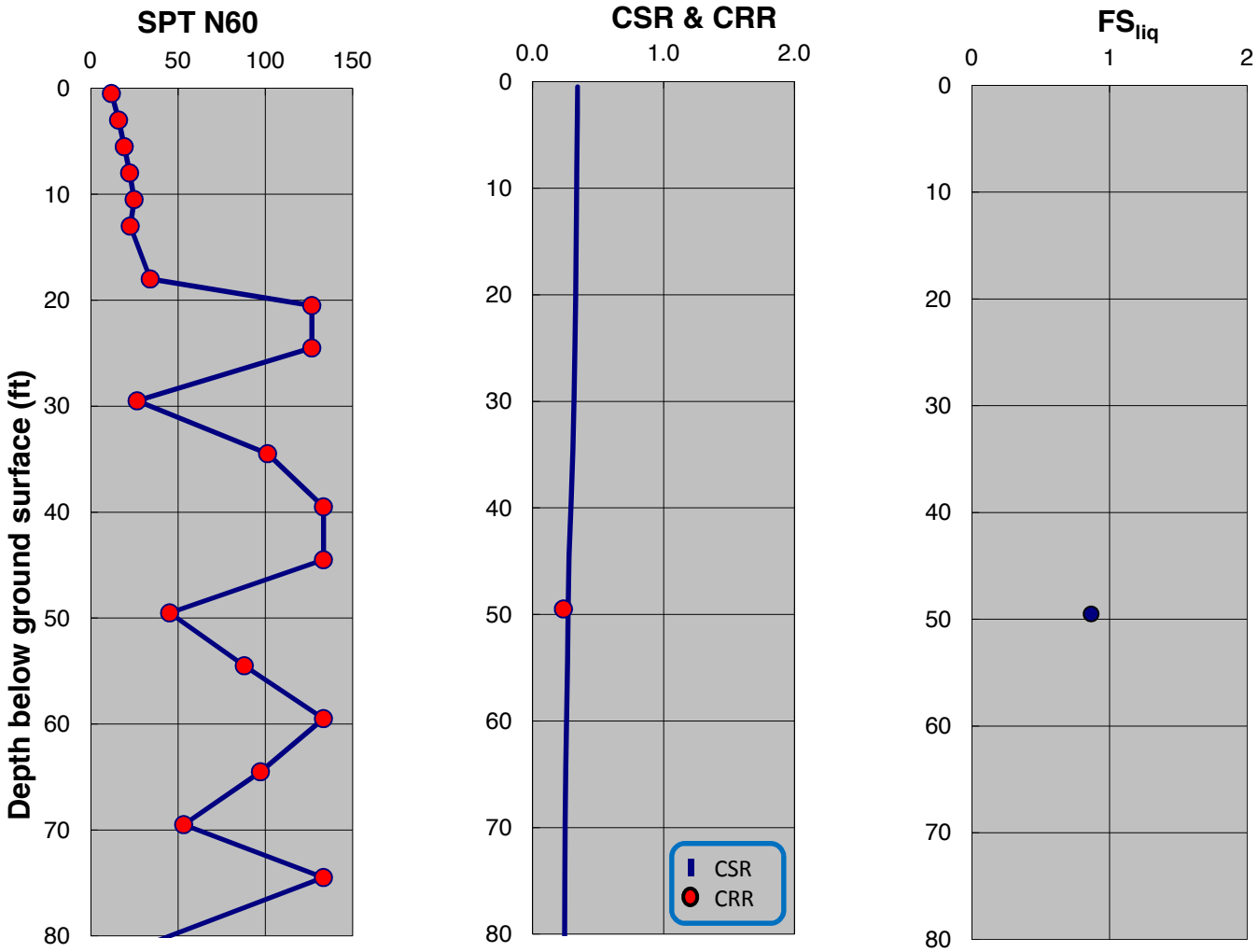
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-138 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



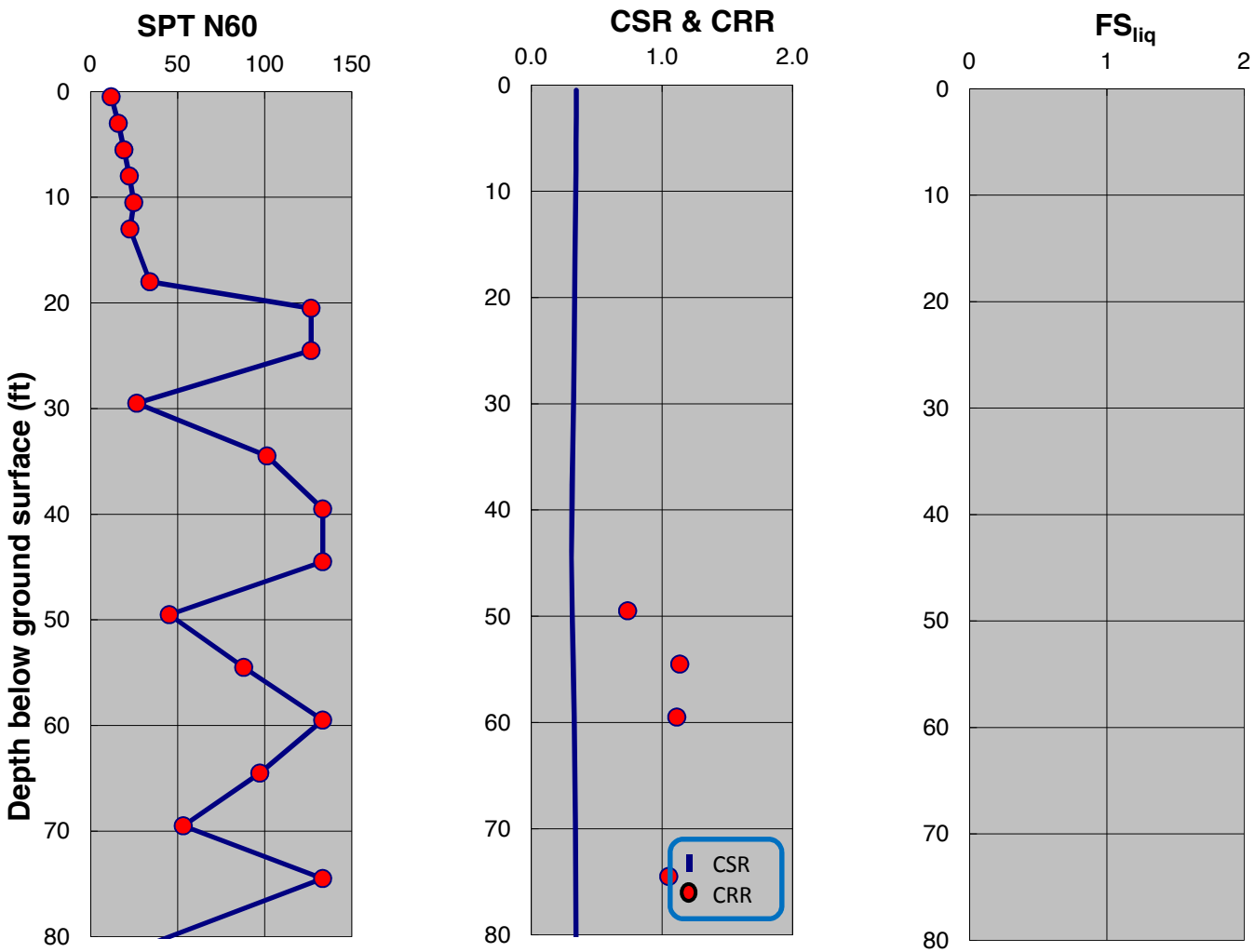
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-138 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



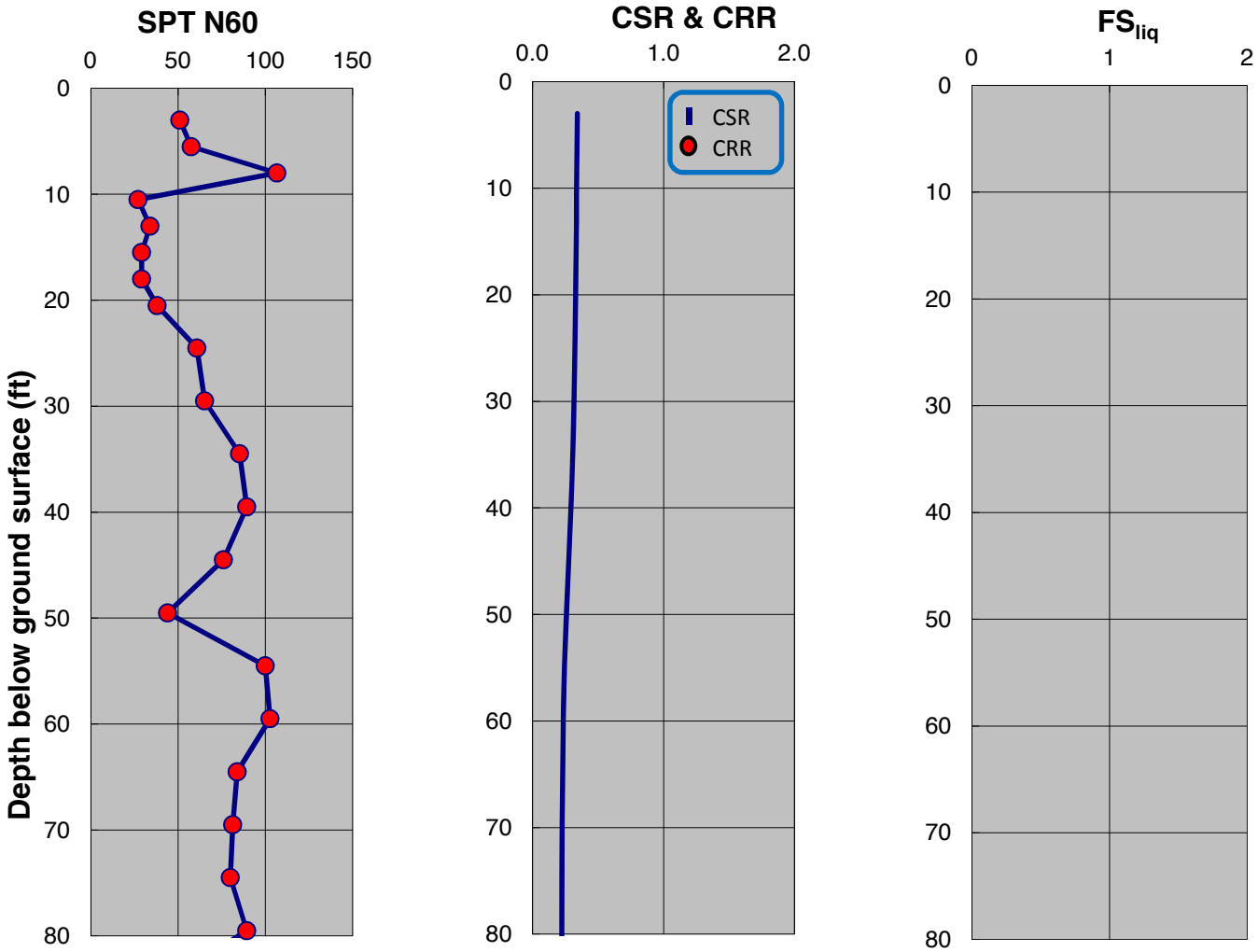
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-146 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



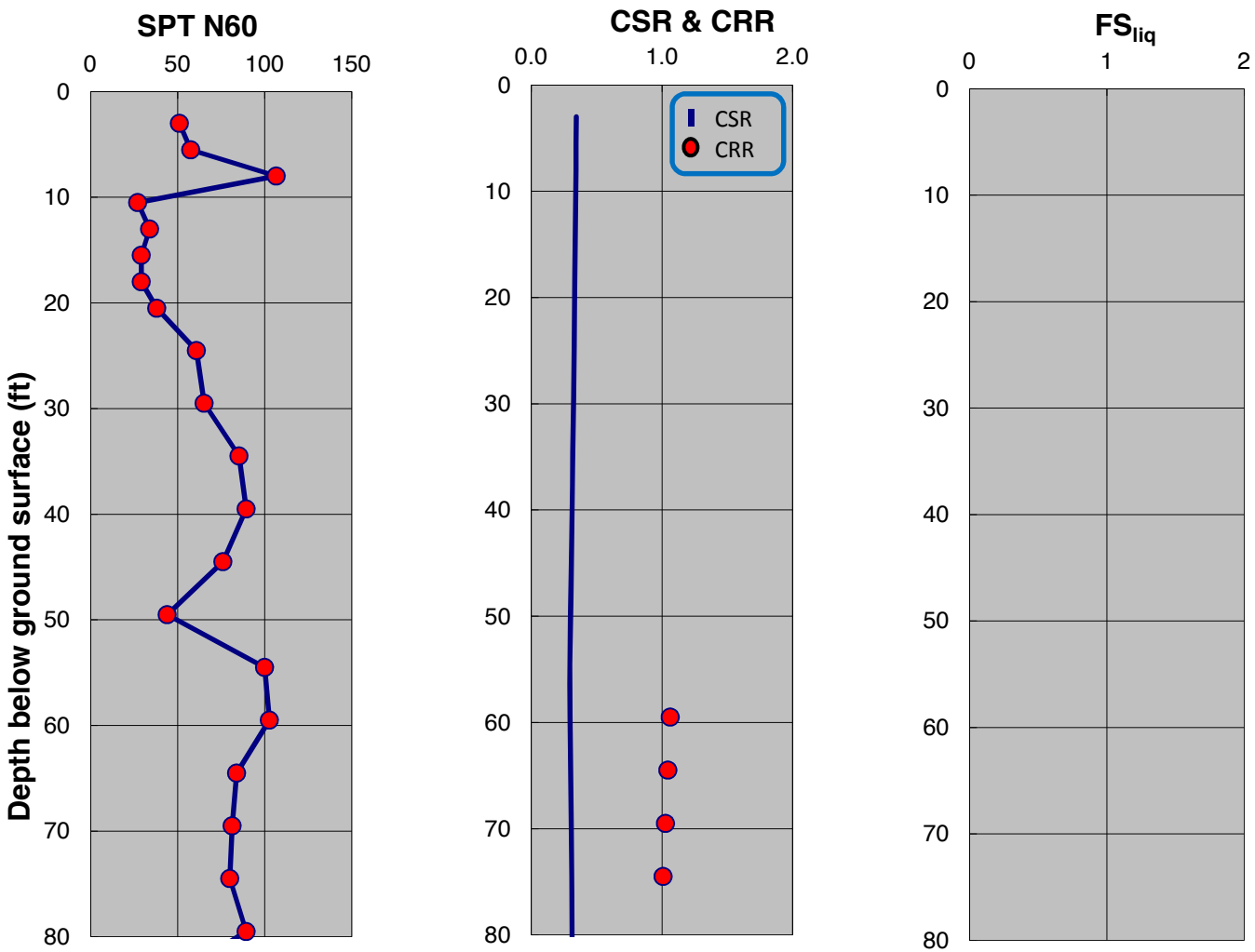
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-146 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



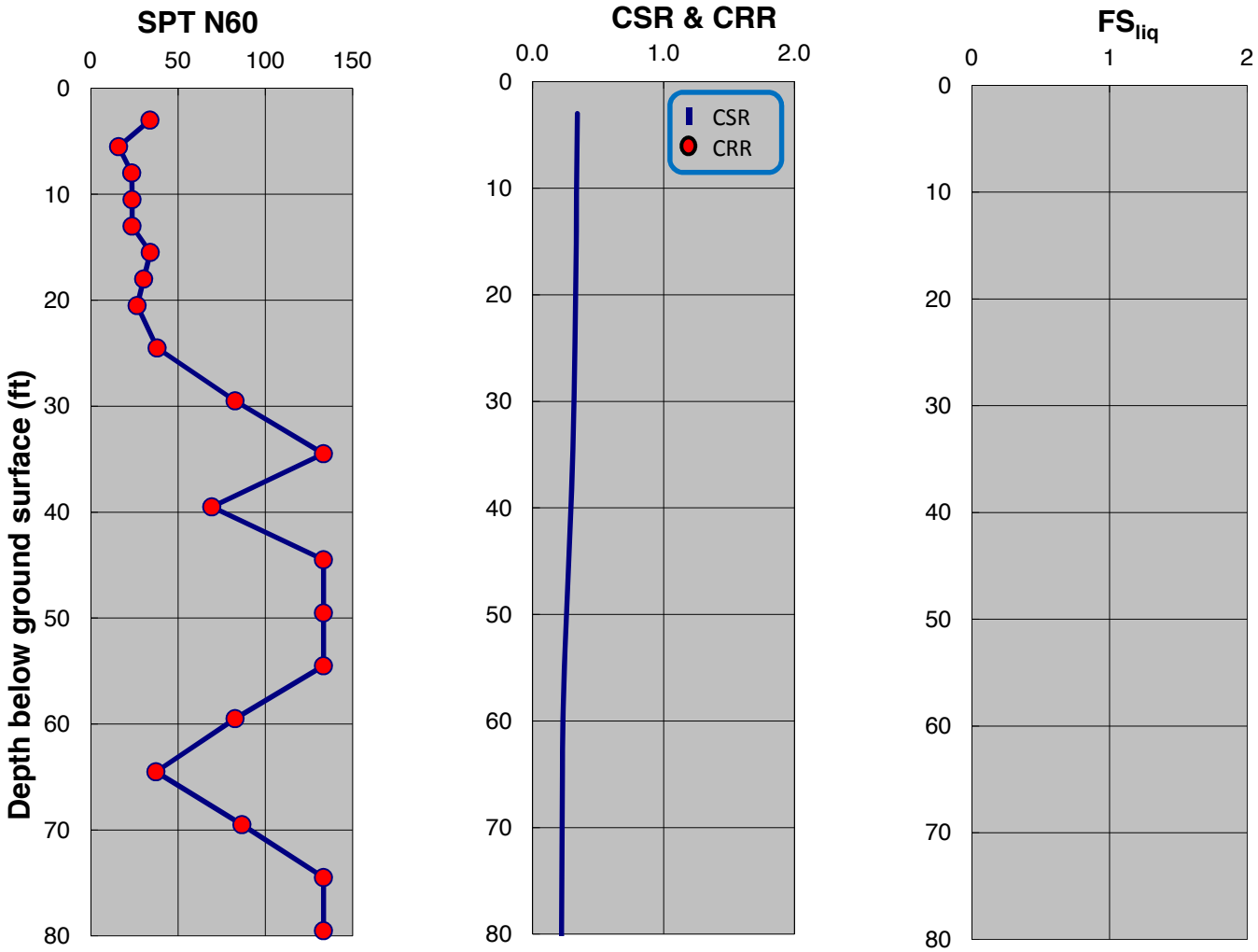
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-147 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



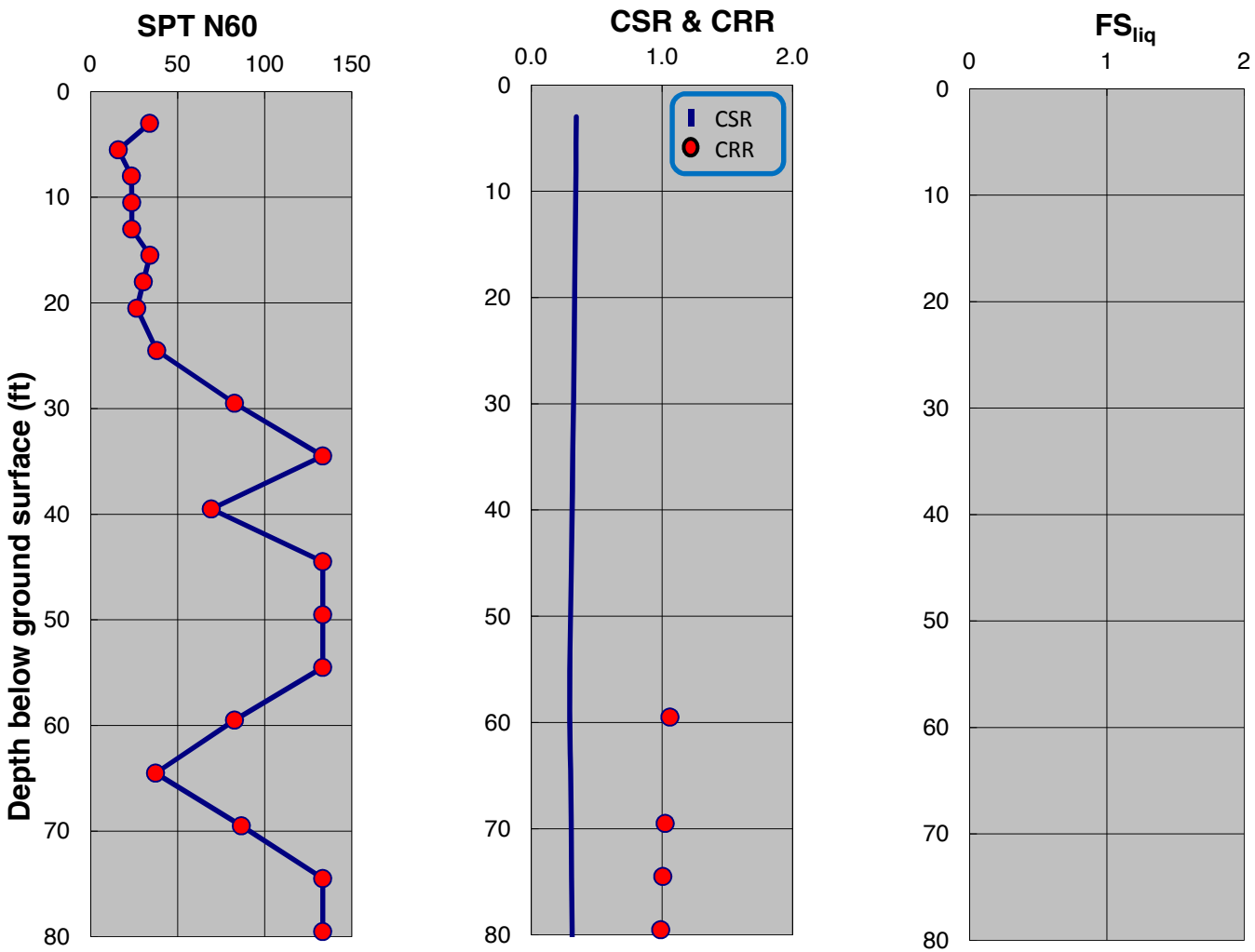
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-147 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-148 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

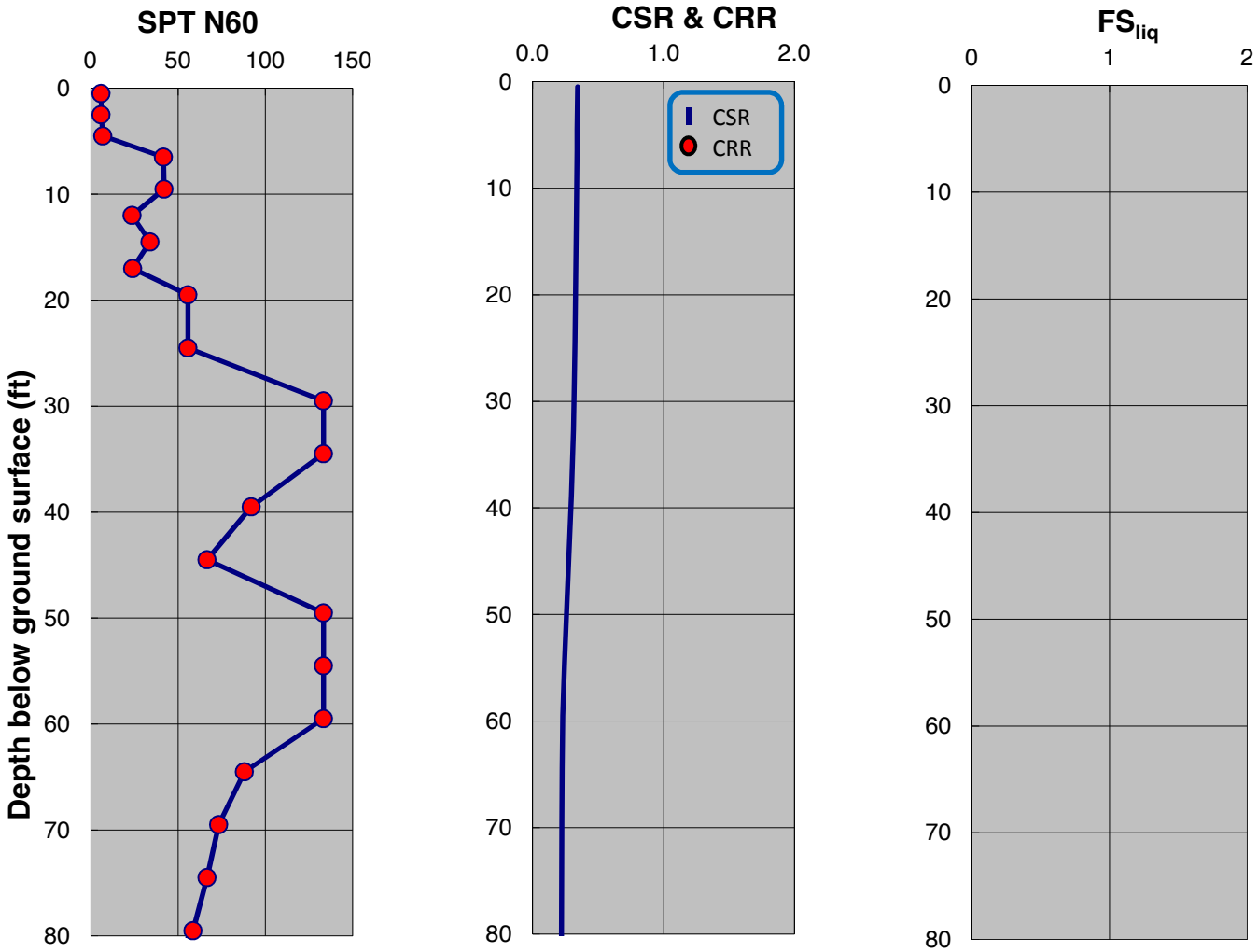
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-148 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

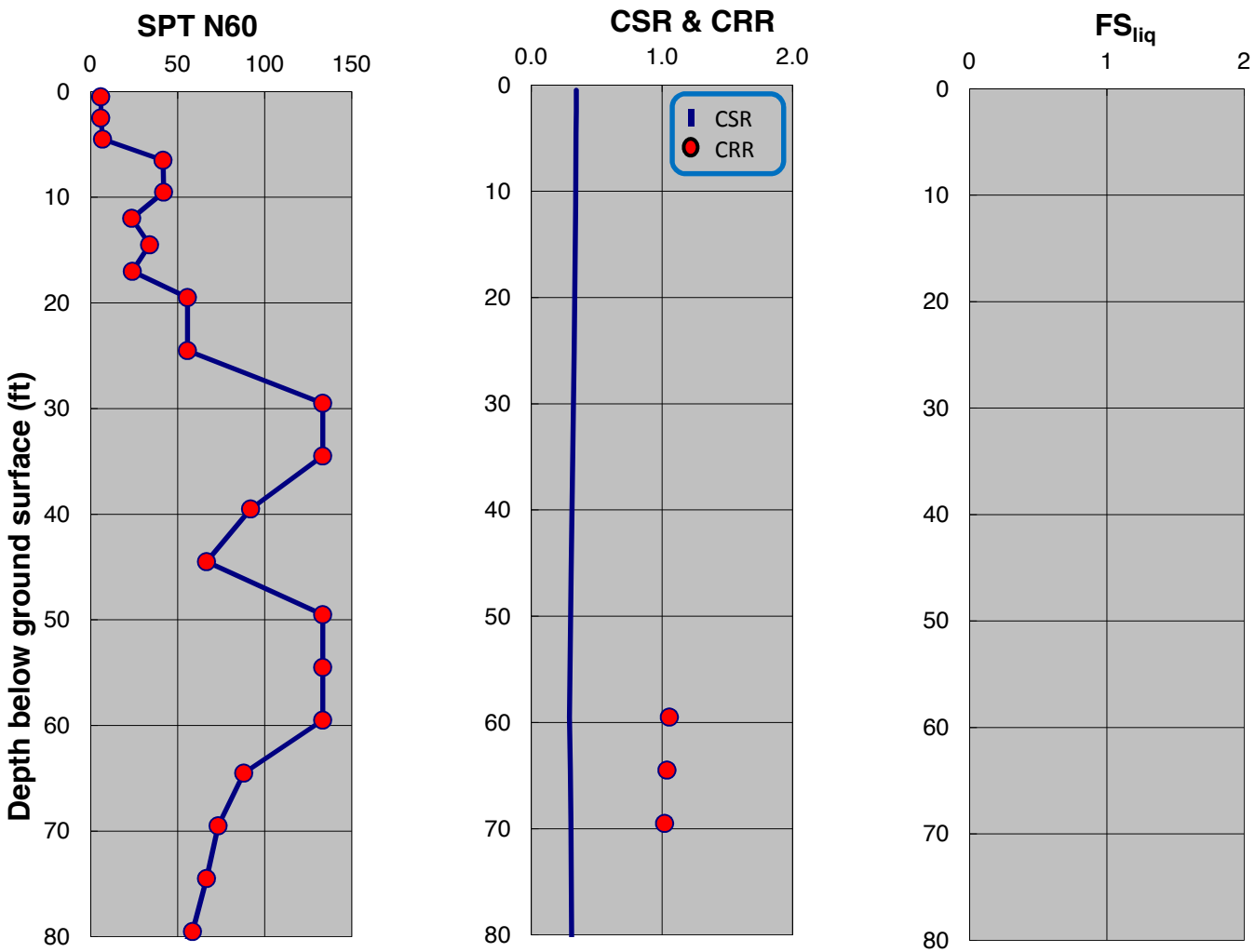
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.180



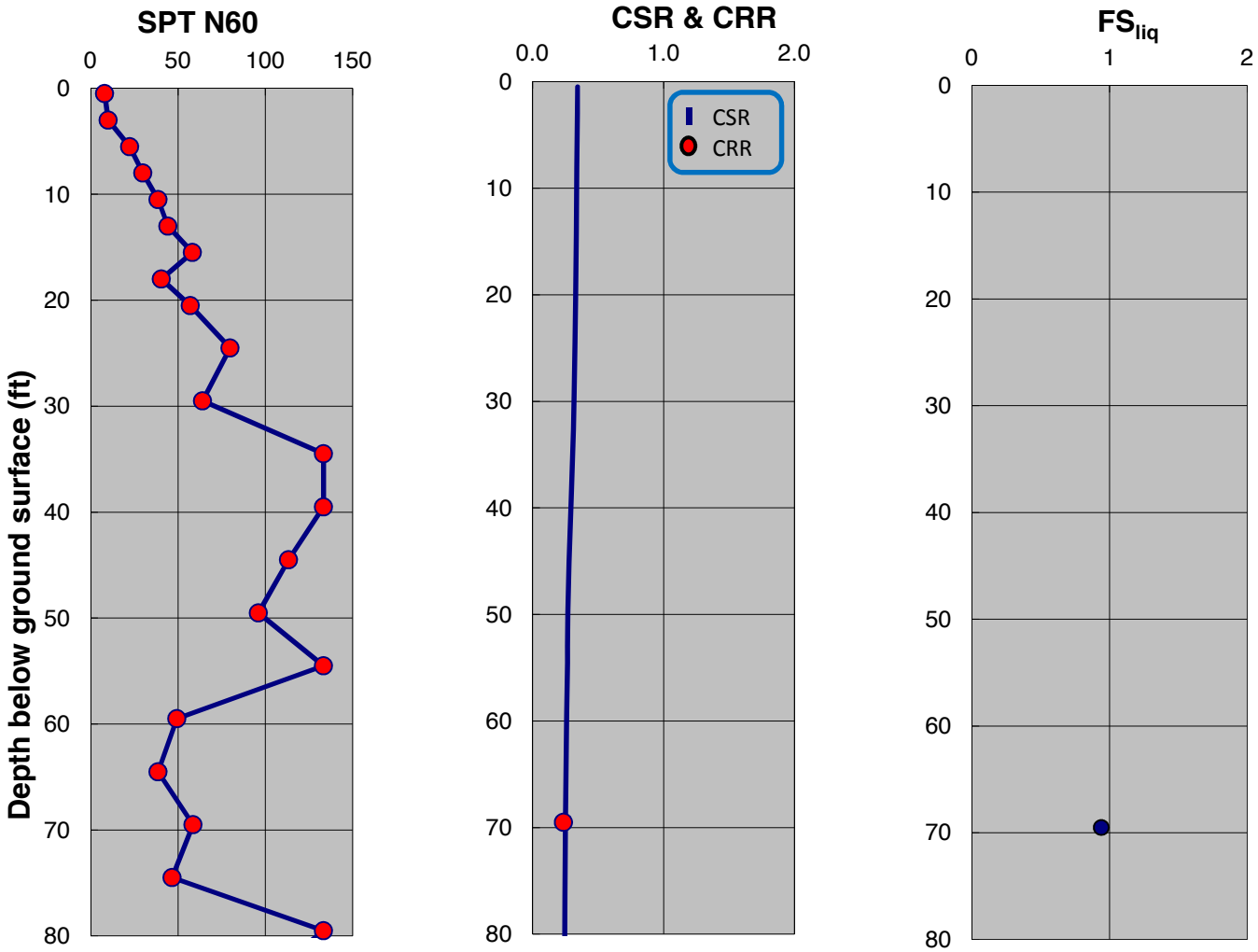
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-149 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



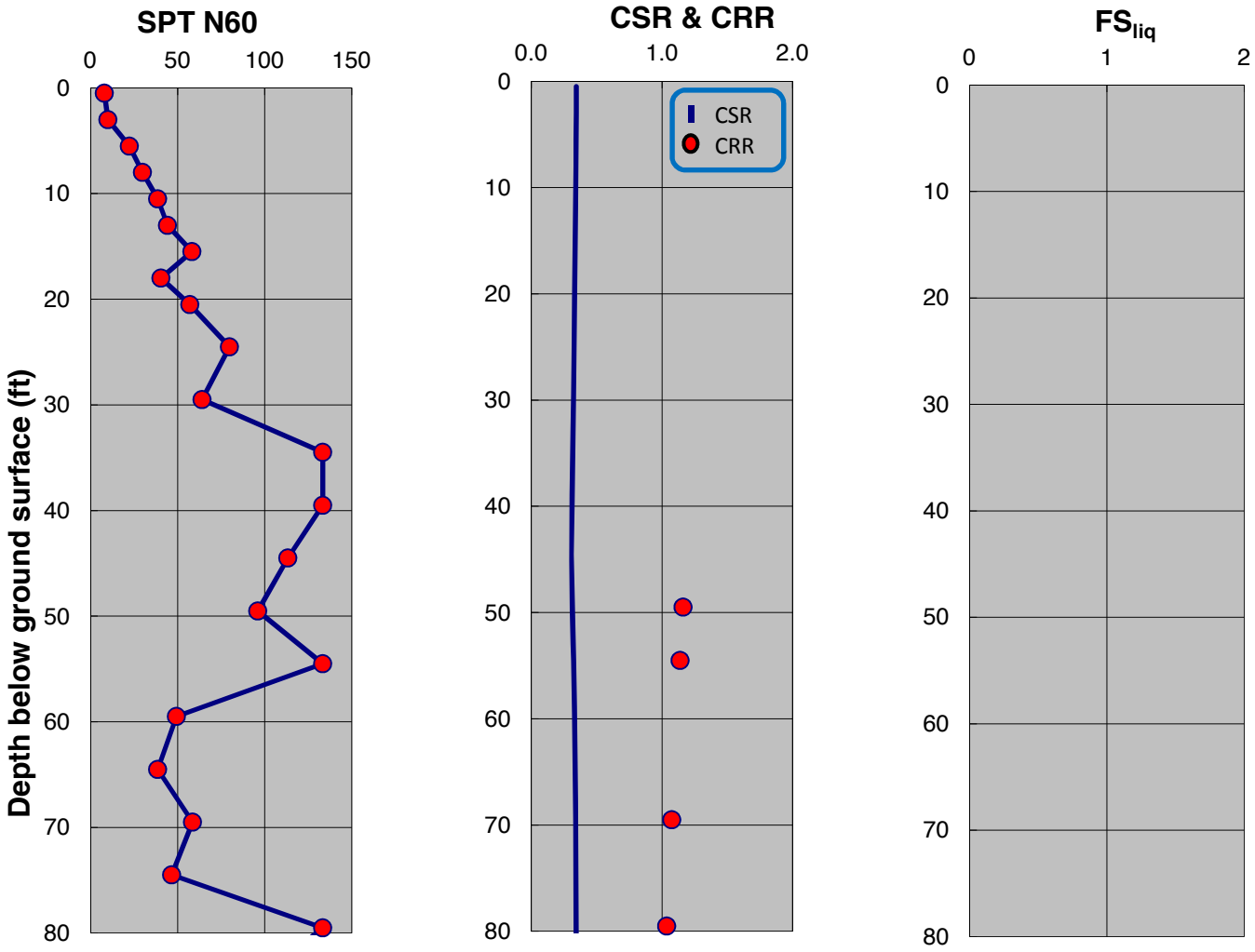
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-149 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



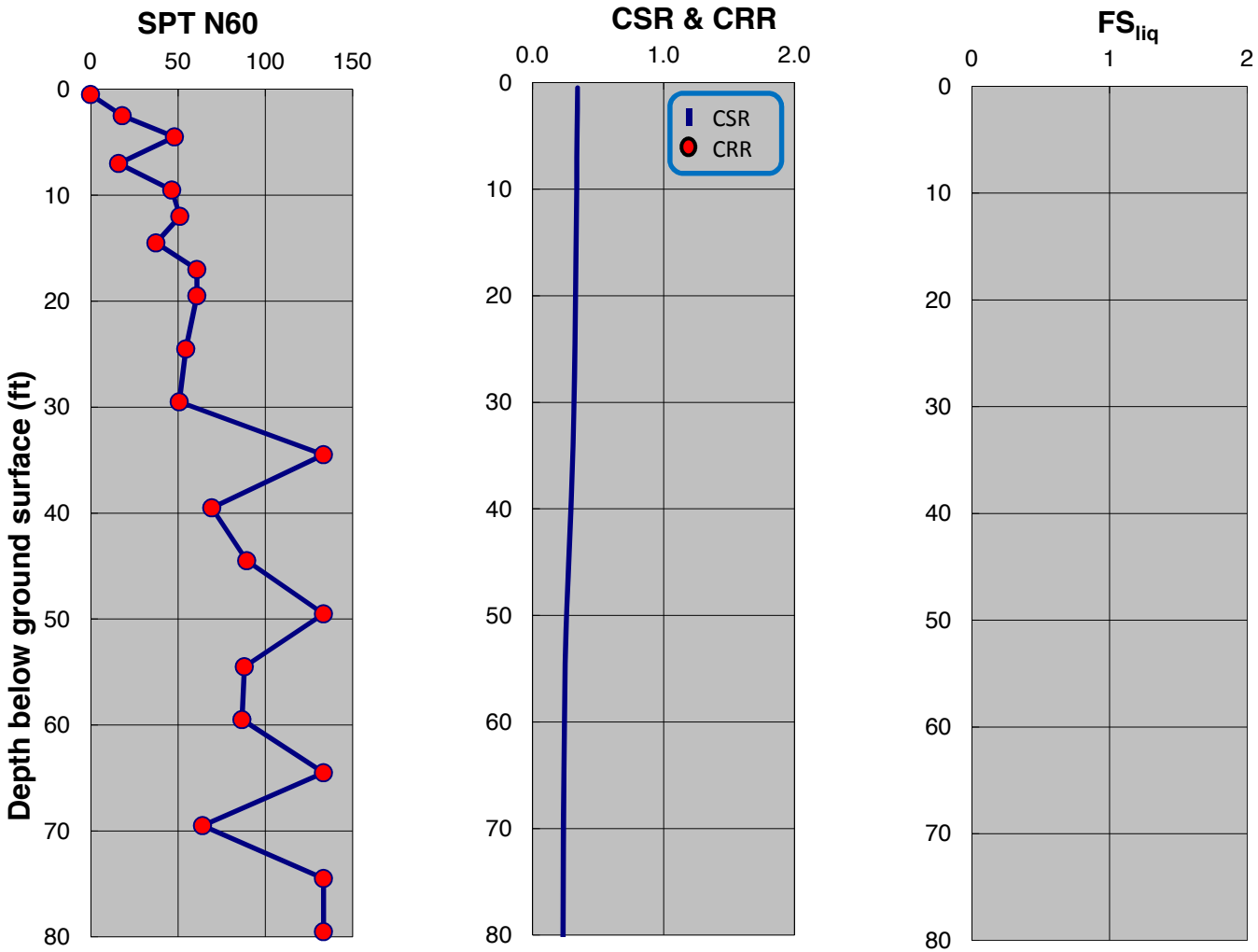
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-150 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



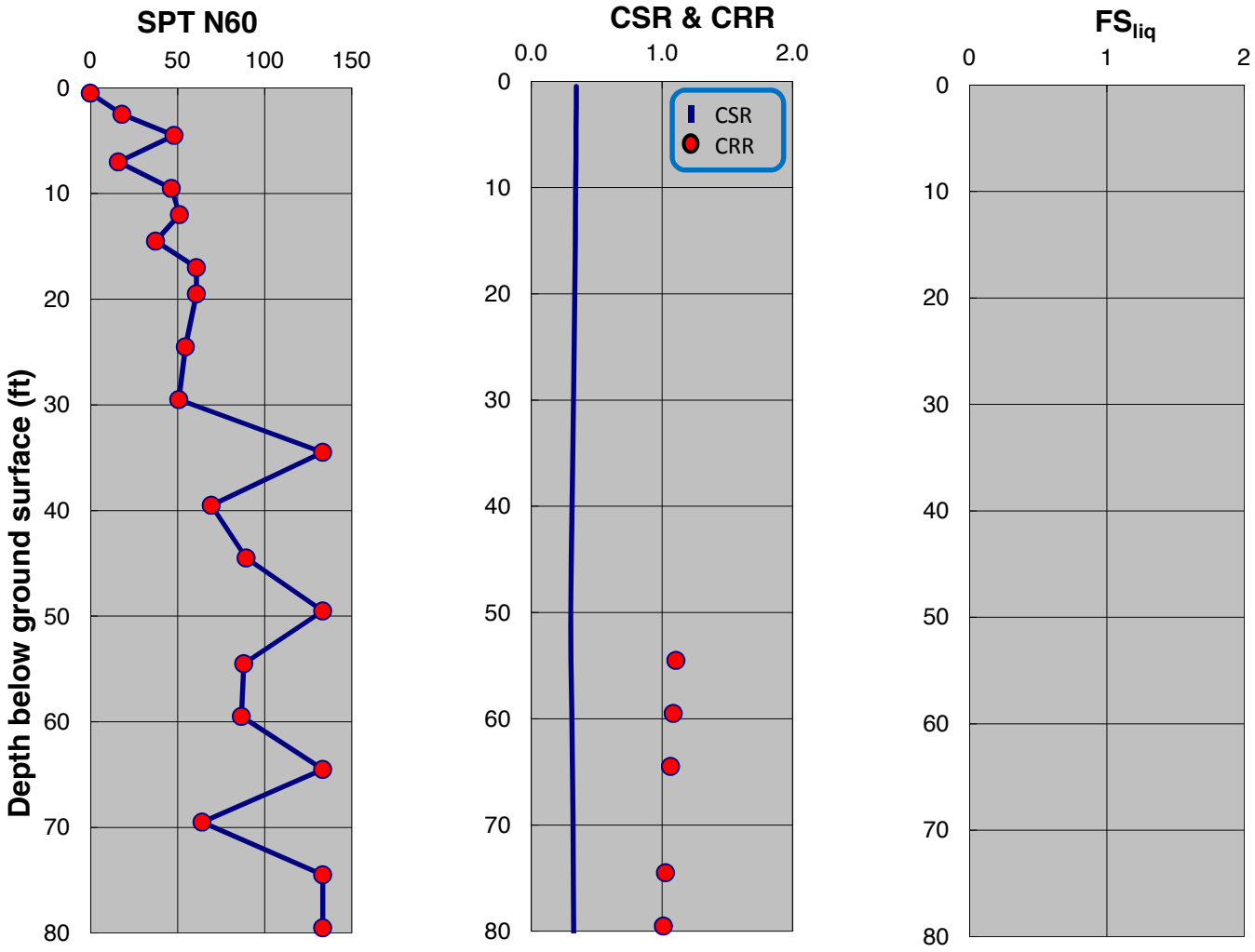
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-150 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



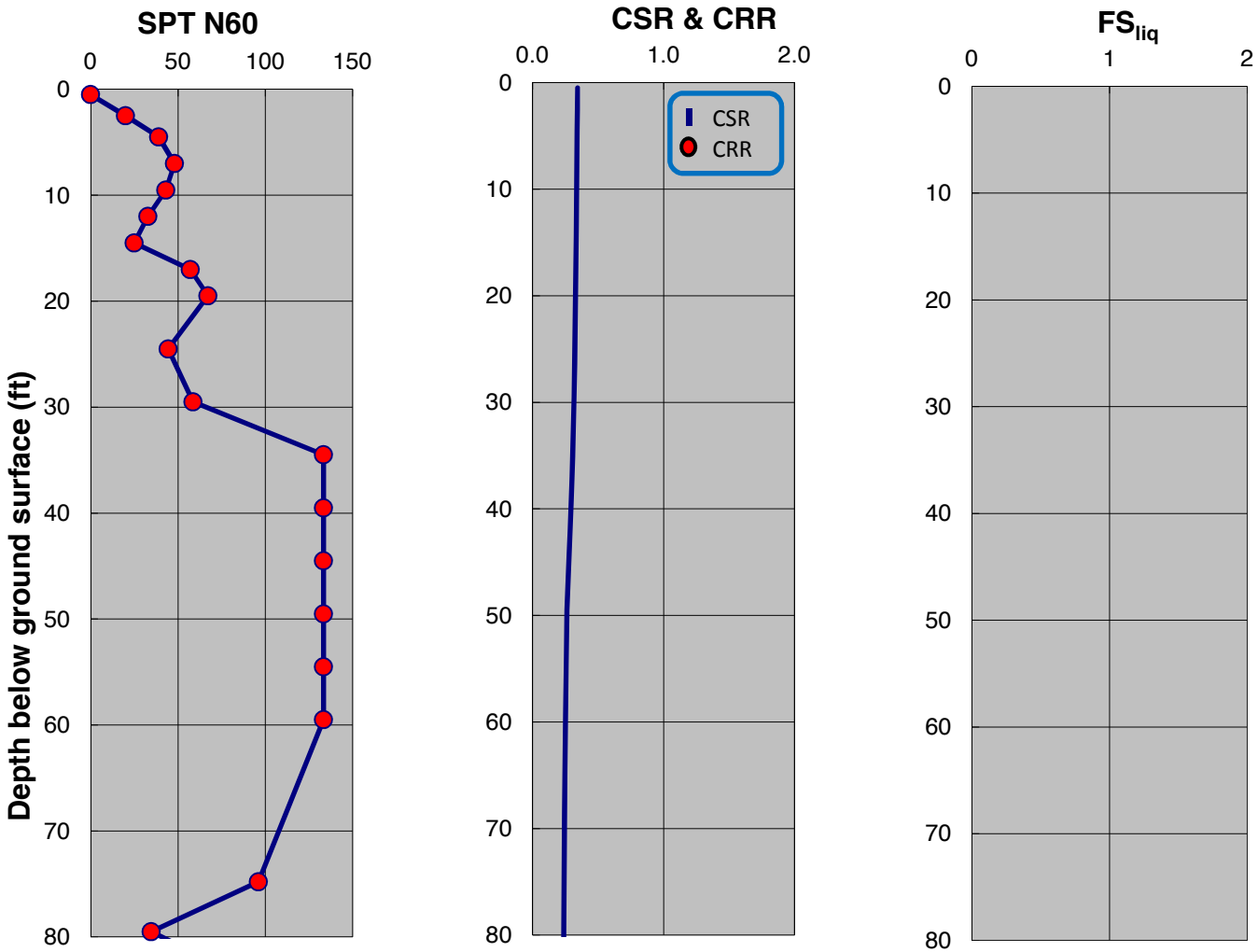
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-151 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



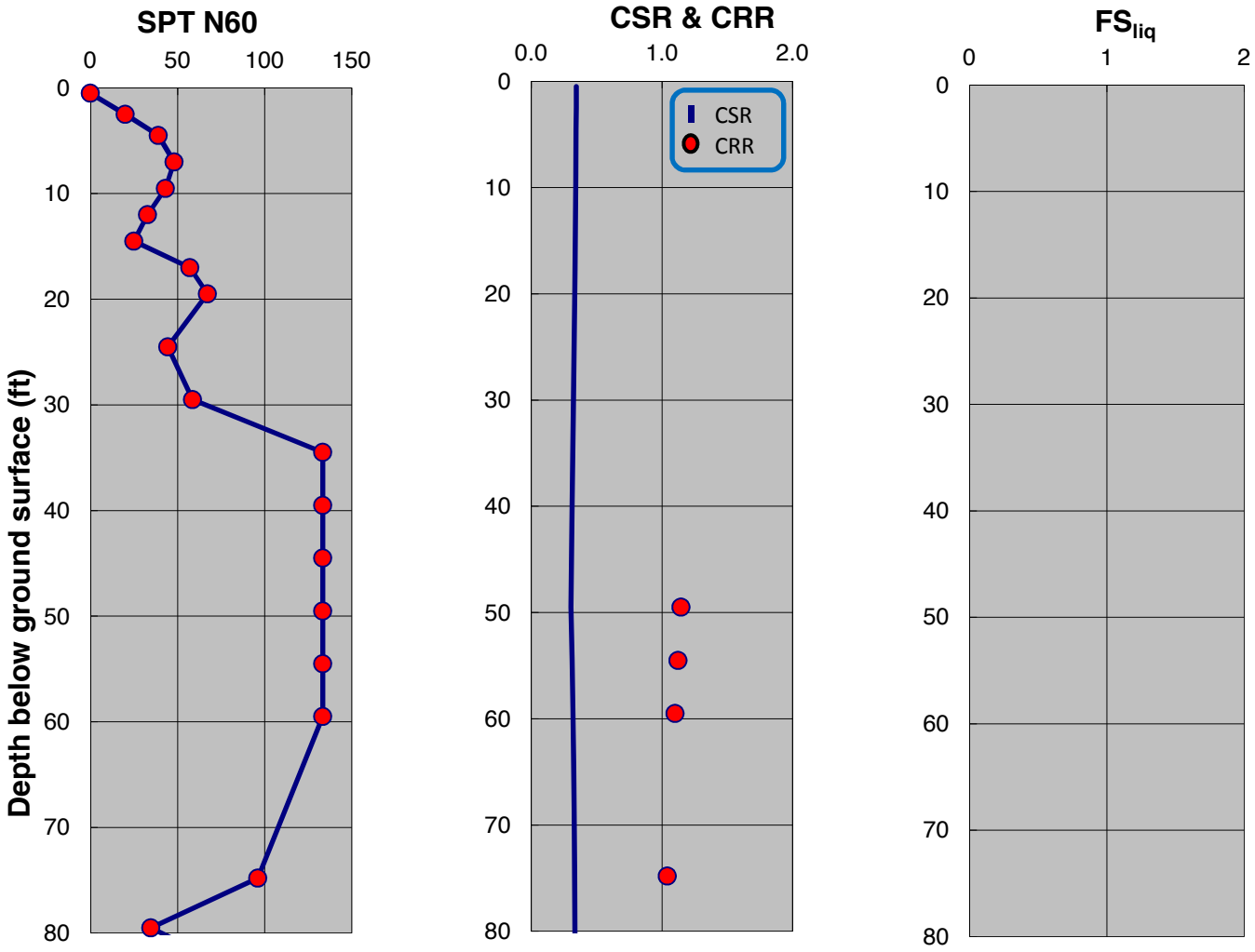
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-151 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



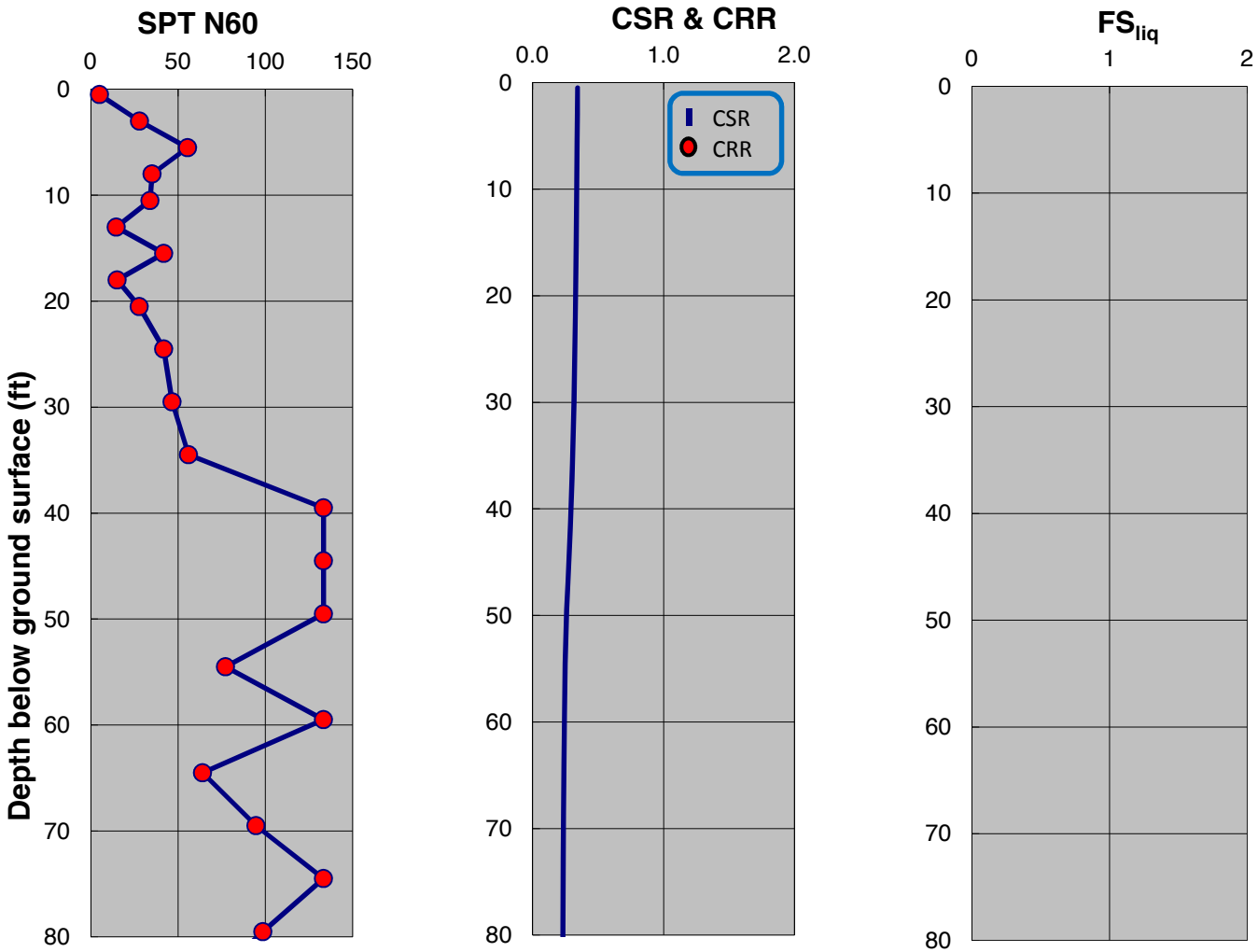
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-152 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



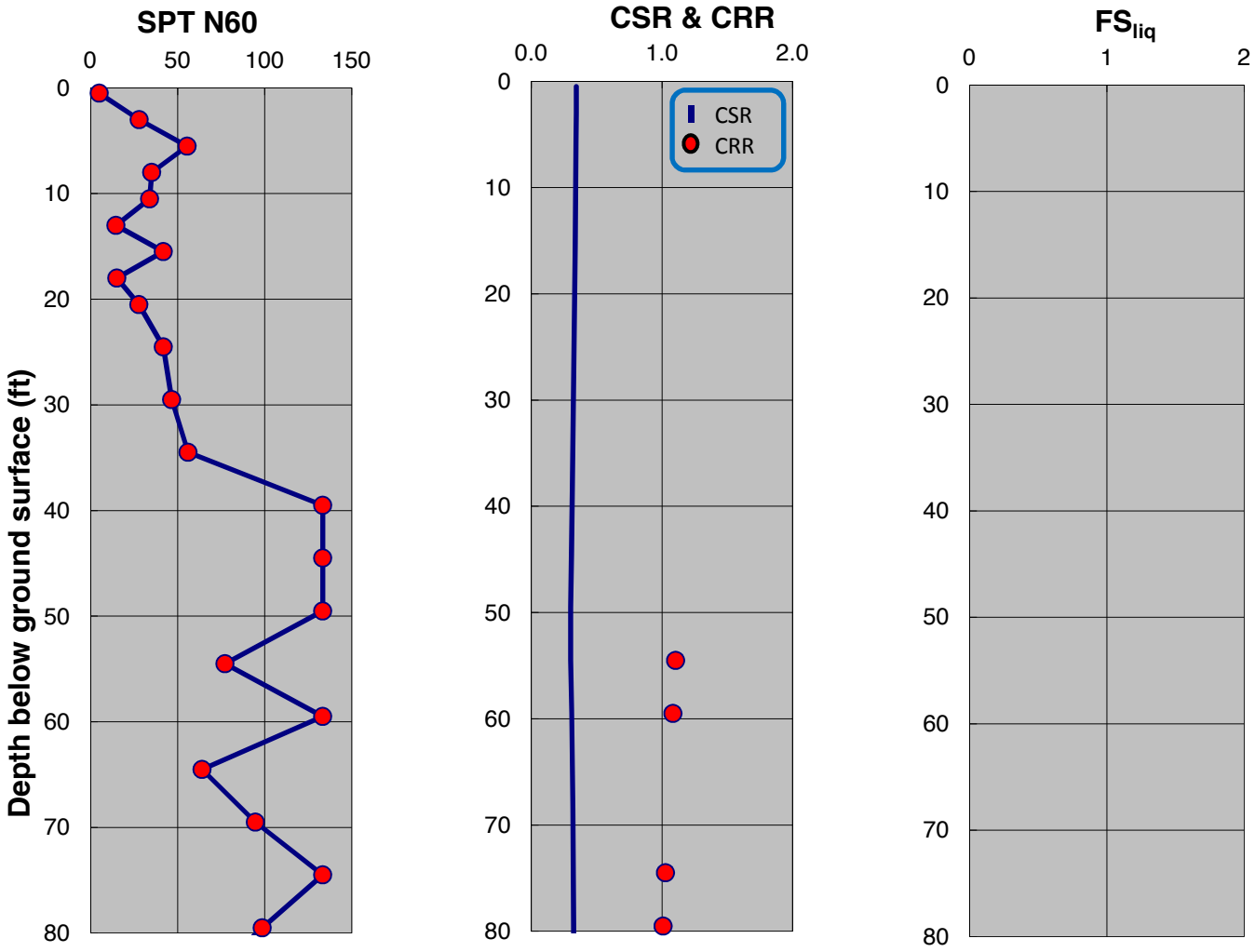
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-152 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



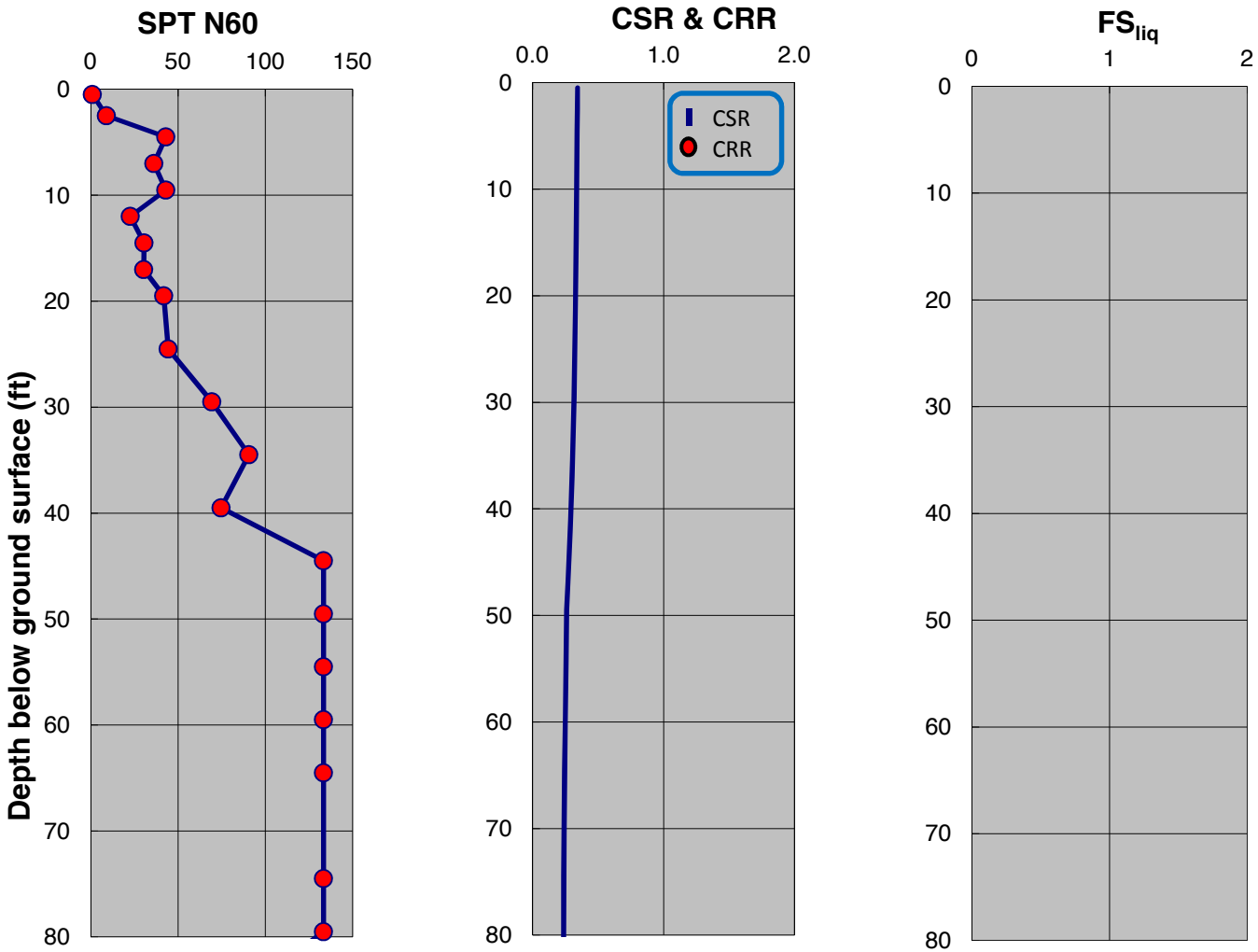
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-153 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



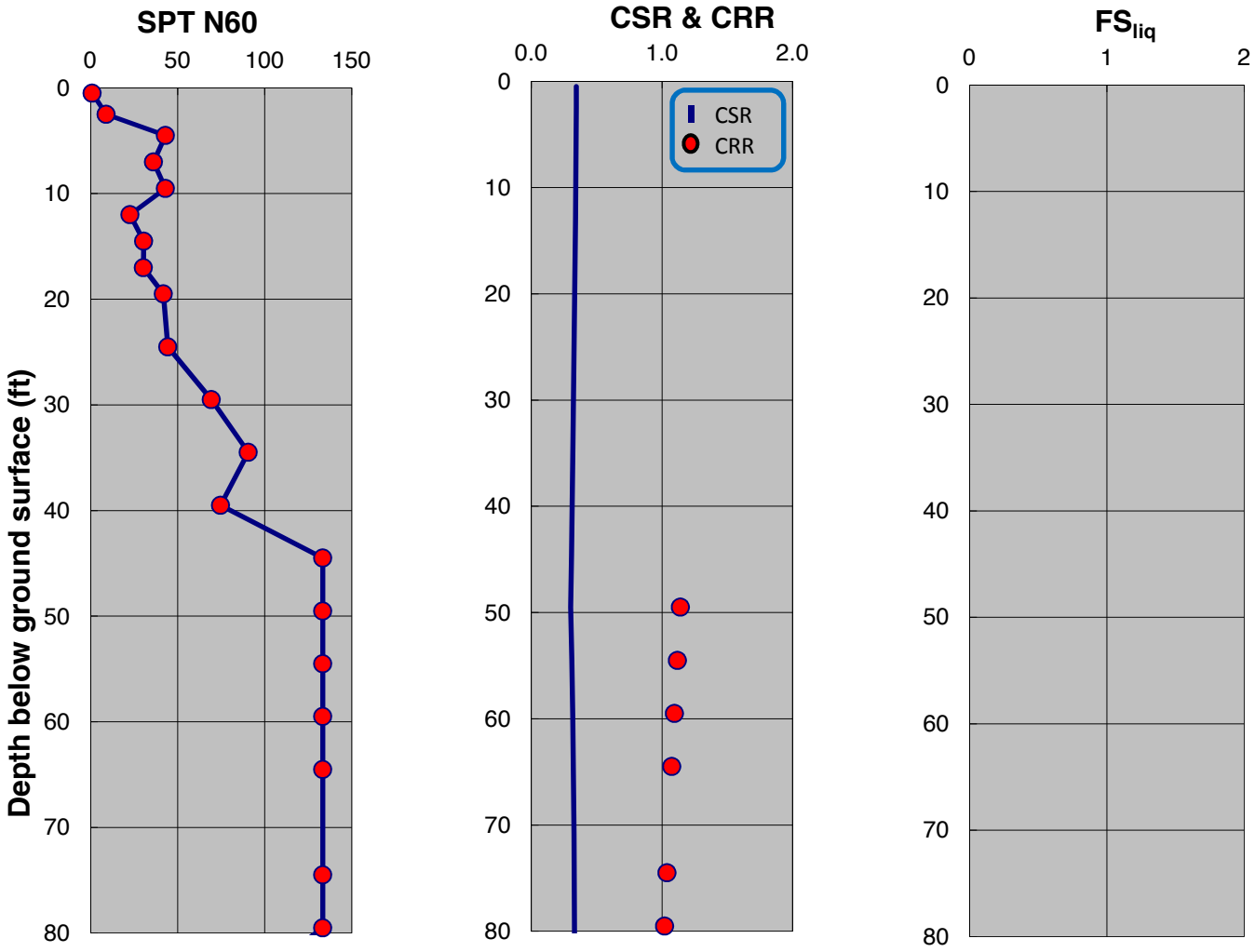
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-153 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



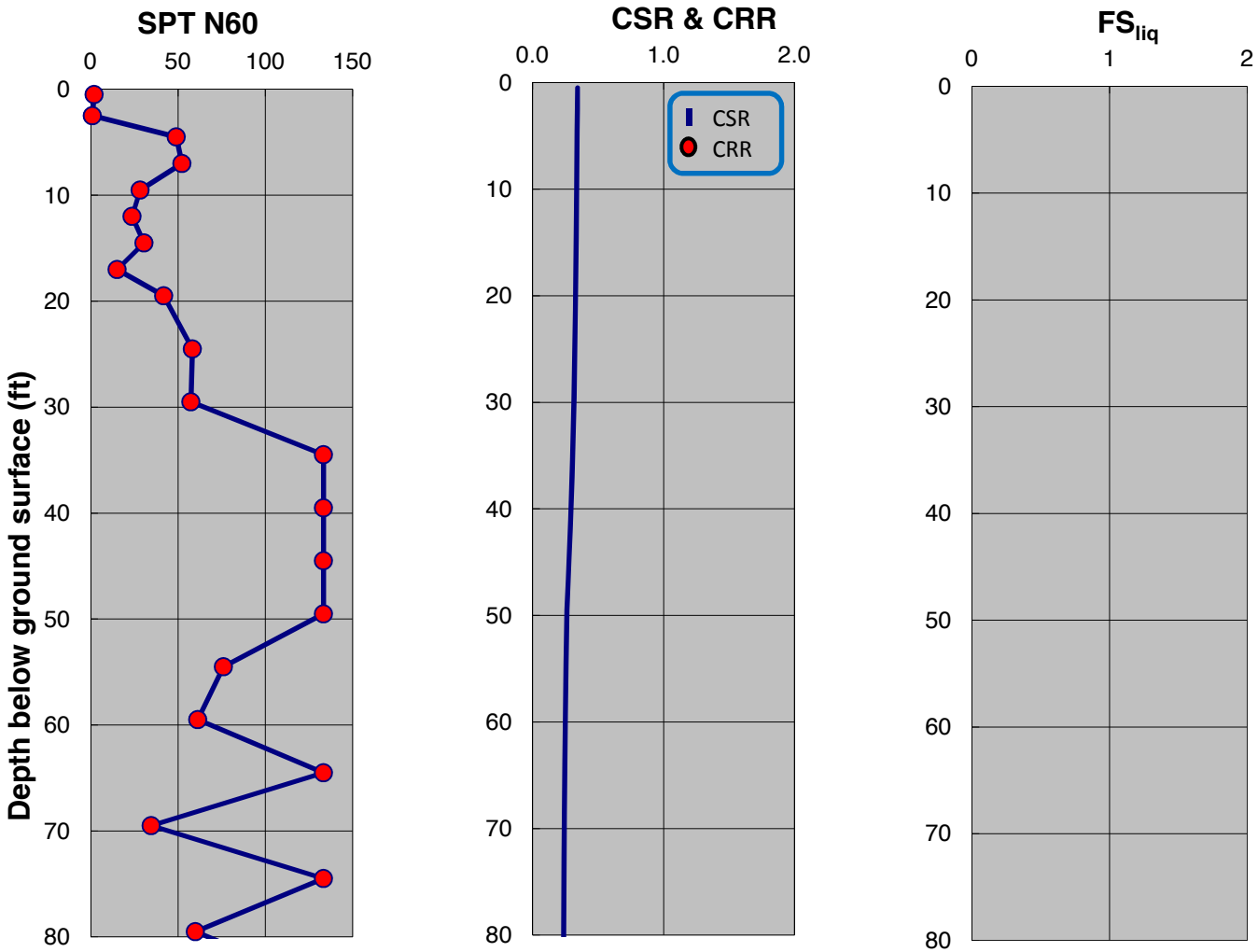
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-154 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



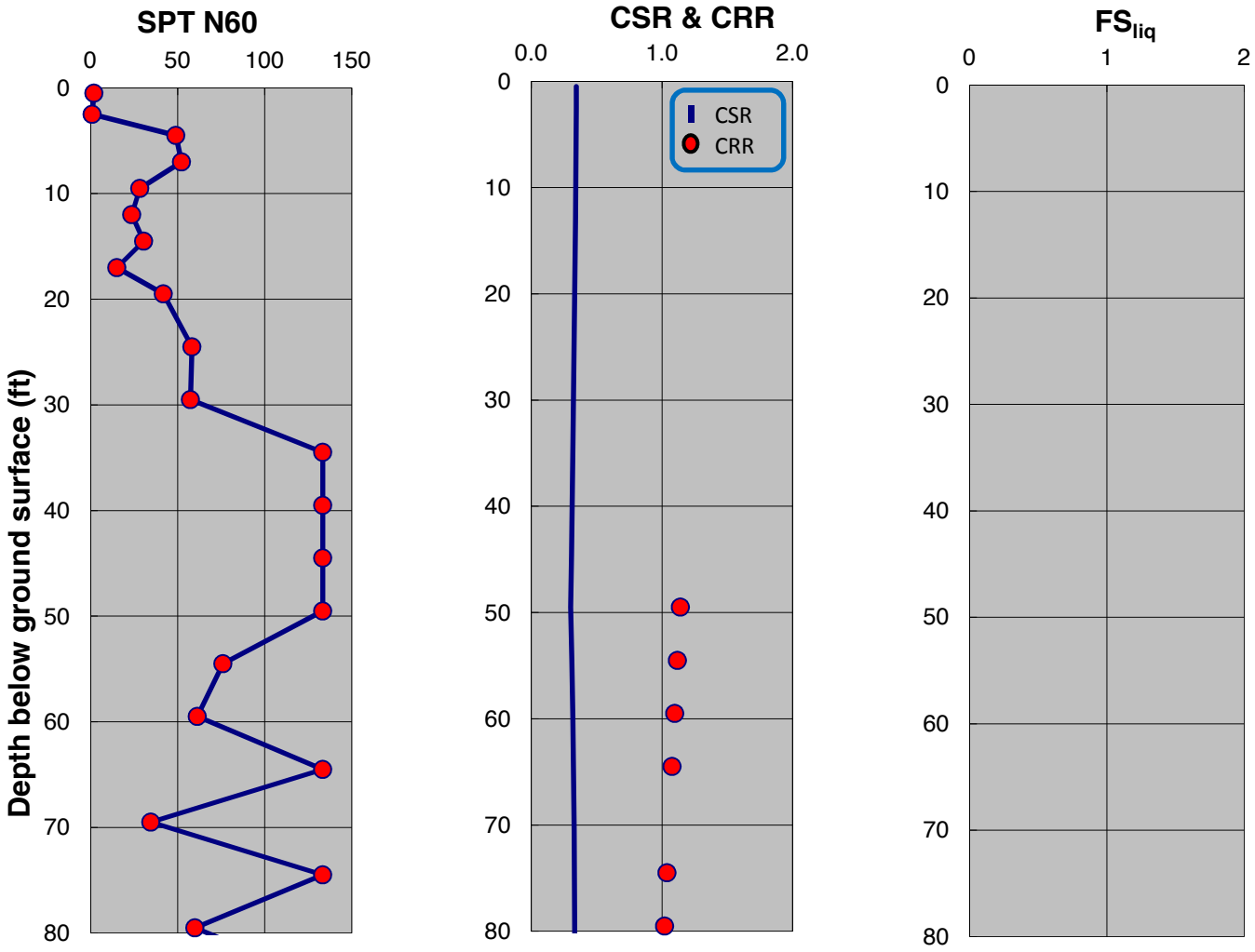
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-154 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



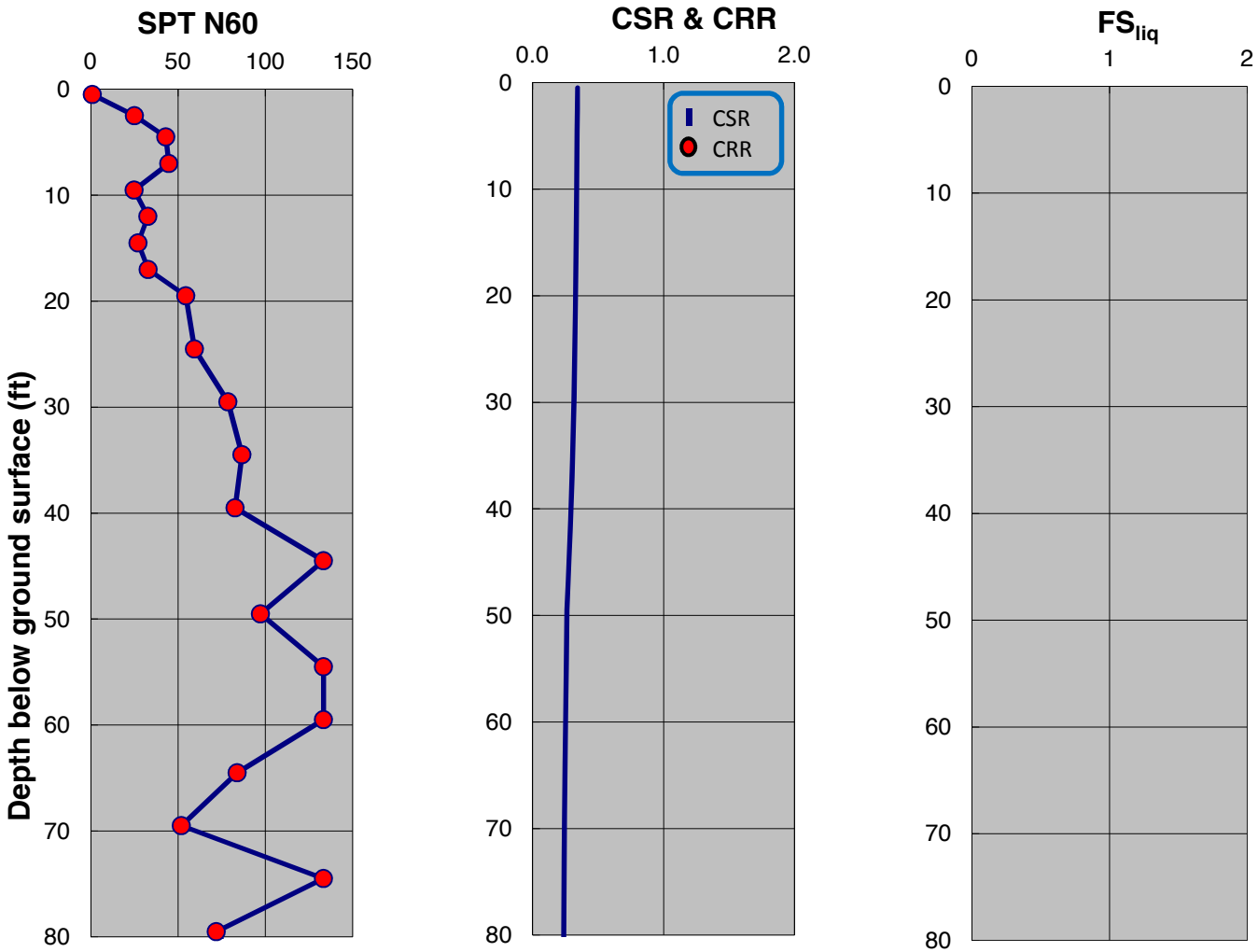
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-155 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



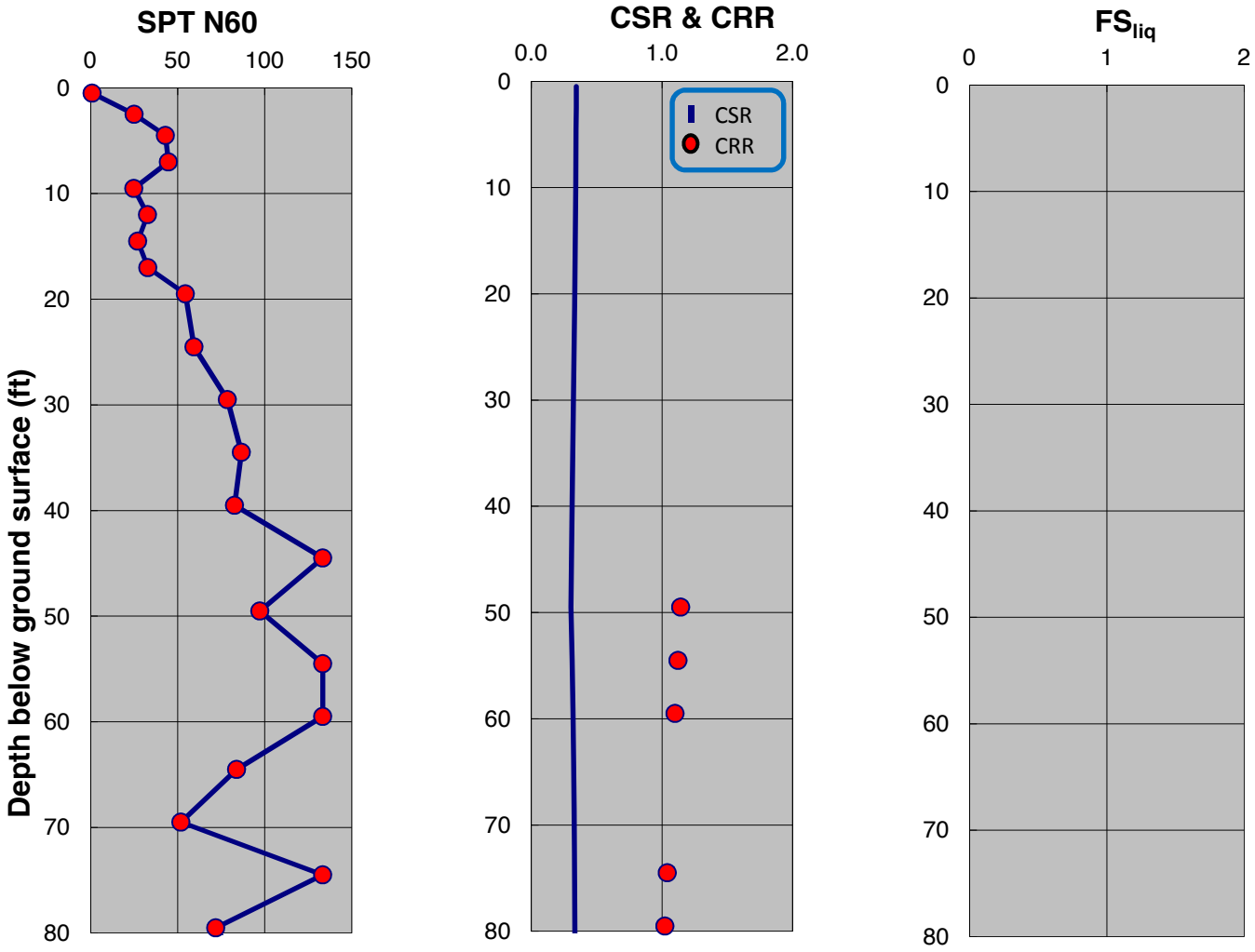
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-155 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



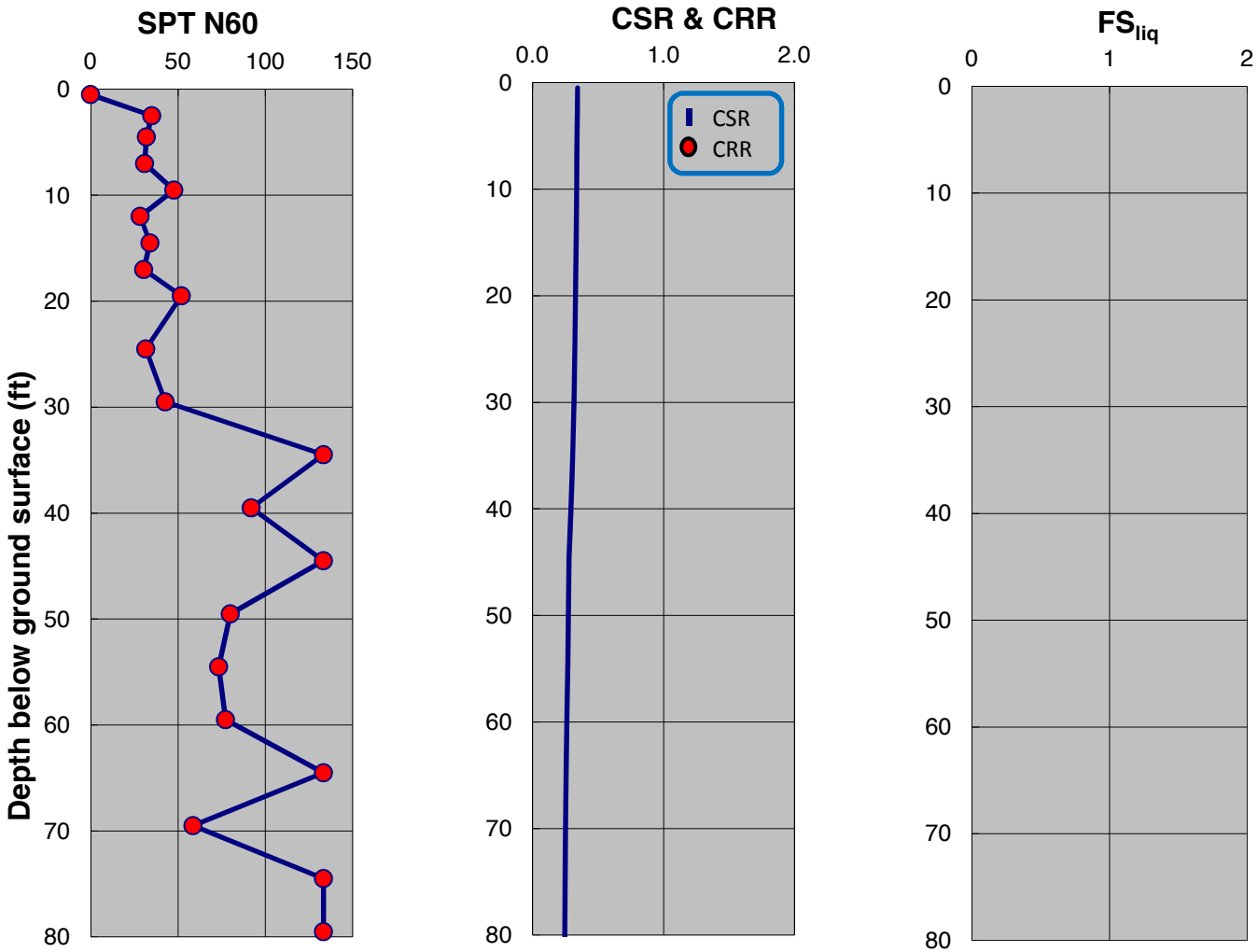
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-156 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



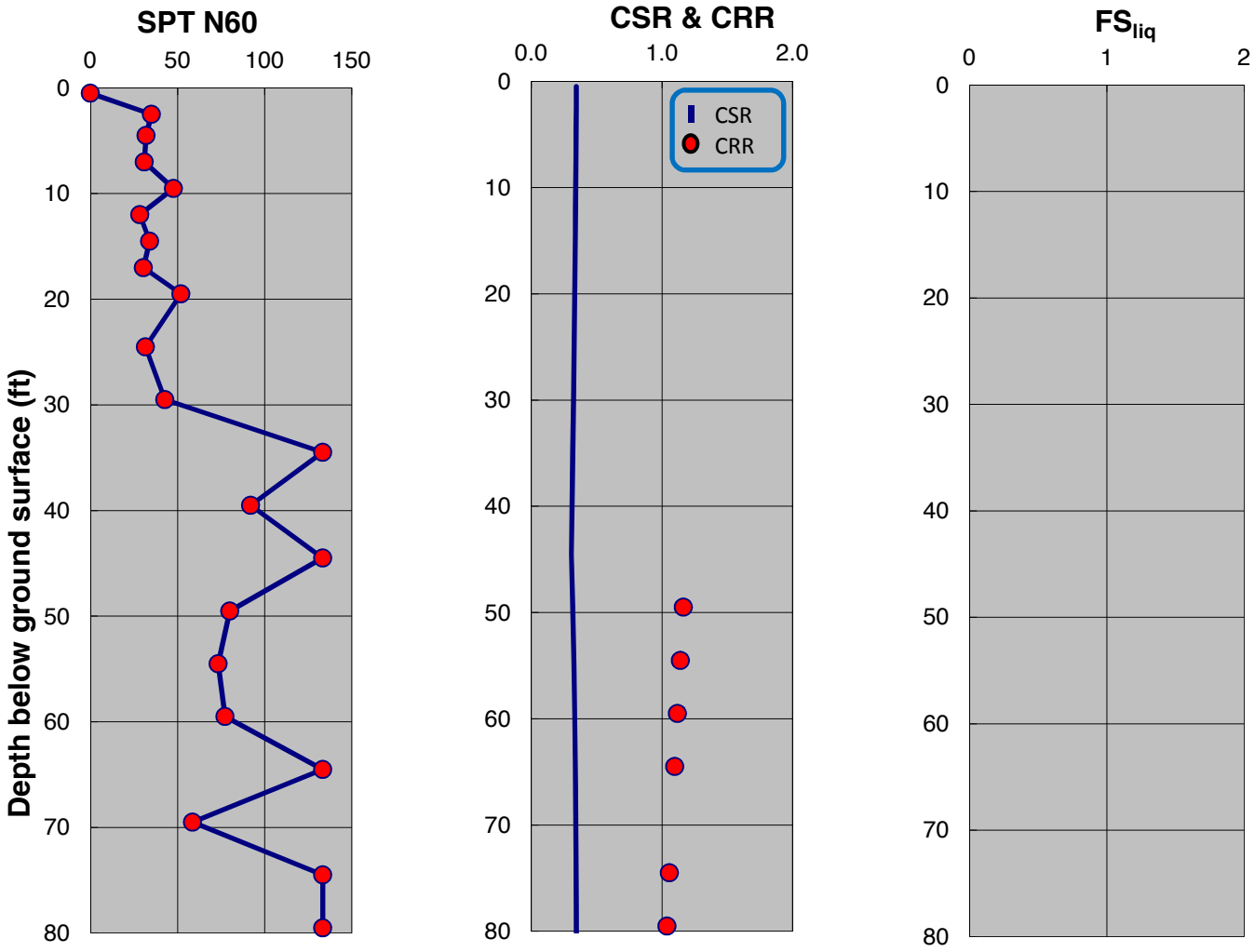
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-156 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



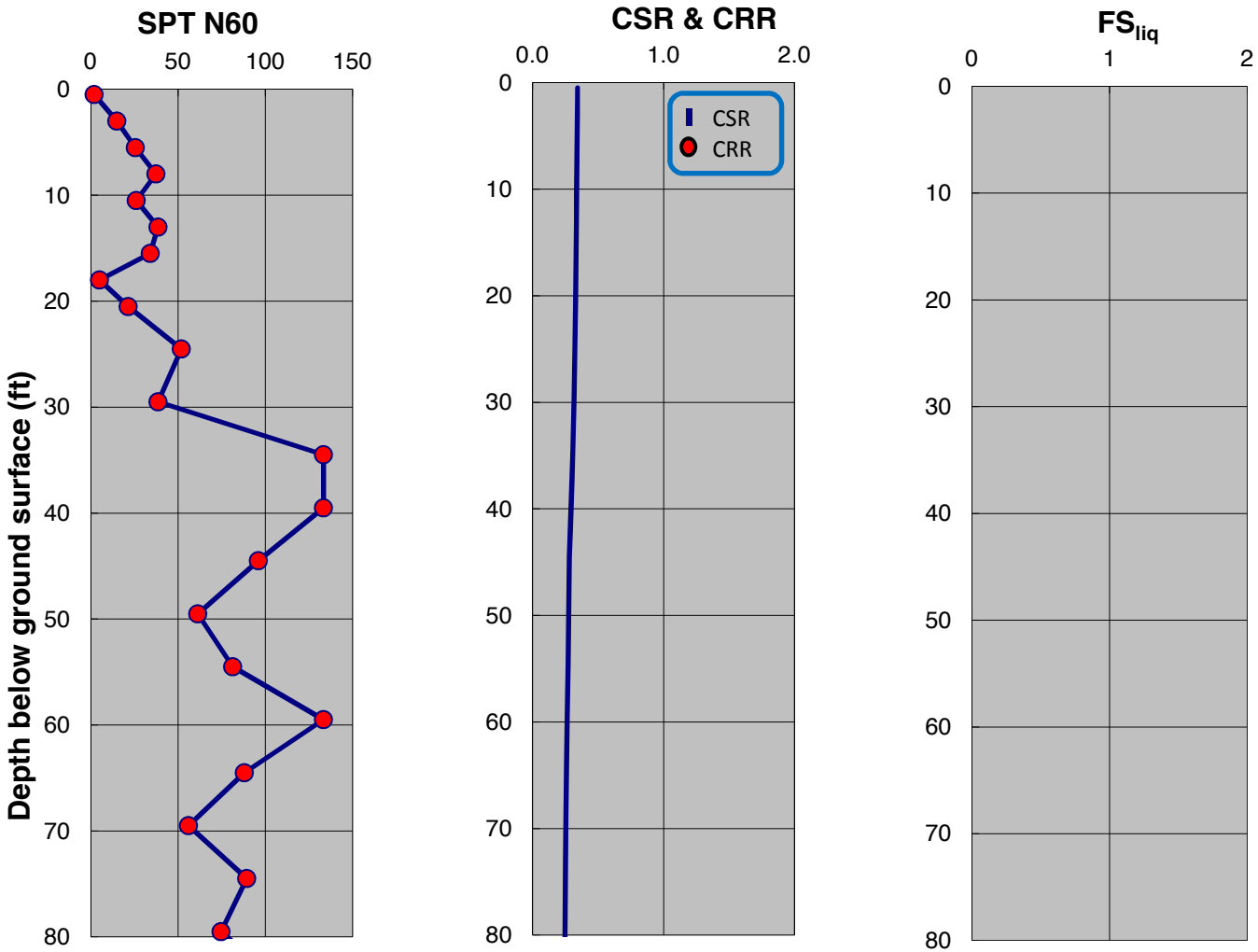
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-157 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



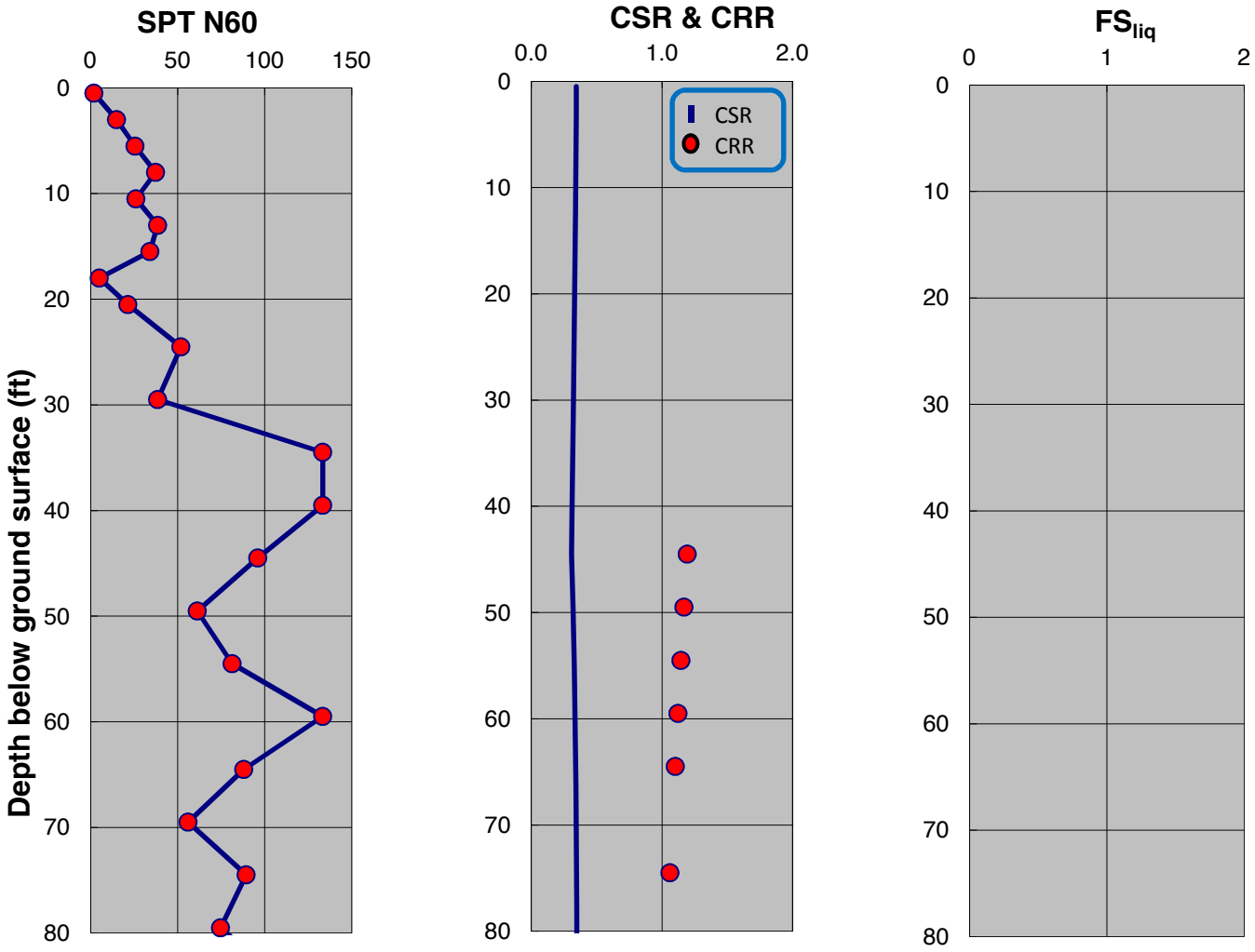
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-157 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-158 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

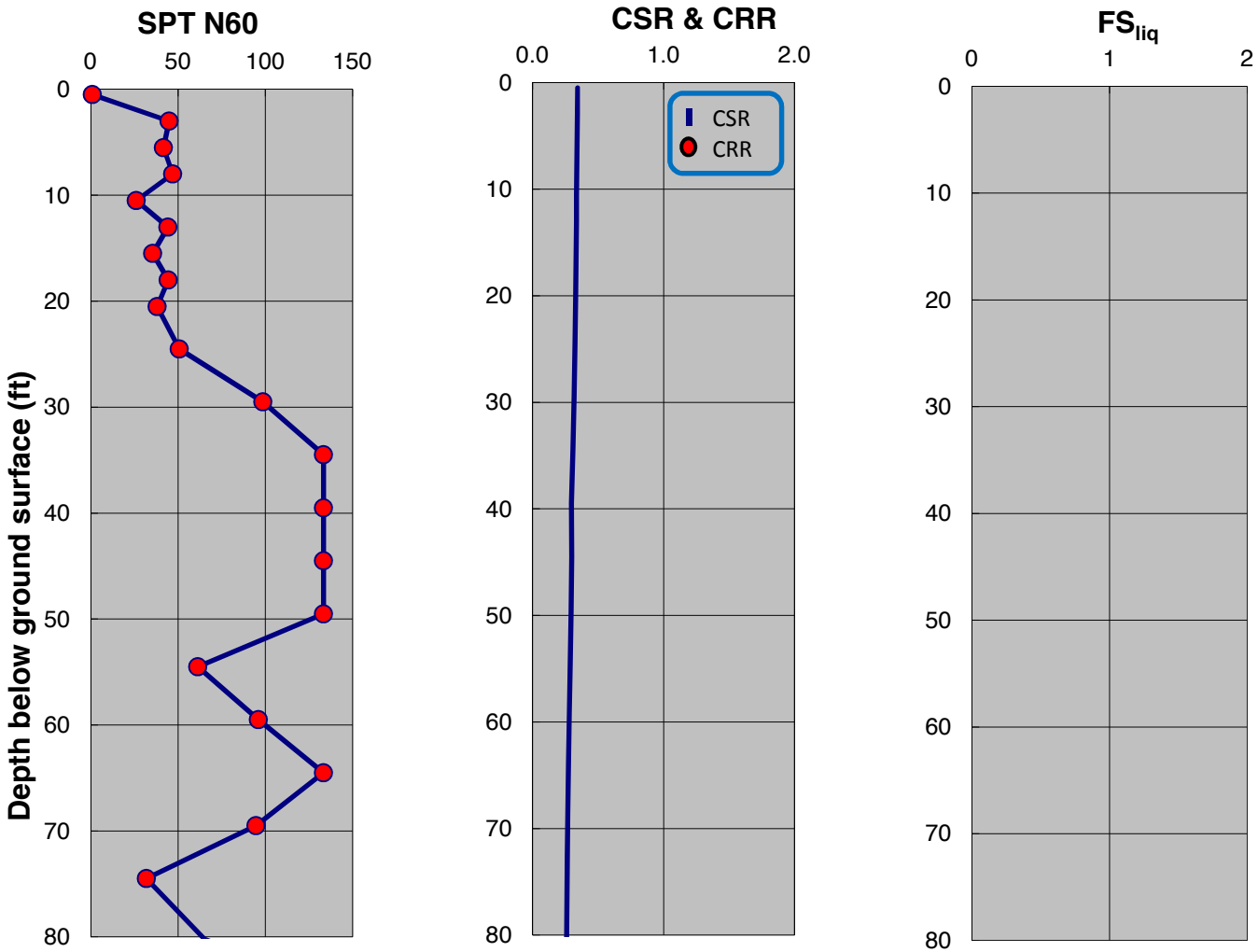
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-158 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

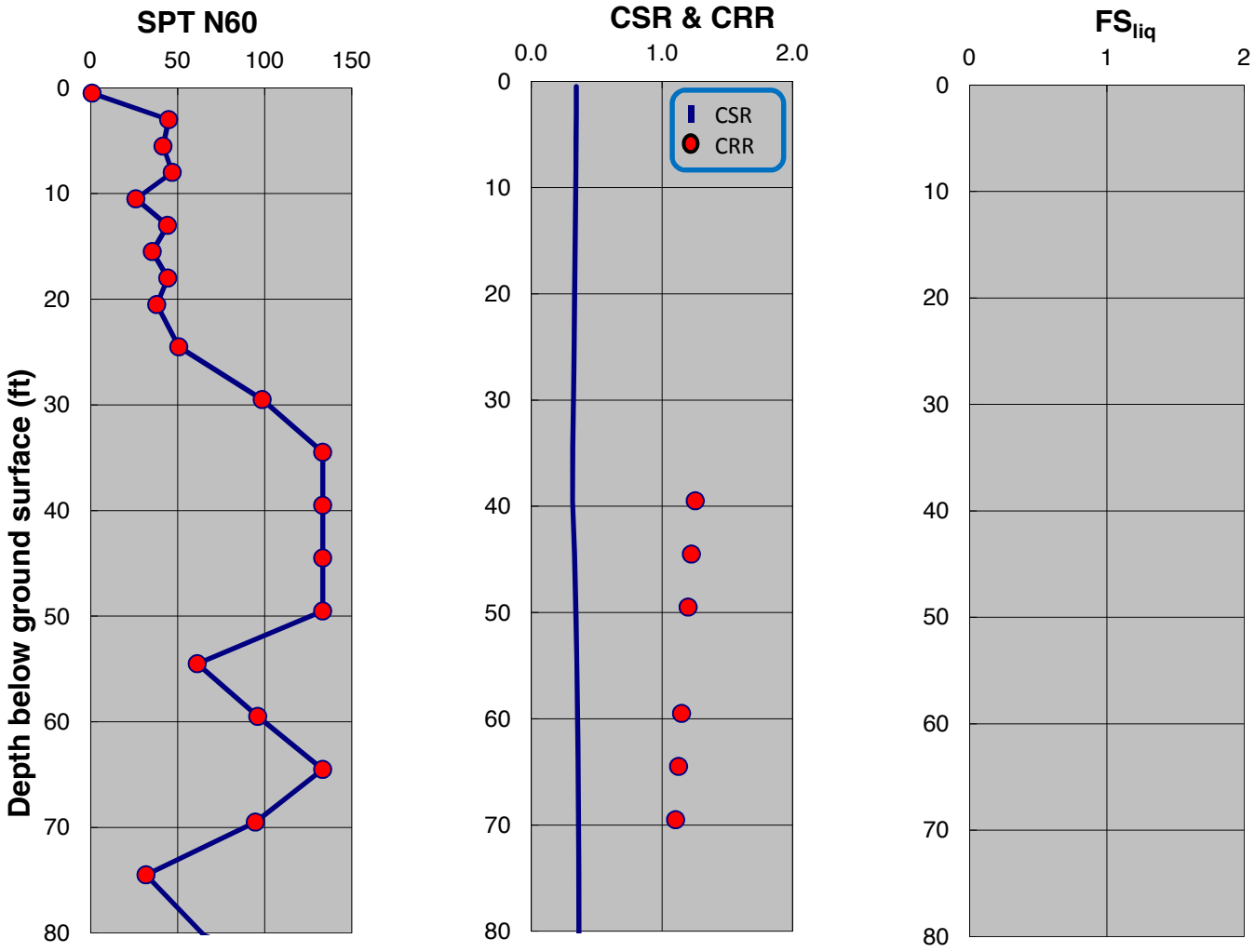
PLATE A.200



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-159 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

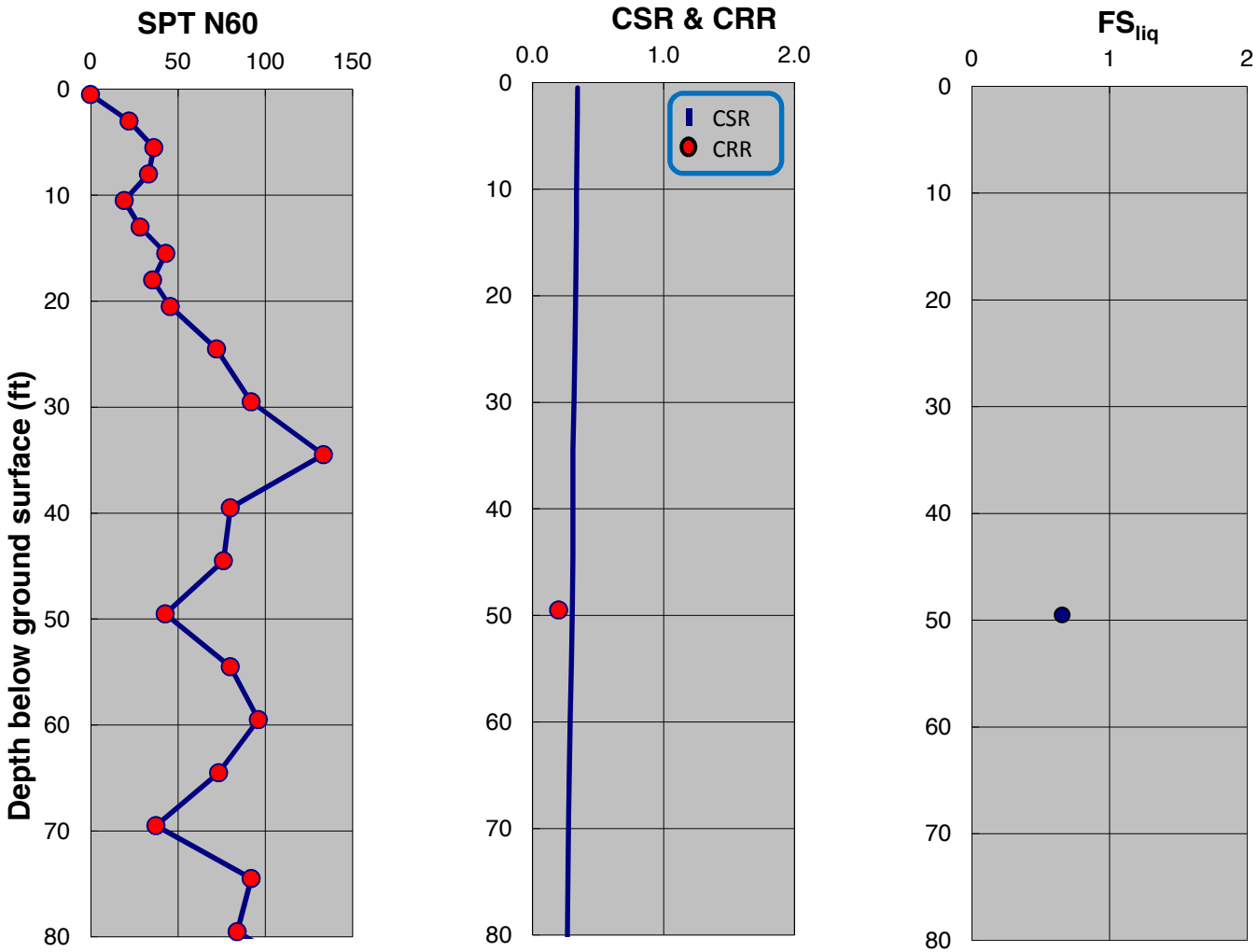
PLATE A.201



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-159 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

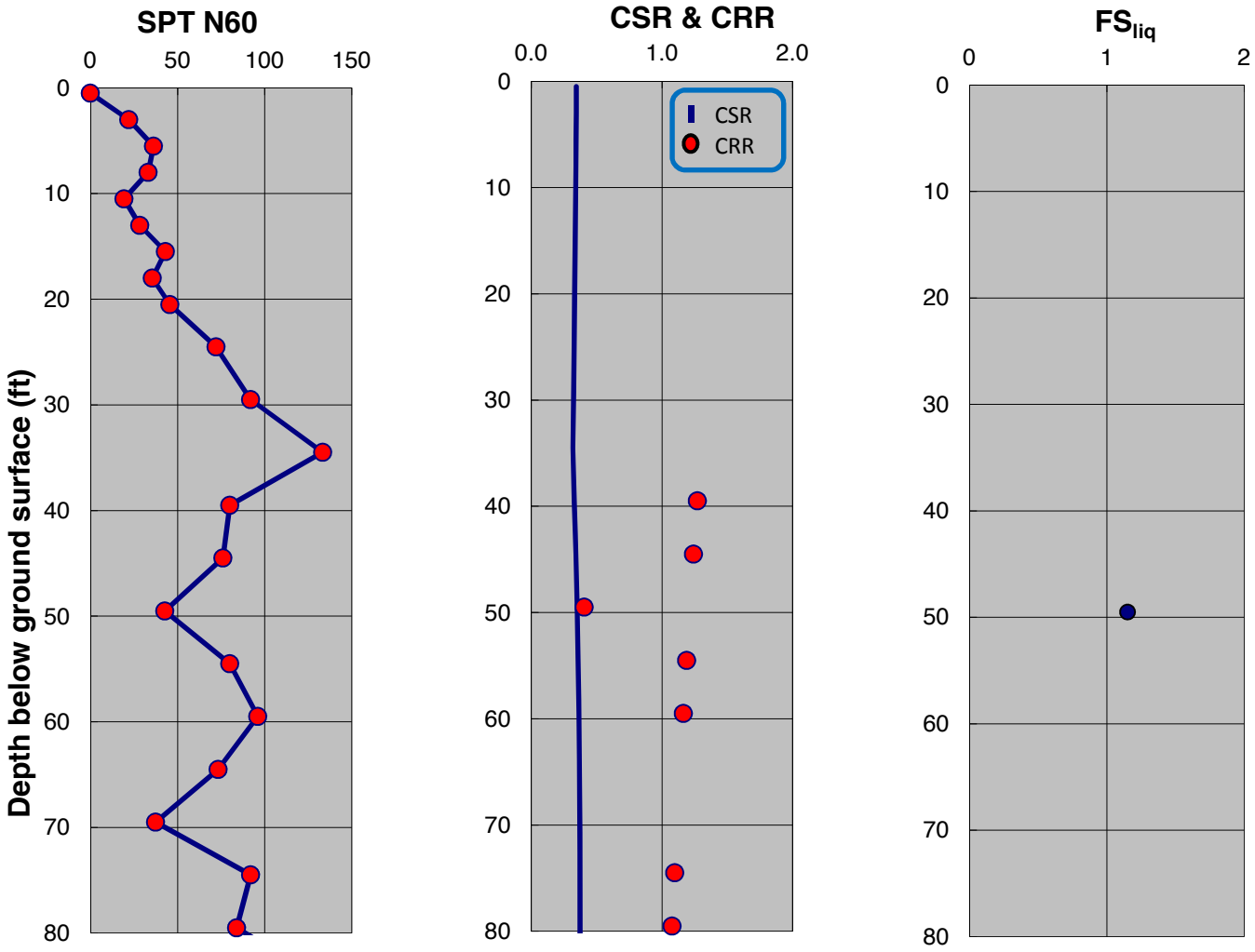
PLATE A.202



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-160 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

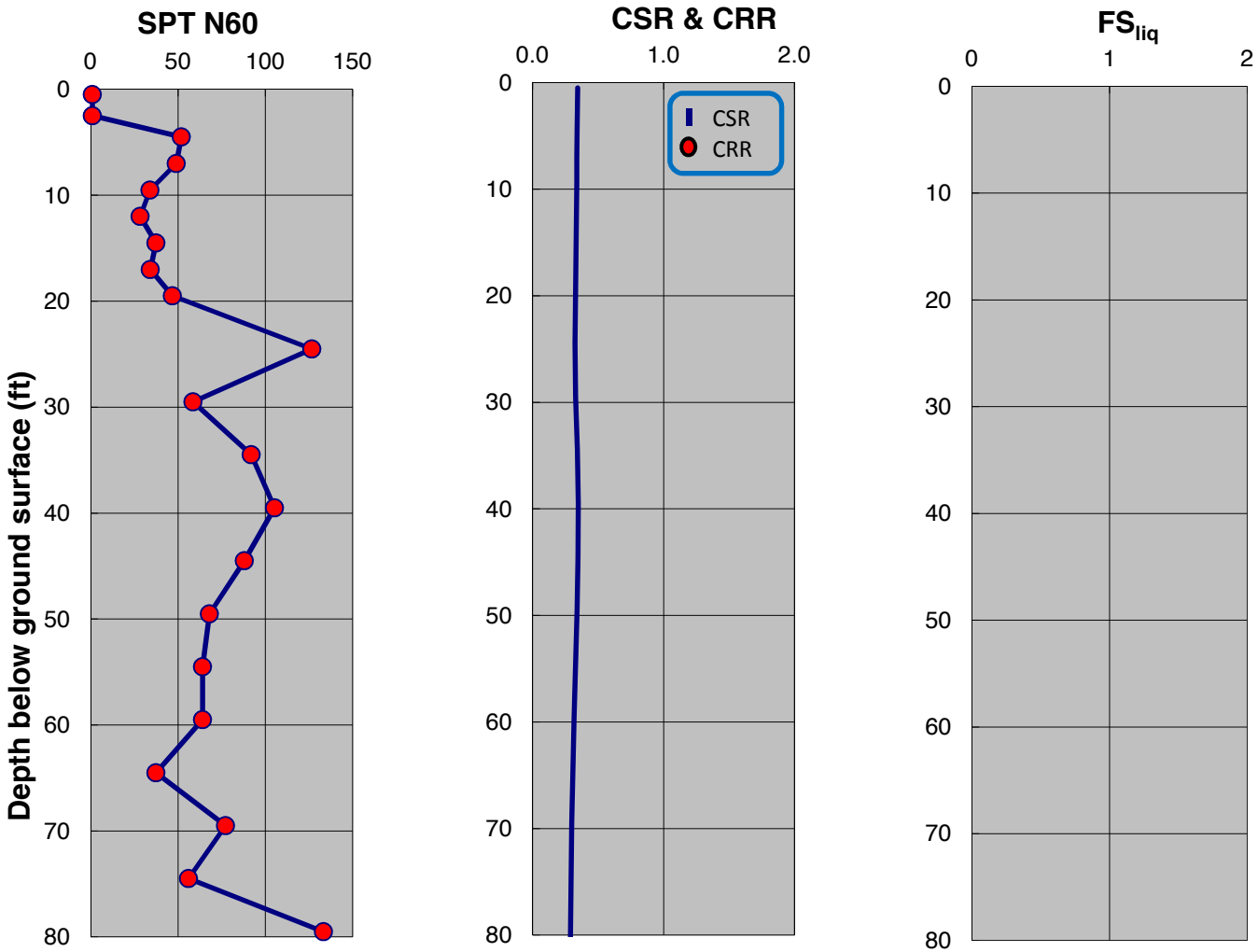
PLATE A.203



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-160 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

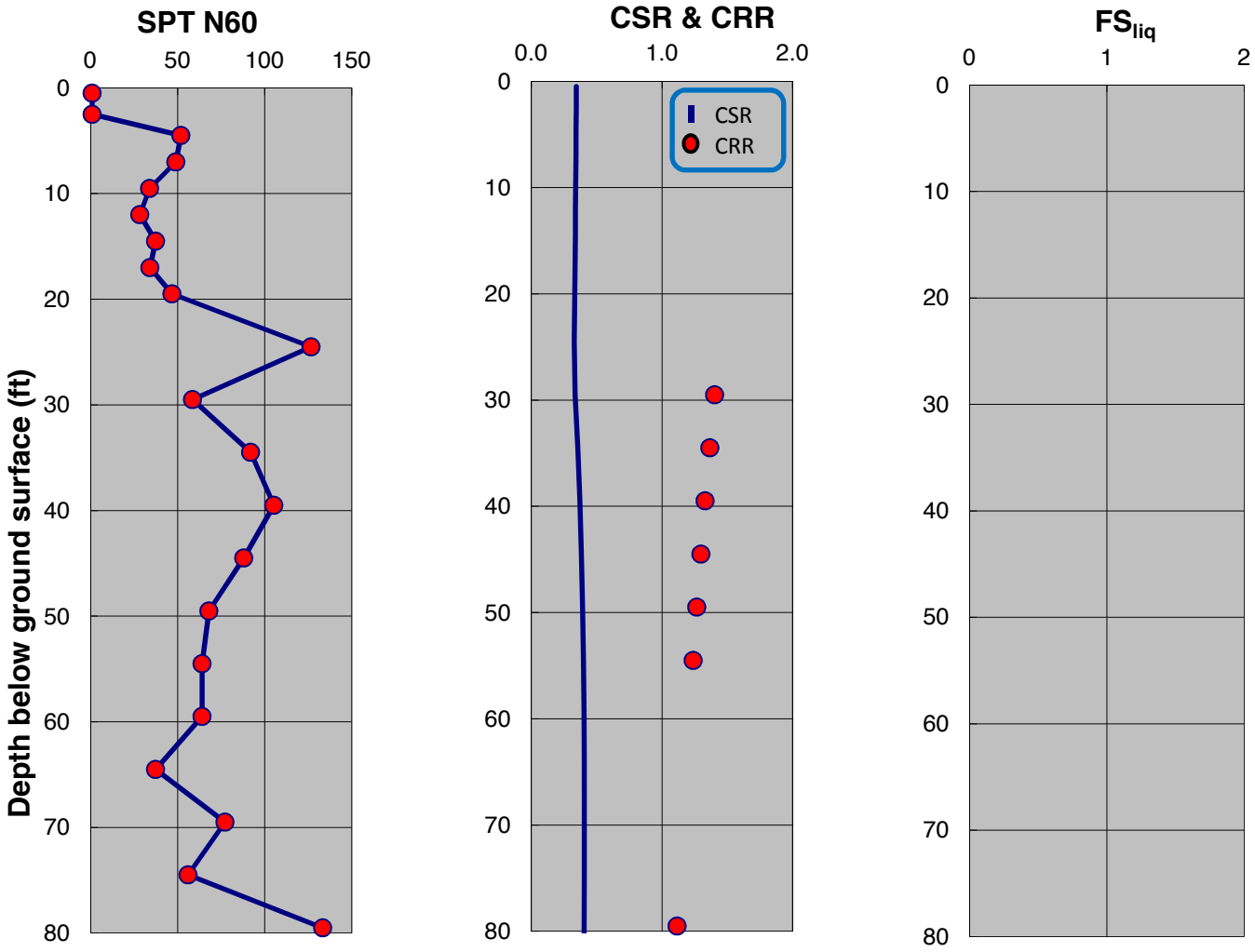
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.204



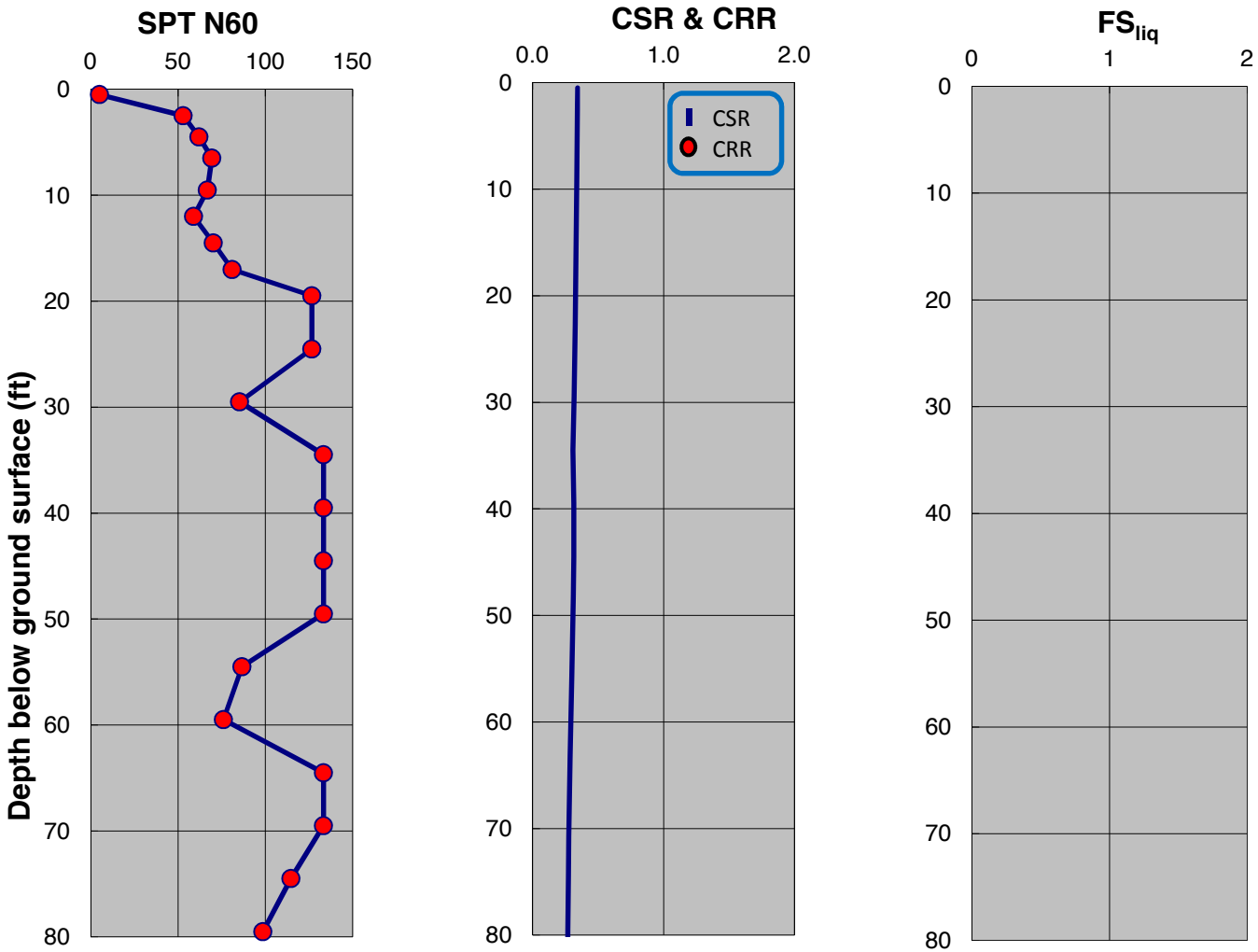
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-161 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



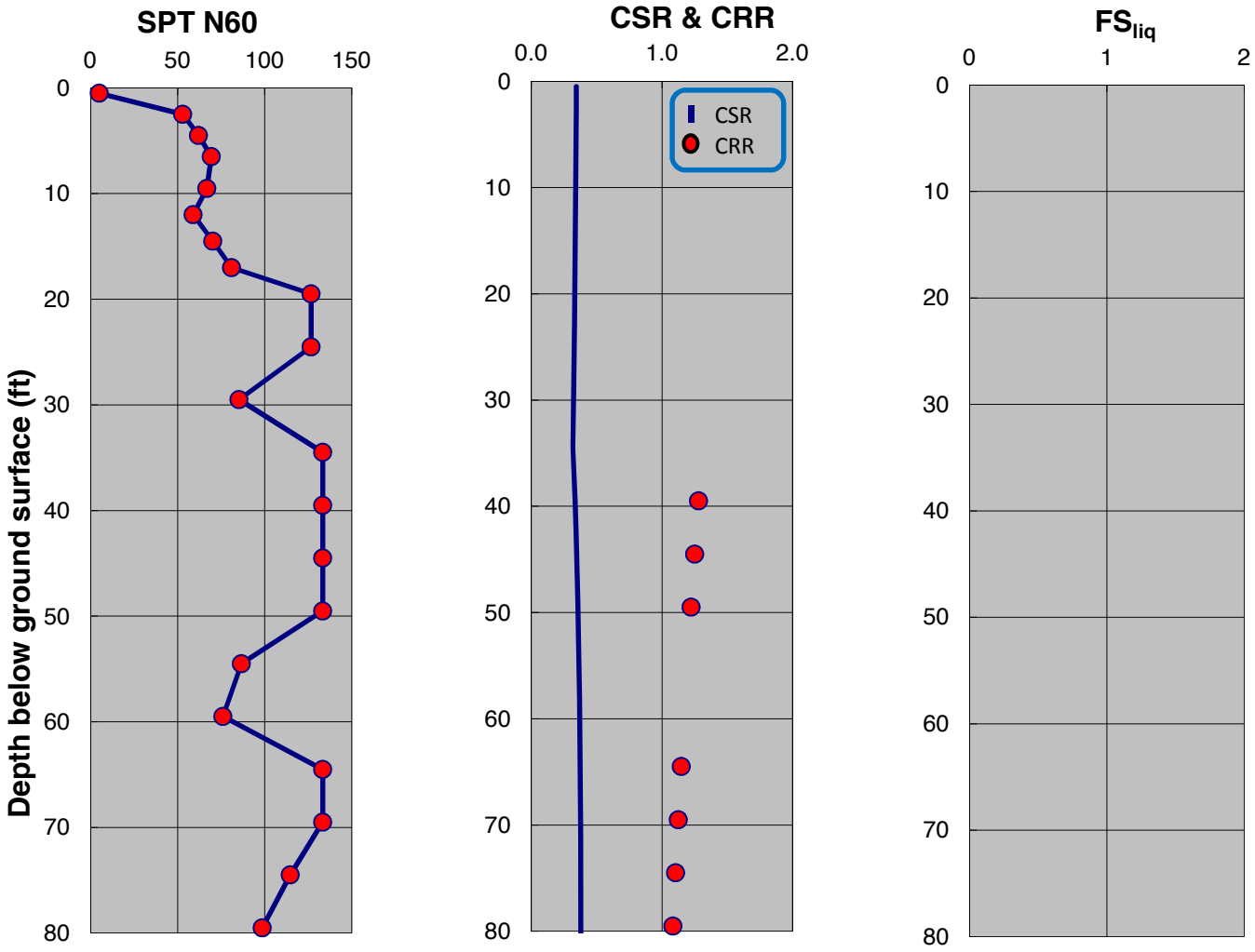
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-161 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



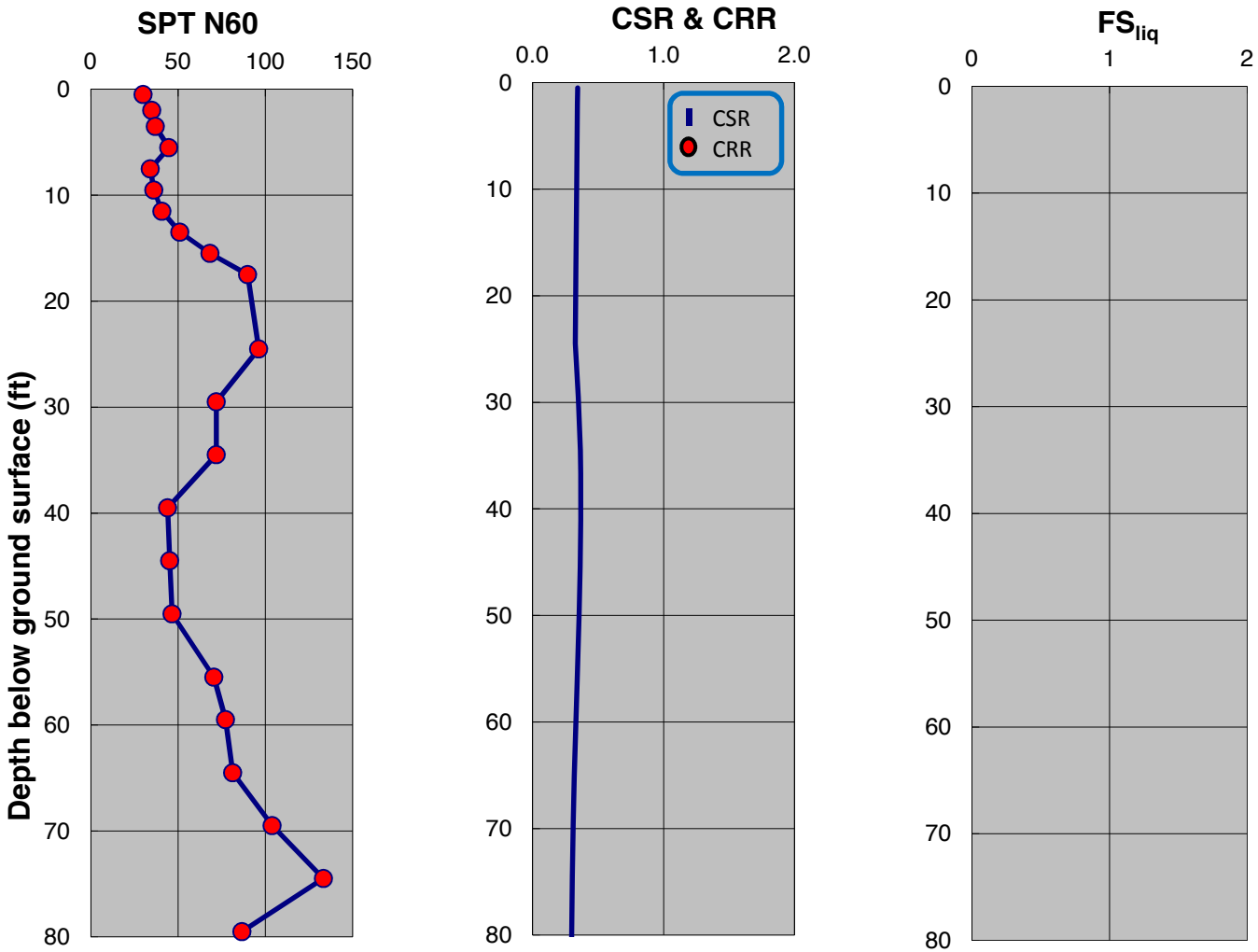
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-162 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



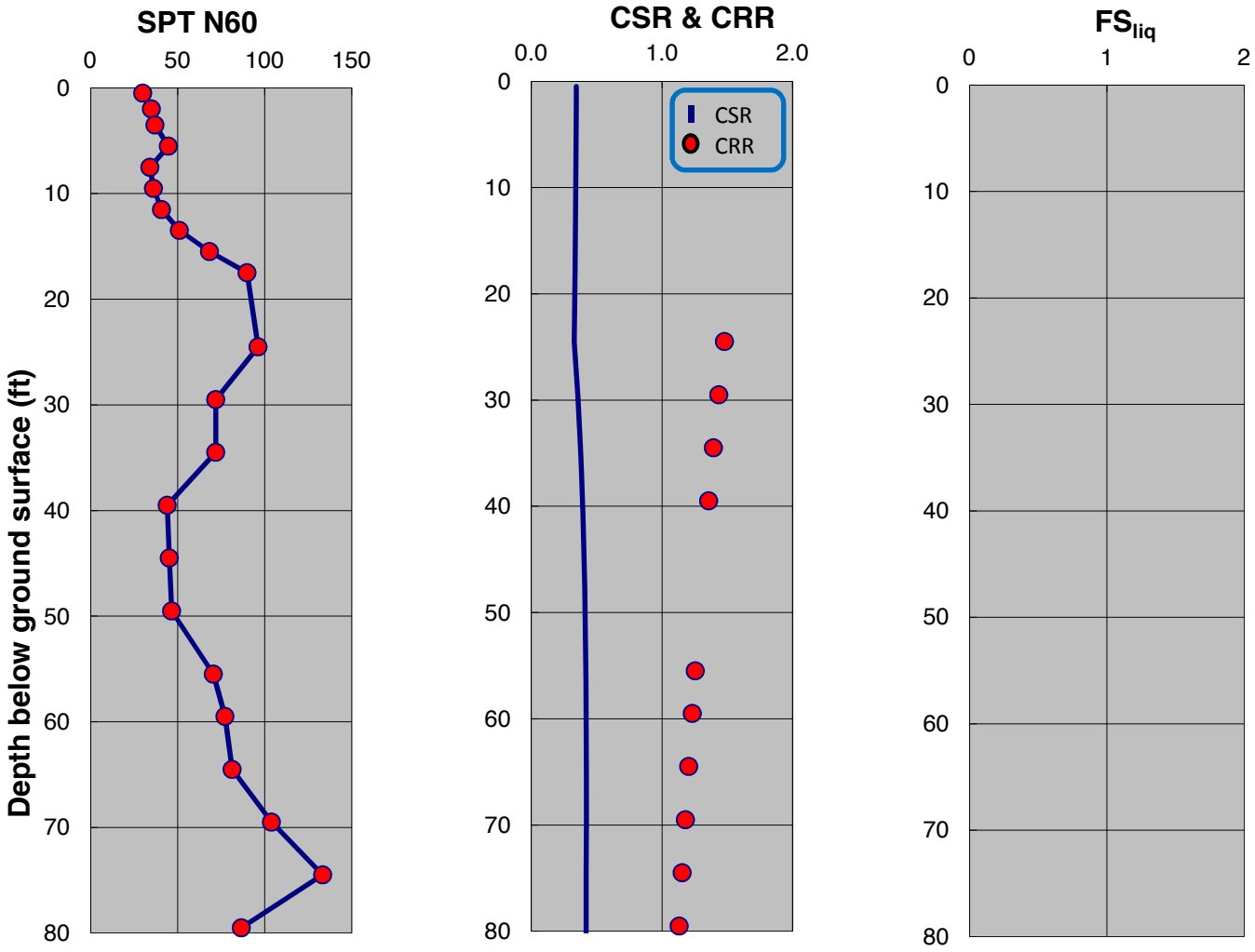
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-162 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-163 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

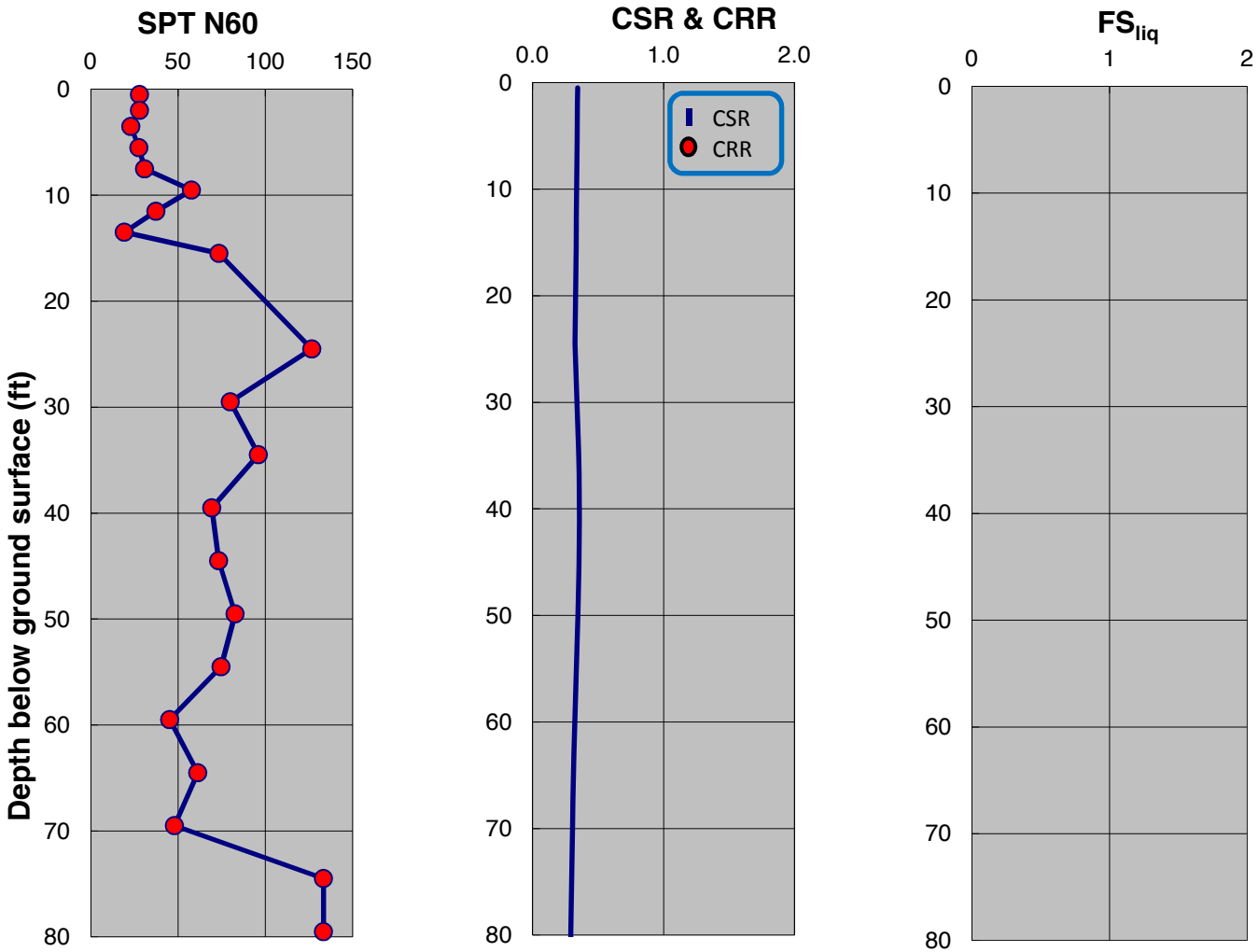
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-163 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

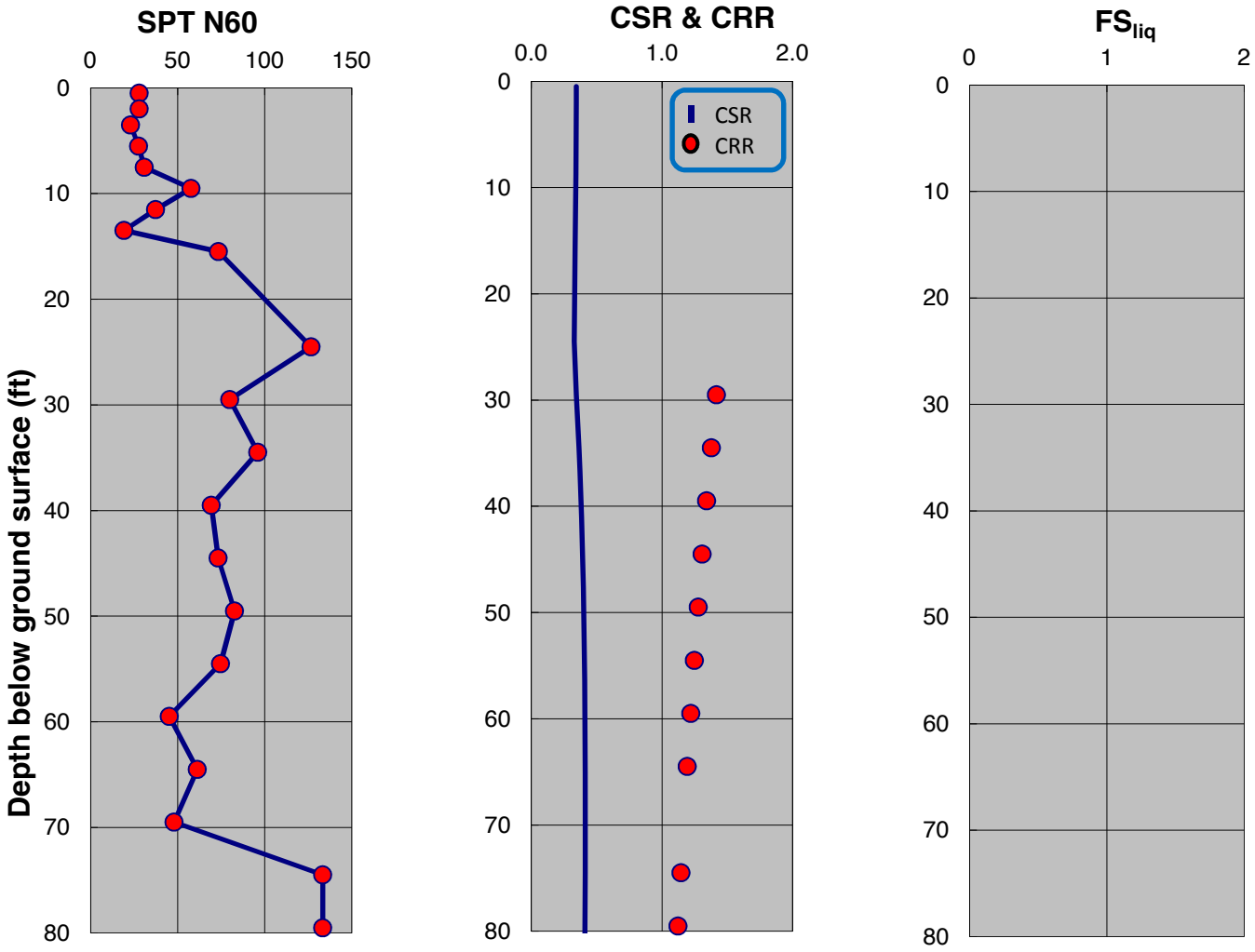
PLATE A.210



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-164 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

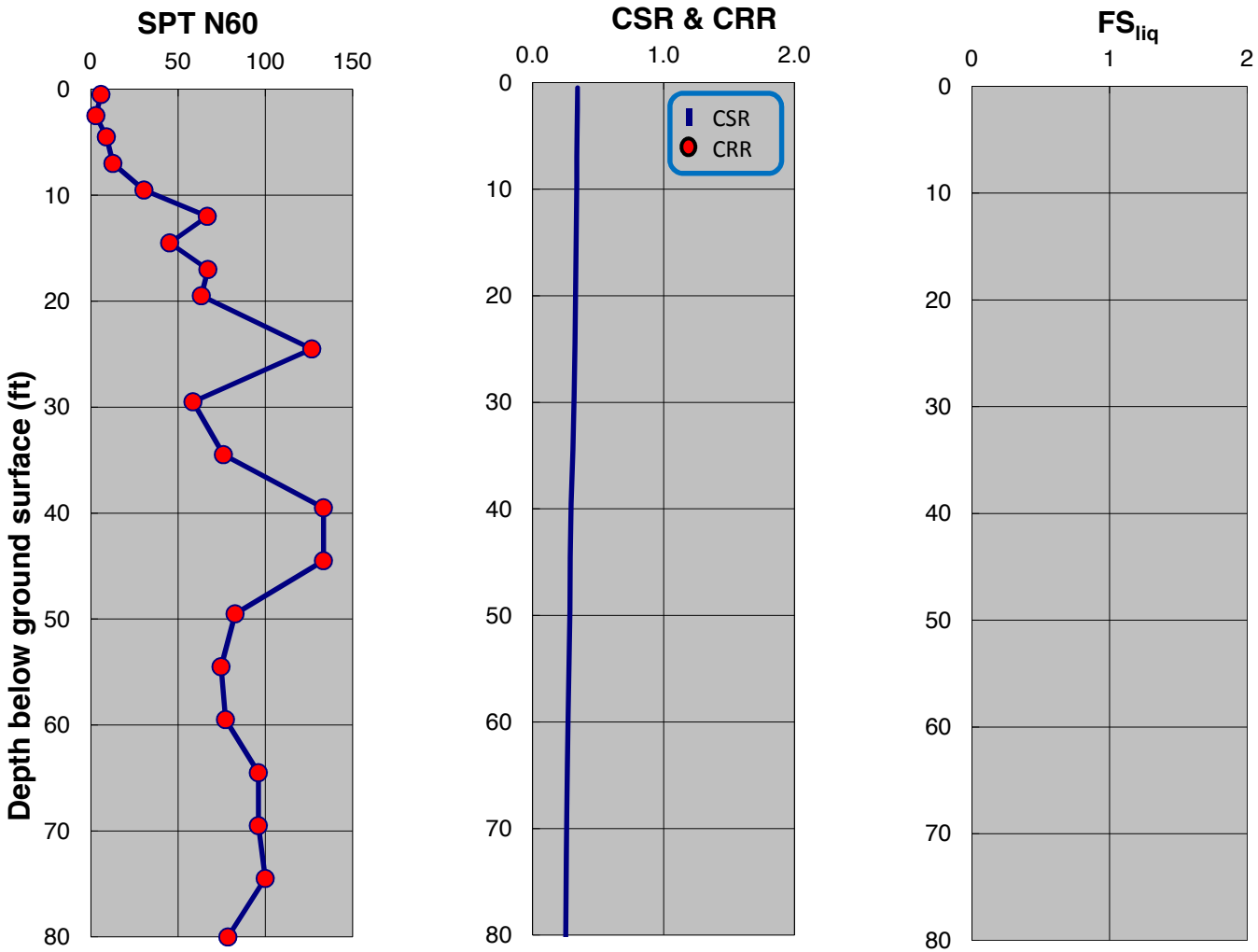
PLATE A.211



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-164 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

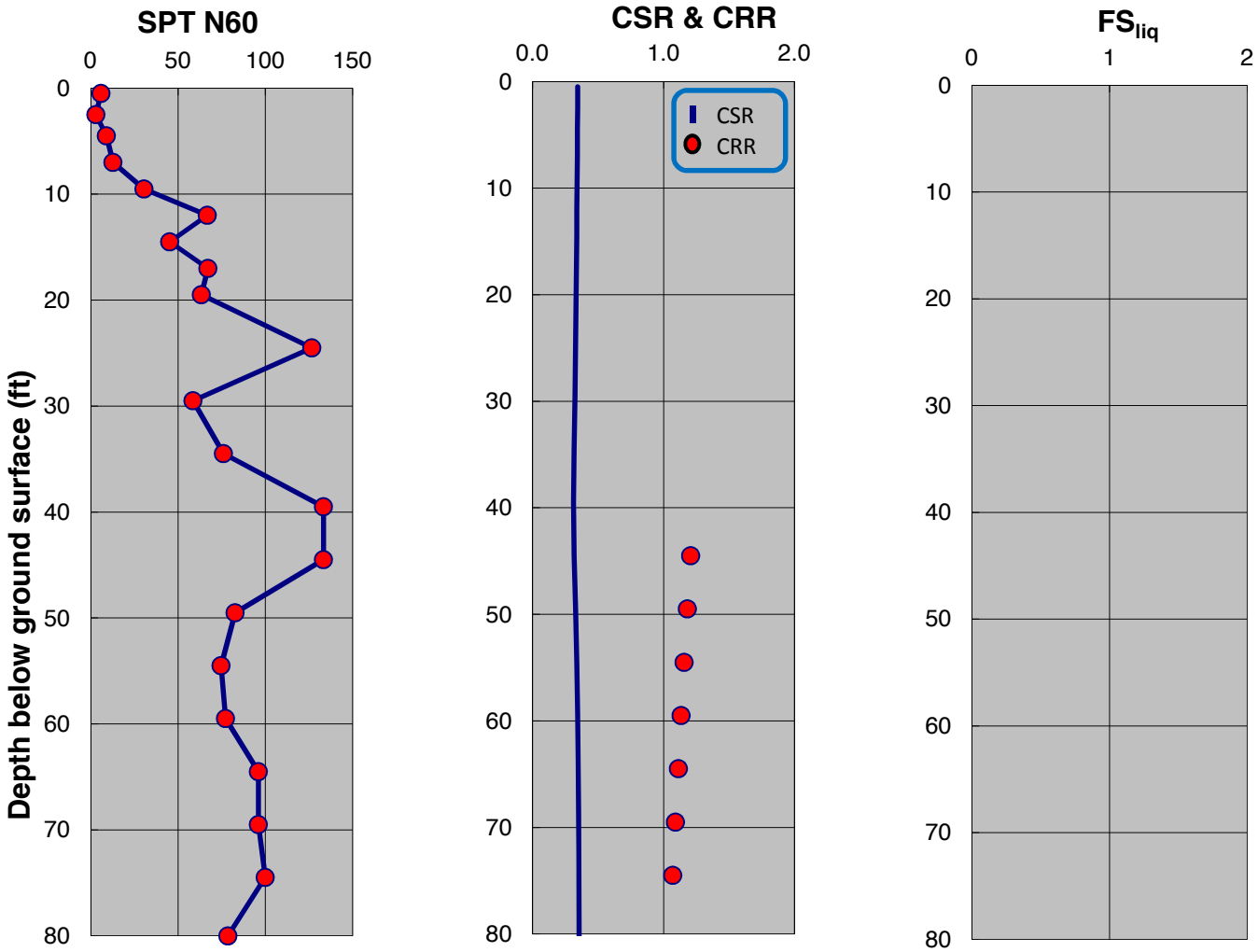
PLATE A.212



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-165 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

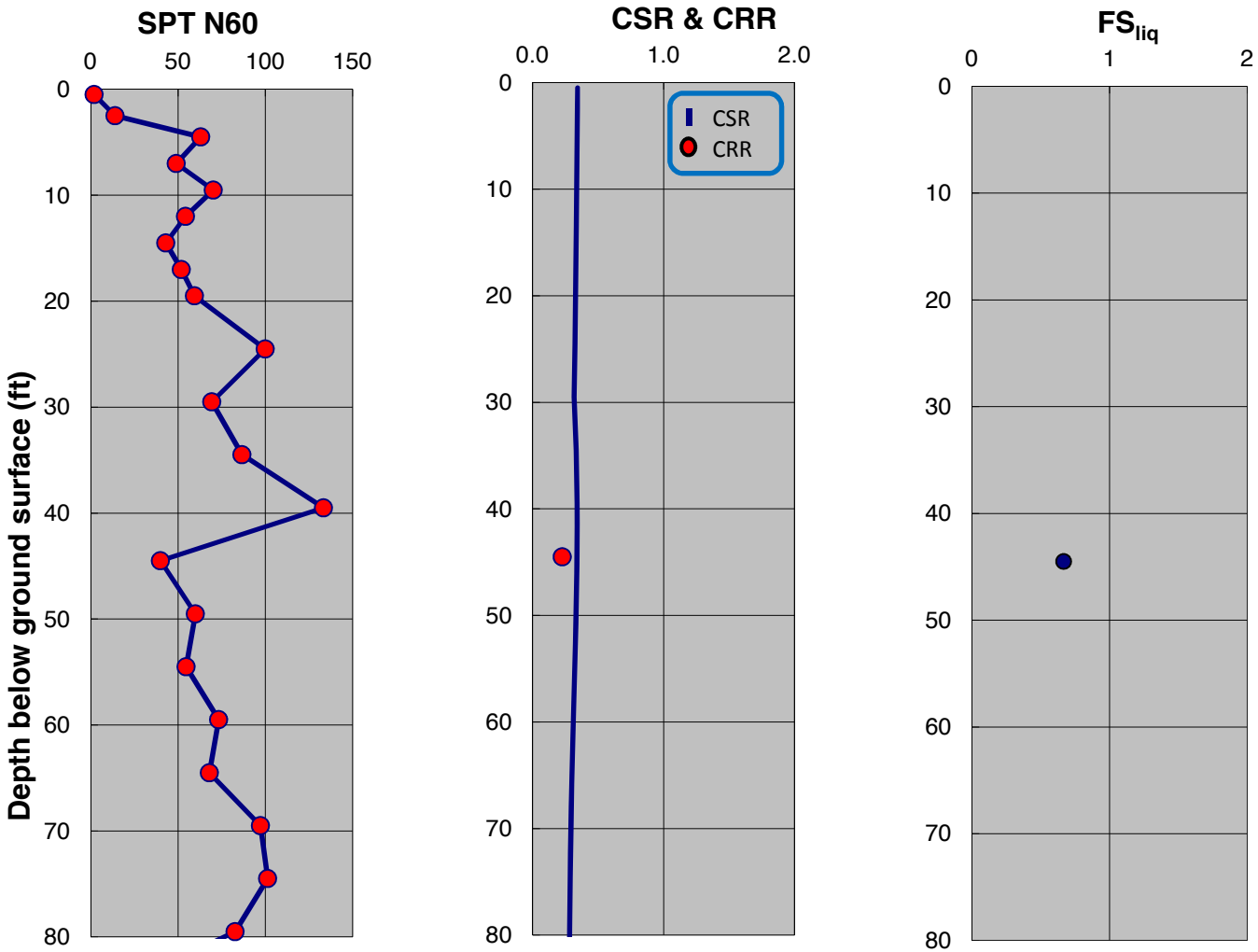
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.213



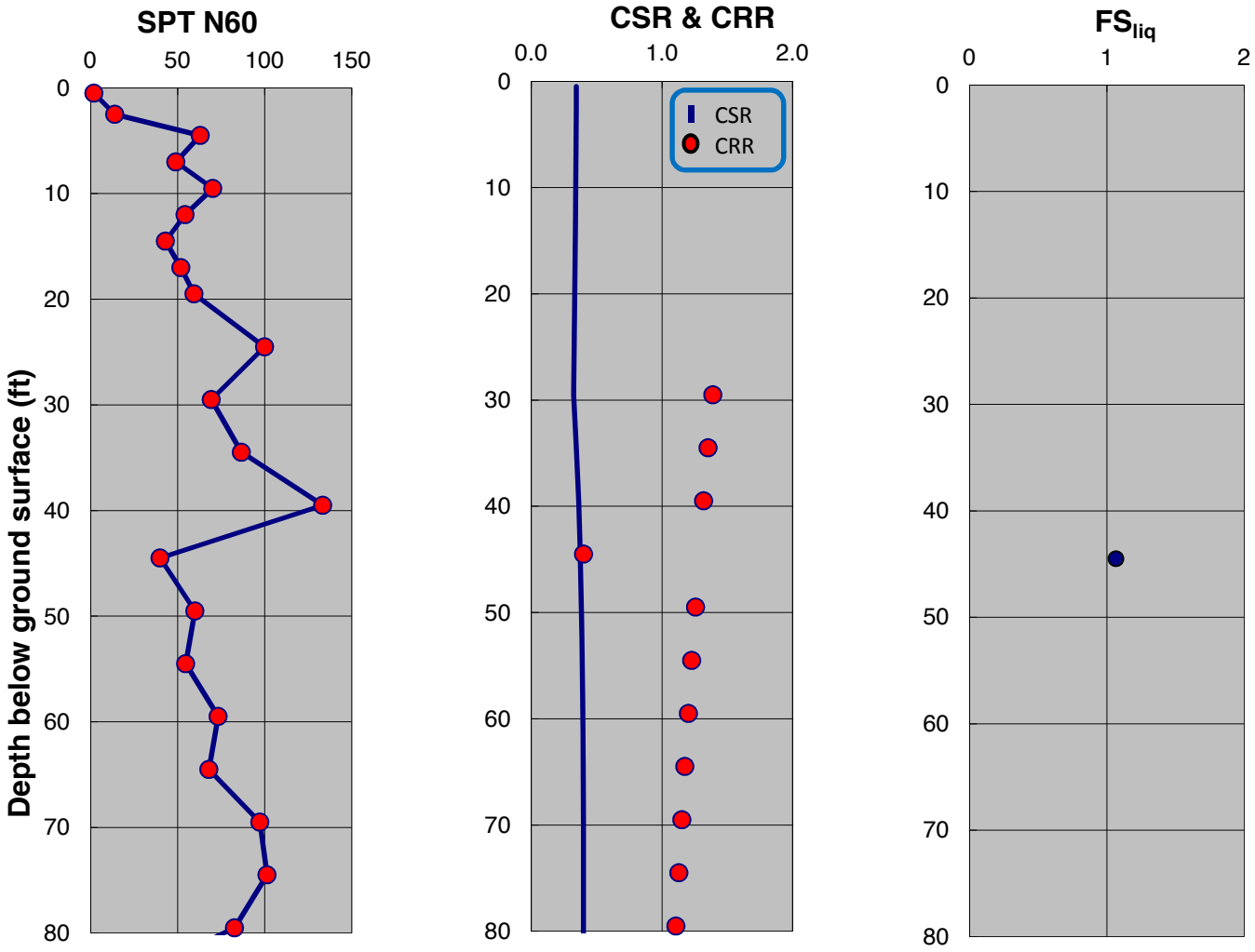
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-165 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



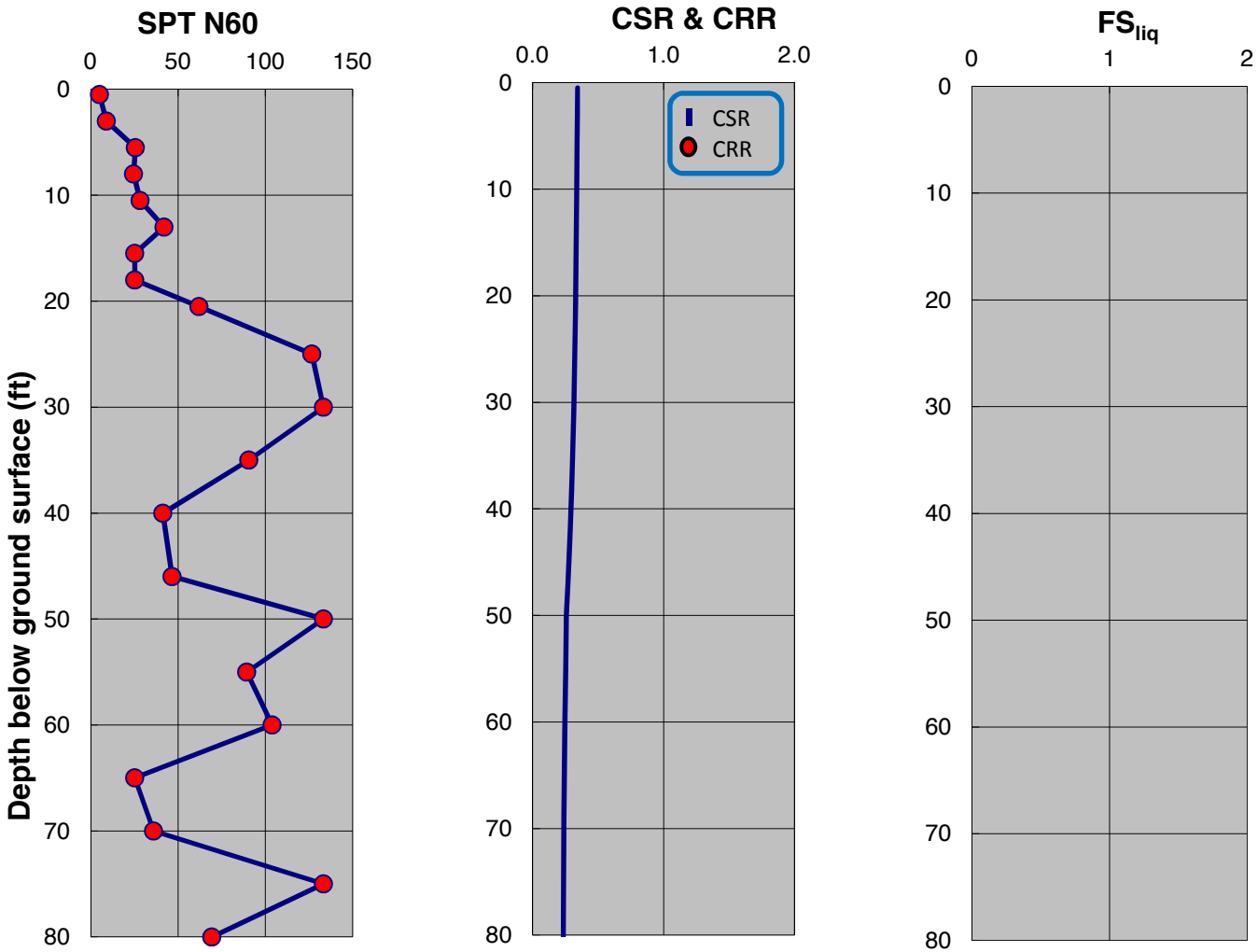
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-166 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



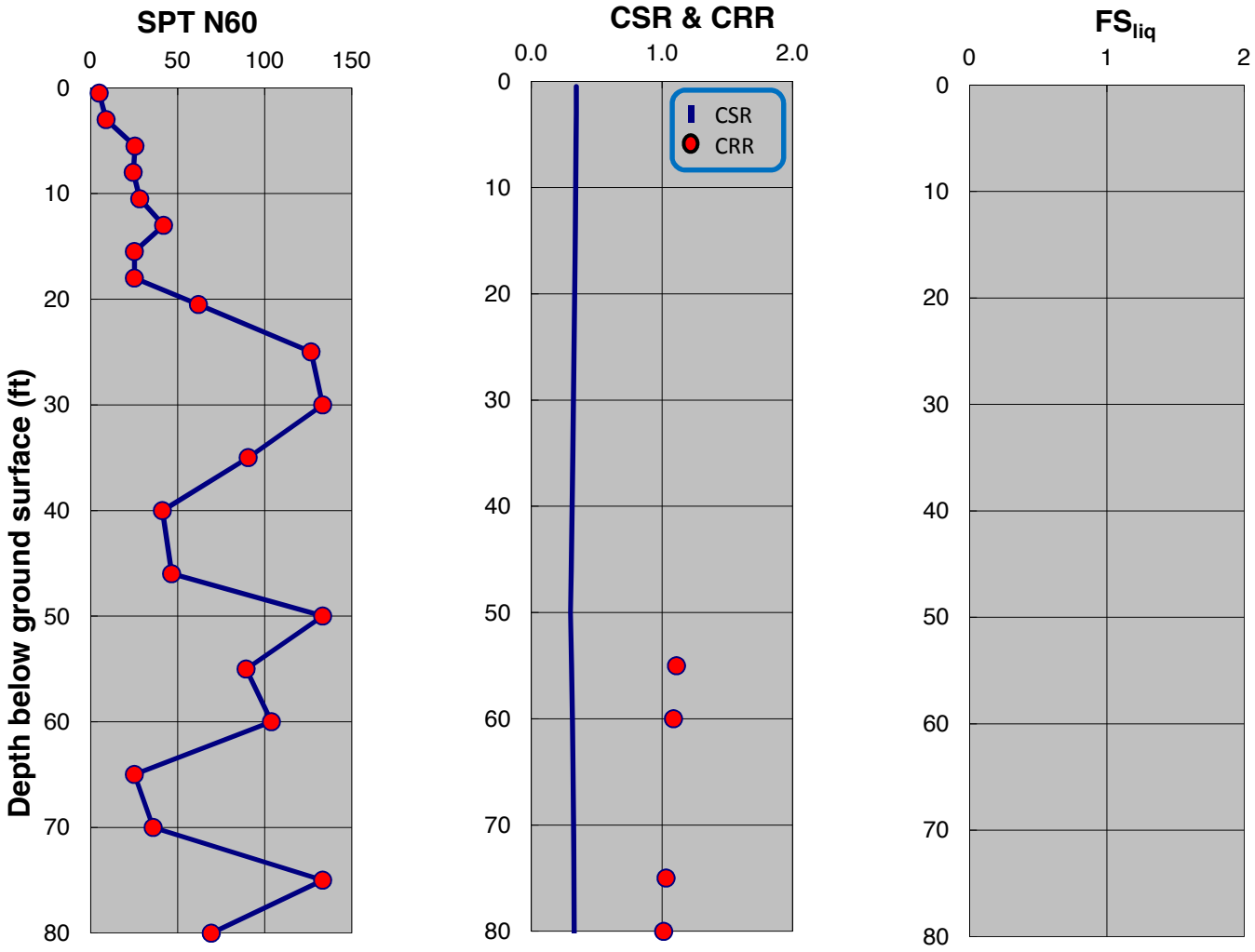
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-166 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



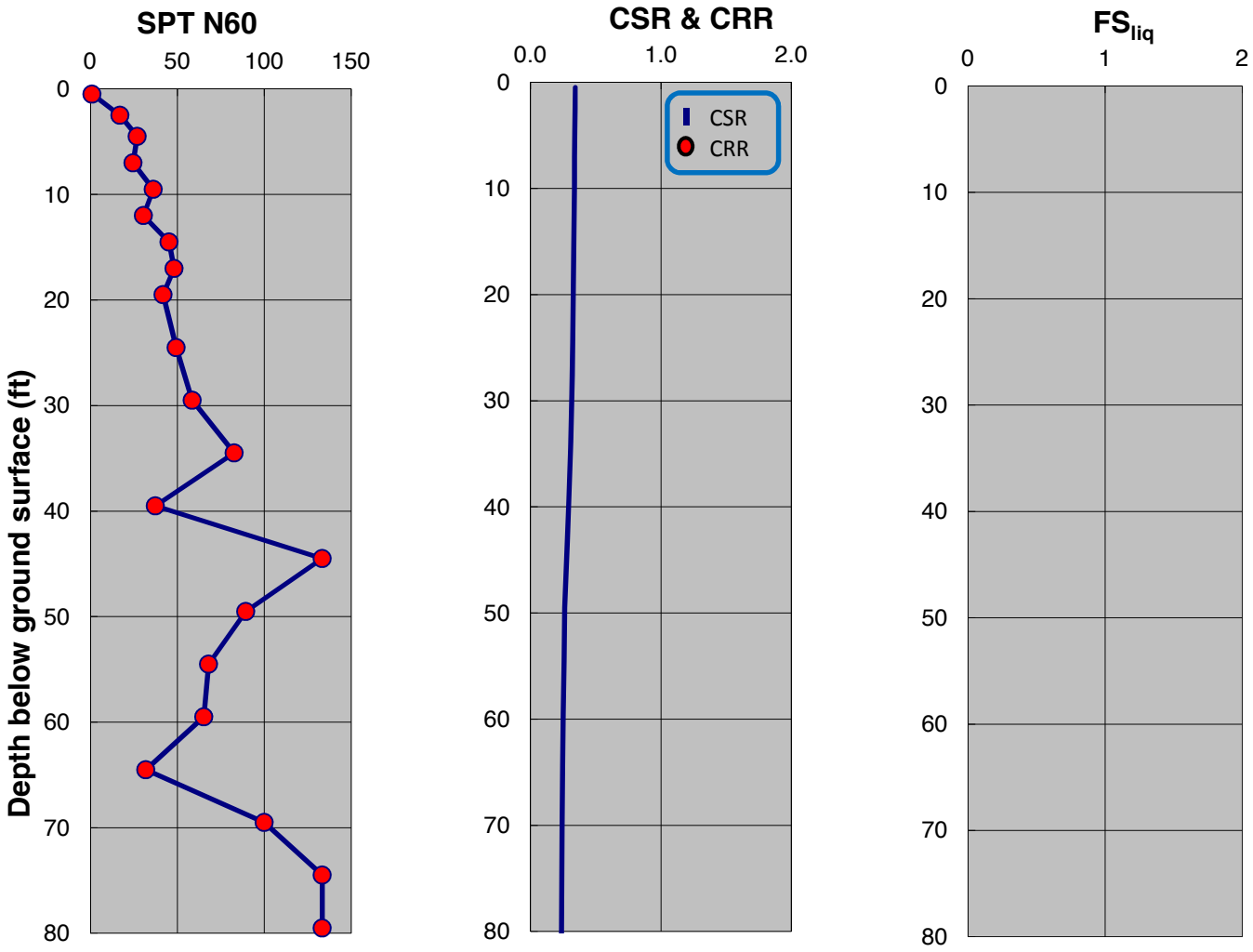
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-167 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-167 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

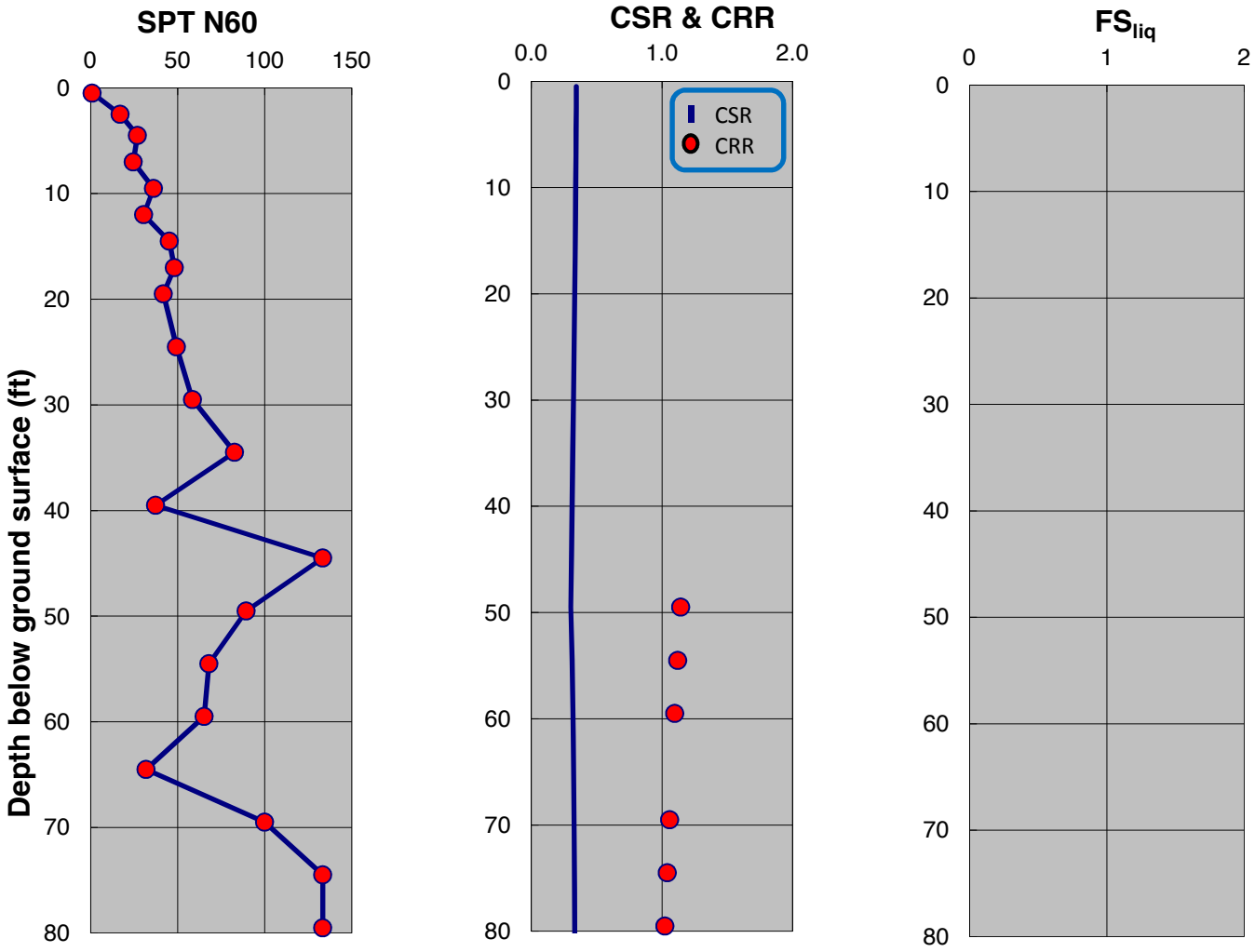
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-168 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

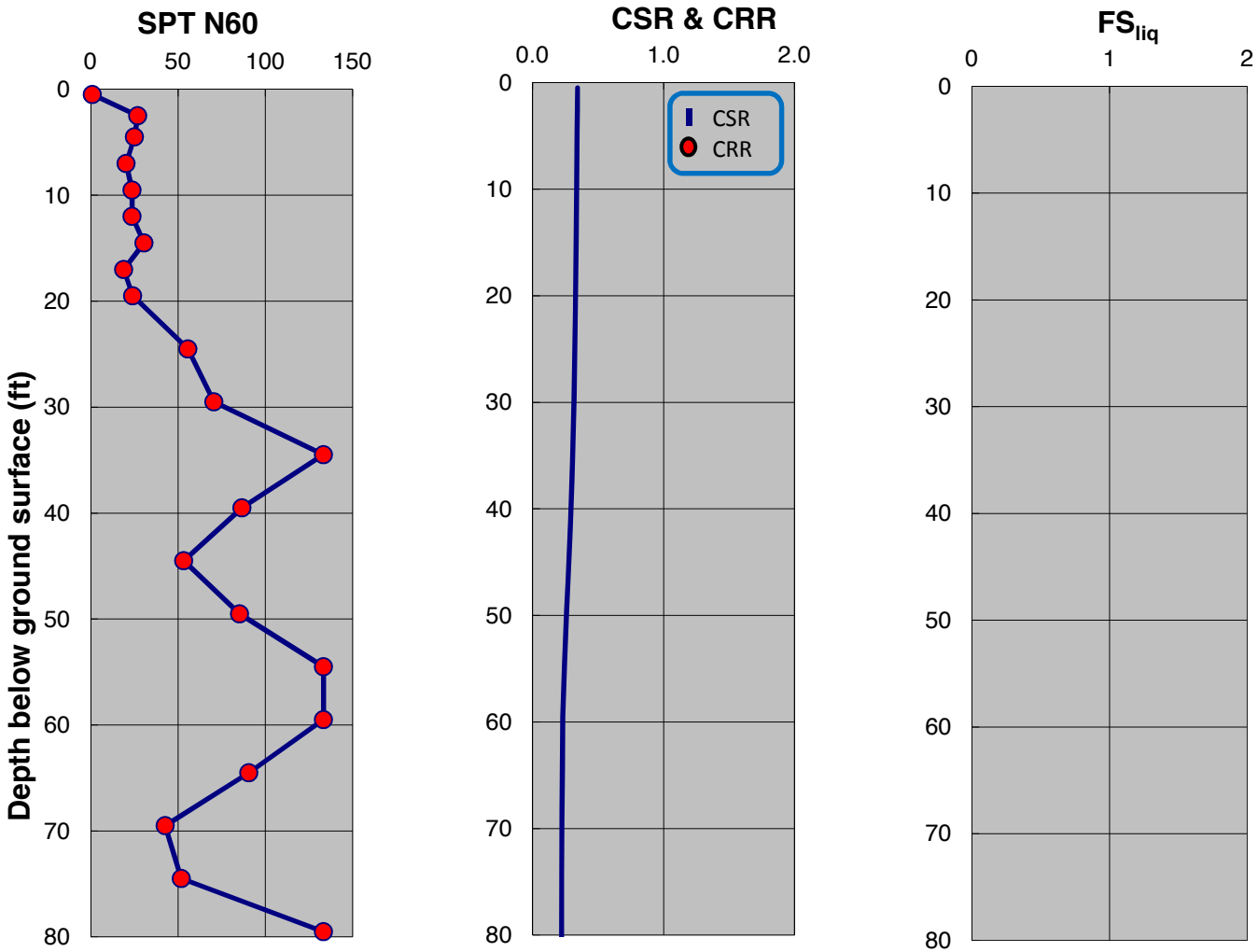
PLATE A.219



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-168 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

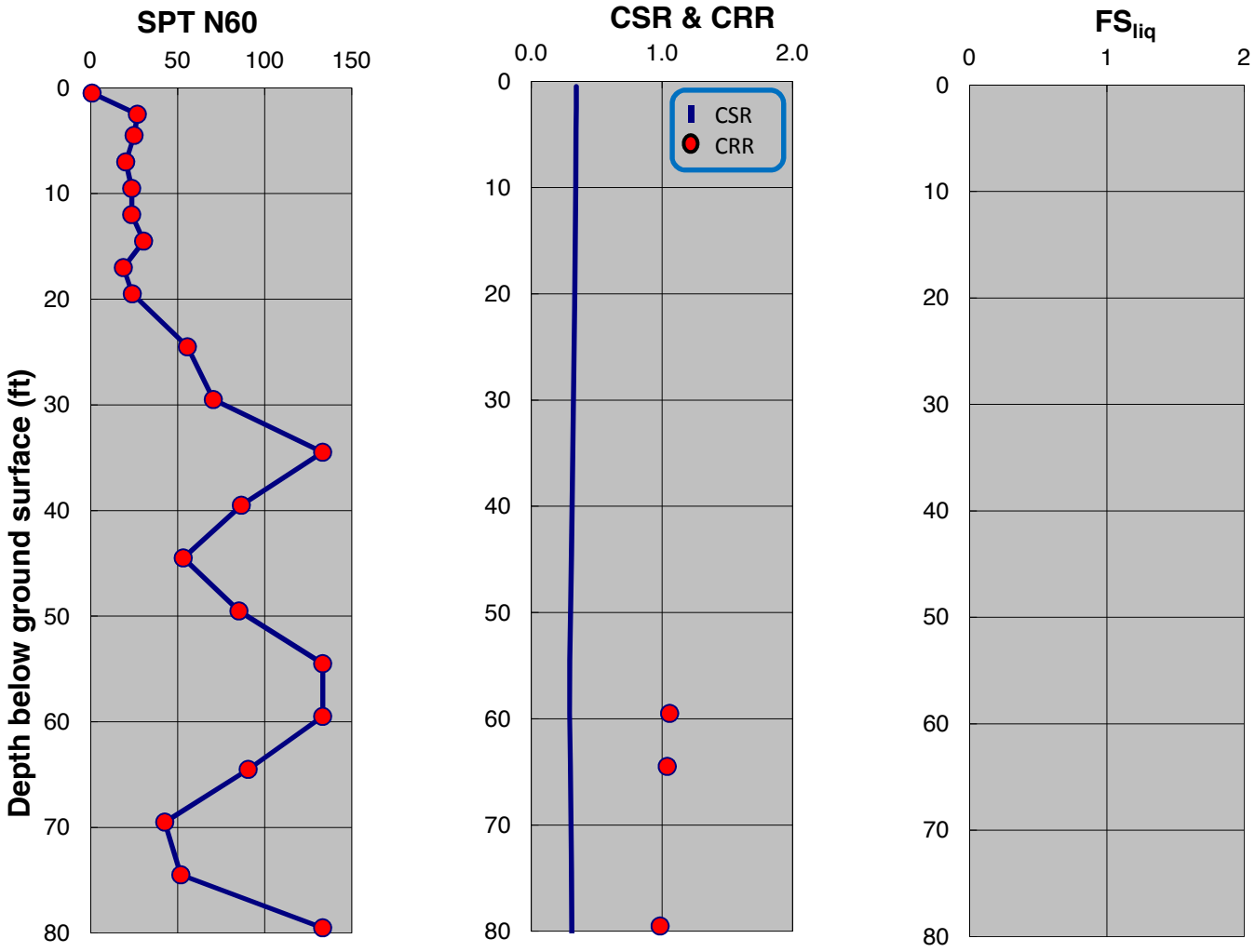
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.220



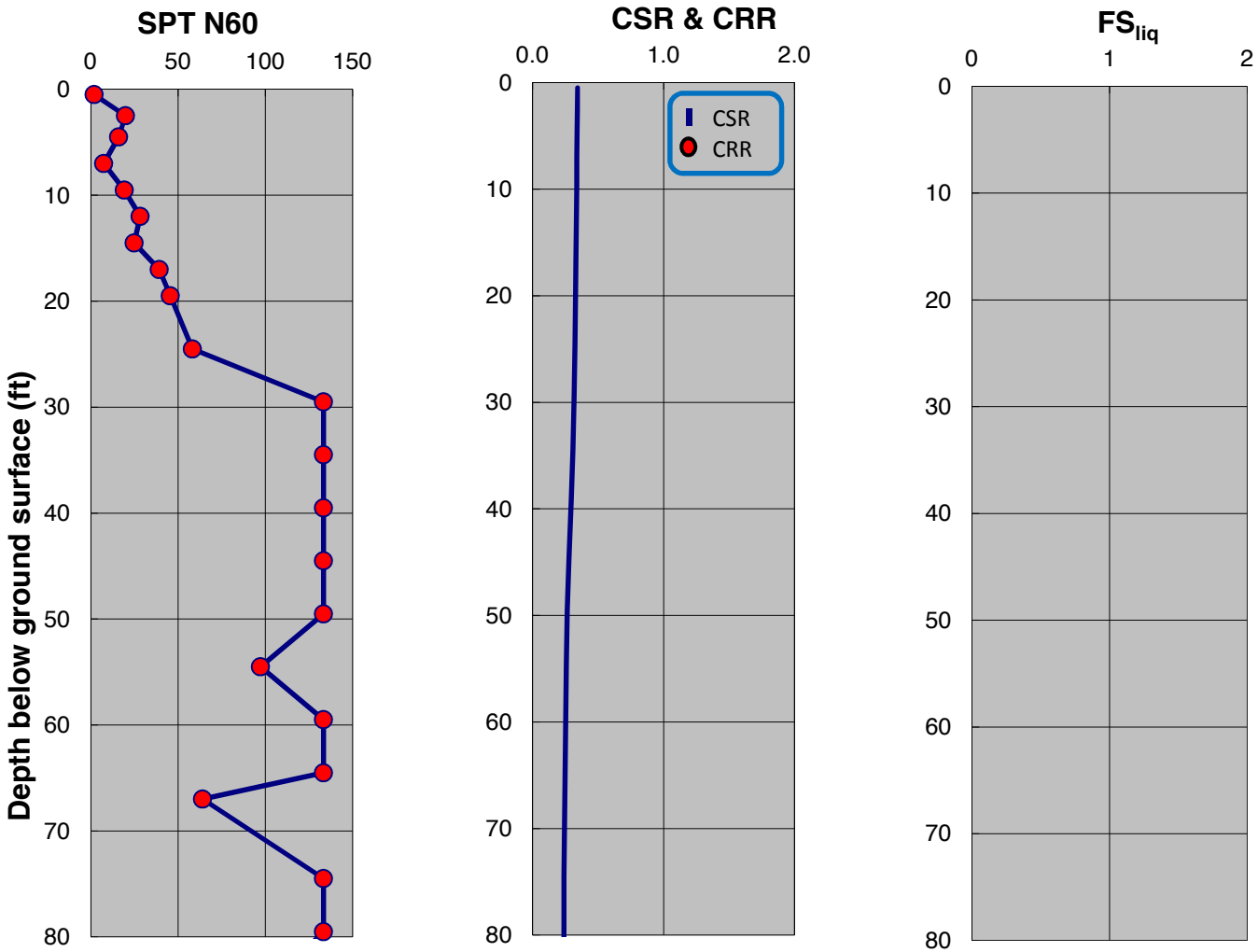
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-169 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



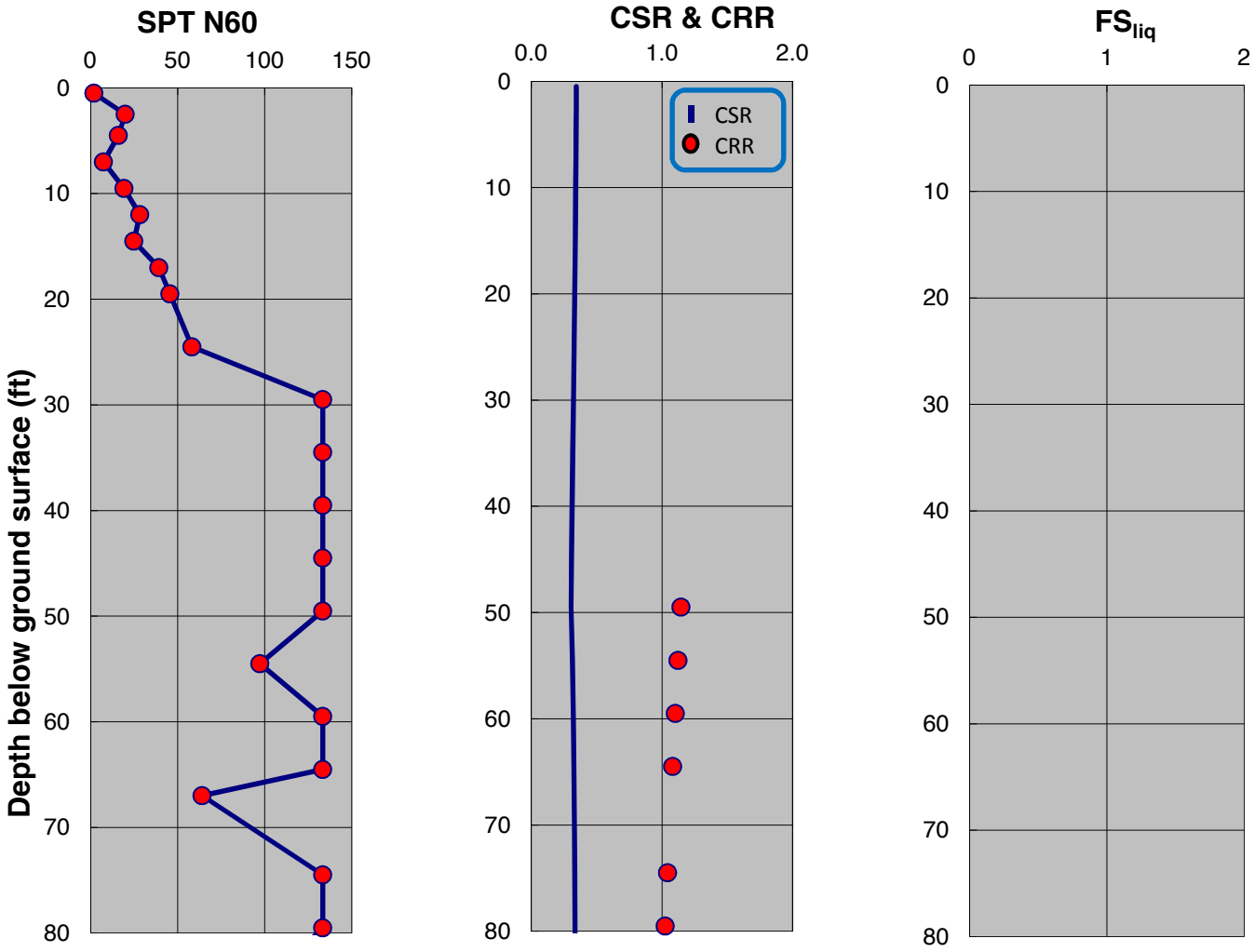
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-169 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



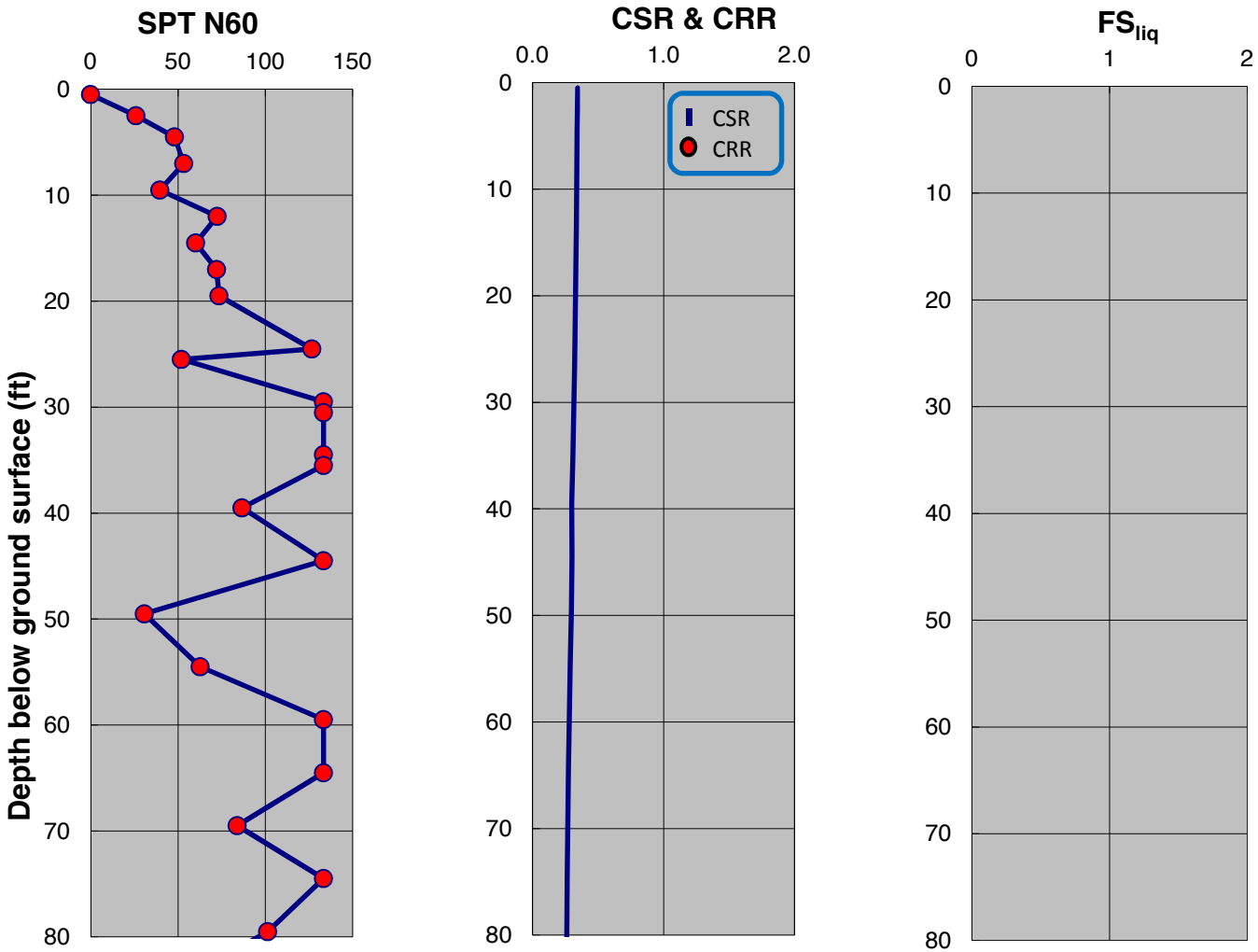
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-170 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



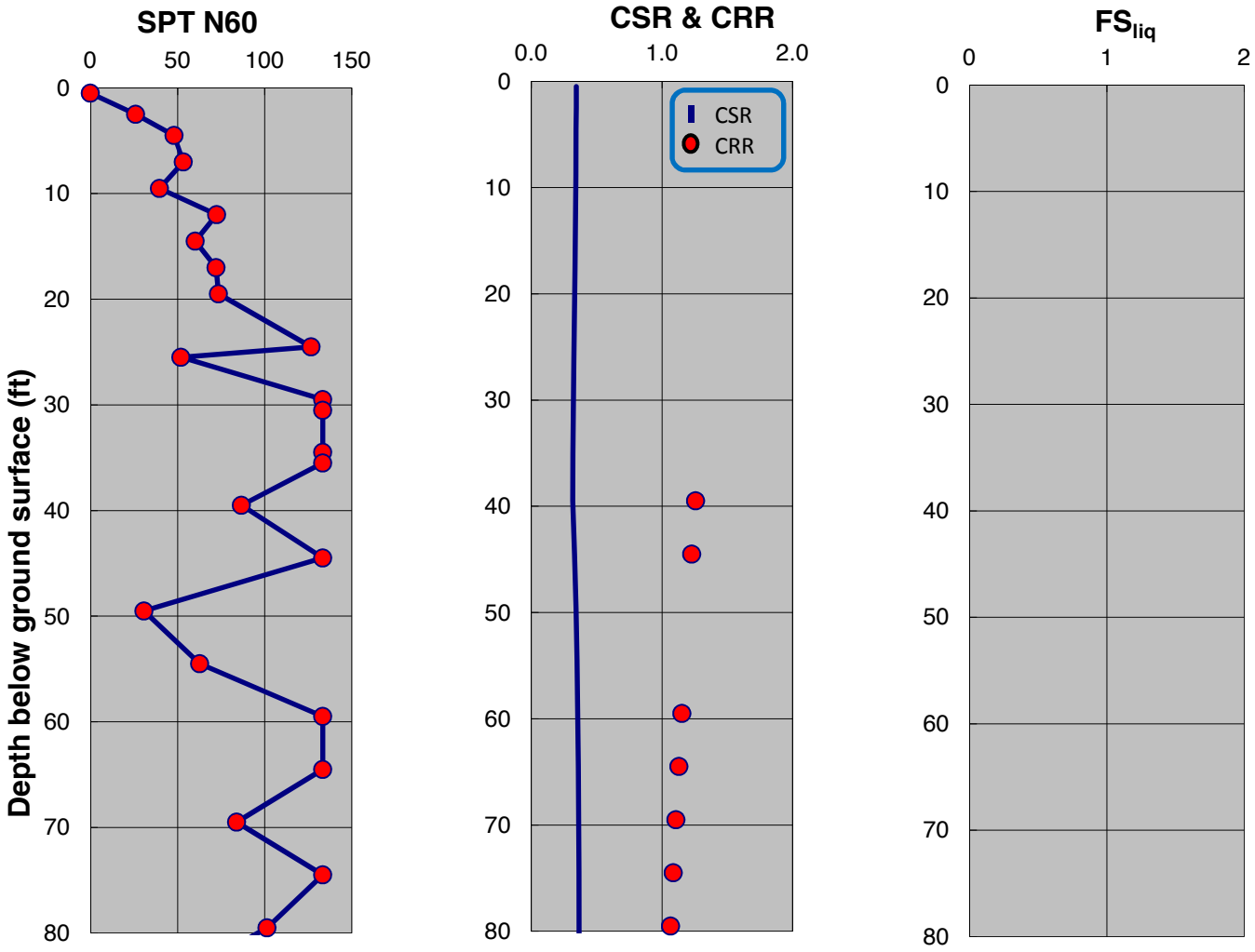
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-170 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



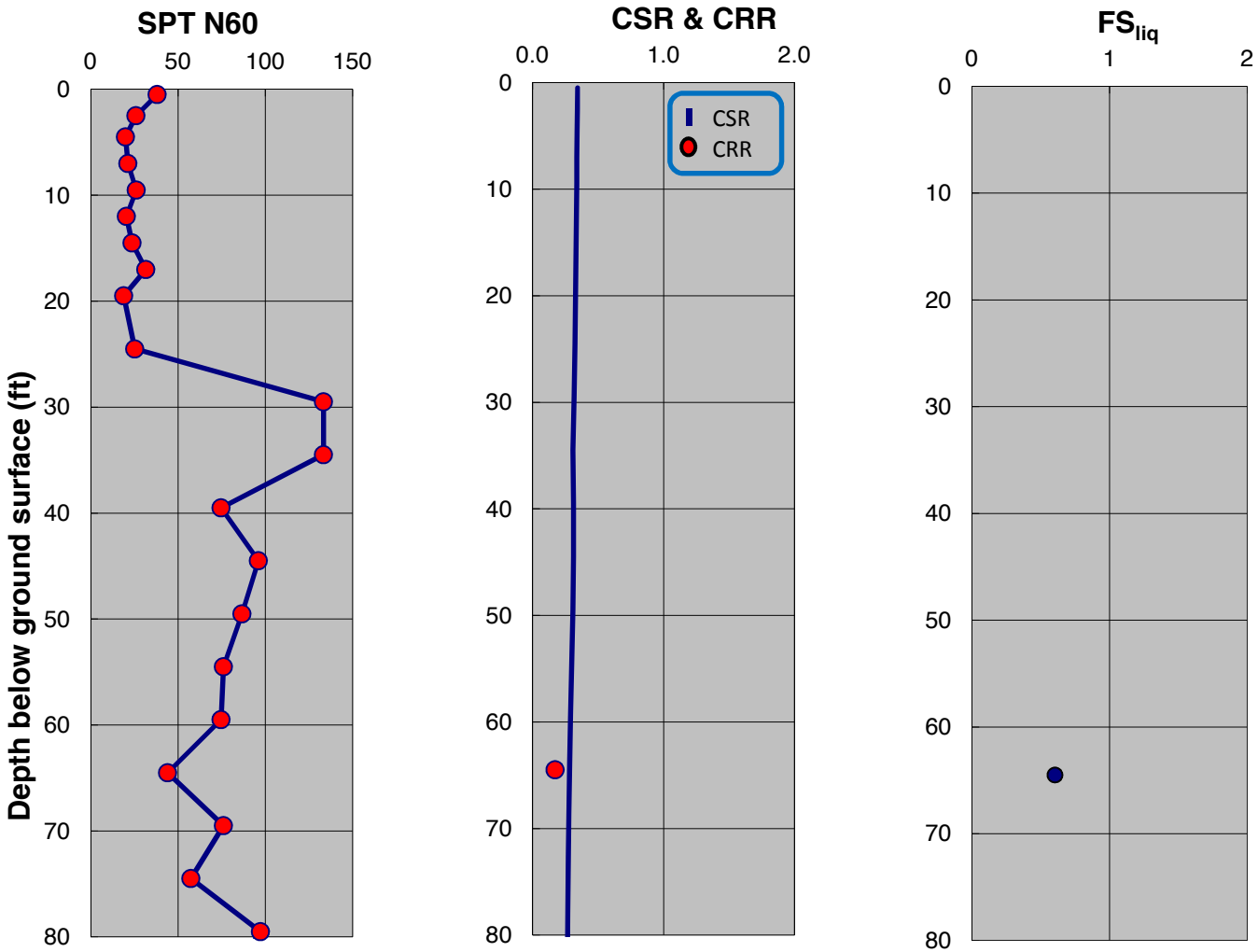
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-171 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



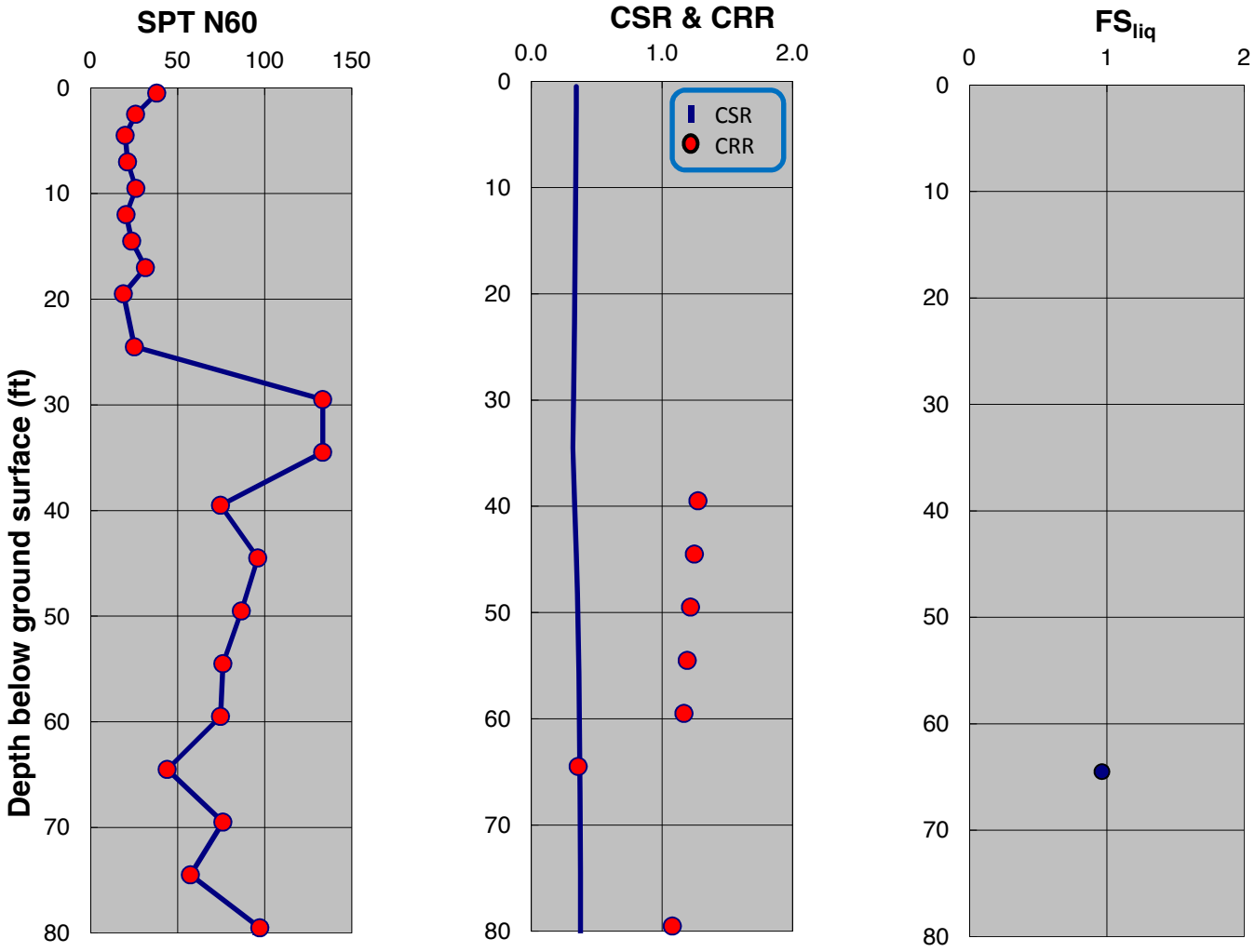
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-171 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



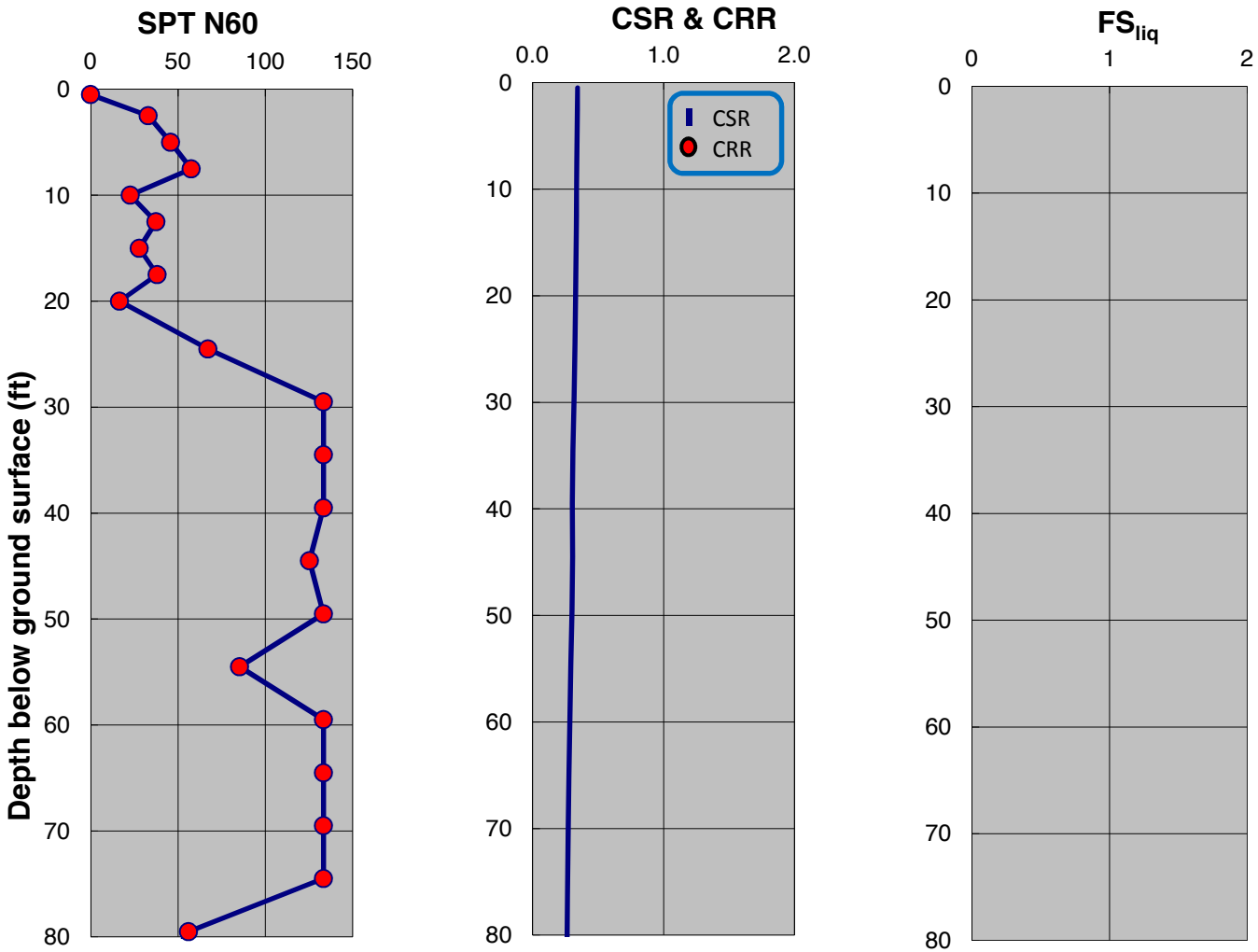
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-172 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



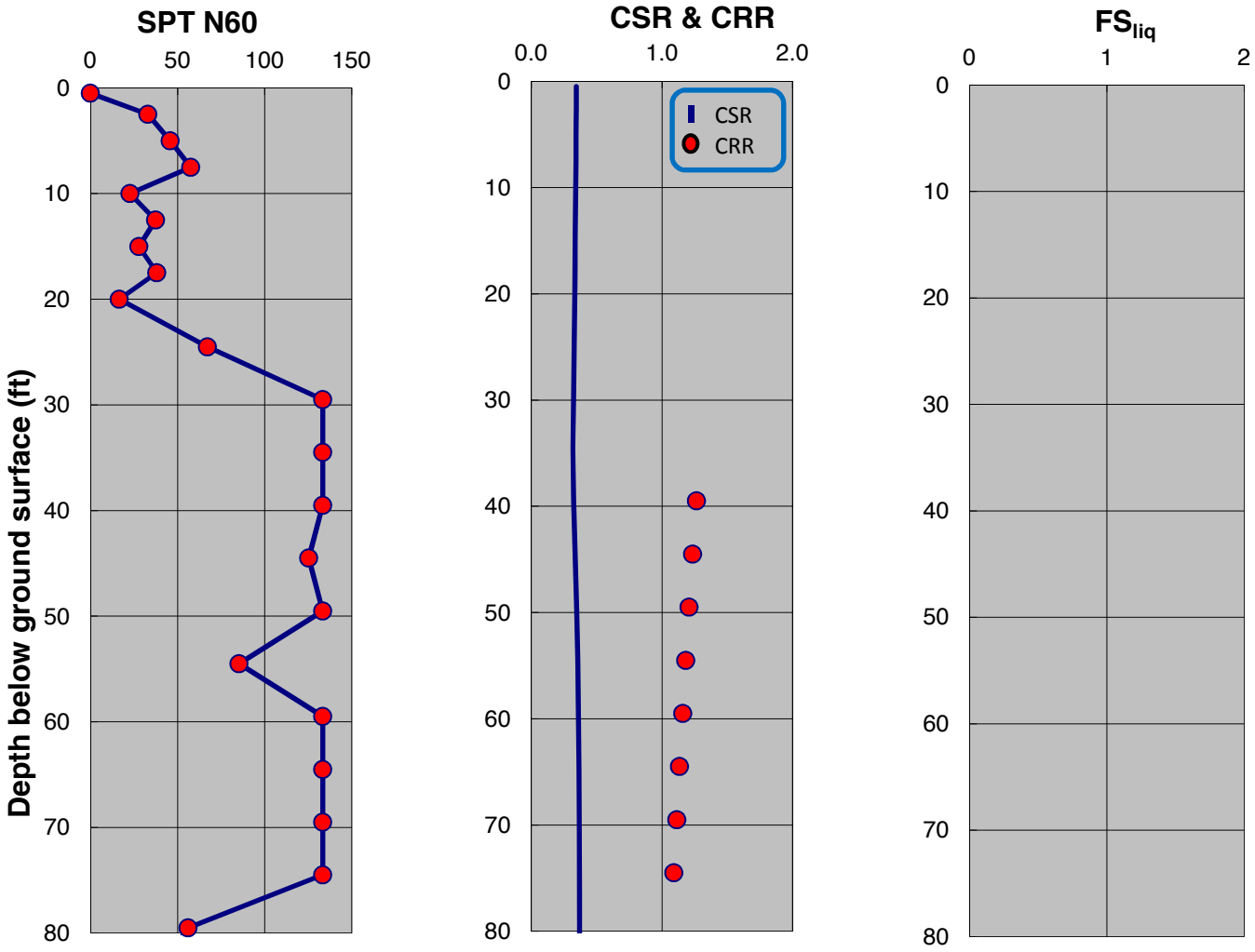
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-172 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-173 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

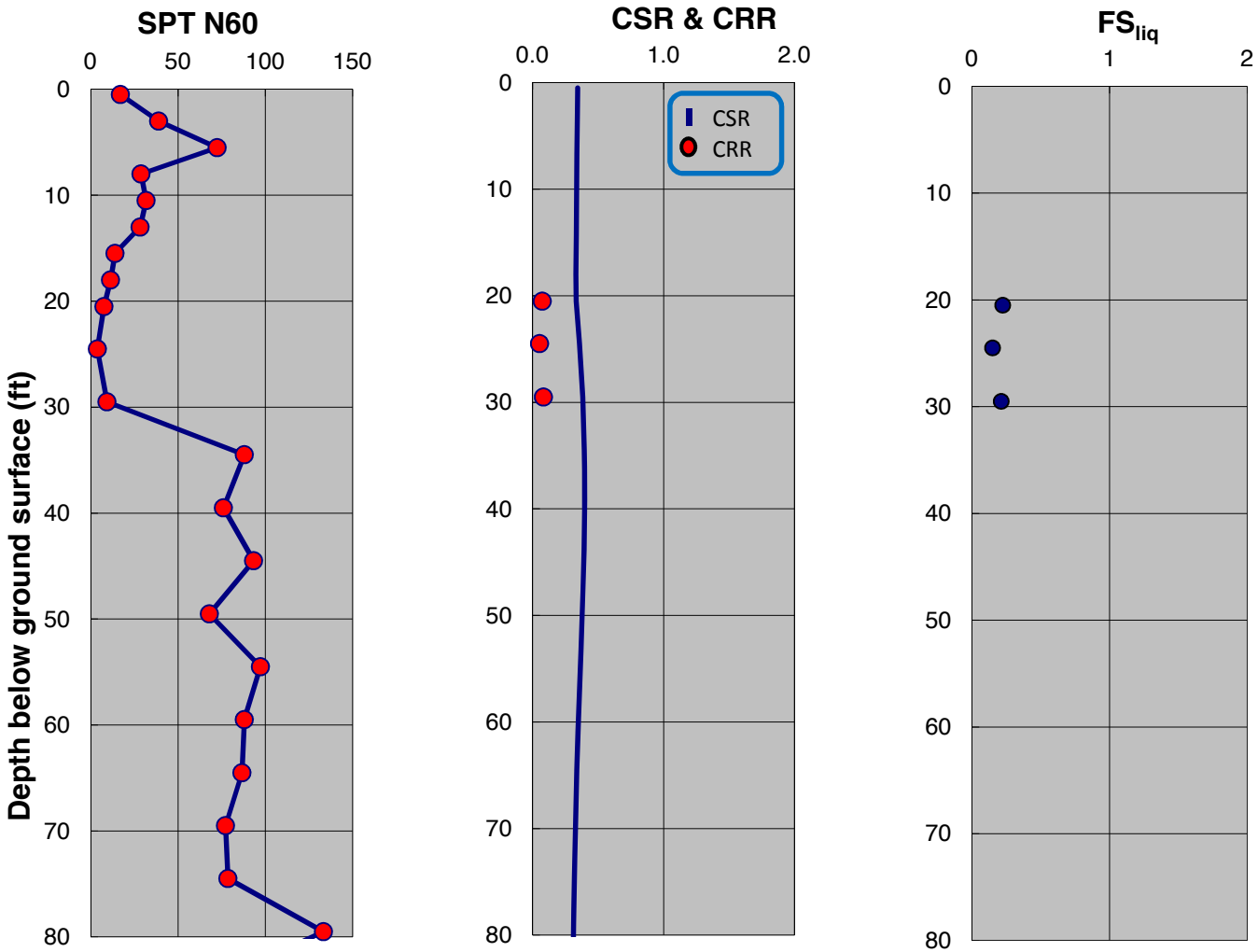
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-173 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

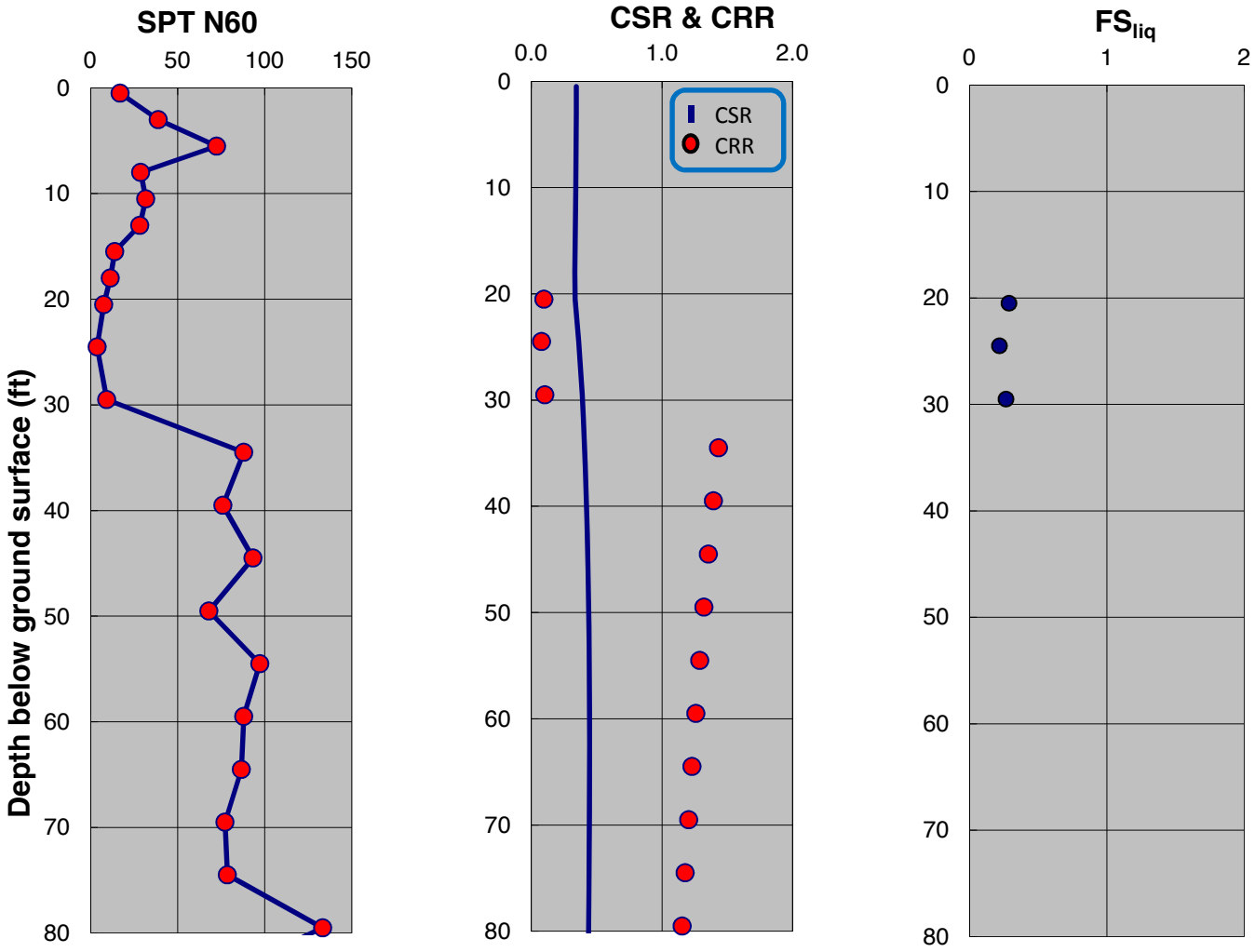
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.230



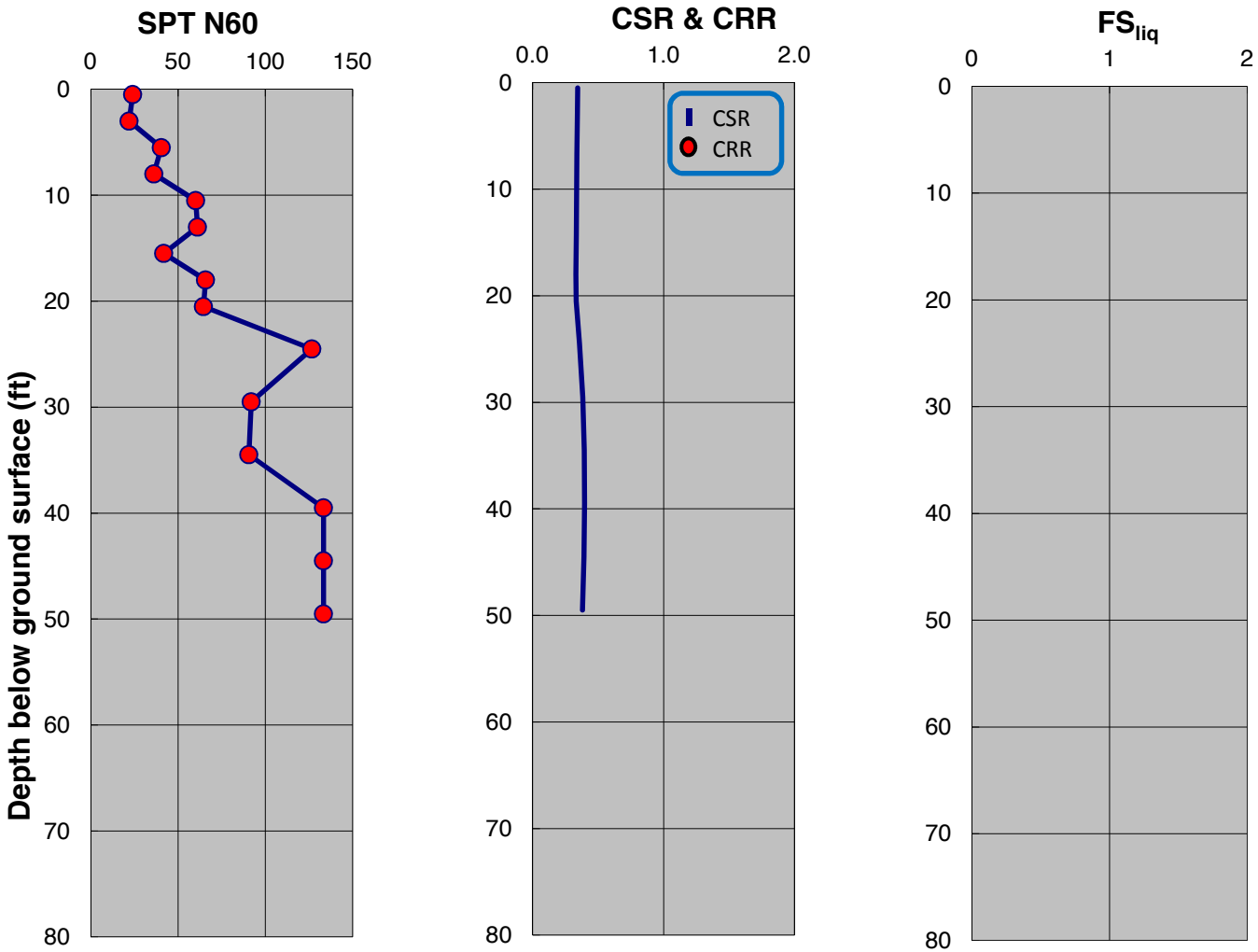
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-176 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



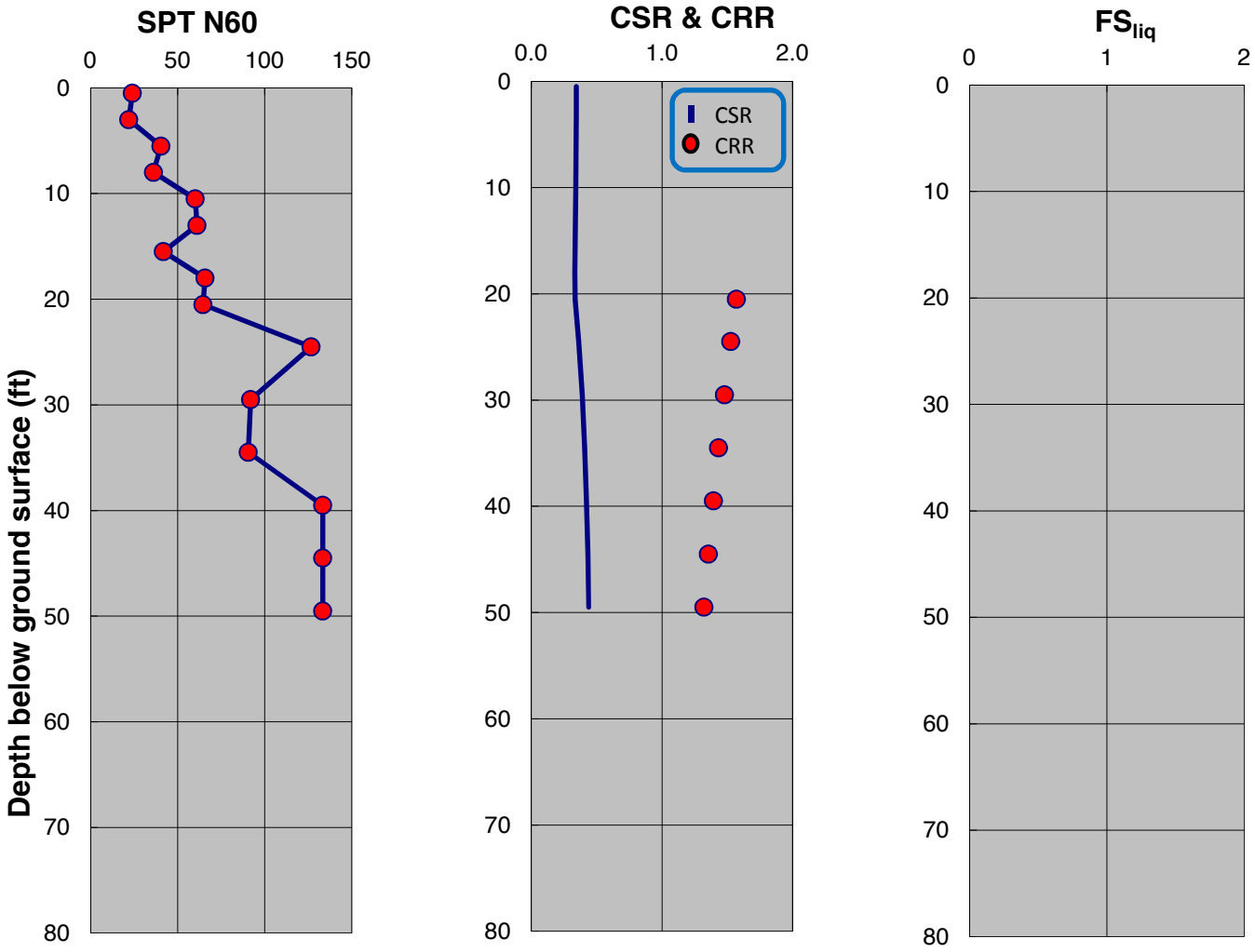
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-176 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-177 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

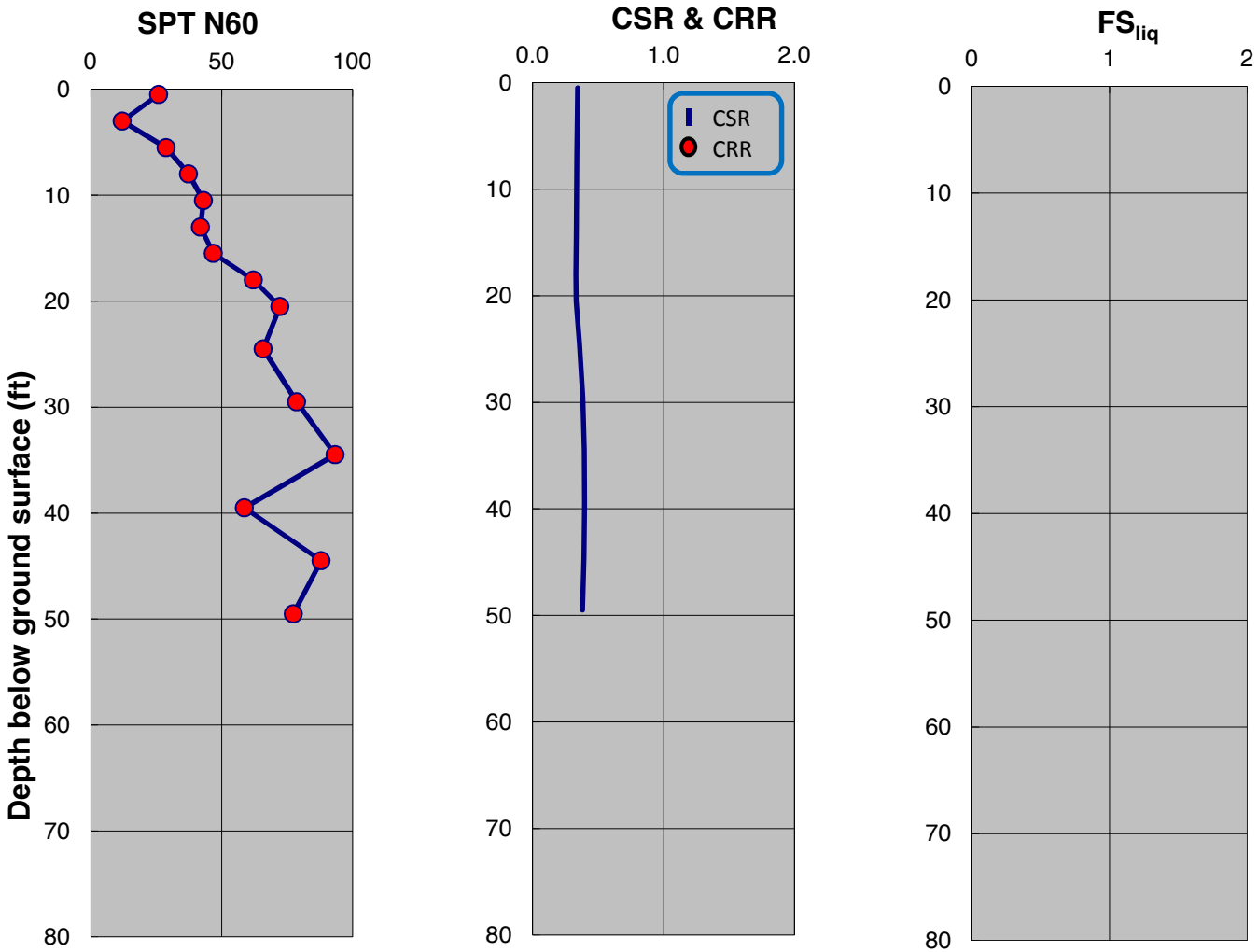
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-177 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

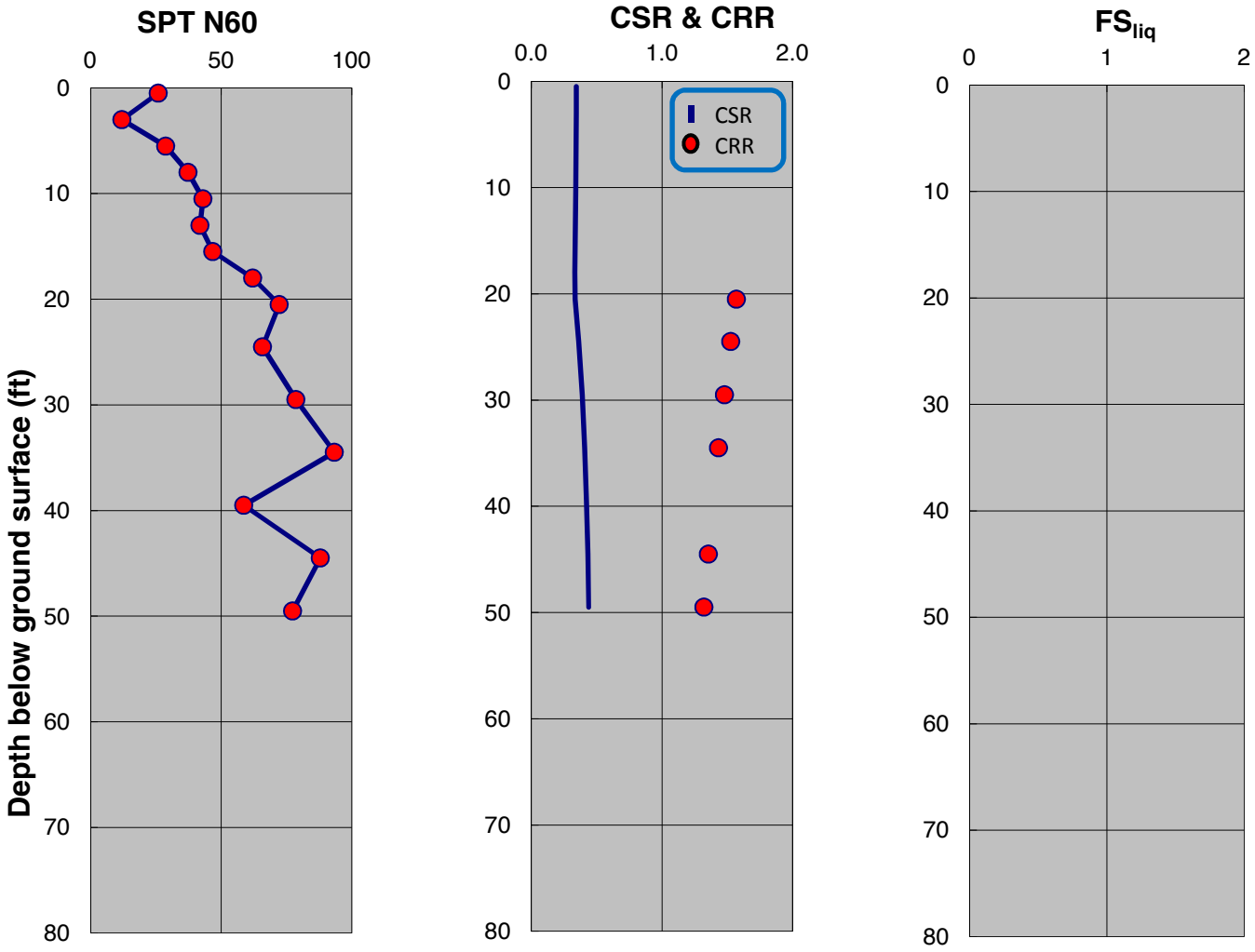
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.234



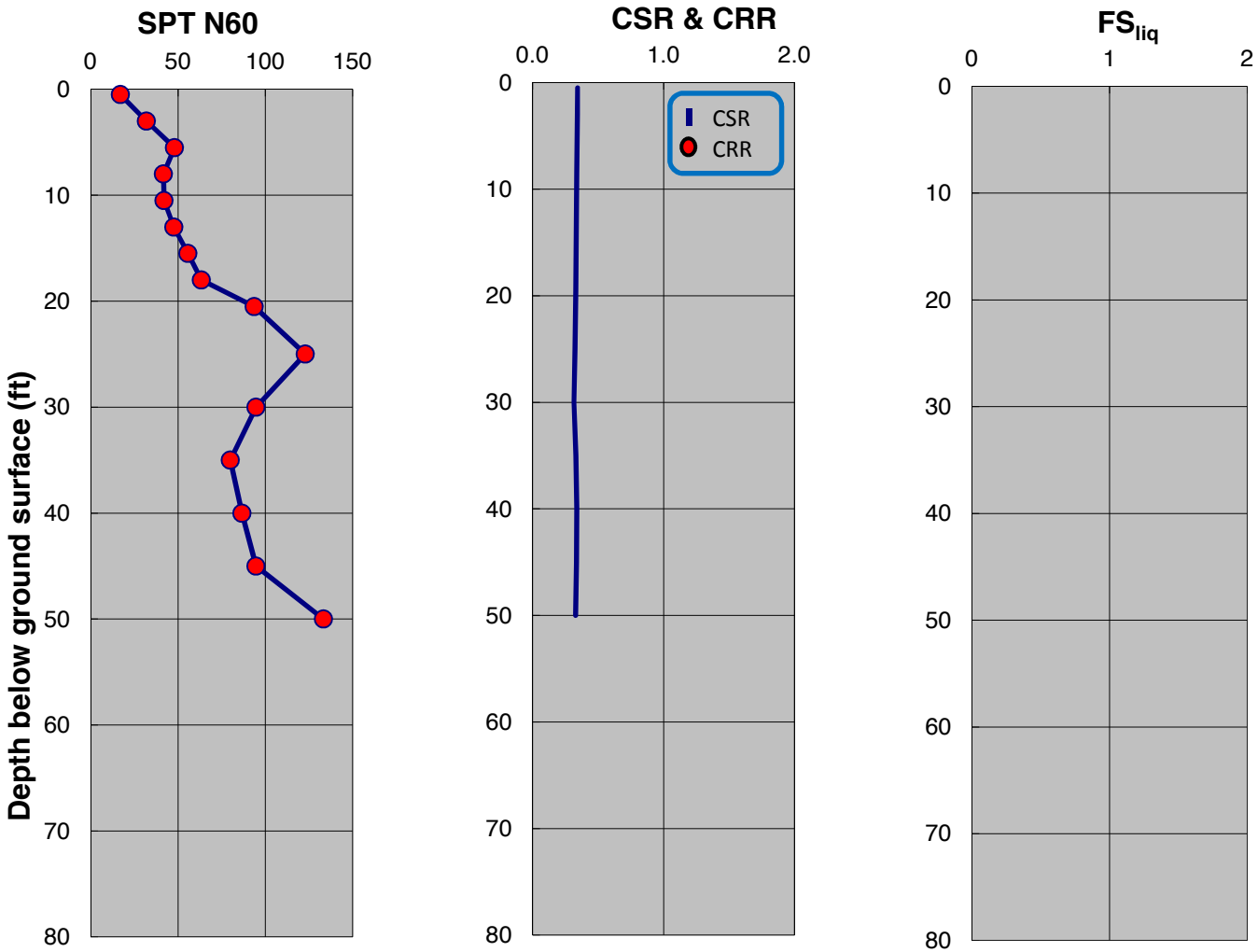
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-178 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



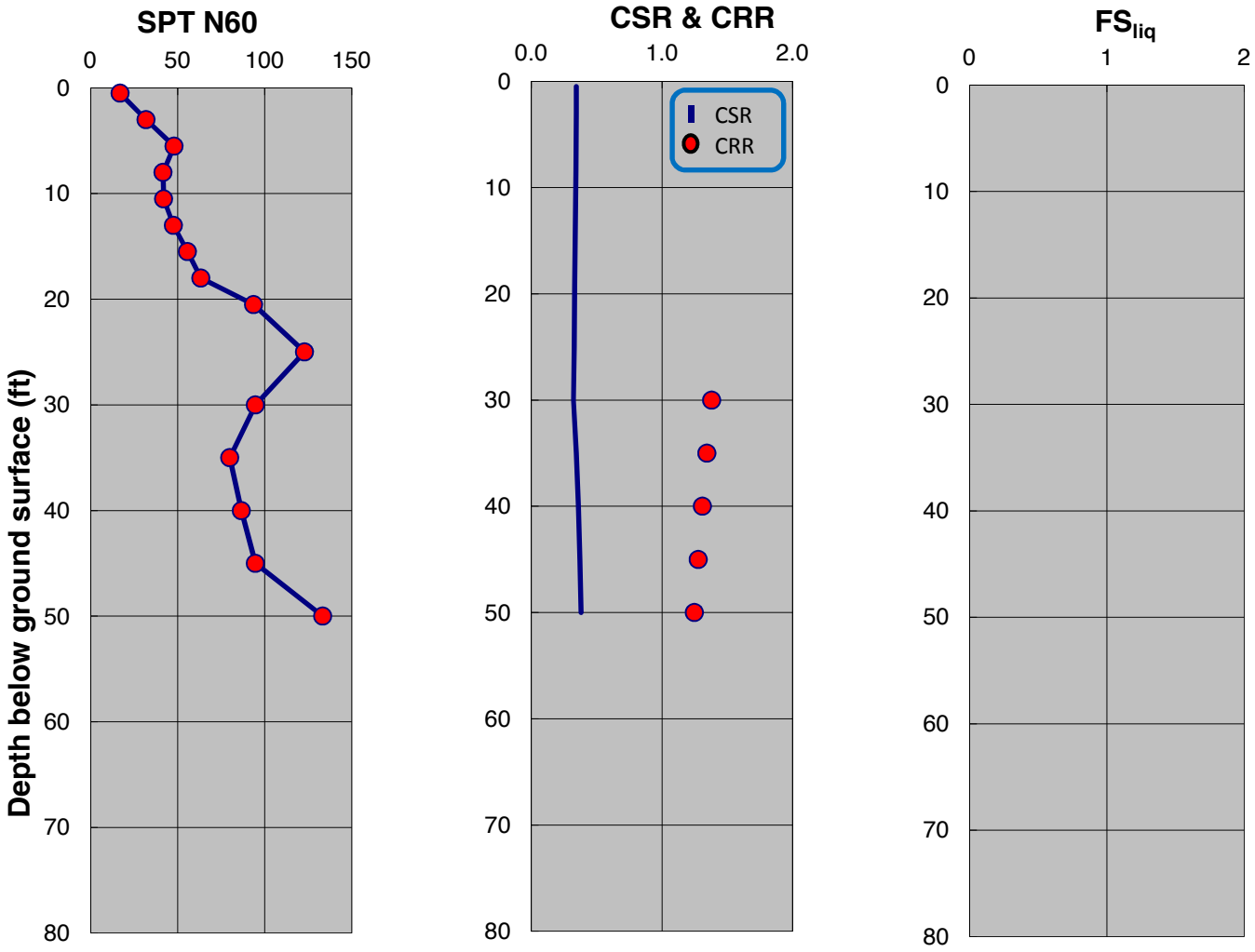
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-178 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



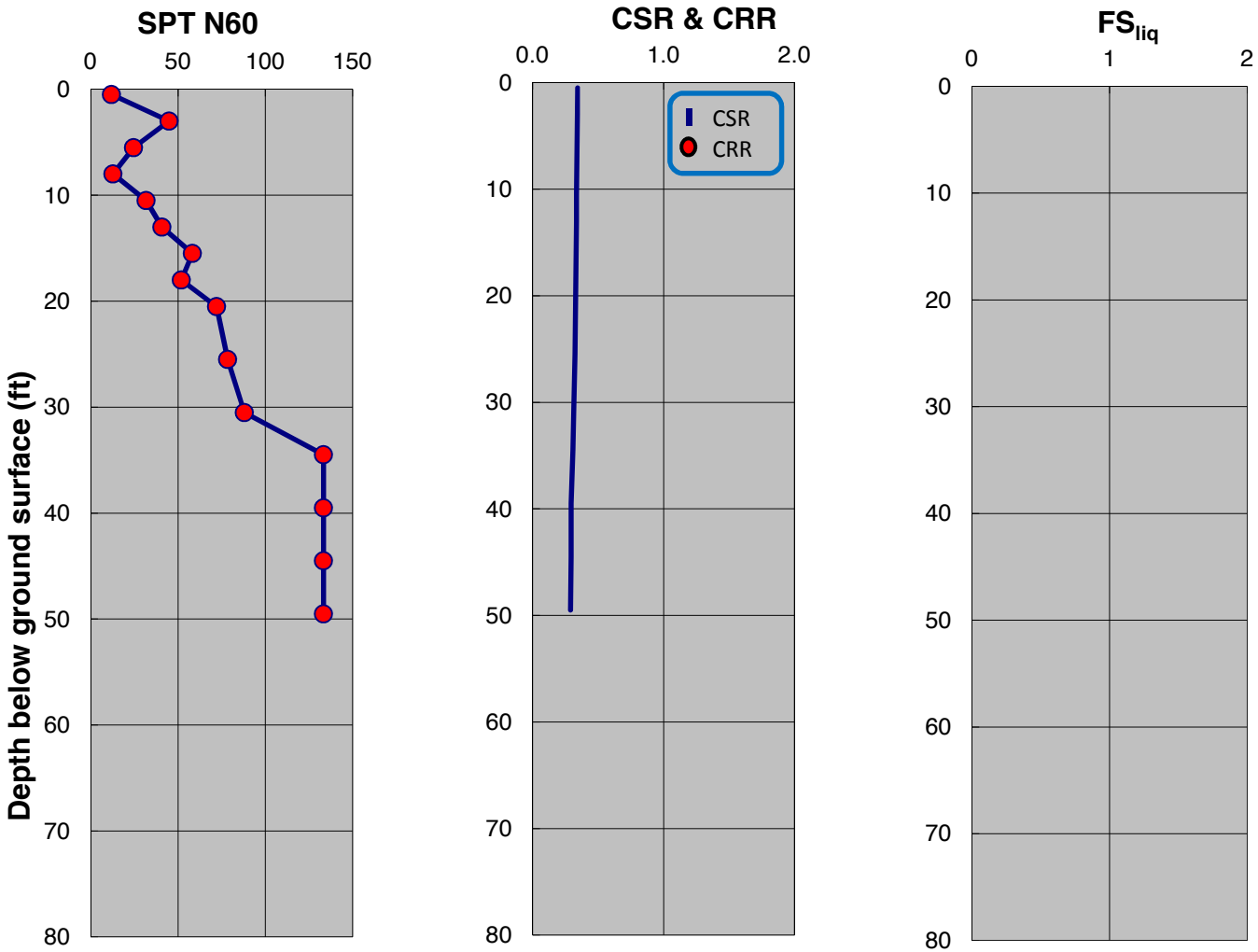
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-179 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



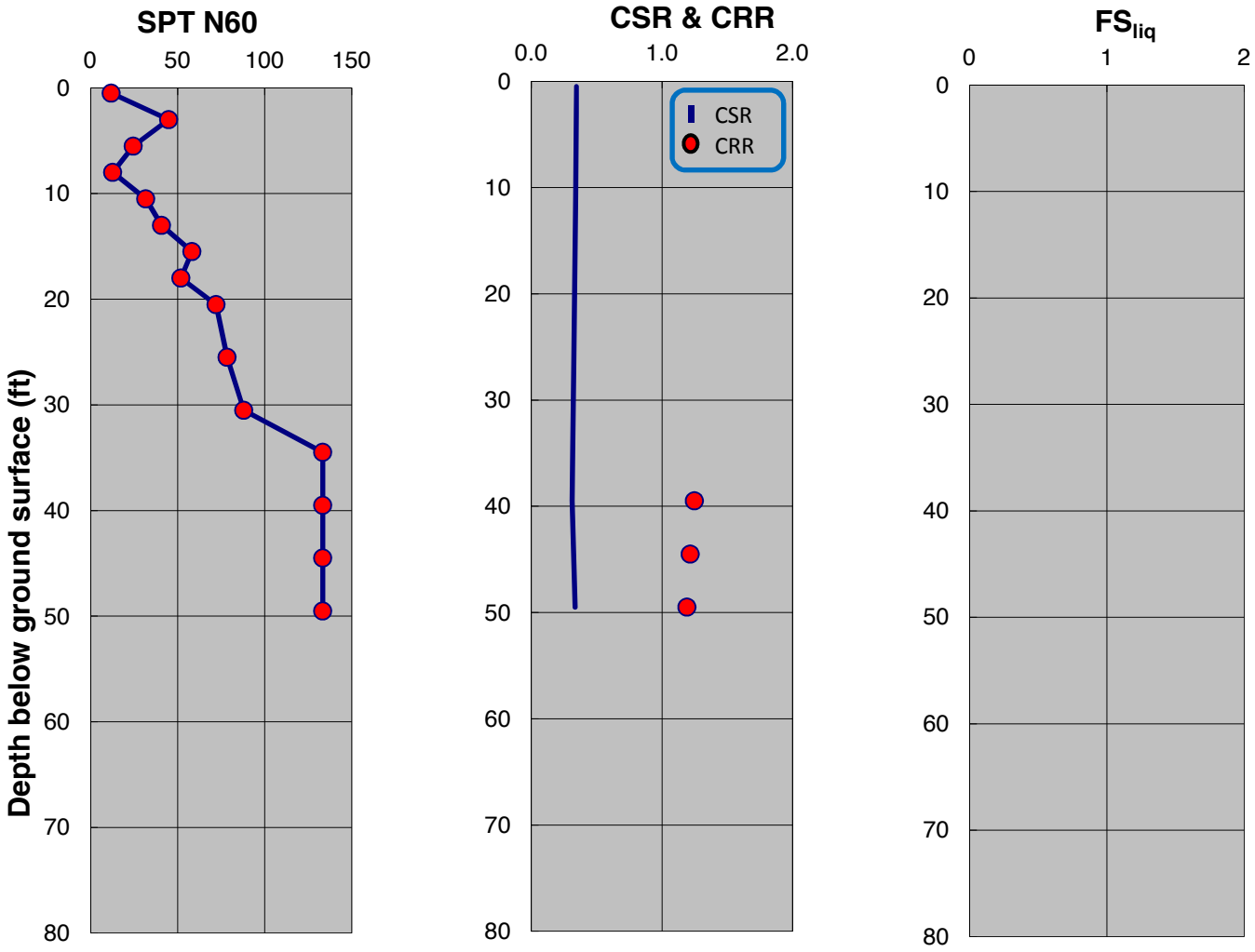
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-179 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-180 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

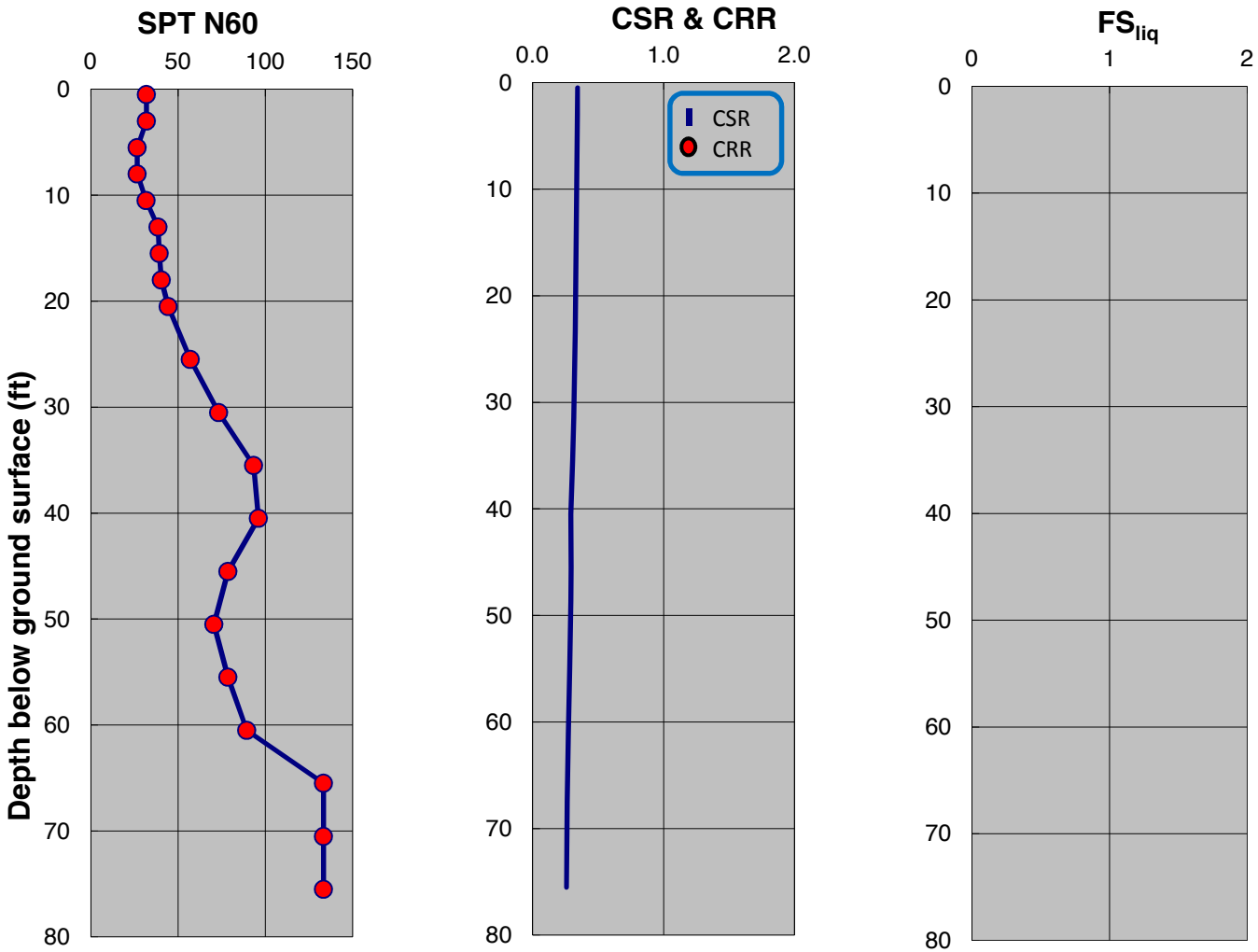
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-180 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

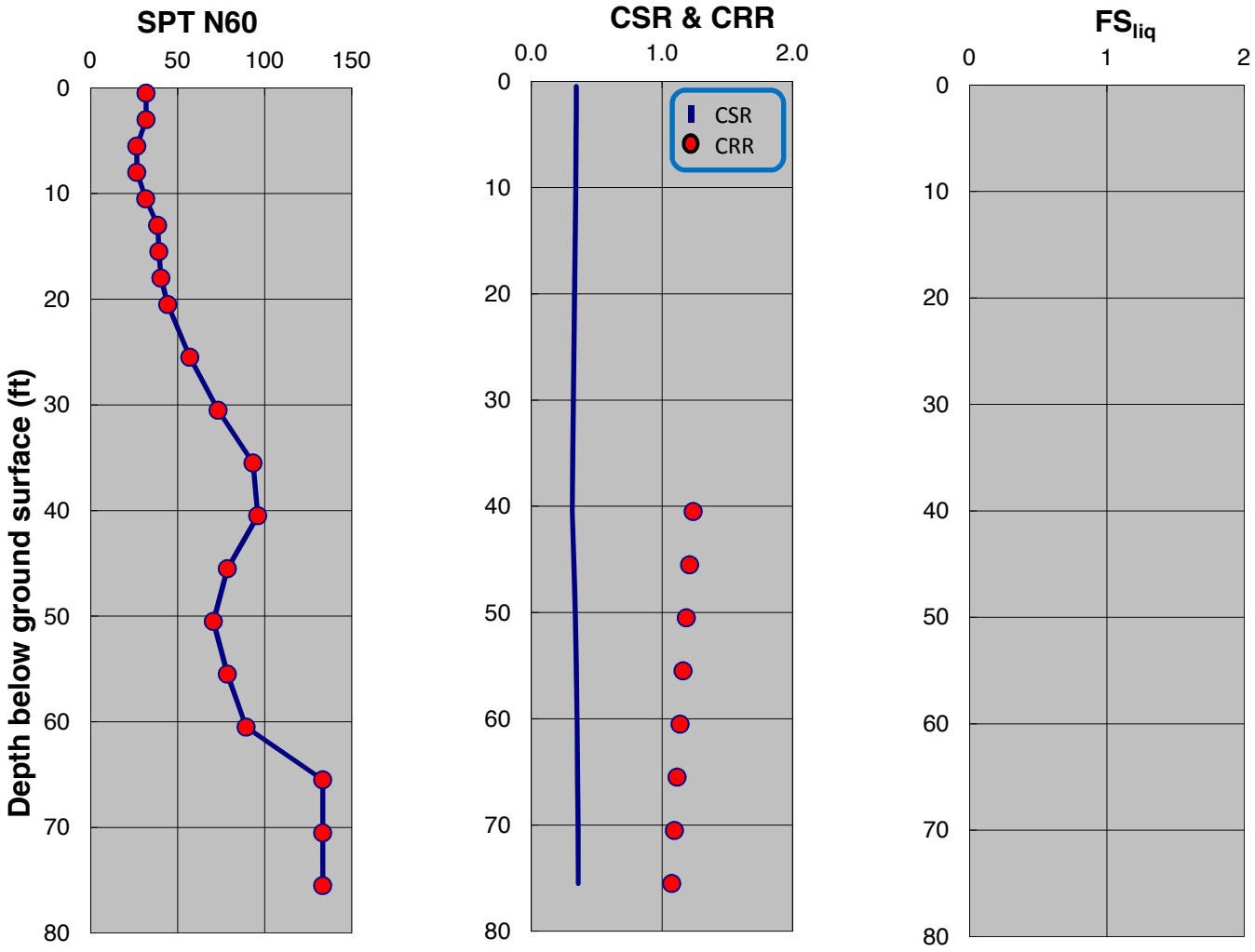
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.240



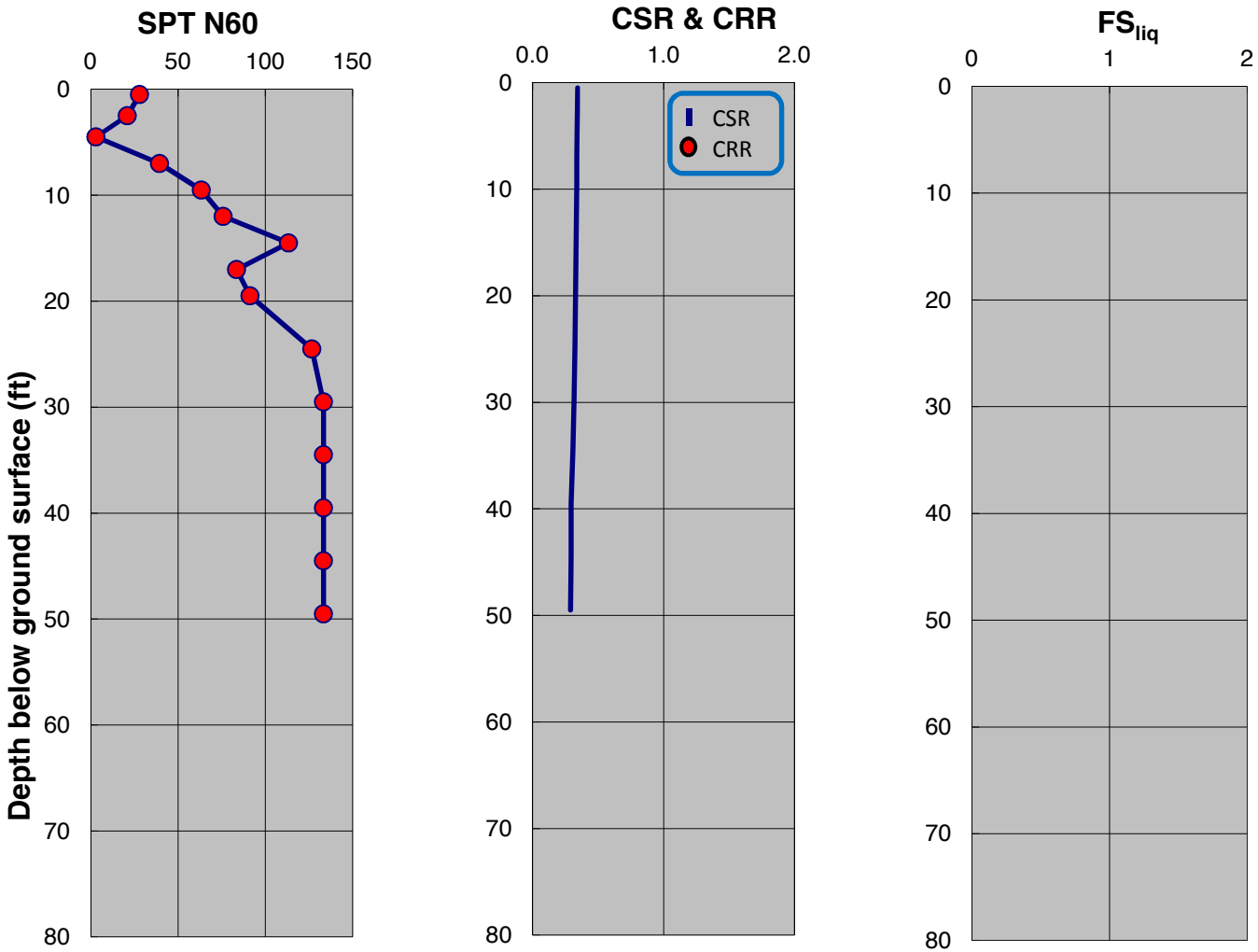
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-181 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



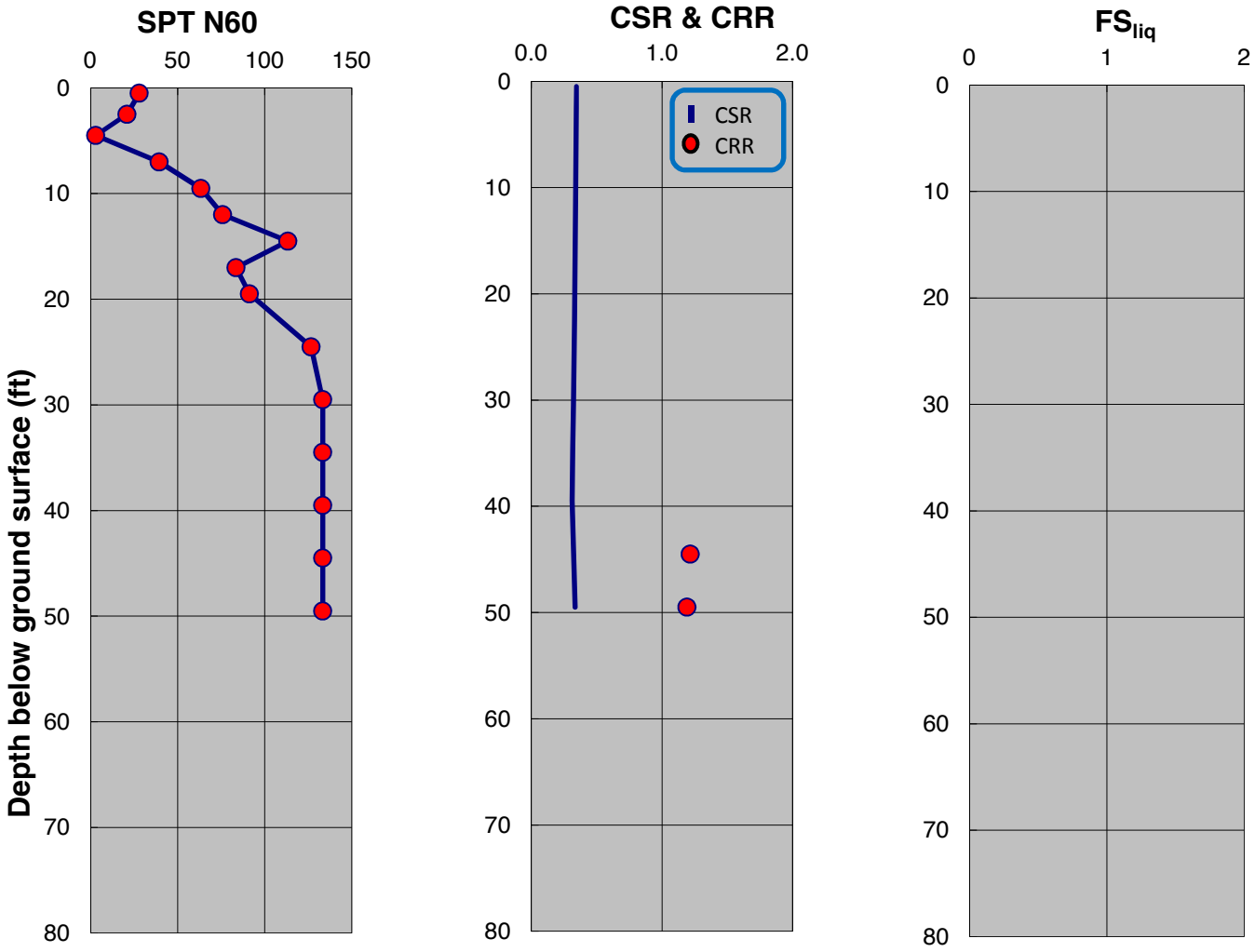
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-181 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



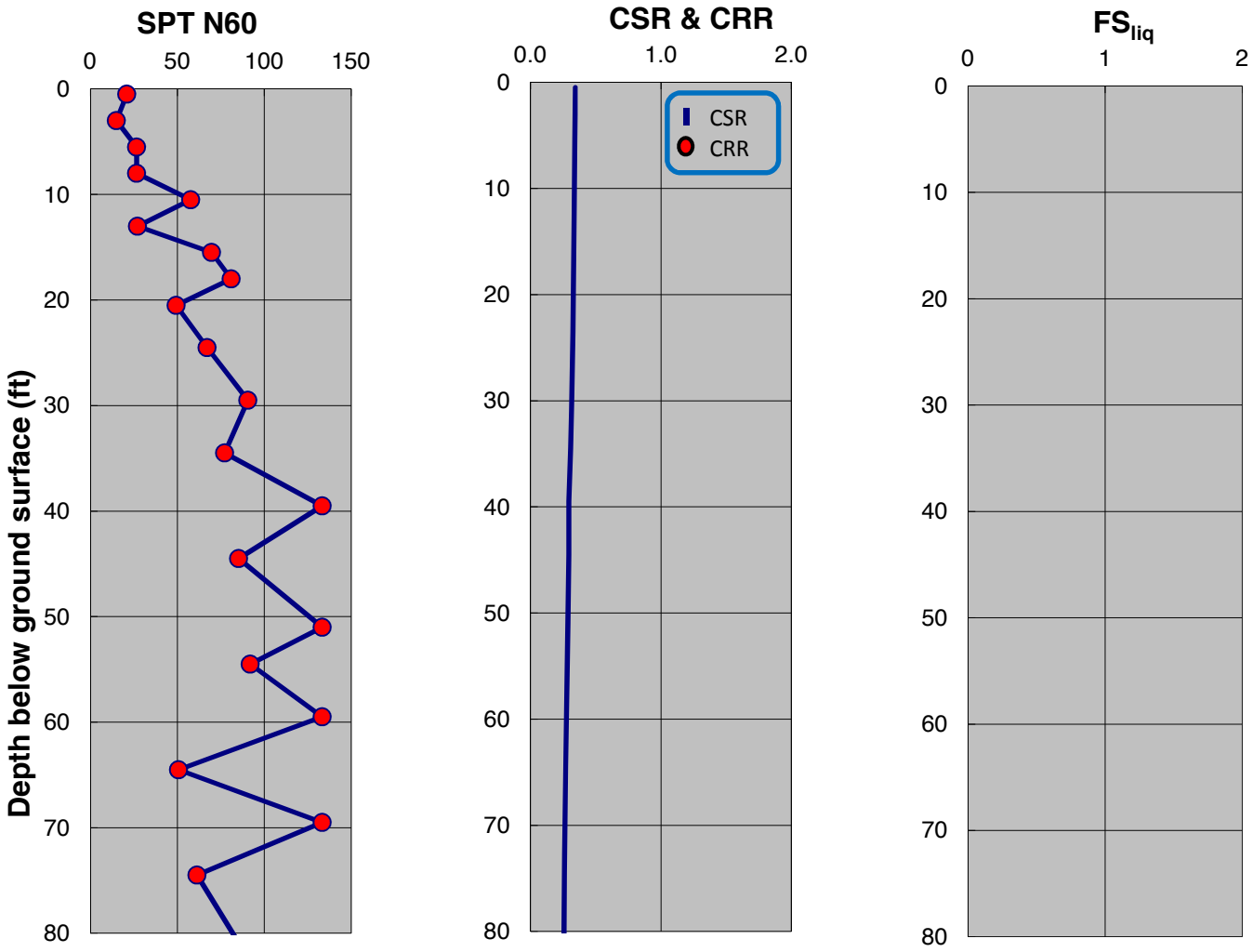
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-182 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



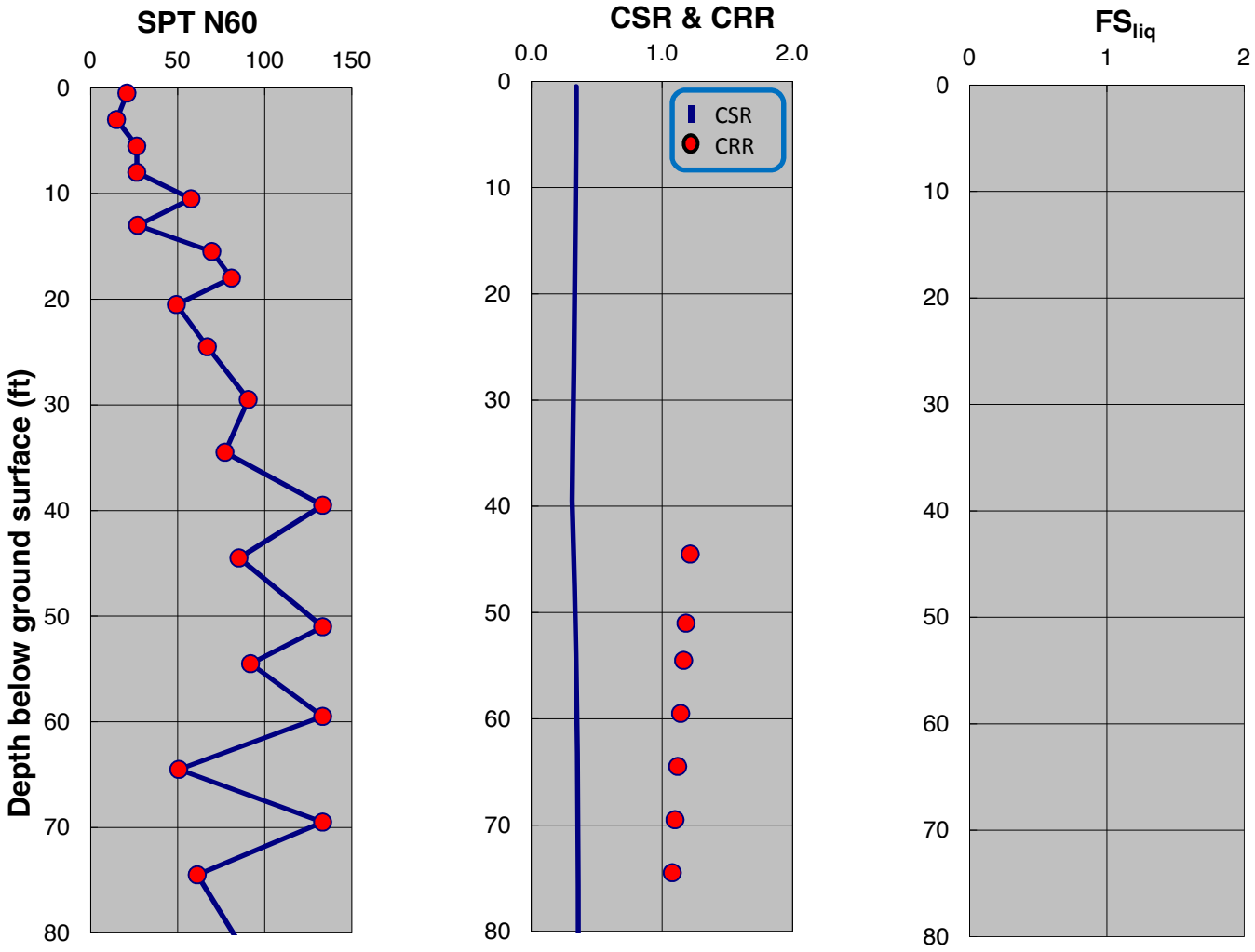
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-182 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



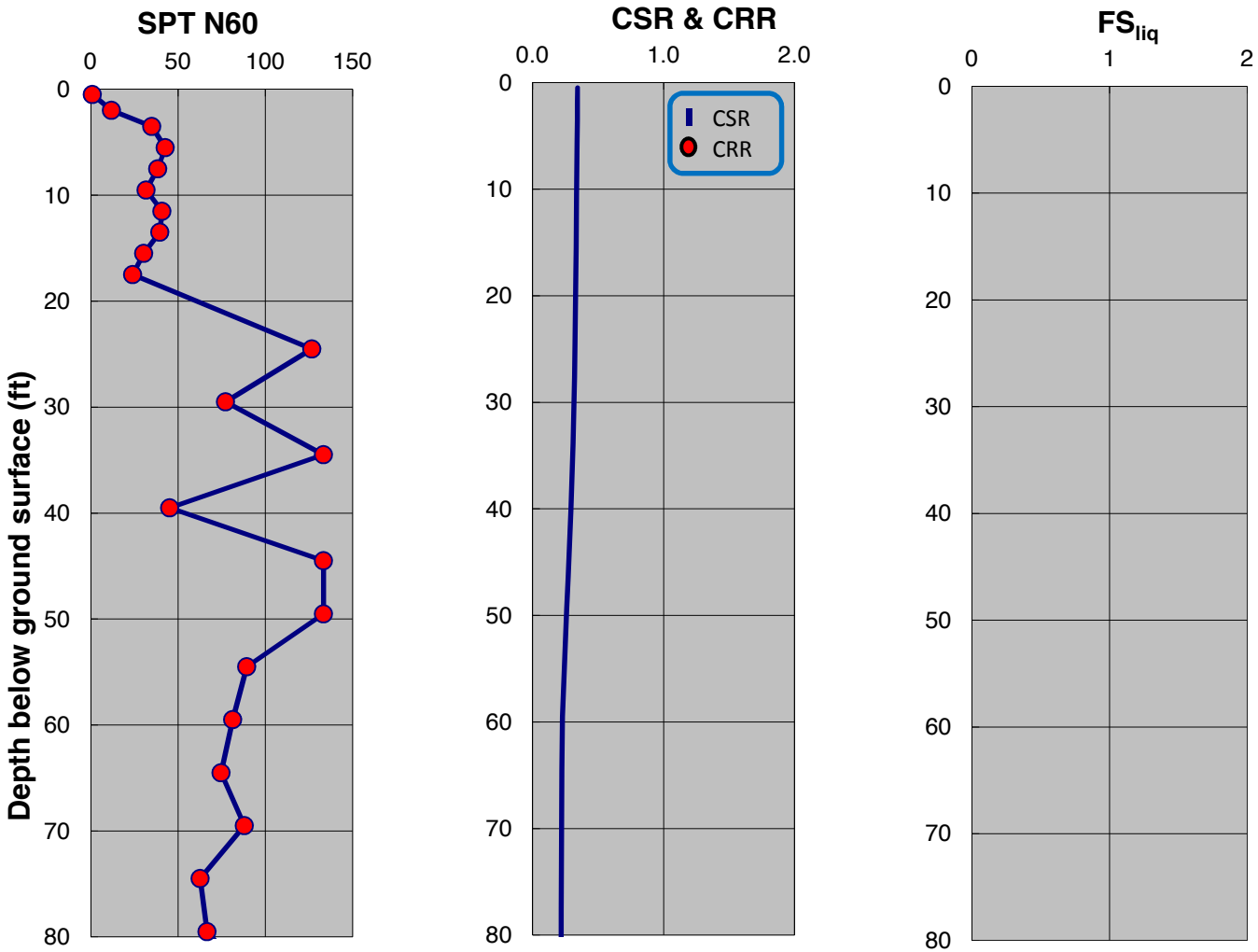
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-183 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



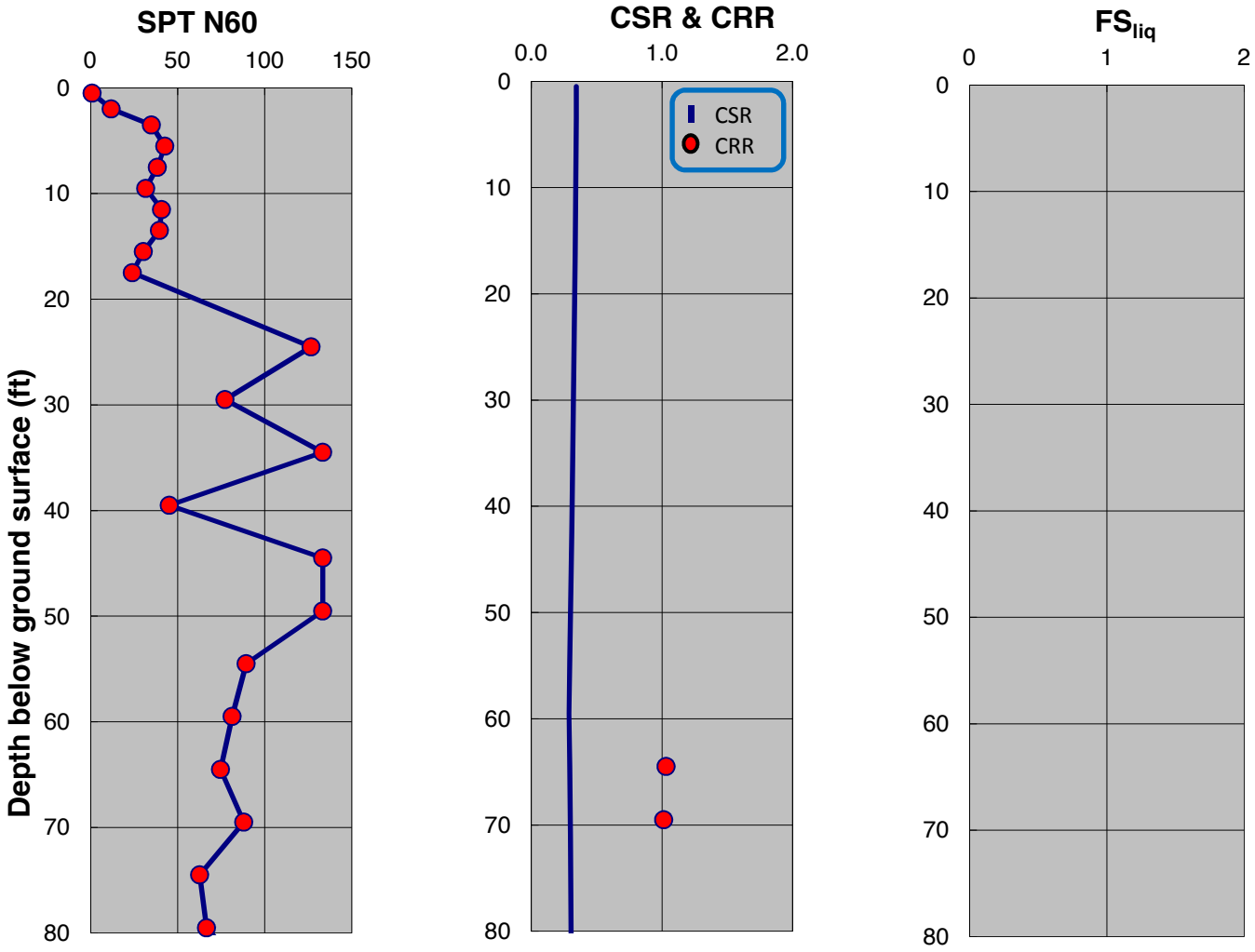
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-183 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



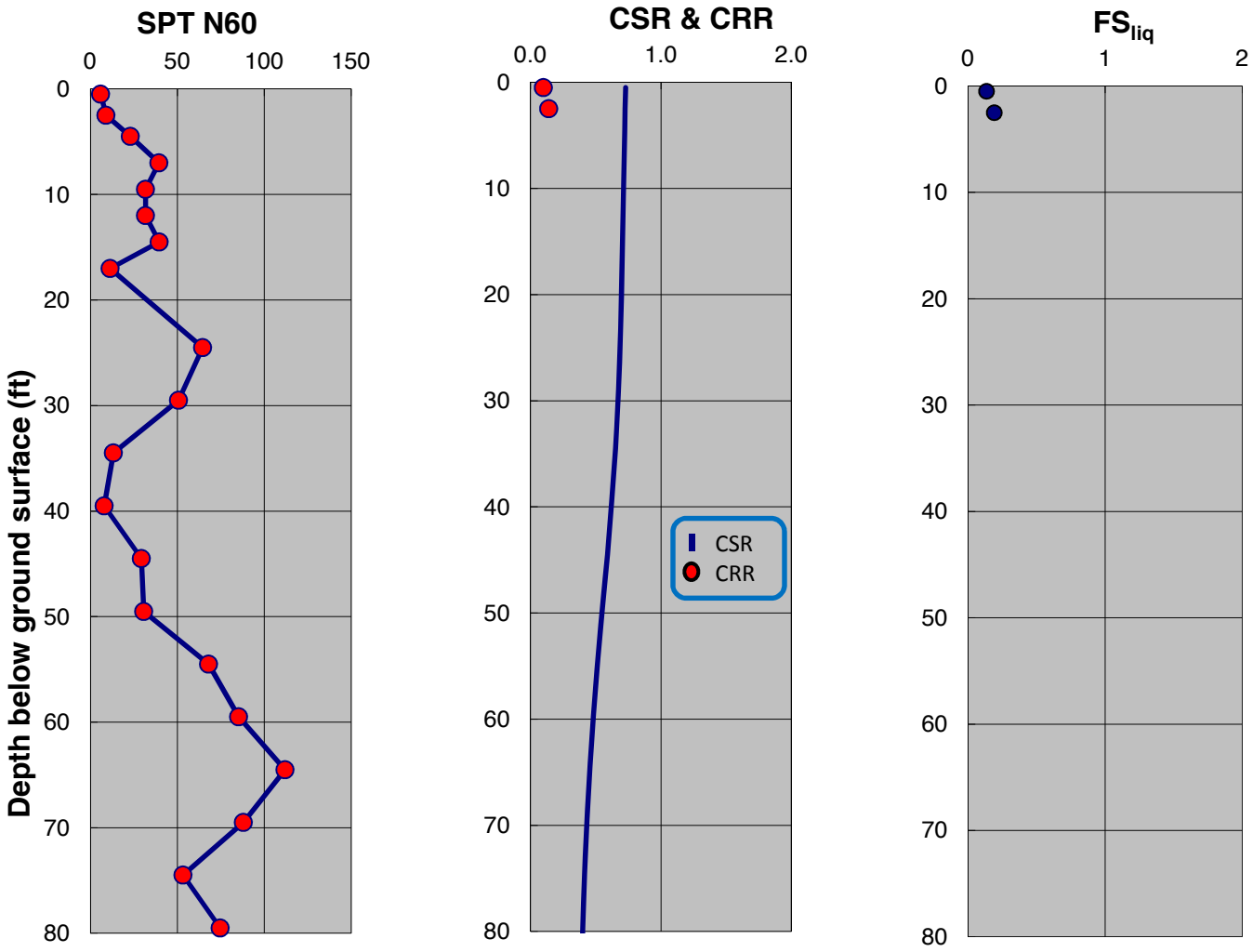
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-189 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



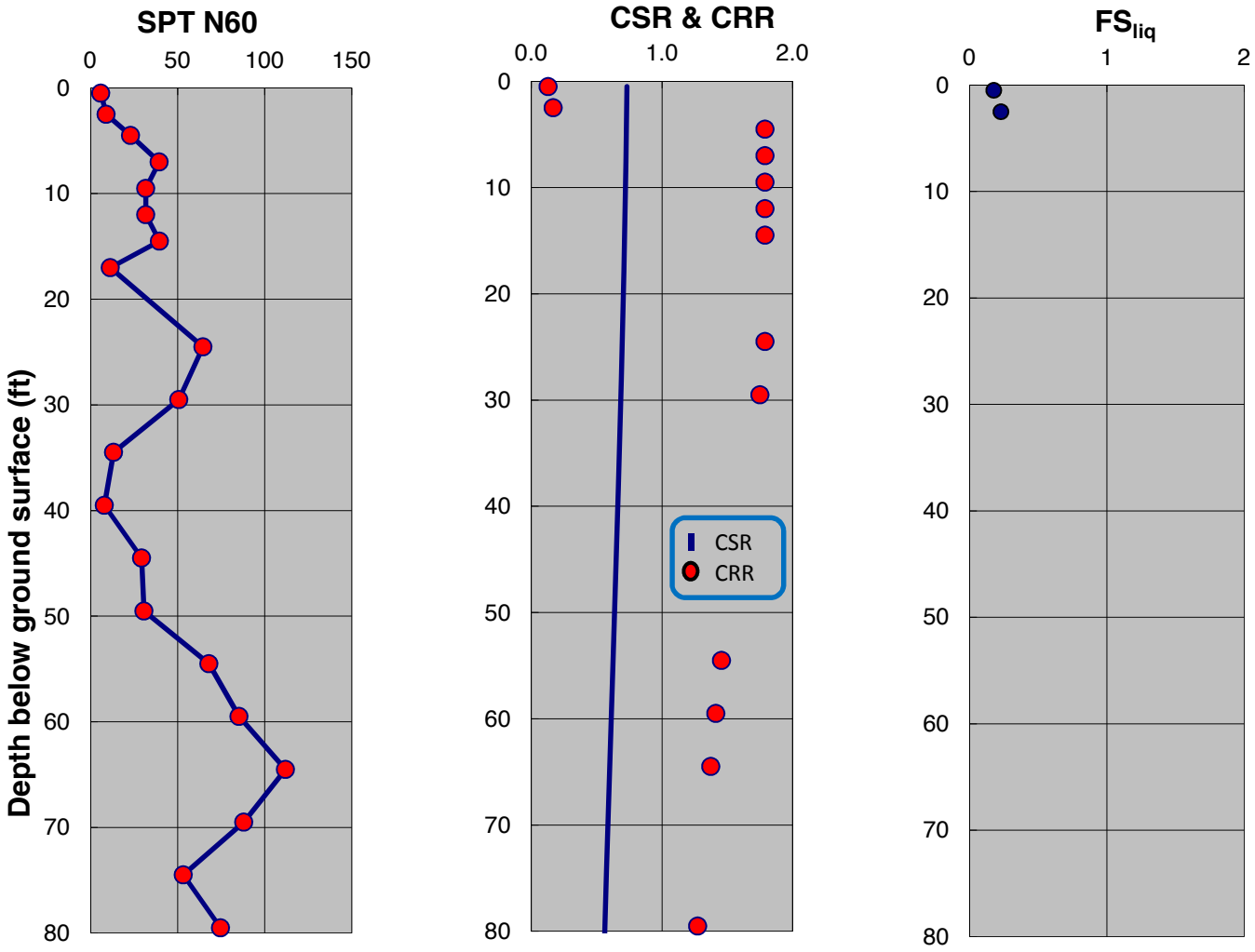
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-189 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-190 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

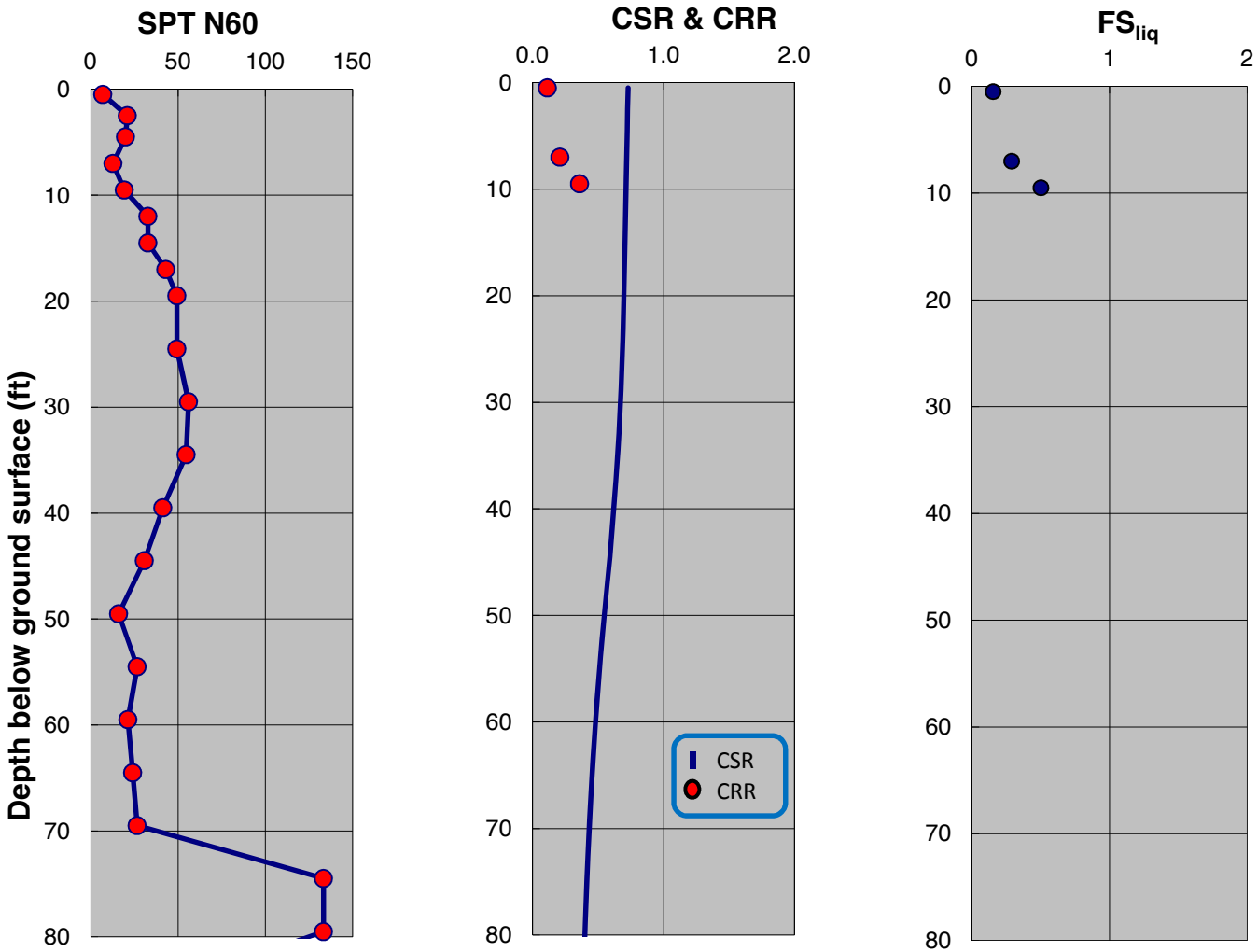
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-190 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

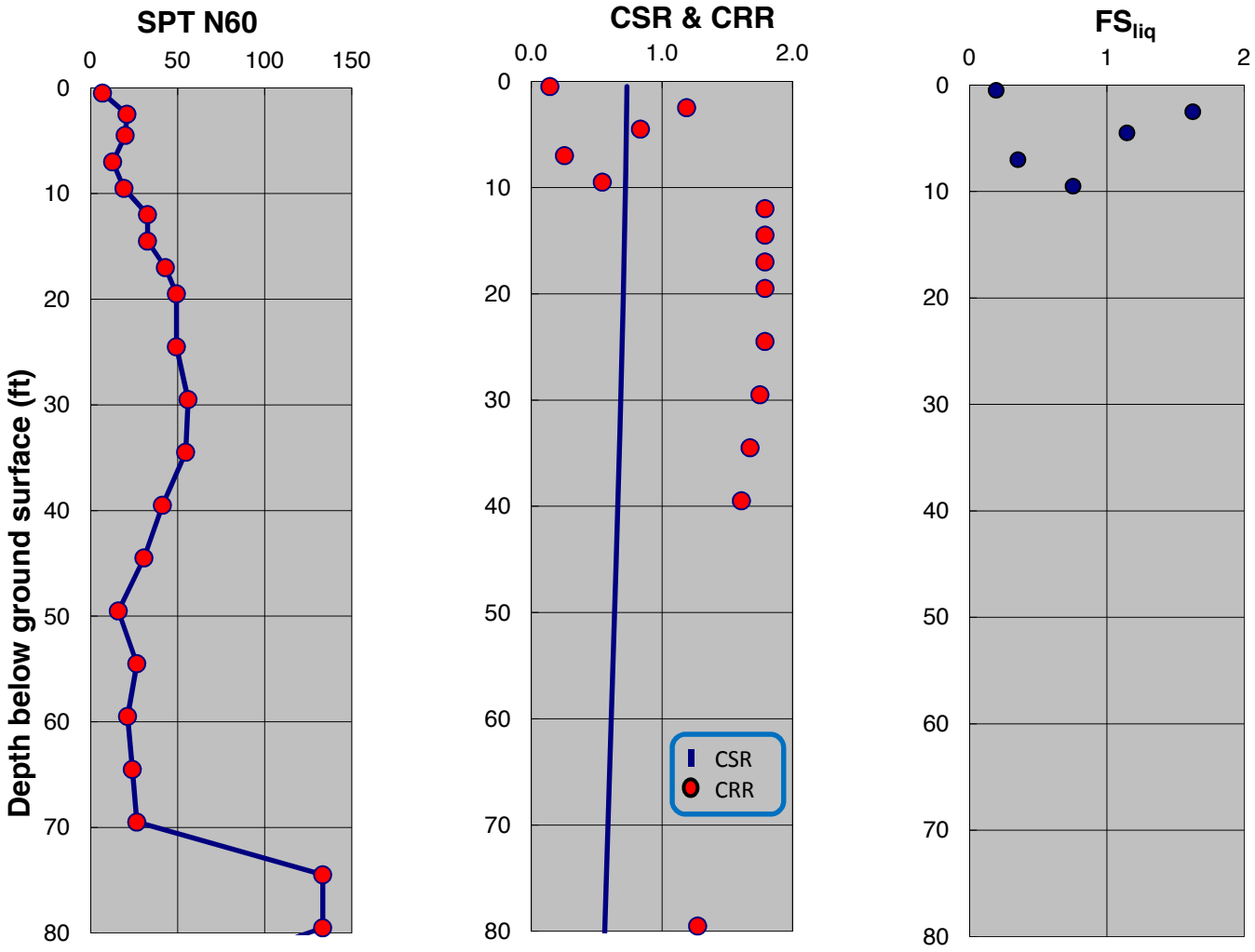
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.250



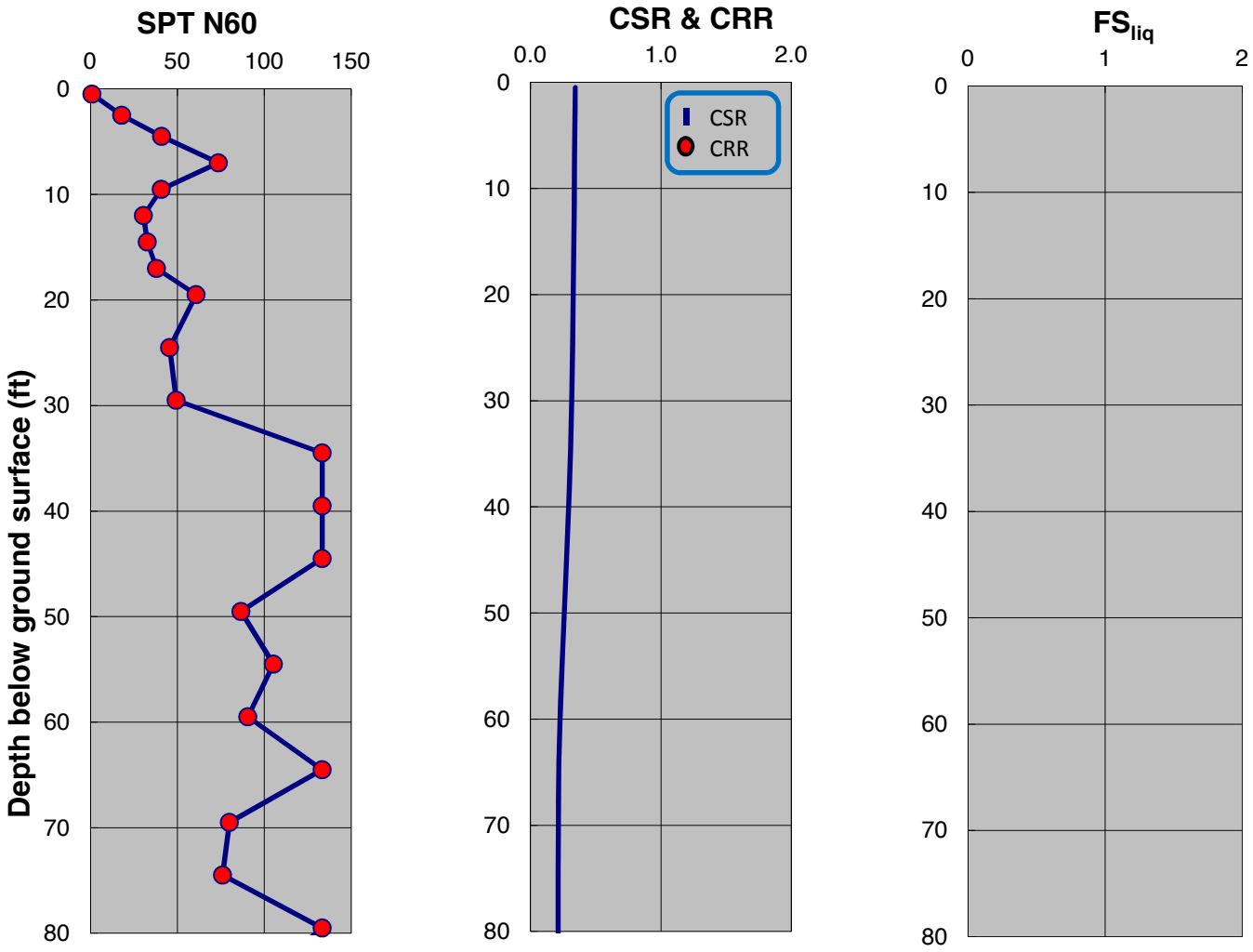
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-191 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



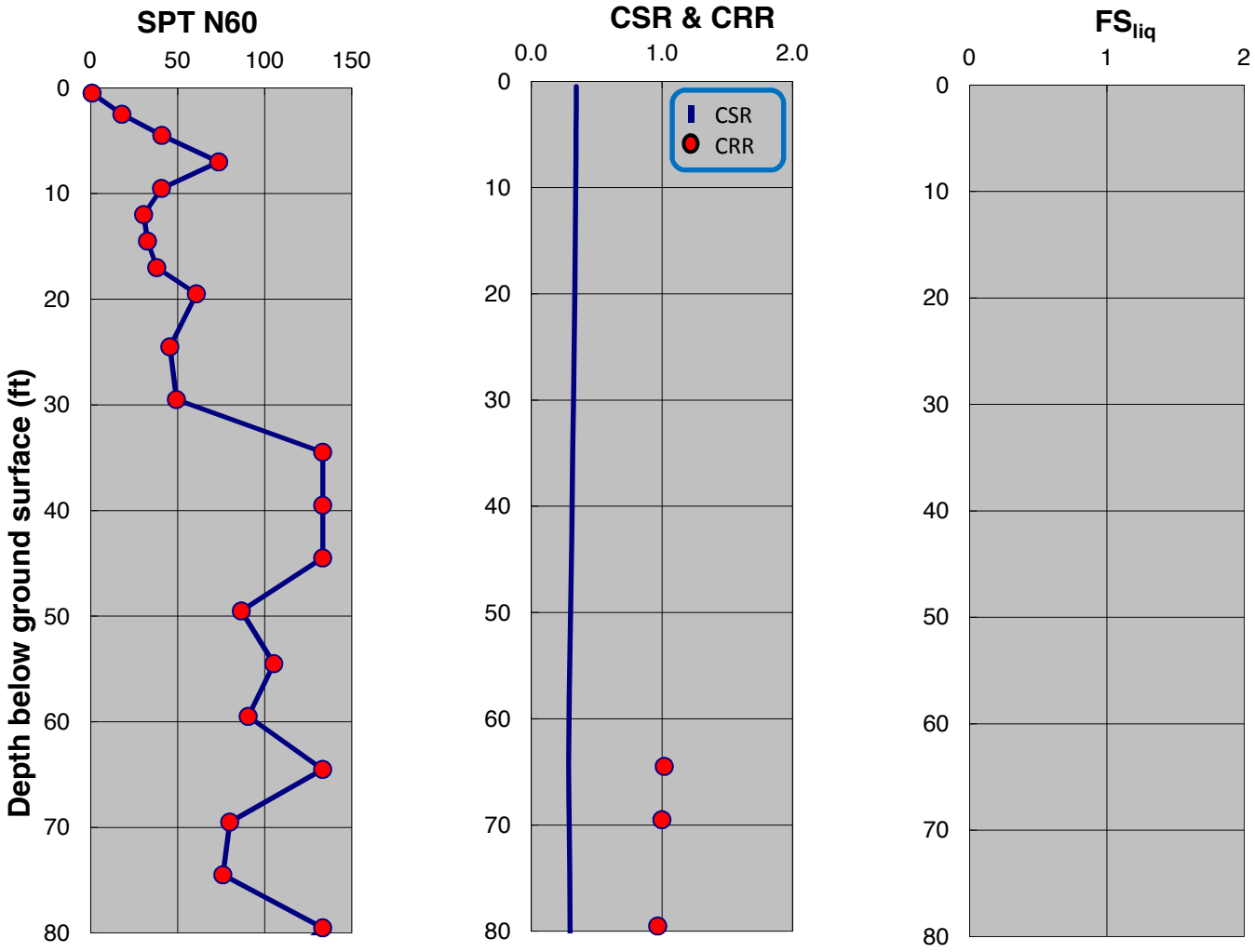
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-191 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



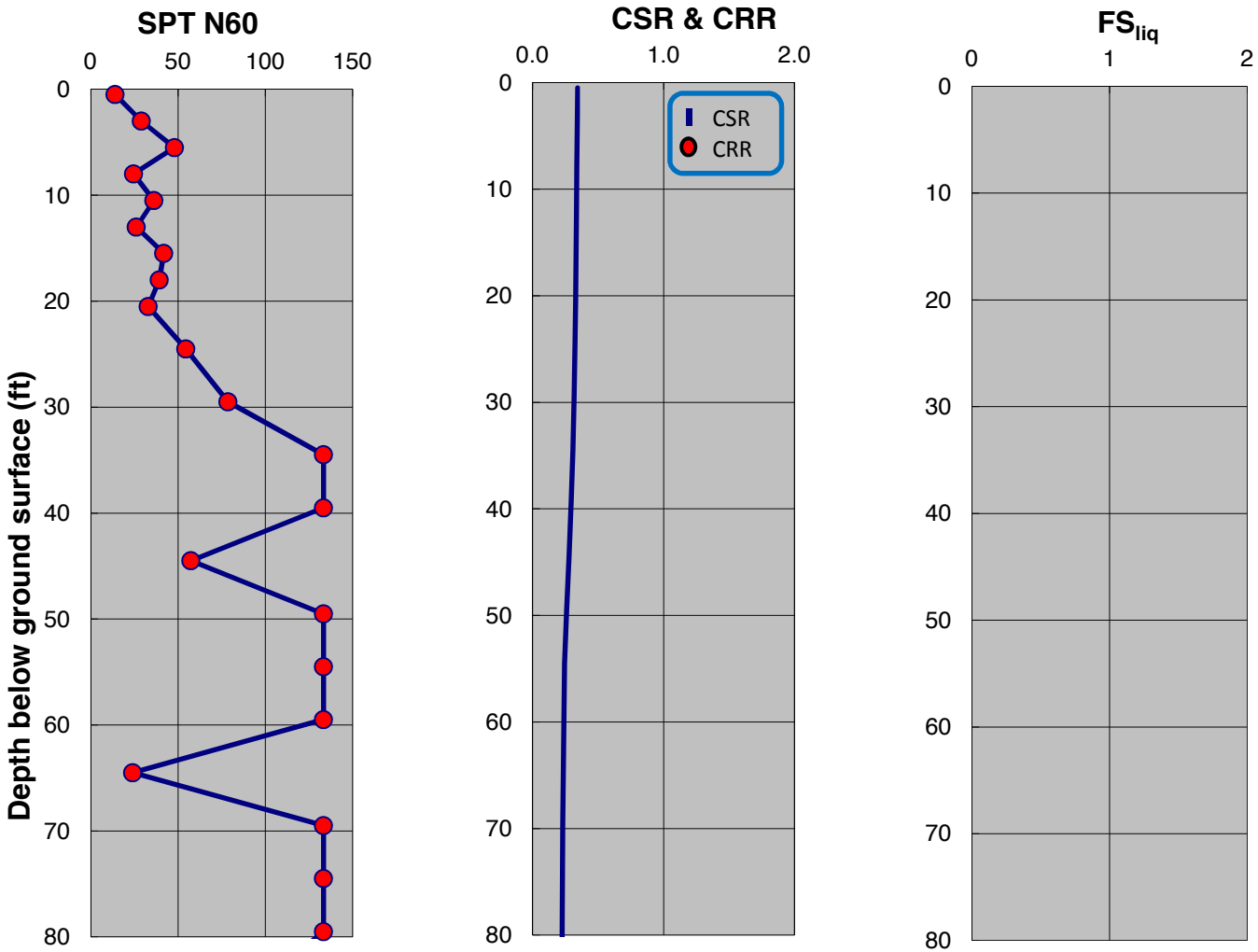
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-192 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



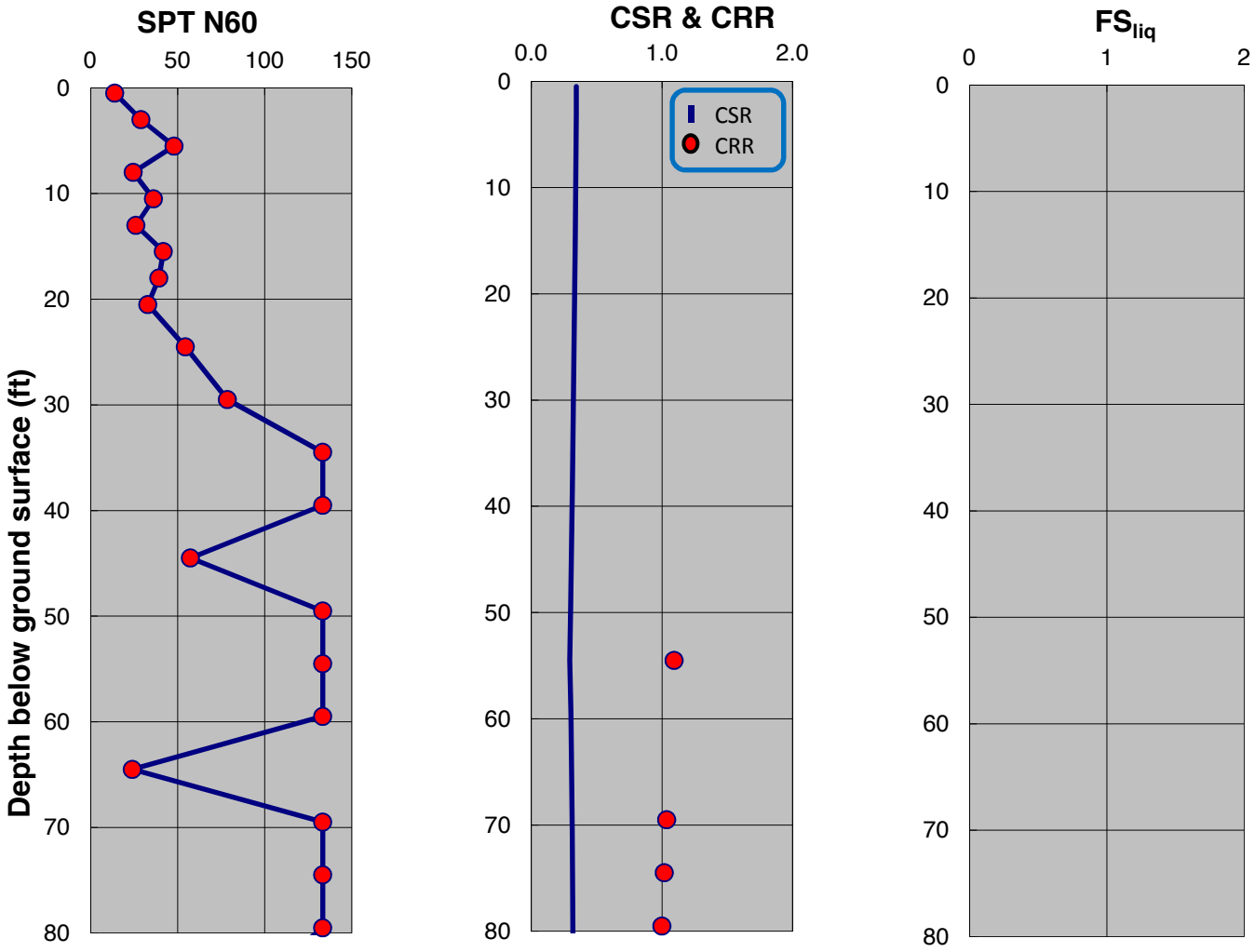
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-192 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



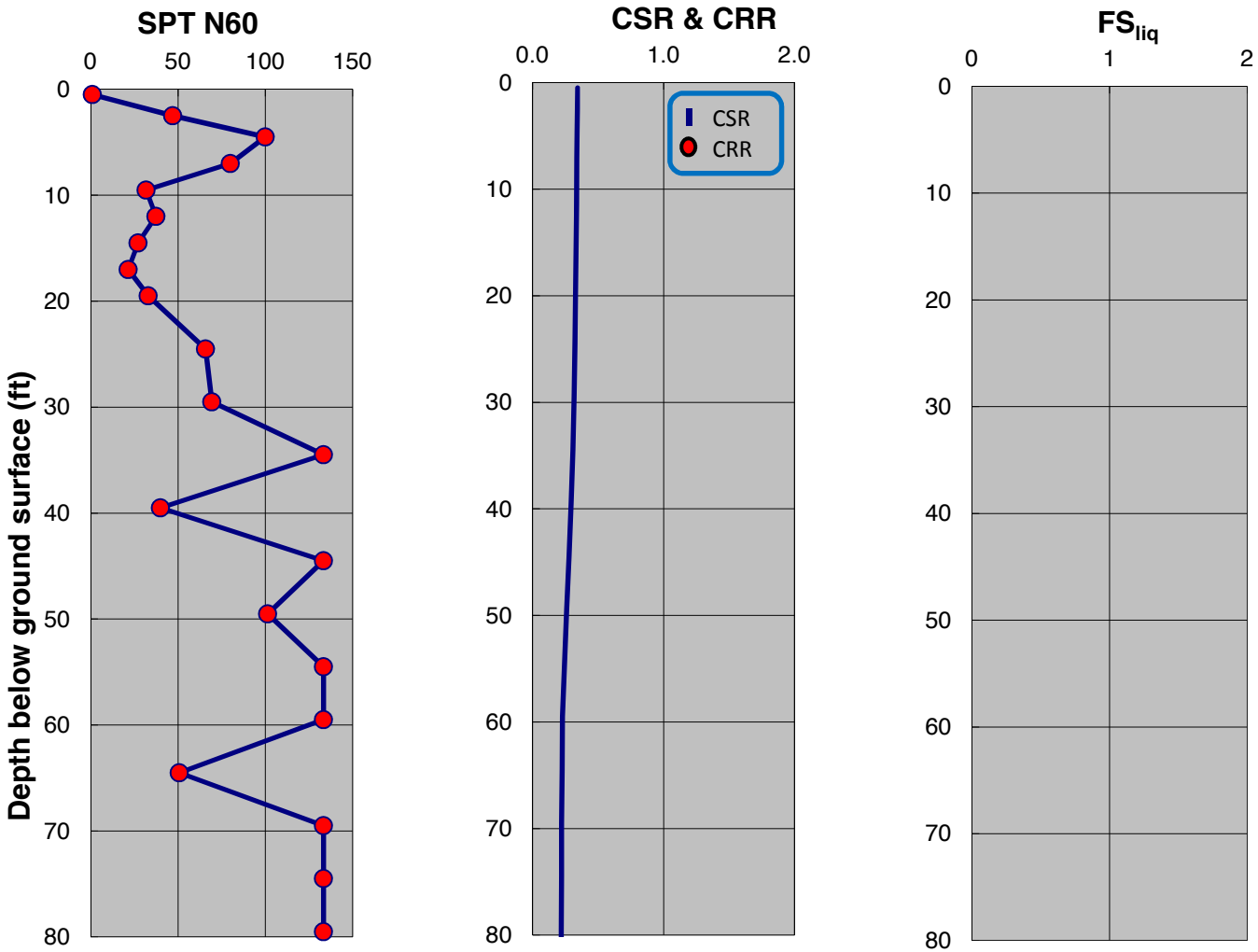
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-195 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



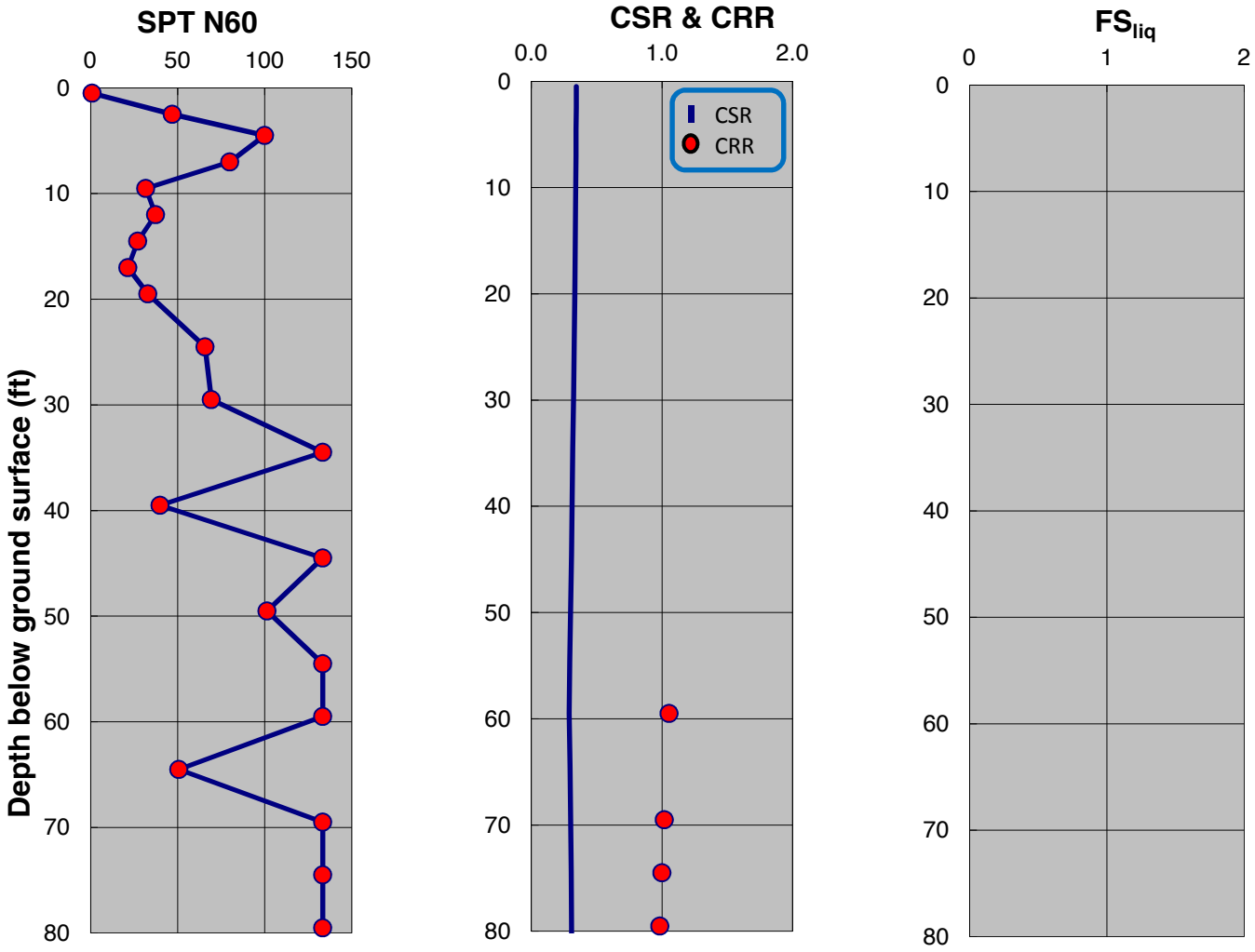
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-195 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



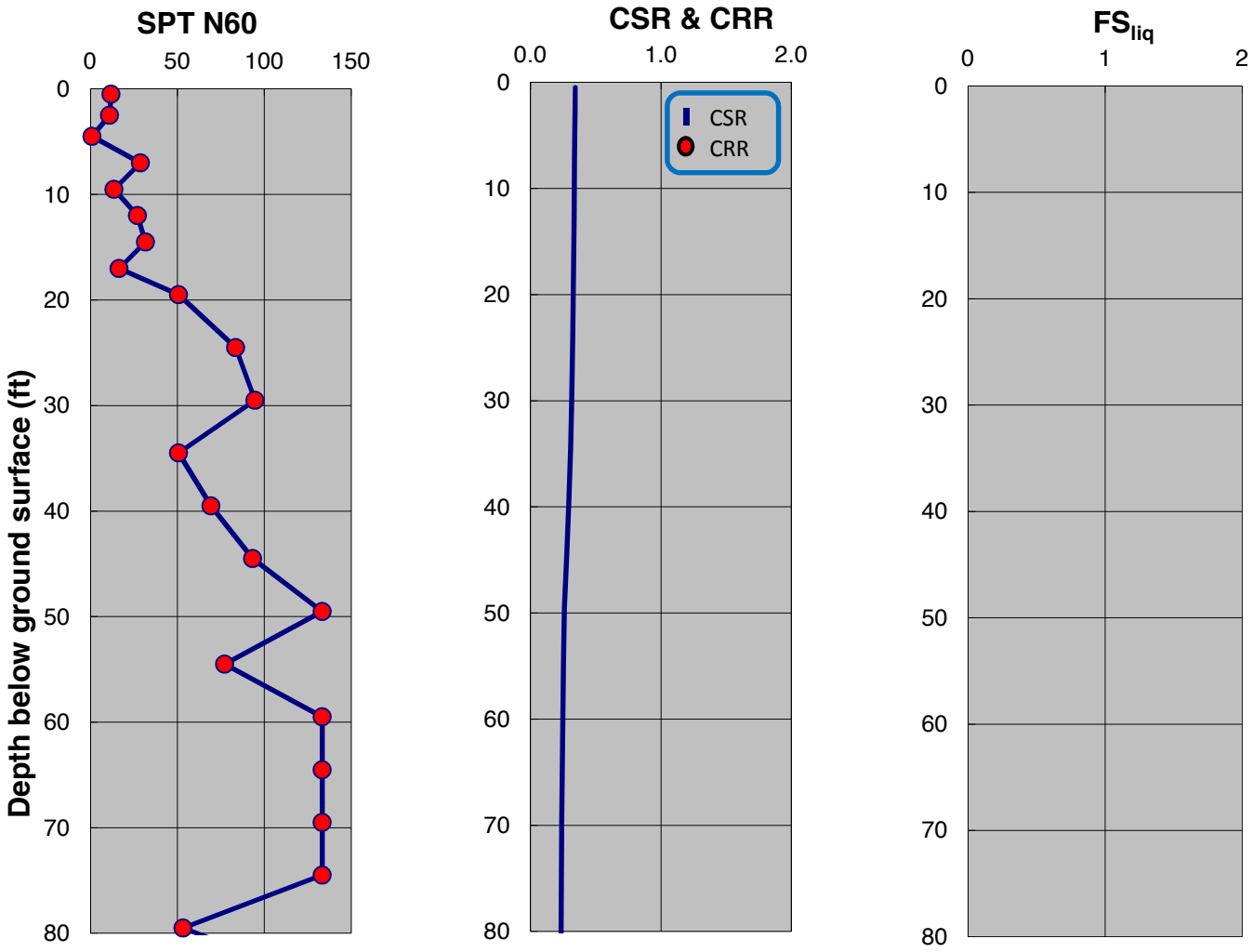
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-197 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



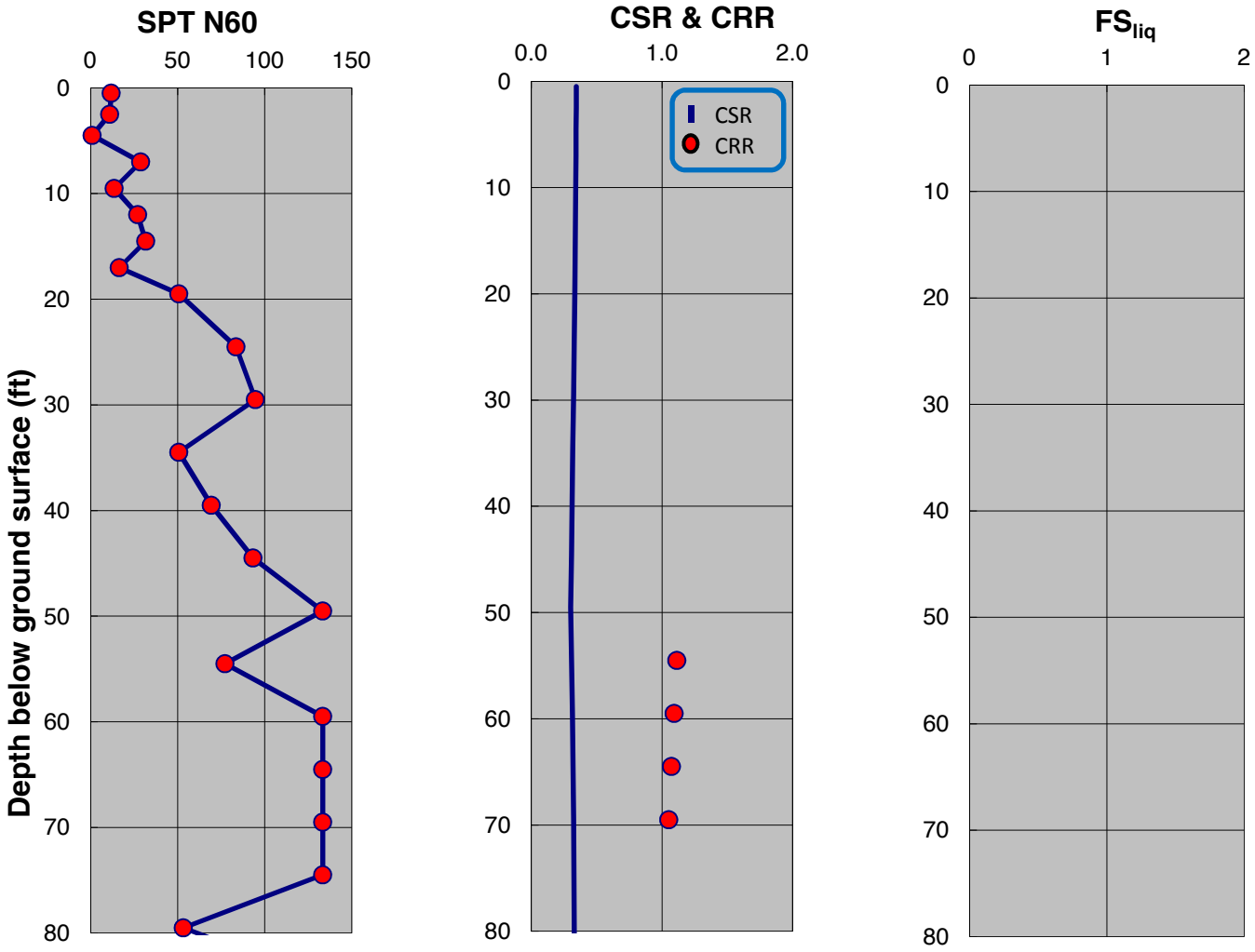
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-197 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-198 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

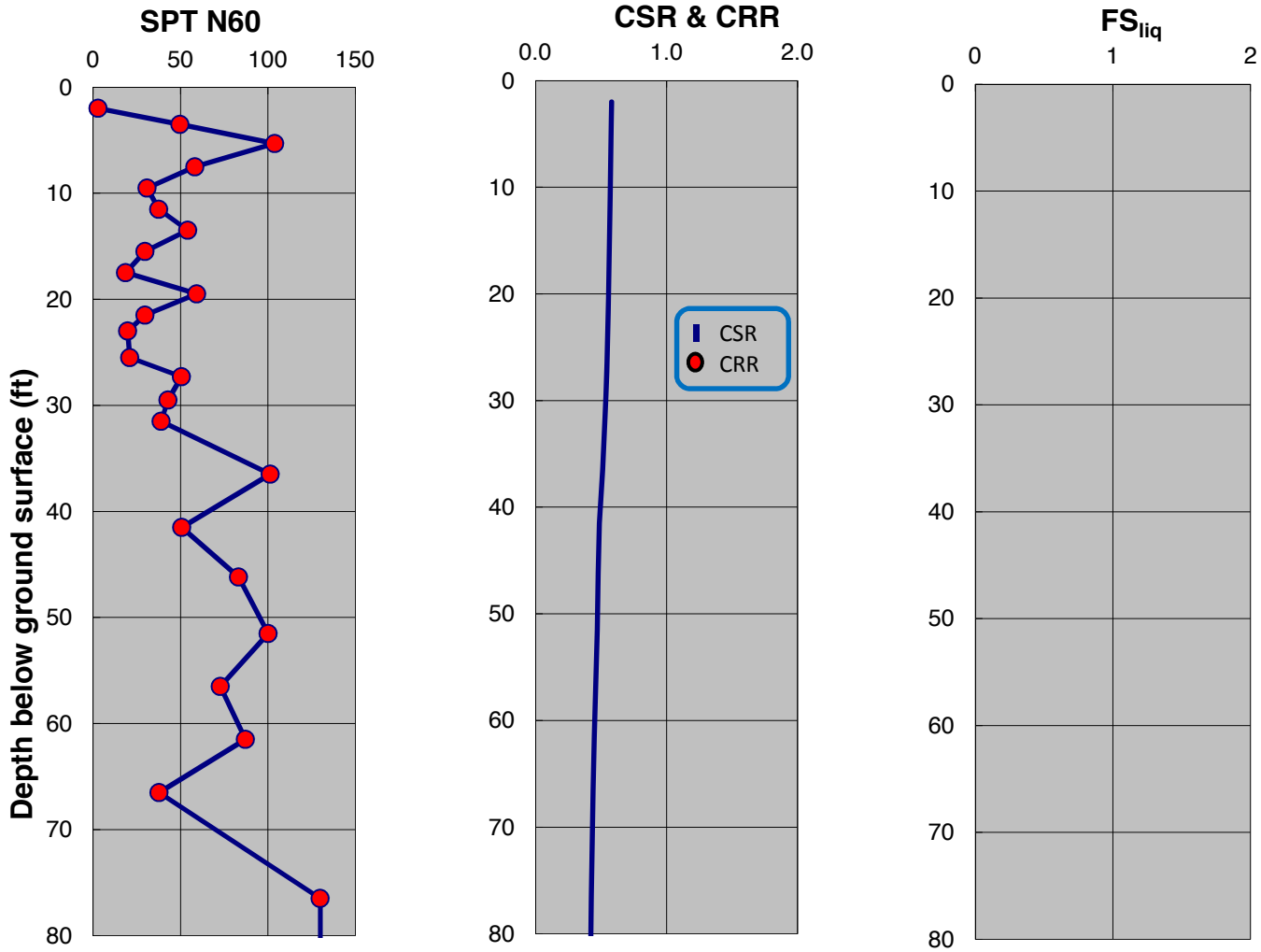
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-198 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

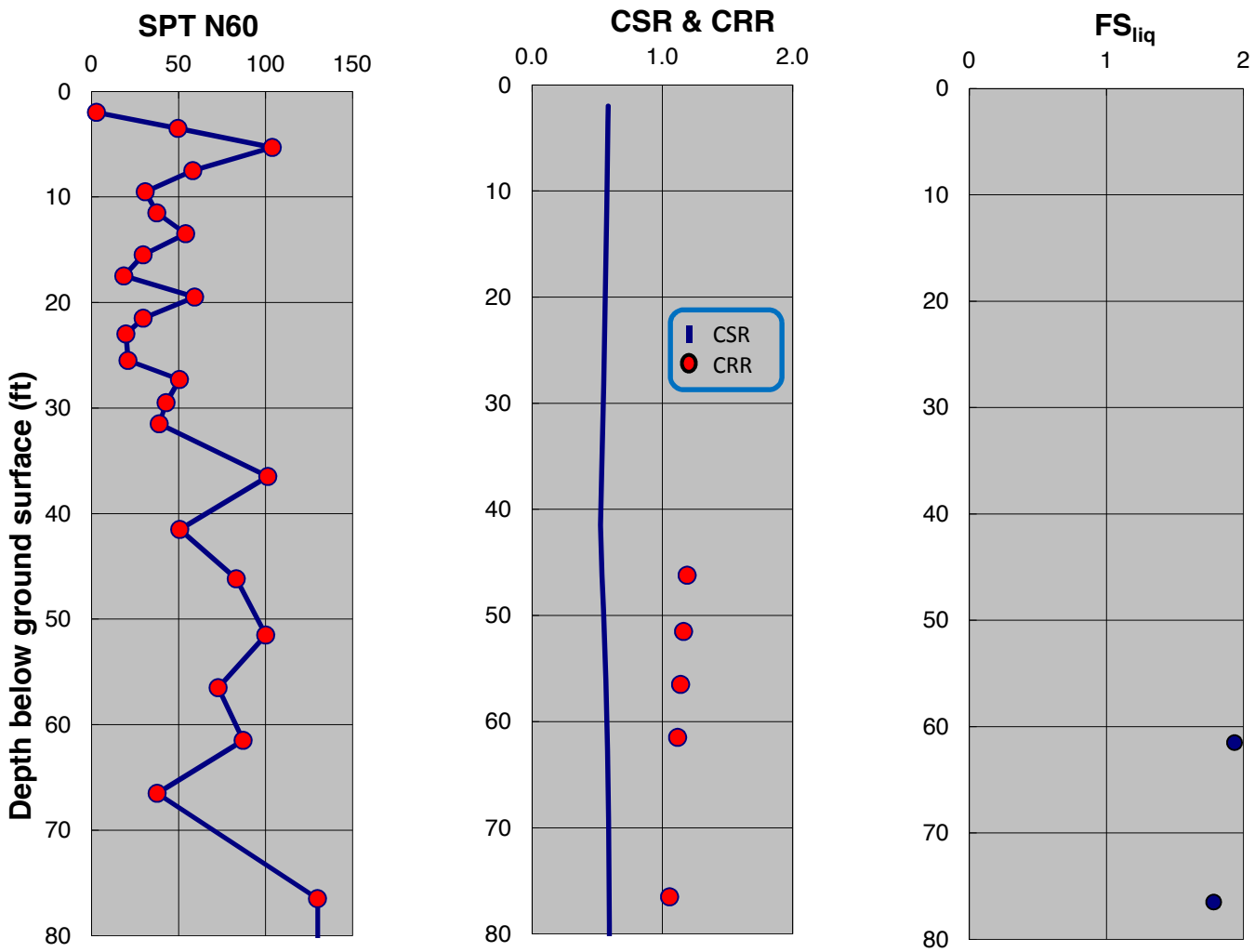
PLATE A.260



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-9 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

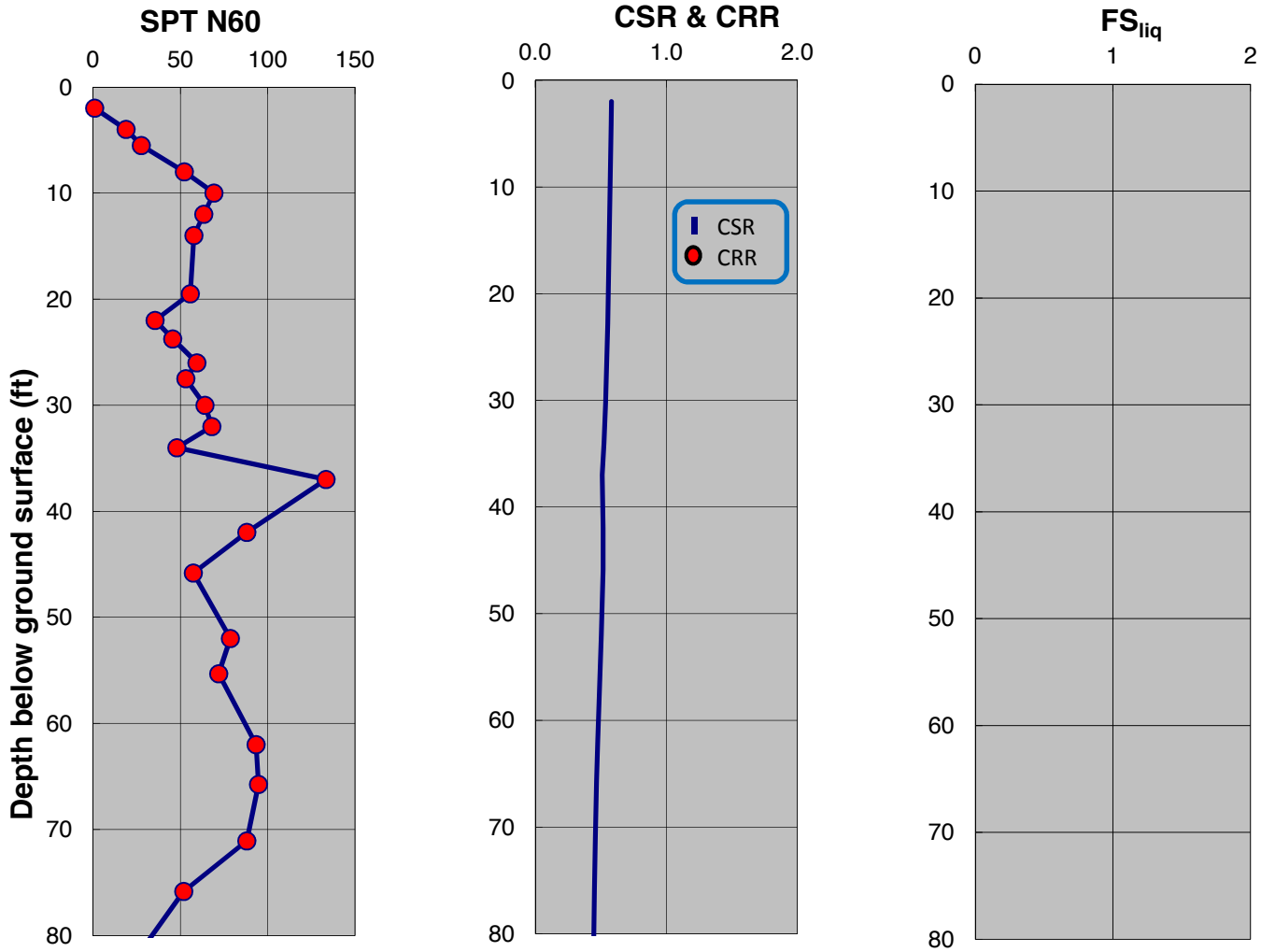
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.261



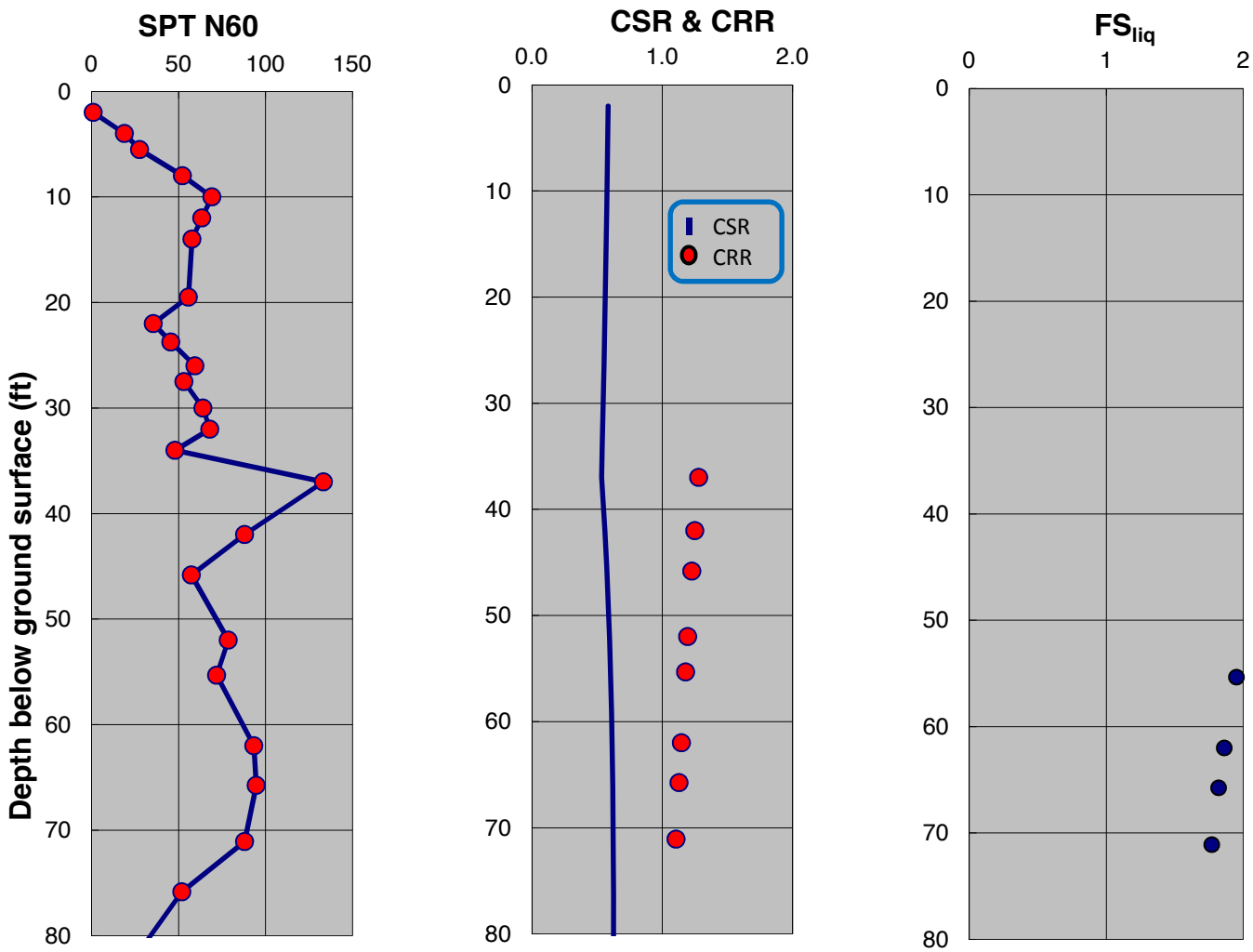
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-9 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



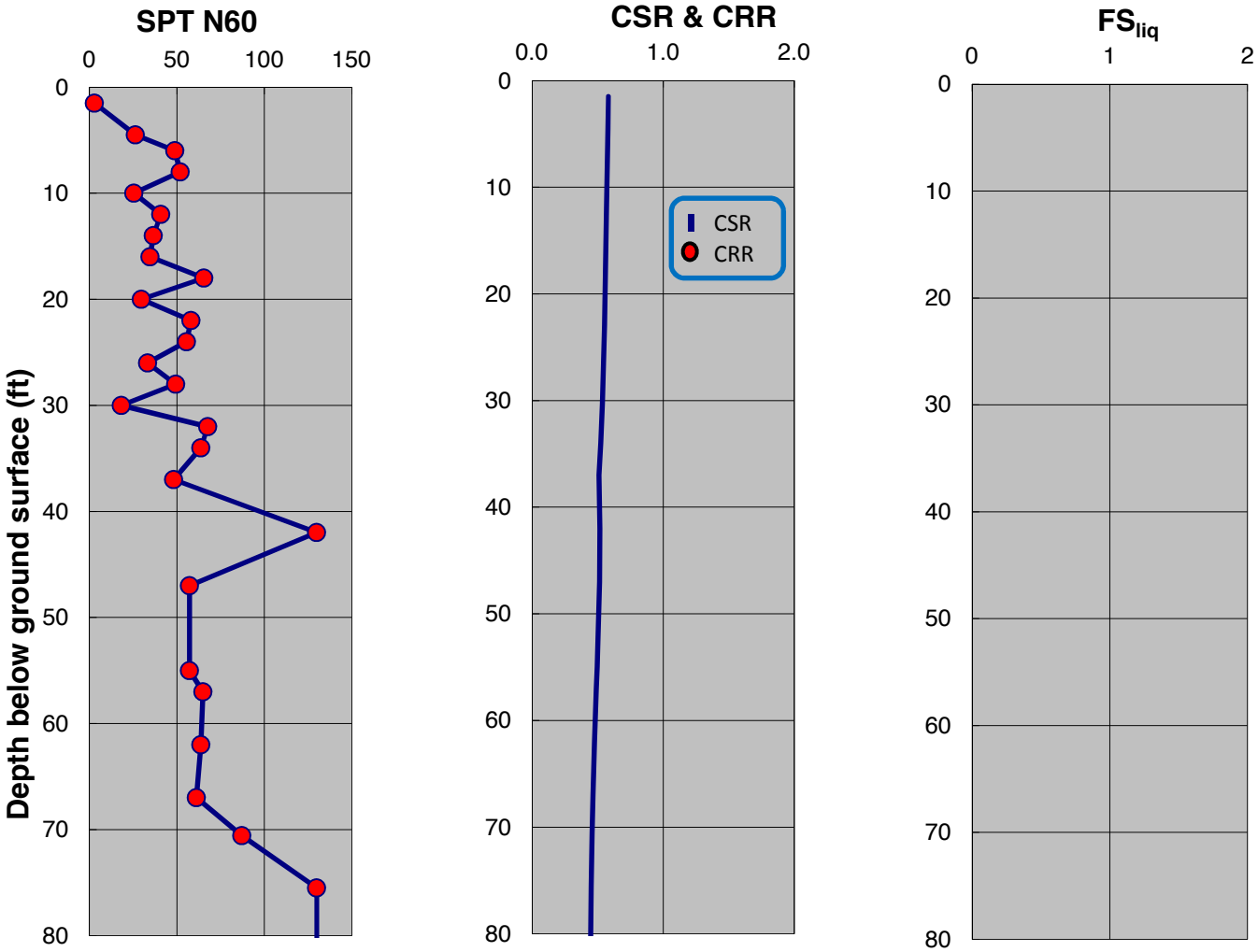
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-10 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



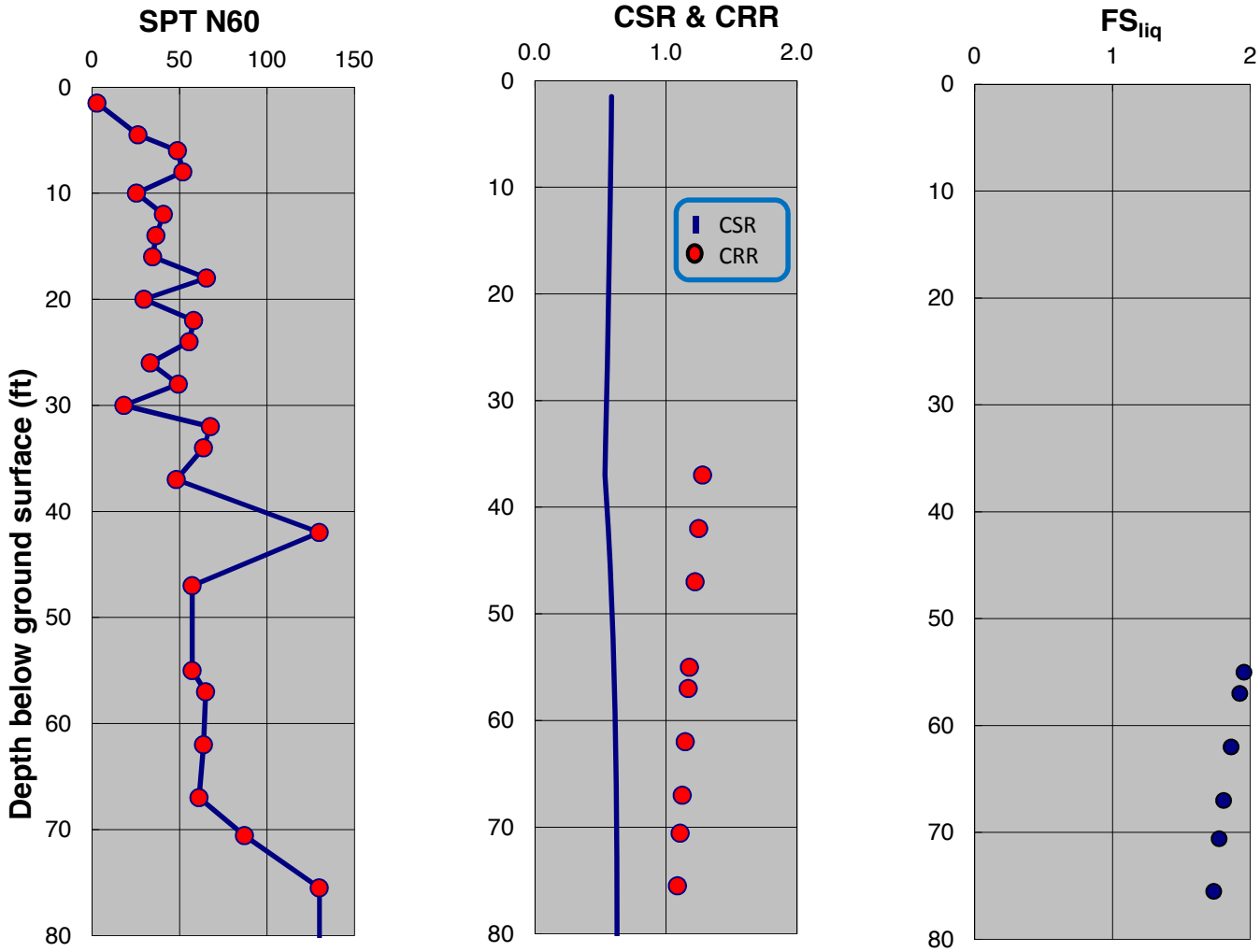
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-10 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



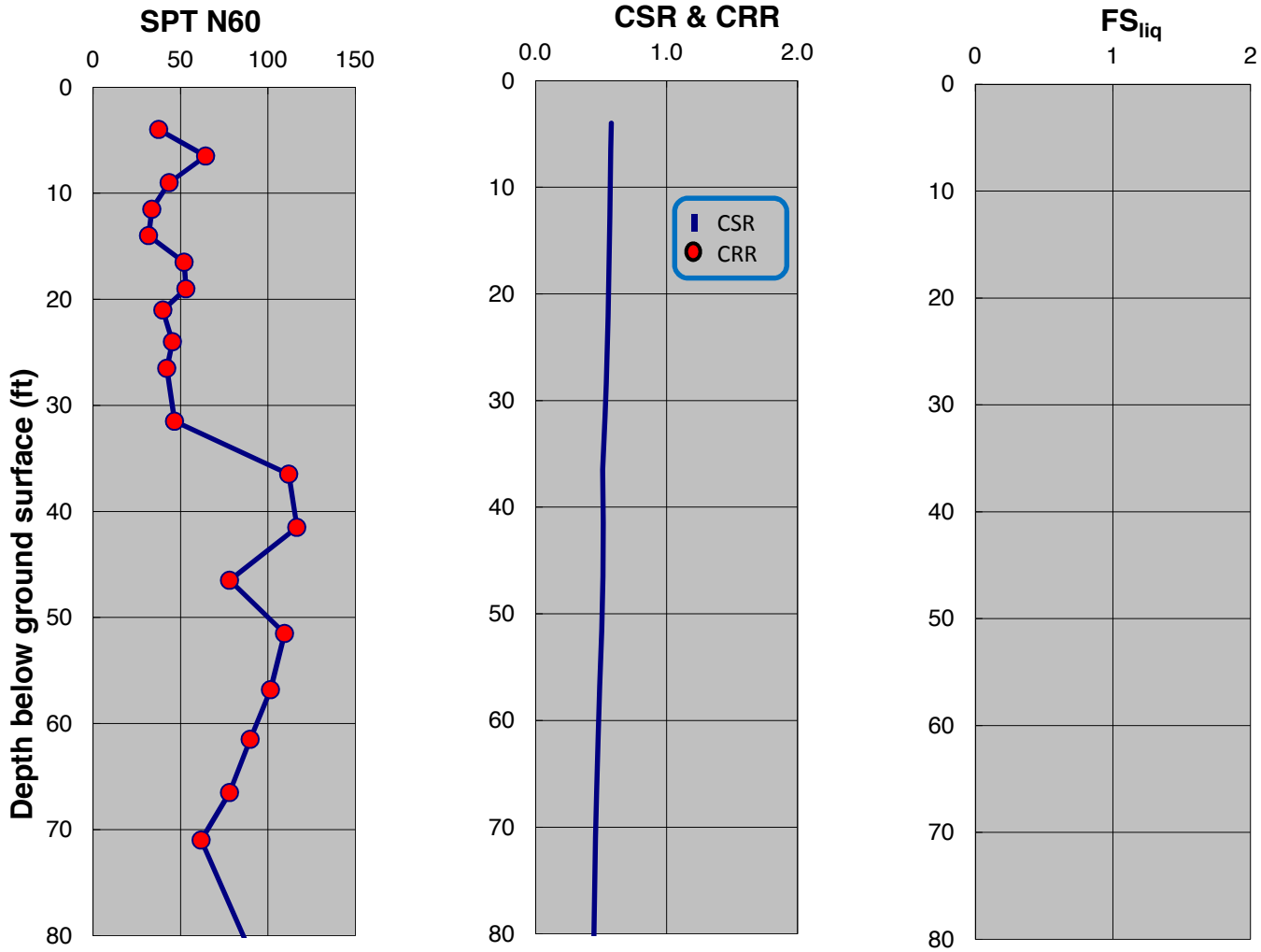
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-11 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



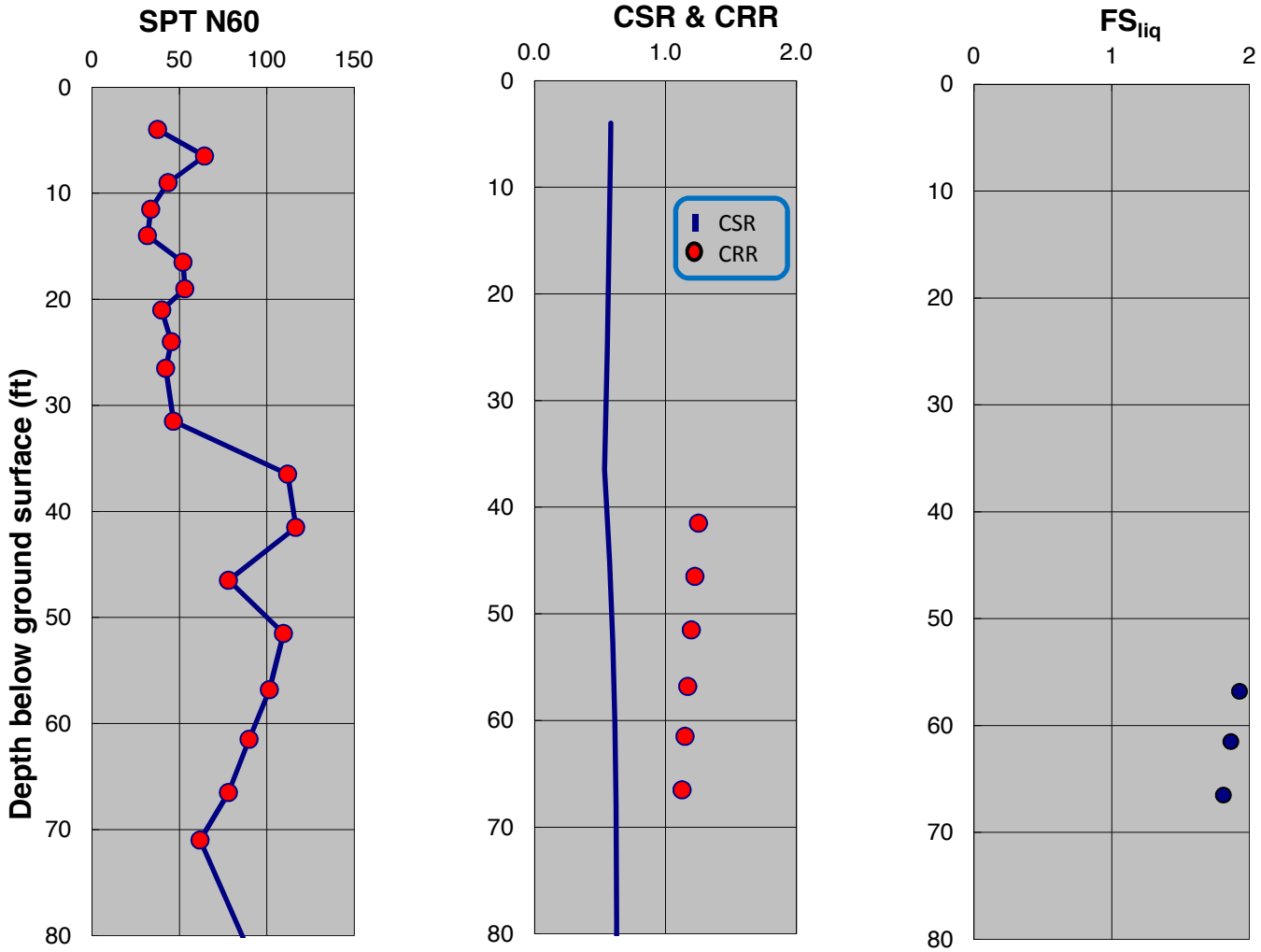
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-11 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



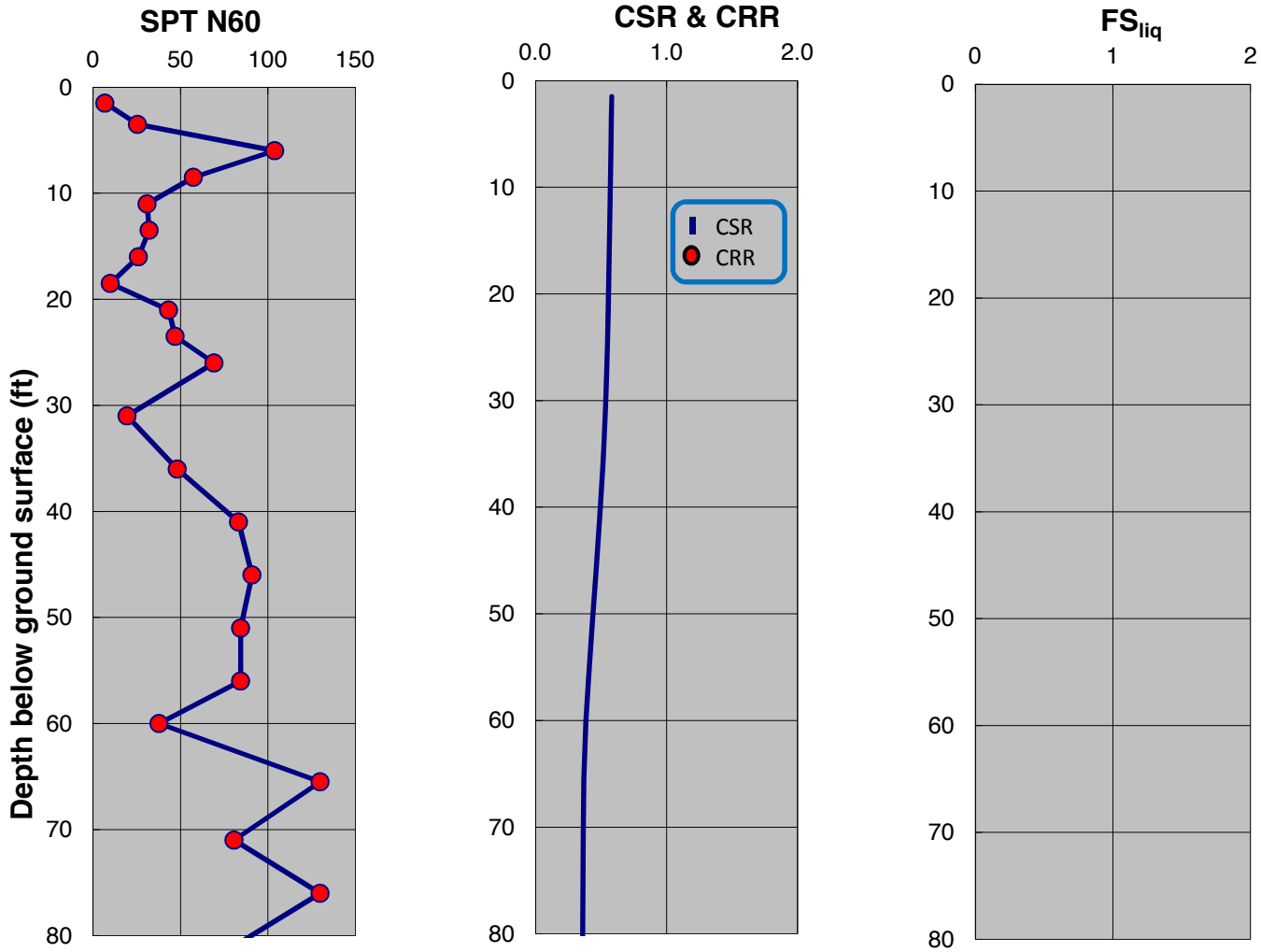
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-14 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



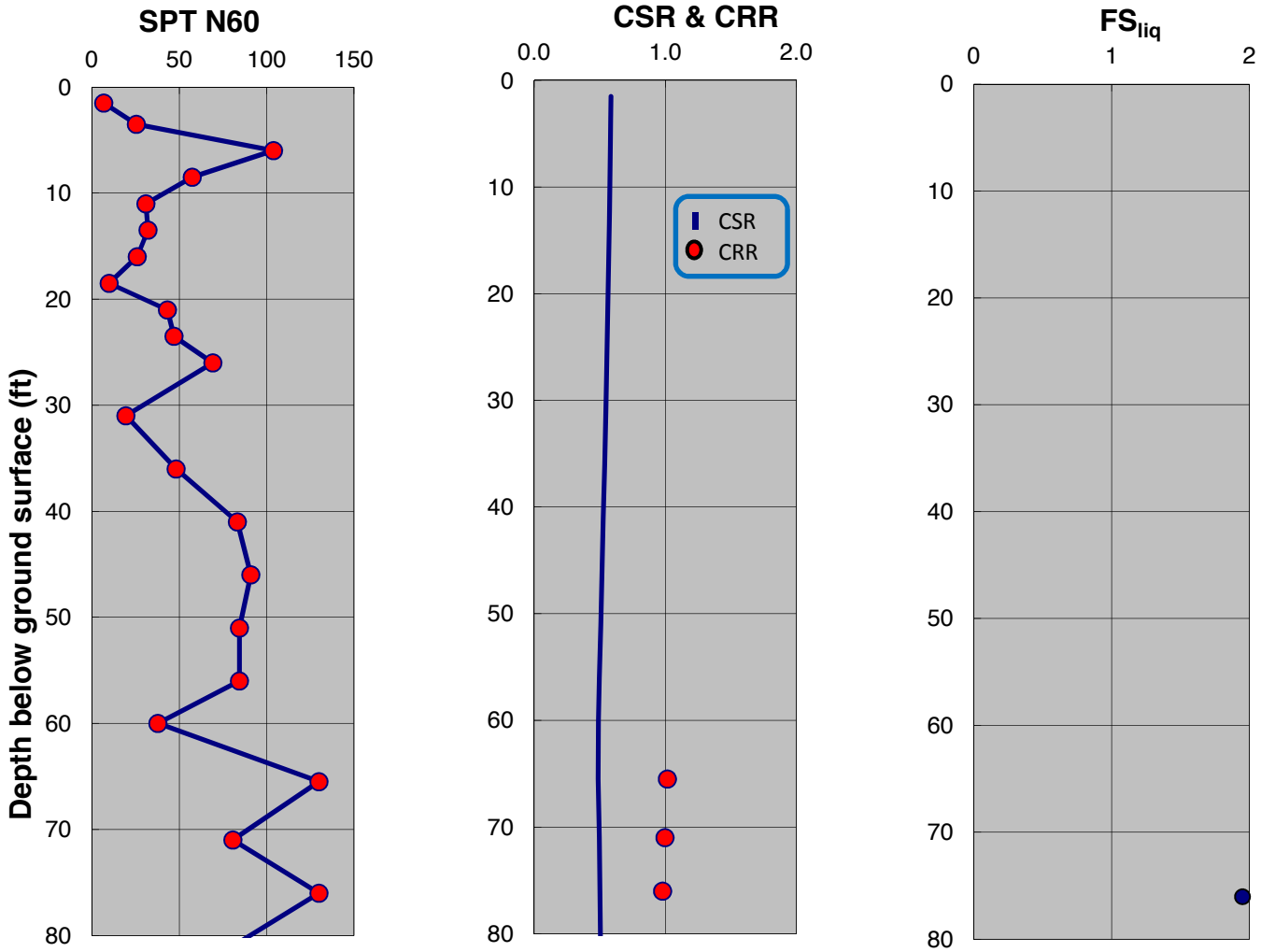
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-14 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



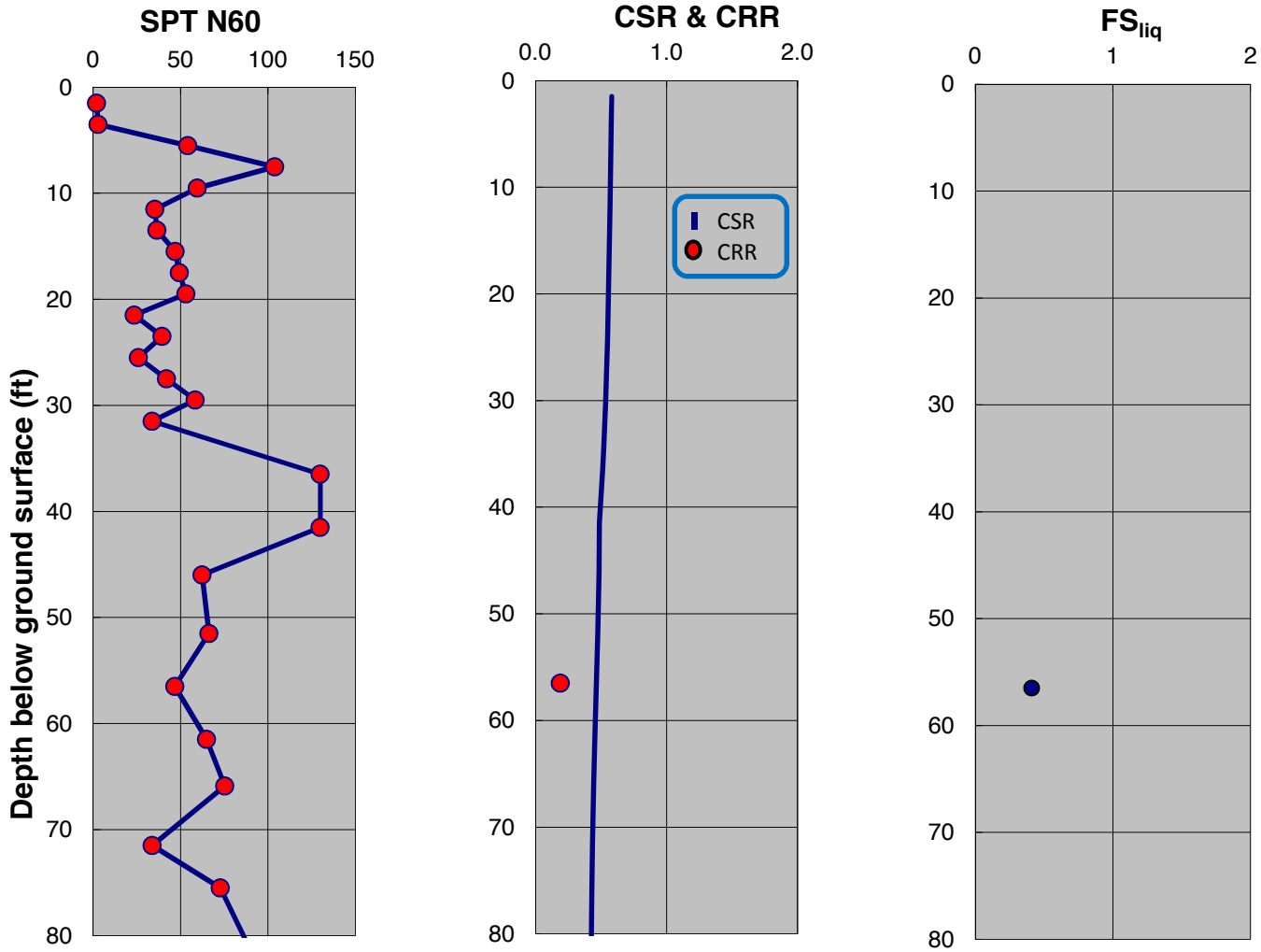
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-15 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



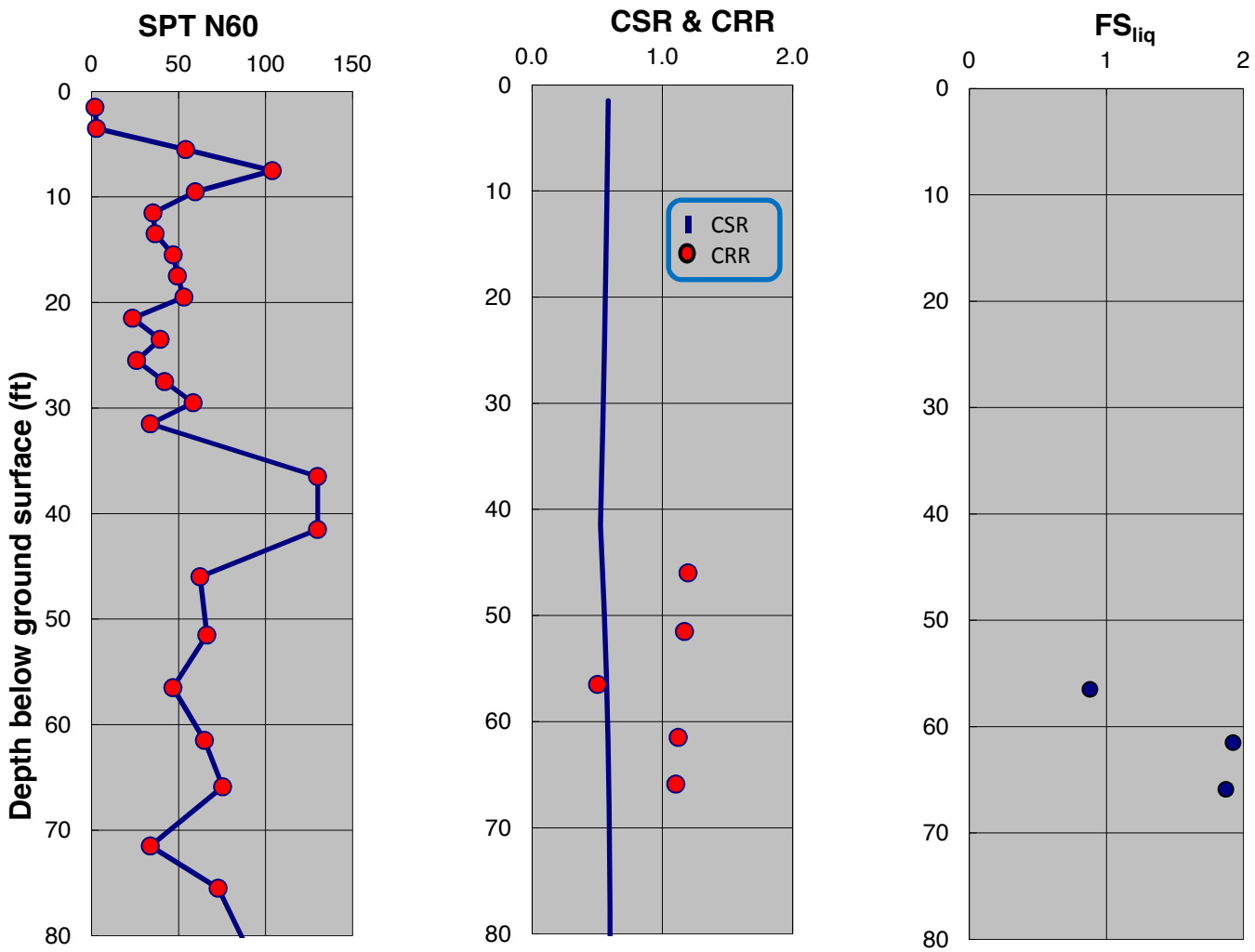
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-15 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



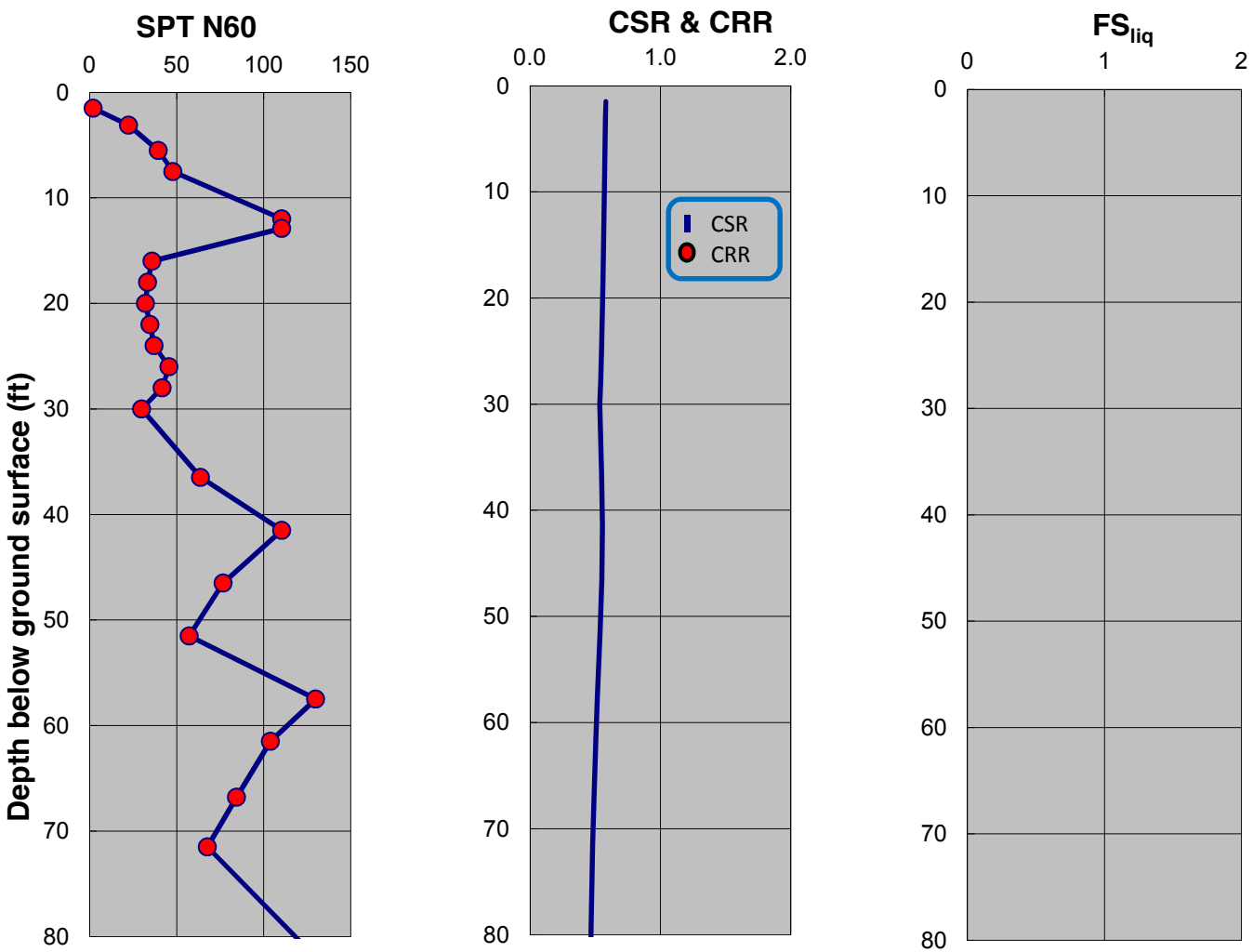
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-17 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



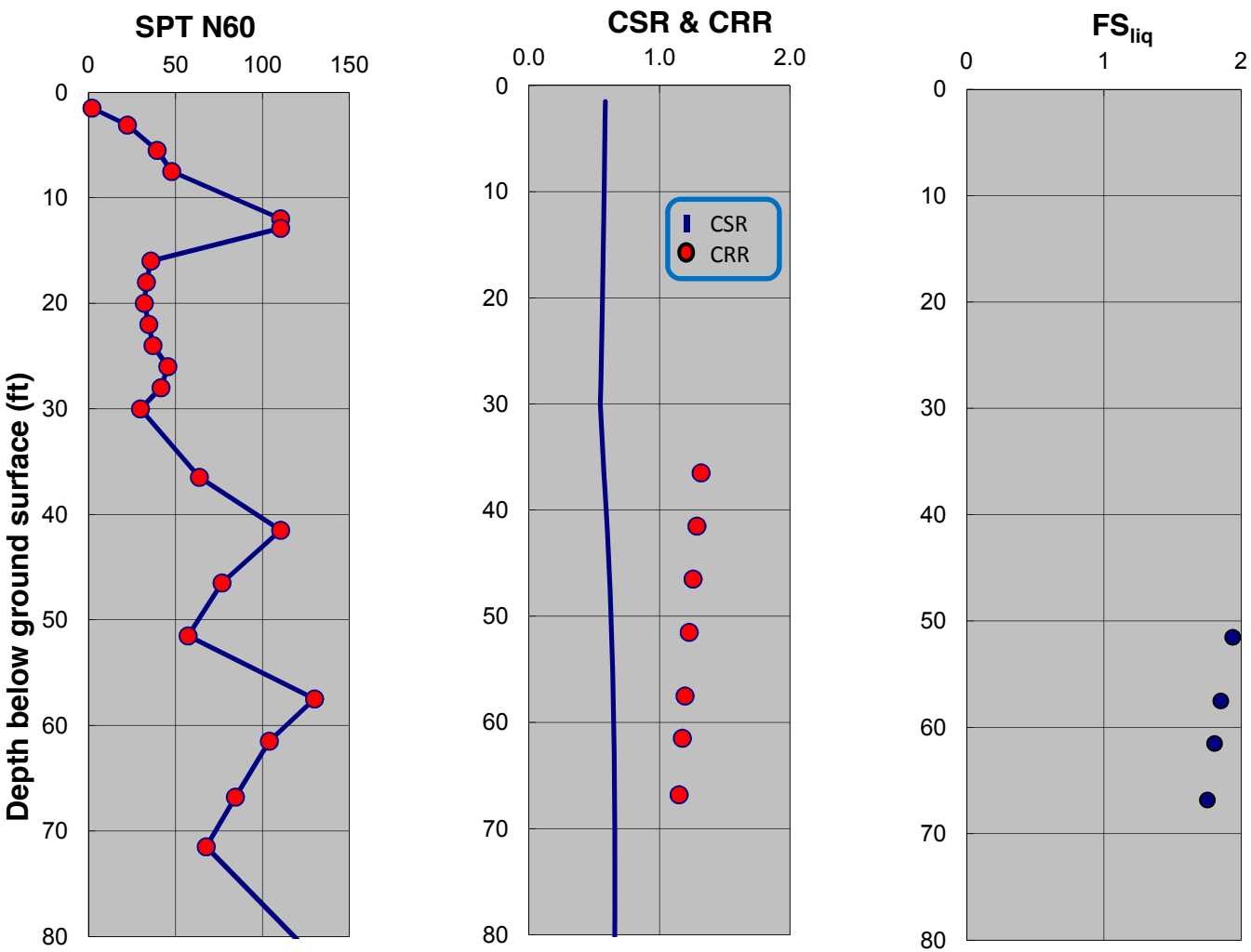
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-17 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



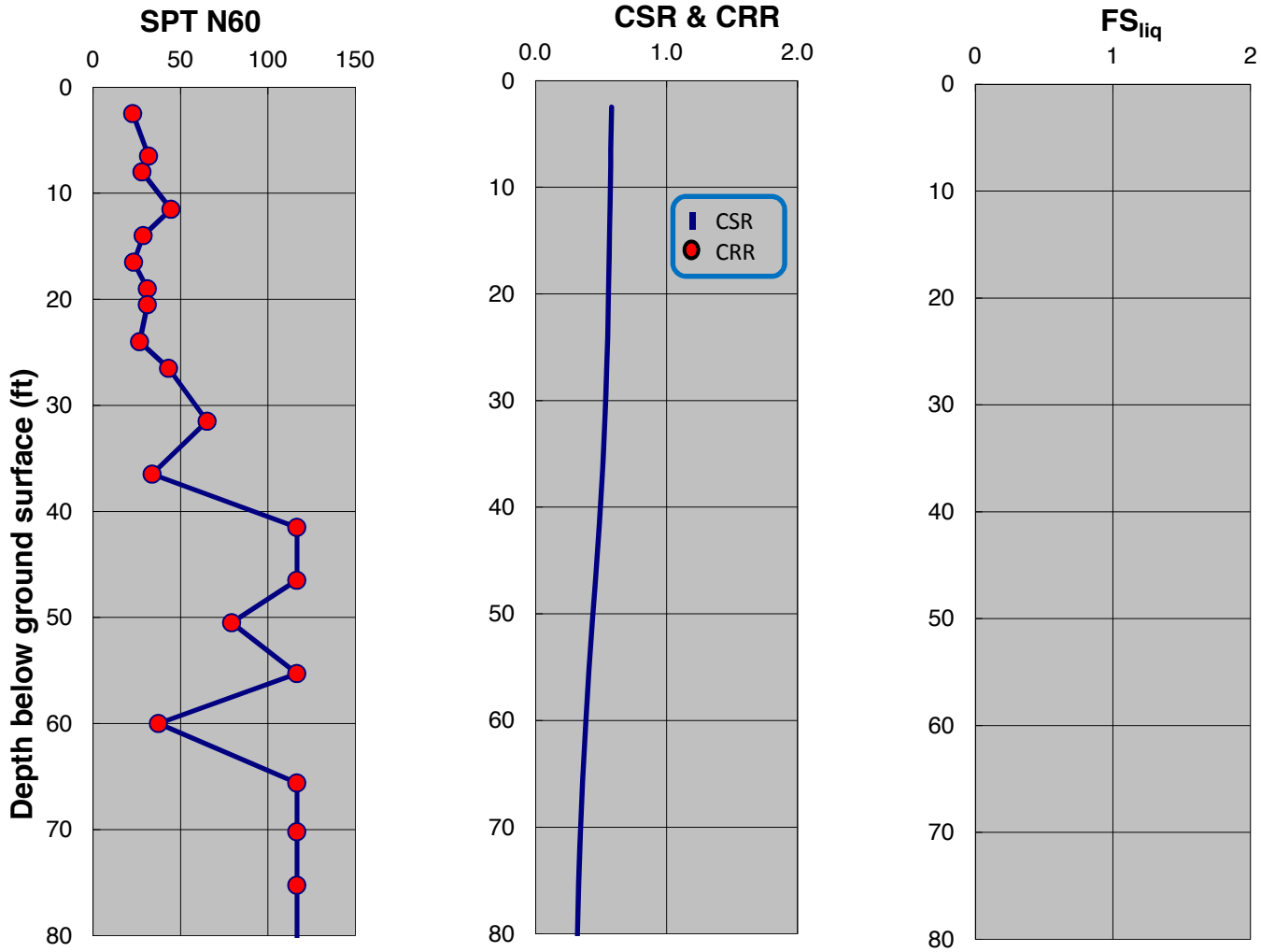
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-18 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



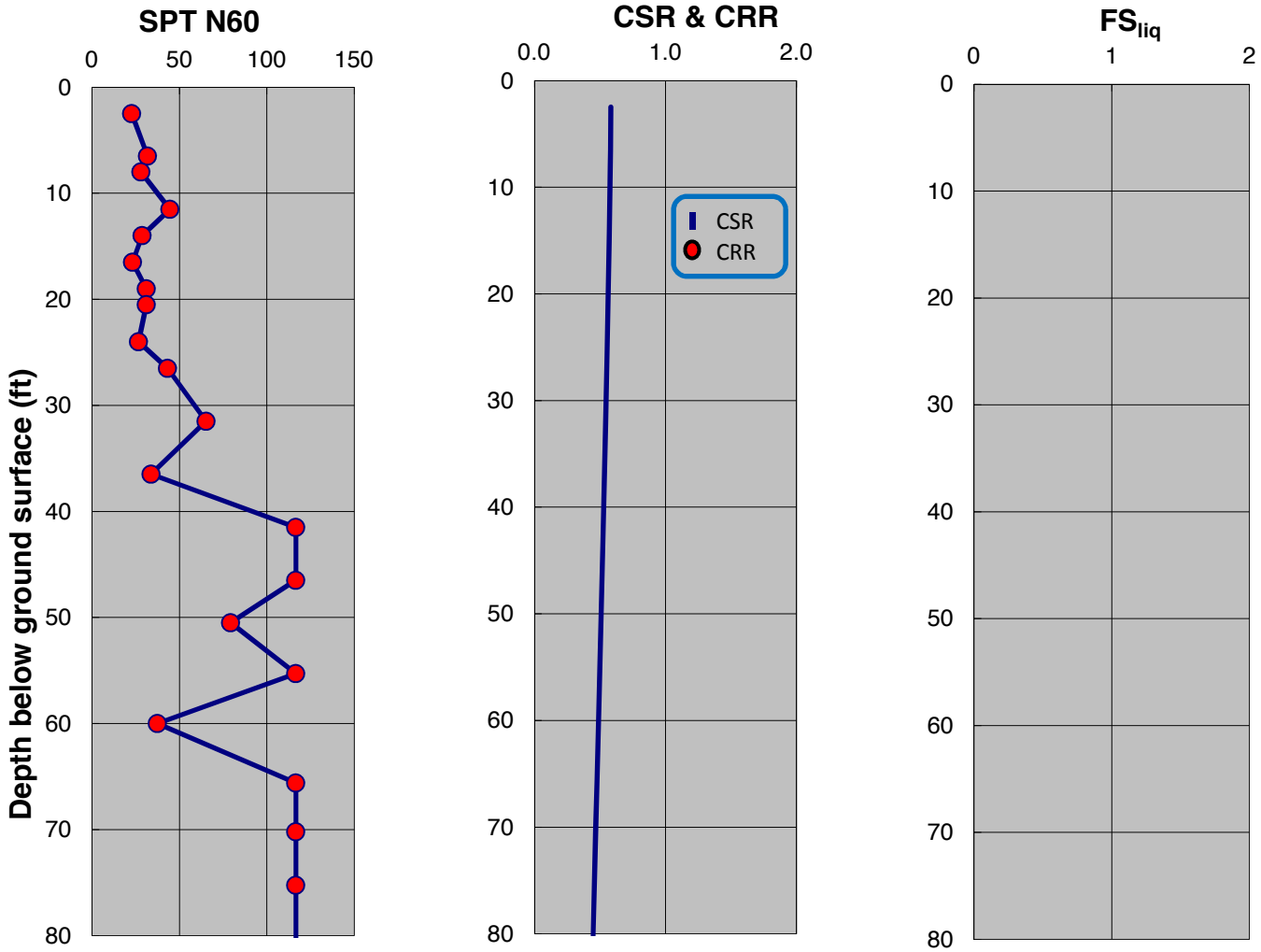
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-18 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



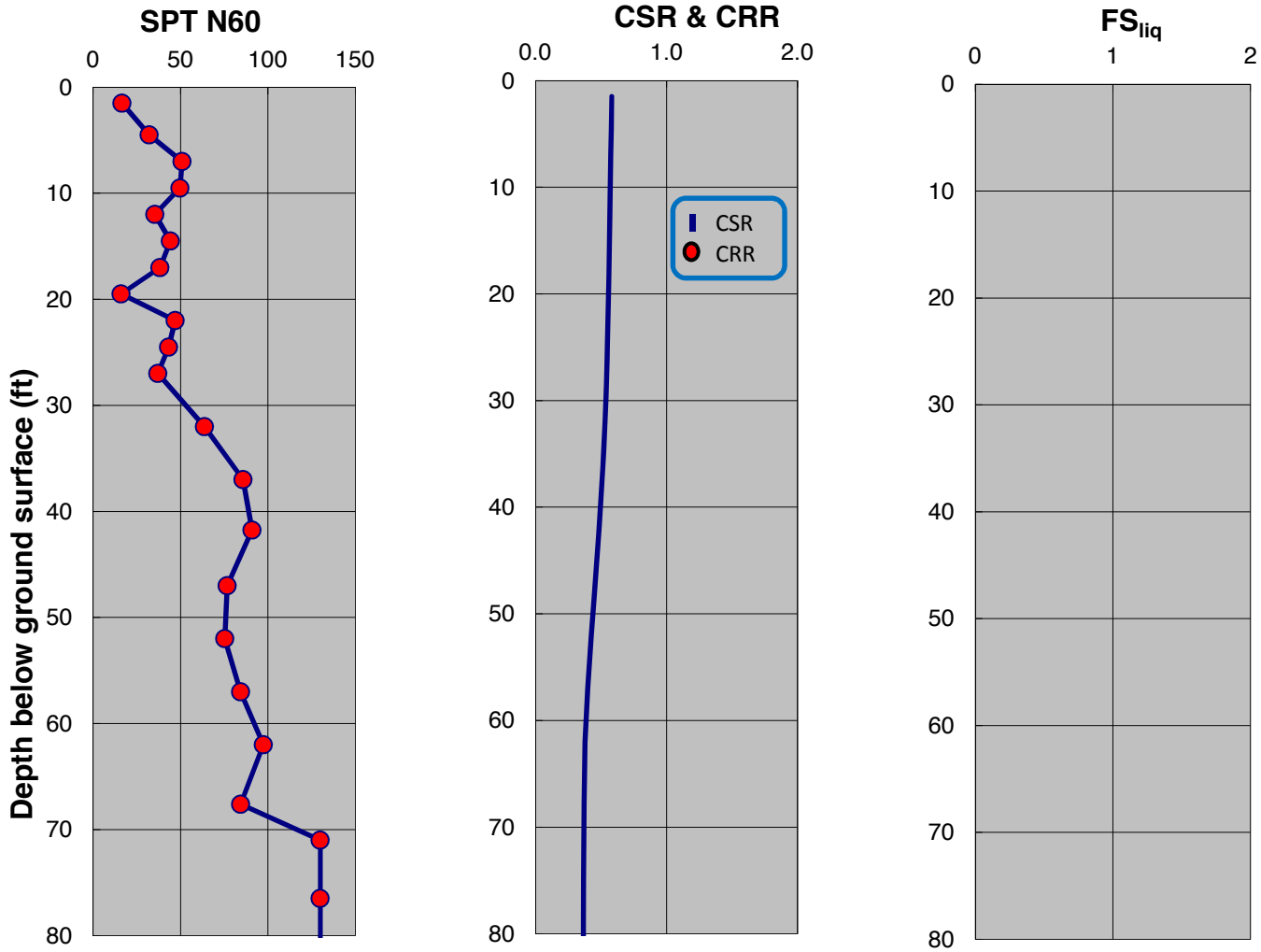
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-23 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



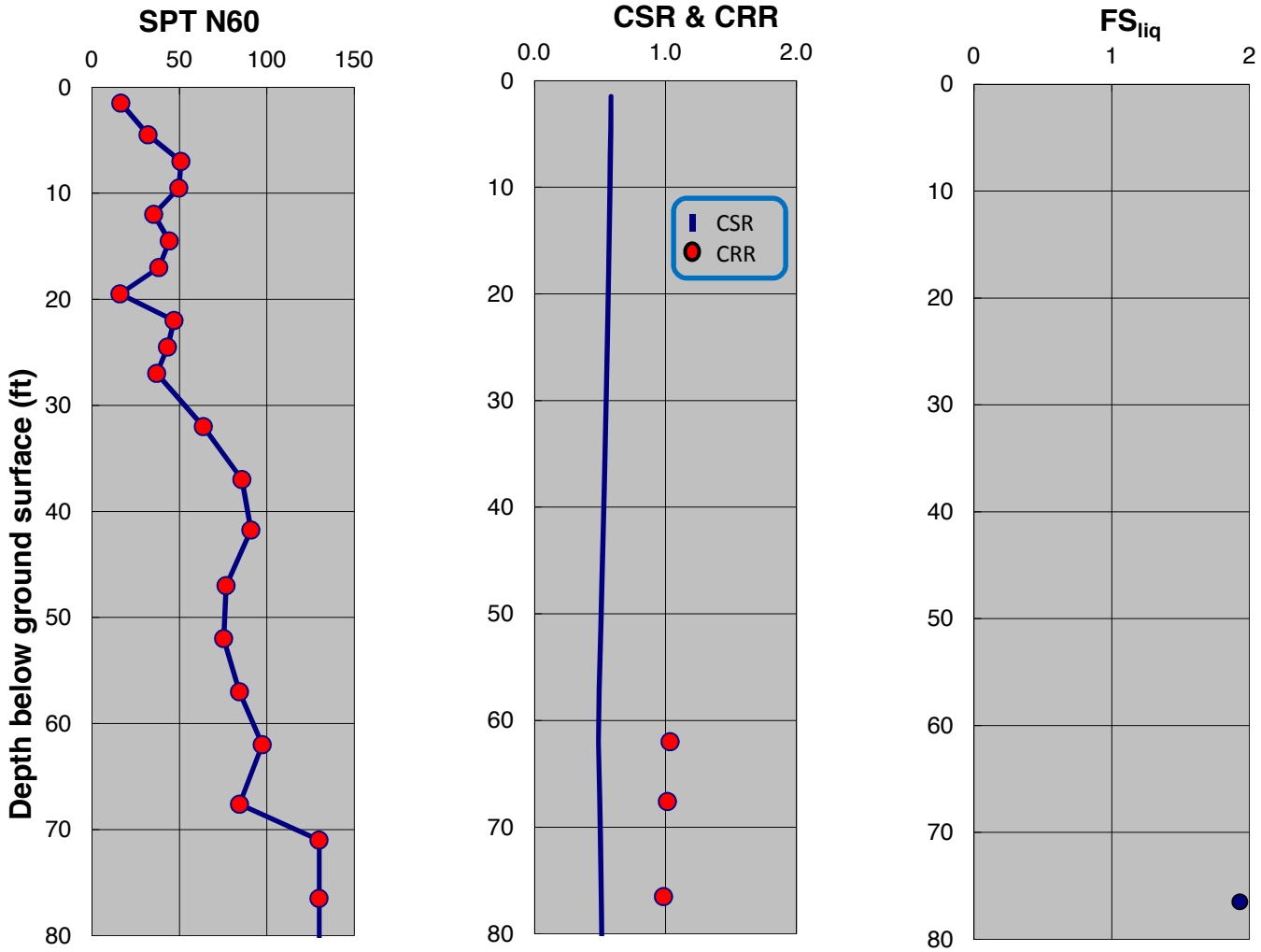
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-23 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



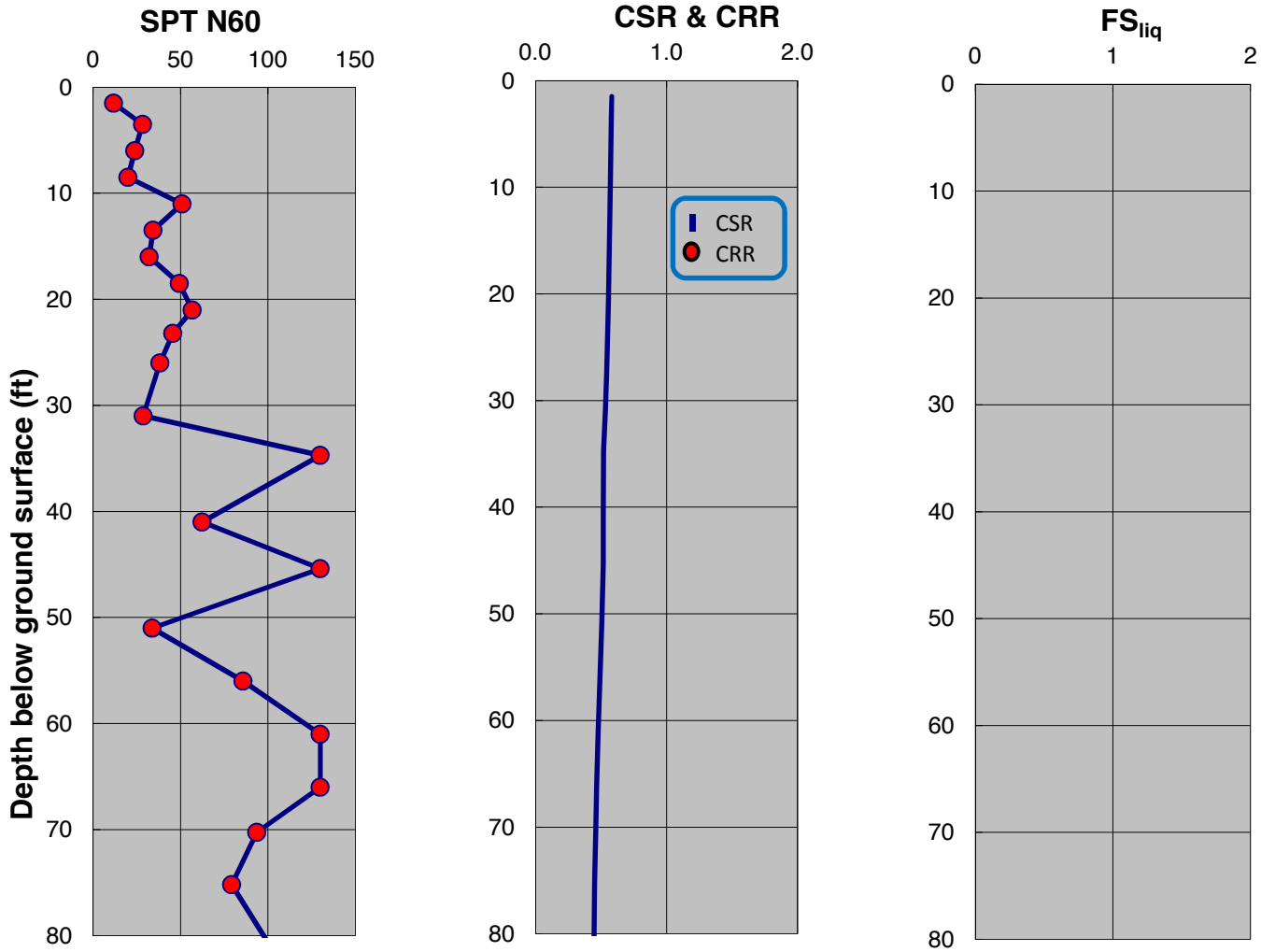
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-24 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



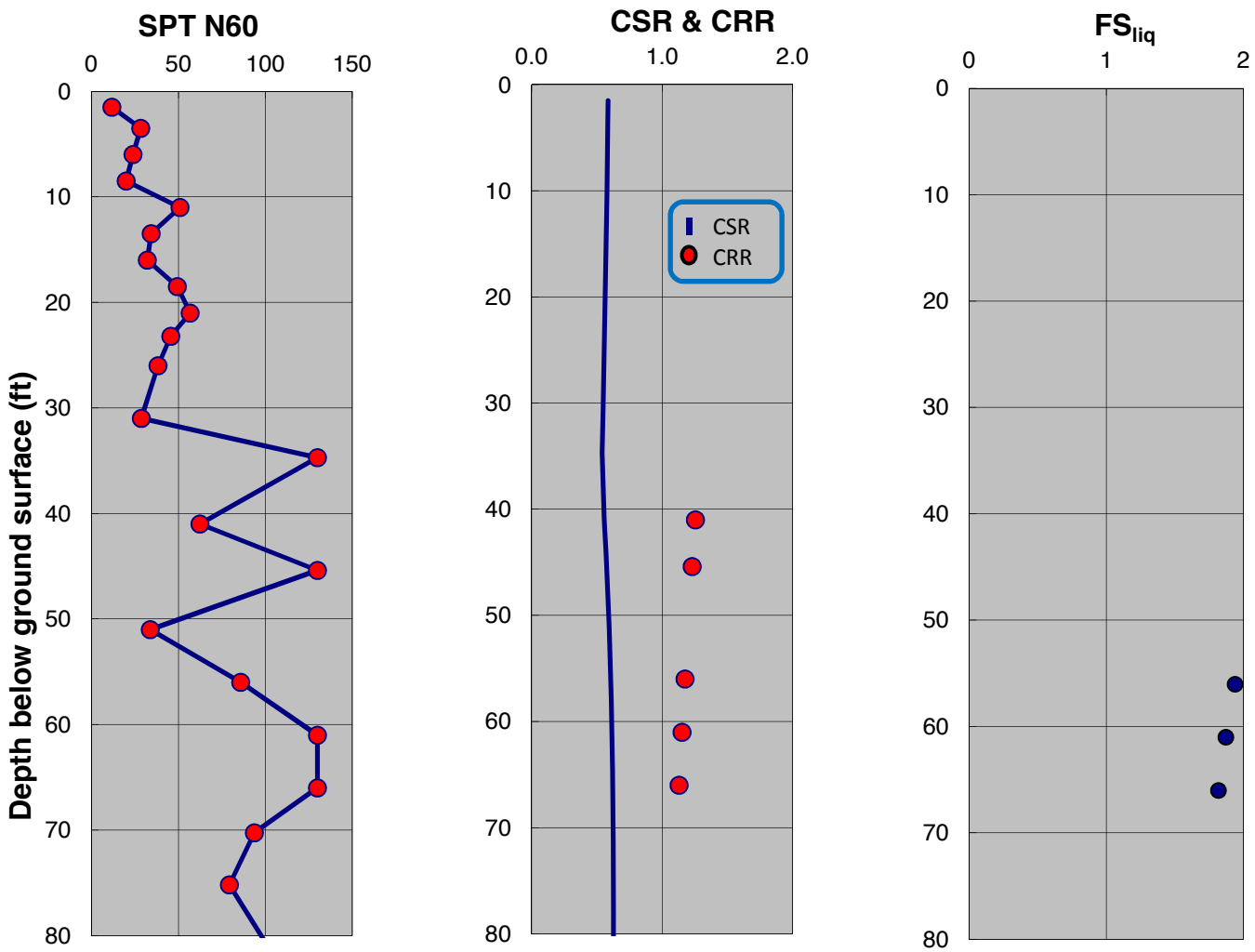
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-24 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



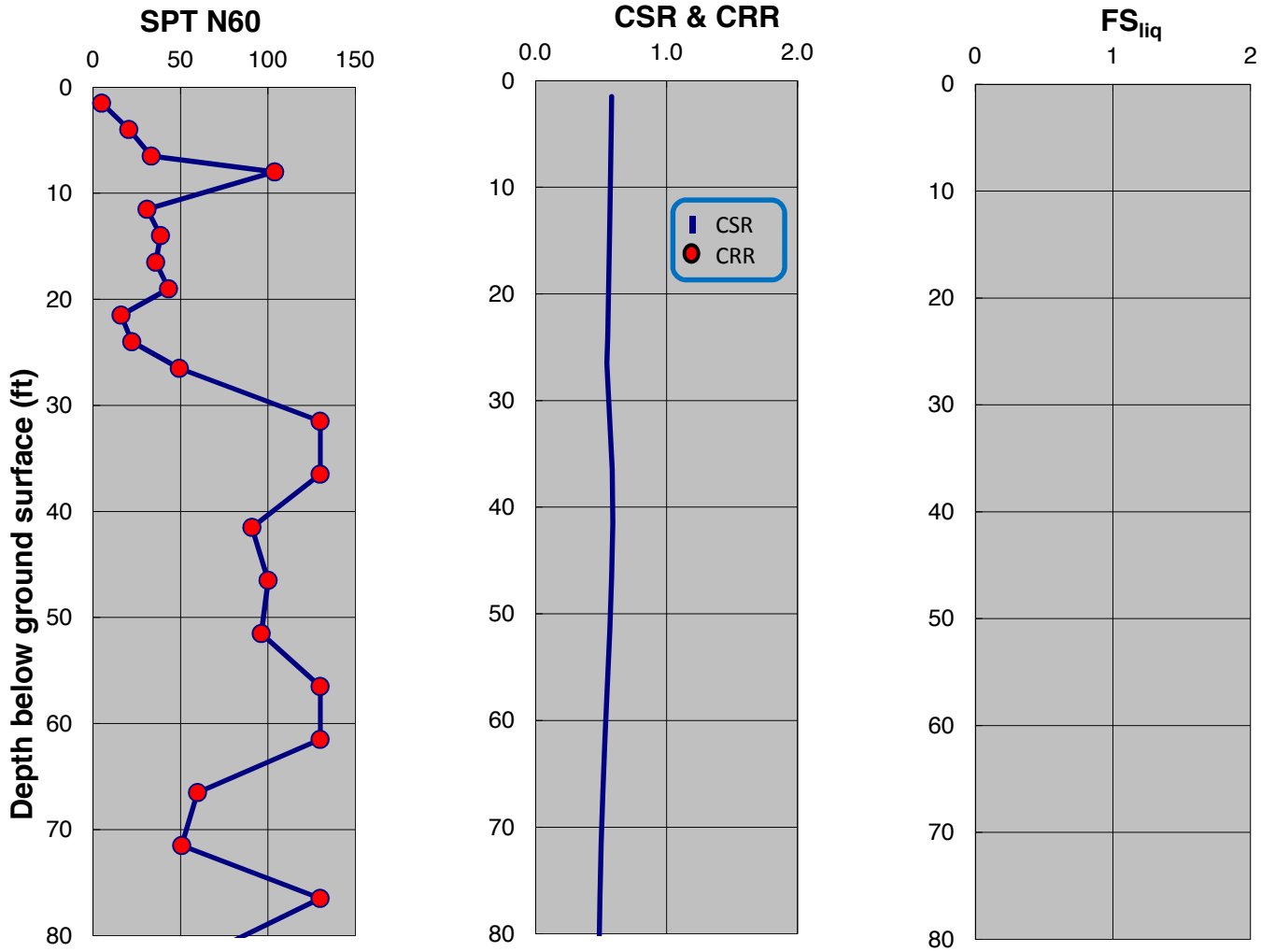
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-26 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



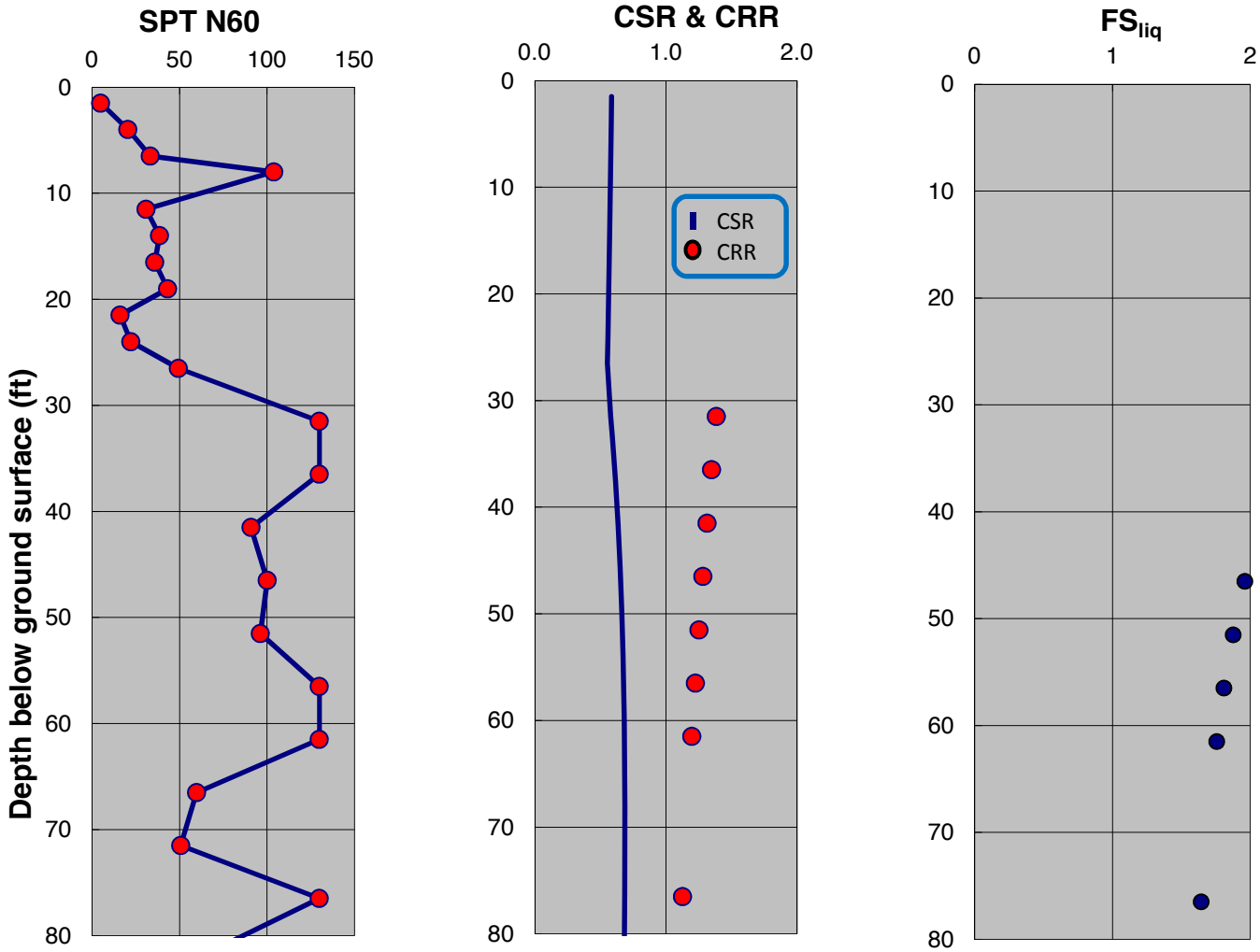
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-26 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



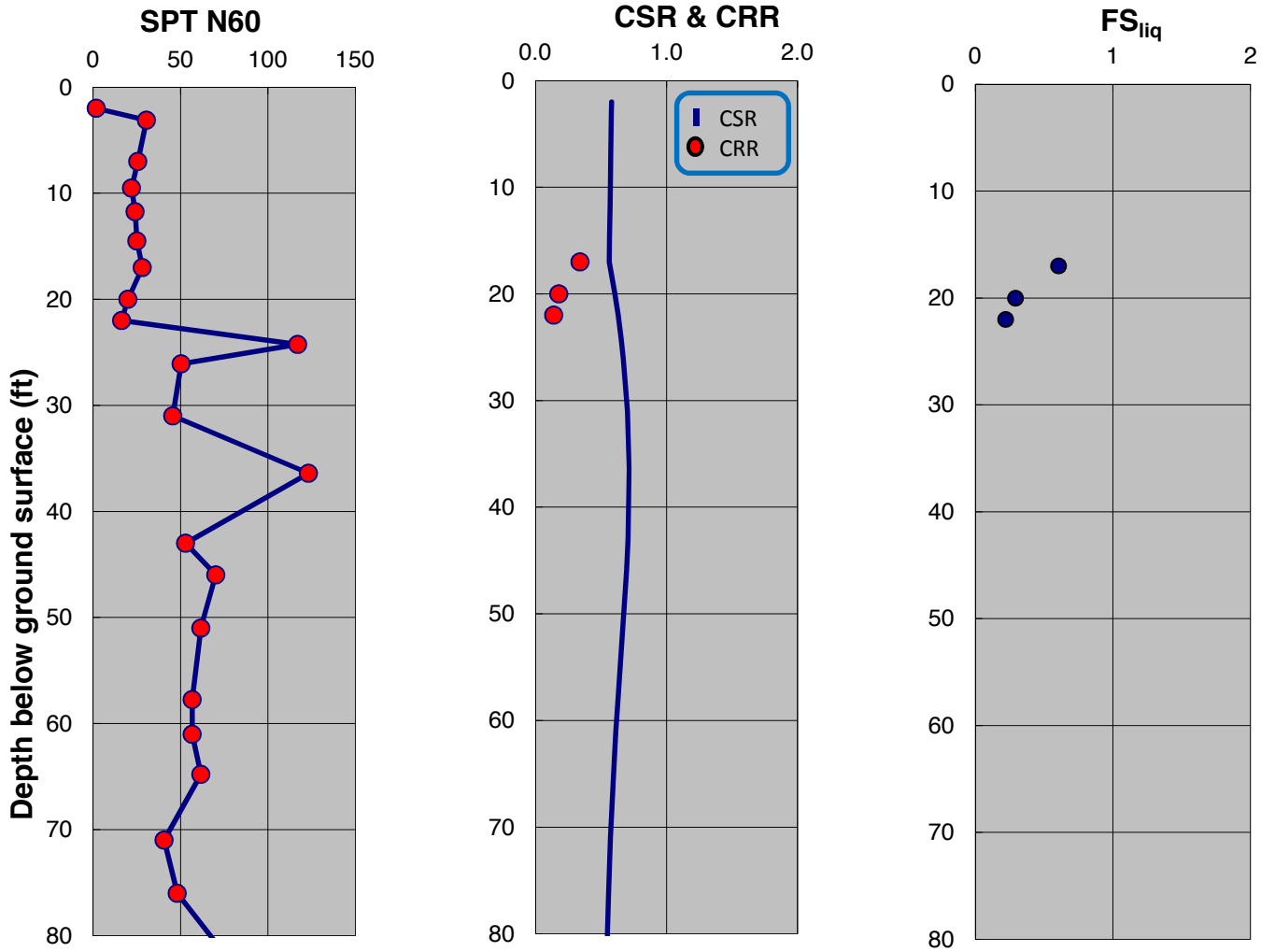
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-27 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



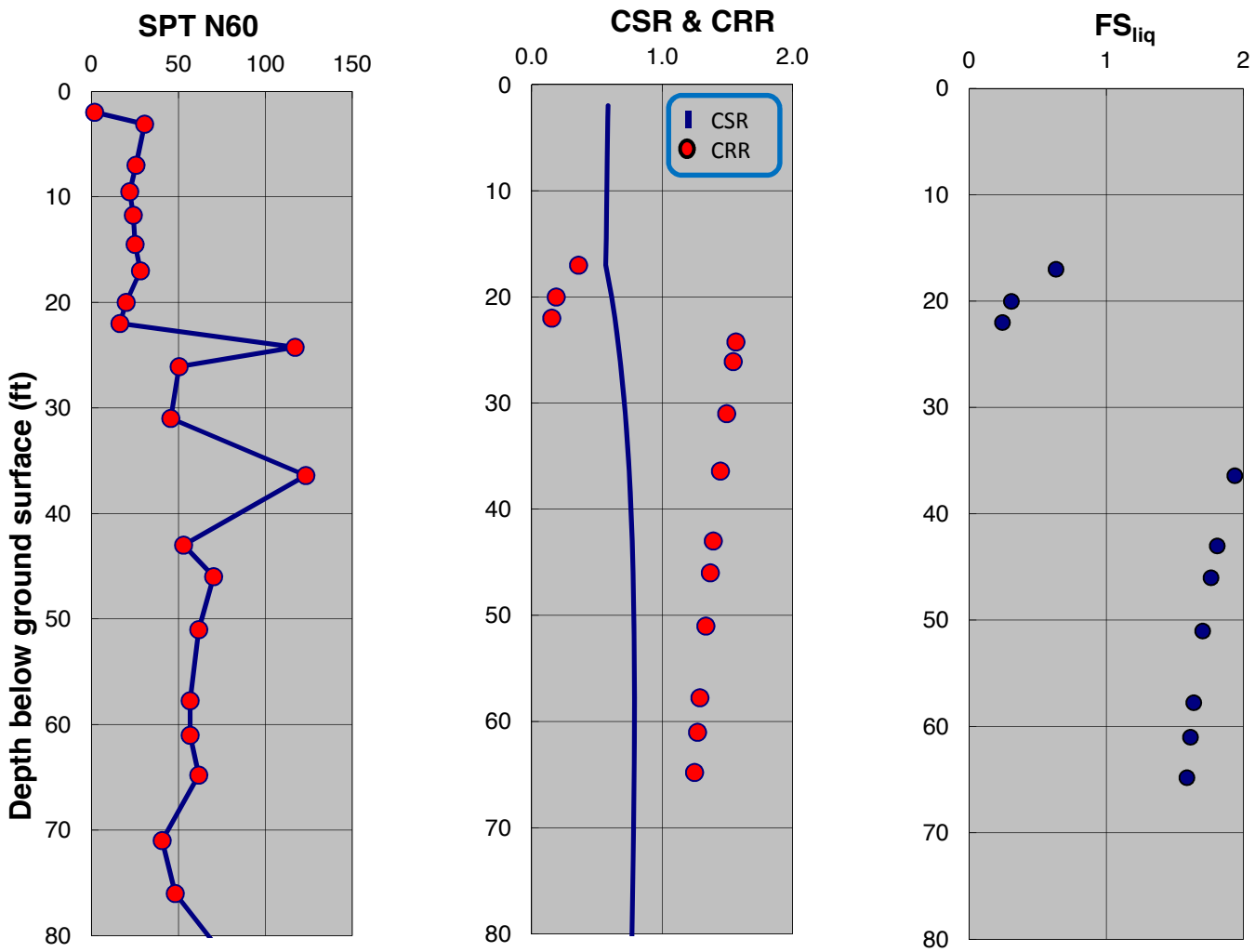
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-27 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



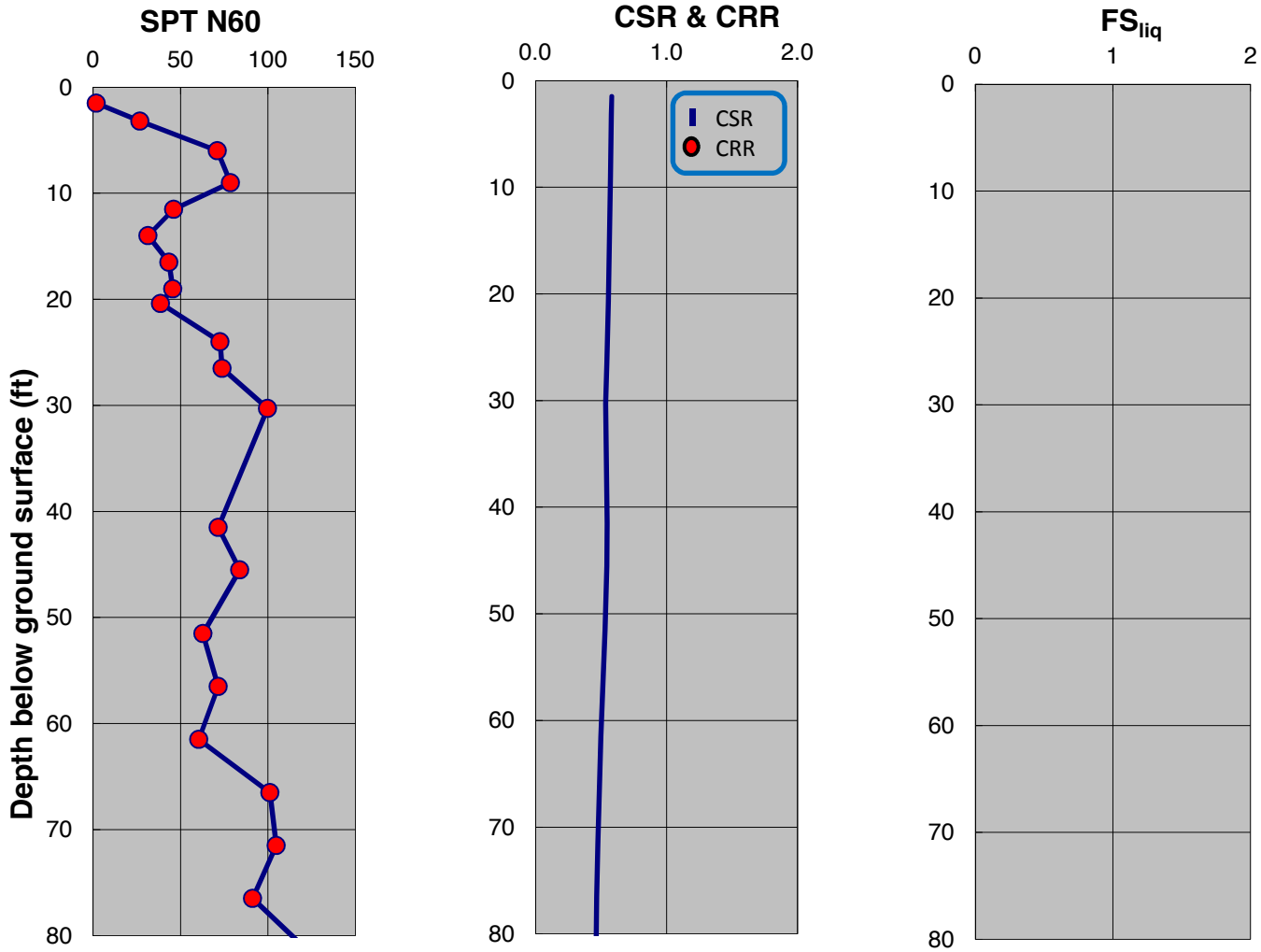
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-28 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



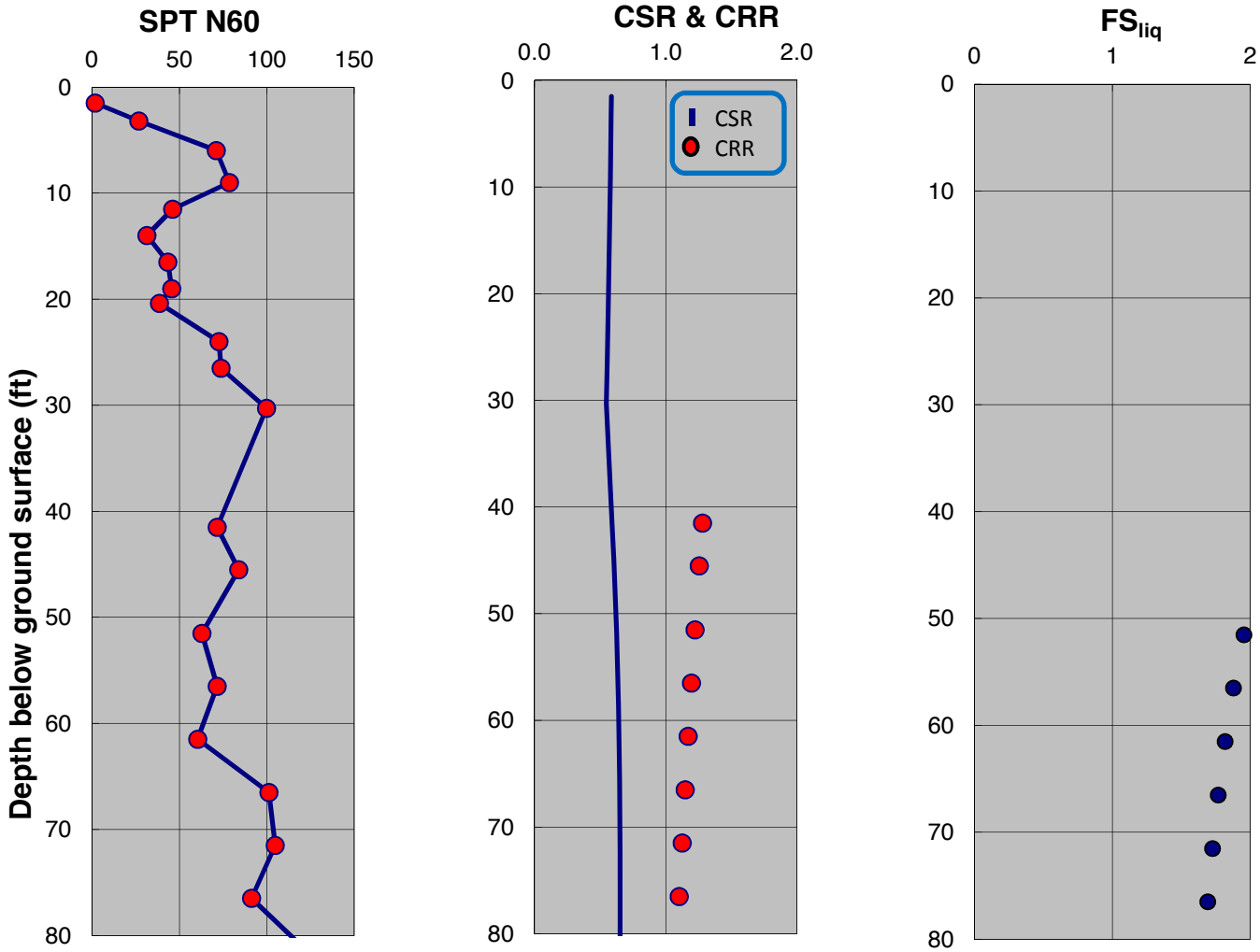
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-28 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



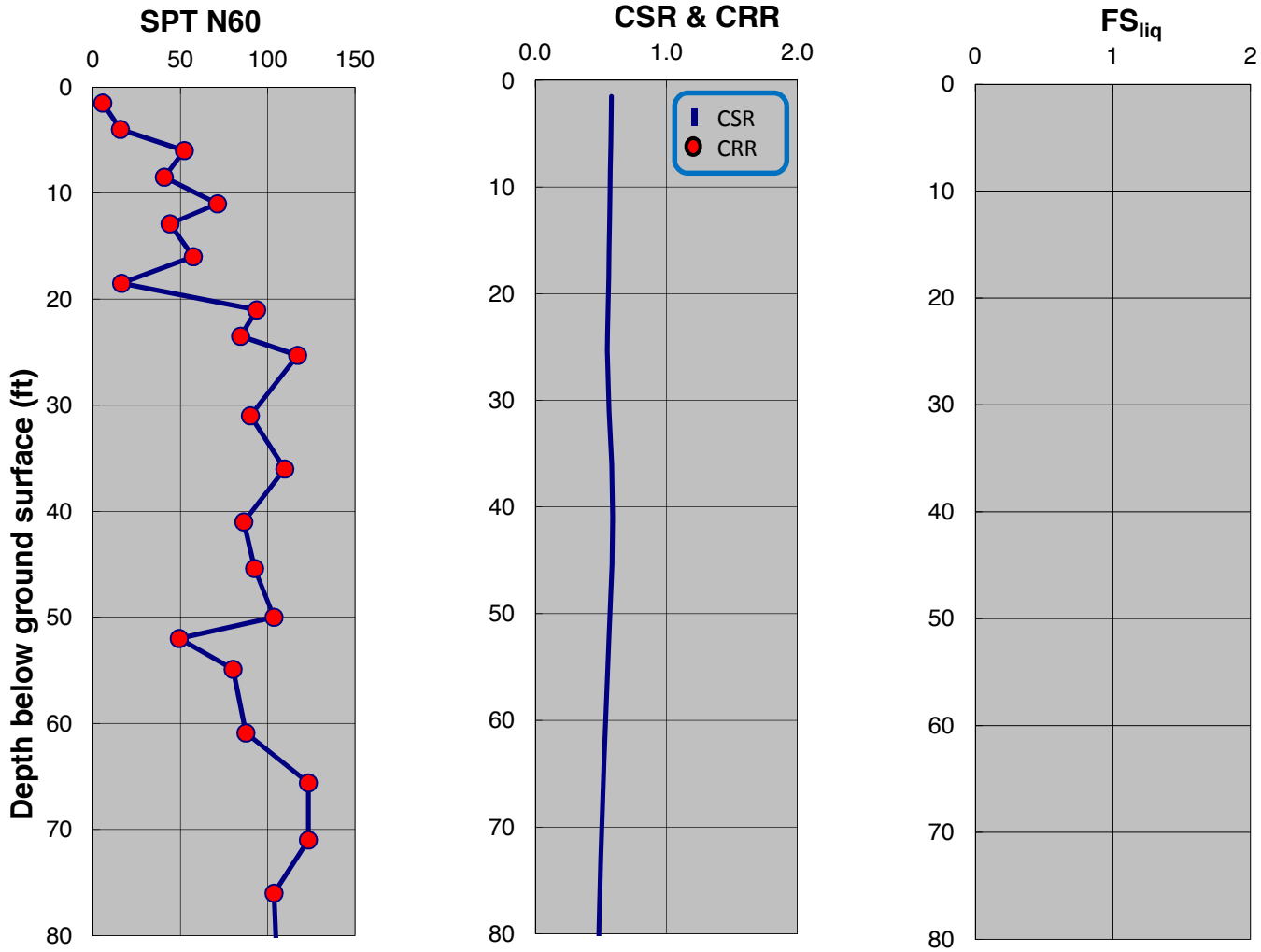
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-32 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



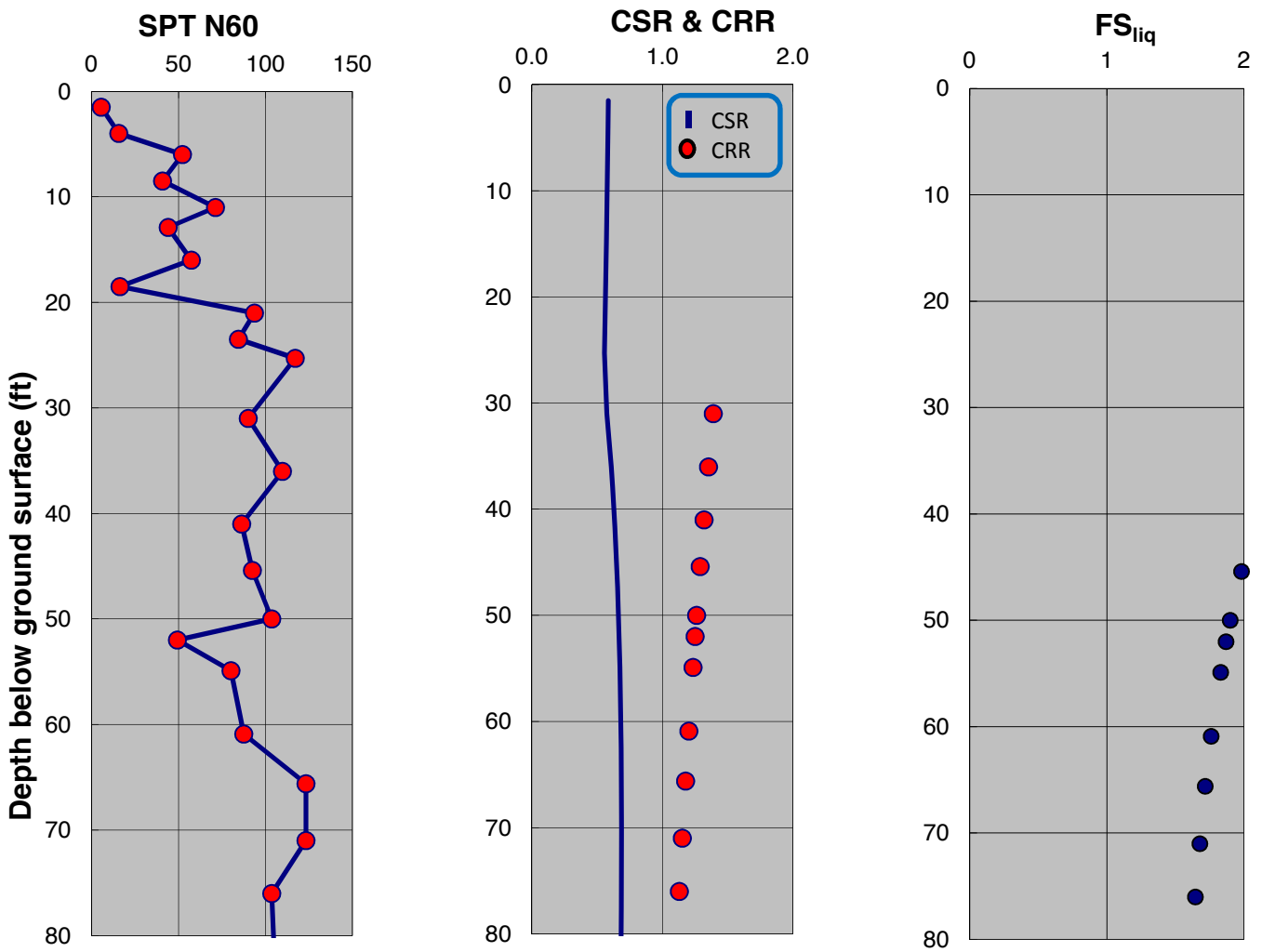
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-32 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



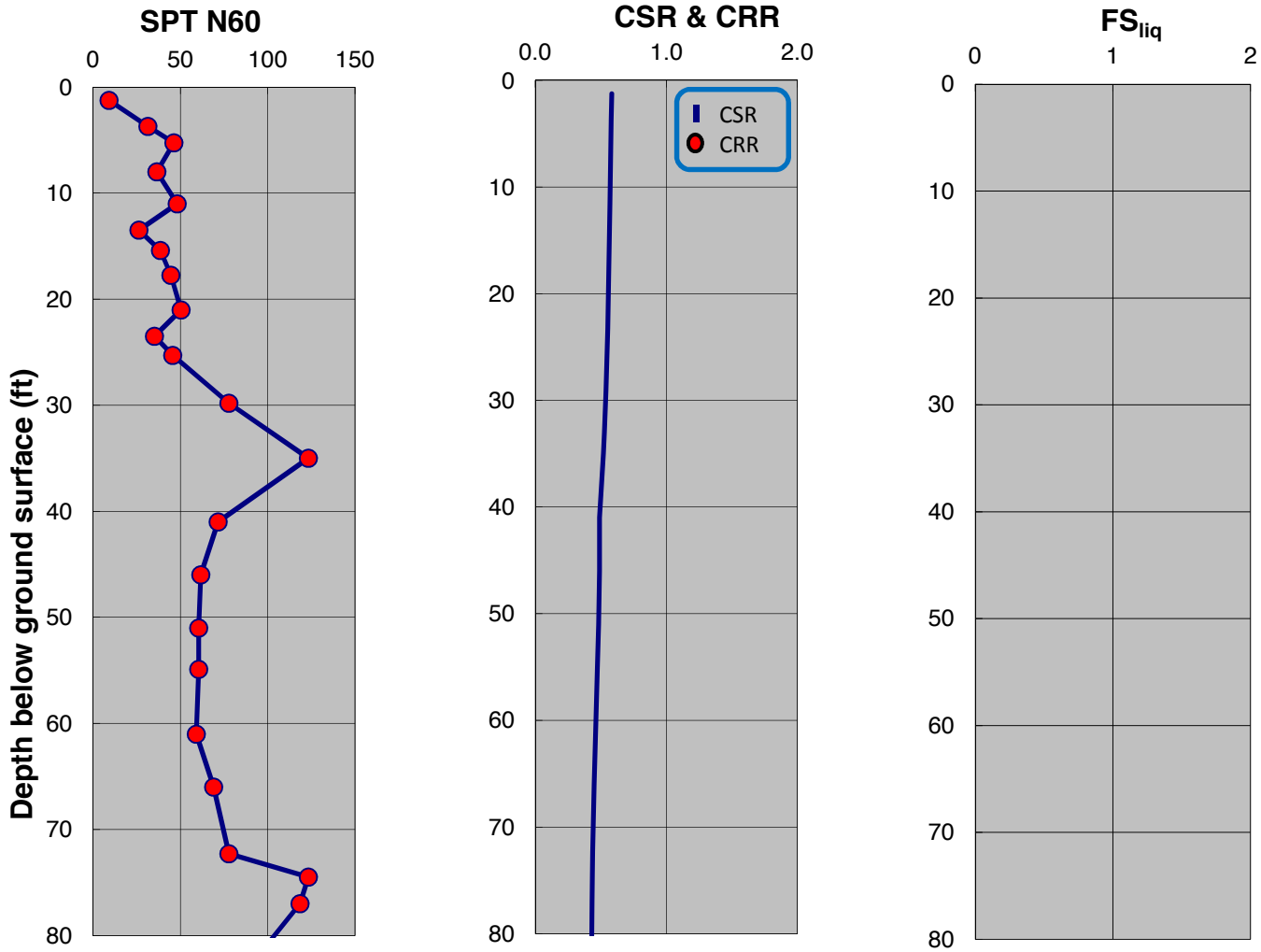
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-34 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



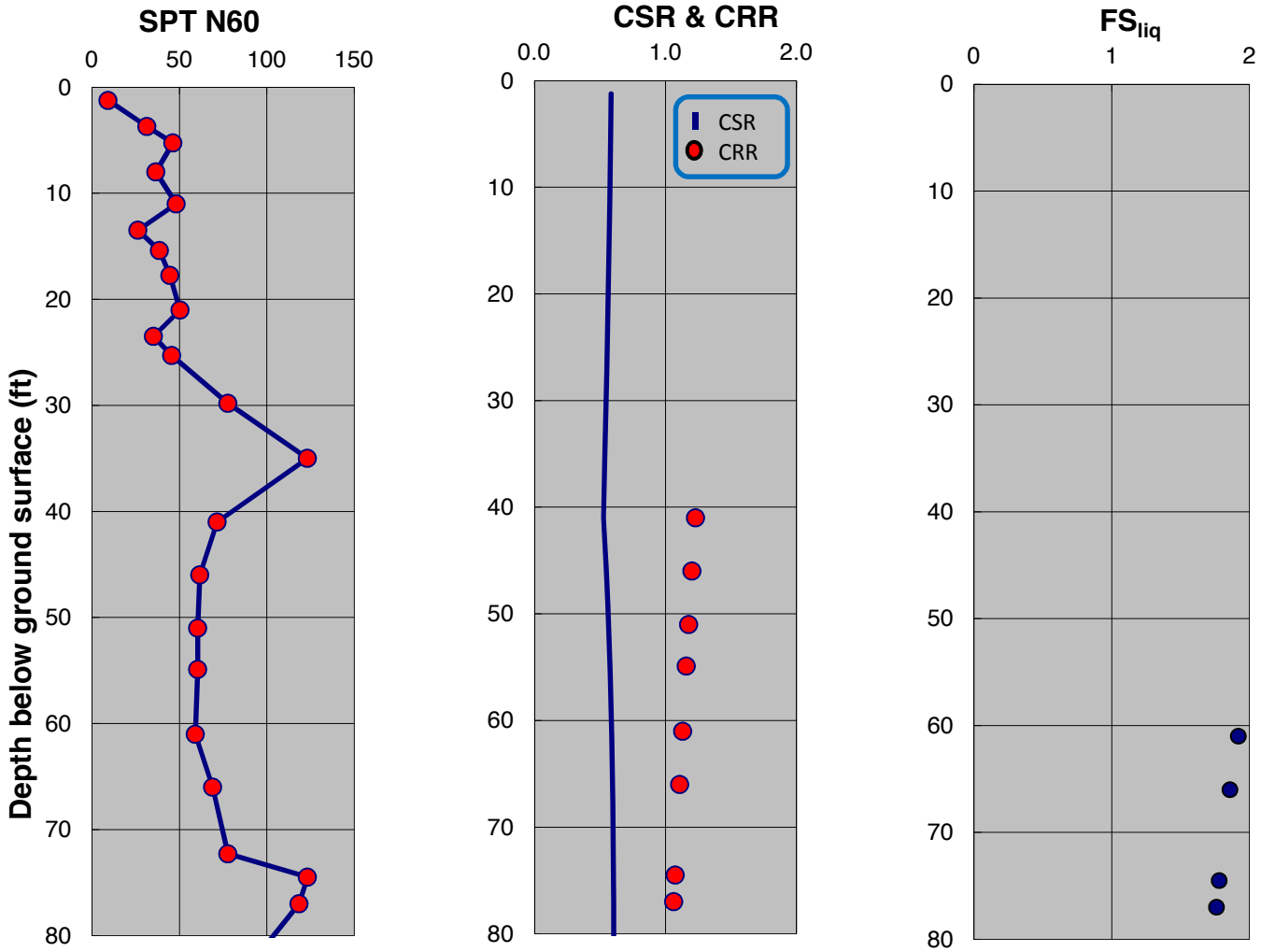
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-34 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-36 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

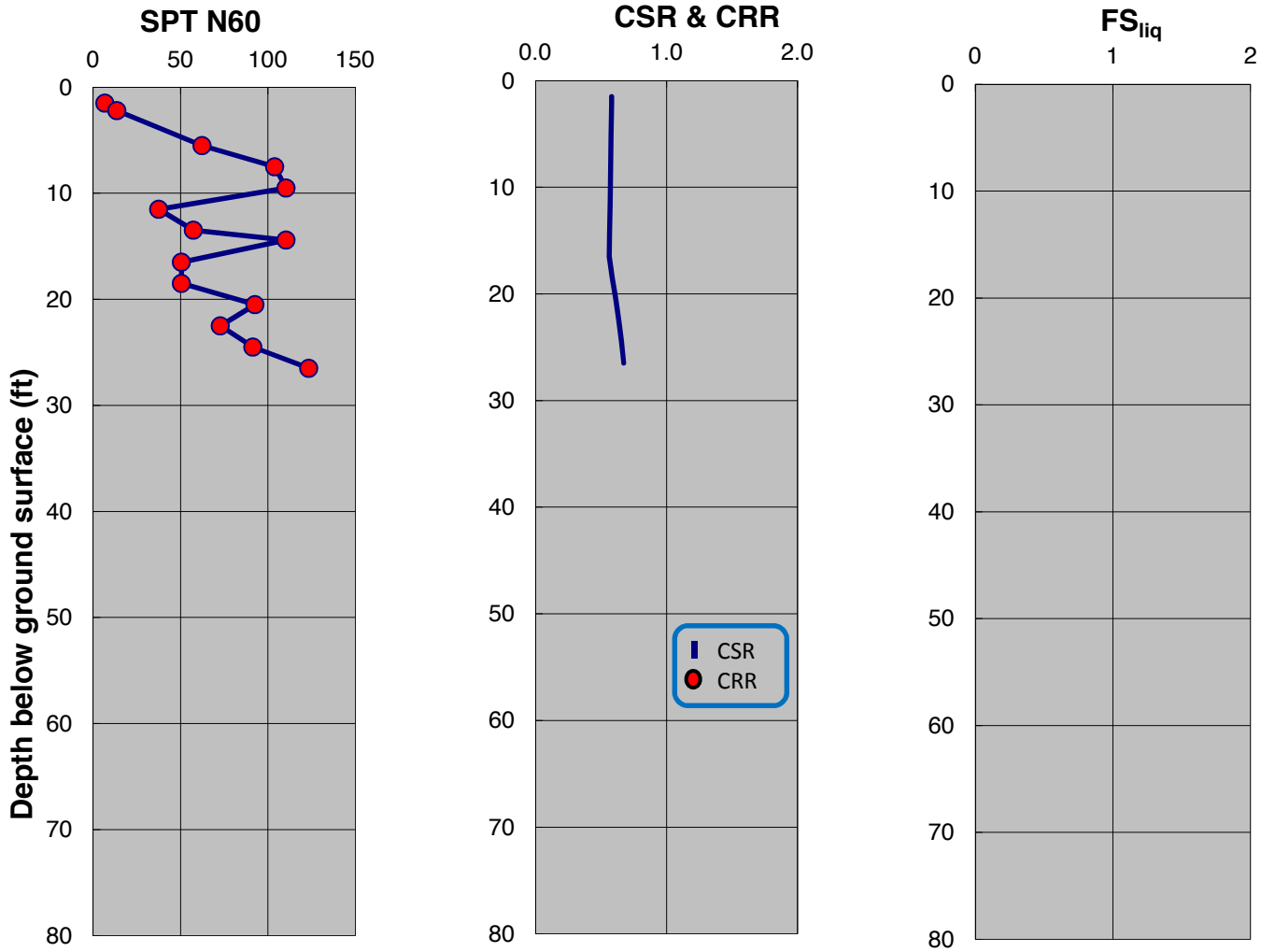
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-36 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

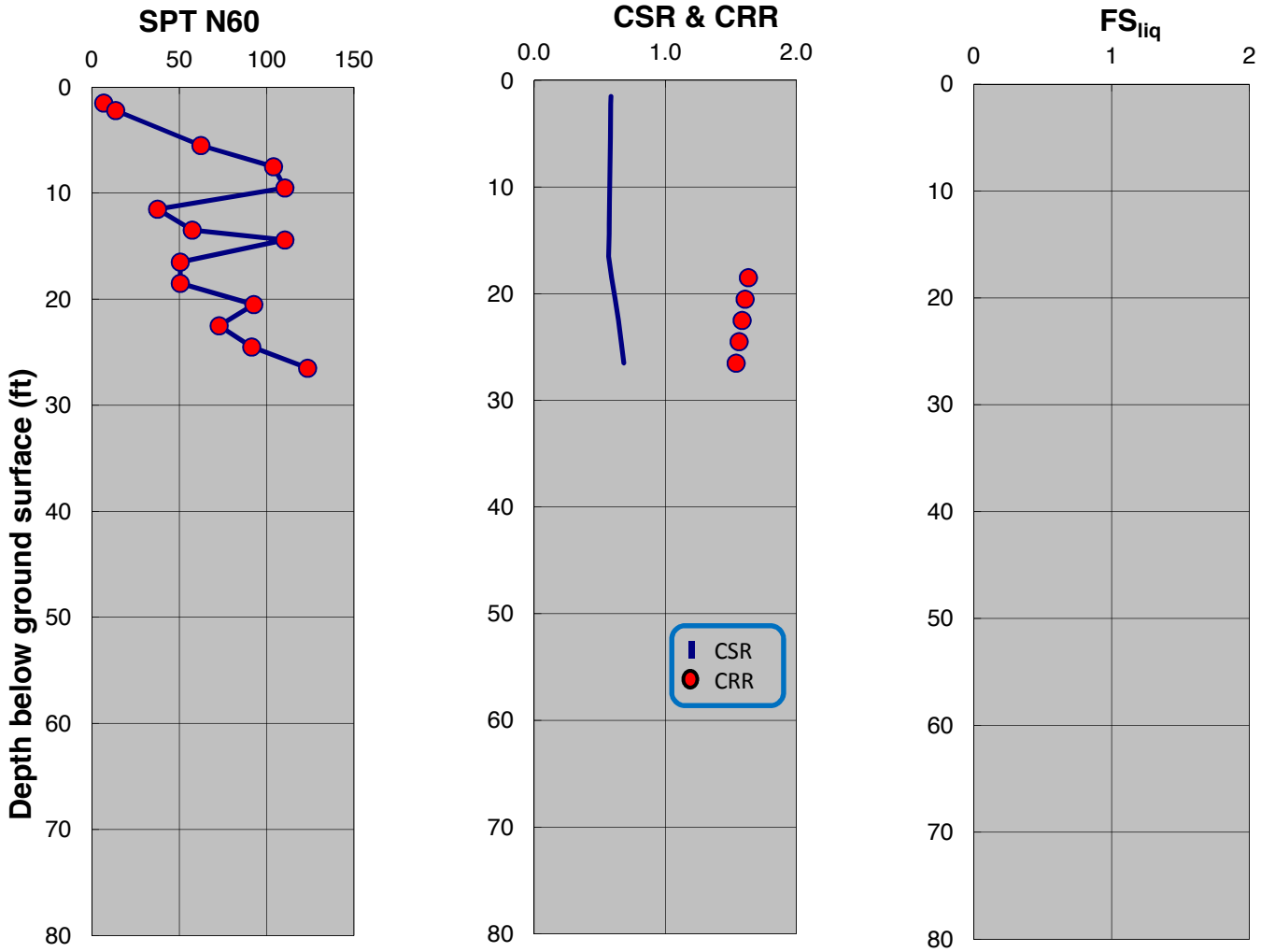
PLATE A.290



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-37 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

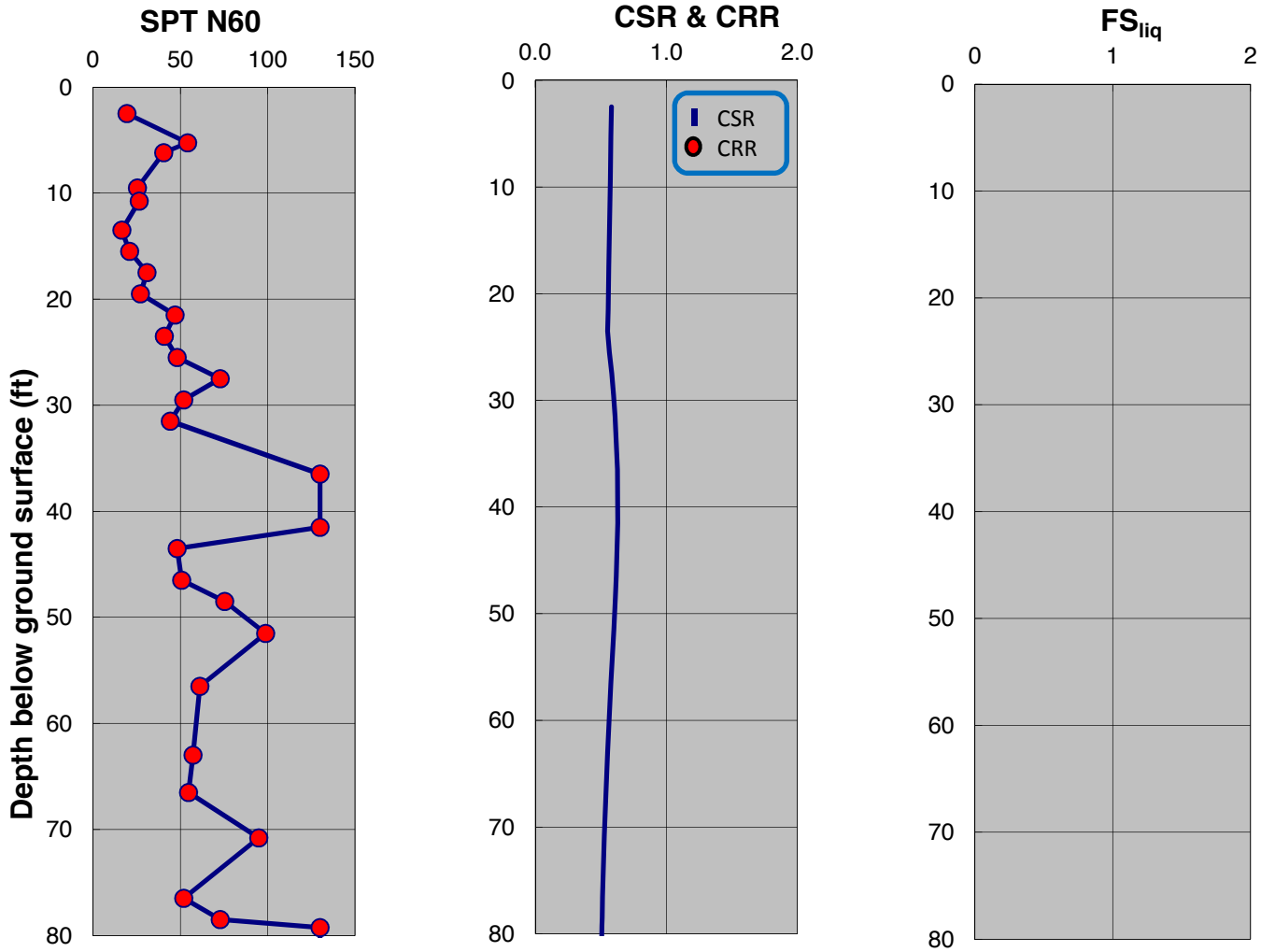
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.291



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-37 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

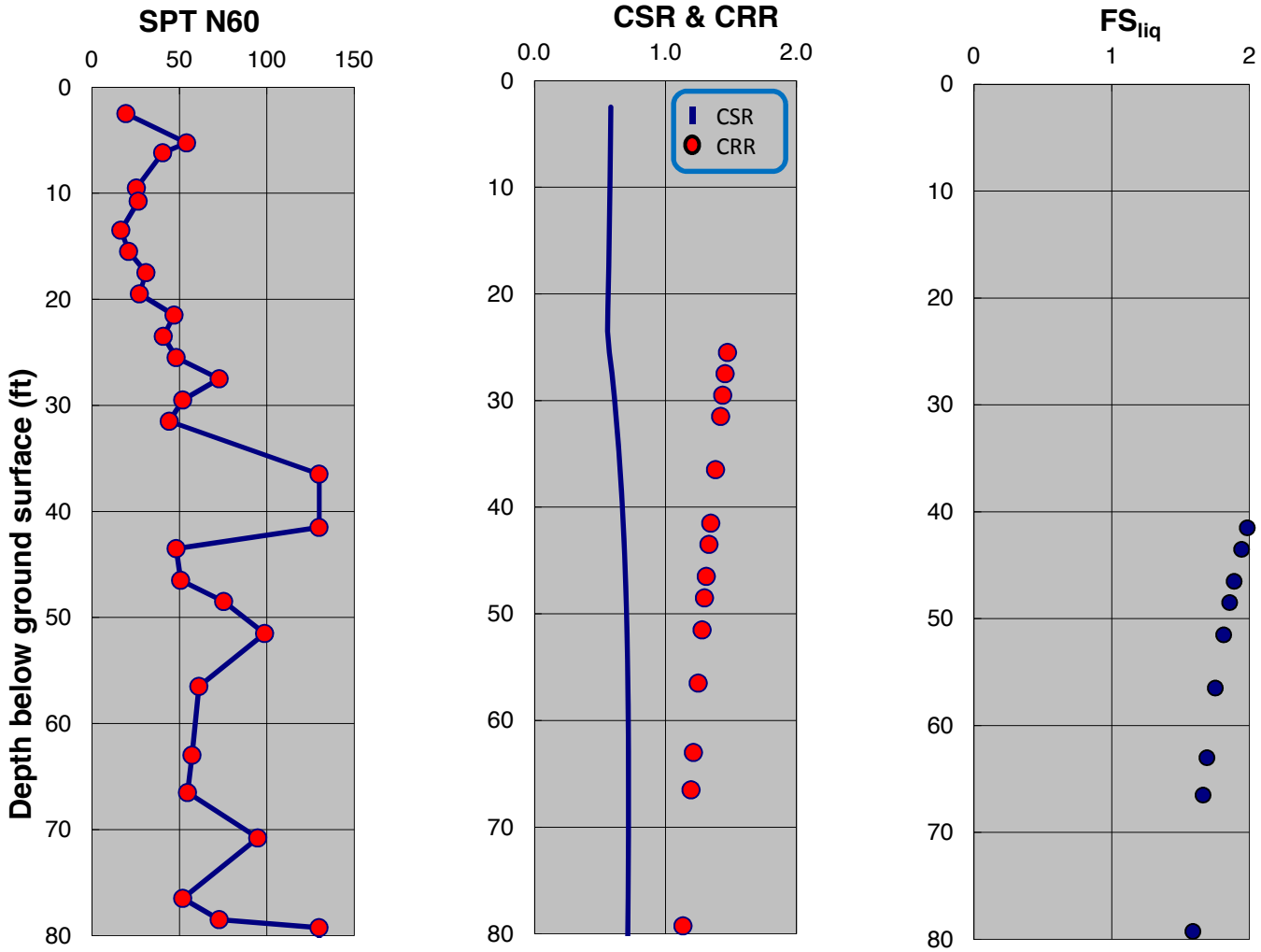
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-38 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

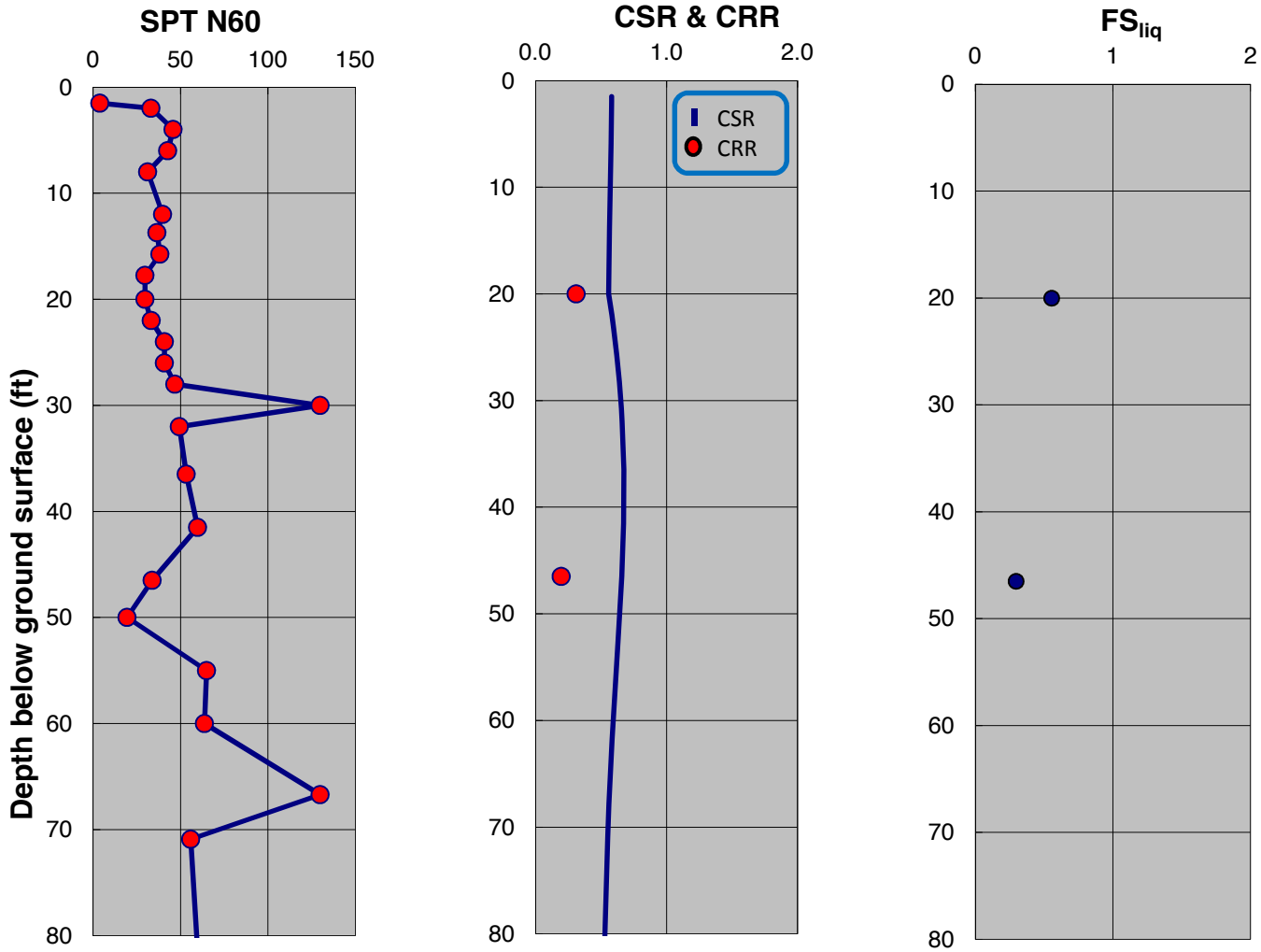
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.293



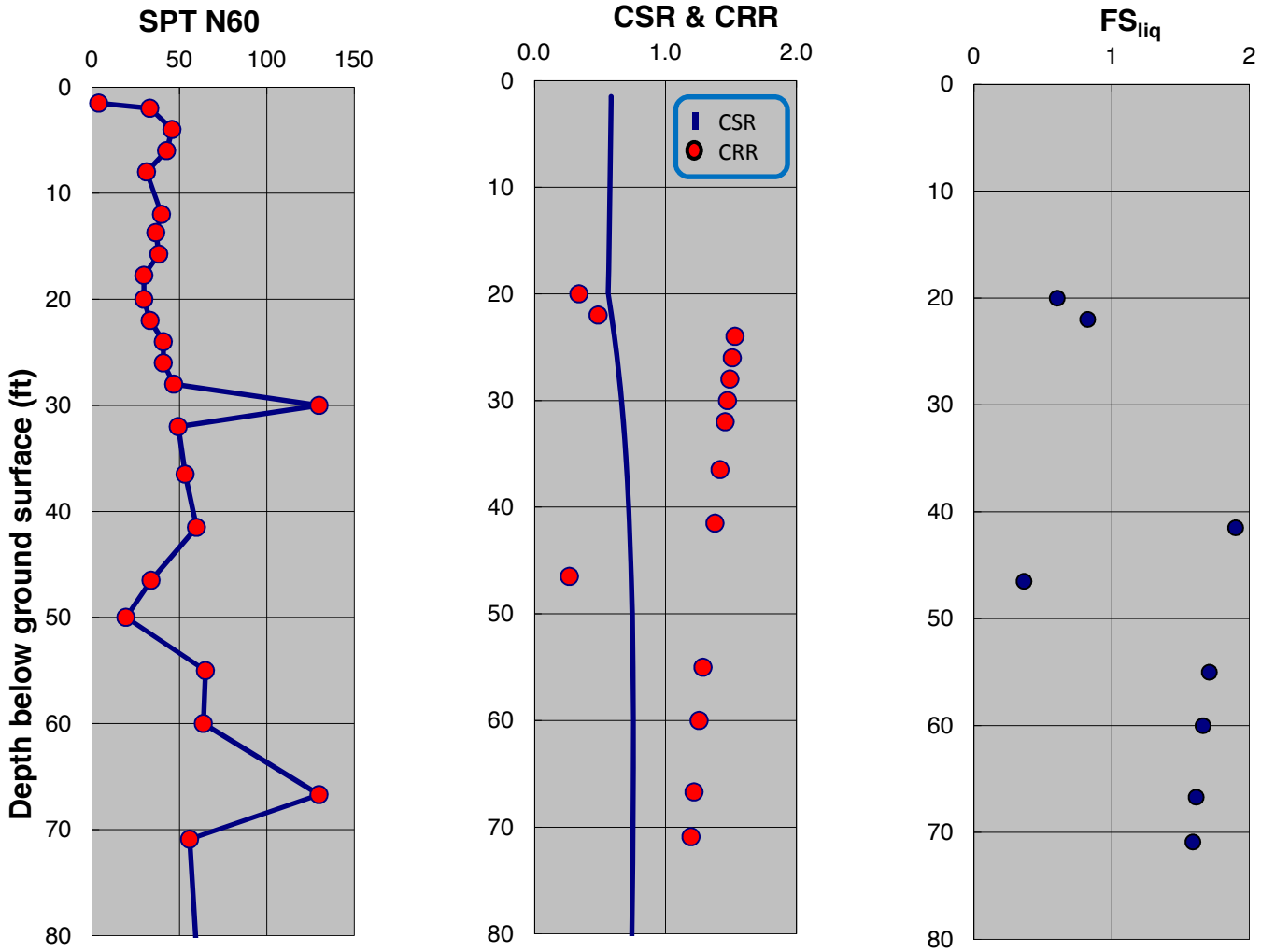
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-38 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



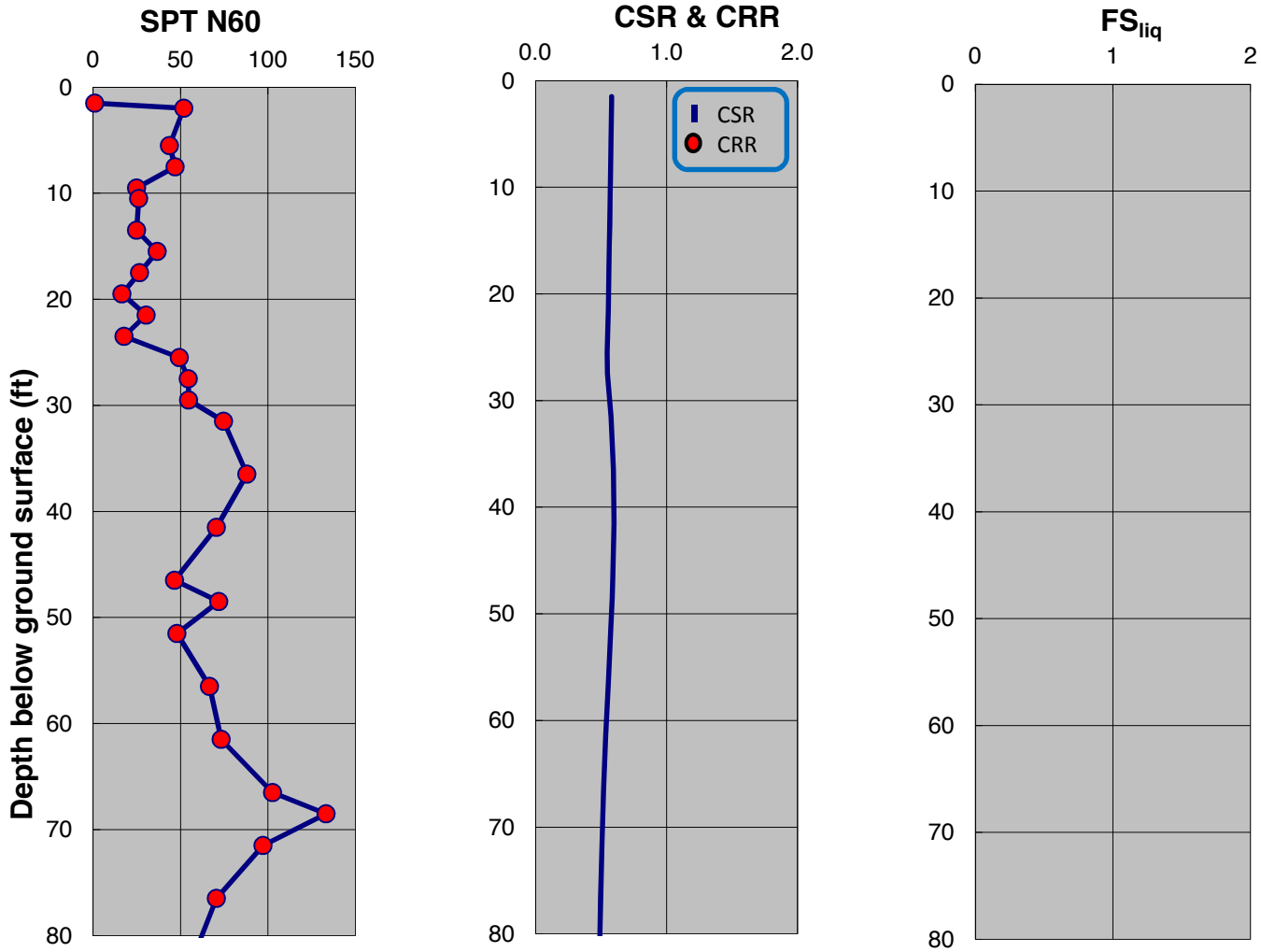
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-39 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



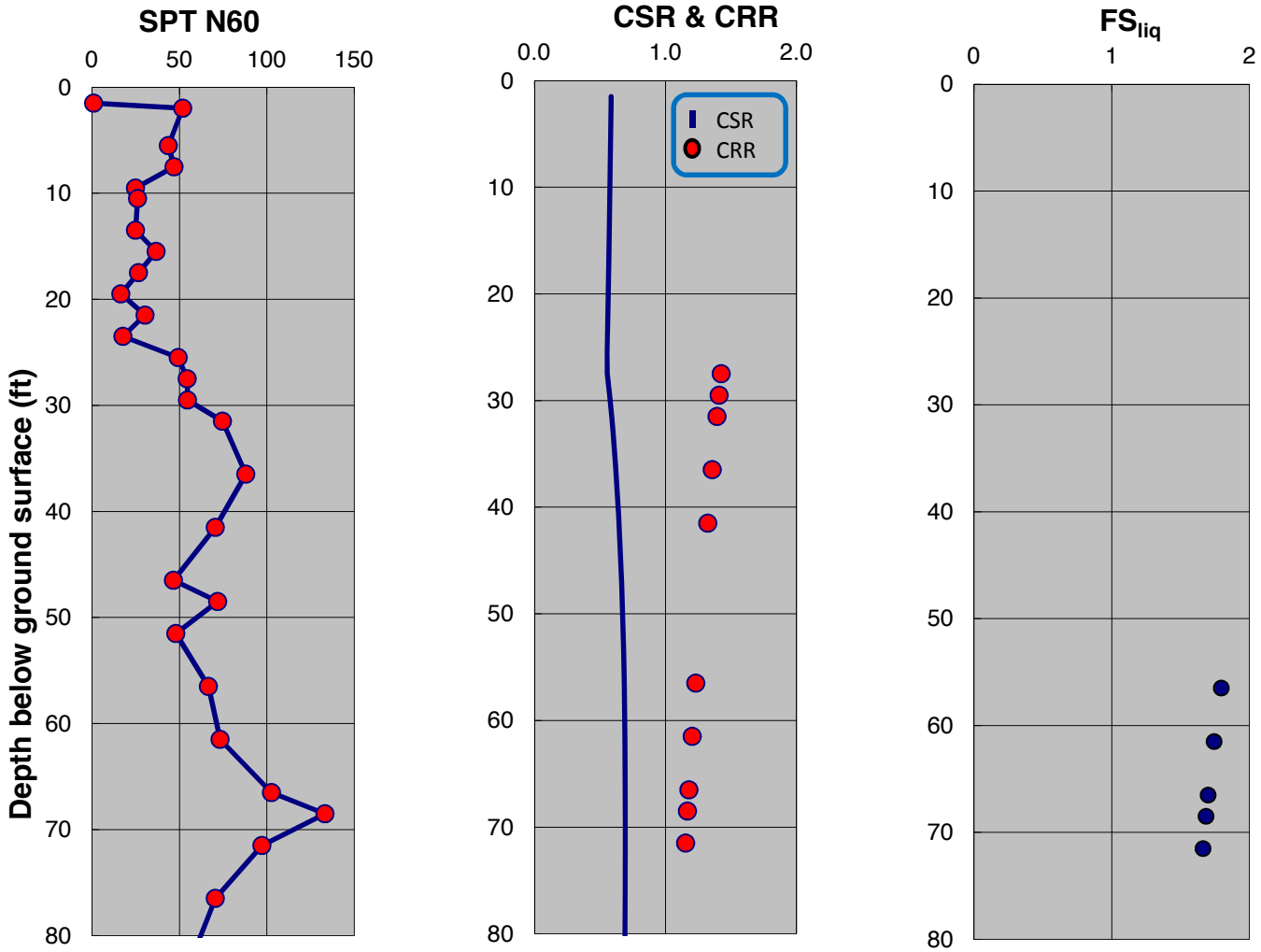
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-39 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



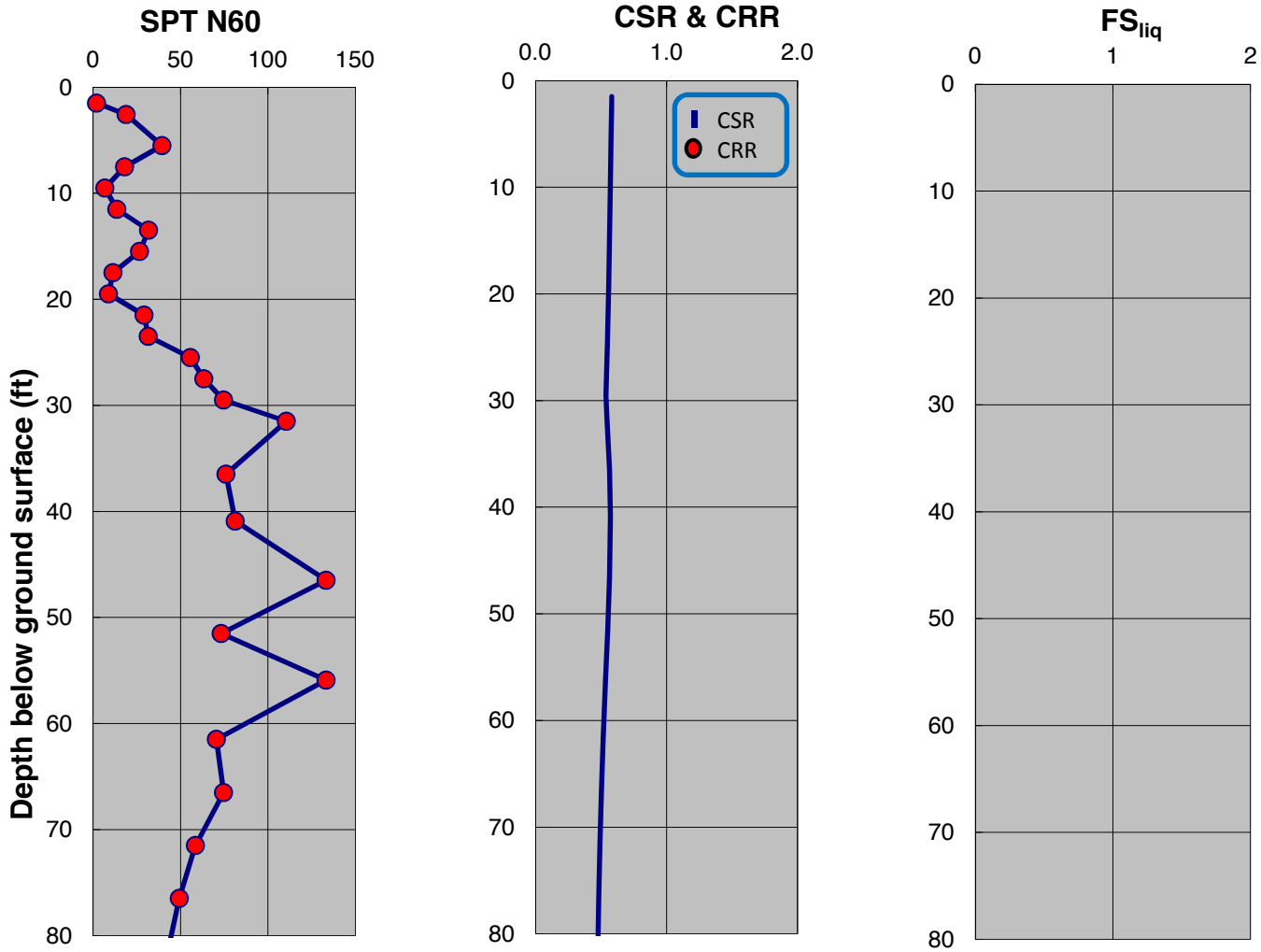
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-40 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



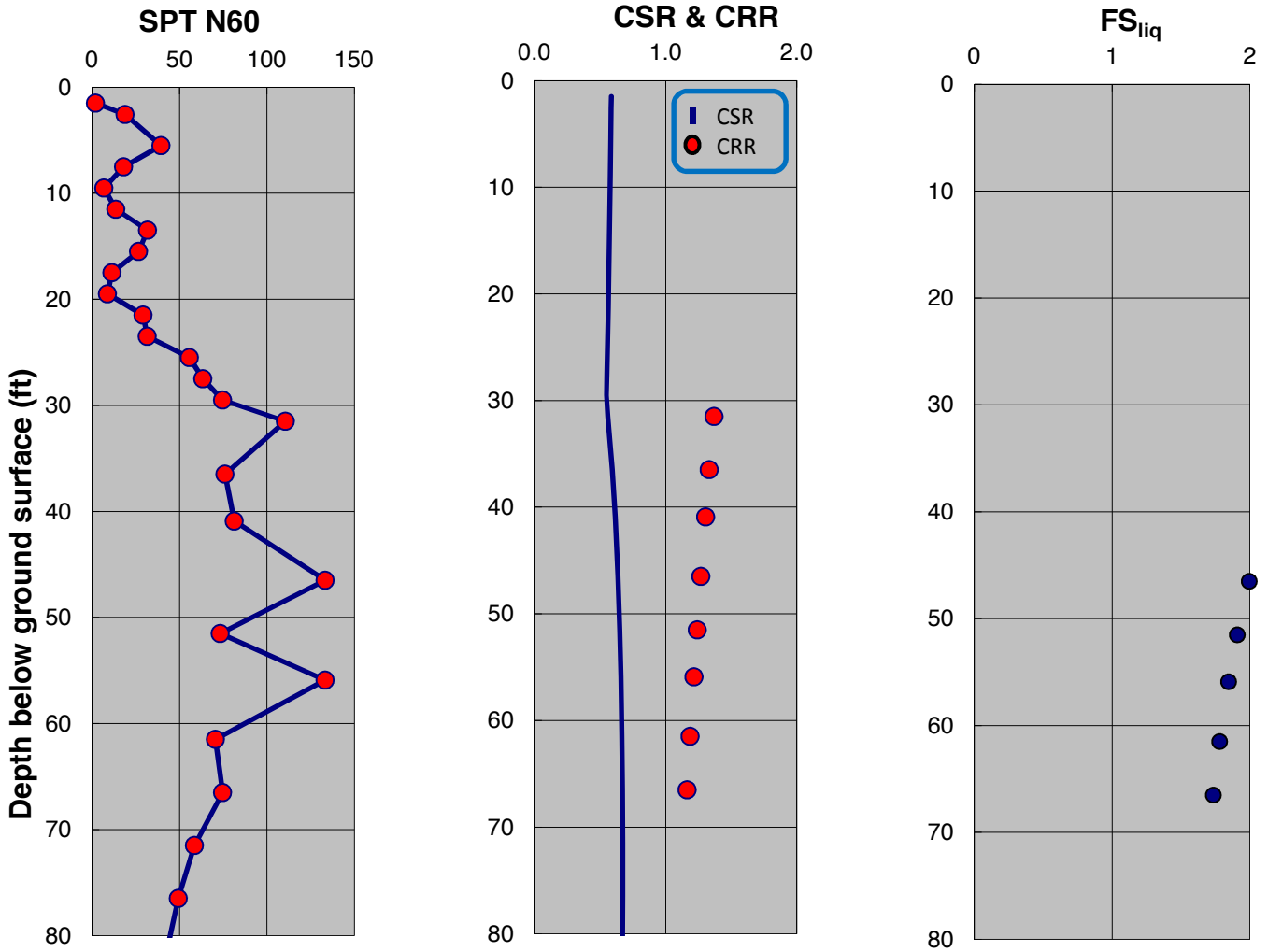
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-40 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-42 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

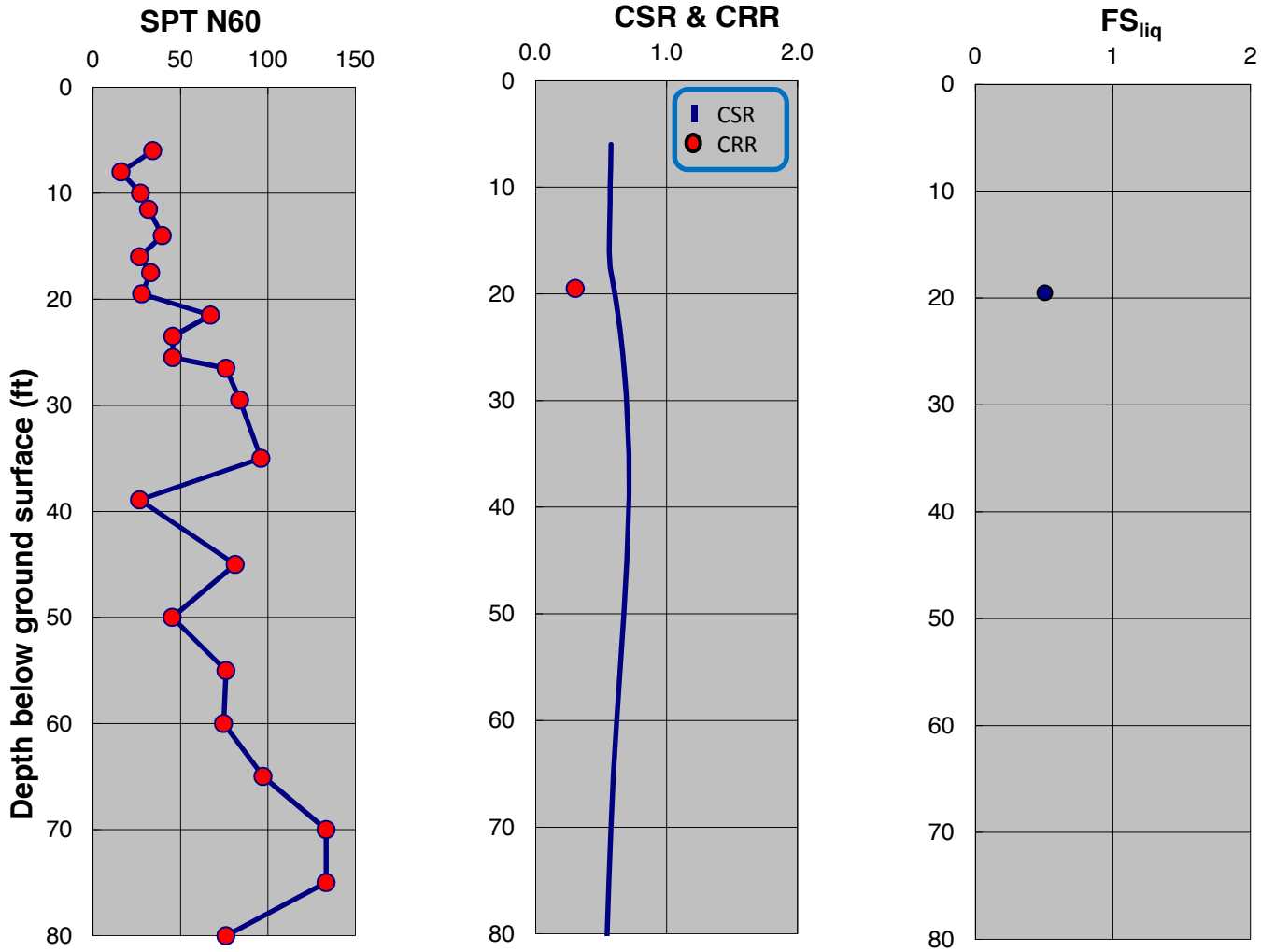
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-42 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

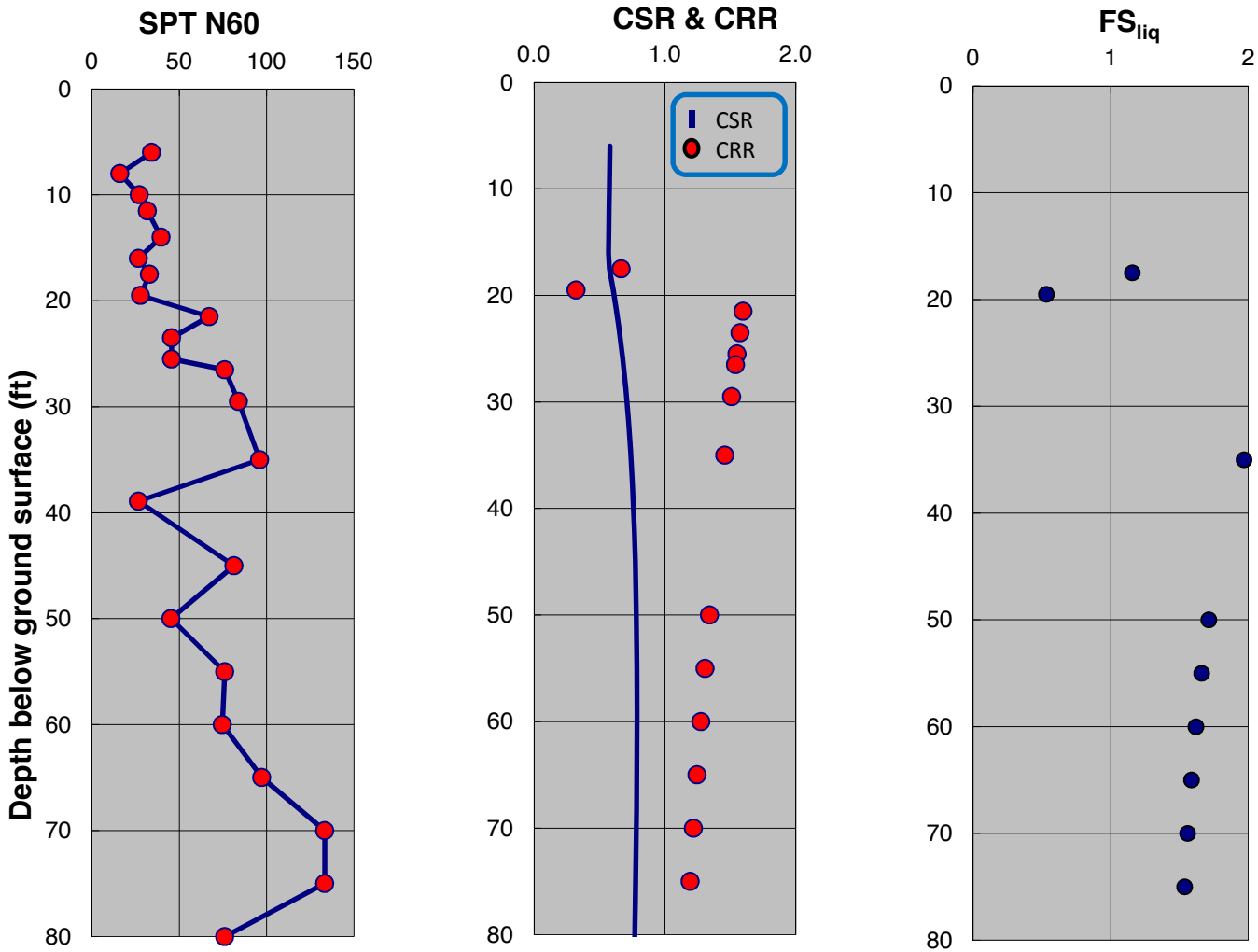
PLATE A.300



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-43 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

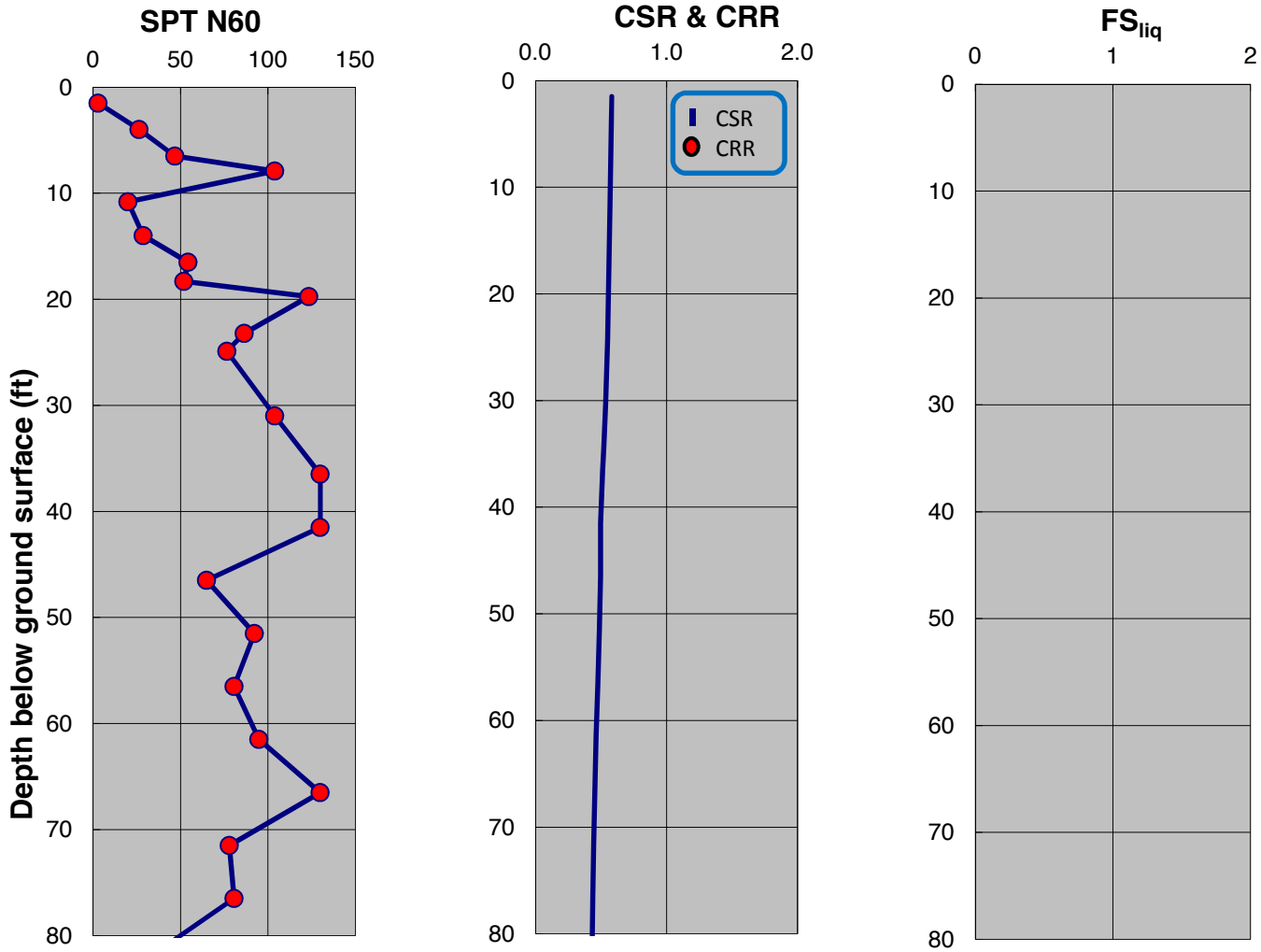
PLATE A.301



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-43 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

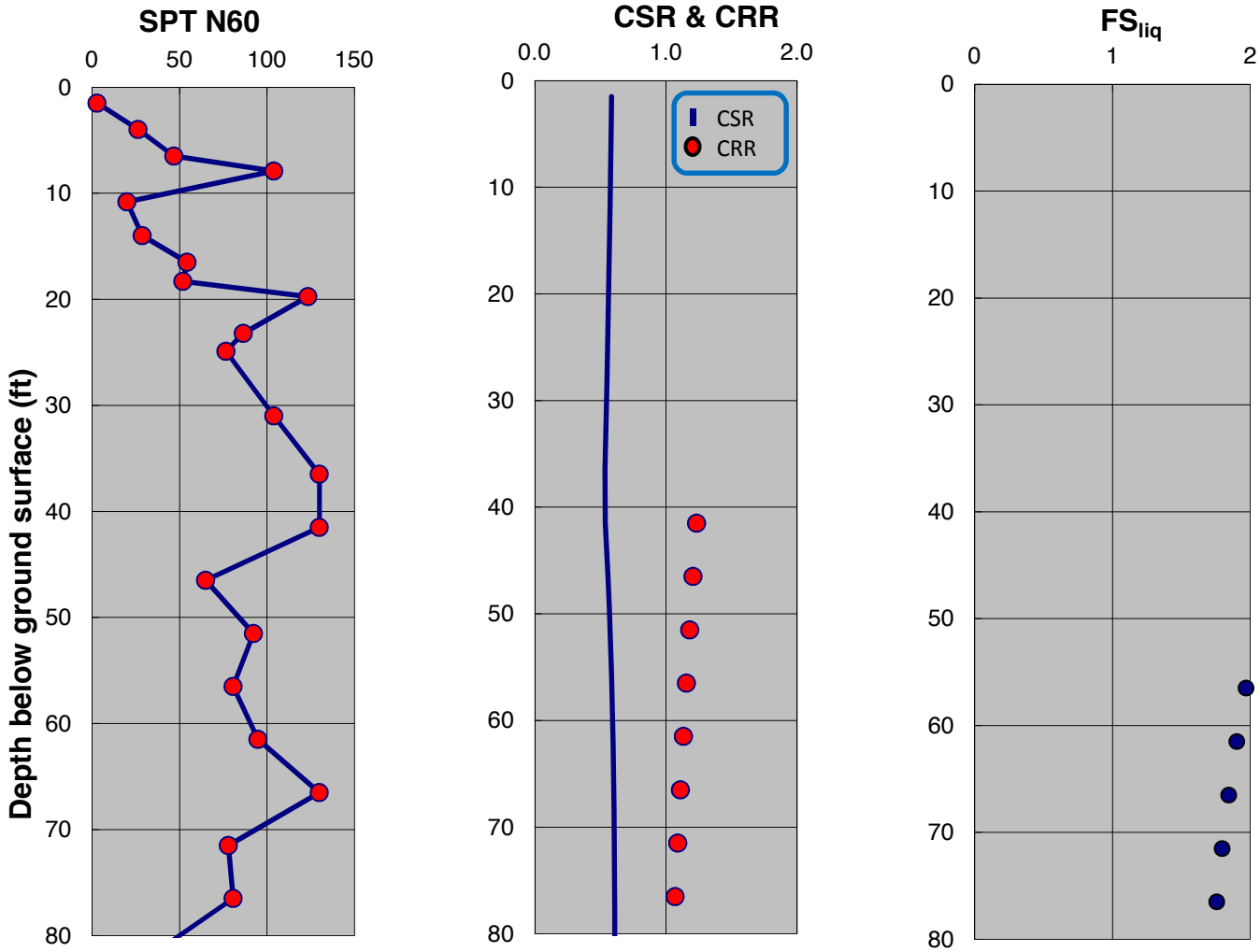
PLATE A.302



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-45 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

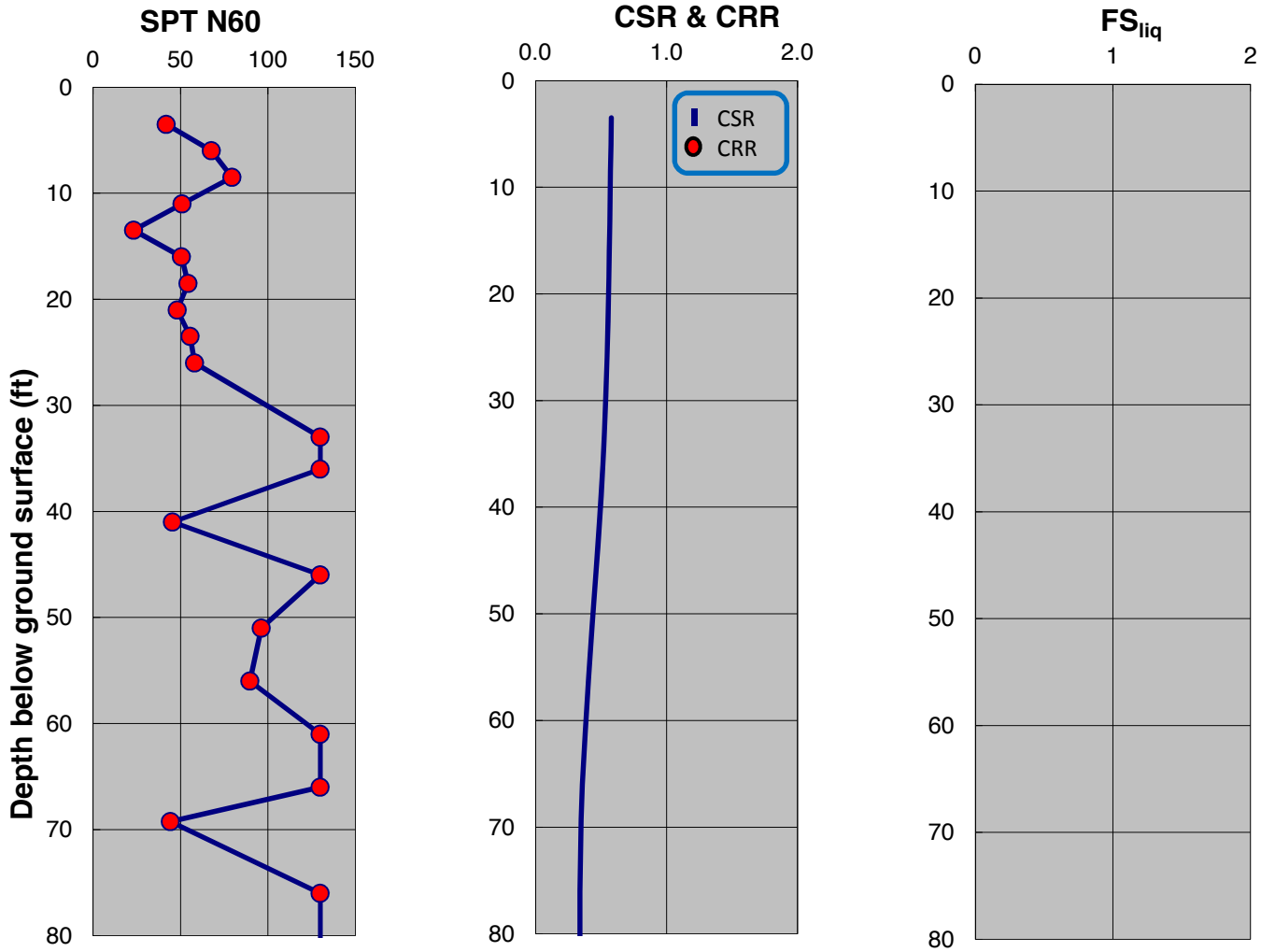
PLATE A.303



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-45 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

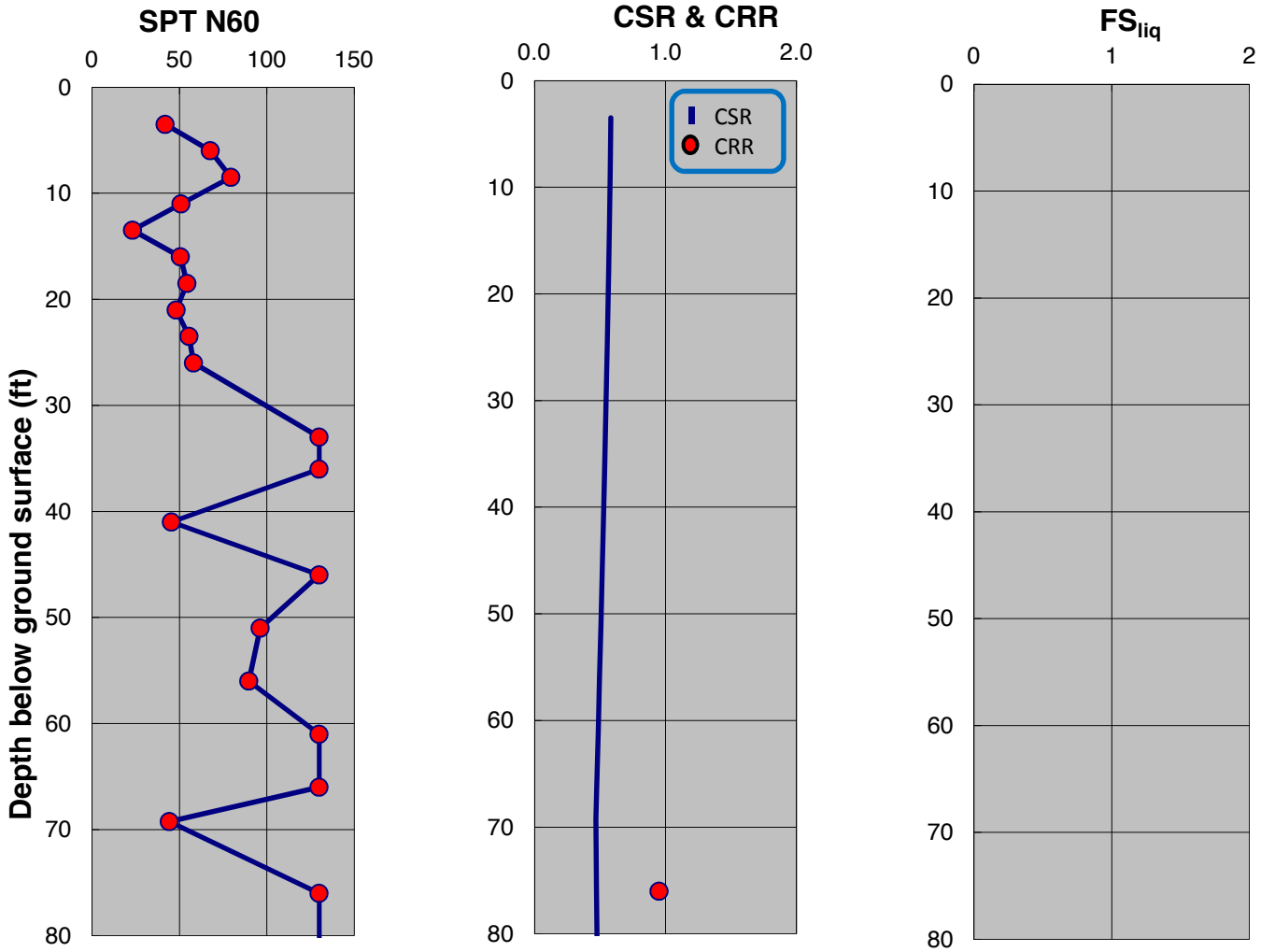
PLATE A.304



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-47 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

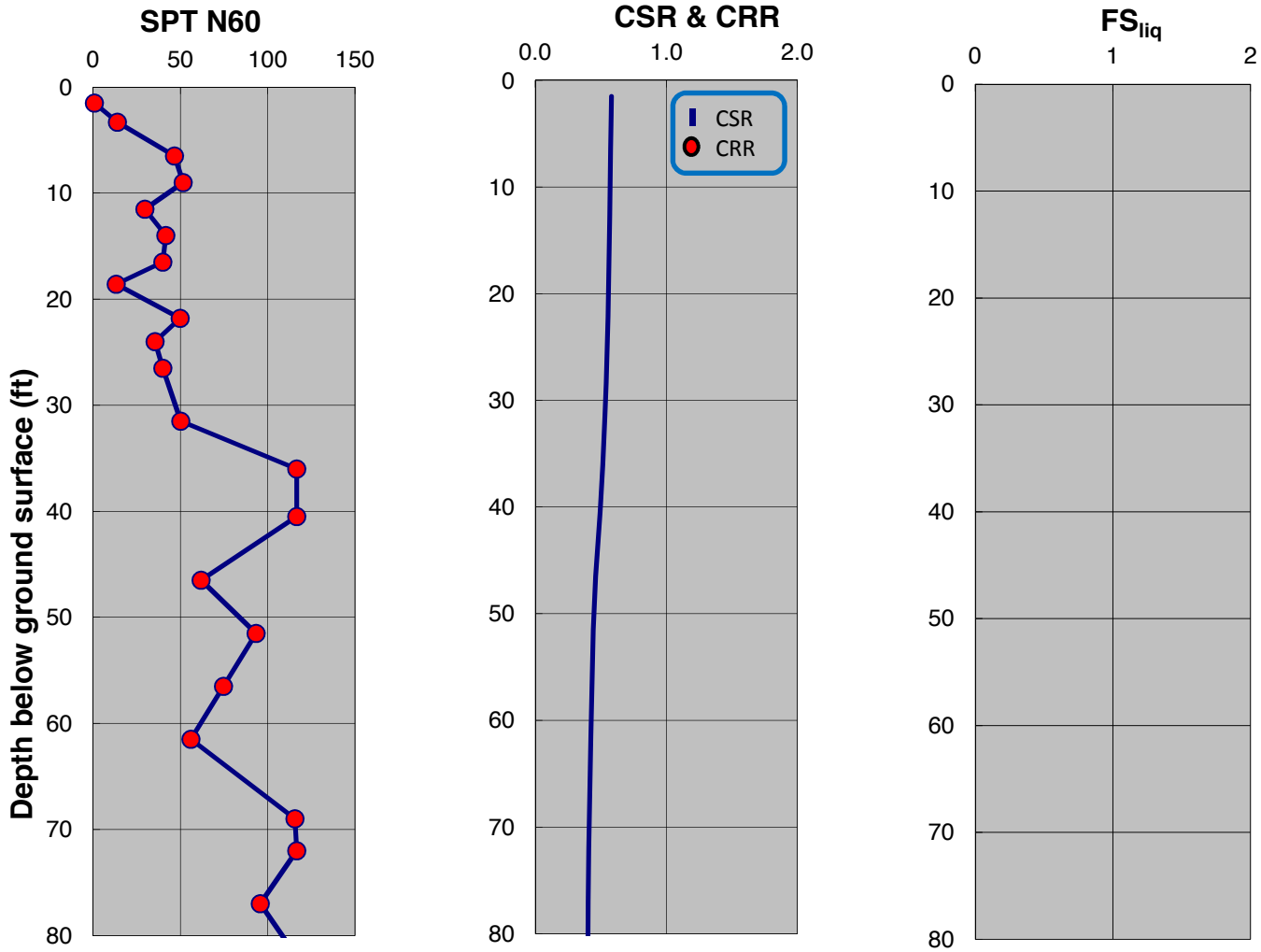
PLATE A.305



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-47 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

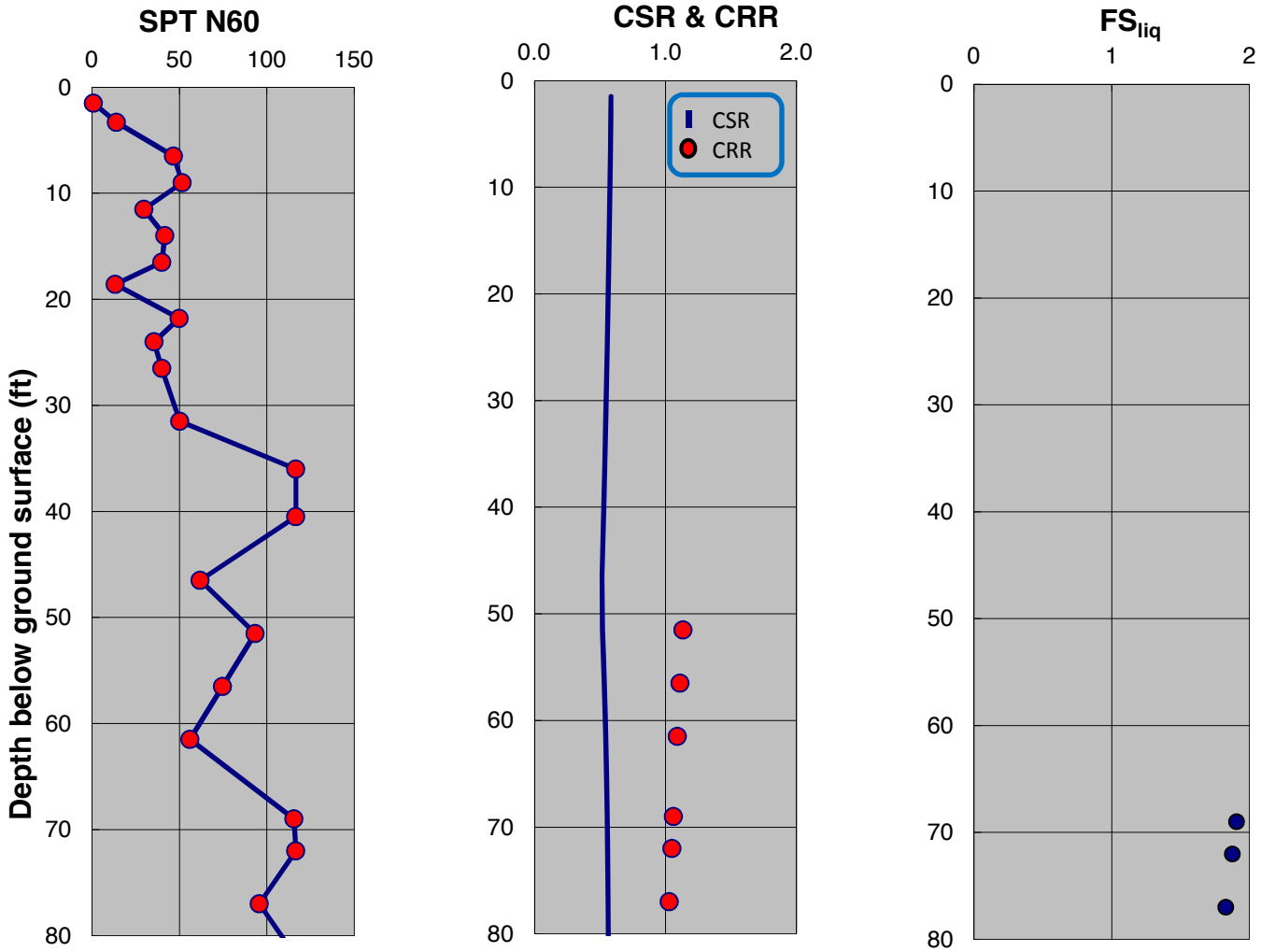
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.306



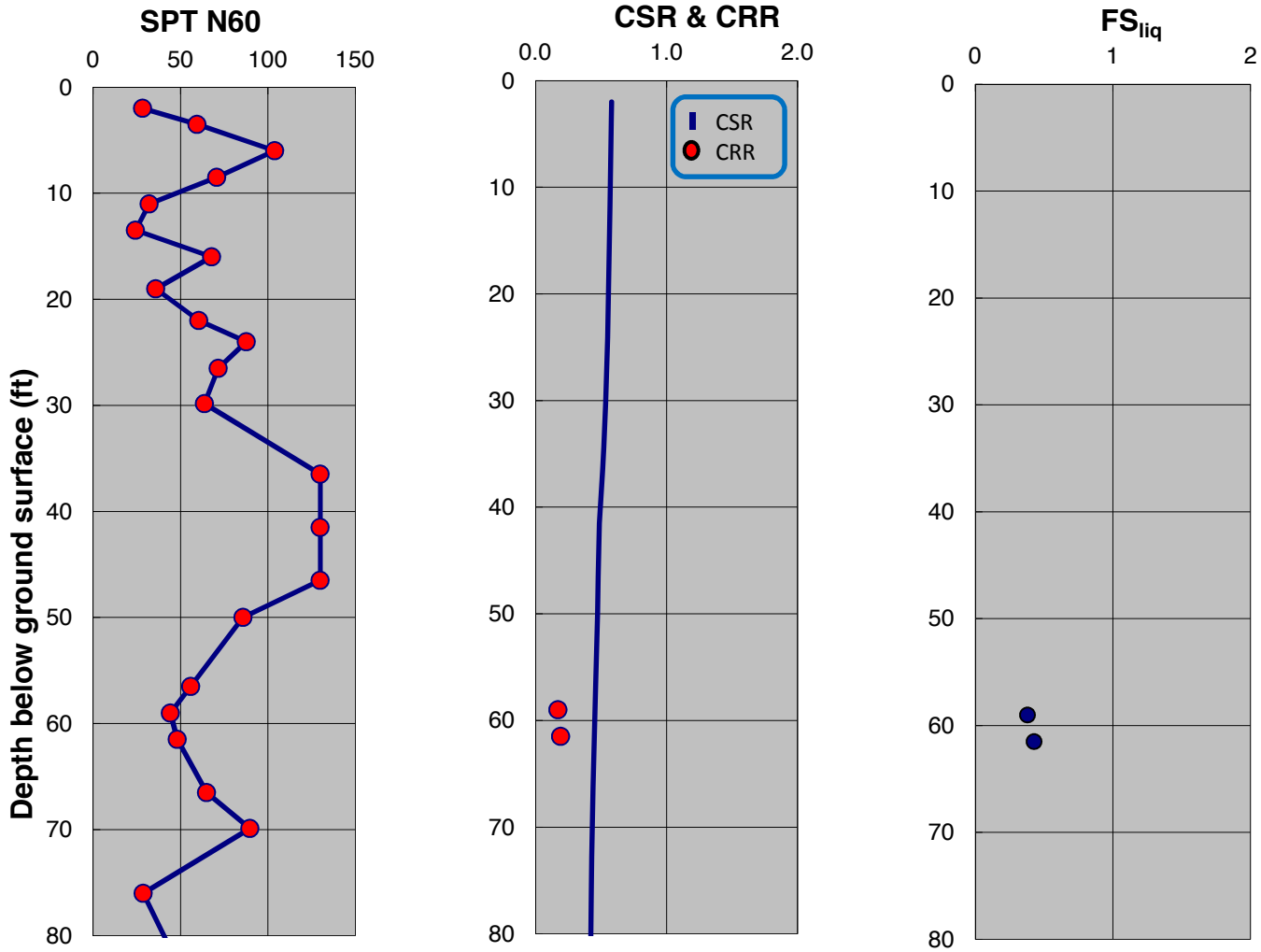
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-49 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-49 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

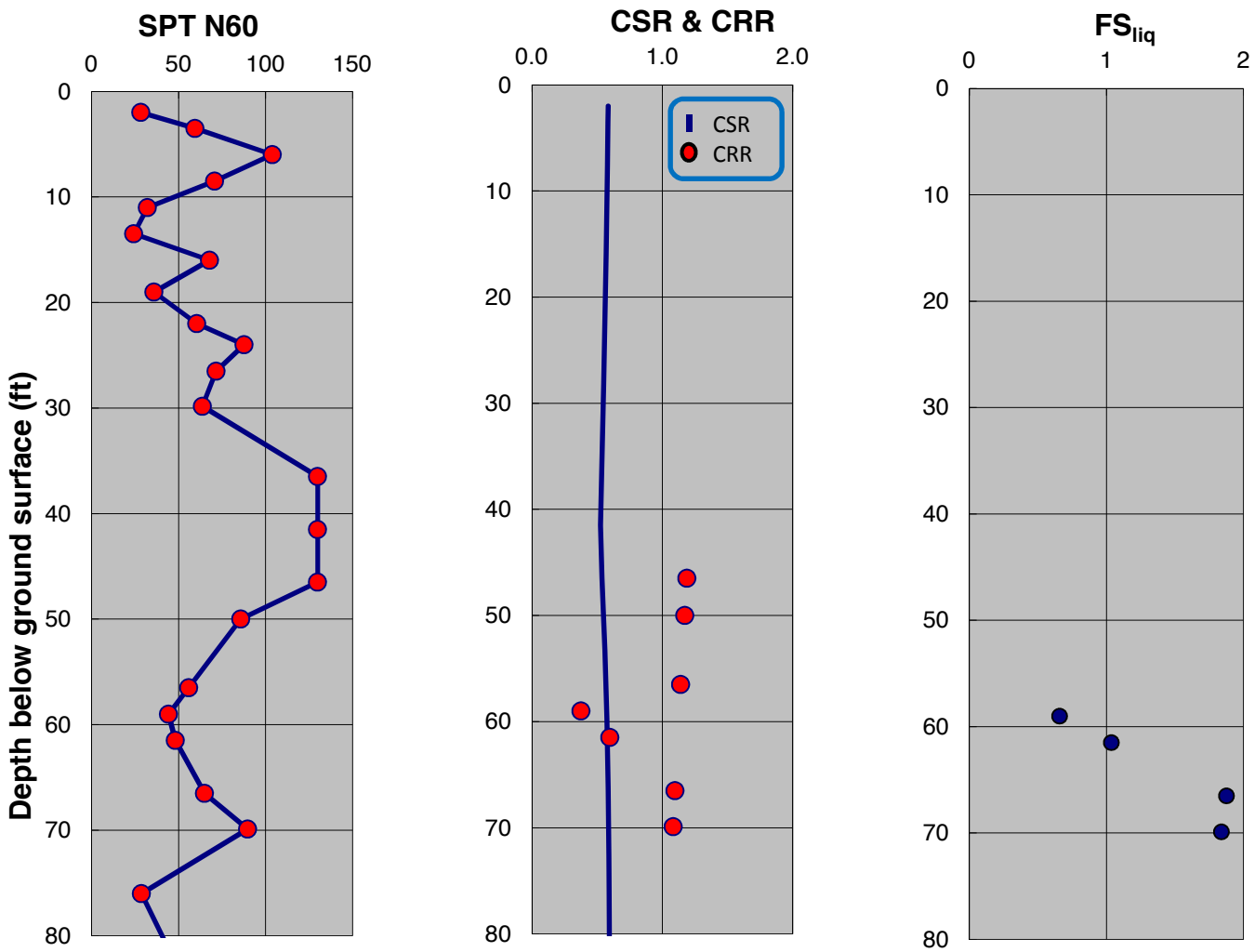
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-50 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

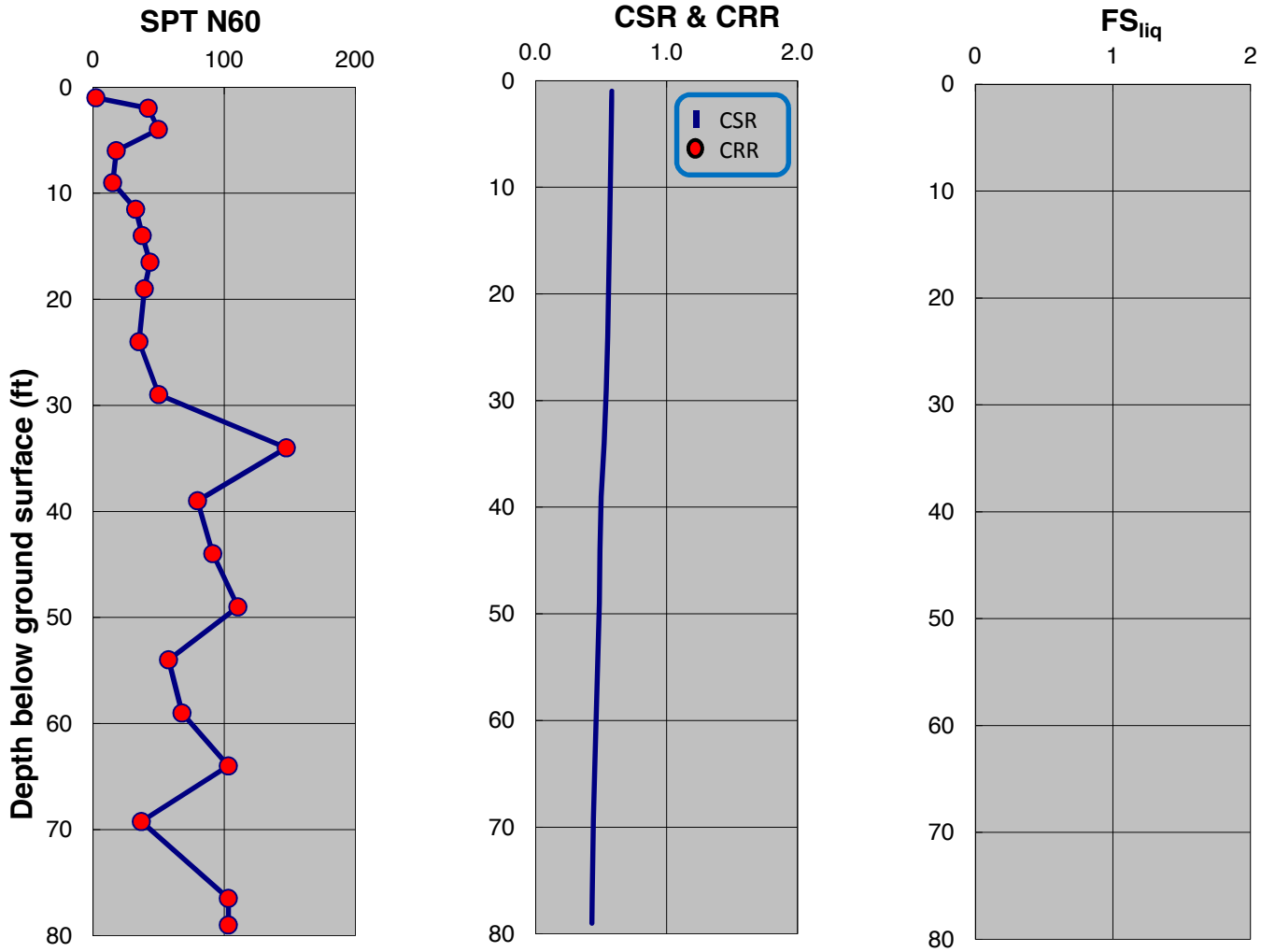
PLATE A.309



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-50 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

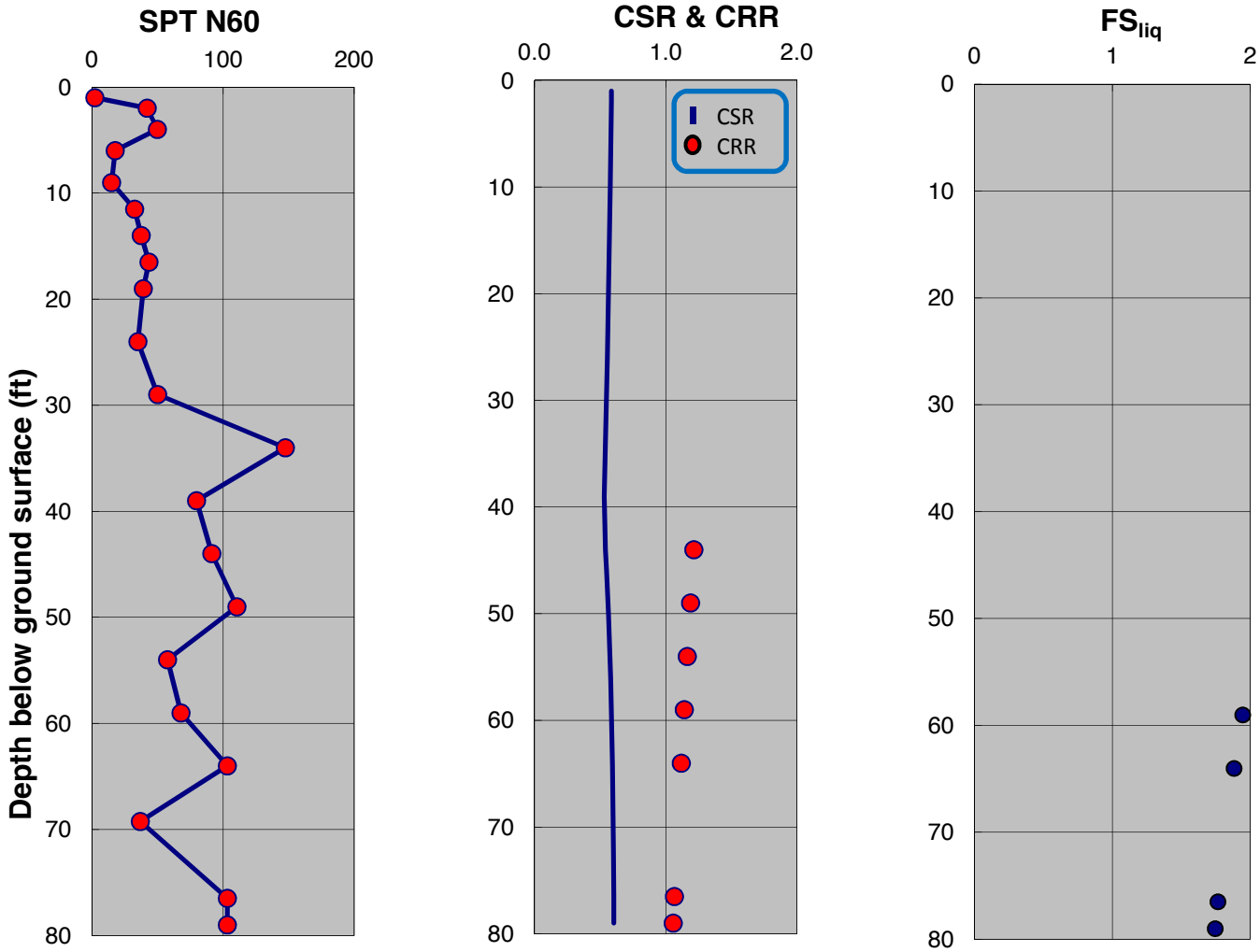
PLATE A.310



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-60 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

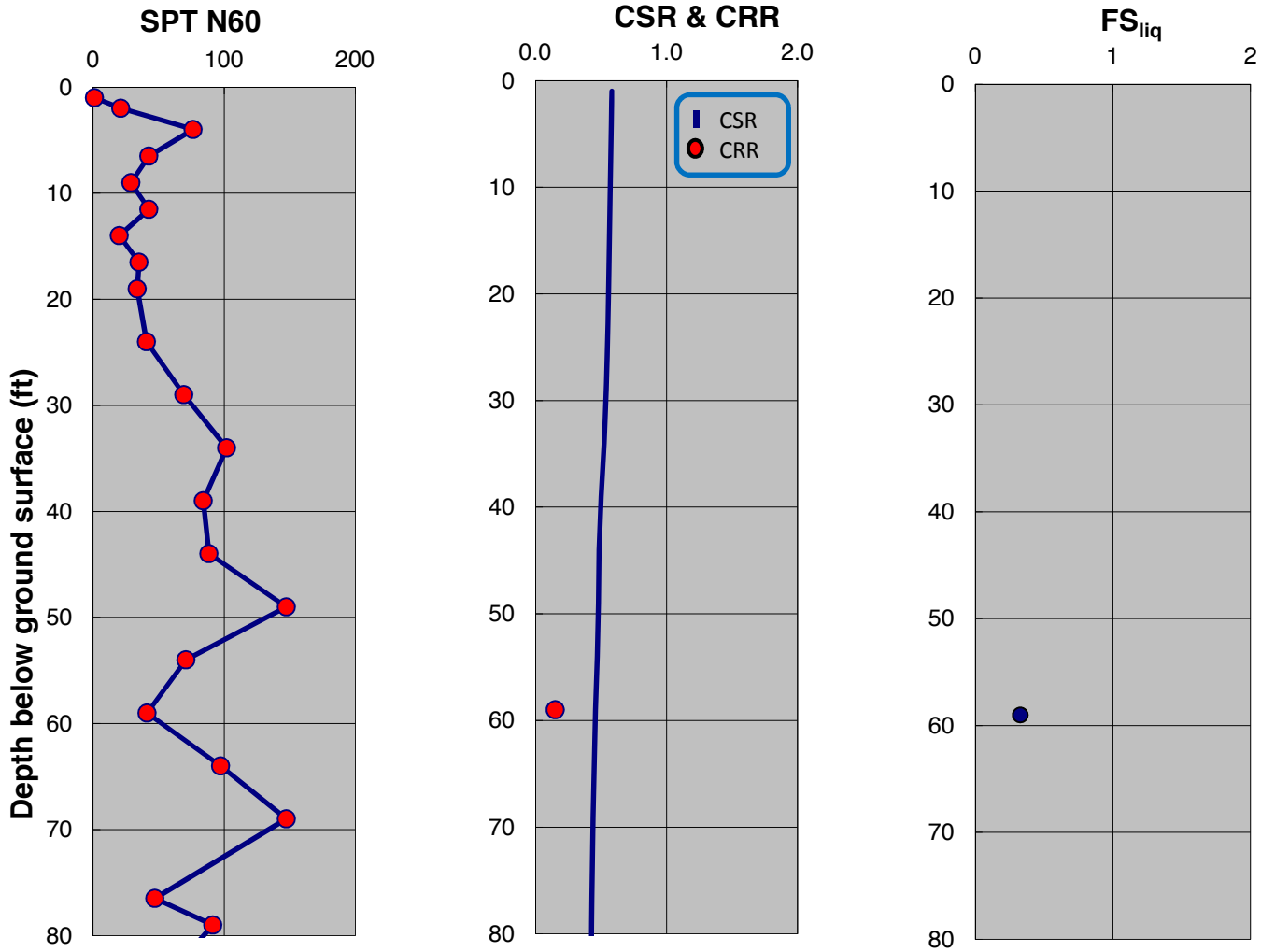
PLATE A.311



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-60 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

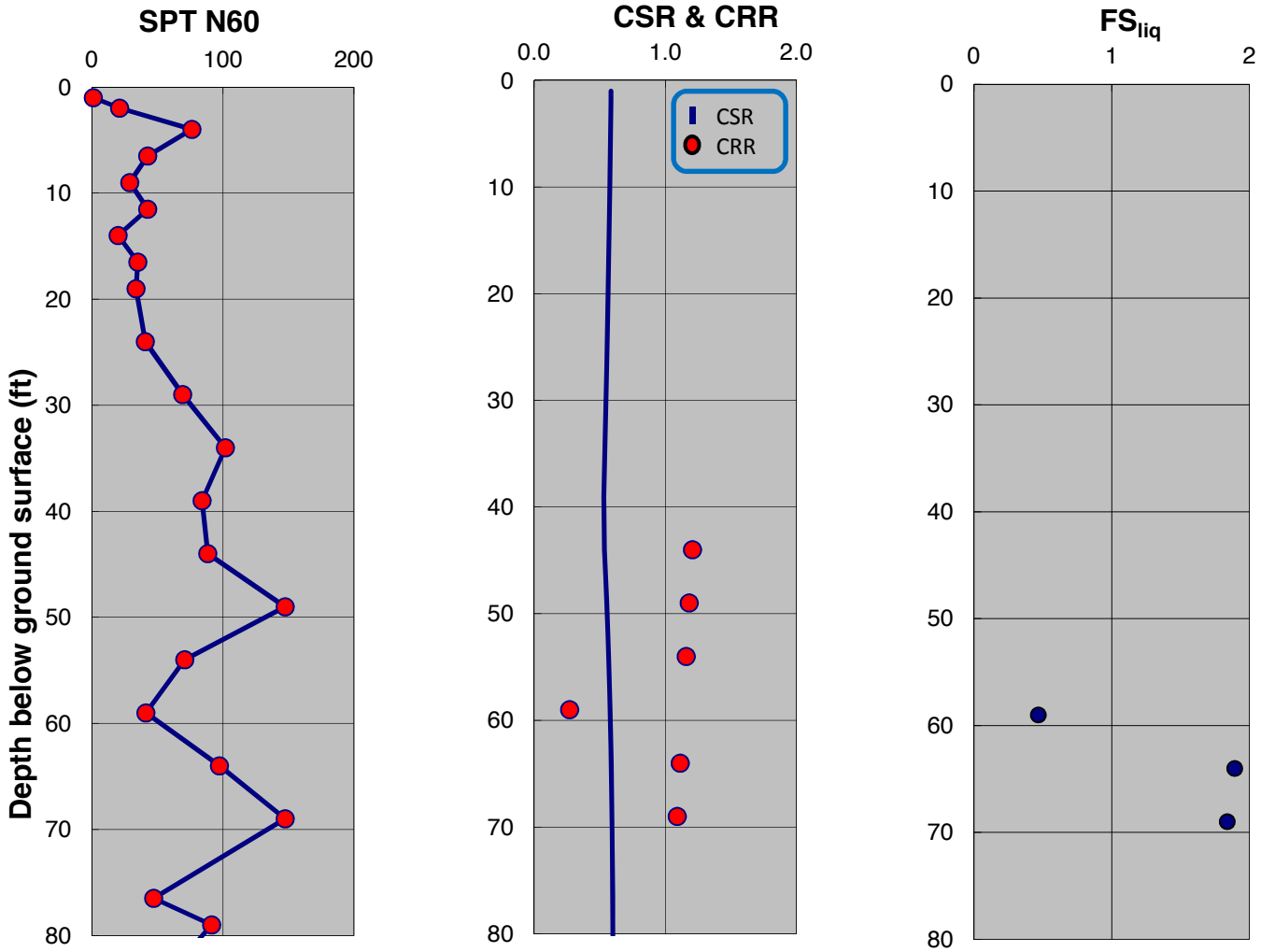
PLATE A.312



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-61 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

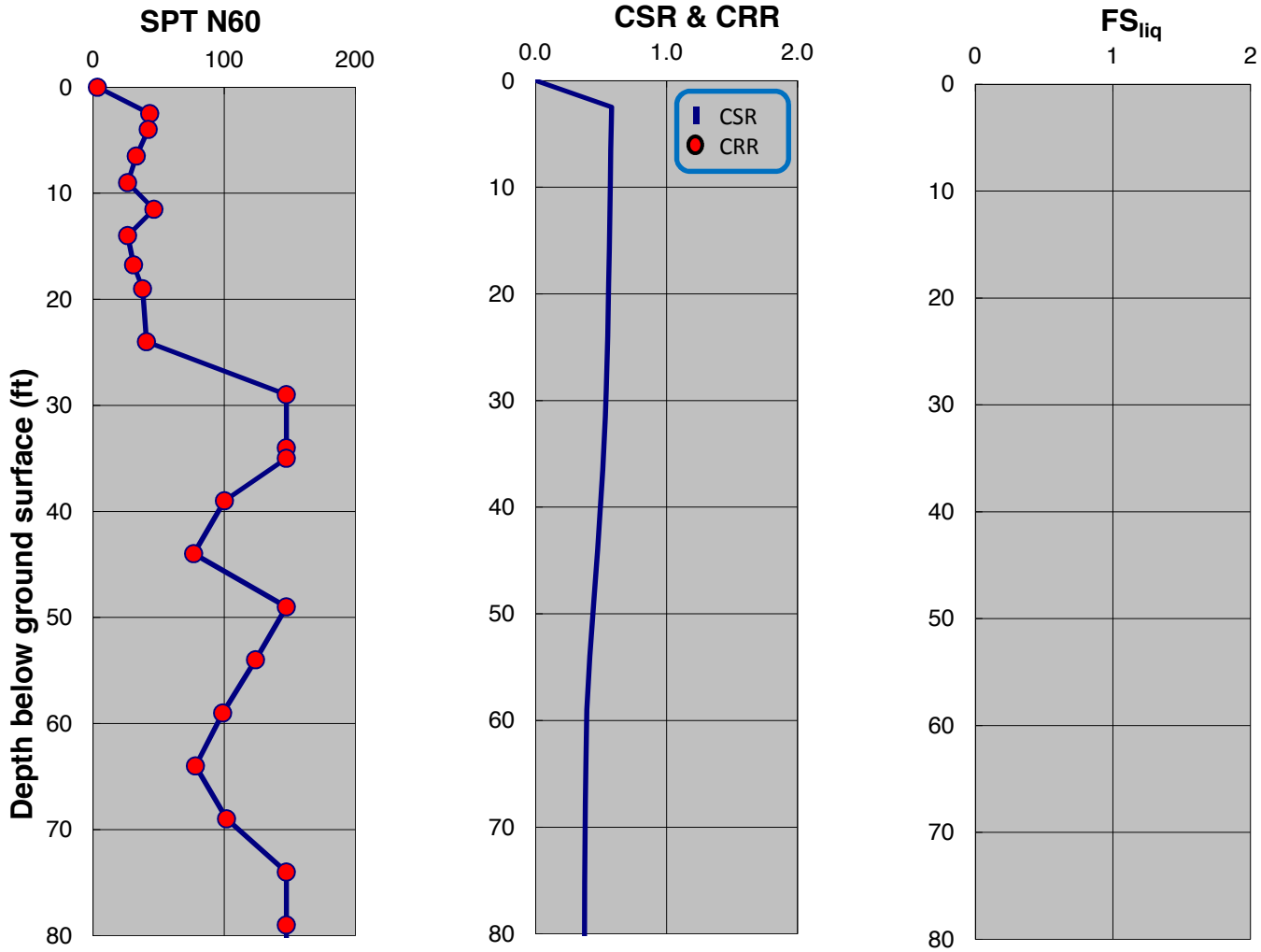
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.313



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-61 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

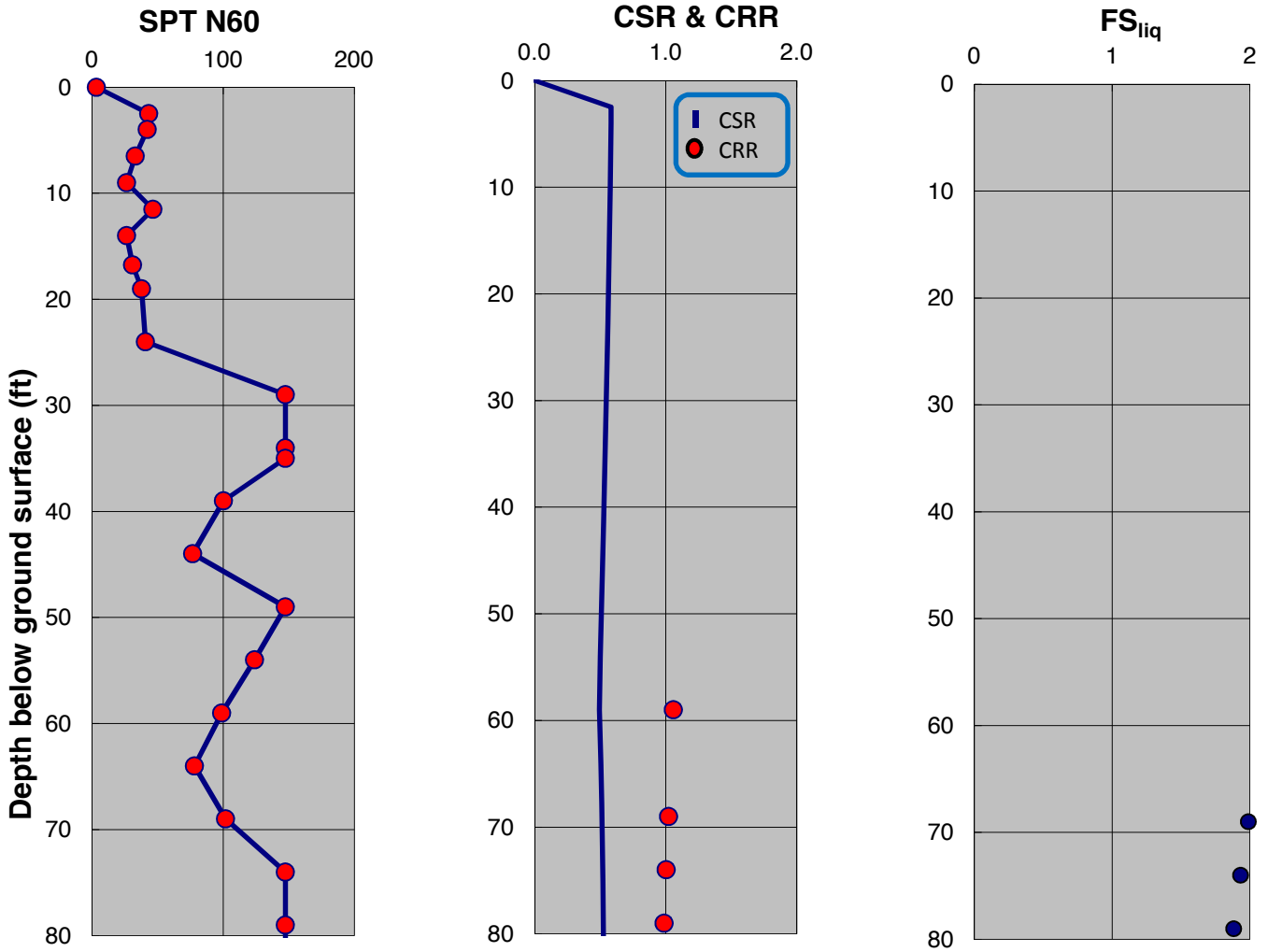
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-62 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

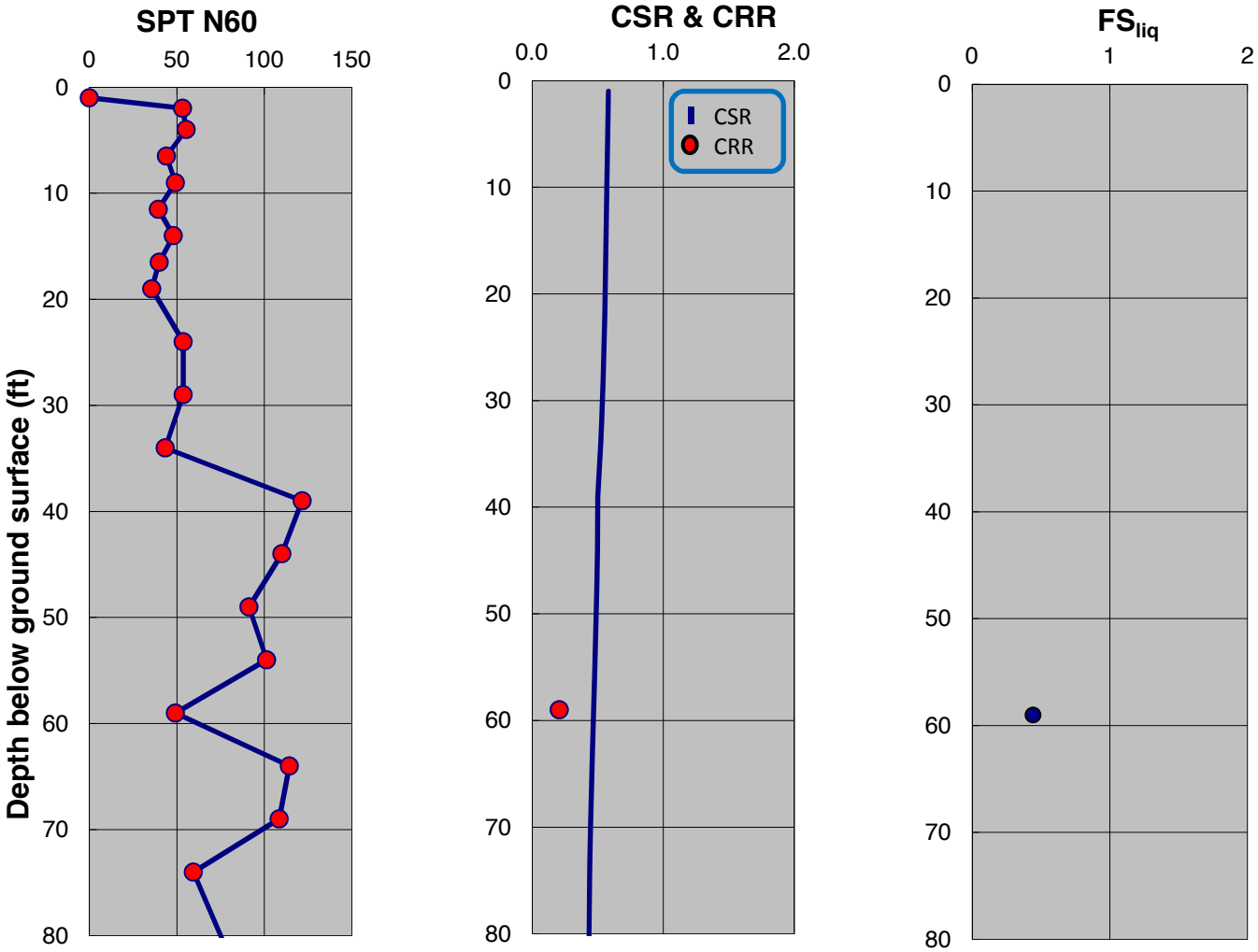
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.315



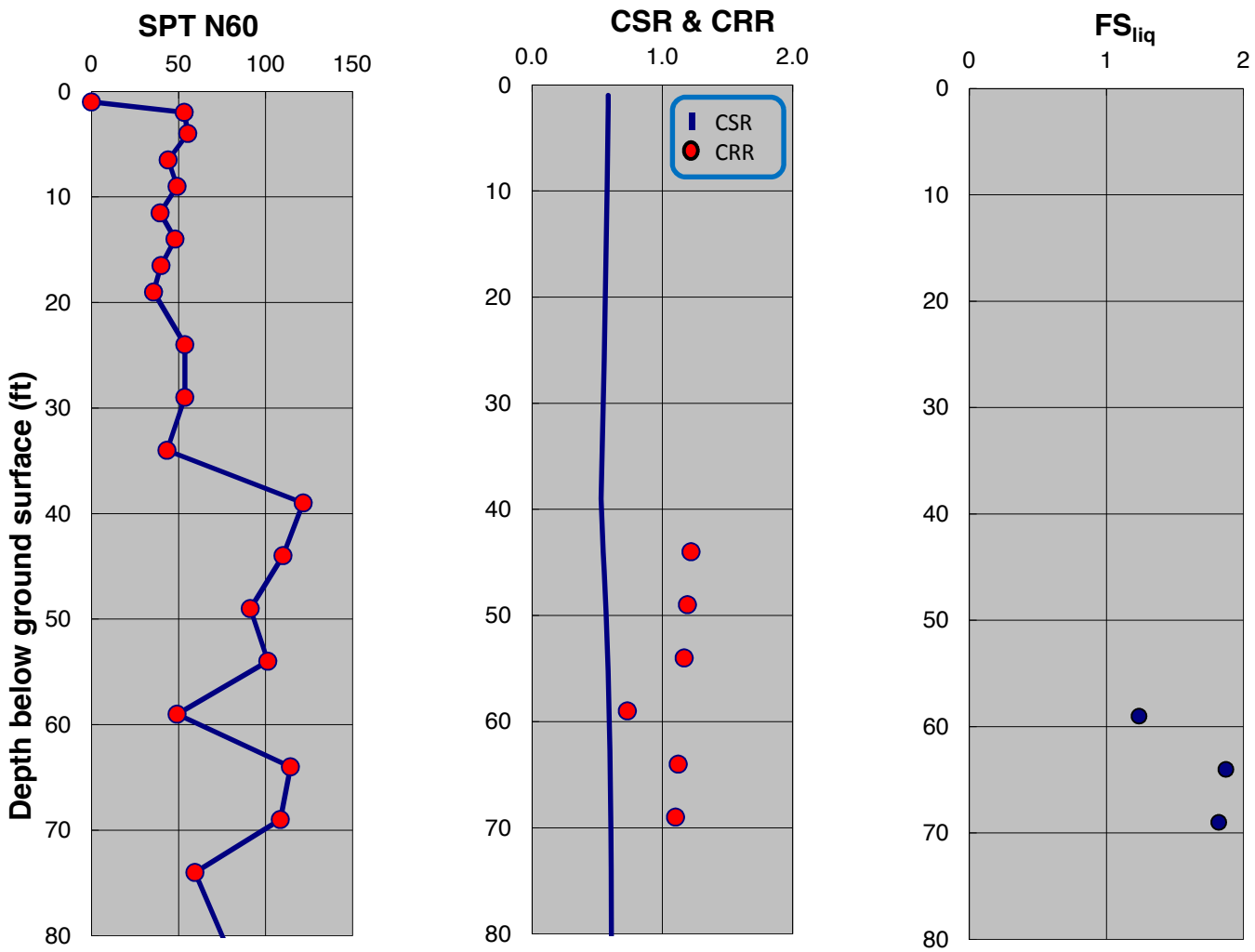
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-62 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



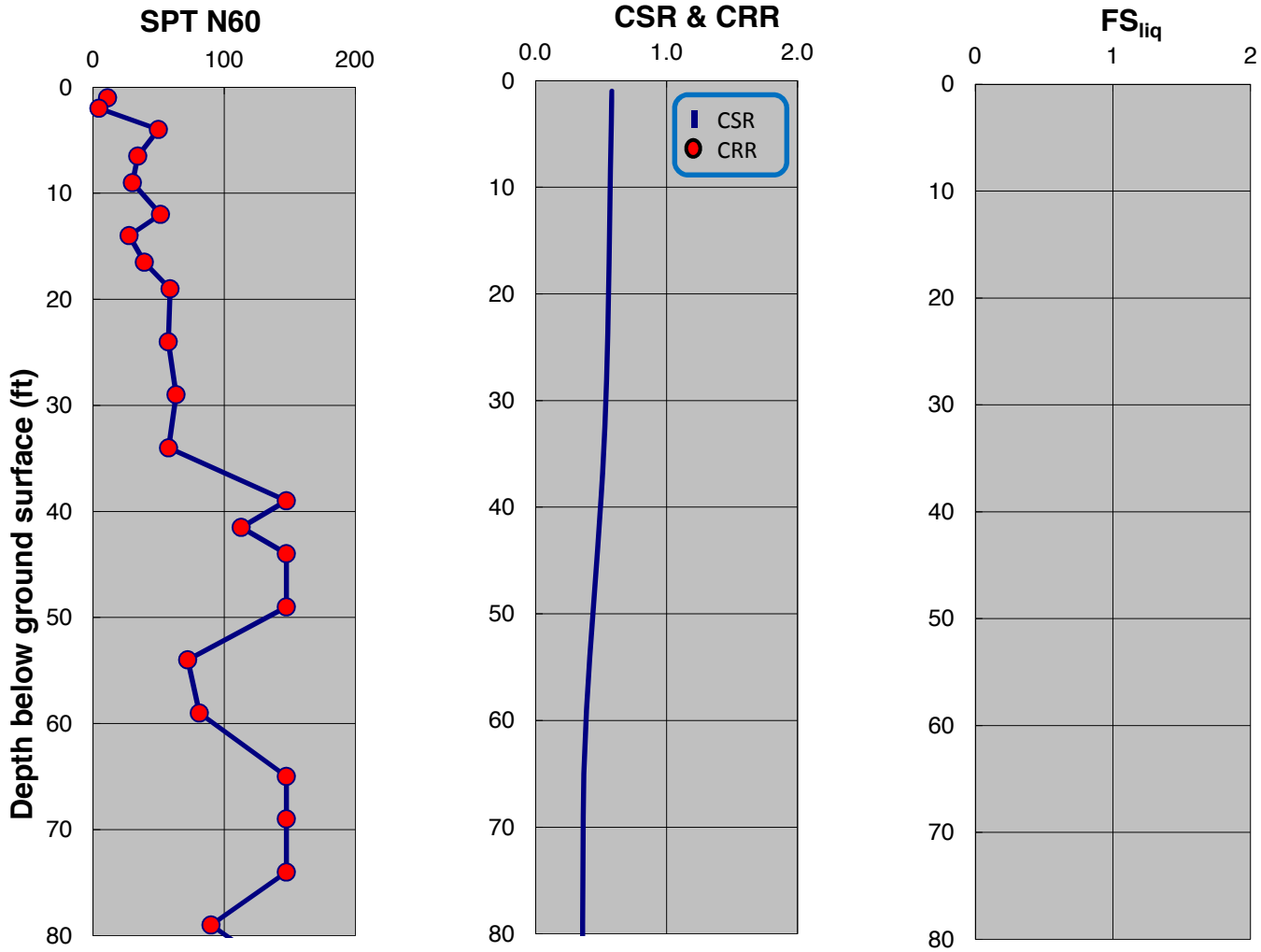
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-64 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



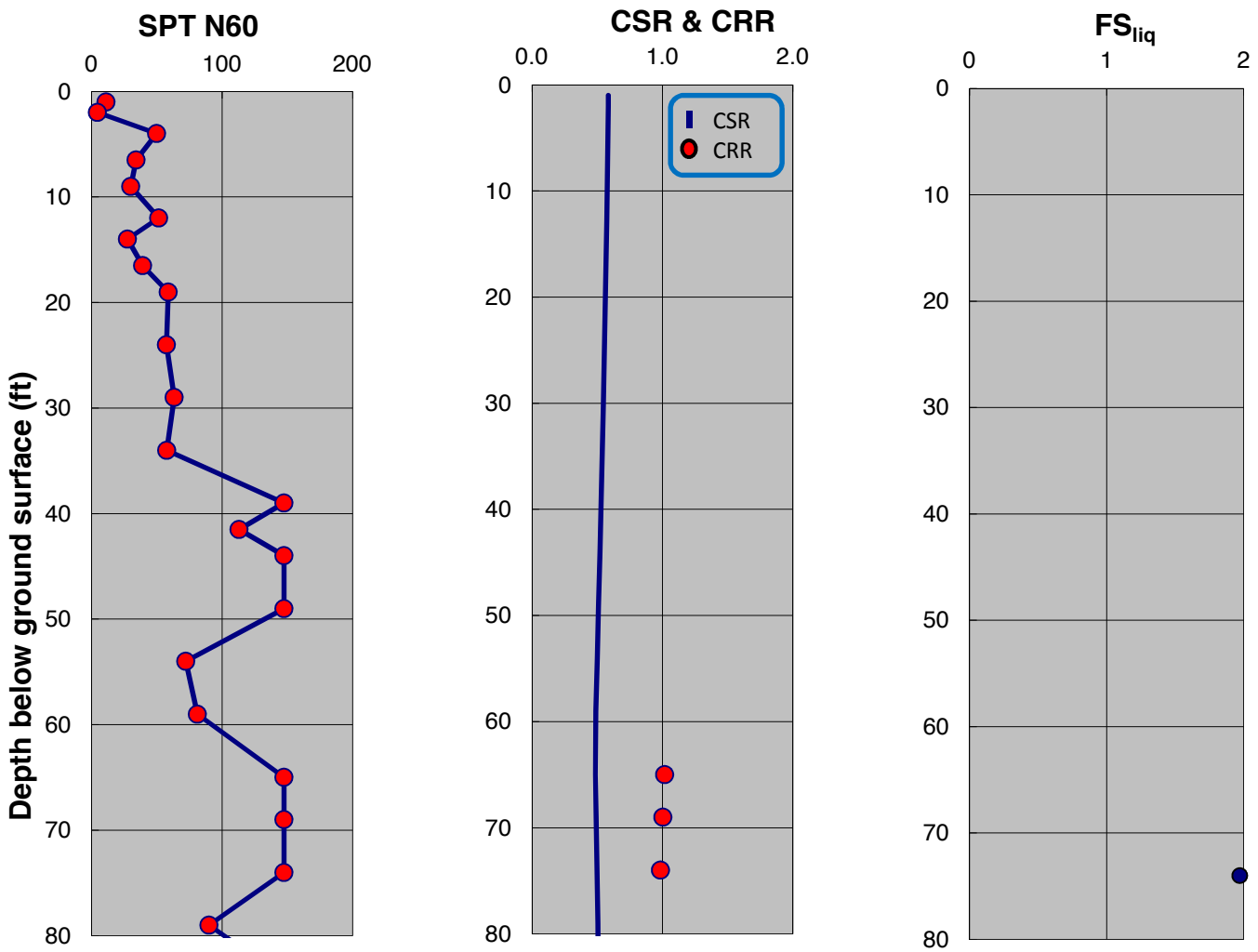
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-64 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-66 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

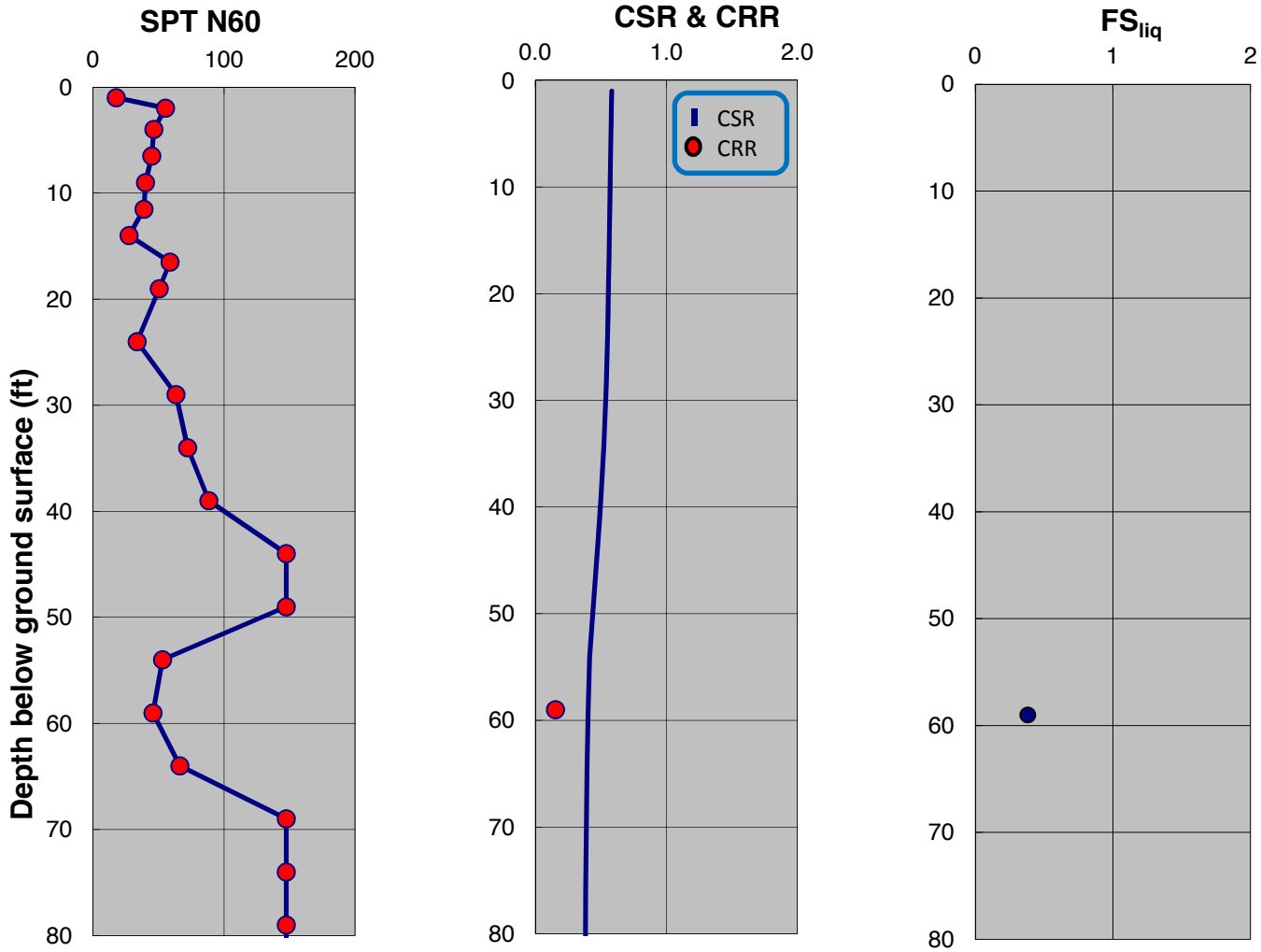
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-66 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

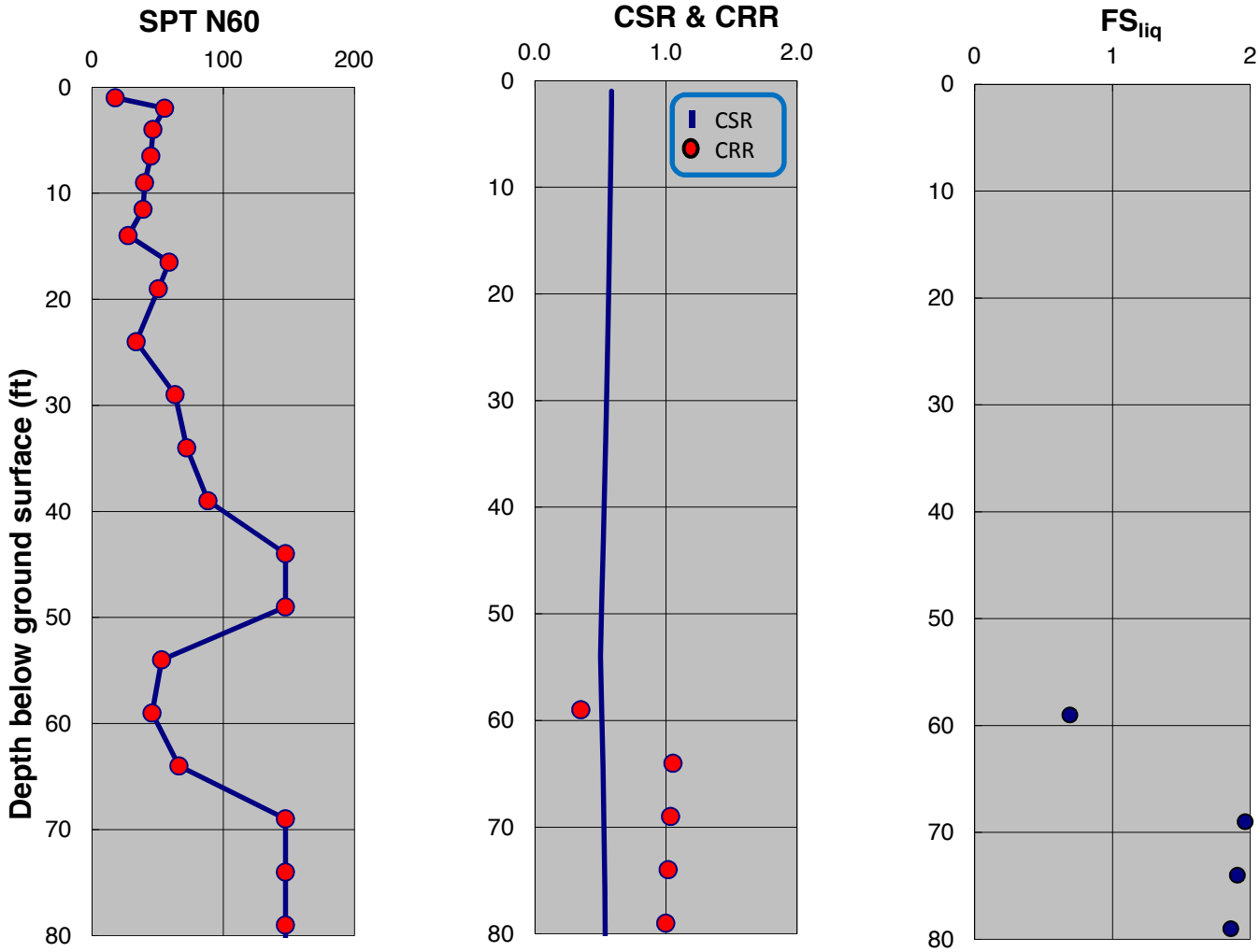
PLATE A.320



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-67 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

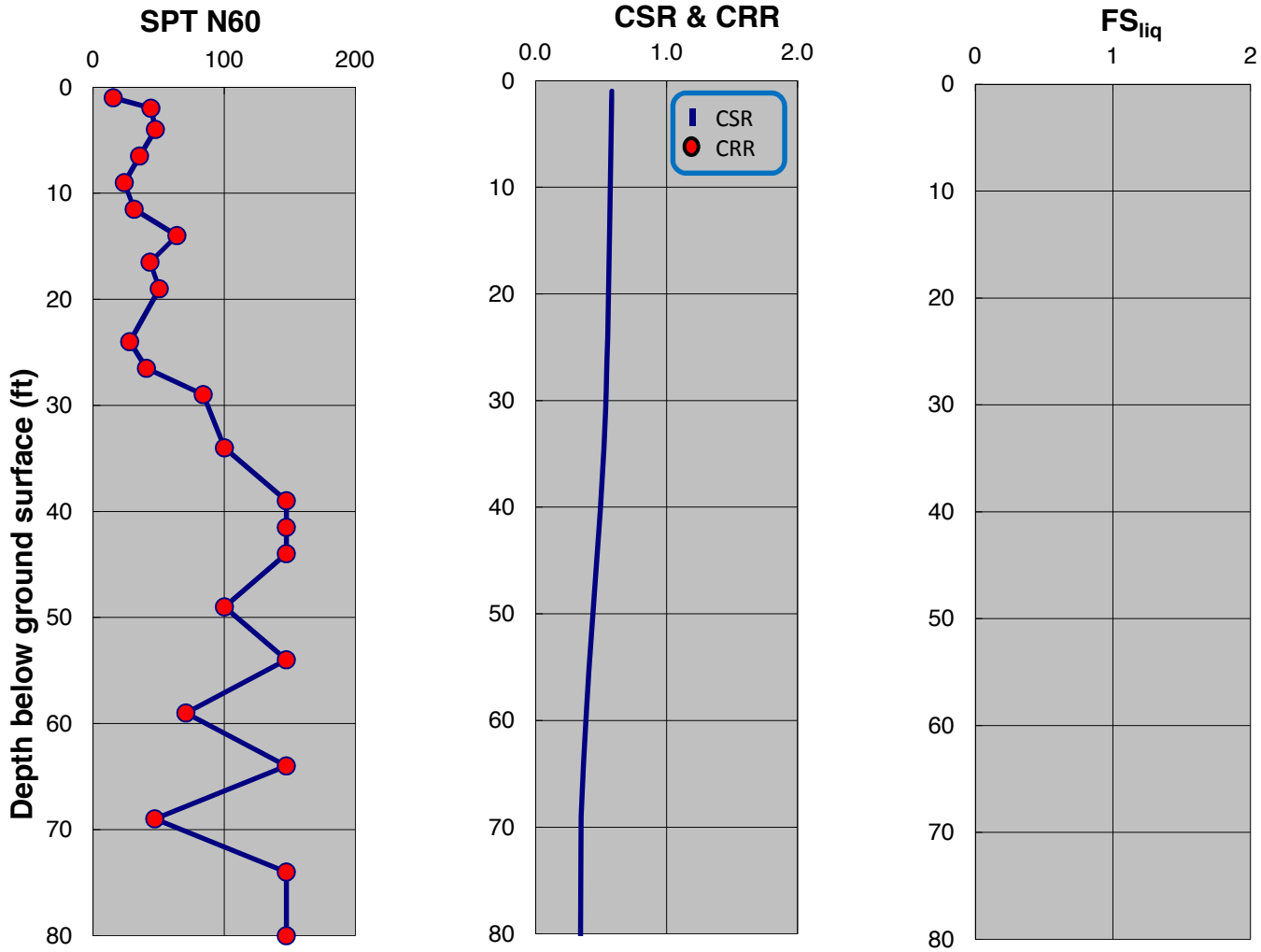
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.321



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-67 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

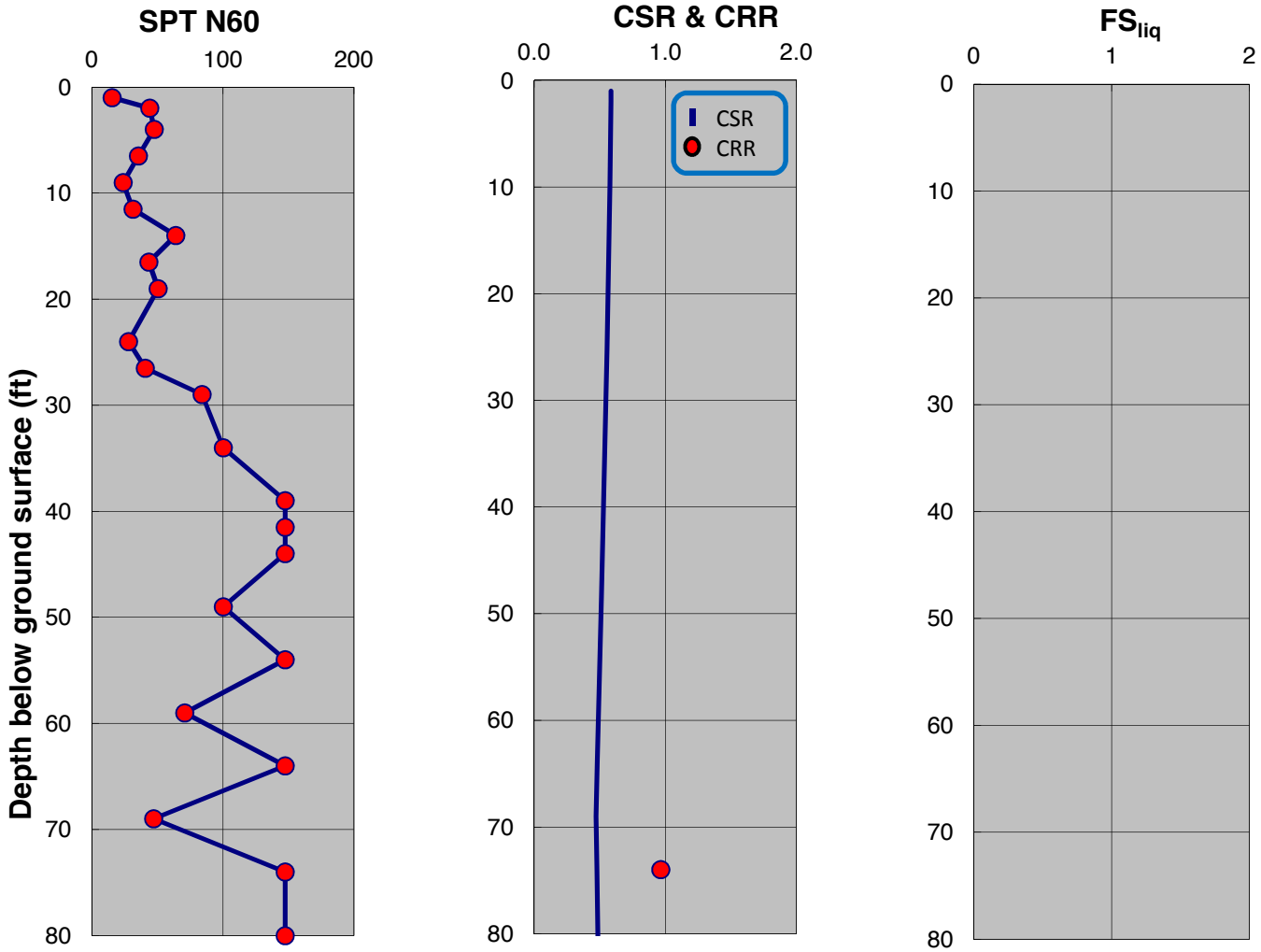
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-68 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

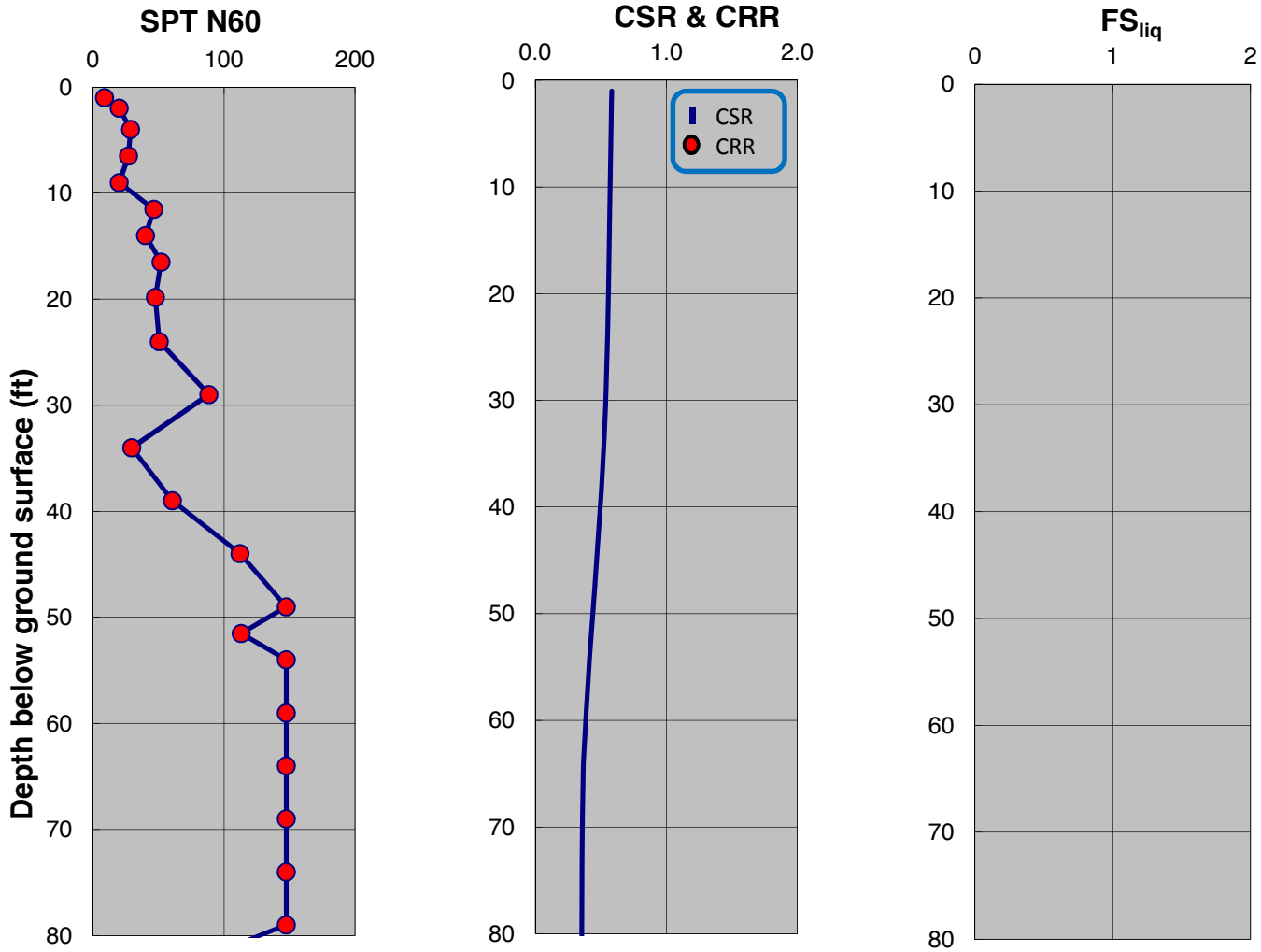
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.323



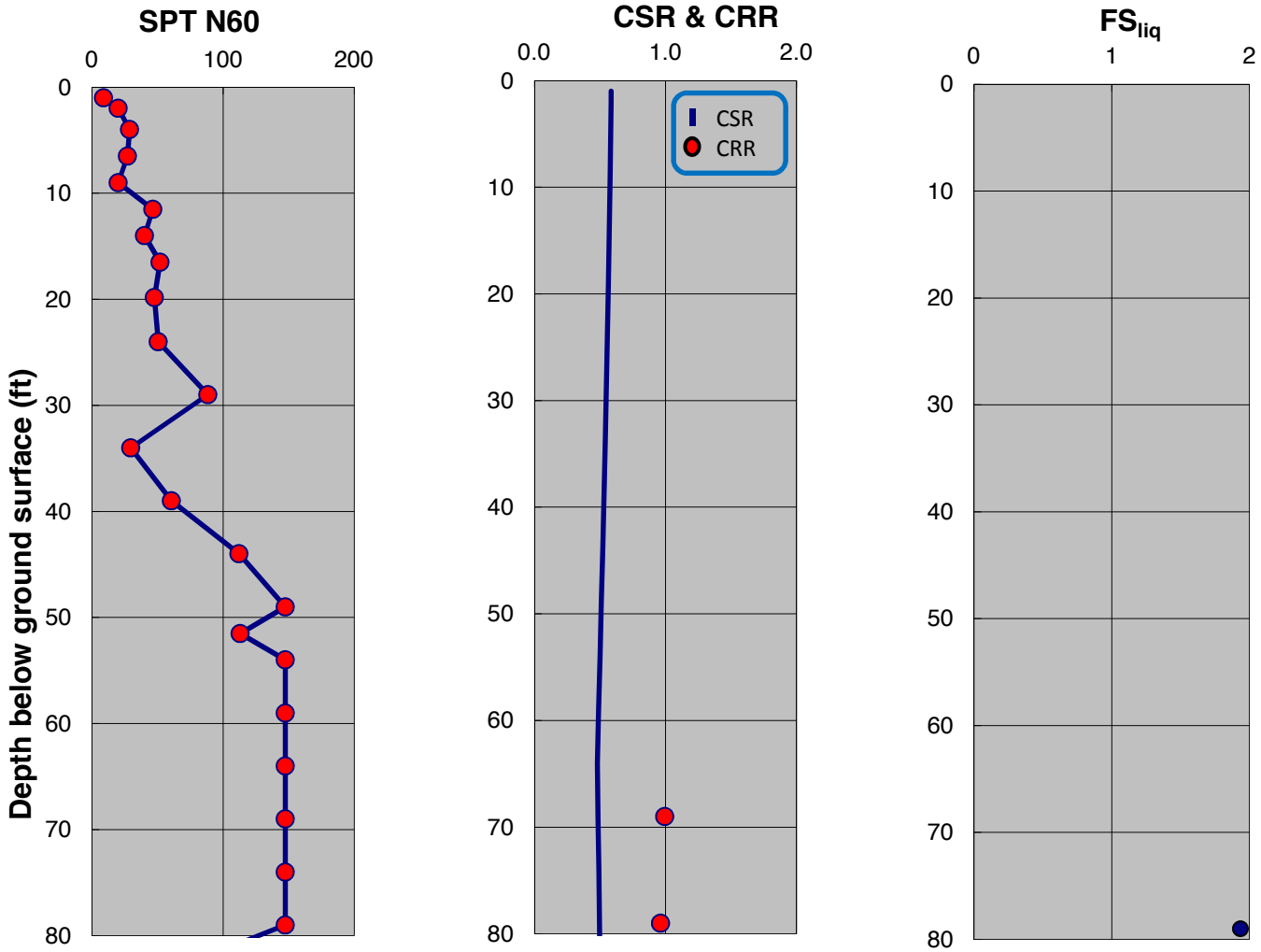
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-68 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



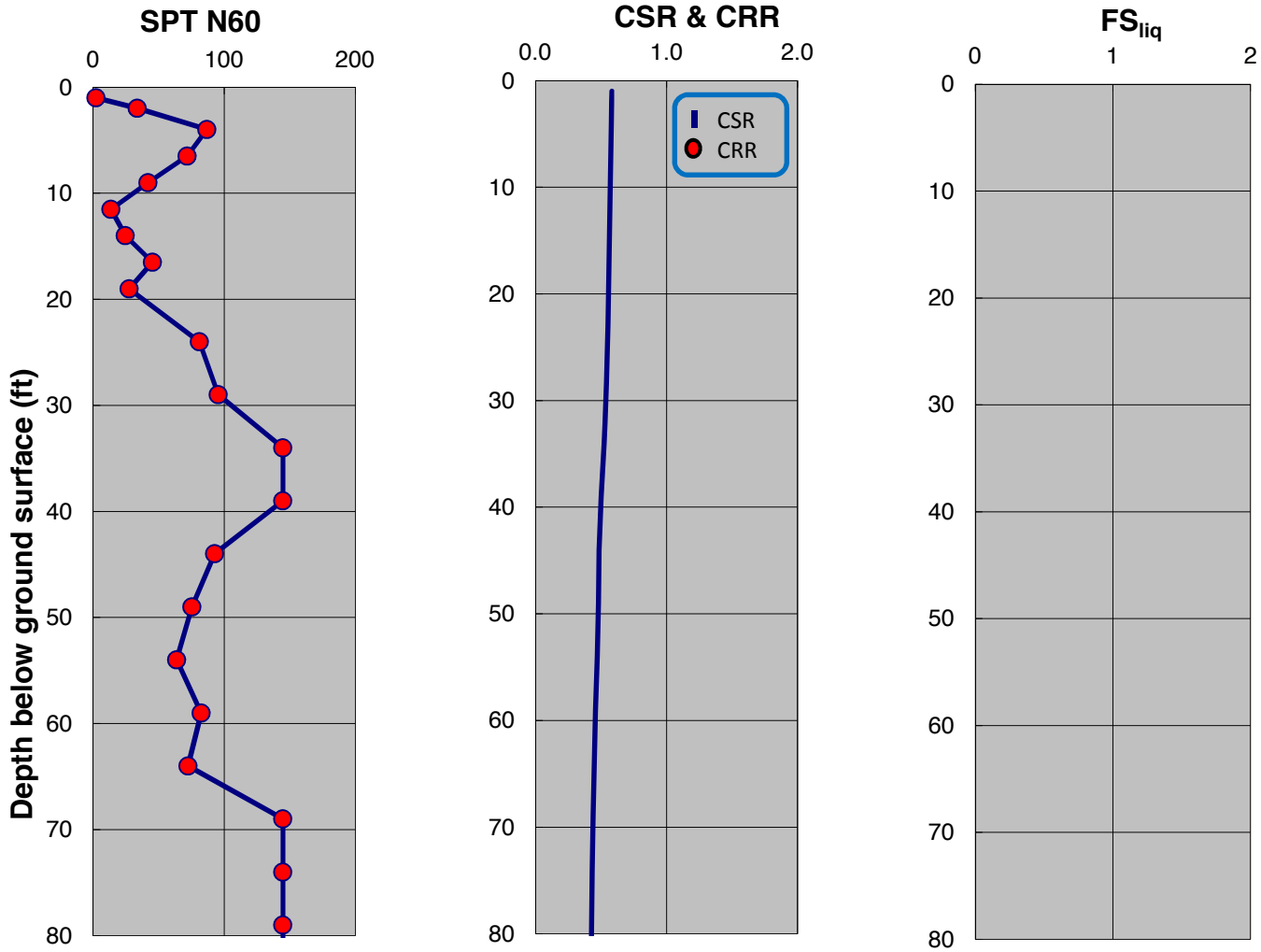
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-69 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



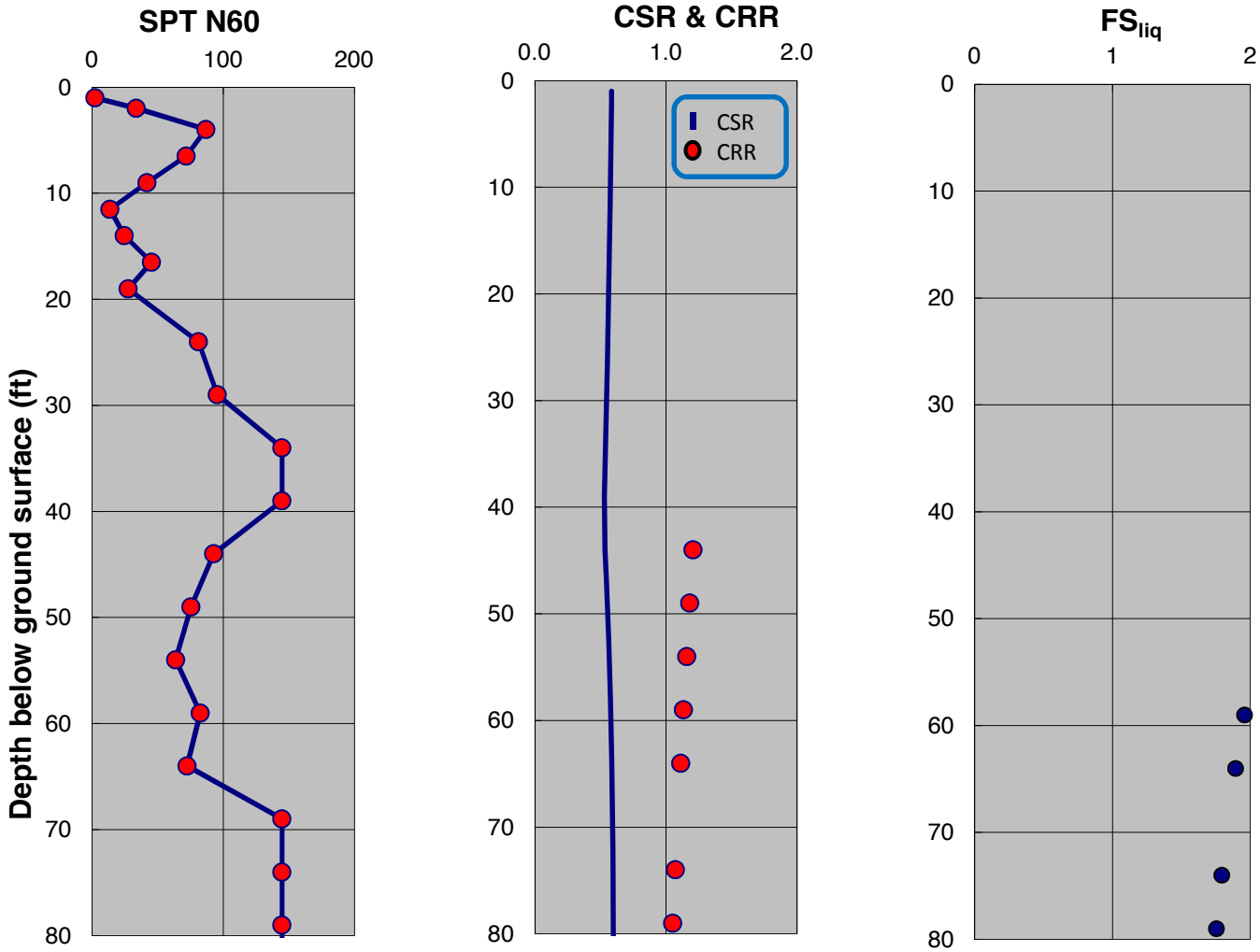
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-69 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



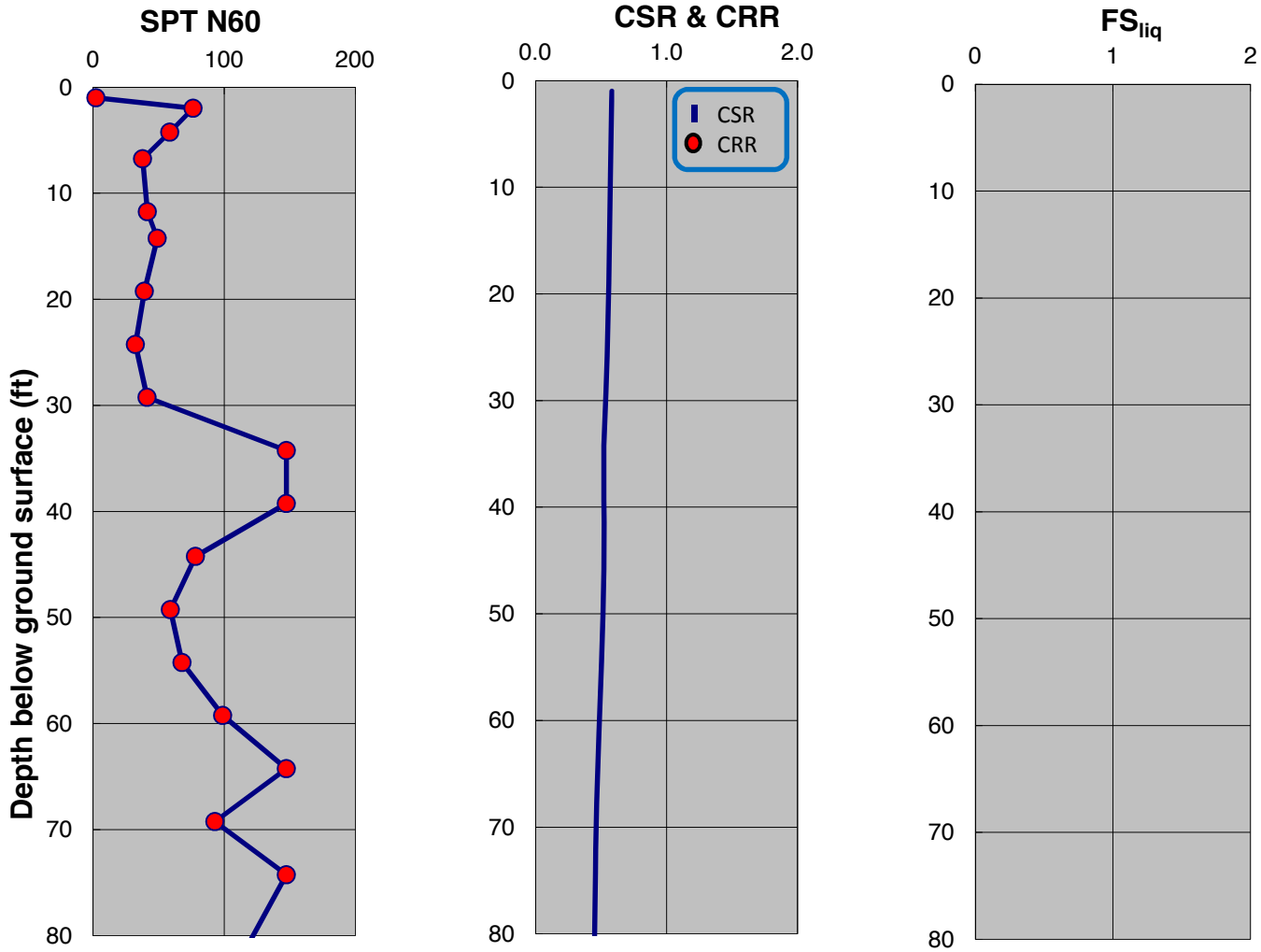
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-71 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



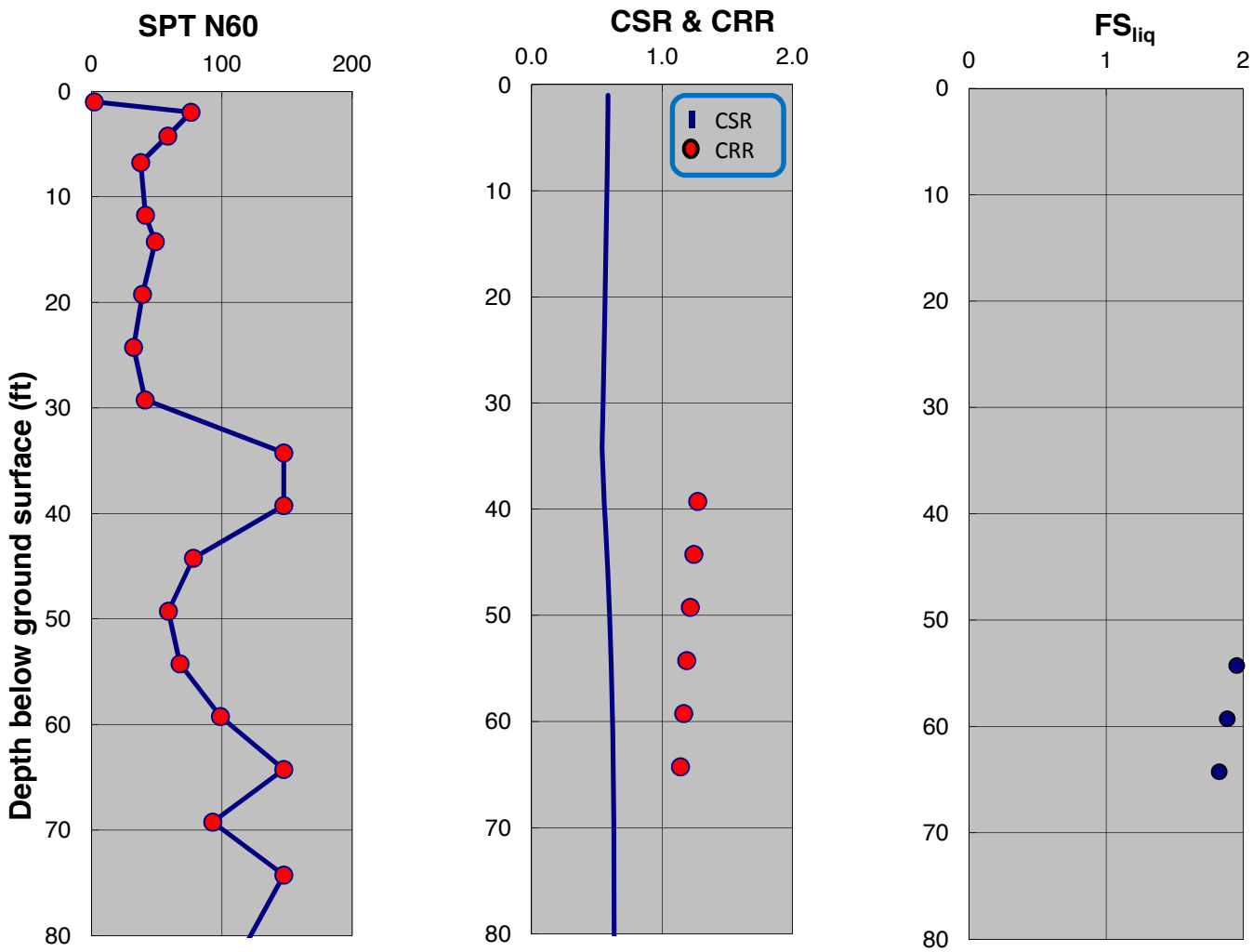
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-71 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



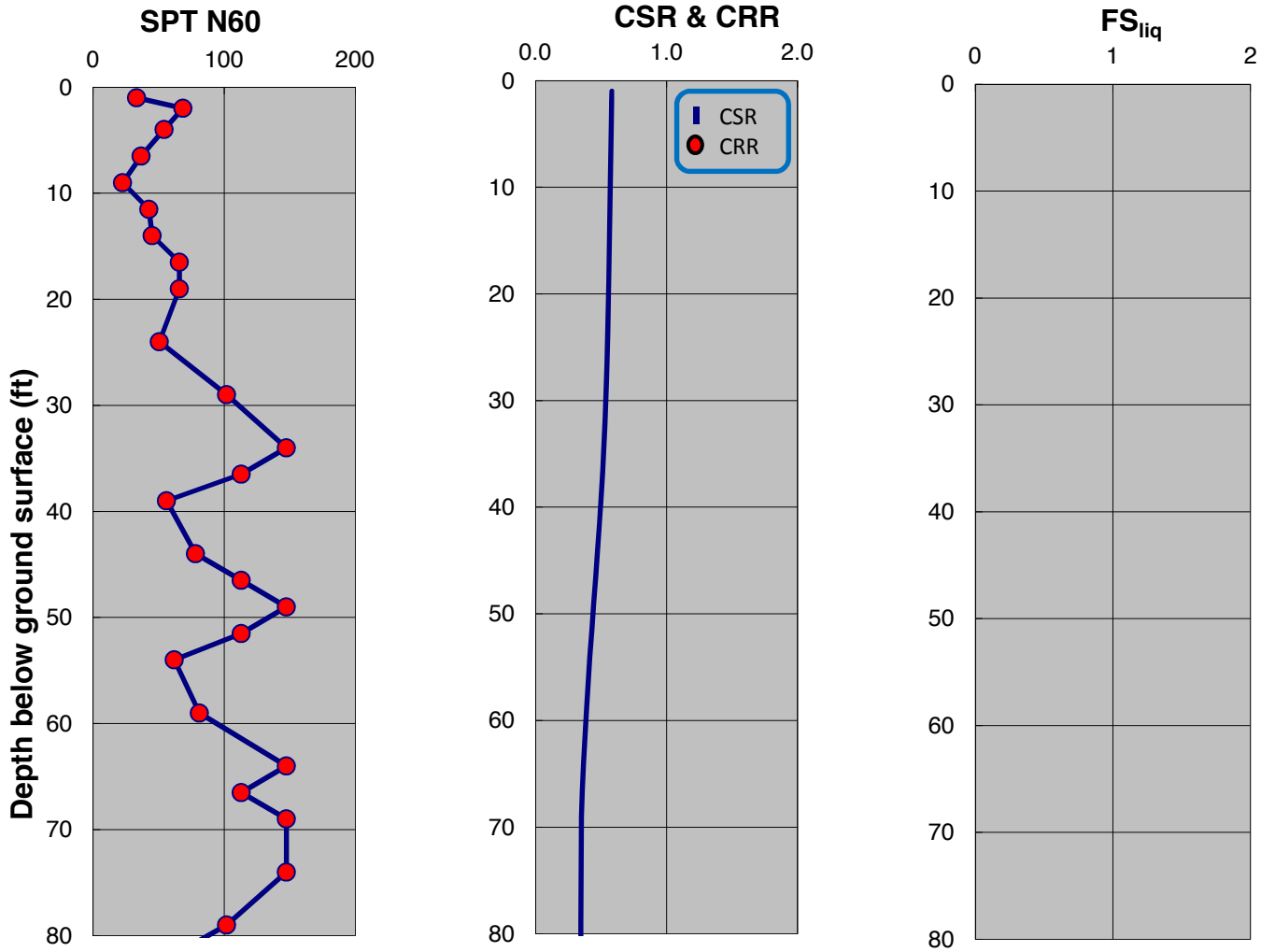
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-72 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



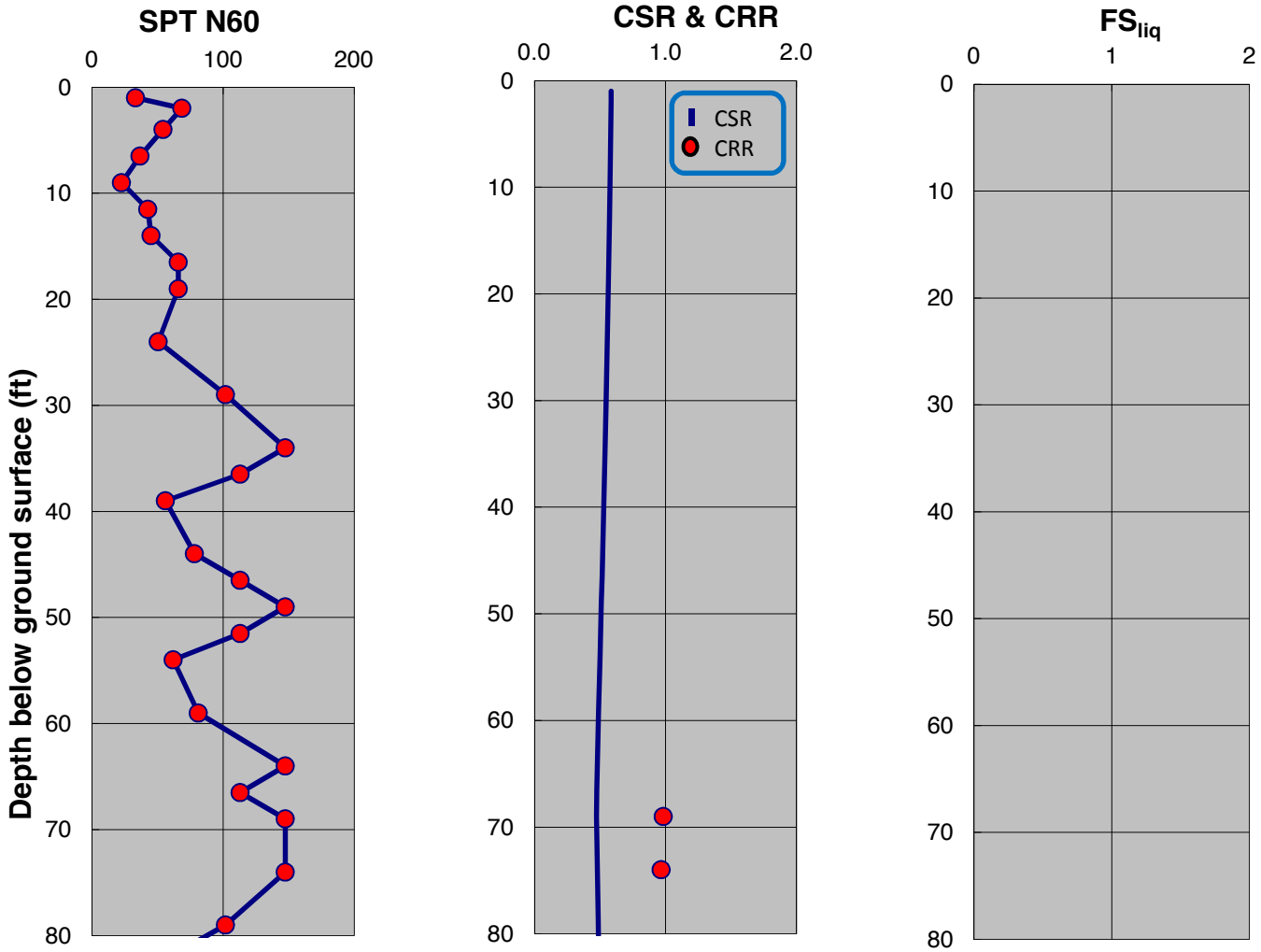
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-72 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



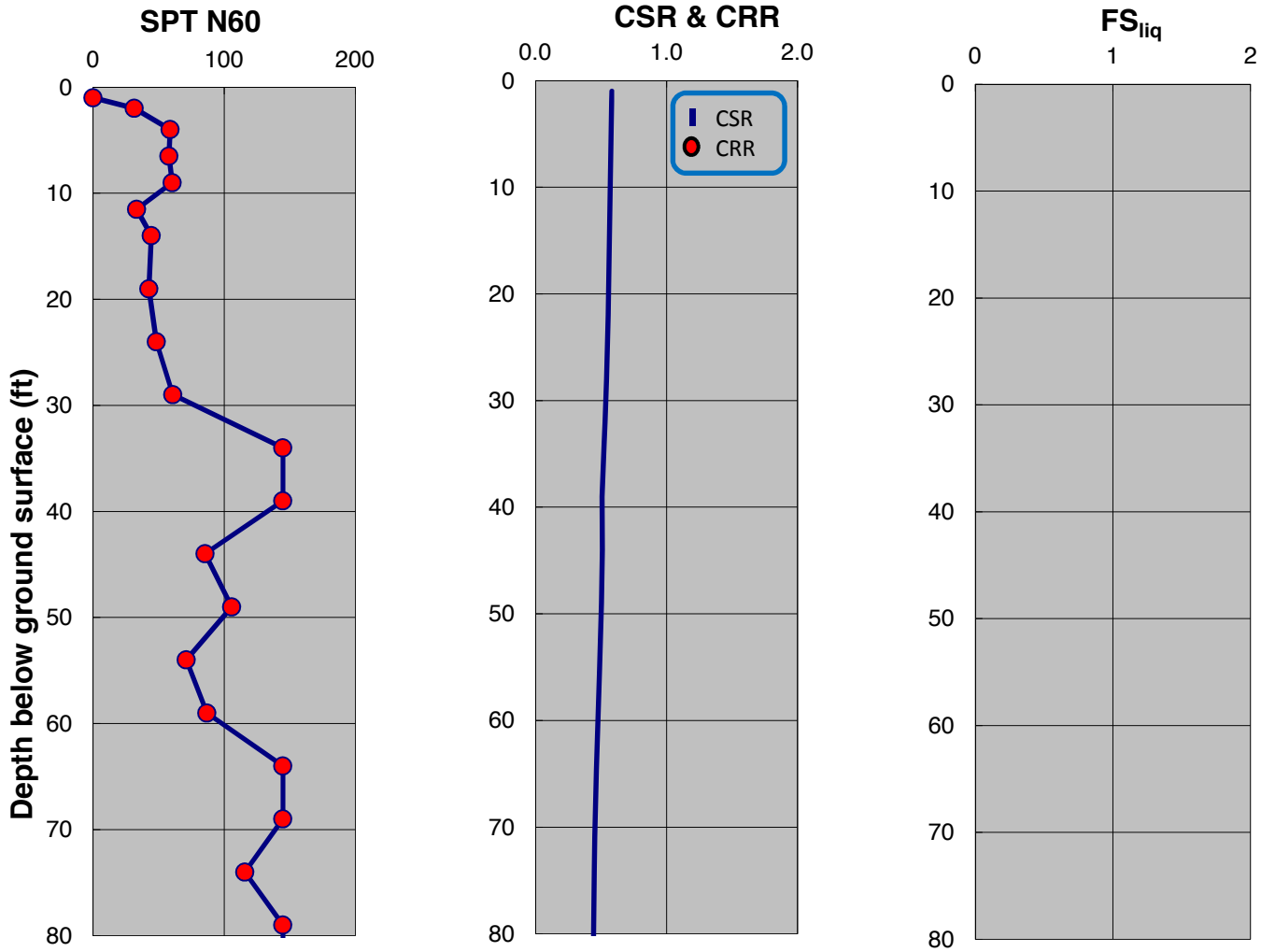
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-73 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



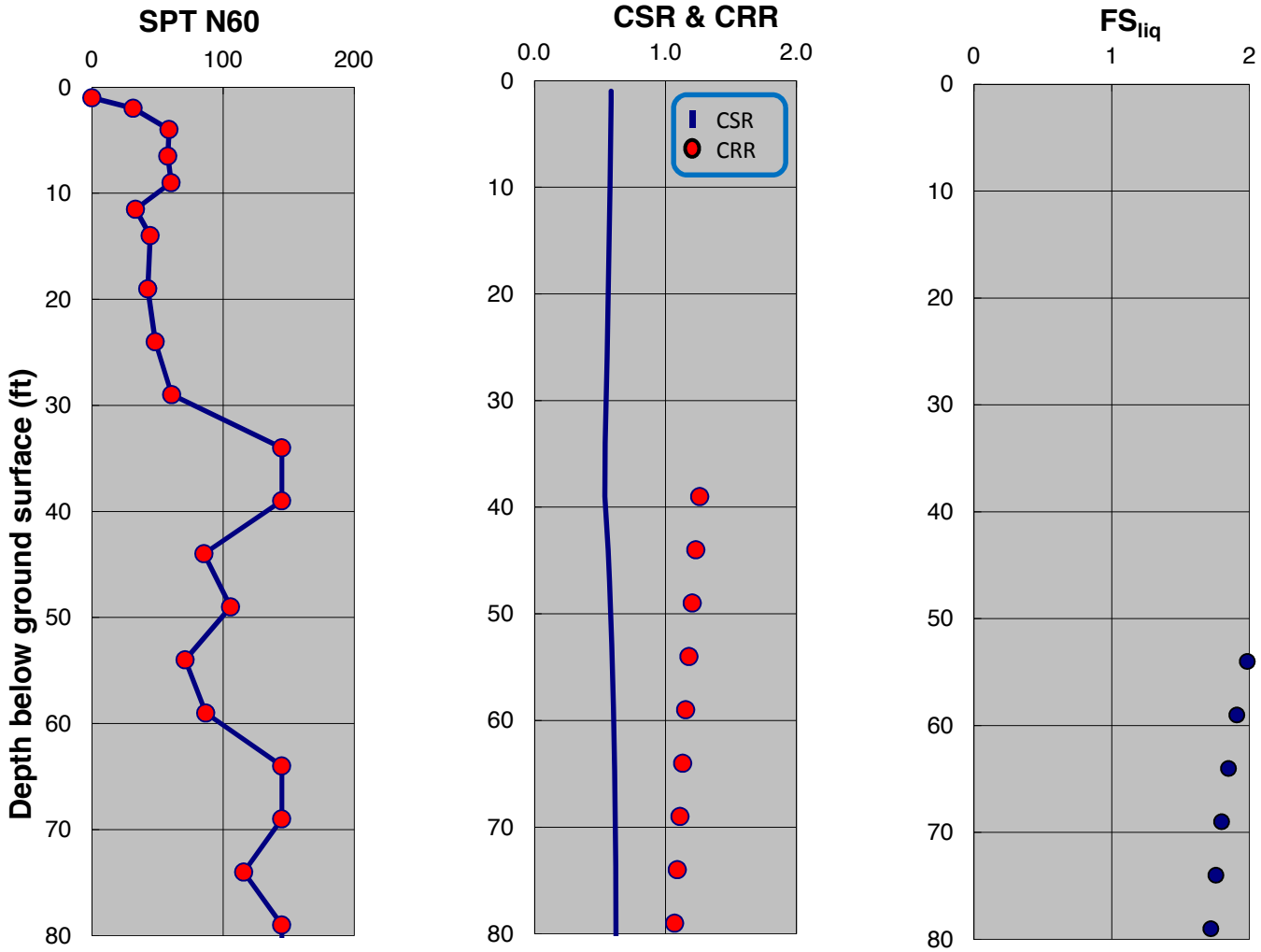
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-73 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



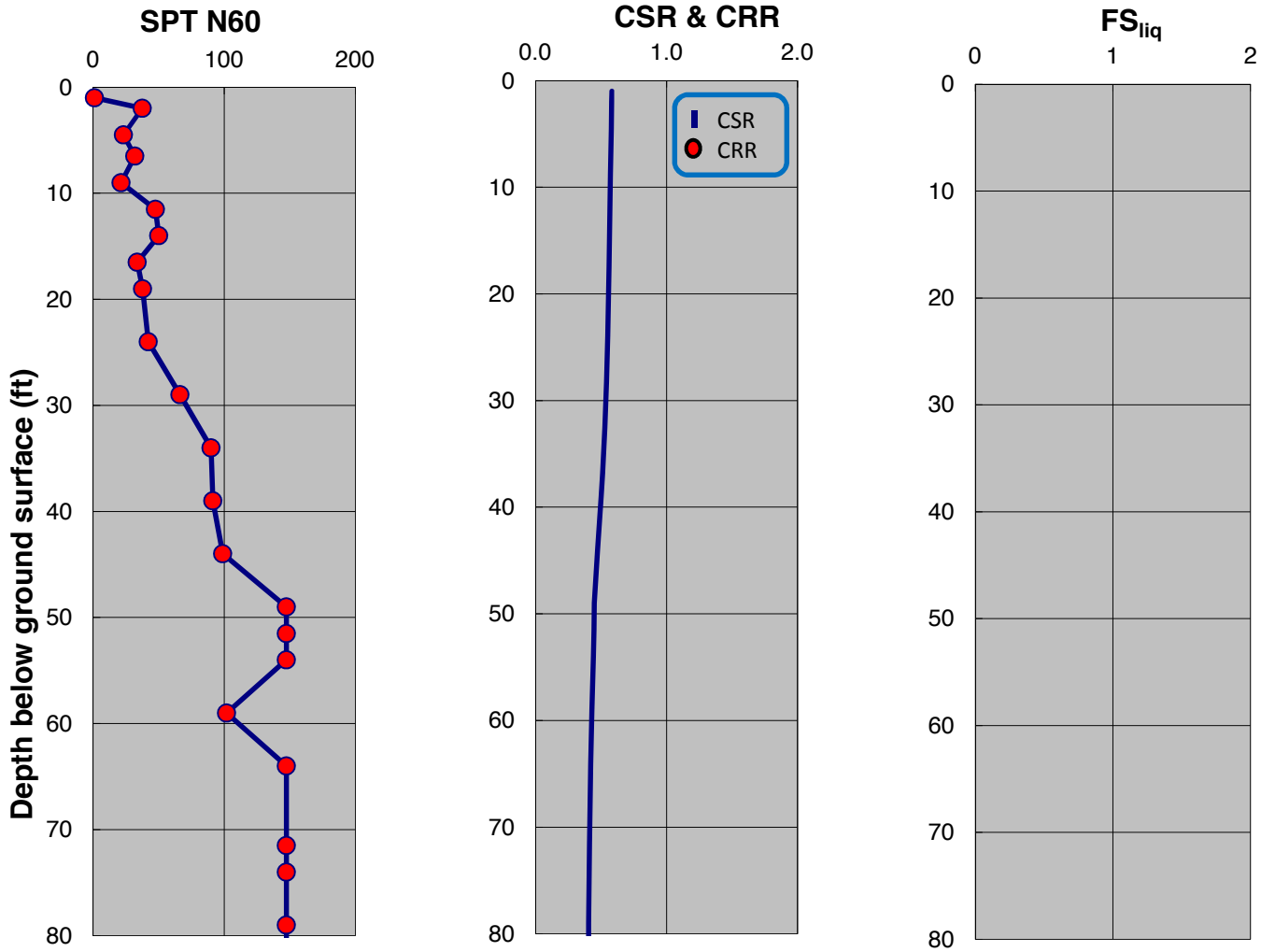
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-74 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



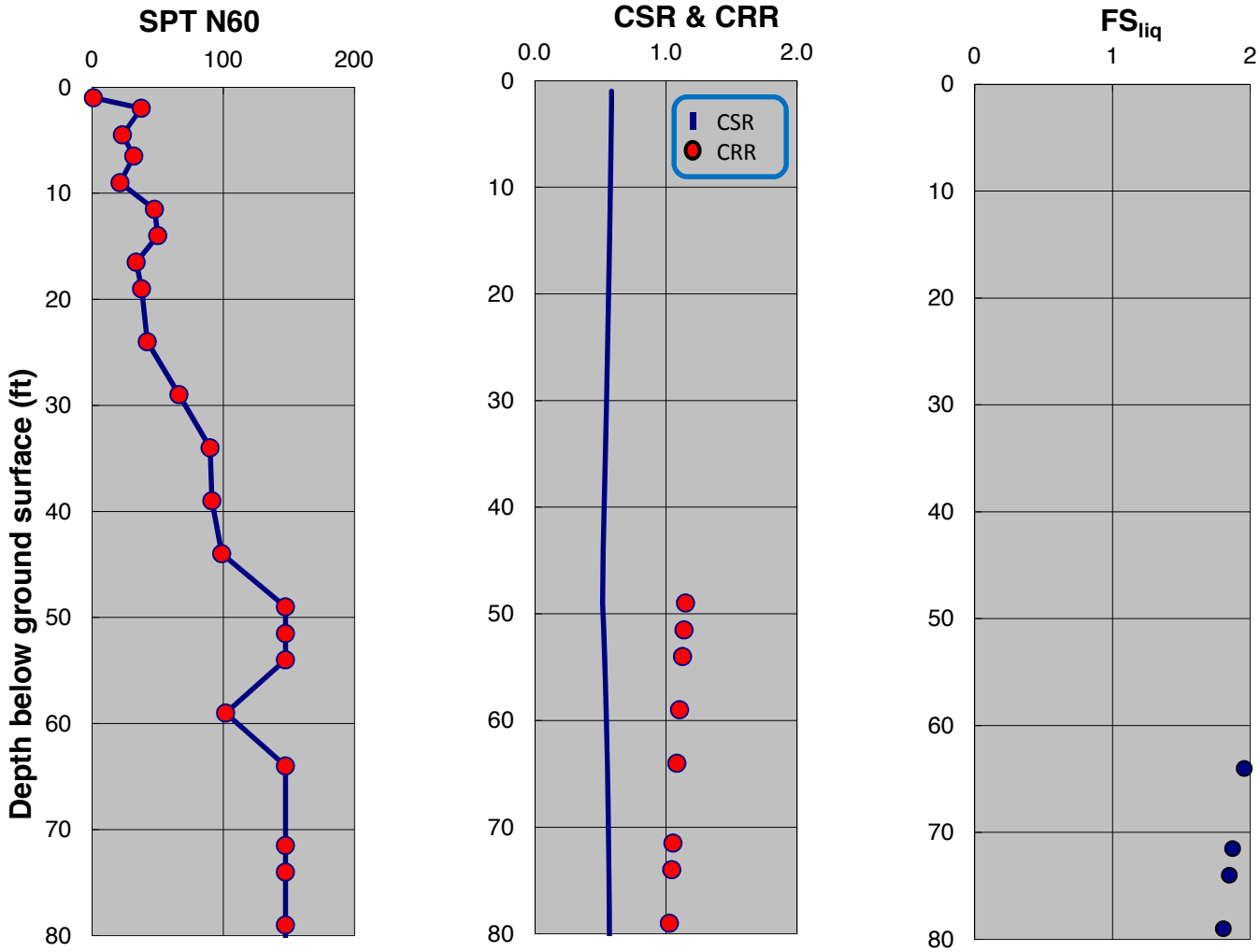
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-74 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



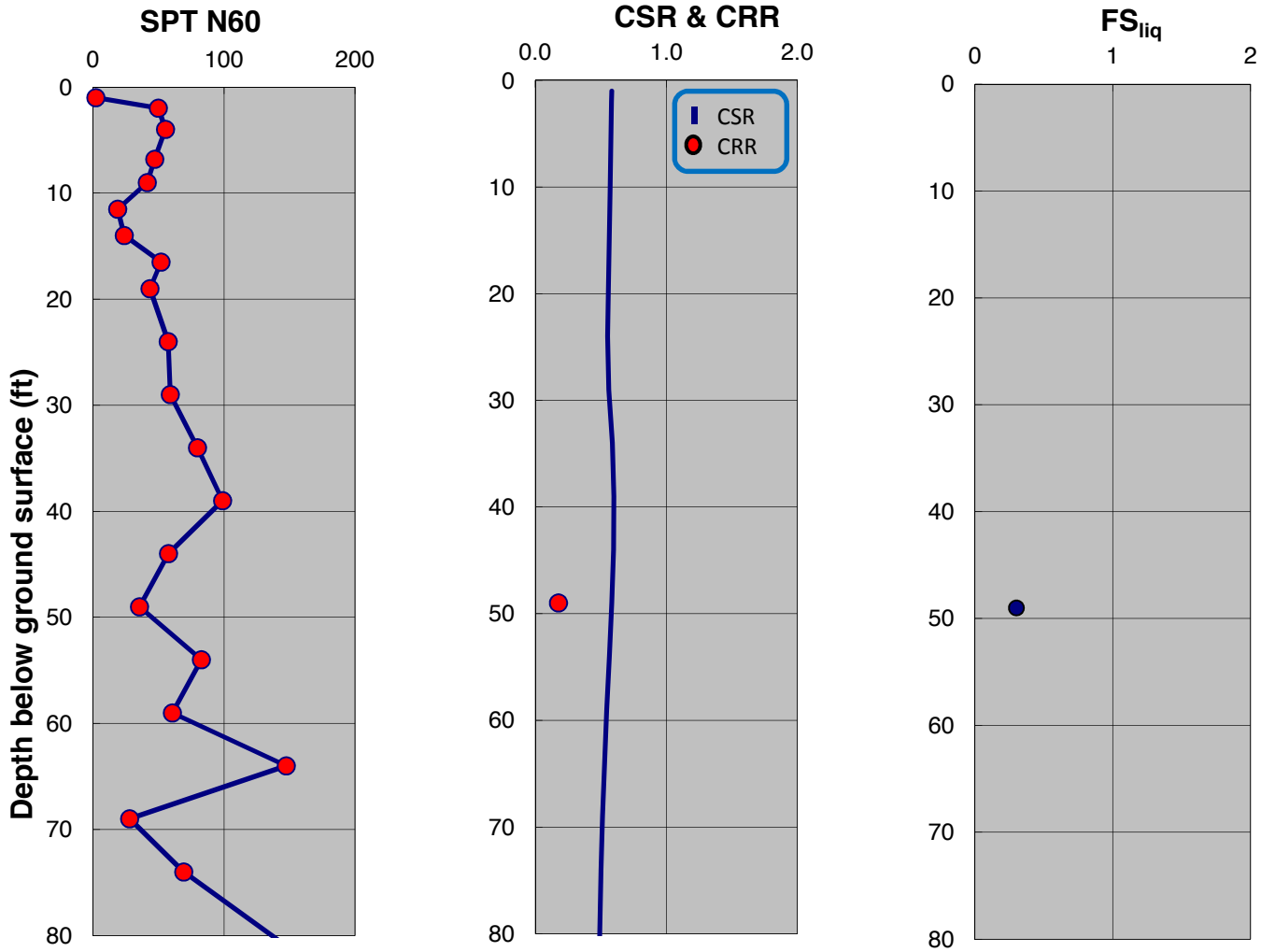
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-75 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



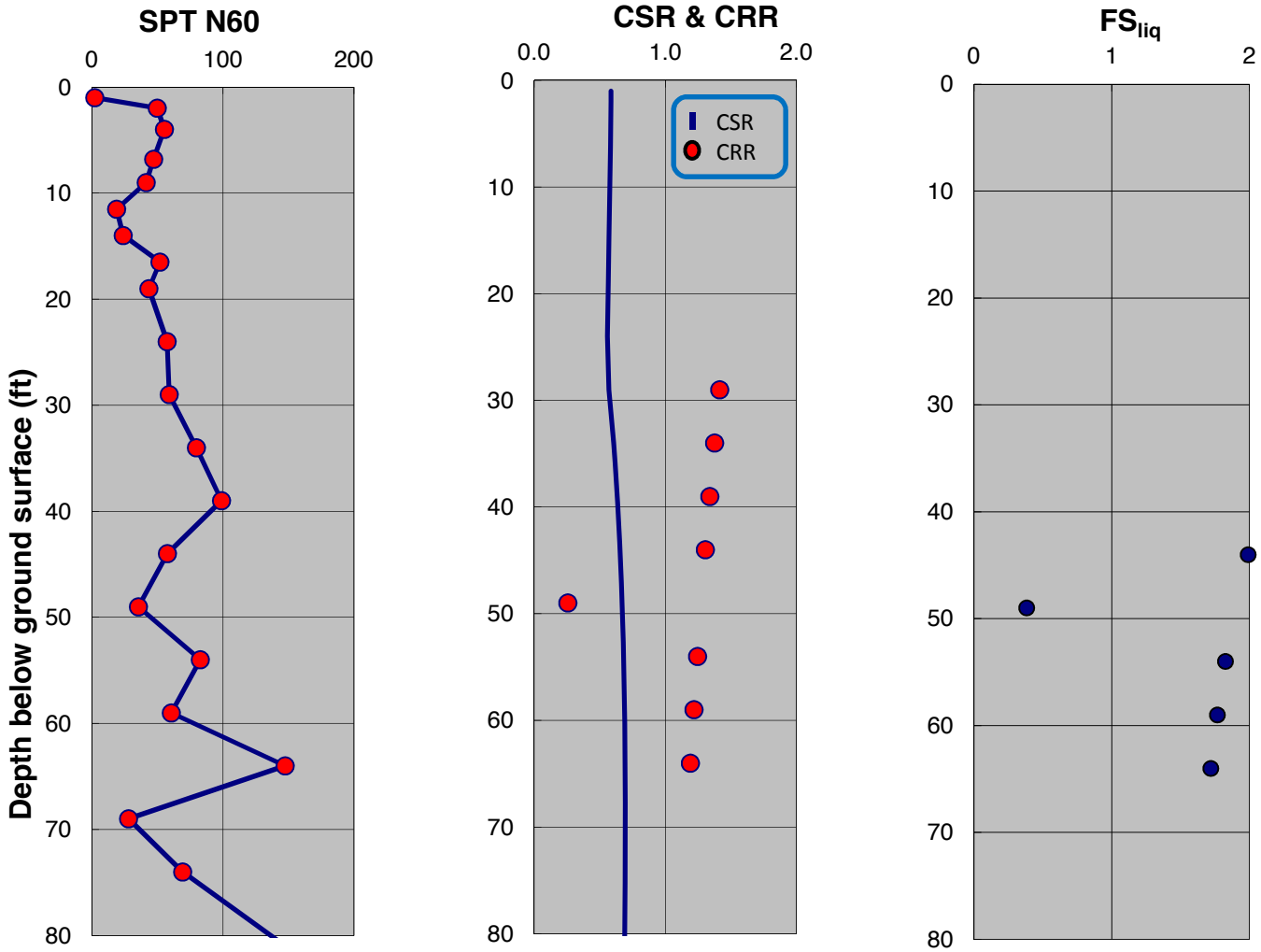
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-75 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



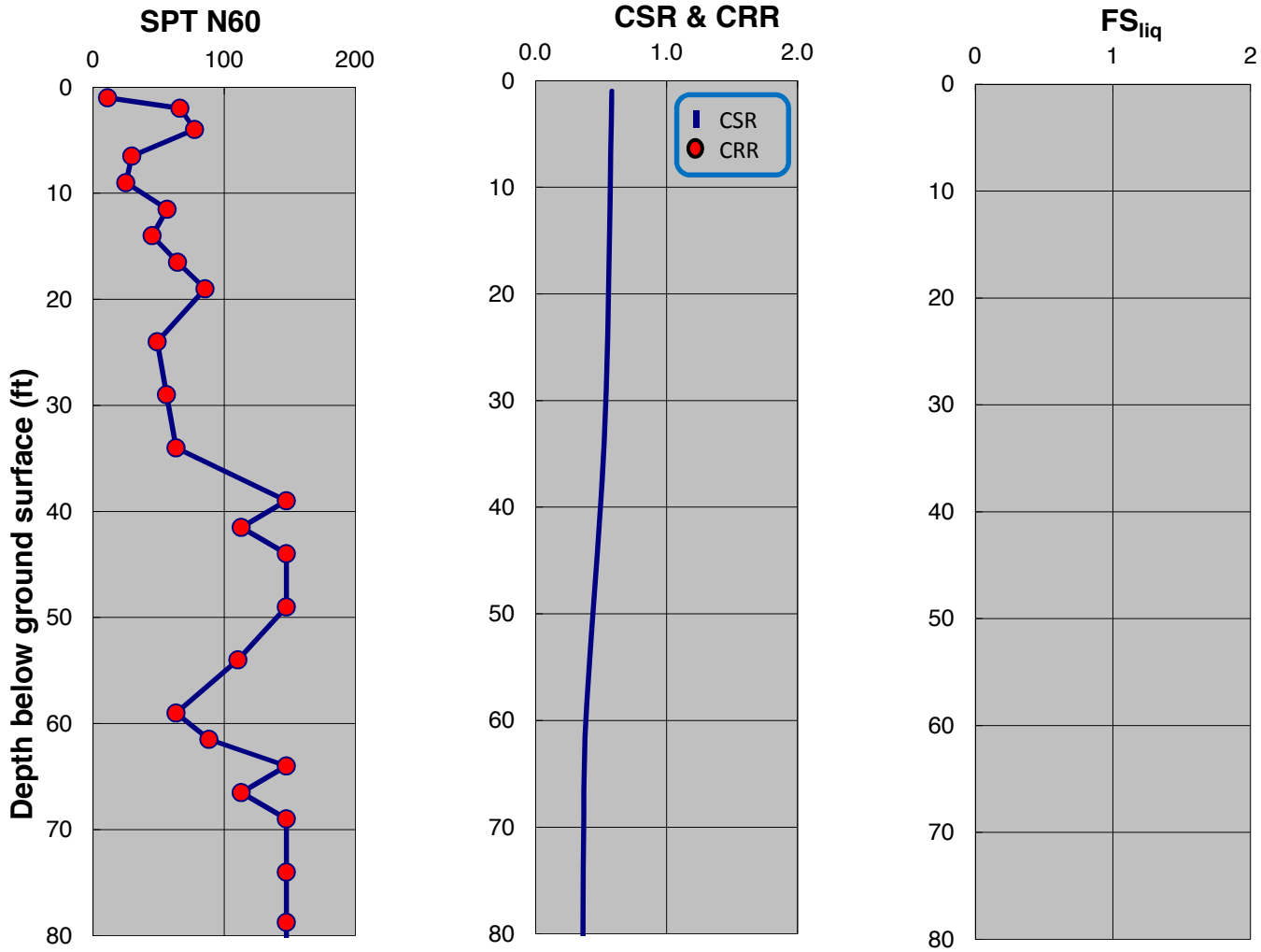
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-76 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



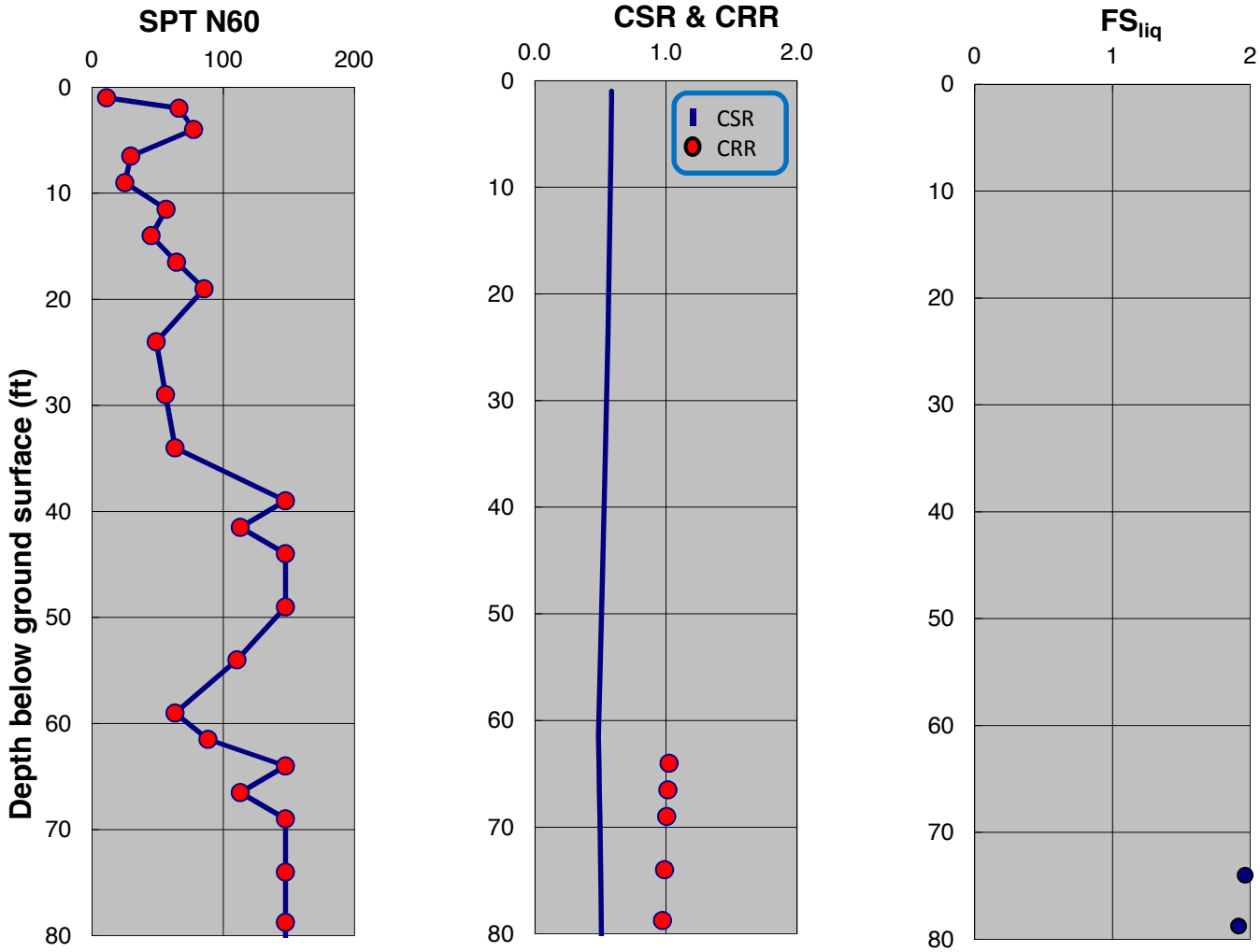
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-76 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-77 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

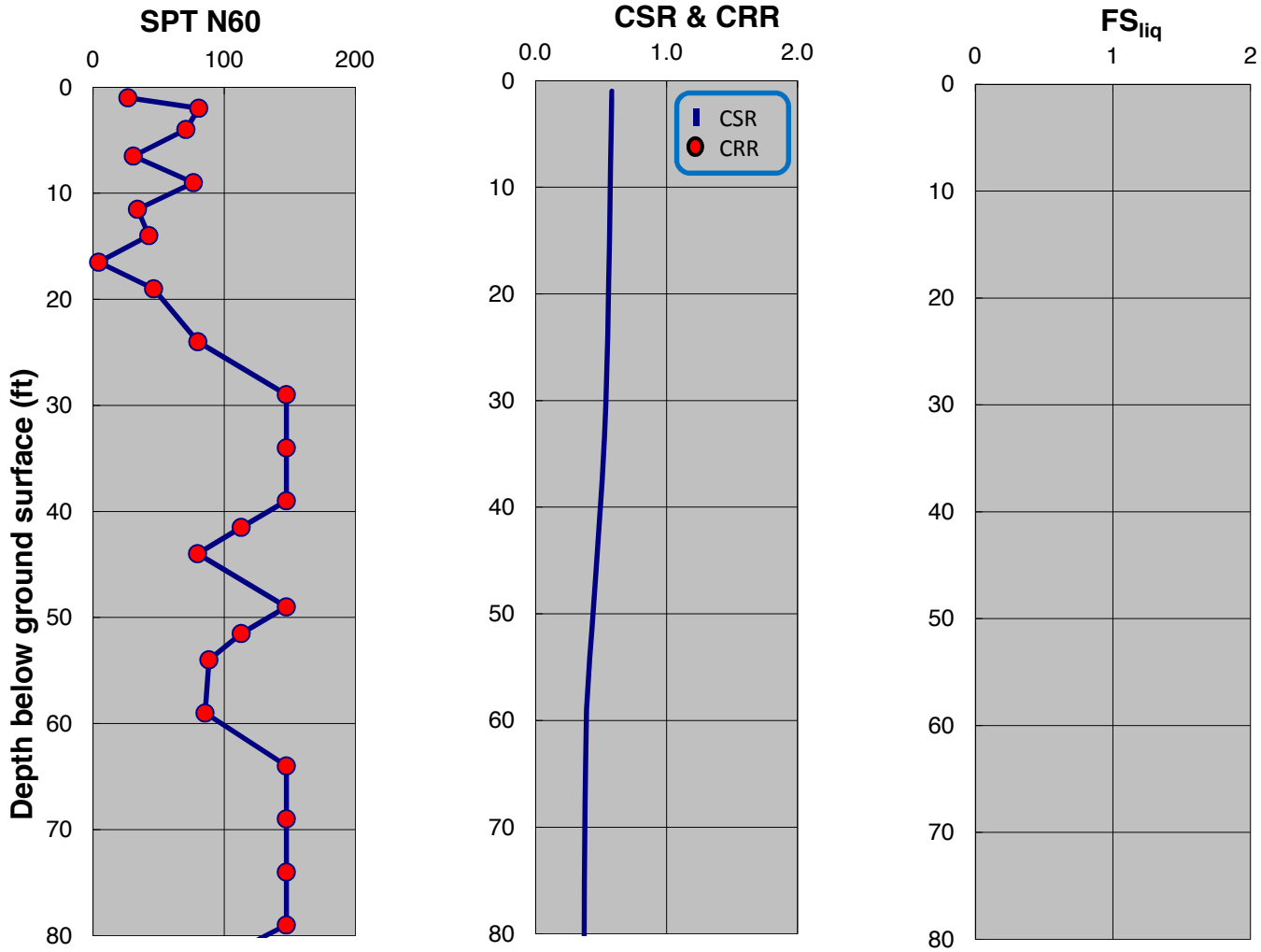
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-77 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

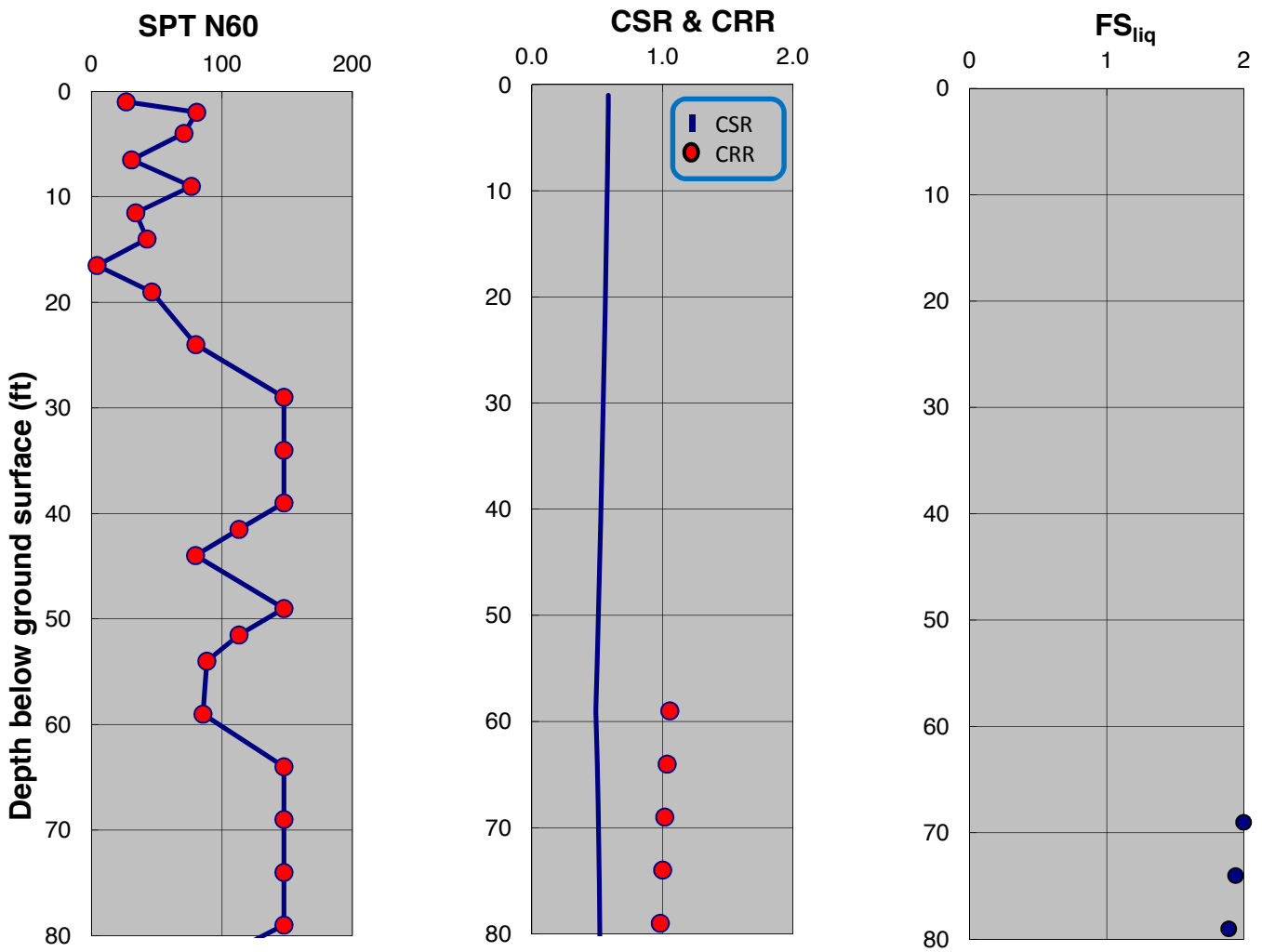
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.340



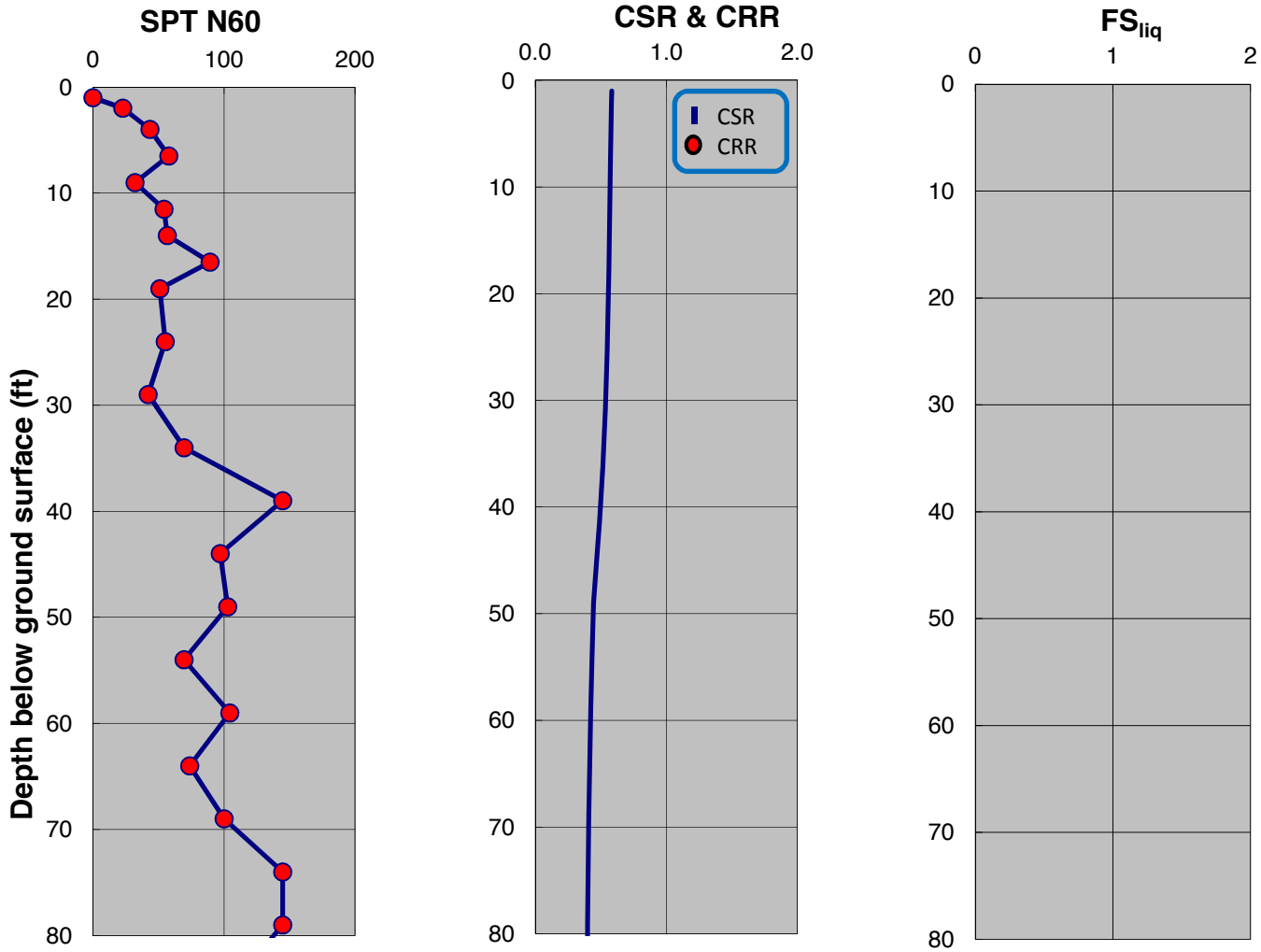
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-78 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



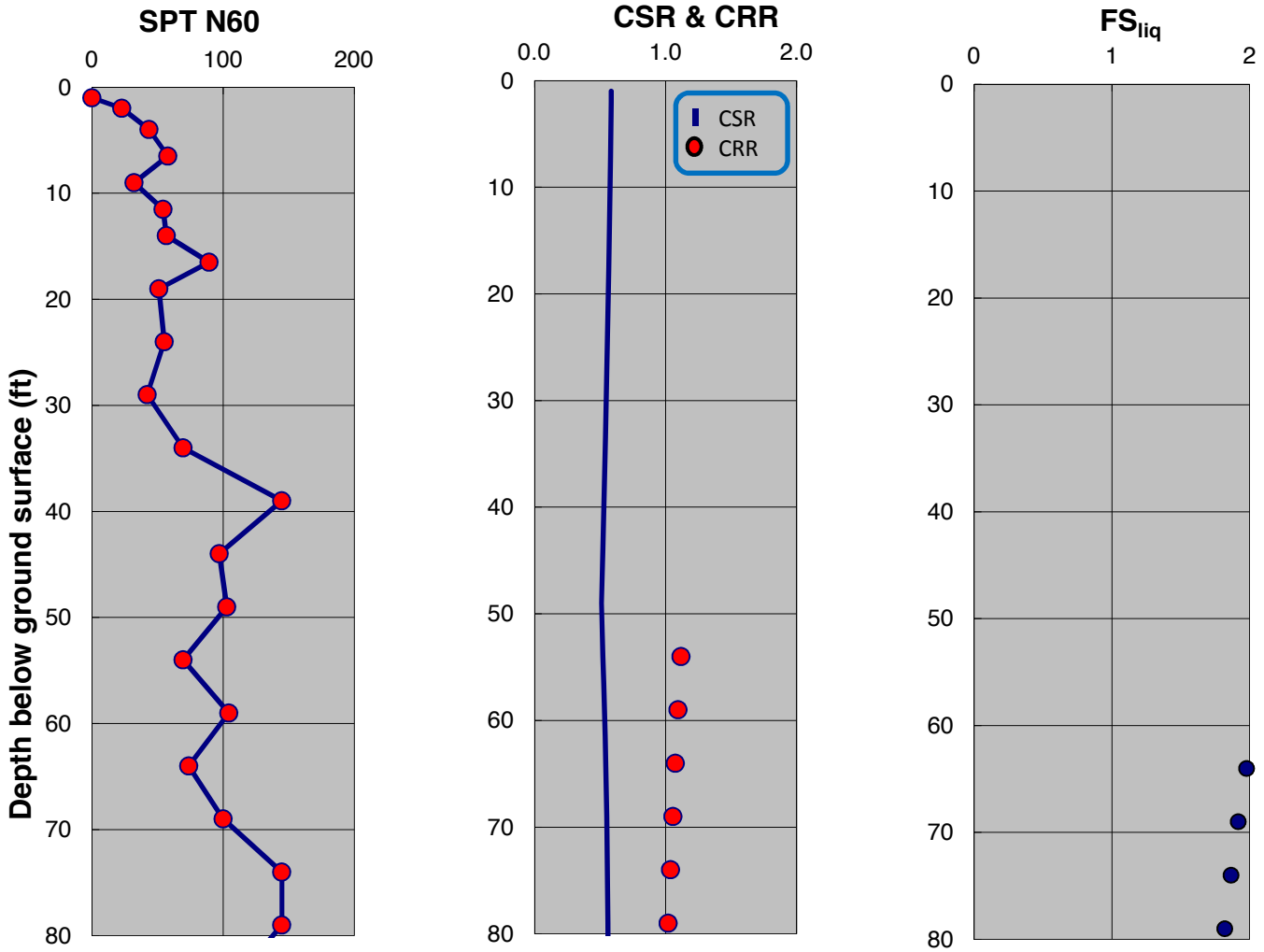
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-78 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



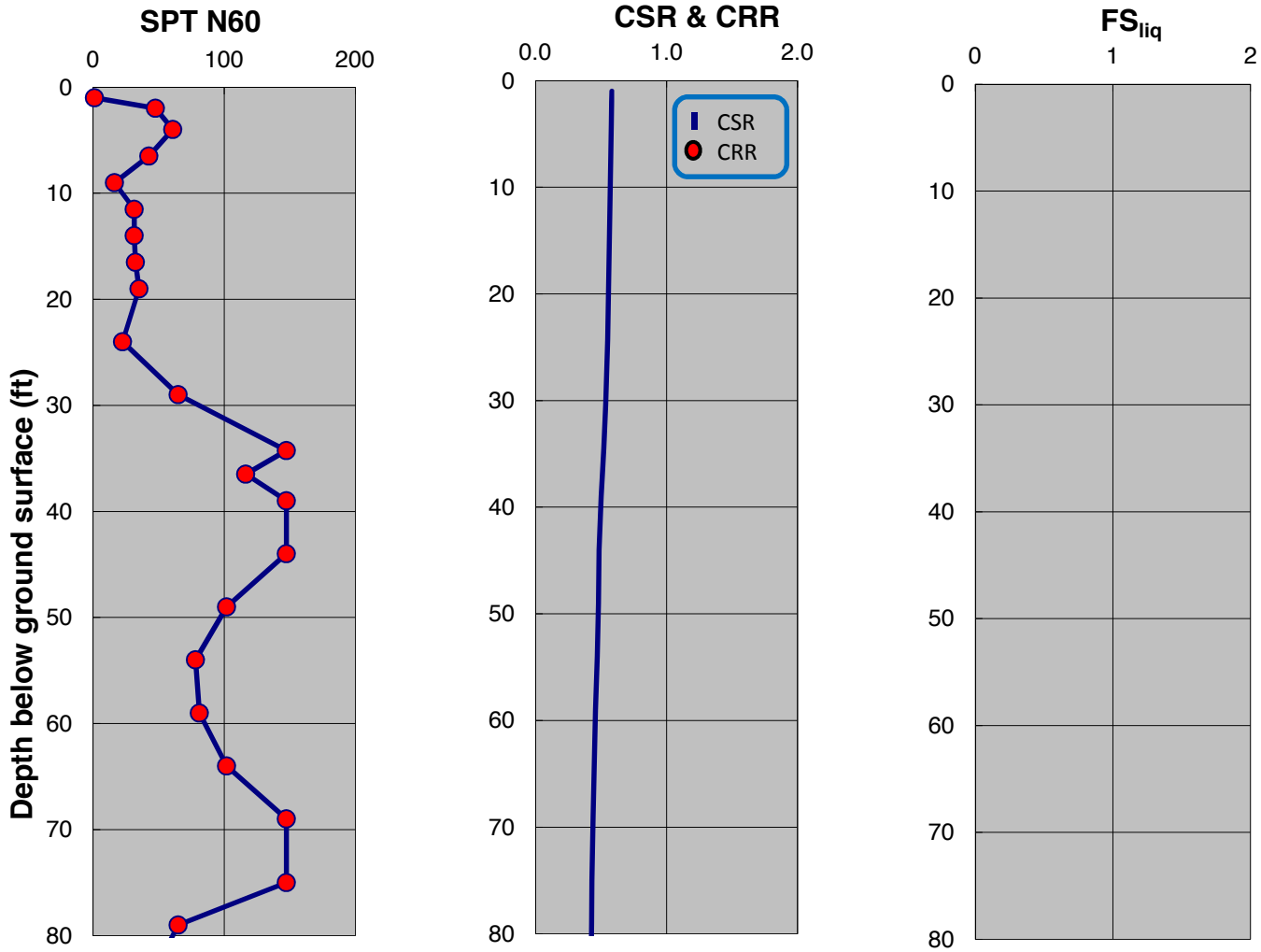
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-79 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



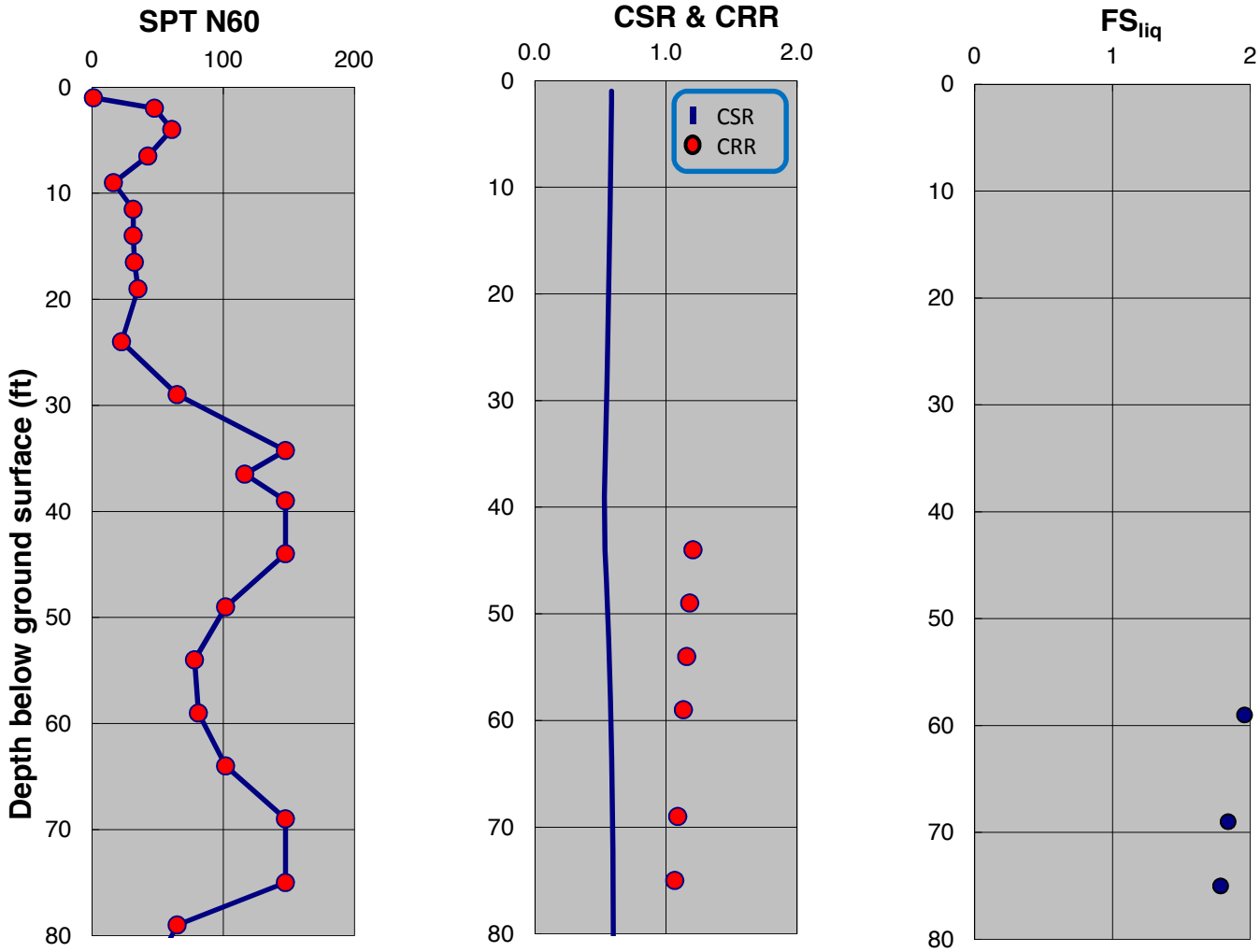
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-79 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



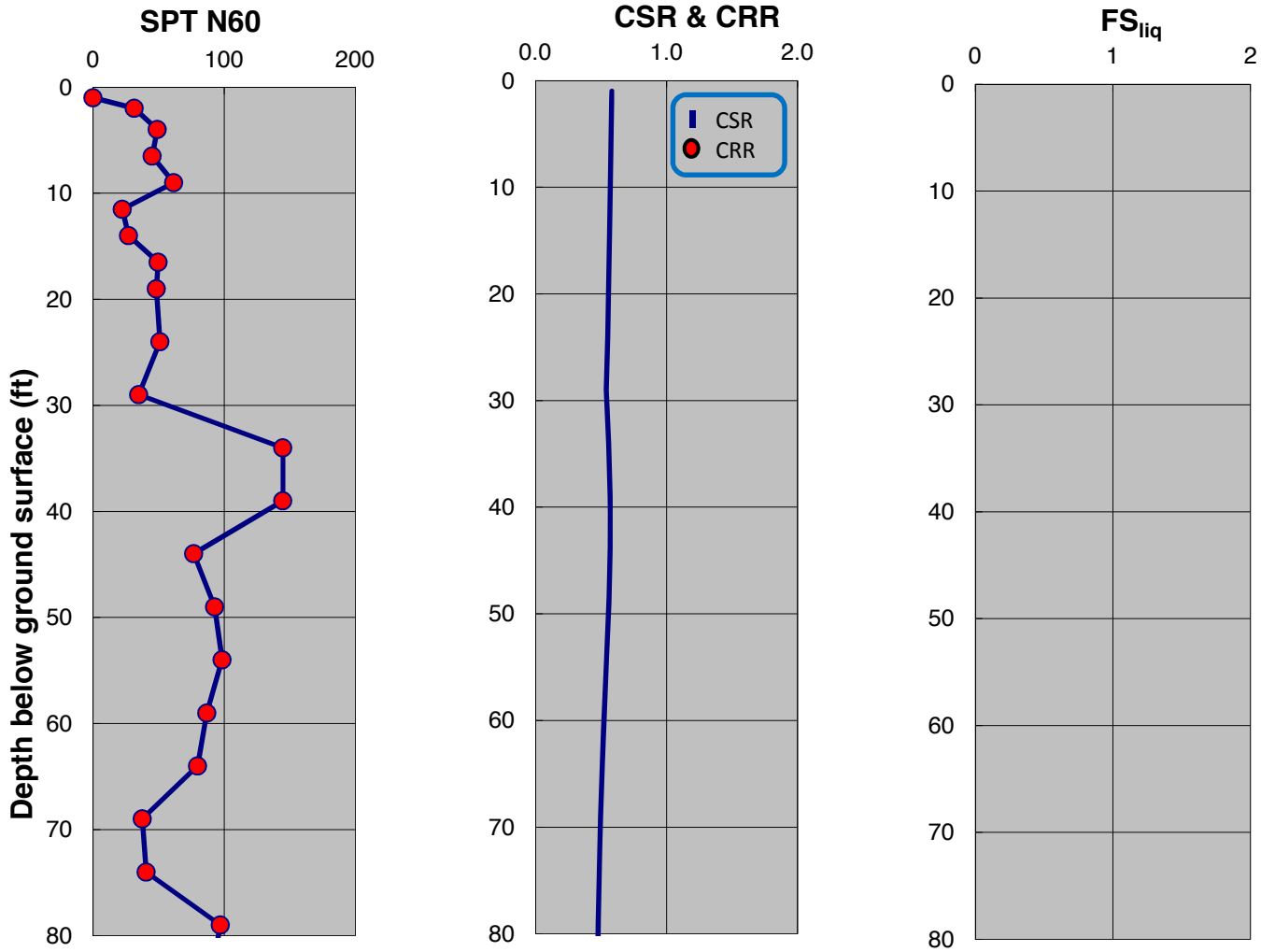
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-80 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



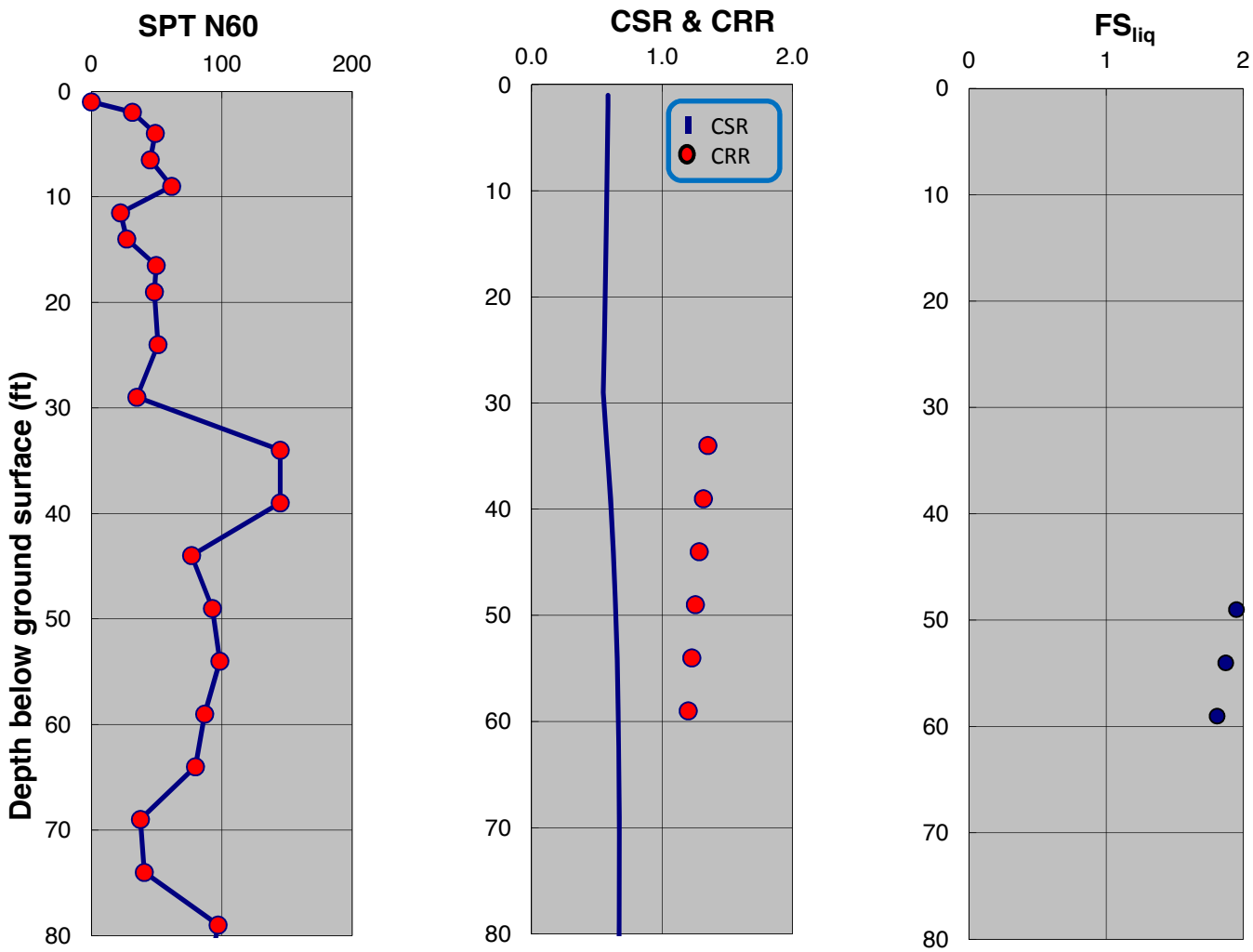
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-80 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



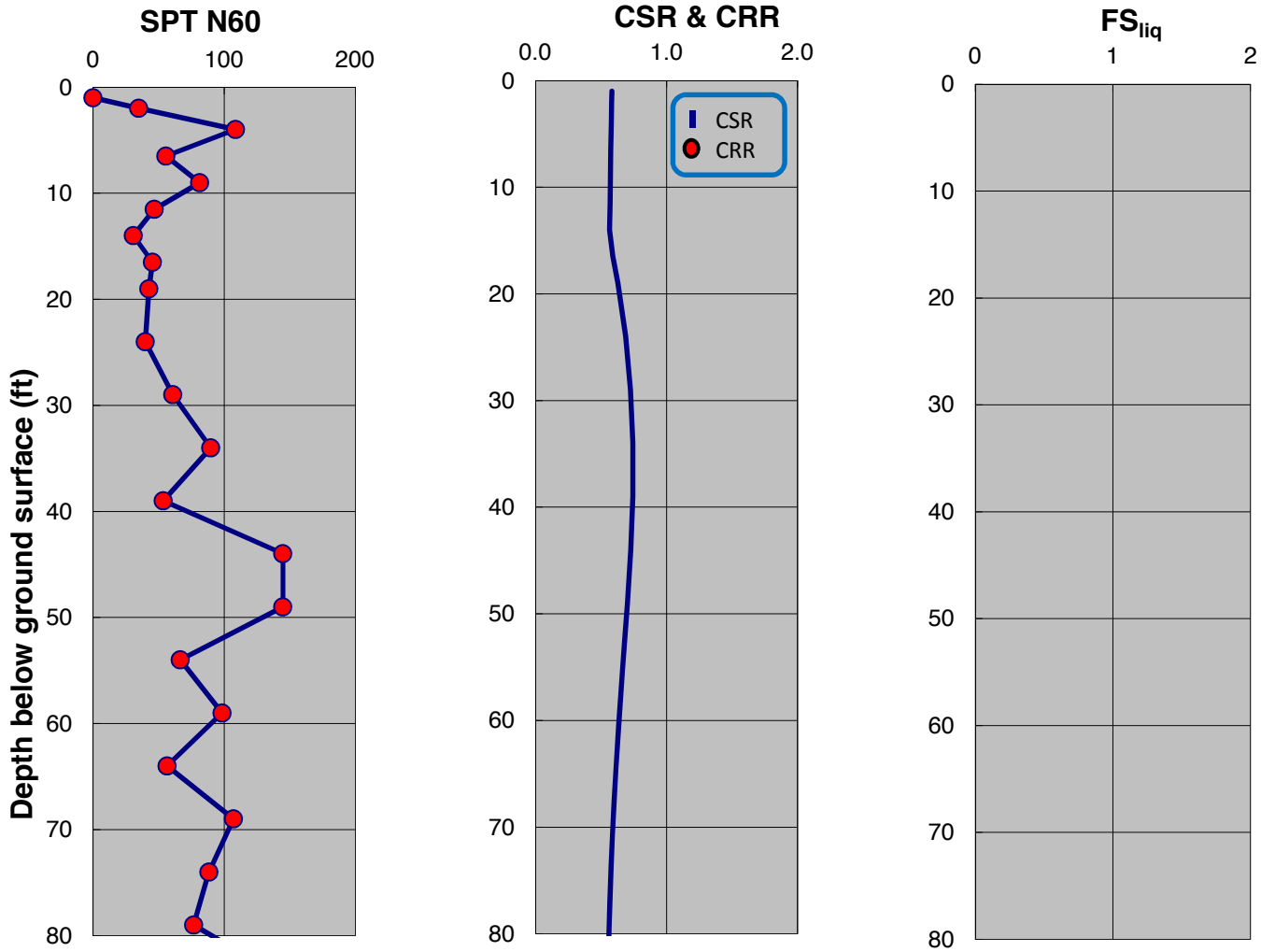
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-81 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



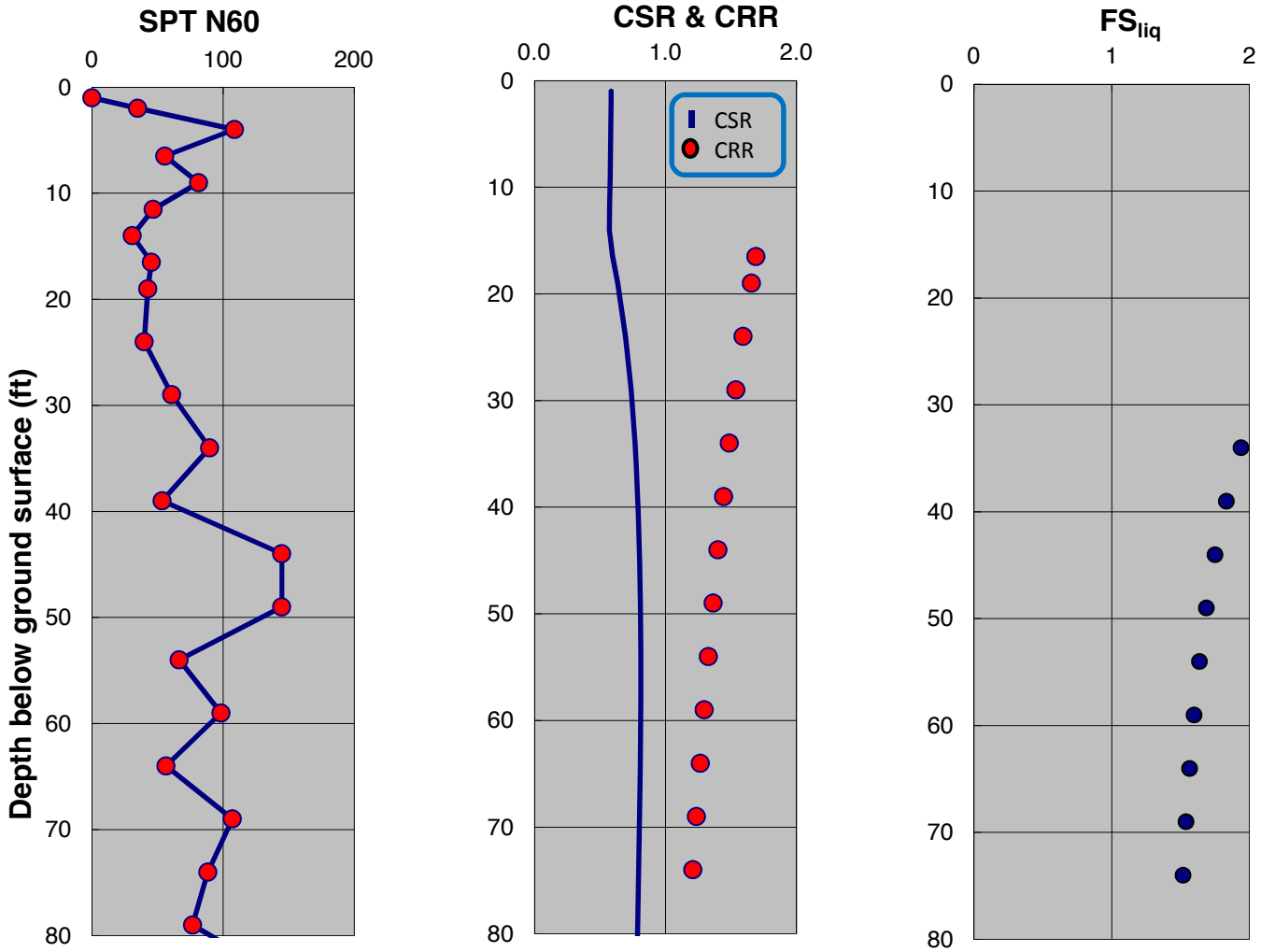
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-81 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-82 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

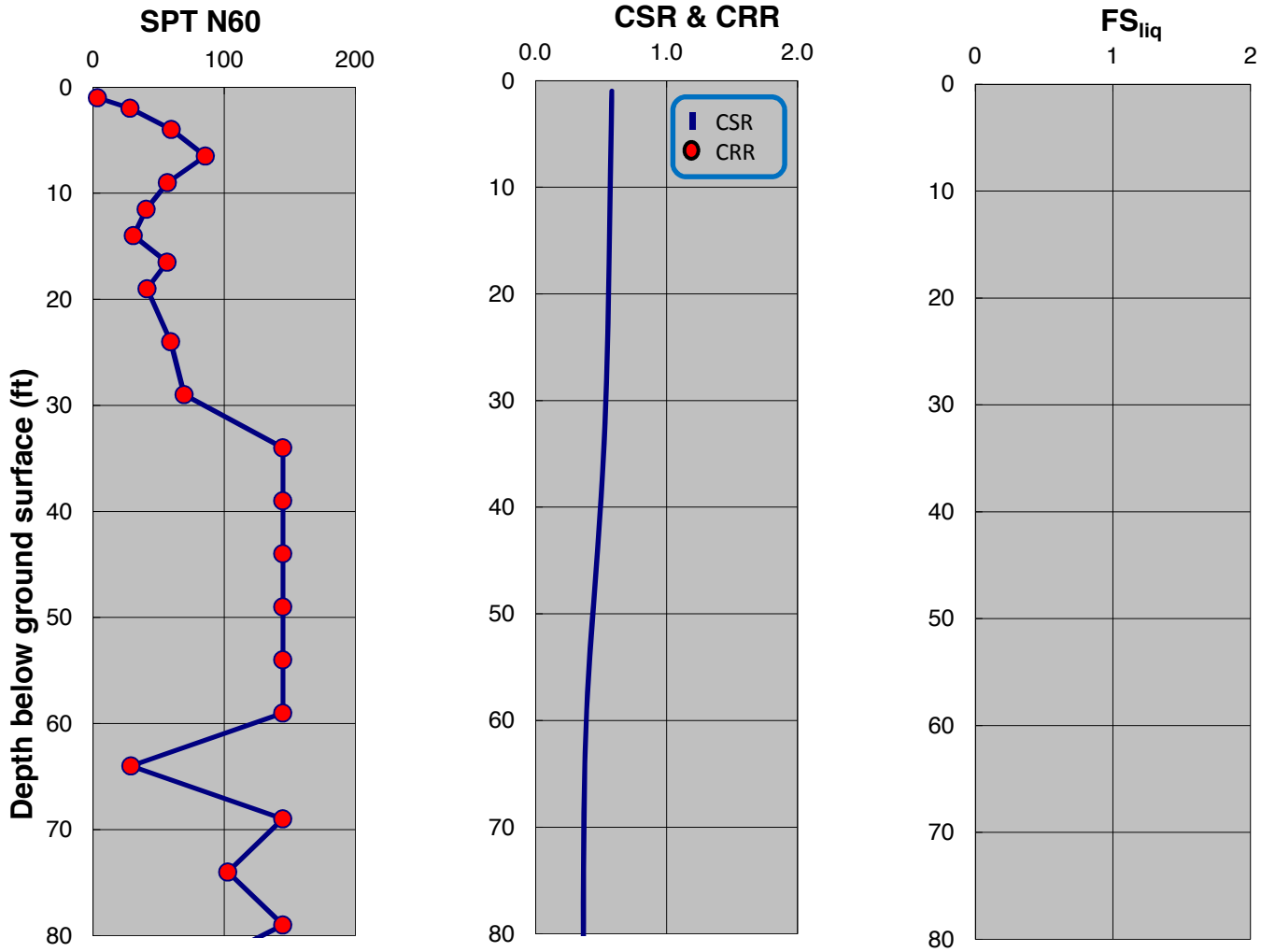
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-82 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

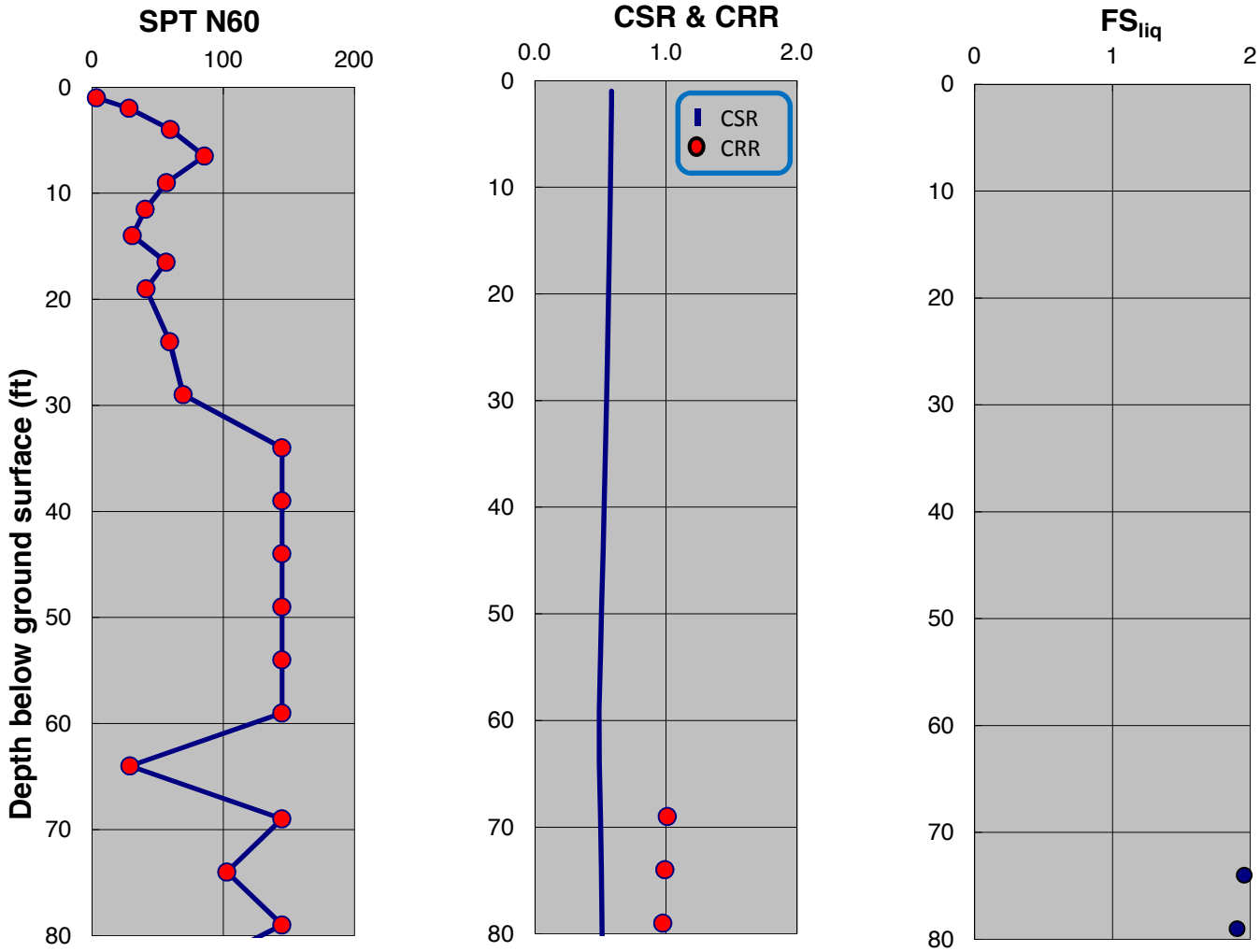
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.350



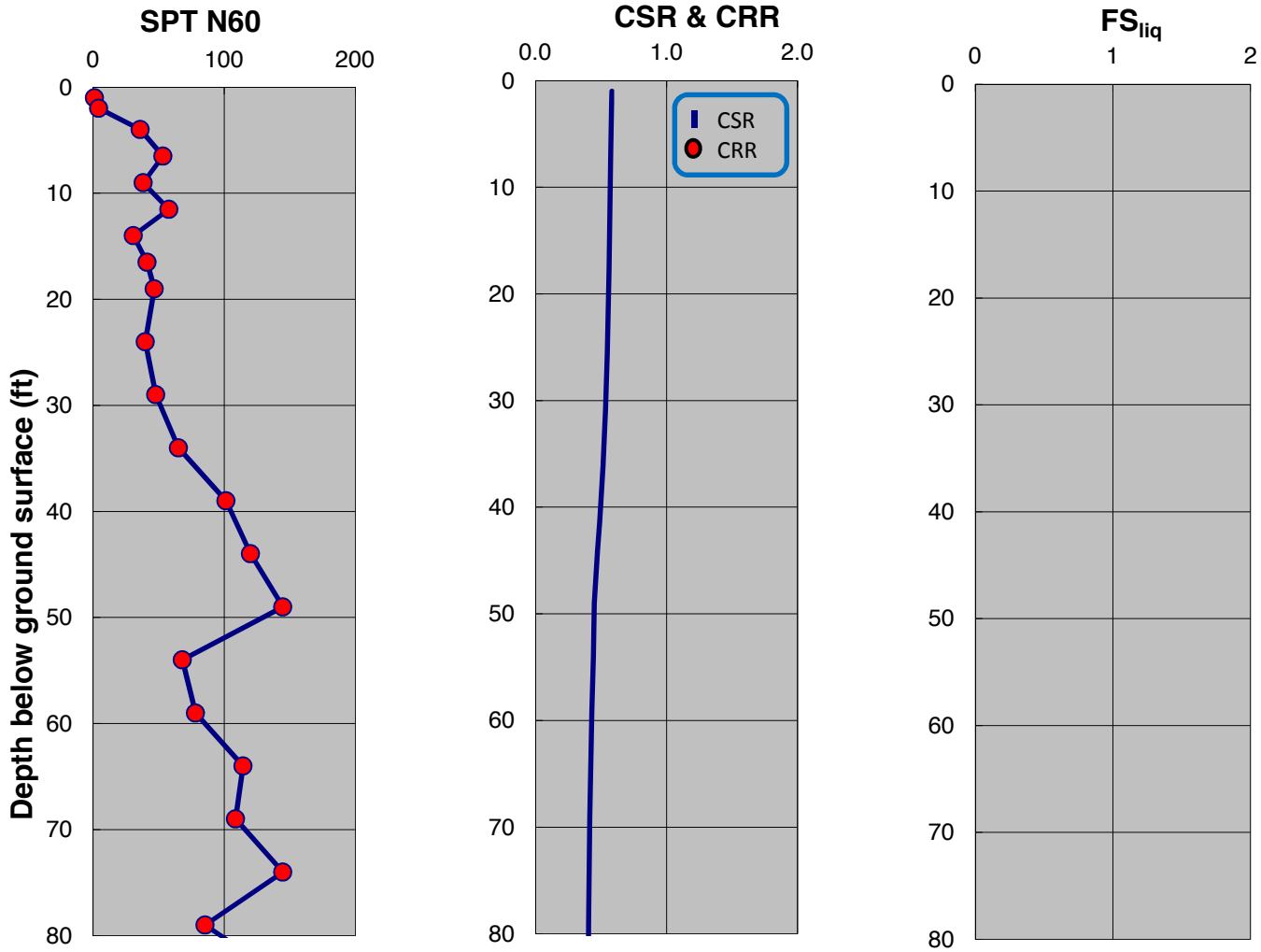
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-83 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



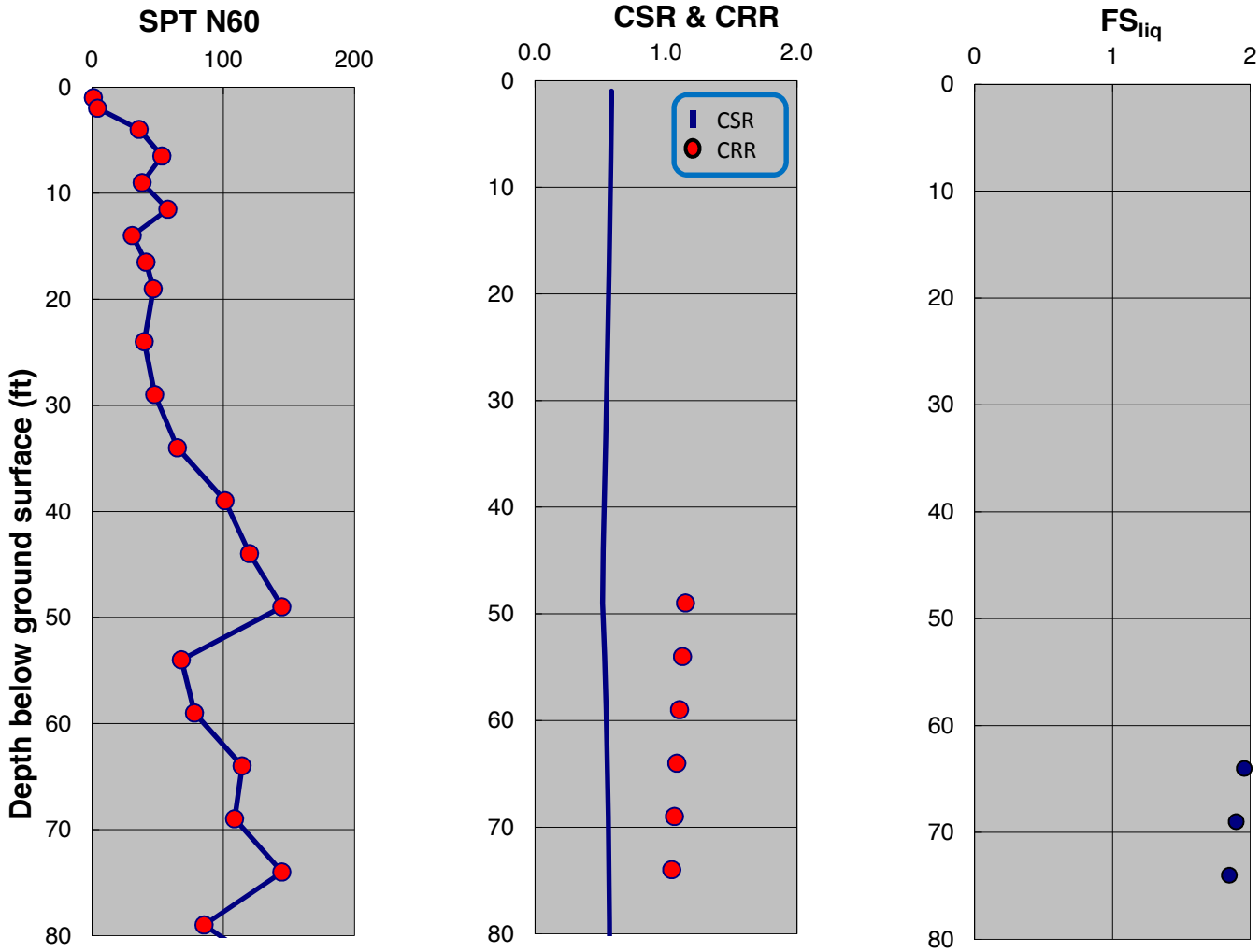
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-83 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



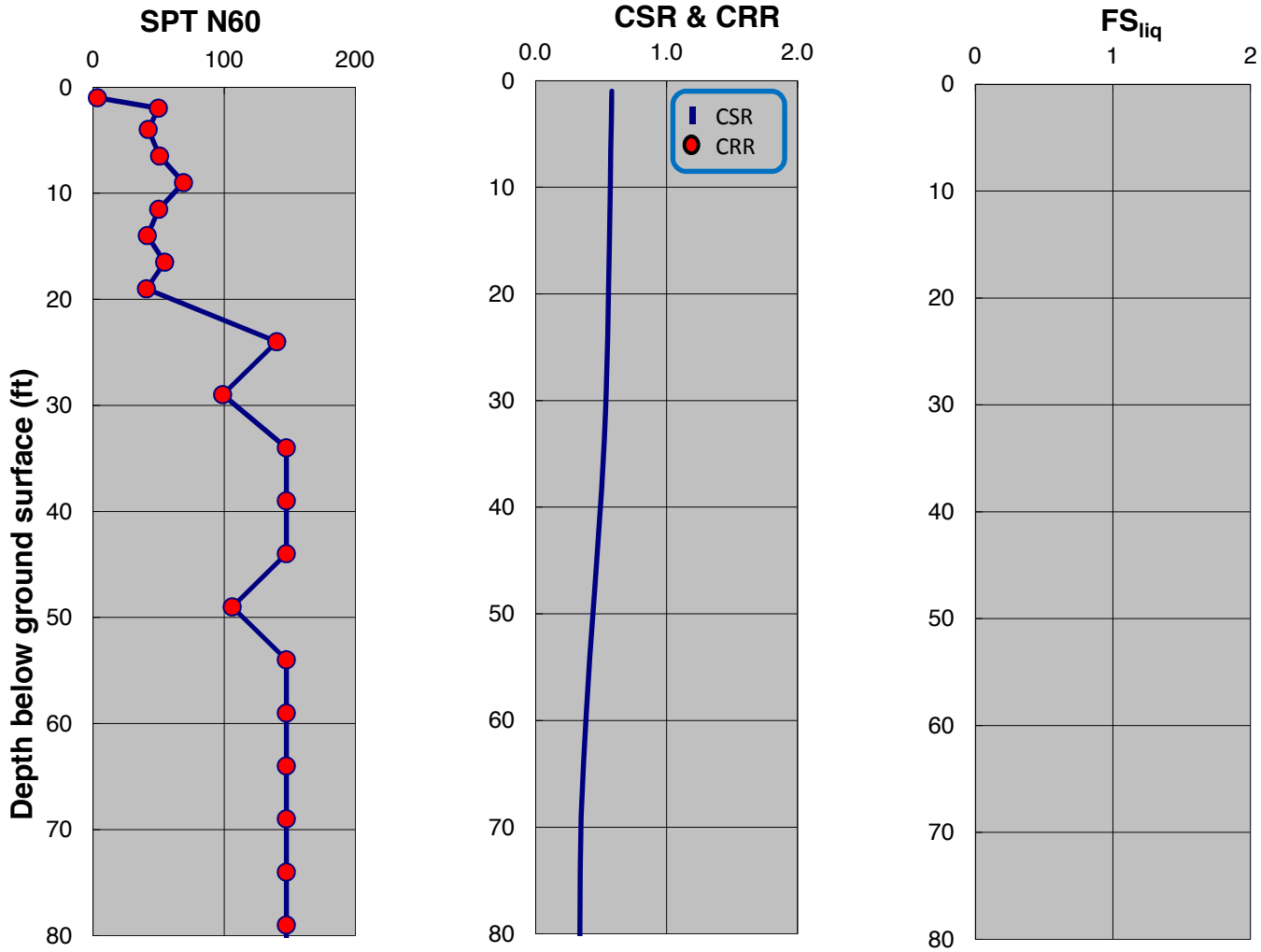
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-84 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



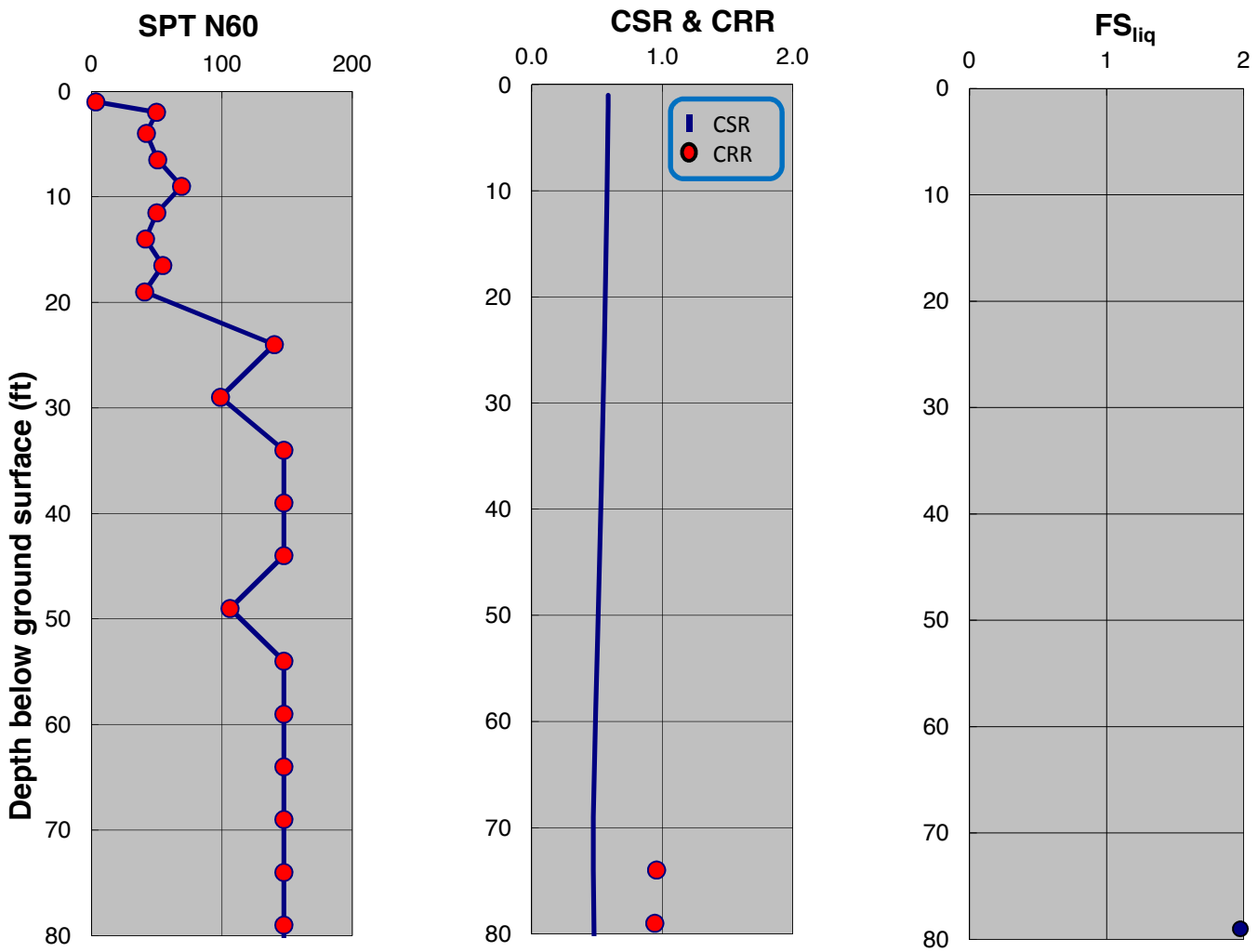
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-84 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



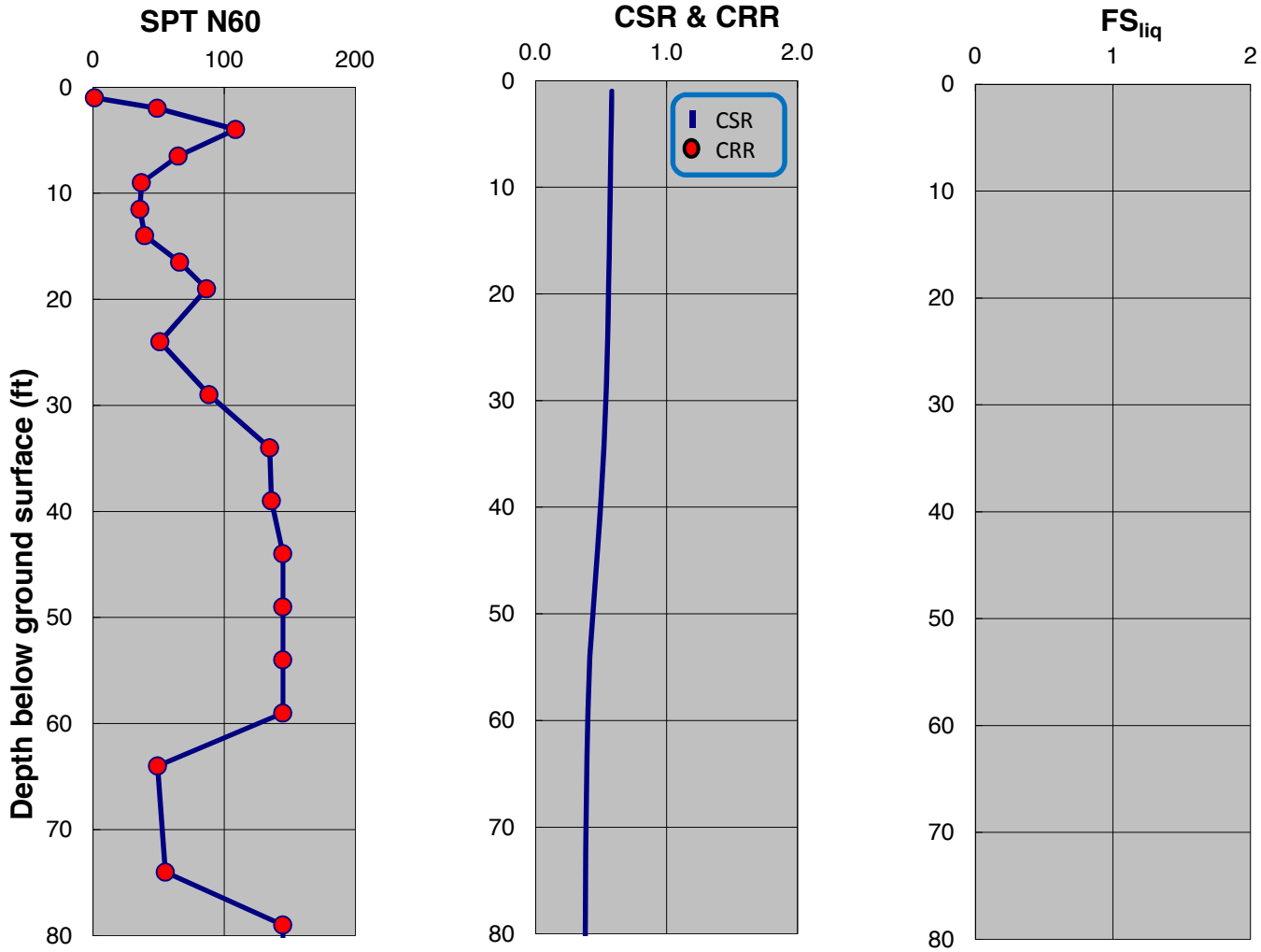
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-85 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



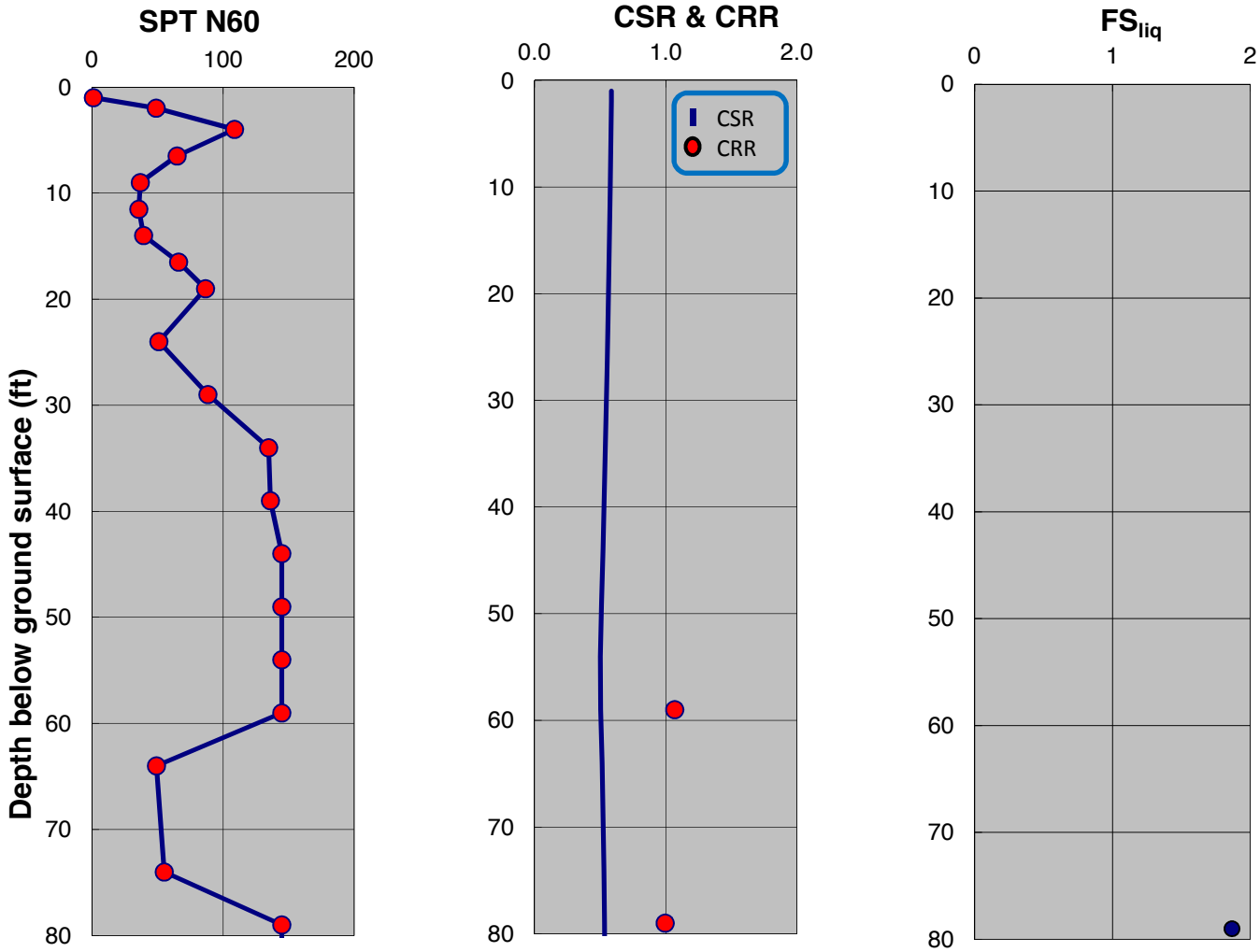
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-85 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



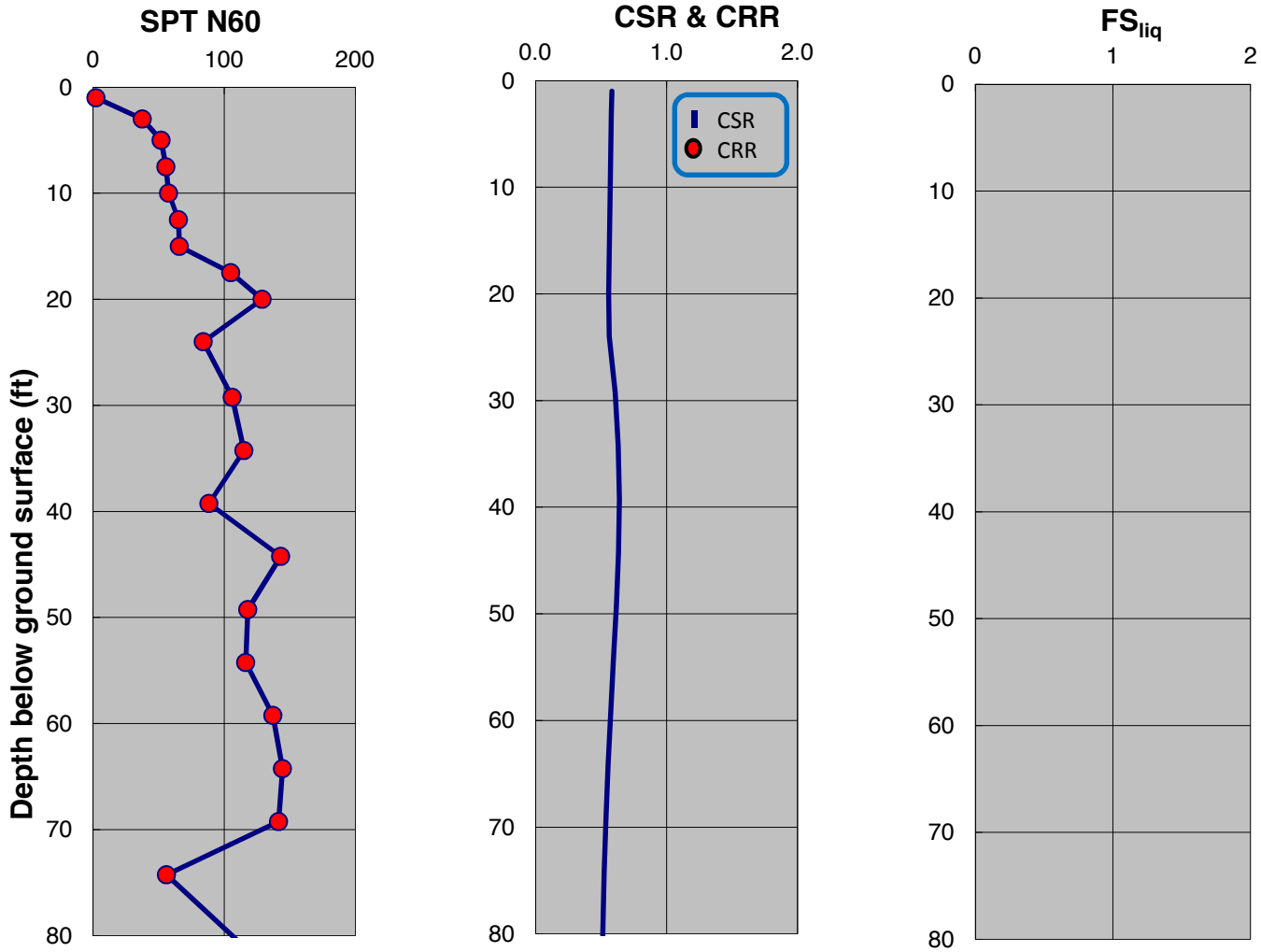
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-86 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



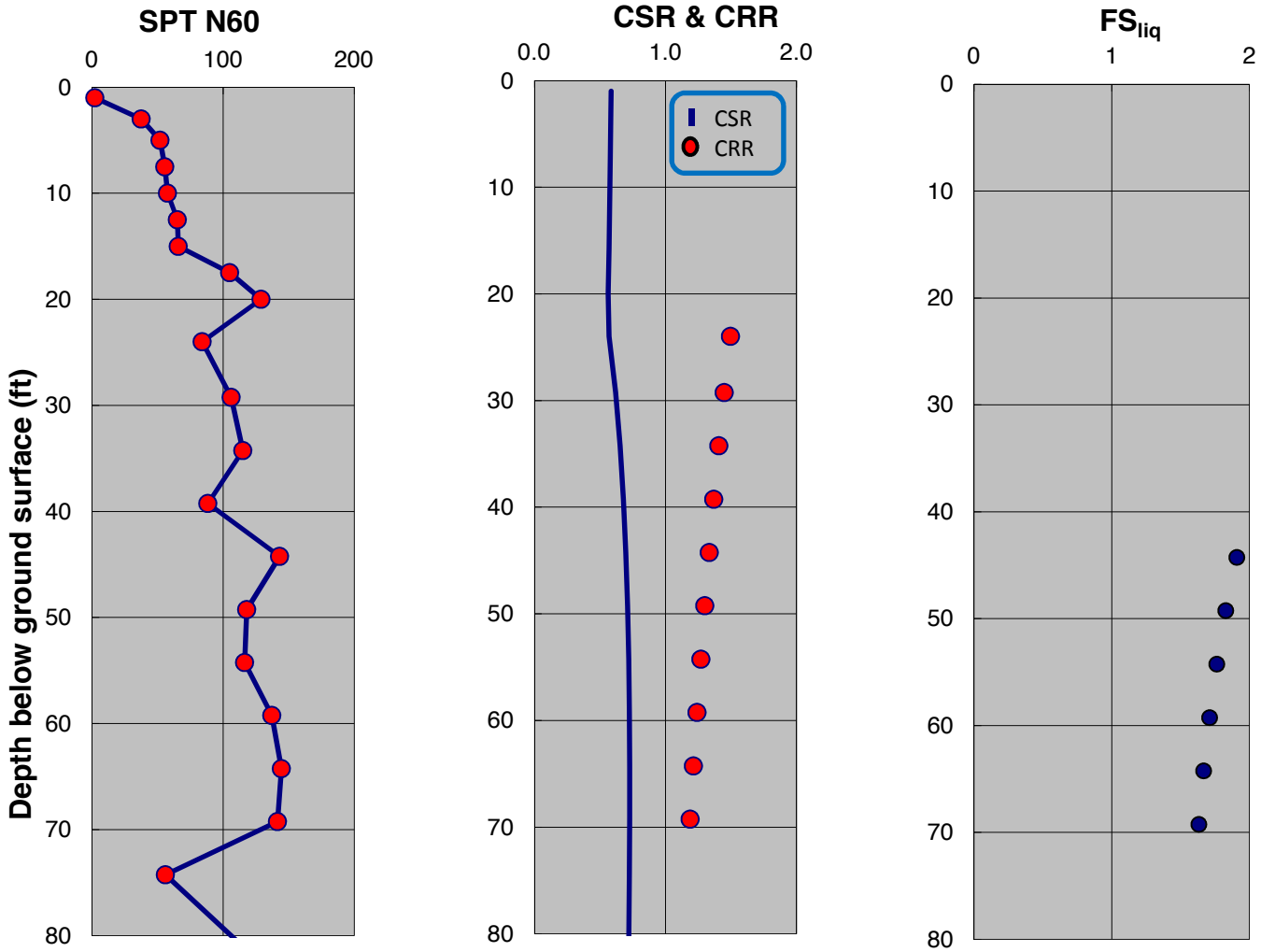
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-86 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-87 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

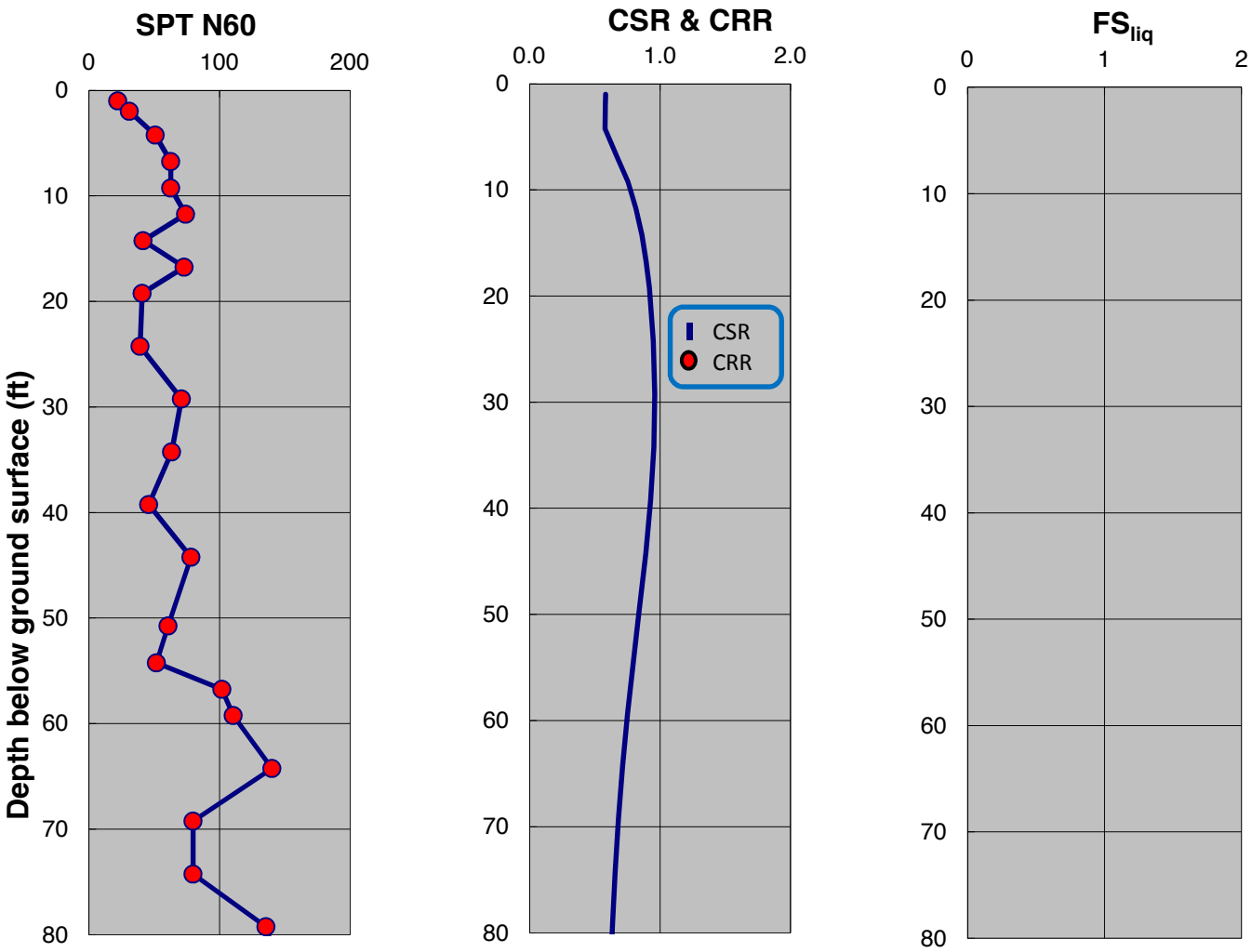
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-87 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

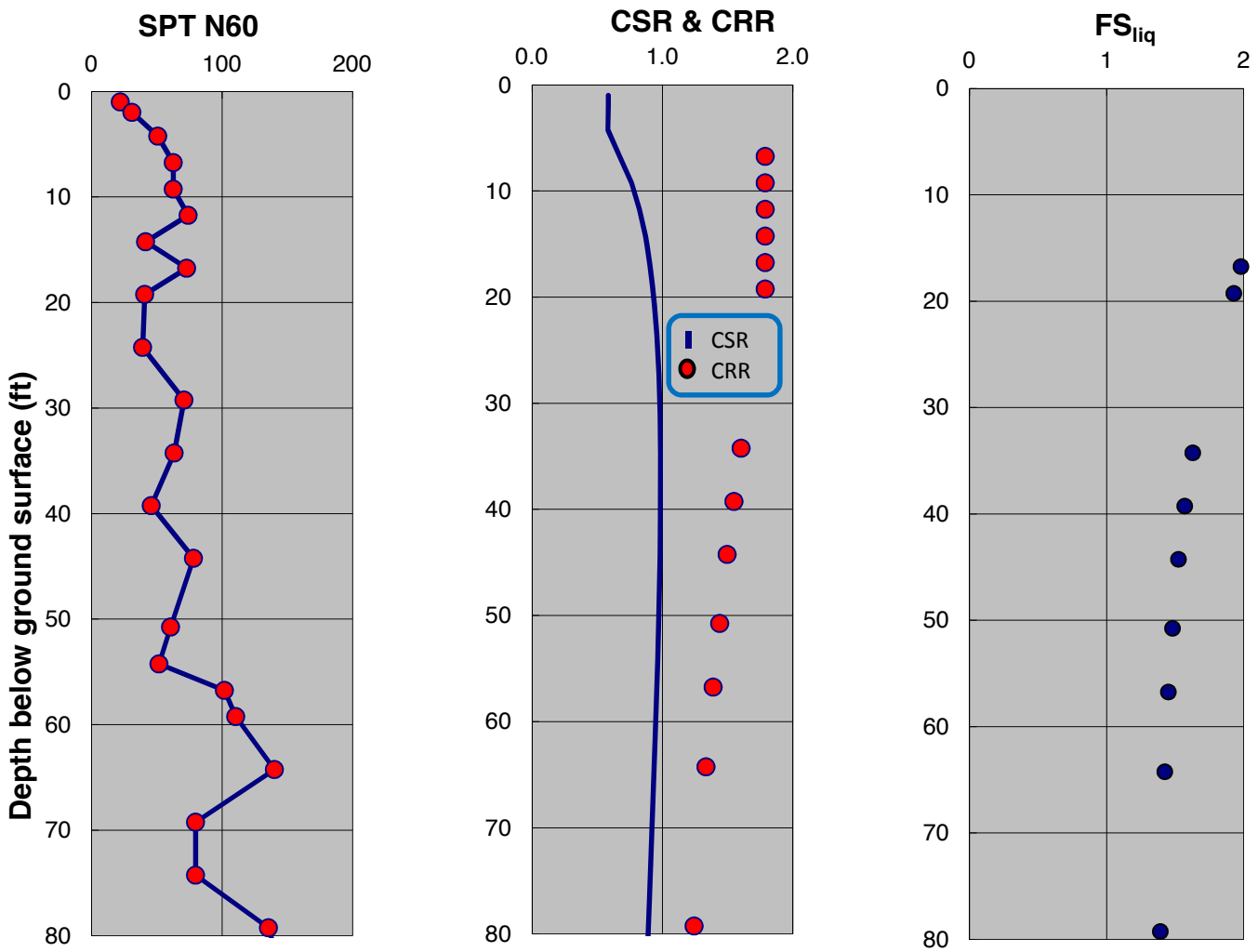
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.360



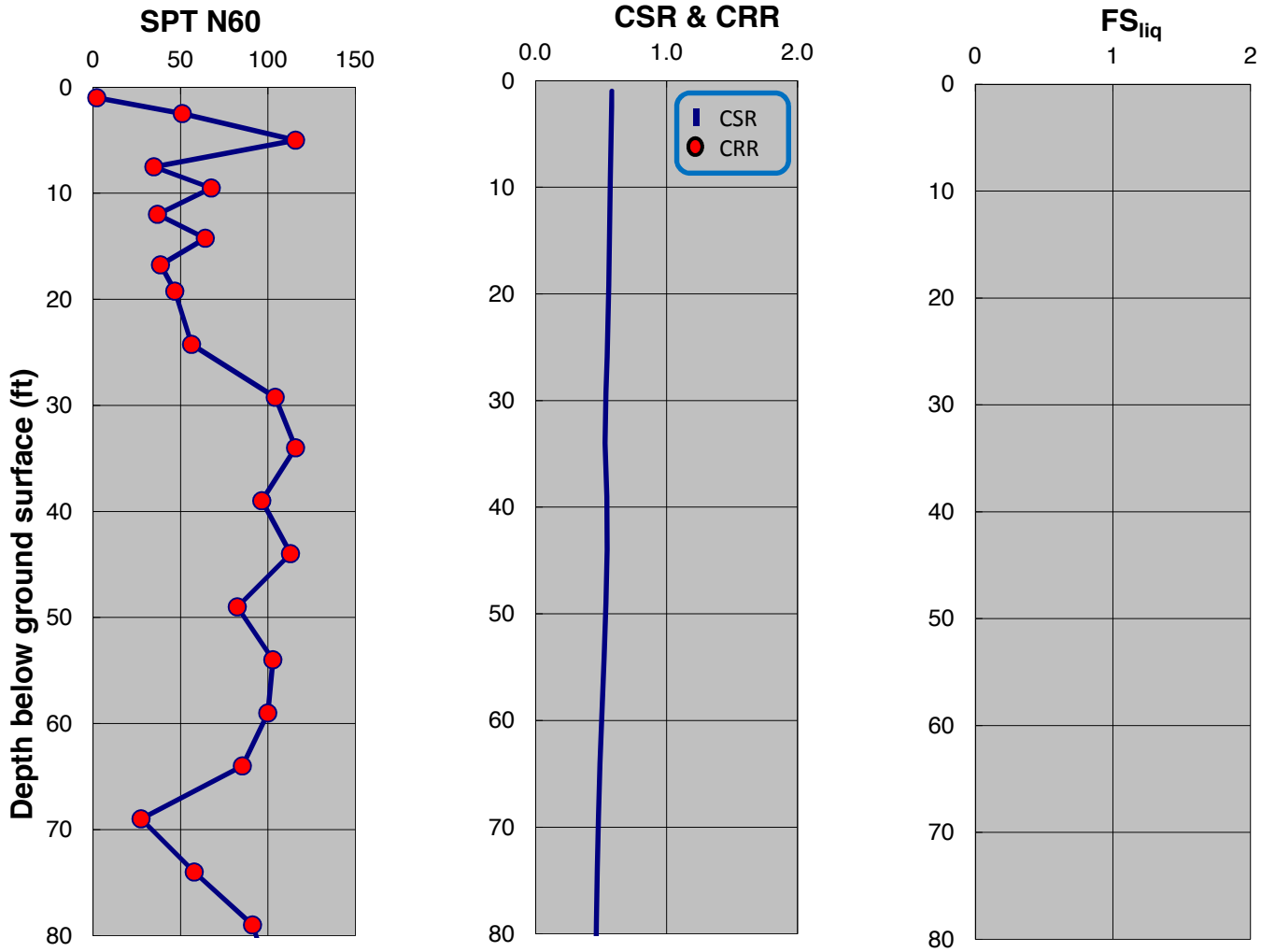
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-88 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-88 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

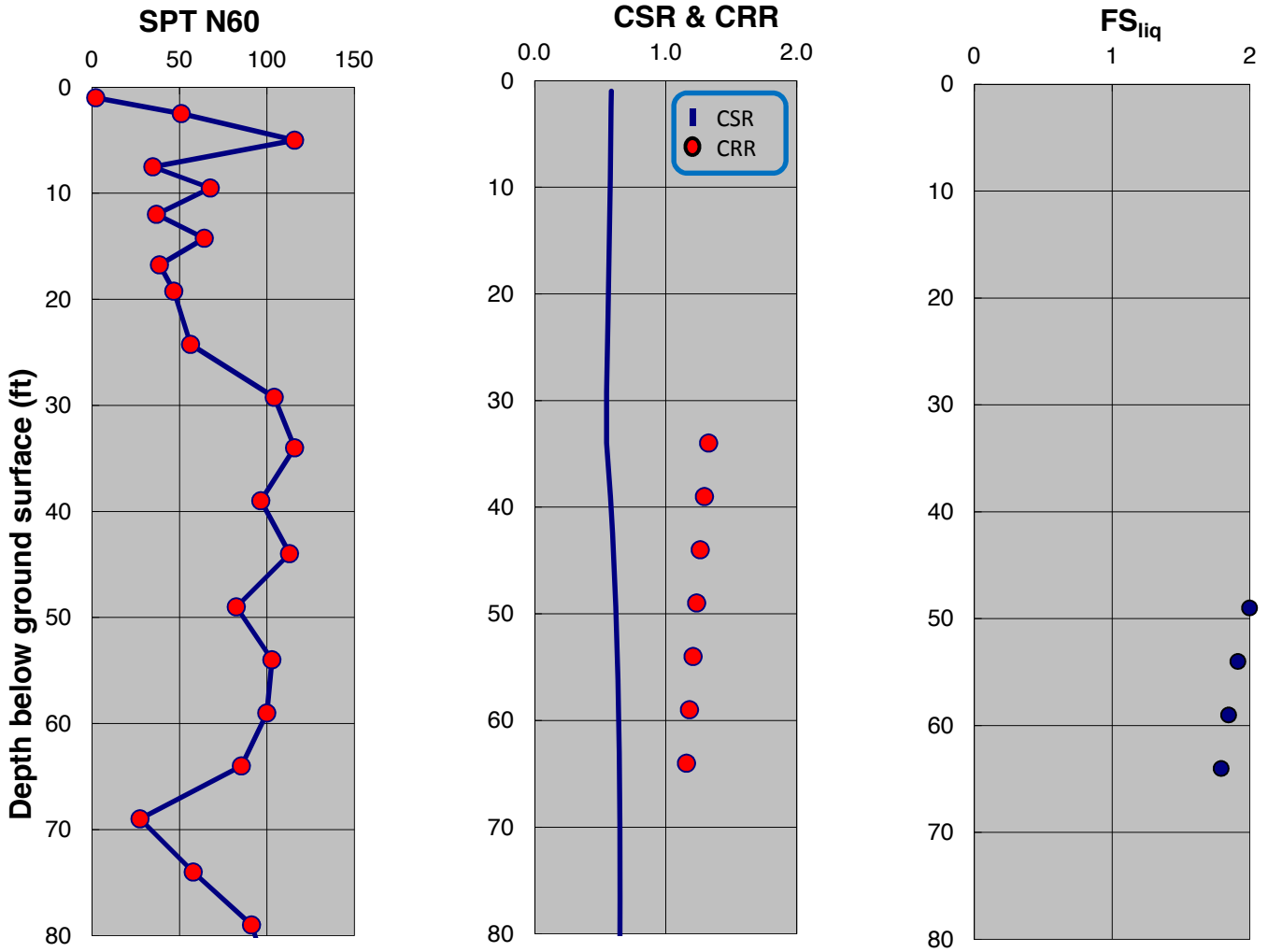
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-89 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

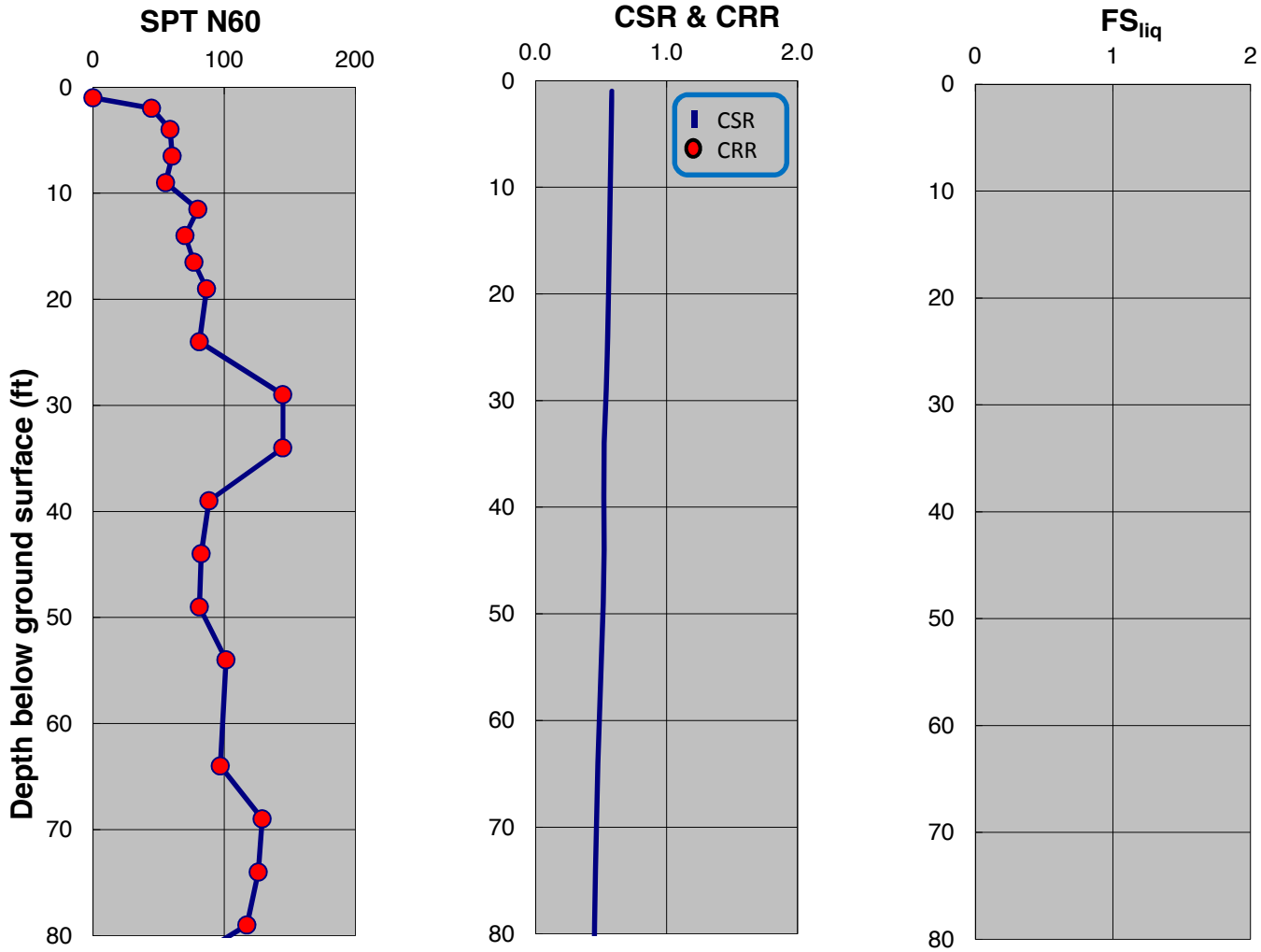
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.363



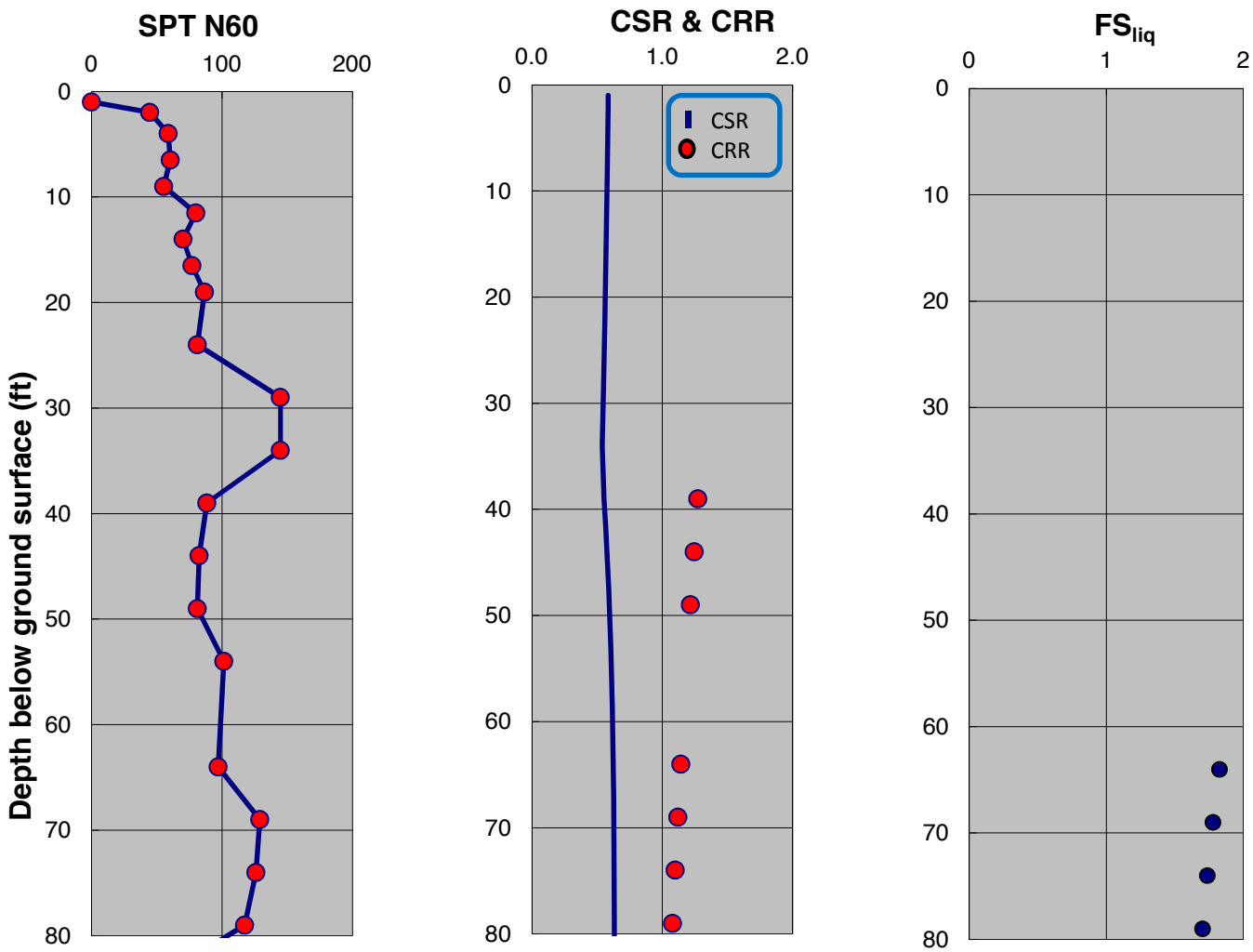
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-89 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



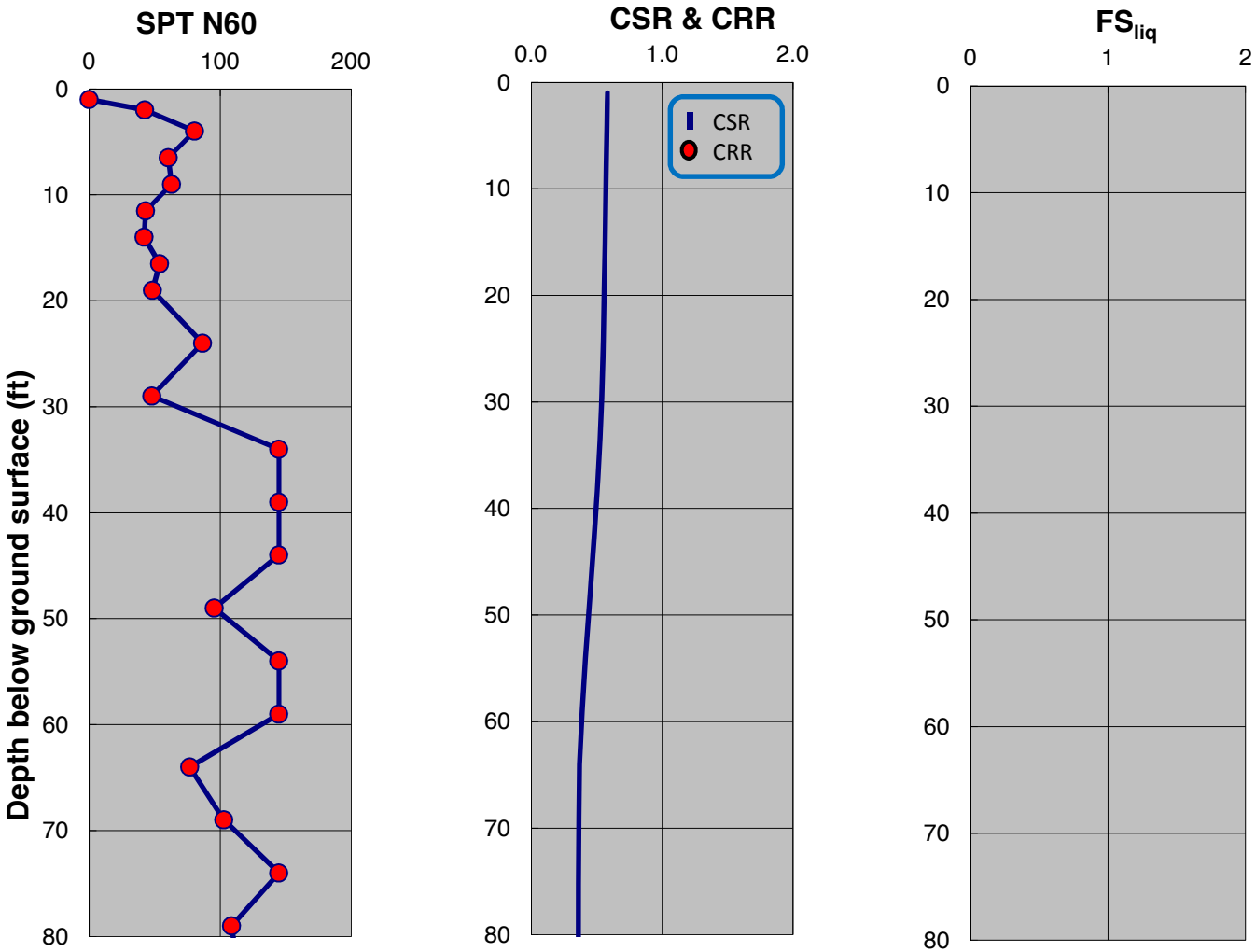
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-90 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



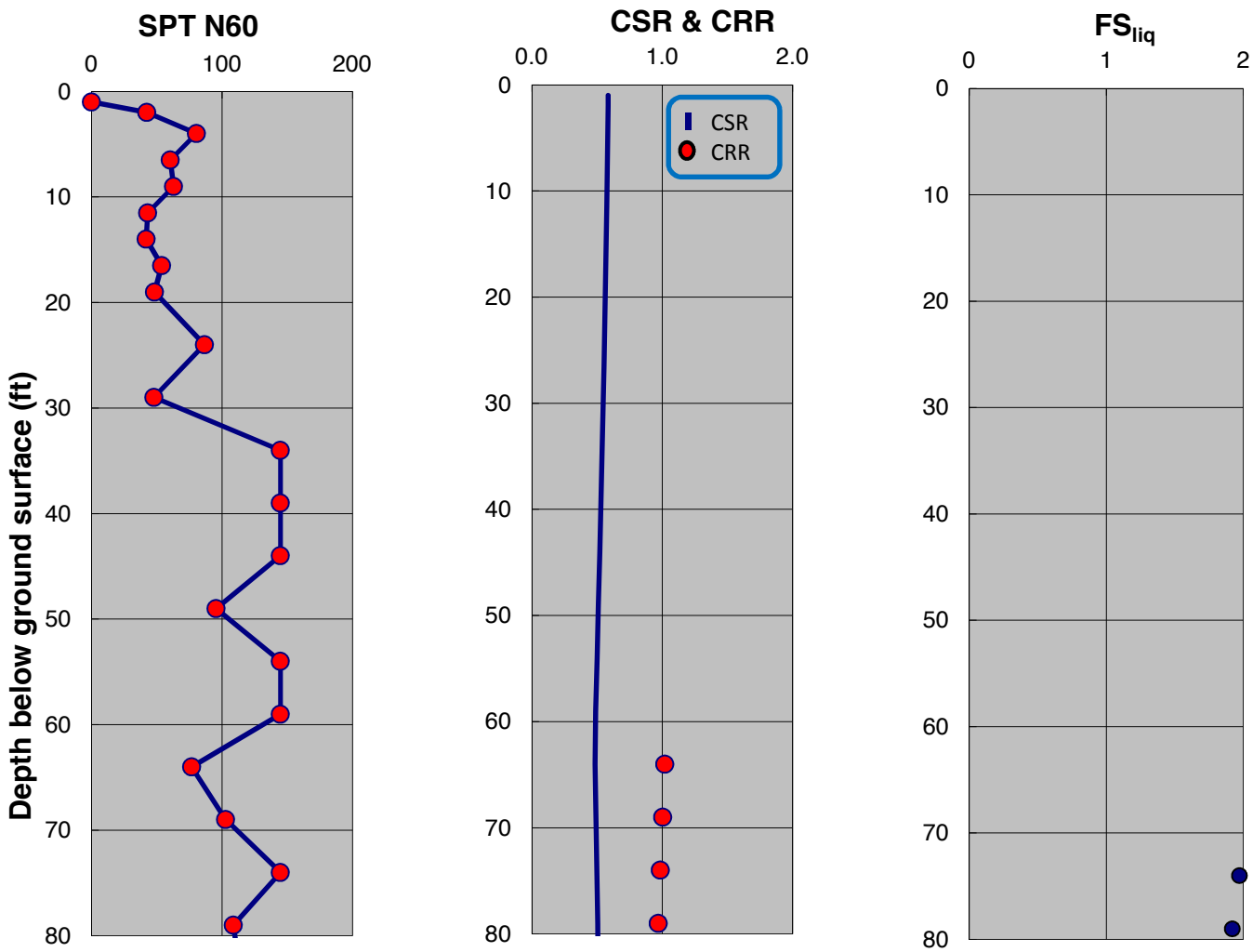
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-90 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



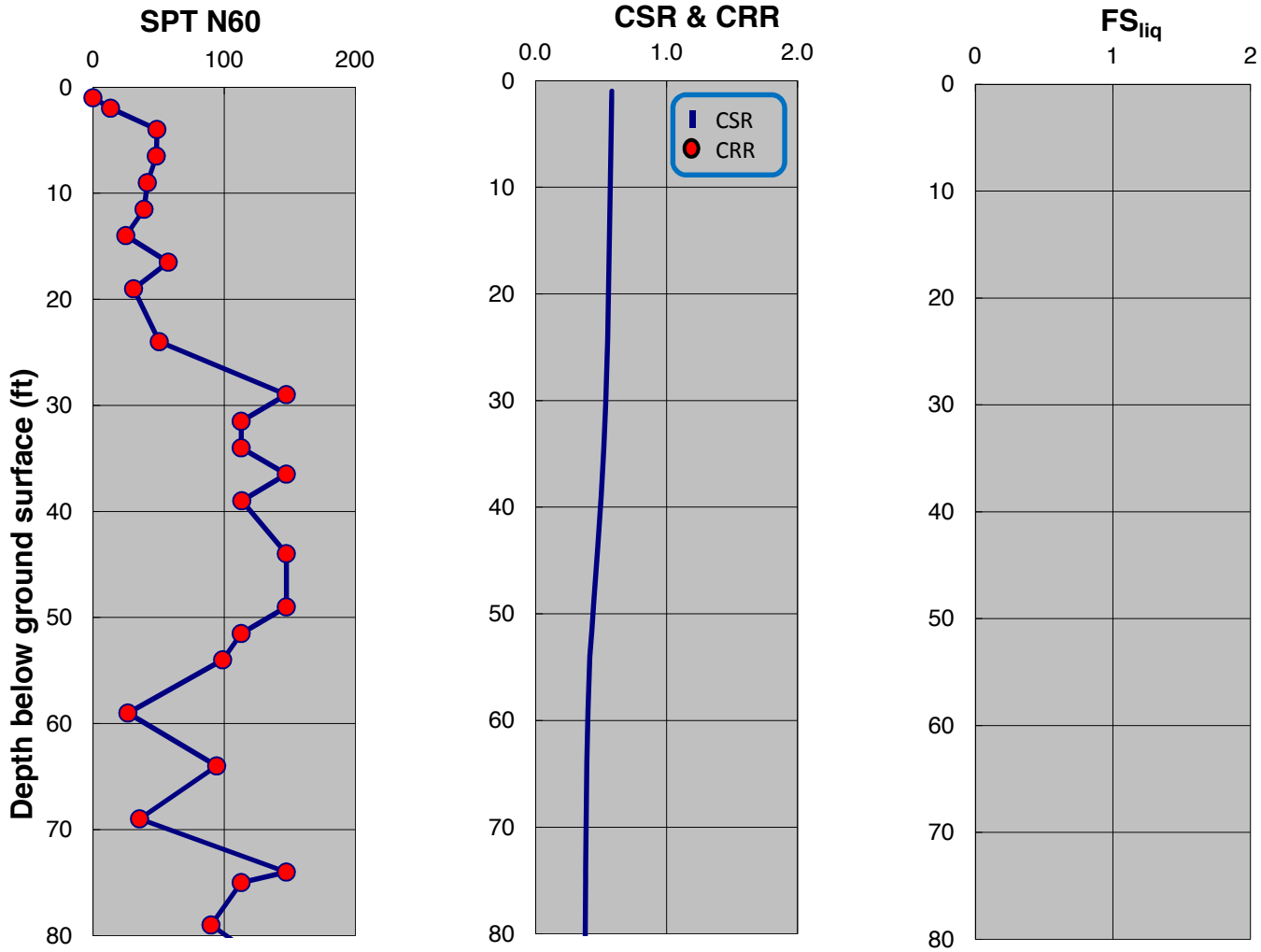
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-91 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



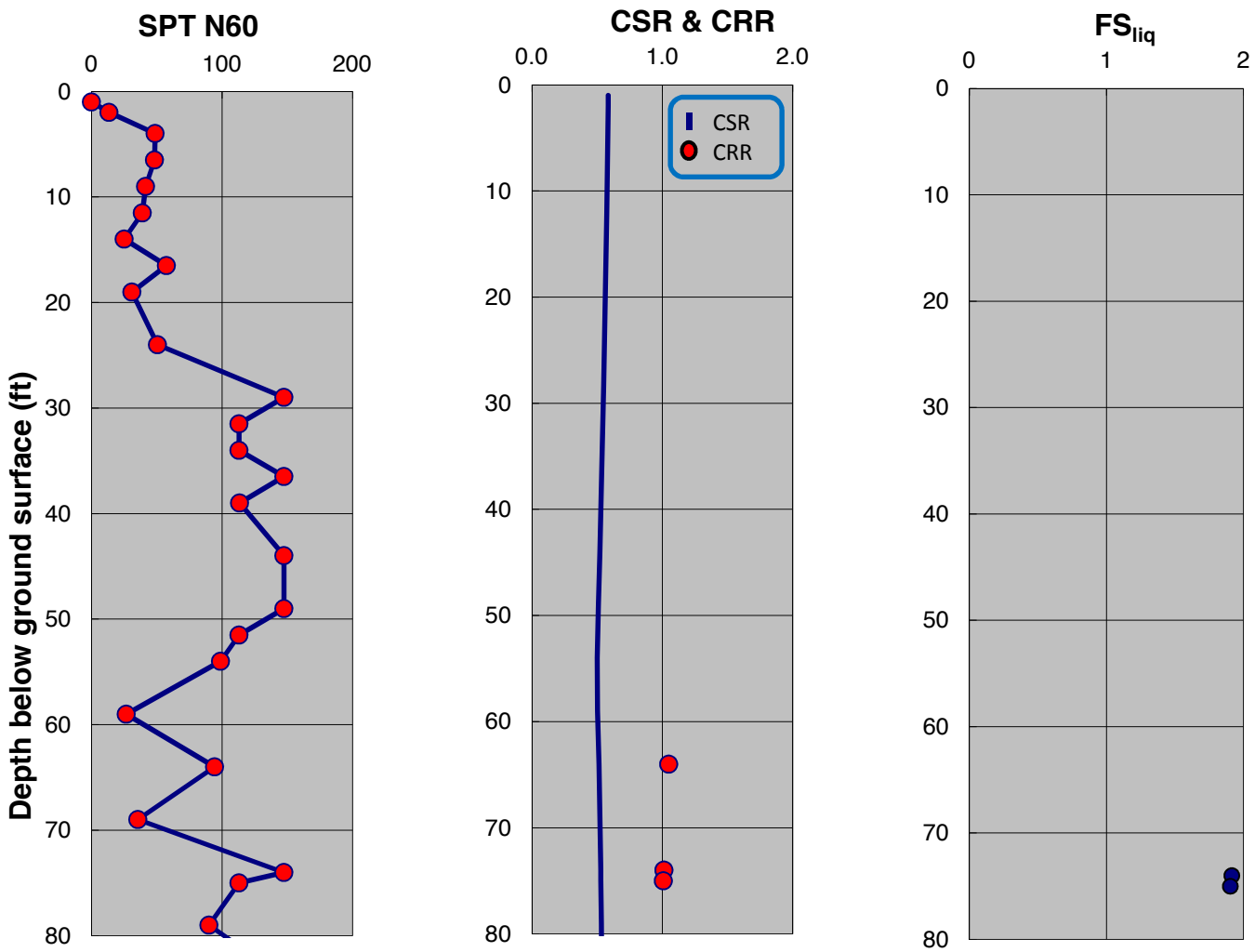
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-91 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



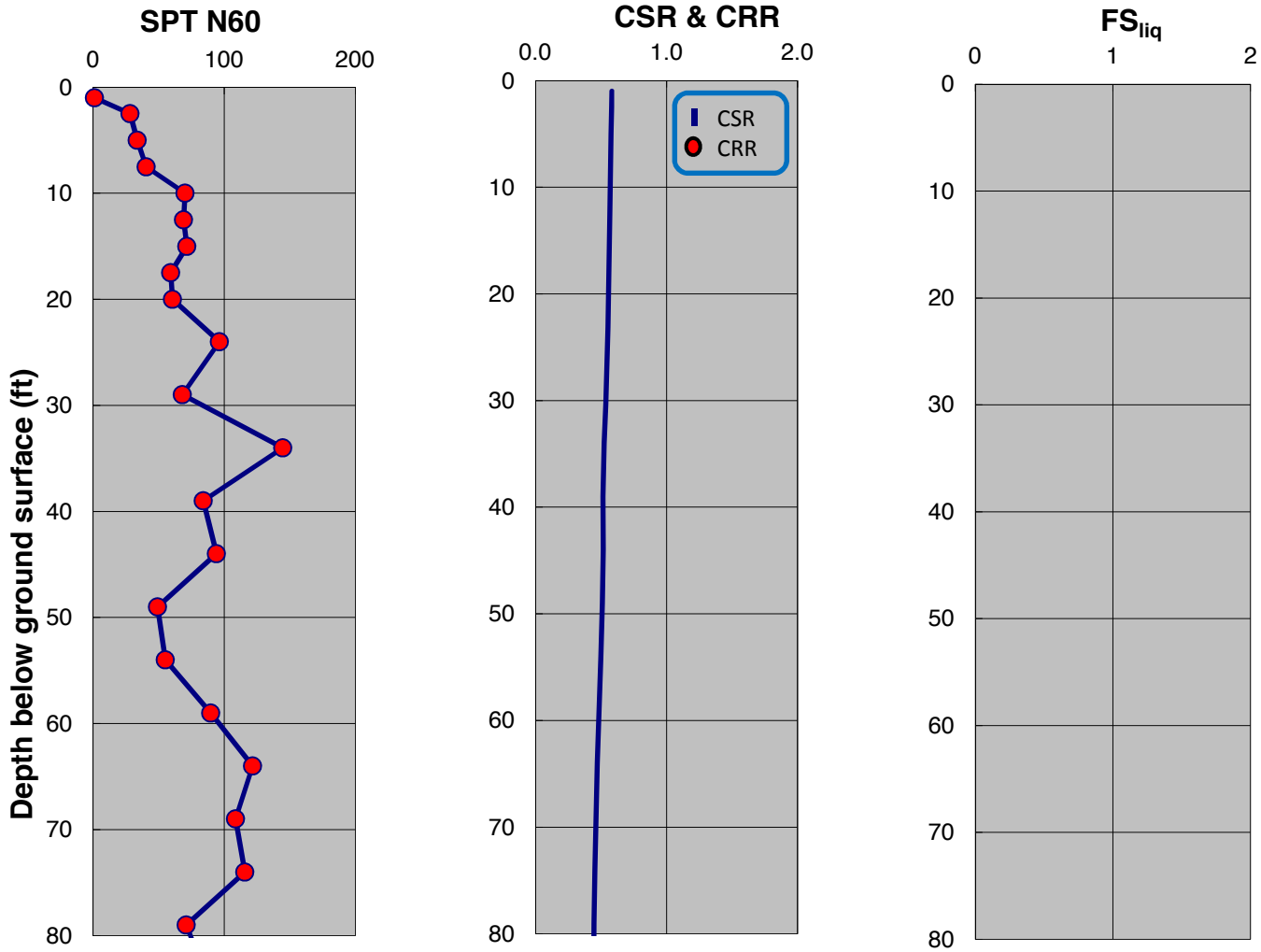
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-92 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



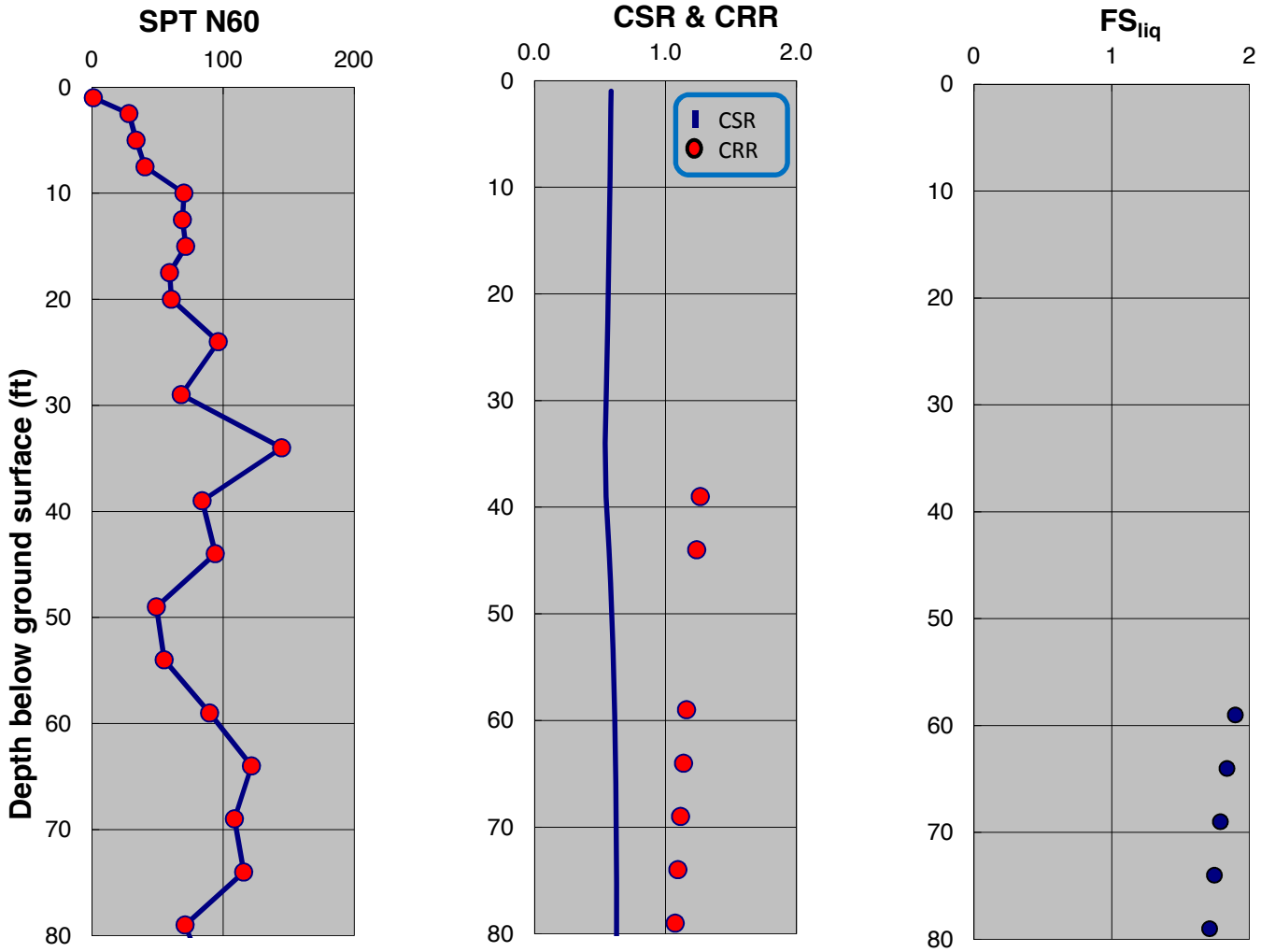
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-92 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



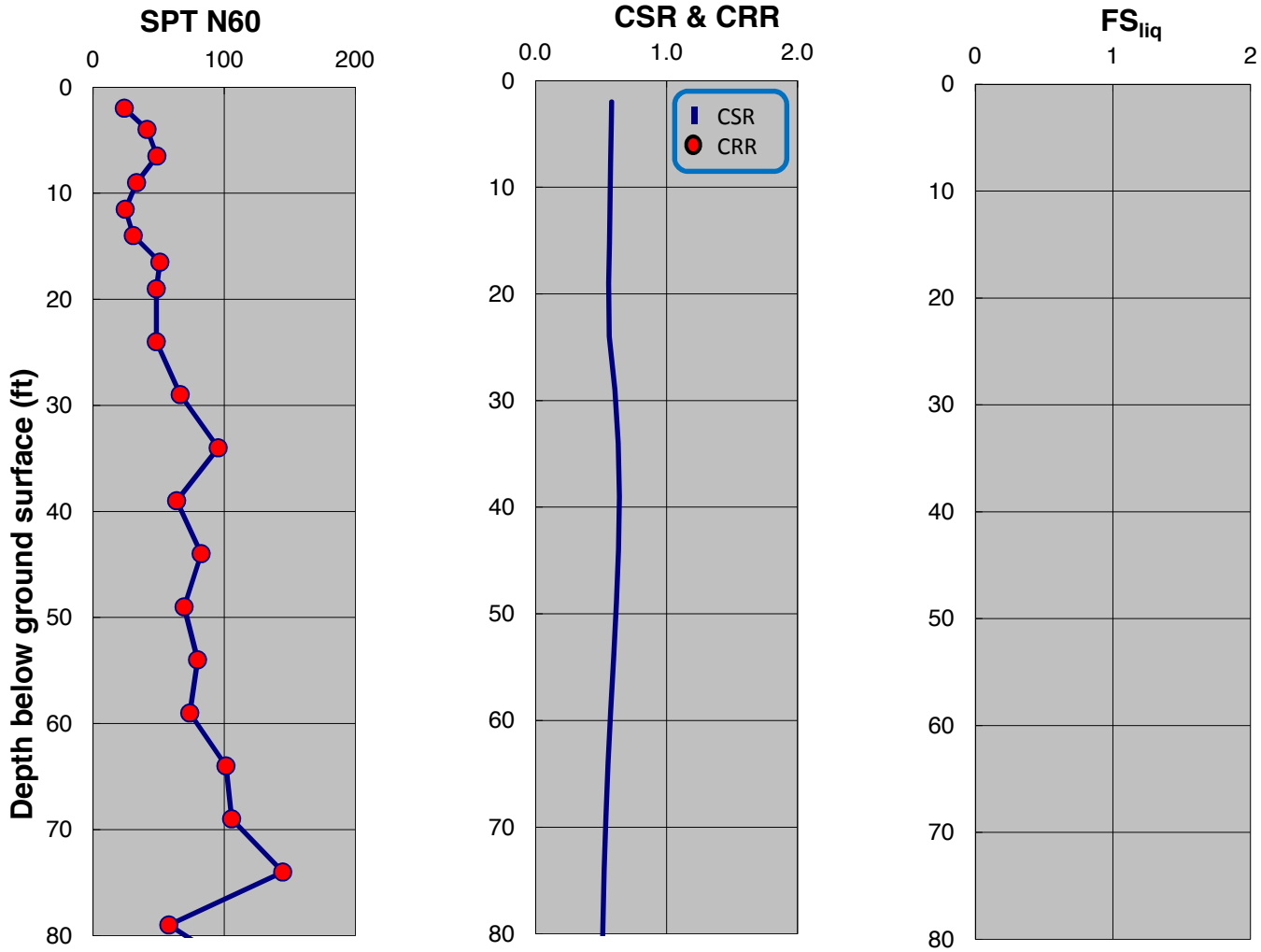
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-93 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



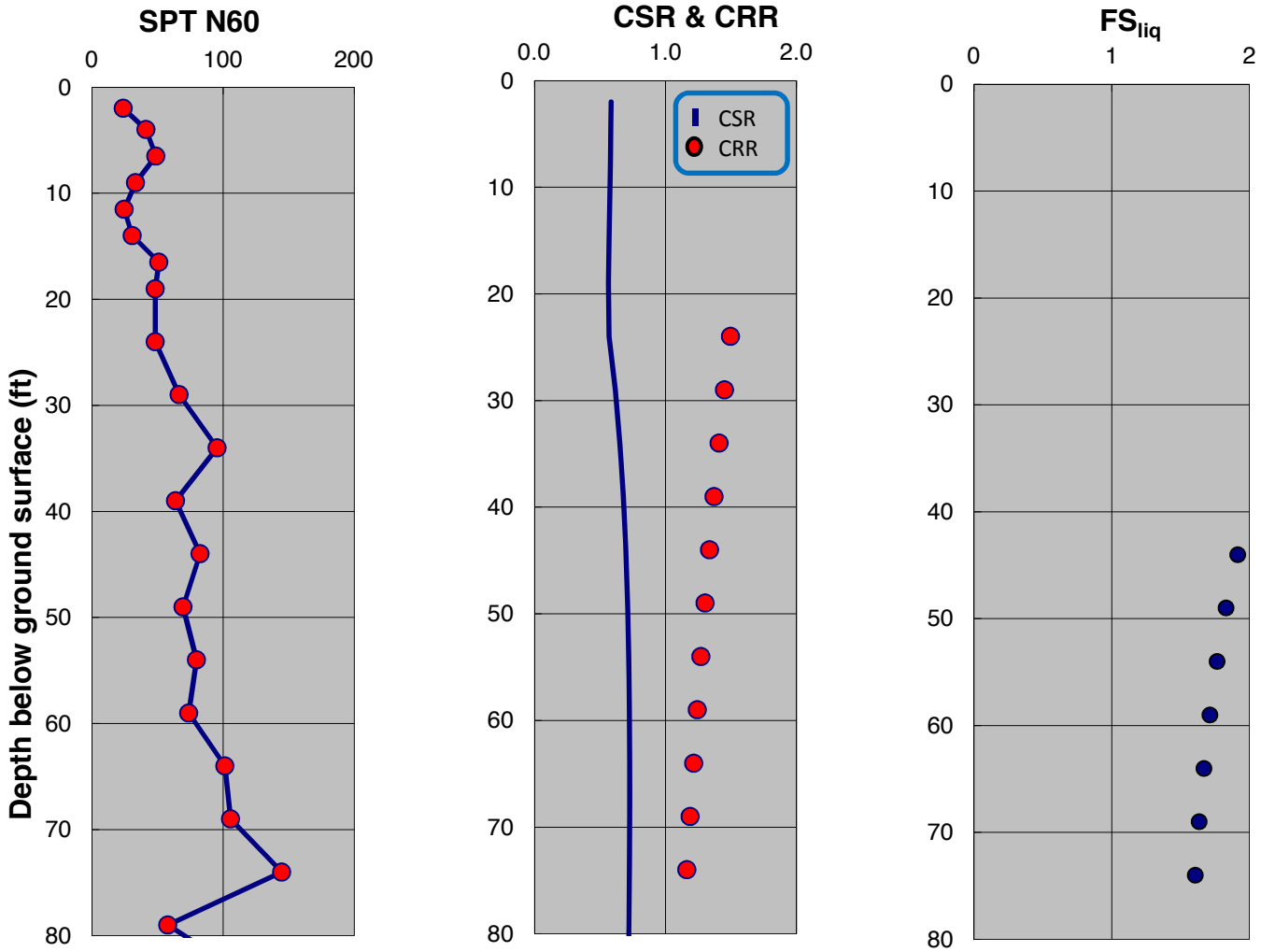
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-93 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



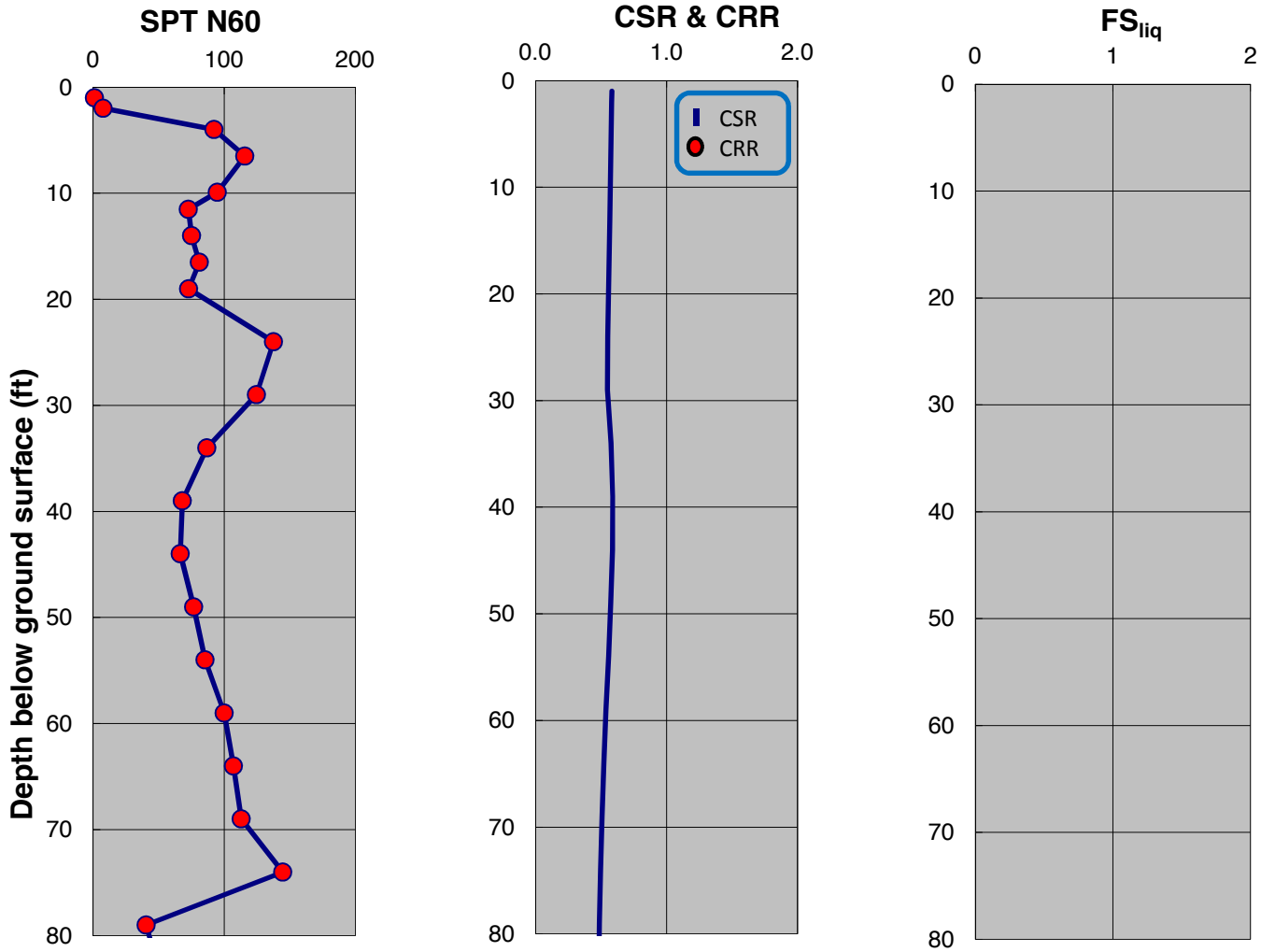
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-94 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



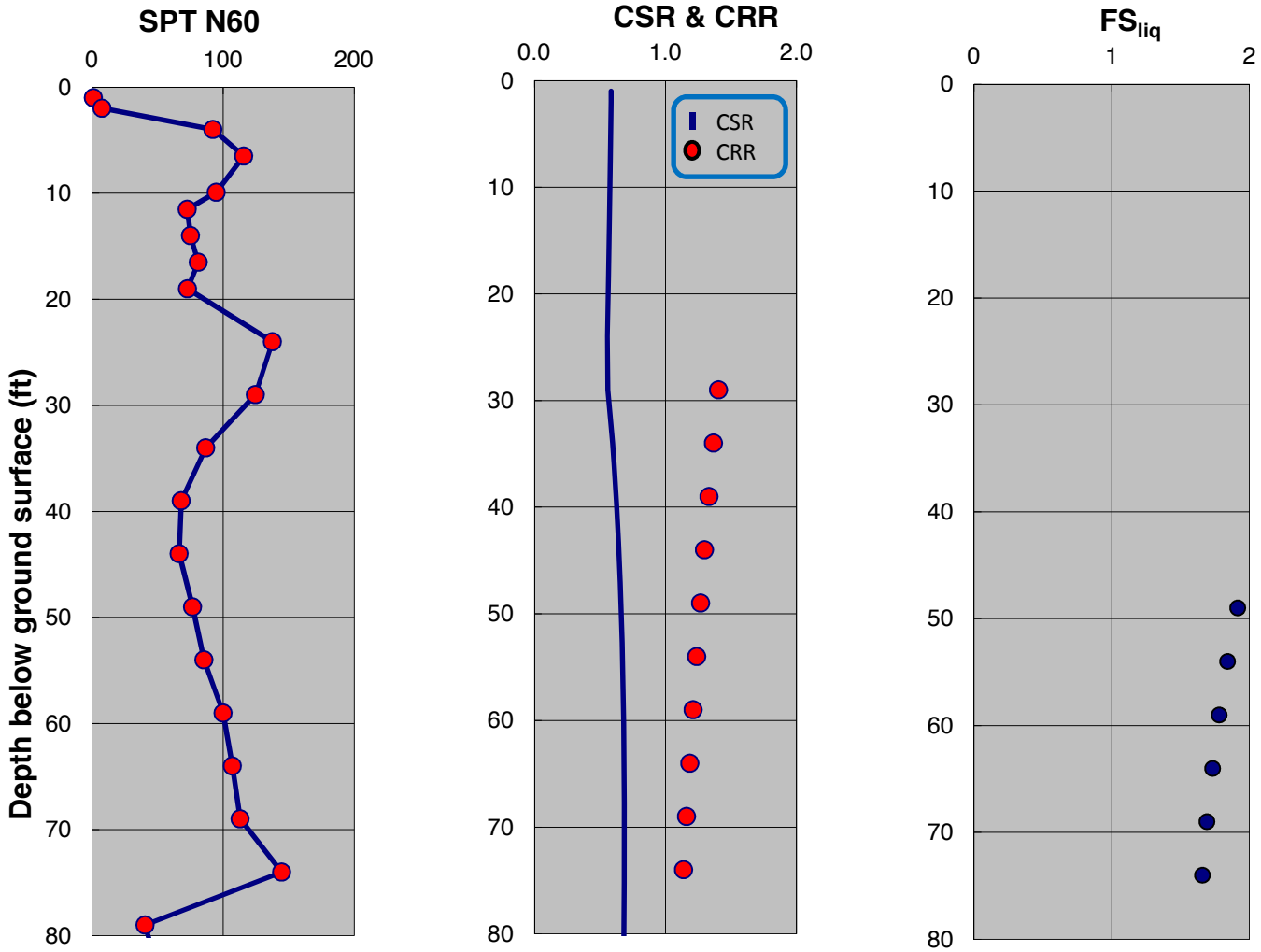
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-94 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



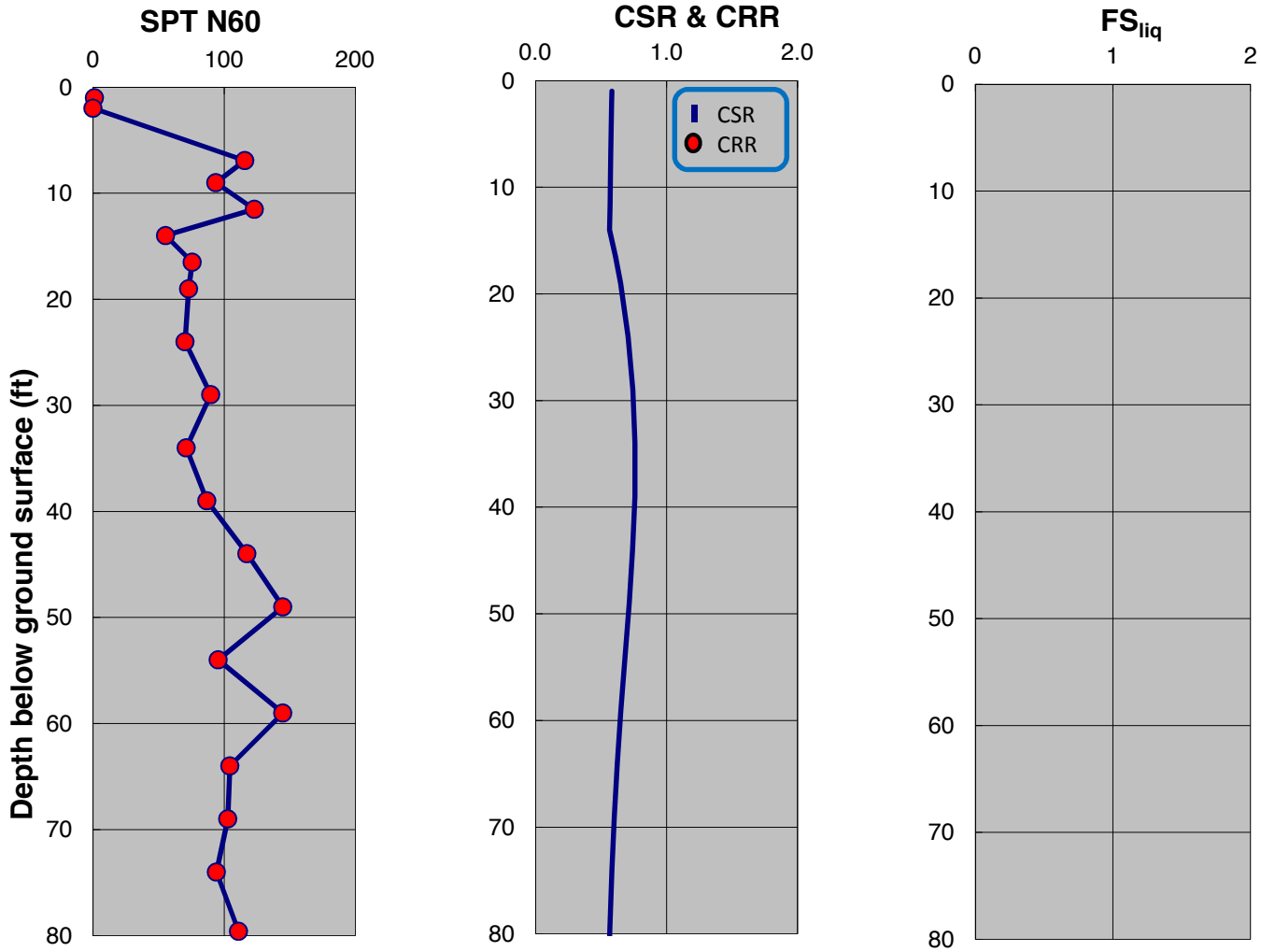
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-95 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



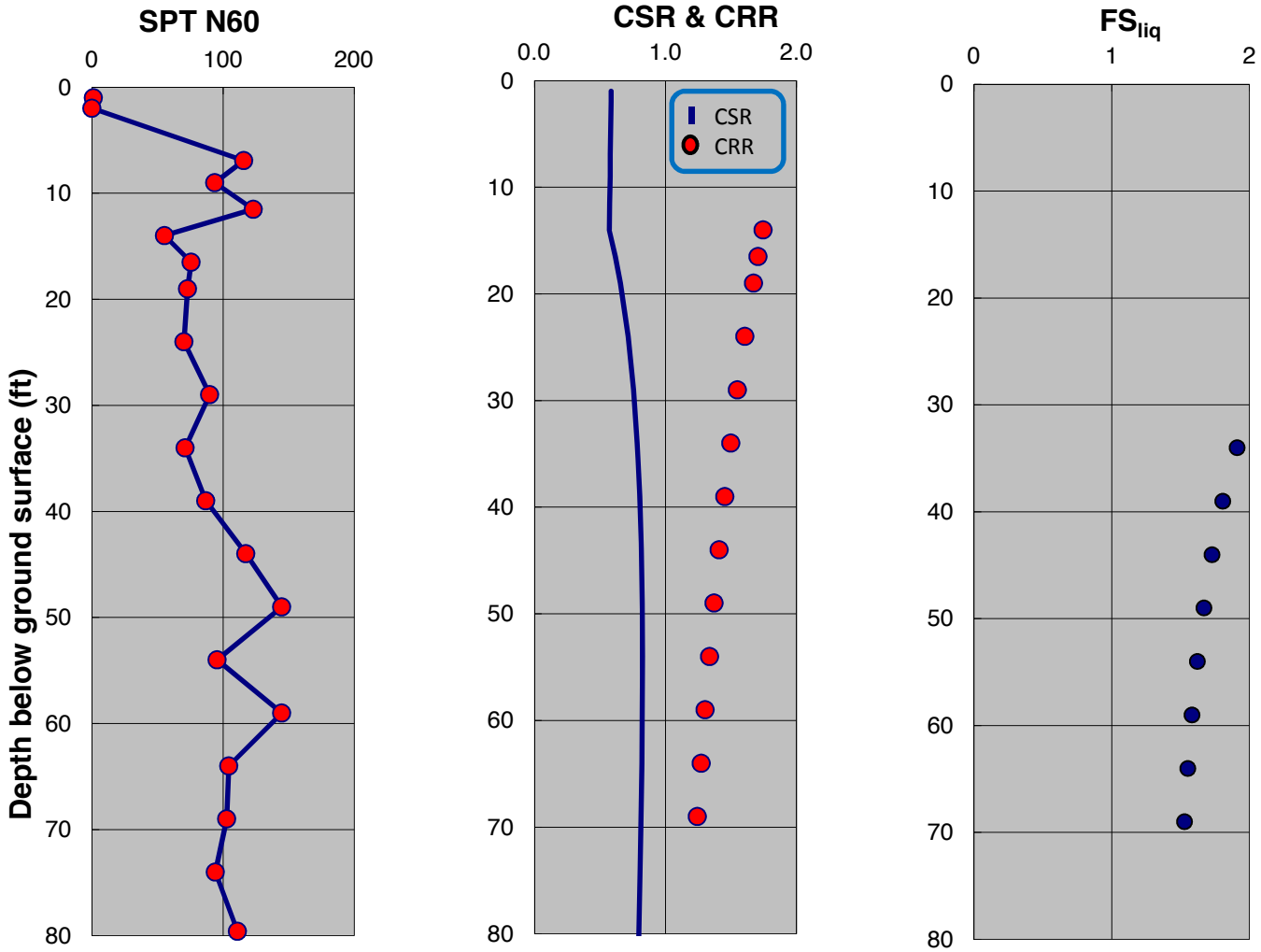
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-95 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



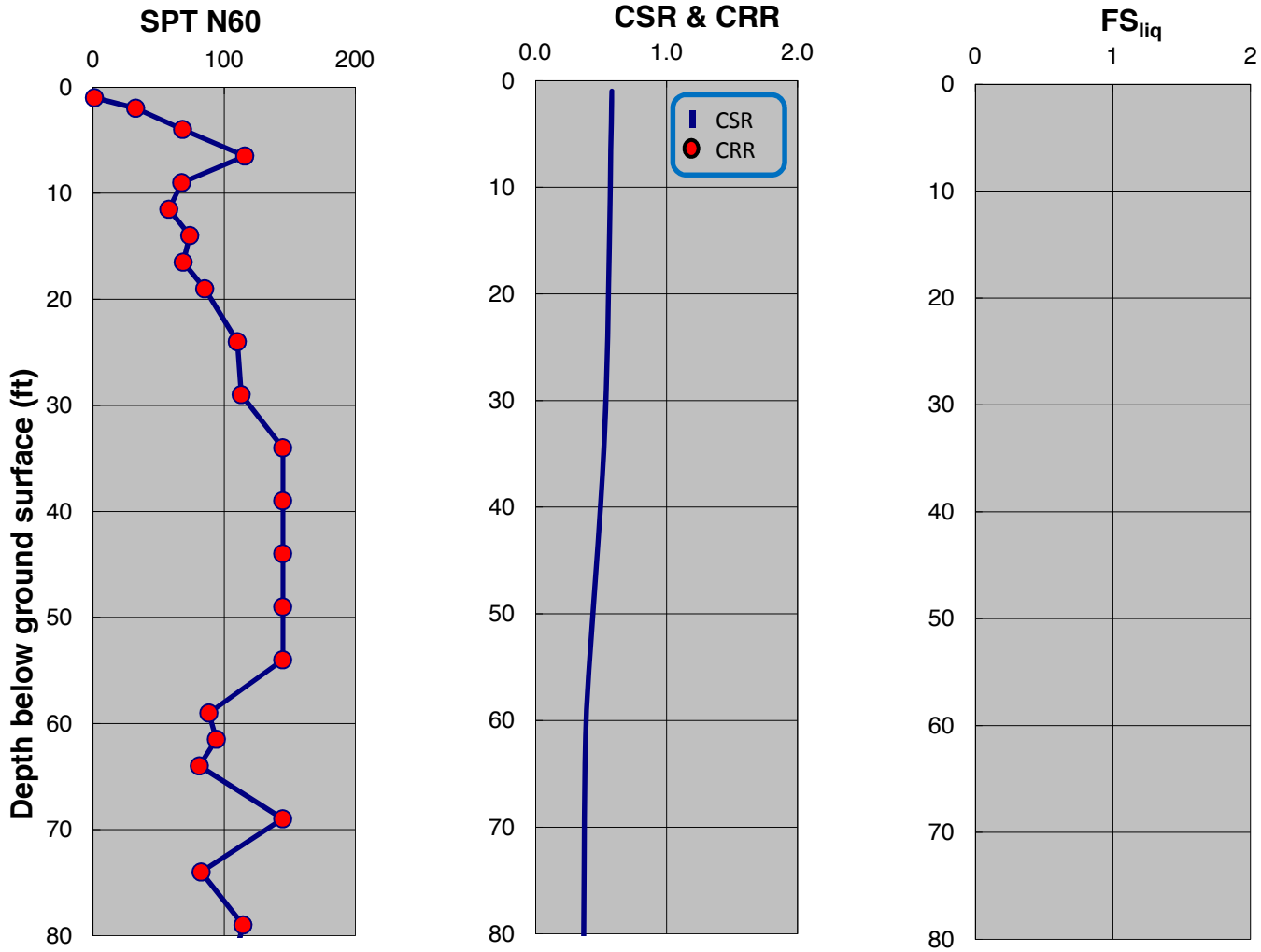
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-96 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



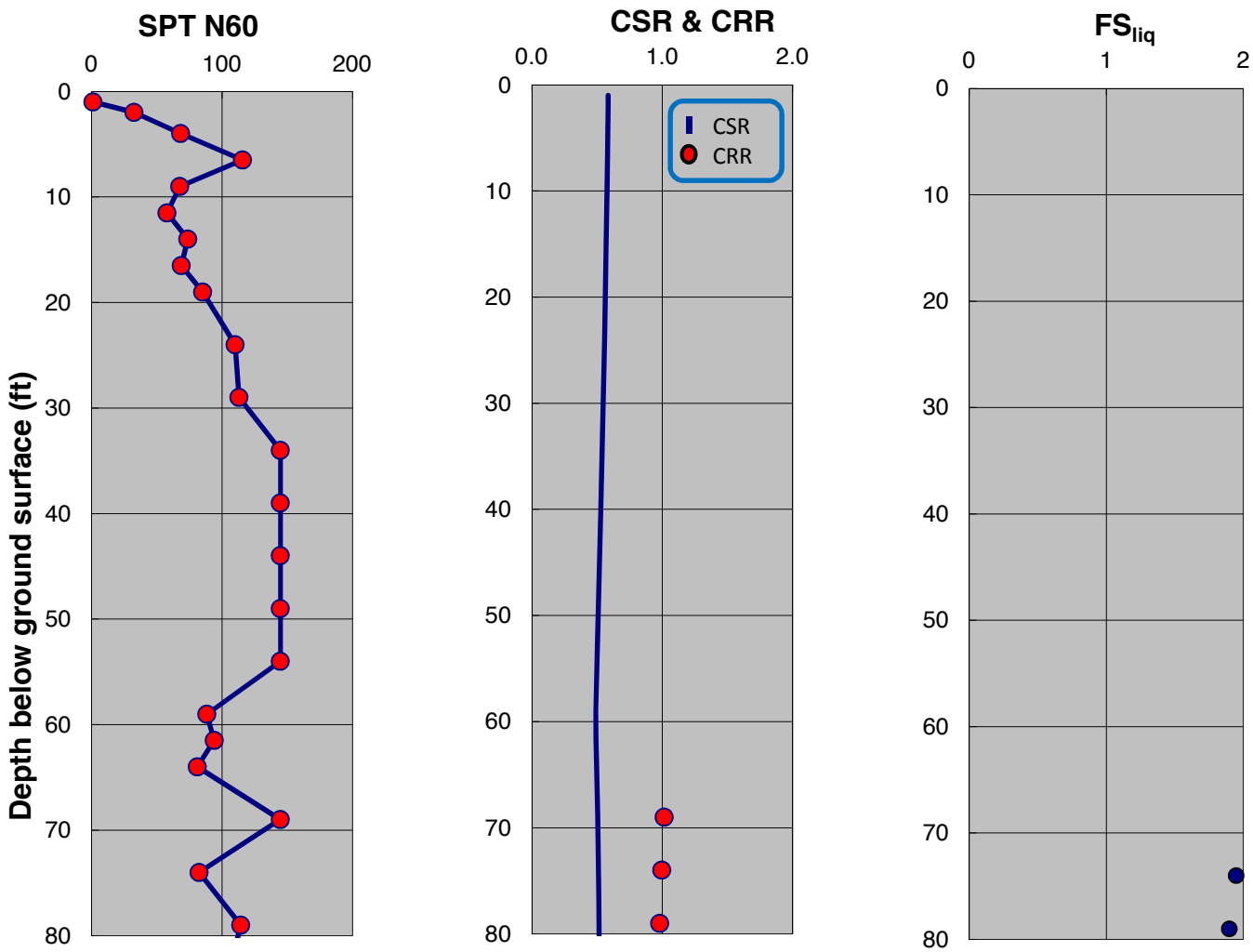
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-96 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-97 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

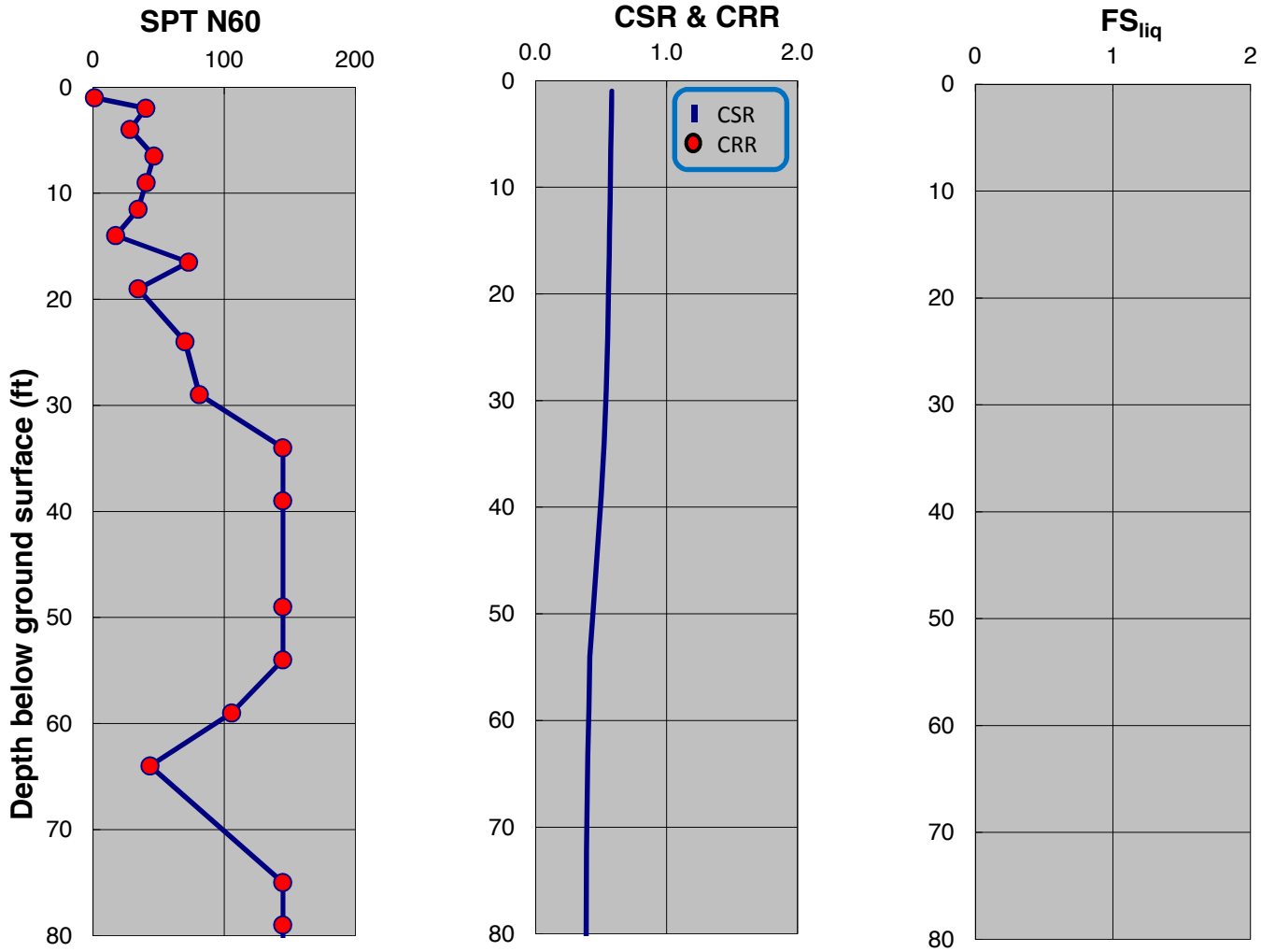
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-97 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

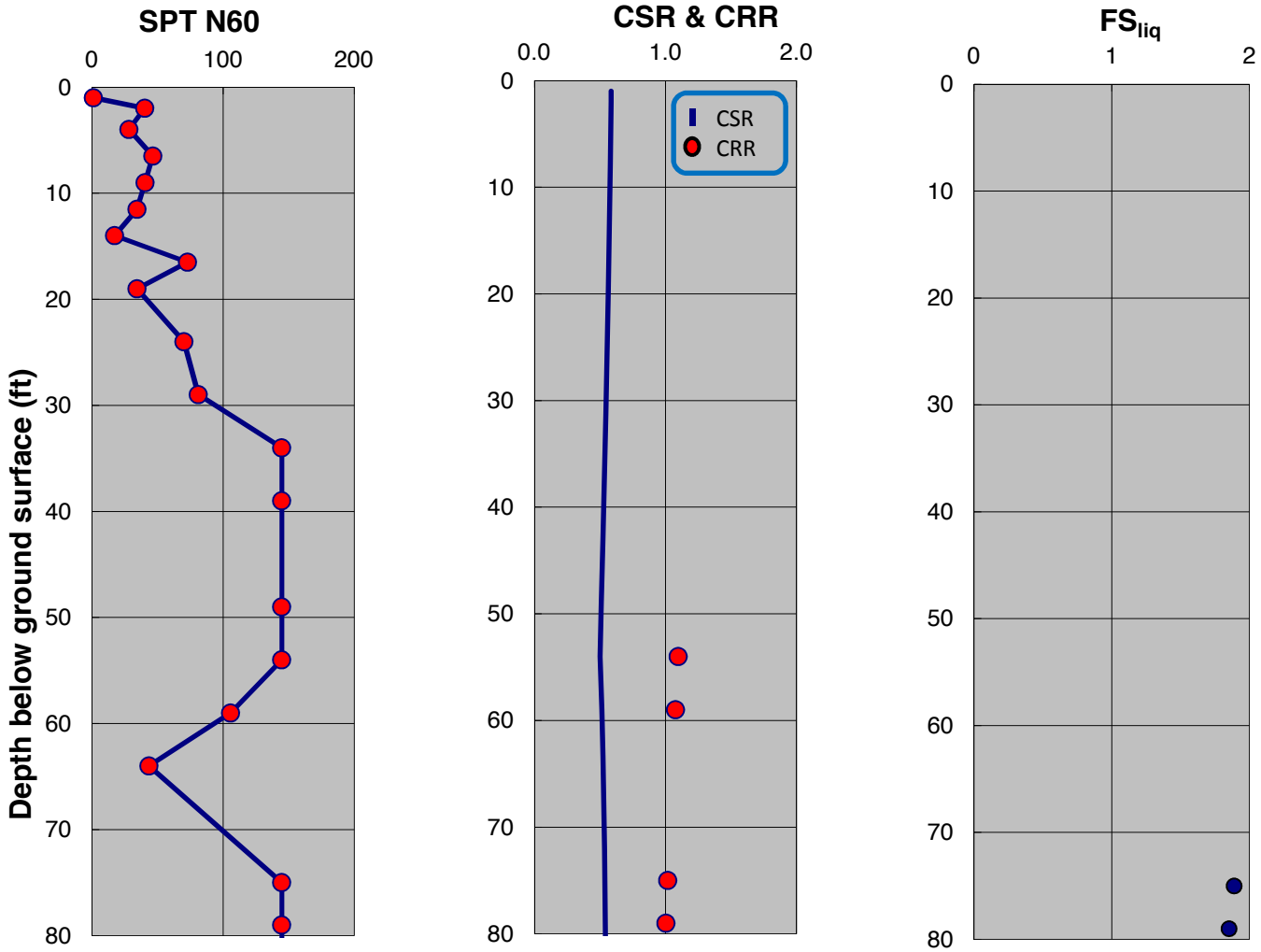
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.380



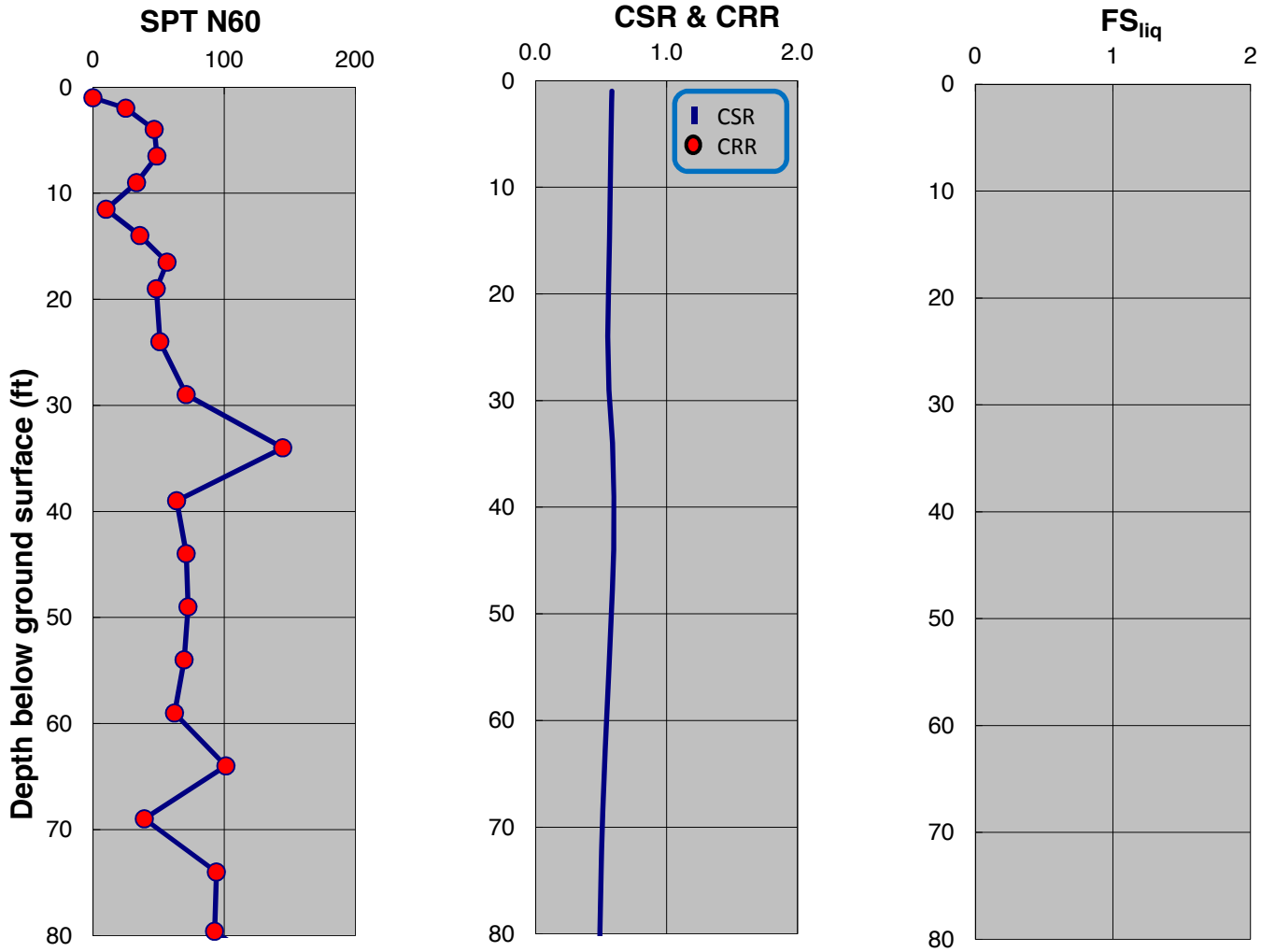
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-98 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



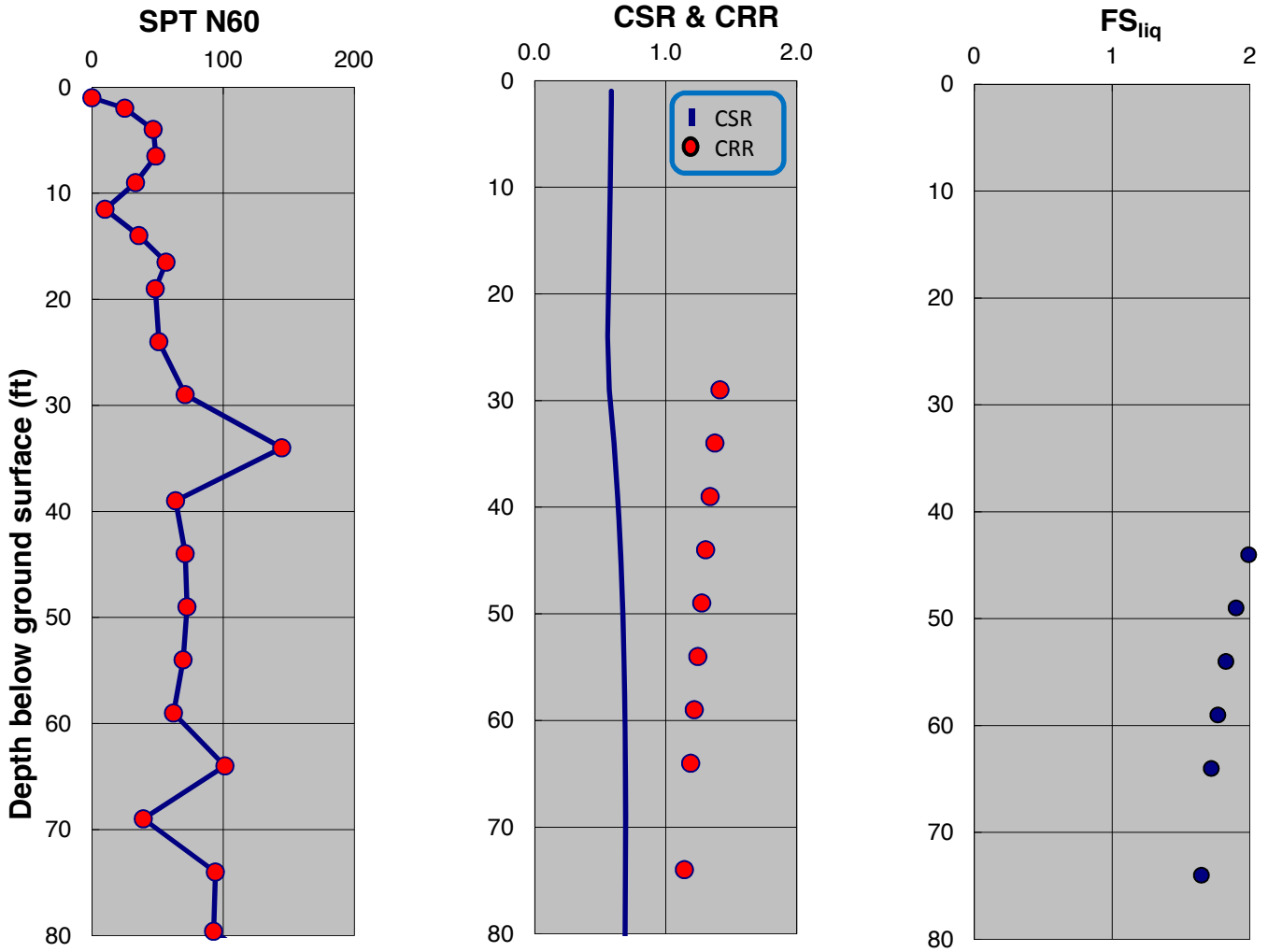
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-98 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



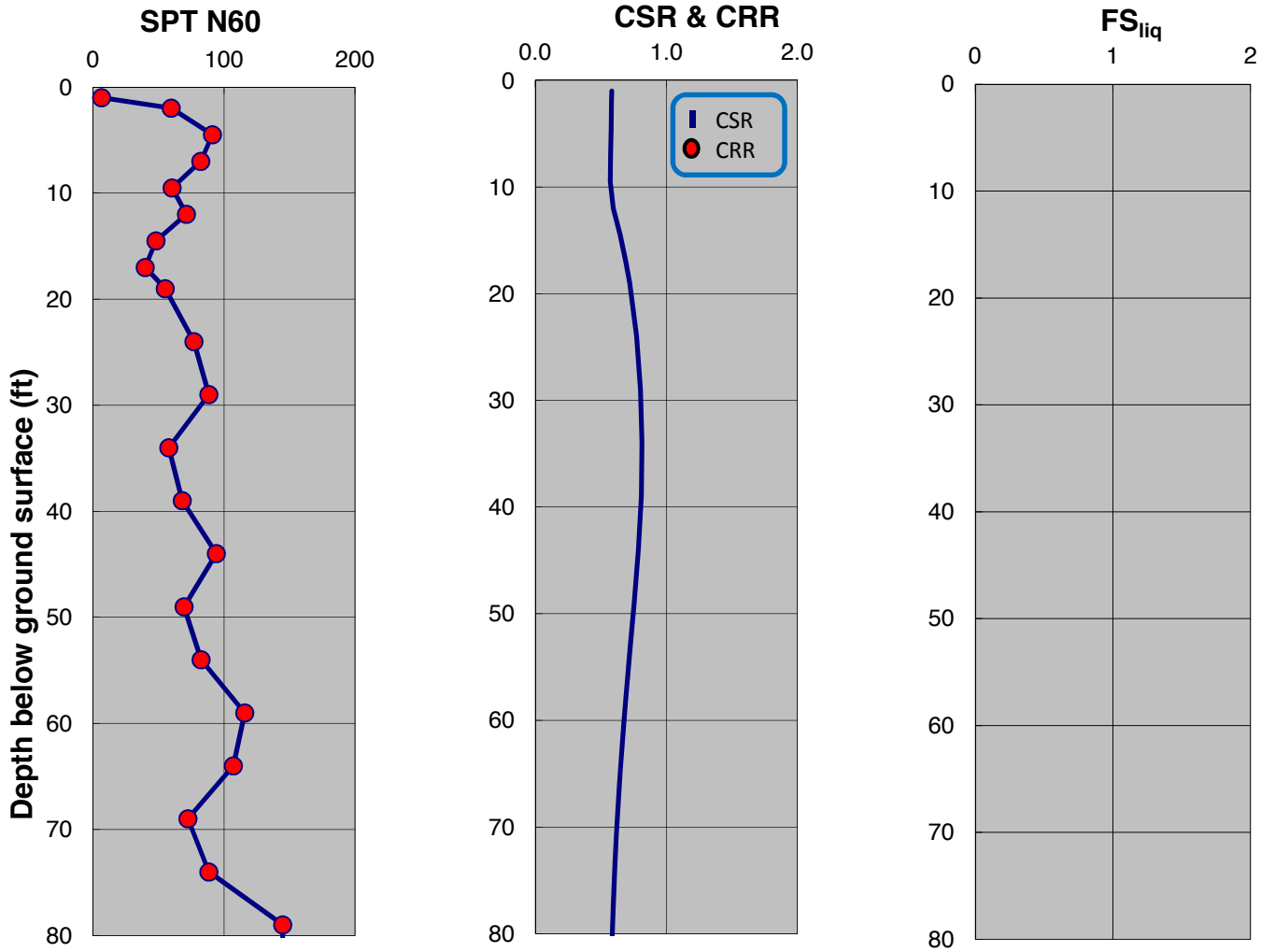
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-99 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



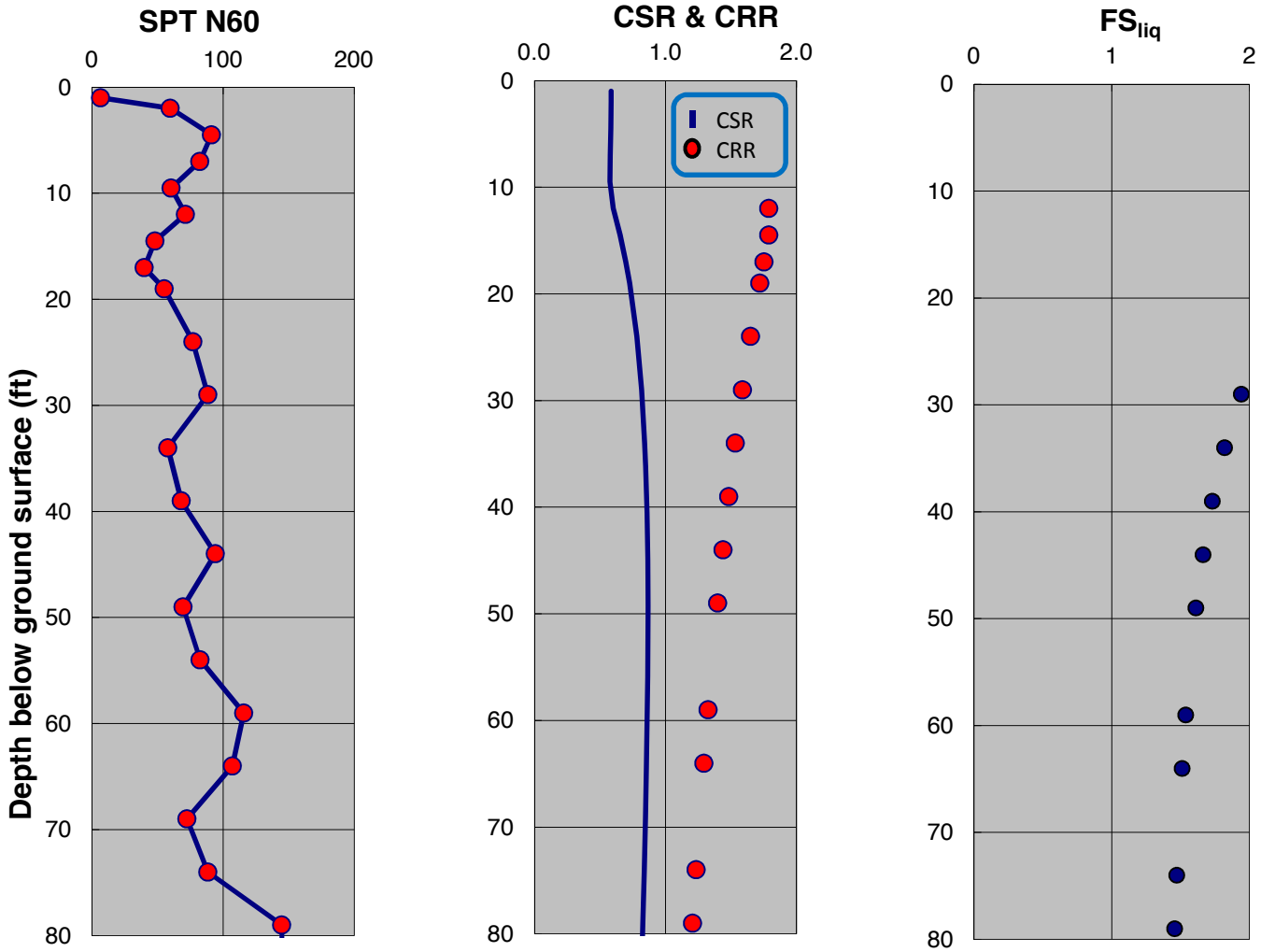
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-99 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



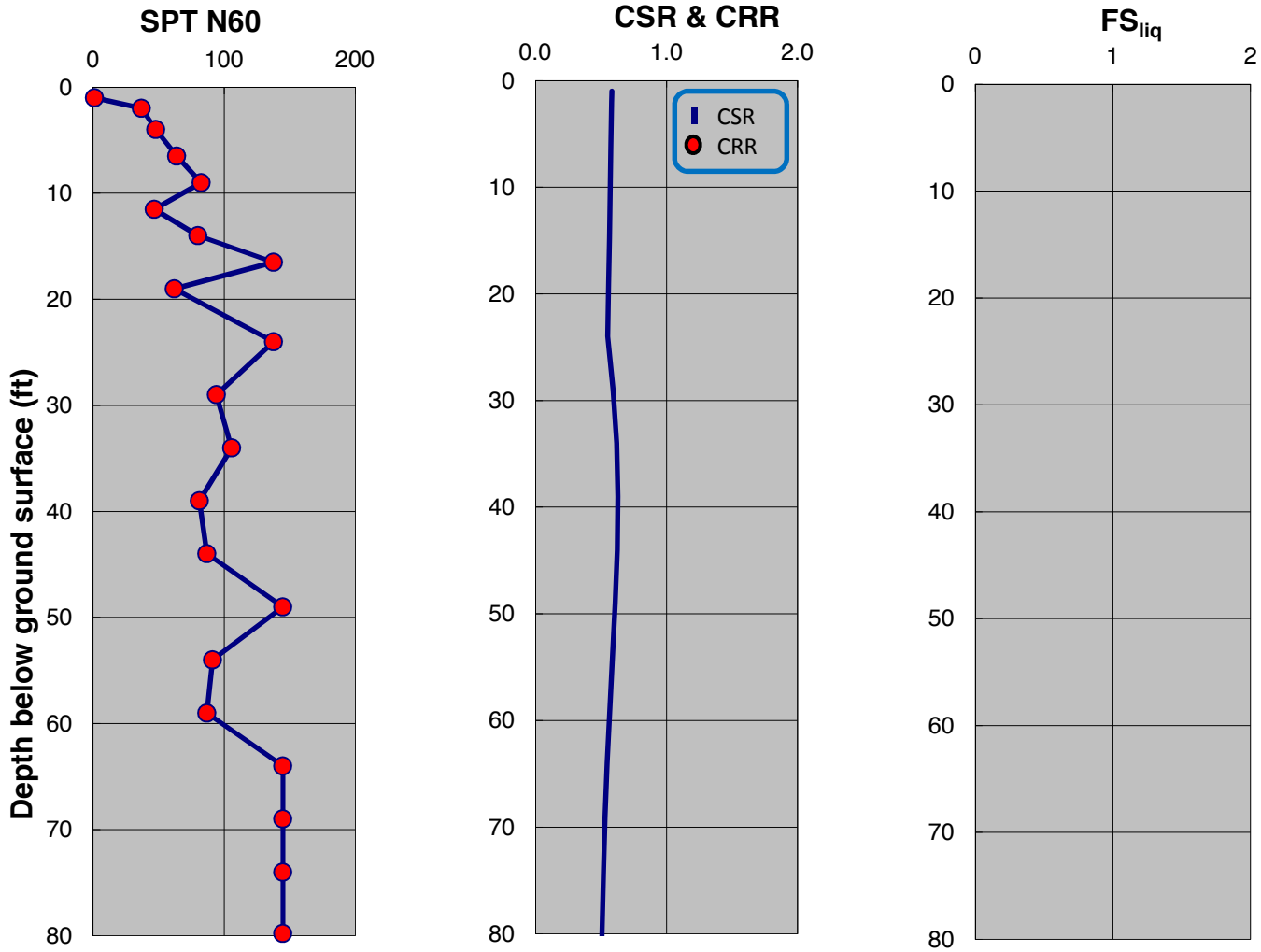
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-101 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



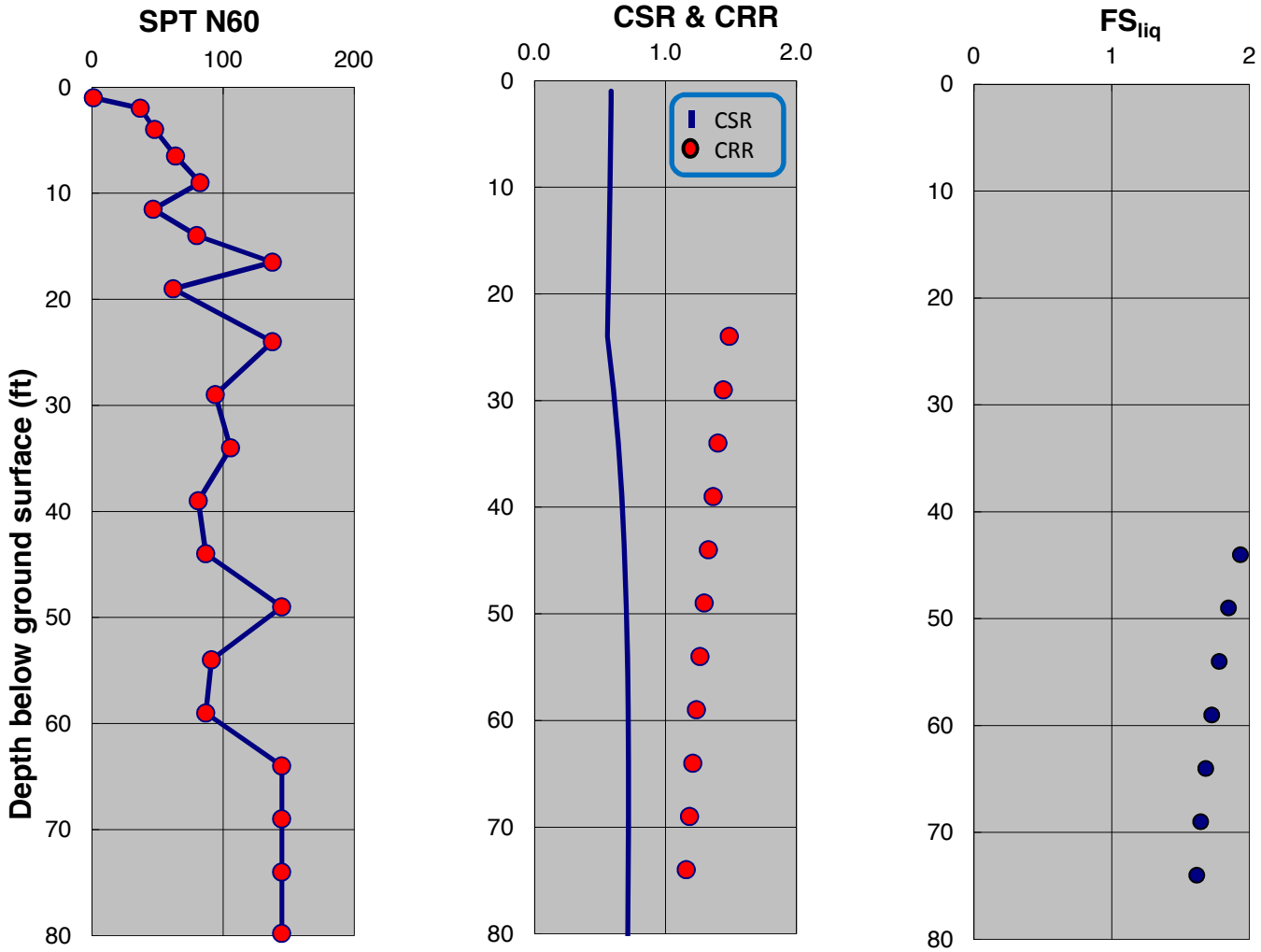
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-101 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



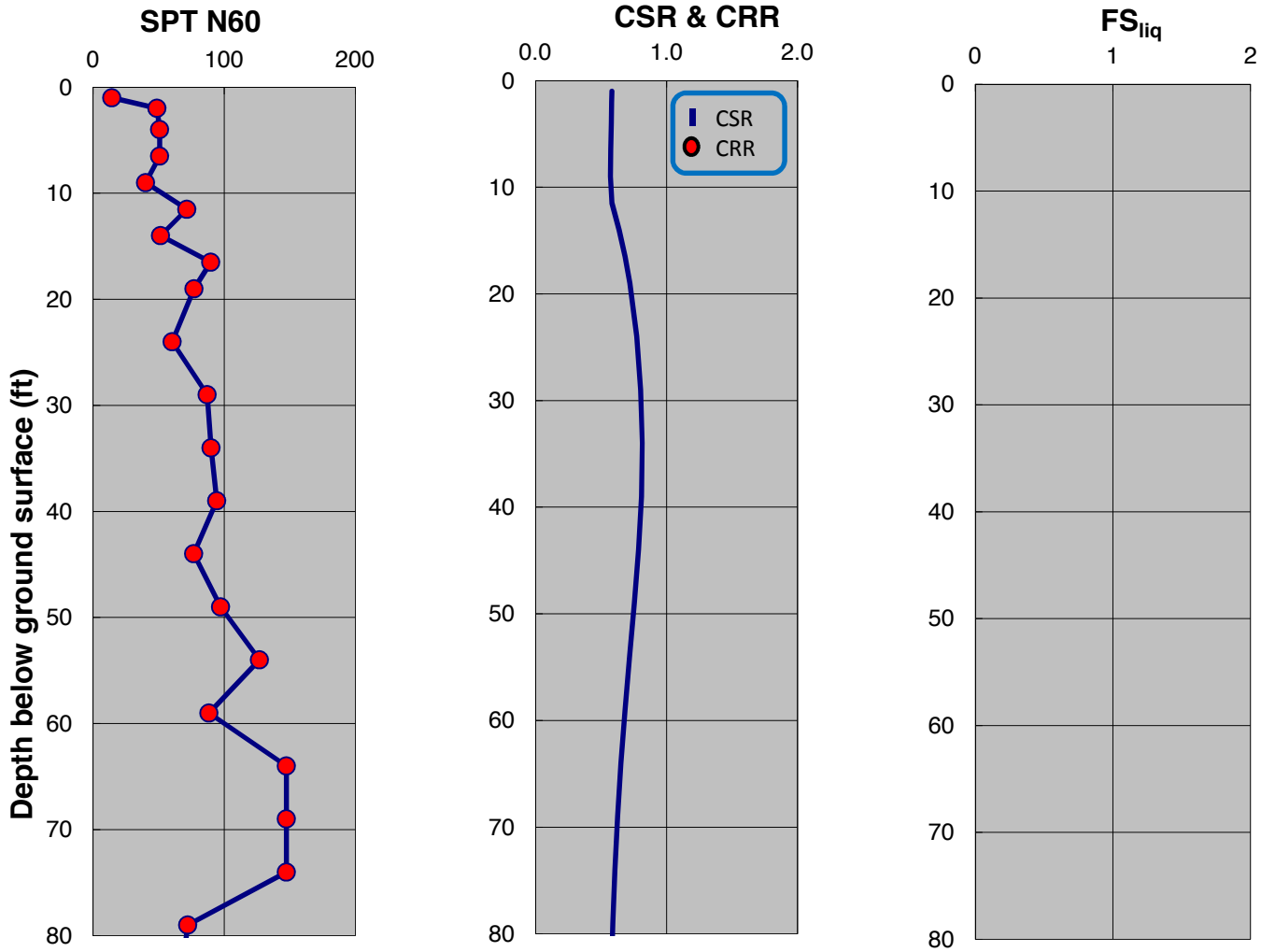
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-102 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



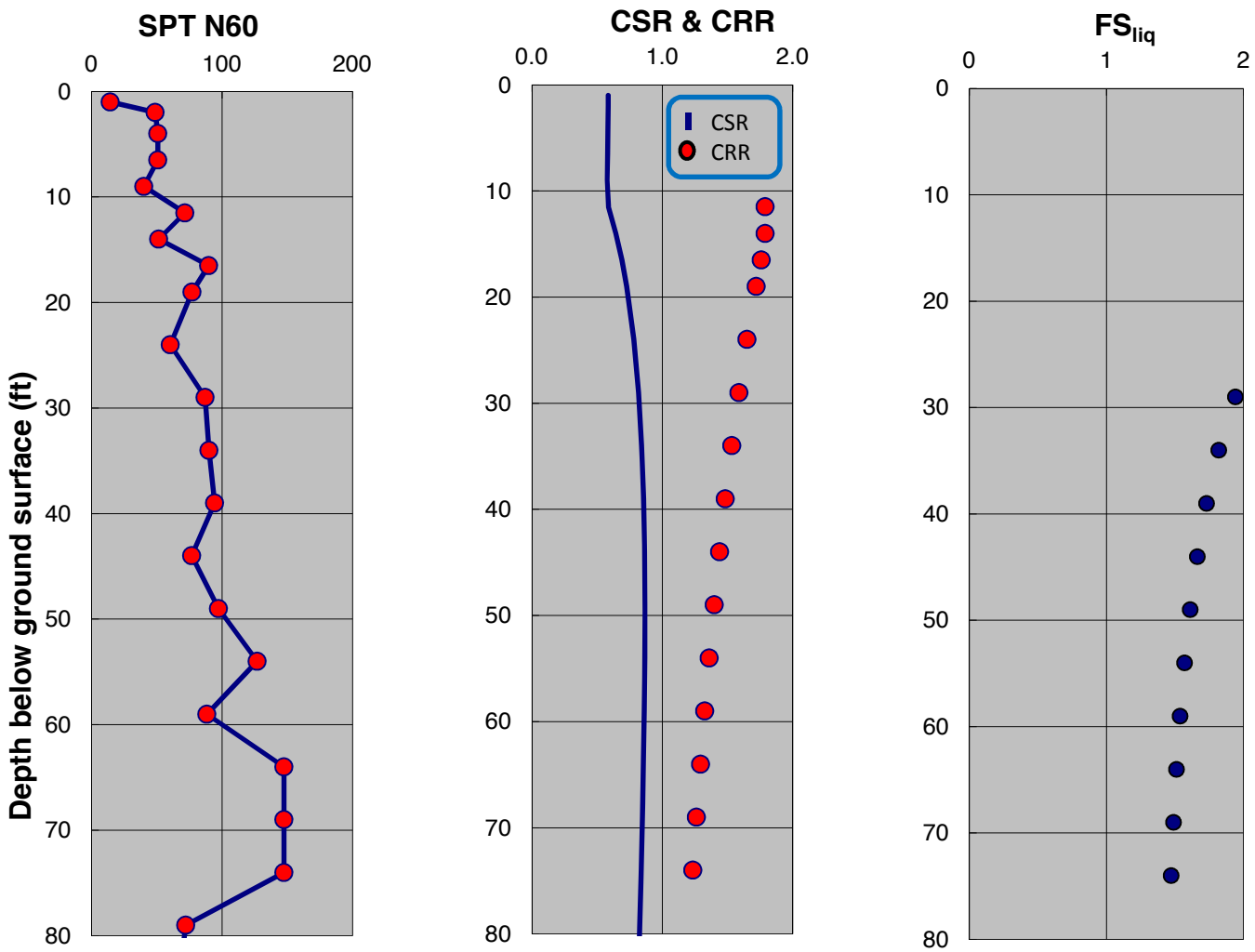
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-102 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



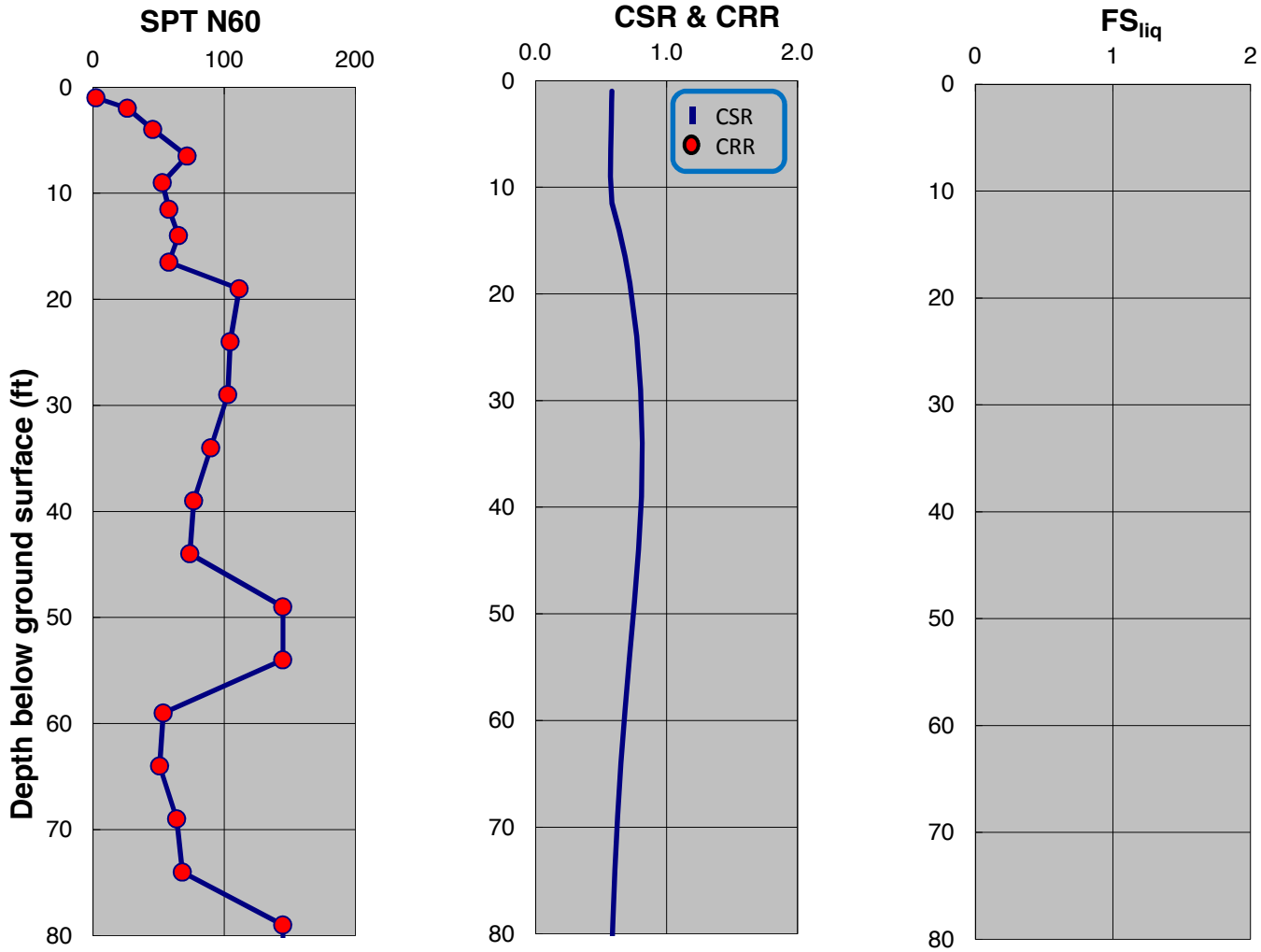
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-104 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



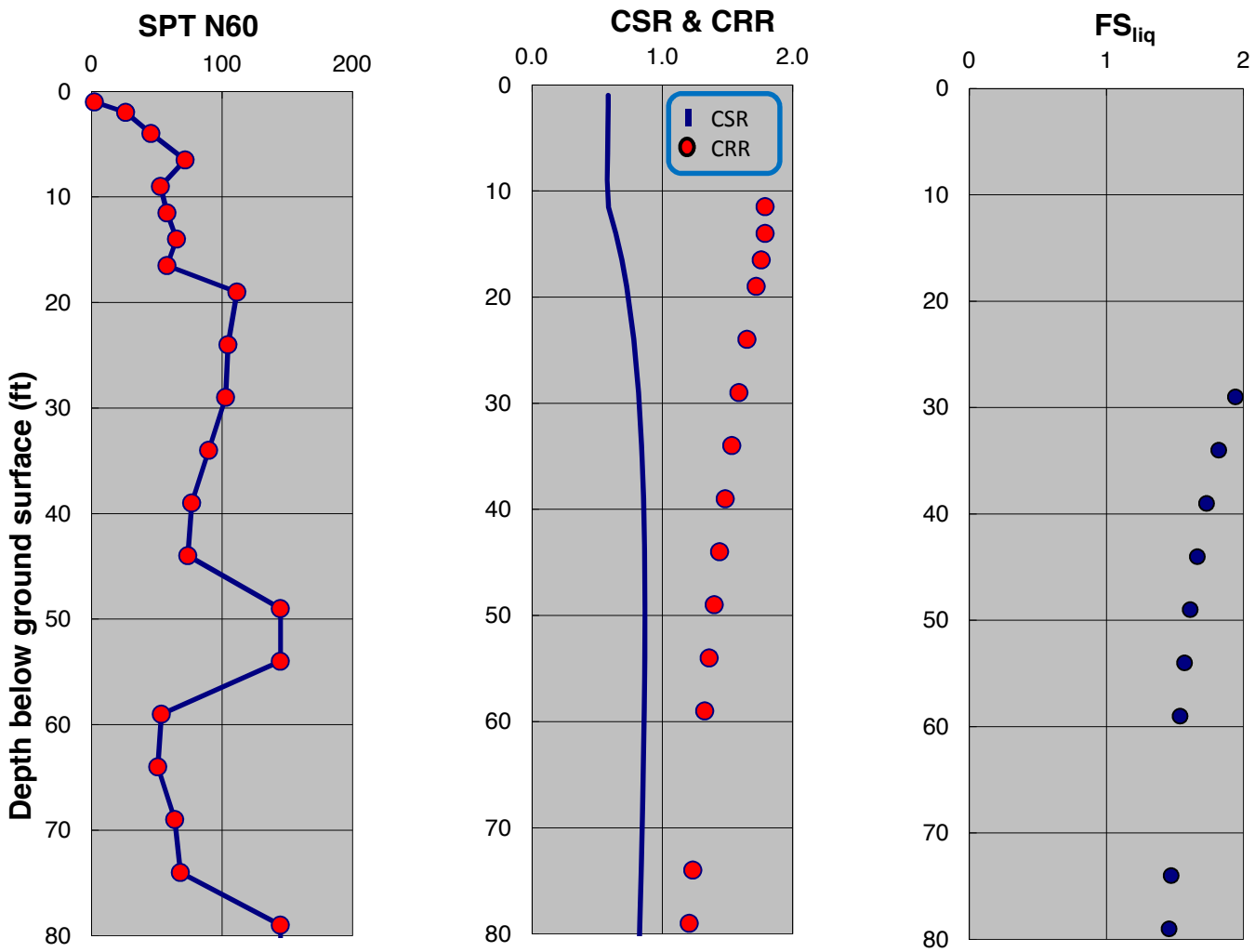
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-104 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



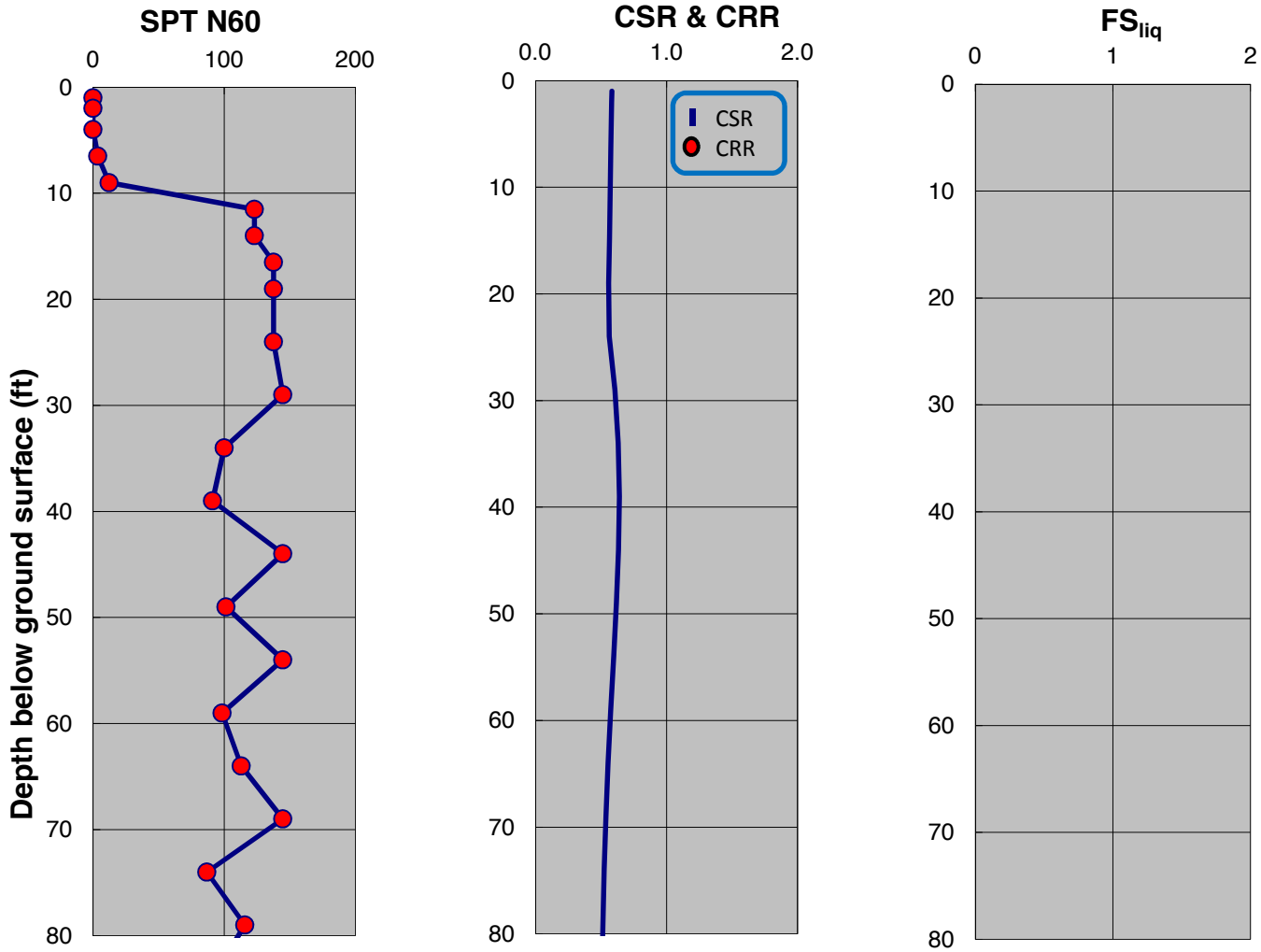
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-105 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



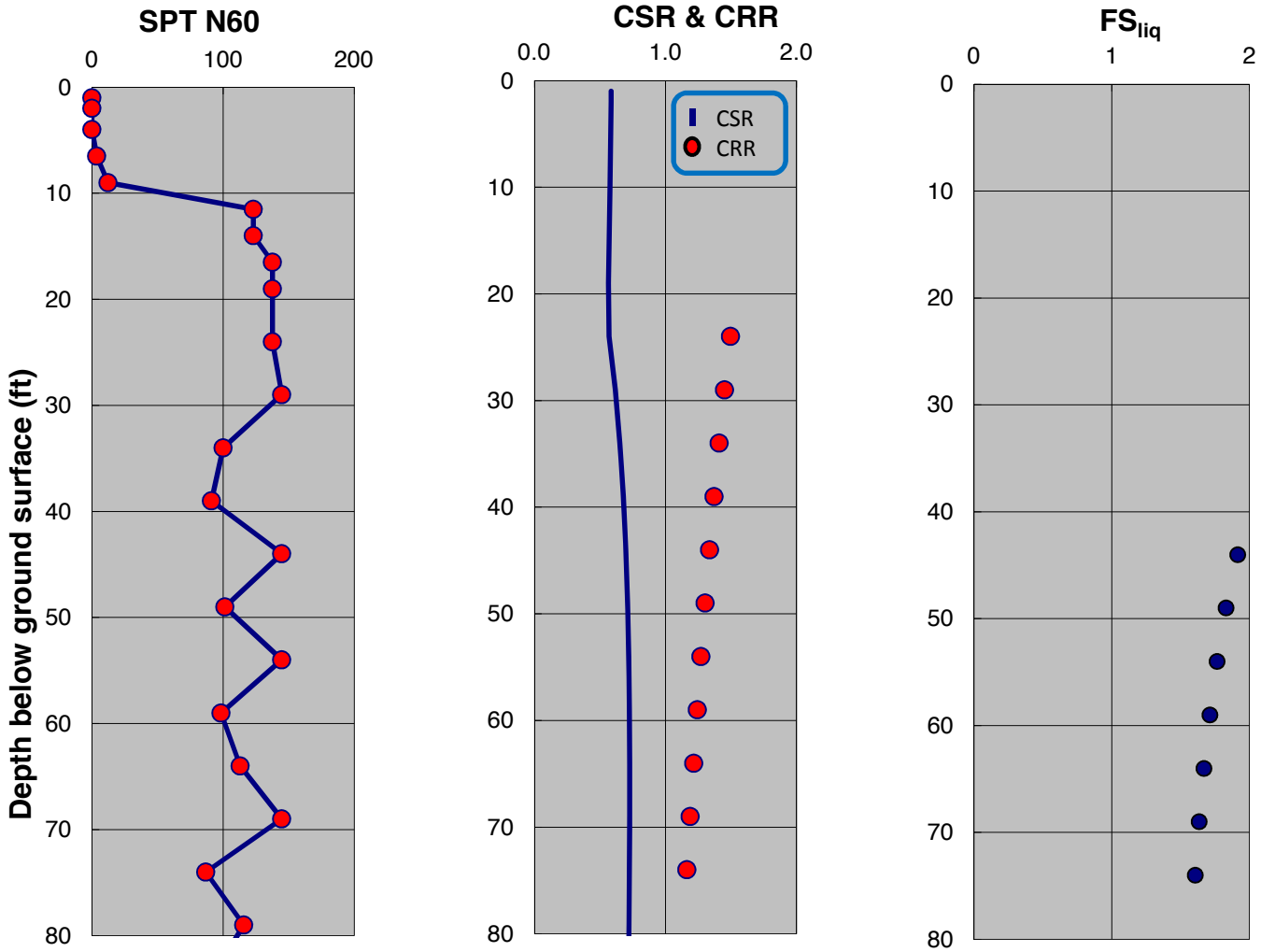
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-105 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



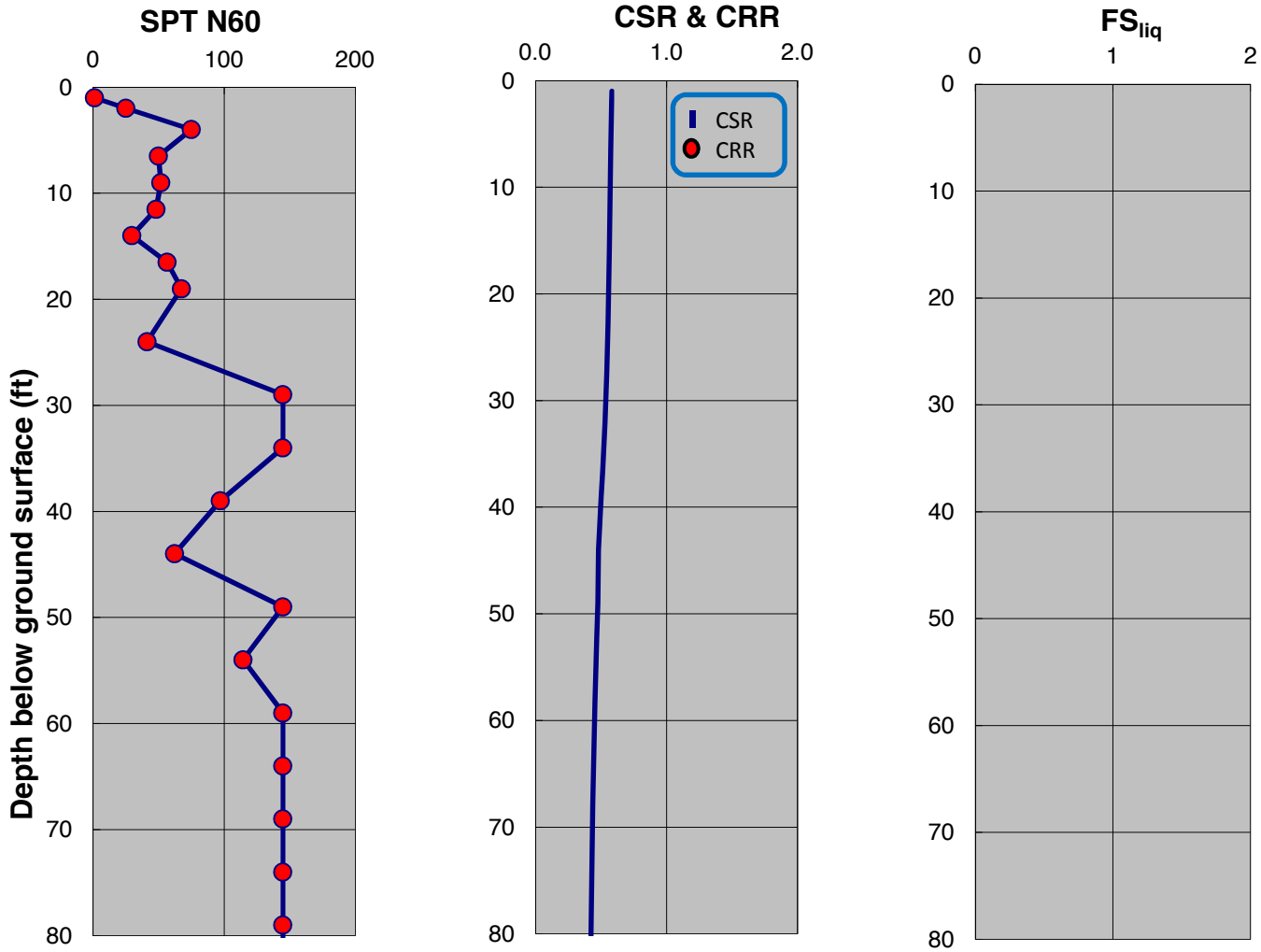
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-107 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



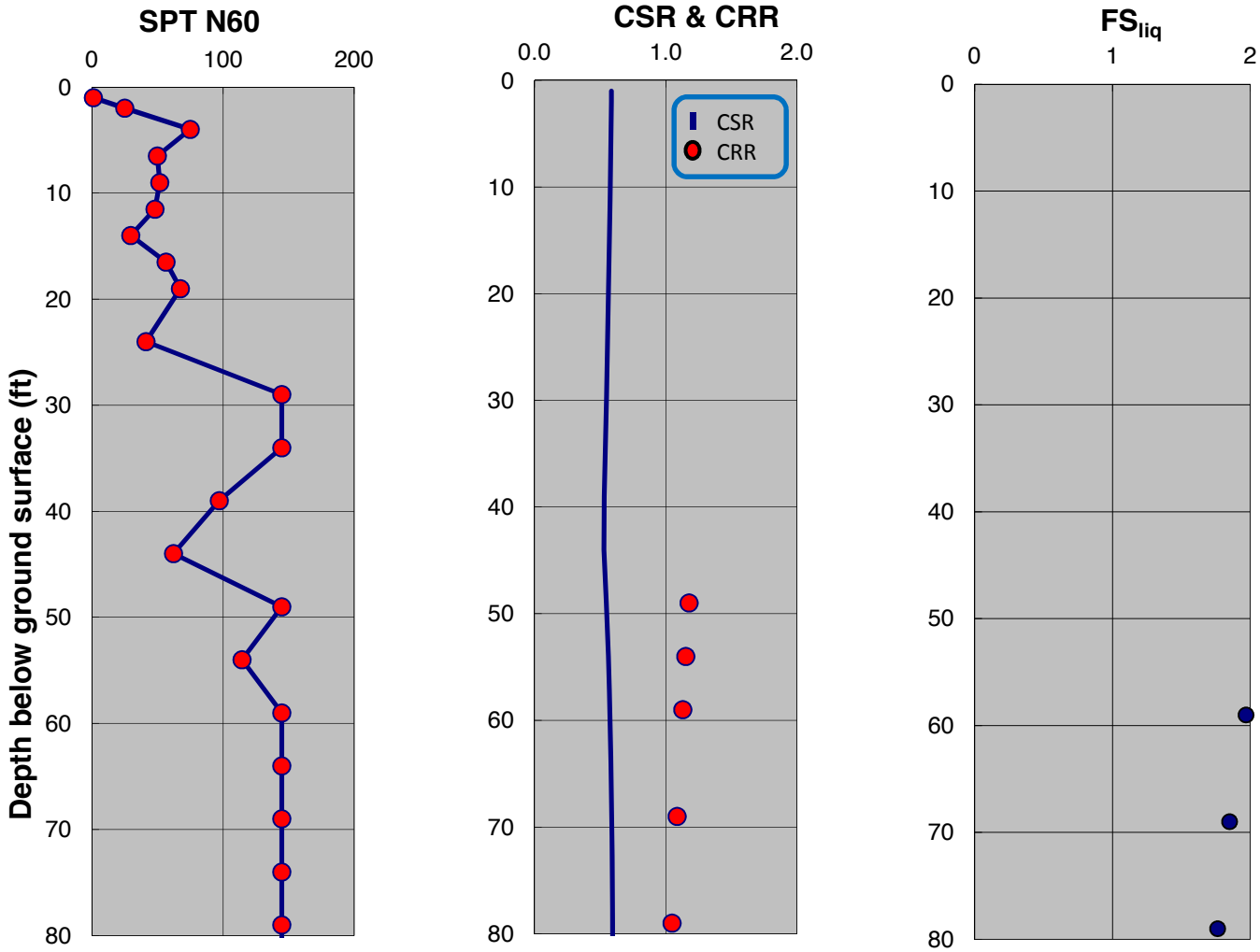
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-107 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



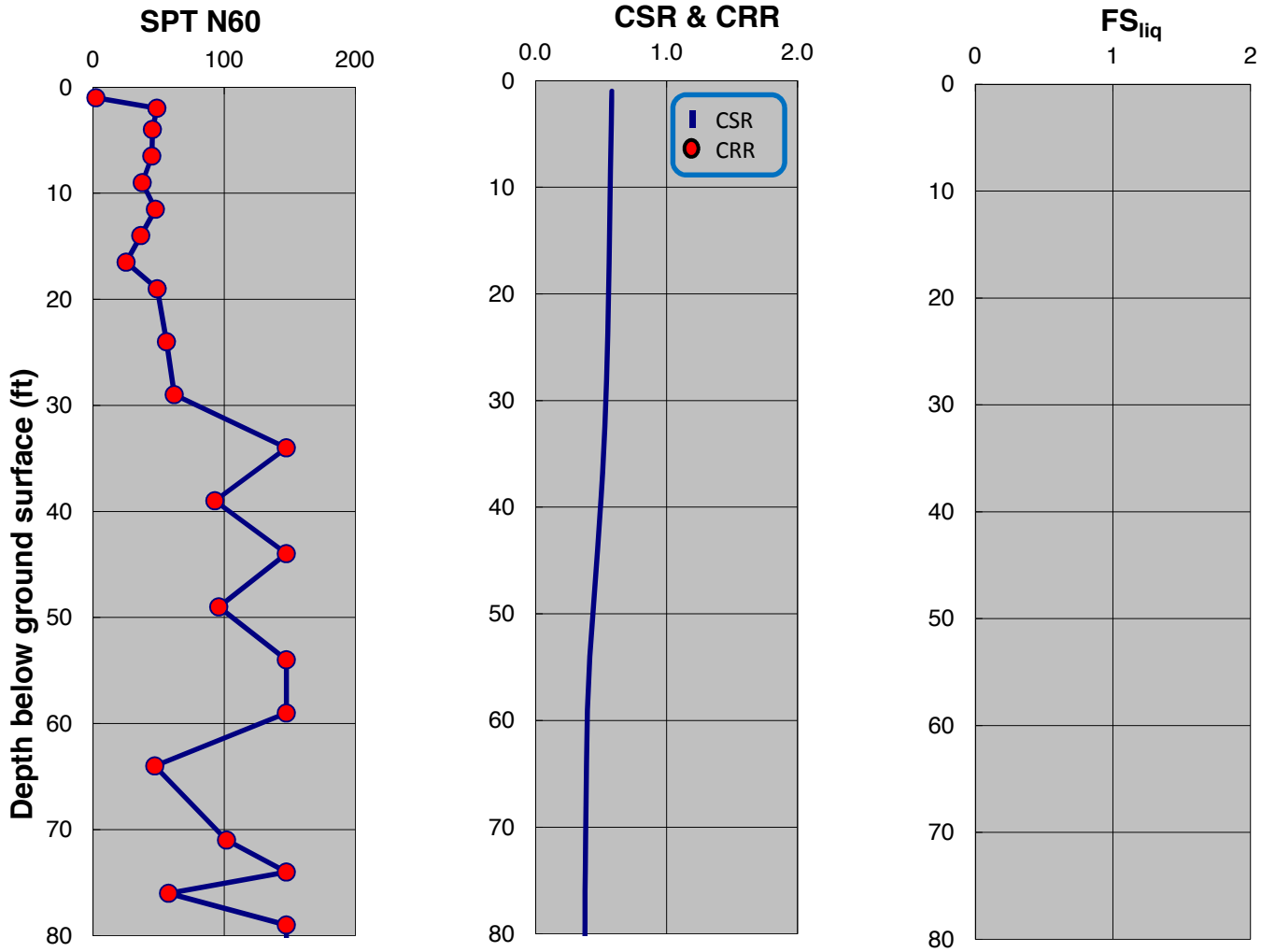
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-110 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



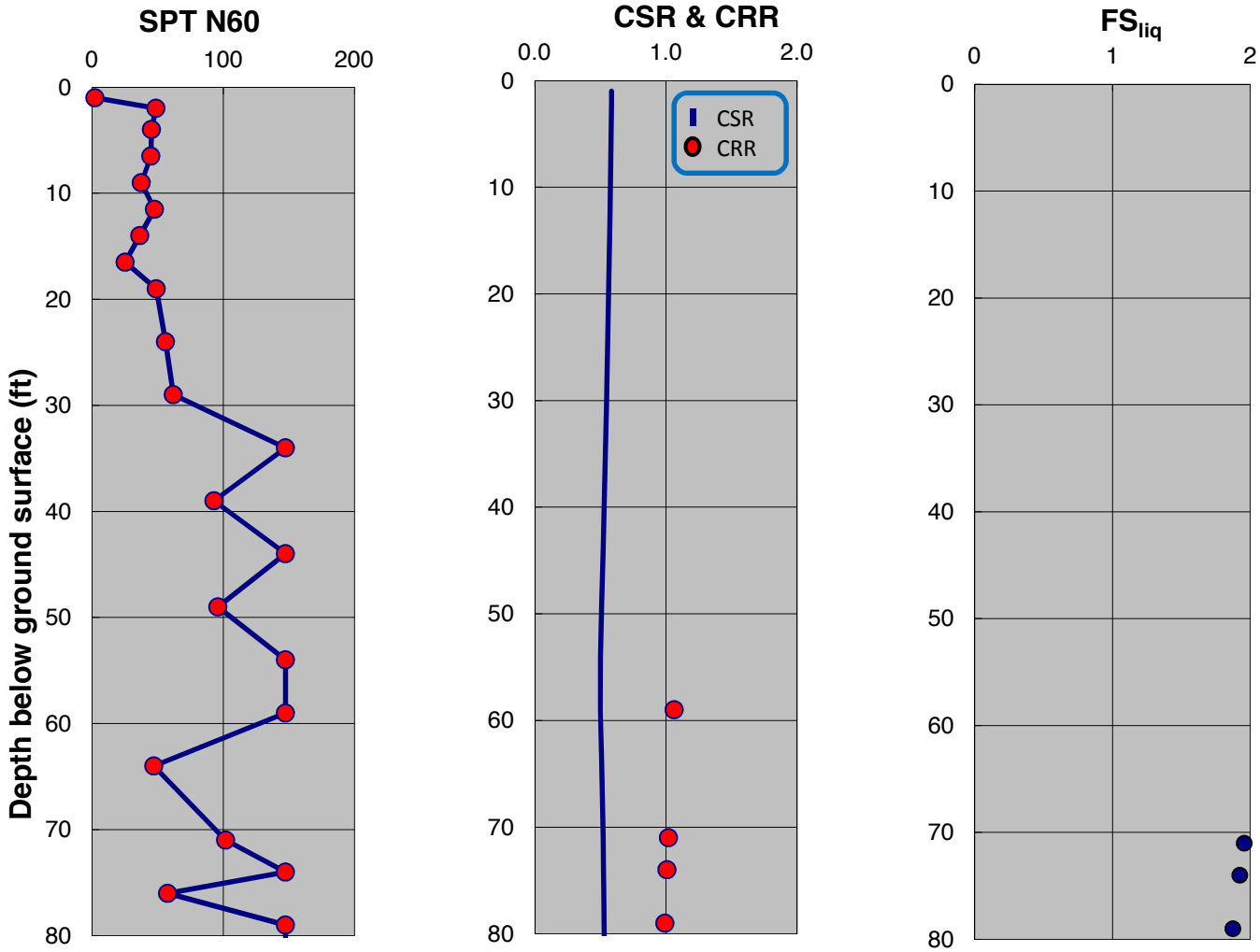
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-110 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



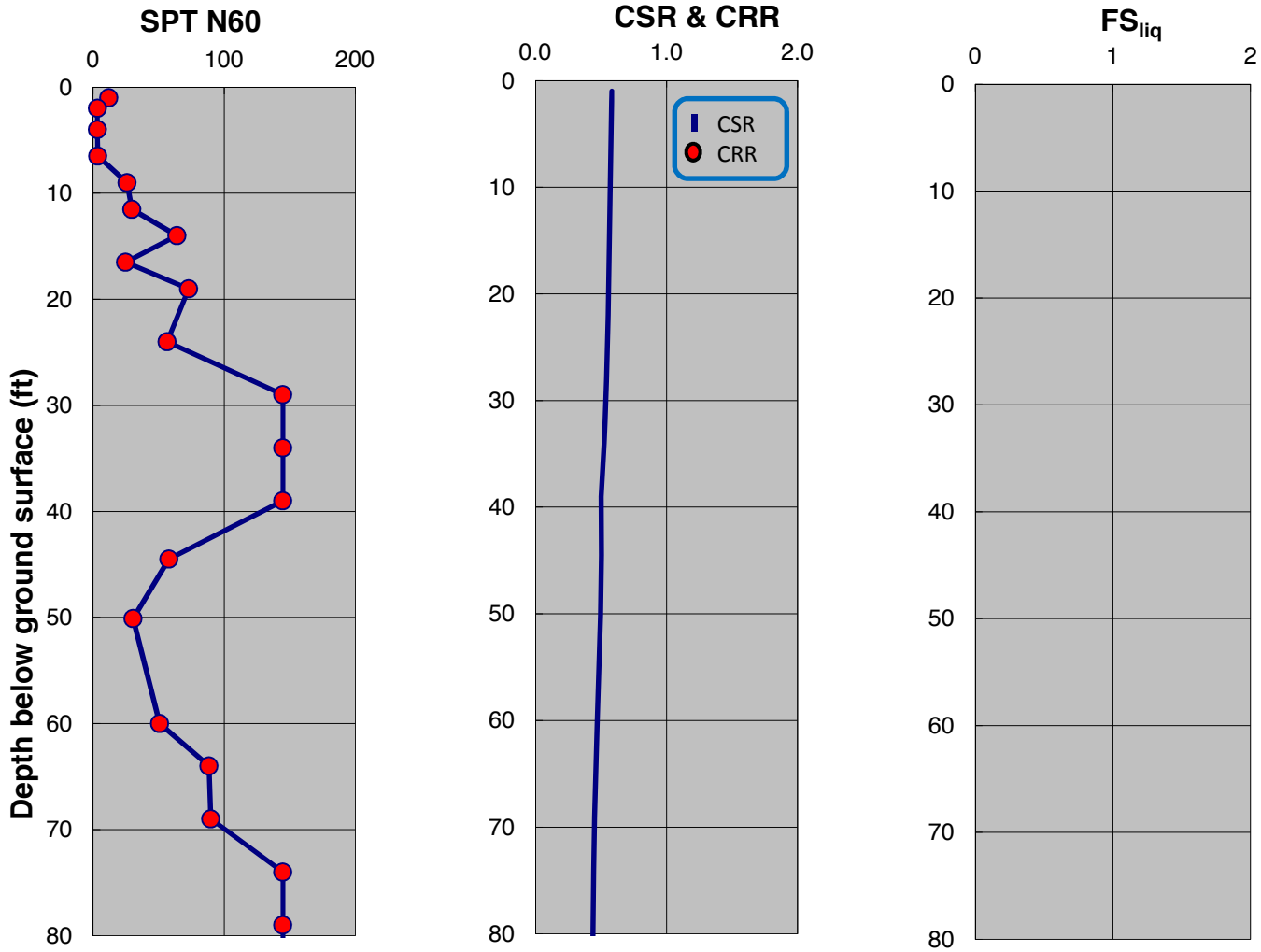
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-112 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



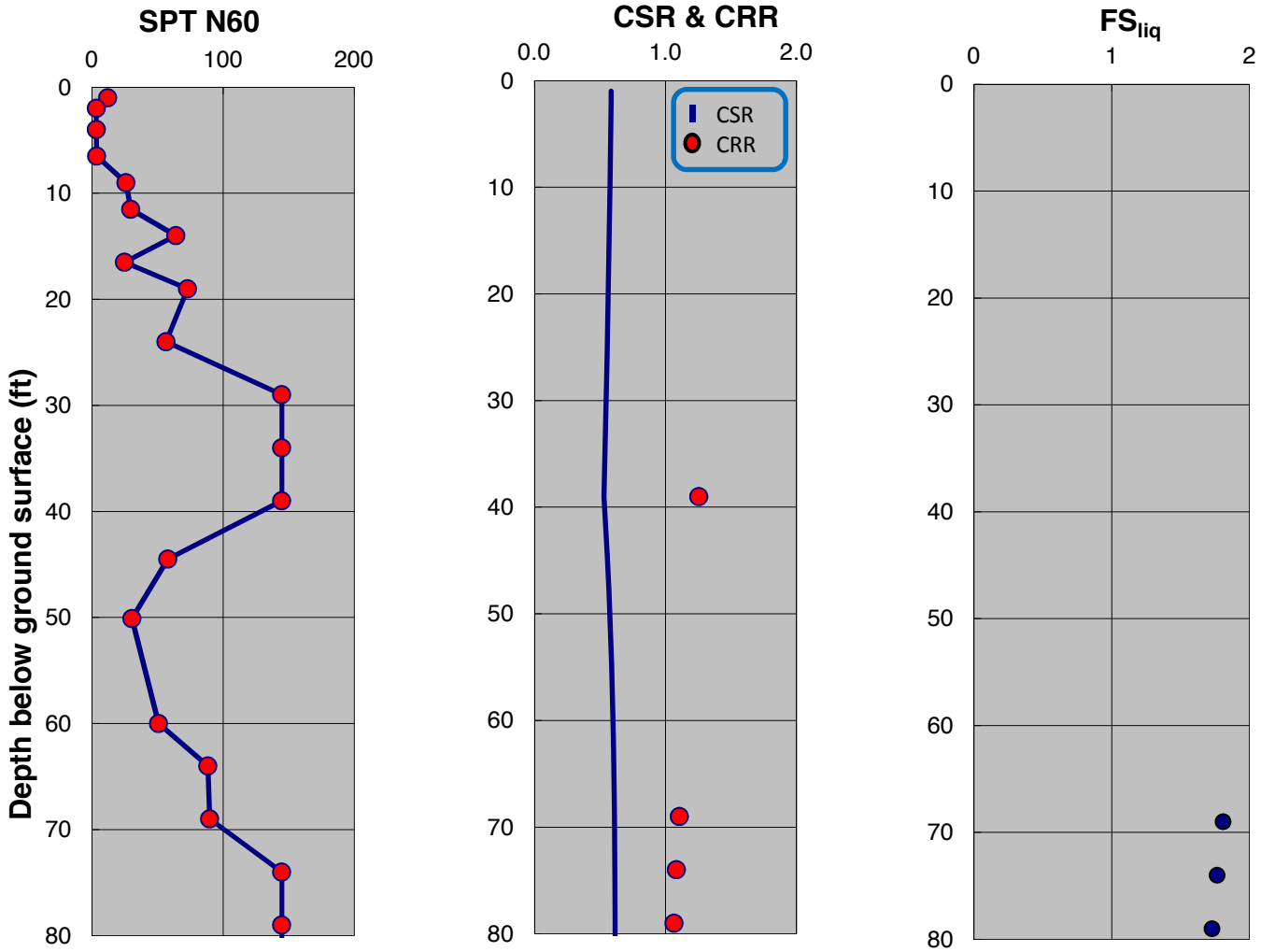
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-112 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-113 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

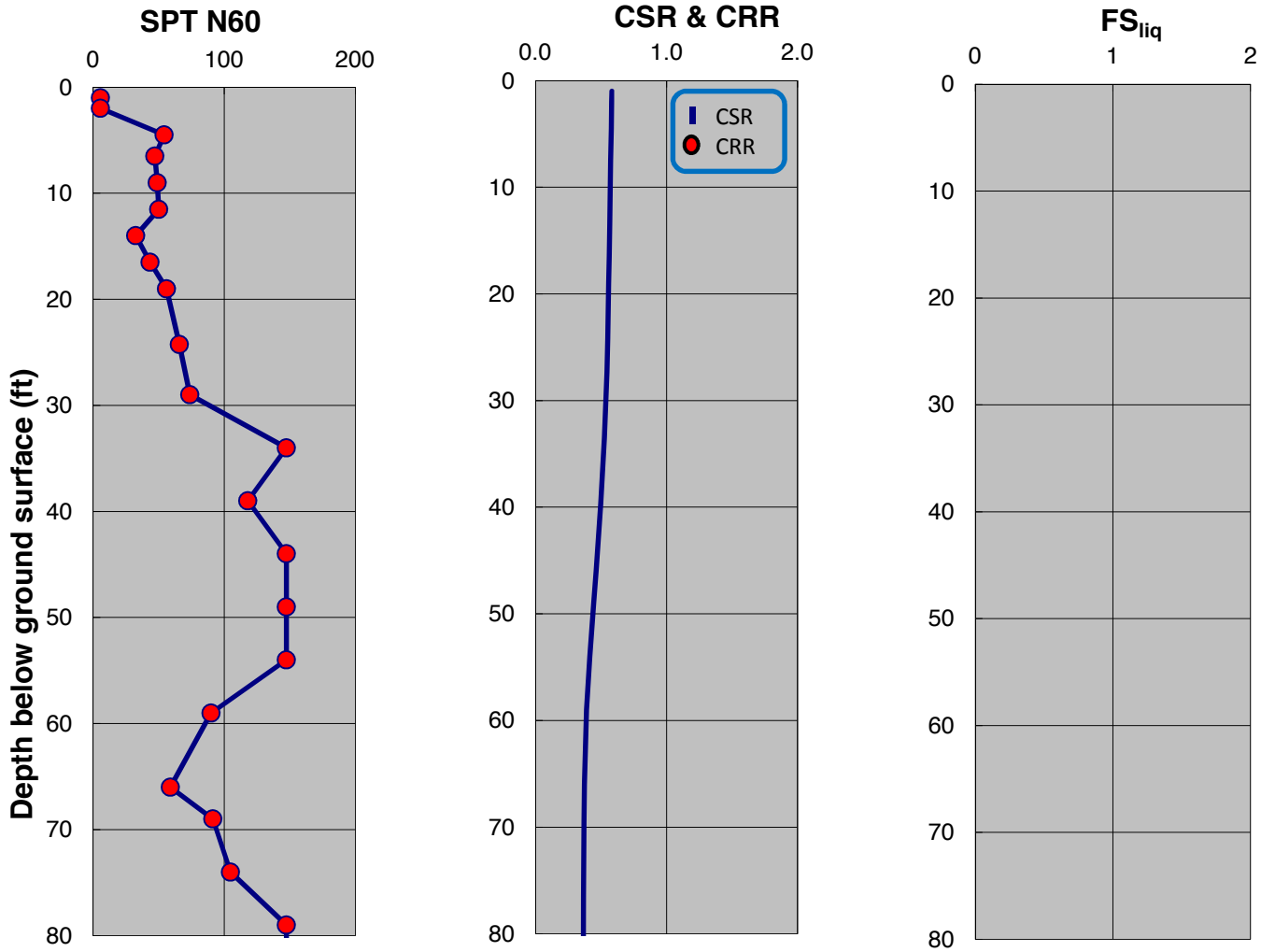
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-113 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

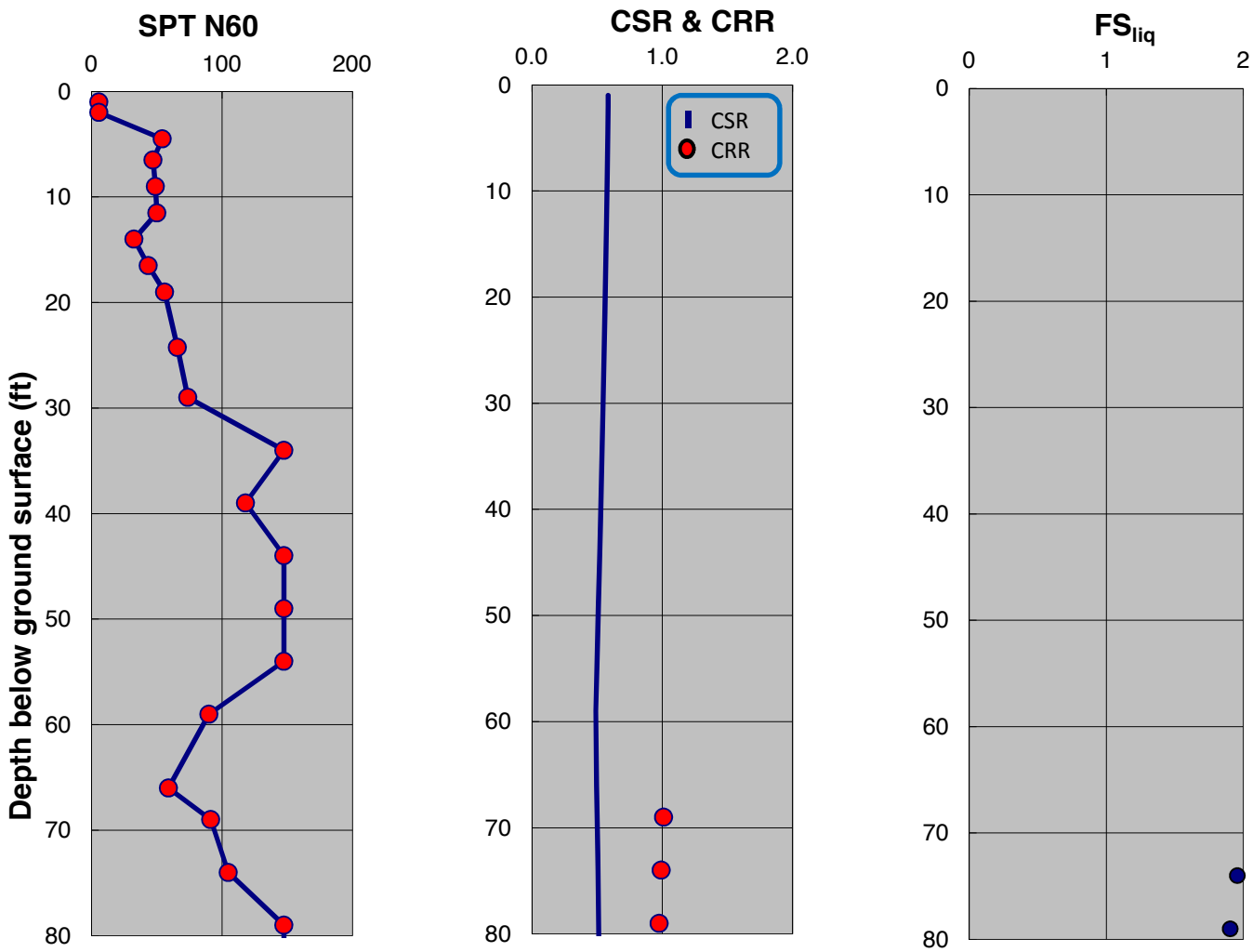
PLATE A.400



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-114 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

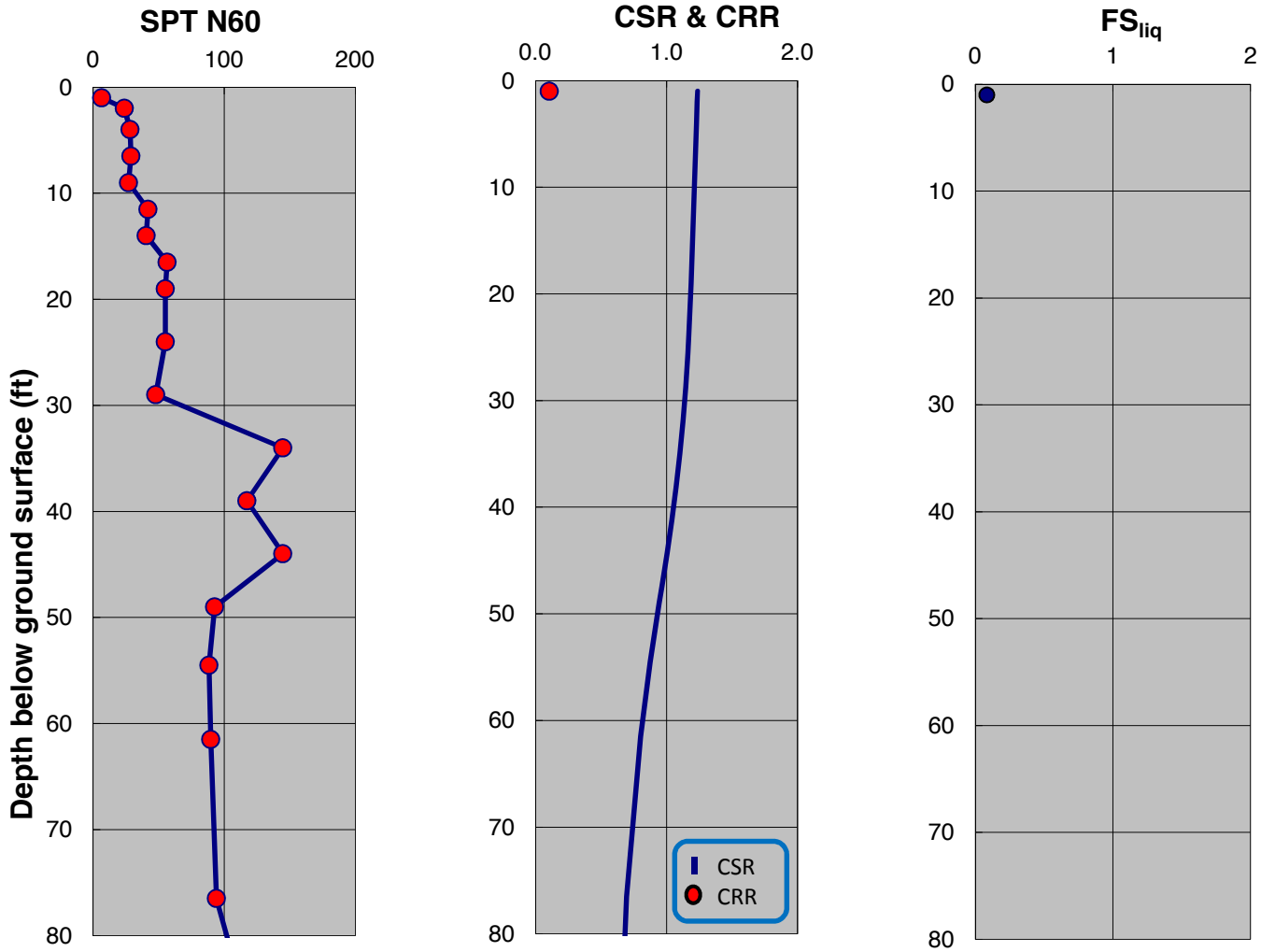
PLATE A.401



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-114 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

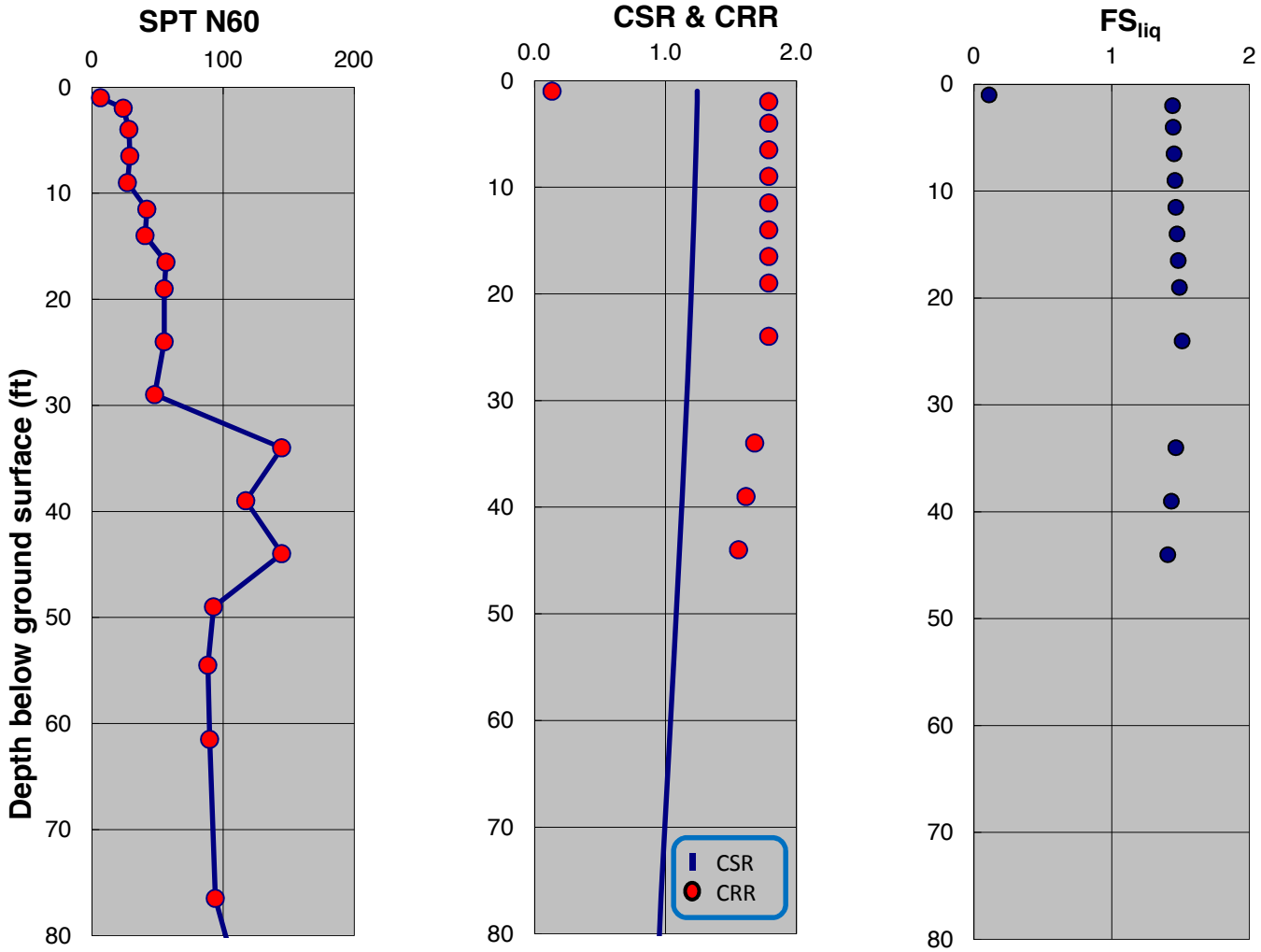
PLATE A.402



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-117 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

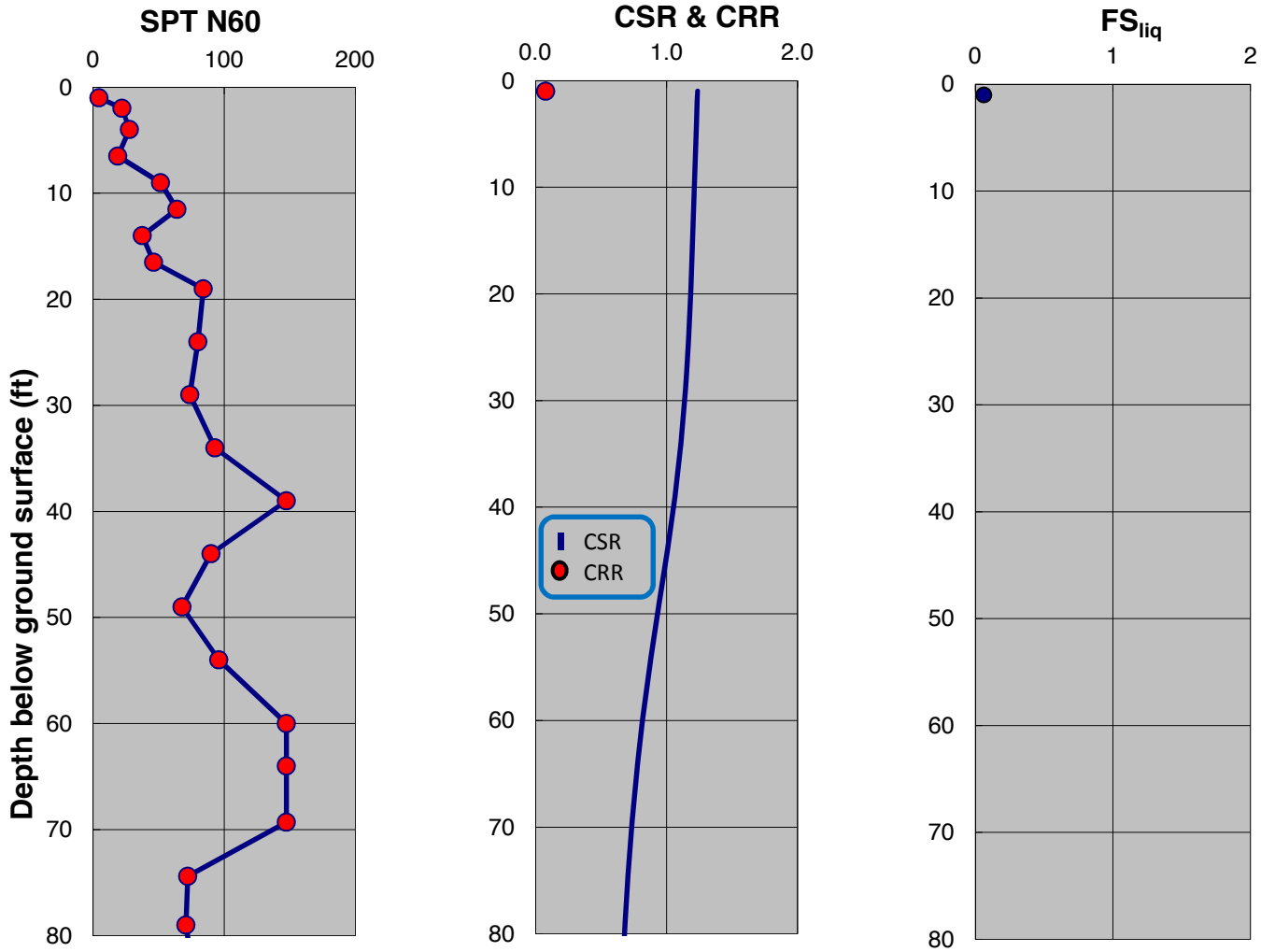
PLATE A.403



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-117 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

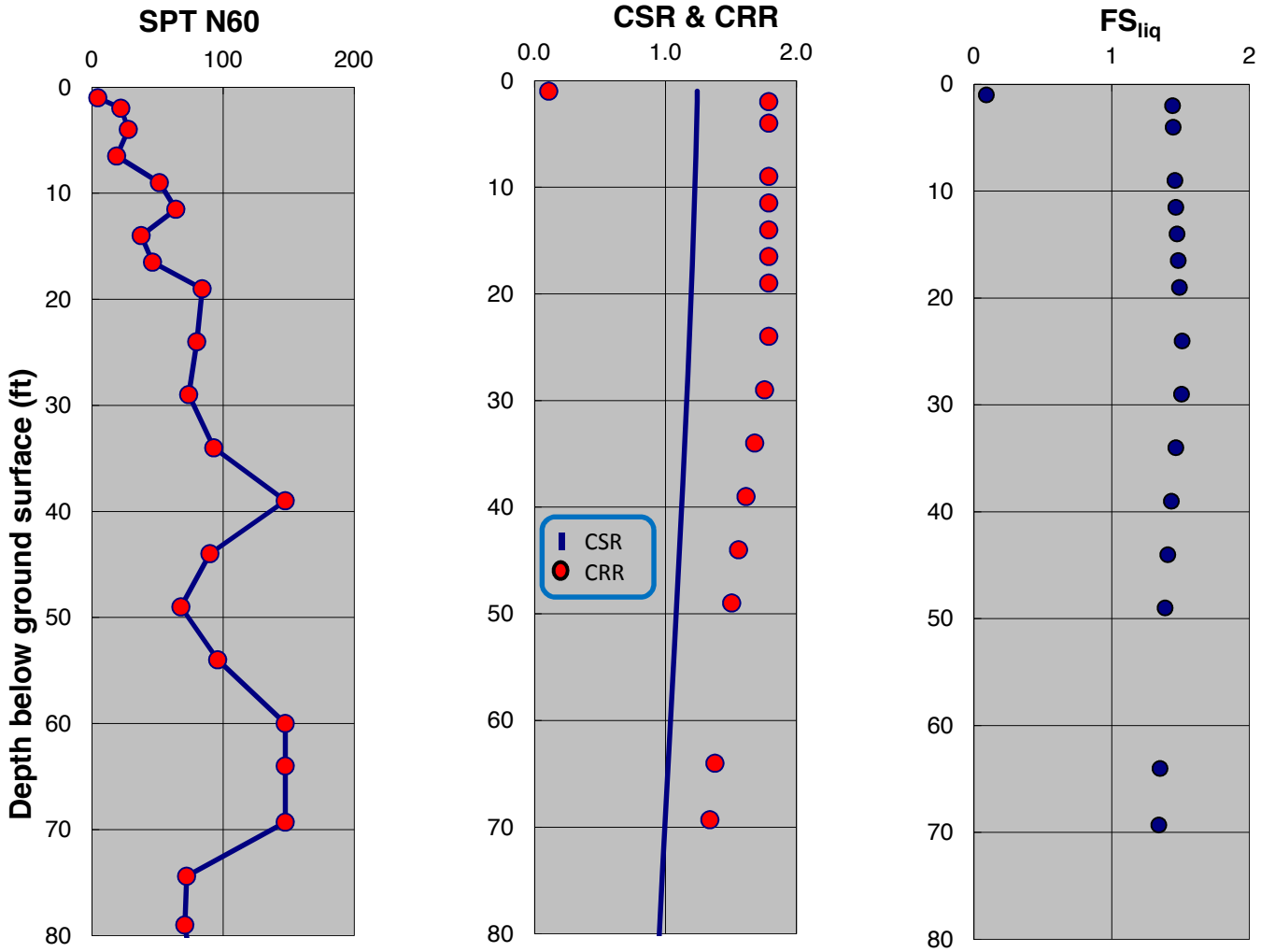
PLATE A.404



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-120 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

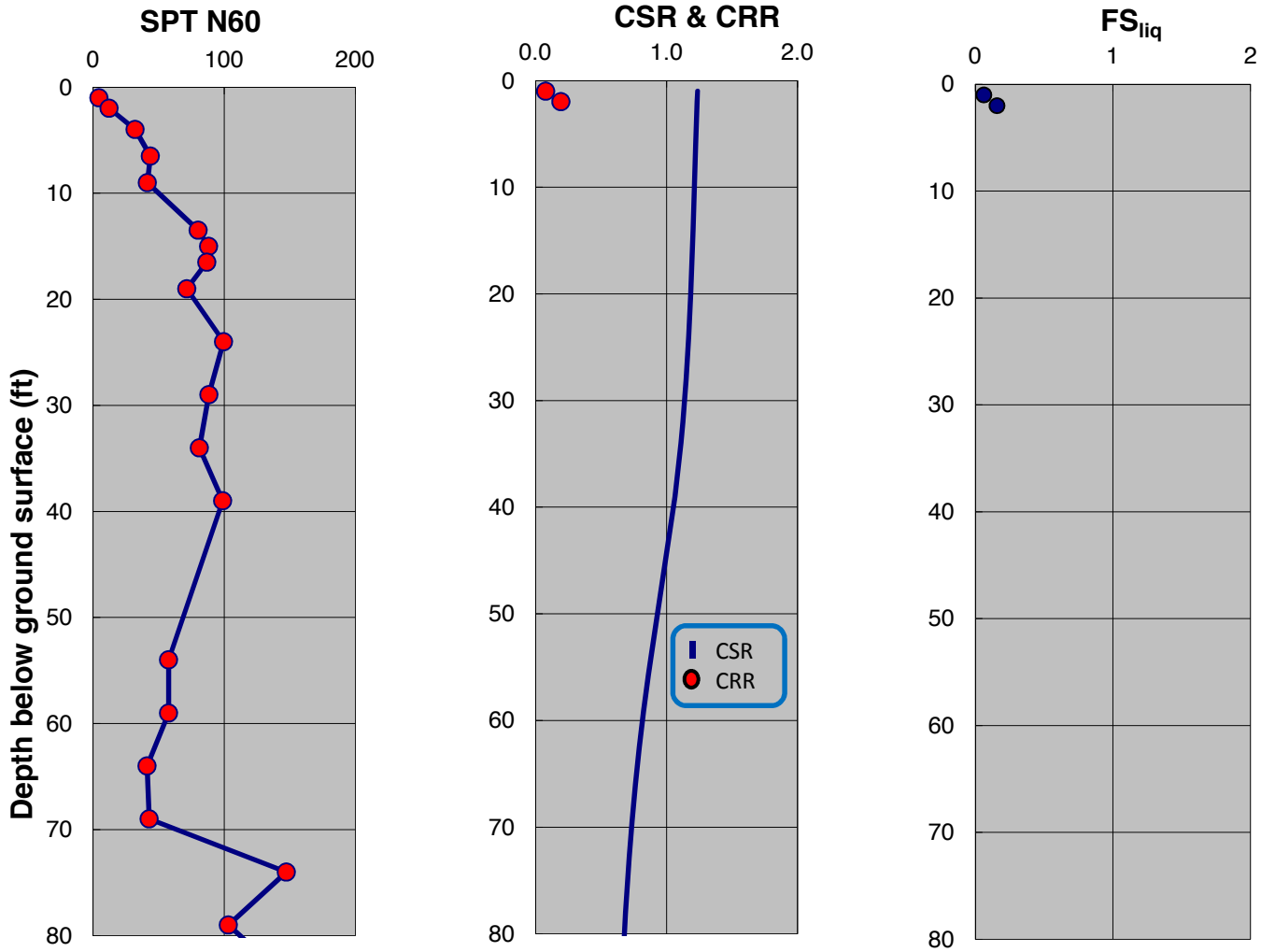
PLATE A.405



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-120 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

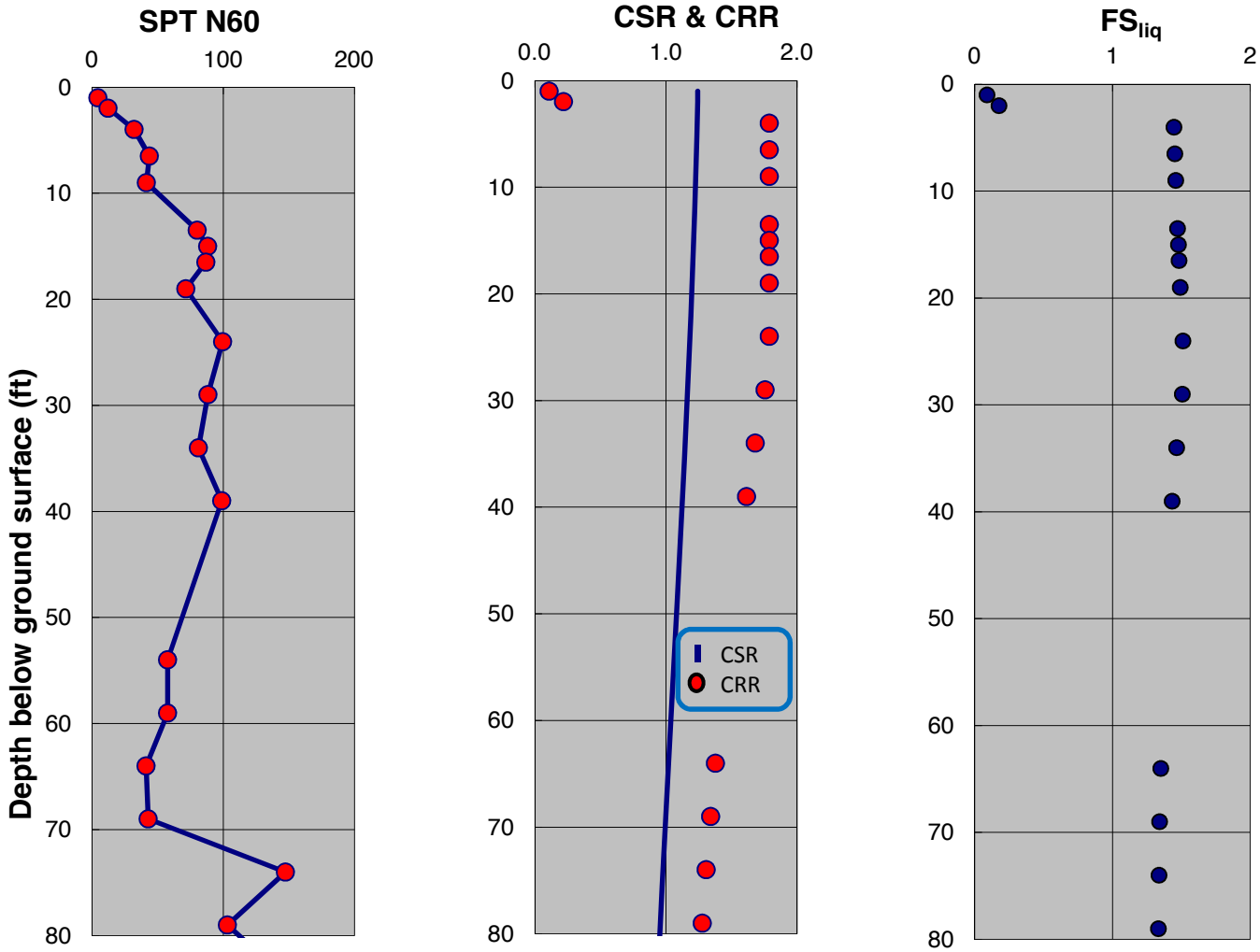
PLATE A.406



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-121 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

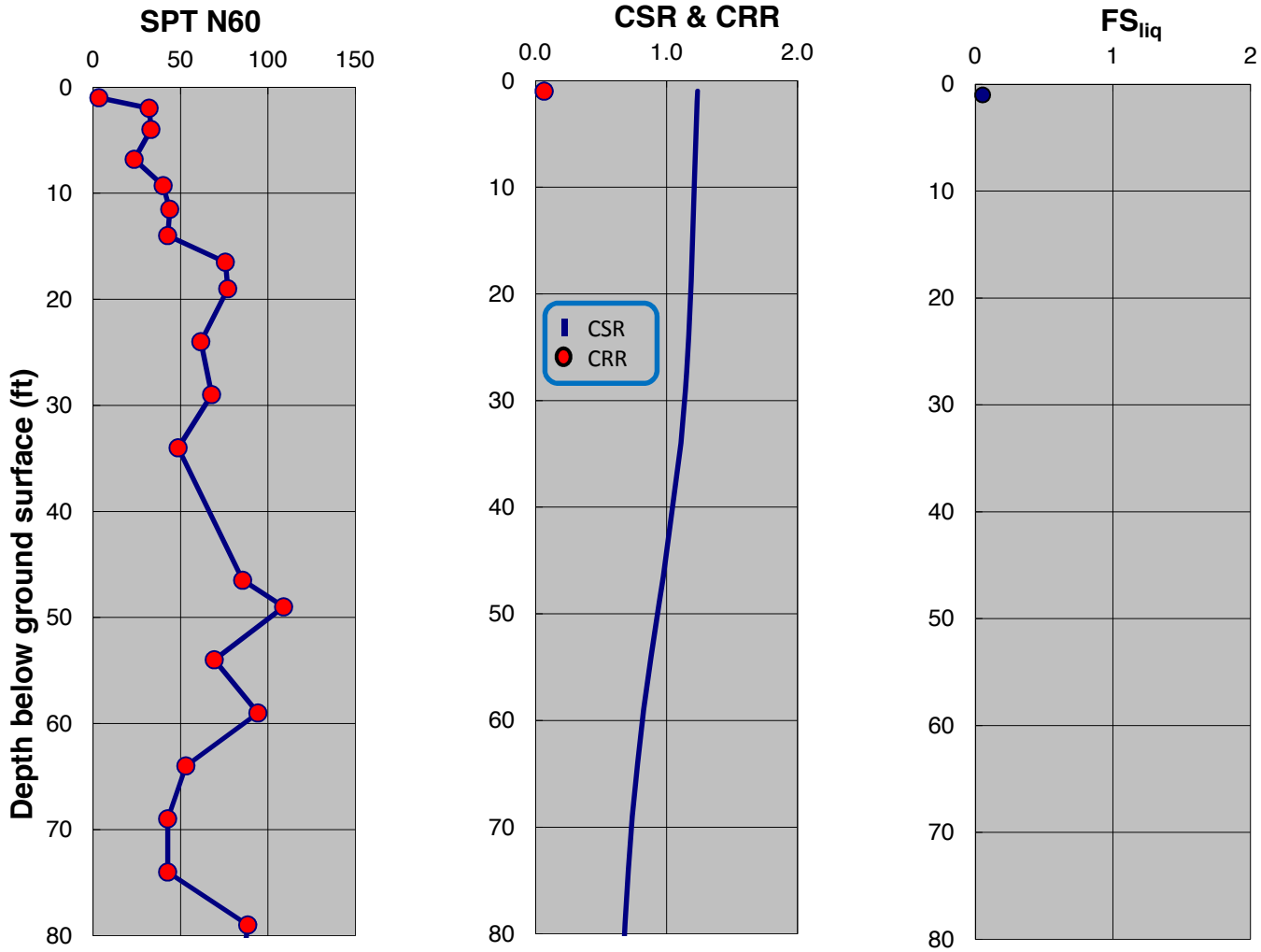
PLATE A.407



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-121 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

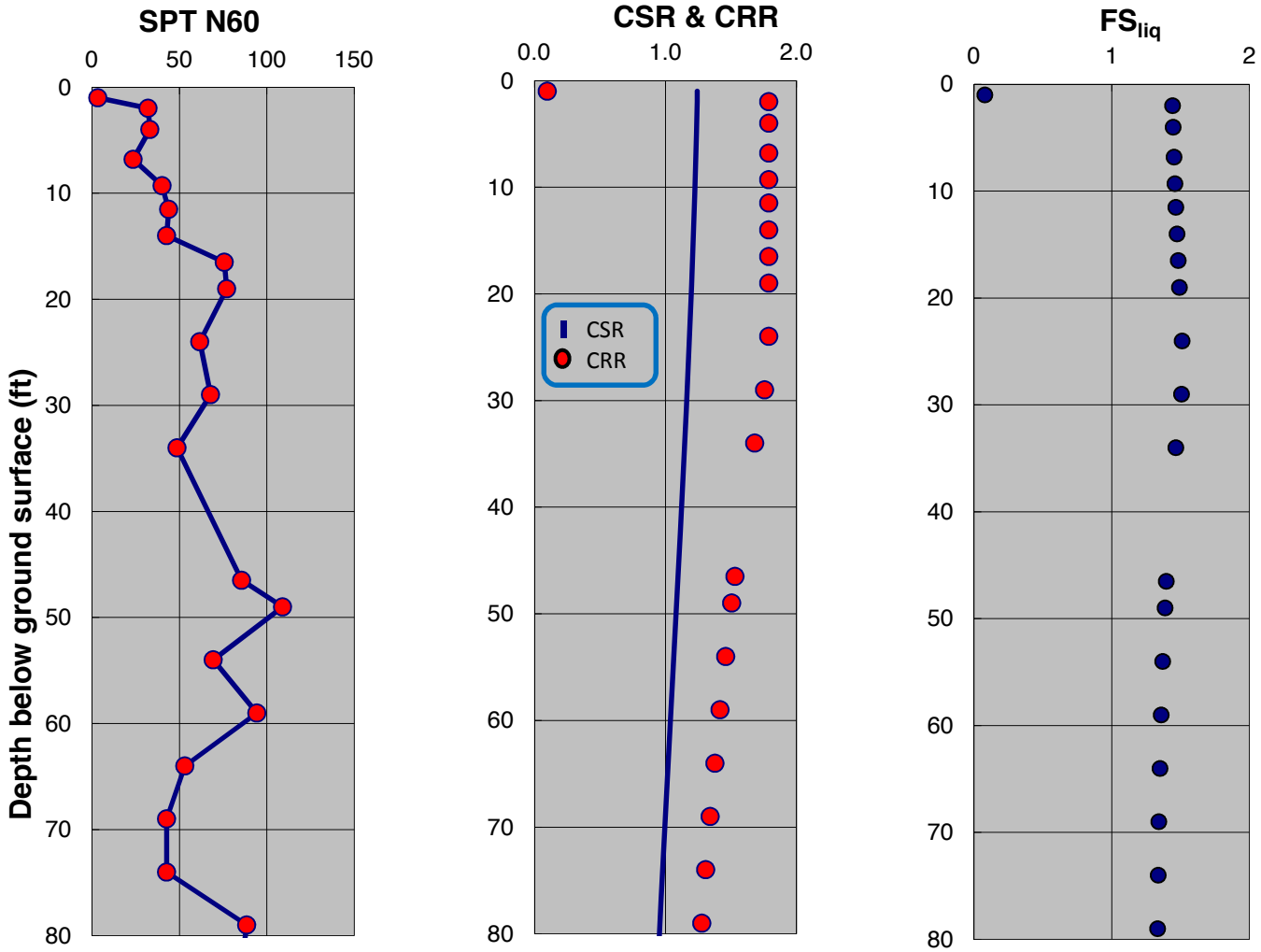
PLATE A.408



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-122 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

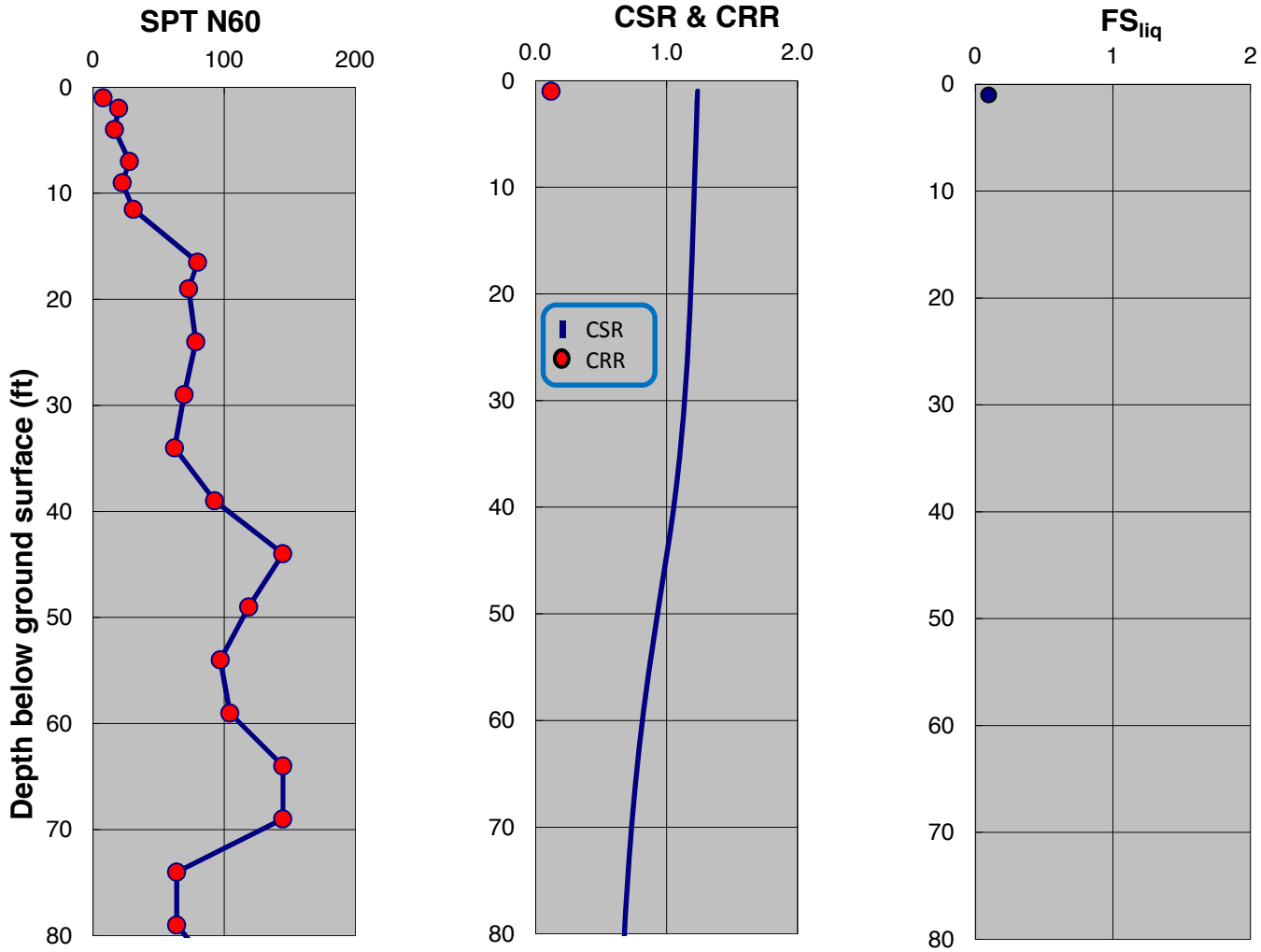
PLATE A.409



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-122 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

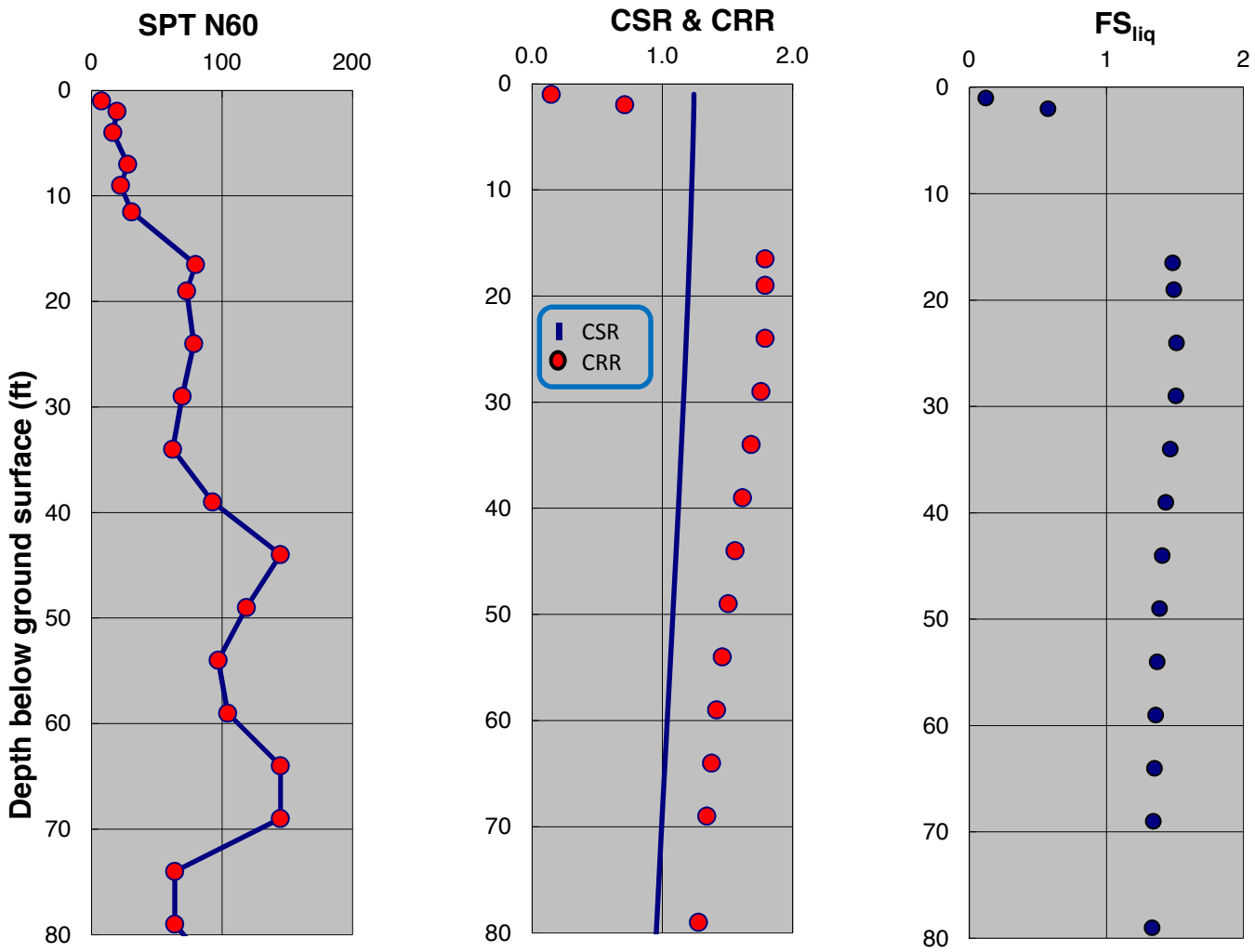
PLATE A.410



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-123 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

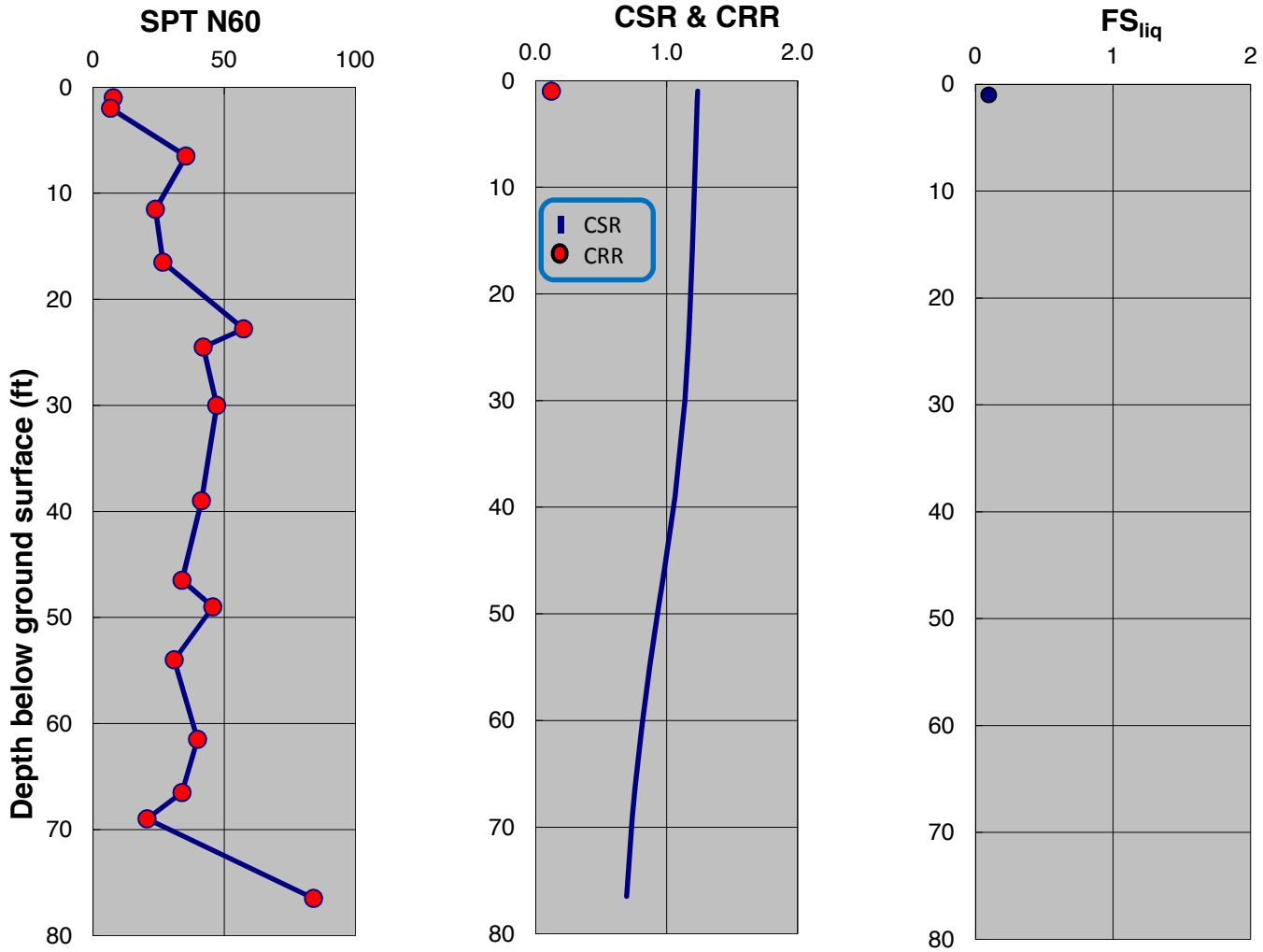
PLATE A.411



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-123 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

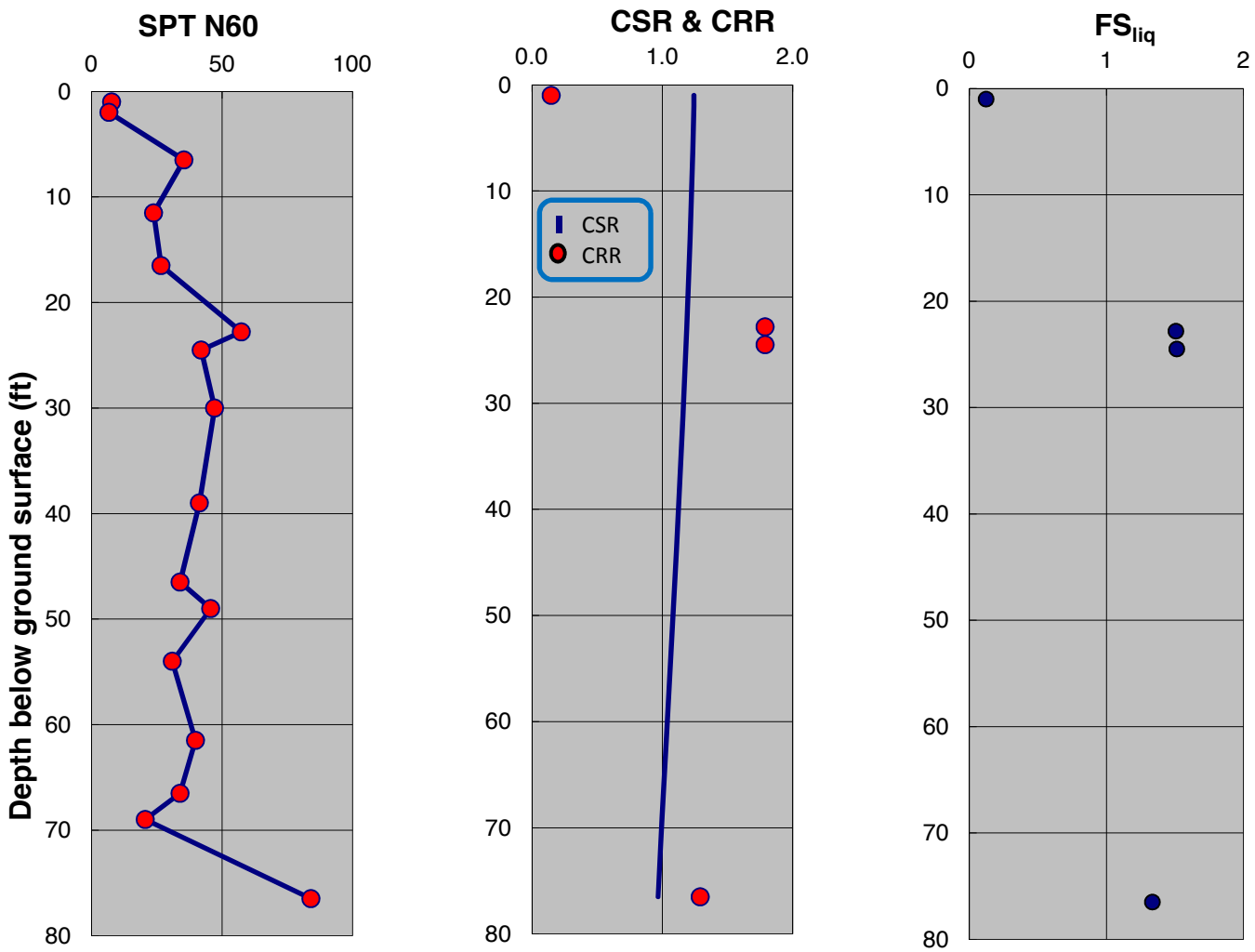
PLATE A.412



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-124 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

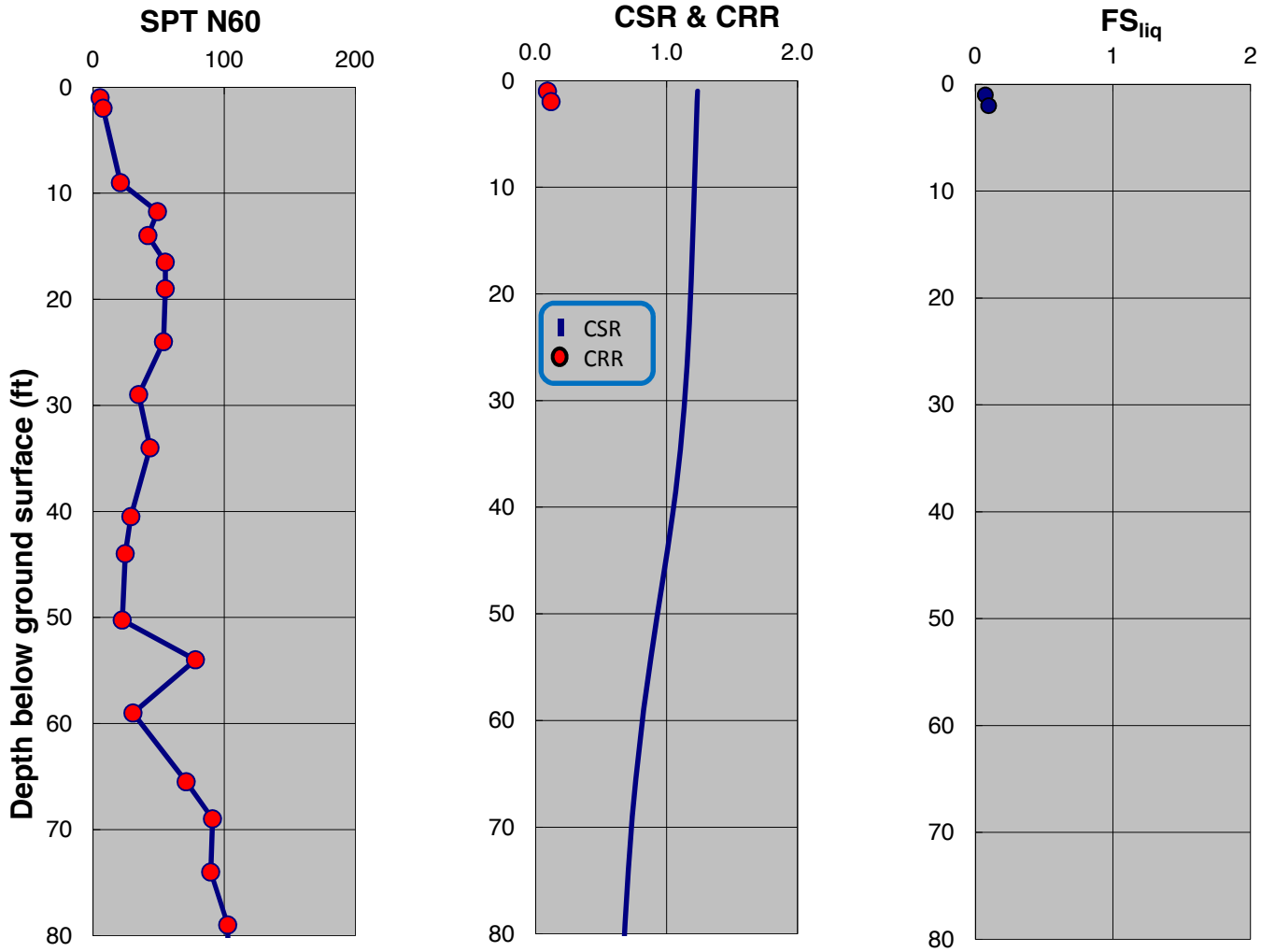
PLATE A.413



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-124 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

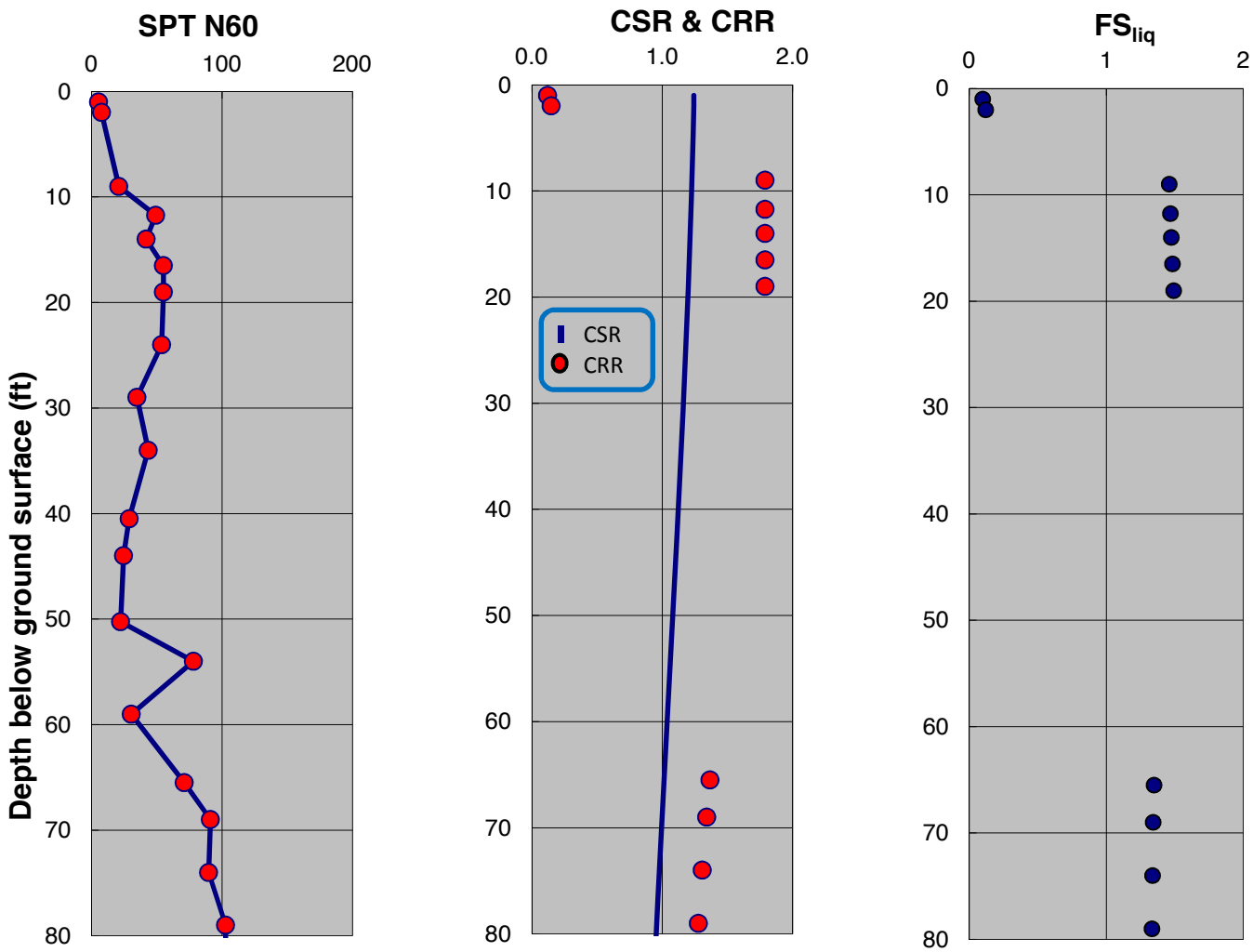
PLATE A.414



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-125 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

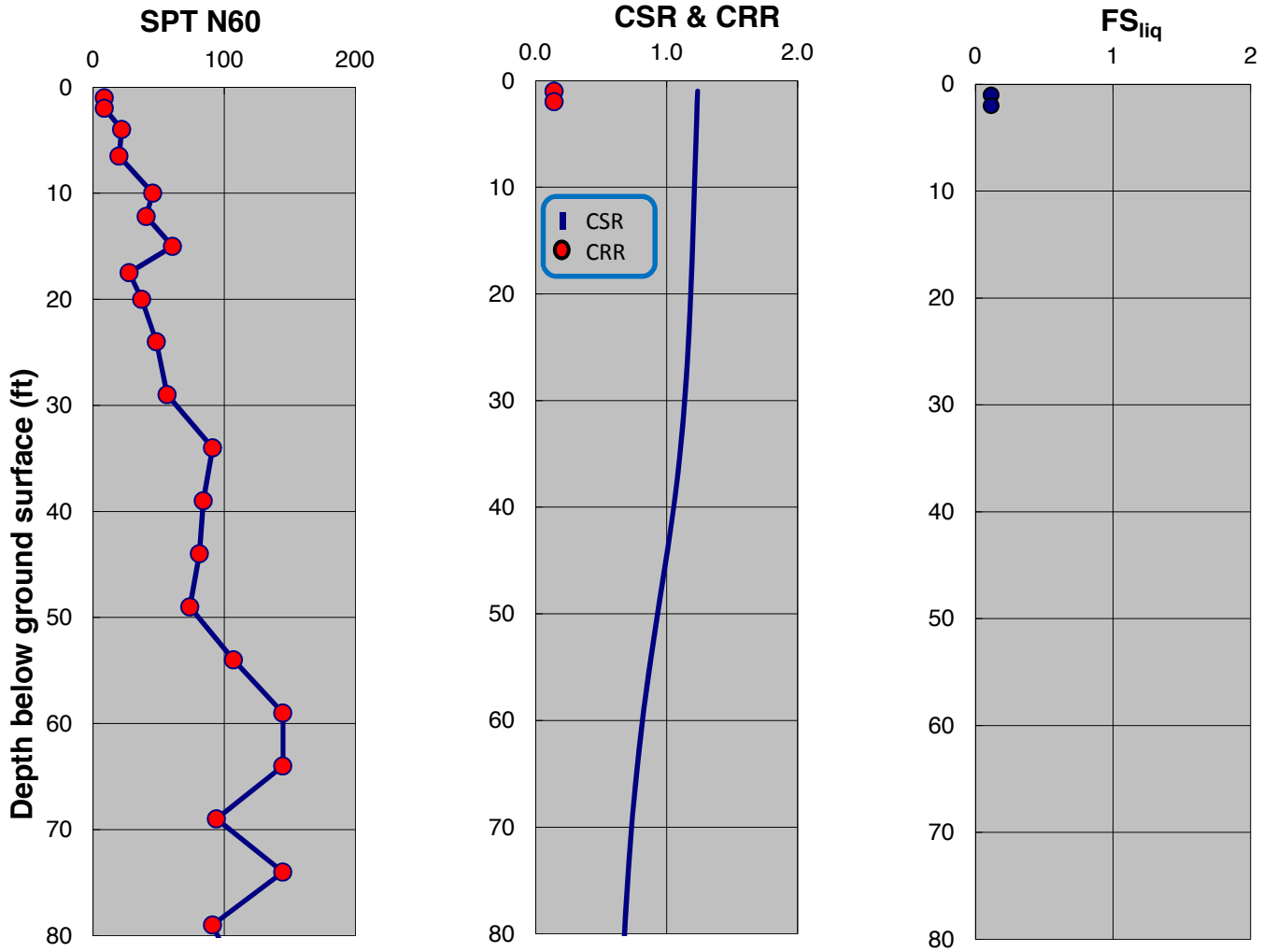
PLATE A.415



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-125 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

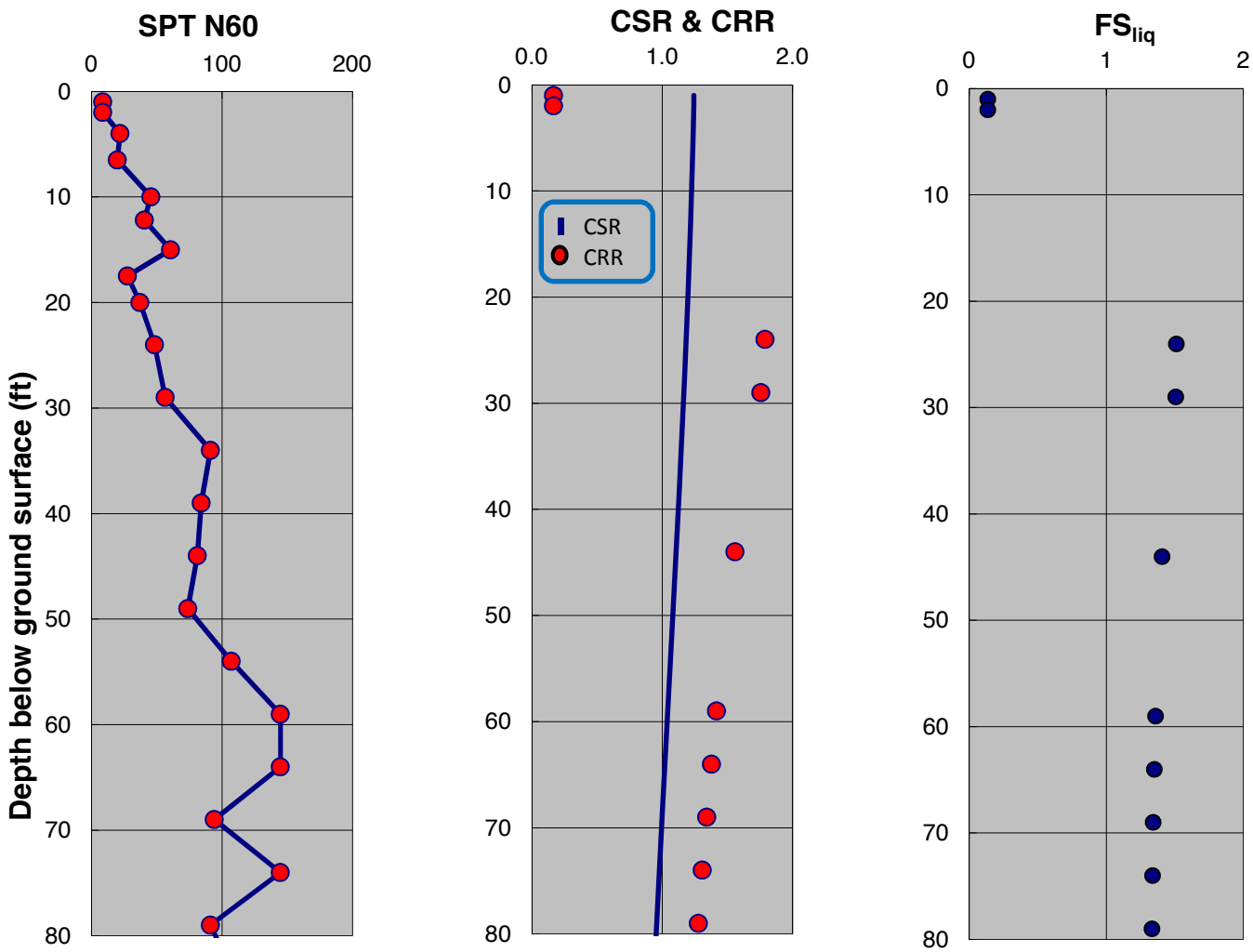
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.416



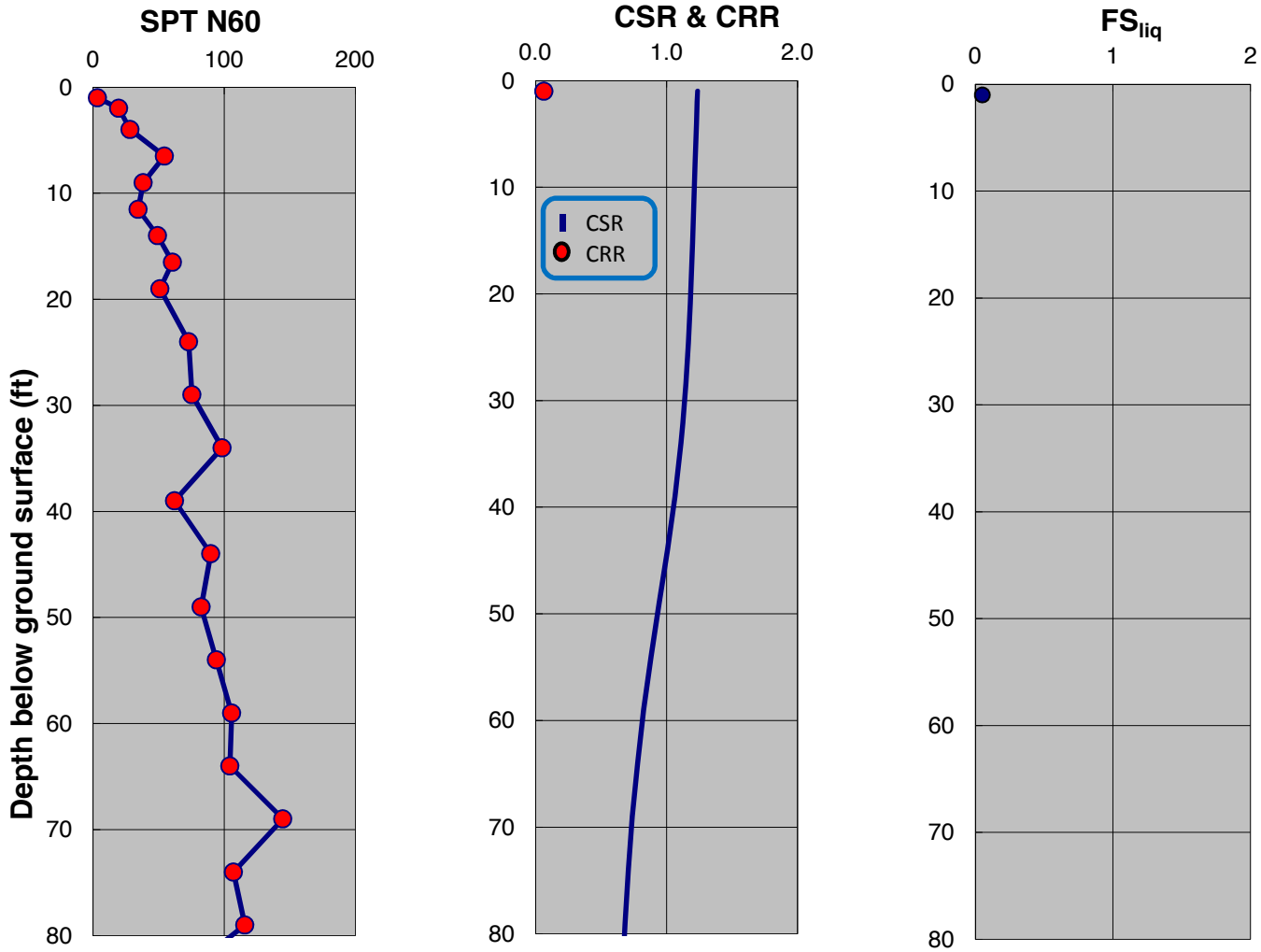
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-126 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-126 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

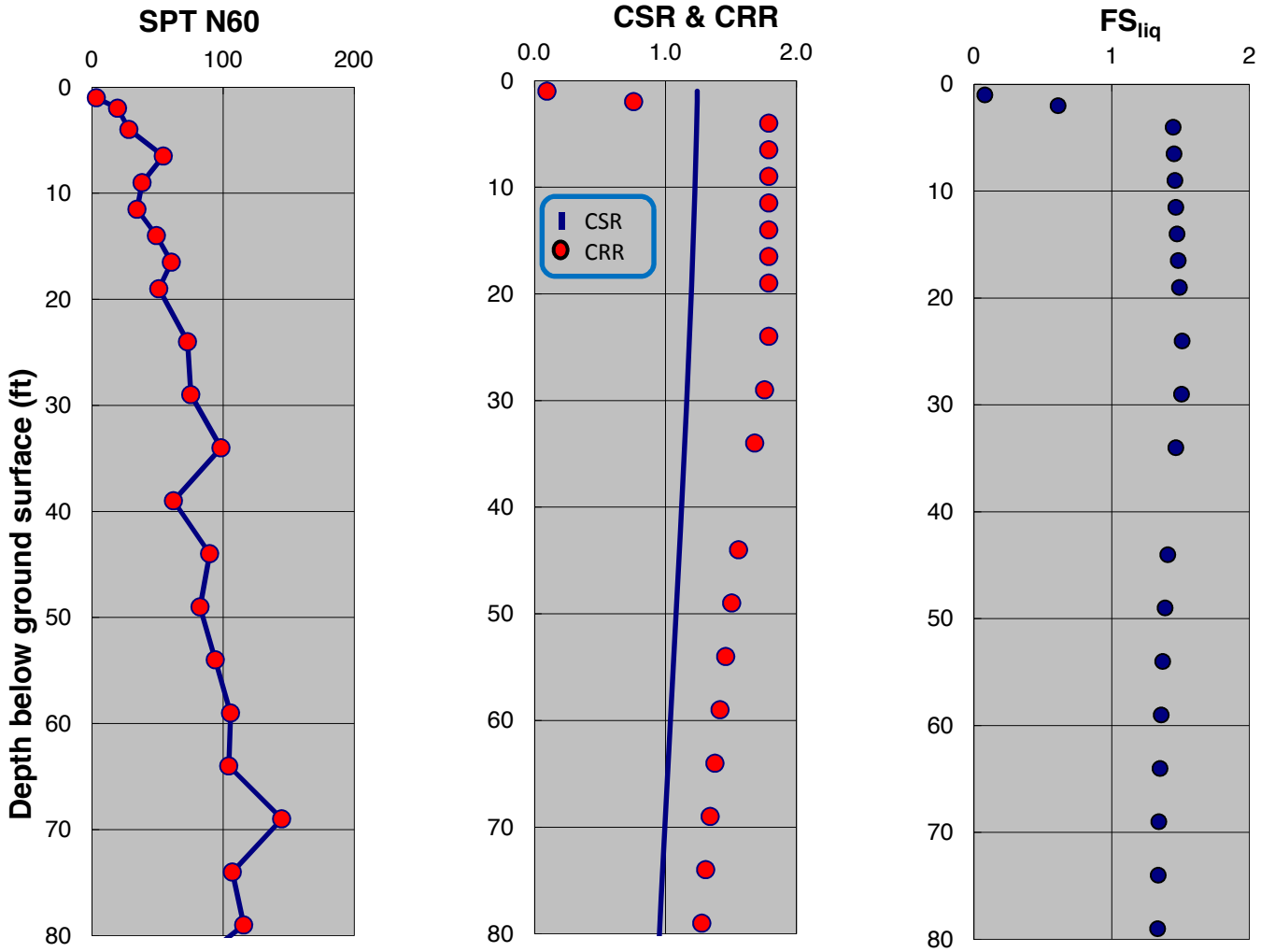
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-127 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

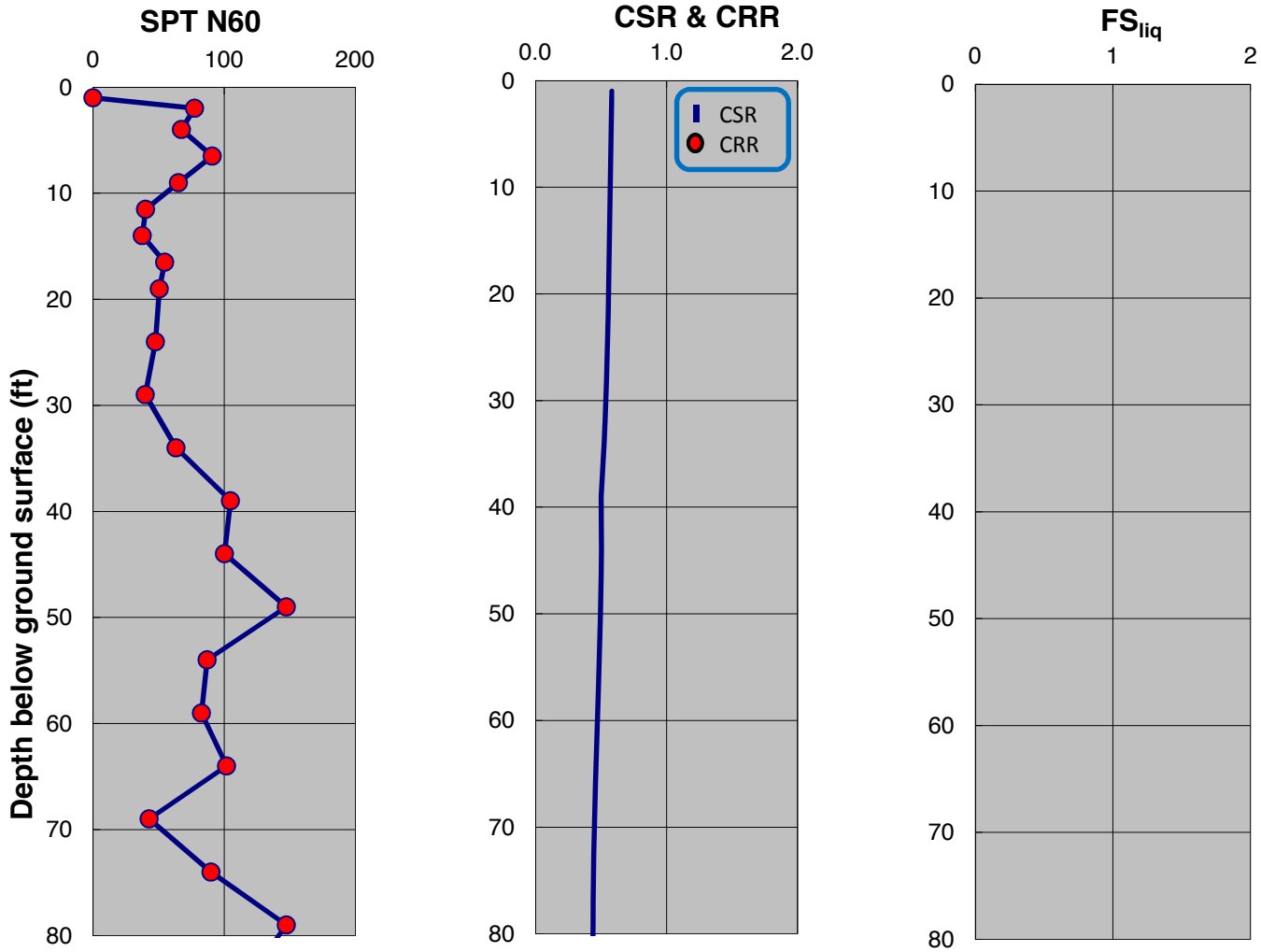
PLATE A.419



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-127 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

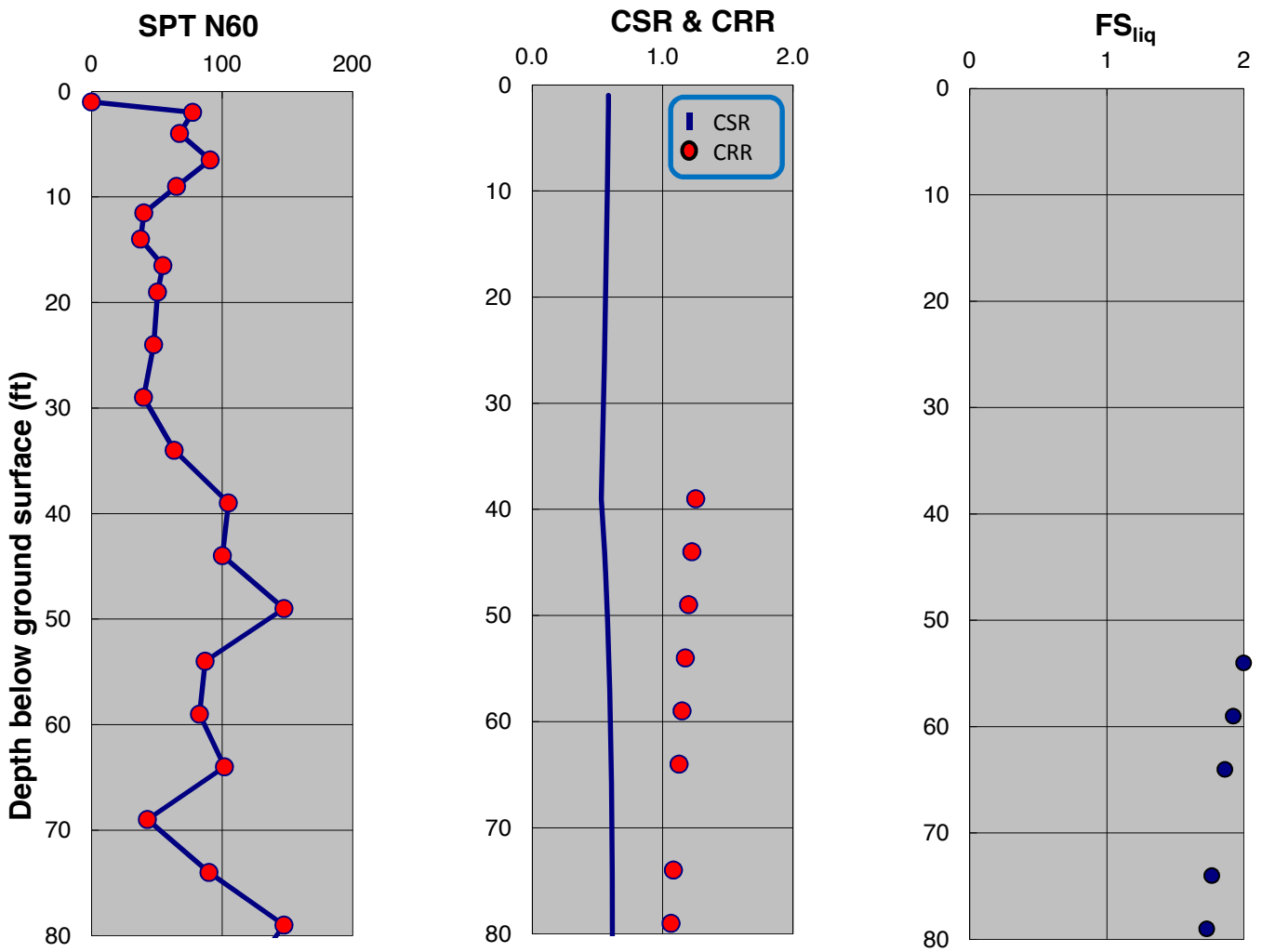
PLATE A.420



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-131 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

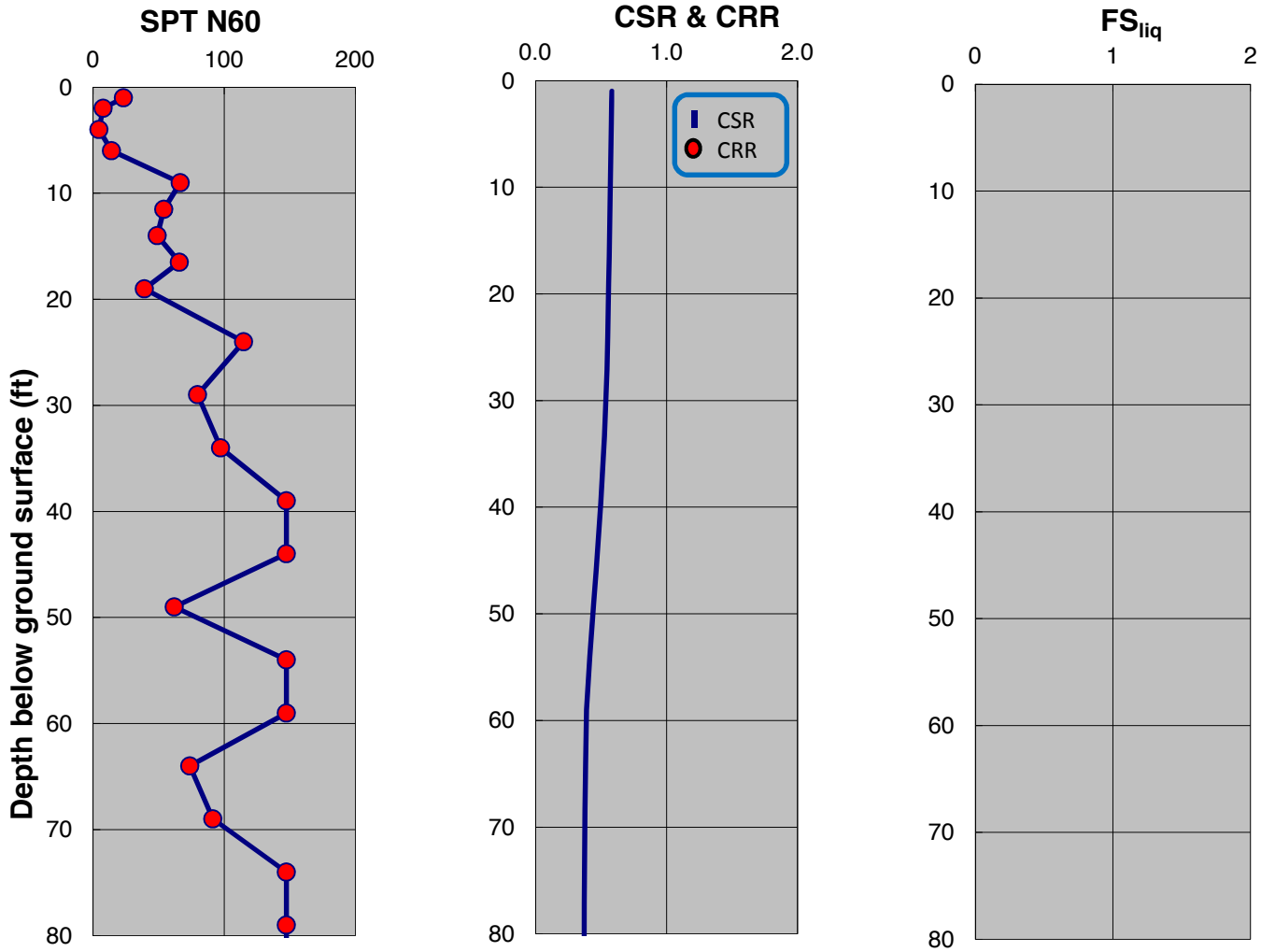
PLATE A.421



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-131 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

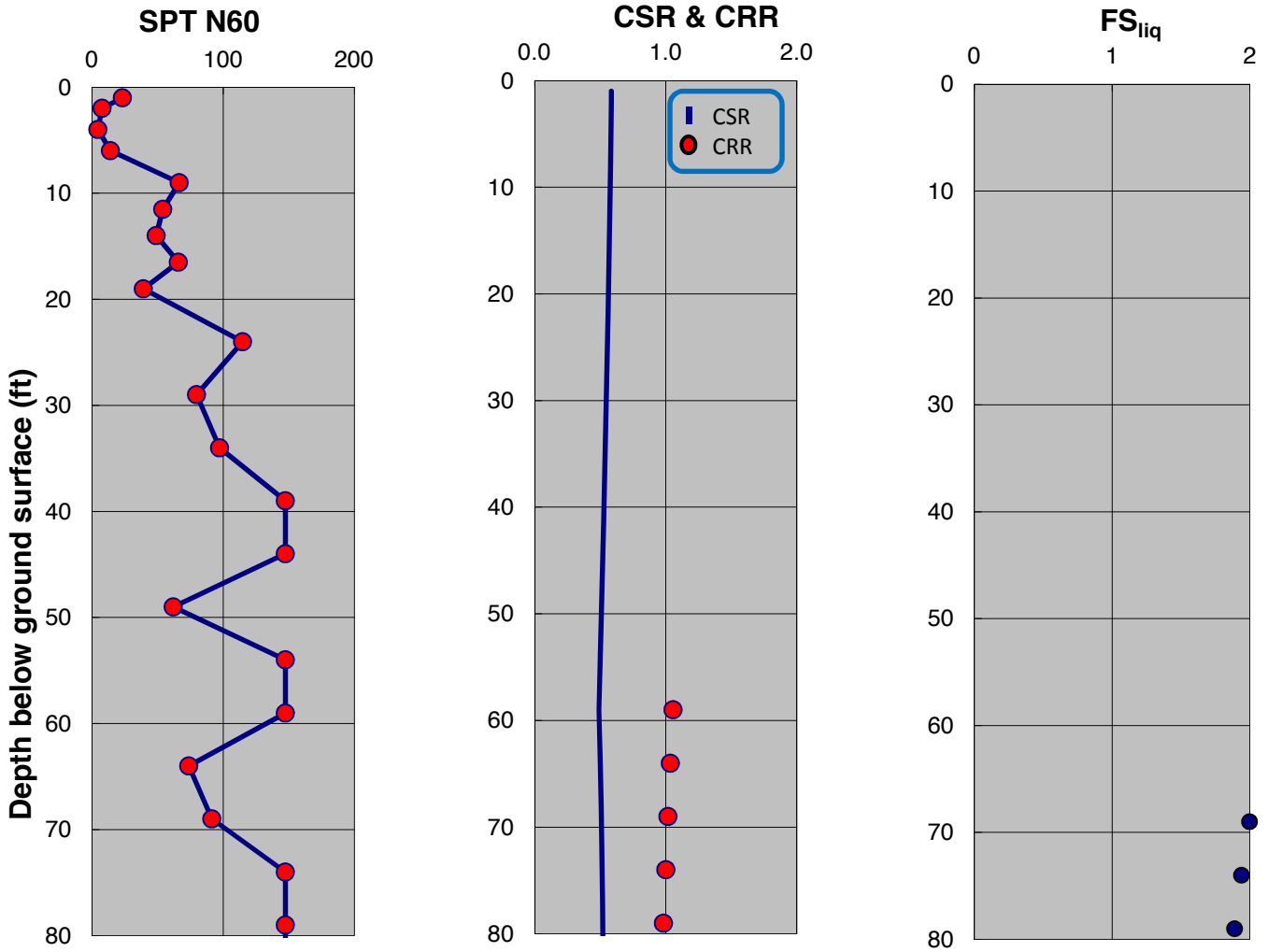
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.422



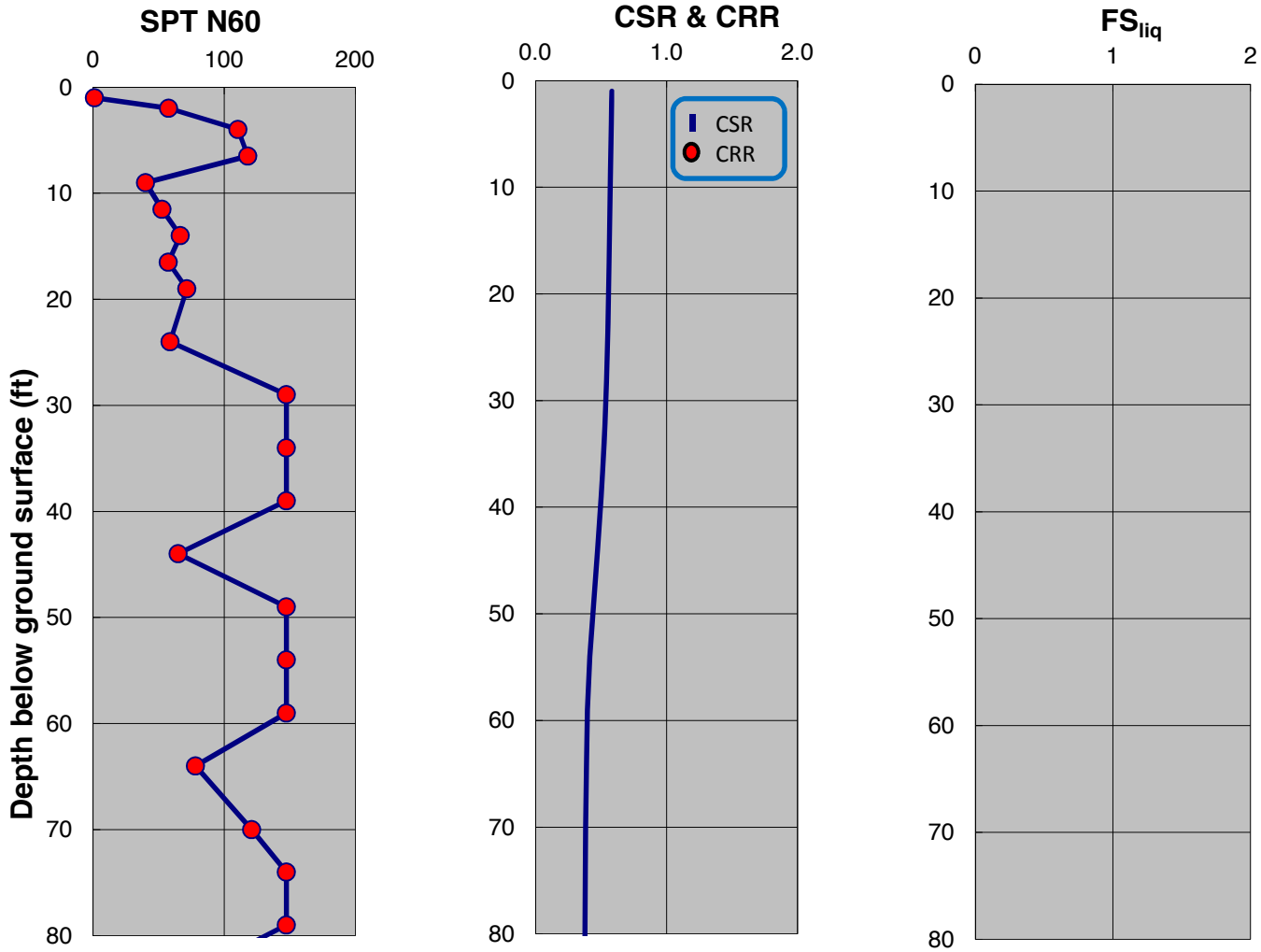
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-132 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



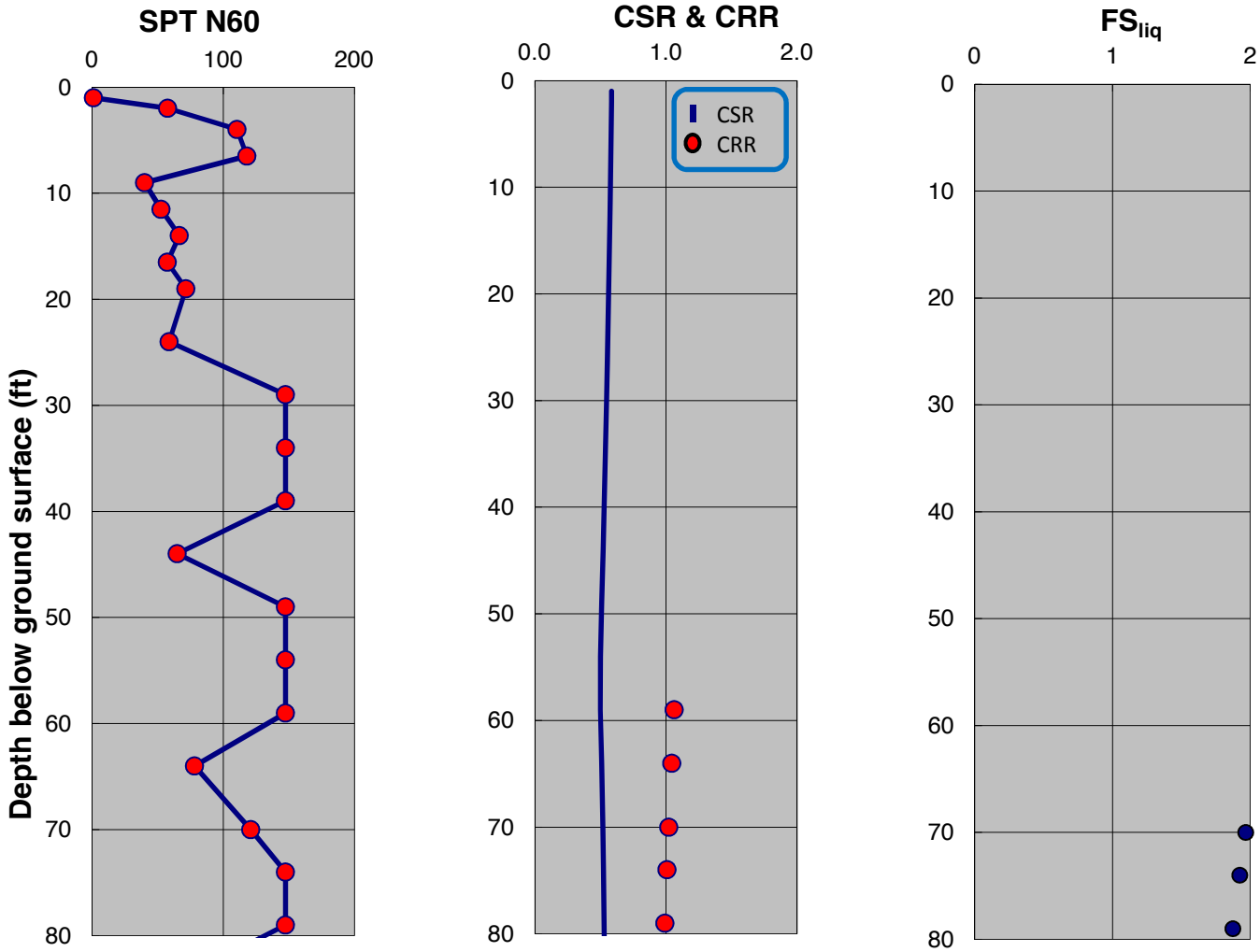
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-132 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



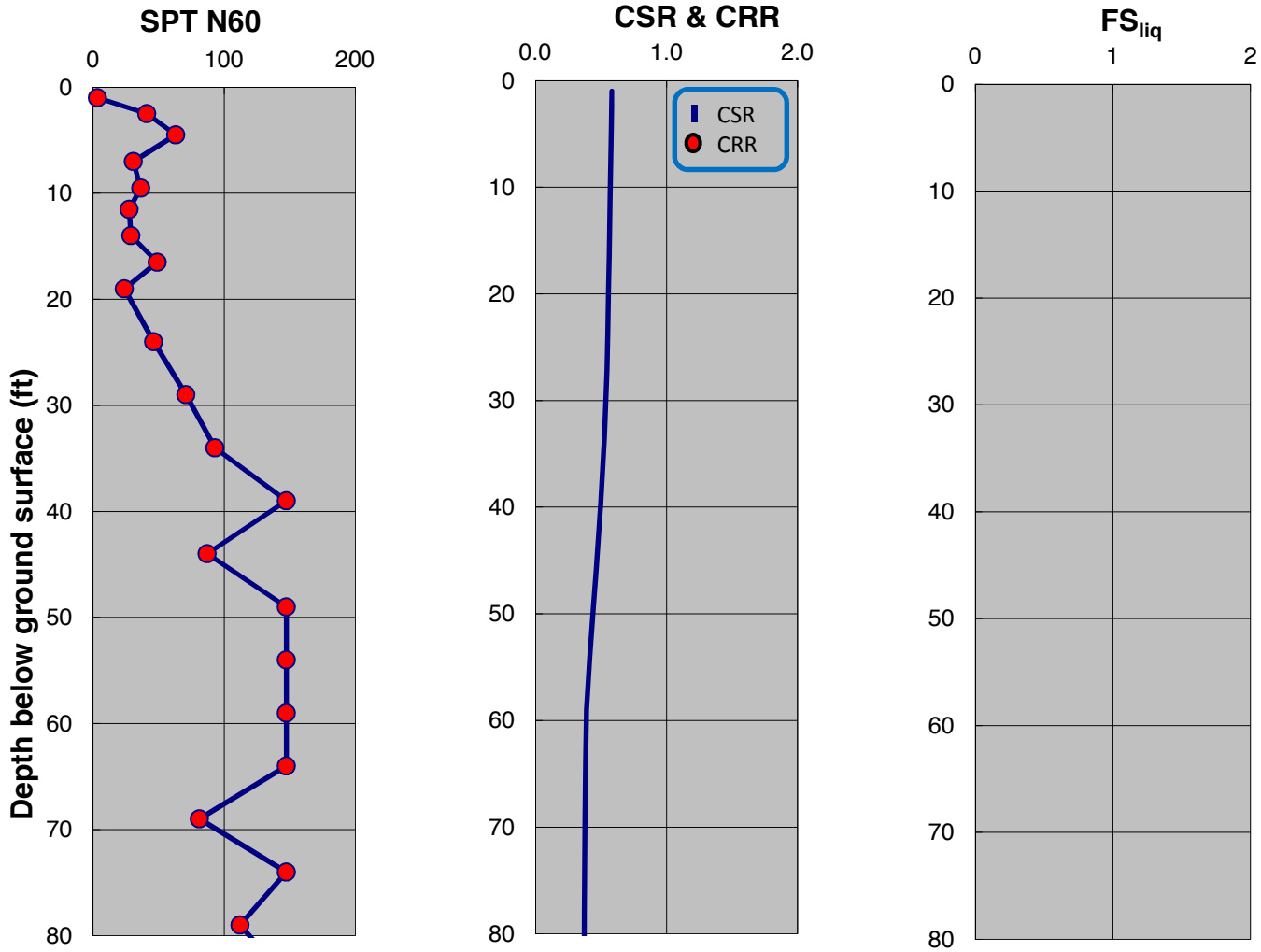
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-133 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



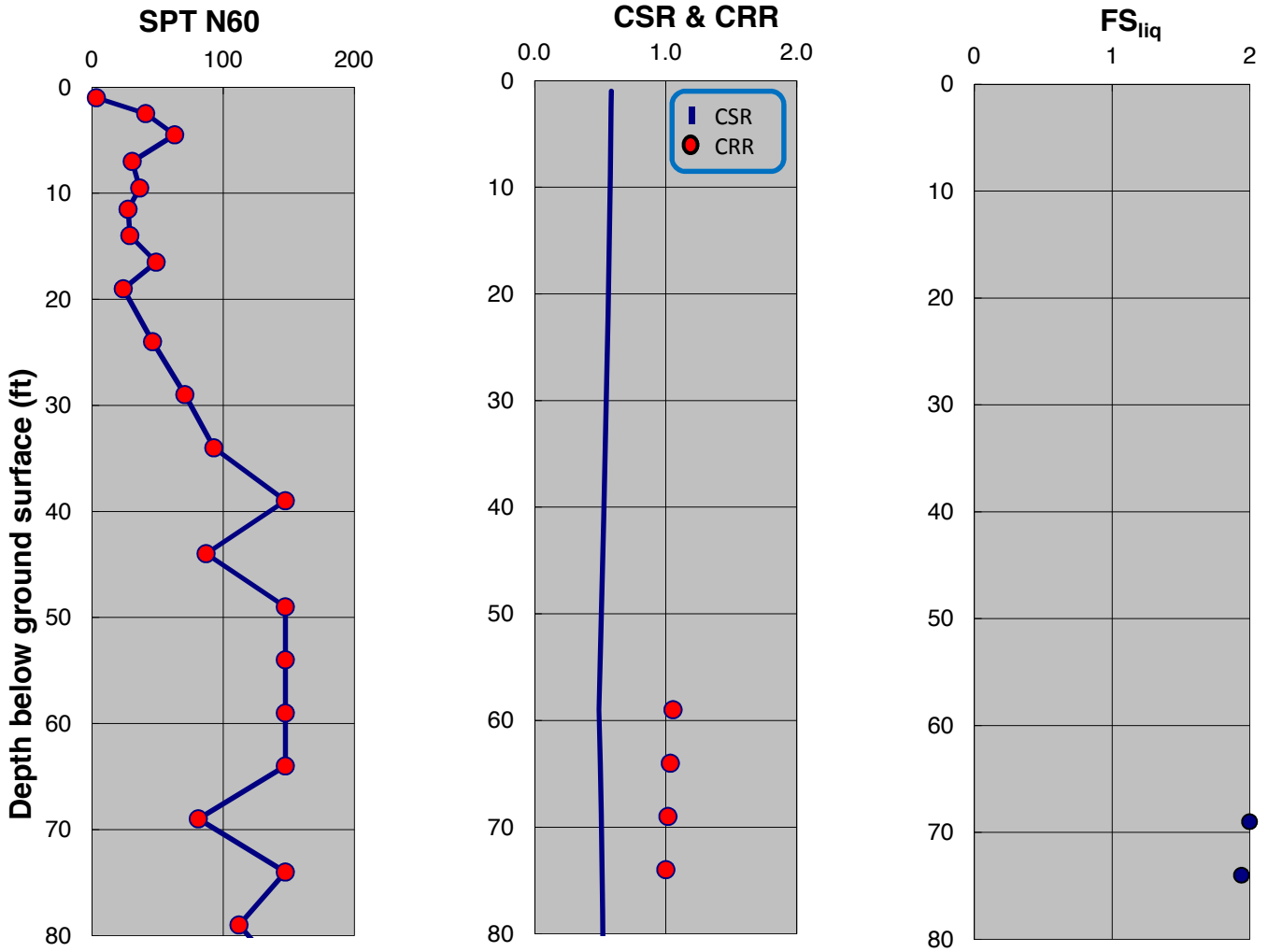
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-133 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



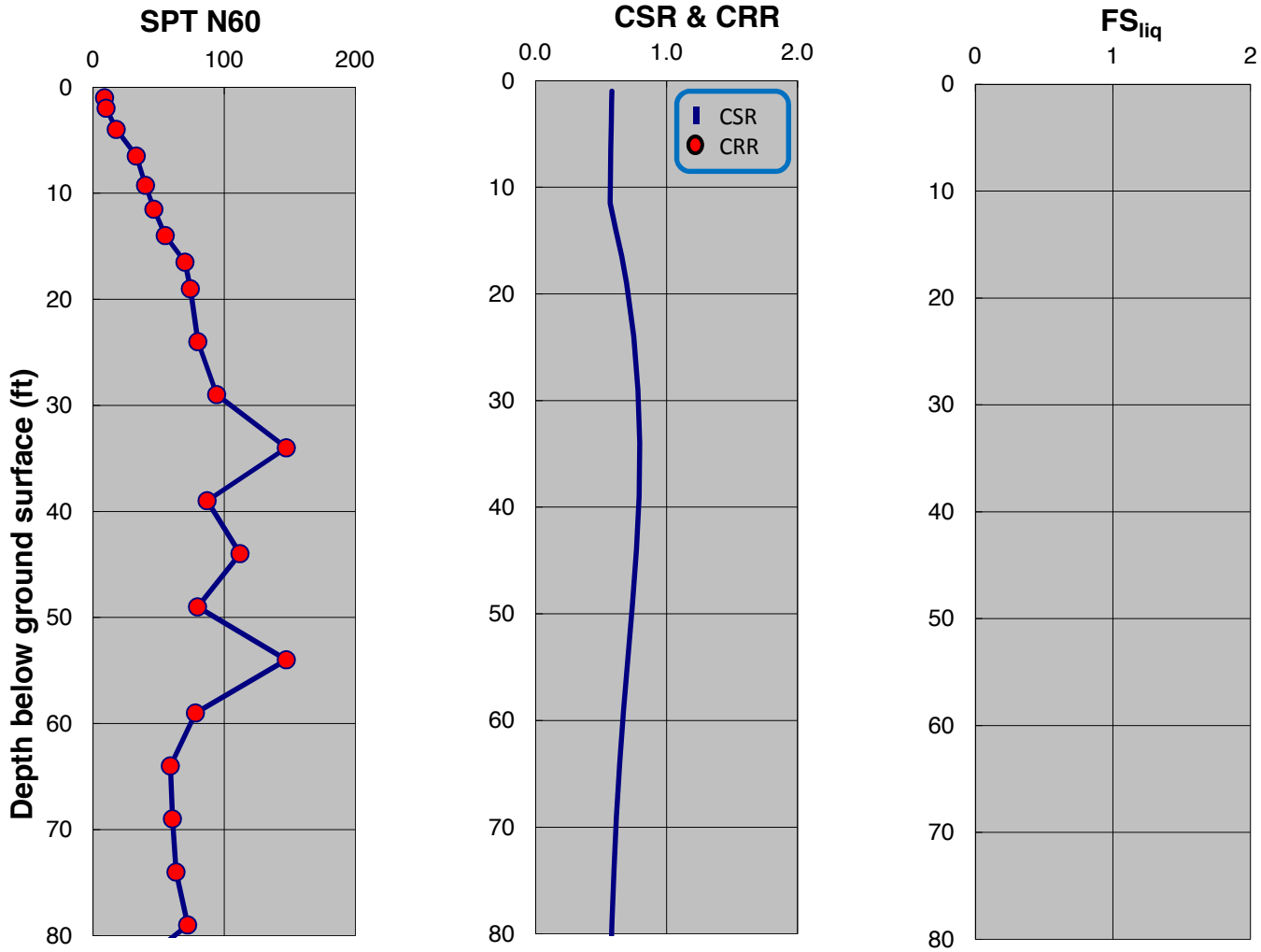
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-135 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



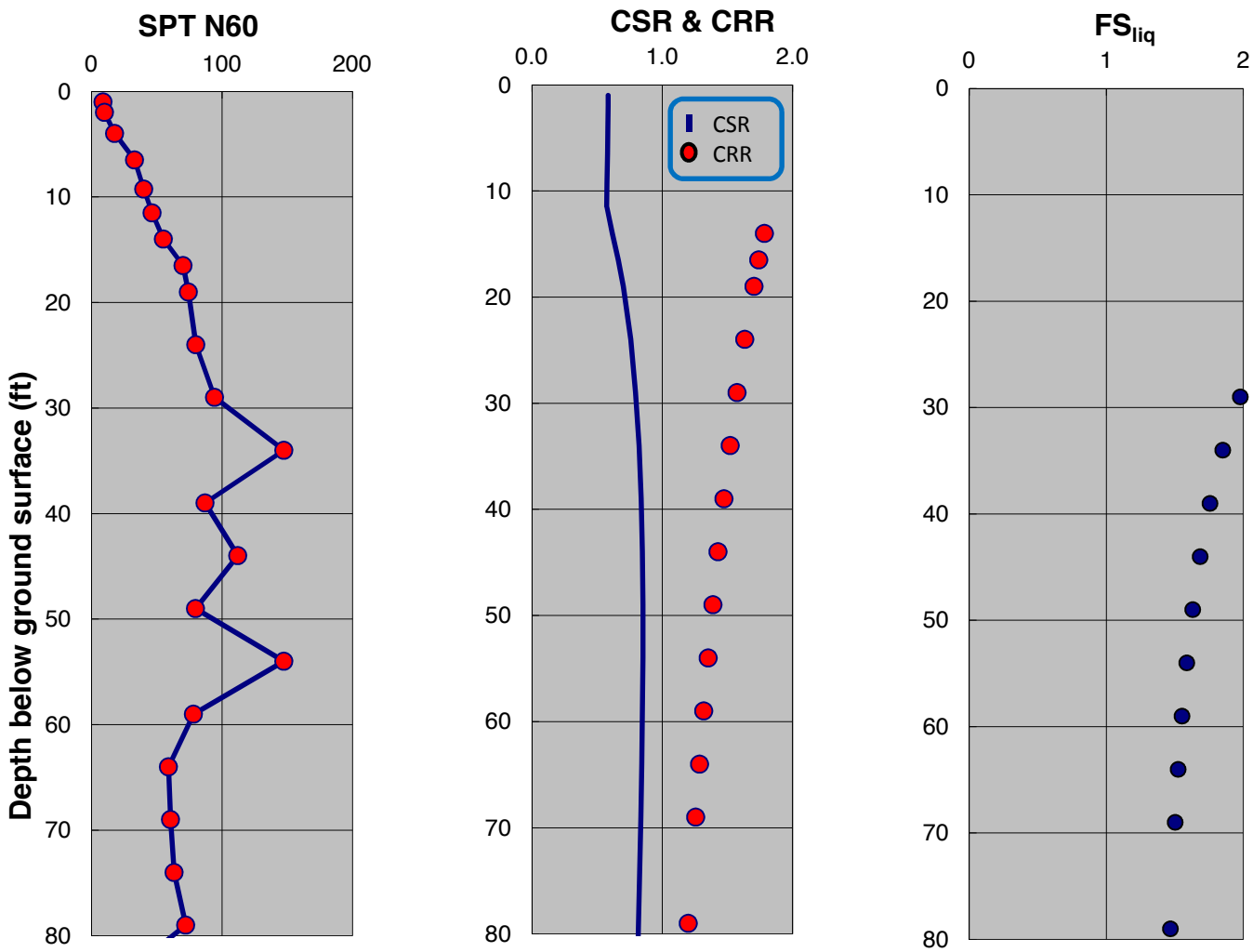
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-135 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-136 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

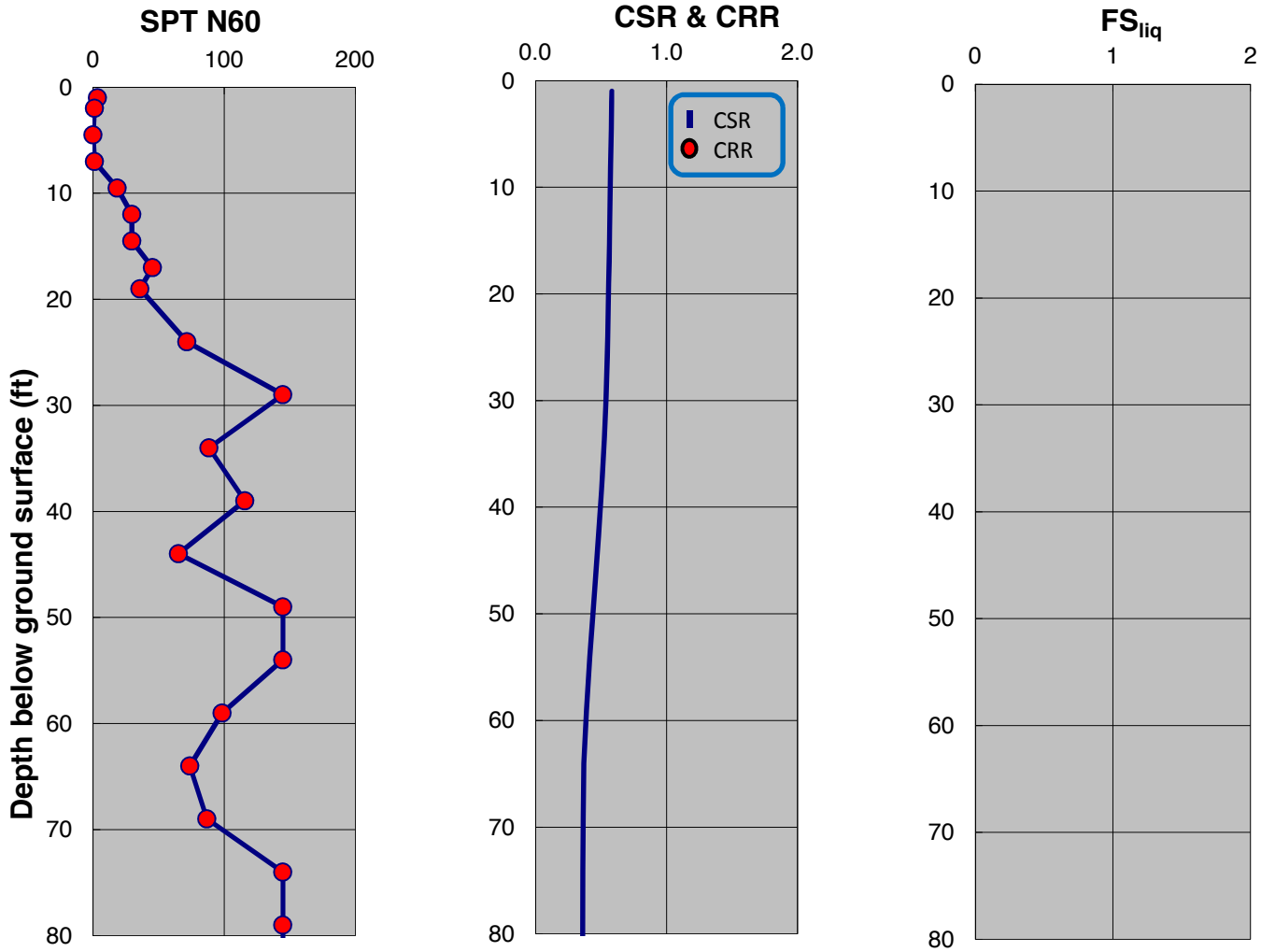
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-136 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

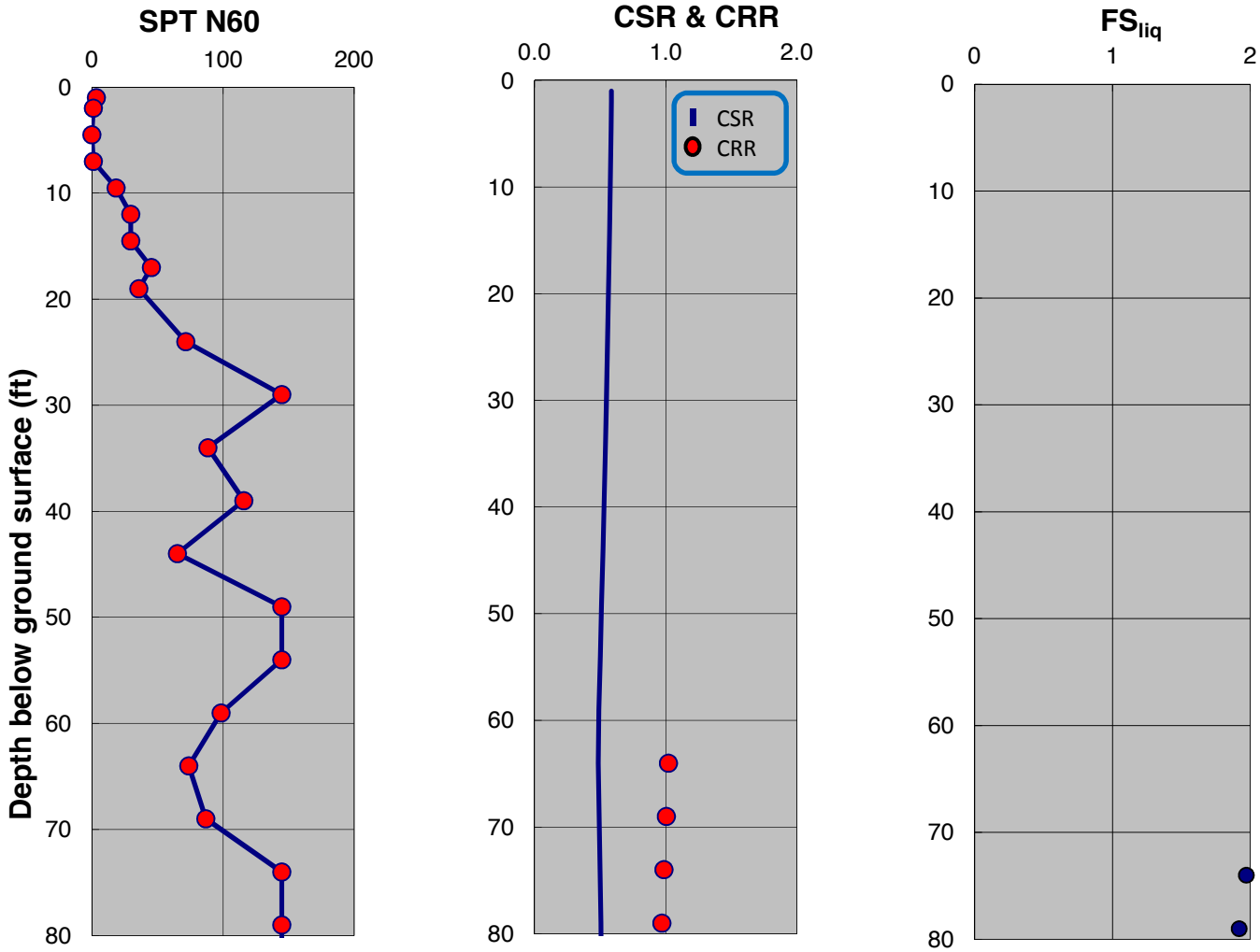
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.430



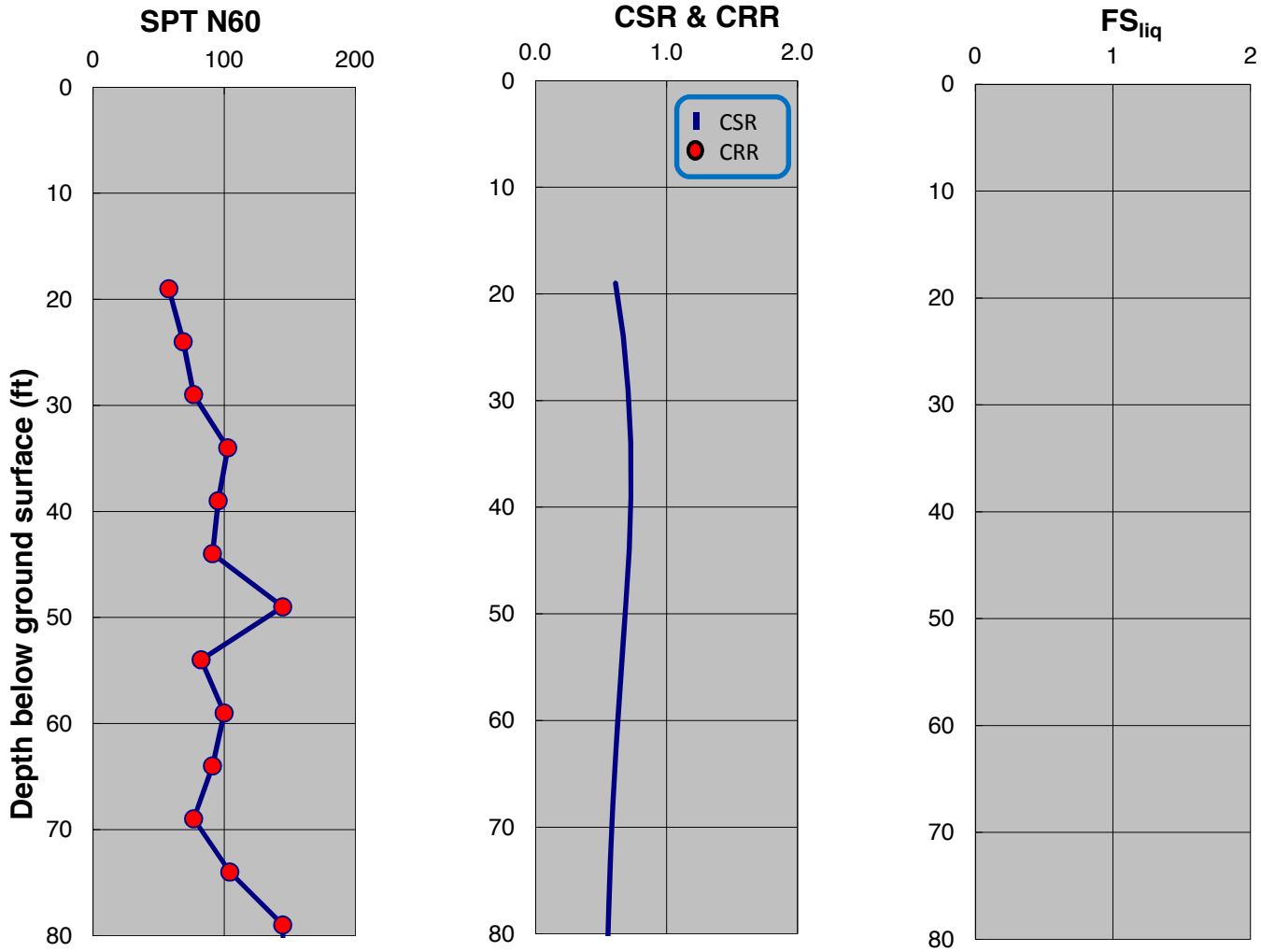
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-137 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



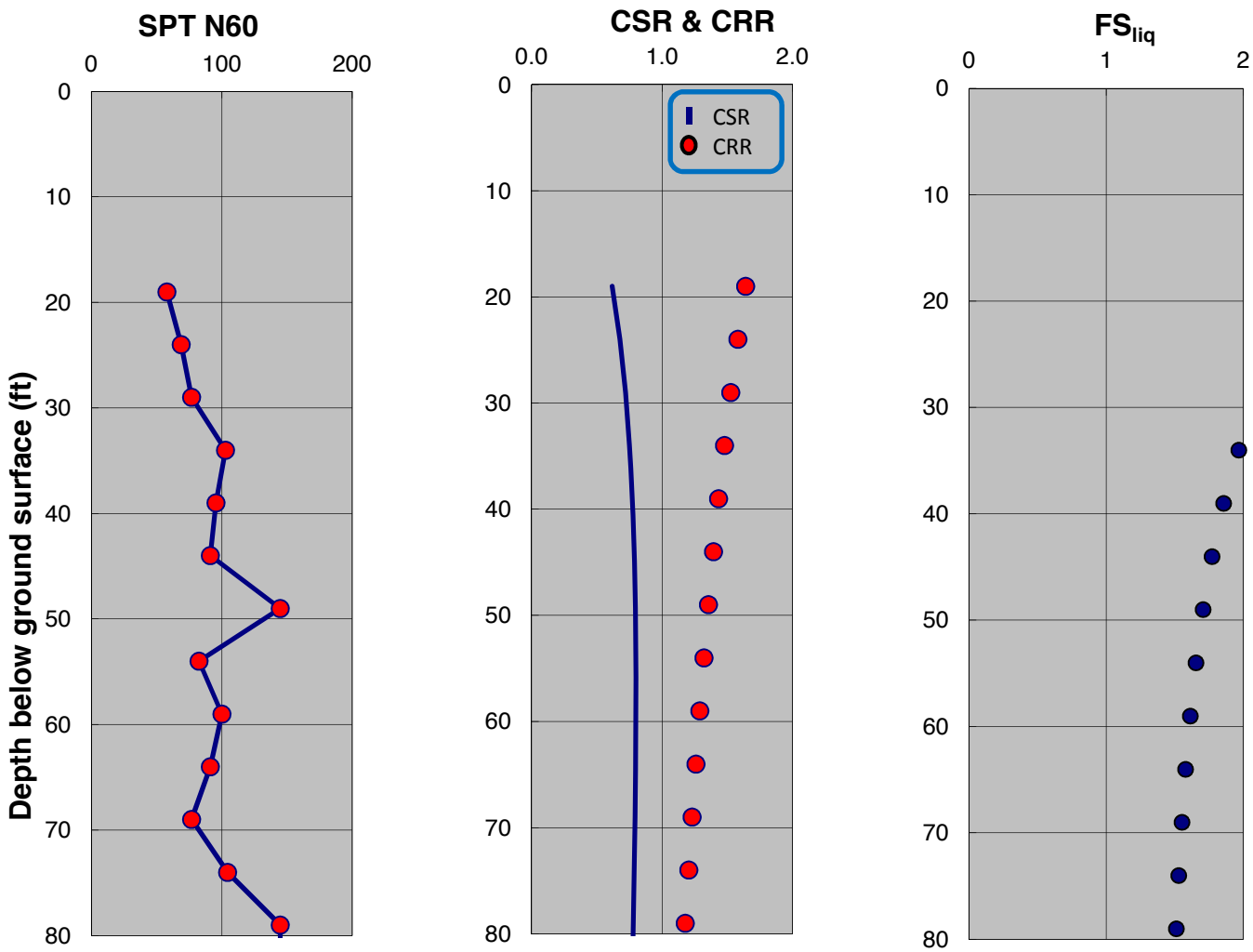
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-137 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-138 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

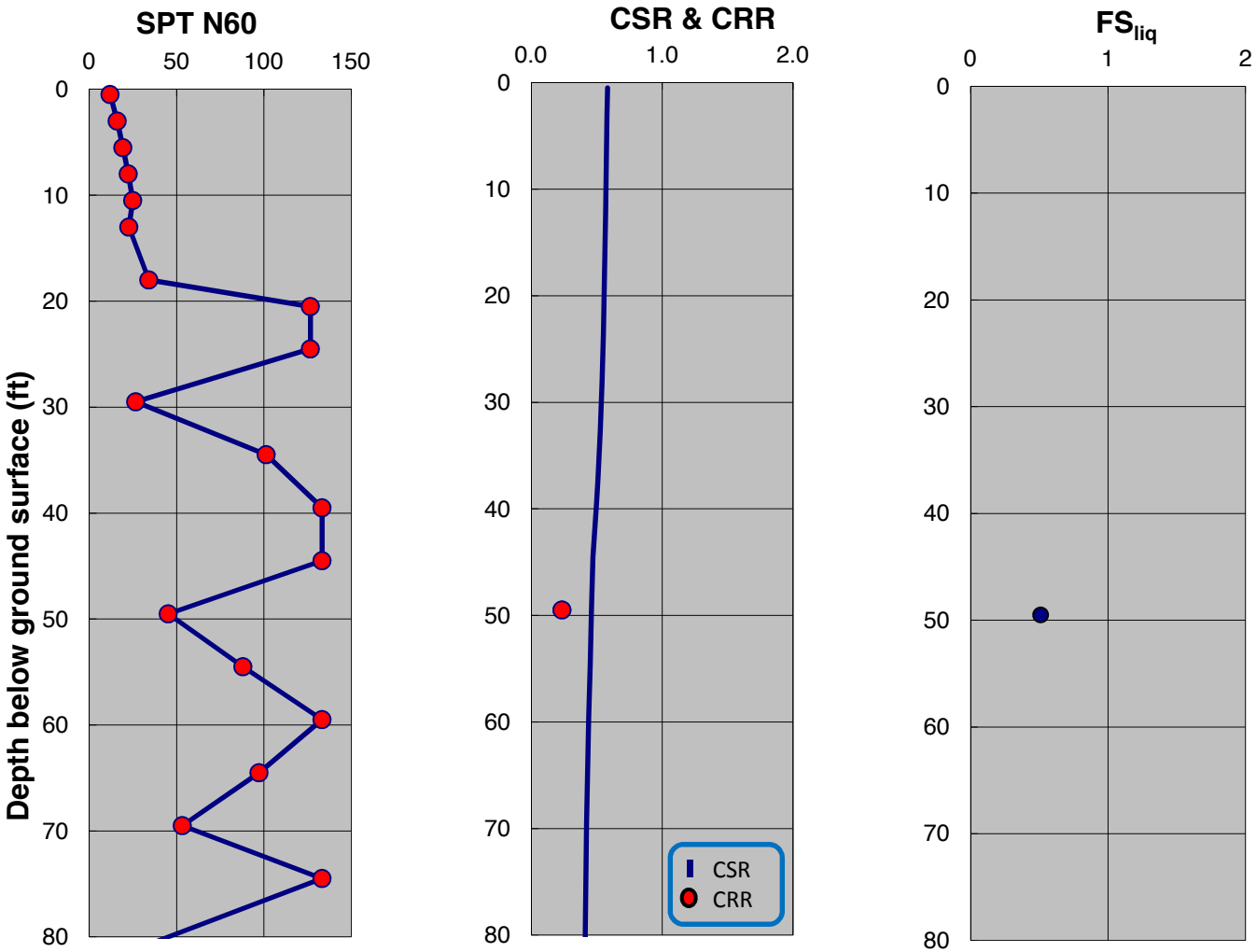
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-138 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

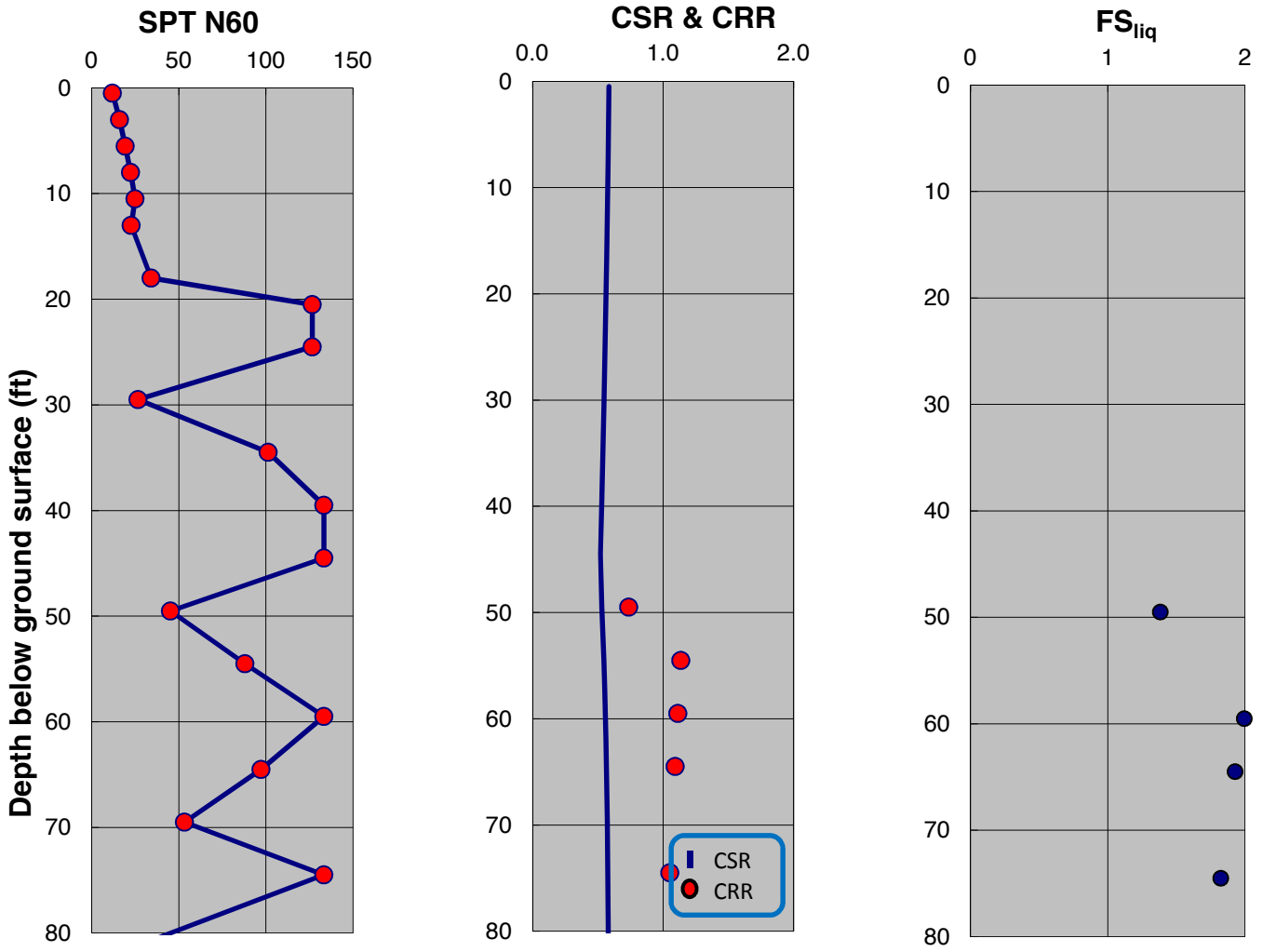
PLATE A.434



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-146 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

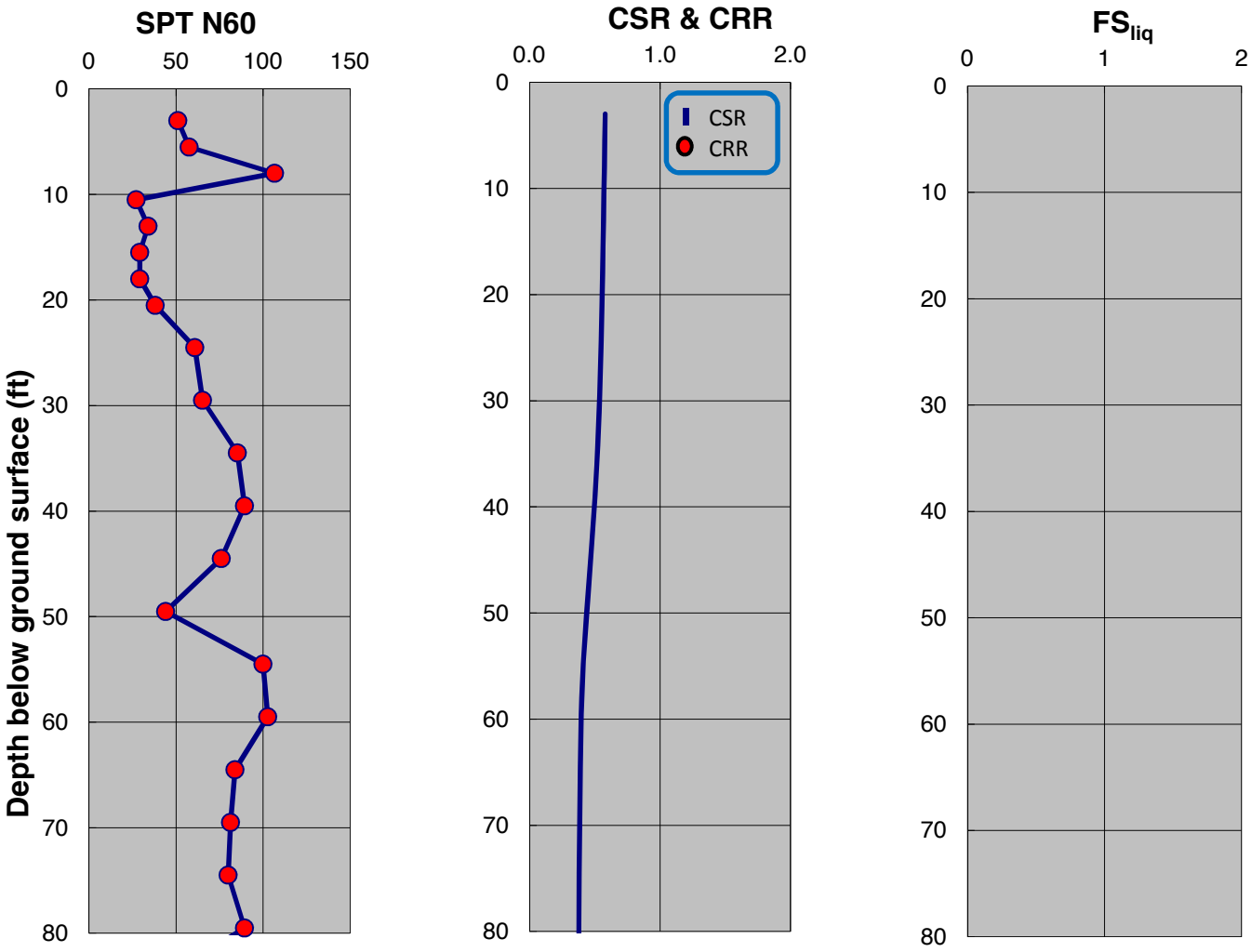
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.435



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-146 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

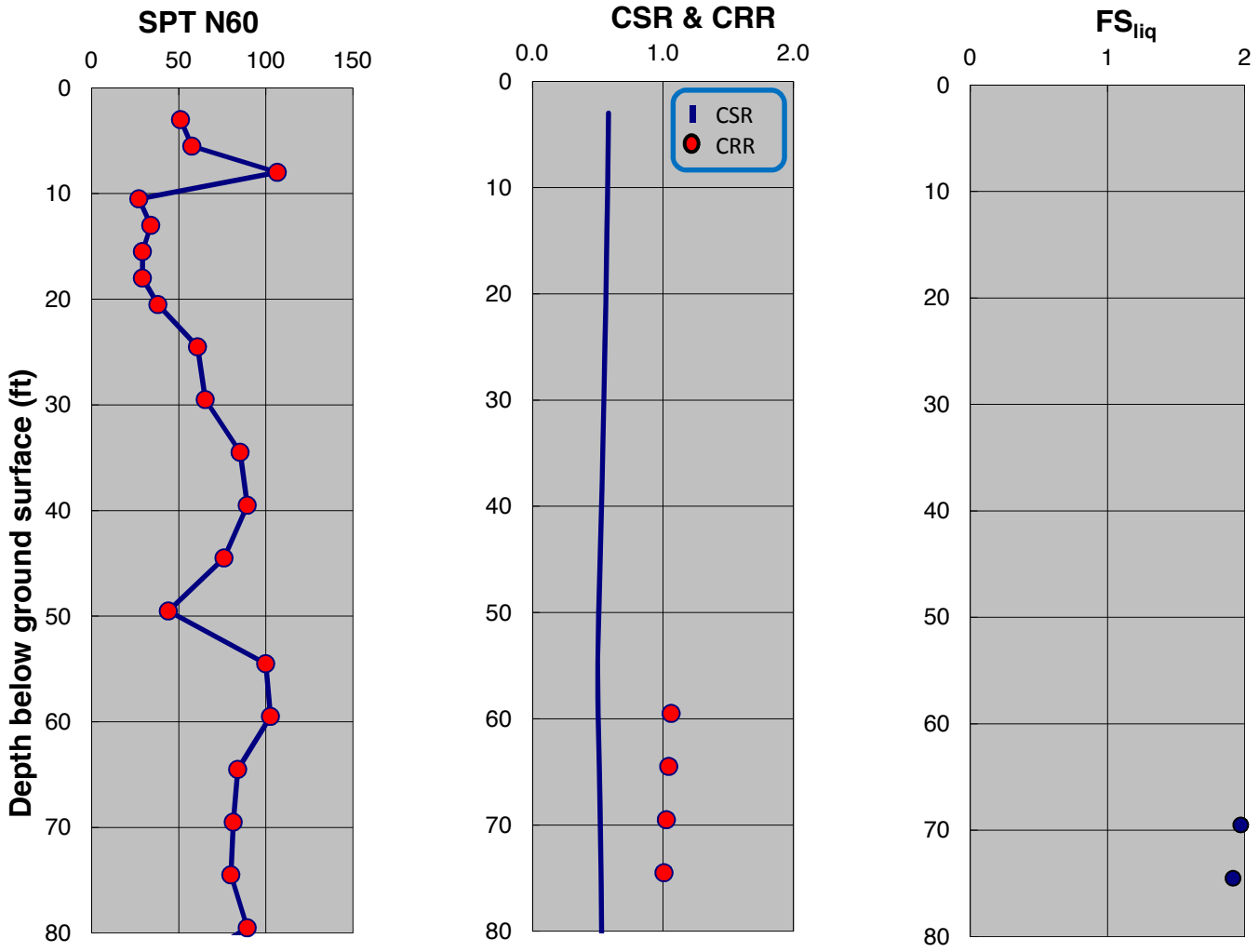
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-147 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

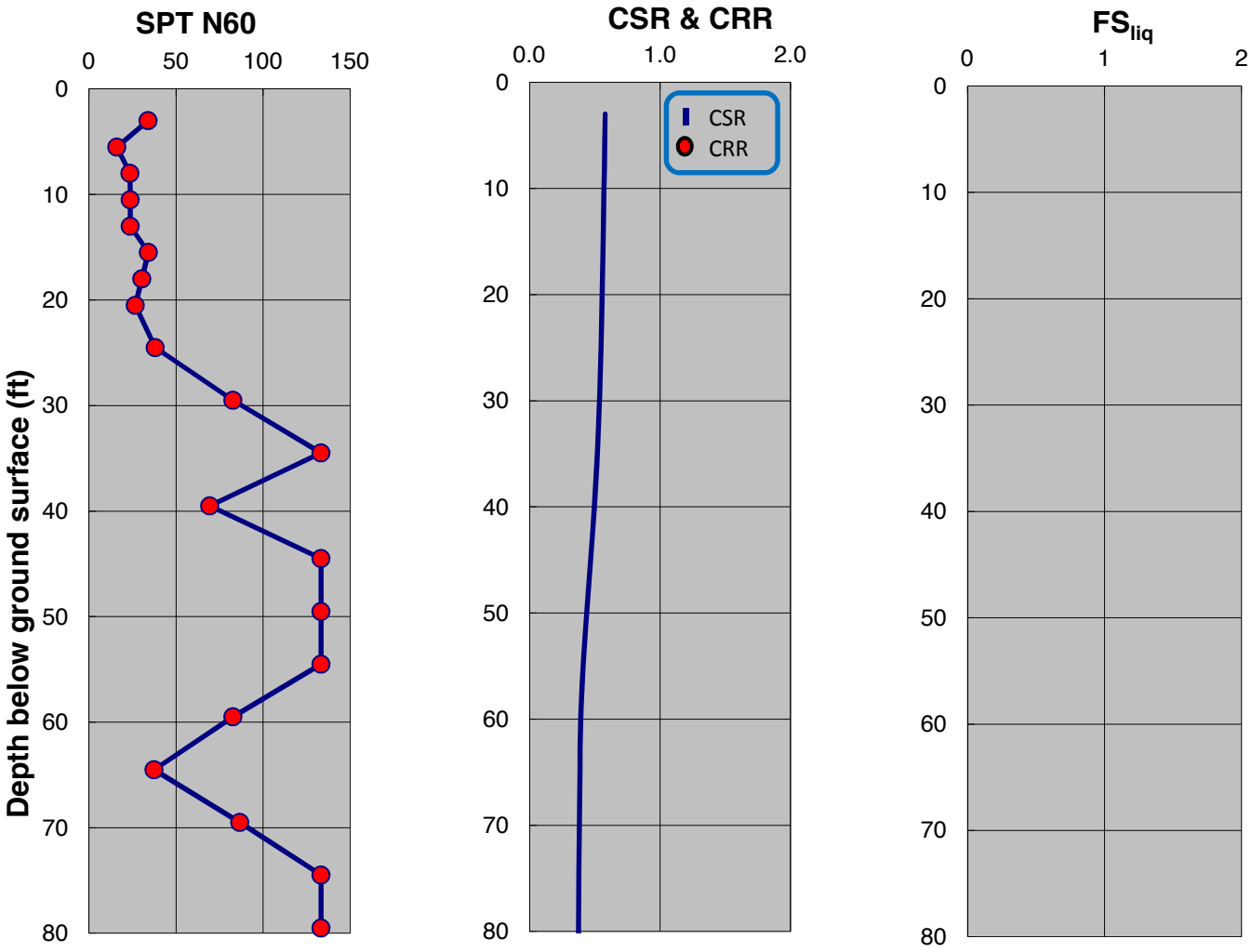
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.437



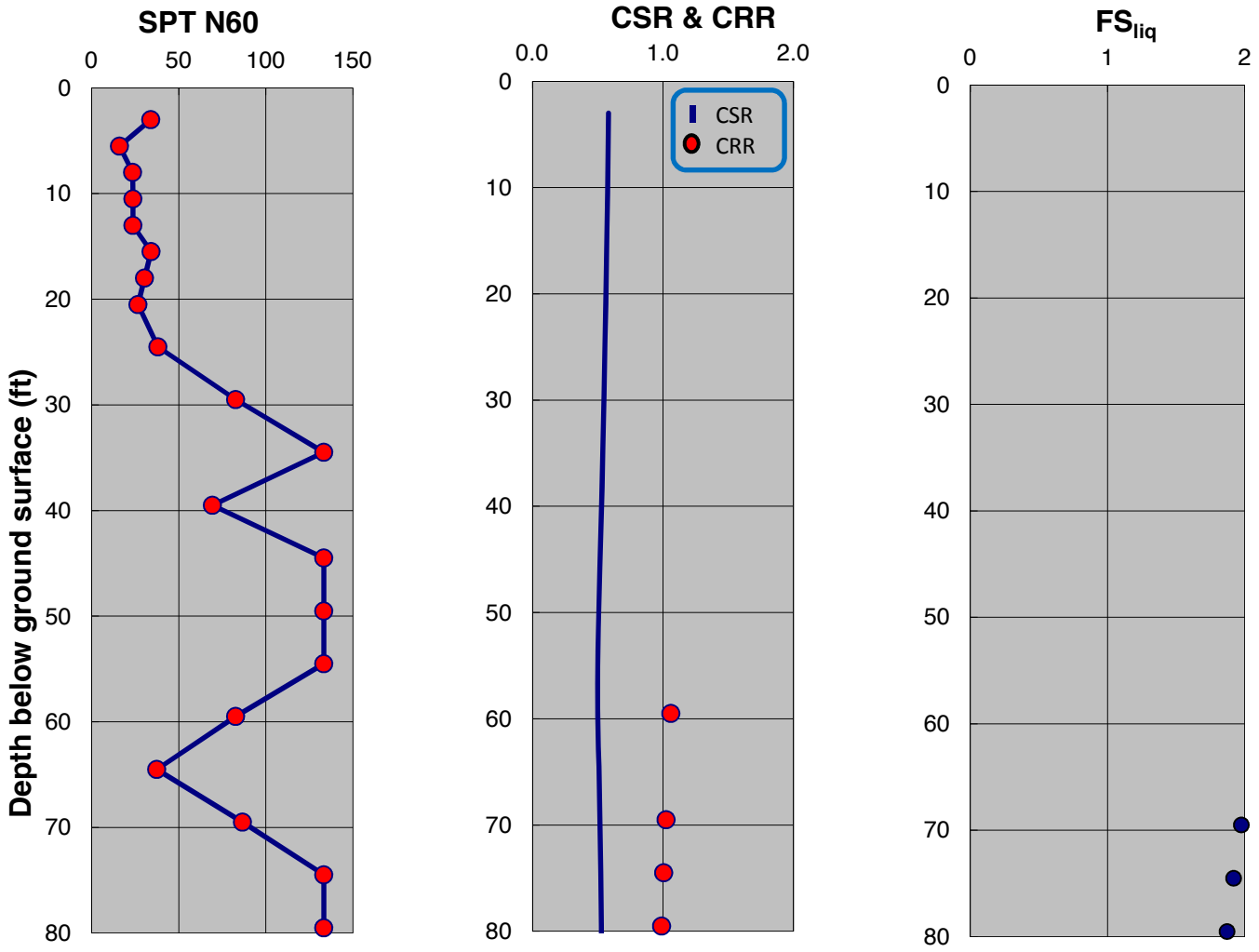
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-147 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-148 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

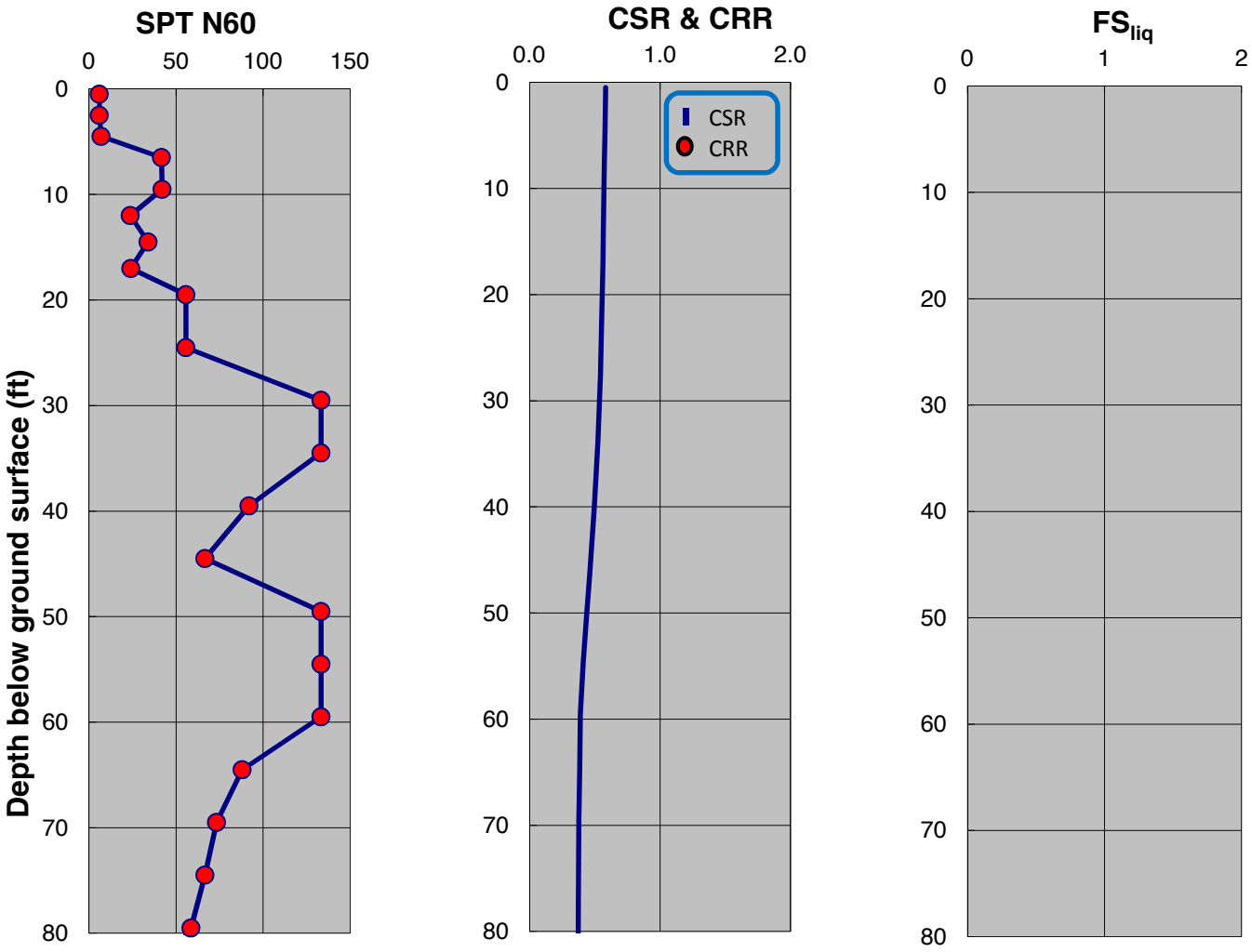
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-148 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

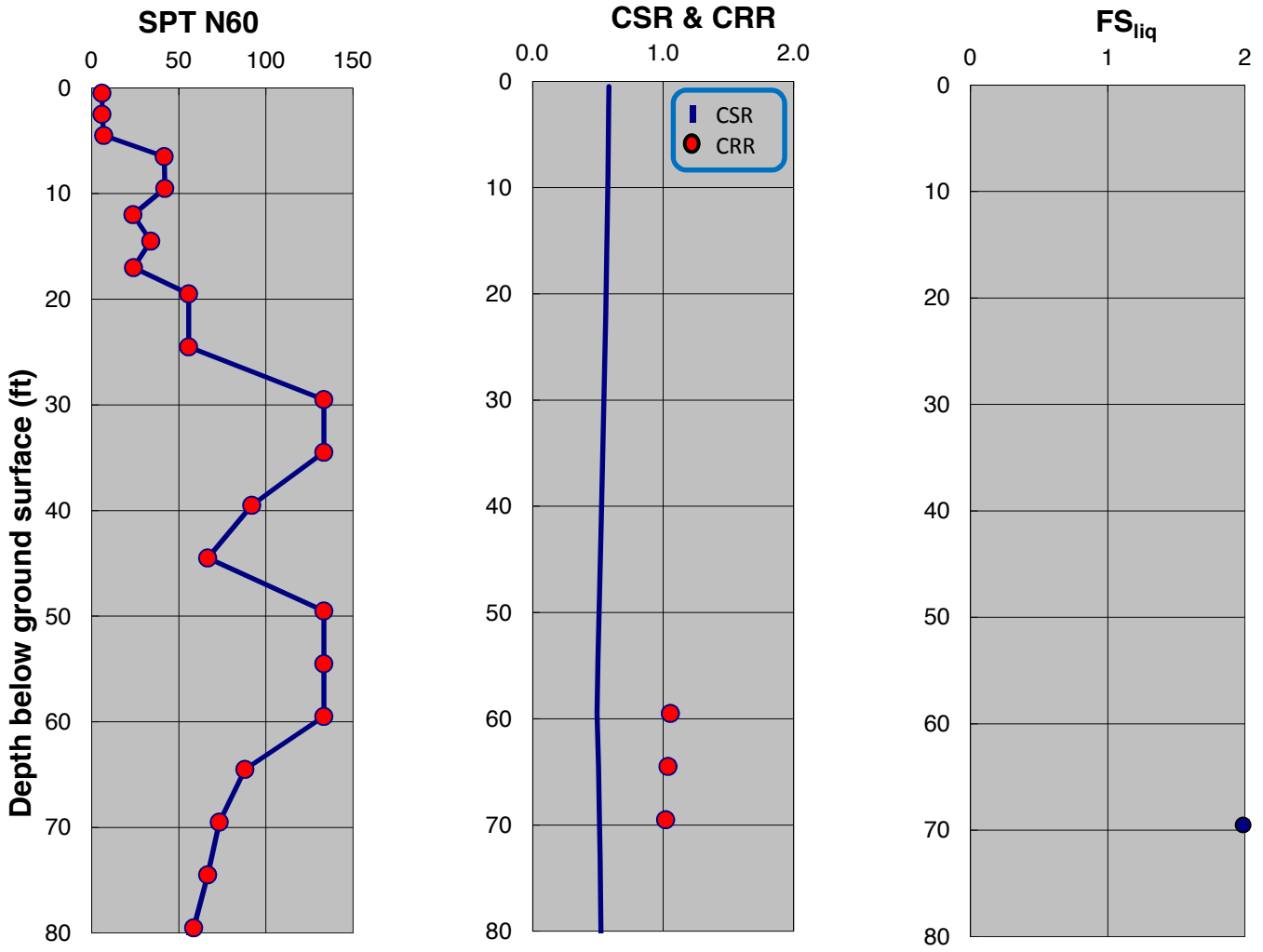
PLATE A.440



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-149 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

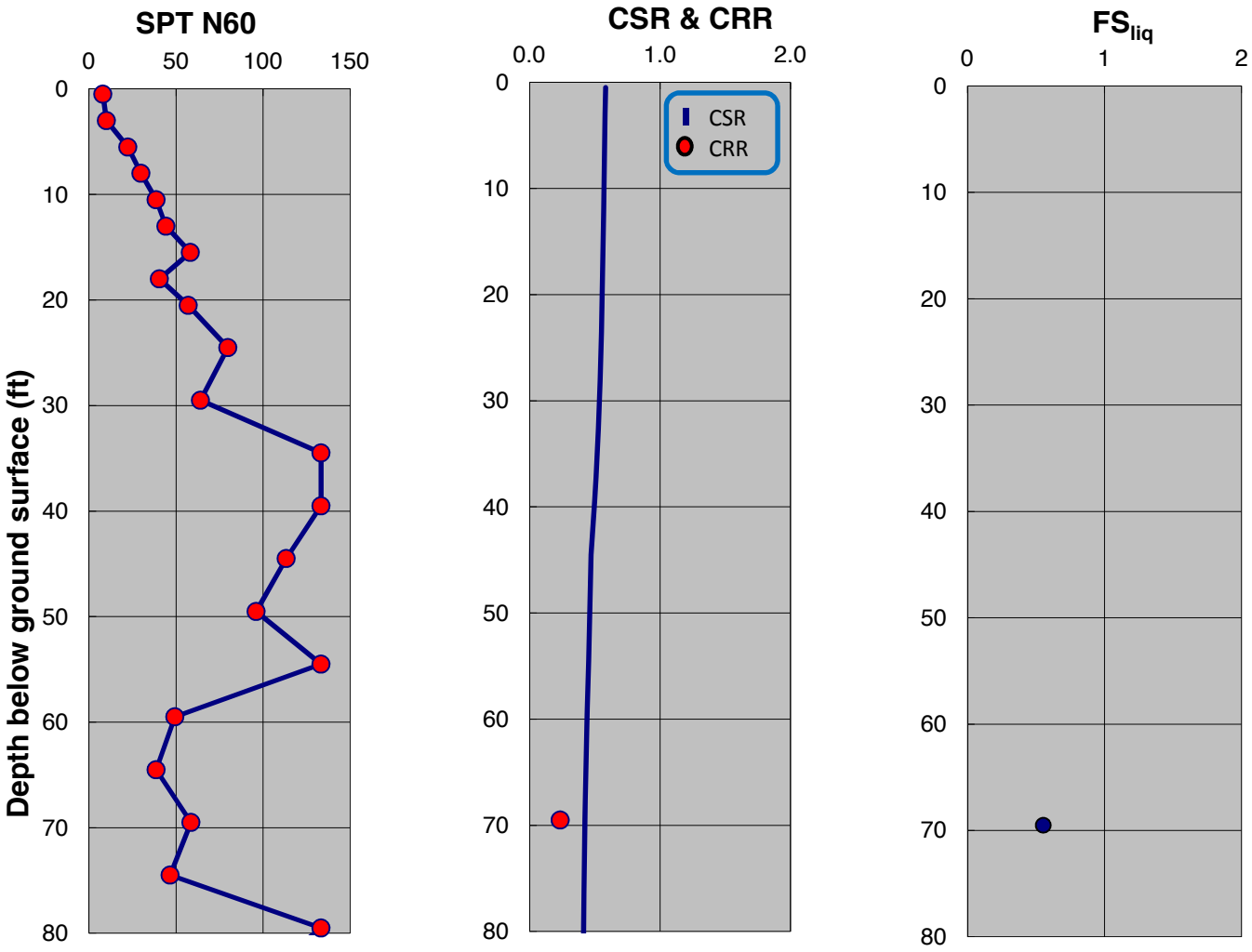
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.441



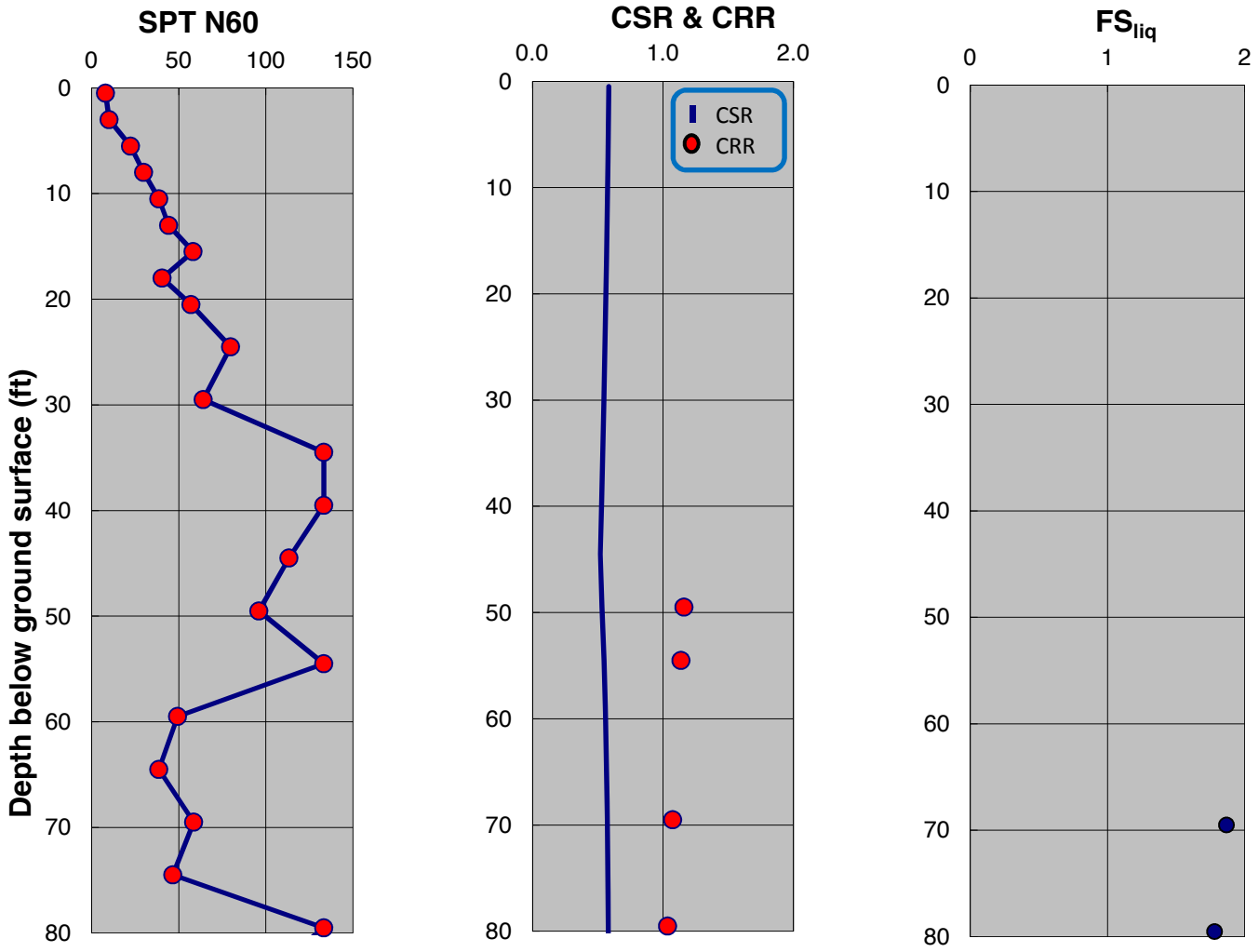
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-149 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



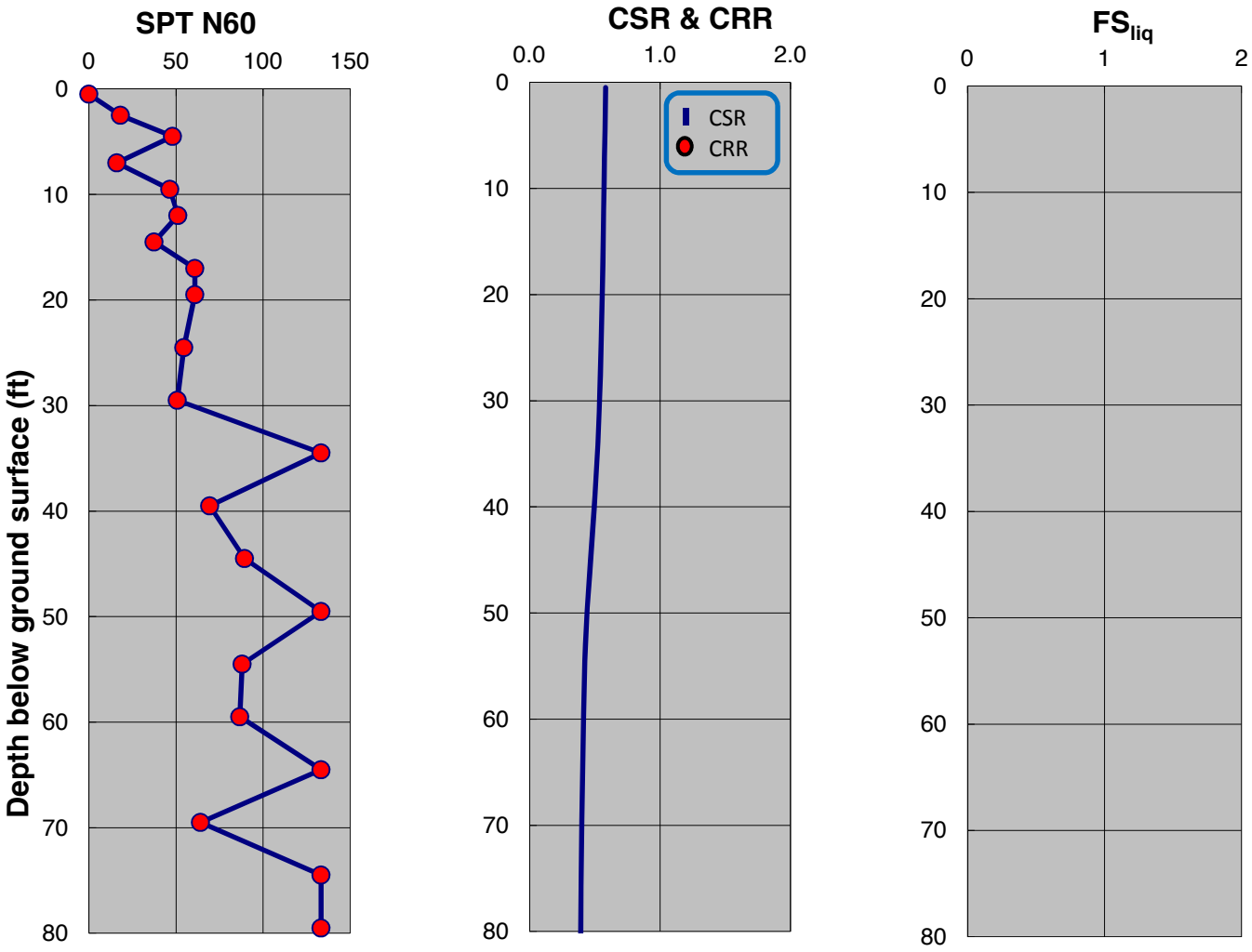
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-150 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-150 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

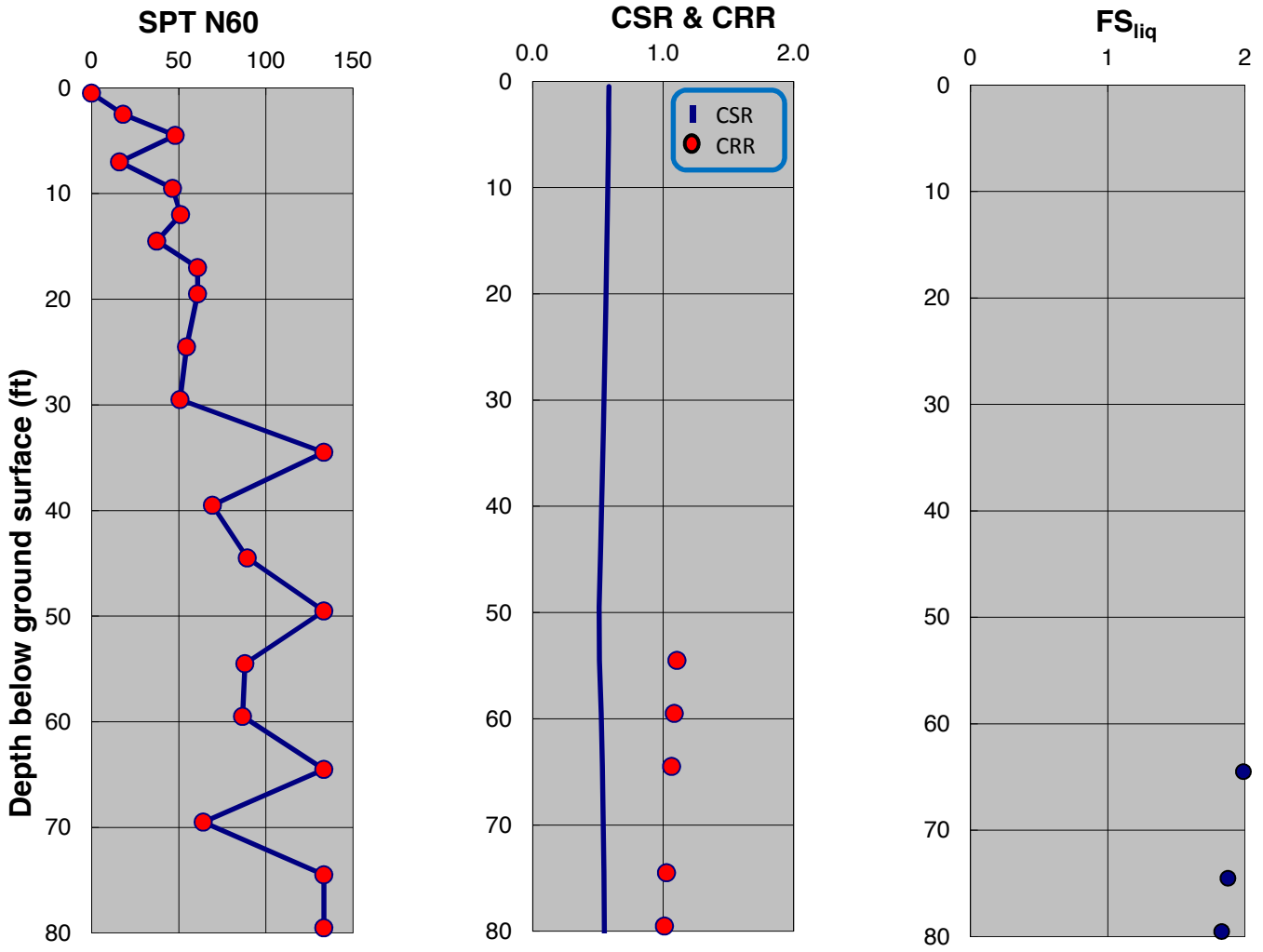
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-151 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

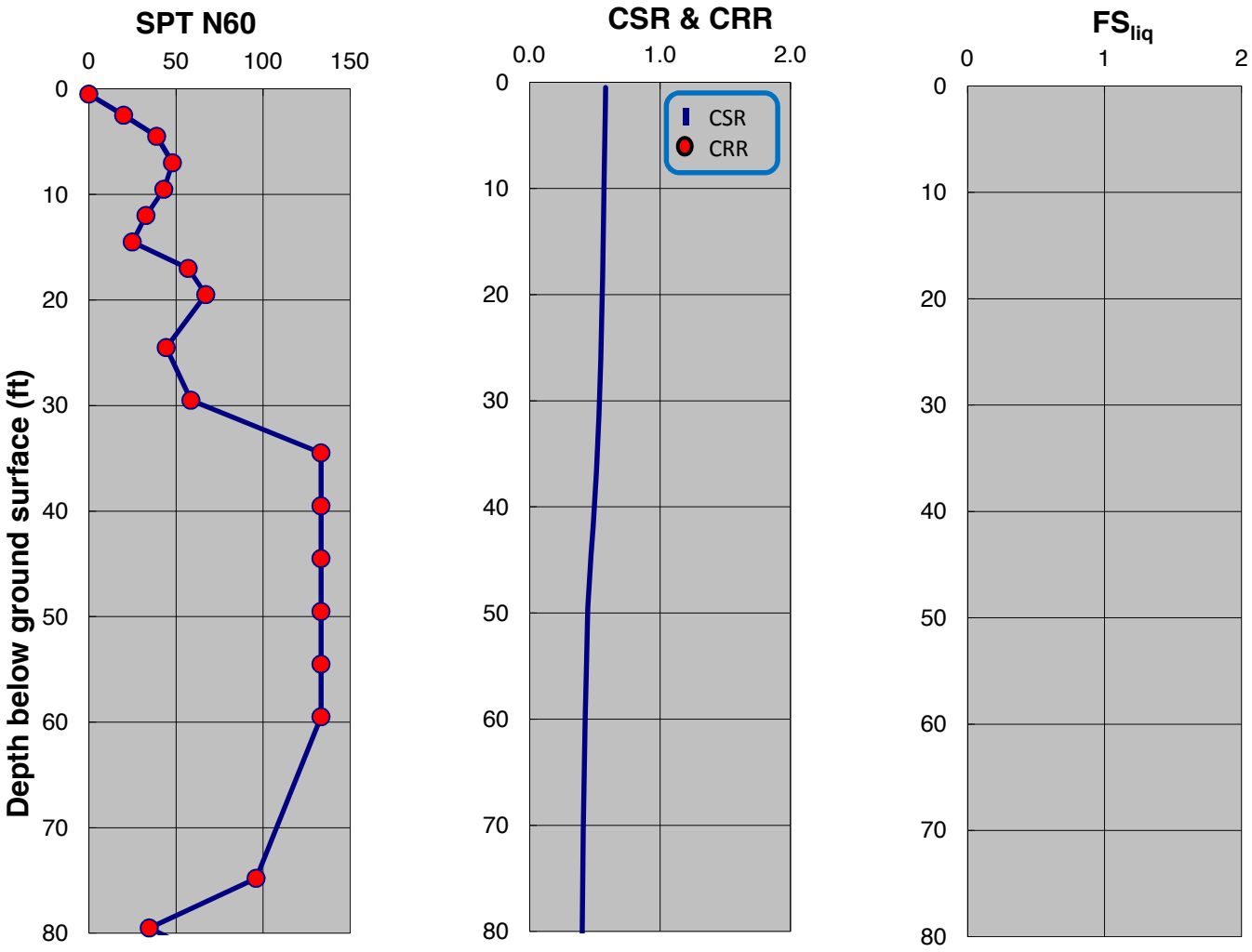
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.445



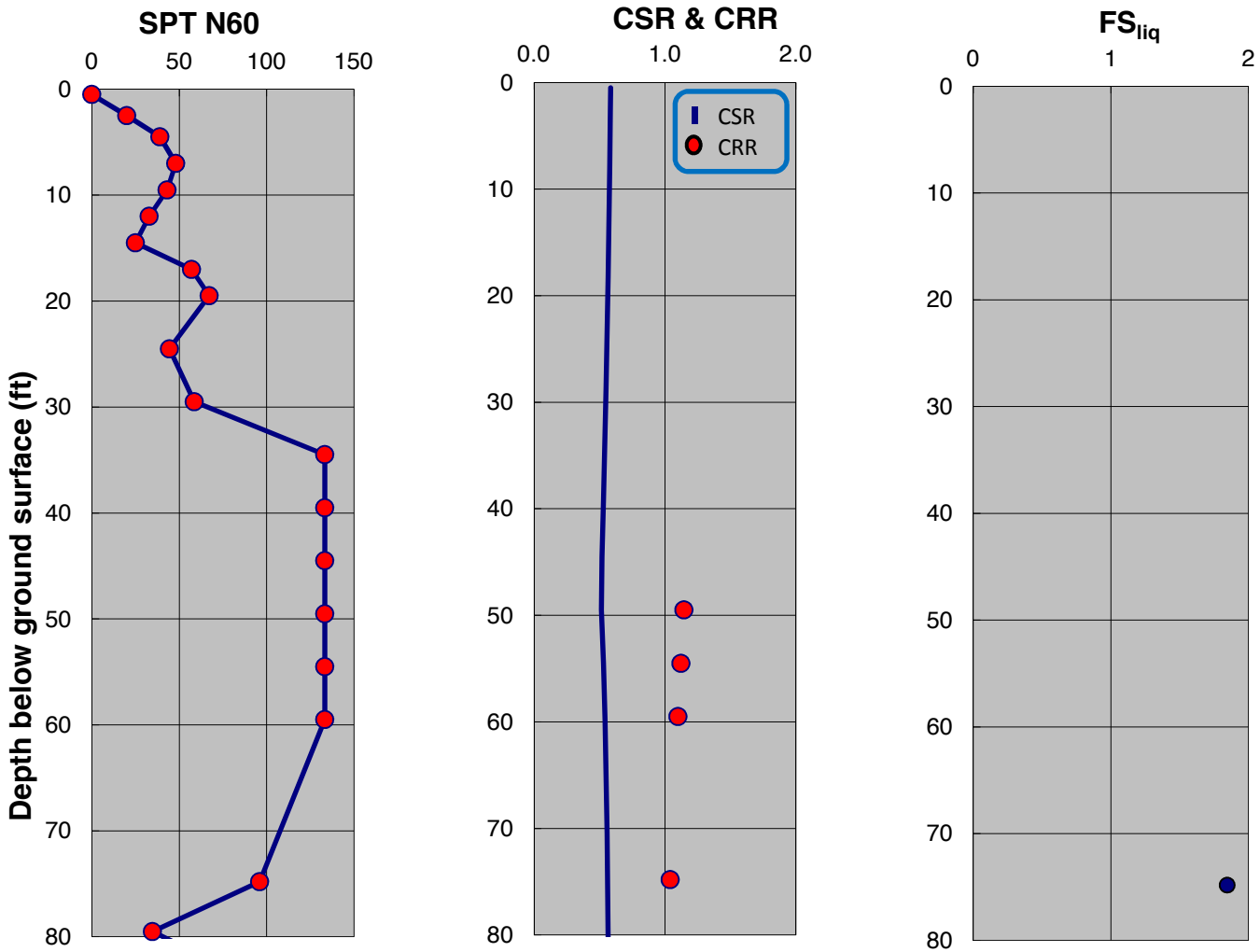
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-151 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



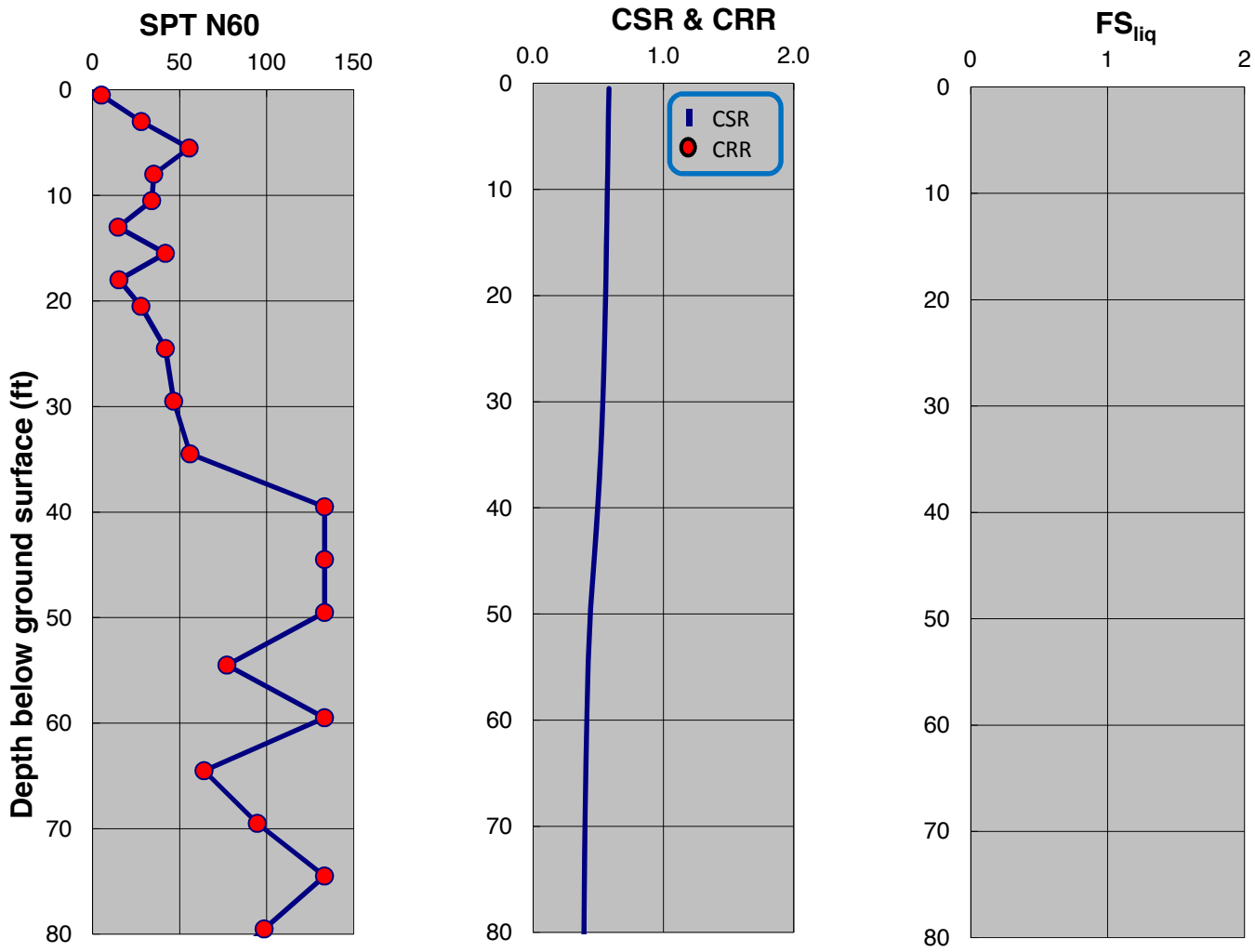
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-152 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



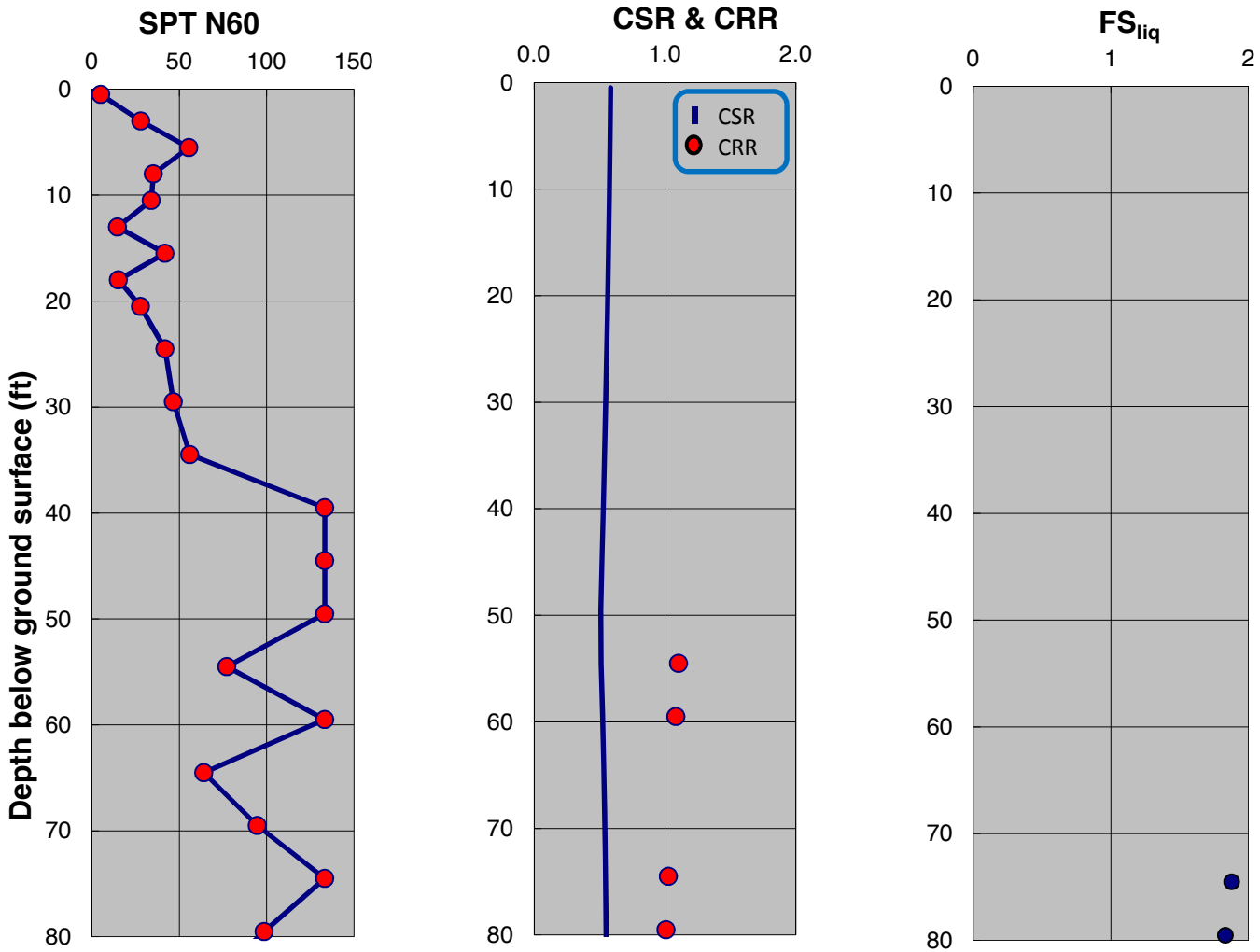
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-152 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-153 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

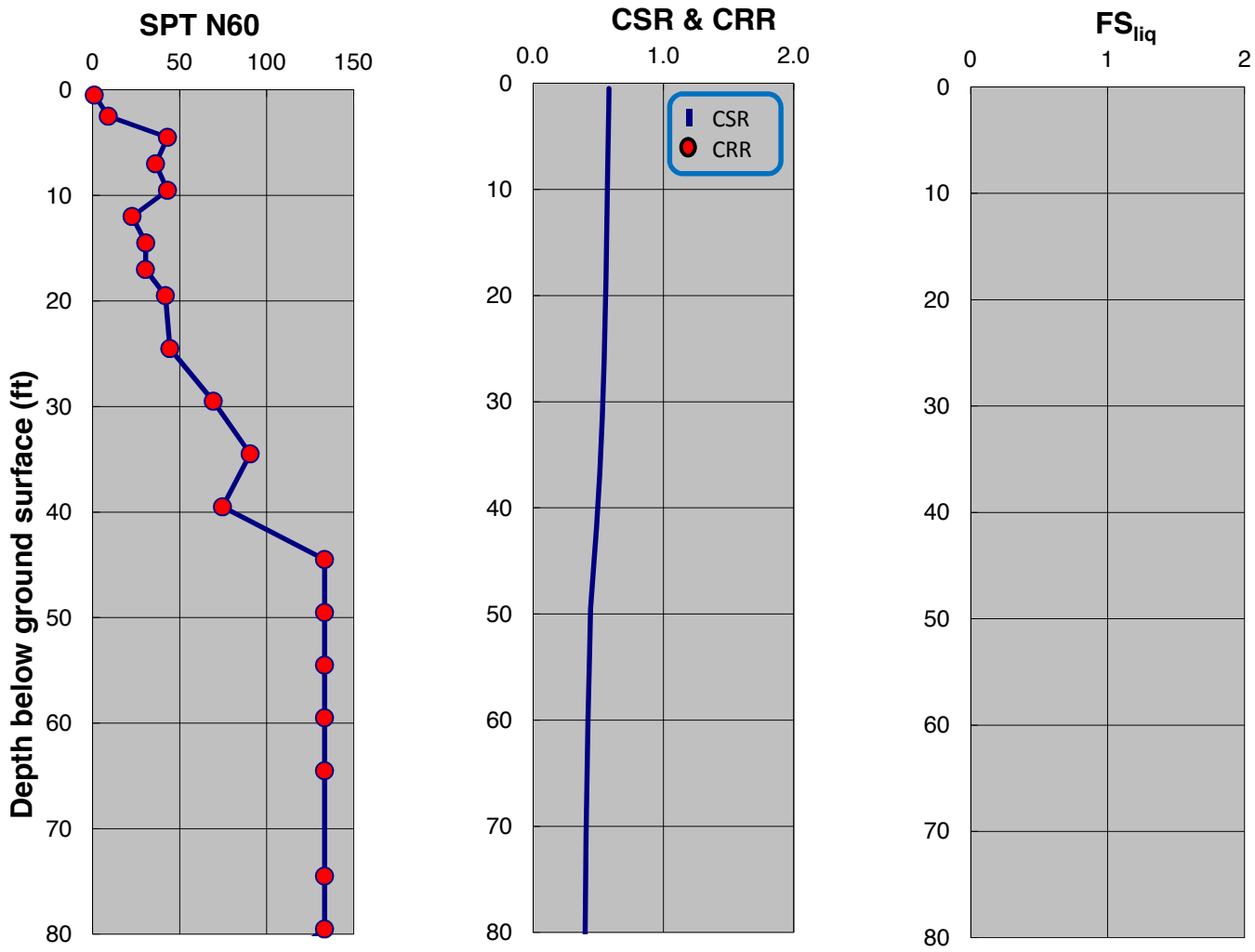
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-153 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

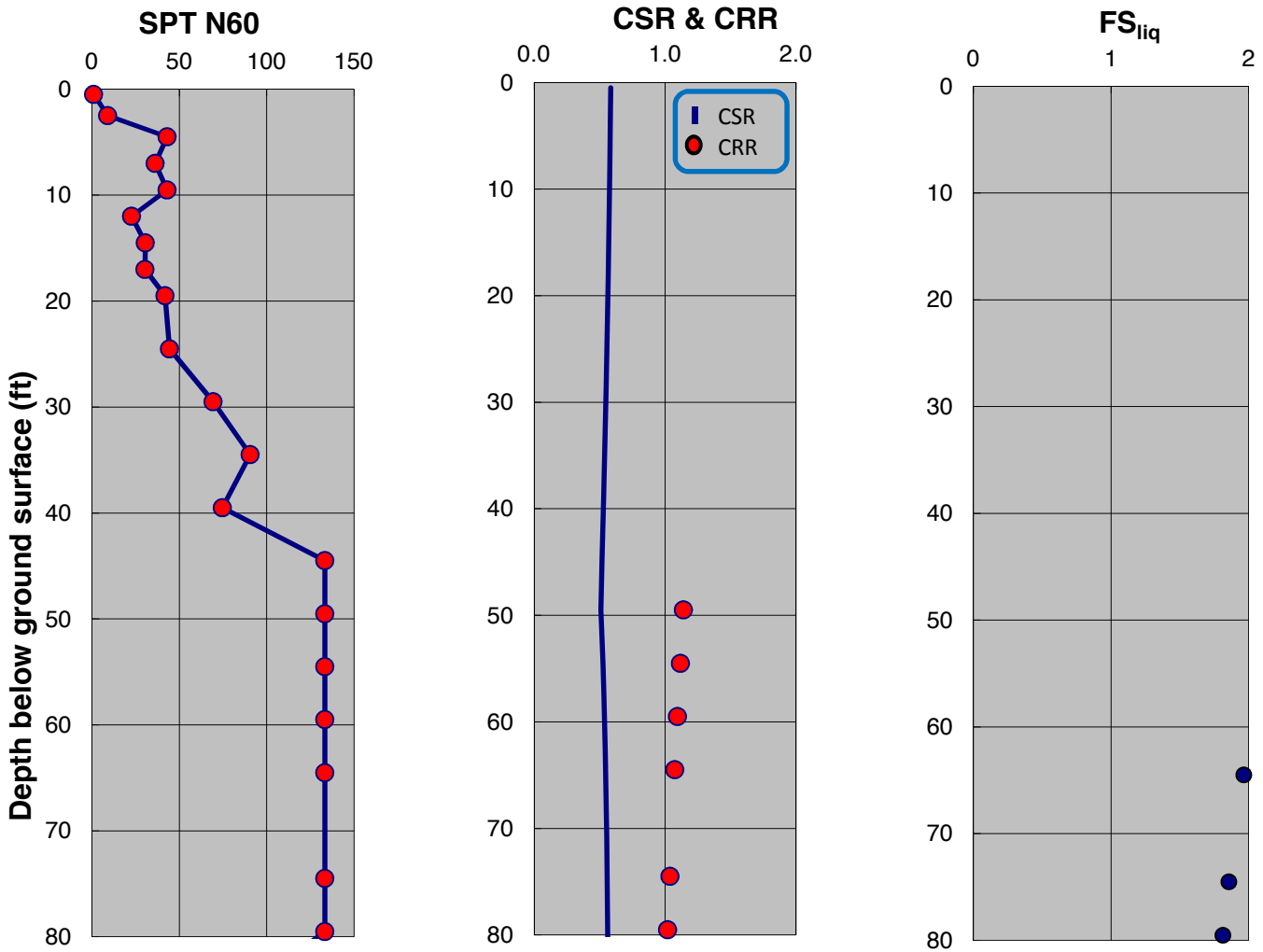
PLATE A.450



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-154 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

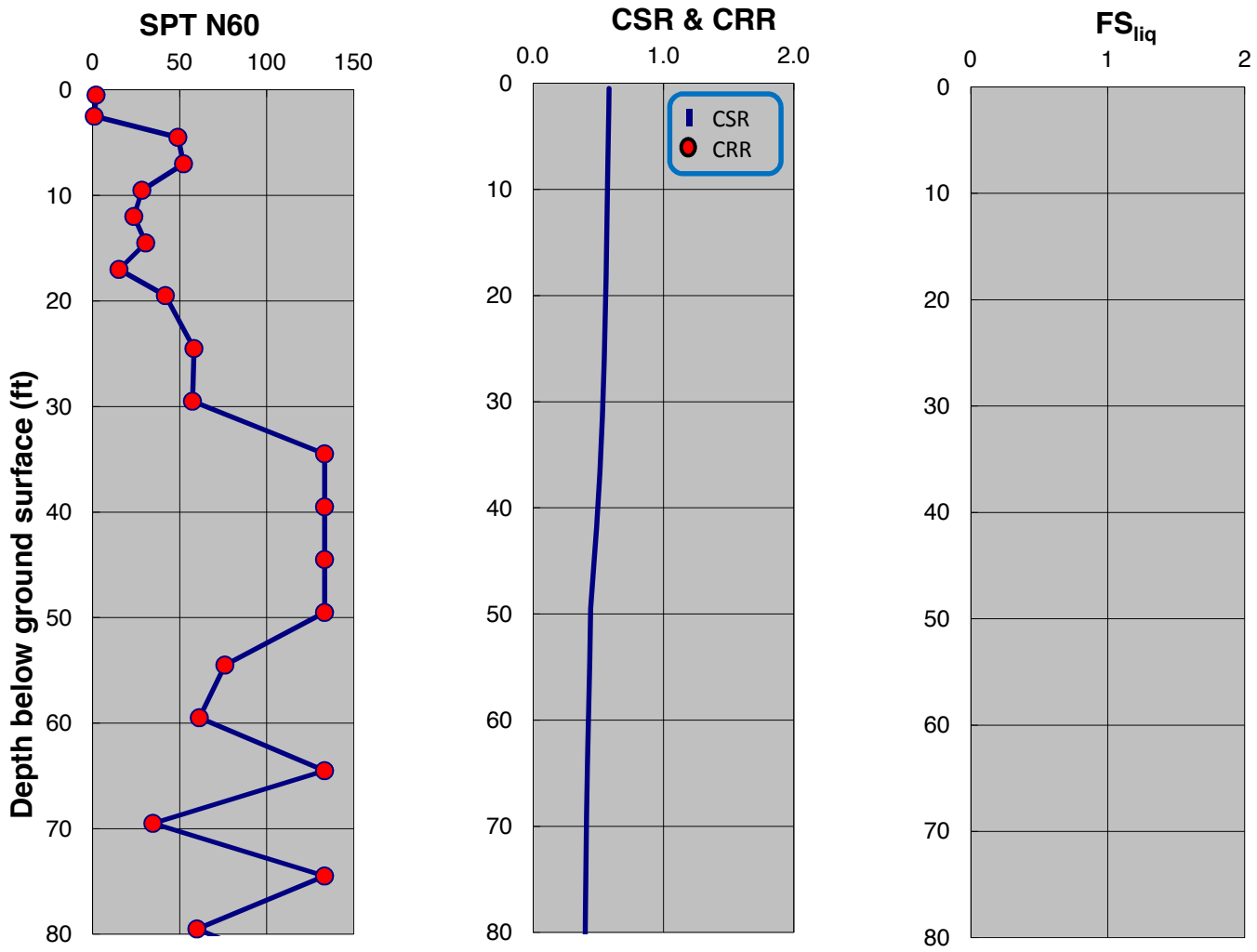
PLATE A.451



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-154 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

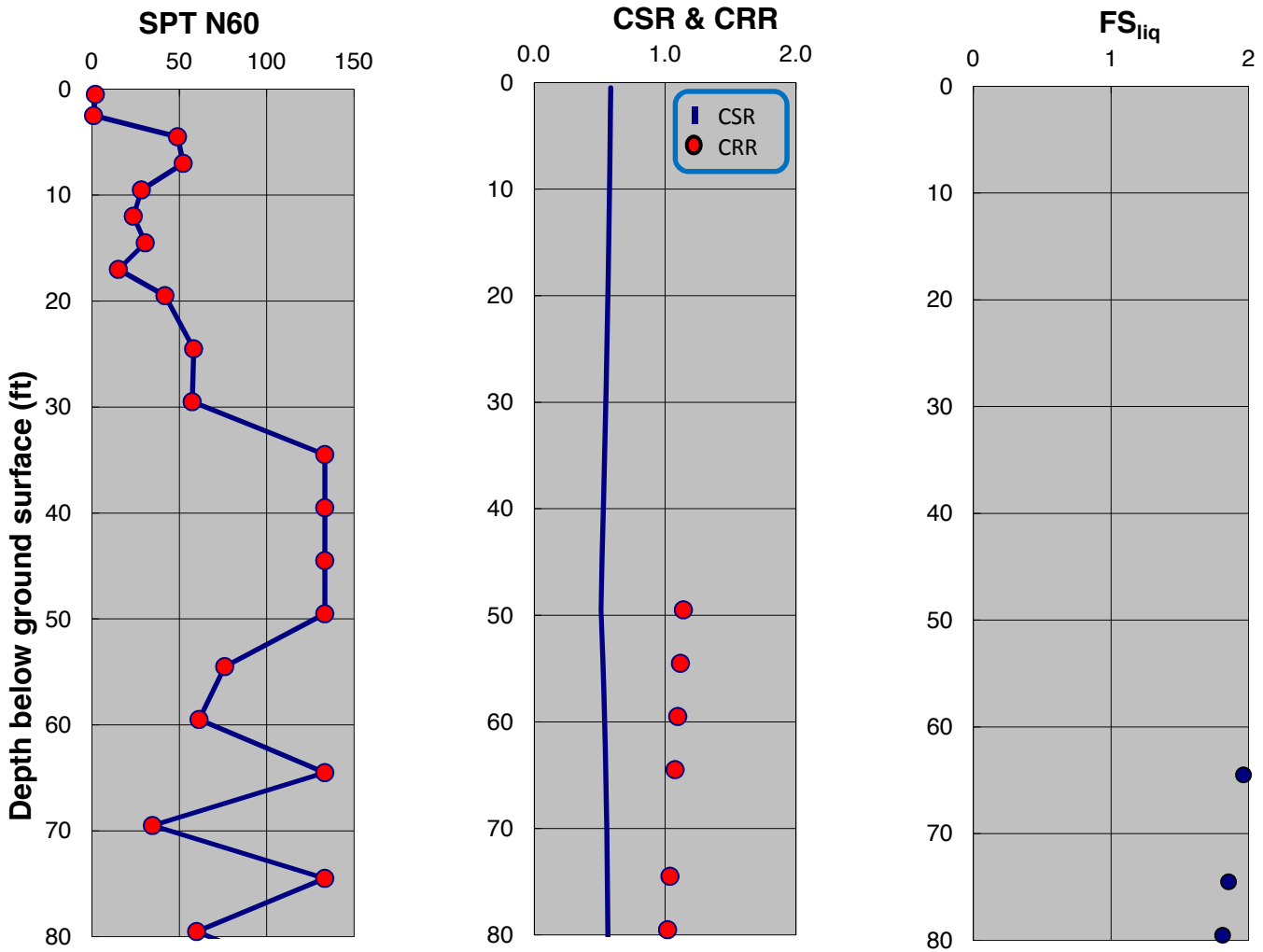
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.452



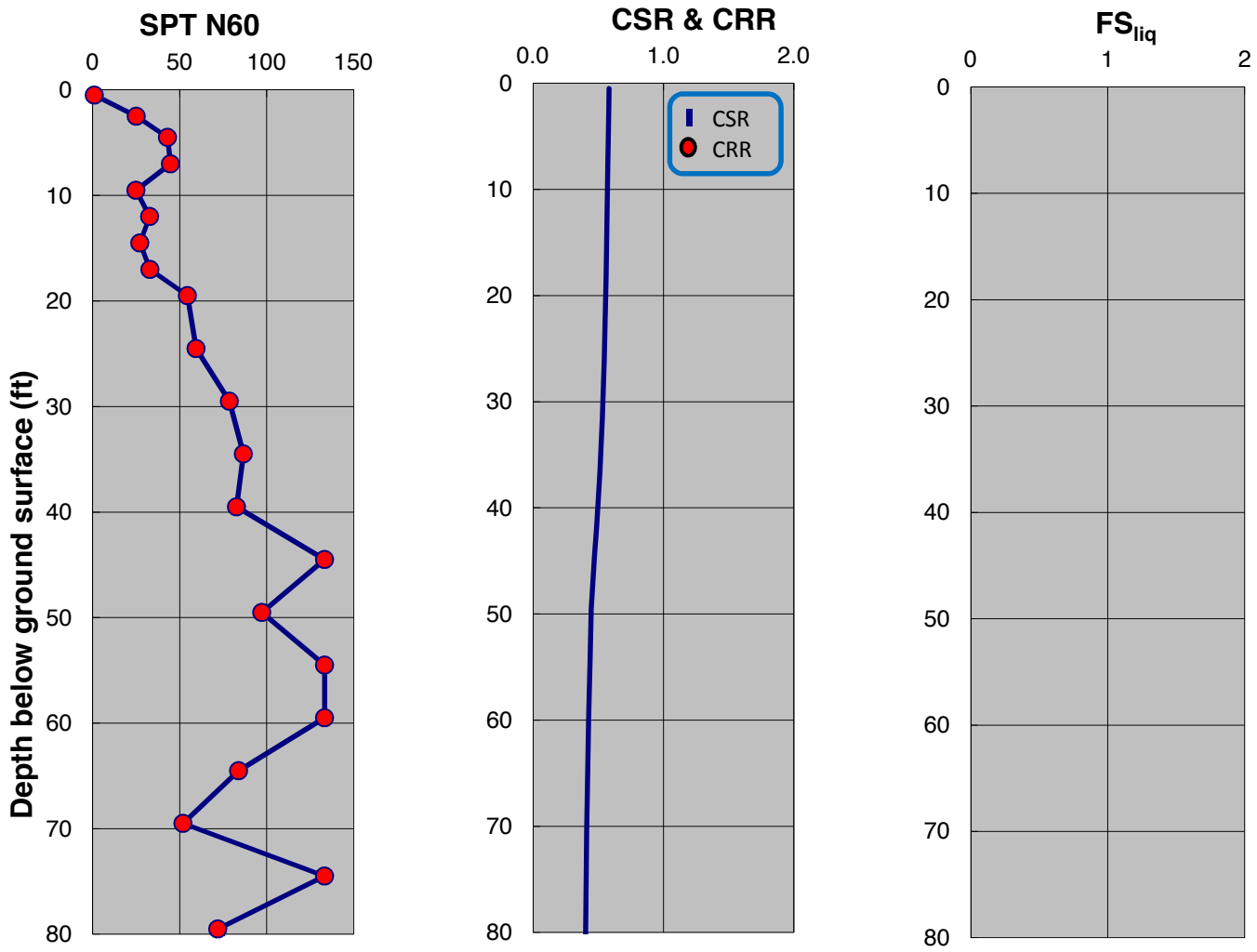
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-155 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



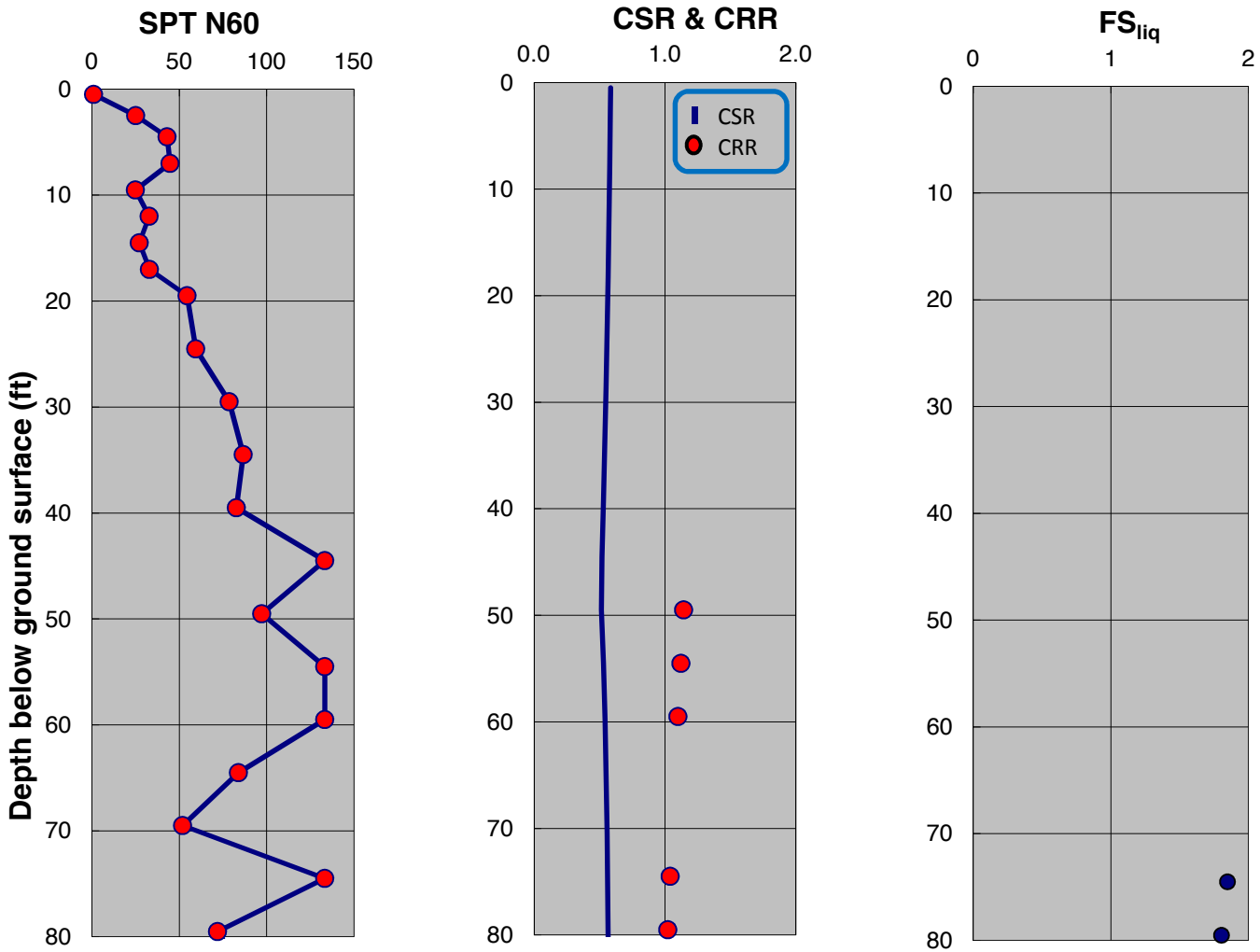
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-155 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-156 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

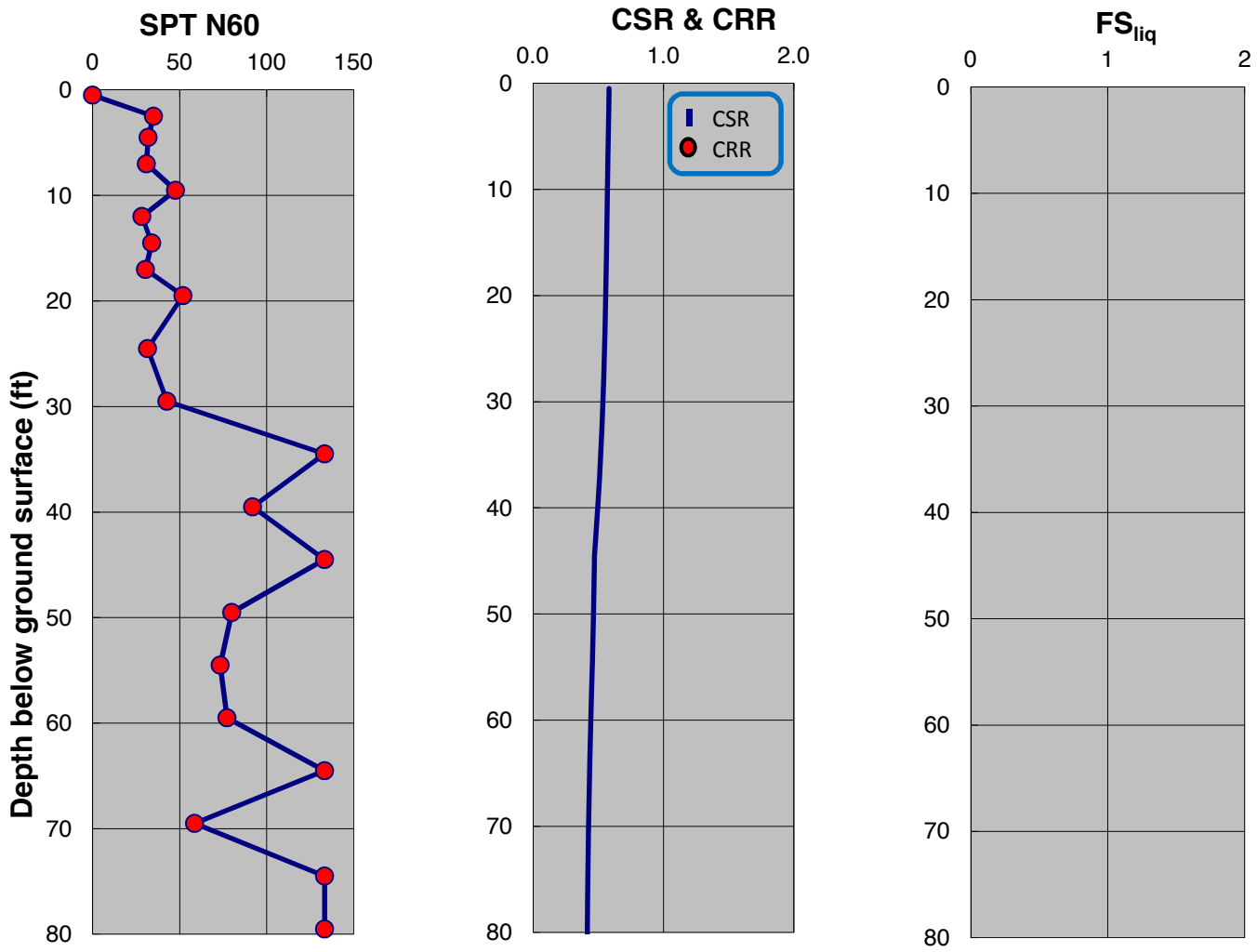
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-156 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

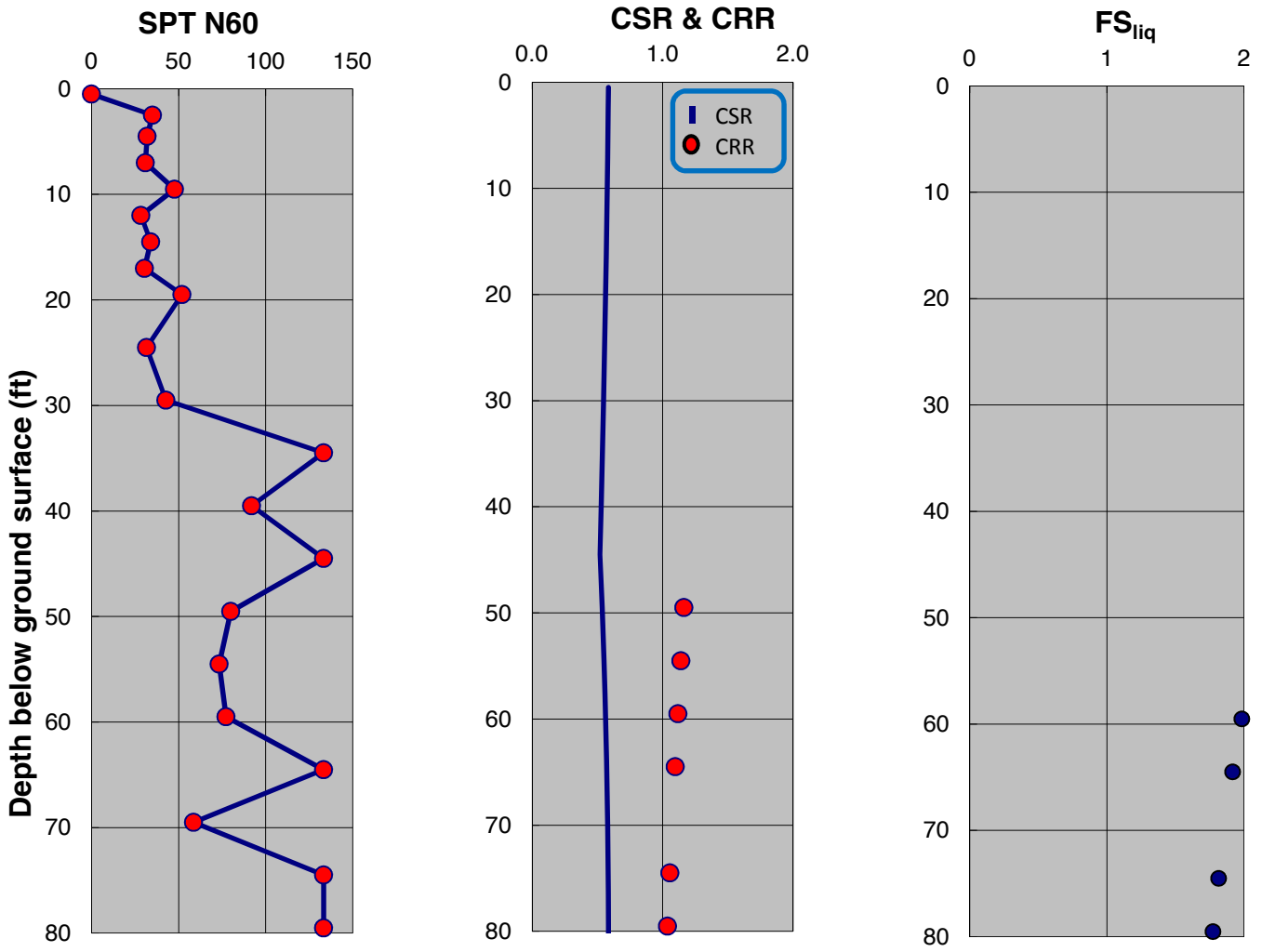
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.456



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-157 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

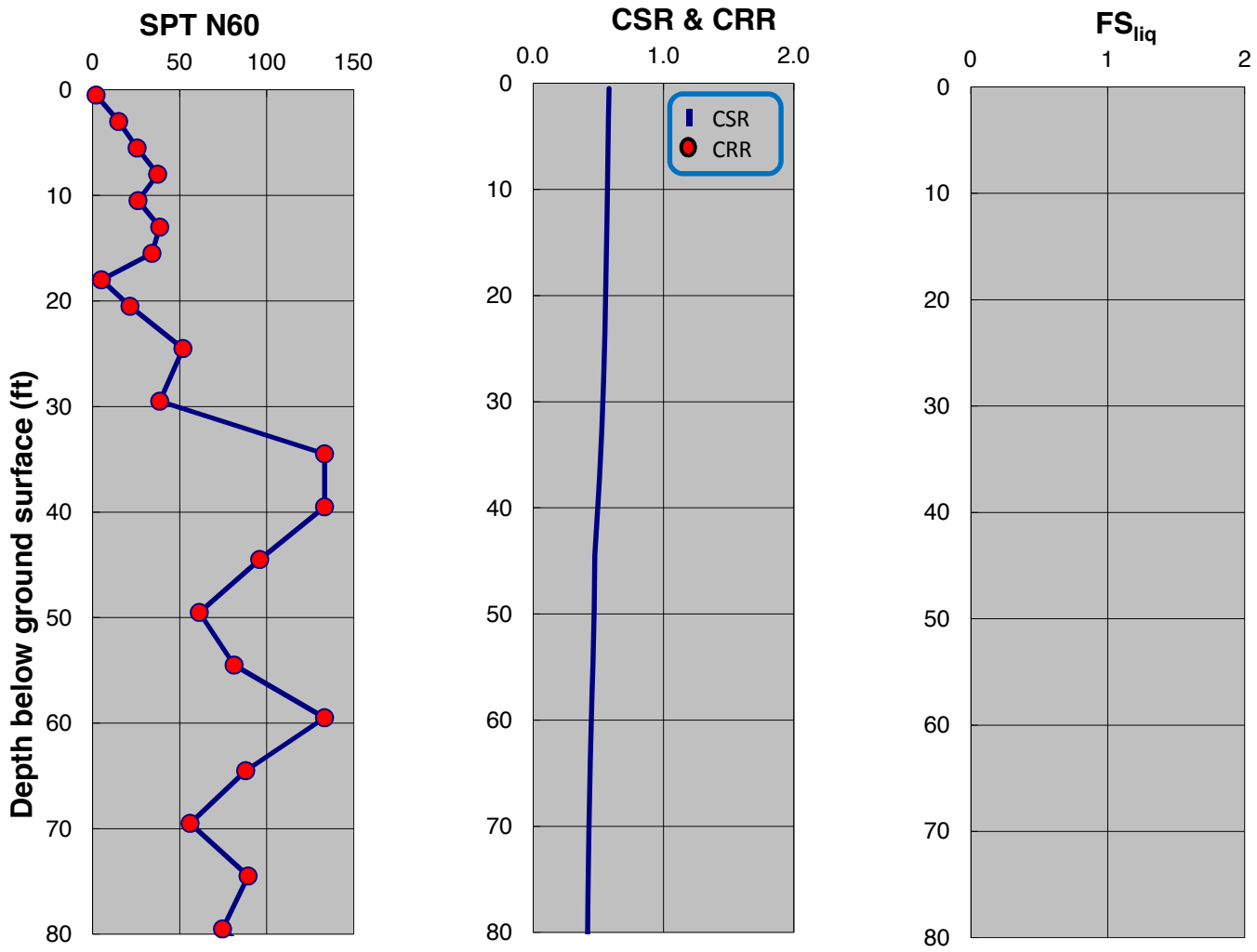
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-157 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

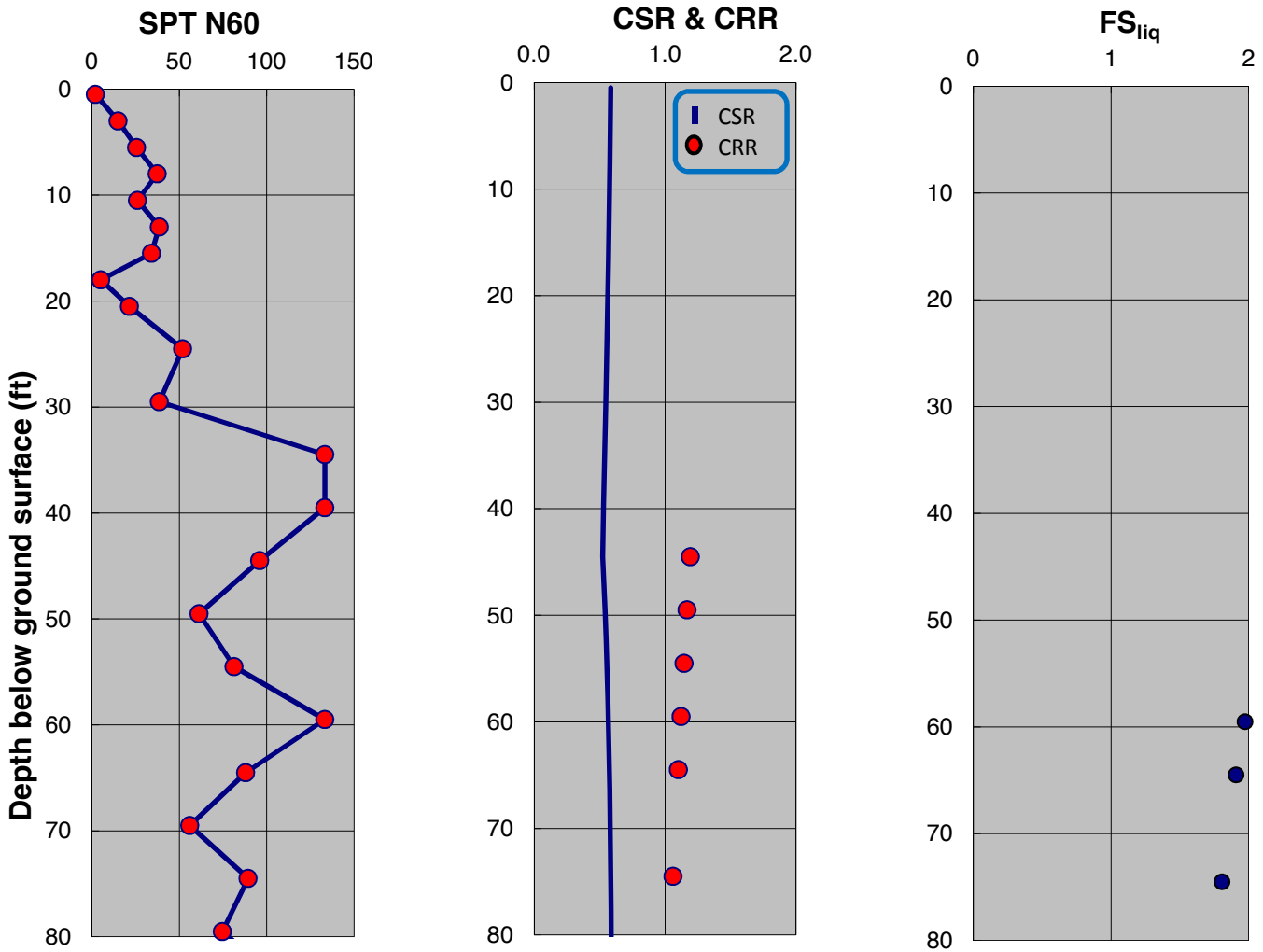
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.458



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-158 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

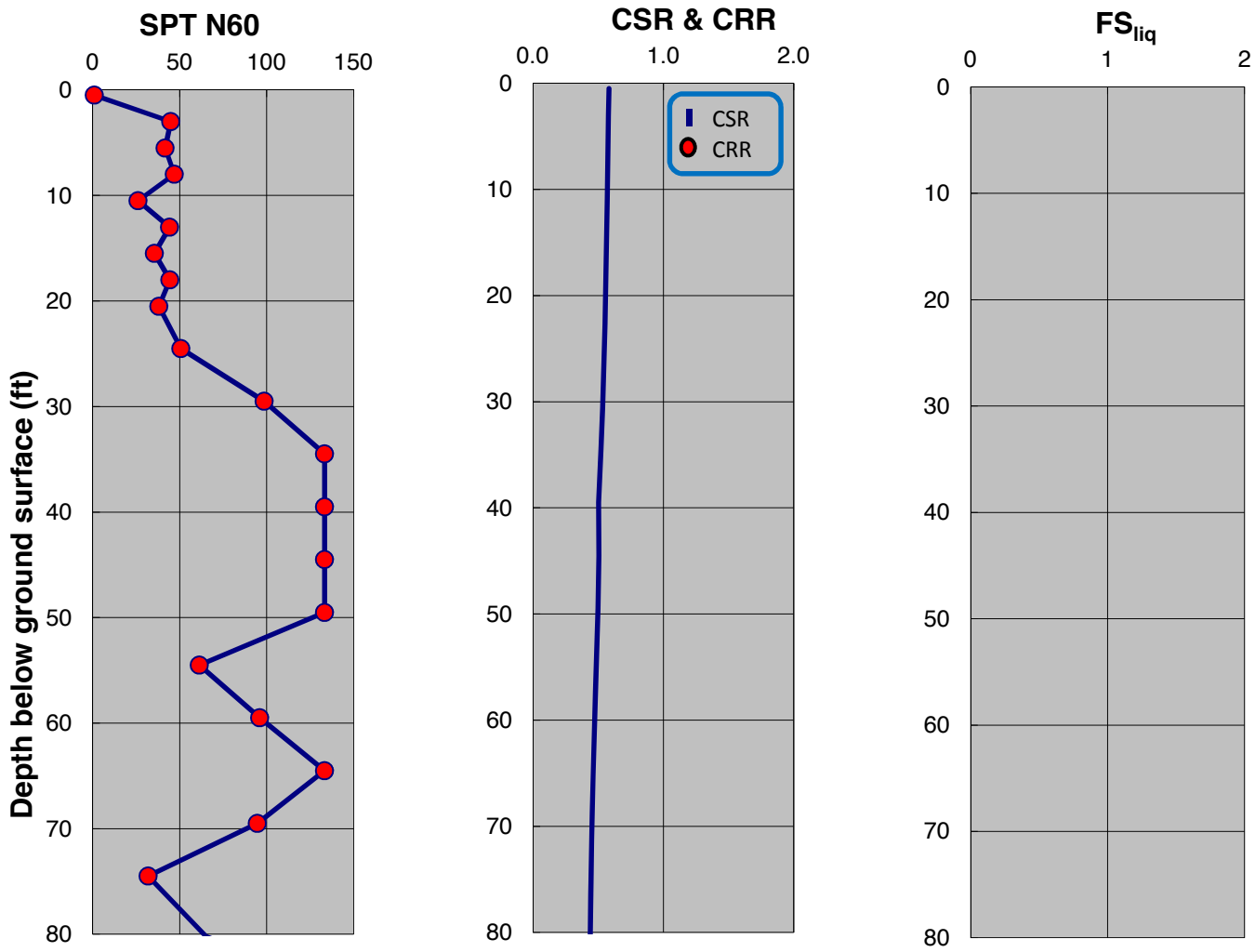
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-158 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

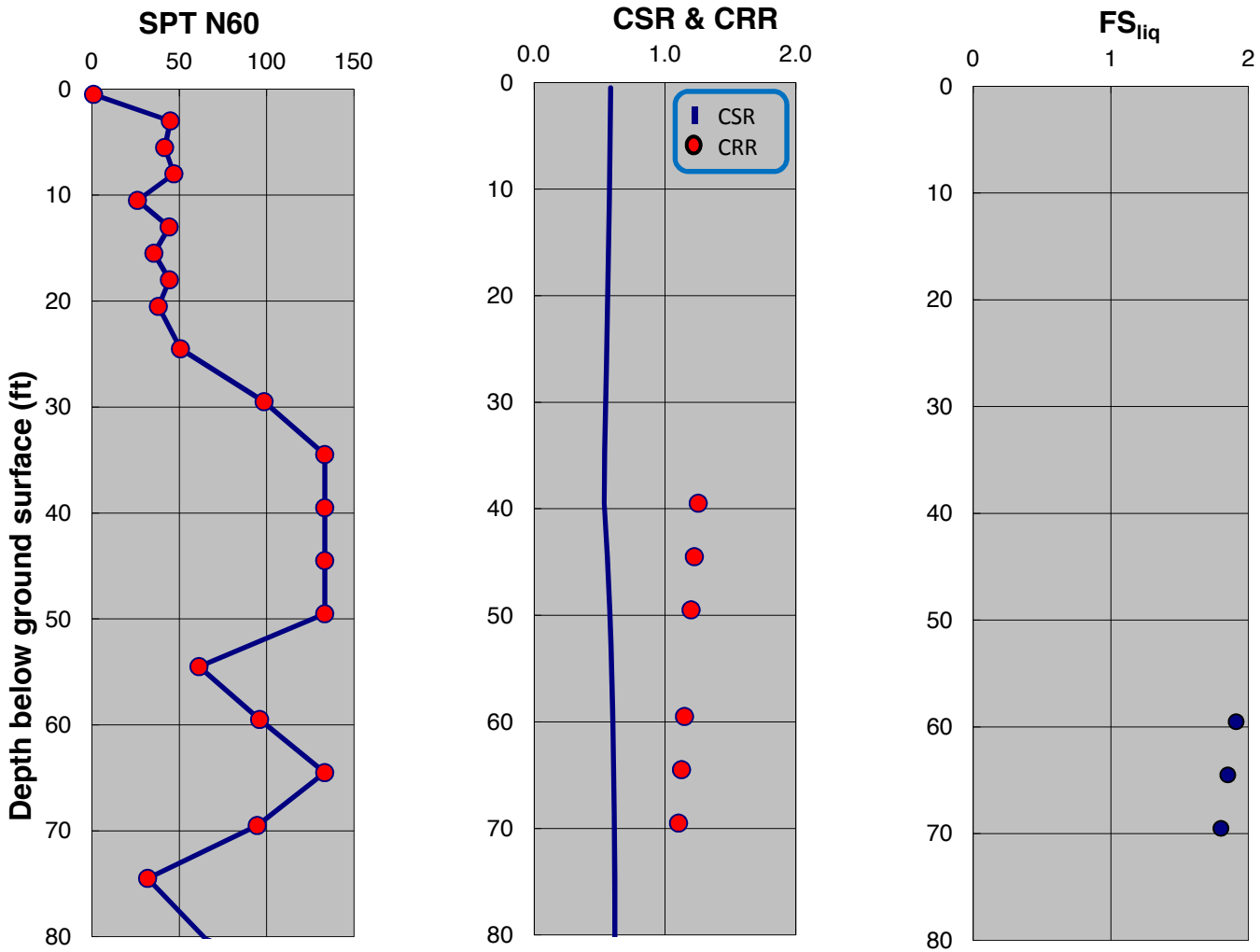
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.460



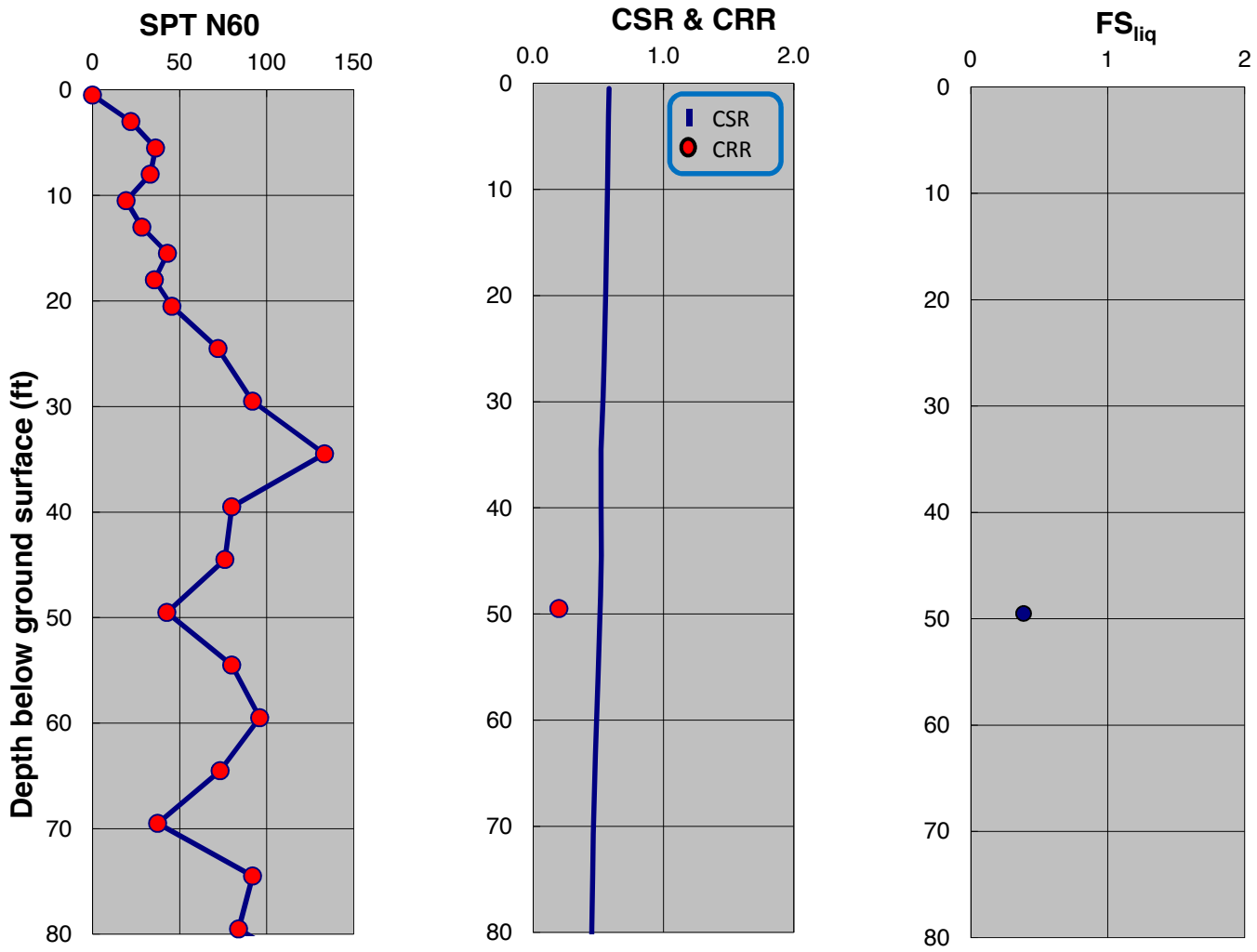
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-159 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



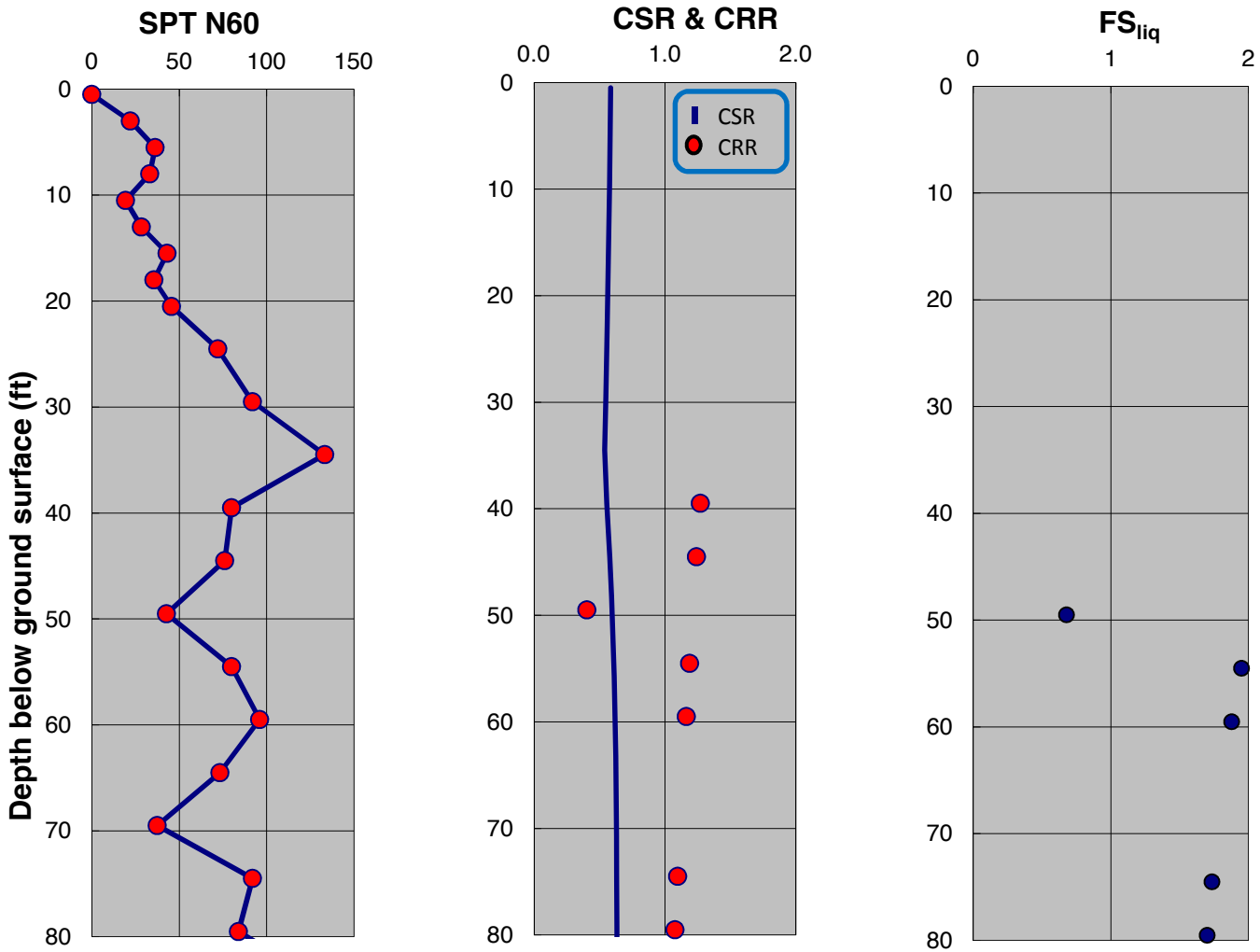
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-159 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



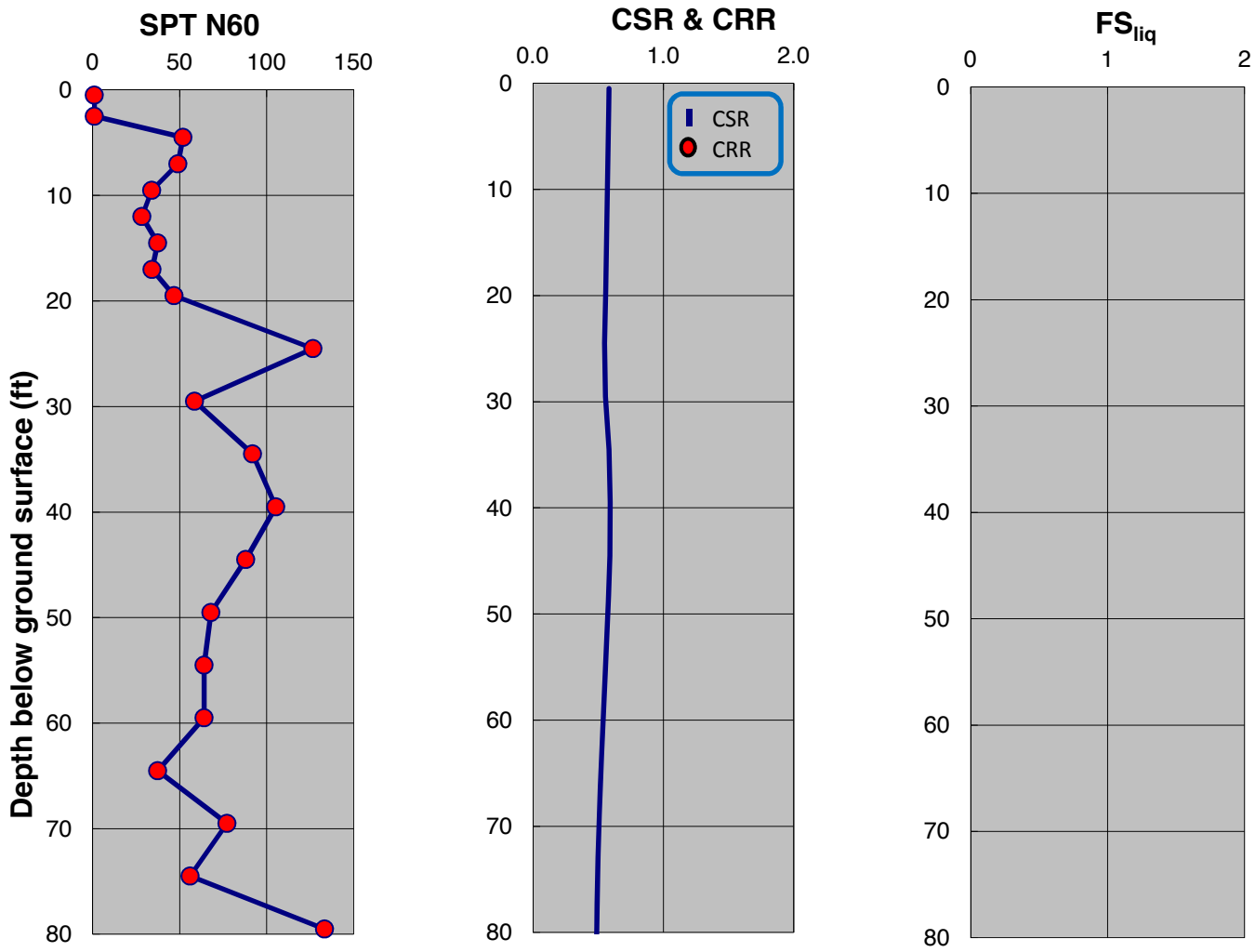
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-160 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



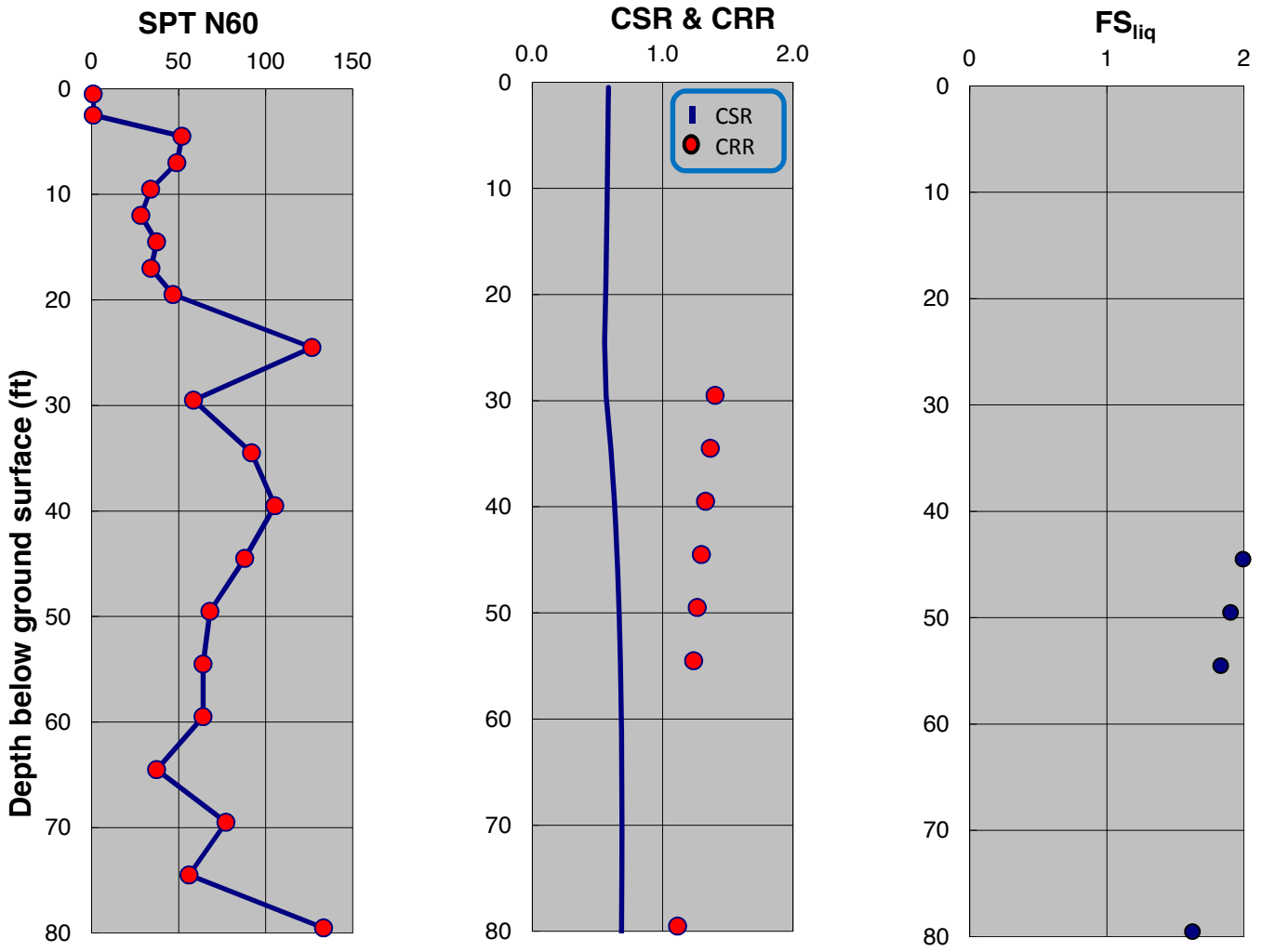
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-160 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-161 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

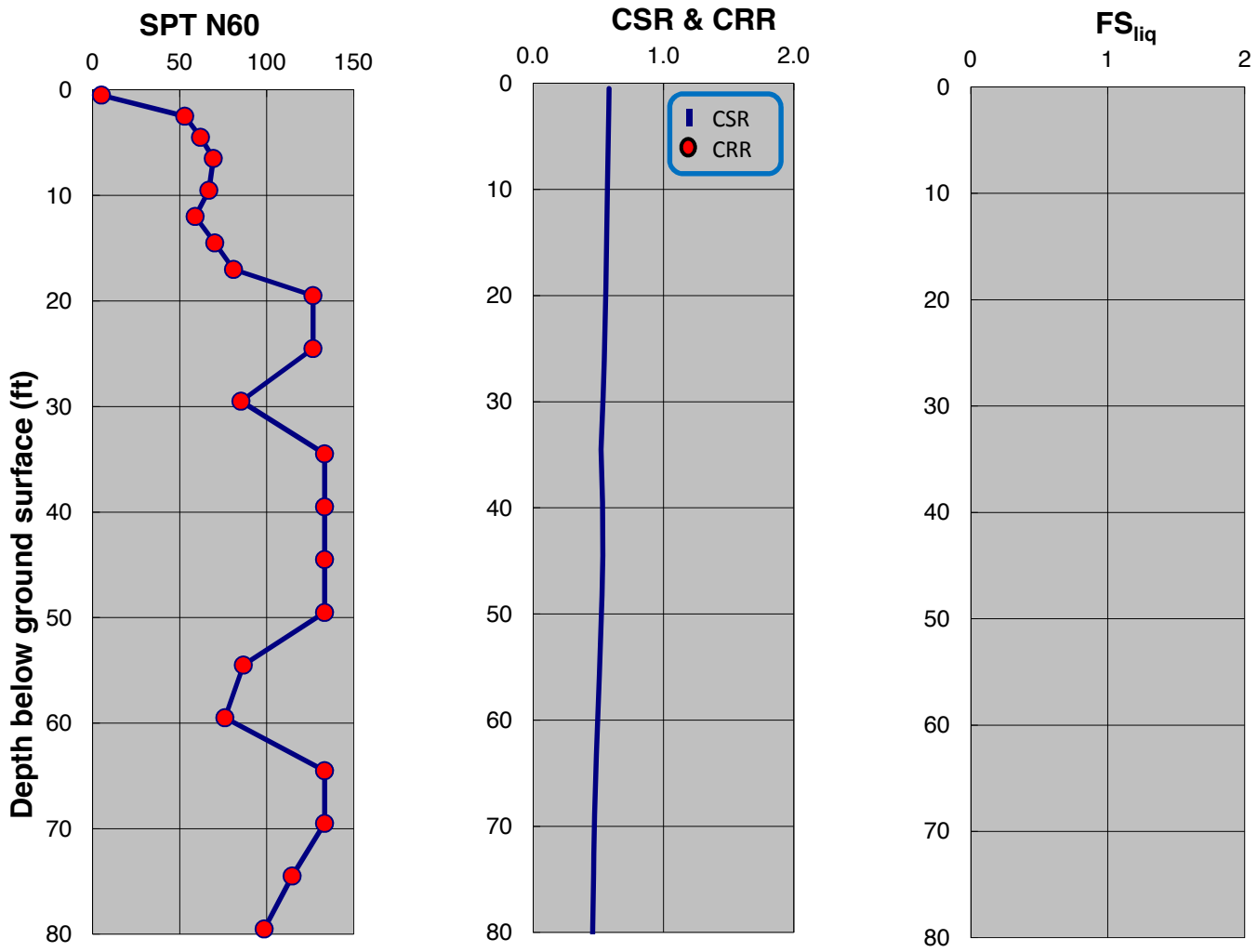
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-161 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

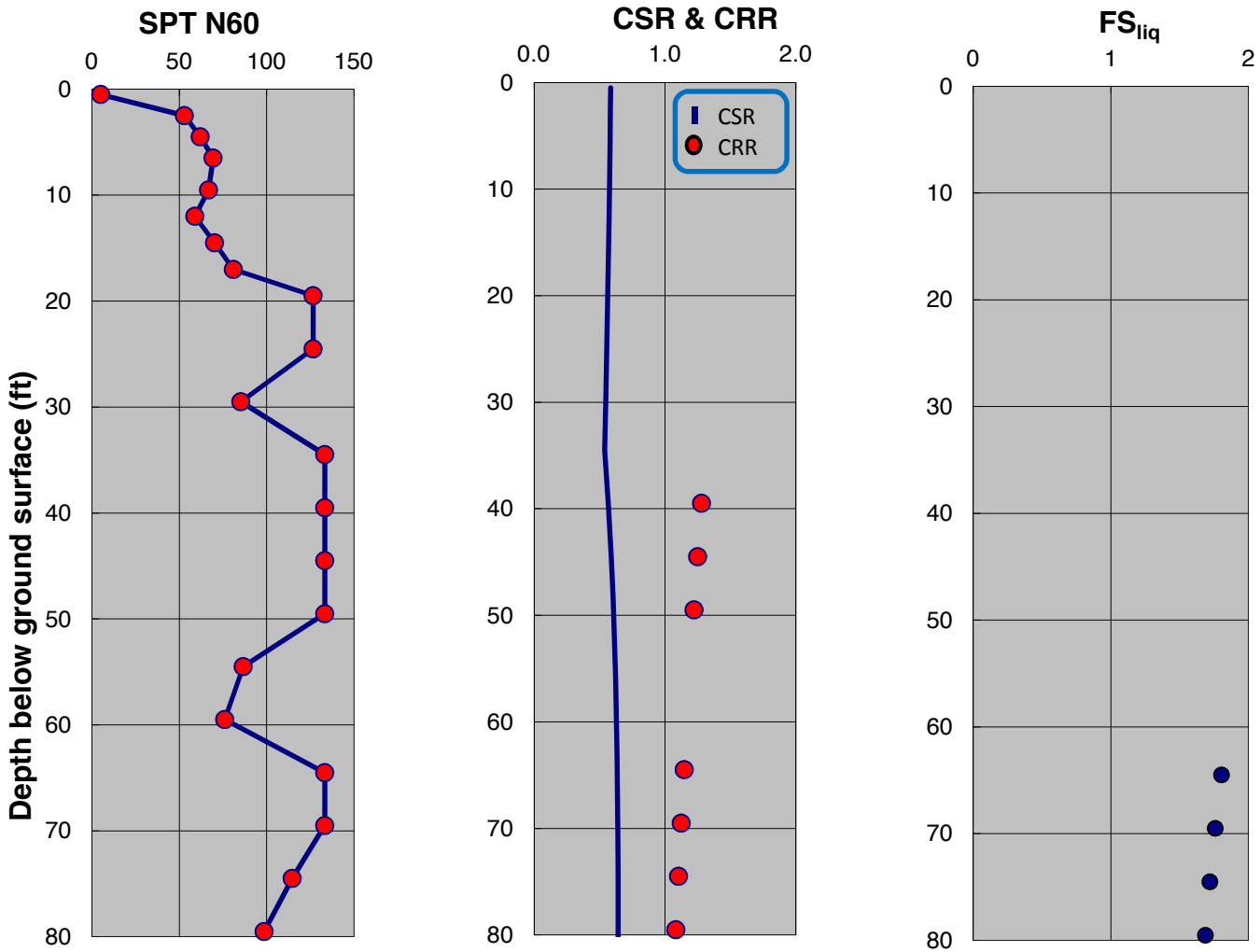
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.466



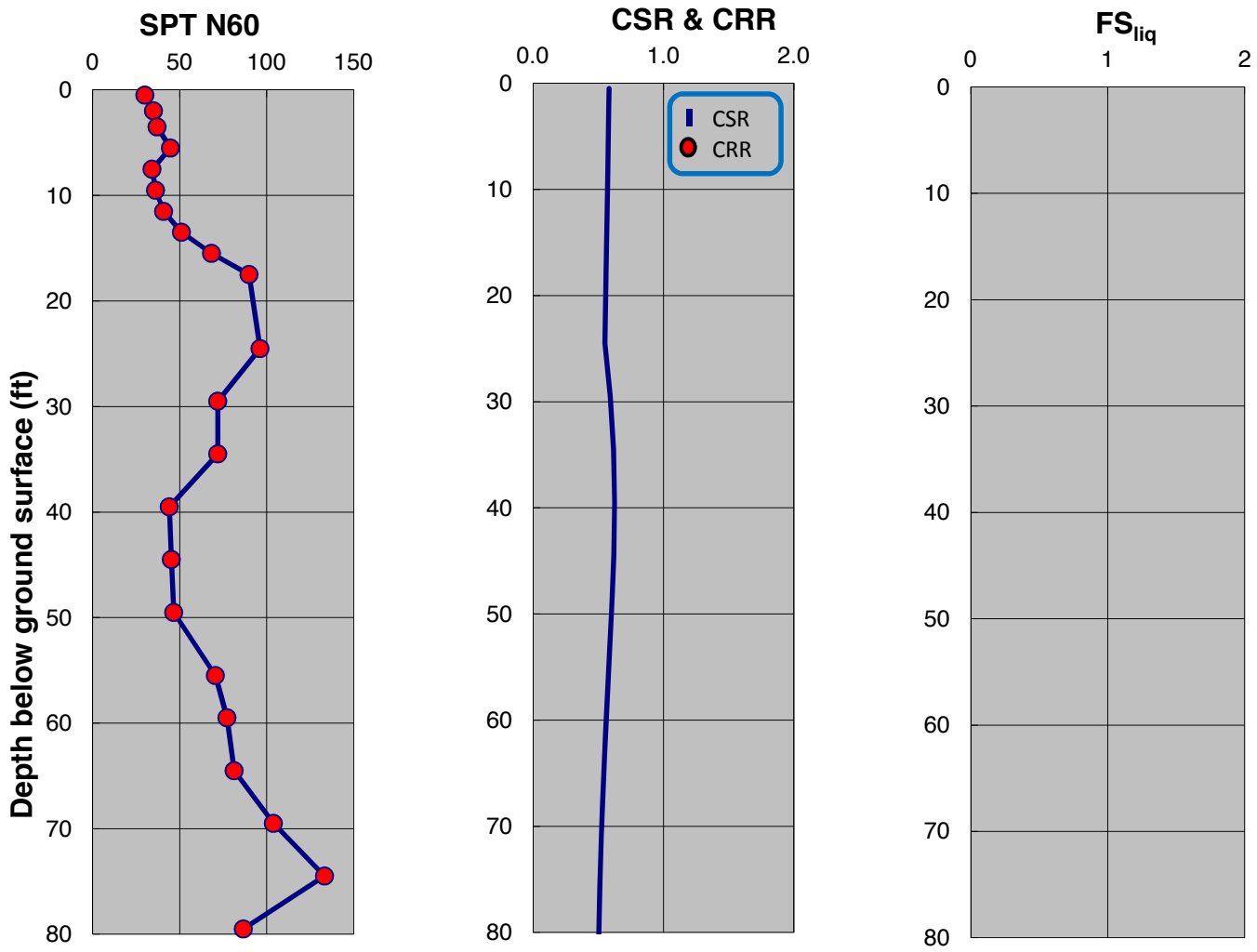
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-162 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



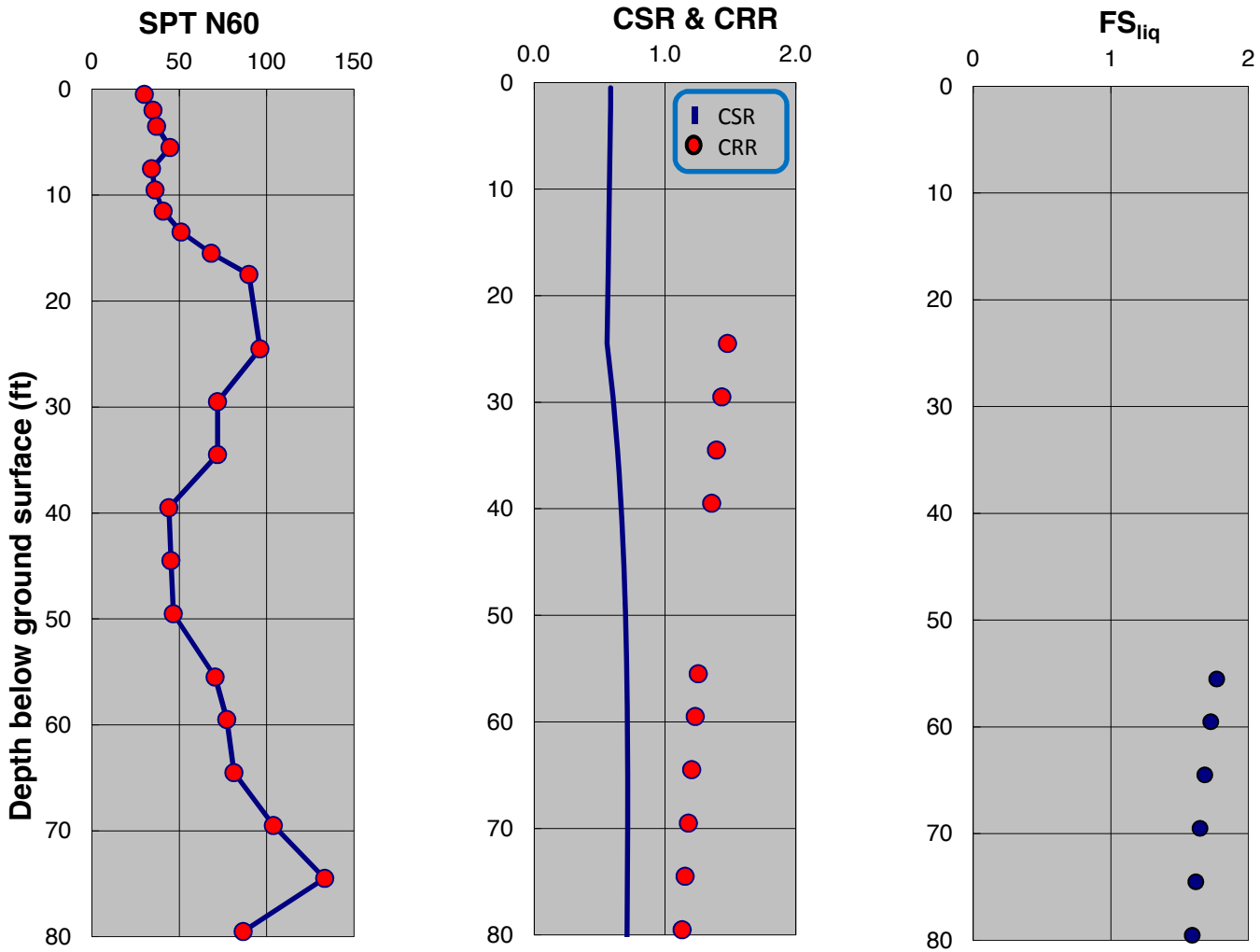
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-162 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-163 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

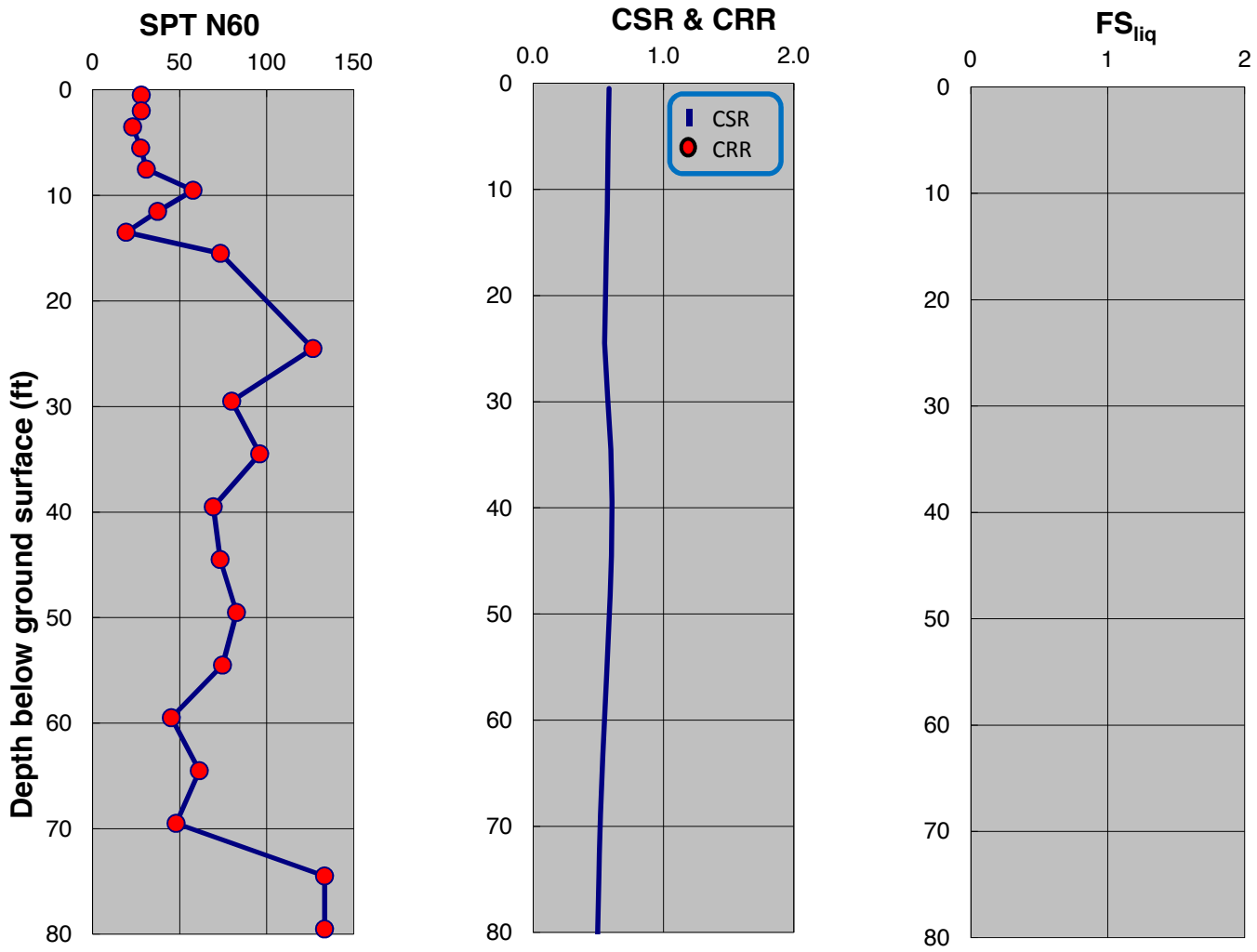
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-163 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

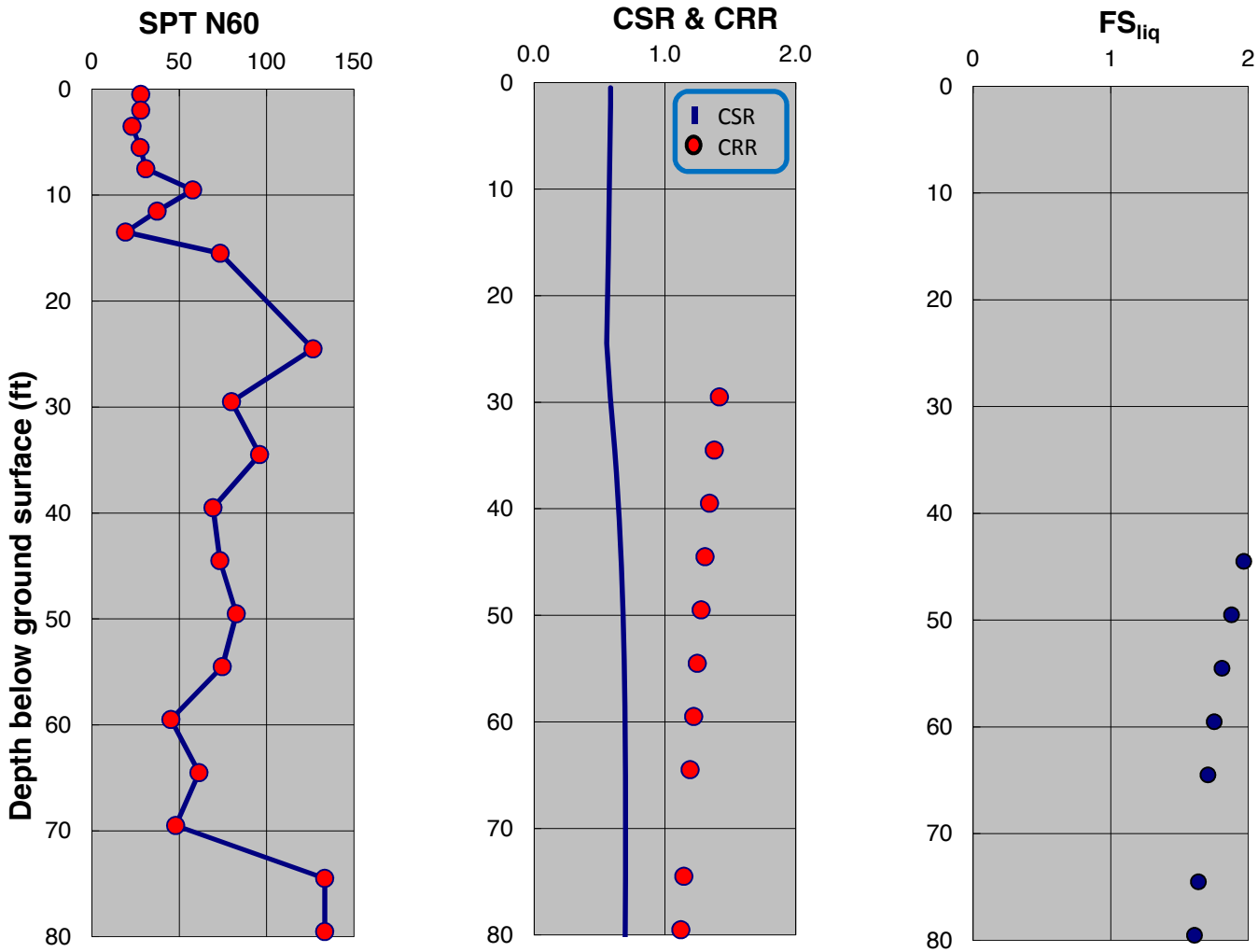
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.470



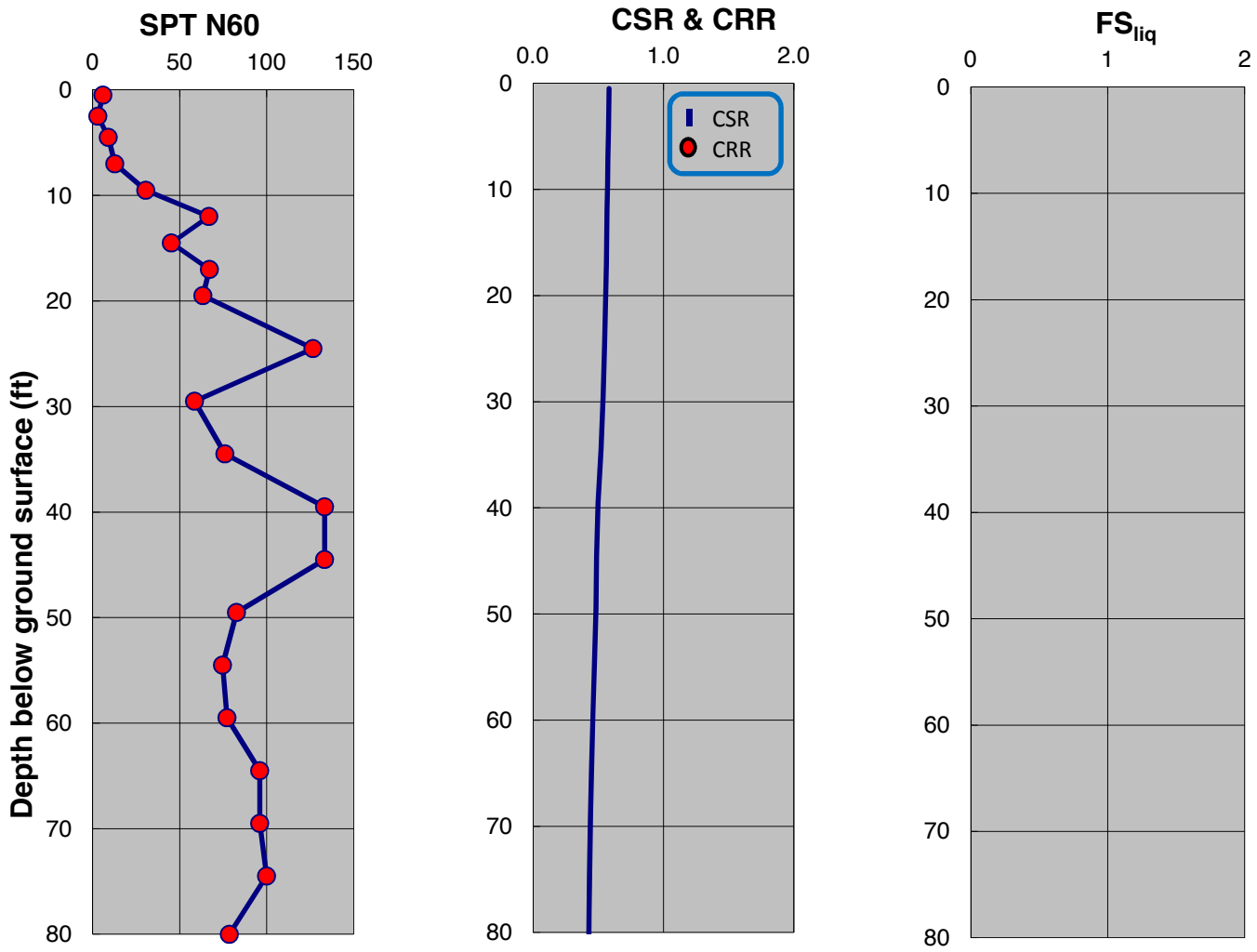
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-164 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



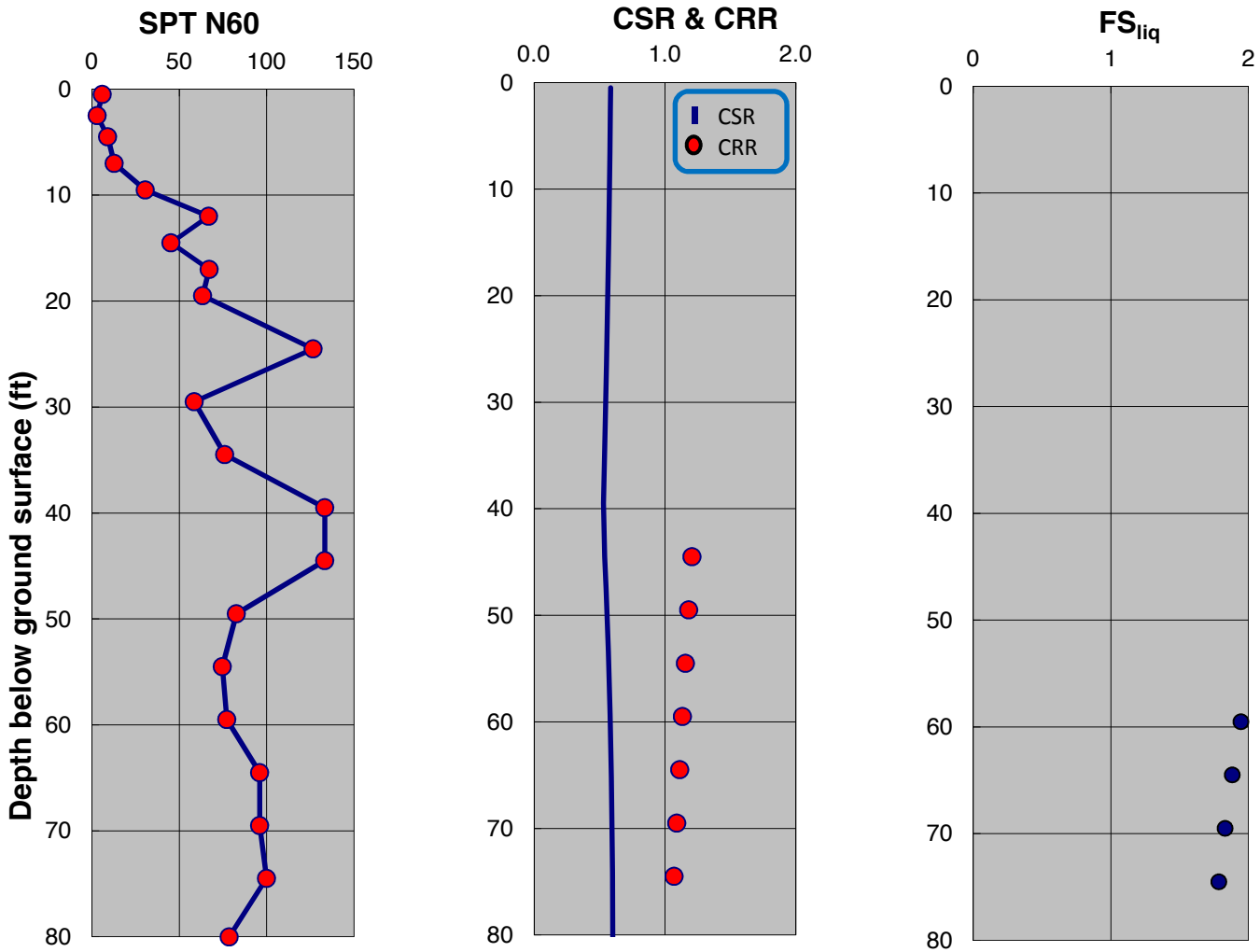
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-164 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



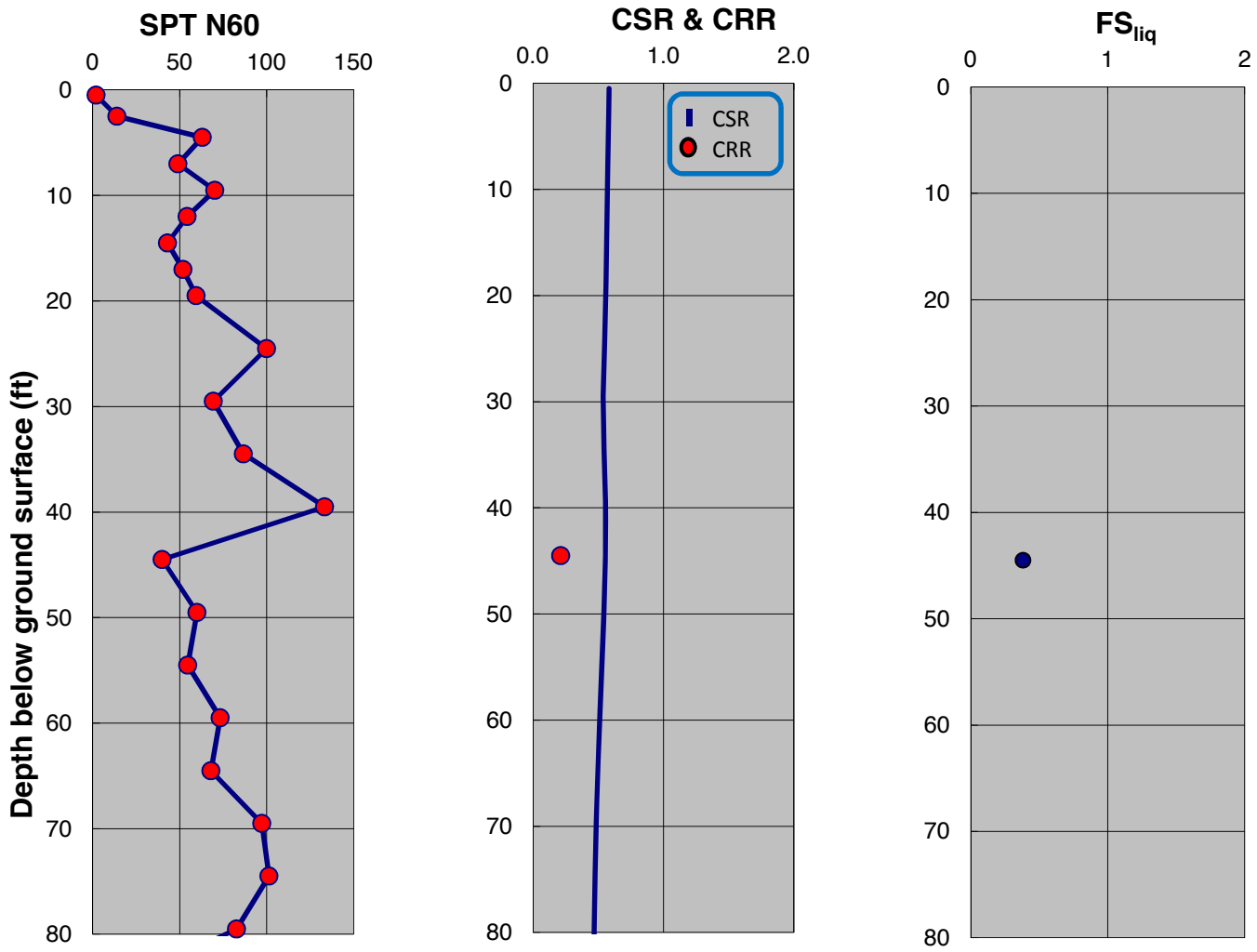
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-165 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



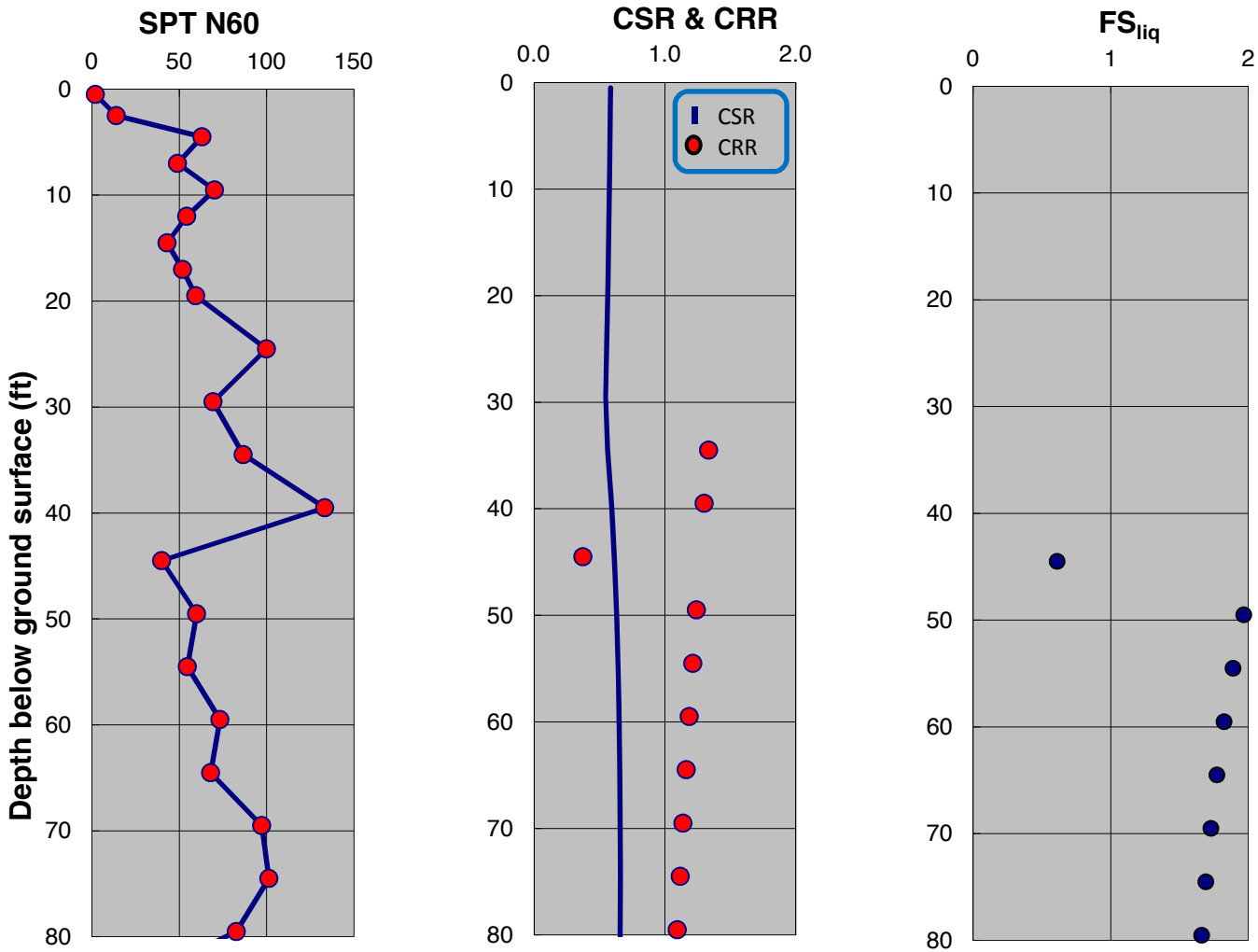
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-165 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



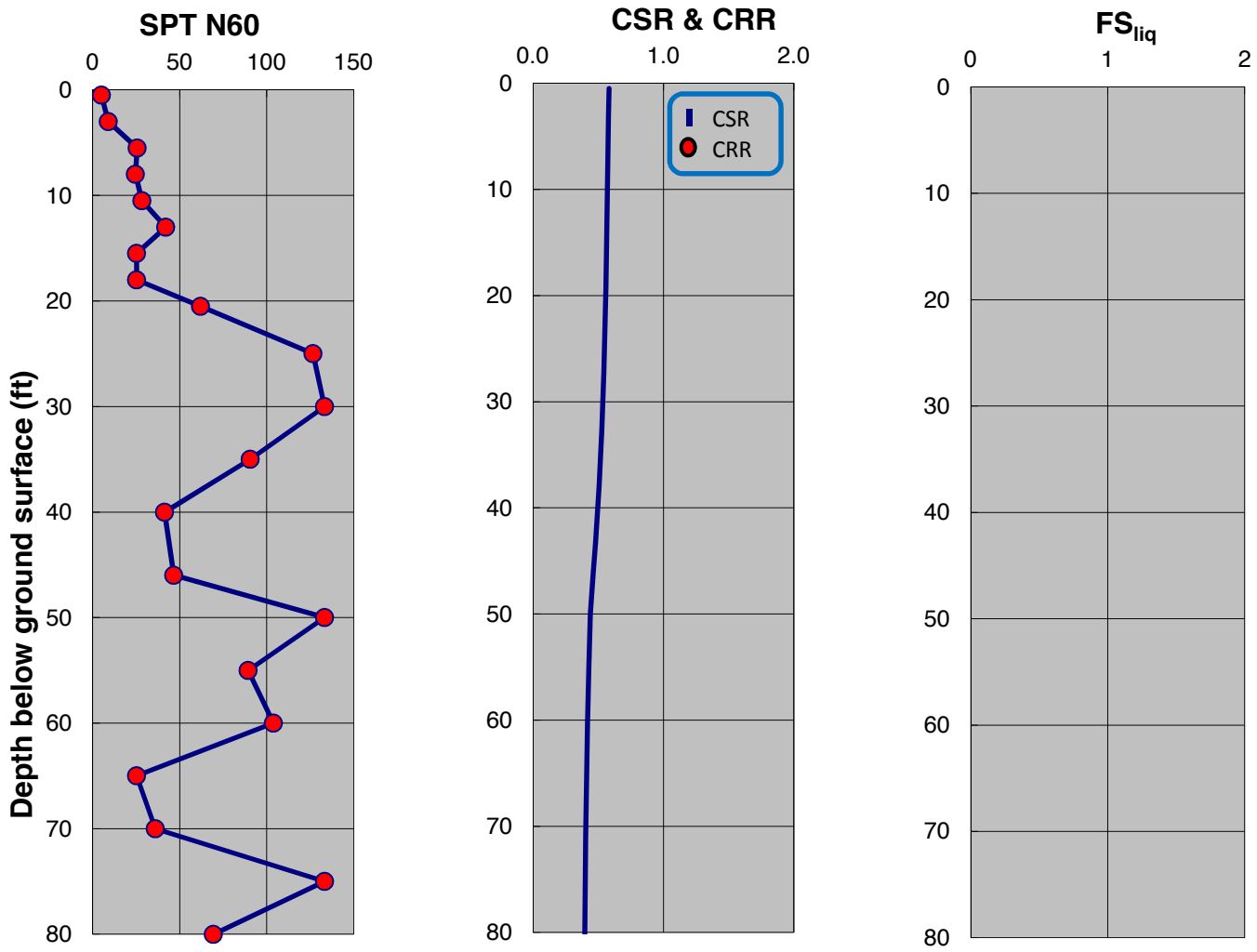
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-166 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



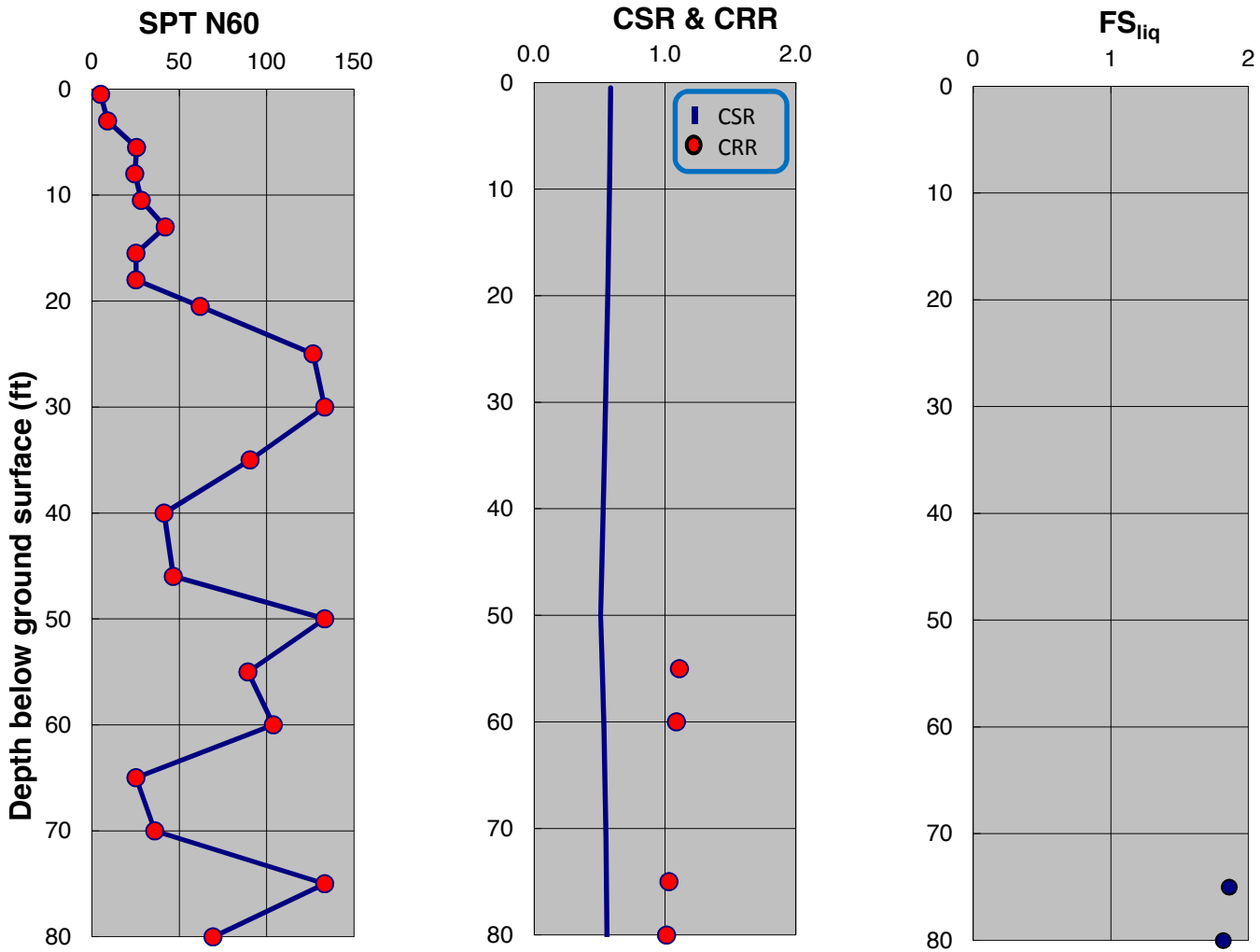
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-166 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



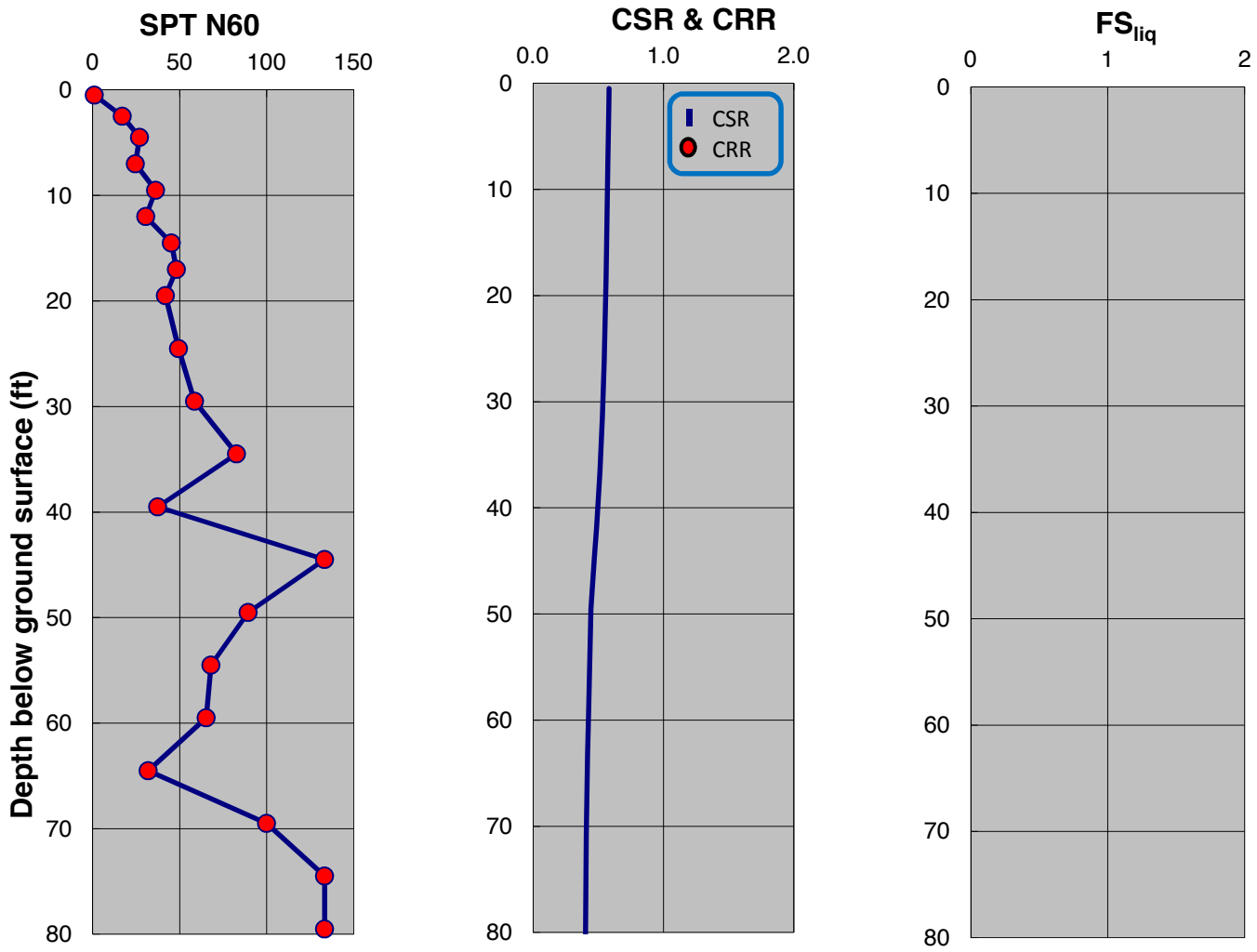
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-167 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



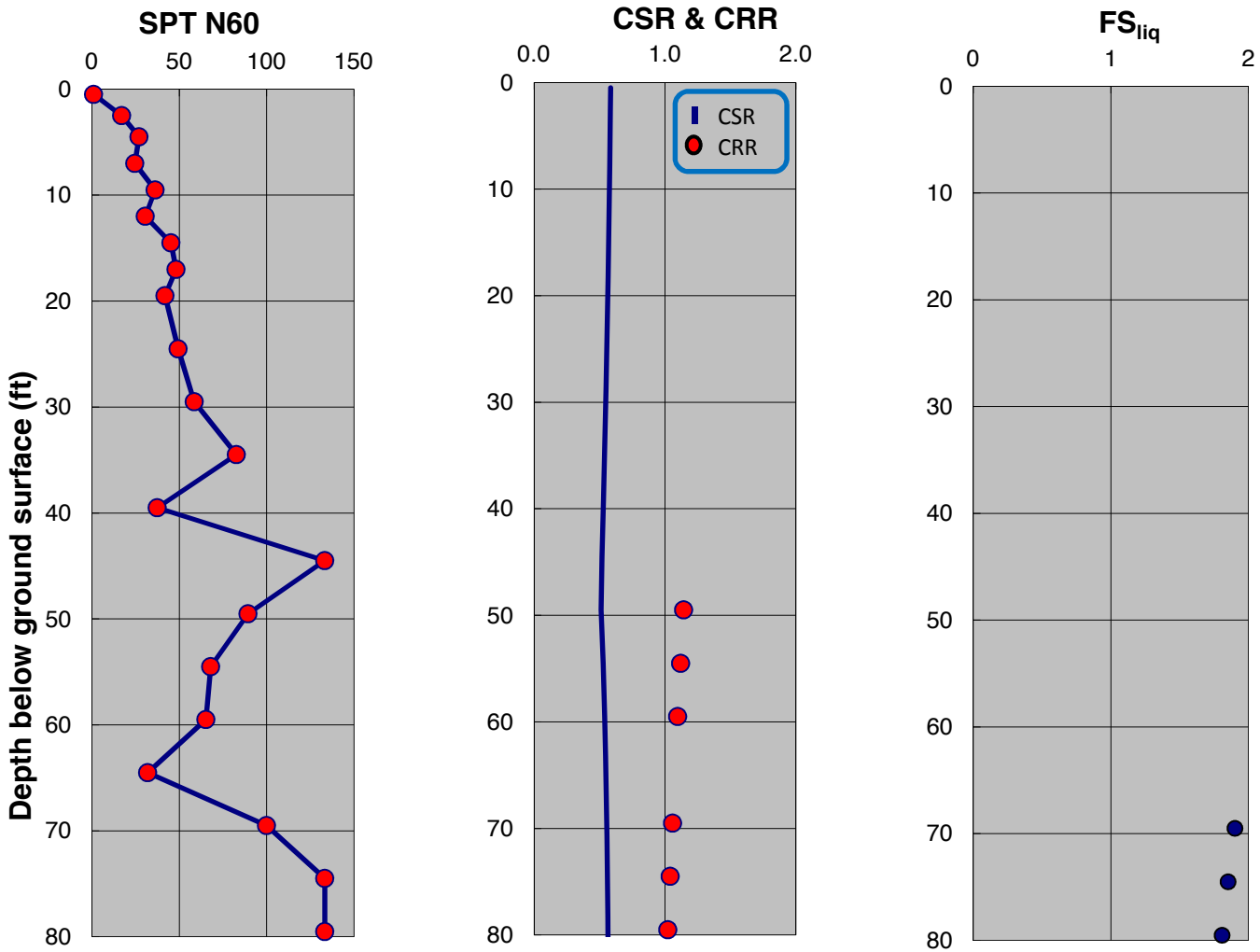
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-167 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-168 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

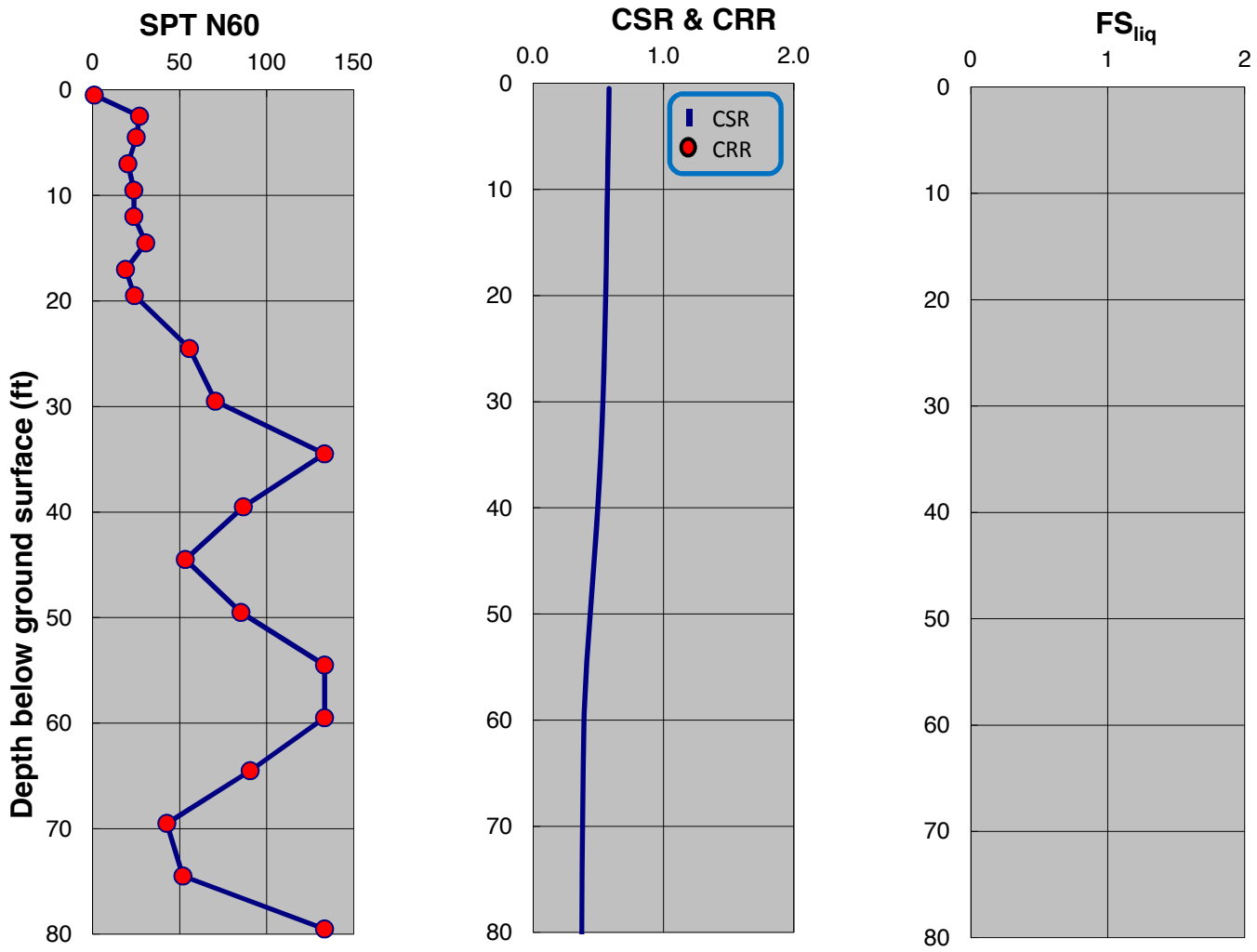
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-168 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

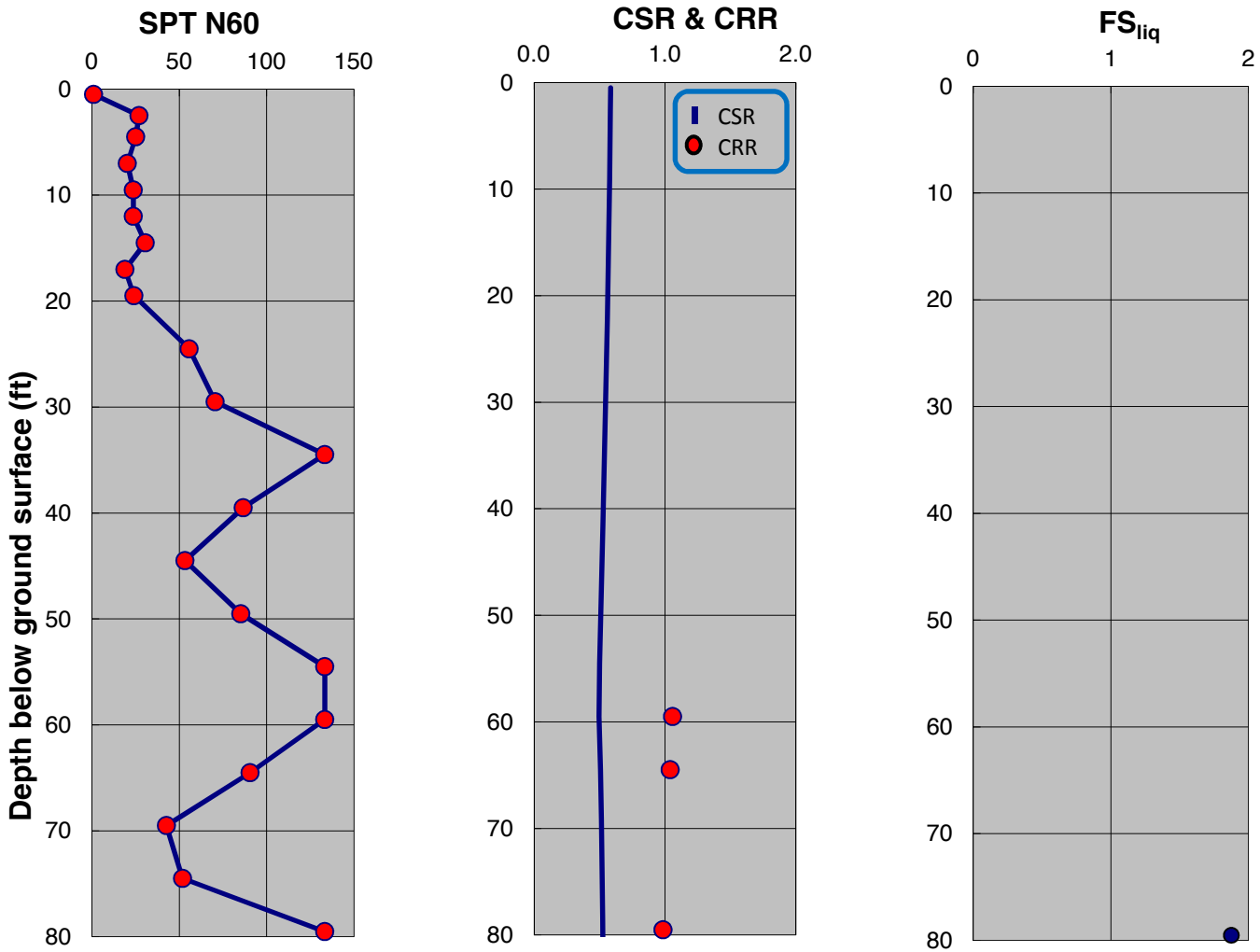
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.480



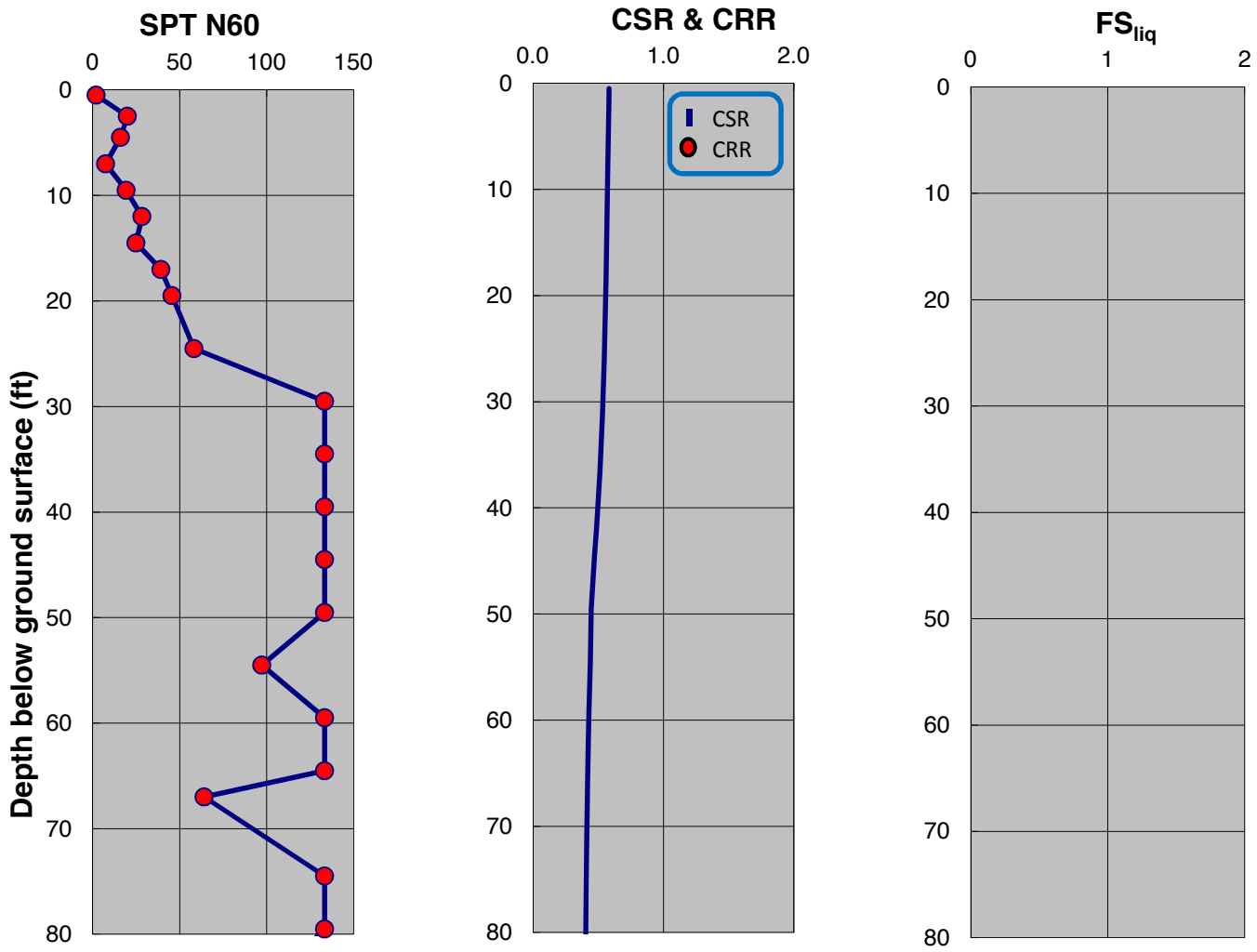
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-169 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-169 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

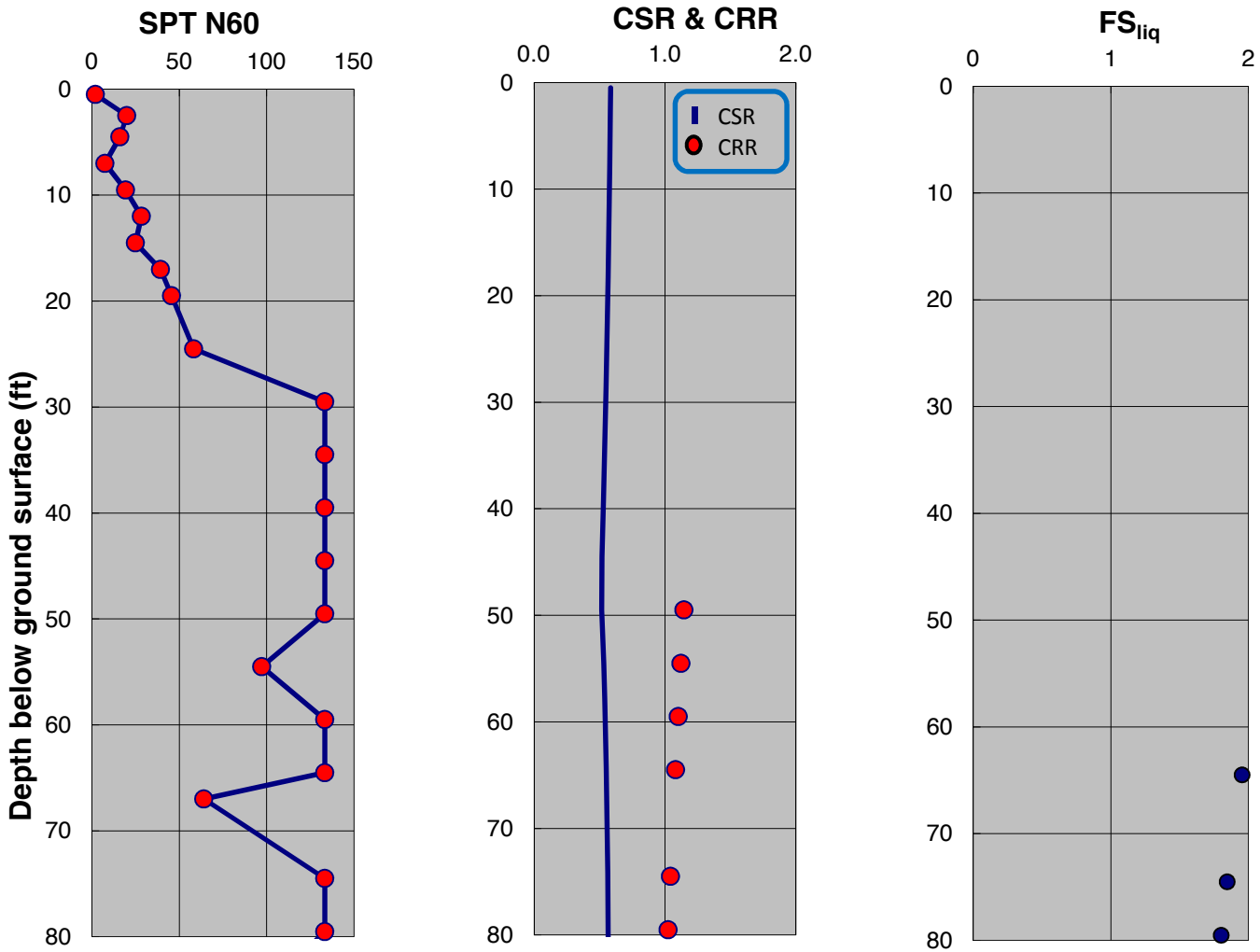
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-170 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

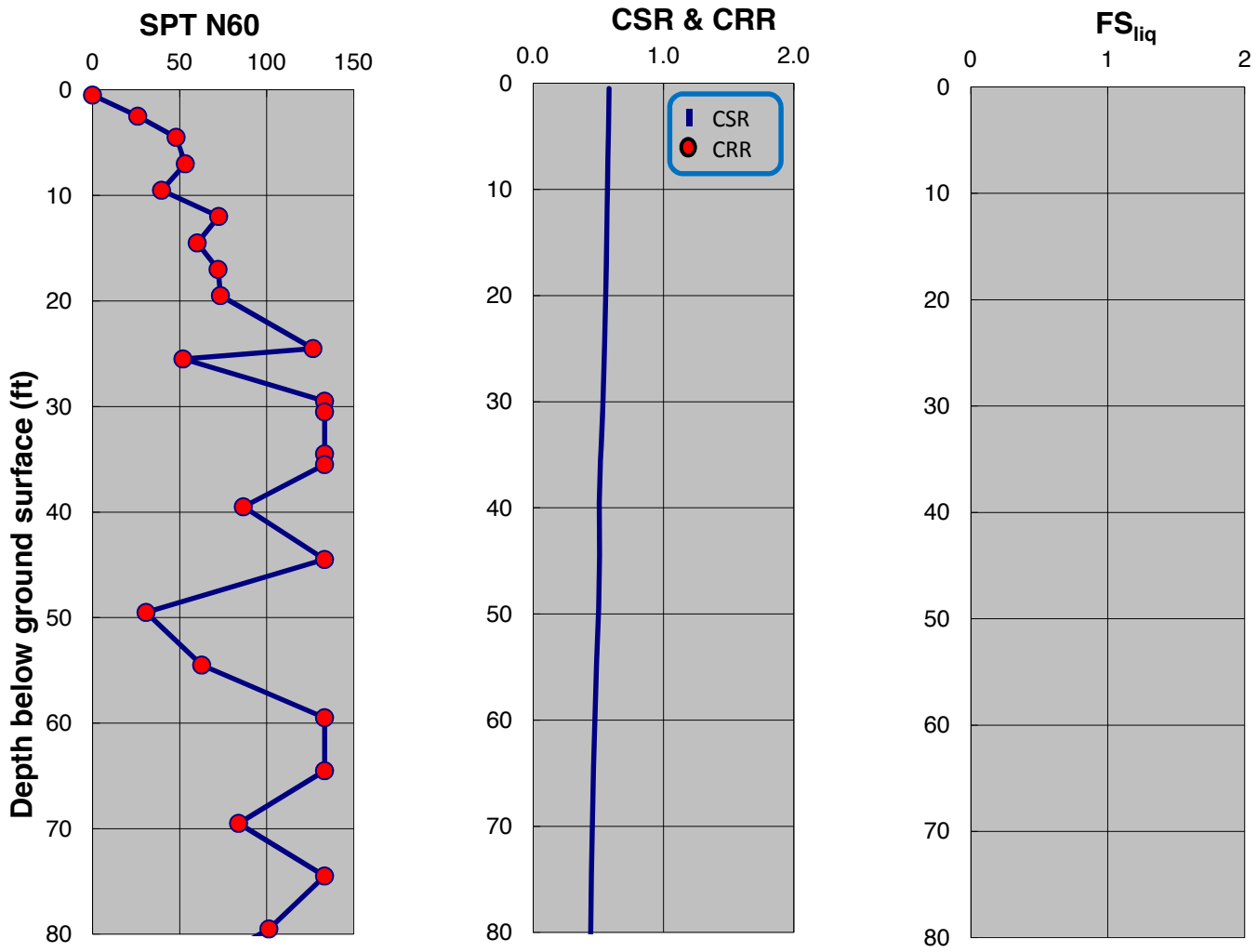
PLATE A.483



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-170 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

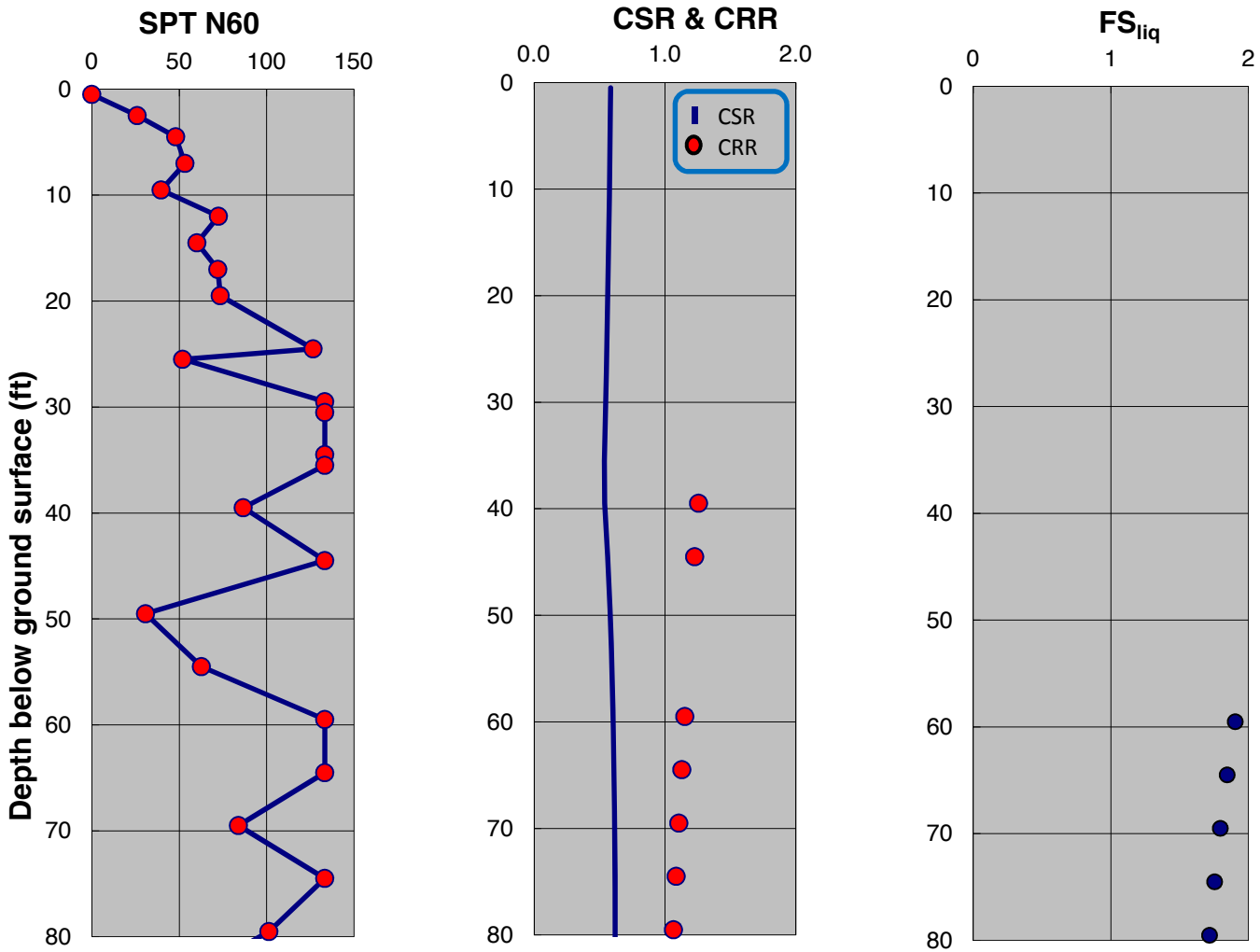
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.484



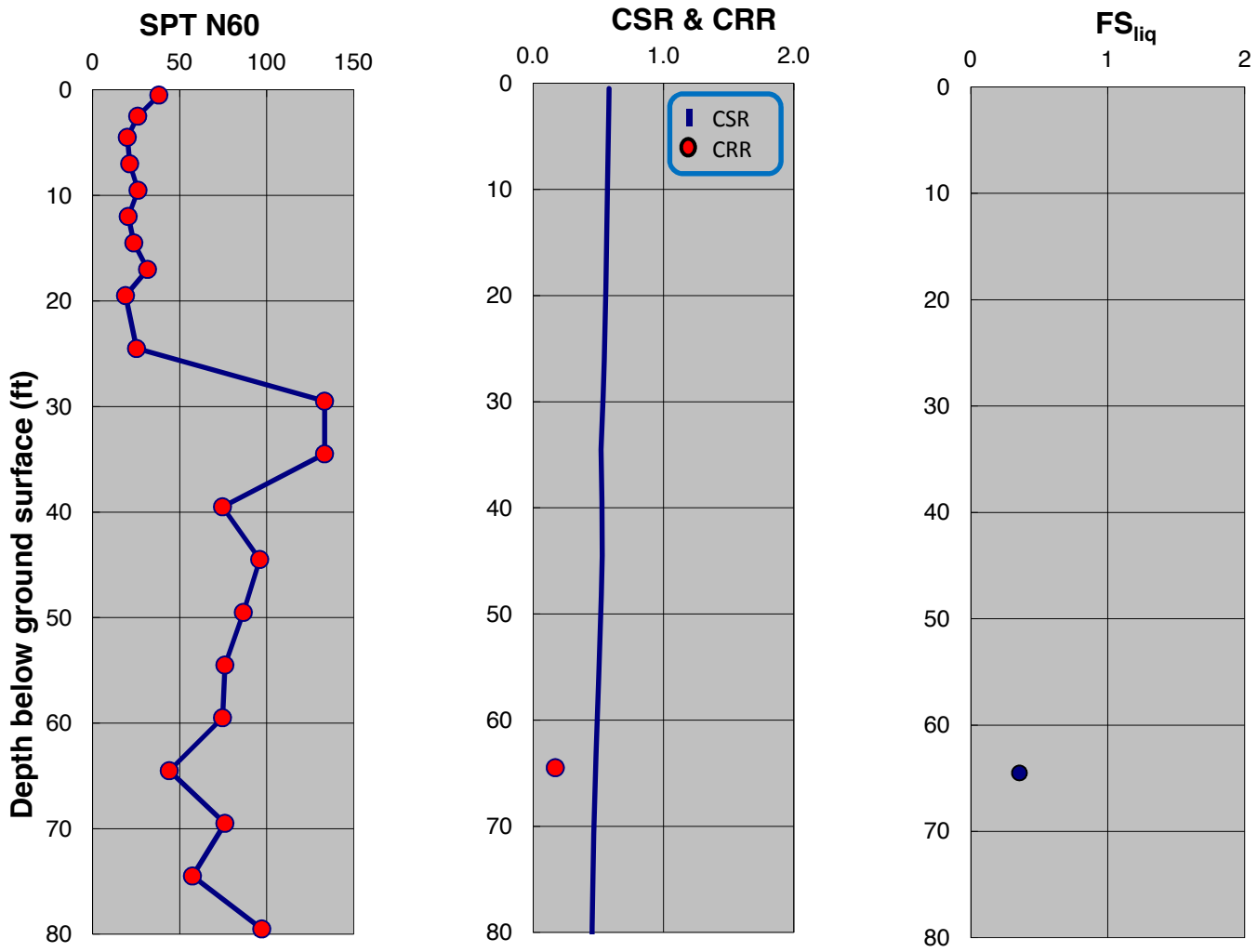
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-171 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



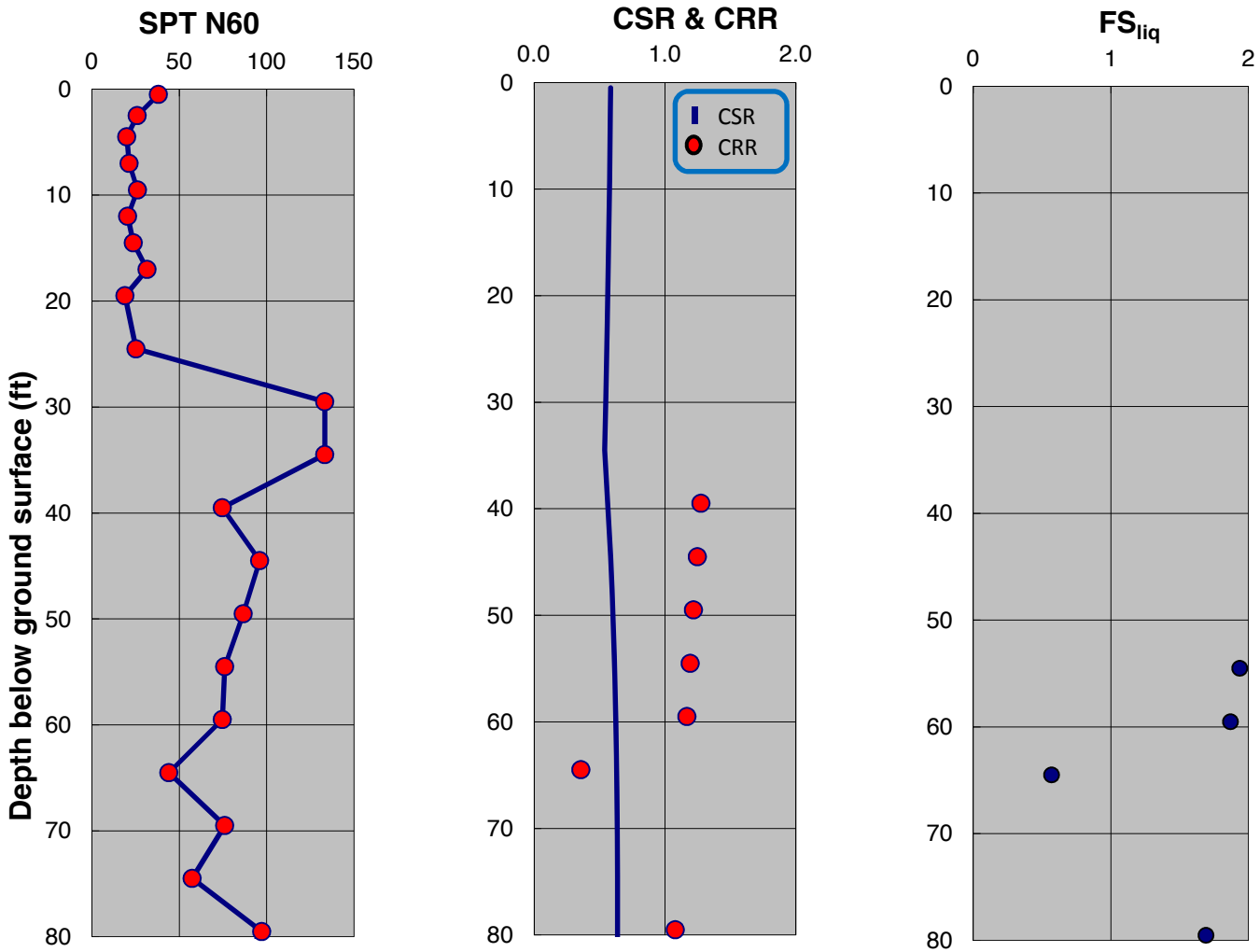
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-171 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



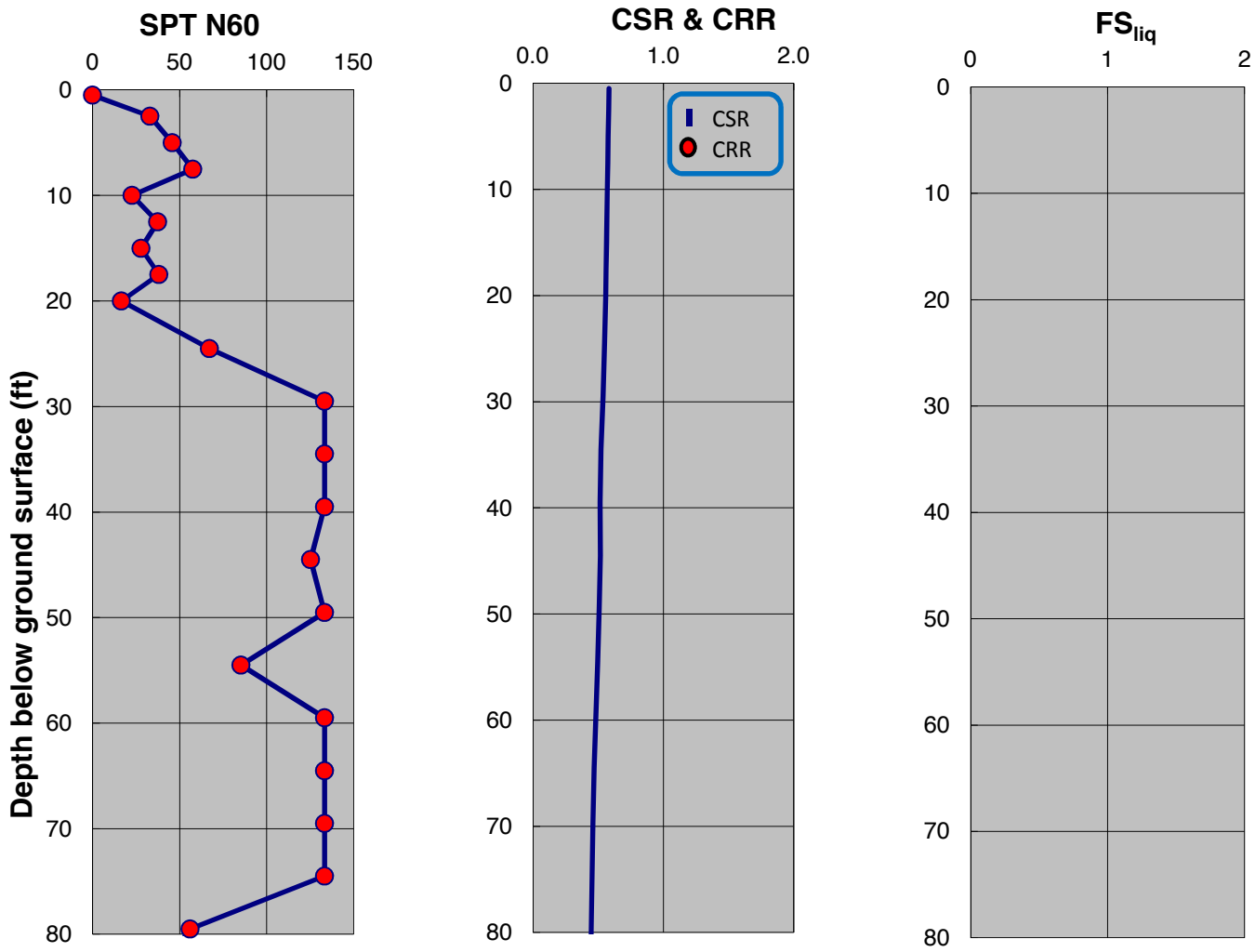
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-172 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



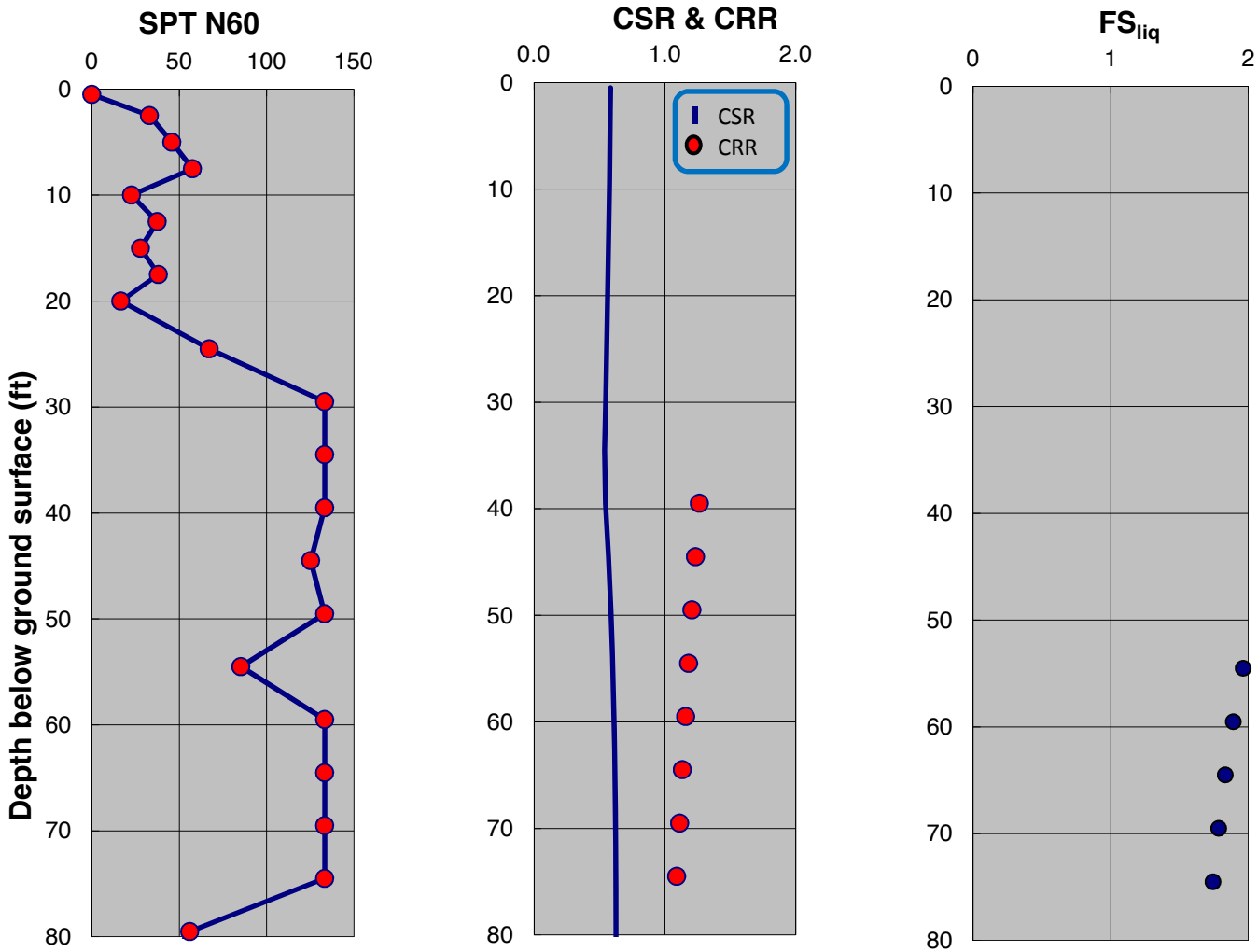
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-172 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-173 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

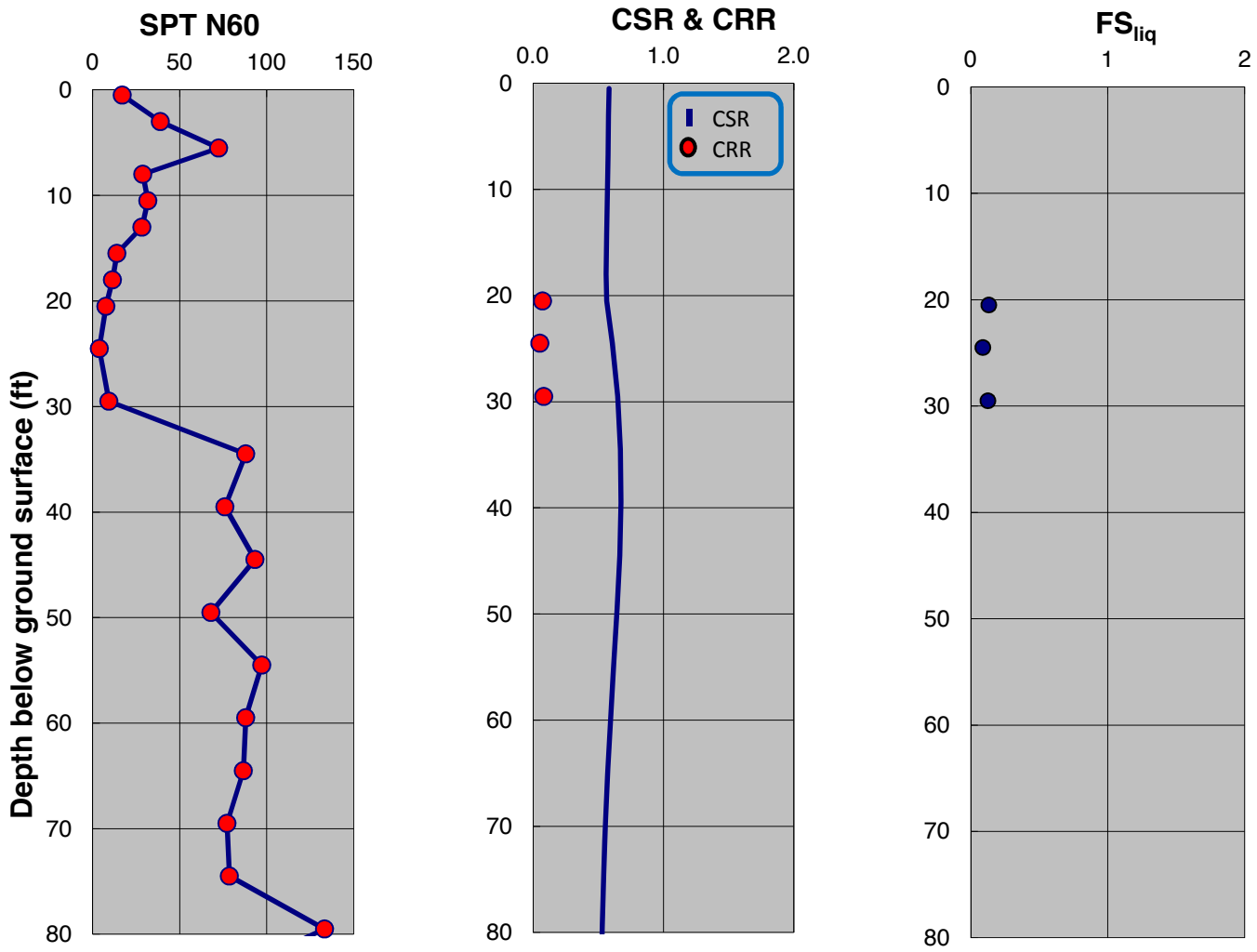
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-173 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

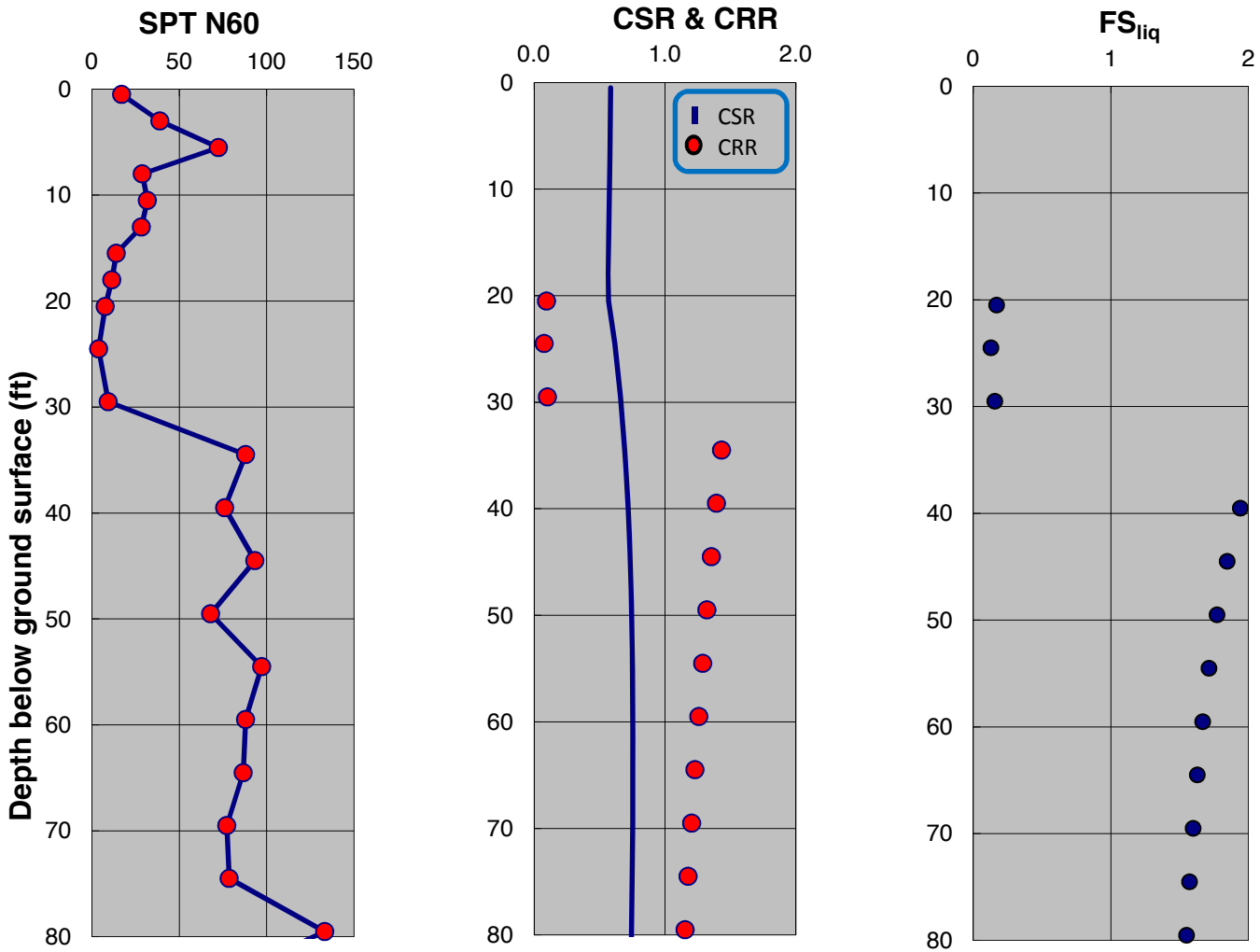
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.490



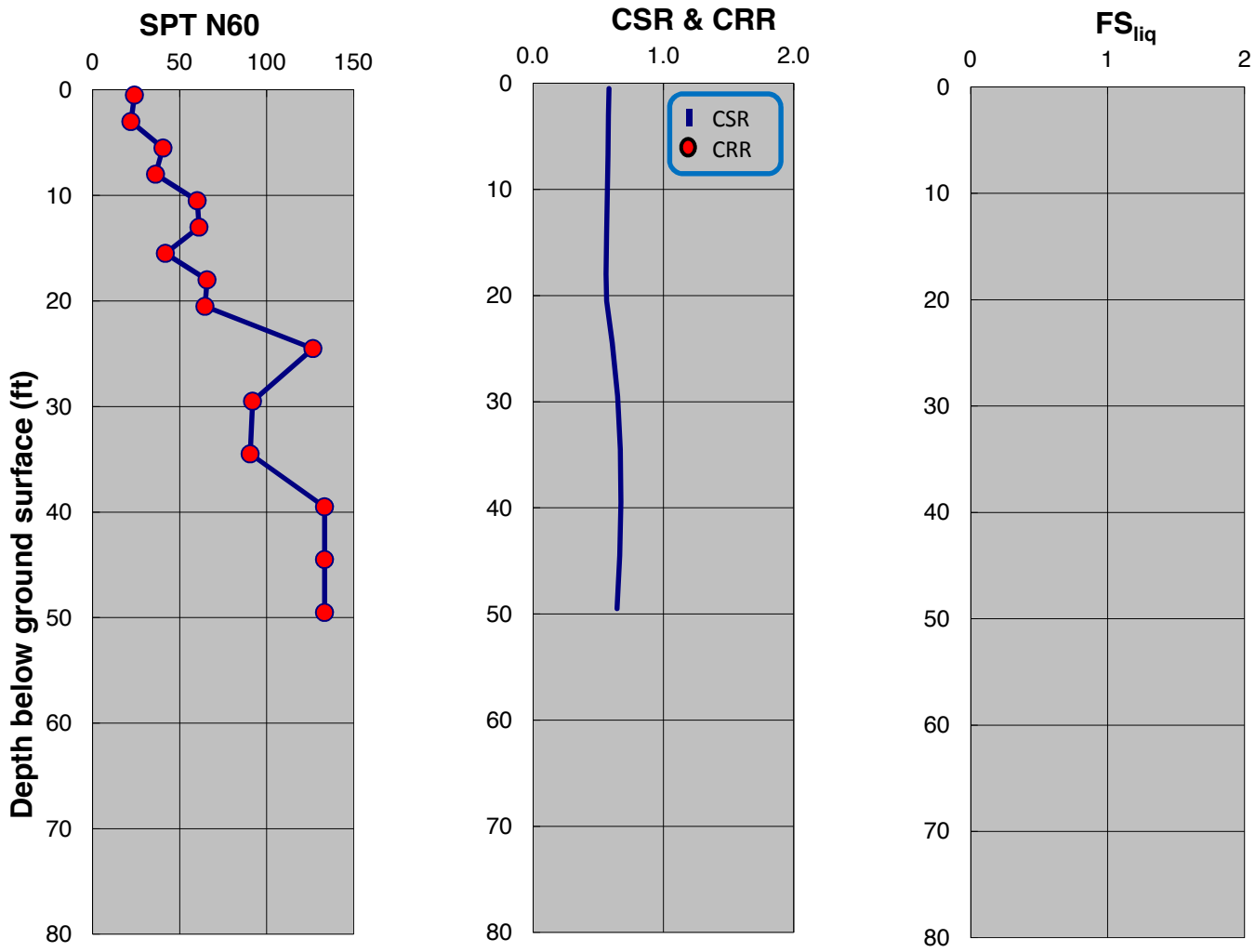
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-176 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



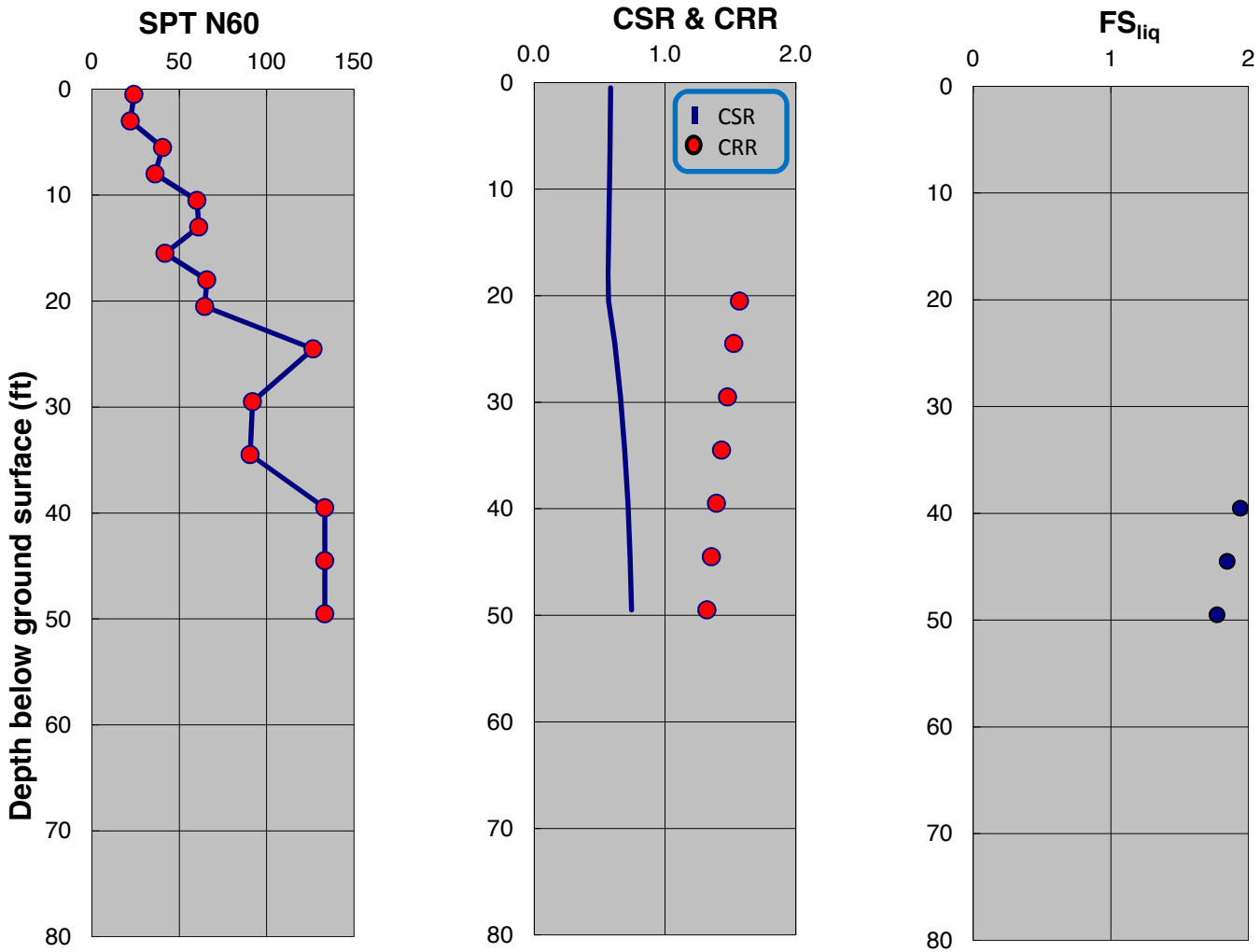
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-176 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-177 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

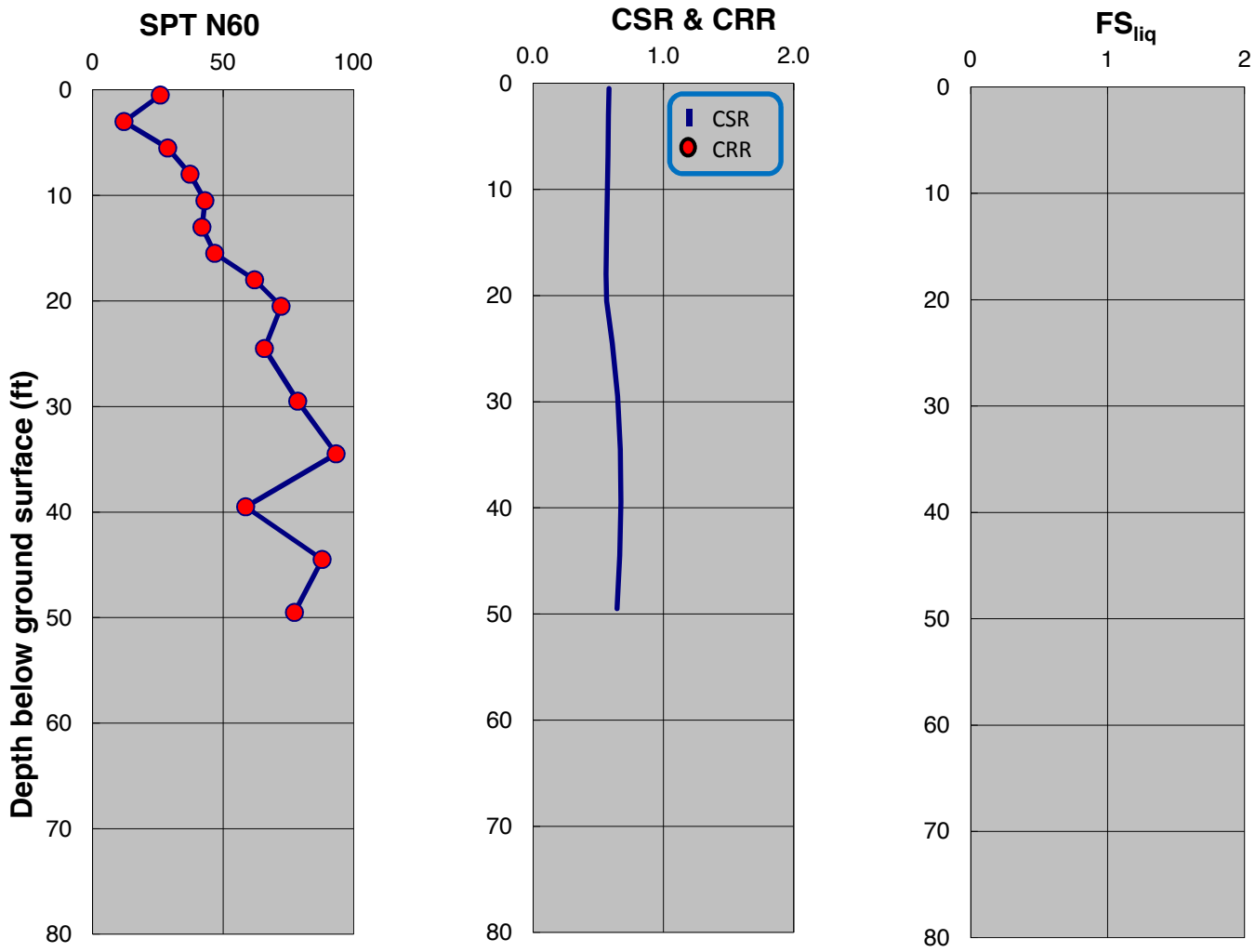
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-177 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

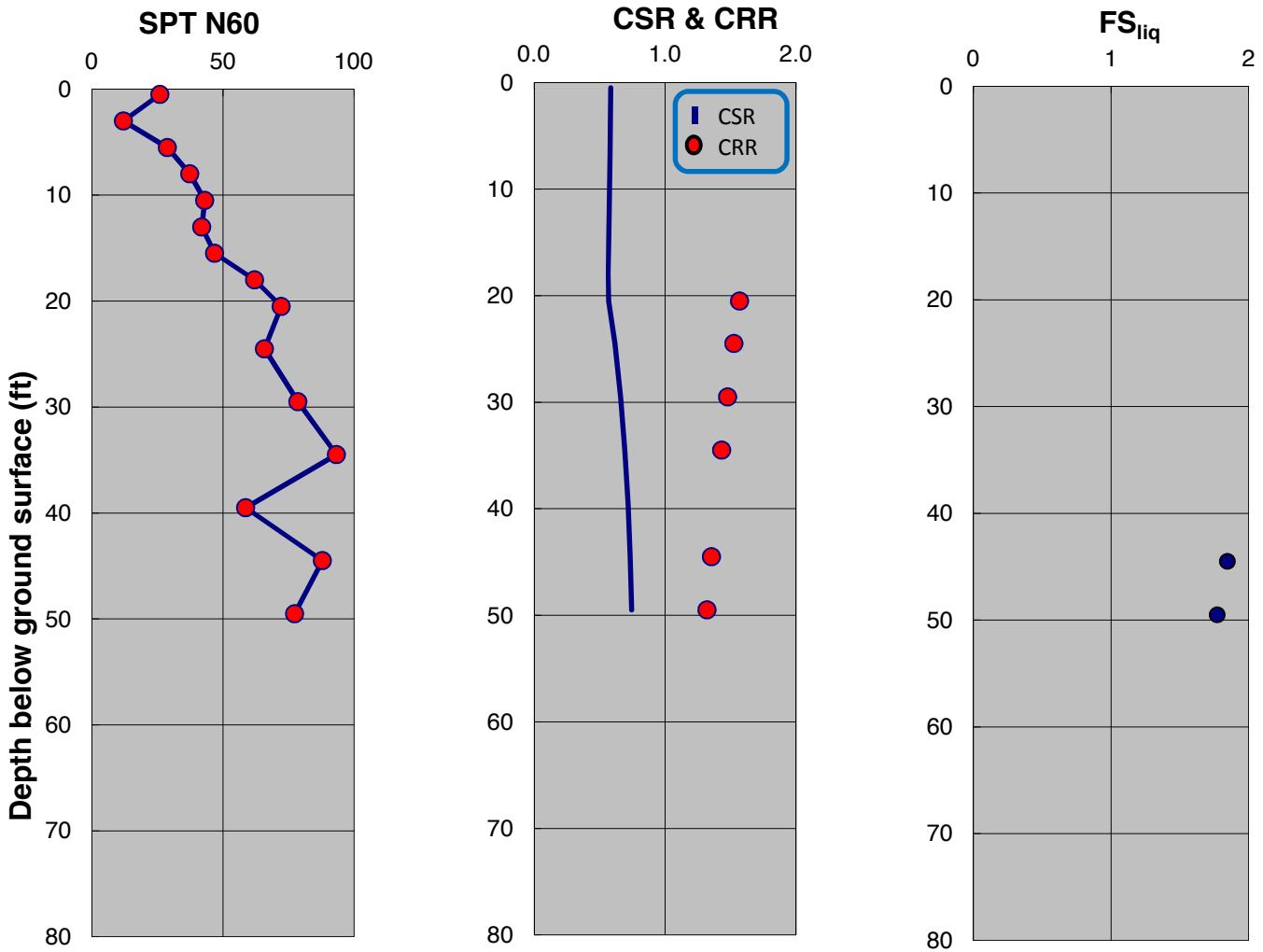
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.494



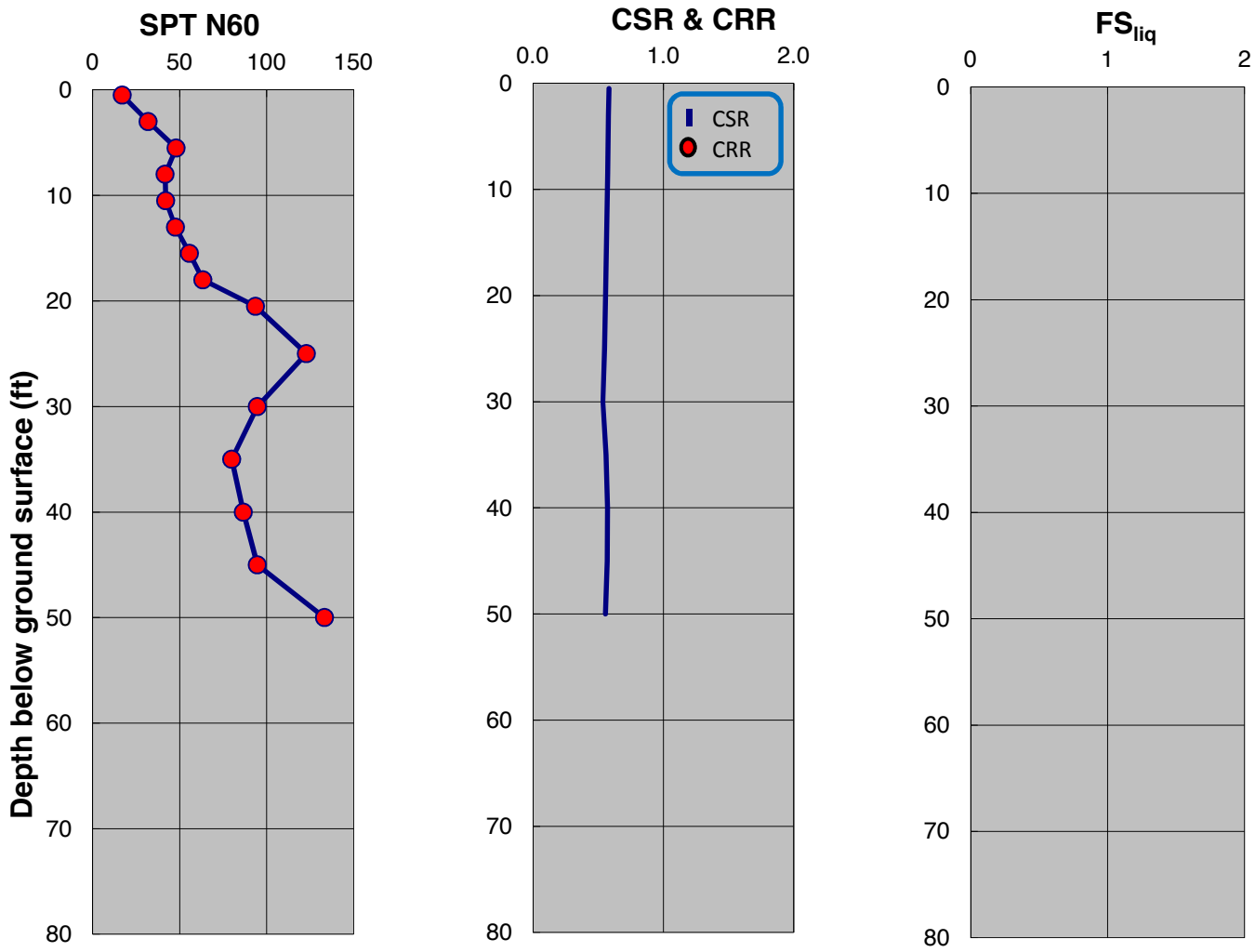
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-178 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



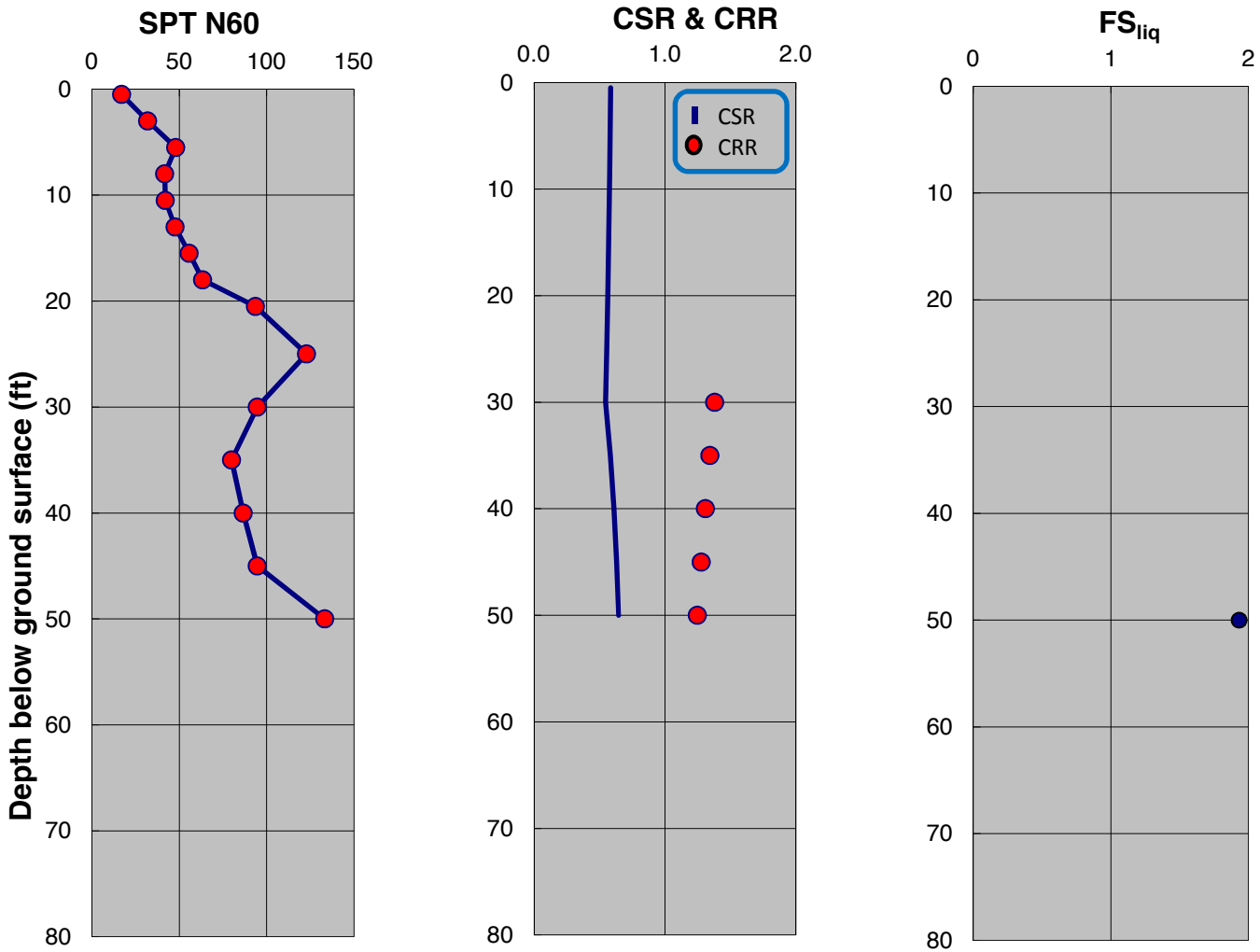
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-178 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-179 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

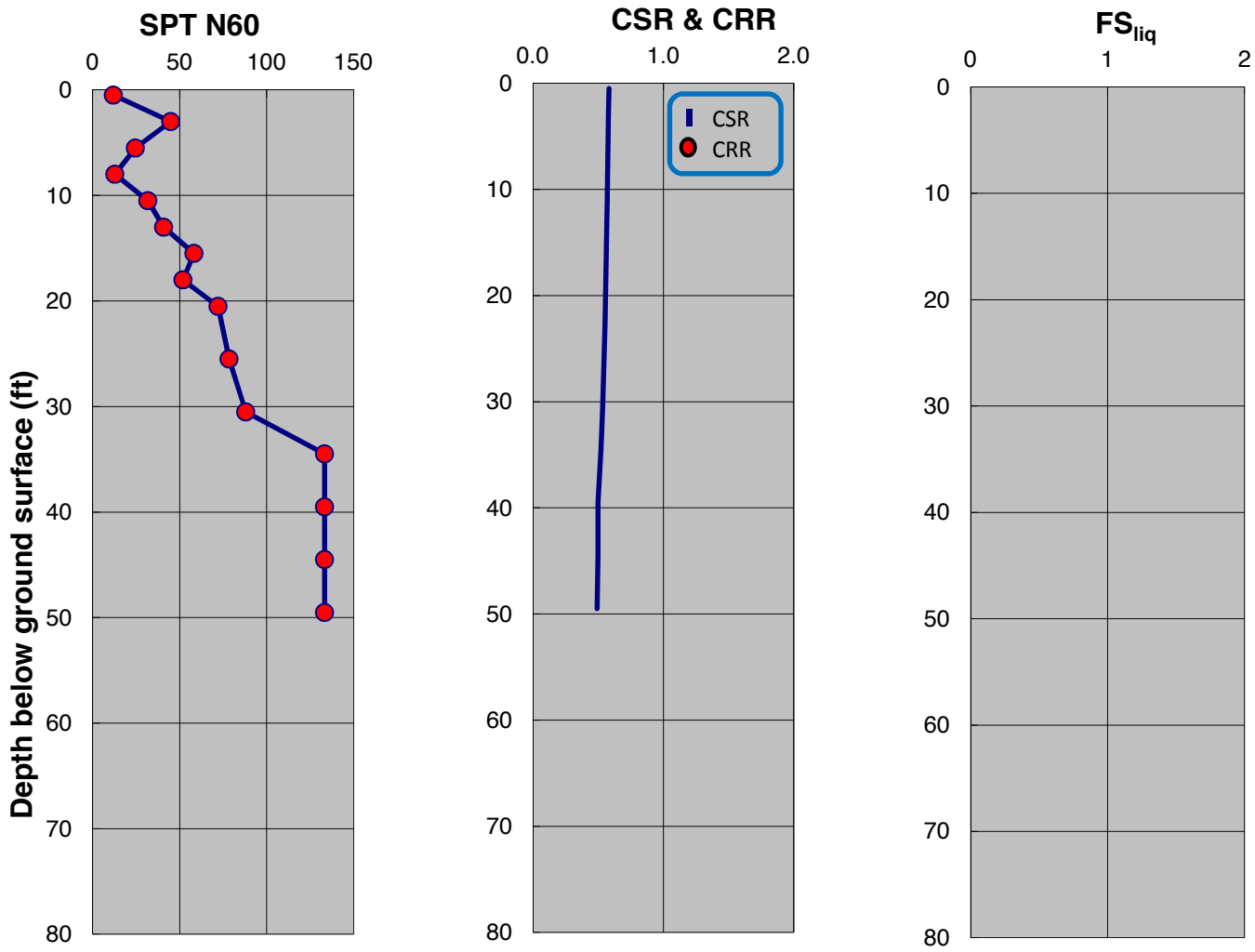
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-179 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

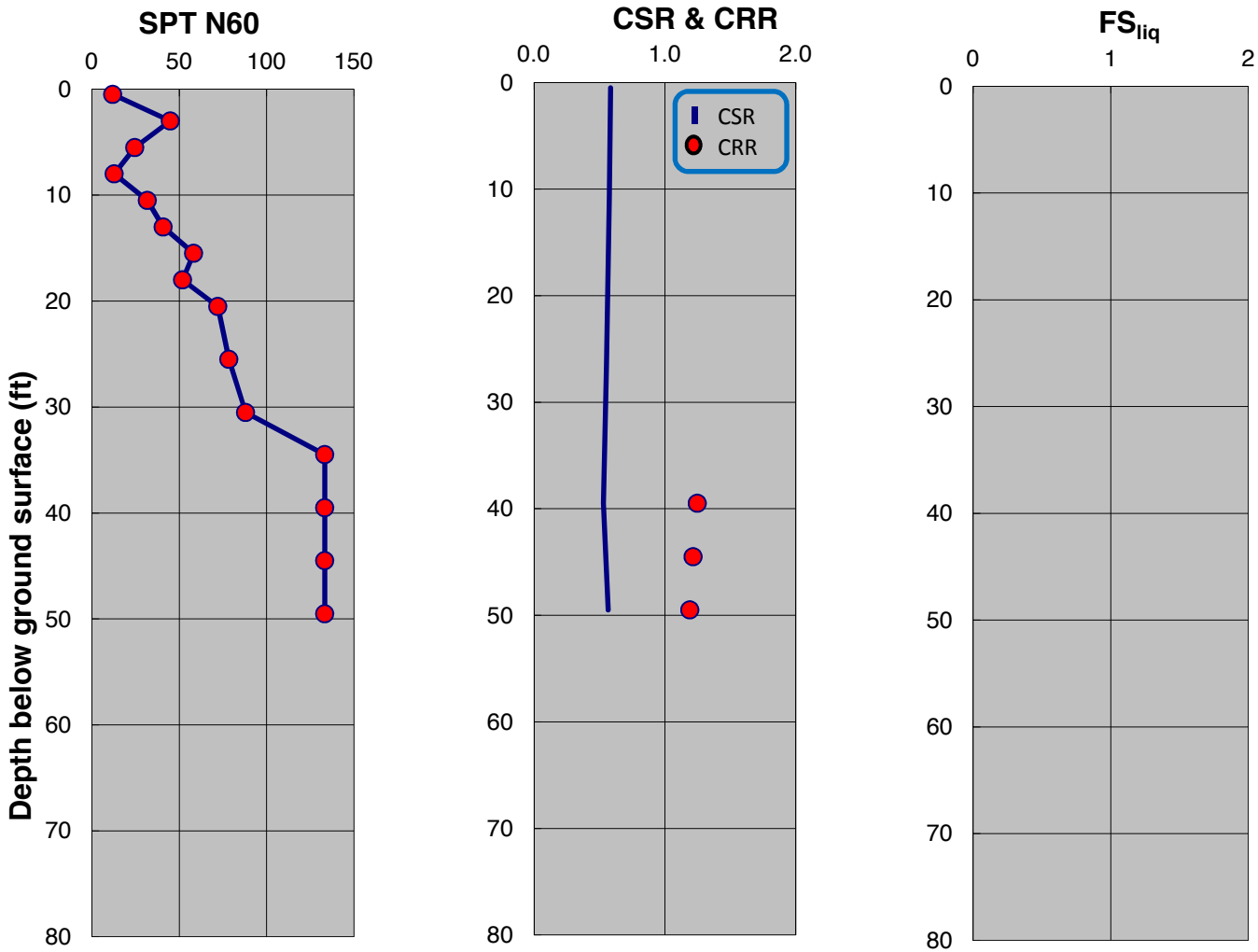
PLATE A.498



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-180 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

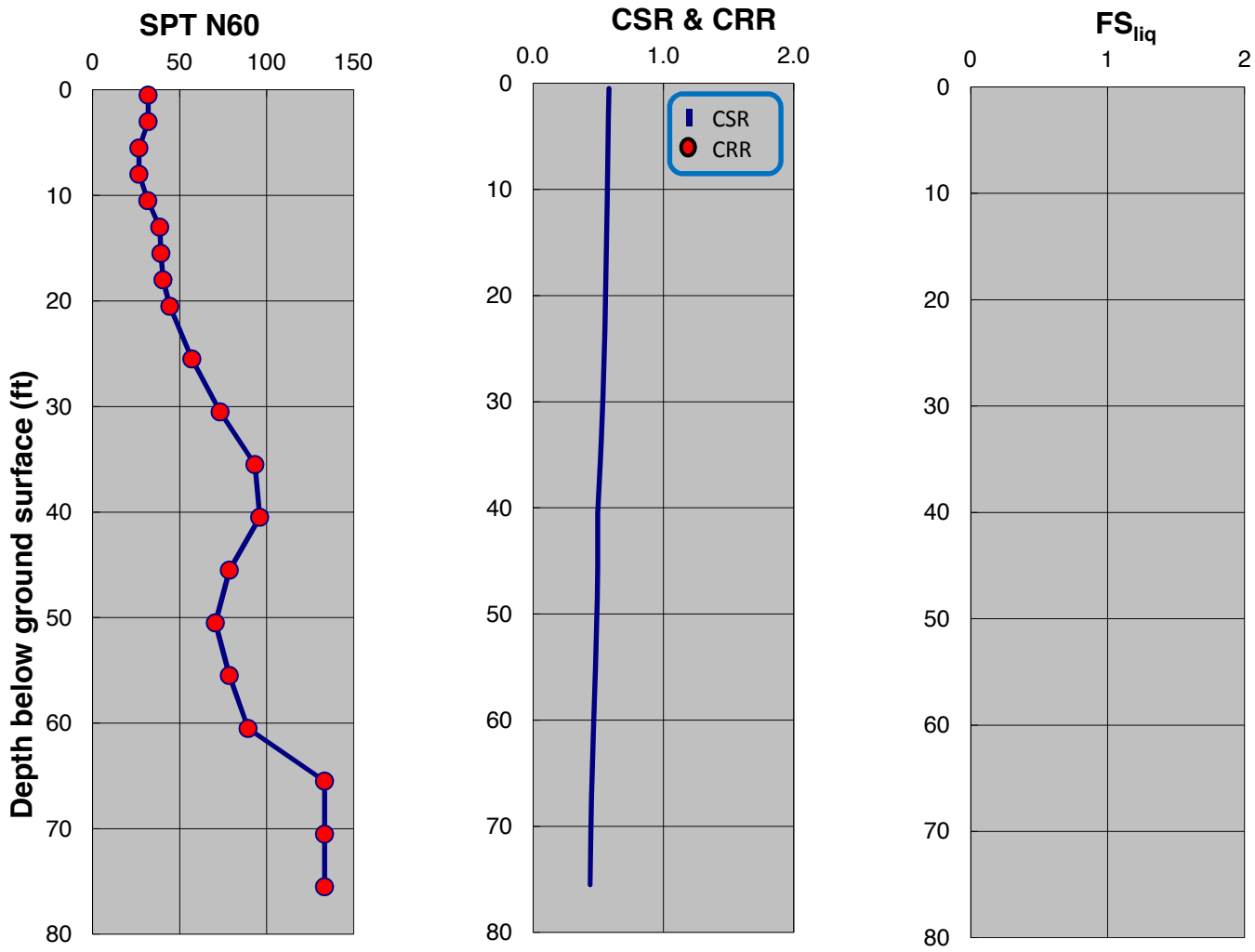
PLATE A.499



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-180 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

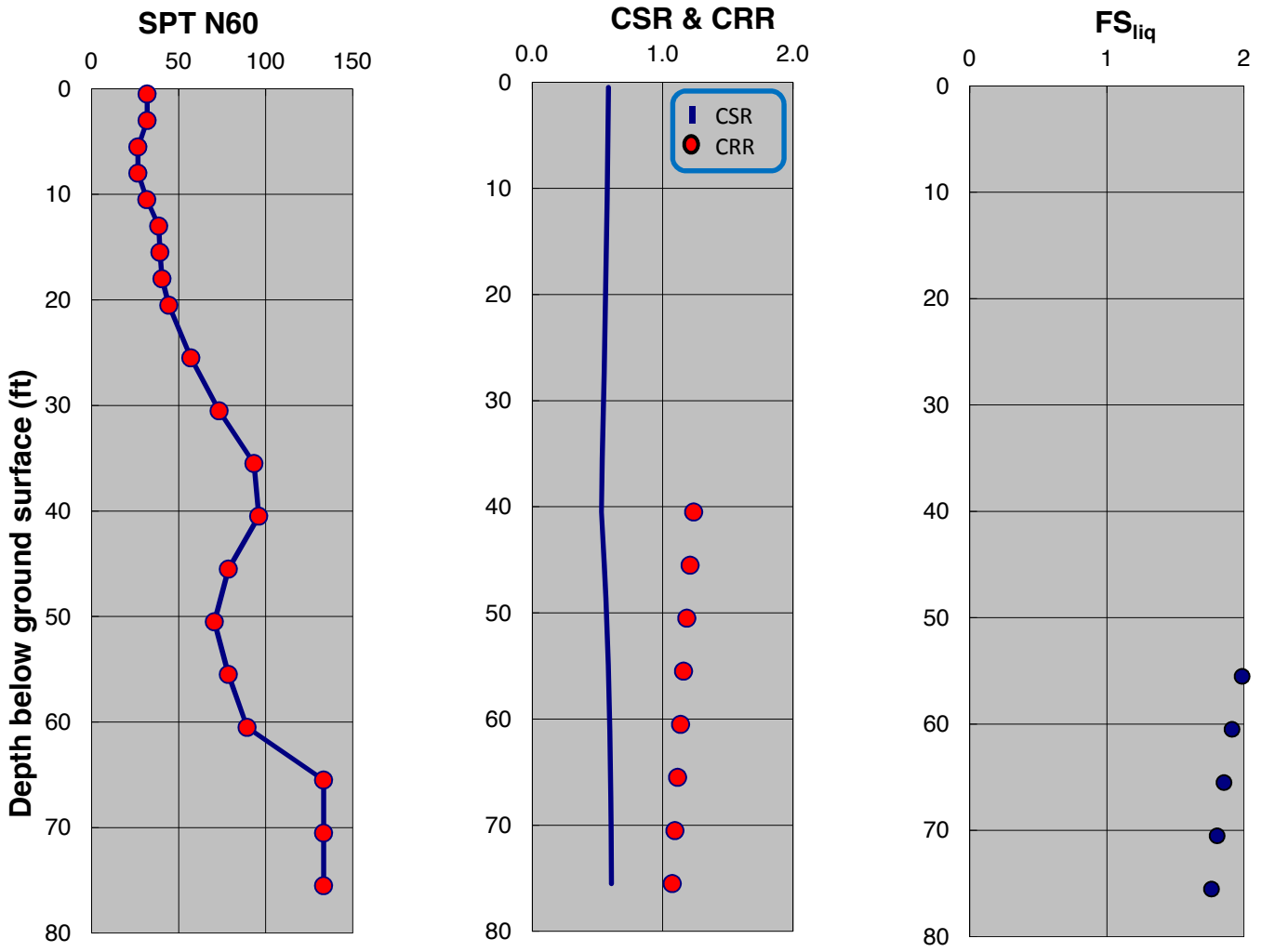
PLATE A.500



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-181 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

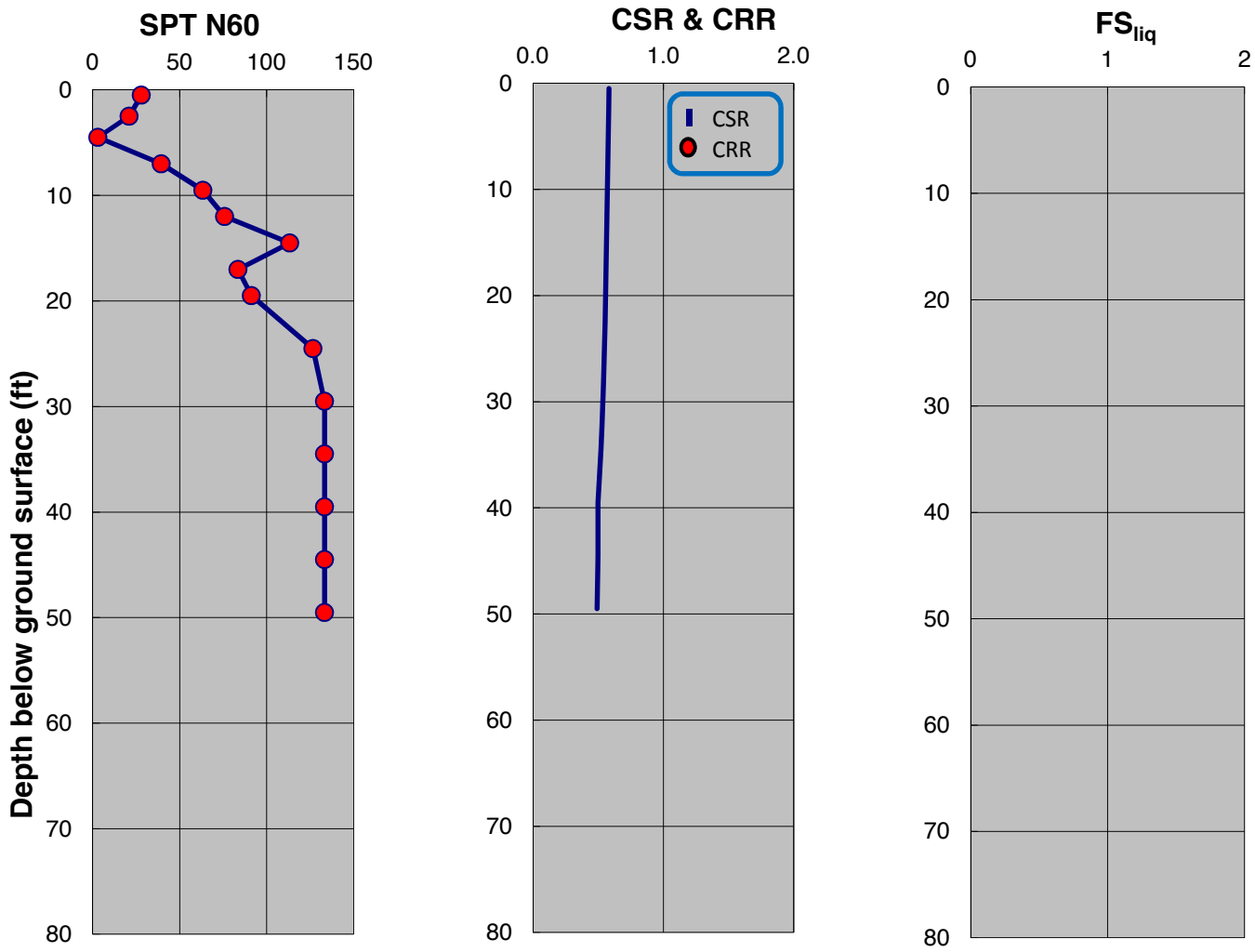
PLATE A.501



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-181 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

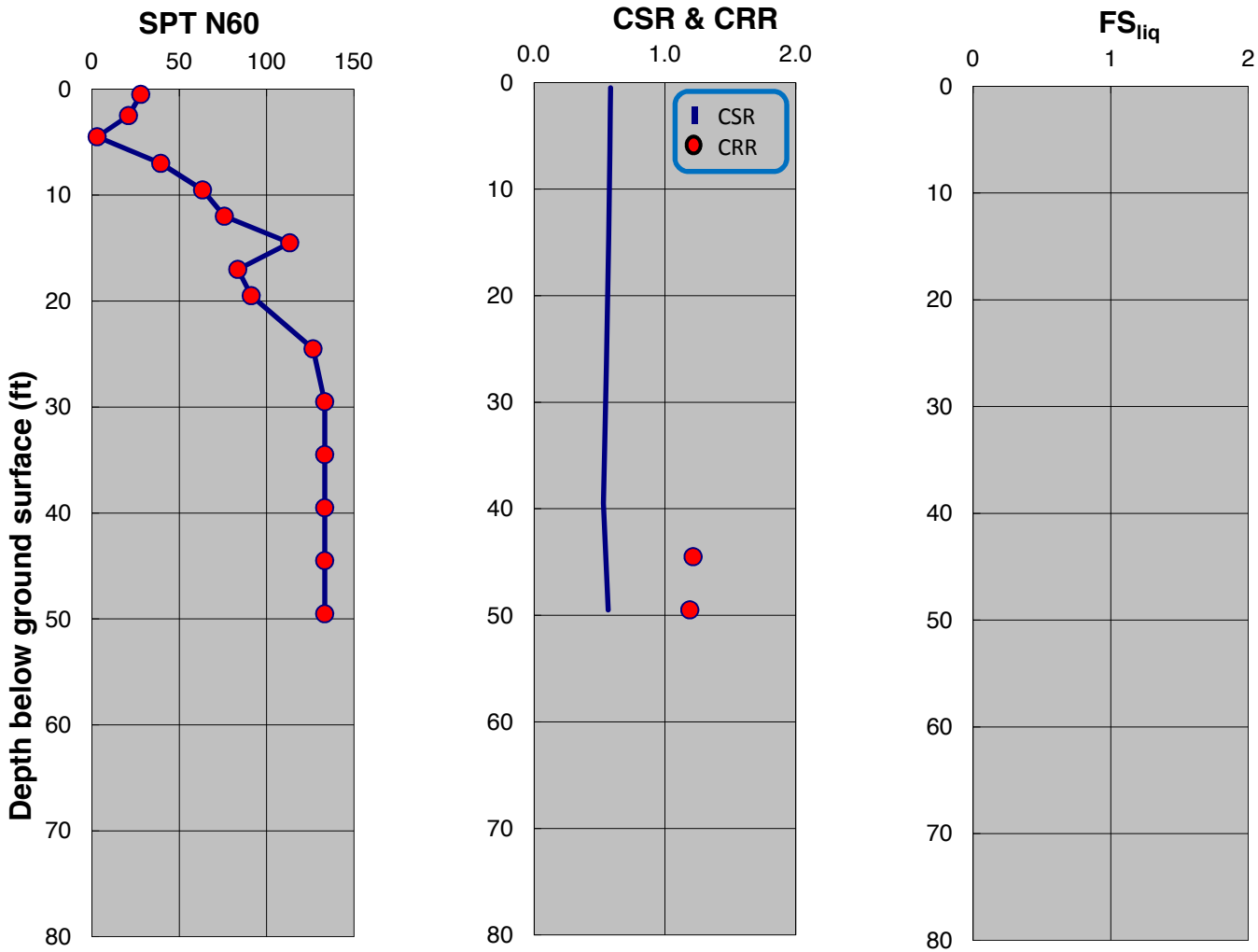
PLATE A.502



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-182 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

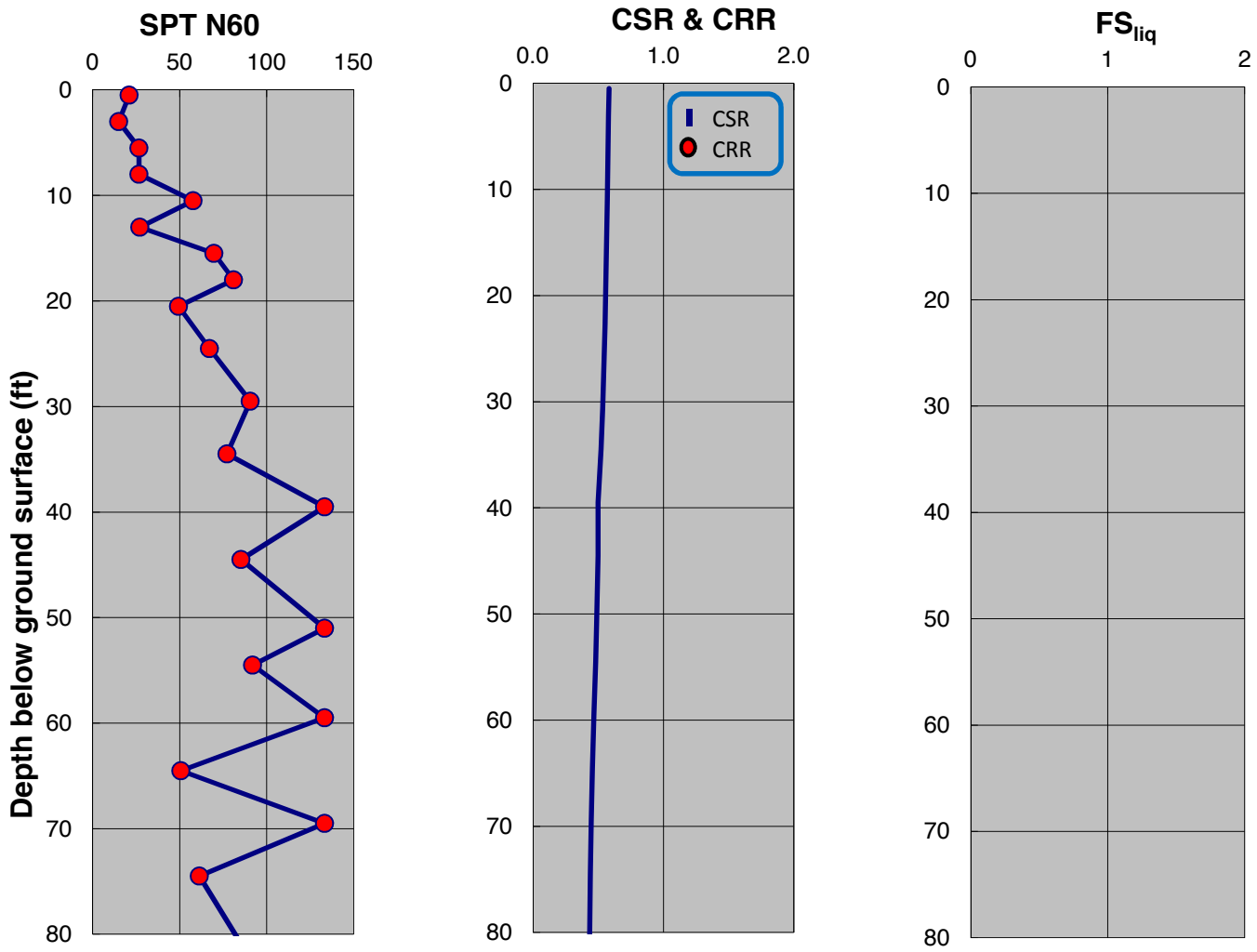
PLATE A.503



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-182 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

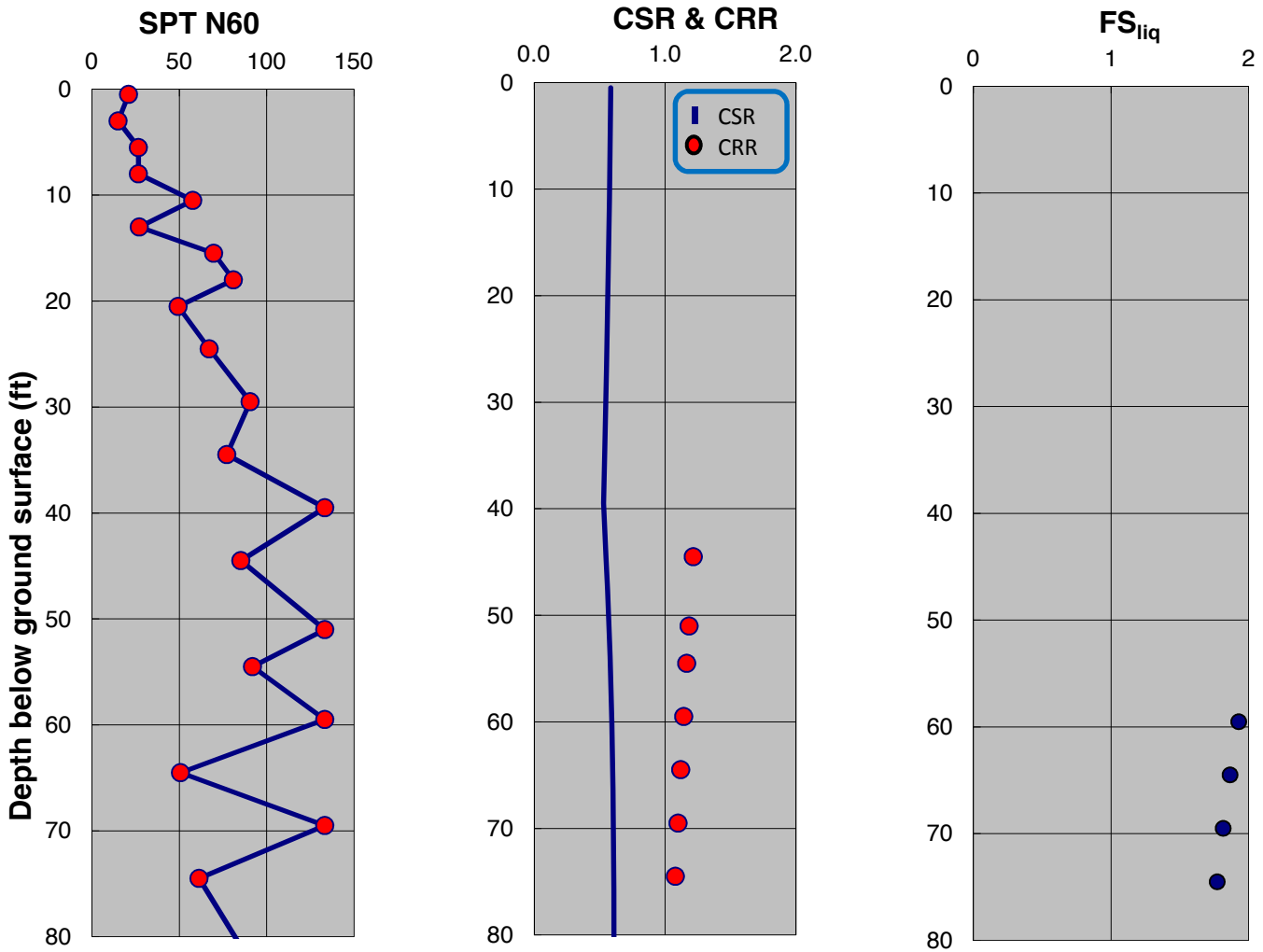
PLATE A.504



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-183 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

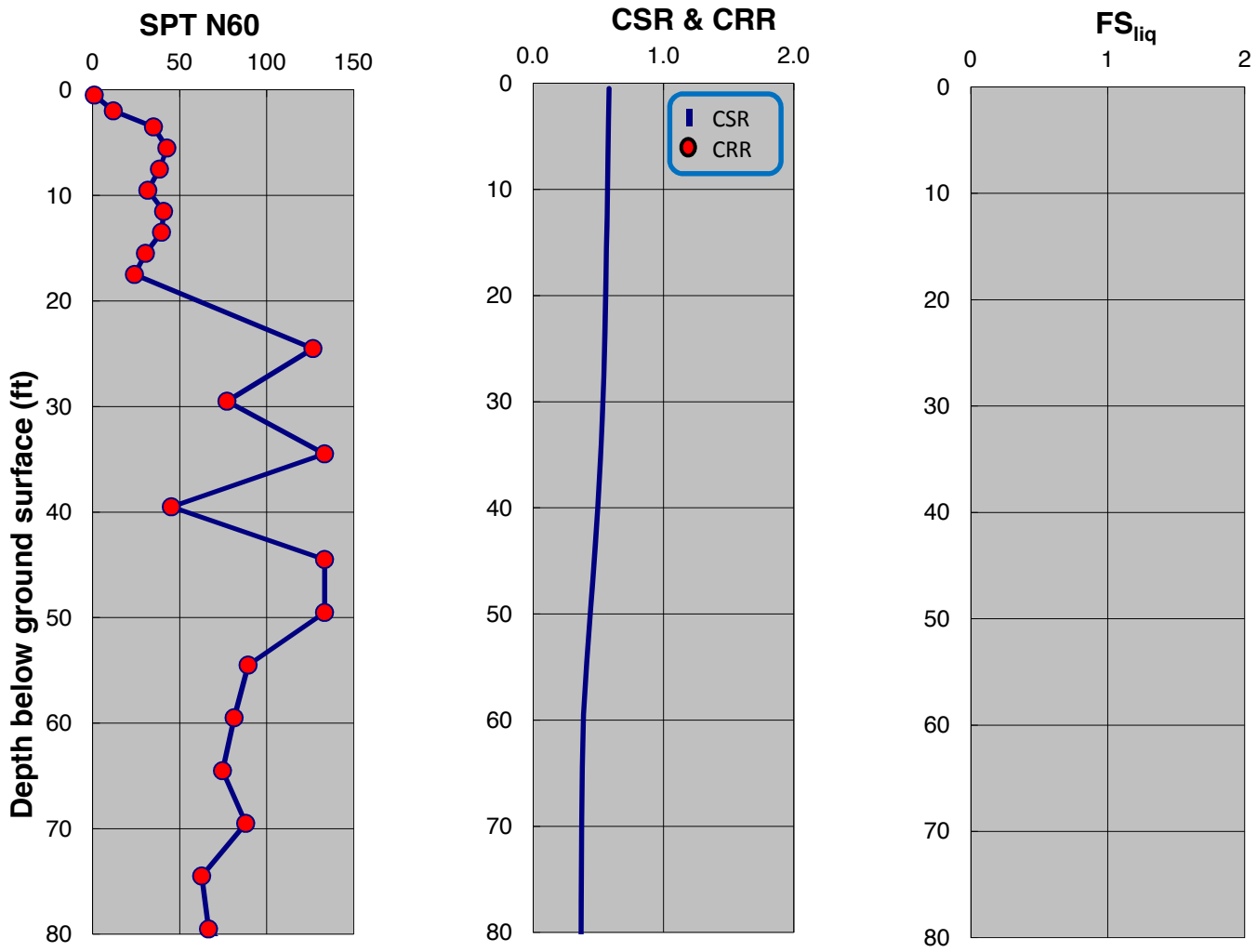
PLATE A.505



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-183 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

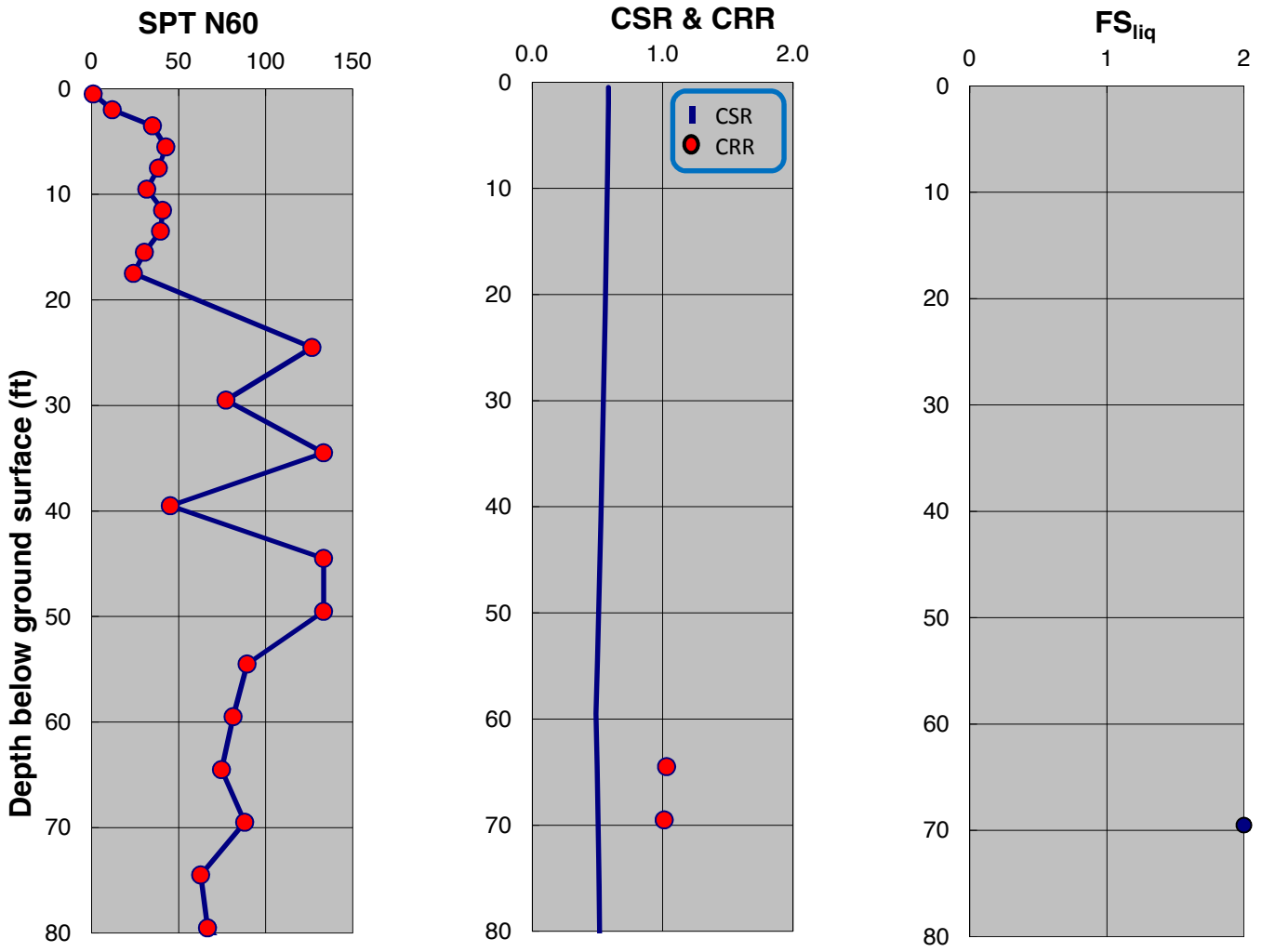
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.506



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-189 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

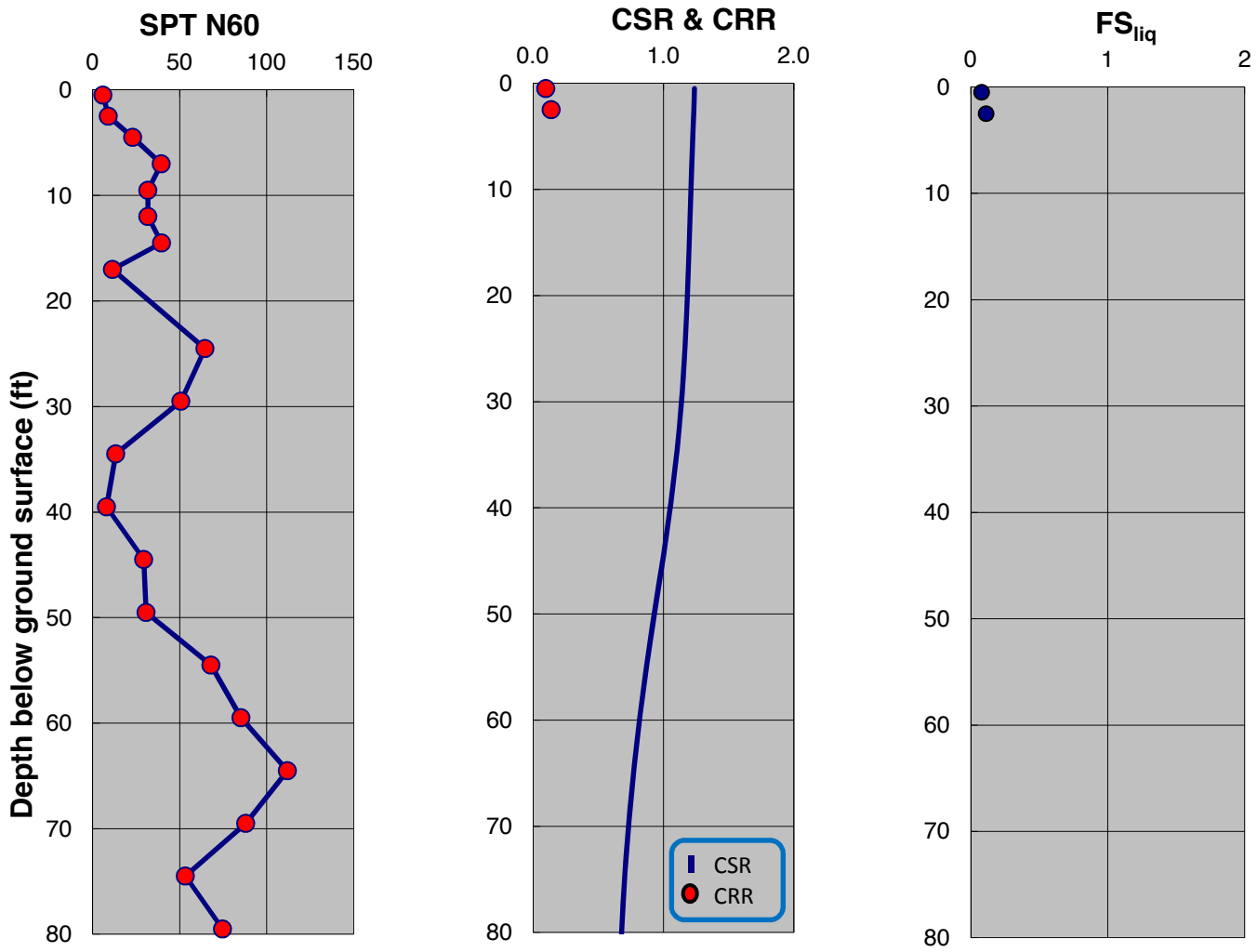
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-189 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

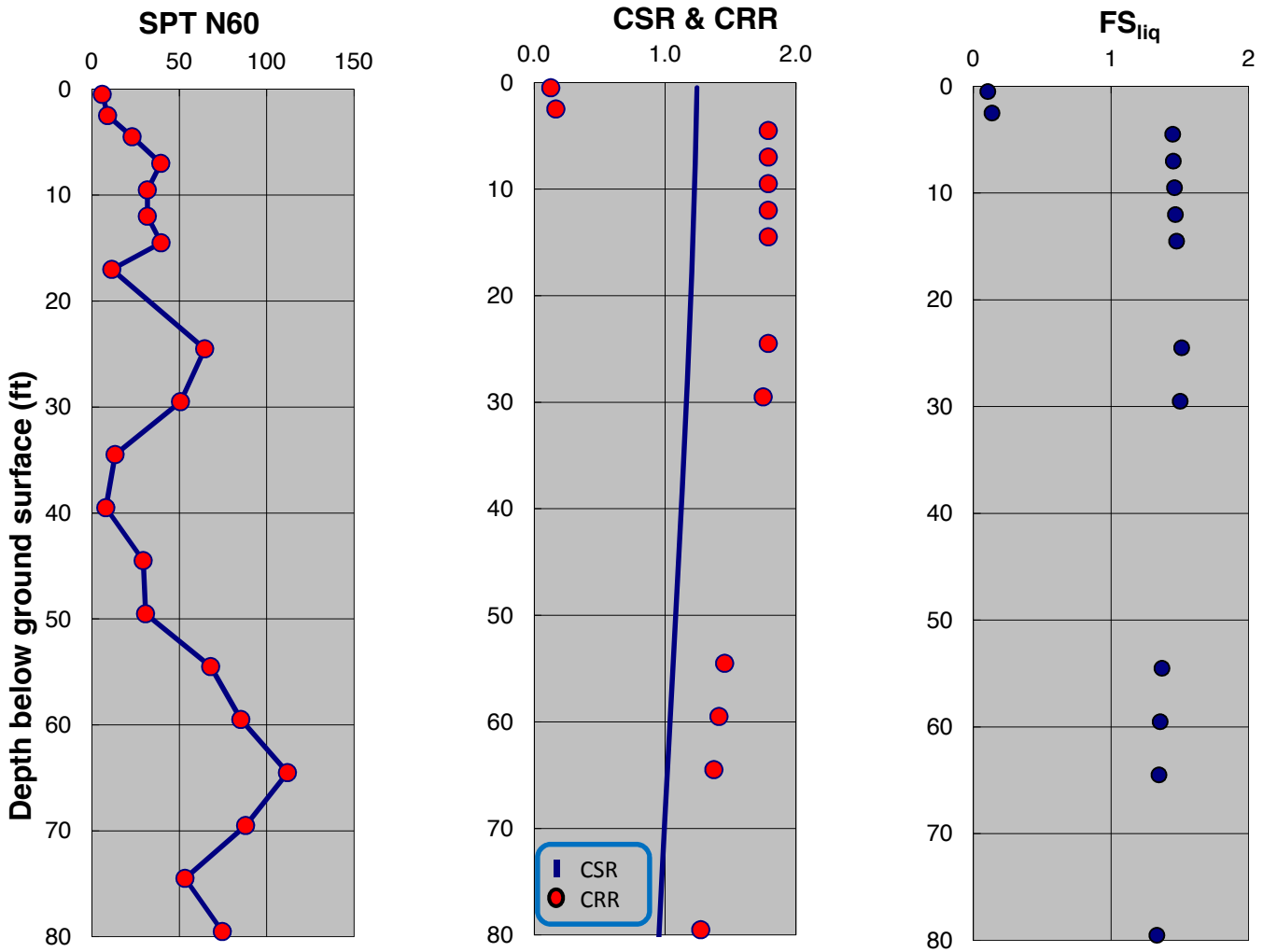
PLATE A.508



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-190 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

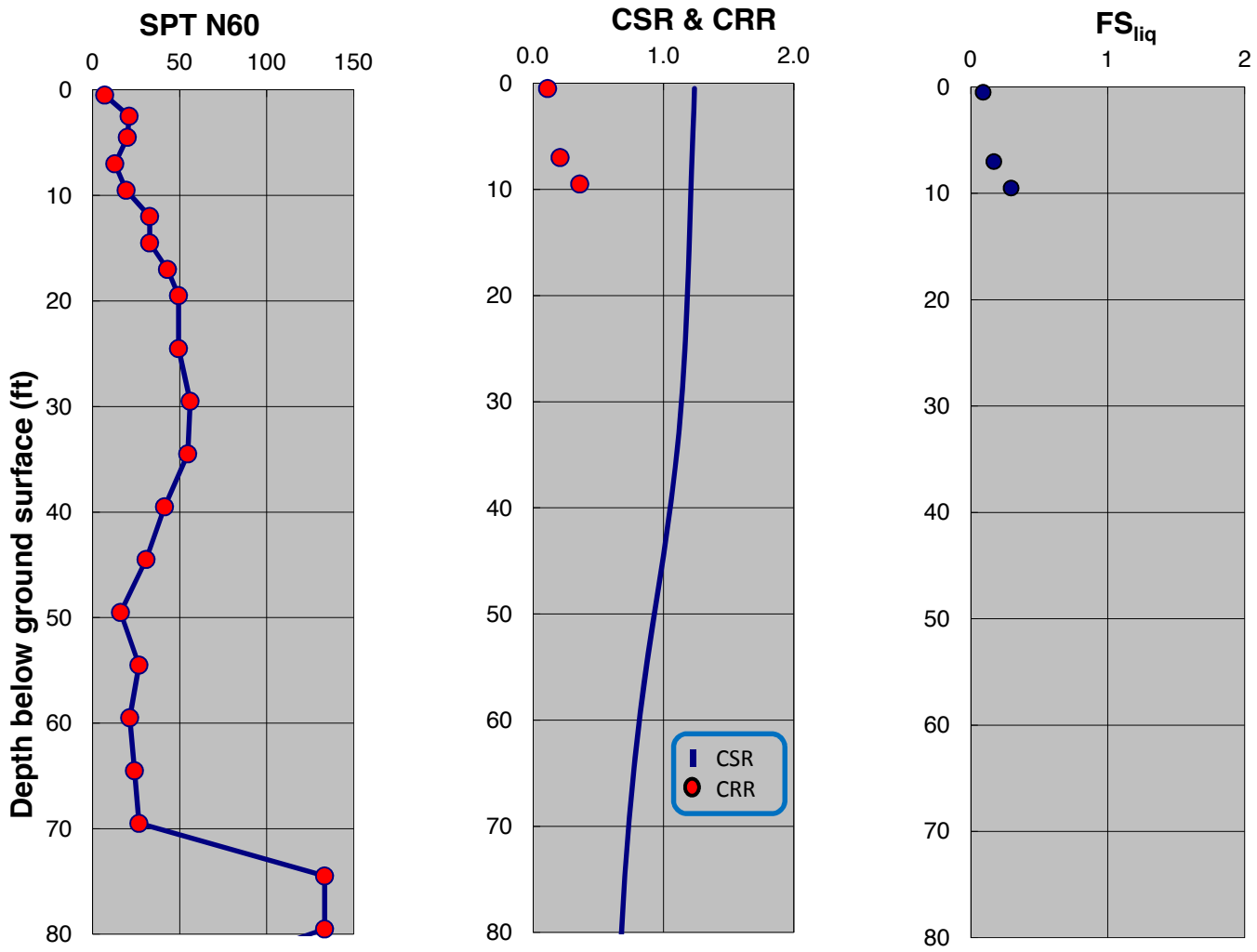
PLATE A.509



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-190 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

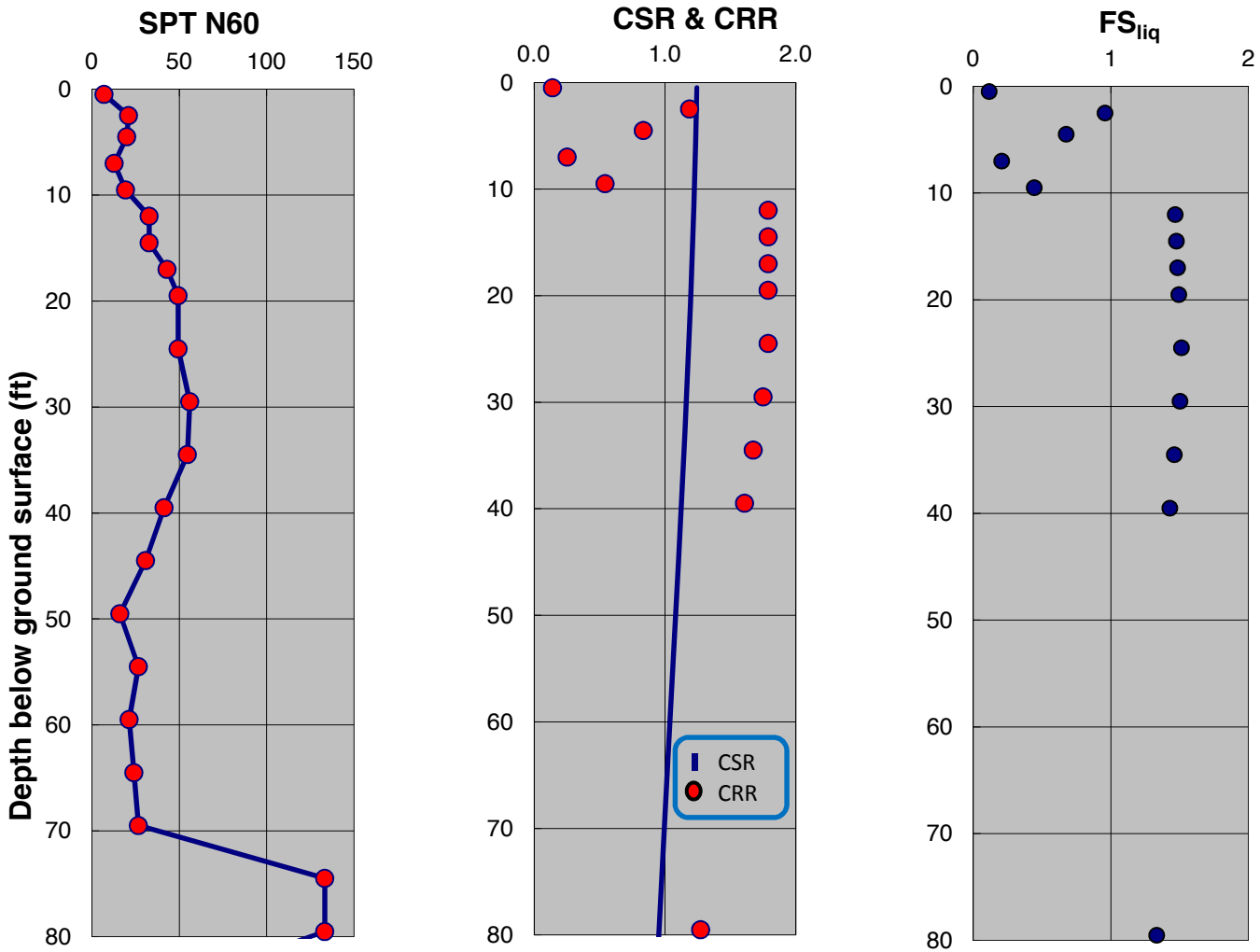
PLATE A.510



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-191 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

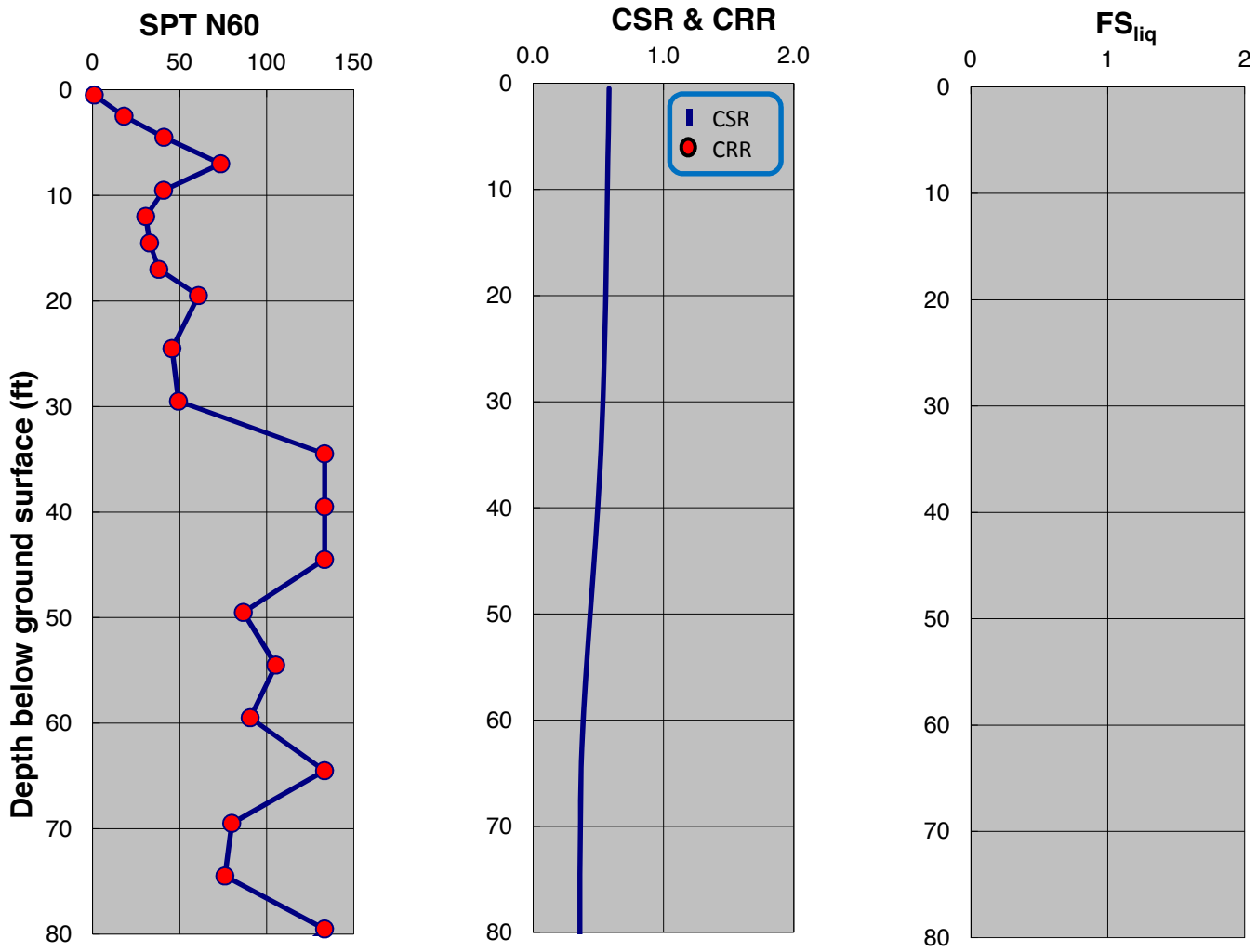
PLATE A.511



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-191 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

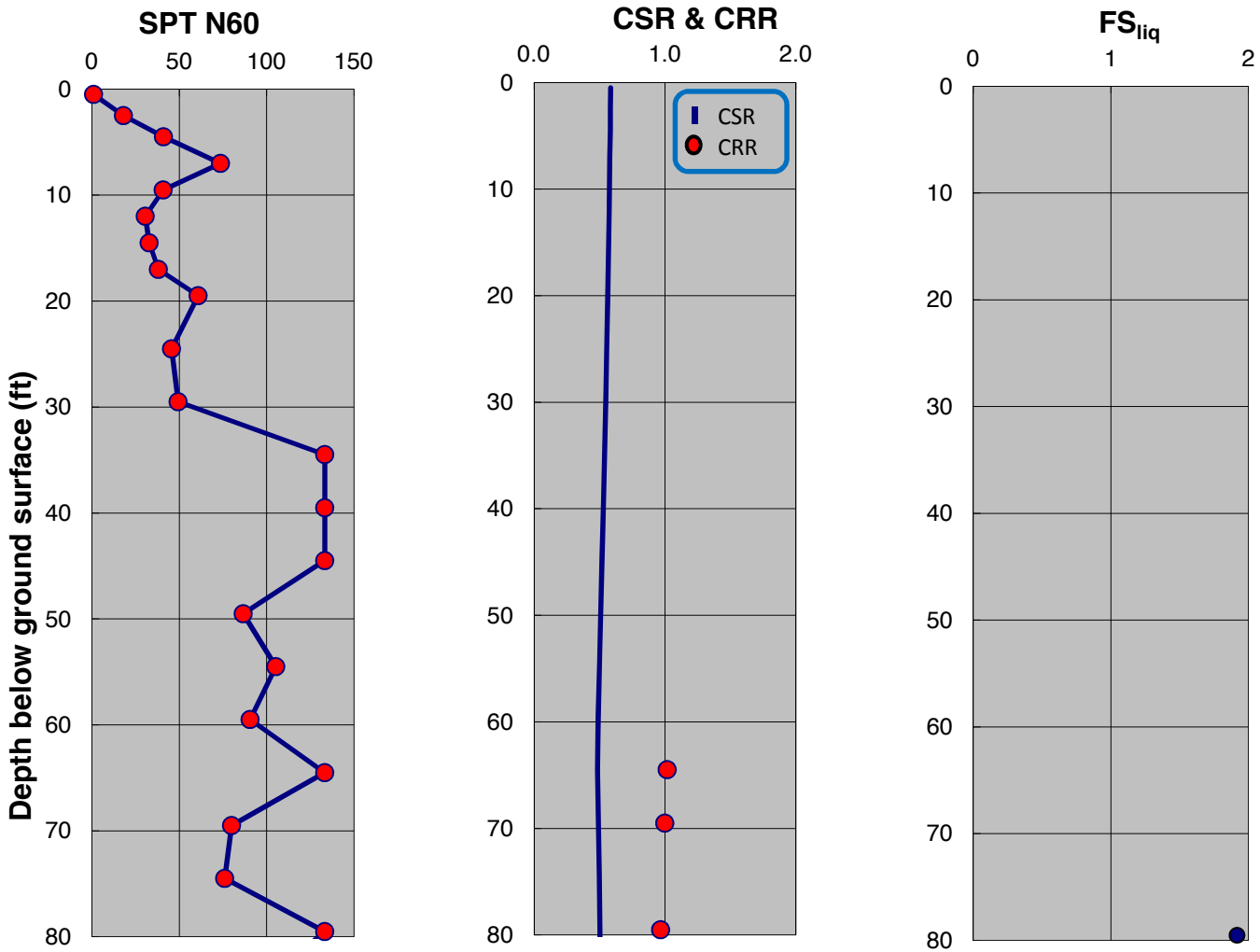
PLATE A.512



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-192 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

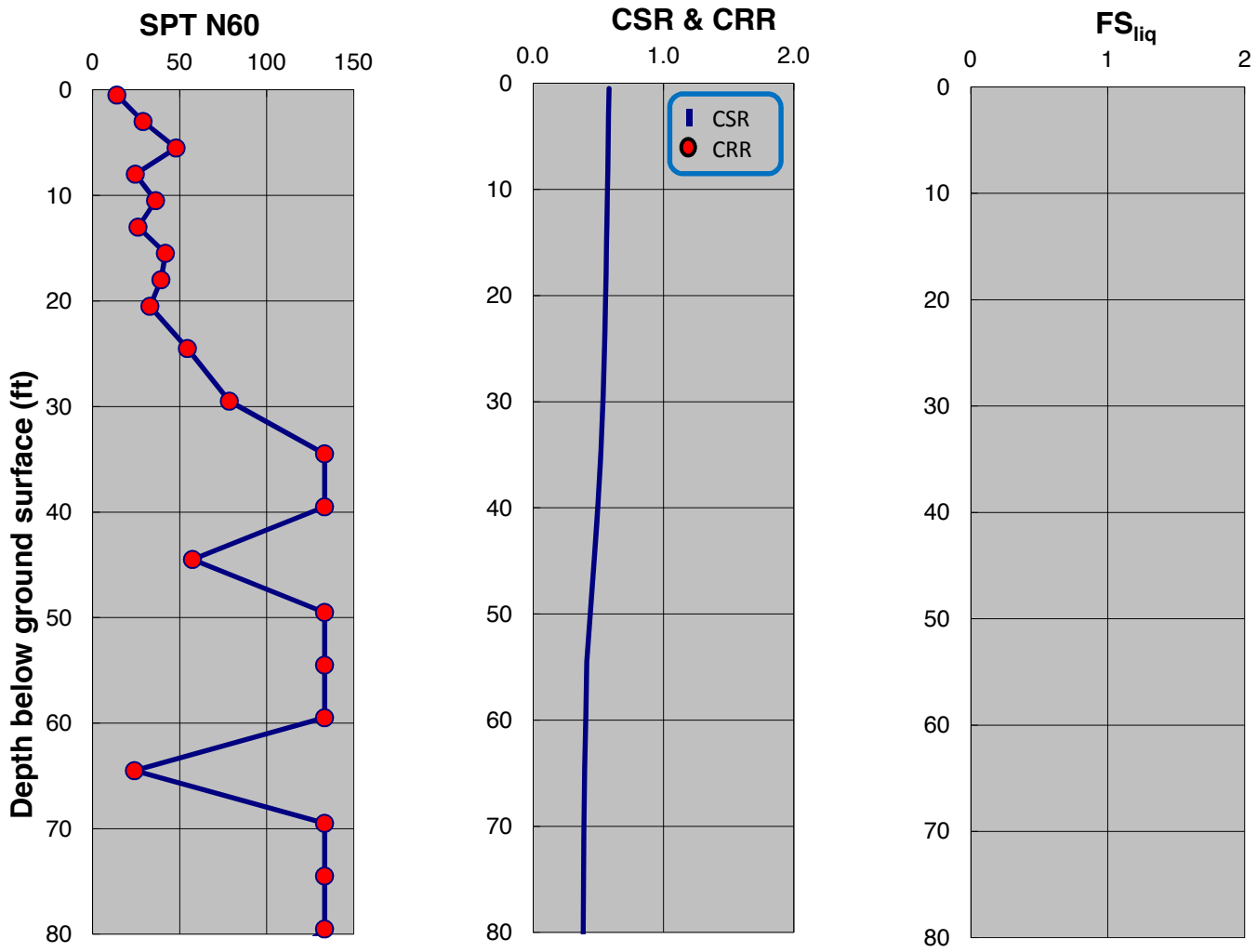
PLATE A.513



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-192 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

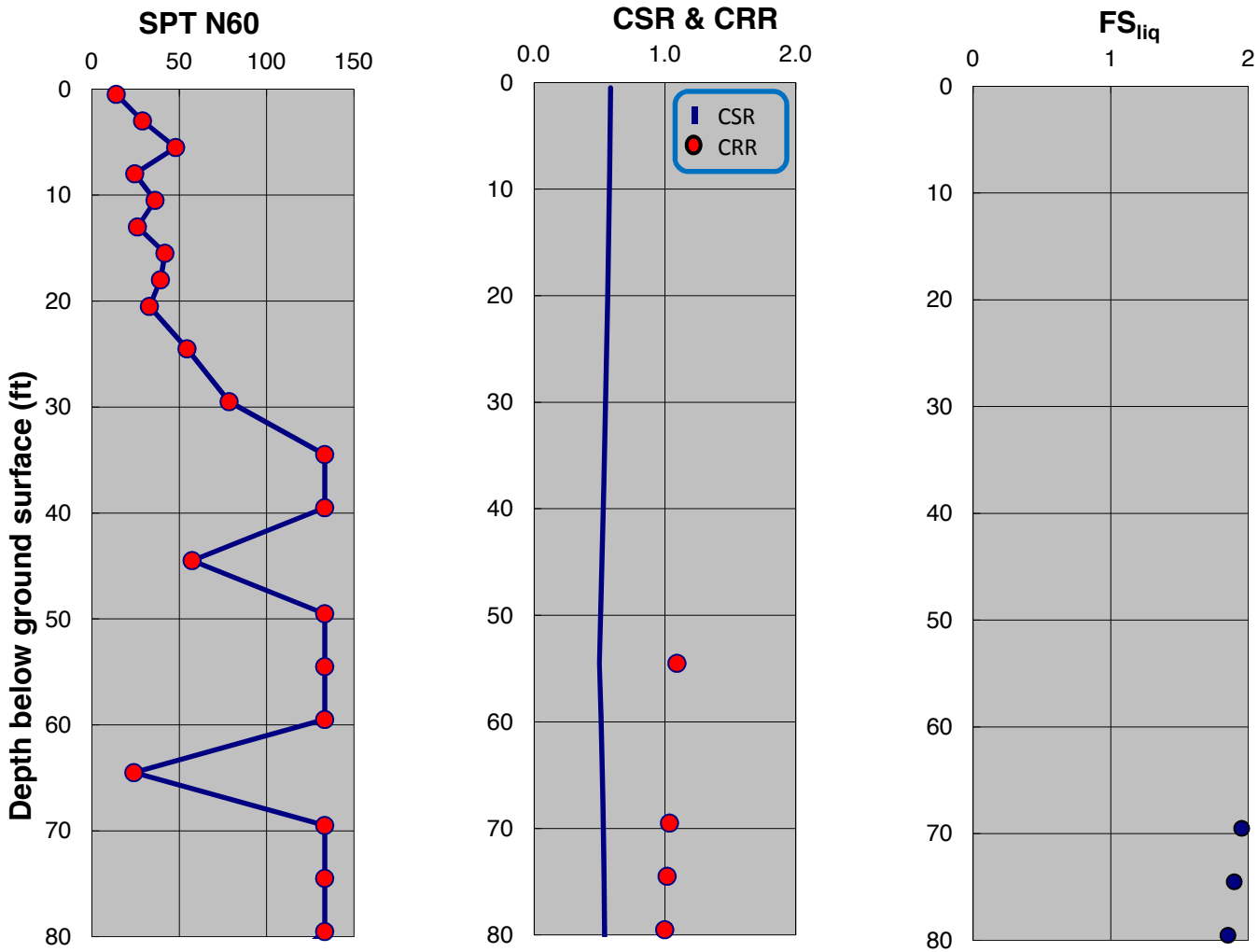
PLATE A.514



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-195 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

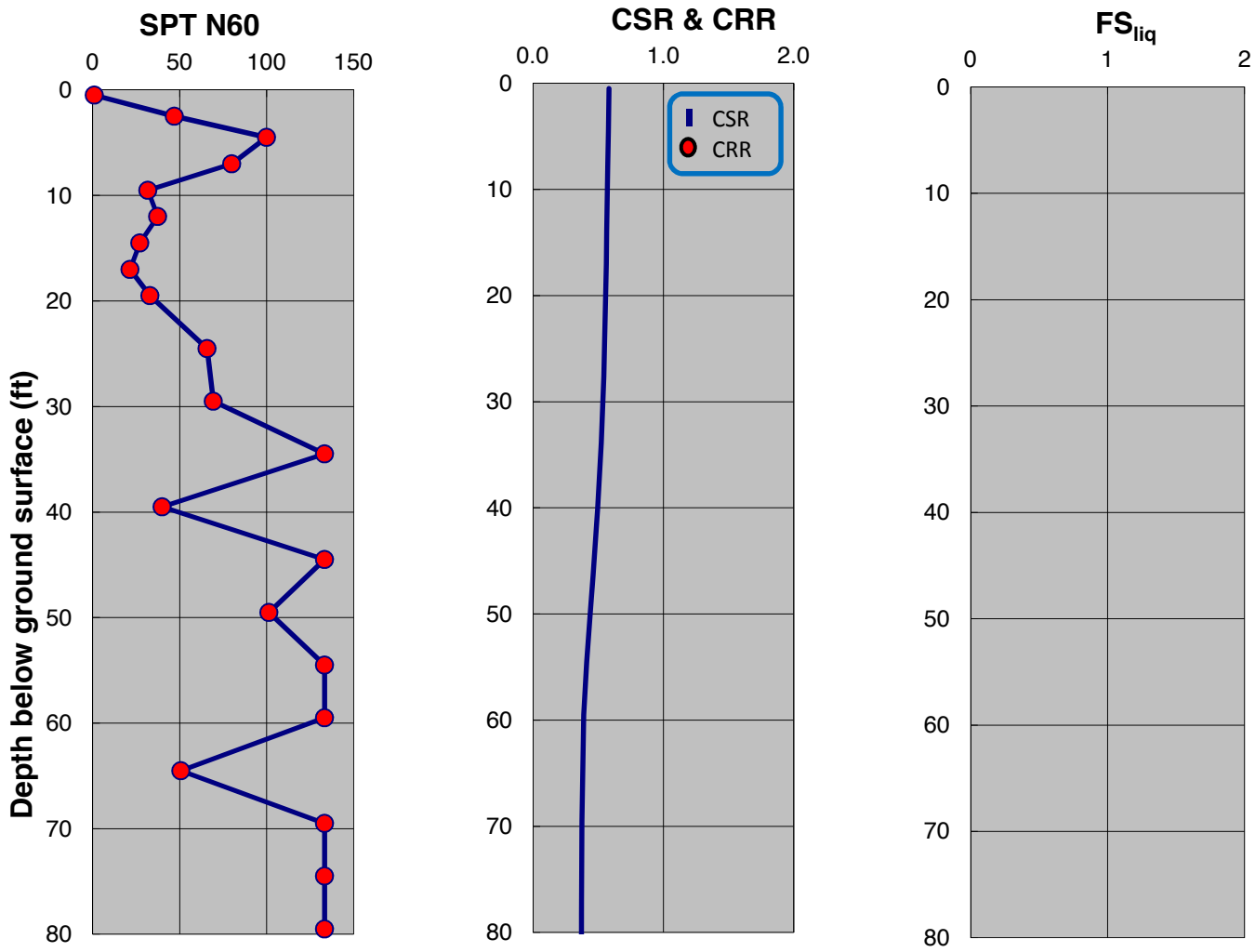
PLATE A.515



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-195 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

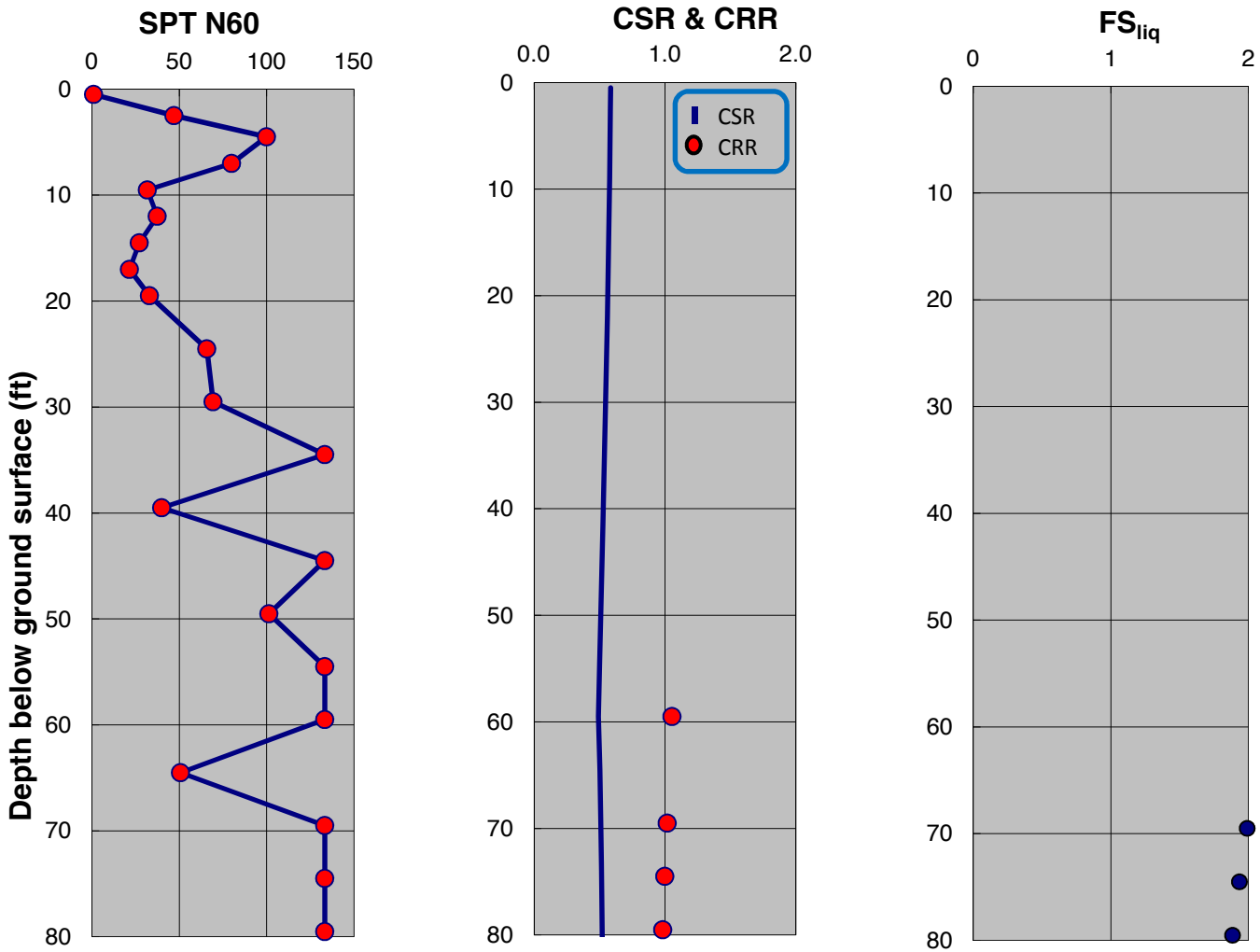
PLATE A.516



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-197 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

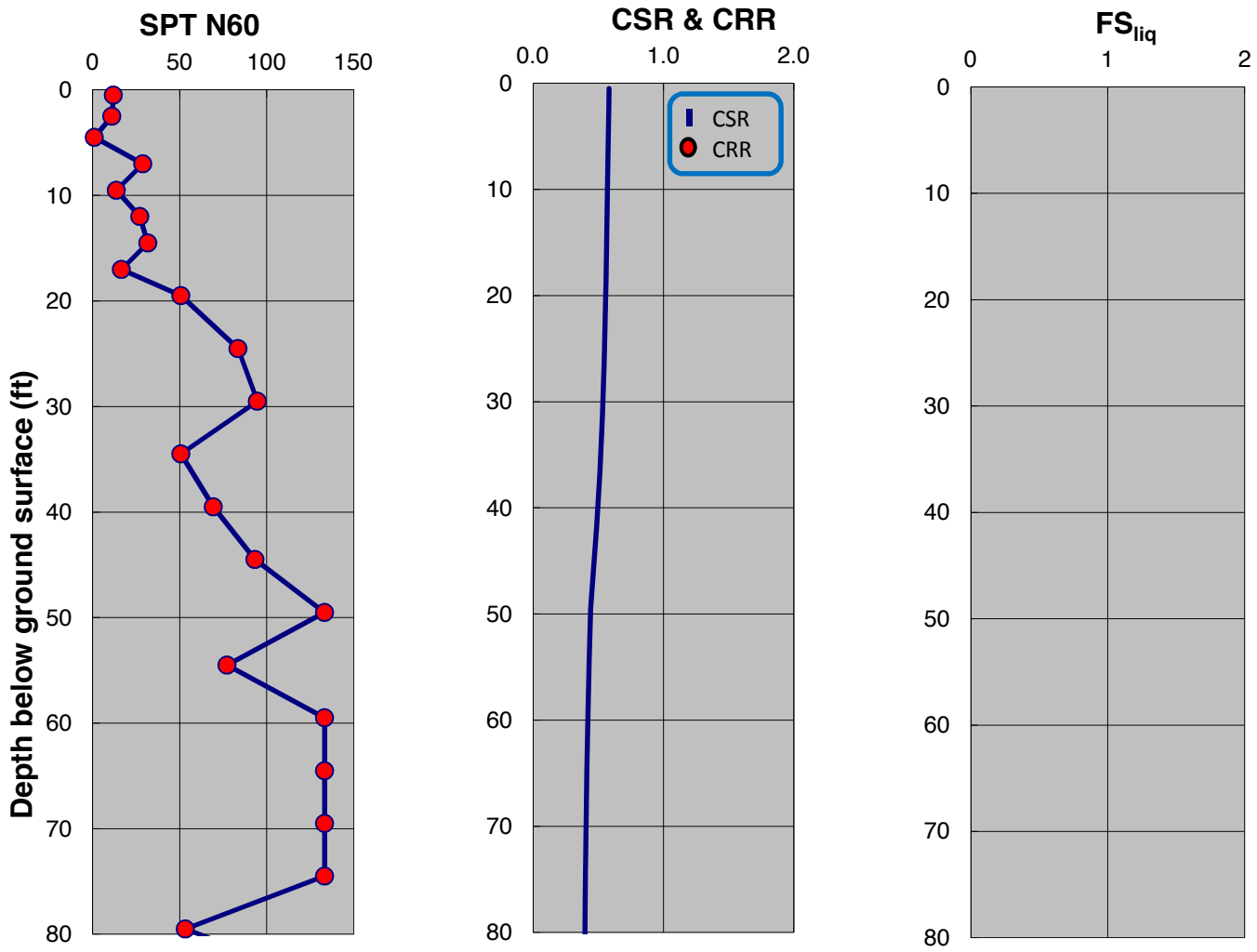
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.517



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-197 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

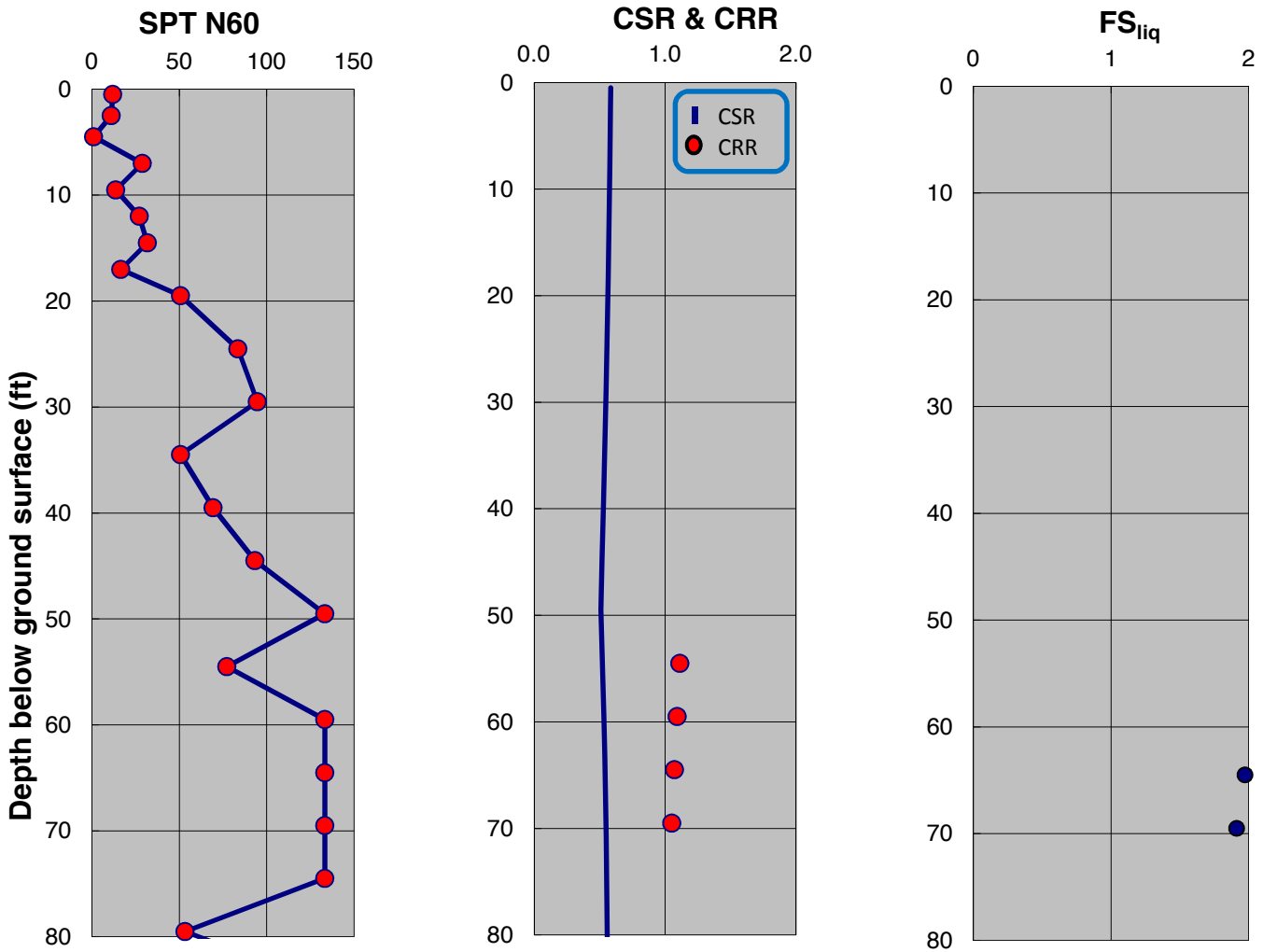
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-198 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.519



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-198 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE A.520

APPENDIX B

SSE / MCE_G LEVEL LIQUEFACTION POTENTIAL EVALUATIONS PER NFPA 59A 2013 AND ASCE 7-10 FOR ONSHORE BORINGS

APPENDIX B

SSE / MCE_G LEVEL LIQUEFACTION POTENTIAL EVALUATIONS PER NFPA 59A 2013 AND ASCE 7-10 FOR ONSHORE BORINGS

B.1 Liquefaction Triggering Hazard Assessment per NFPA 59A 2013 and IBC (2012)

Liquefaction triggering hazard assessment was also performed for the onshore area per the requirements of NFPA 59A 2013 and ASCE 7-10, per the request of EMALL. SSE requirements per NFPA 59A 2013 are the same as ASCE 7-10 MCE requirements. ASCE 7-10 requires liquefaction potential evaluation to be conducted for Maximum Considered Earthquake geometric mean peak ground acceleration (MCE_G), which is geometric mean ground motion for the 84th percentile deterministic spectrum for the Alaska LNG project. Based on the PSHA results (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001), magnitude M_w 8.0 and PGA 0.75g were used for the MCE_G event (Table B.1). The OBE requirements per NFPA 59A 2013 are same as that of NFPA 59A 2006, which corresponds to a 475-year return period event.

Table B.1: Earthquake Scenarios for Liquefaction Evaluation Analyses of the Onshore Area

EQ Event	PGA (g)	Magnitude
OBE	0.53	8.0
SSE / MCE_G	0.75	8.0

Section 3.0 presents the results for the OBE event. Table B.2 summarizes the depths of potentially liquefiable soil for the onshore borings and the existing elevations based on the results of the liquefaction triggering hazard assessment conducted using the SPT-based procedures proposed by NCEER (Youd et al., 2001) and Boulanger and Idriss (2014) per NFPA 59A 2013.

Table B.2: SPT-based Liquefaction Triggering Hazard Assessment According to NCEER (Youd et al., 2001) and Boulanger and Idriss (2014): Depths of Potentially Liquefiable Localized Soil Pockets for the Onshore Borings and the Existing Elevations for Both OBE and SSE / MCE_G Levels per NFPA 59A (2013)

EQ Event	Boring	Depth (ft.)	Elevation (ft., NAVD88)	Measured SPT-N
OBE and SSE / MCE_G	B-17	56.5	74.7	36
	B-28	17.0	101.9	24
		20.0	98.9	17
		22.0	96.9	14
	B-39	20.0	75.5	24
		22.0	73.5	27
		46.5	49.0	26
	B-43	19.5	101.6	22
	B-50	59.0	72.7	34
		61.5	70.2	37
	B-61	59.0	78.7	28
	B-64	59.0	74.9	34
	B-67	59.0	65.5	31
	B-76	49.0	81.5	24
	B-117	1.0	13.9	6
	B-120	1.0	14.4	4
	B-121	1.0	15.4	4
		2.0	14.4	11
	B-122	1.0	15.5	3
	B-123	1.0	14.8	7
		2.0	13.8	18
	B-124	1.0	12.7	7
	B-125	1.0	13.4	5
		2.0	12.4	7
	B-126	1.0	13.4	9
		2.0	12.4	9
	B-127	1.0	13.7	3
		2.0	12.7	18
	B-146	49.5	62.2	34
	B-160	49.5	65.9	32
	B-166	44.5	56.2	30
	B-172	64.5	55.4	33
	B-176	20.5	6.6	6
		24.5	2.6	3
		29.5	-2.4	7

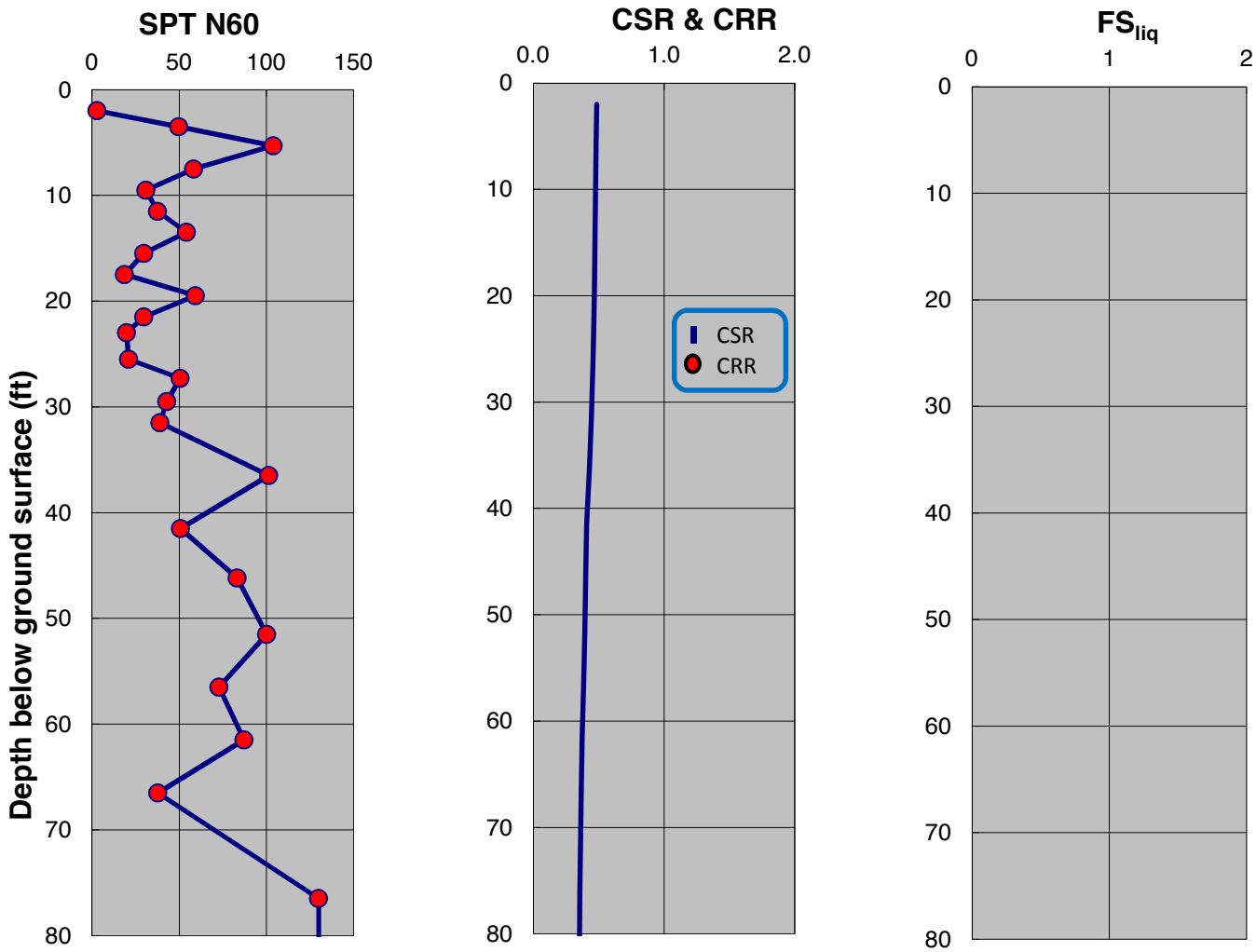
EQ Event	Boring	Depth (ft.)	Elevation (ft., NAVD88)	Measured SPT-N
OBE and SSE / MCE_G	B-190	1.0	19.6	6
		2.5	18.1	9
	B-191	1.0	19.5	7
		2.5	18.0	21
		4.5	16.0	20
		7.0	13.5	12
		9.5	11.0	17

As presented in Table B.2, in general, continuous potentially liquefiable soil layers were not identified at the site except the top 3 feet surficial granular soils at the beach area (borings B-117, B-120, B-121, B-122, B-123, B-124, B-125, B-126, B-127, B-190 and B-191) which are expected to liquefy for both OBE and SSE shaking levels. Especially for beach boring B-191, the extend of liquefaction is expected to reach up to 10 ft. depth. For the rest of borings, limited and localized liquefaction is estimated during the OBE and SSE shaking levels. For example, sublayers of coarse-grained soils (sand with gravel) in the depth range of approximately 20 to 25 feet were found to be potentially liquefiable in borings B-28 and B-39 (6 and 4 feet thick, respectively), for both SSE and OBE events, however these borings are located outside the locations of the planned structures. Some localized pockets of potentially liquefiable coarse-grained soils were also identified in borings B-17, B-43, B-50, B-61, B-64, B-67, B-76, B-146, B-160 and B-166. The measured SPT blow count values in these sublayers range between approximately 14 to 37. Also, boring B-176 which is close to the coast and located on the alternative heavy haul road area north from the project site, contains a potentially liquefiable soil layer from approximately 18 to 34 ft. depth.

B.2 Evaluation of Liquefaction-Induced Reconsolidation Settlements per NFPA 59A 2013 and IBC (2012)

Estimates of post-liquefaction reconsolidation settlements are computed using the procedure suggested by Ishihara and Yoshimine (1992) and described in Idriss and Boulanger (2008). Plate 10 presents the liquefaction-induced reconsolidation settlements for OBE per NFPA 59A 2013 and ASCE 7-10 requirements which is the same as the OBE event per NFPA 59A 2006 and ASCE 7-05 requirements. Plate B.261 presents similar results for SSE per NFPA 59A 2013 and ASCE 7-10. Liquefaction-induced reconsolidation settlements are in the range of approximately 0 to 0.5 inches during the SSE / MCE_G shaking level with the exception of borings B-61 and B-76, where they were estimated to be approximately 0.8 and 1.0 inches, respectively, for the SSE / MCE_G shaking level, and borings B-28 and B-39 where they were estimated to be approximately 1.8 and 1.3 inches, respectively, for the SSE / MCE_G shaking level. The estimated settlements for boring B-176 are higher than 3 inches, but boring B-176 is located on the alternative heavy haul road area north from the project site. The estimated settlements at the beach area (borings B-117, B-120, B-121, B-122, B-123, B-124, B-125, B-126, B-127, B-190

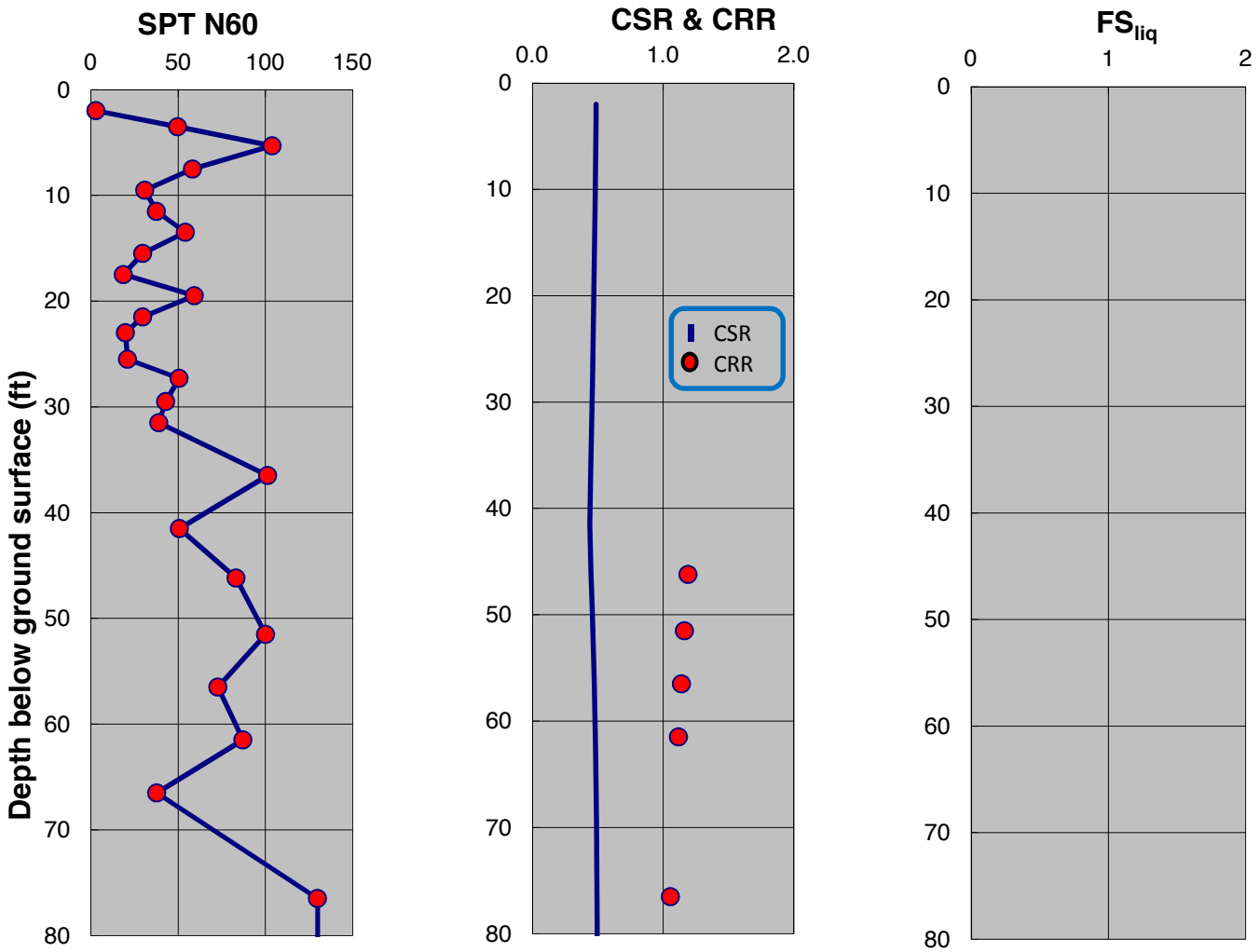
and B-191) are in the range of 0.6 to 1.9 inches during both the SSE / MCE_G shaking. However, these values will be reduced significantly if the top 3 feet at the beach area are dredged or densified.



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-9 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

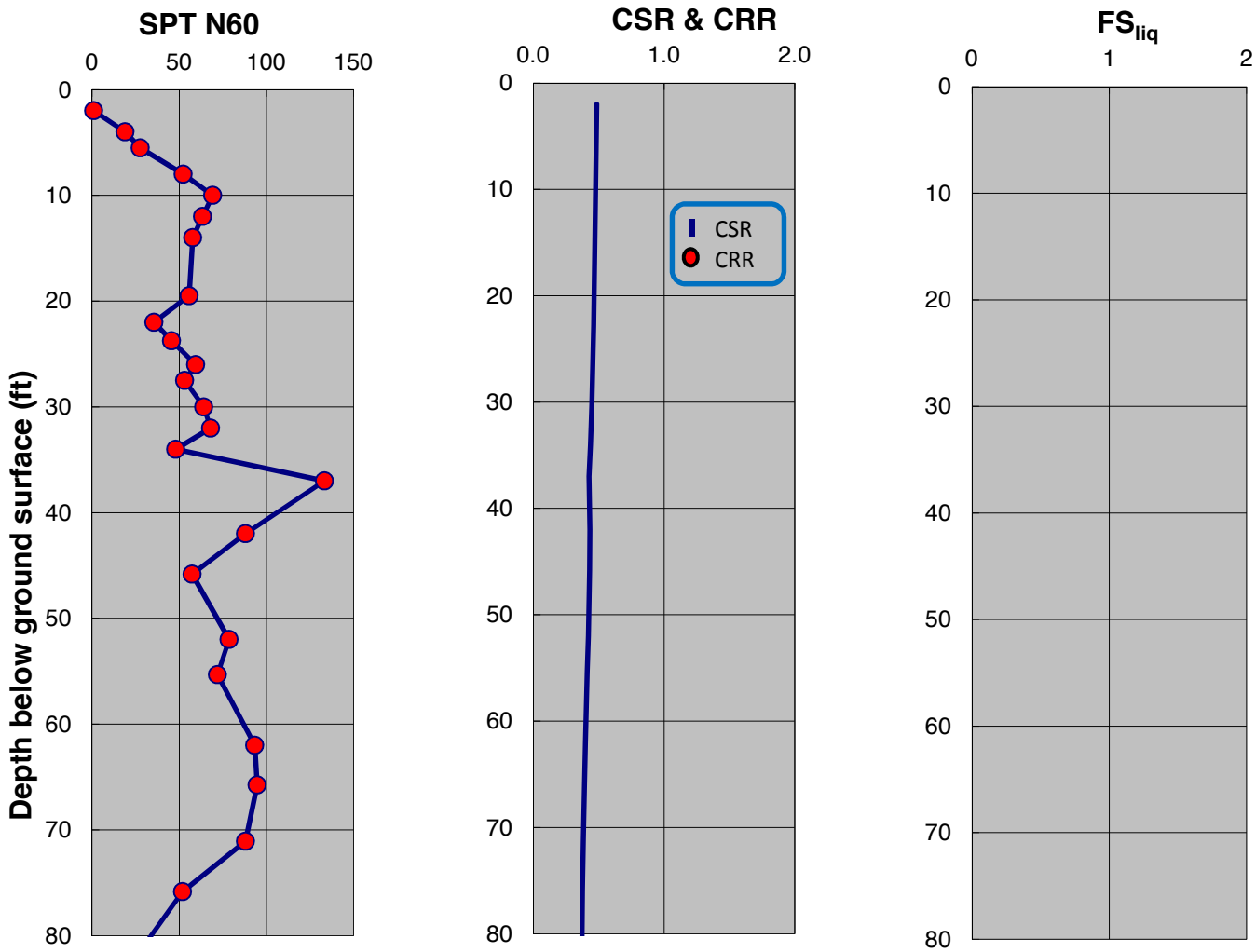
PLATE B.1



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-9 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

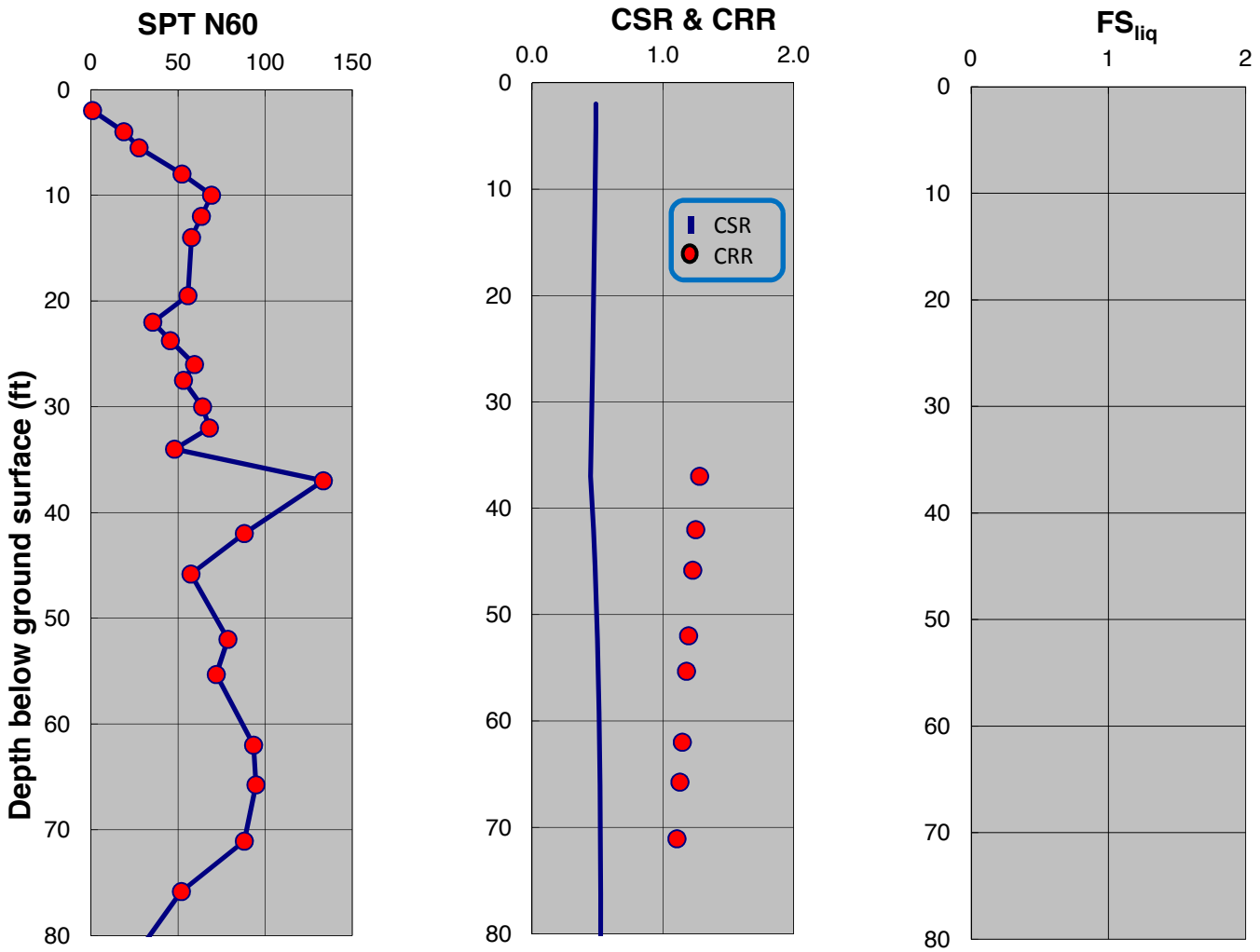
PLATE B.2



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-10 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

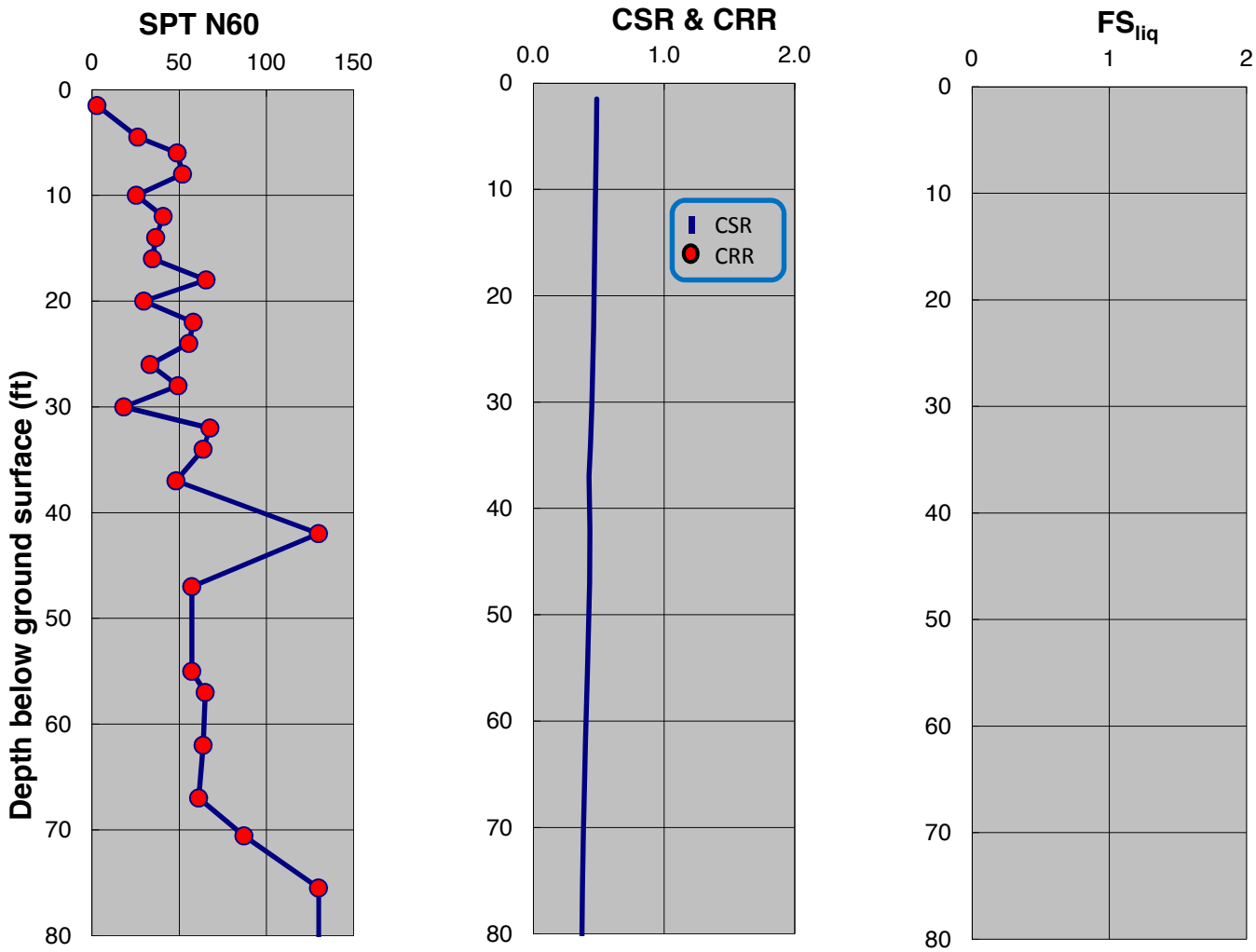
PLATE B.3



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-10 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

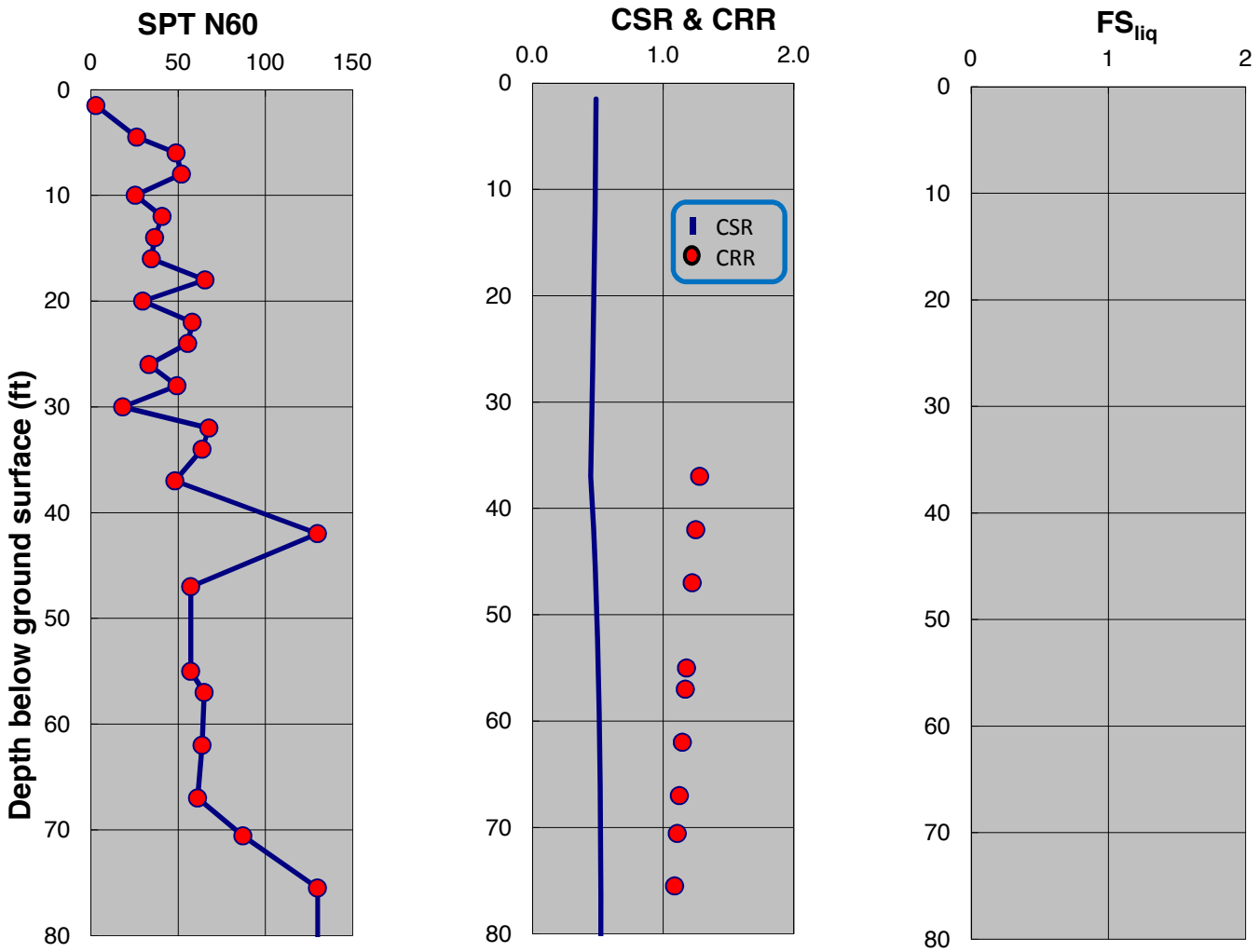
PLATE B.4



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-11 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

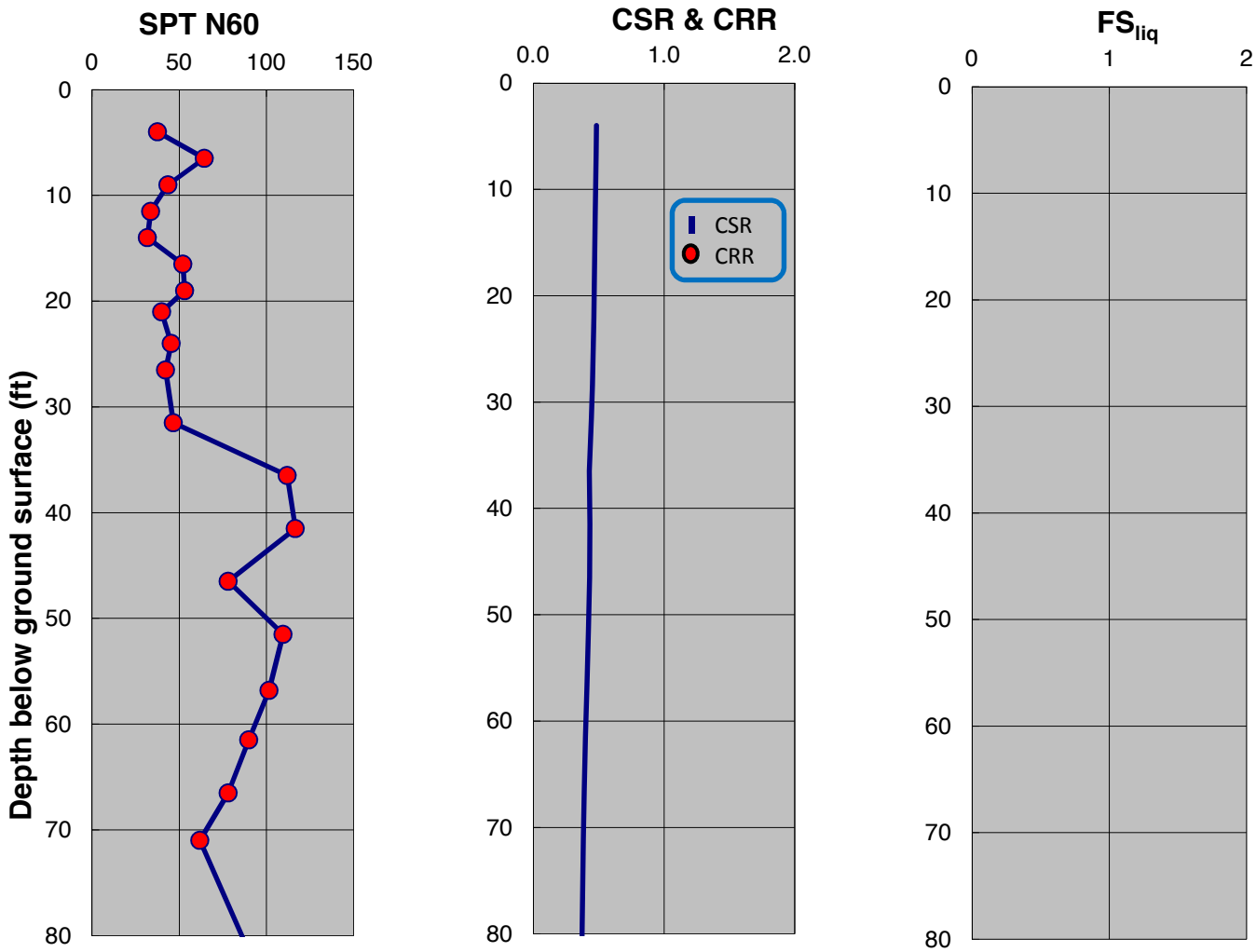
PLATE B.5



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-11 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

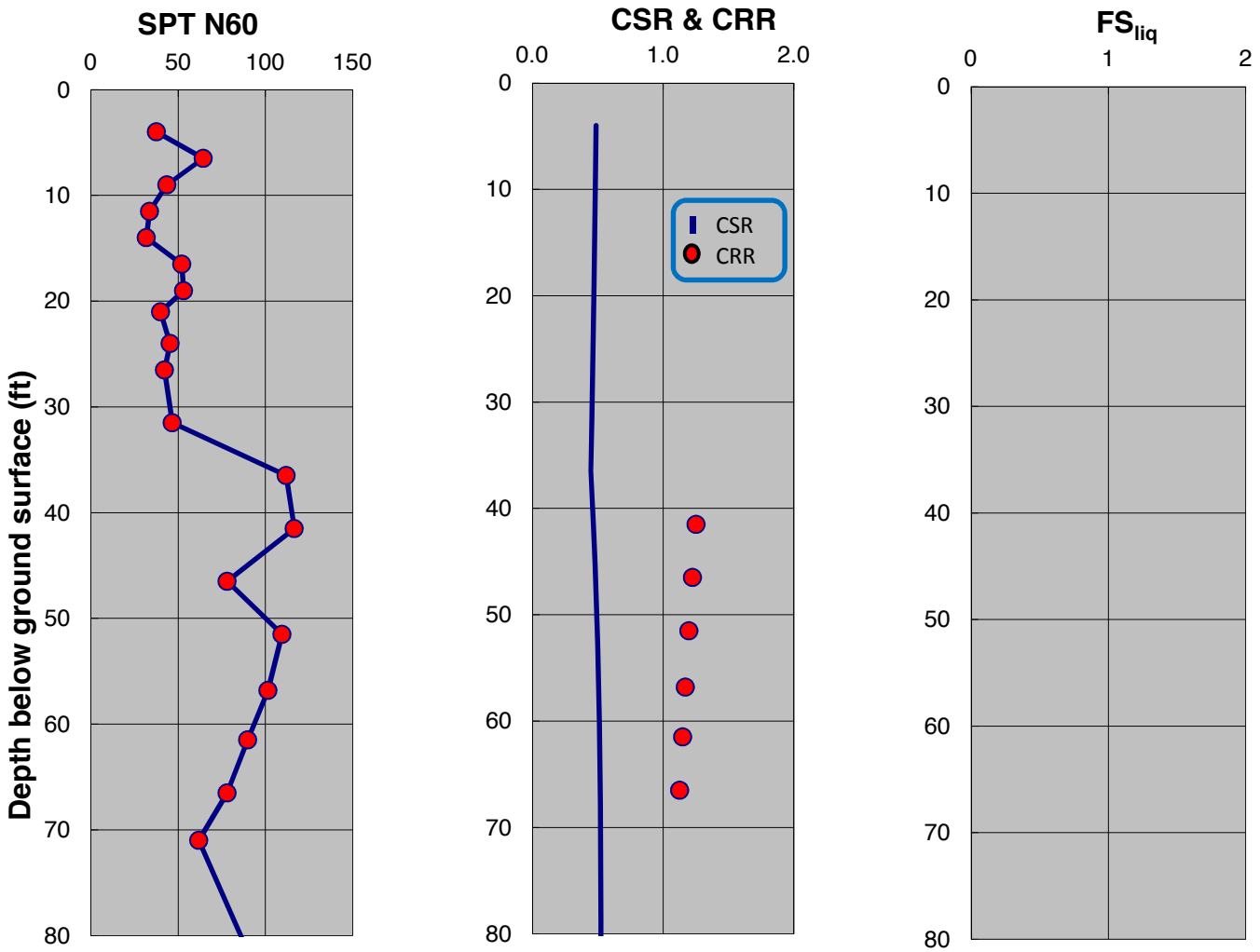
PLATE B.6



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-14 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

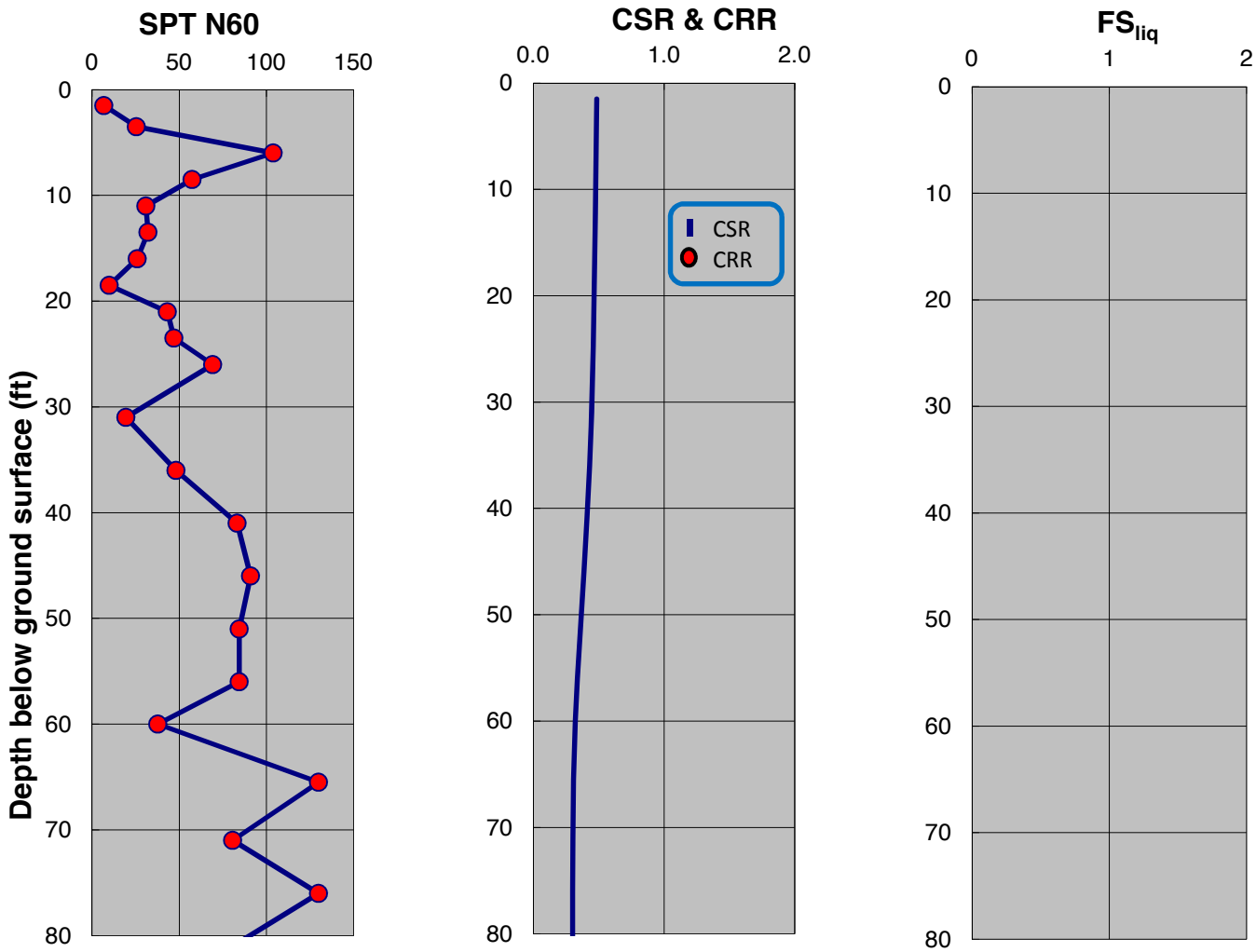
PLATE B.7



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-14 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

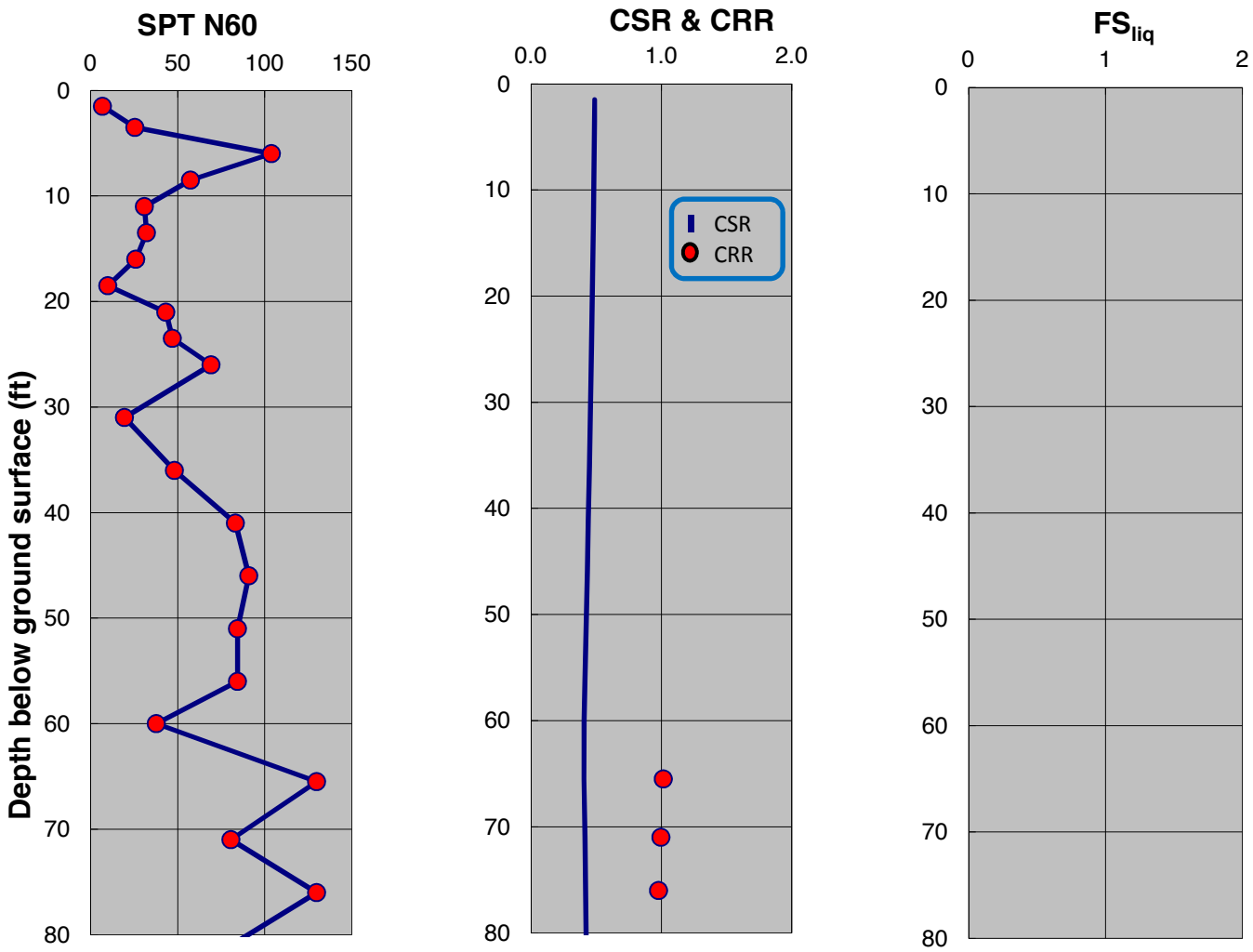
PLATE B.8



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-15 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

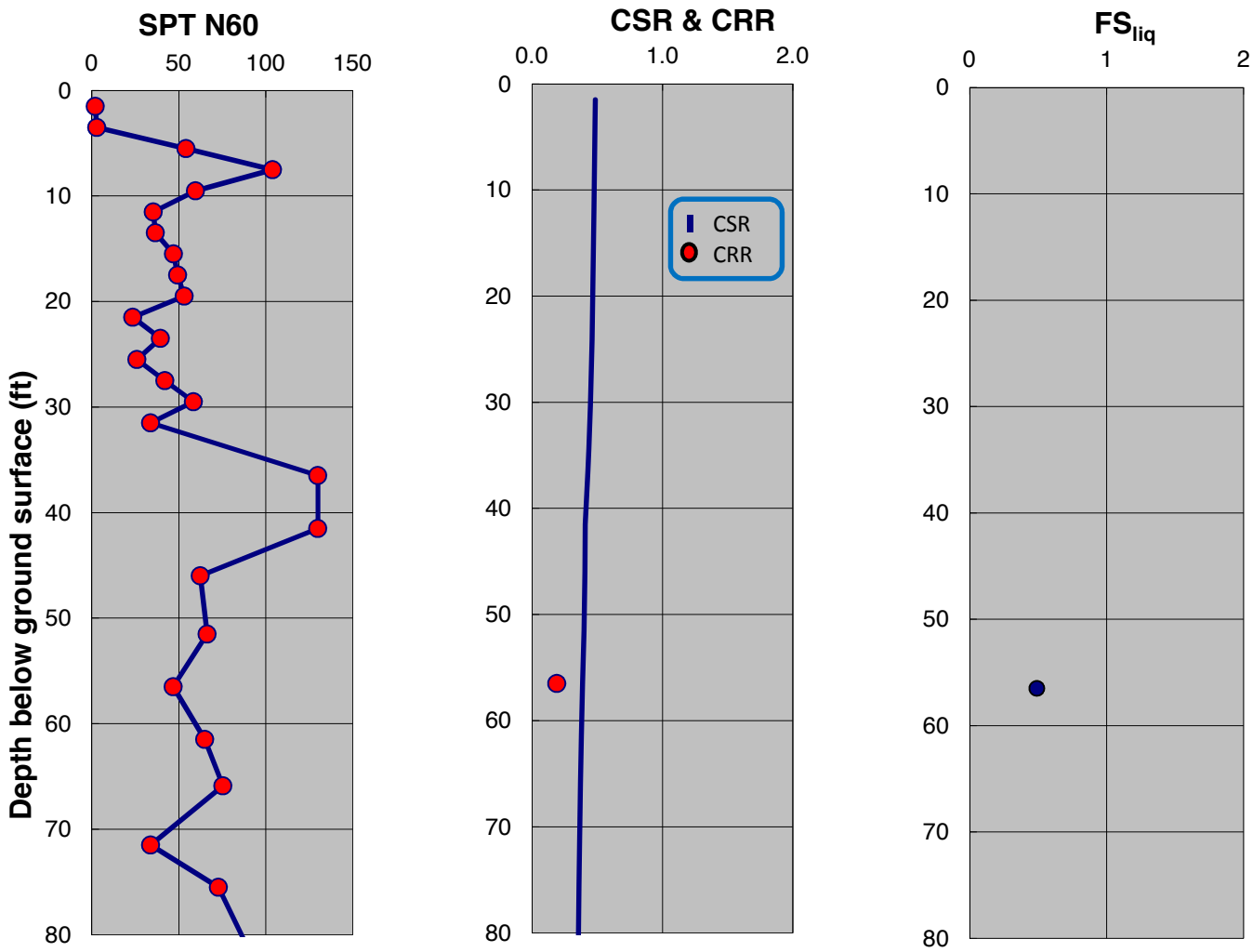
PLATE B.9



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-15 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

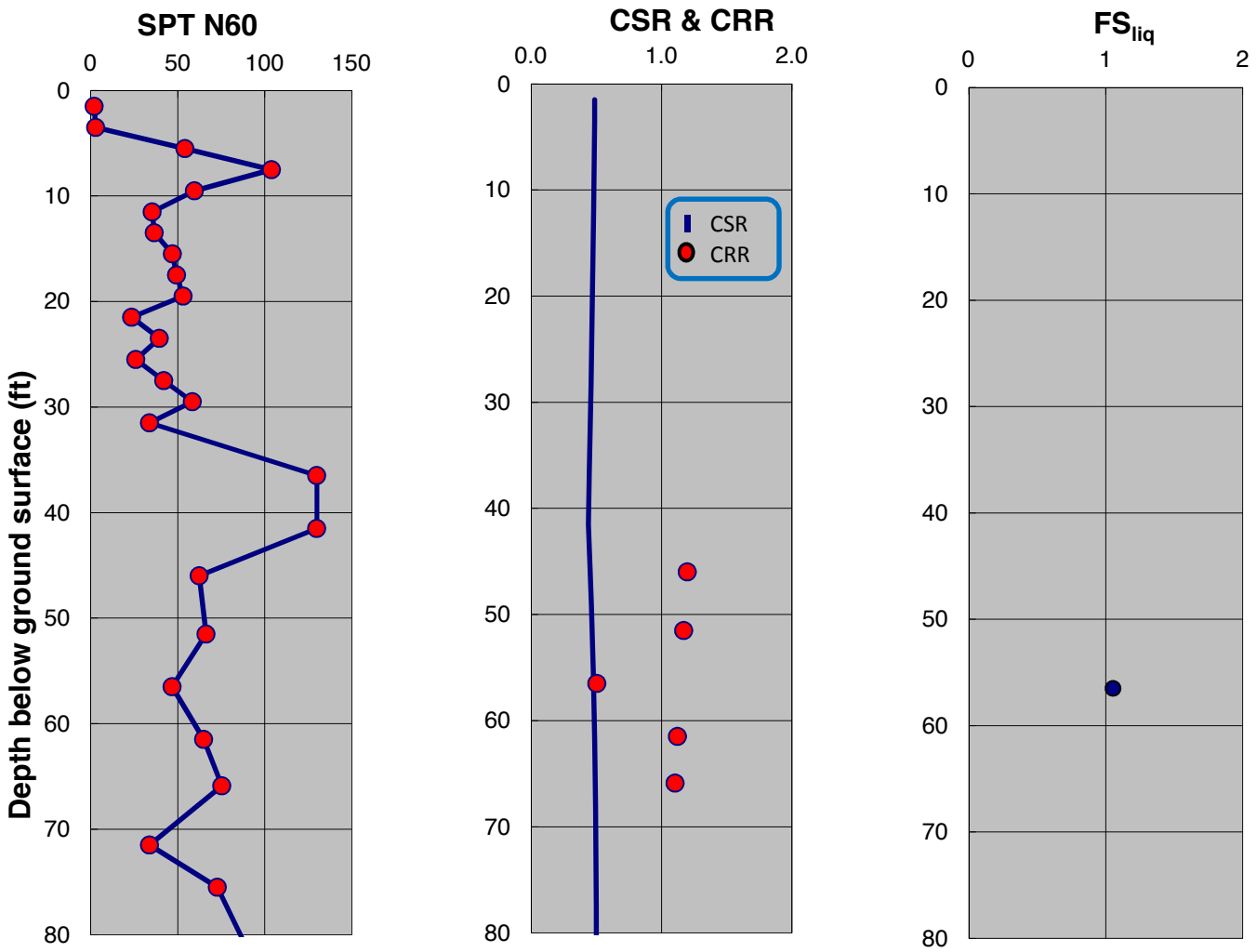
PLATE B.10



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-17 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

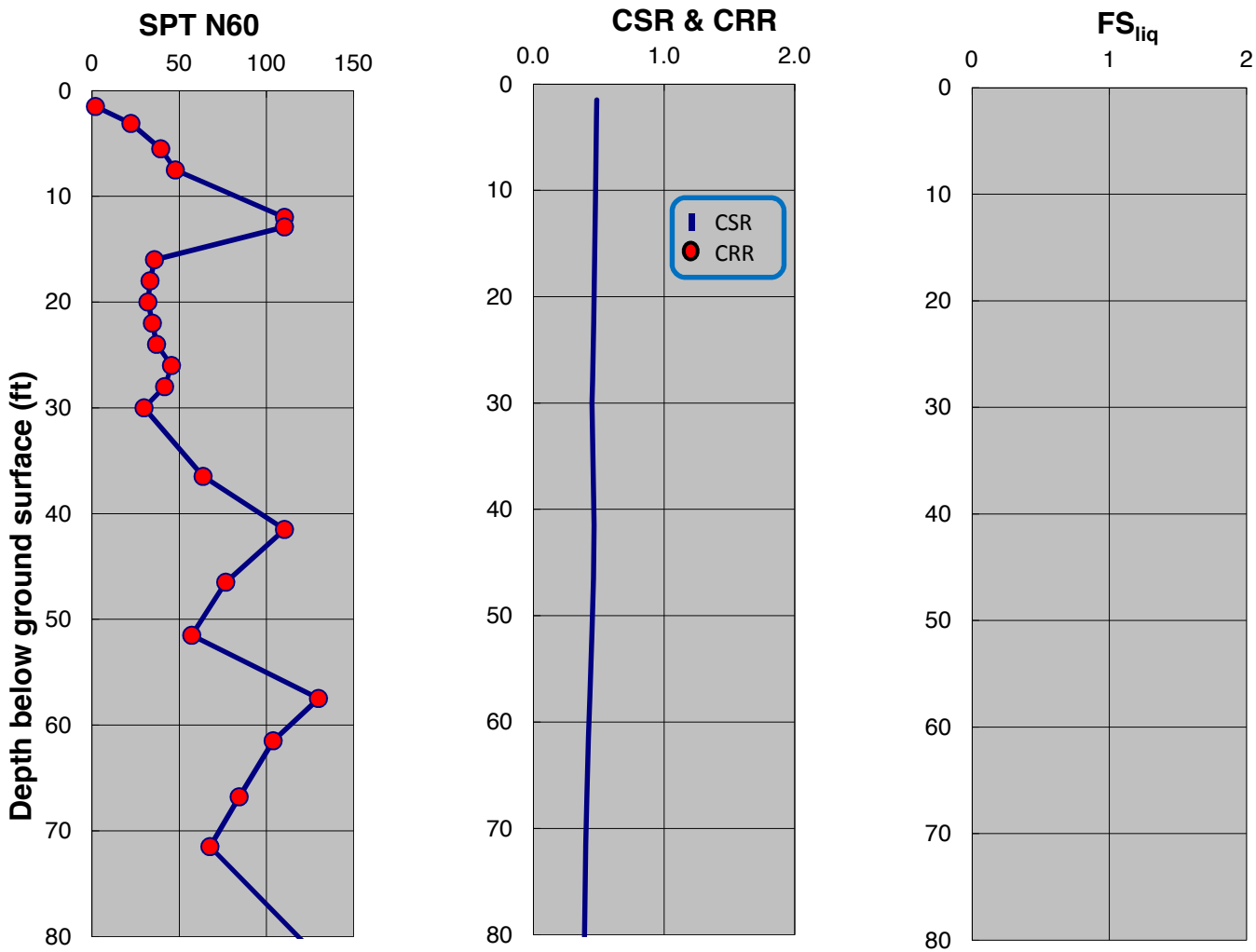
PLATE B.11



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-17 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

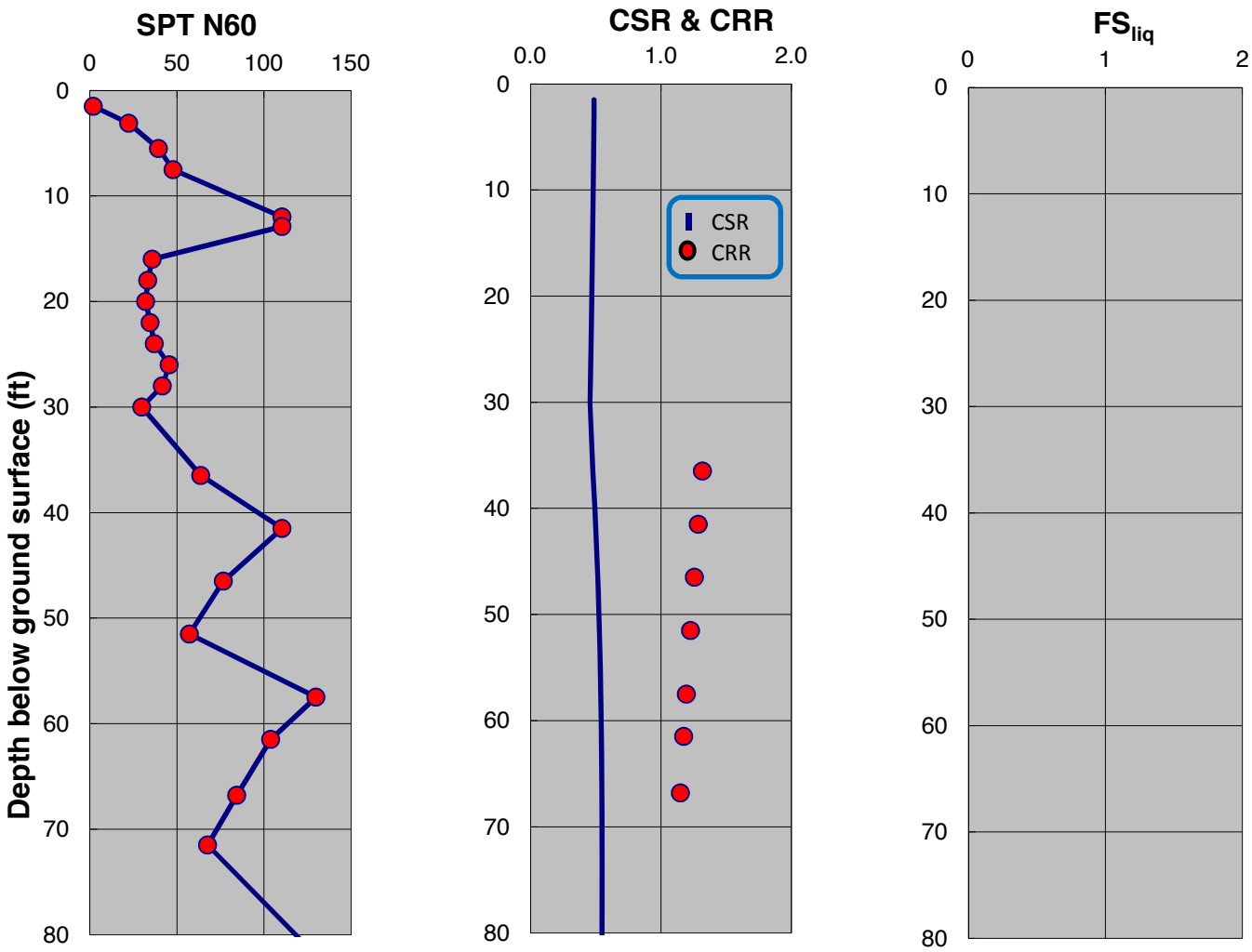
PLATE B.12



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-18 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

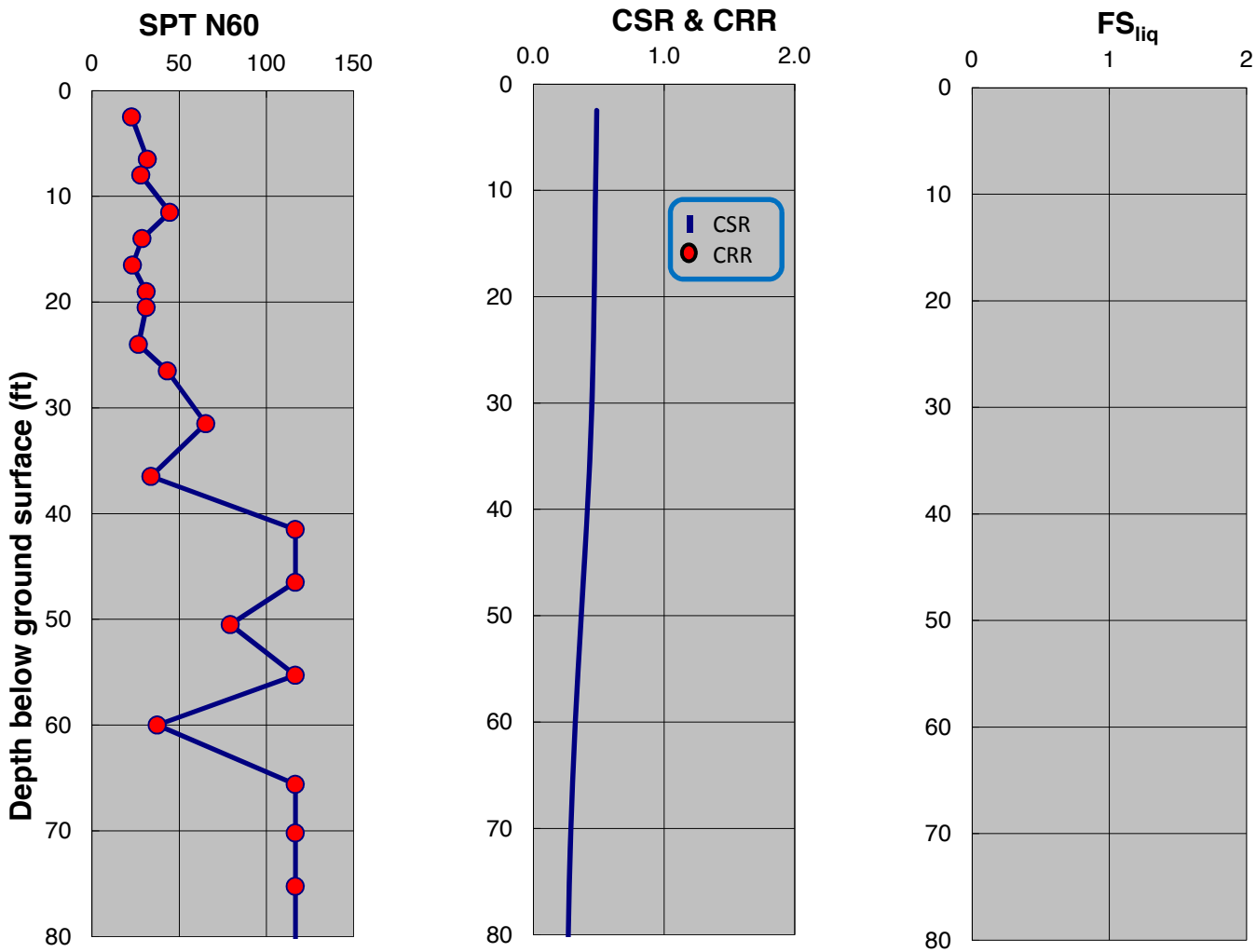
PLATE B.13



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-18 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

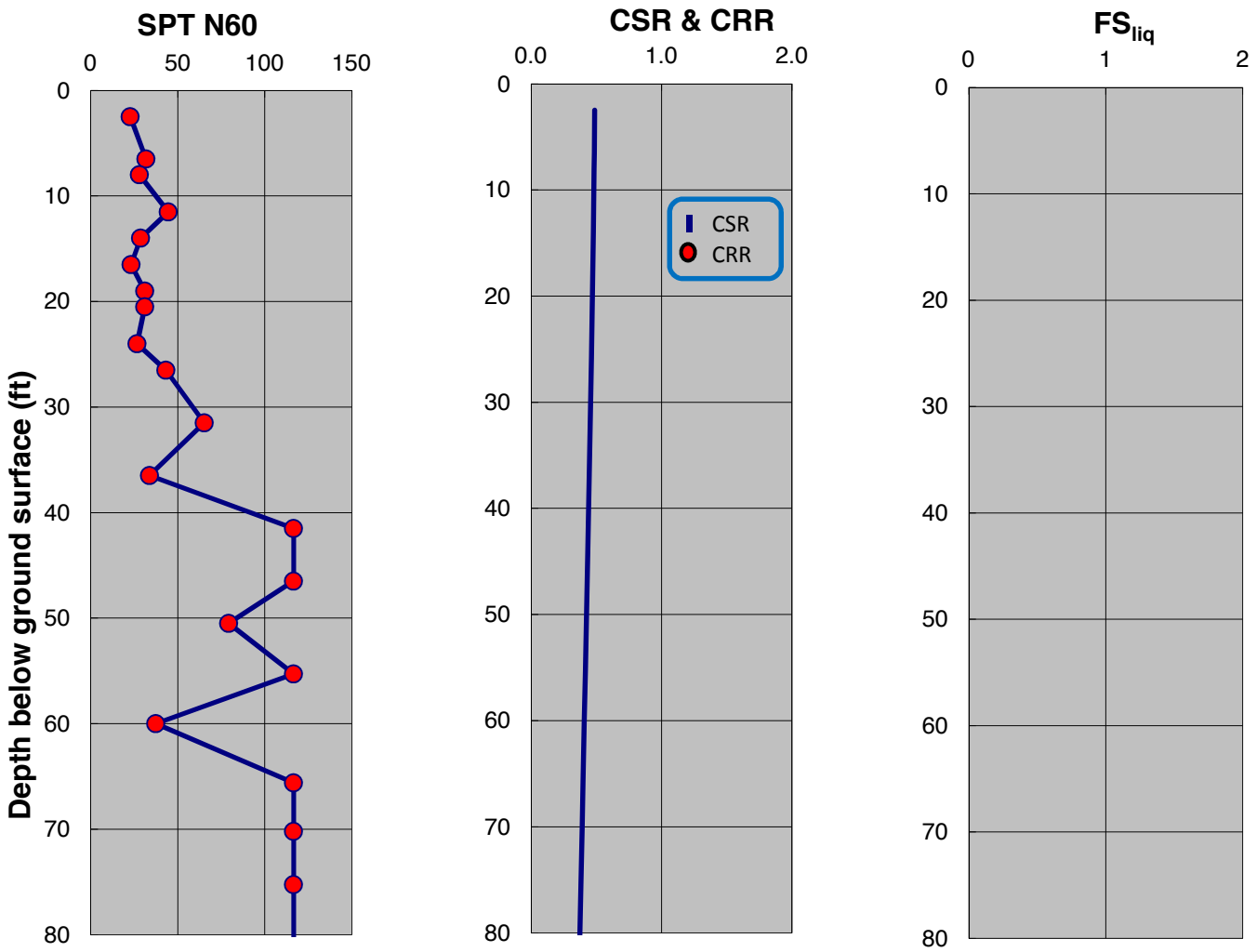
PLATE B.14



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-23 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

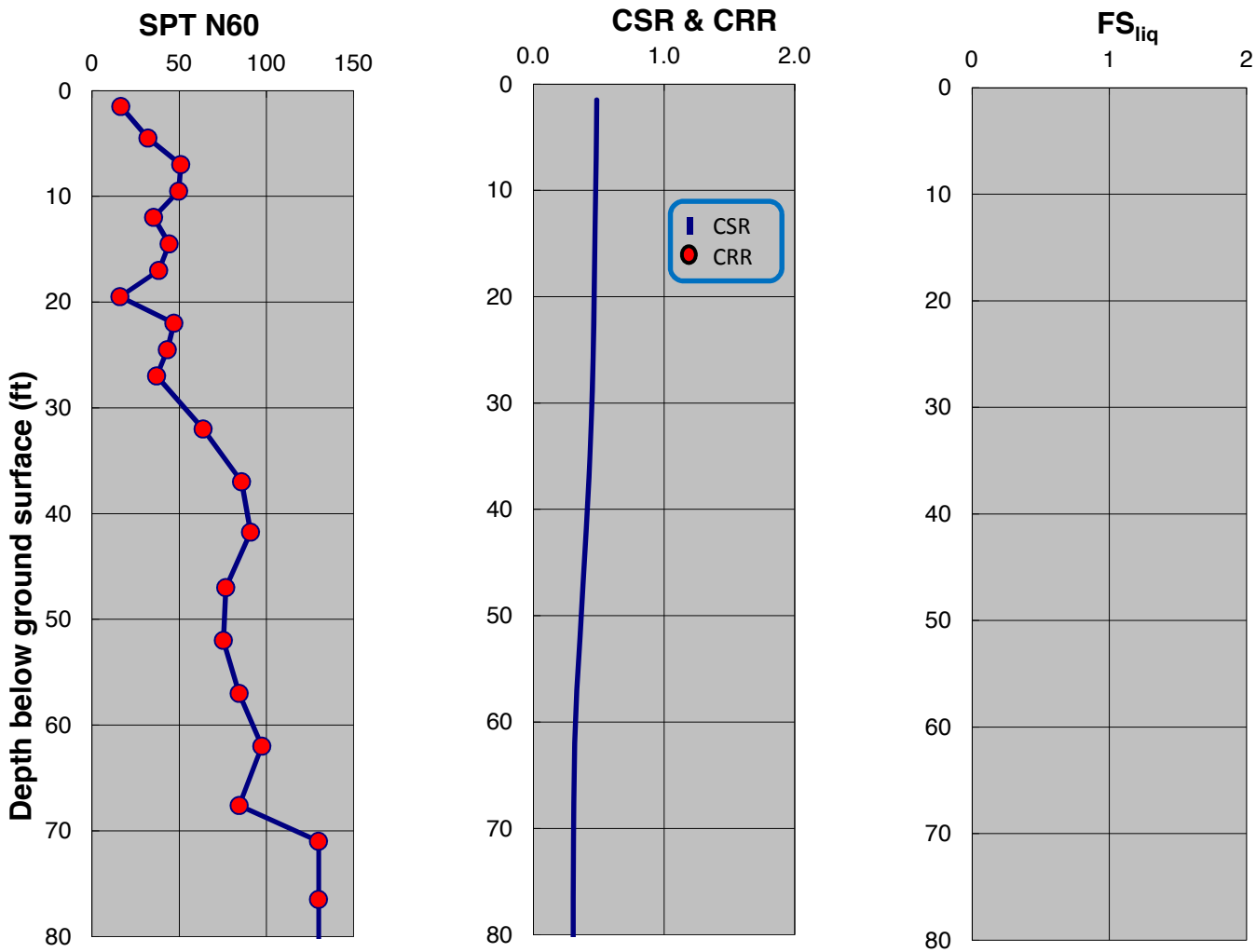
PLATE B.15



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-23 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

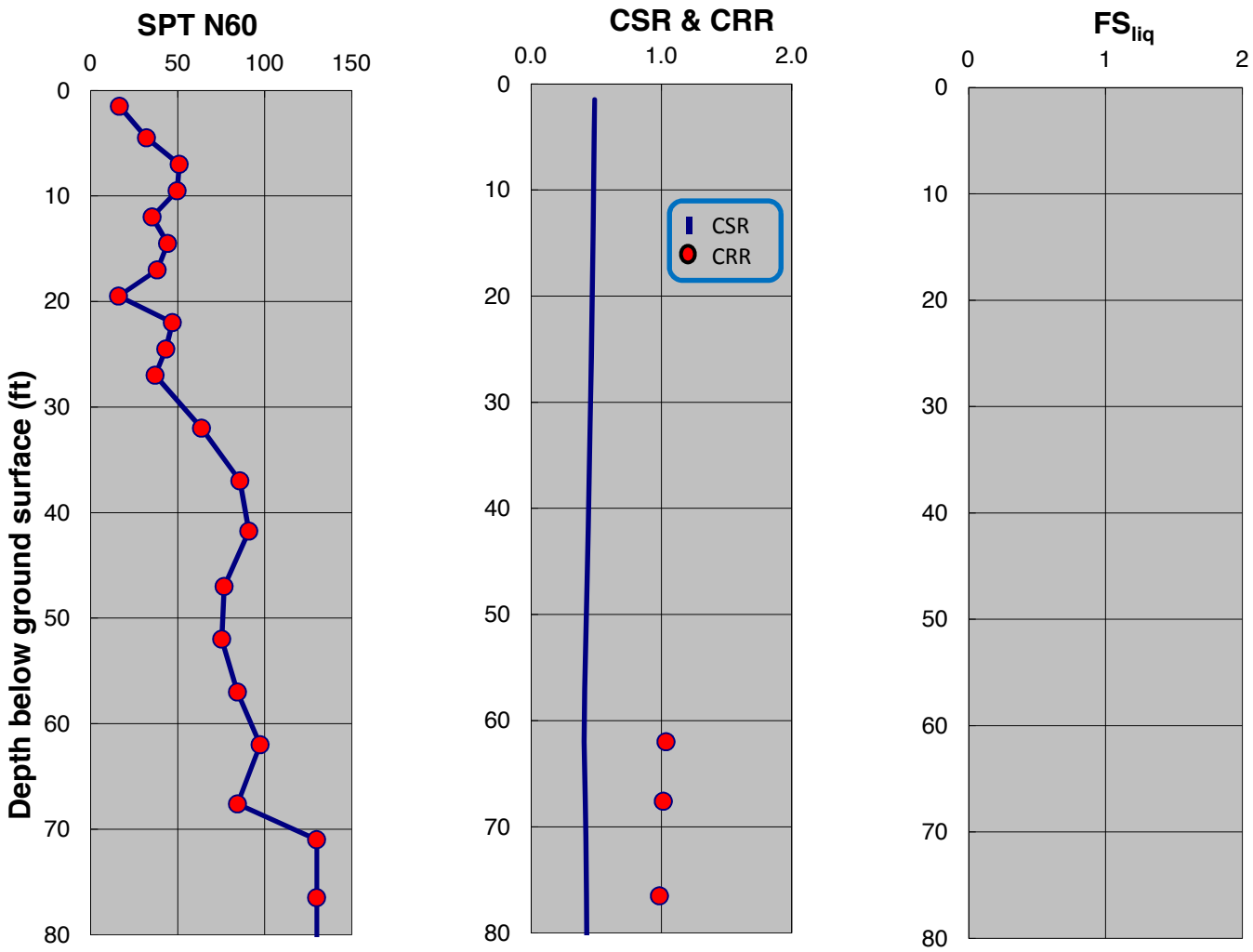
PLATE B.16



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-24 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

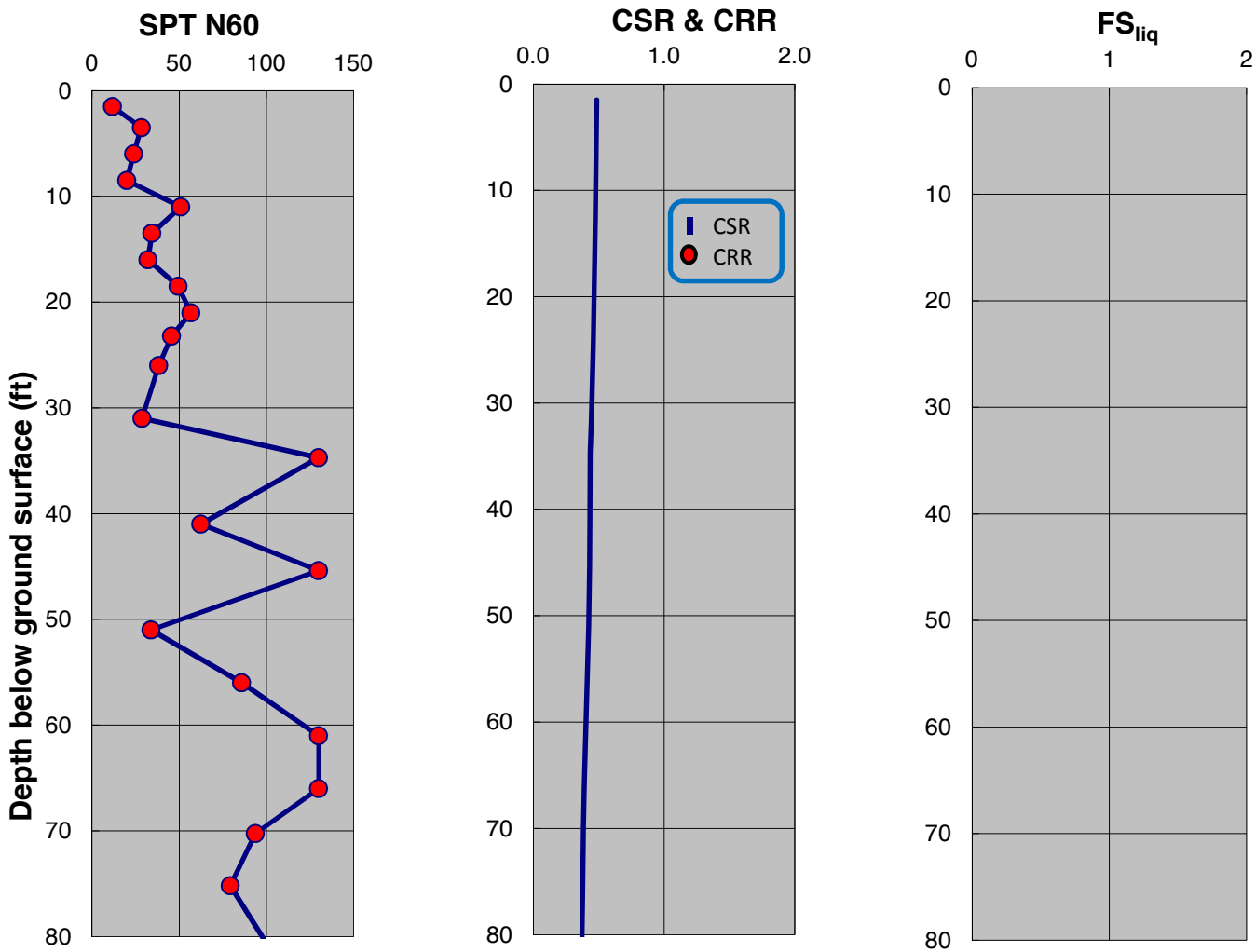
PLATE B.17



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-24 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

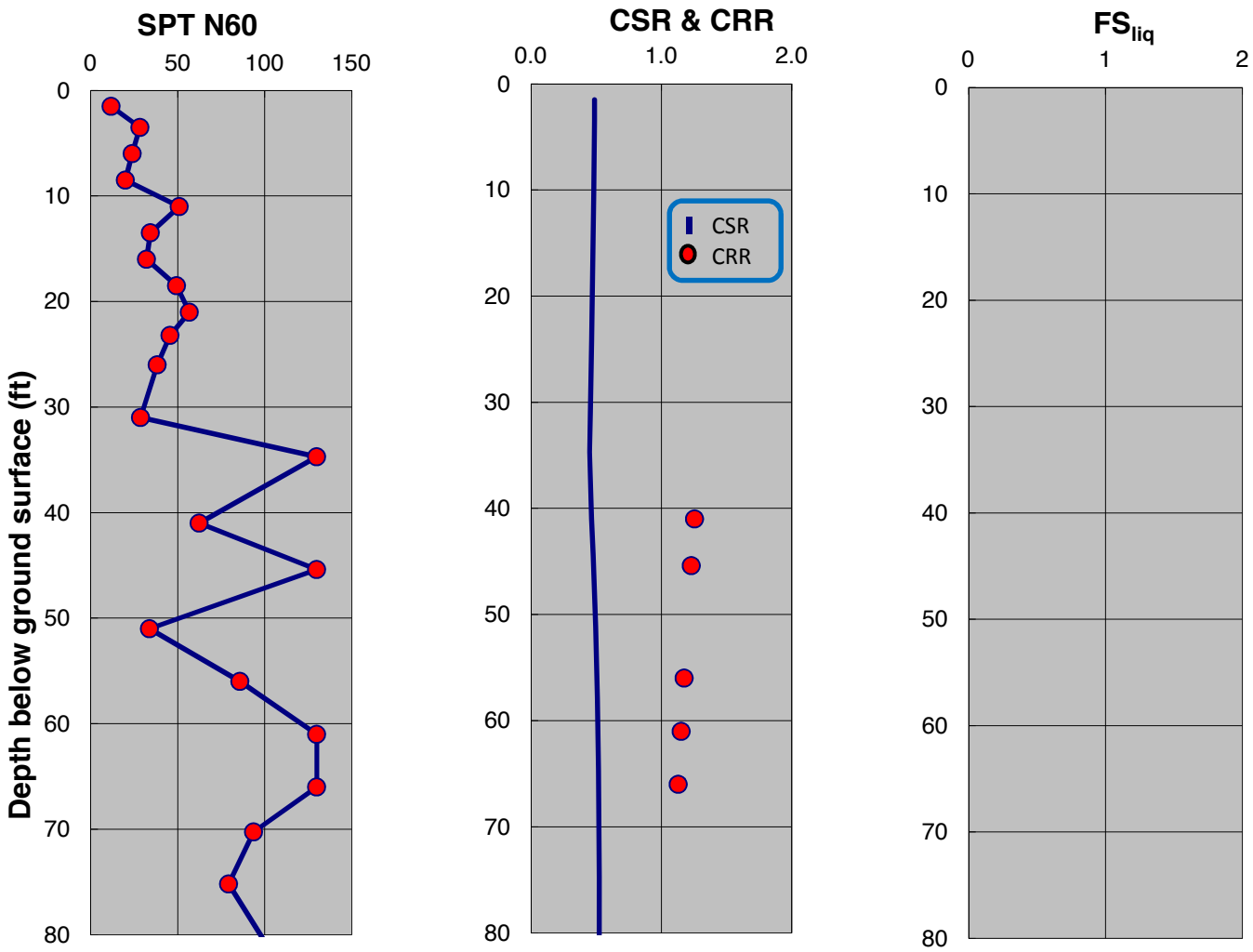
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.18



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-26 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

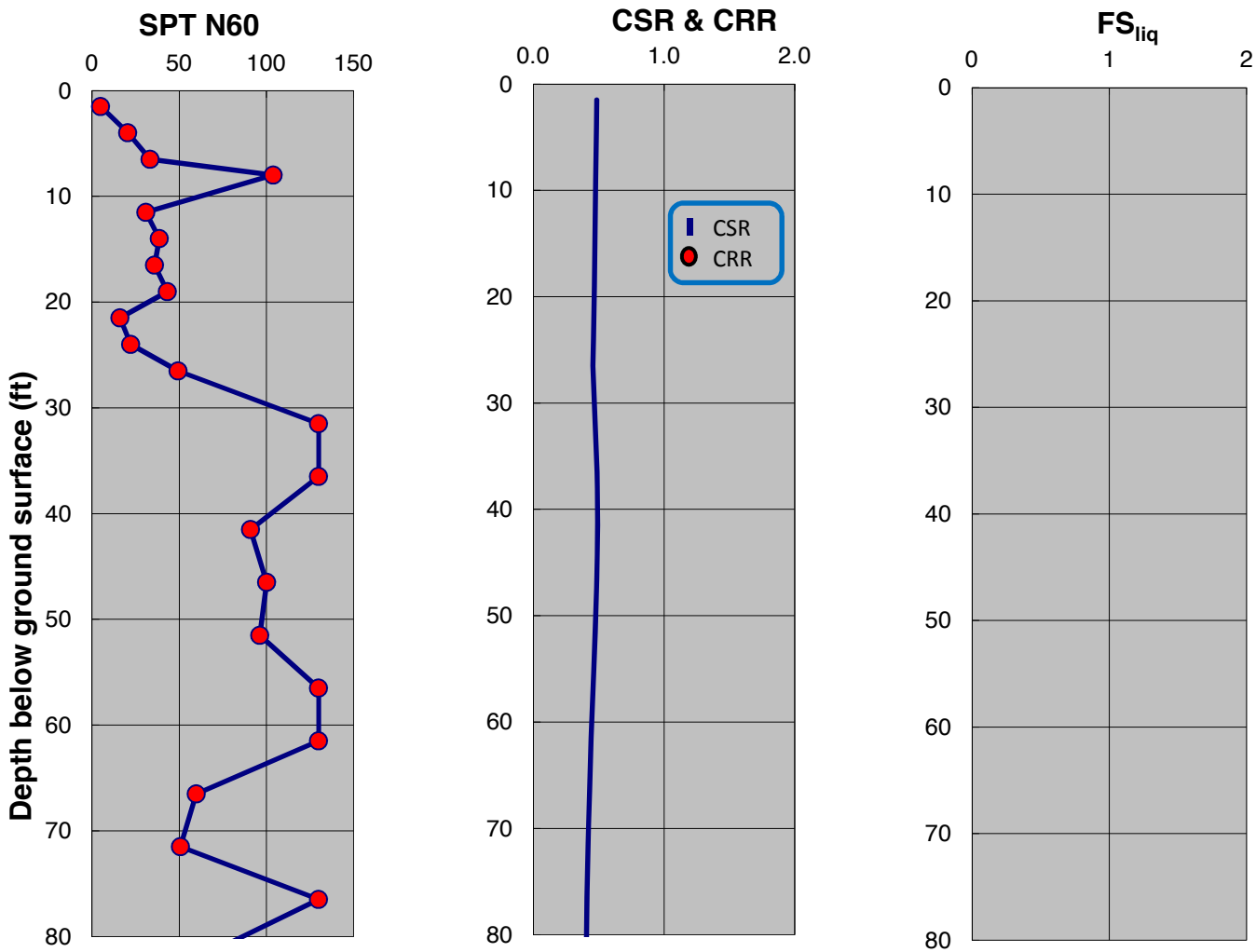
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-26 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

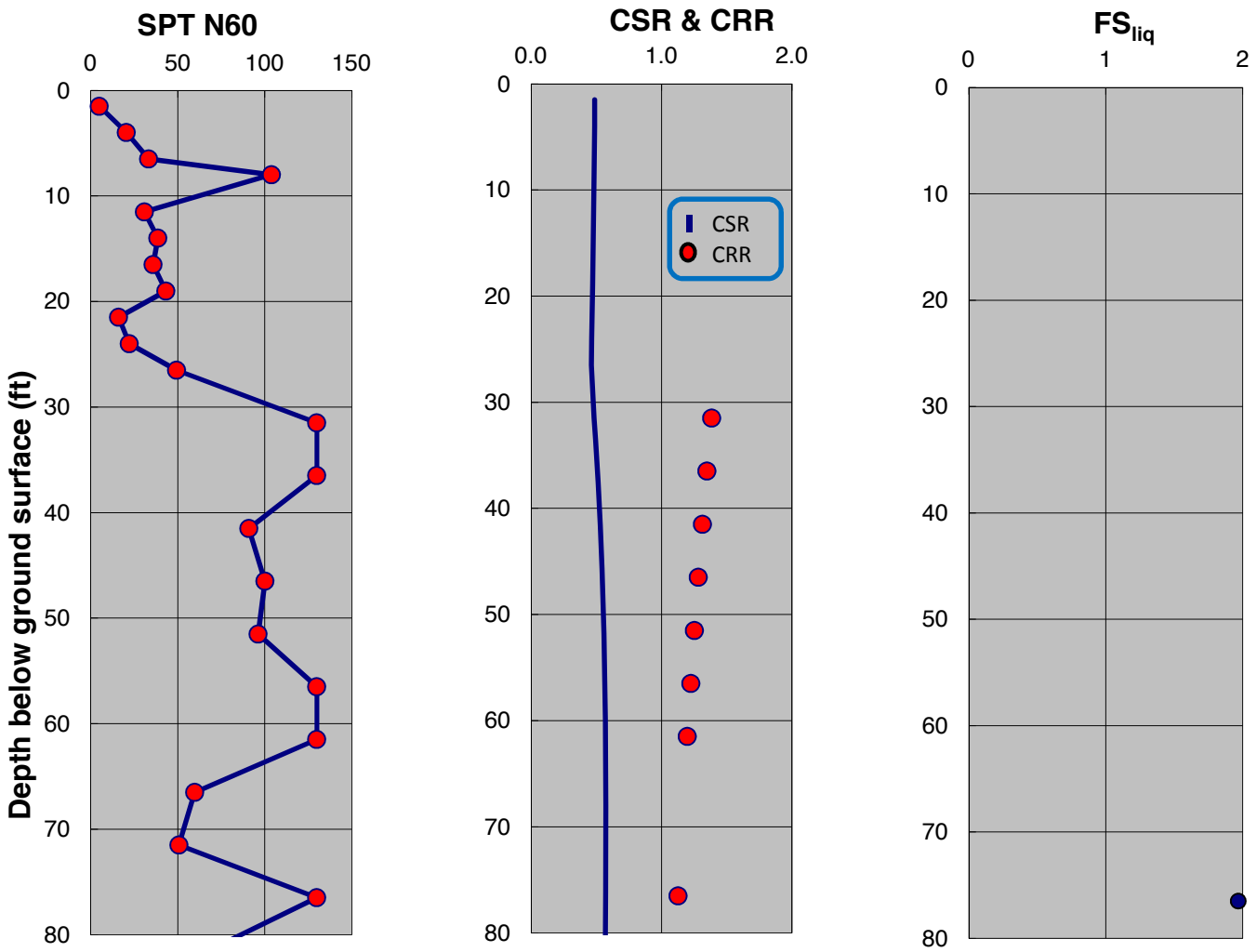
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.20



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-27 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

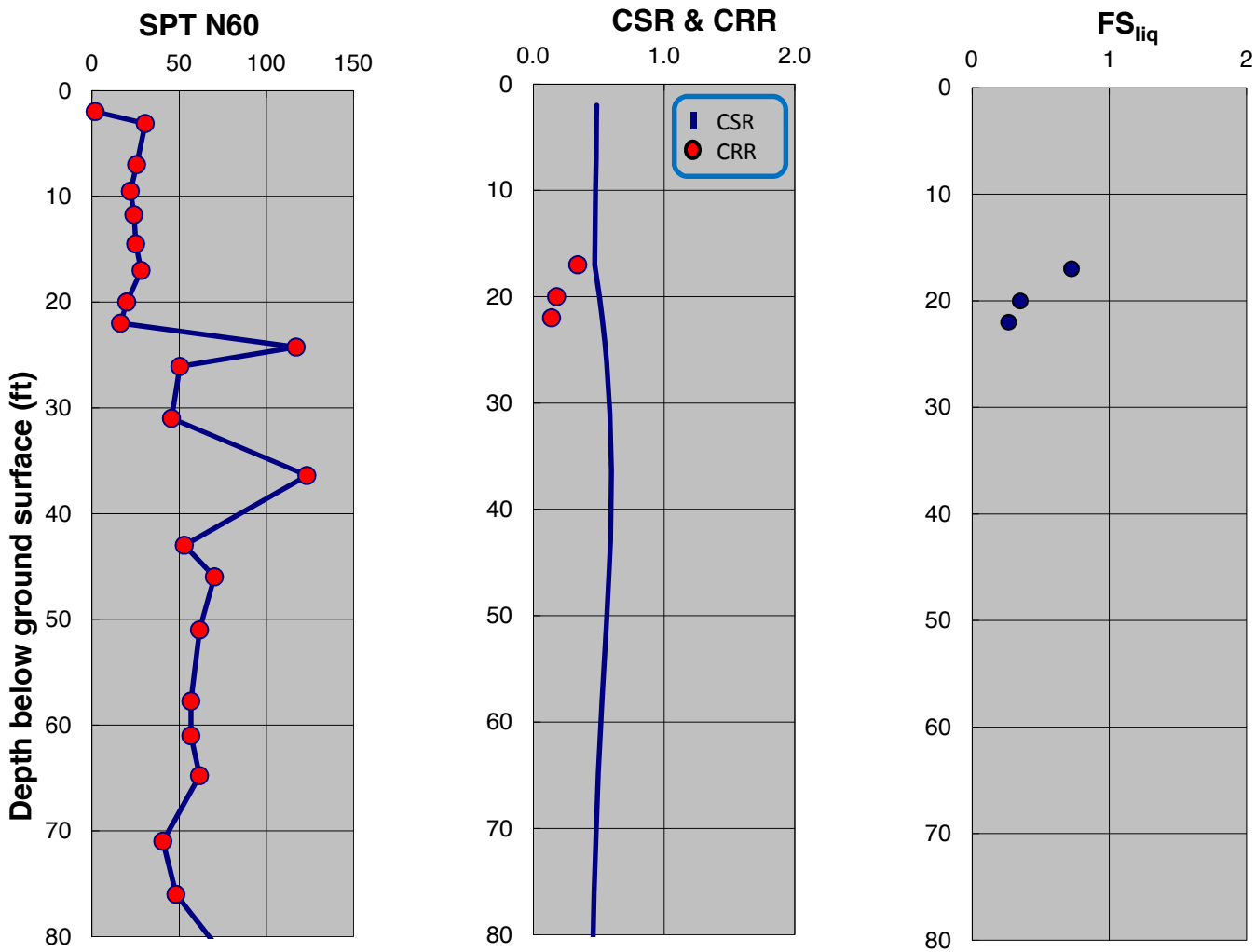
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-27 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

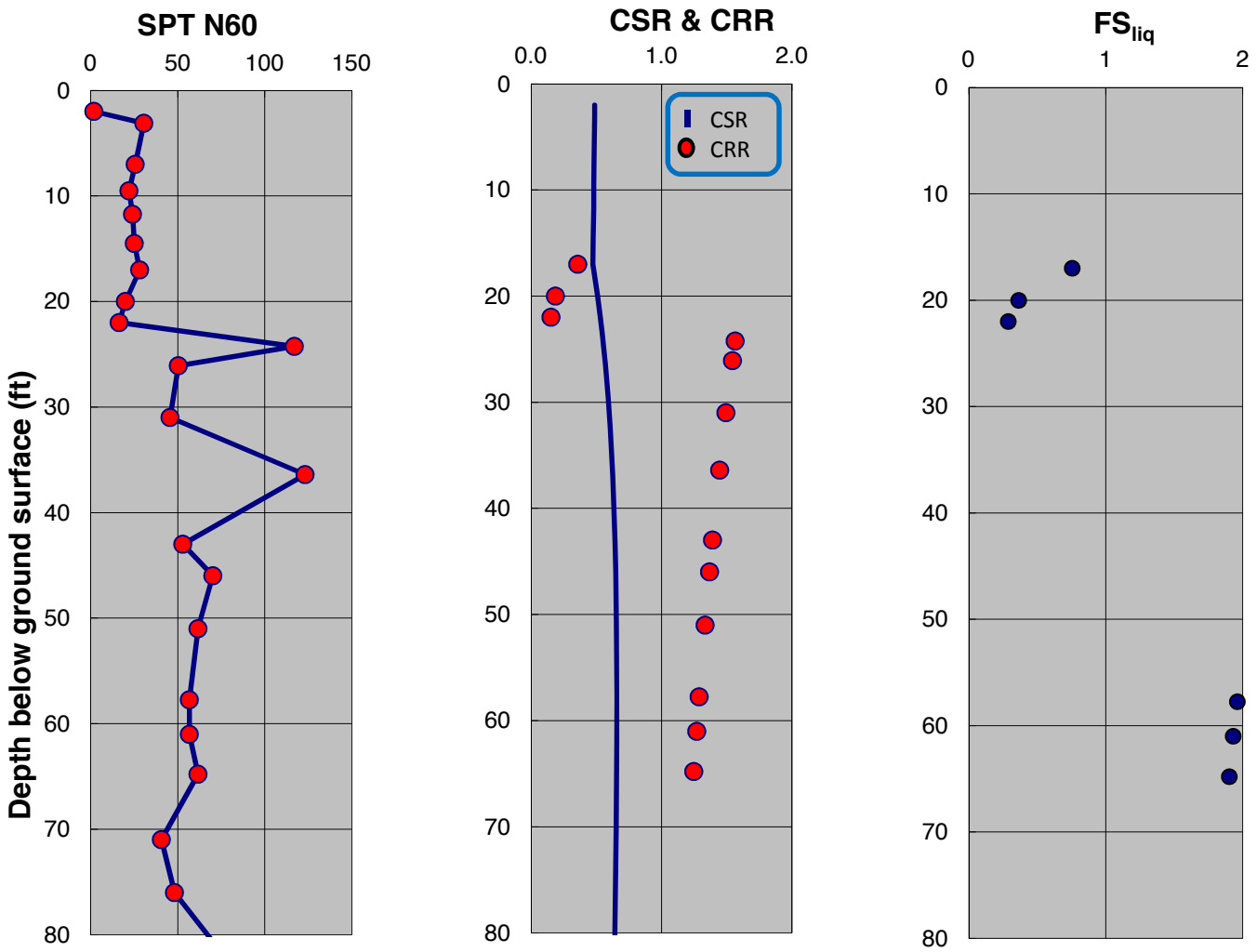
PLATE B.22



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-28 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

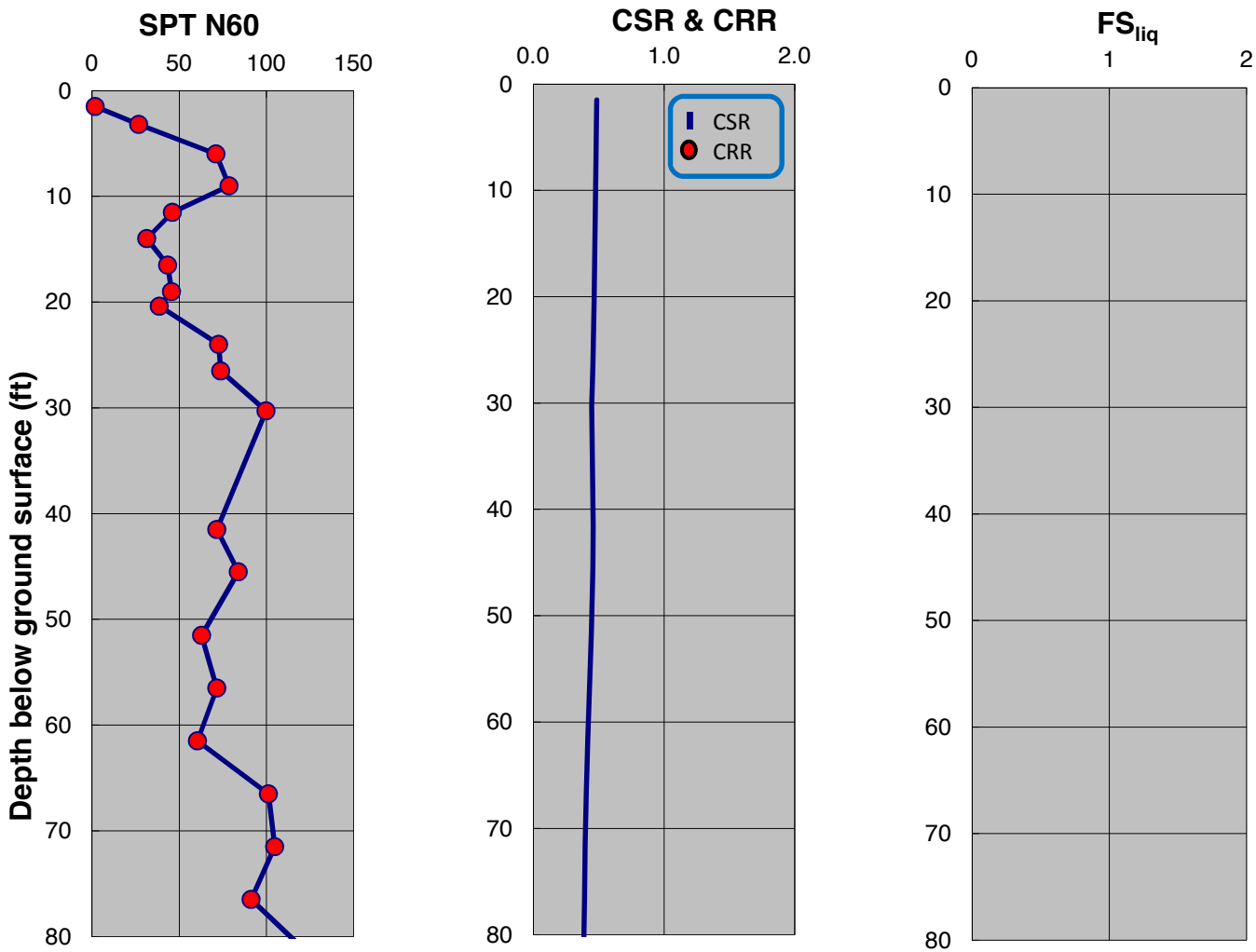
PLATE B.23



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-28 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

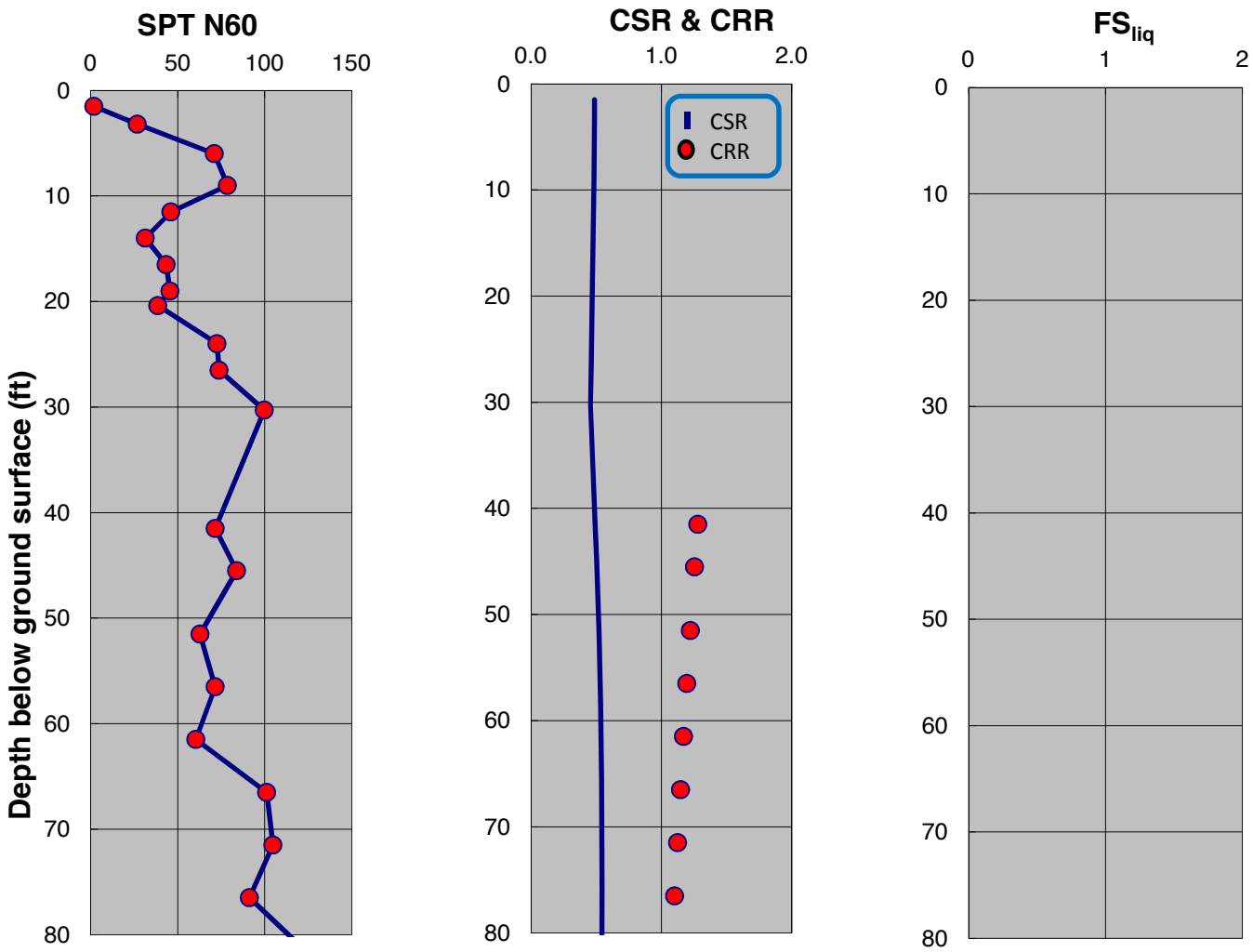
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.24



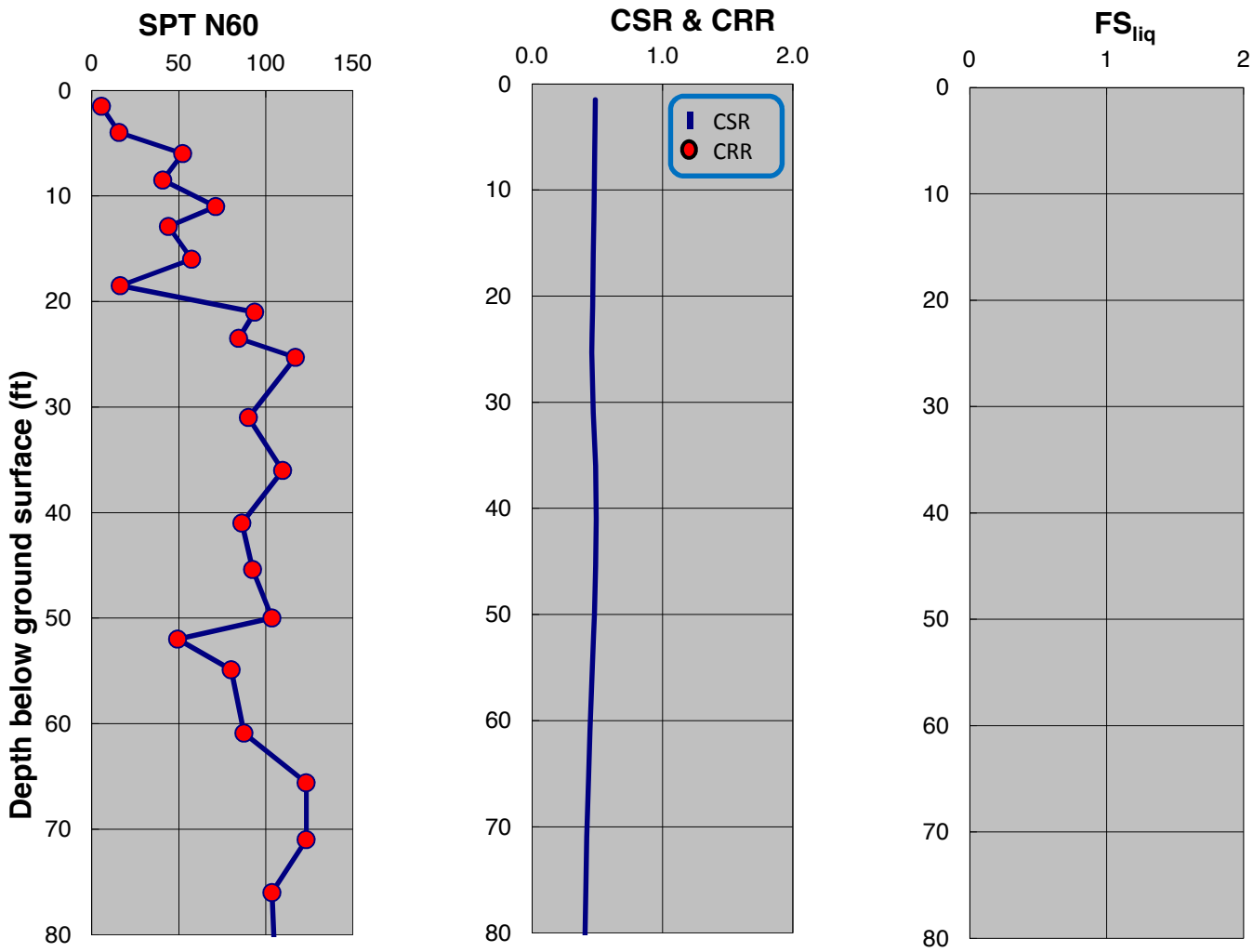
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-32 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



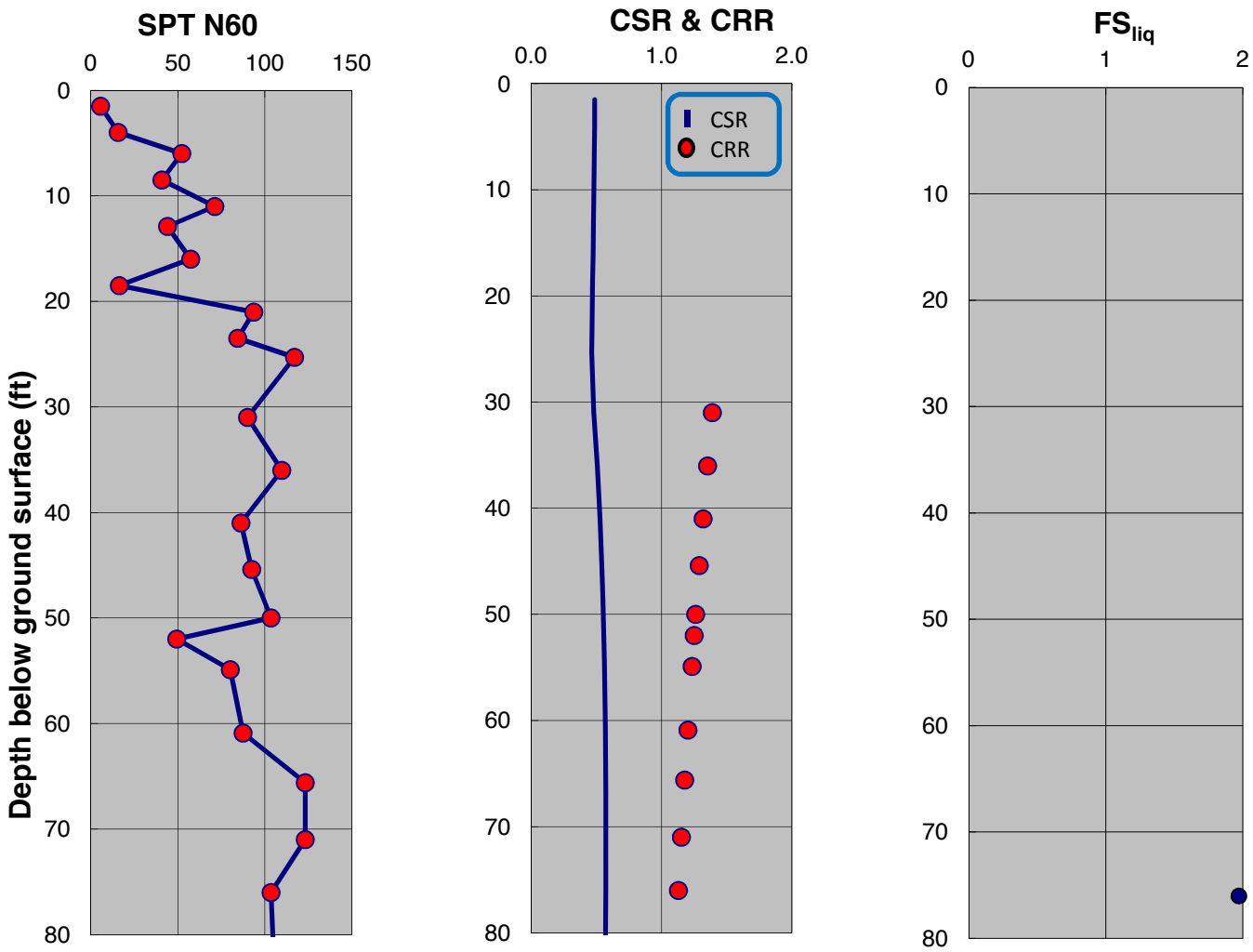
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-32 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



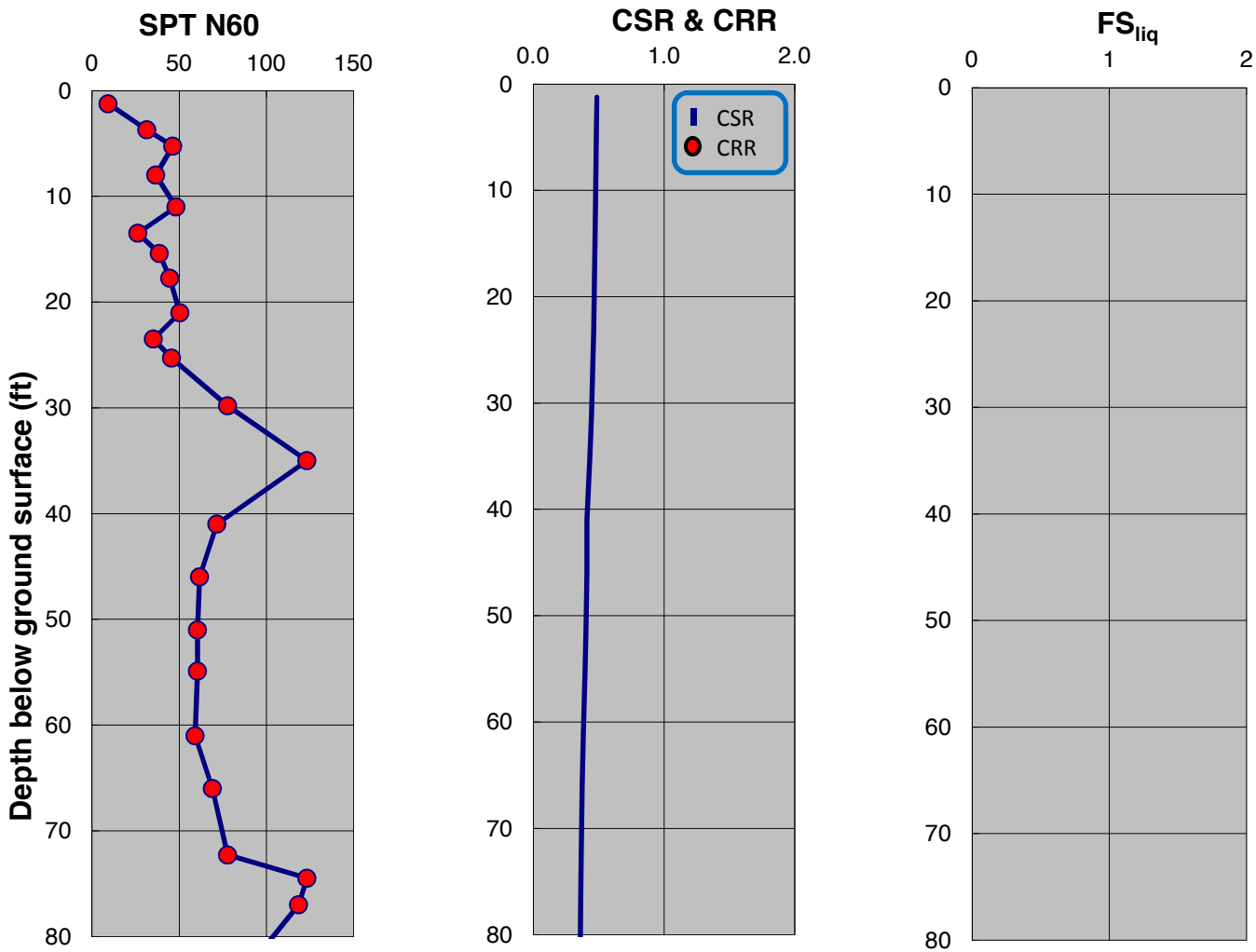
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-34 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



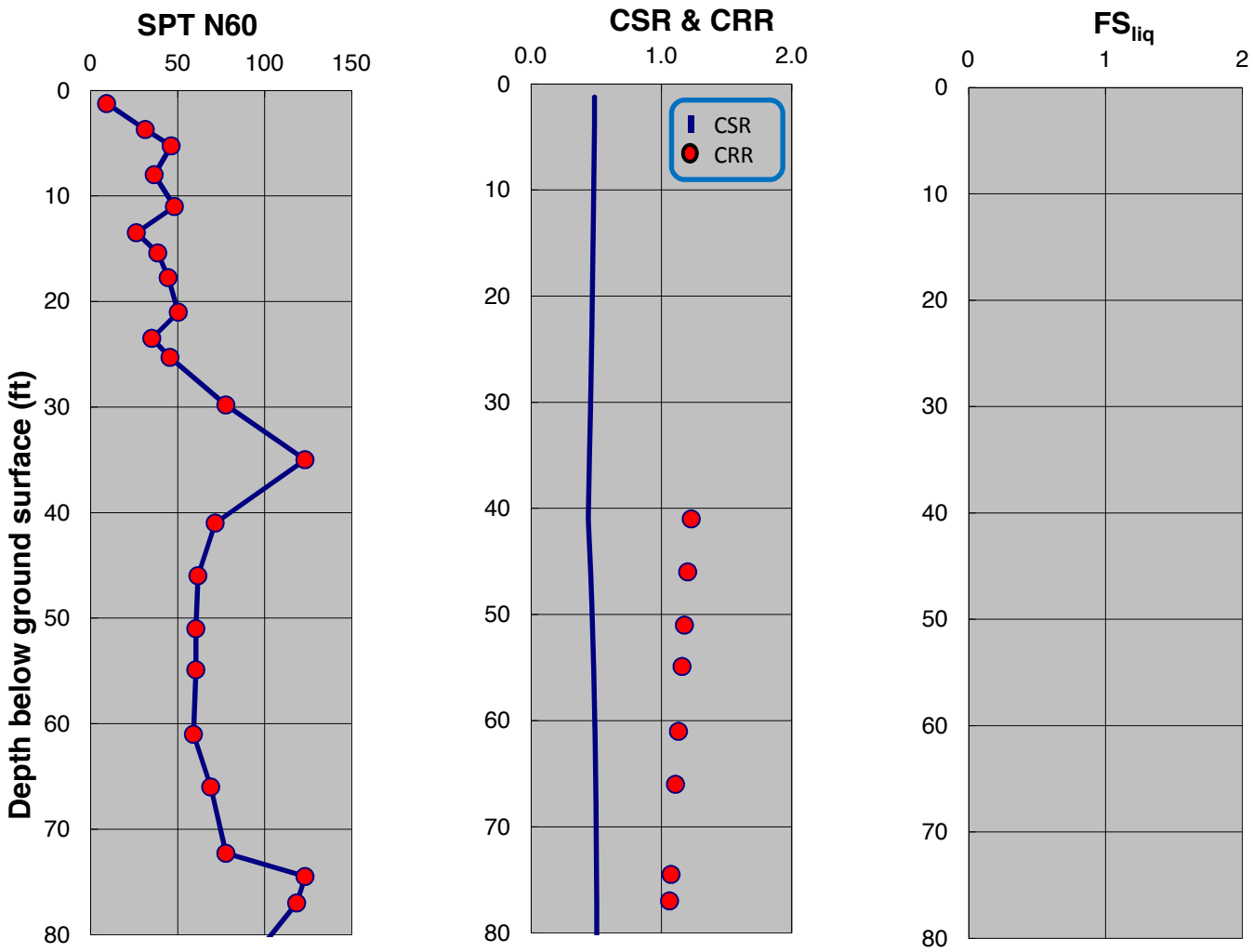
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-34 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-36 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

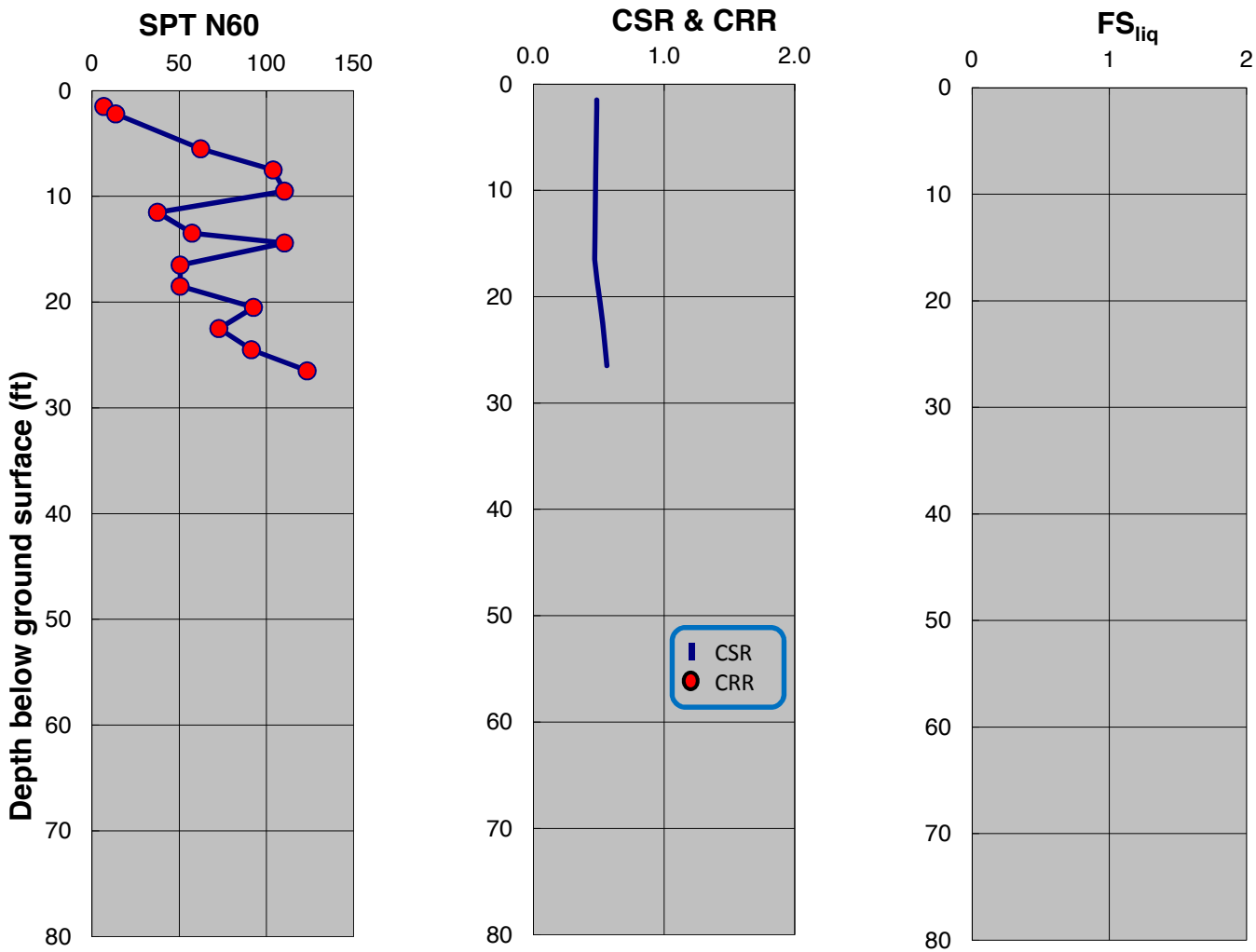
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-36 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

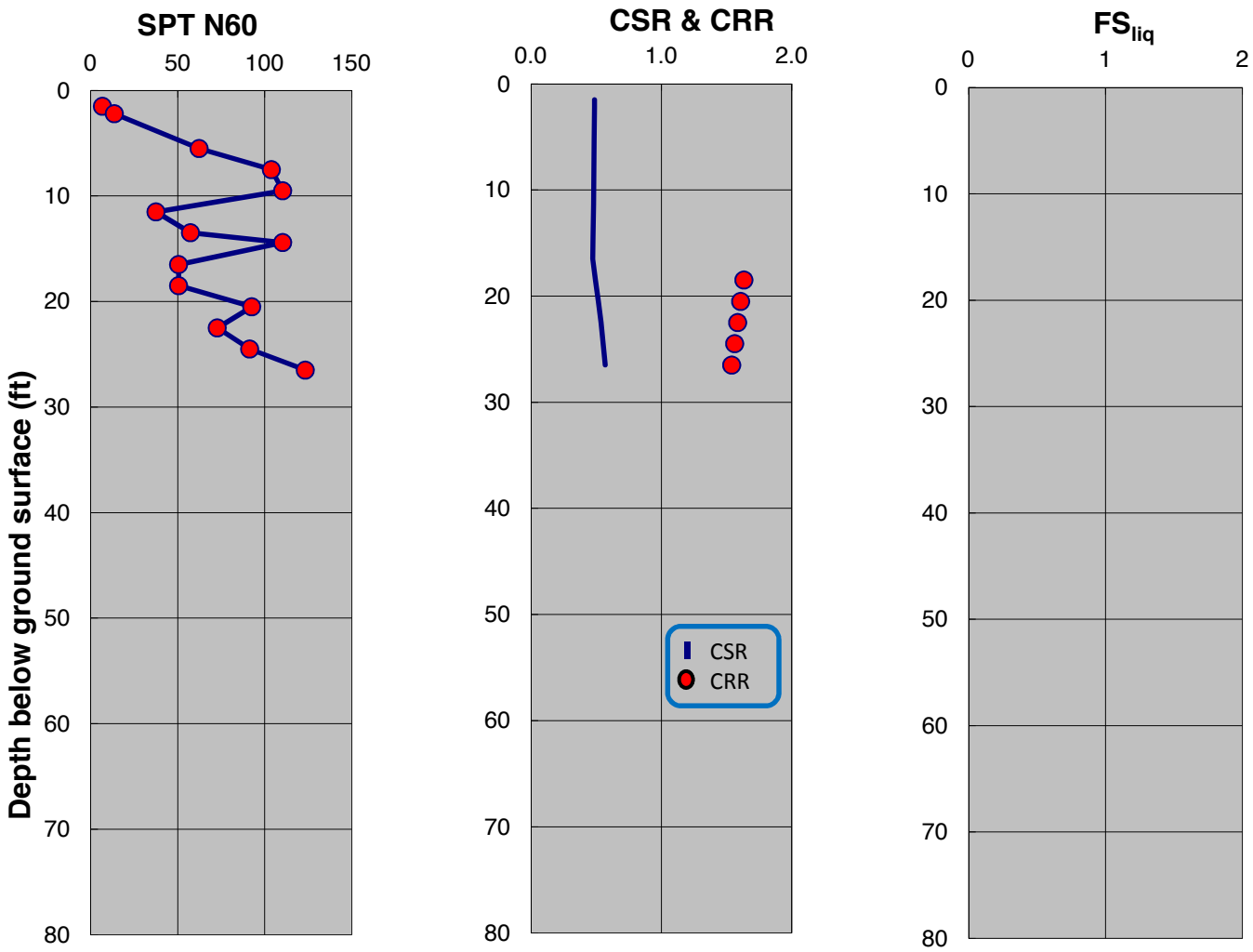
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.30



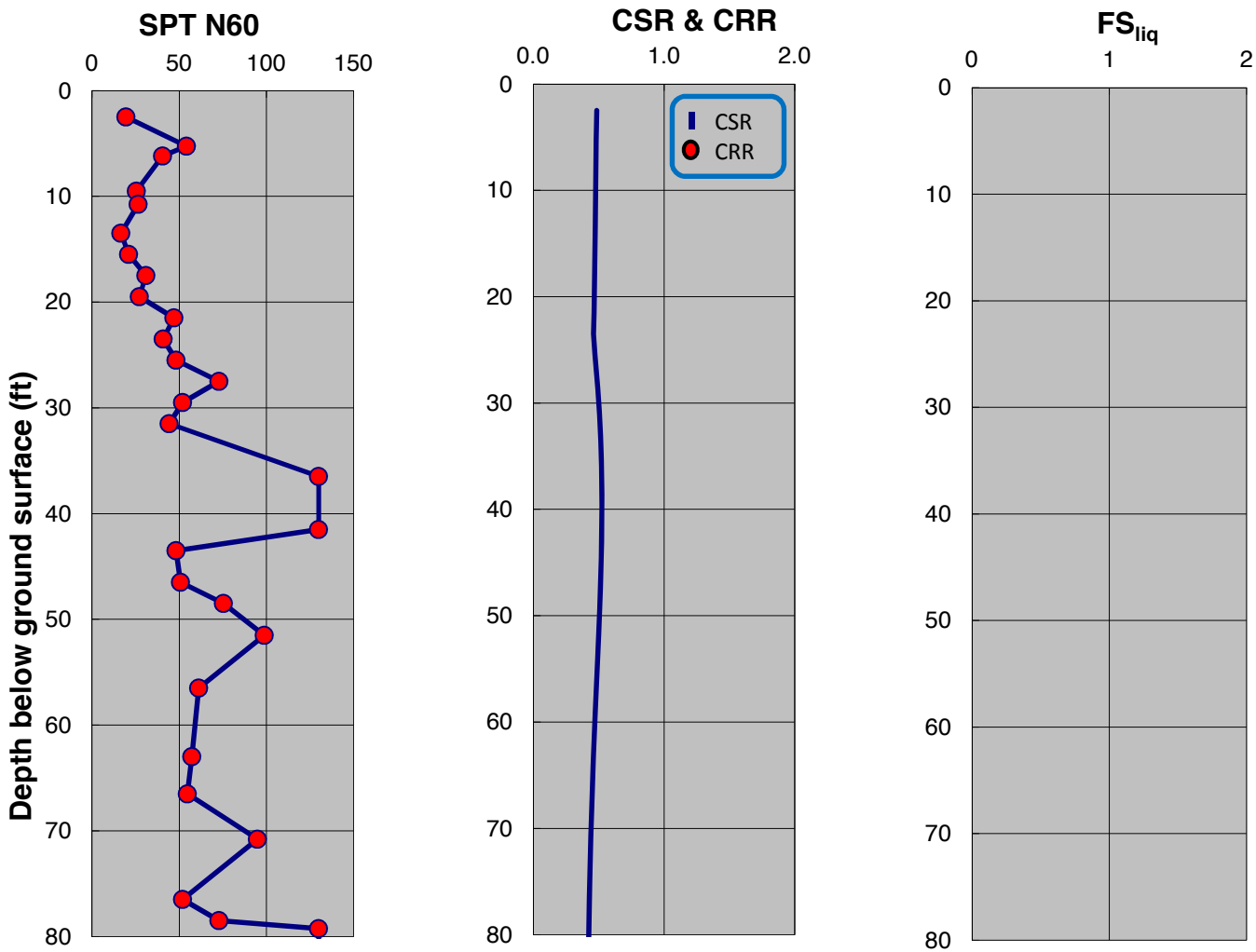
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-37 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



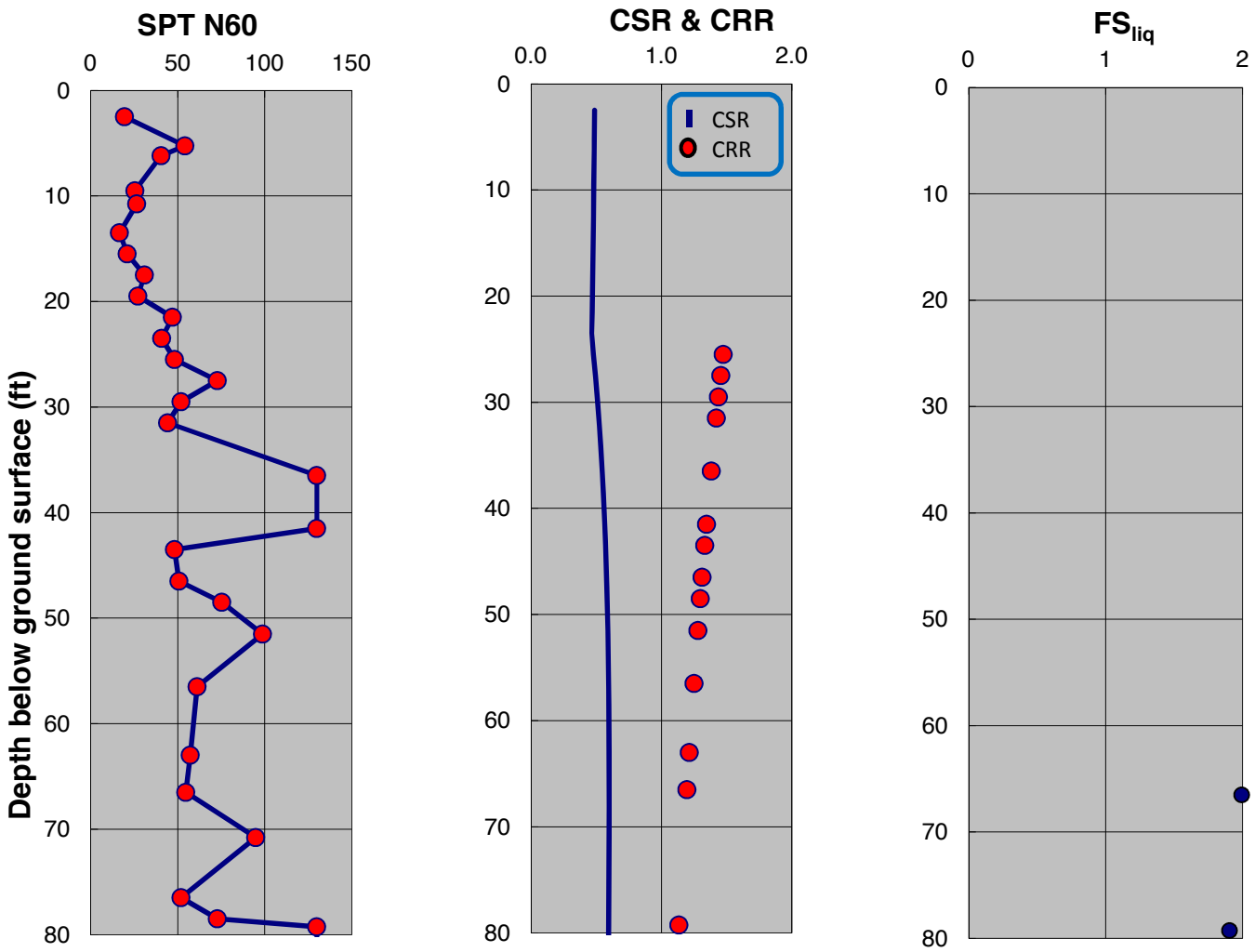
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-37 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-38 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

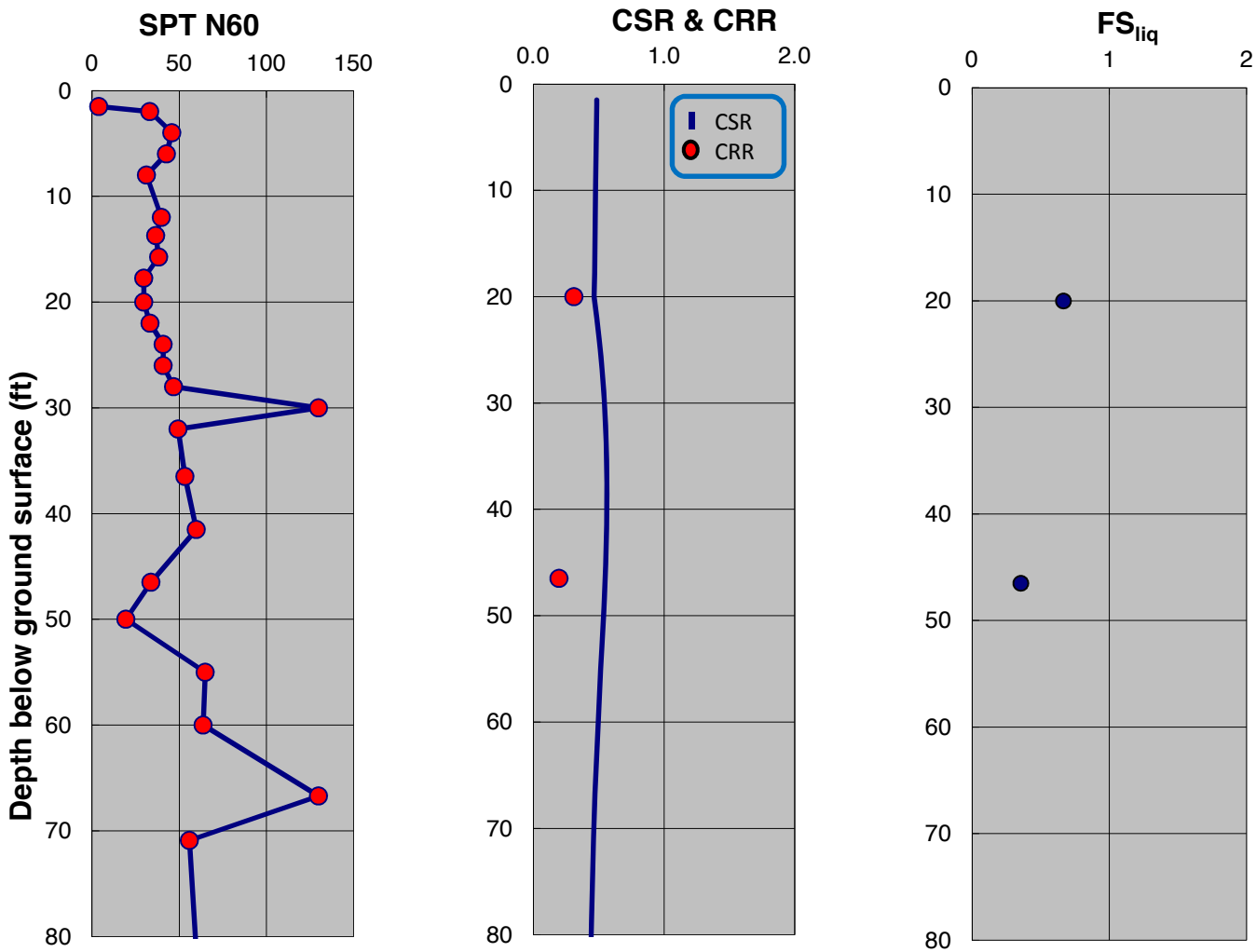
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-38 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

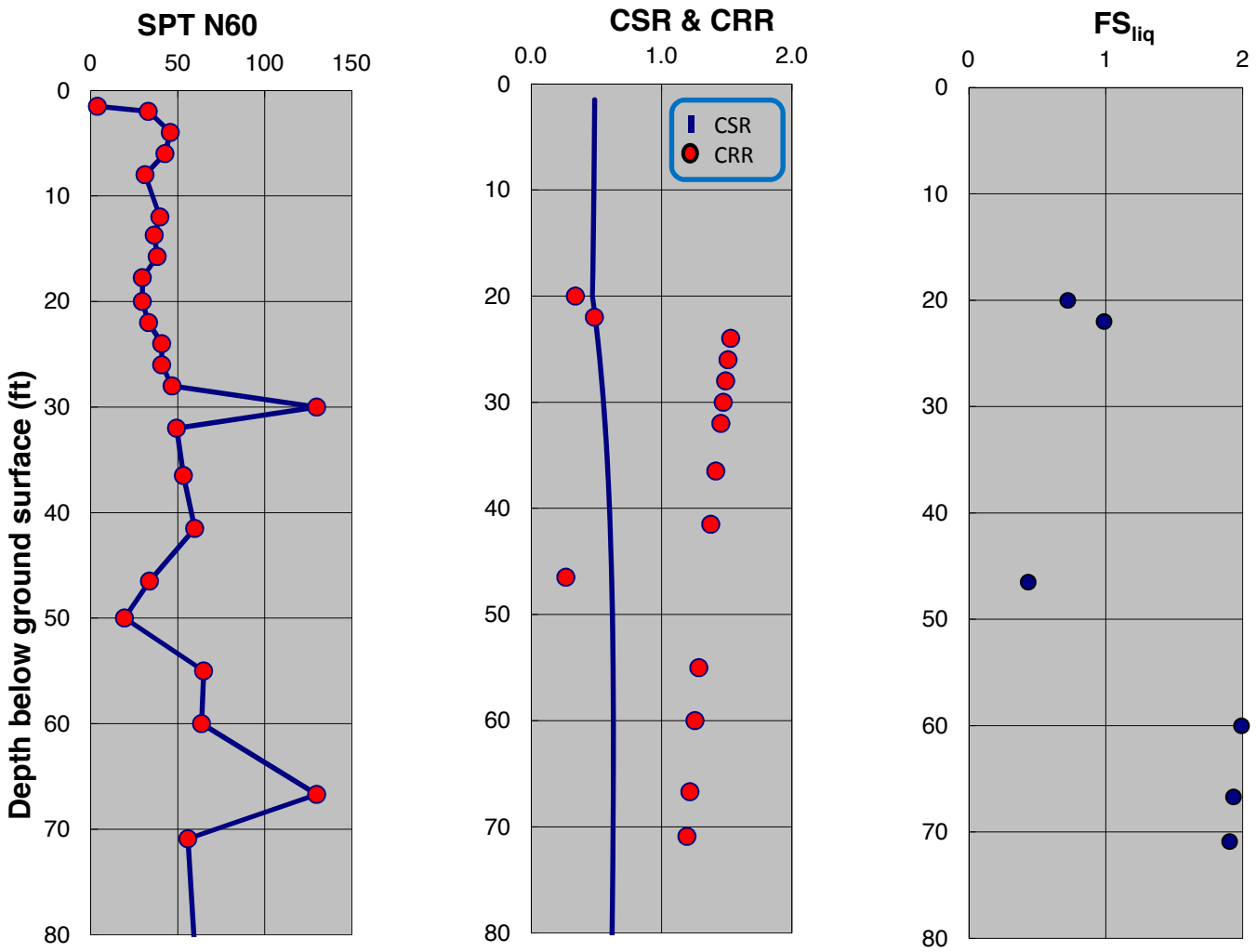
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.34



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-39 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

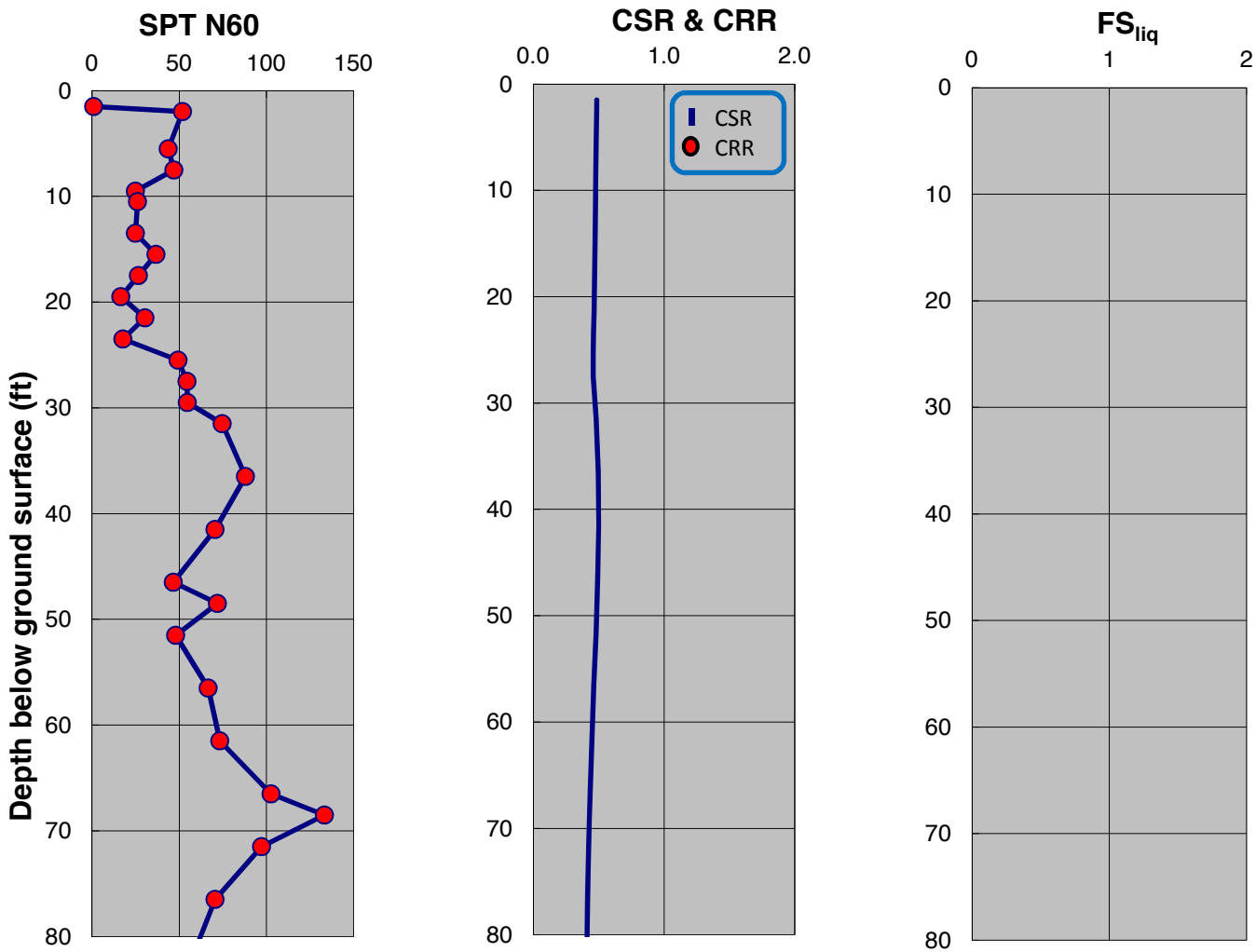
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-39 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

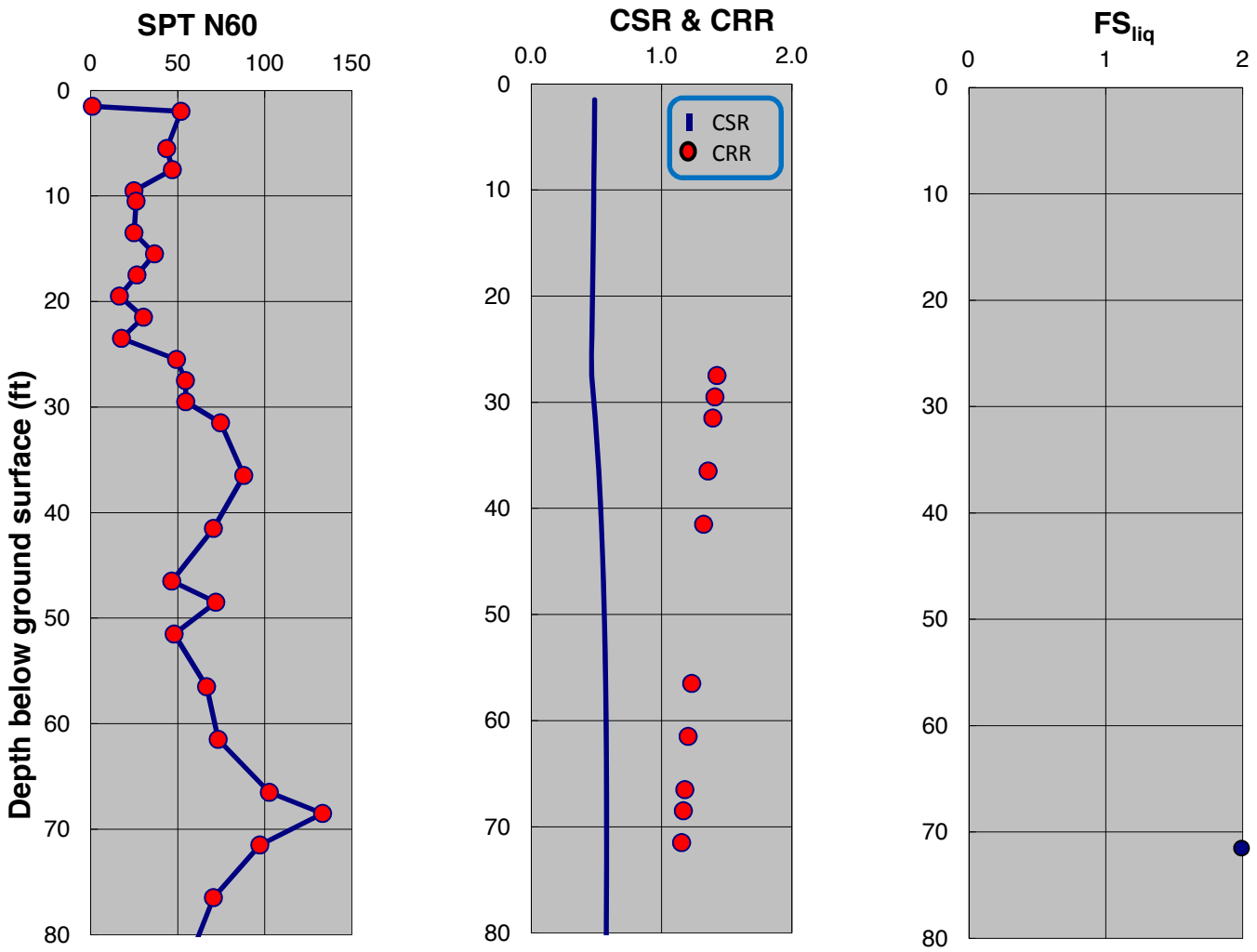
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.36



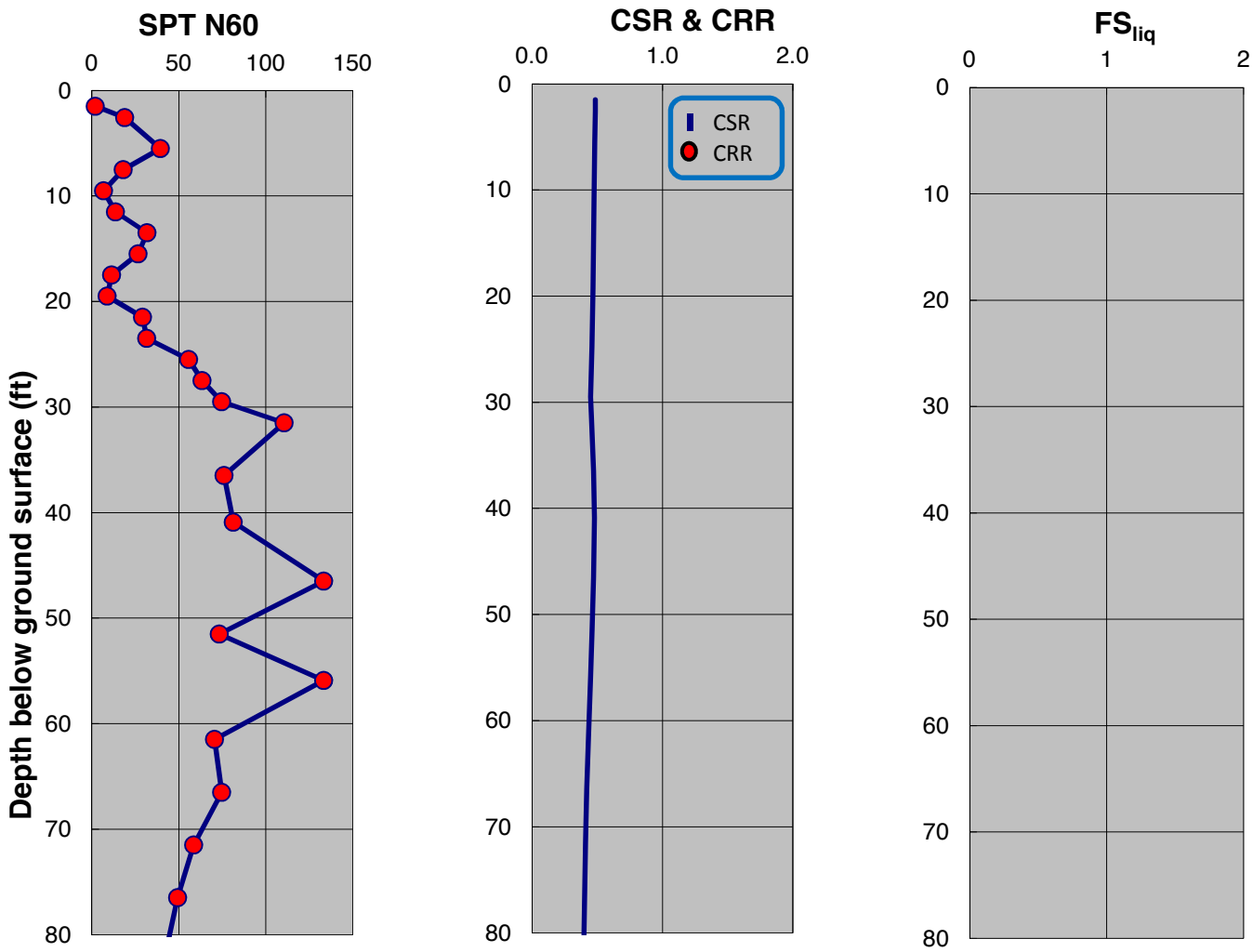
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-40 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



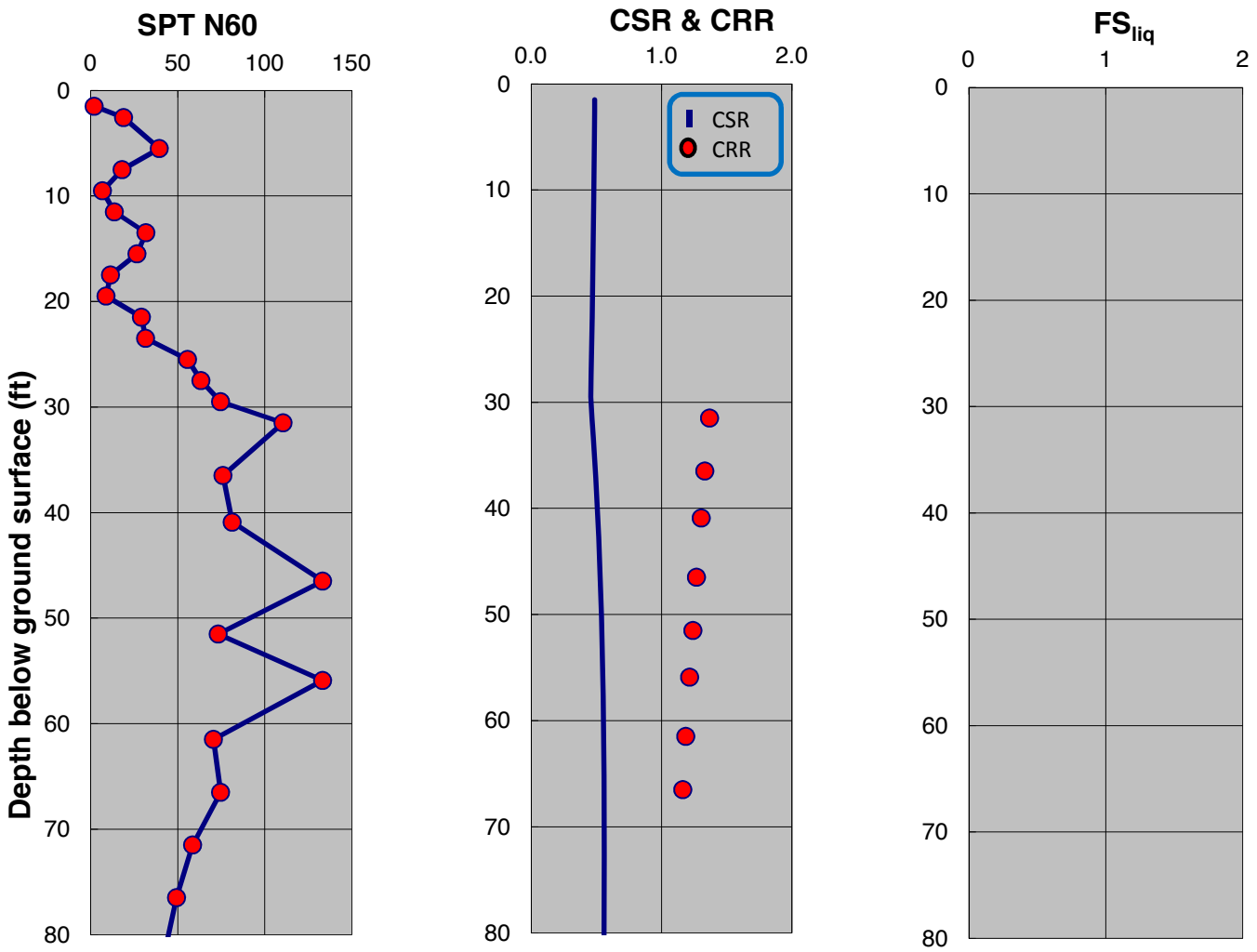
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-40 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-42 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

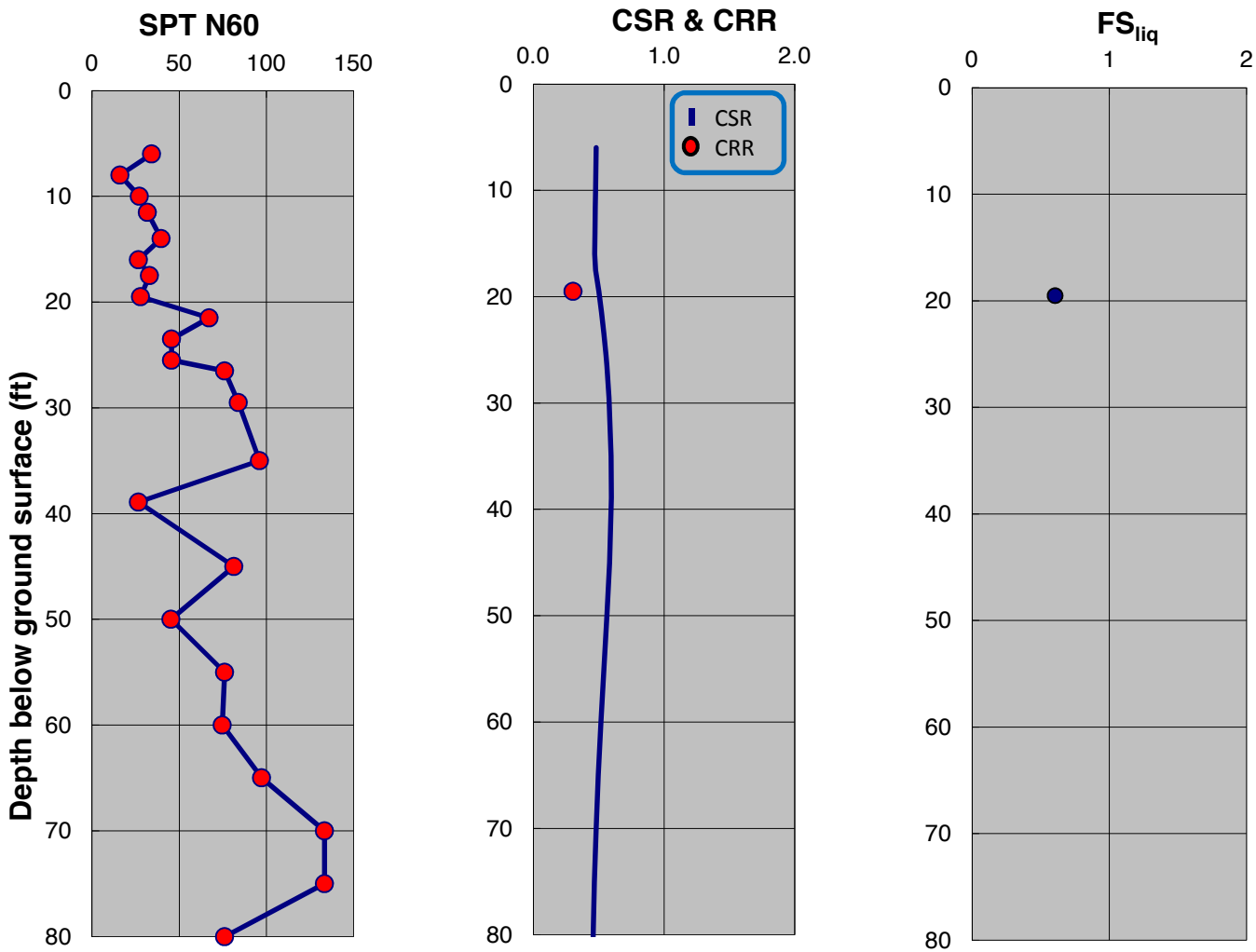
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-42 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

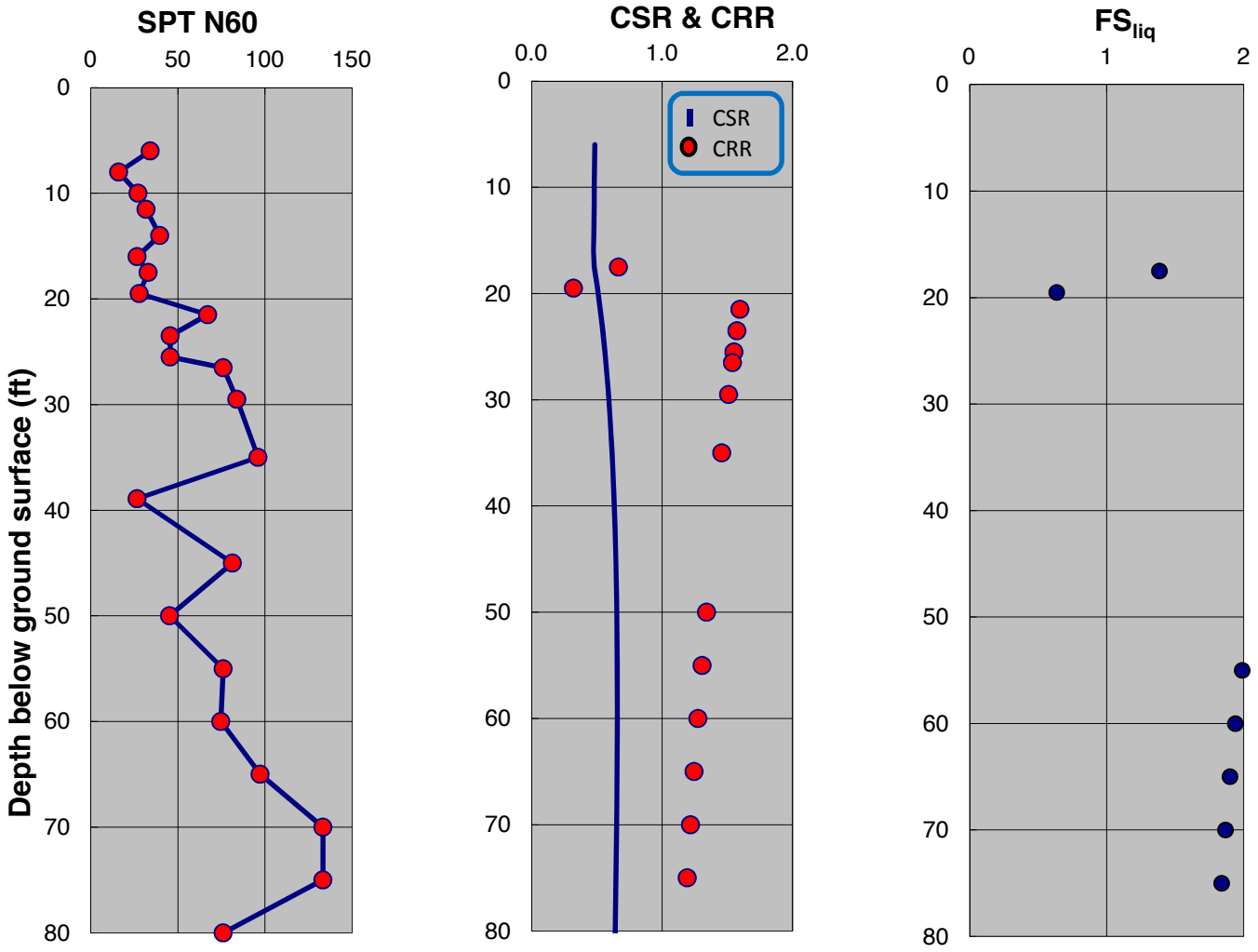
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.40



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-43 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

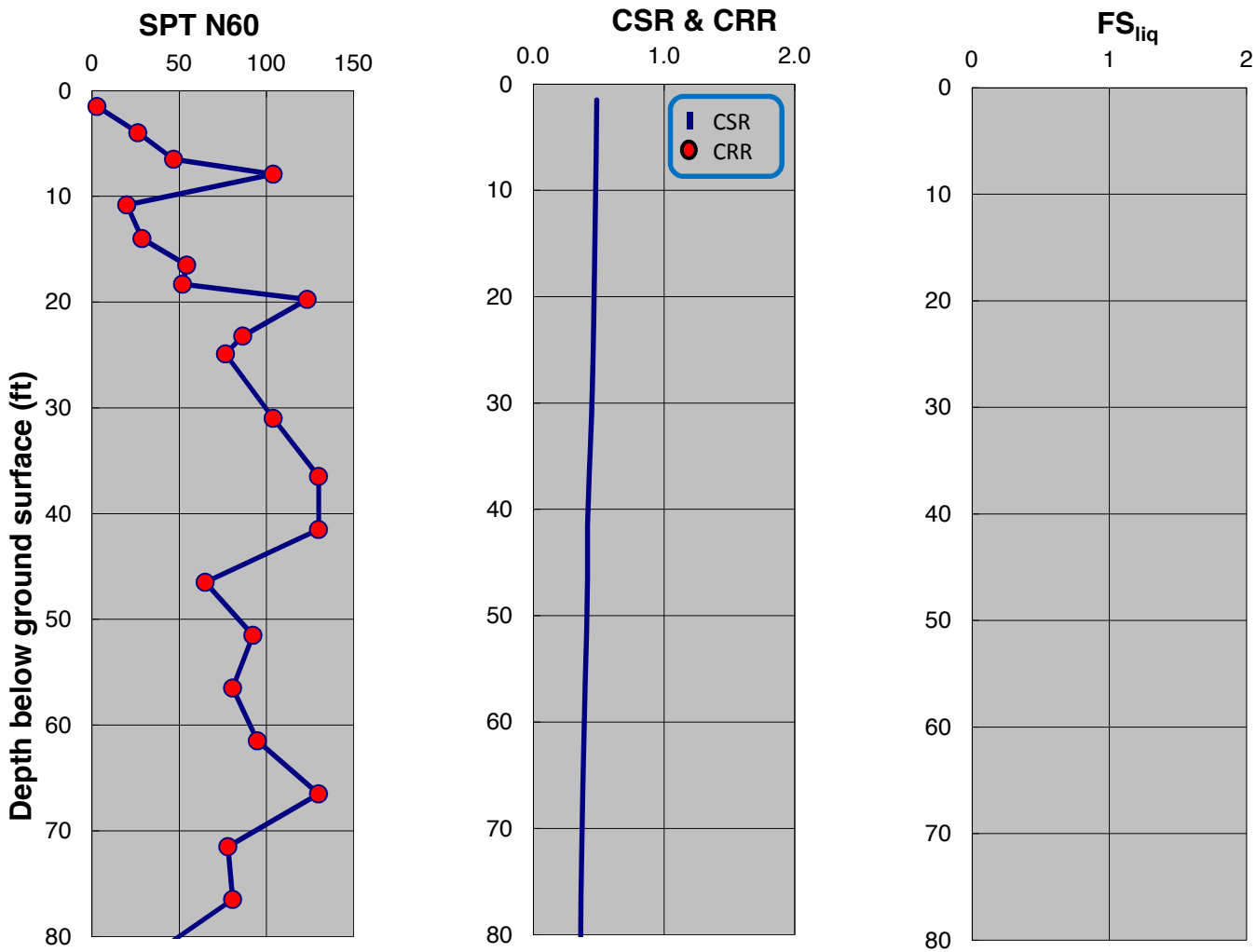
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-43 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

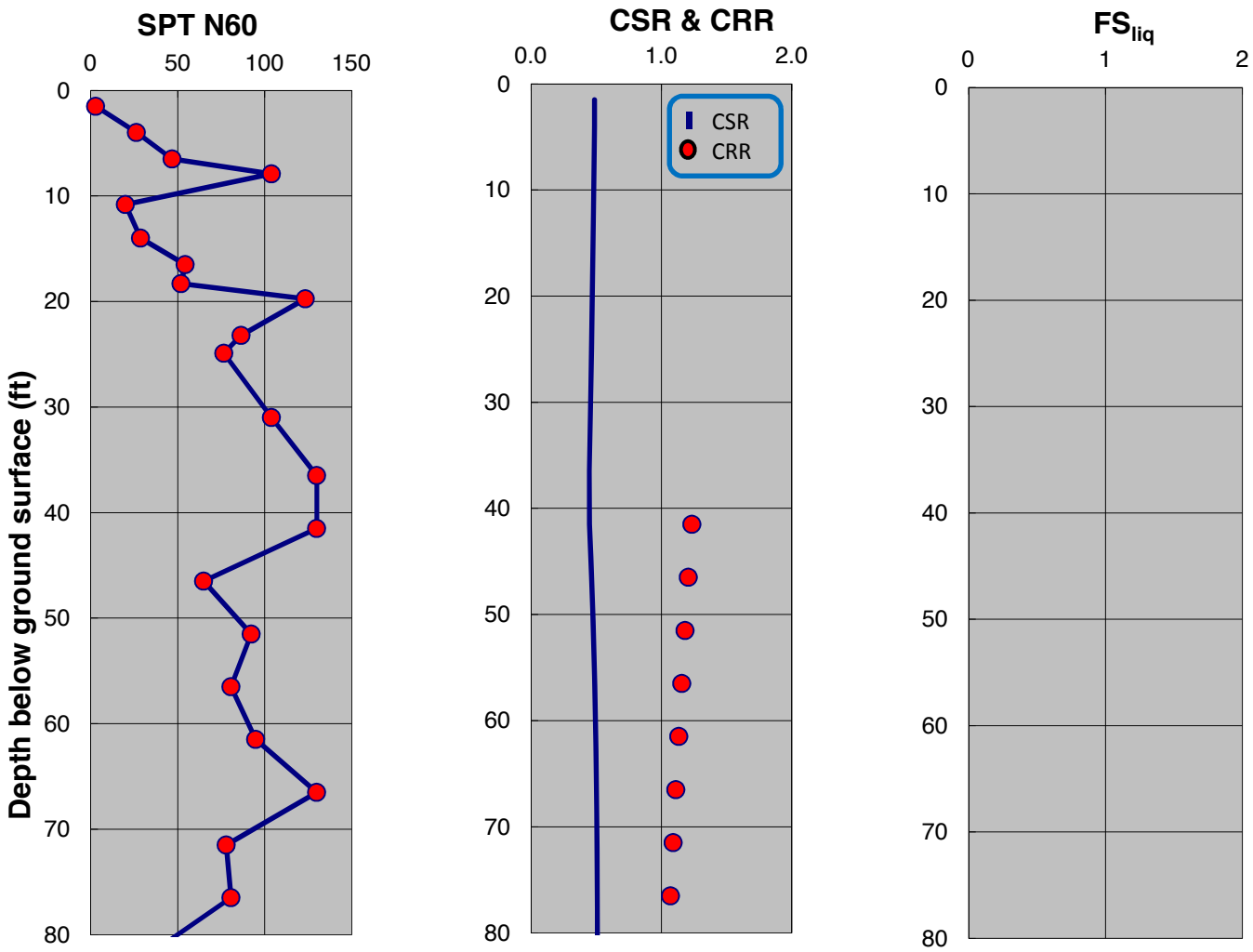
PLATE B.42



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-45 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

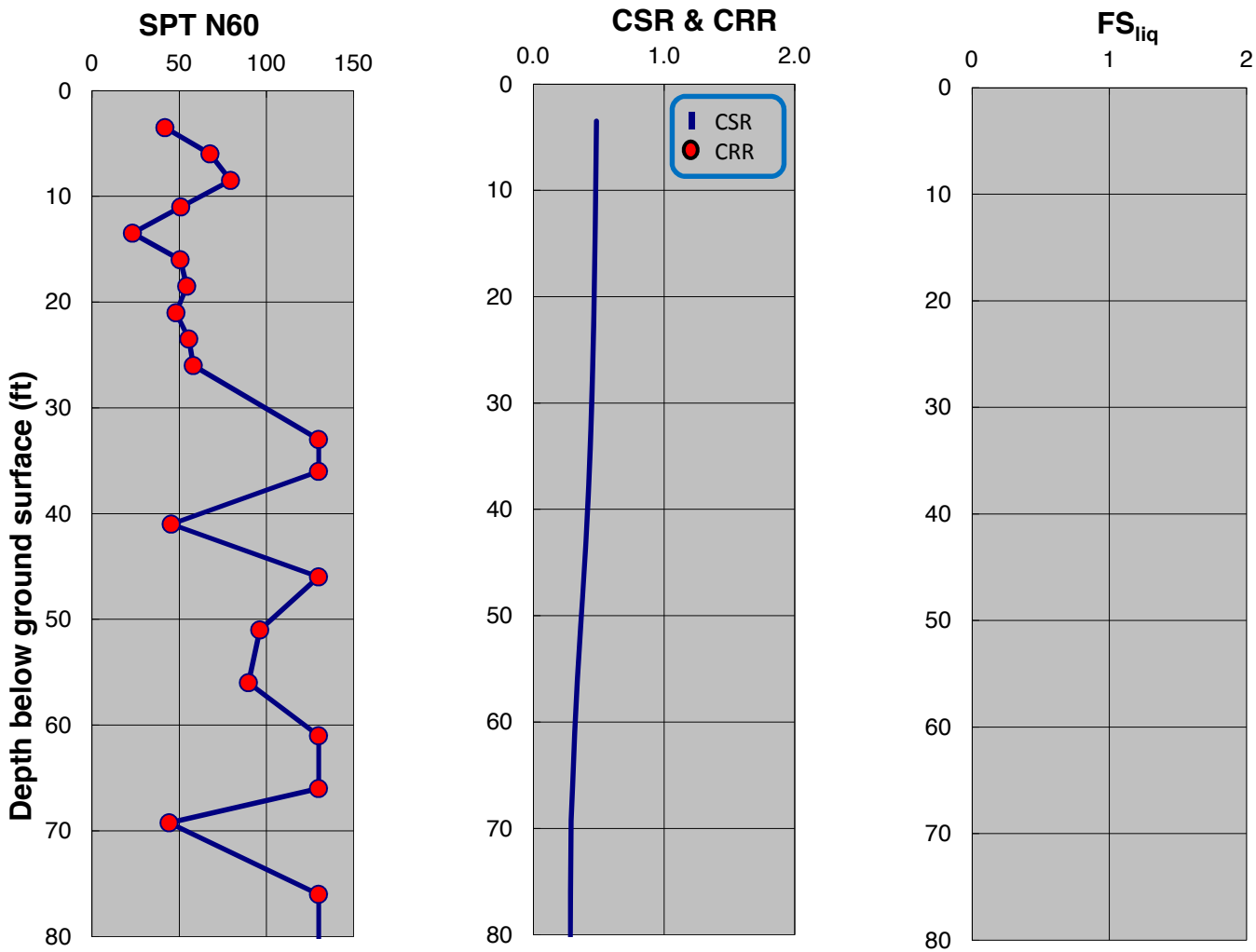
PLATE B.43



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-45 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

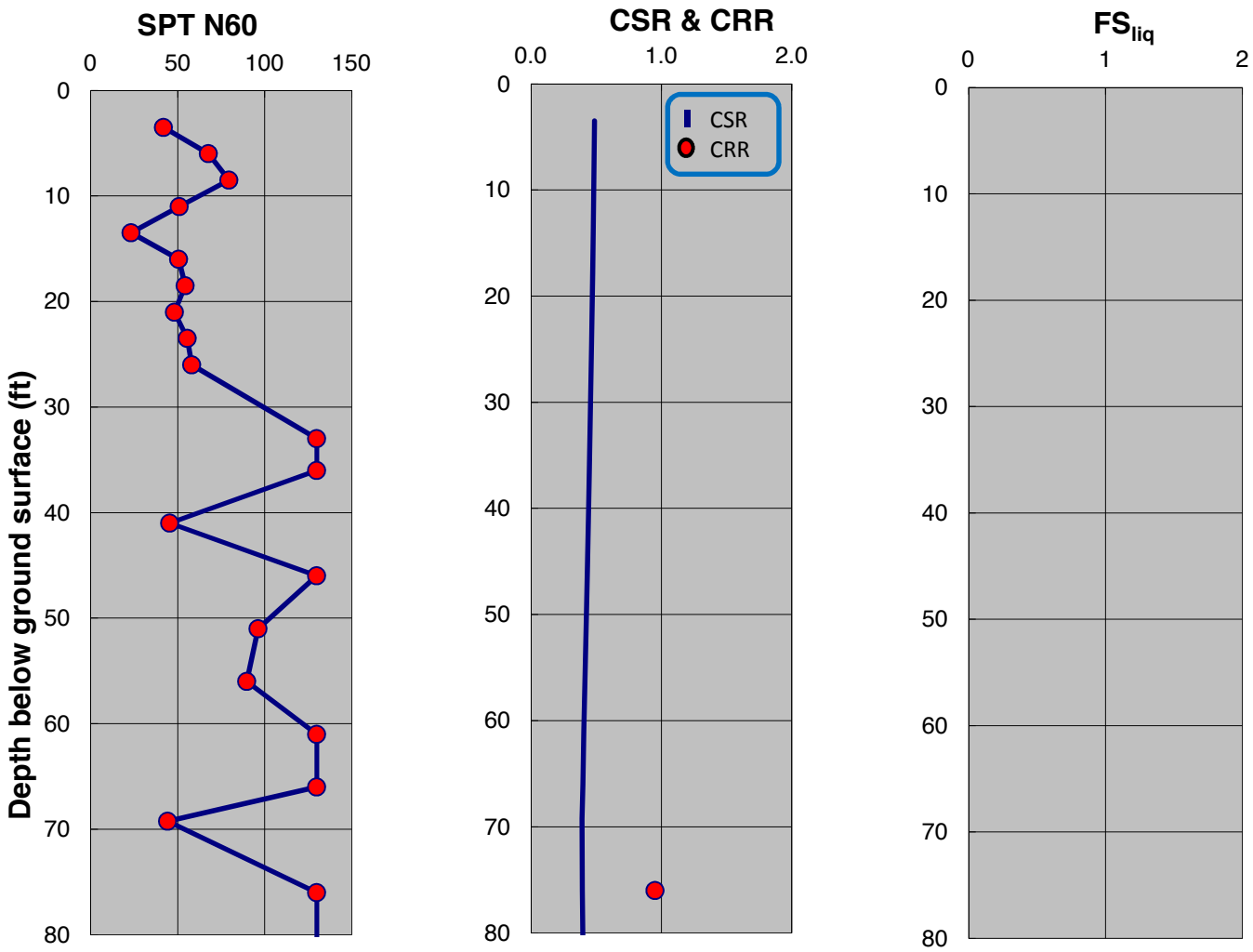
PLATE B.44



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-47 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

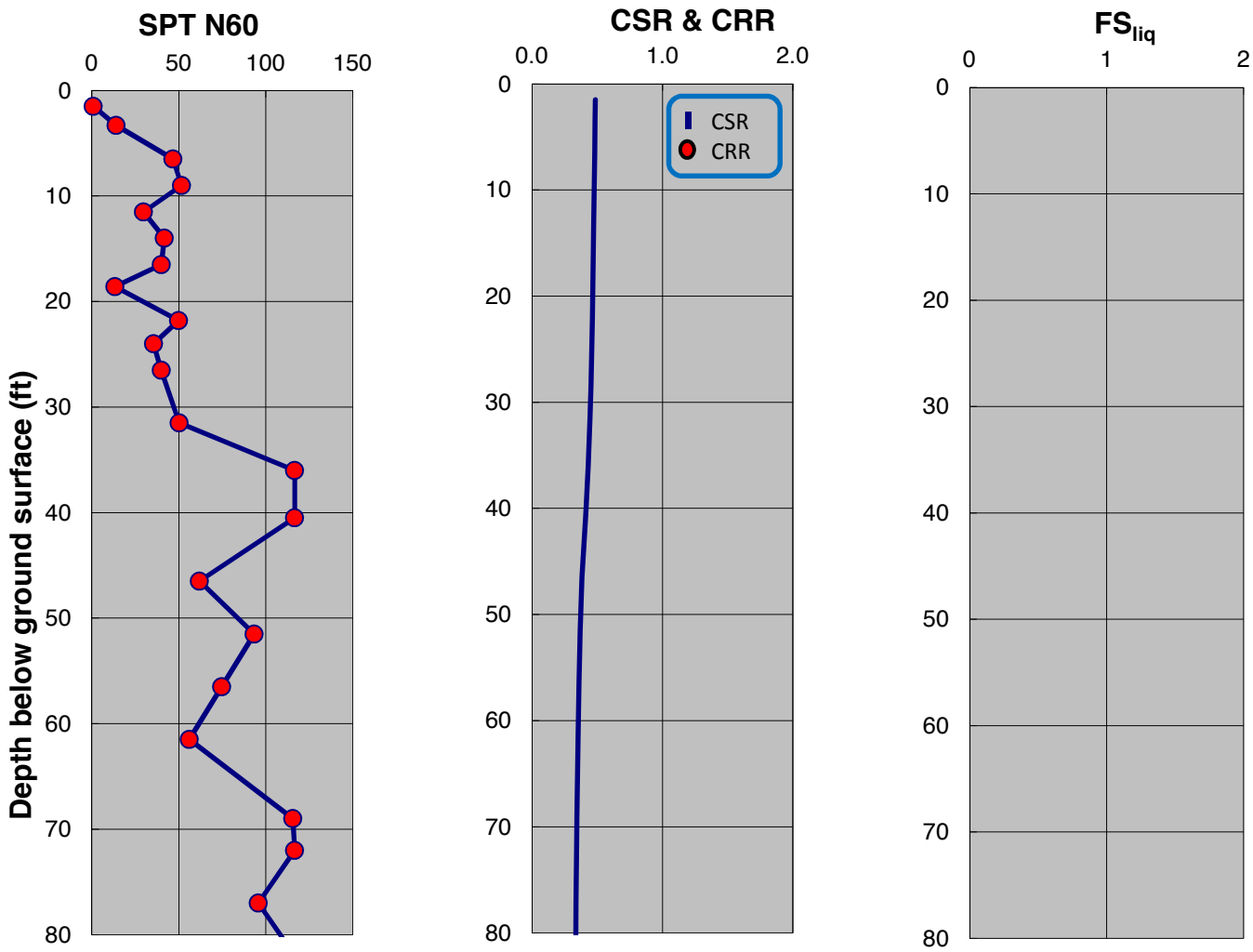
PLATE B.45



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-47 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

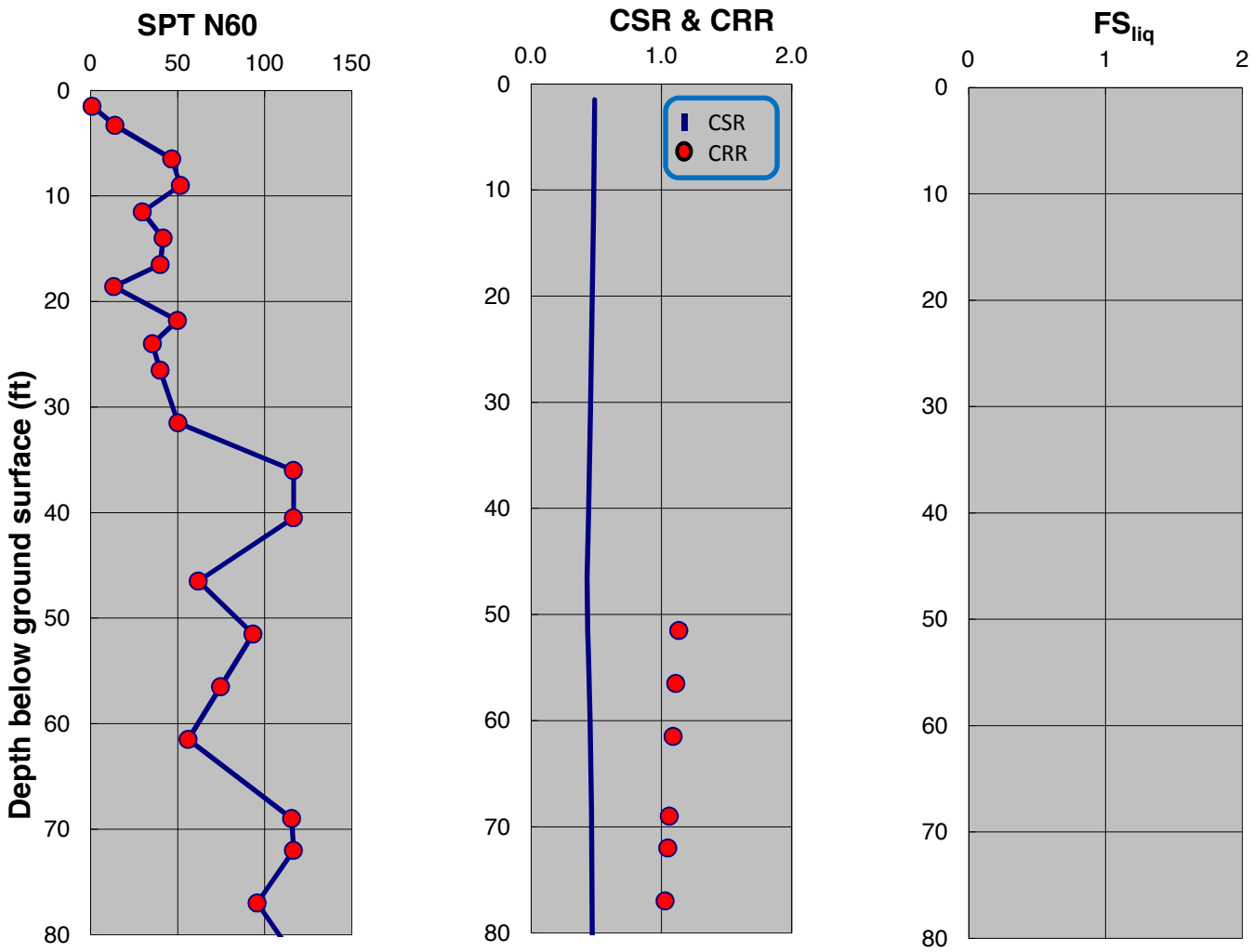
PLATE B.46



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-49 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

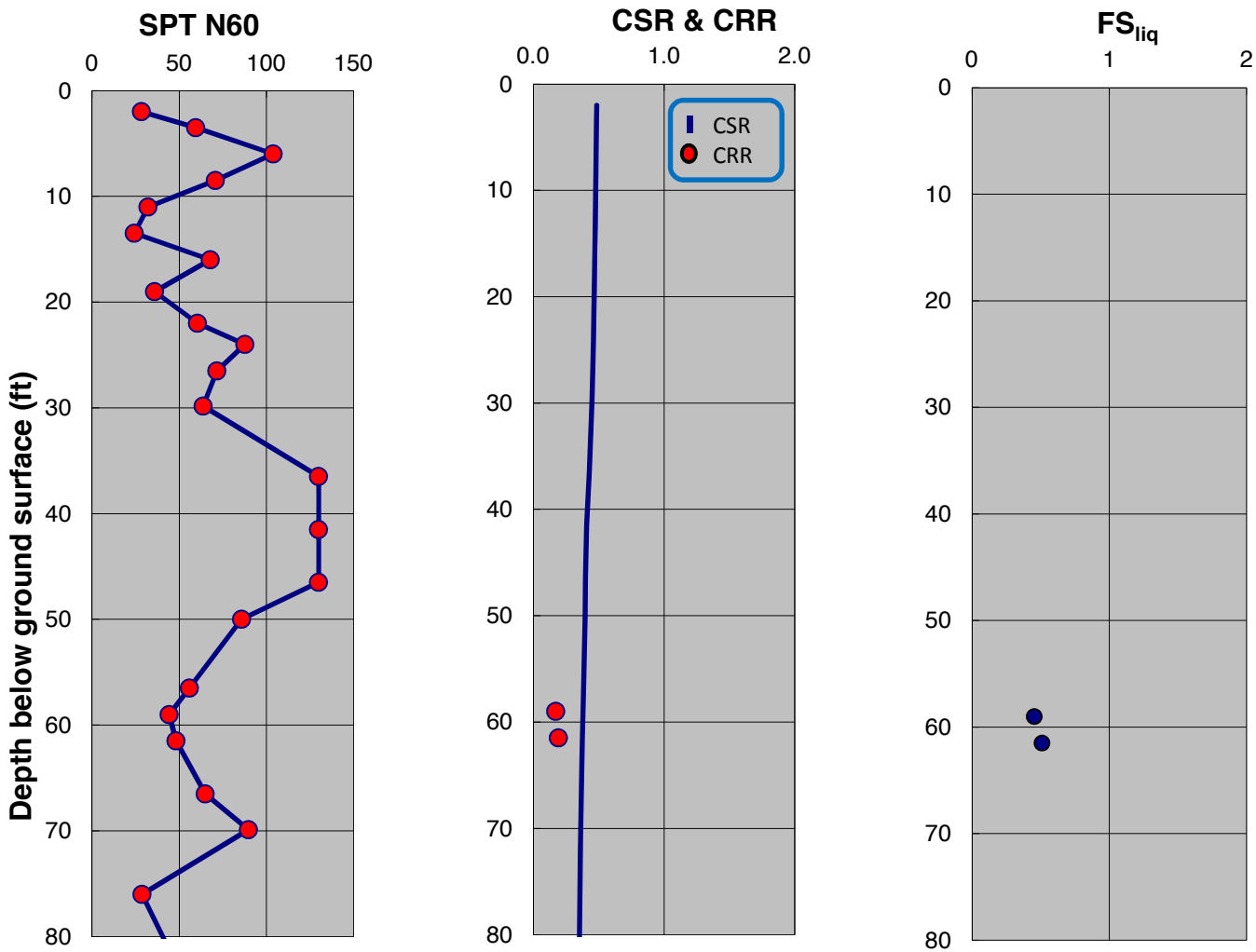
PLATE B.47



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-49 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

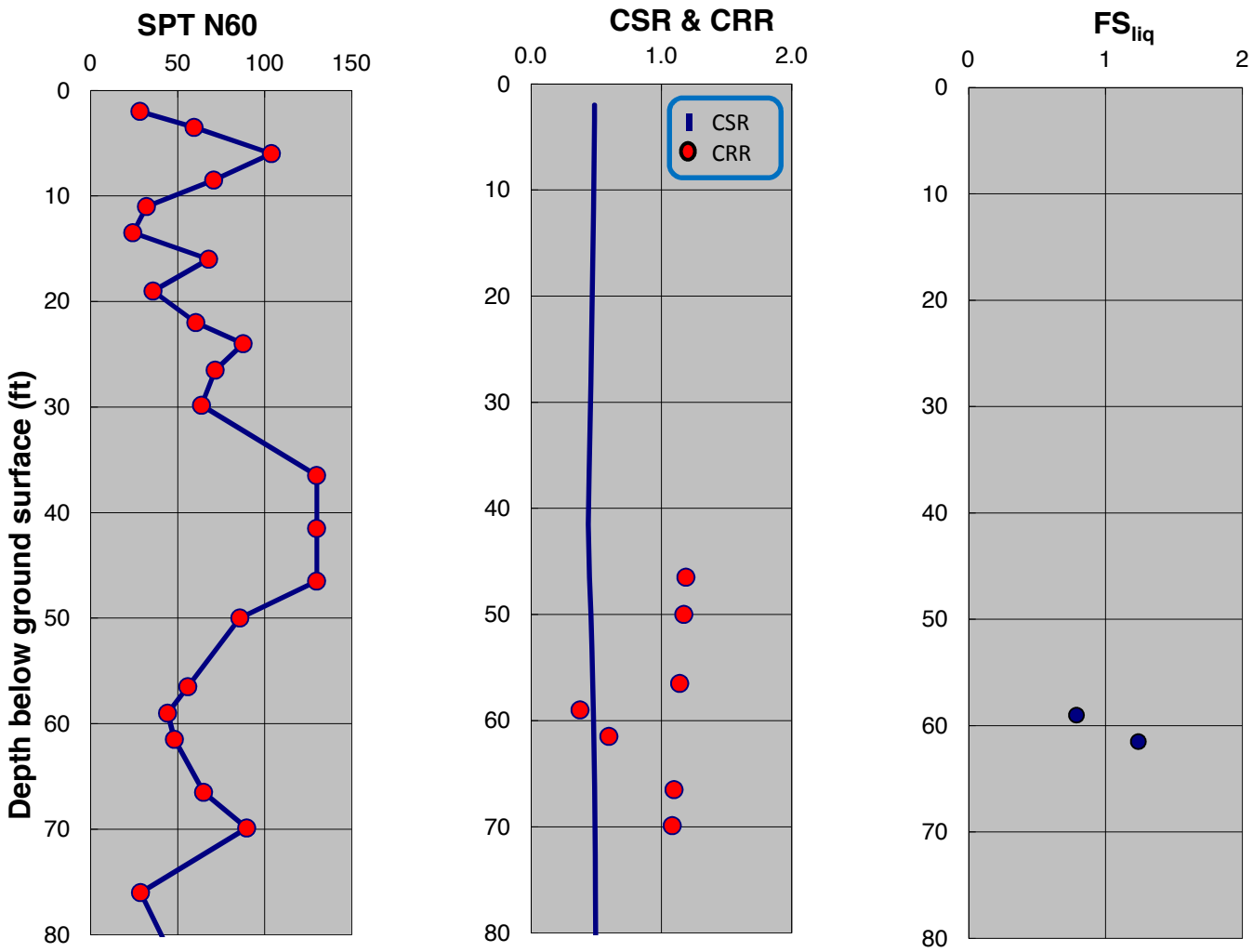
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.48



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-50 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

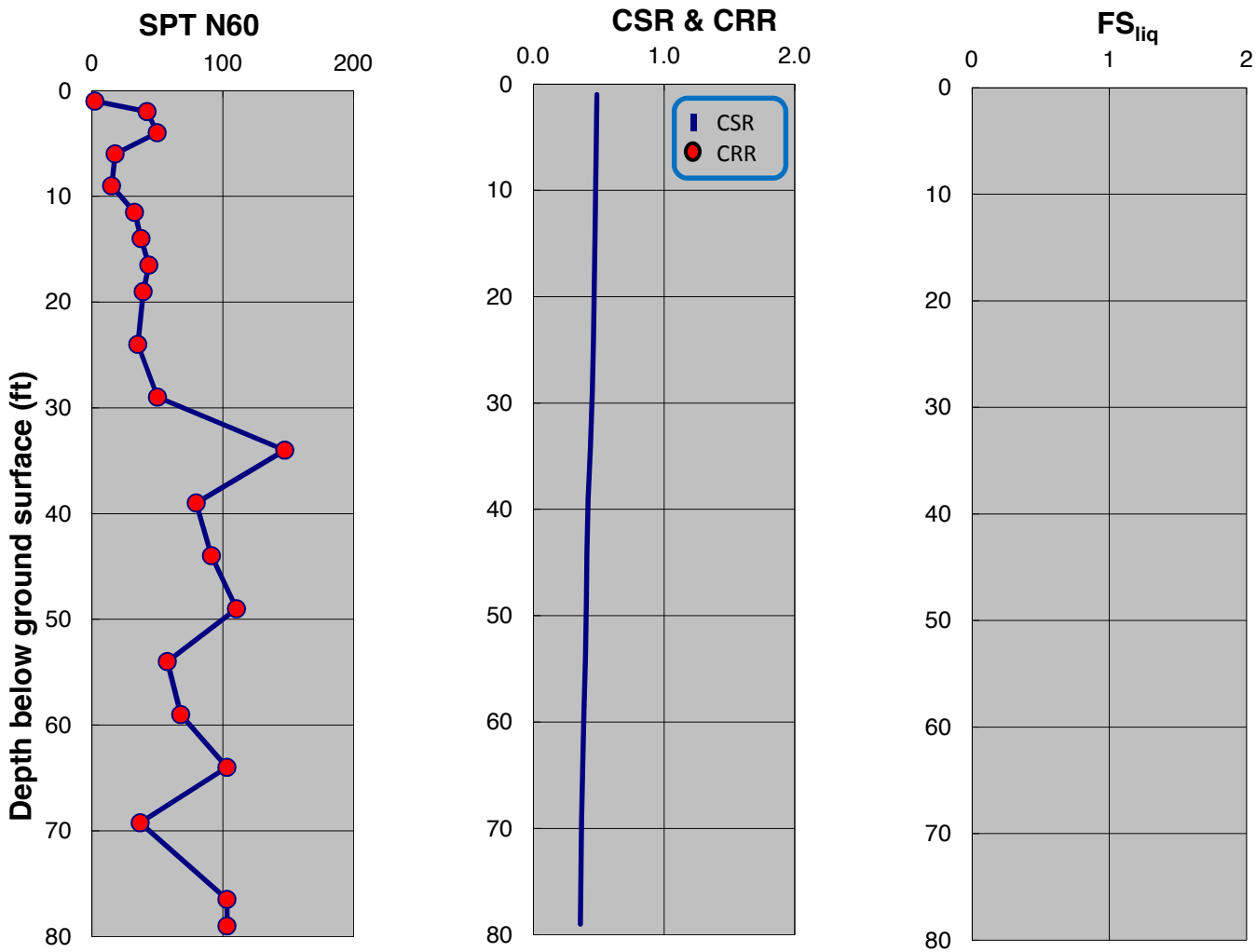
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-50 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

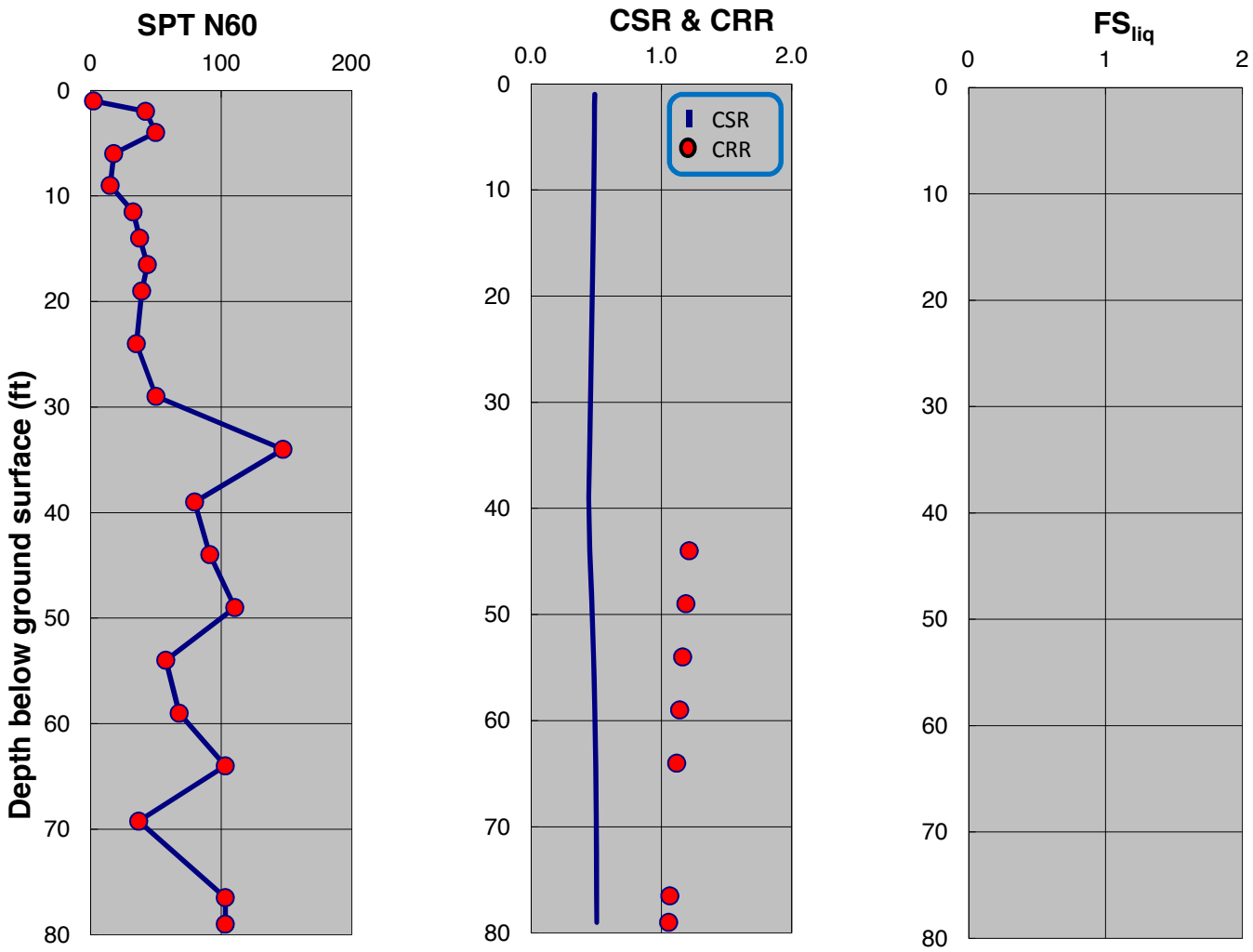
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.50



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-60 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

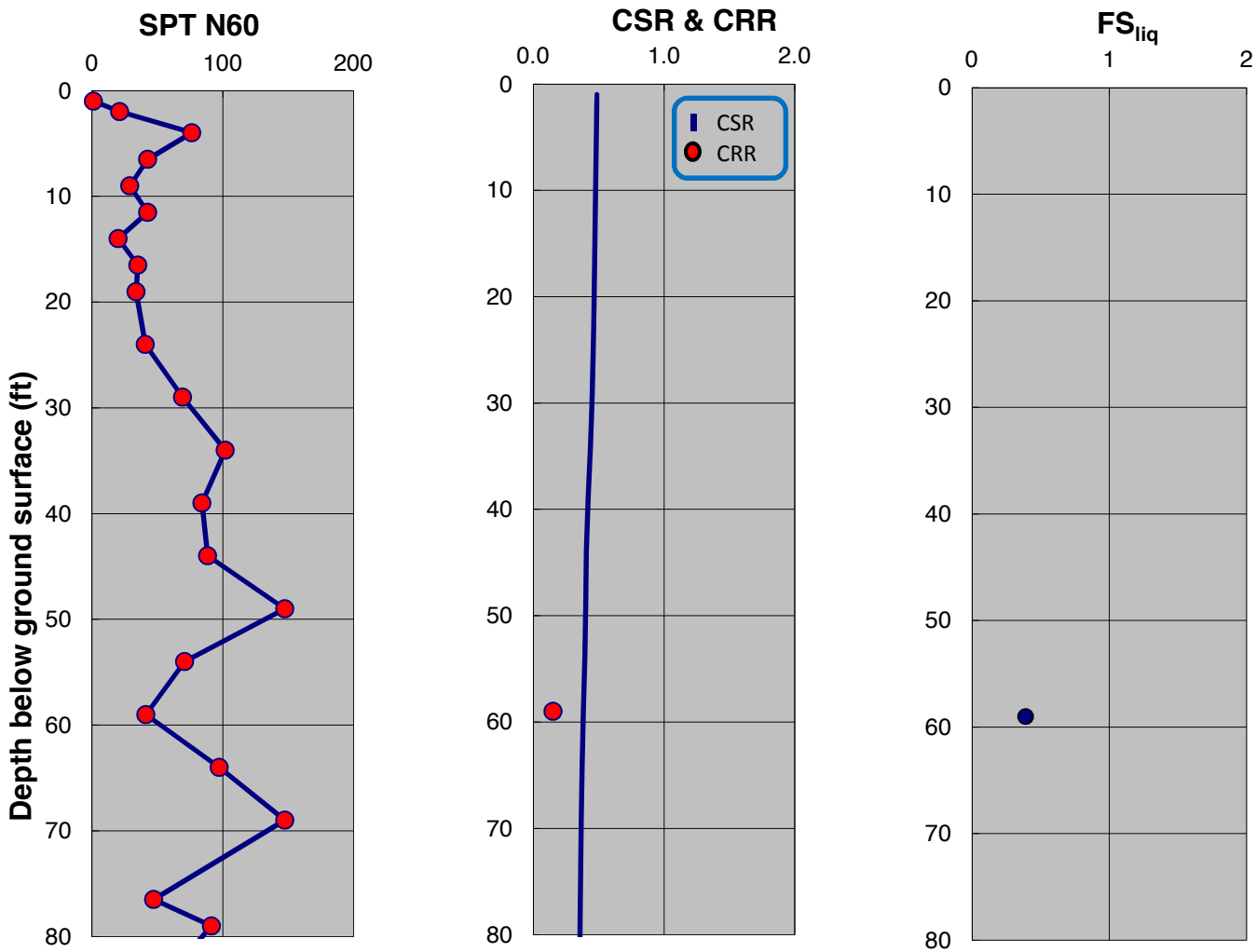
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-60 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

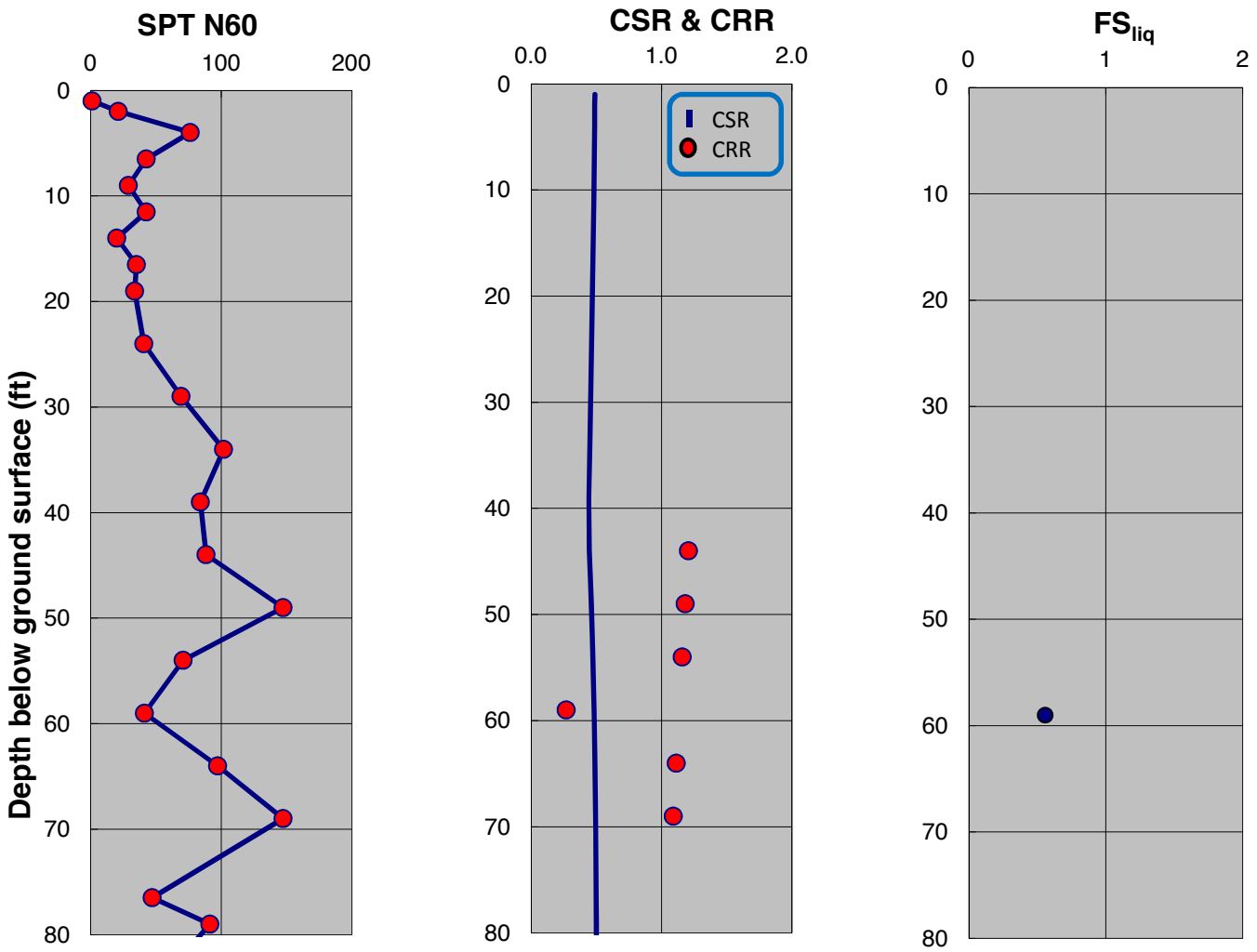
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.52



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-61 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

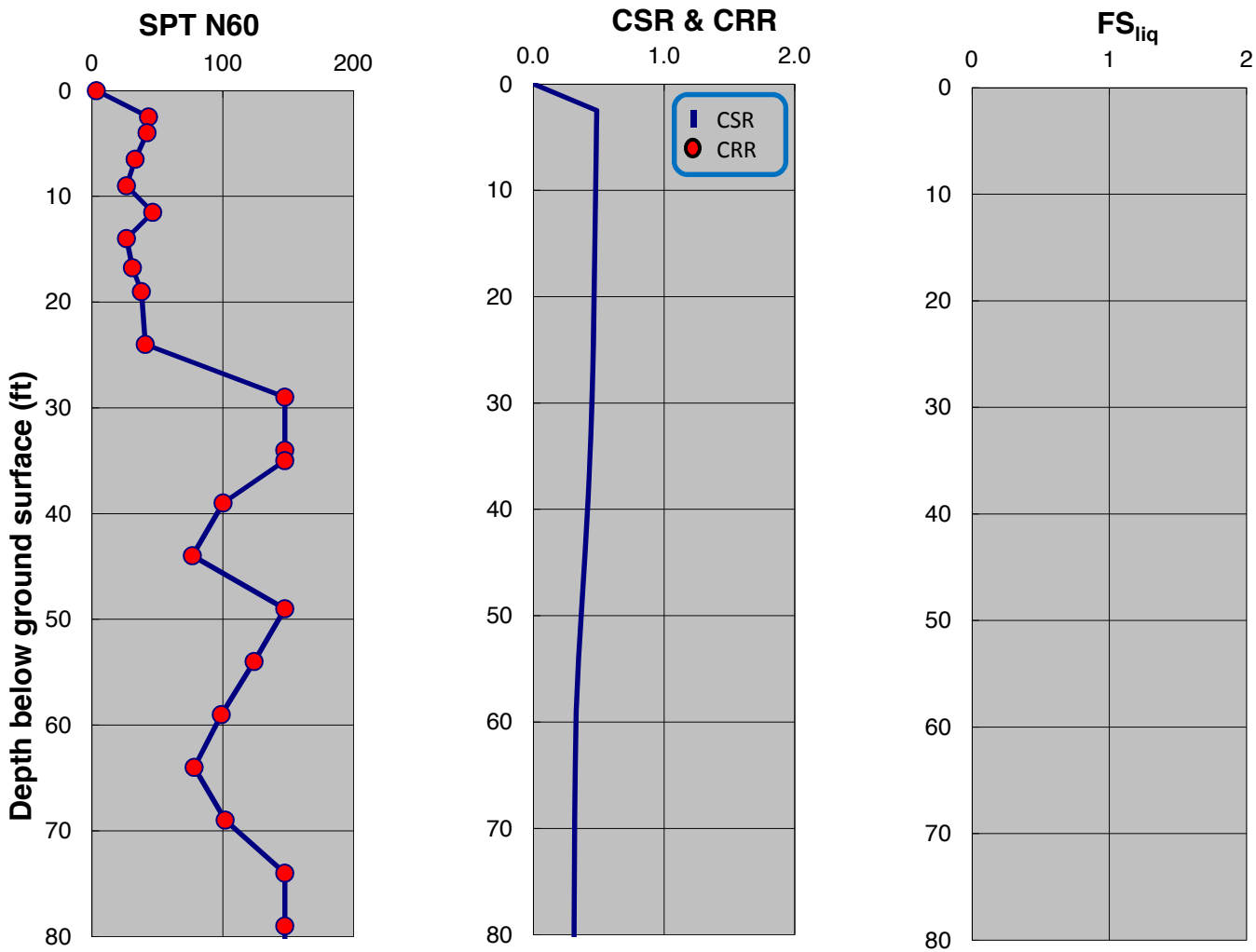
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-61 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

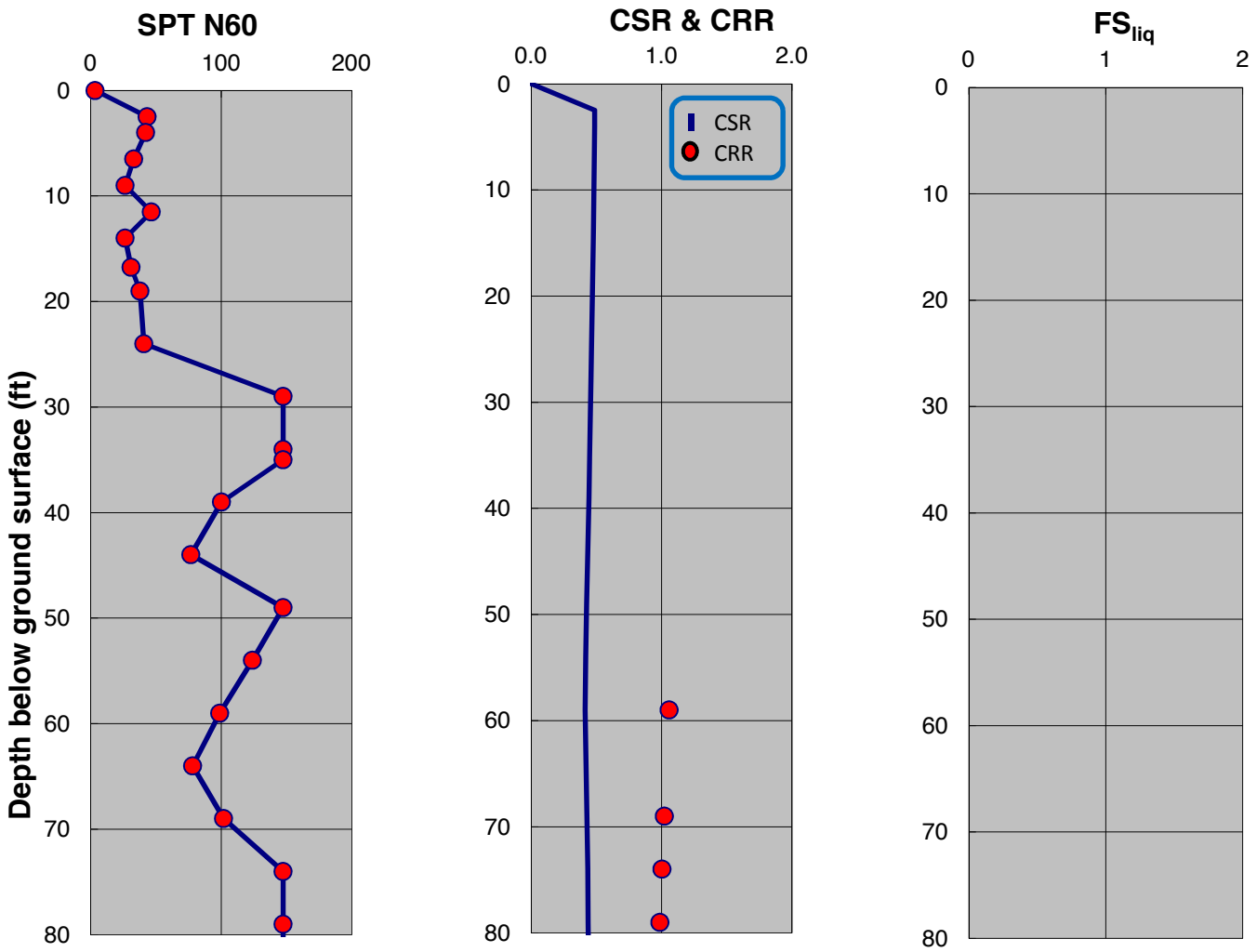
PLATE B.54



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-62 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

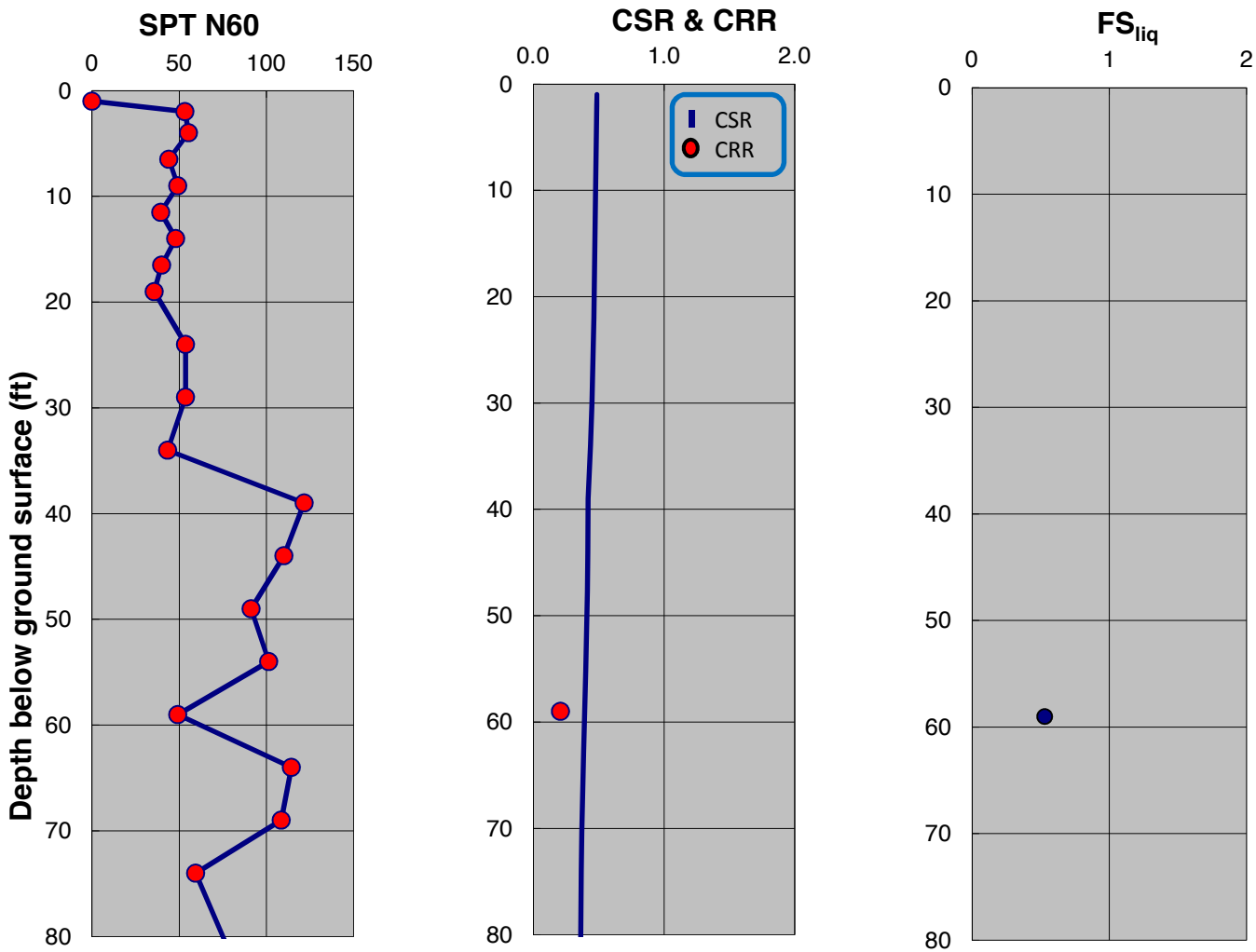
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.55



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-62 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

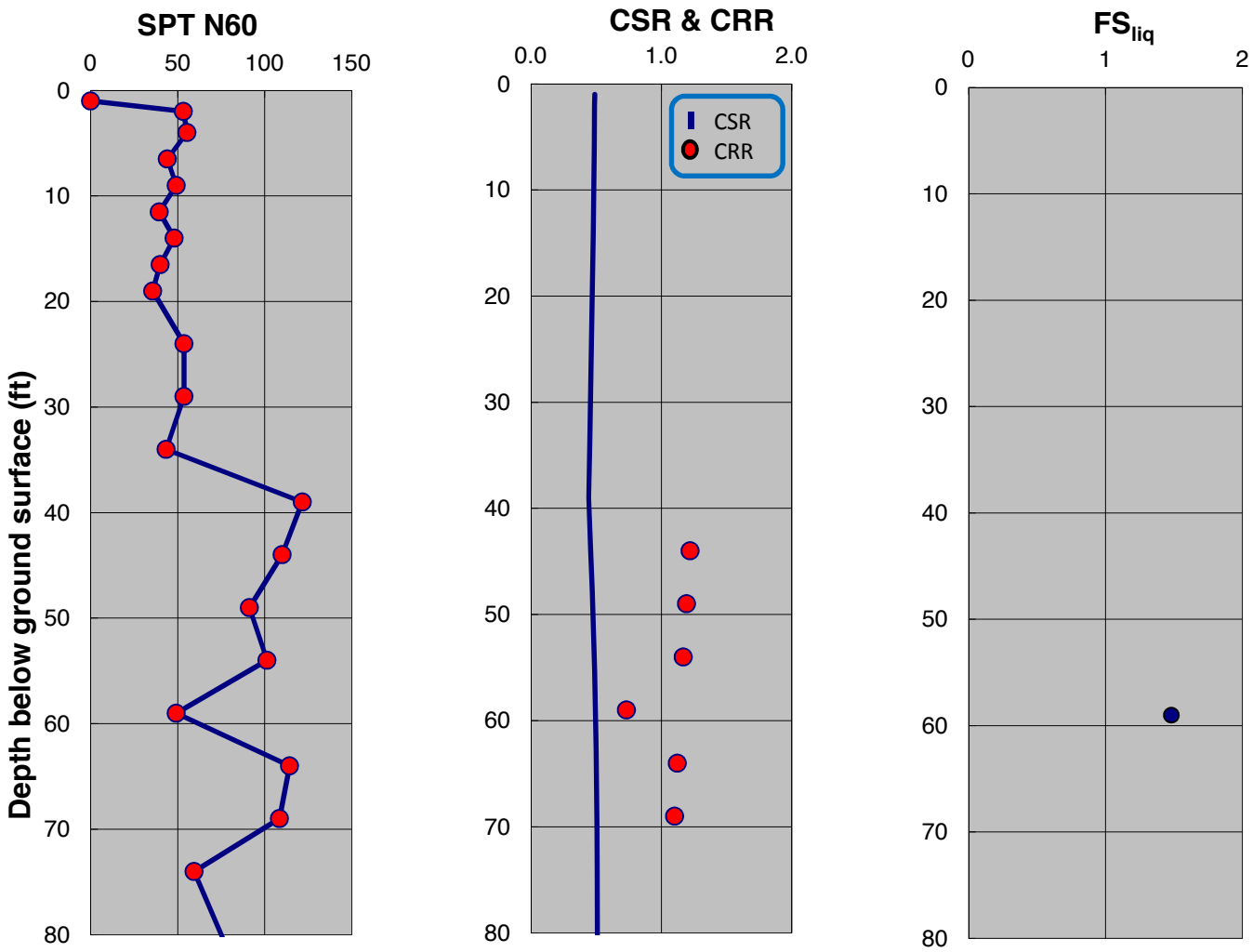
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-64 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

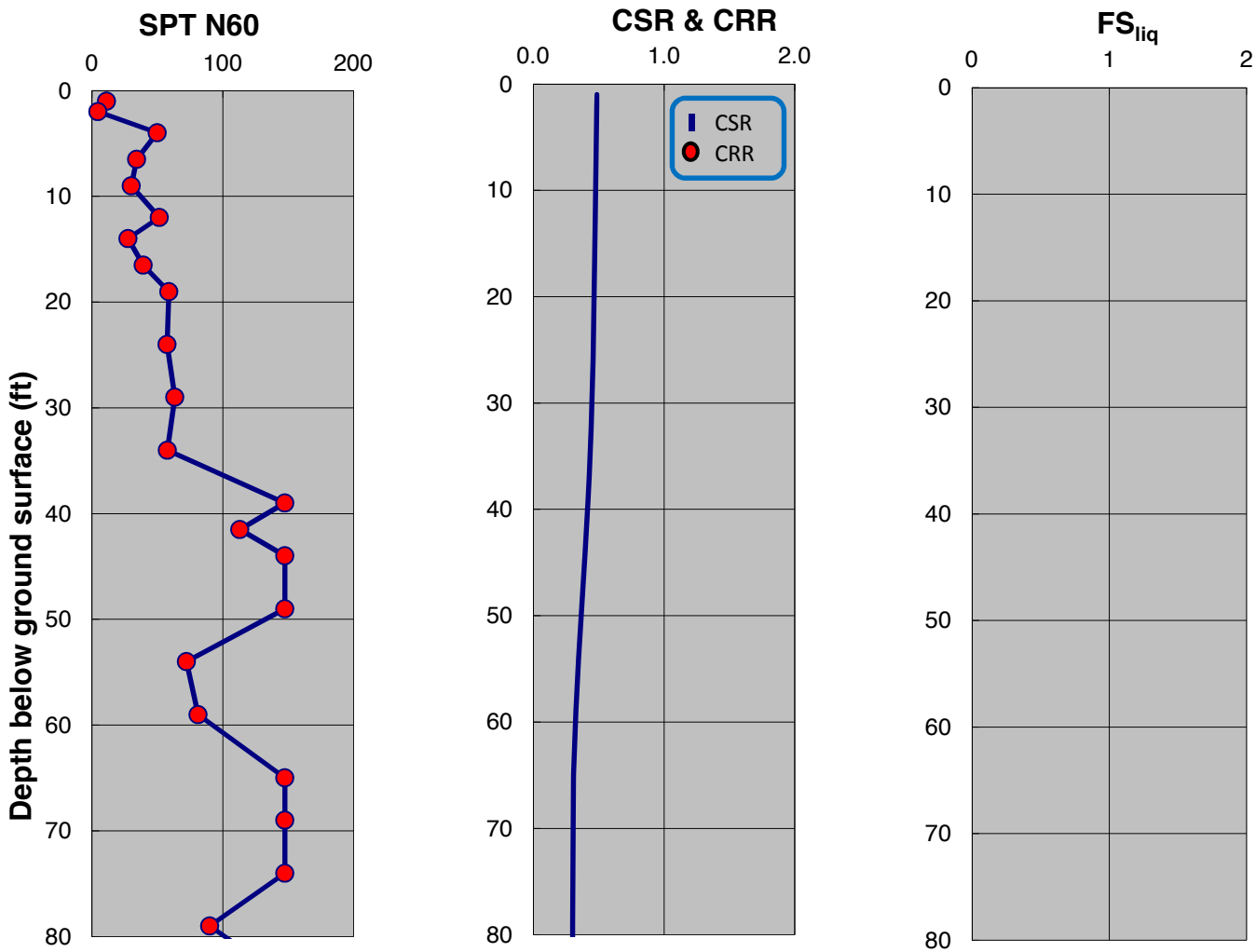
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.57



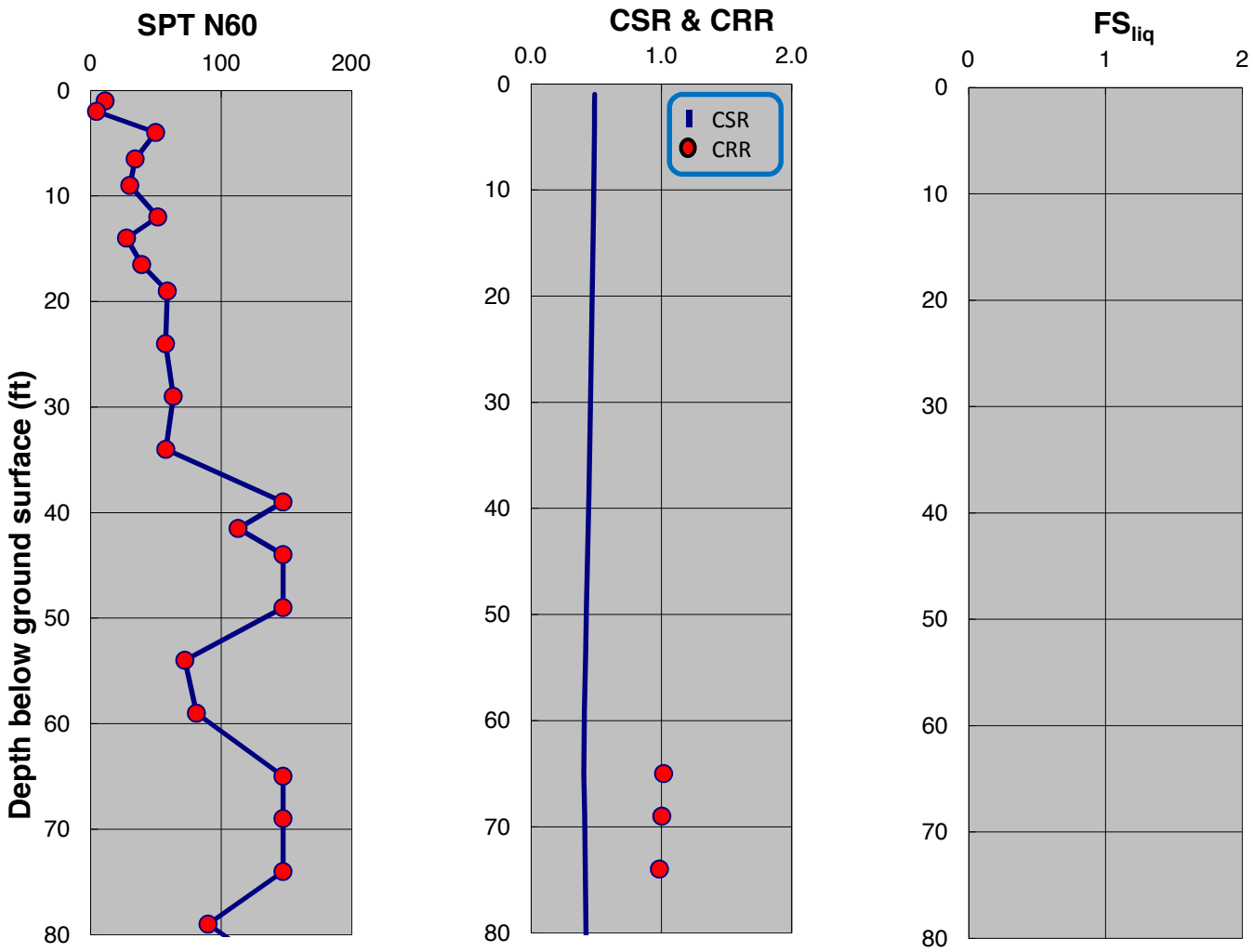
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-64 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-66 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

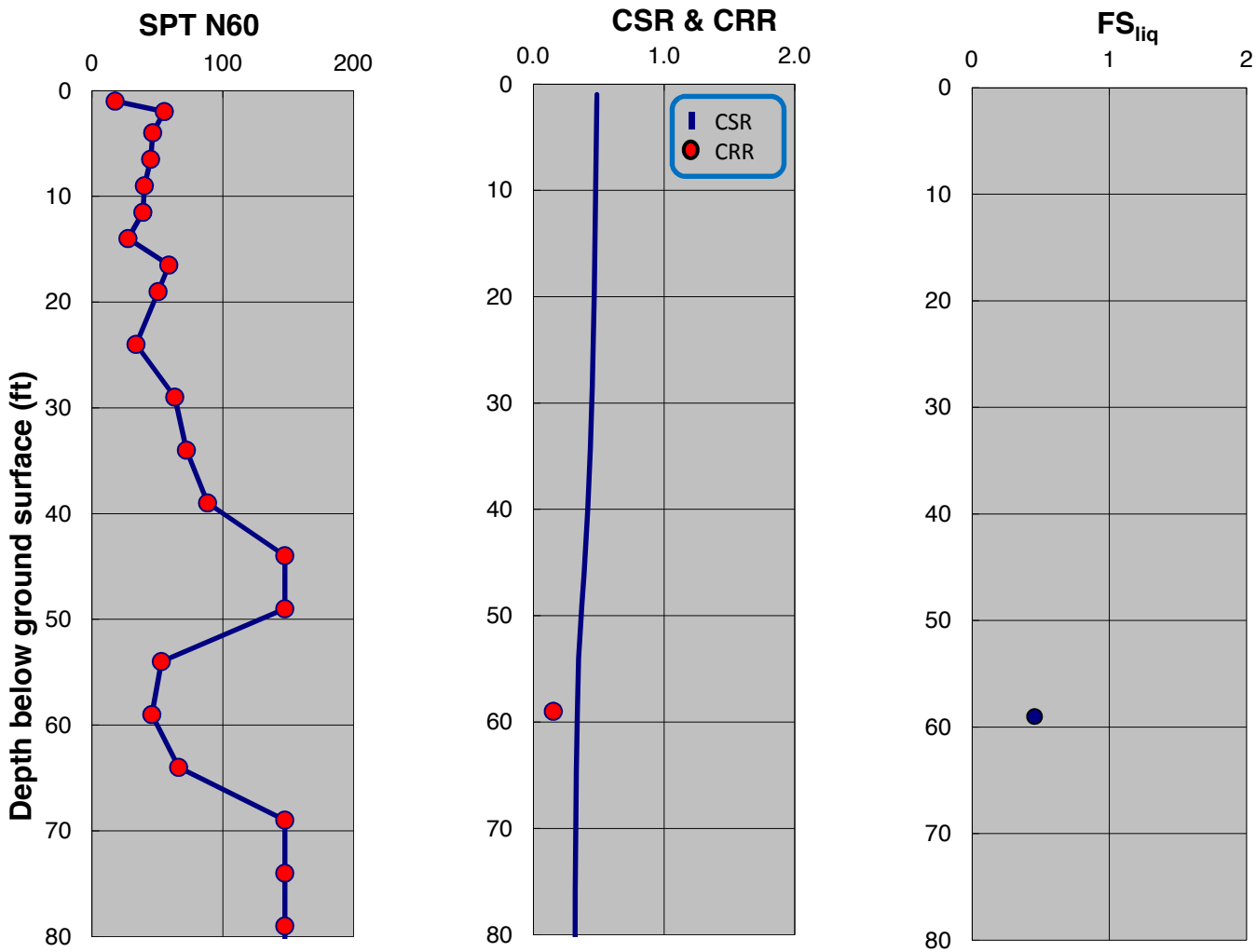
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-66 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

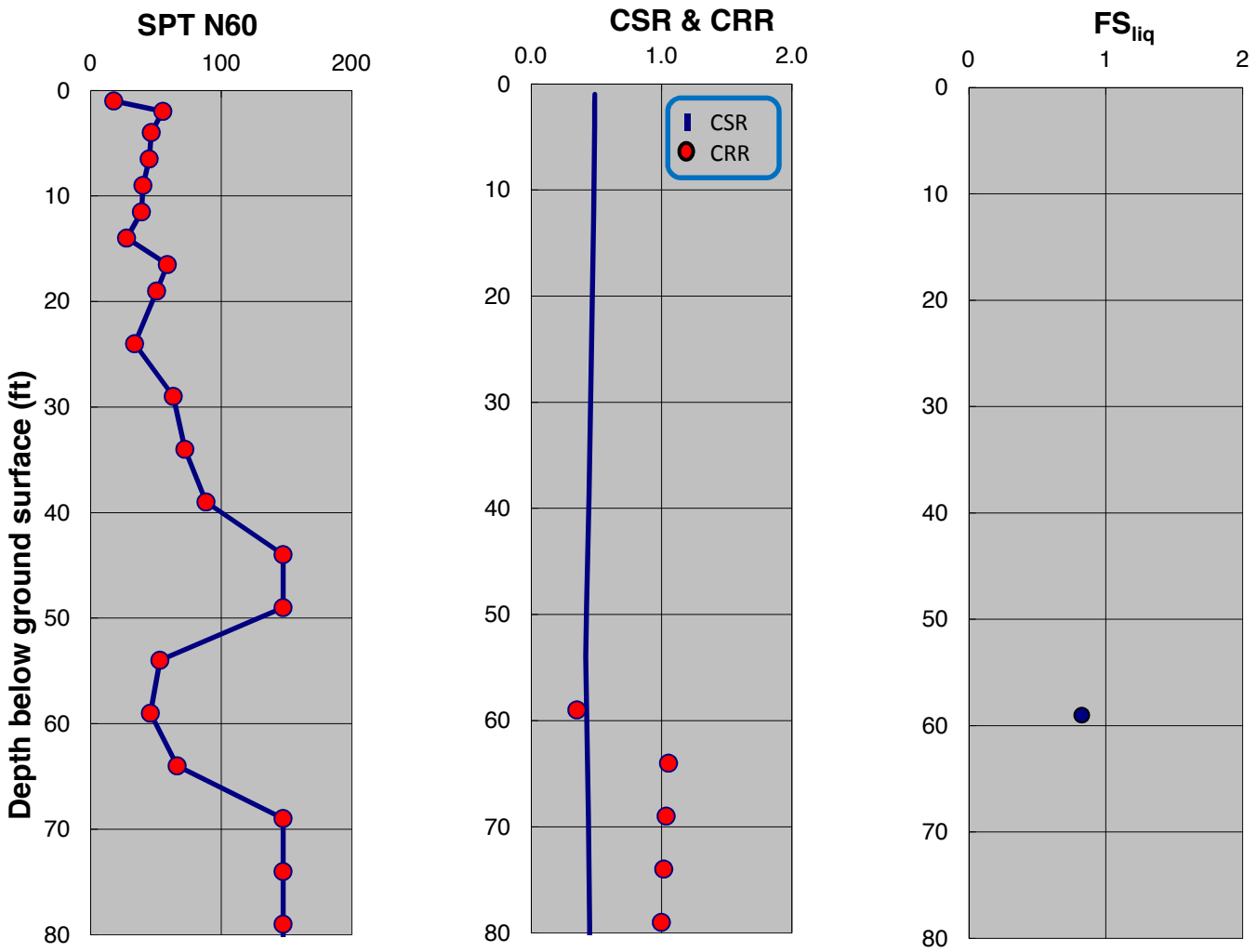
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.60



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-67 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

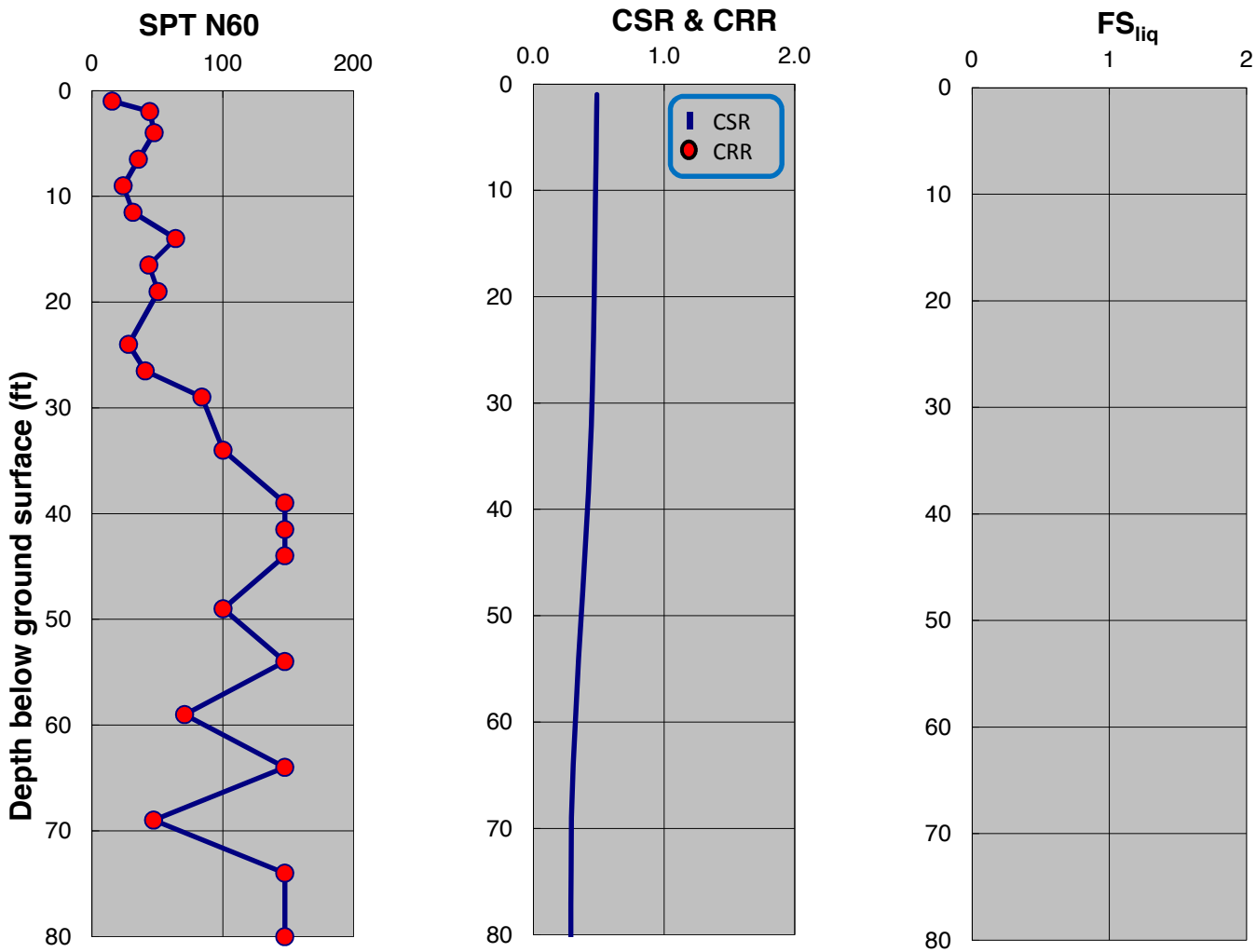
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-67 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

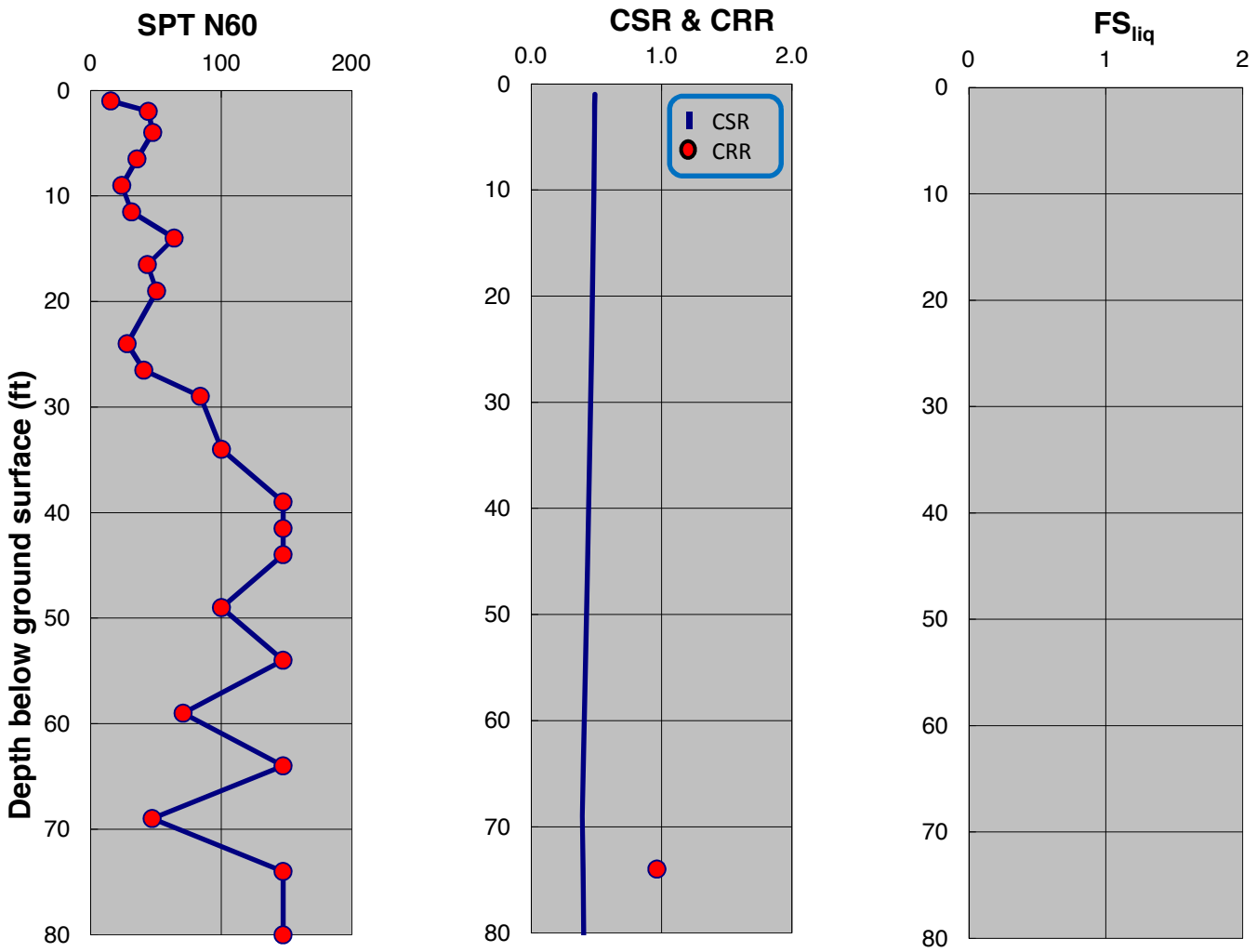
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.62



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-68 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

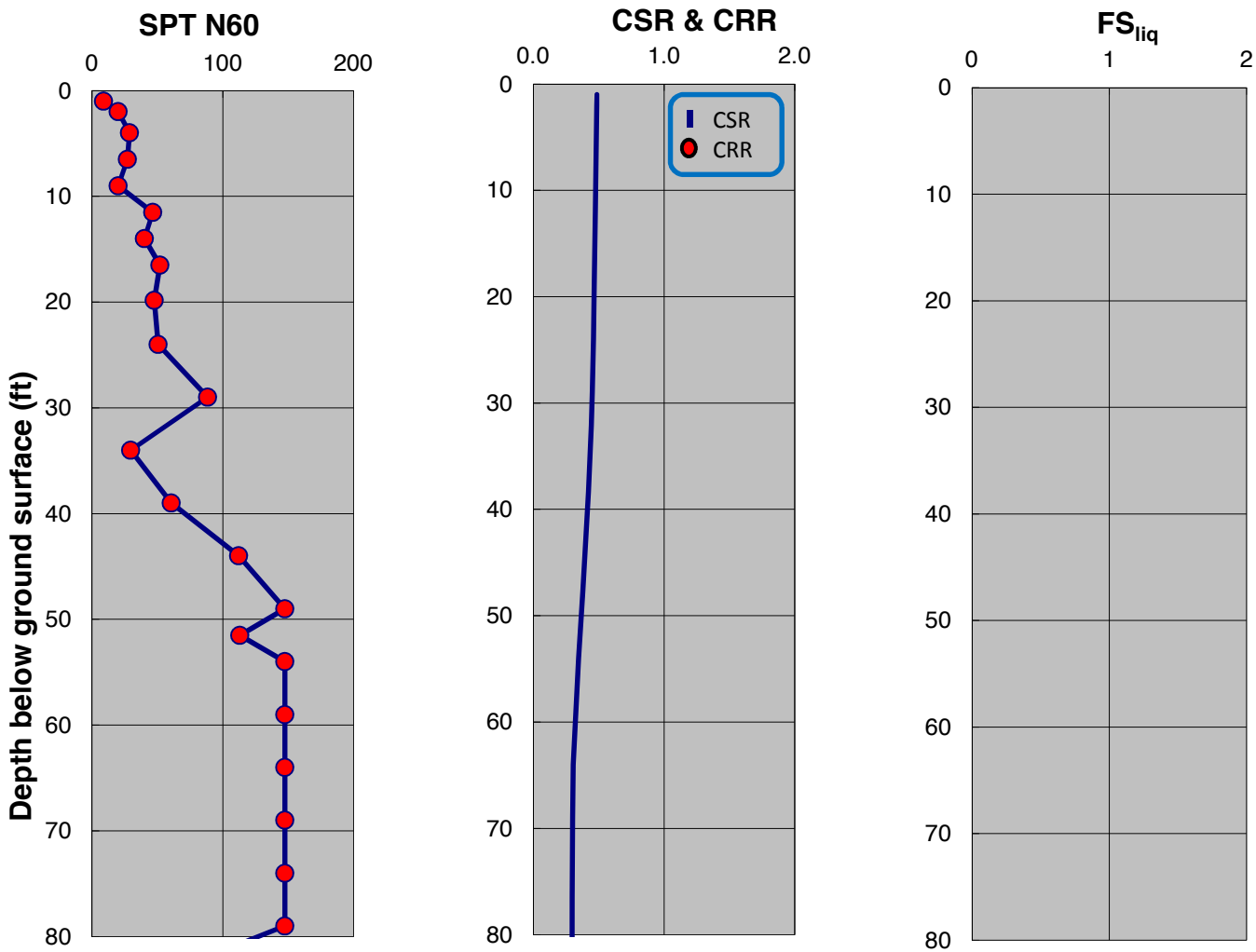
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-68 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

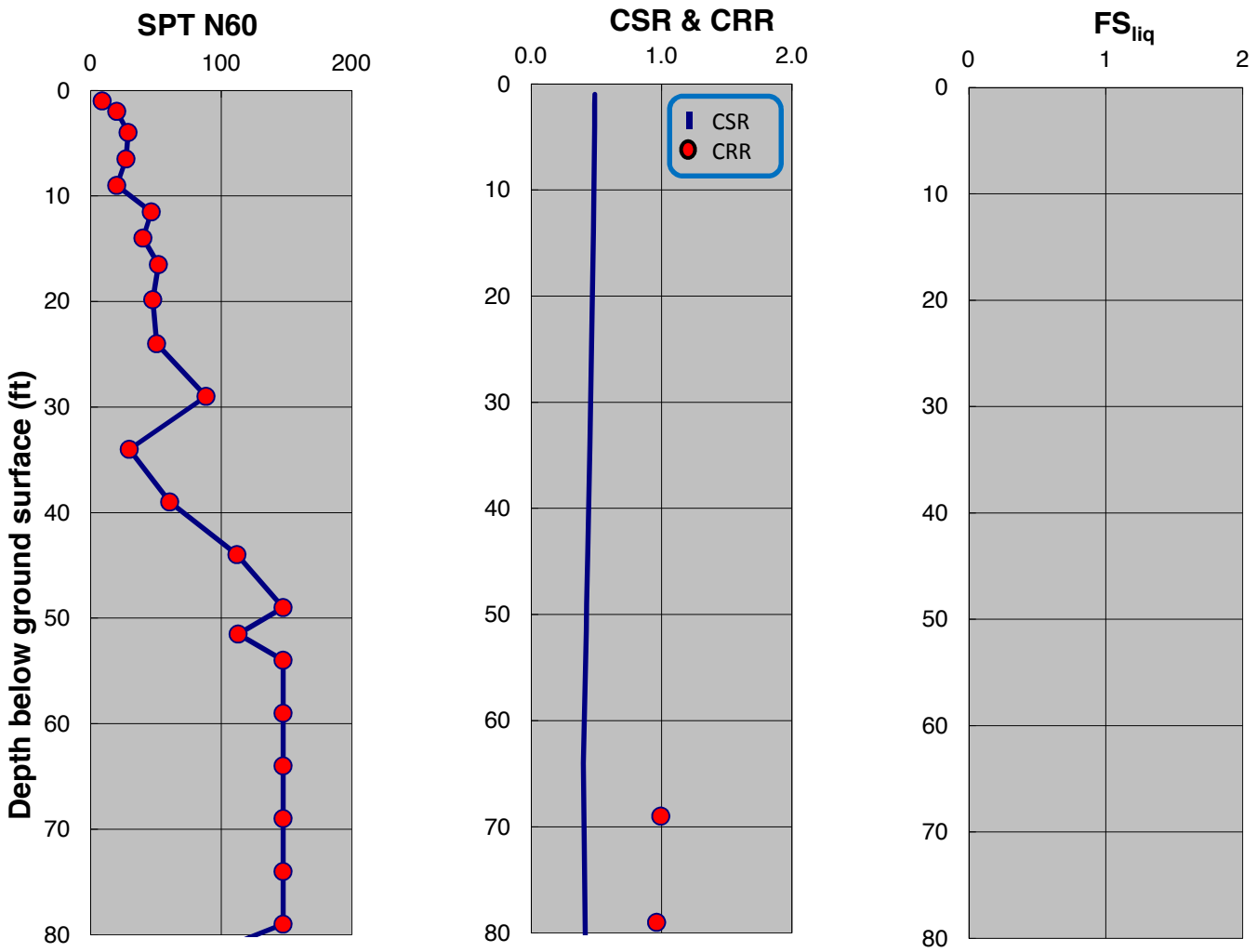
PLATE B.64



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-69 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

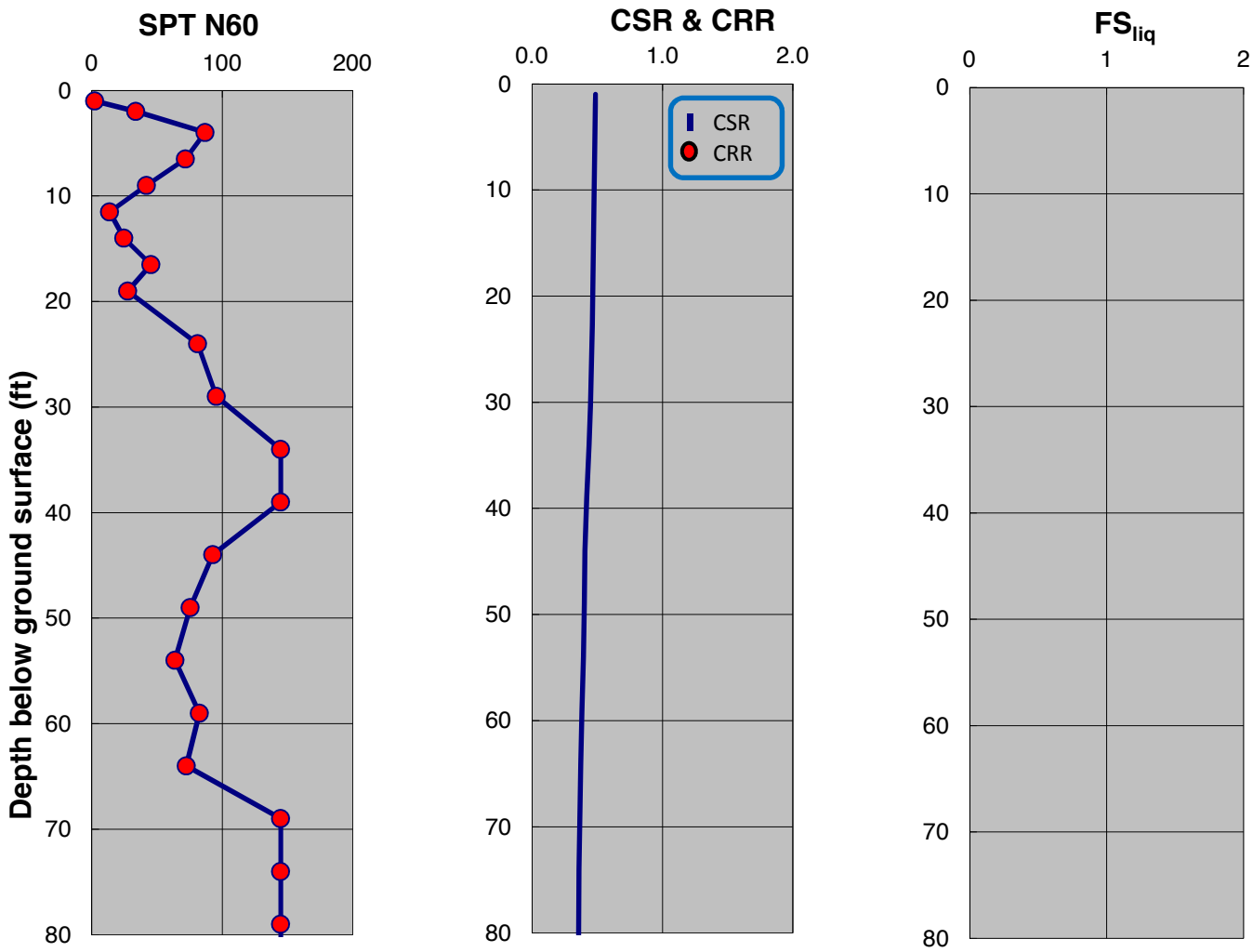
PLATE B.65



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-69 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

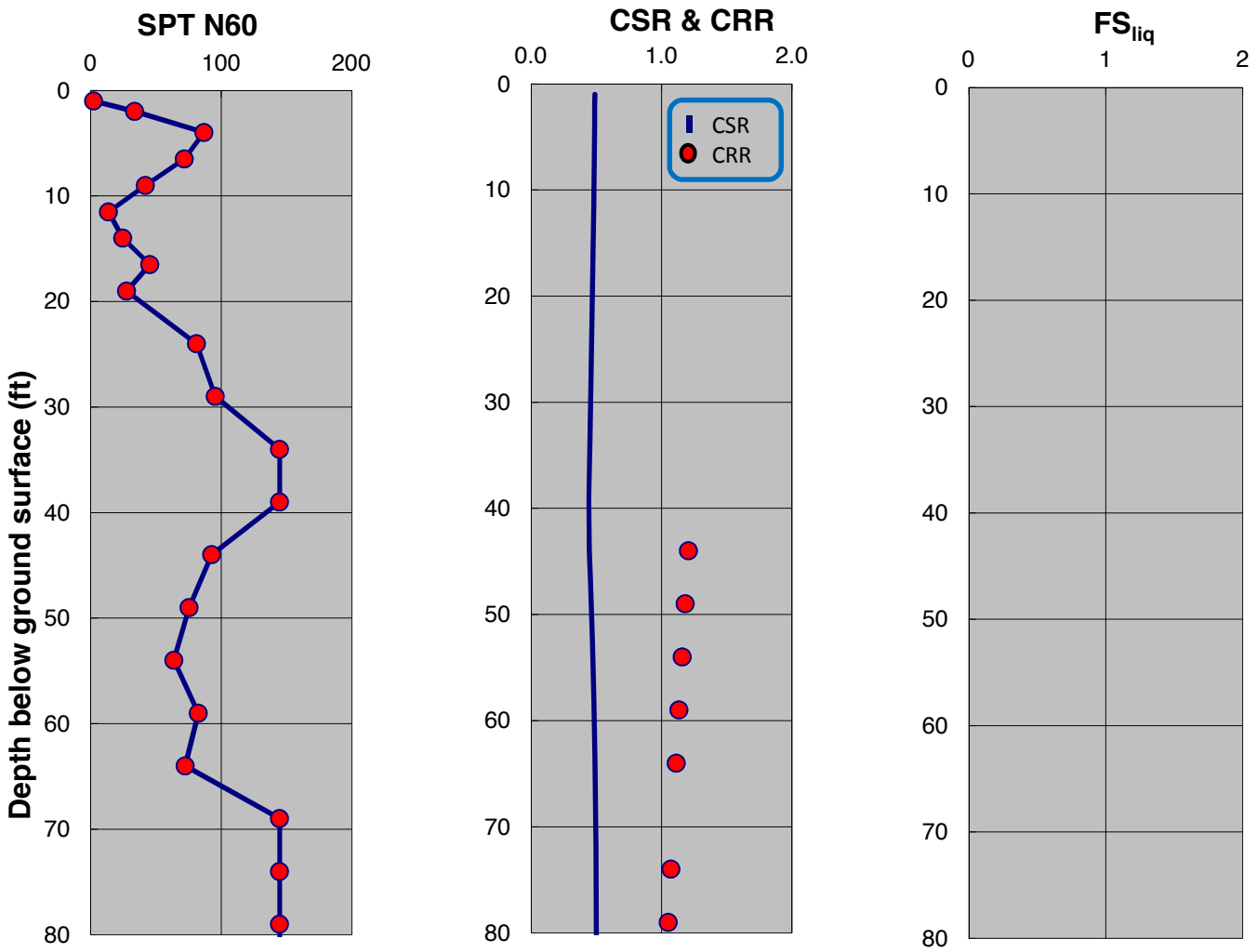
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.66



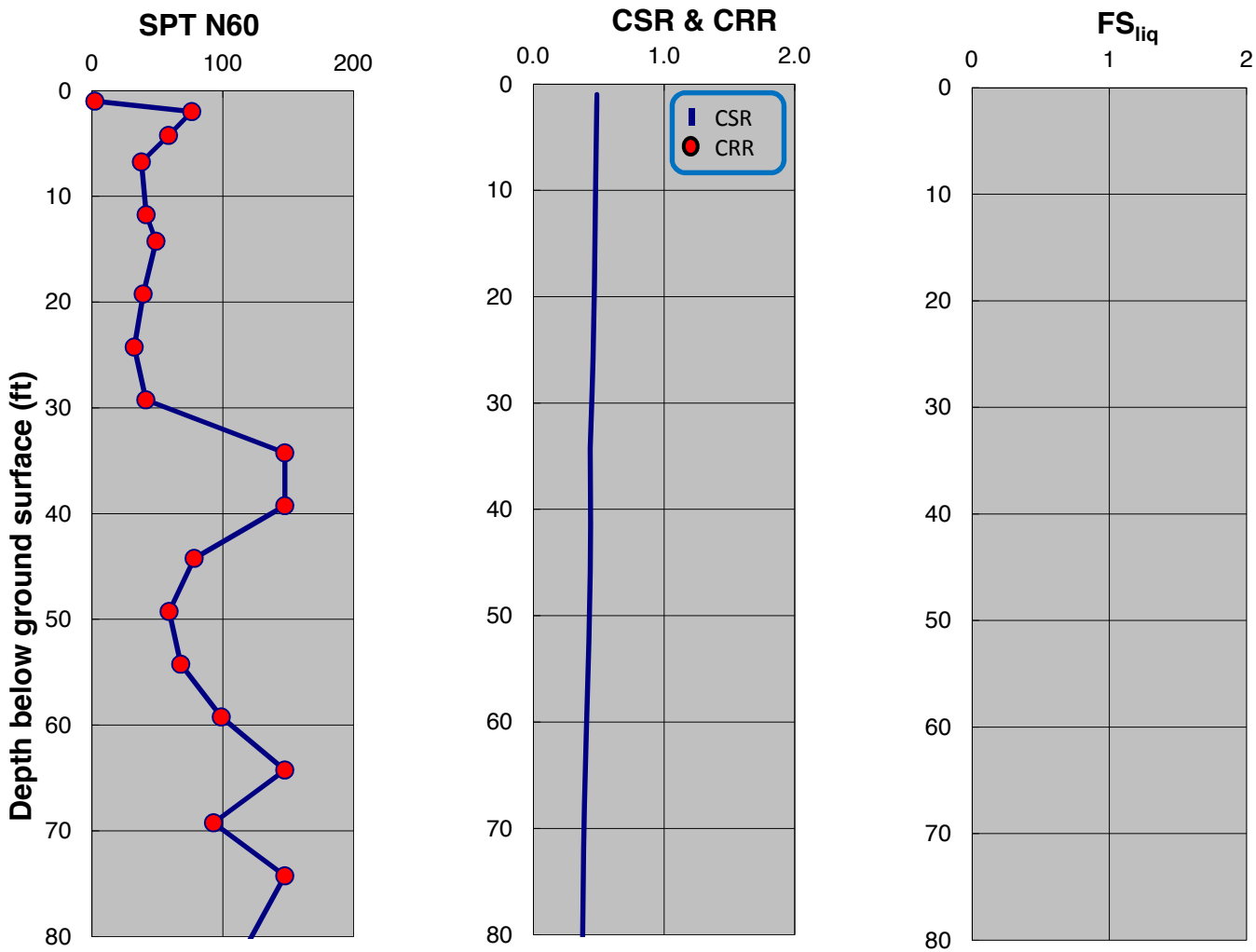
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-71 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



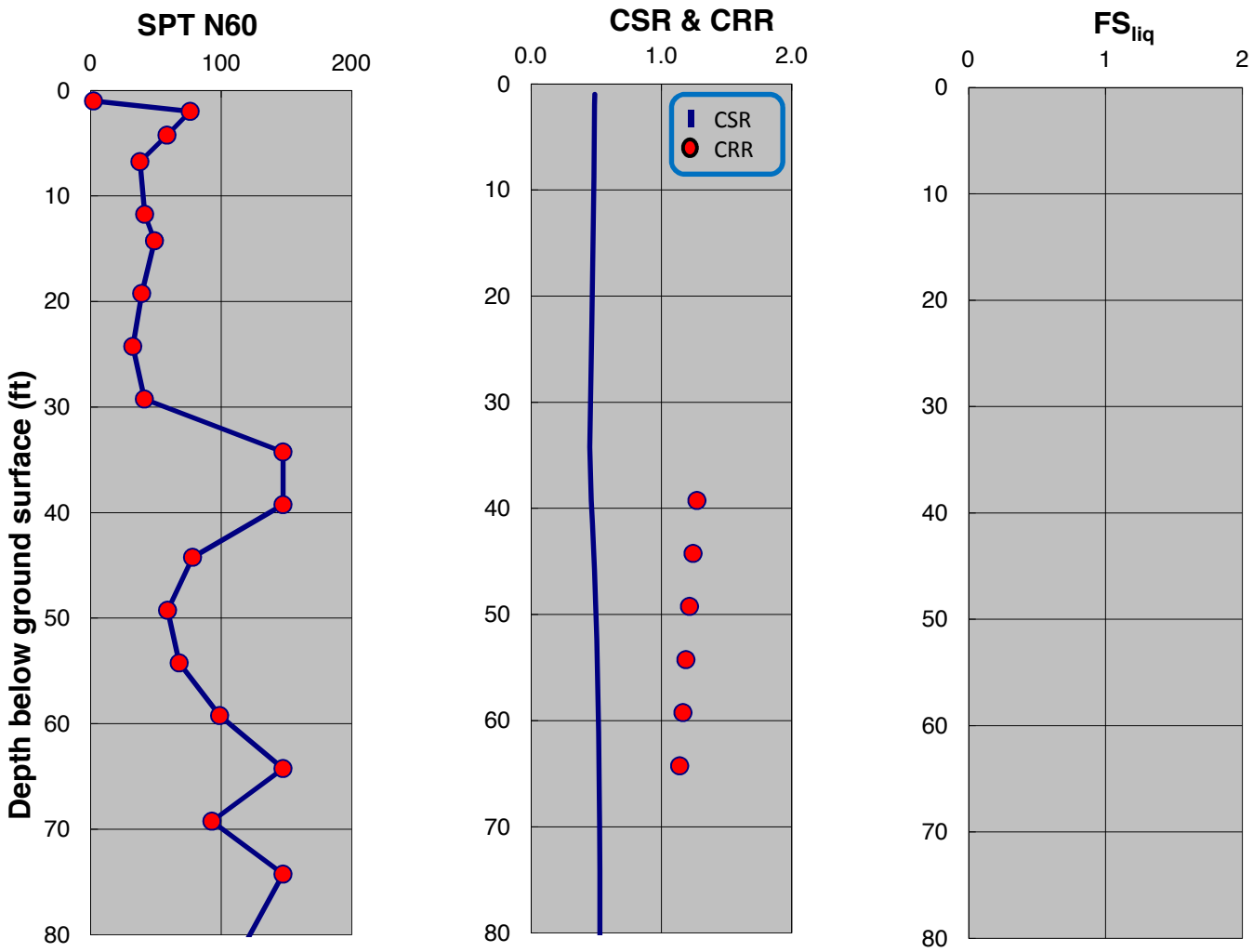
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-71 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-72 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

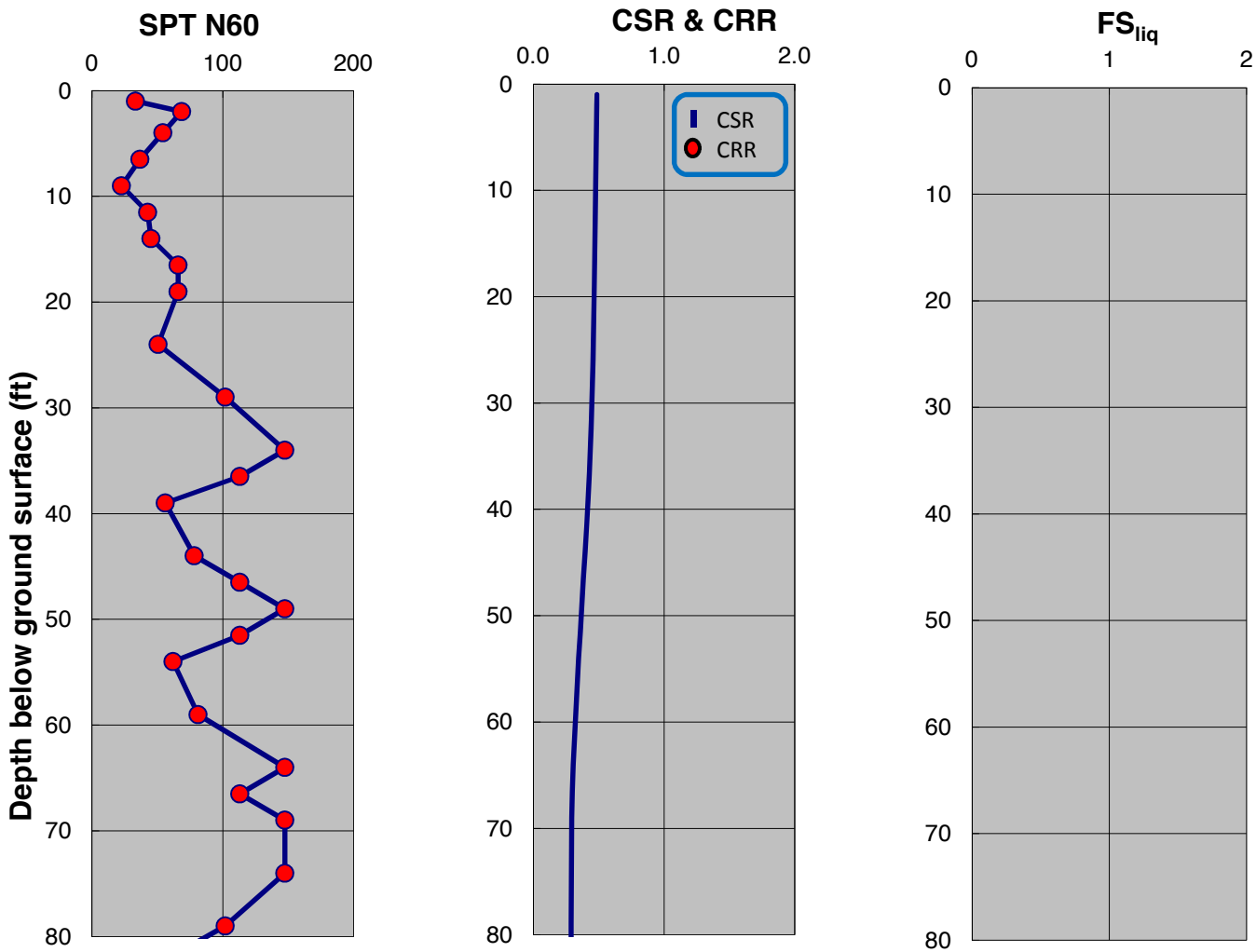
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-72 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

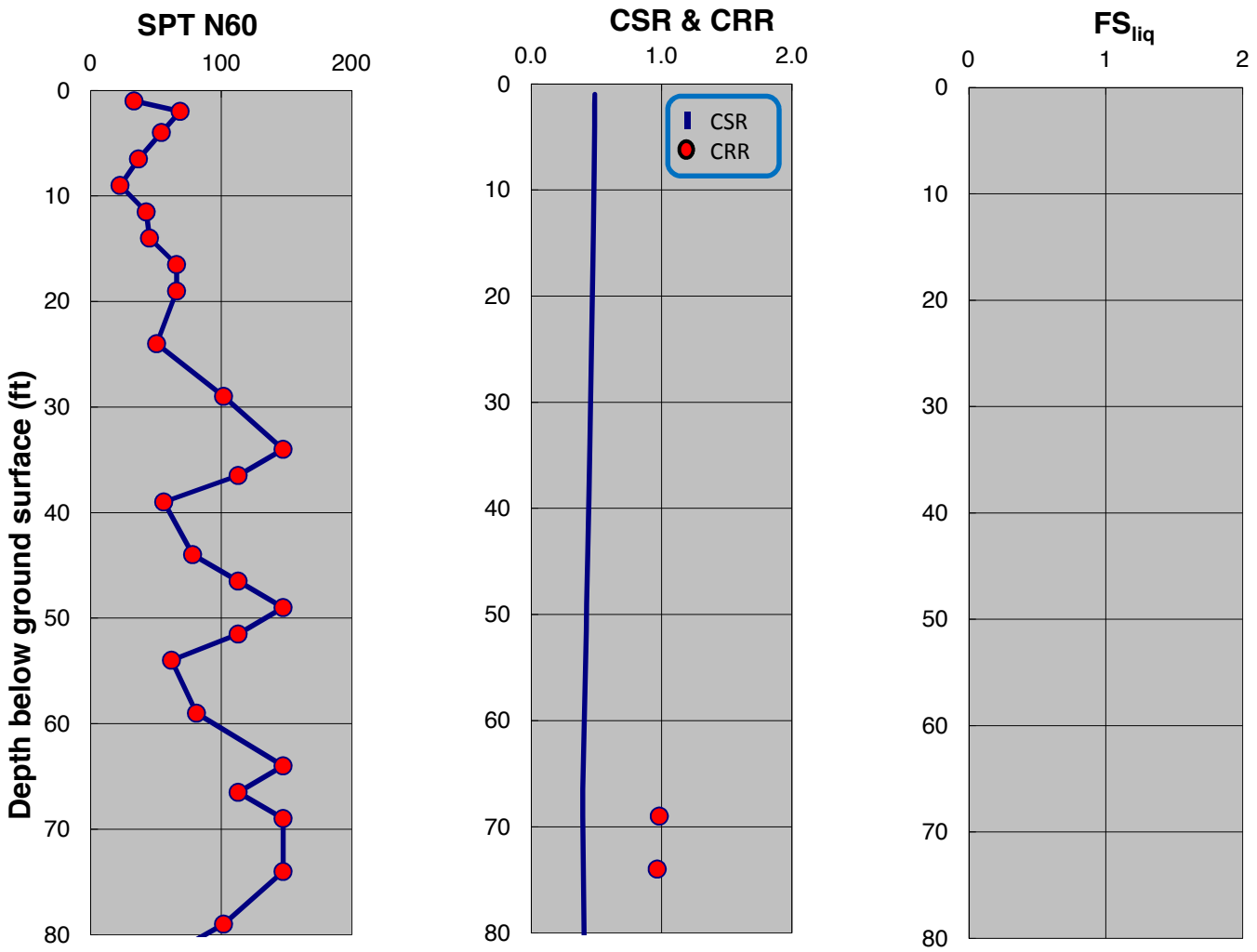
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.70



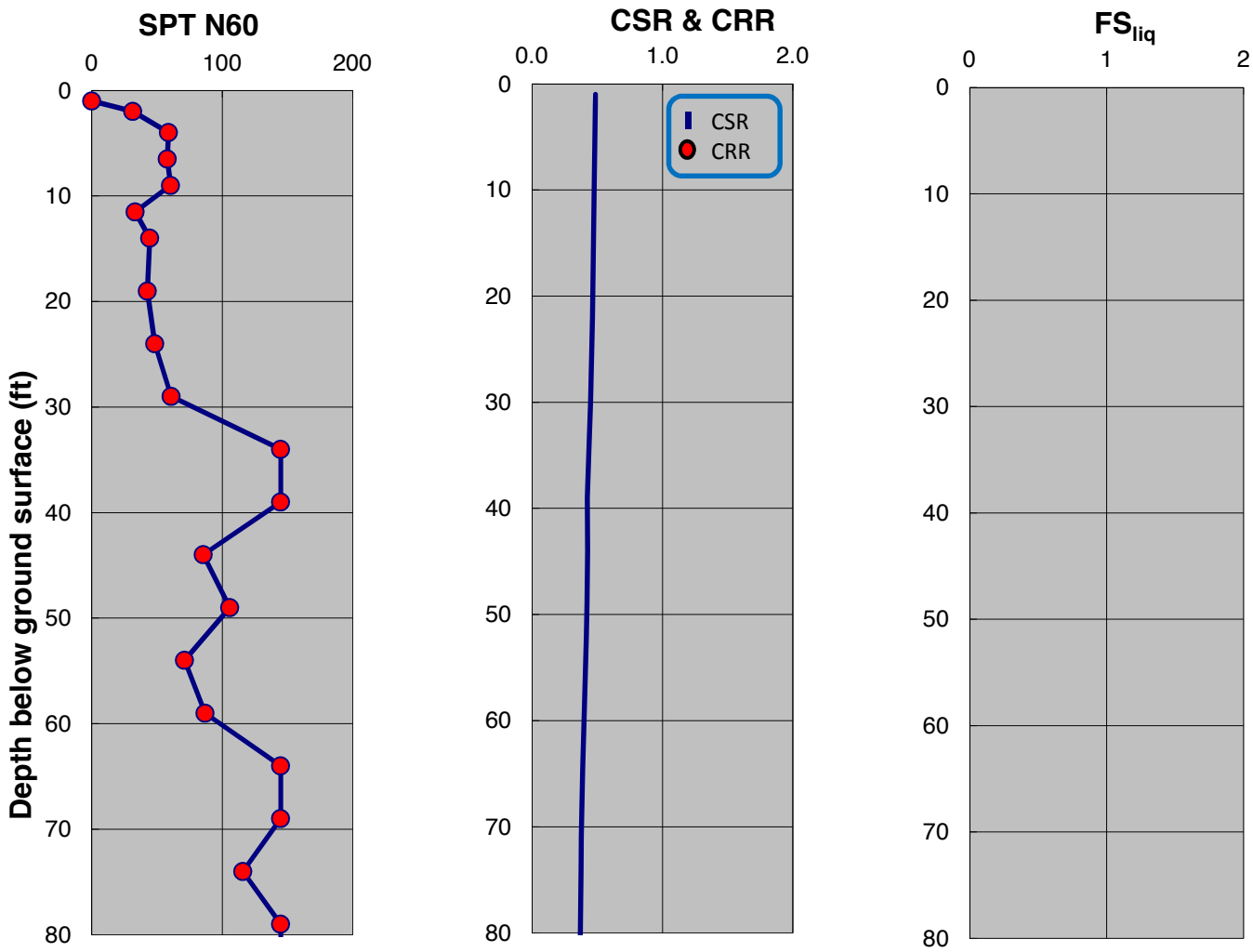
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-73 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



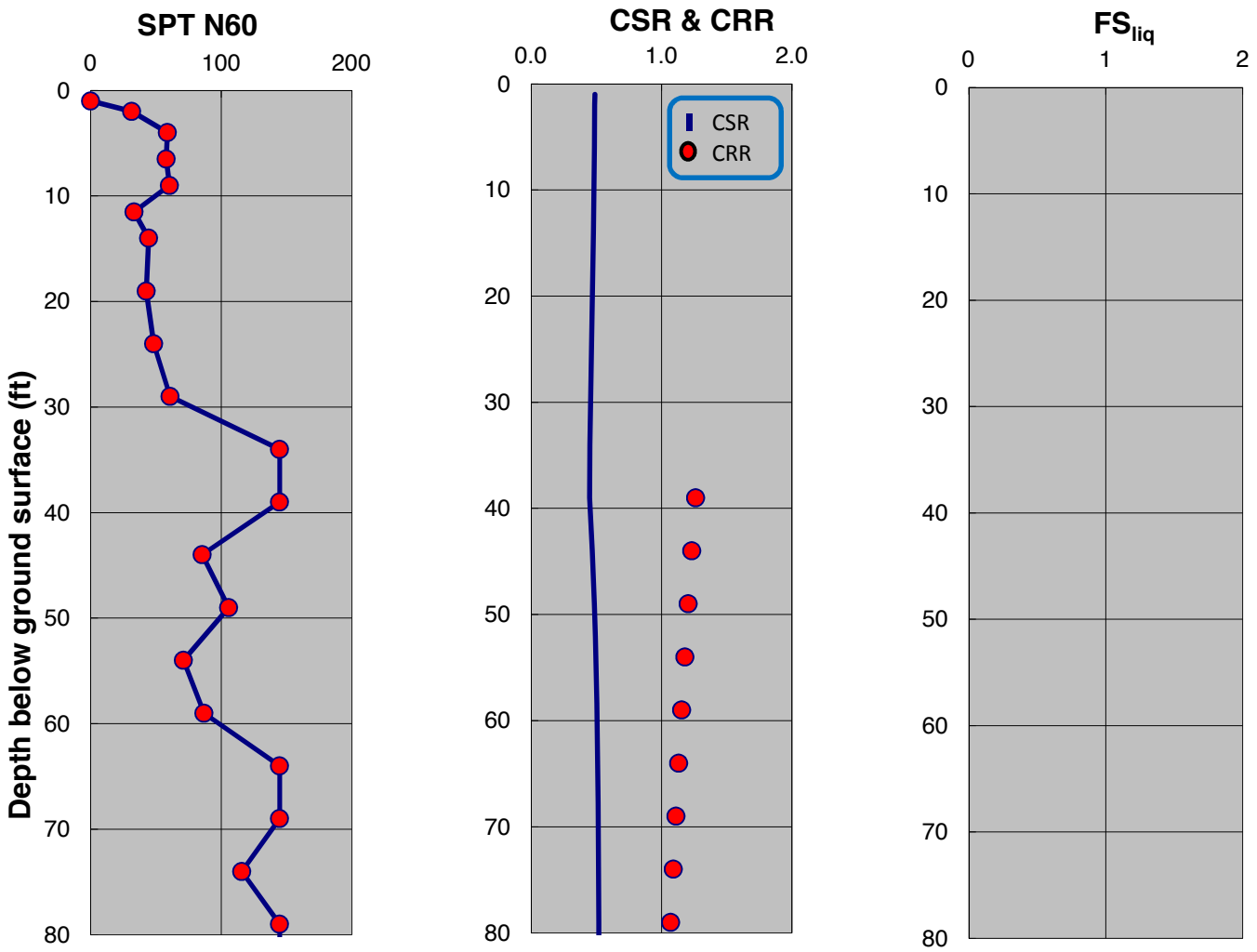
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-73 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-74 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

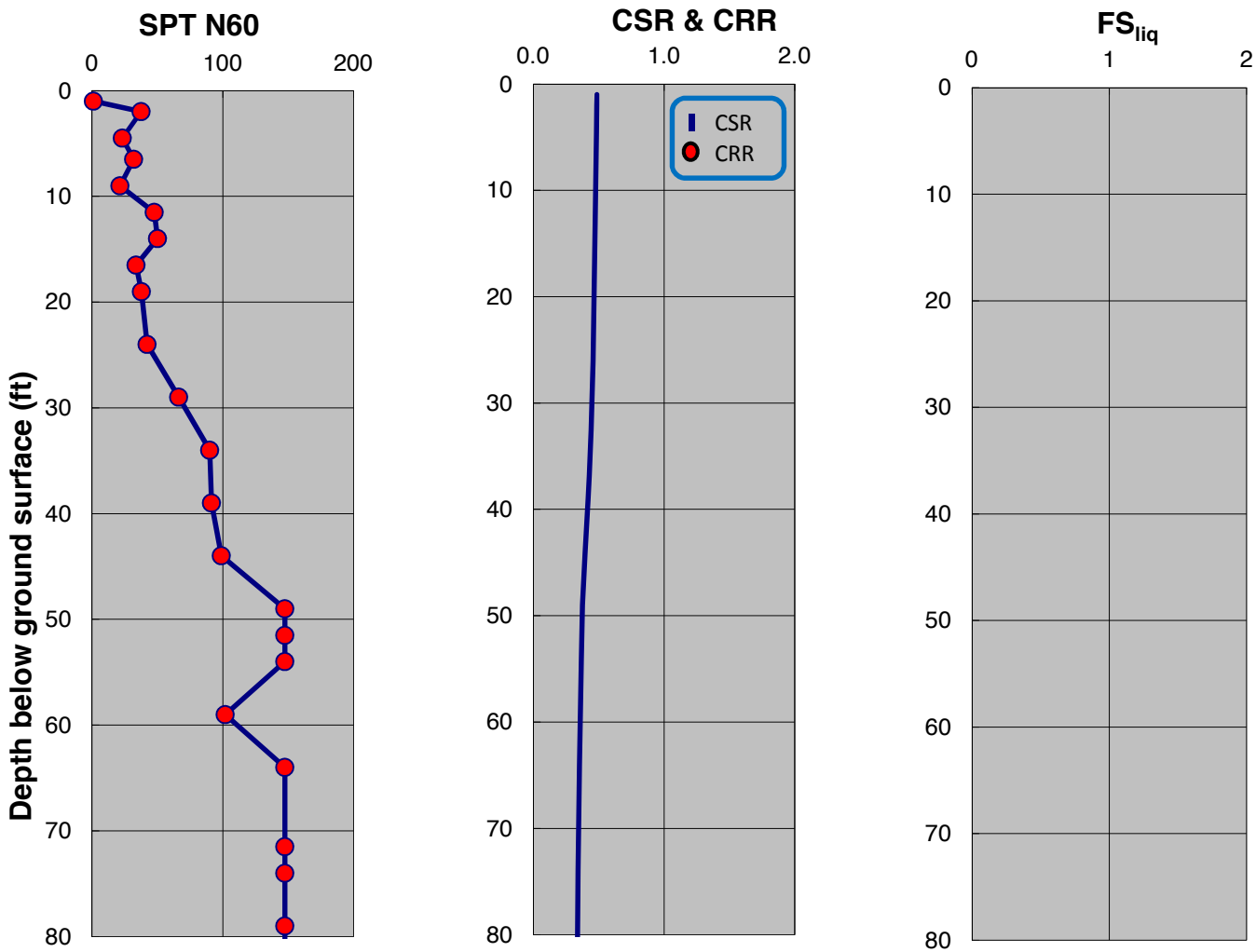
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-74 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

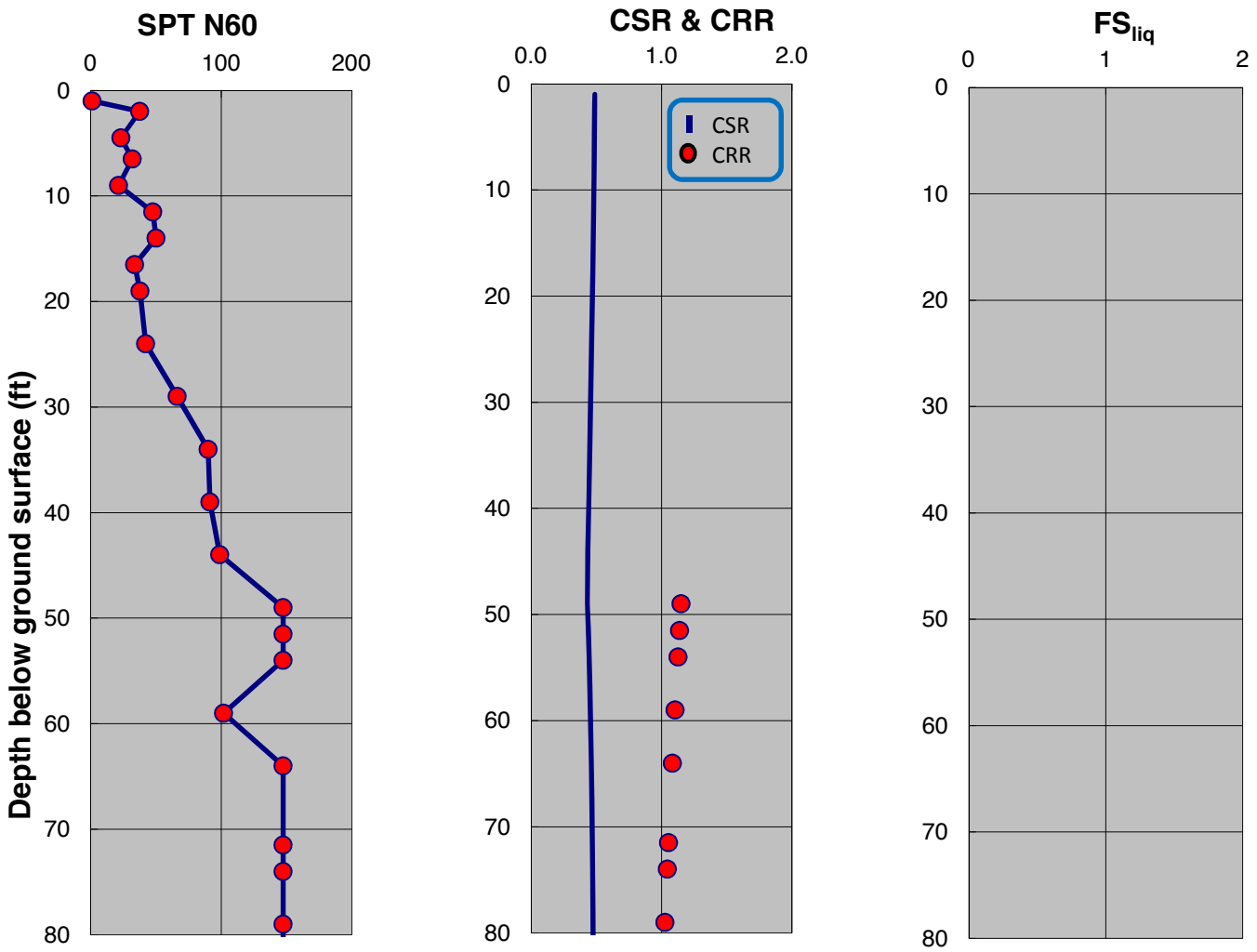
PLATE B.74



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-75 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

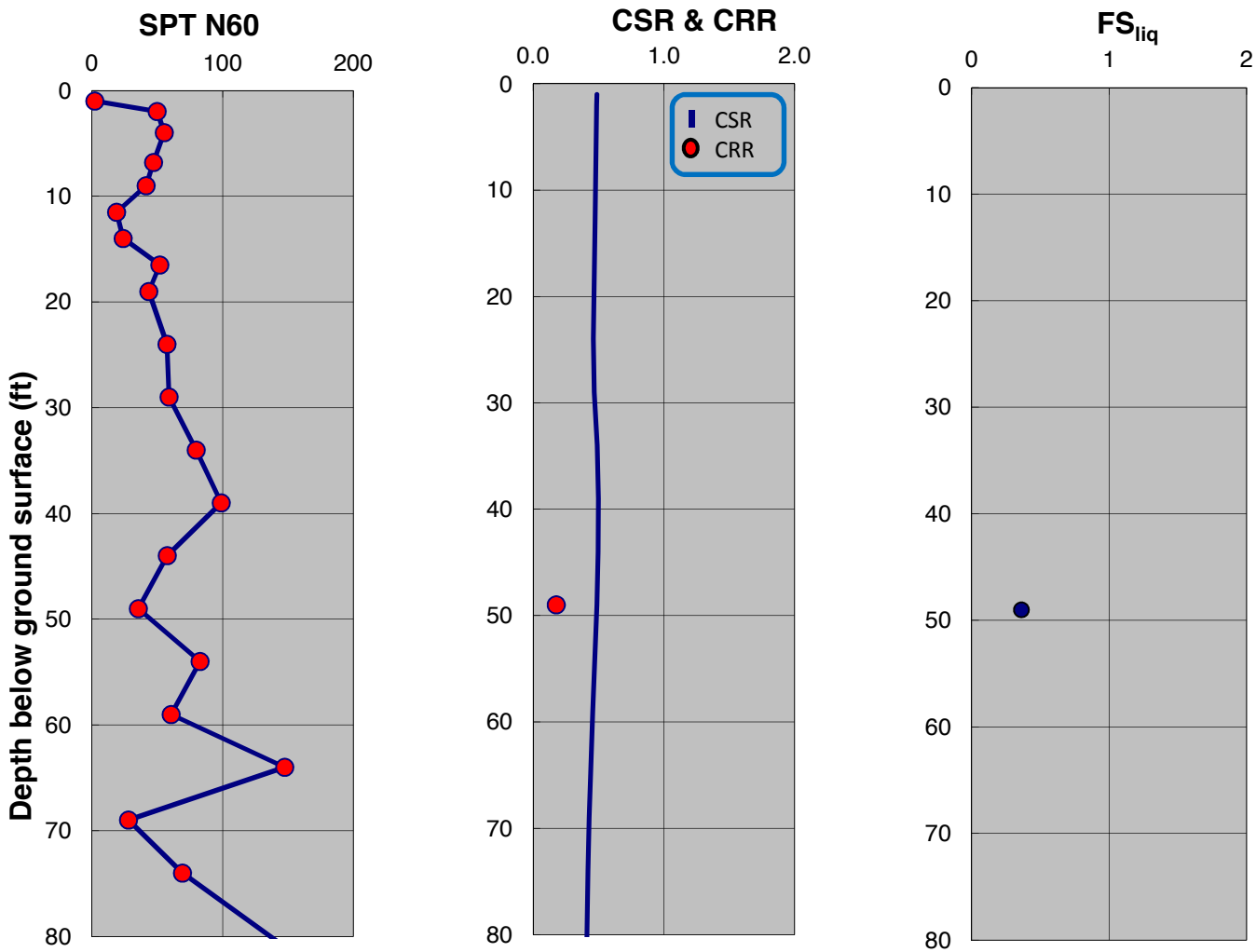
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.75



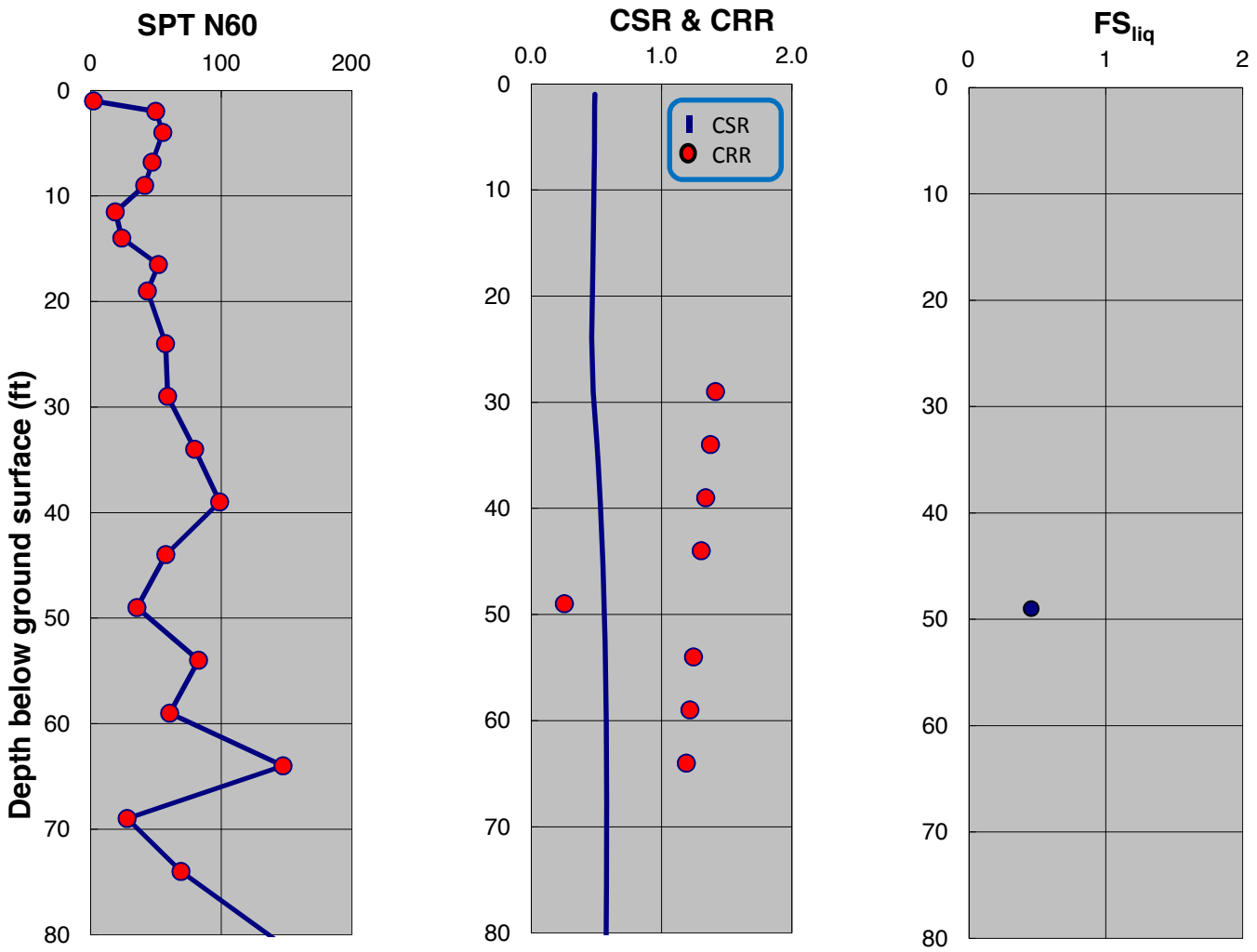
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-75 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



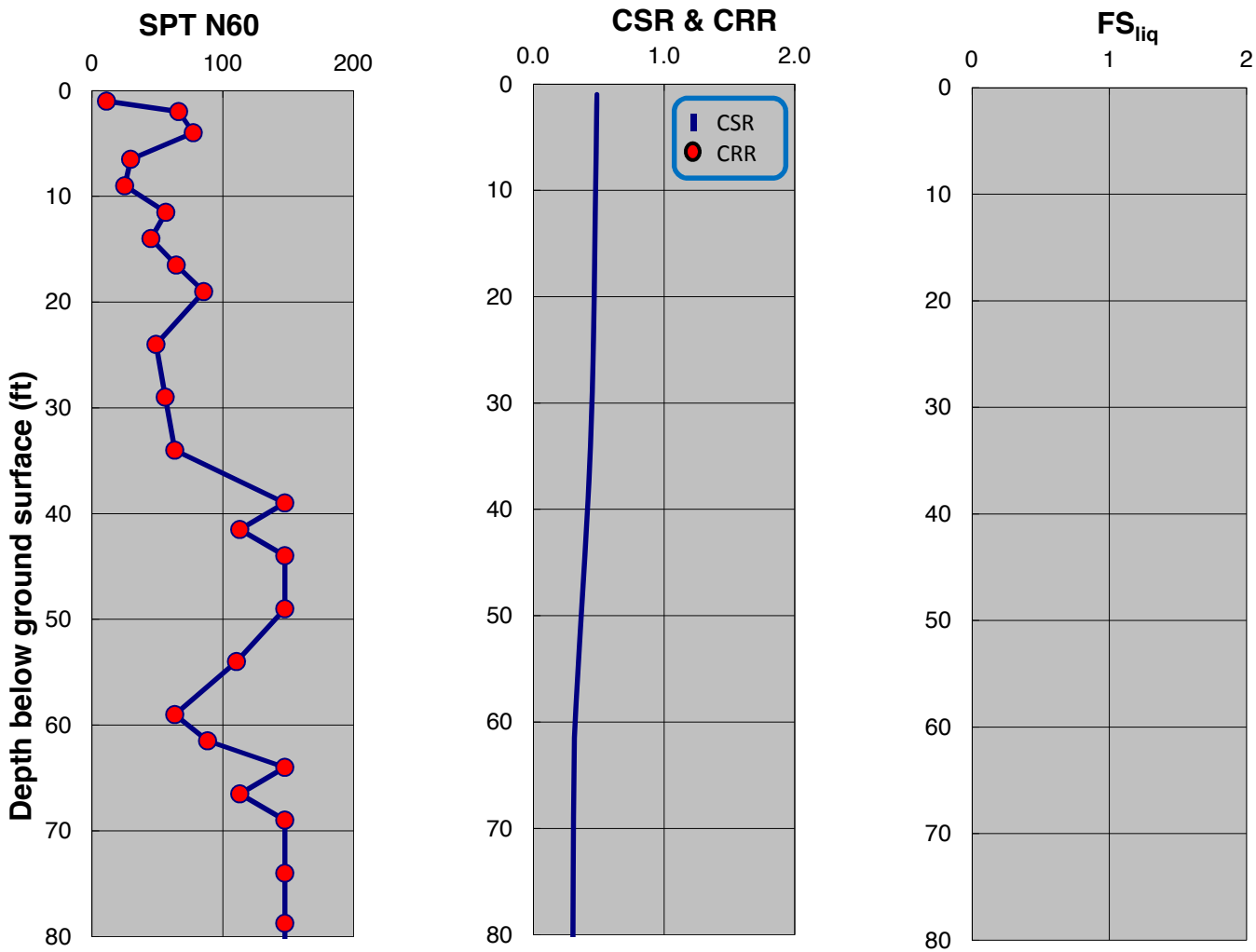
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-76 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



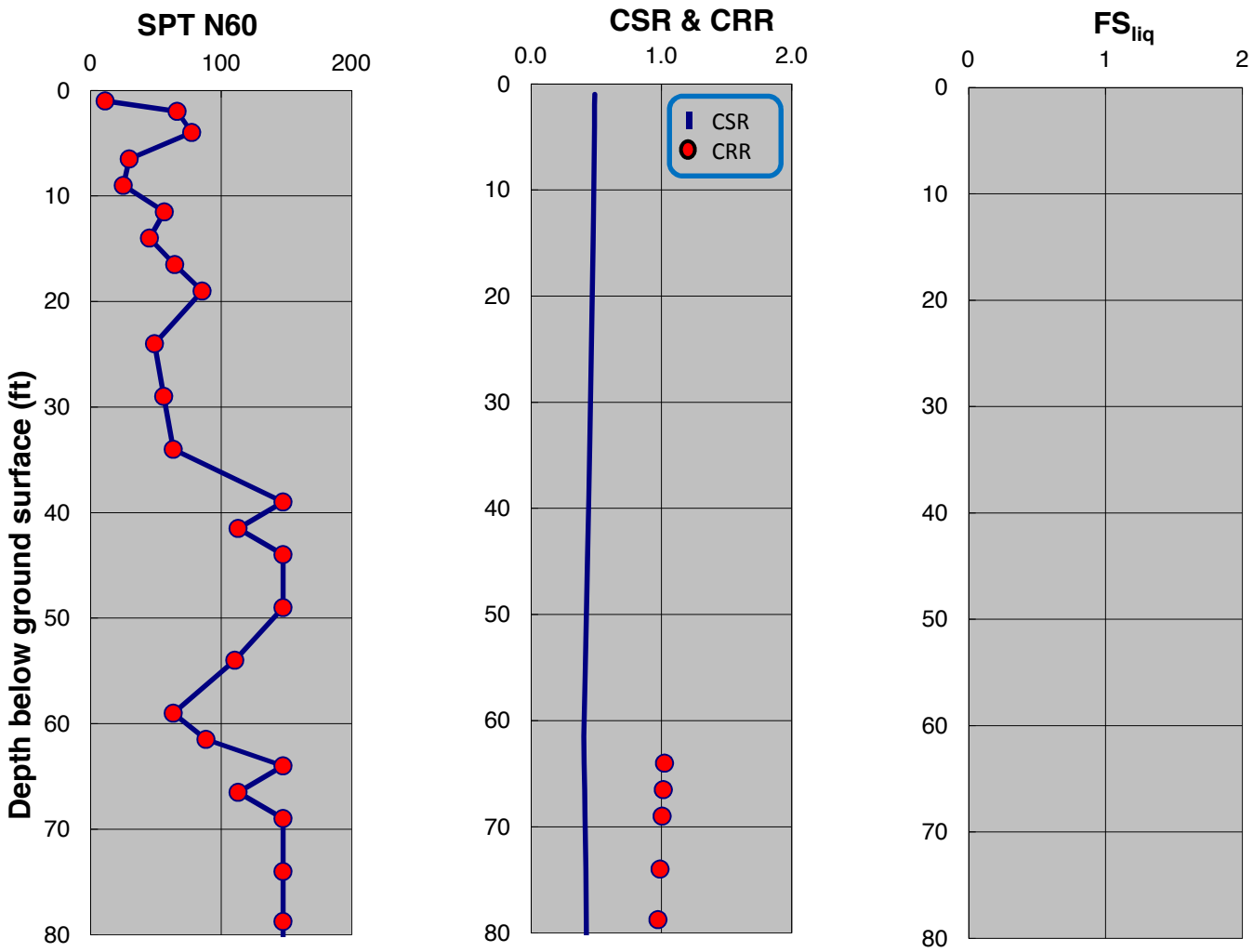
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-76 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-77 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

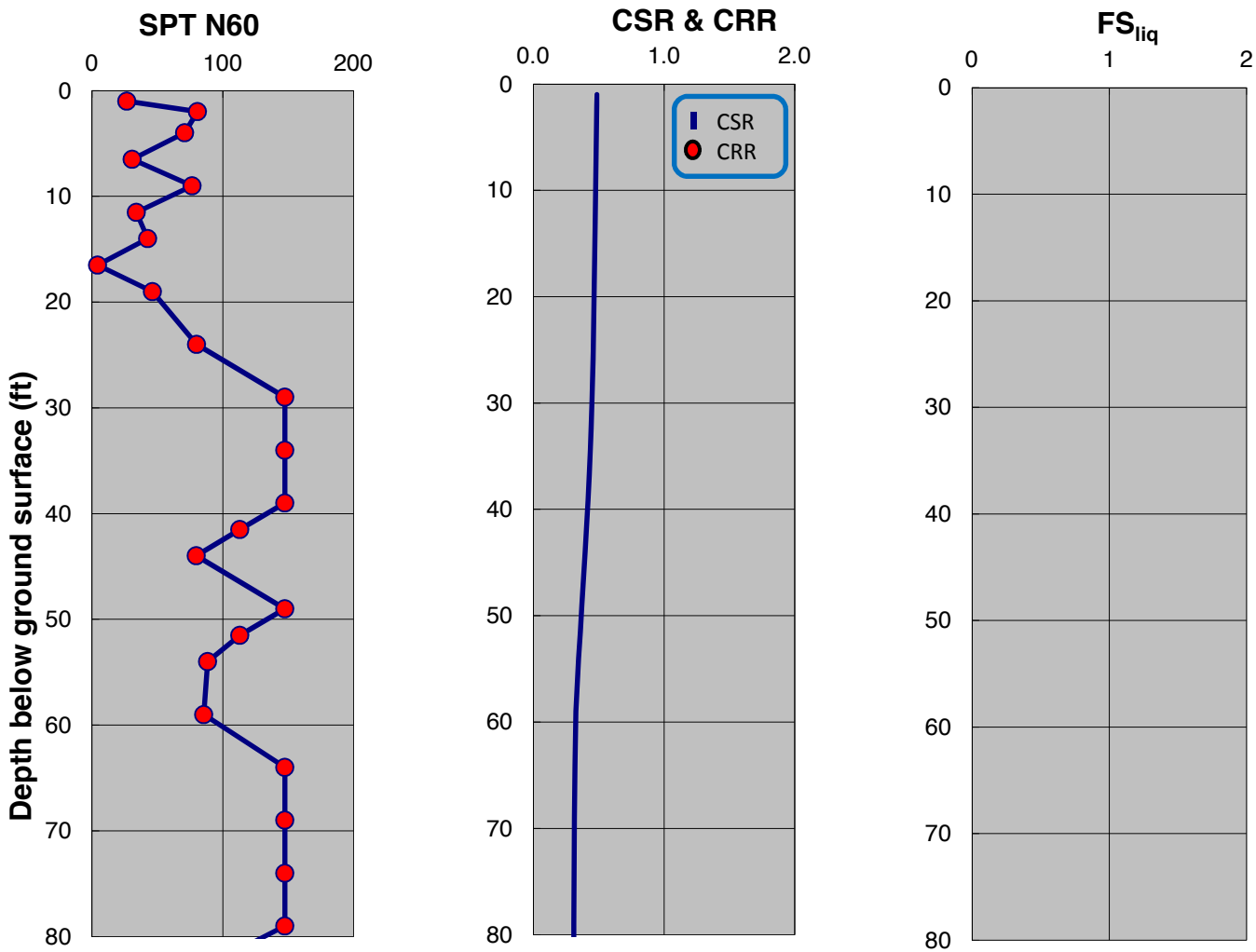
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-77 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

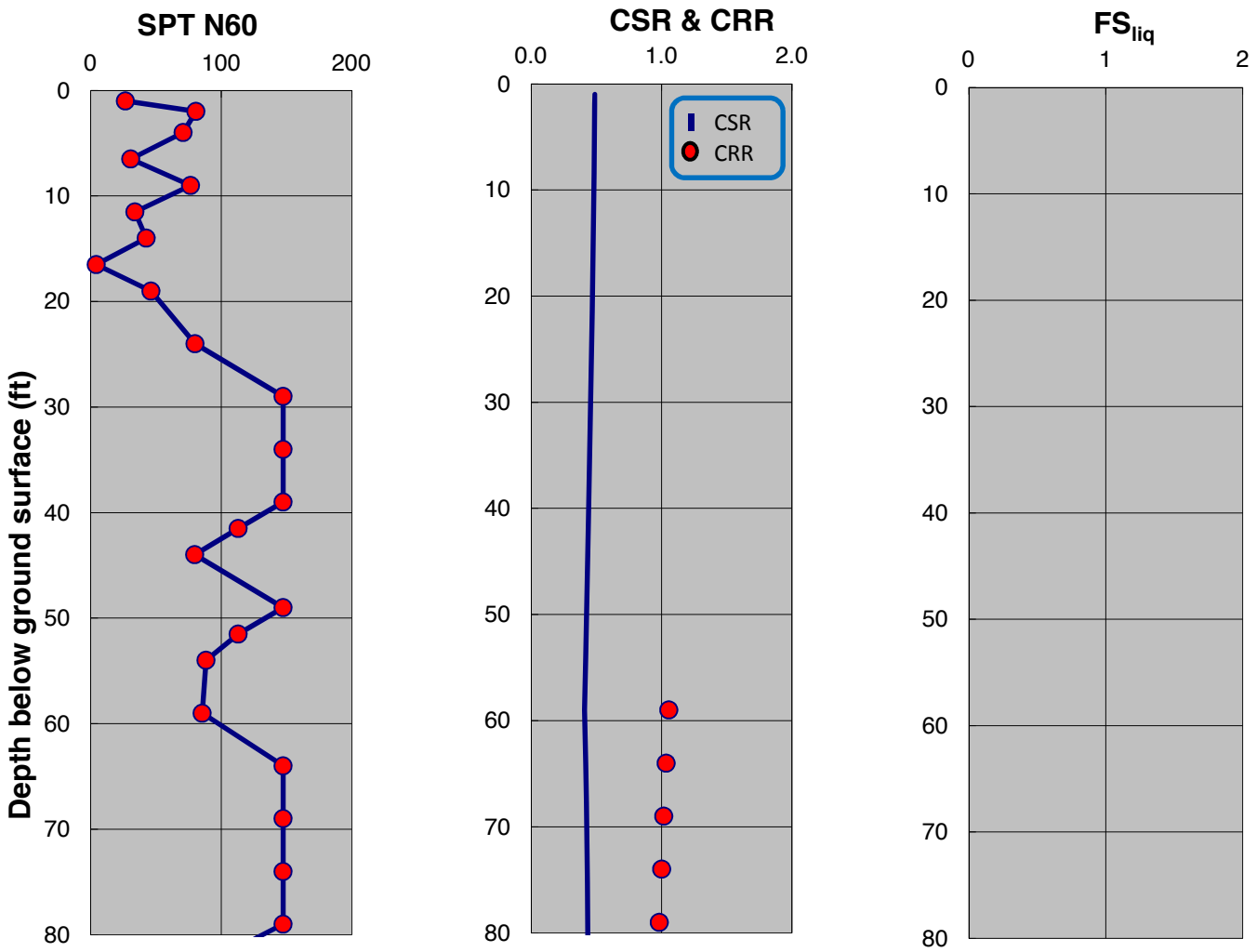
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.80



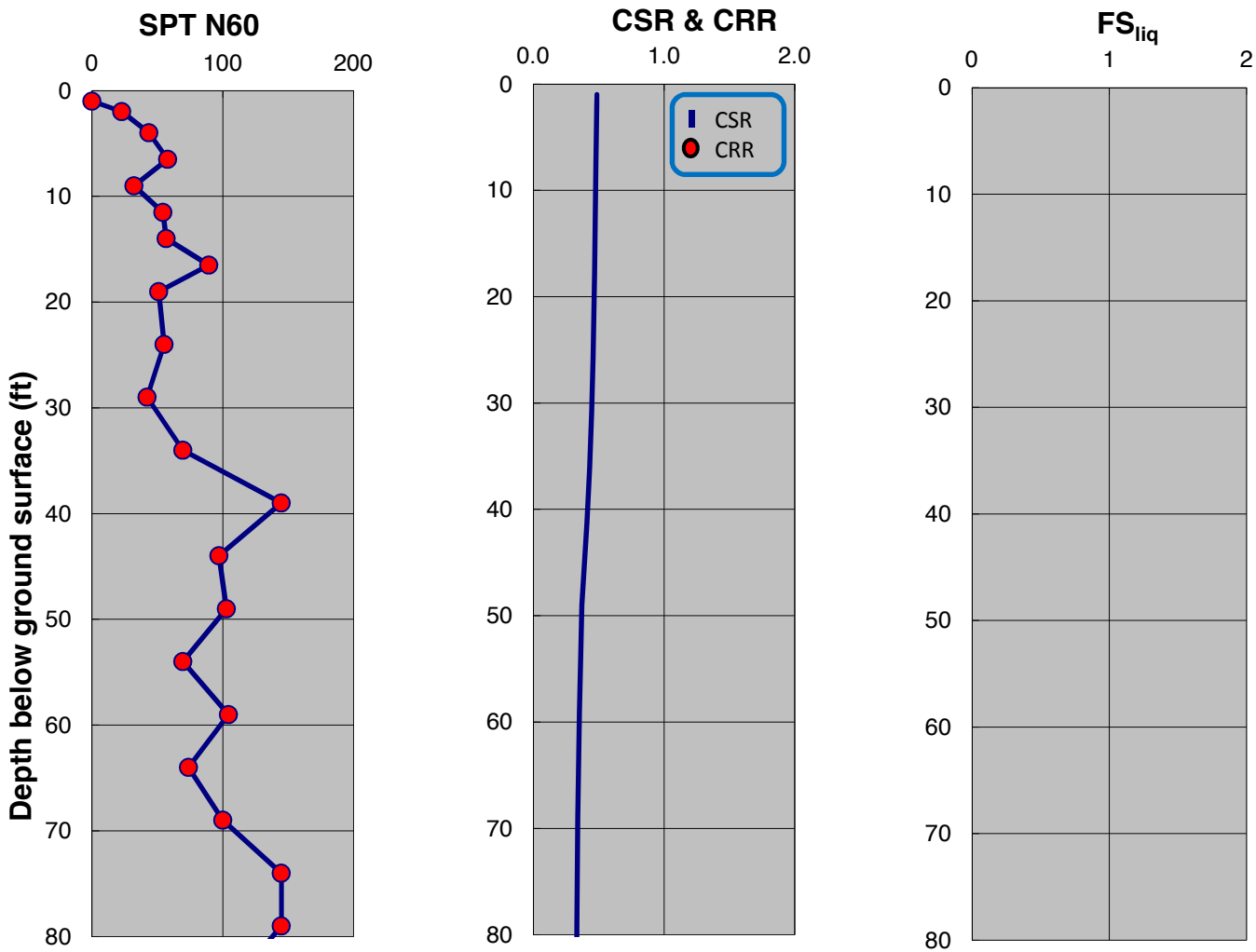
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-78 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



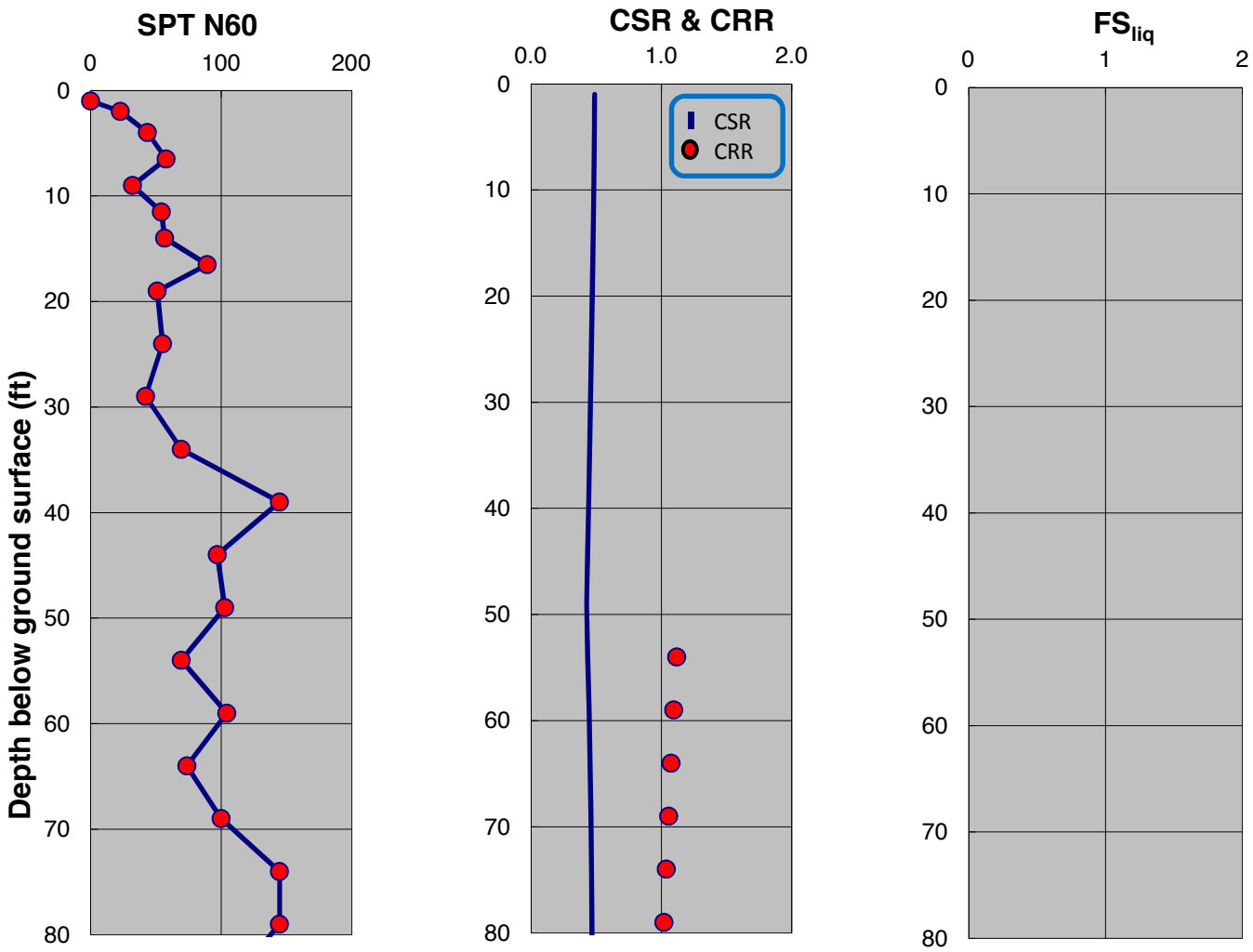
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-78 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



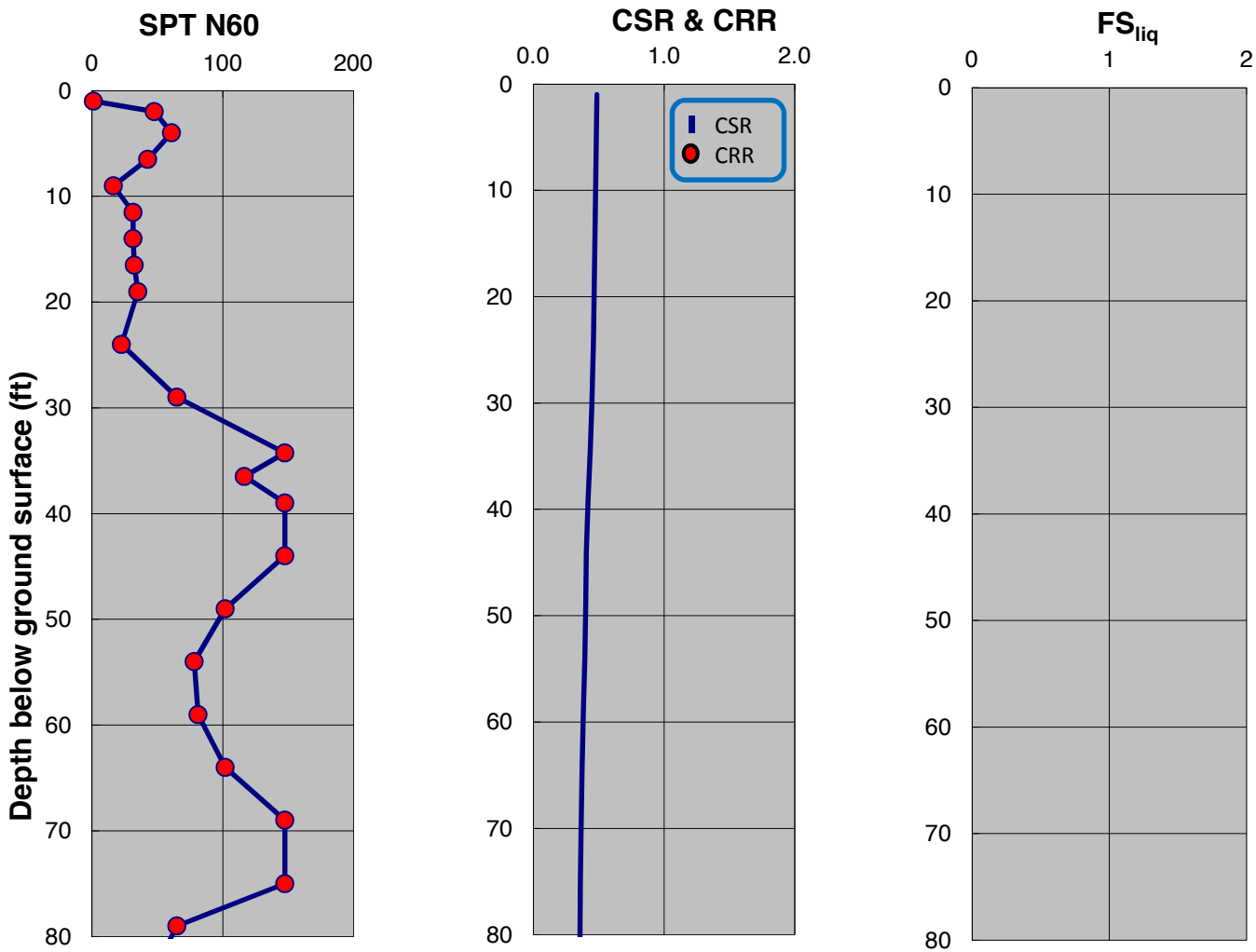
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-79 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



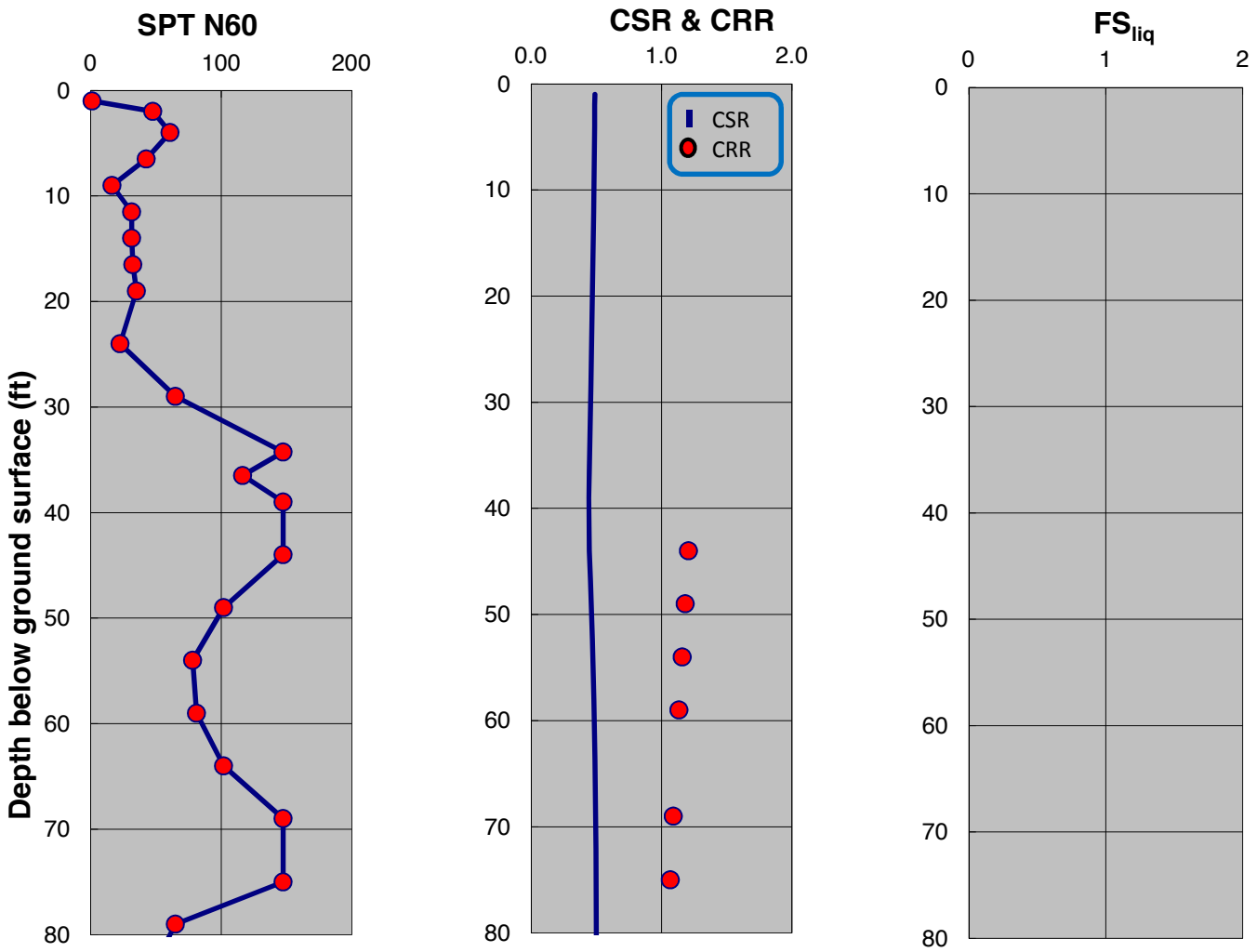
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-79 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



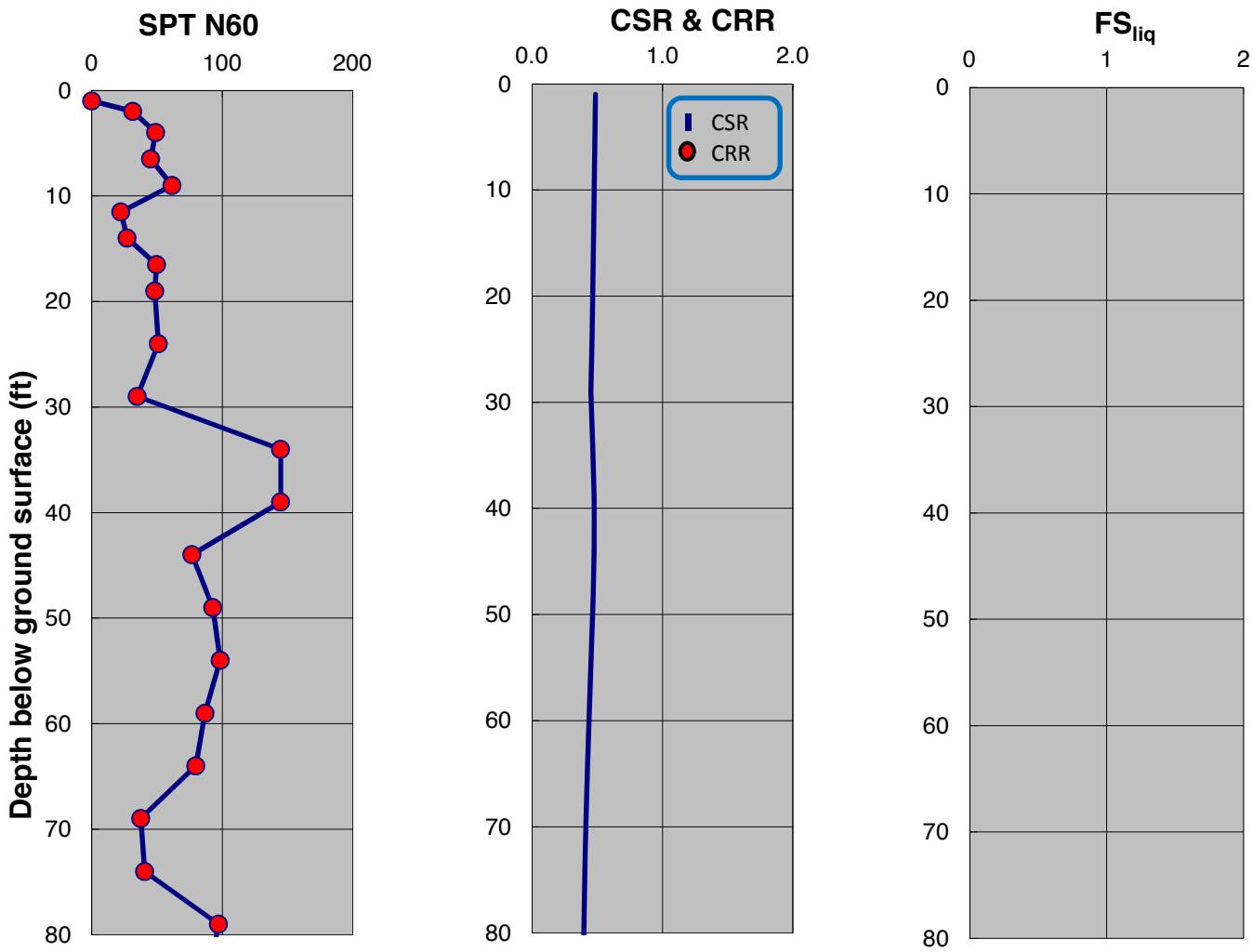
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-80 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



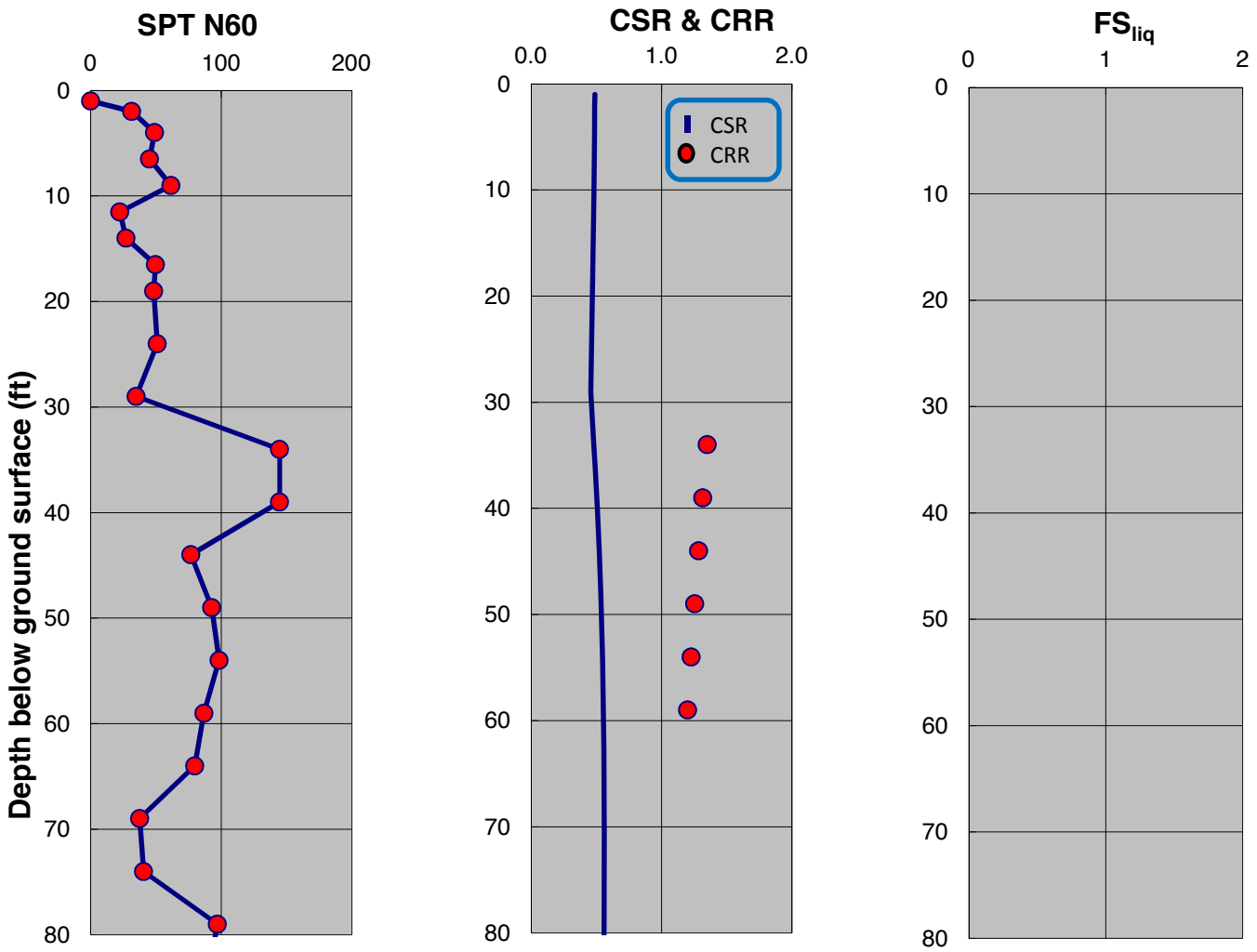
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-80 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



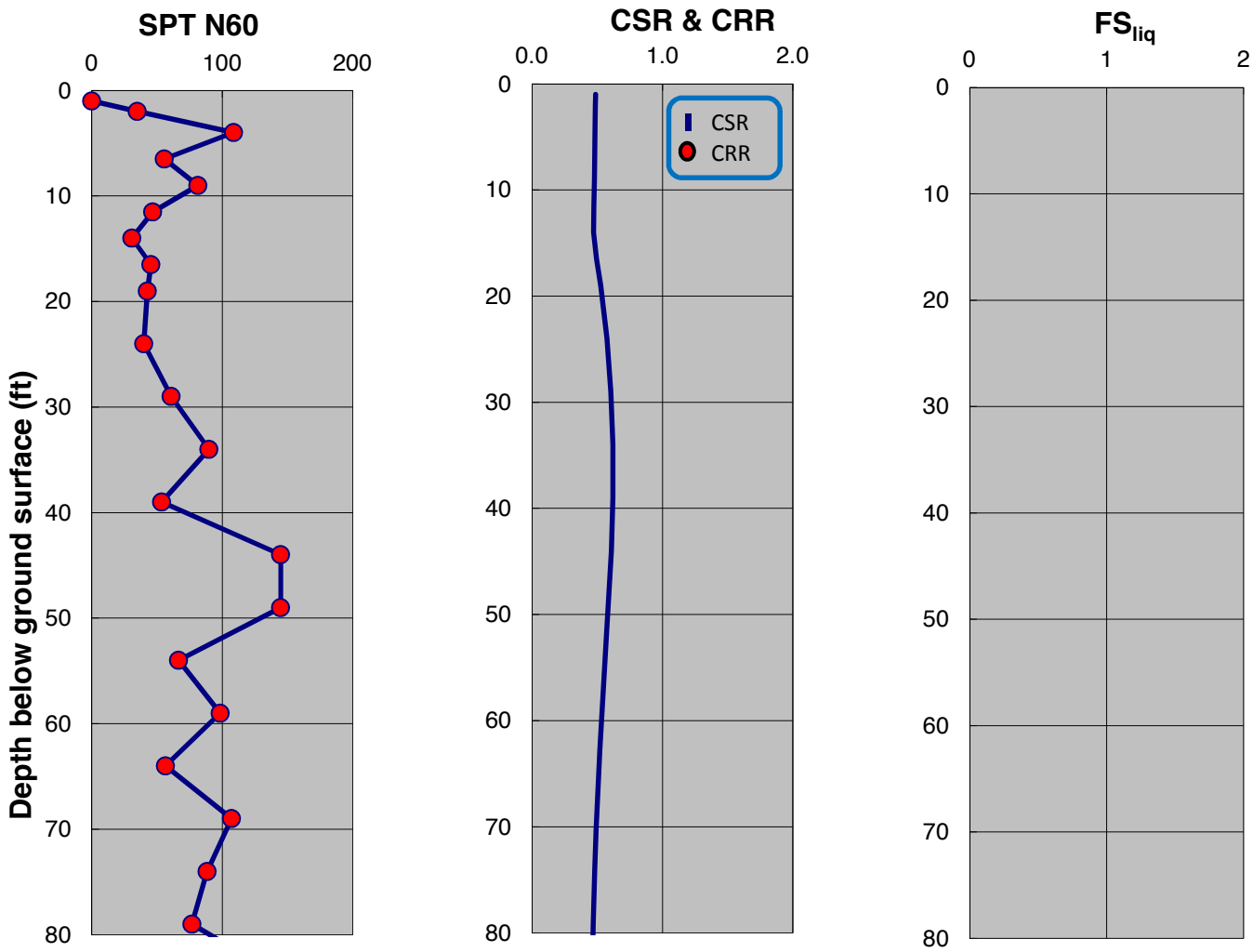
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-81 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



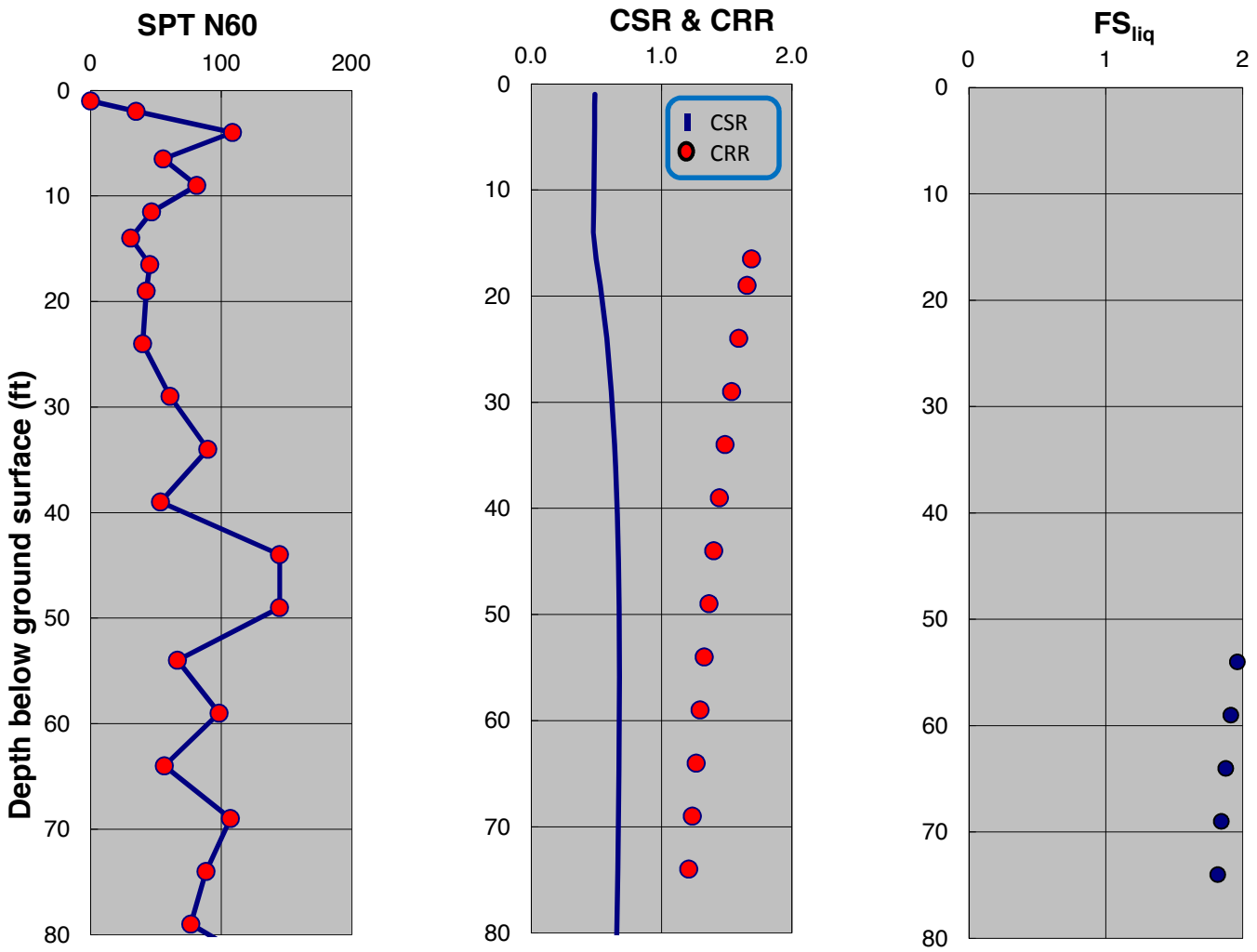
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-81 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-82 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

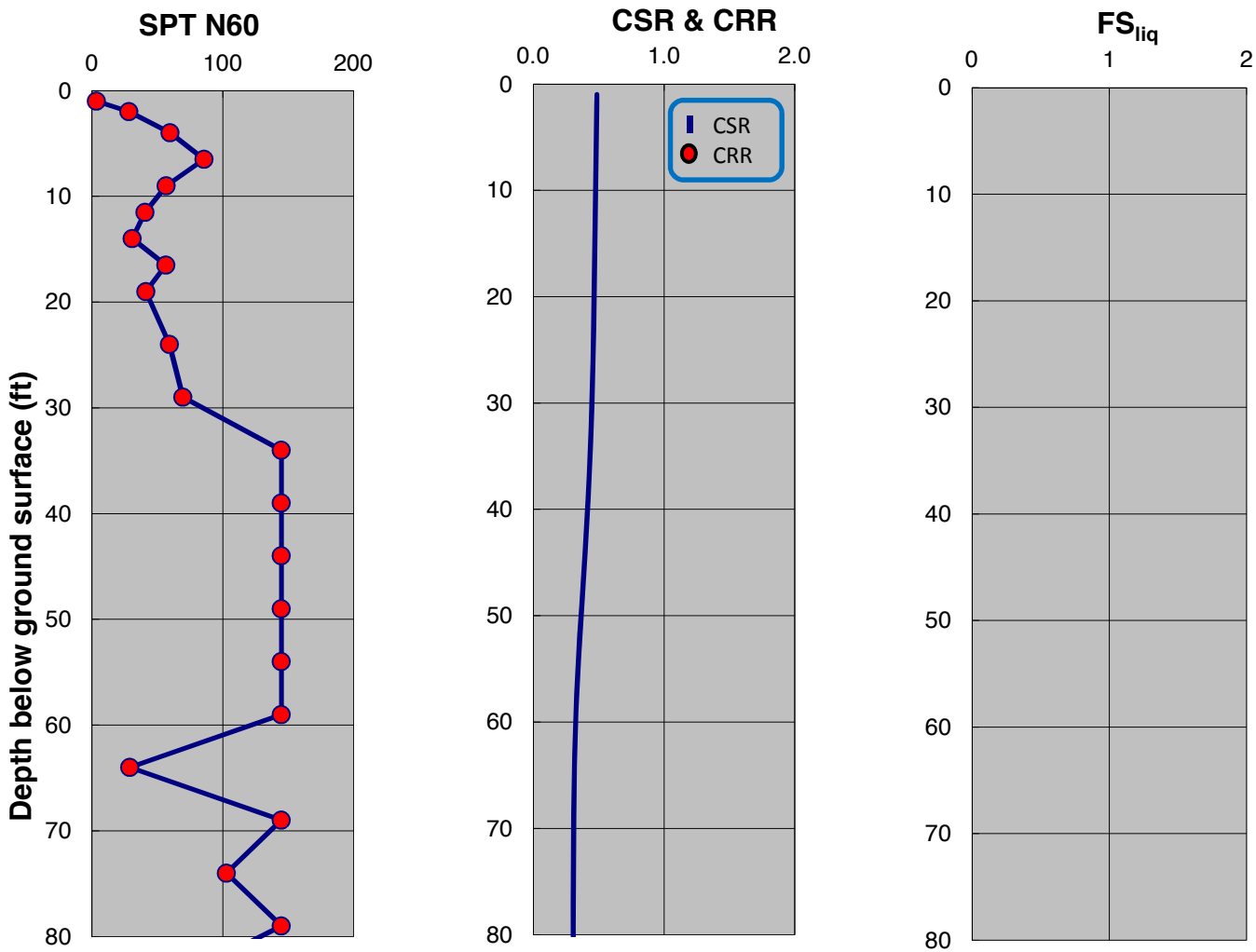
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-82 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

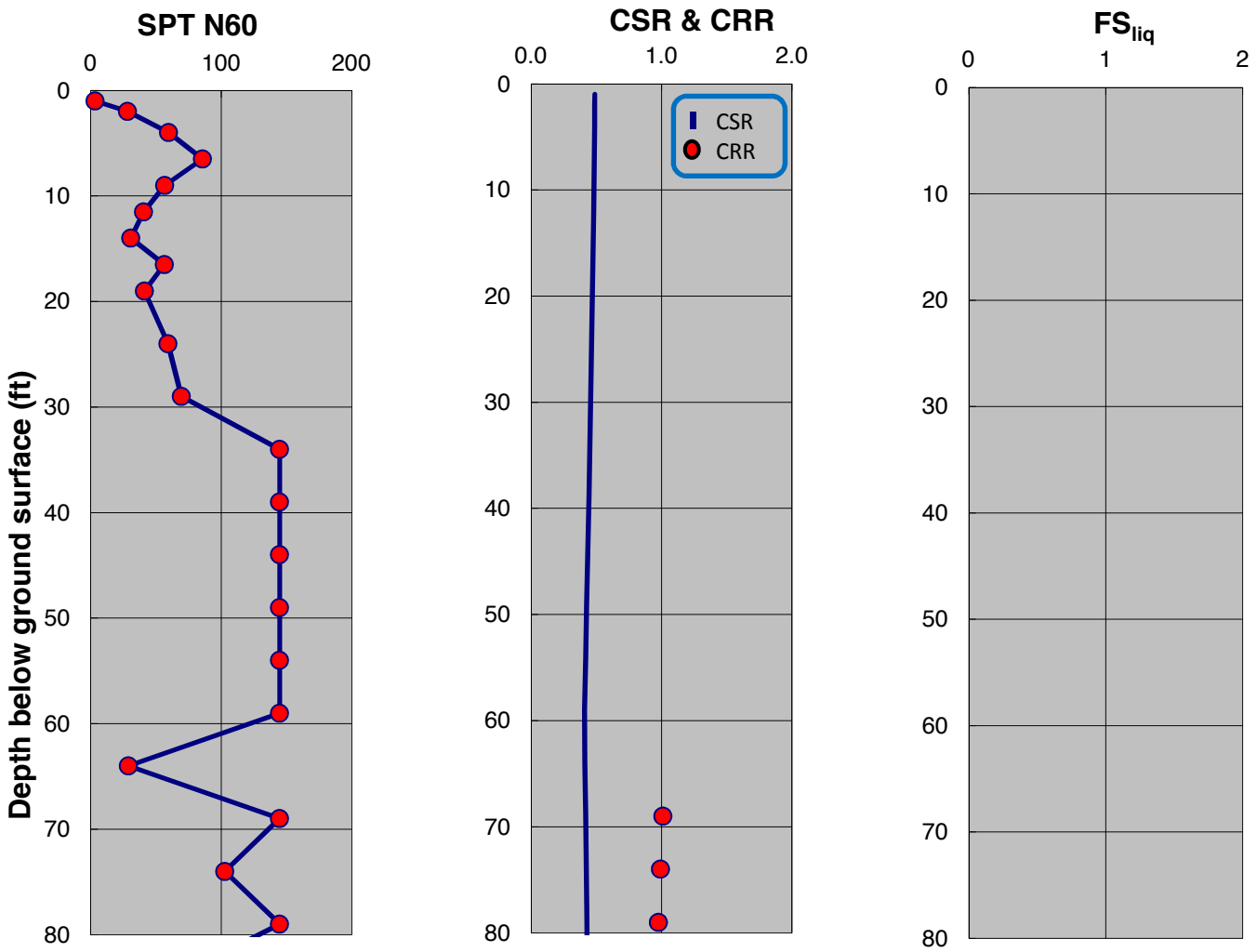
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.90



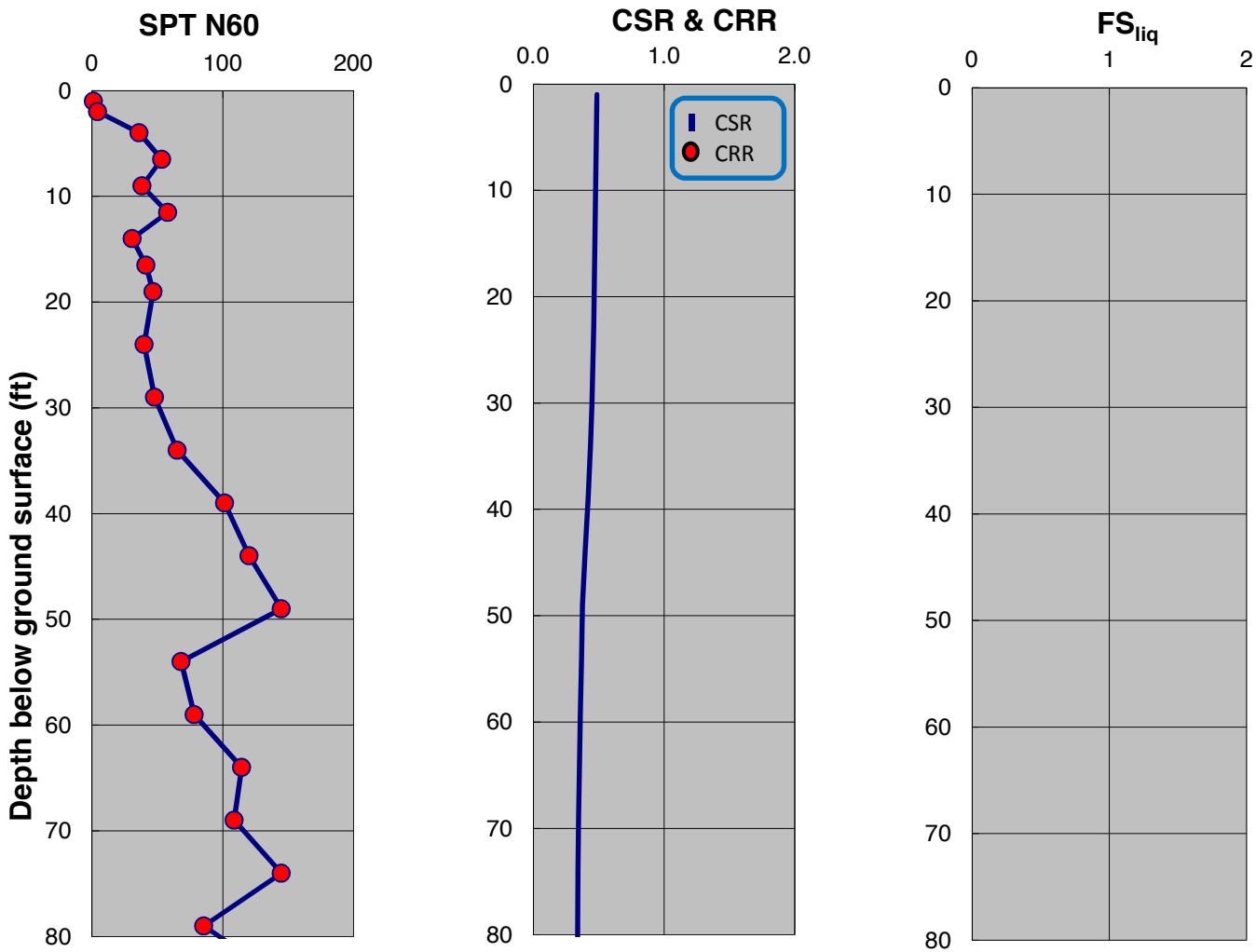
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-83 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



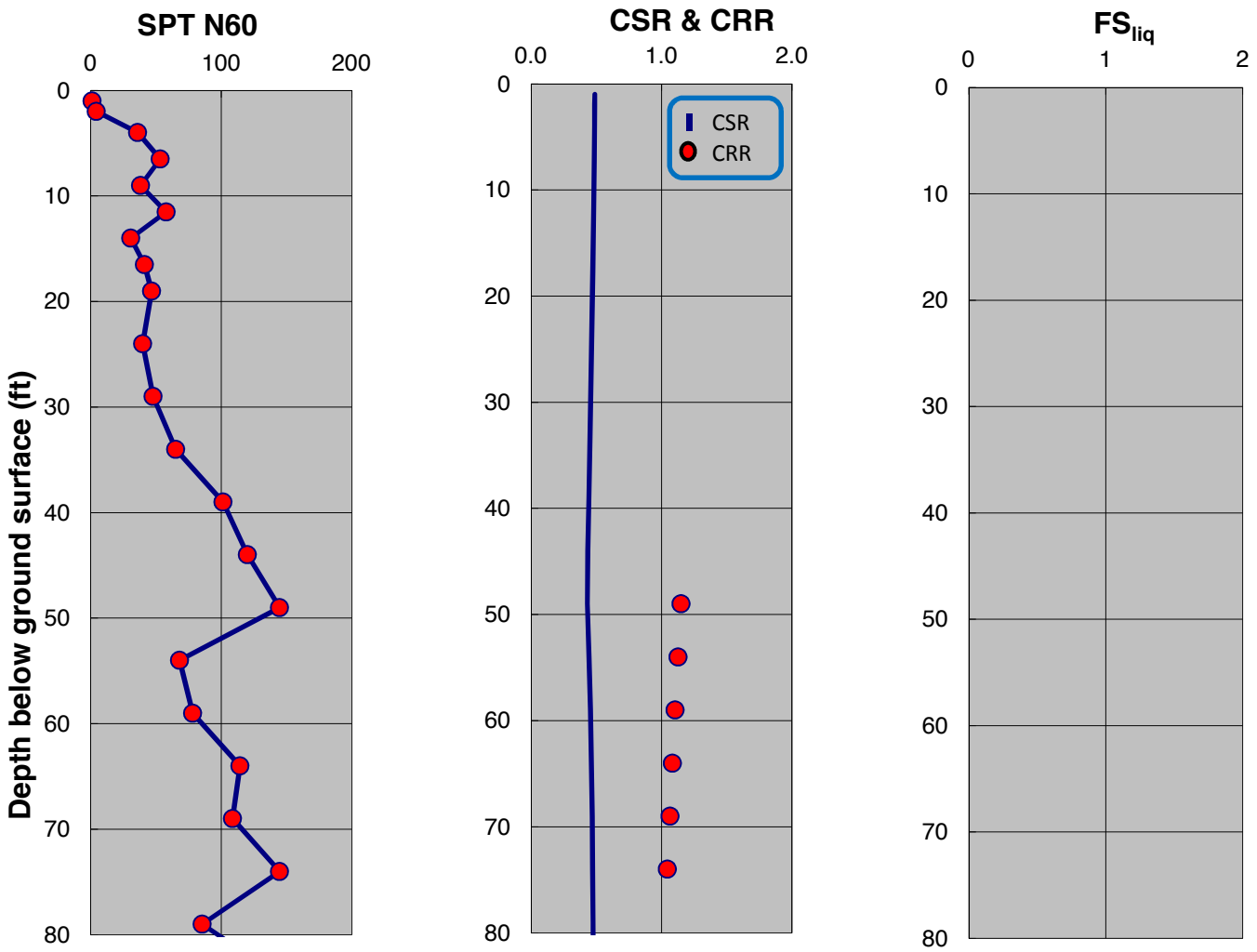
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-83 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



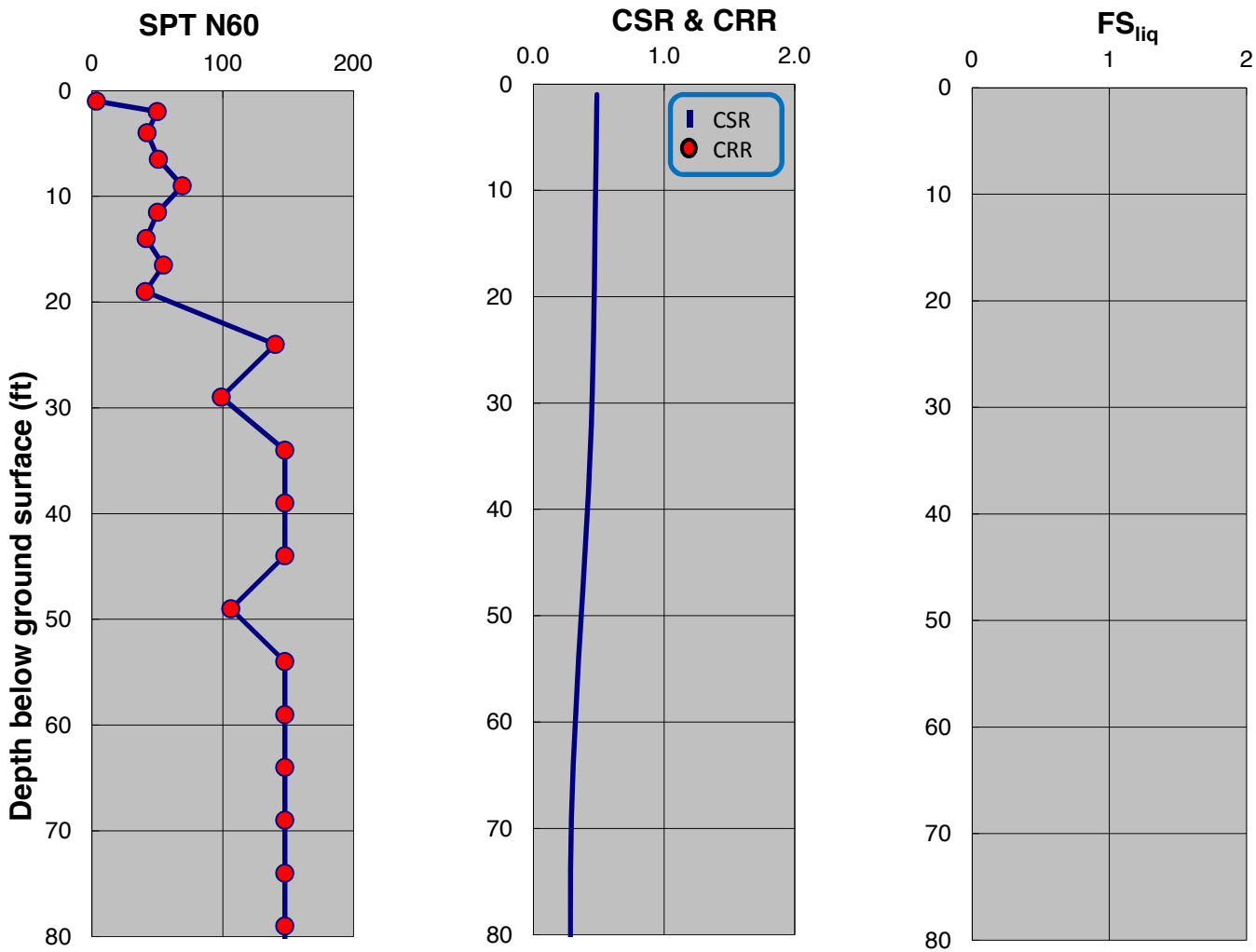
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-84 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



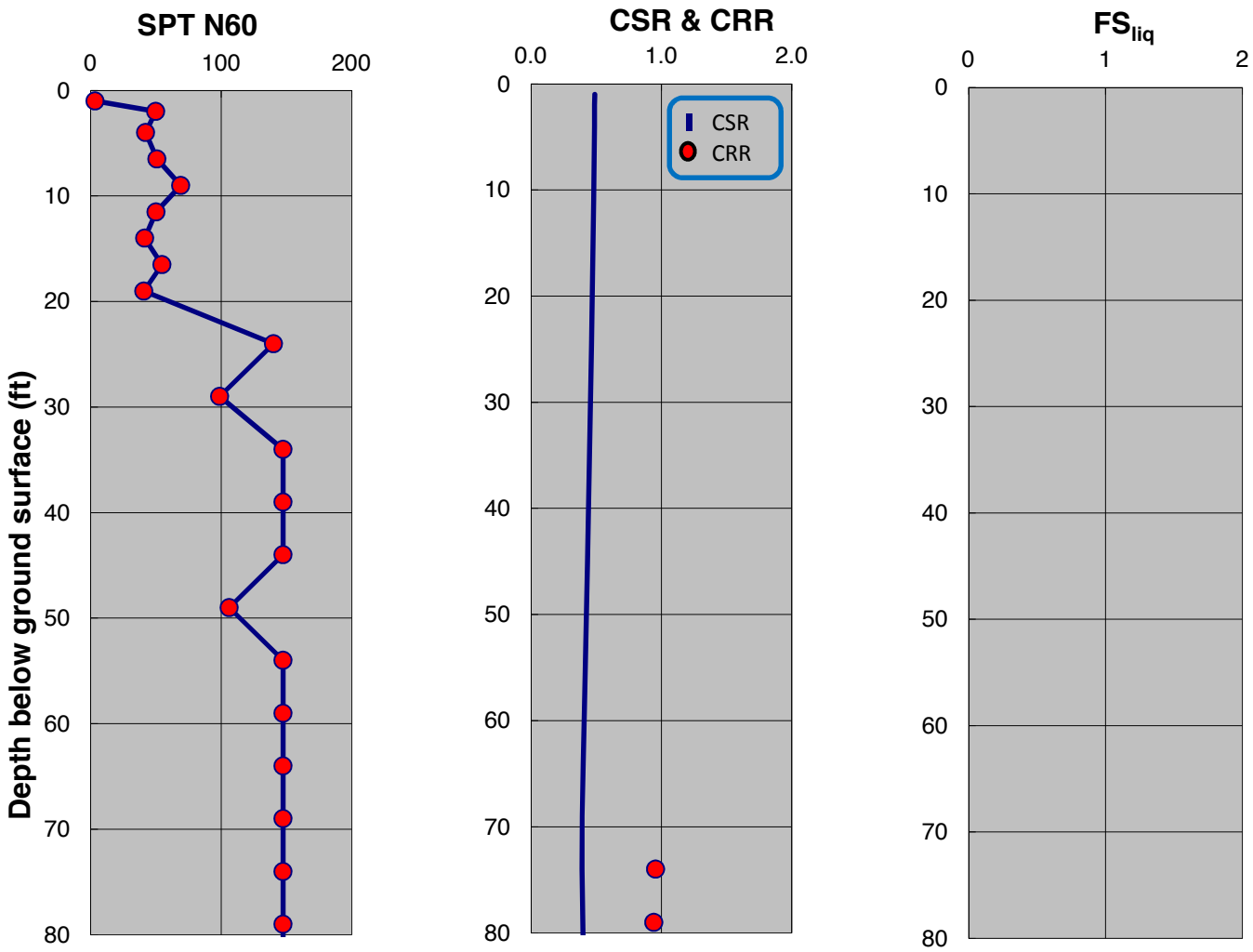
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-84 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-85 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

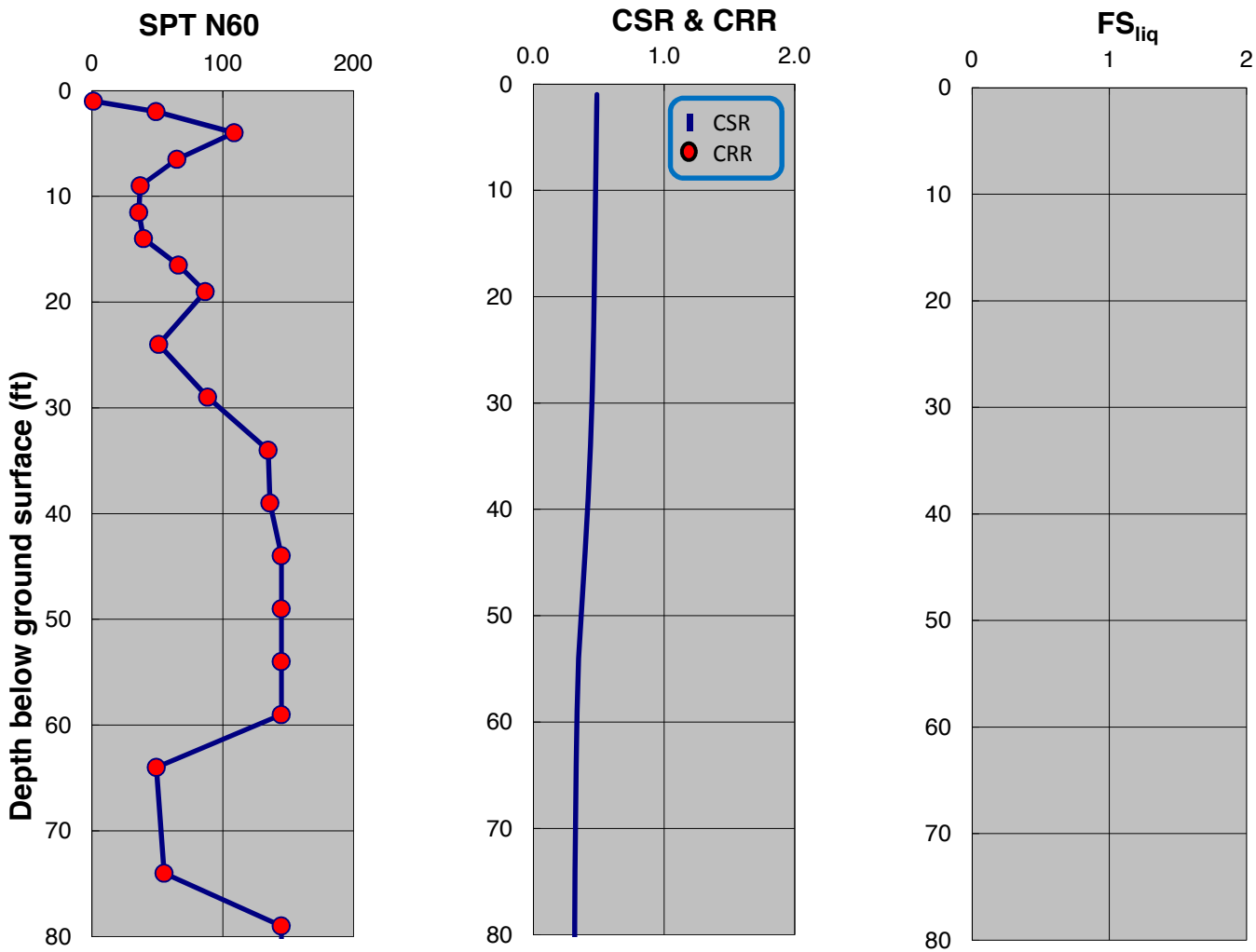
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-85 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

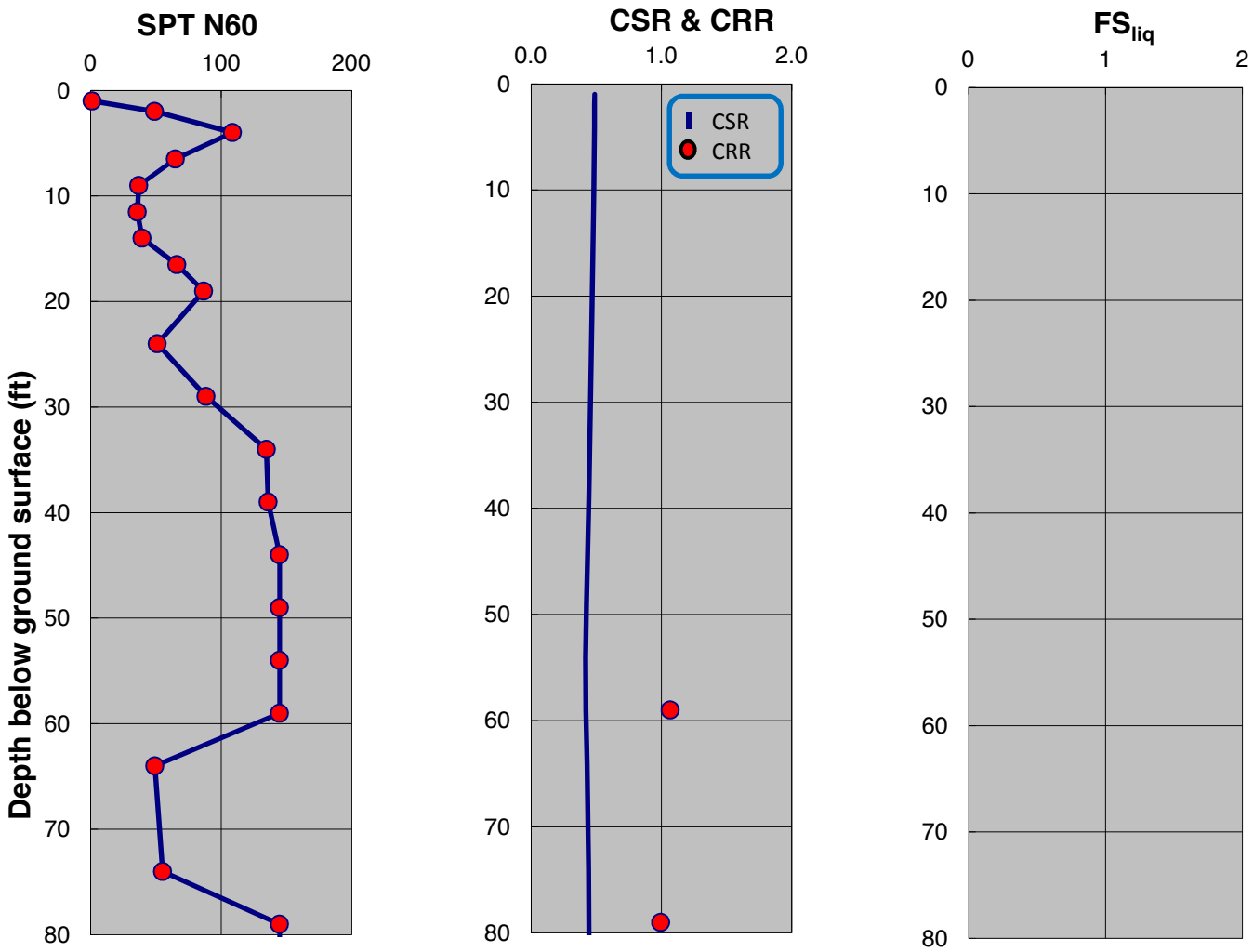
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.96



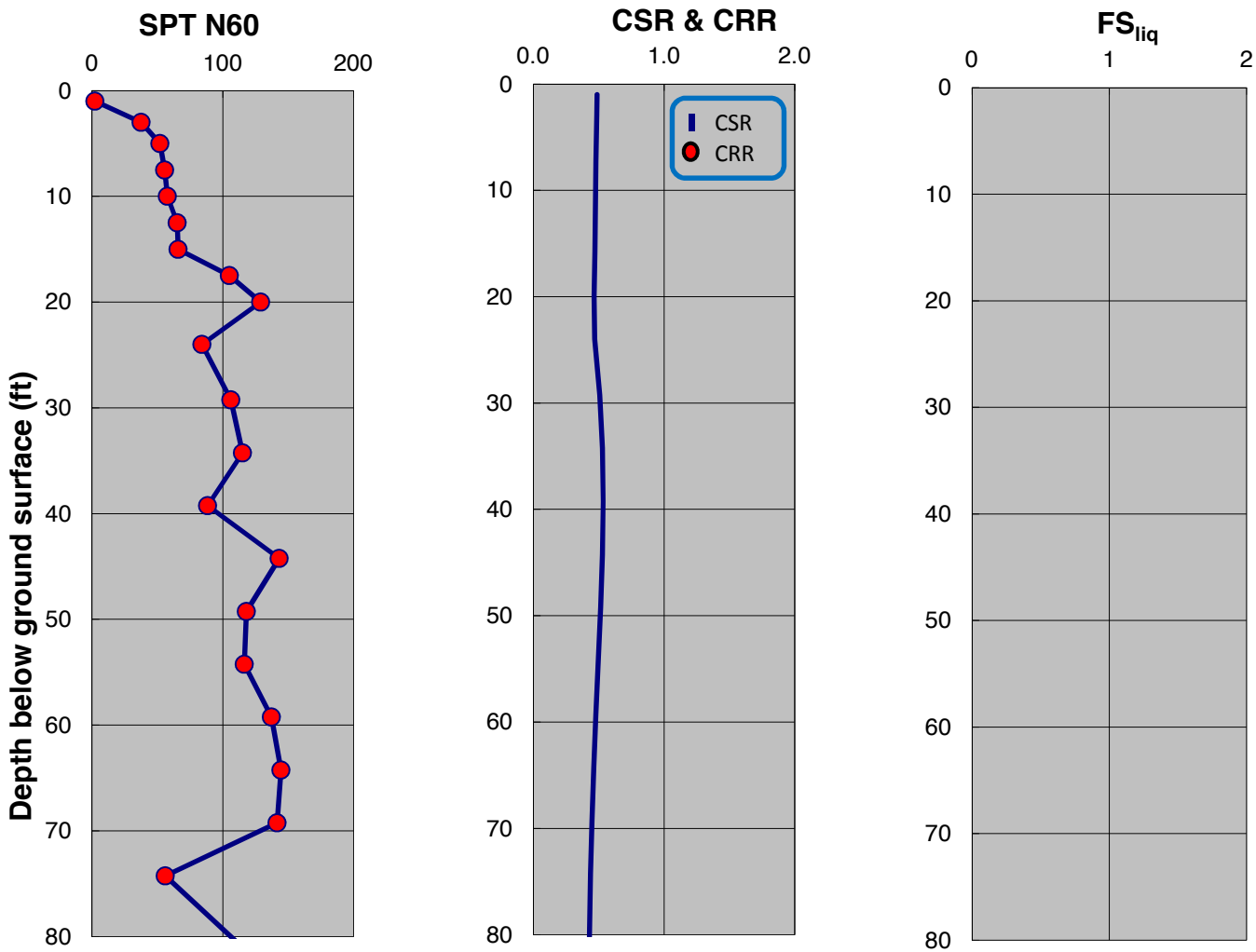
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-86 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



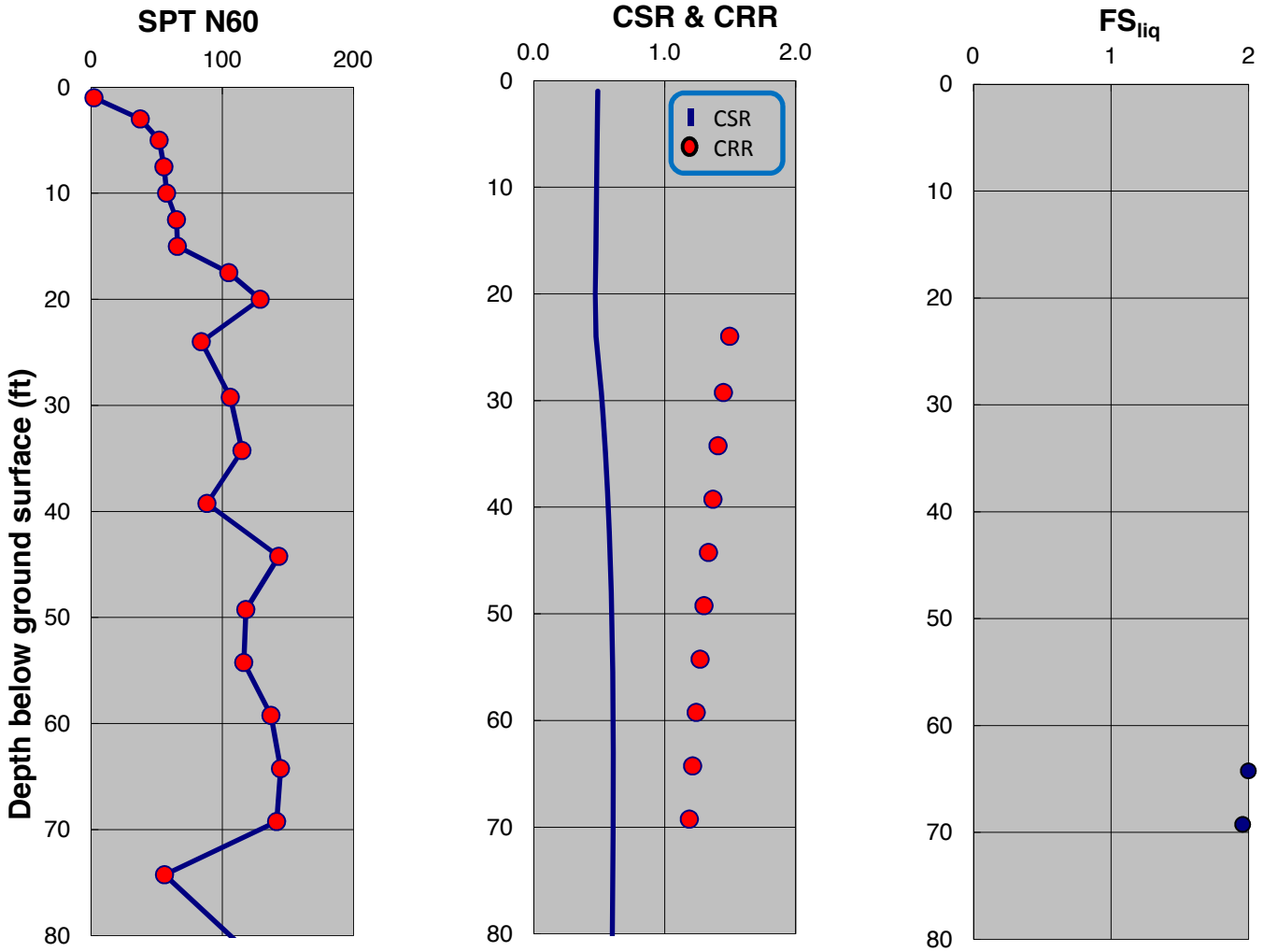
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-86 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



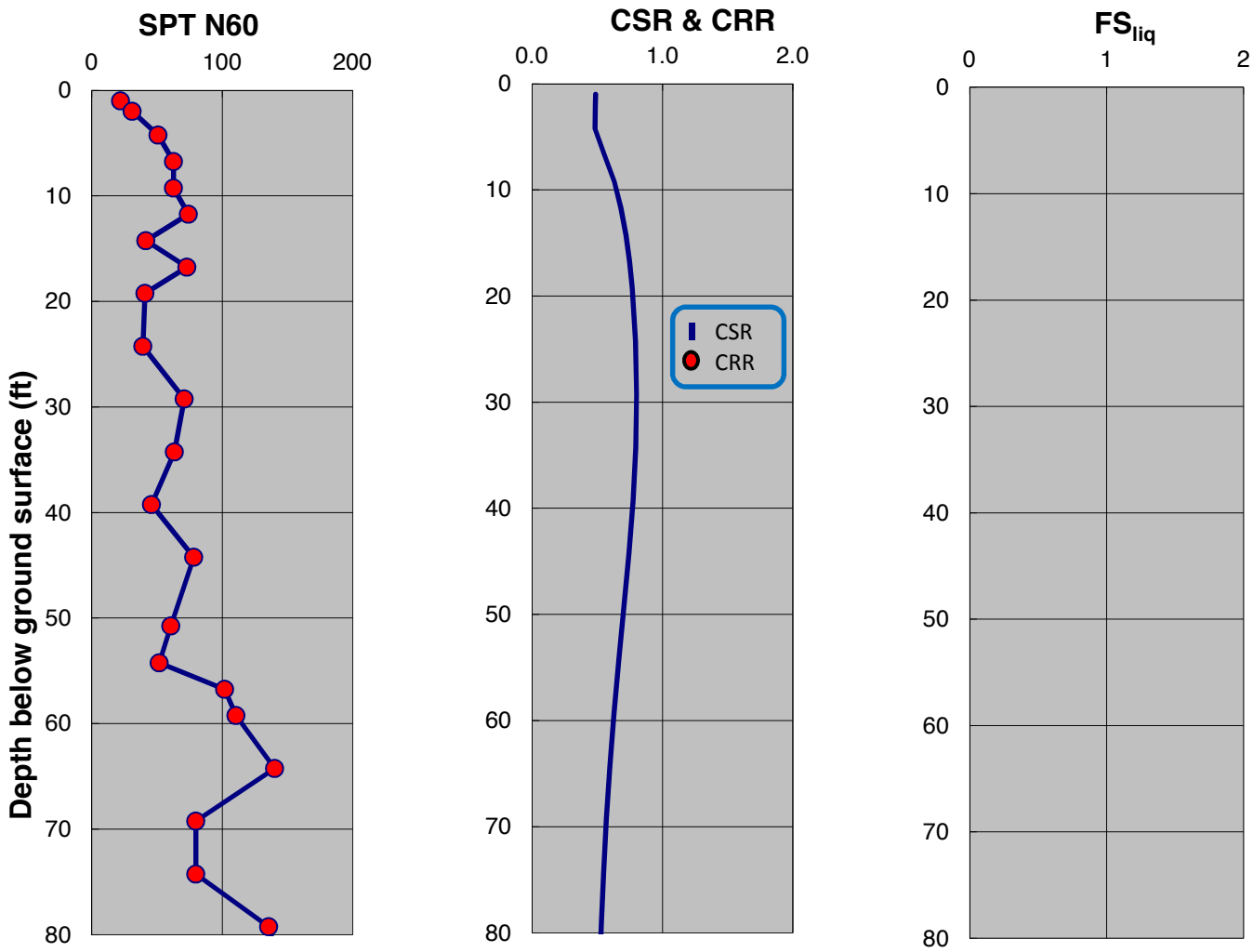
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-87 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-87 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

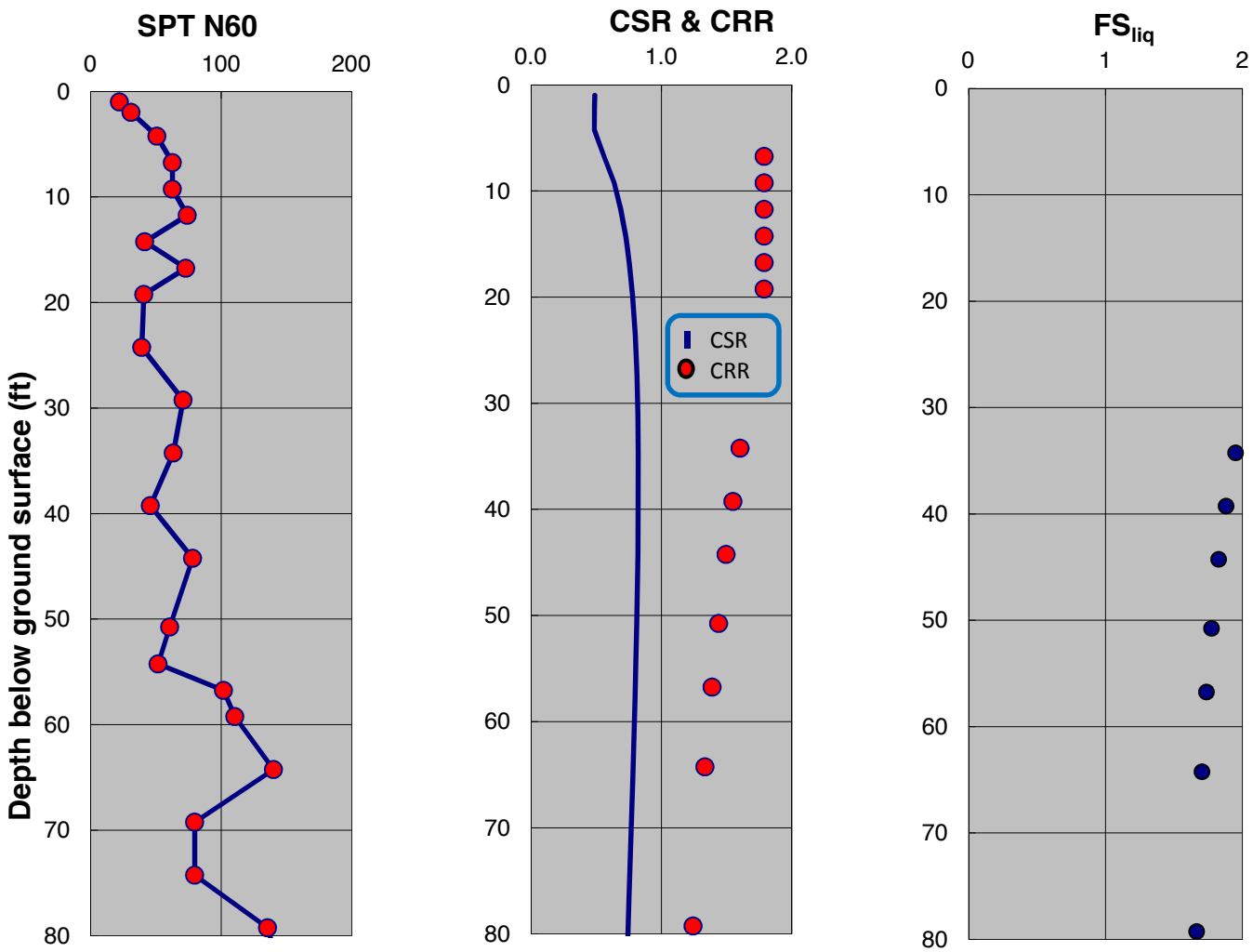
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-88 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

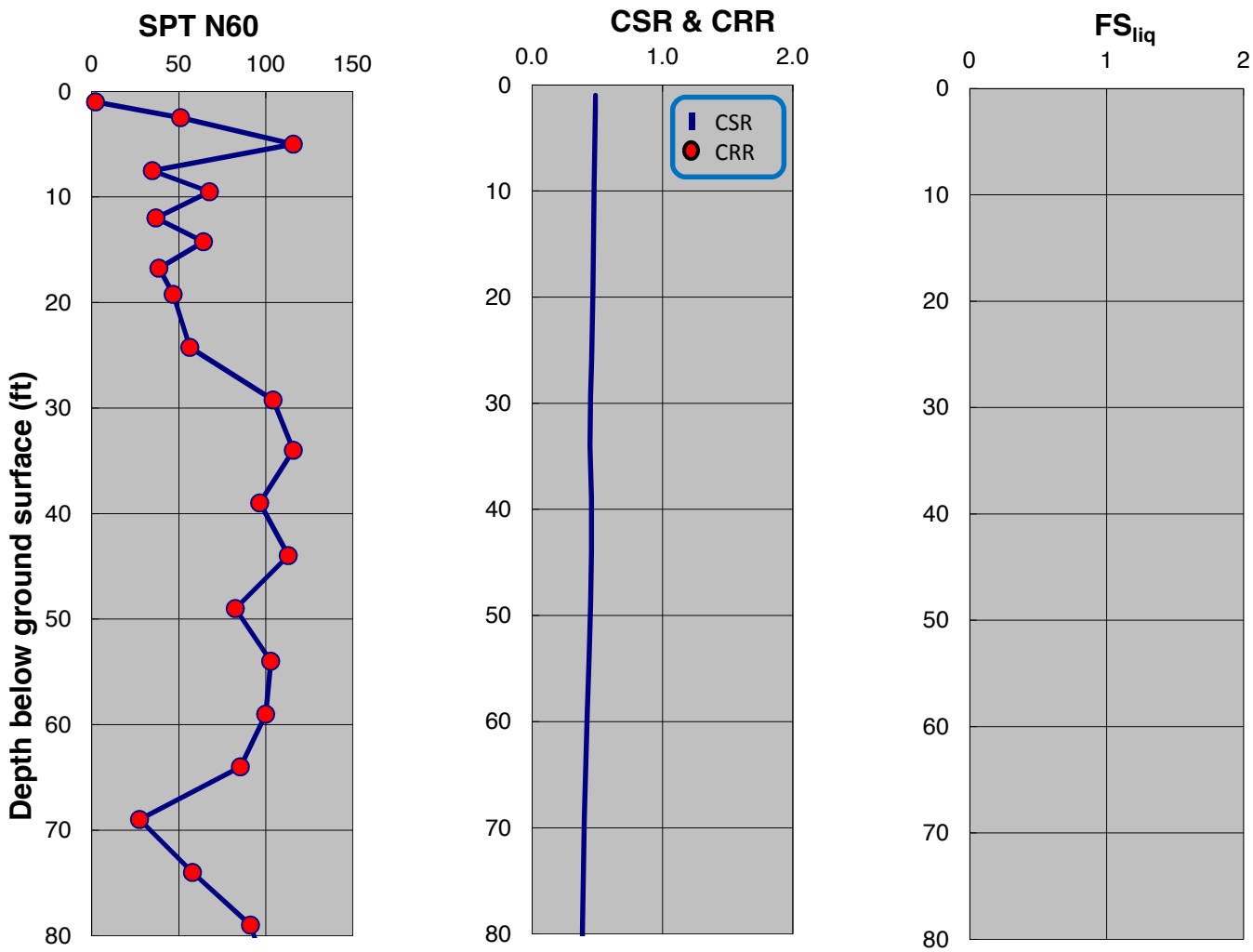
PLATE B.101



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-88 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

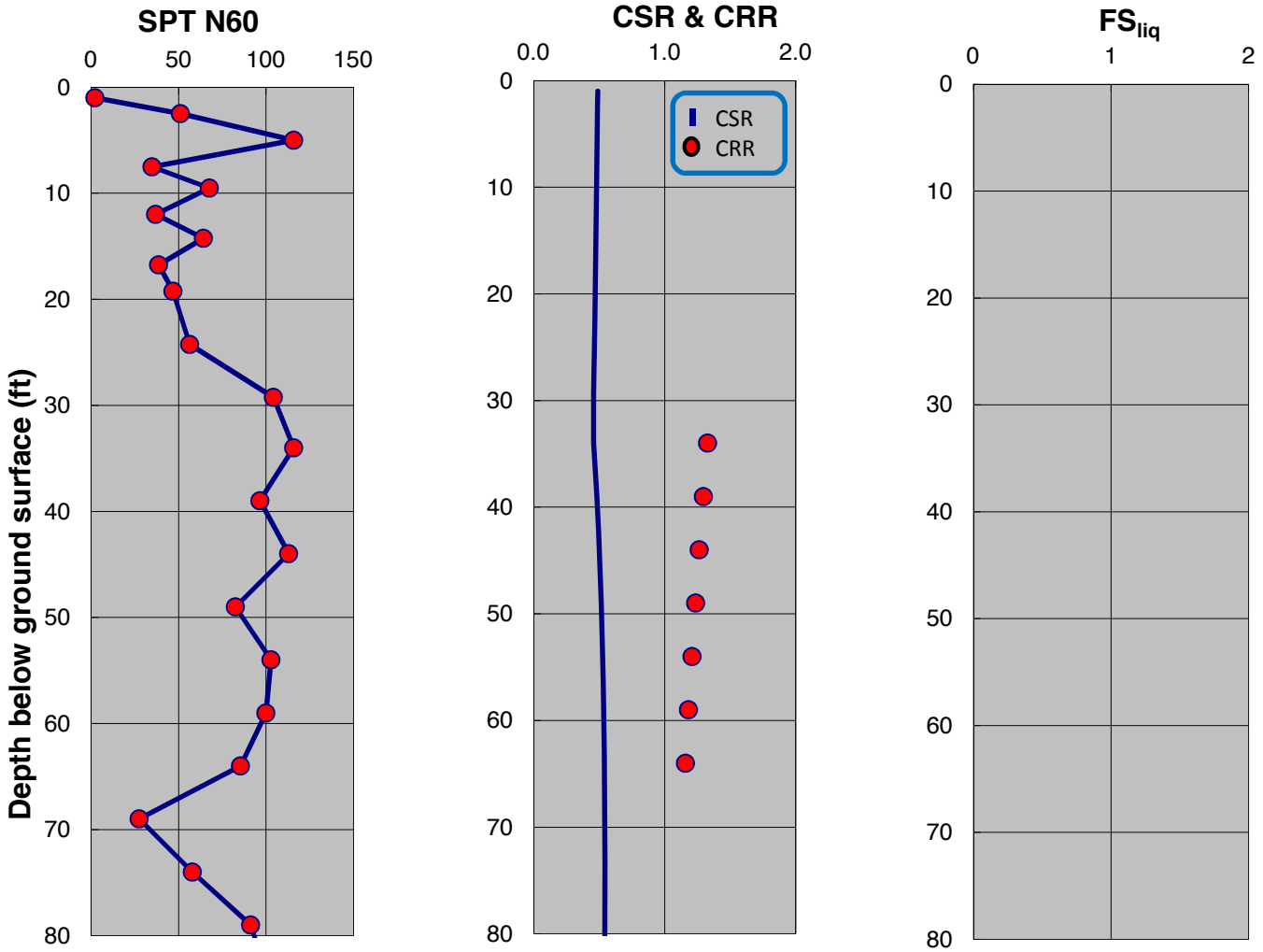
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.102



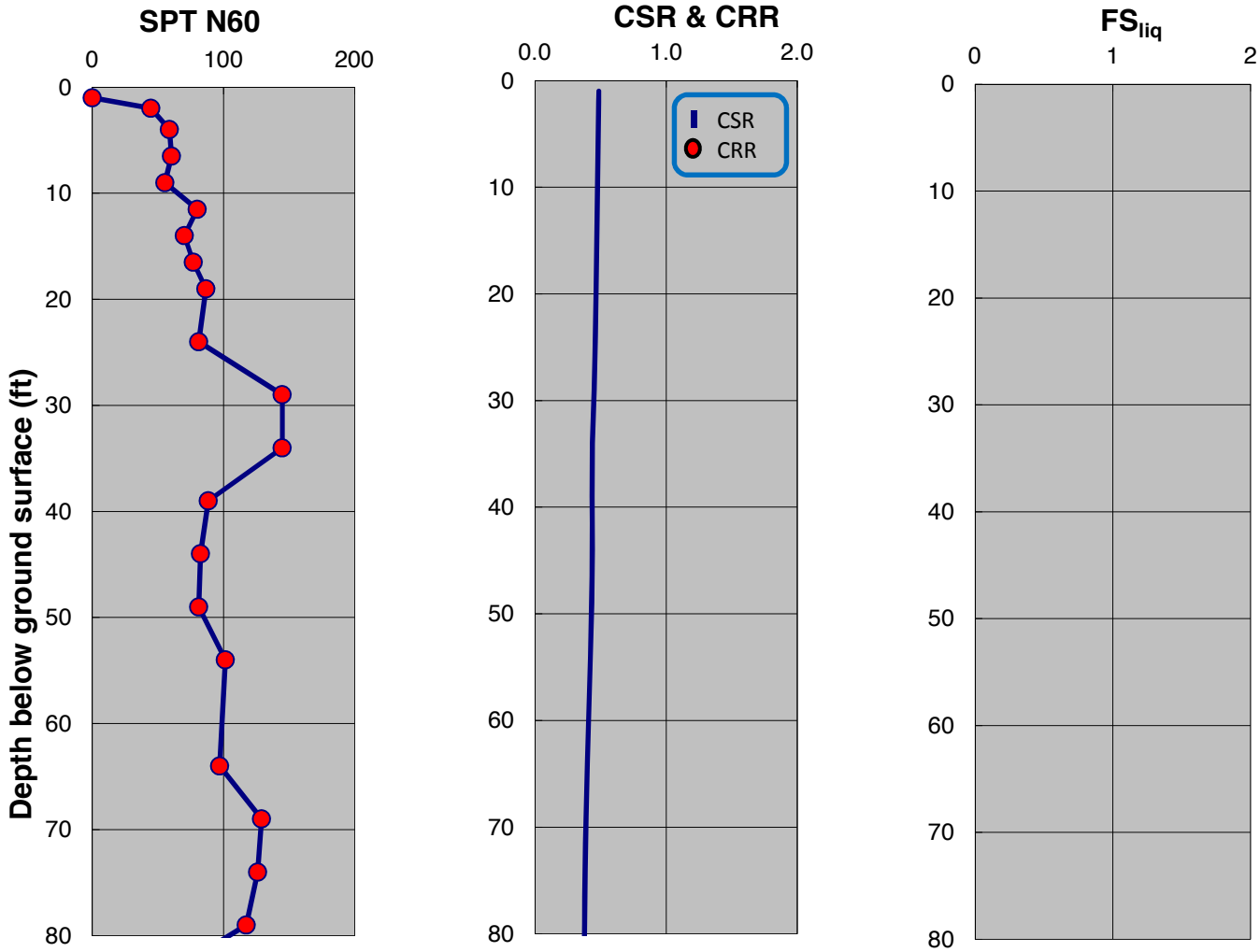
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-89 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



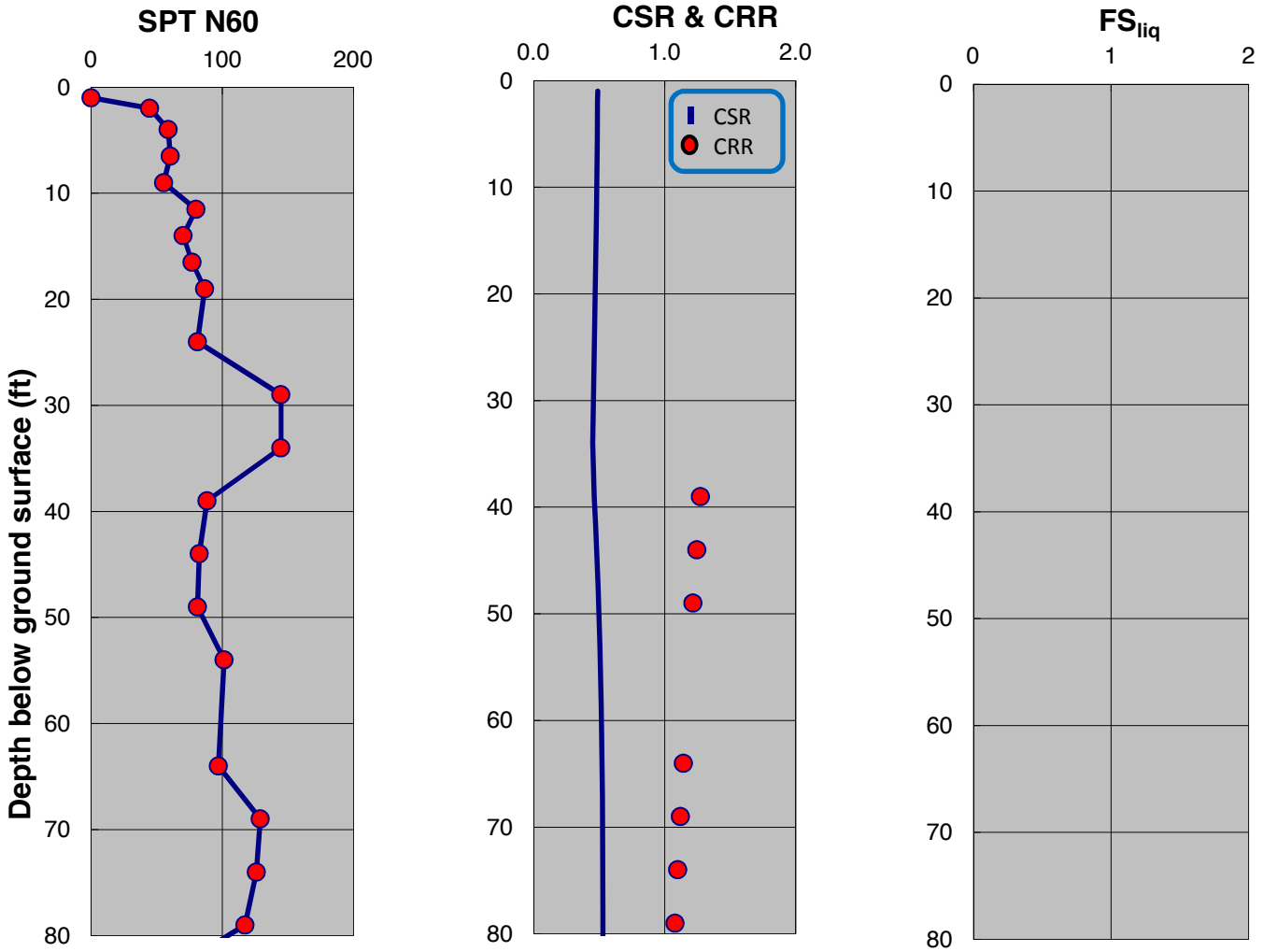
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-89 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



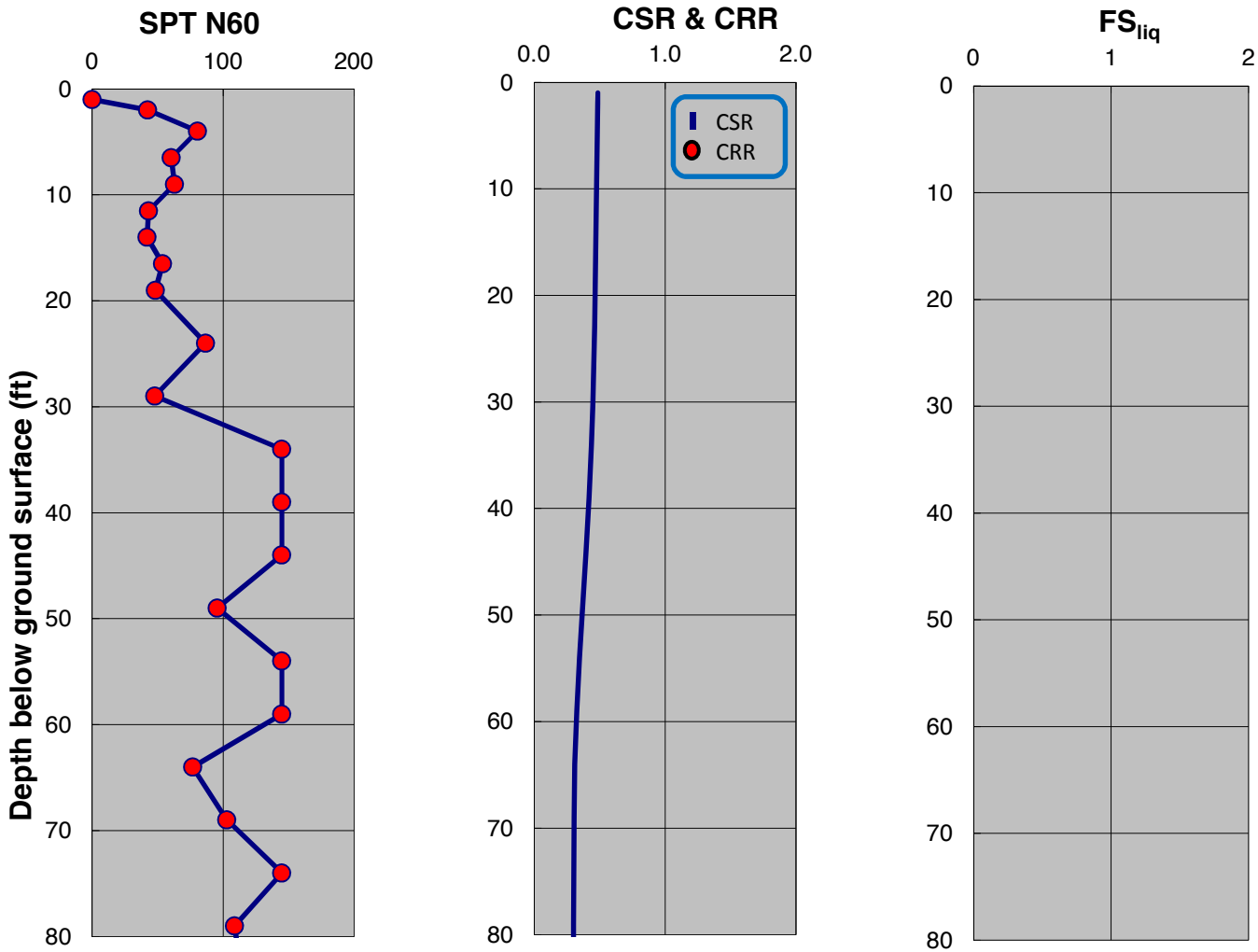
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-90 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



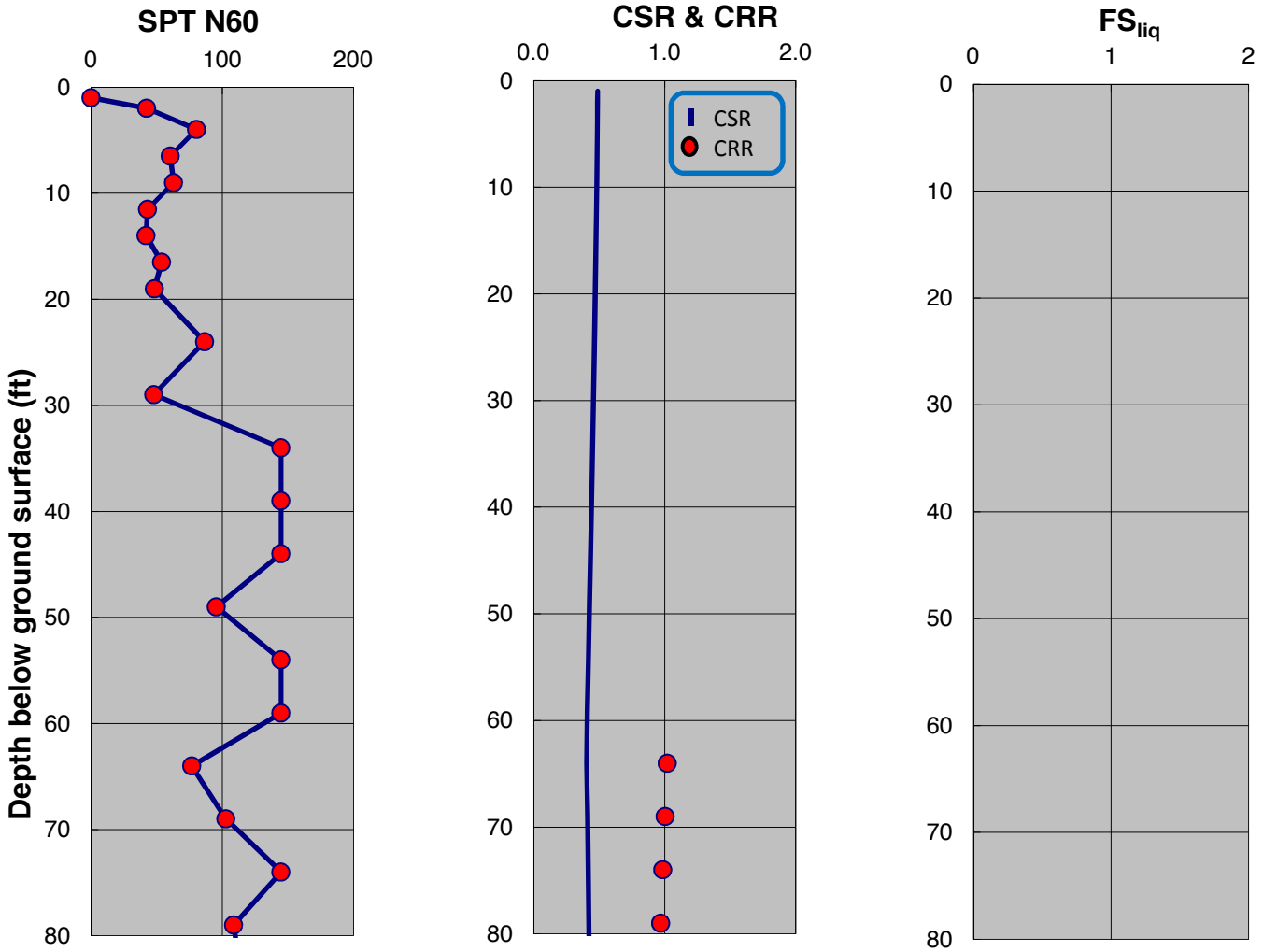
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-90 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



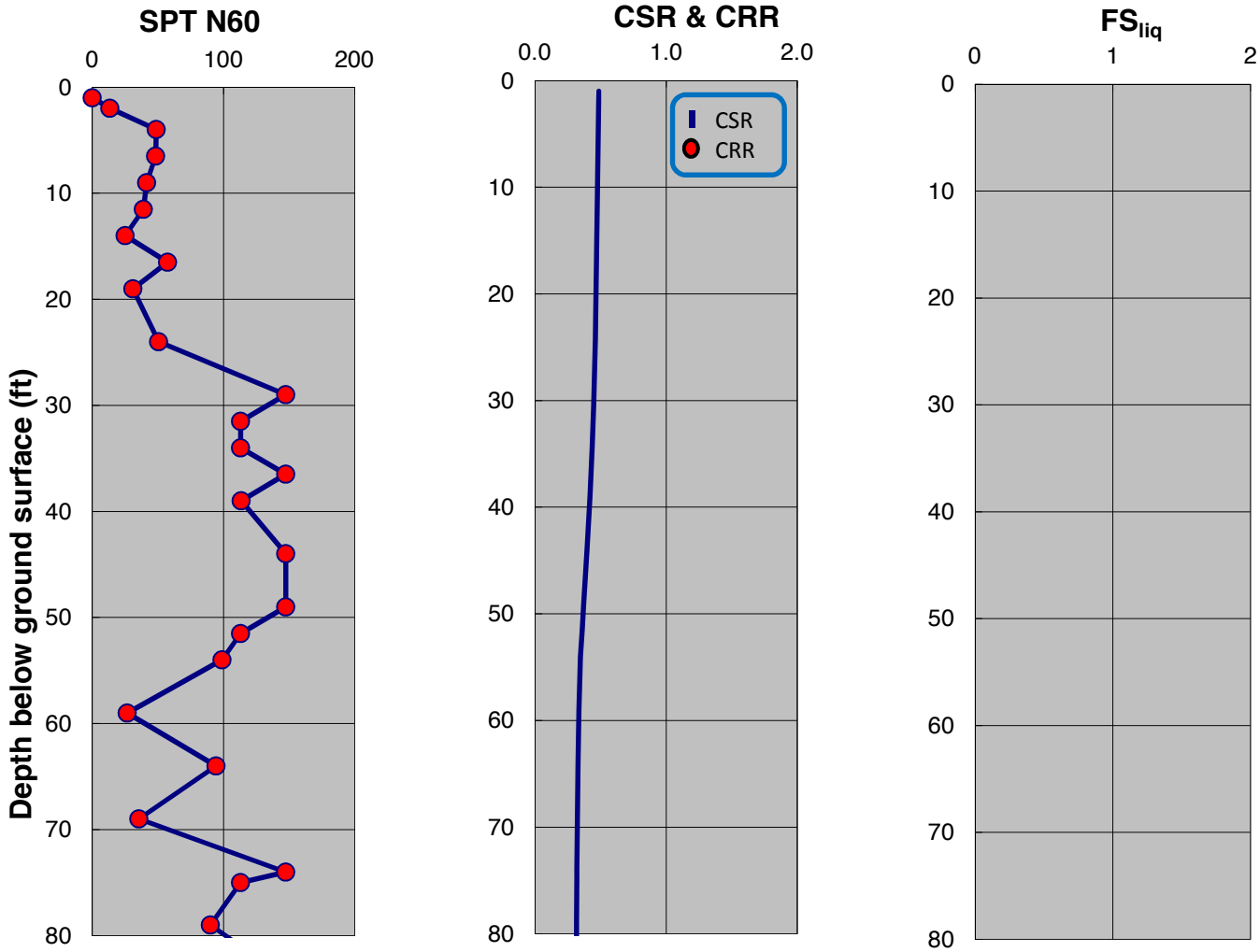
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-91 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



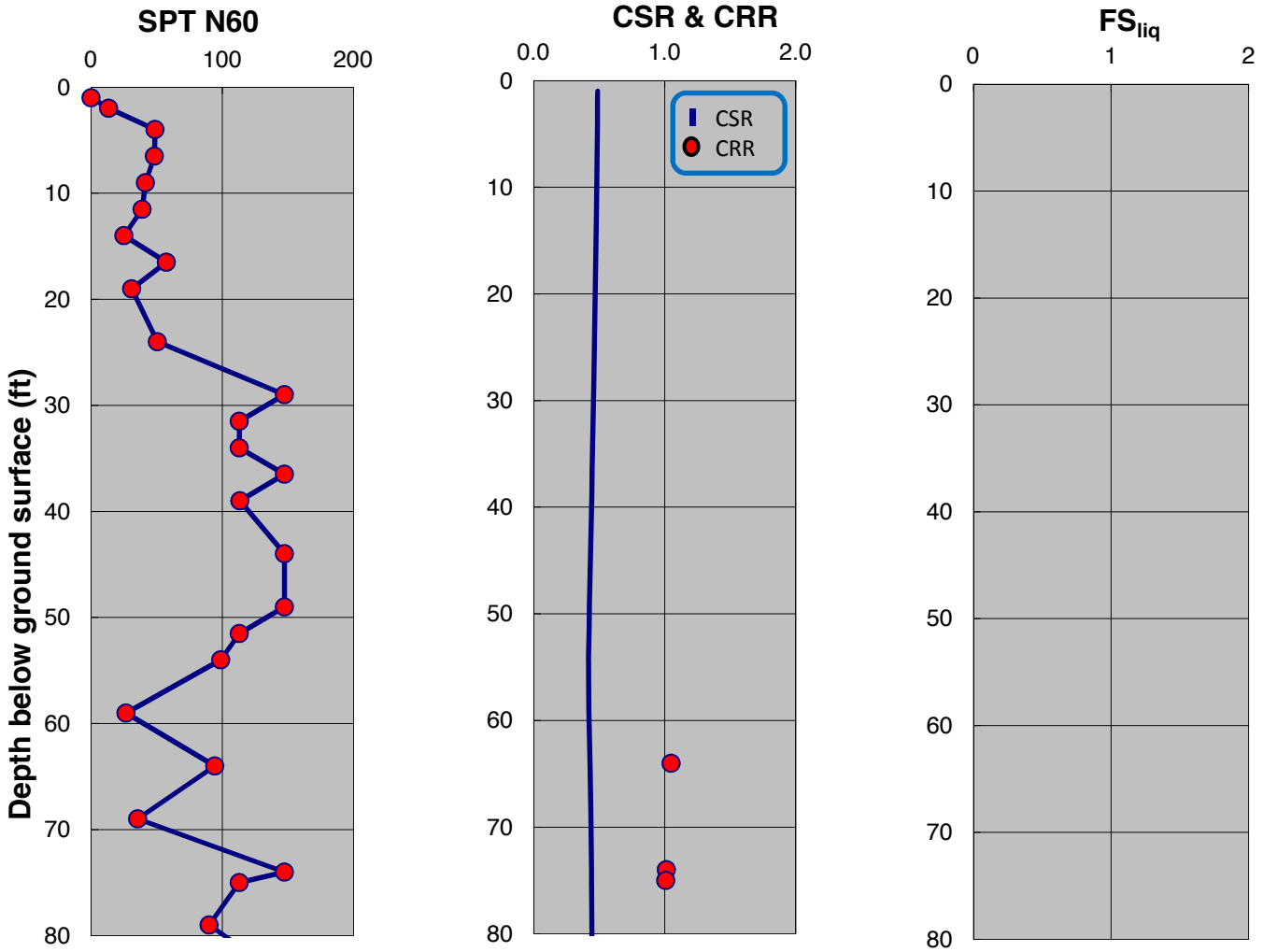
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-91 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



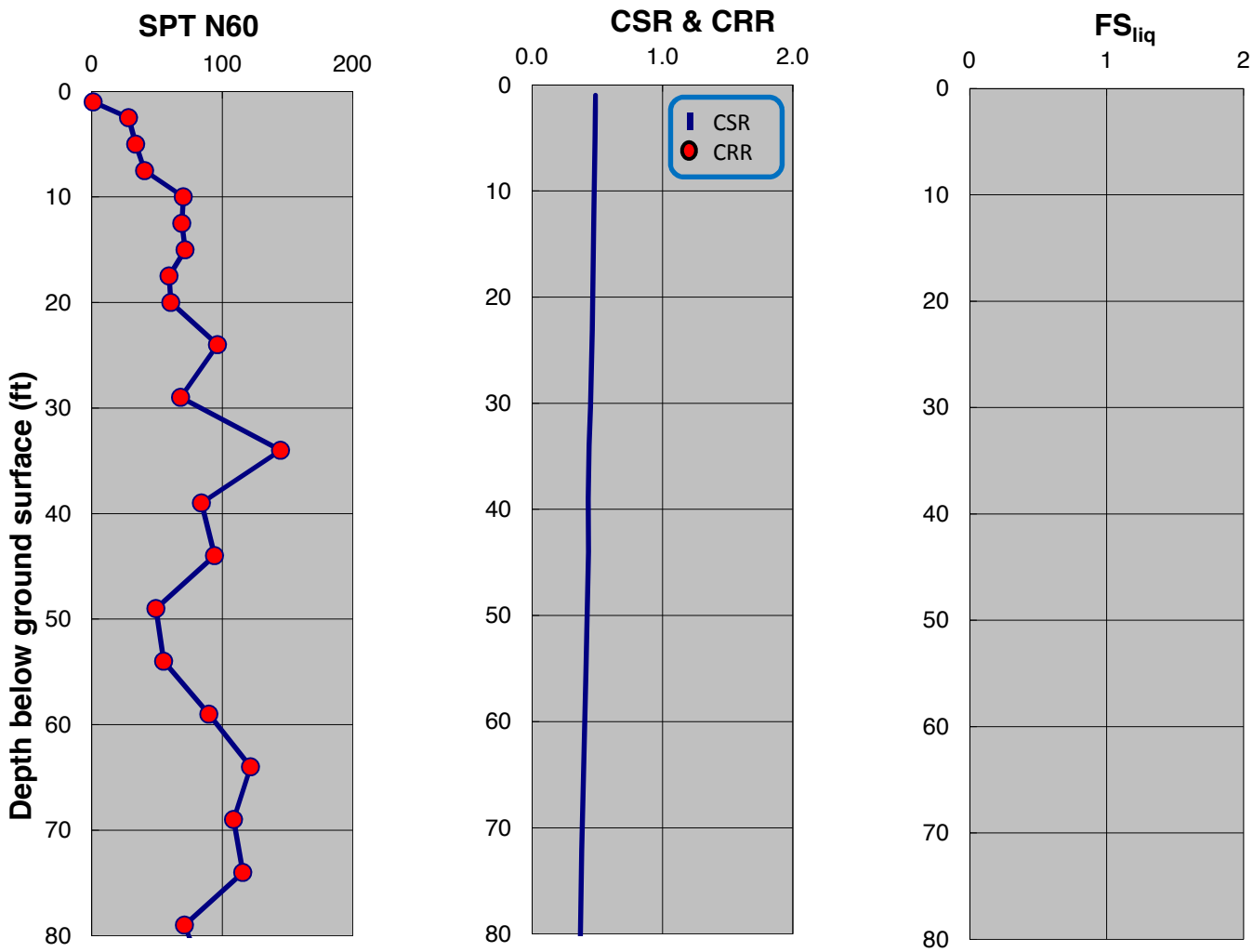
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-92 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



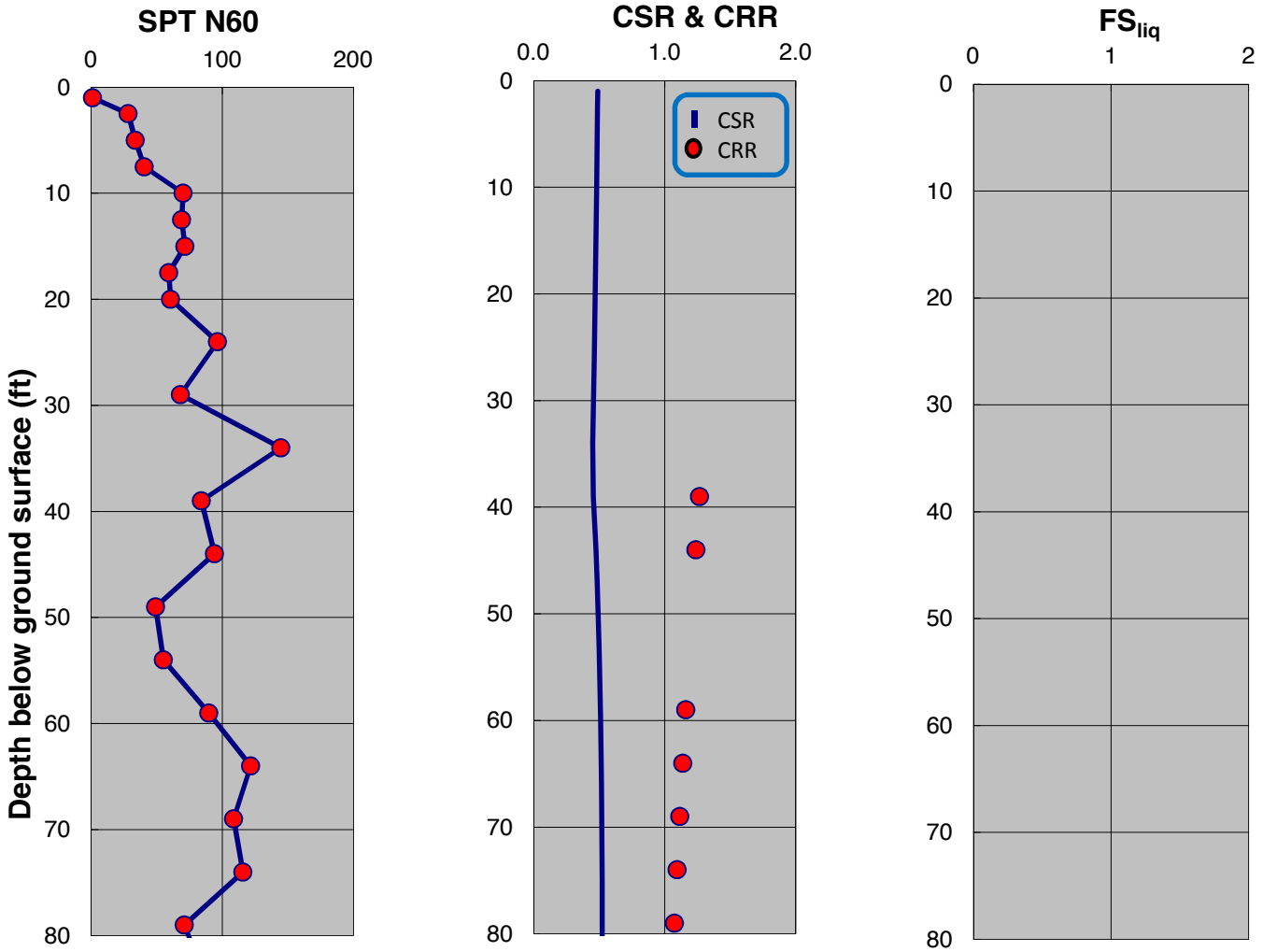
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-92 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



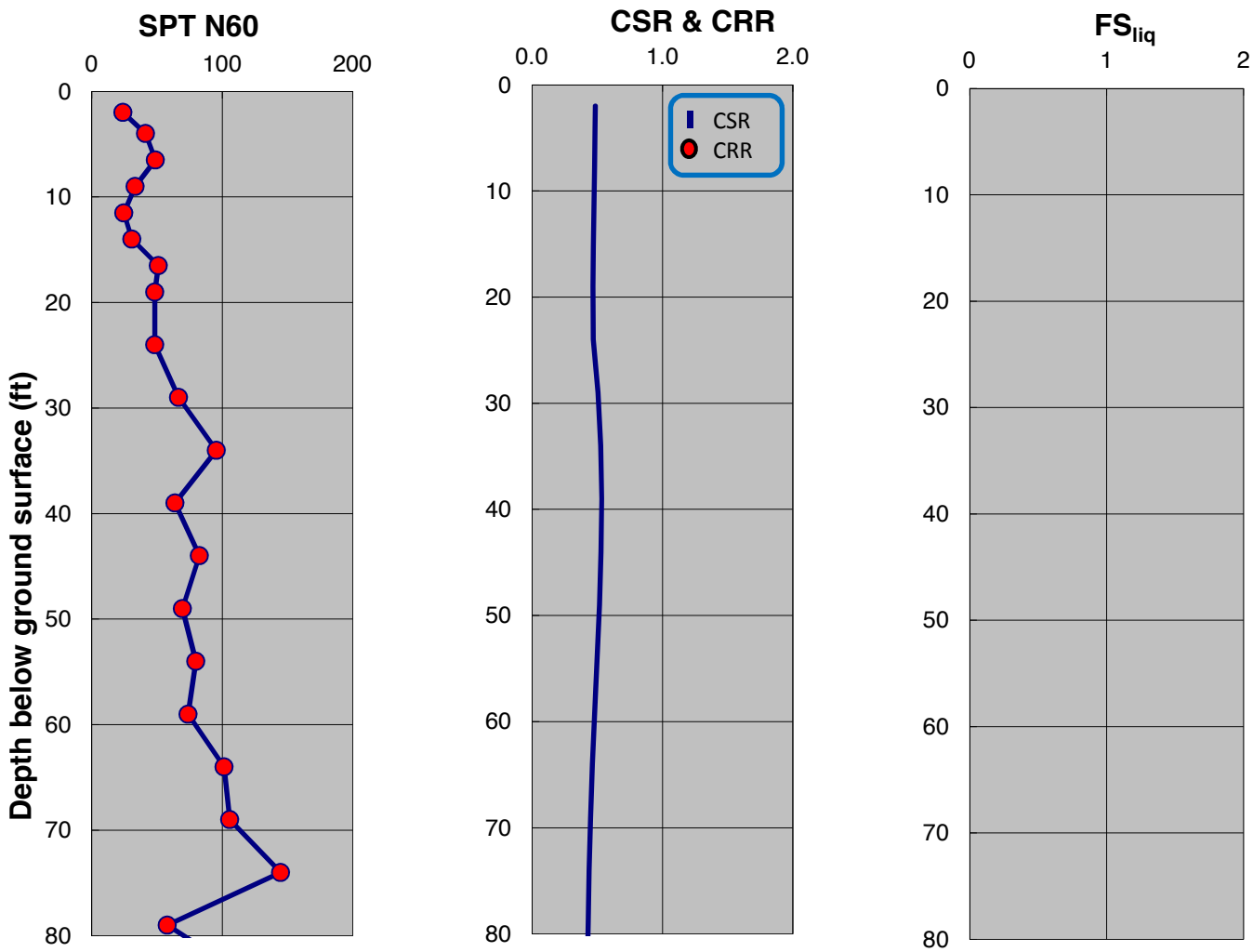
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-93 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



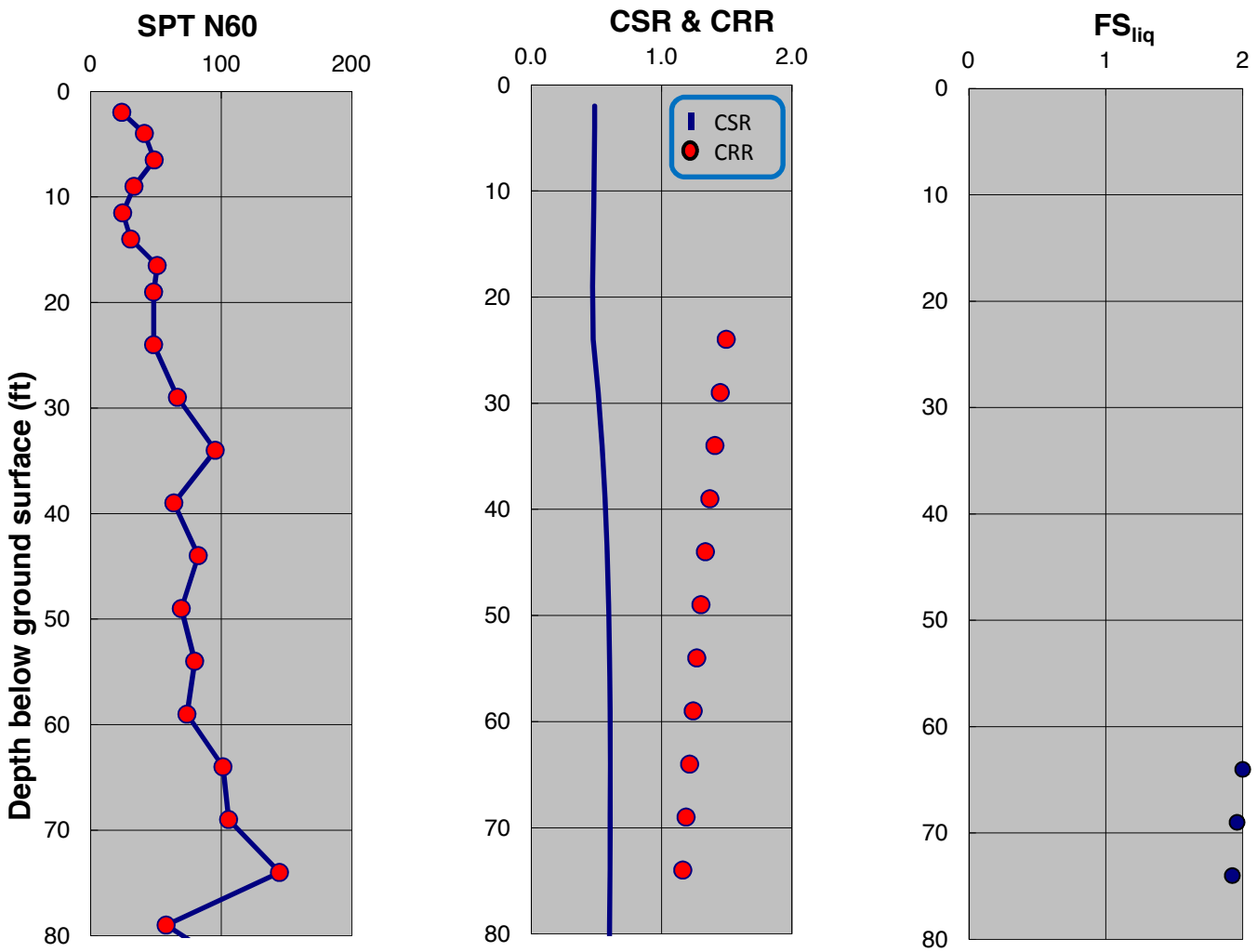
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-93 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



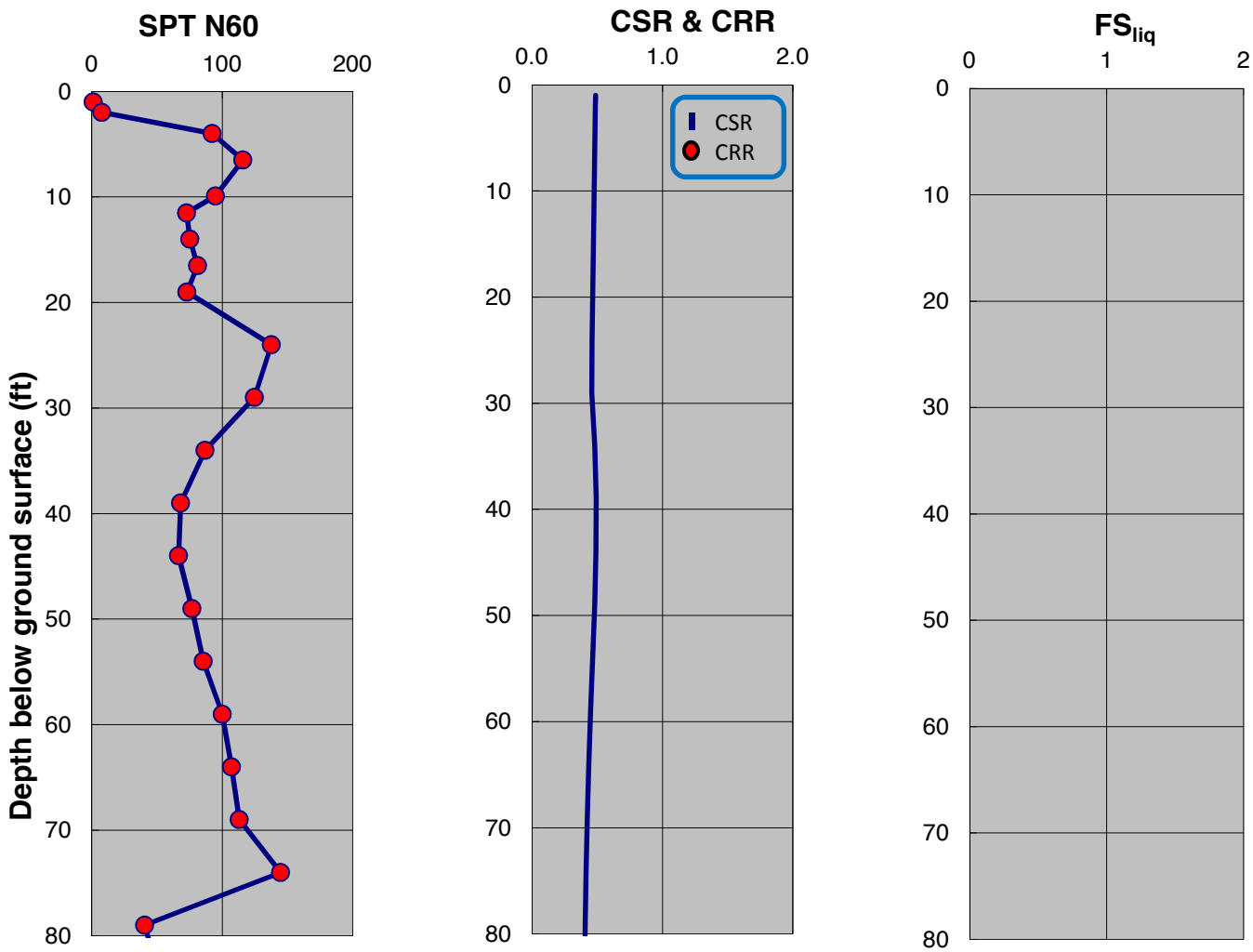
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-94 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



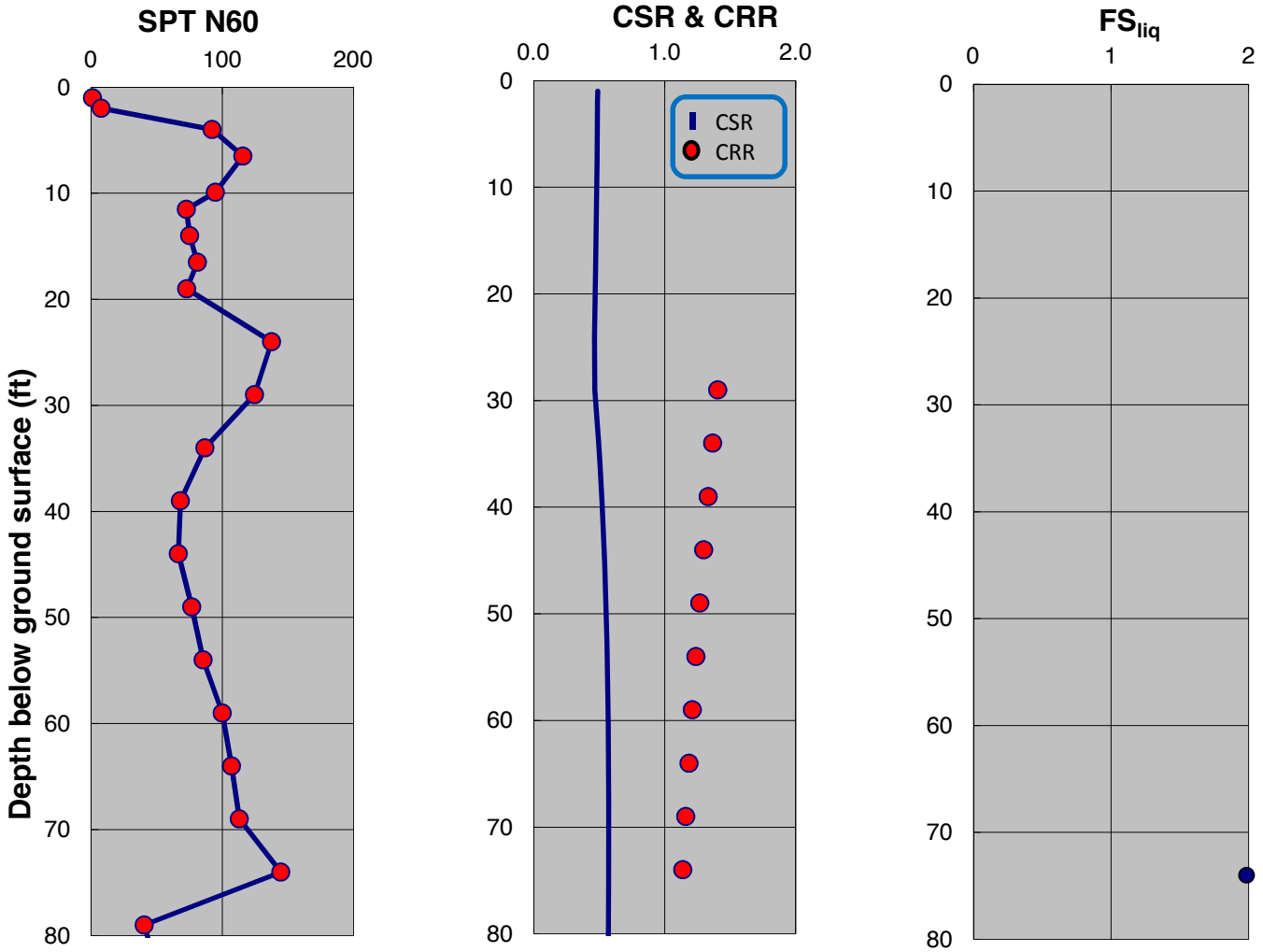
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-94 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



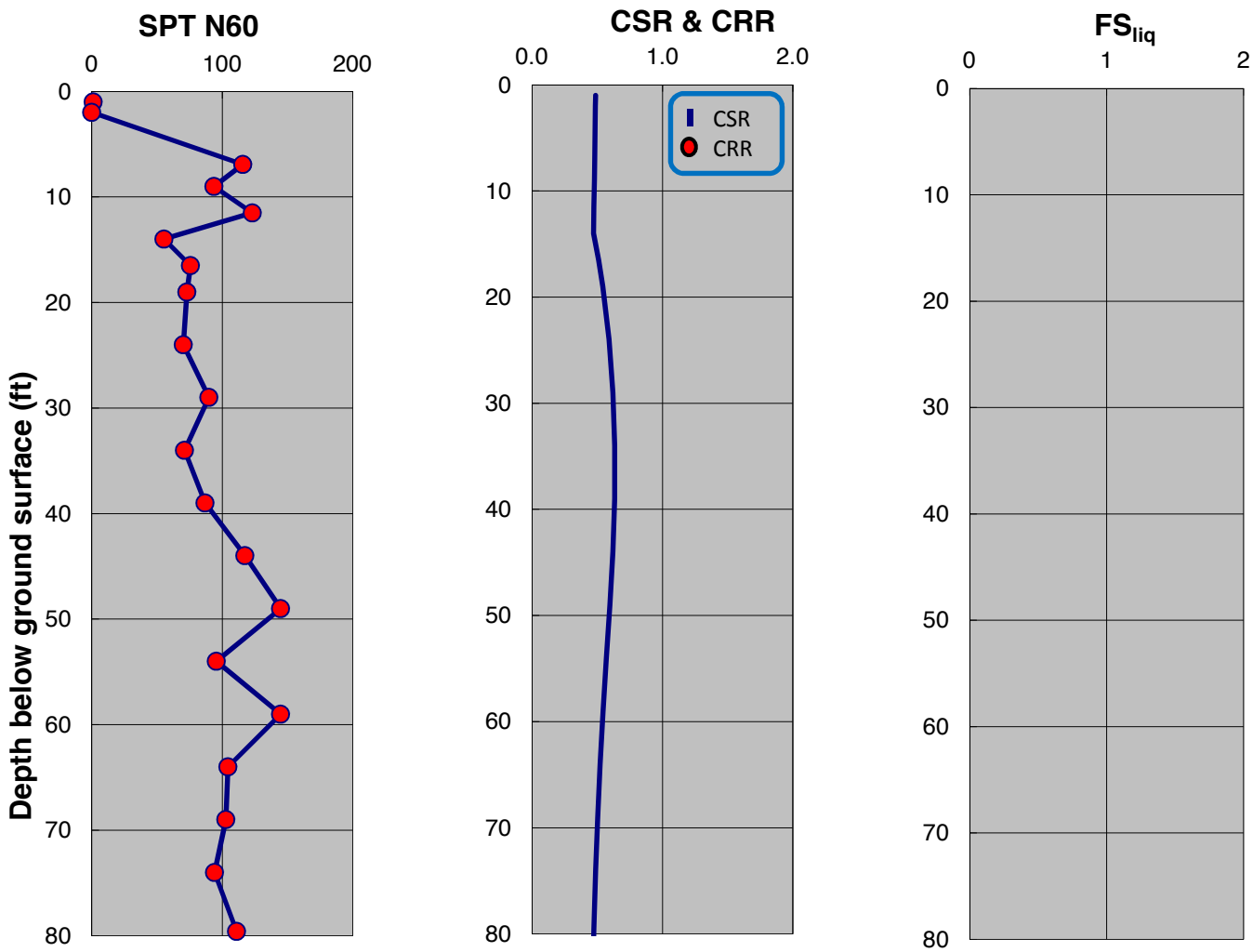
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-95 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



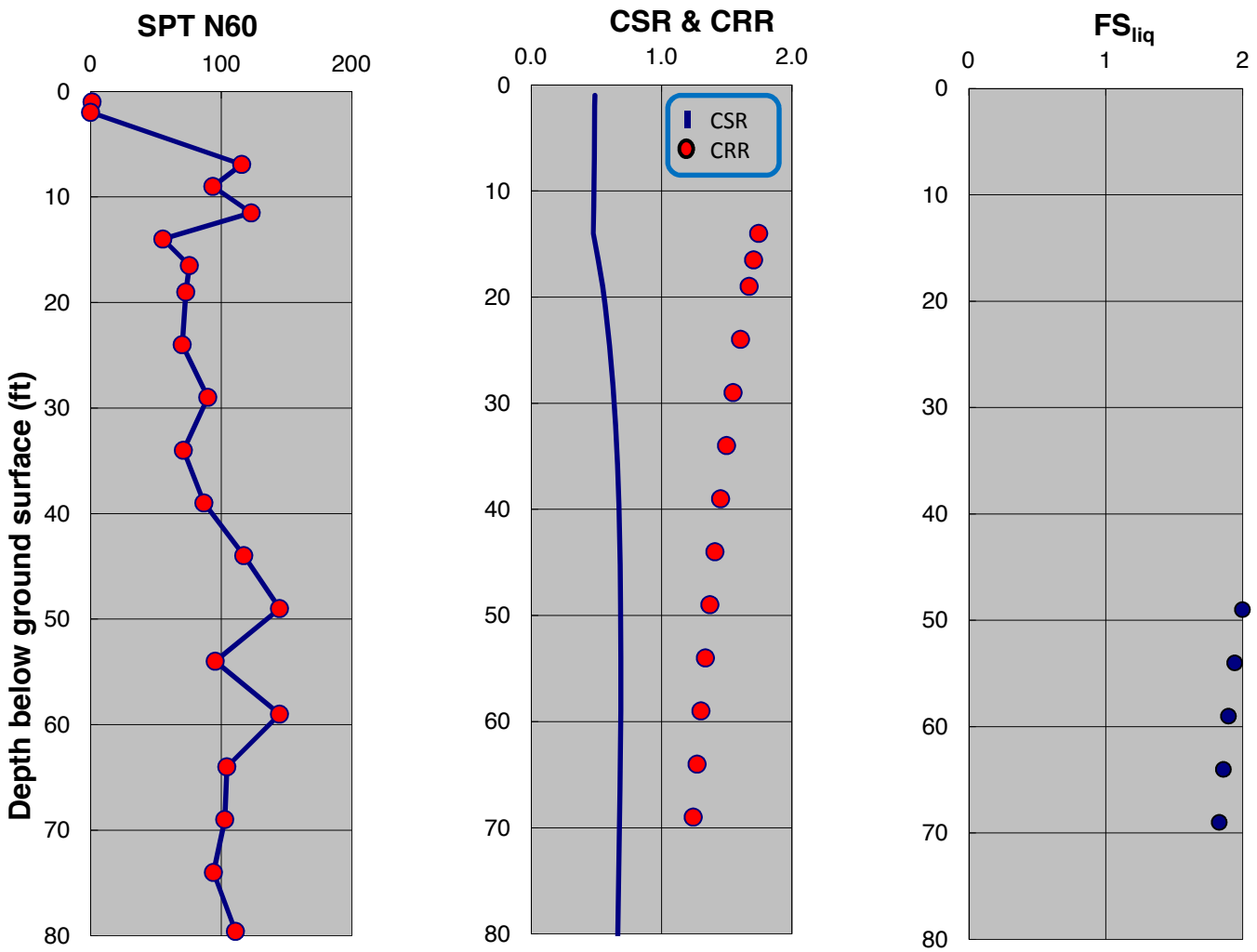
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-95 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



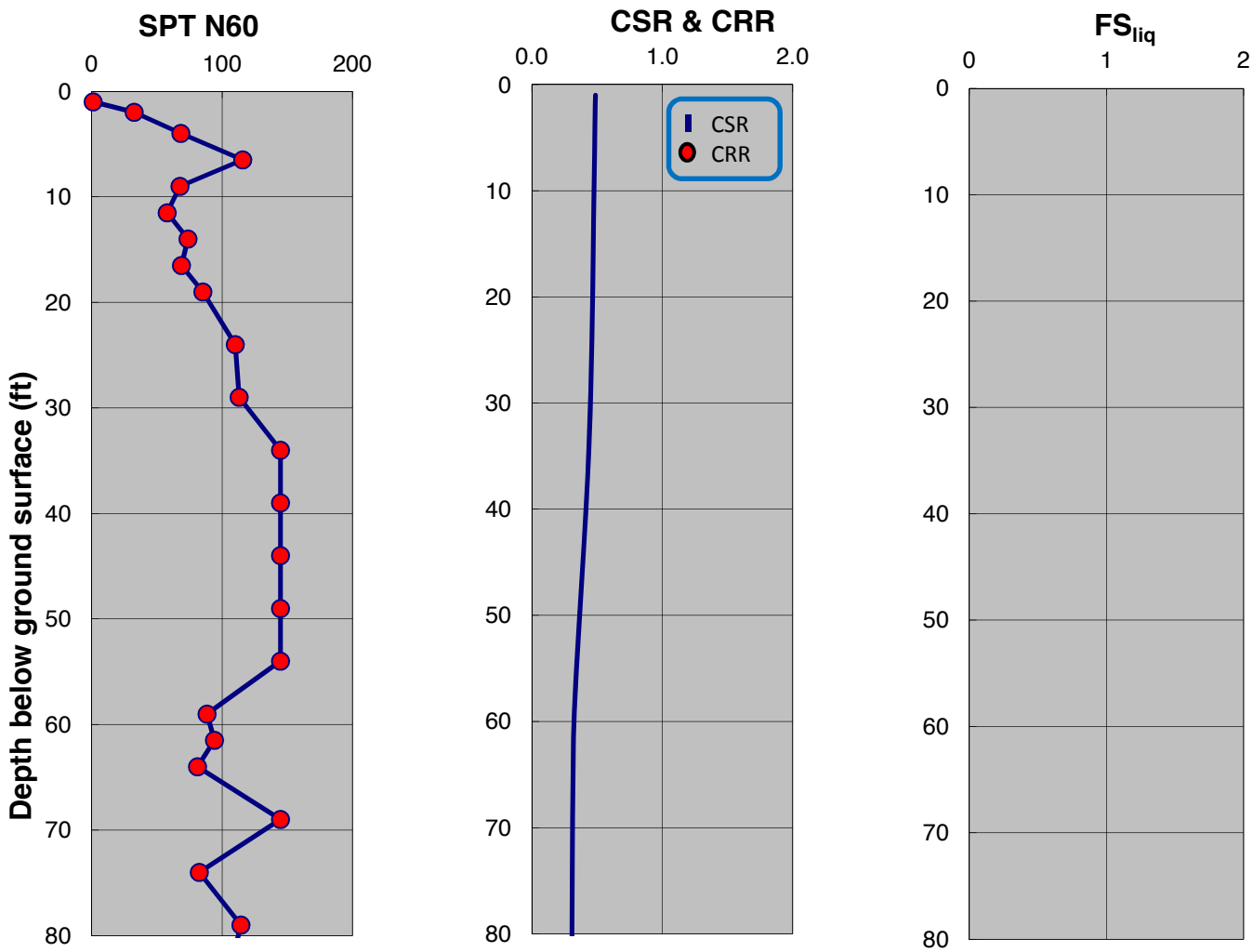
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-96 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



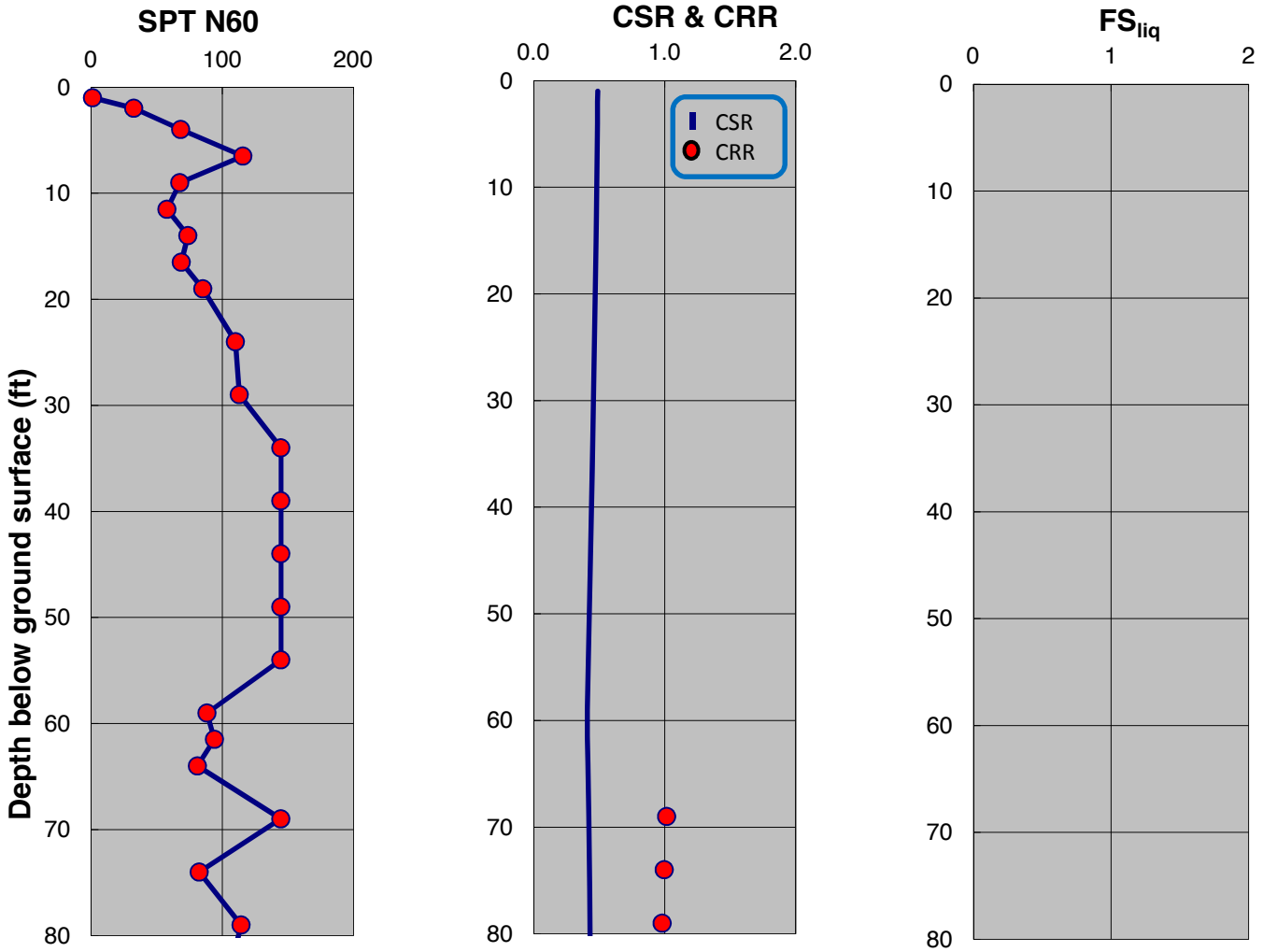
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-96 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



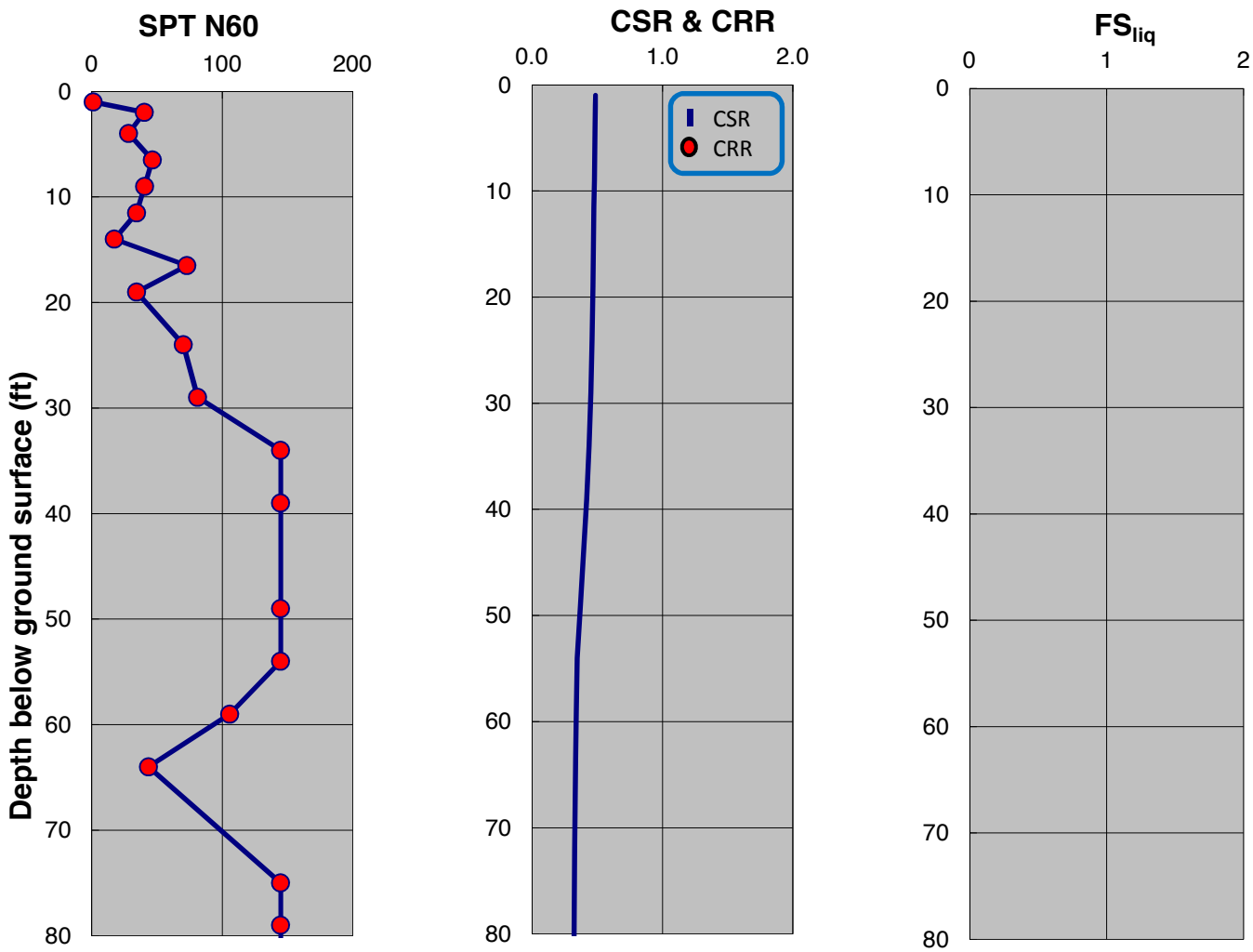
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-97 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



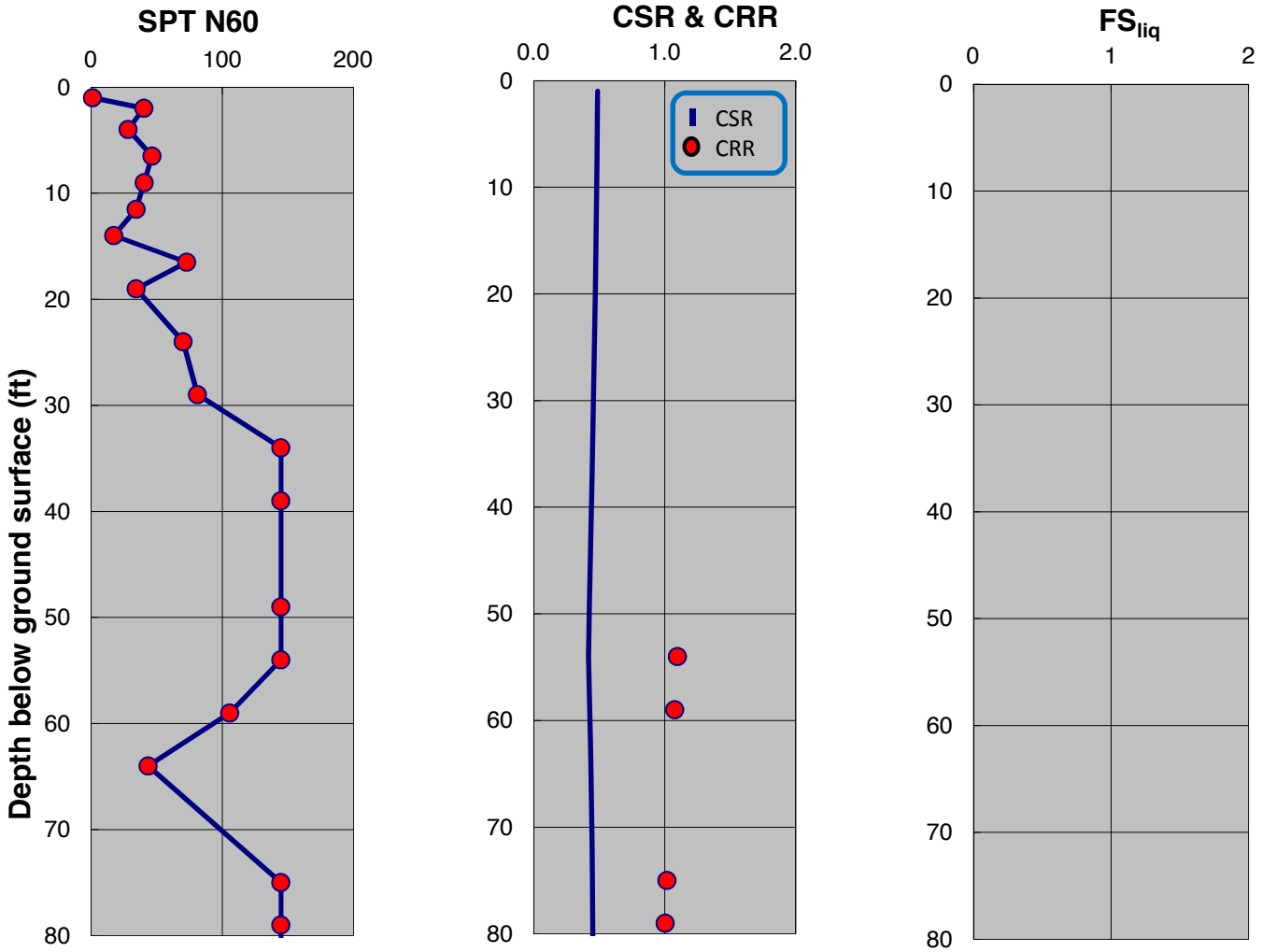
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-97 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



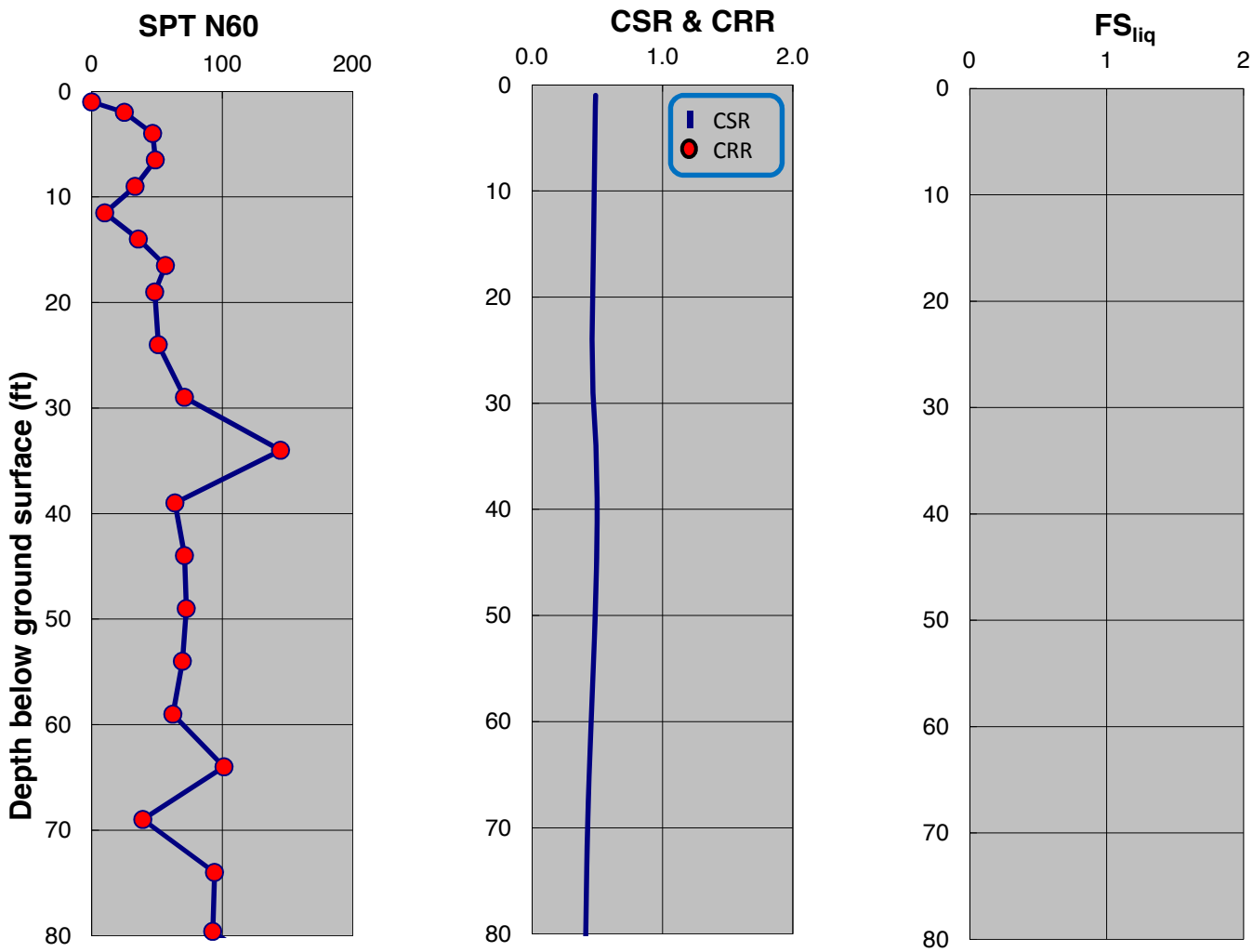
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-98 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



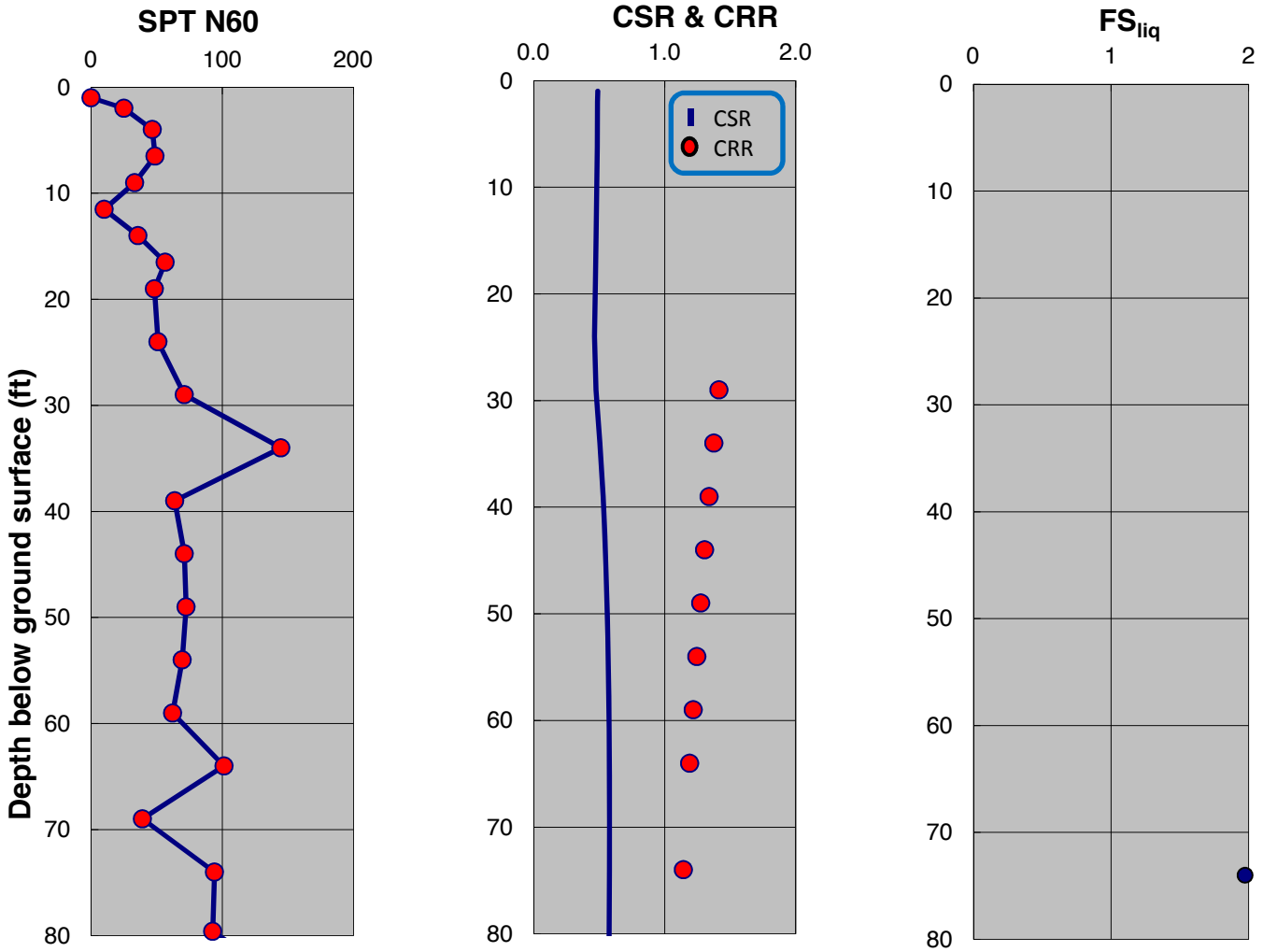
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-98 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



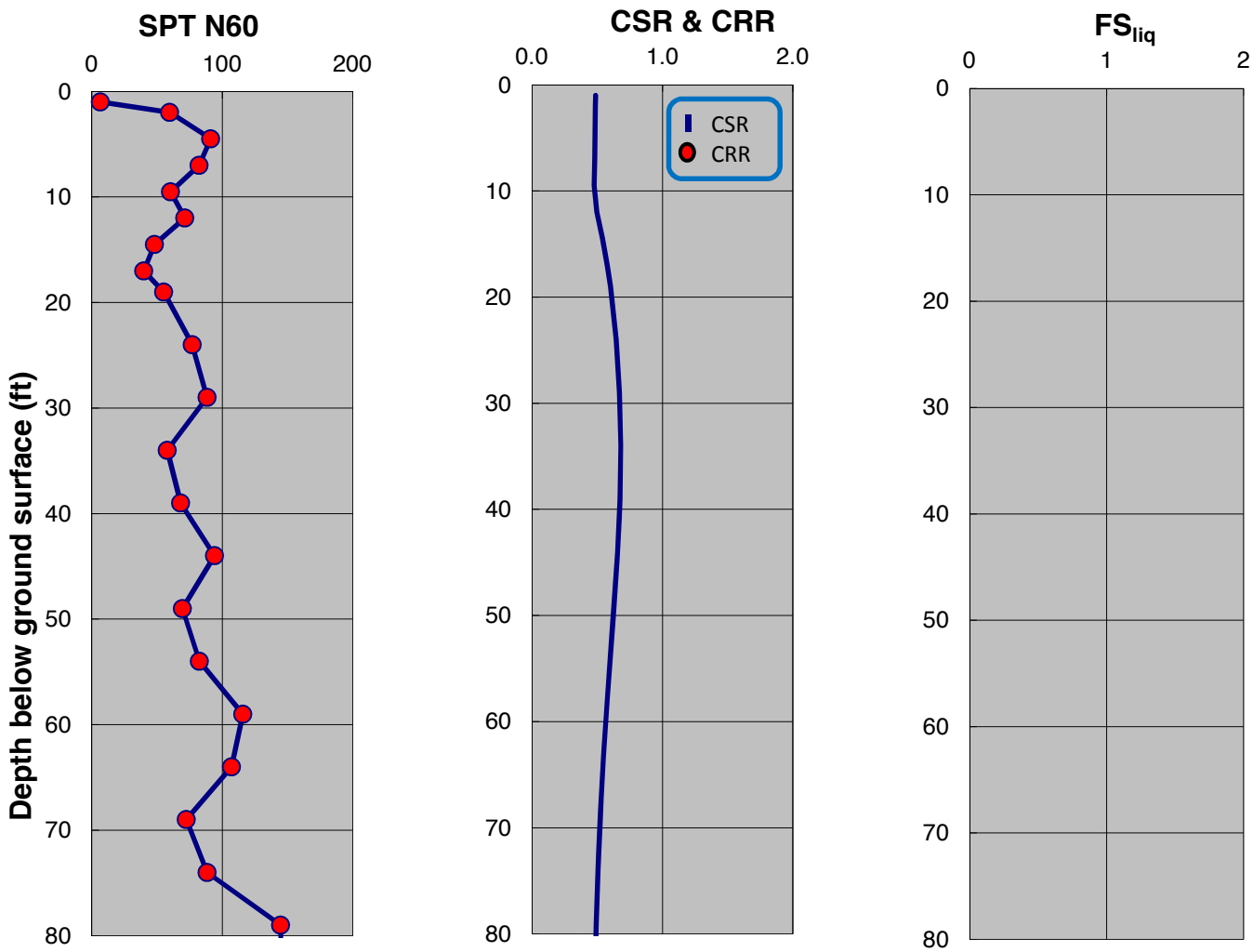
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-99 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



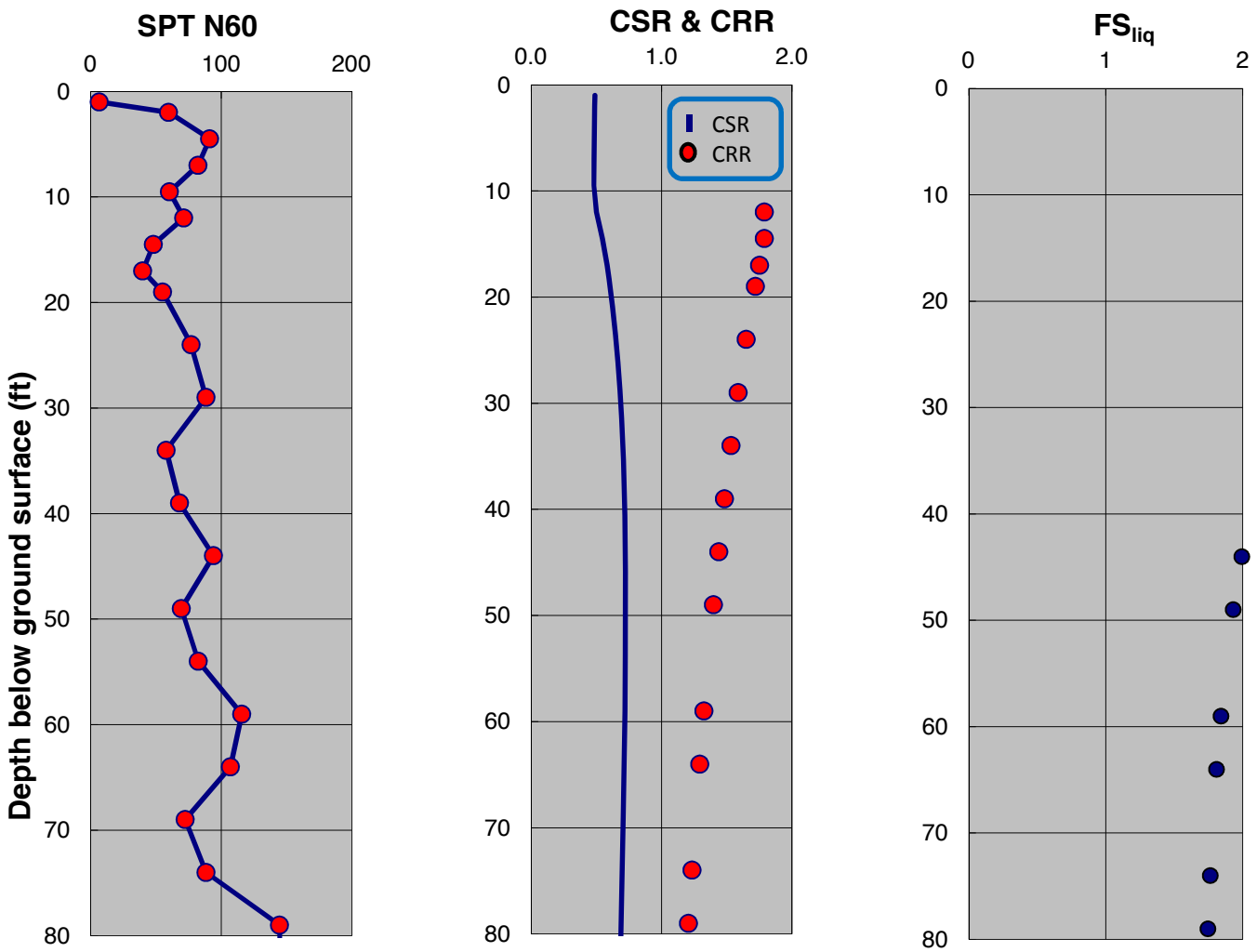
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-99 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



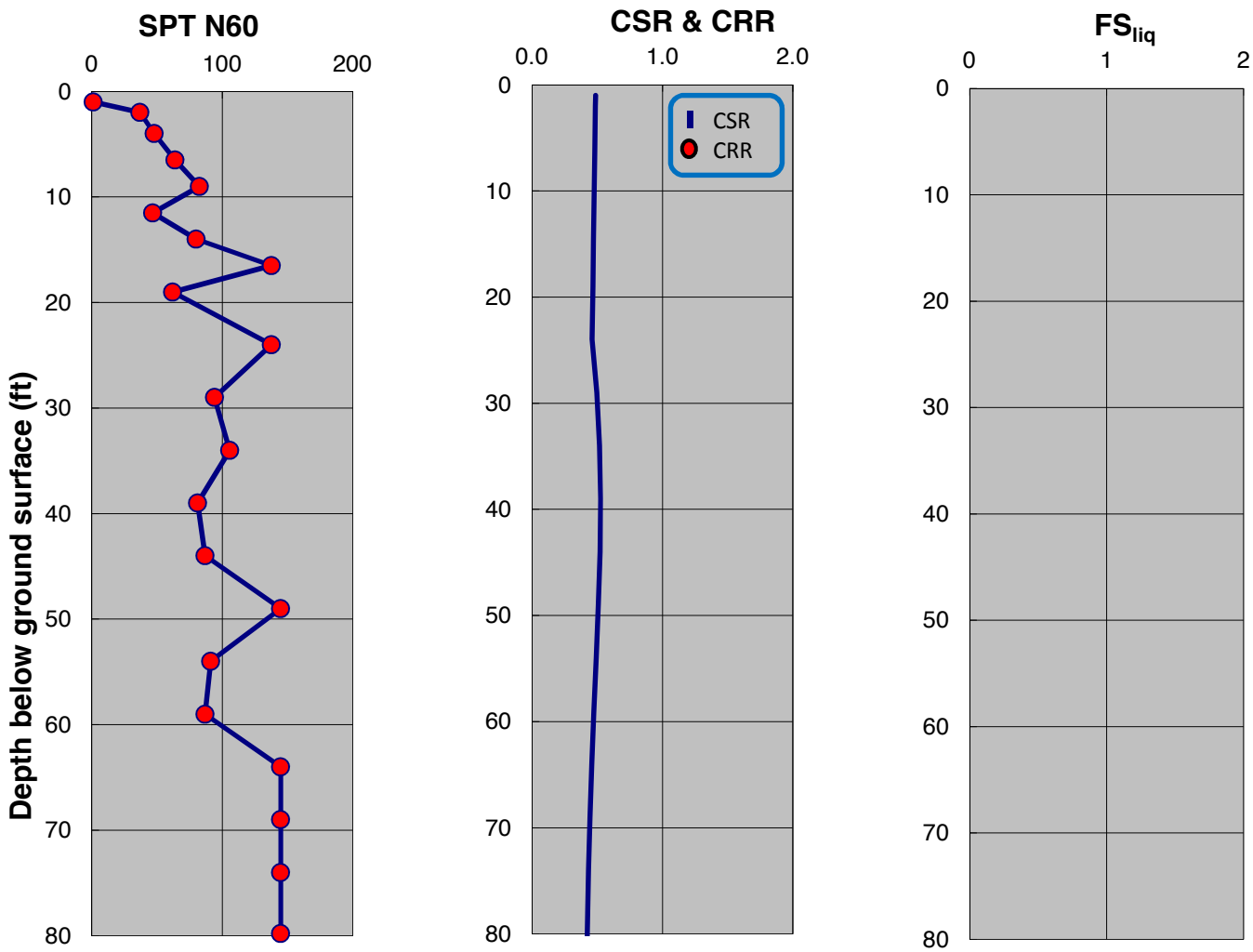
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-101 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



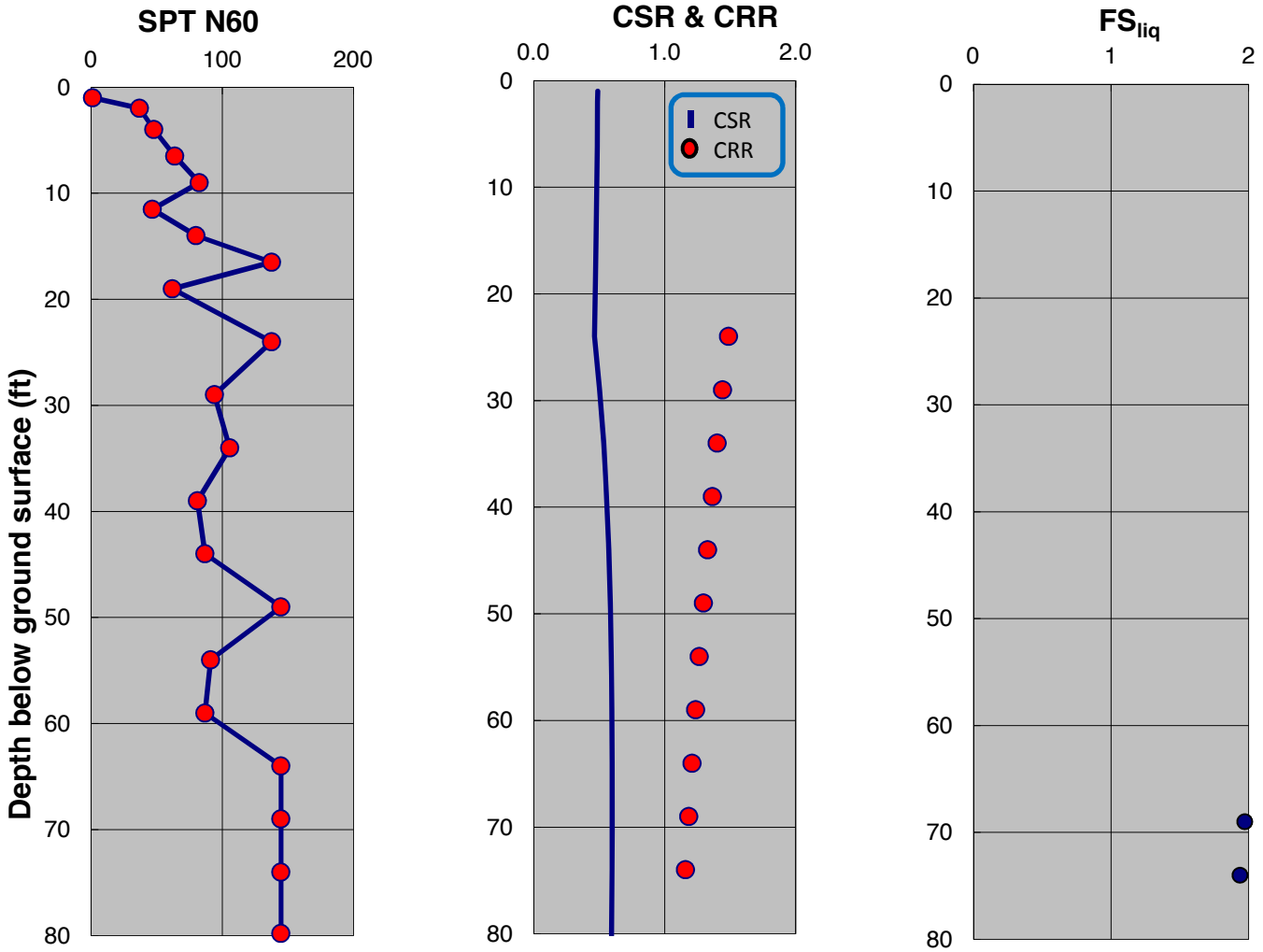
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-101 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



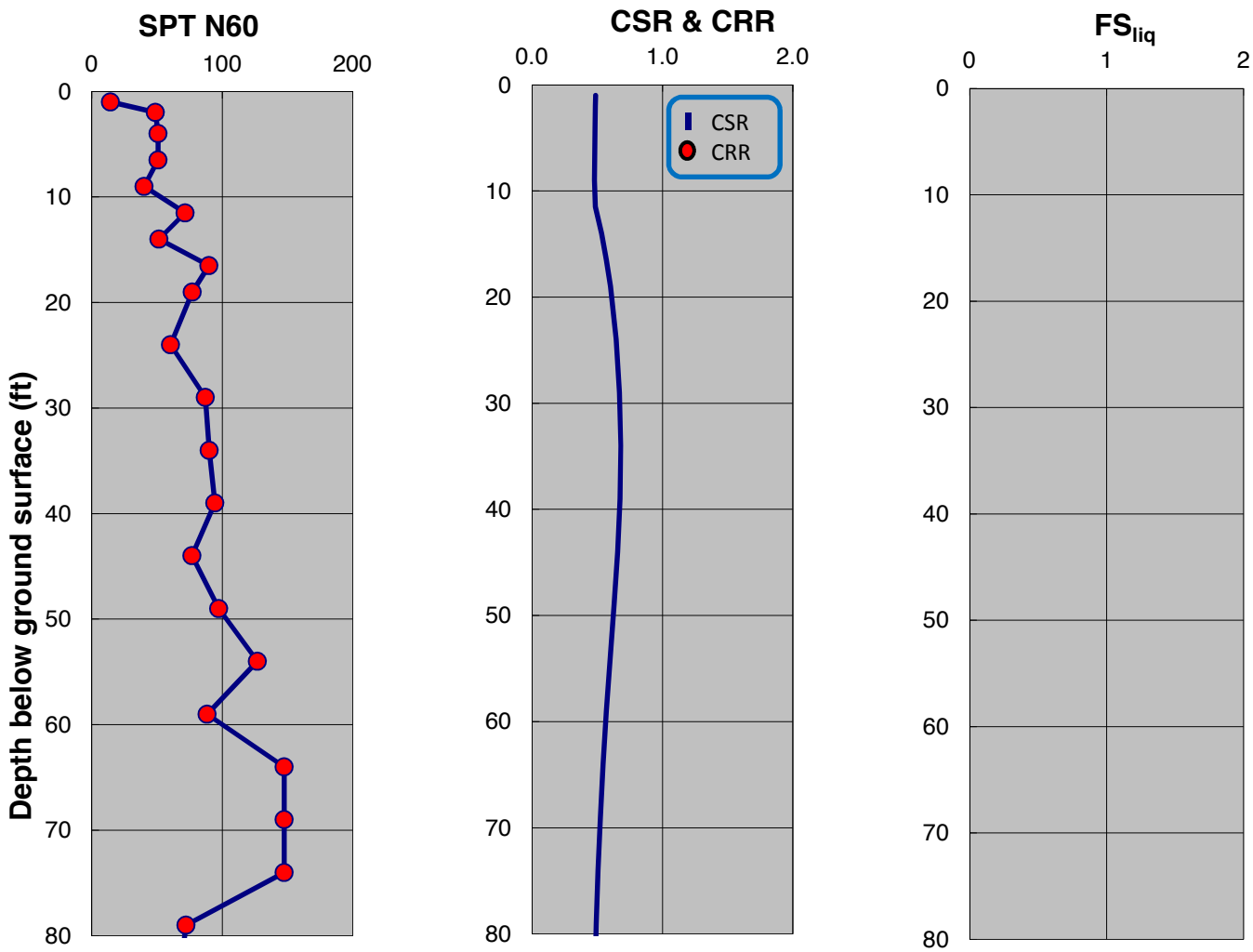
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-102 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



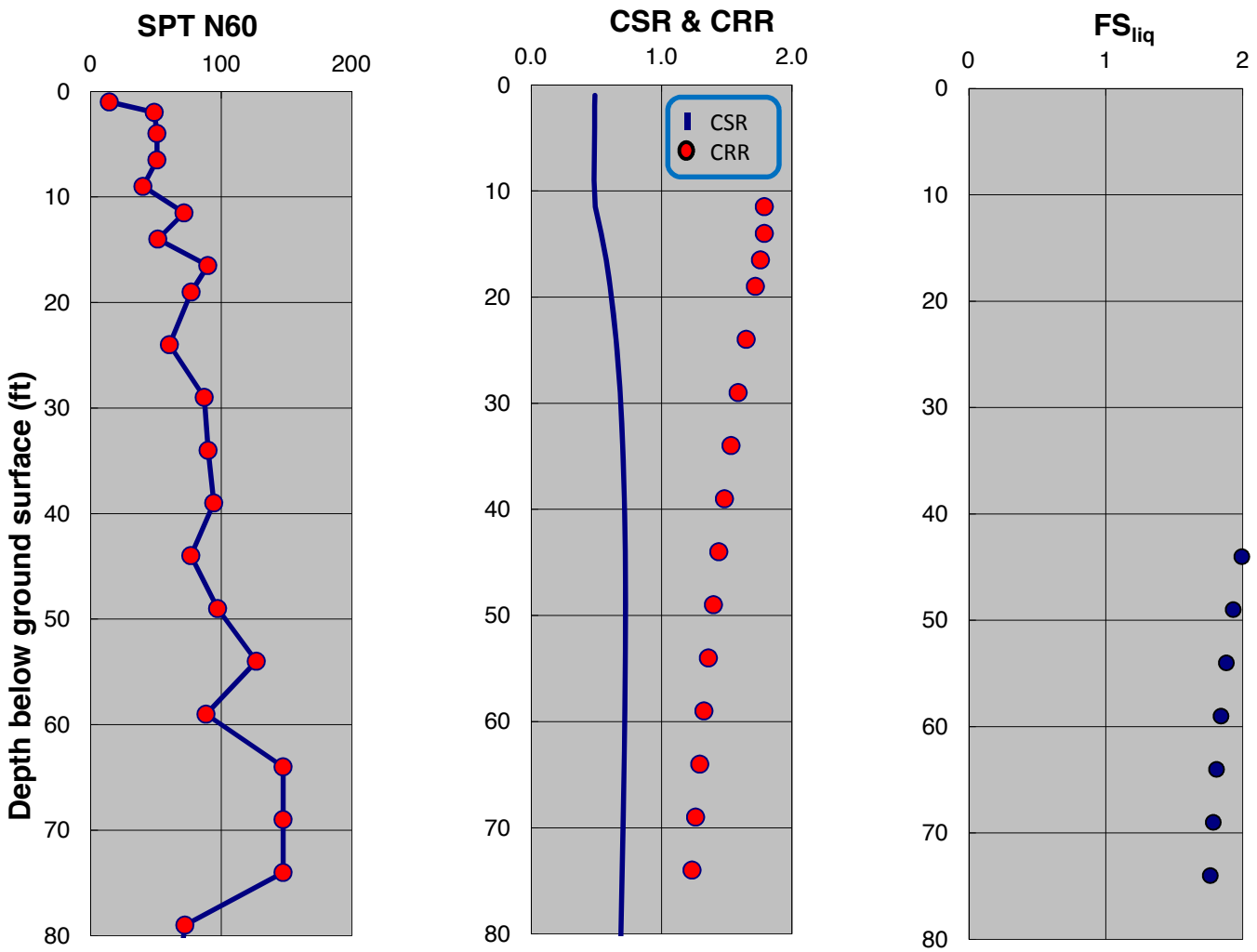
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-102 FOR SSE LEVEL PER NFPA 59A 2015 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



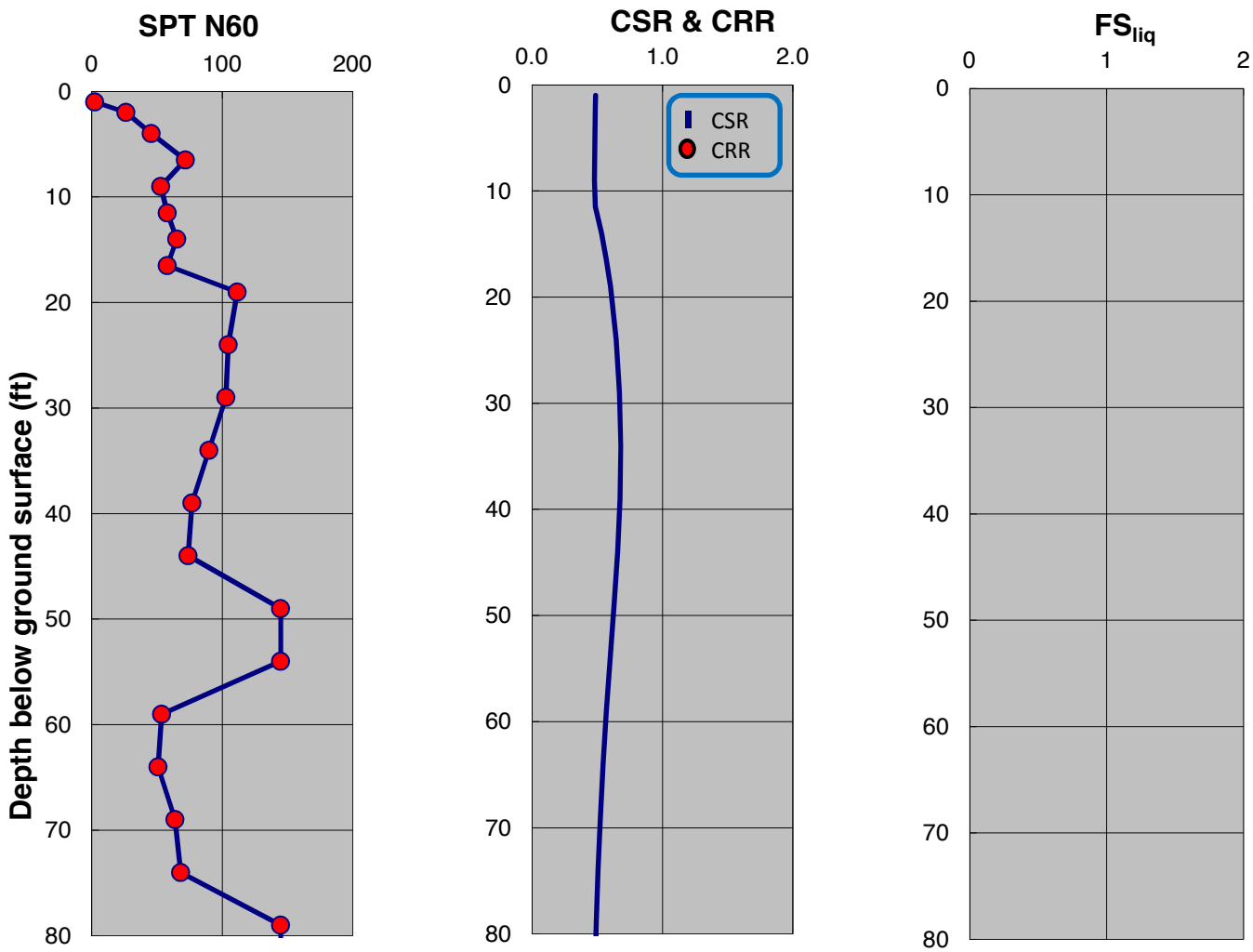
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-104 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



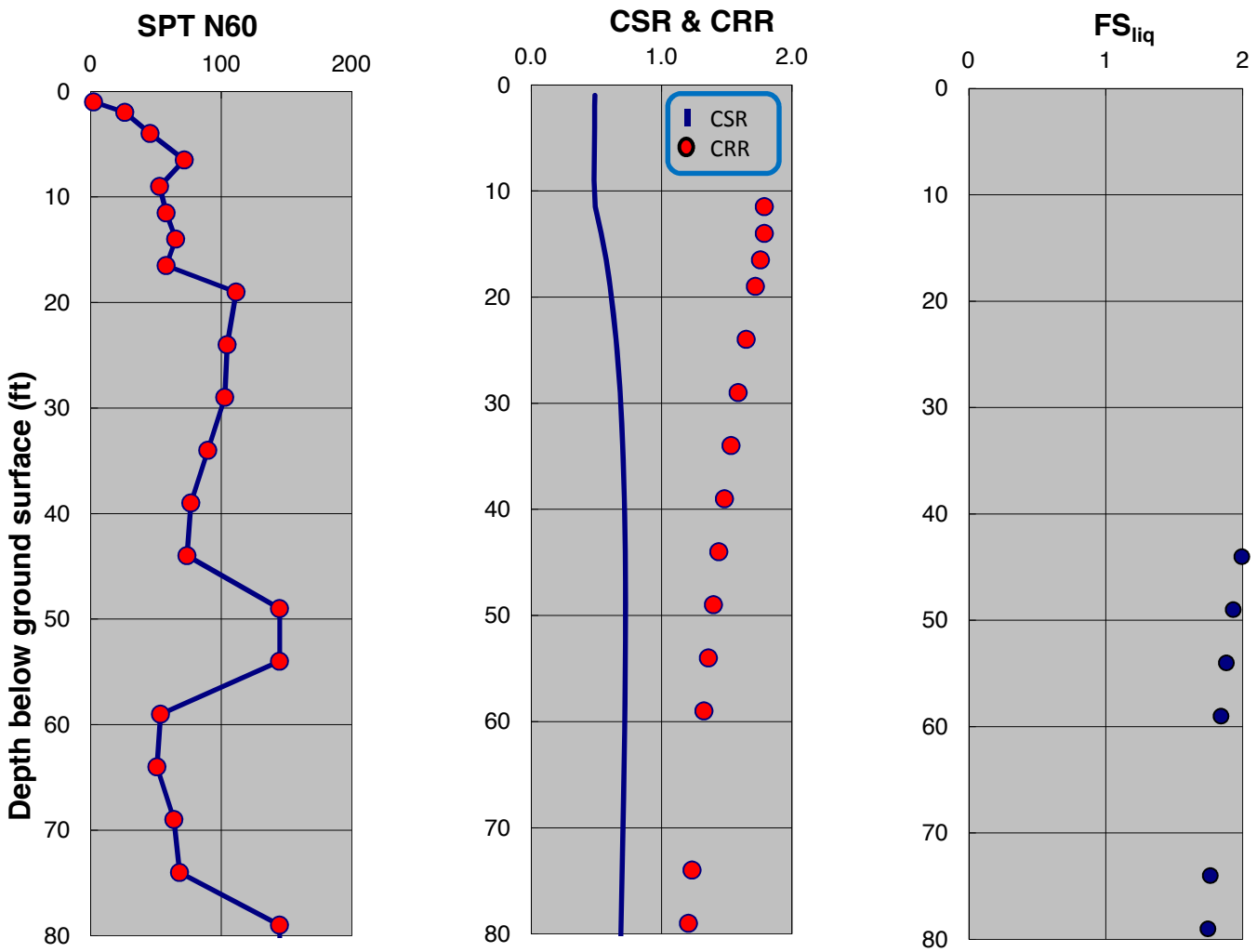
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-104 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



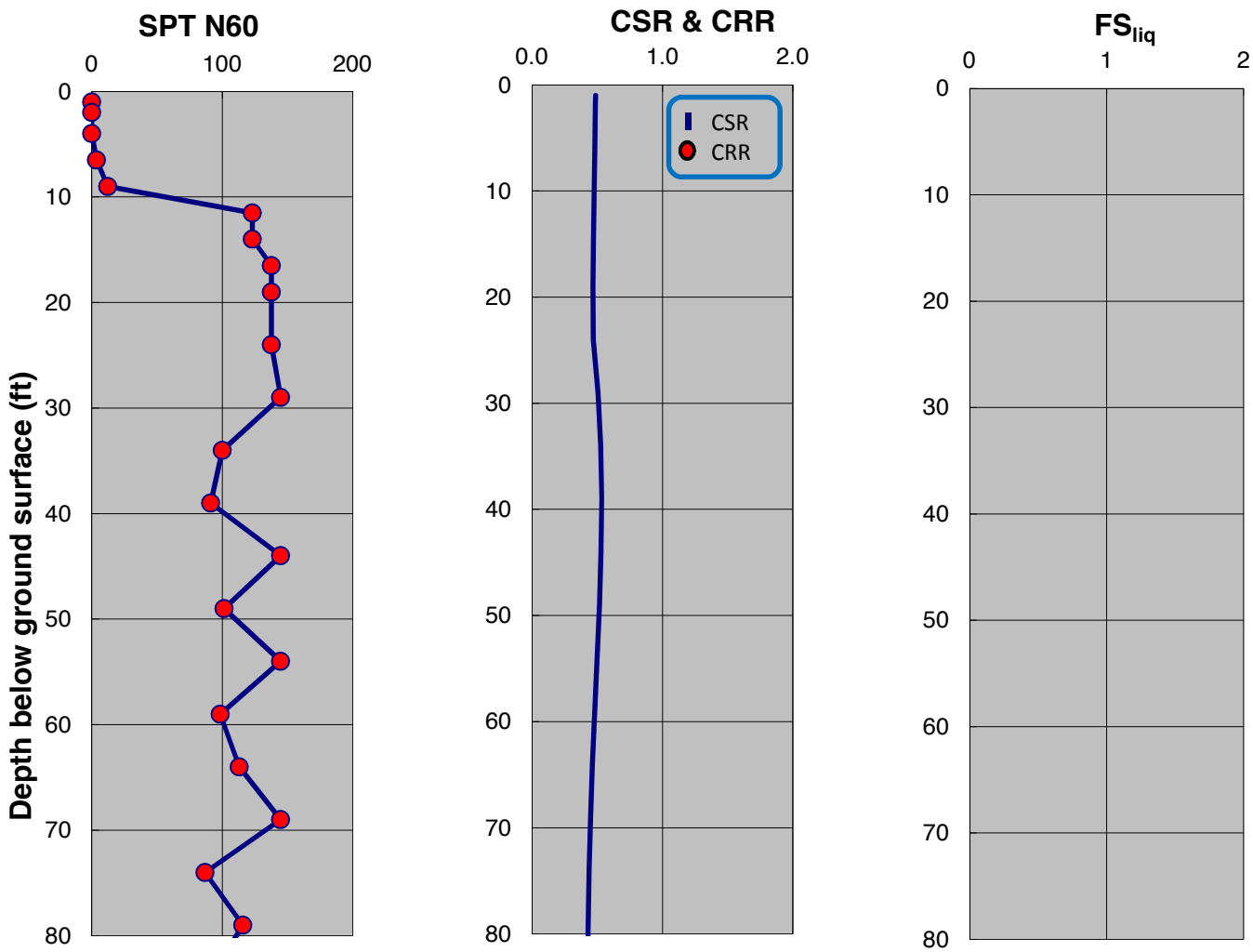
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-105 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



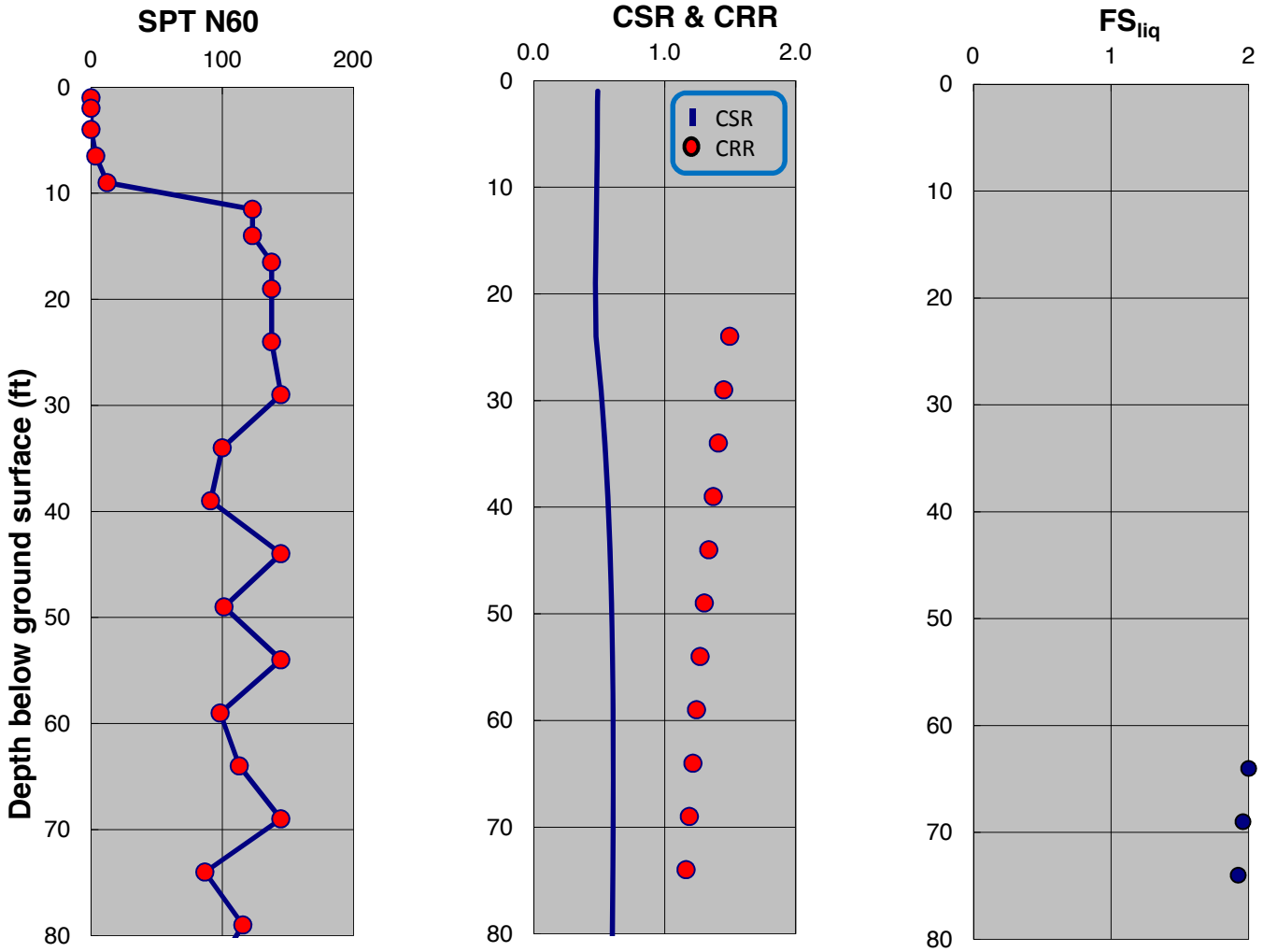
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-105 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



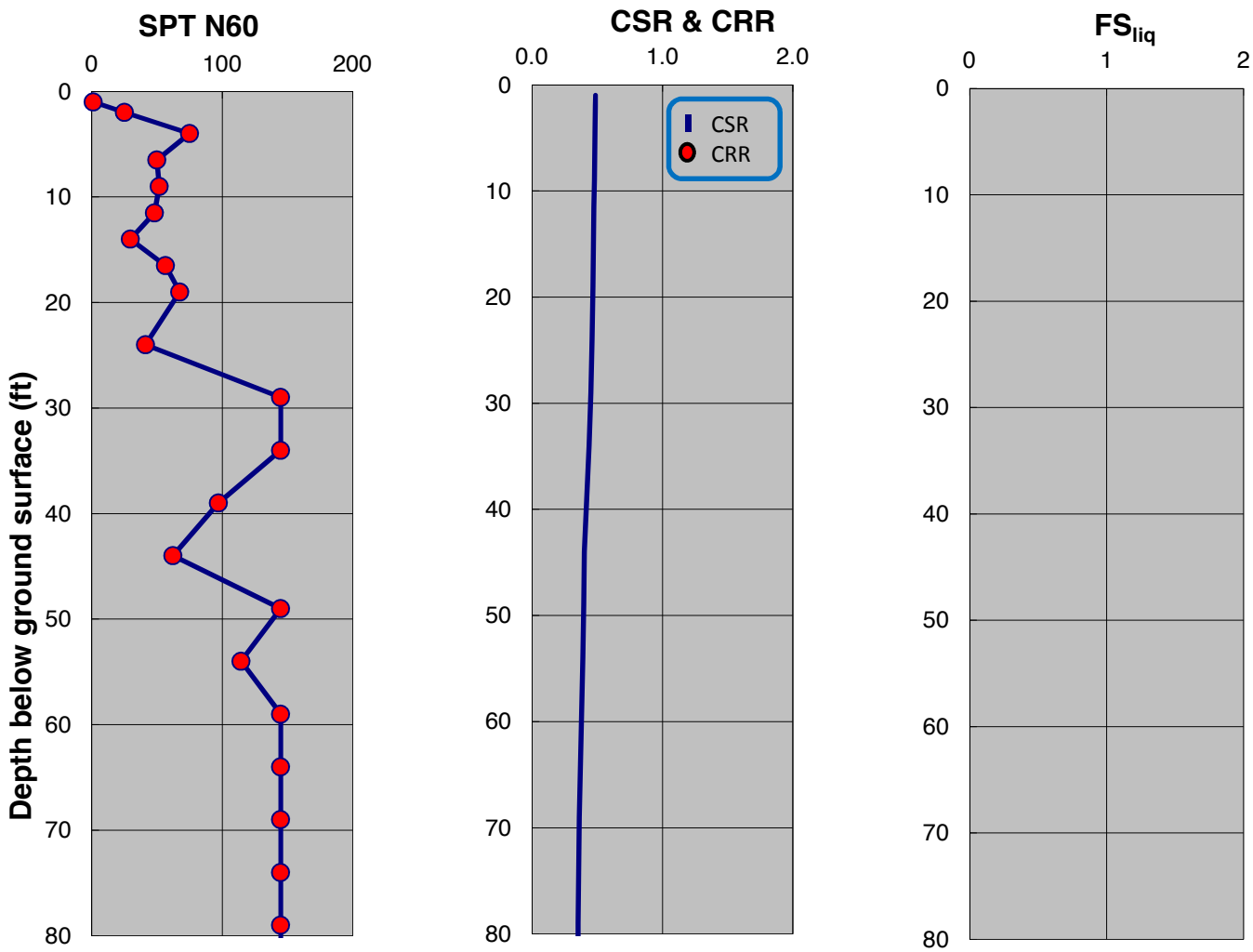
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-107 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



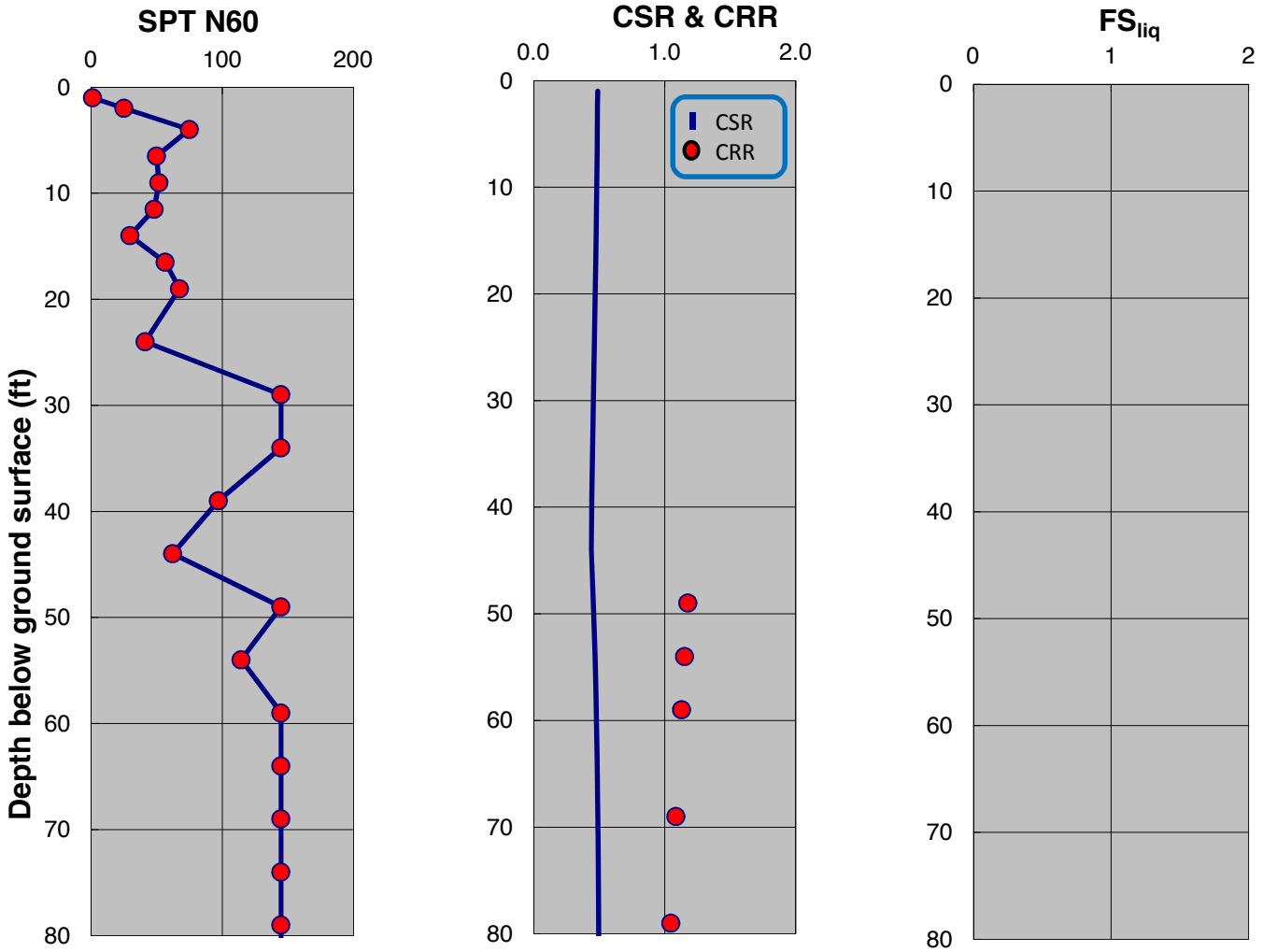
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-107 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



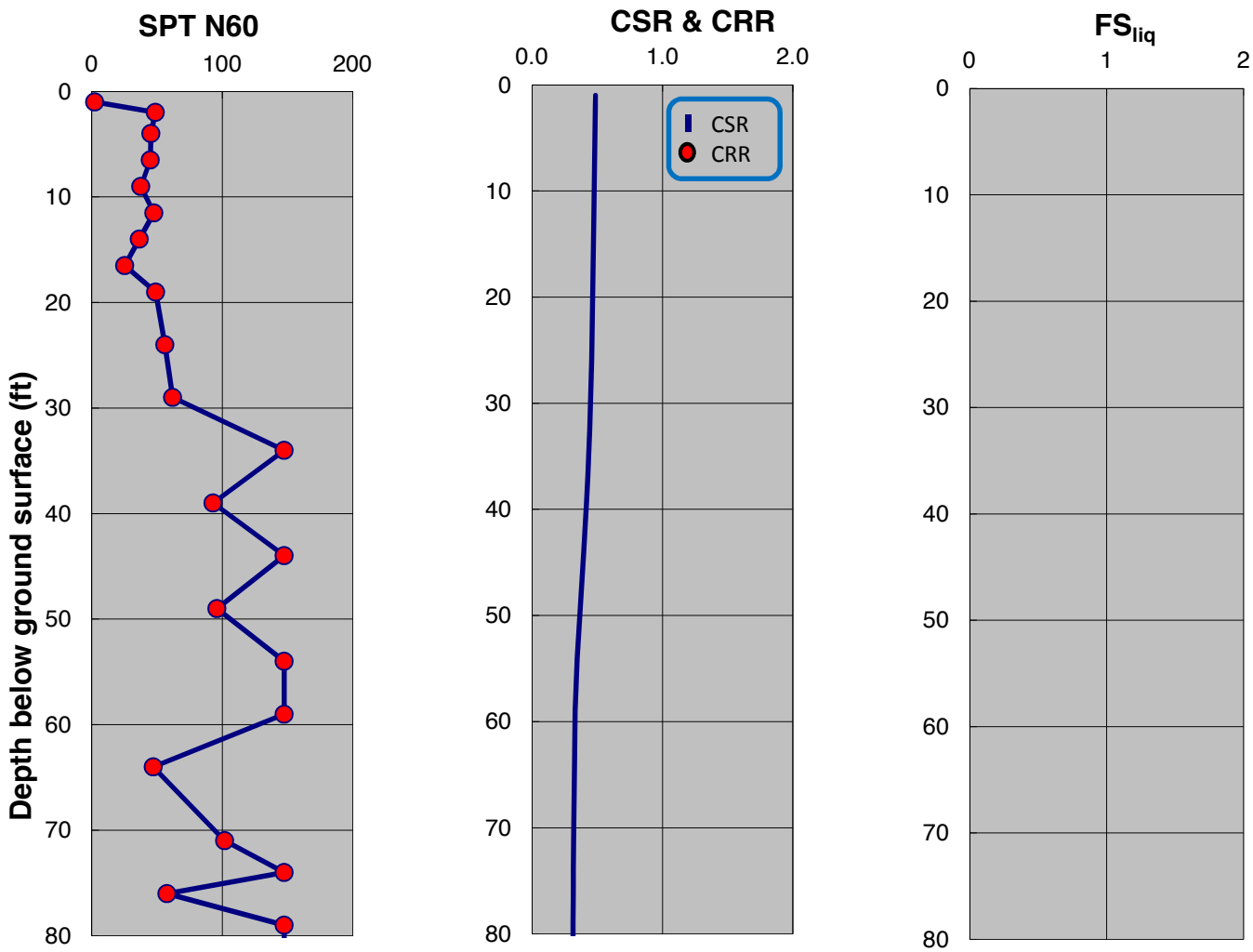
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-110 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



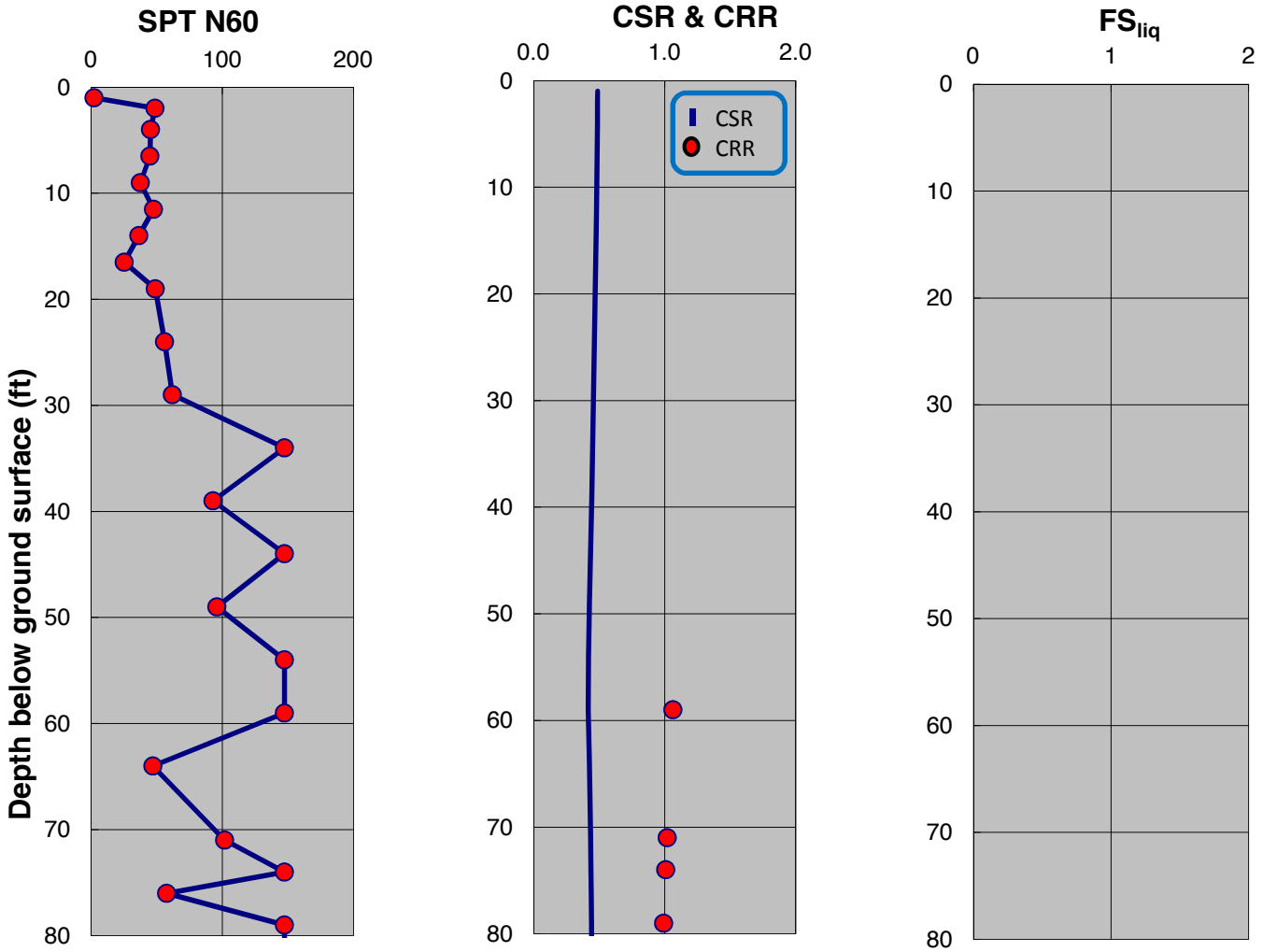
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-110 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



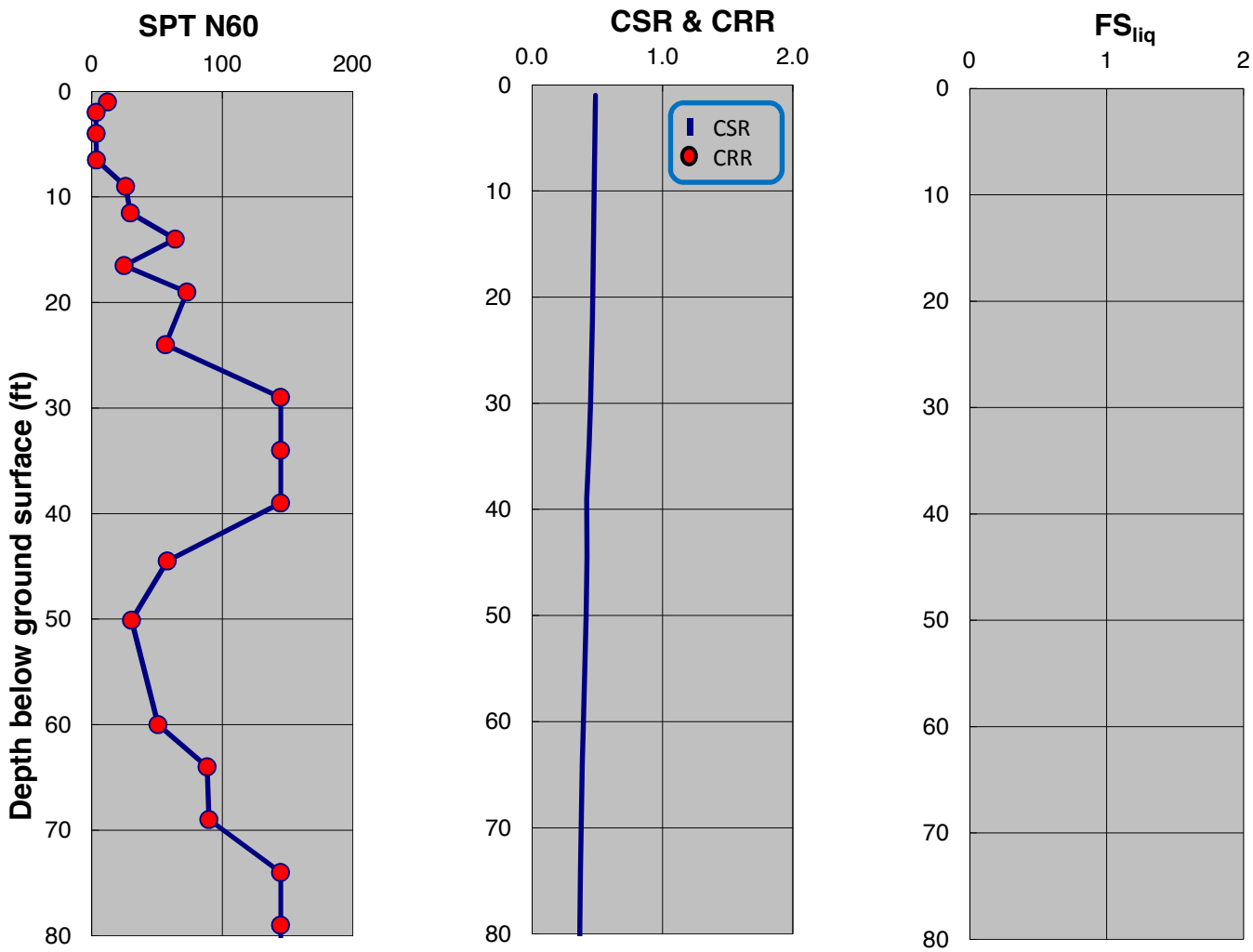
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-112 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



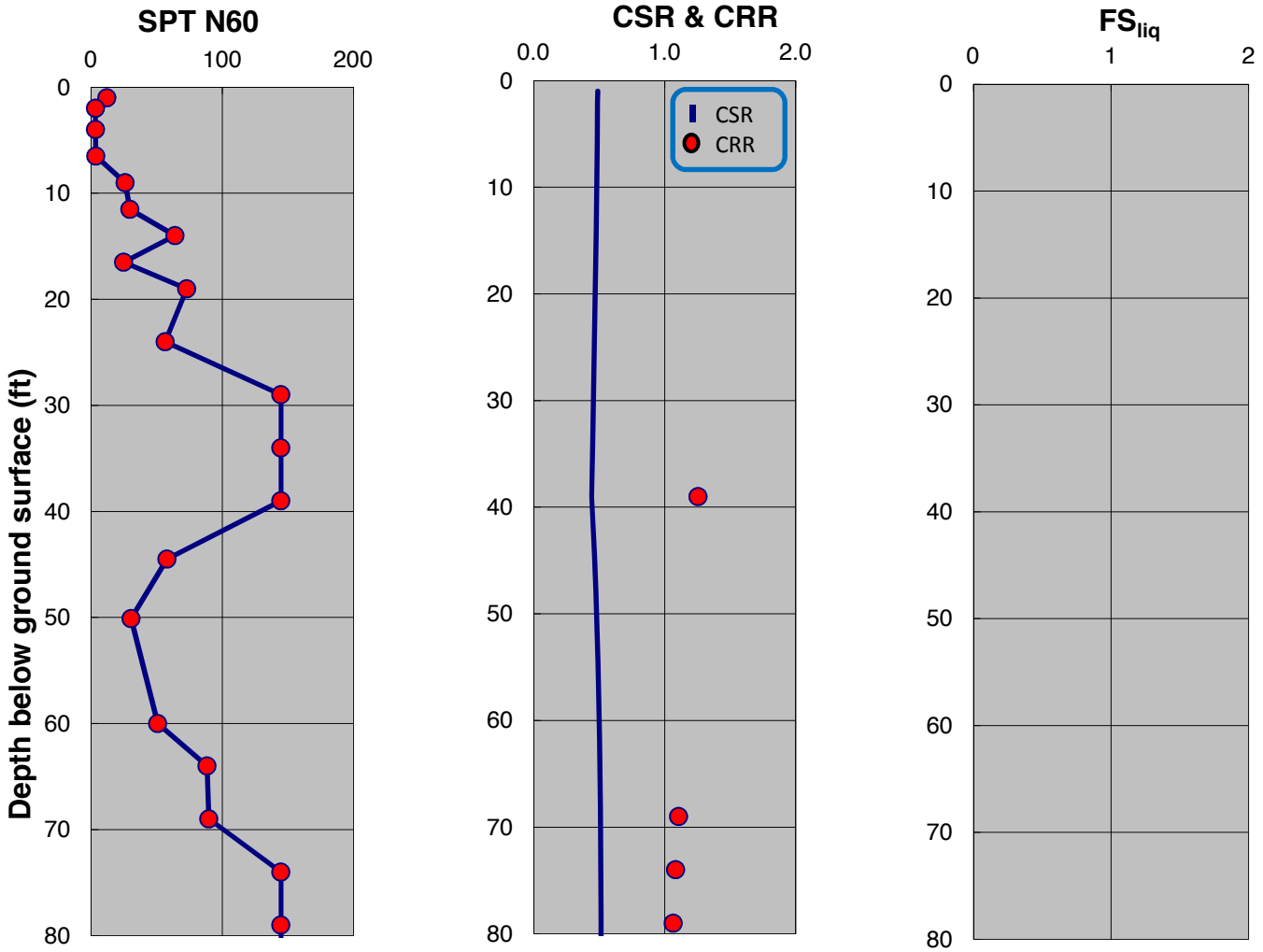
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-112 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



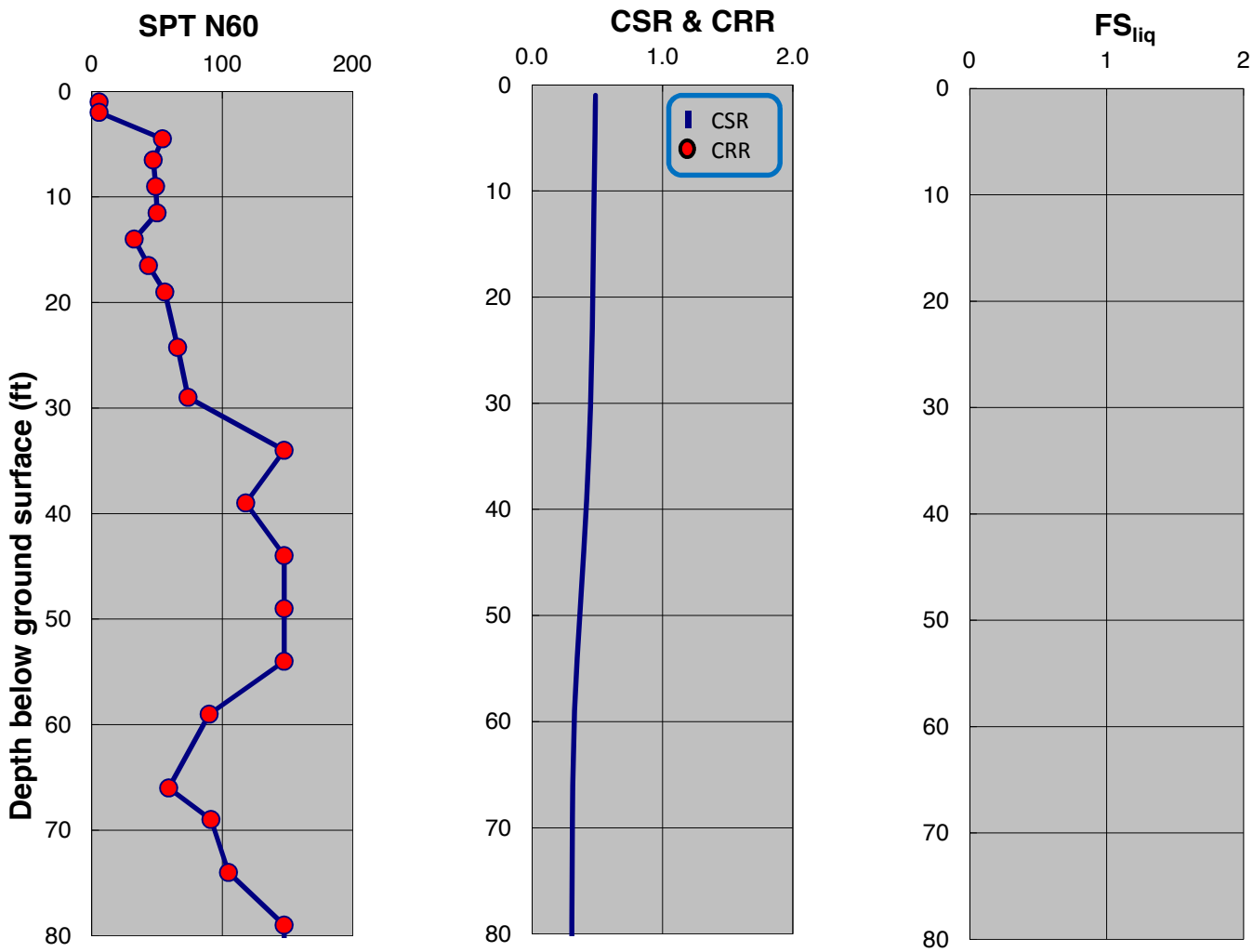
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-113 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



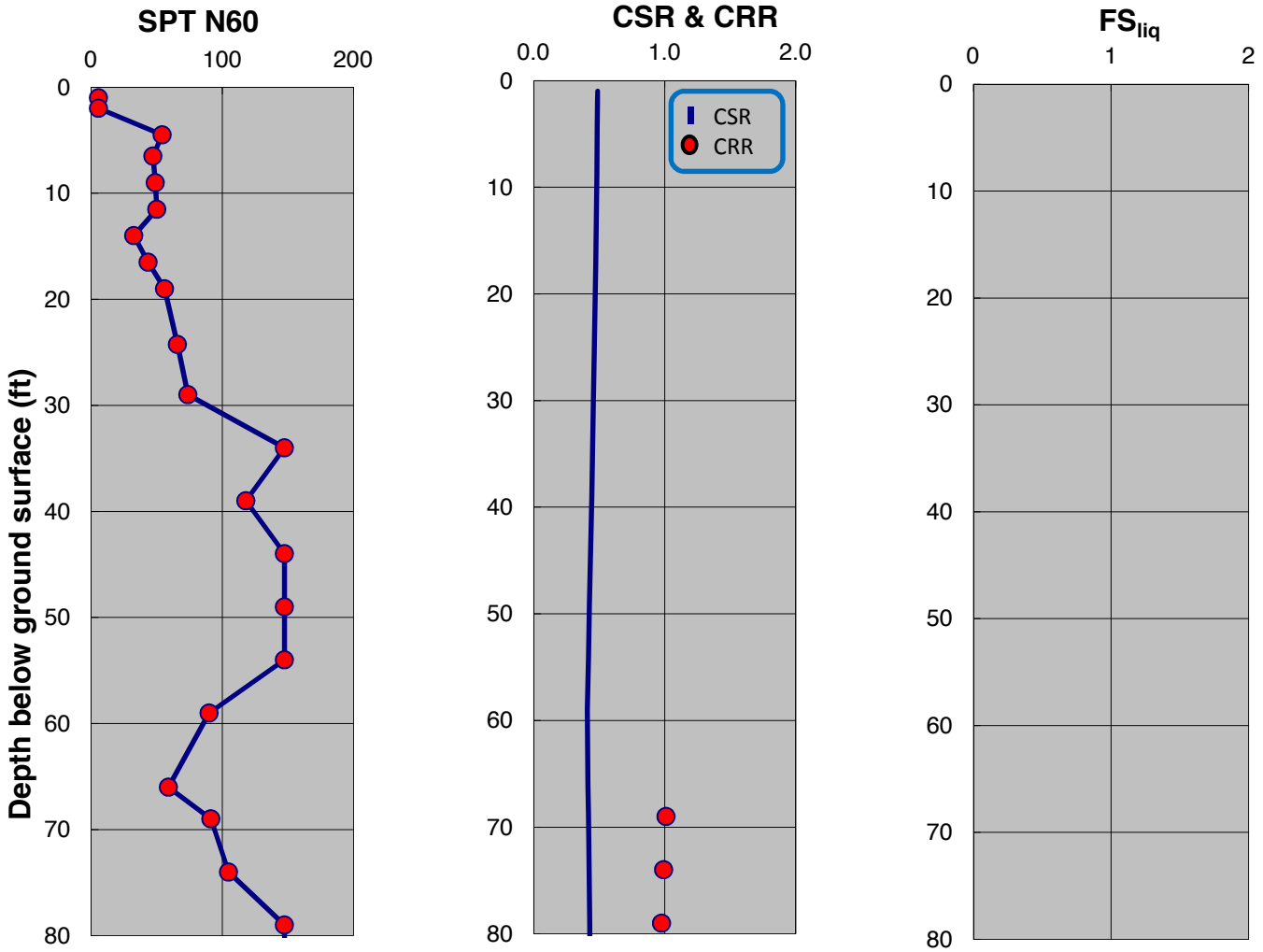
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-113 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



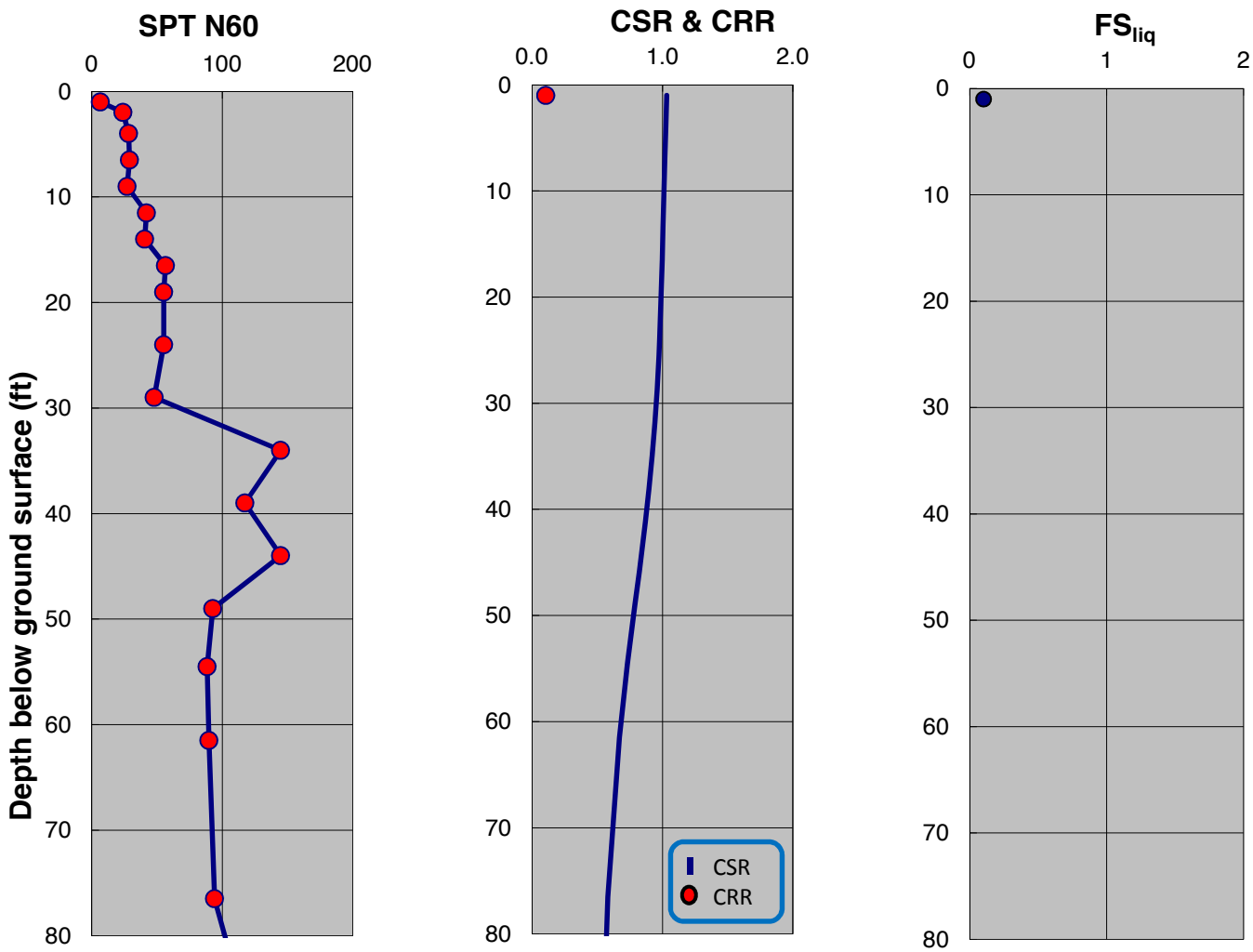
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-114 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



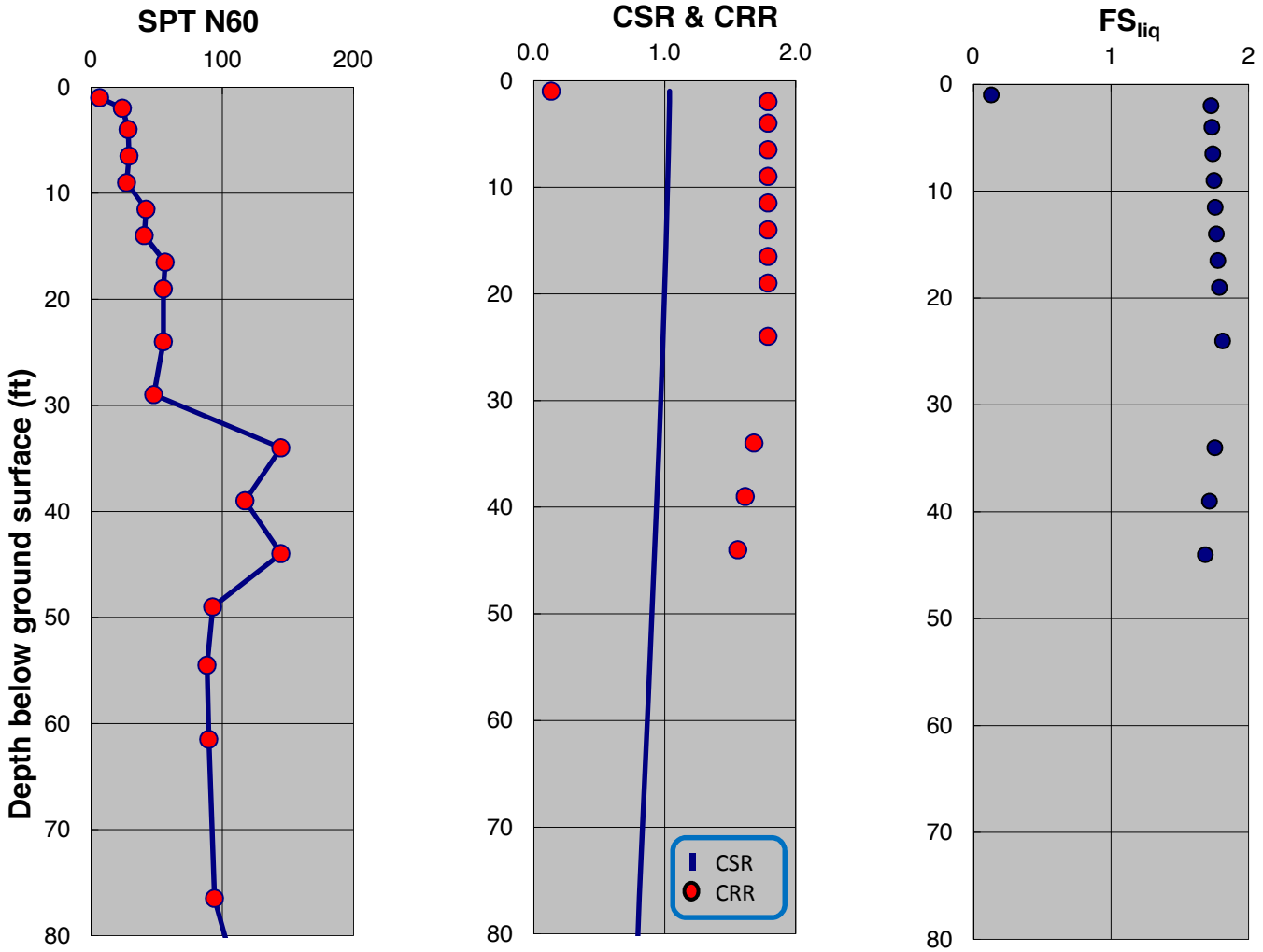
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-114 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



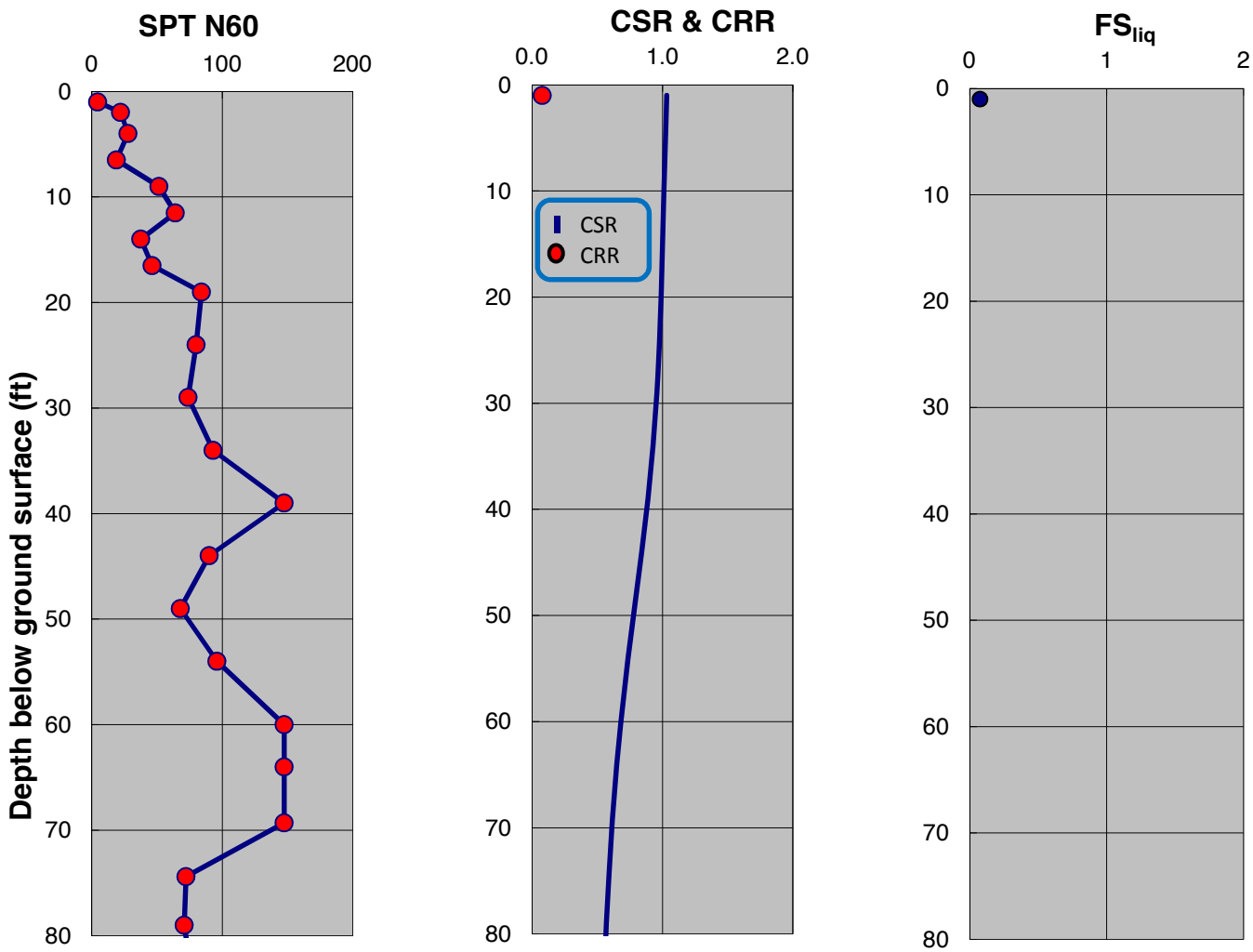
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-117 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



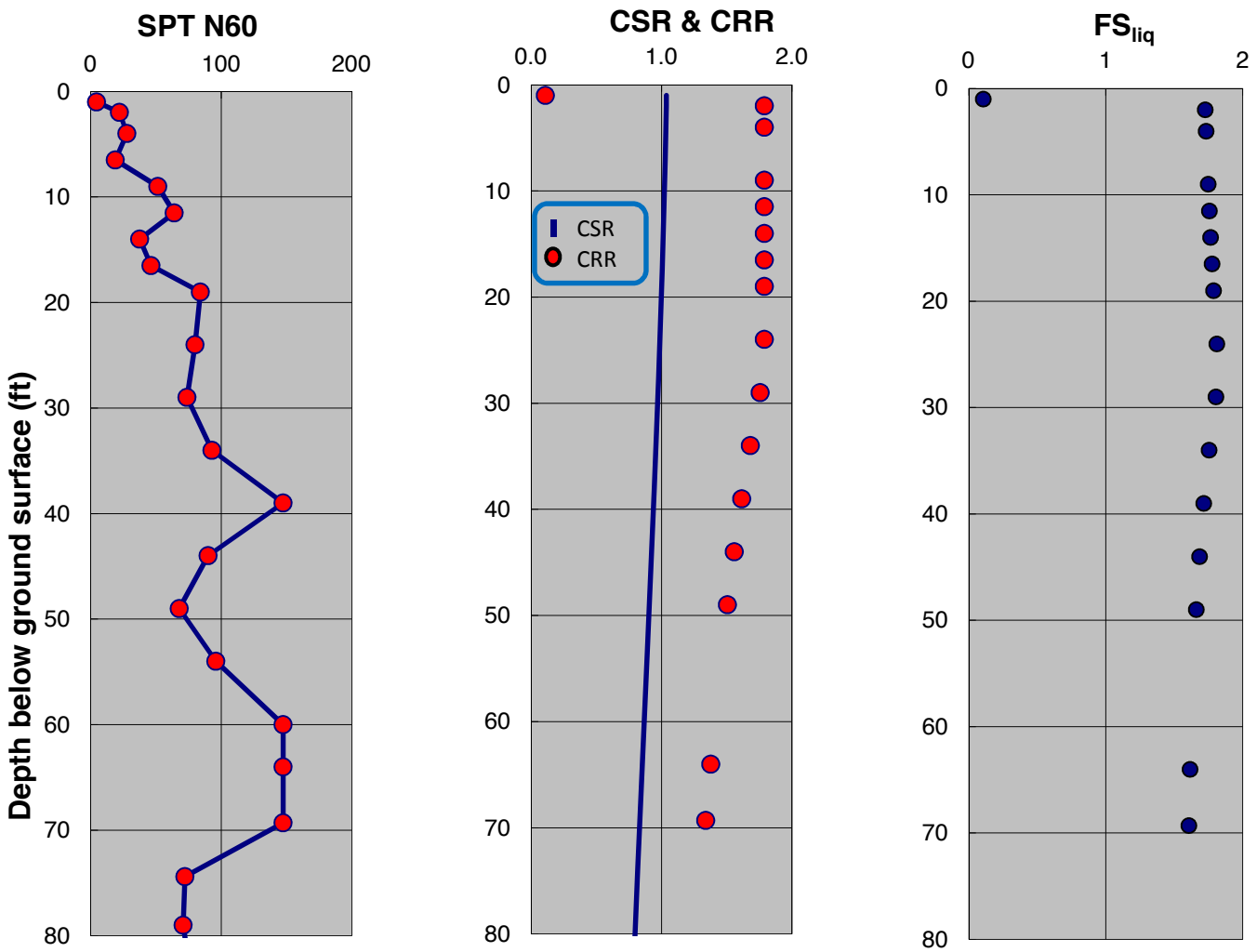
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-117 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



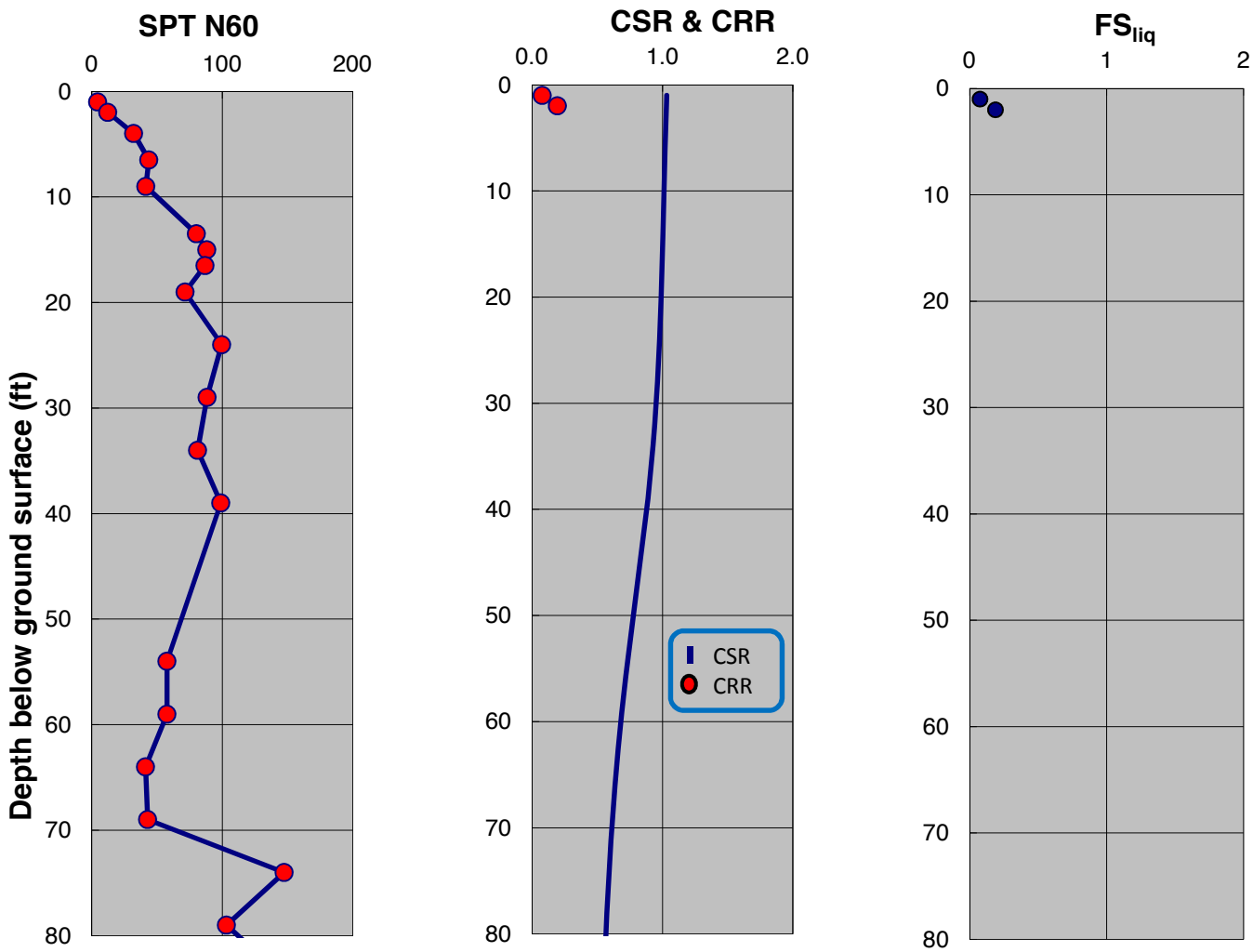
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-120 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



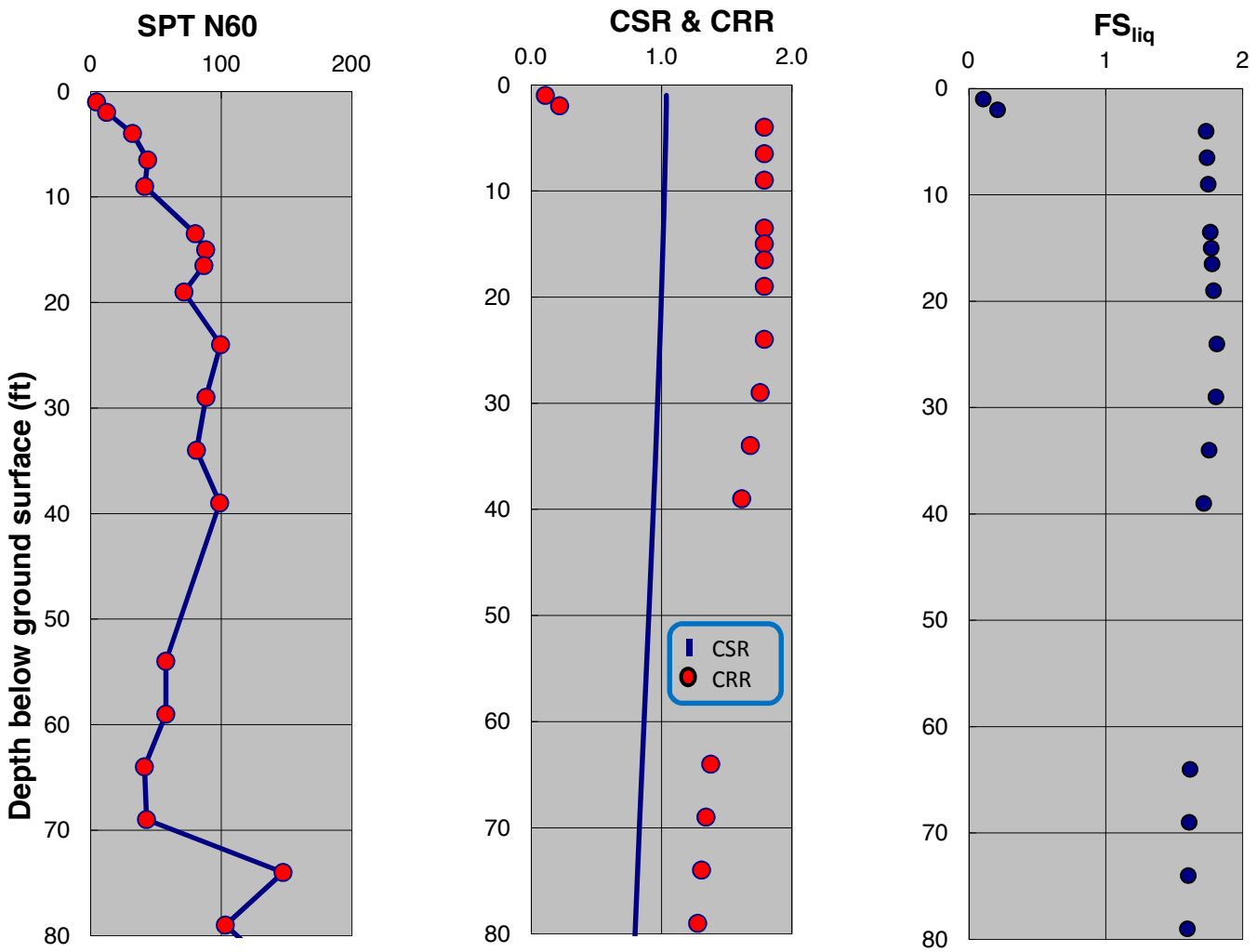
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-120 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



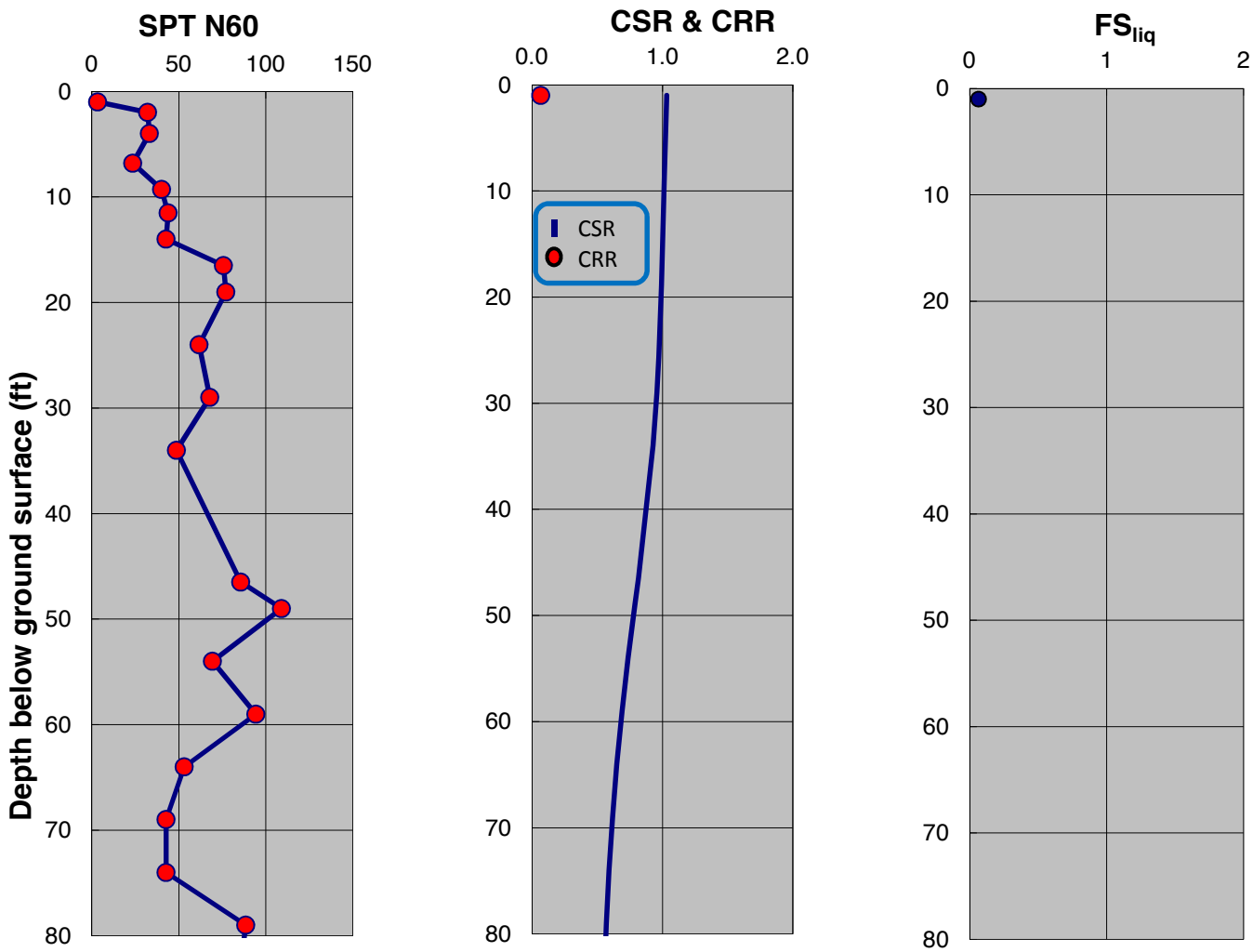
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-121 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



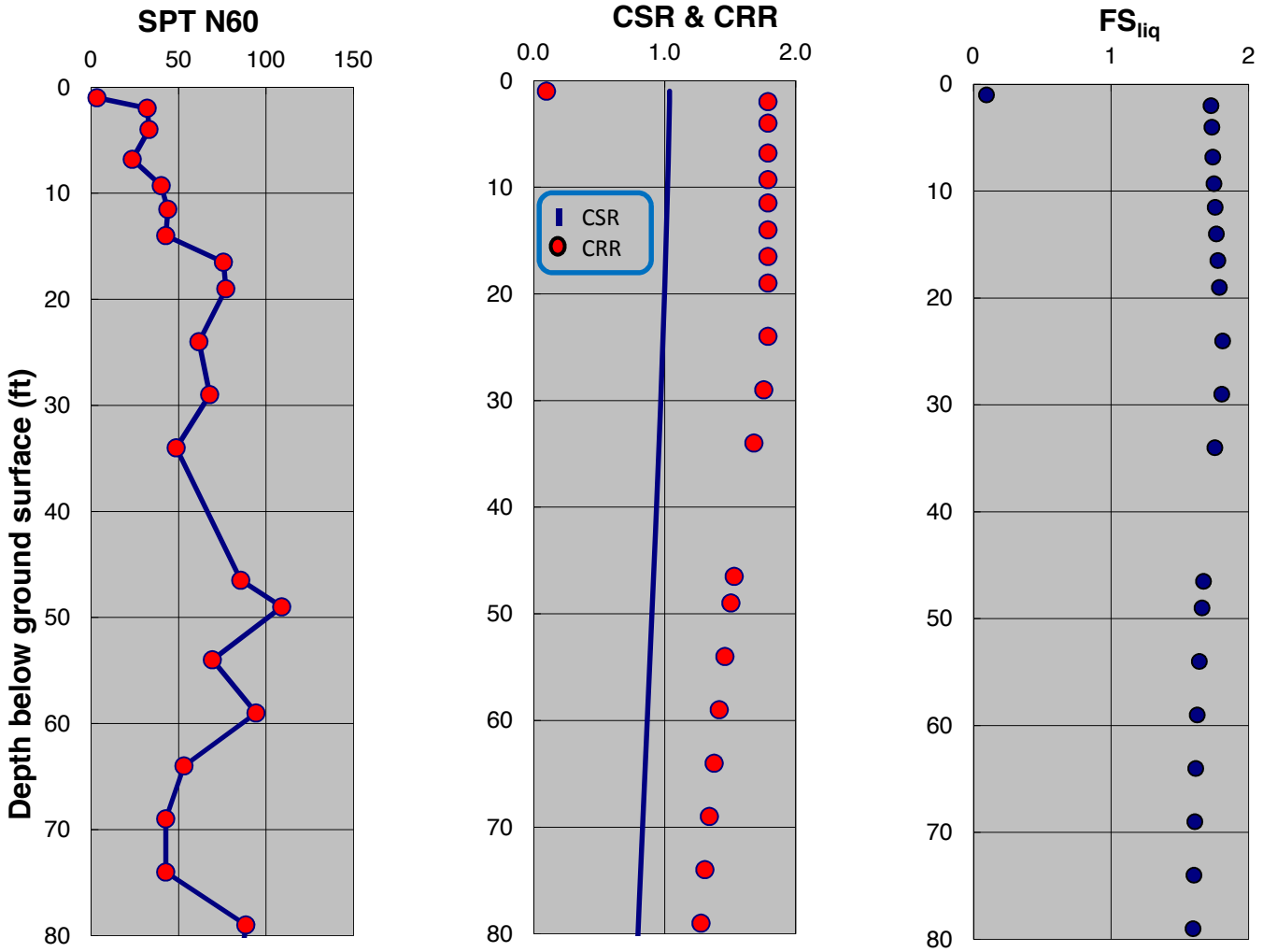
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-121 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



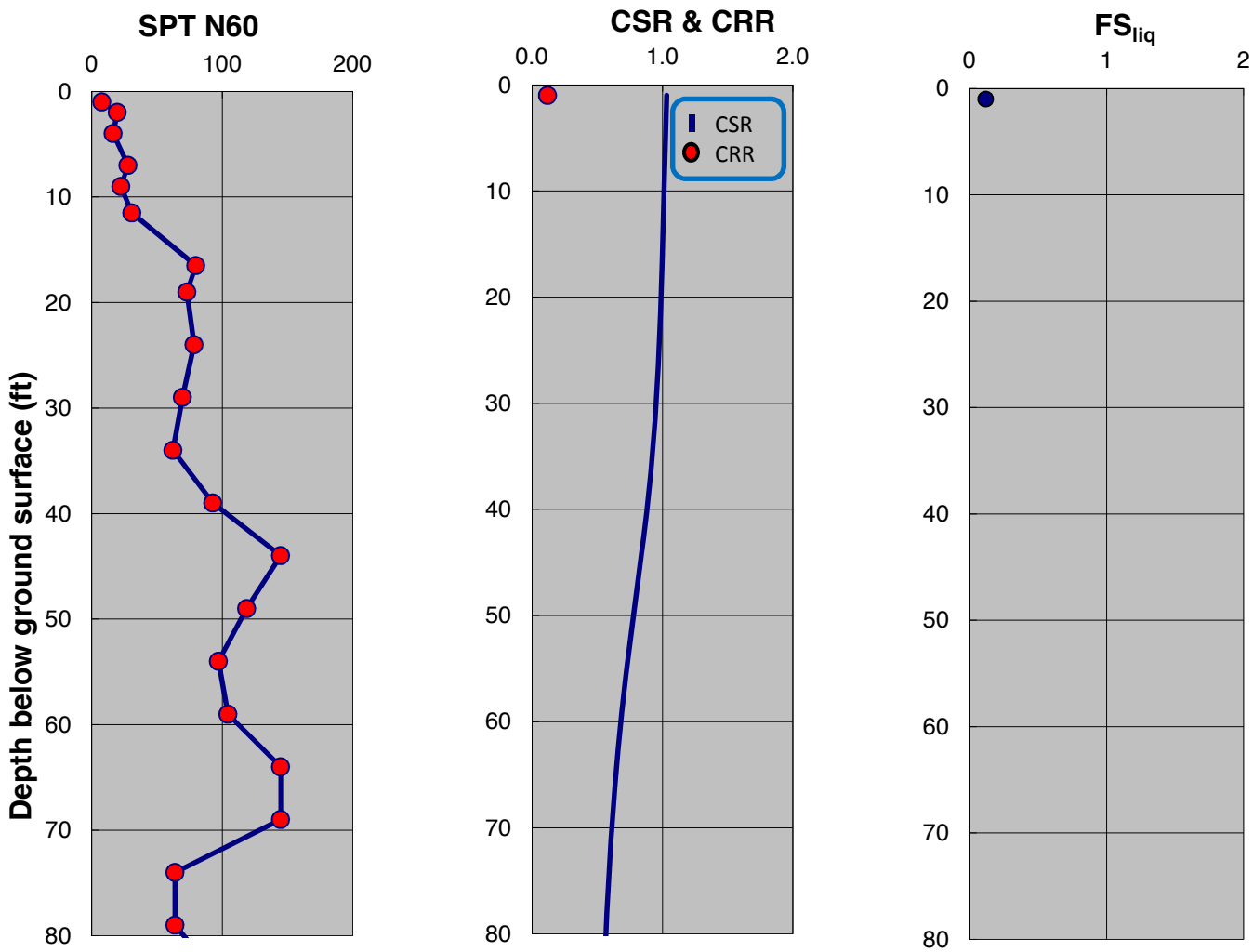
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-122 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



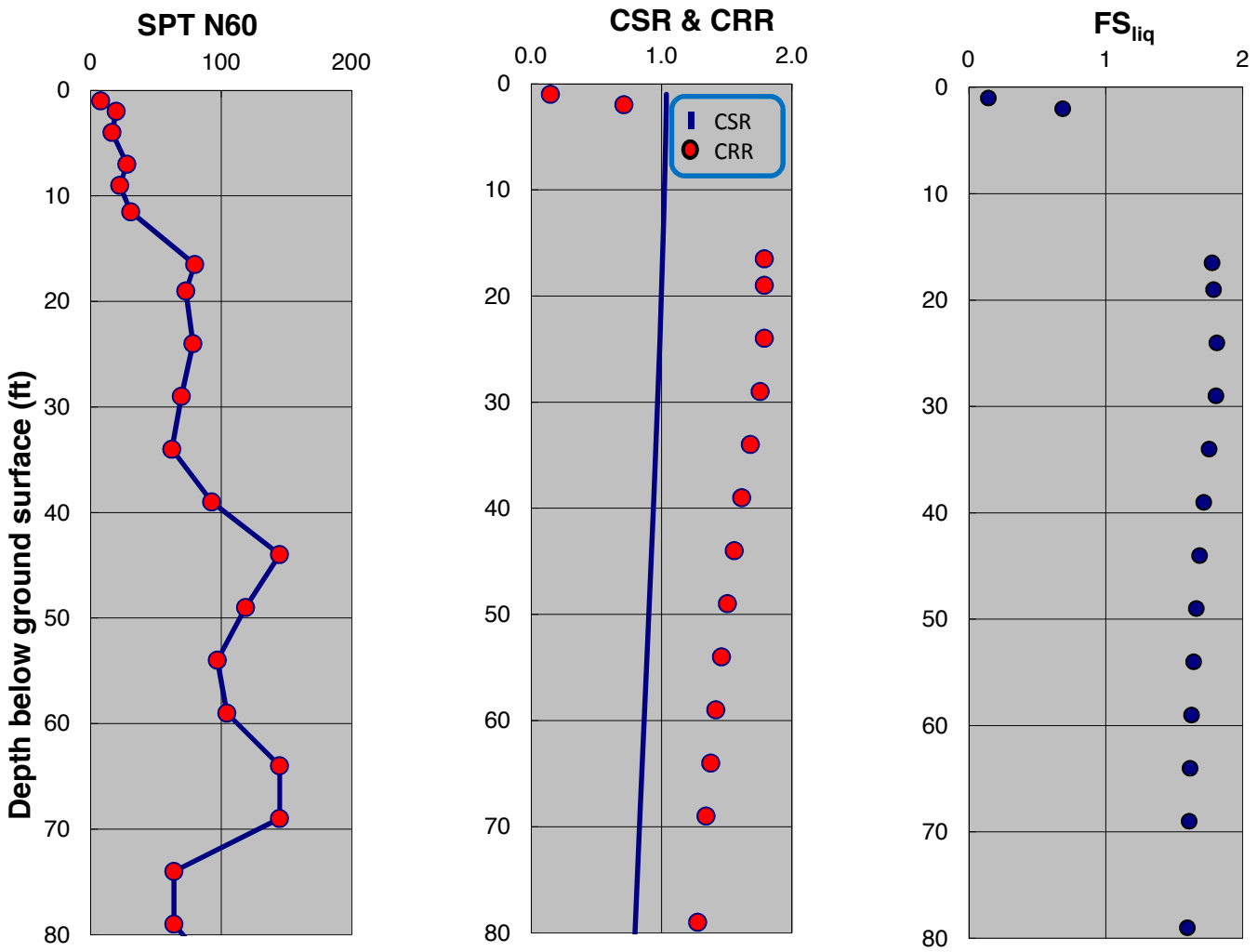
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-122 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



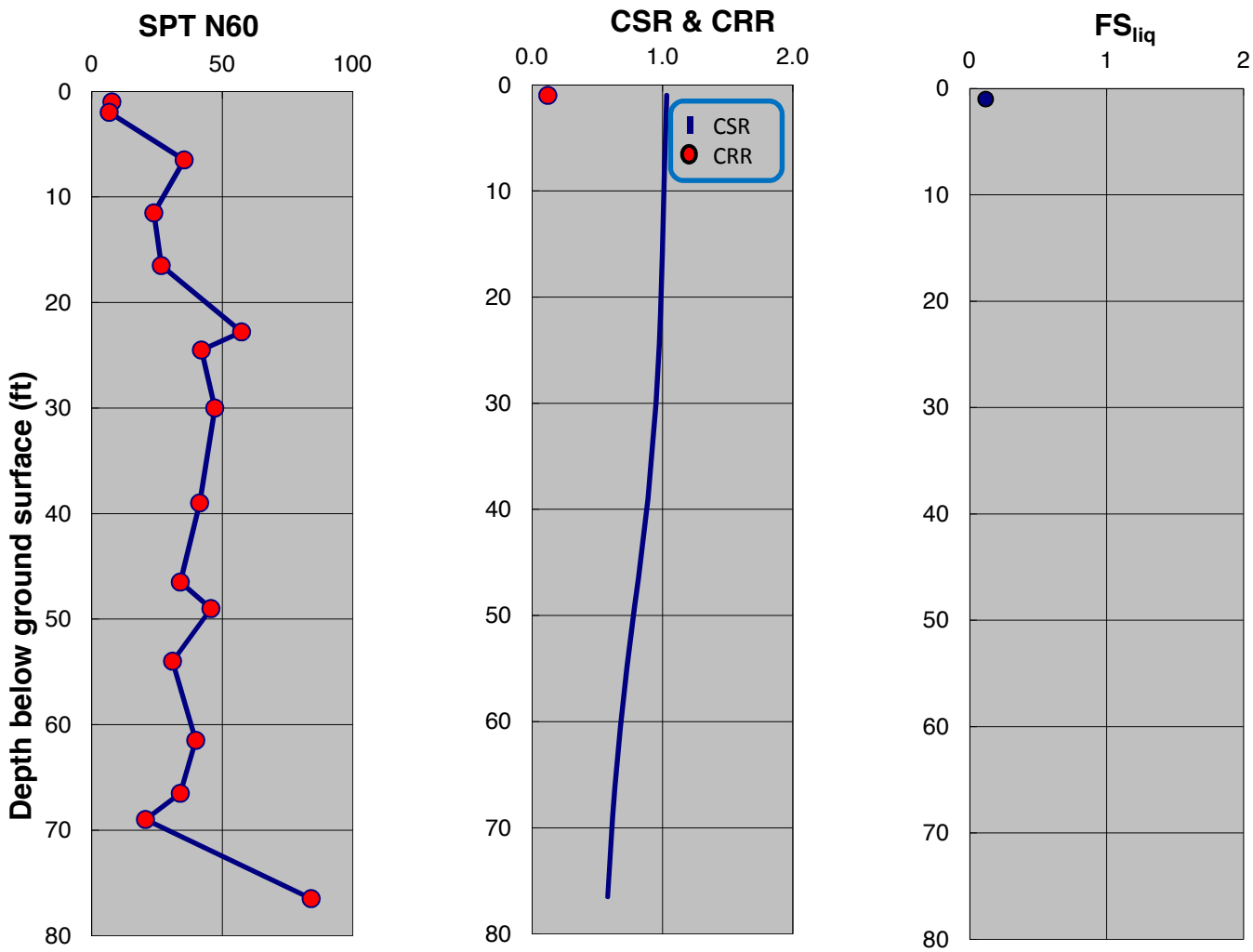
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-123 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



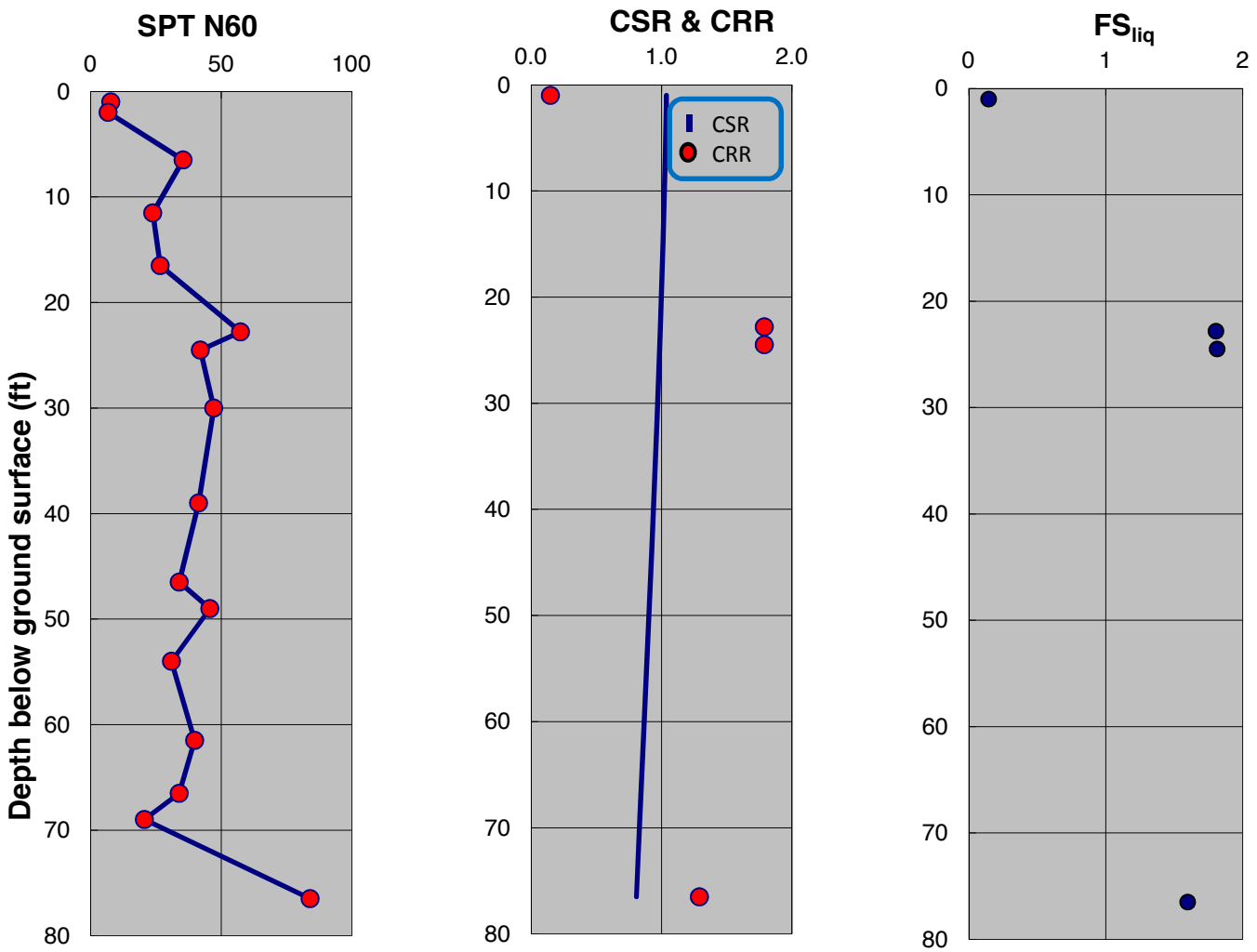
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-123 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



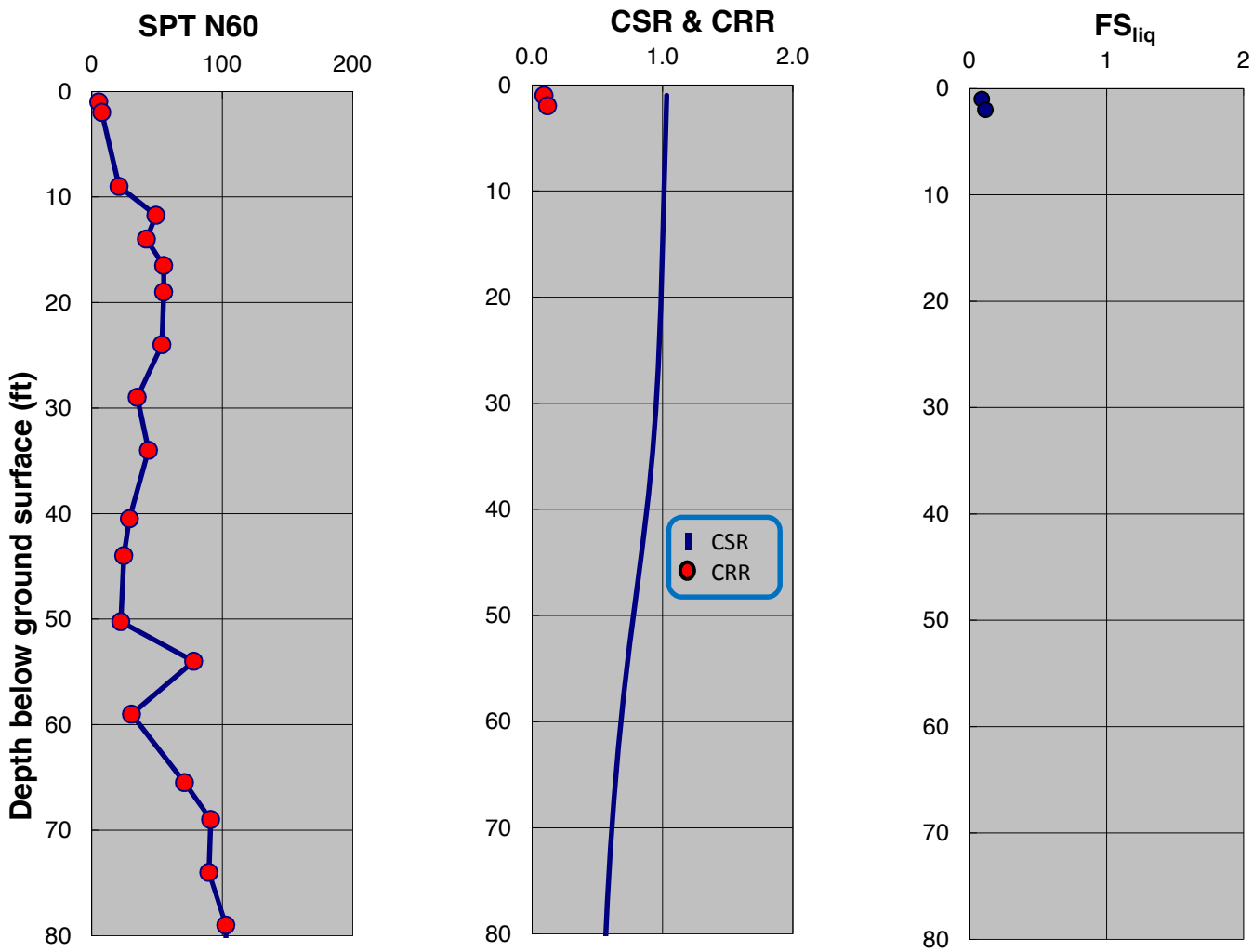
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-124 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



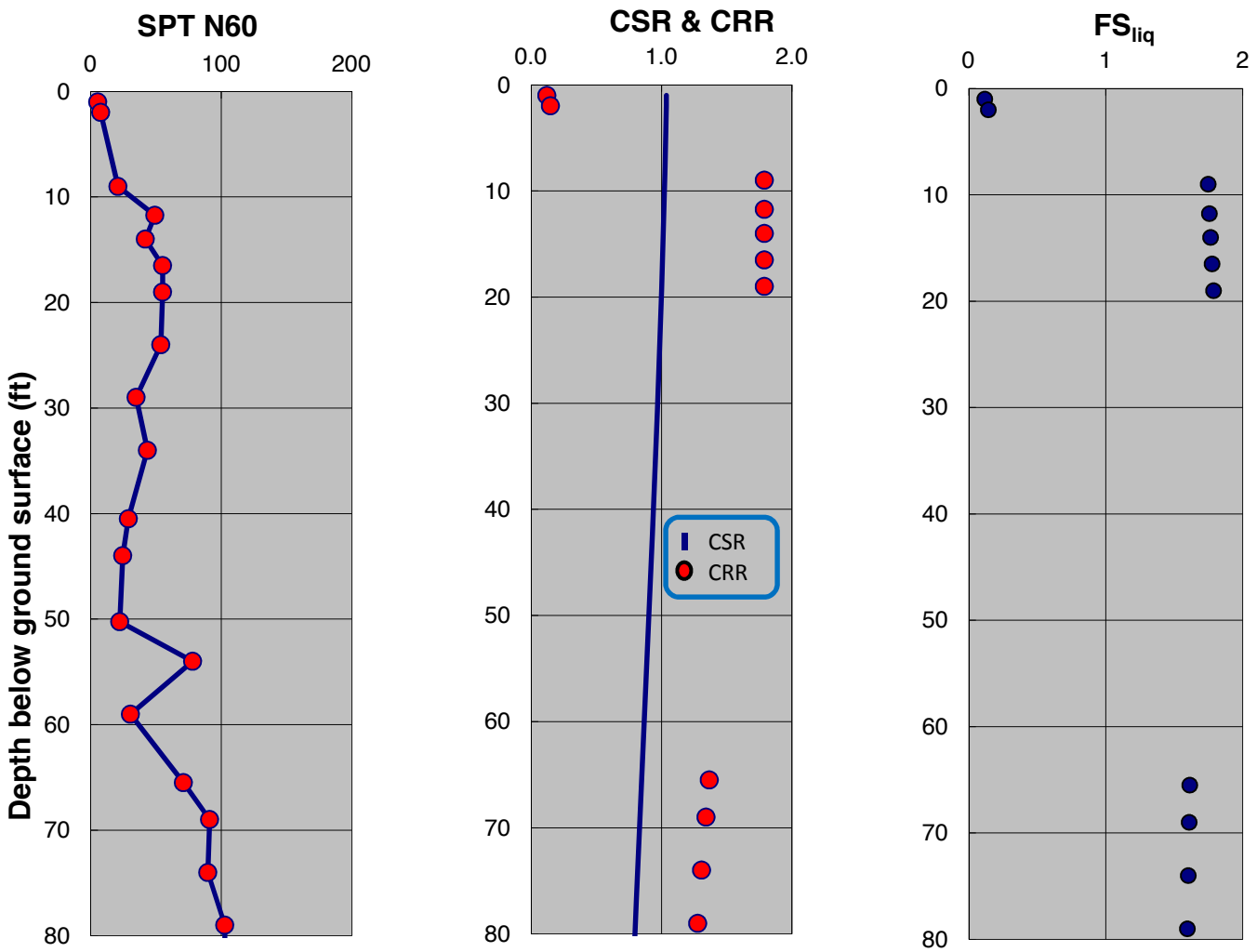
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-124 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



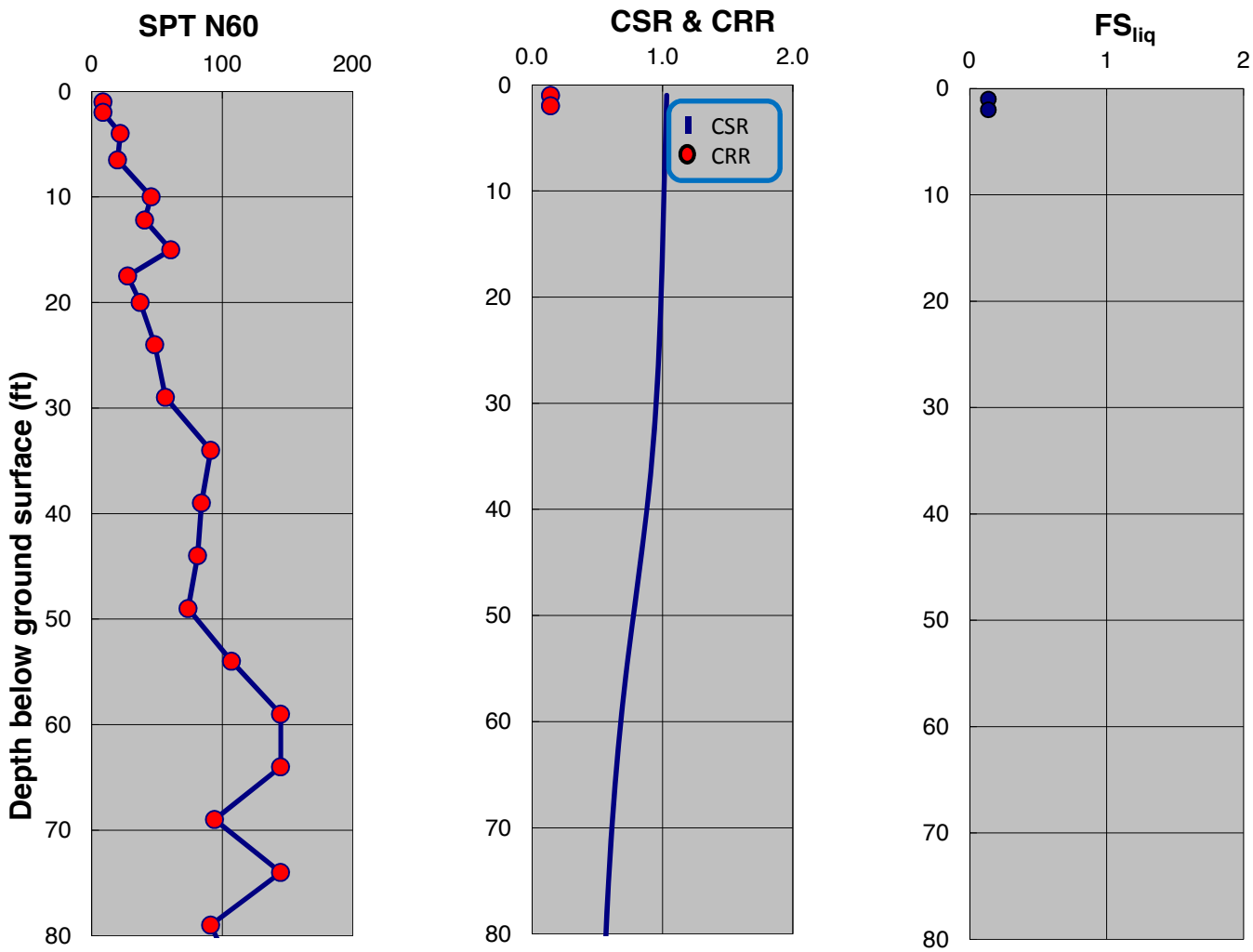
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-125 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



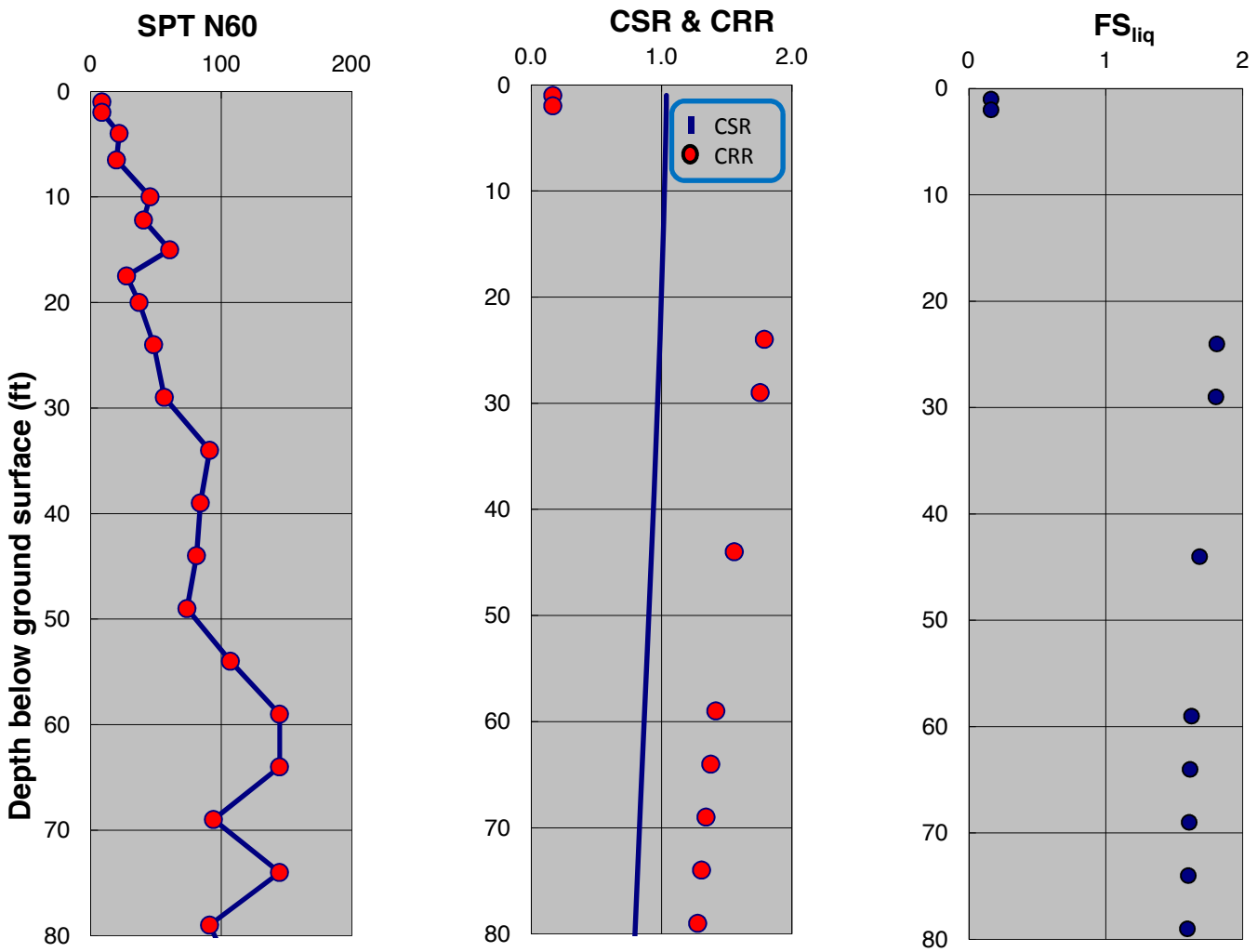
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-125 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



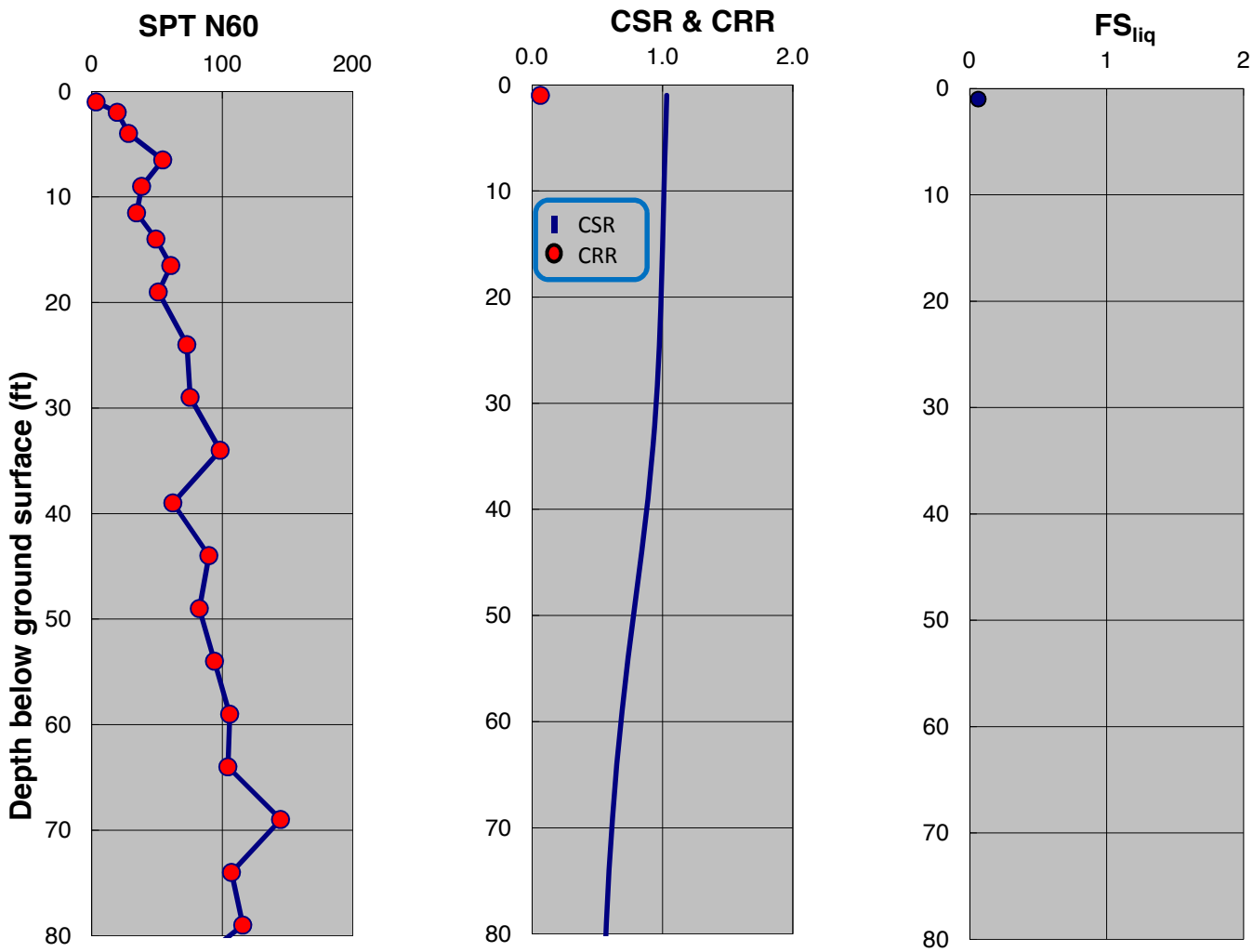
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-126 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



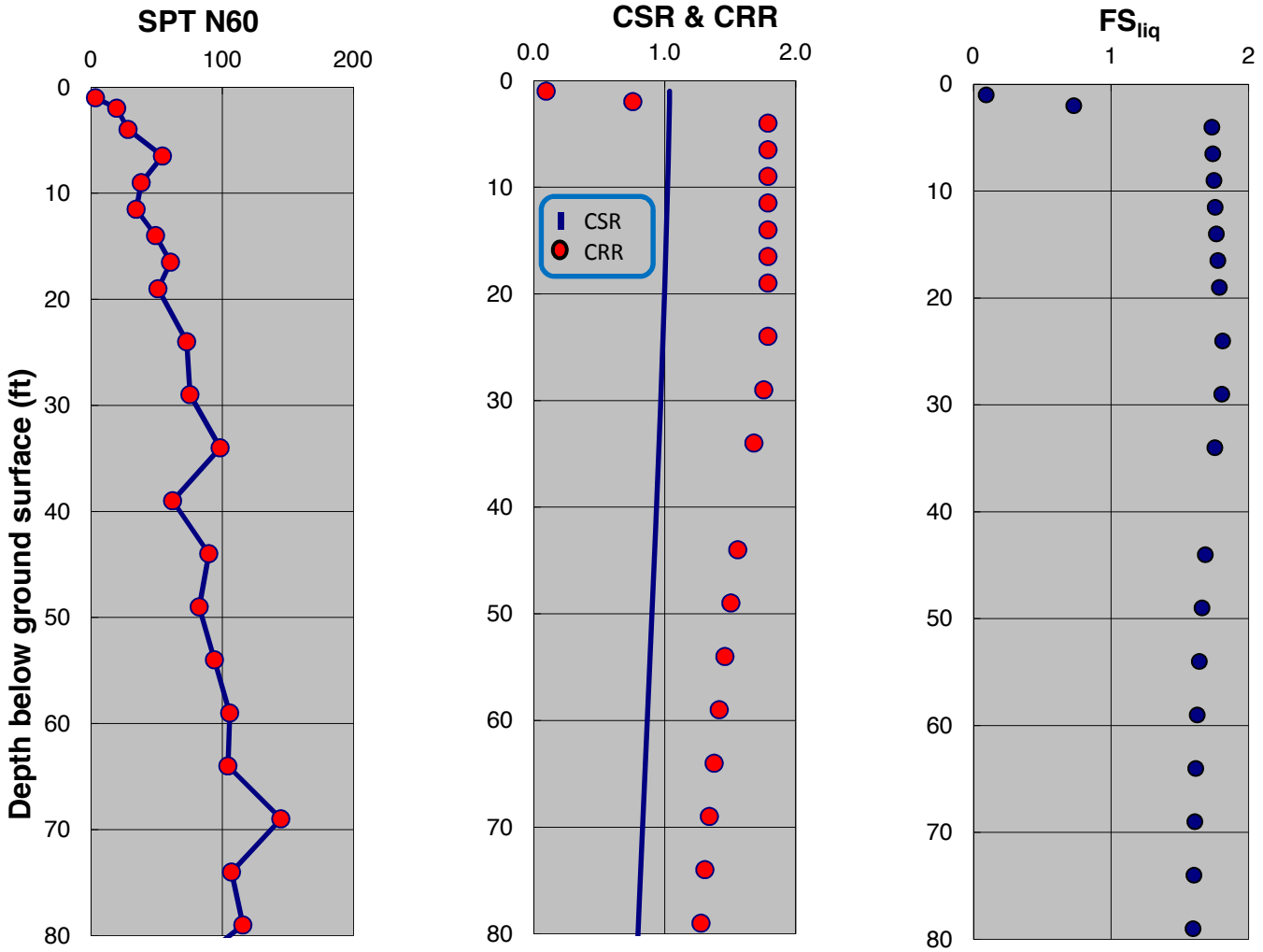
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-126 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-127 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

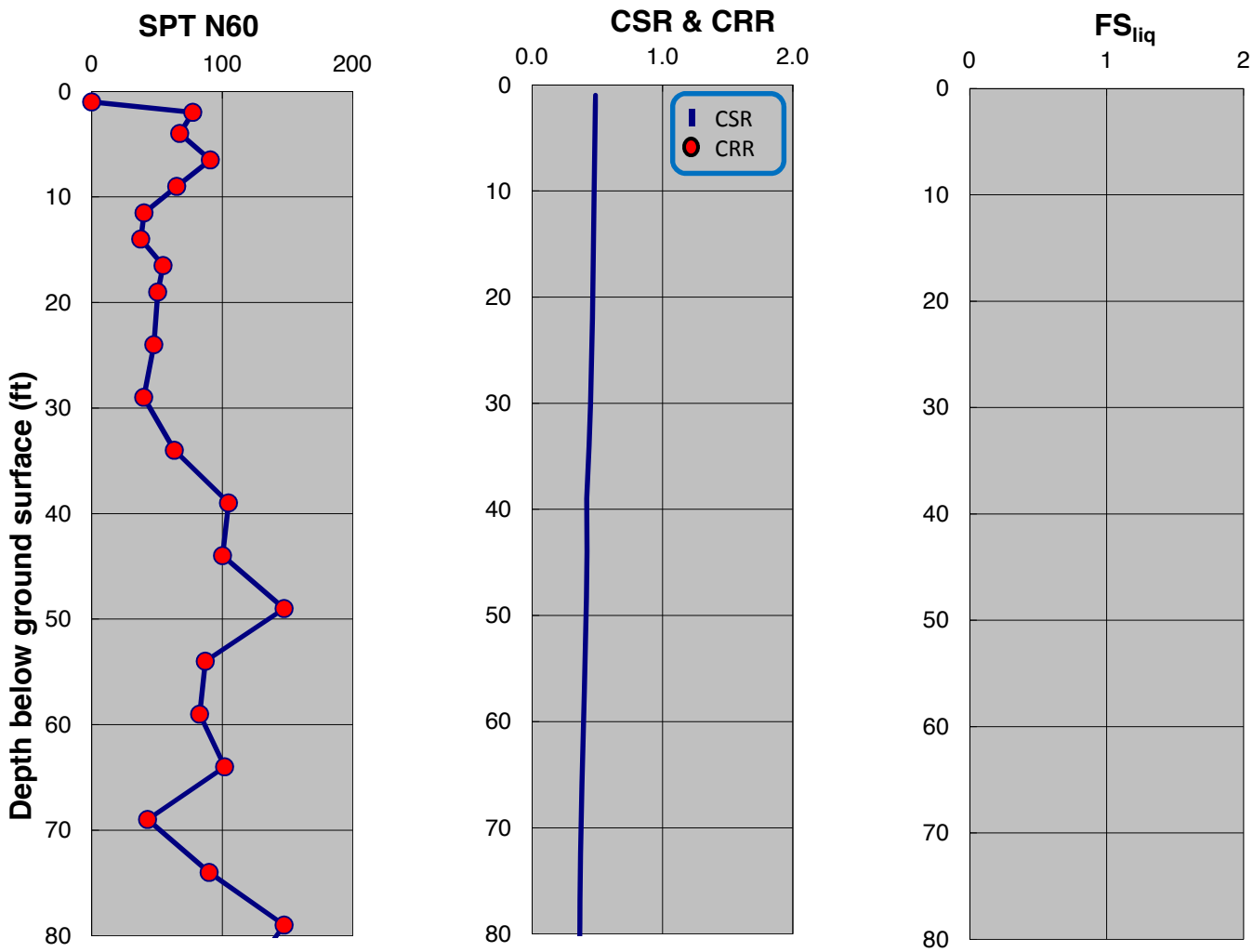
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-127 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

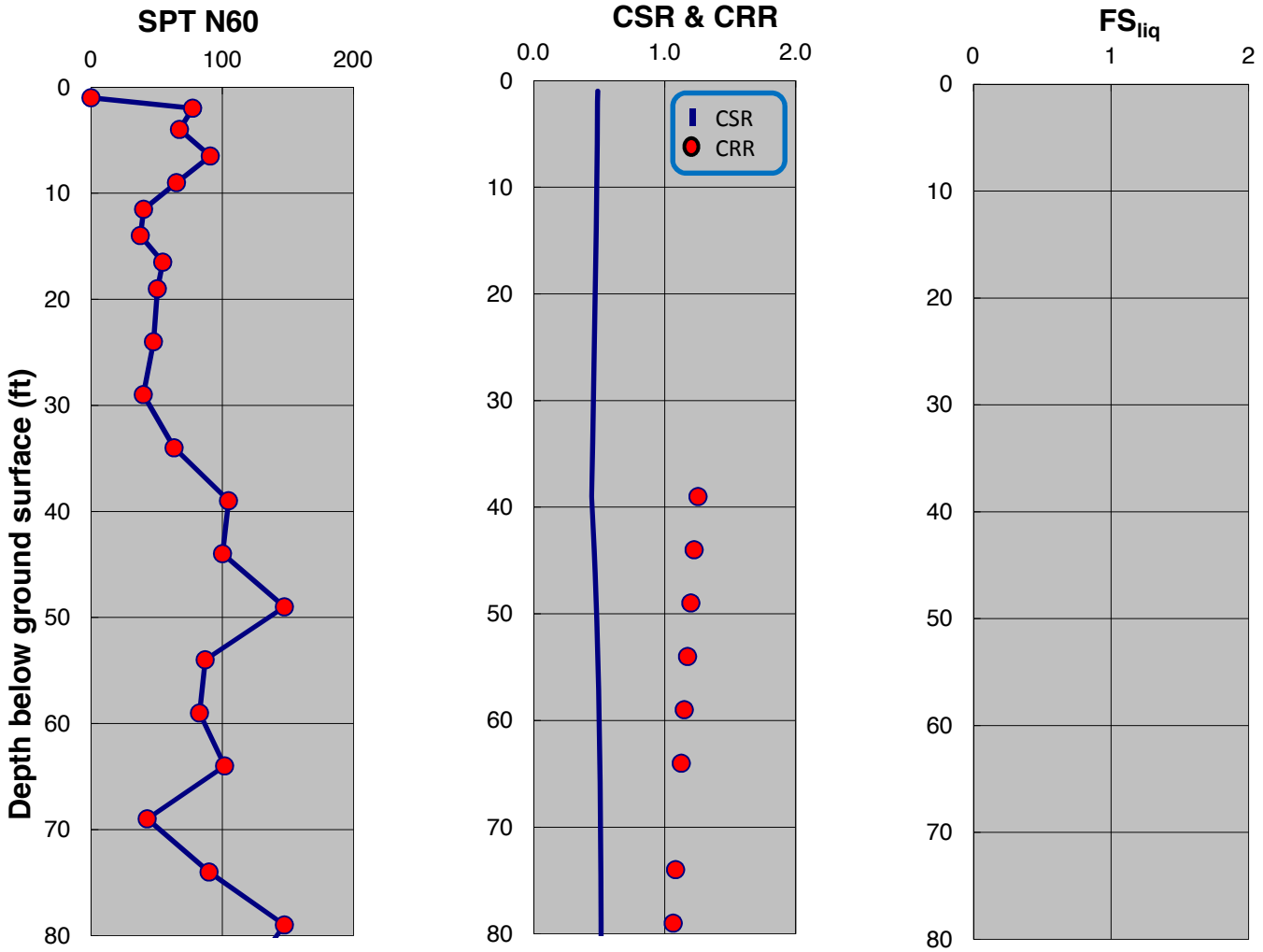
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.160



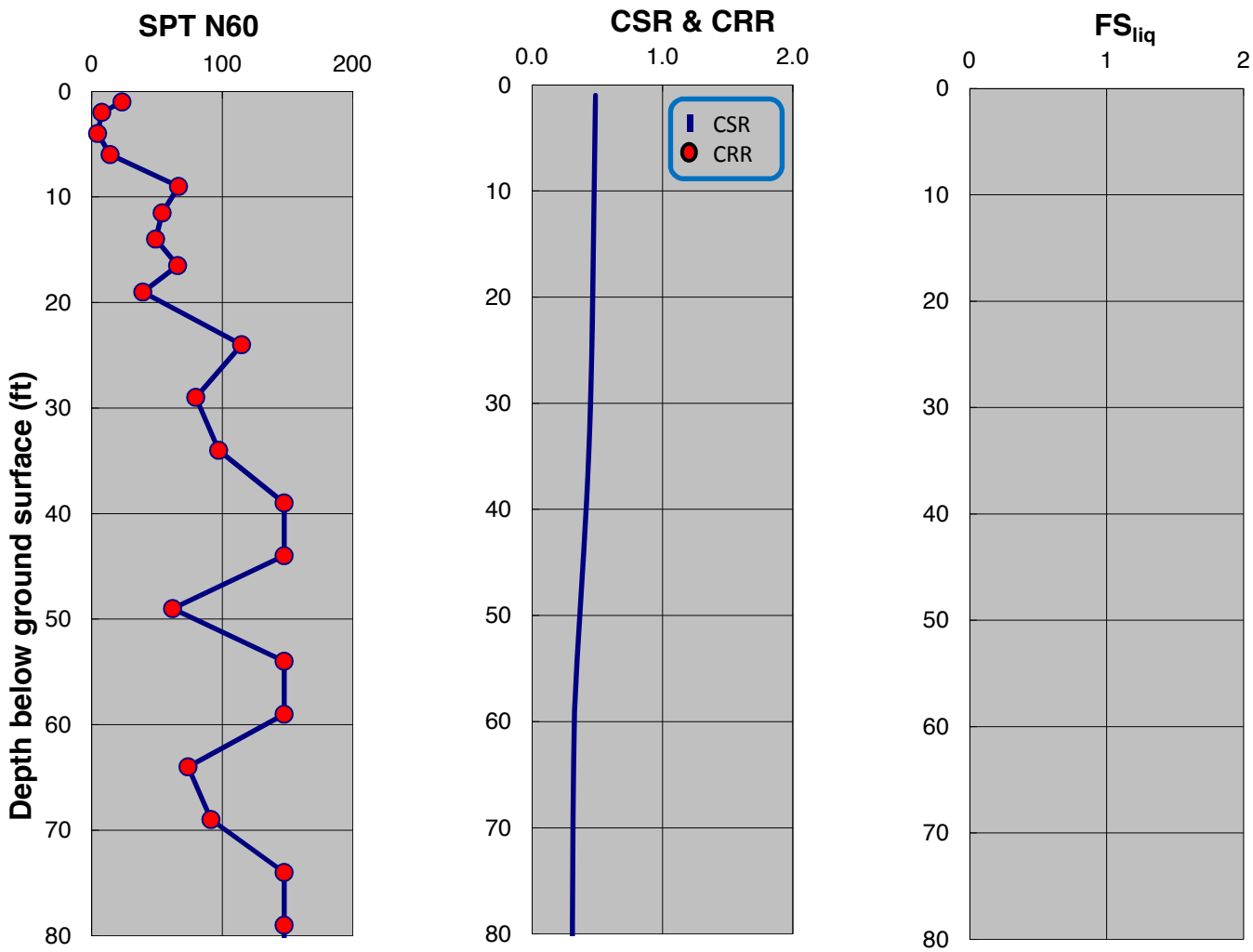
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-131 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



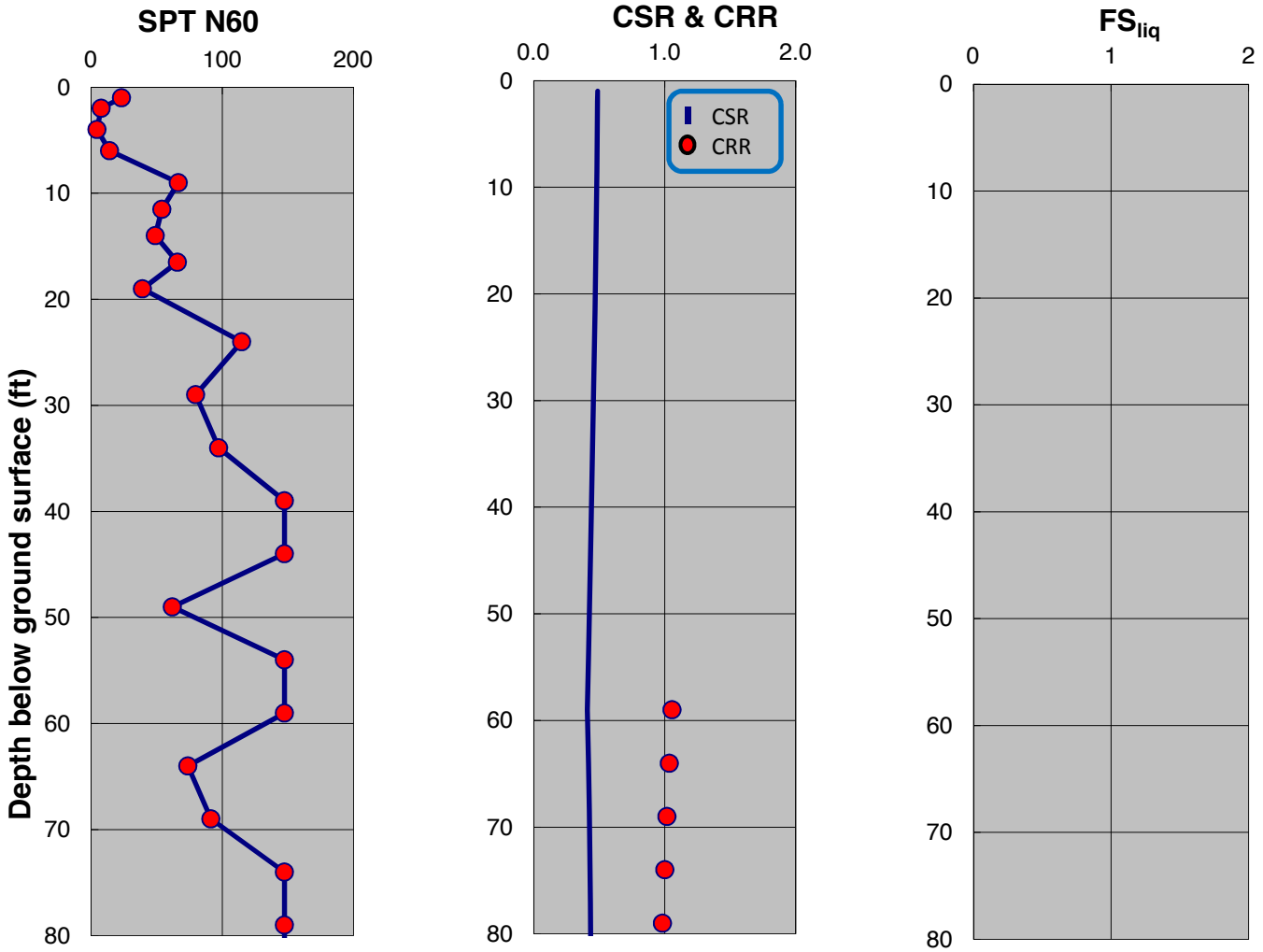
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-131 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



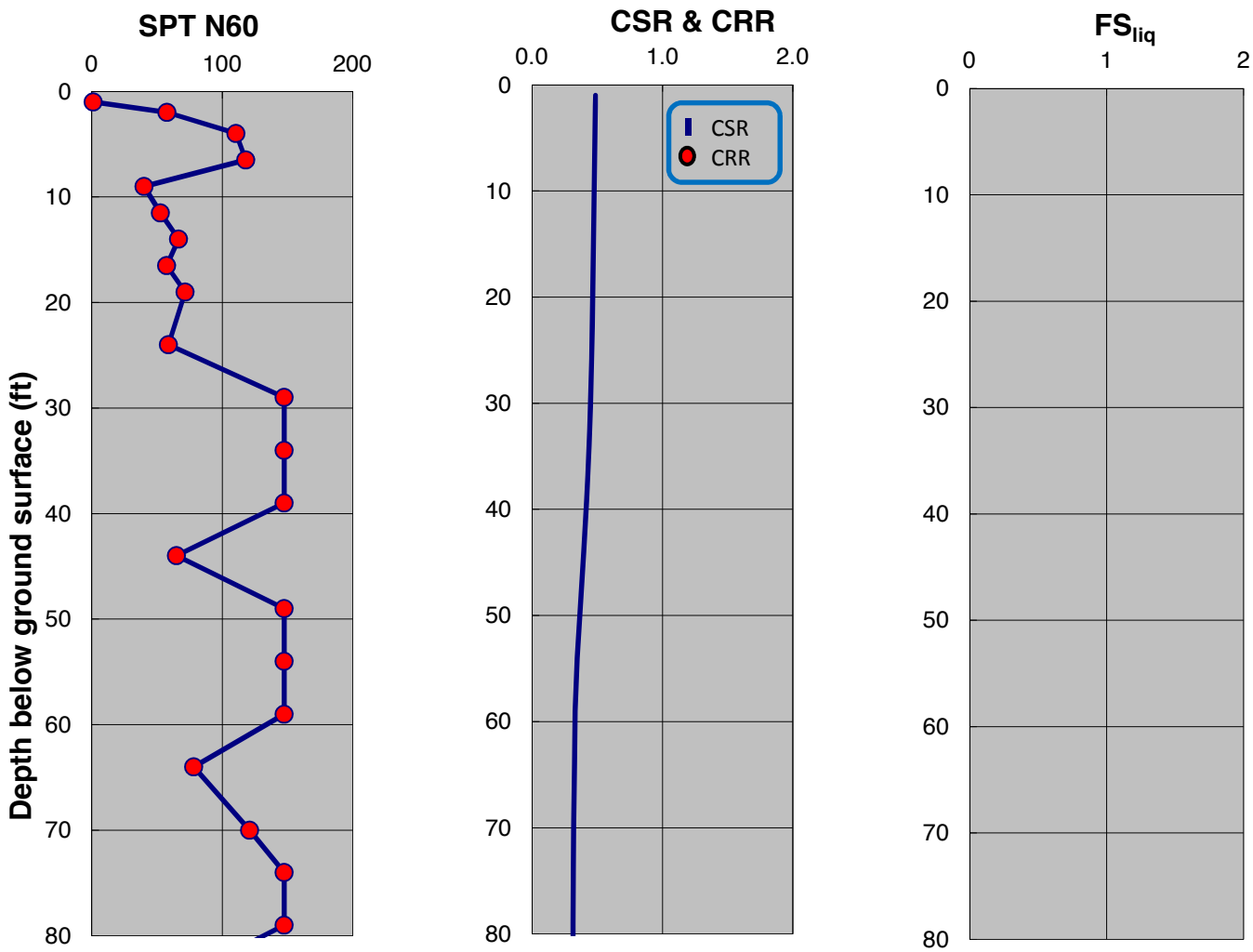
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-132 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



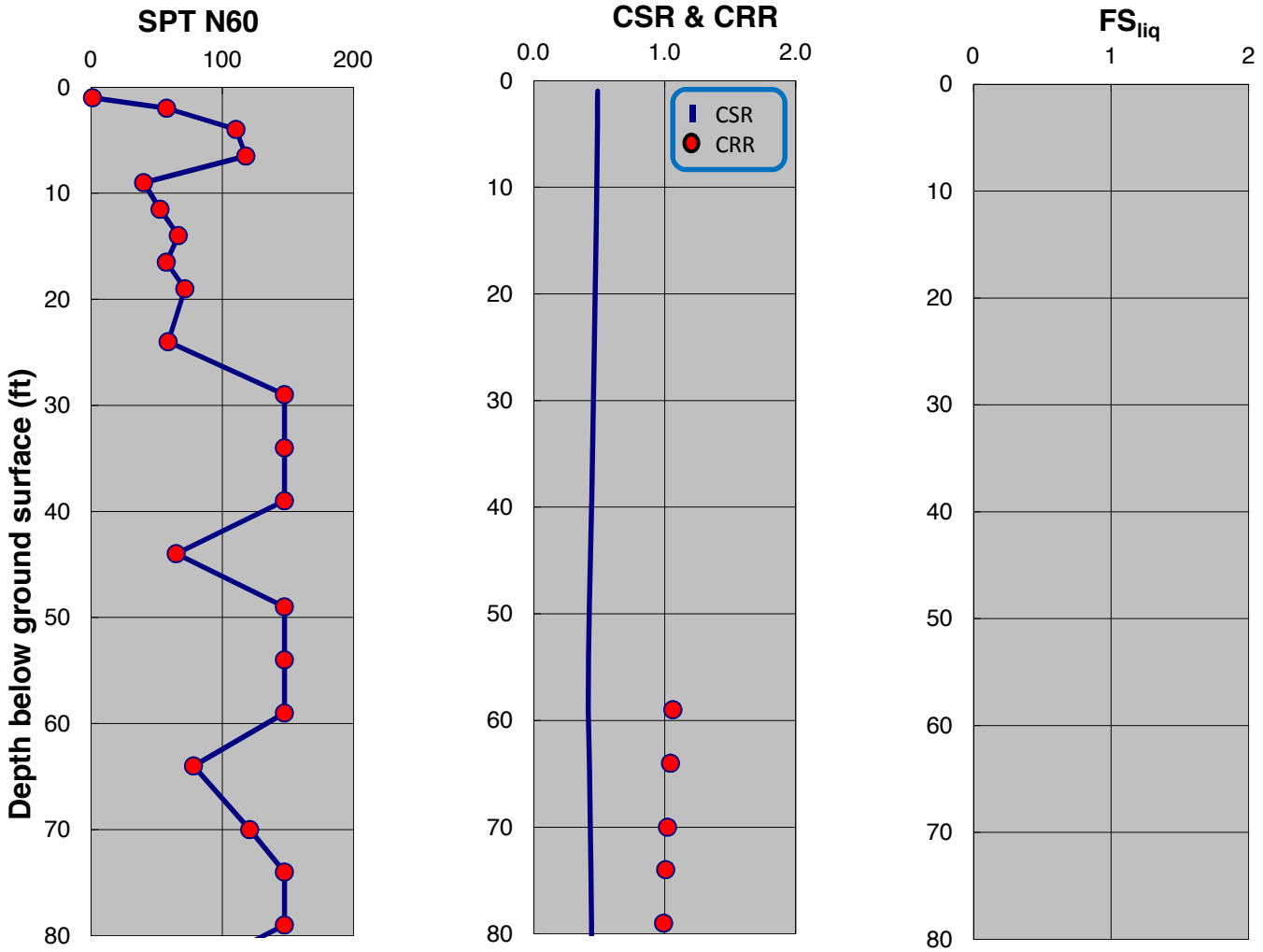
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-132 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



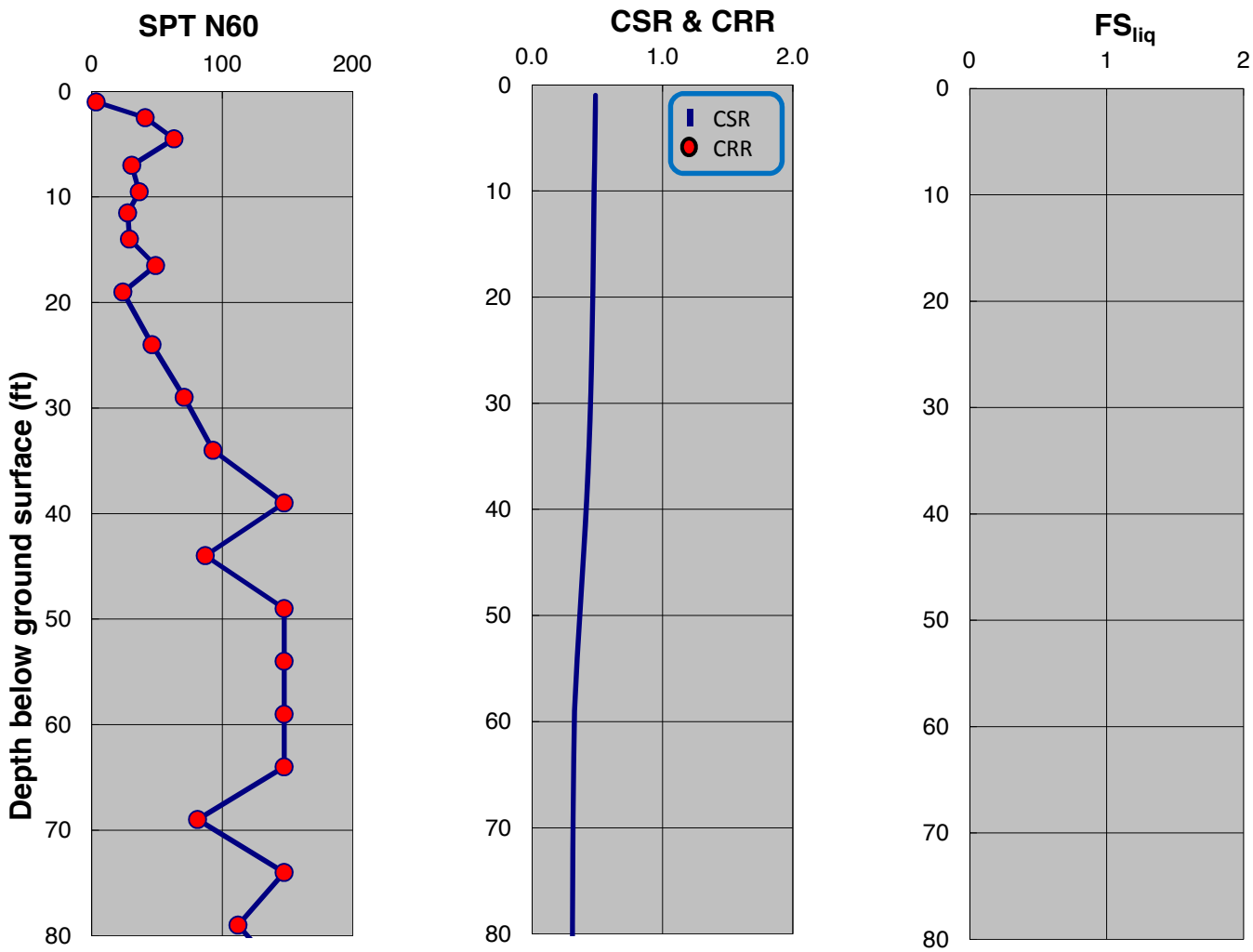
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-133 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



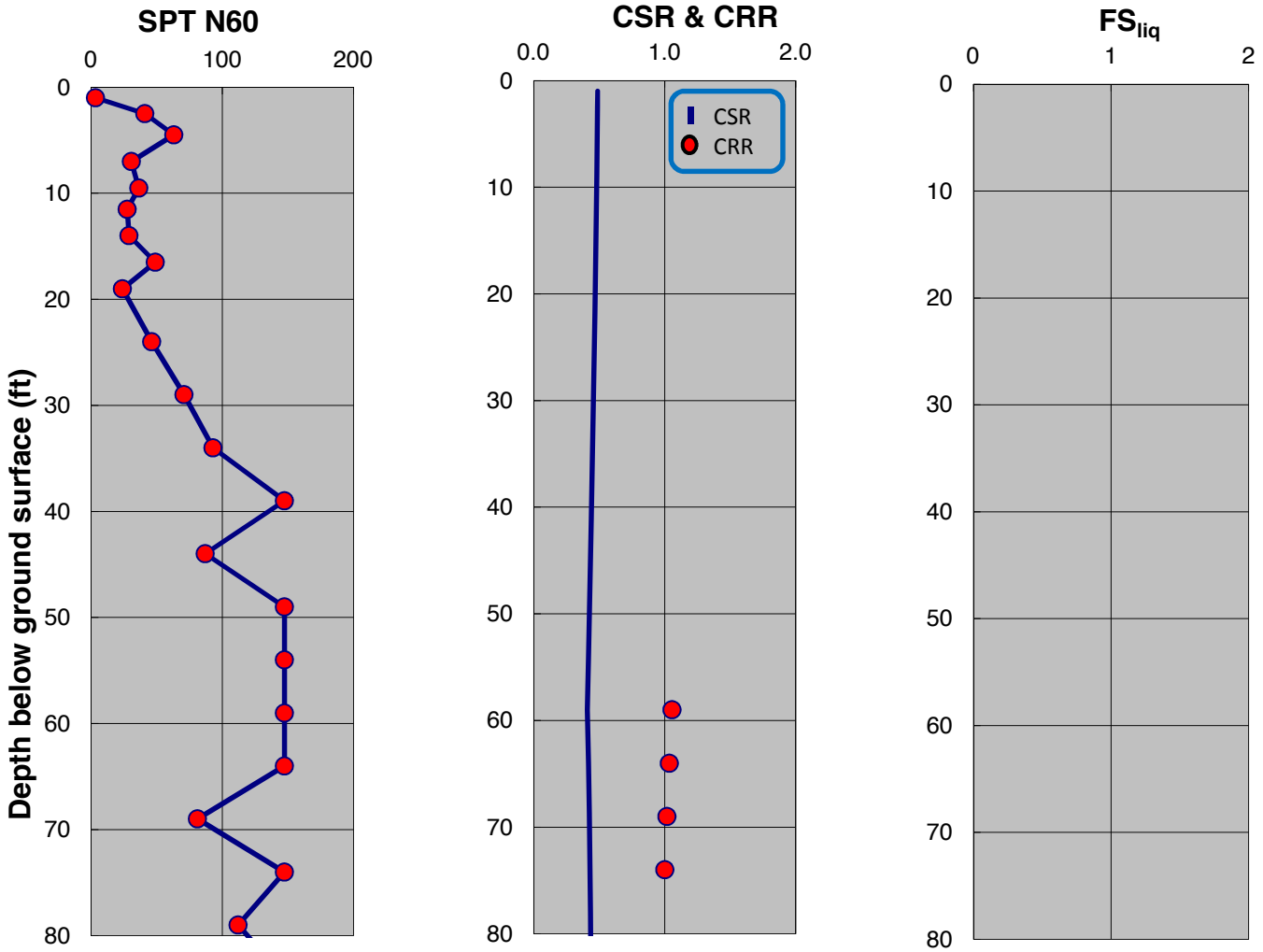
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-133 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



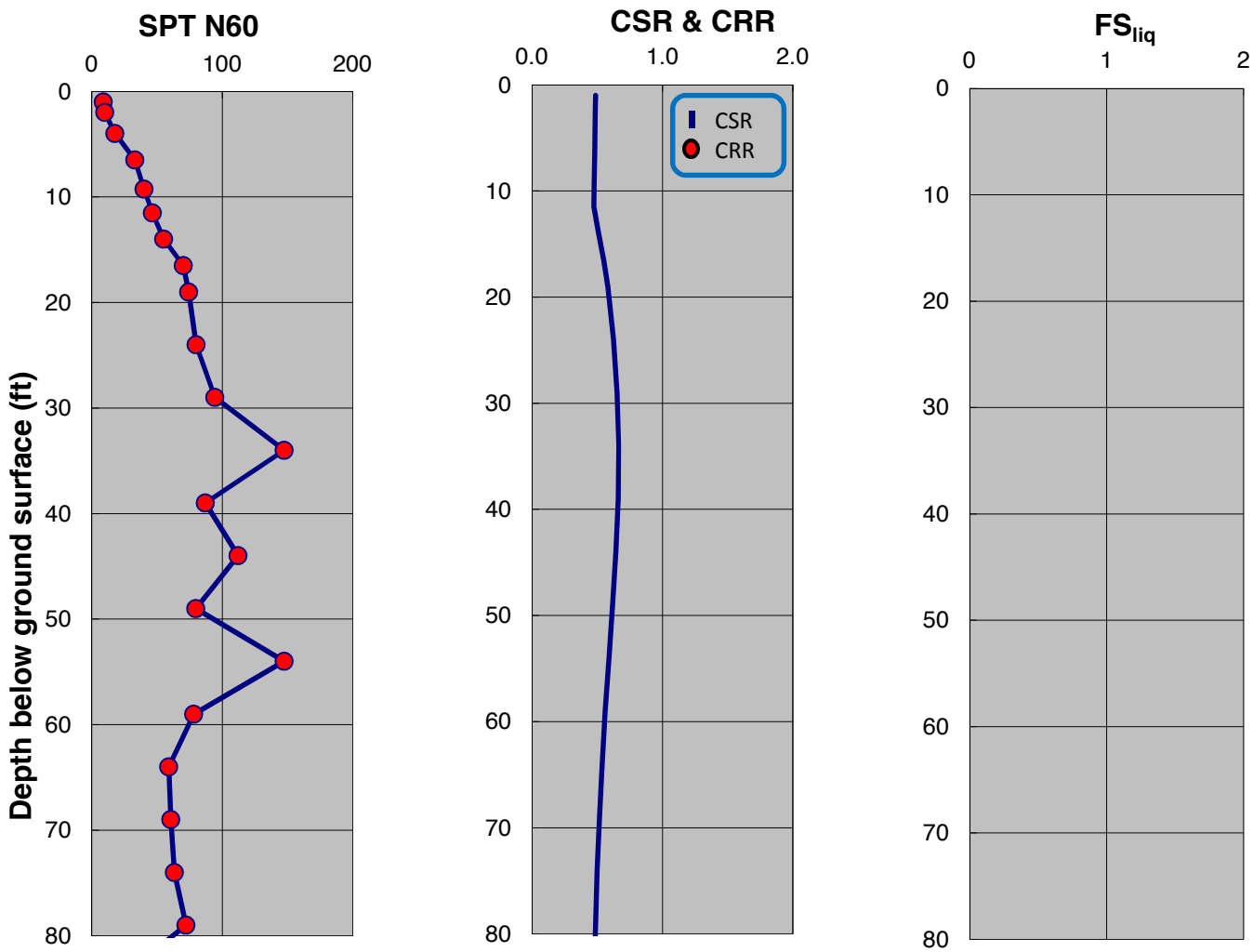
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-135 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



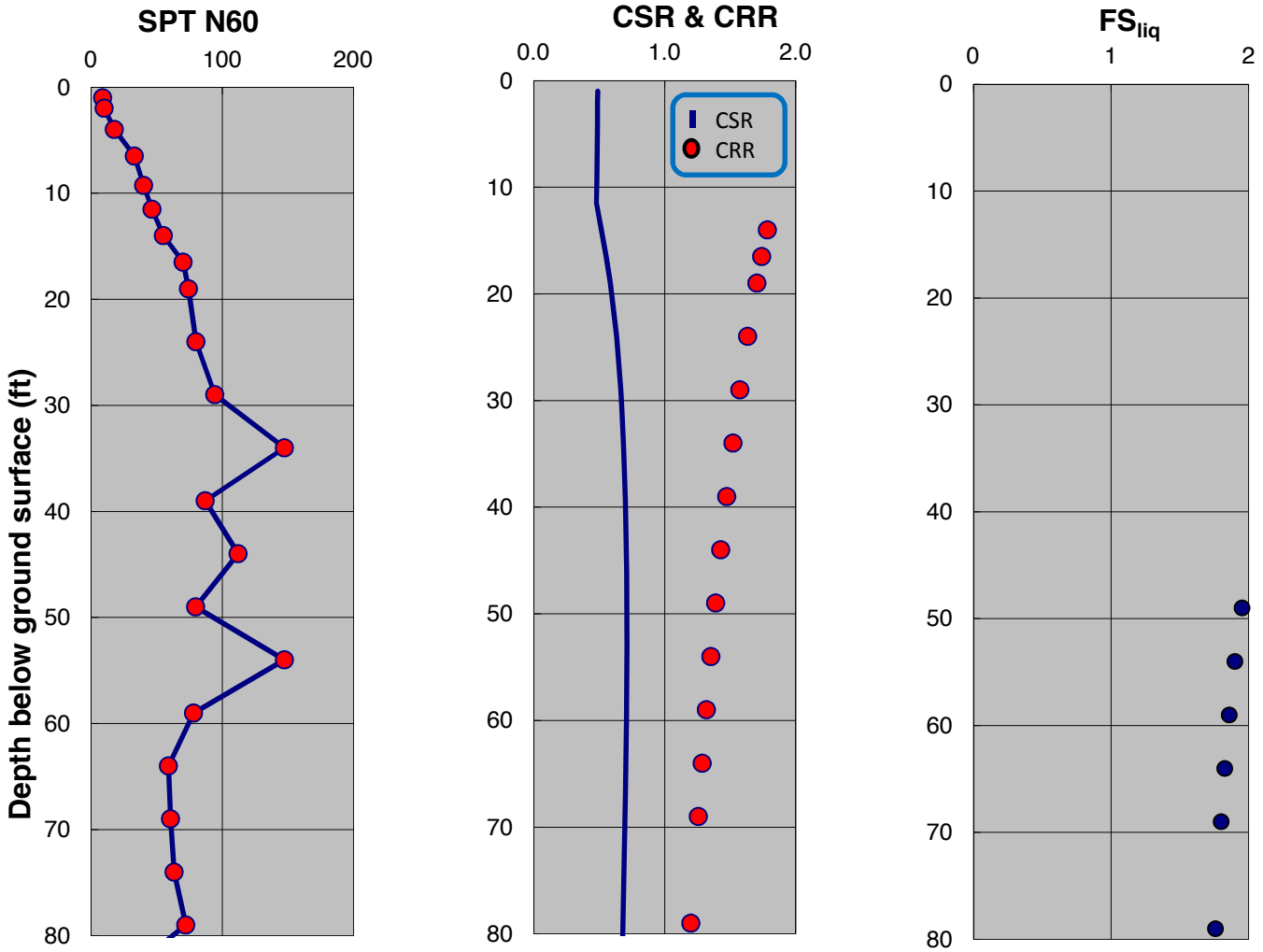
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-135 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



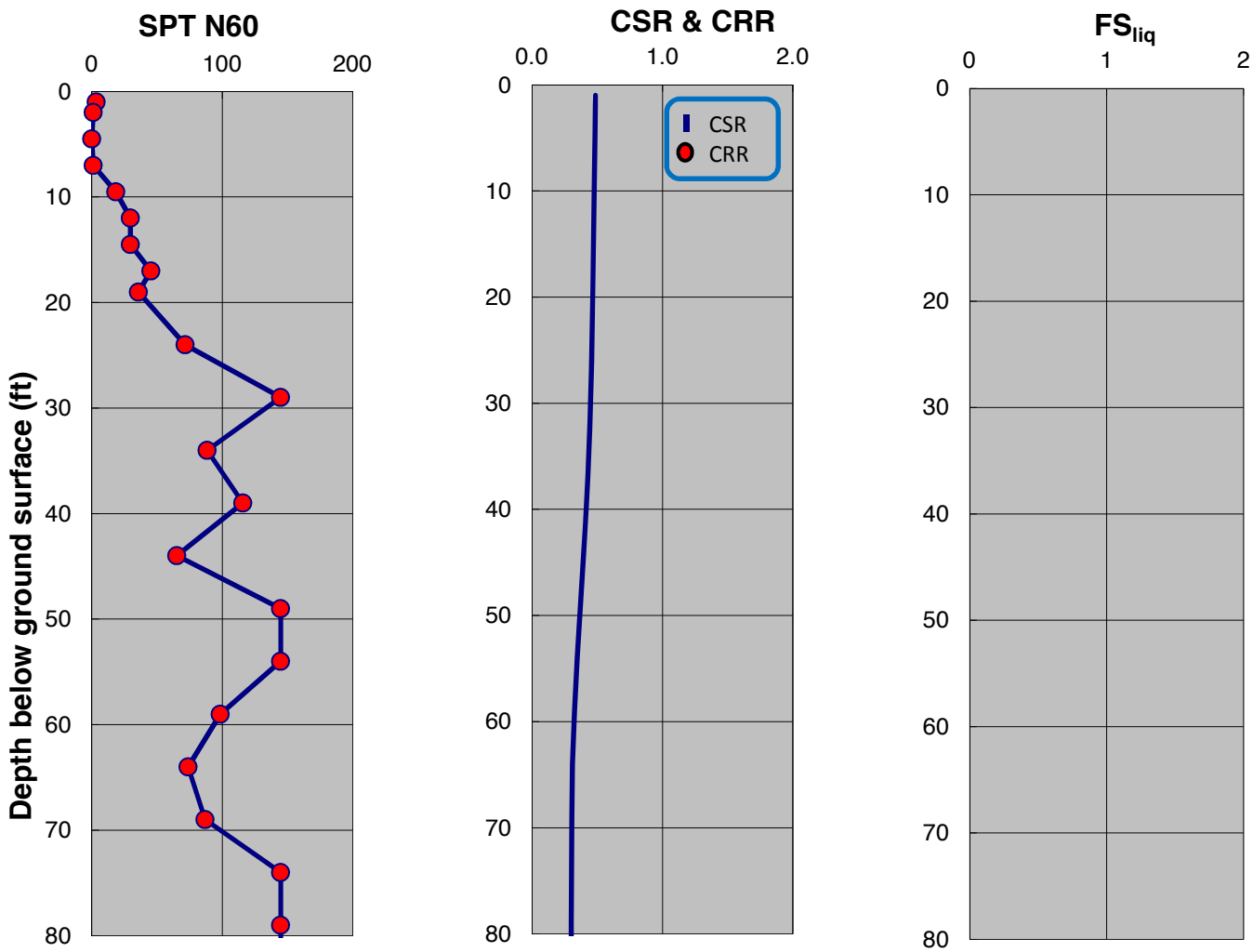
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-136 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



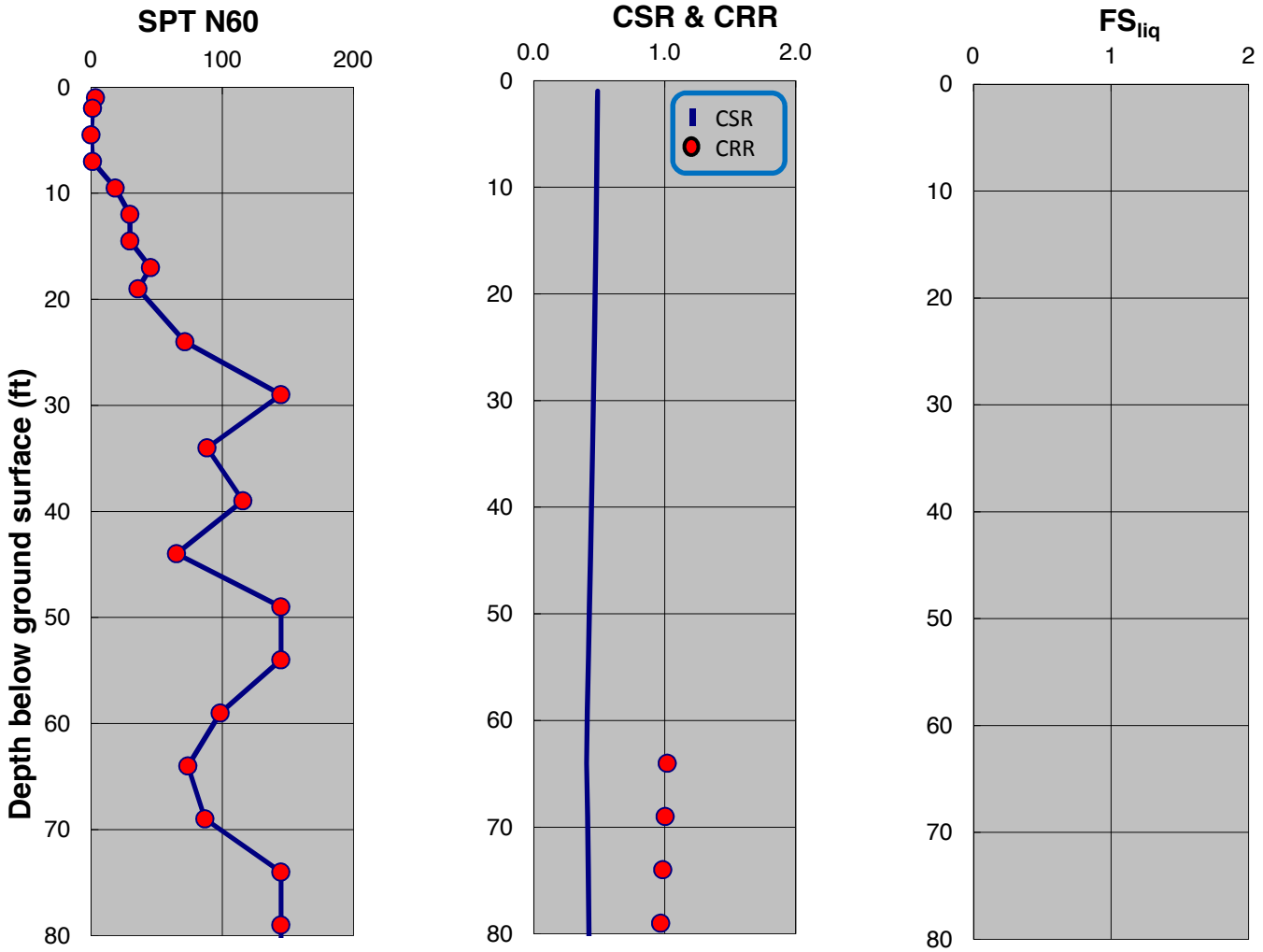
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-136 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



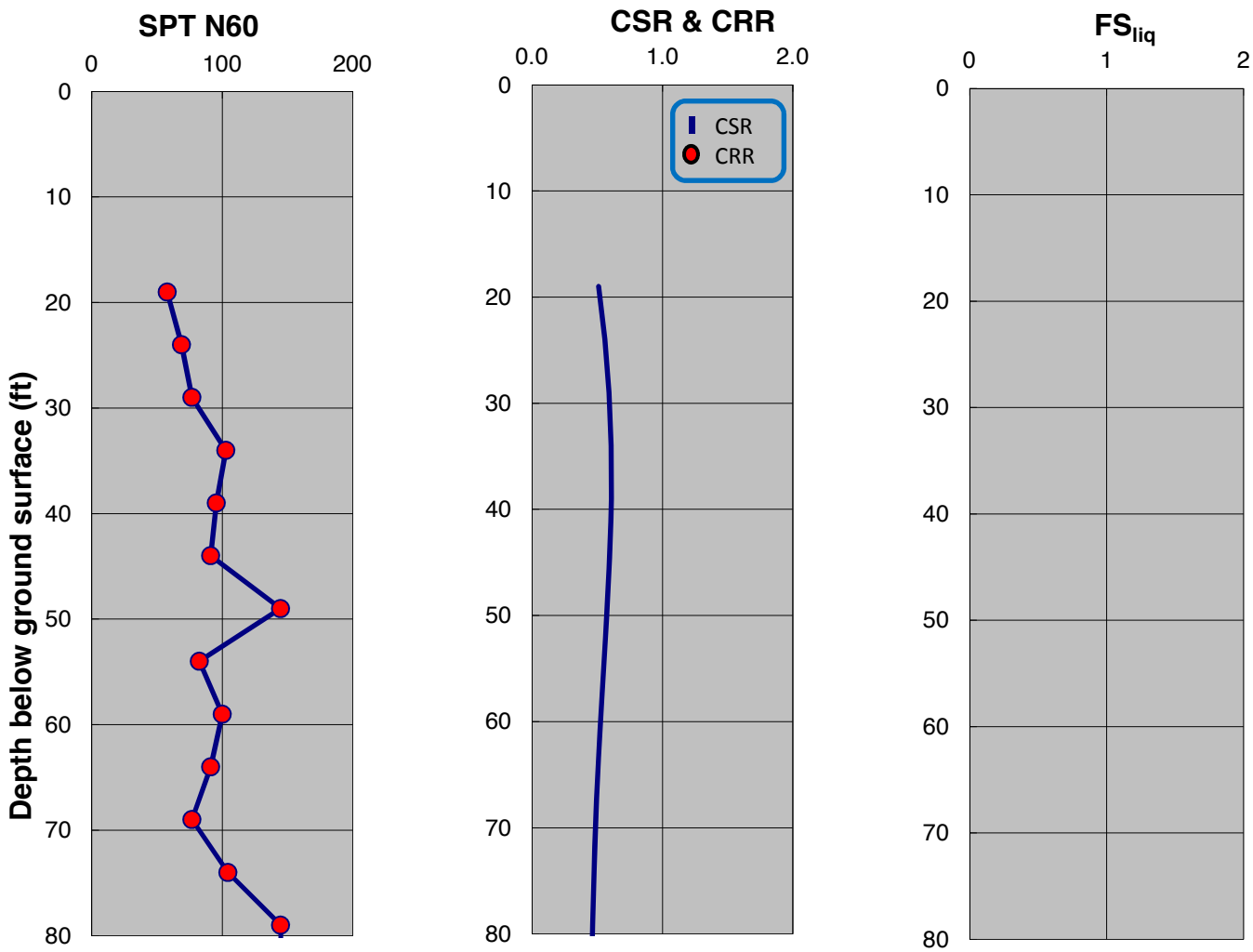
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-137 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



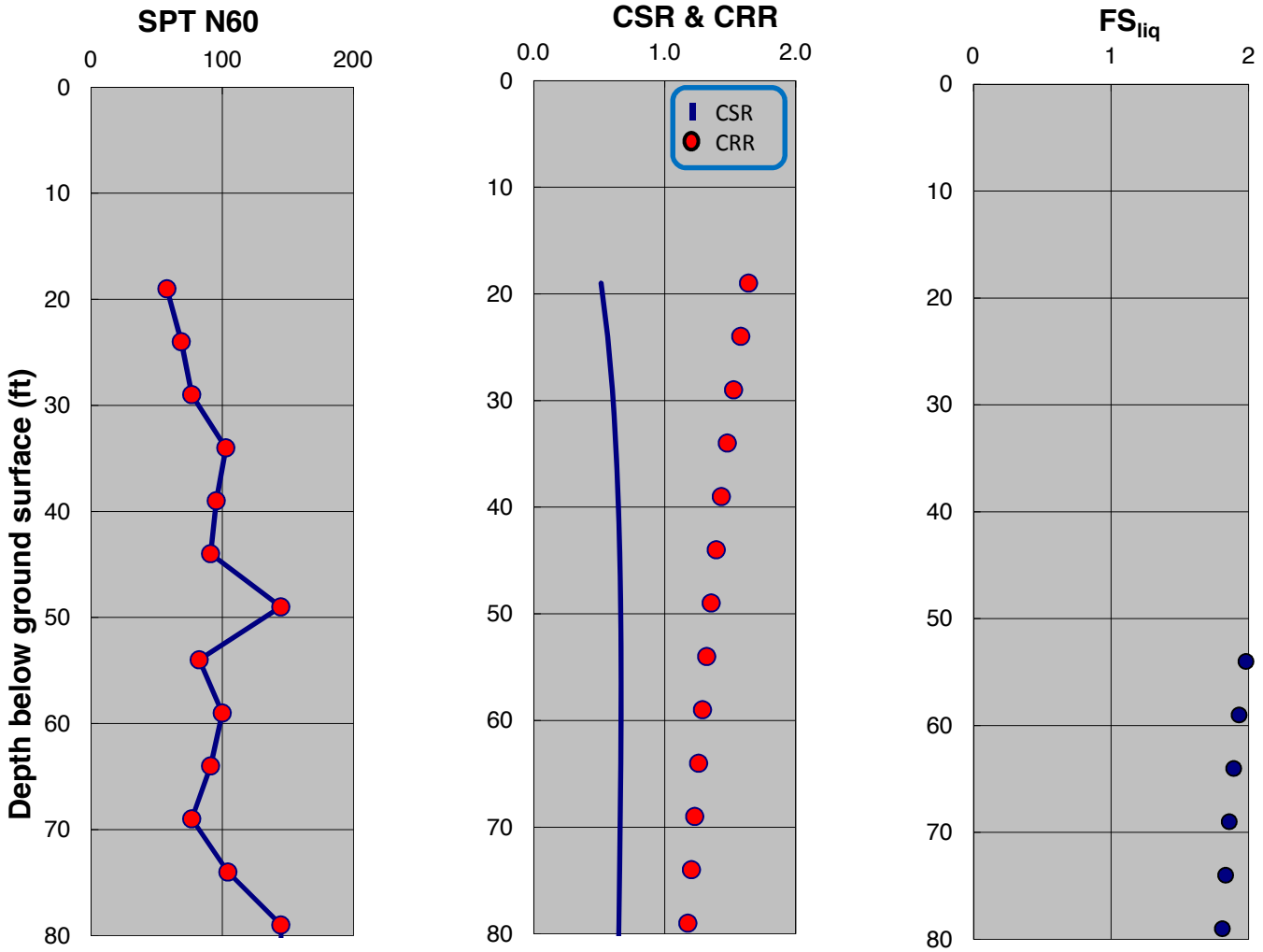
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-137 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



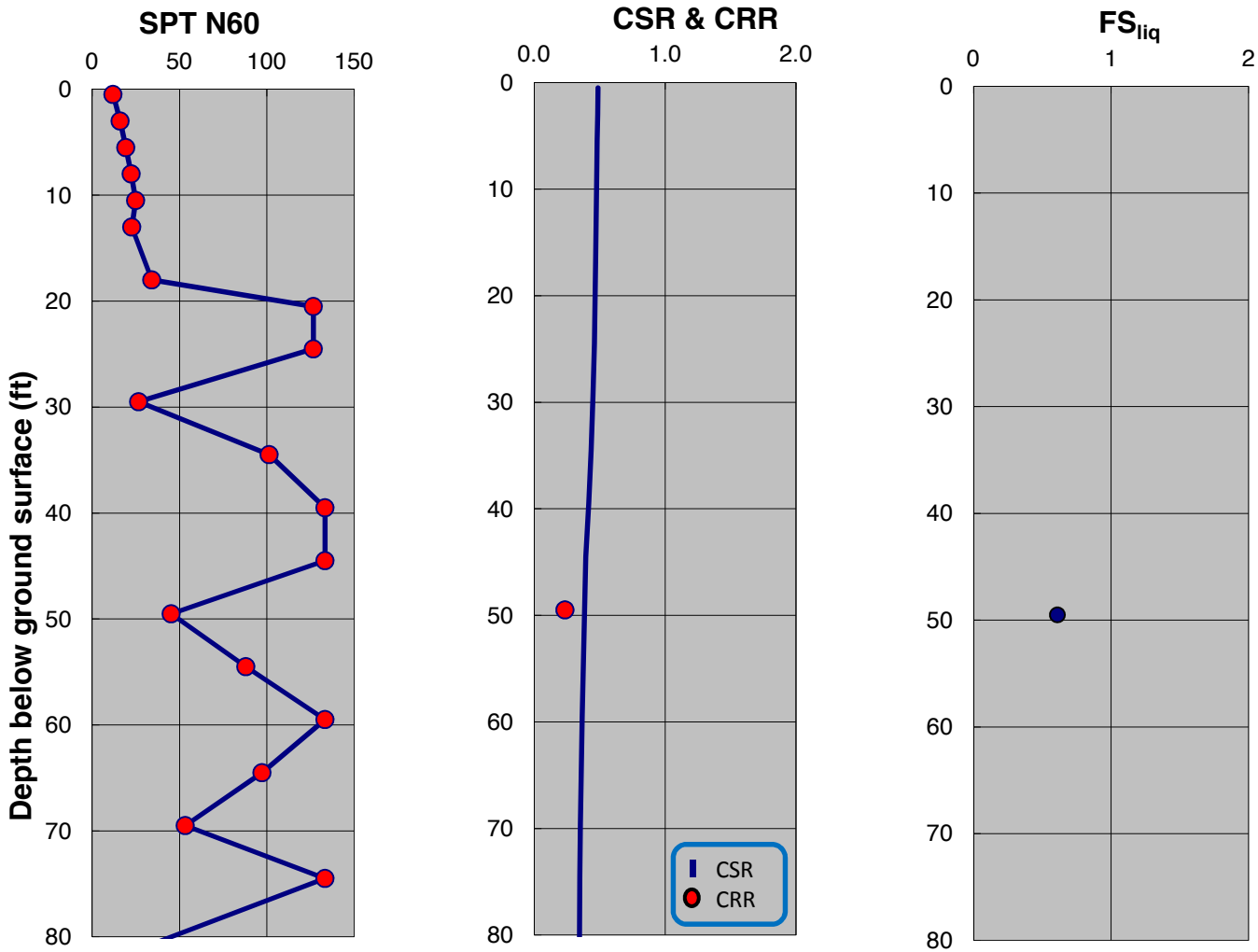
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-138 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



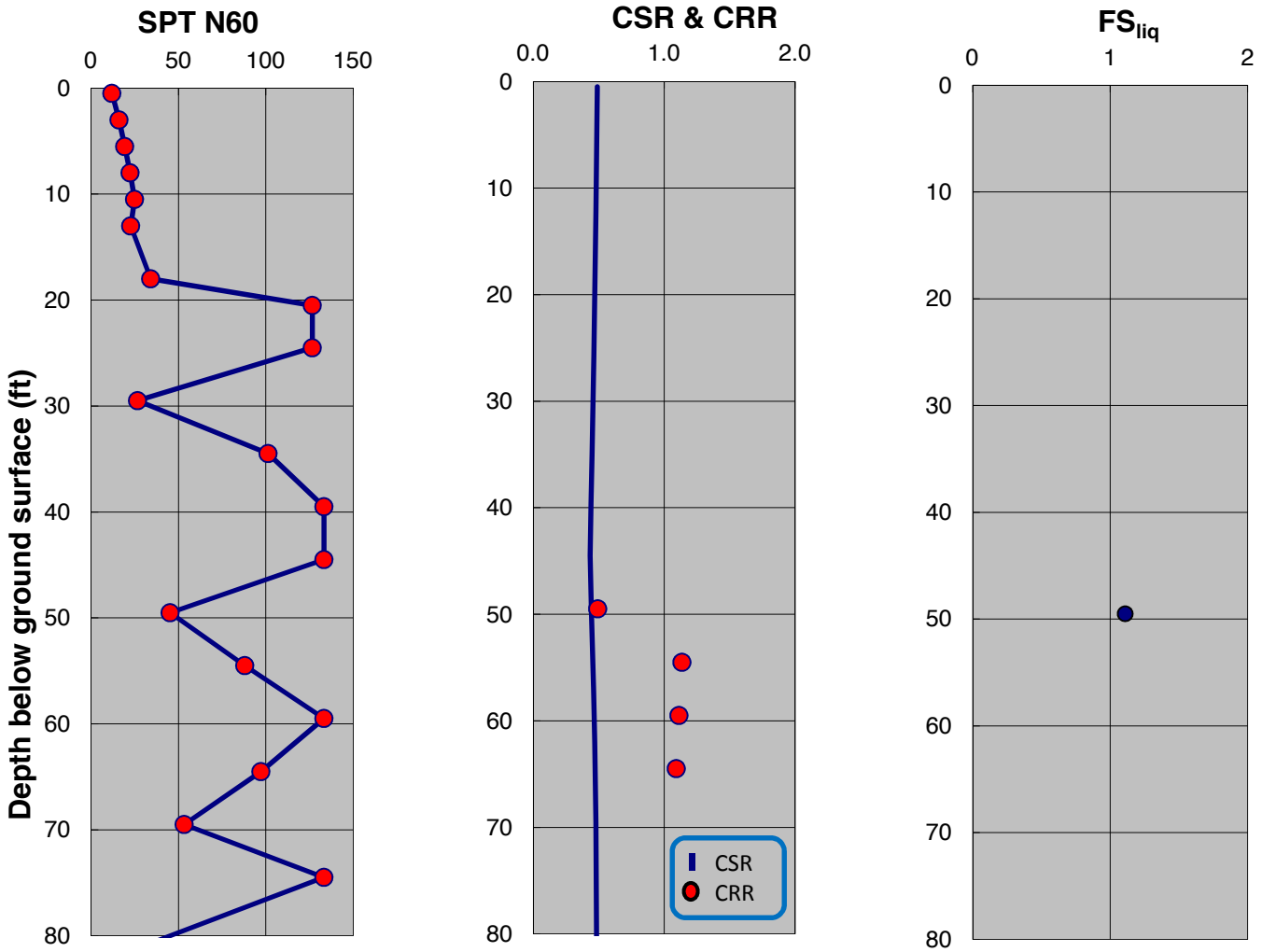
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-138 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



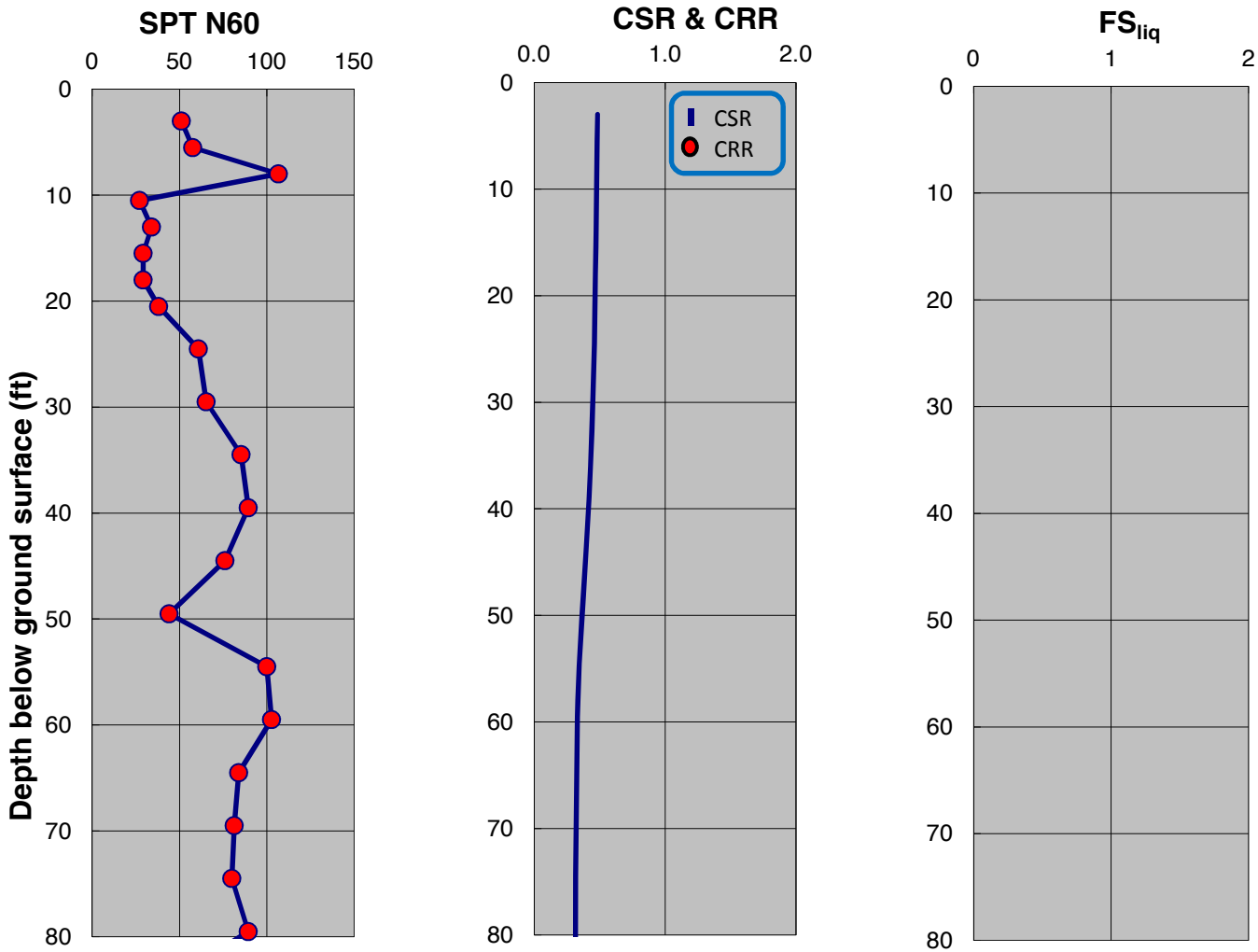
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-146 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



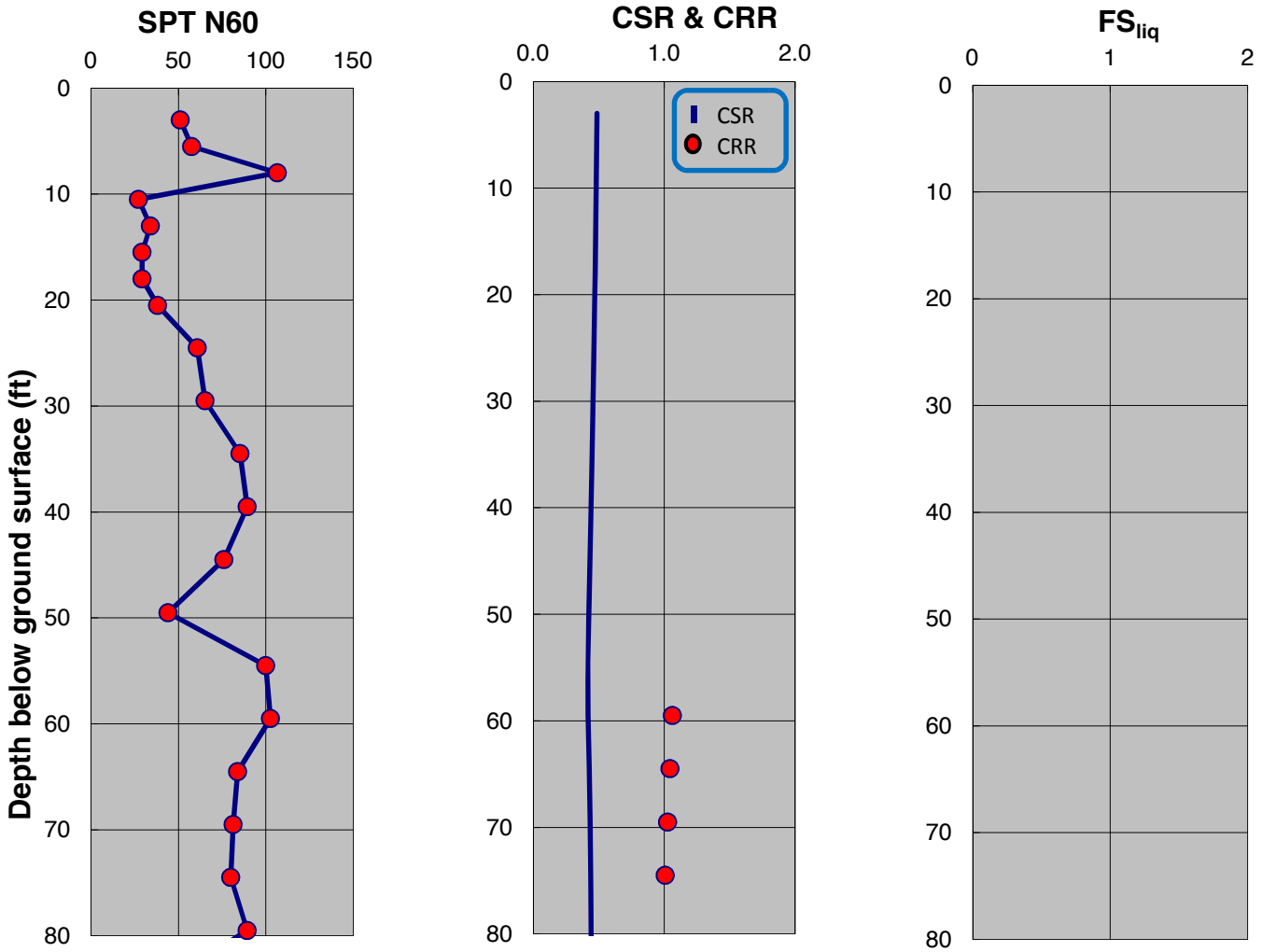
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-146 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



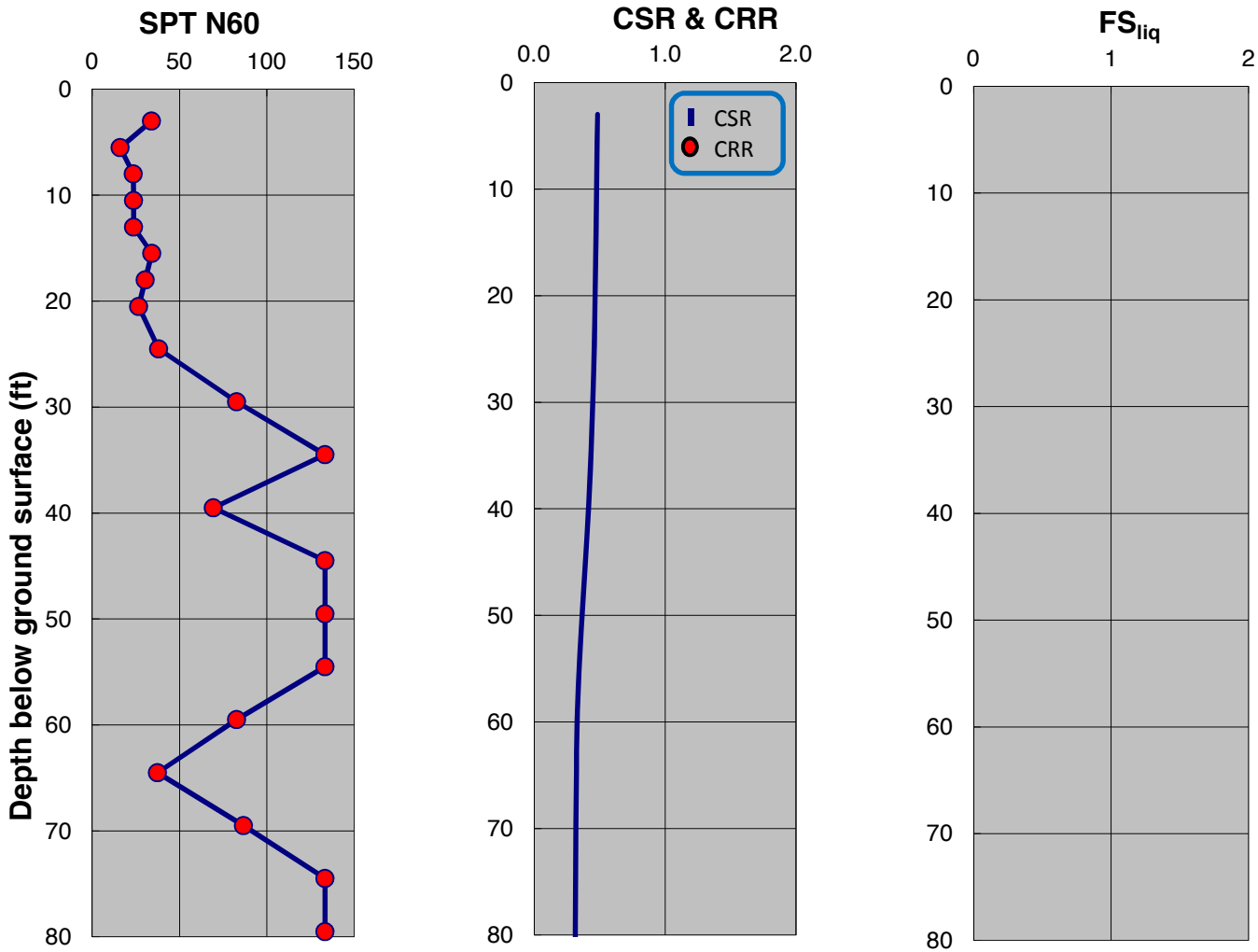
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-147 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



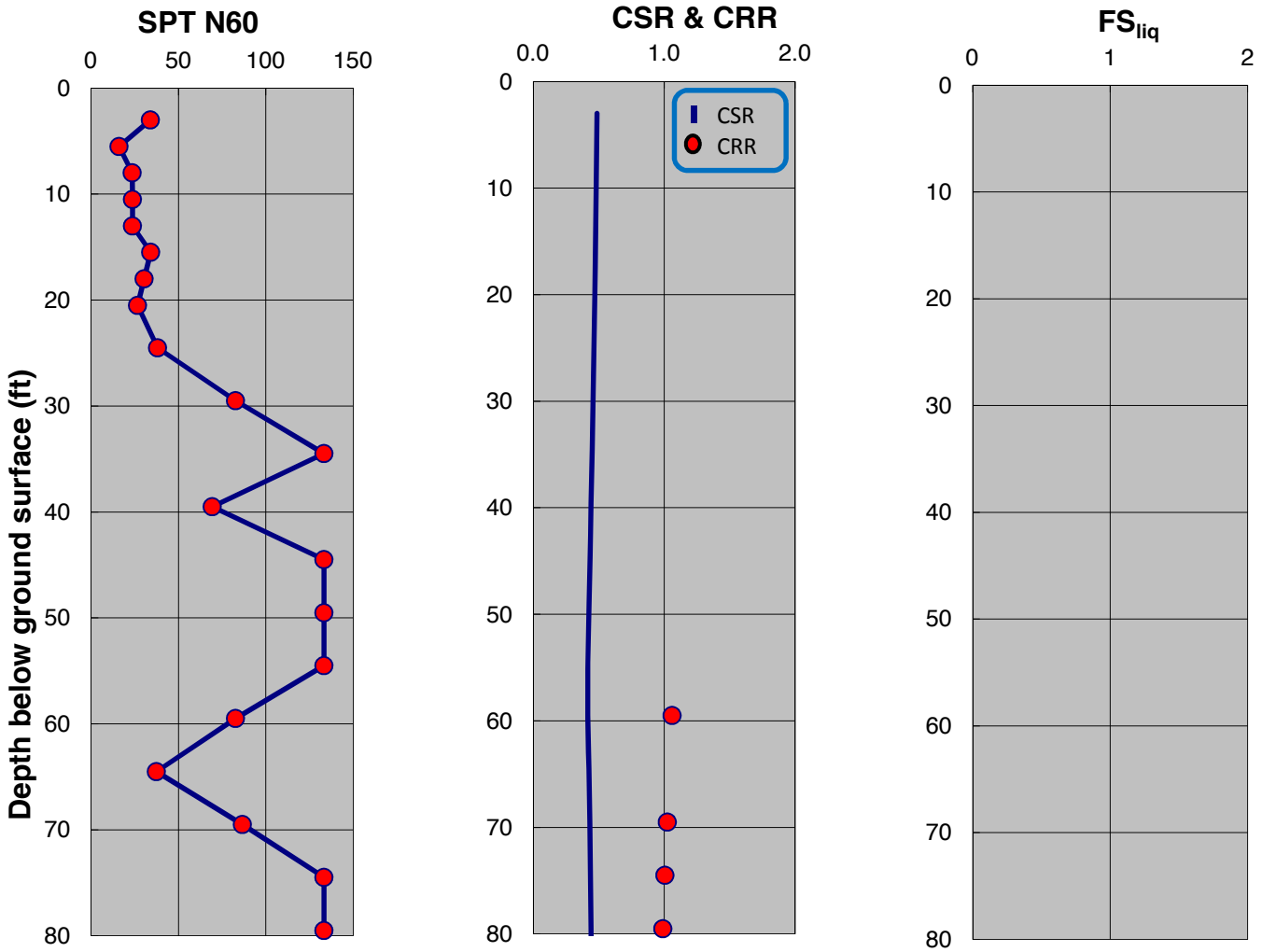
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-147 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



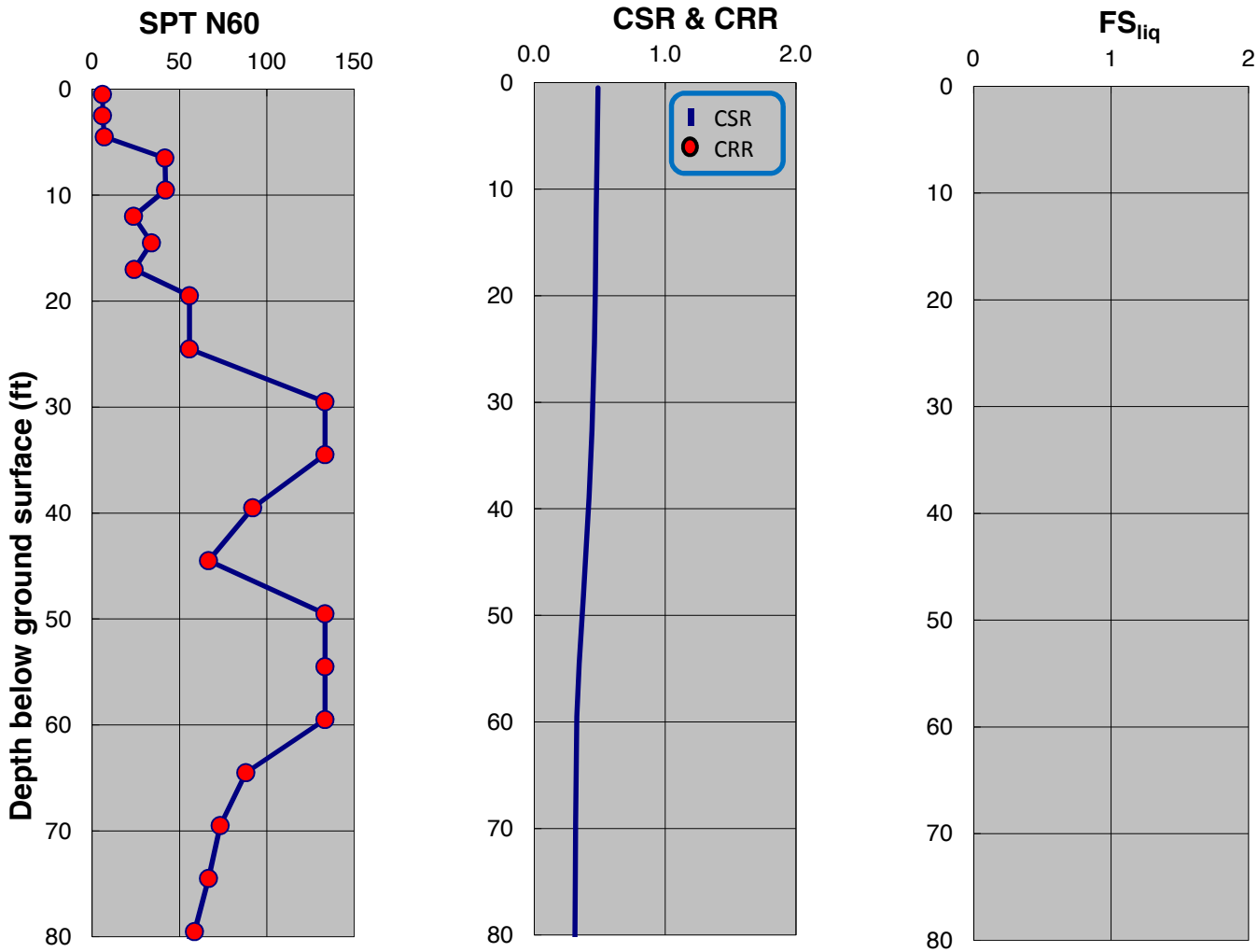
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-148 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



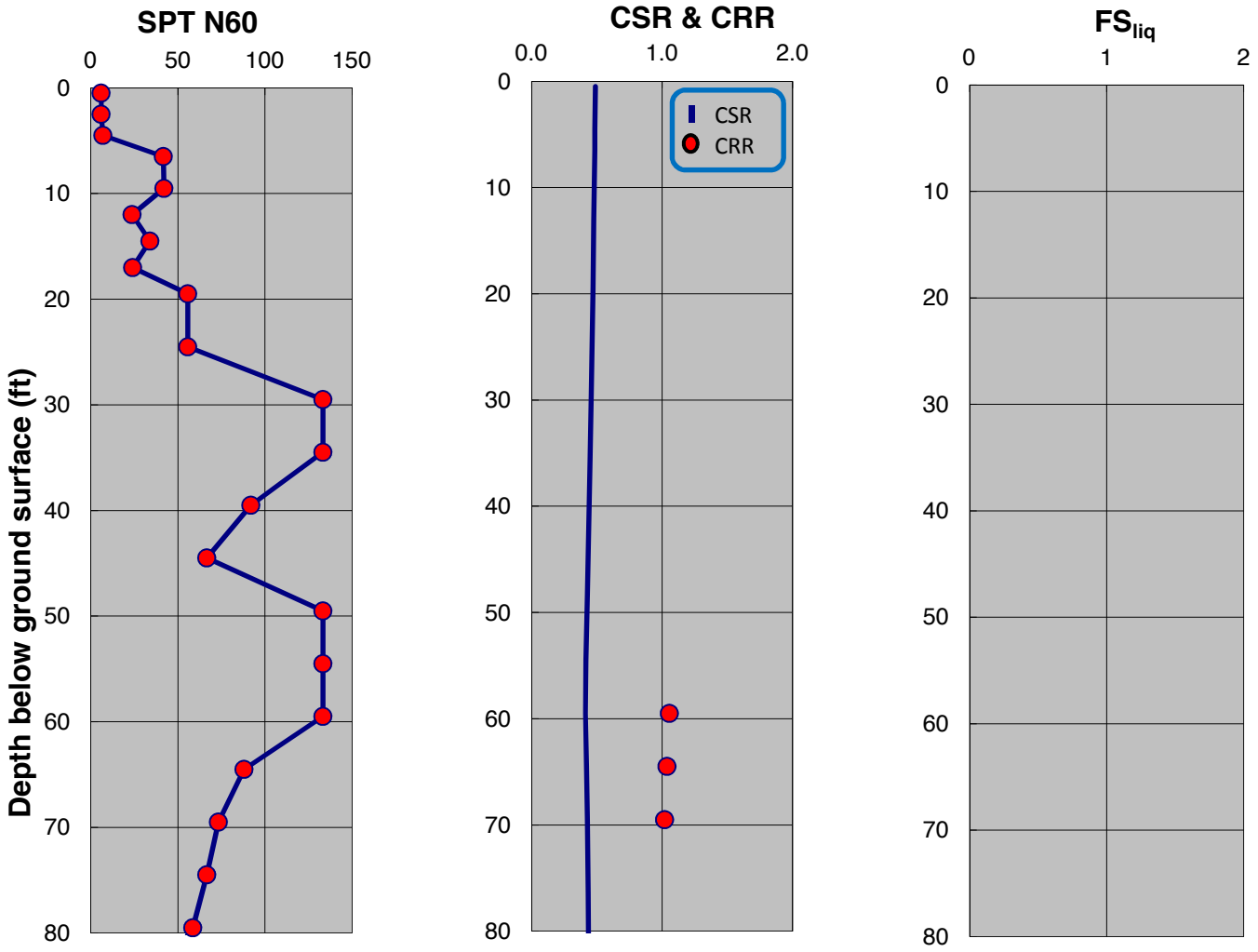
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-148 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



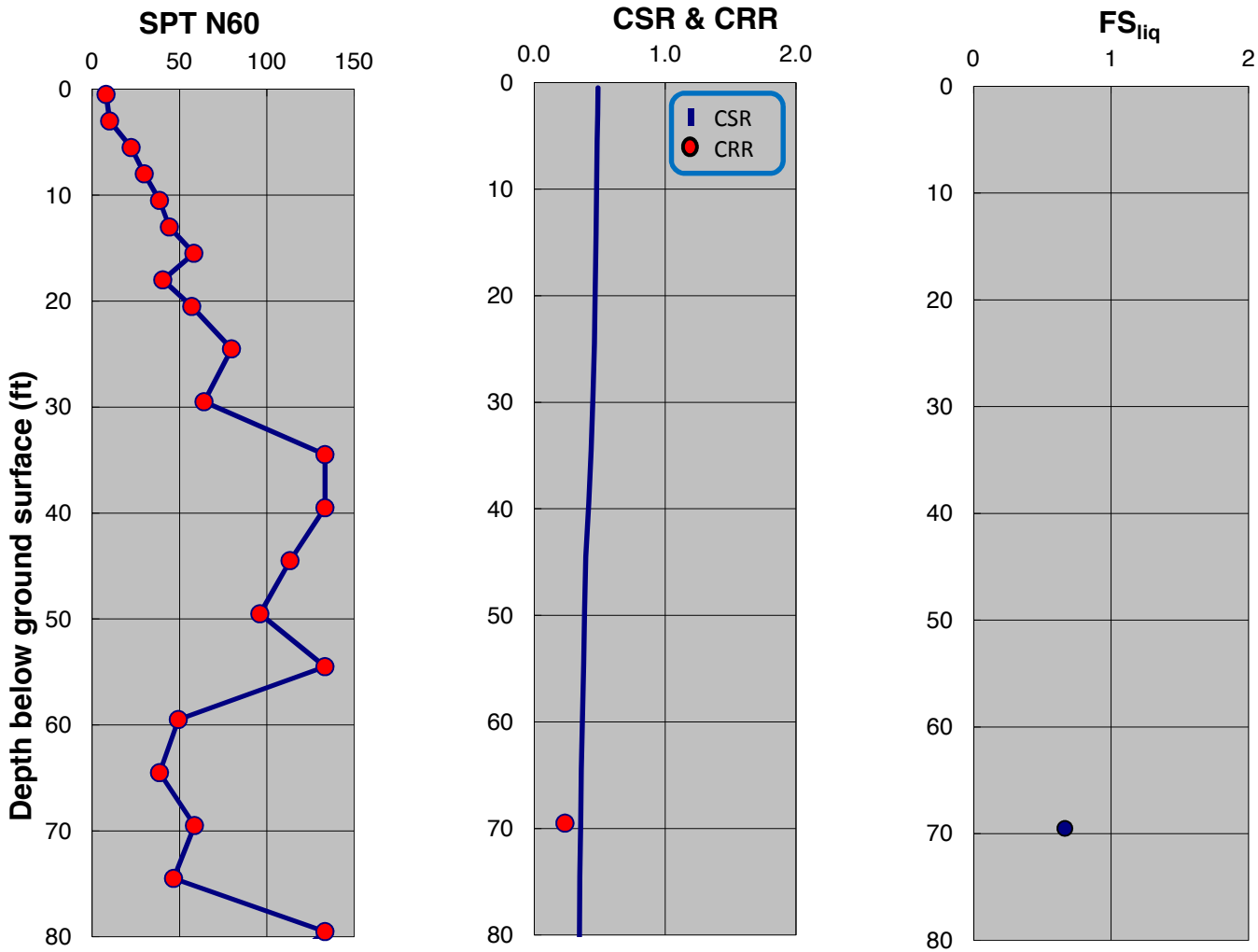
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-149 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



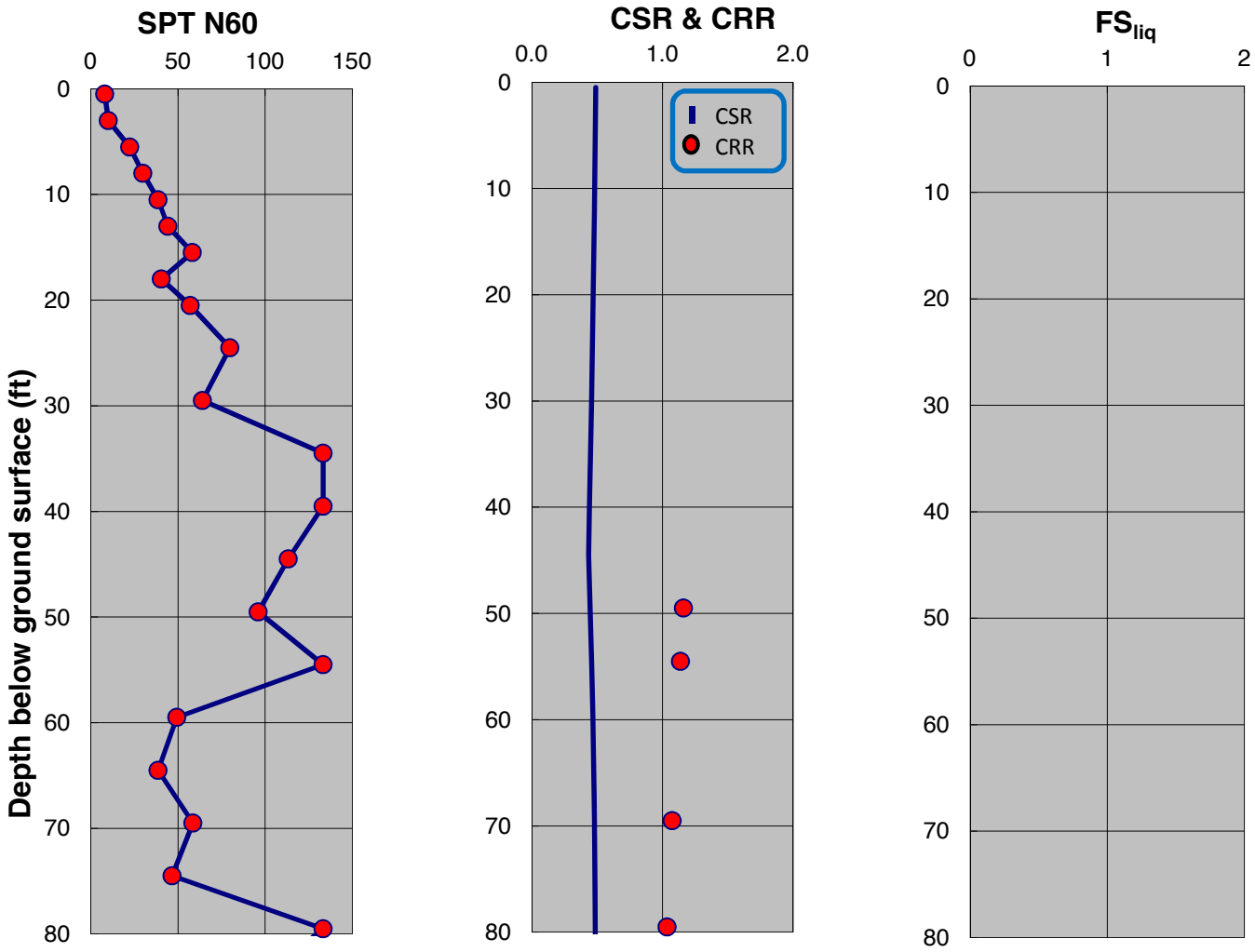
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-149 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



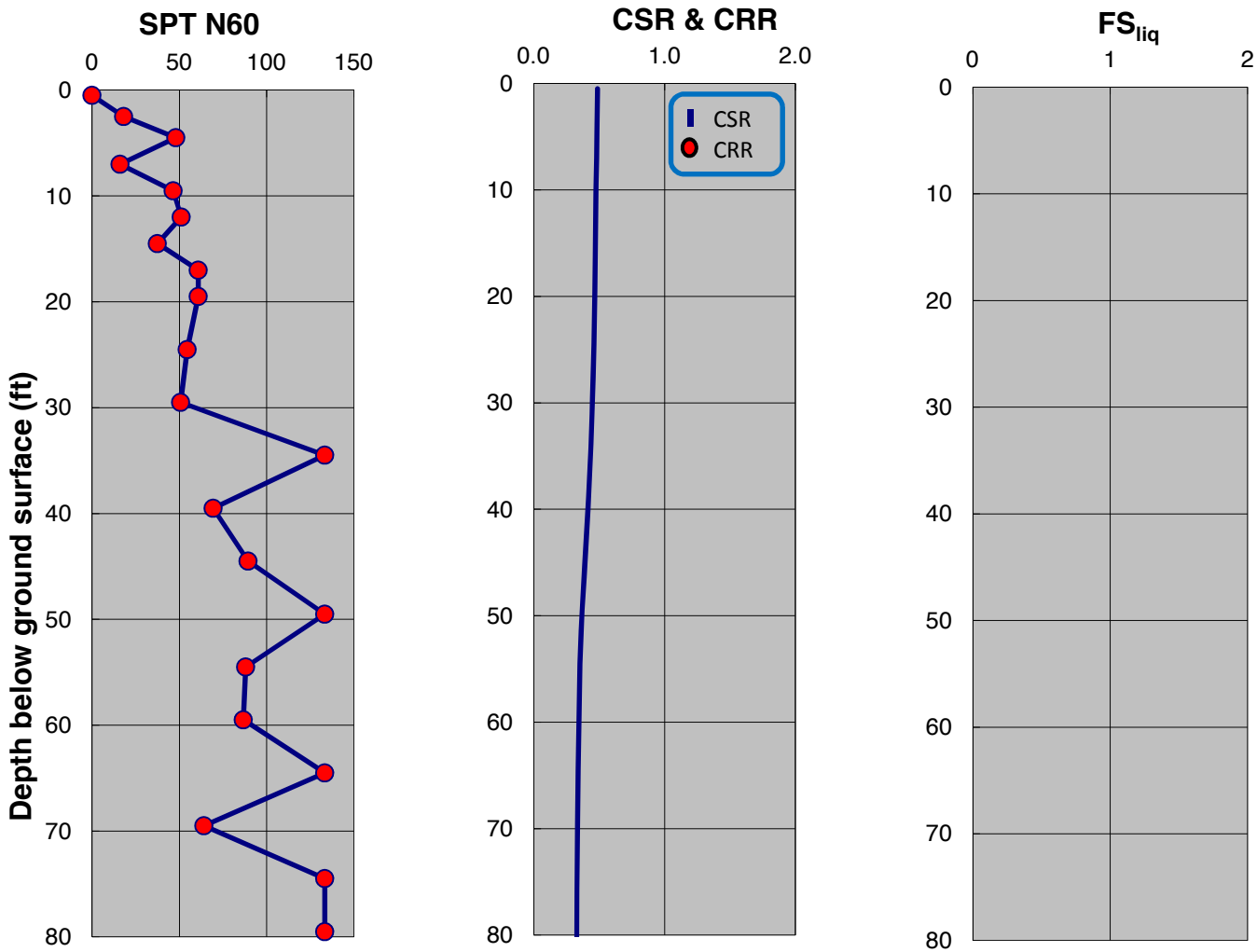
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-150 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



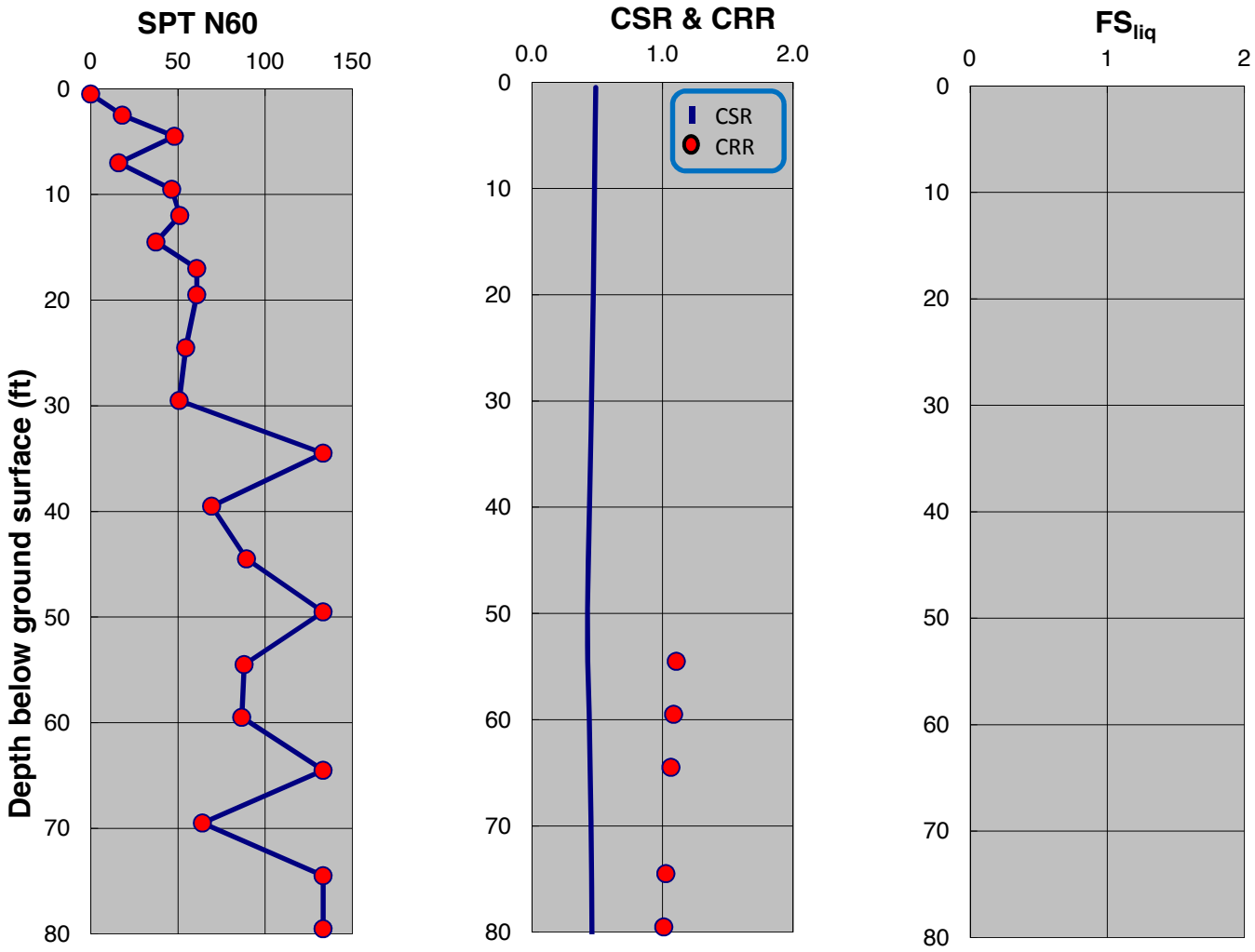
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-150 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



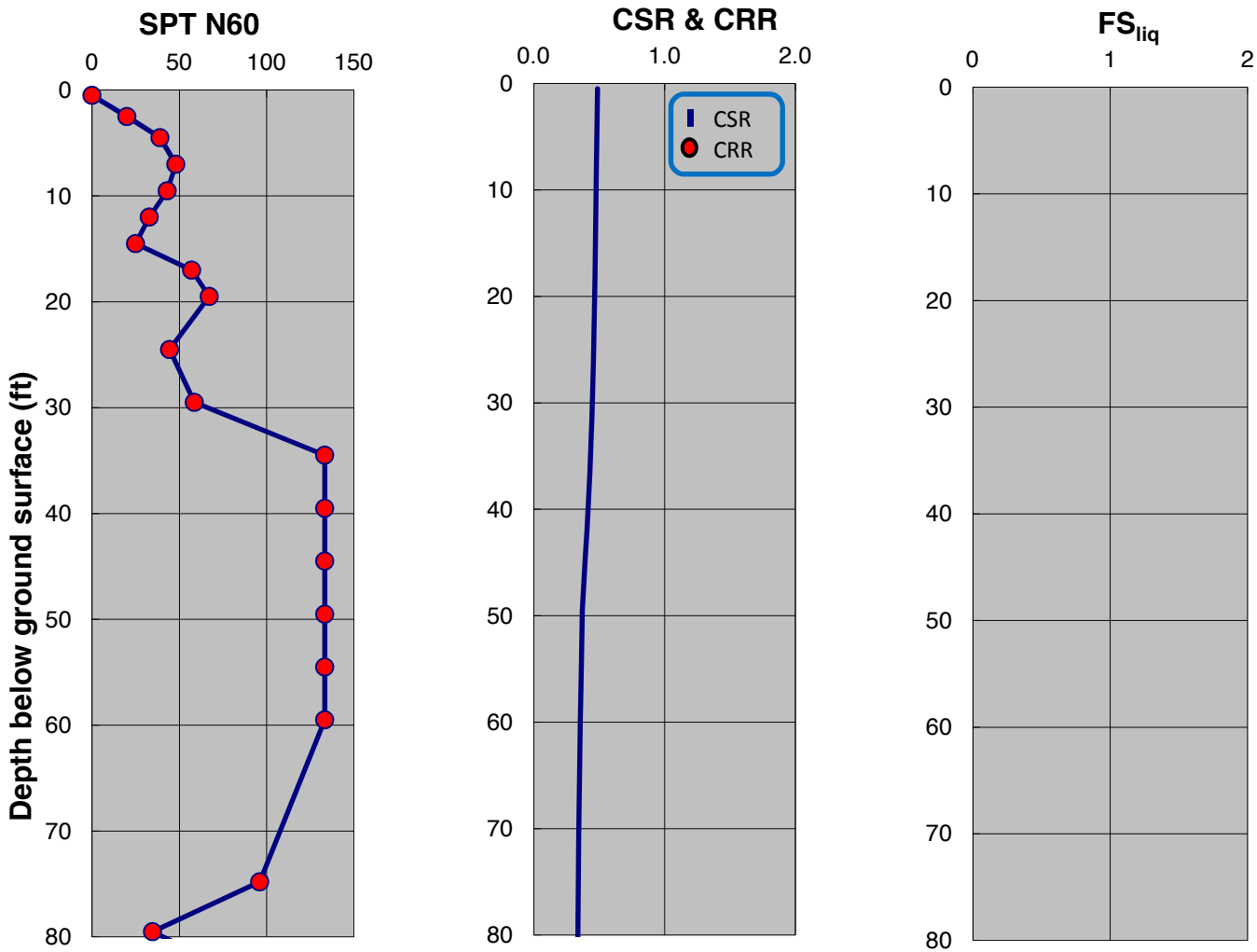
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-151 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



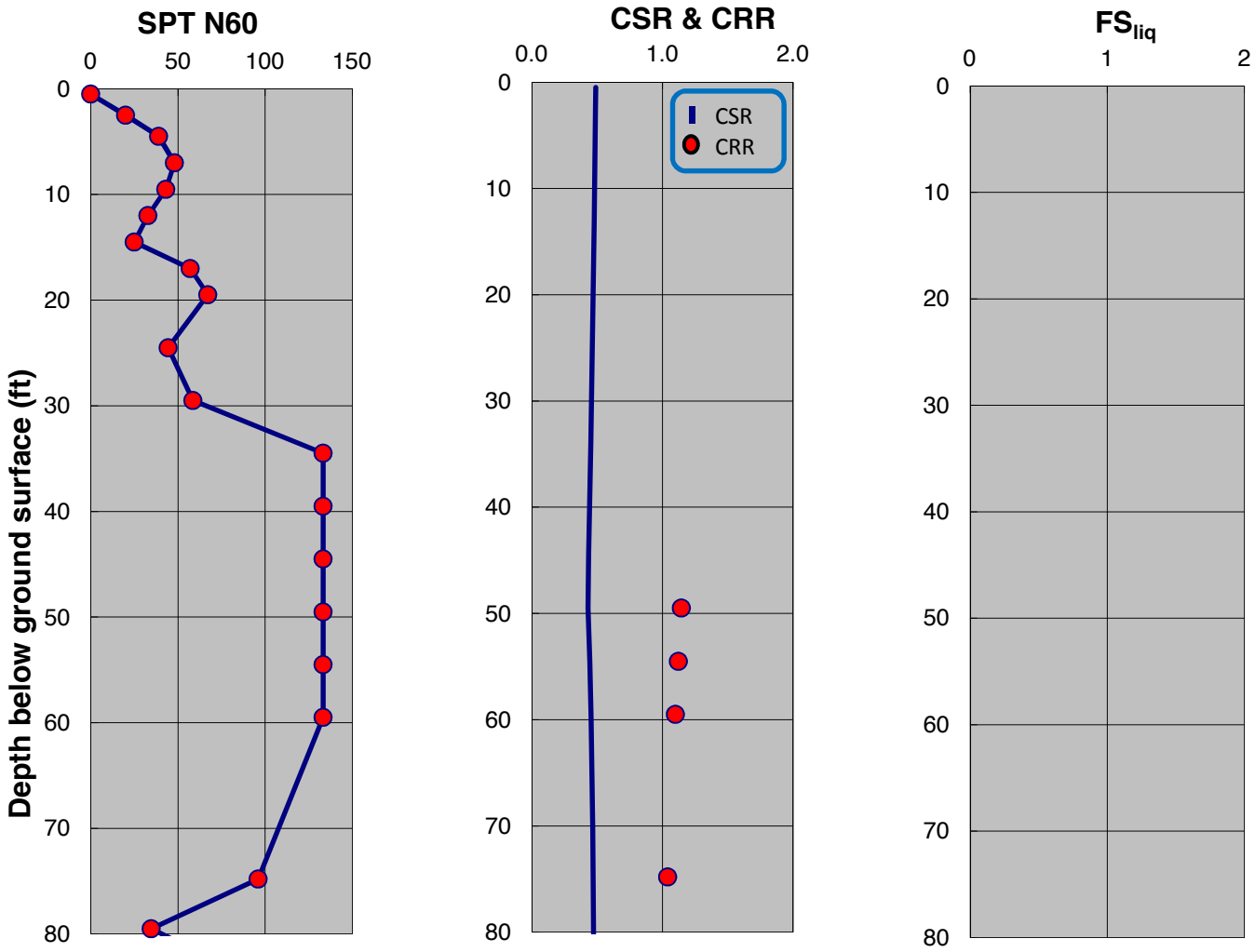
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-151 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



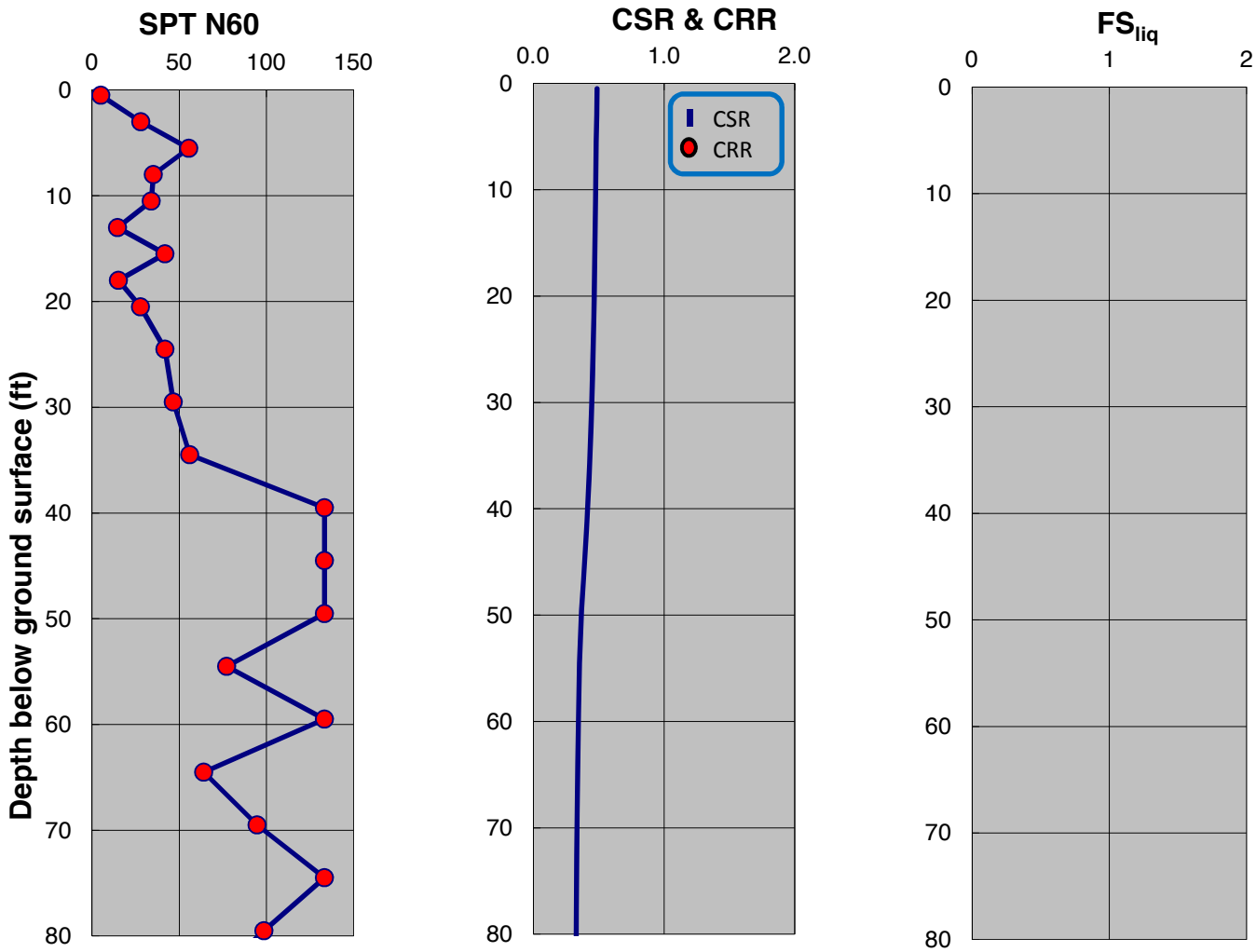
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-152 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



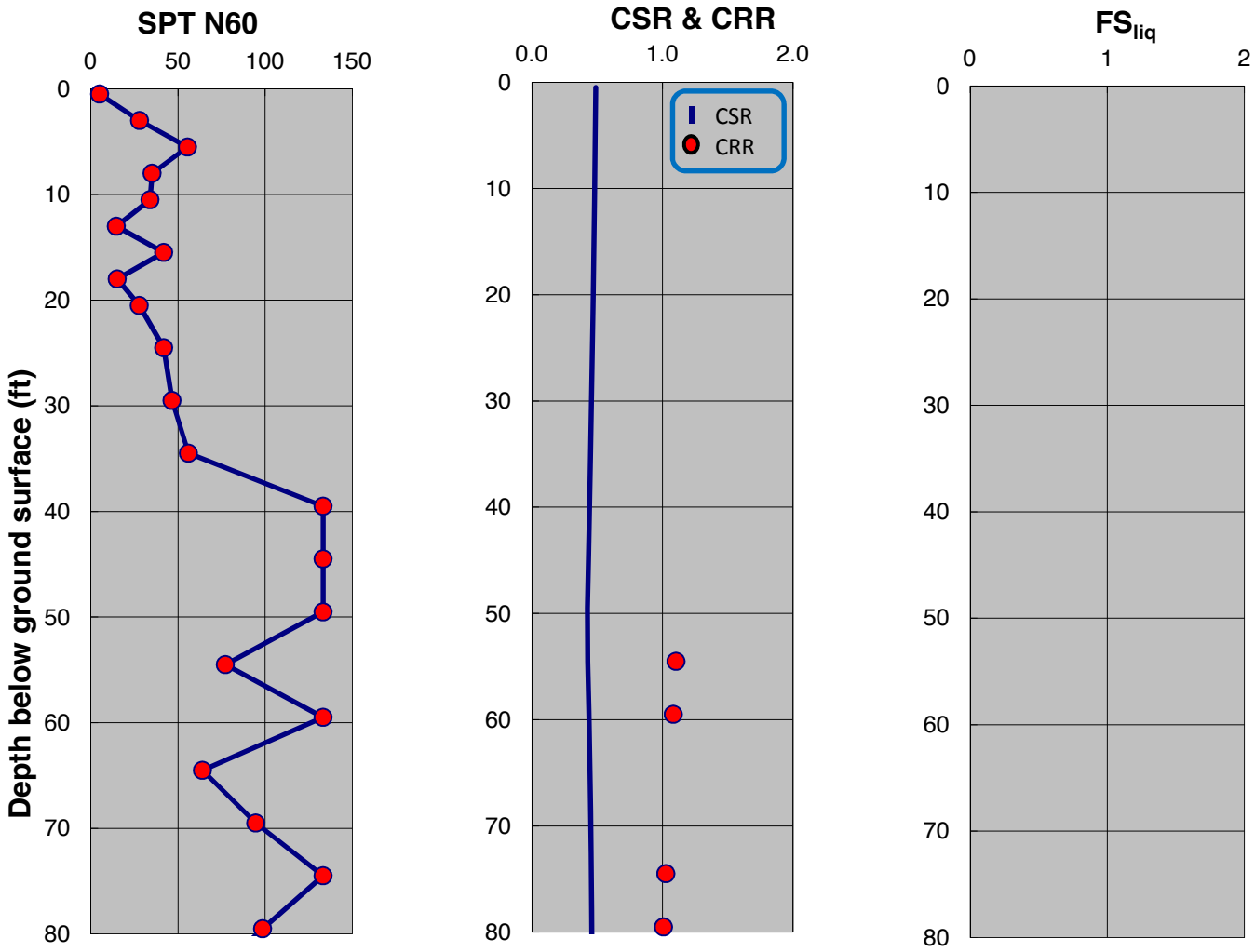
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-152 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



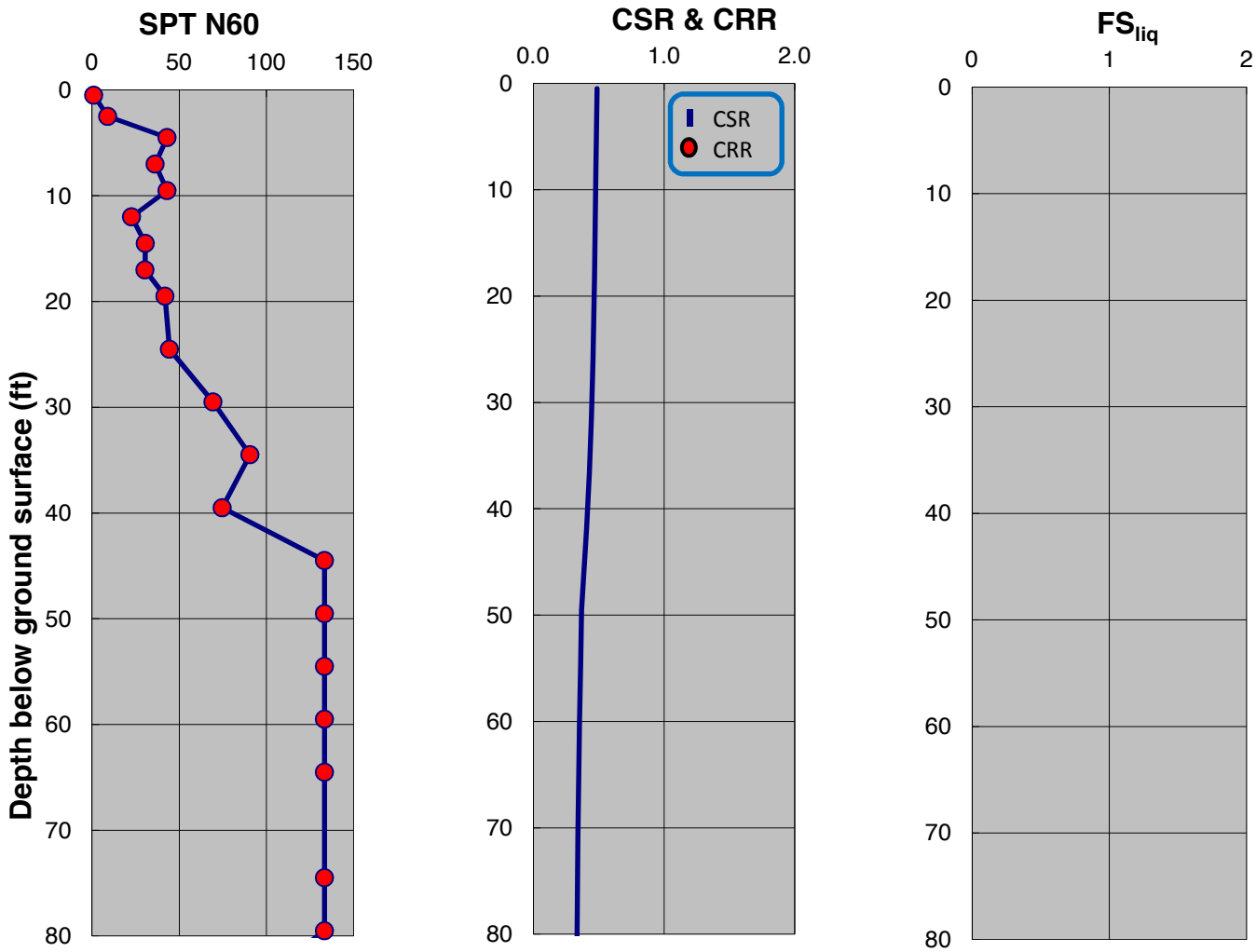
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-153 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



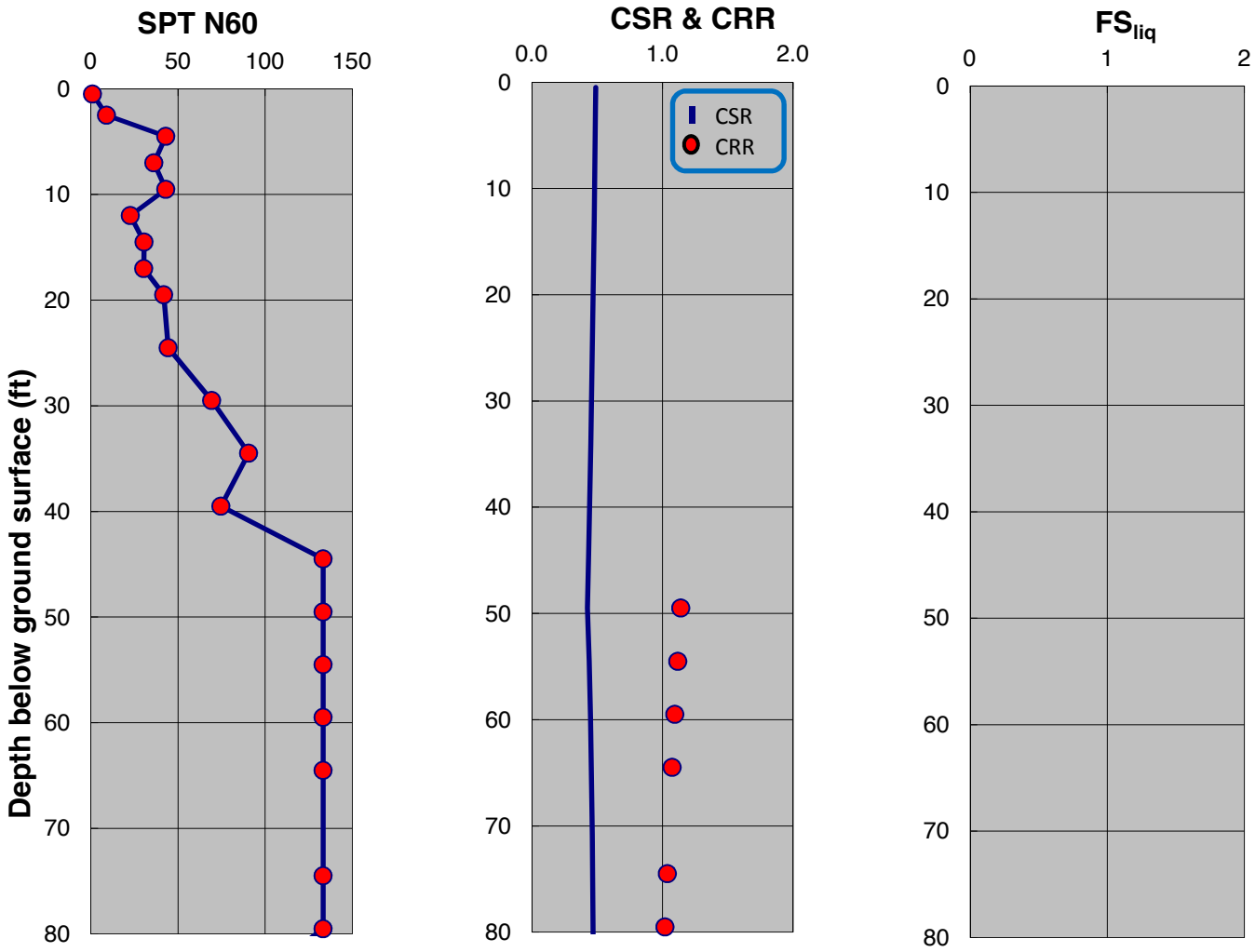
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-153 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



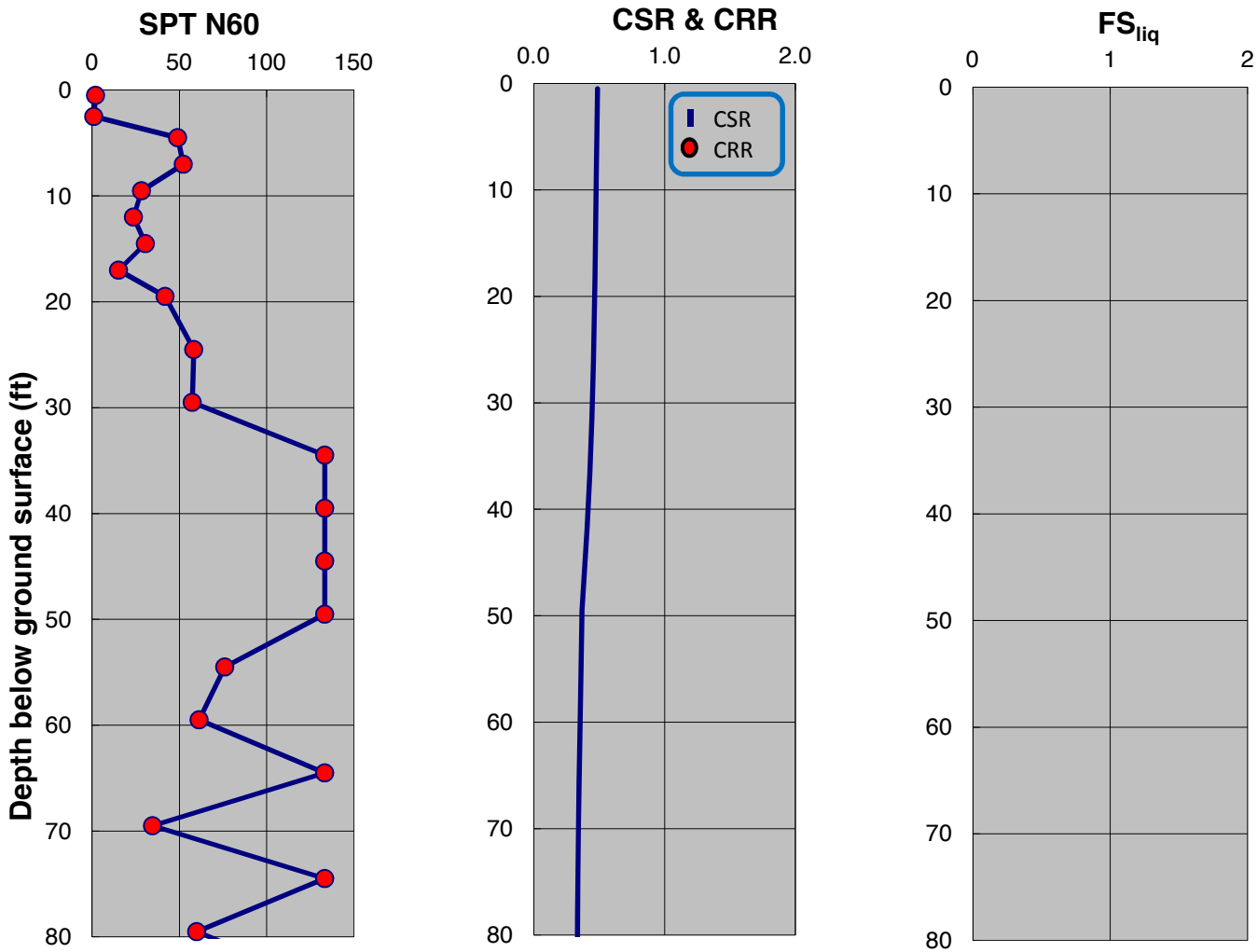
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-154 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



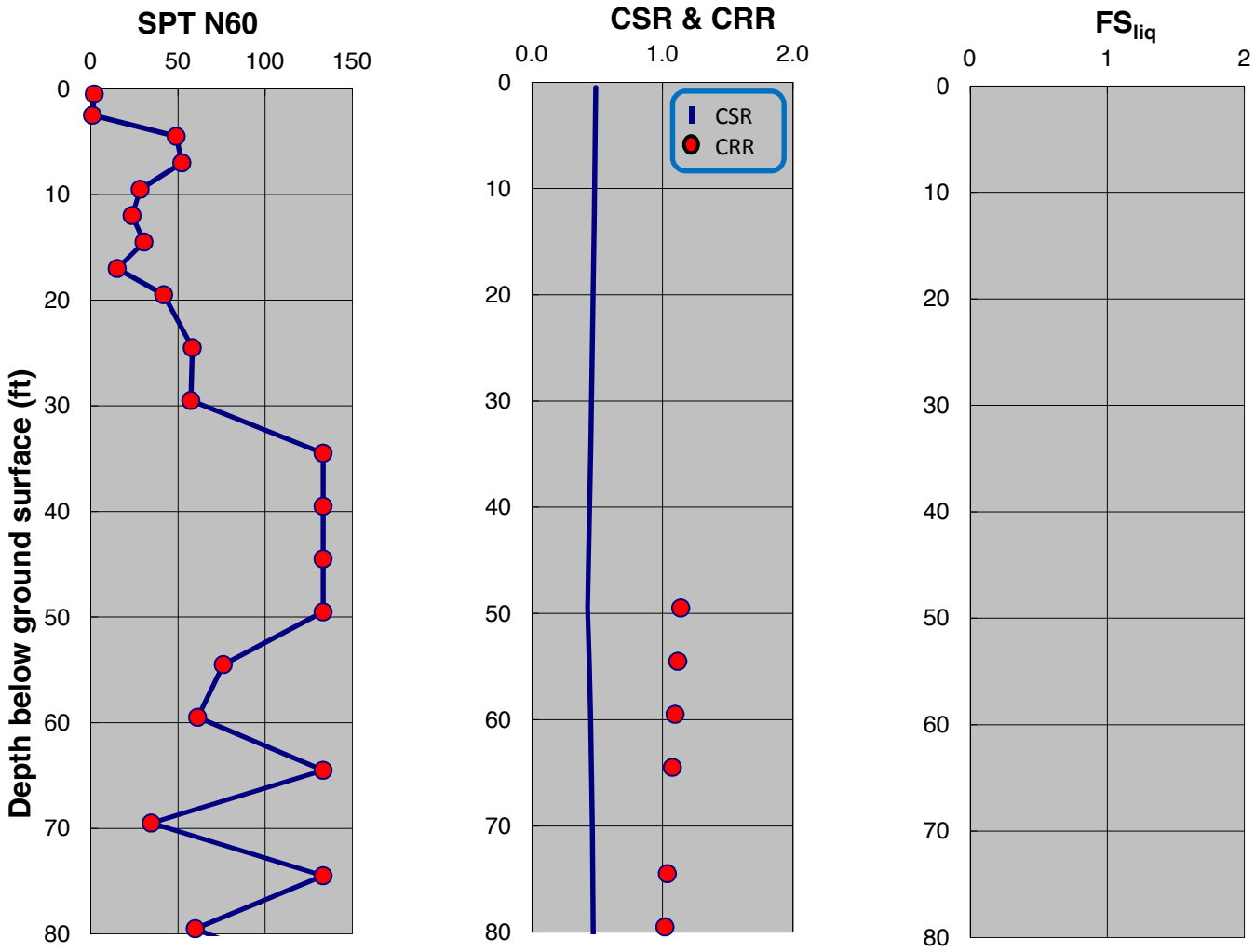
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-154 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



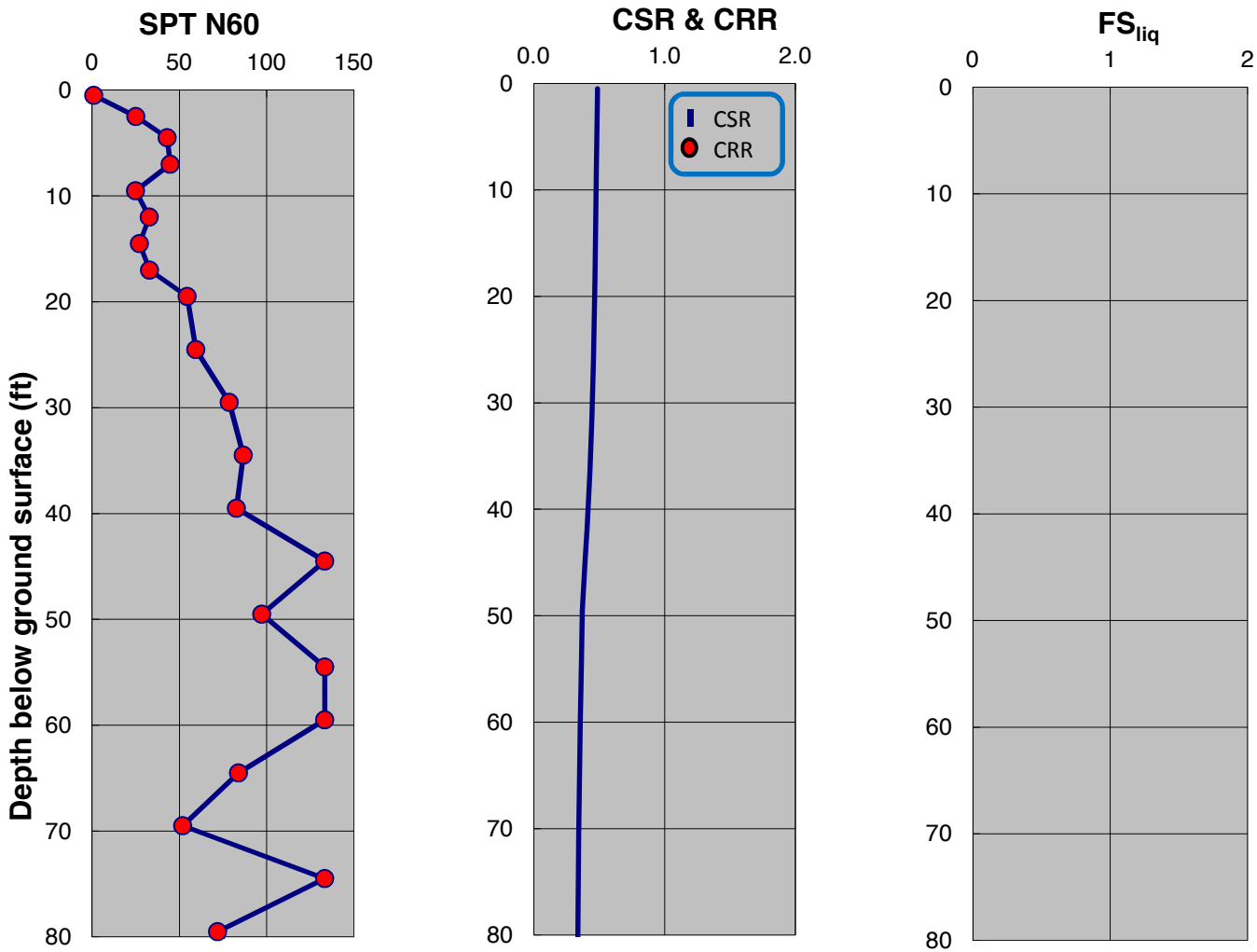
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-155 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



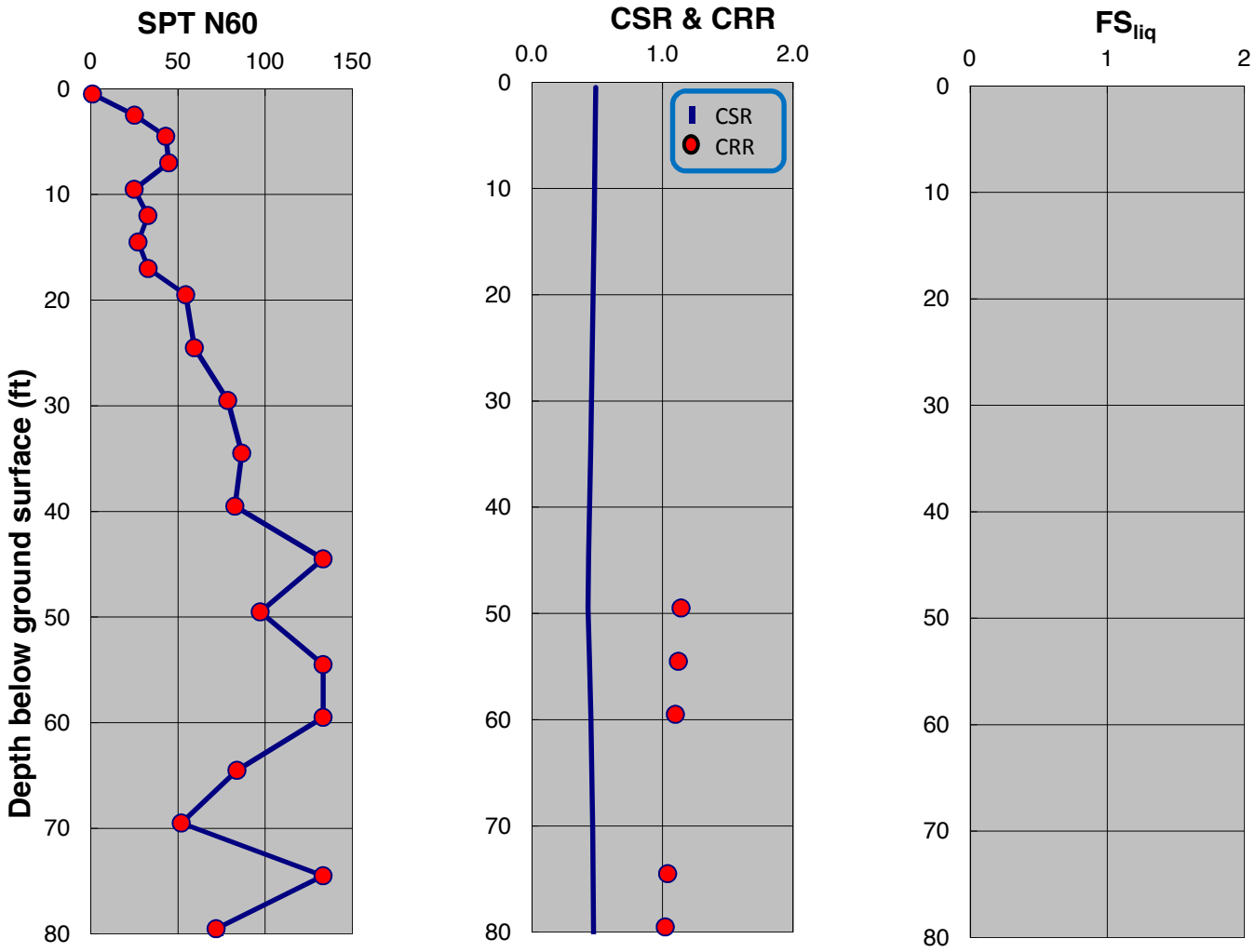
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-155 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



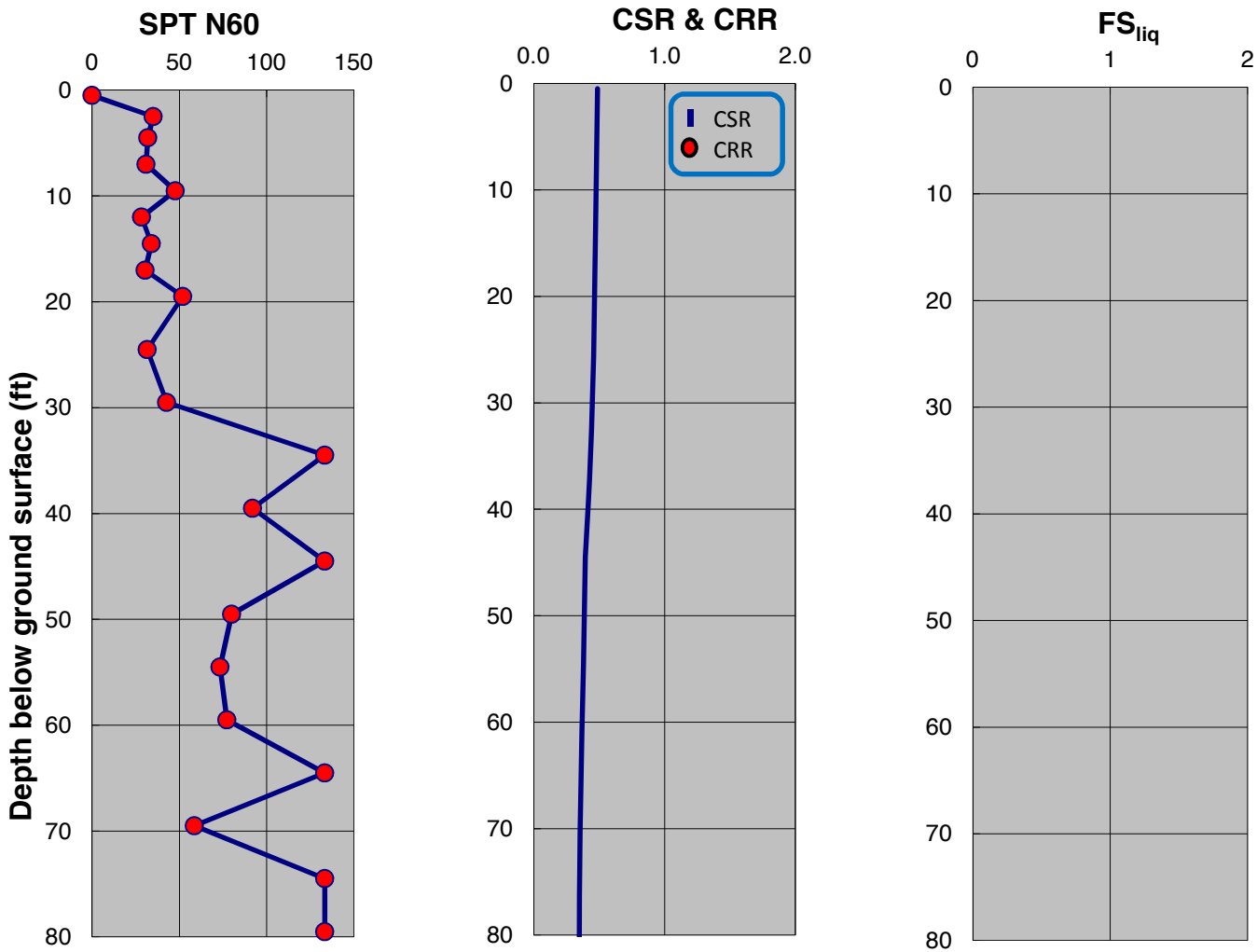
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-156 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



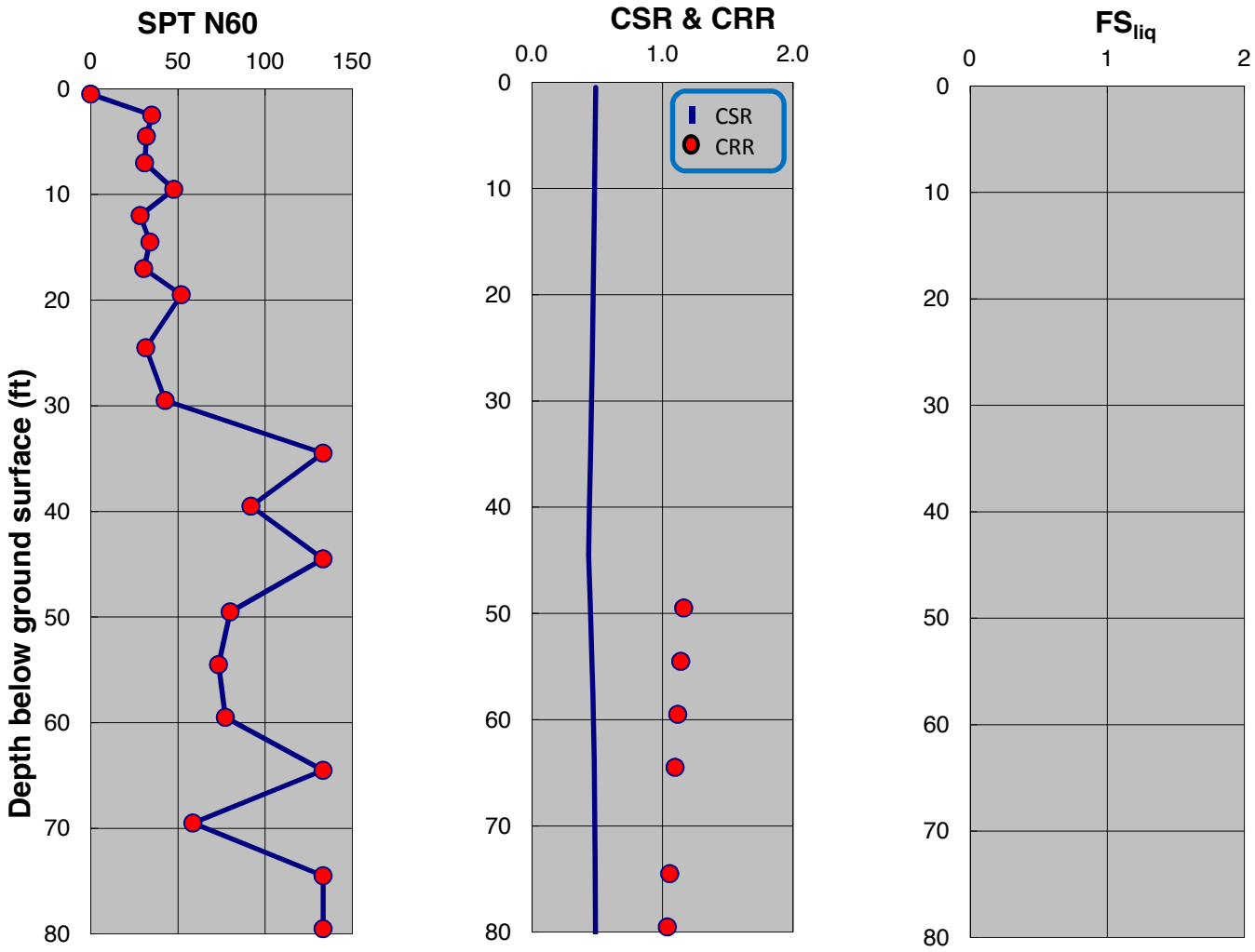
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-156 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



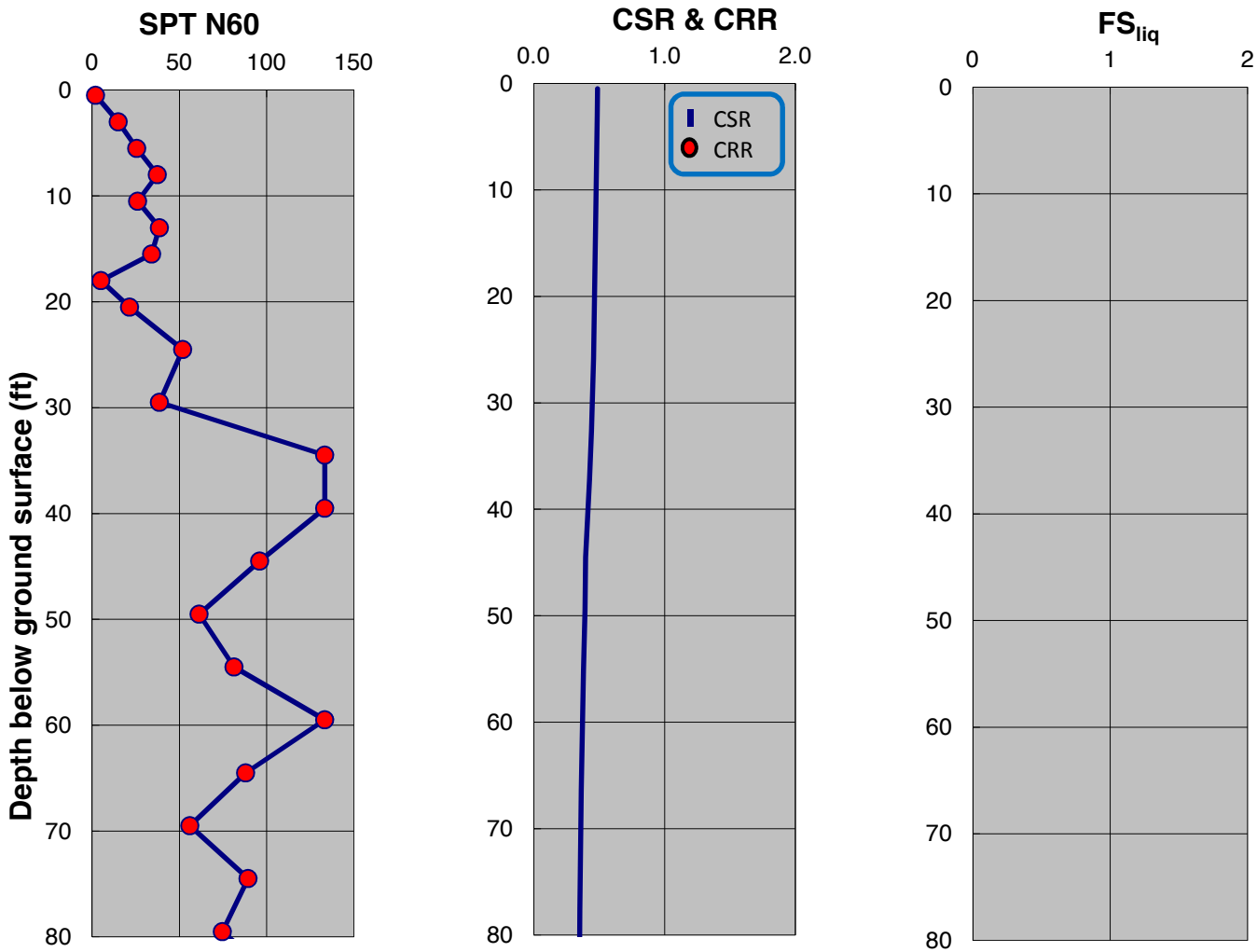
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-157 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



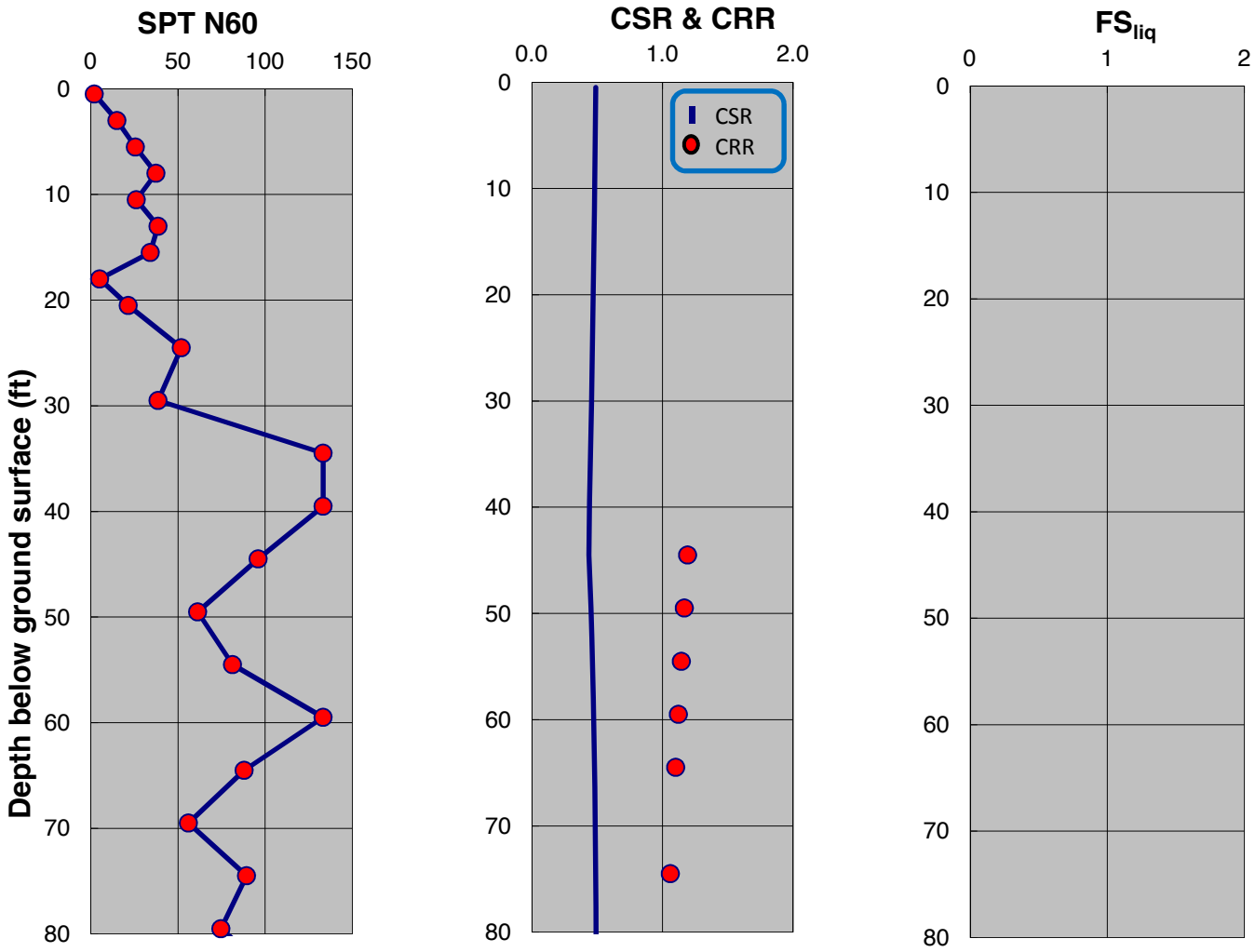
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-157 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-158 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

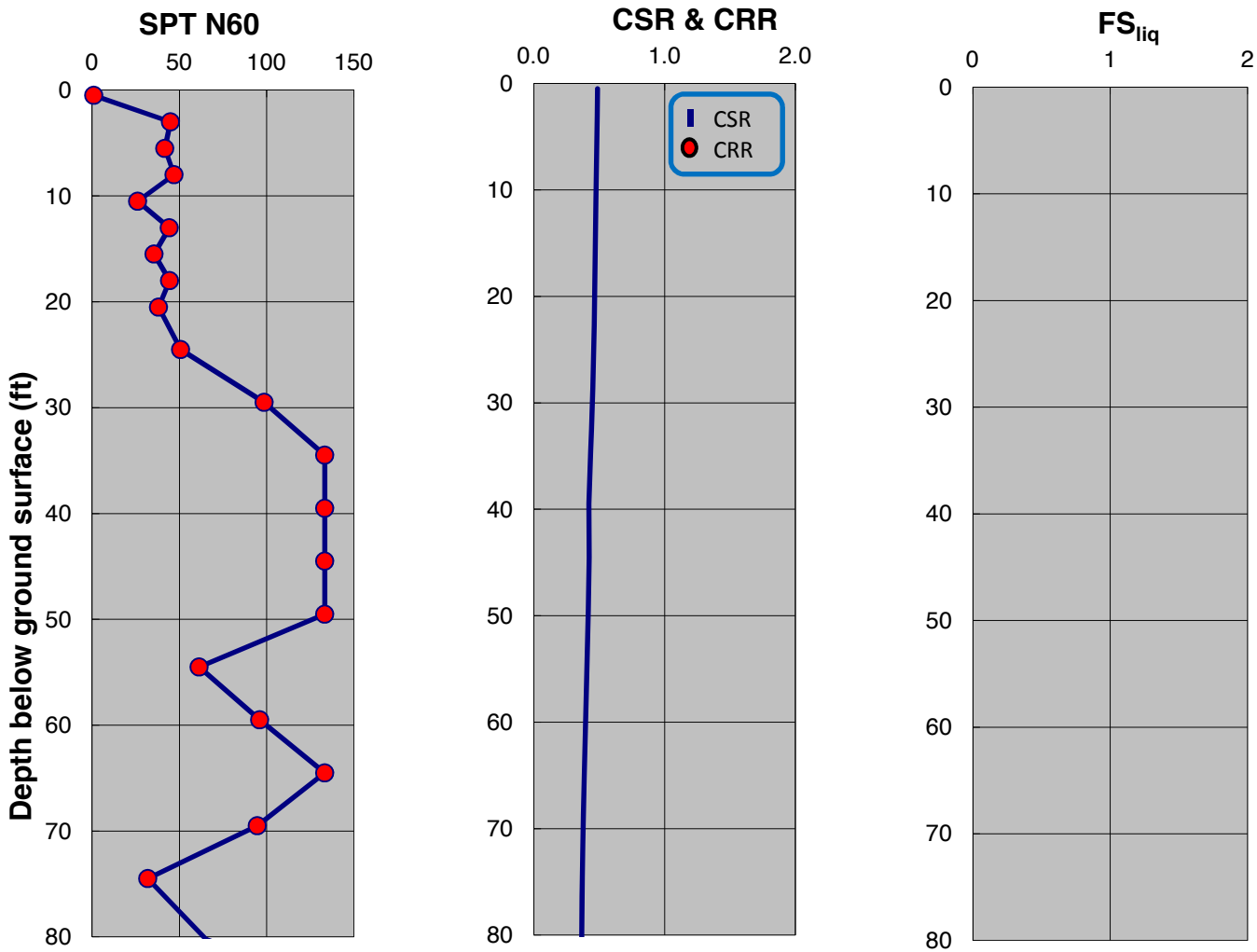
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-158 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

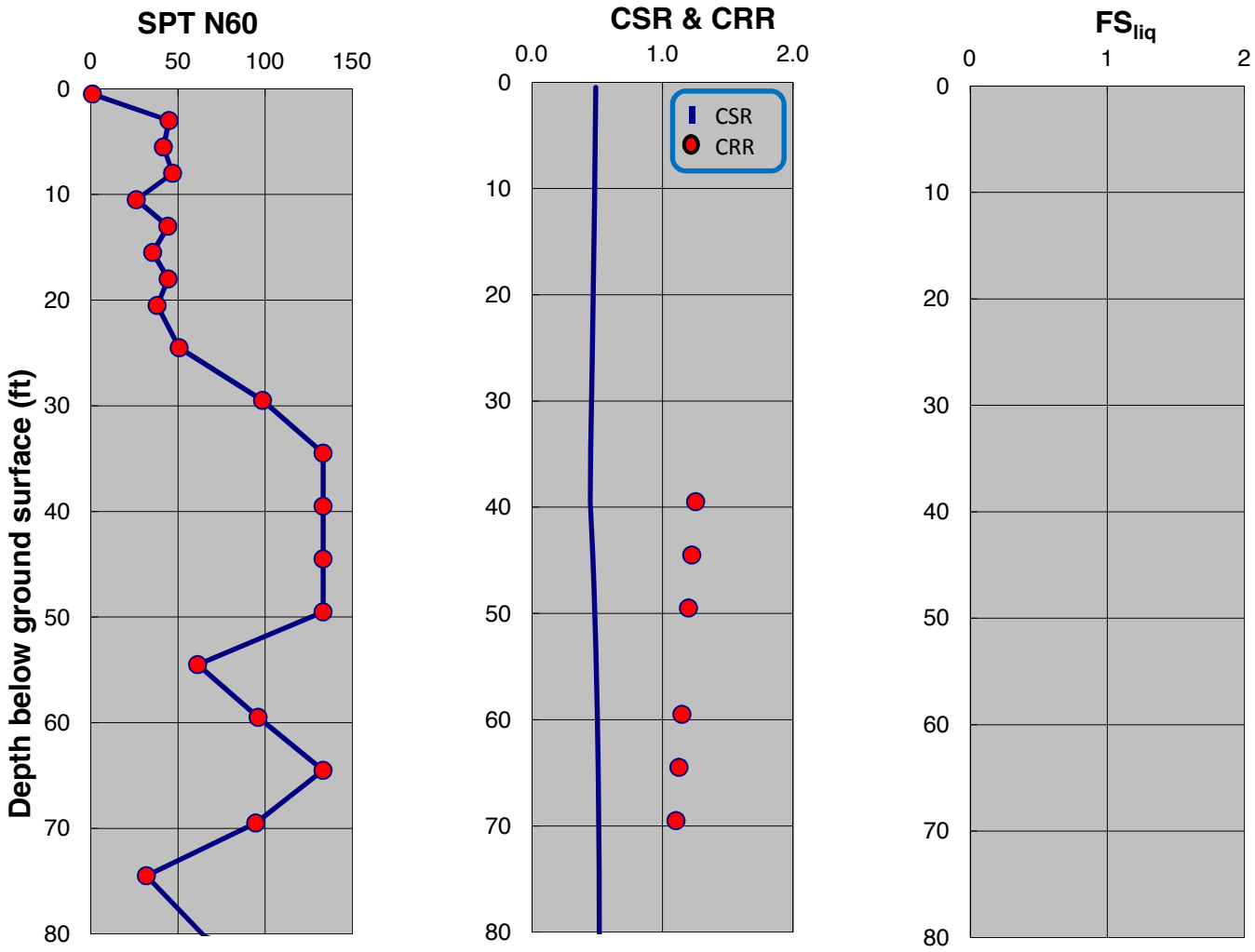
PLATE B.200



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-159 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

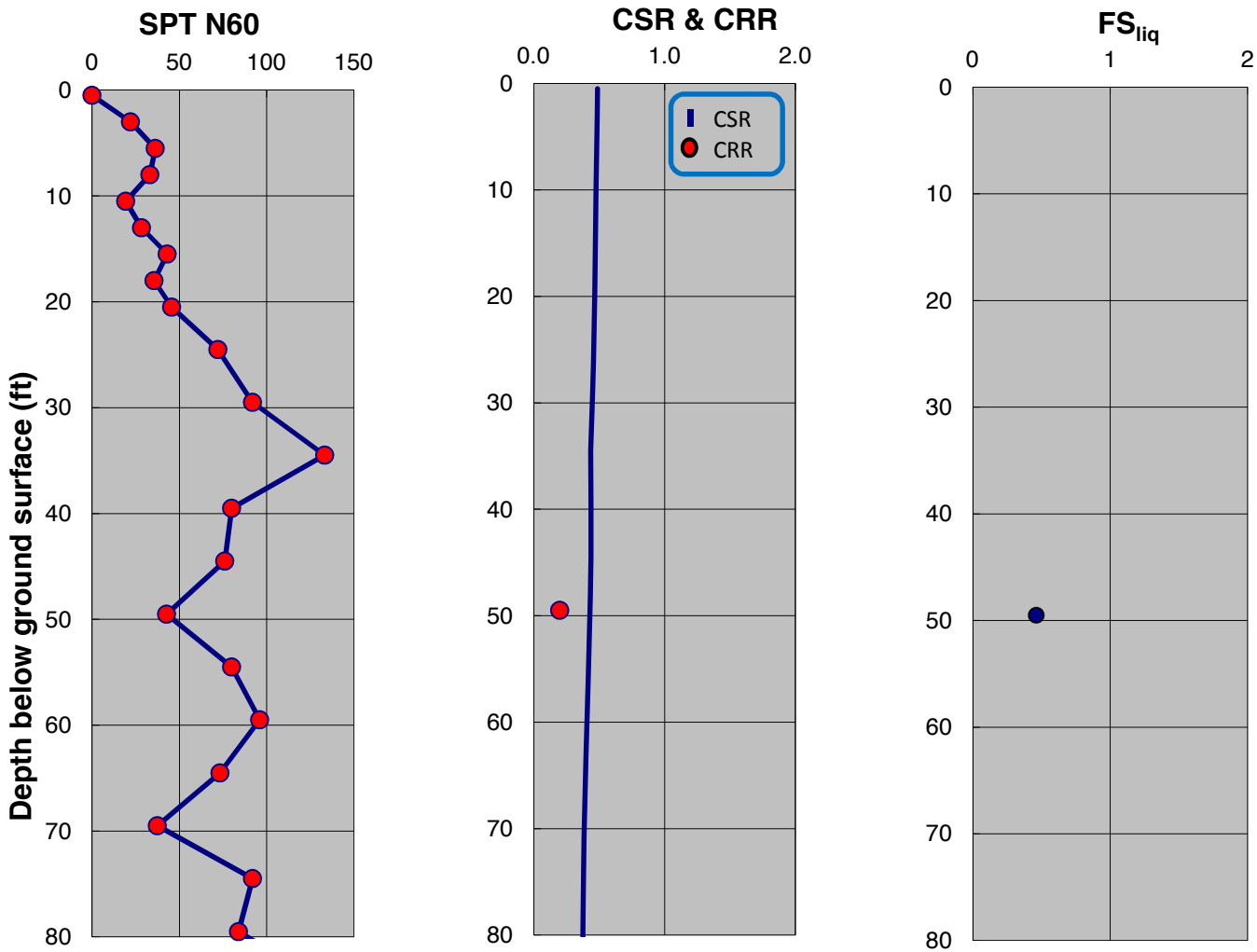
PLATE B.201



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-159 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

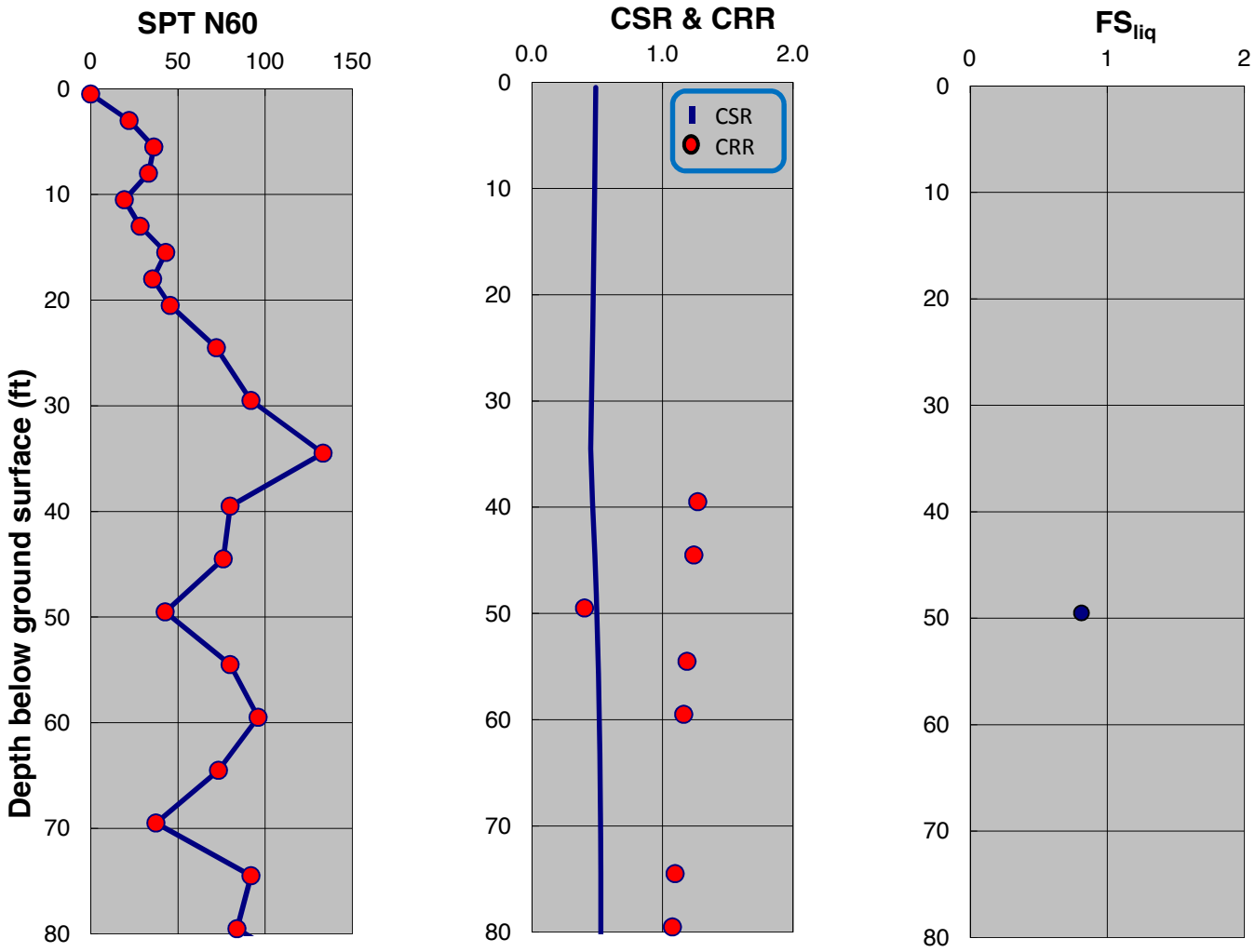
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.202



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-160 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

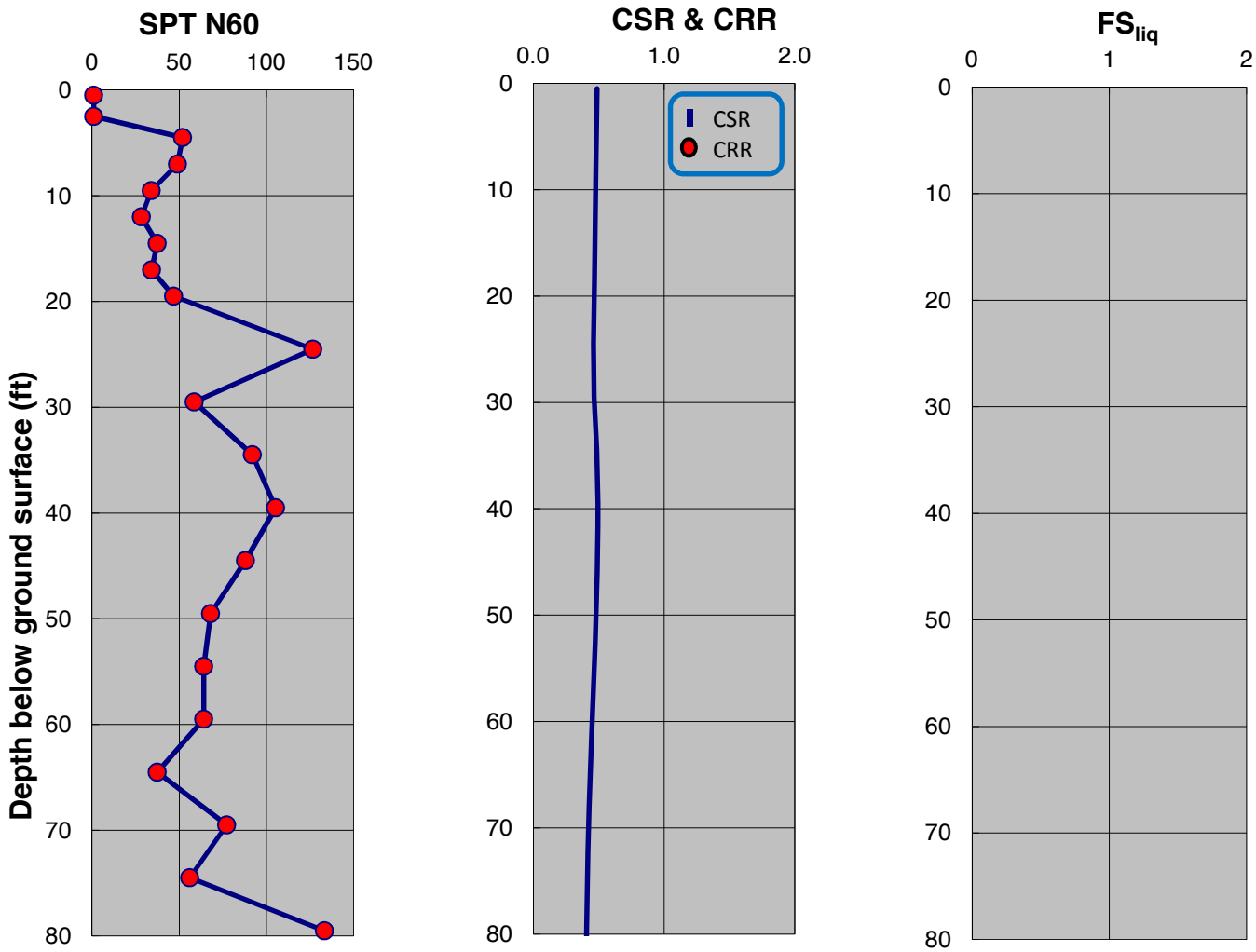
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-160 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

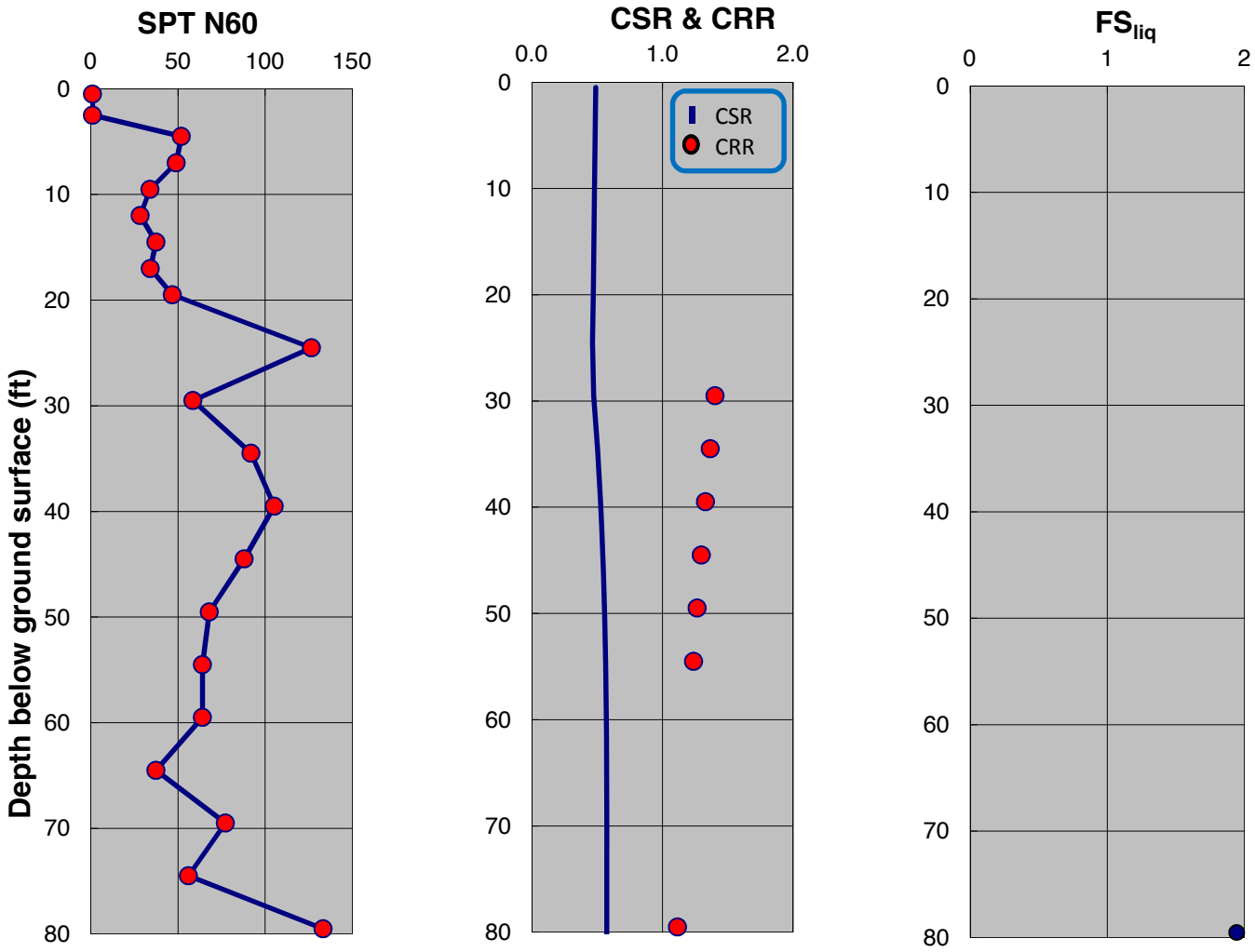
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.204



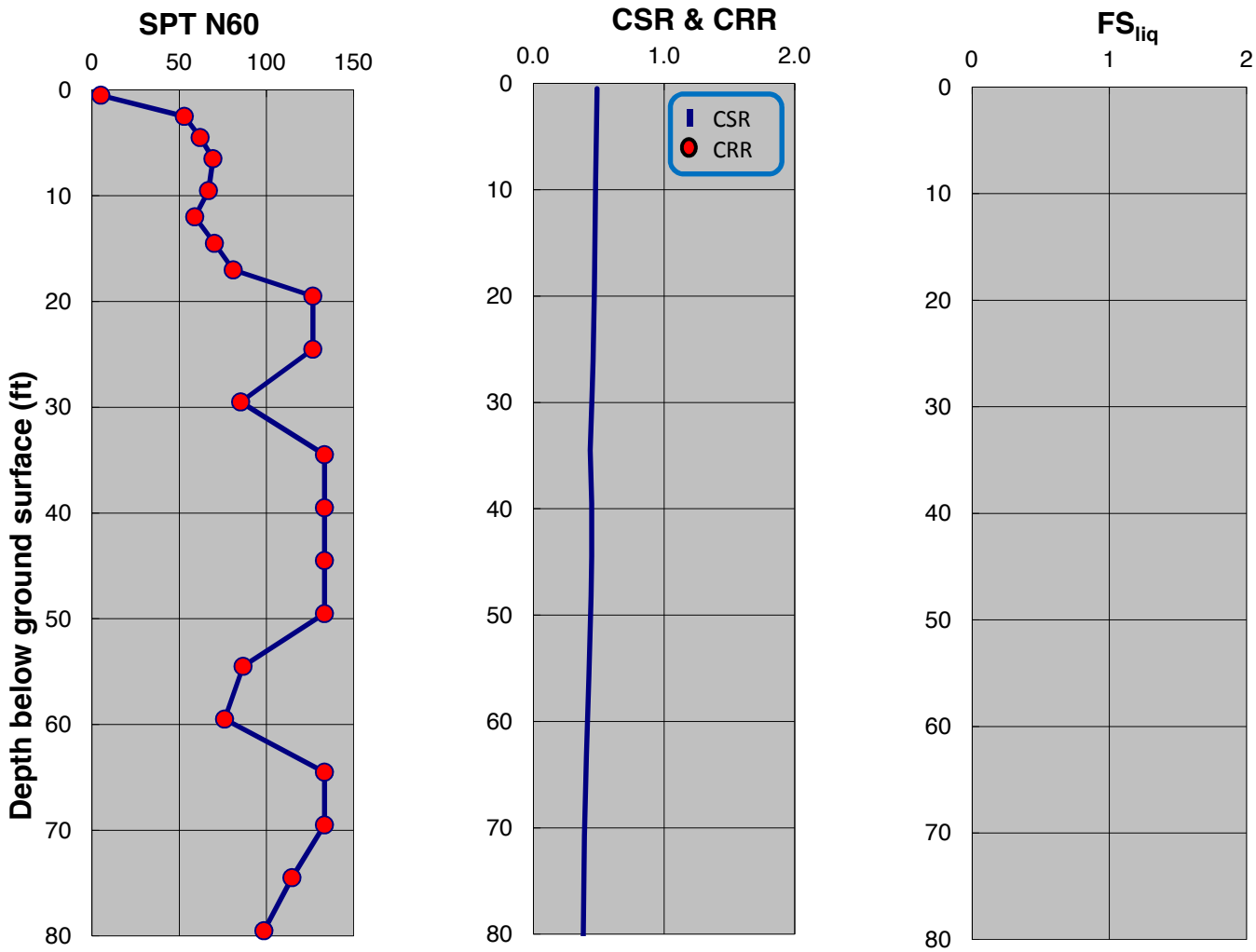
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-161 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



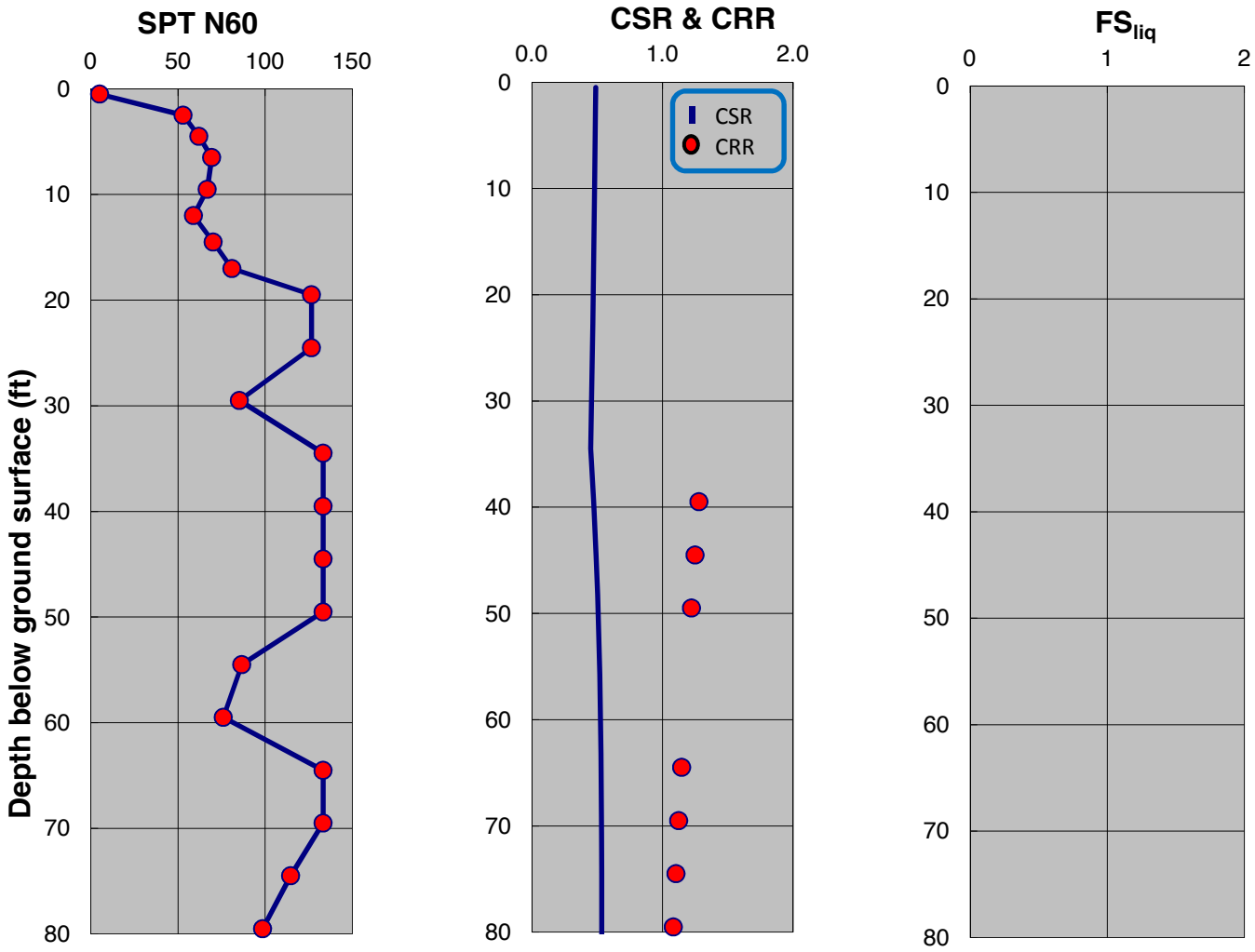
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-161 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



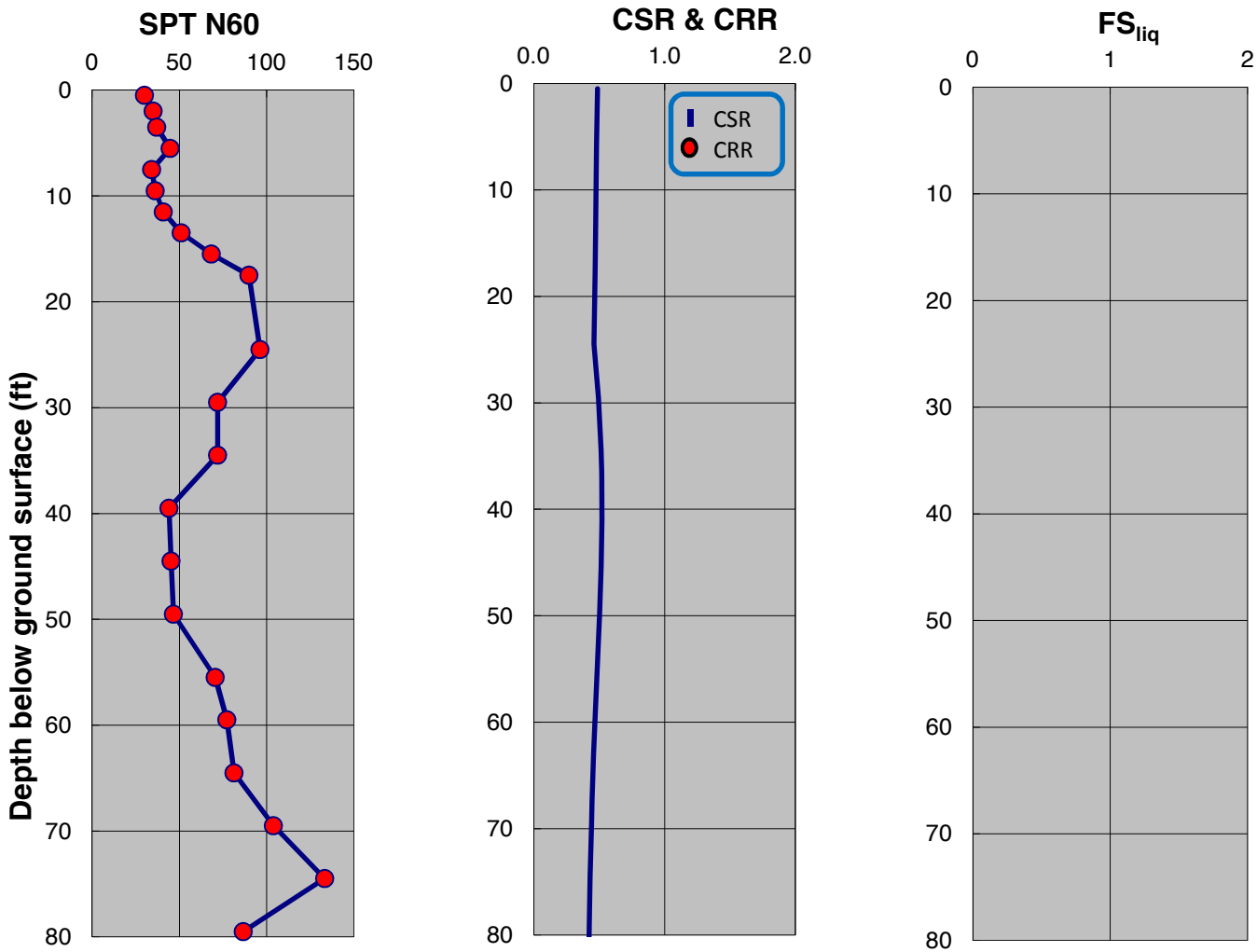
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-162 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



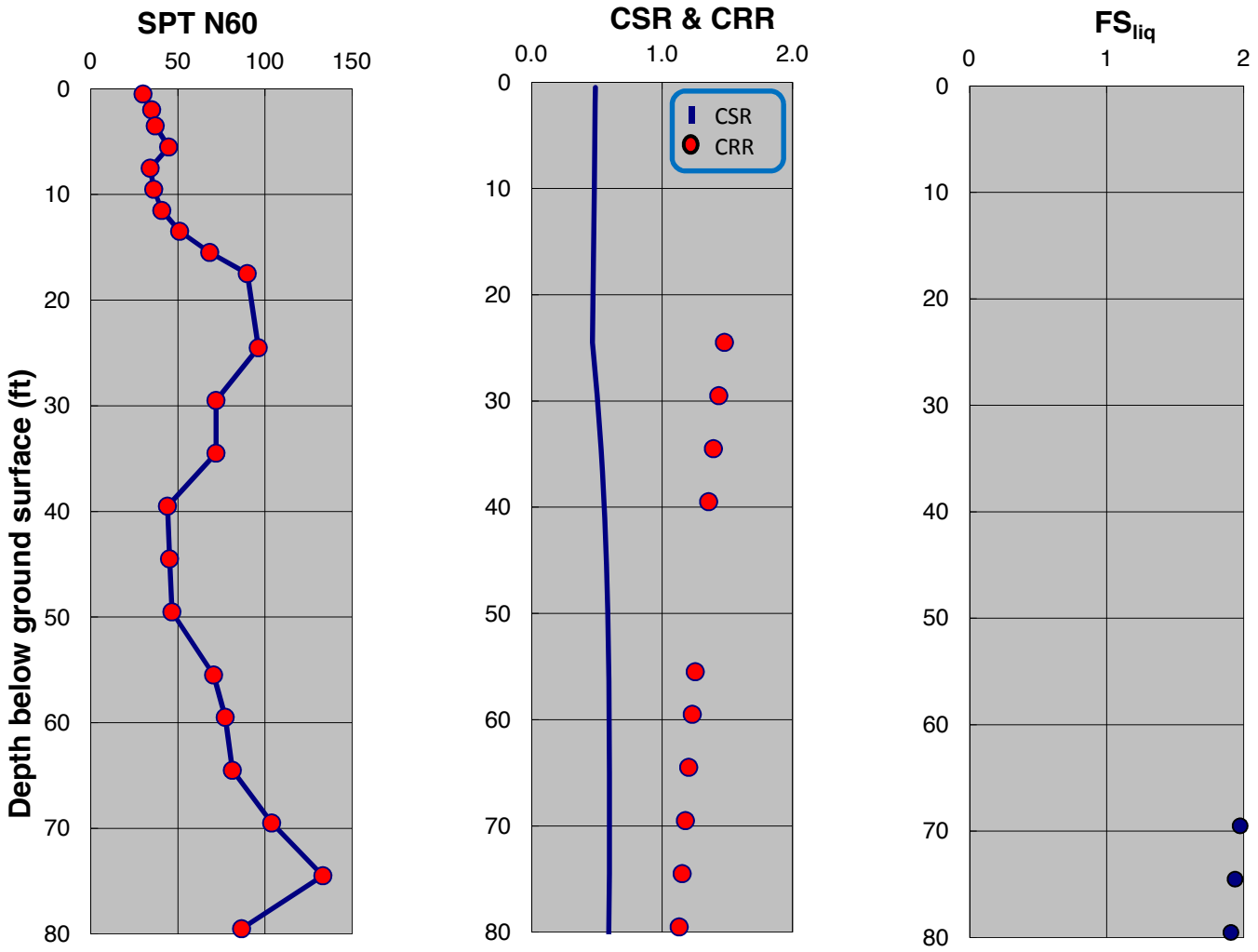
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-162 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-163 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

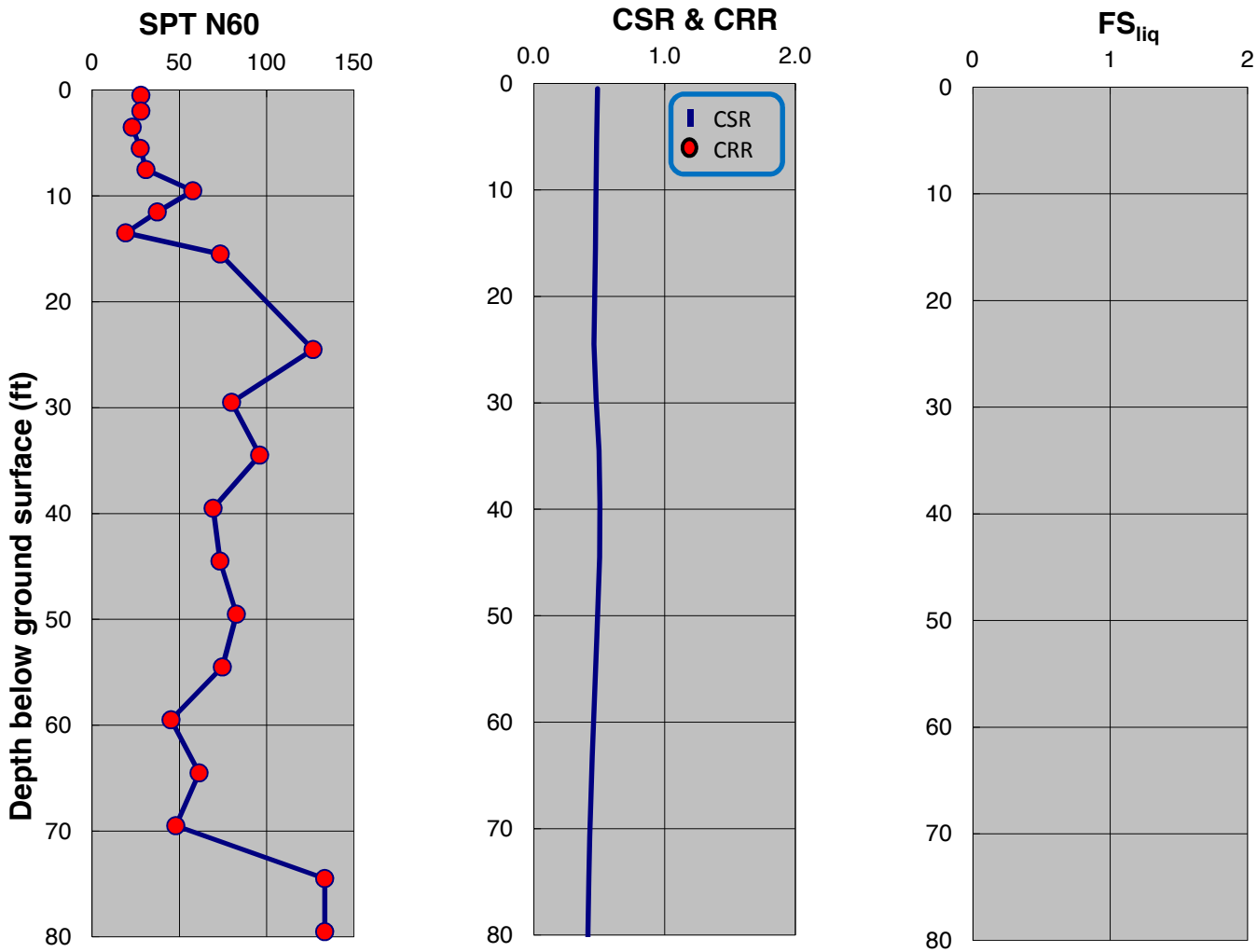
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-163 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

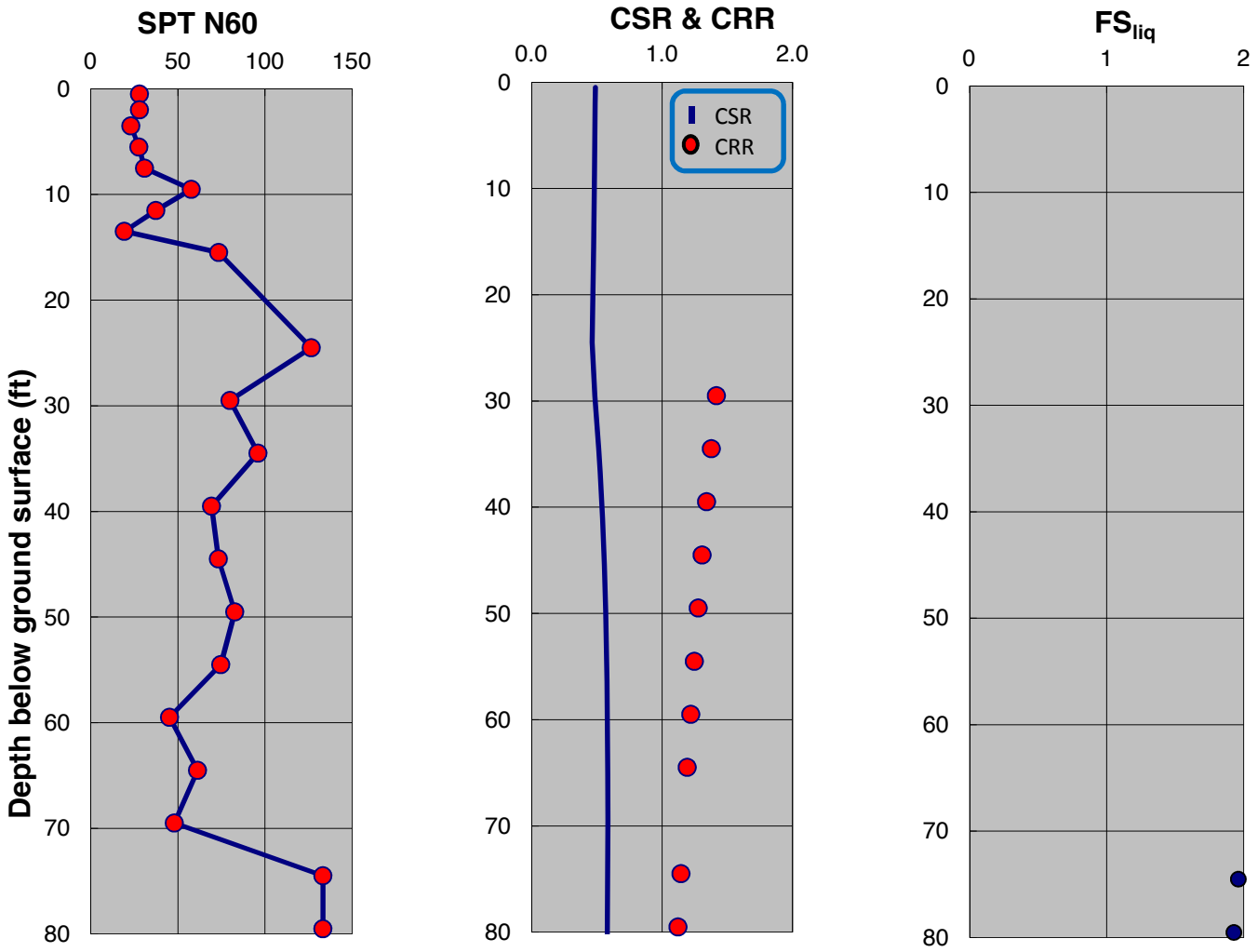
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.210



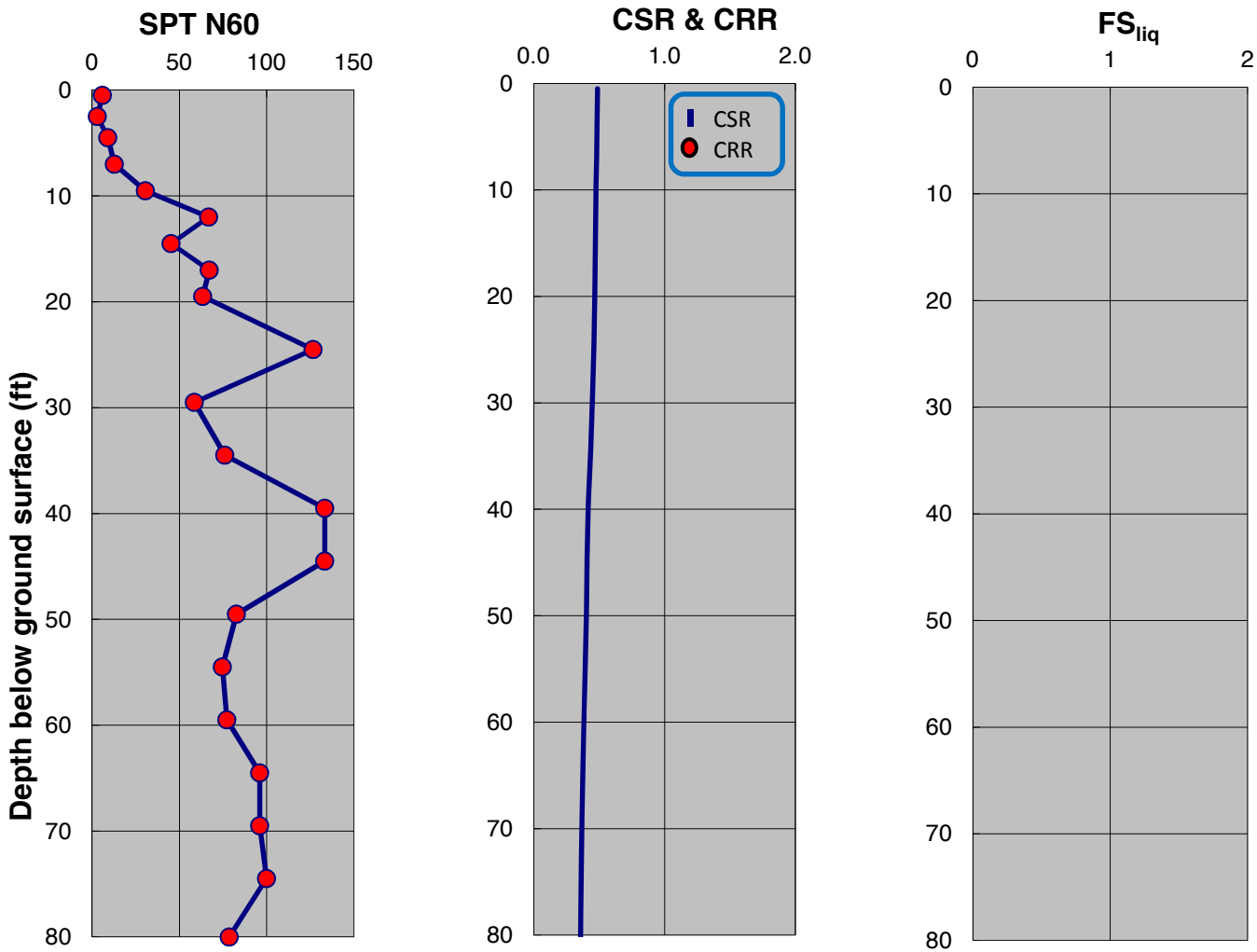
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-164 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



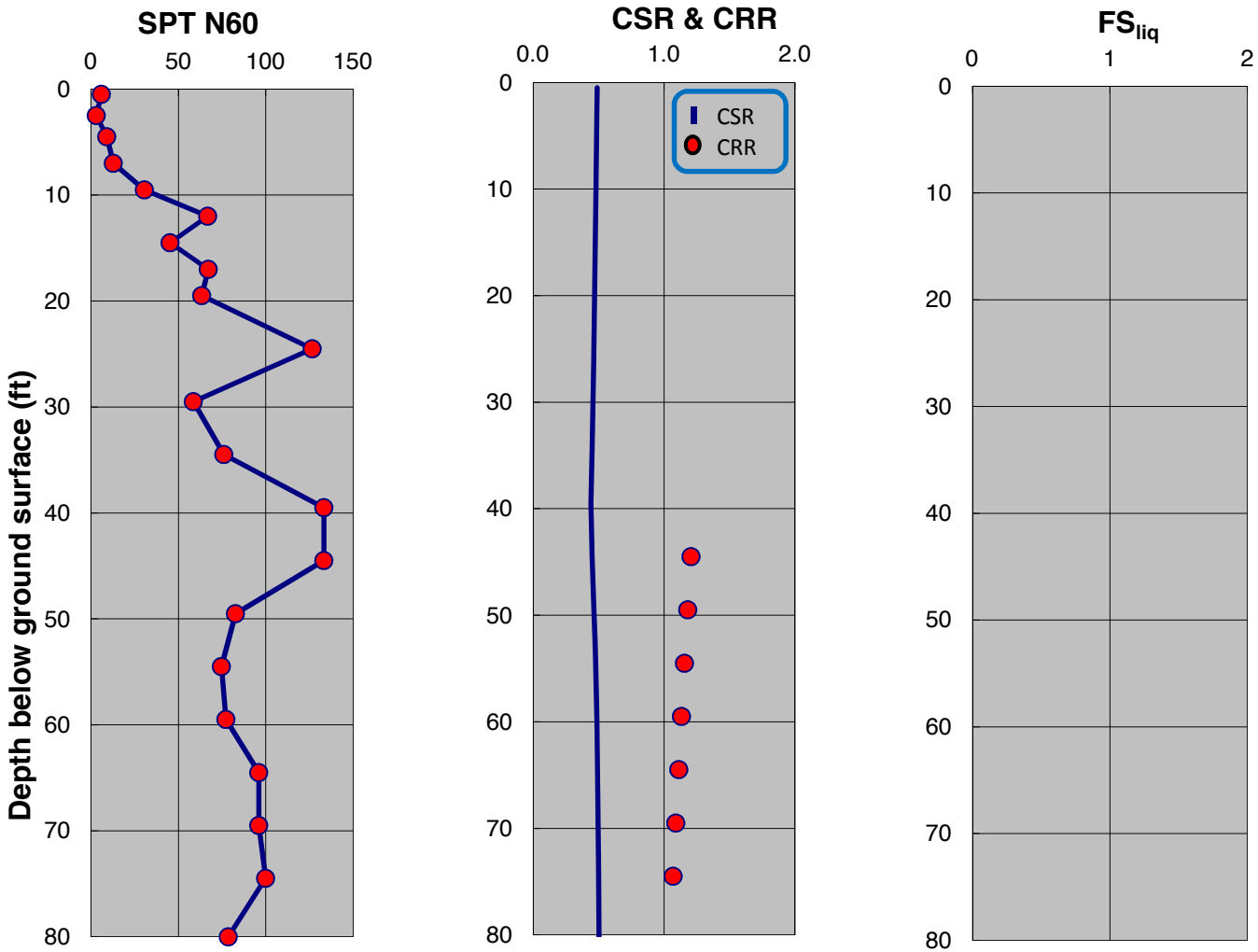
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-164 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



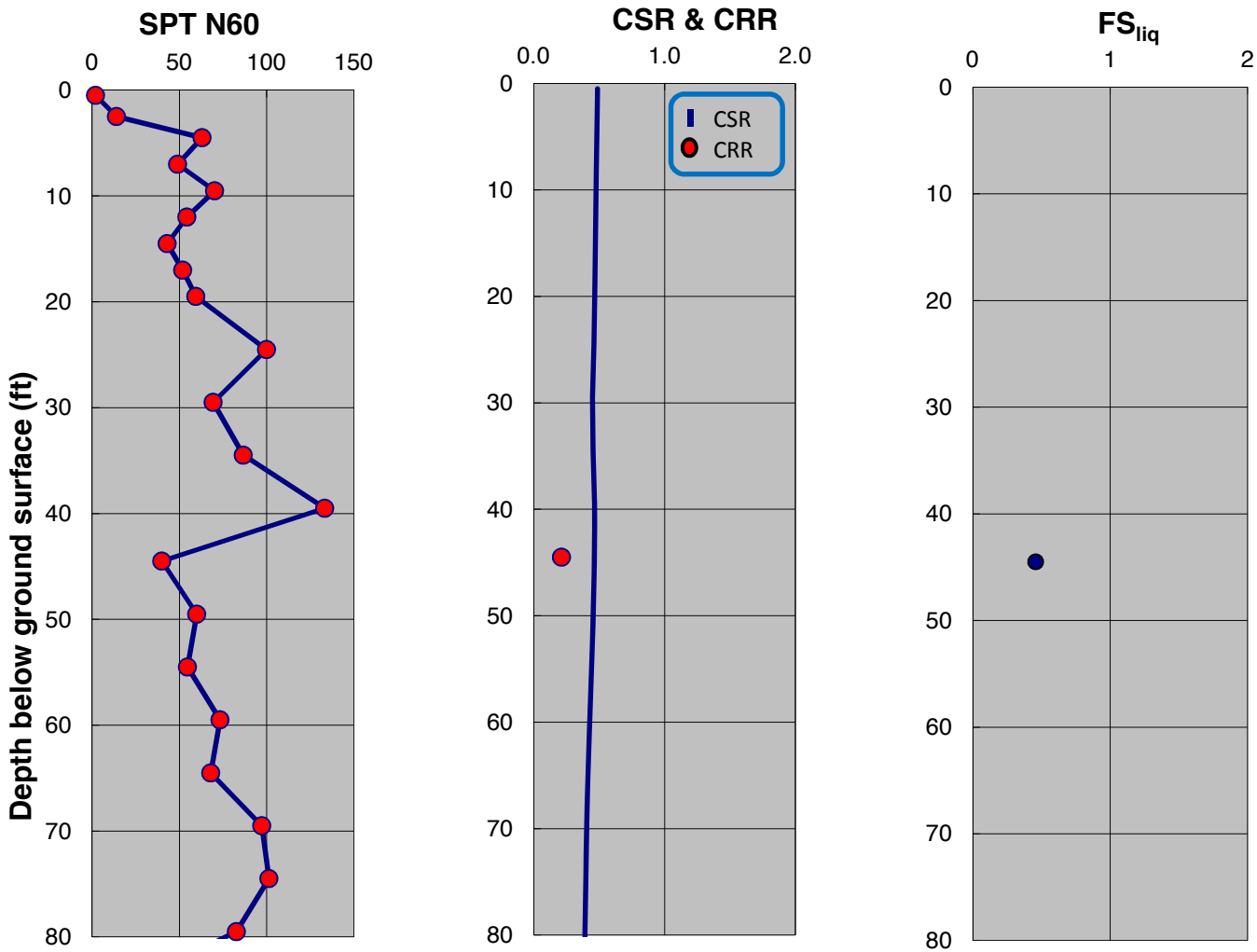
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-165 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



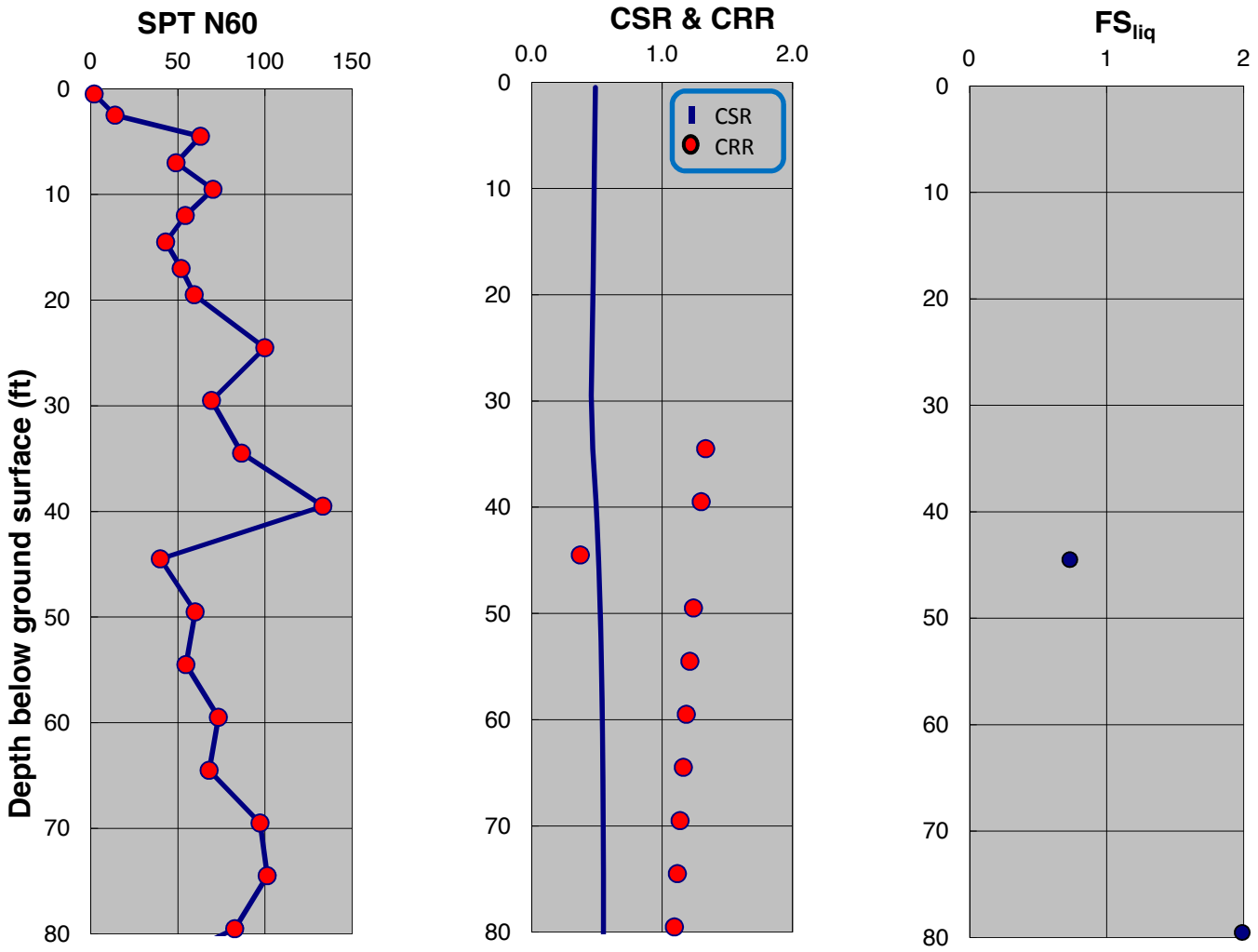
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-165 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



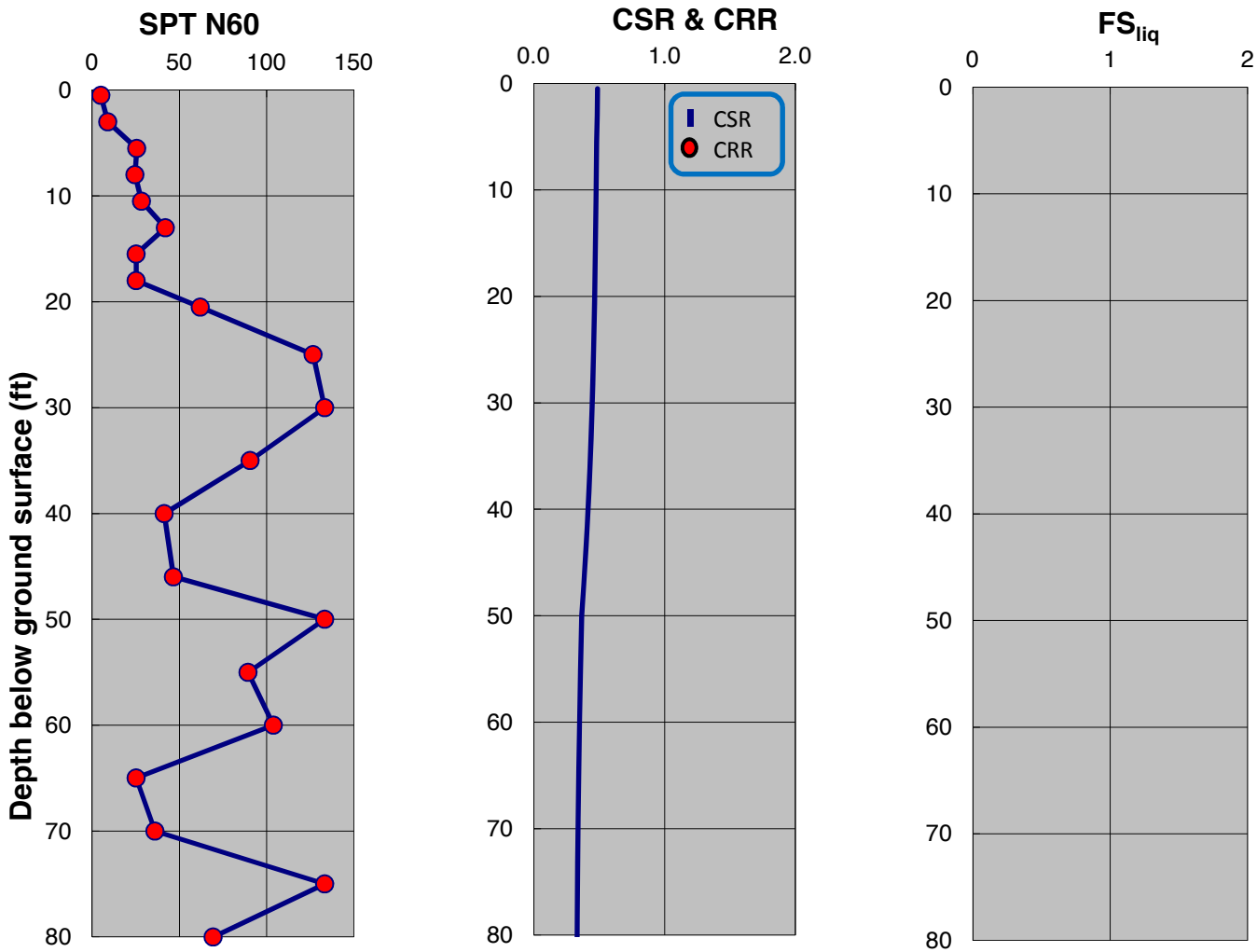
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-166 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



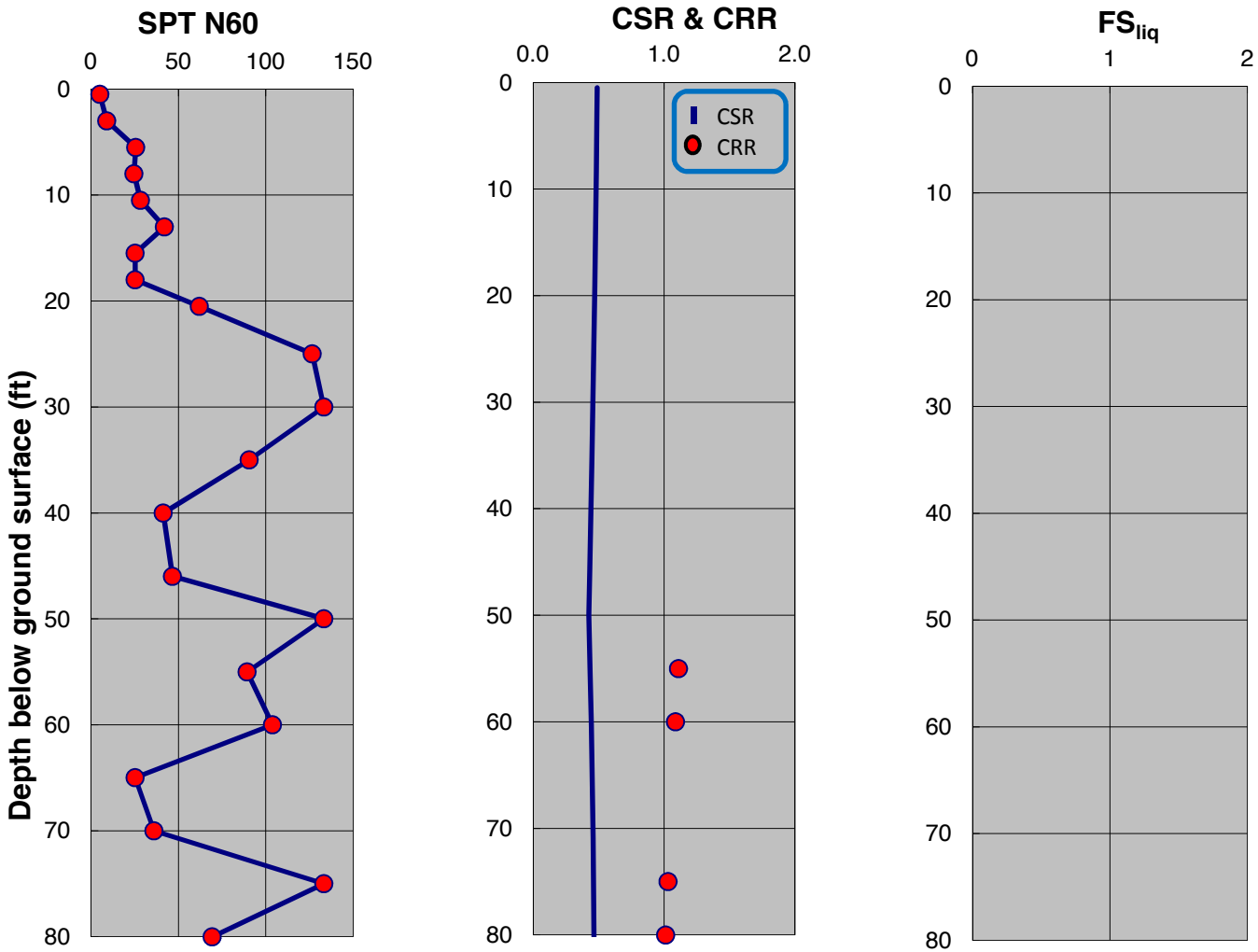
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-166 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



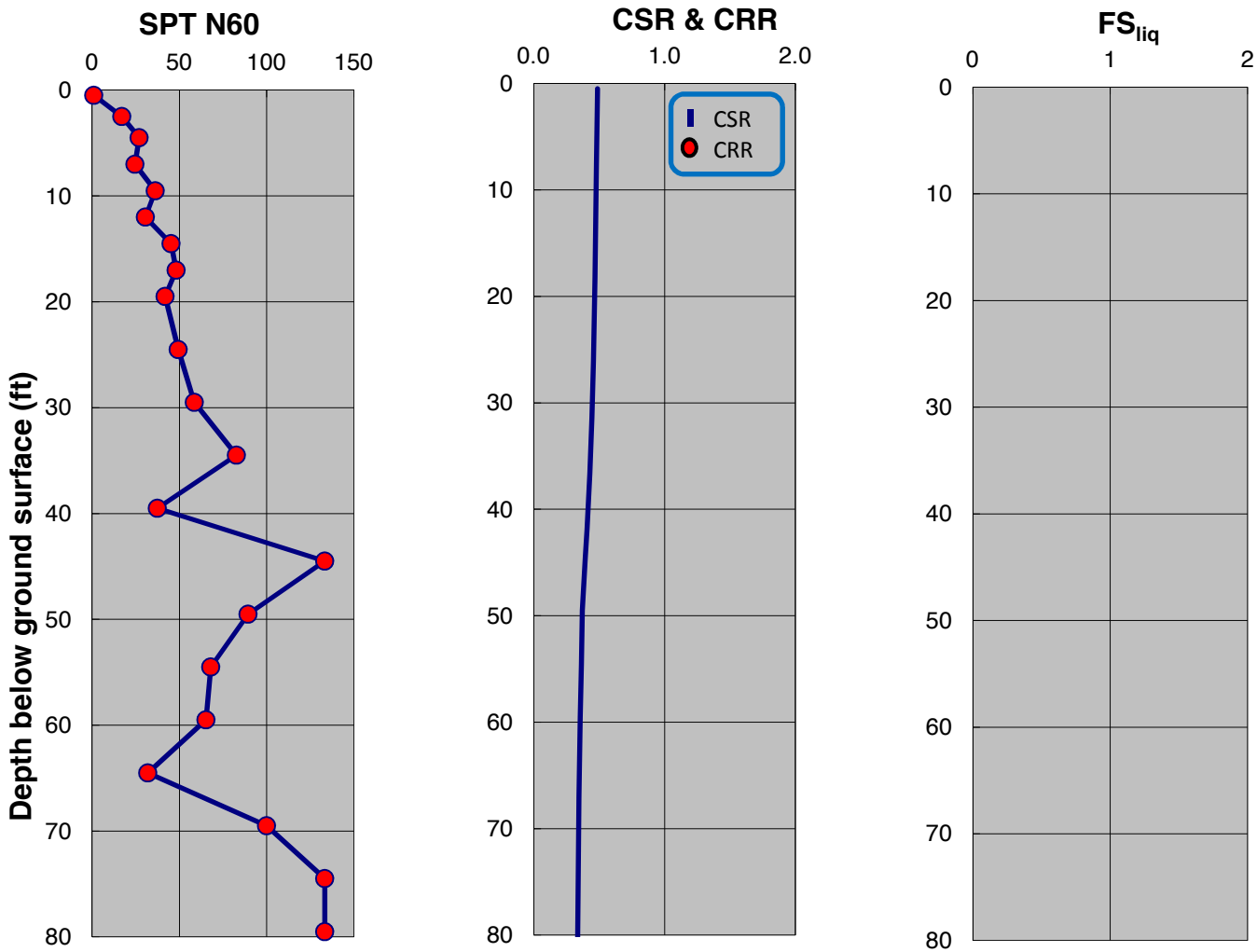
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-167 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



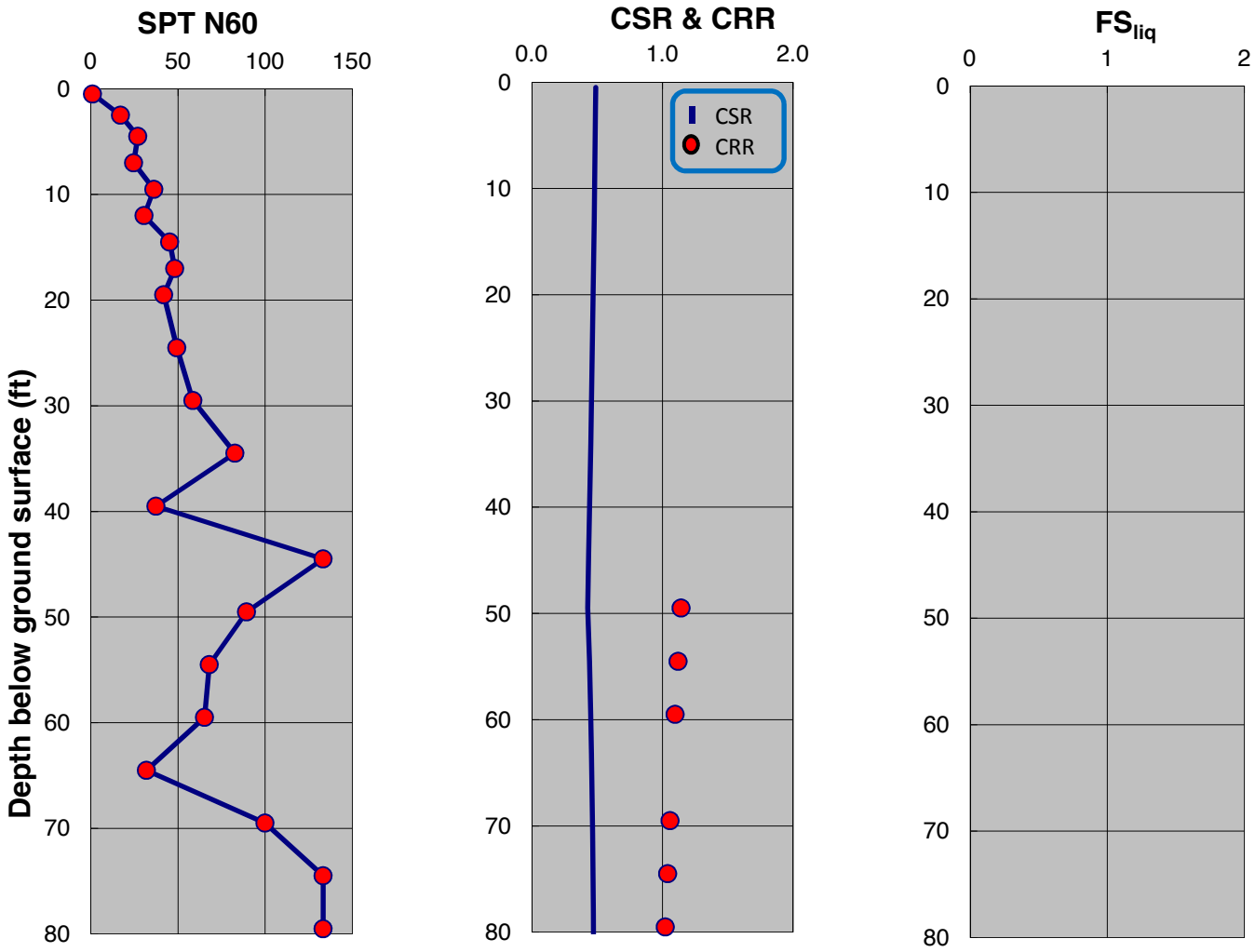
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-167 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



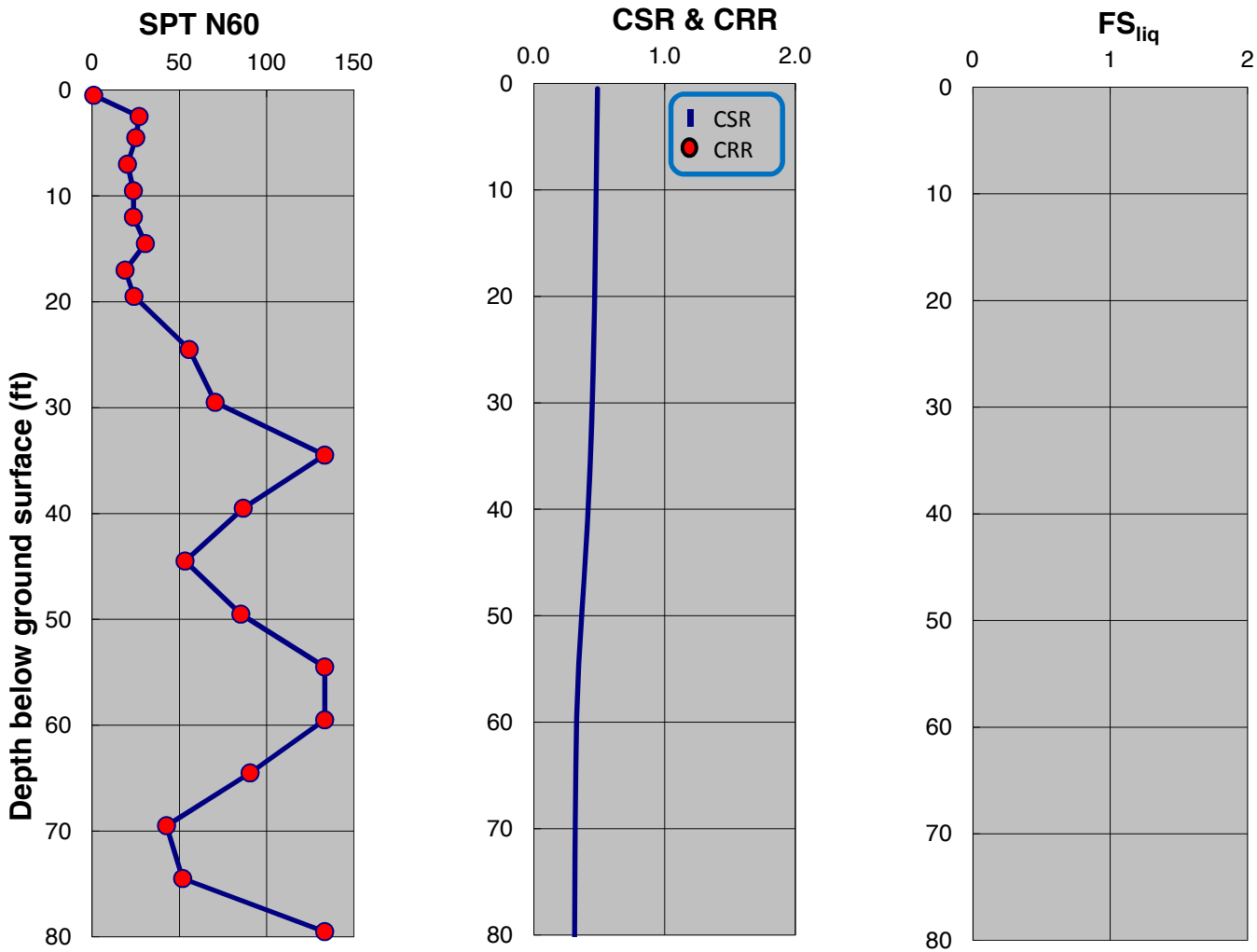
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-168 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



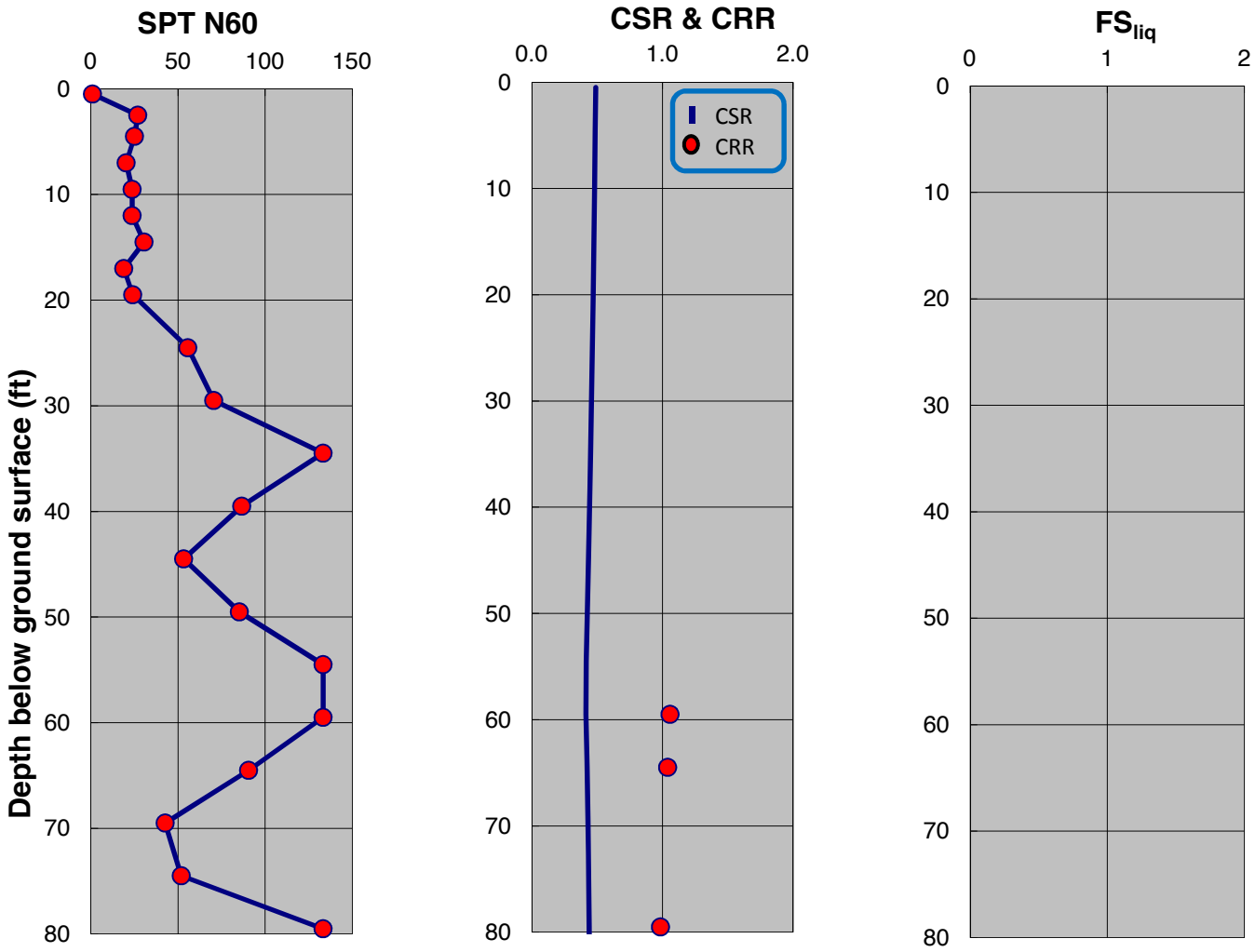
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-168 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



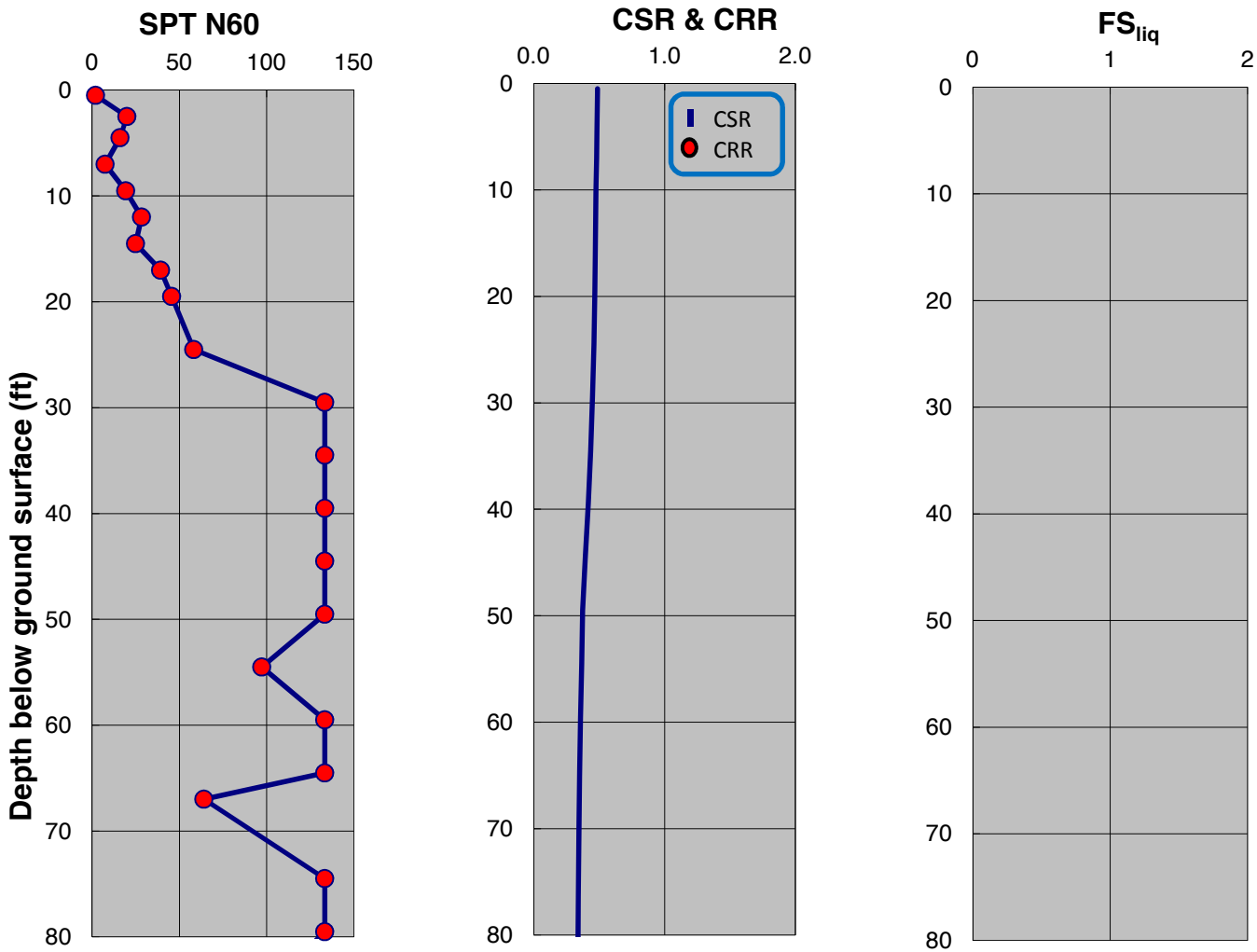
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-169 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



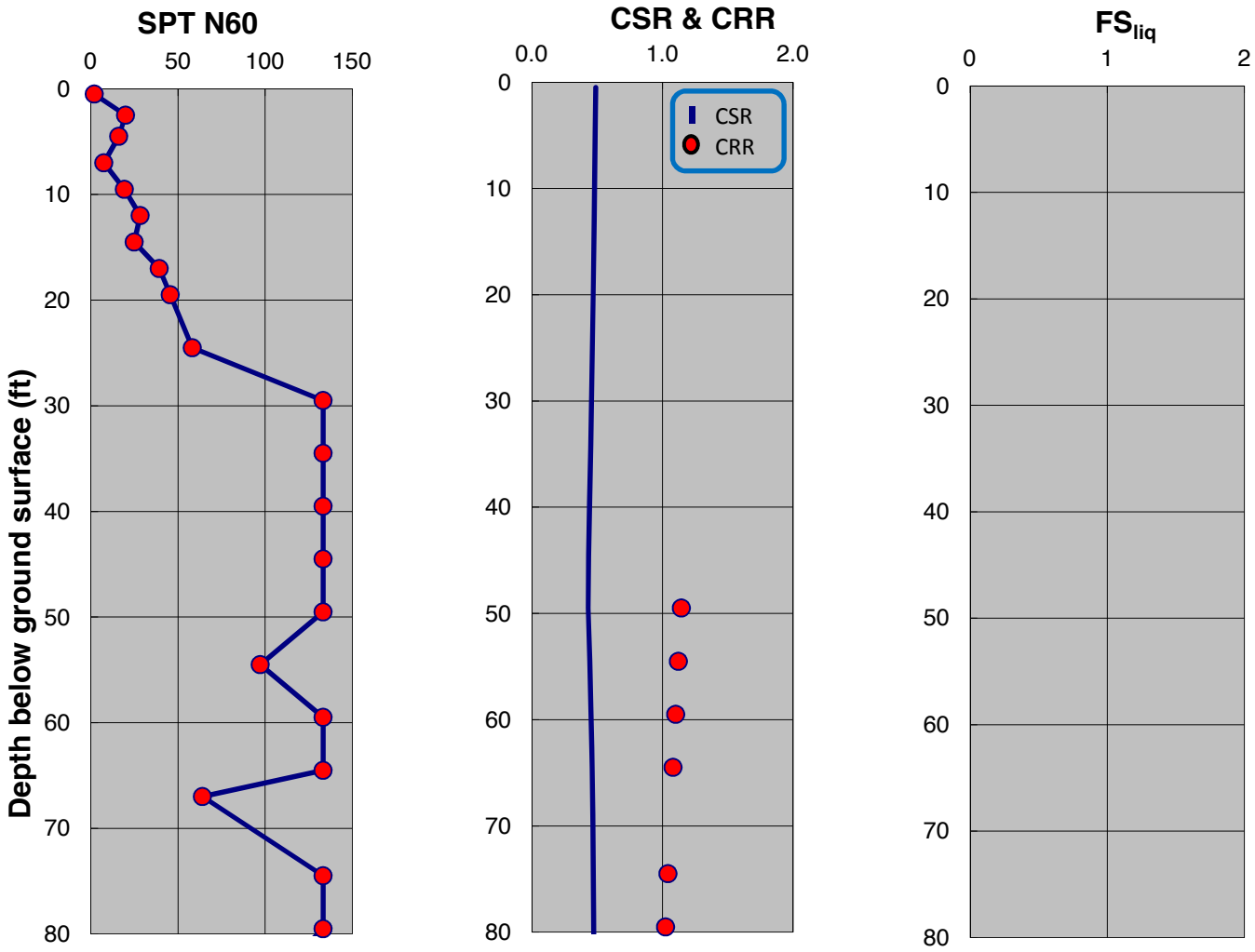
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-169 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



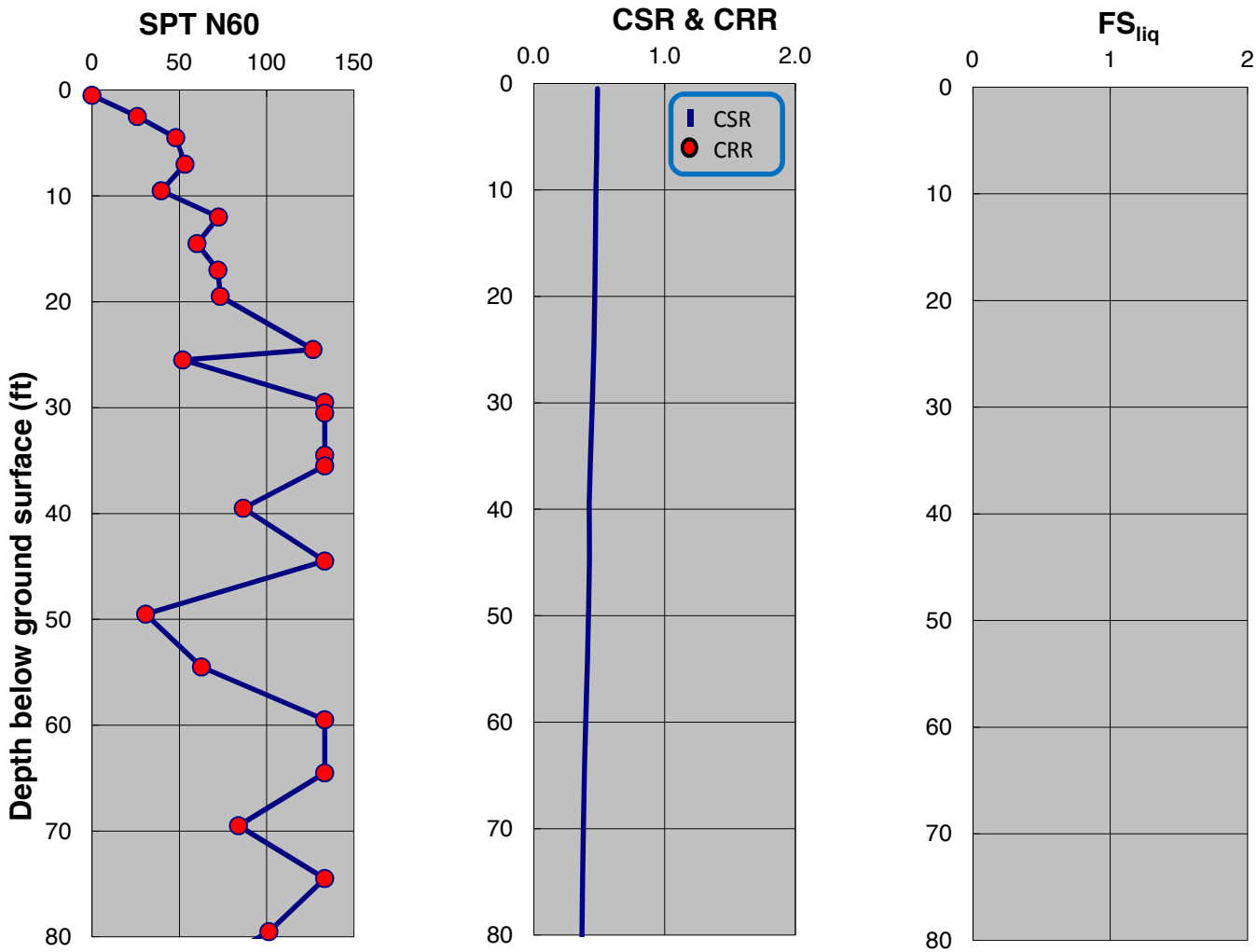
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-170 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



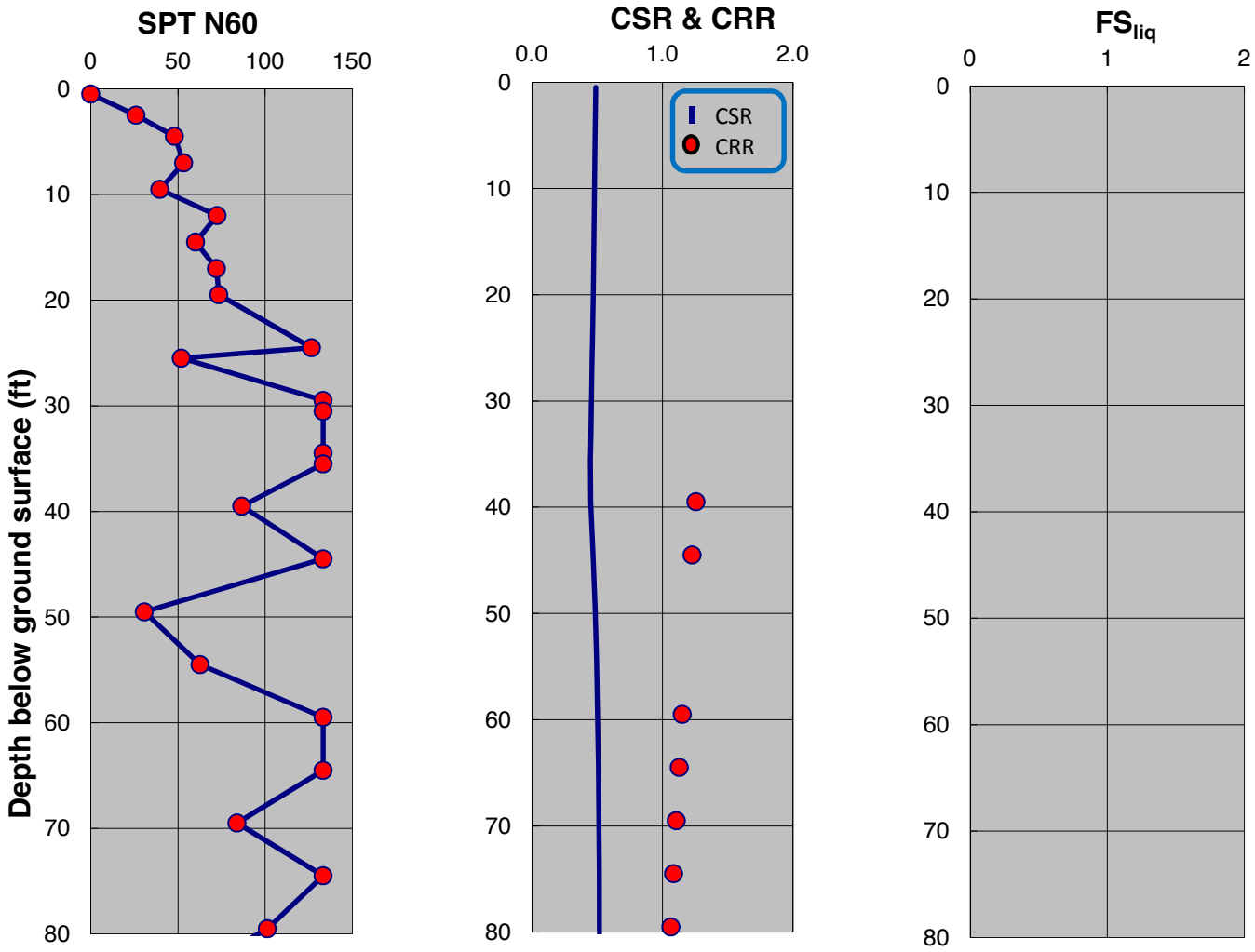
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-170 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



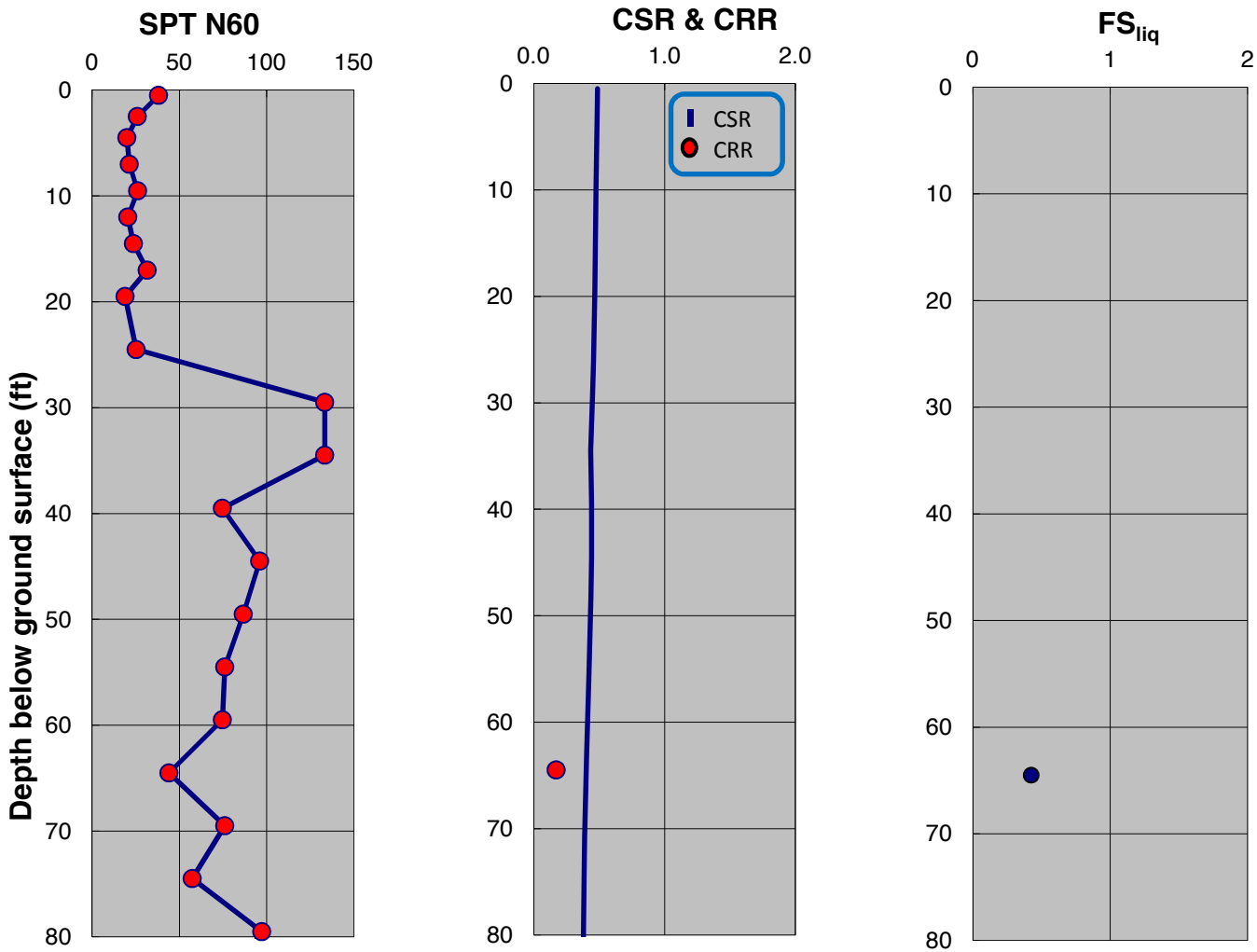
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-171 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



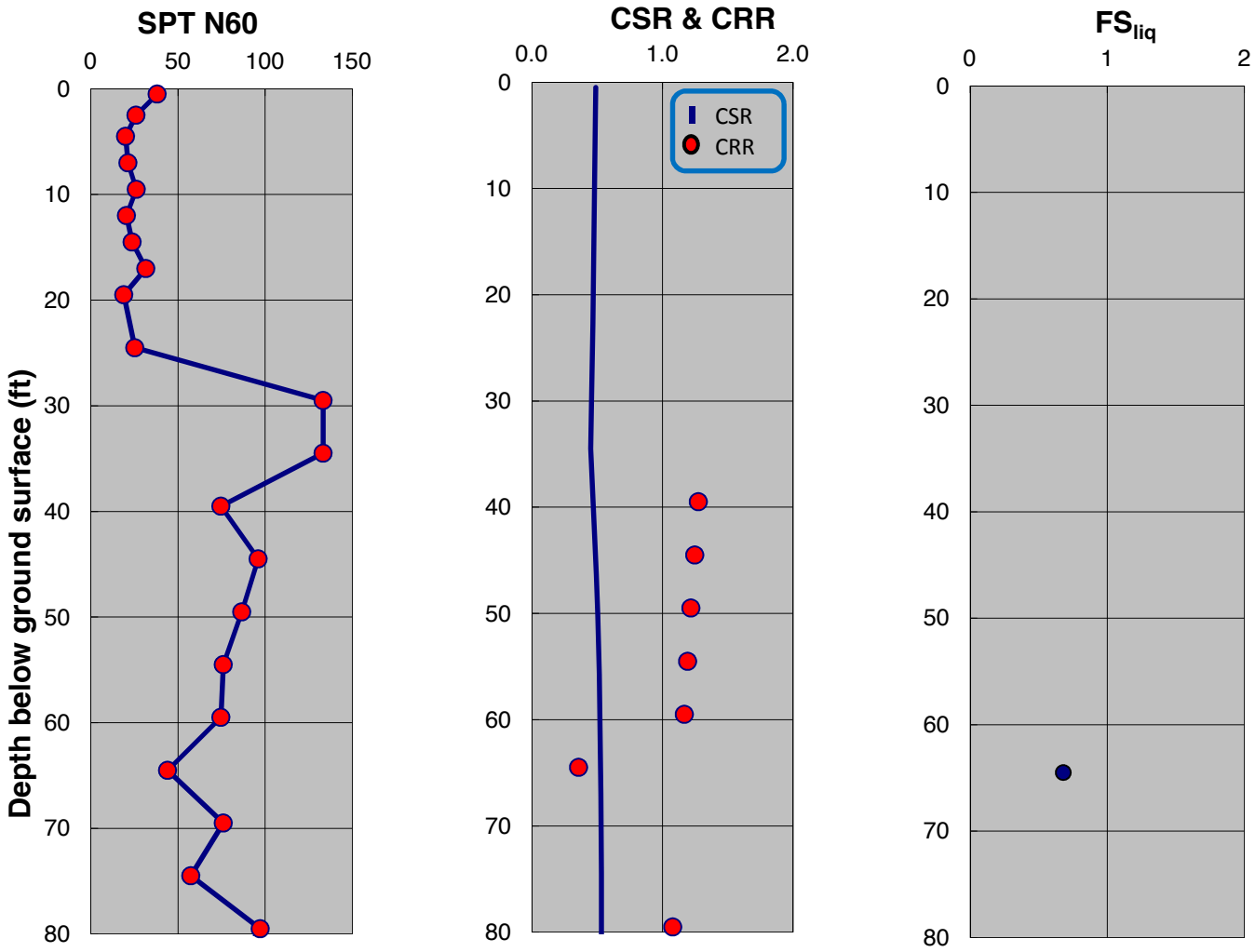
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-171 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



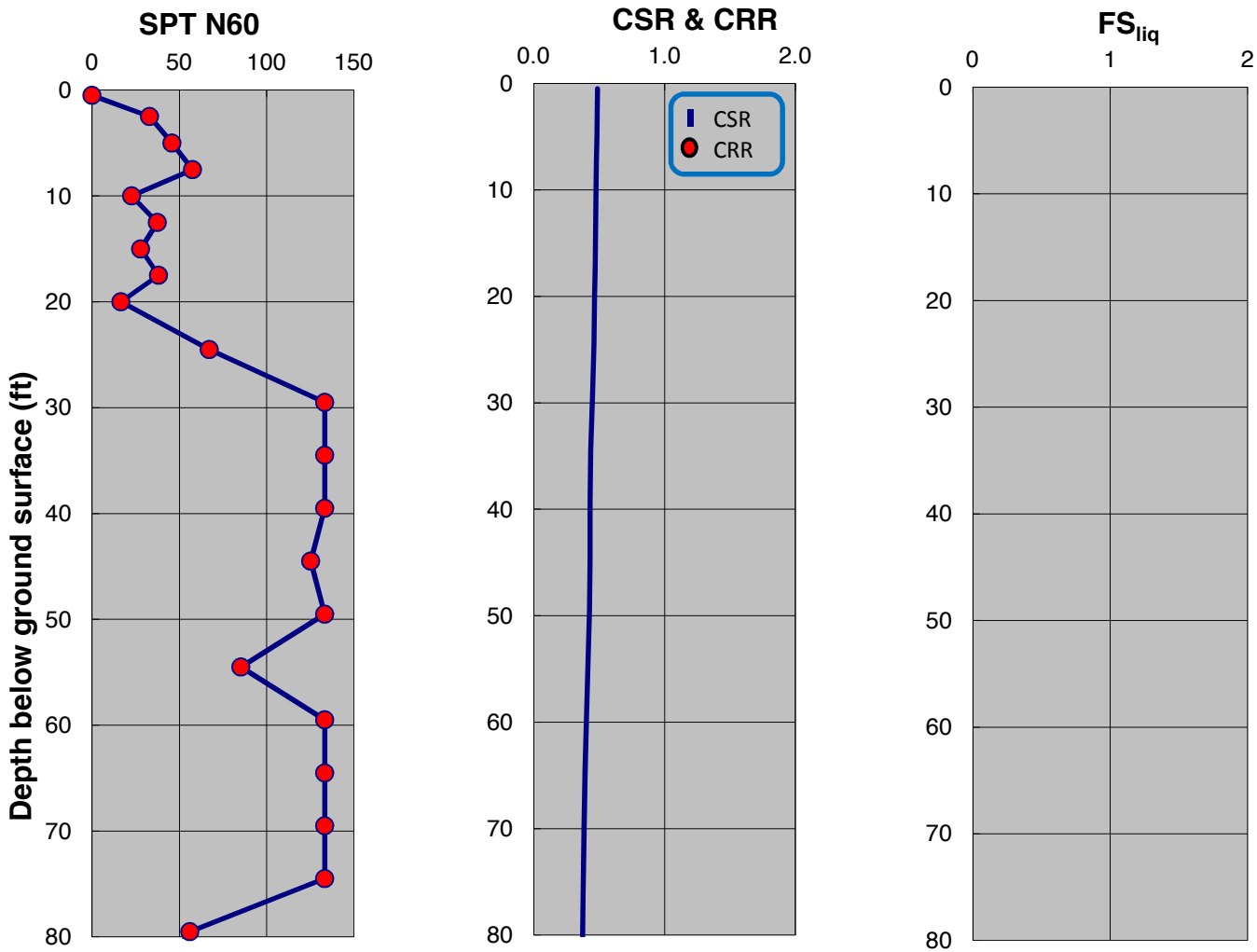
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-172 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



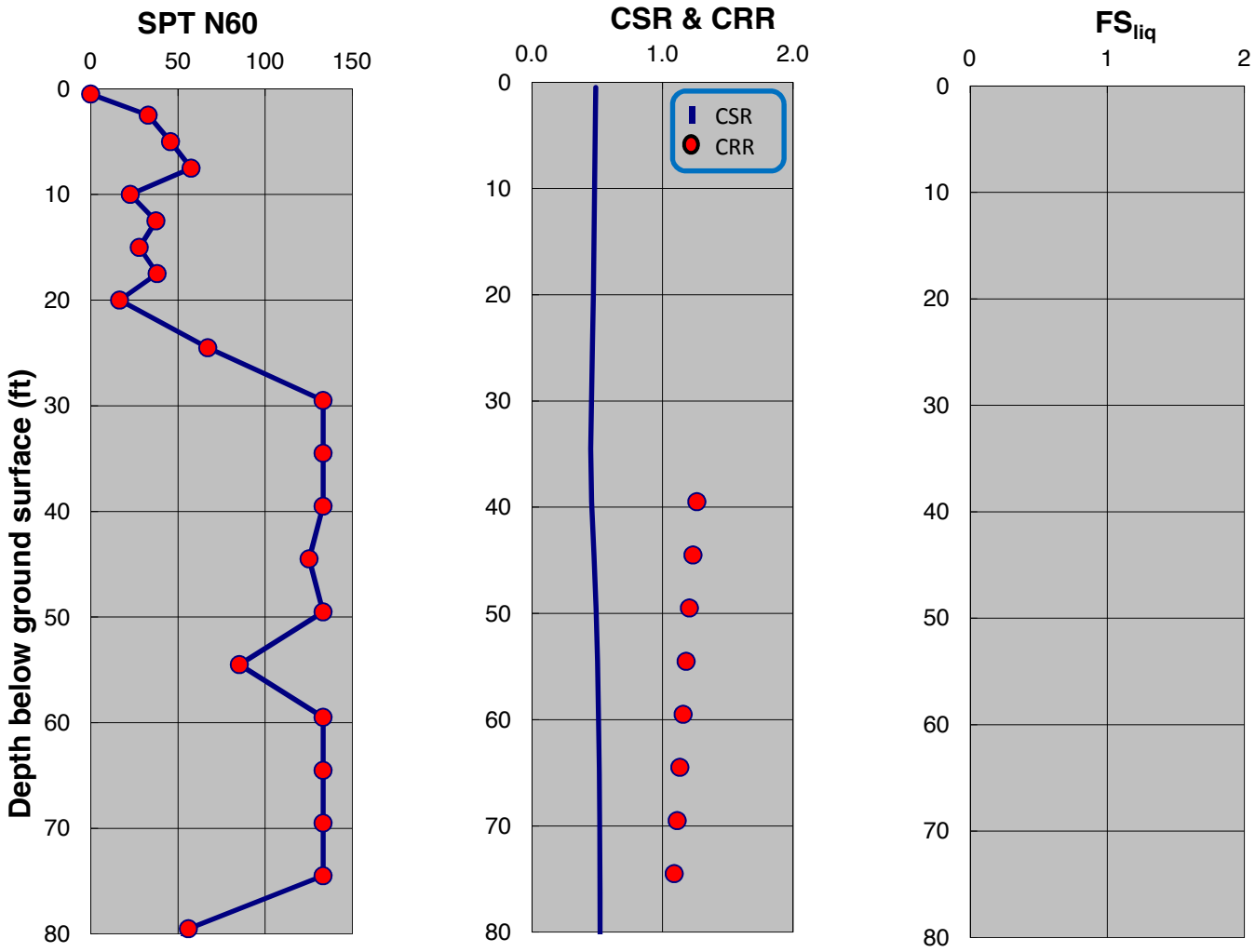
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-172 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



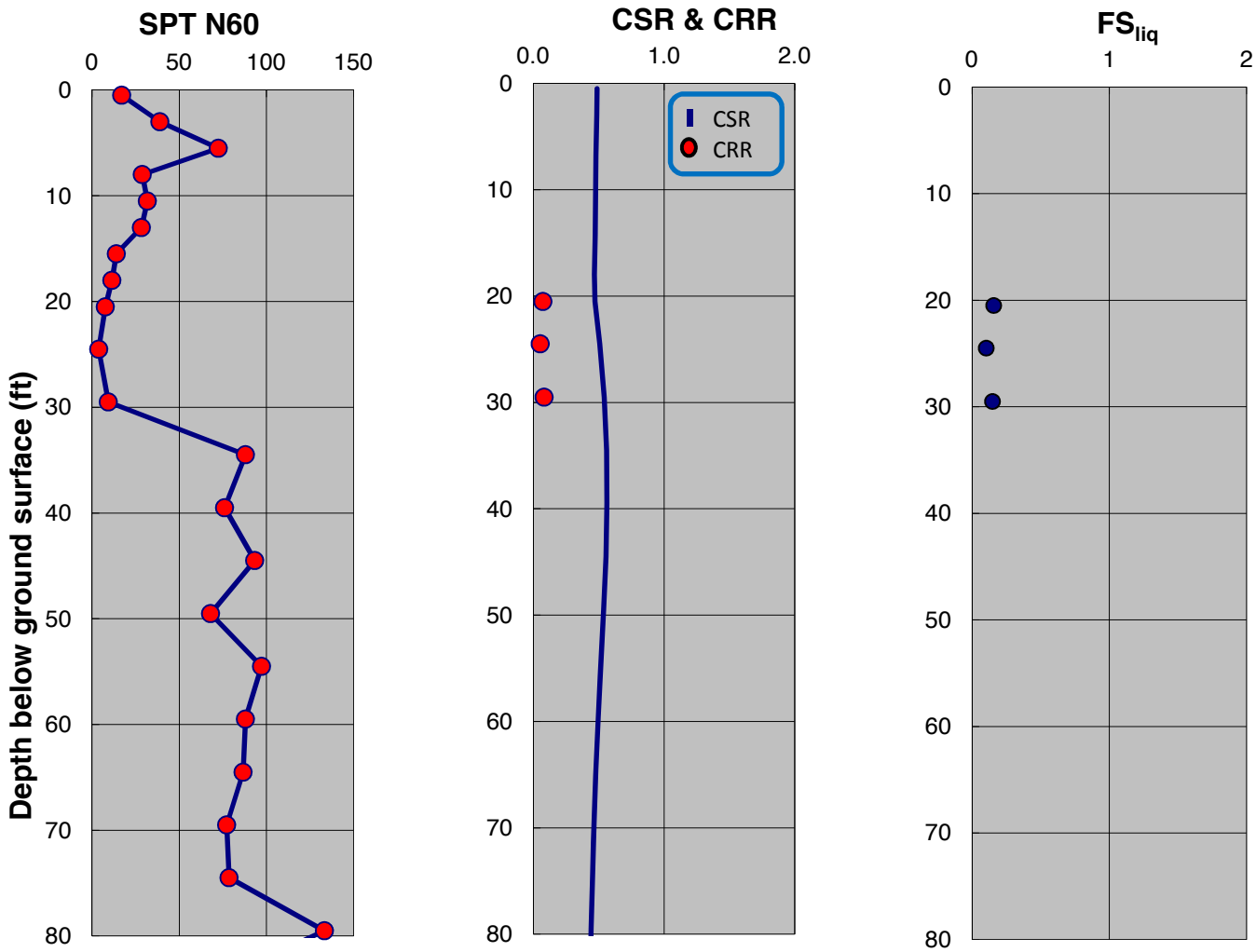
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-173 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



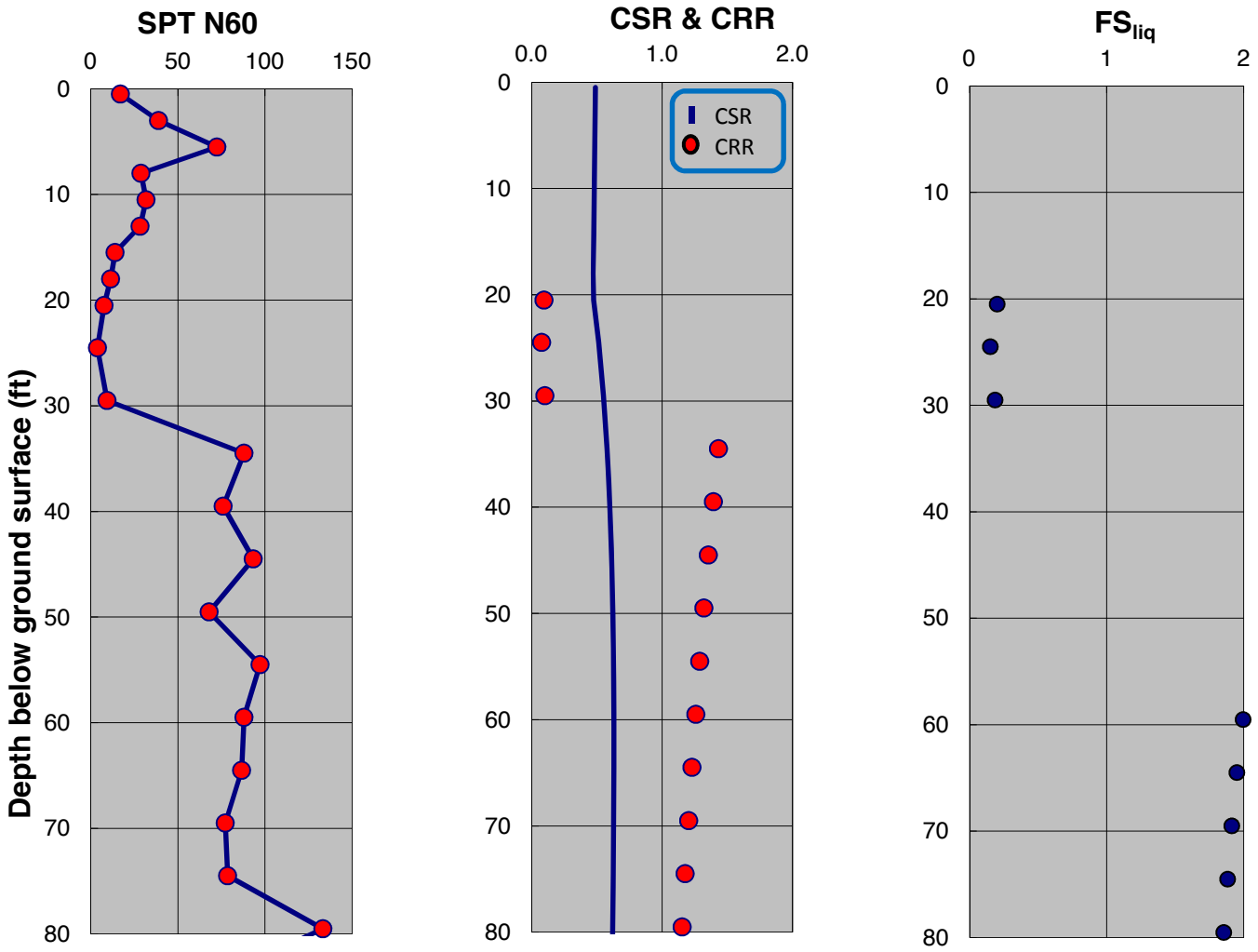
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-173 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



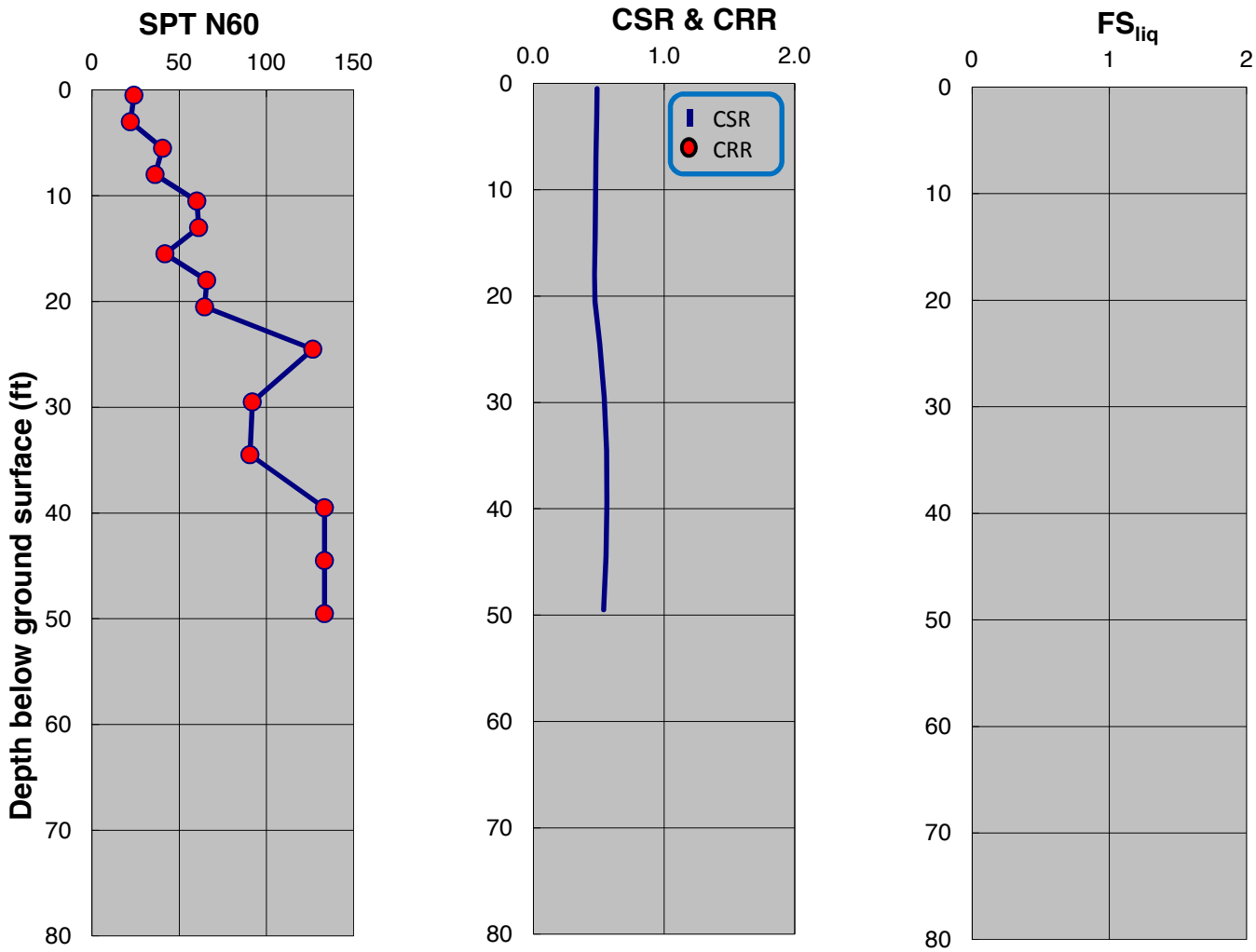
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-176 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



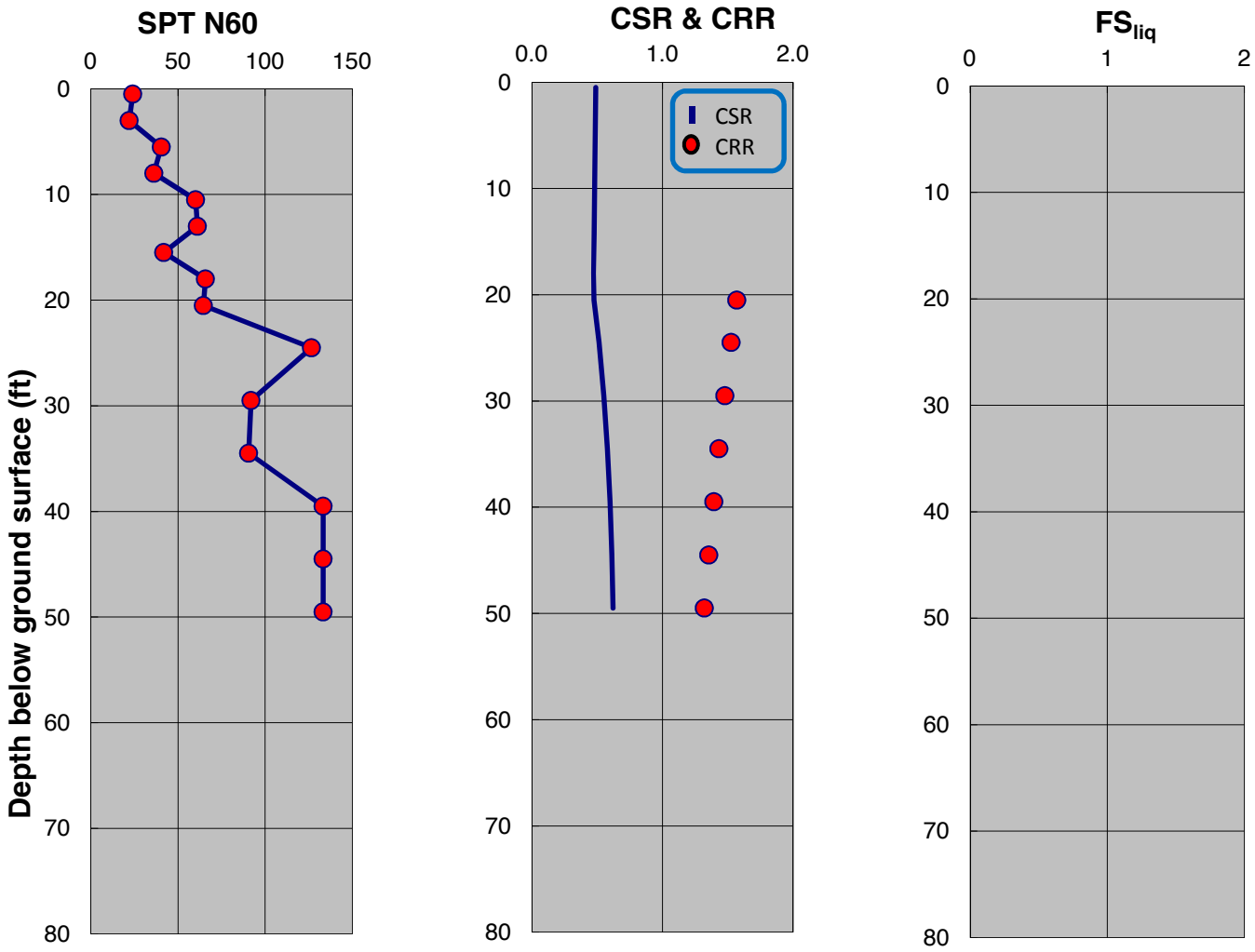
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-176 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



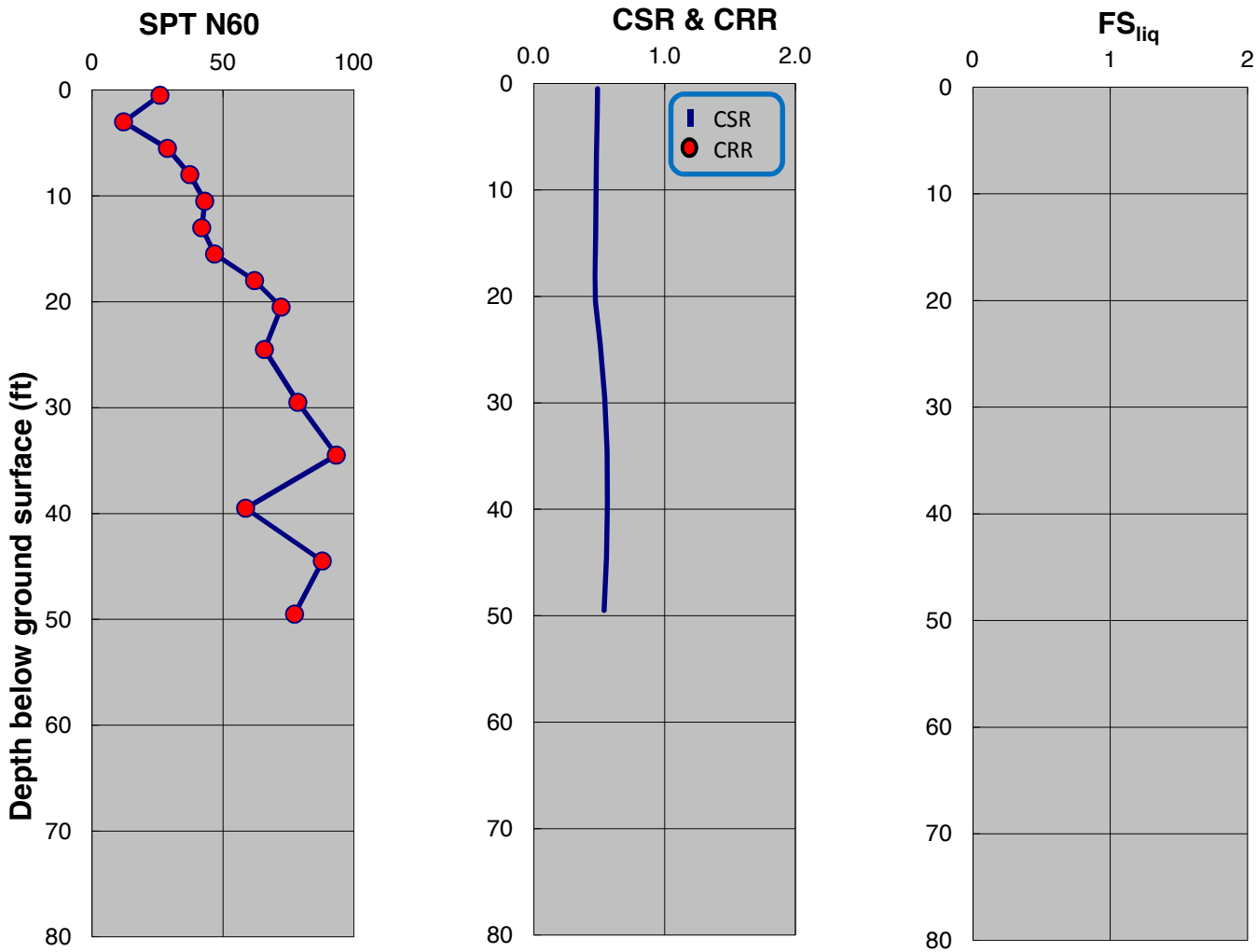
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-177 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



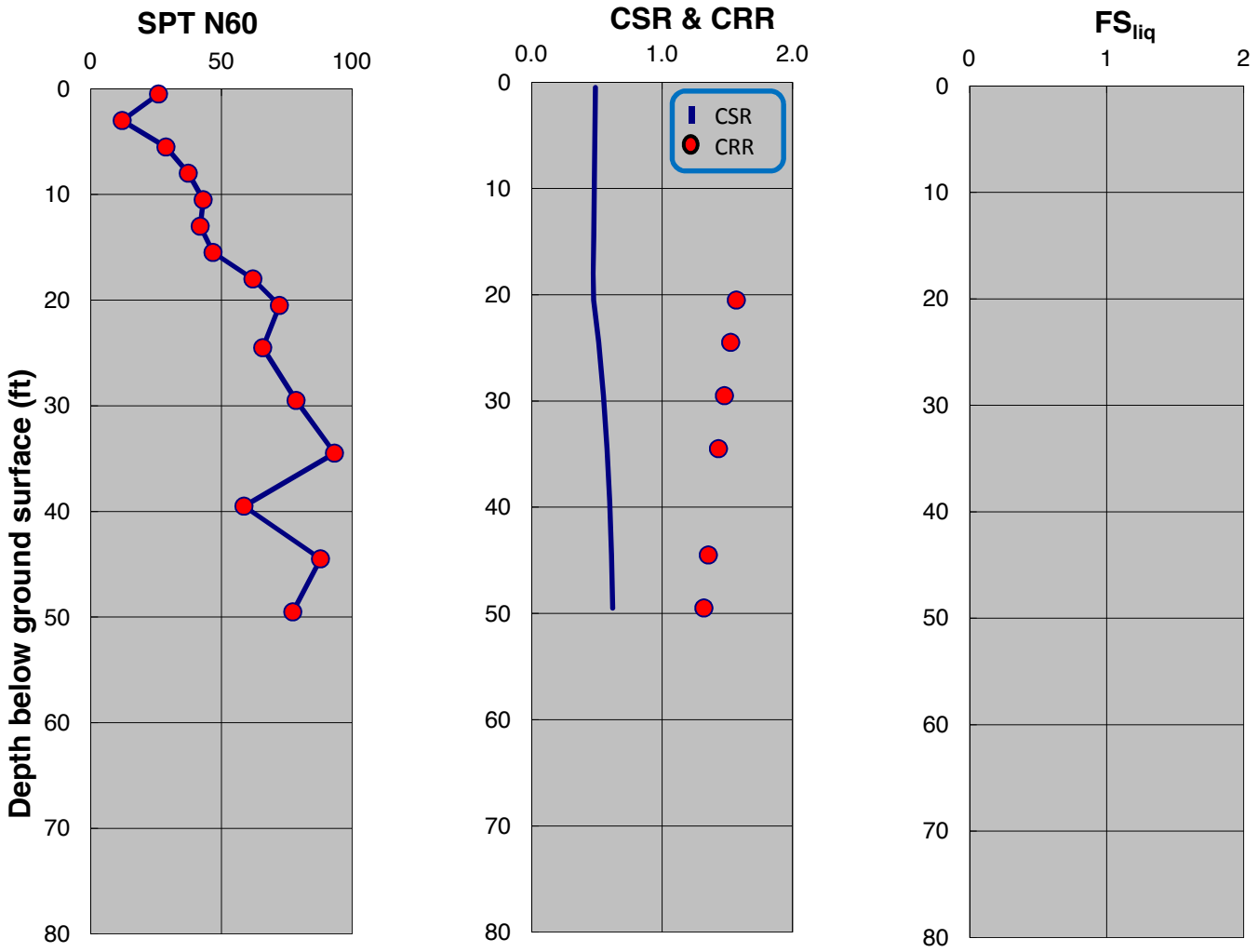
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-177 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



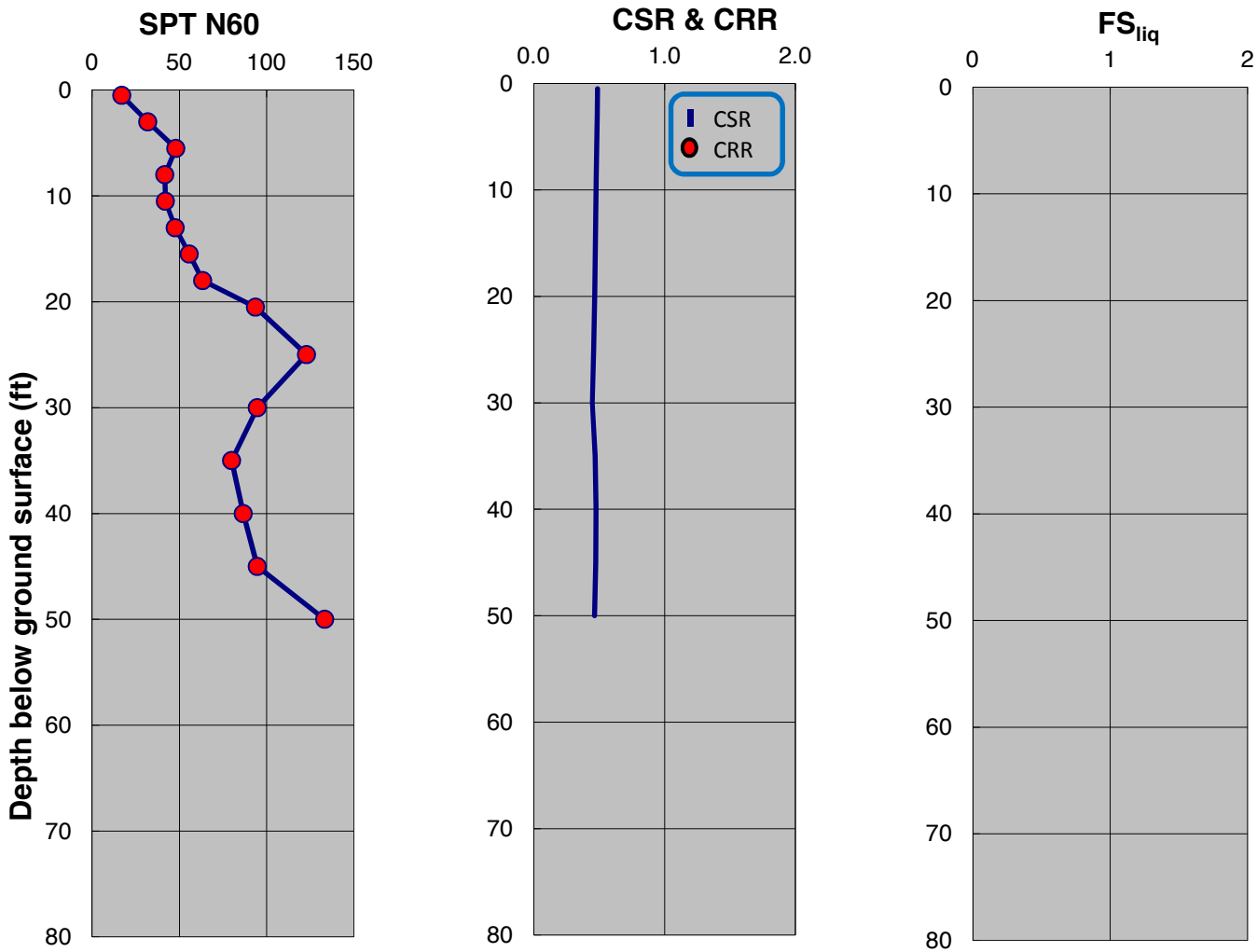
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-178 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



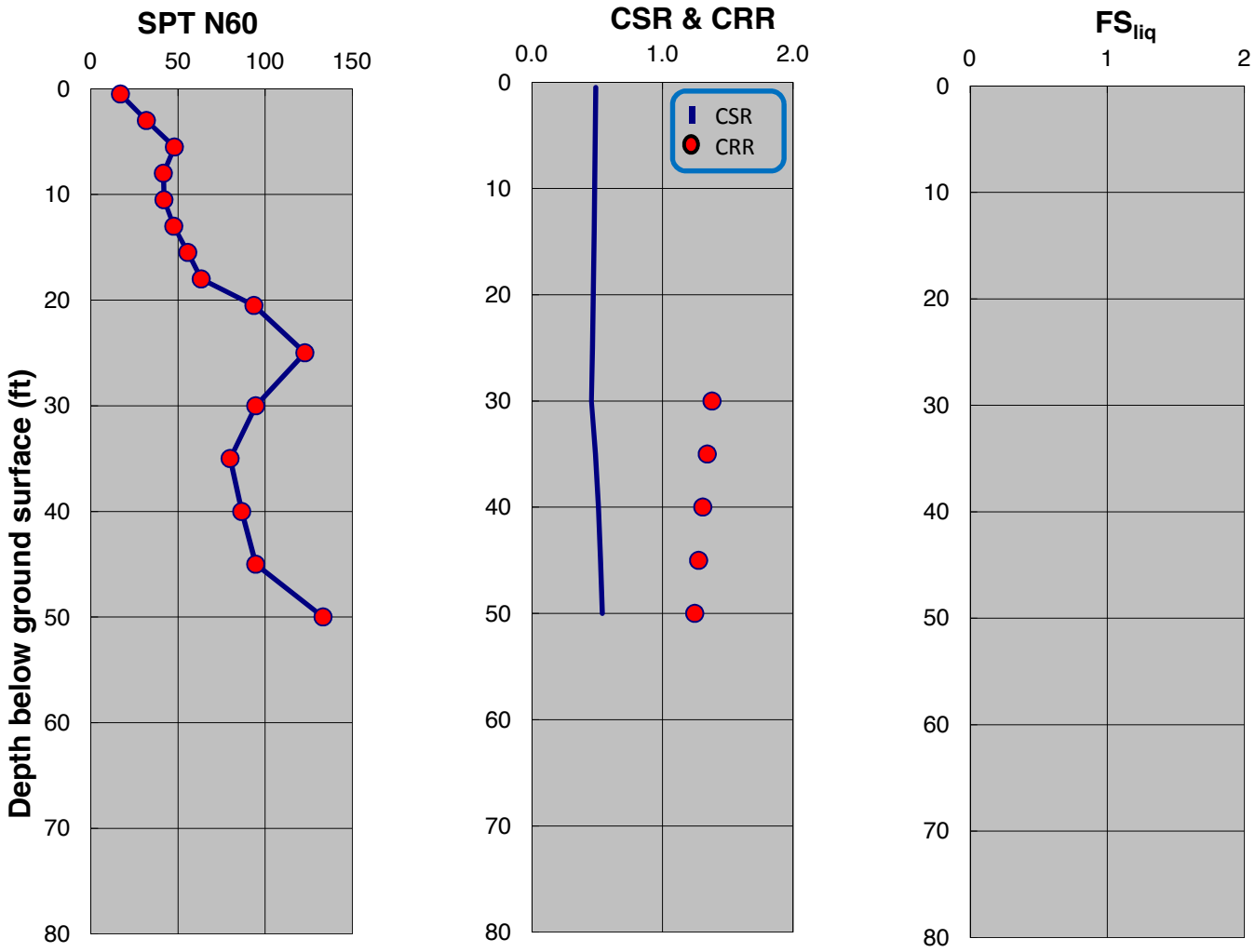
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-178 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



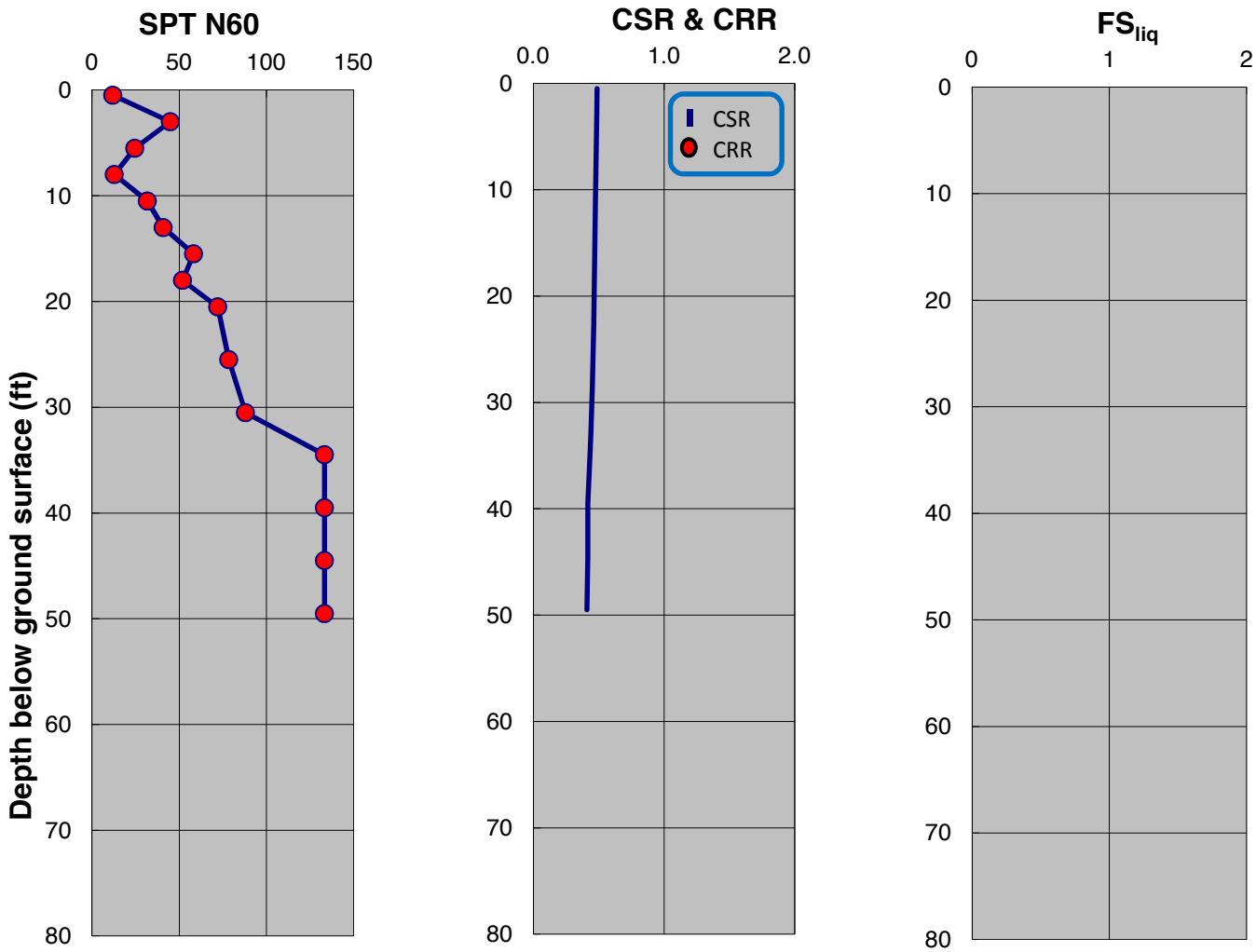
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-179 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



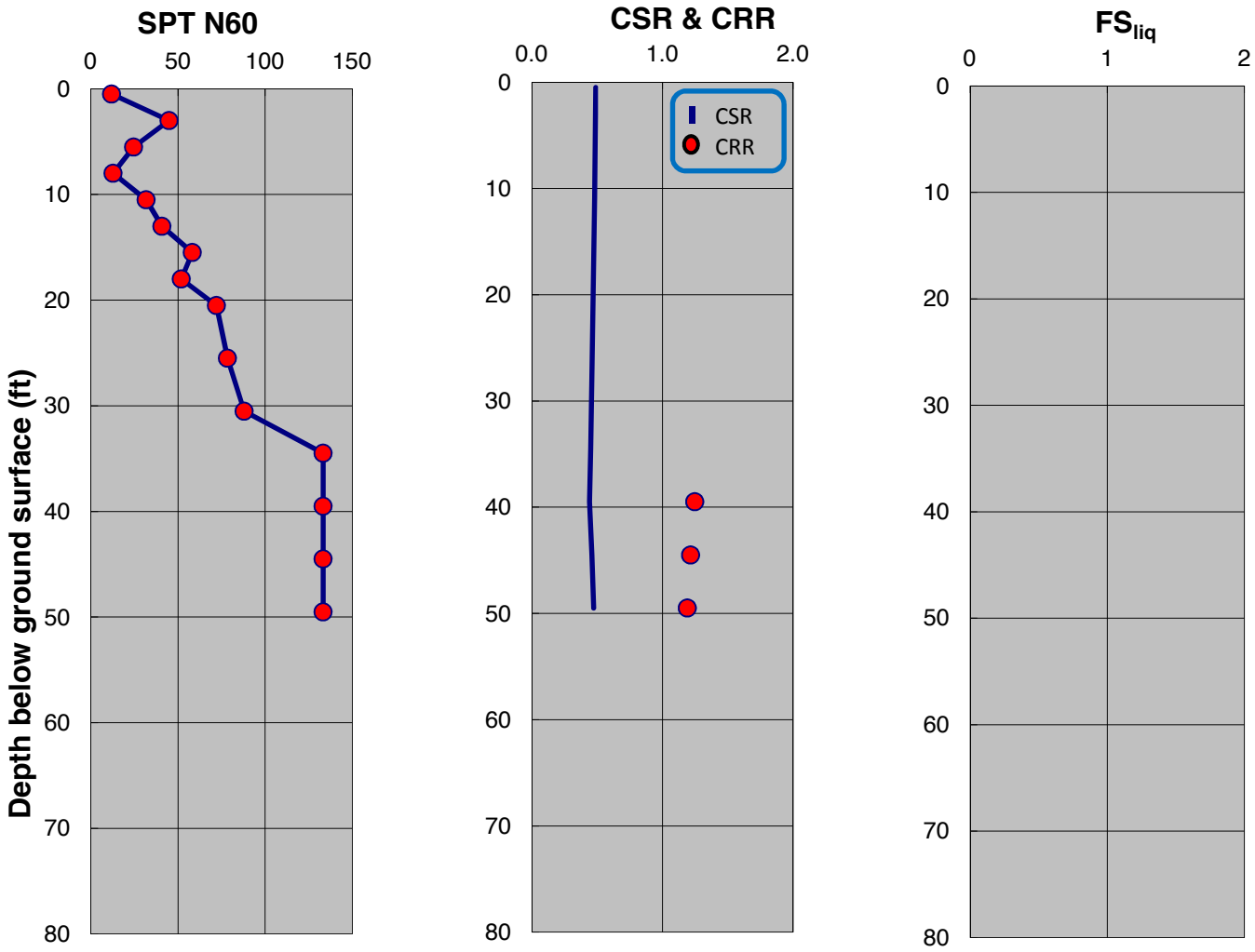
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-179 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-180 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

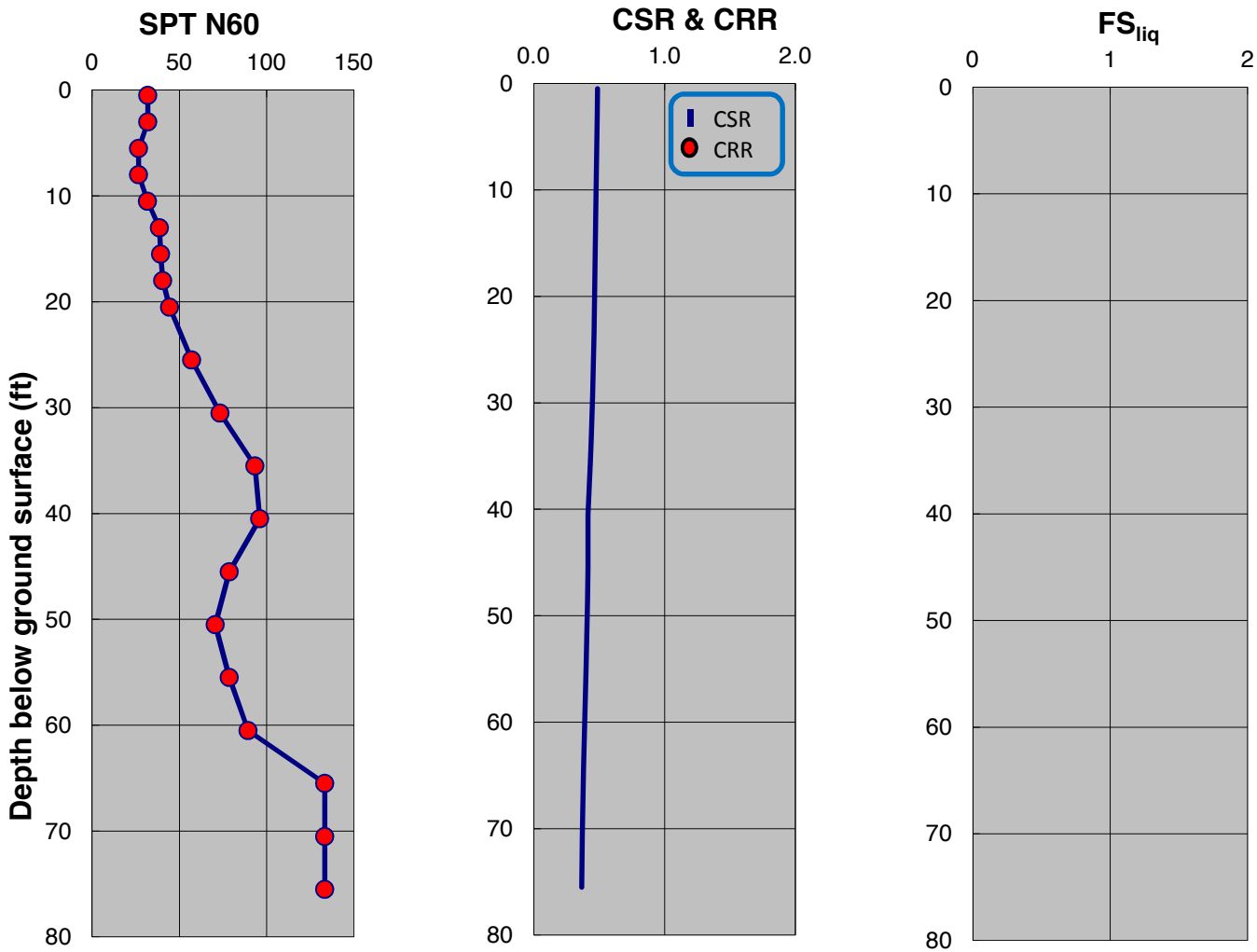
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-180 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

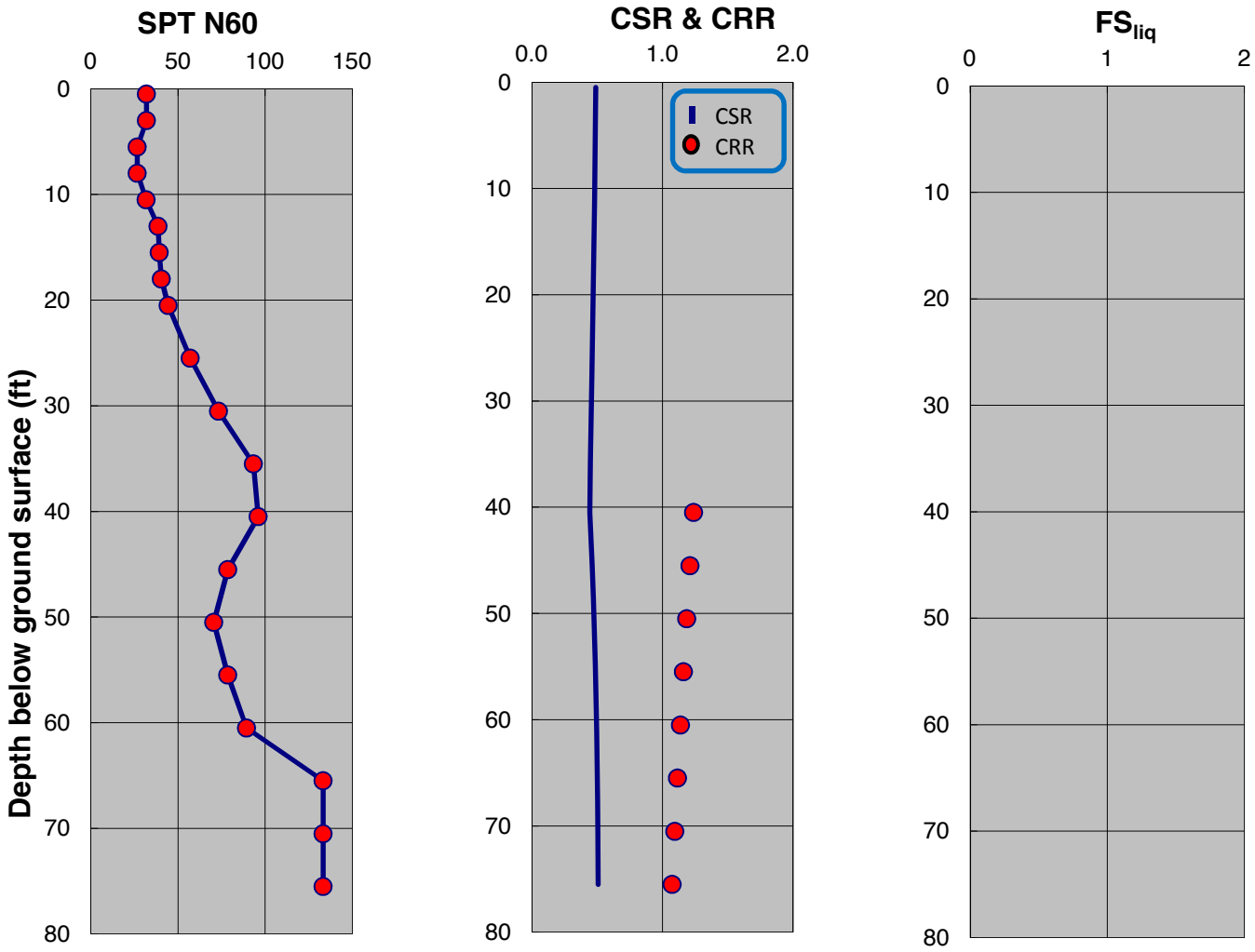
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.240



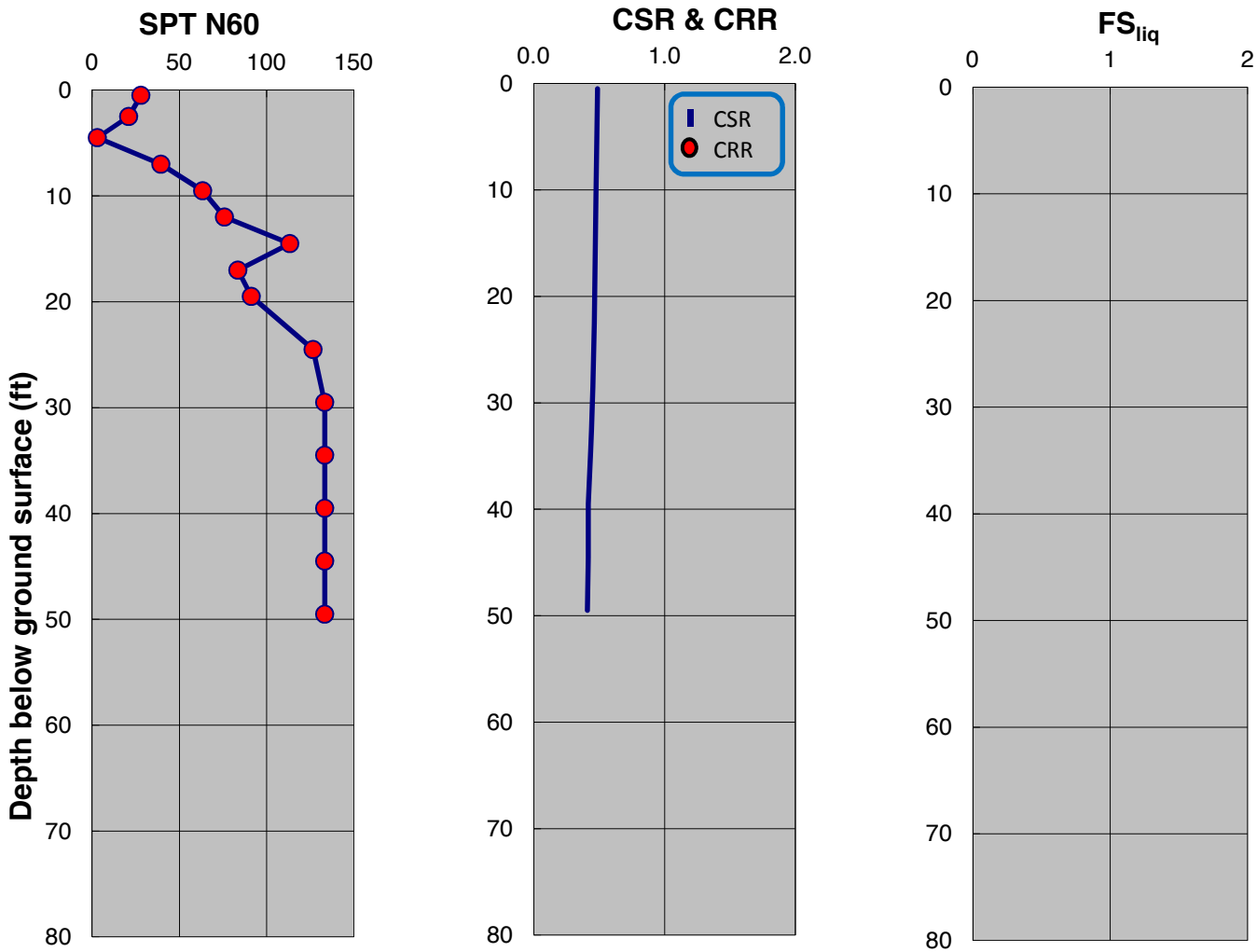
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-181 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



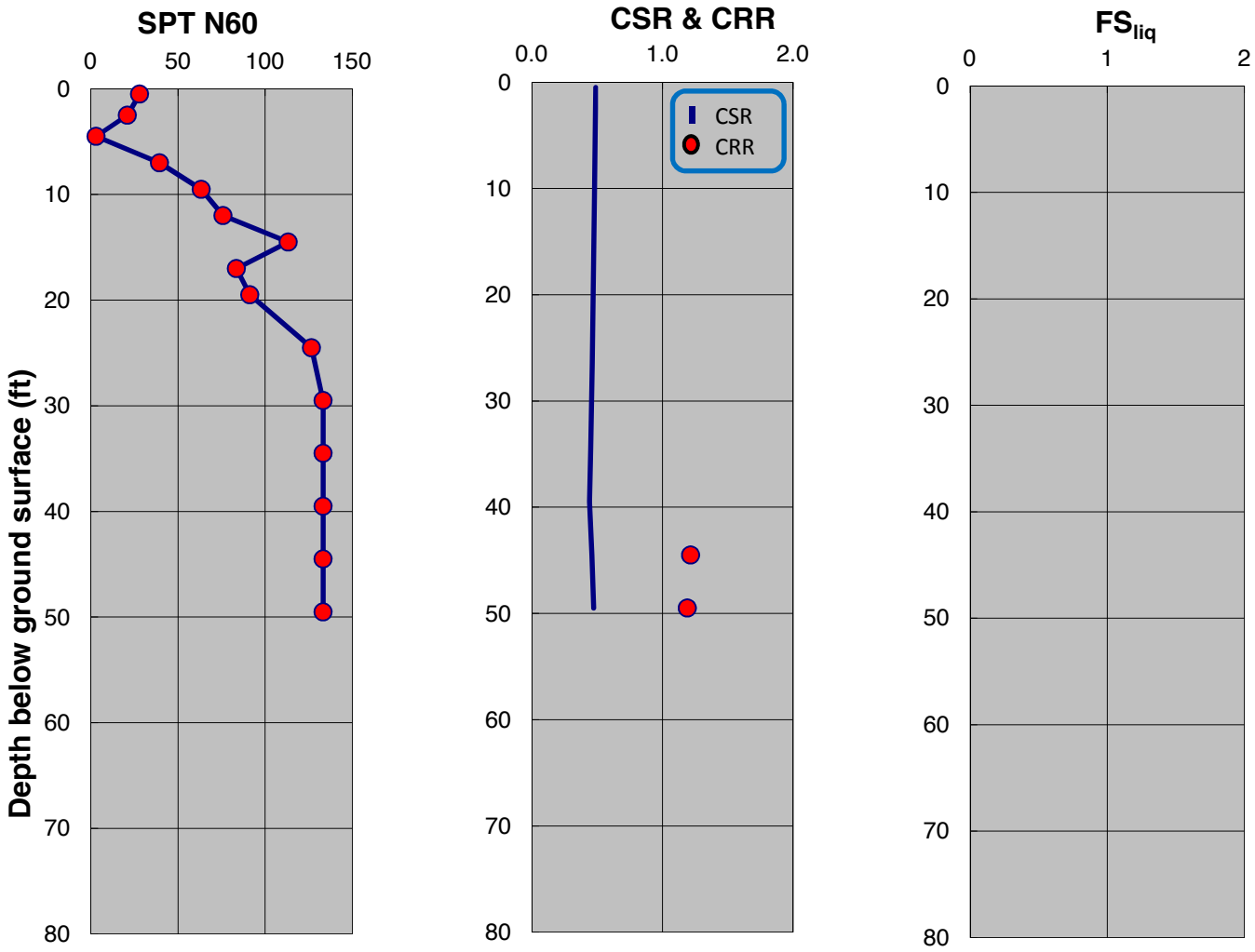
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-181 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



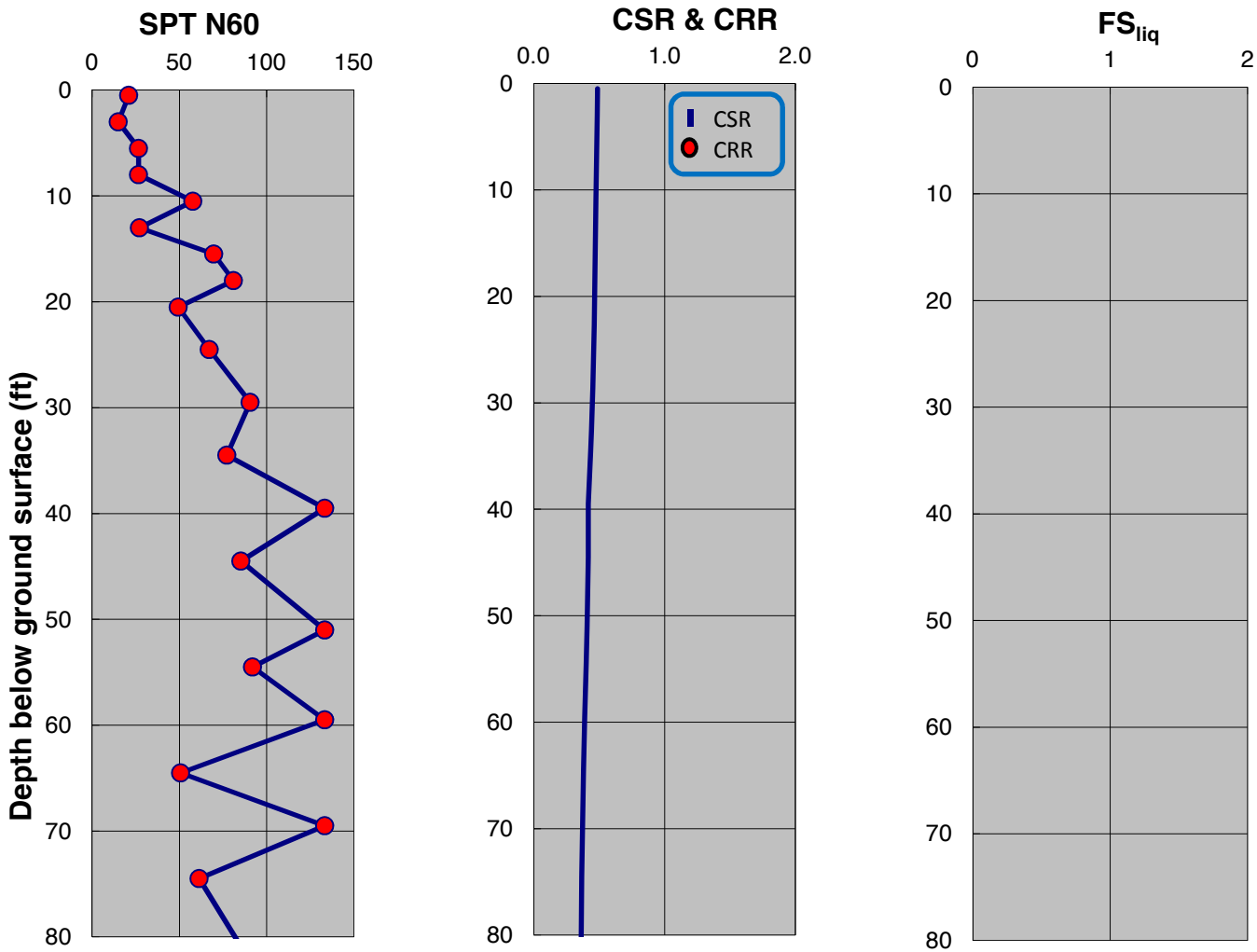
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-182 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



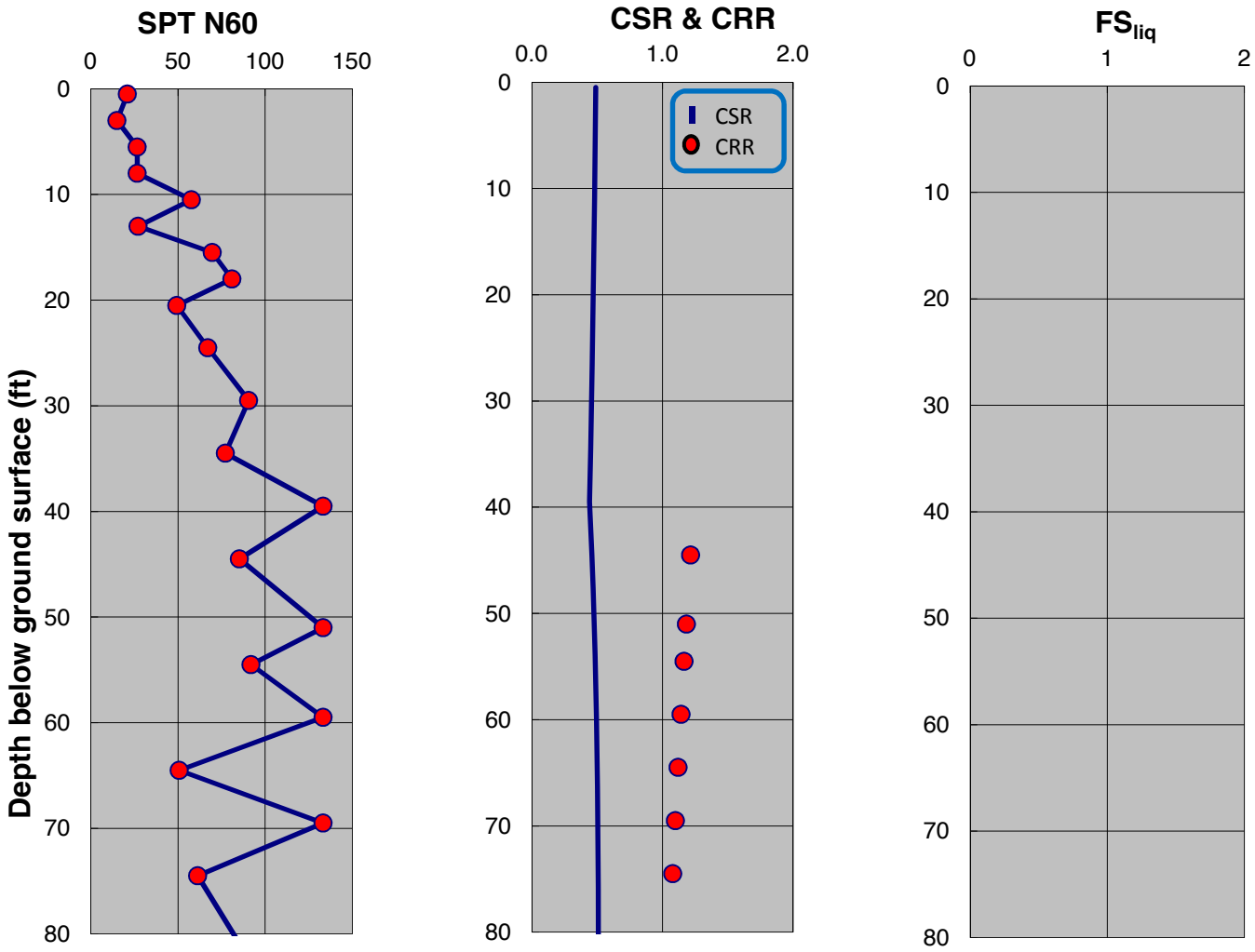
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-182 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



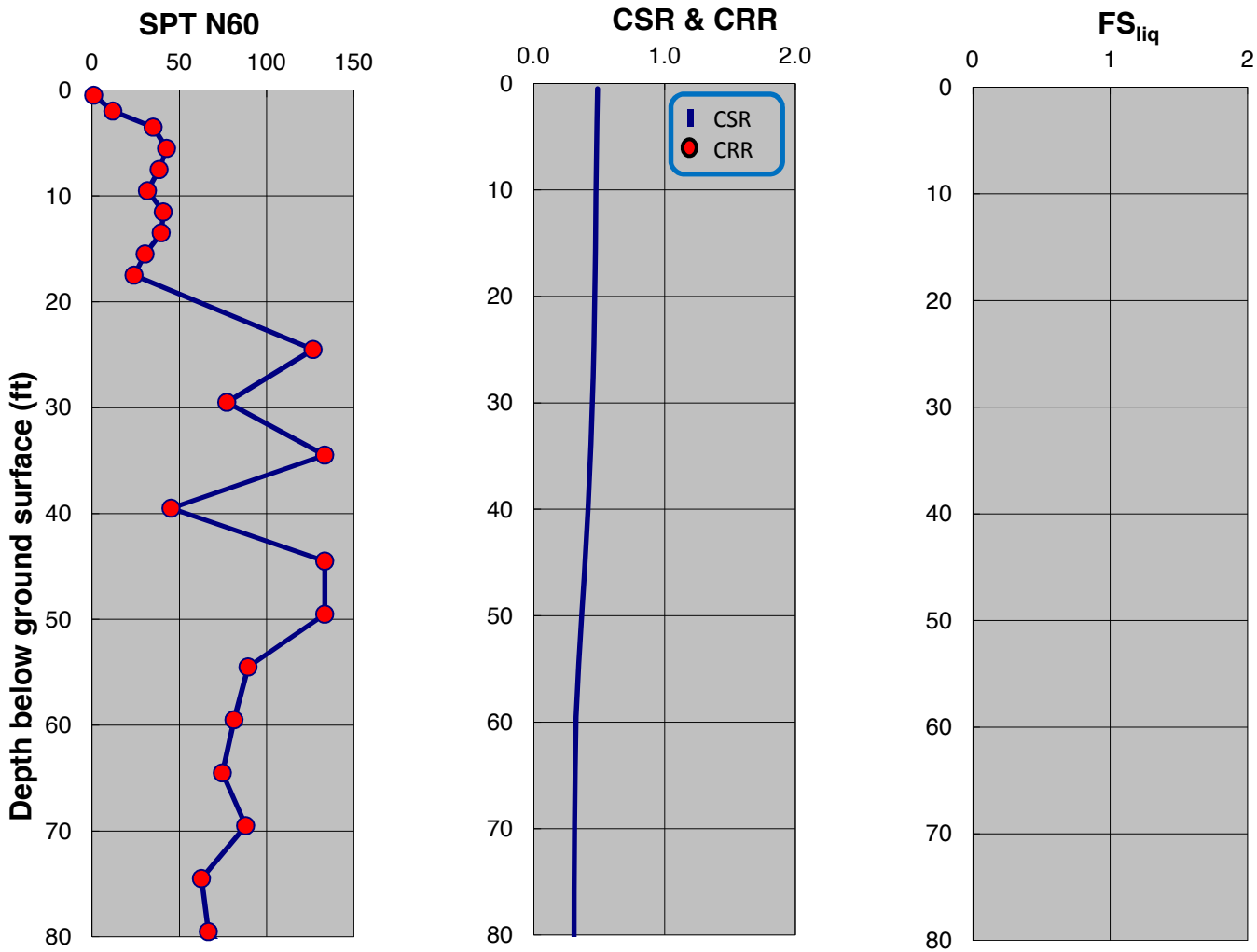
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-183 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



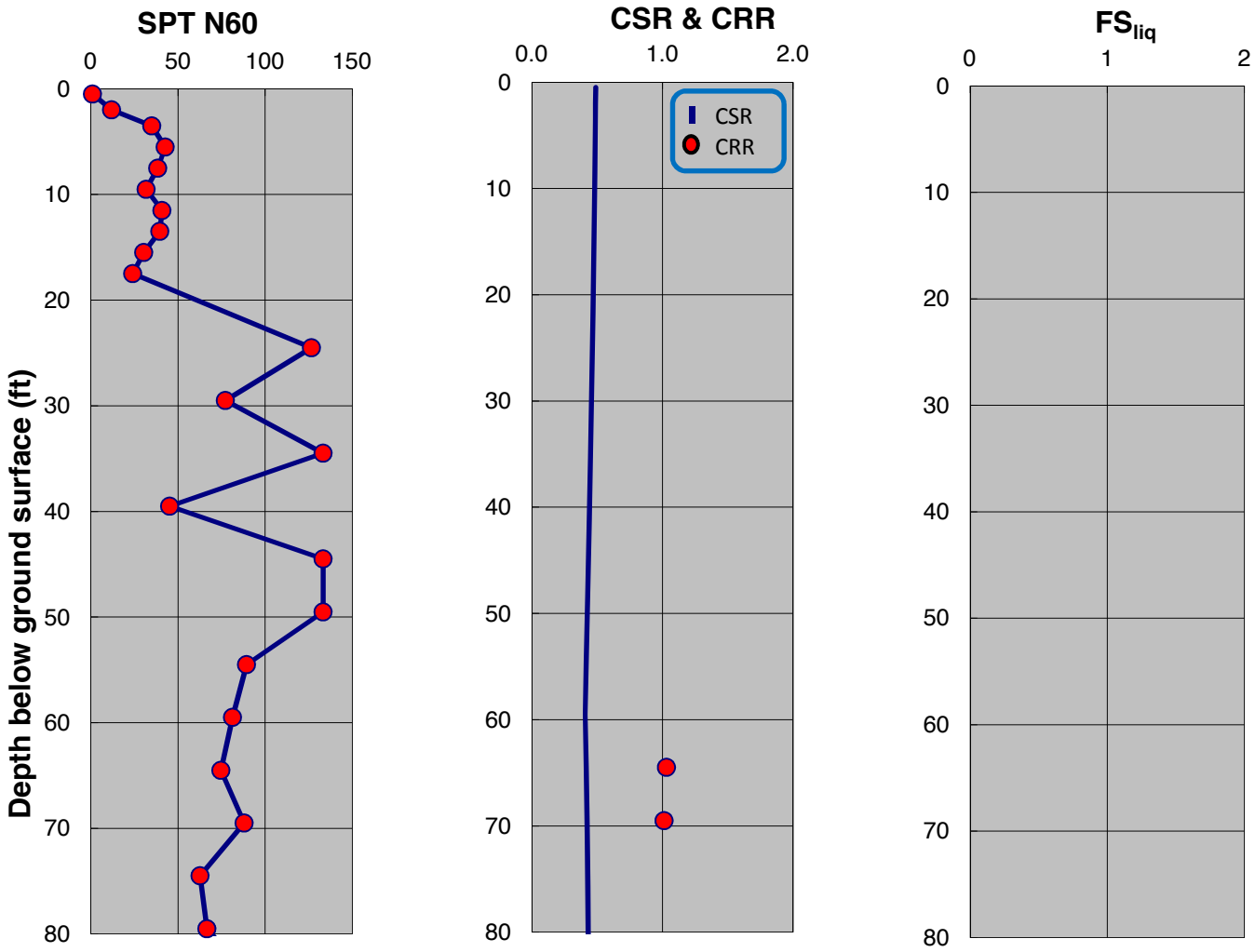
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-183 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



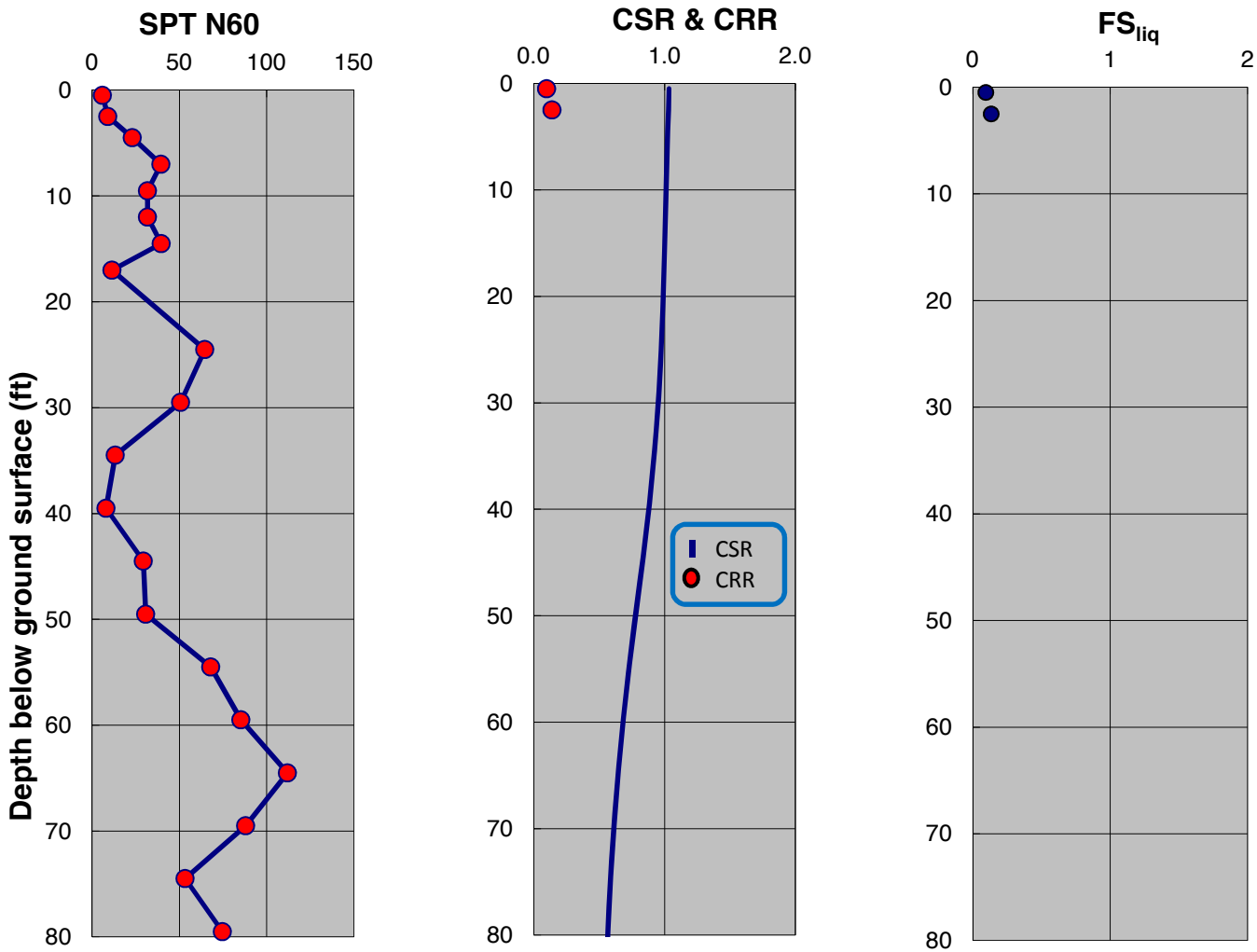
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-189 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



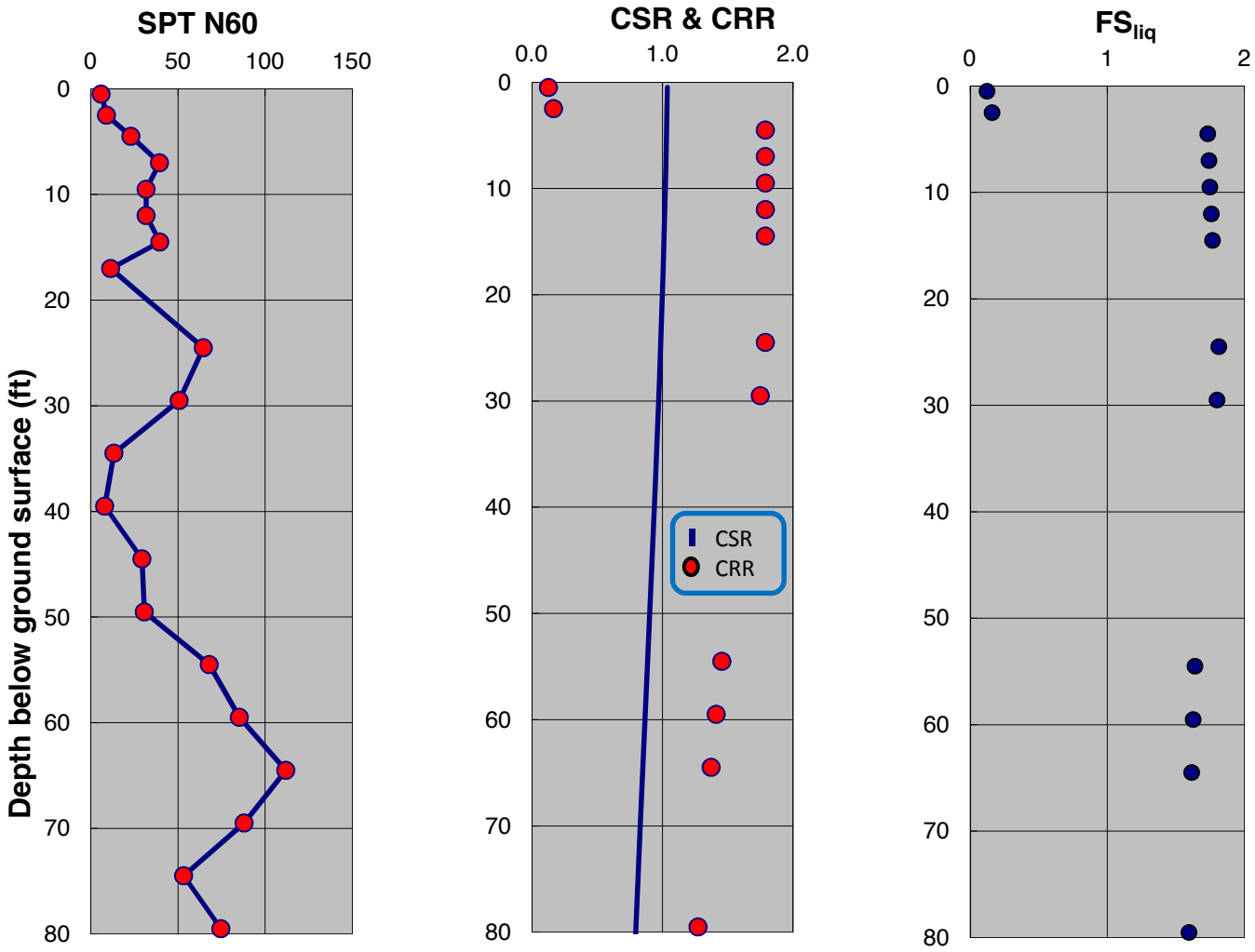
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-189 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-190 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

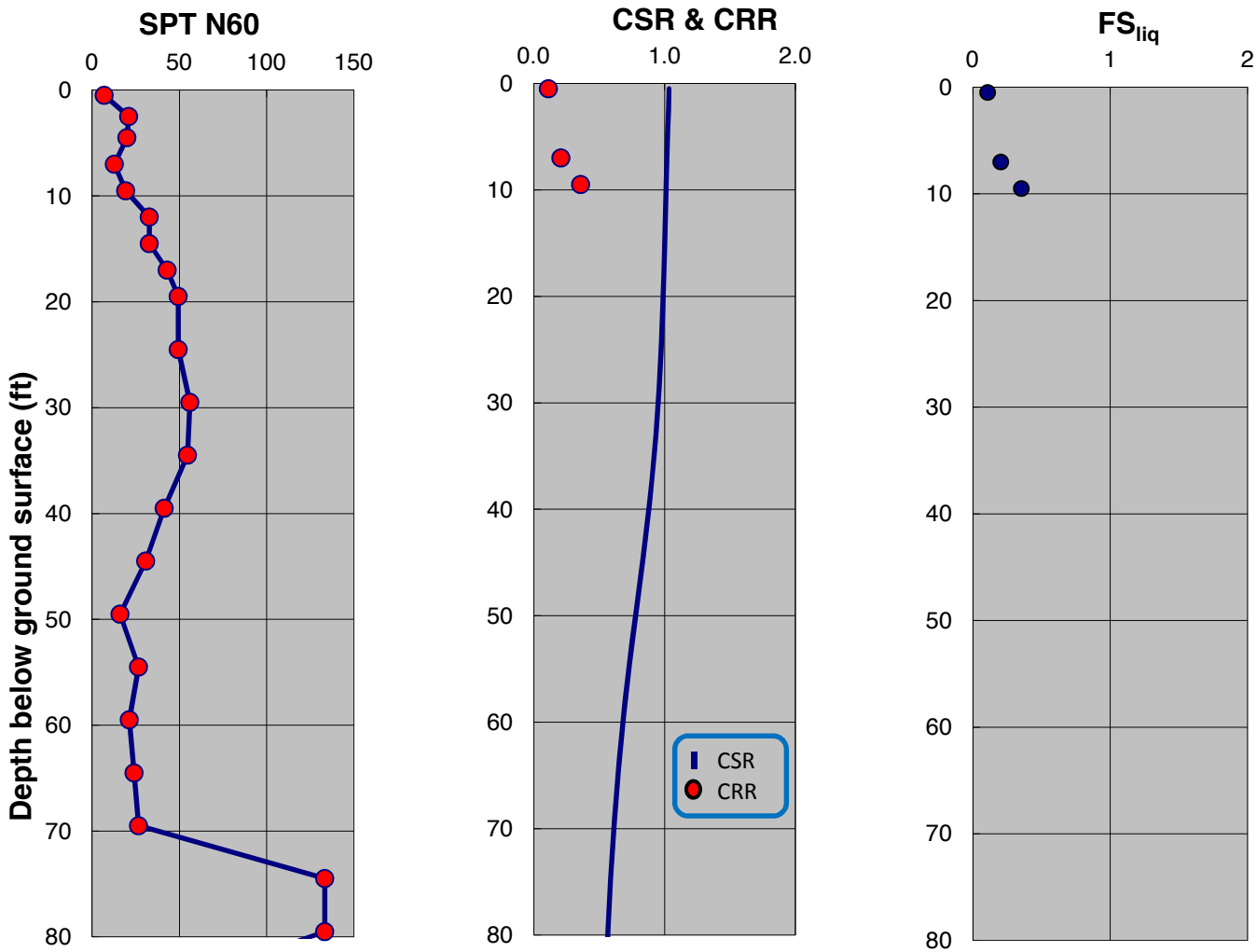
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-190 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

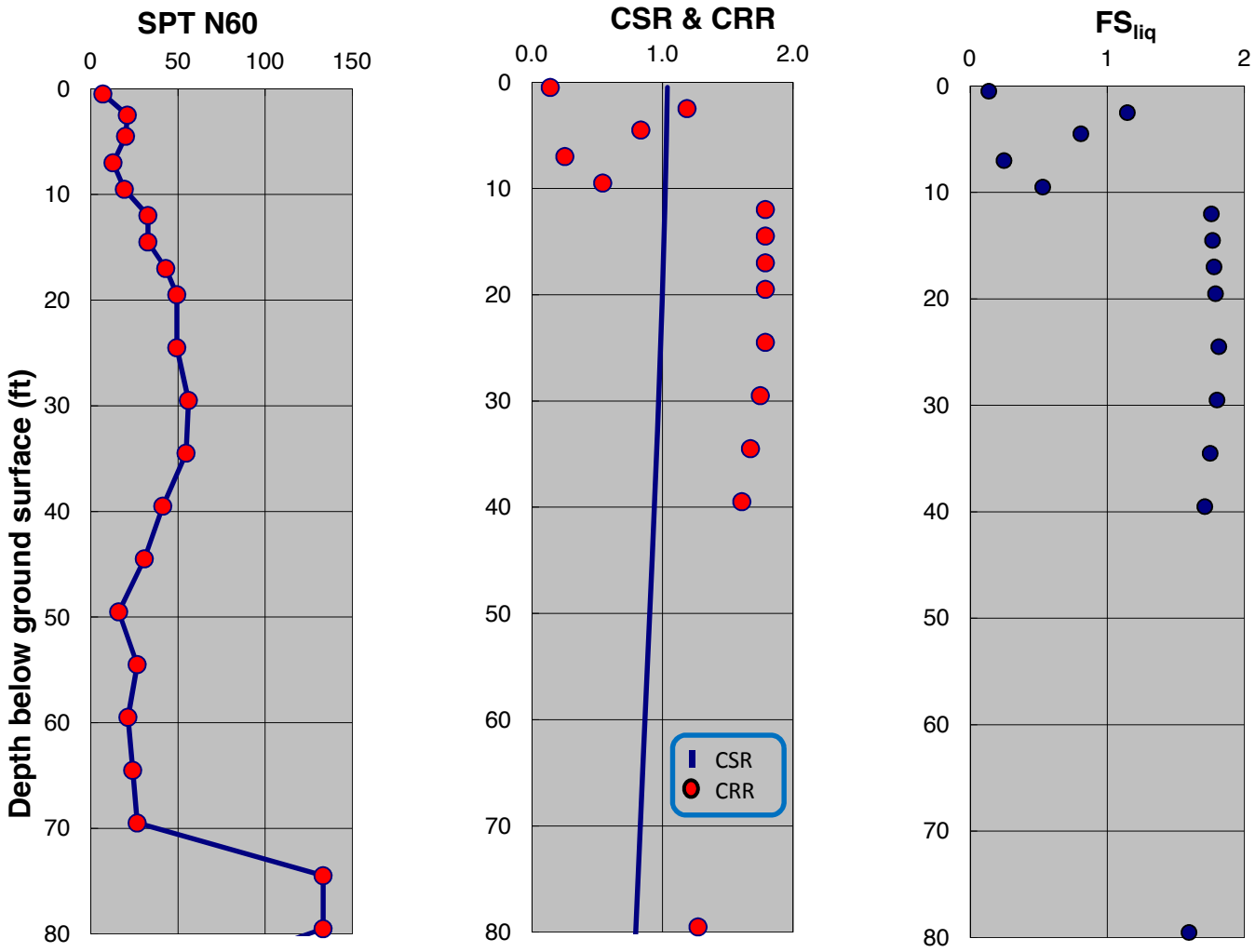
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.250



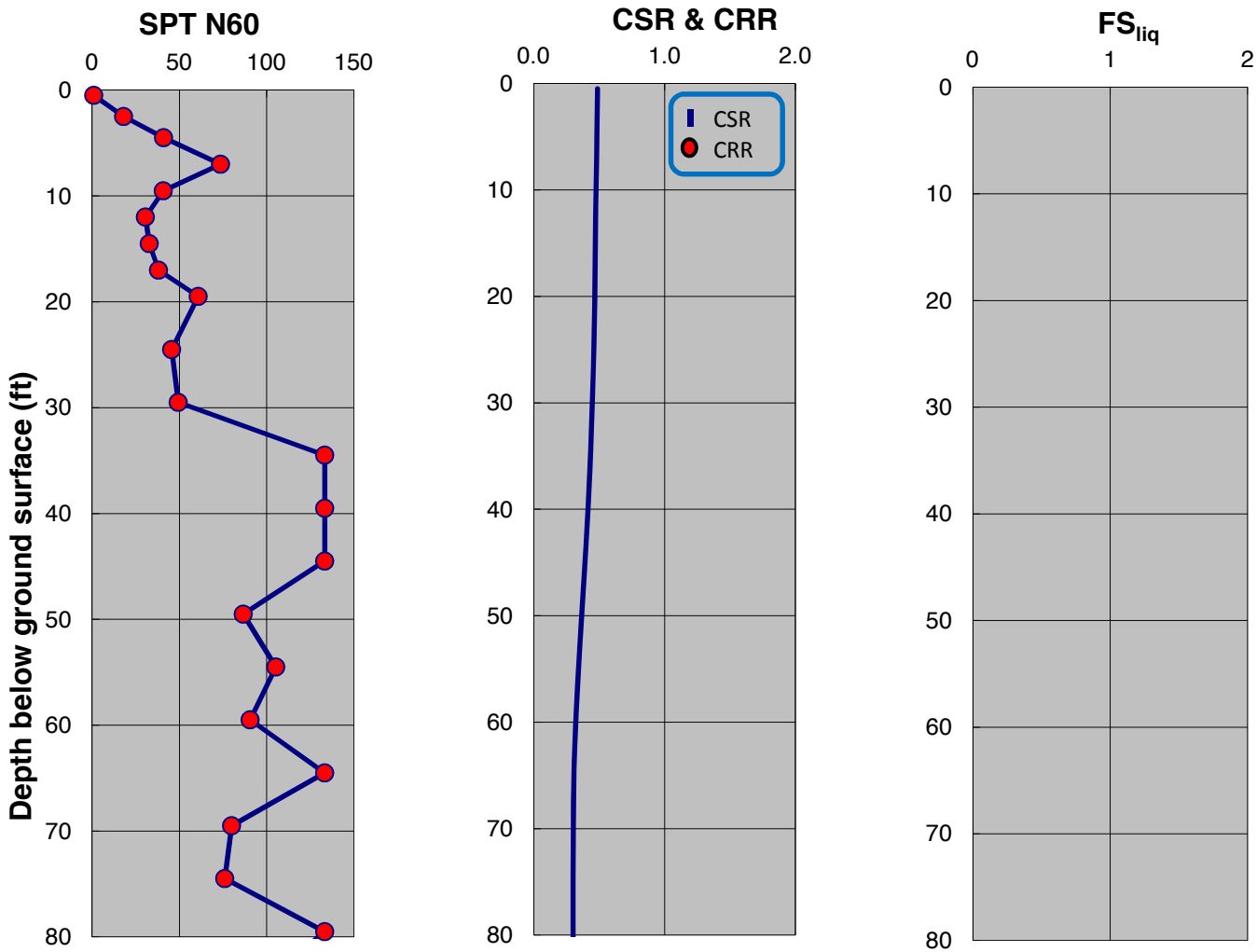
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-191 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



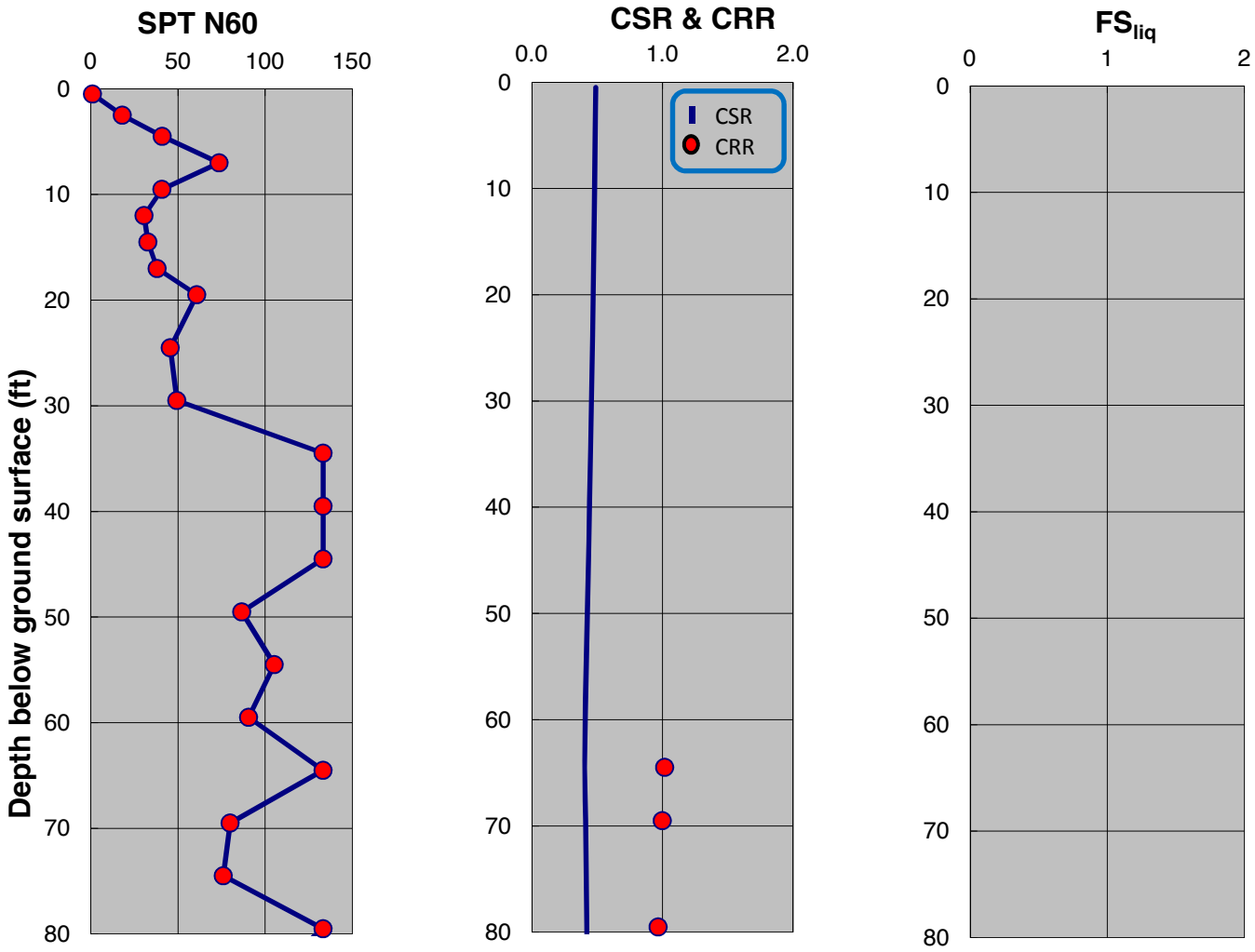
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-191 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



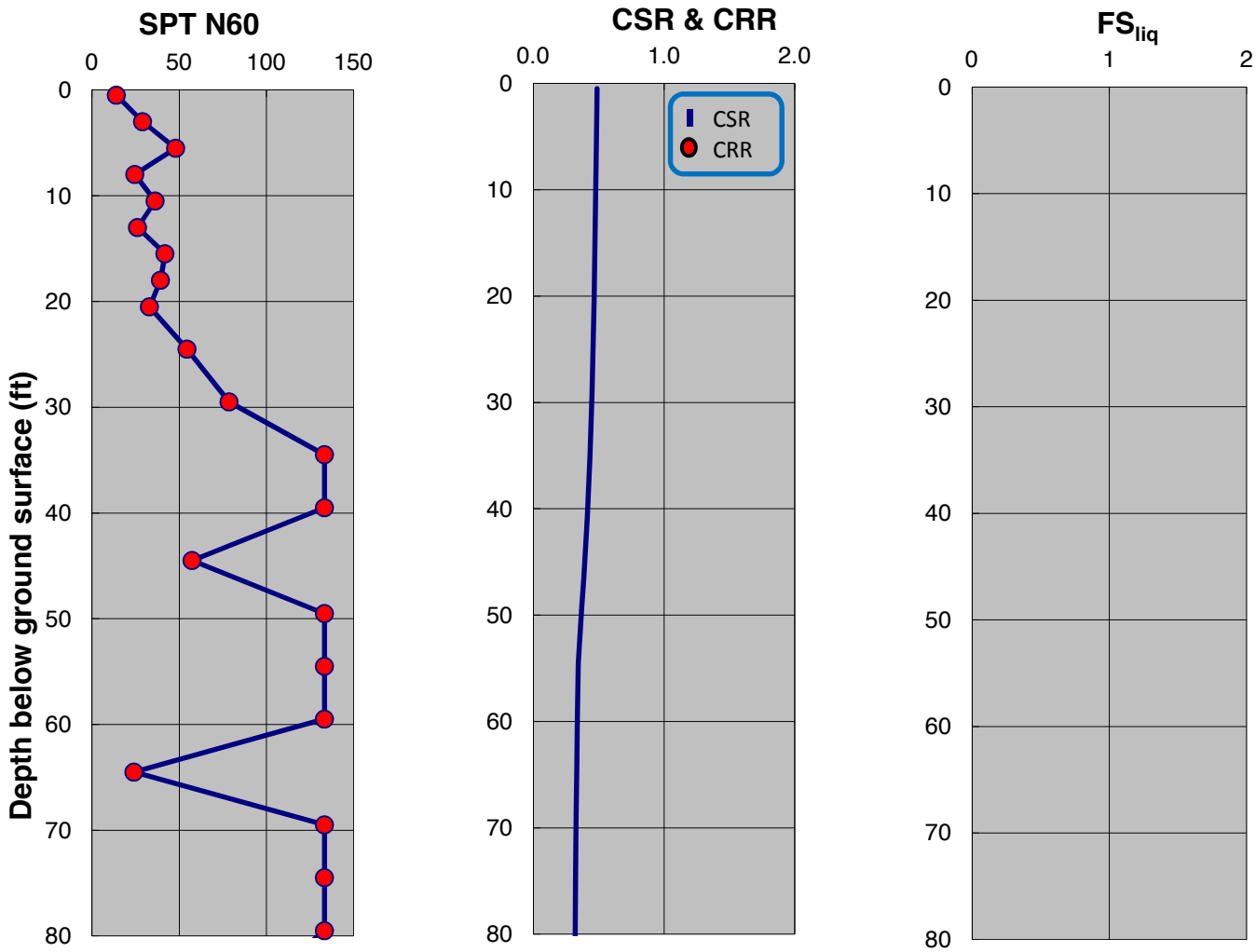
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-192 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



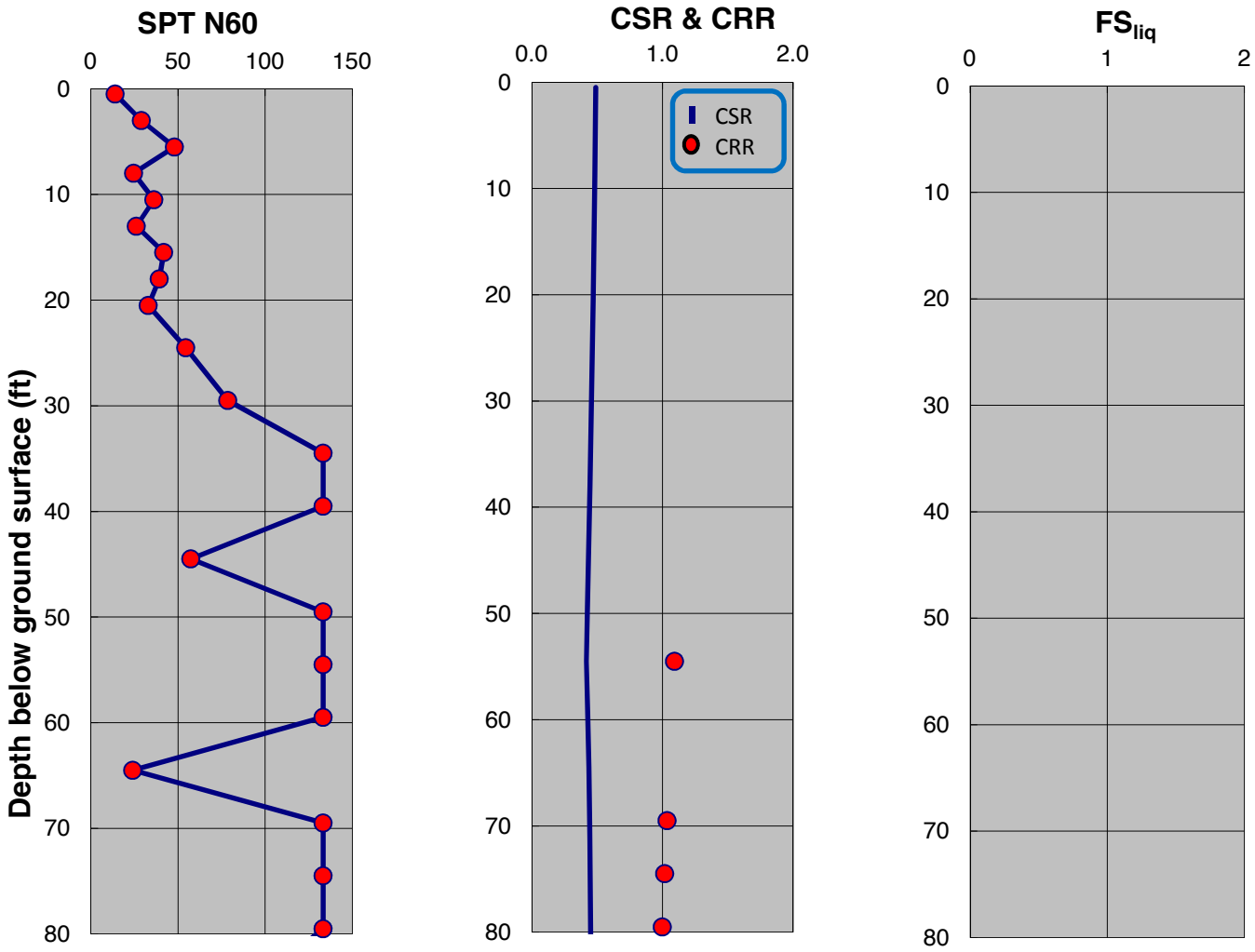
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-192 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



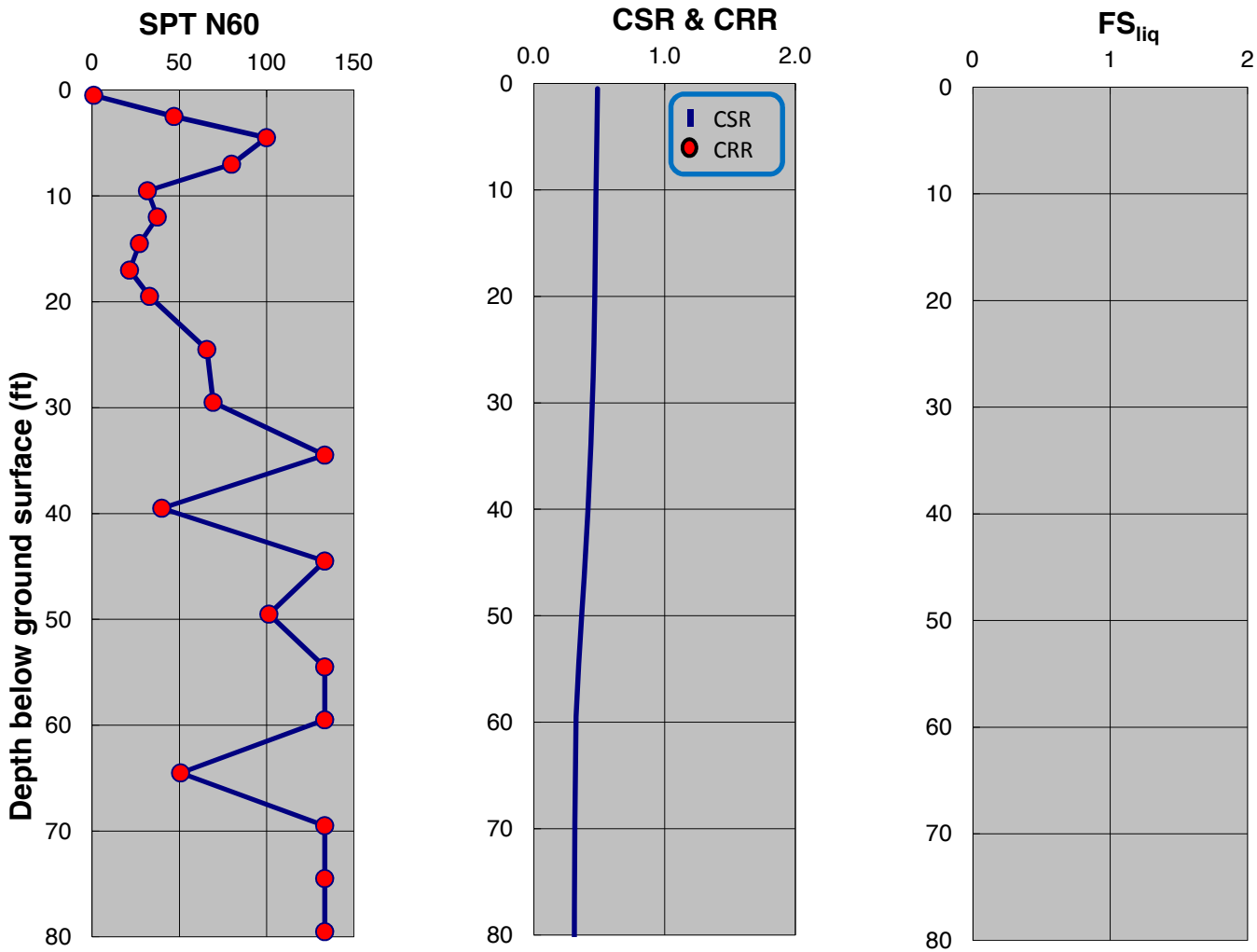
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-195 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



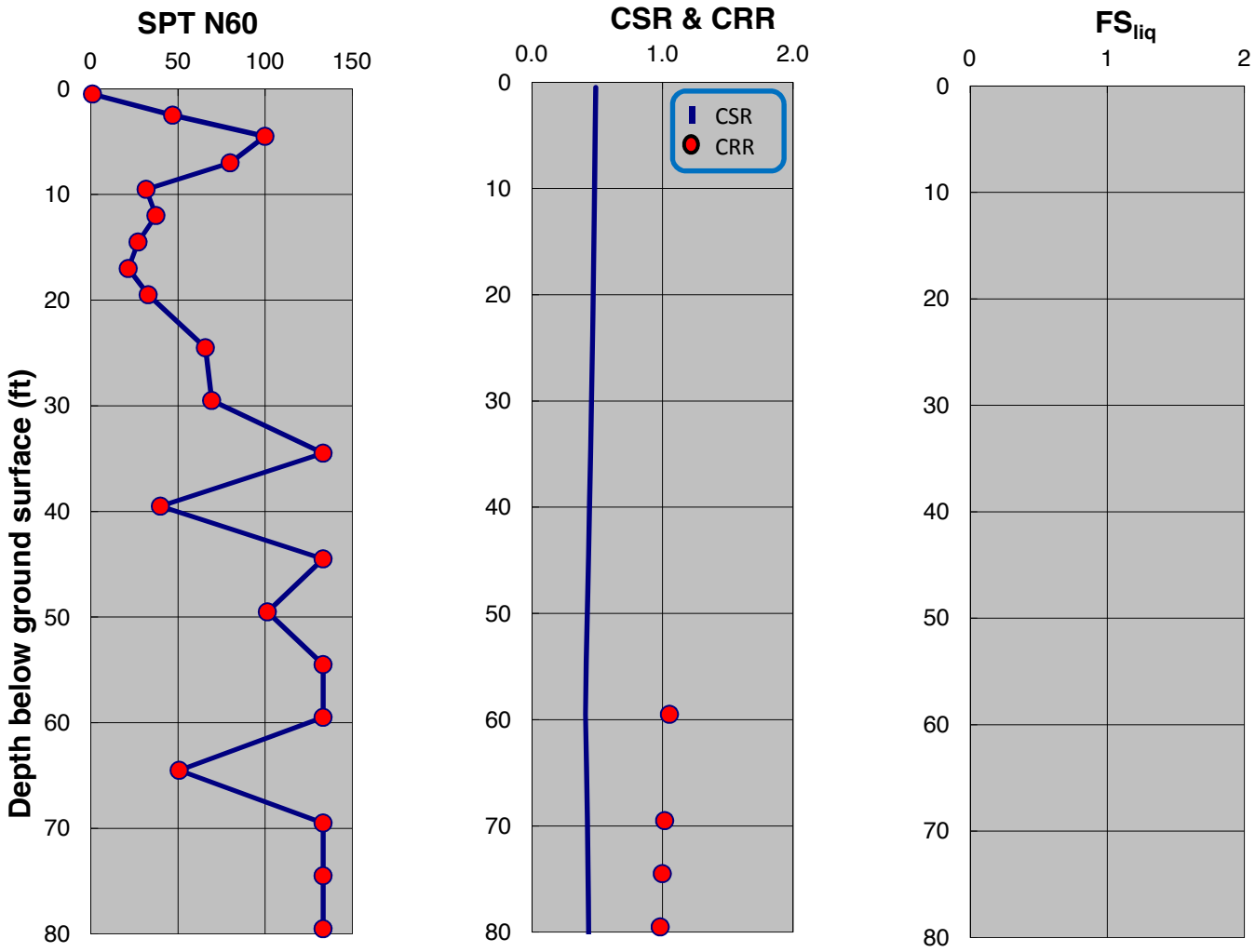
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-195 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



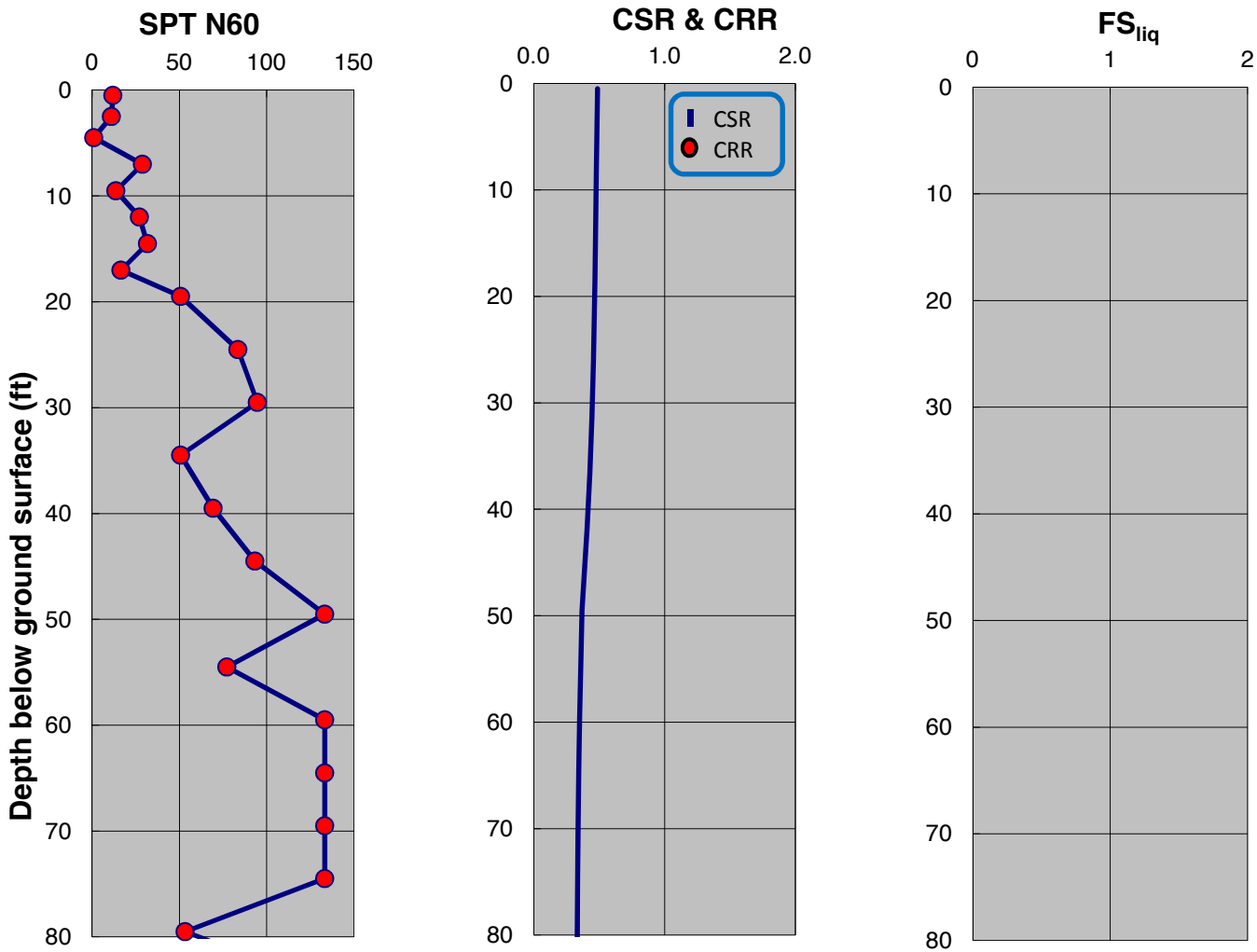
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-197 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



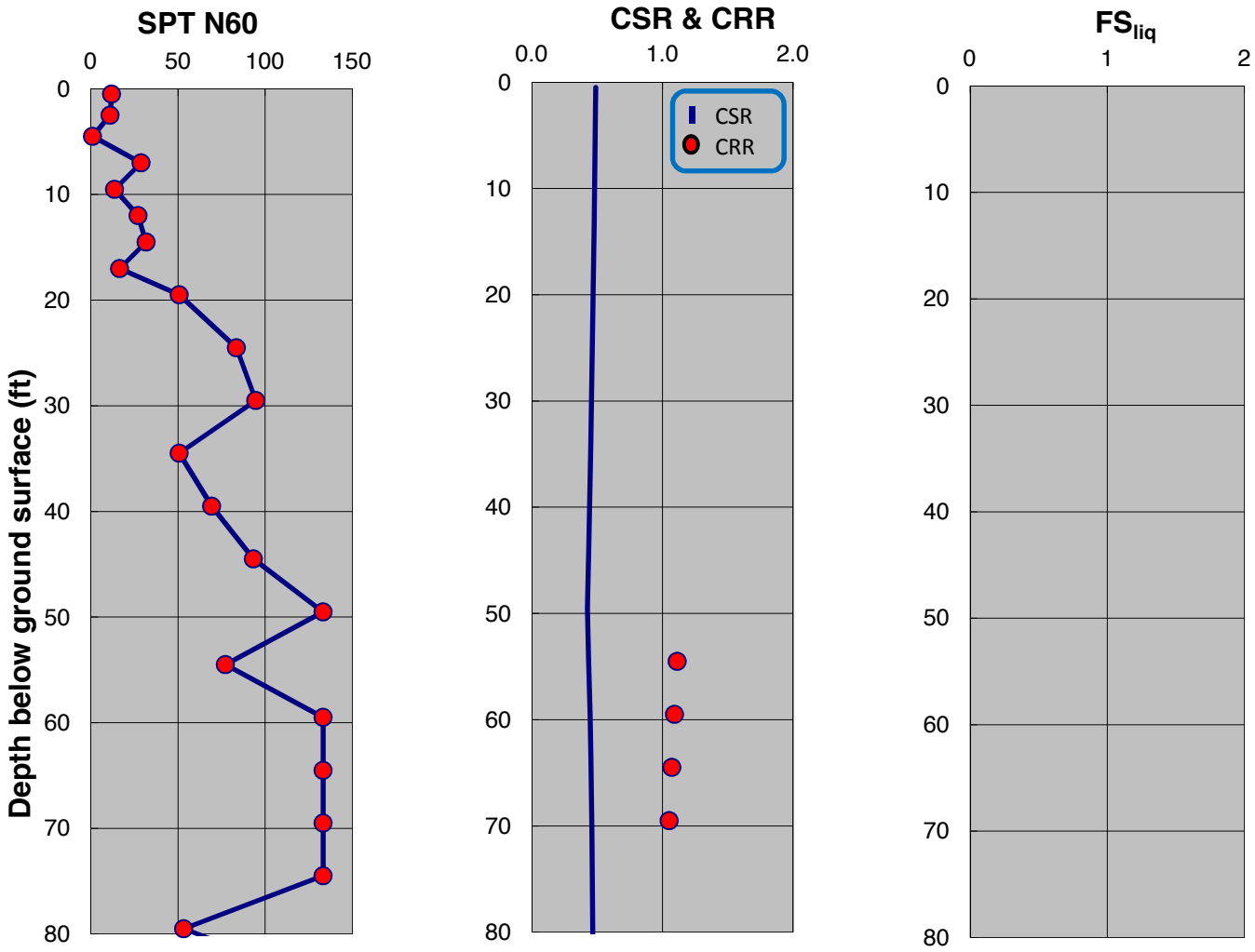
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-197 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



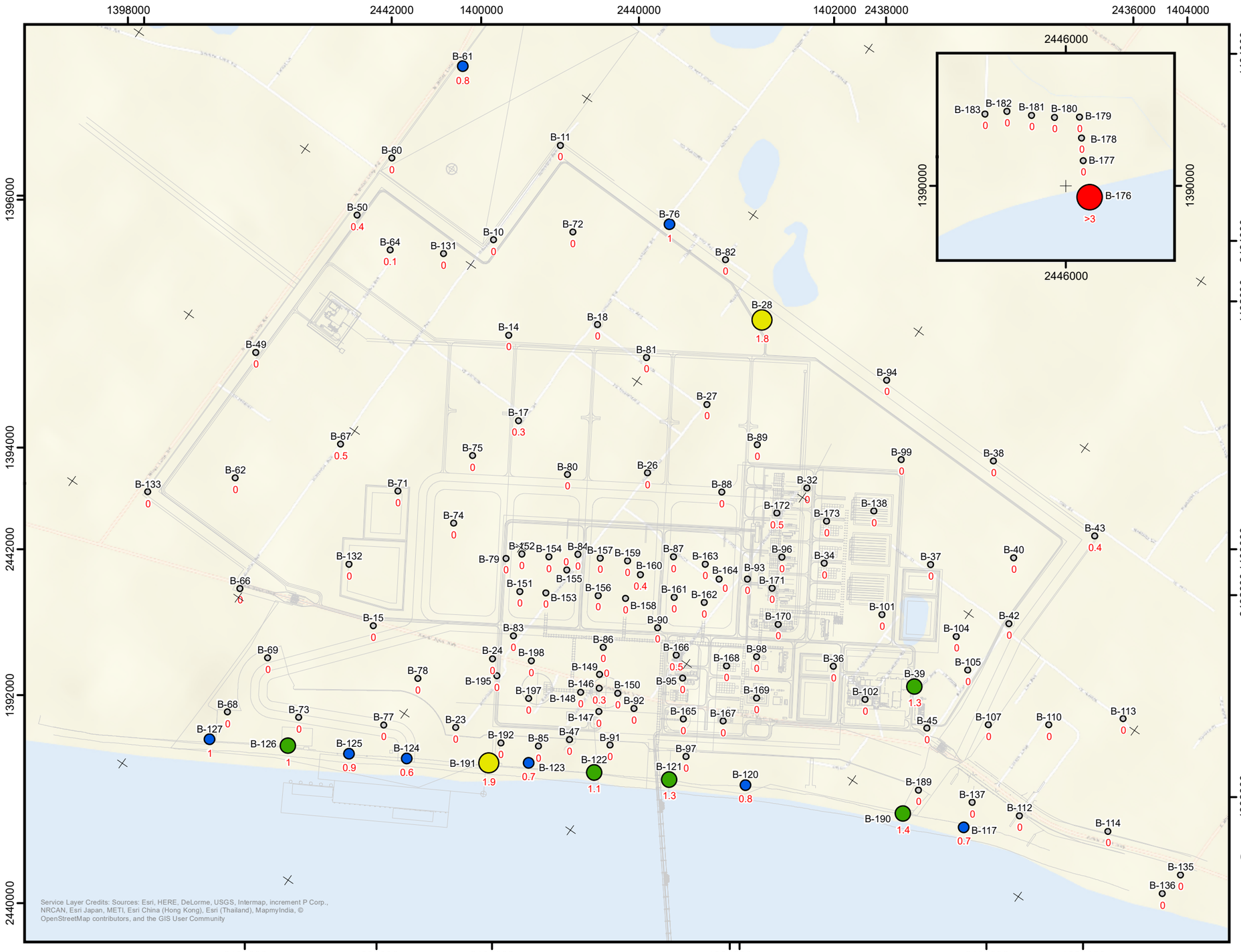
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-198 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-198 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



Legend

Estimated Cumulative Settlement (in)

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 3
- > 3

Site Layout

B-02 0.9 — Boring location with boring name and settlement in Inches

Note: SSE Level per NFPA 59A 2013 / MCEG level per ASCE 7-10 (M=8.0, PGA=0.75g), Boulanger and Idriss (2014), existing elevation

Coordinate System: Alaska State Plane, Zone 4, NAD83, NSRS 2007, Feet

N

1:12,000

0 375 750 1,500 Feet

ESTIMATED CUMULATIVE SETTLEMENT ONSHORE LOCATIONS - SSE/MCEG LEVEL

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE B.261

Y:\Jobdocs\04_2016\04.10160001_AKLNG_Phase3\05_GIS\Outputs\2016_10_19_SeismicReport_Ph3\mxd\PlateH-87_Settlement_Onshore_MCEG.mxd, 10/21/2016, c.dean

APPENDIX C

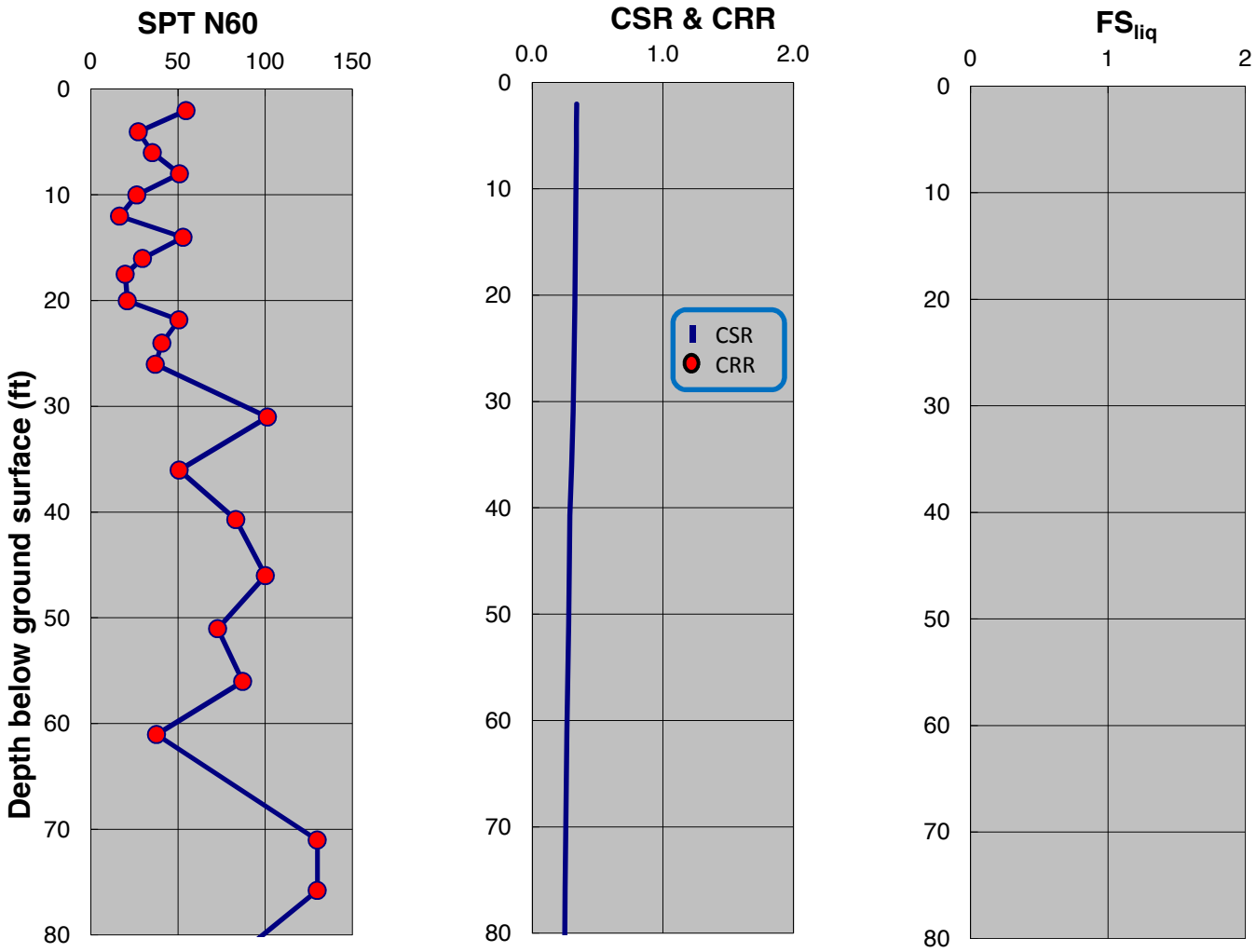
SPT-BASED LIQUEFACTION POTENTIAL EVALUATIONS PER NFPA 59A 2006 AND ASCE 7-05 FOR ONSHORE BORINGS, PROPOSED ELEVATION

APPENDIX C

SPT-BASED LIQUEFACTION POTENTIAL EVALUATIONS PER NFPA 59A 2006 AND ASCE 7-05 FOR ONSHORE BORINGS, PROPOSED ELEVATION

C.1 Liquefaction Triggering Hazard Assessment per NFPA 59A 2006 for the Proposed Site-grade Elevation

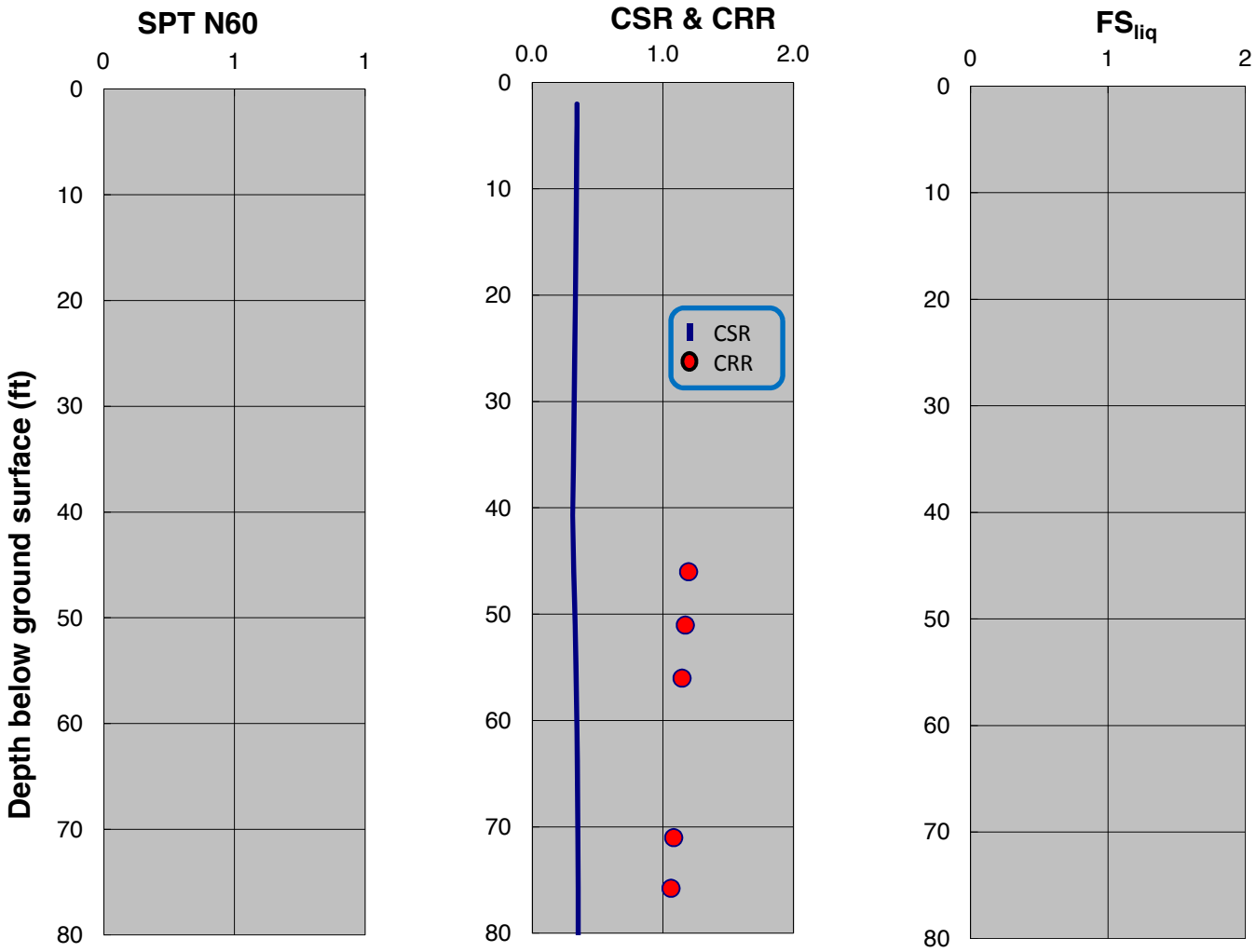
This appendix presents the liquefaction triggering hazard assessment results based on the SPT-based procedures proposed by NCEER (Youd et. al., 2001) and Boulanger and Idriss (2014) for the onshore borings and the proposed site-grade elevations (i.e., Plates 16 and 17 of the Onshore Integrated Site Characterization and Geotechnical Engineering report, Fugro Report No. 04.10140334-14, AKLNG Document No. USAL-FG-GRZZZ-00-002015-009) at each onshore boring as presented on Table 3.2 for the OBE and the SSE / MCE events per NFPA 59A 2006. These analyses assume the same $(N_1)_{60}$ blow counts (SPT blow counts corrected to energy ratio of 60% and an effective overburden stress of 1 atm) as the existing elevation conditions and that the additional fill required to reach the proposed elevations will be unsusceptible to liquefaction.



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-9 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

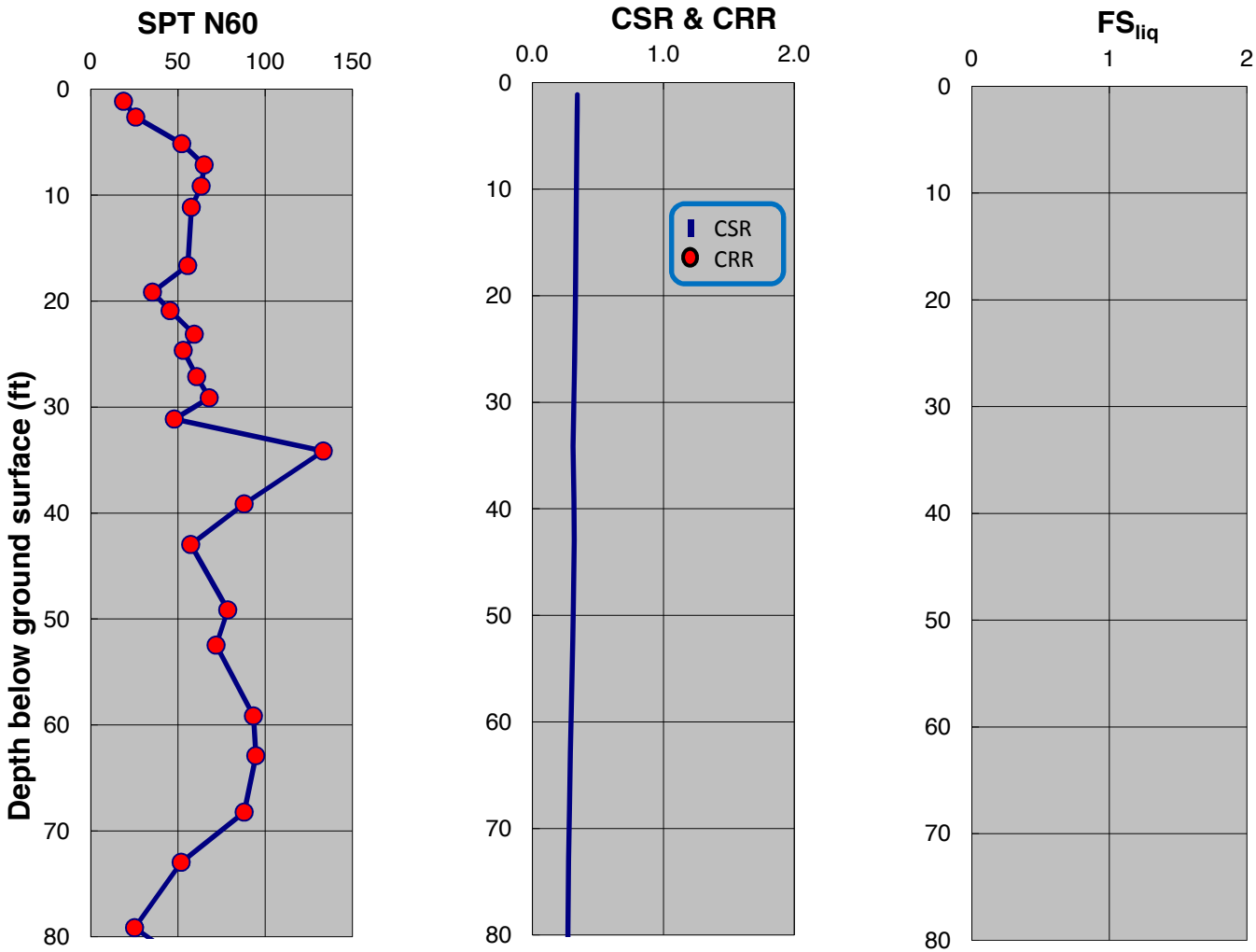
PLATE C.1



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-9 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

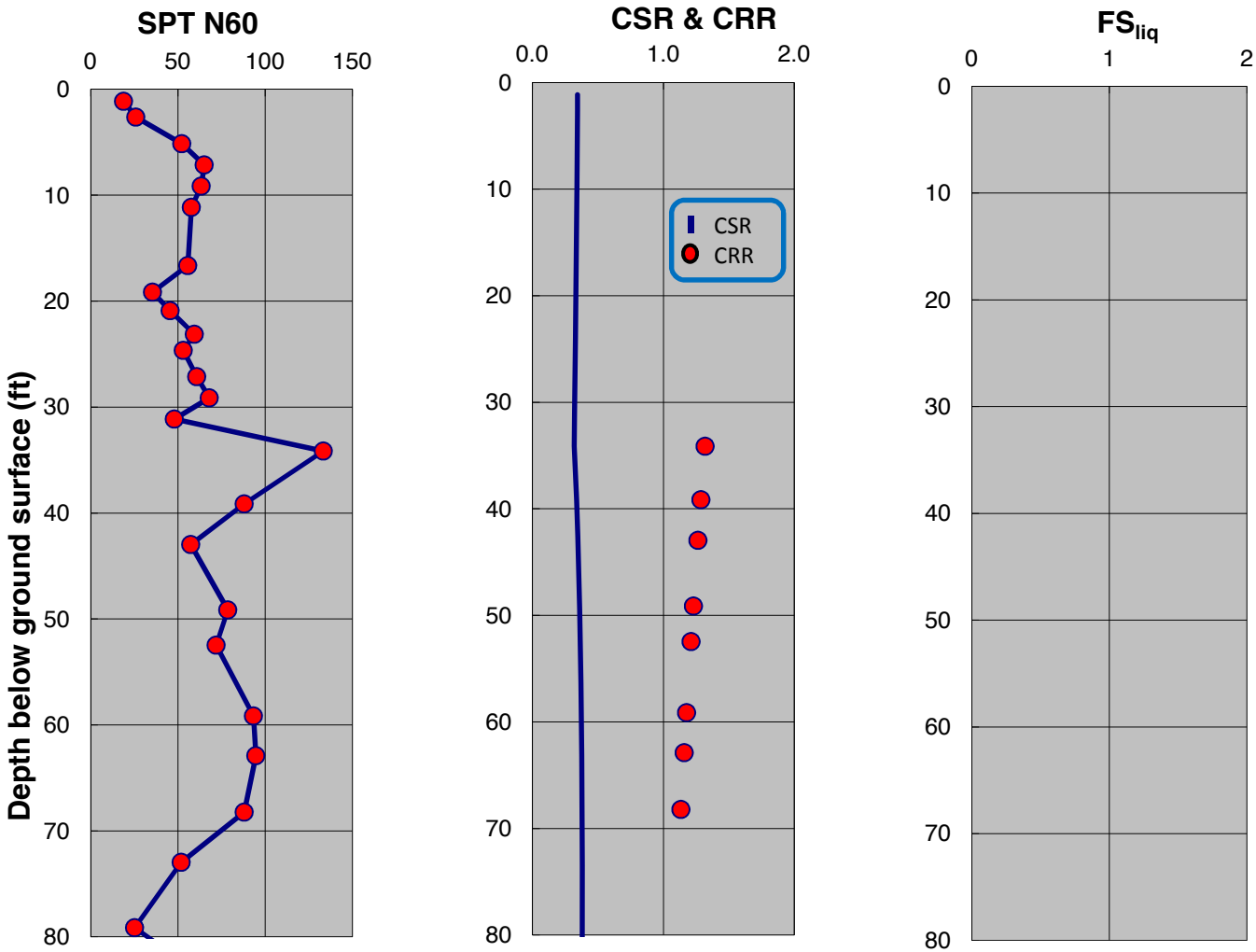
PLATE C.2



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-10 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

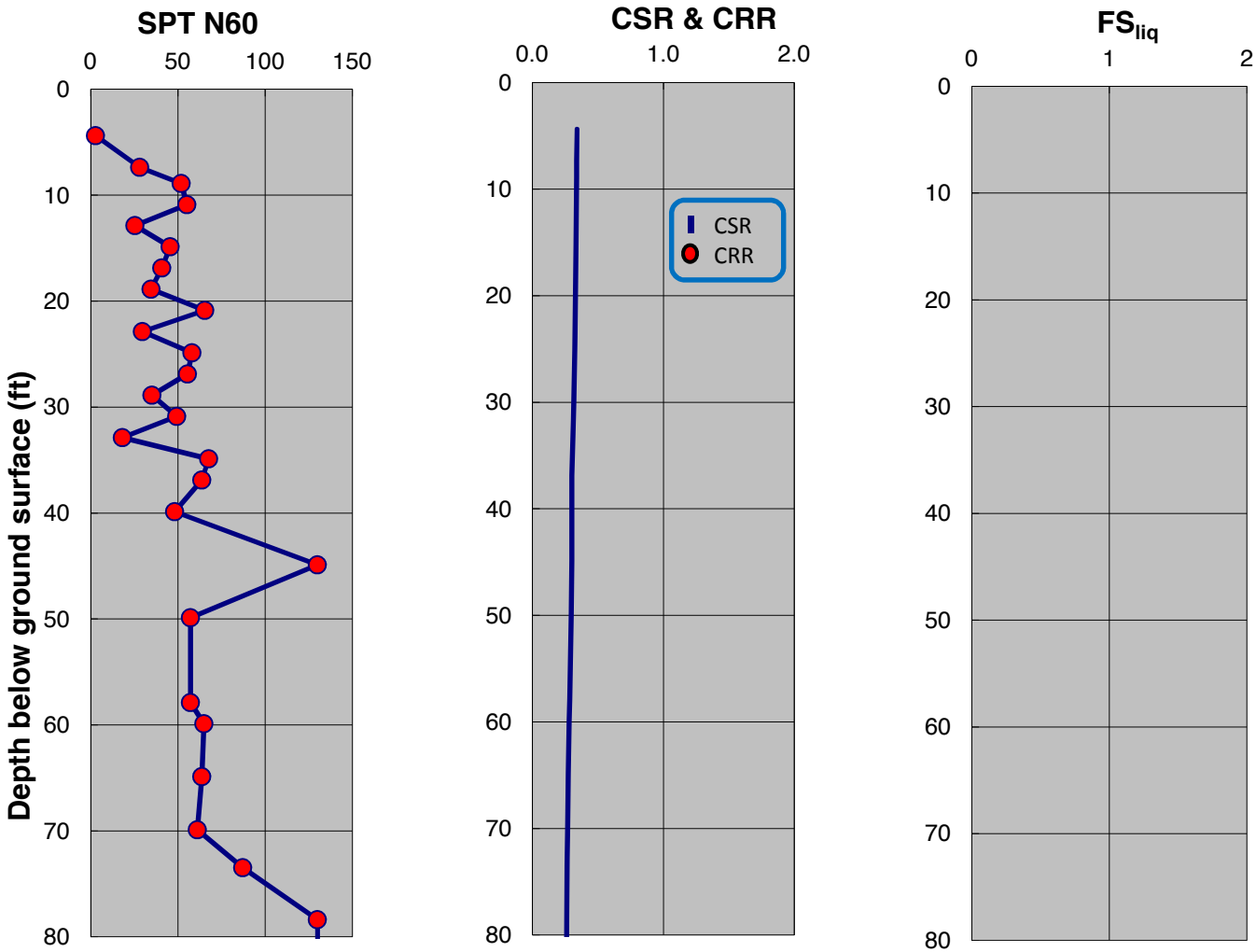
PLATE C.3



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-10 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

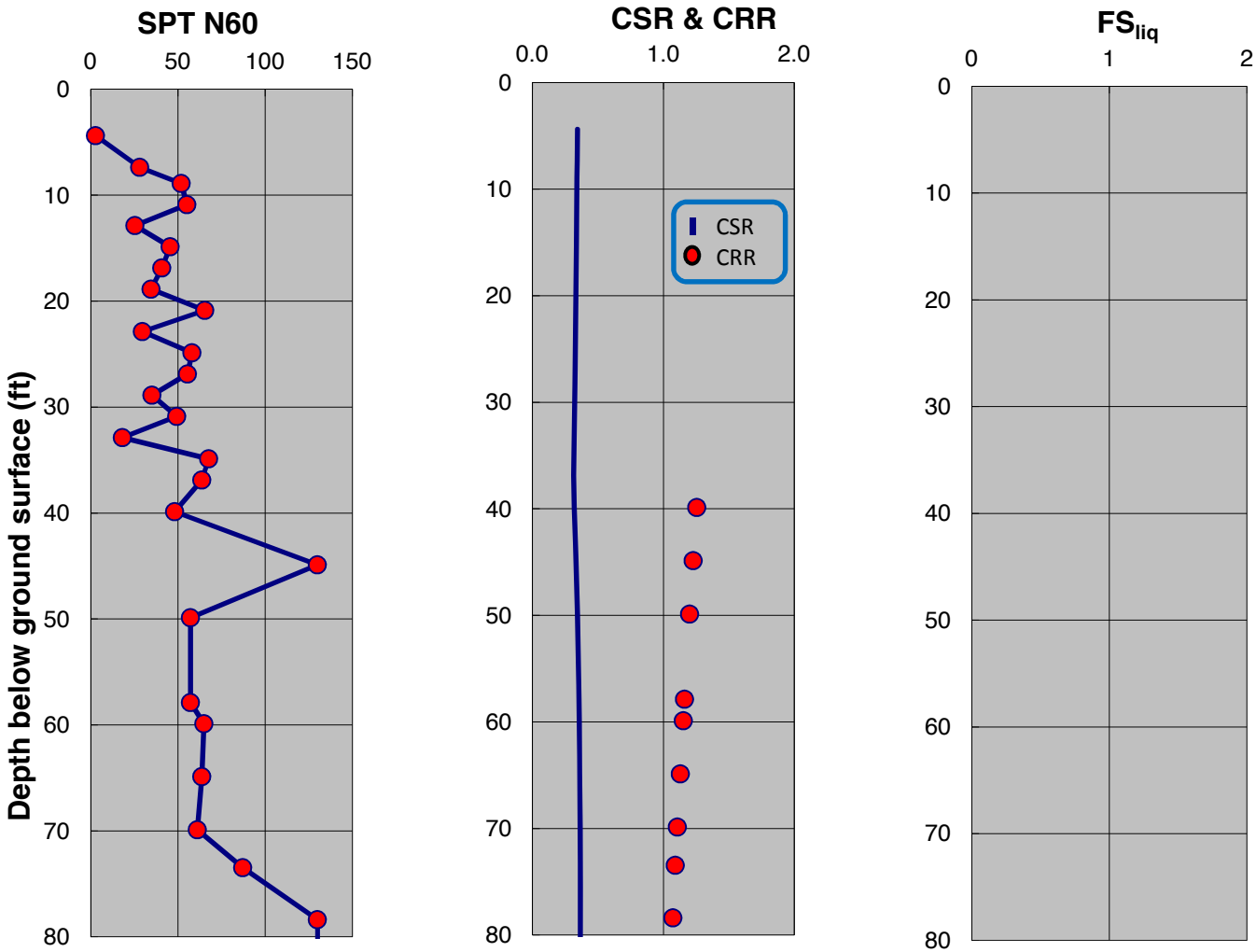
PLATE C.4



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-11 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

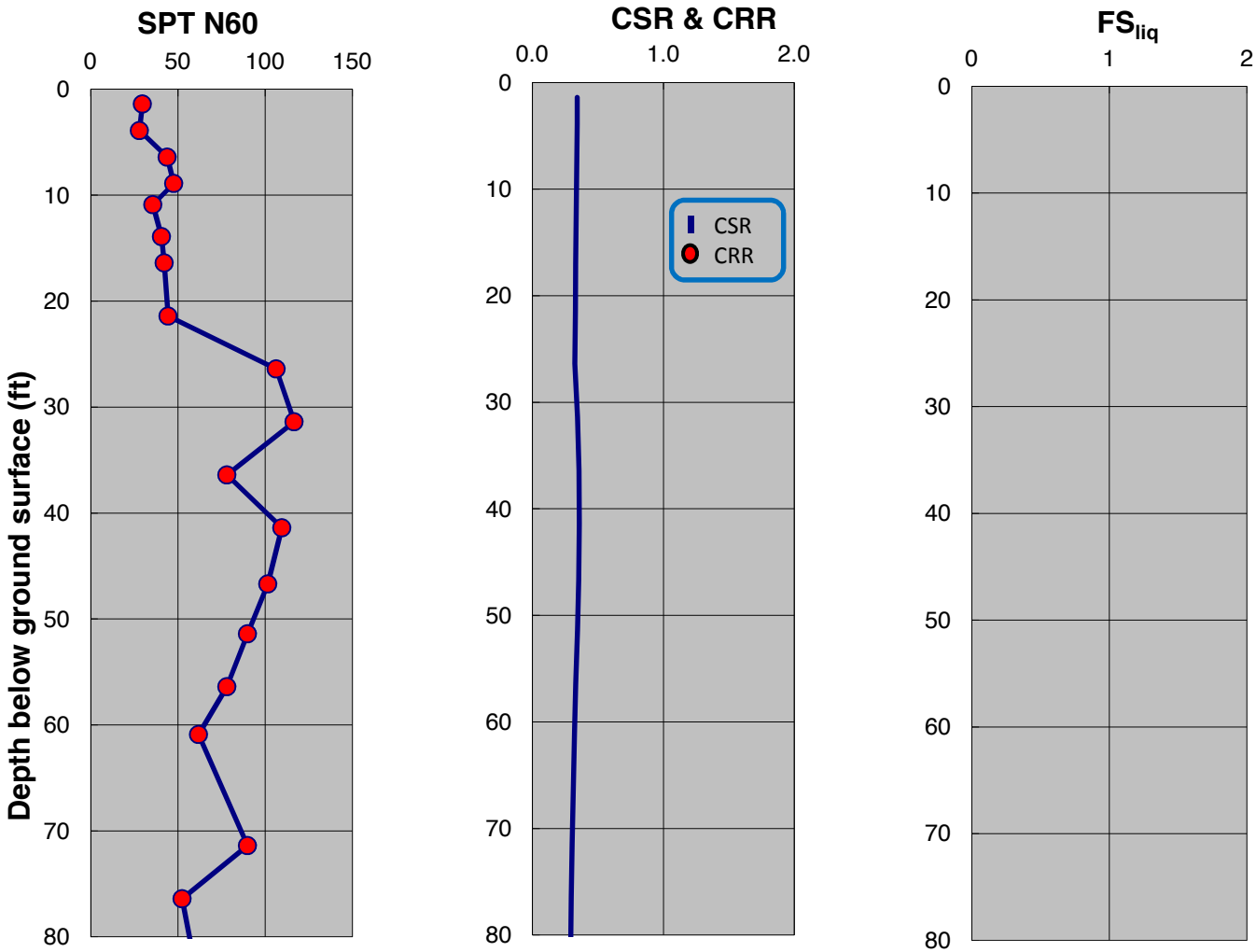
PLATE C.5



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-11 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

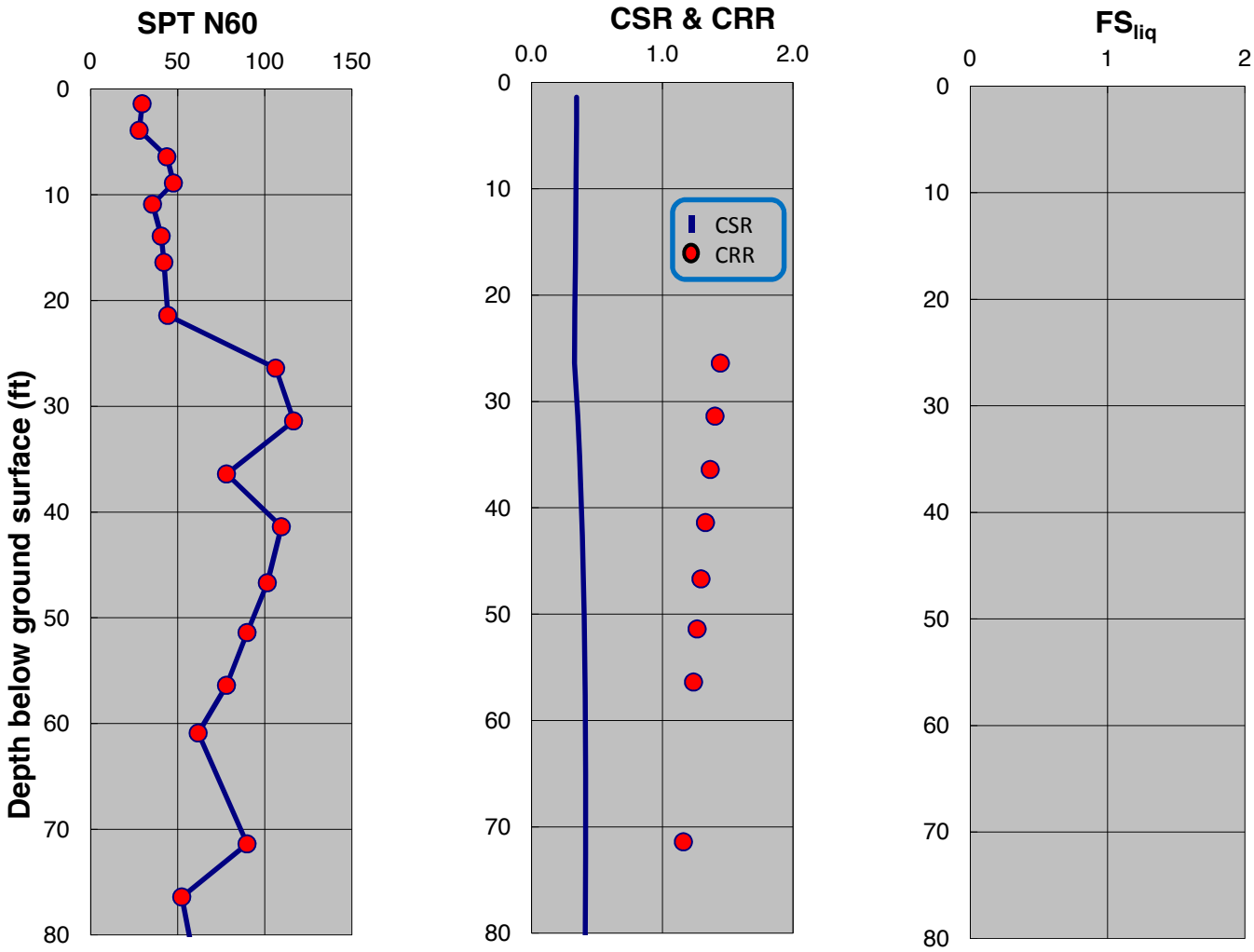
PLATE C.6



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-14 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

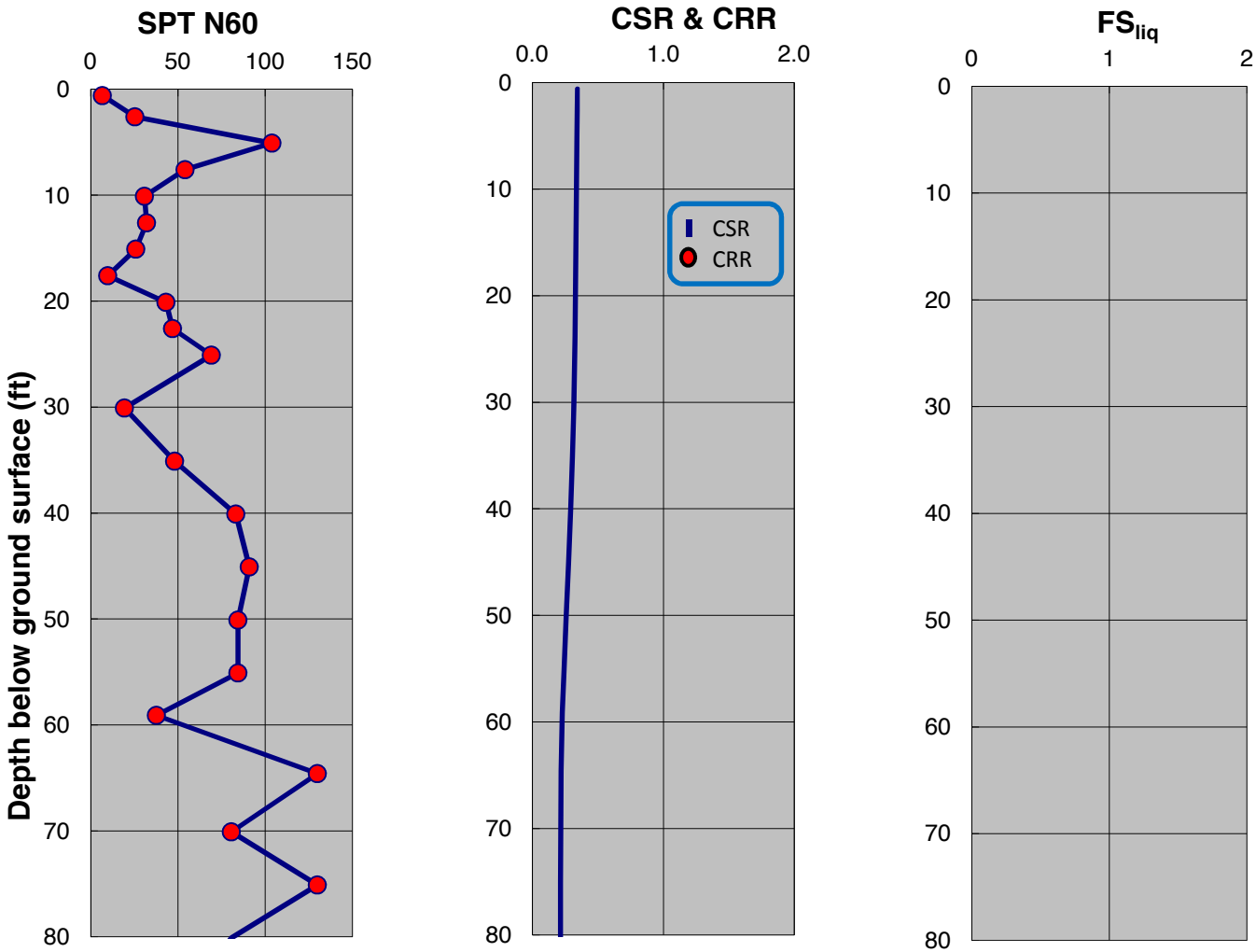
PLATE C.7



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-14 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

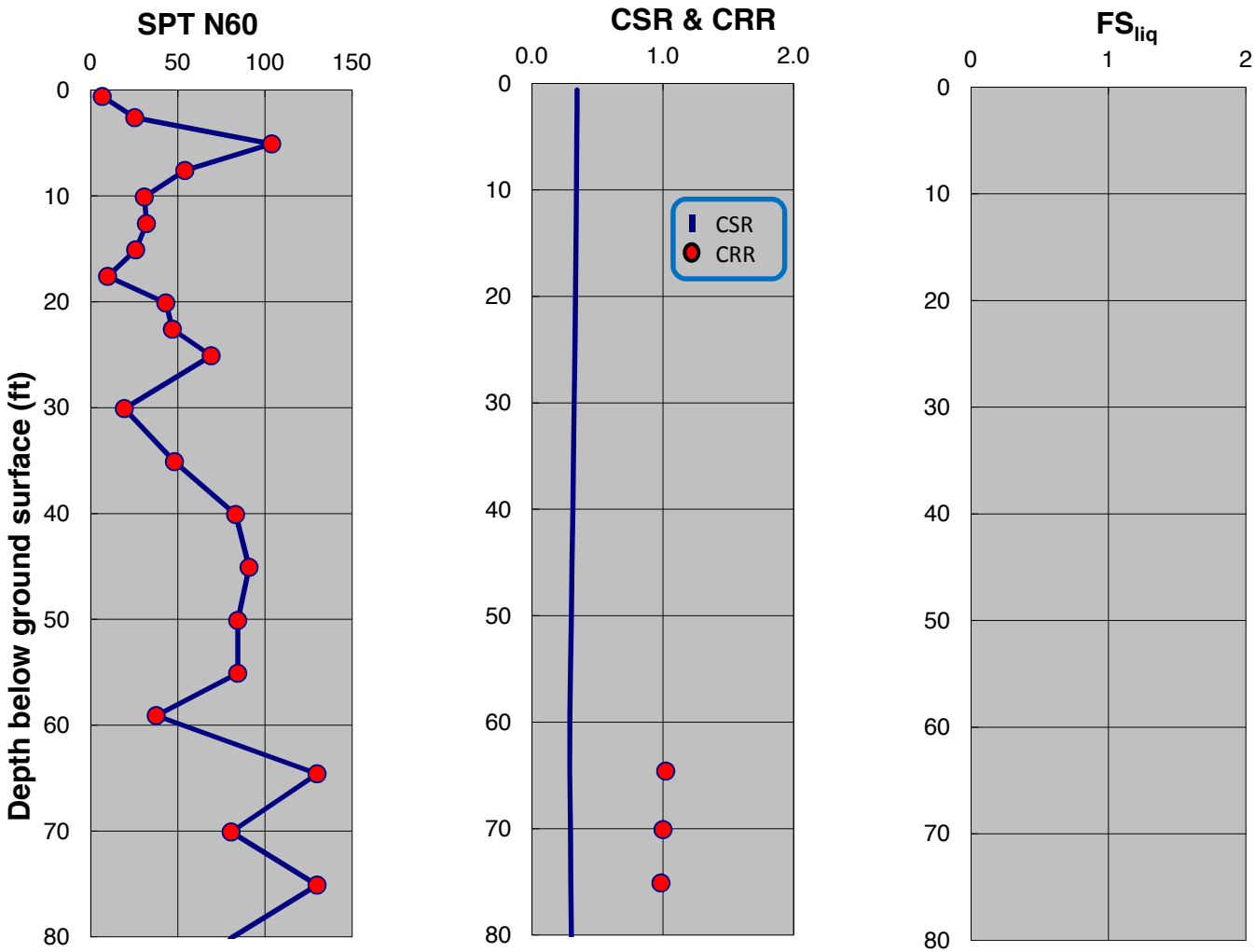
PLATE C.8



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-15 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

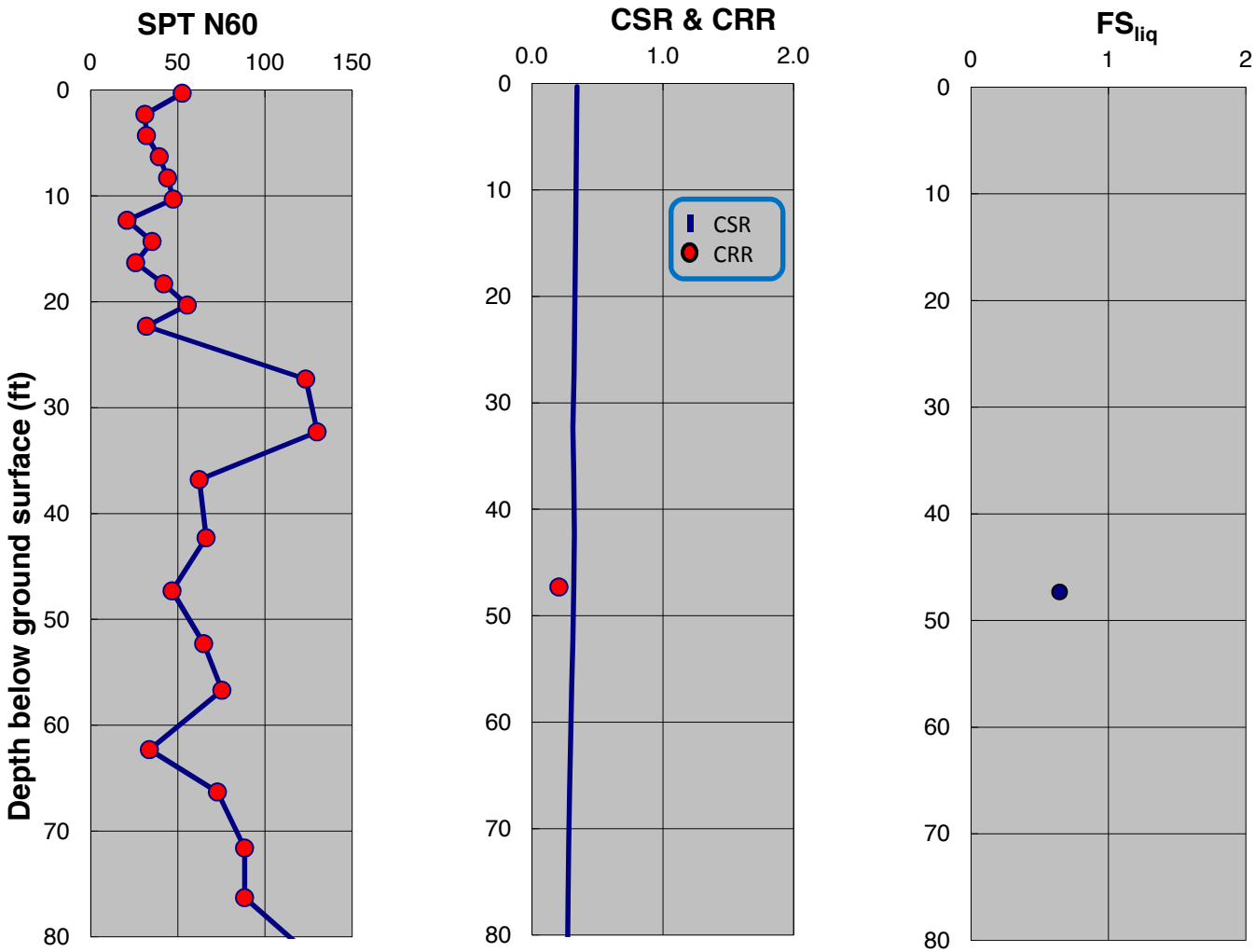
PLATE C.9



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-15 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

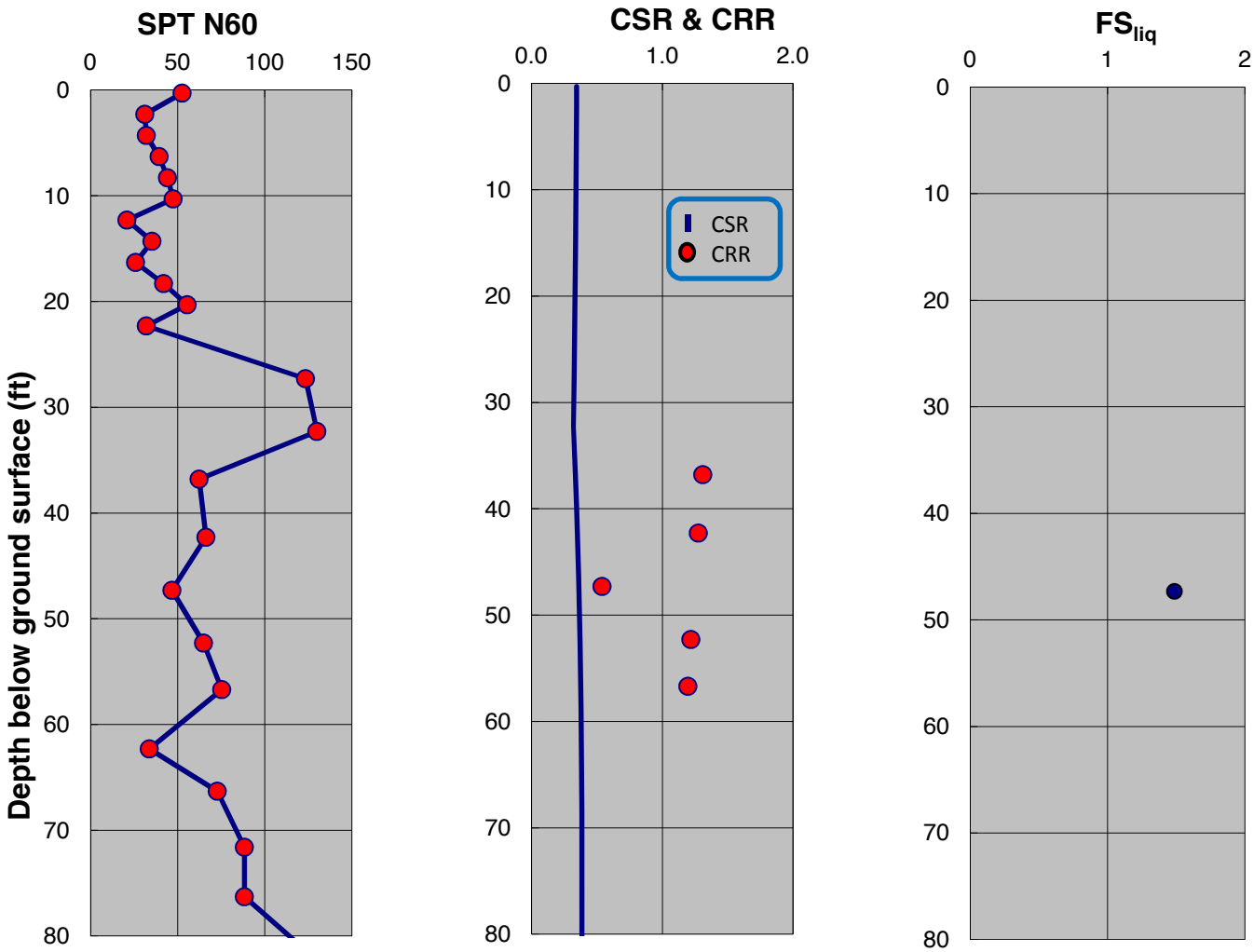
PLATE C.10



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-17 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

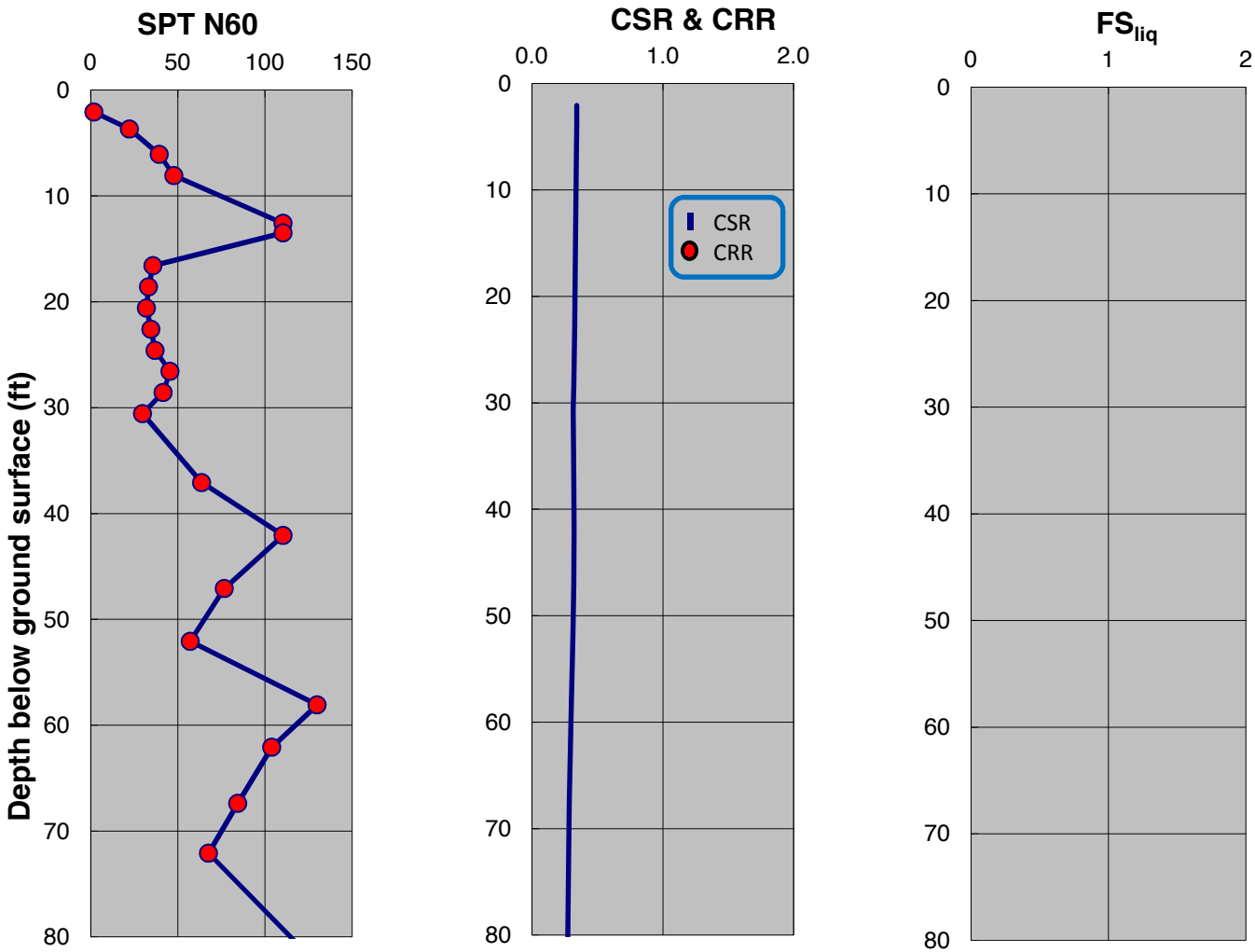
PLATE C.11



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-17 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

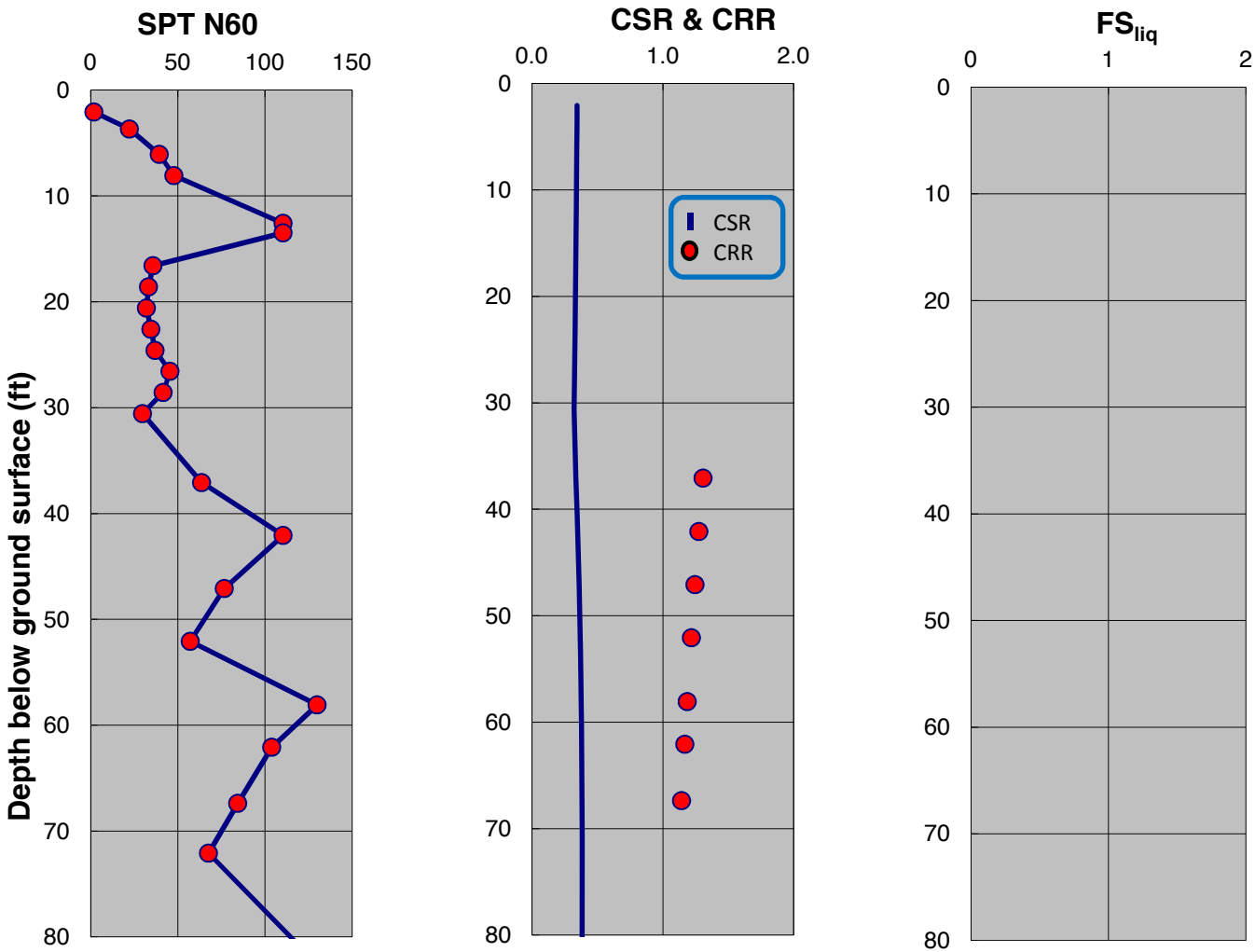
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.12



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-18 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

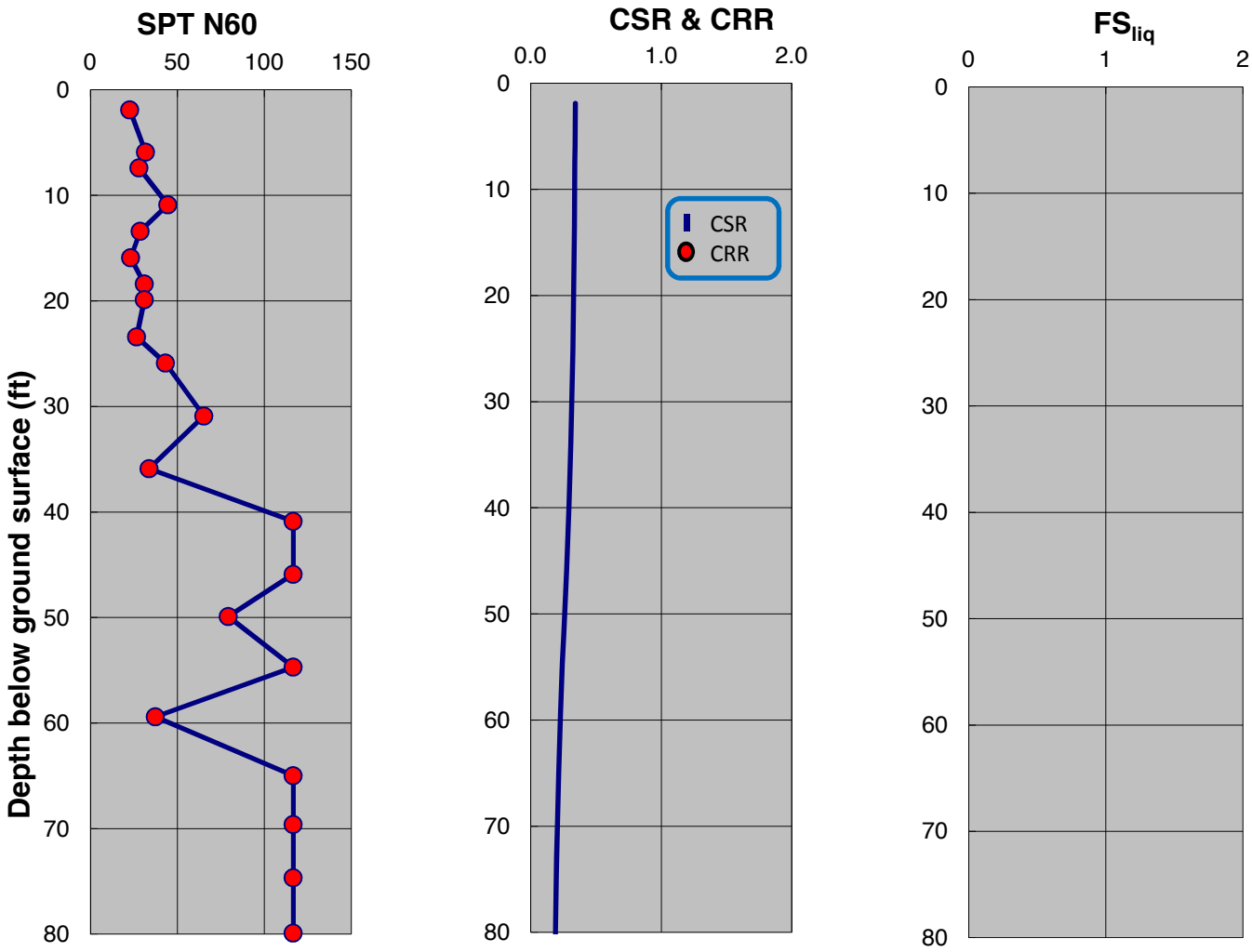
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-18 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

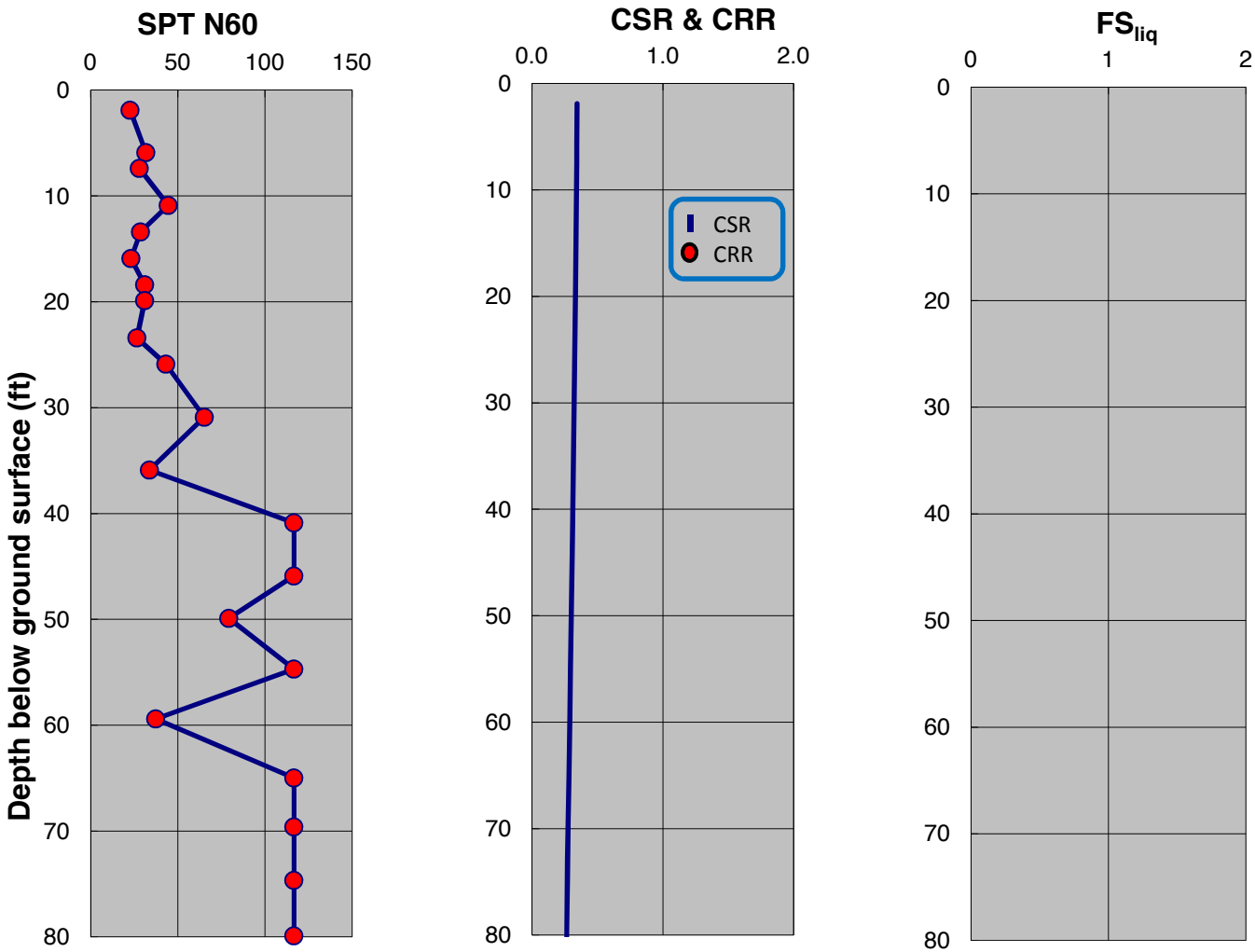
PLATE C.14



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-23 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

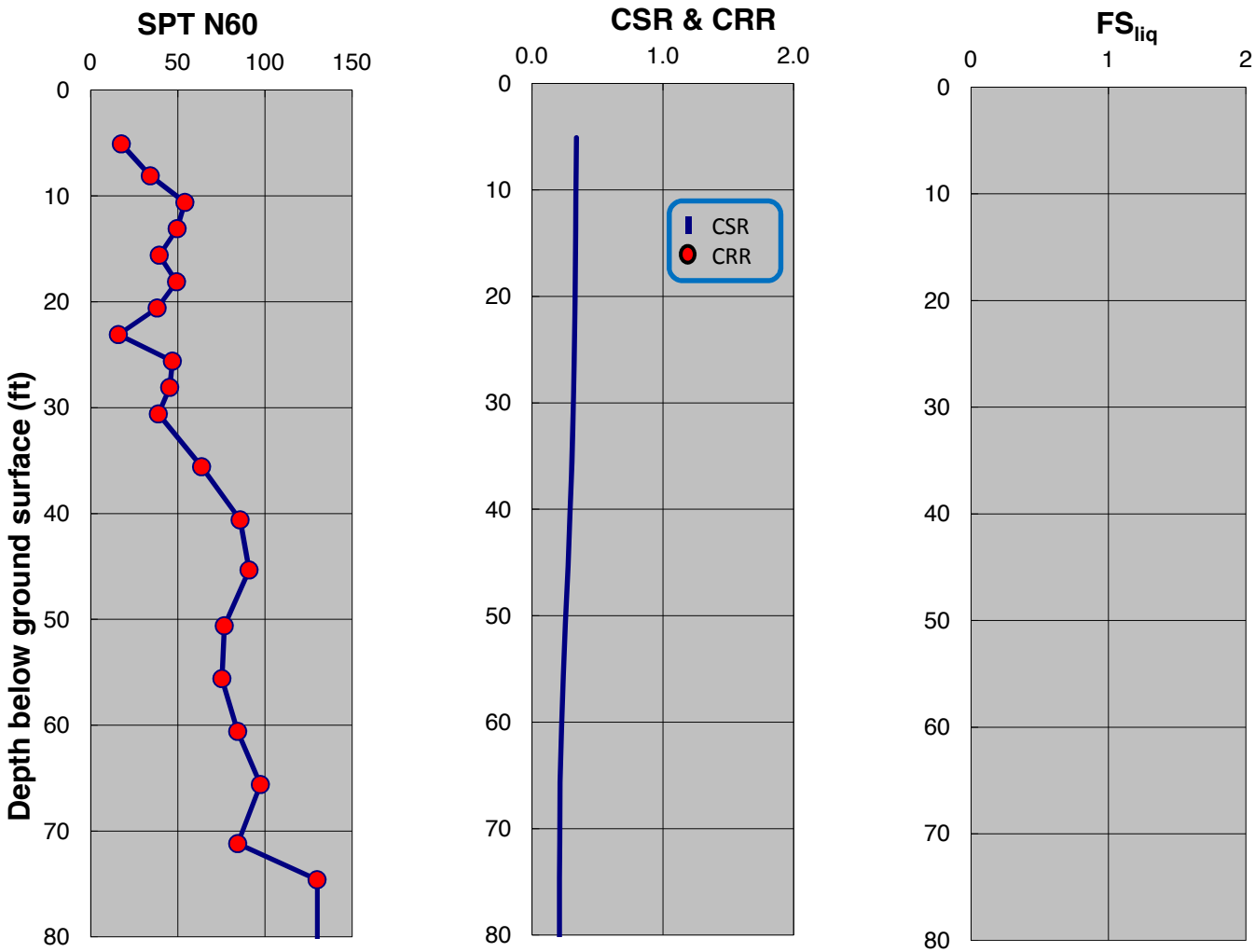
PLATE C.15



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-23 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

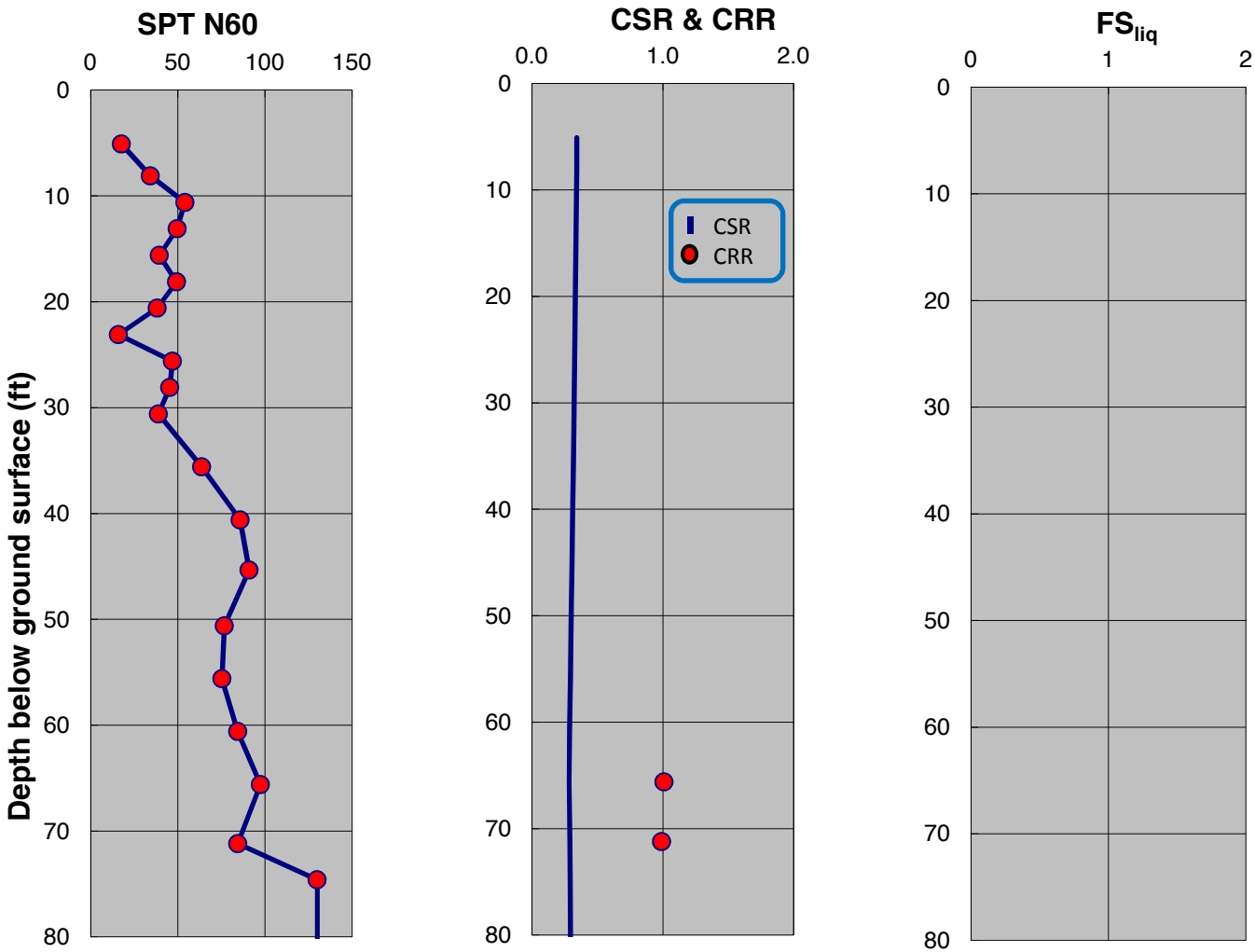
PLATE C.16



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-24 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

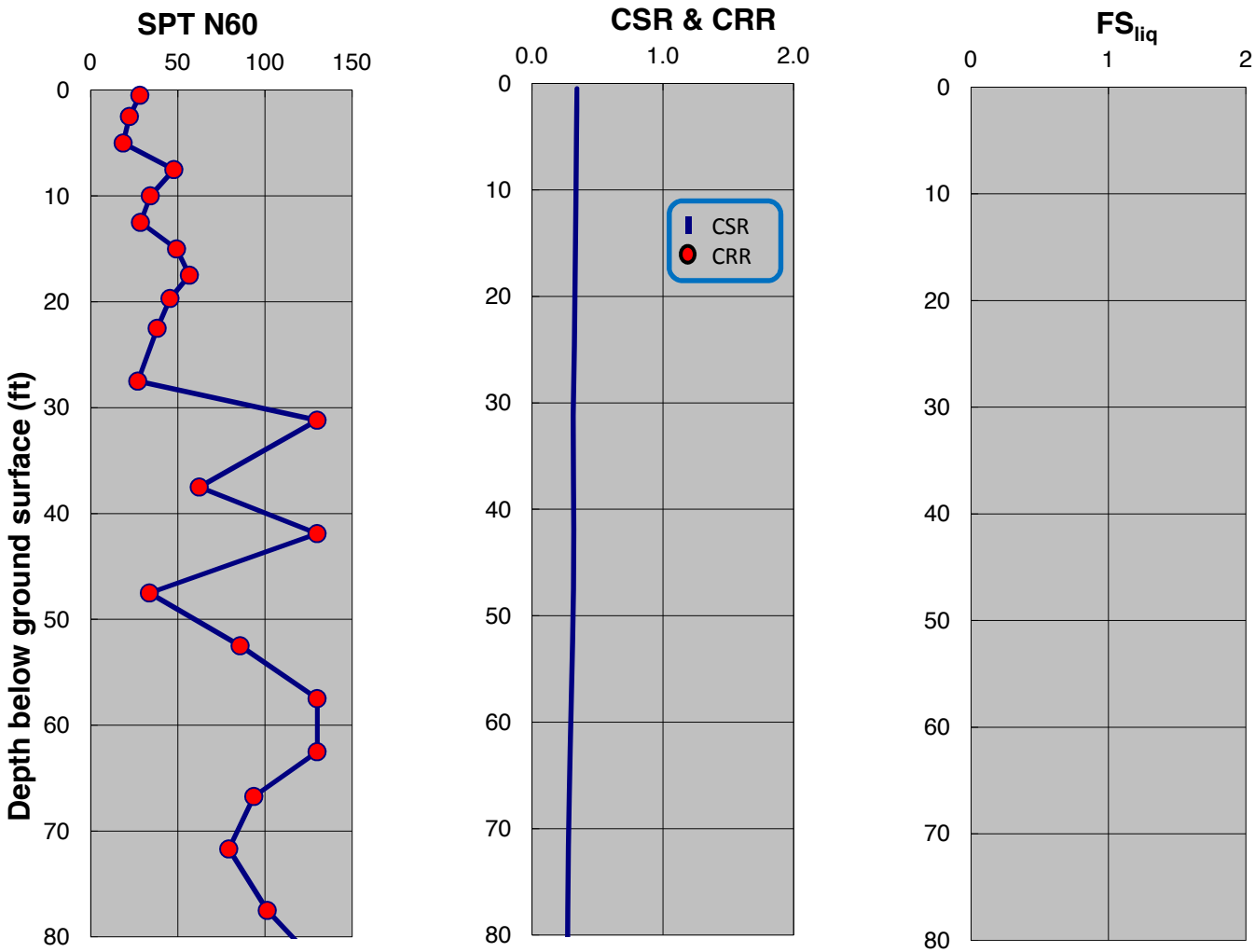
PLATE C.17



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-24 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

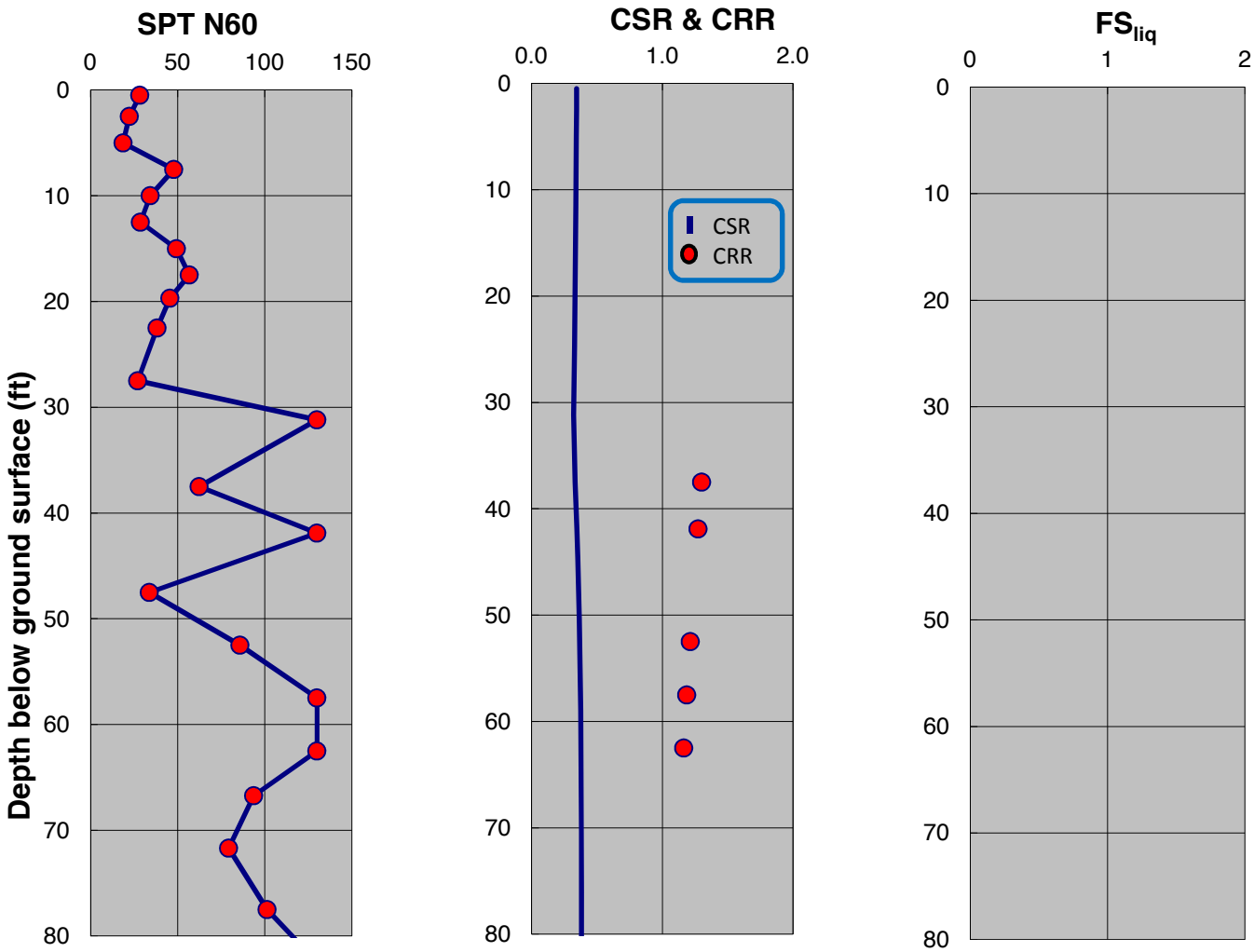
PLATE C.18



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-26 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

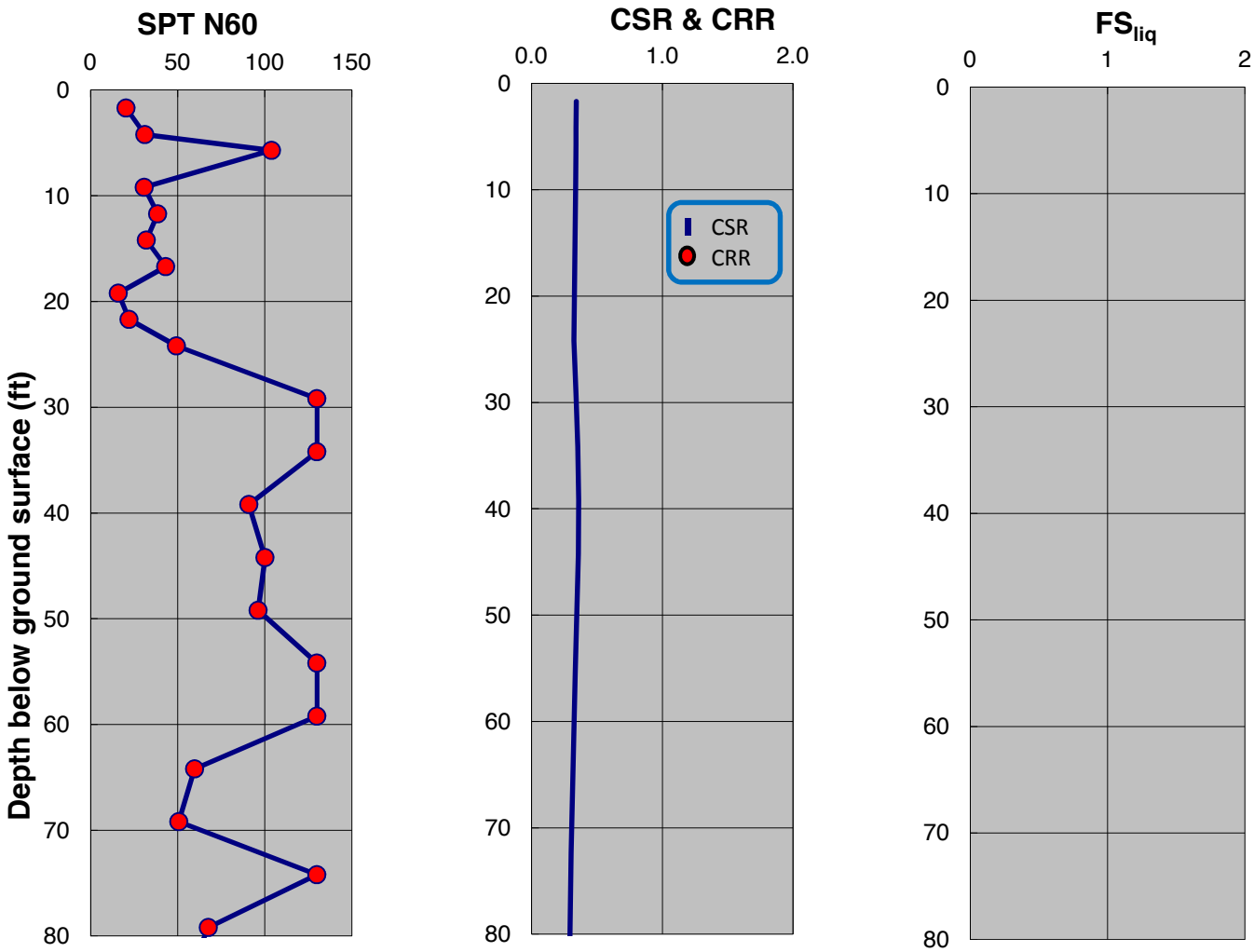
PLATE C.19



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-26 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

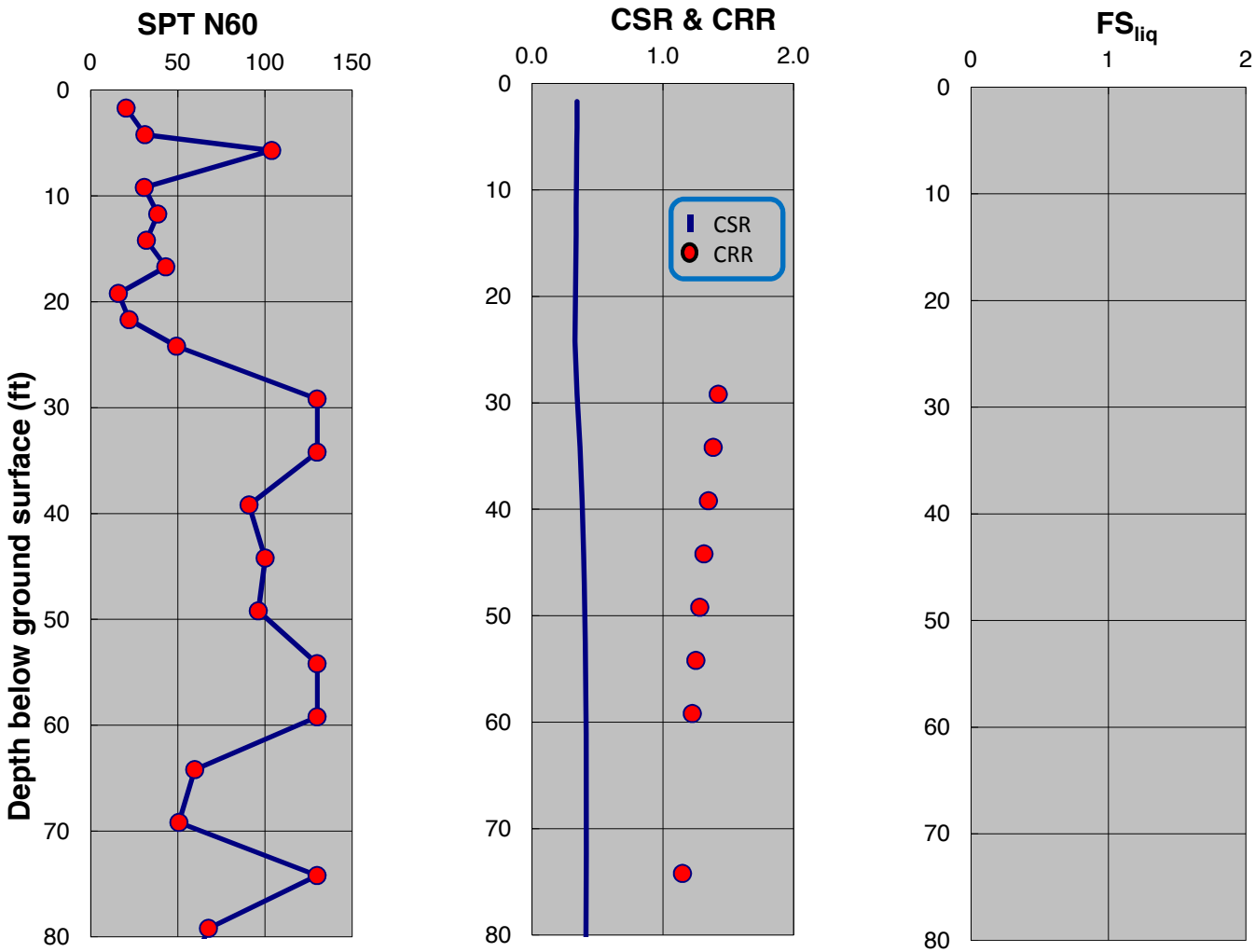
PLATE C.20



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-27 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

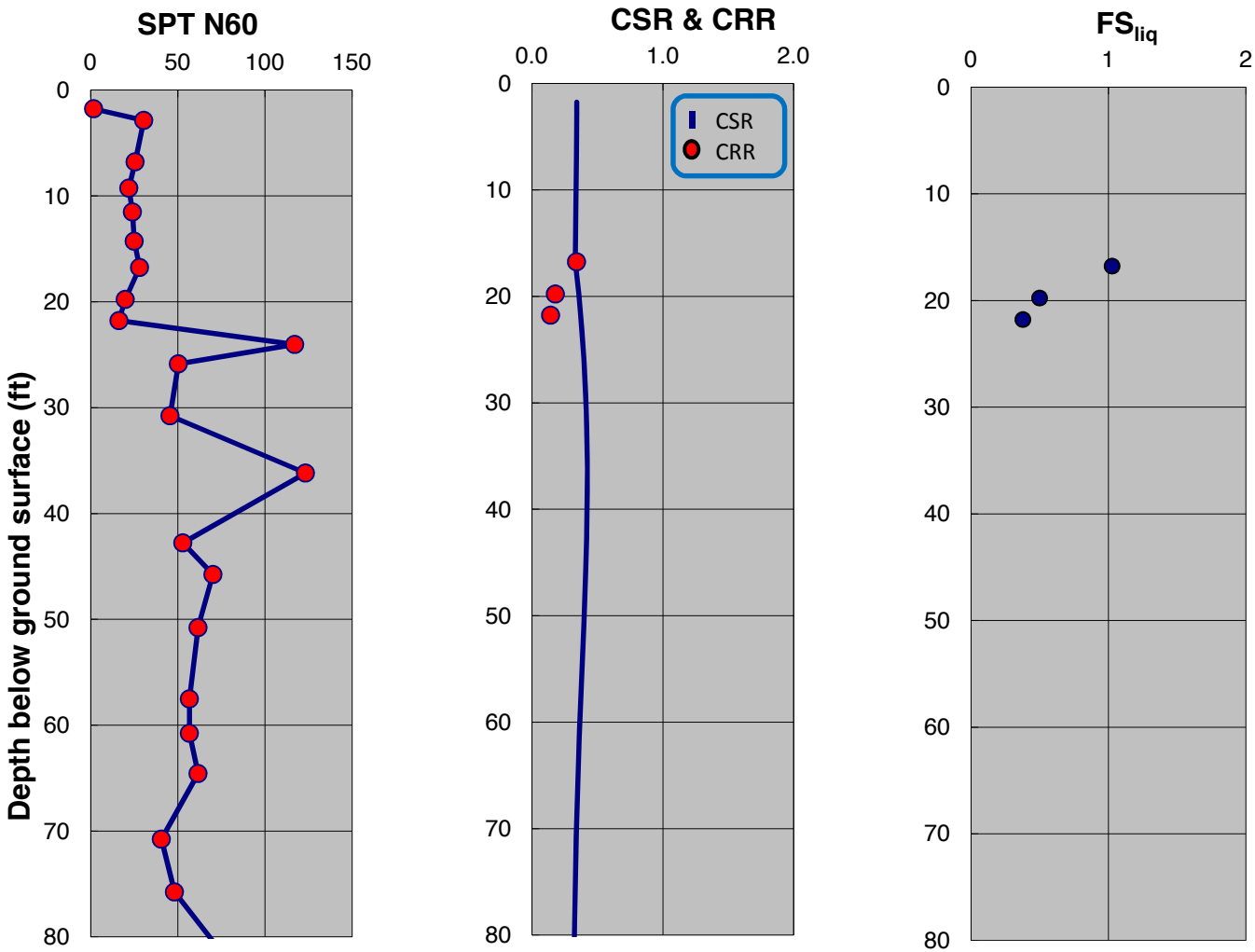
PLATE C.21



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-27 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

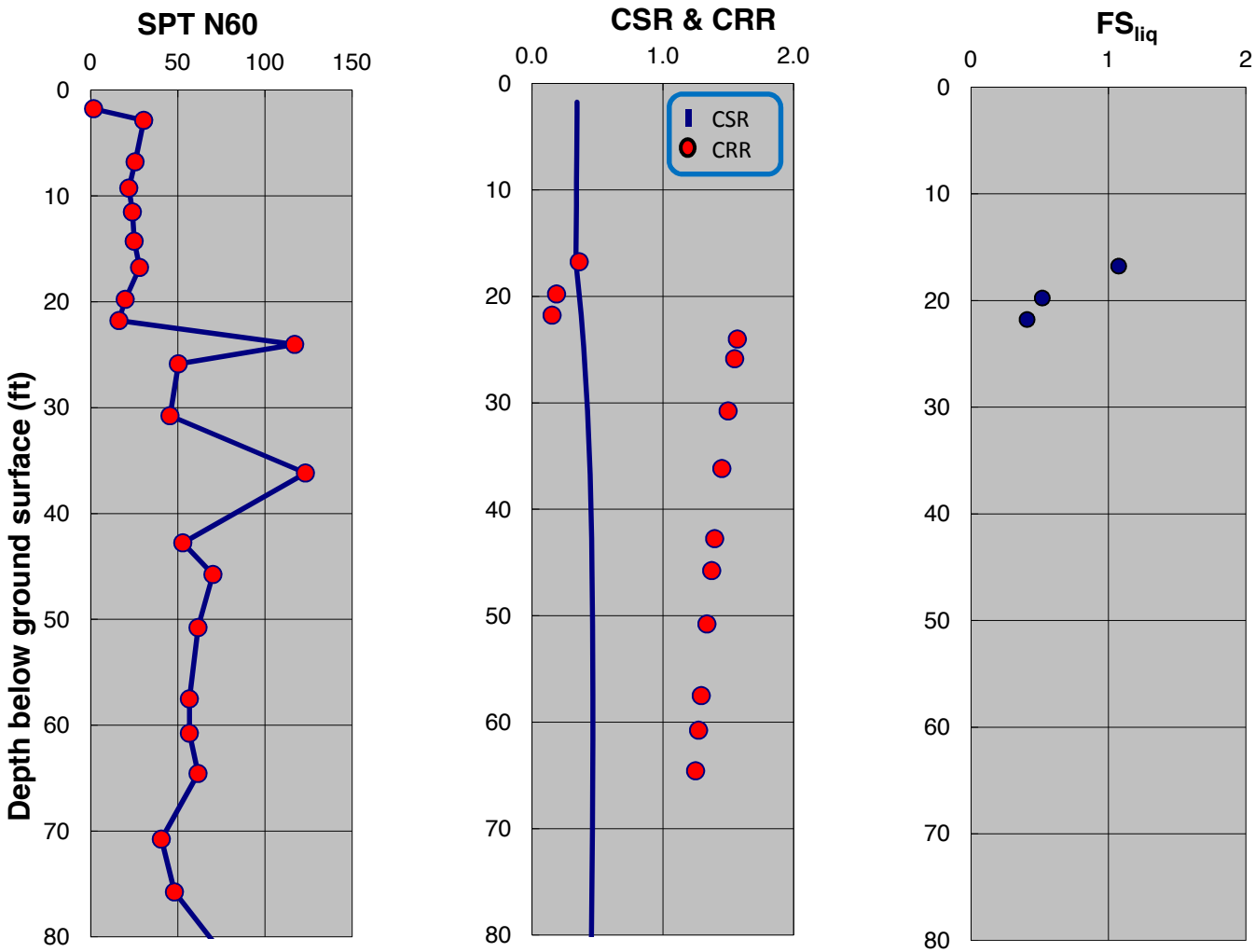
PLATE C.22



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-28 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

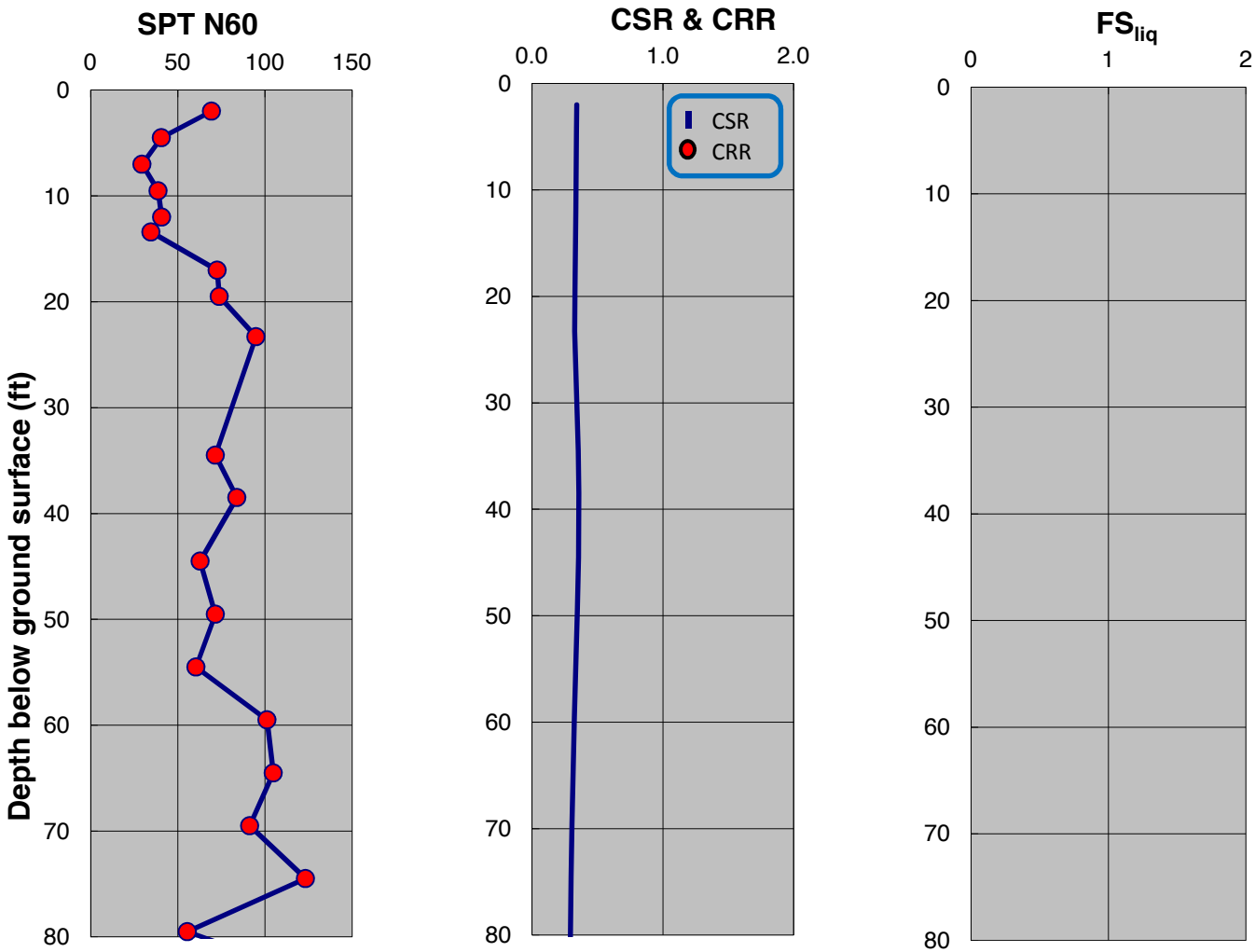
PLATE C.23



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-28 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

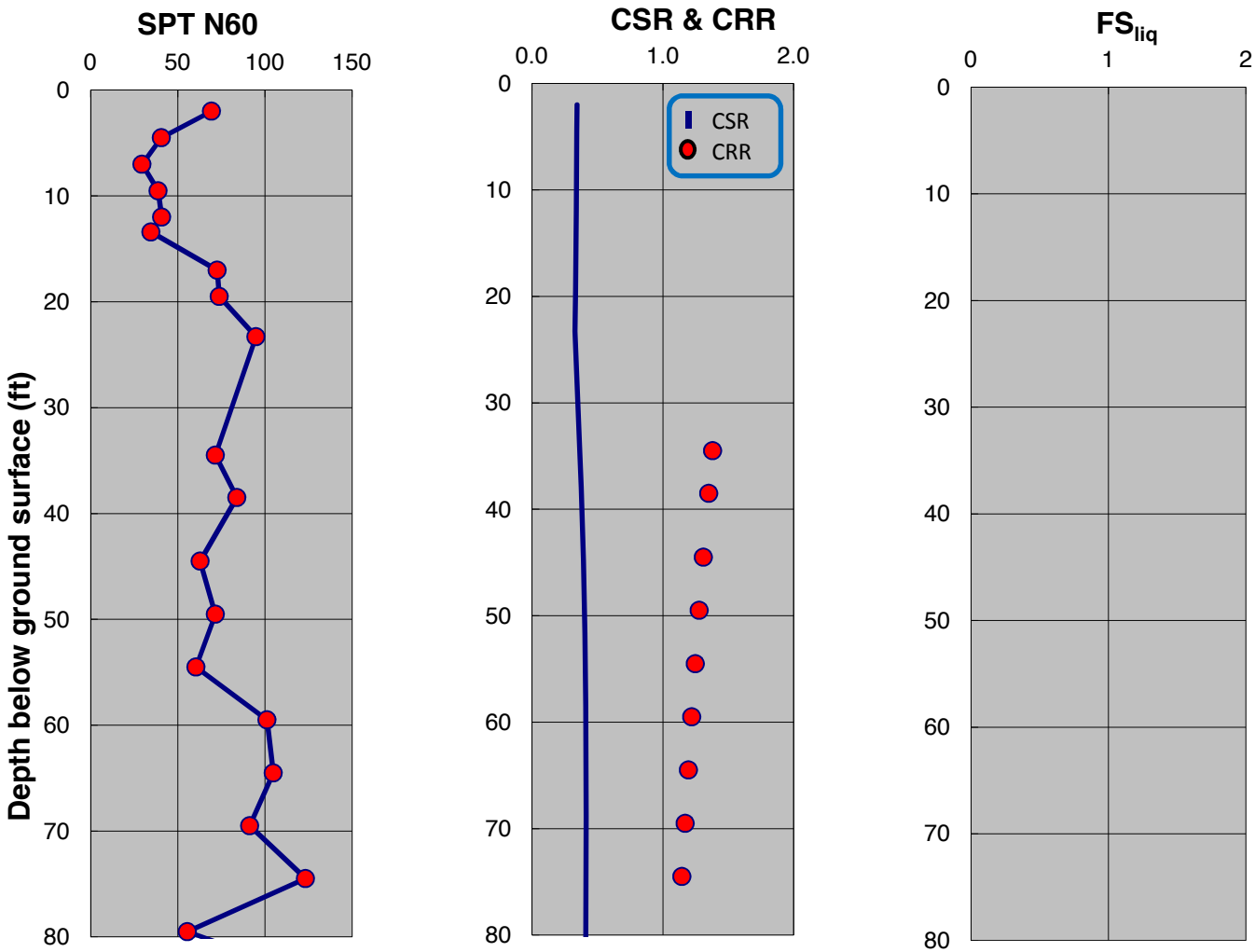
PLATE C.24



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-32 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

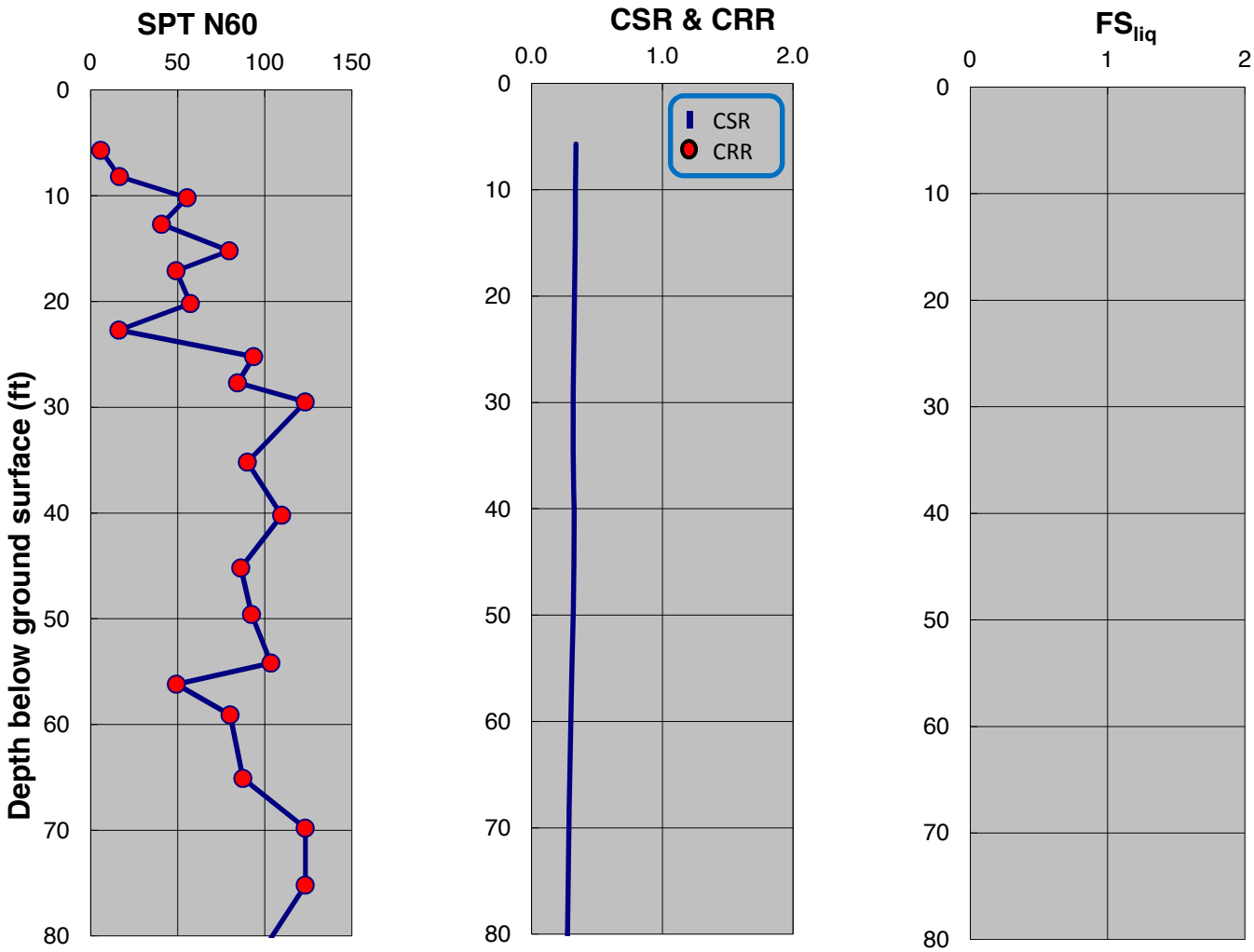
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.25



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-32 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

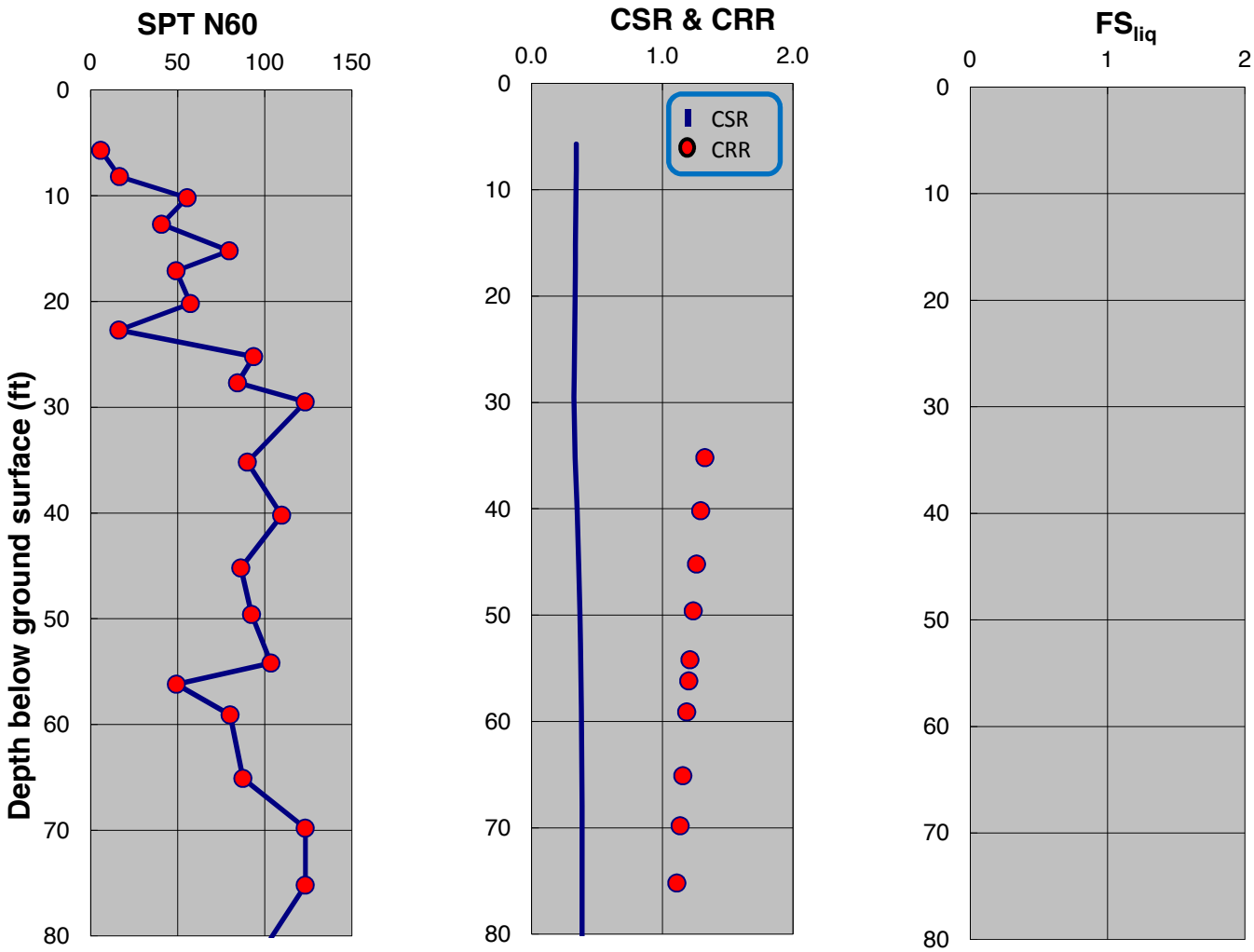
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-34 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

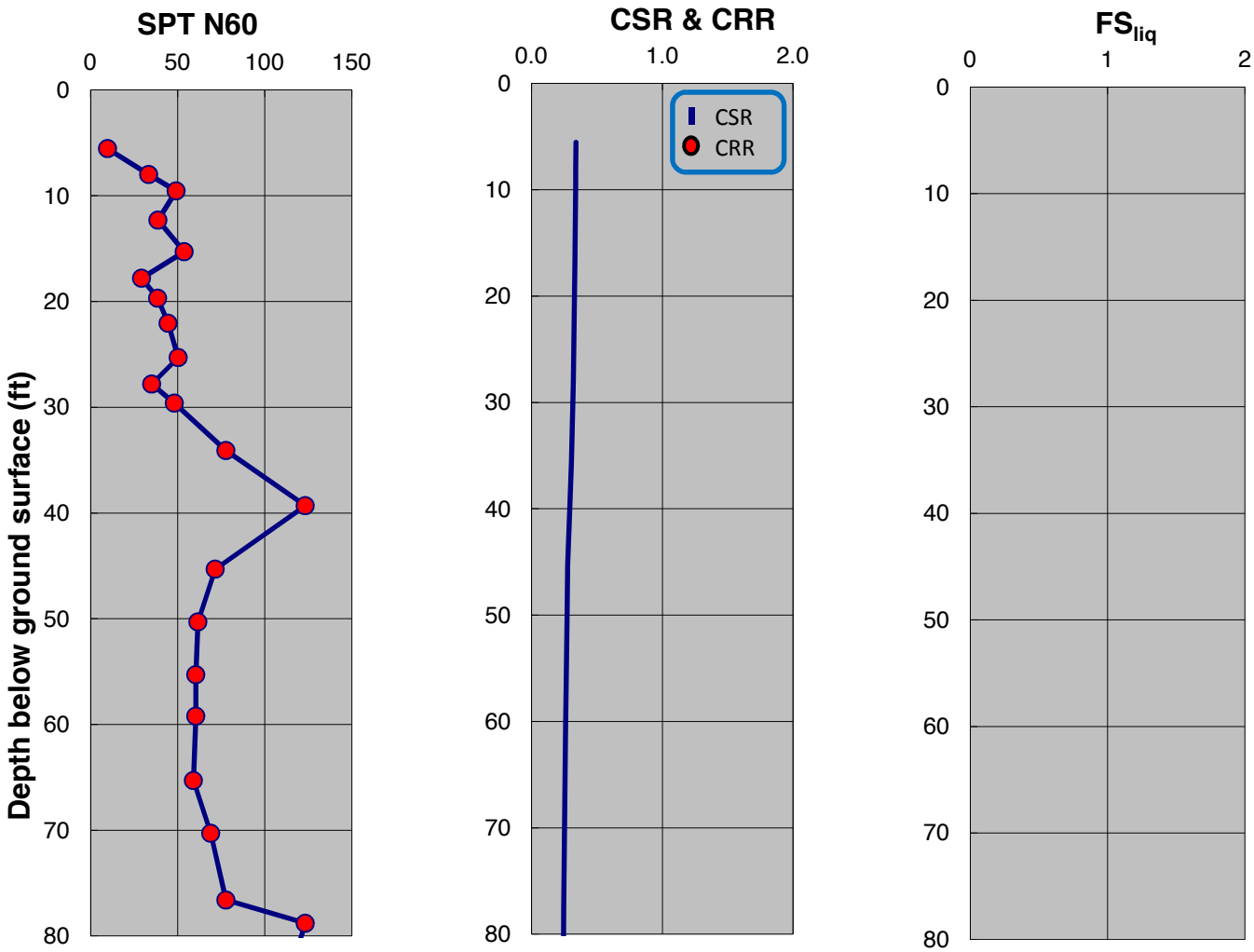
PLATE C.27



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-34 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

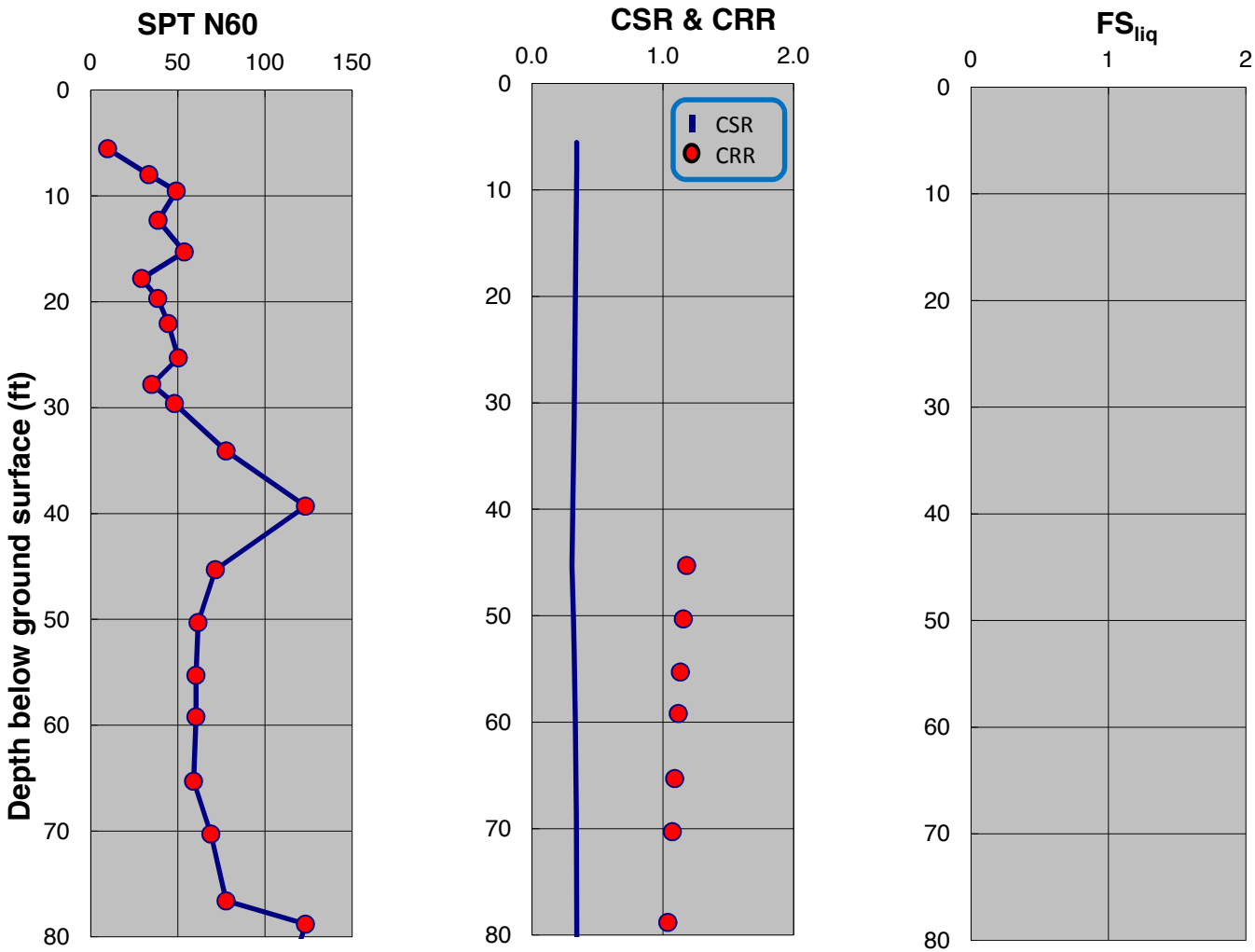
PLATE C.28



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-36 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

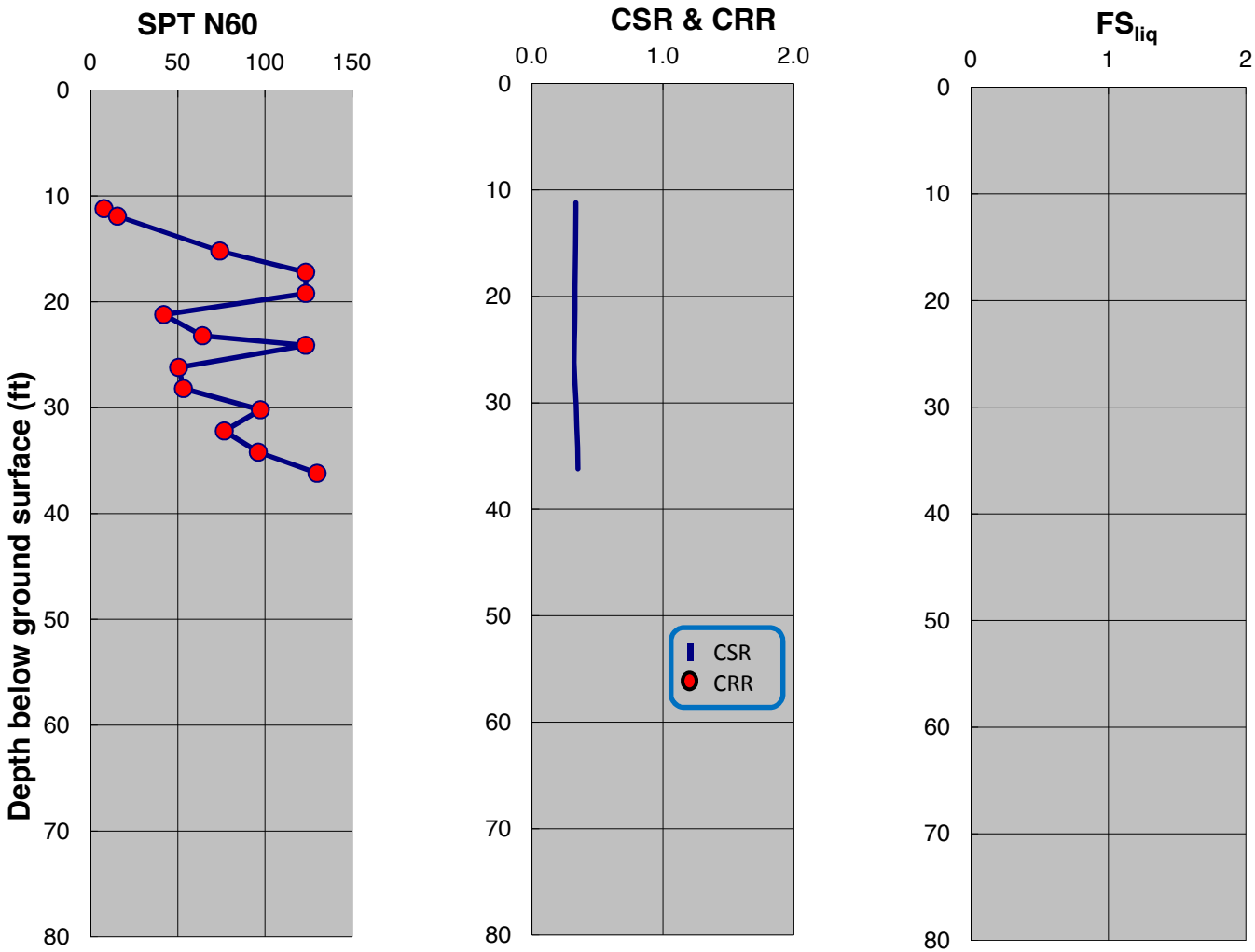
PLATE C.29



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-36 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

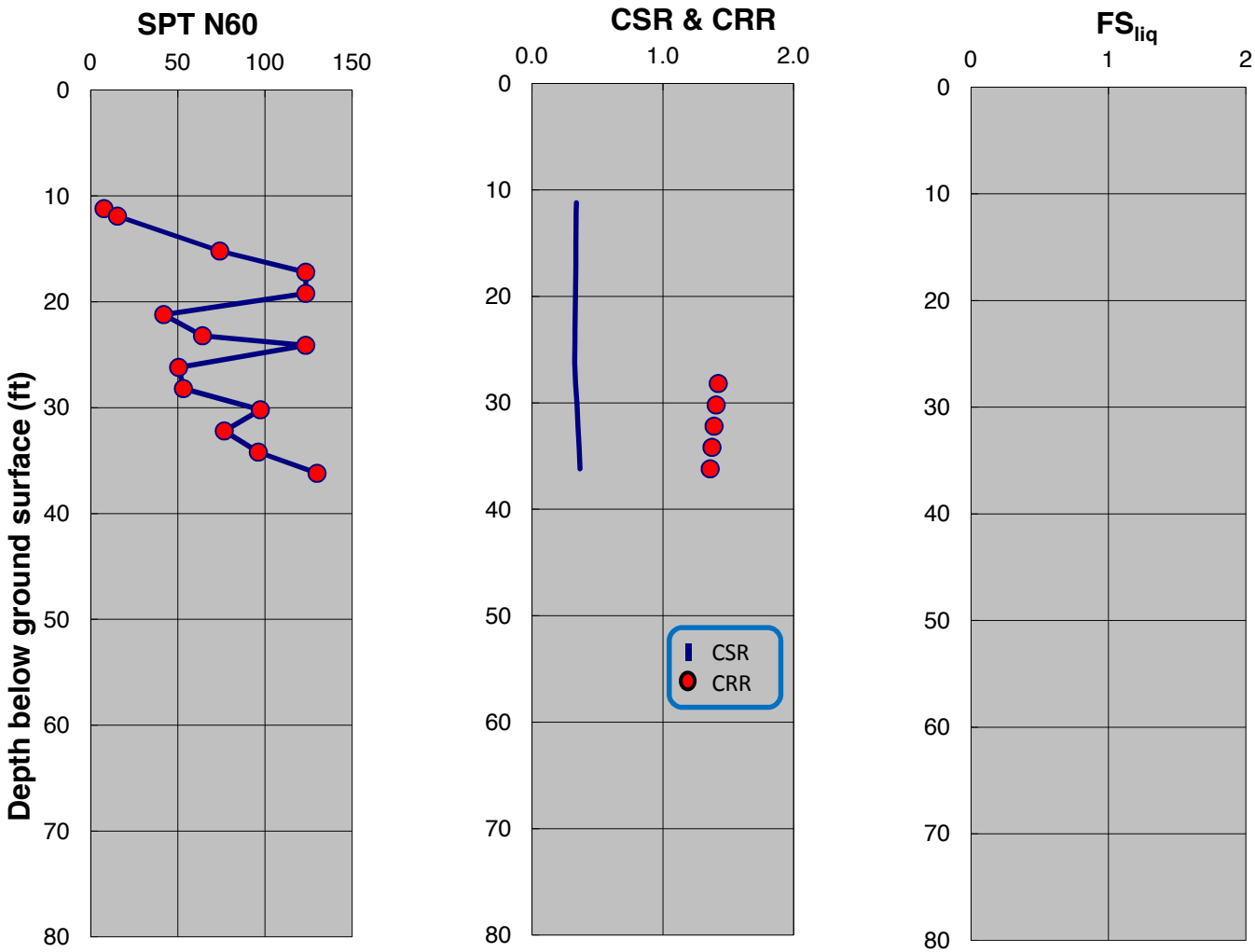
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.30



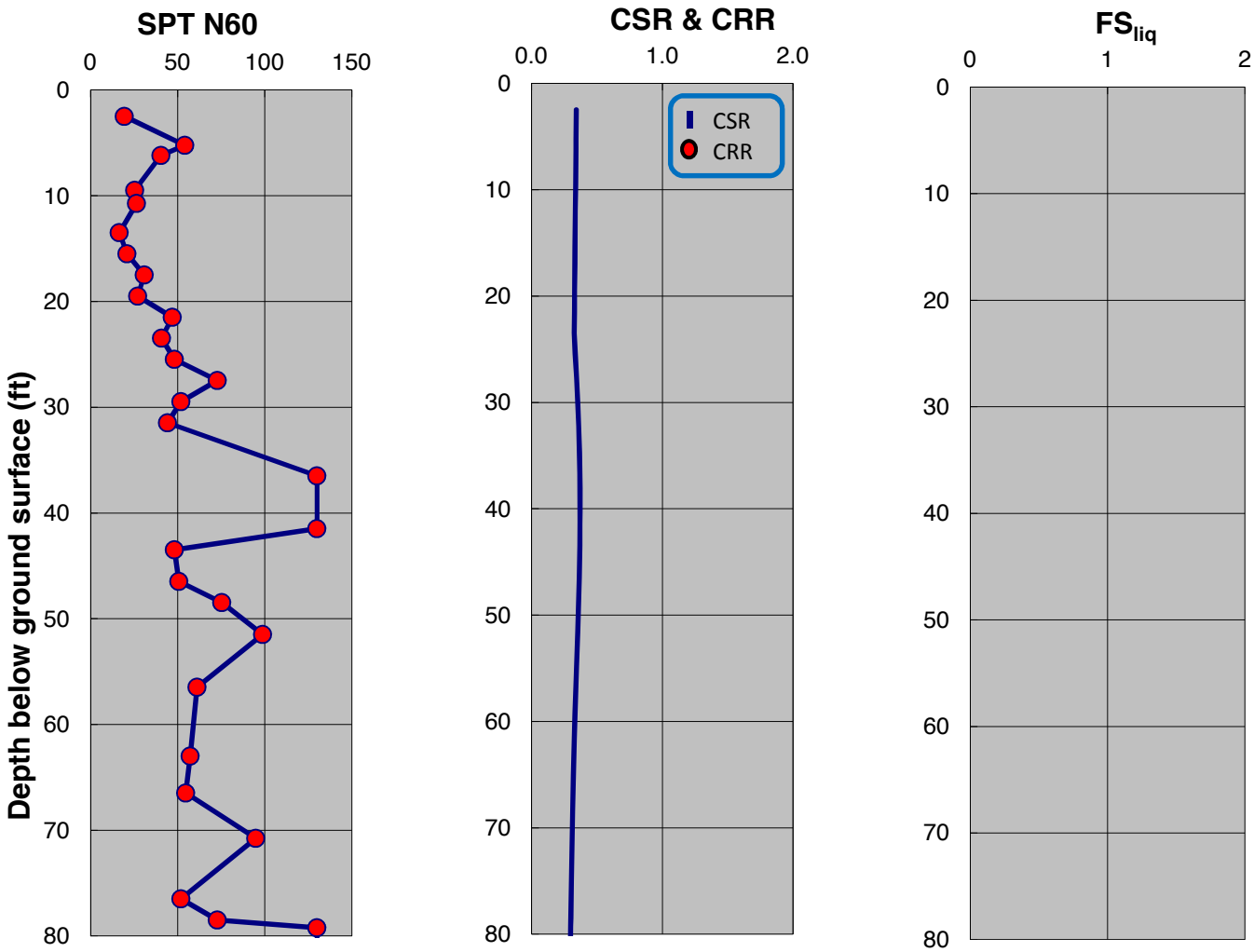
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-37 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-37 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

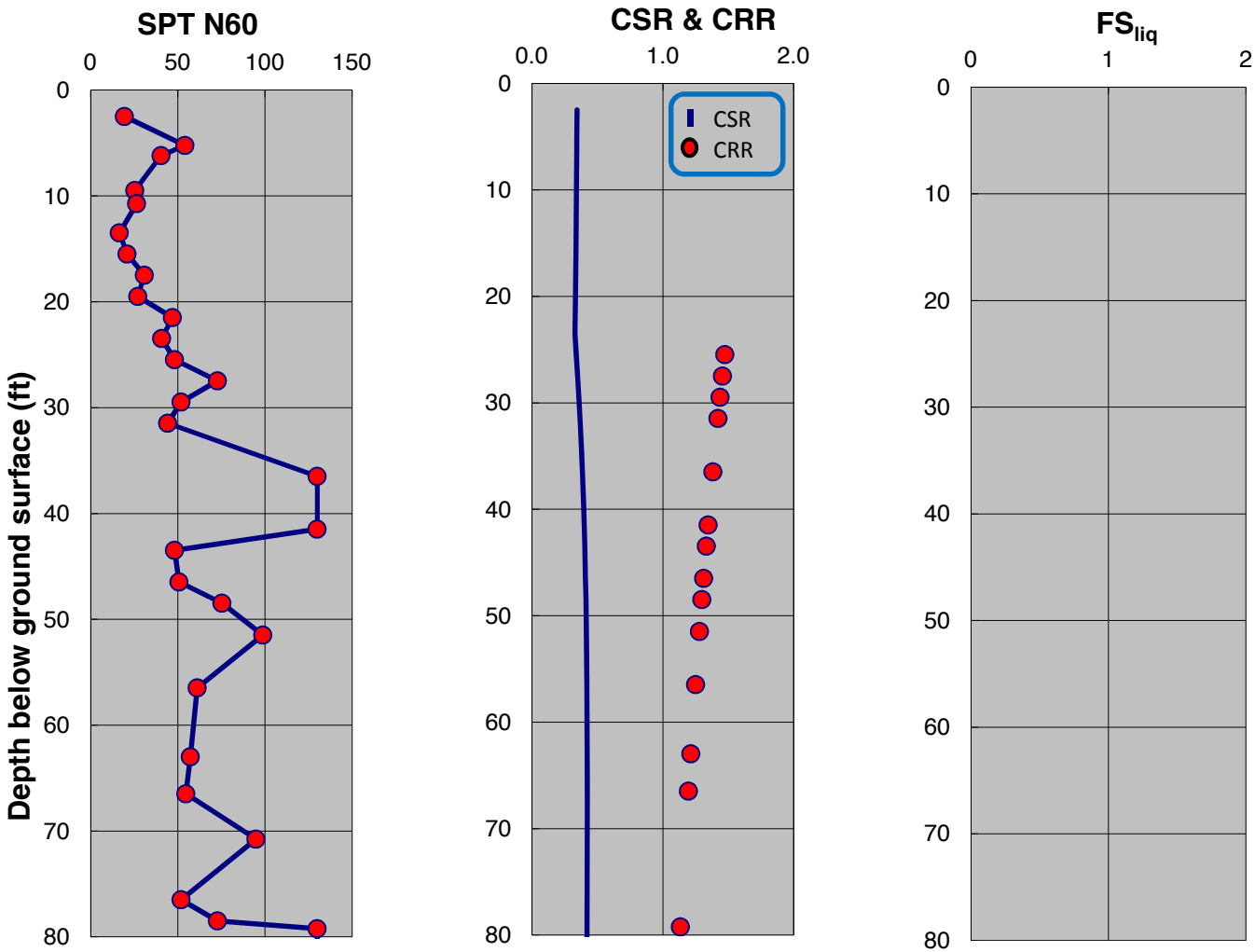
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-38 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

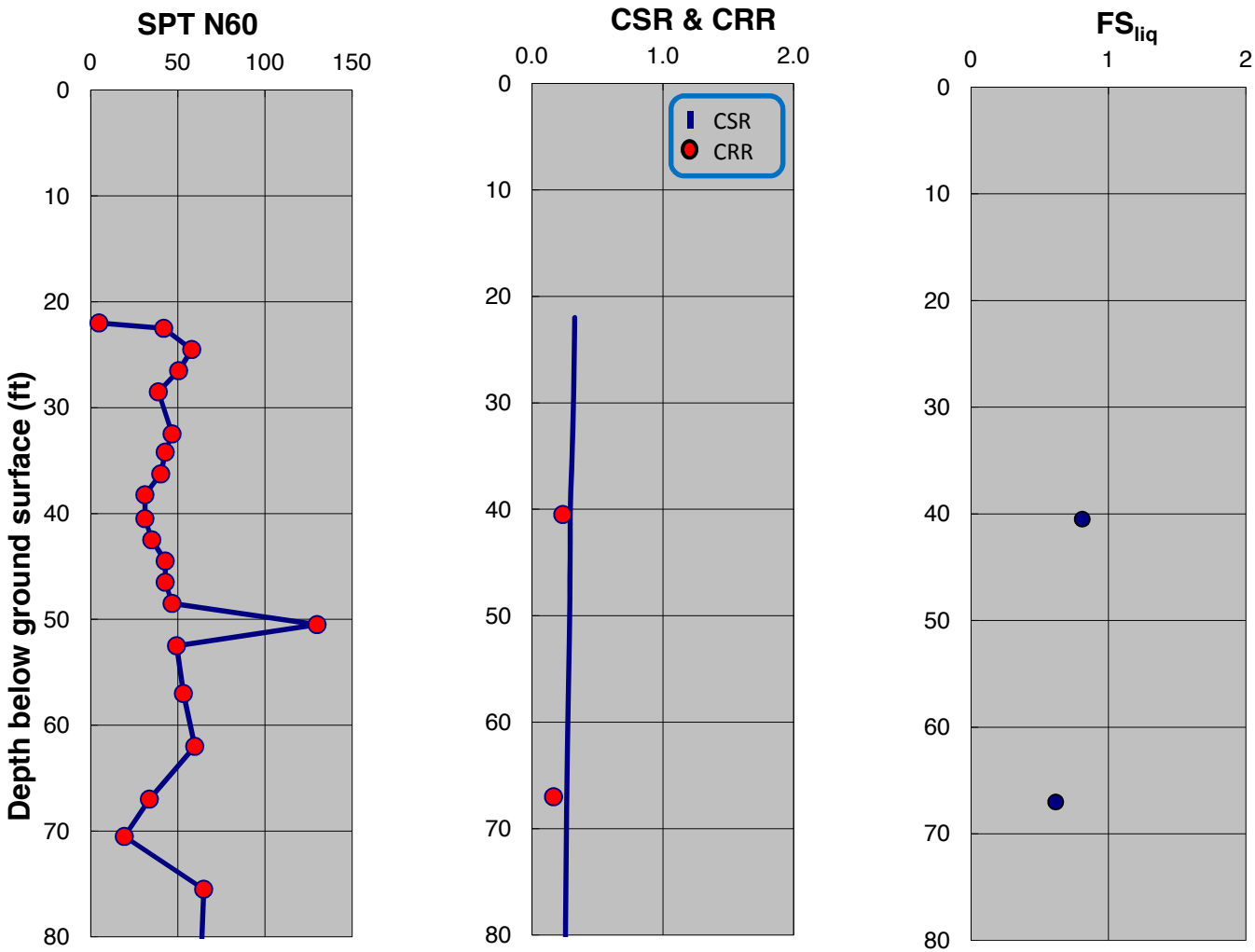
PLATE C.33



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-38 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

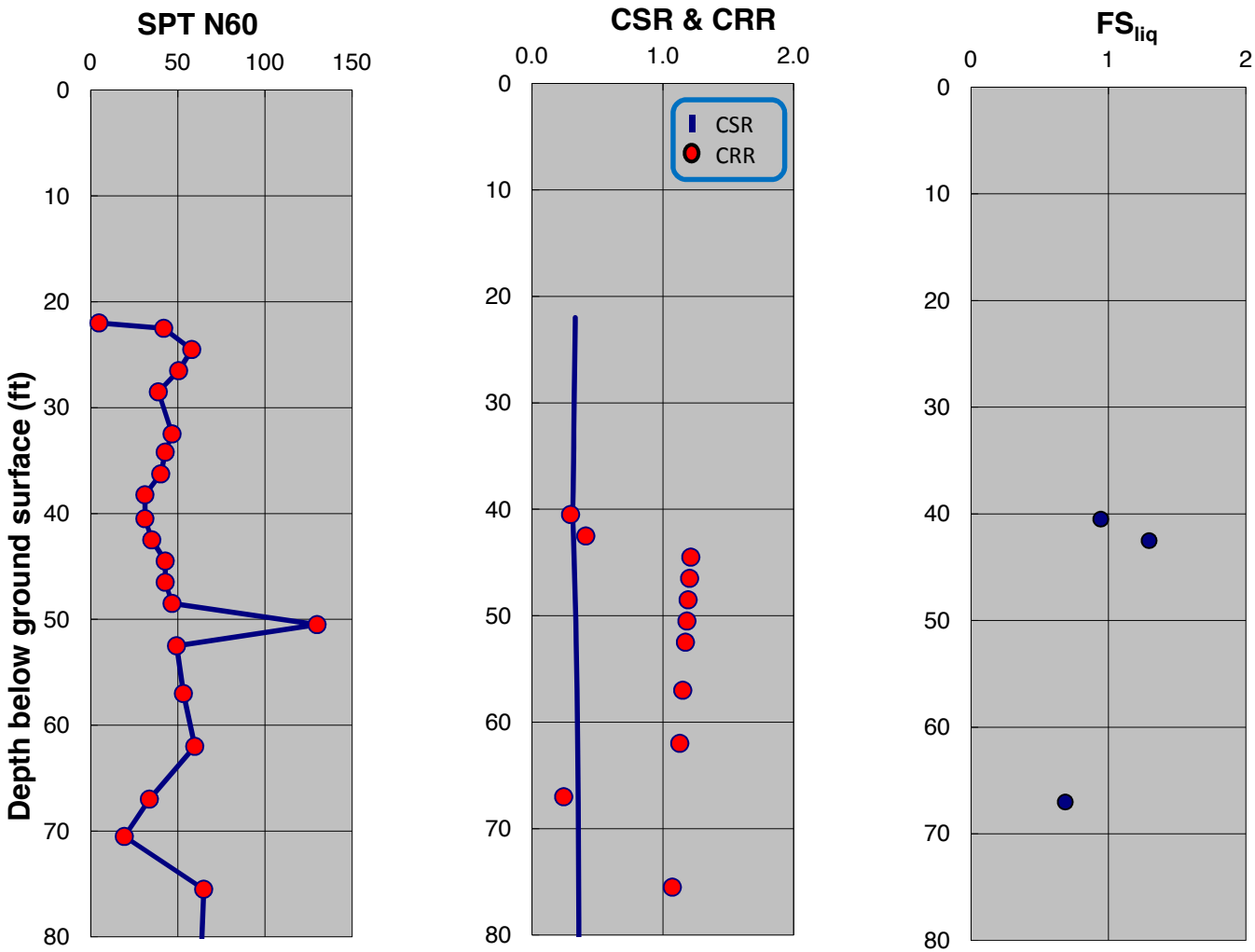
PLATE C.34



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-39 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

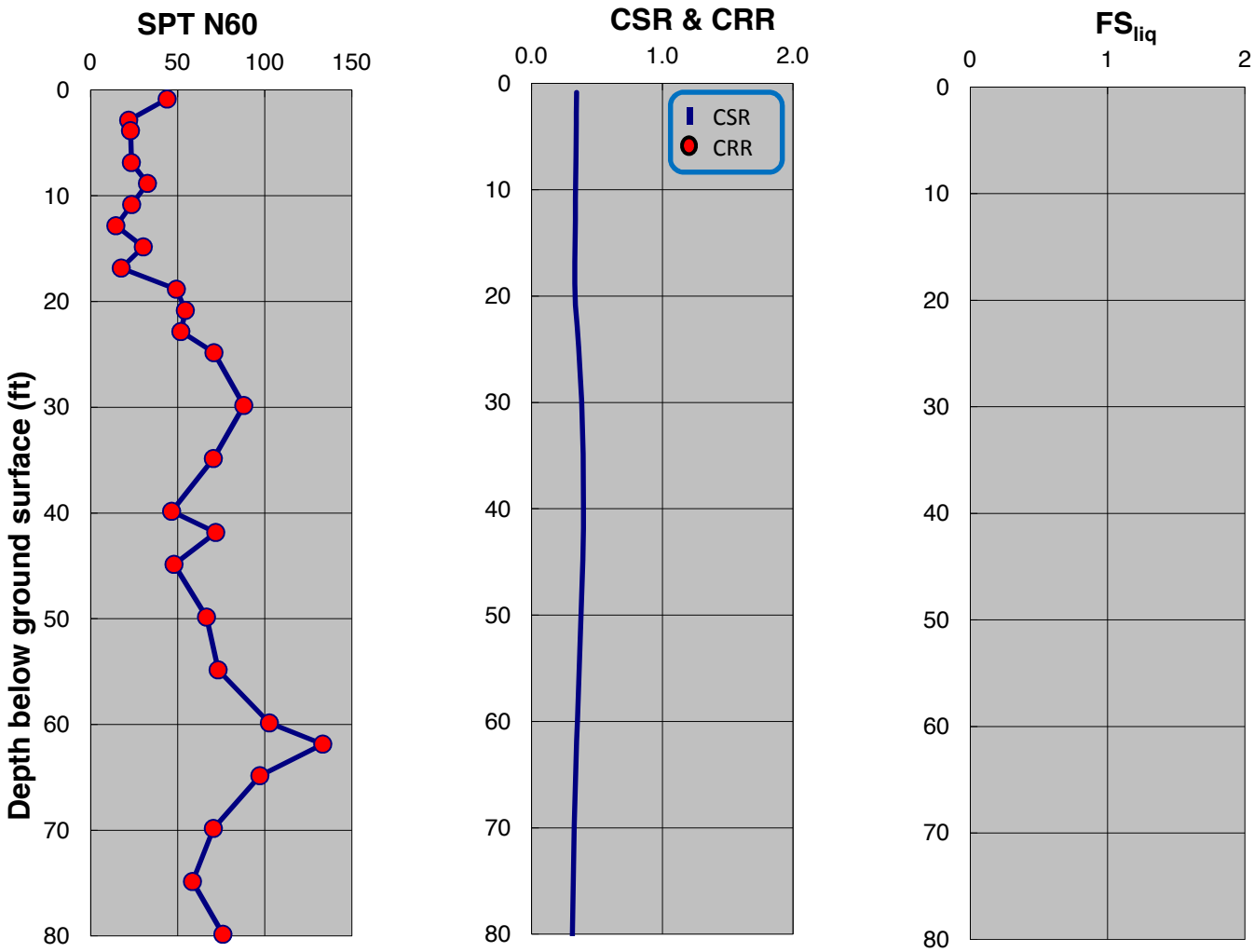
PLATE C.35



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-39 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

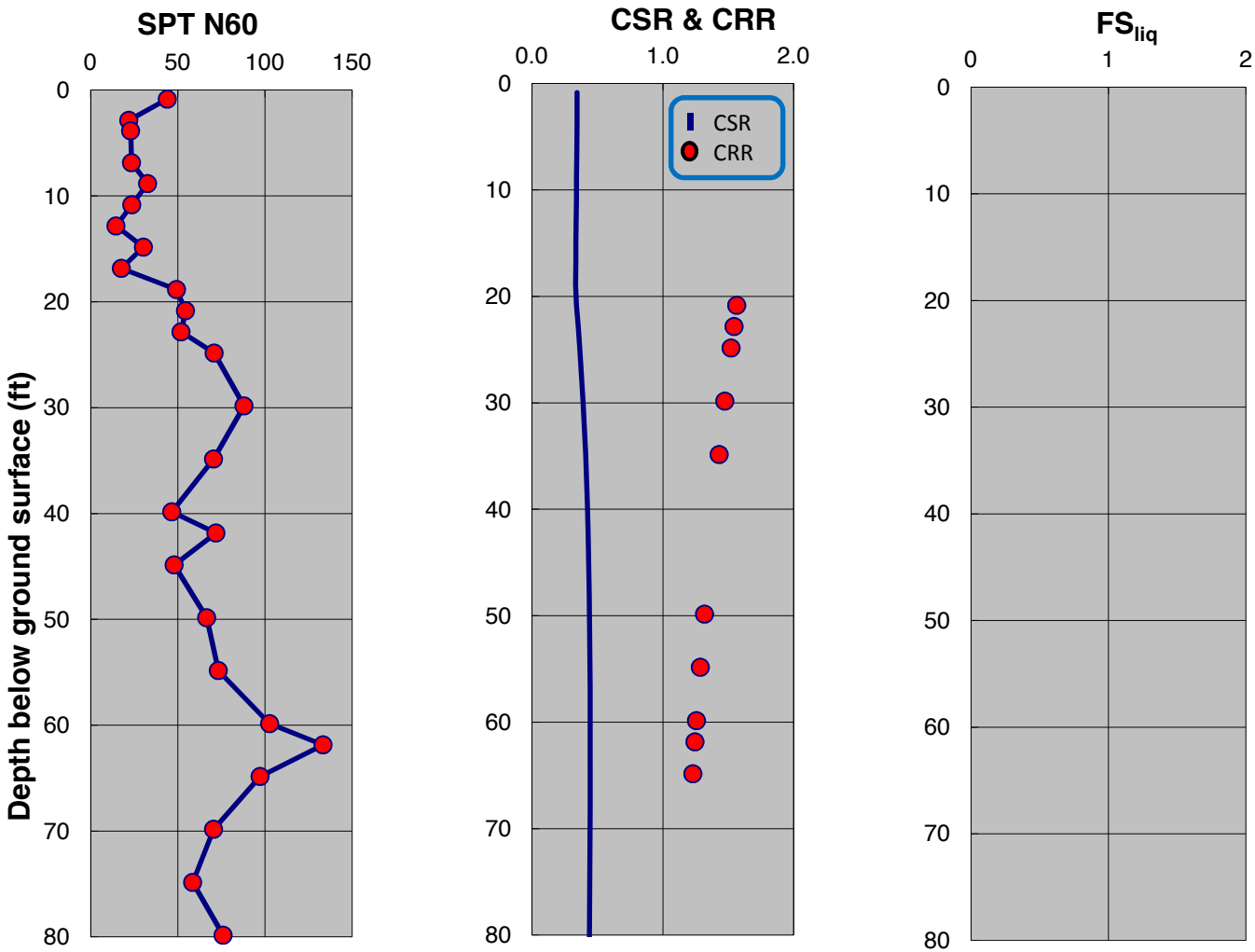
PLATE C.36



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-40 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

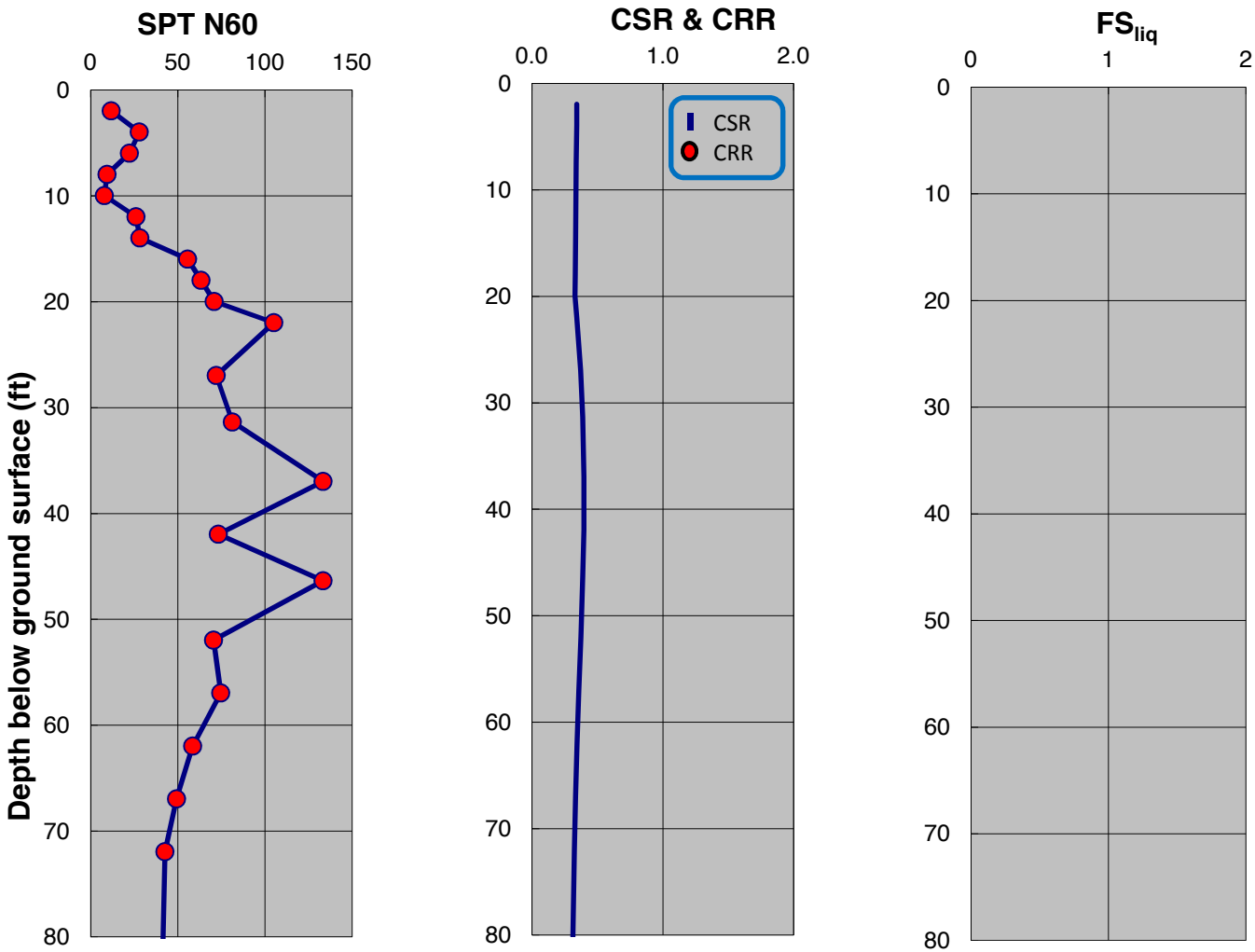
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.37



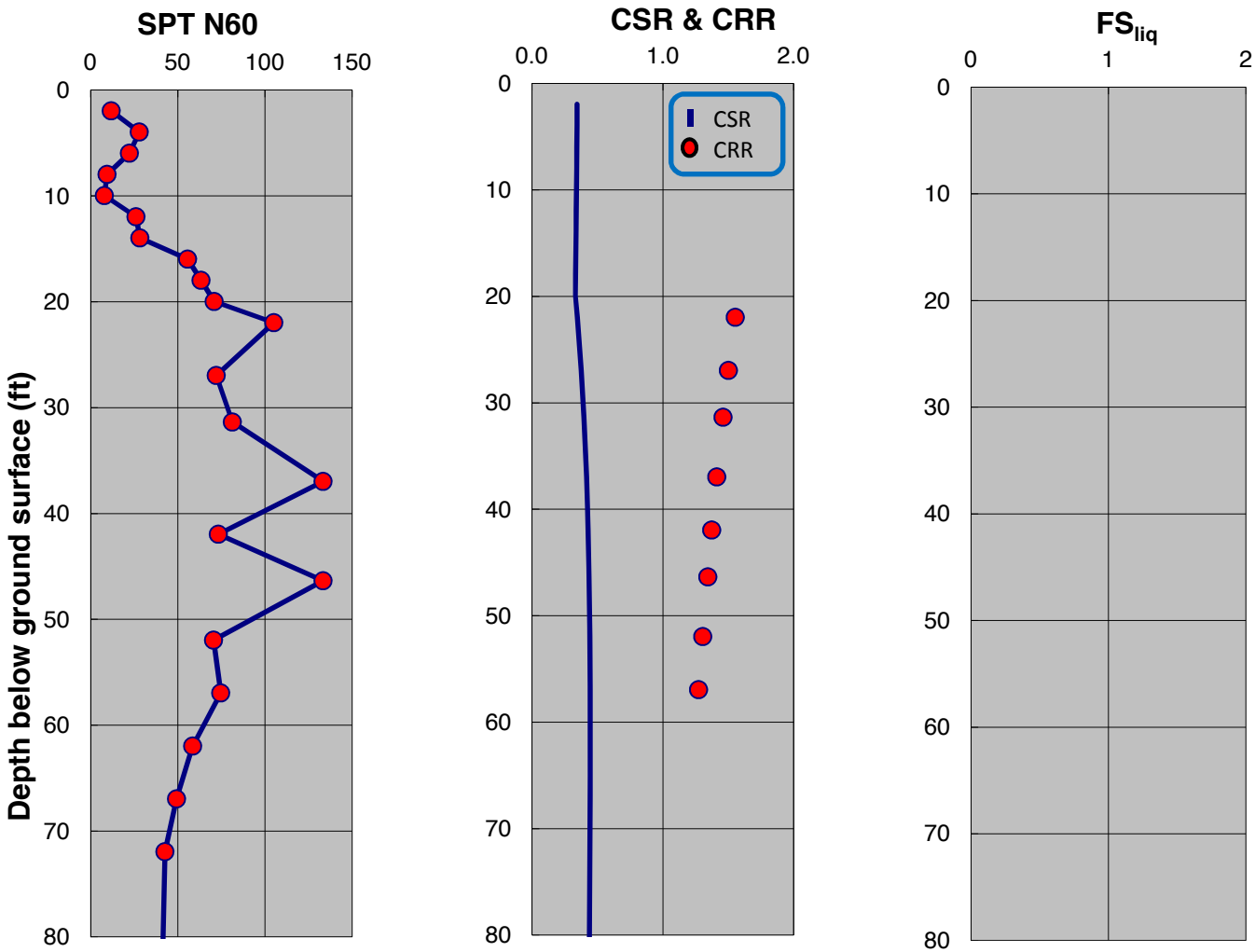
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-40 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-42 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

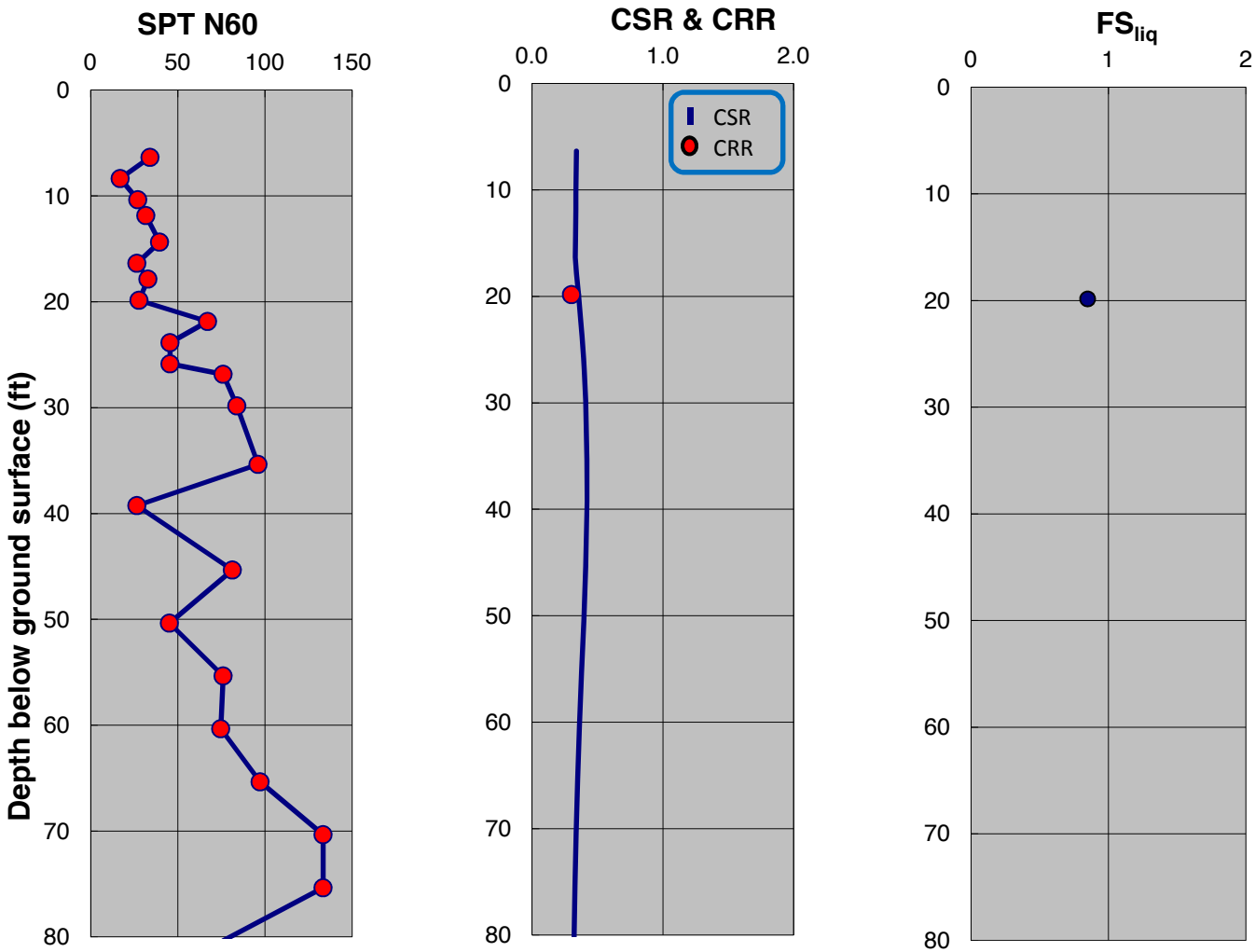
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-42 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

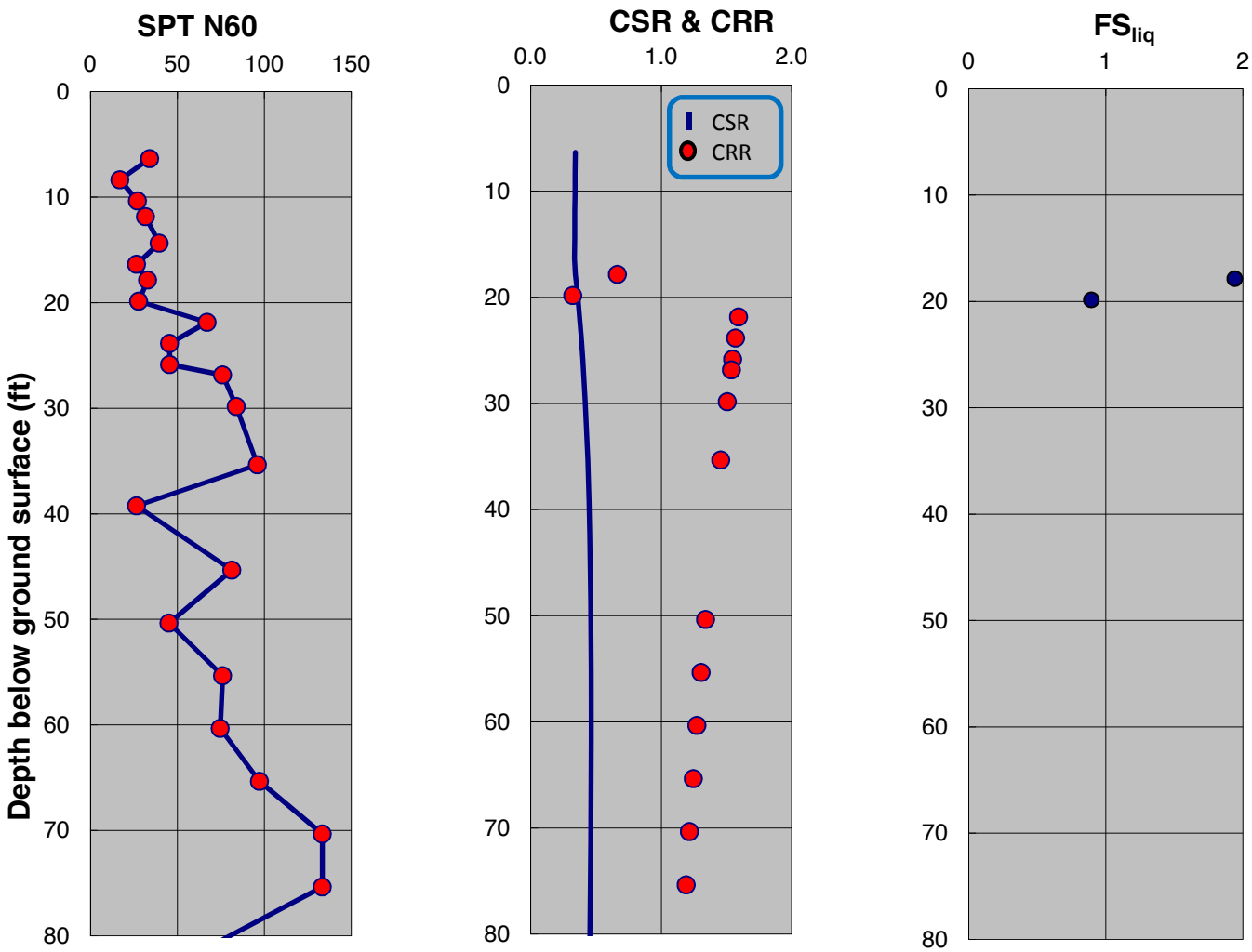
PLATE C.40



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-43 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

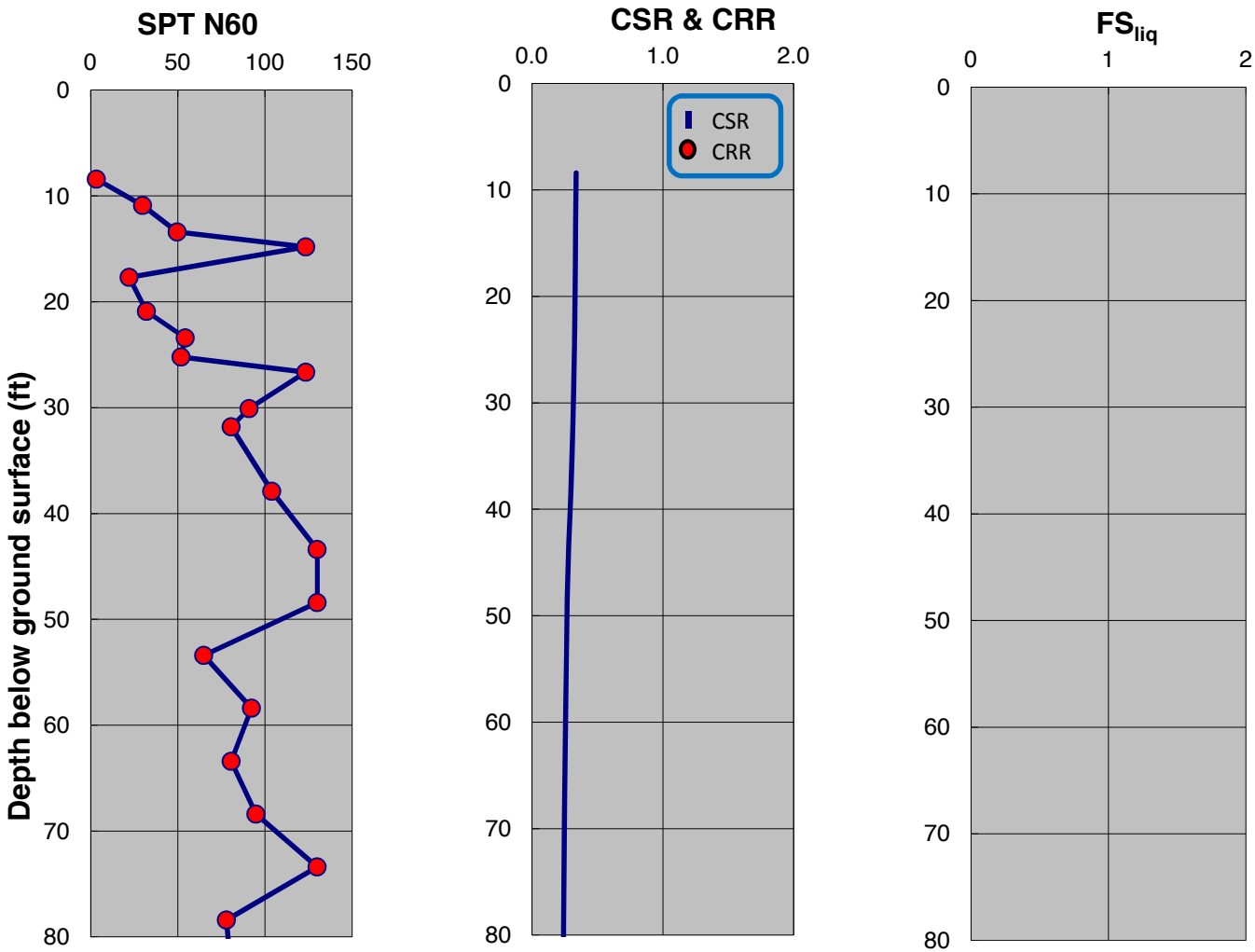
PLATE C.41



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-43 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

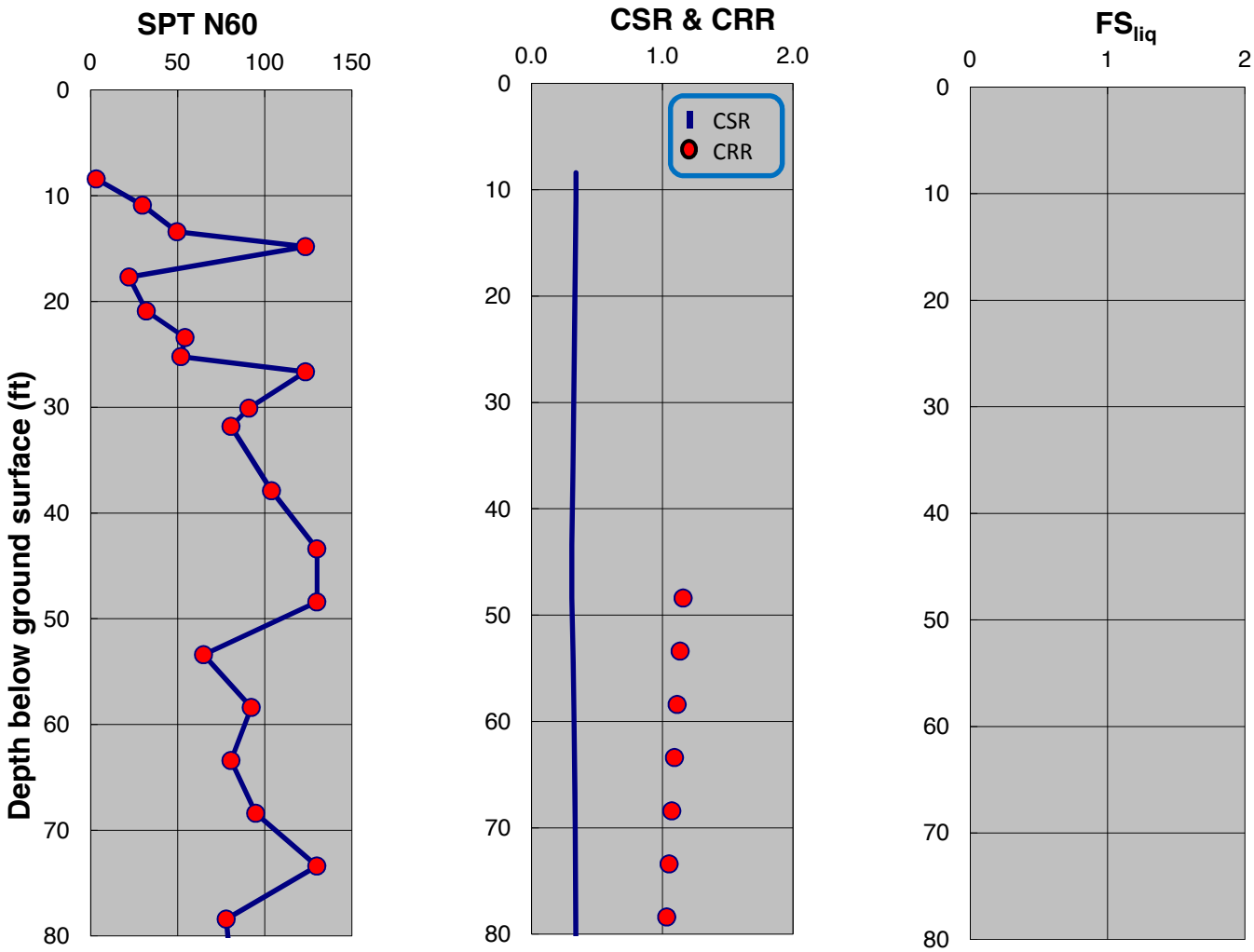
PLATE C.42



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-45 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

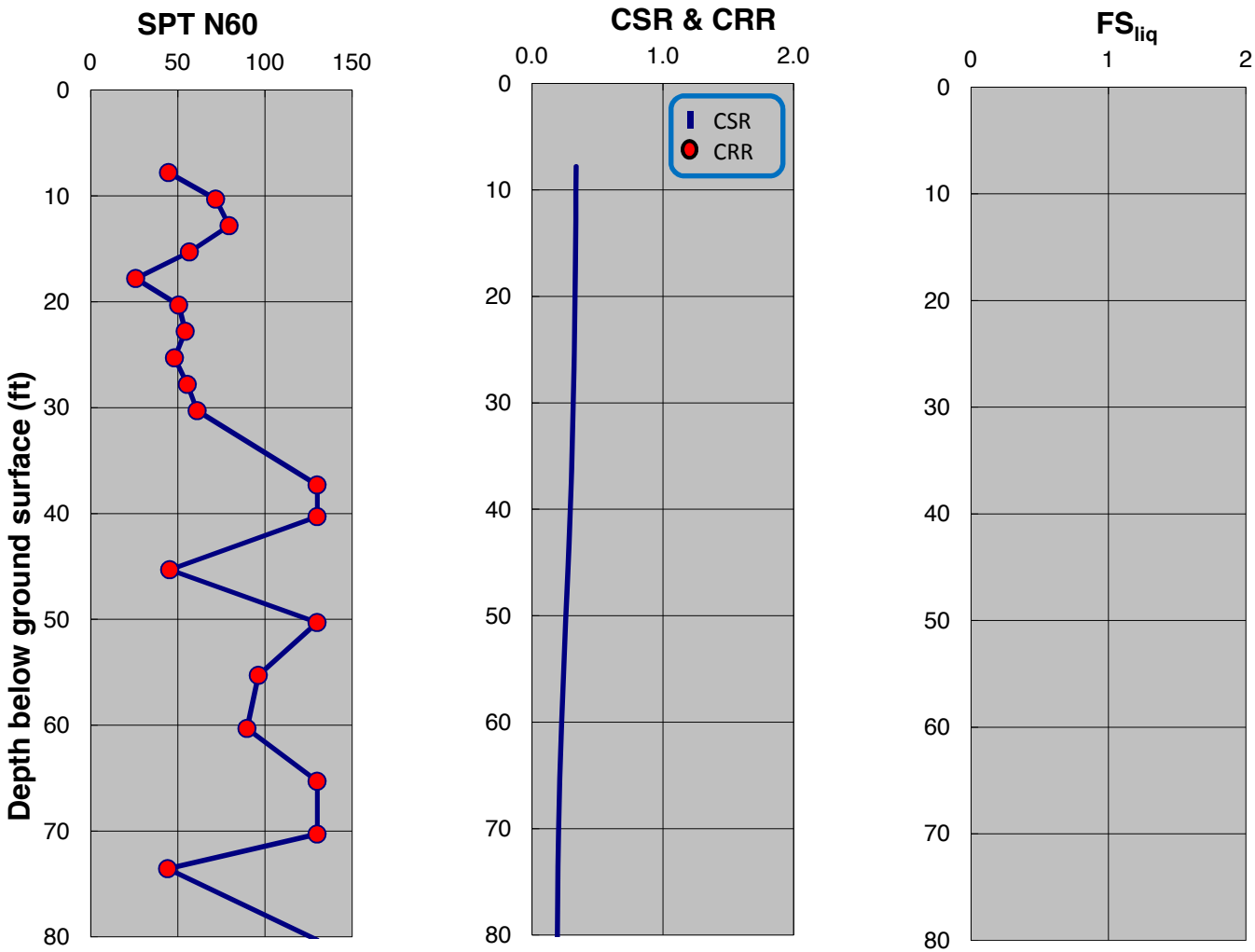
PLATE C.43



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-45 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

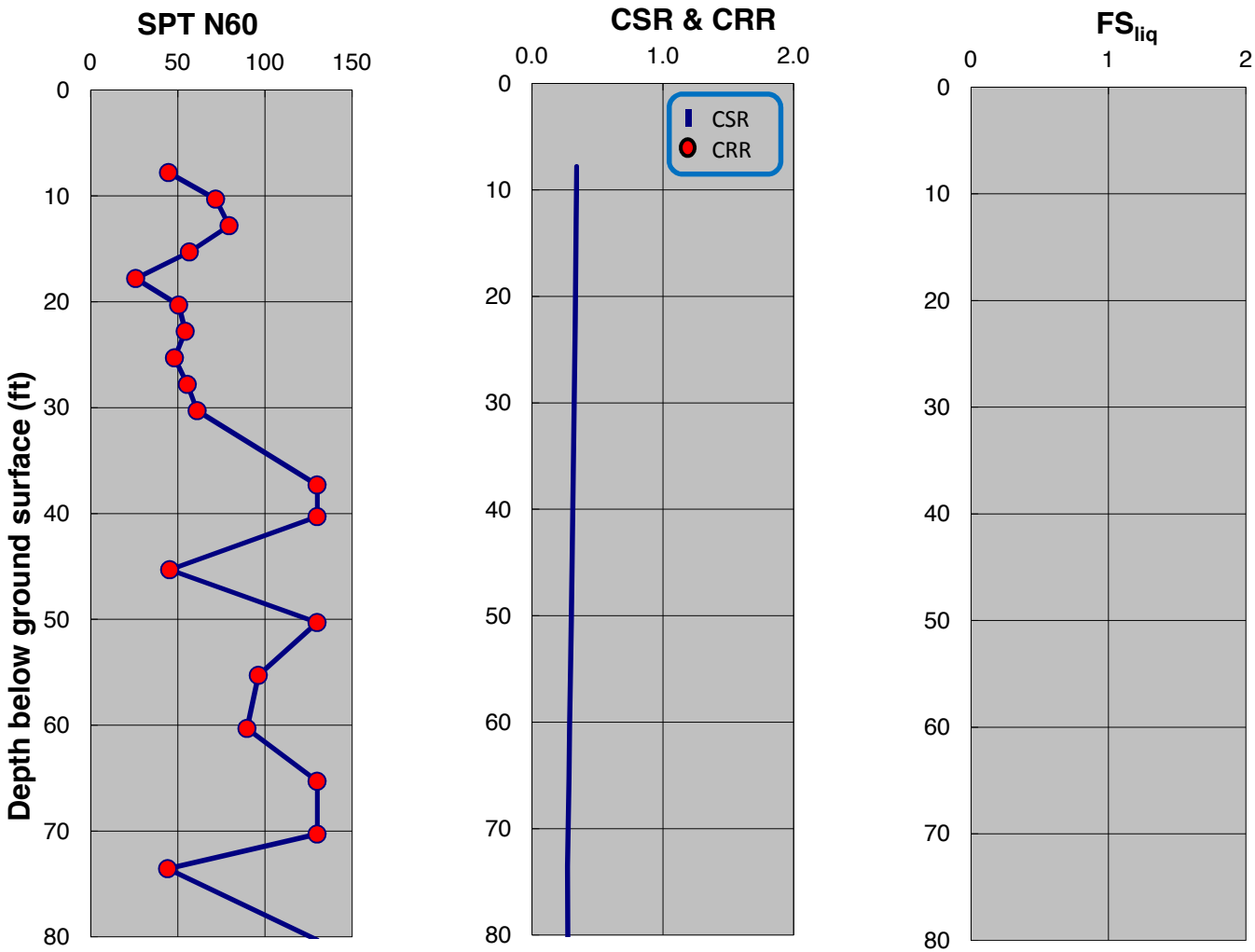
PLATE C.44



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-47 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

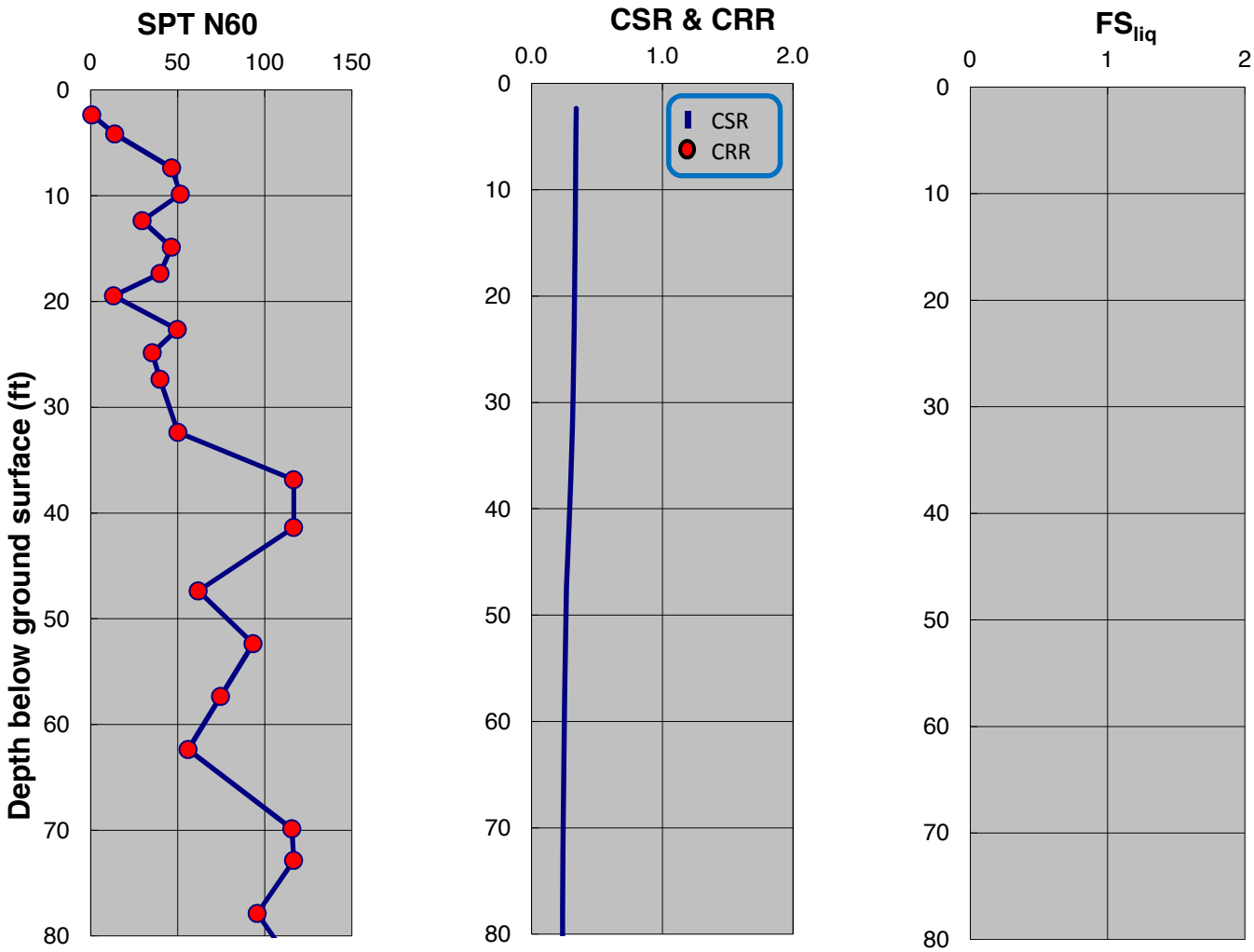
PLATE C.45



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-47 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

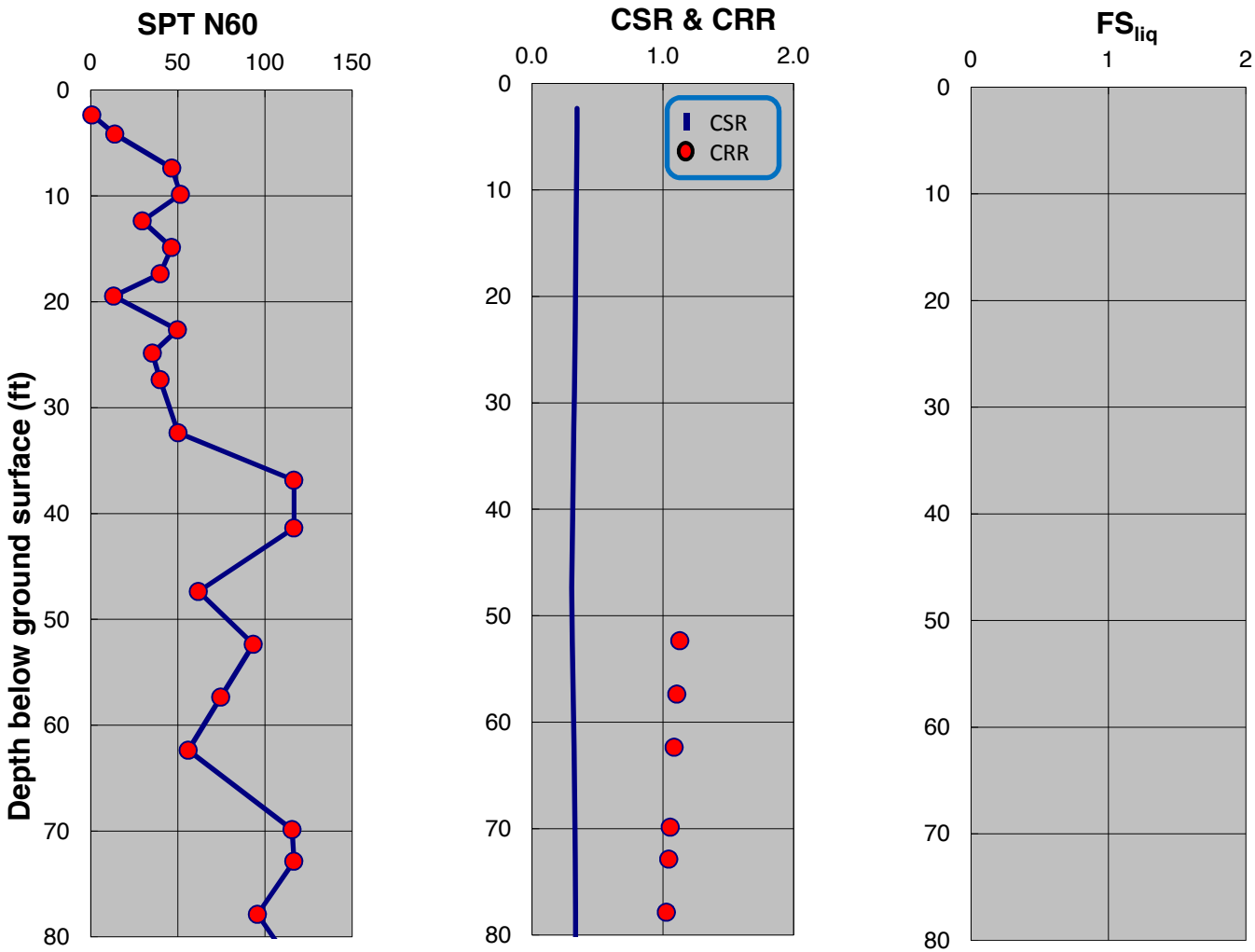
PLATE C.46



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-49 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

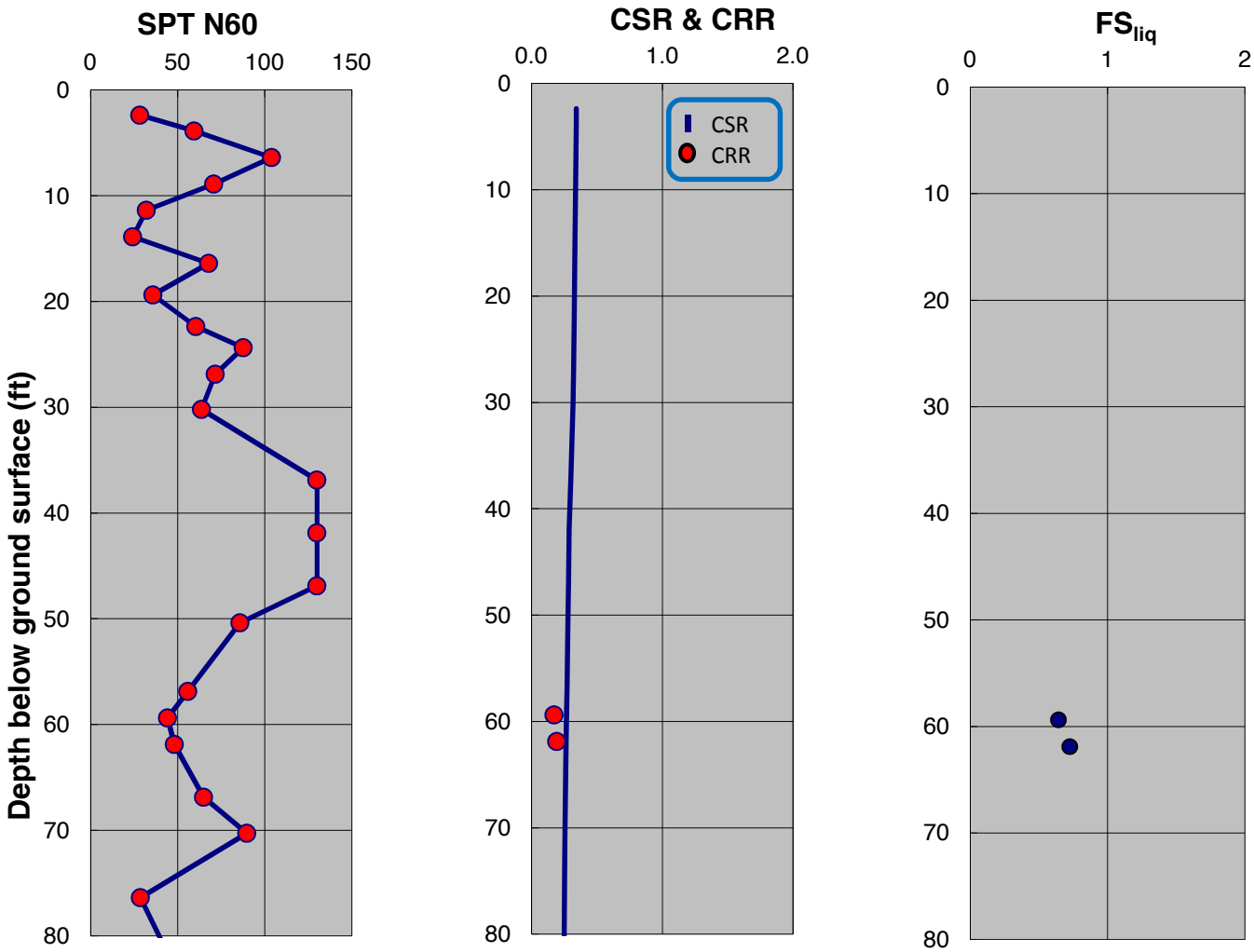
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.47



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-49 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

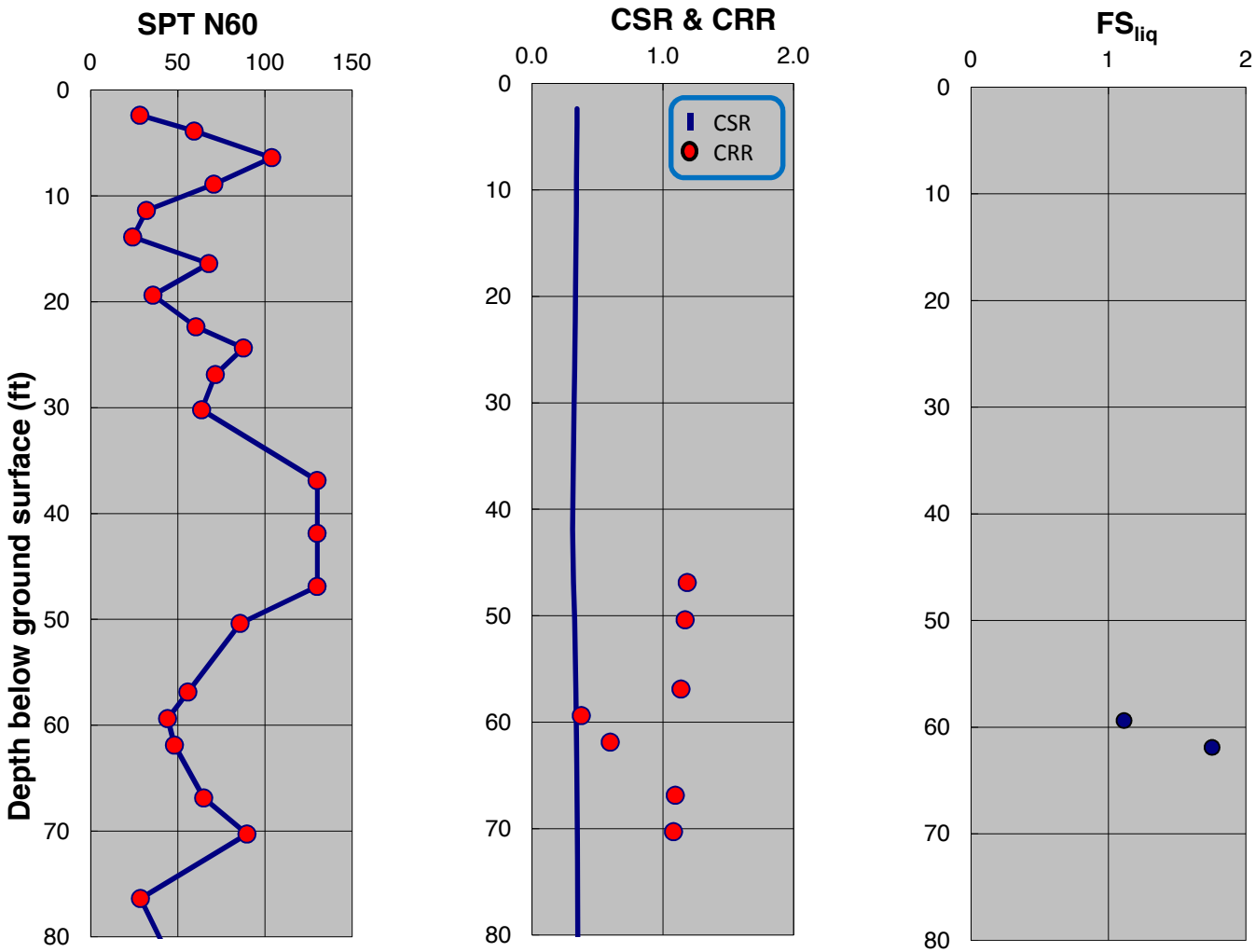
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-50 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

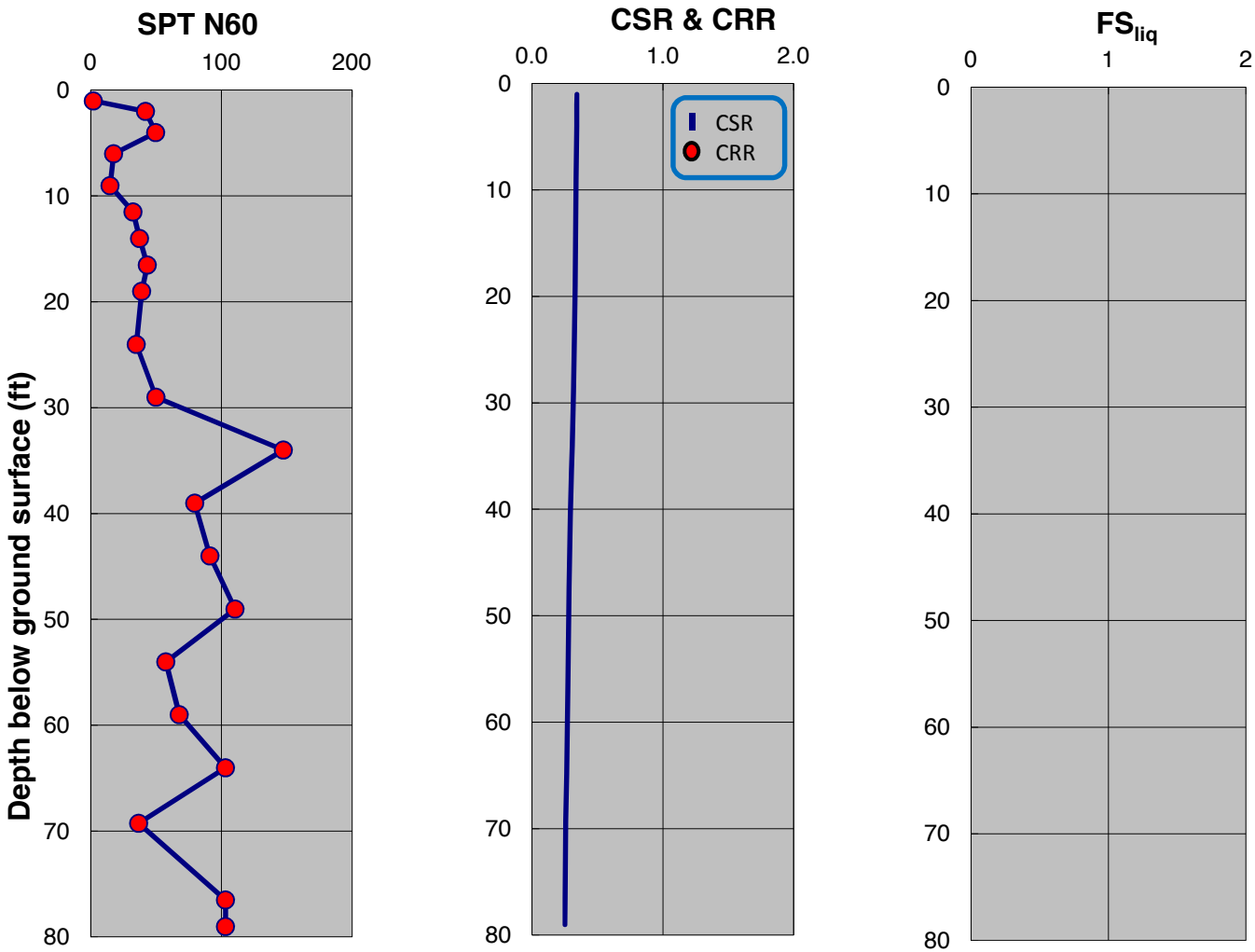
PLATE C.49



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-50 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

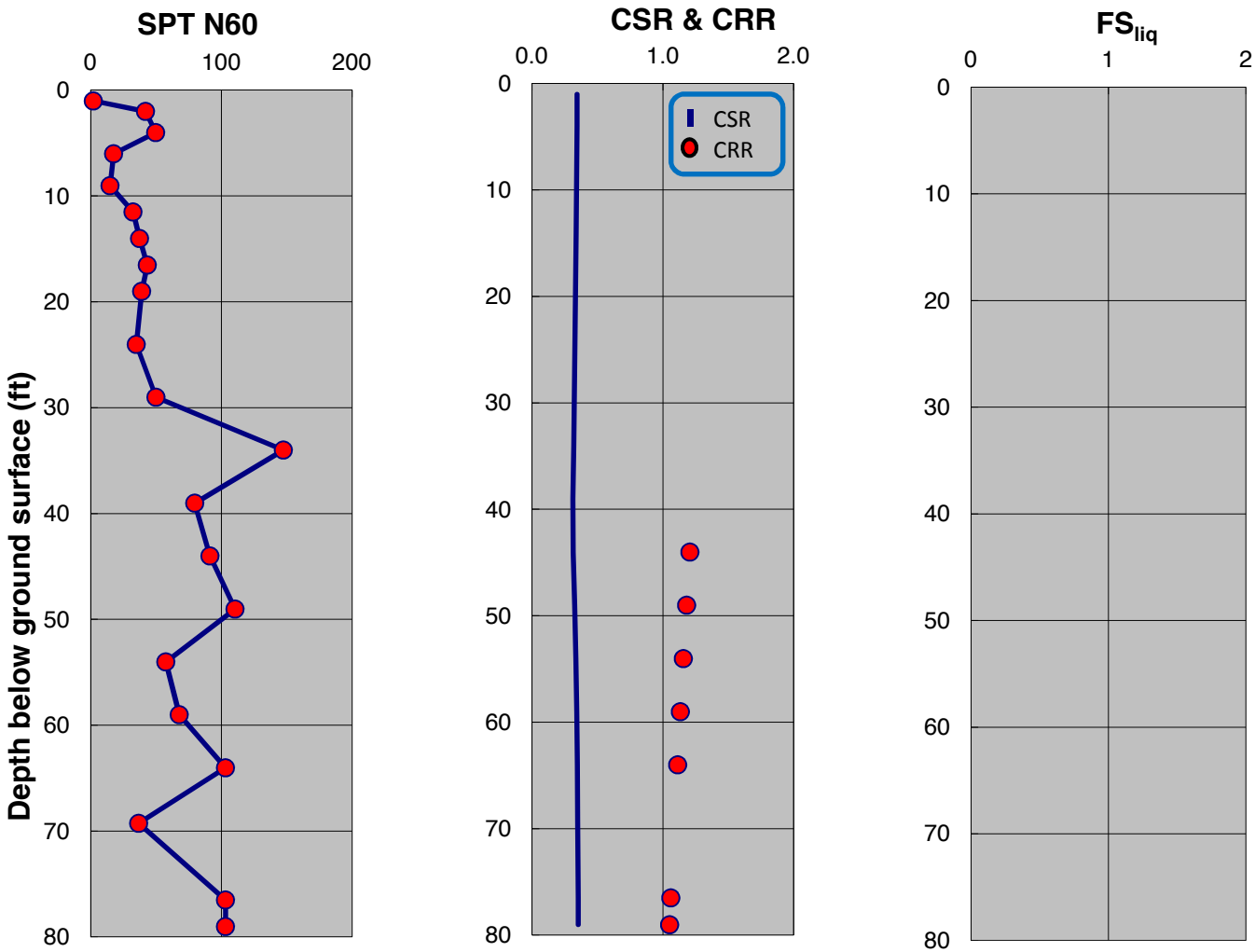
PLATE C.50



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-60 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

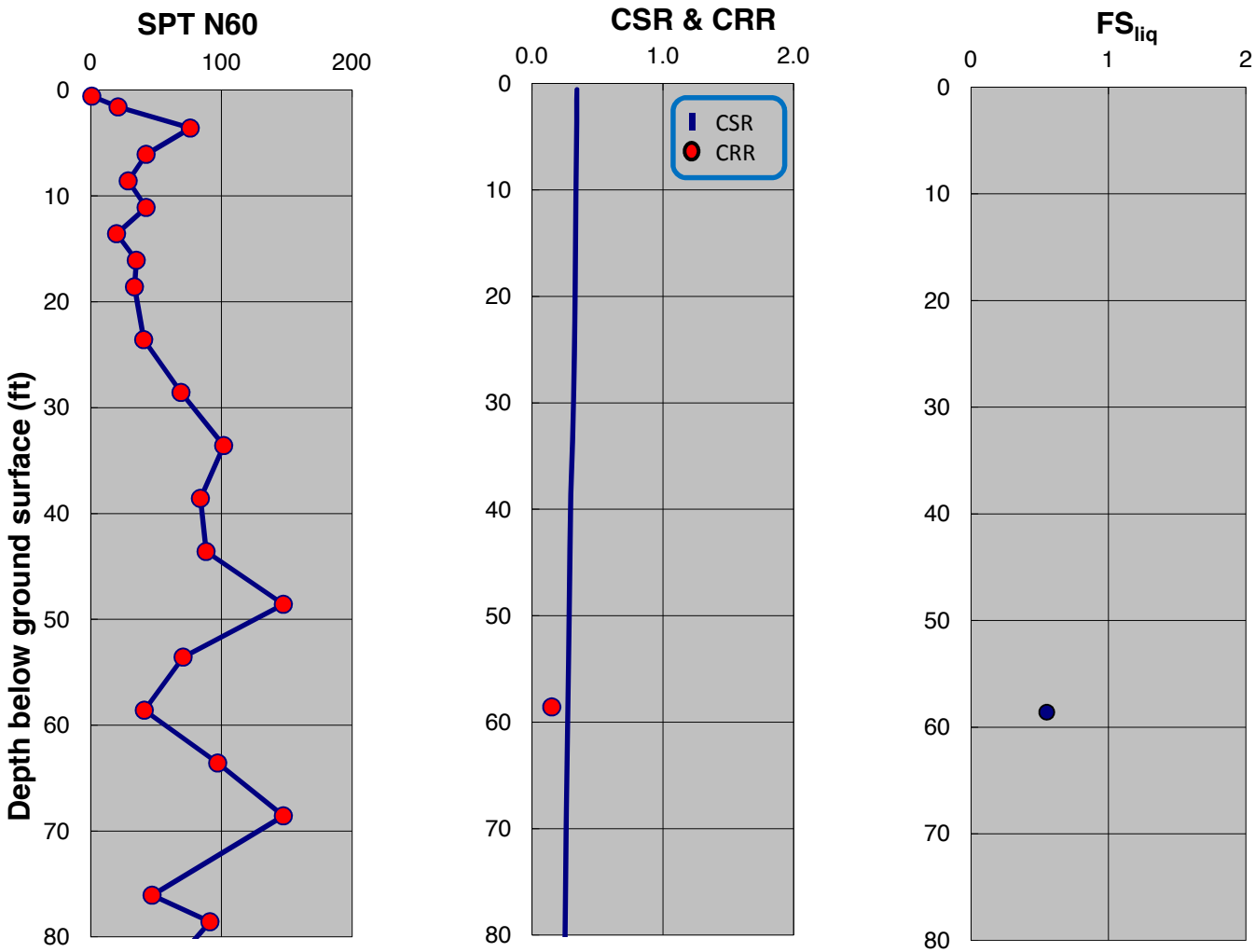
PLATE C.51



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-60 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

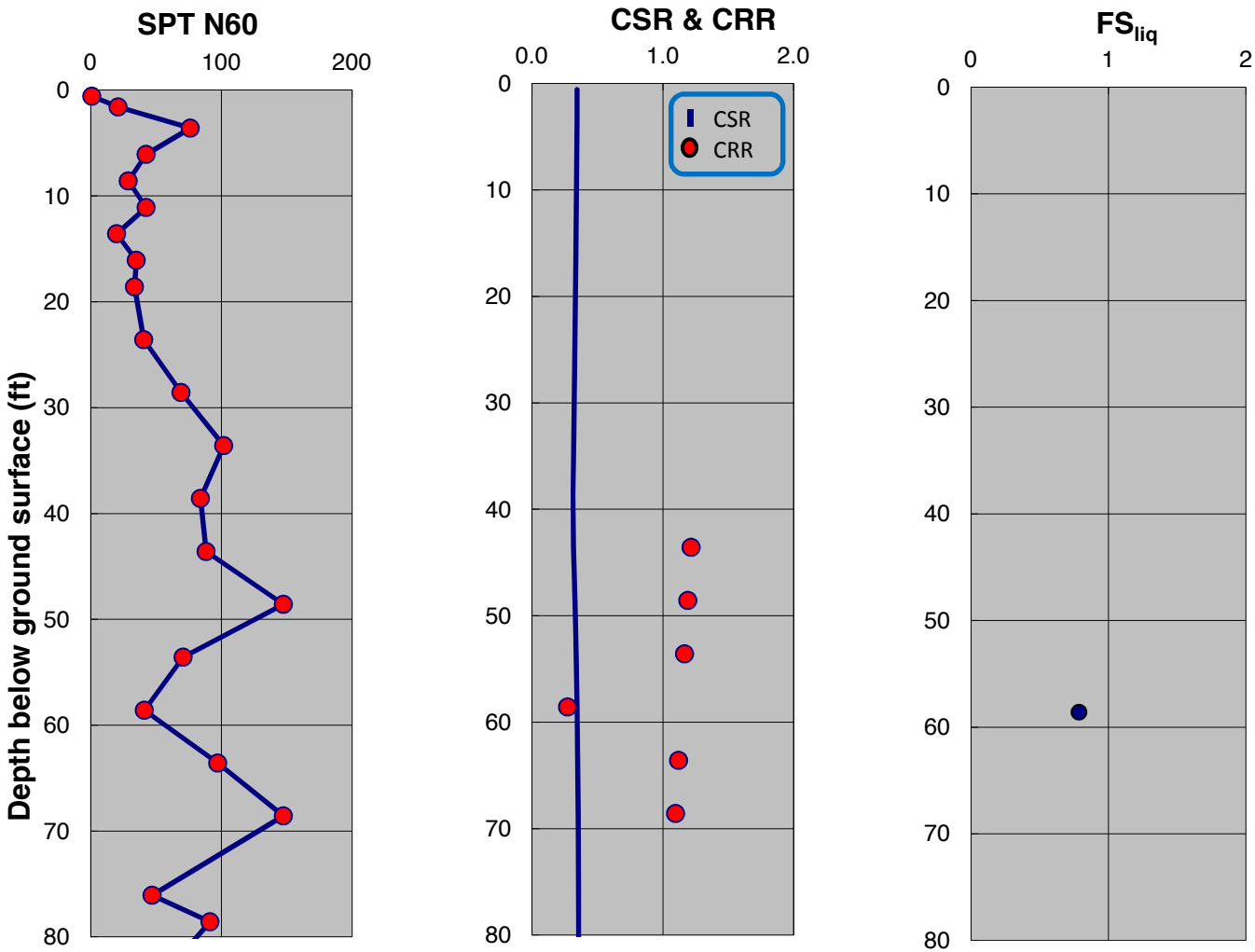
PLATE C.52



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-61 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

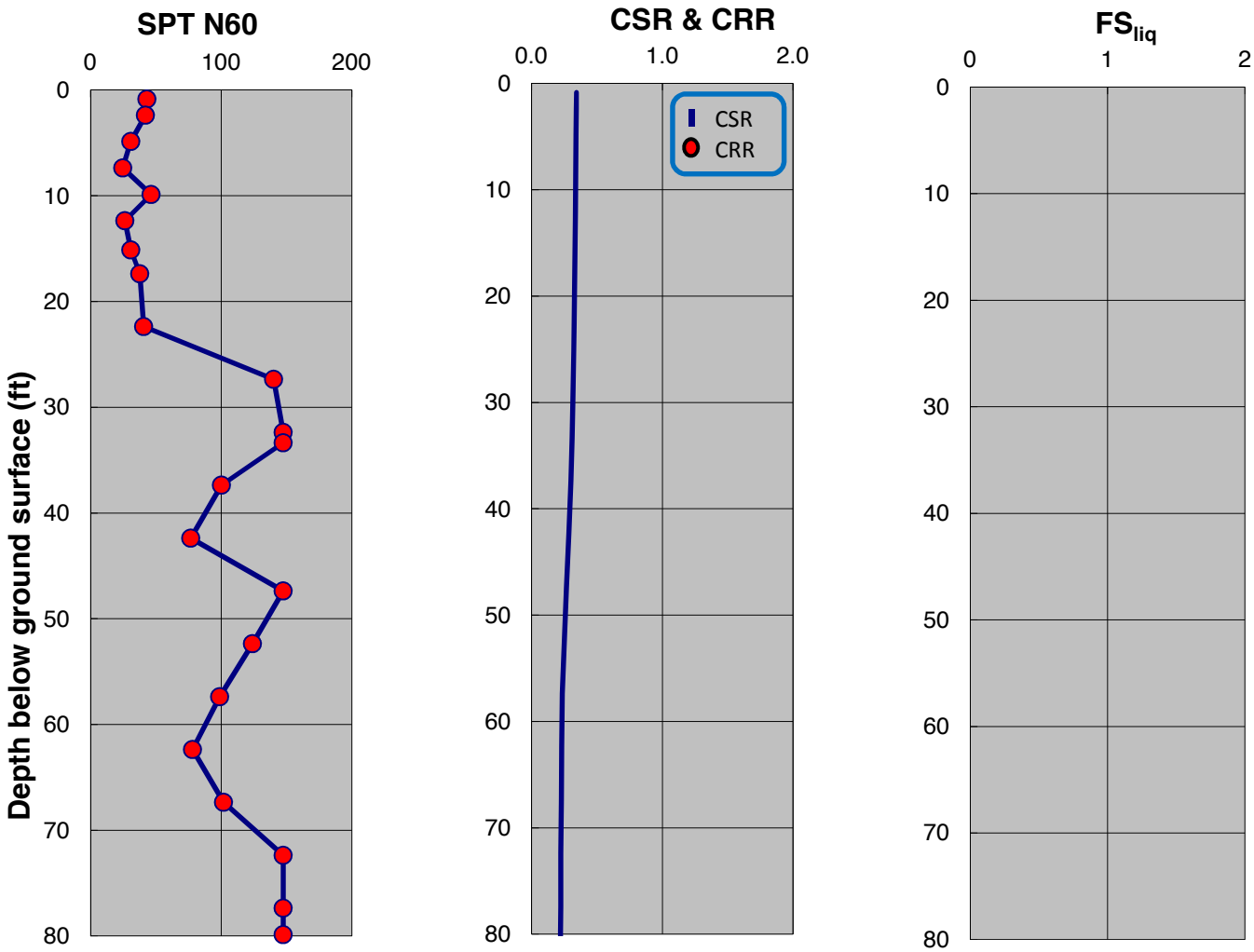
PLATE C.53



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-61 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

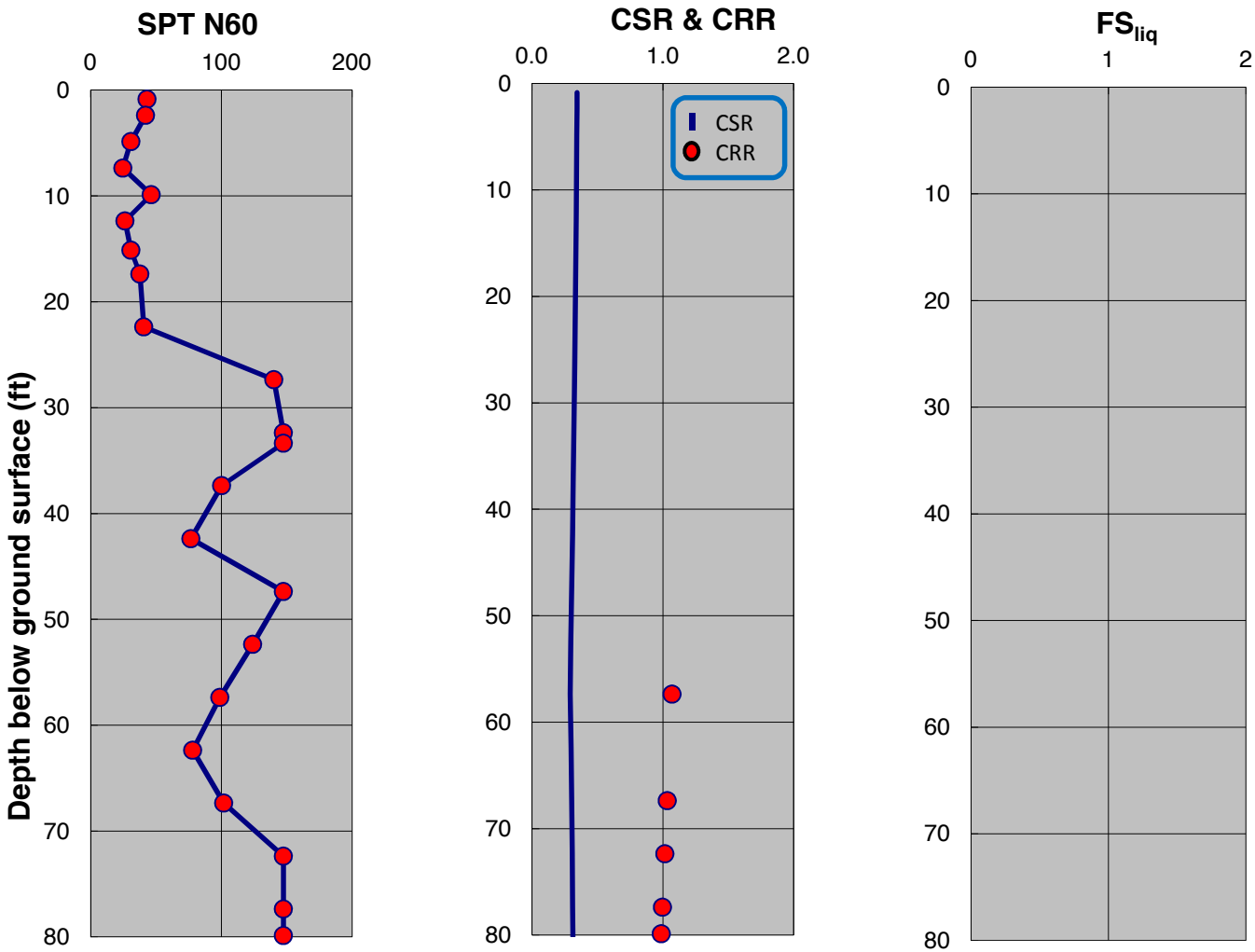
PLATE C.54



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-62 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

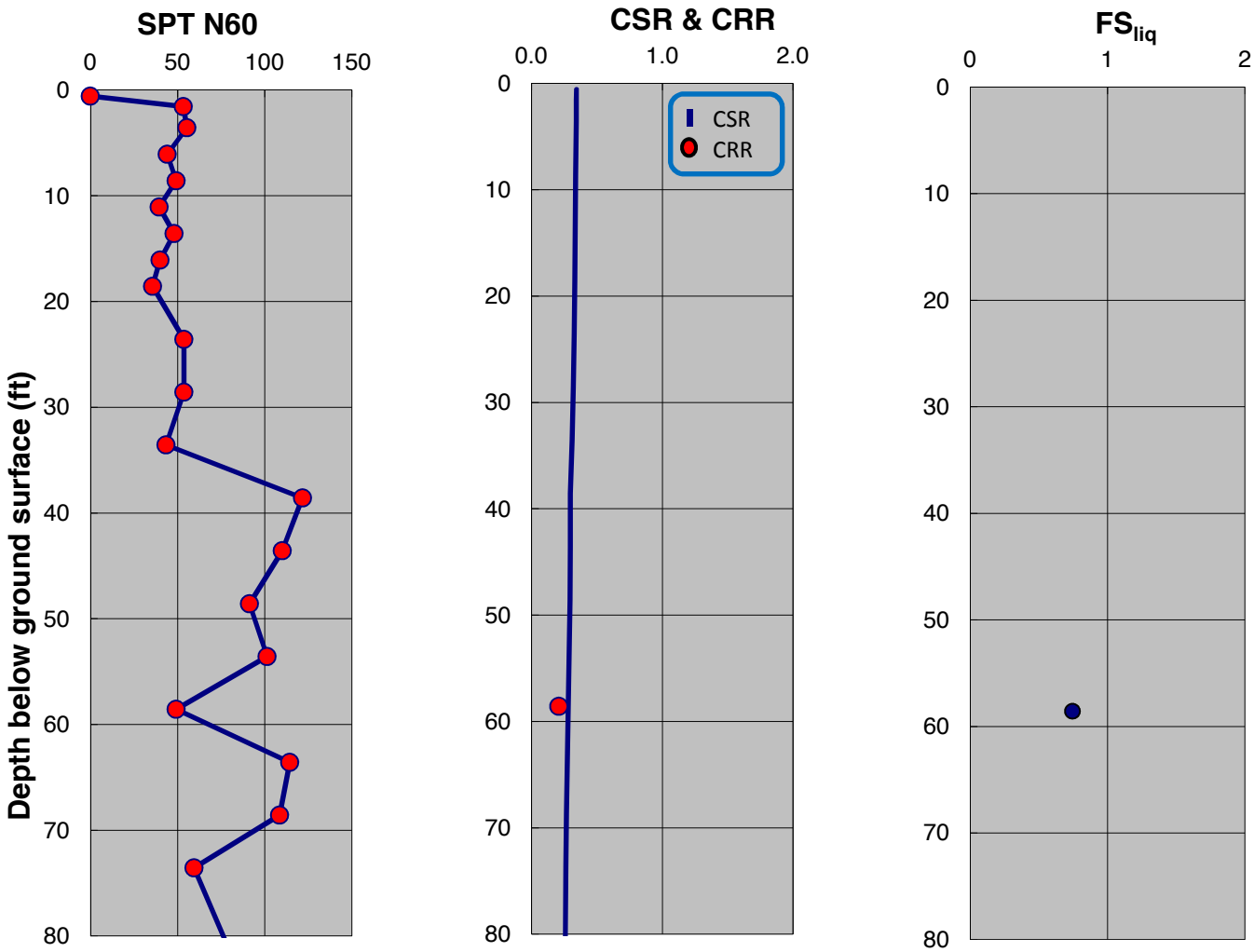
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.55



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-62 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

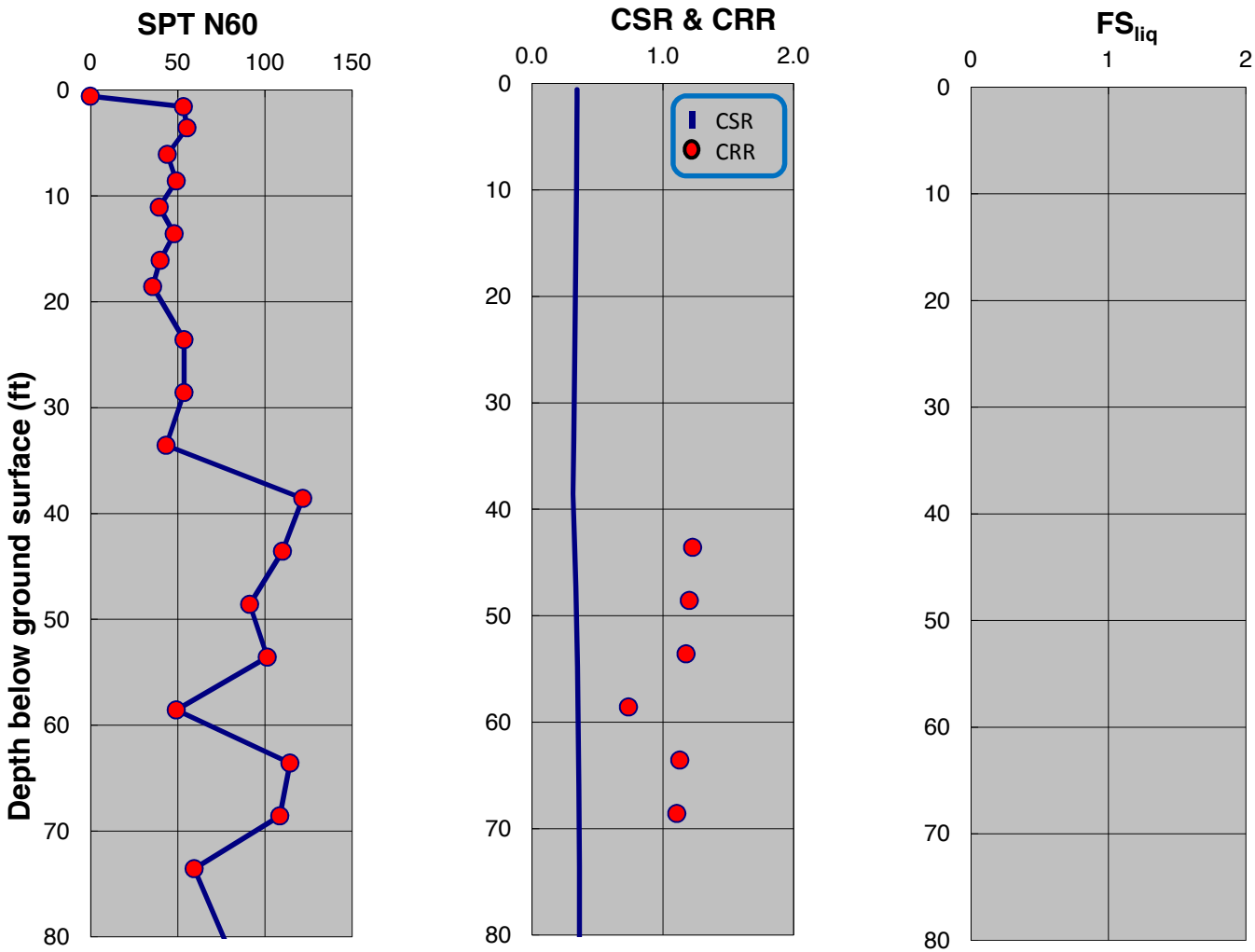
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-64 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

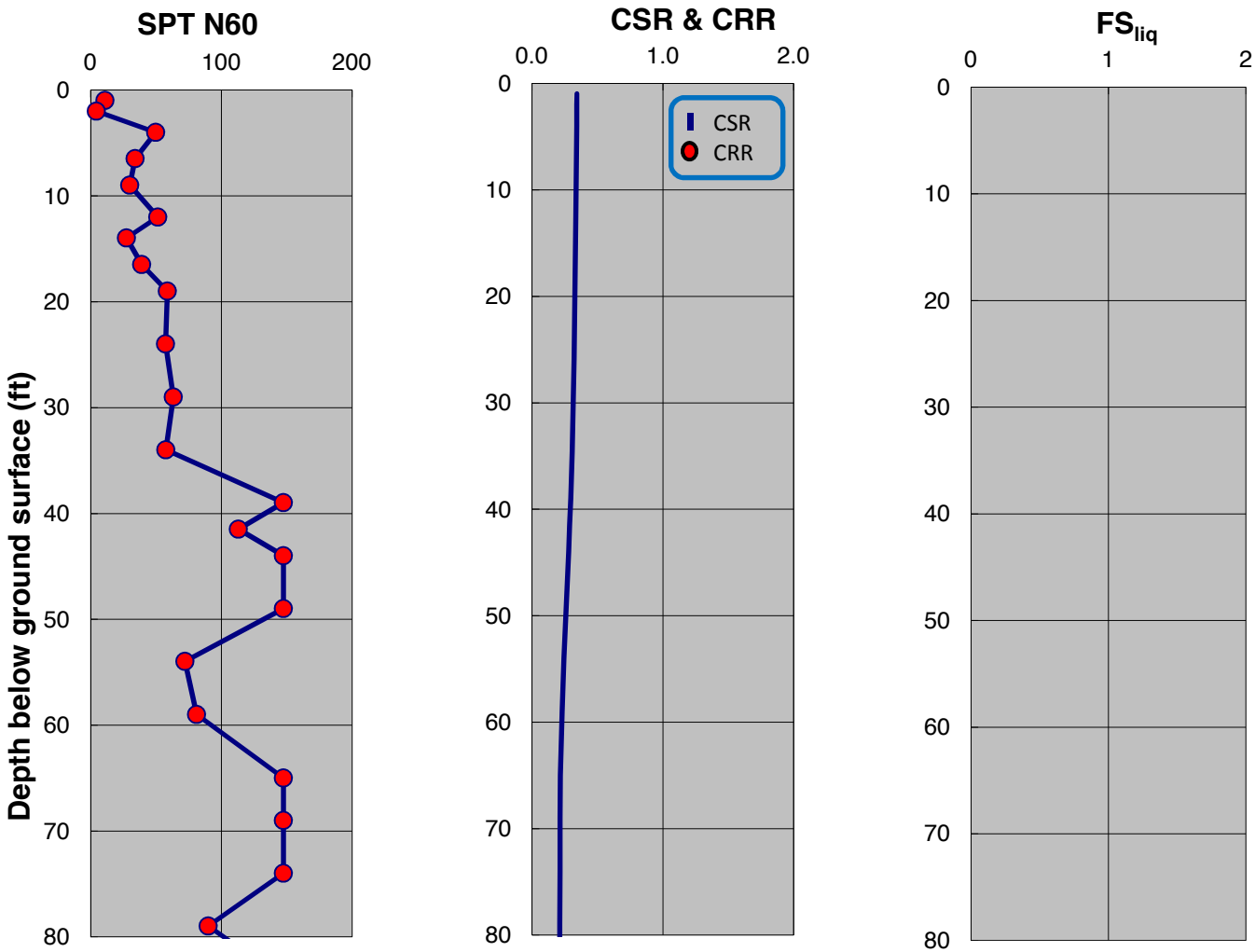
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.57



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-64 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

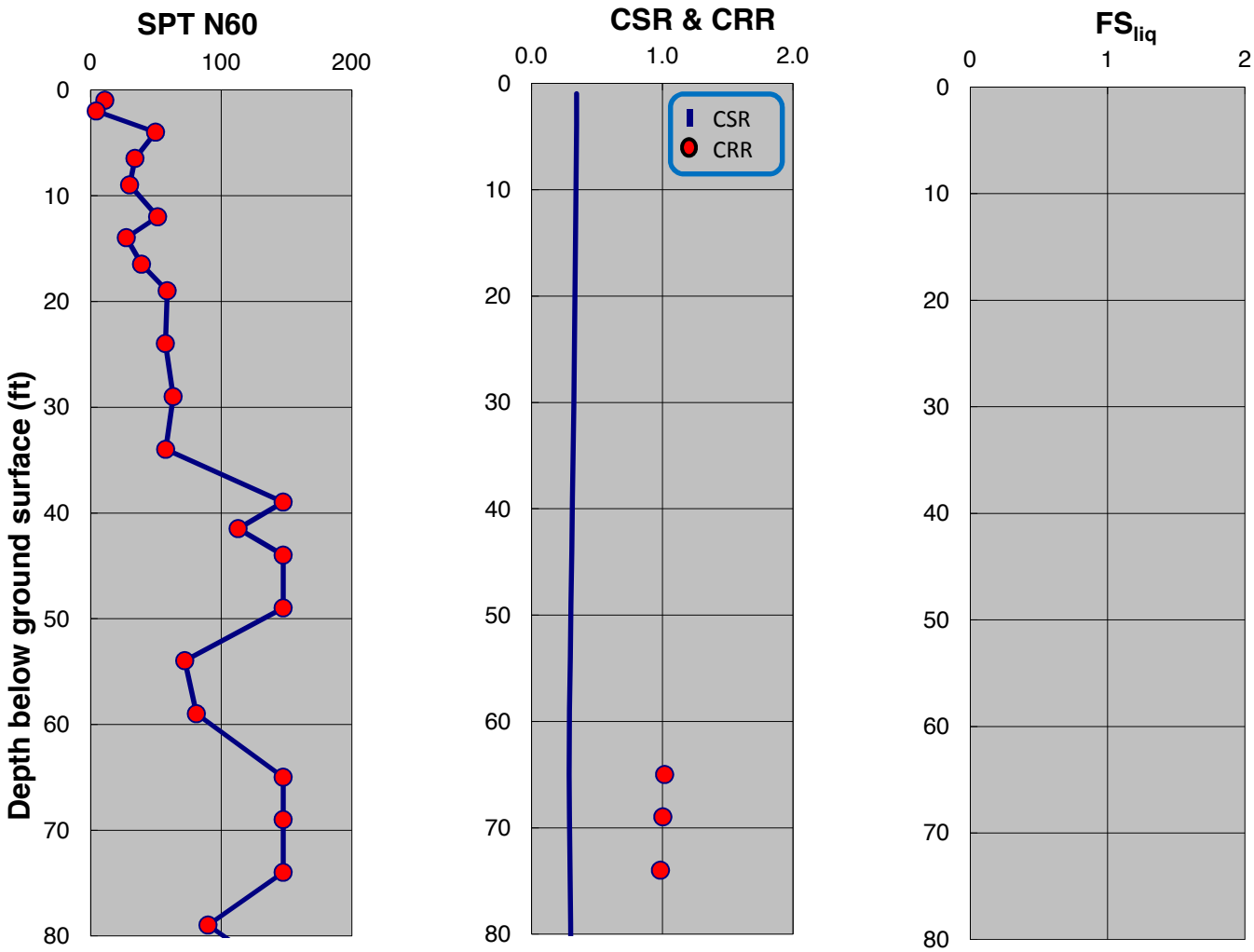
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-66 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

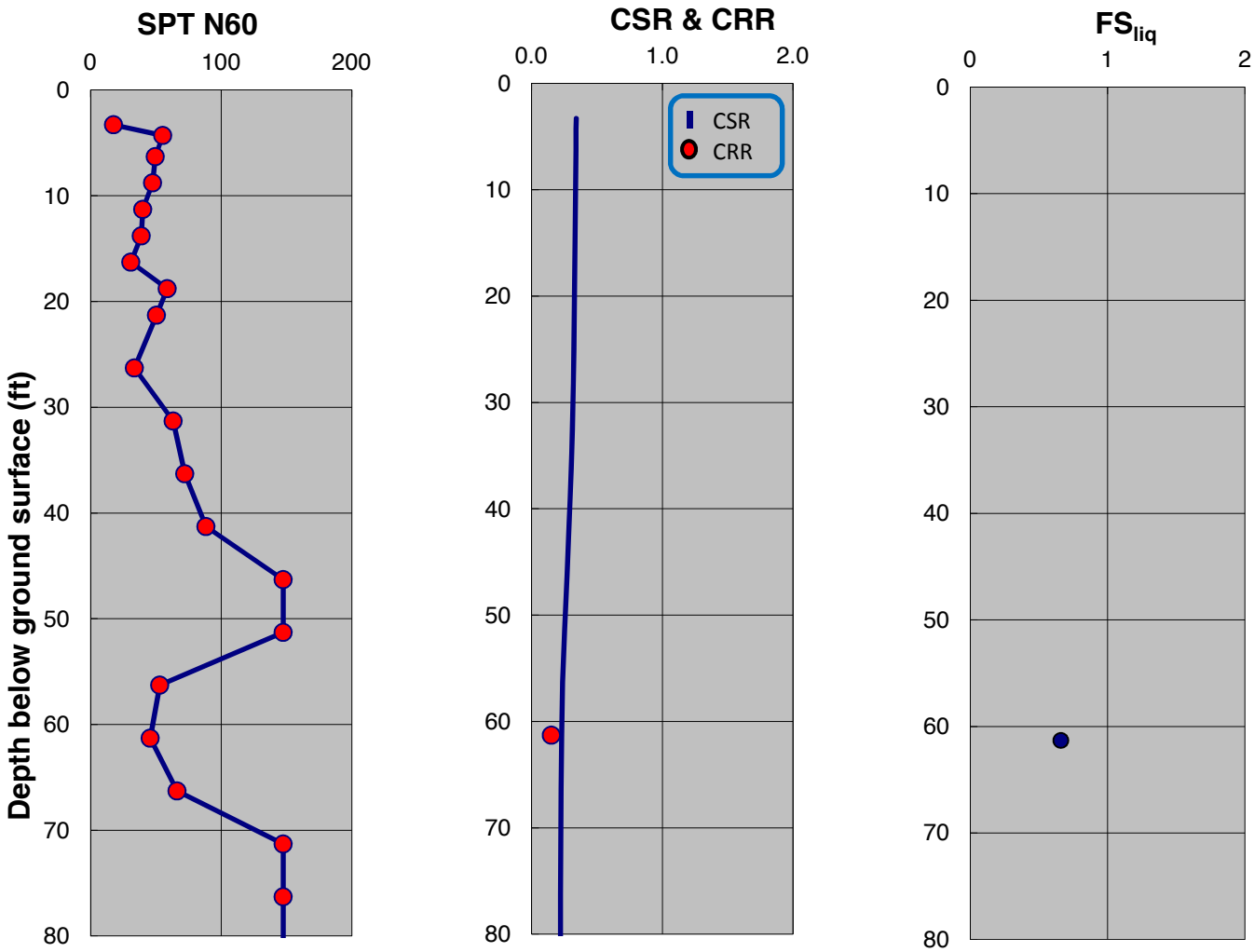
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.59



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-66 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

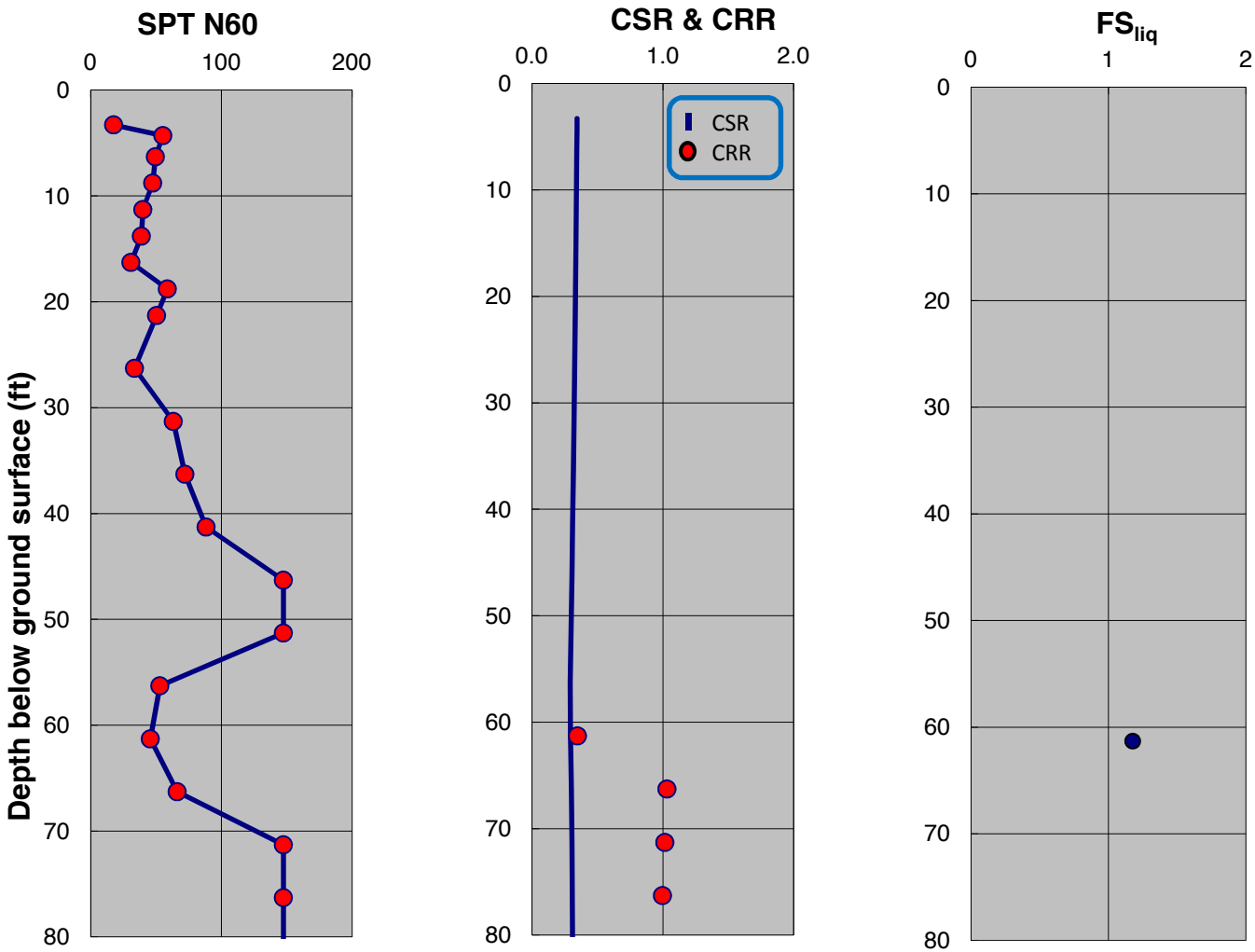
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-67 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

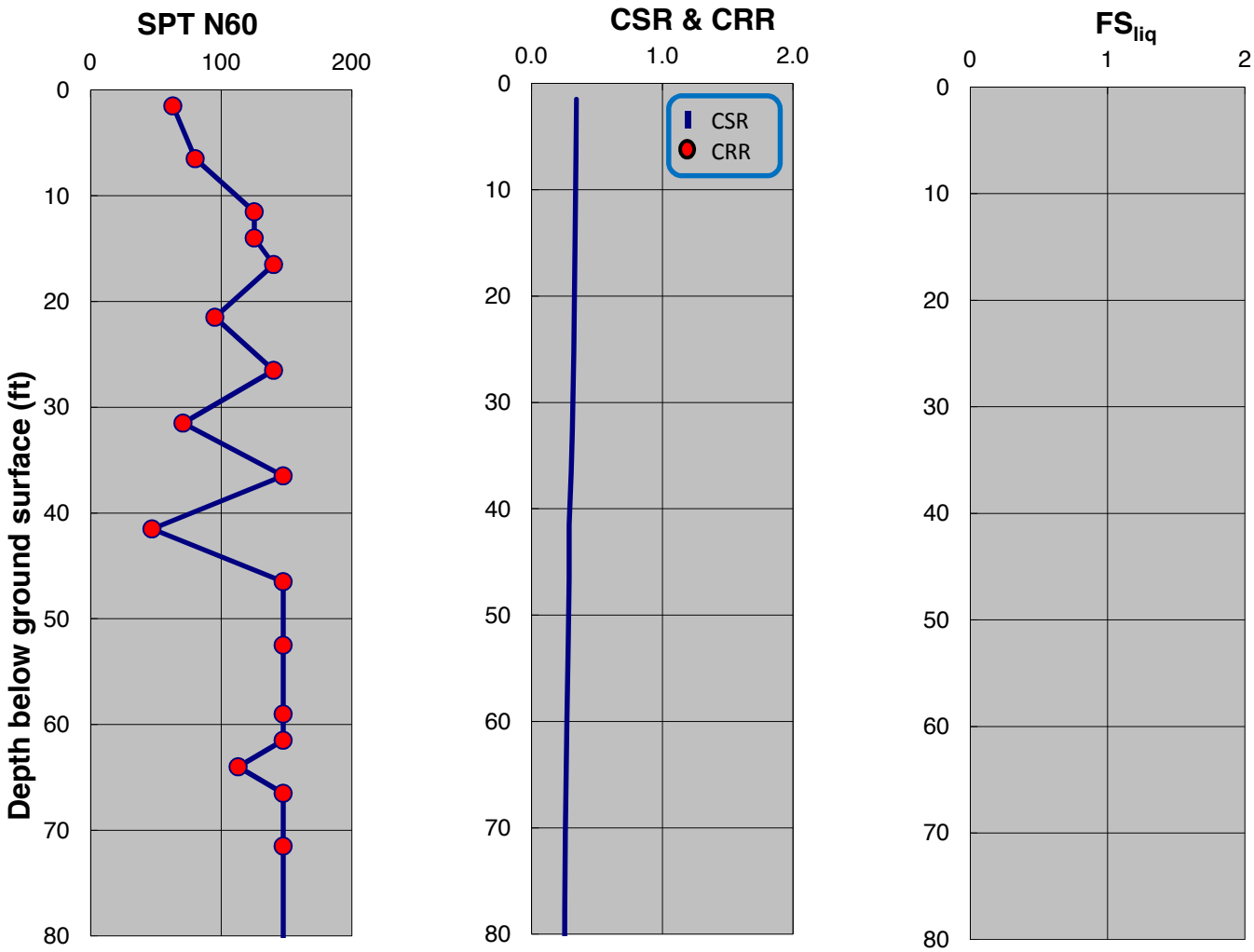
PLATE C.61



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-67 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

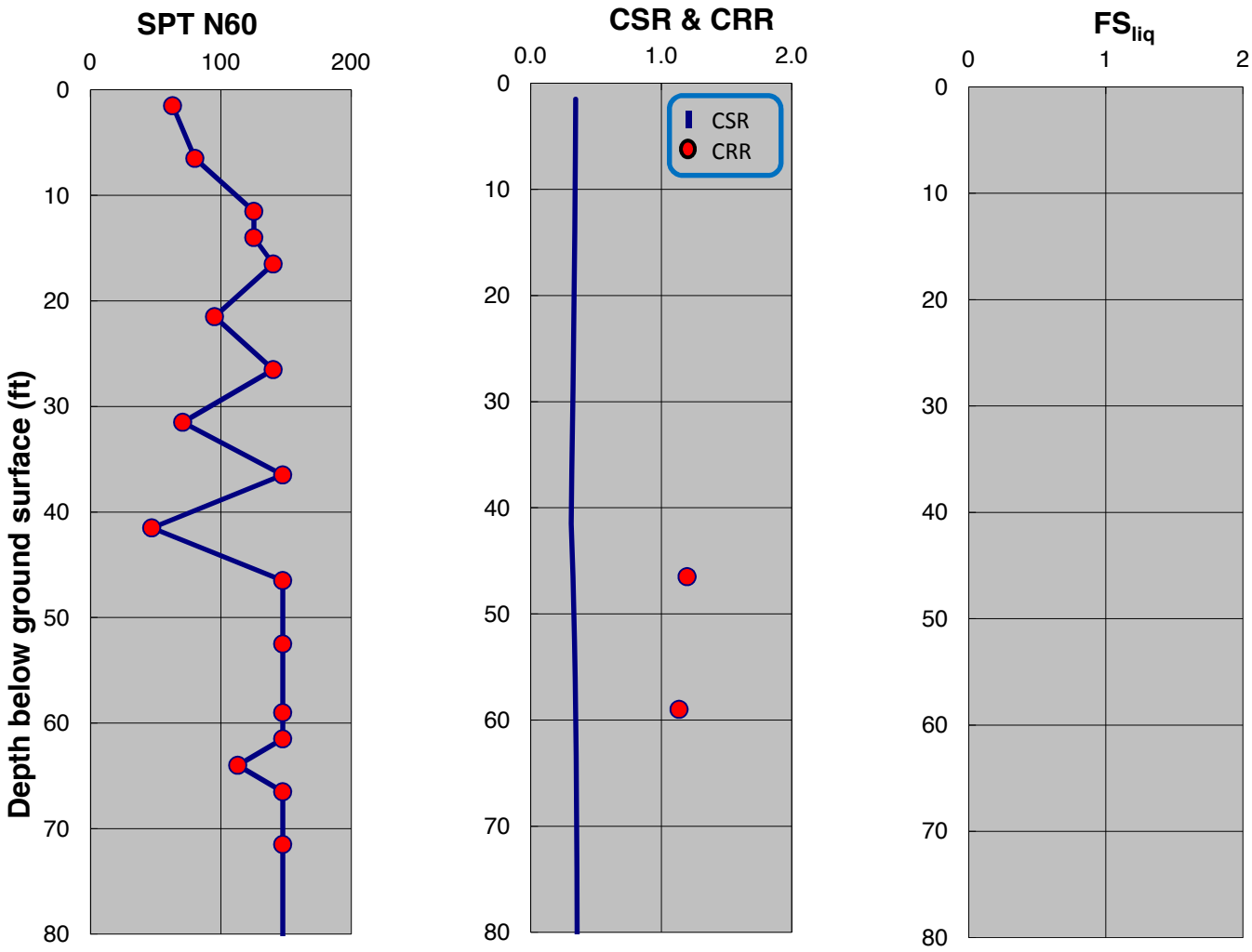
PLATE C.62



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-68 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

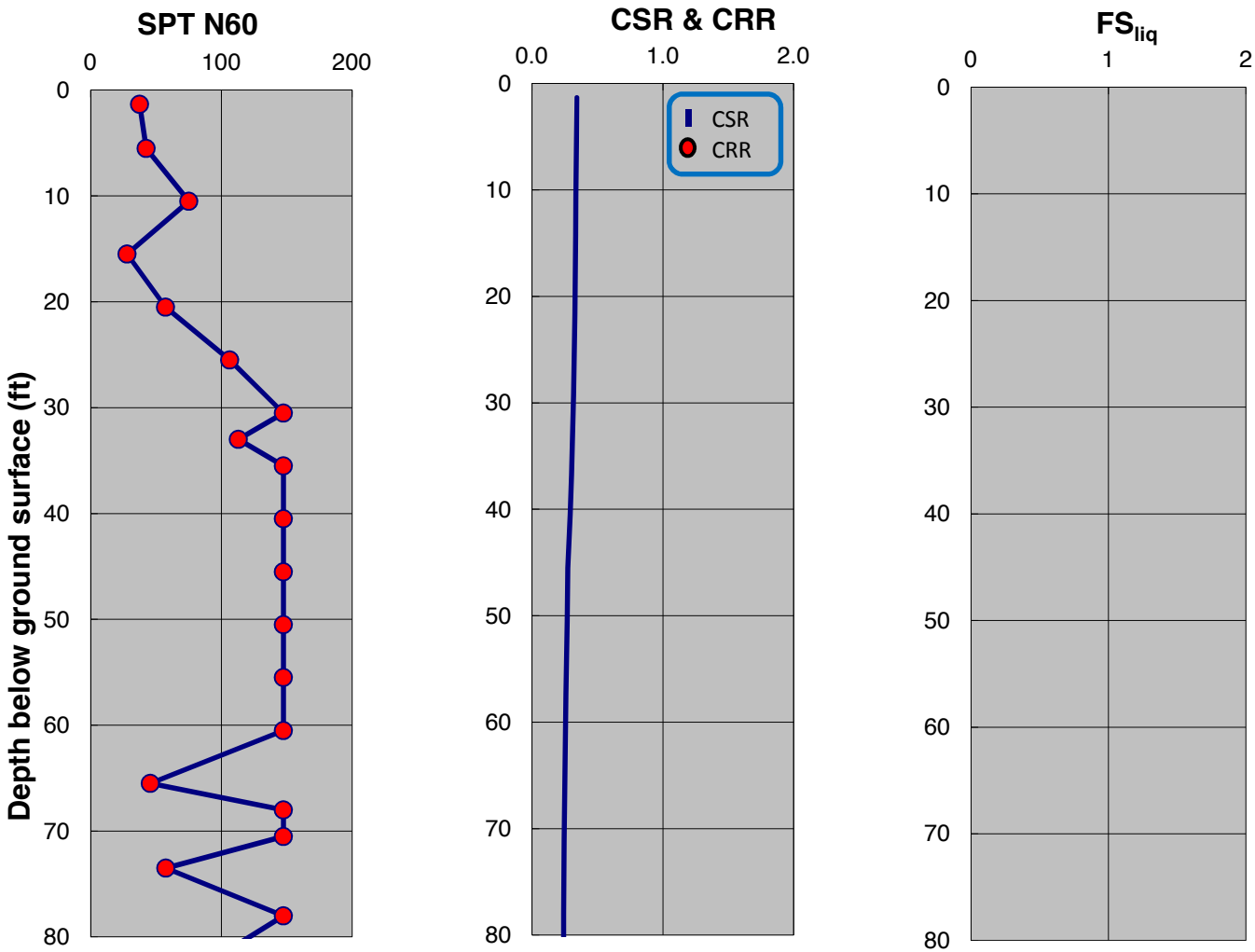
PLATE C.63



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-68 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

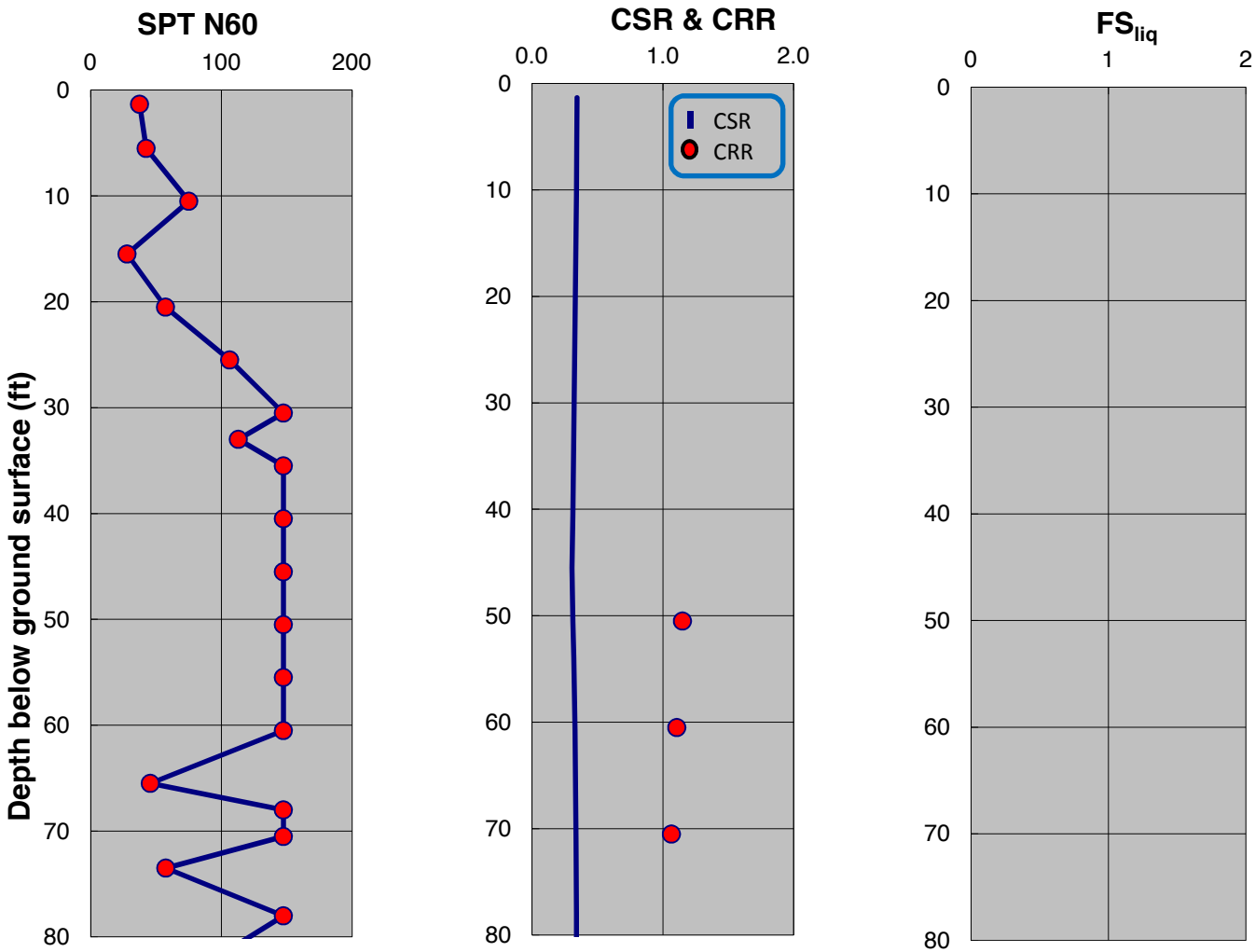
PLATE C.64



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-69 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

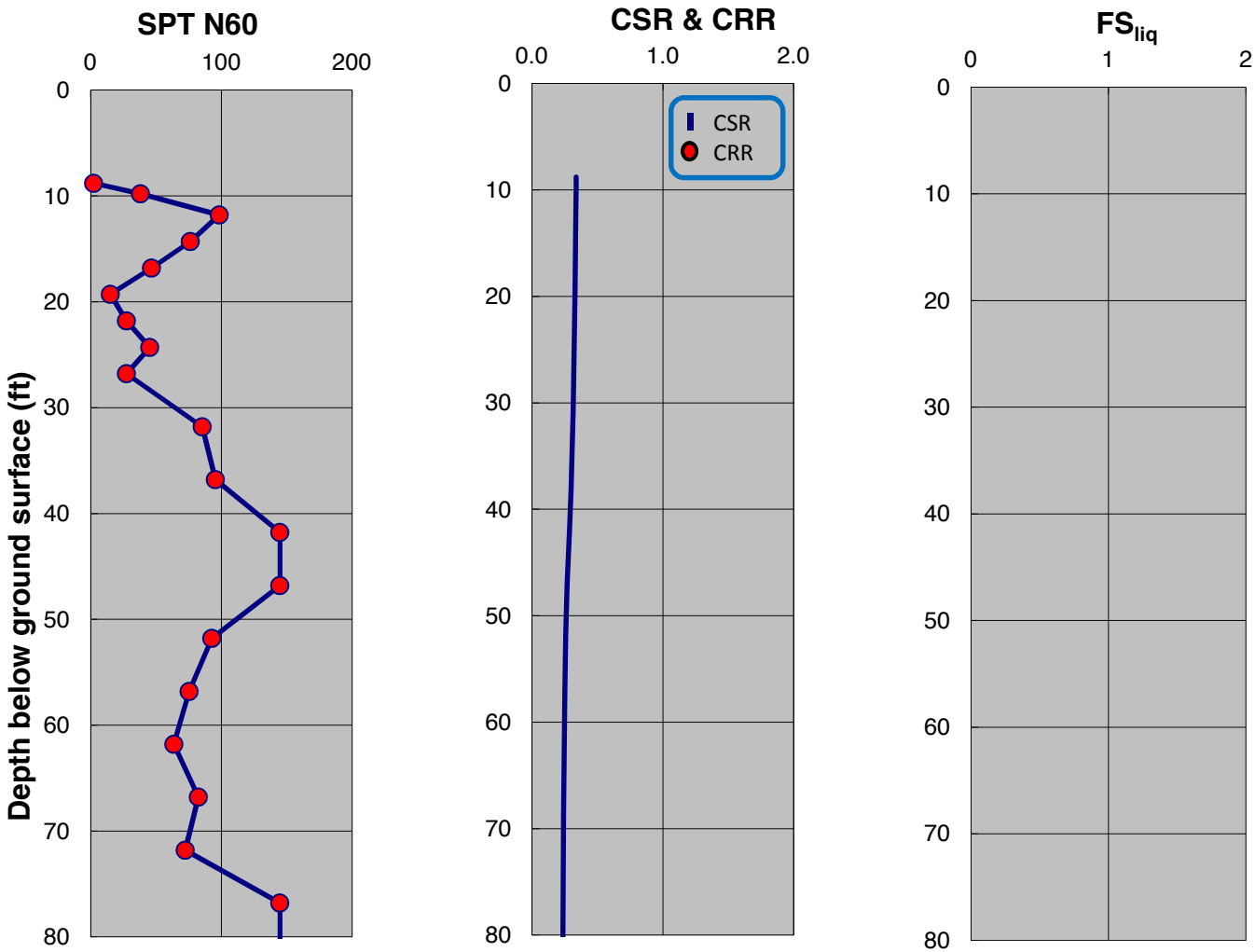
PLATE C.65



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-69 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

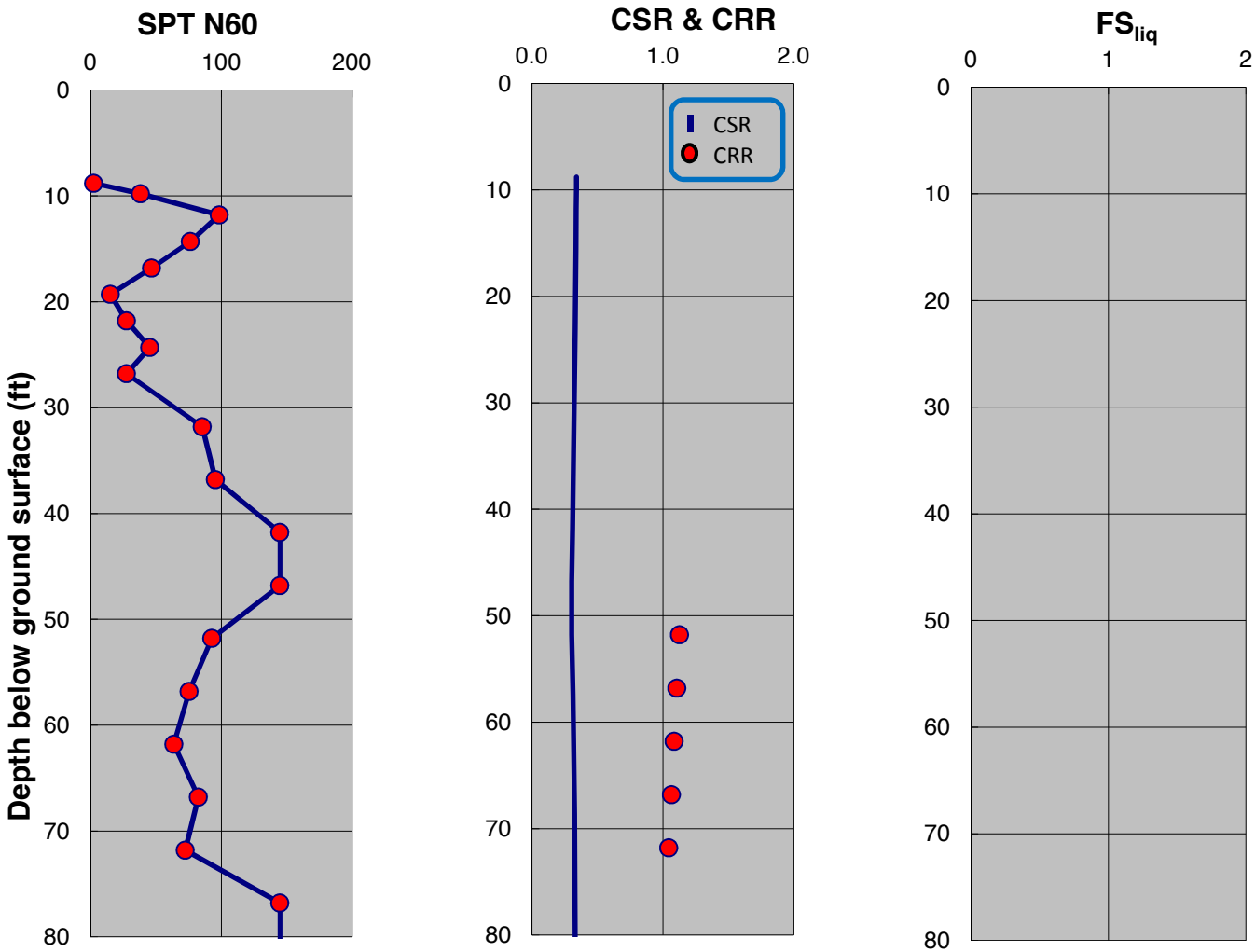
PLATE C.66



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-71 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

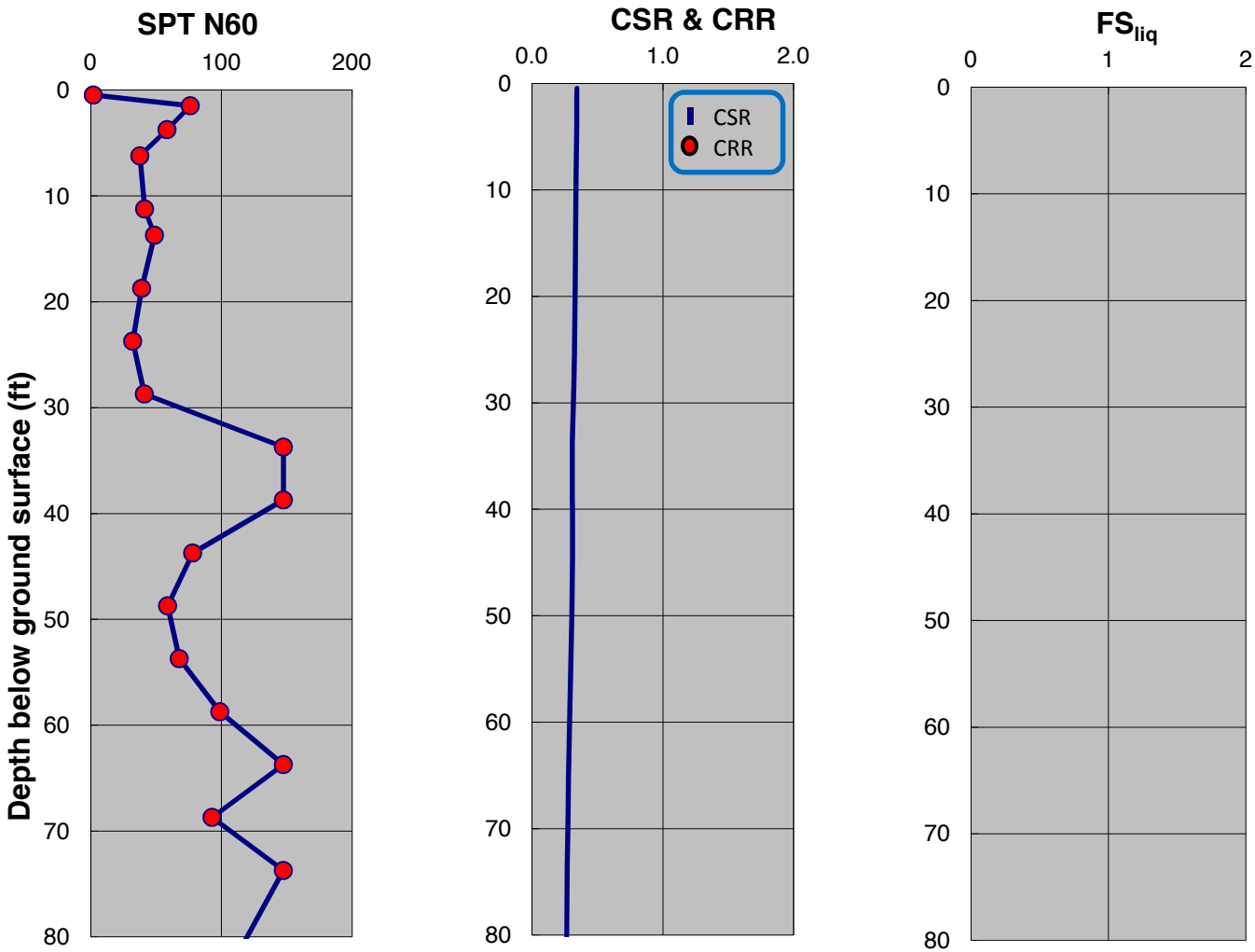
PLATE C.67



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-71 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

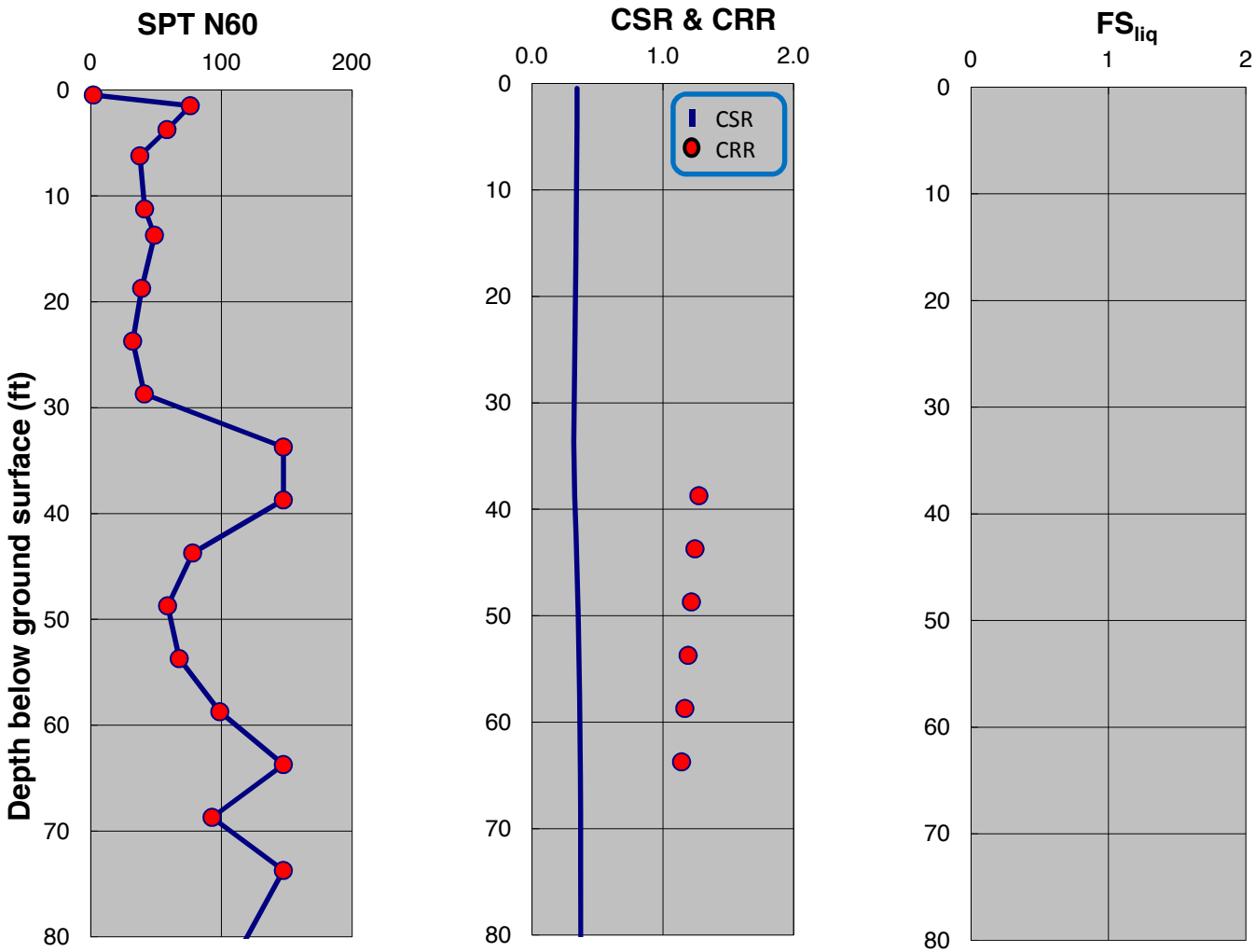
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.68



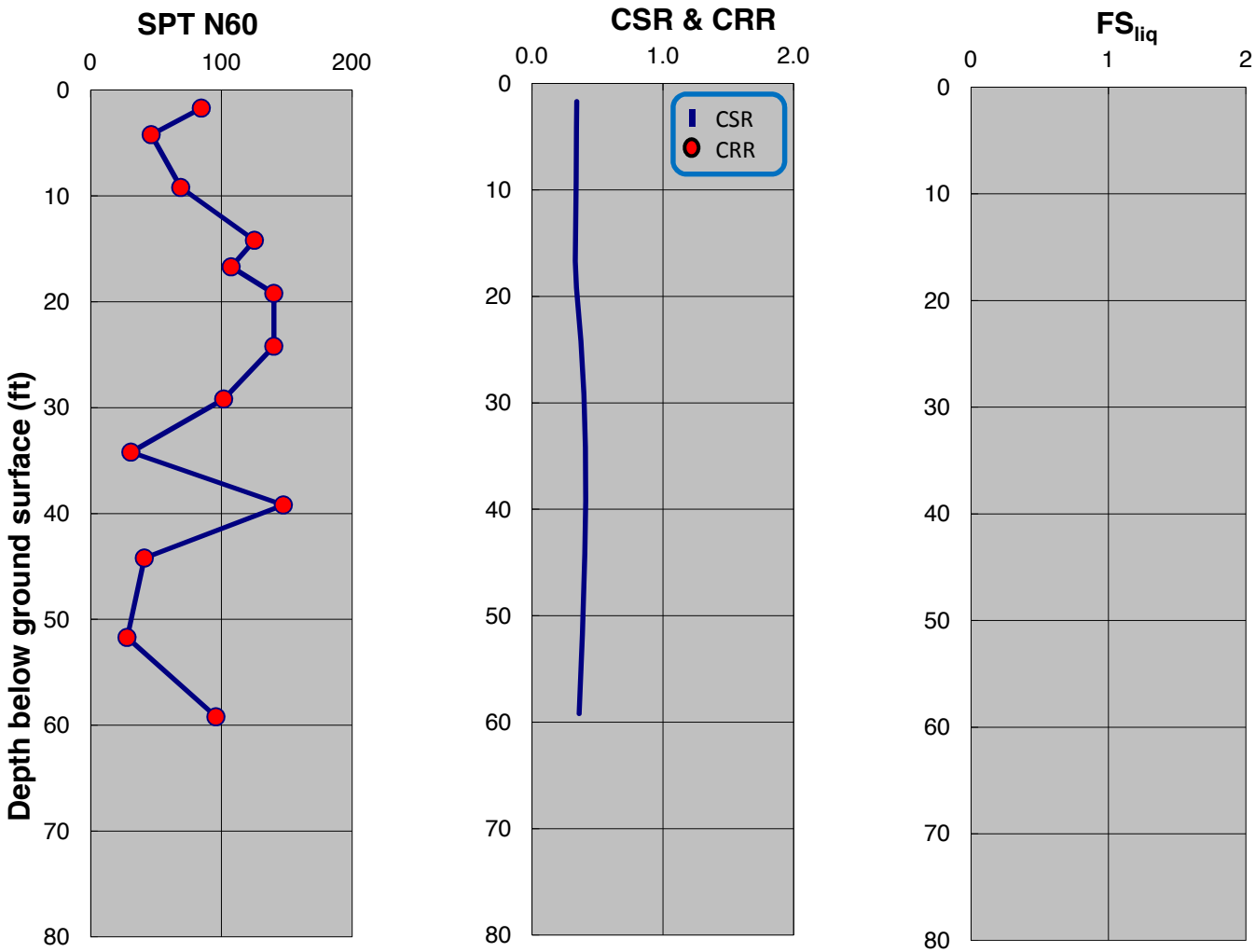
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-72 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-72 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

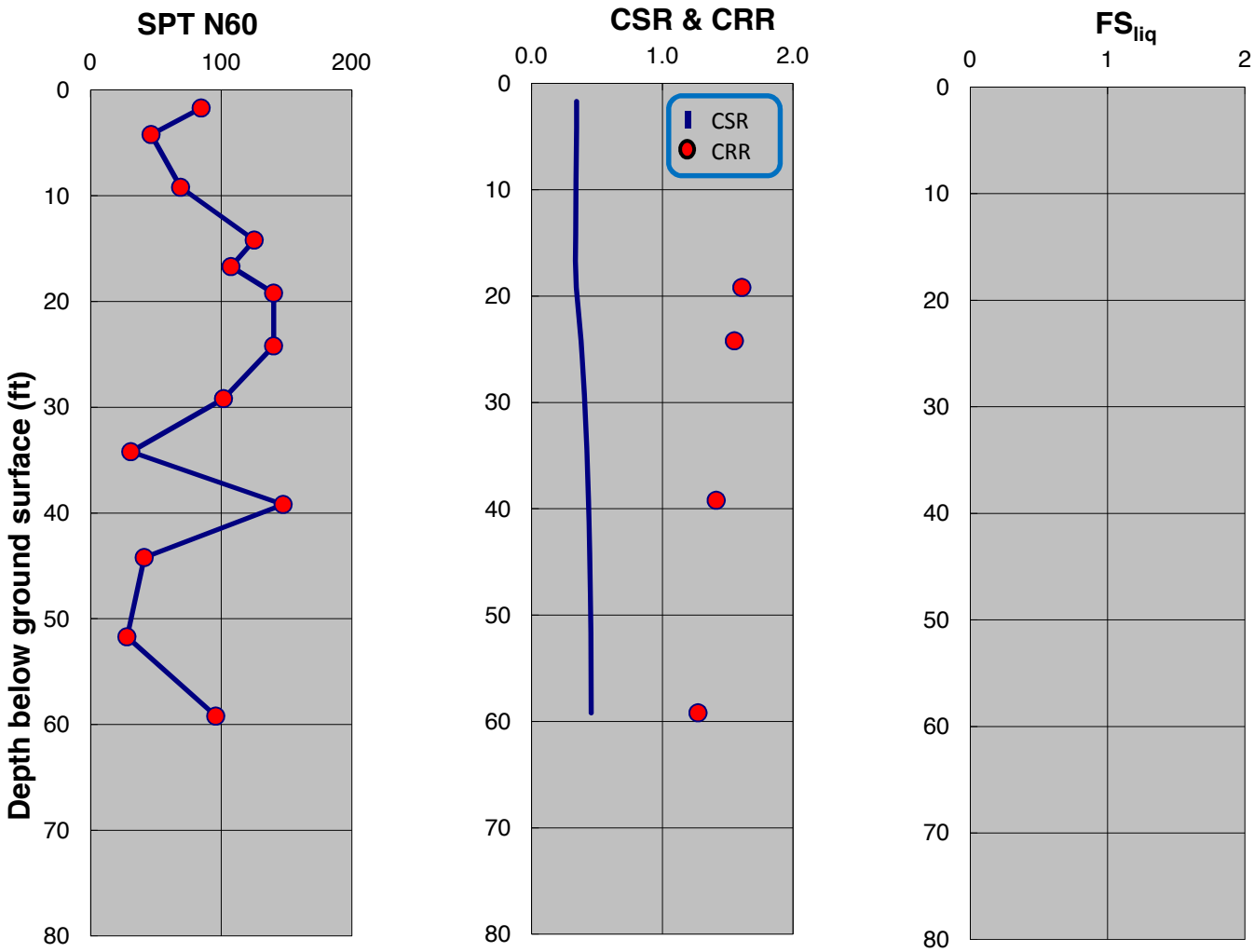
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-73 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

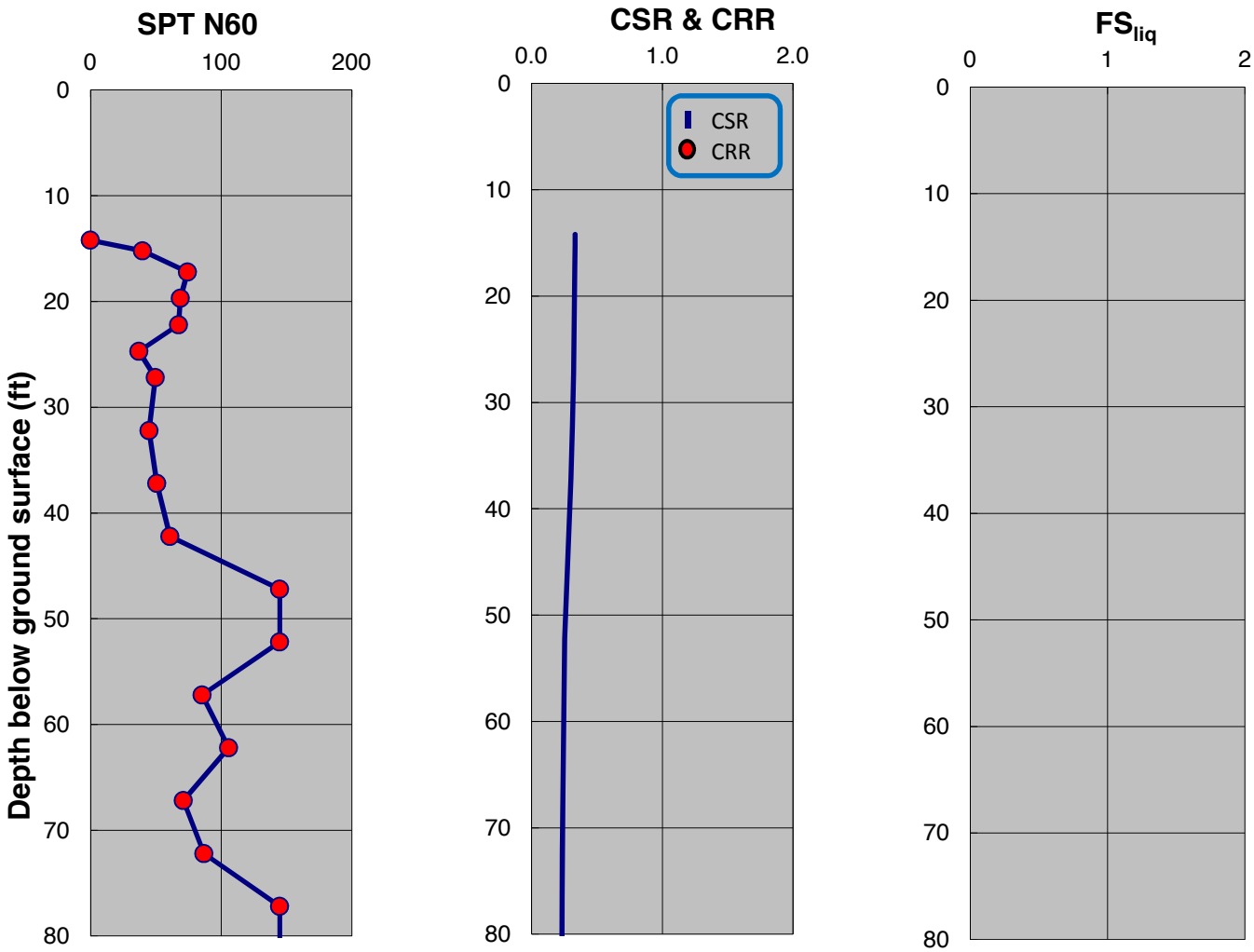
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.71



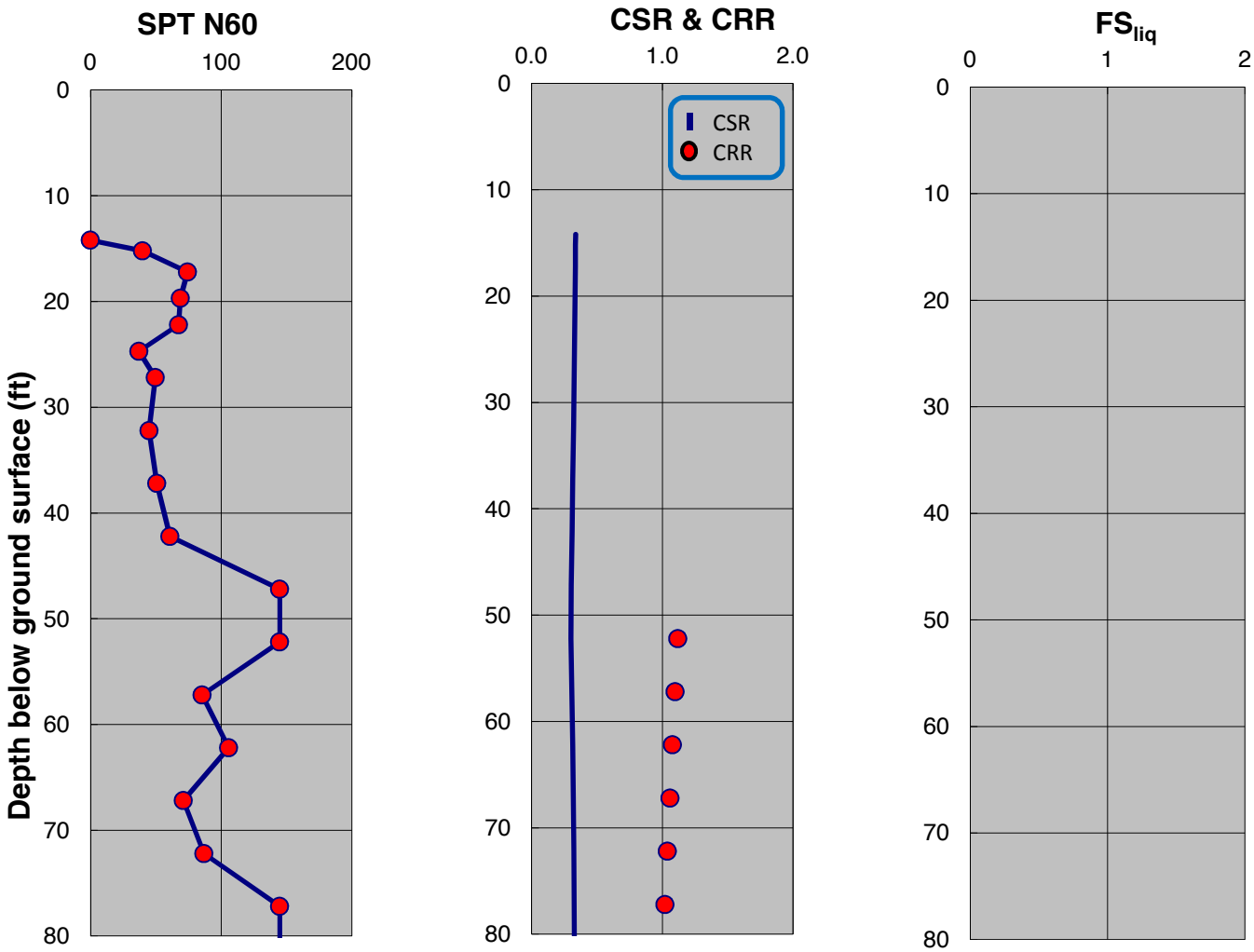
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-73 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-74 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

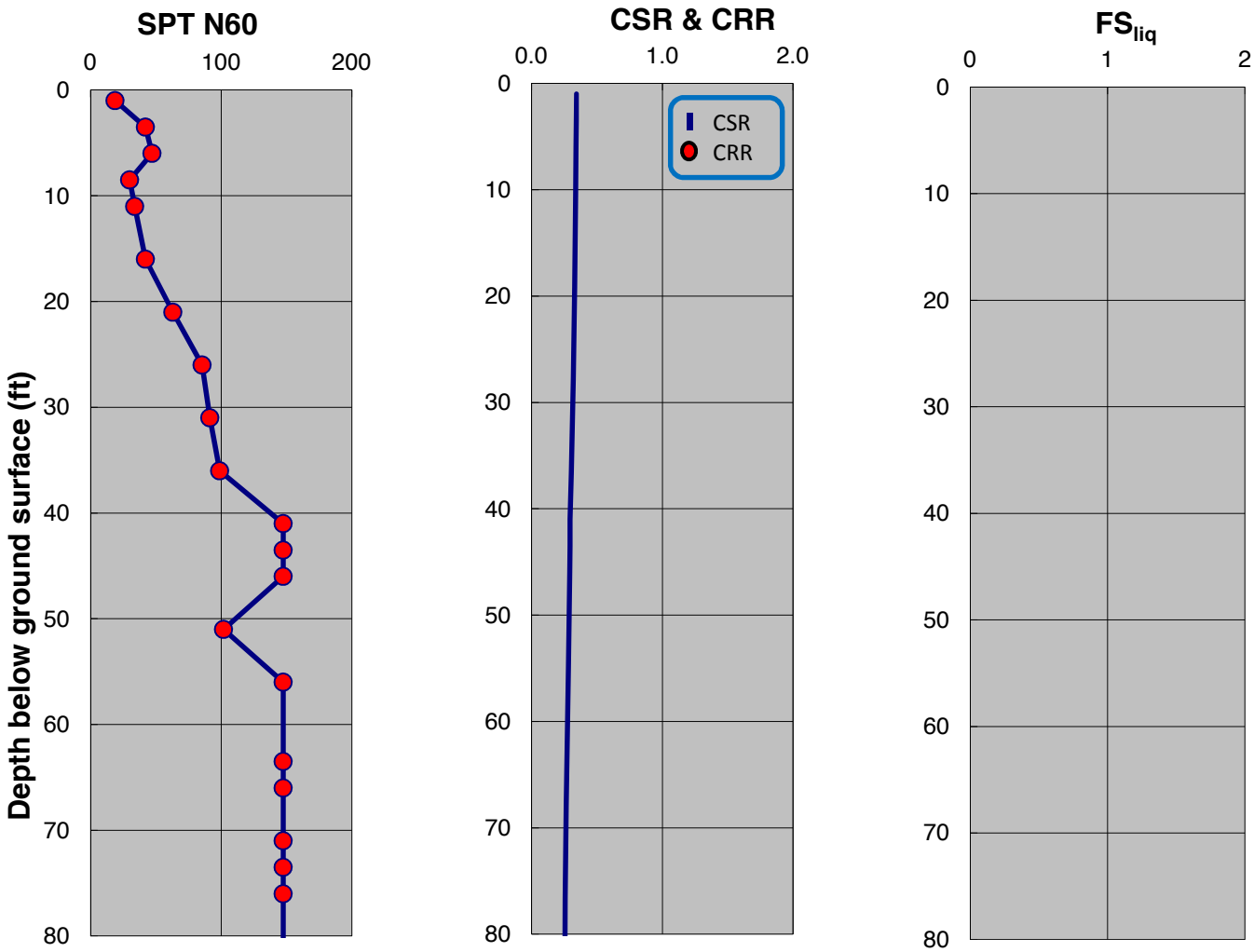
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-74 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

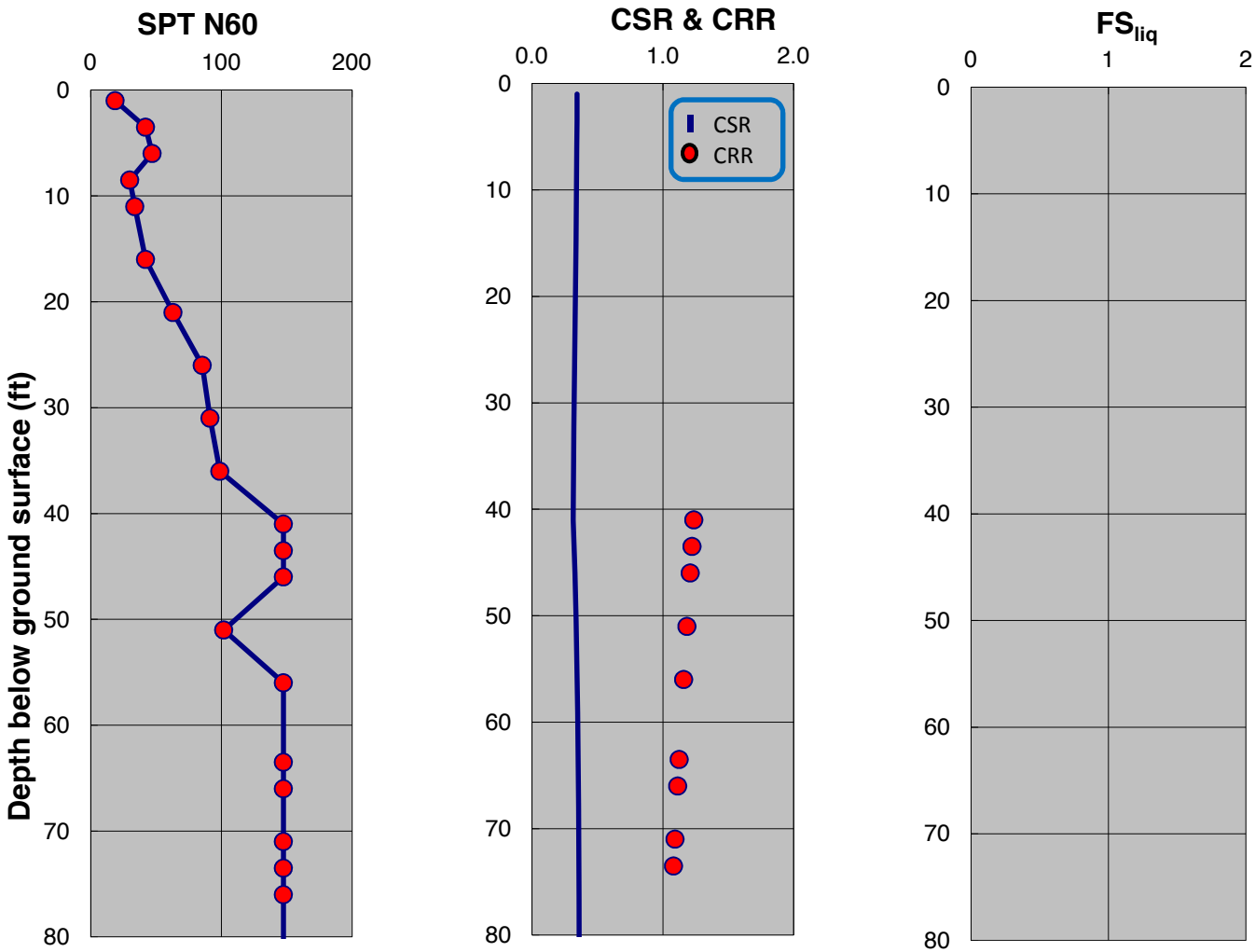
PLATE C.74



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-75 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

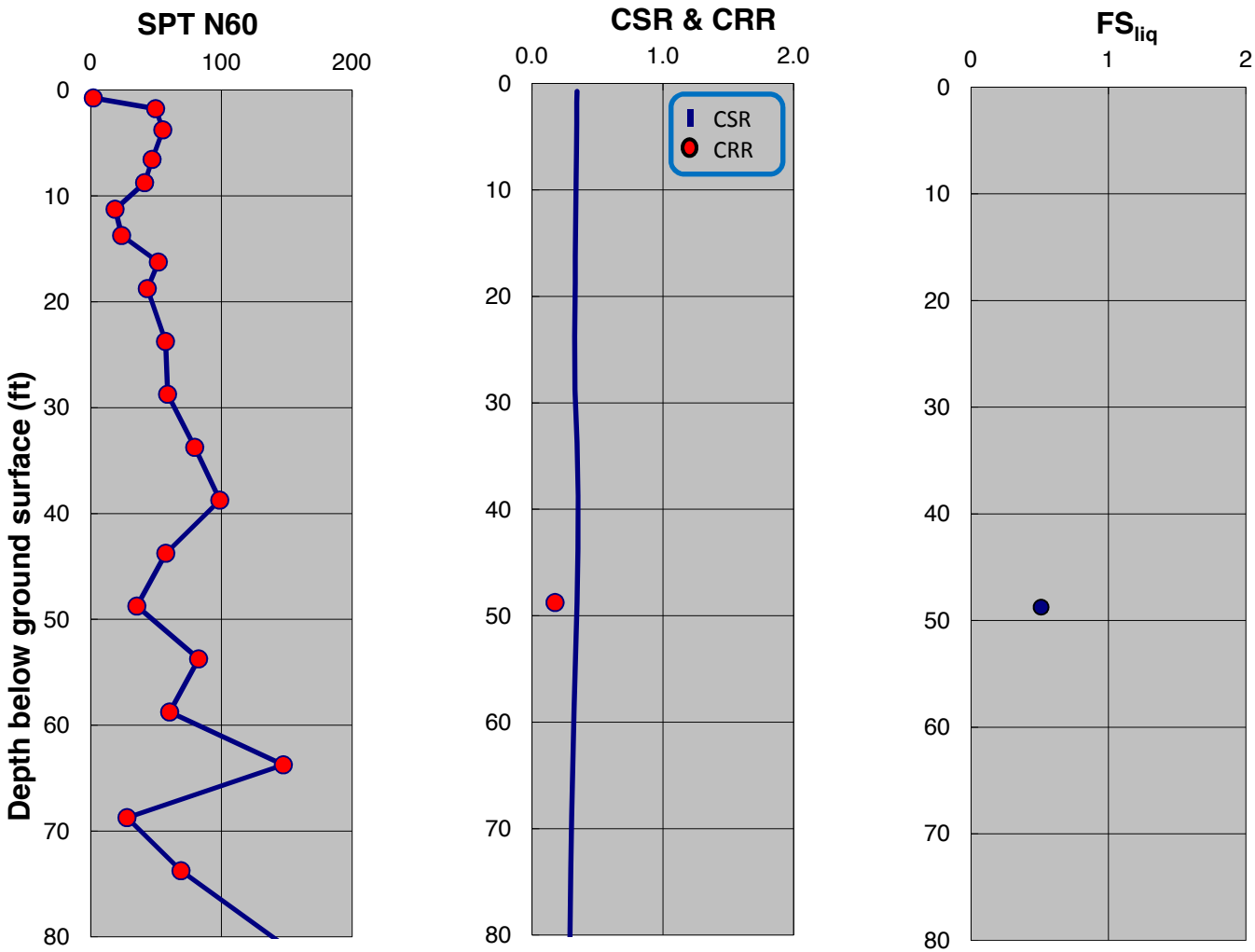
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.75



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-75 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

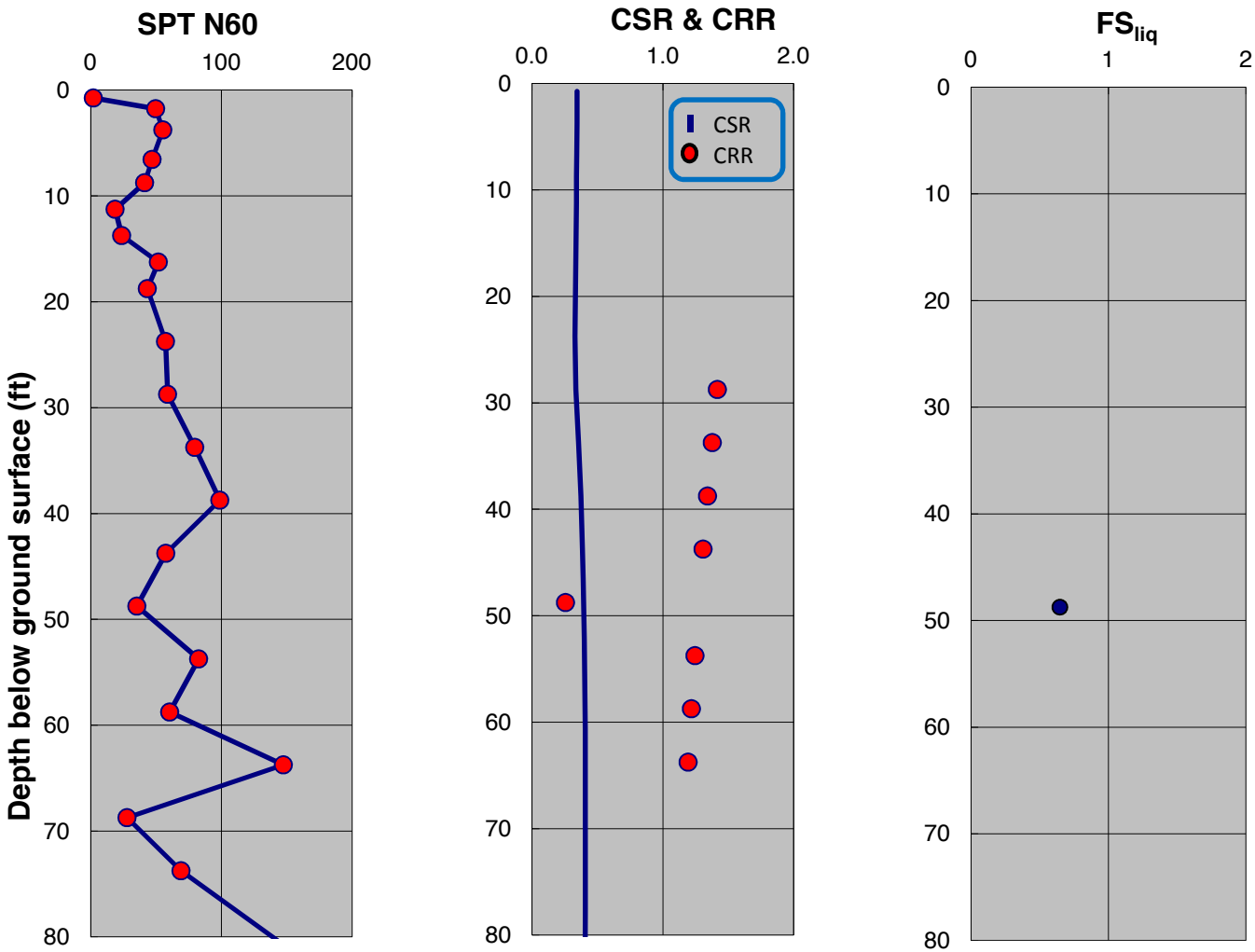
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-76 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

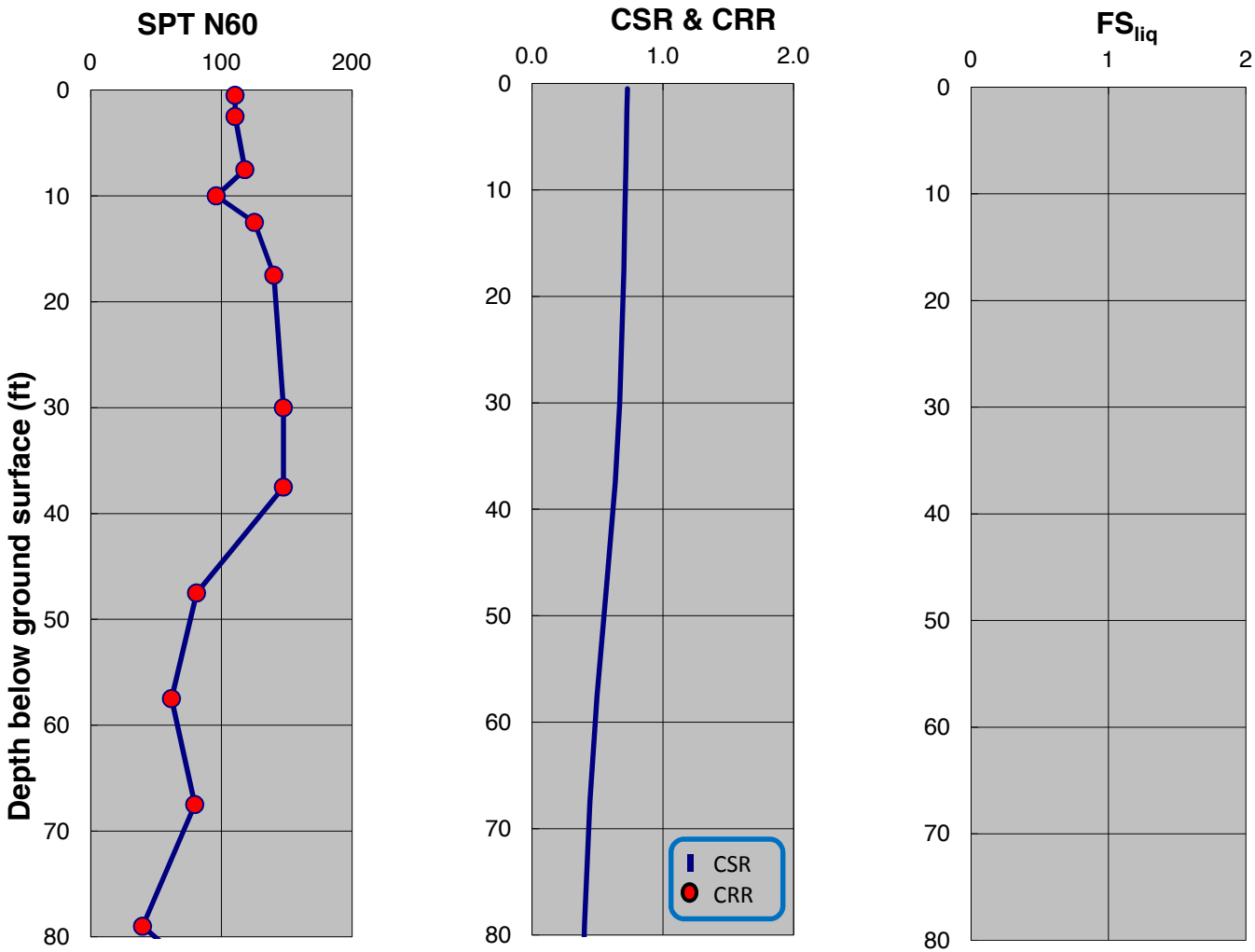
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.77



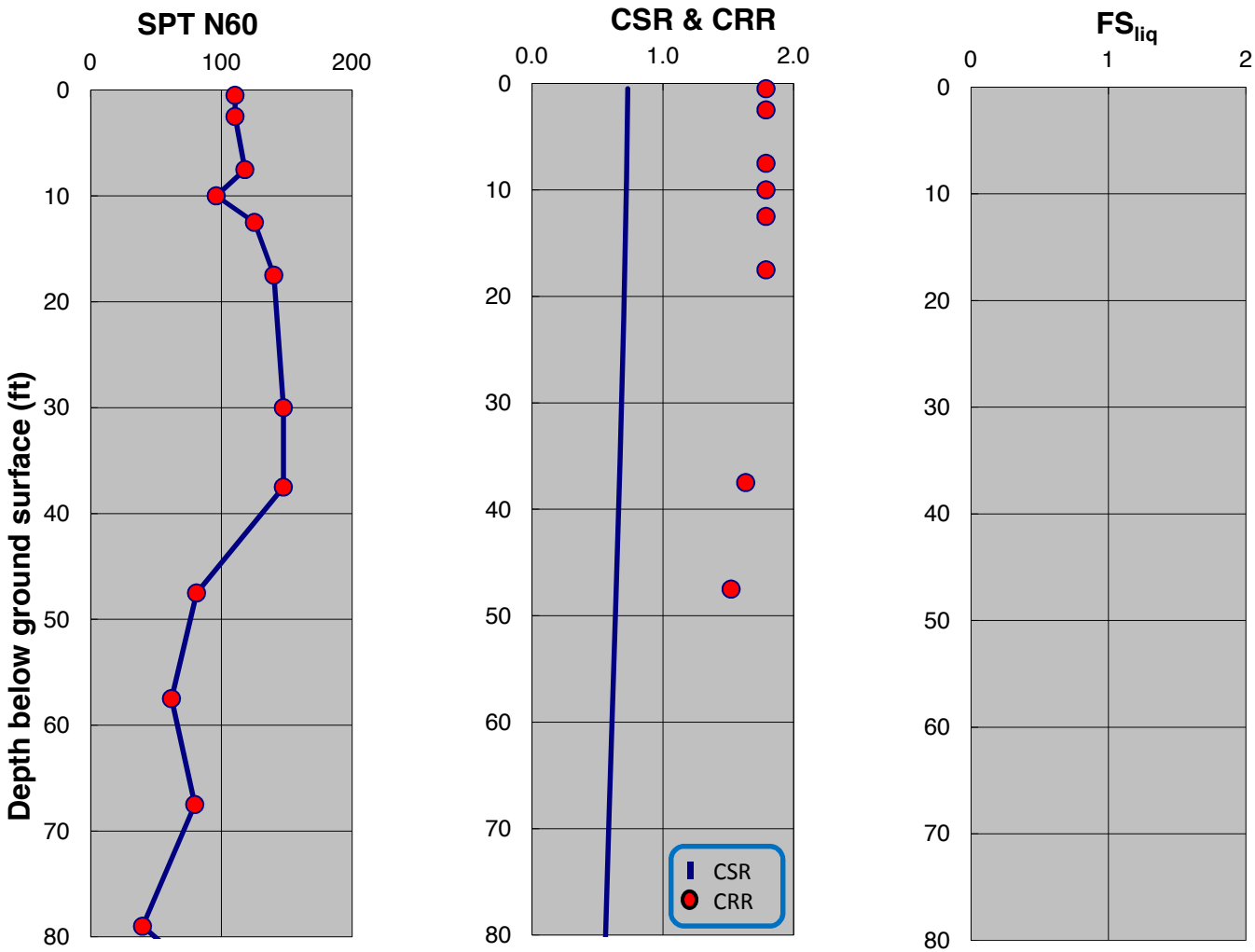
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-76 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



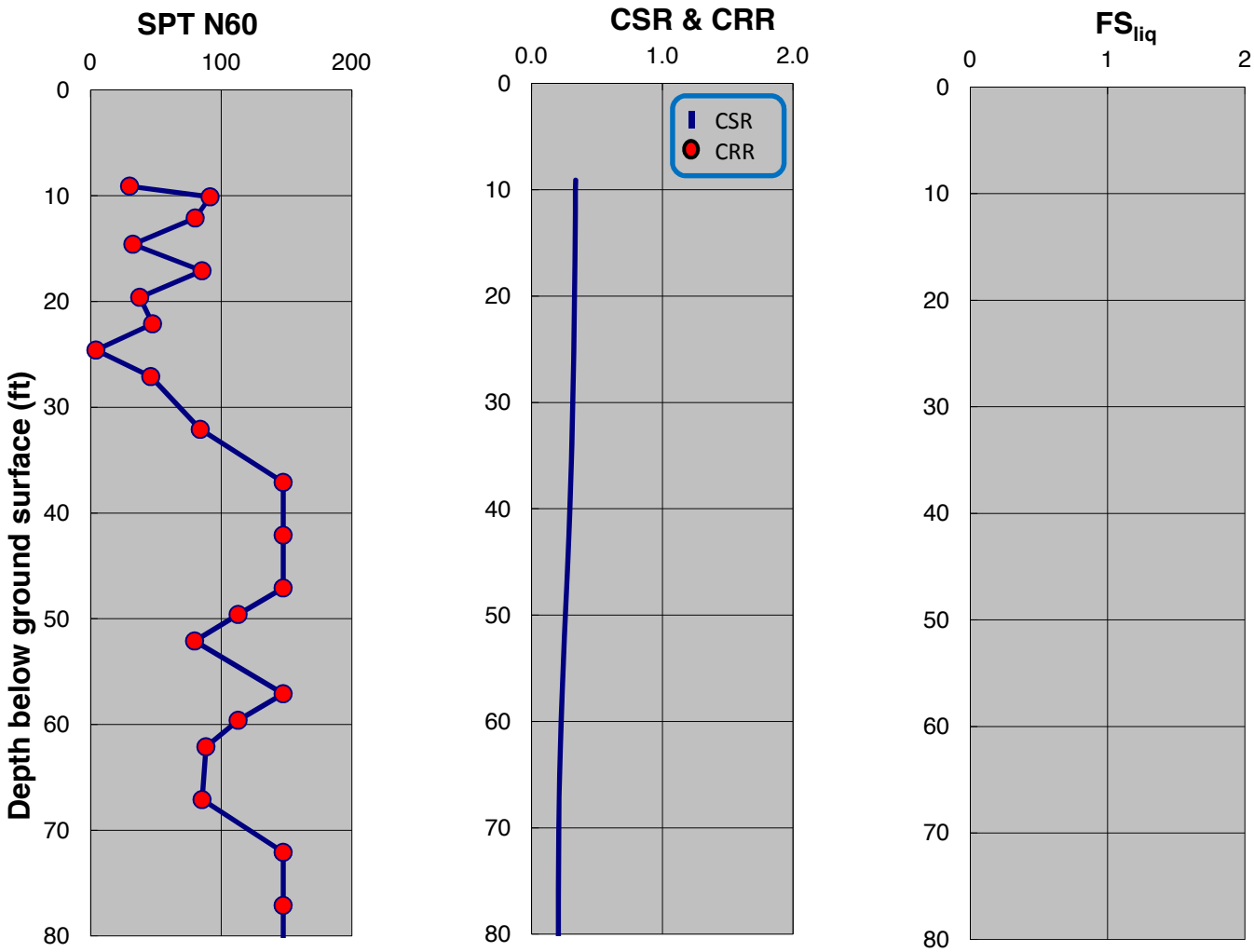
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-77 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



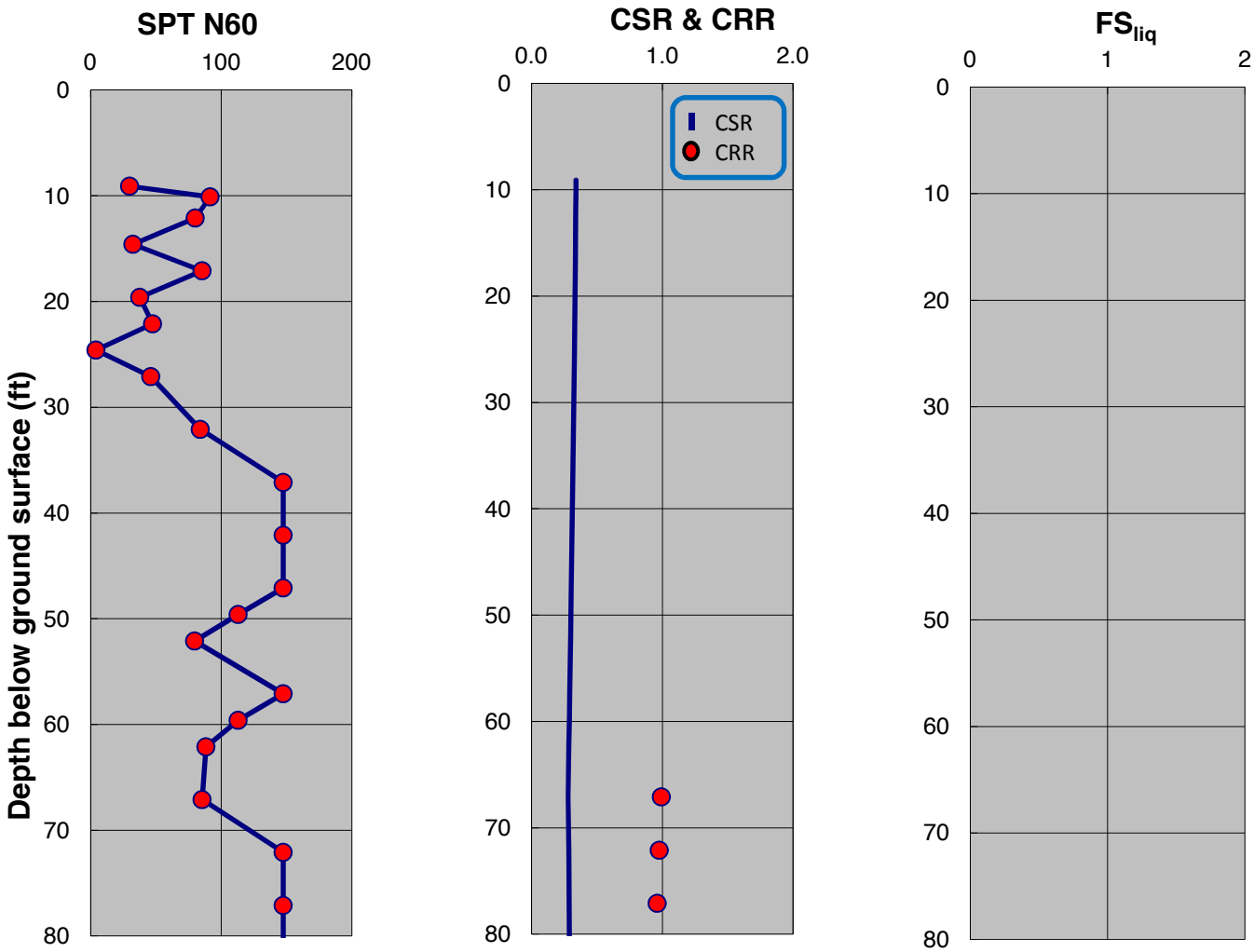
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-77 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



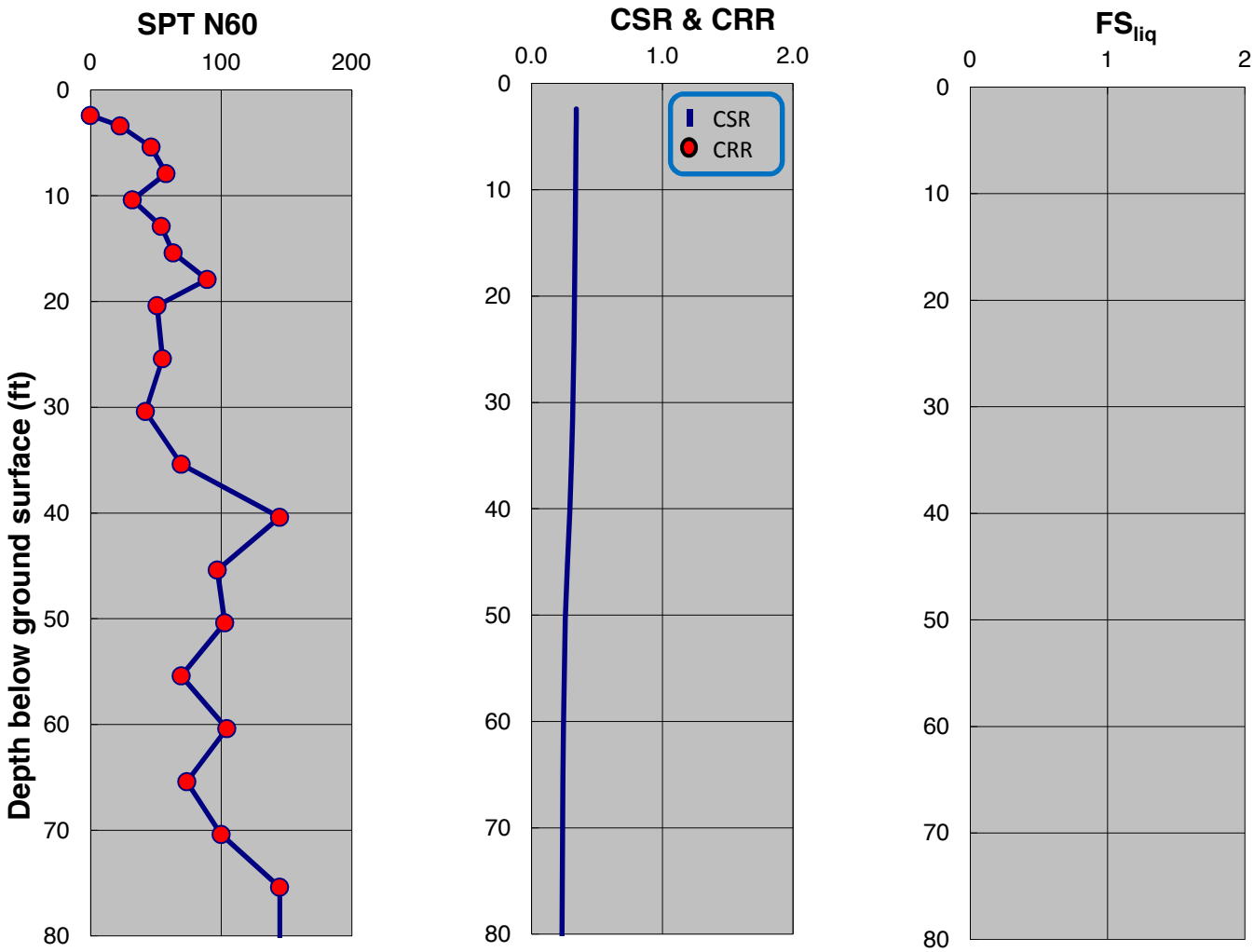
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-78 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



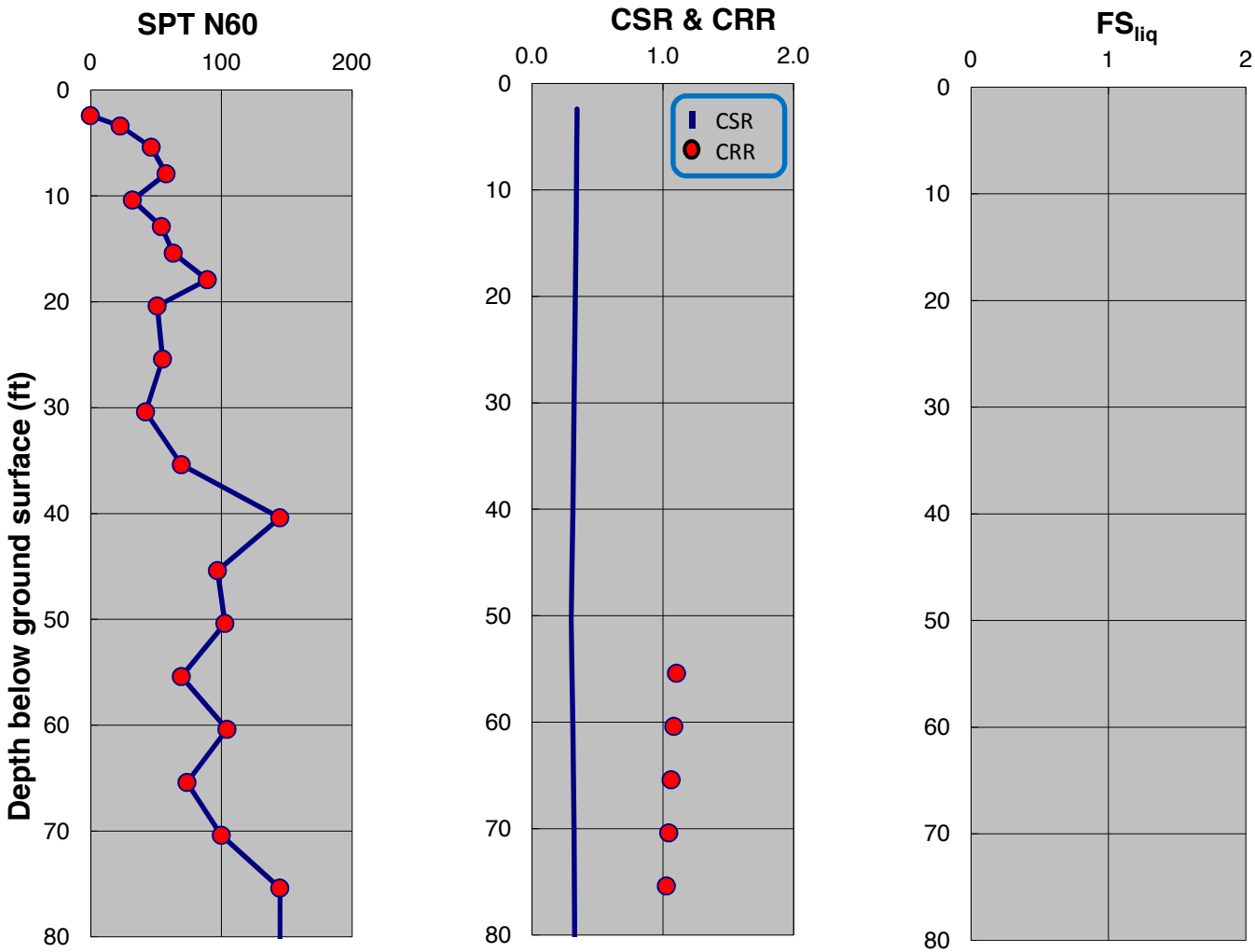
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-78 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



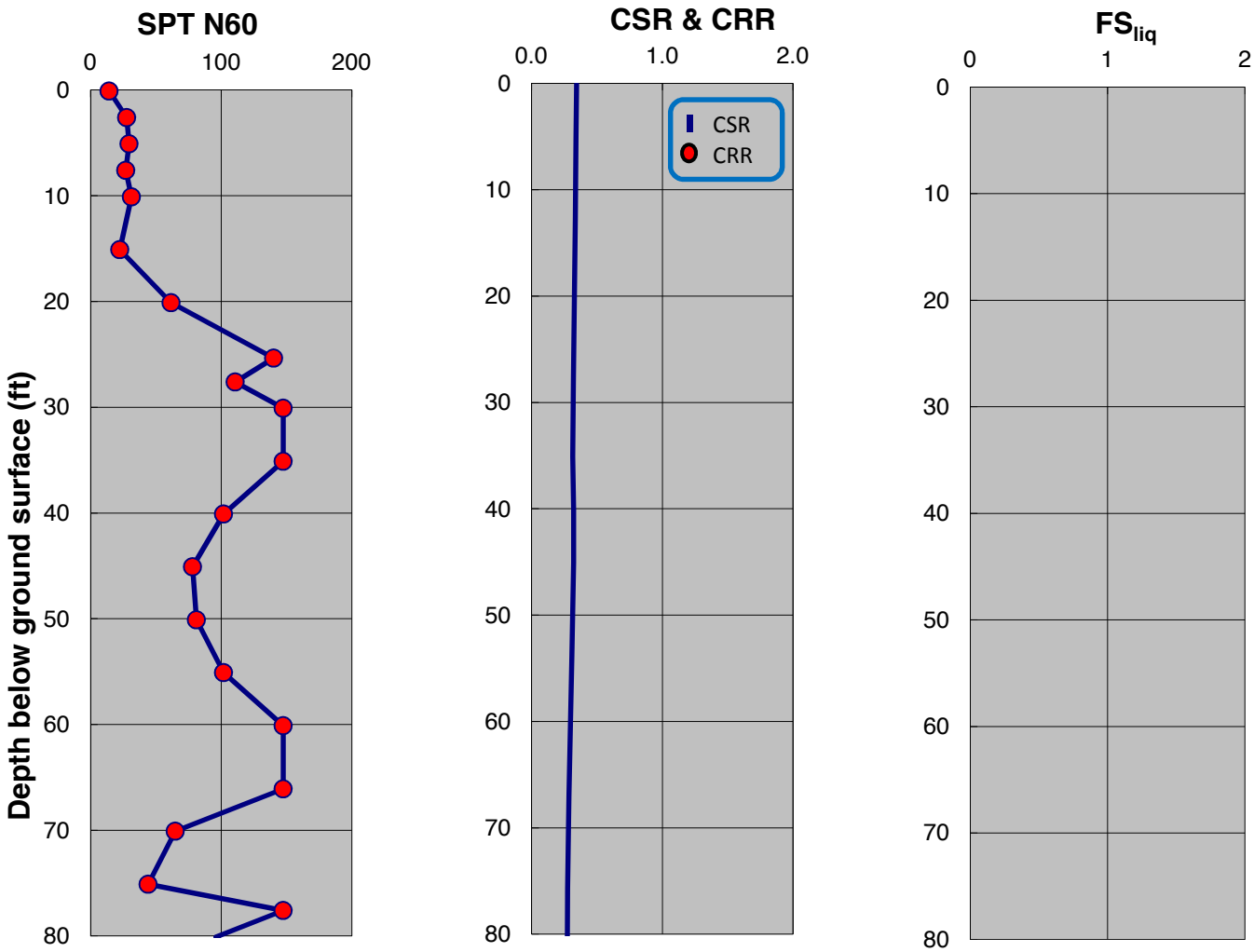
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-79 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-79 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

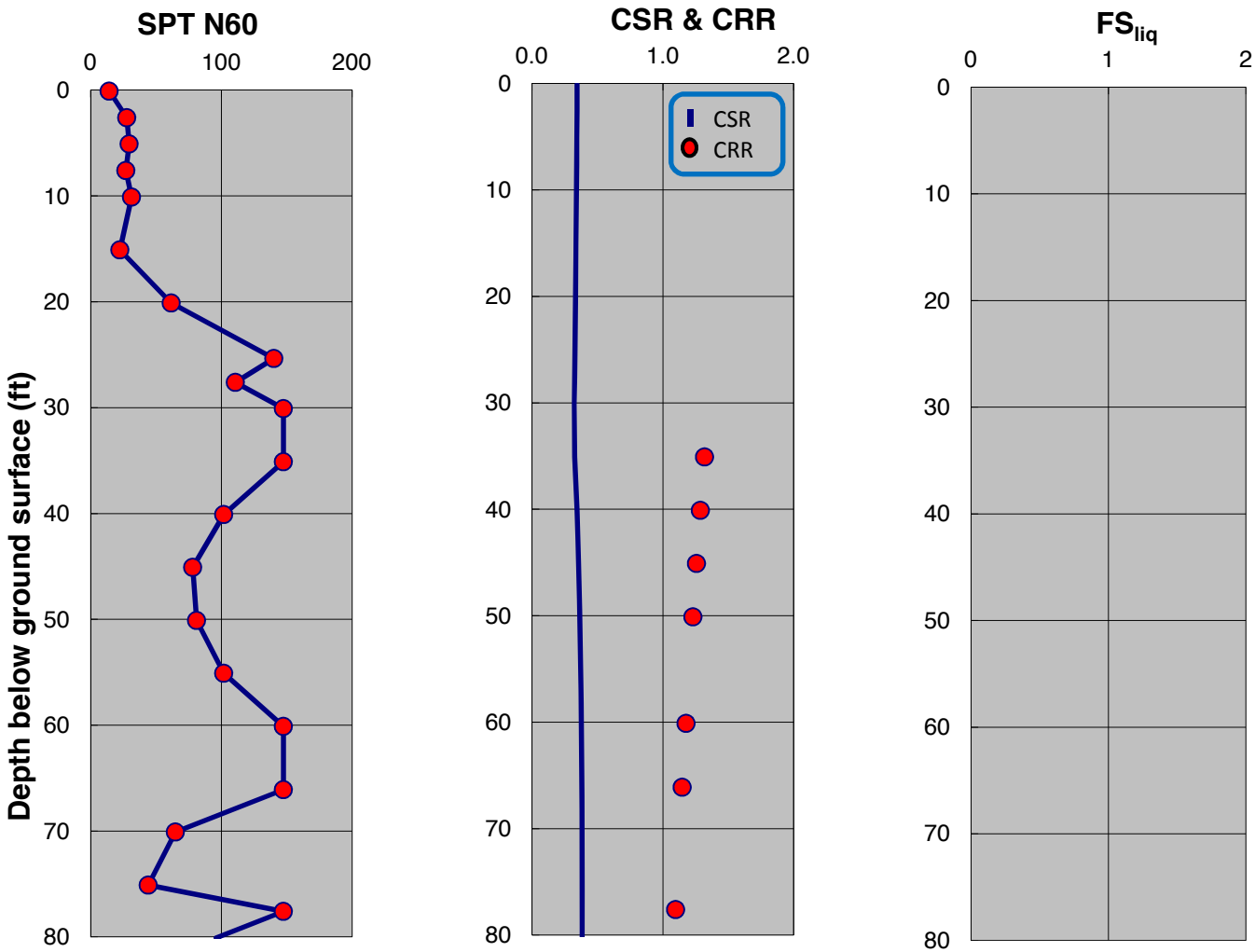
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-80 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

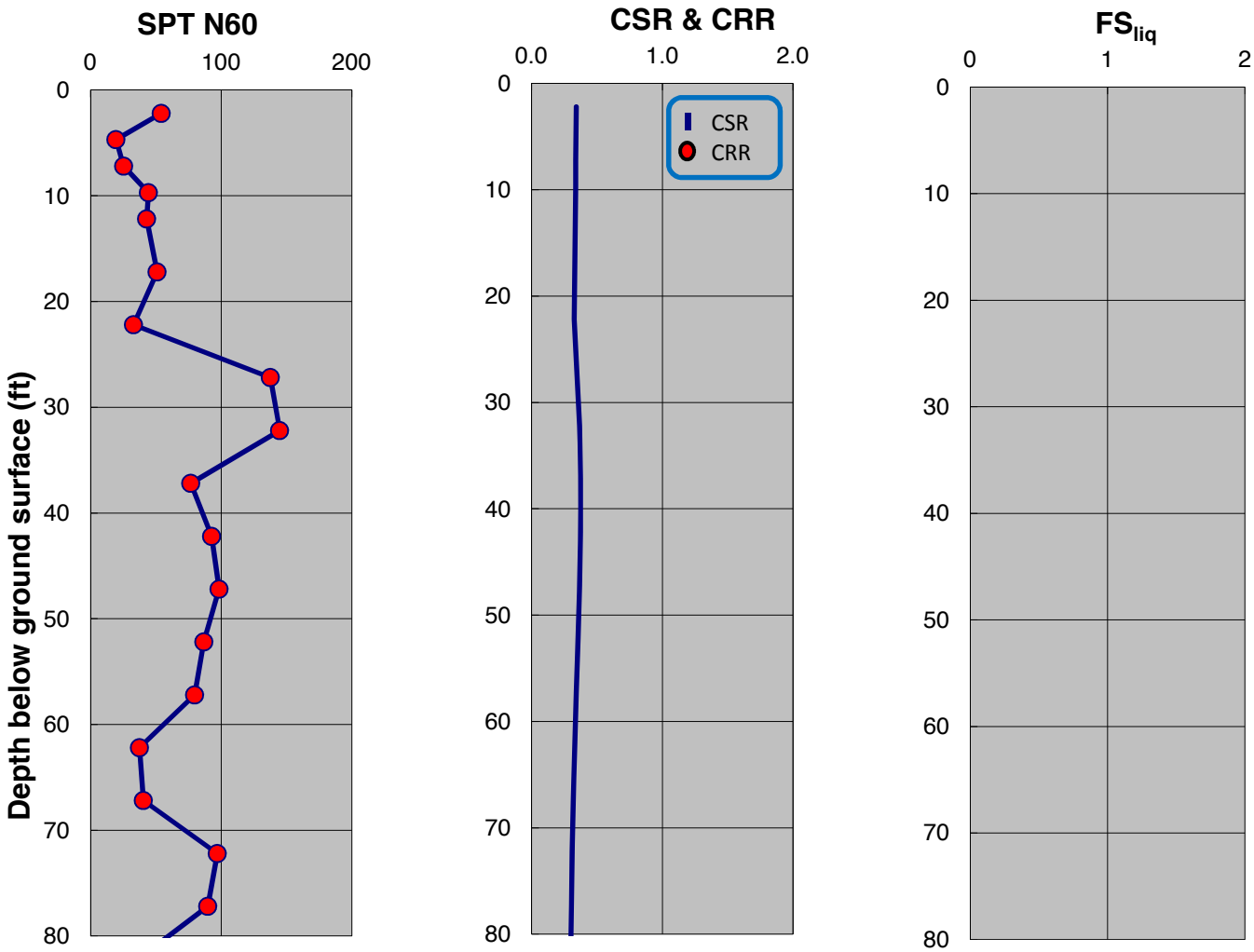
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.85



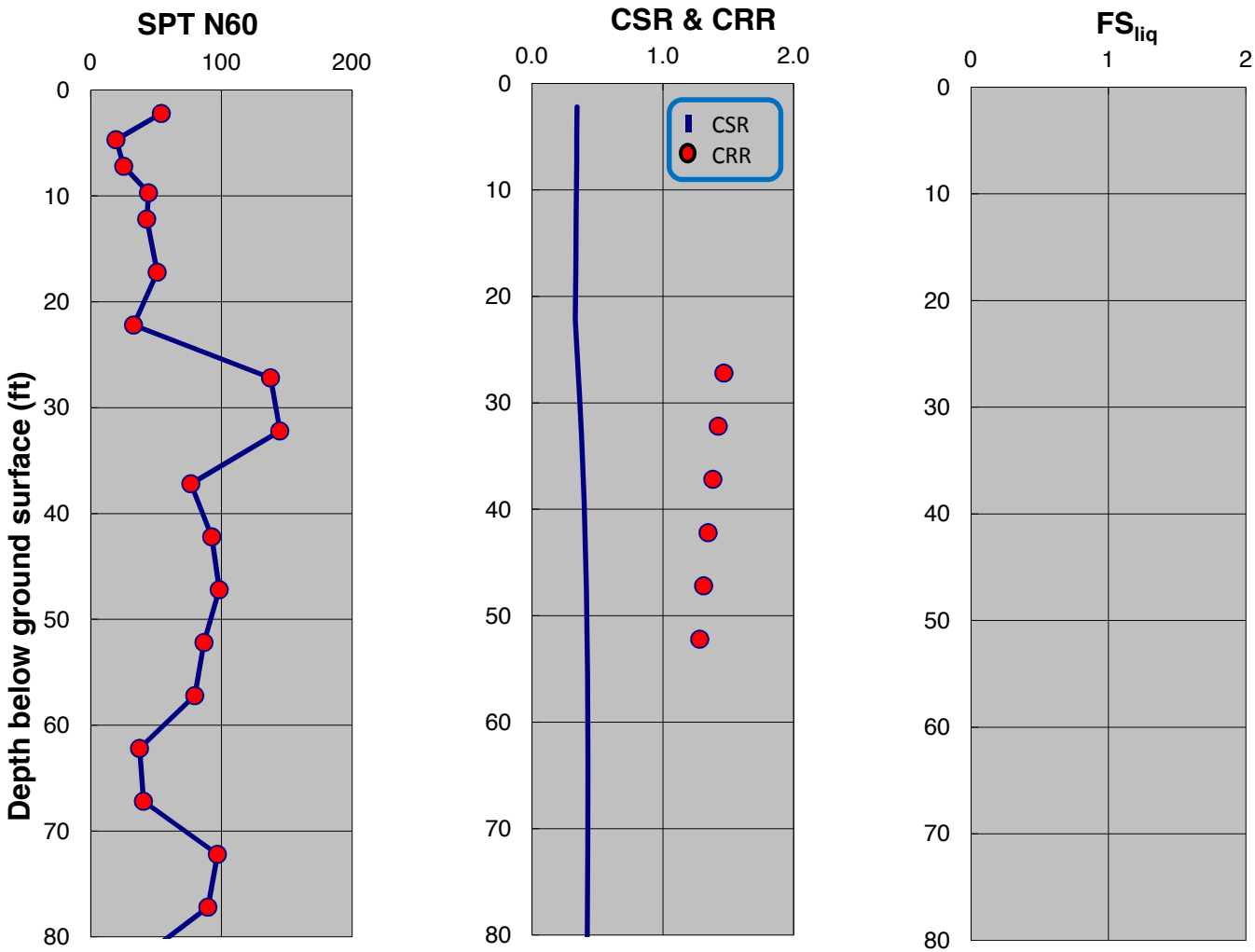
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-80 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



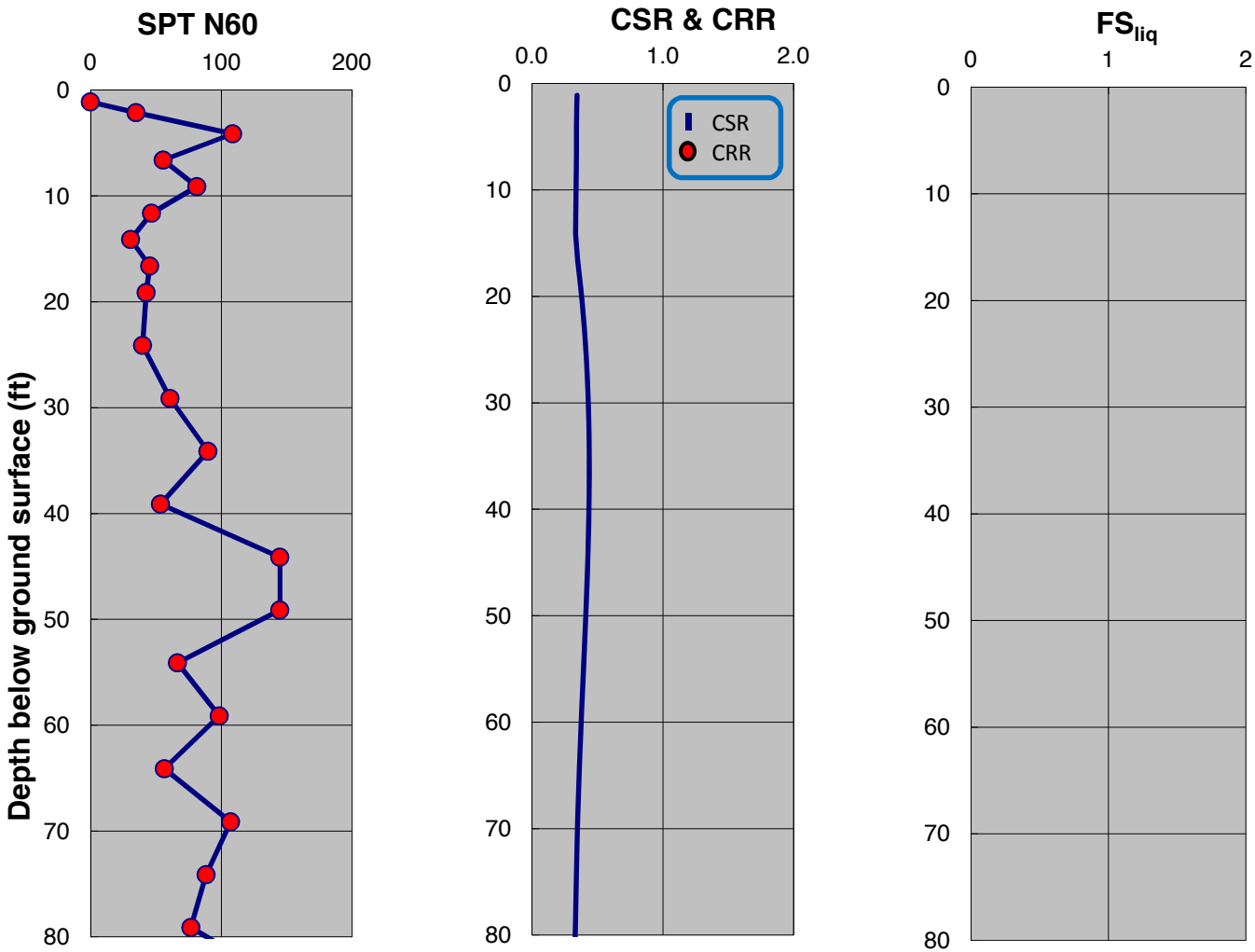
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-81 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



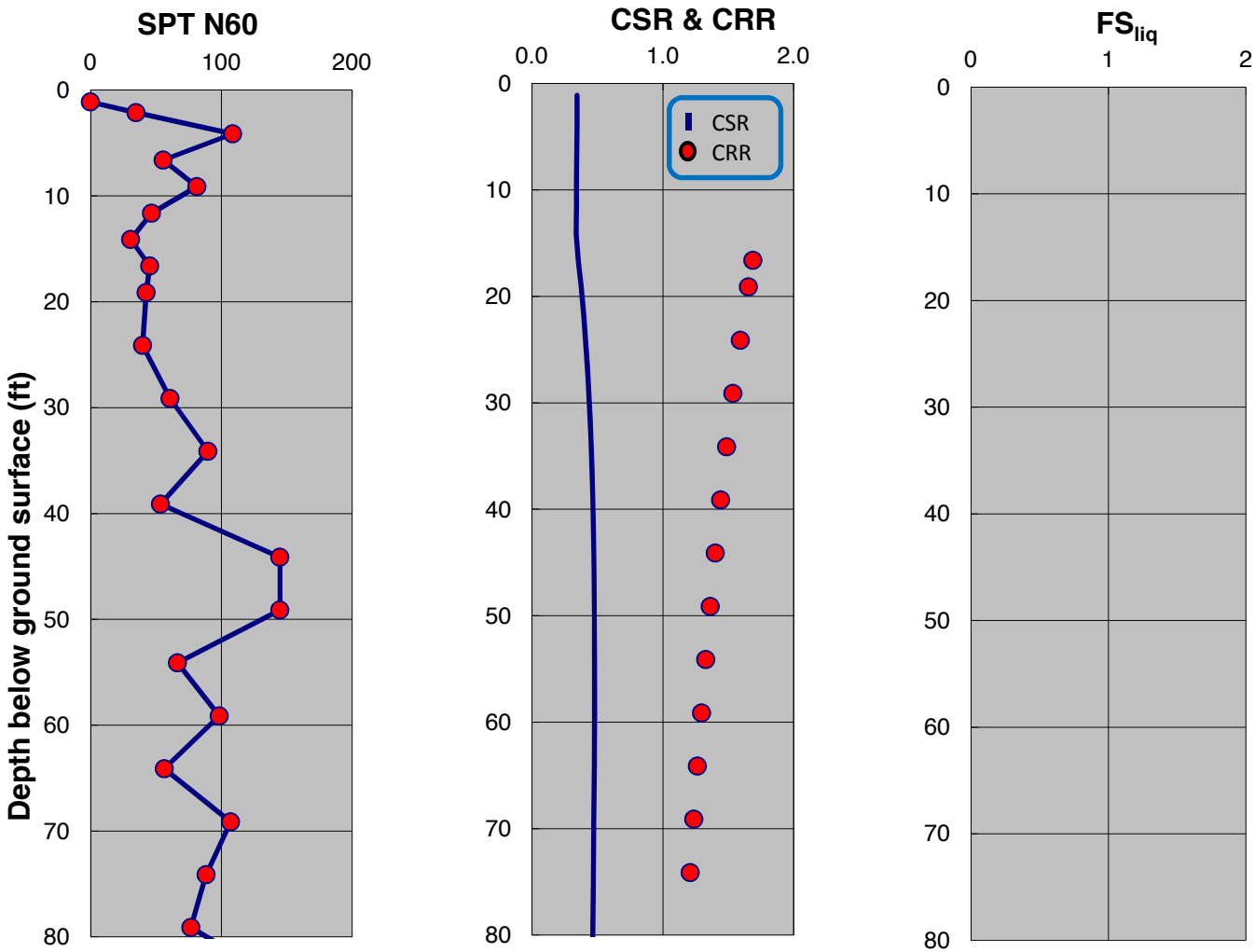
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-81 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



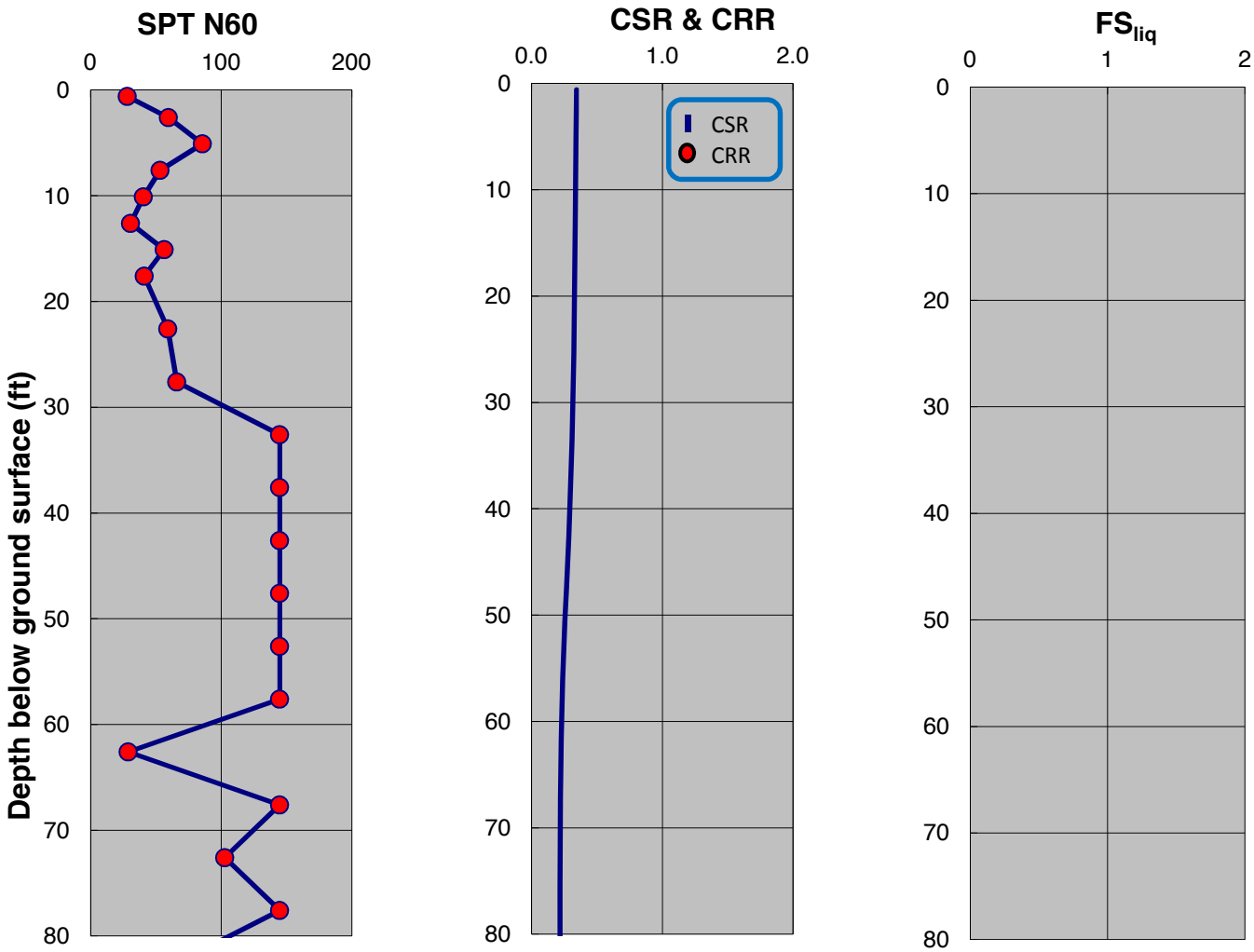
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-82 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-82 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

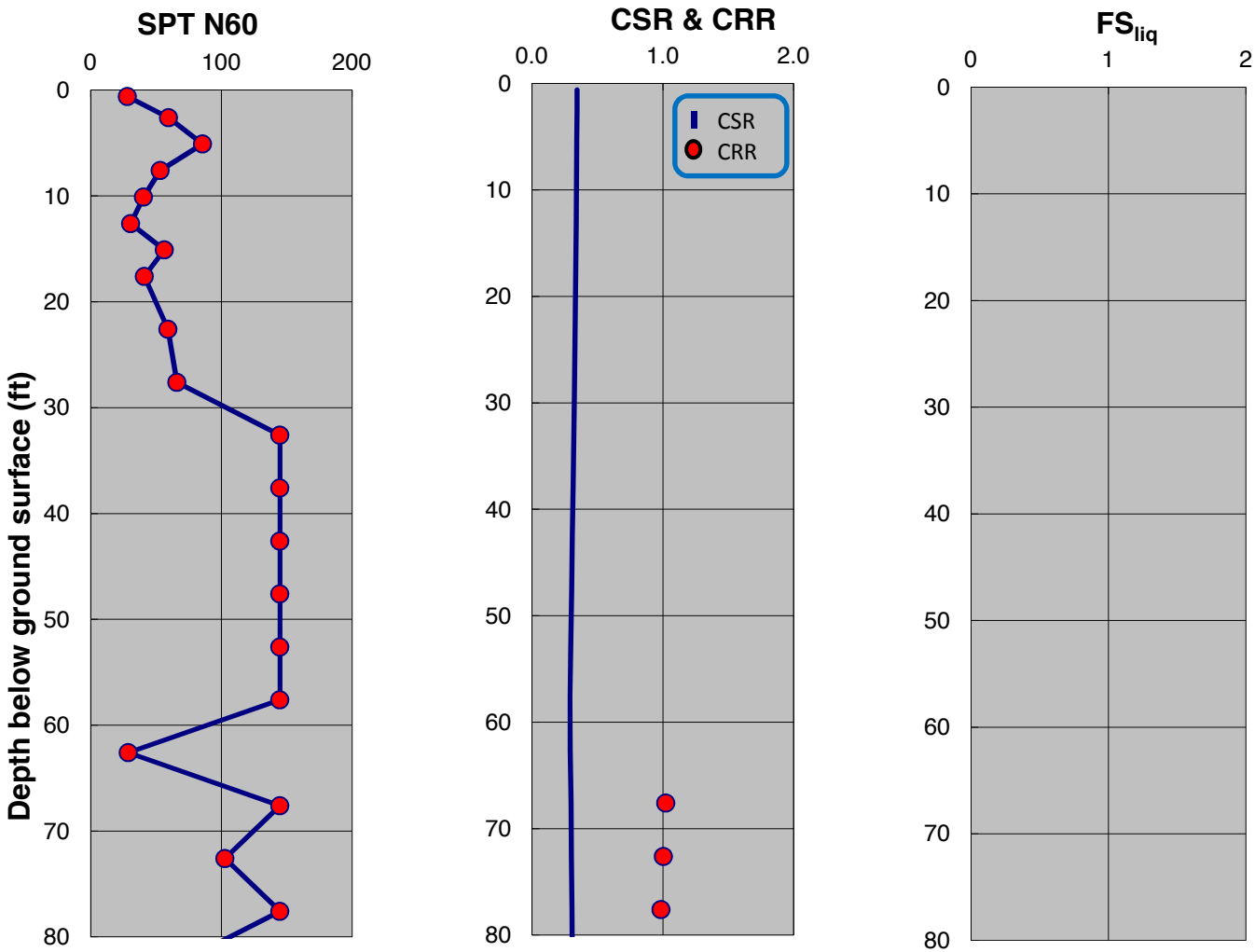
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-83 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

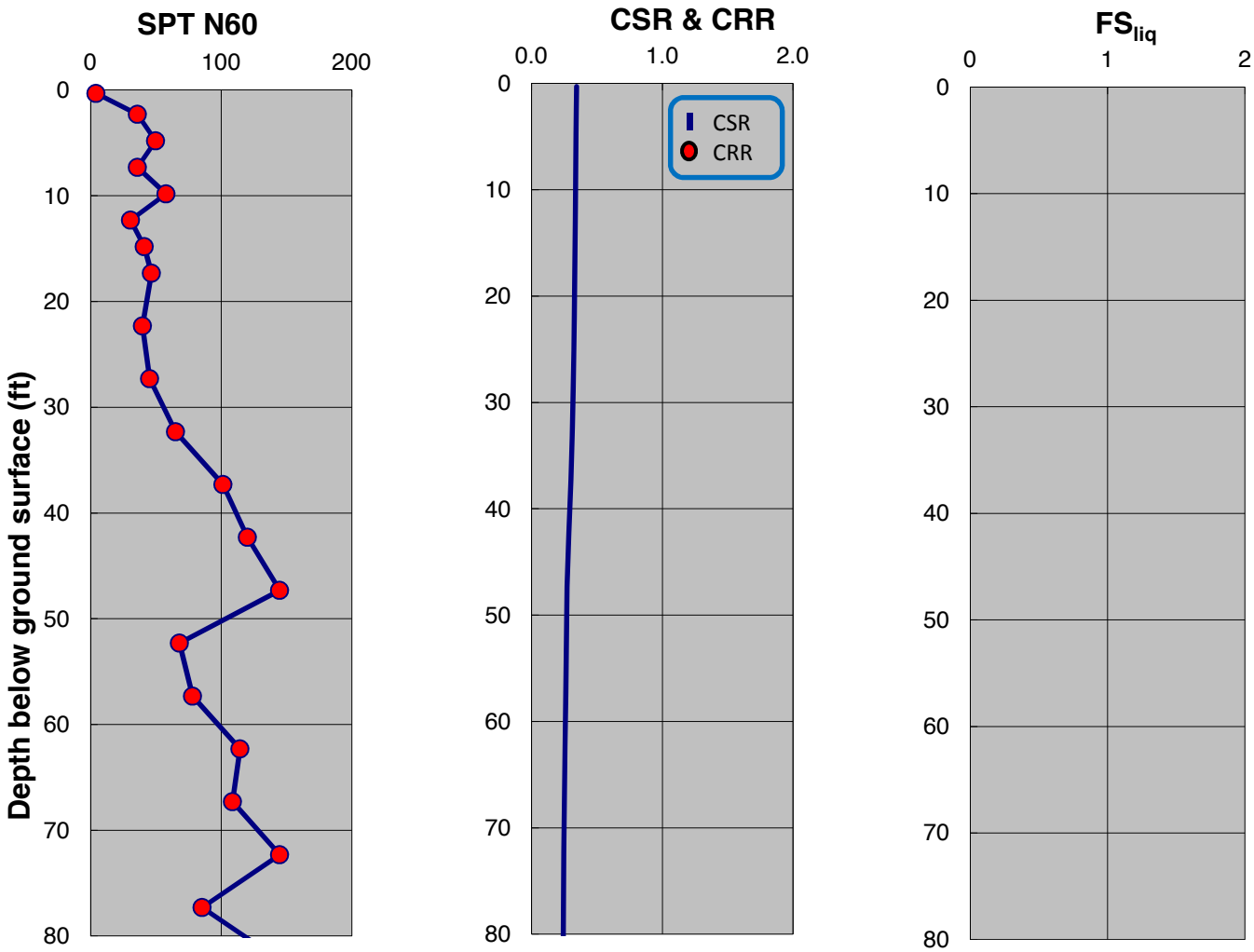
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.91



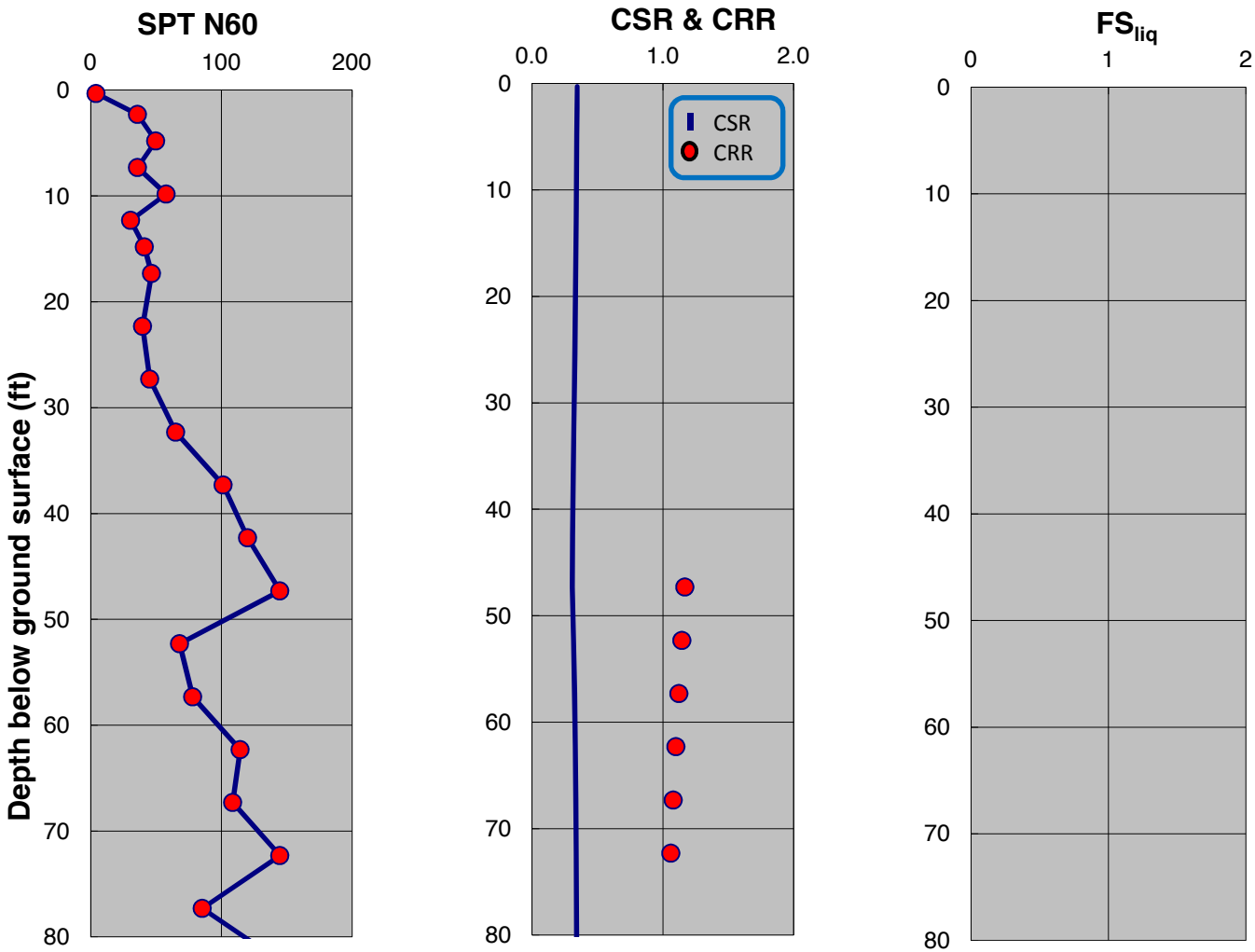
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-83 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-84 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

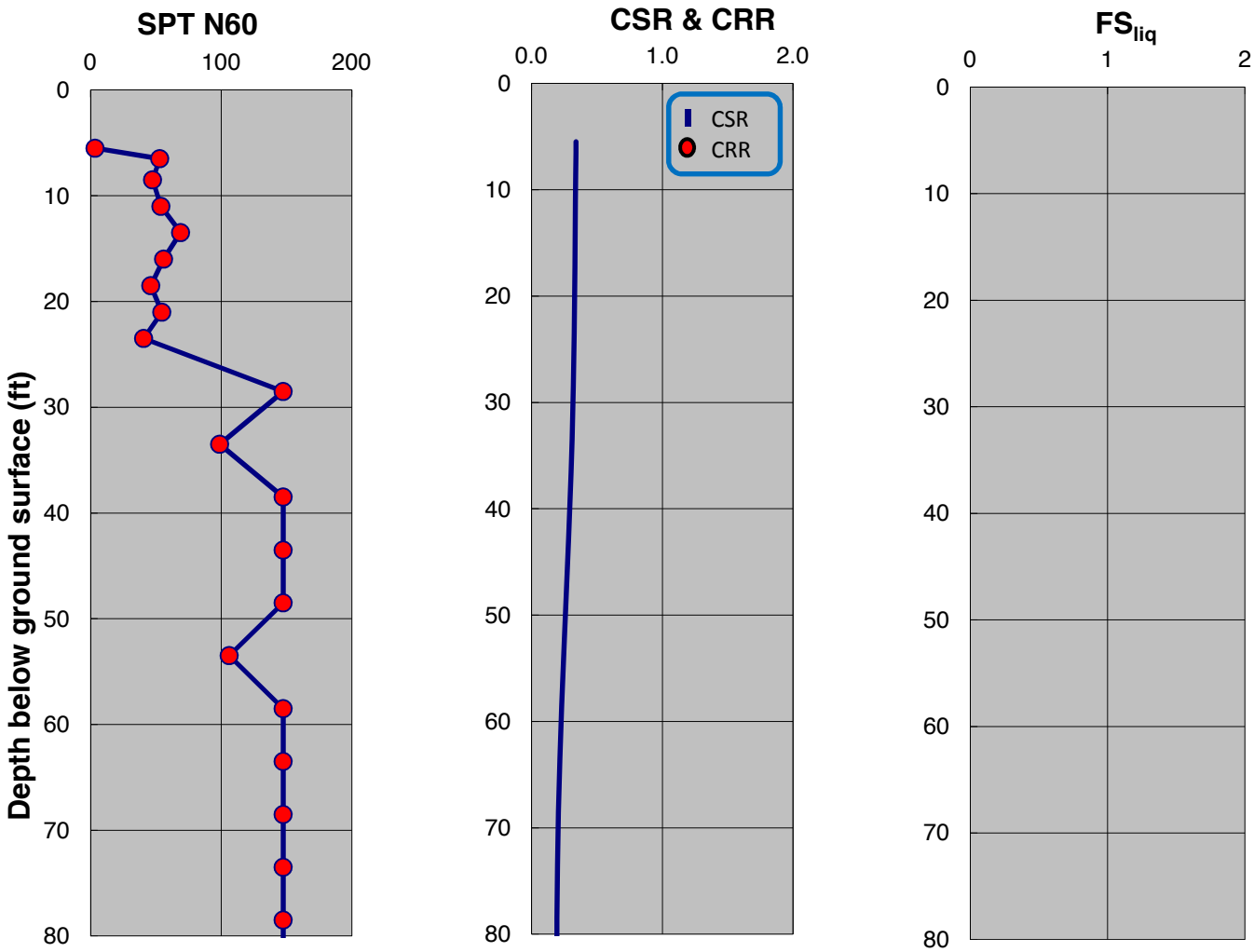
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-84 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

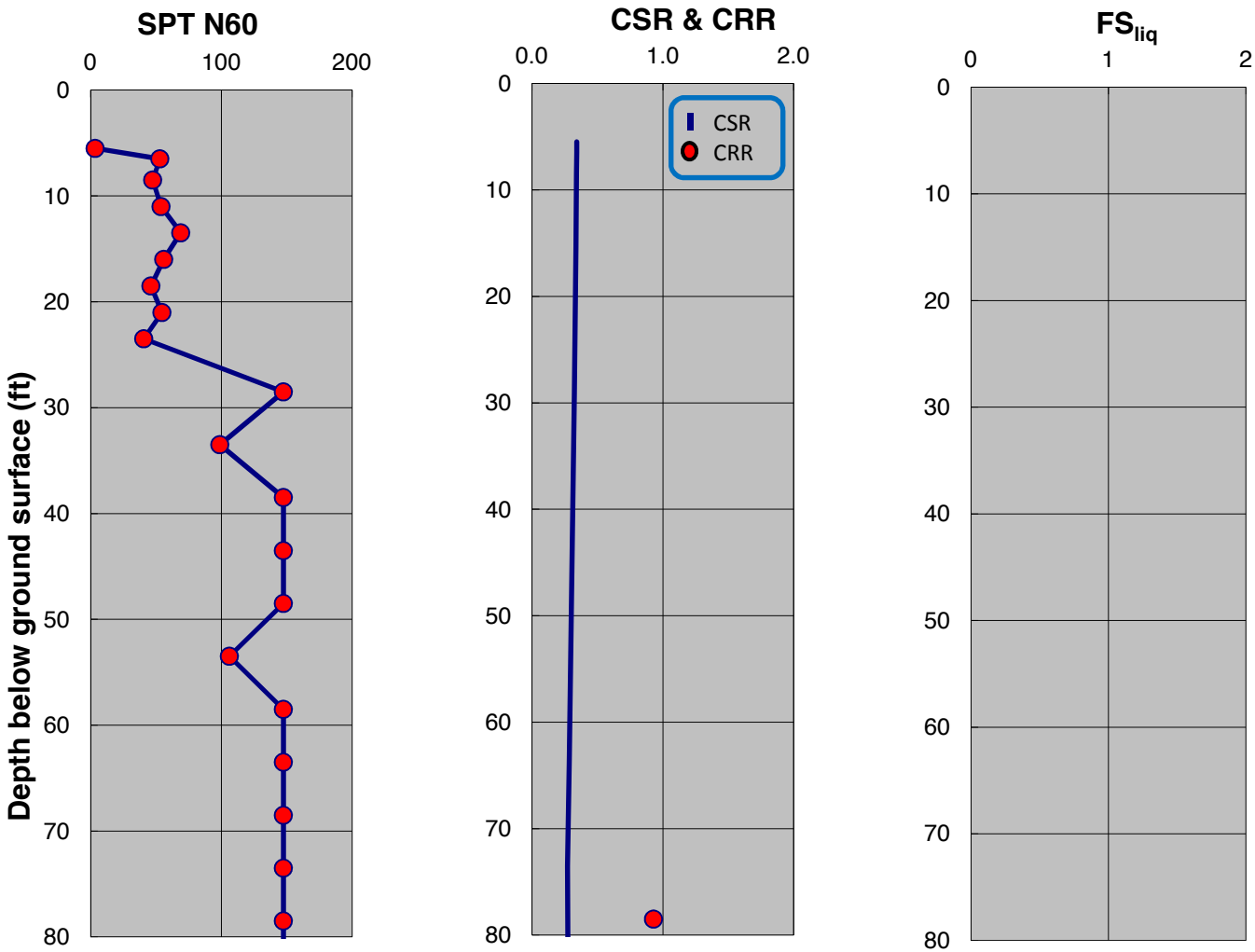
PLATE C.94



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-85 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

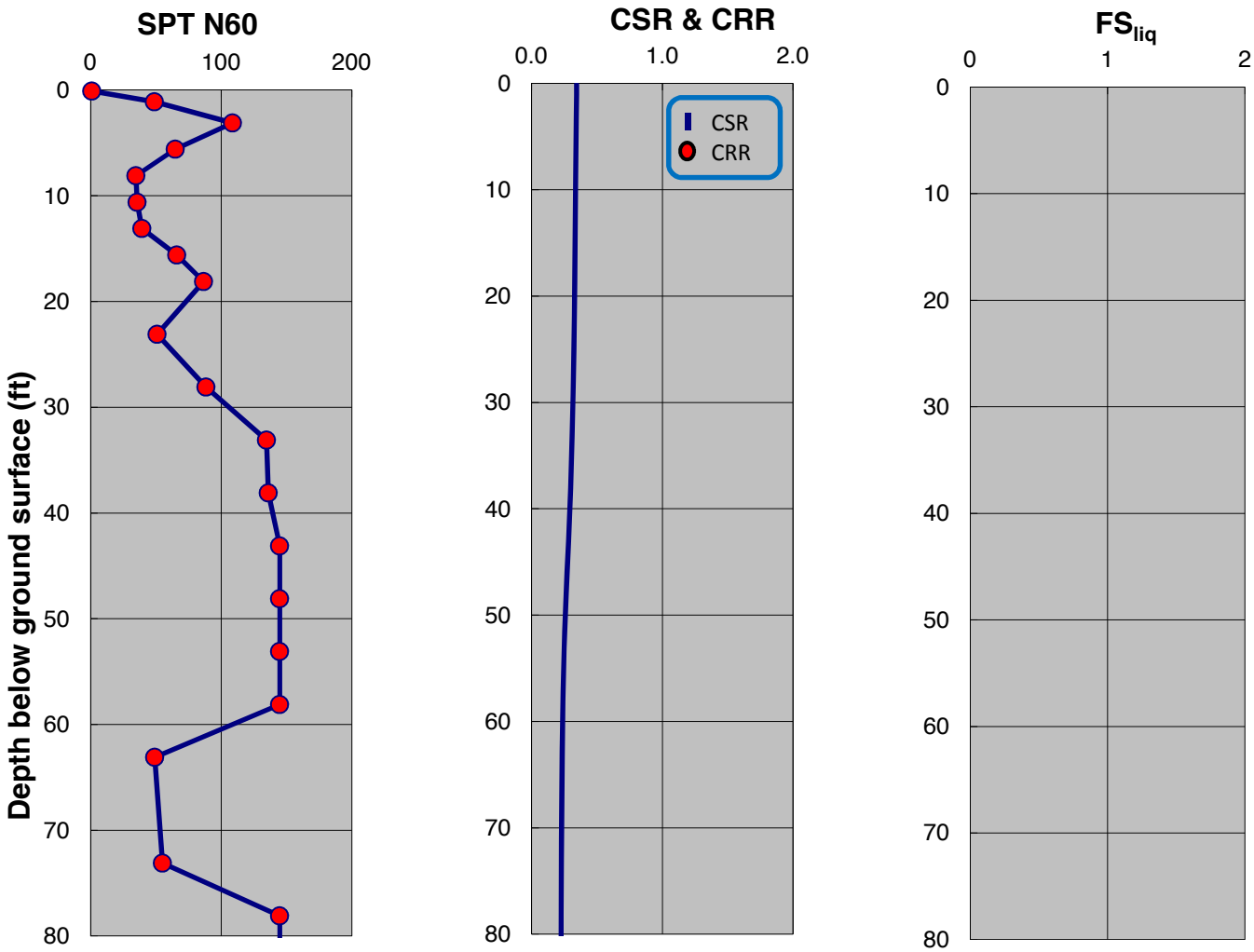
PLATE C.95



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-85 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

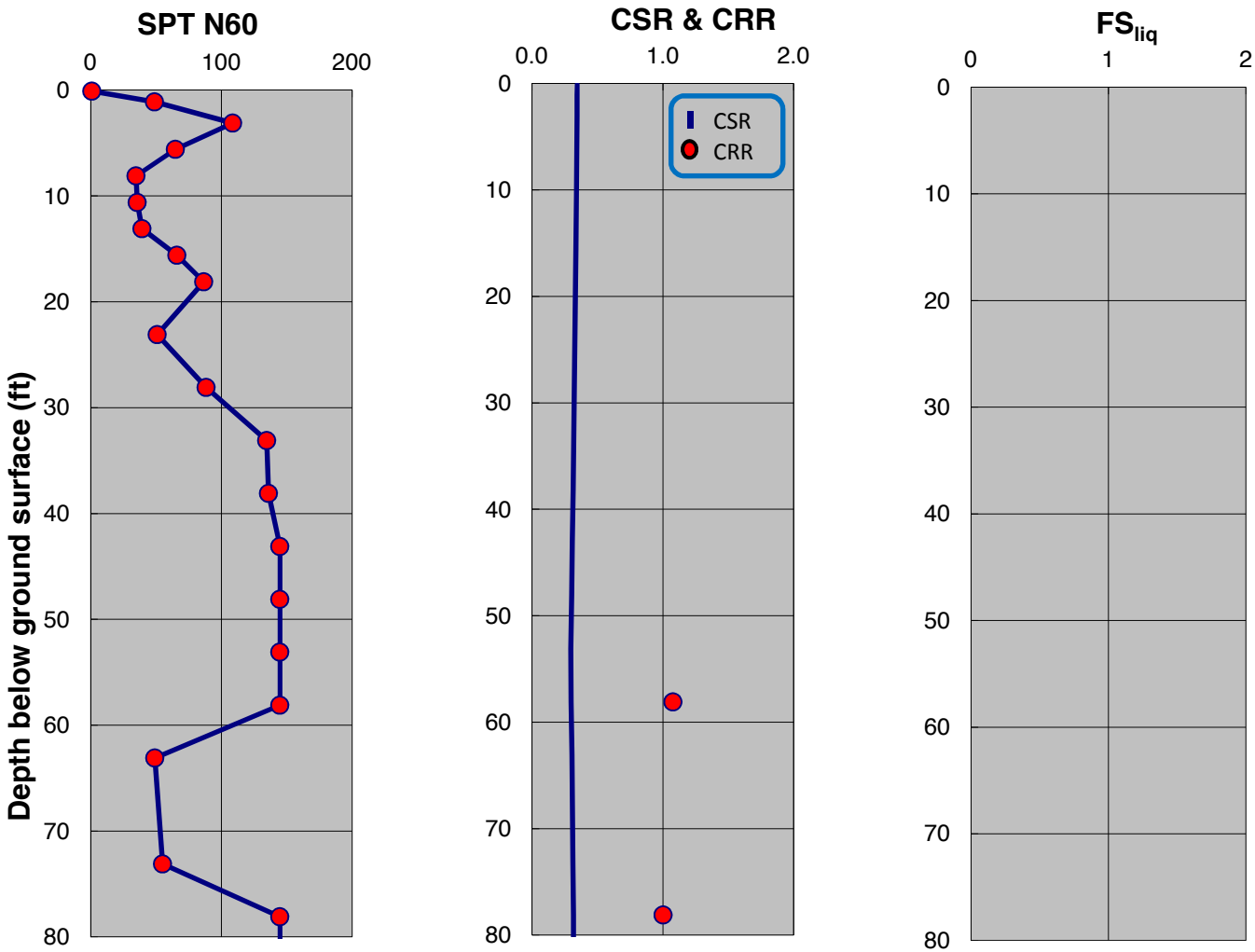
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.96



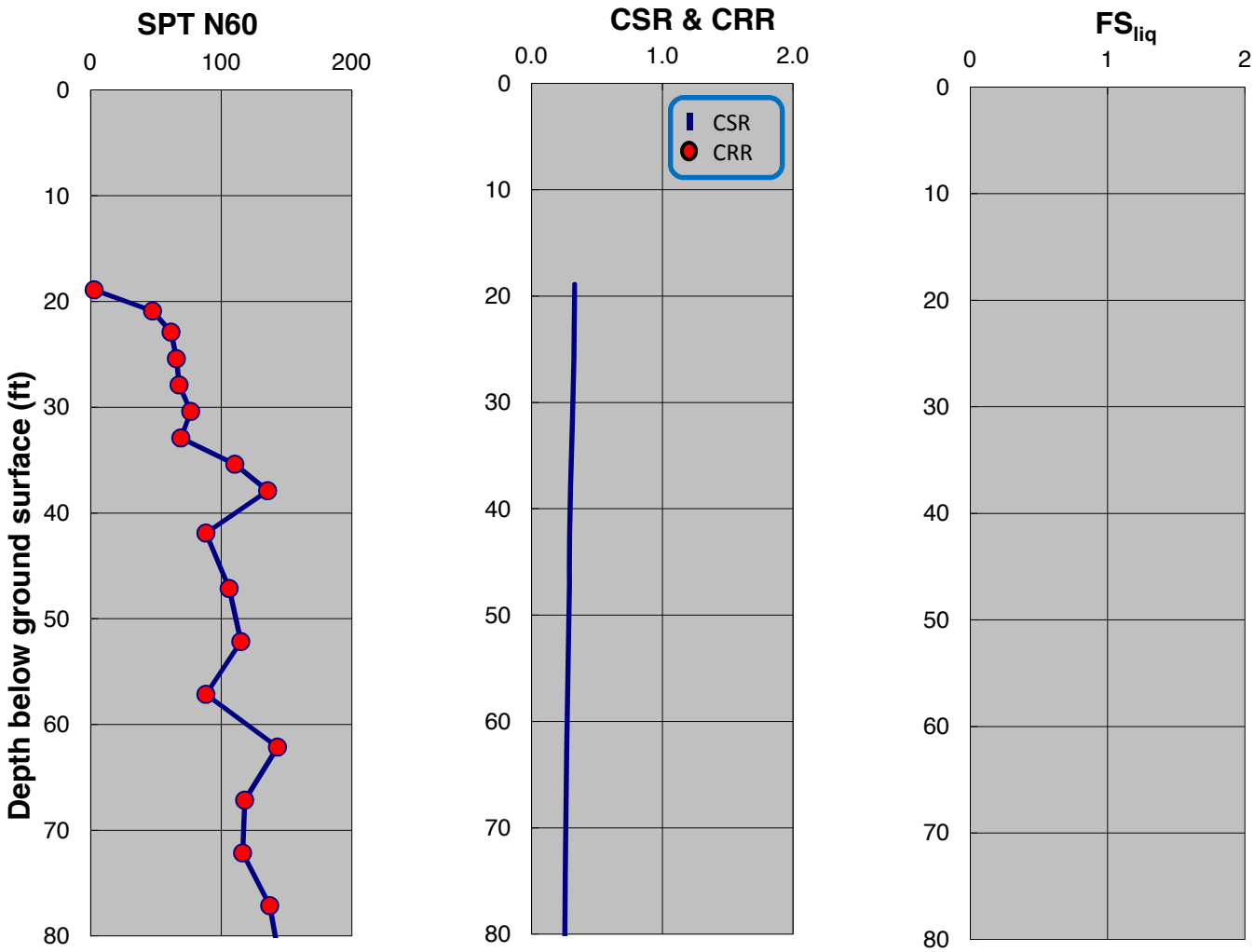
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-86 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



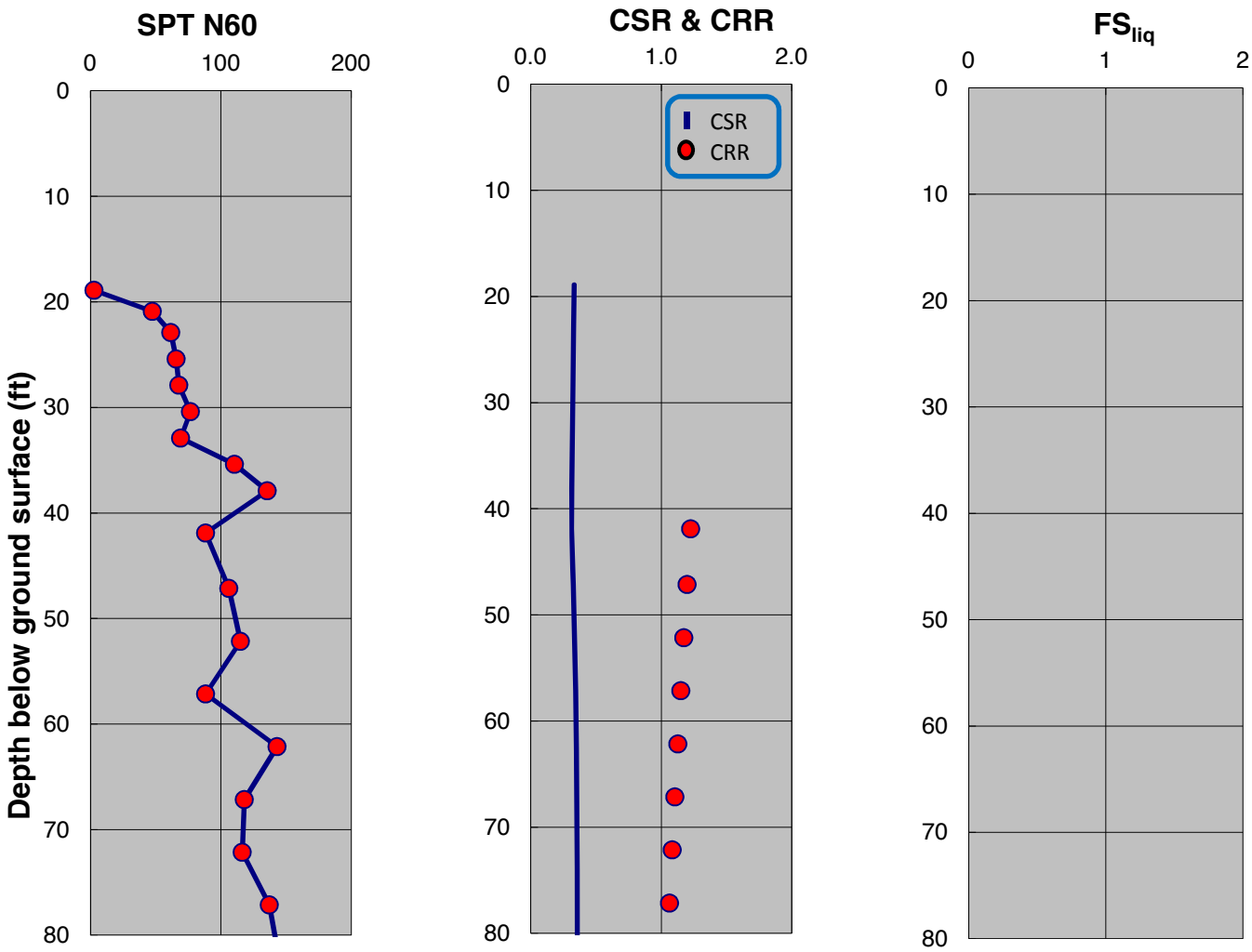
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-86 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-87 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

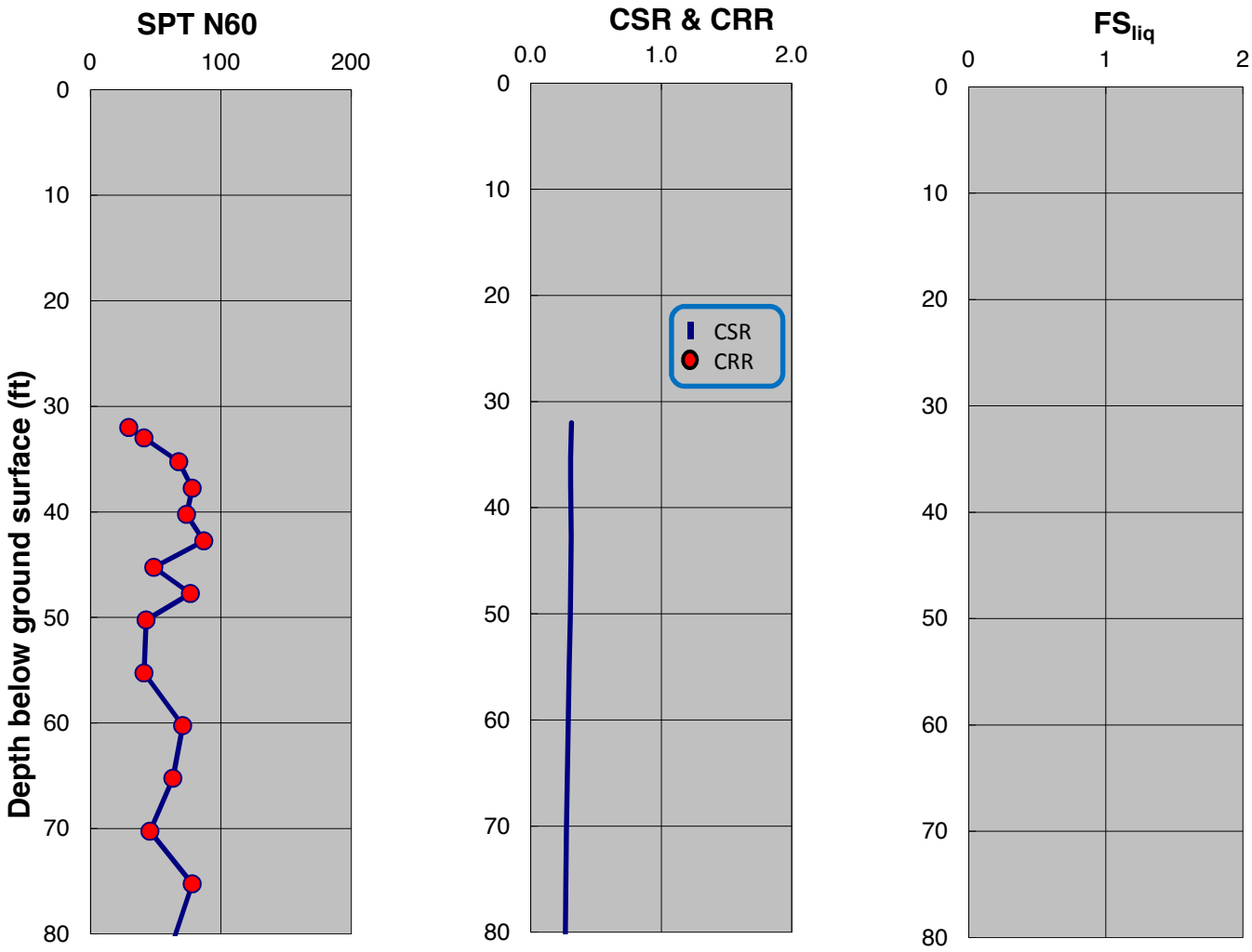
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-87 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

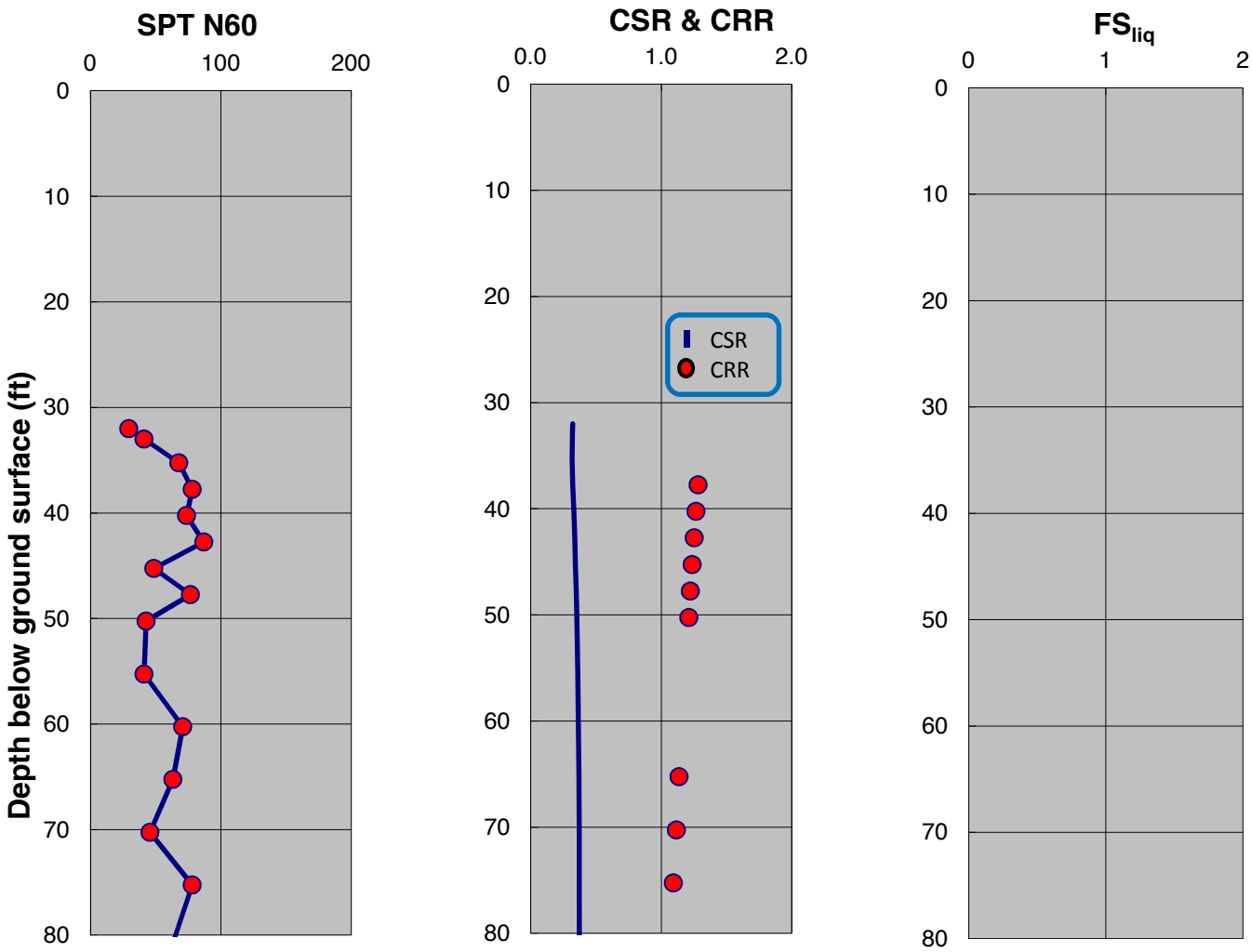
PLATE C.100



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-88 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

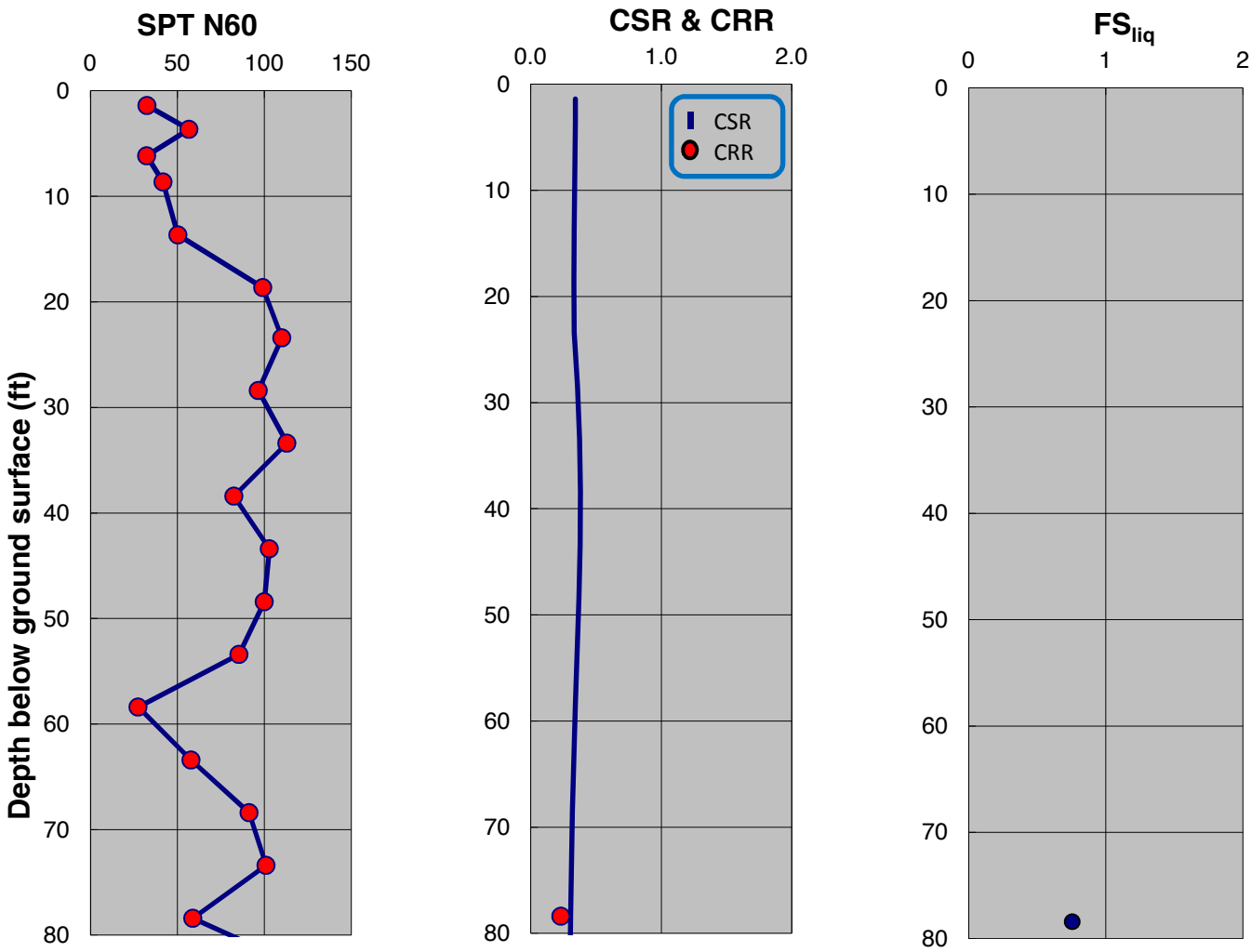
PLATE C.101



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-88 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

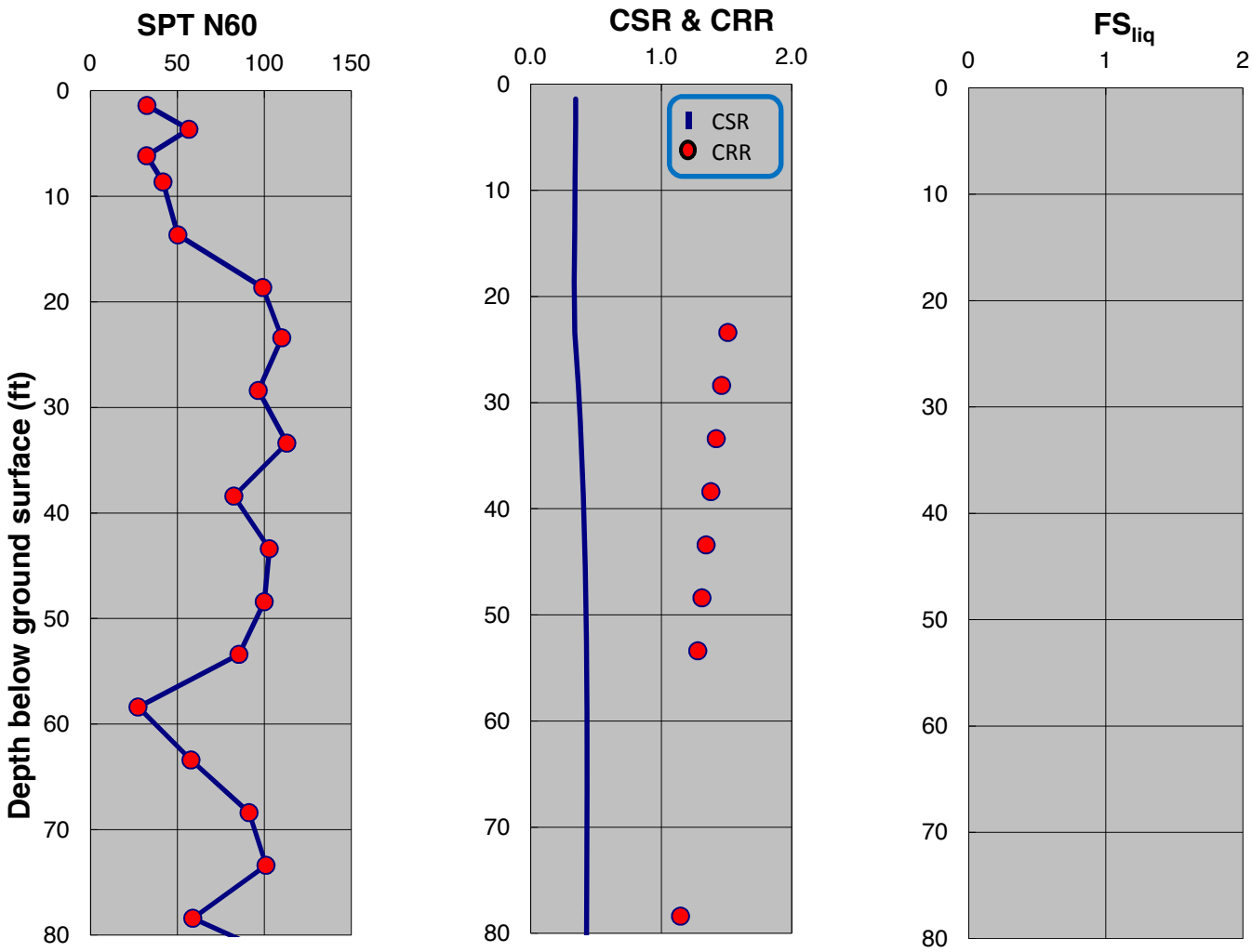
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.102



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-89 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

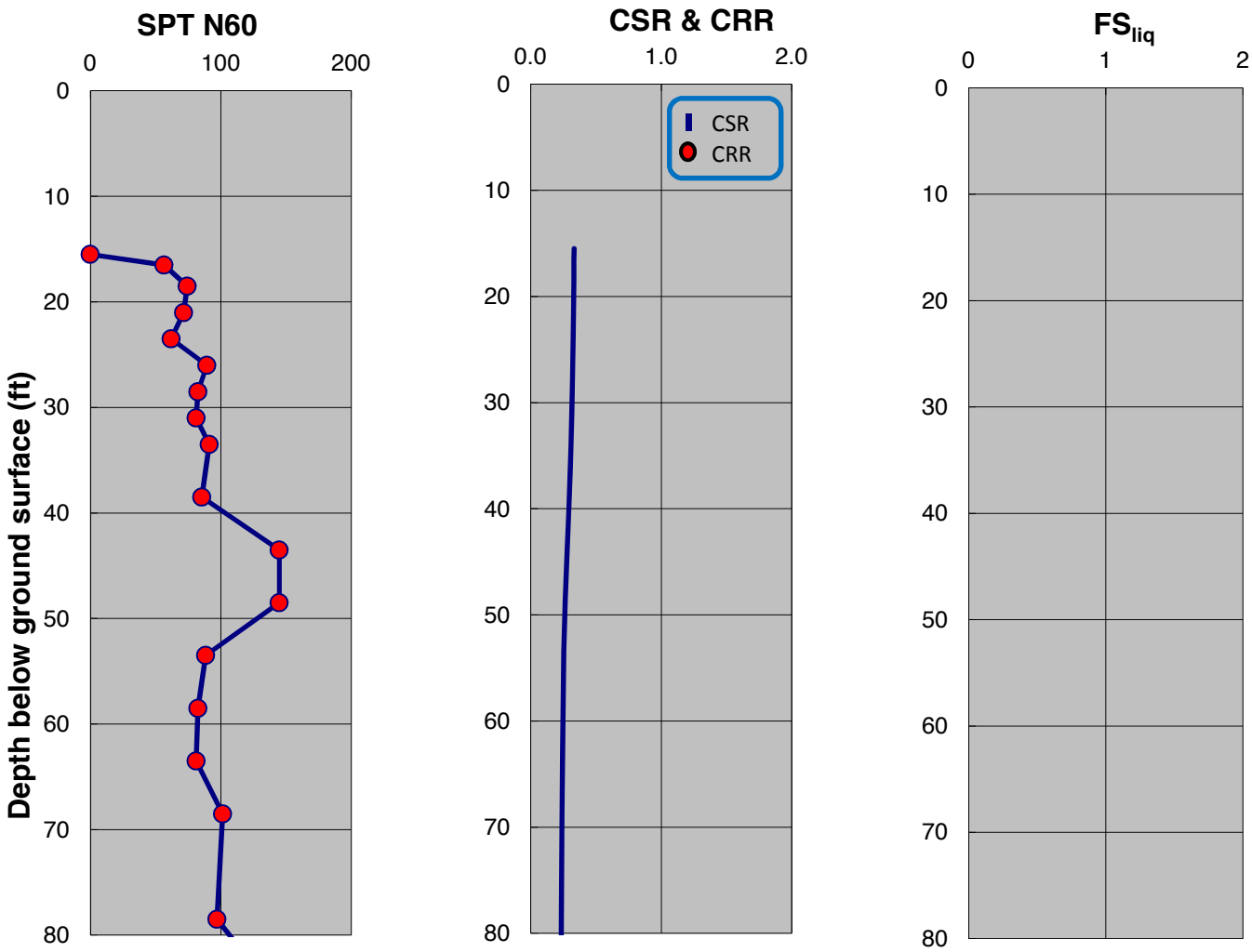
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-89 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

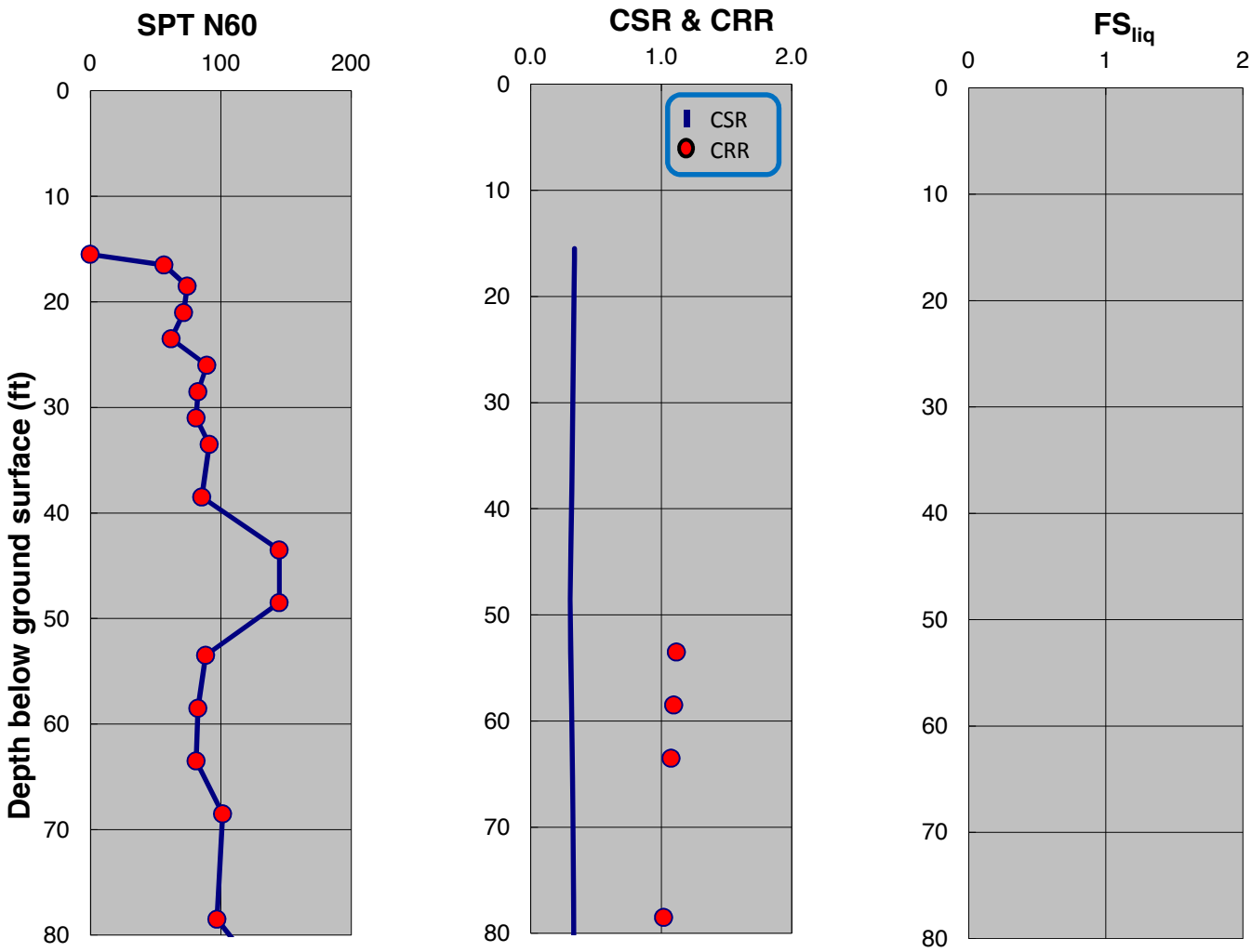
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.104



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-90 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

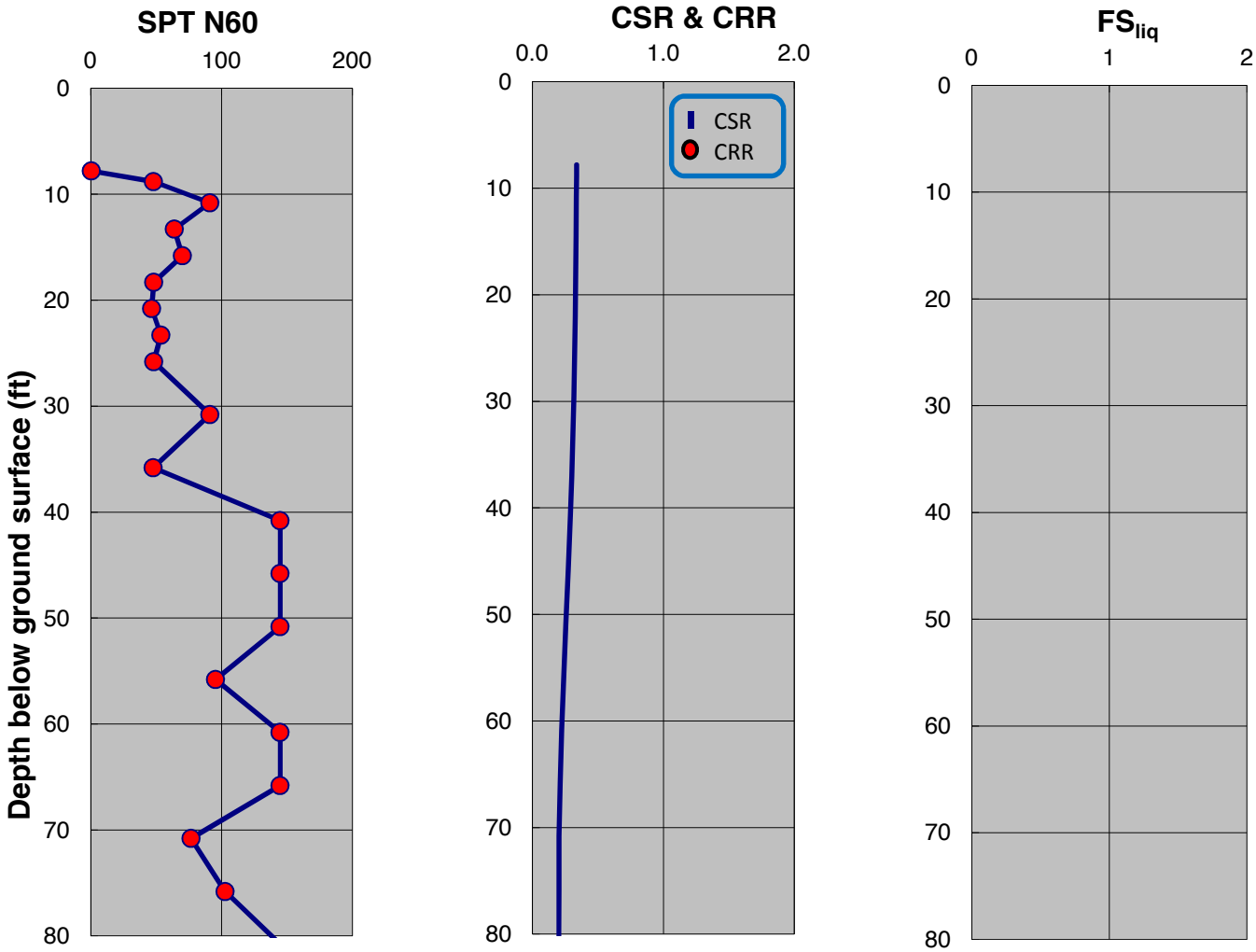
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-90 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

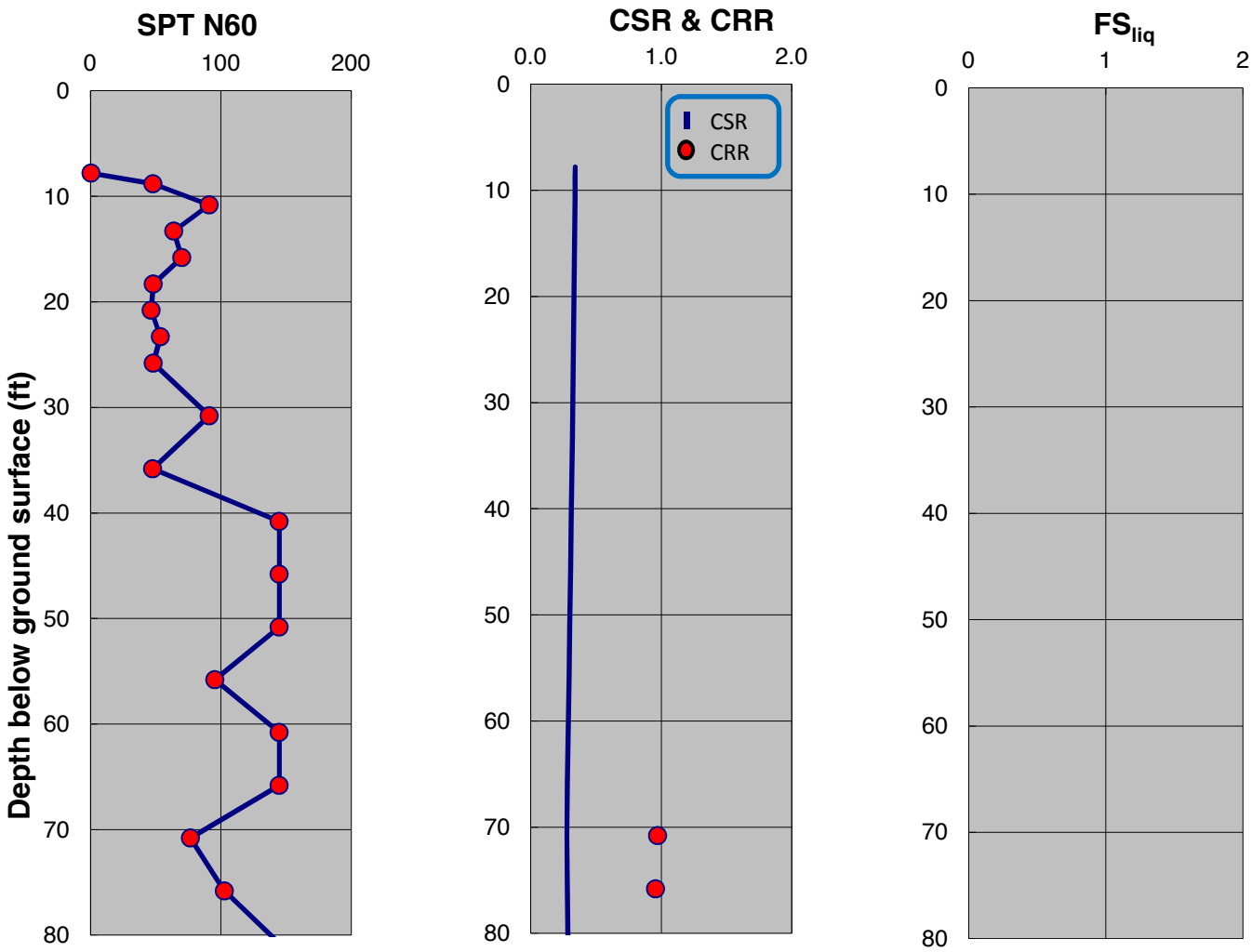
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.106



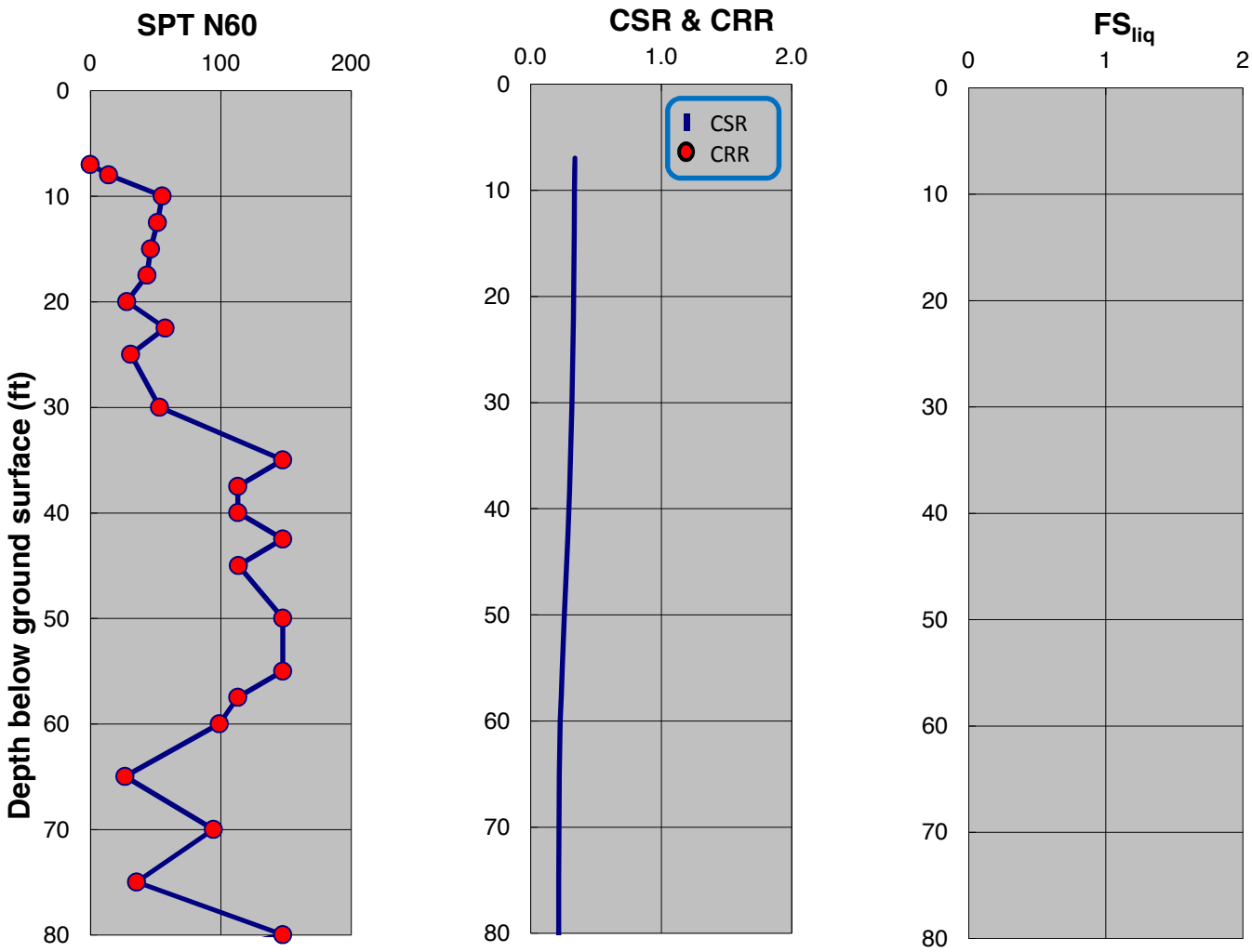
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-91 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



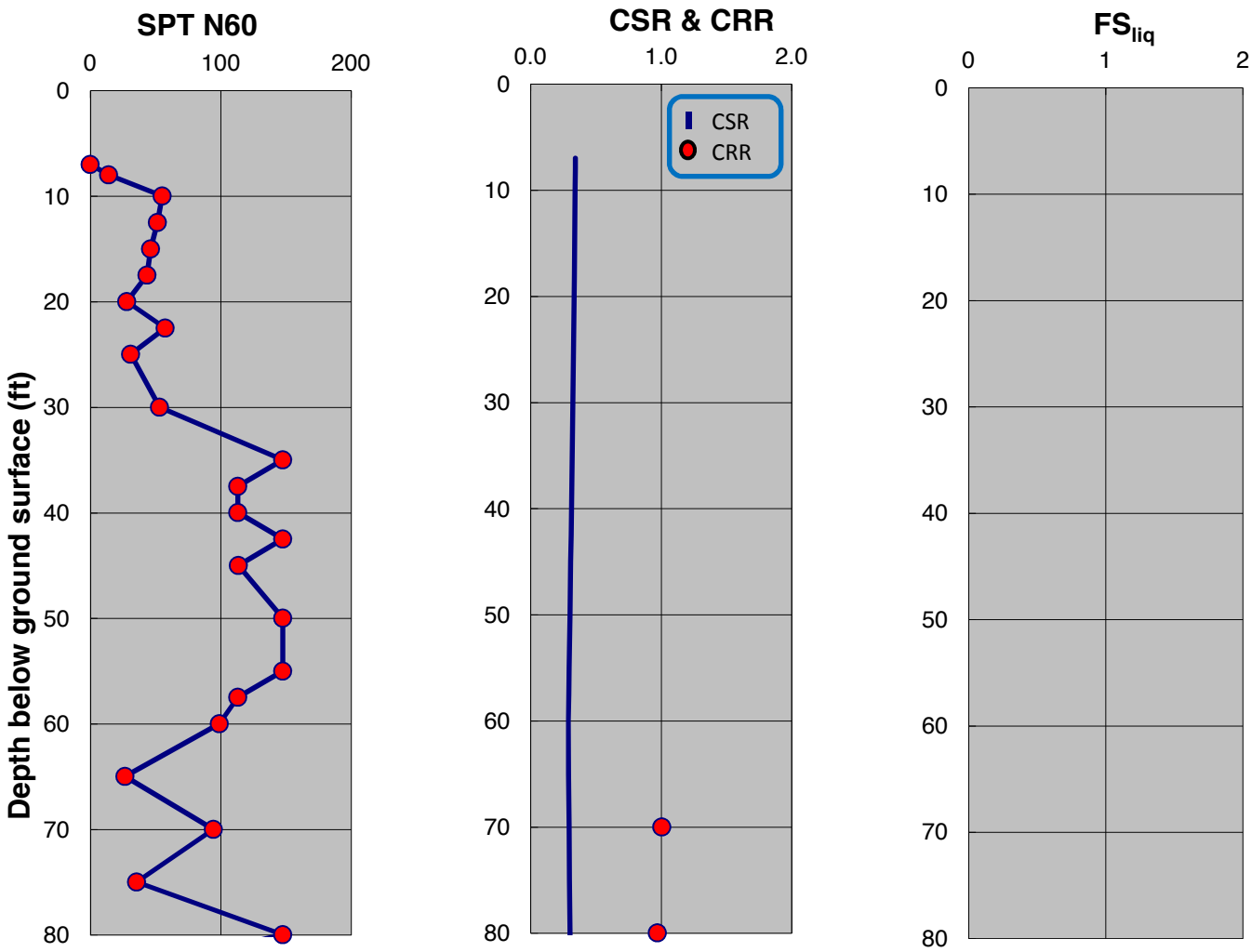
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-91 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-92 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

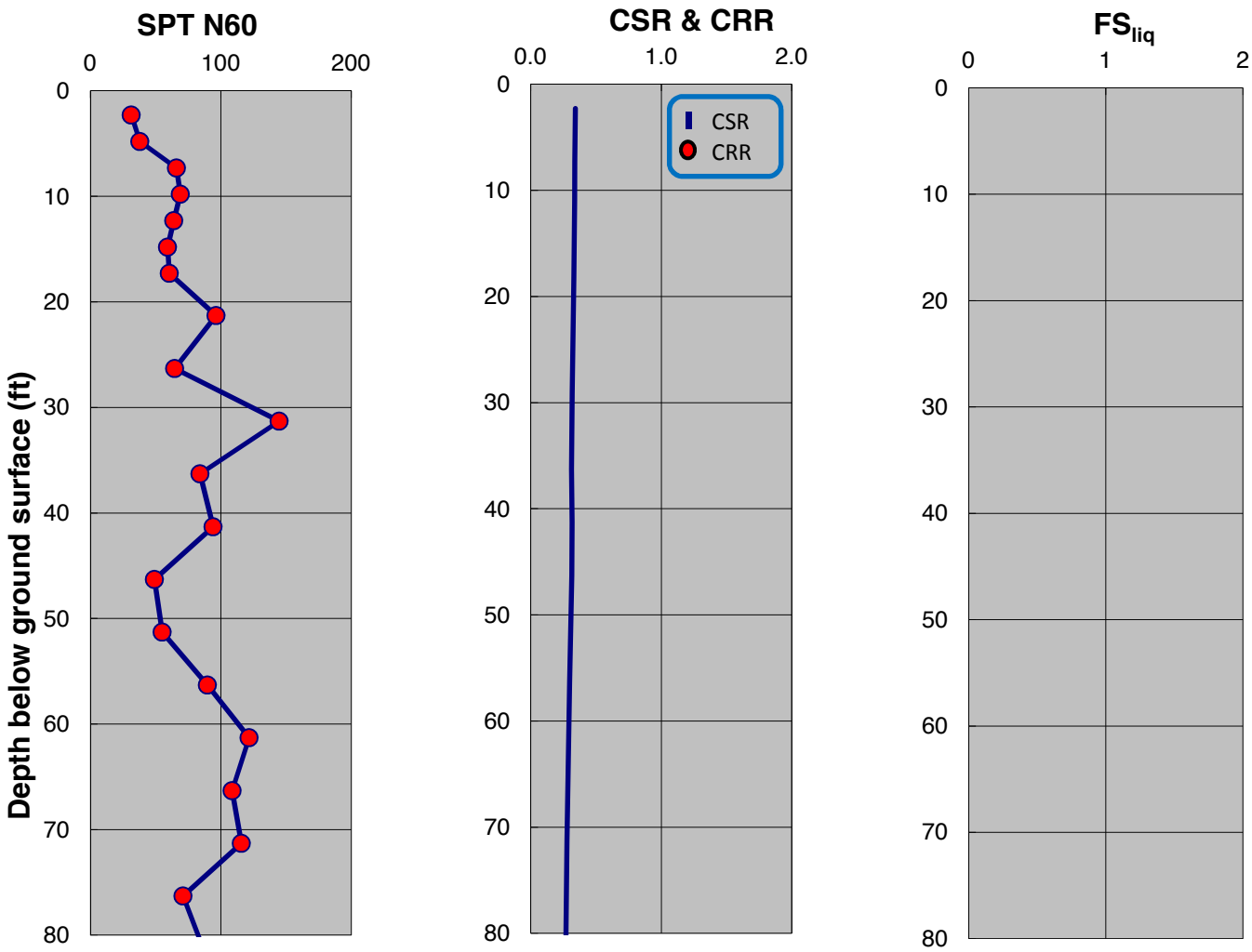
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-92 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

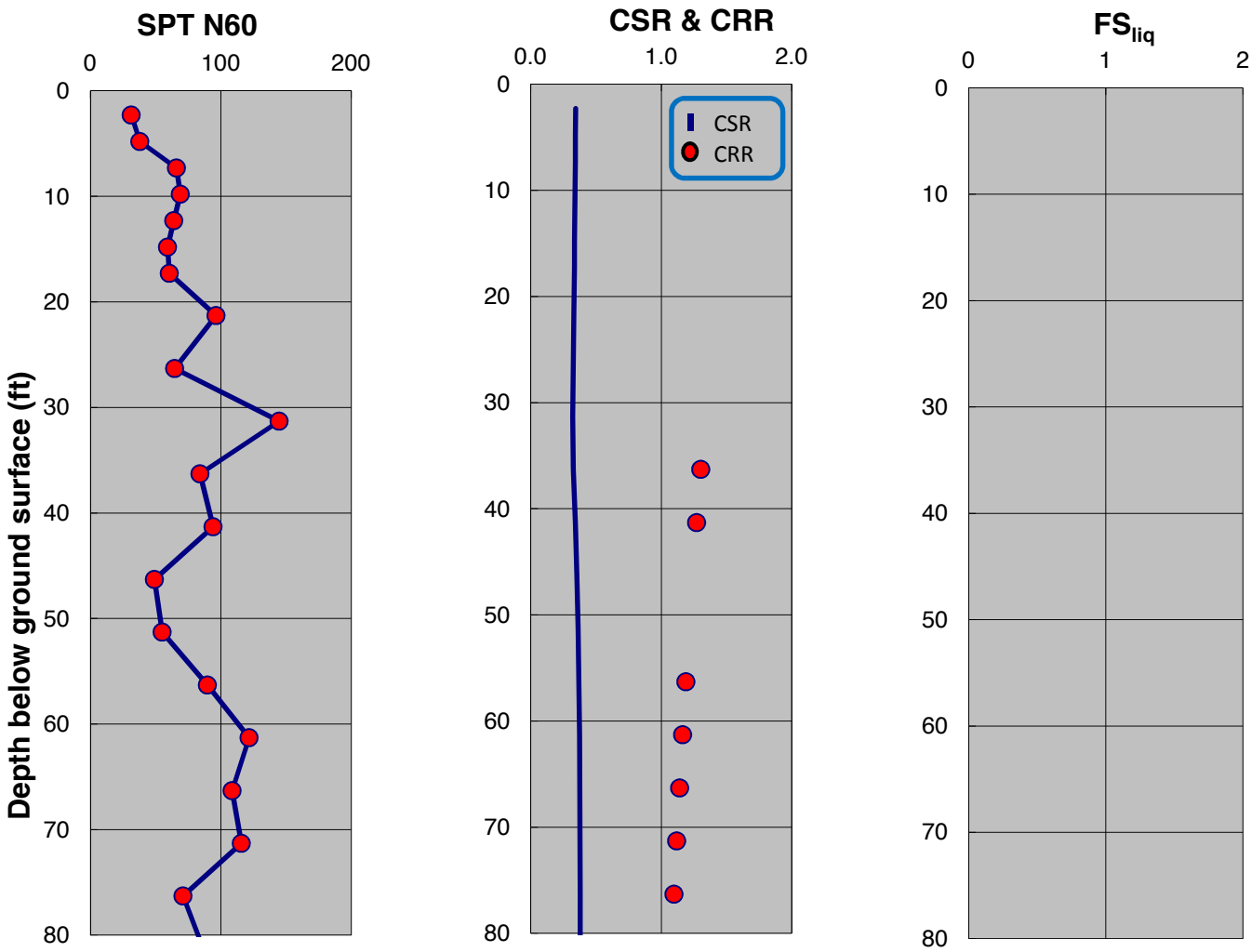
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.110



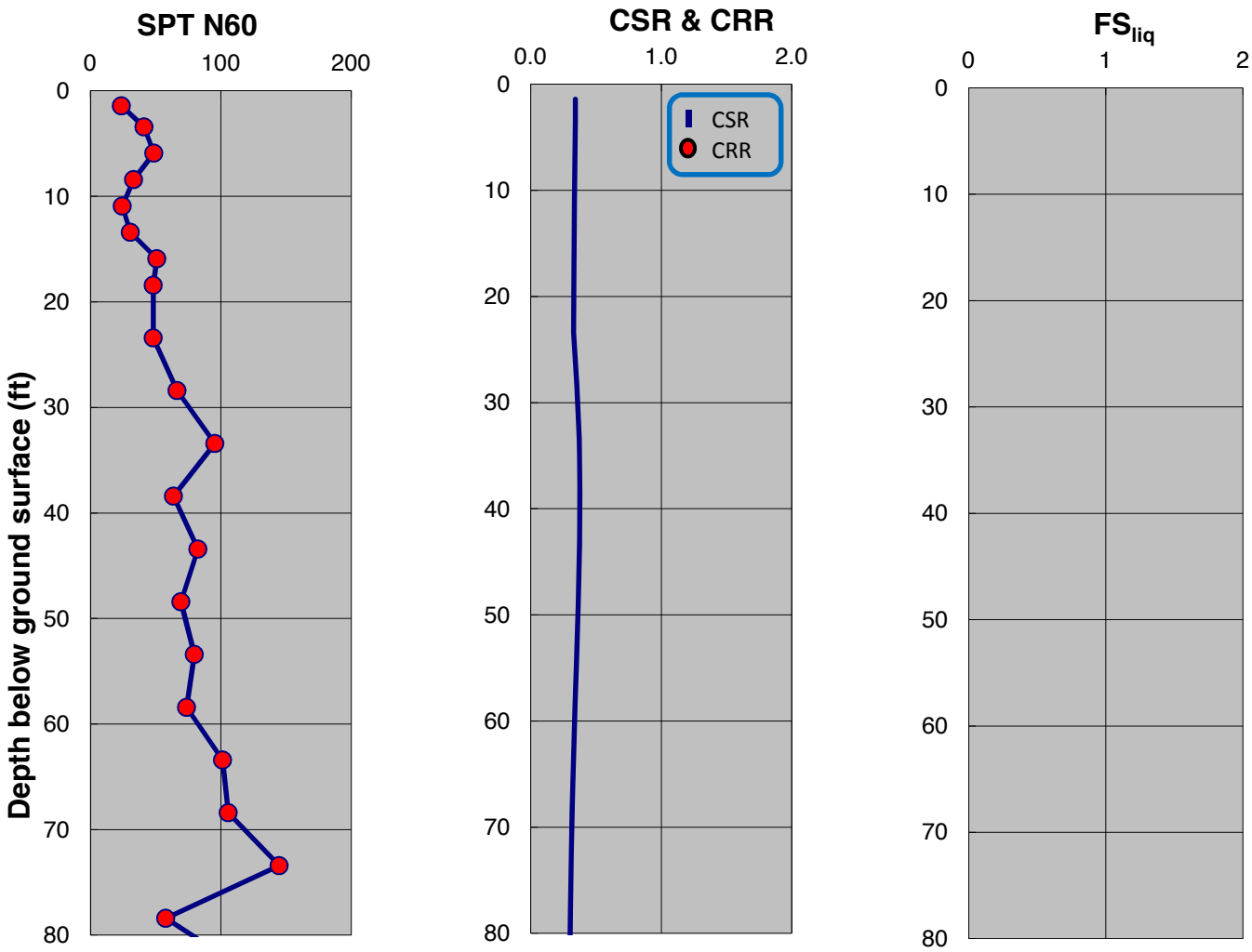
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-93 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



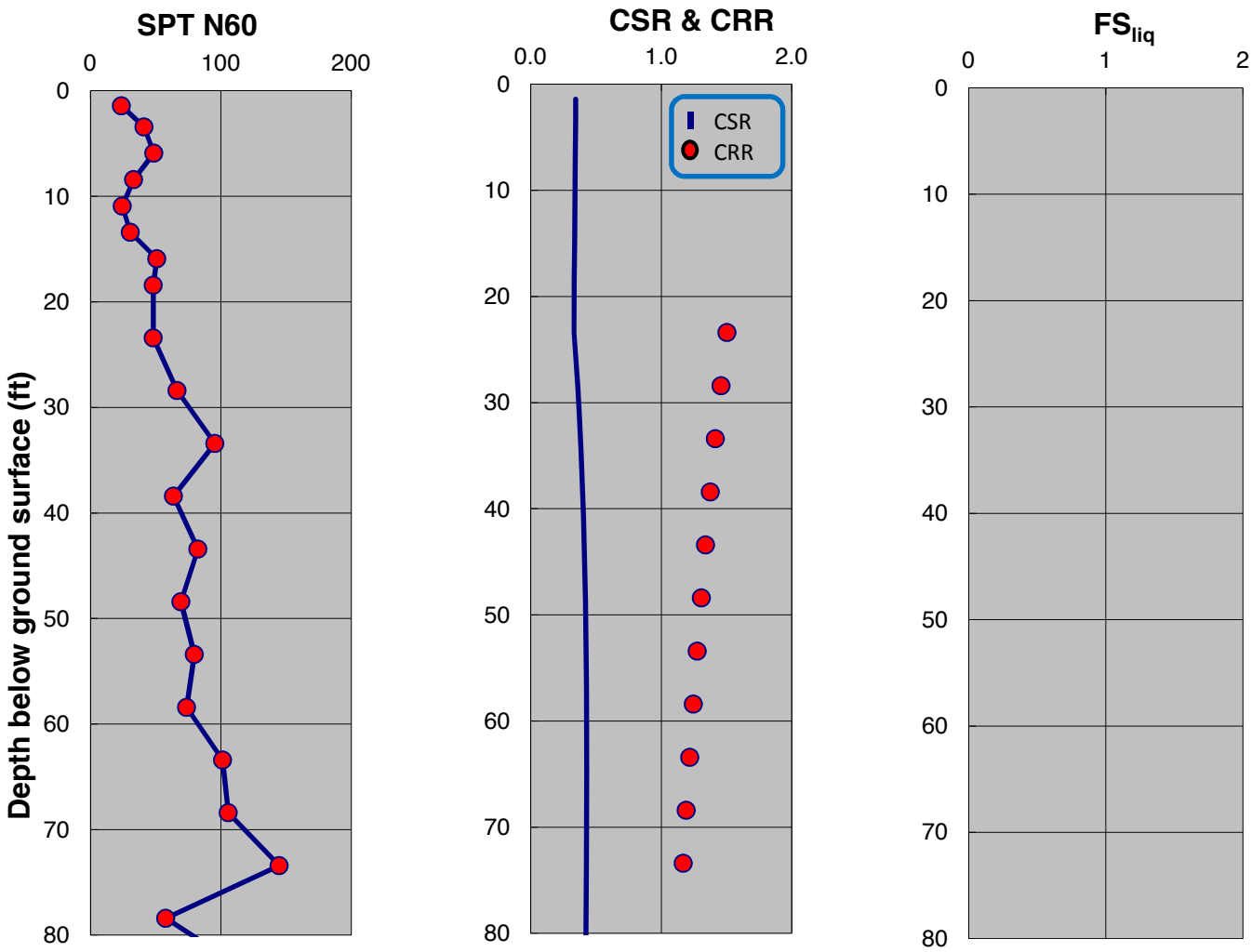
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-93 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



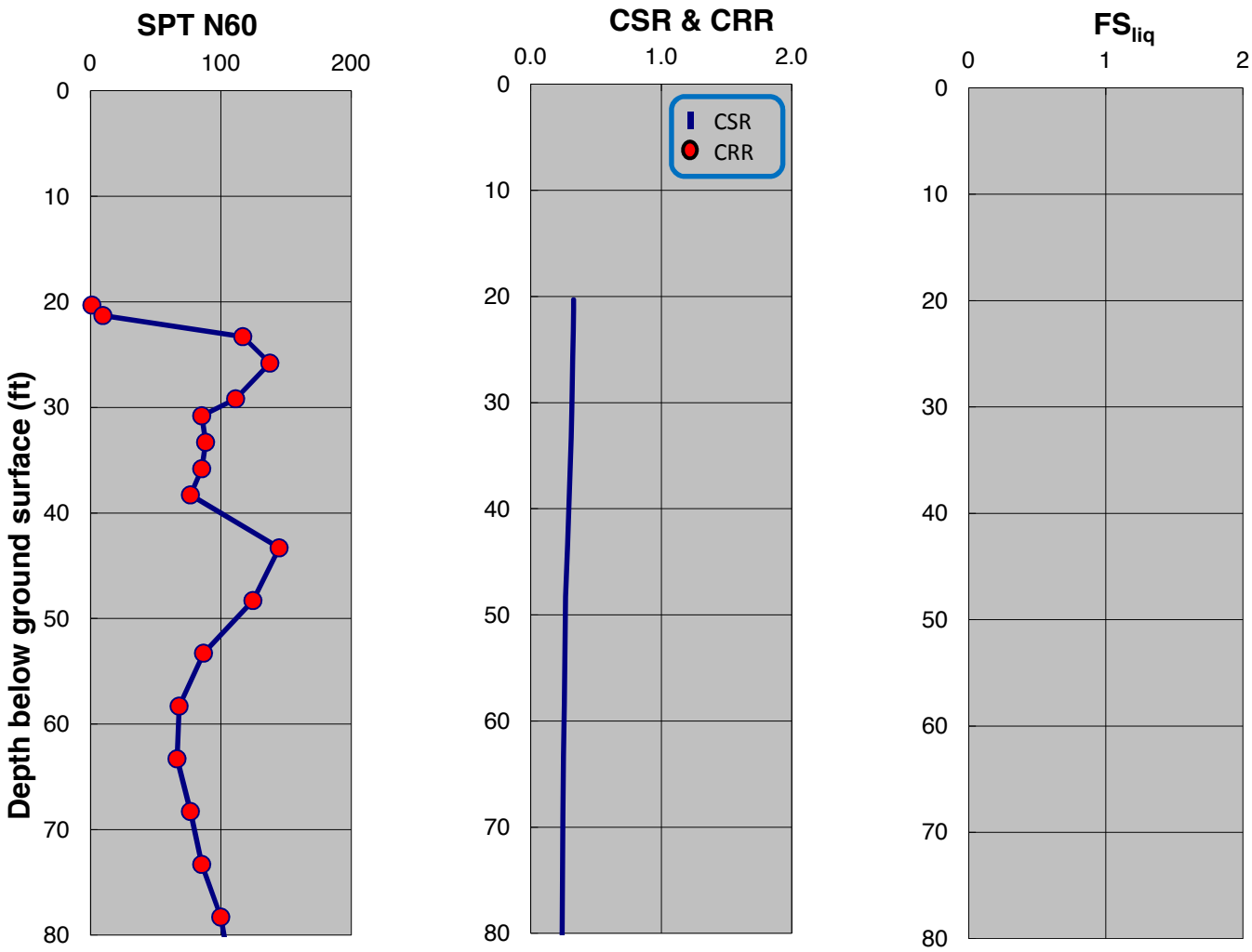
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-94 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



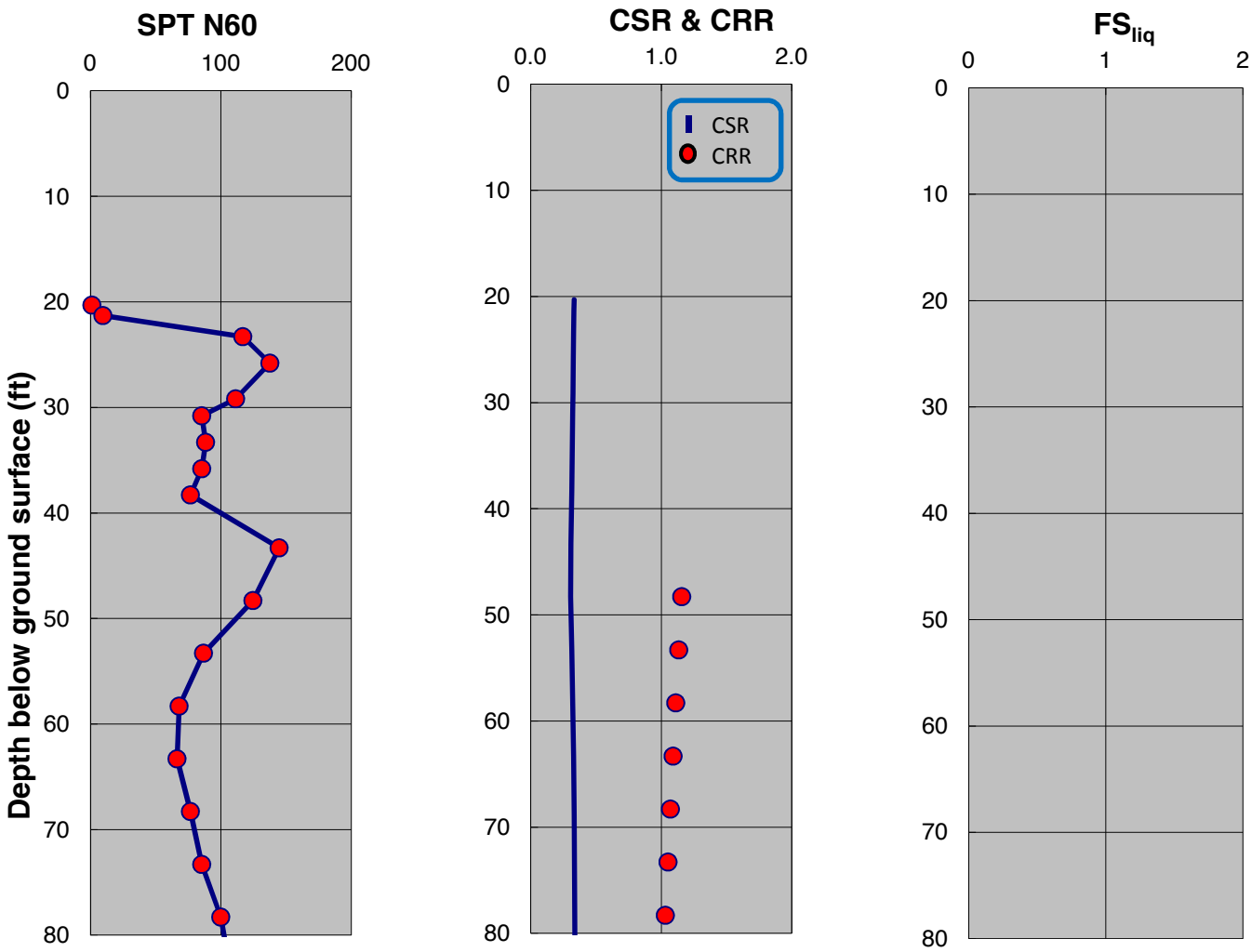
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-94 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



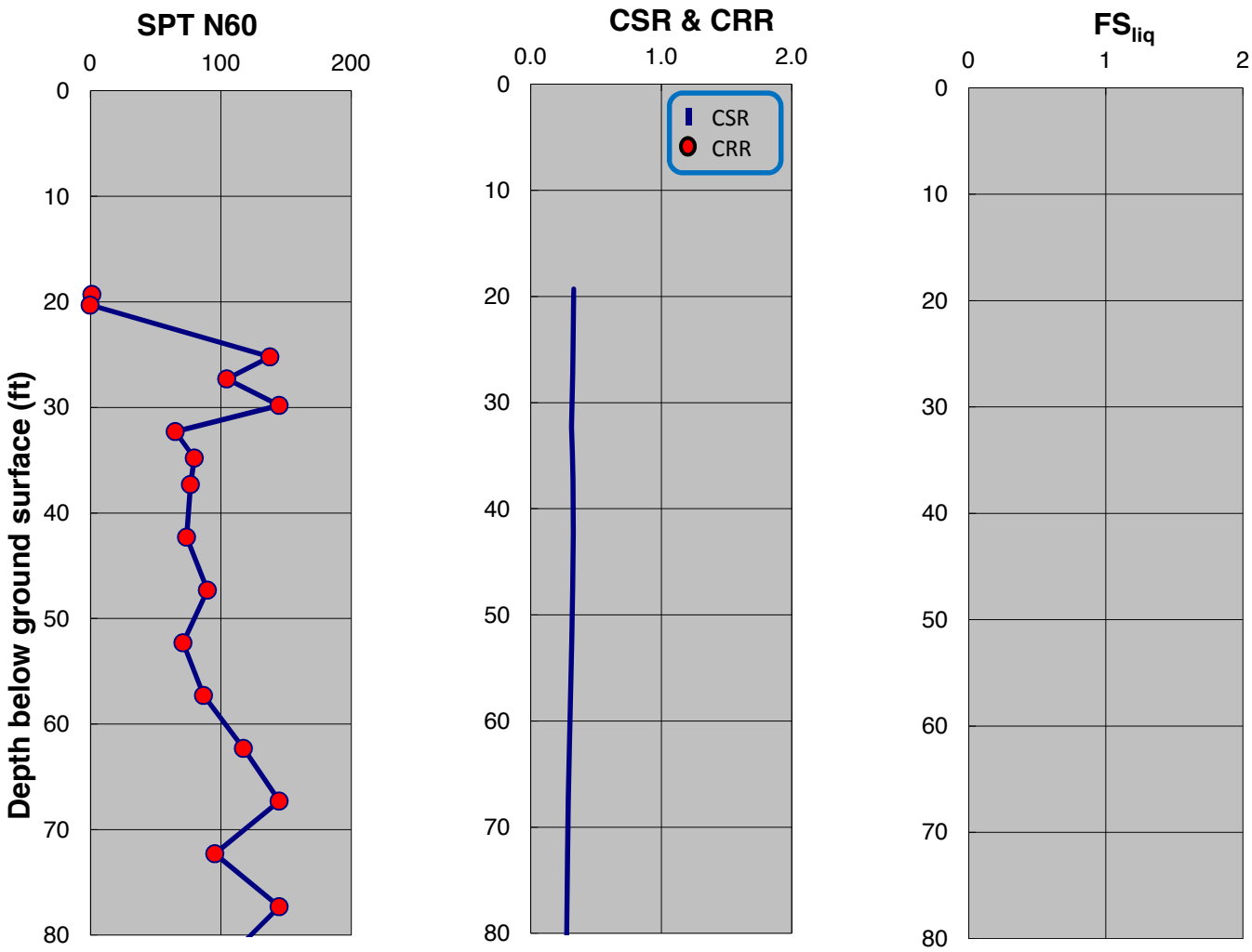
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-95 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



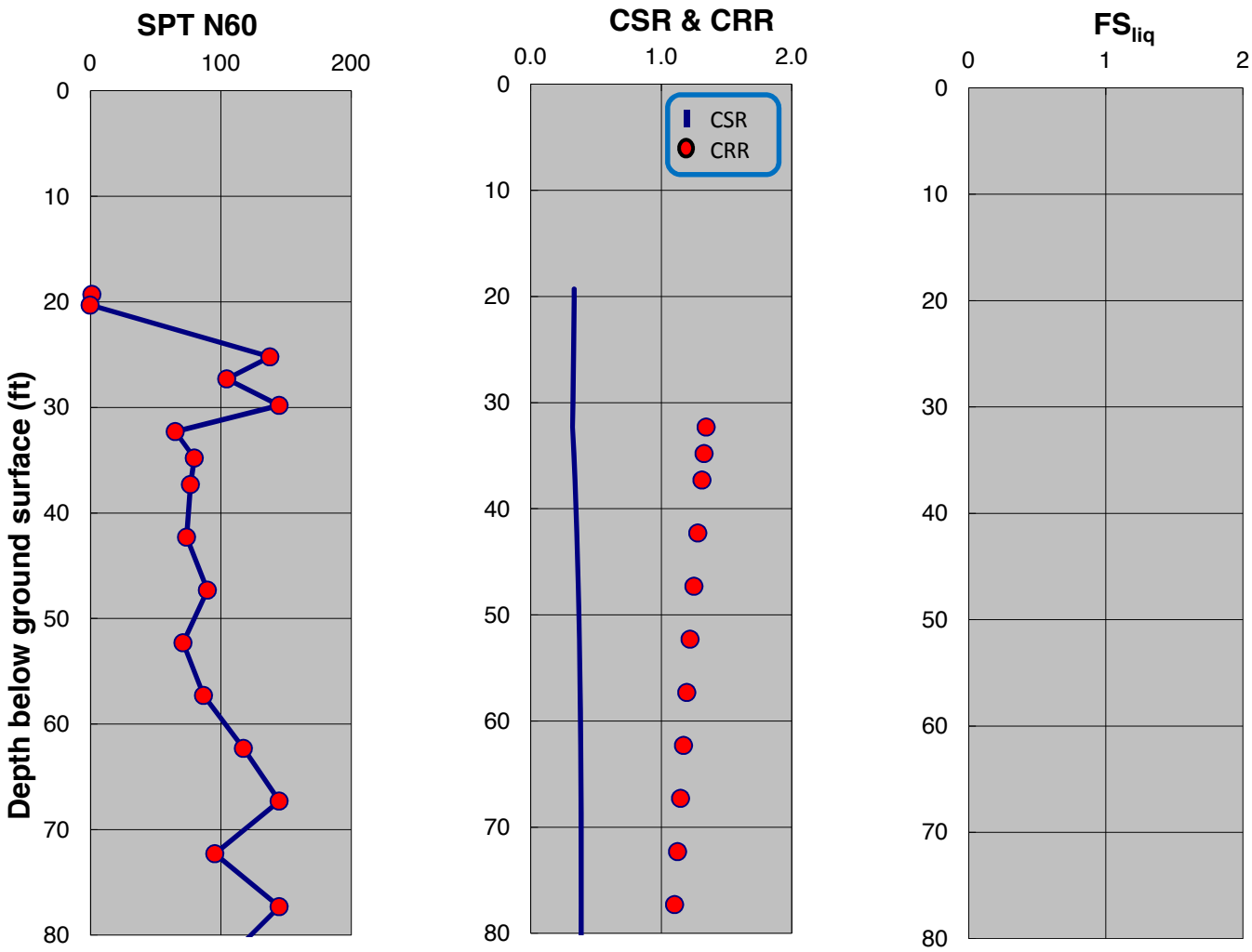
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-95 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



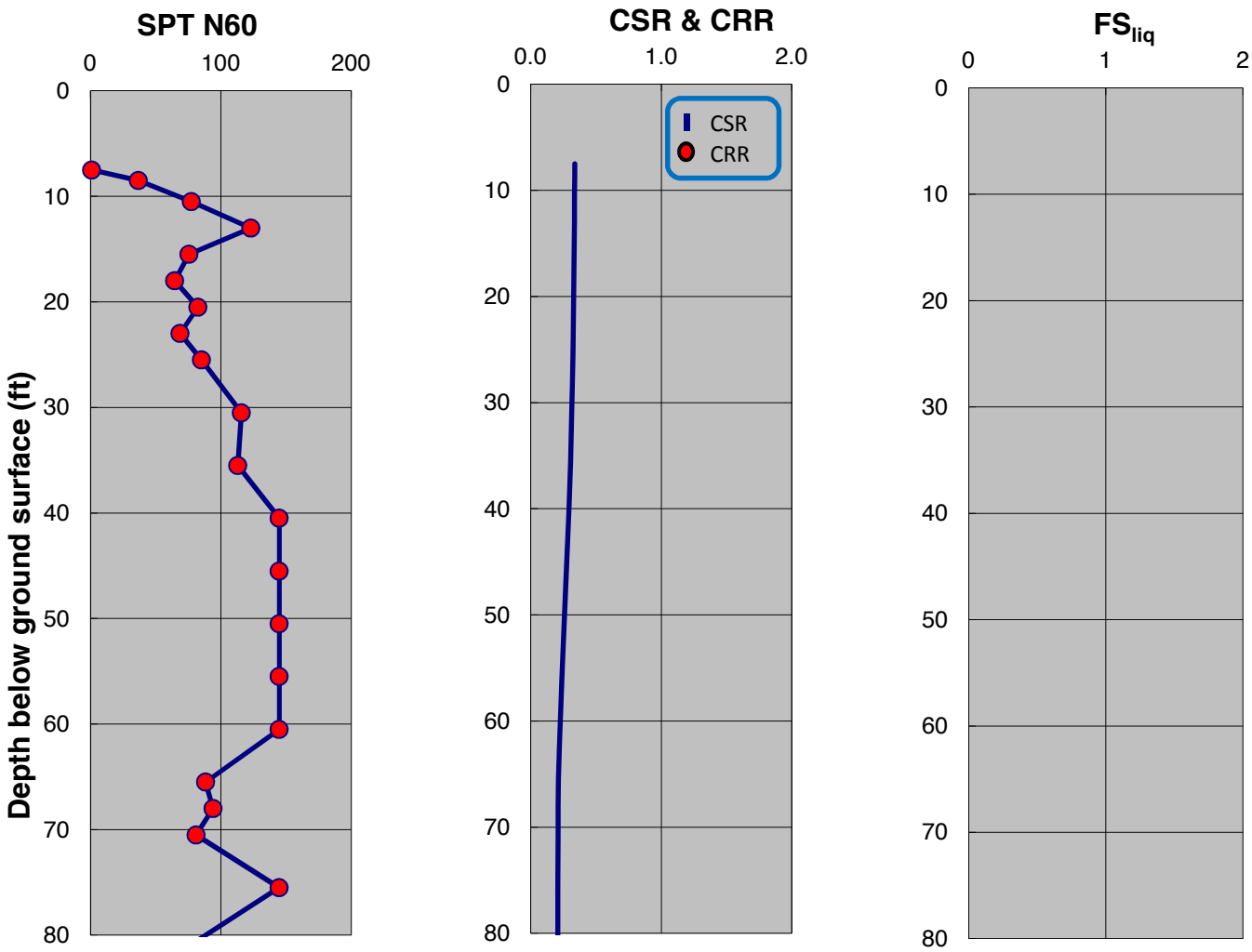
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-96 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



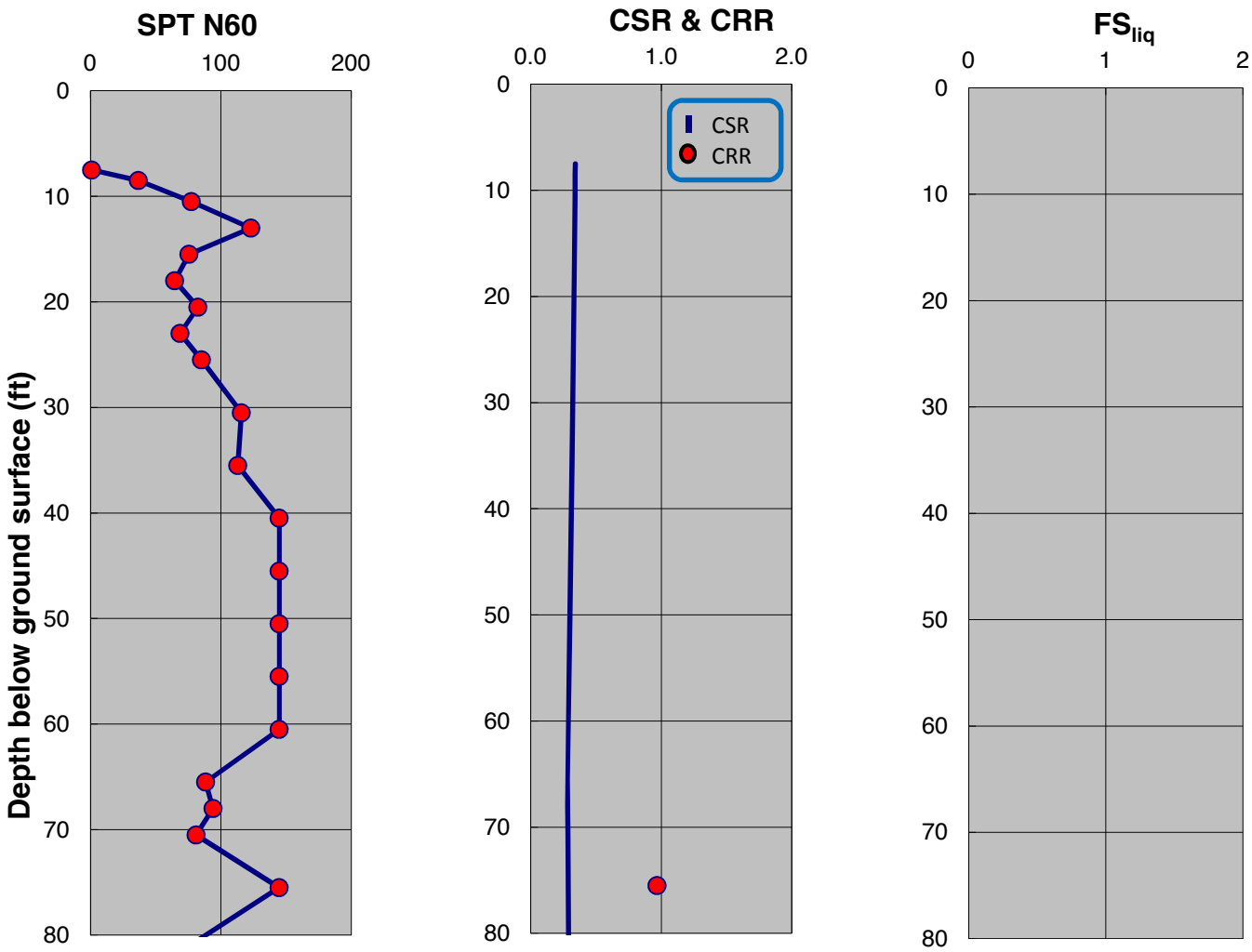
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-96 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



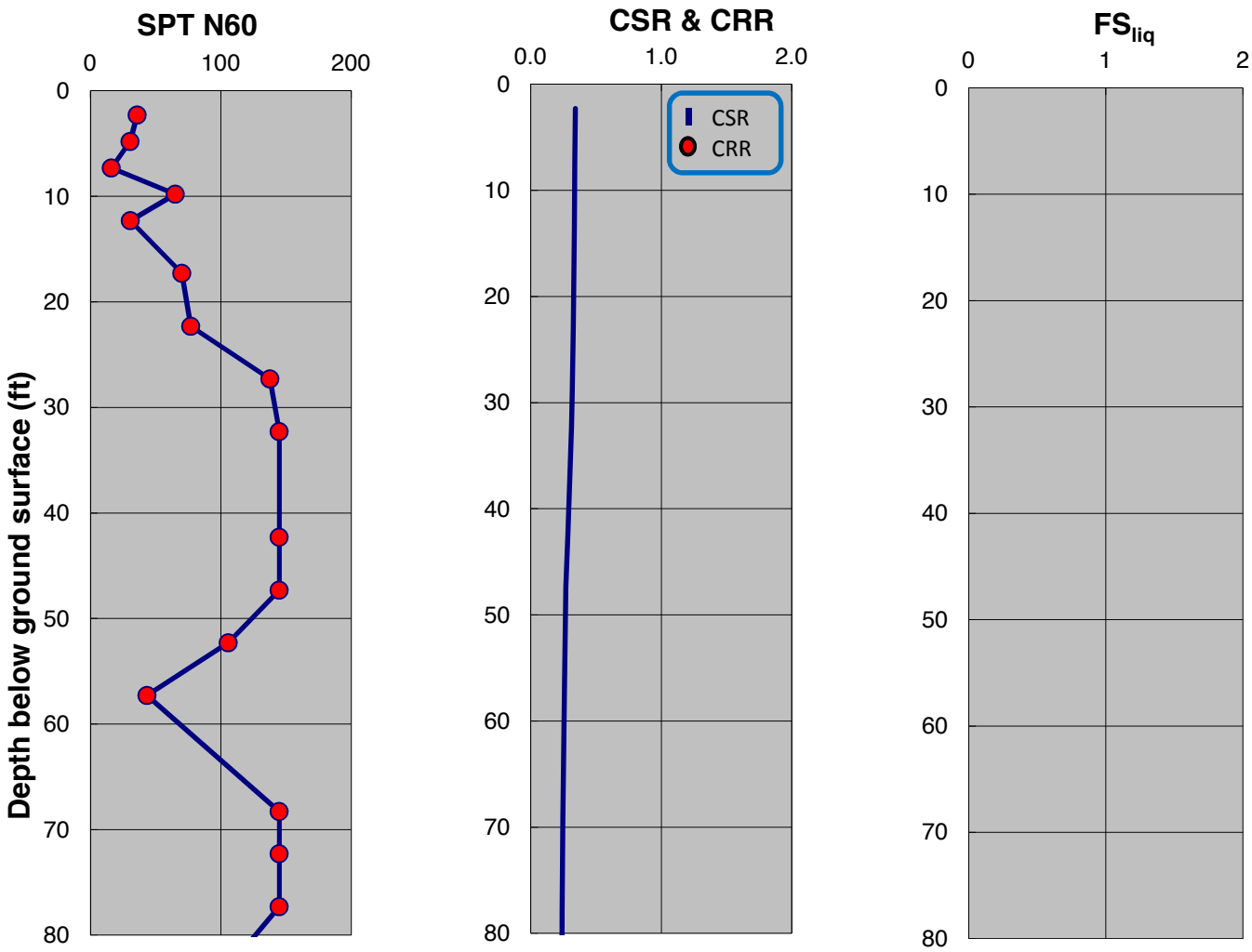
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-97 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



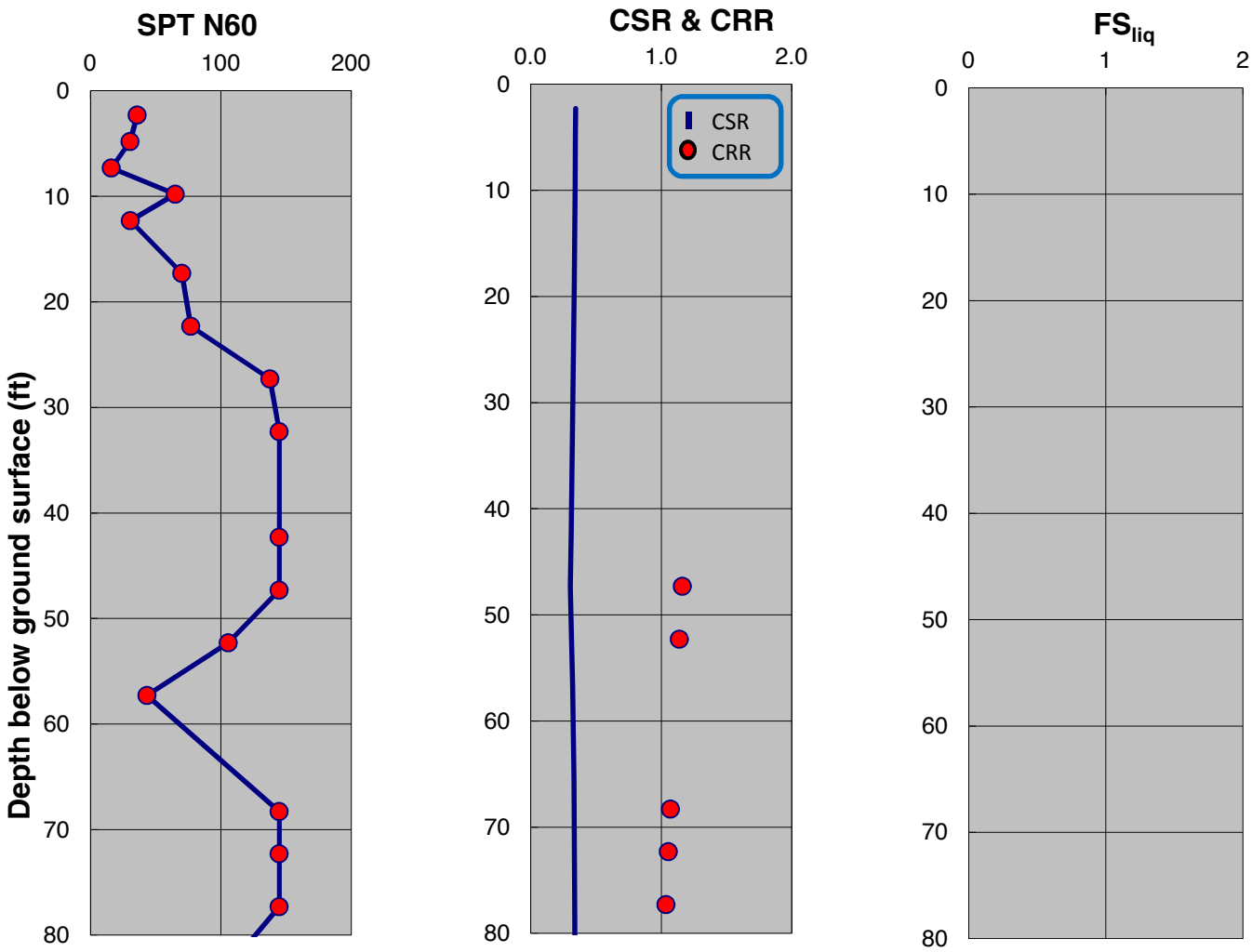
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-97 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



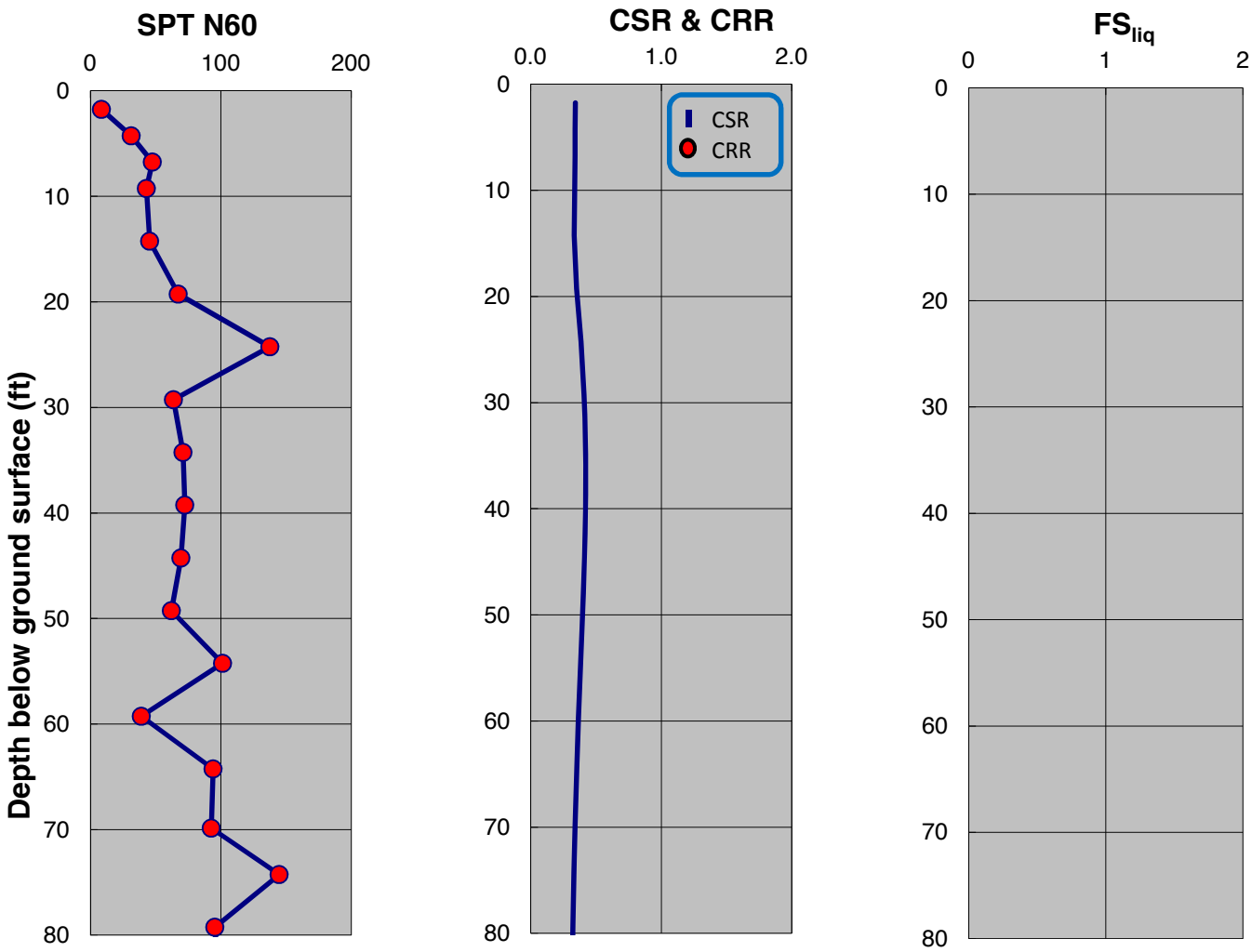
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-98 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



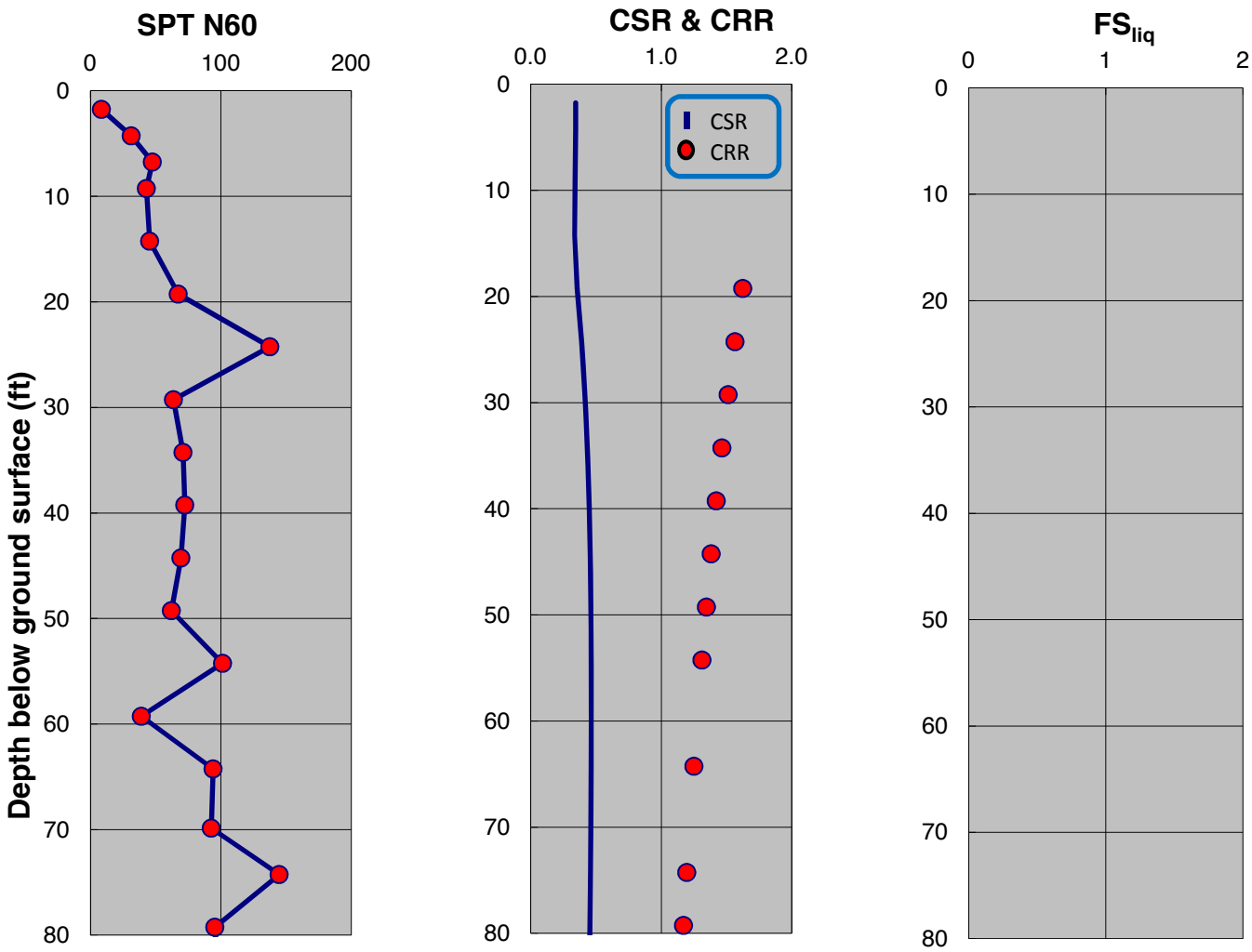
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-98 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



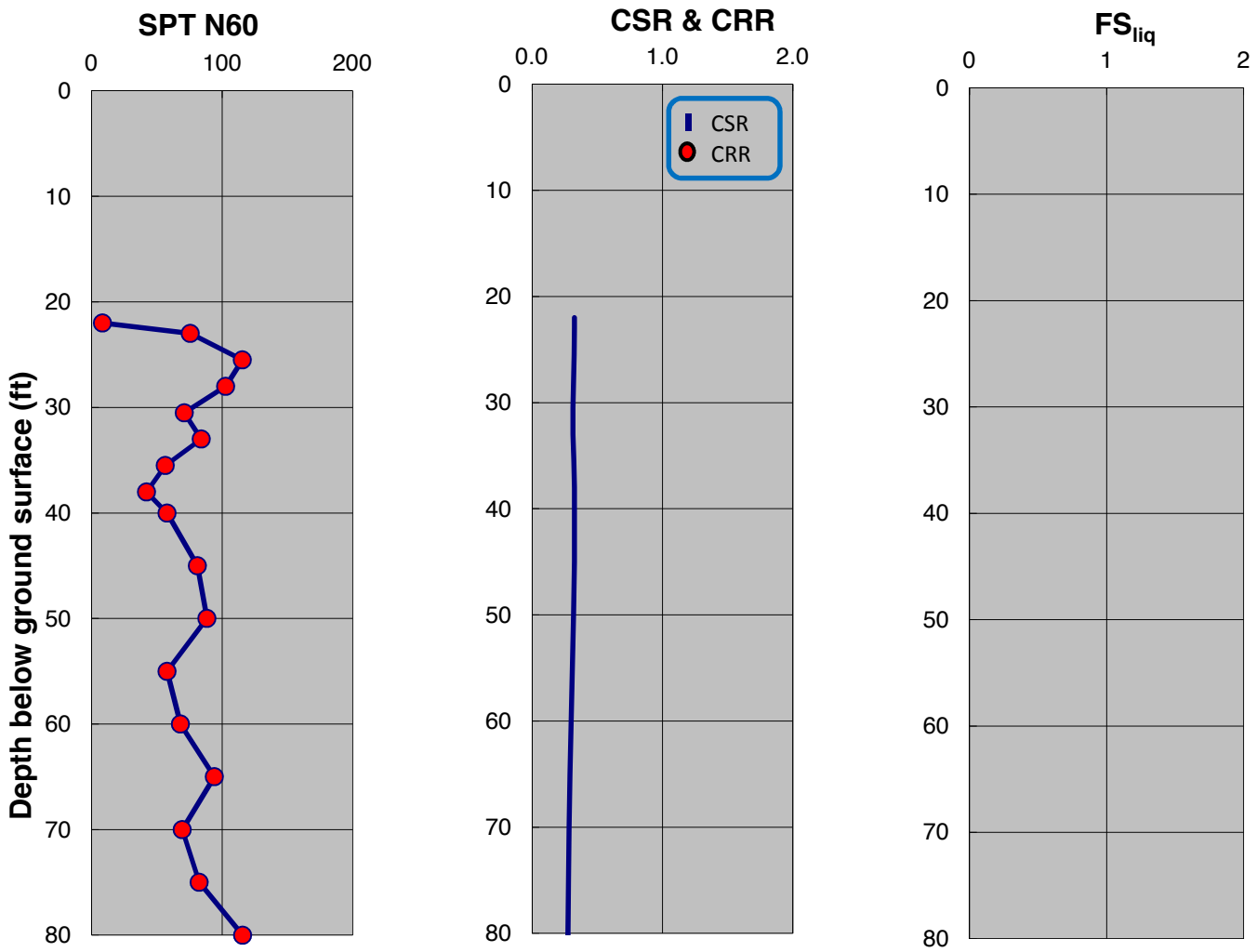
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-99 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



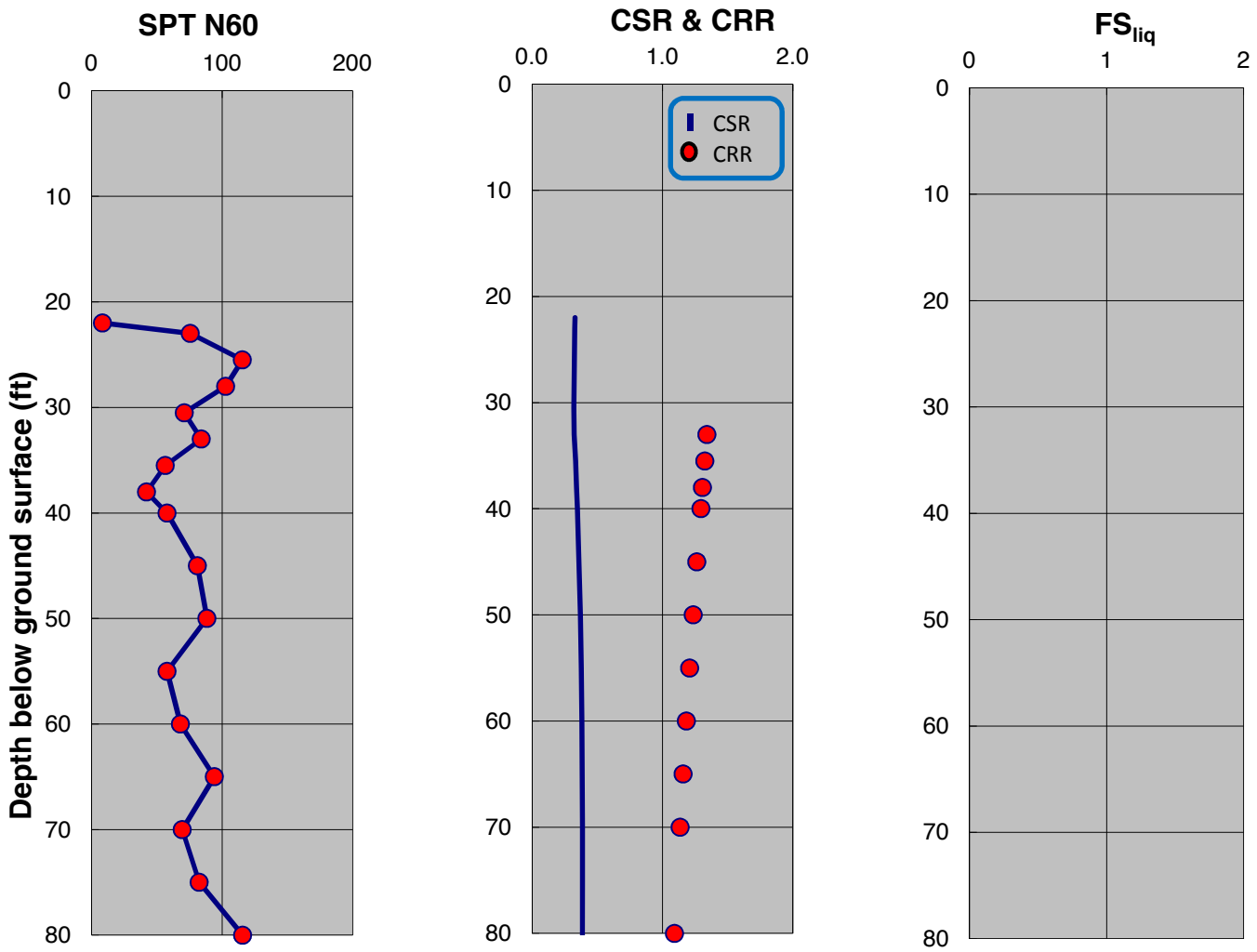
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-99 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



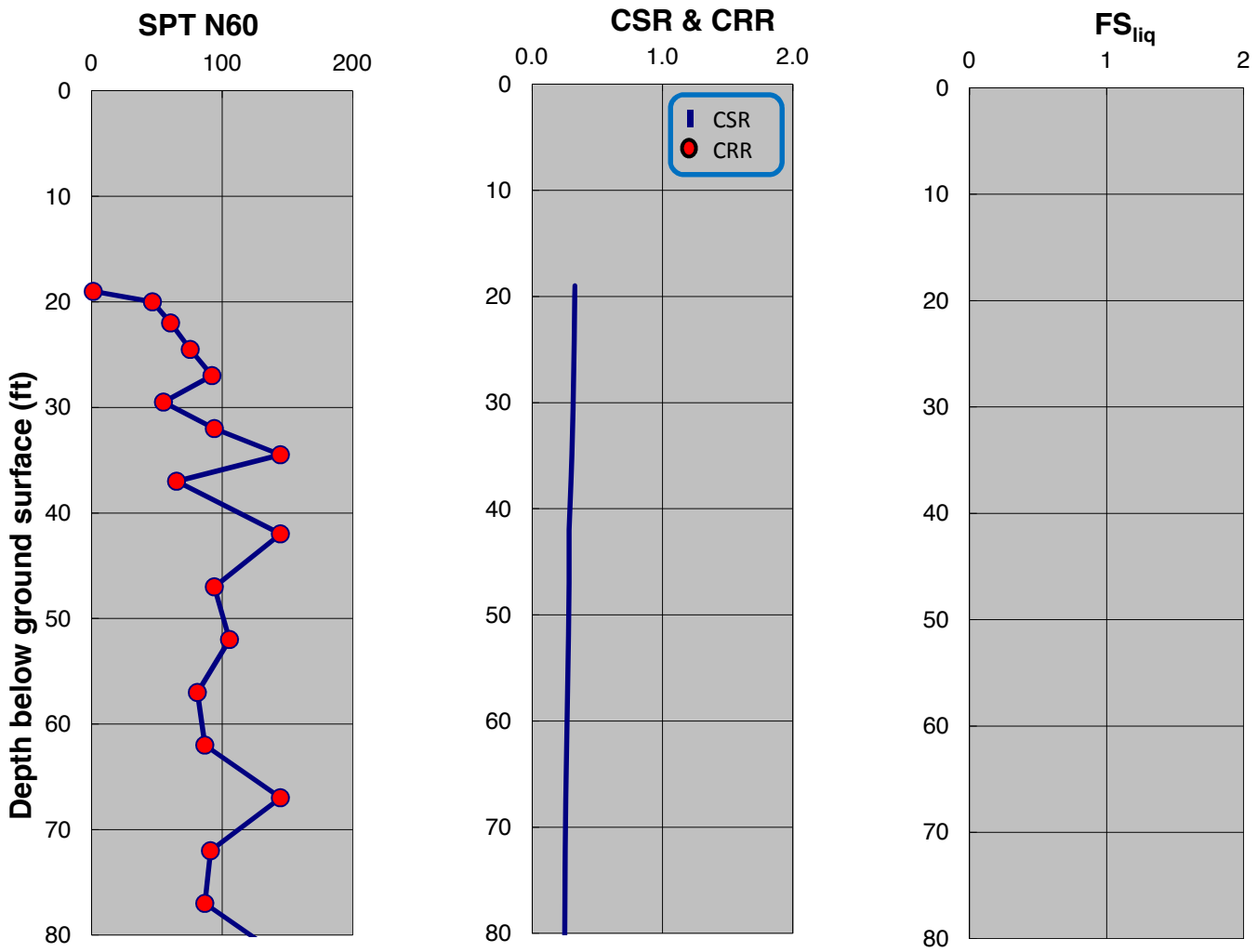
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-101 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



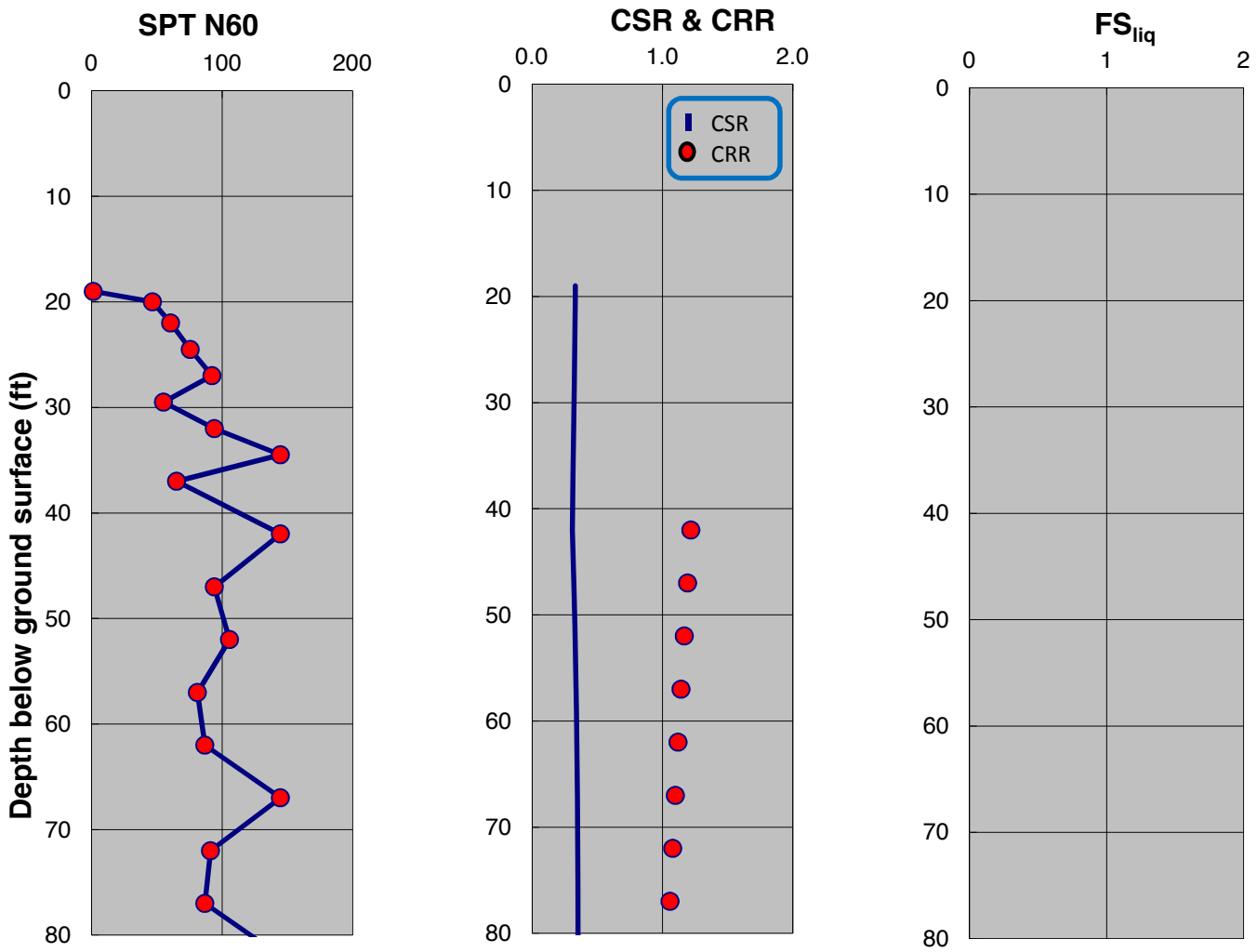
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-101 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



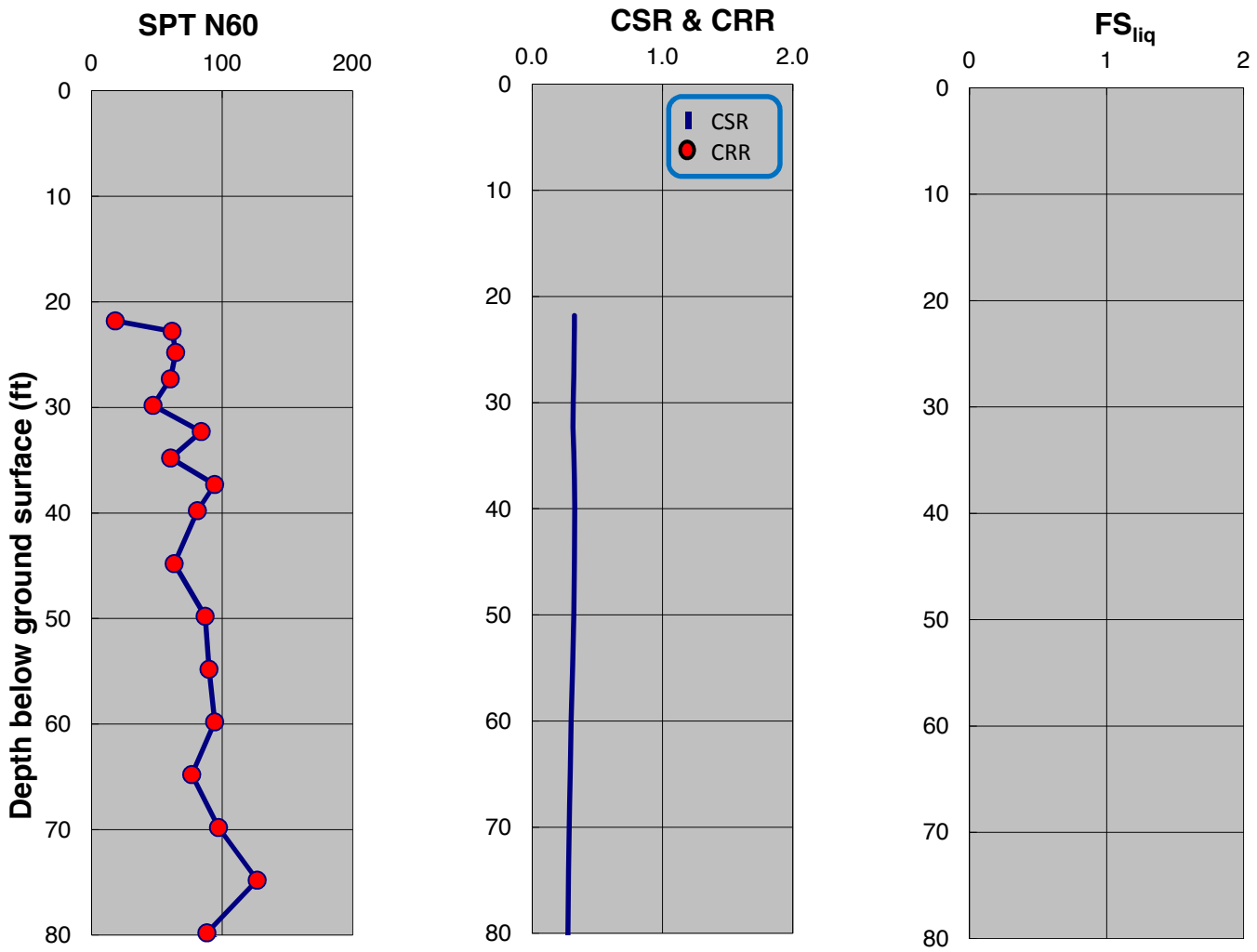
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-102 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



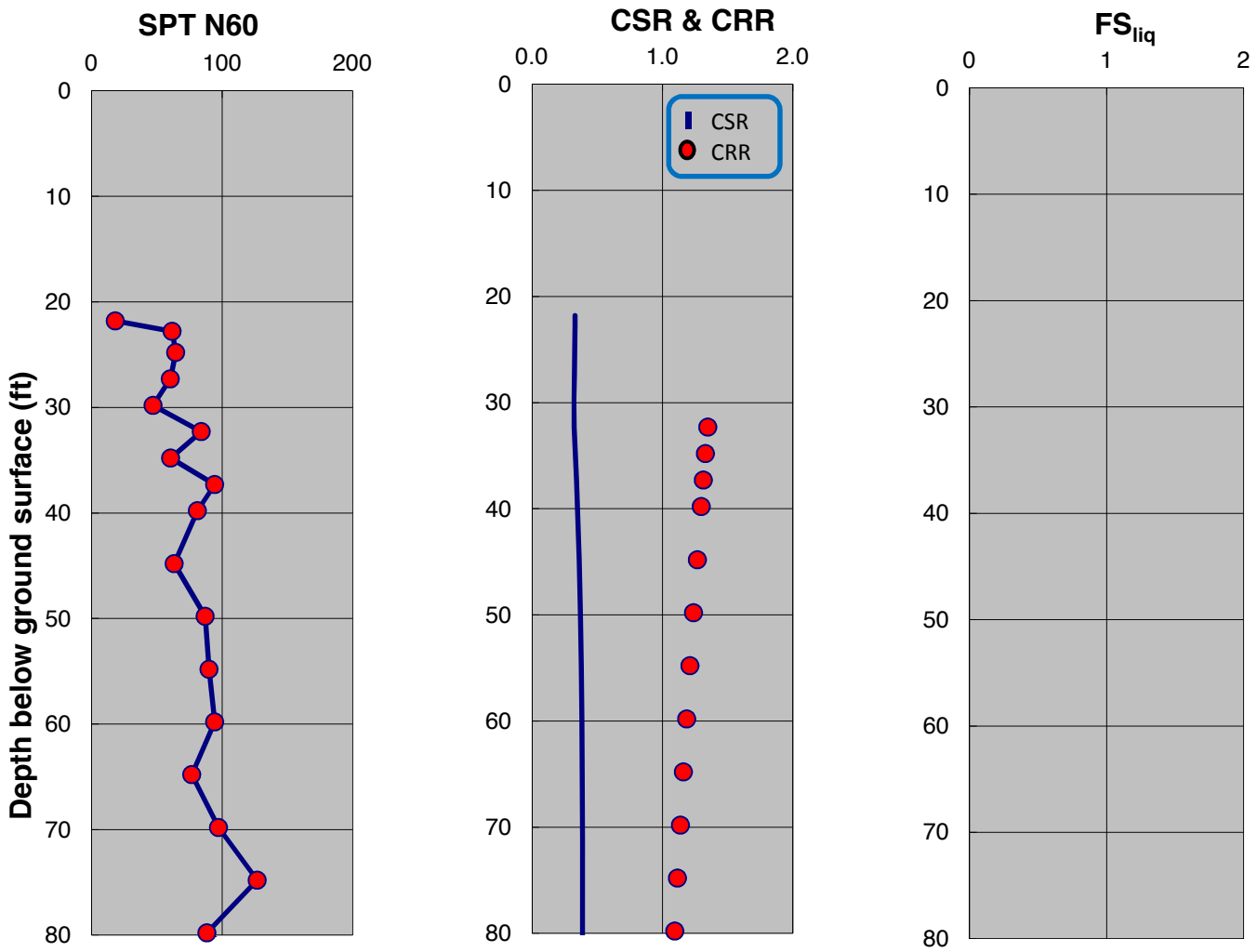
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-102 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



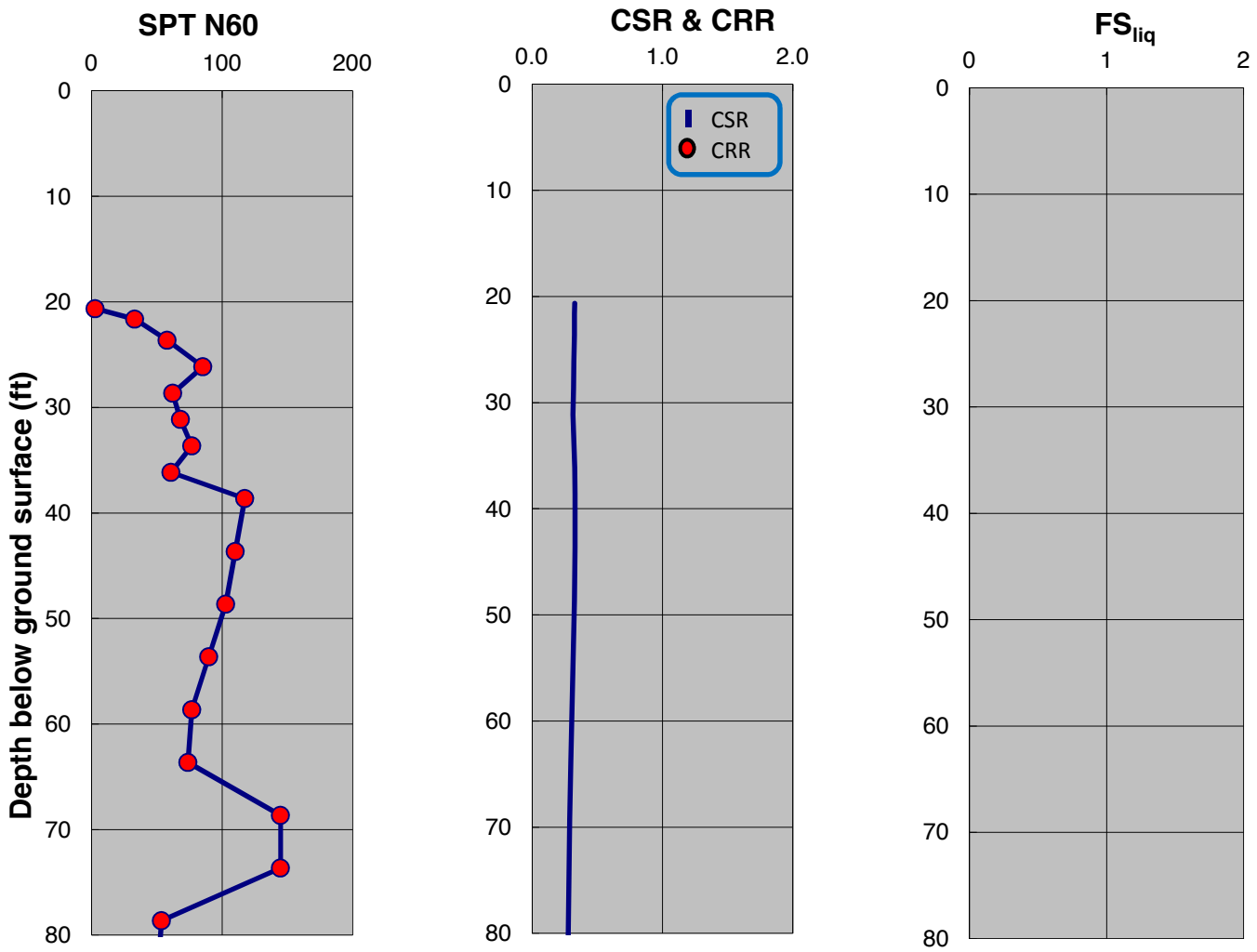
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-104 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



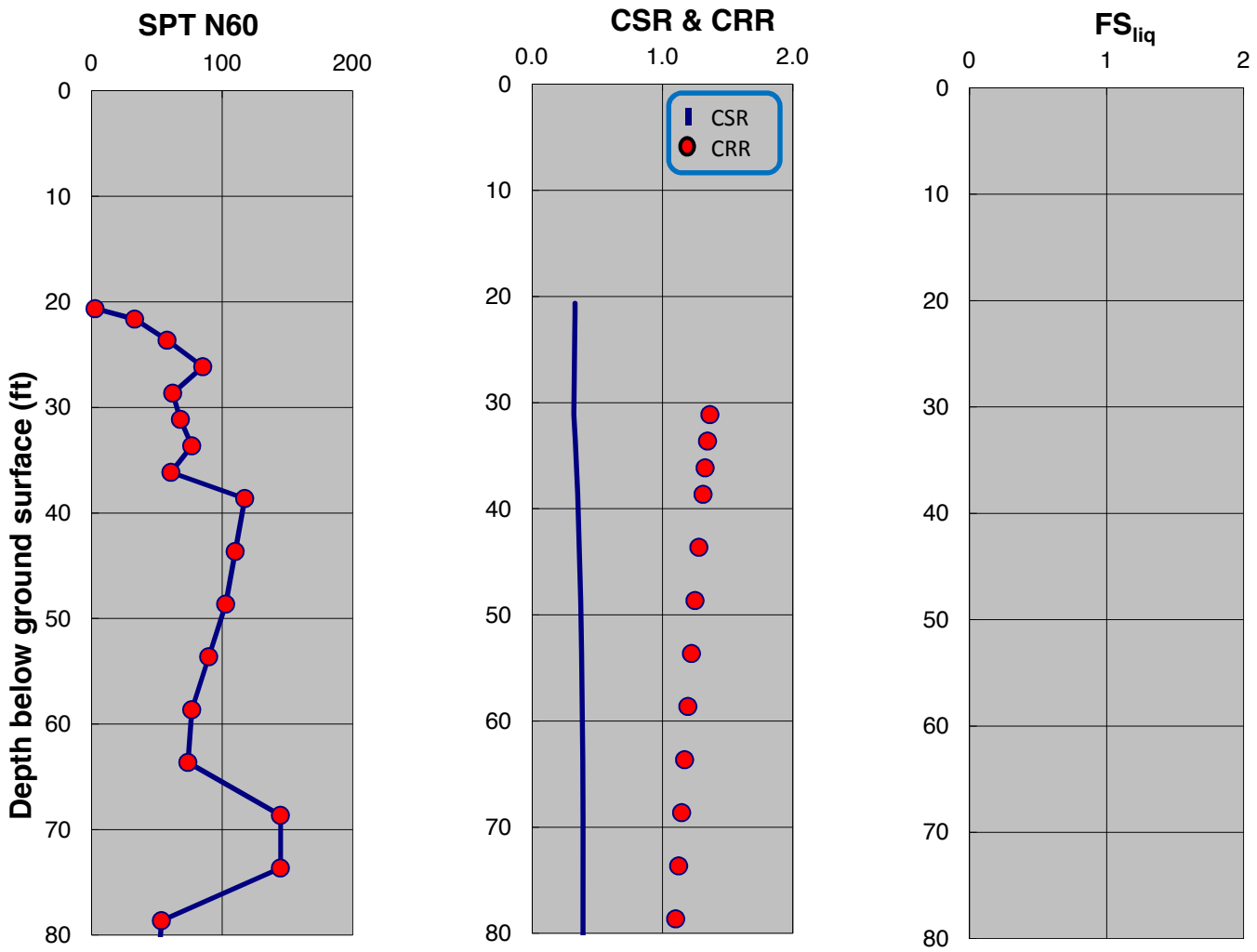
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-104 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



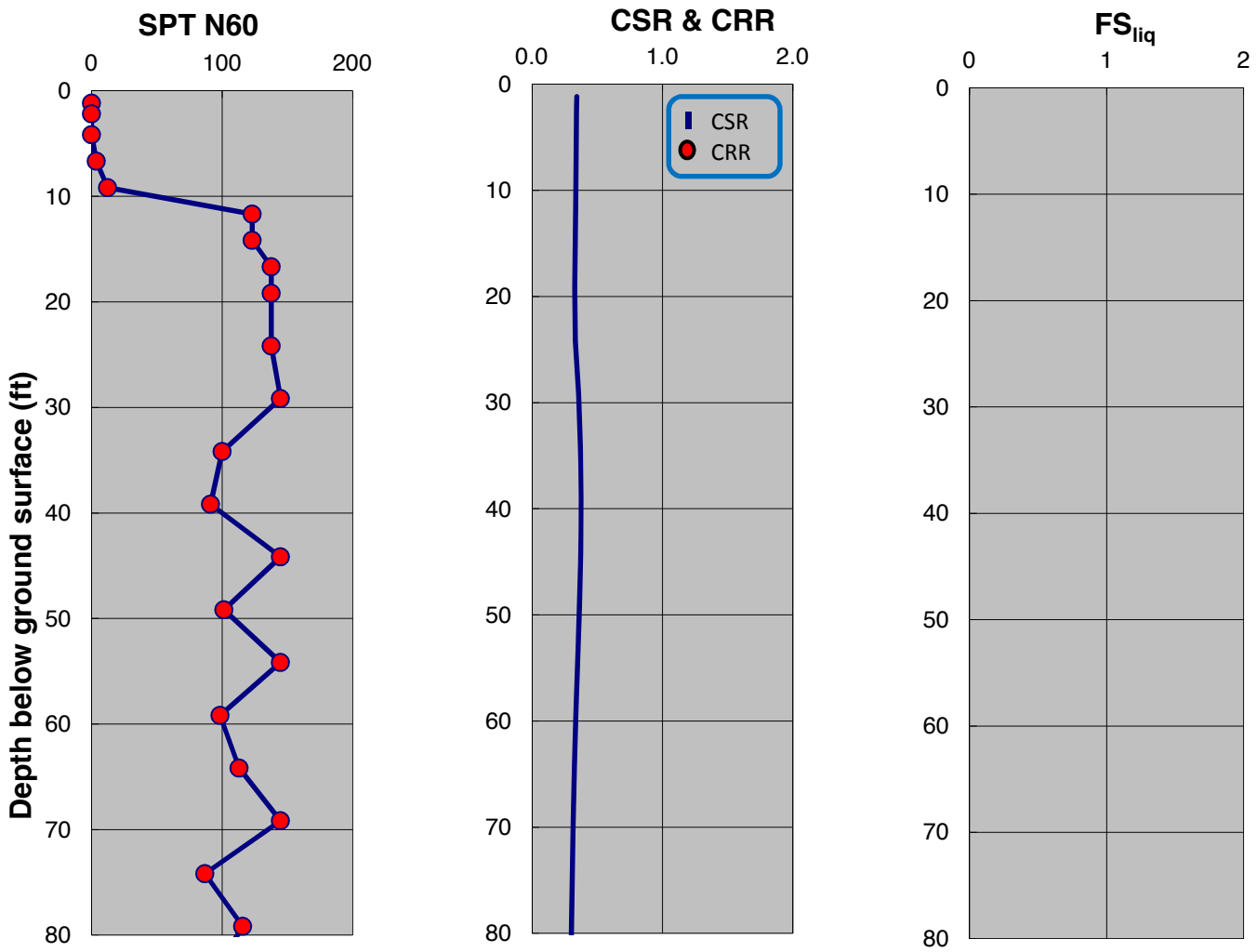
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-105 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



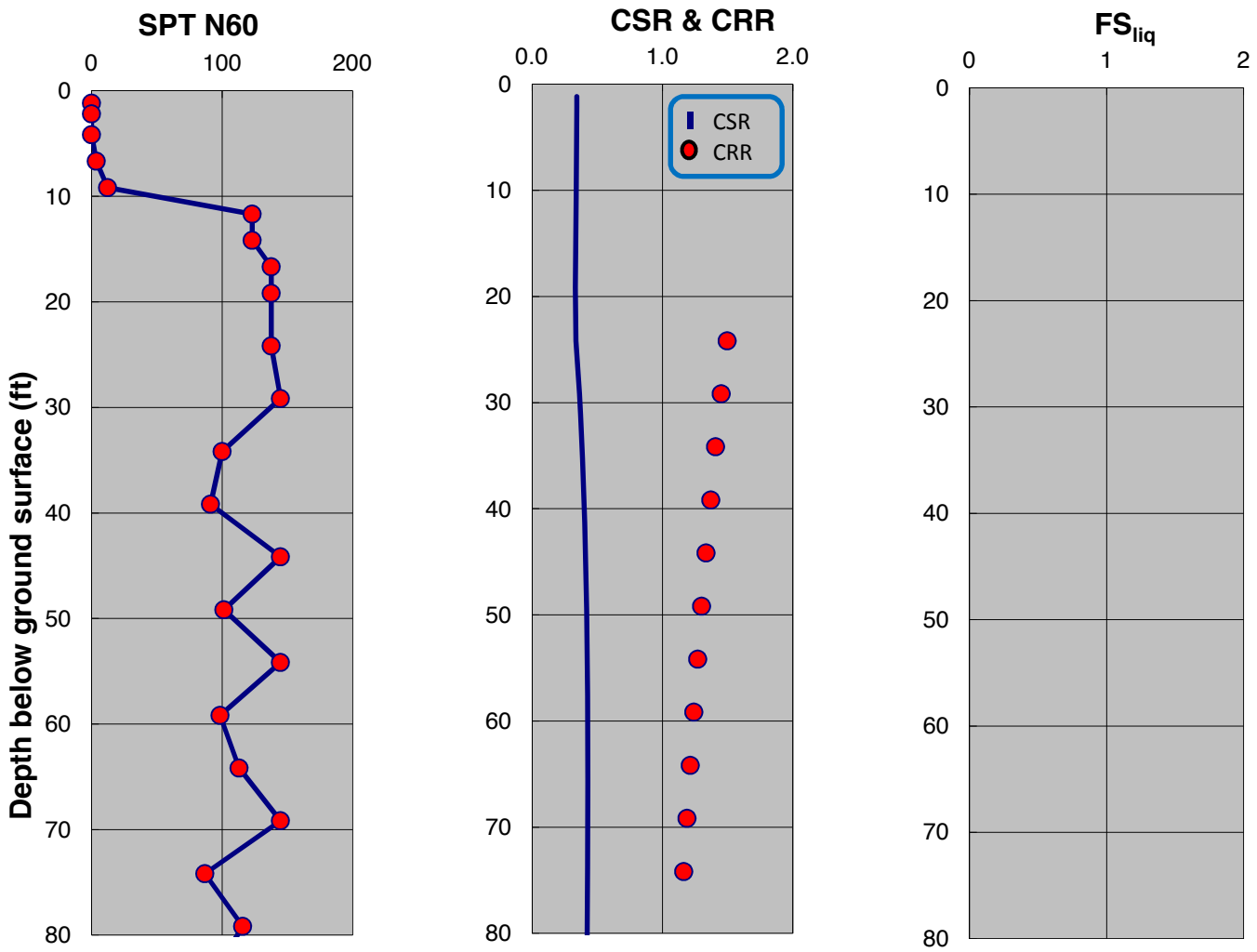
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-105 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



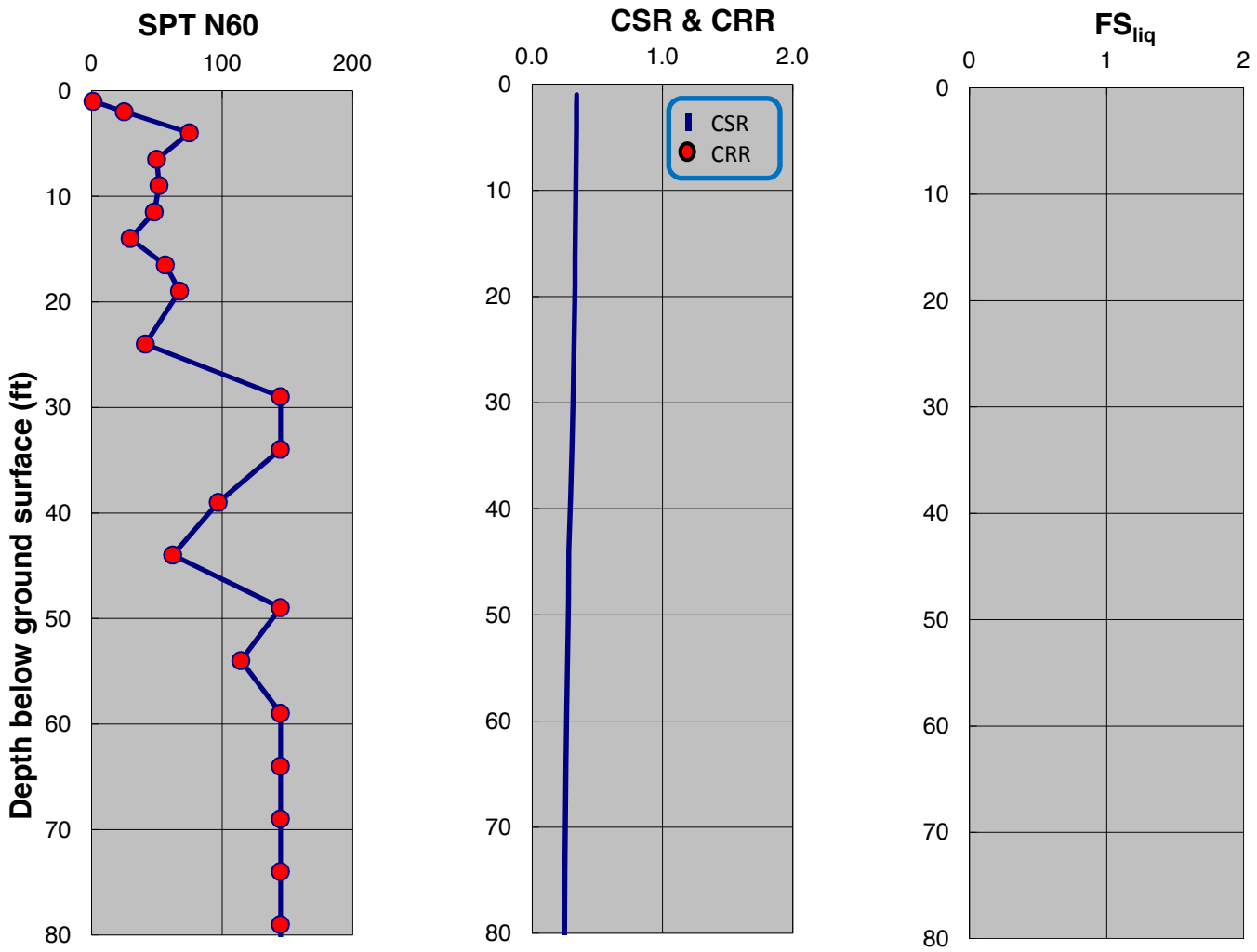
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-107 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



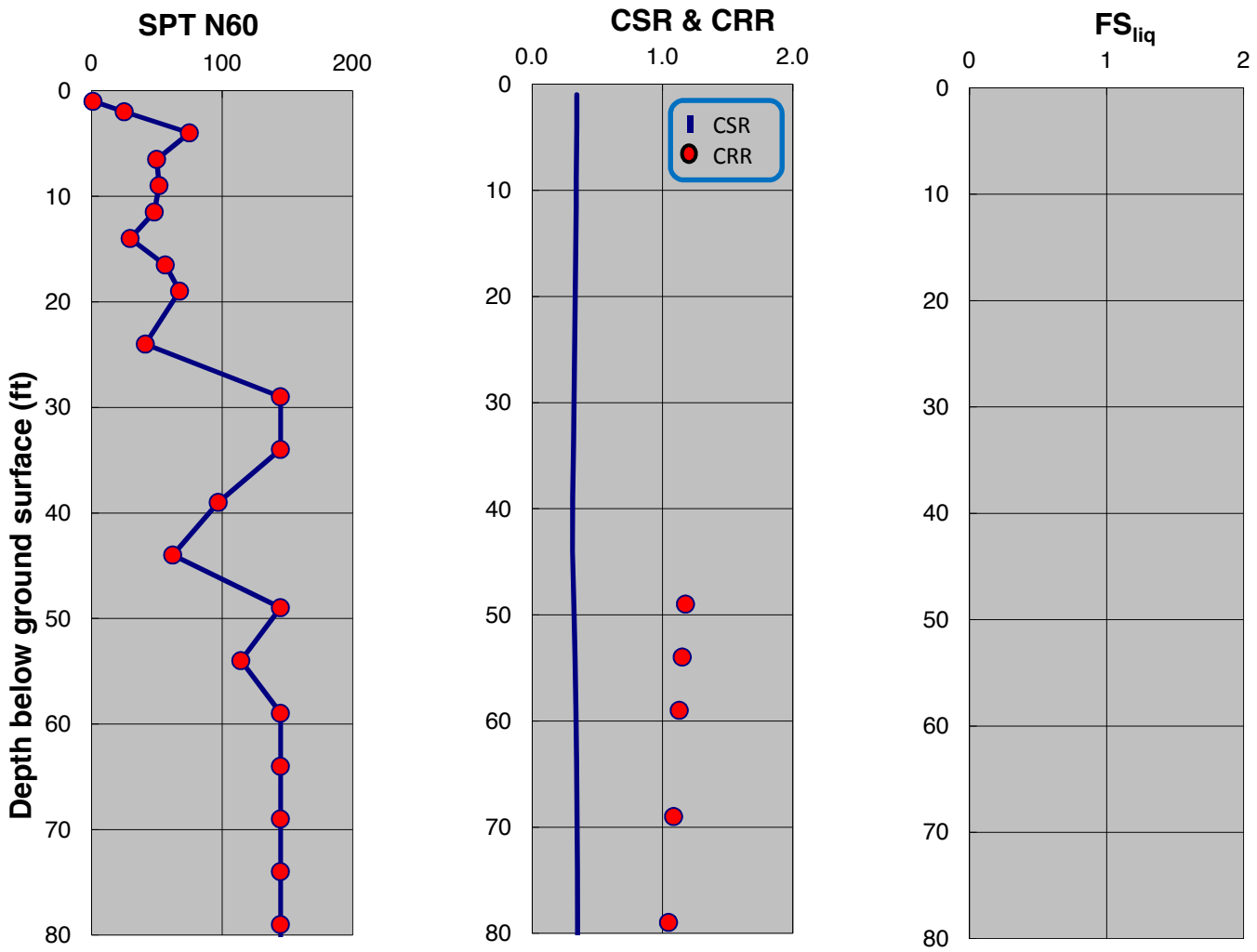
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-107 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



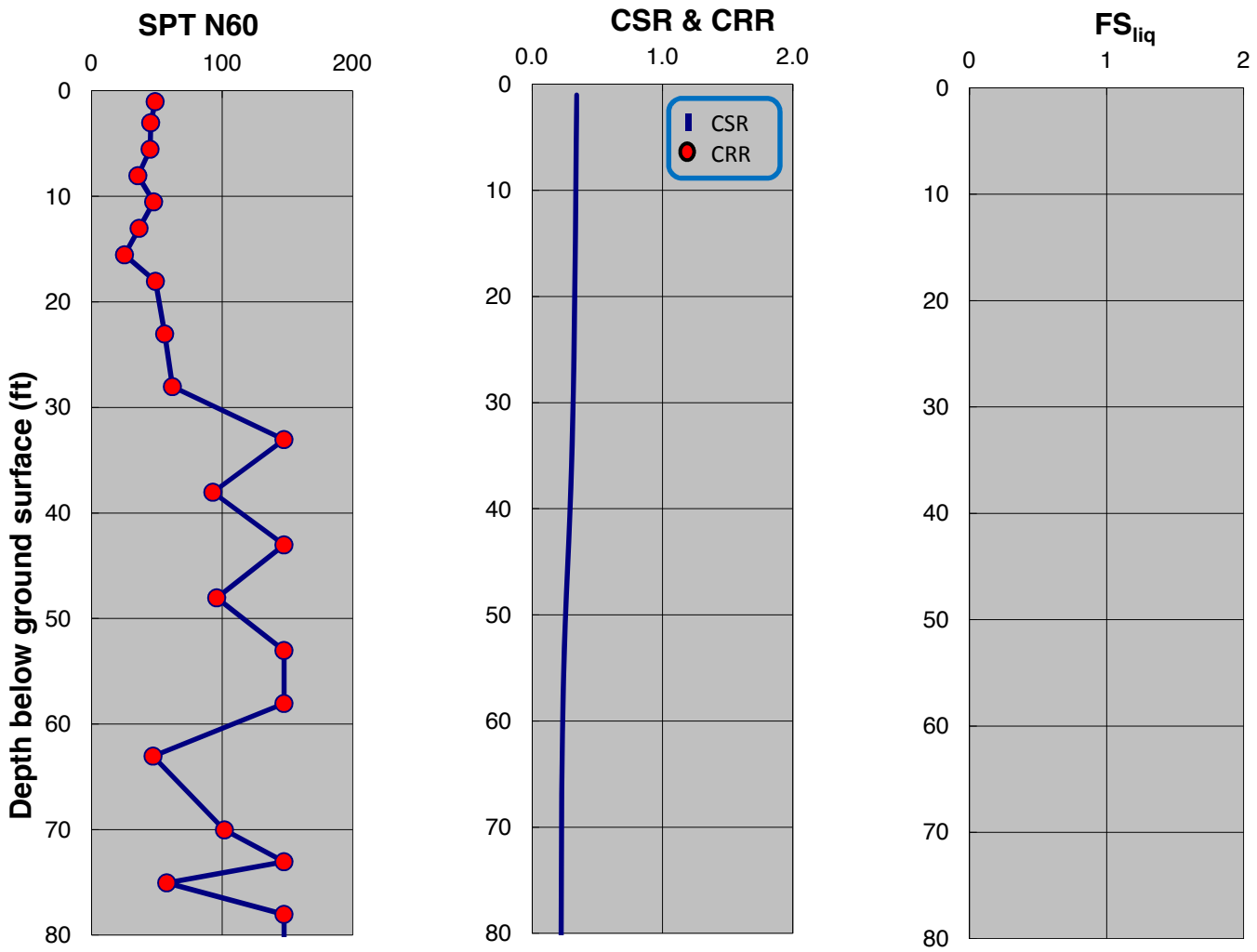
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-110 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



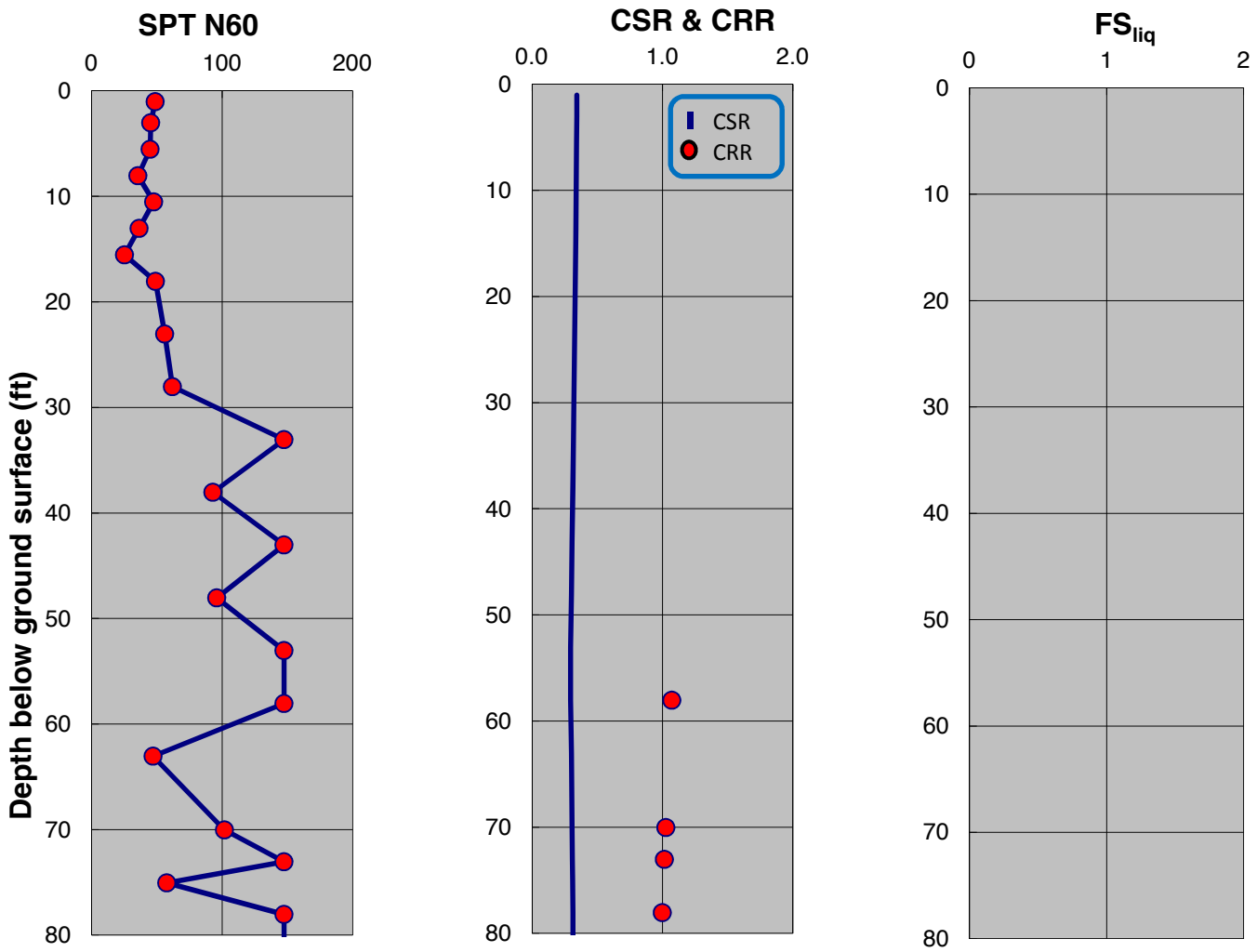
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-110 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



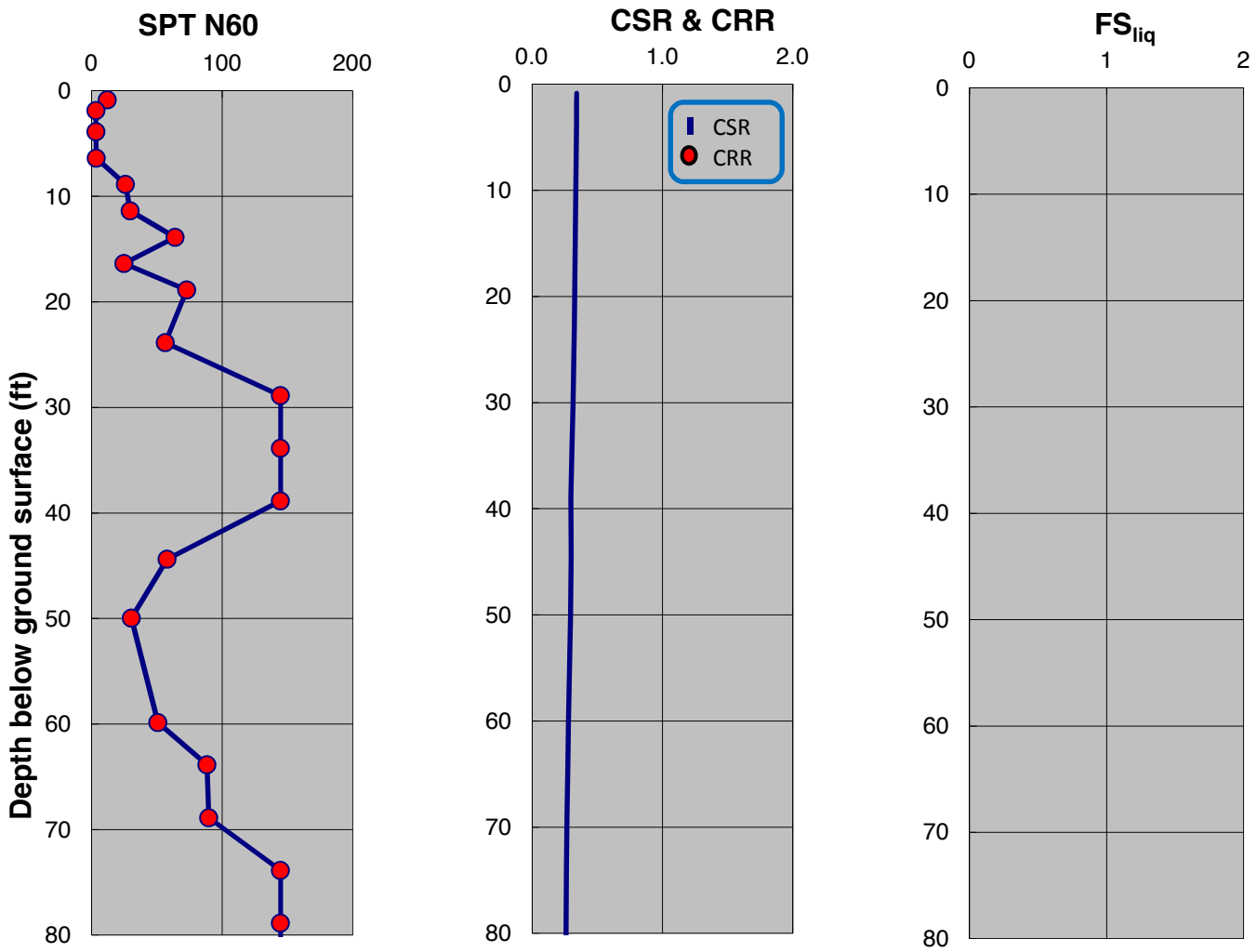
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-112 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



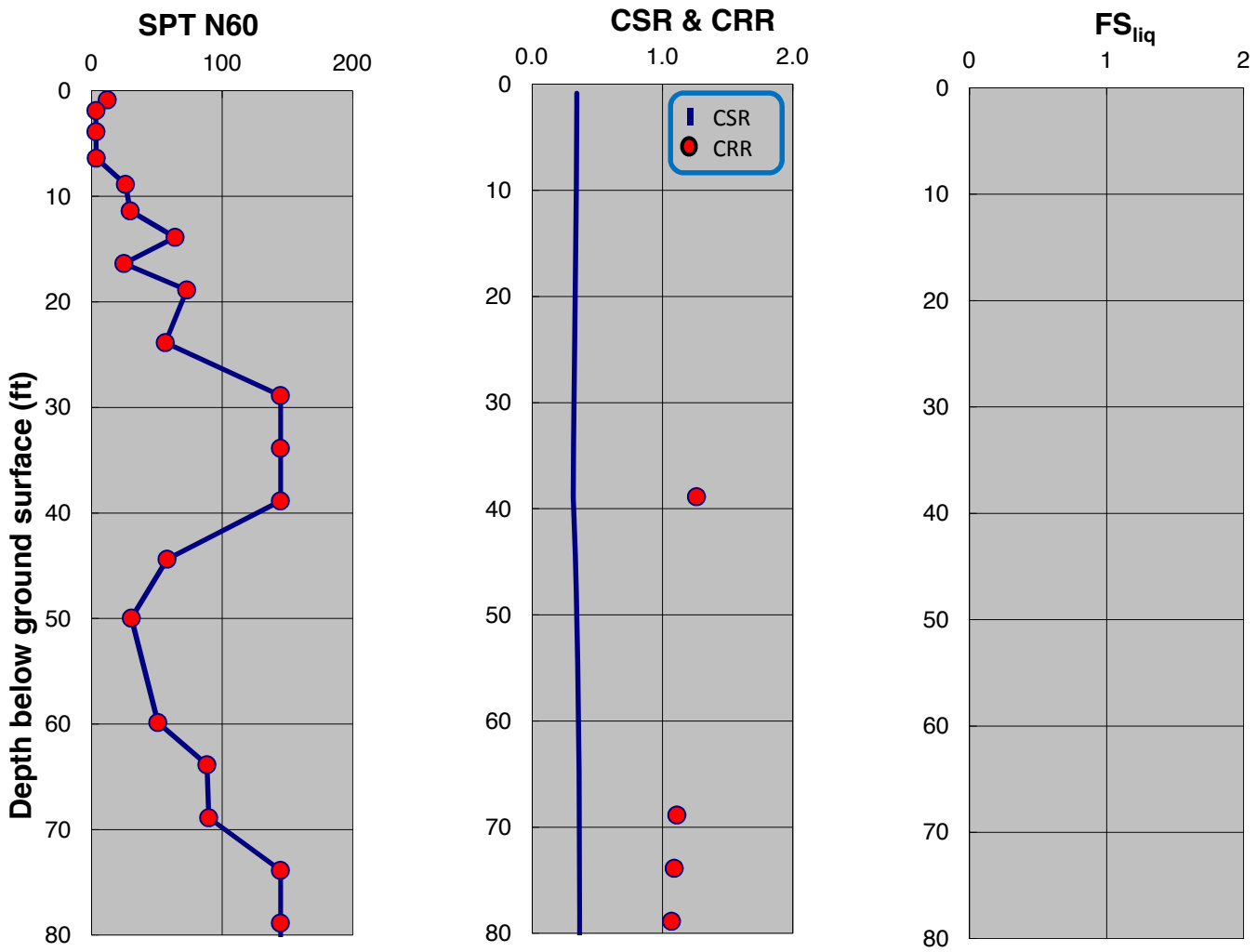
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-112 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



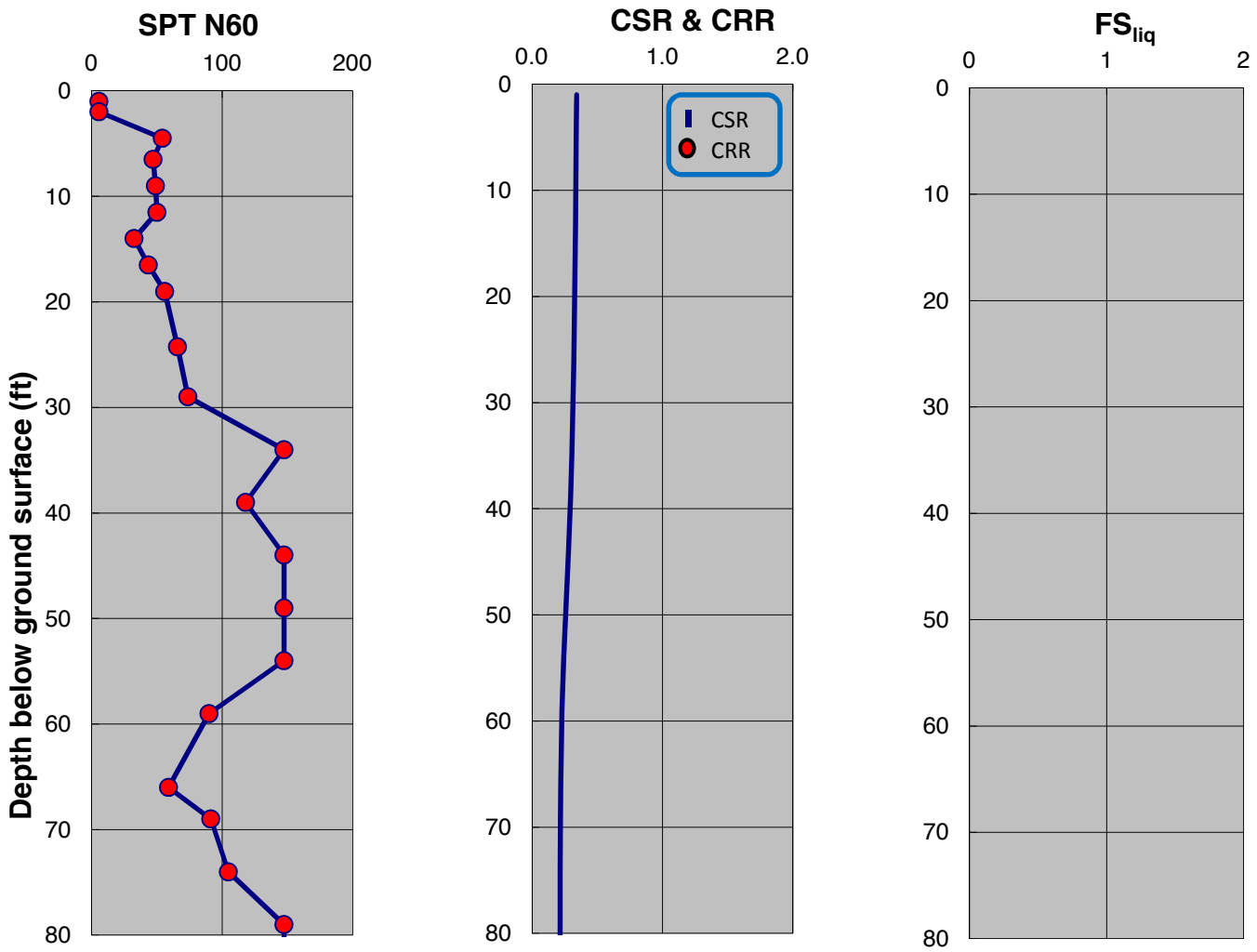
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-113 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



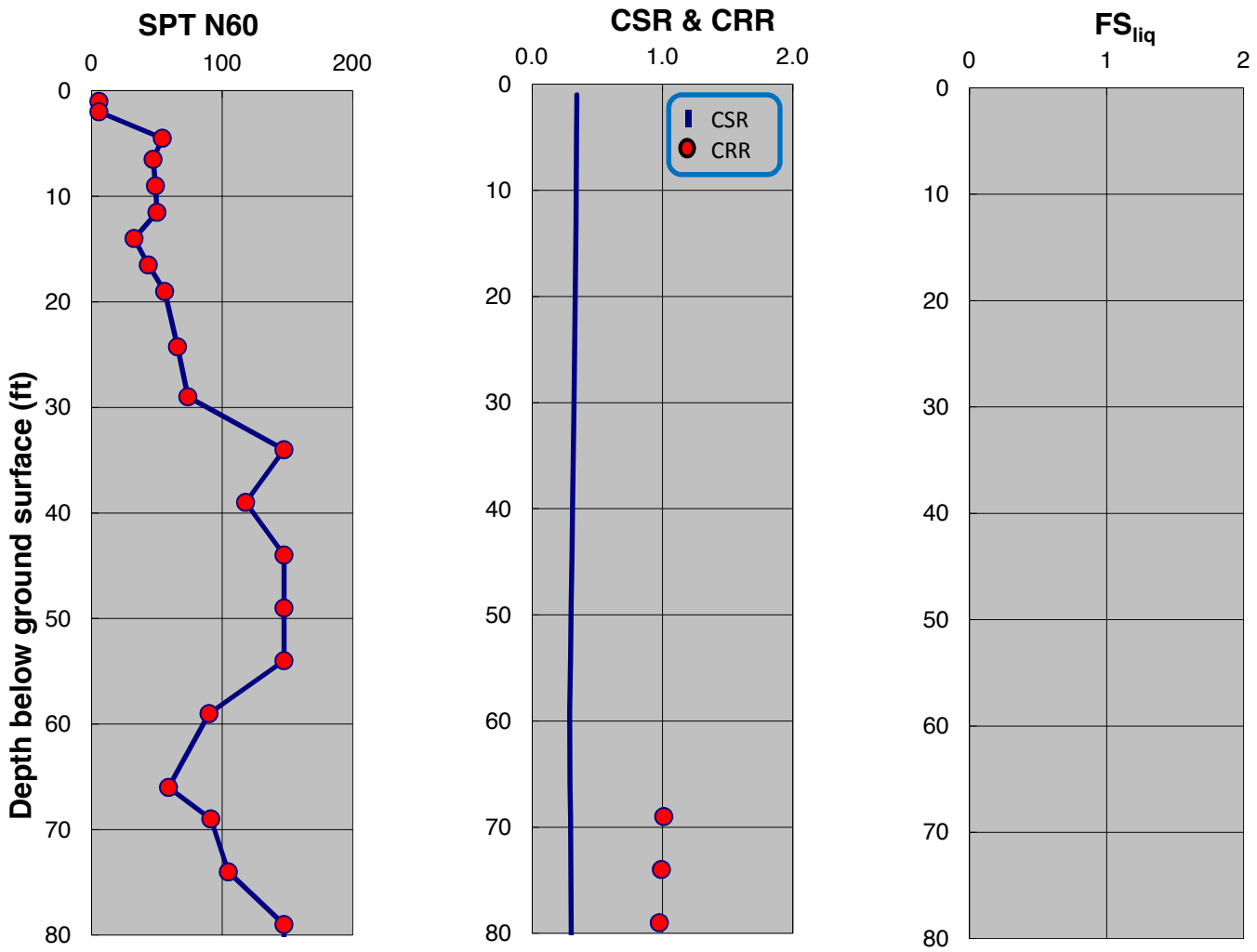
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-113 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



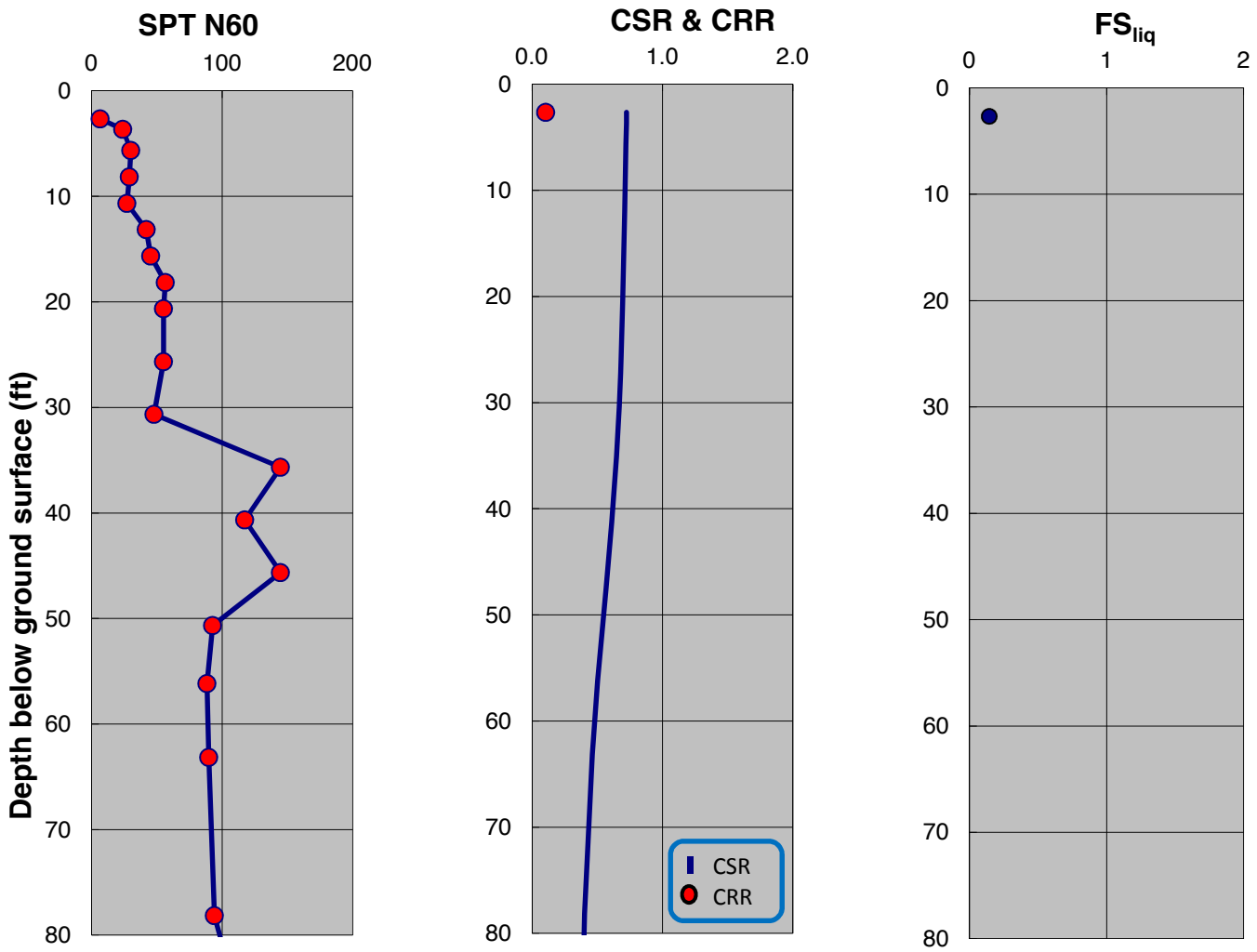
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-114 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



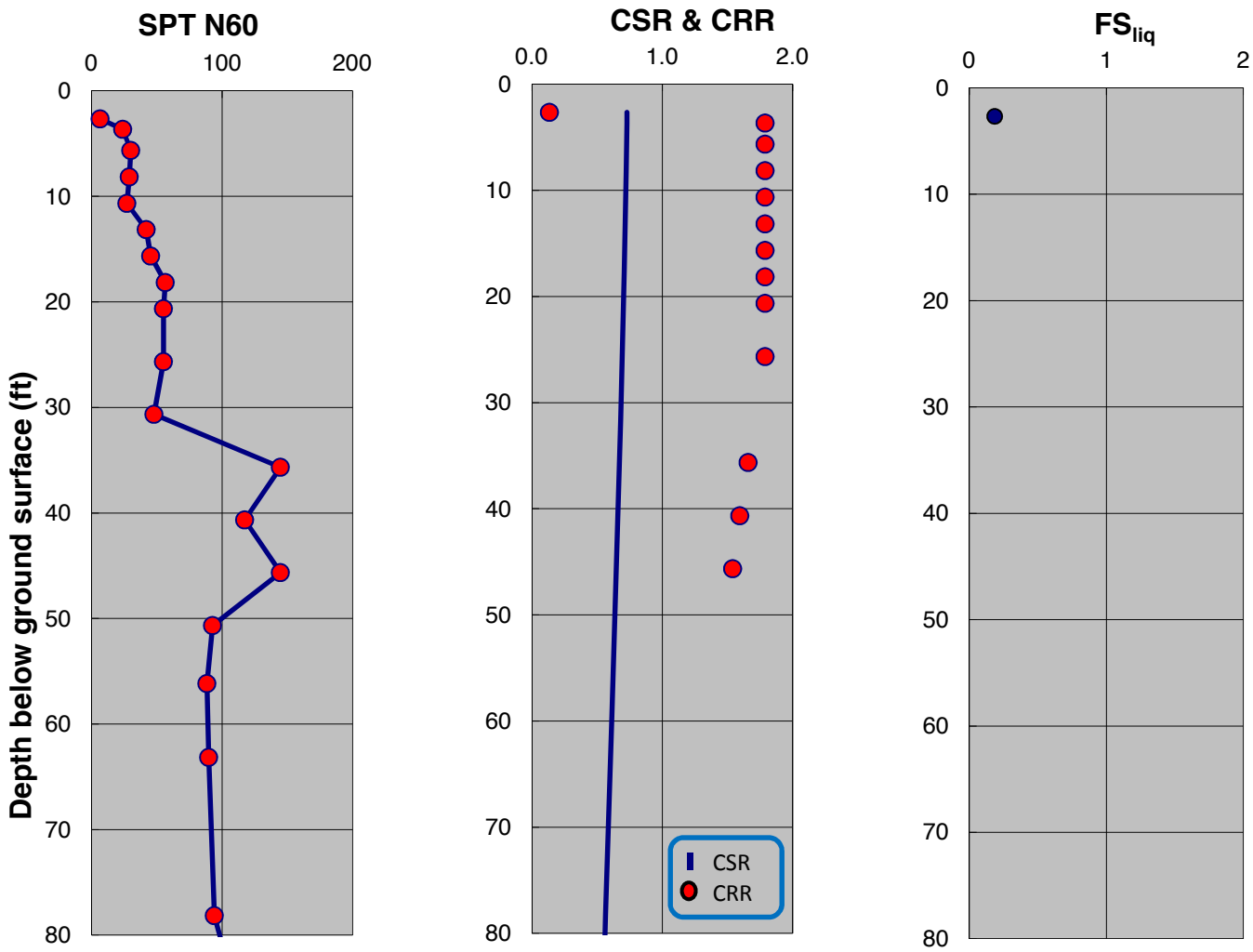
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-114 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



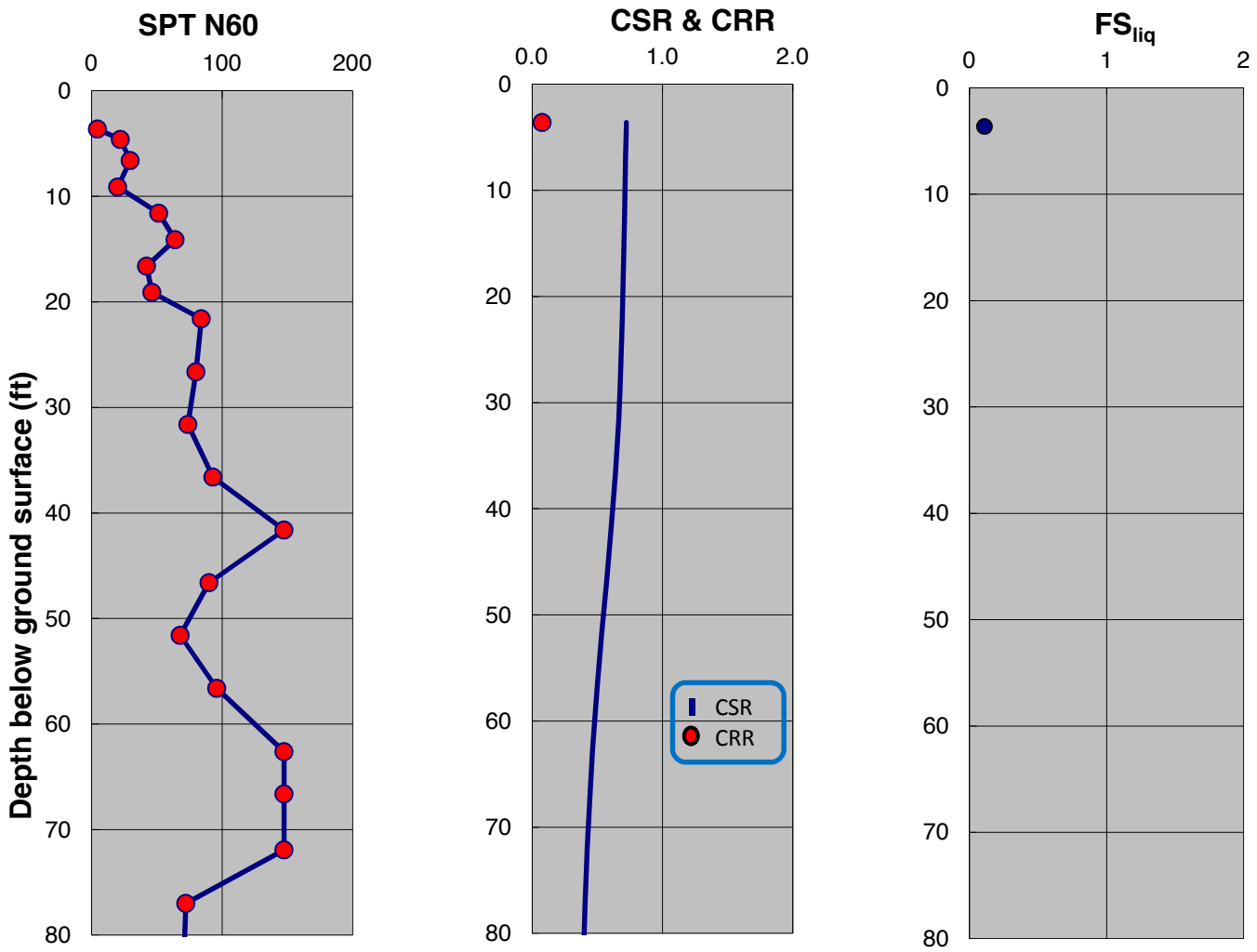
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-117 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



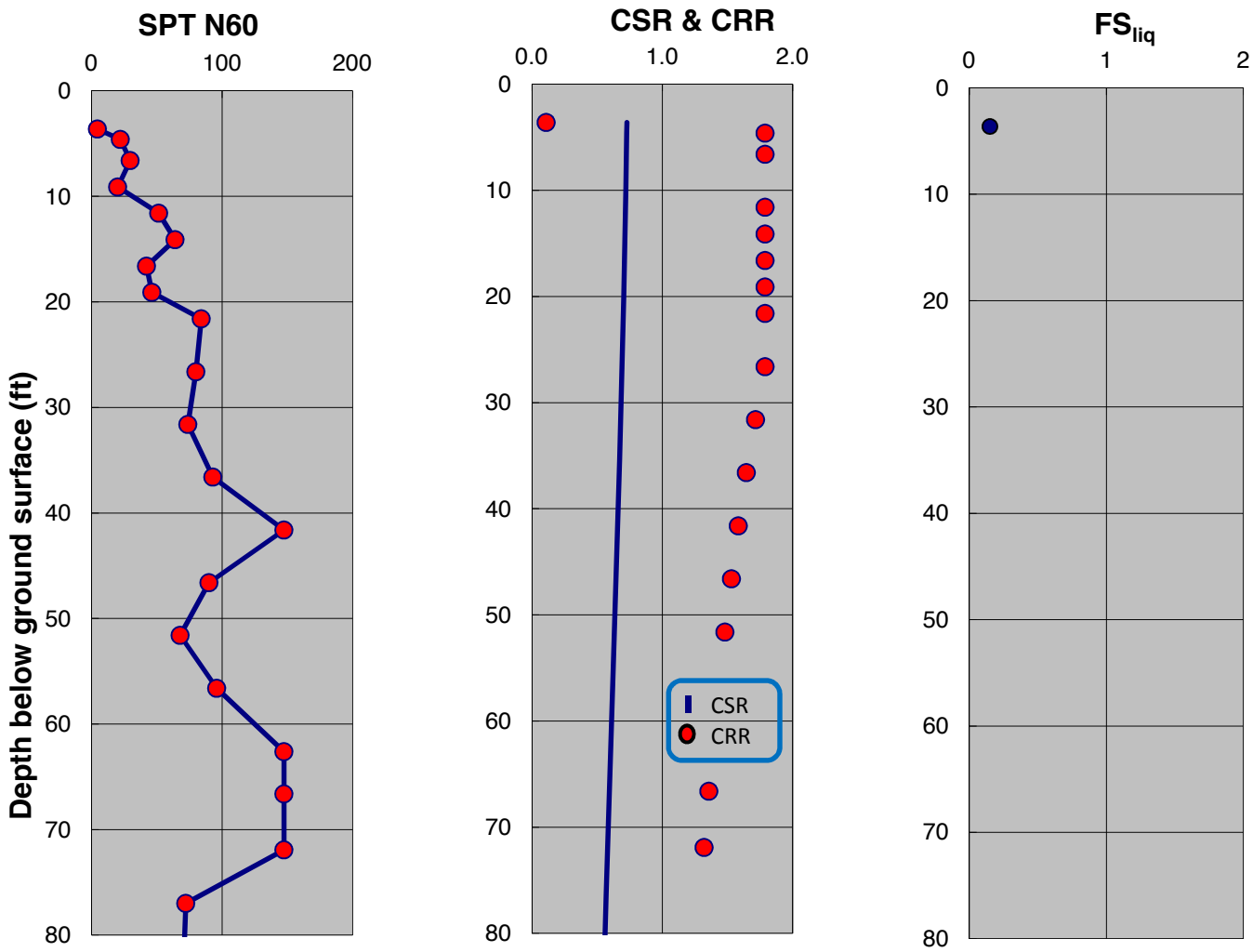
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-117 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



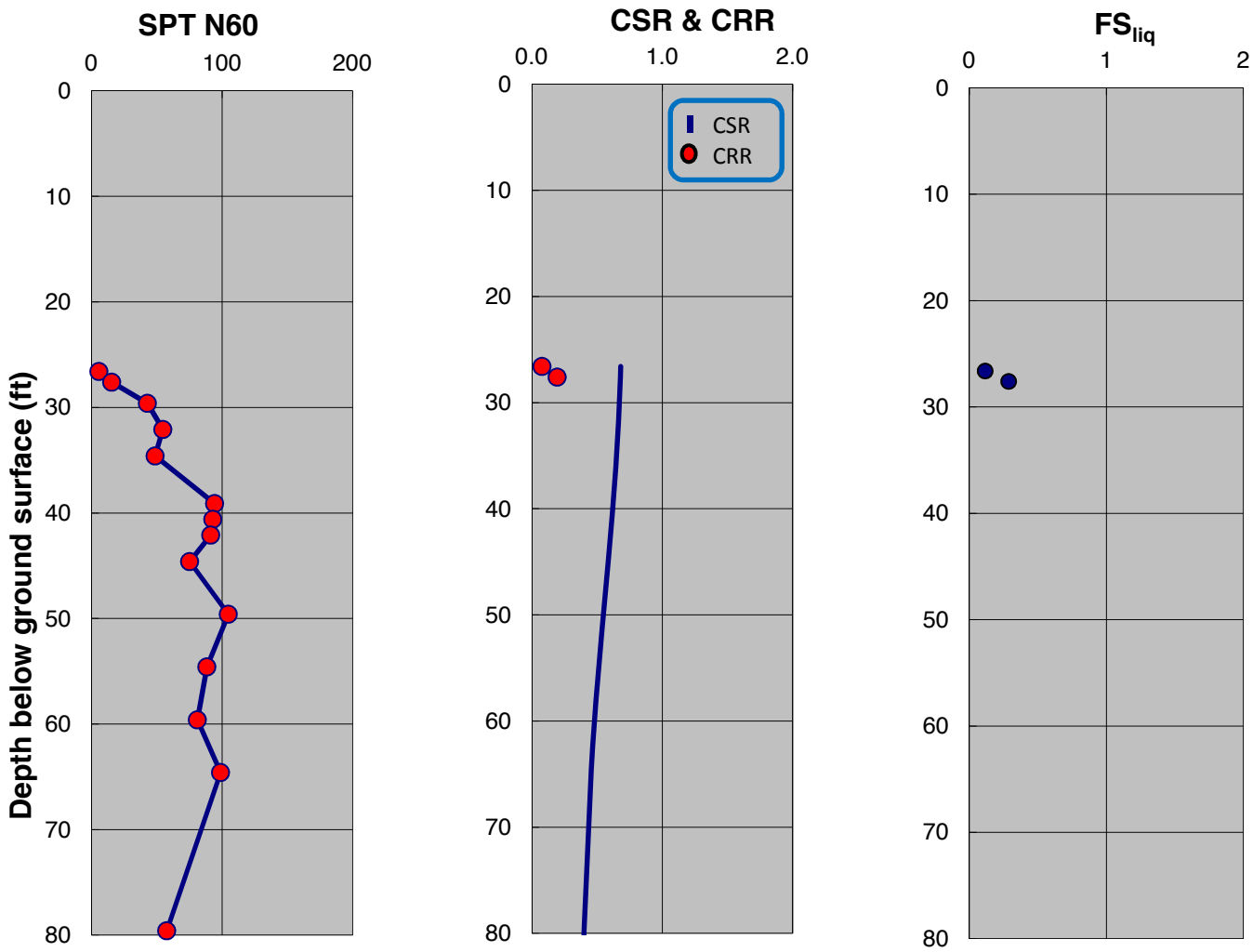
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-120 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



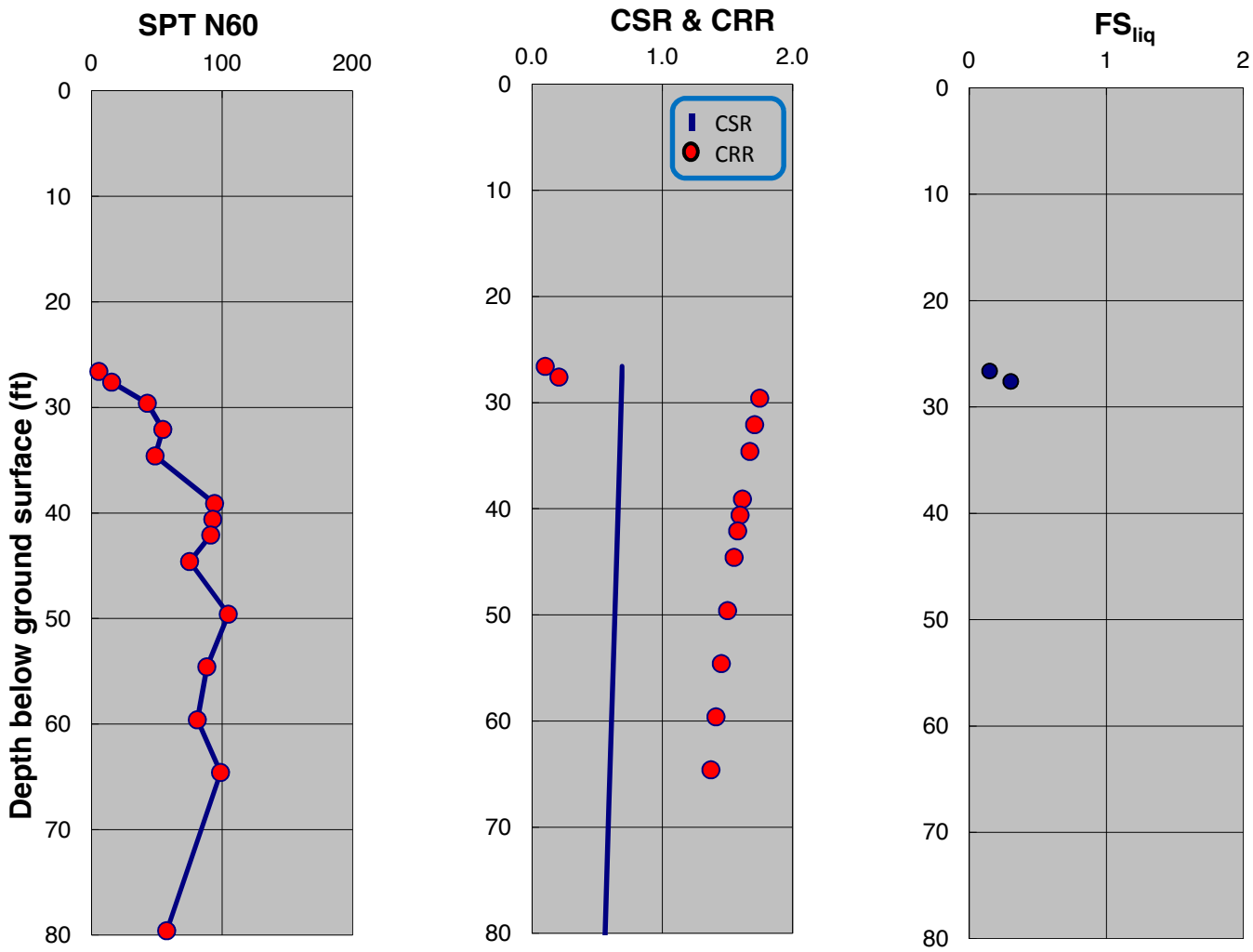
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-120 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



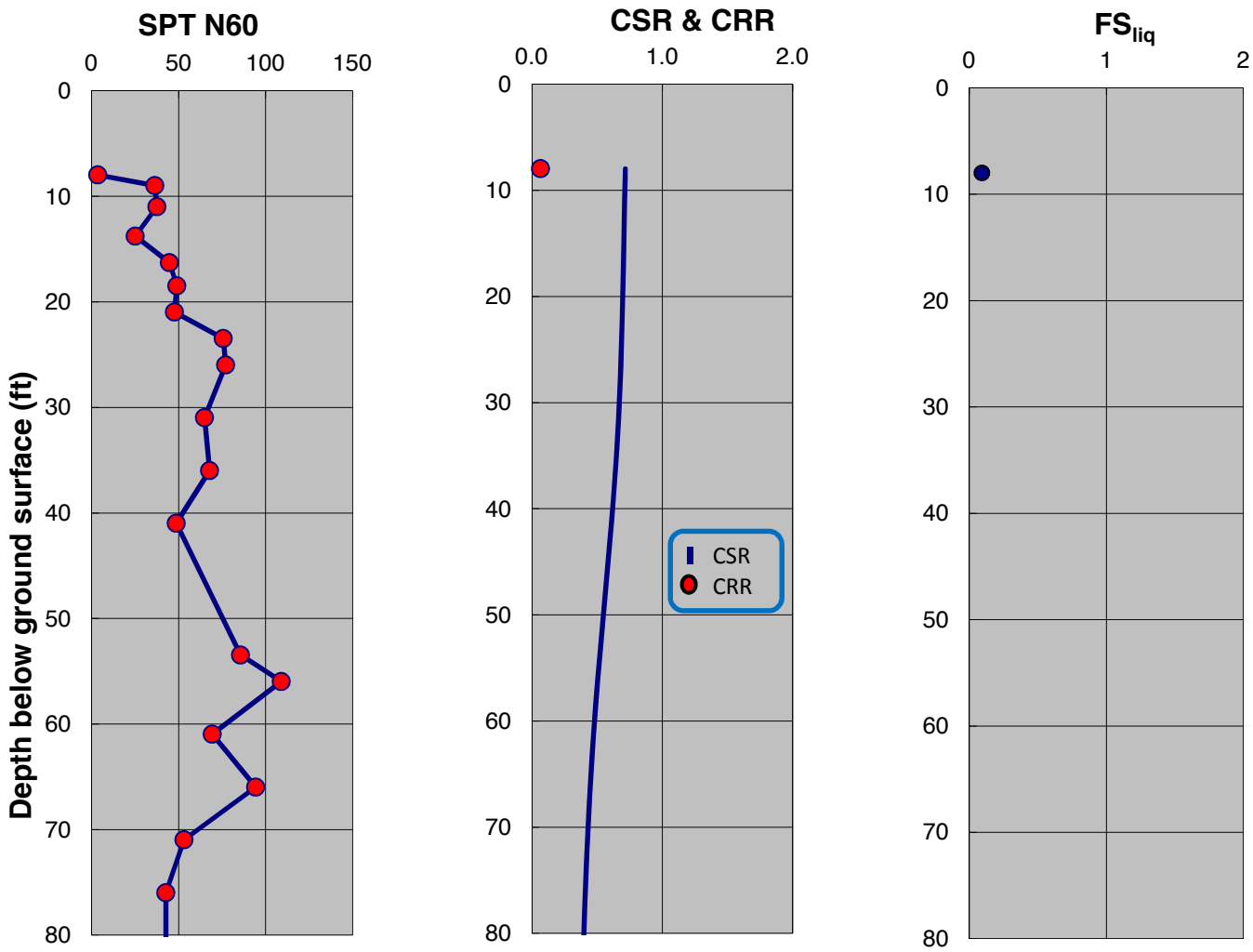
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-121 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



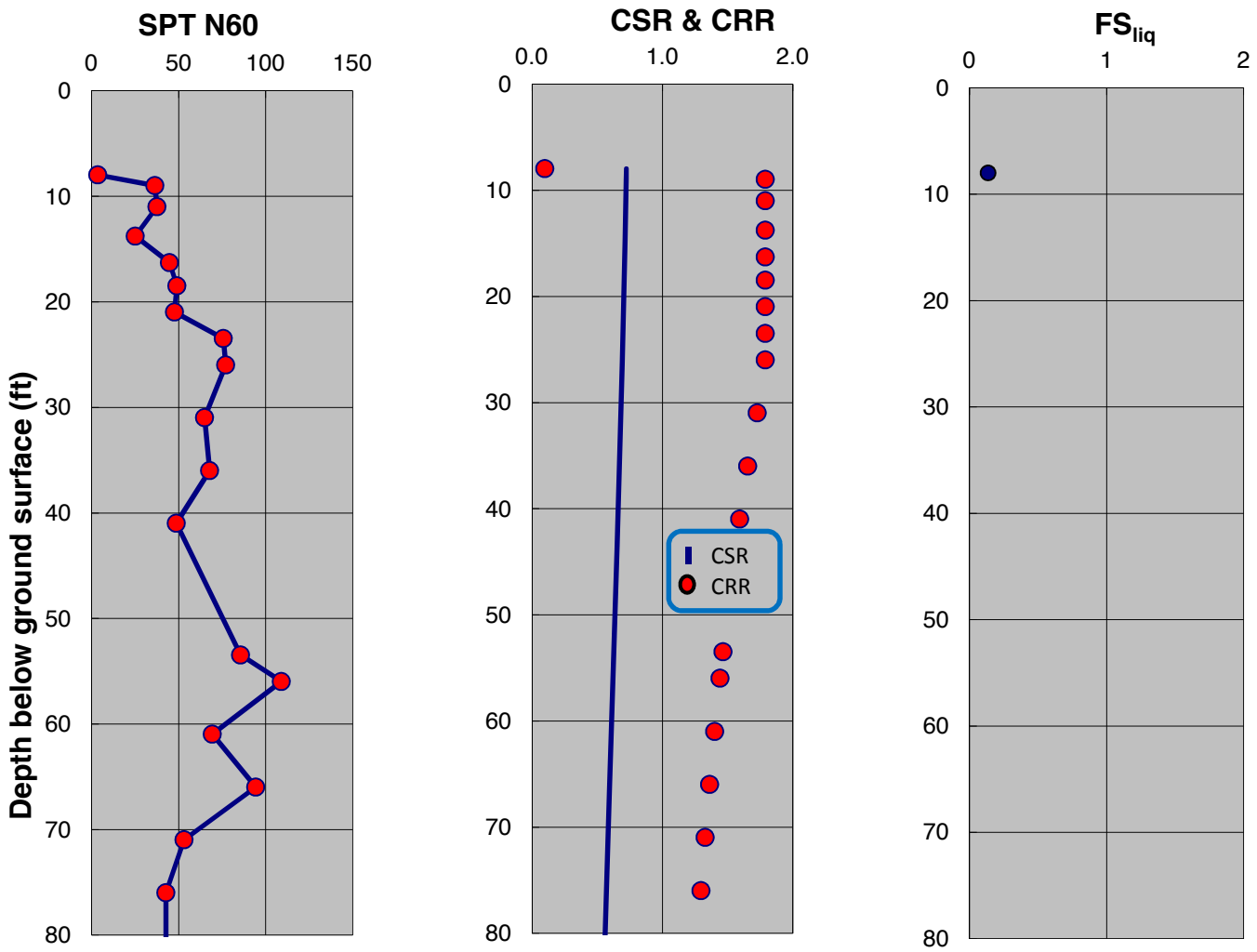
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-121 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-122 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

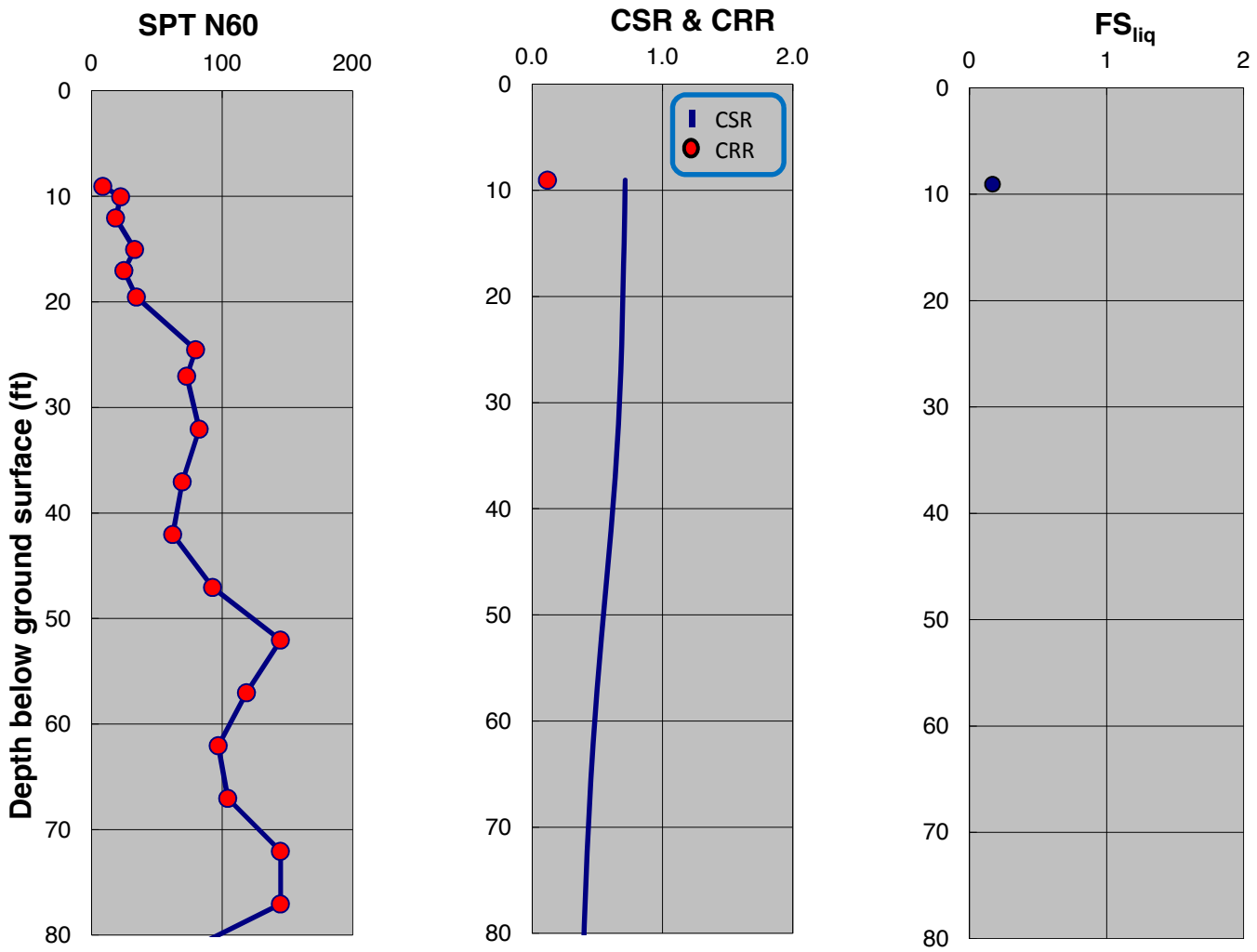
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-122 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

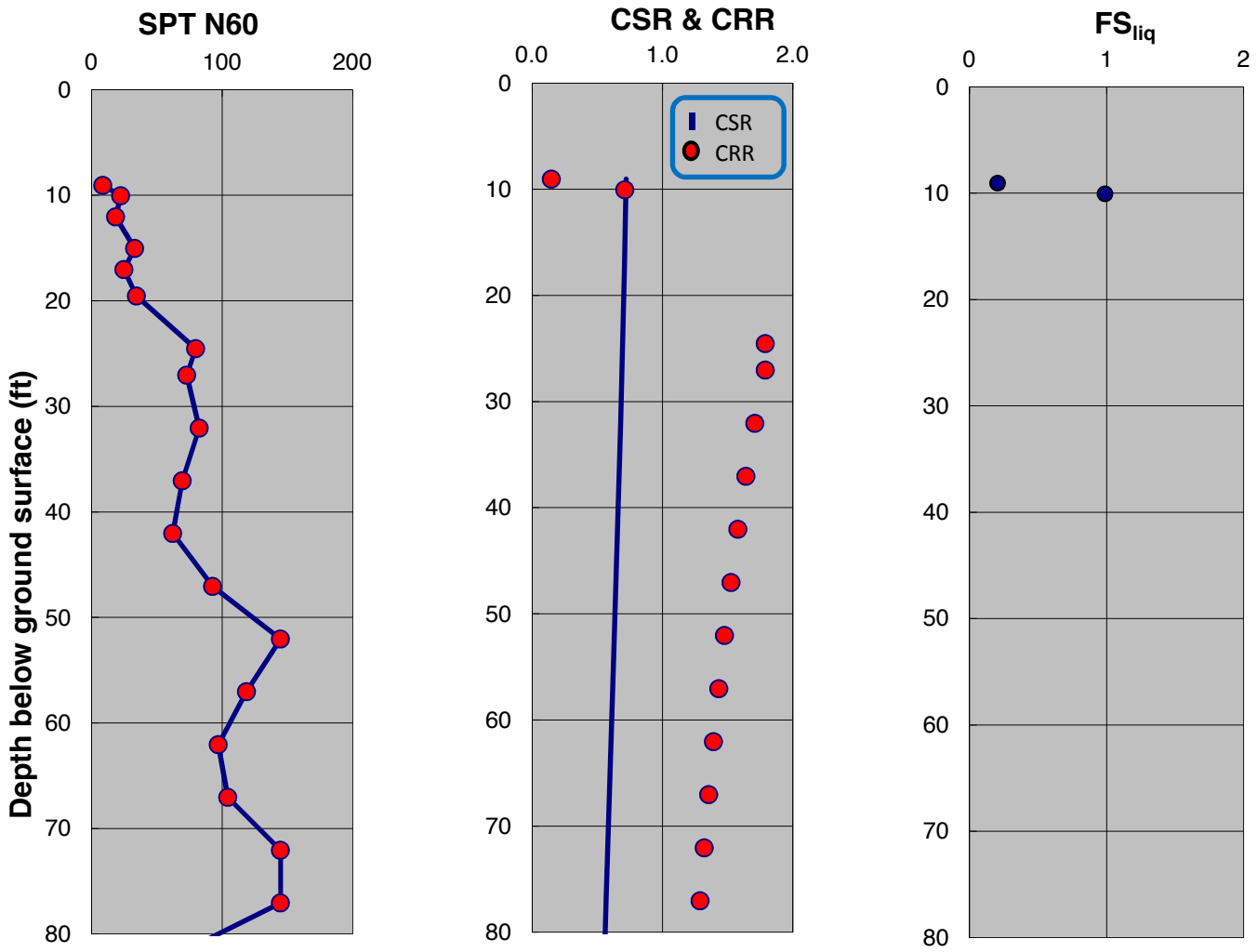
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.150



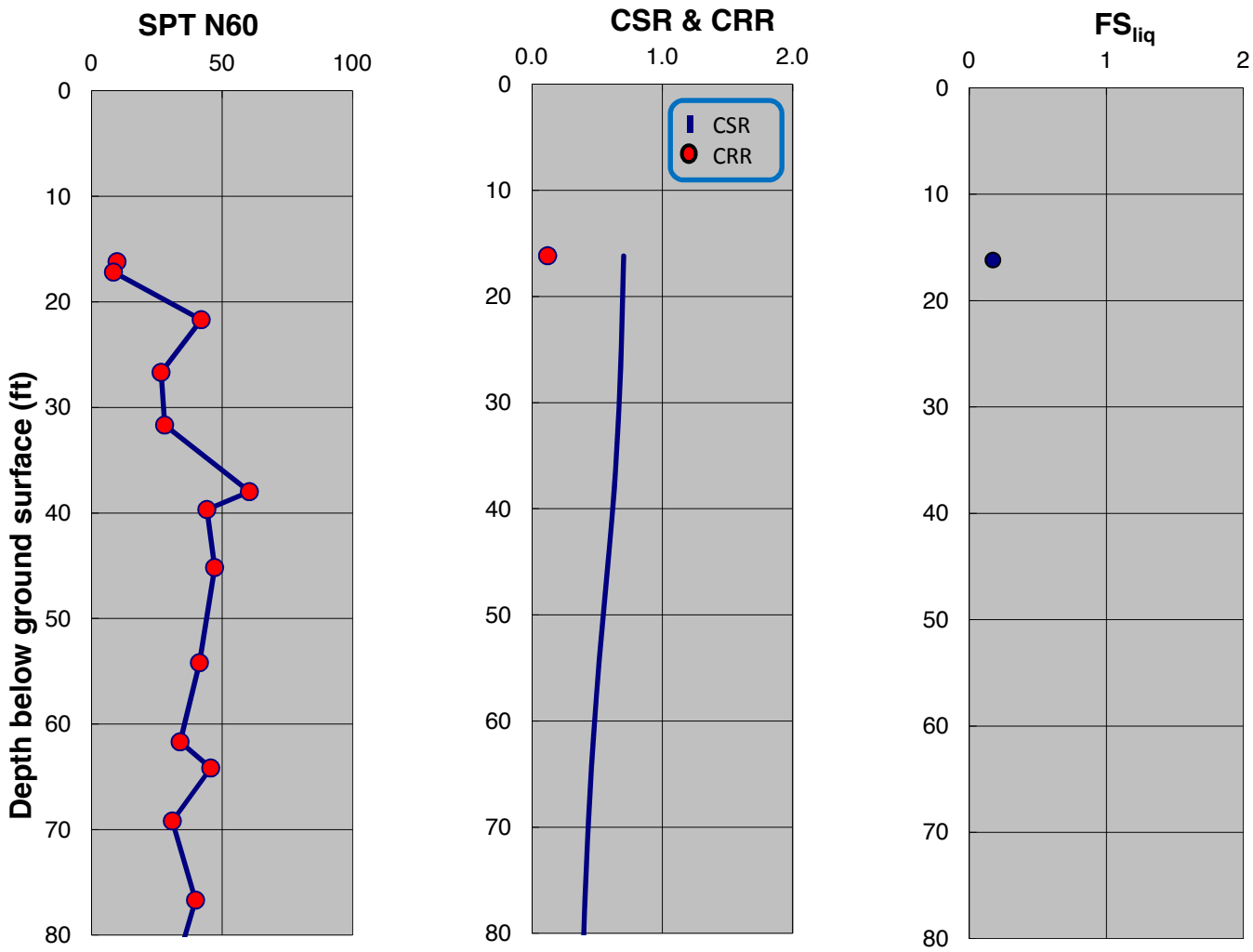
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-123 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



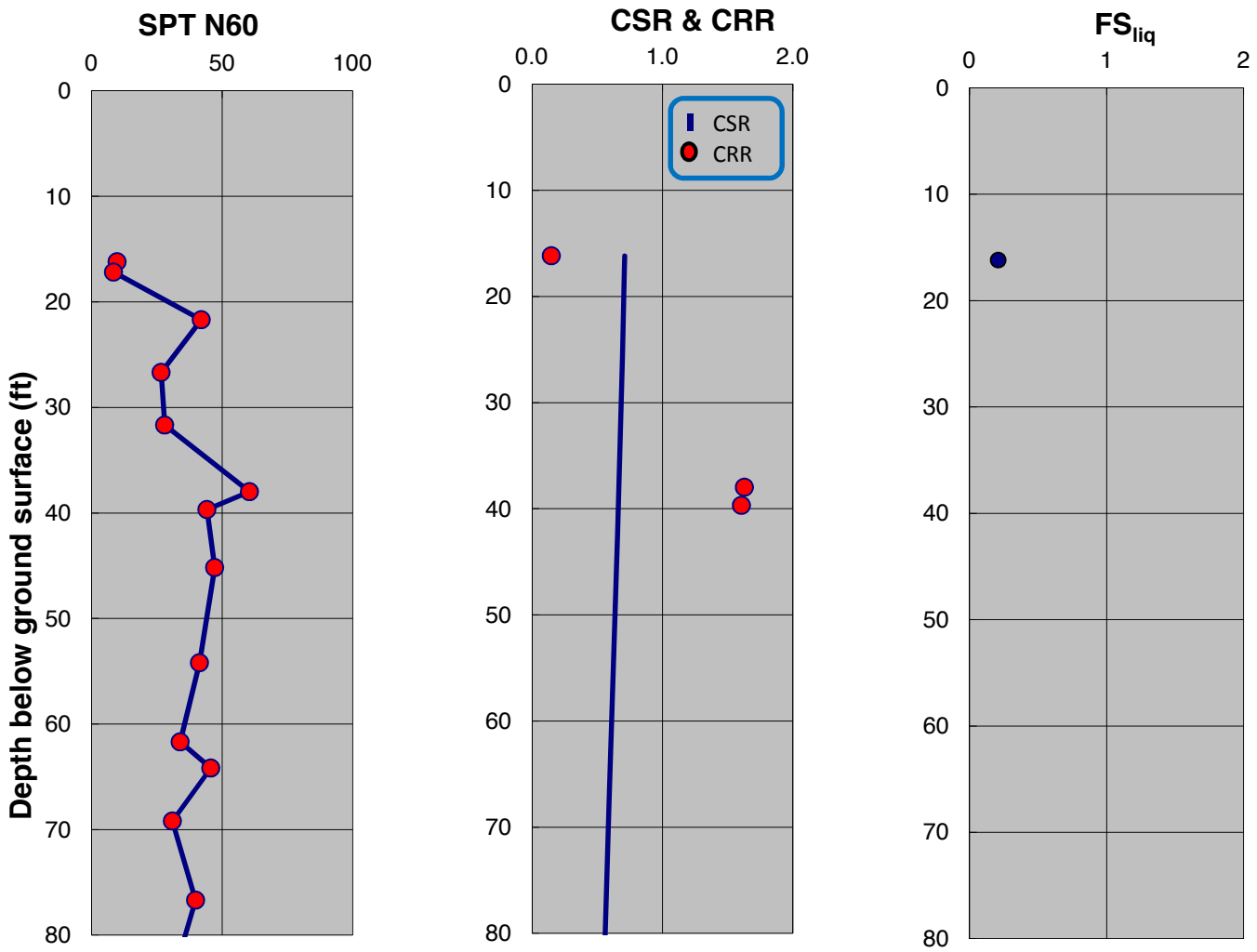
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-123 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



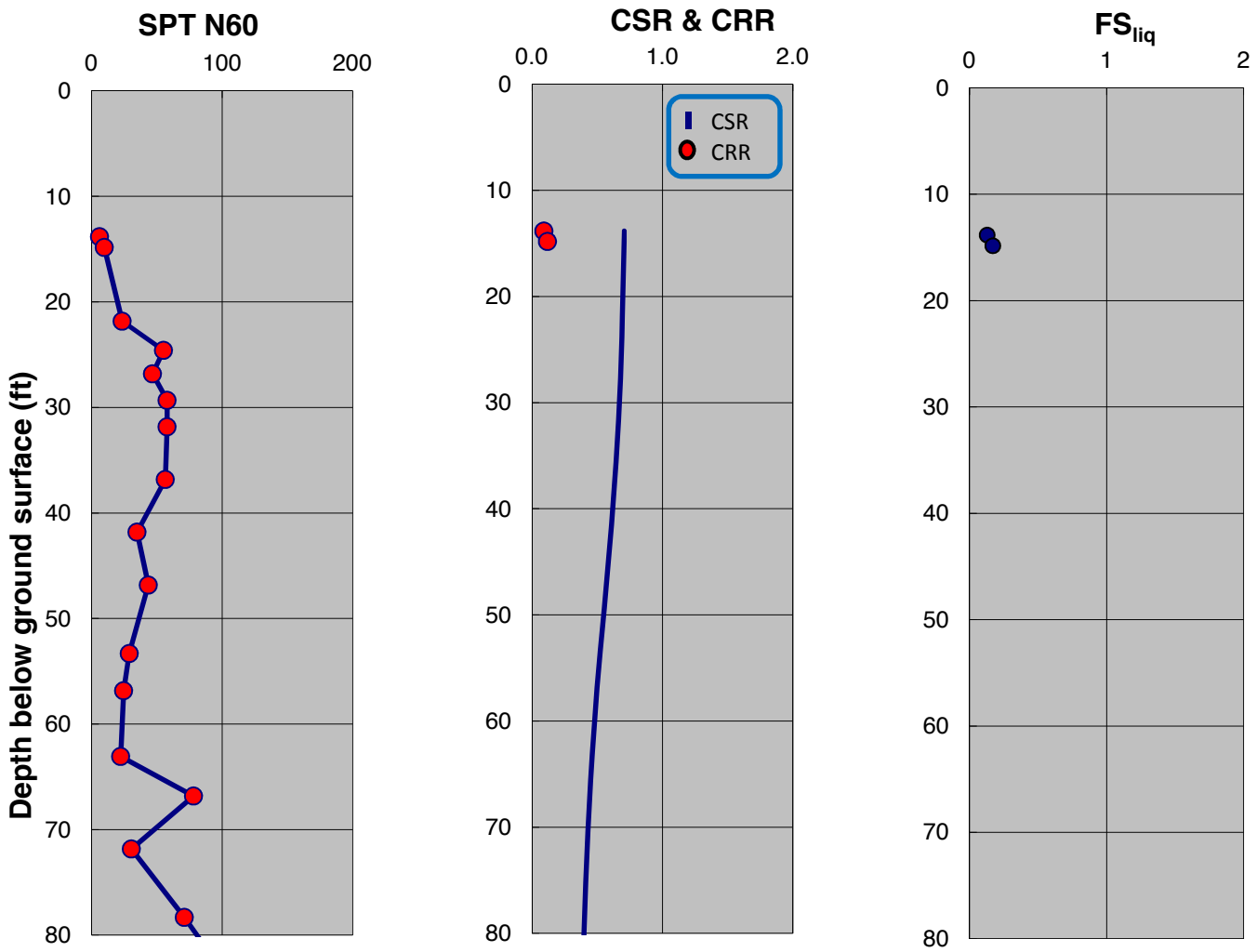
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-124 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



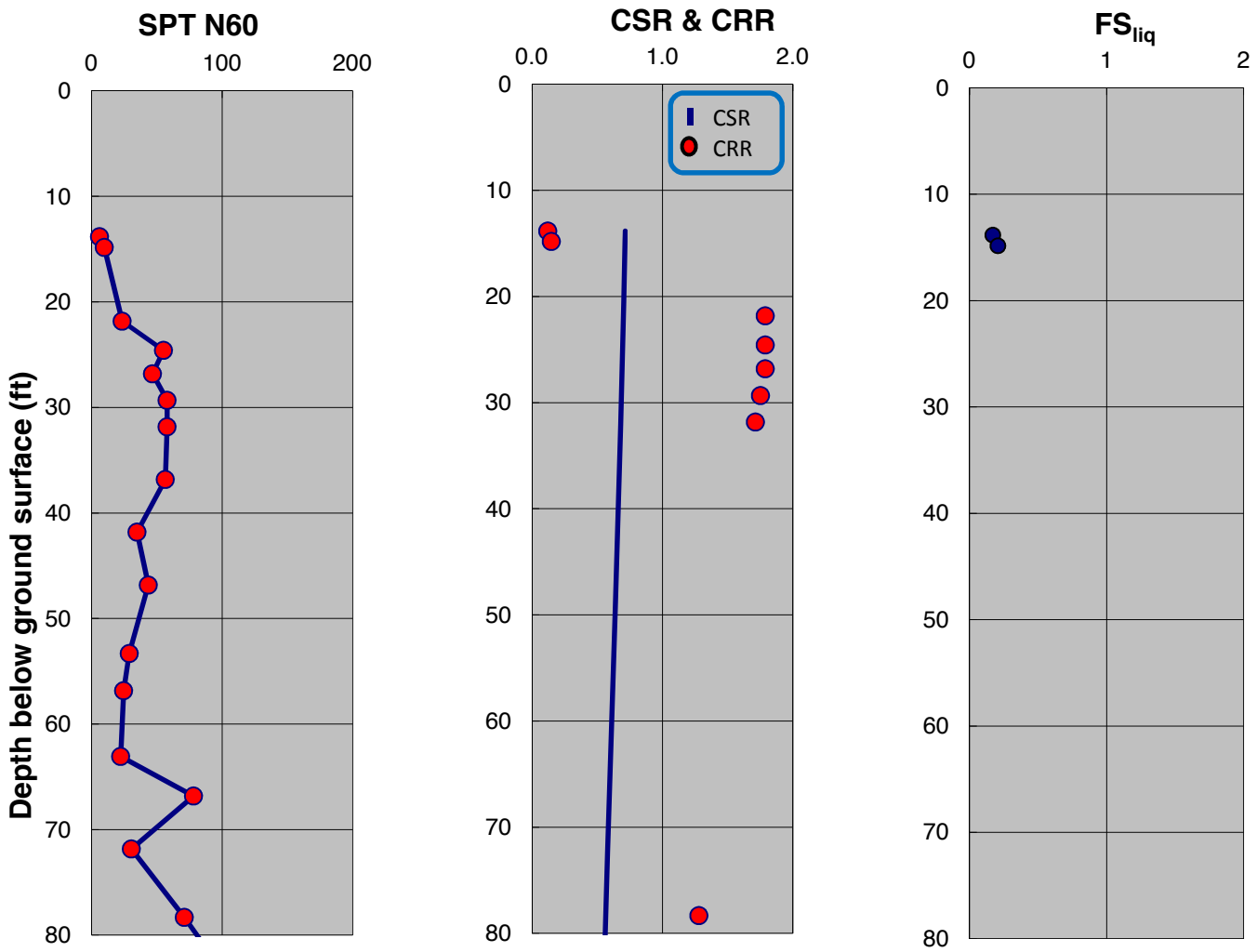
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-124 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



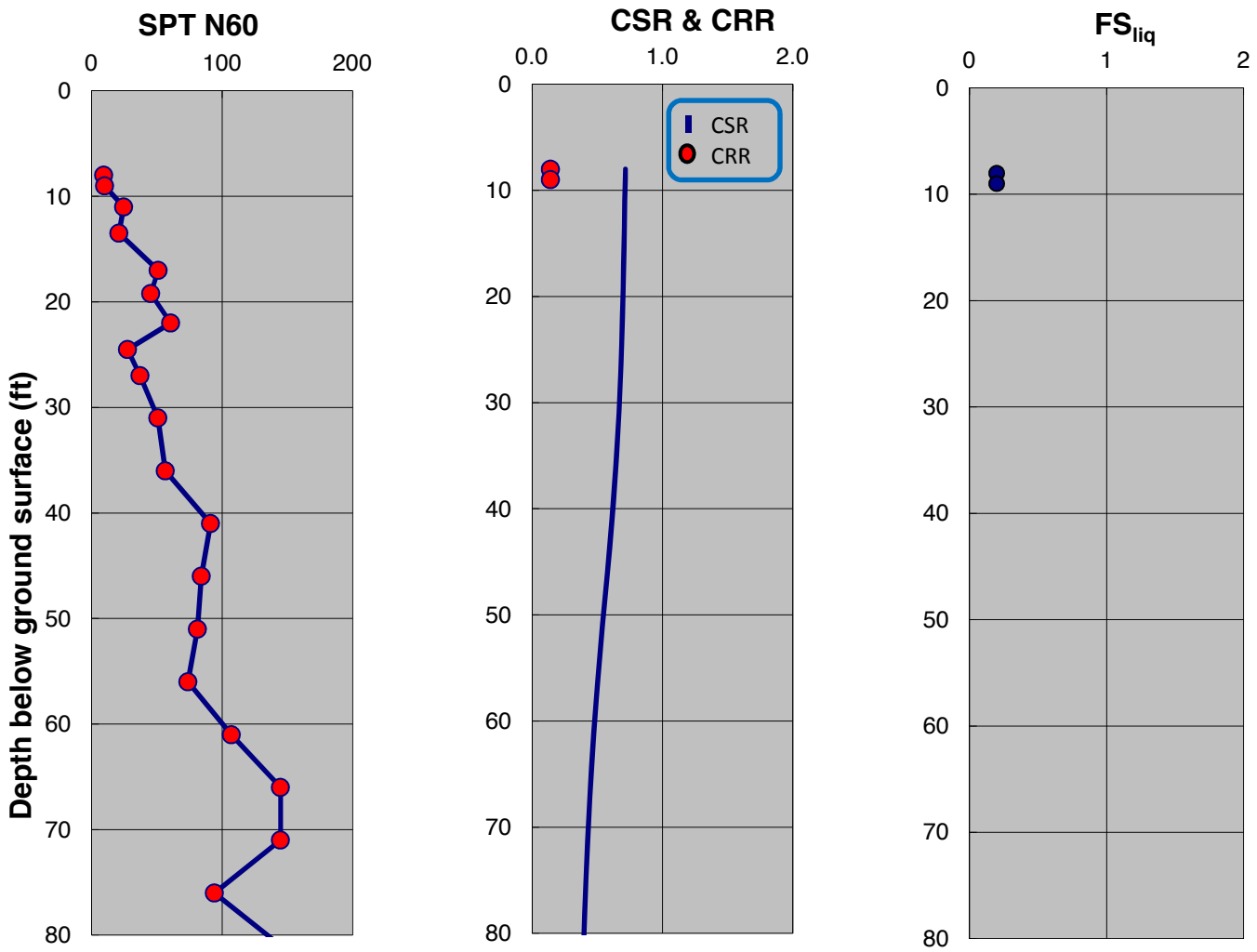
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-125 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



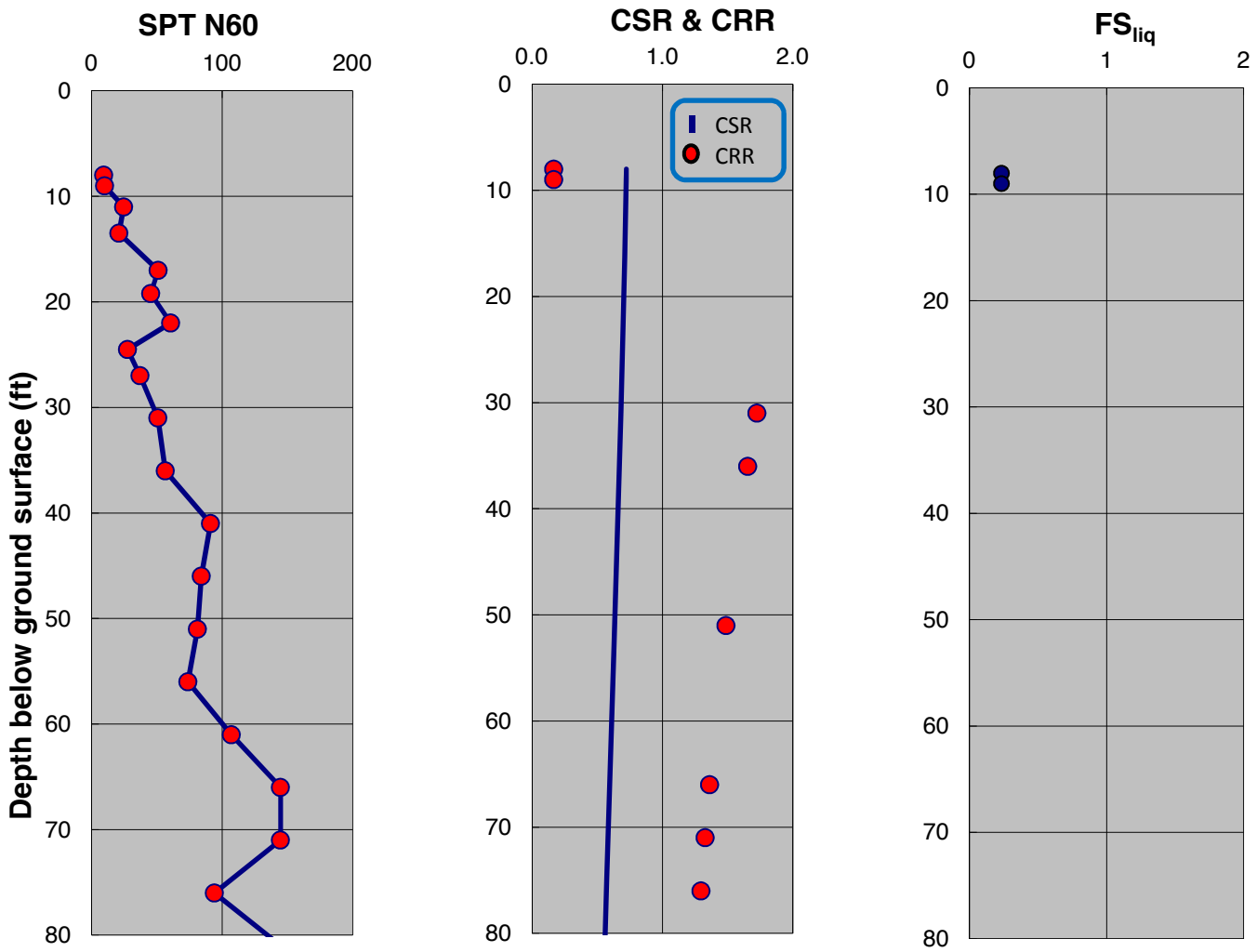
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-125 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



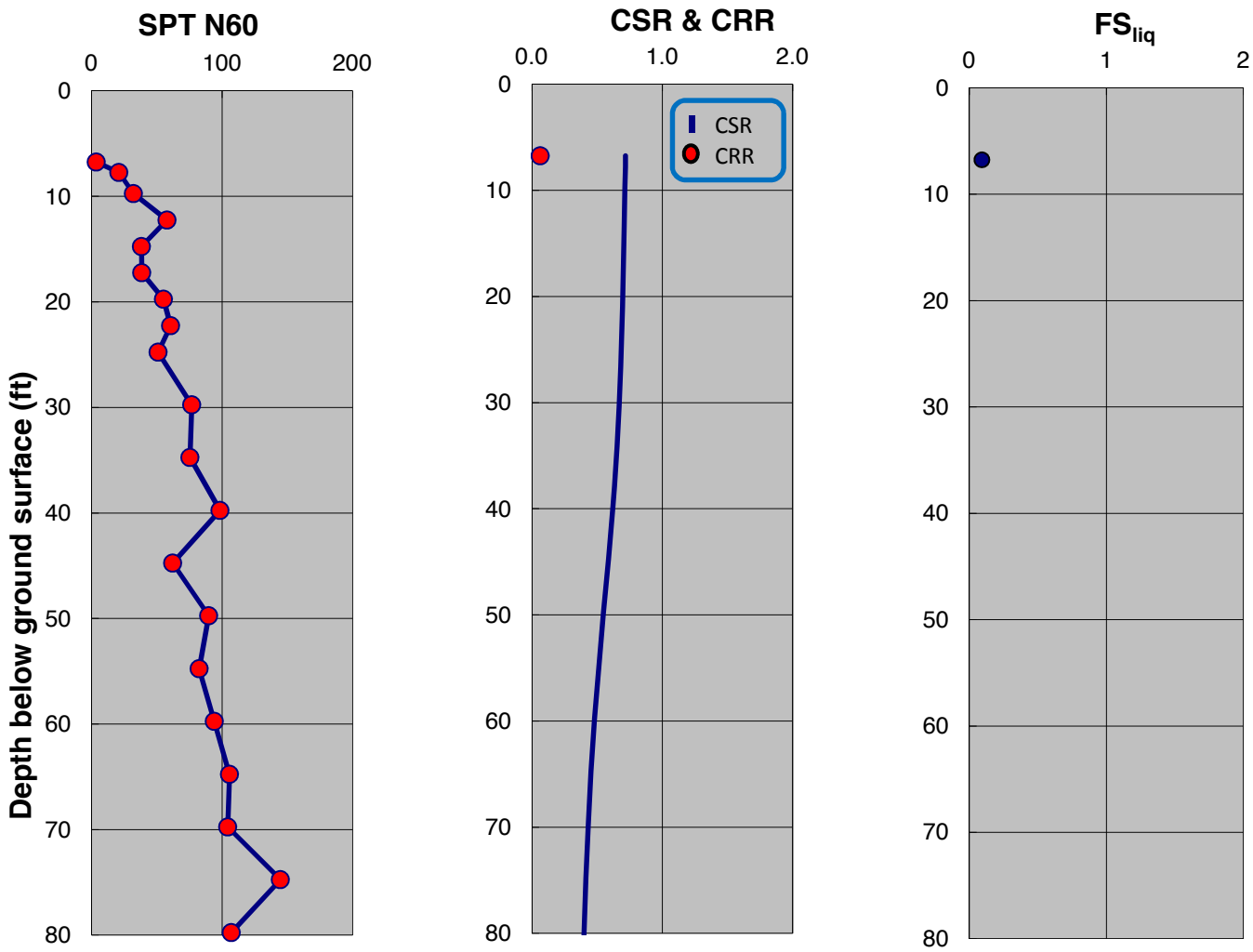
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-126 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



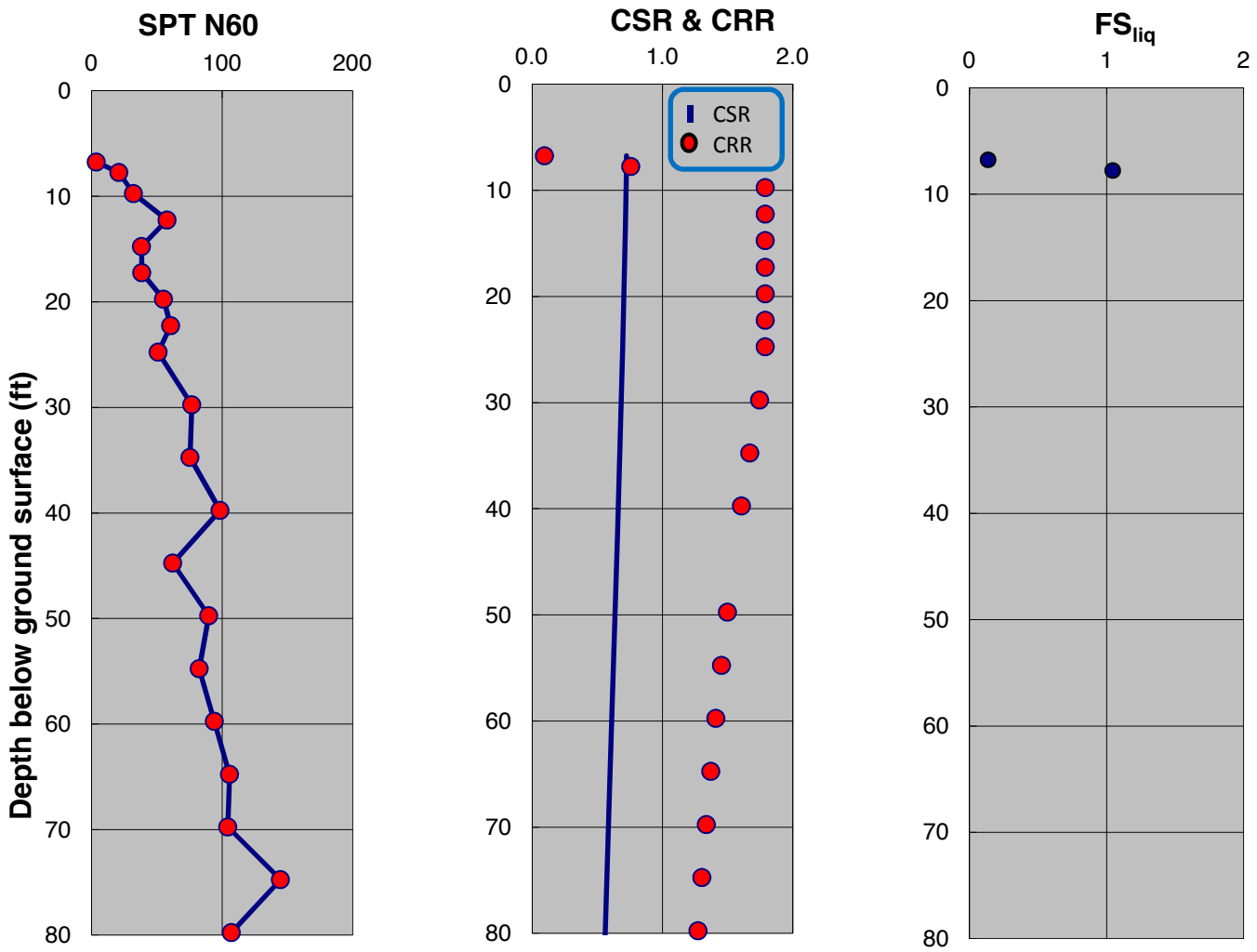
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-126 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-127 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

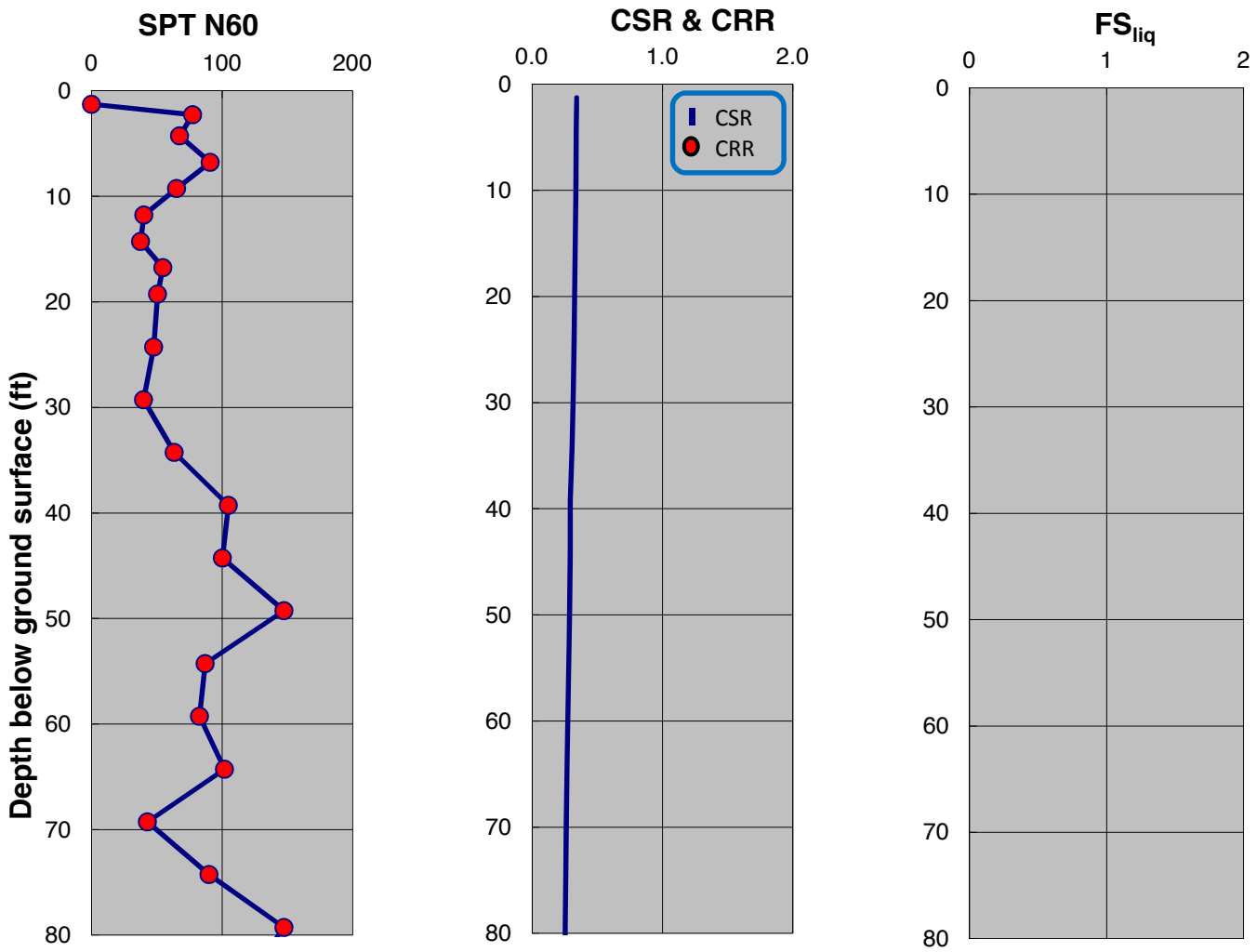
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-127 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

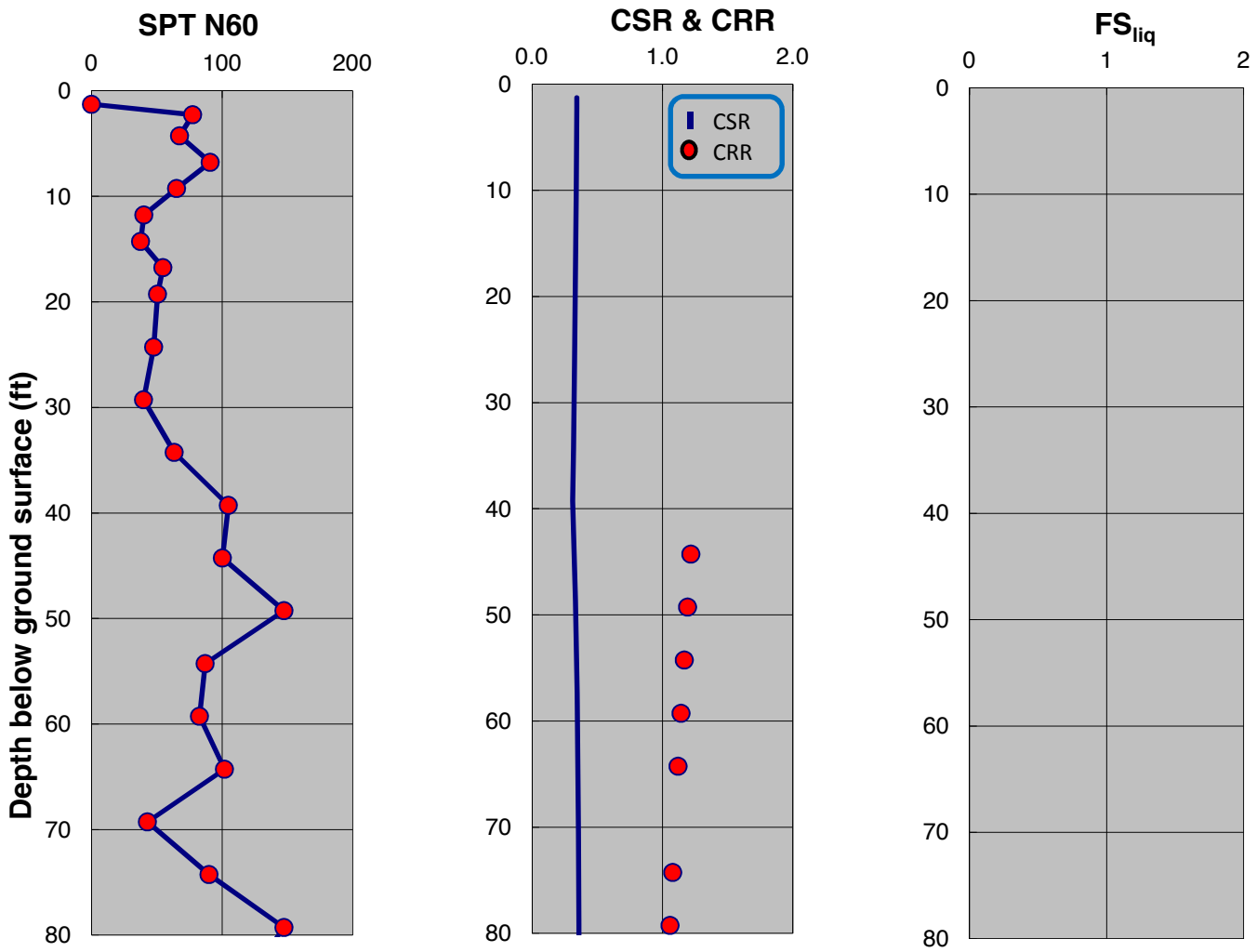
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.160



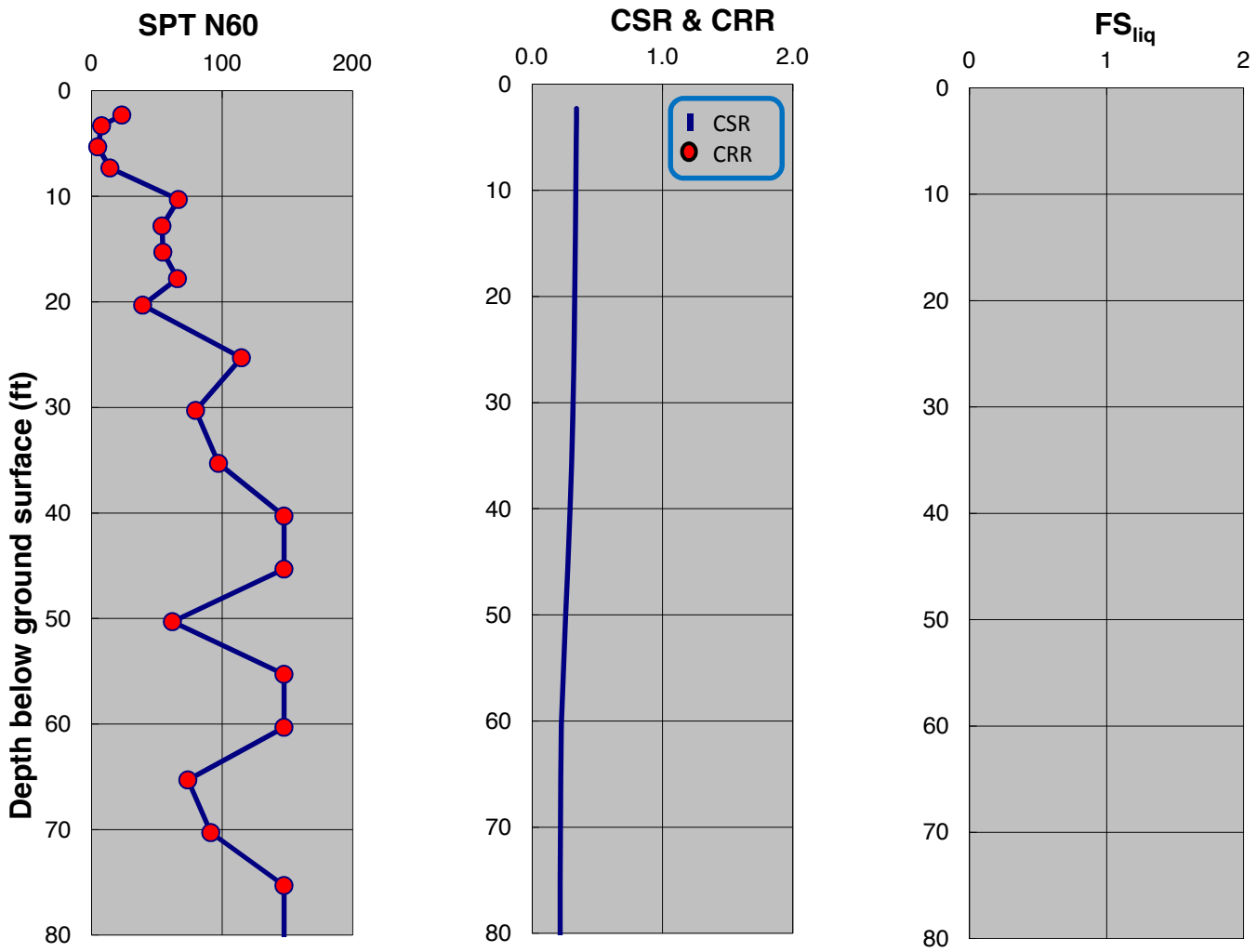
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-131 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



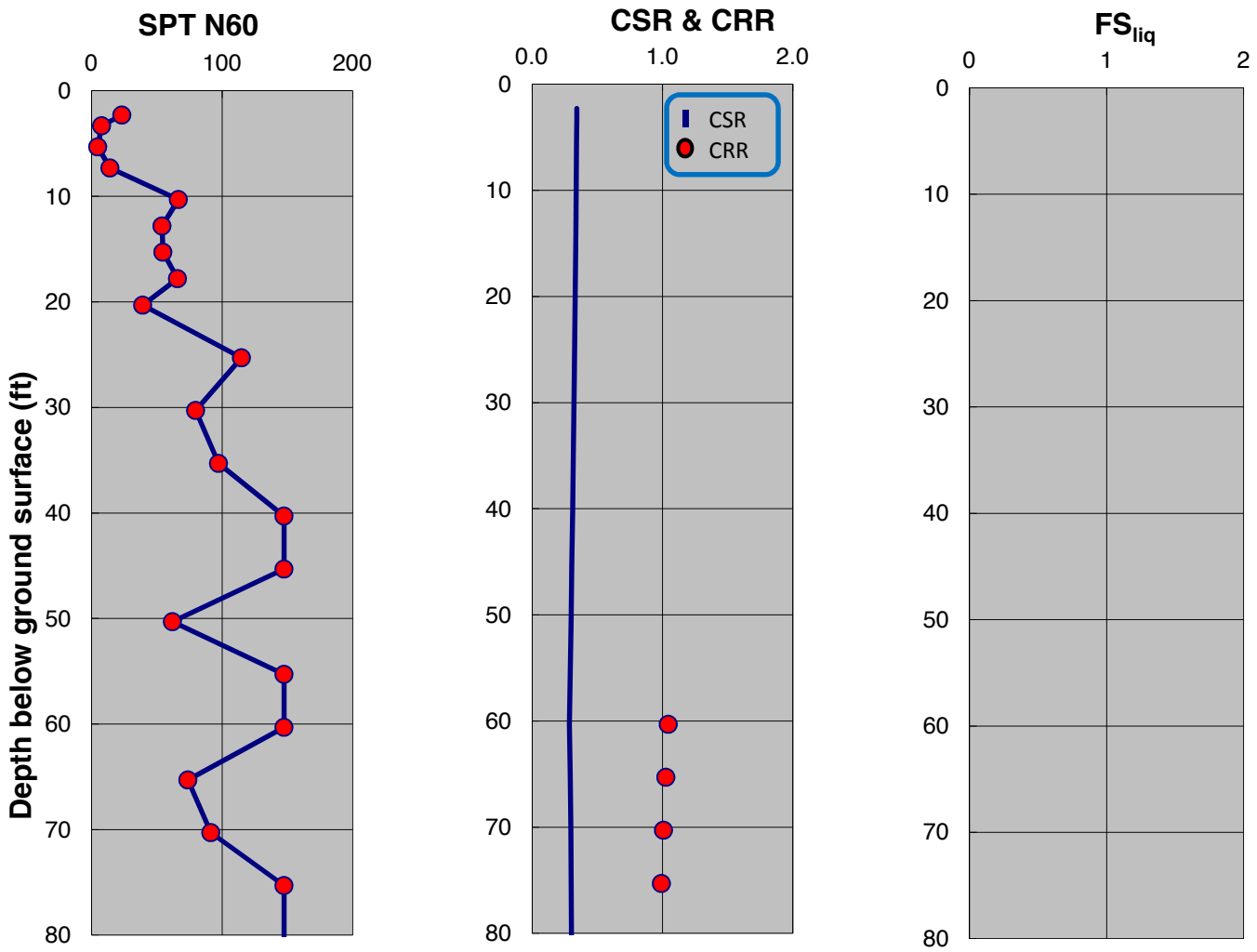
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-131 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



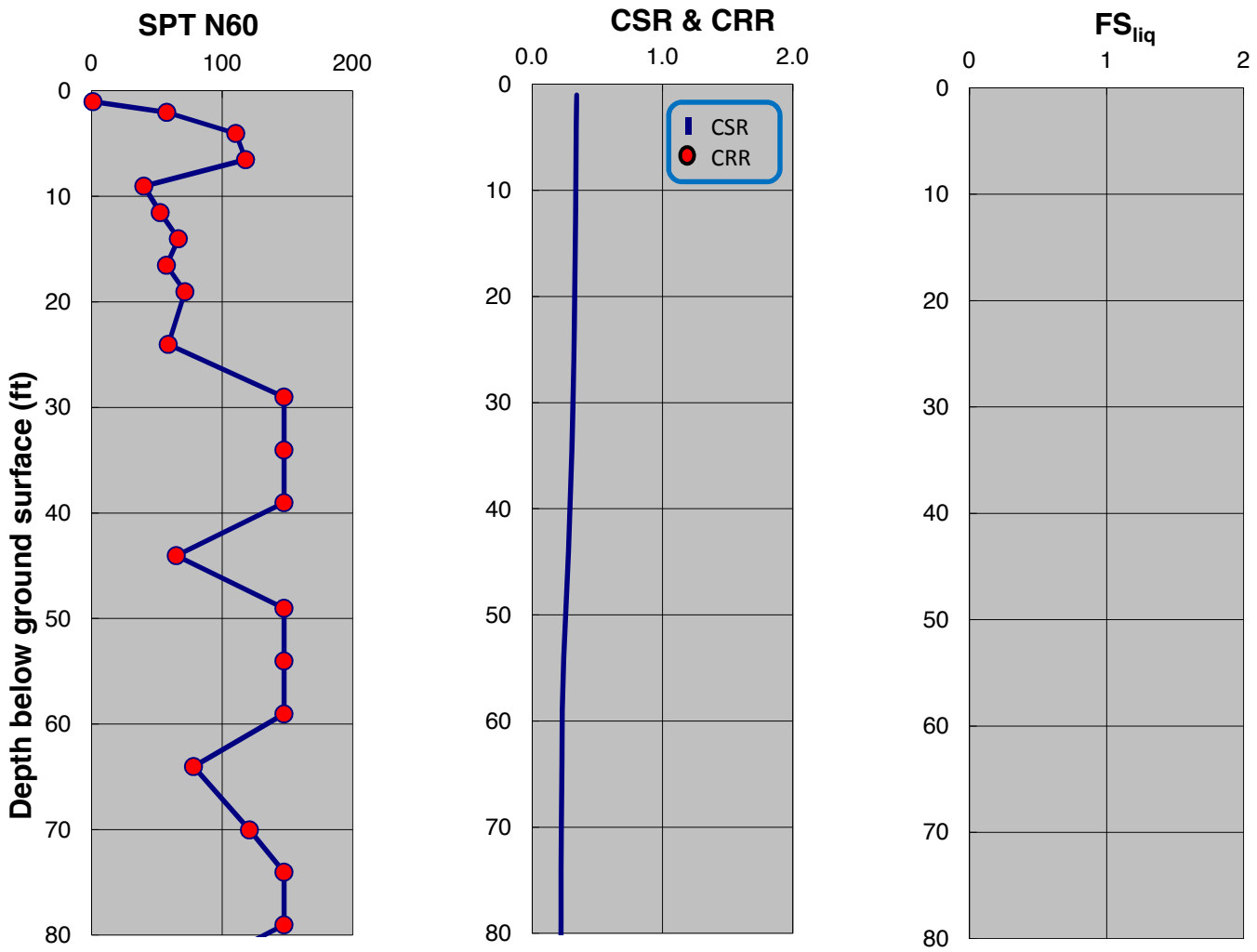
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-132 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



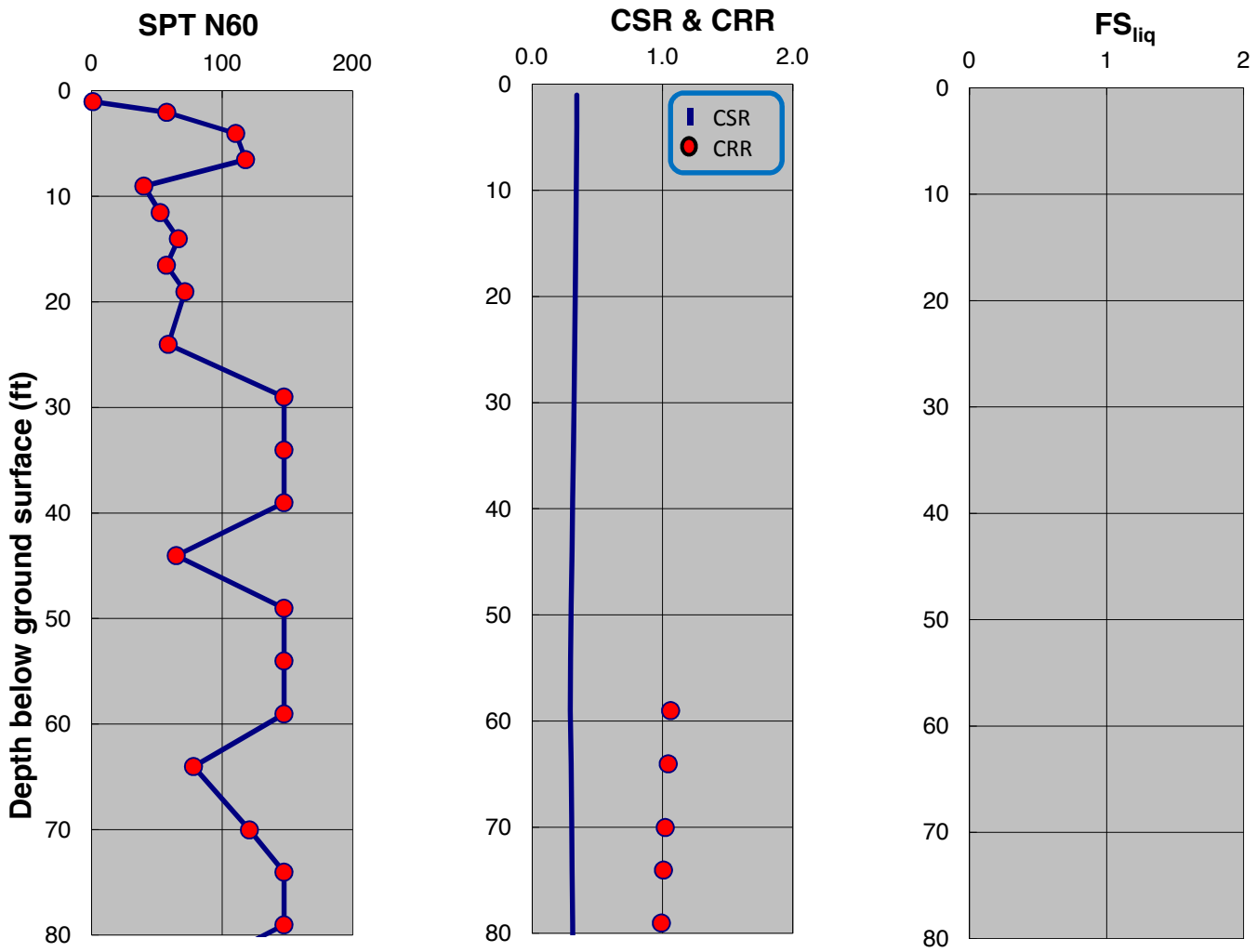
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-132 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



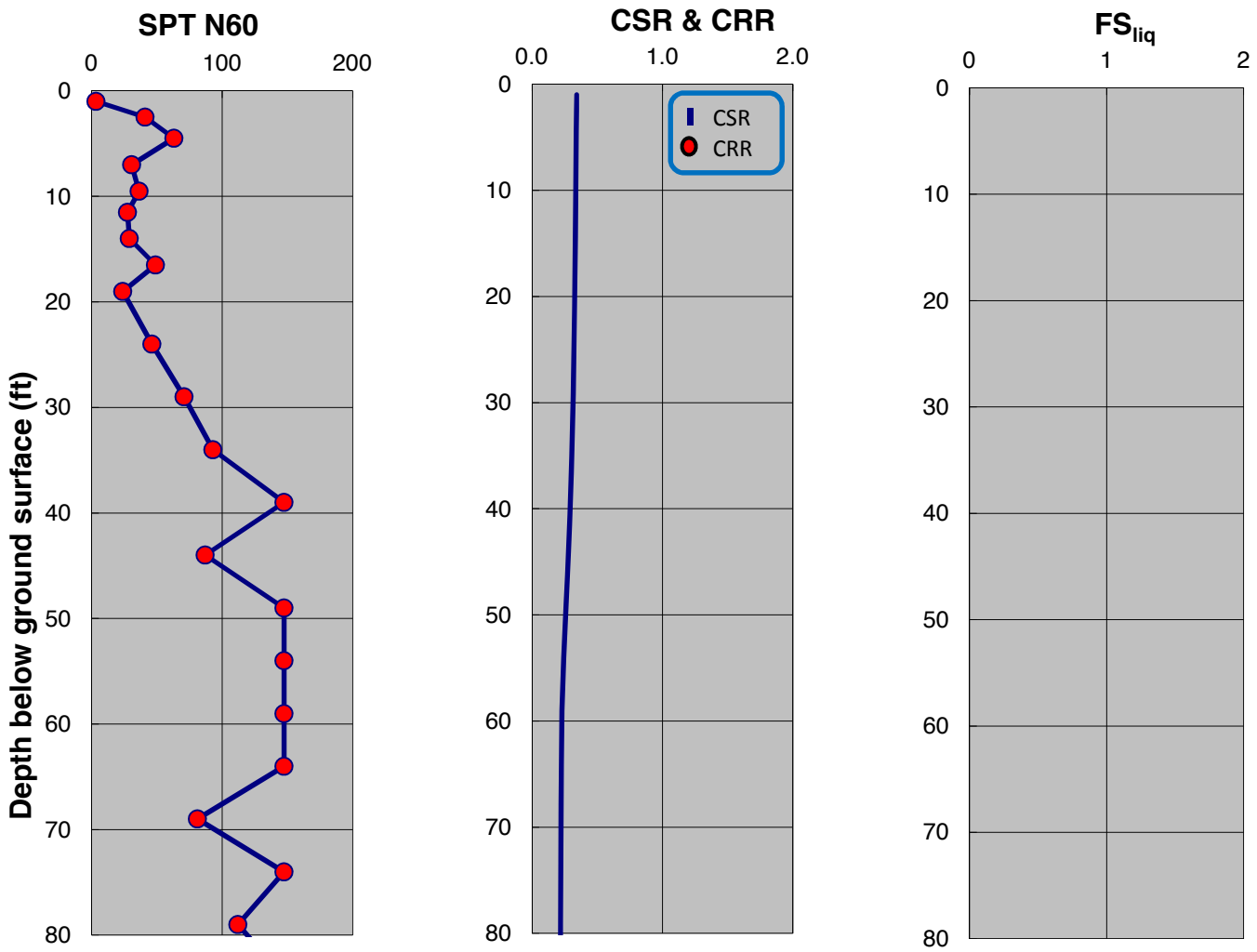
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-133 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



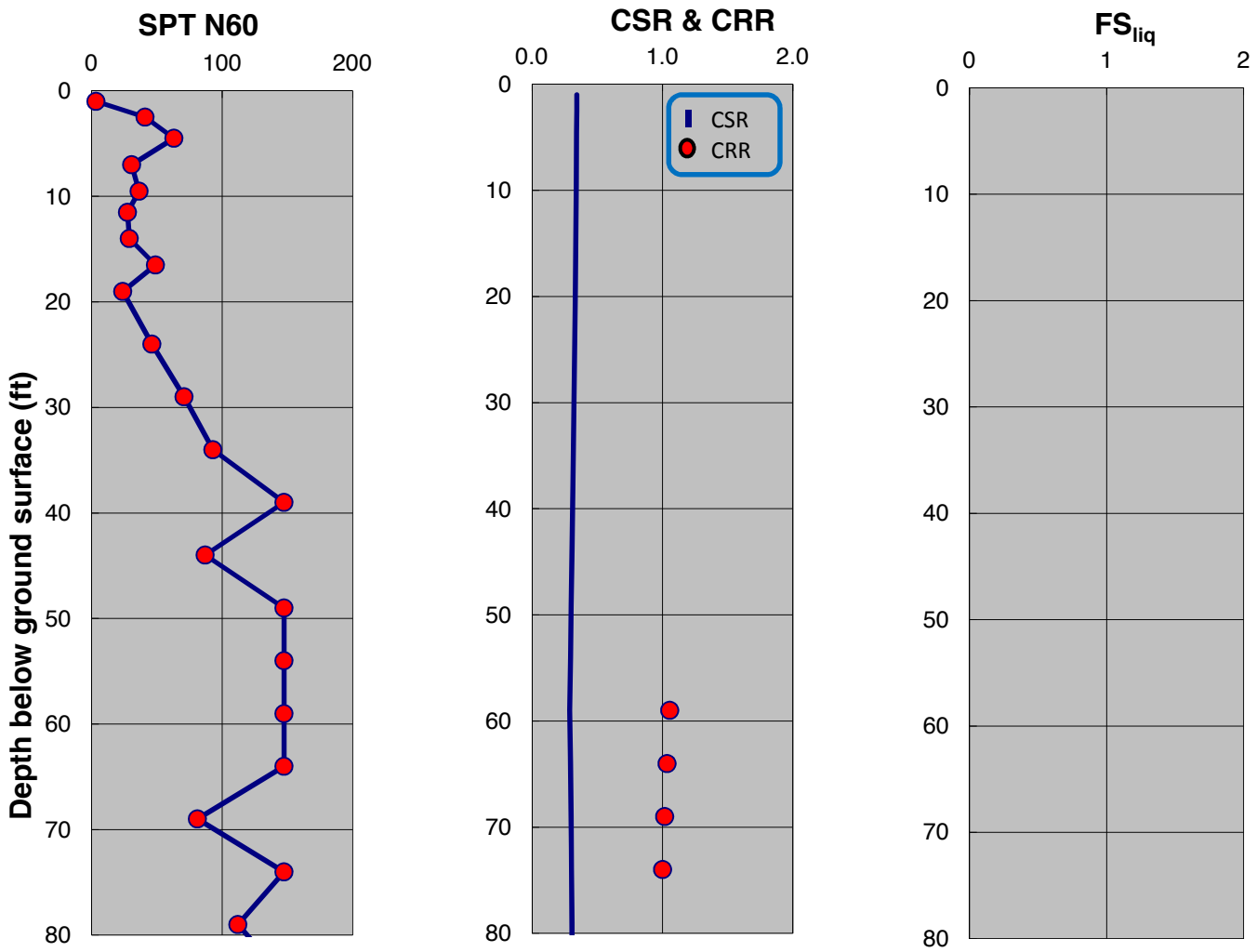
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-133 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



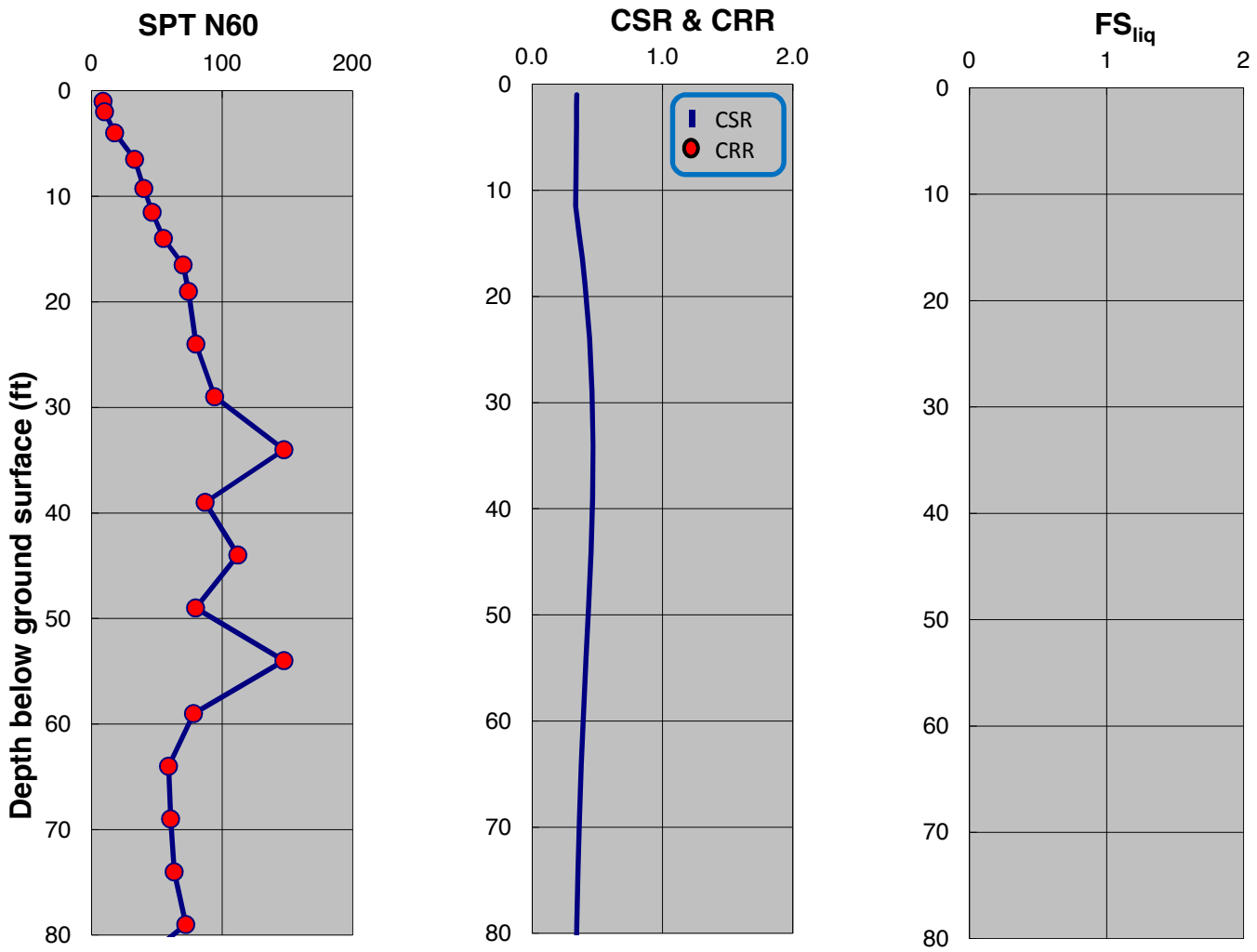
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-135 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



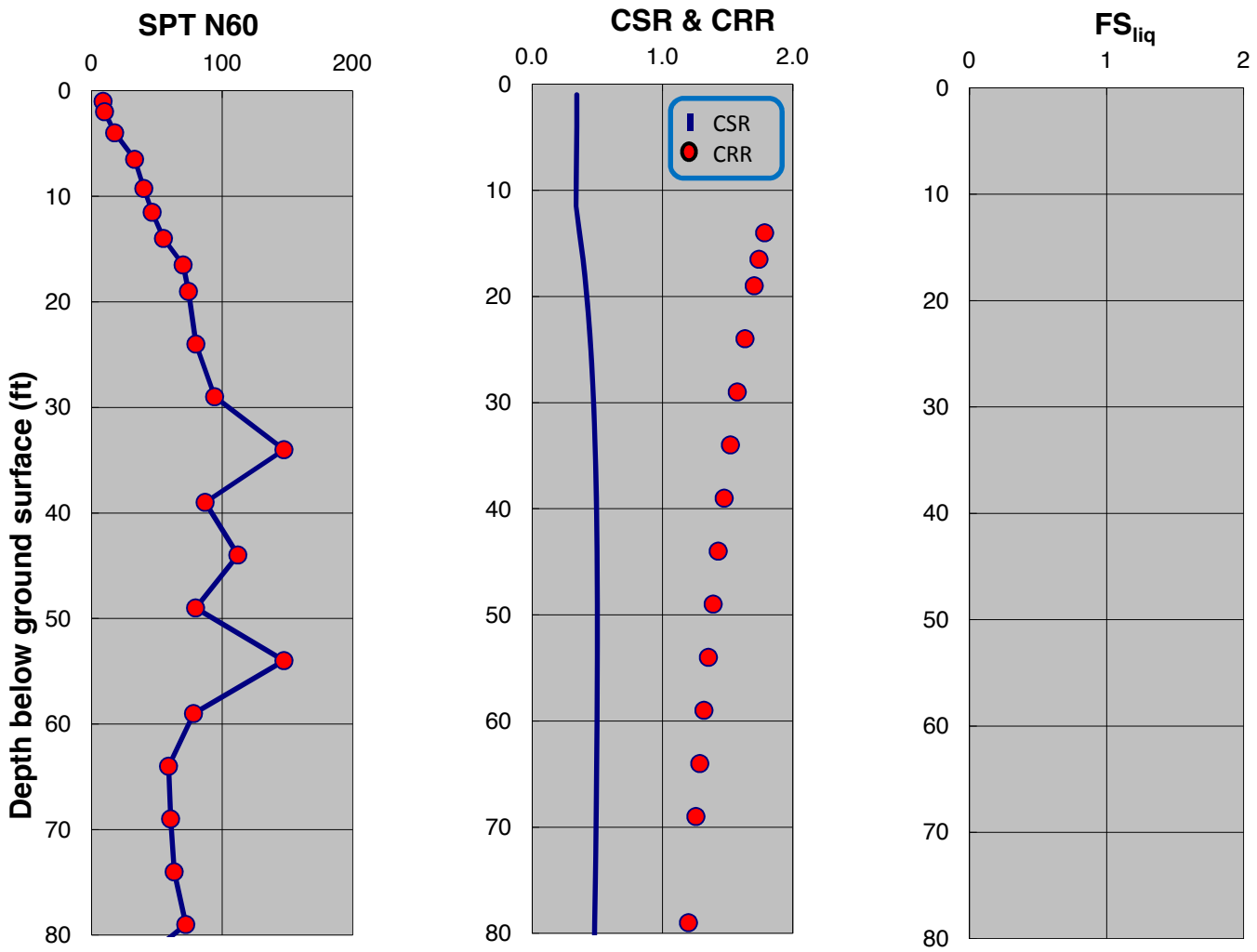
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-135 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-136 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

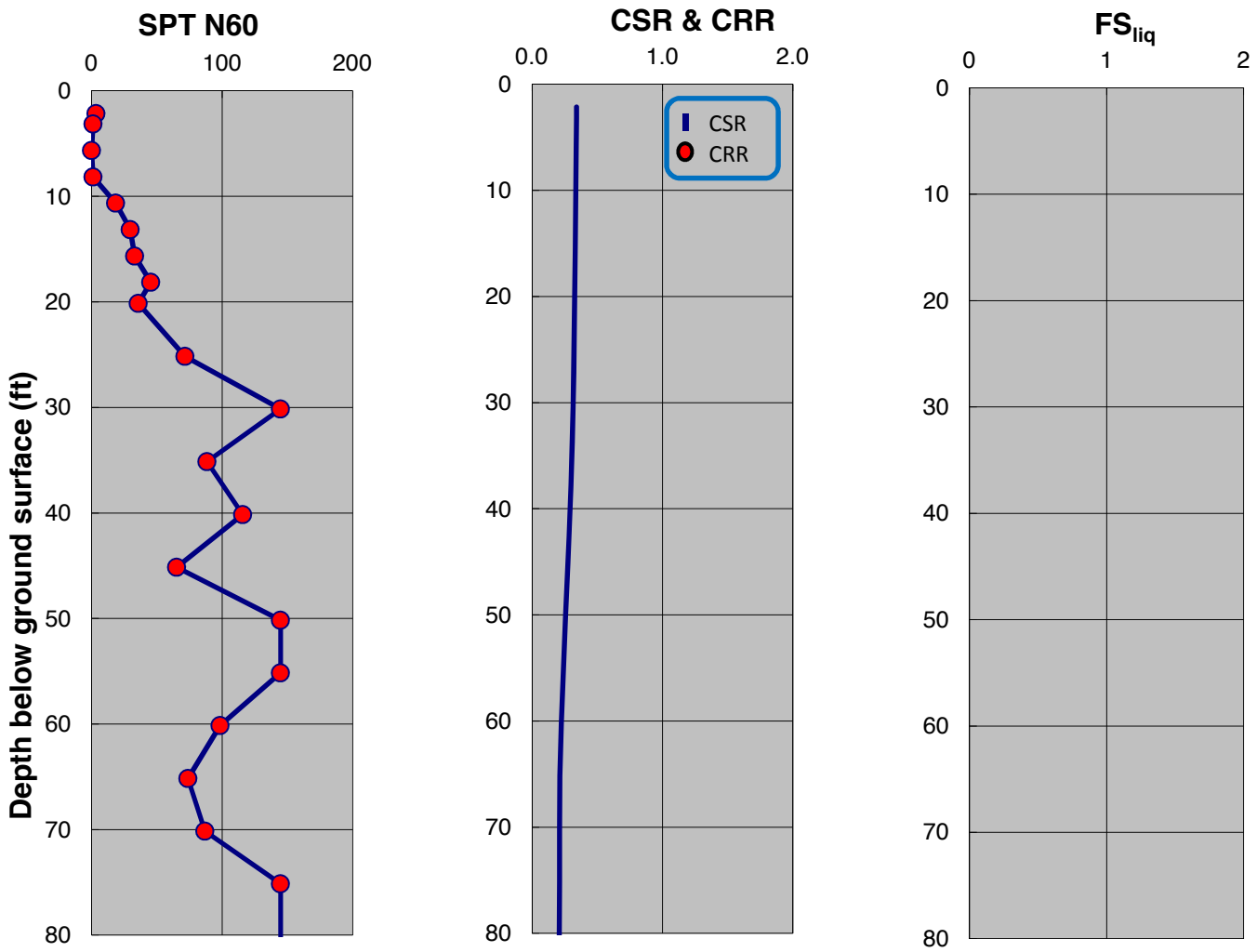
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-136 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

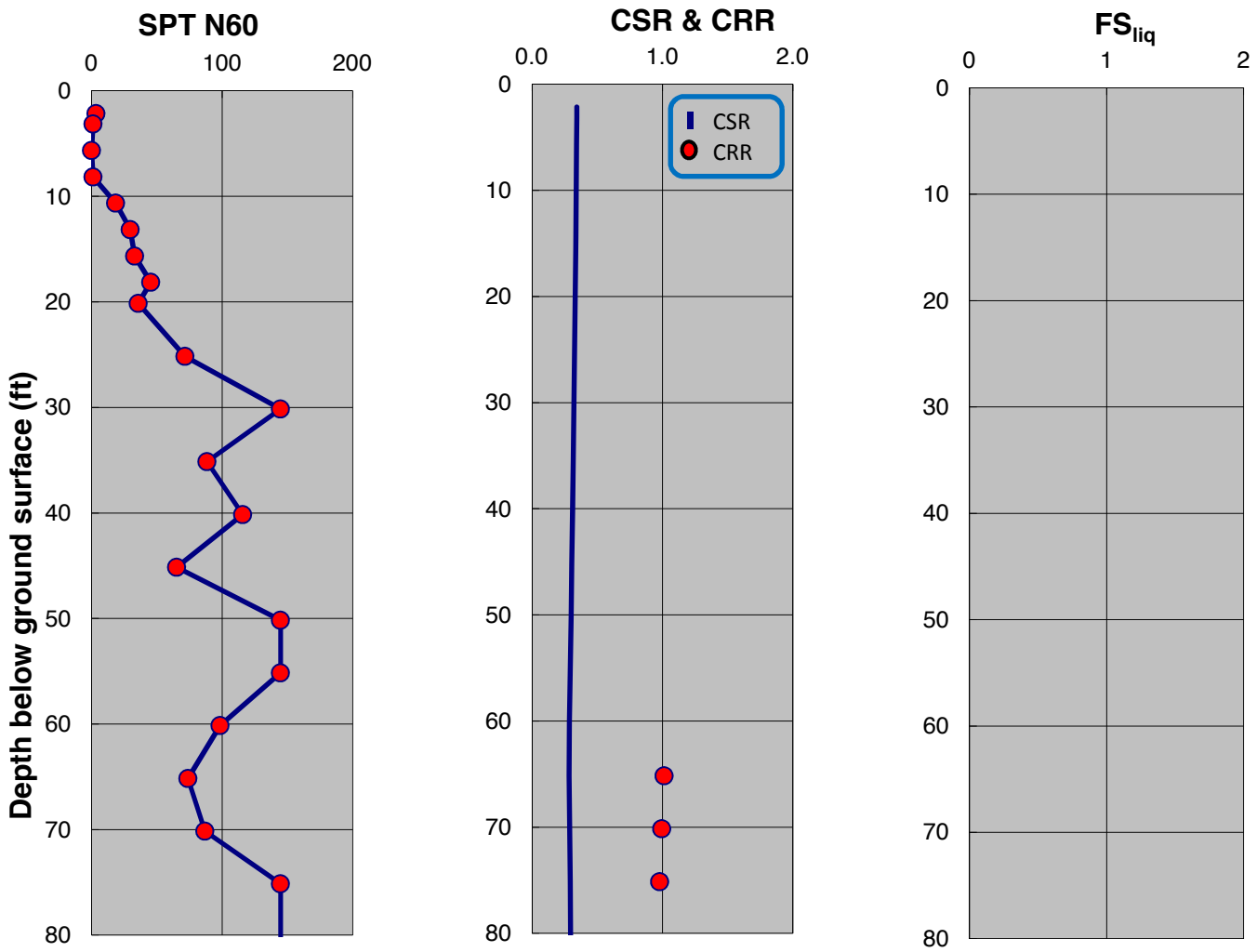
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.170



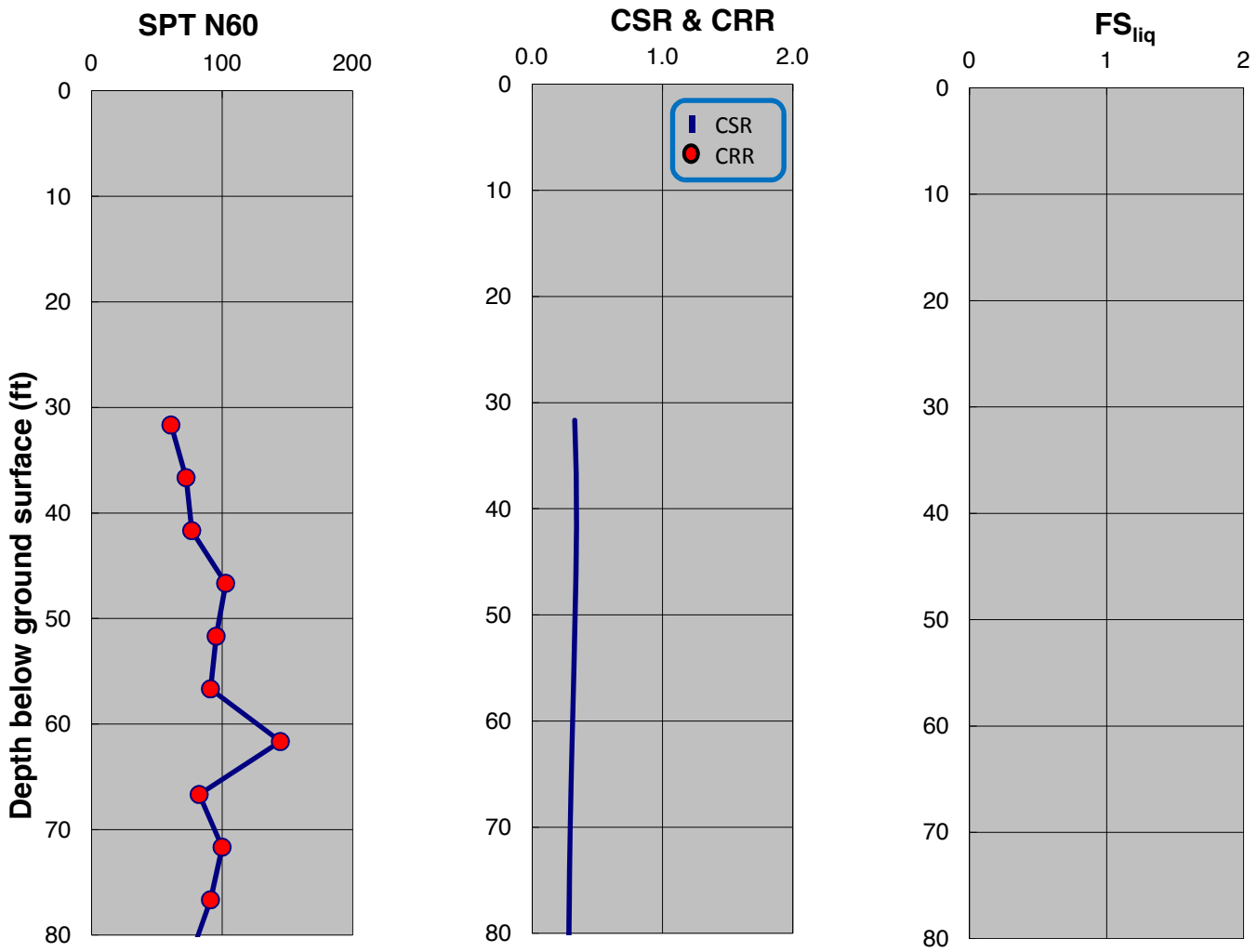
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-137 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



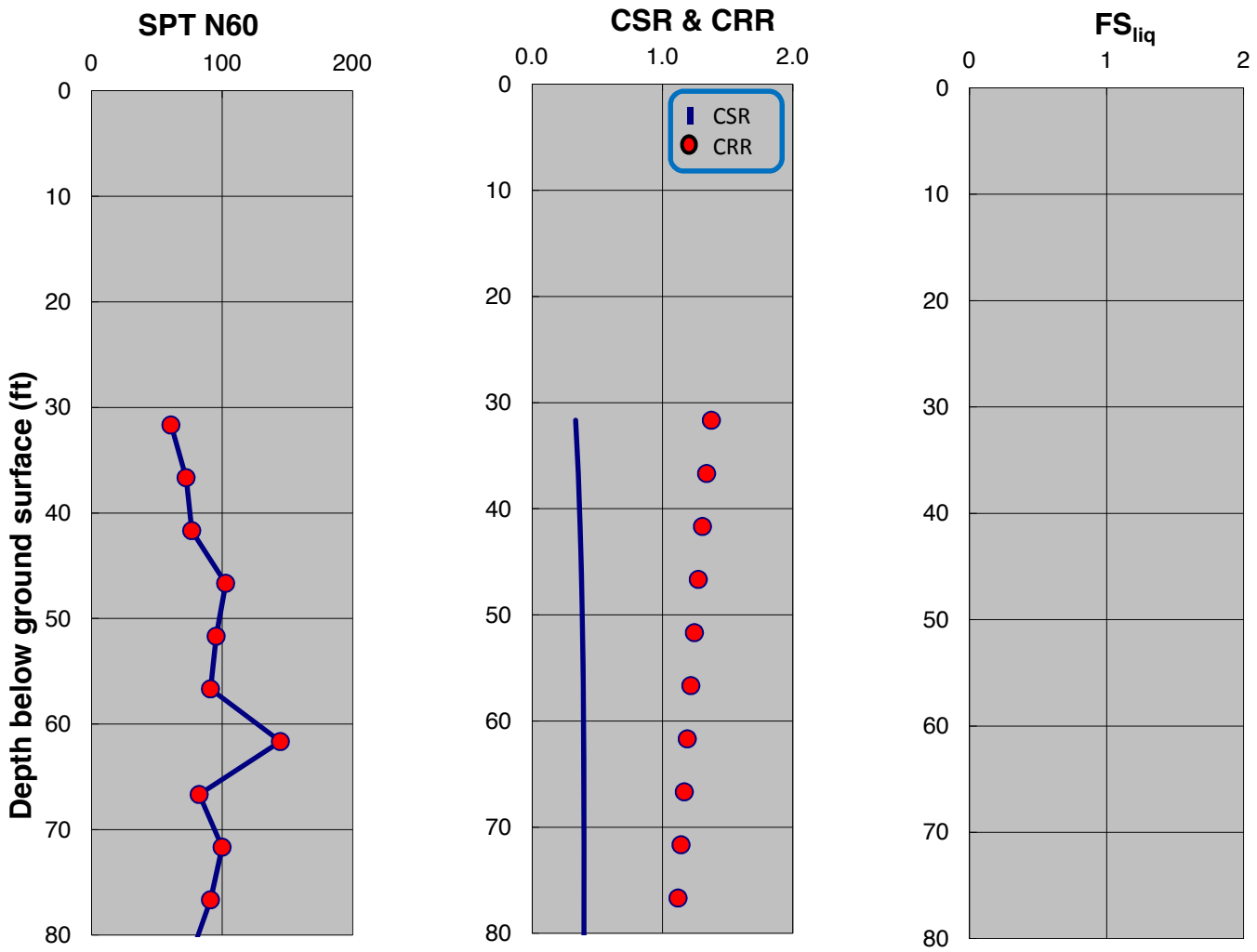
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-137 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



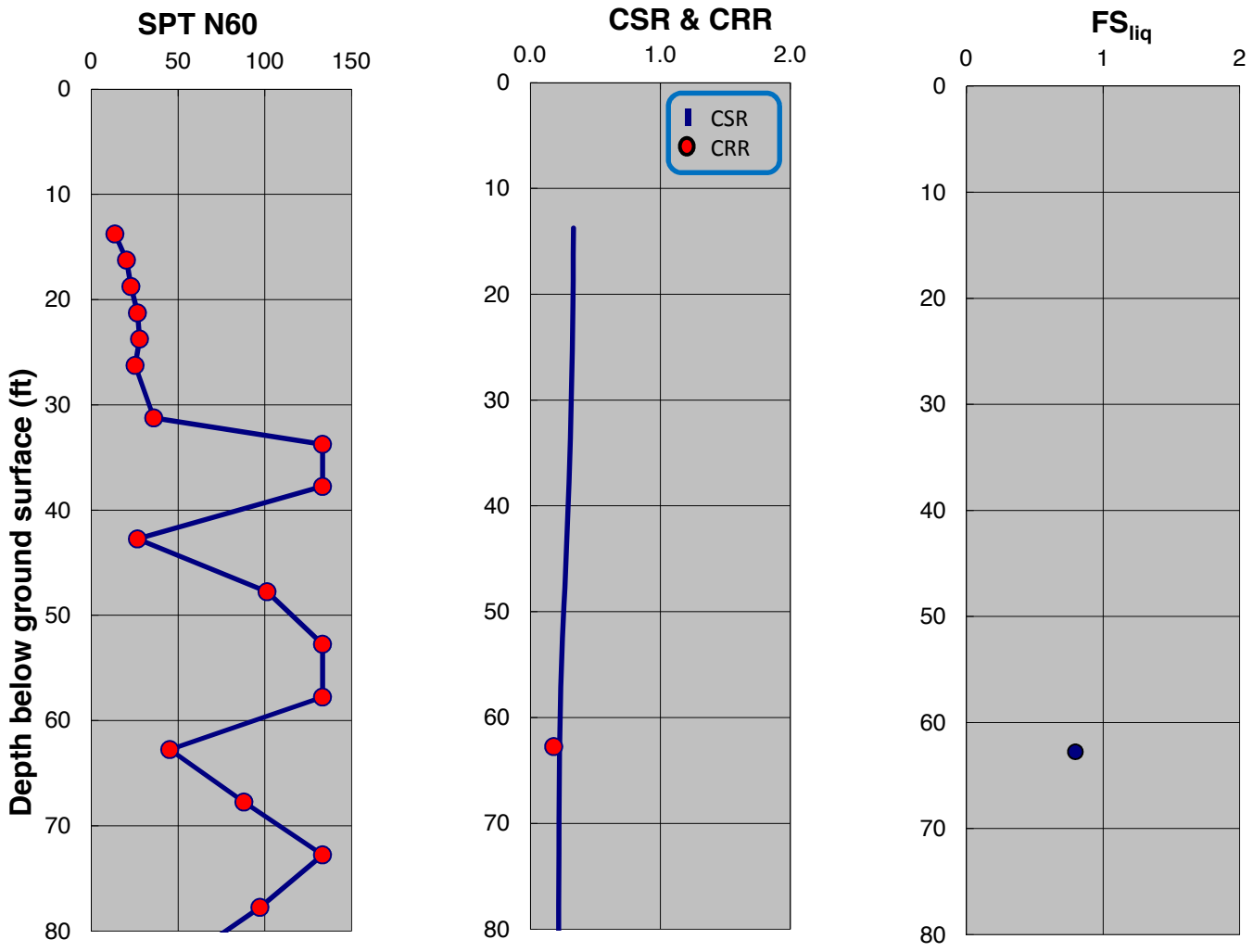
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-138 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



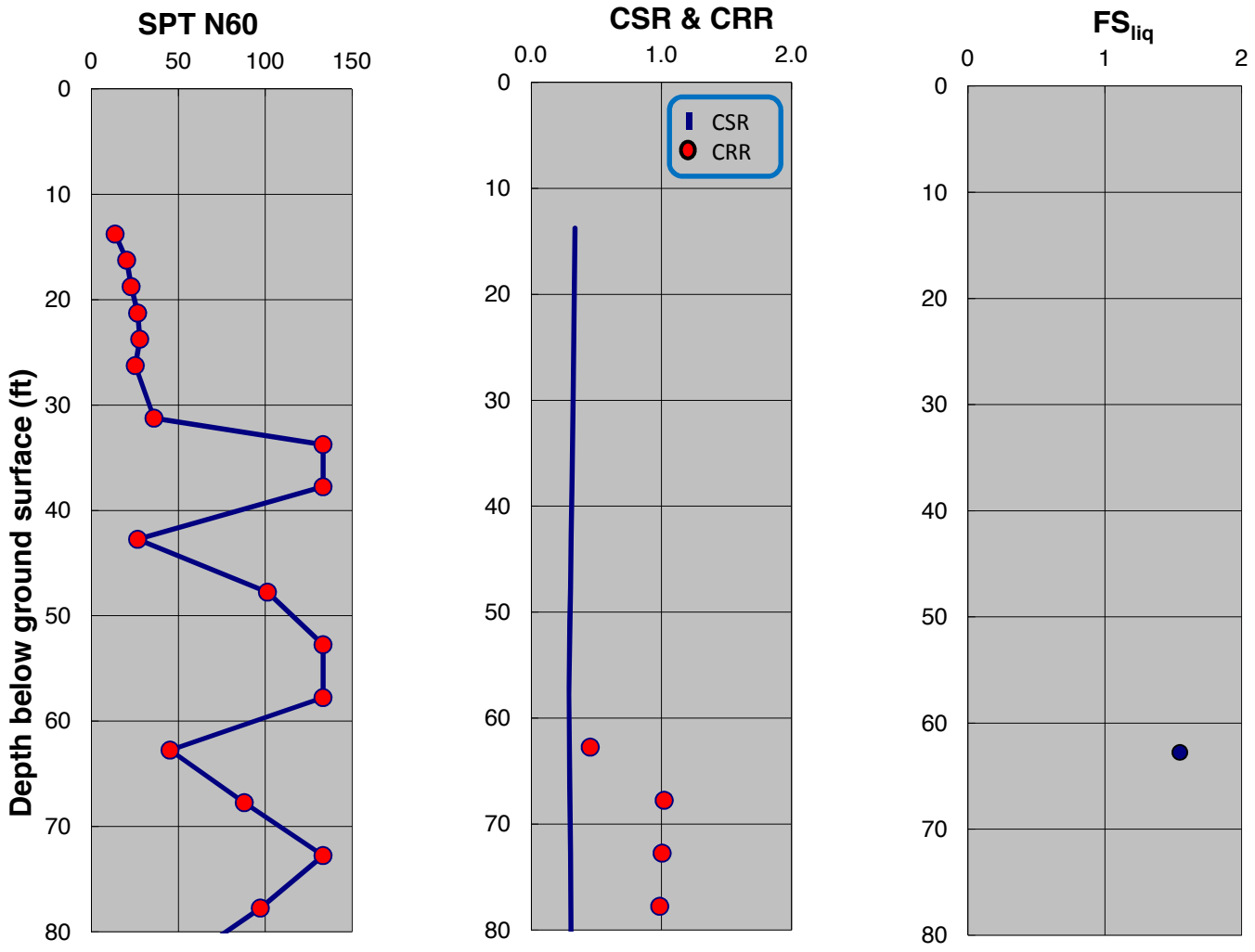
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-138 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



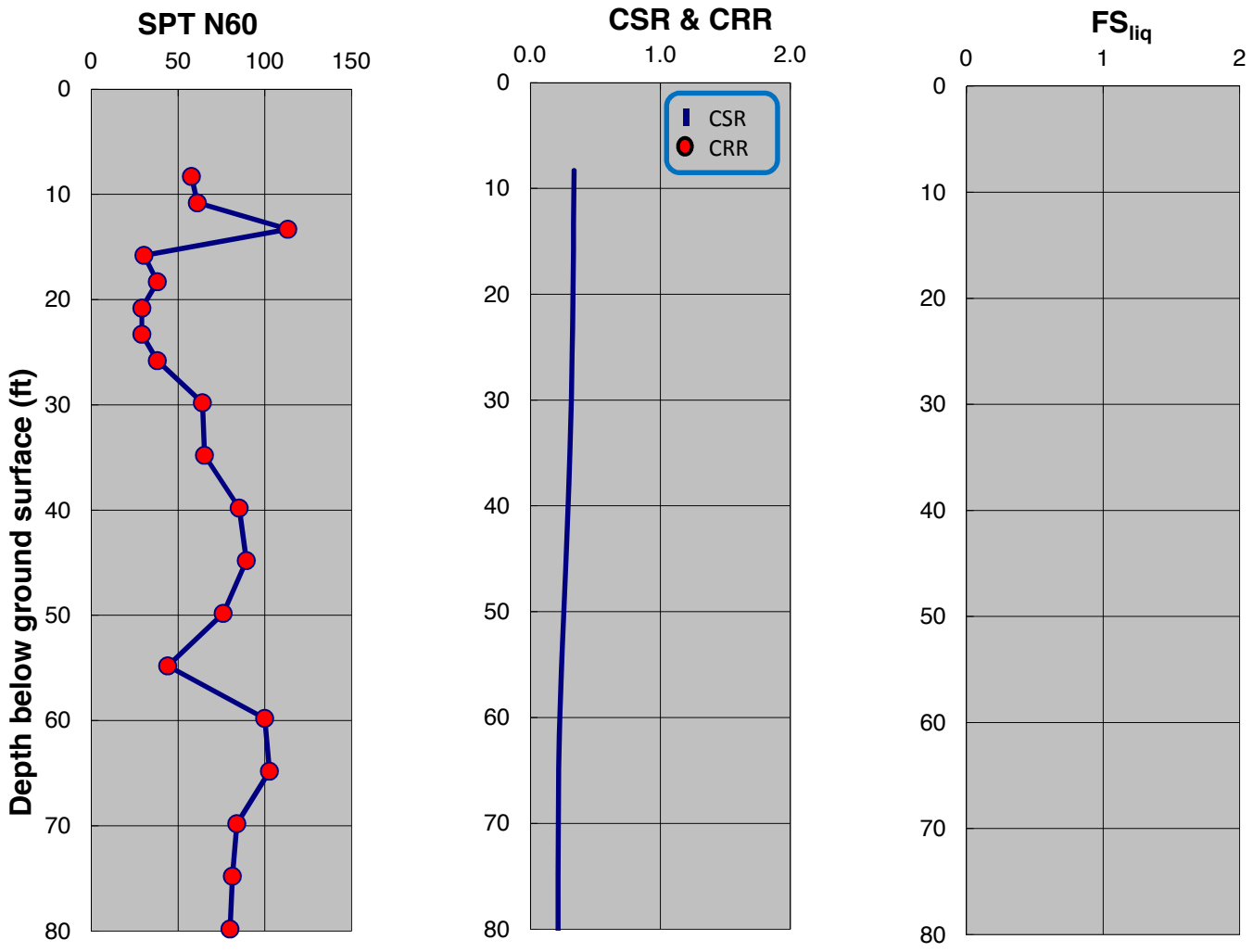
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-146 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



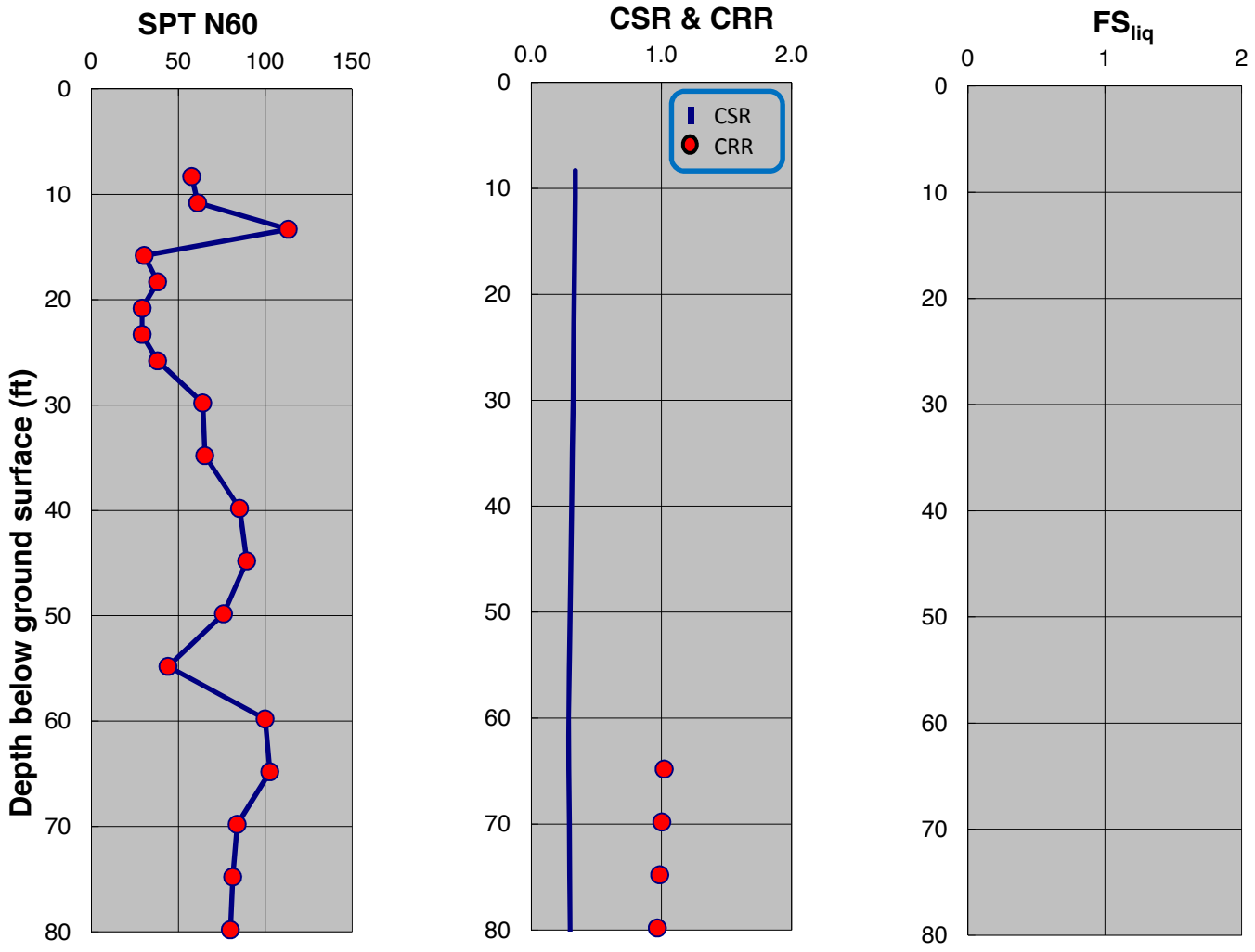
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-146 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



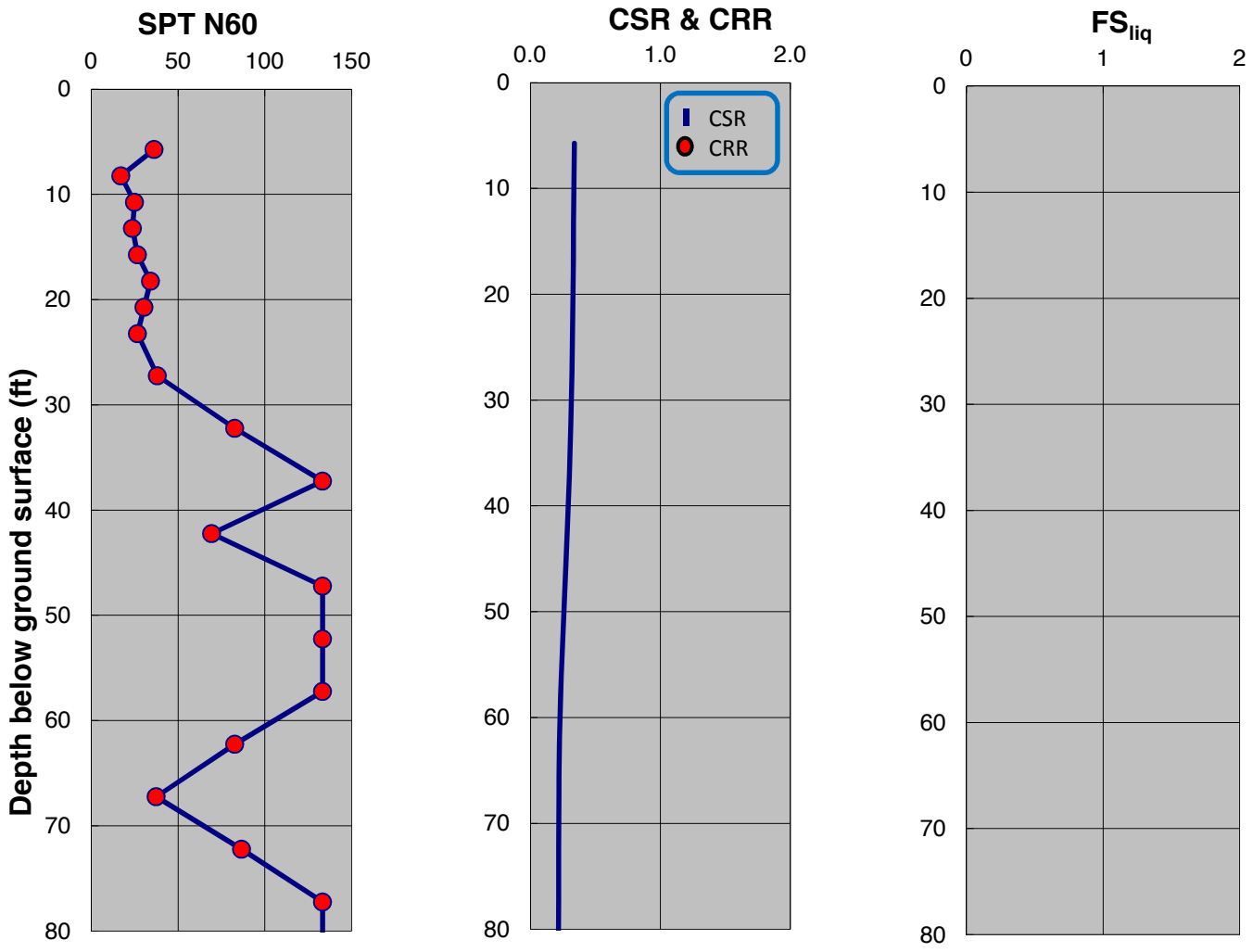
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-147 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



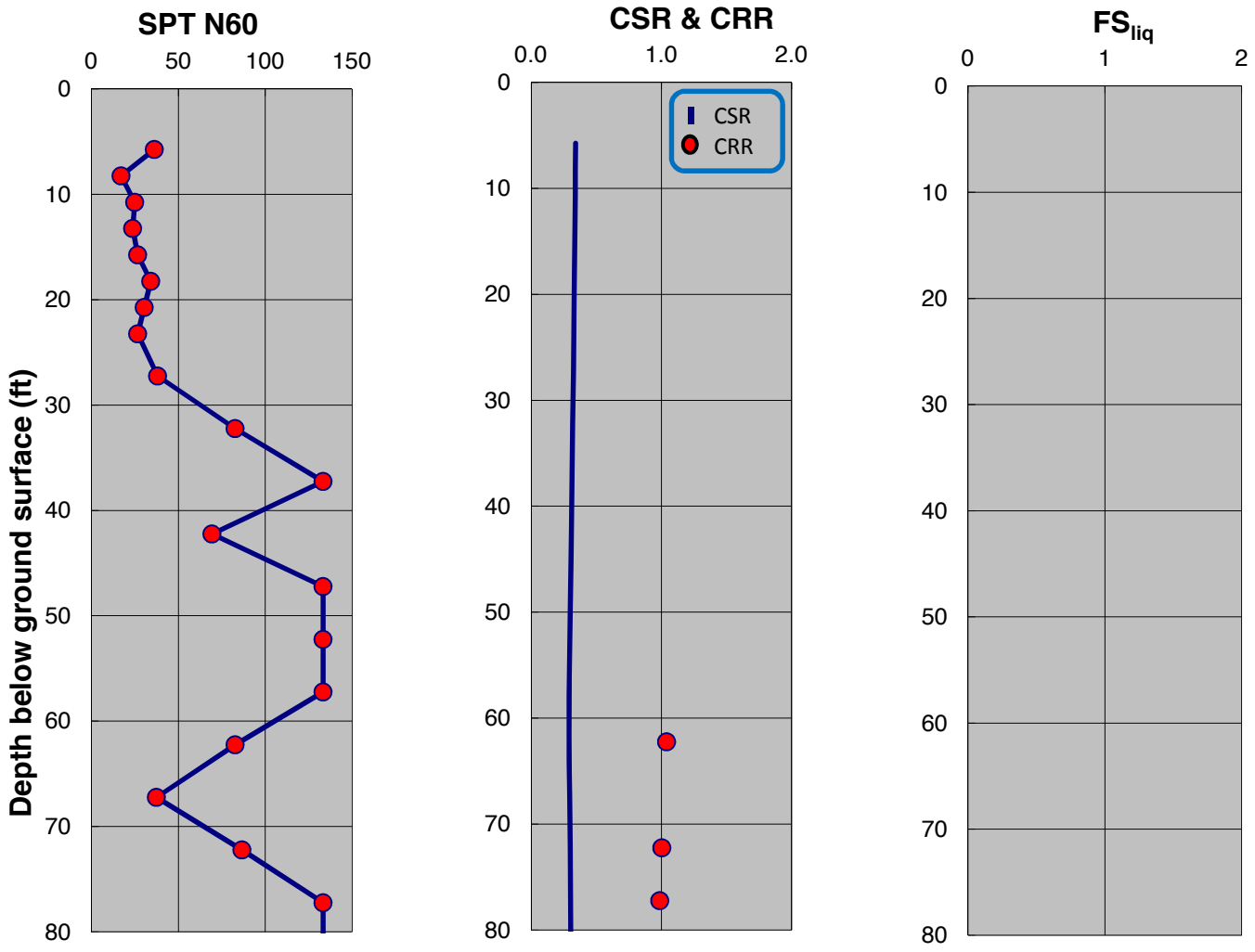
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-147 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-148 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

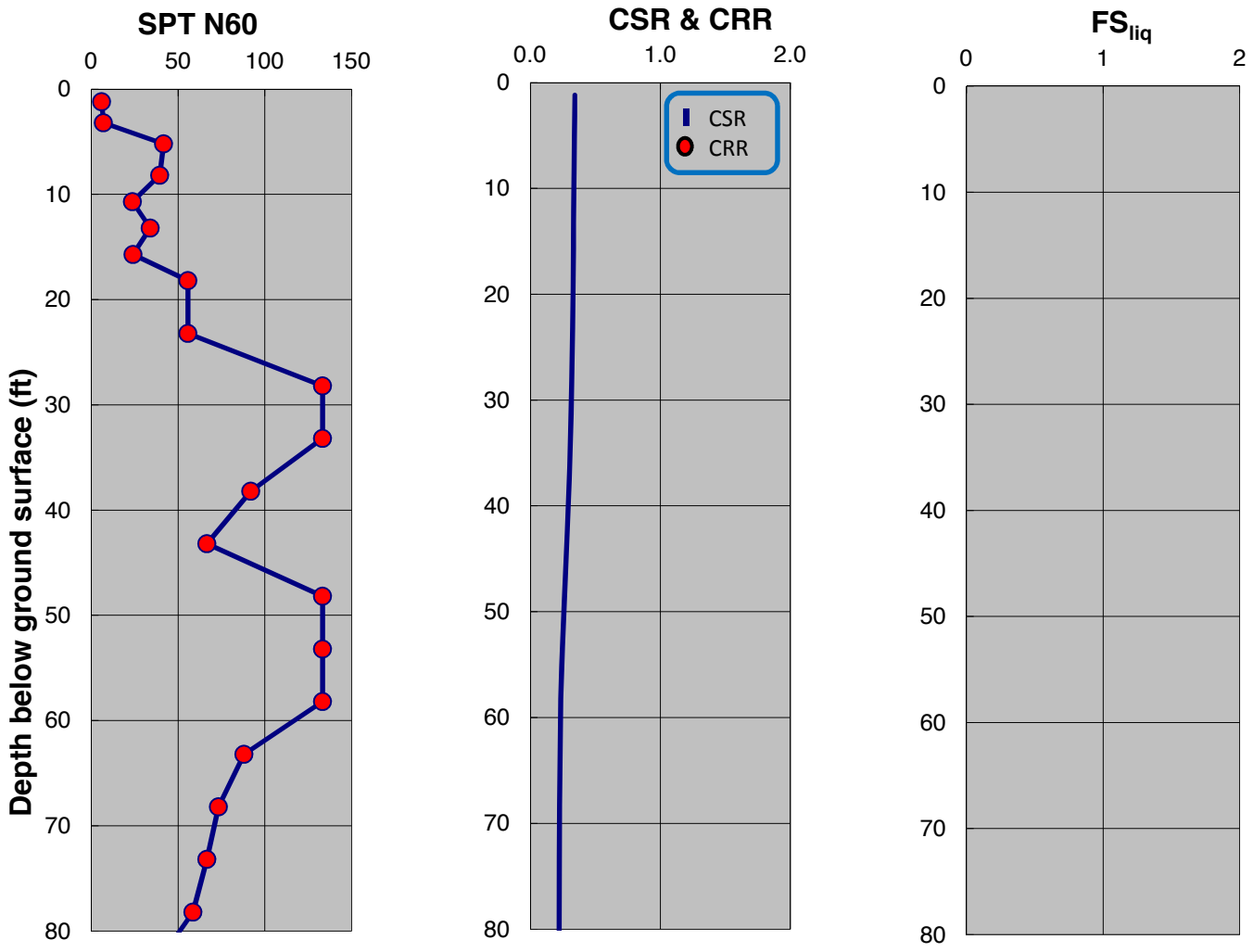
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-148 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

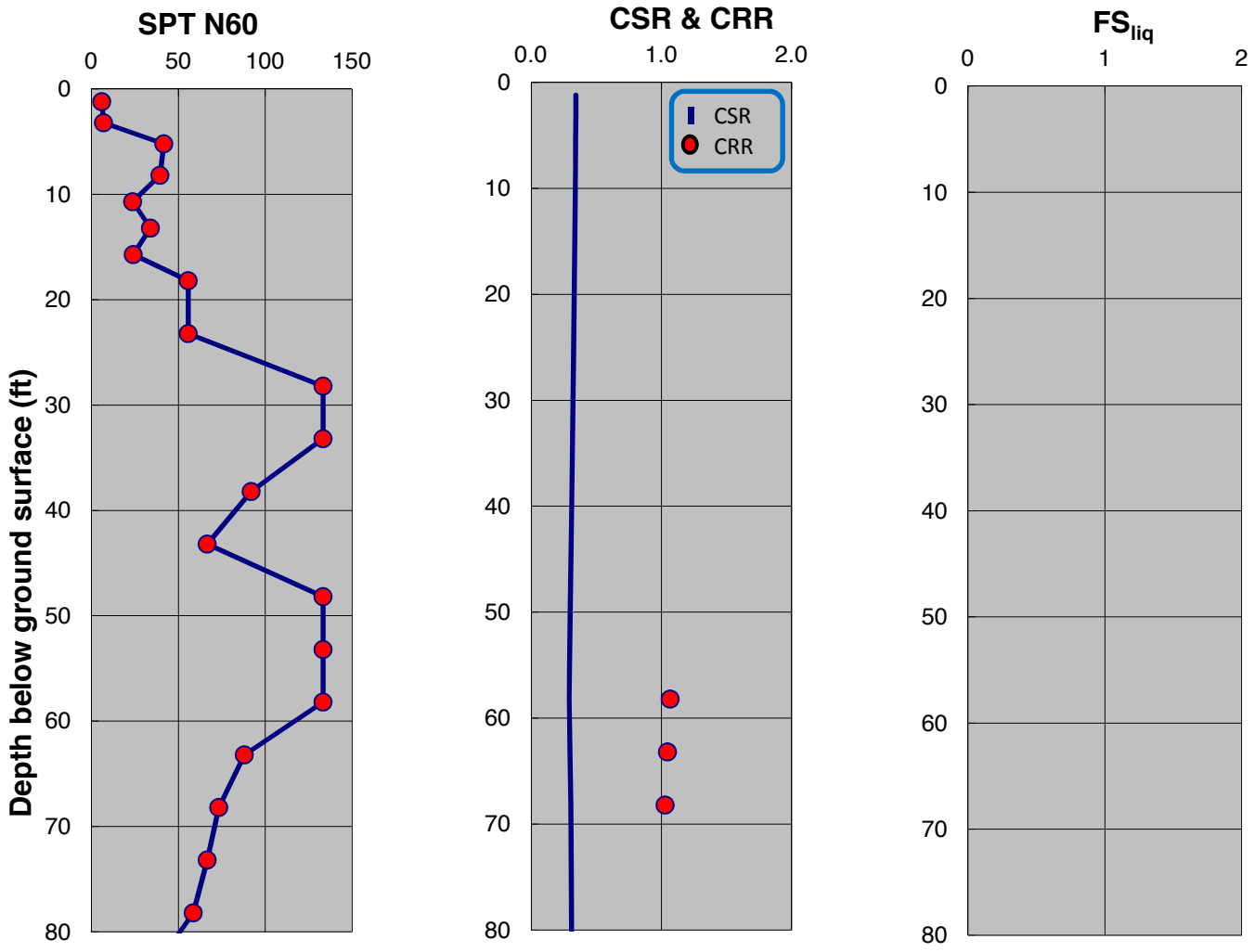
PLATE C.180



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-149 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

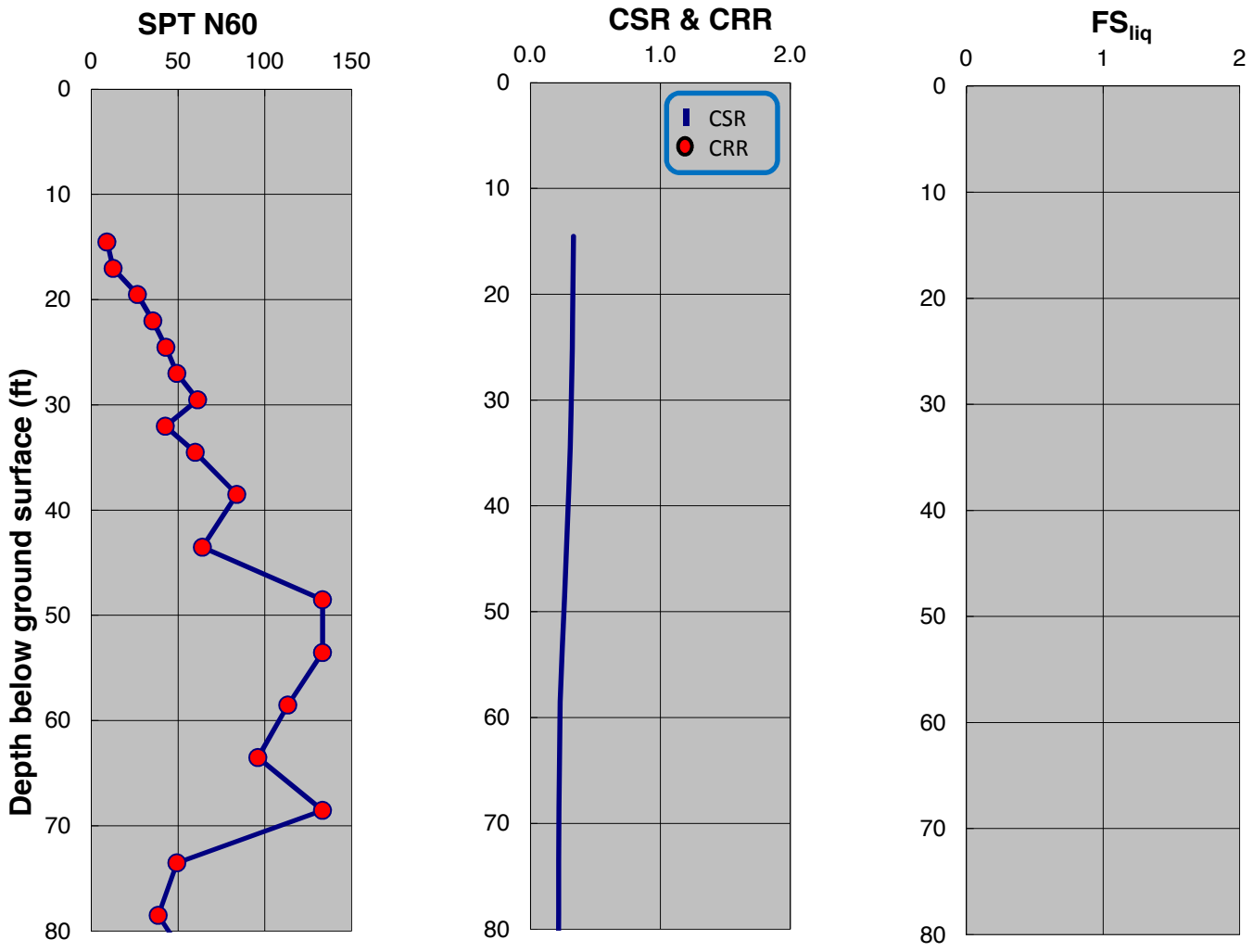
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.181



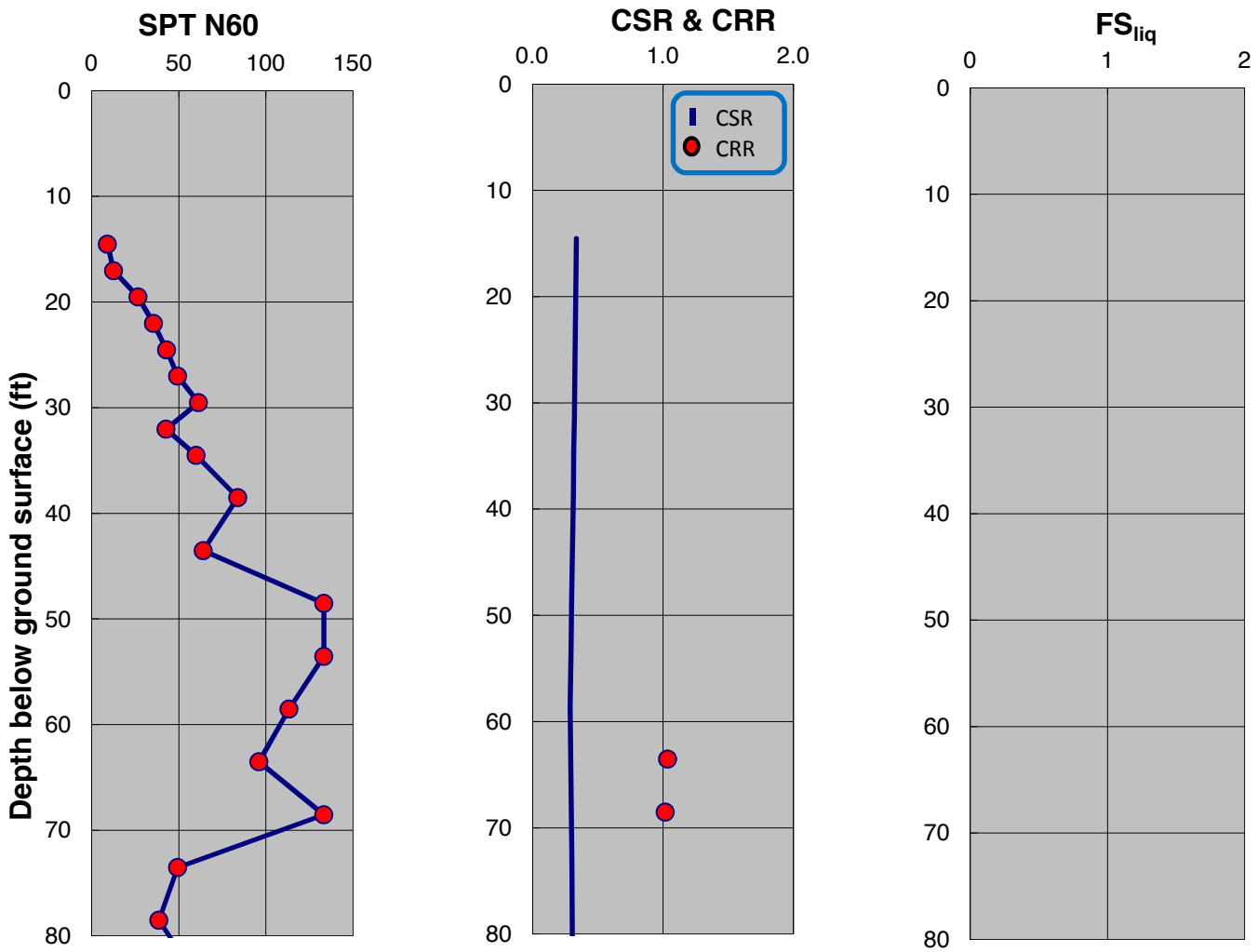
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-149 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



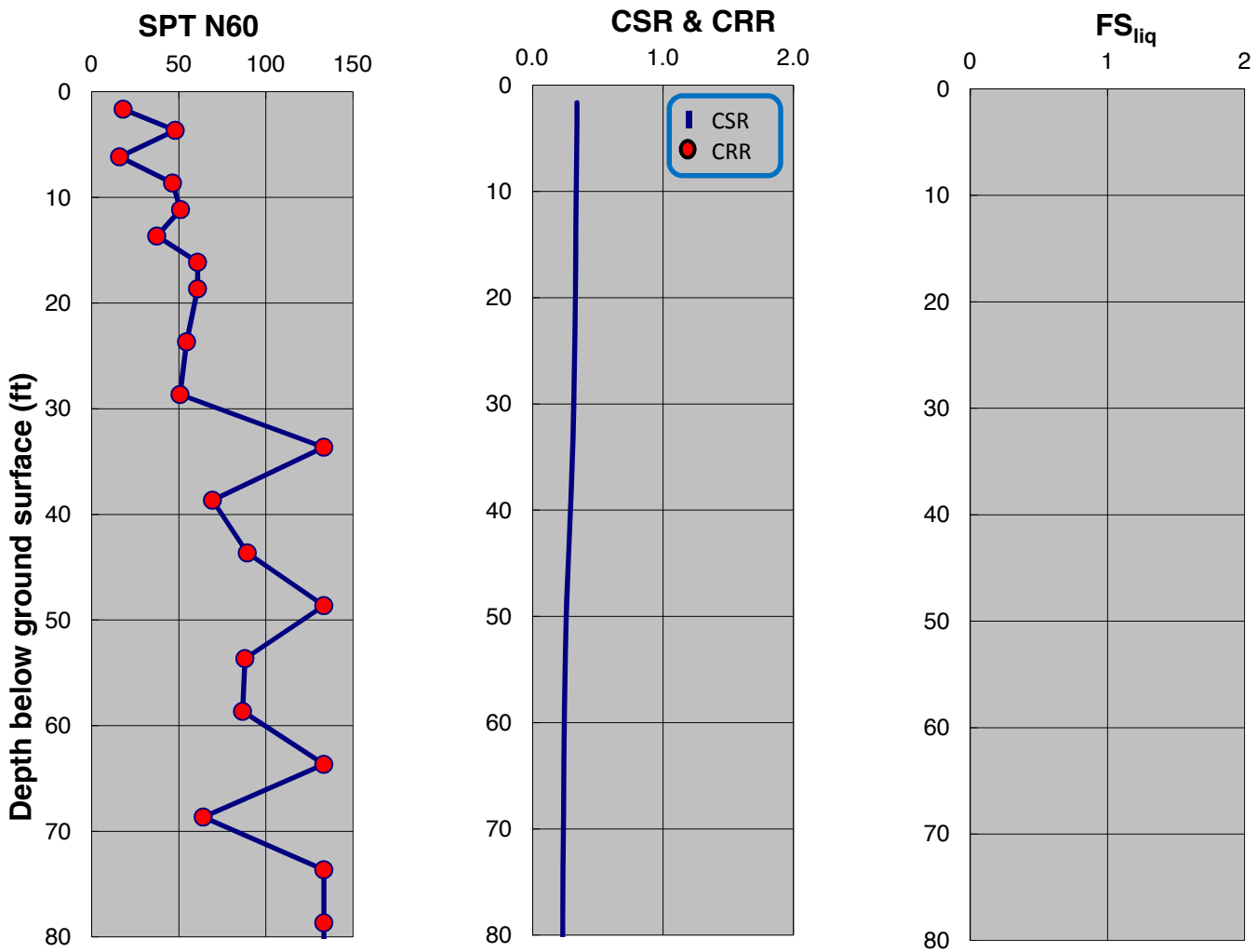
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-150 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



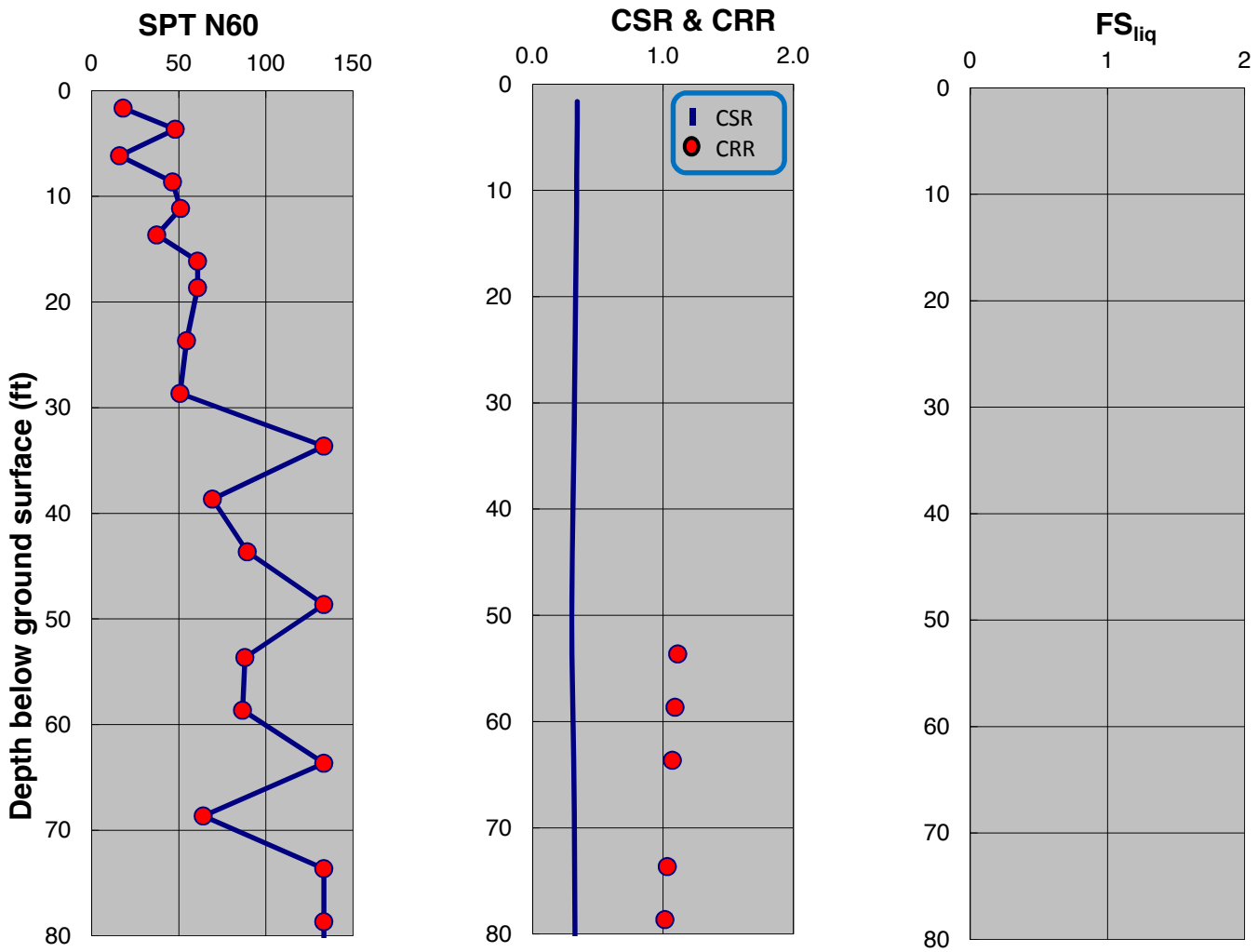
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-150 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



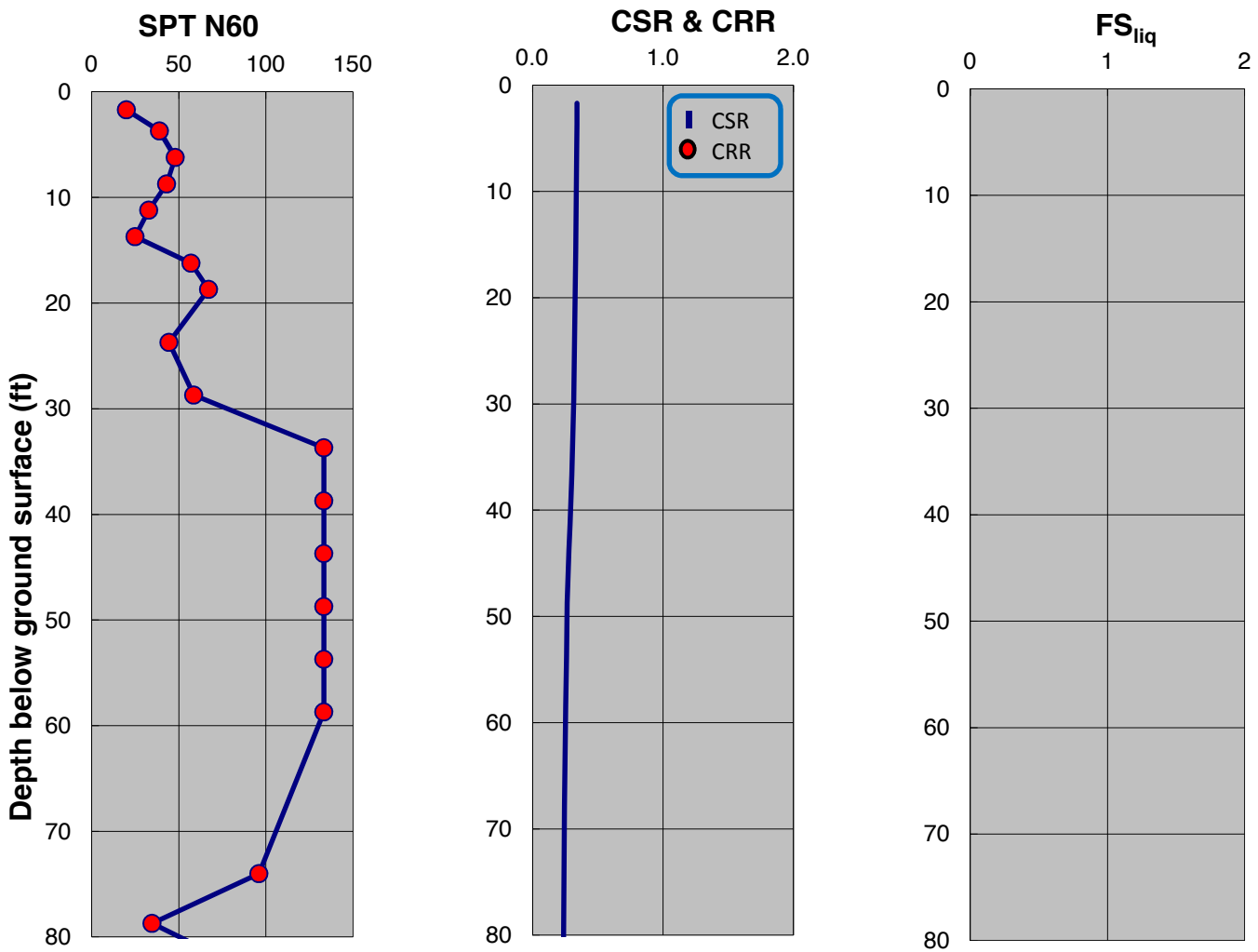
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-151 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



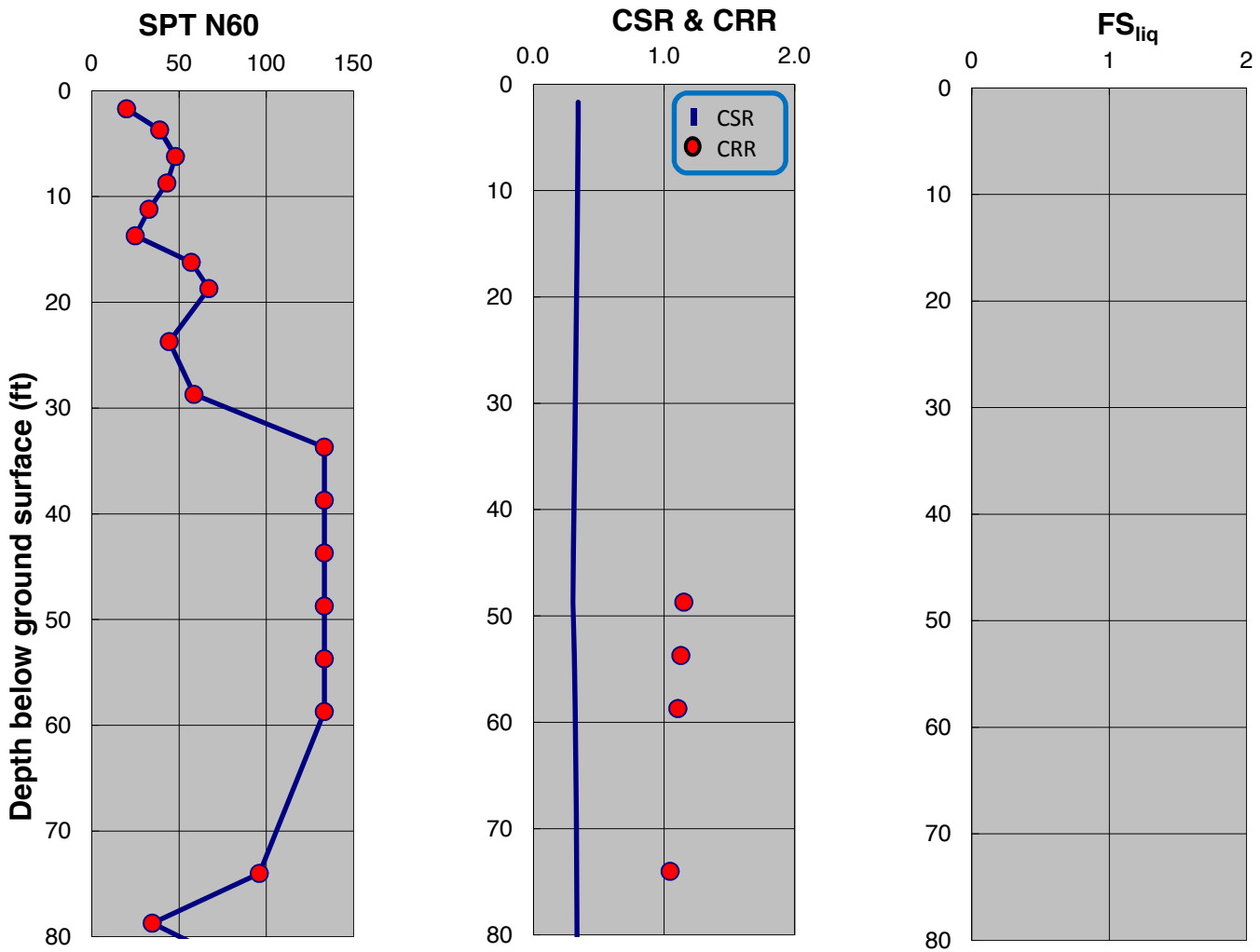
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-151 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



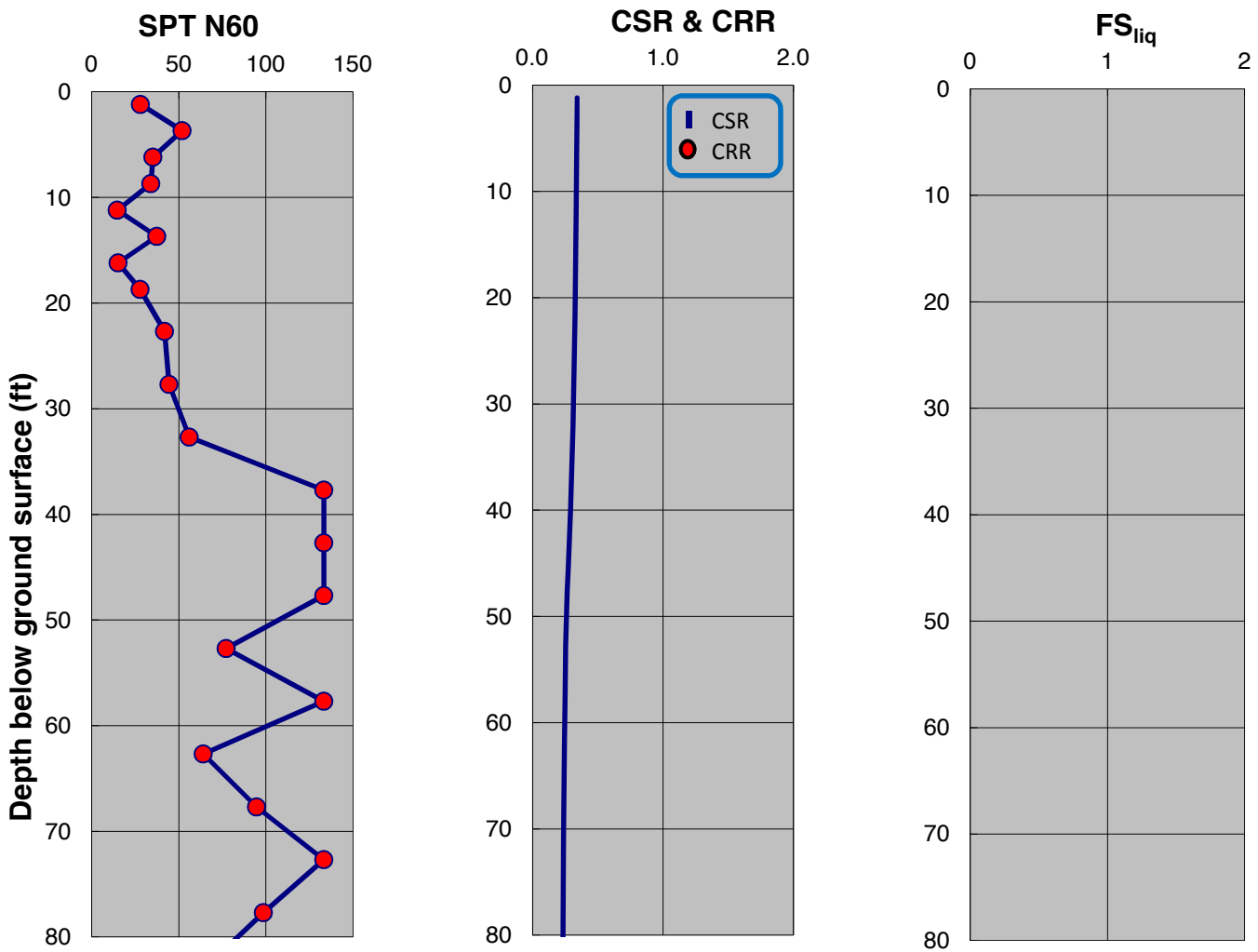
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-152 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



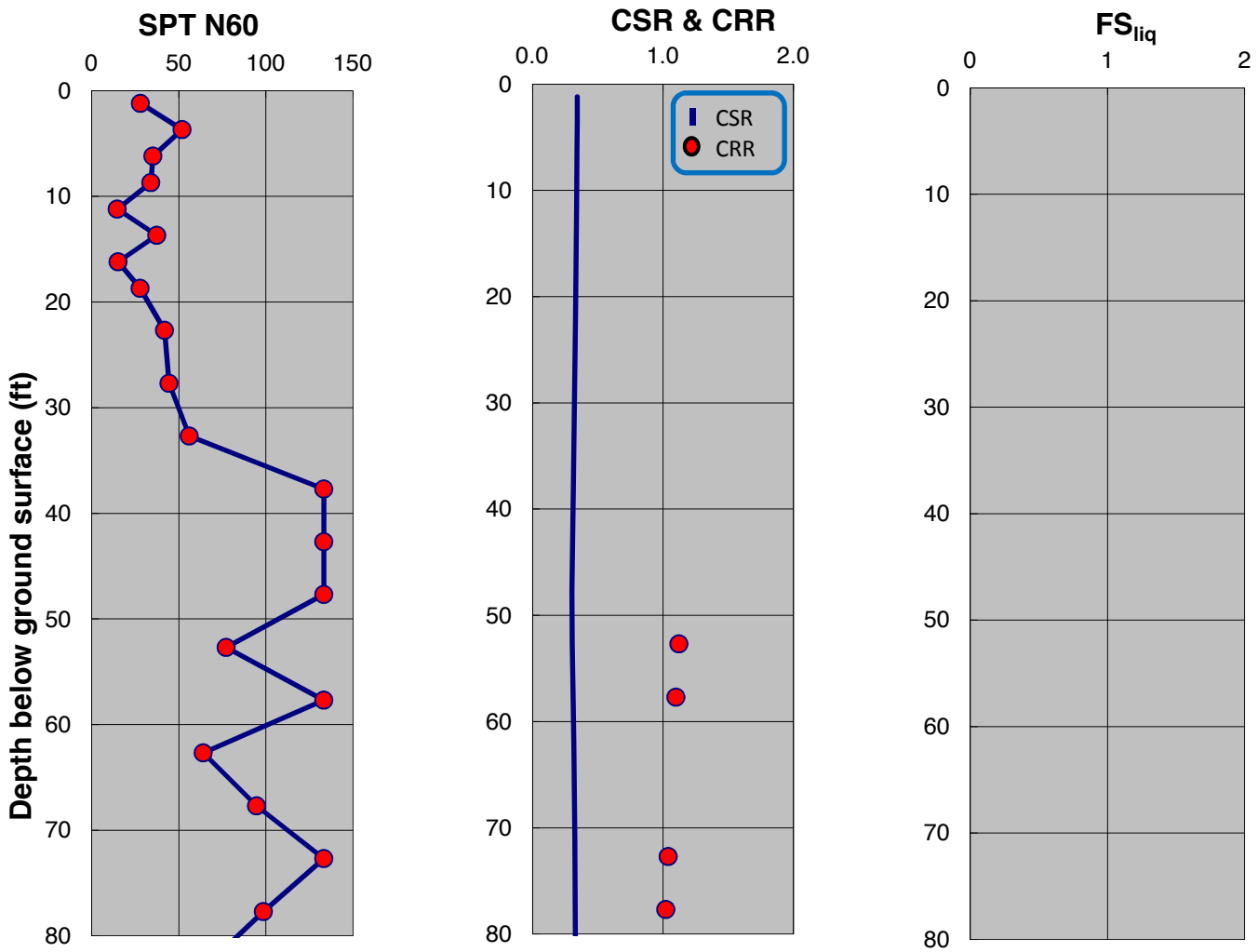
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-152 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



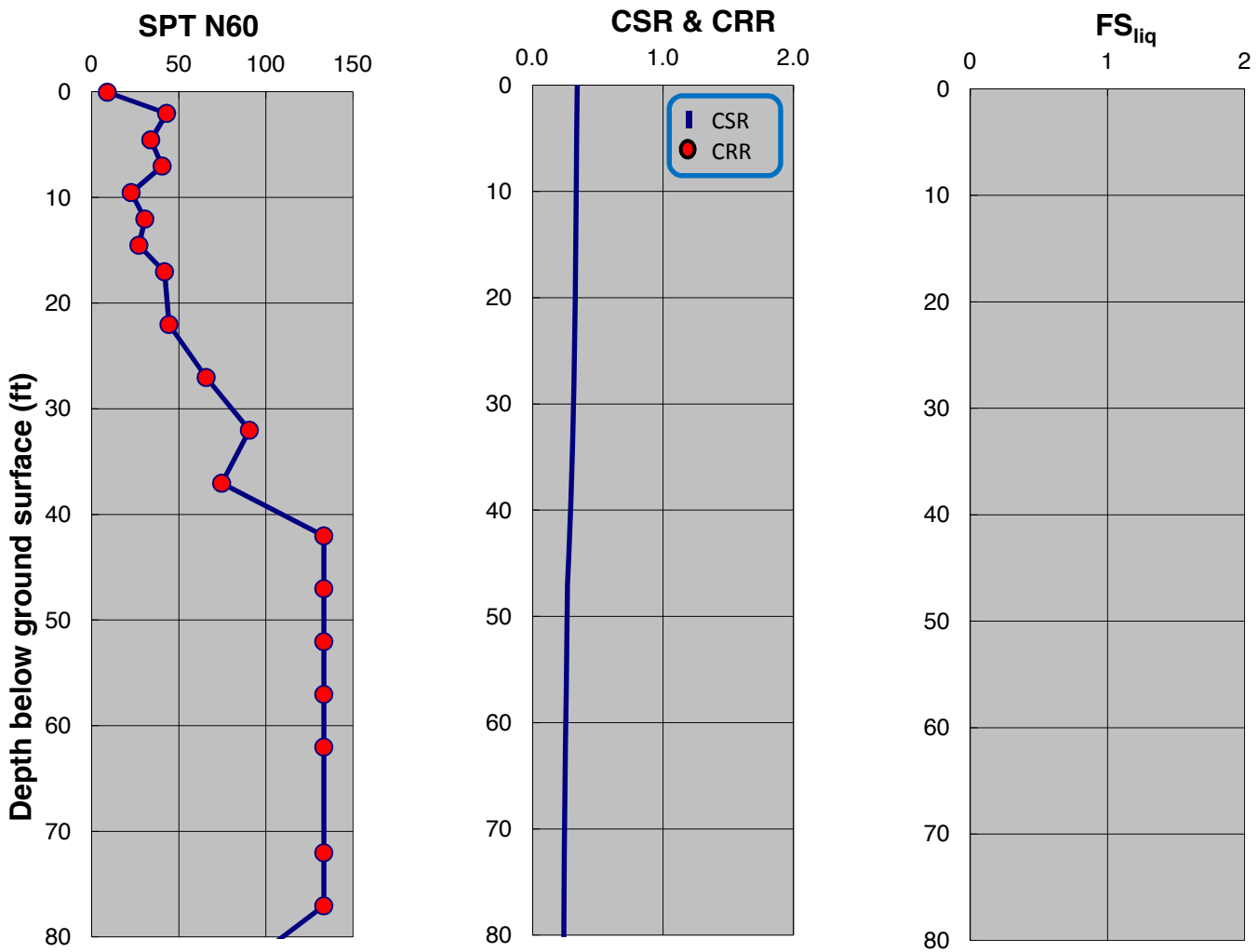
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-153 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



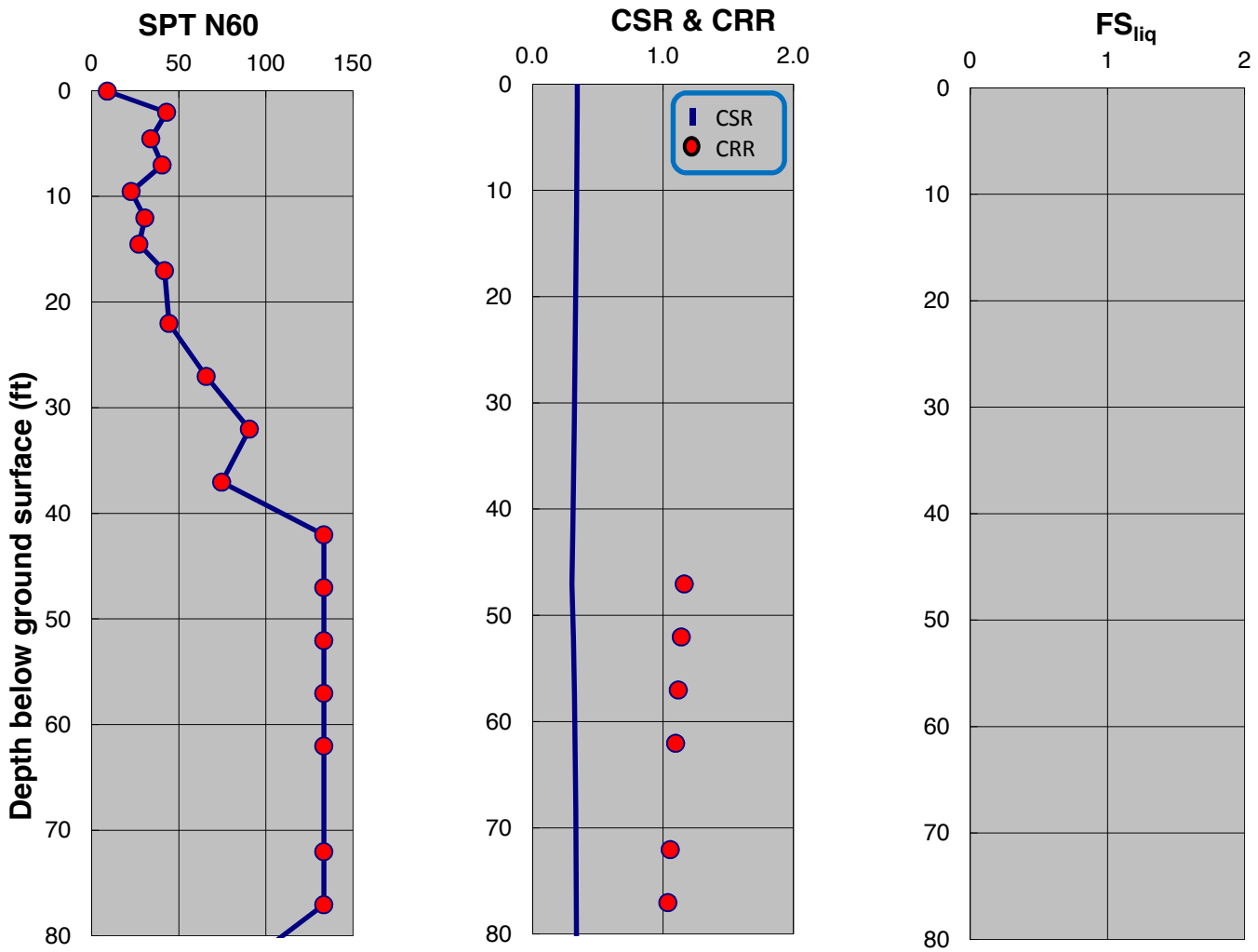
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-153 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



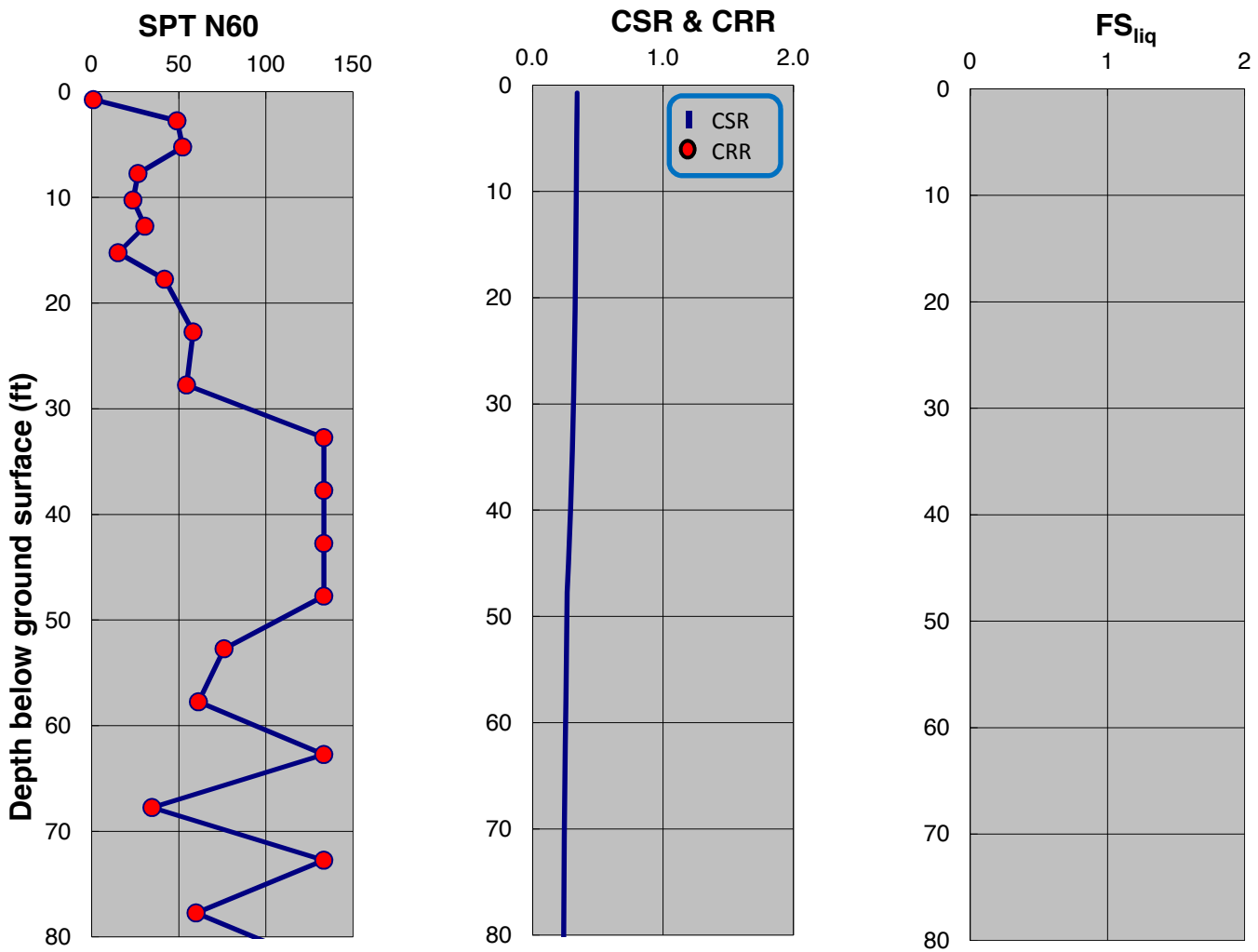
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-154 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



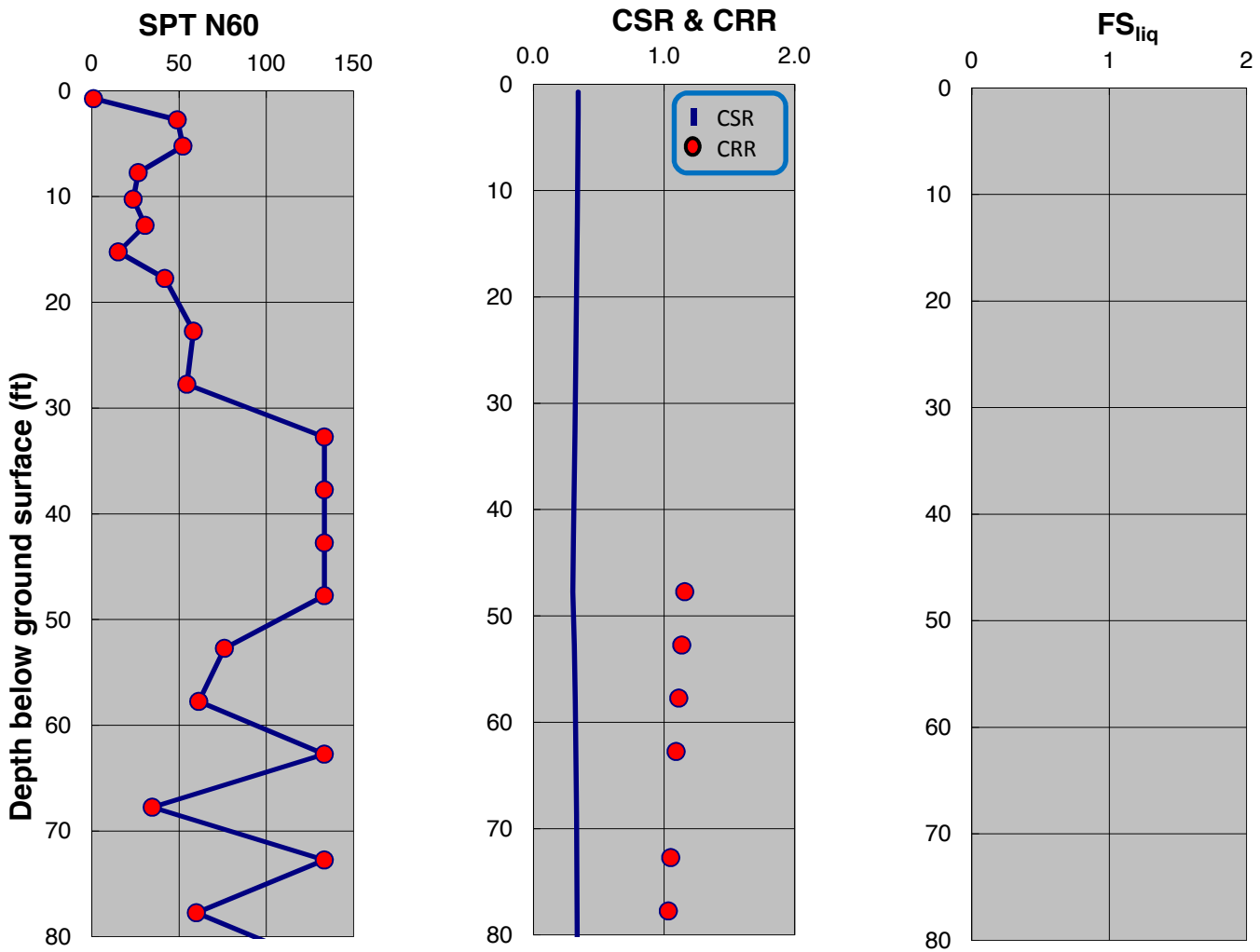
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-154 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



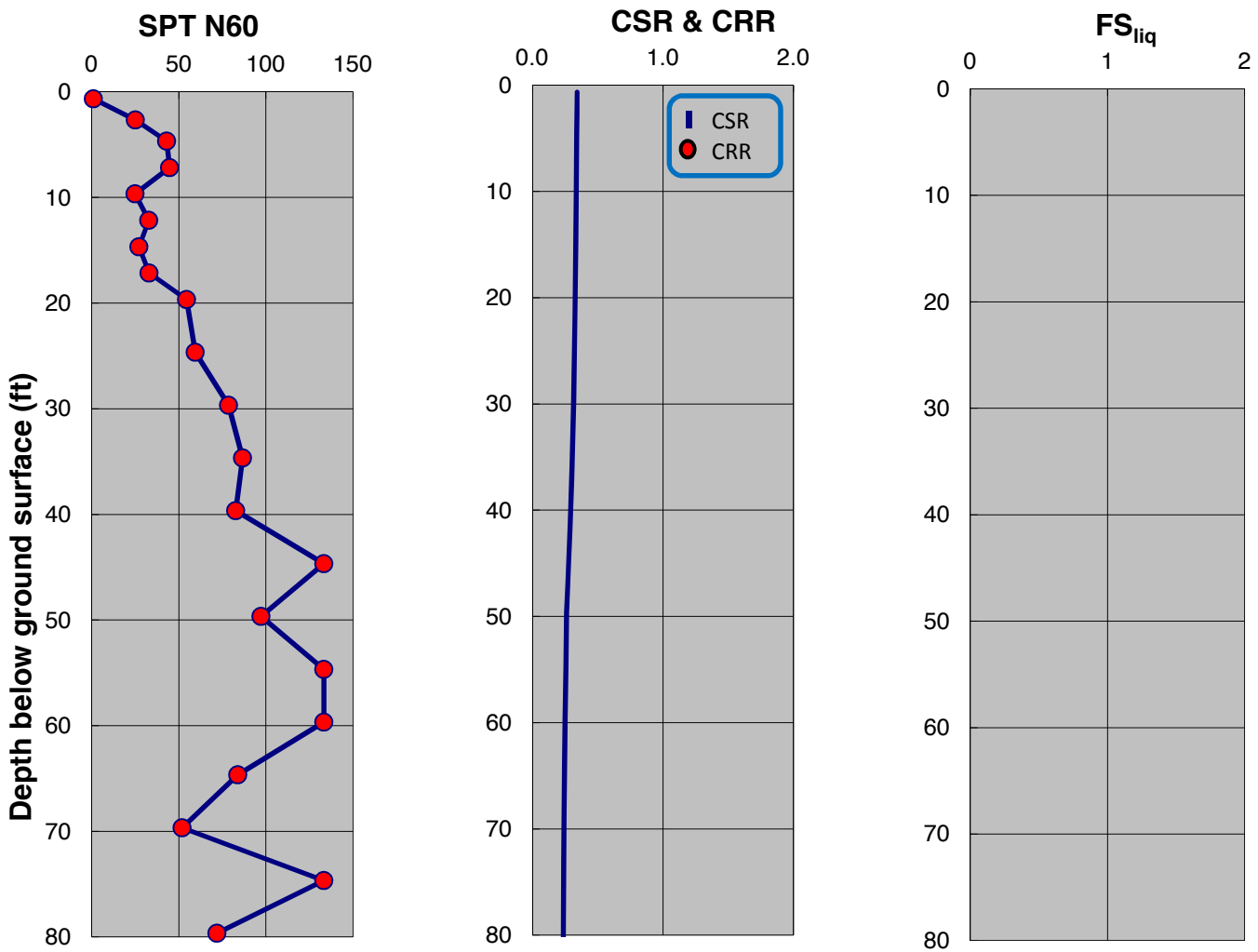
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-155 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



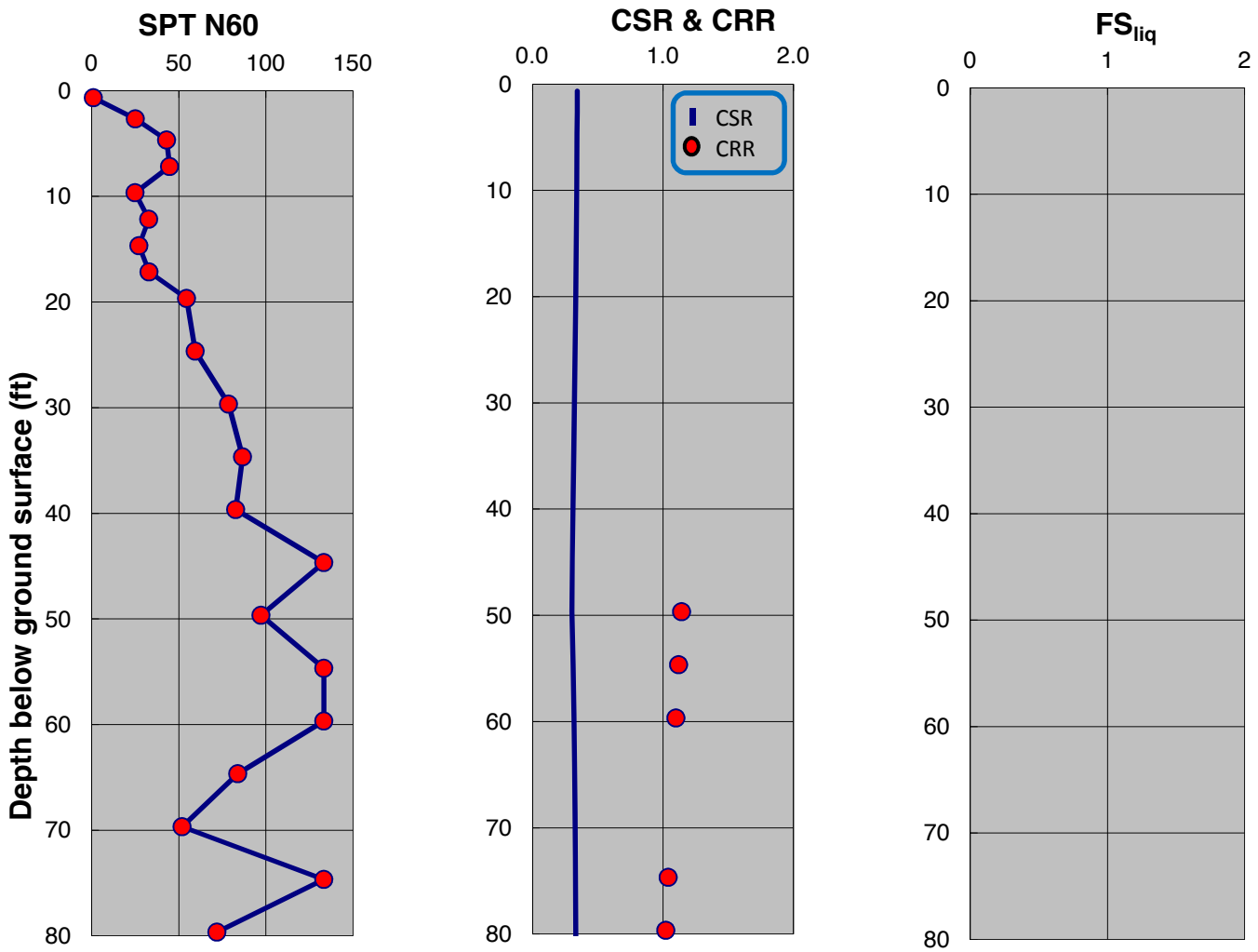
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-155 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



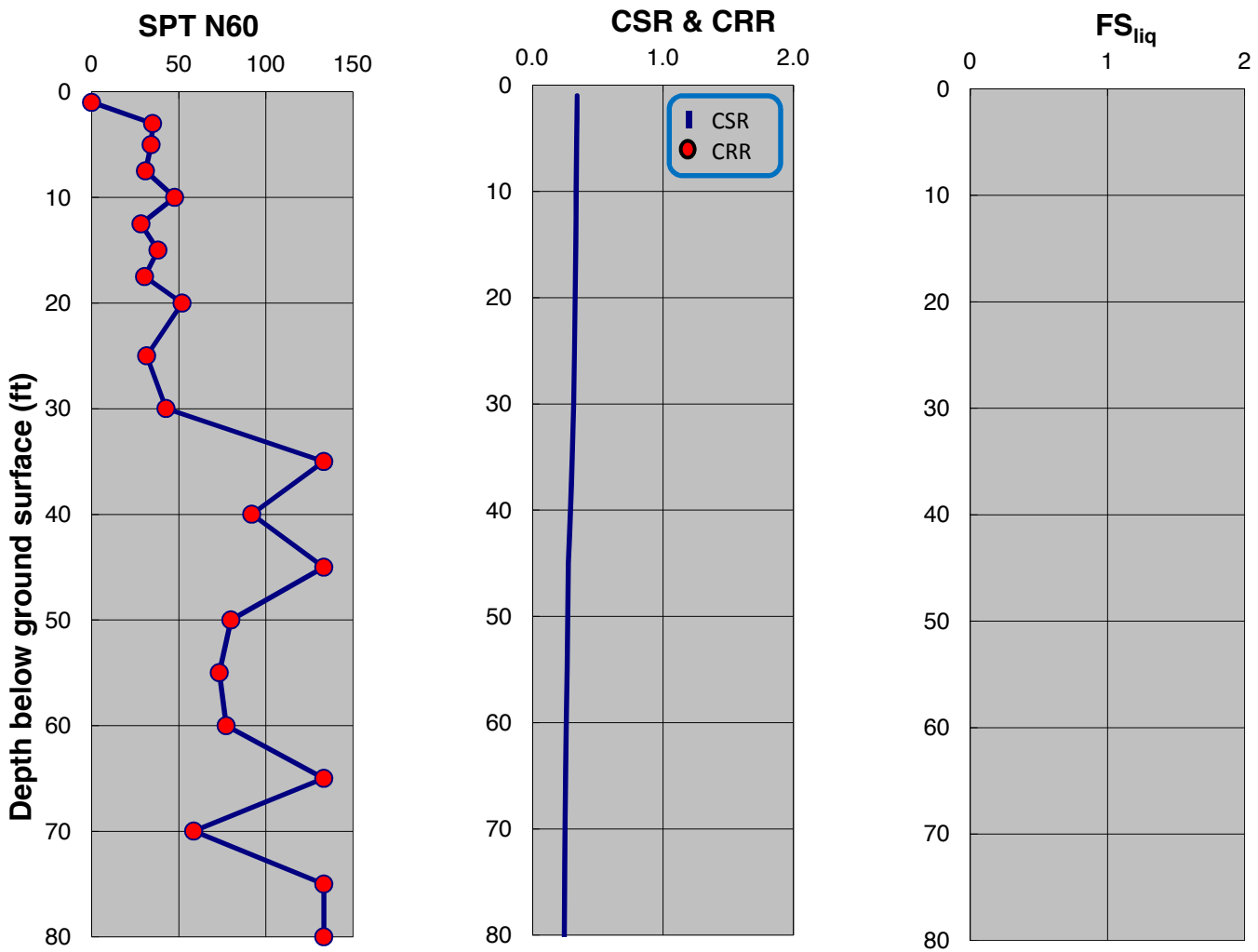
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-156 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



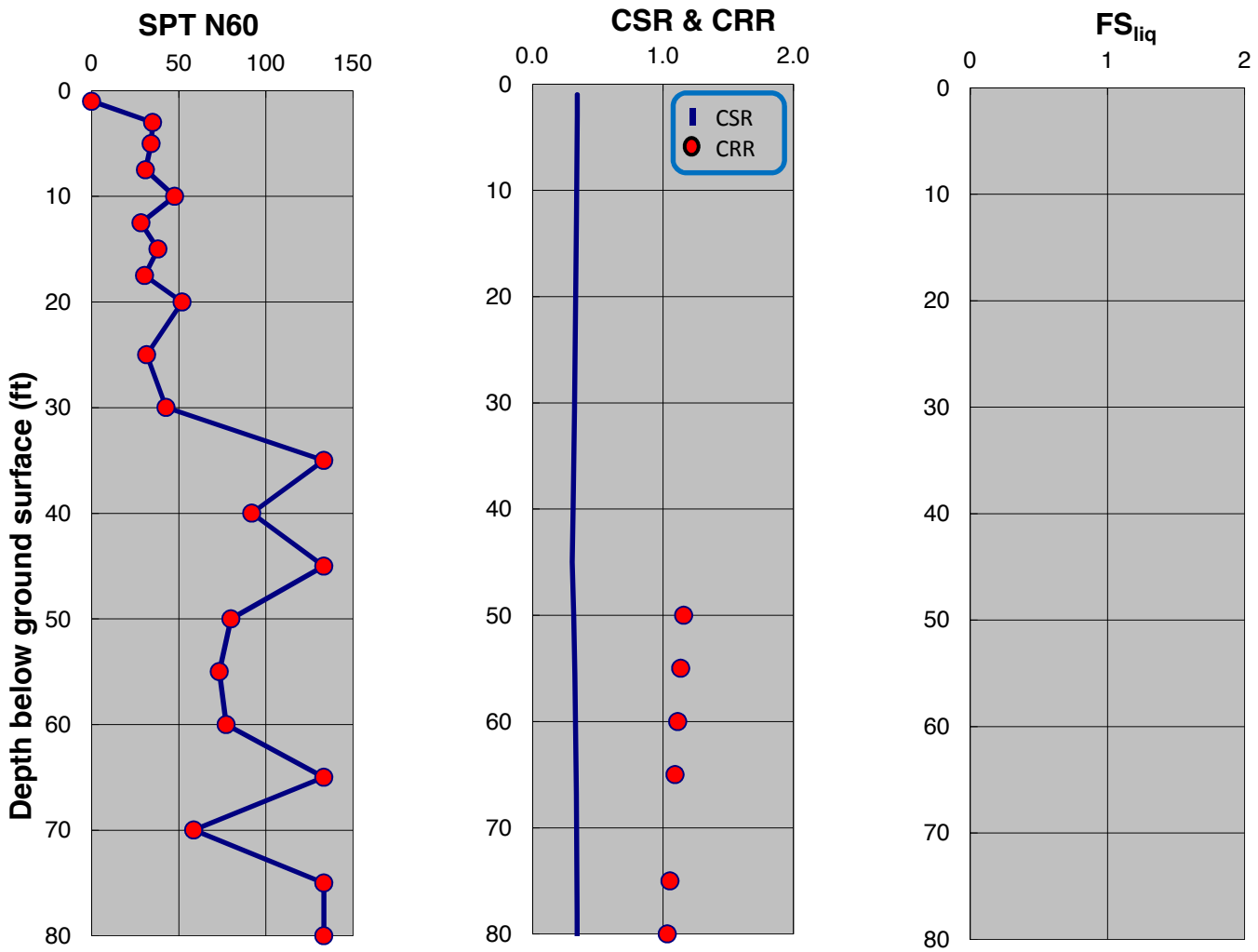
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-156 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



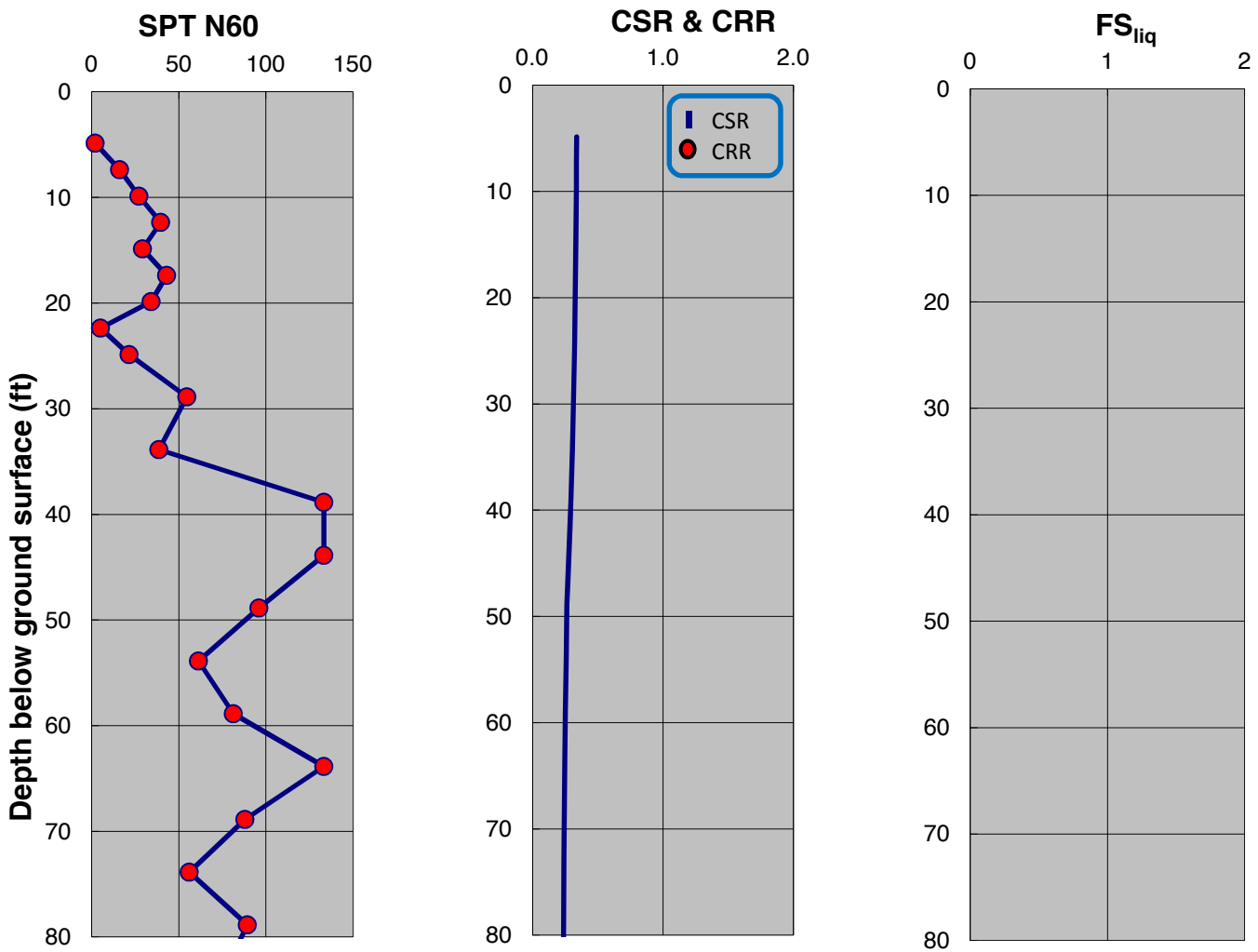
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-157 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



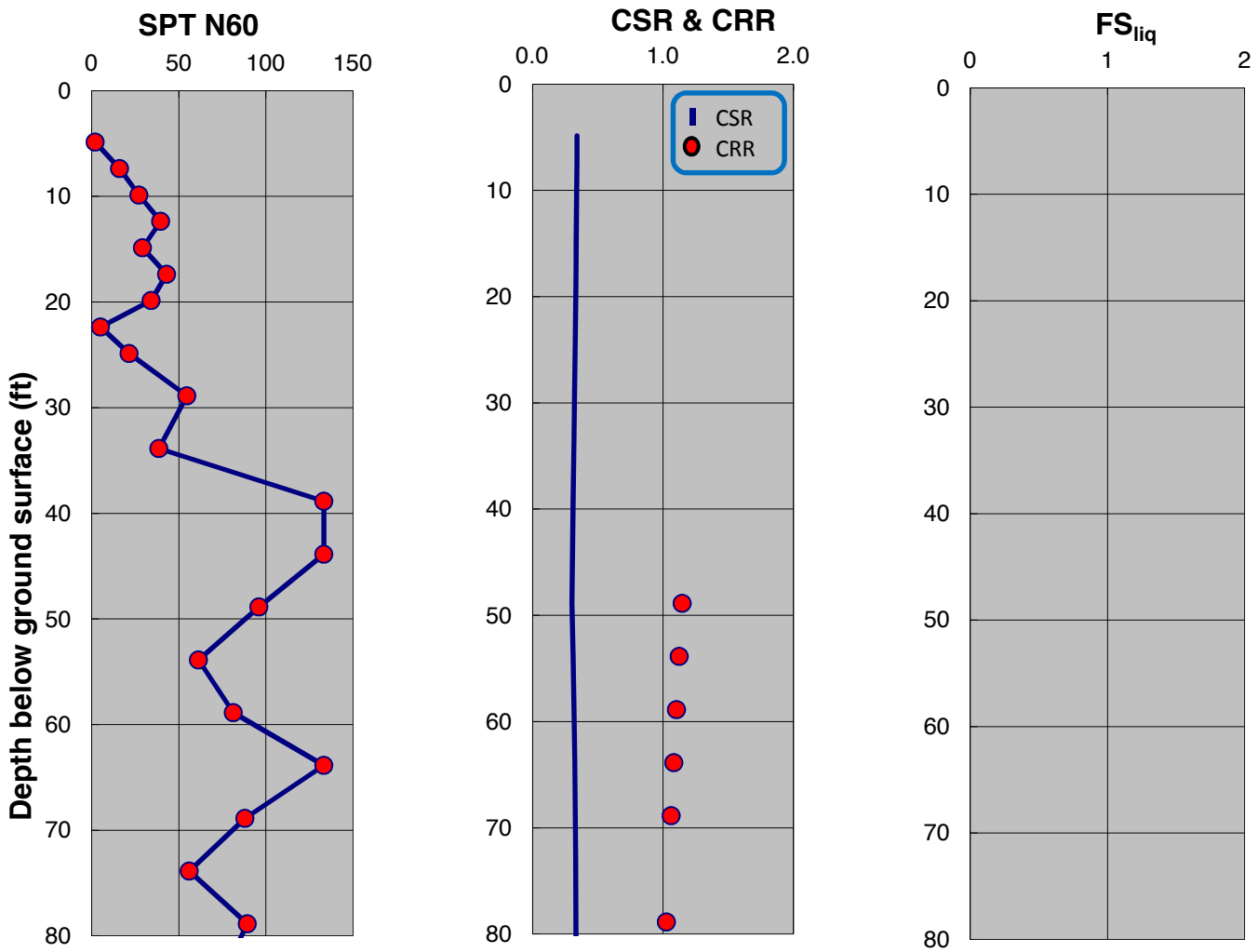
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-157 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-158 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

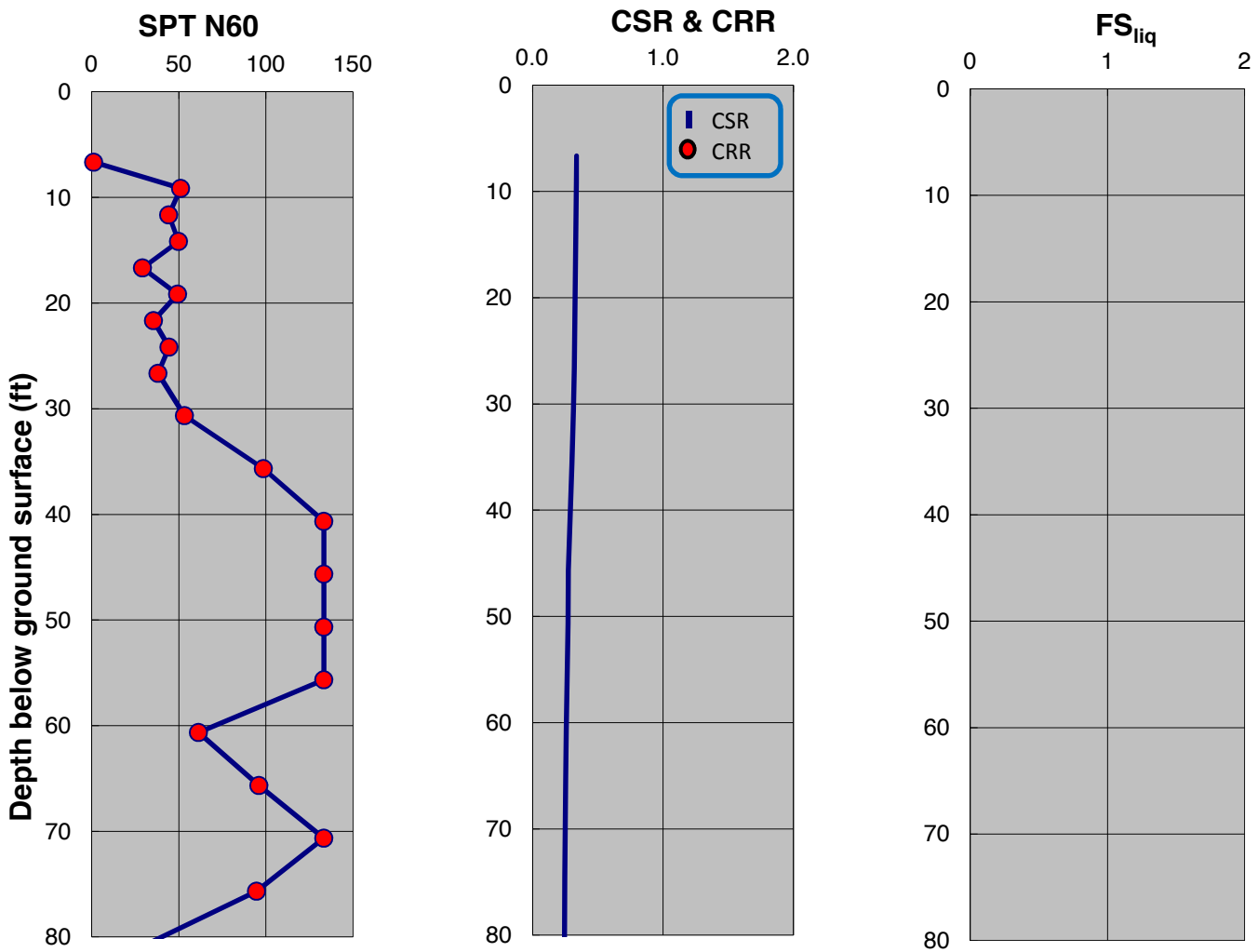
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-158 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

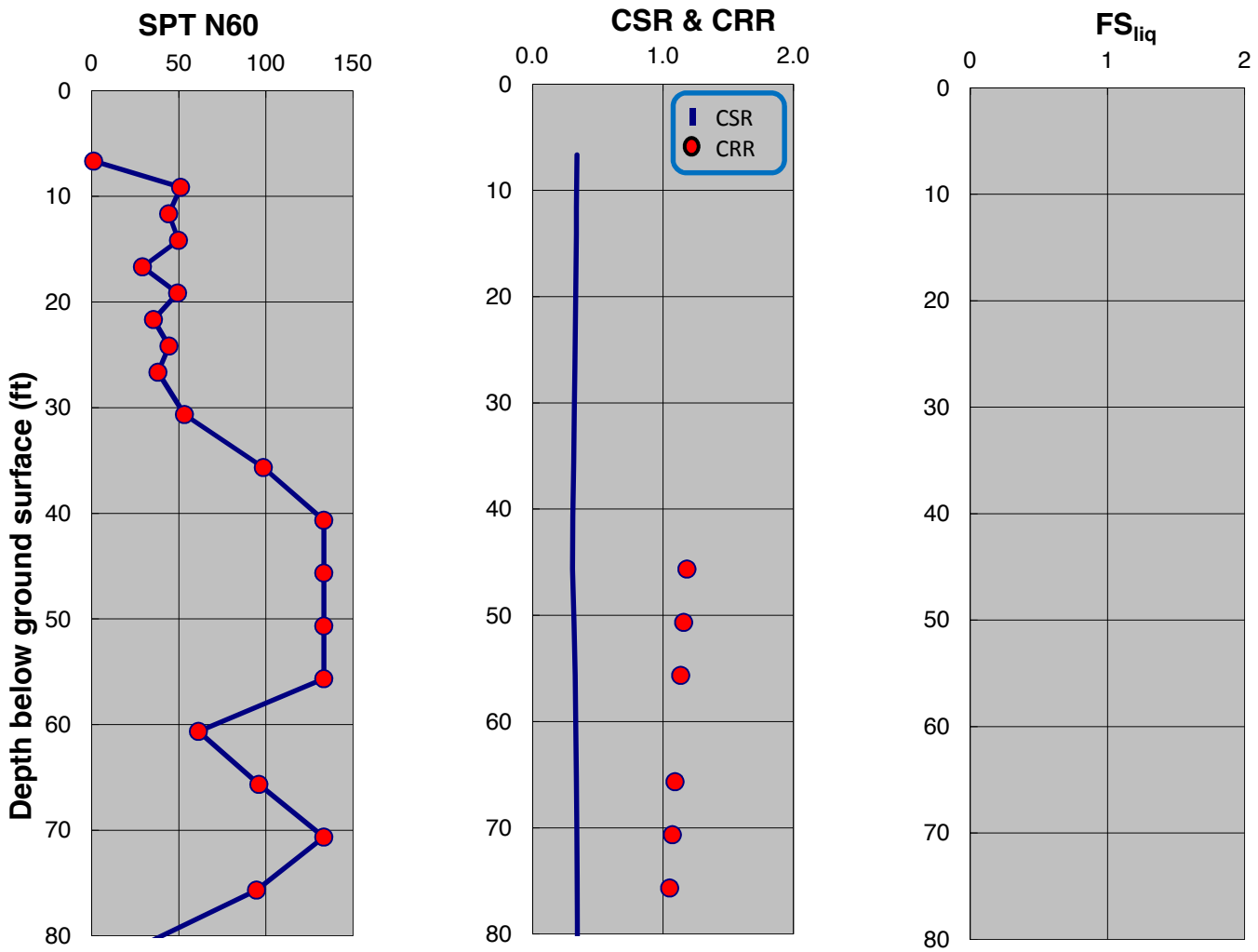
PLATE C.200



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-159 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

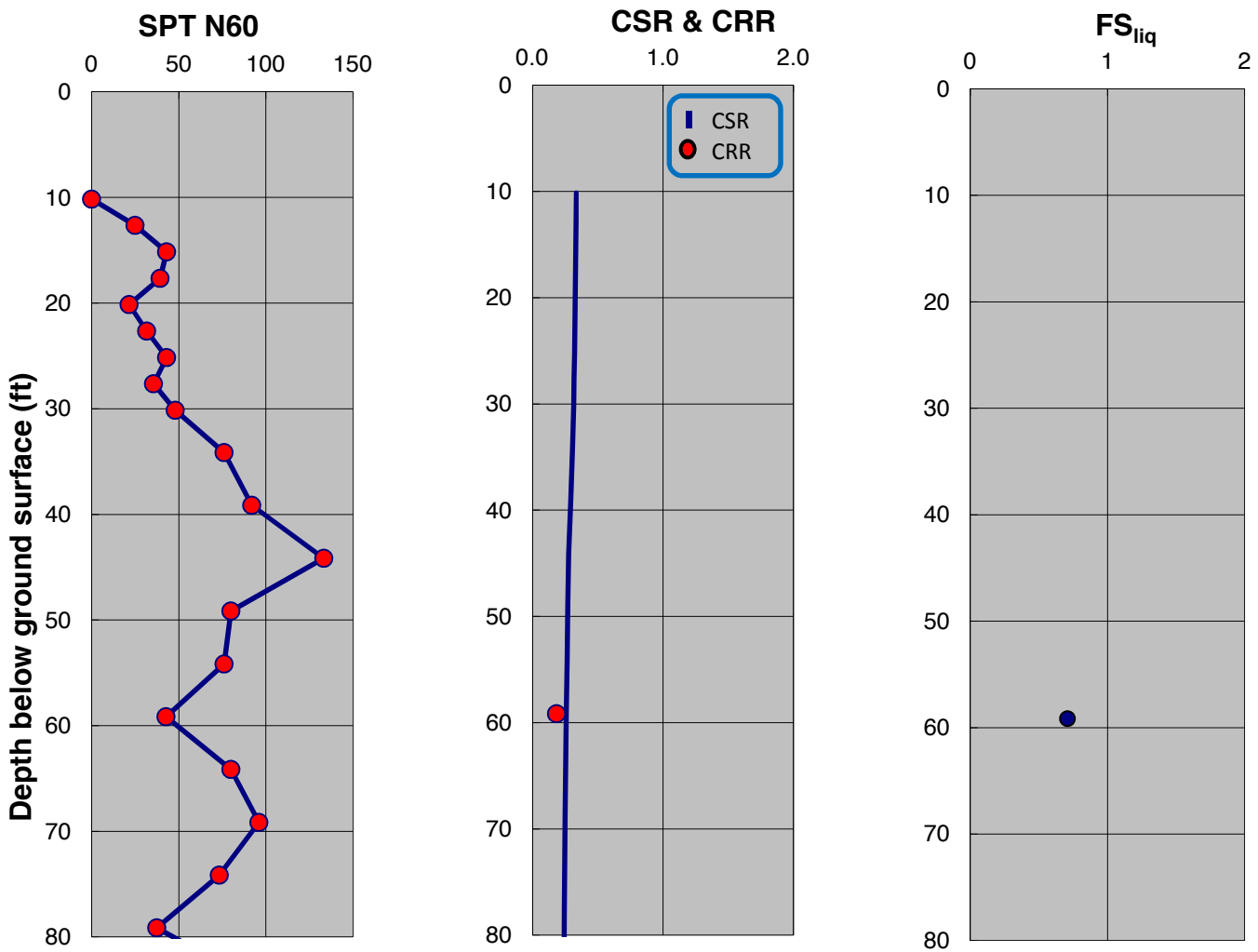
PLATE C.201



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-159 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

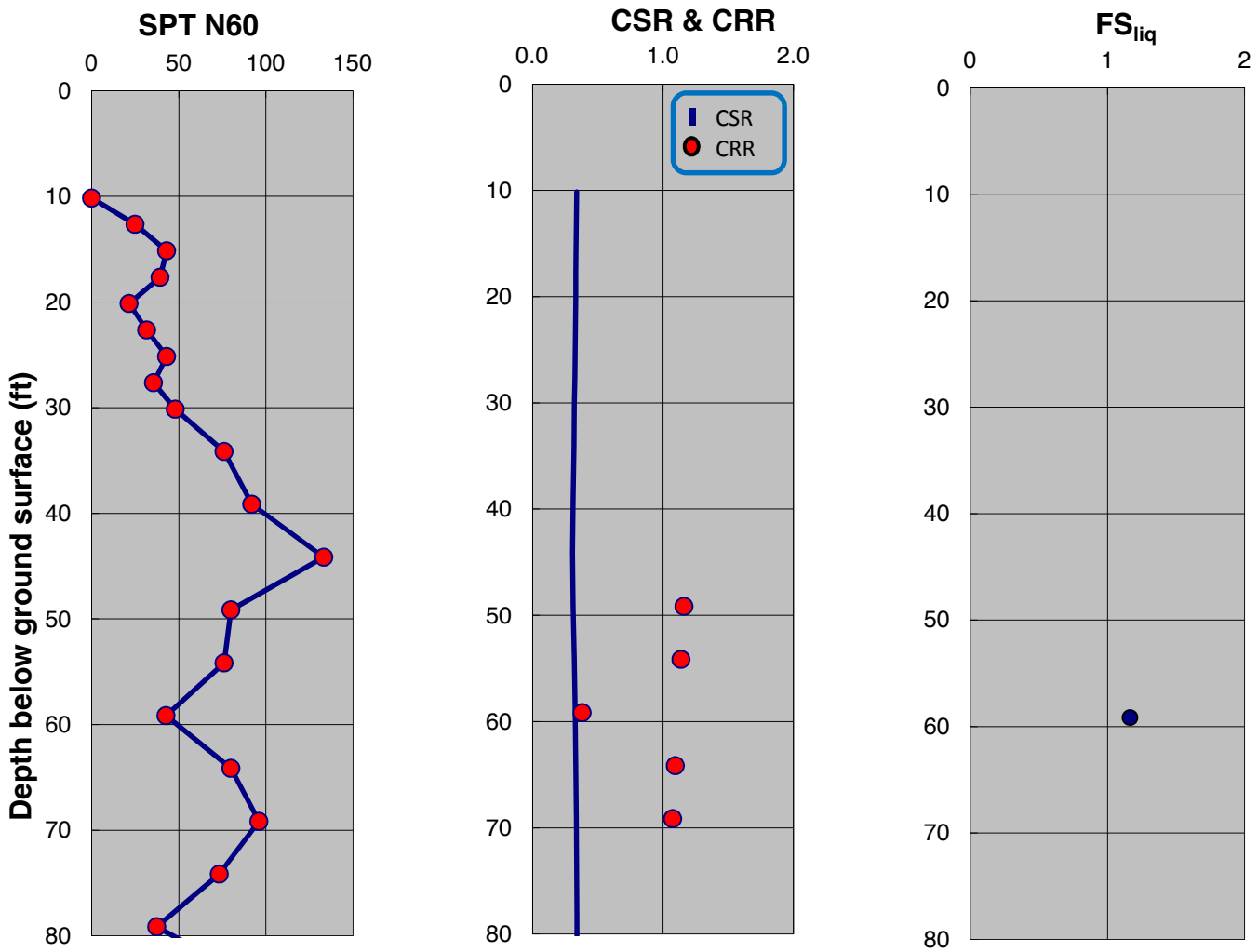
PLATE C.202



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-160 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

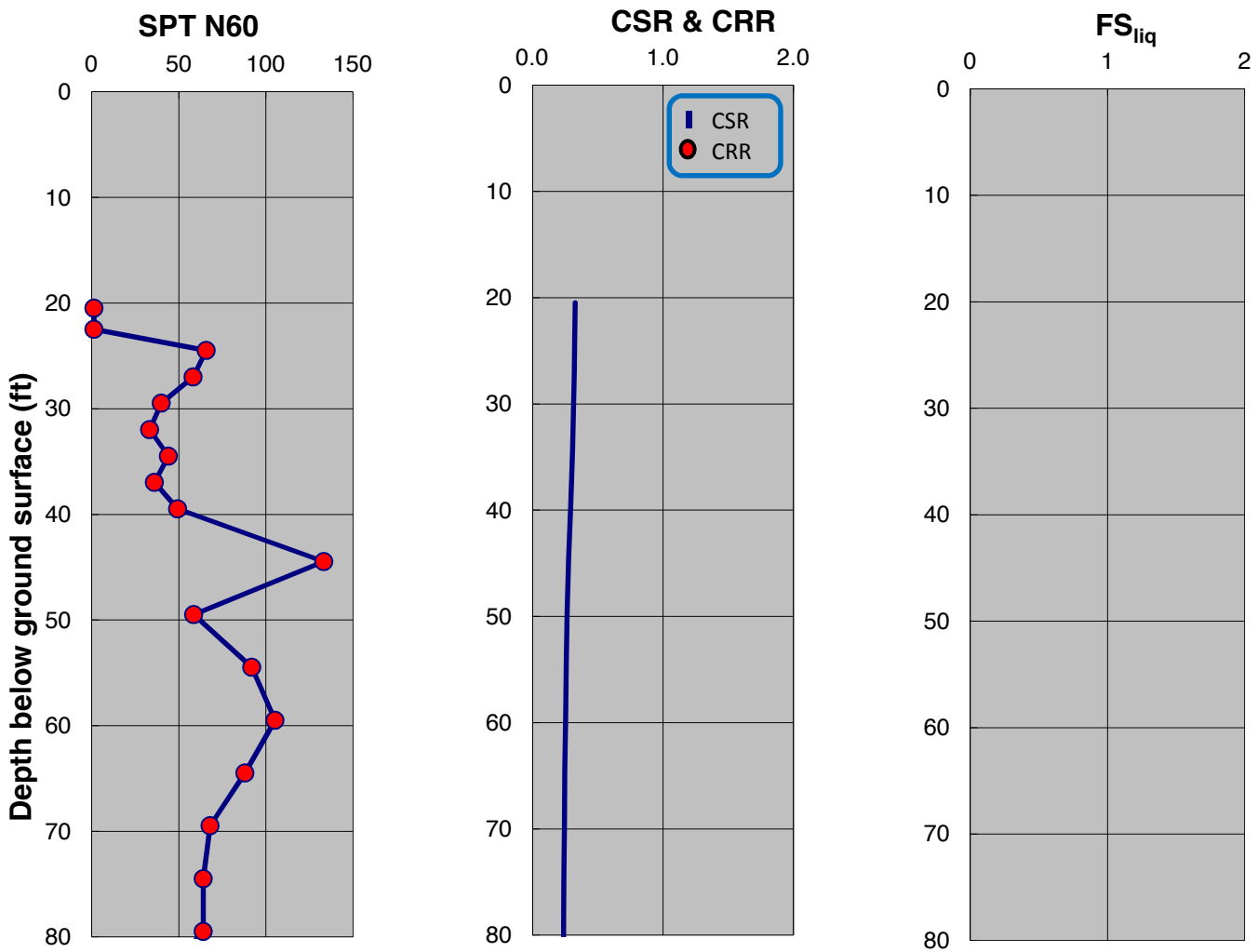
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.203



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-160 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

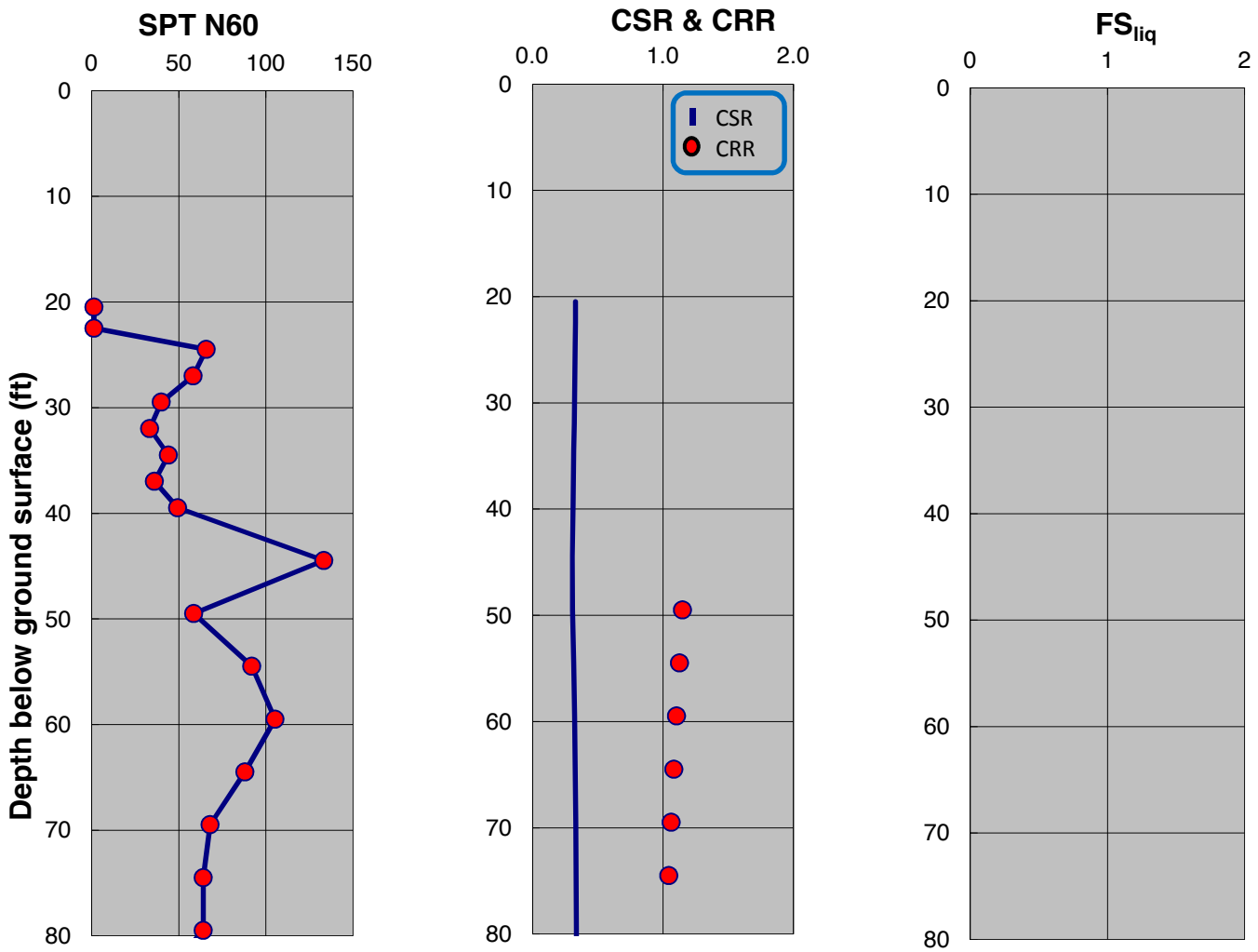
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-161 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

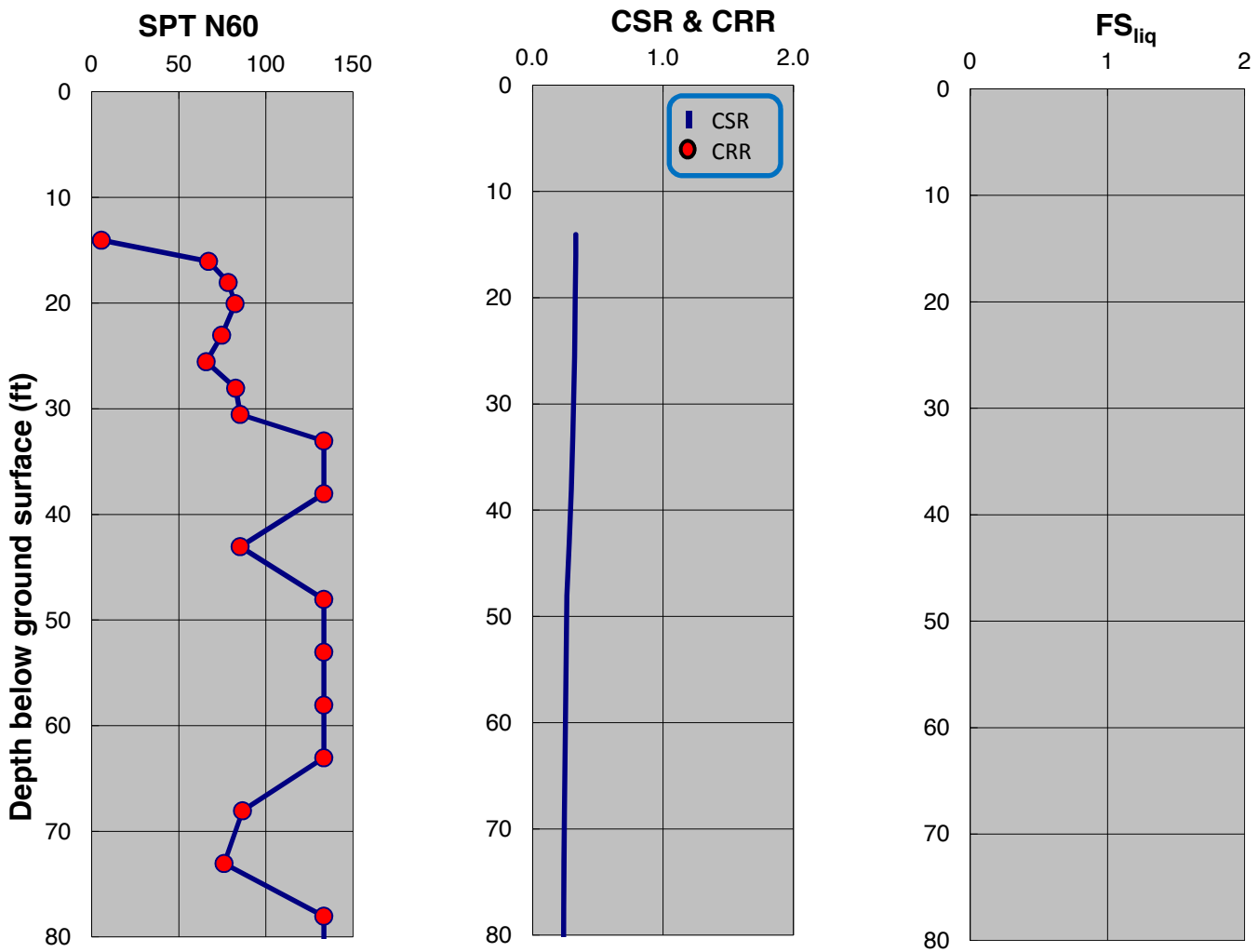
PLATE C.205



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-161 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

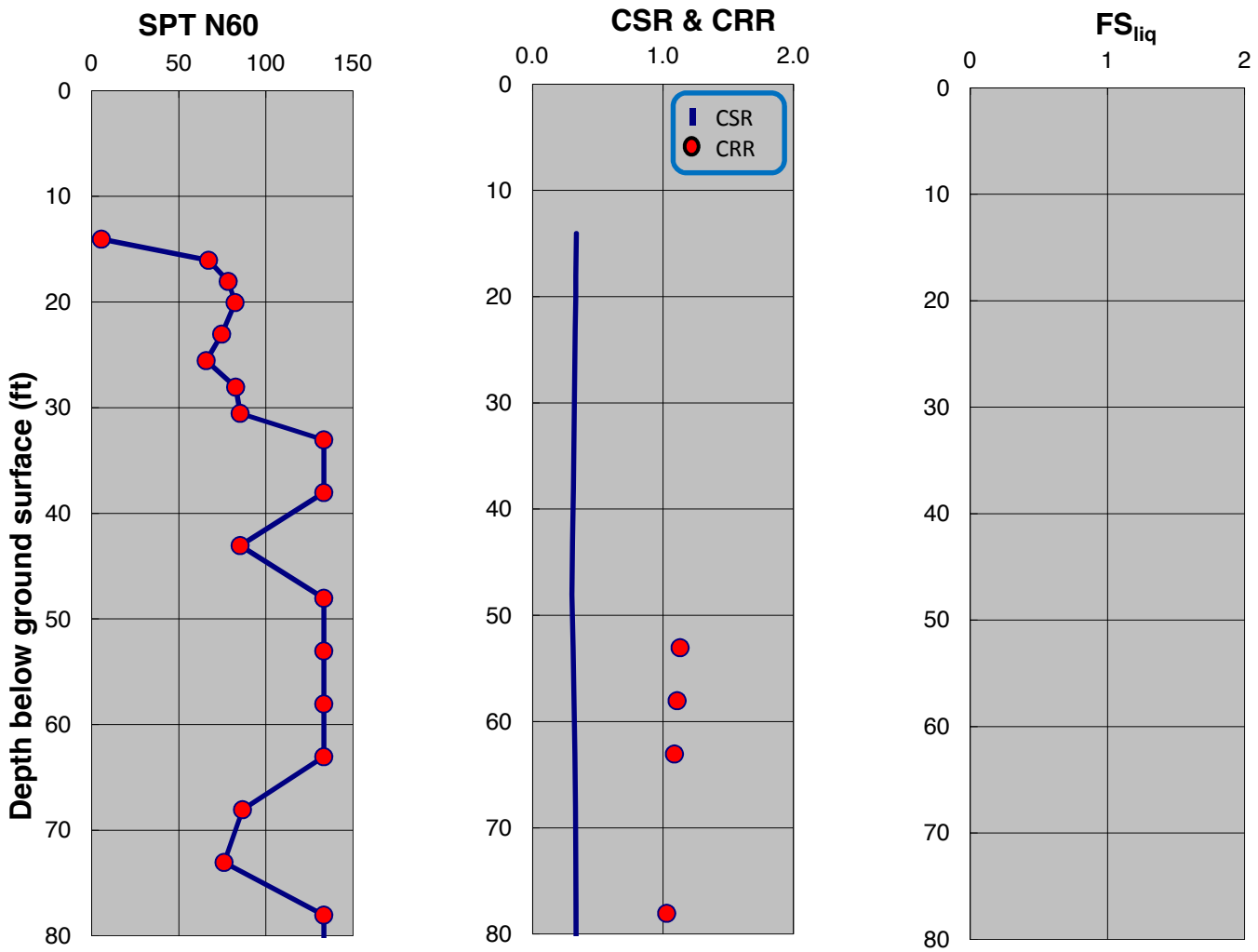
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.206



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-162 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

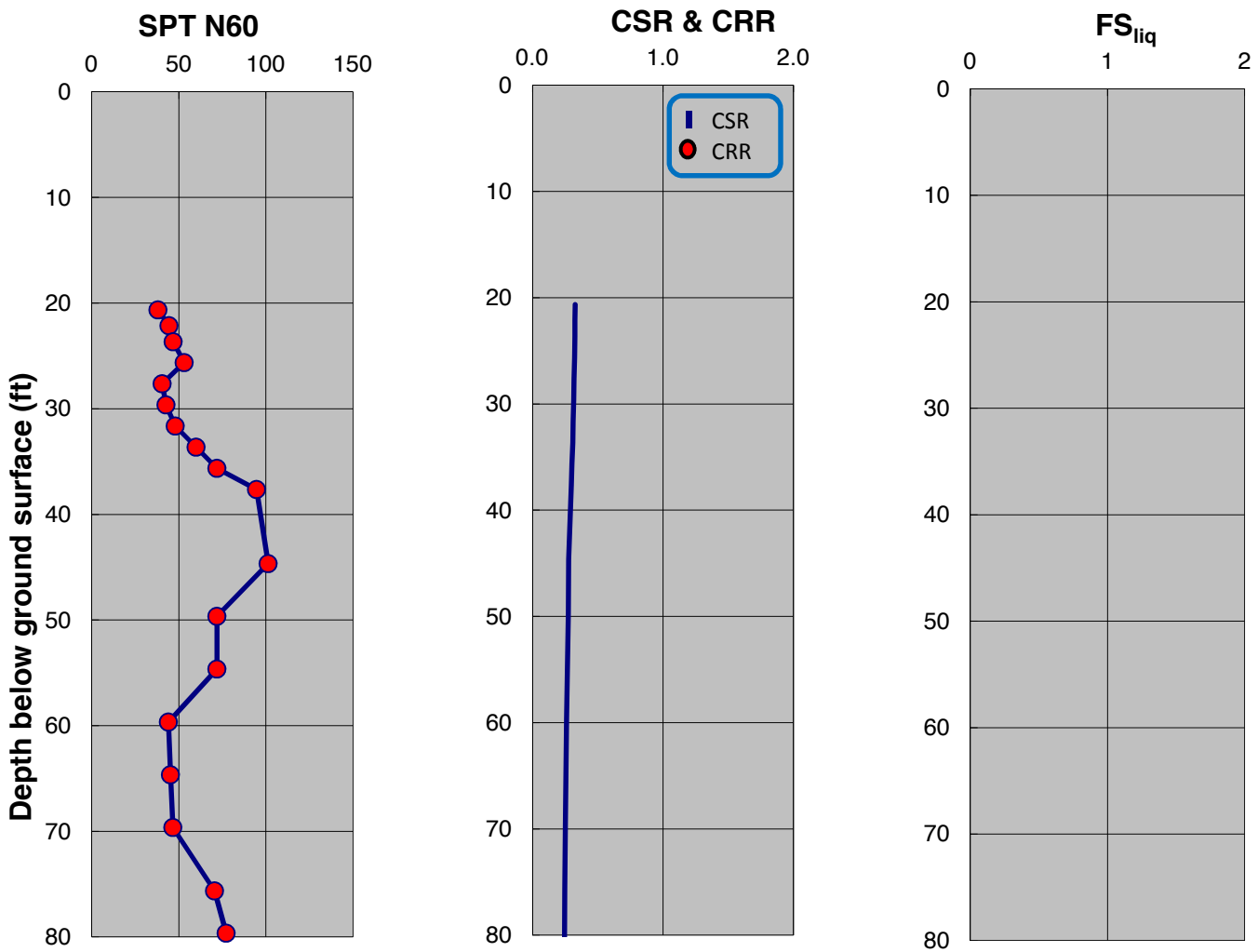
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-162 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

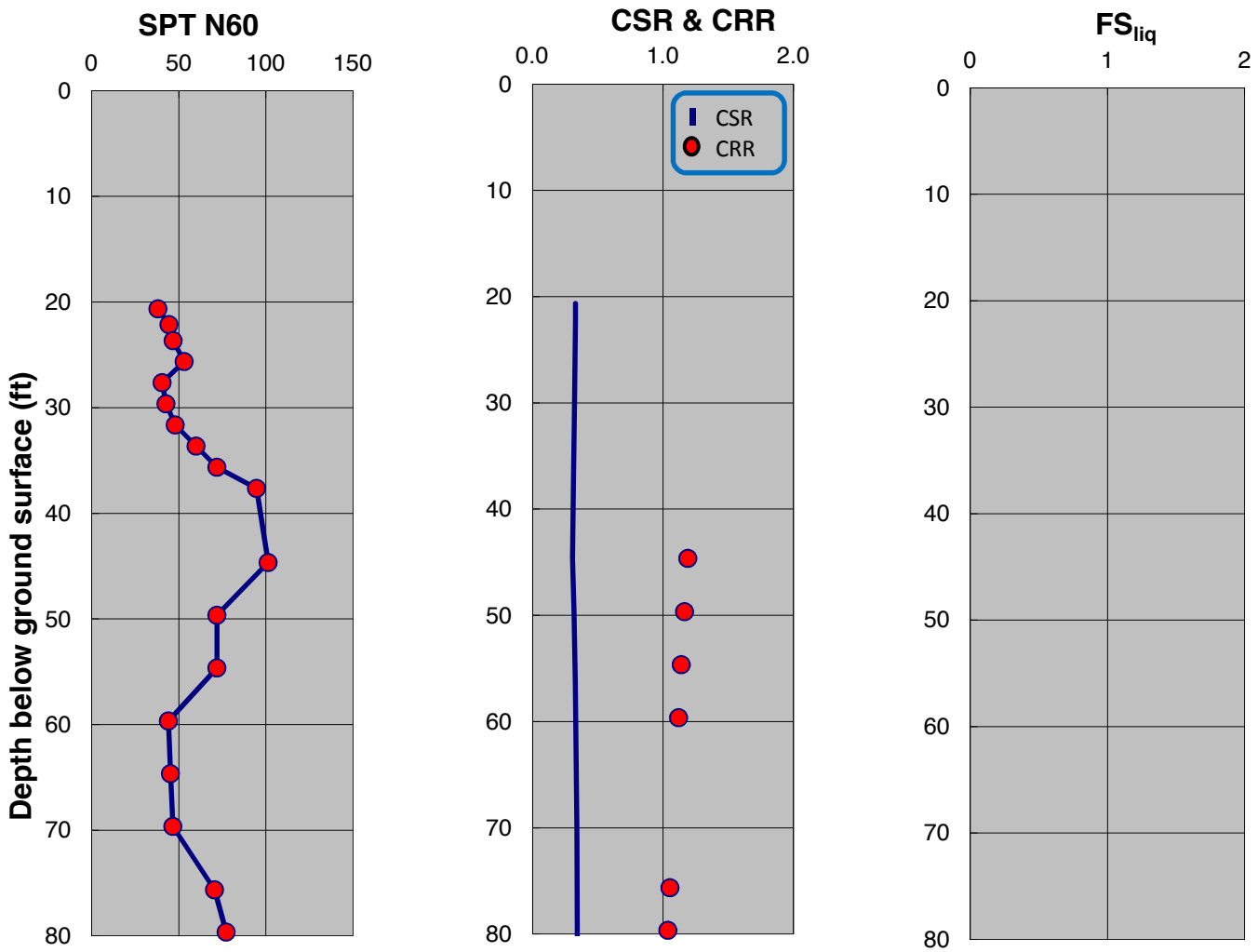
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.208



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-163 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

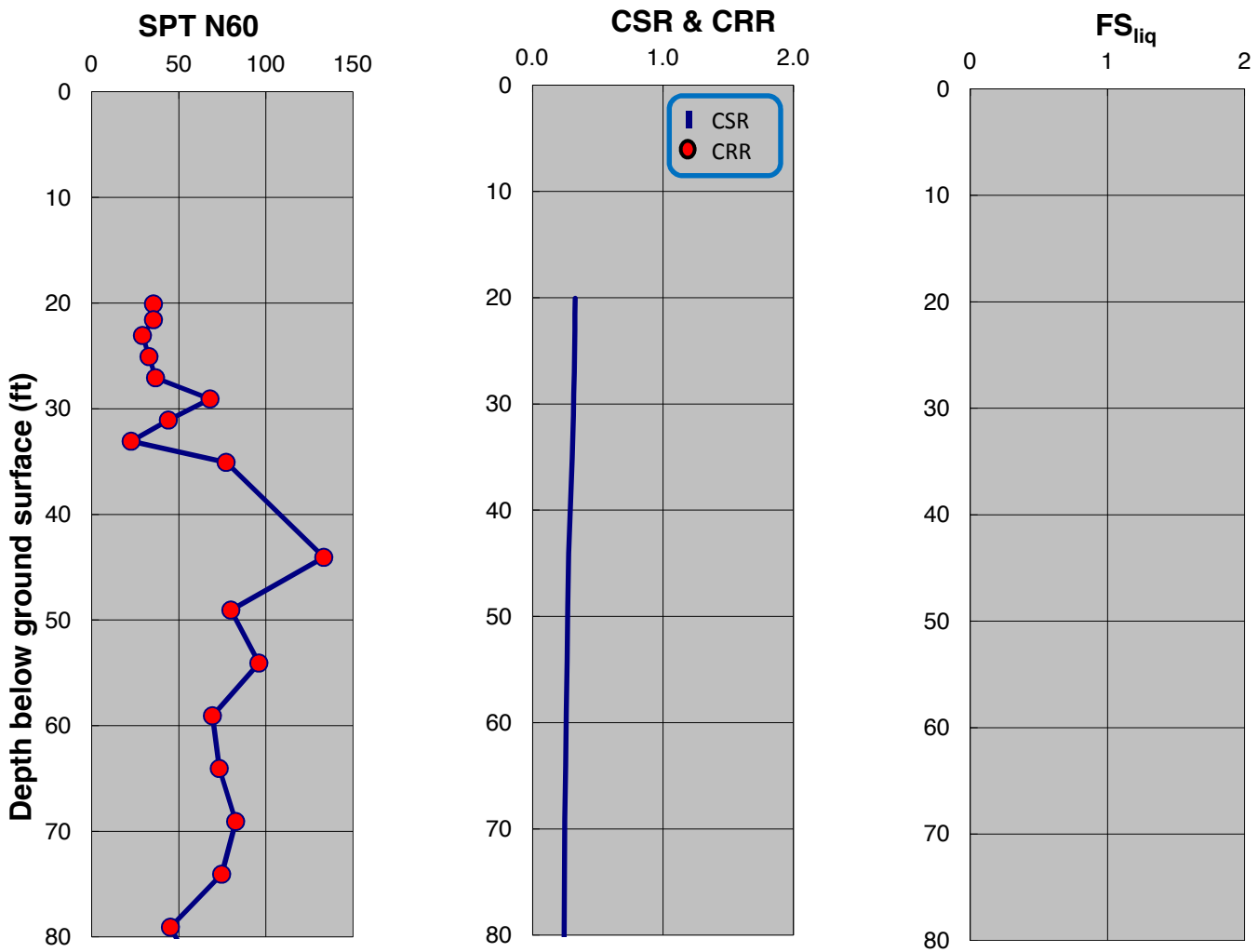
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-163 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

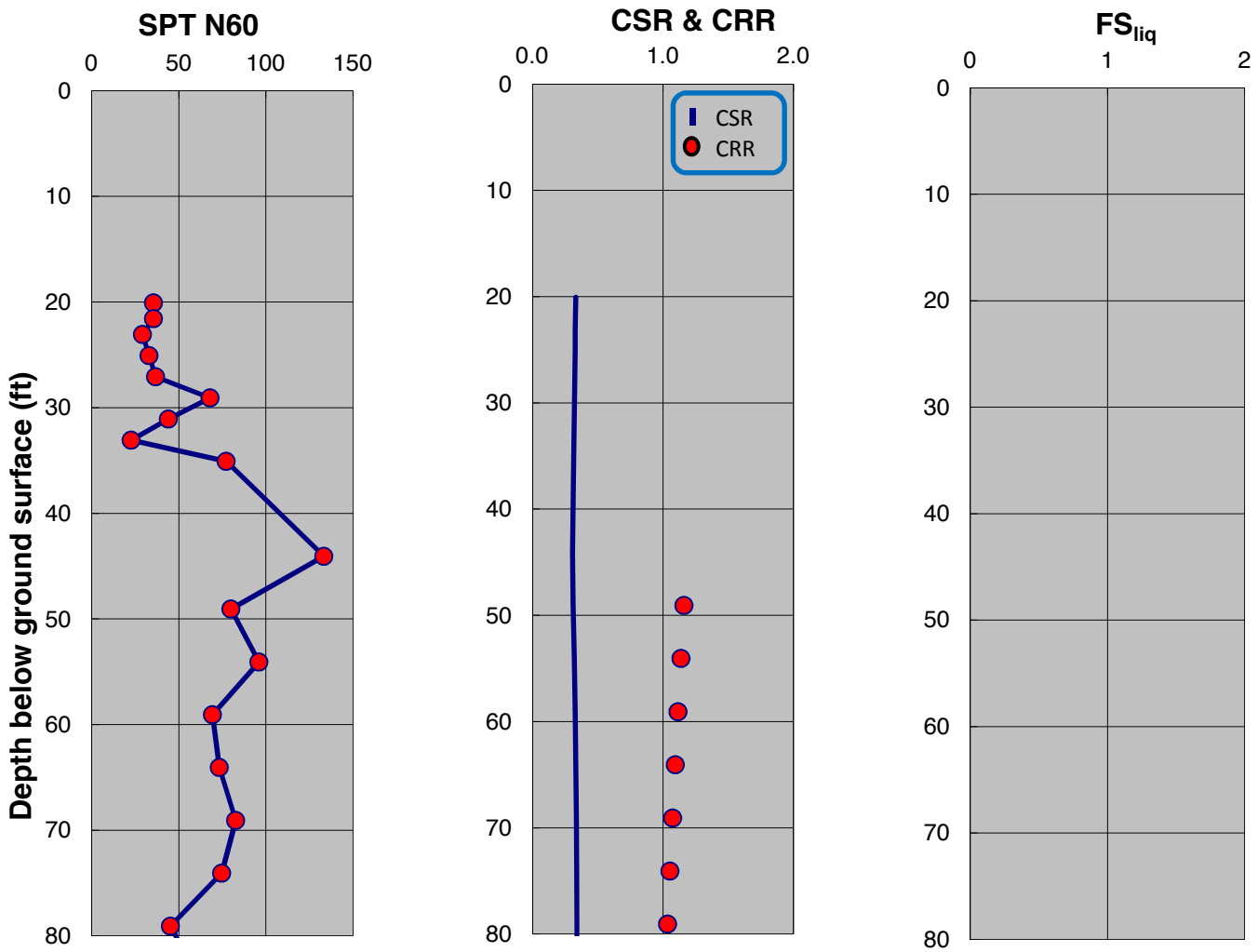
PLATE C.210



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-164 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

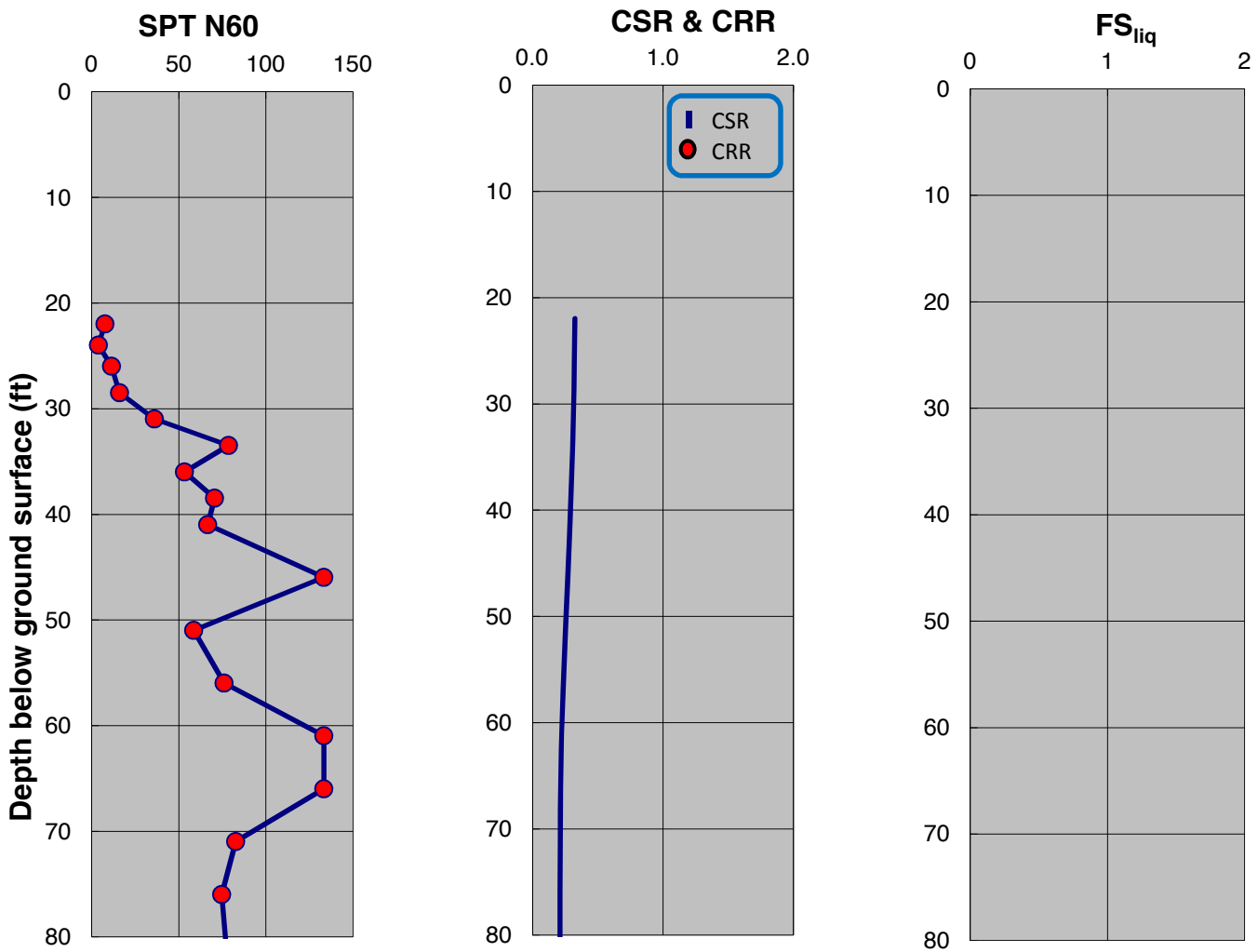
PLATE C.211



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-164 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

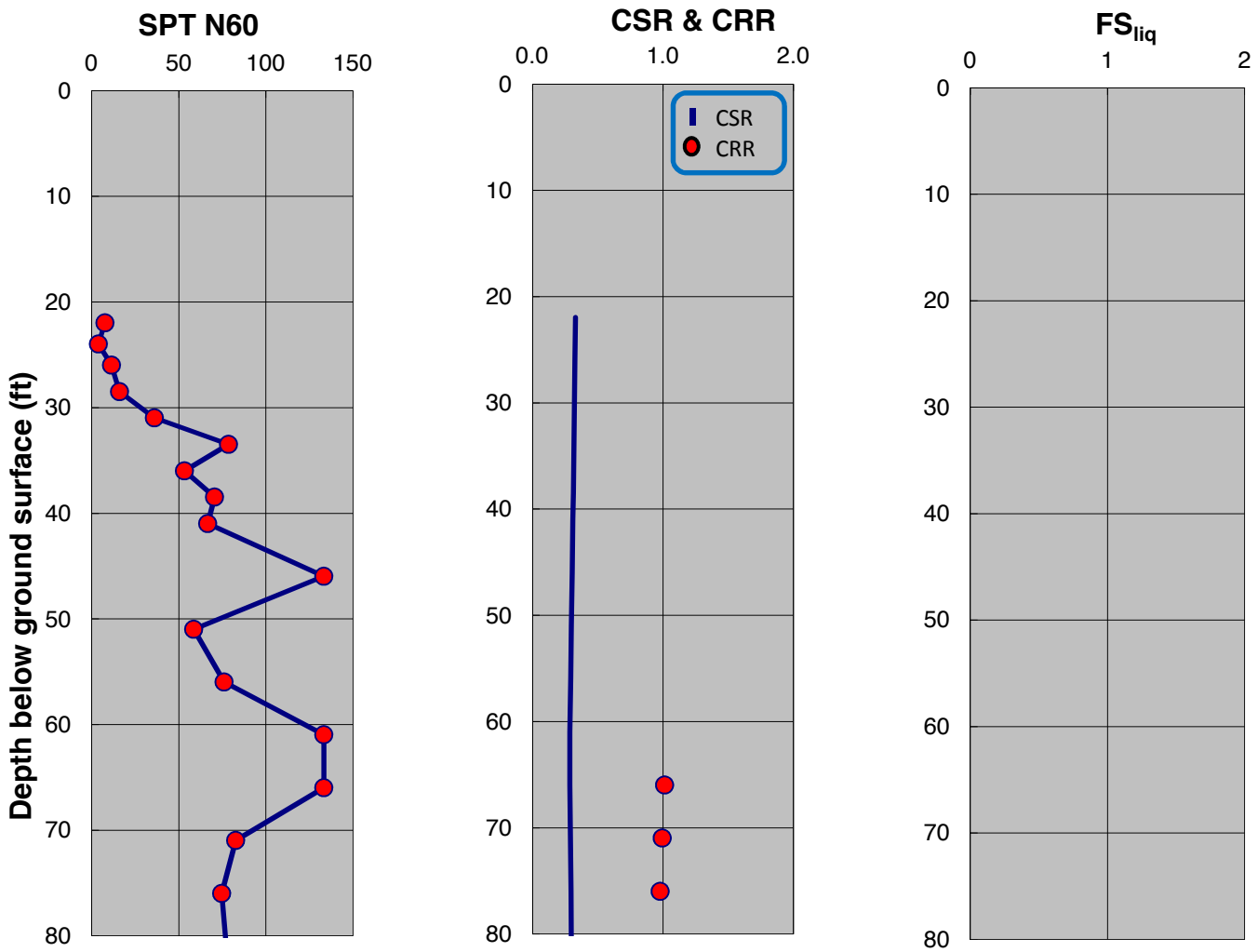
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.212



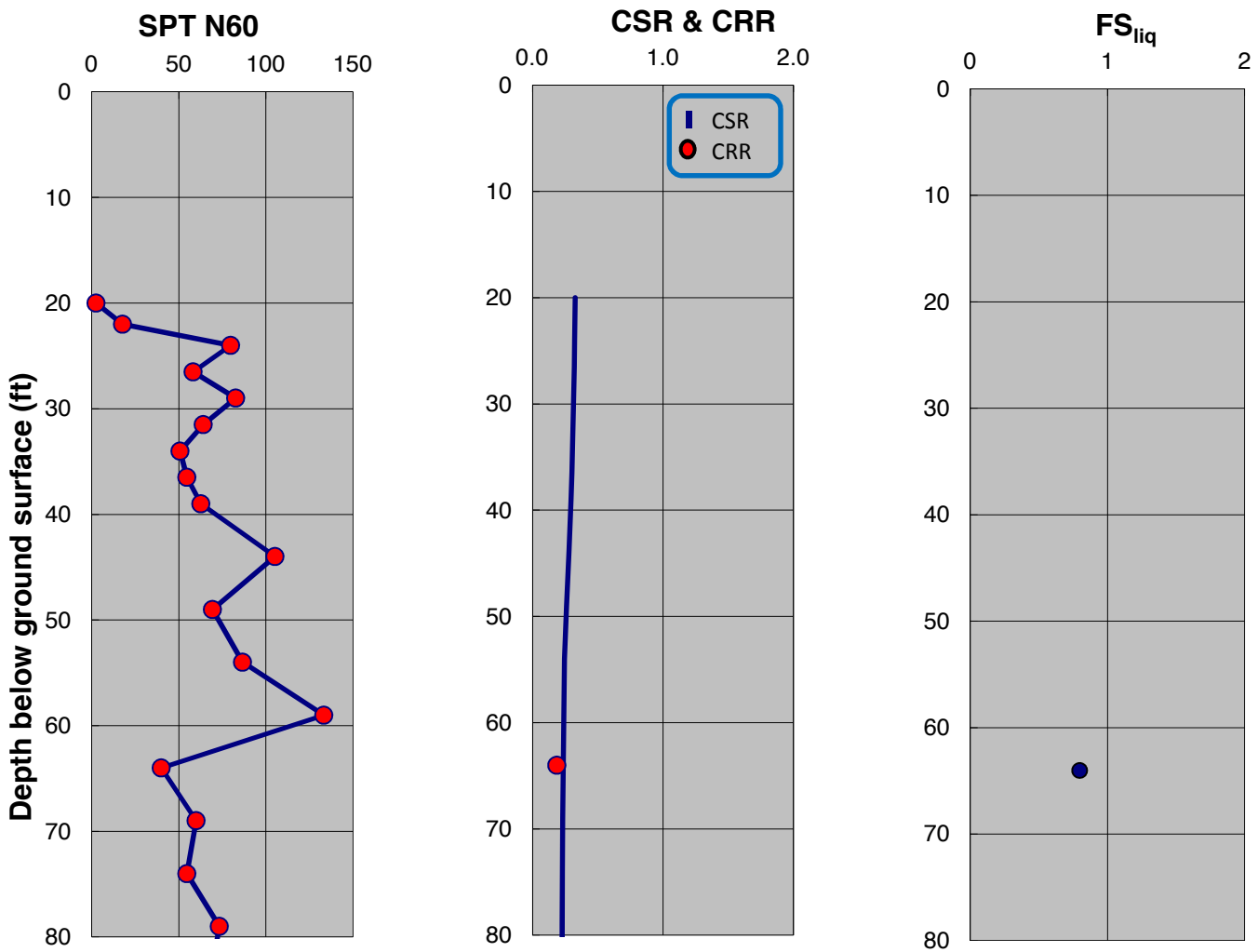
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-165 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-165 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

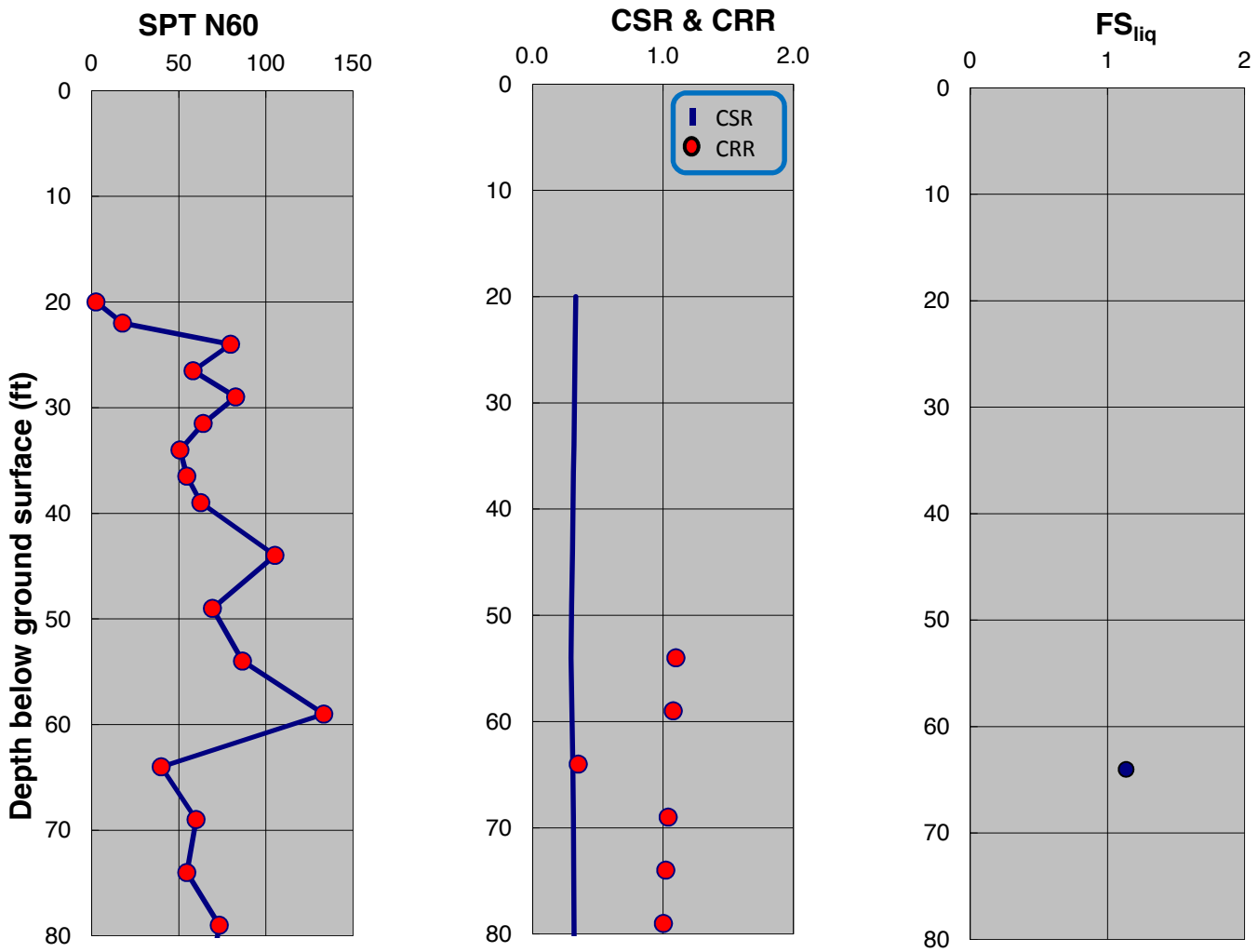
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-166 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

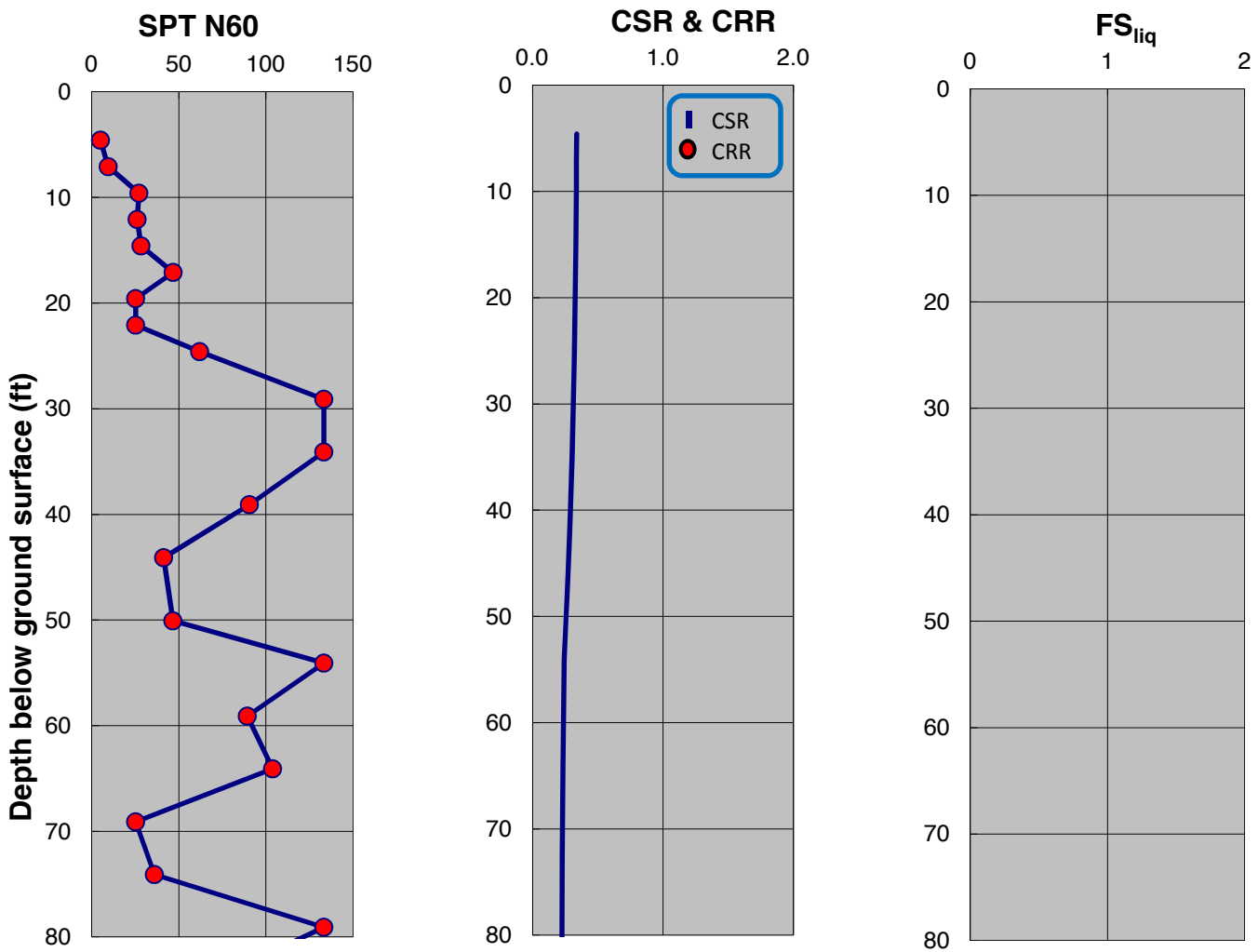
PLATE C.215



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-166 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

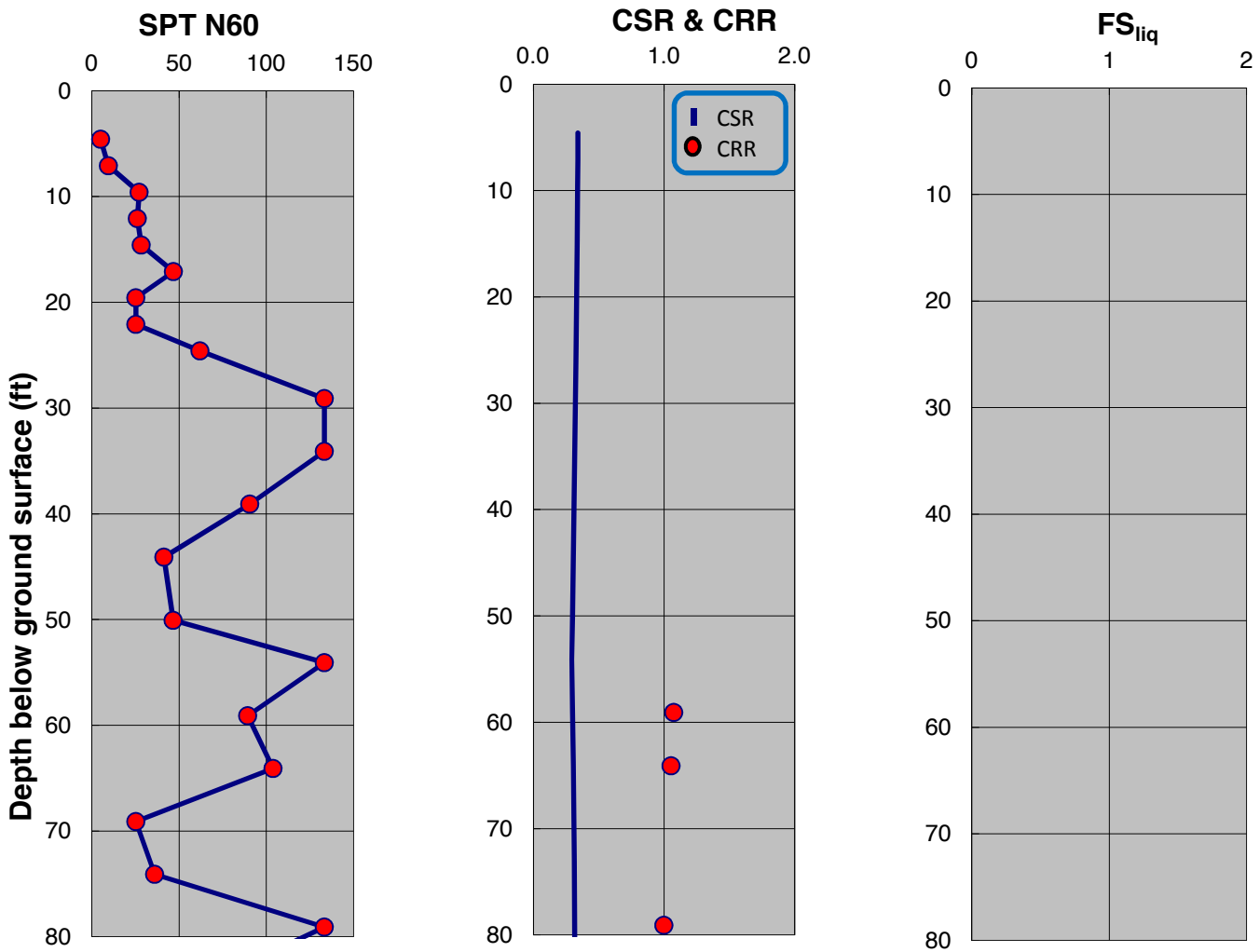
PLATE C.216



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-167 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

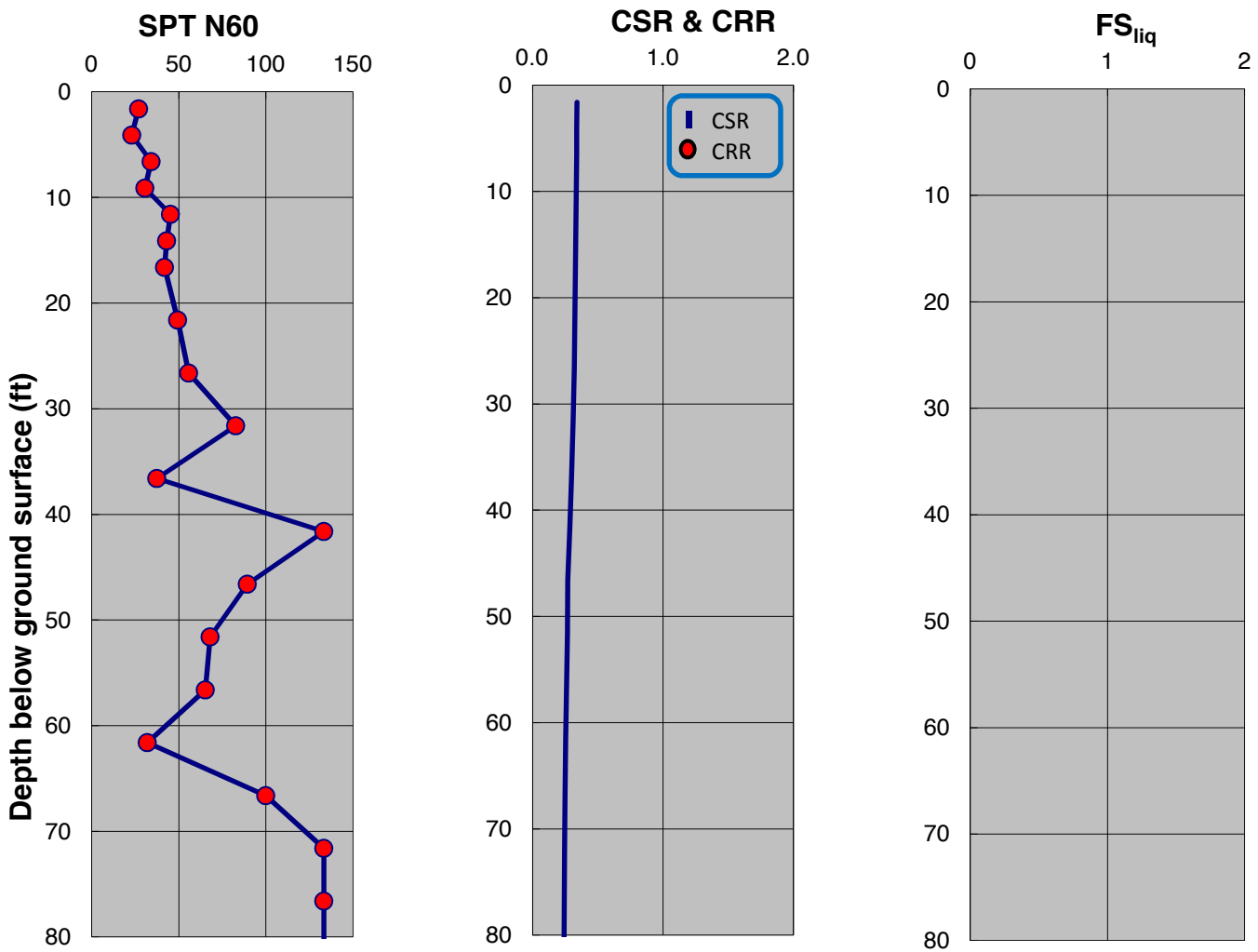
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.217



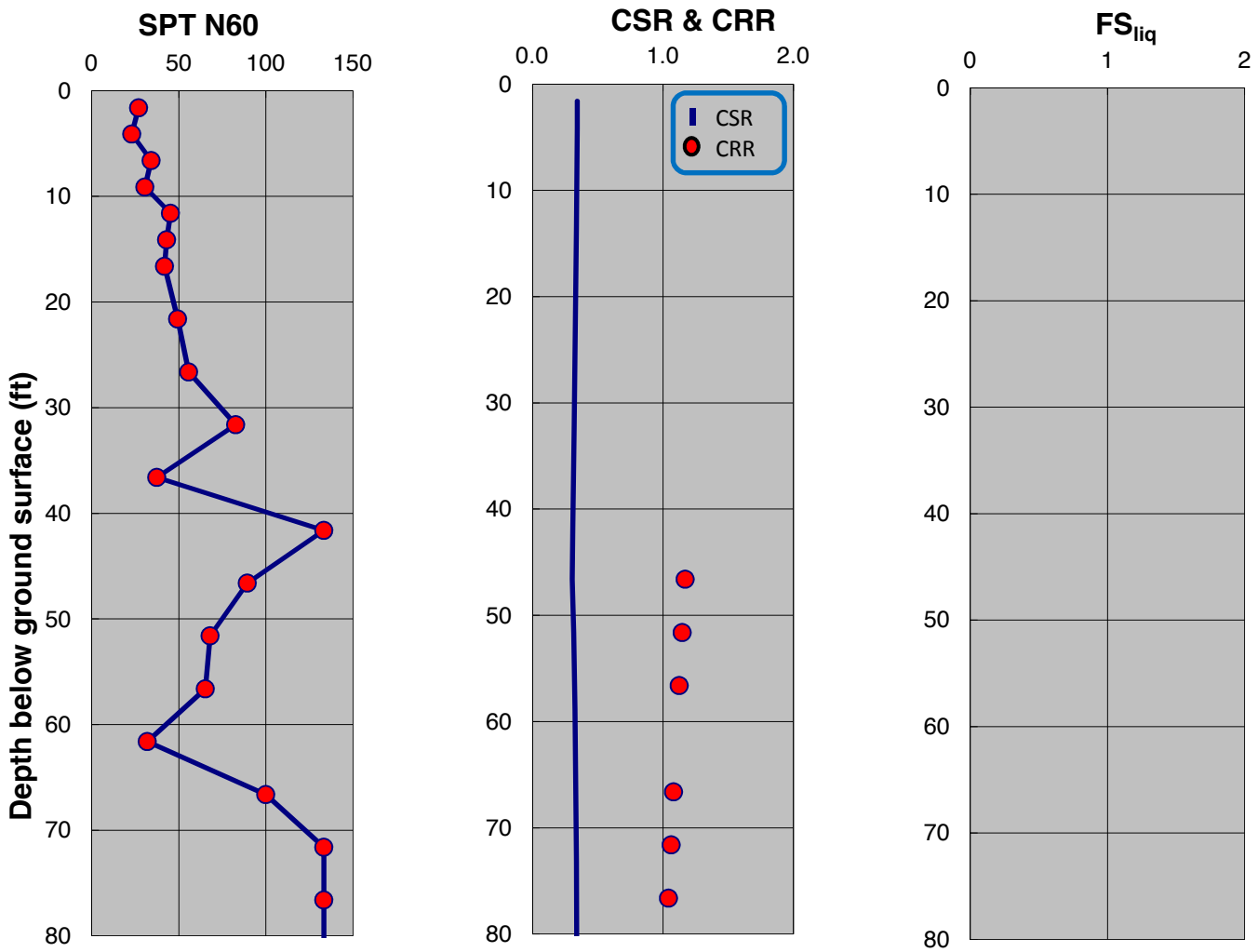
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-167 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-168 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

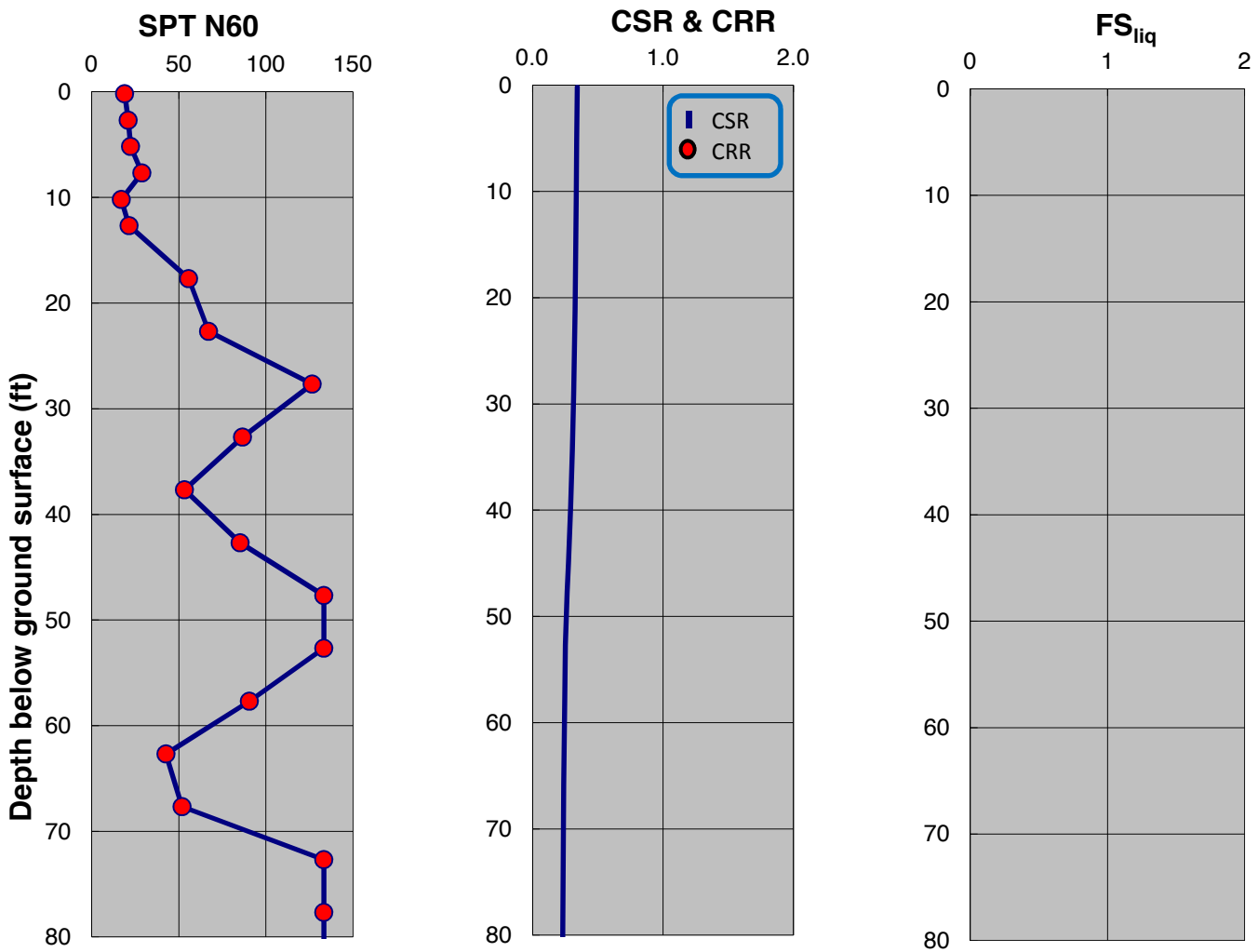
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-168 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

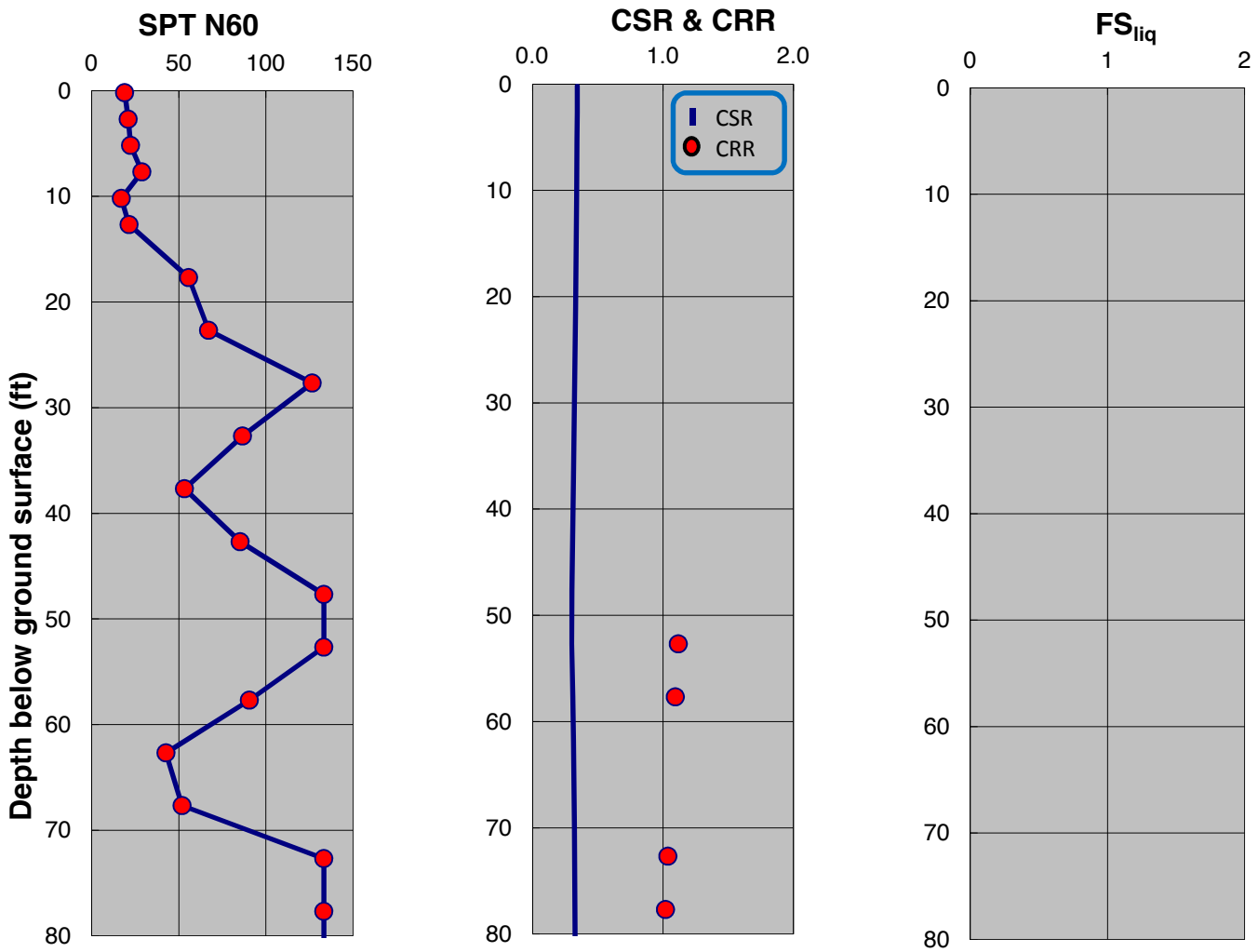
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.220



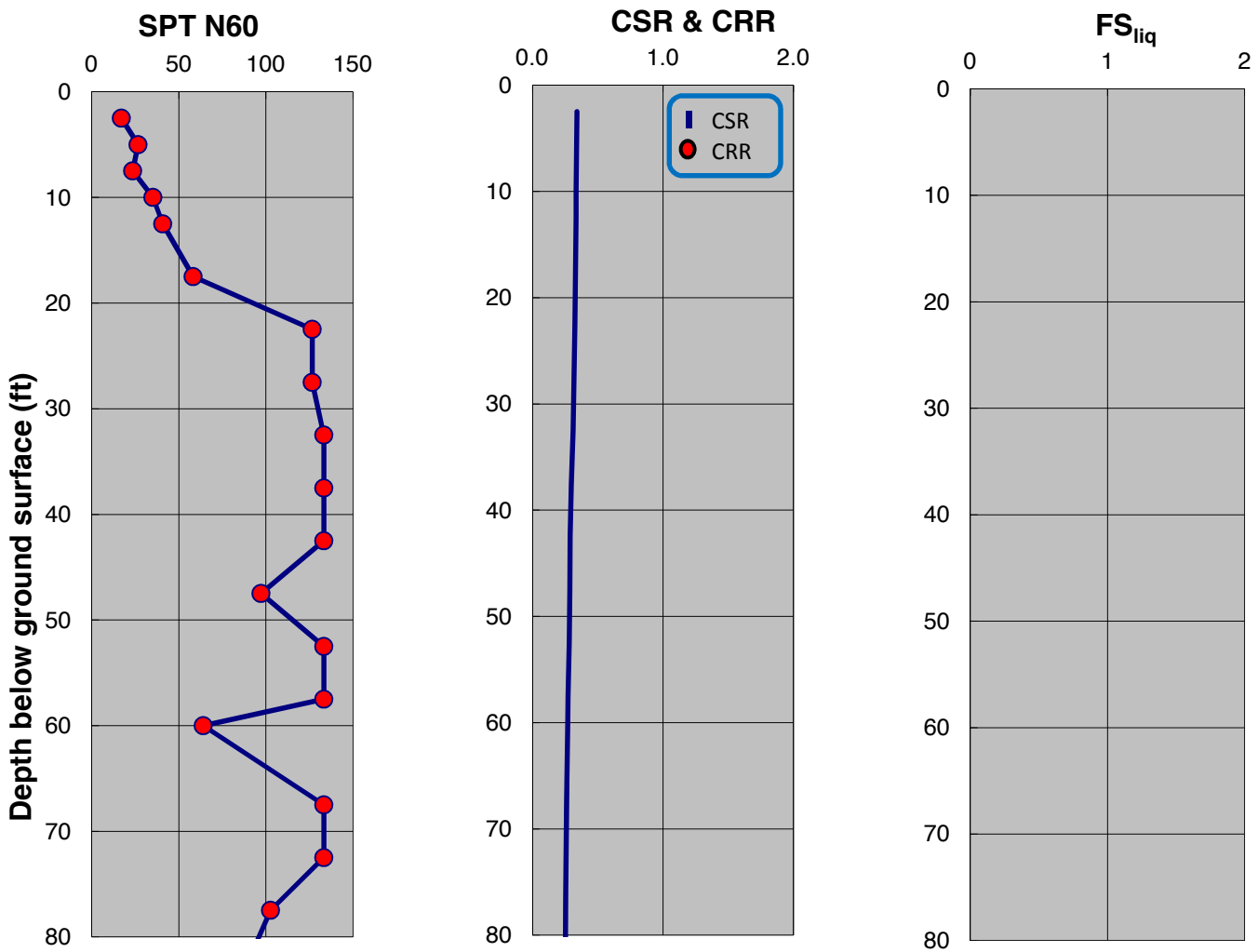
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-169 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



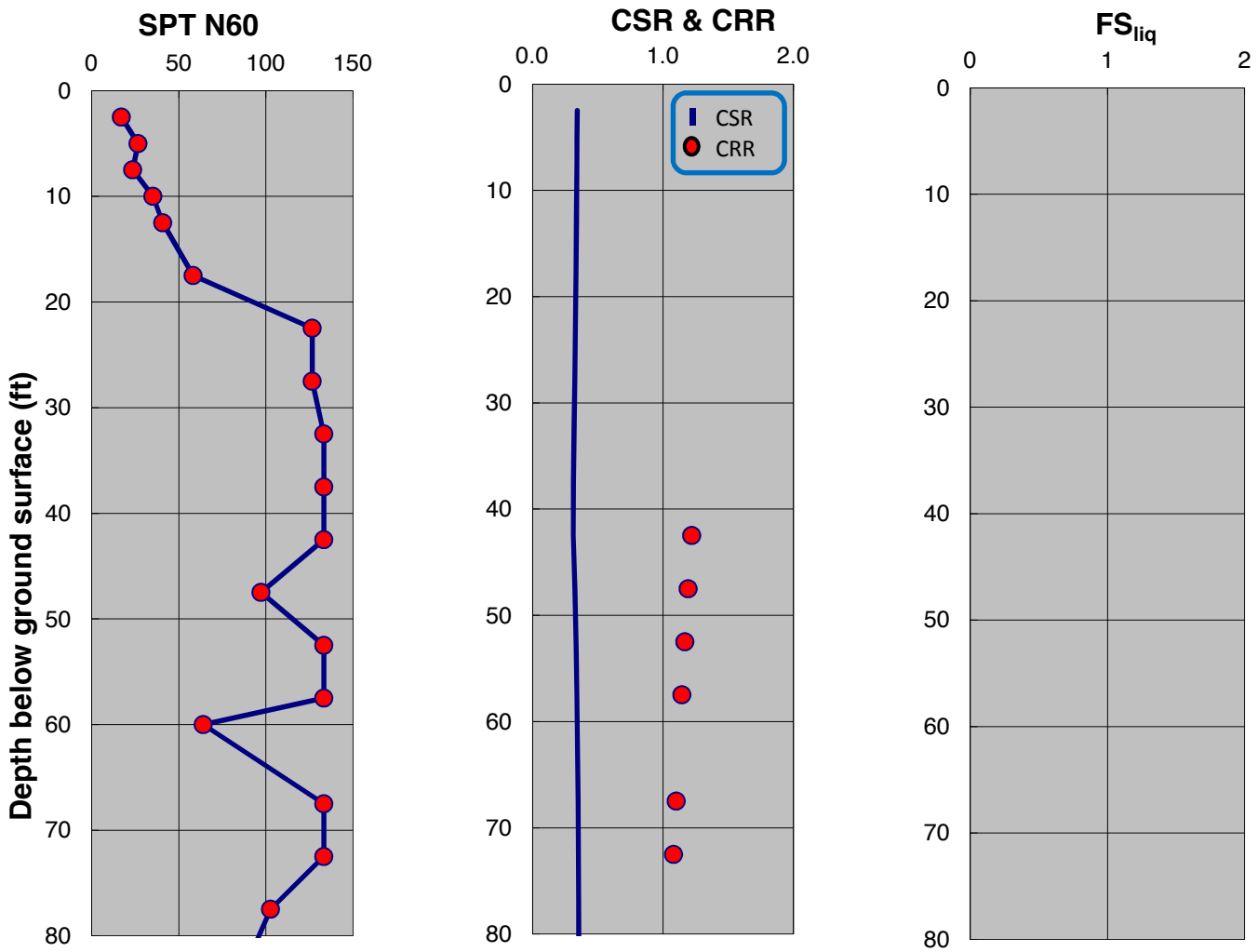
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-169 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



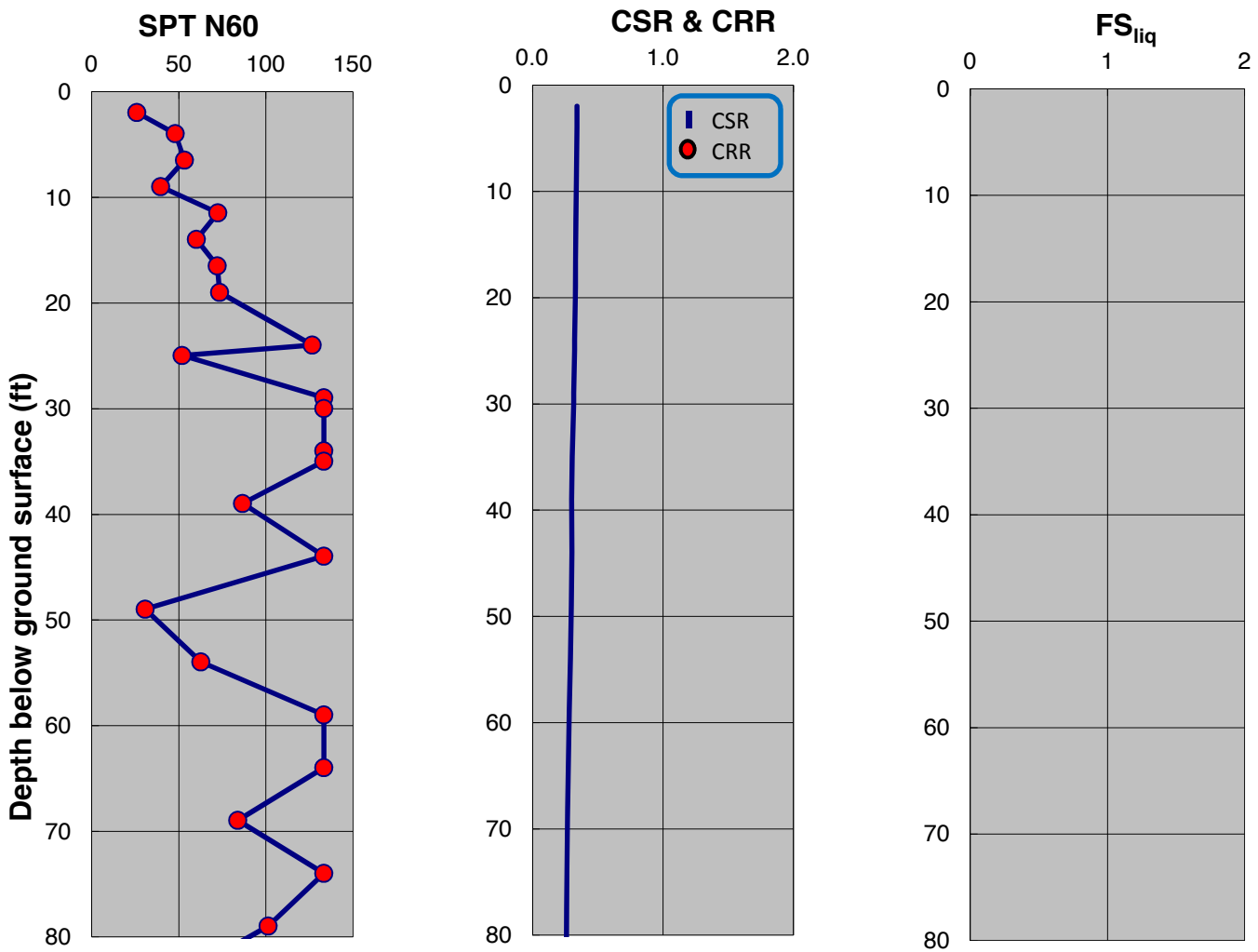
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-170 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



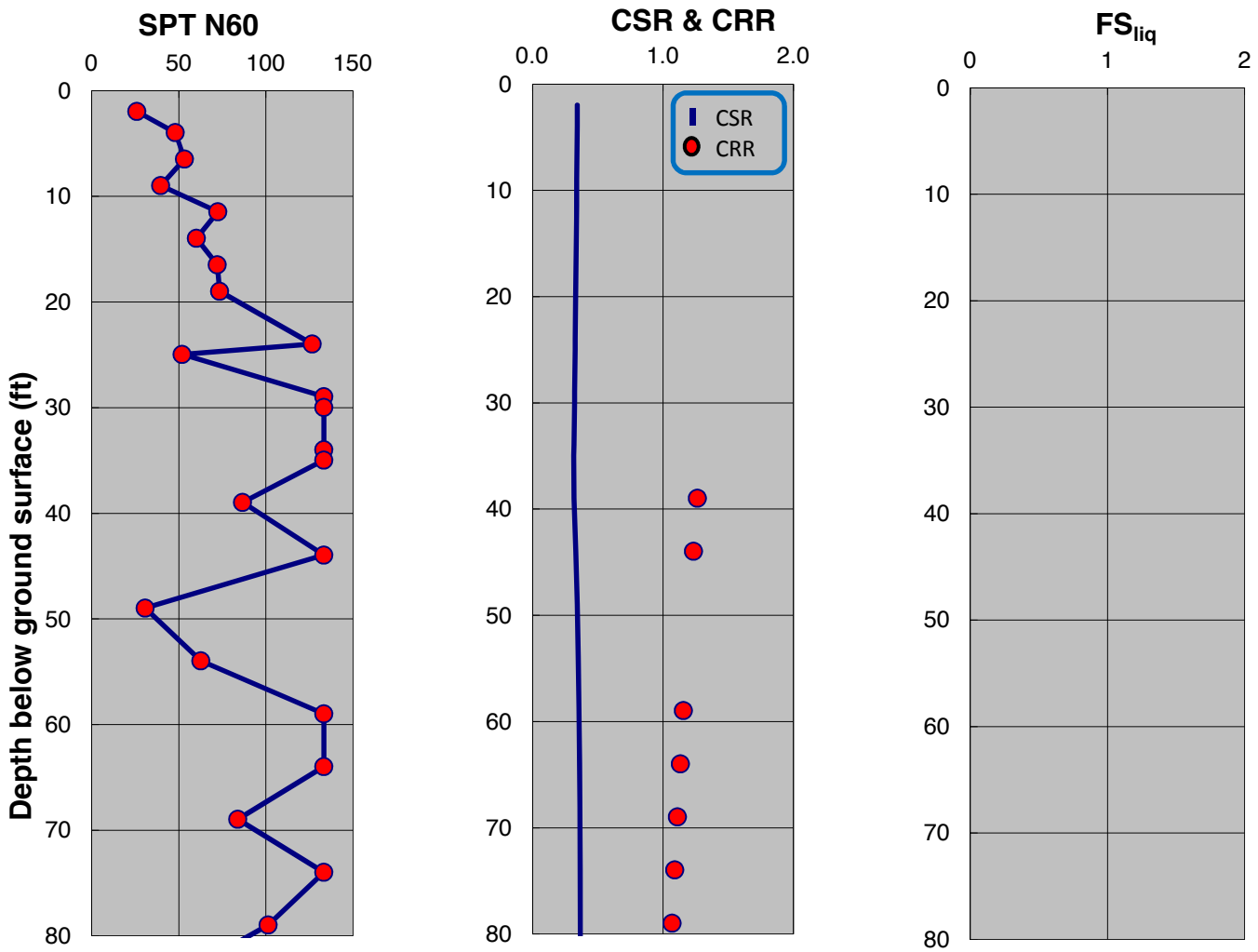
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-170 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-171 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

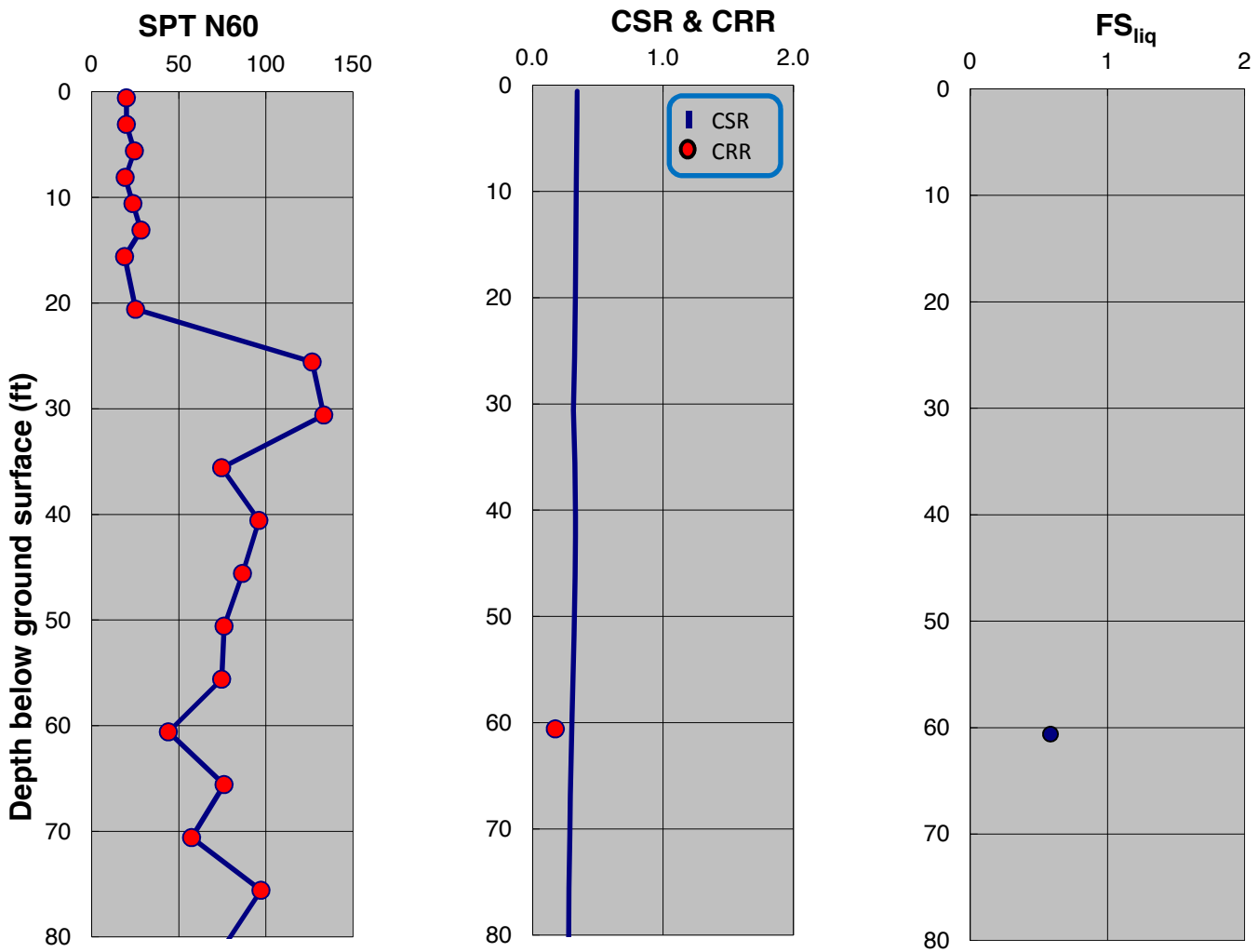
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-171 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

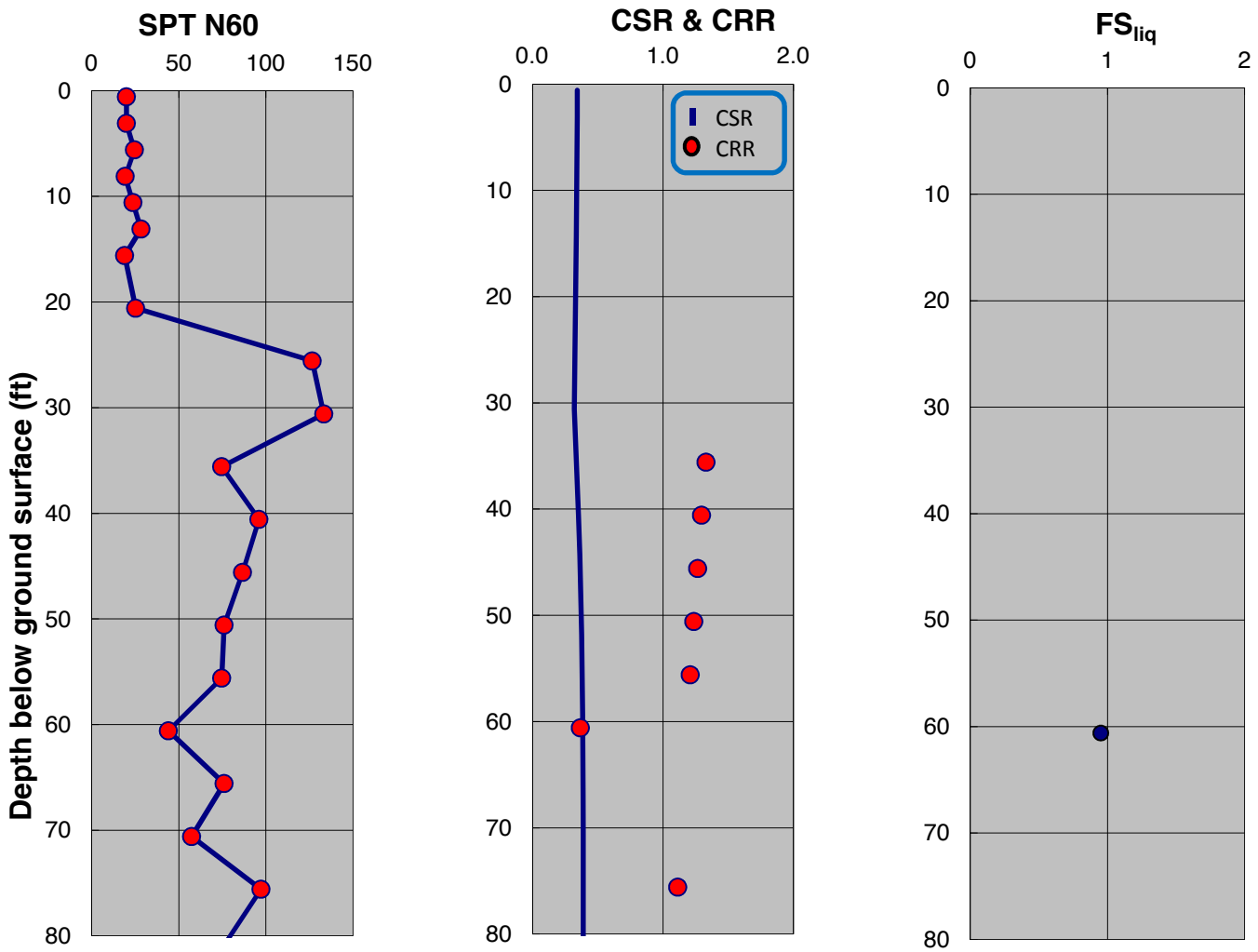
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.226



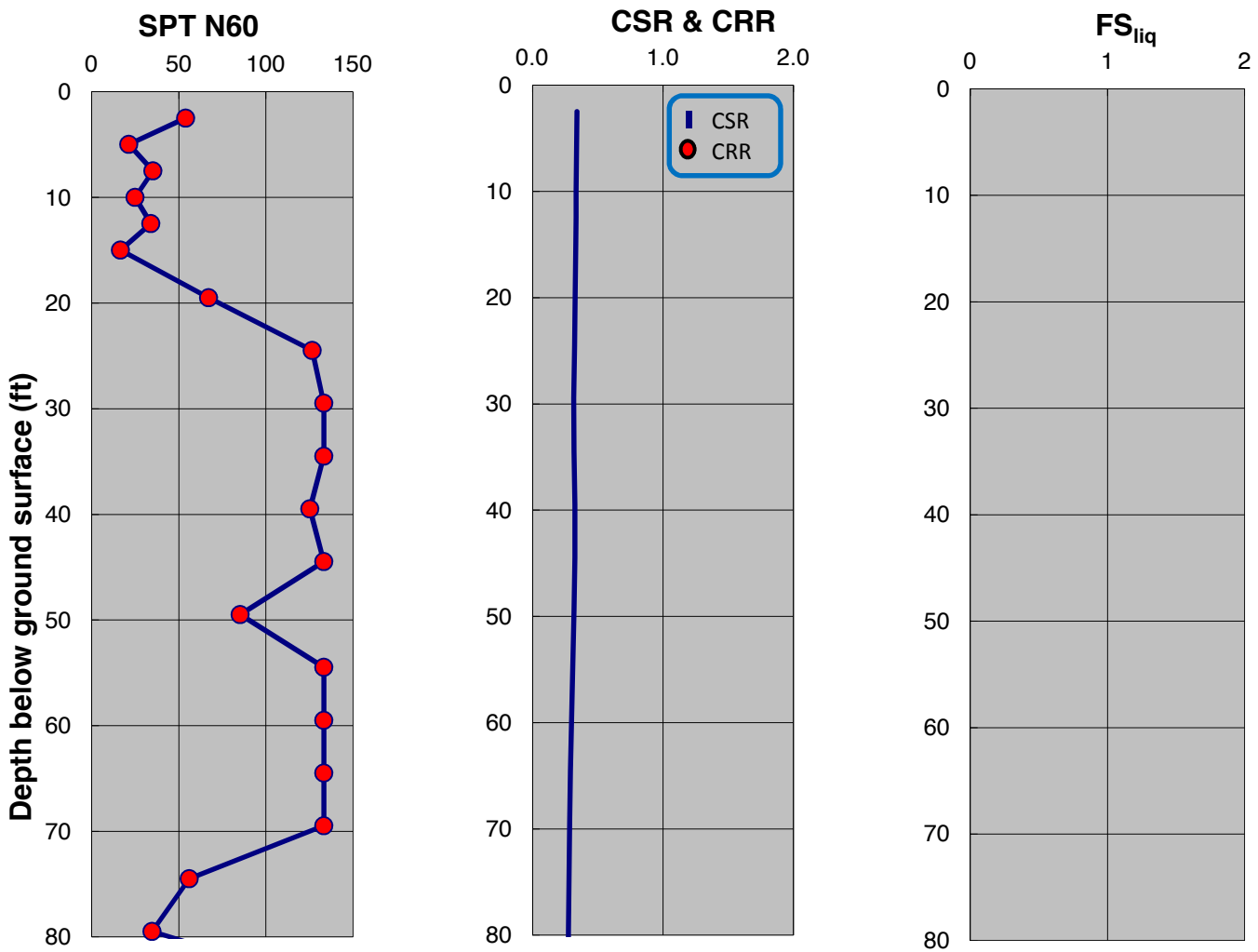
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-172 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



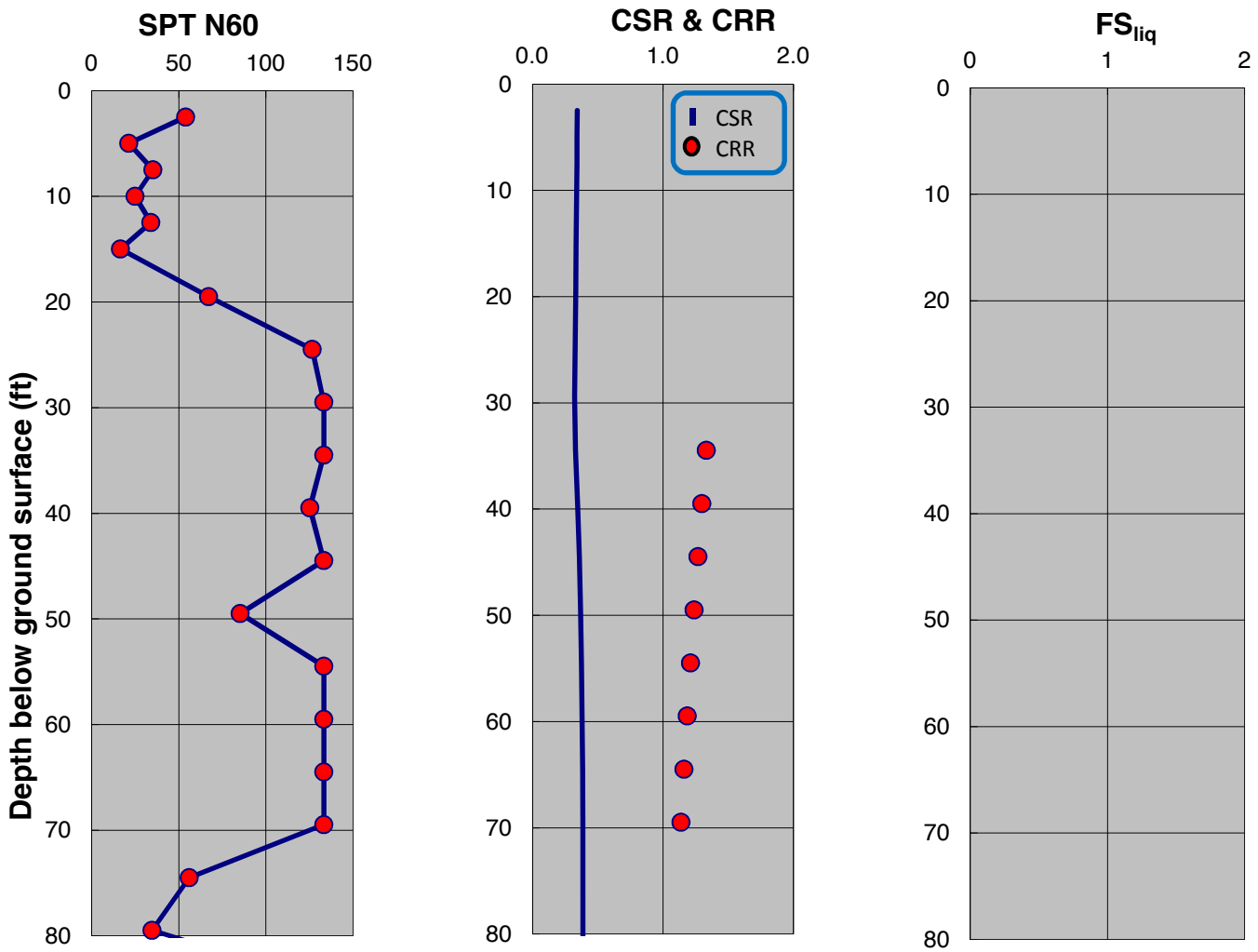
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-172 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-173 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

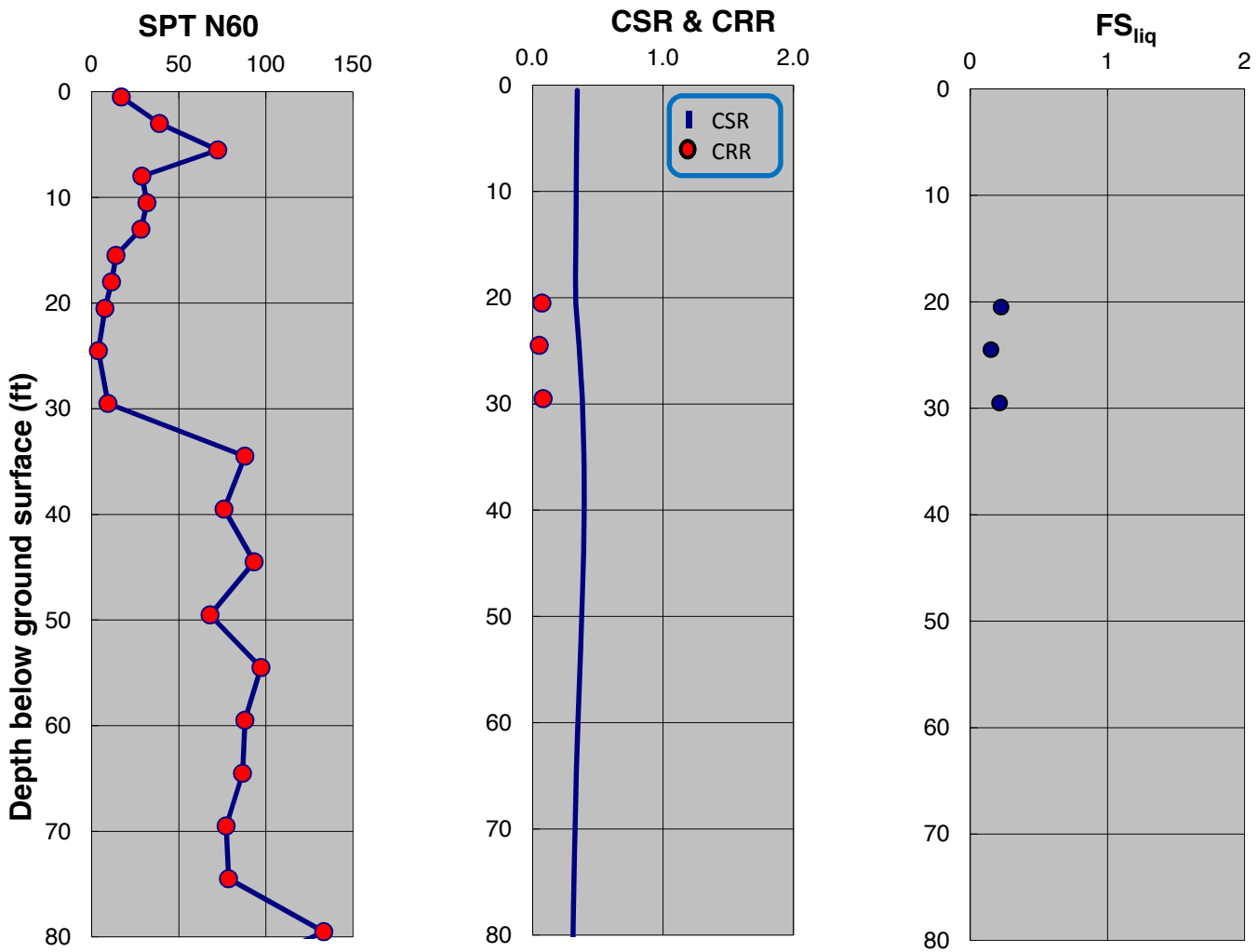
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-173 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

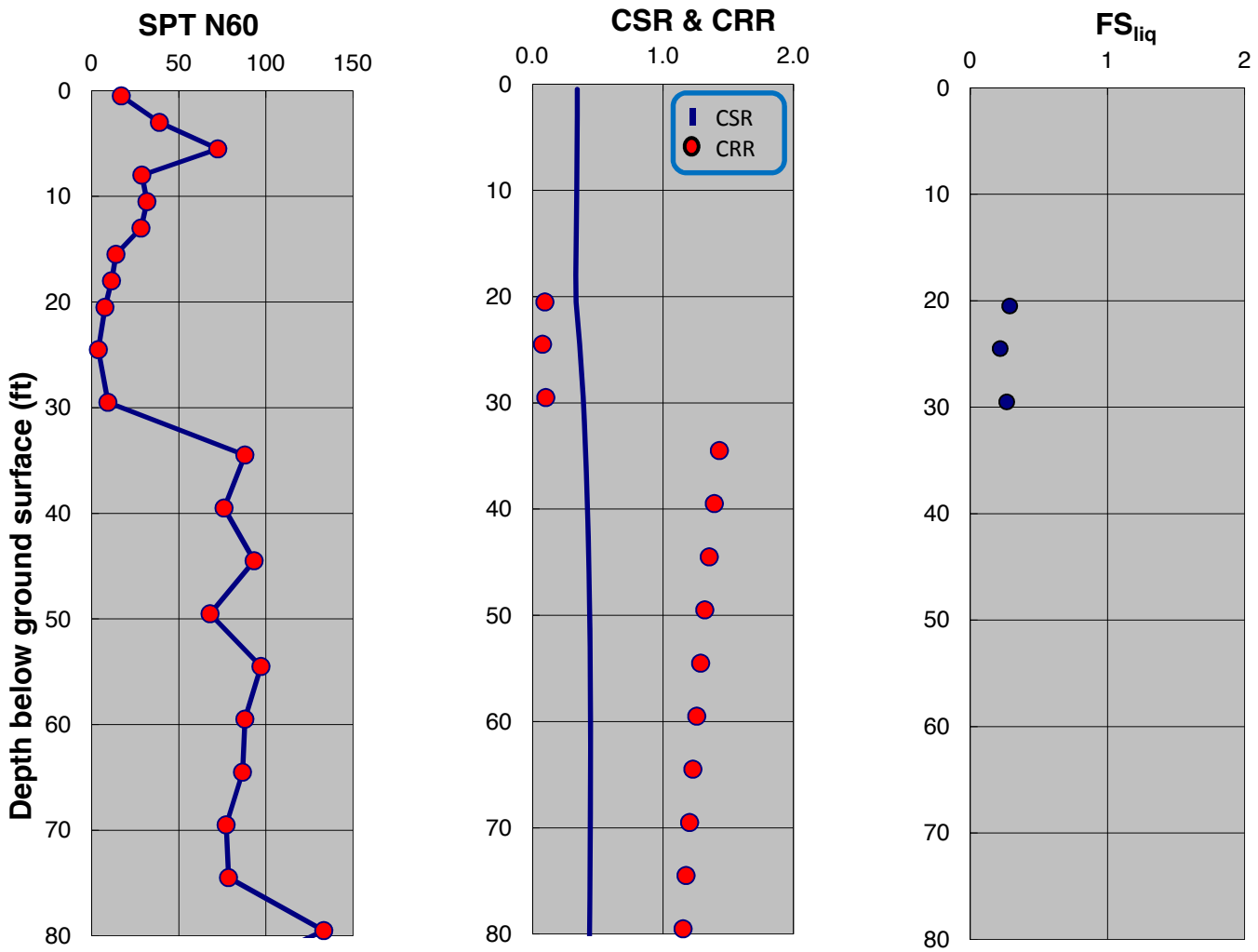
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.230



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-176 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

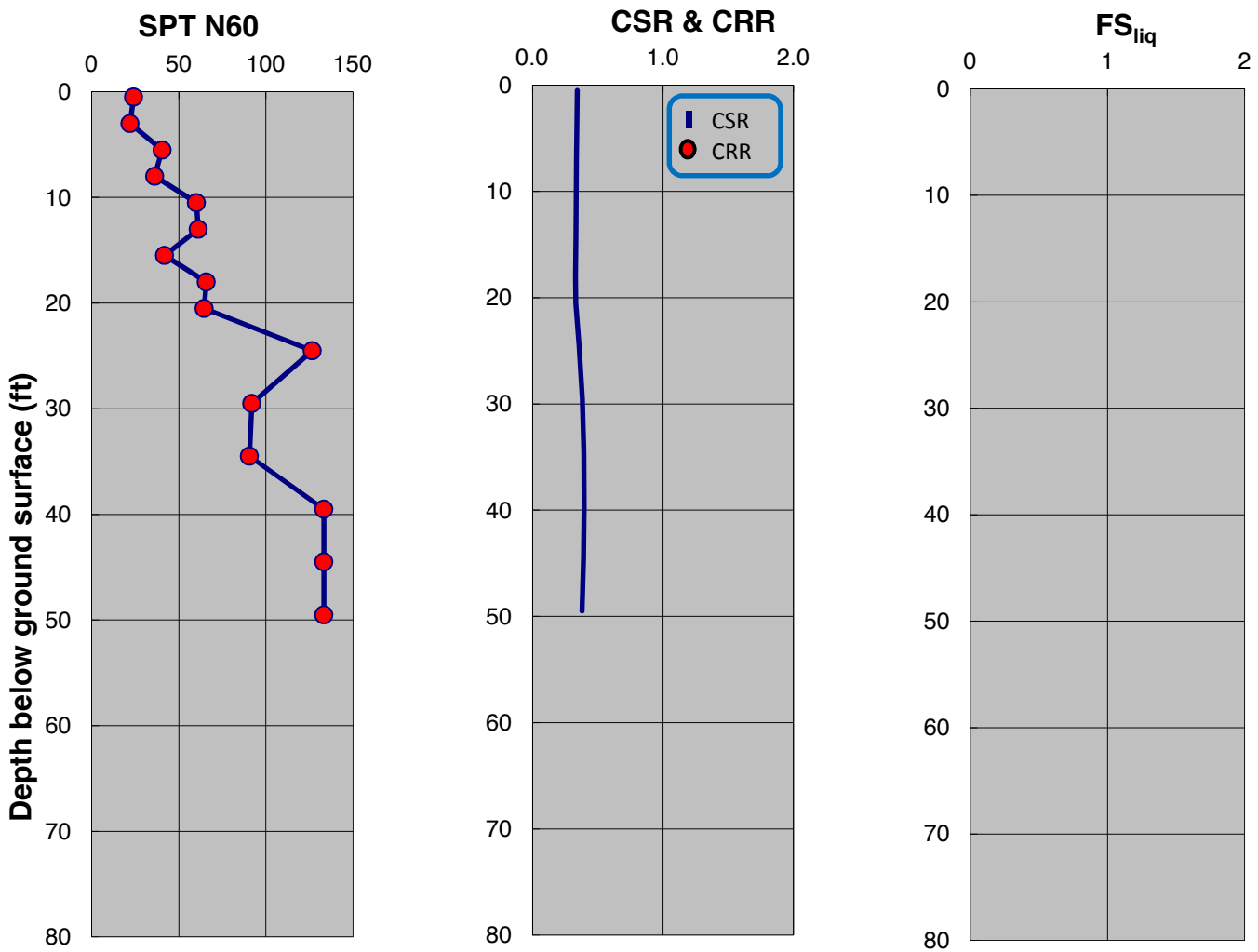
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-176 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

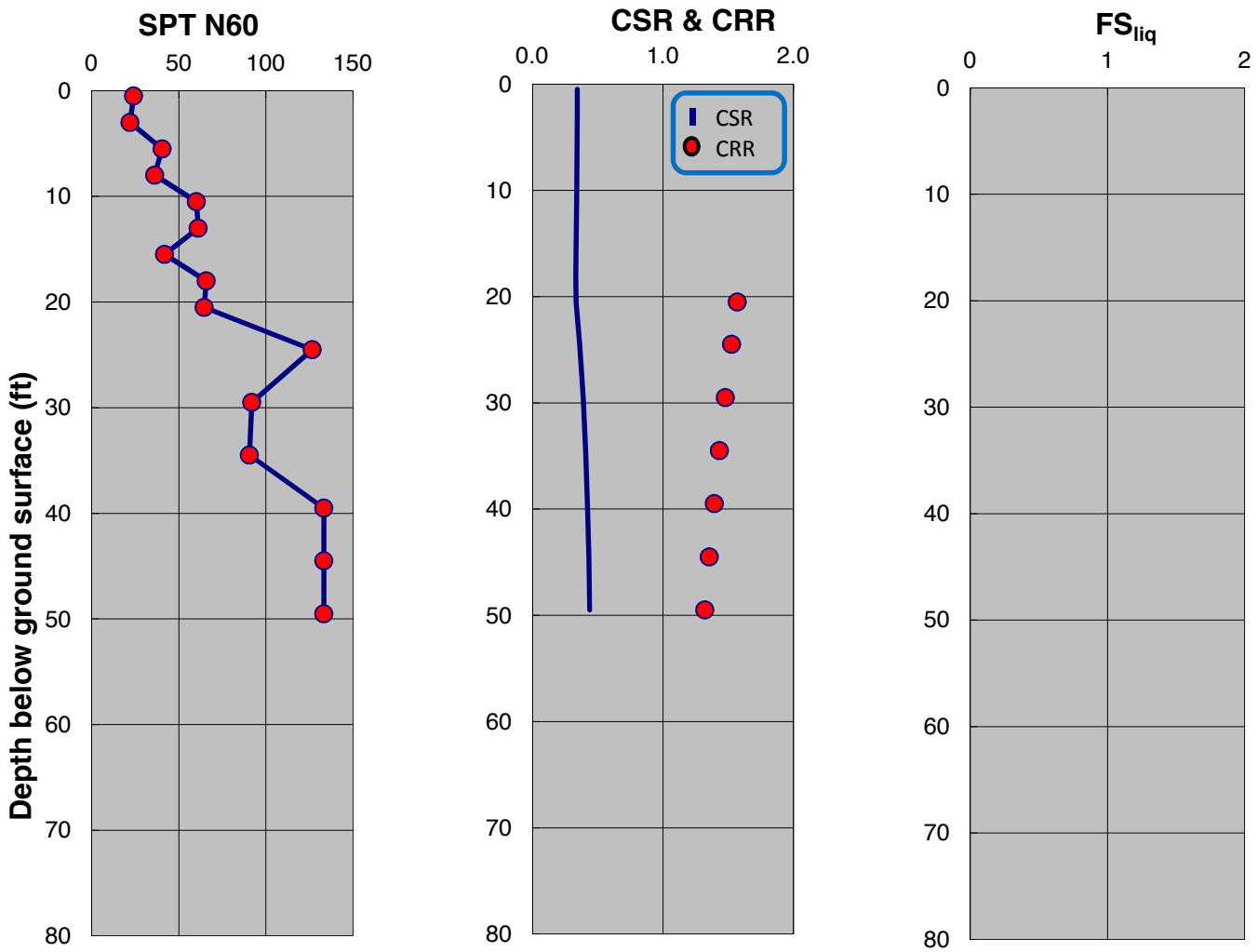
PLATE C.232



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-177 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

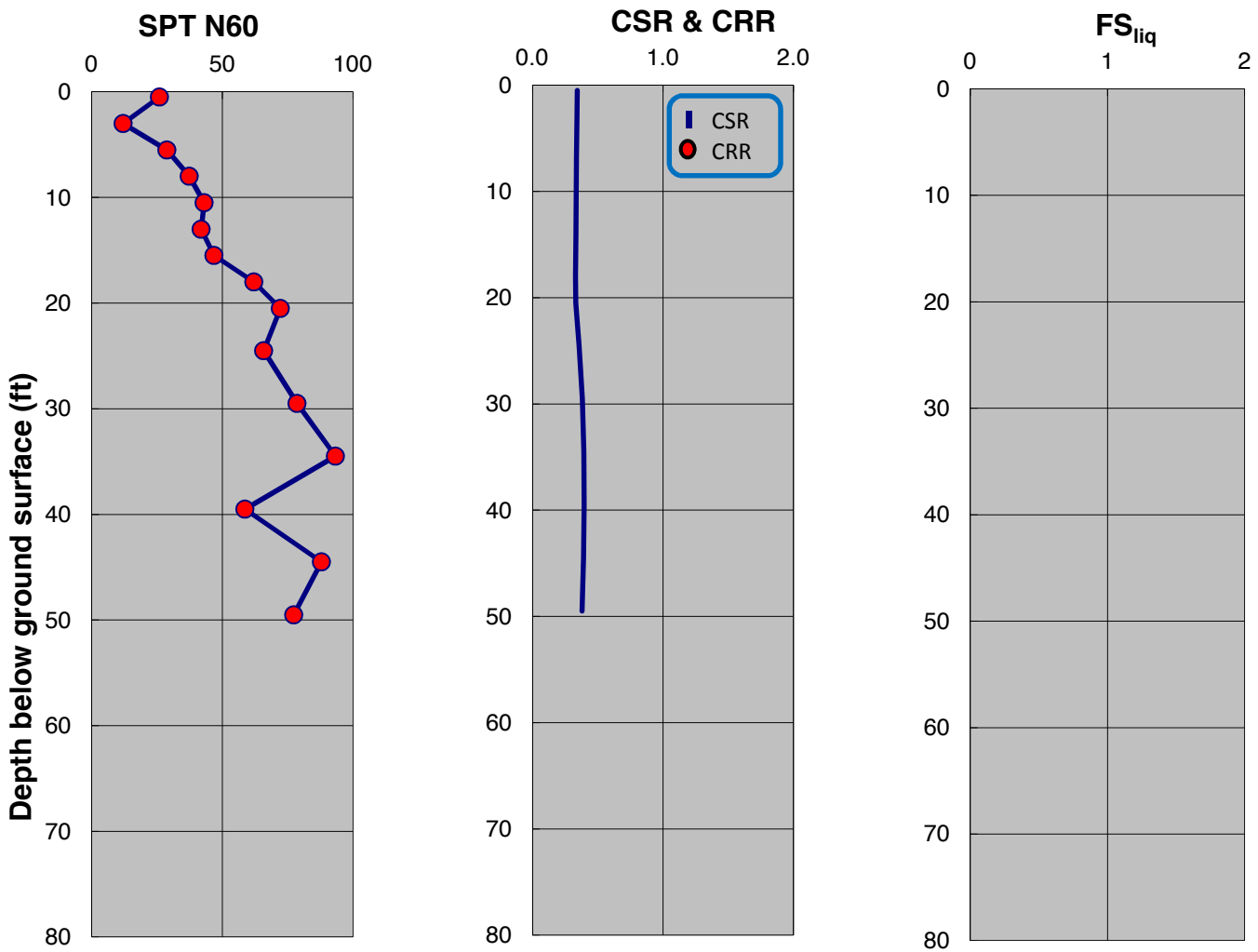
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.233



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-177 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

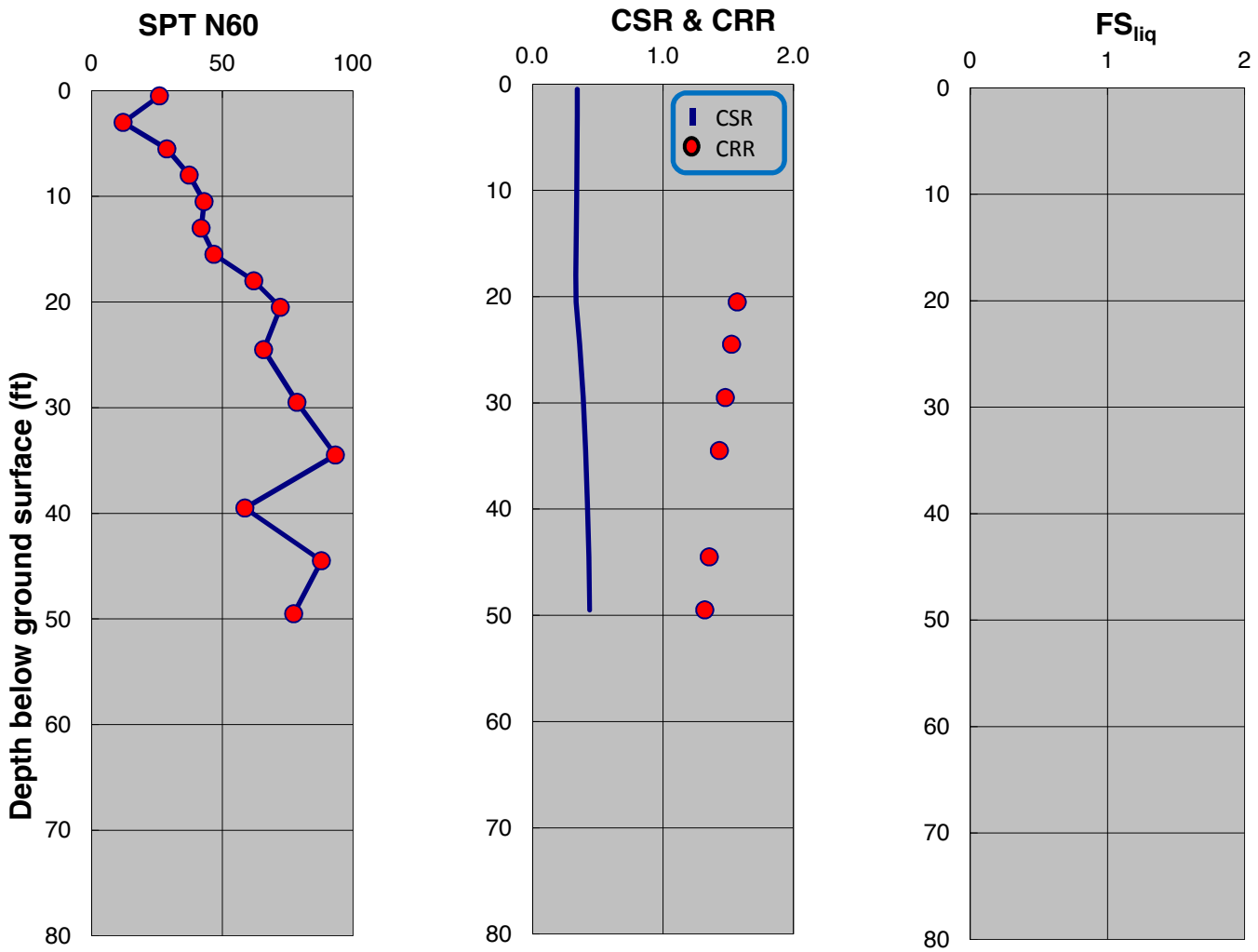
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-178 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

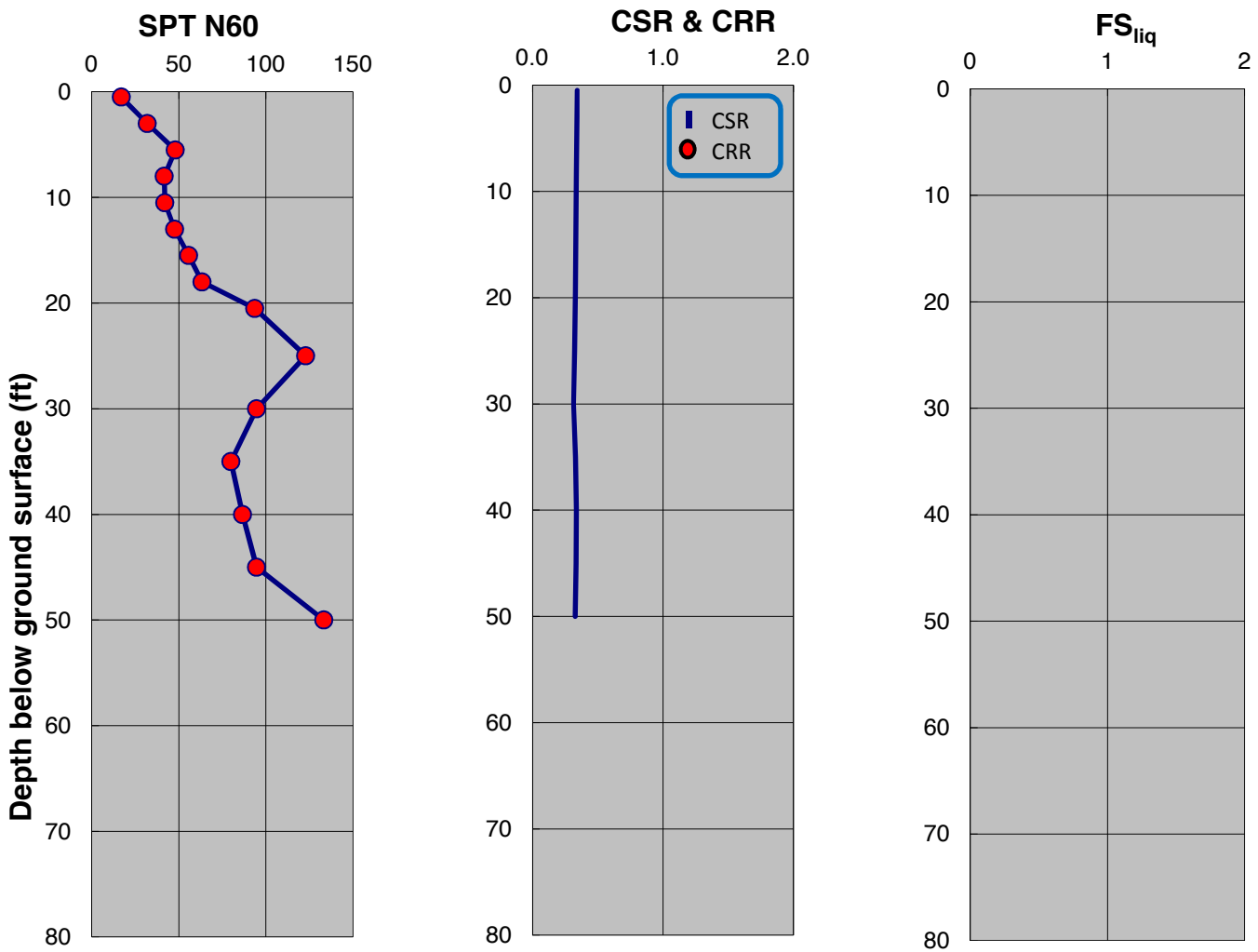
PLATE C.235



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-178 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

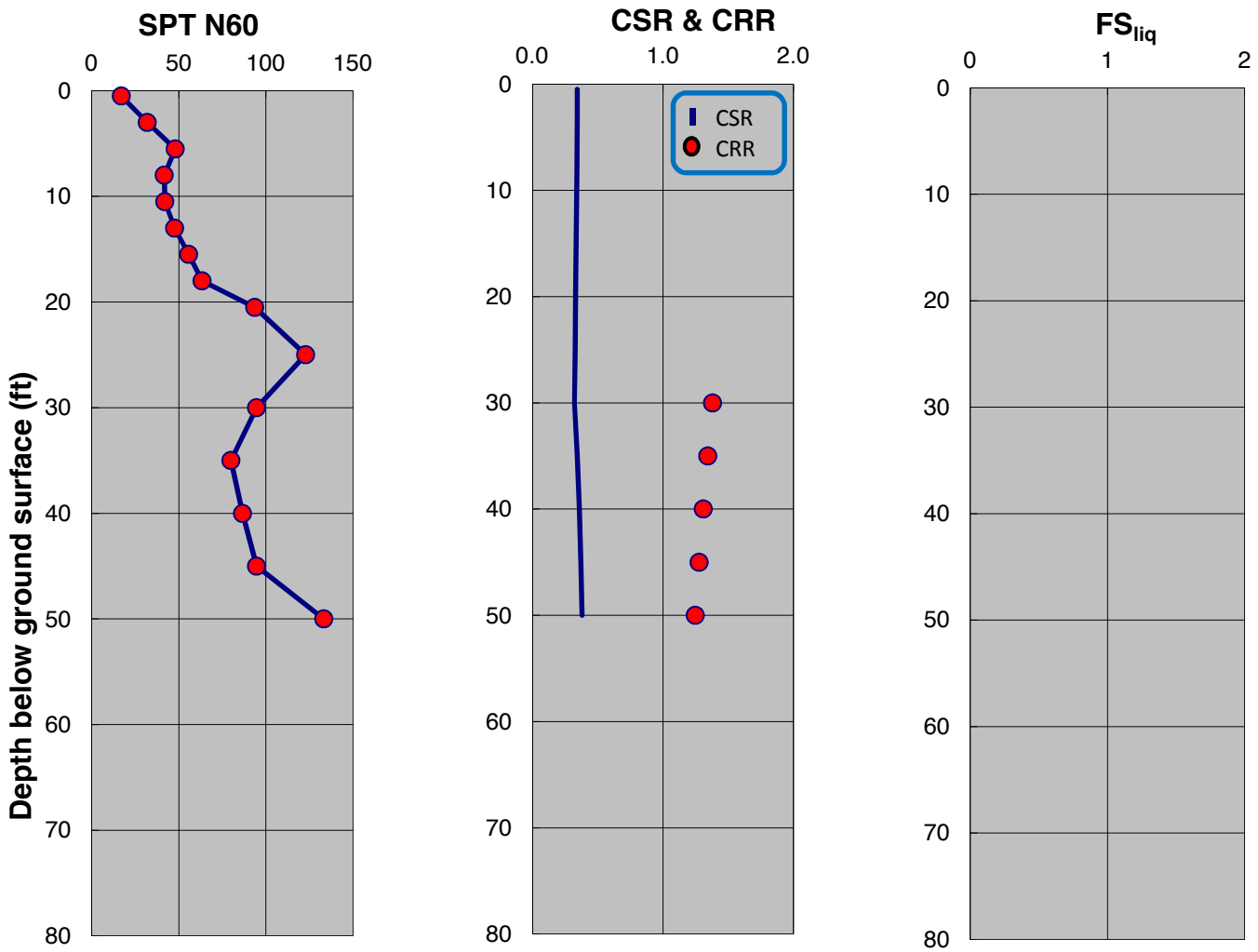
PLATE C.236



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-179 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

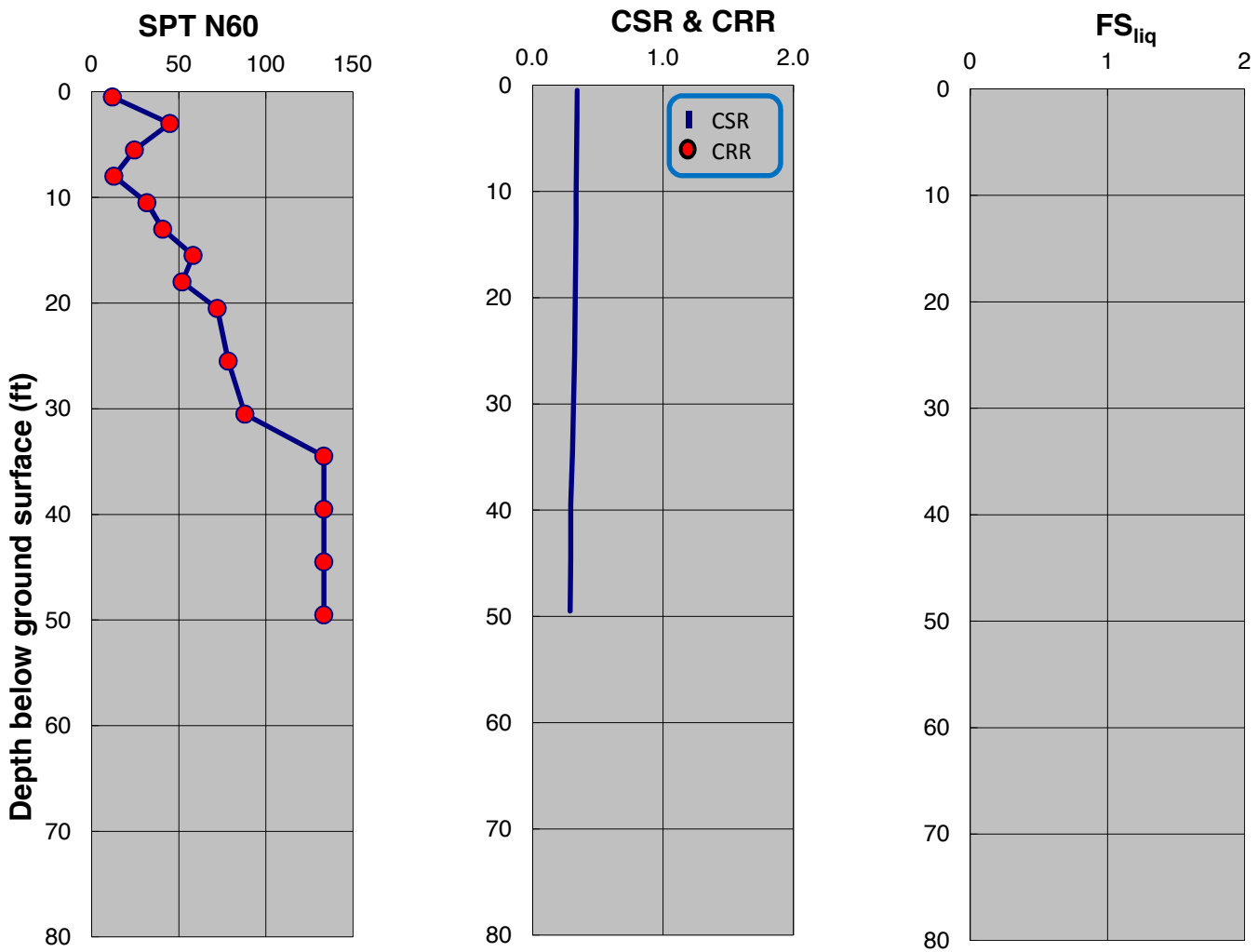
PLATE C.237



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-179 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

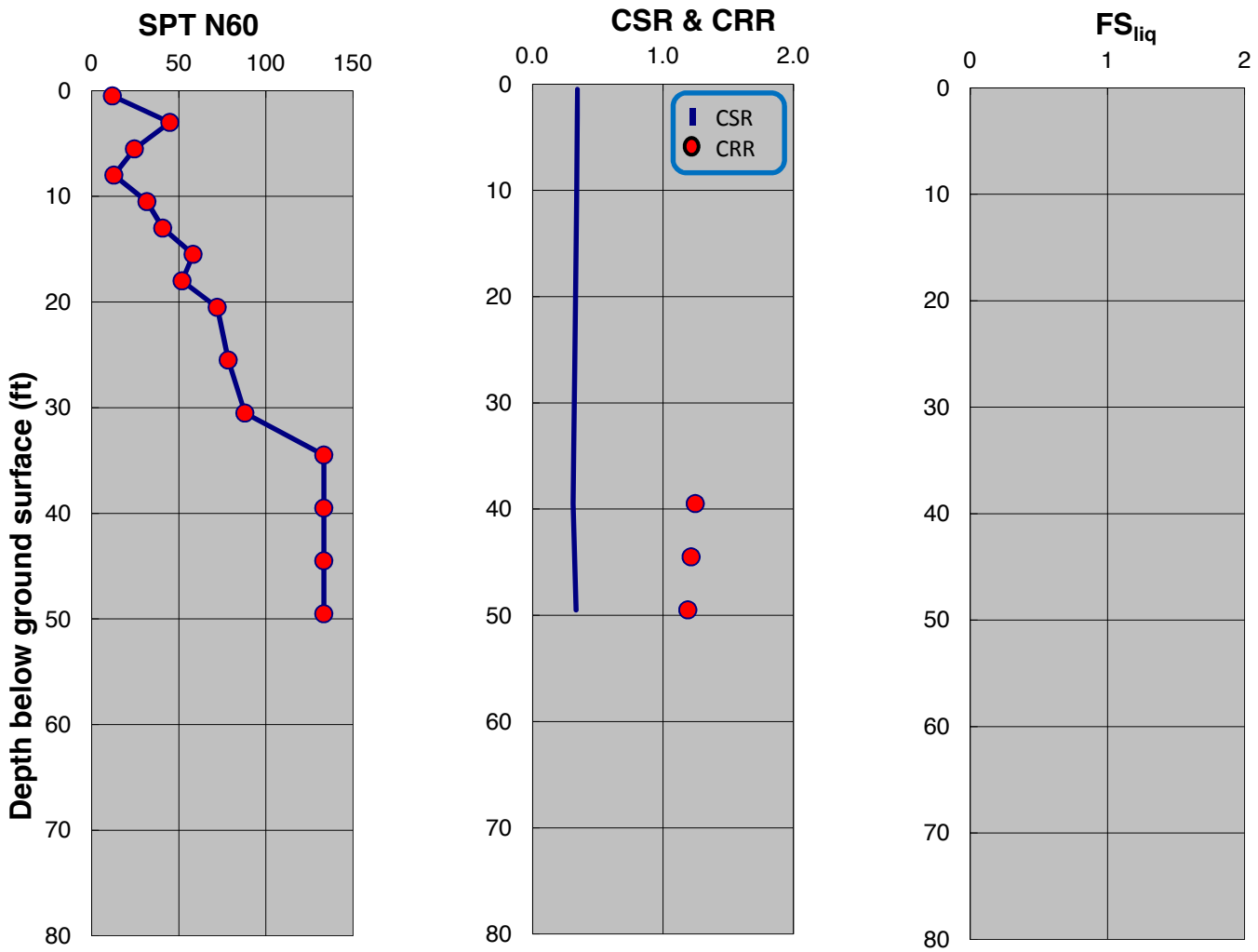
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.238



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-180 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

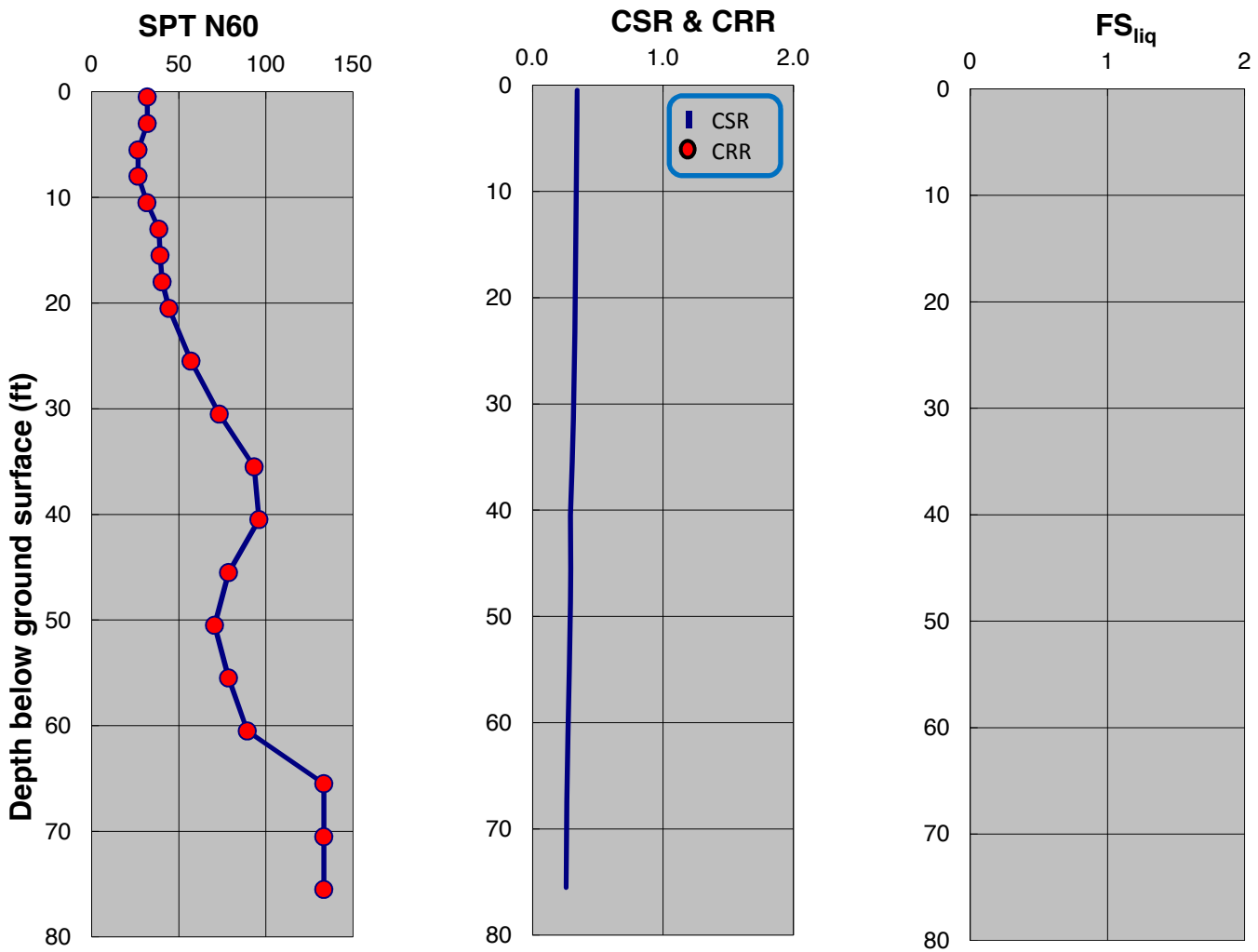
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-180 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

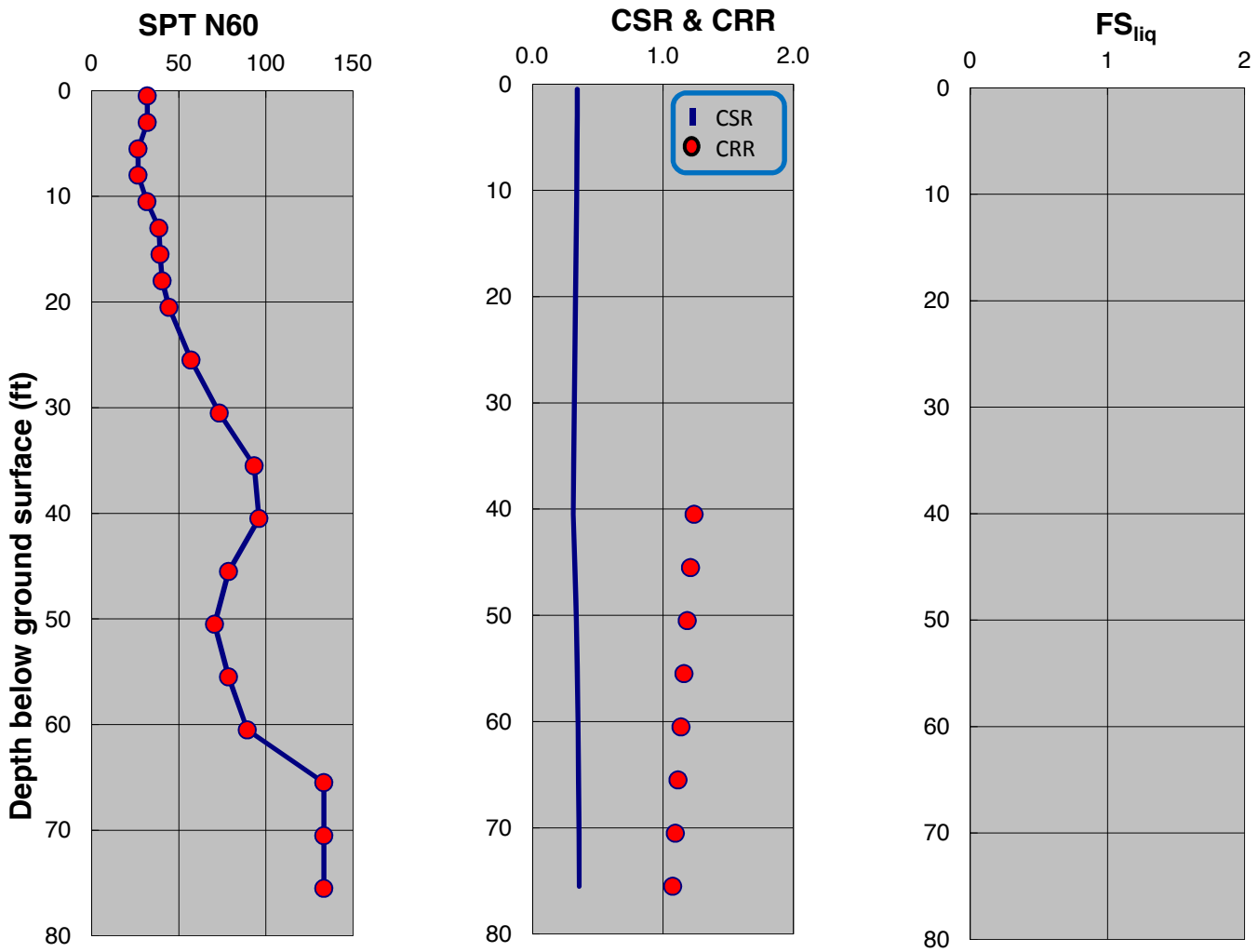
PLATE C.240



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-181 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

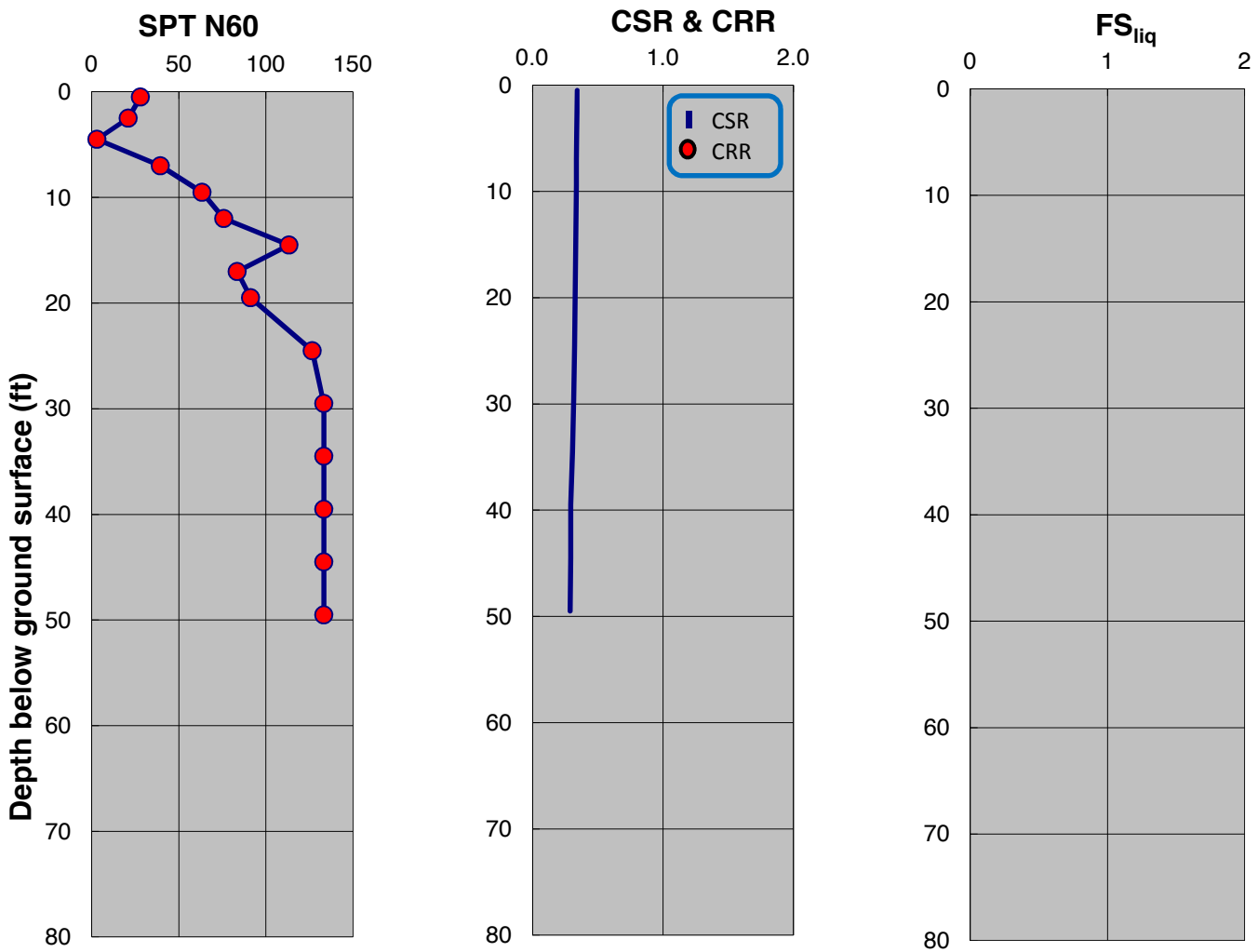
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.241



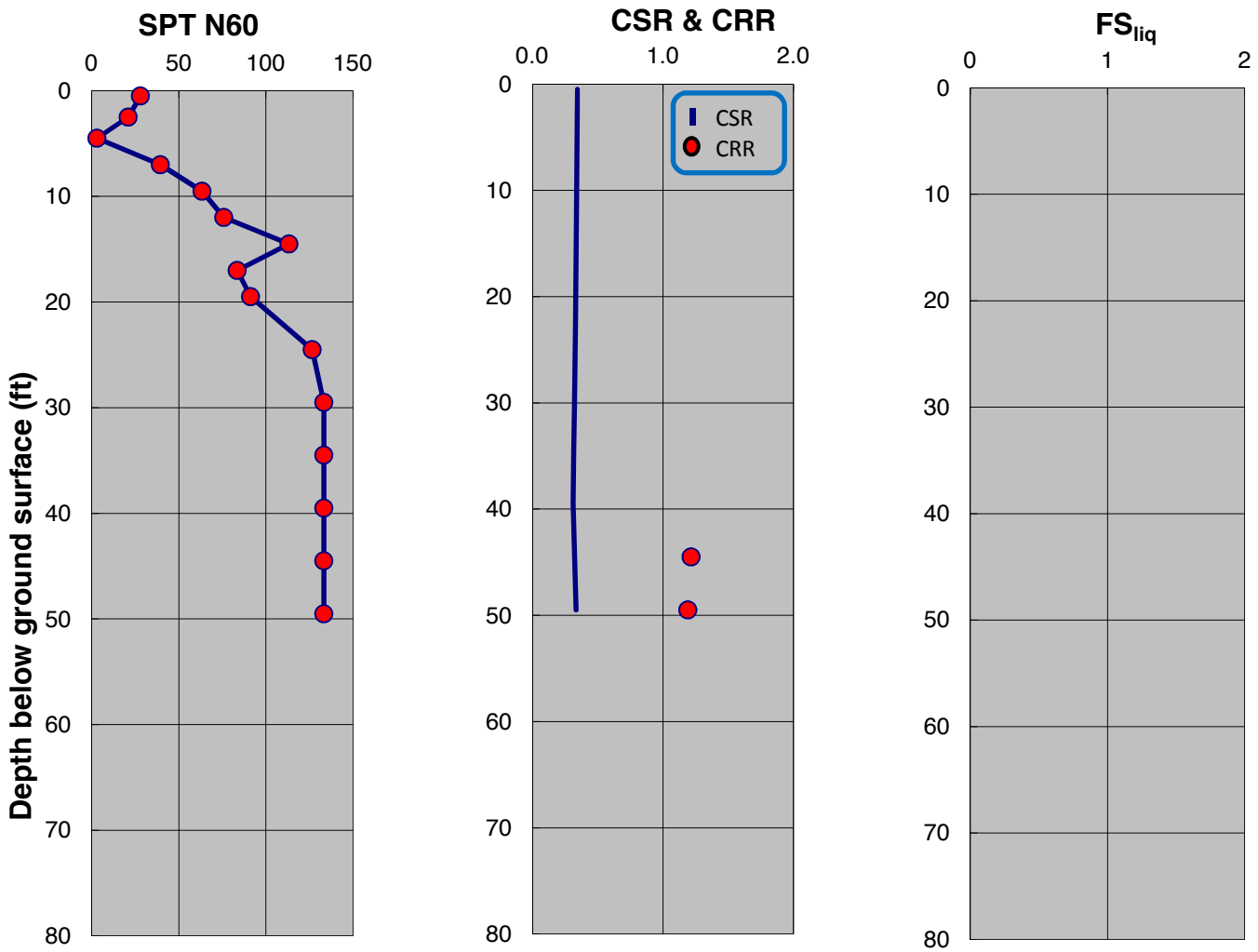
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-181 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



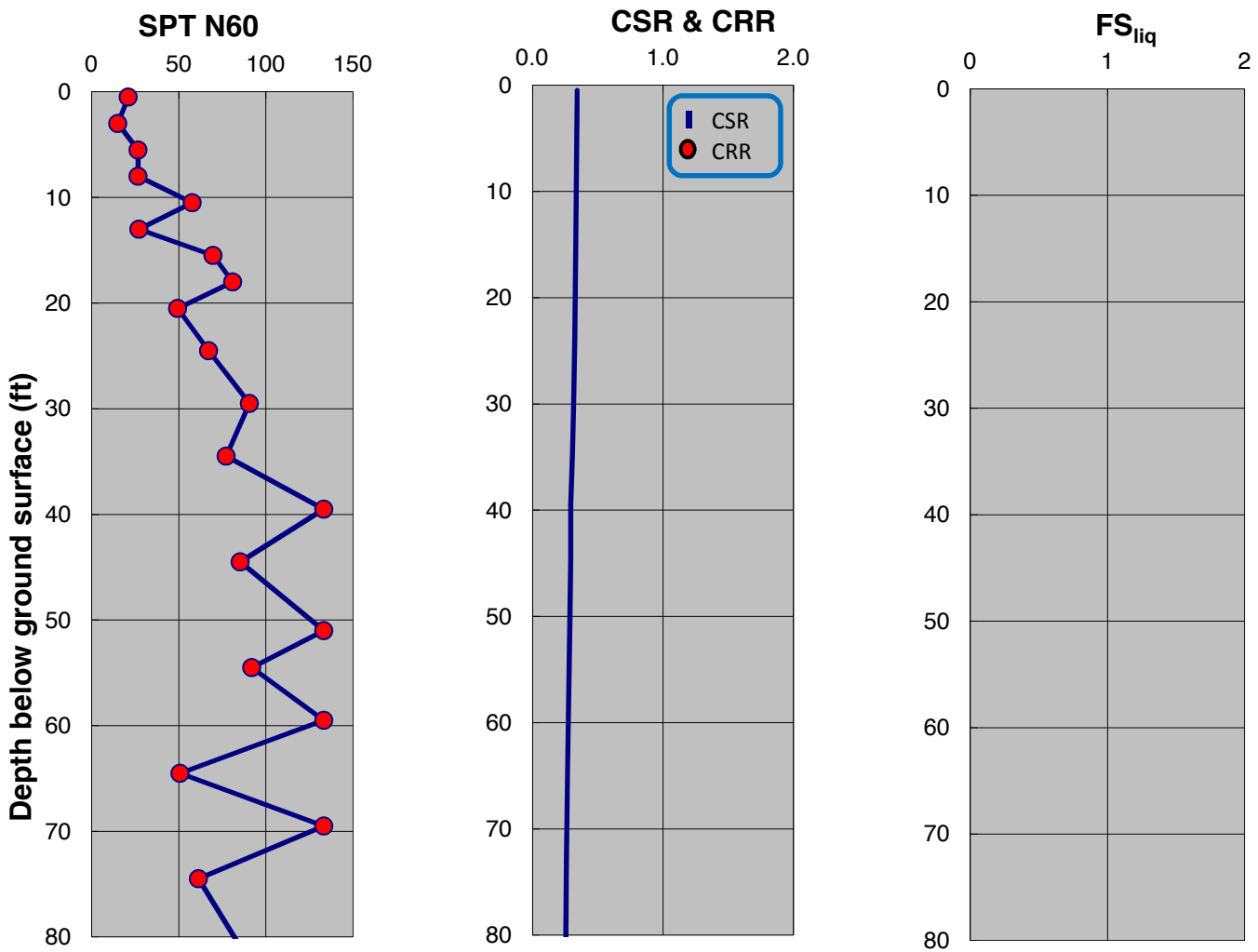
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-182 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



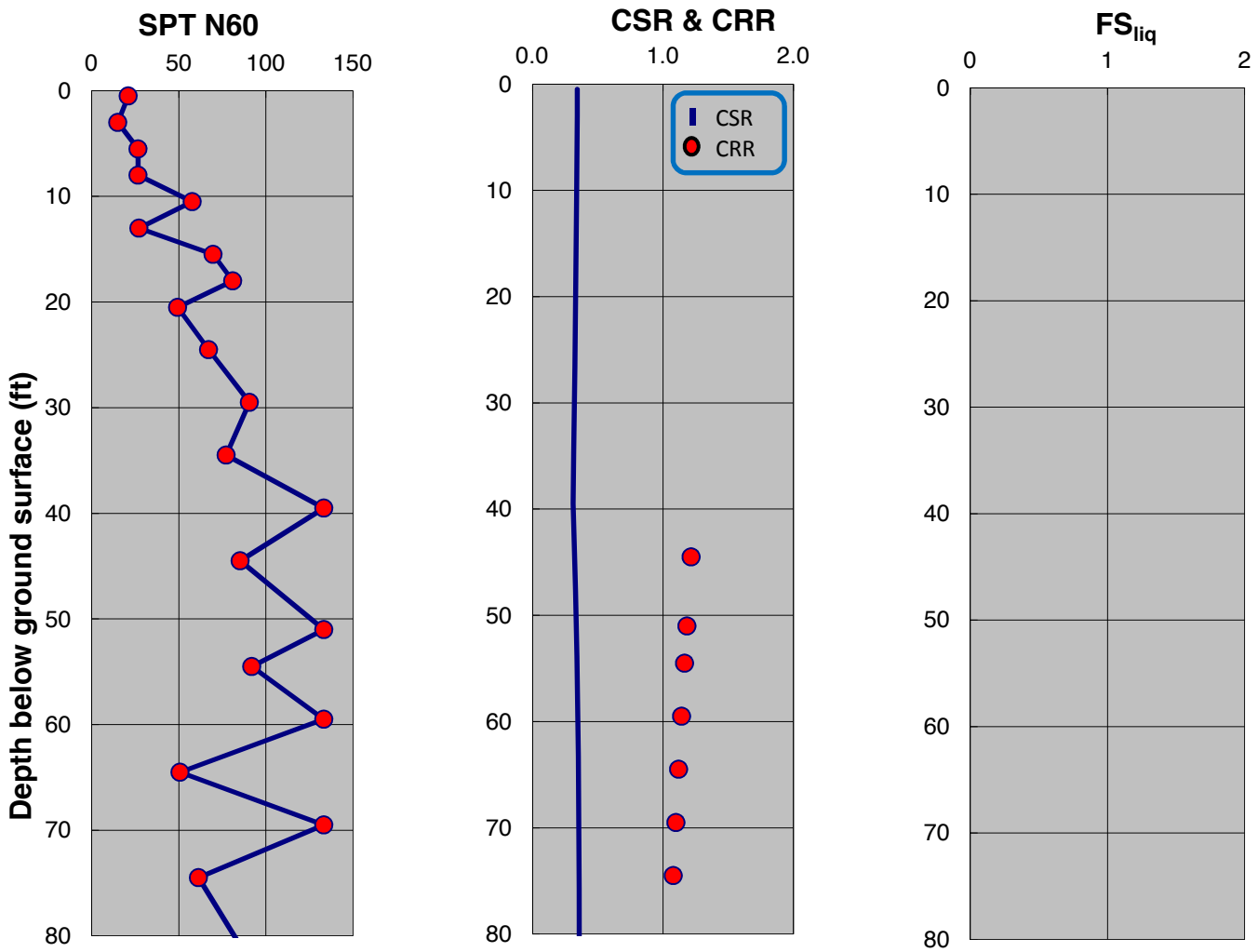
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-182 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



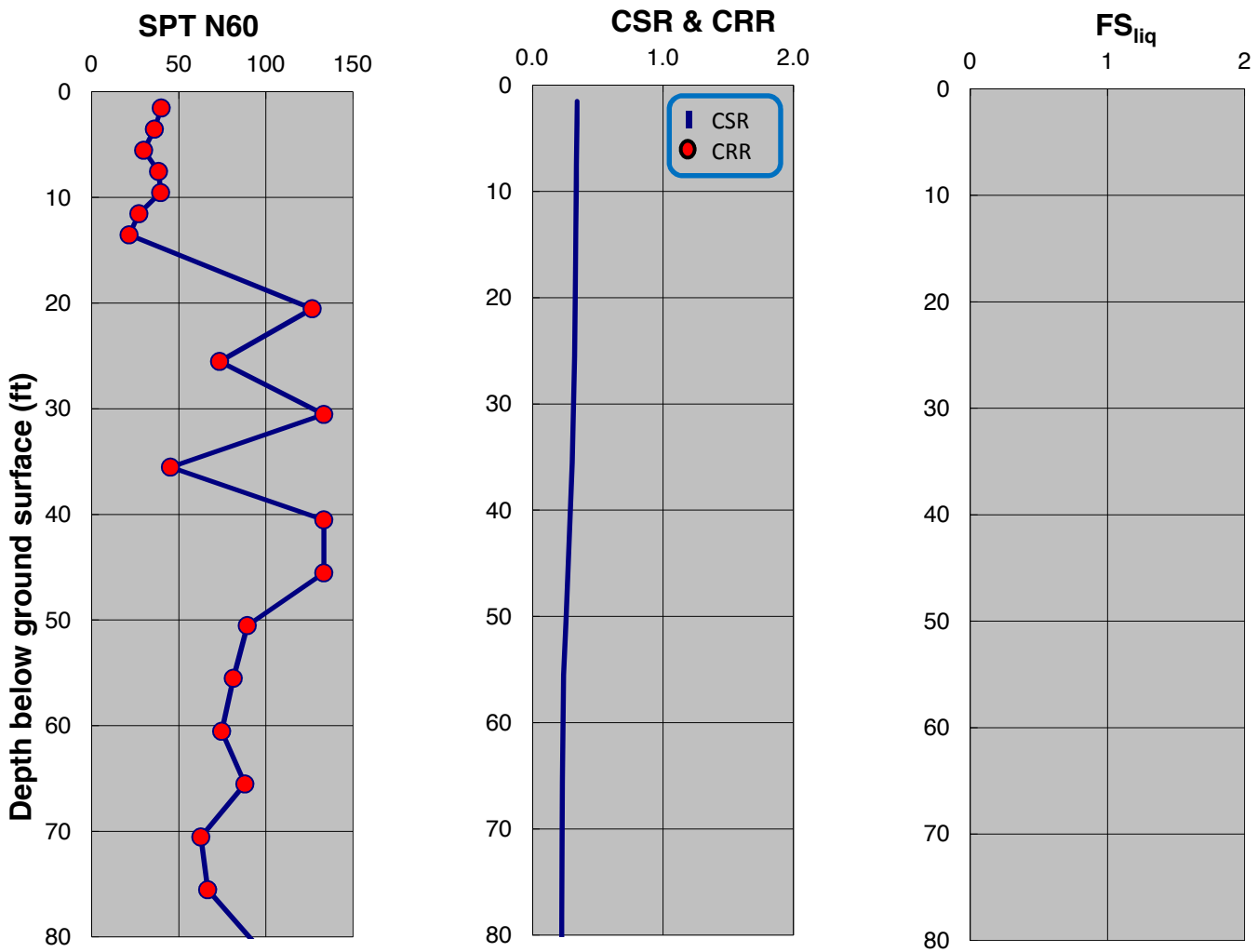
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-183 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



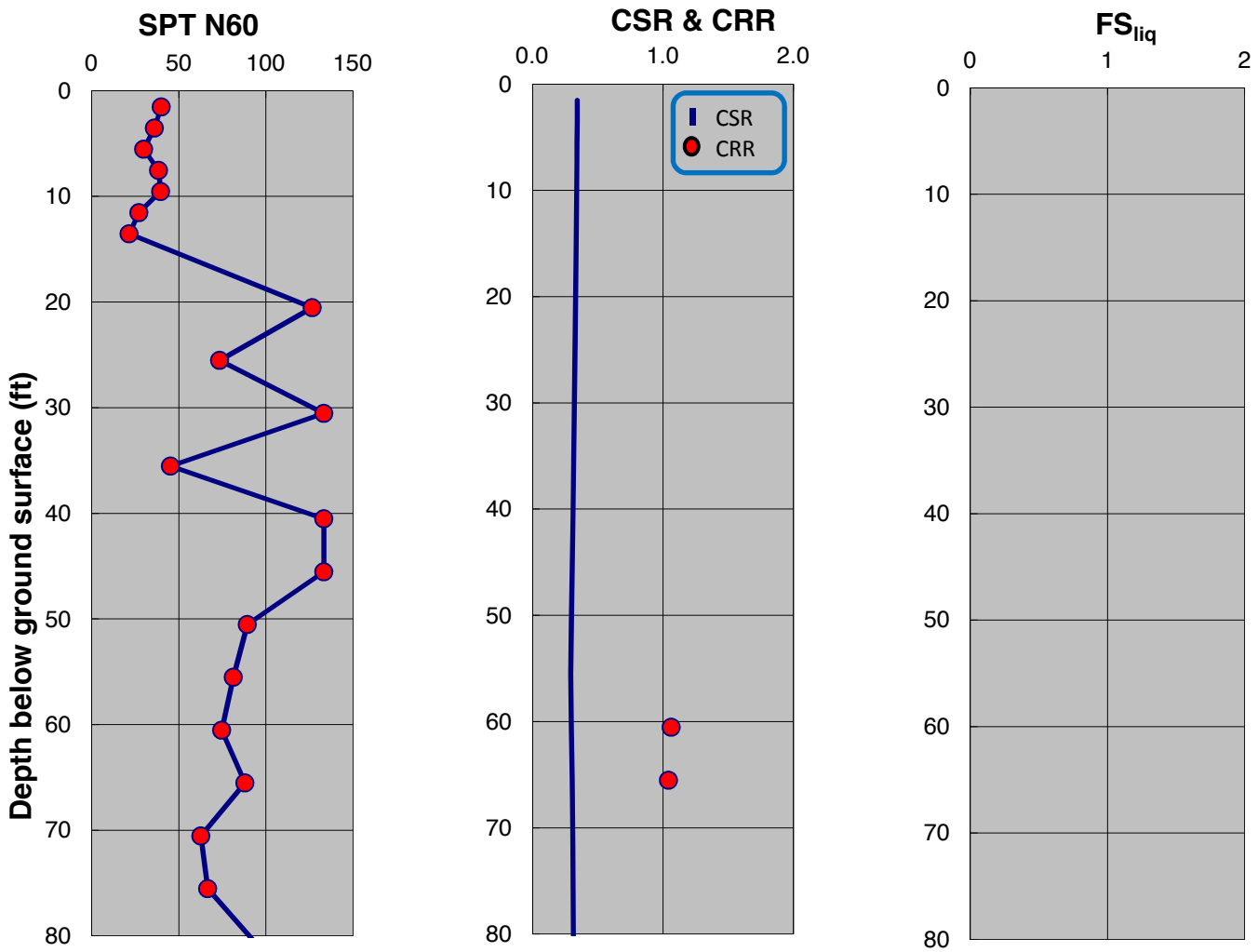
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-183 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



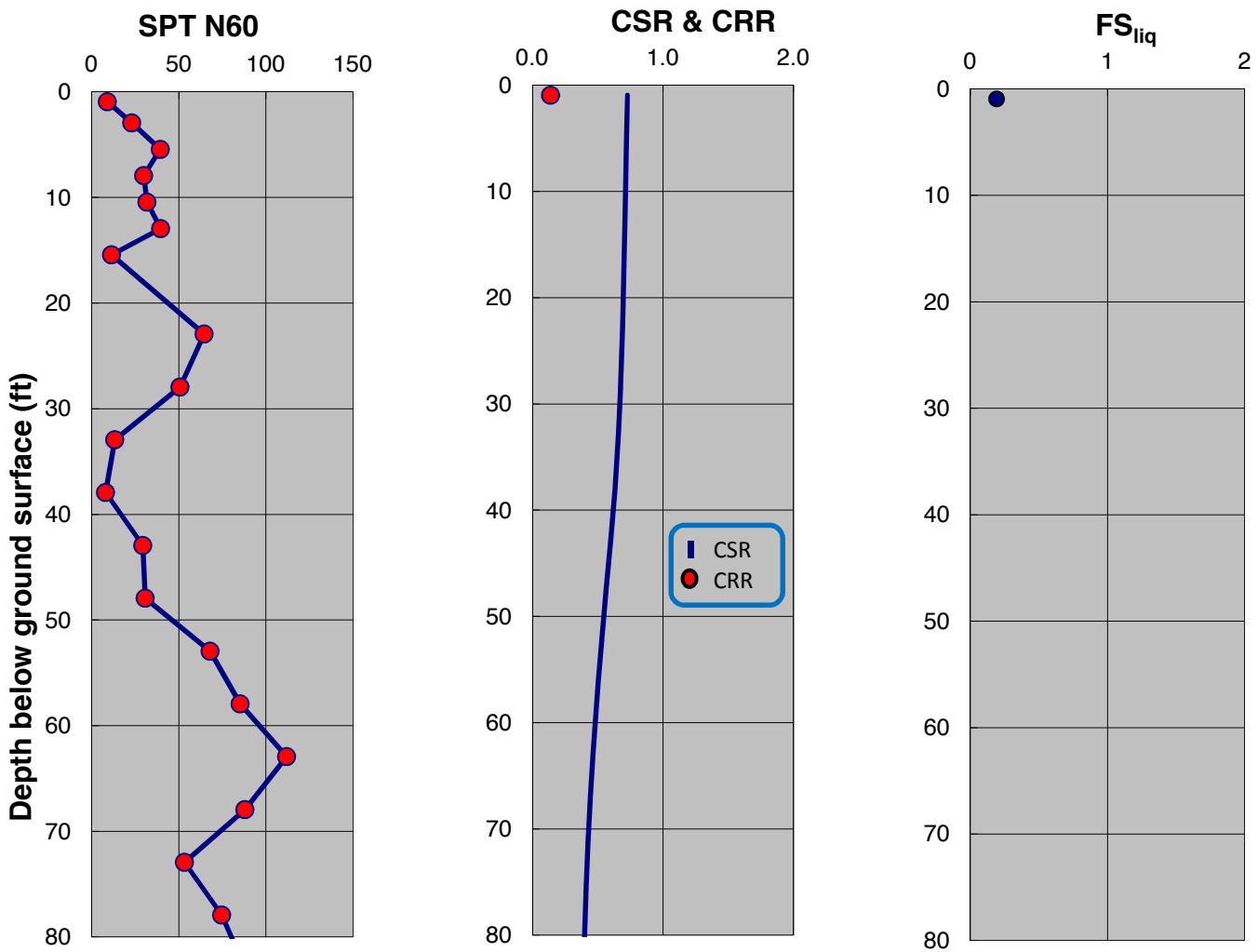
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-189 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



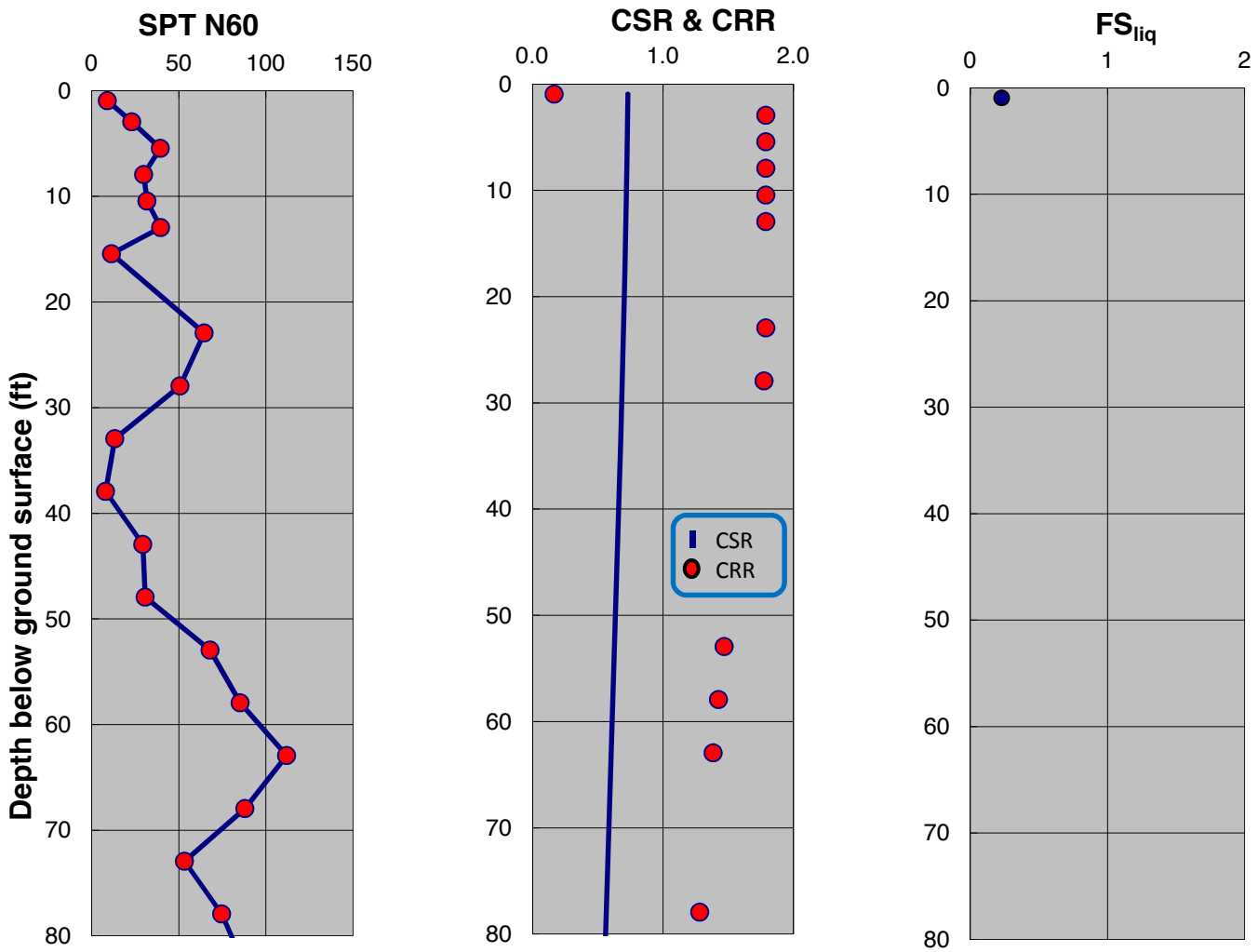
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-189 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-190 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

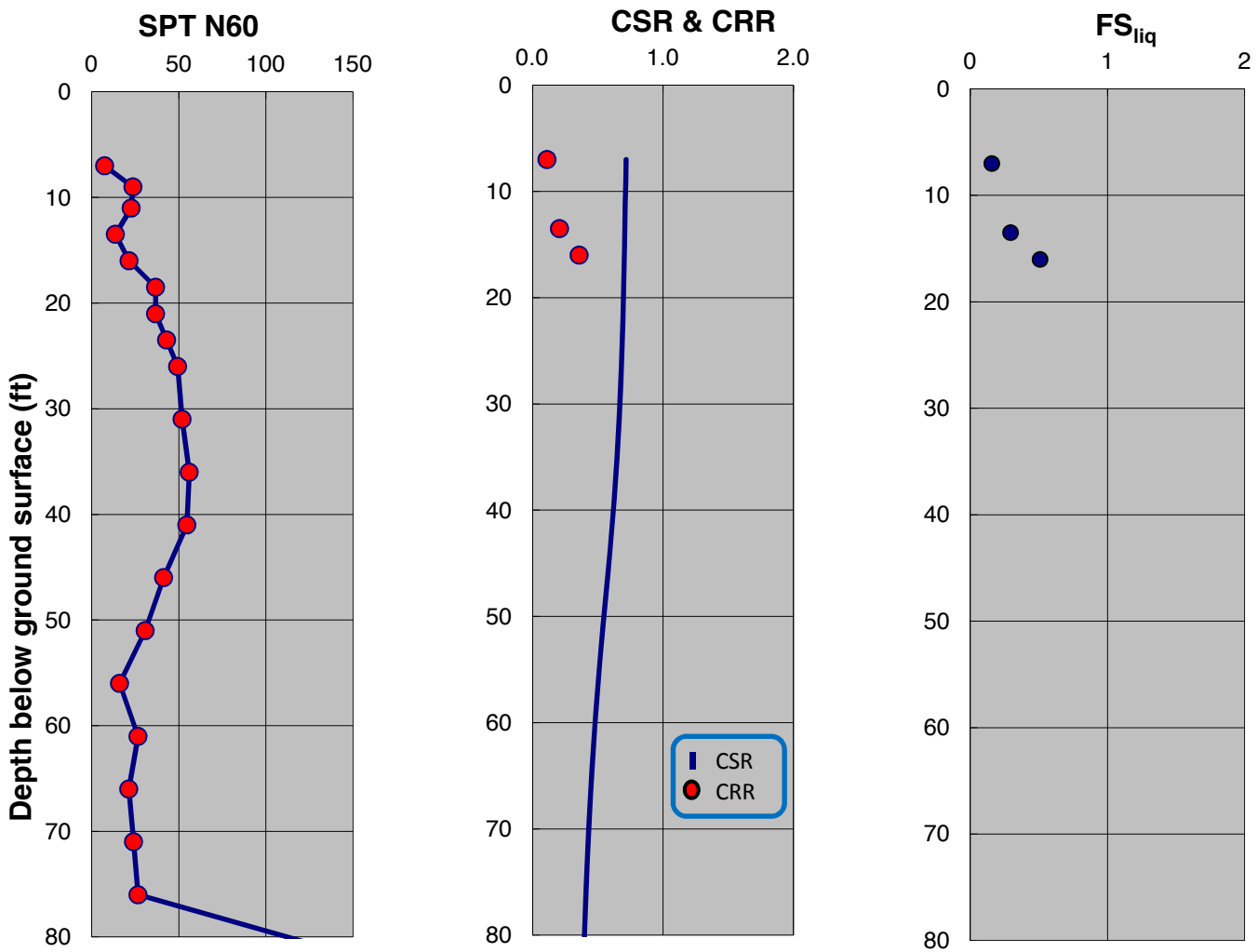
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-190 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

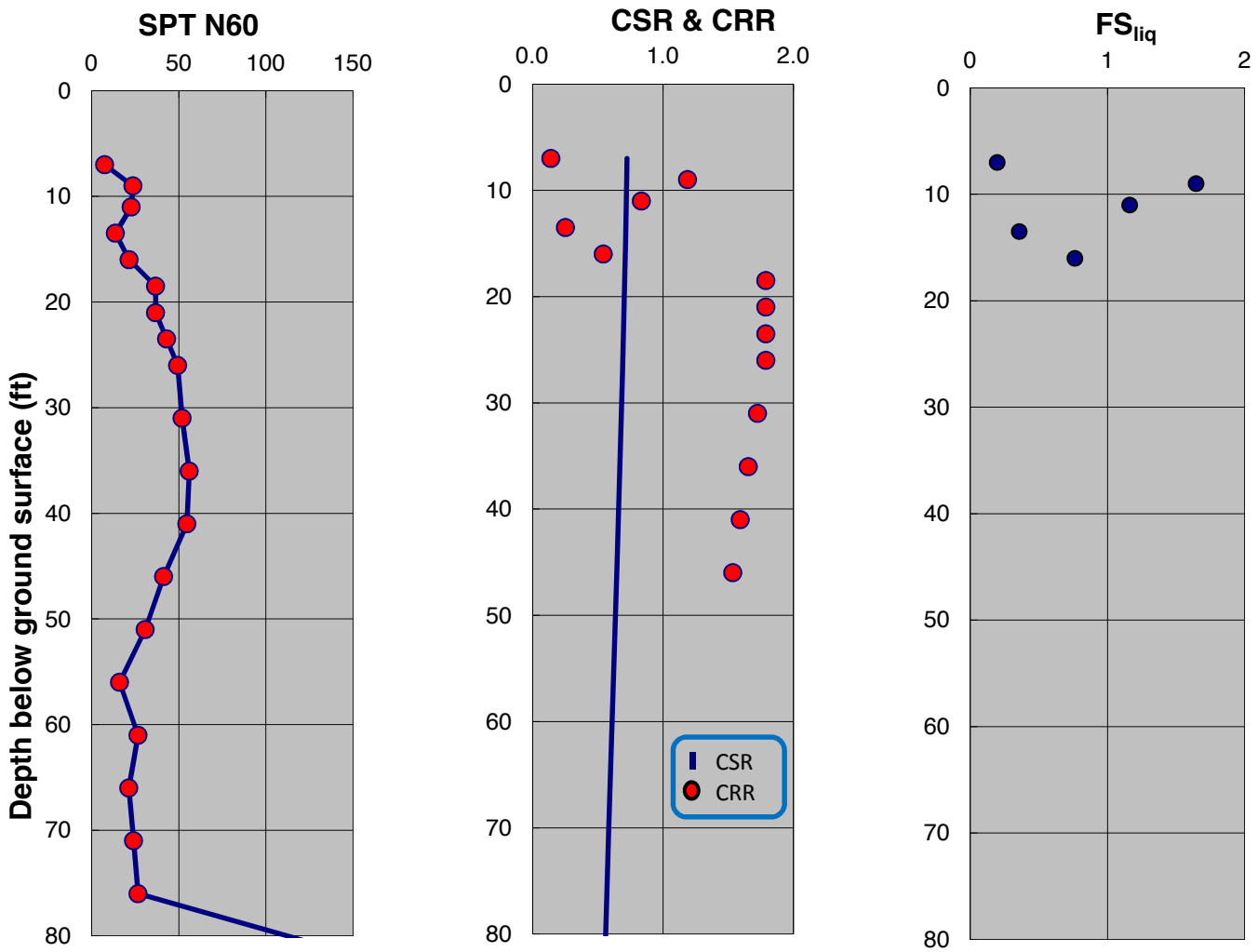
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.250



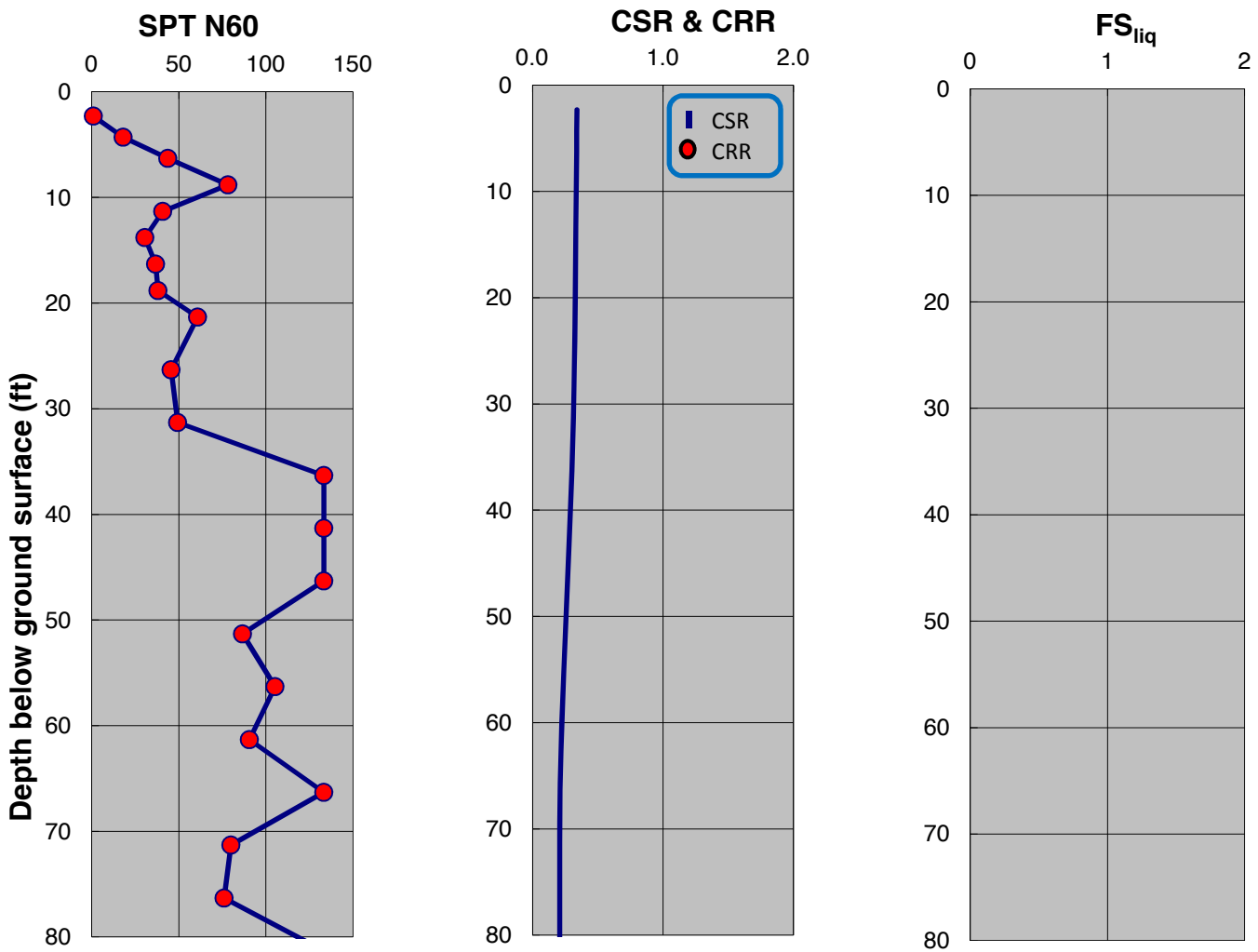
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-191 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



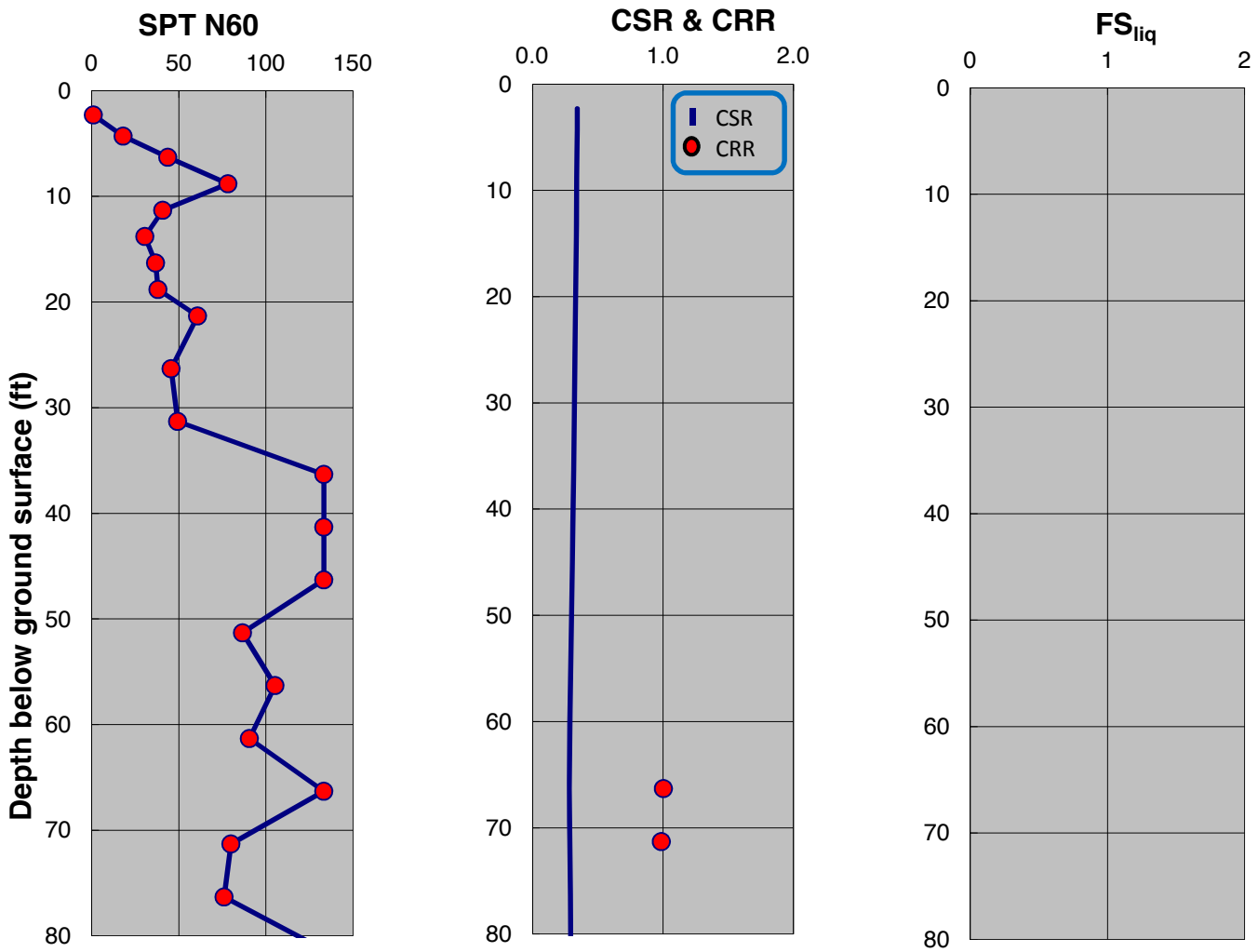
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-191 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



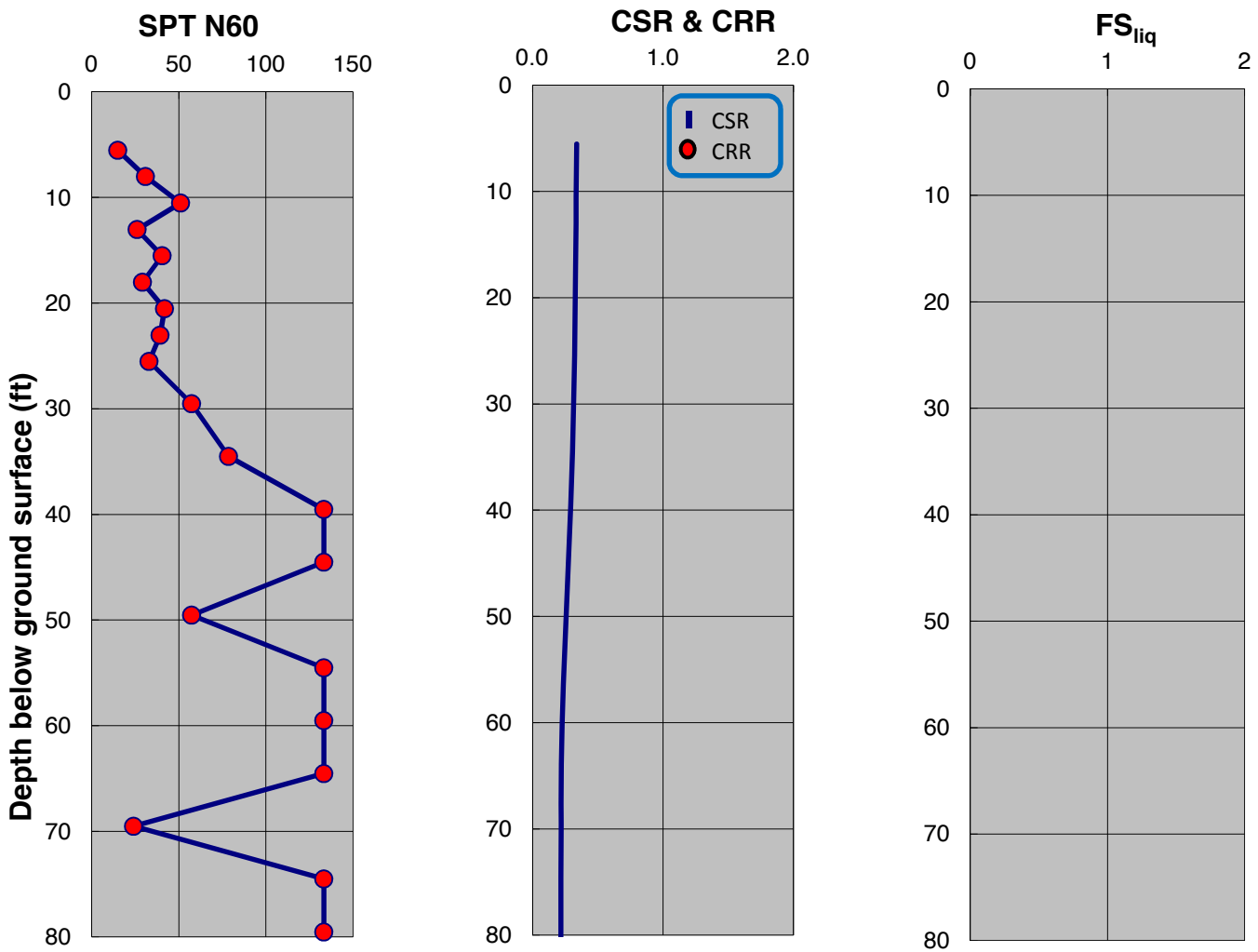
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-192 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-192 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

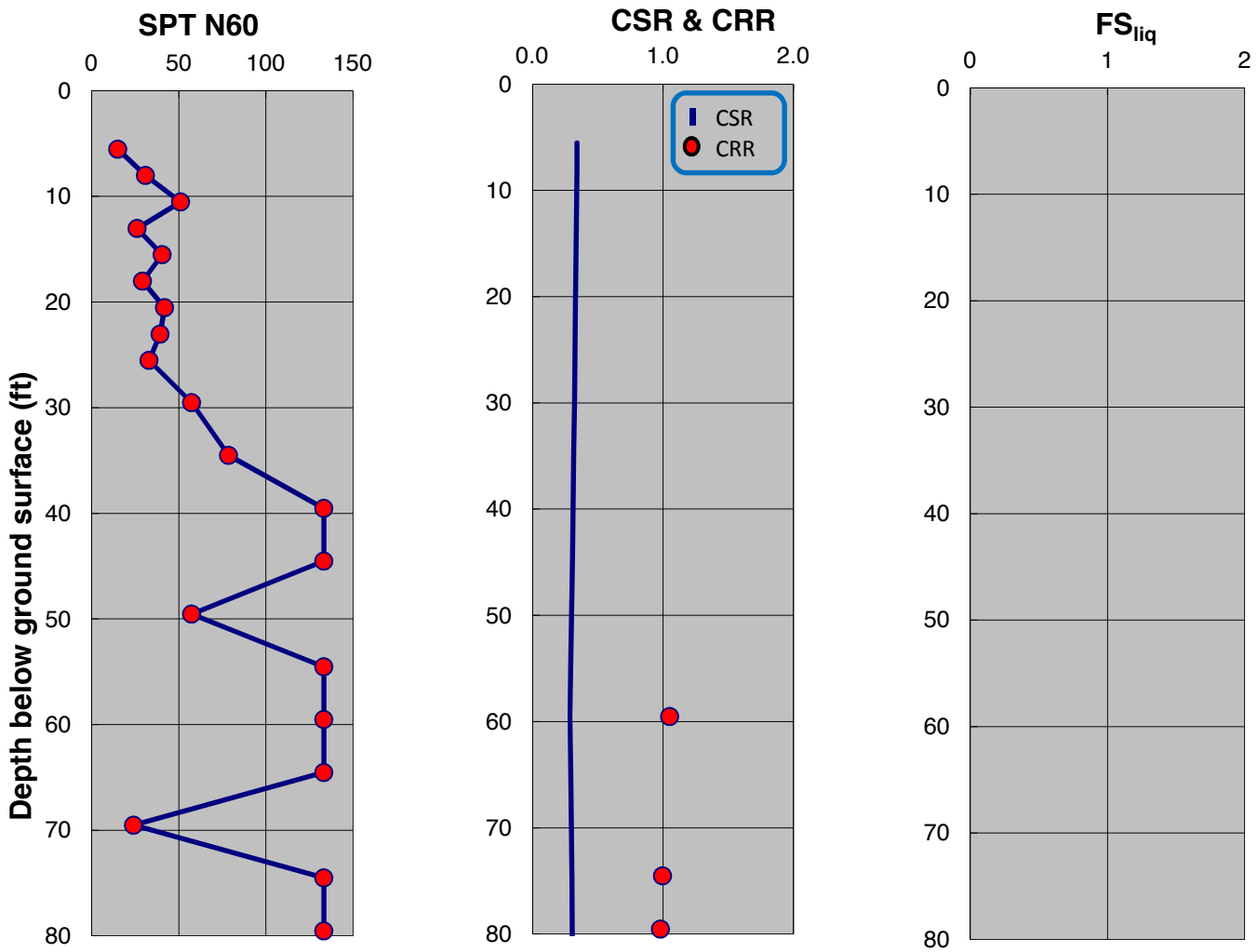
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-195 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

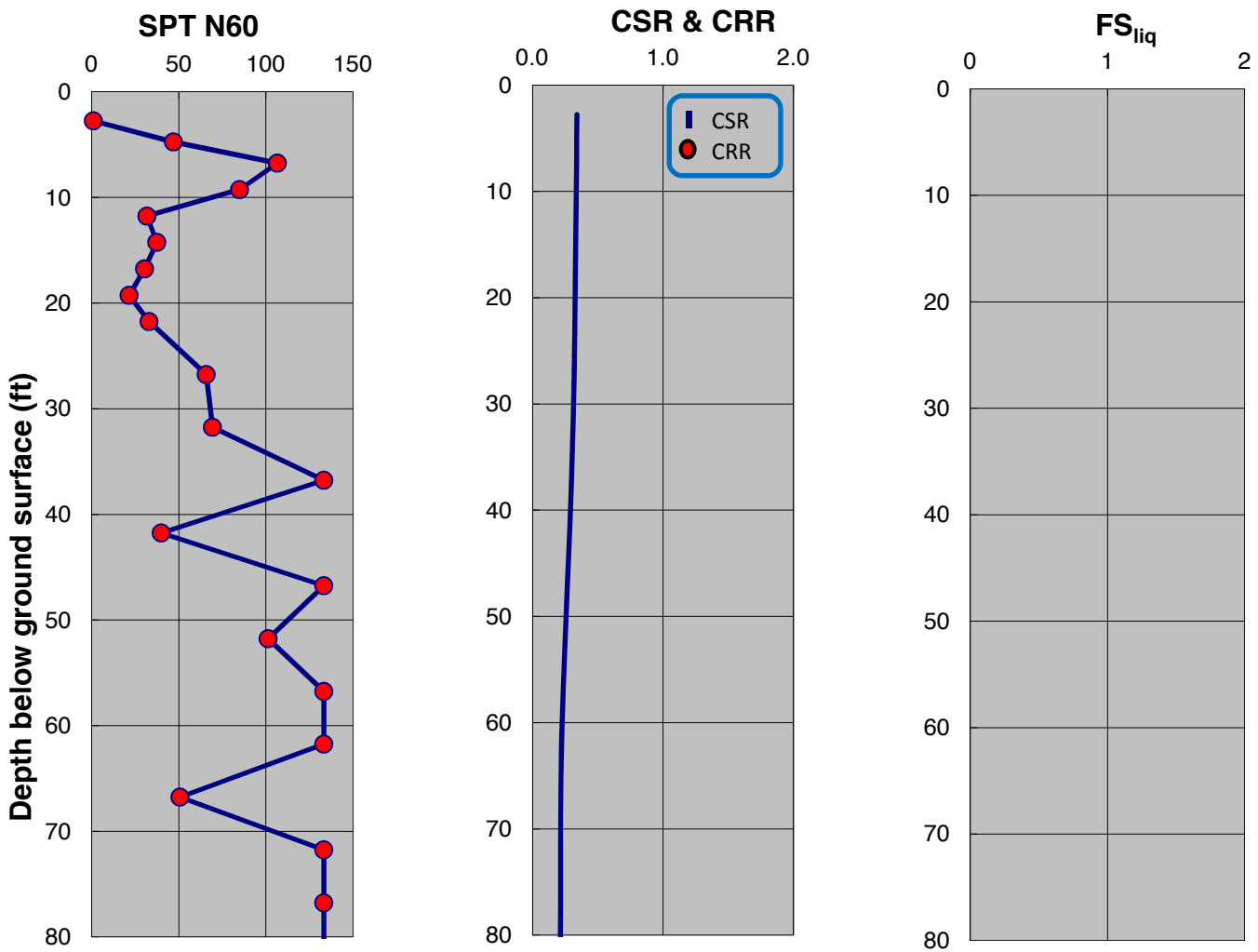
PLATE C.255



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-195 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

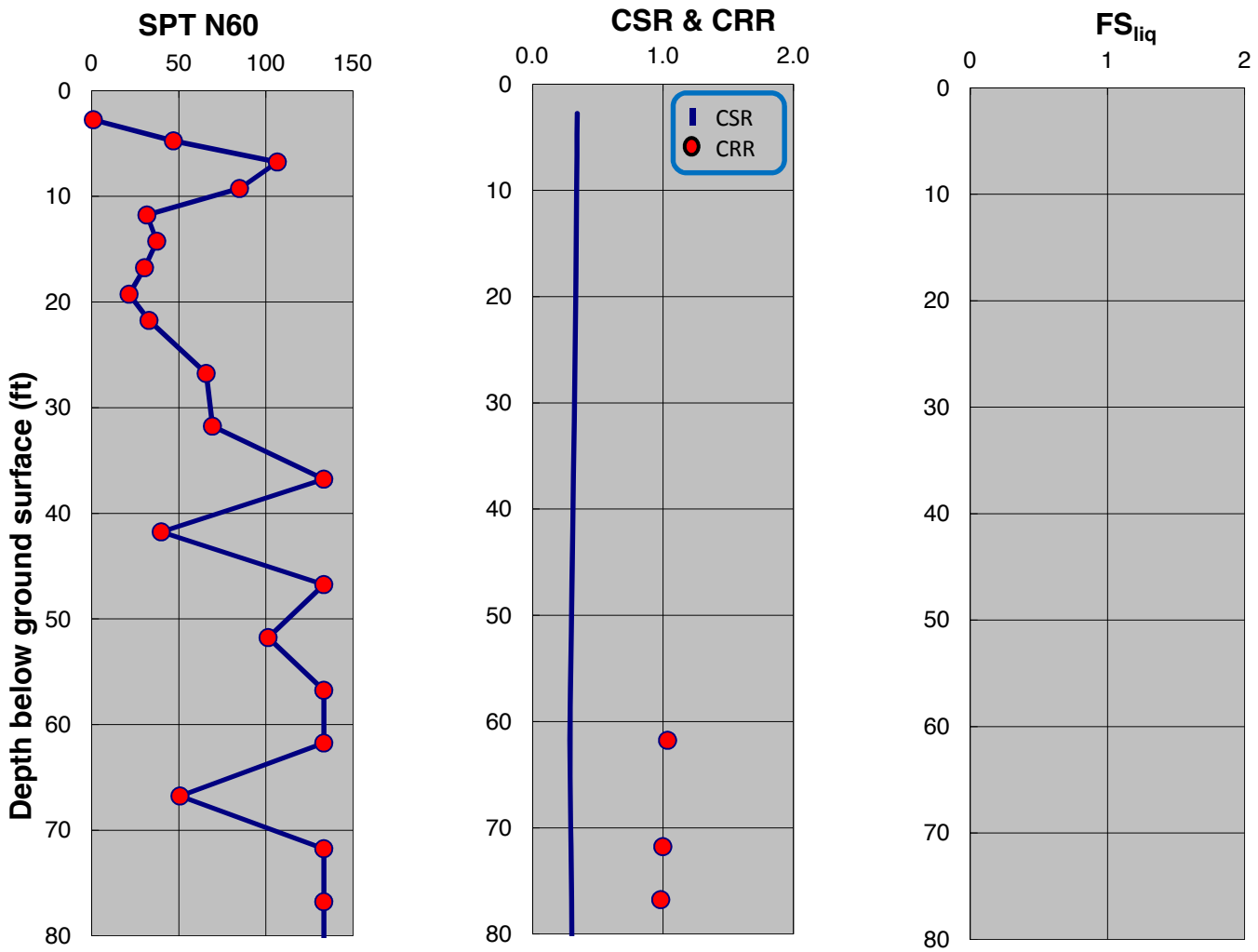
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.256



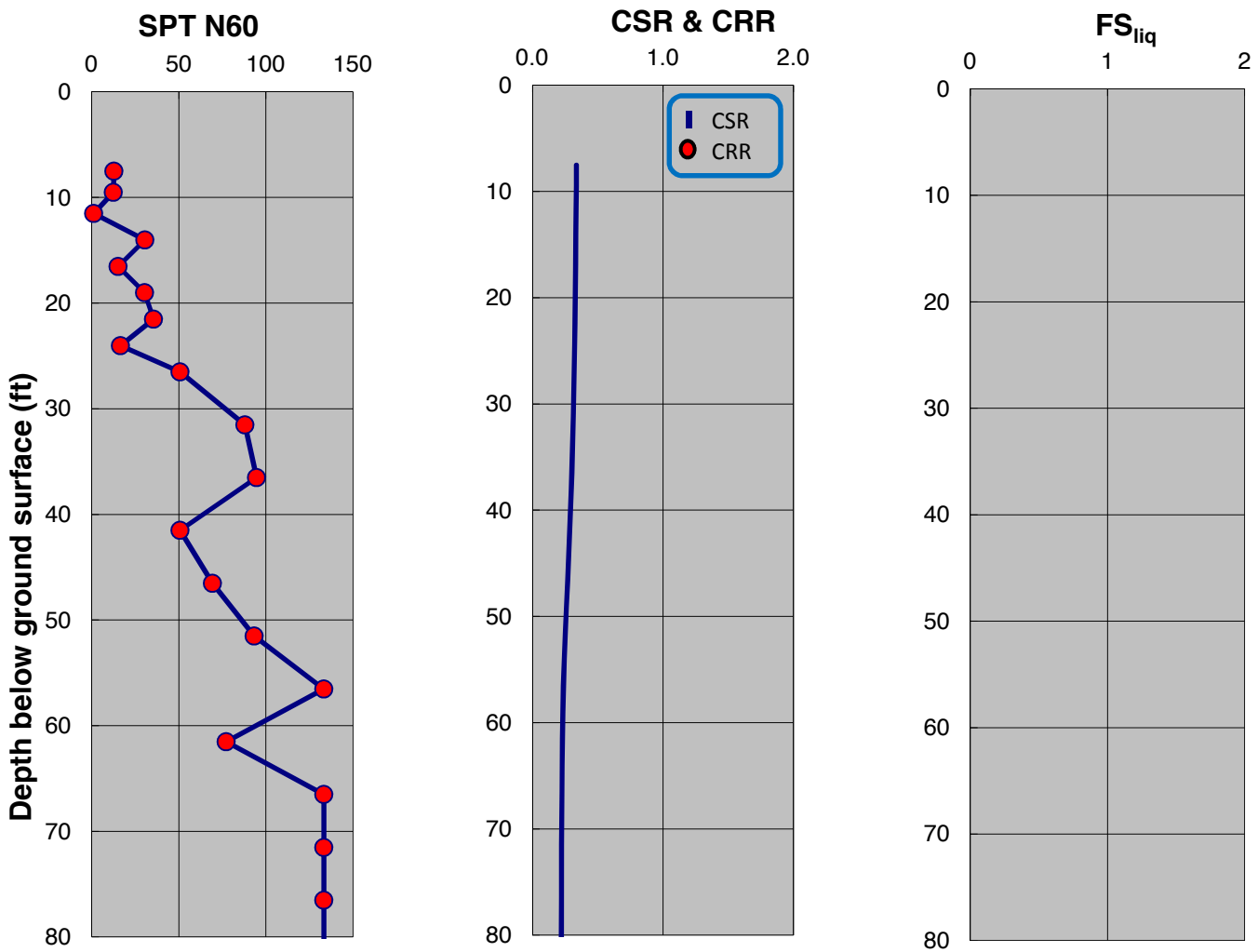
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-197 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-197 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

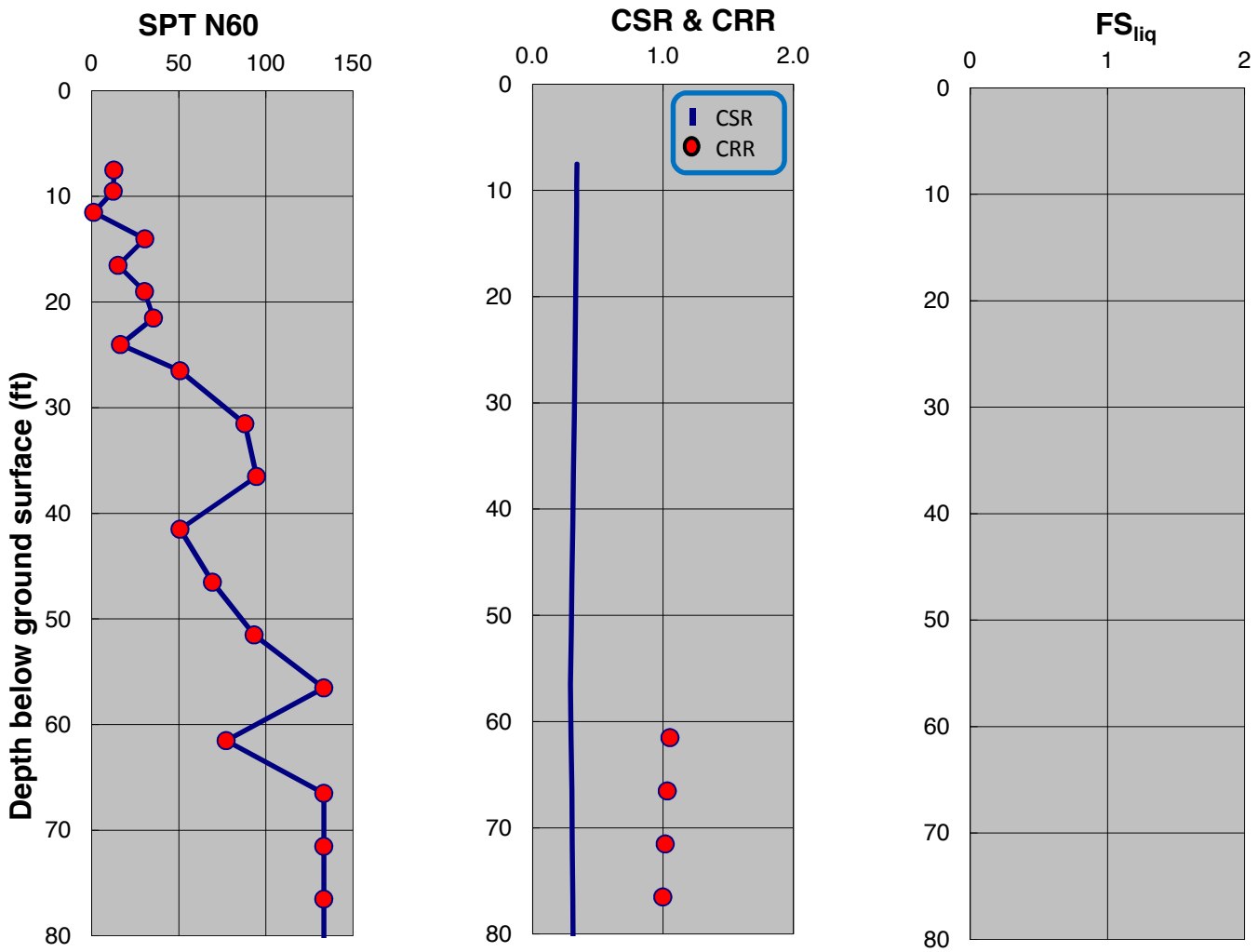
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-198 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

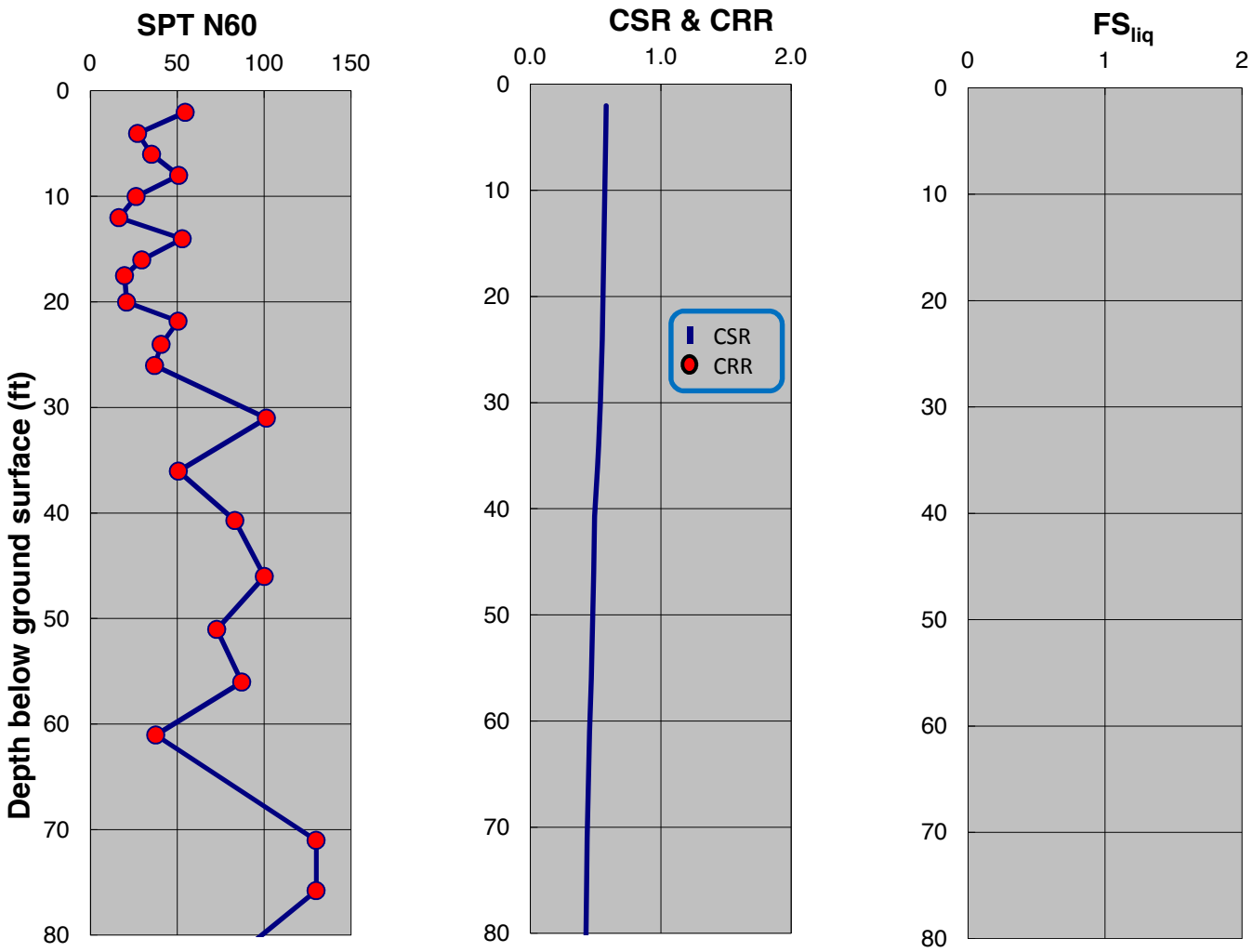
PLATE C.259



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-198 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

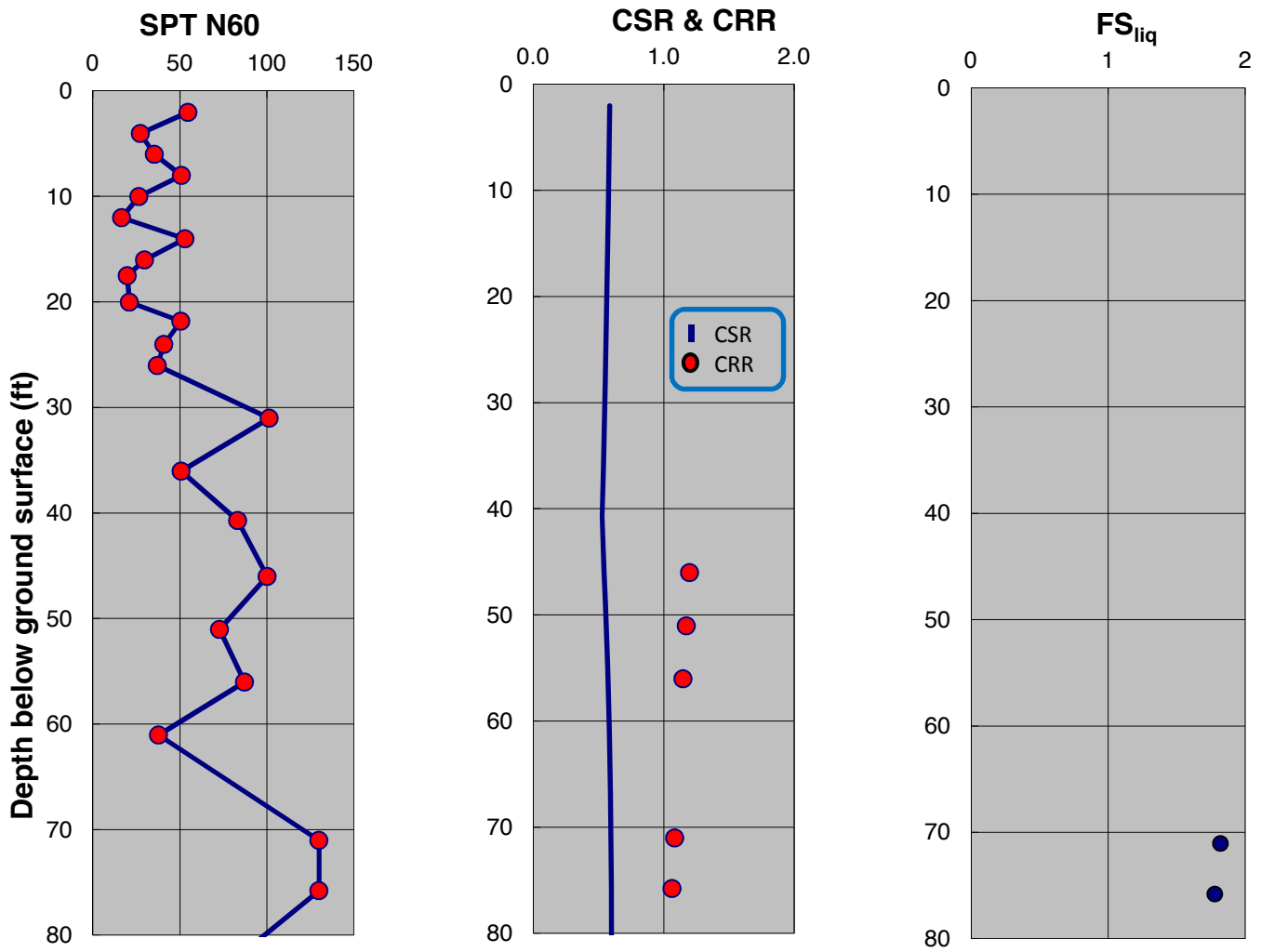
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.260



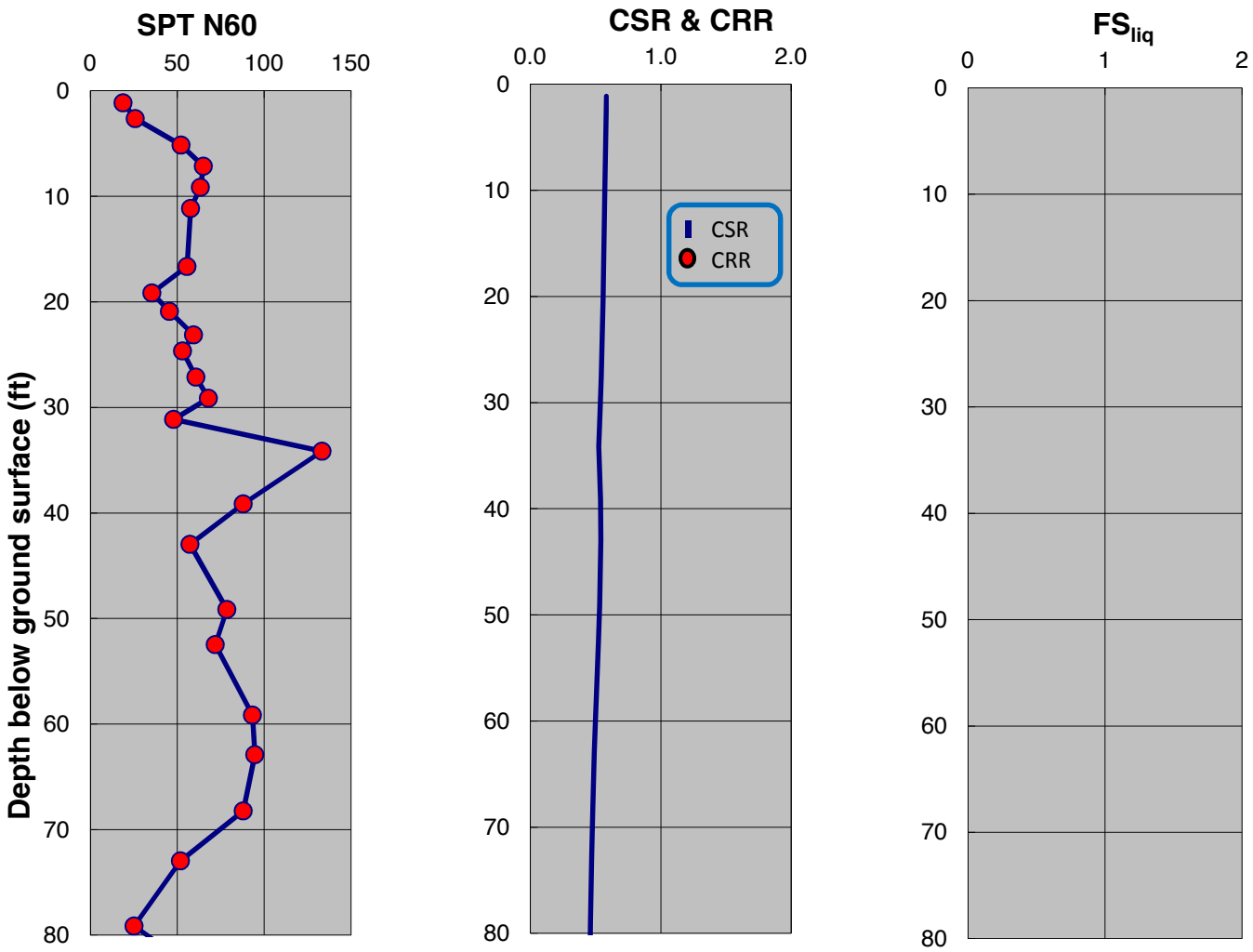
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-9 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



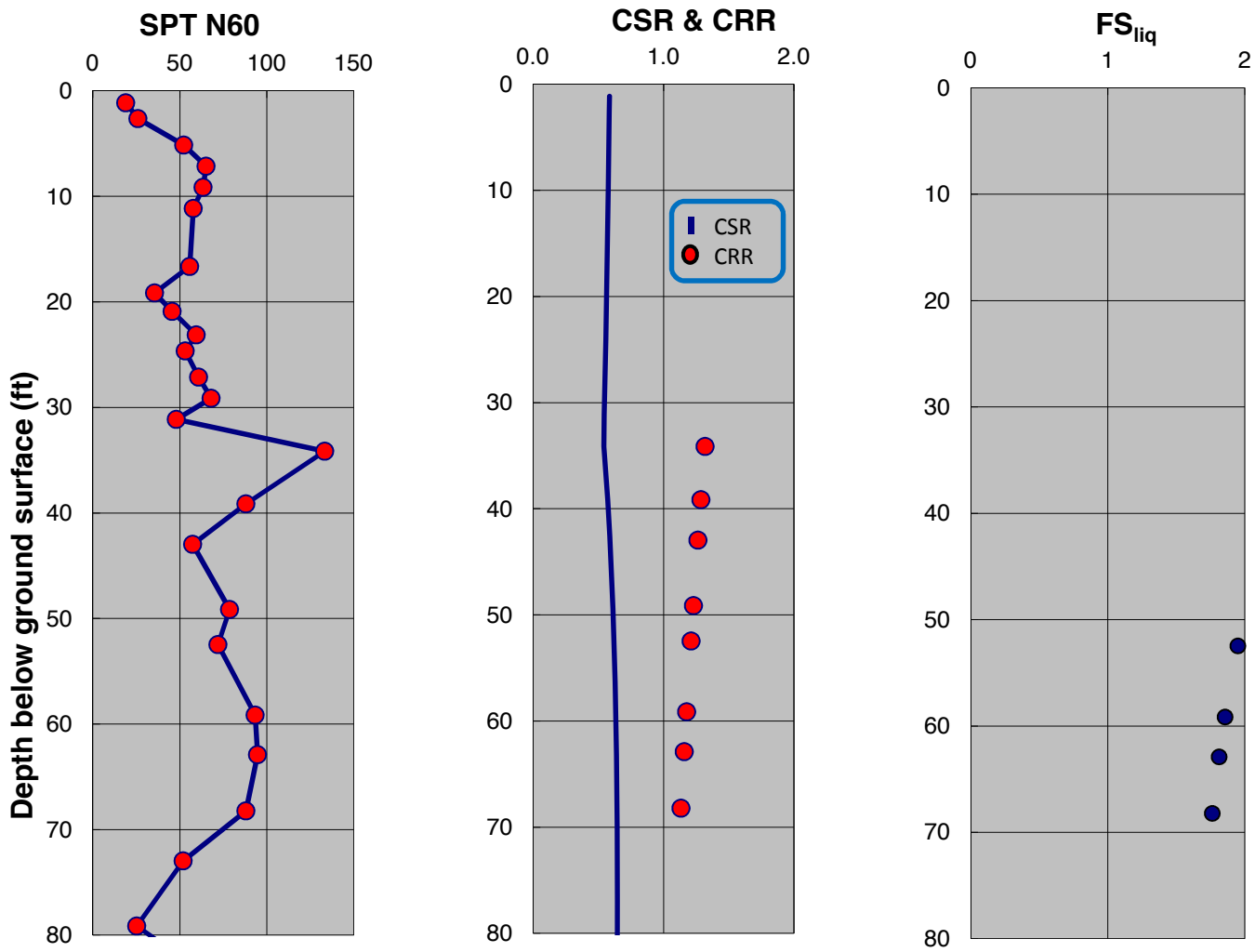
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-9 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



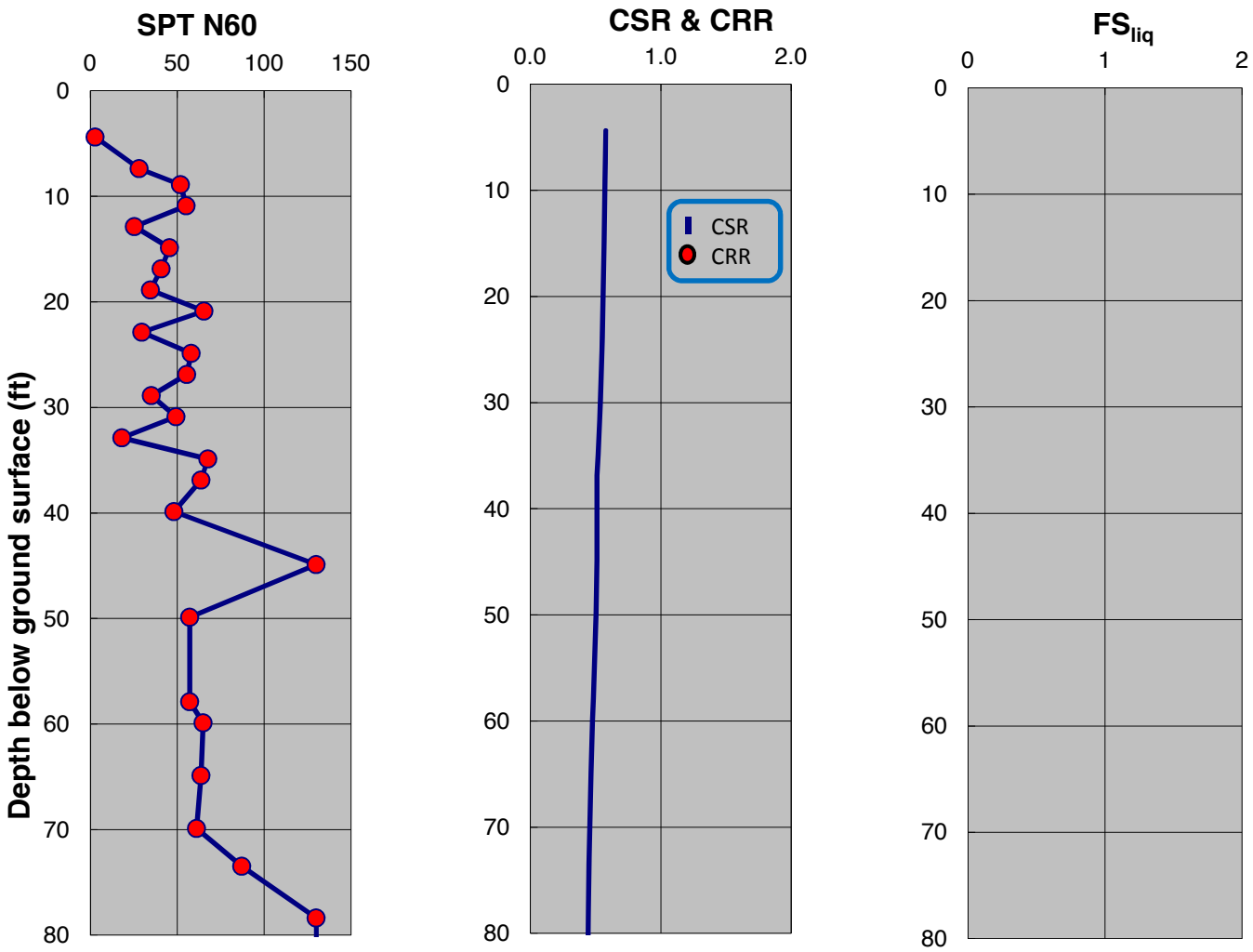
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-10 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



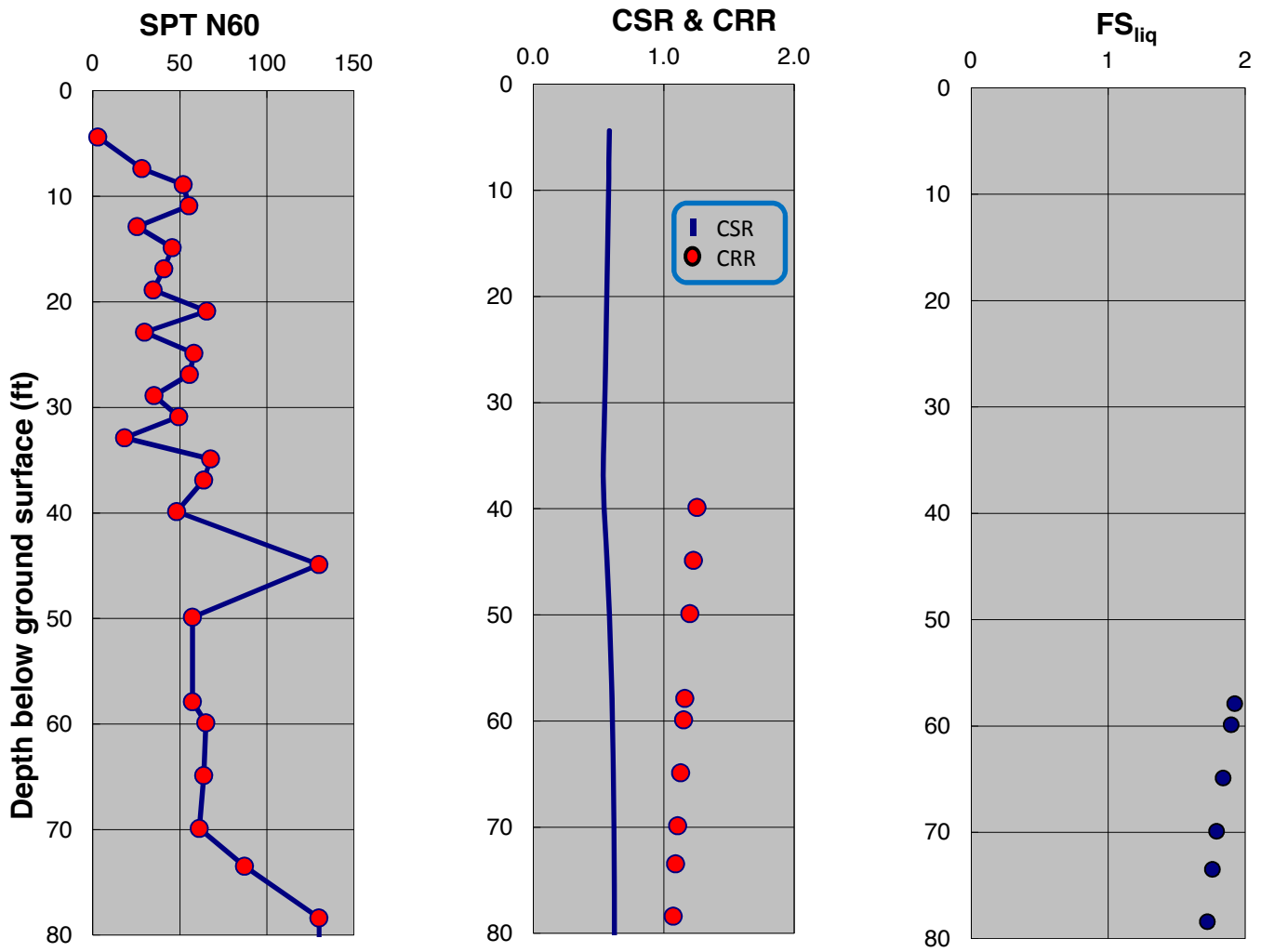
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-10 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



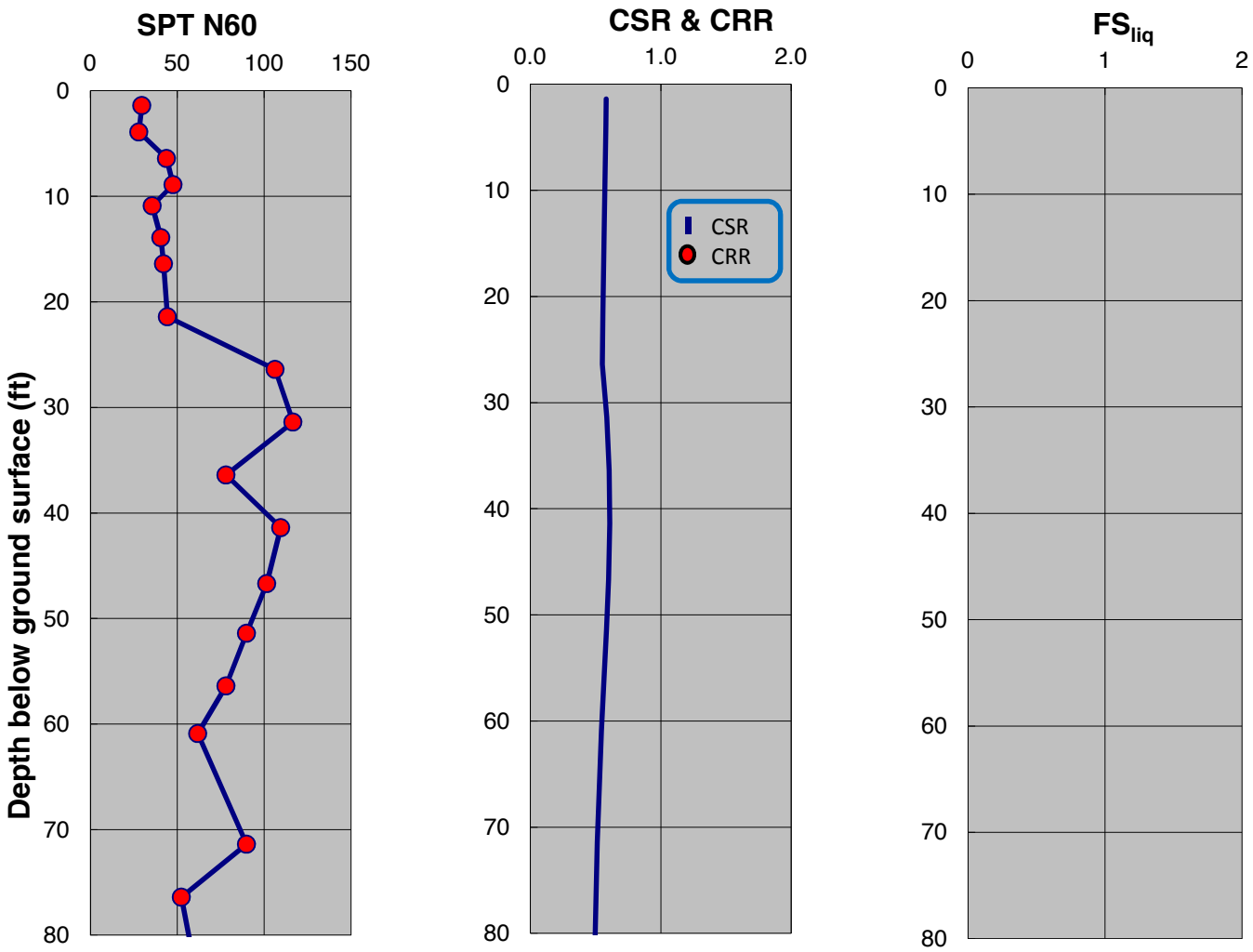
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-11 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



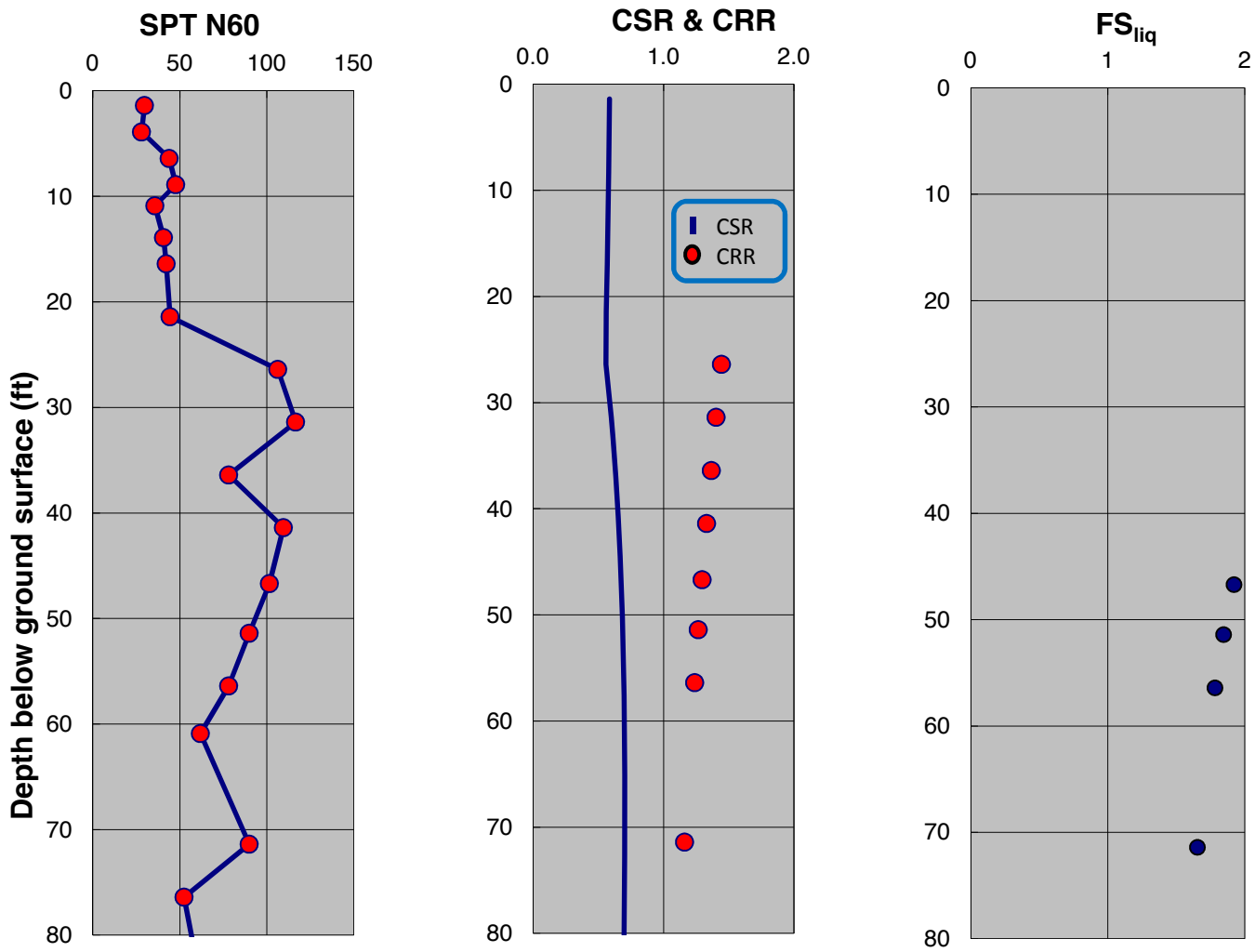
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-11 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



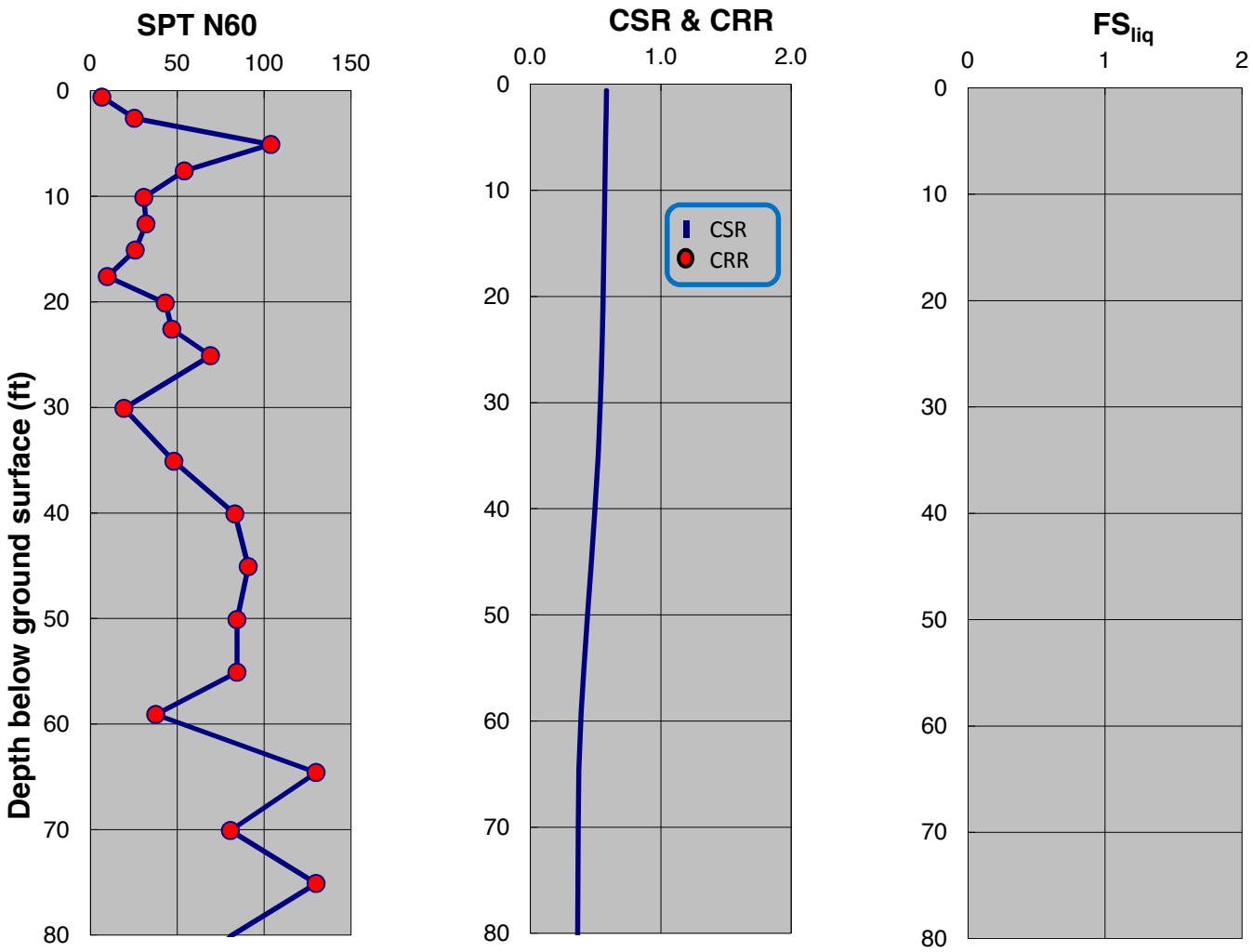
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-14 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



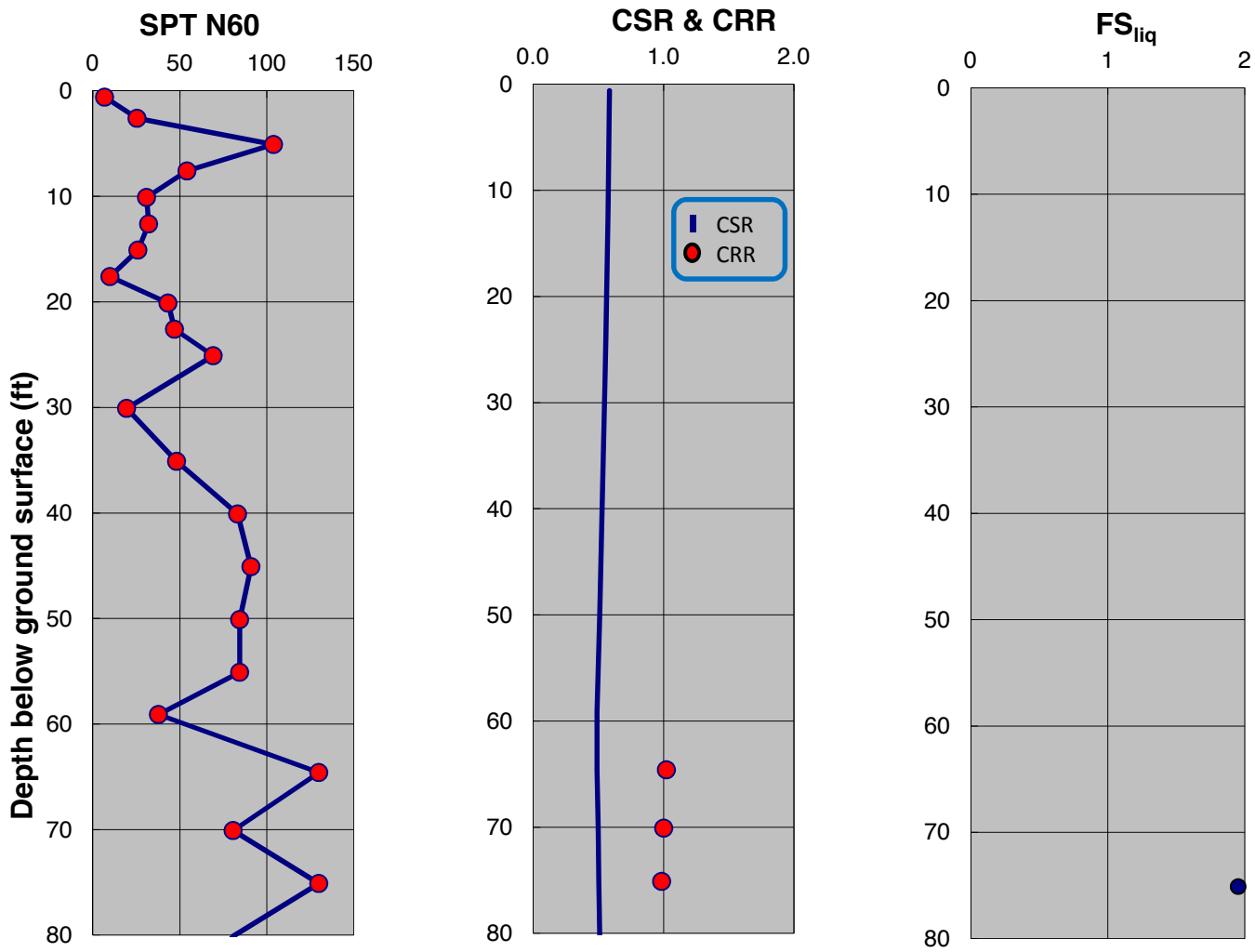
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-14 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



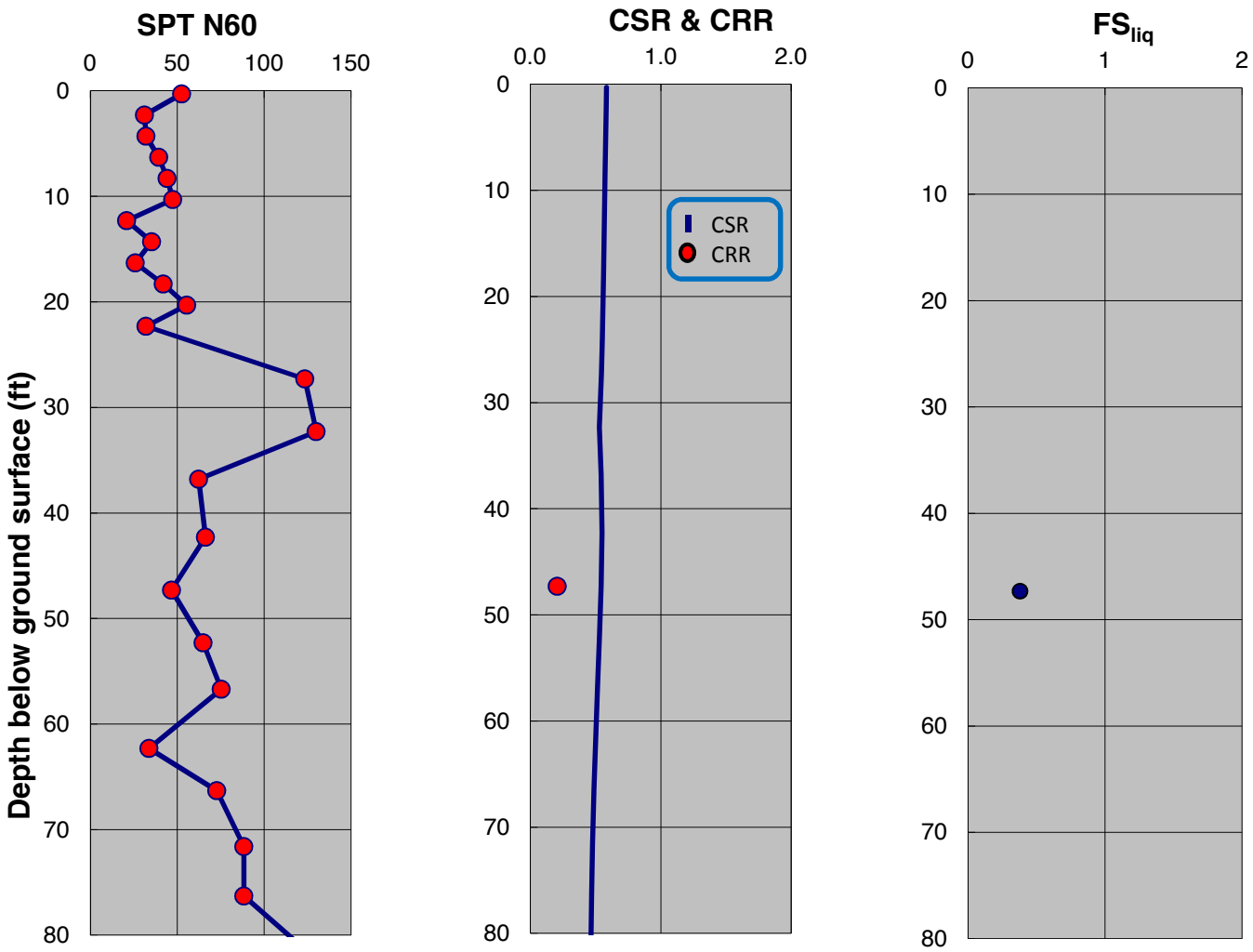
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-15 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



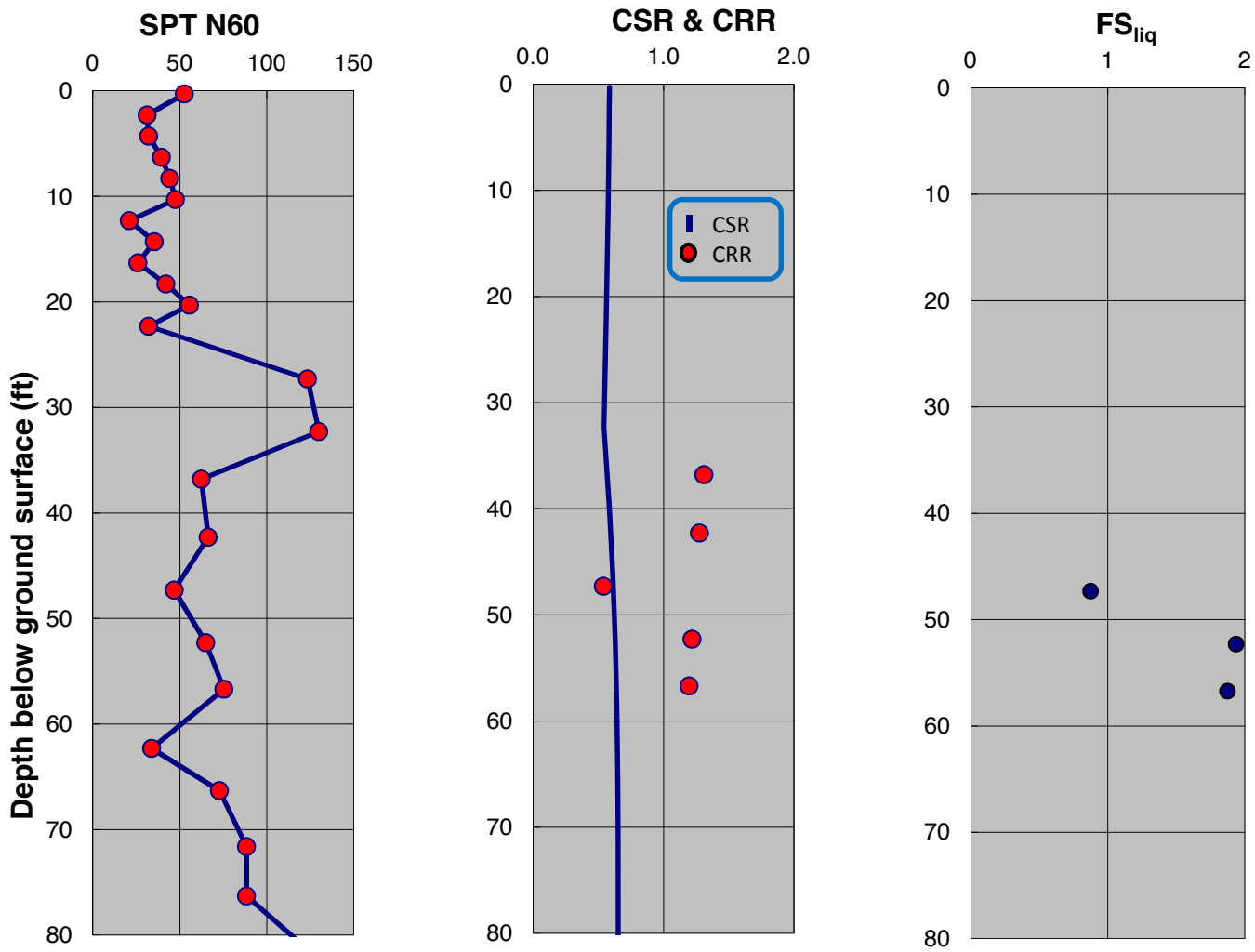
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-15 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



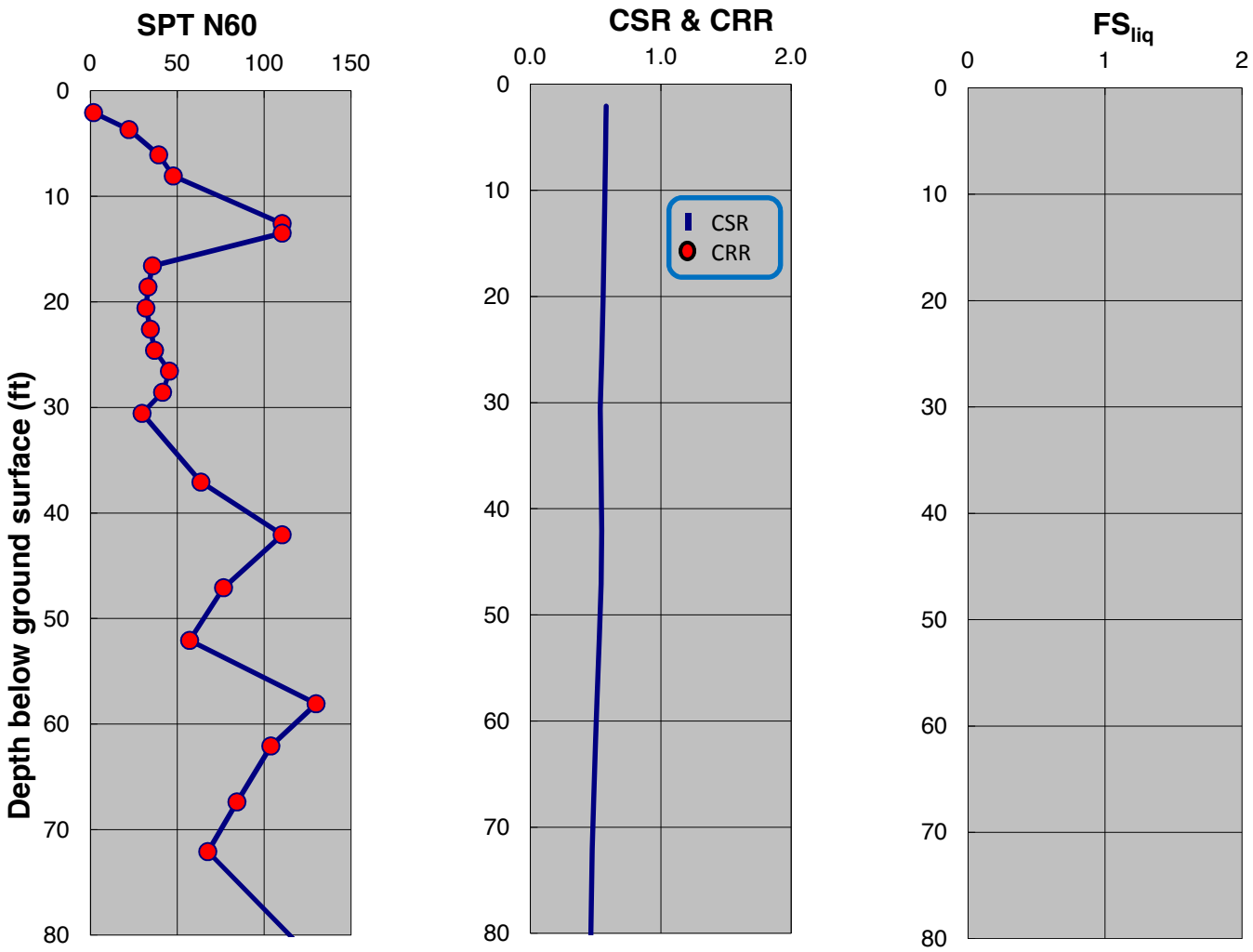
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-17 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



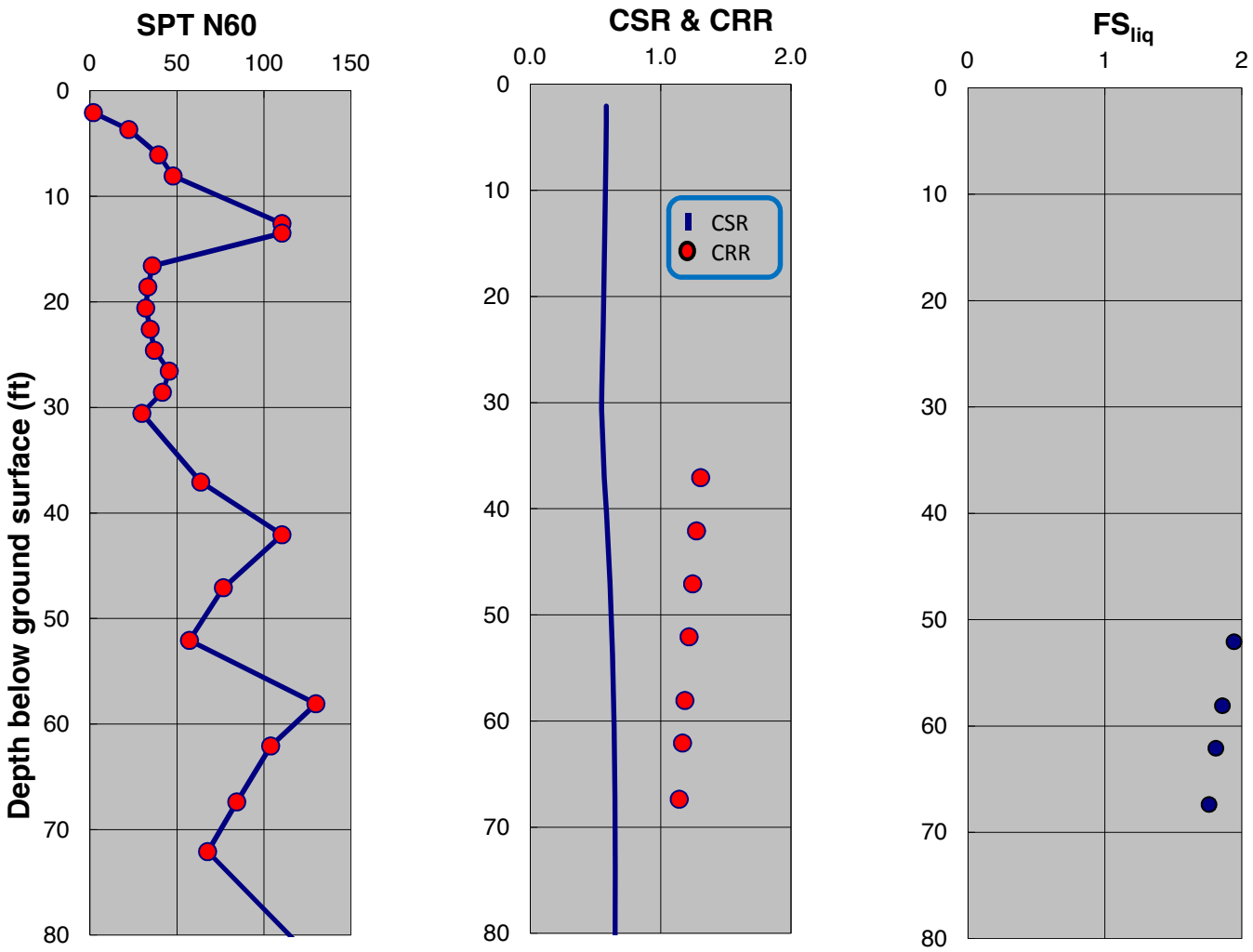
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-17 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



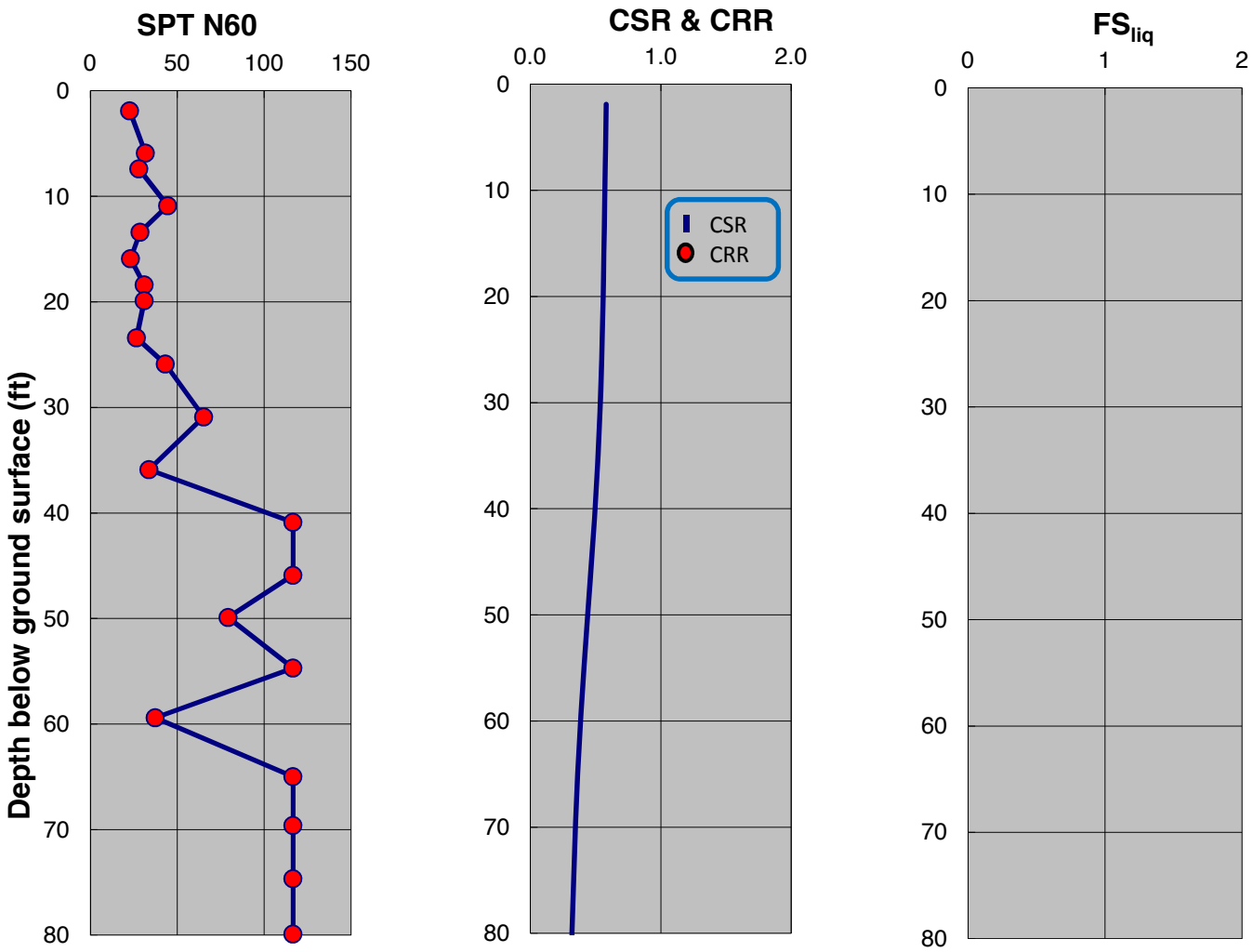
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-18 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



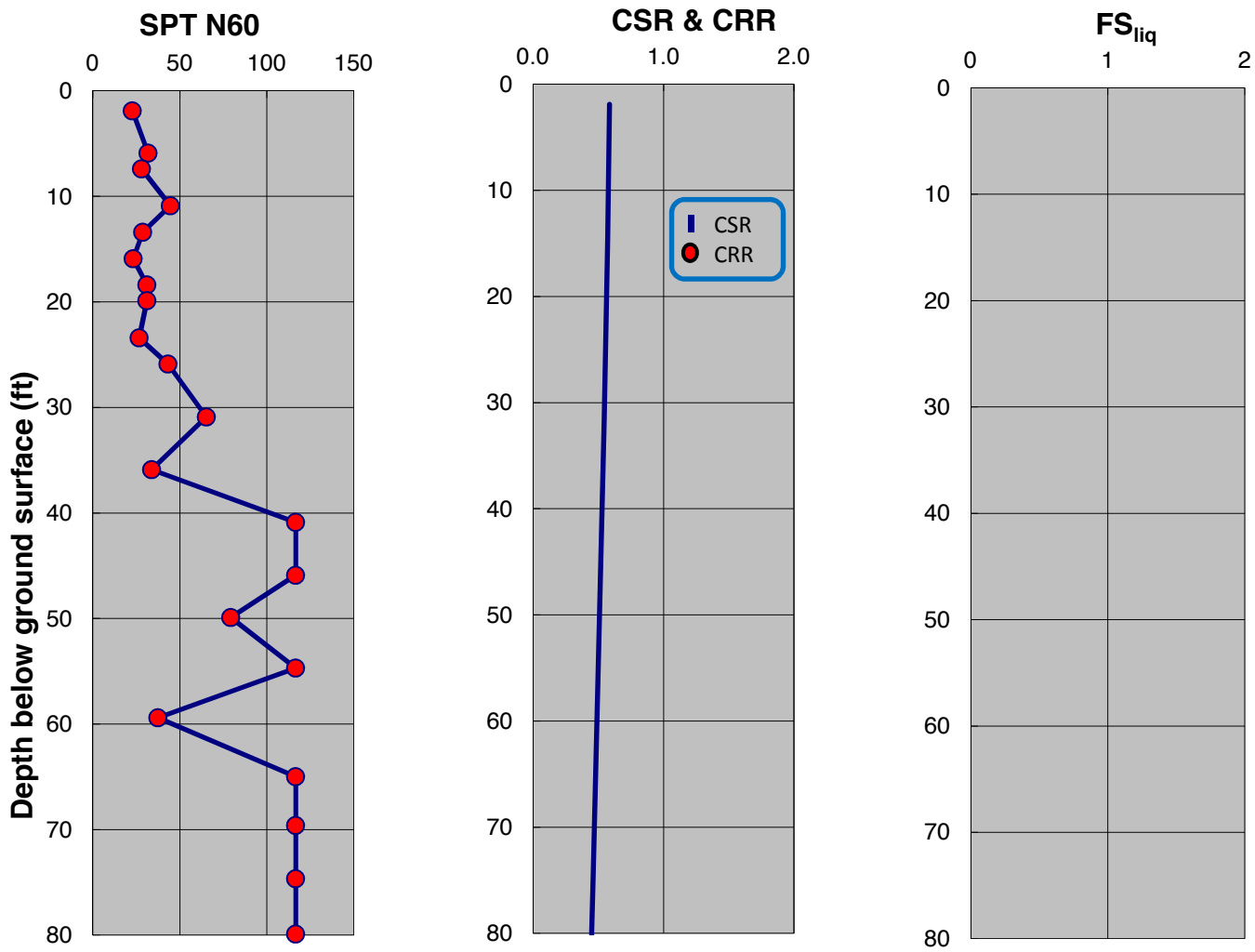
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-18 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



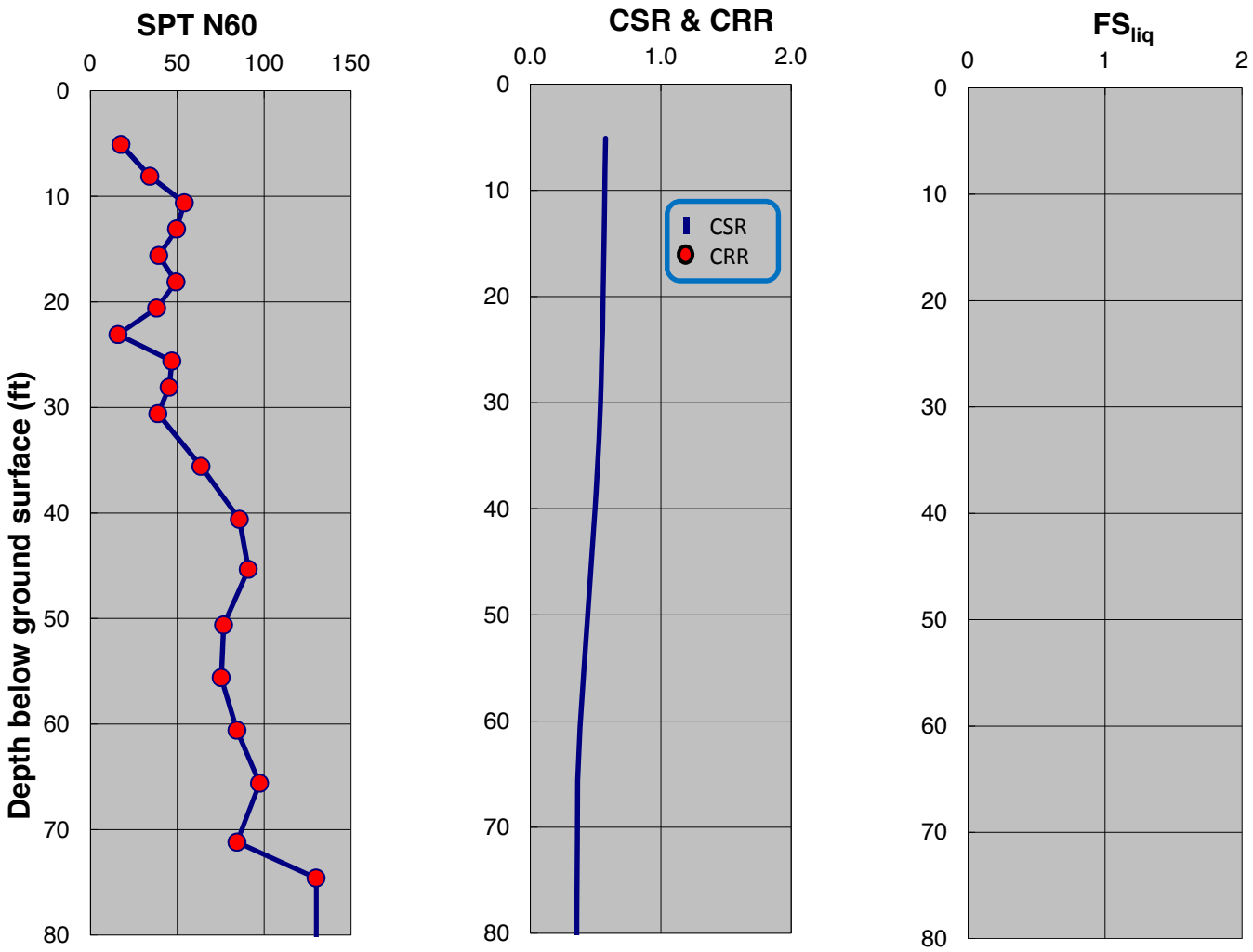
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-23 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



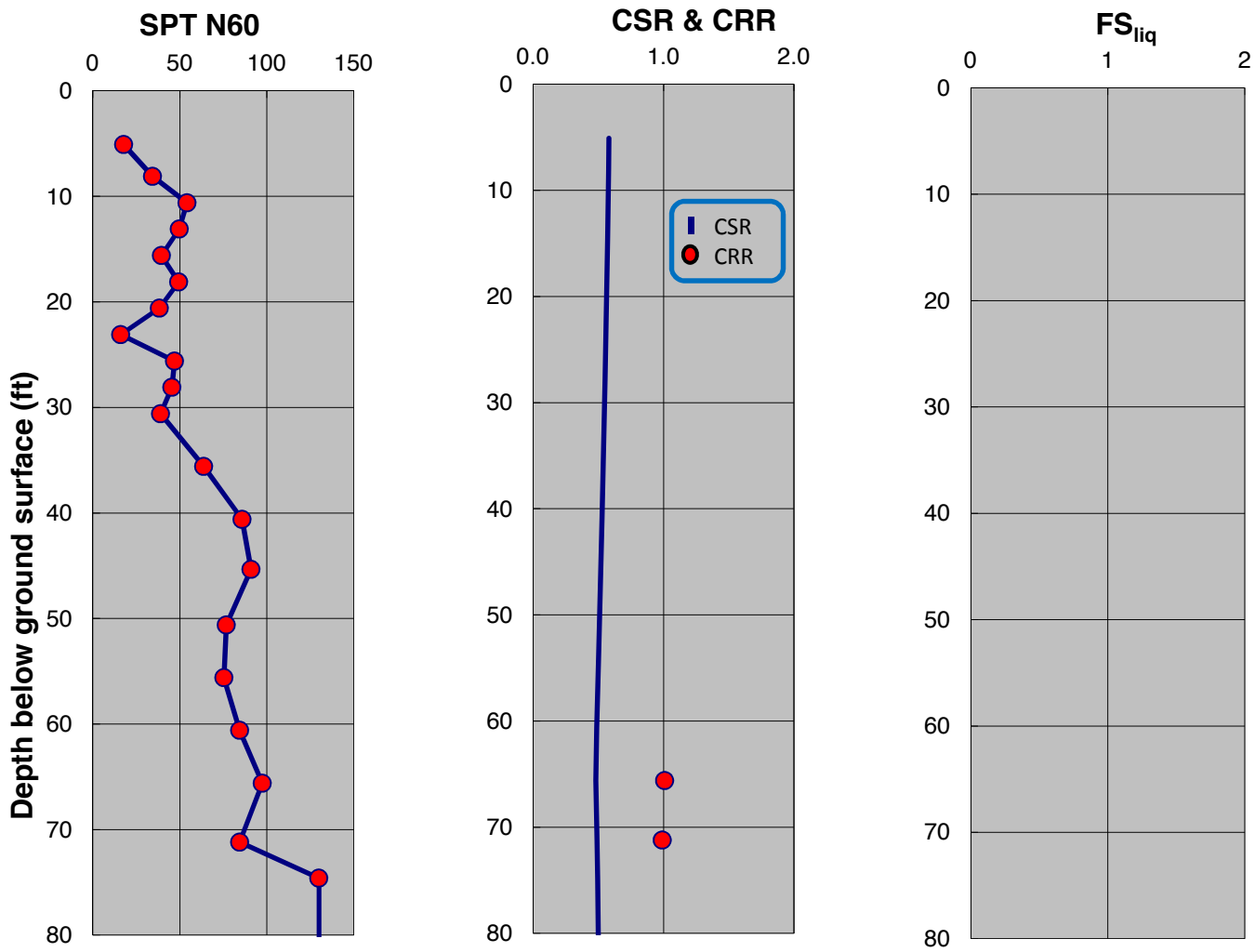
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-23 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



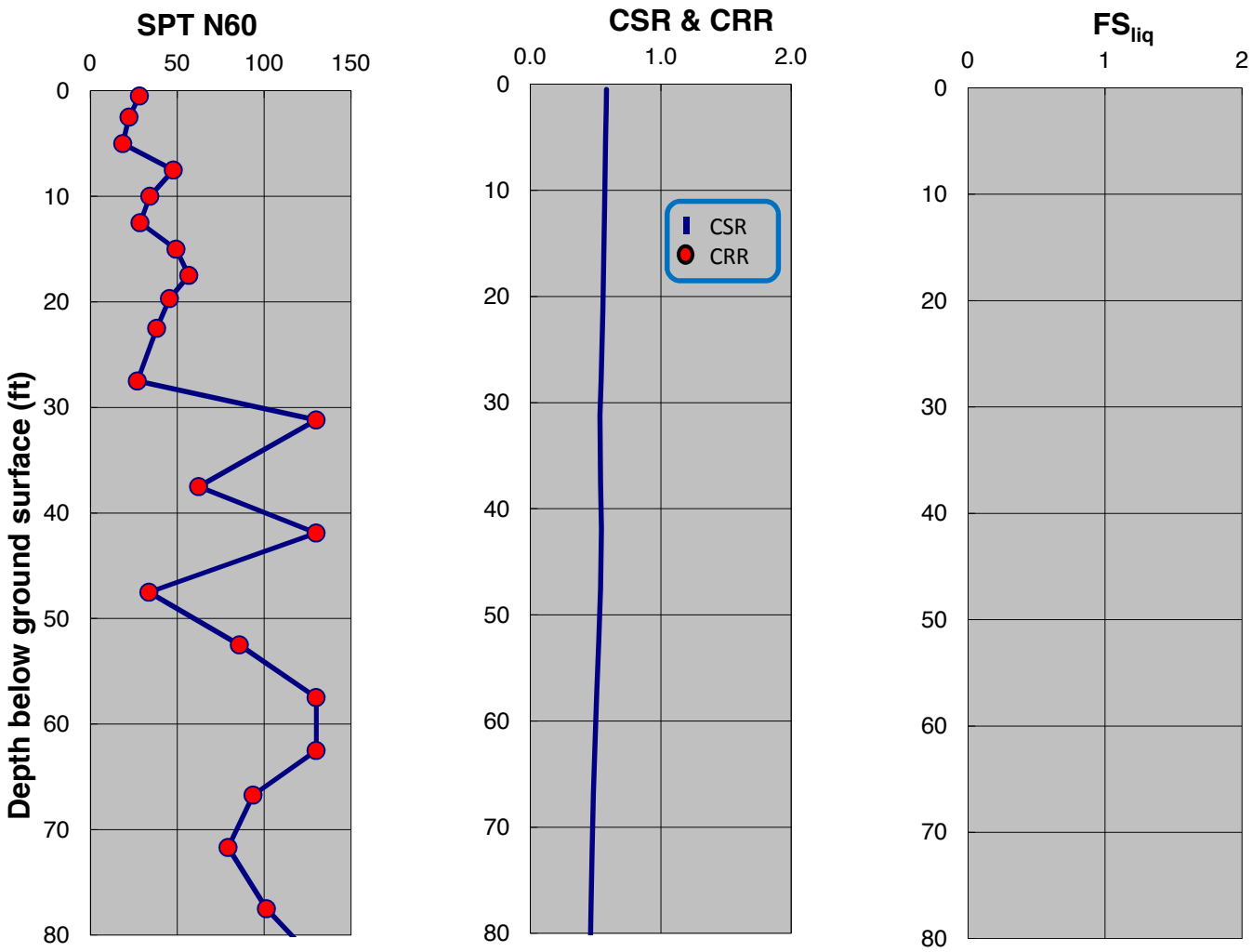
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-24 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



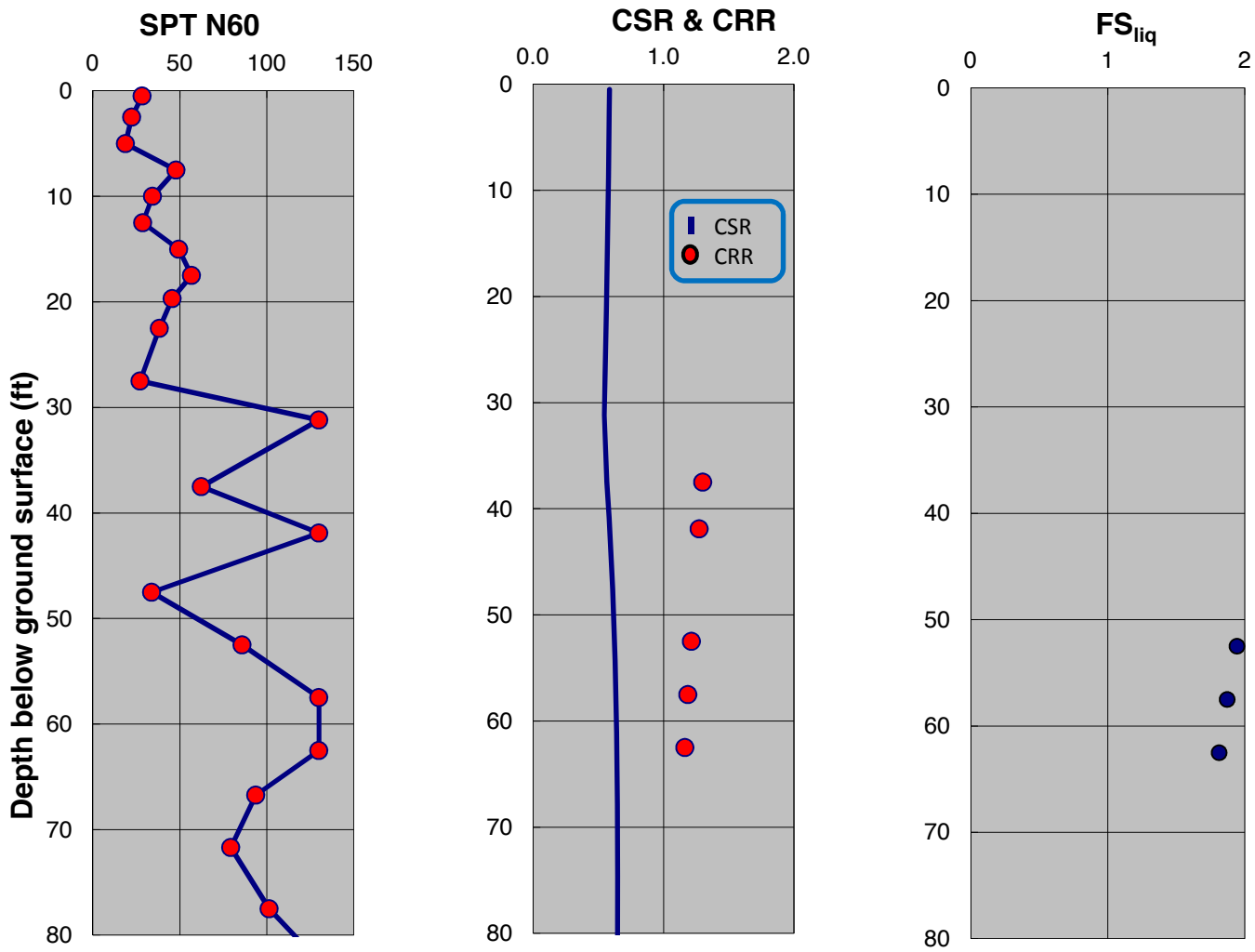
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-24 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



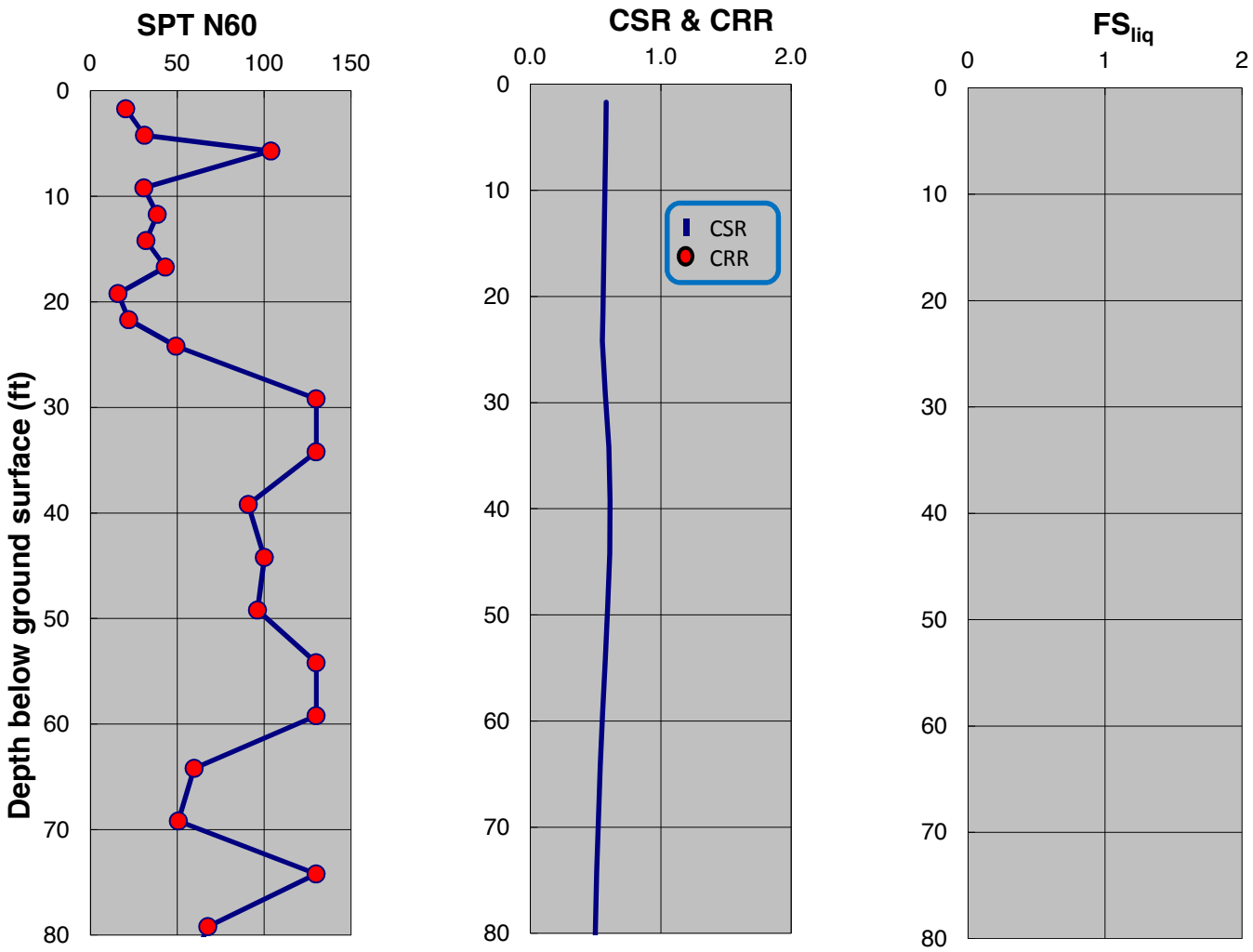
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-26 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



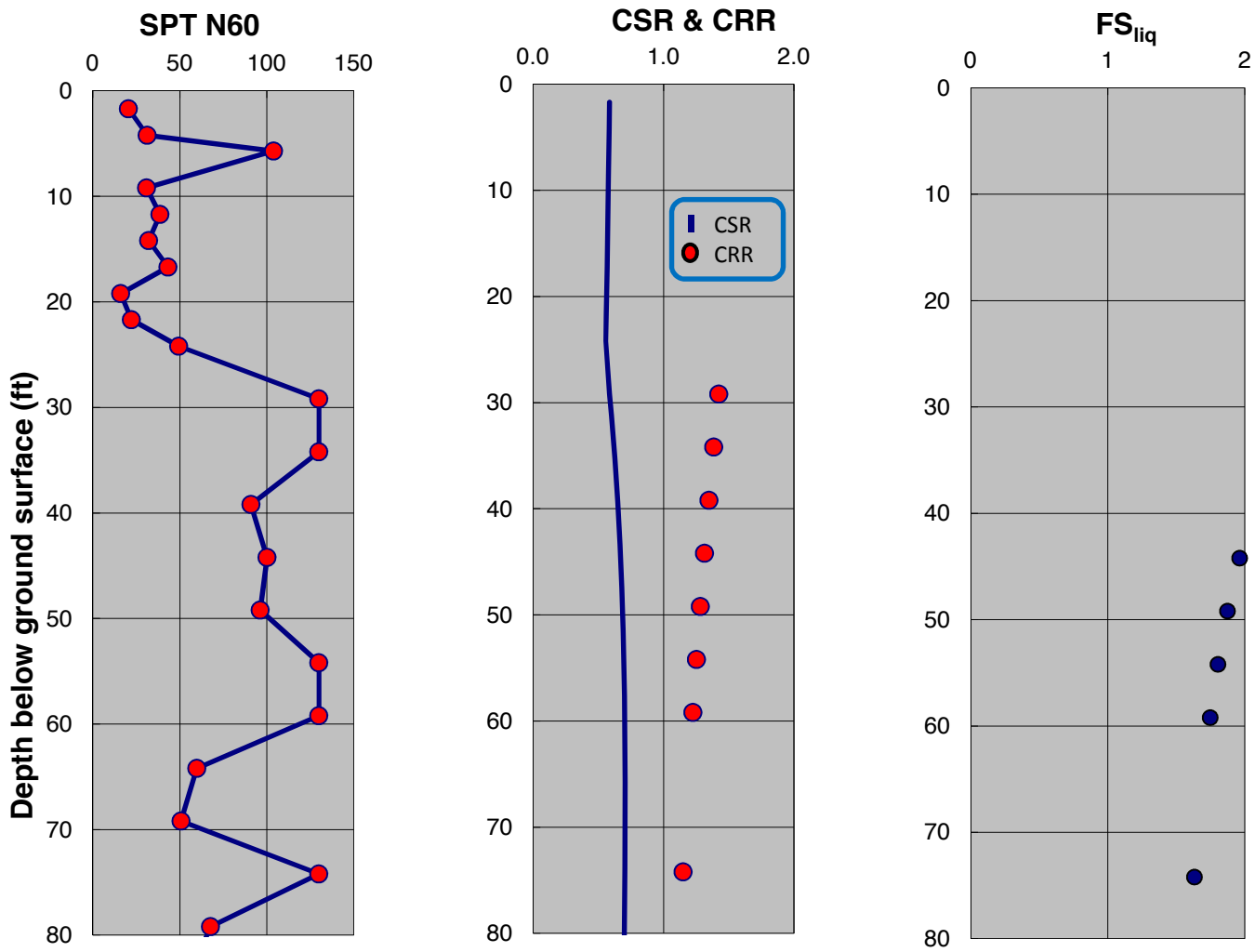
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-26 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



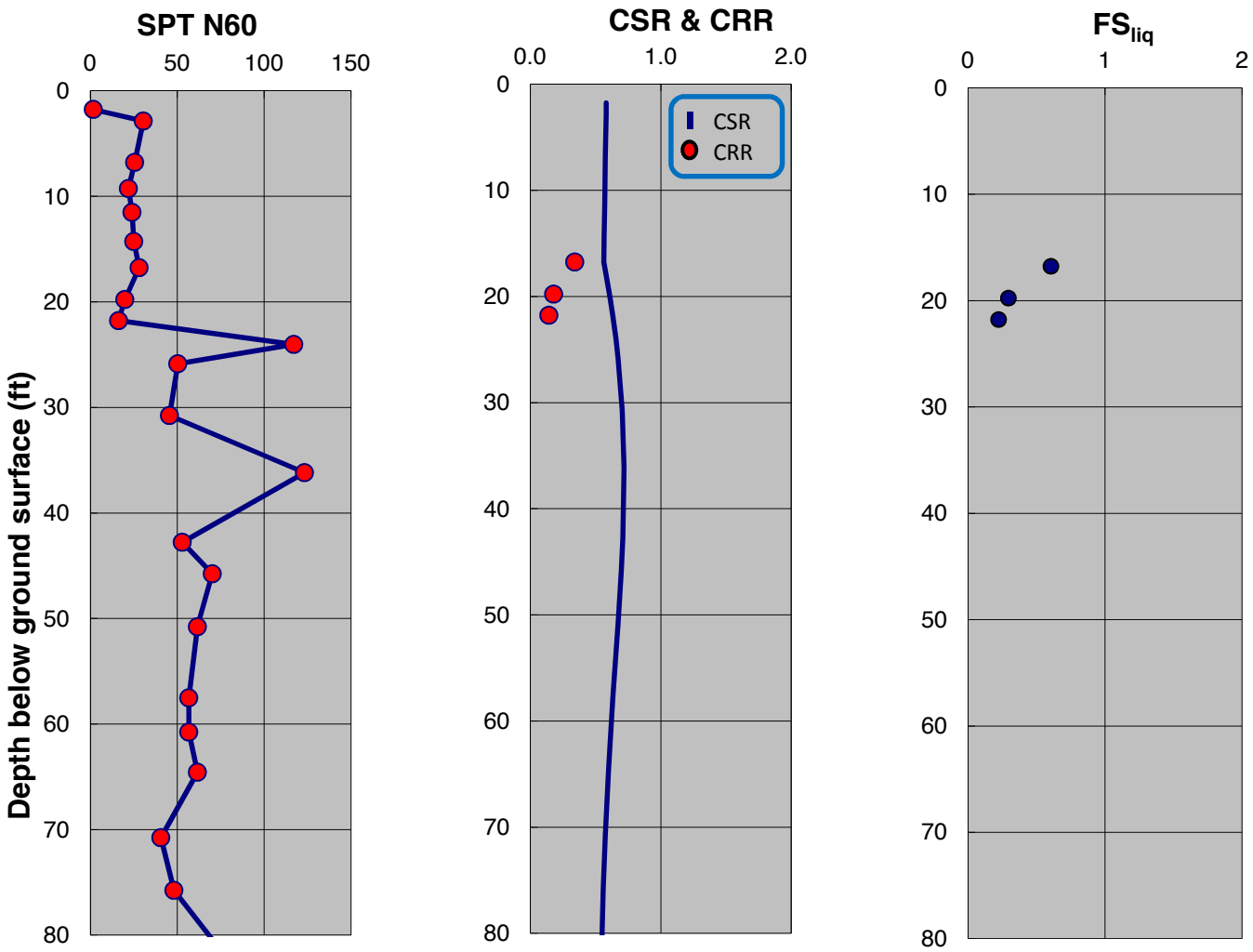
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-27 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



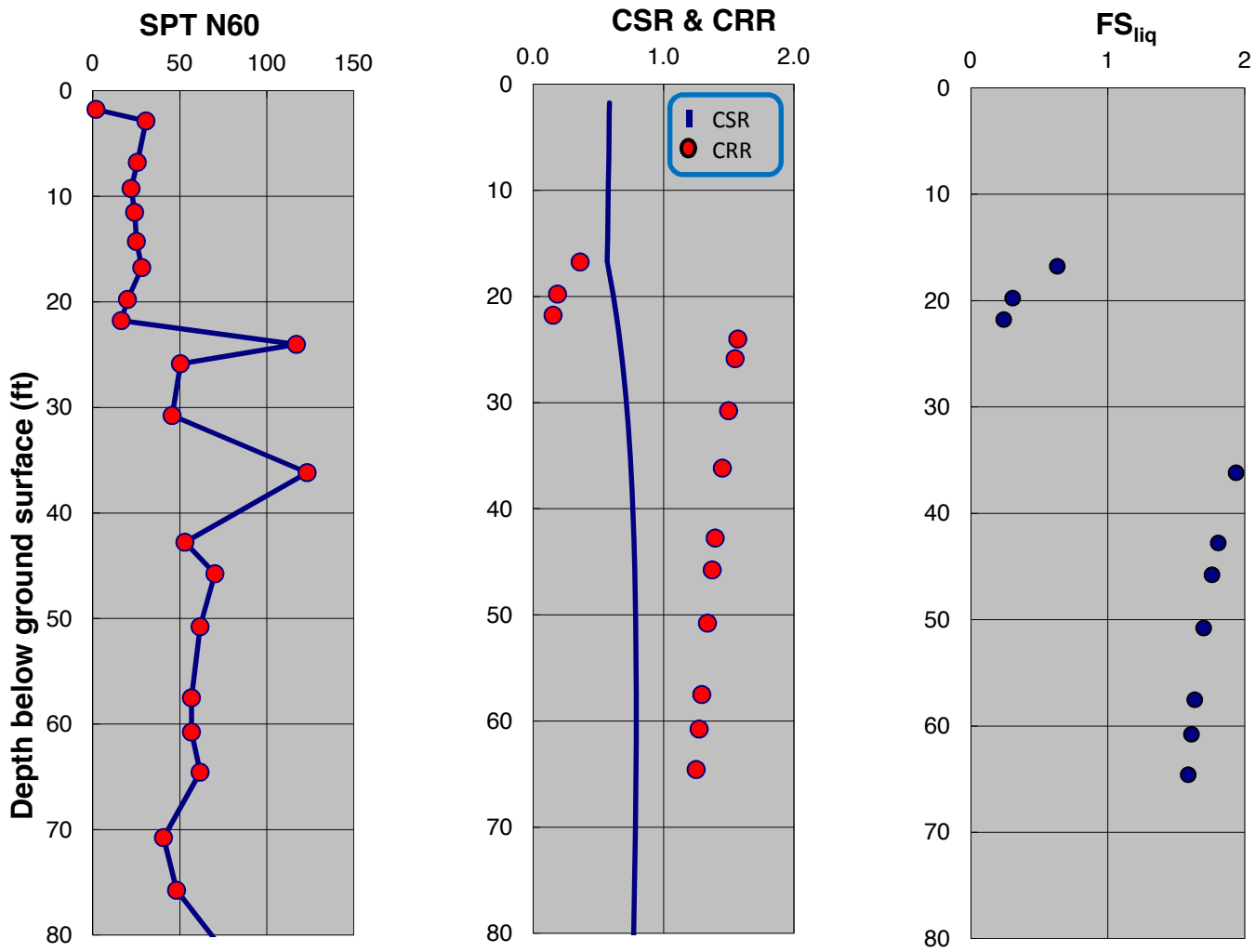
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-27 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



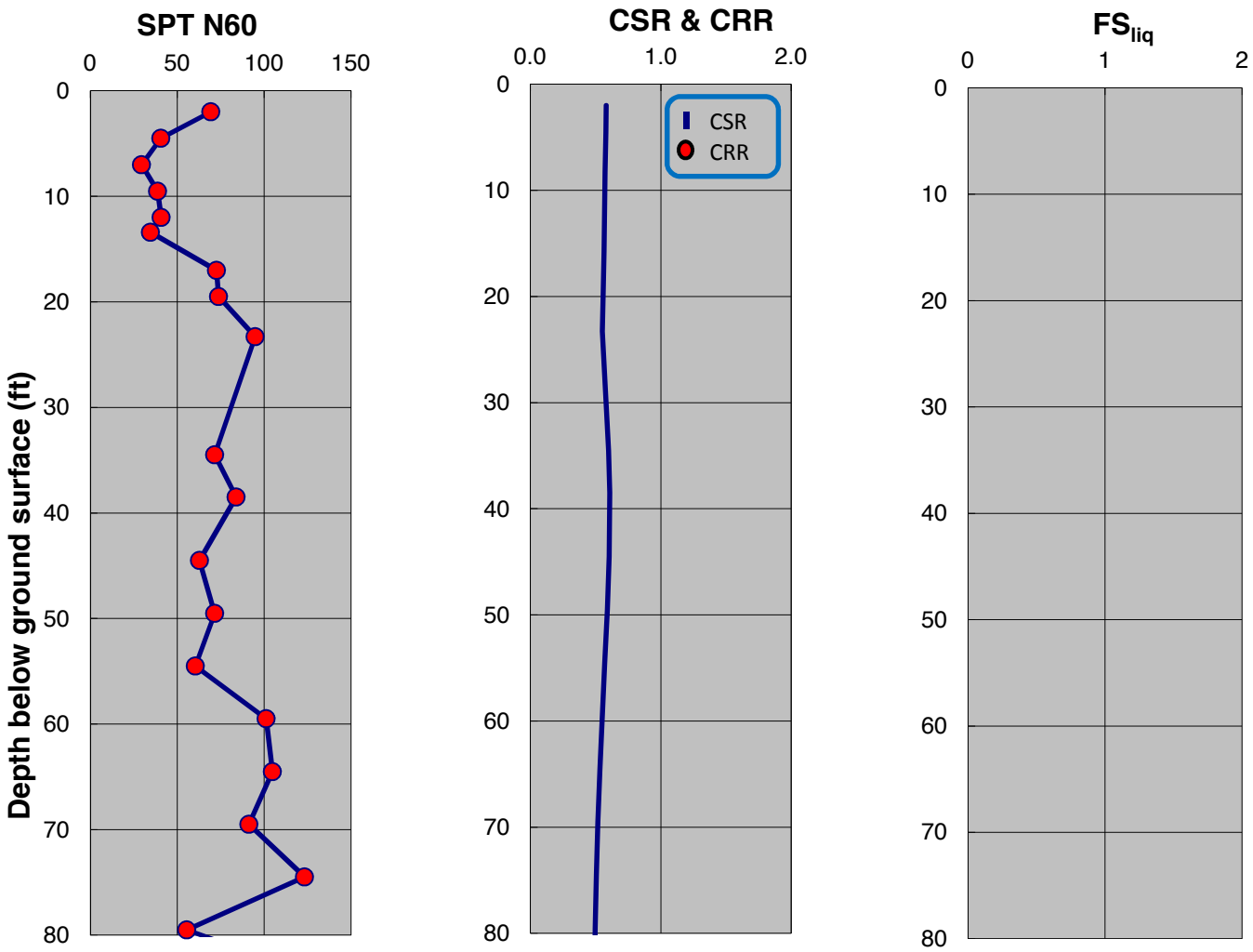
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-28 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



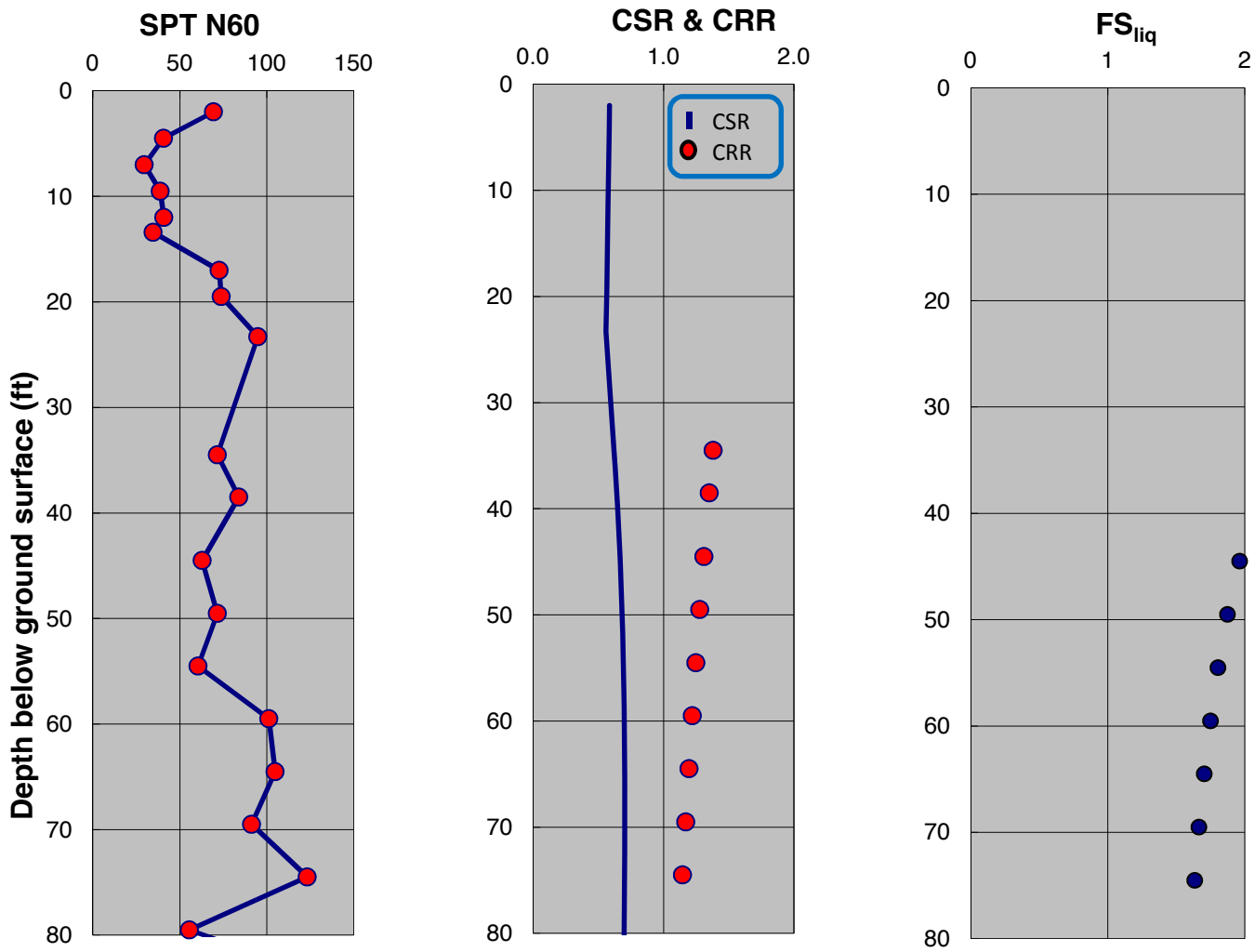
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-28 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



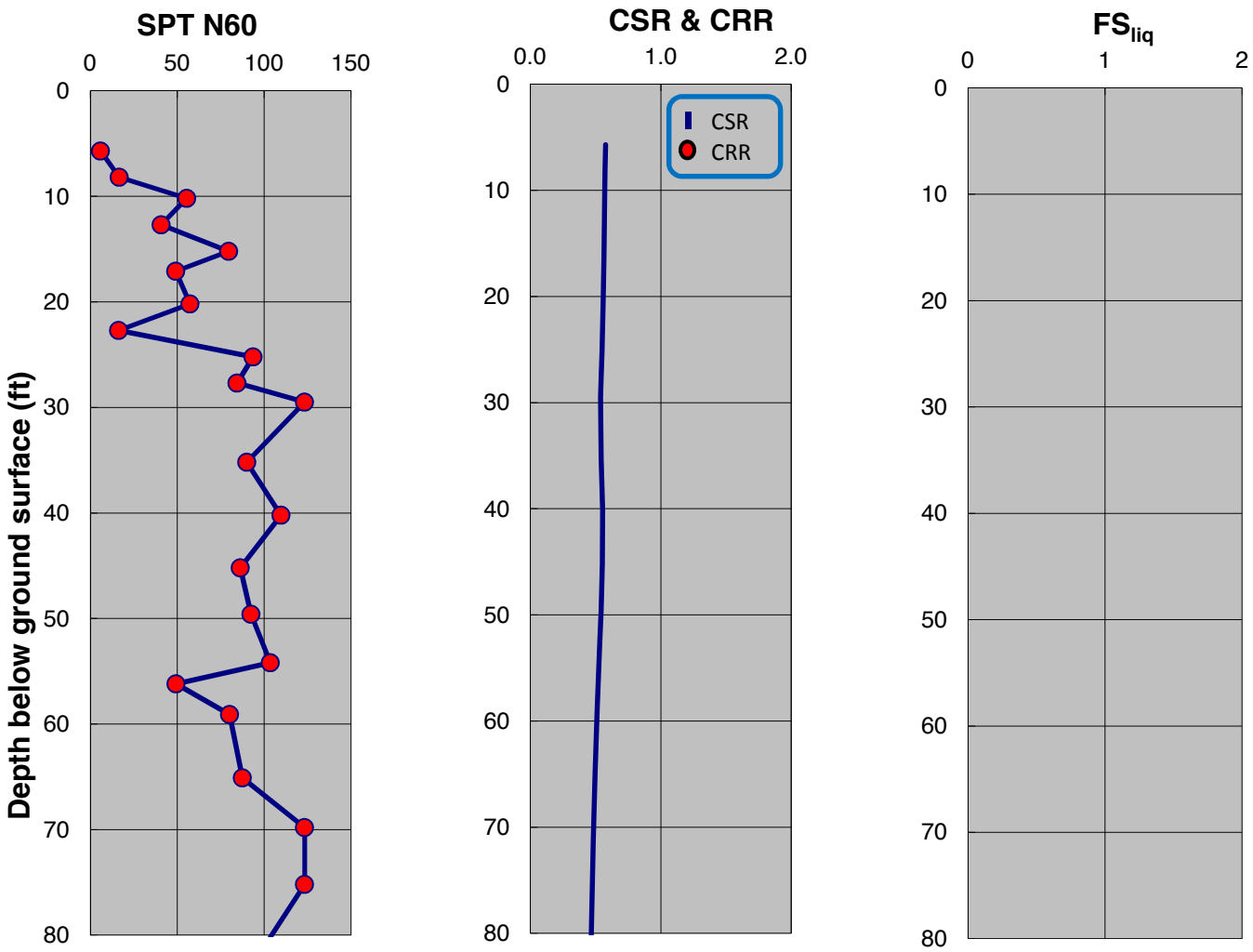
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-32 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



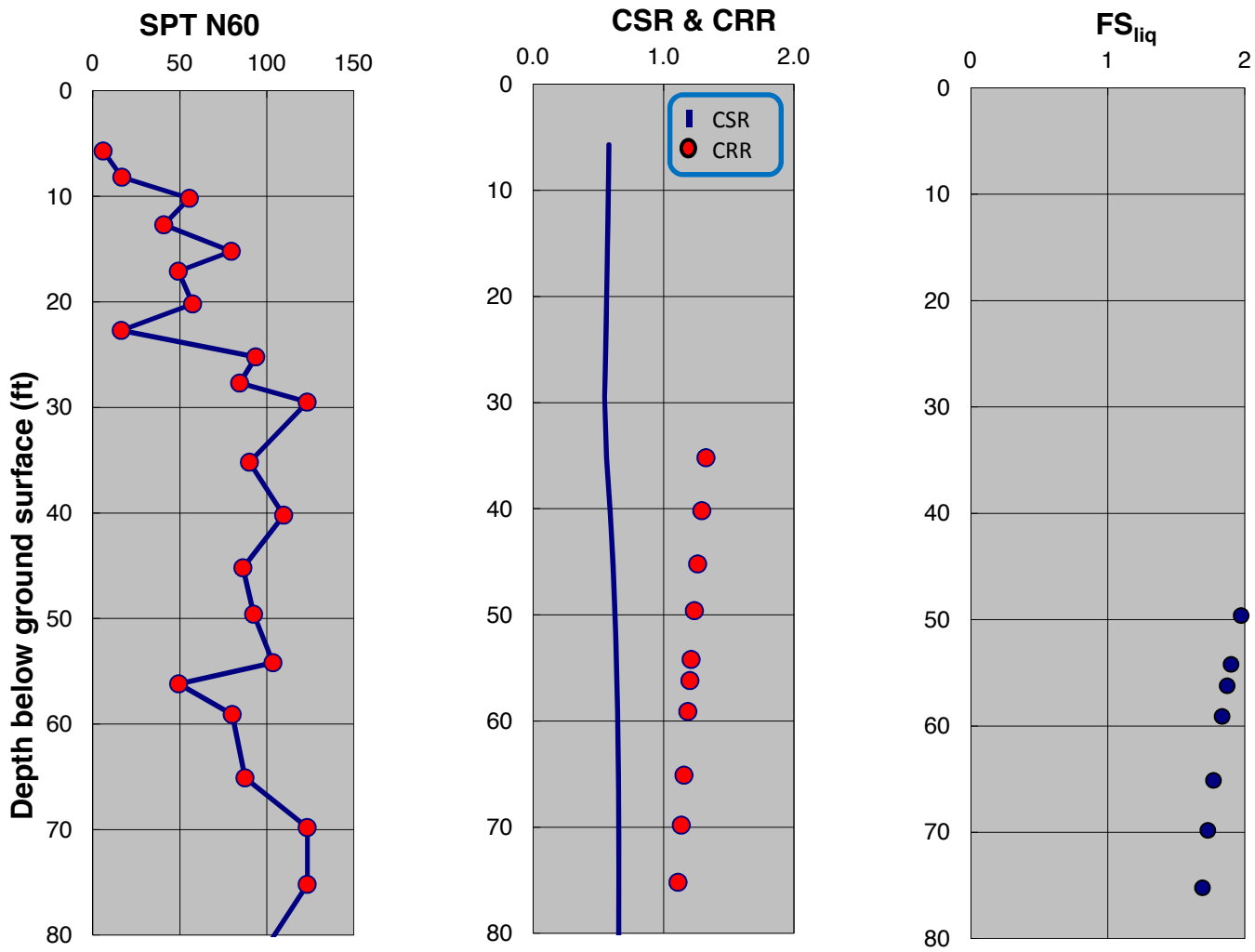
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-32 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



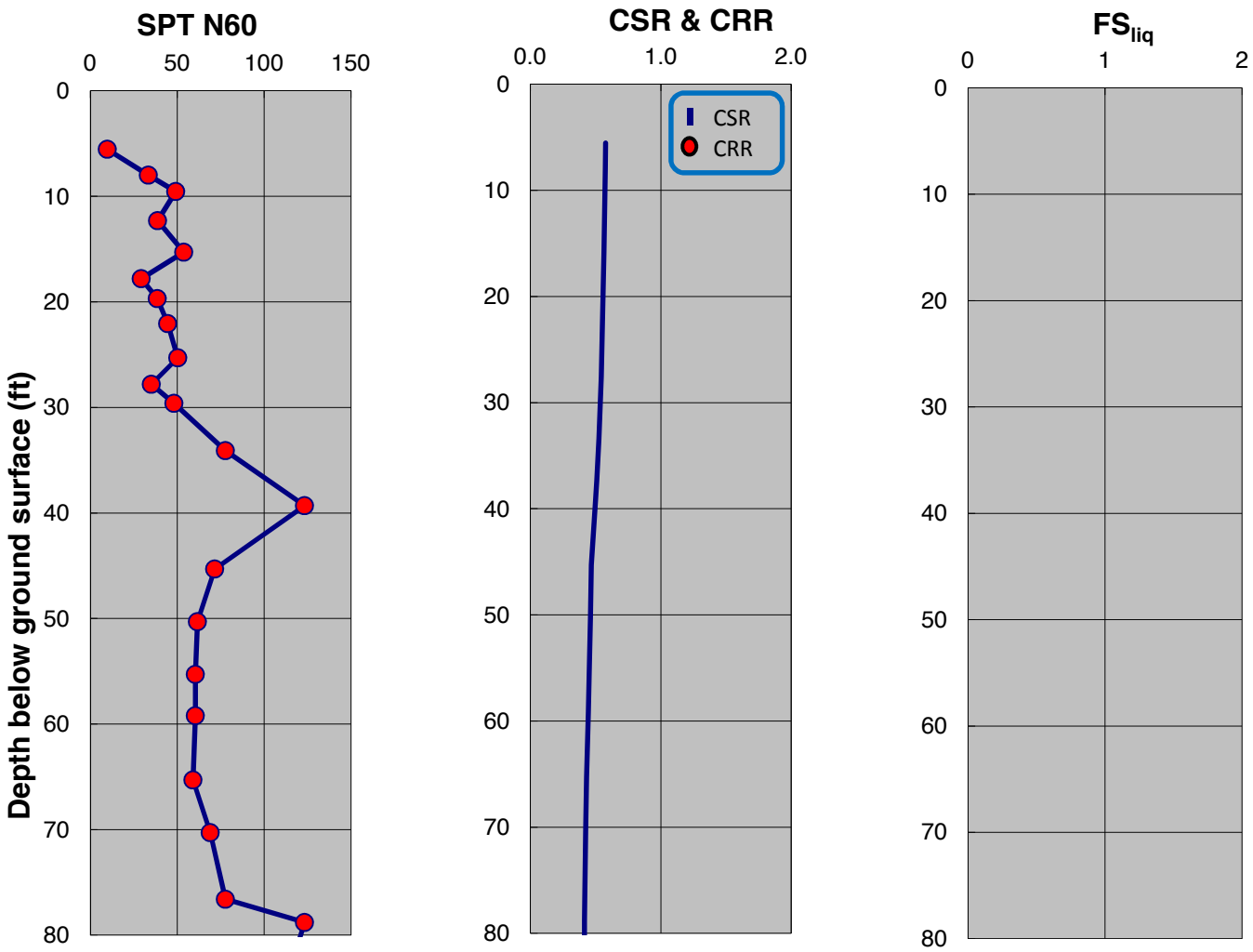
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-34 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



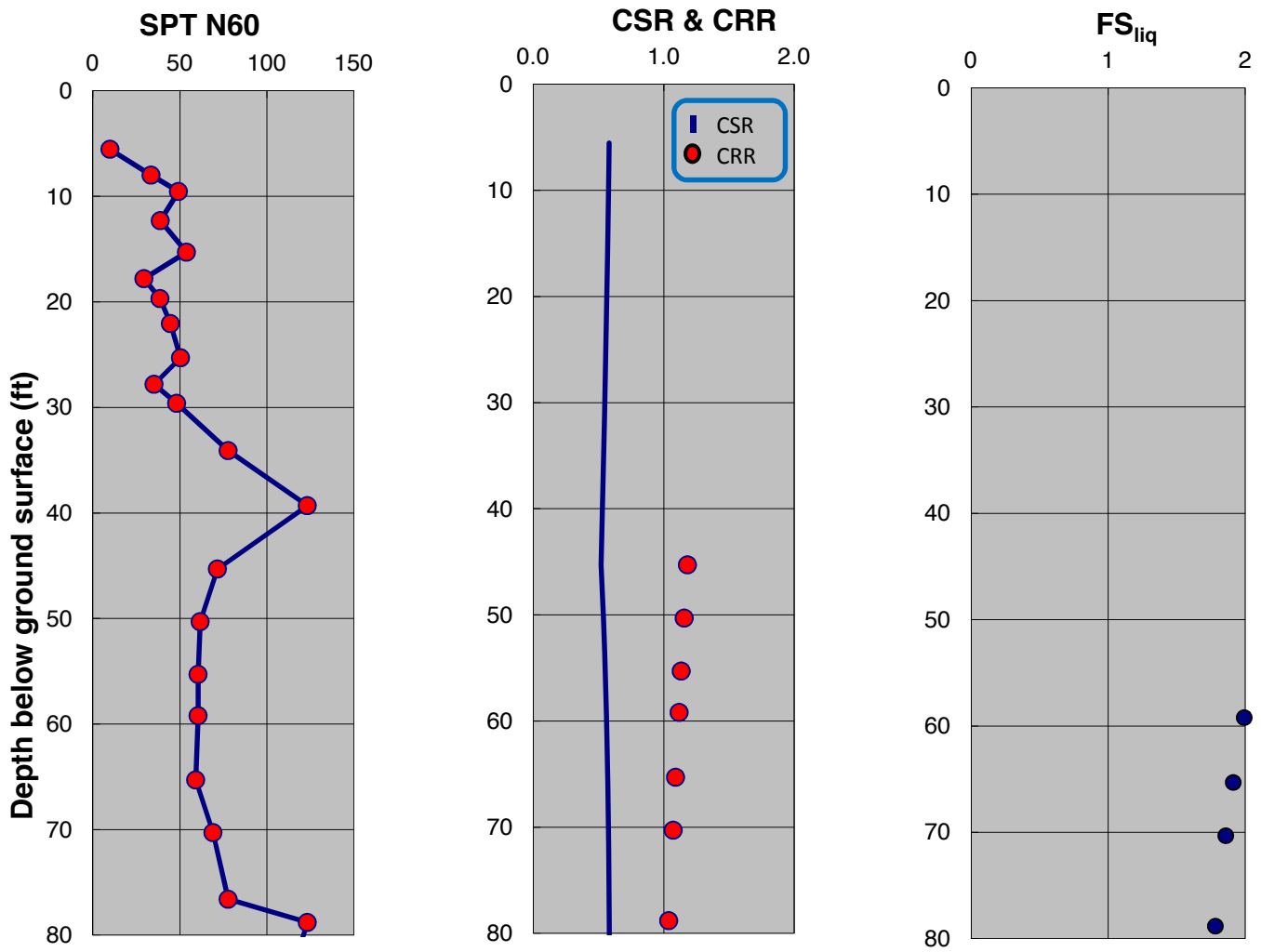
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-34 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



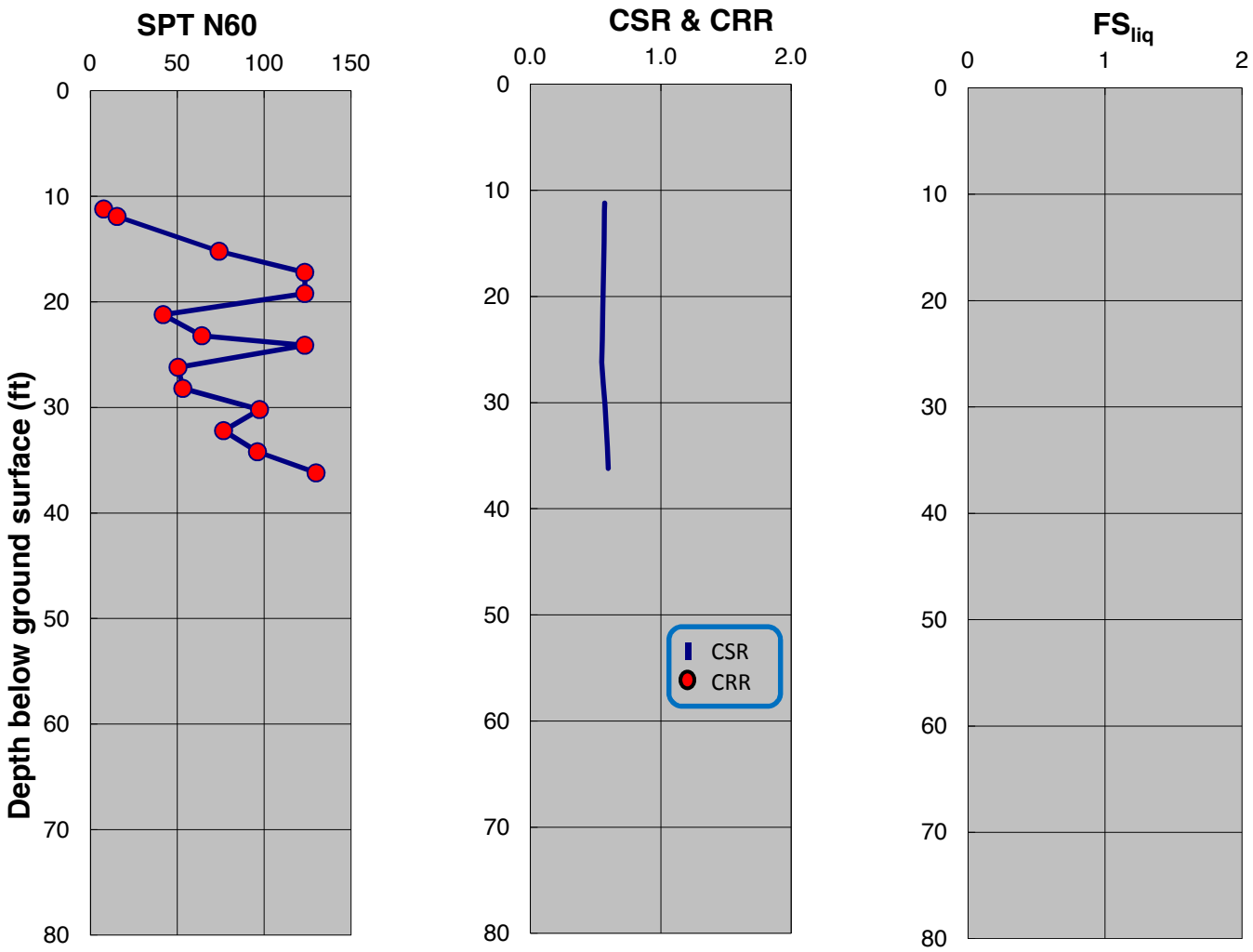
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-36 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



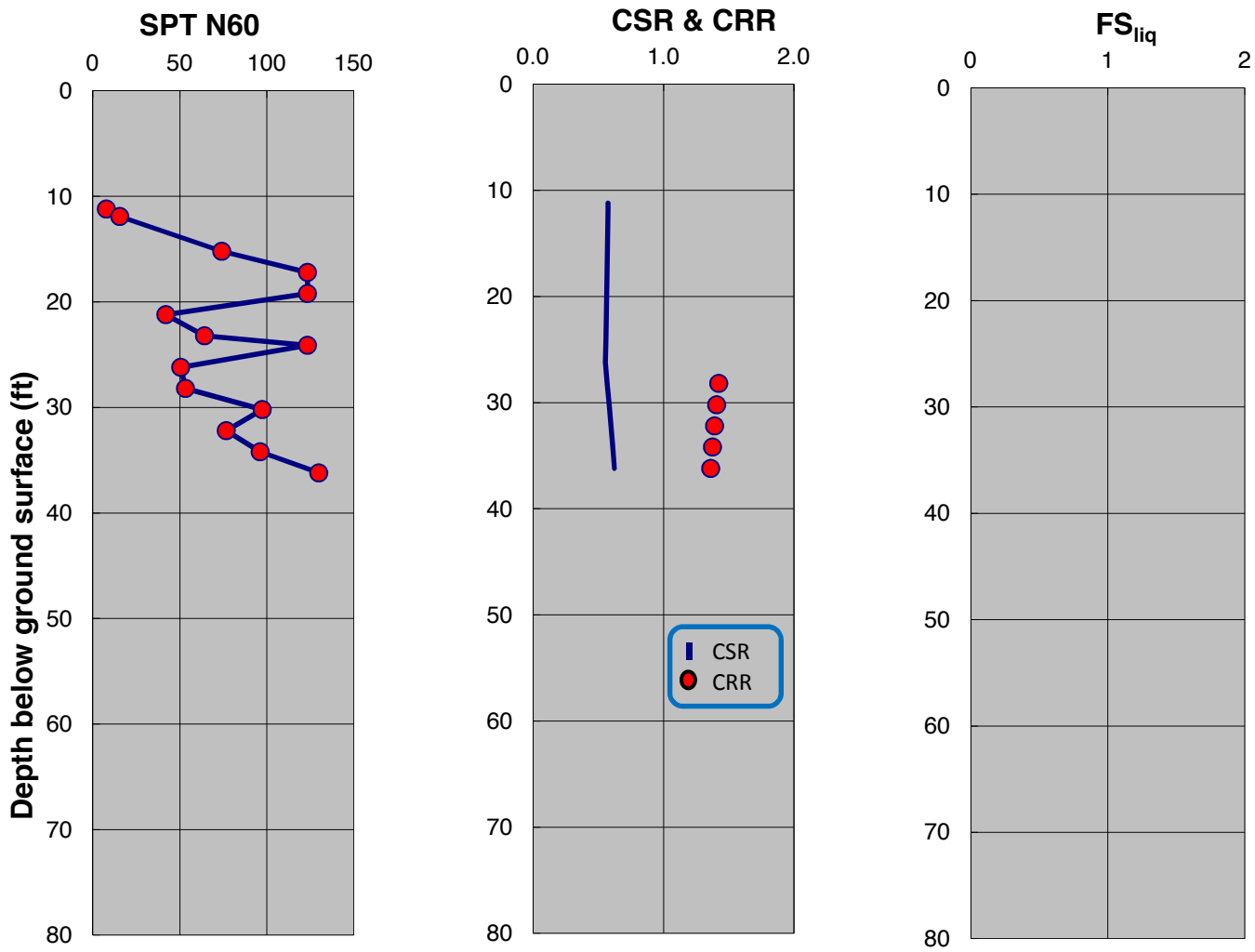
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-36 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



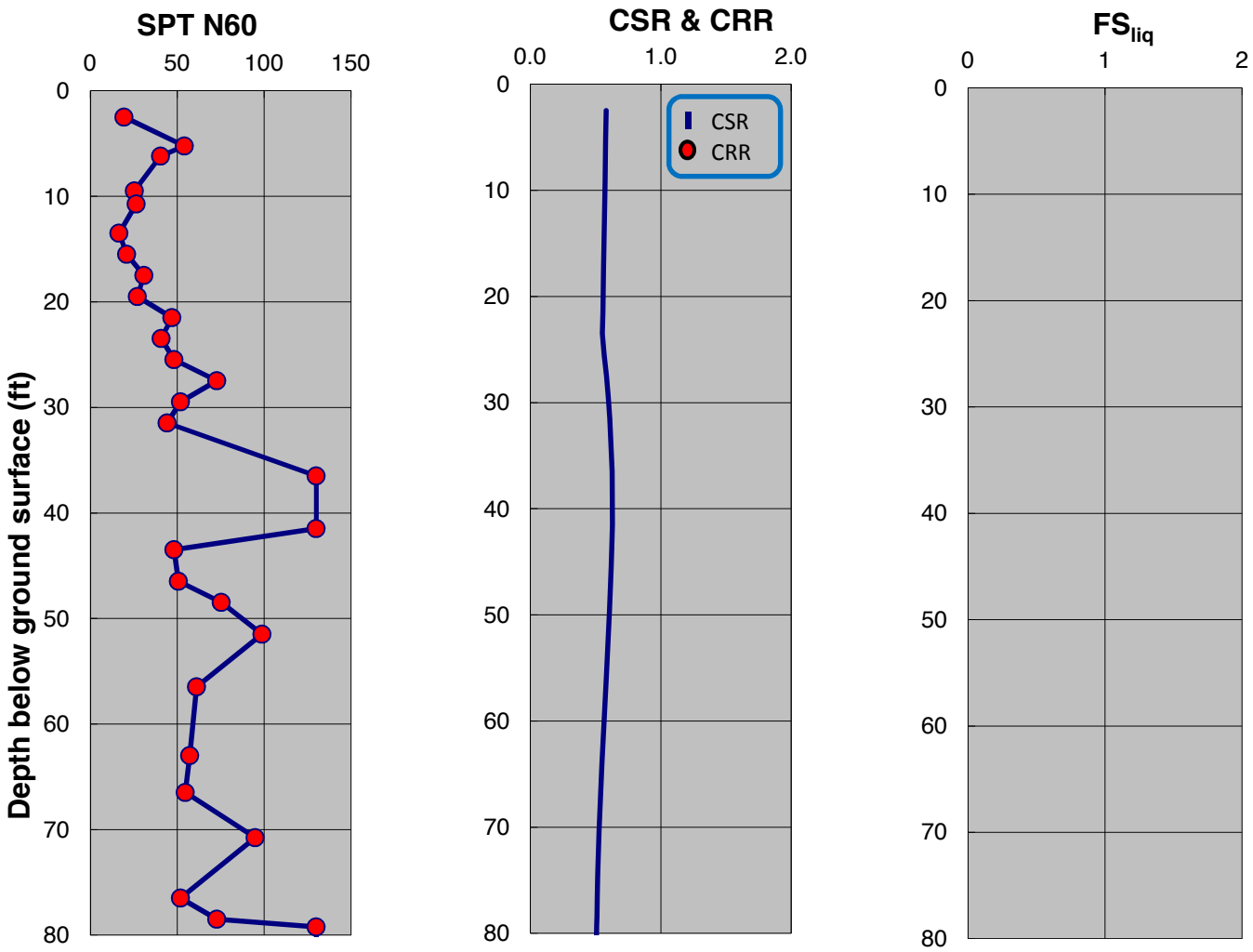
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-37 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



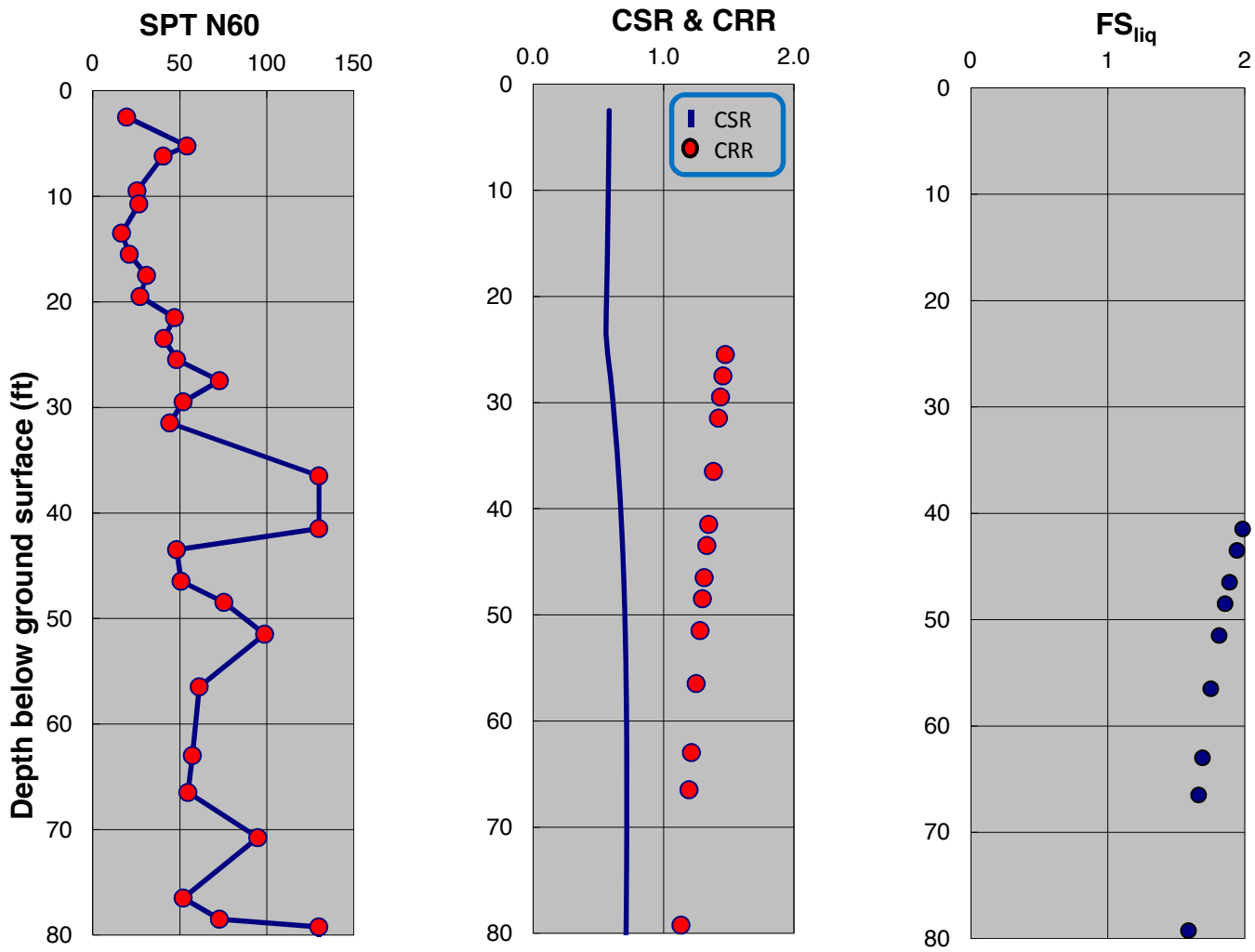
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-37 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



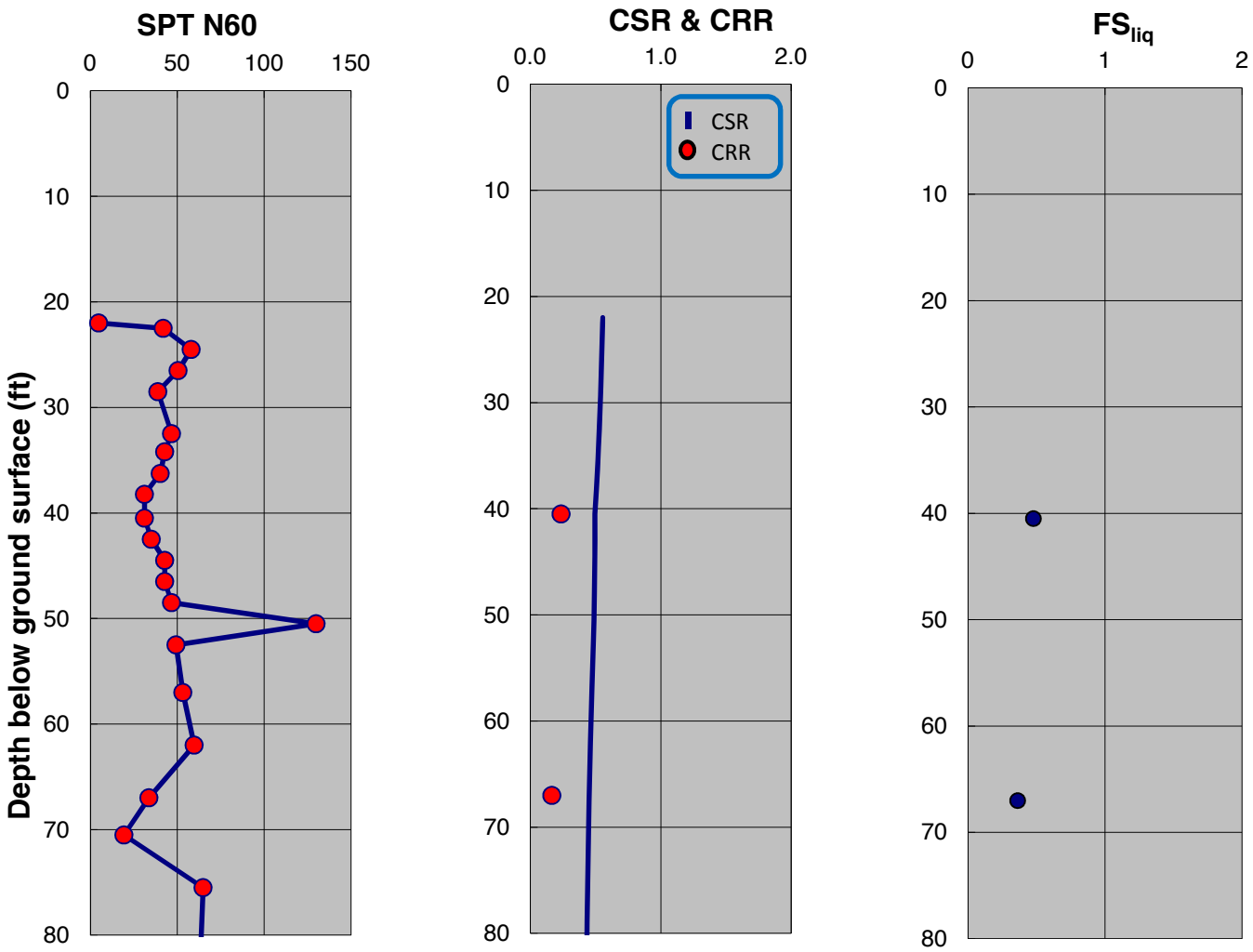
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-38 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



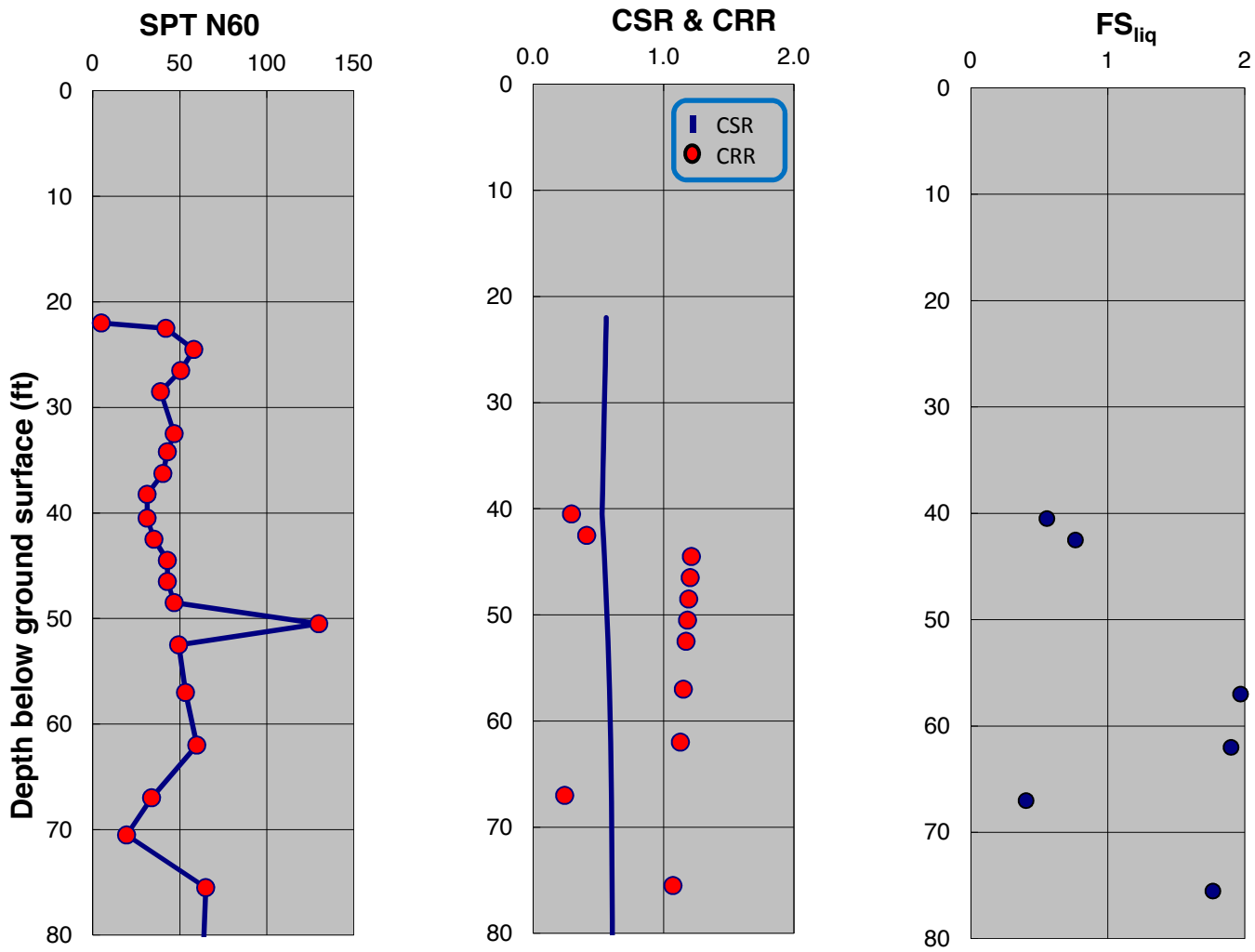
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-38 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



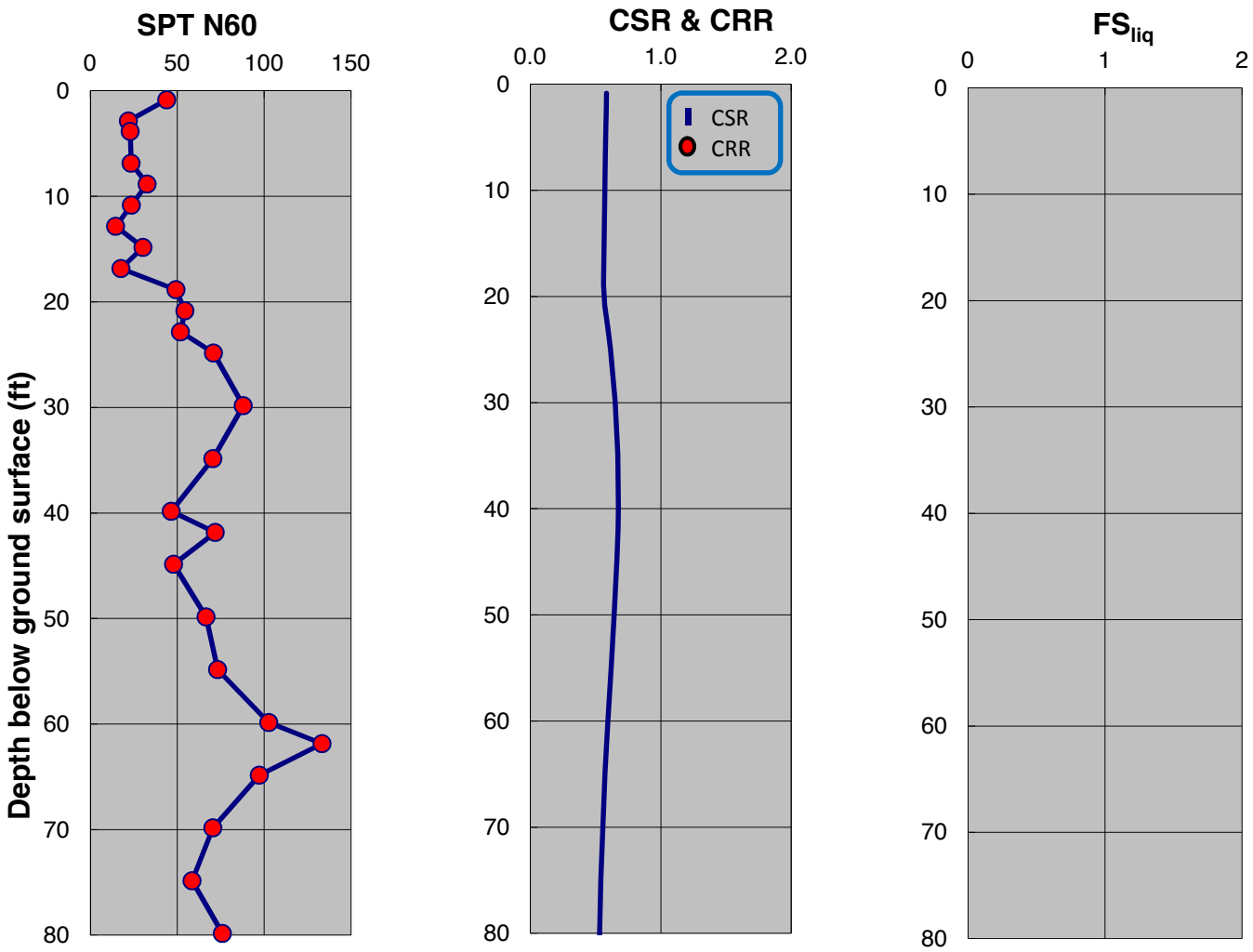
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-39 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



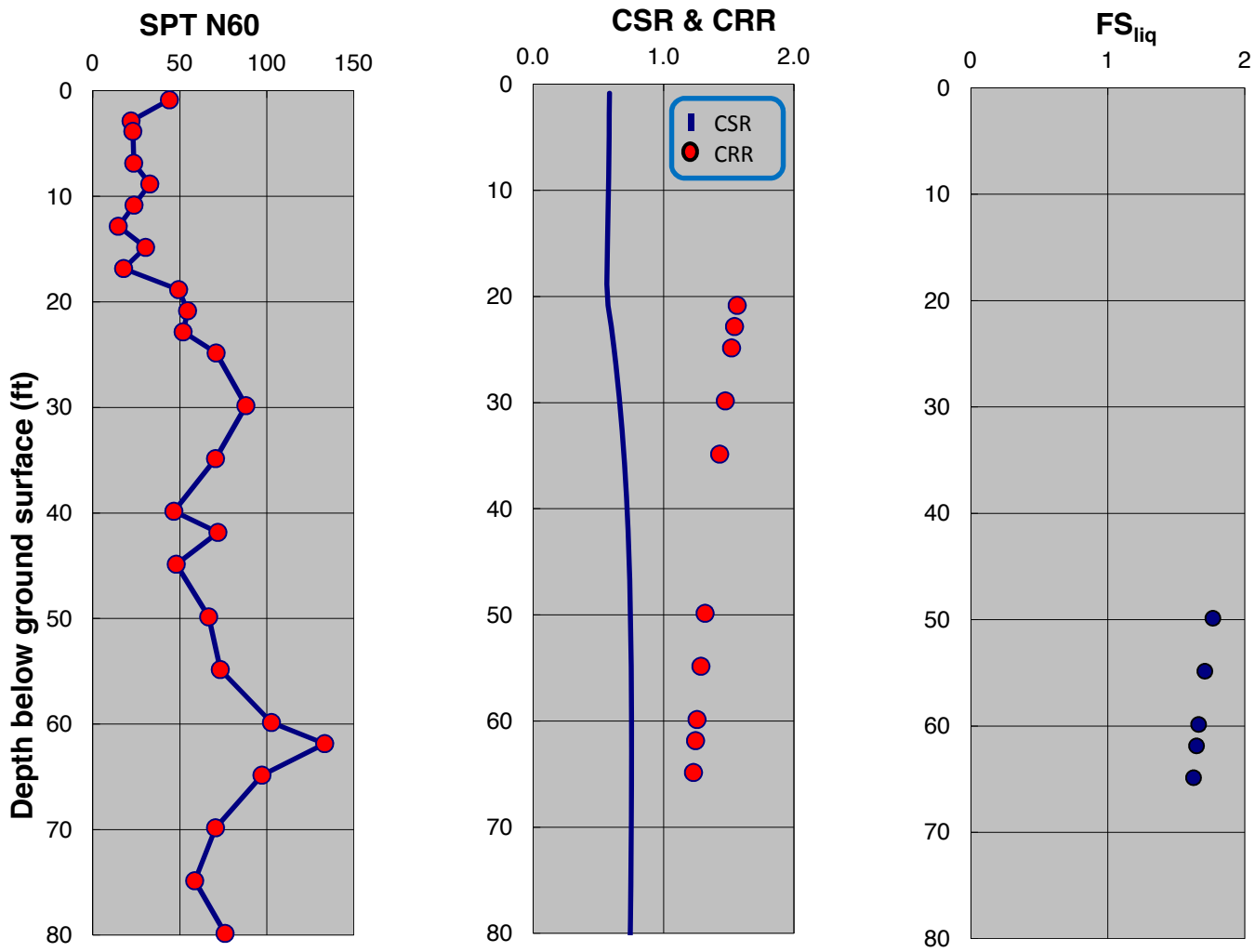
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-39 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



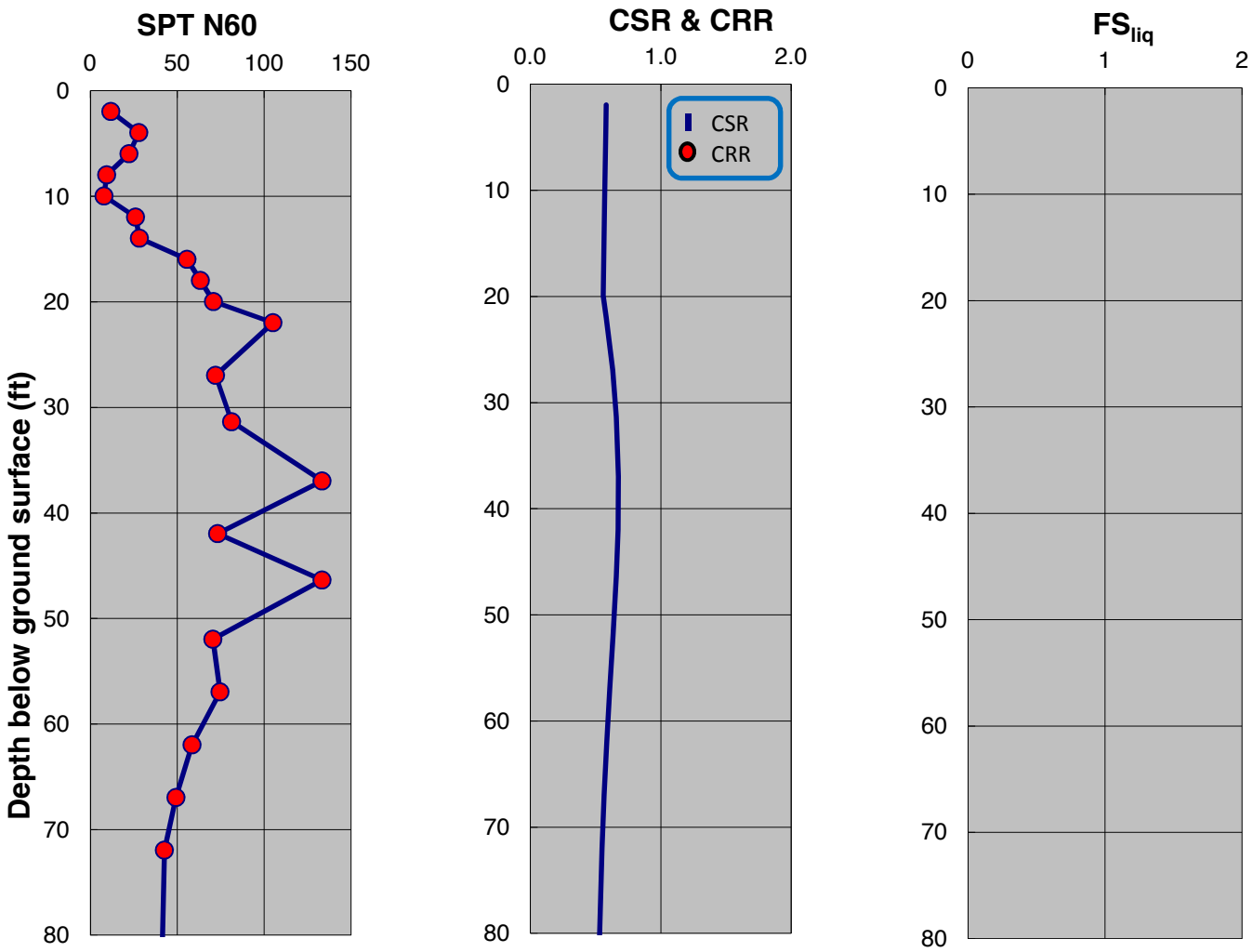
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-40 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



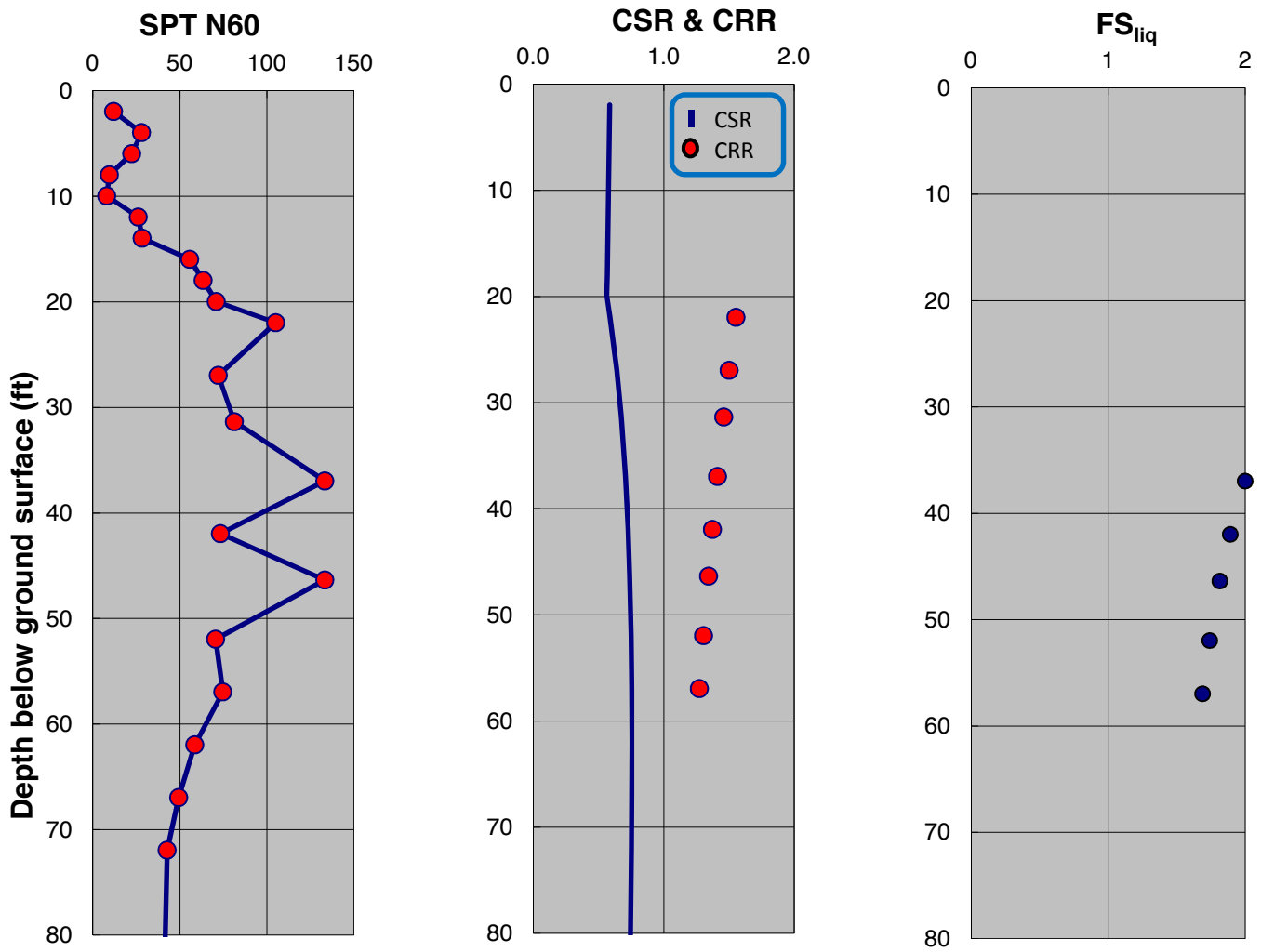
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-40 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-42 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

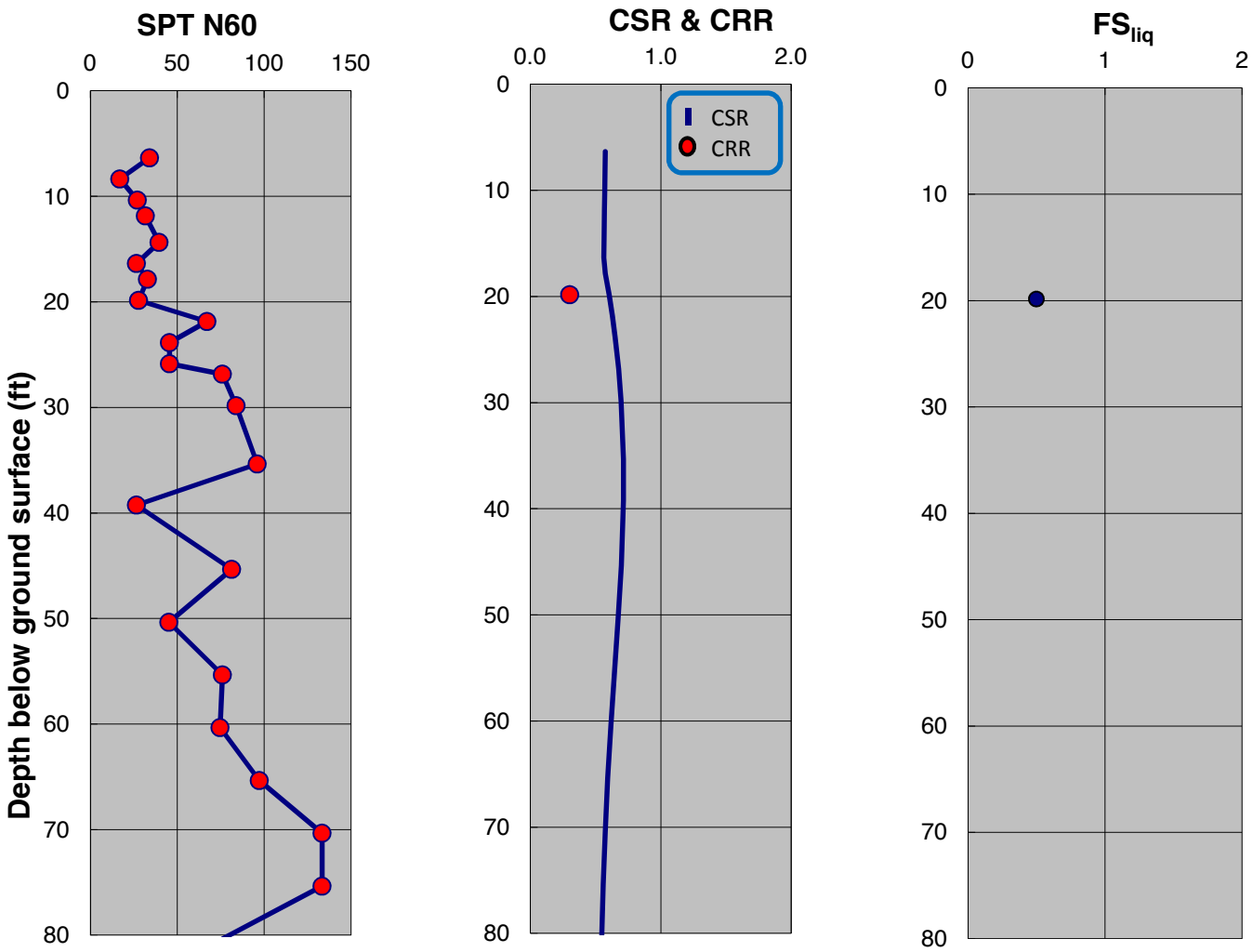
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-42 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

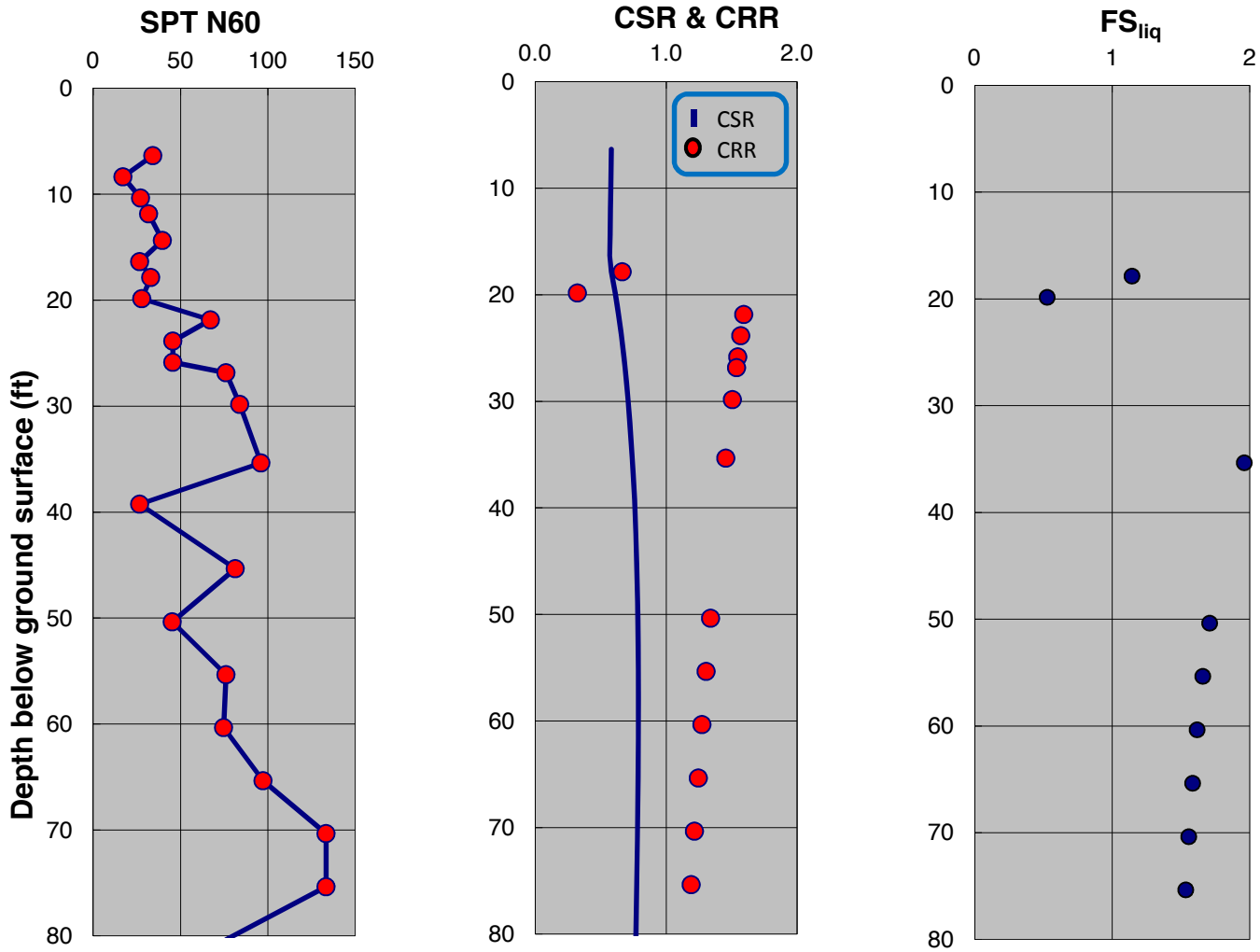
PLATE C.300



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-43 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

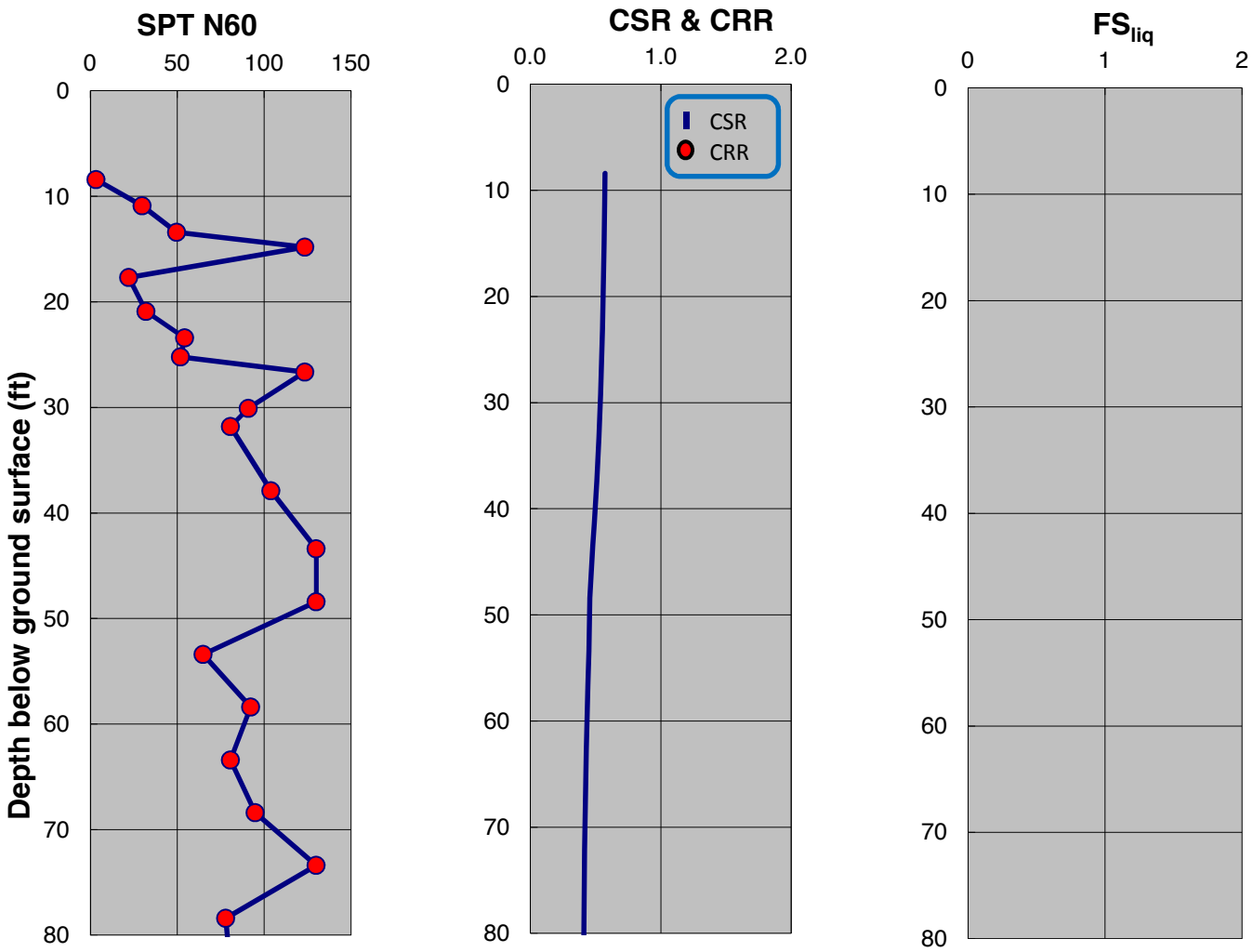
PLATE C.301



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-43 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

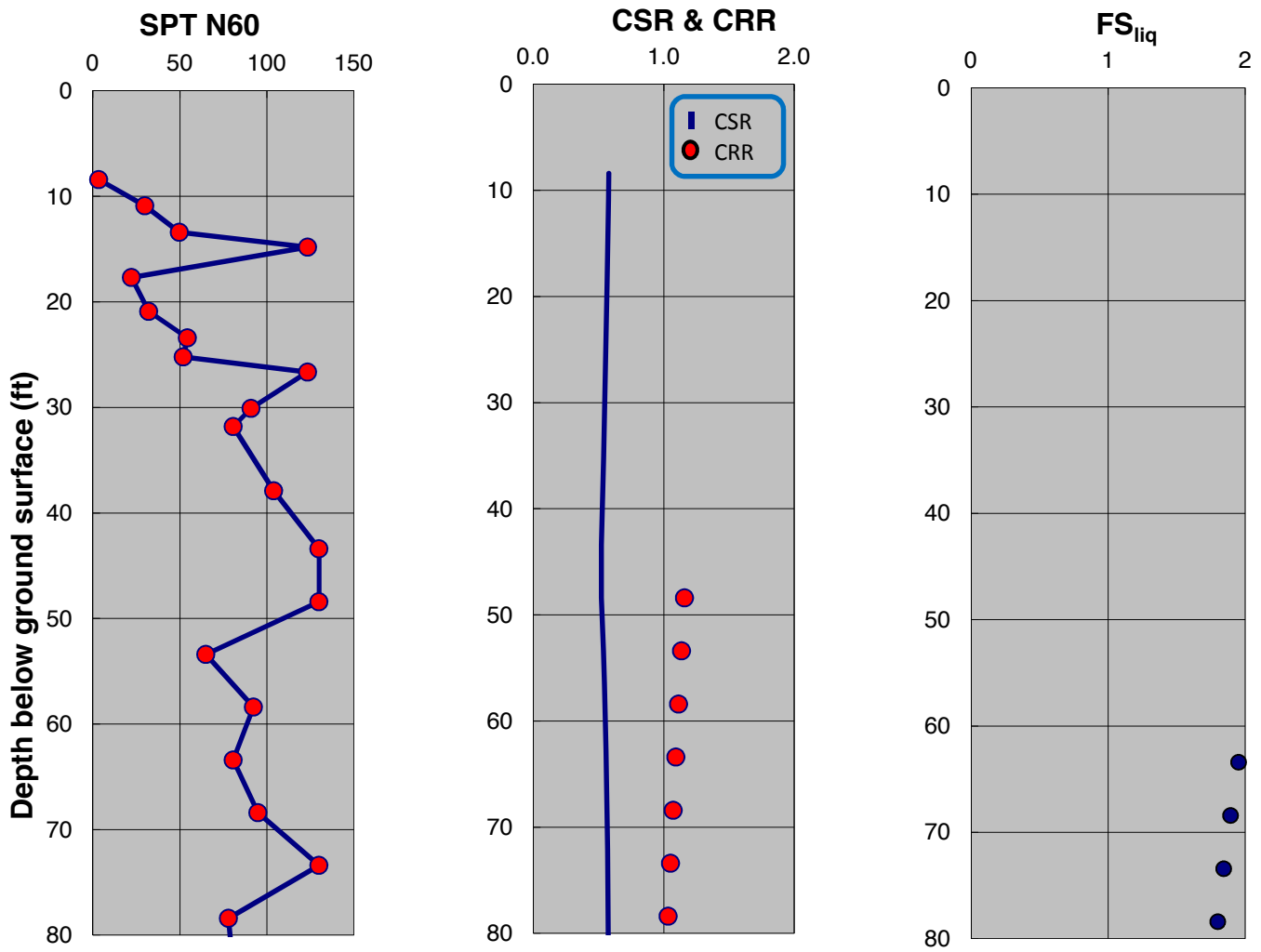
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.302



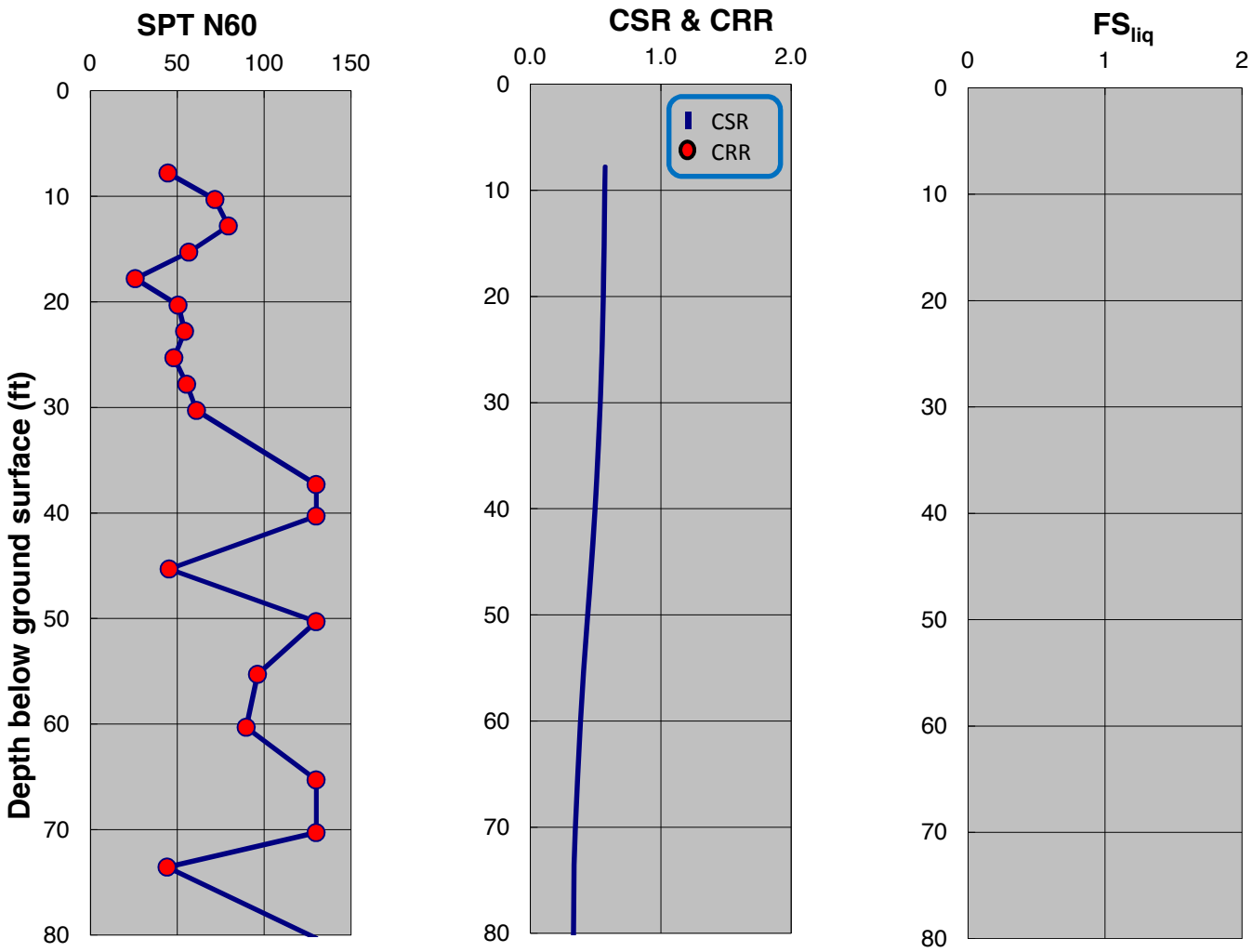
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-45 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



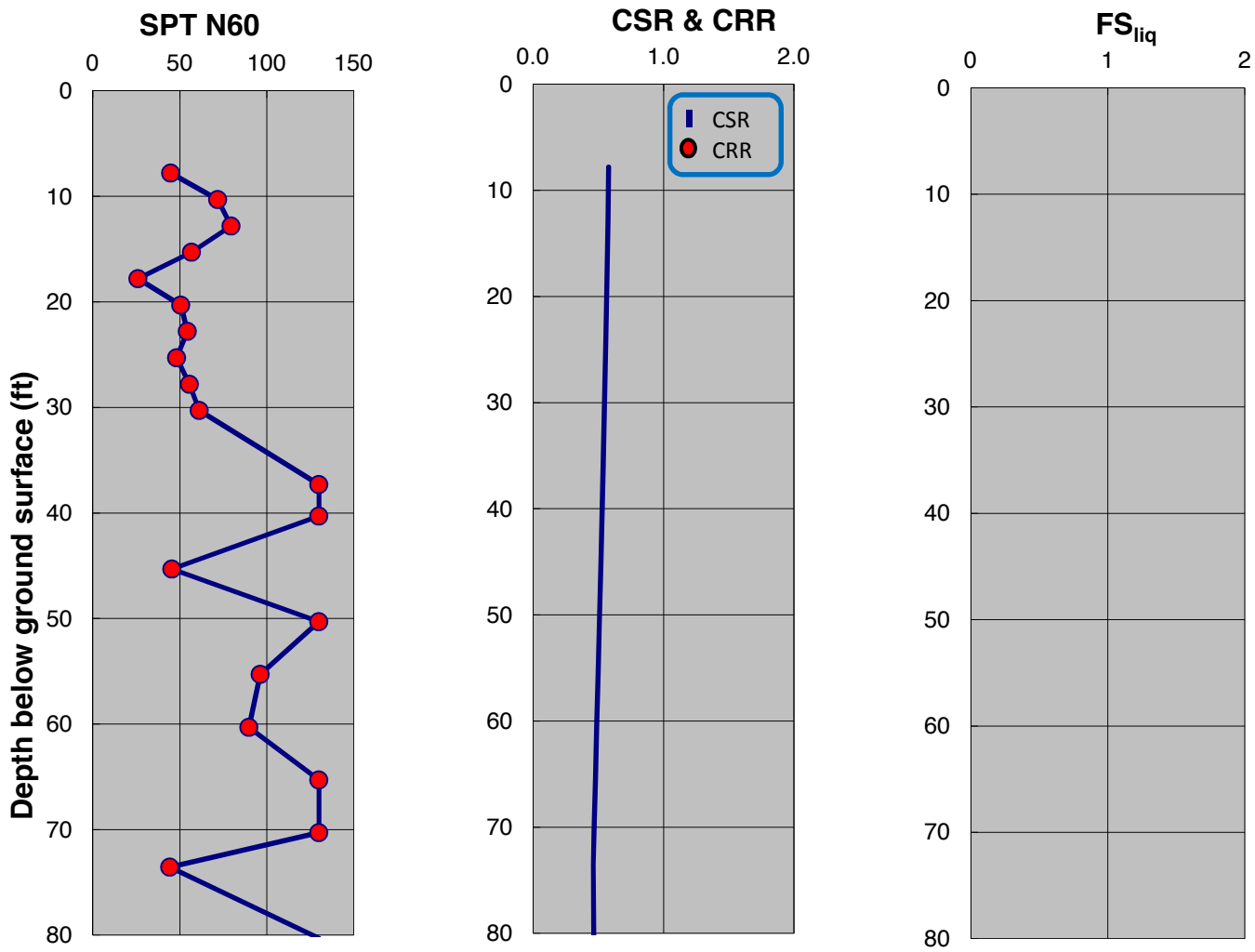
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-45 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



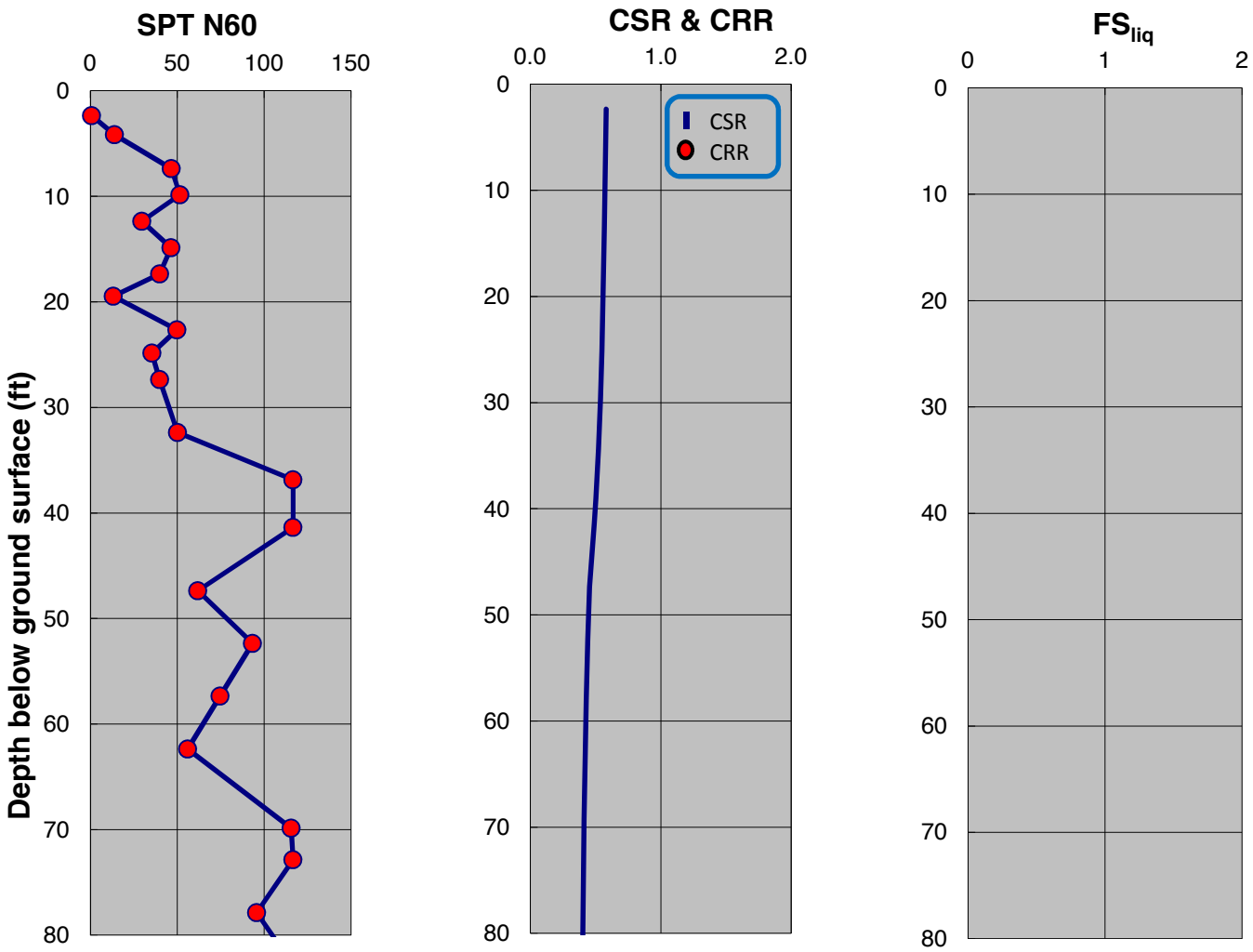
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-47 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



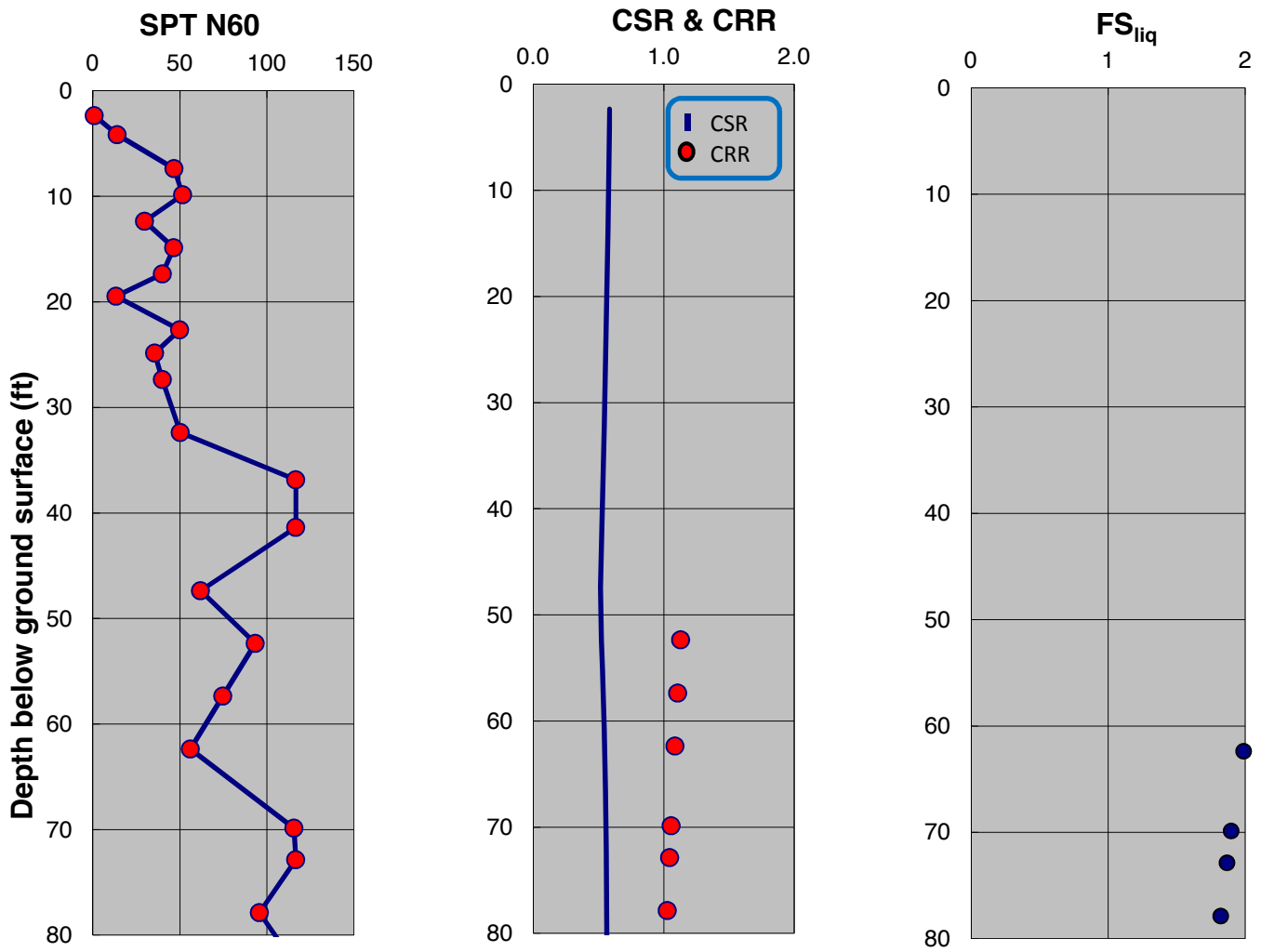
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-47 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



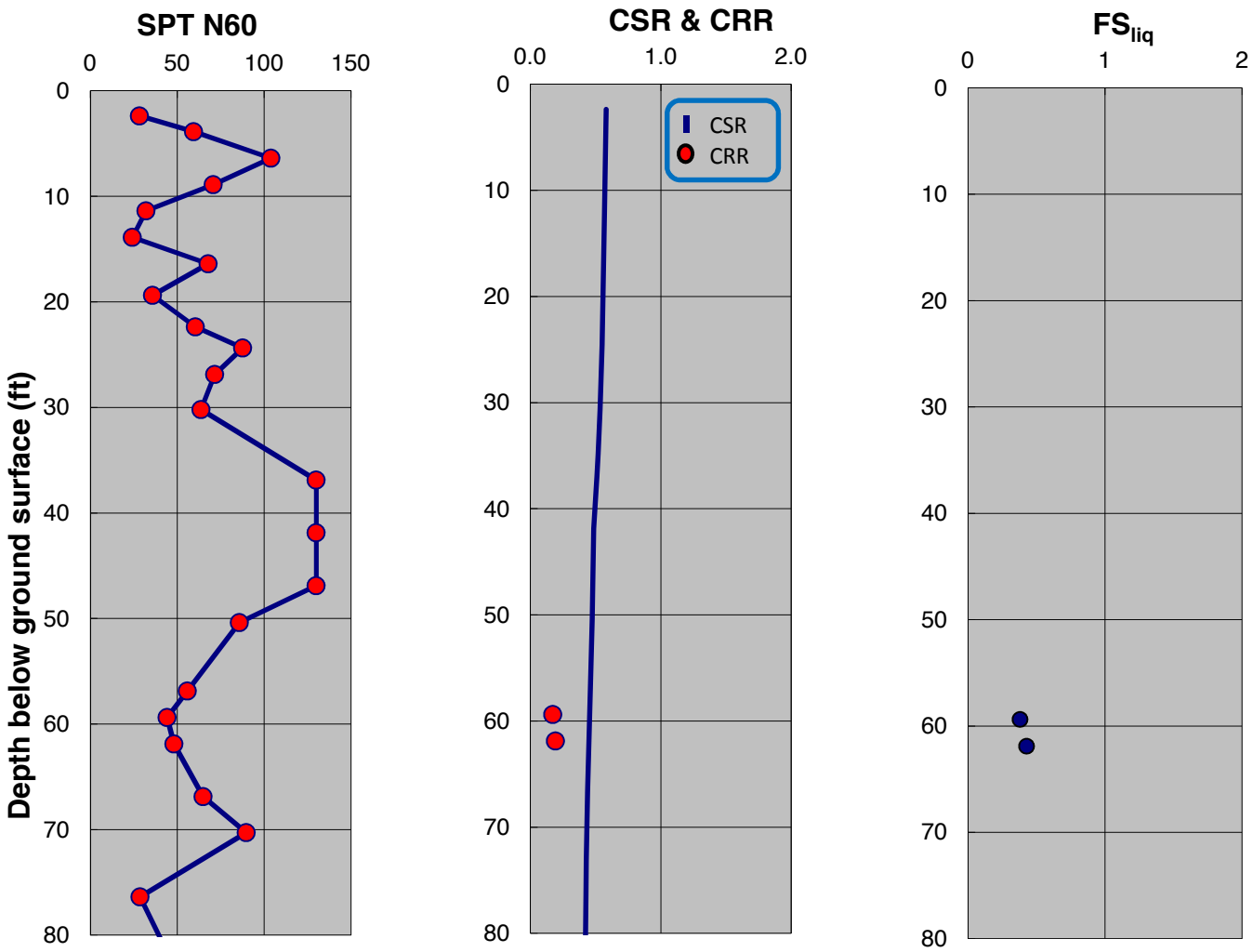
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-49 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



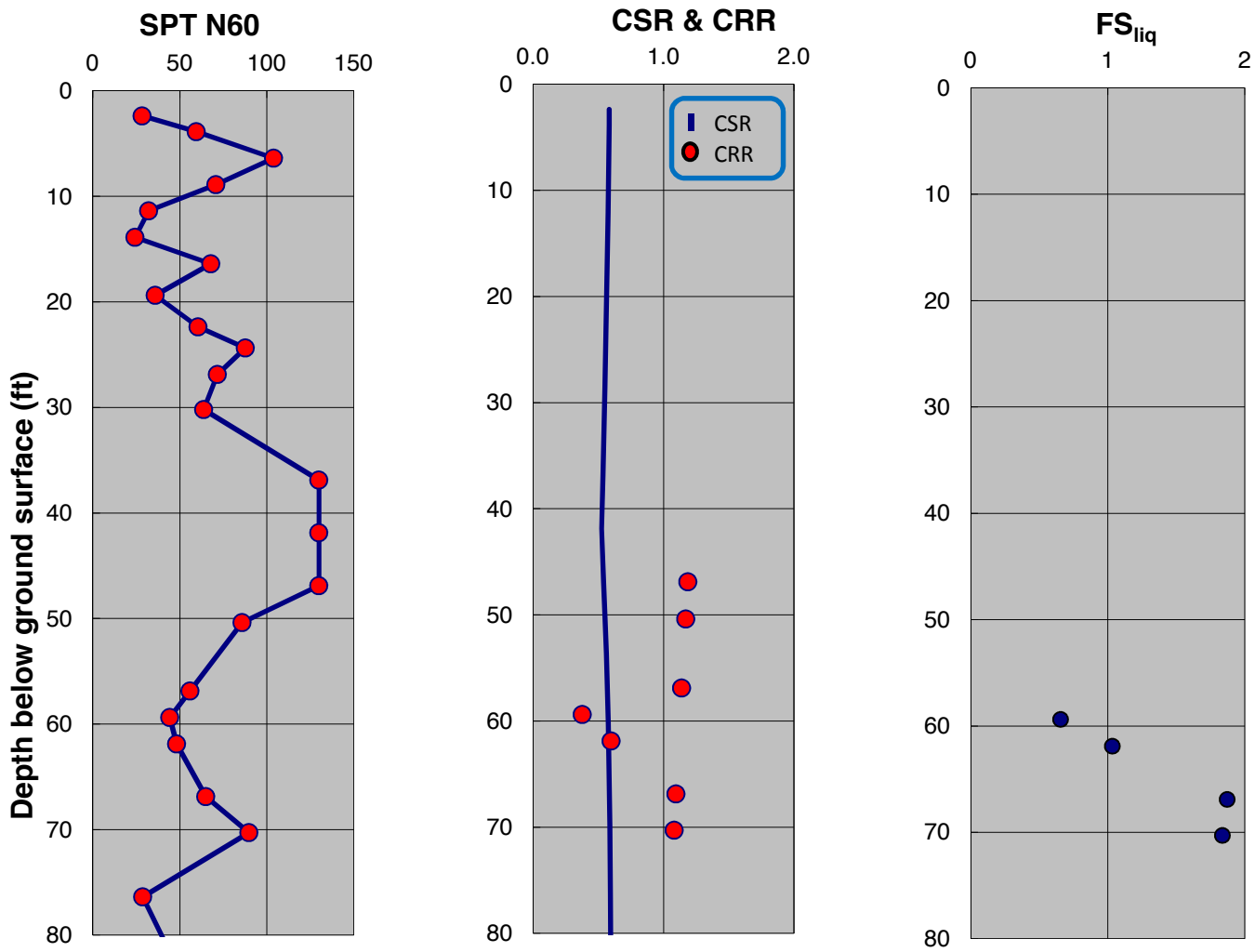
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-49 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-50 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

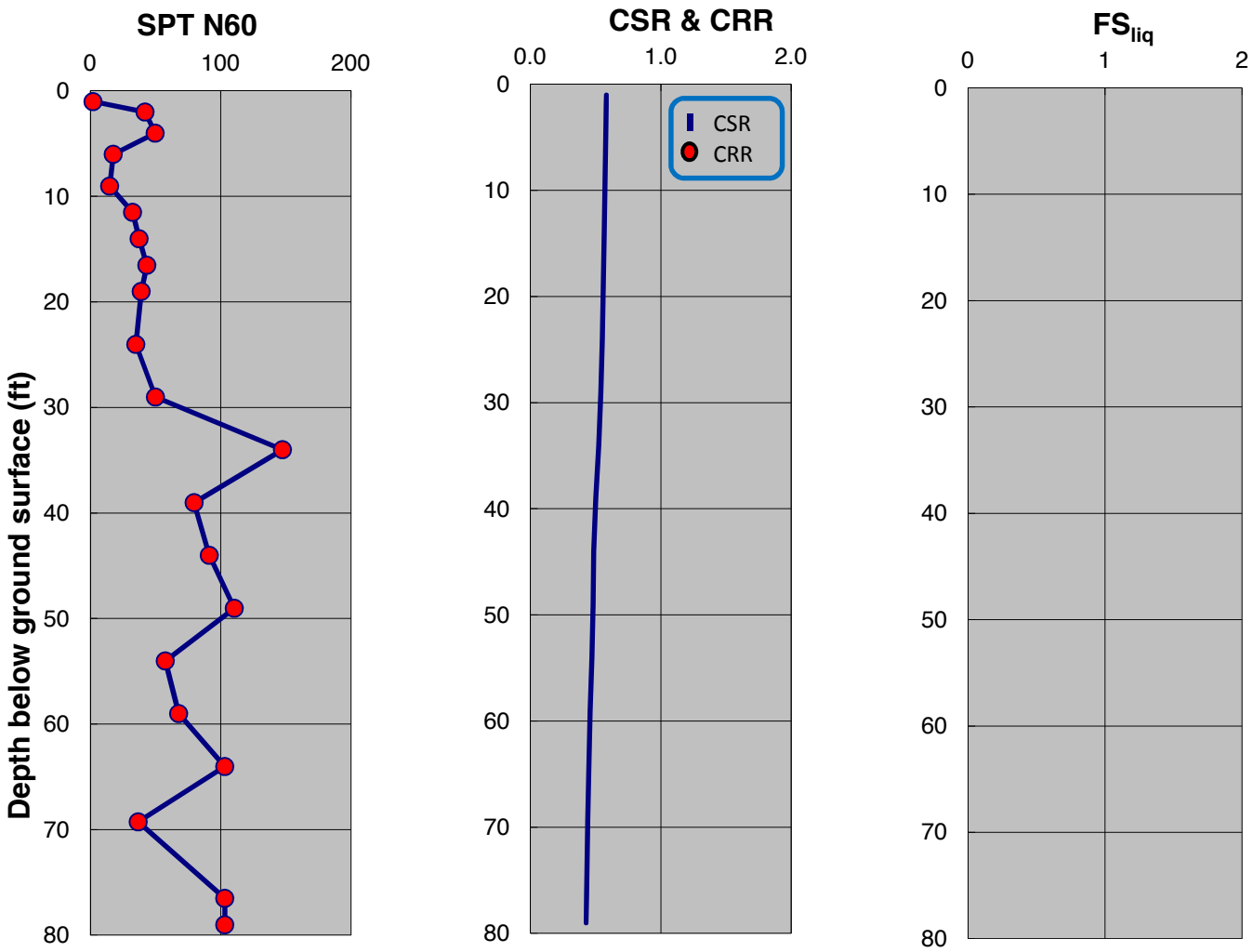
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-50 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

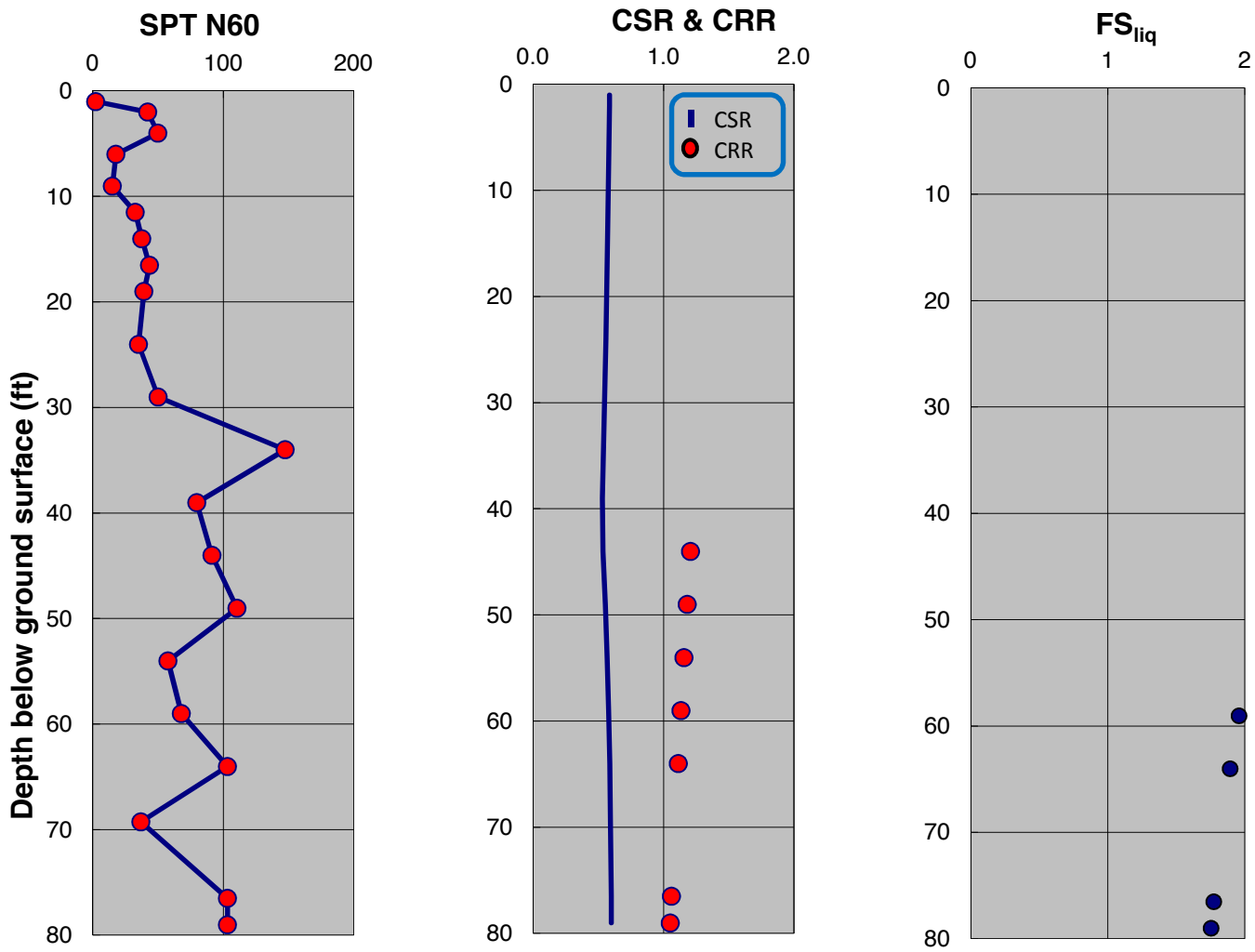
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.310



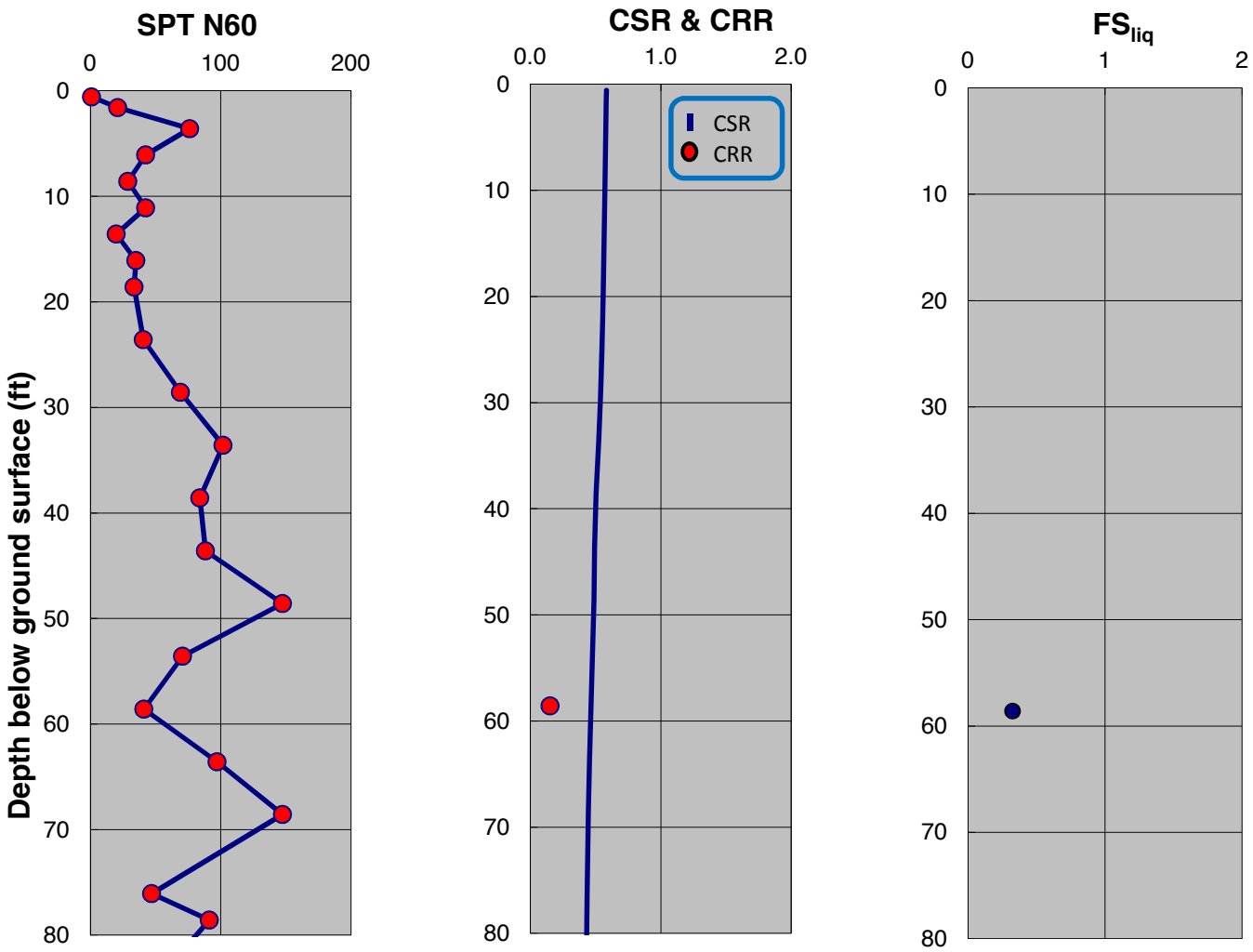
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-60 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



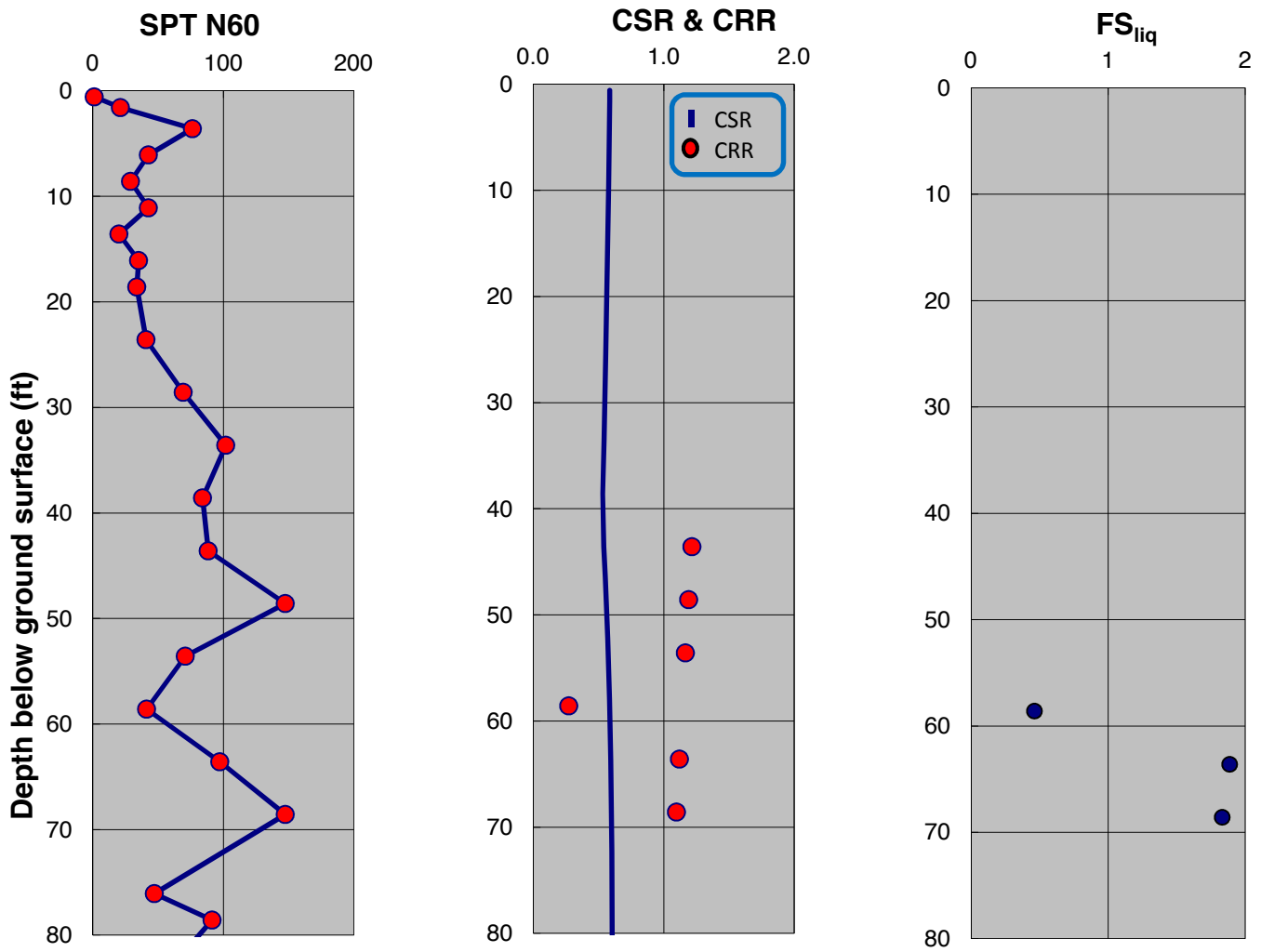
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-60 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



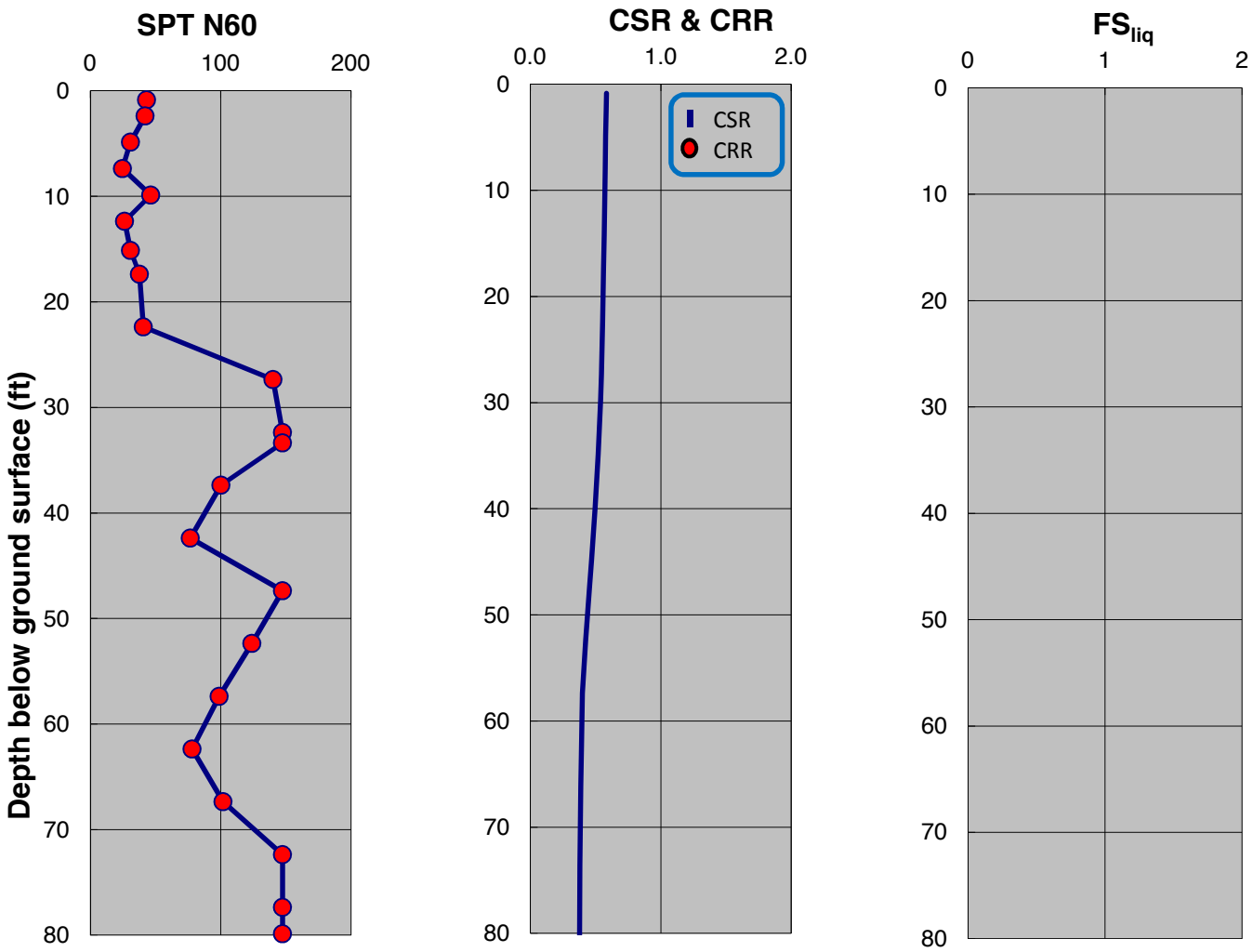
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-61 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



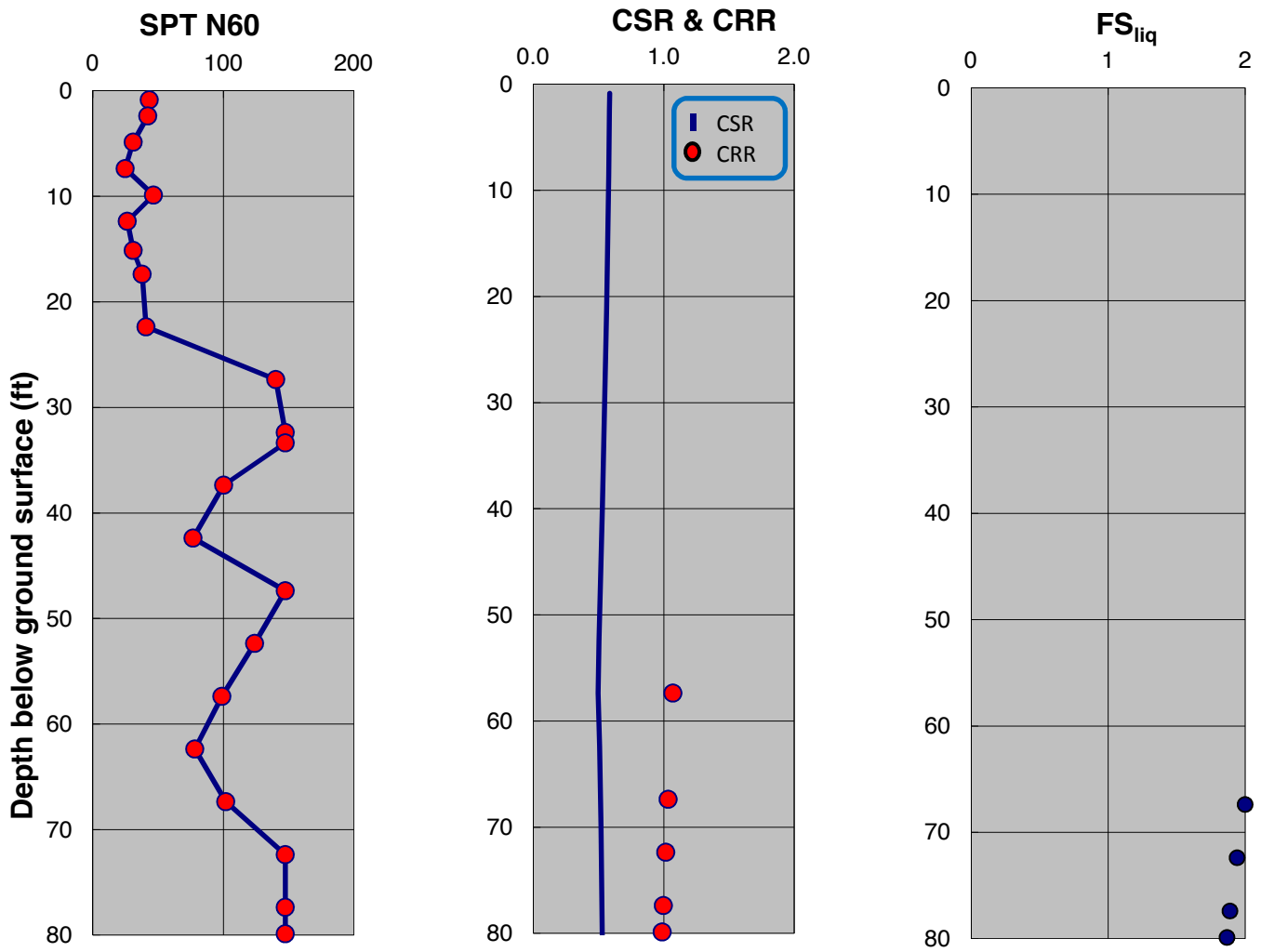
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-61 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



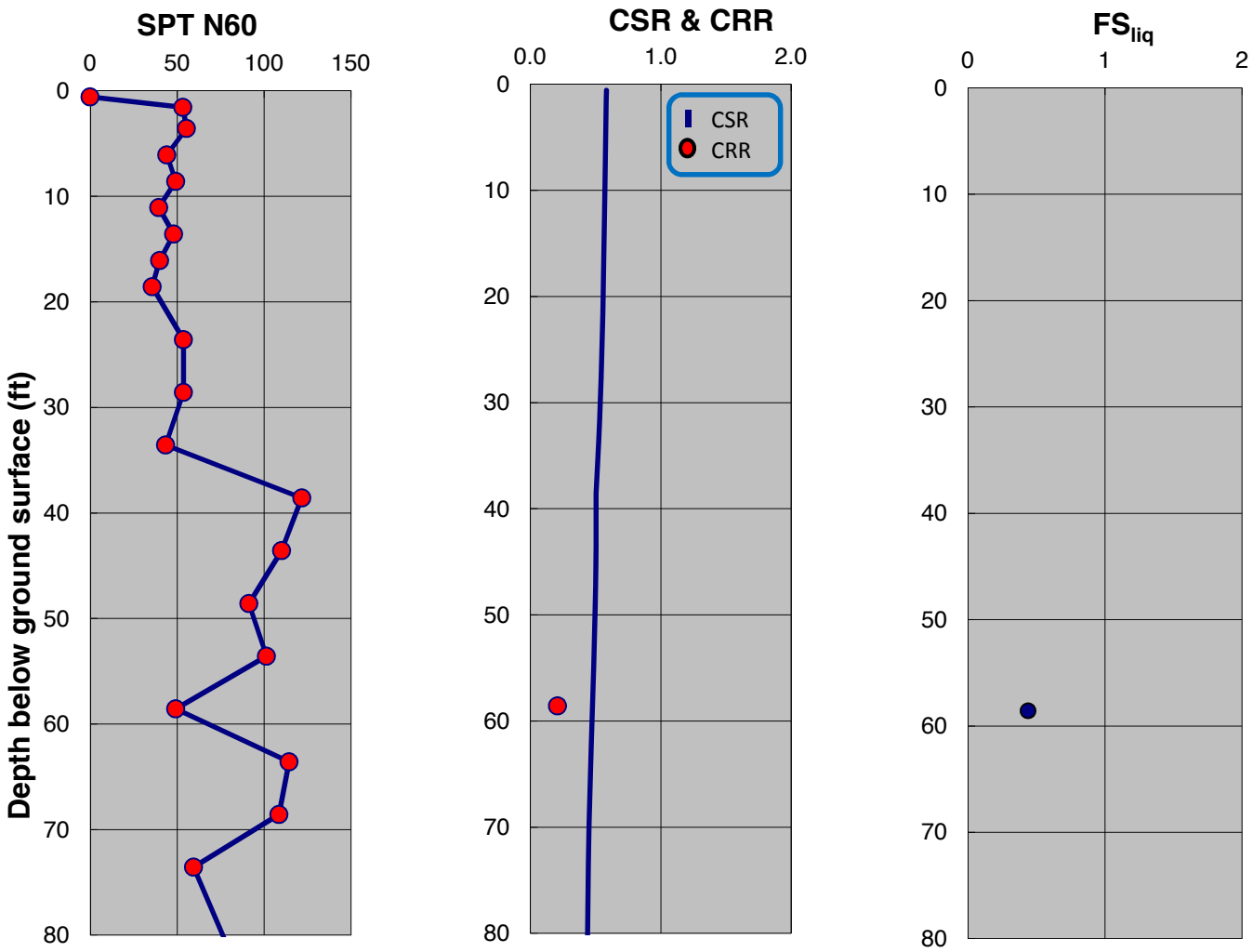
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-62 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



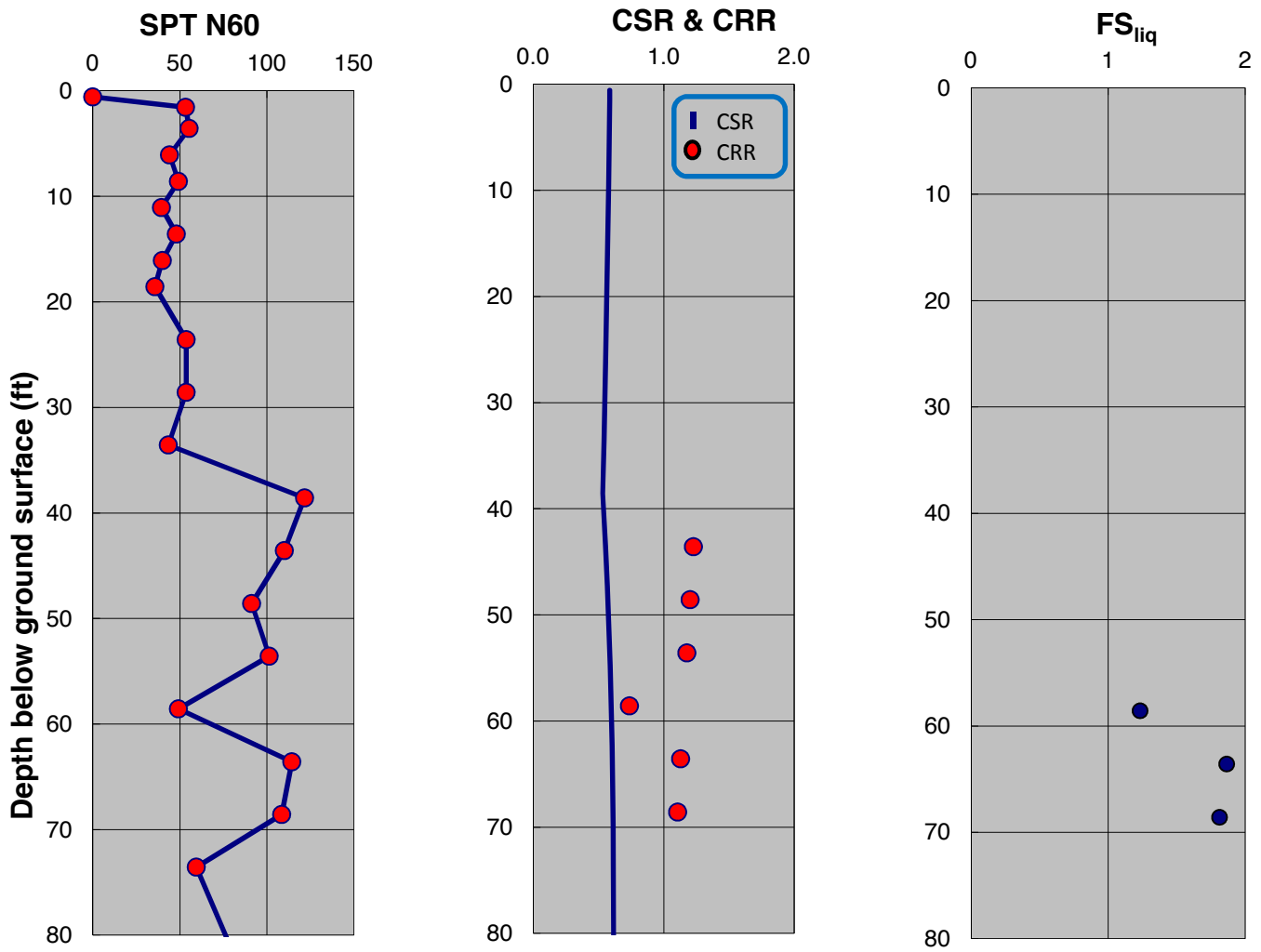
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-62 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



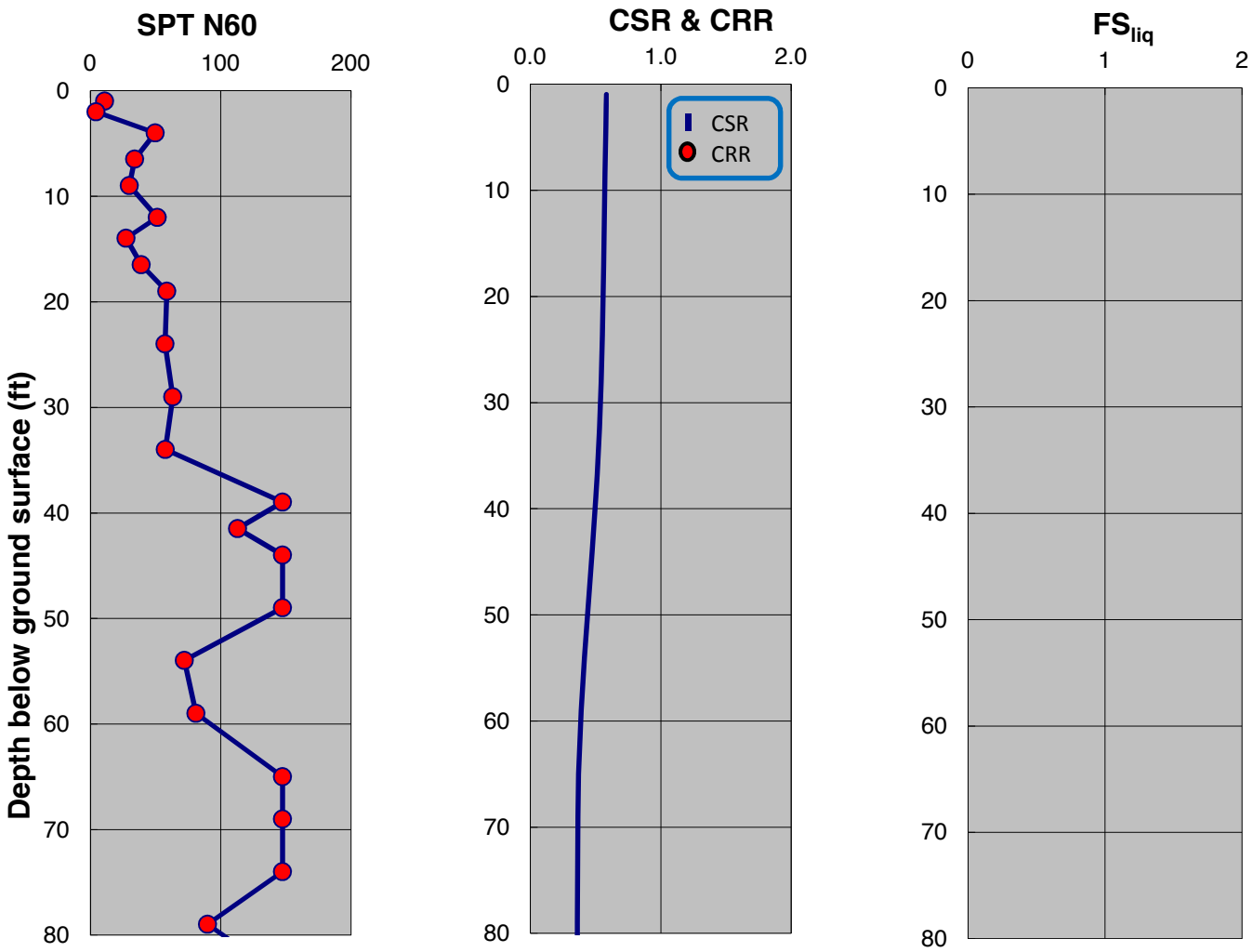
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-64 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



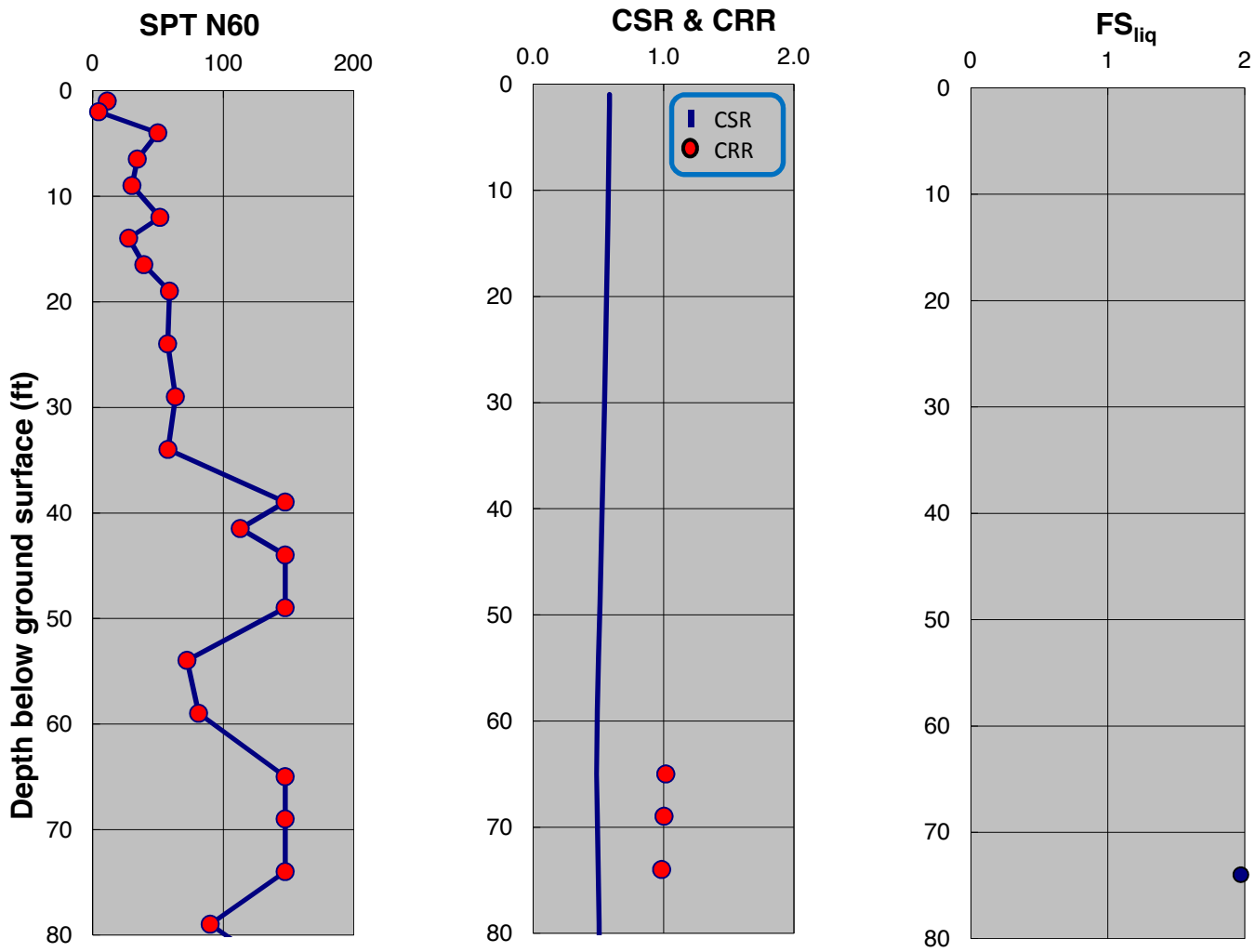
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-64 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



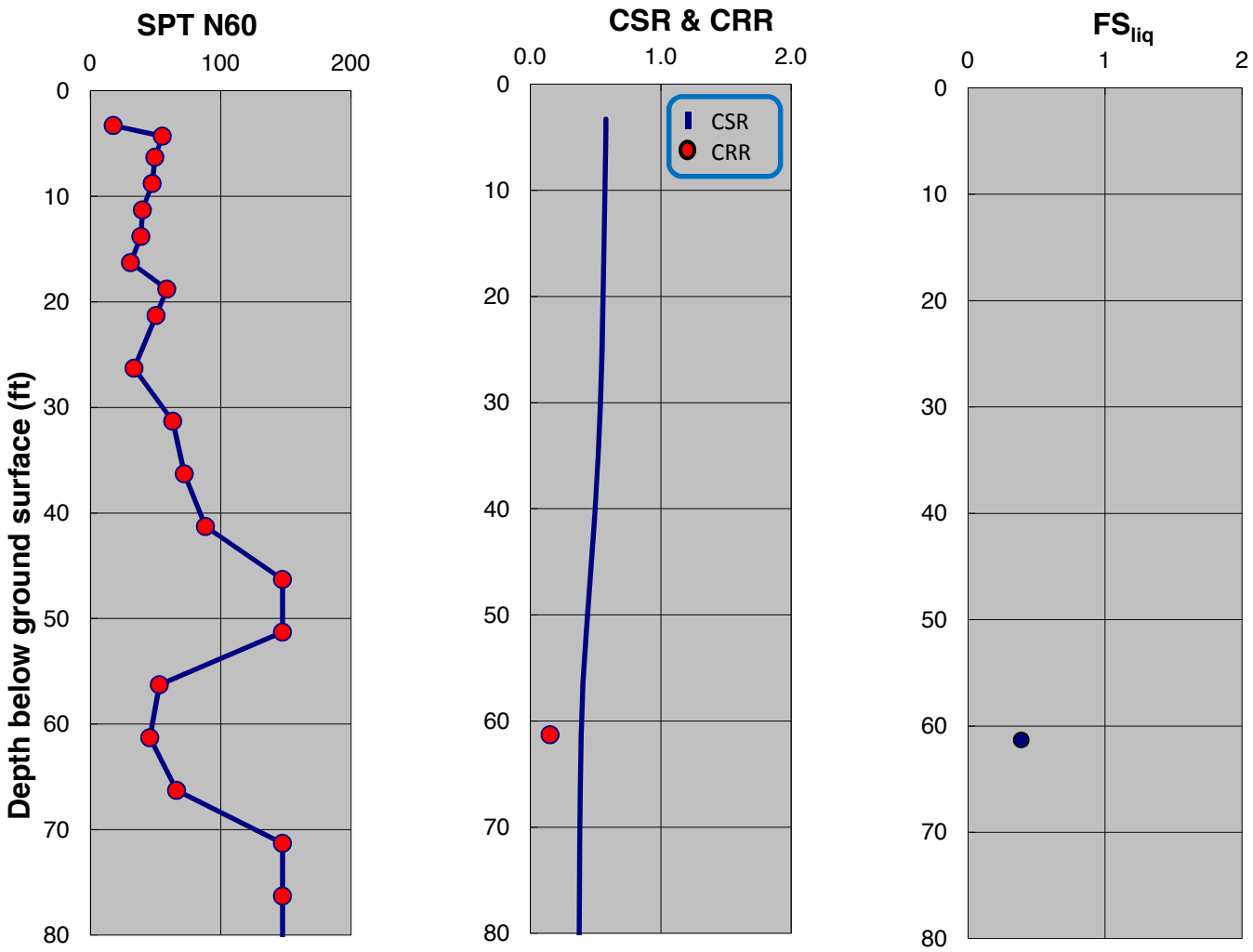
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-66 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



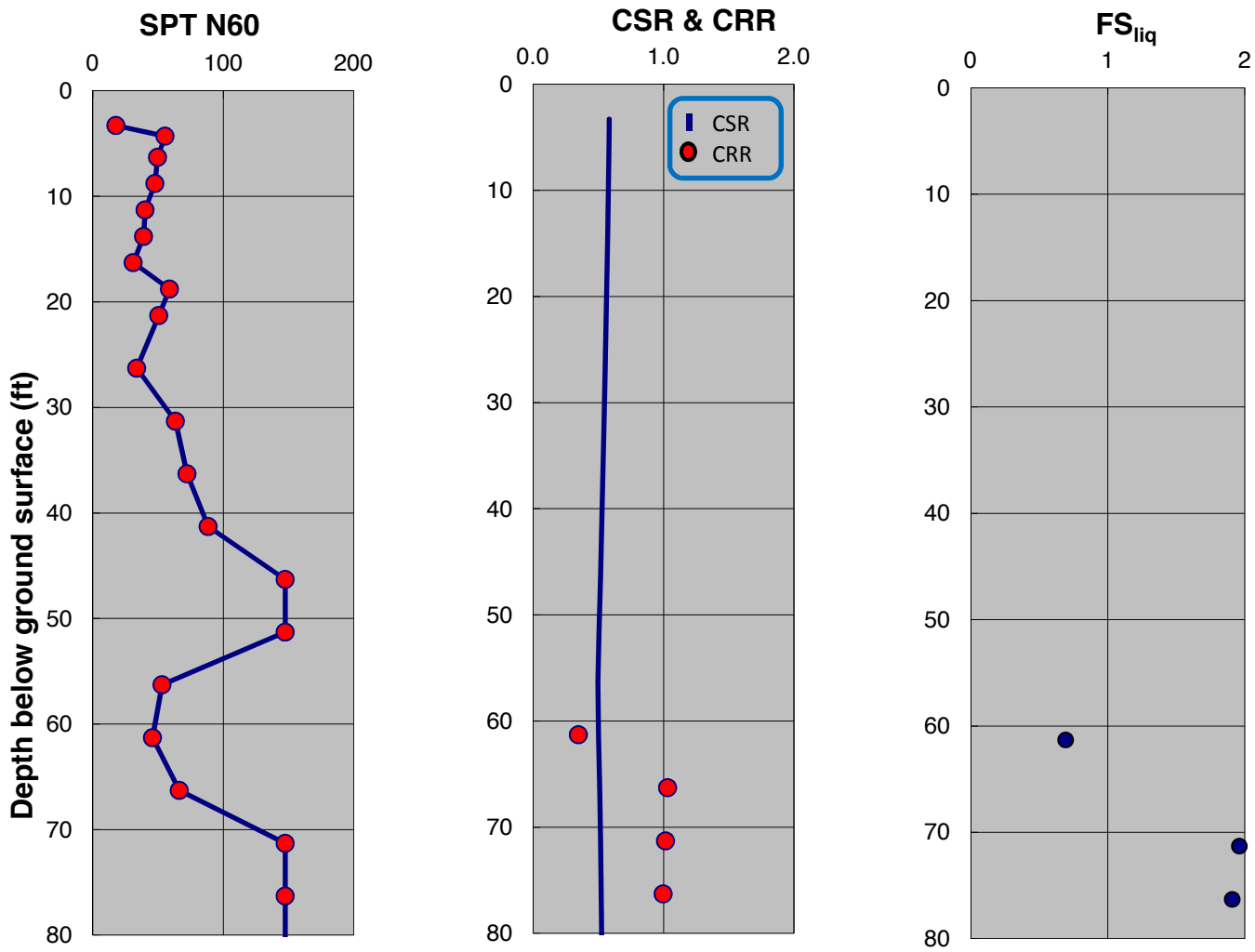
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-66 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



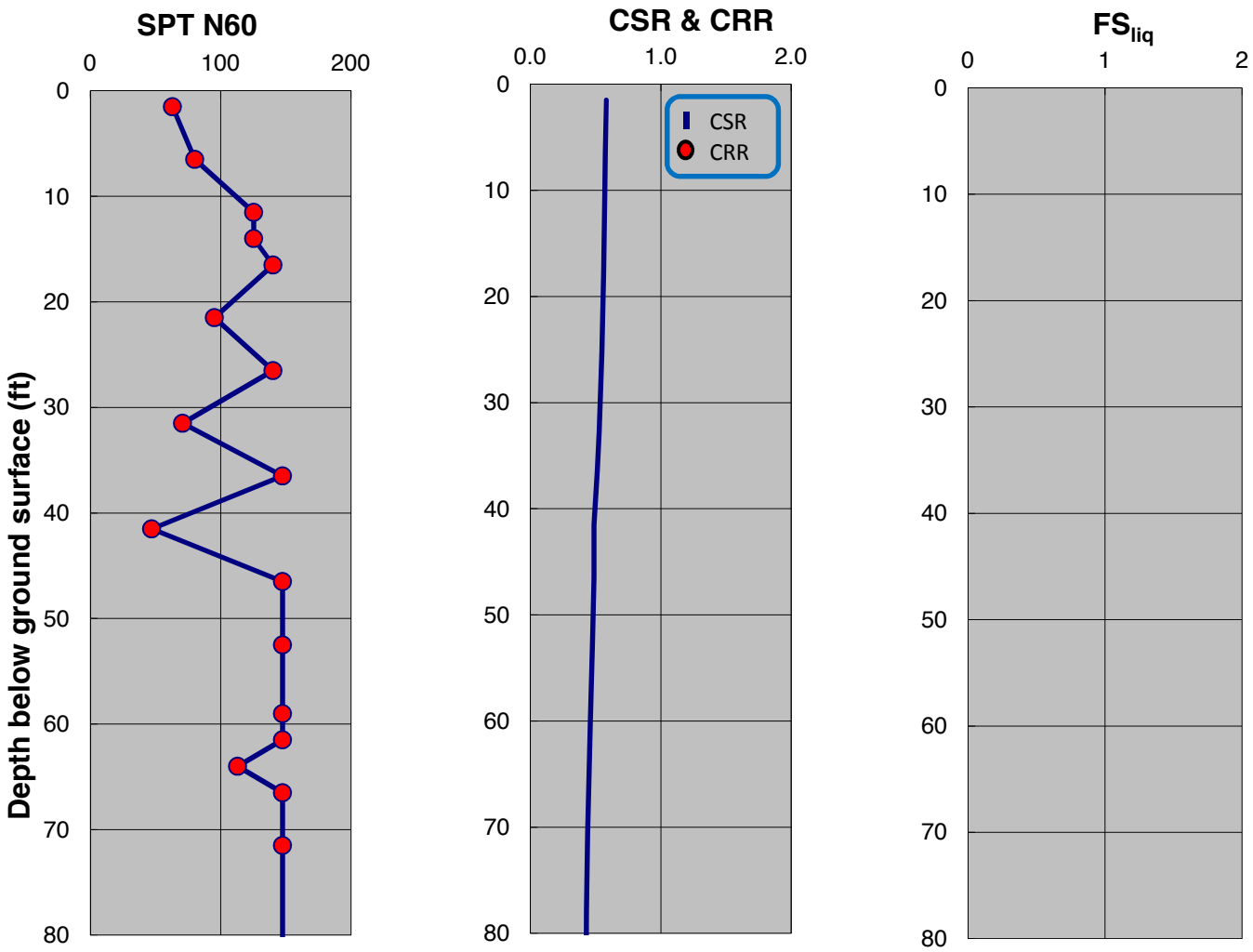
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-67 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



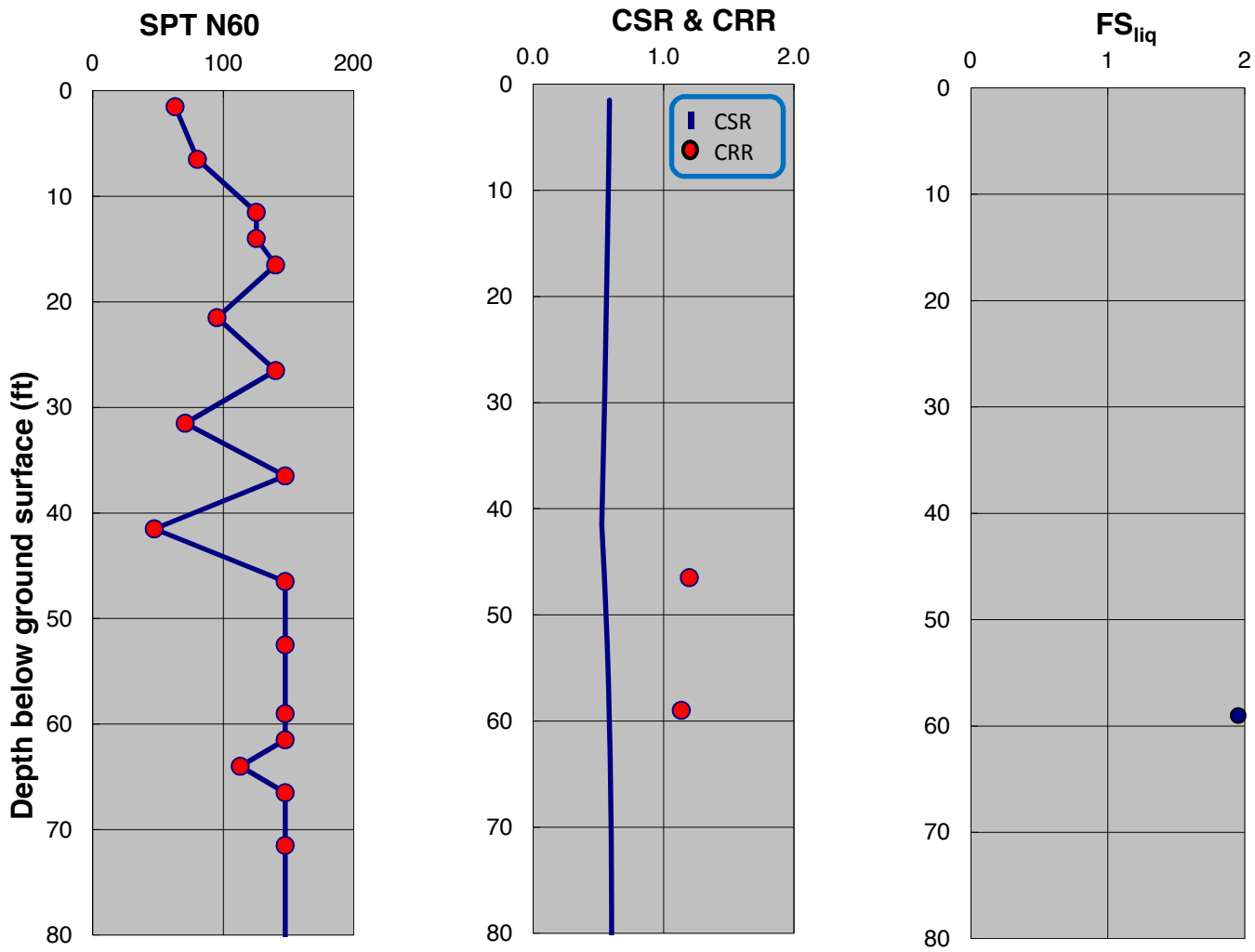
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-67 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



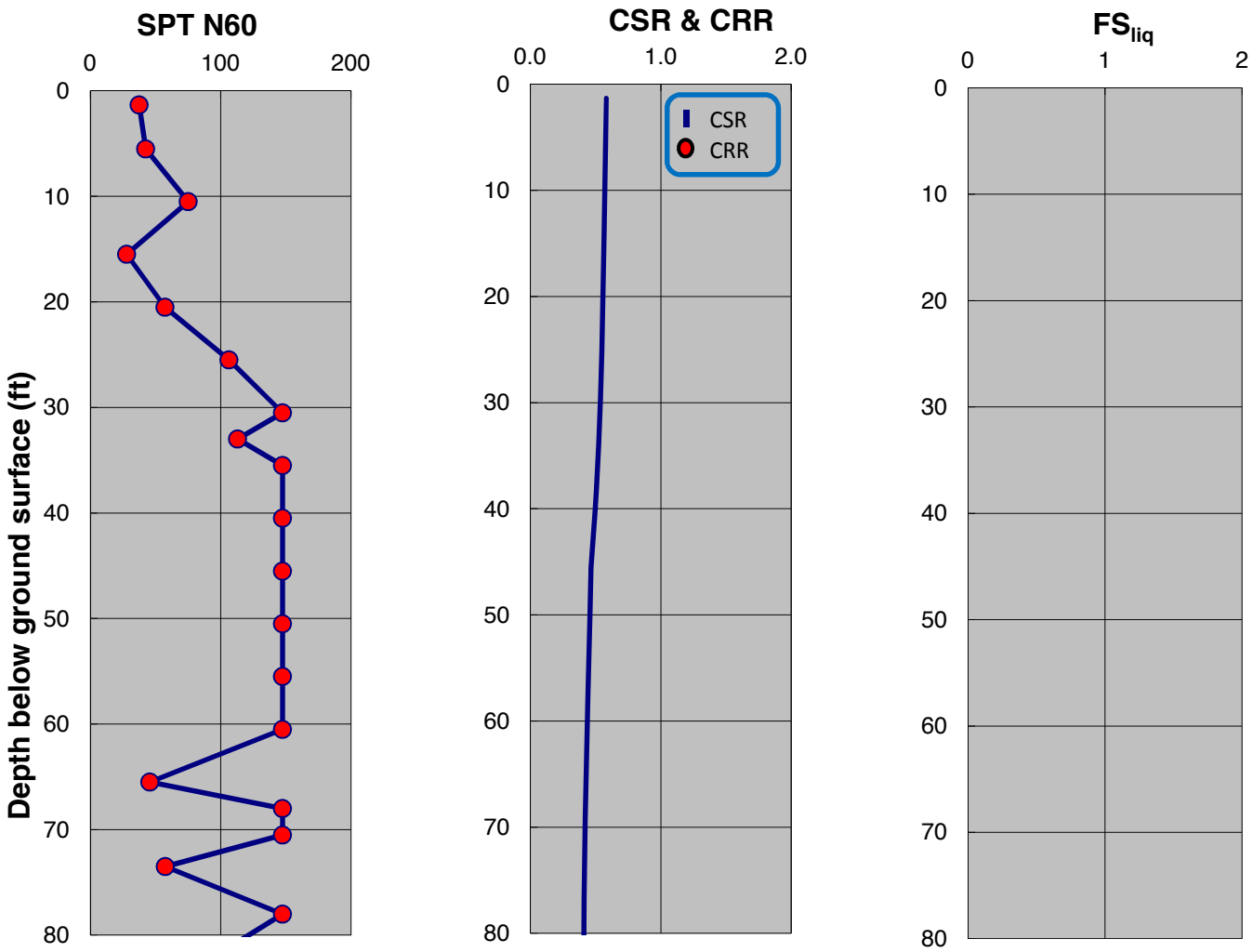
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-68 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



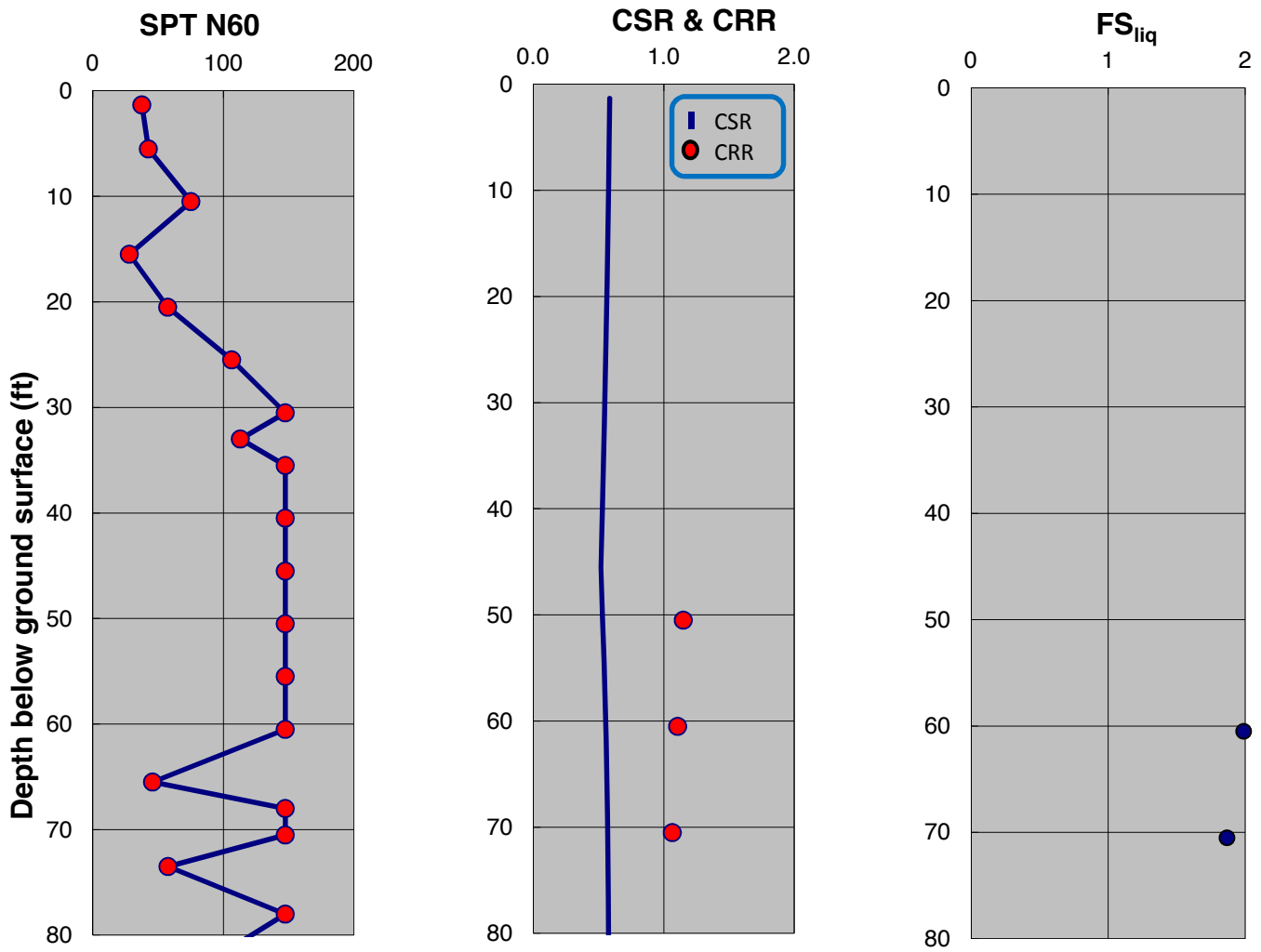
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-68 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



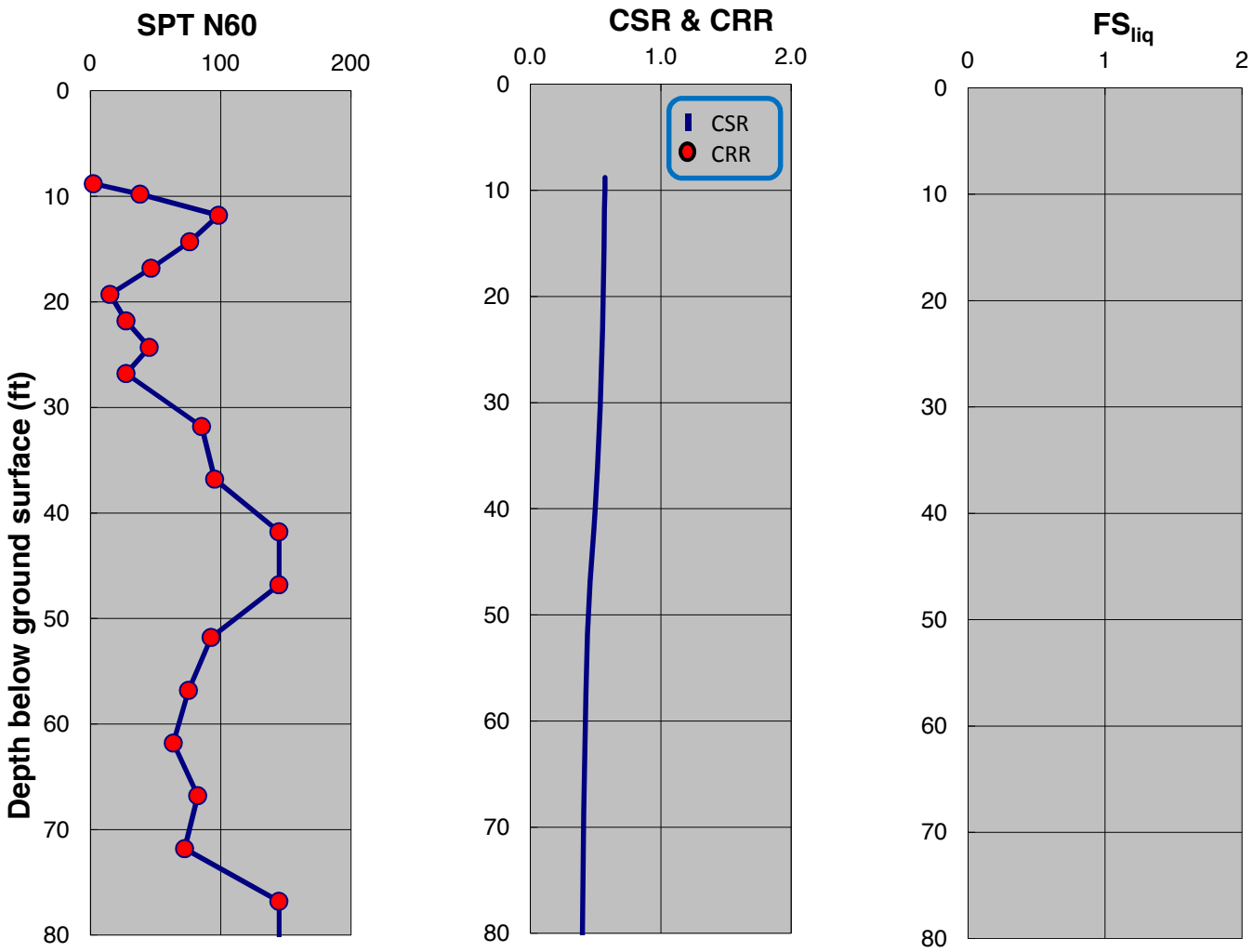
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-69 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



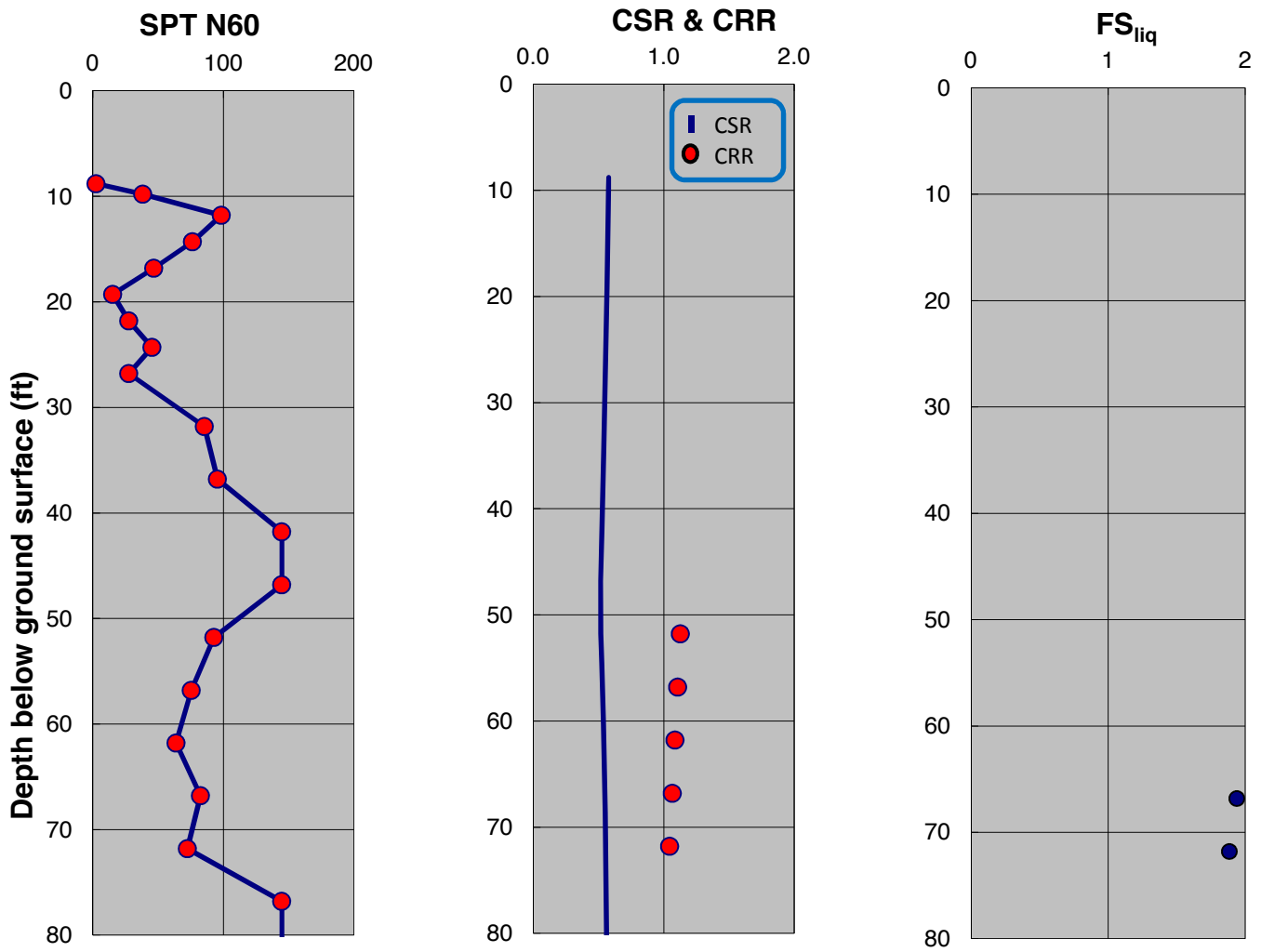
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-69 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



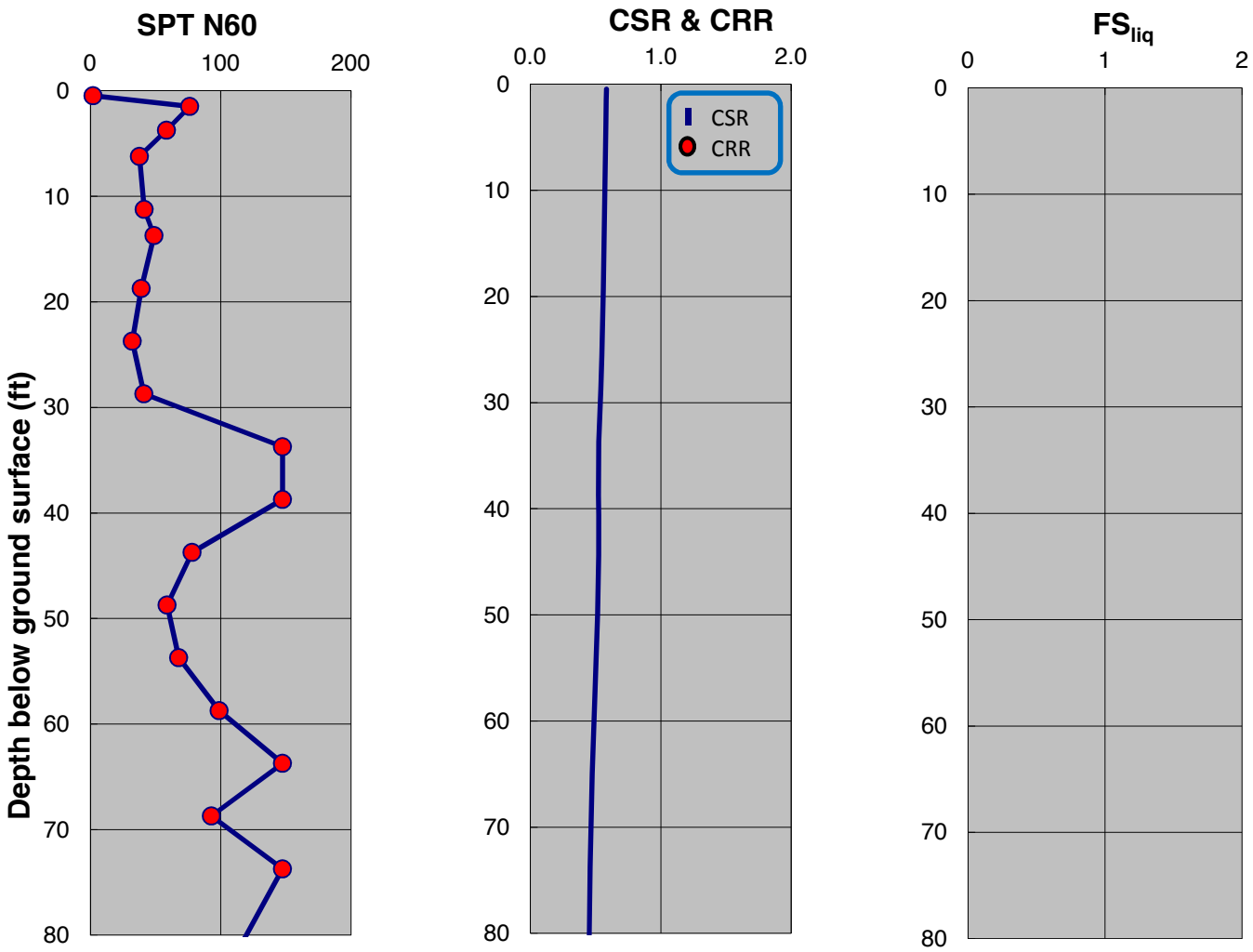
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-71 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



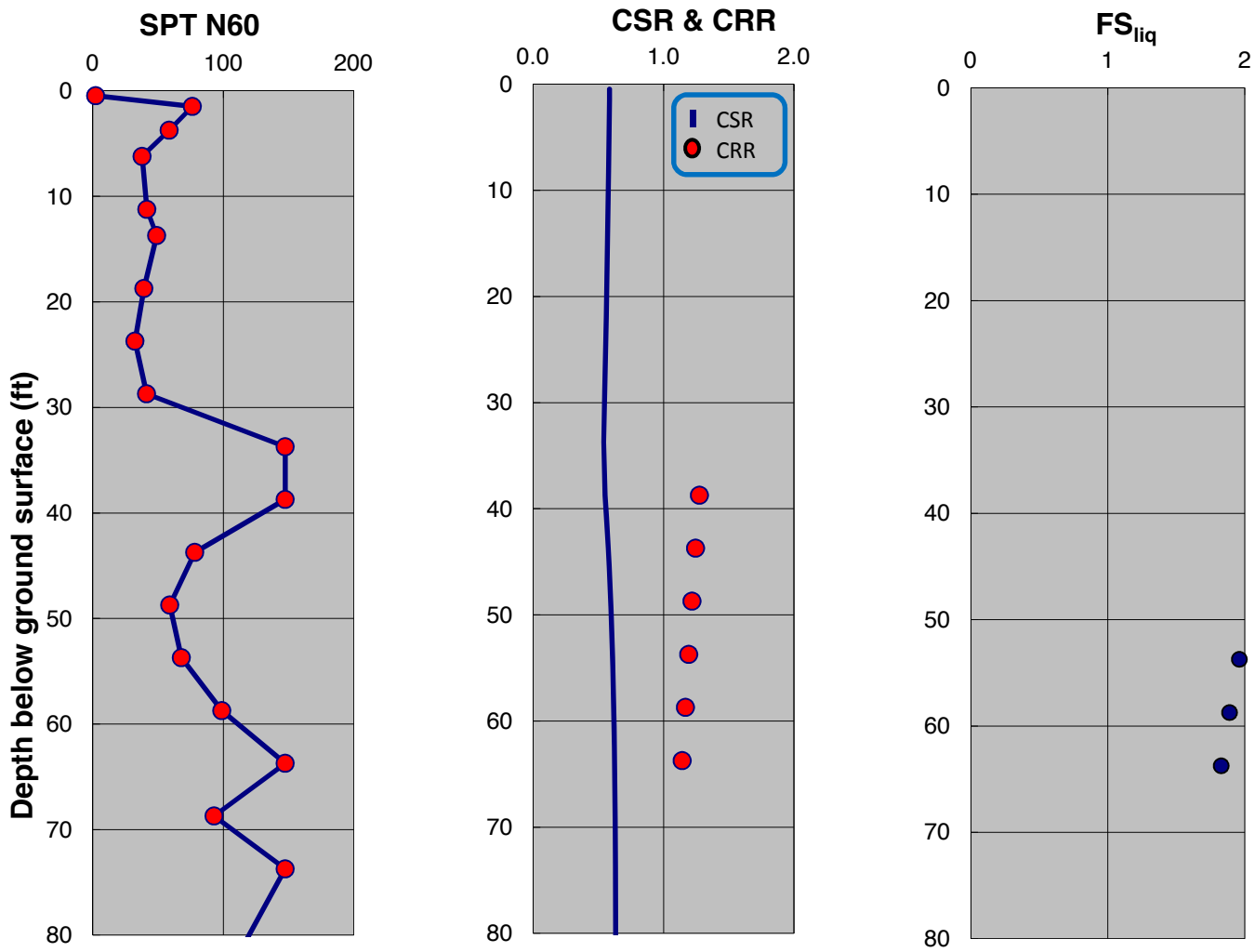
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-71 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



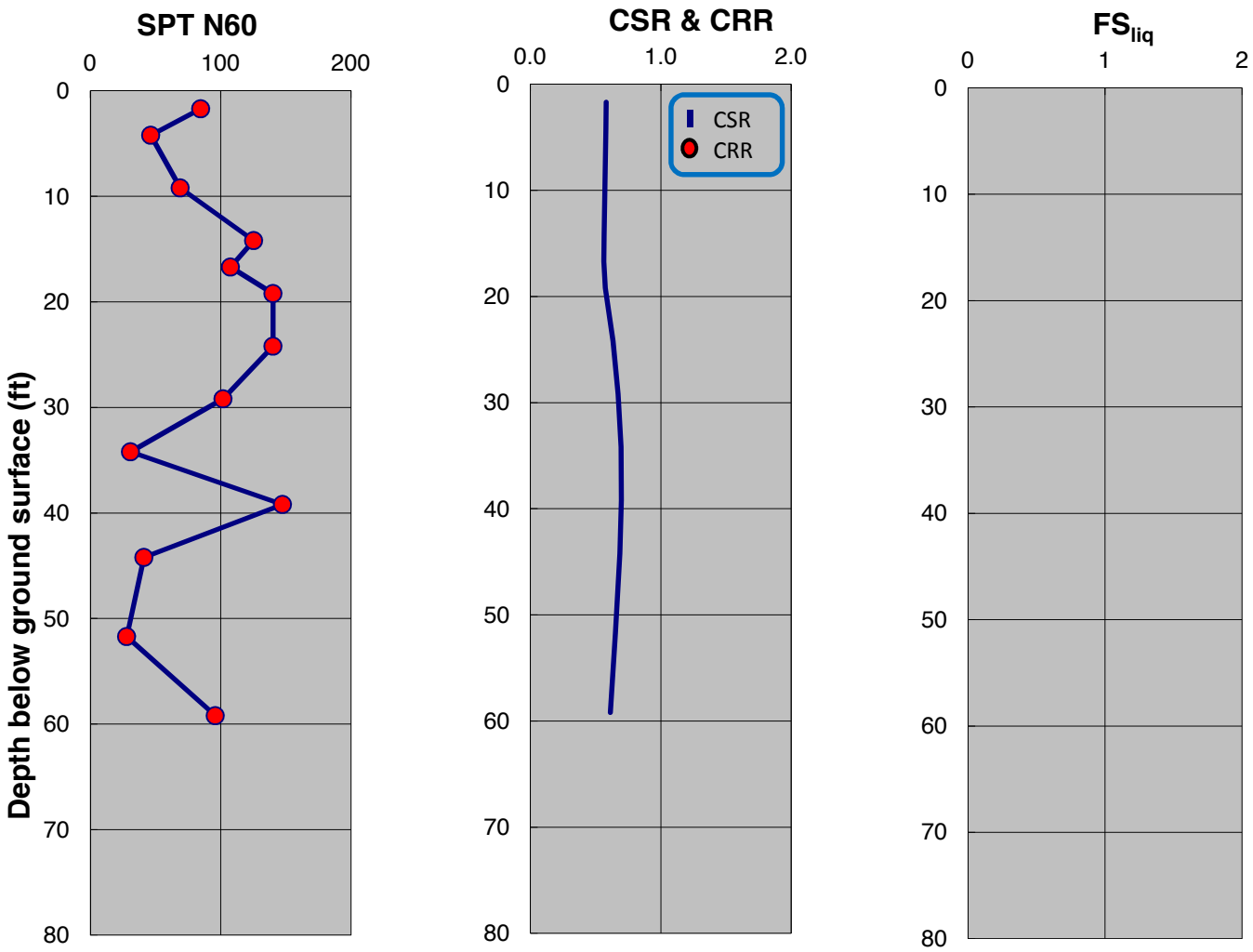
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-72 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



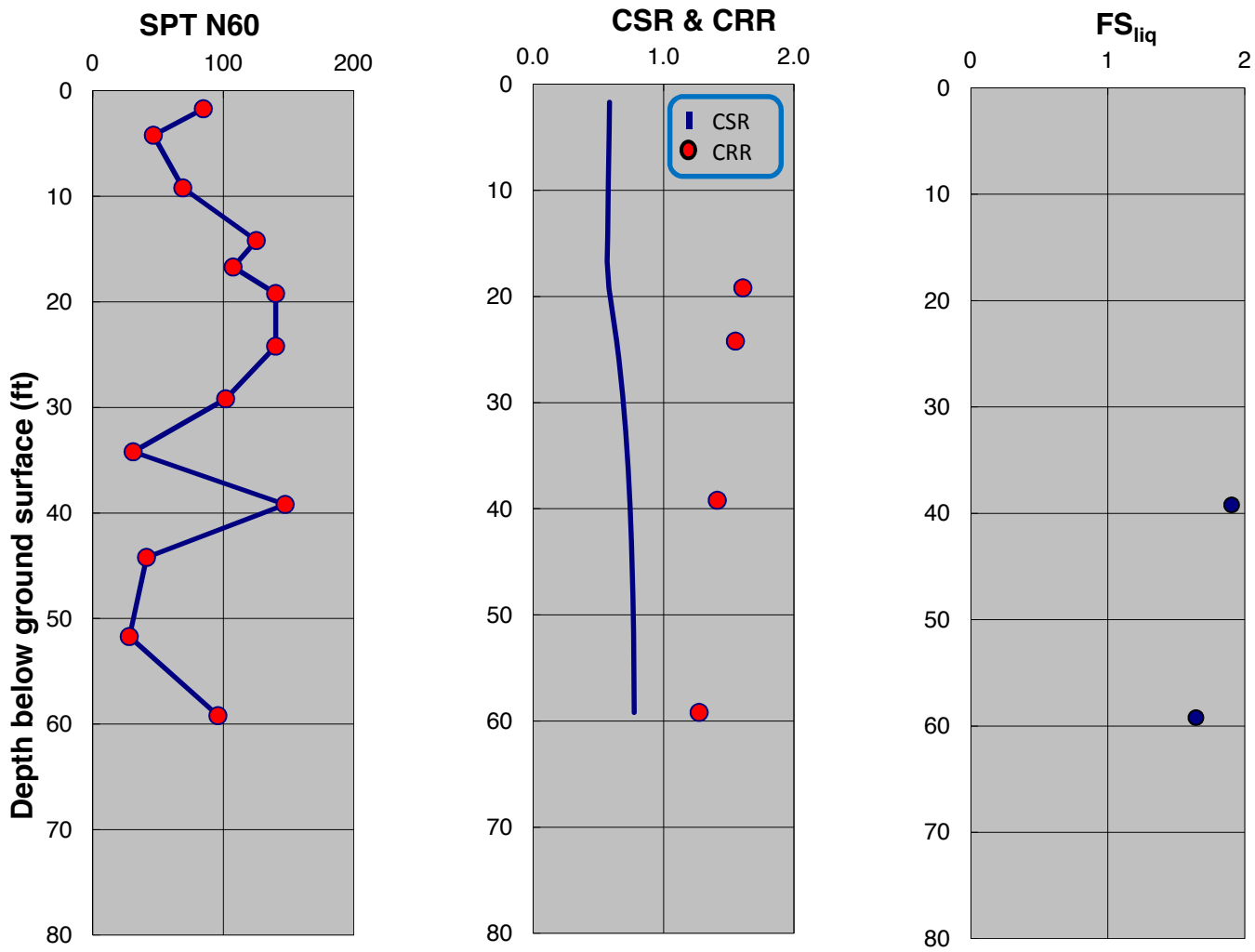
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-72 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



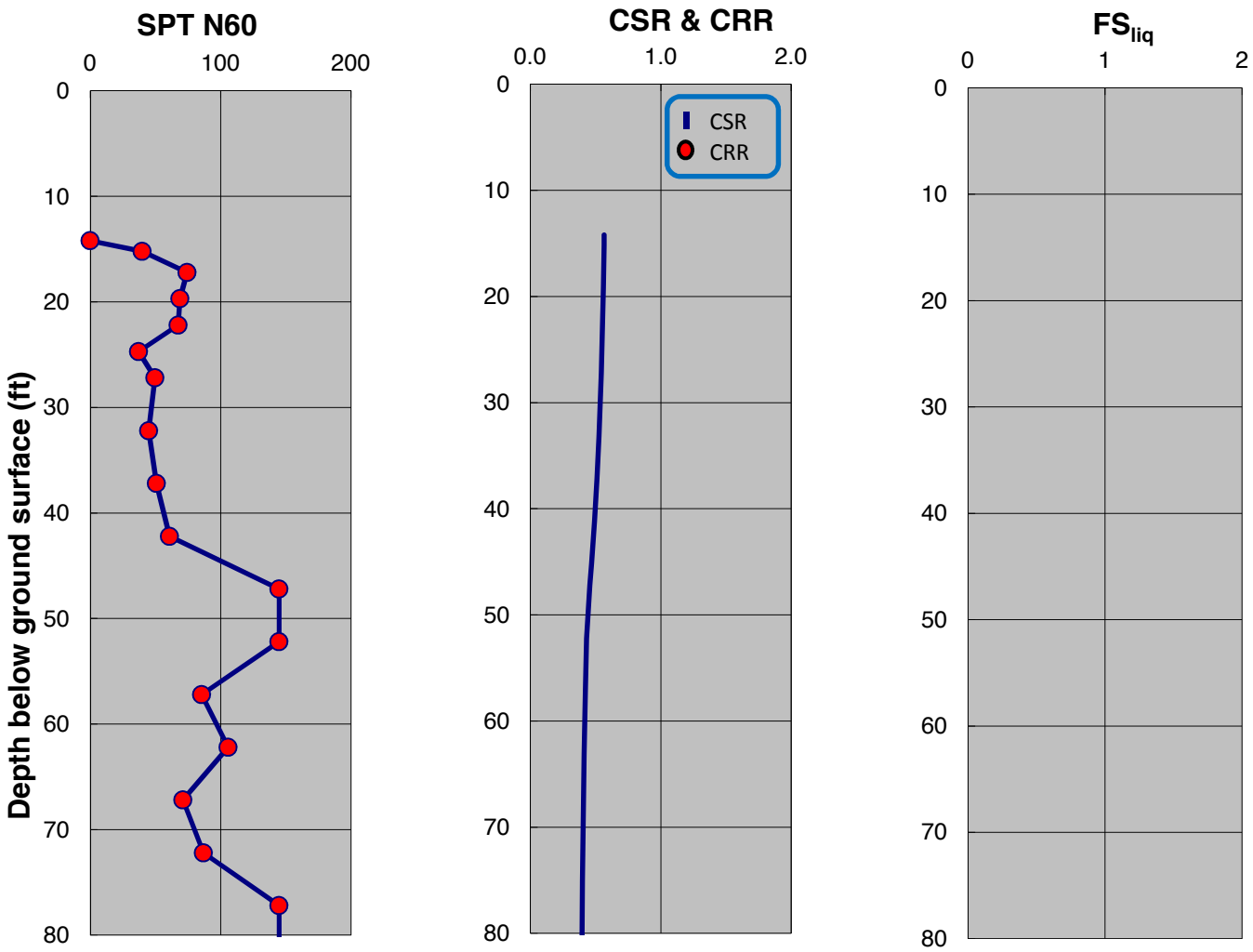
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-73 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



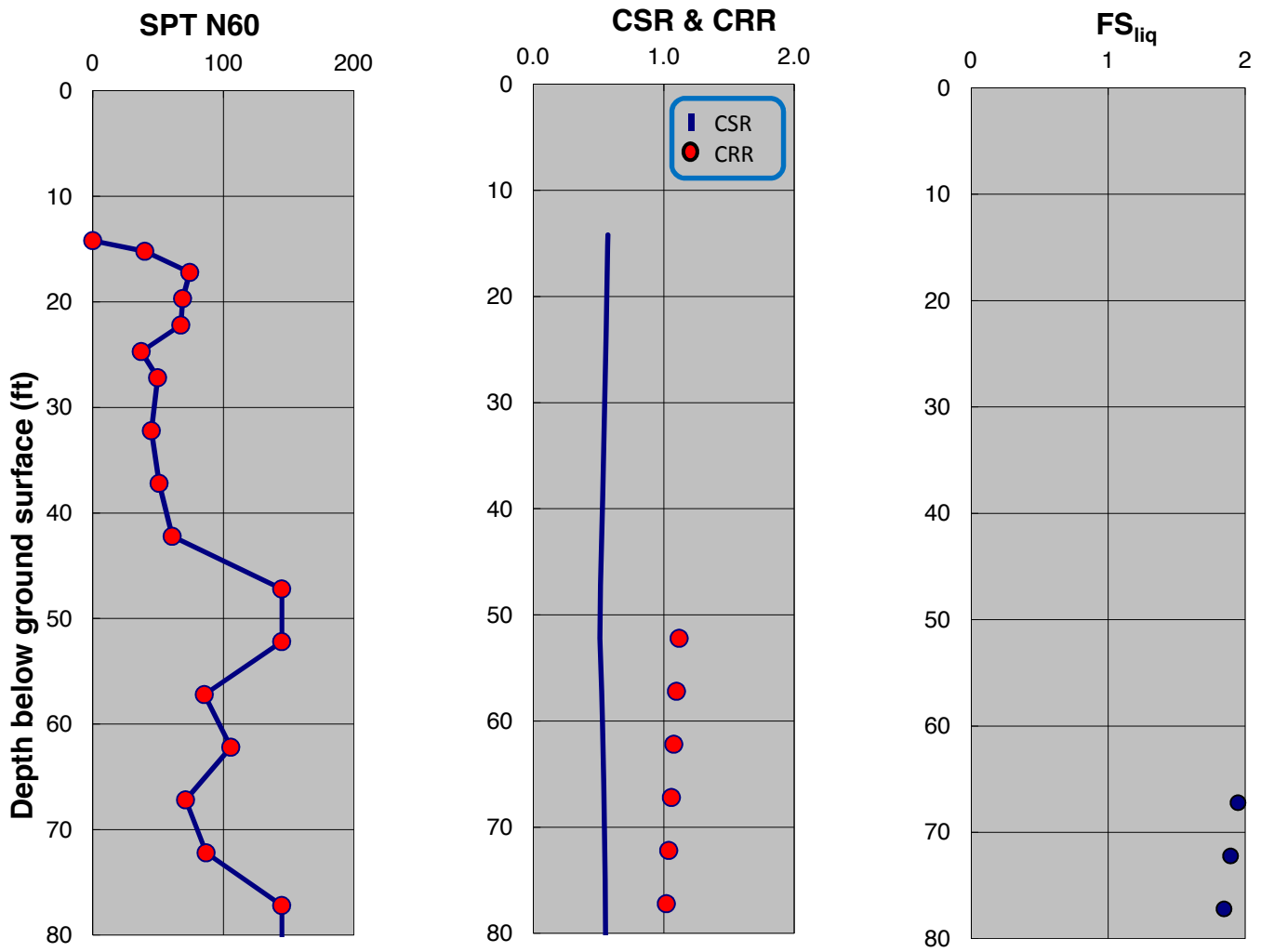
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-73 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



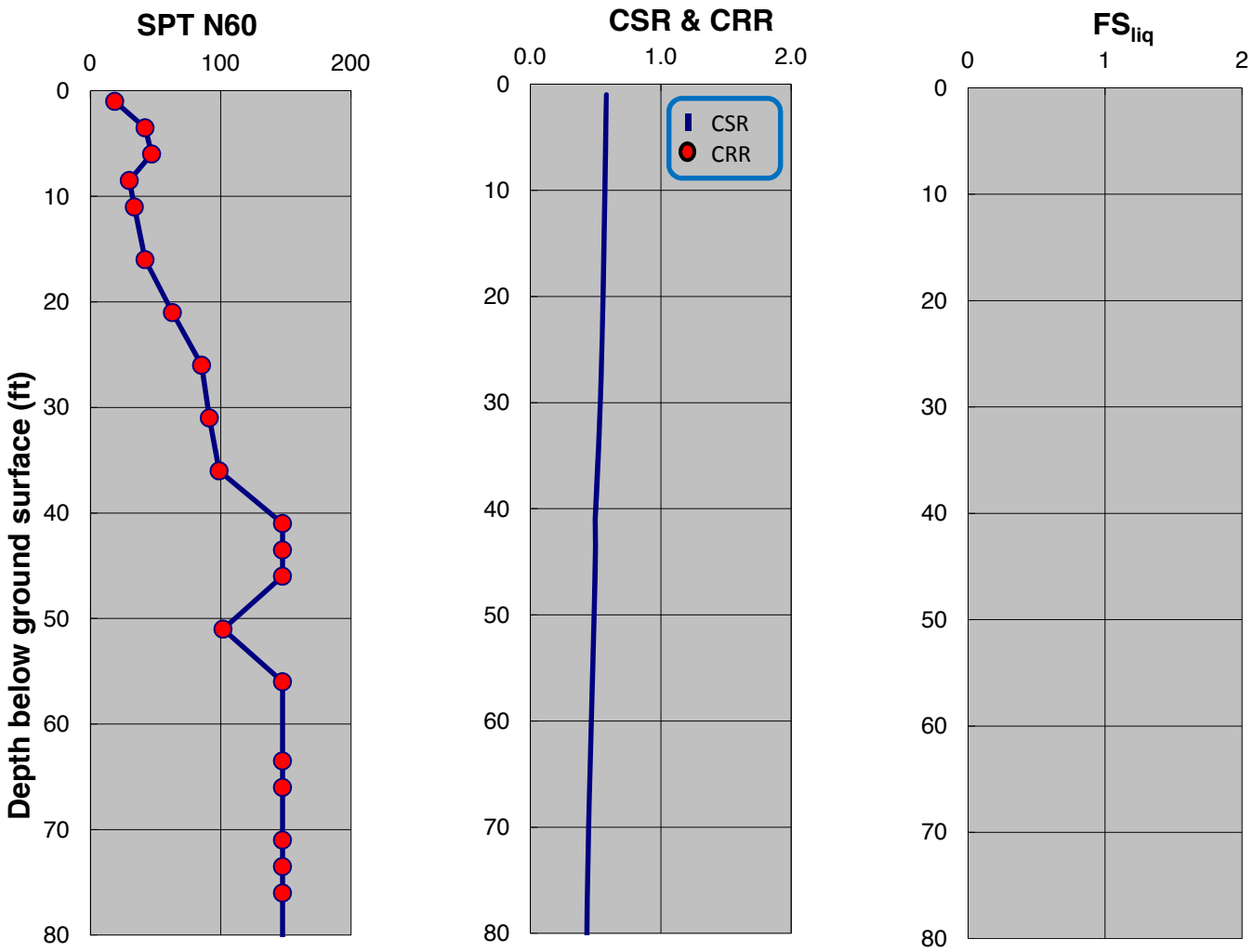
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-74 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



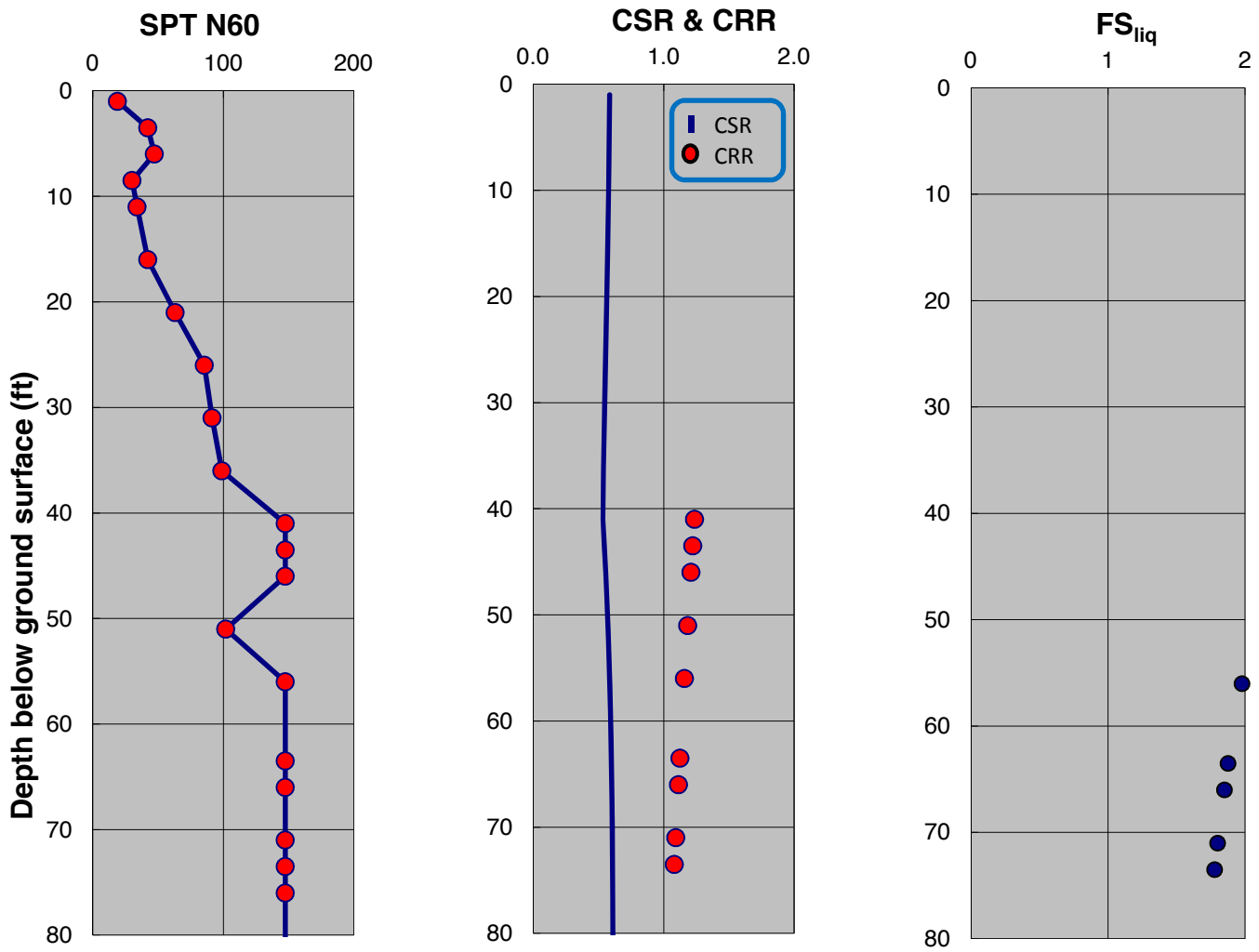
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-74 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



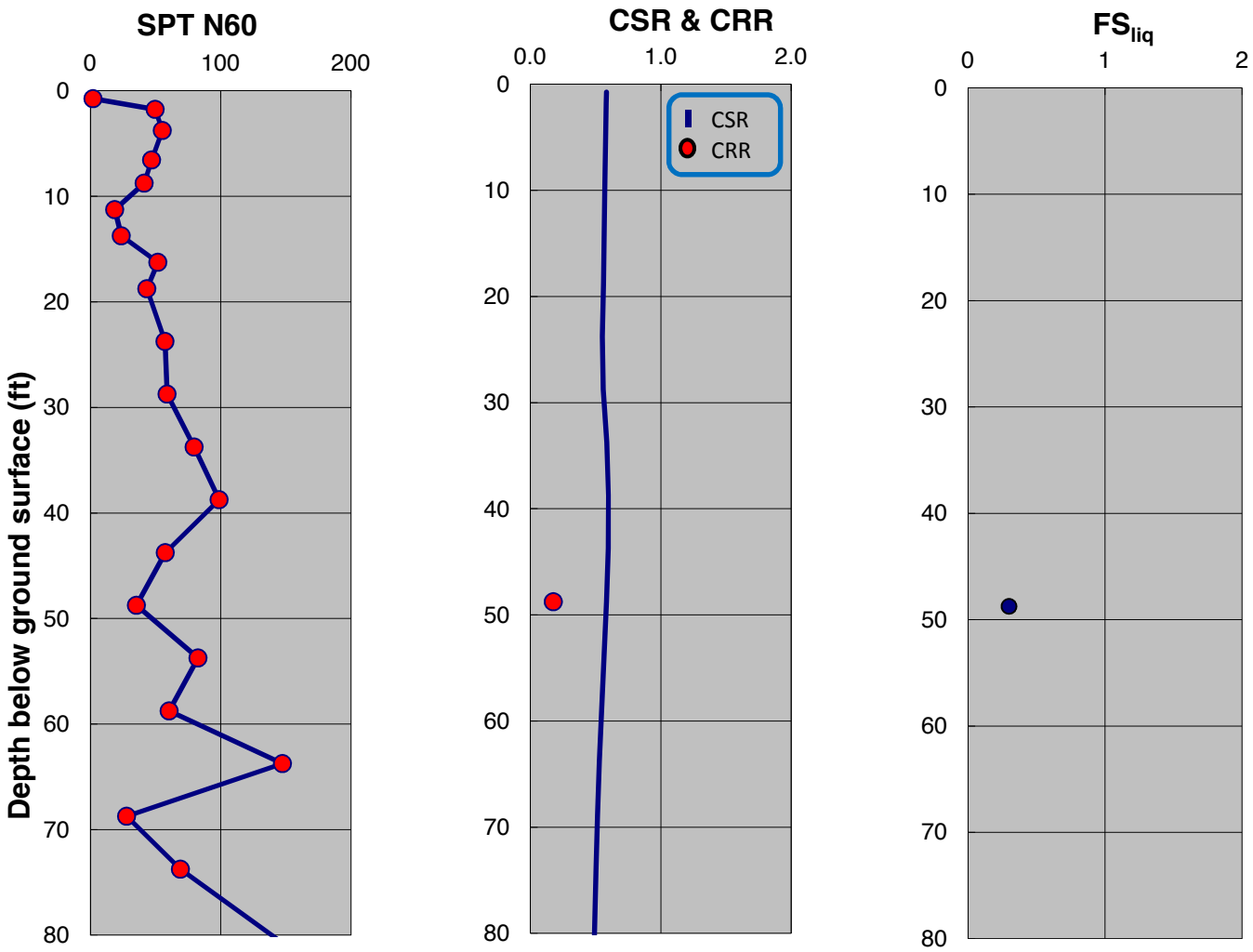
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-75 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



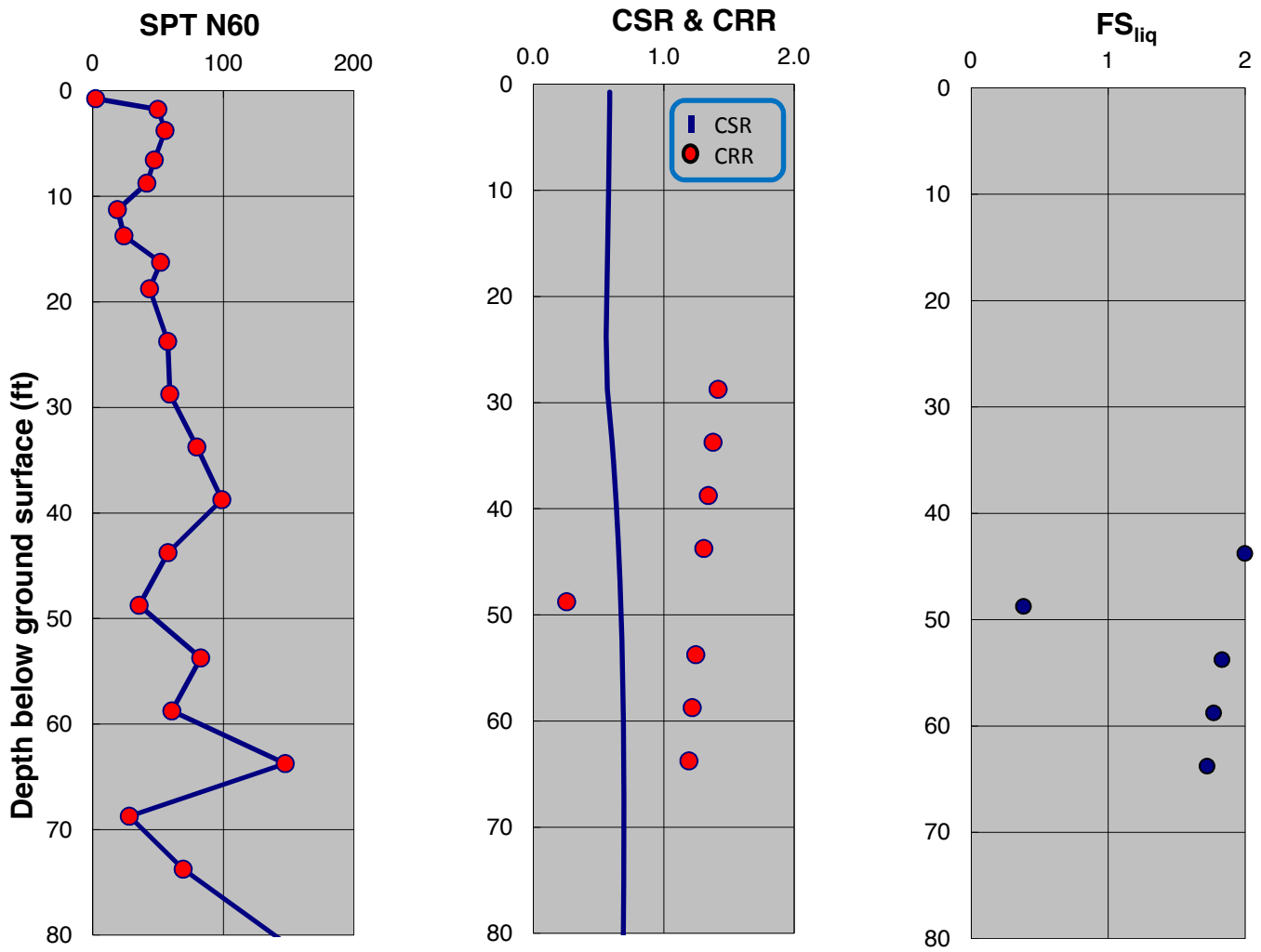
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-75 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



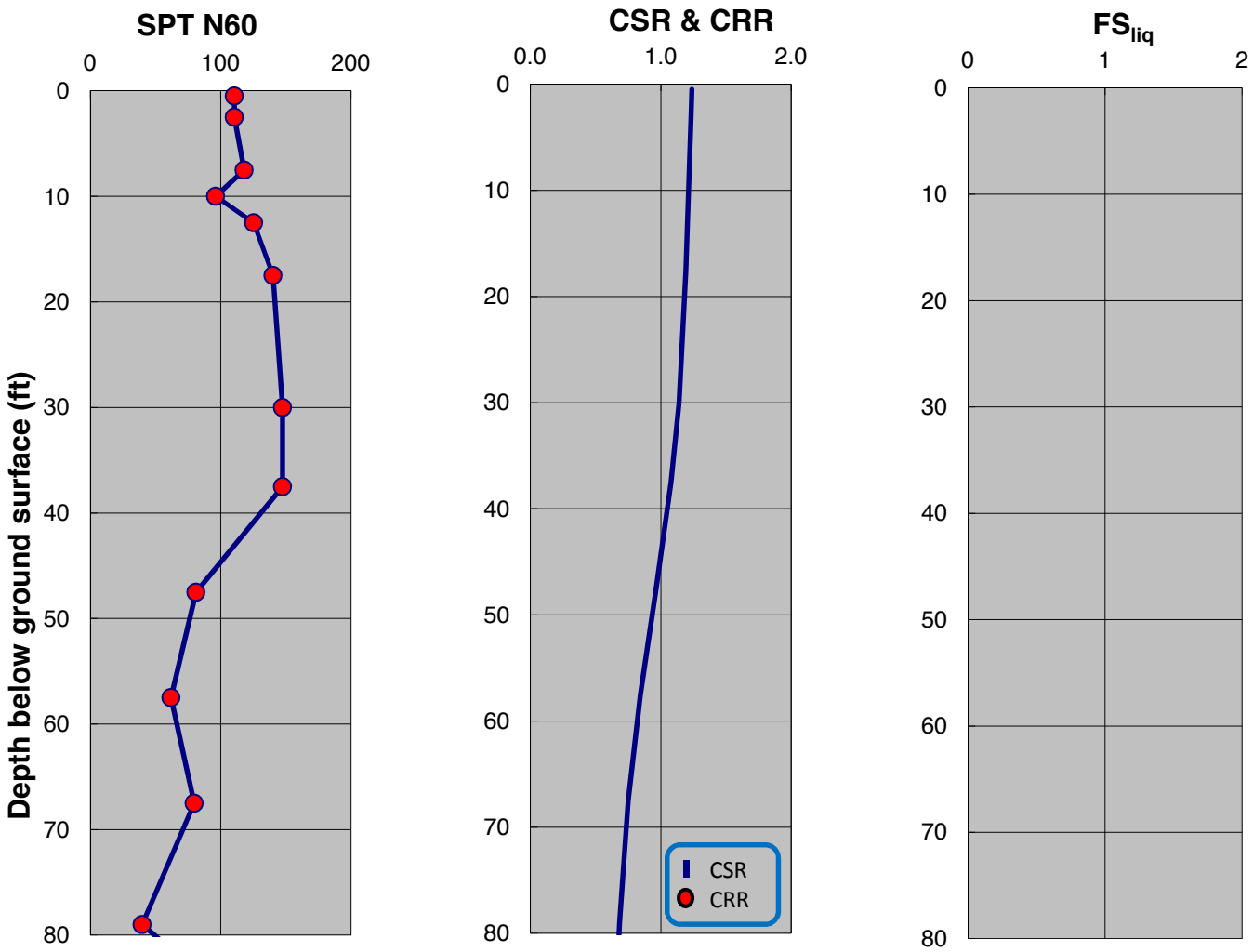
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-76 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



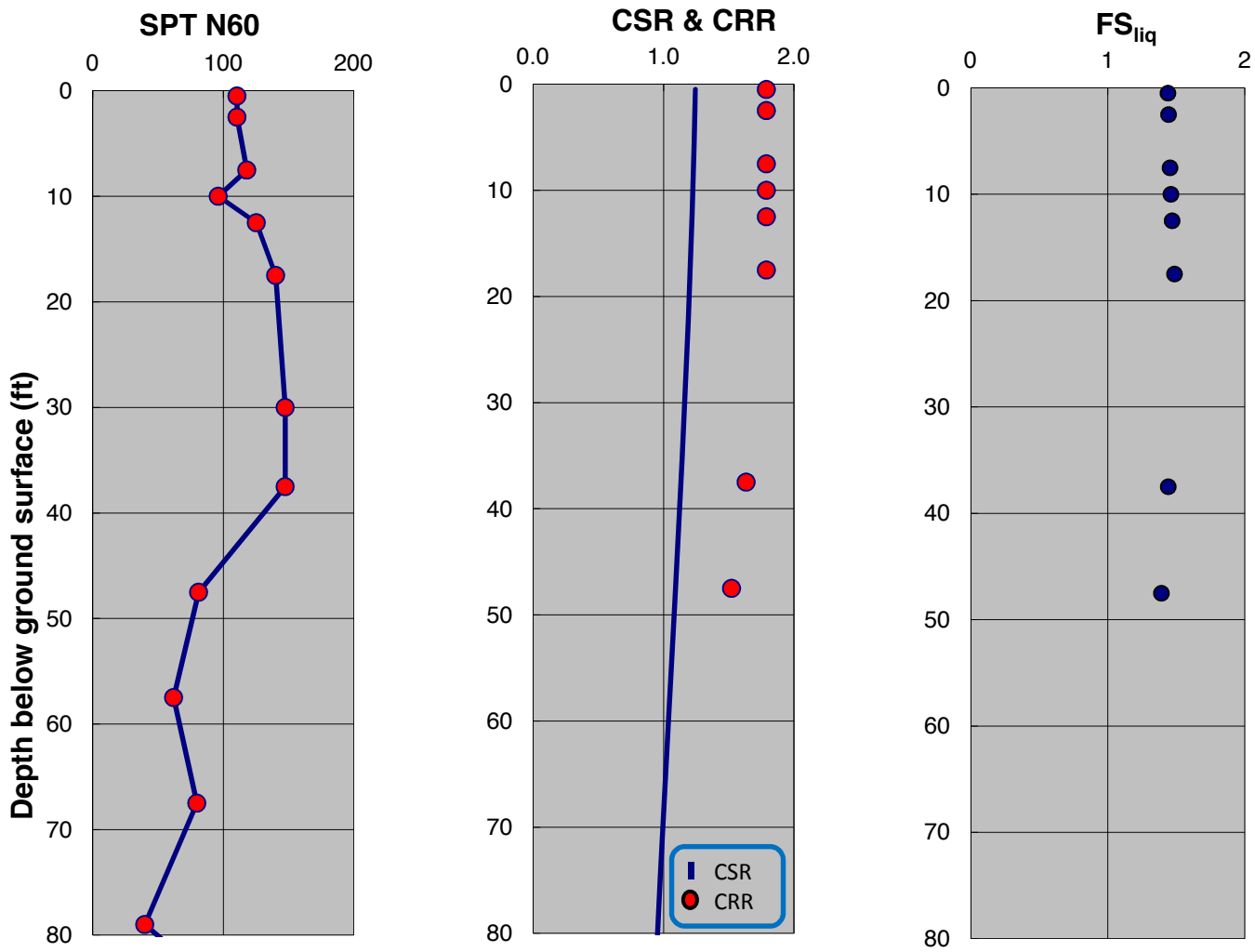
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-76 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-77 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

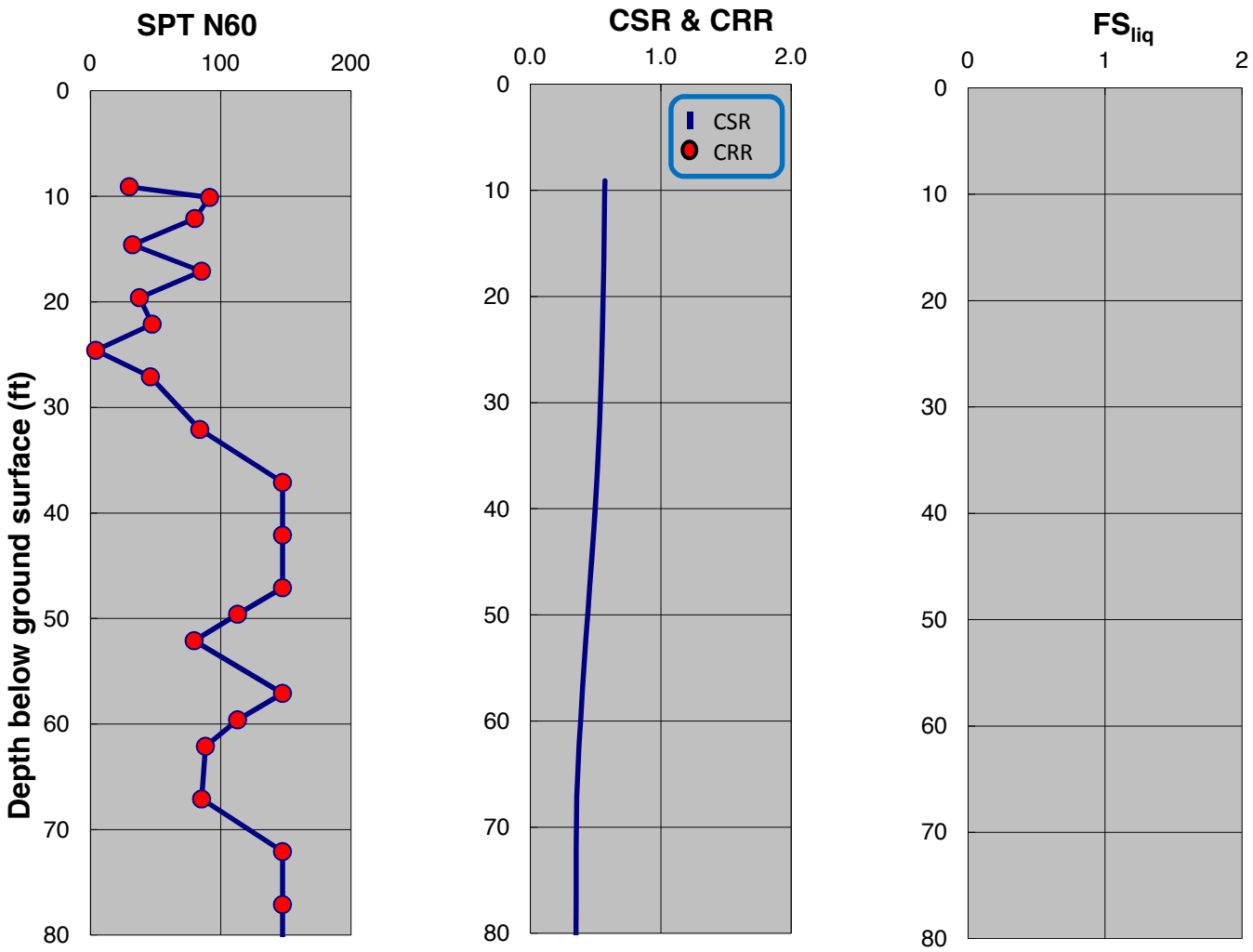
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-77 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

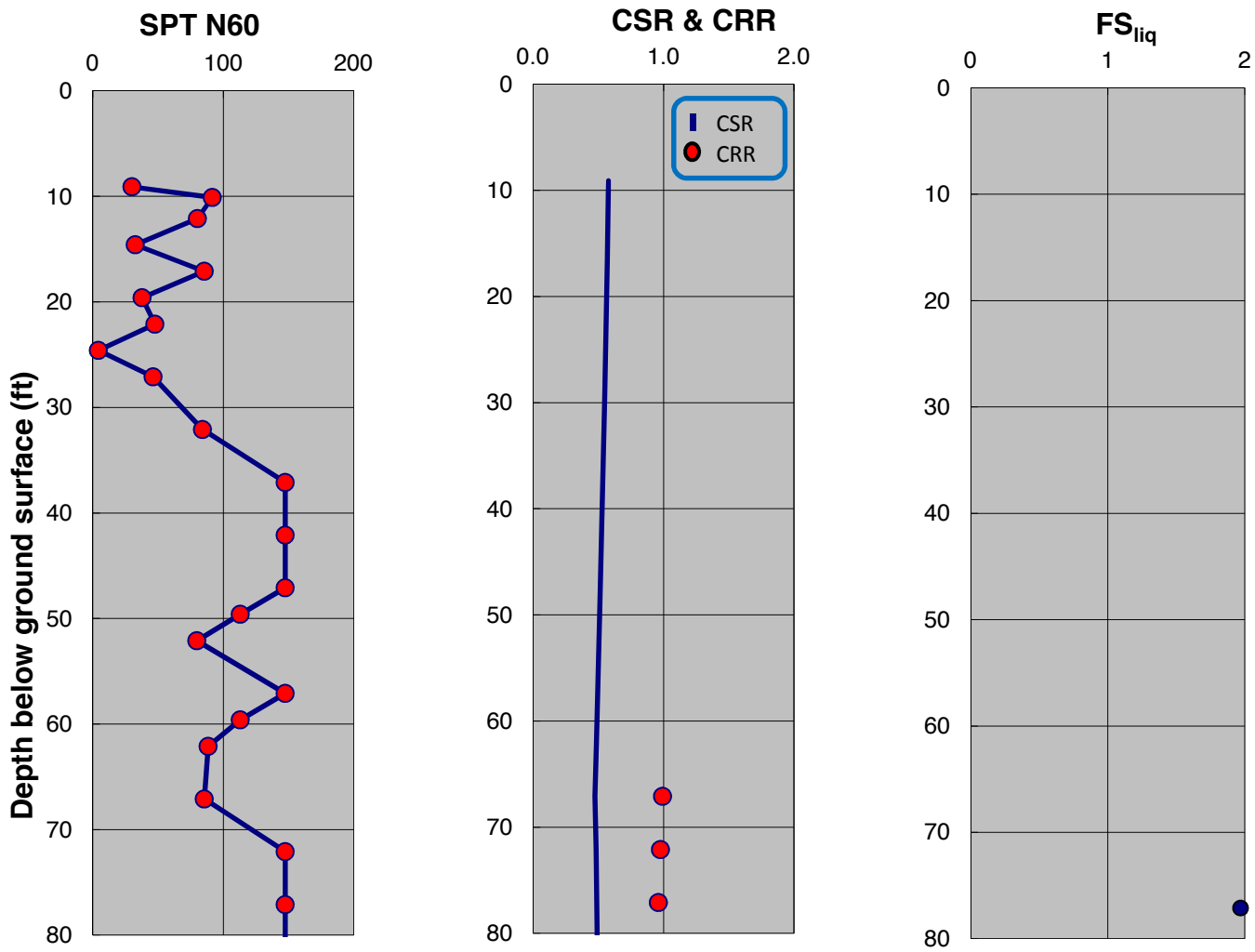
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.340



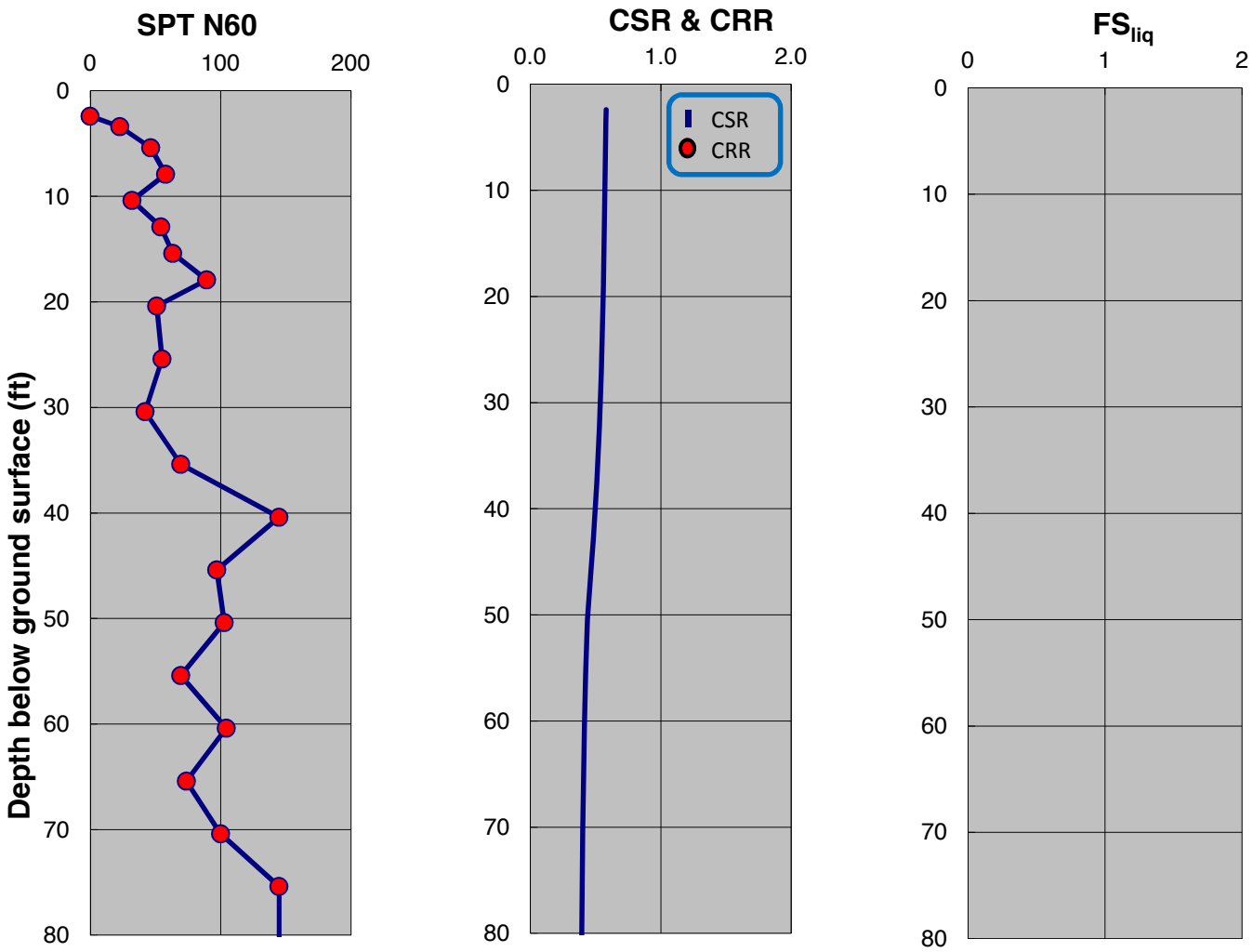
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-78 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



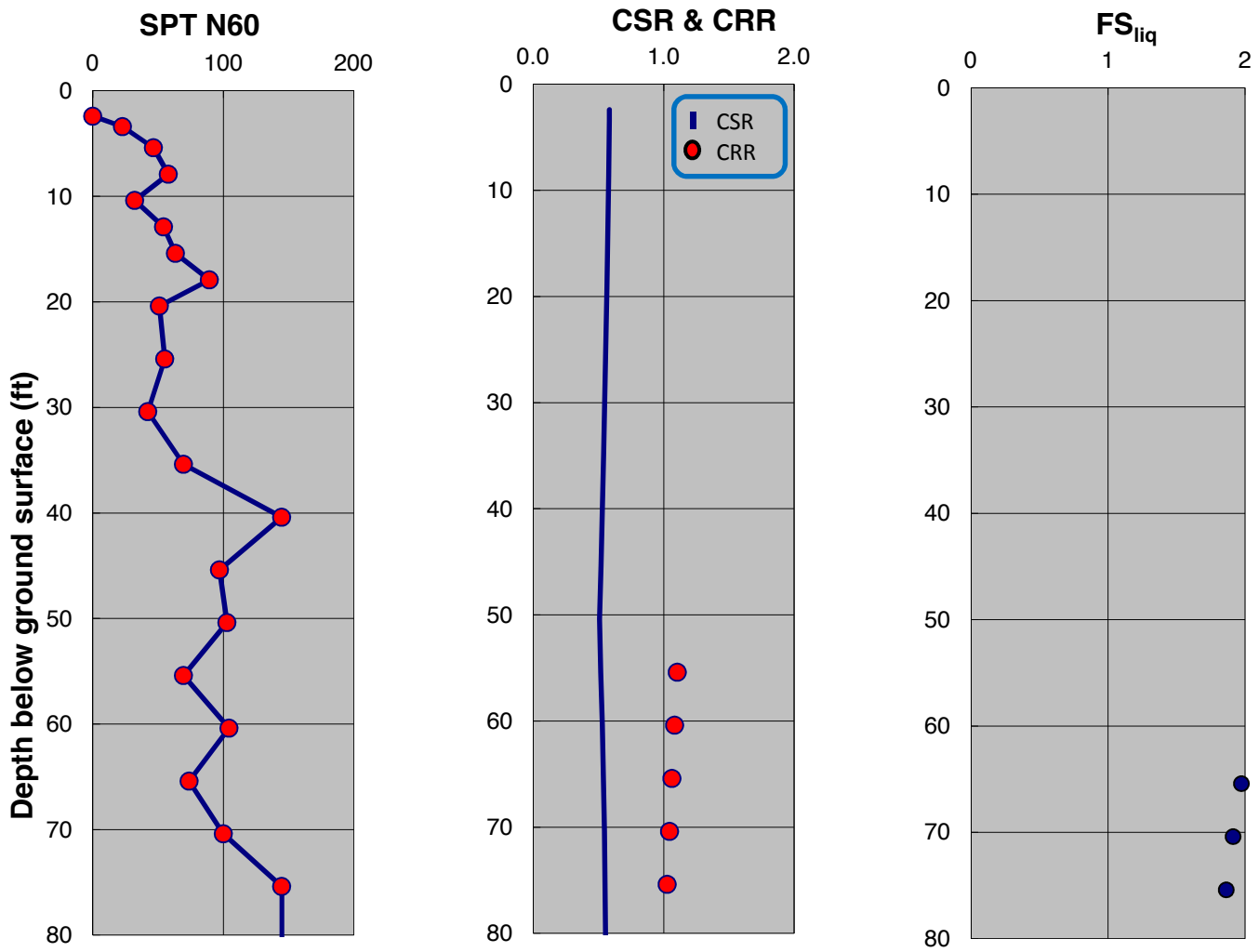
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-78 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



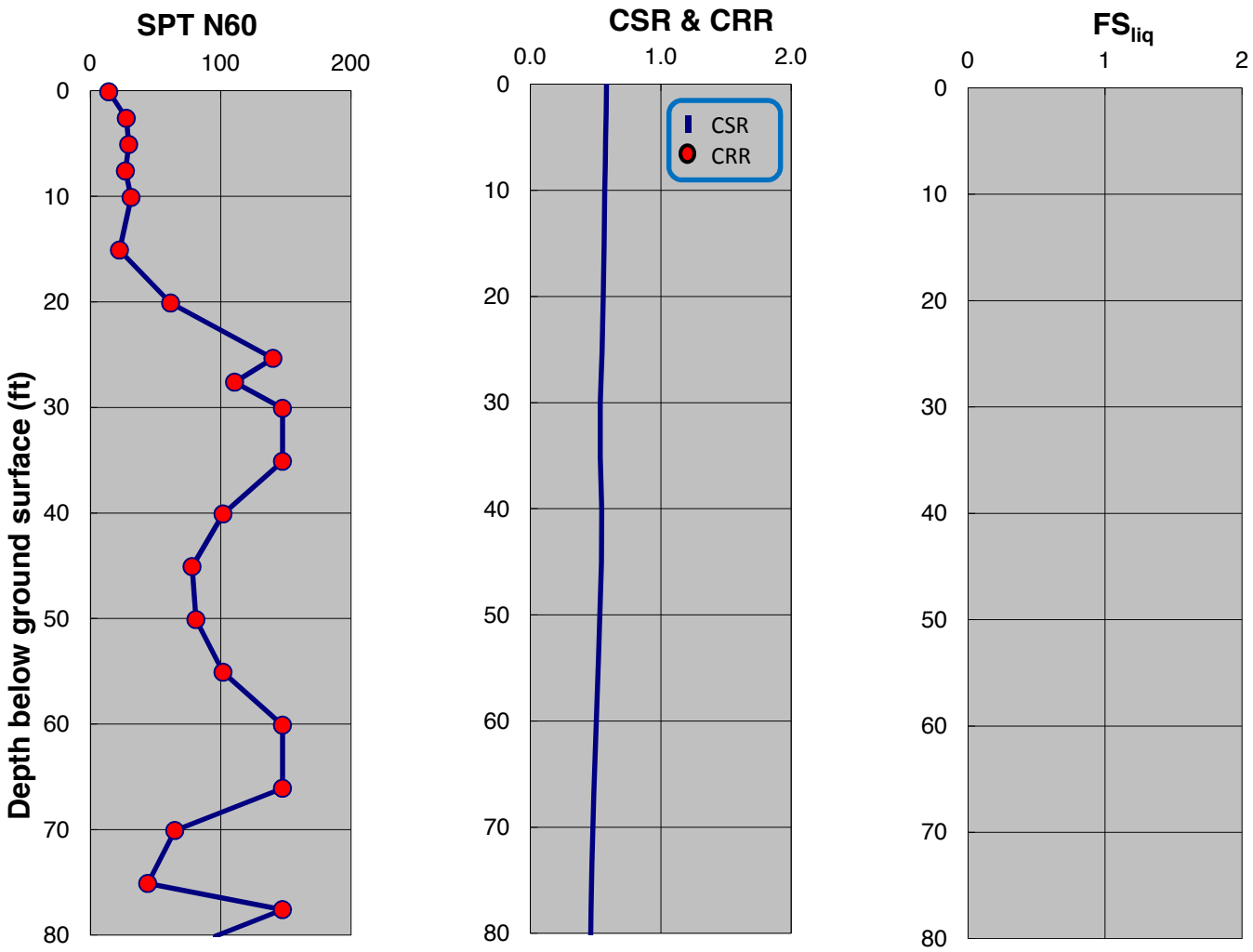
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-79 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-79 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

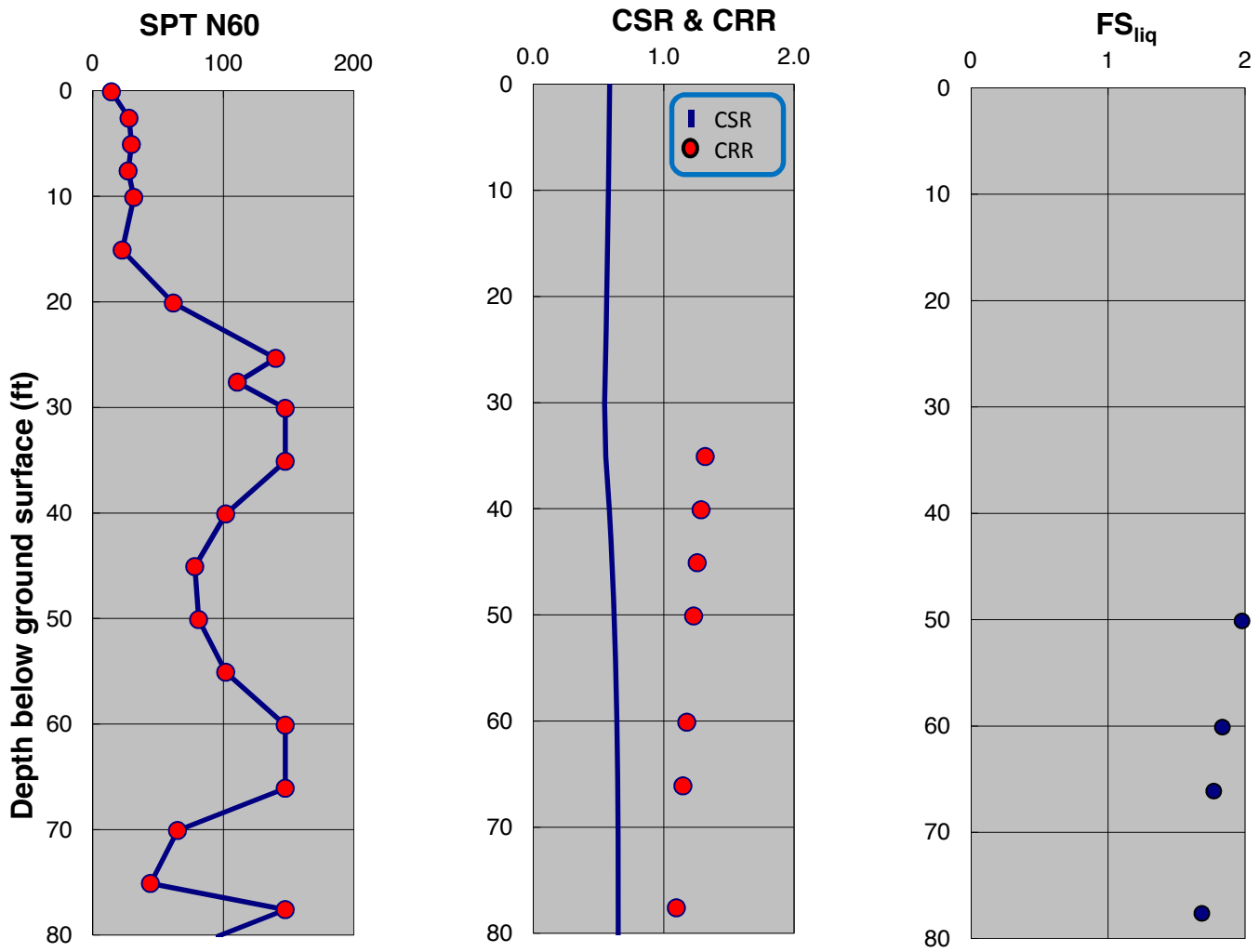
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-80 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

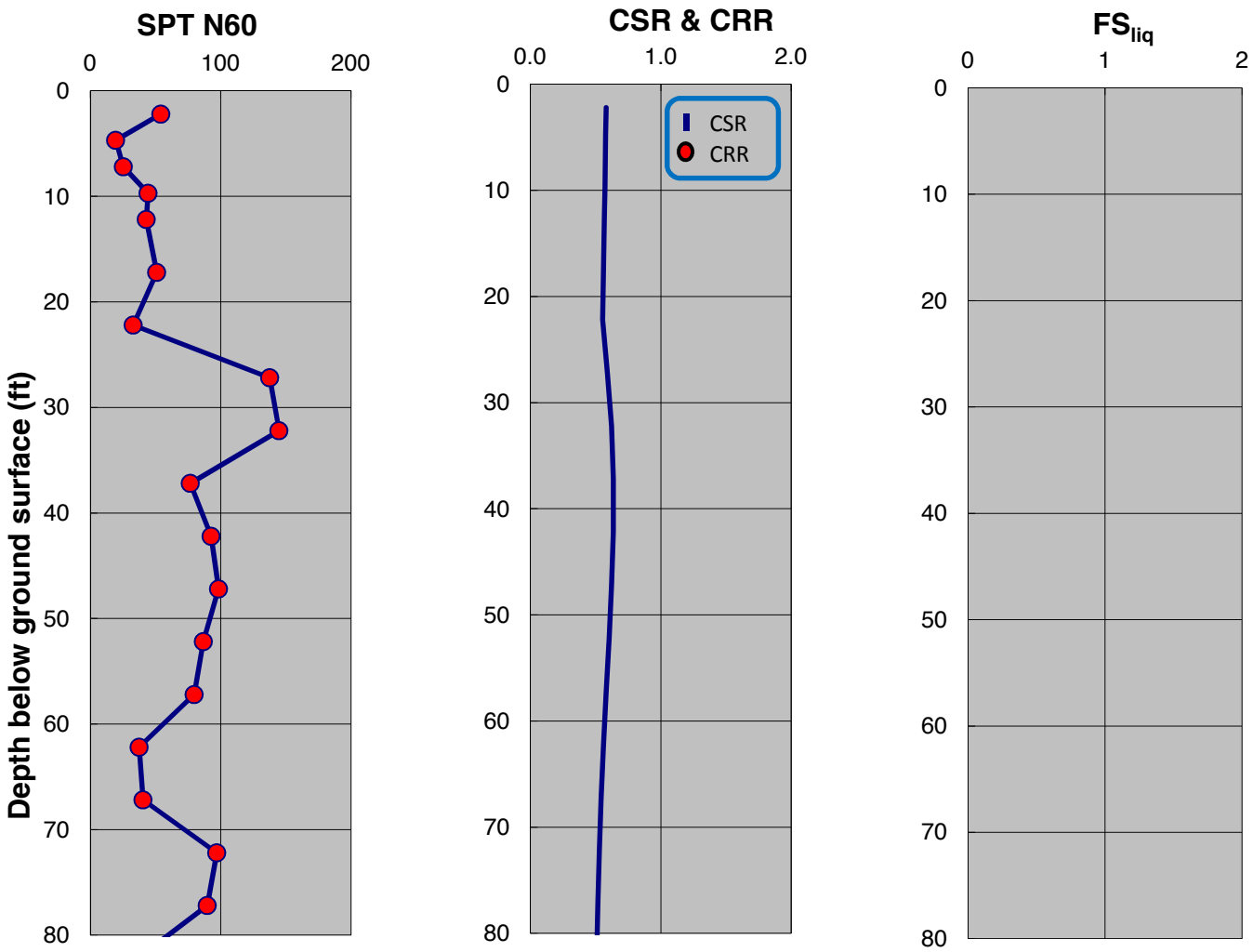
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.345



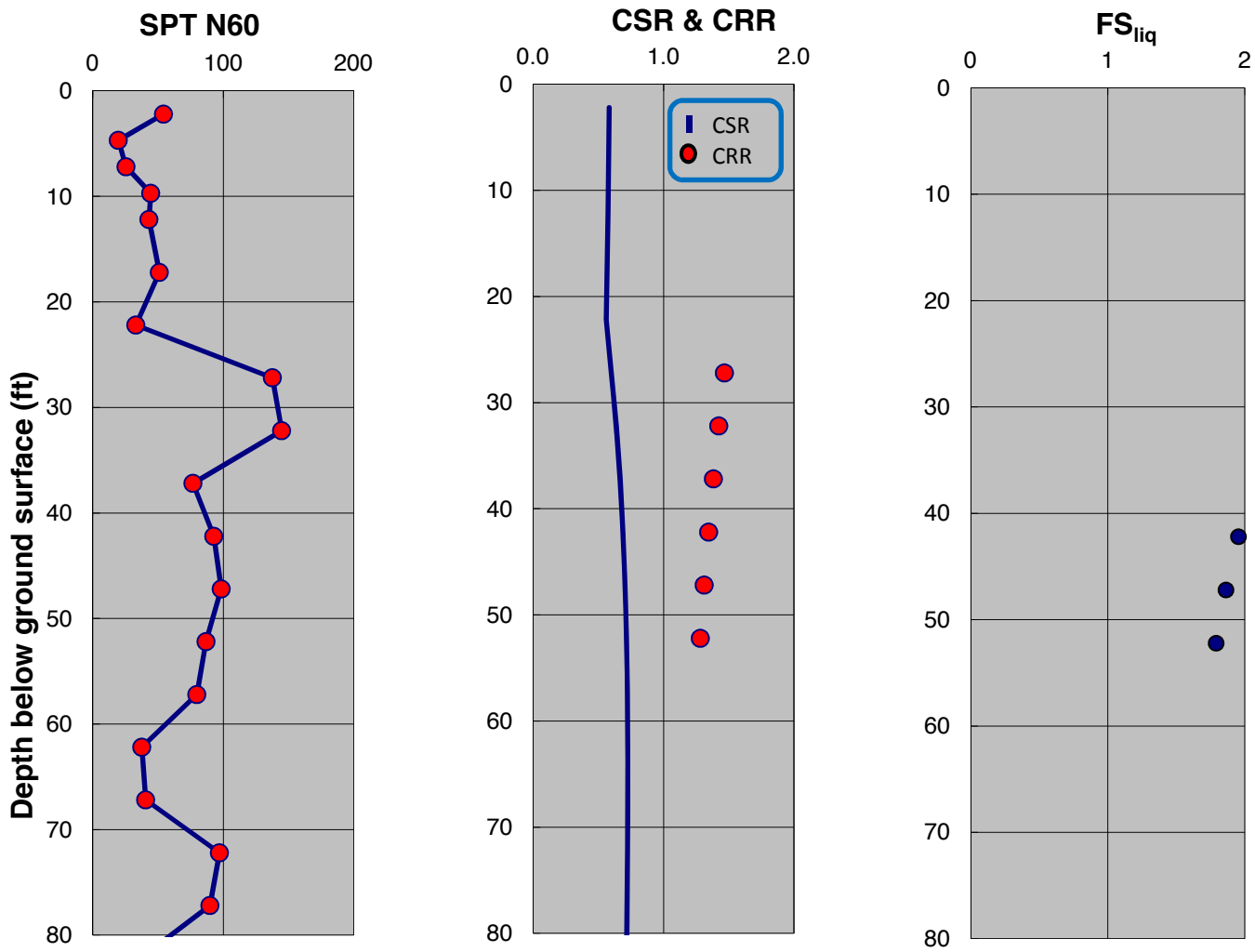
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-80 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



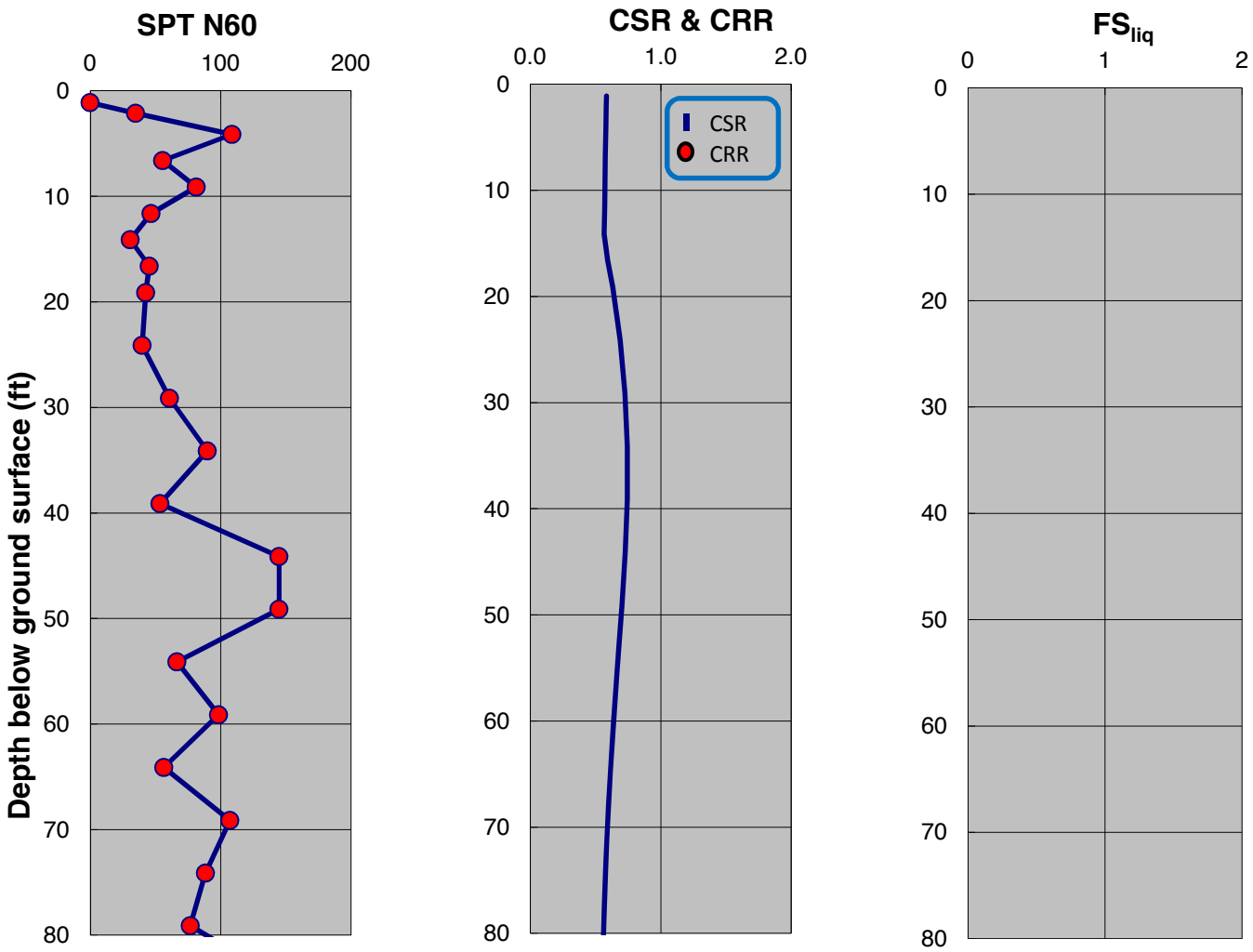
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-81 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



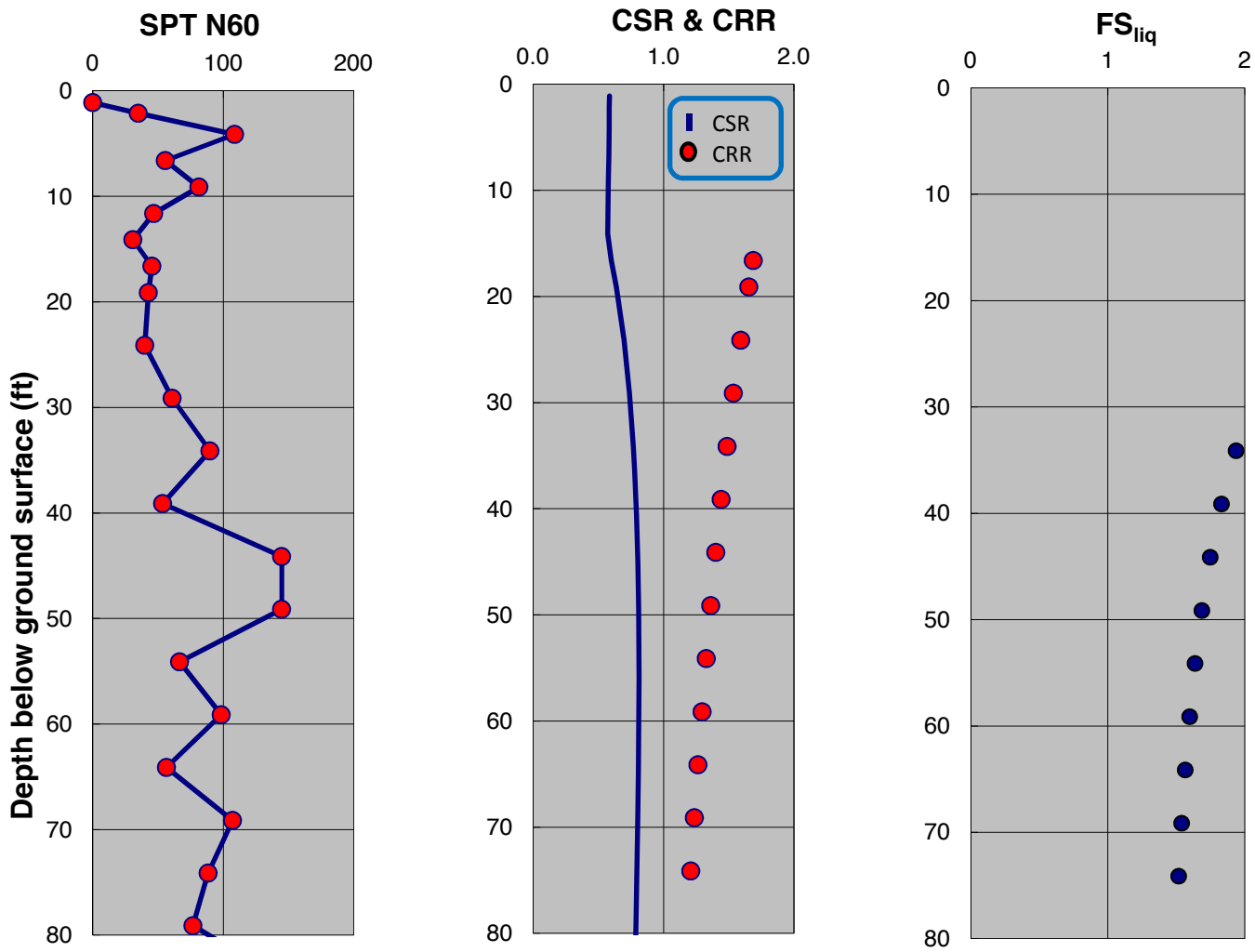
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-81 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-82 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

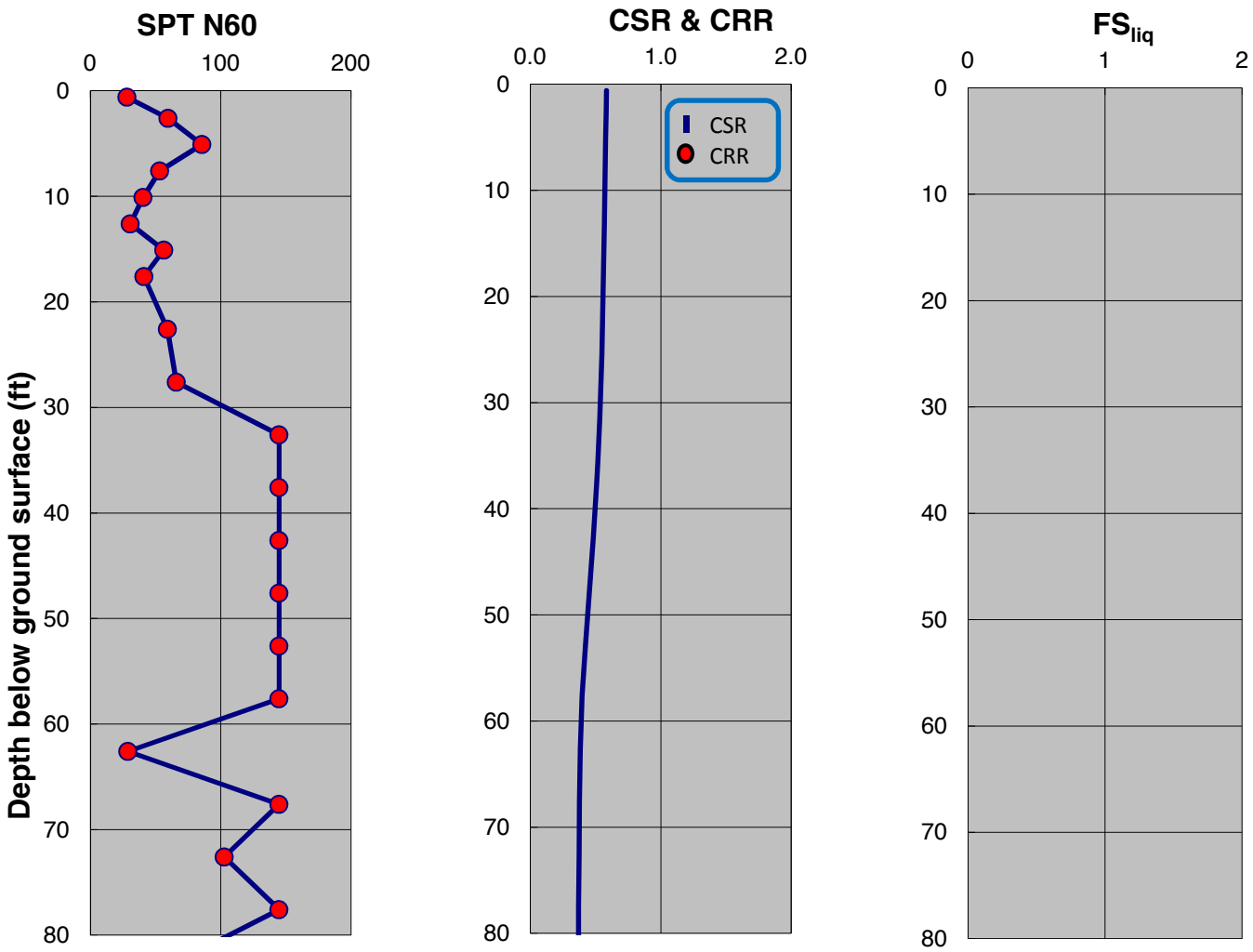
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-82 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

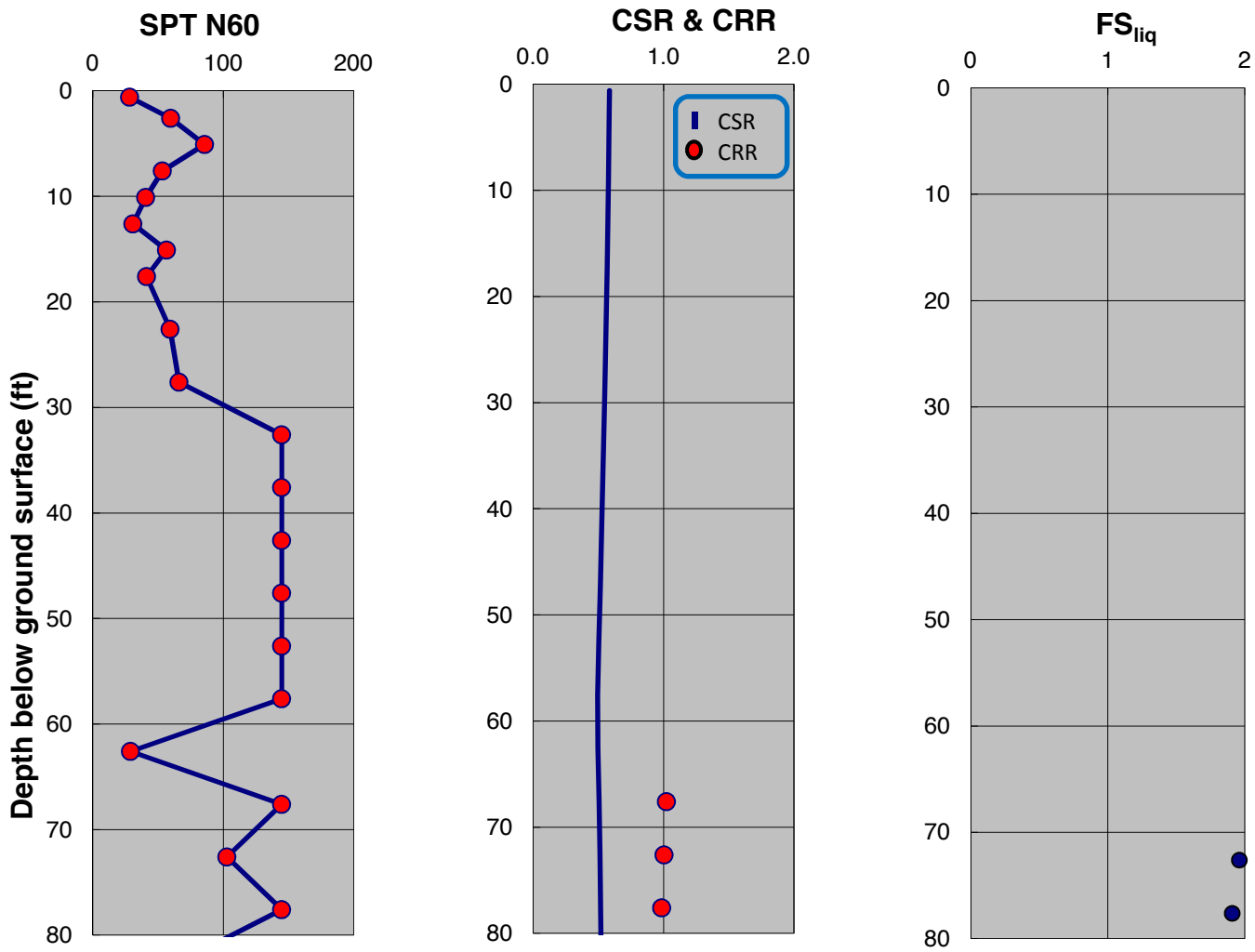
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.350



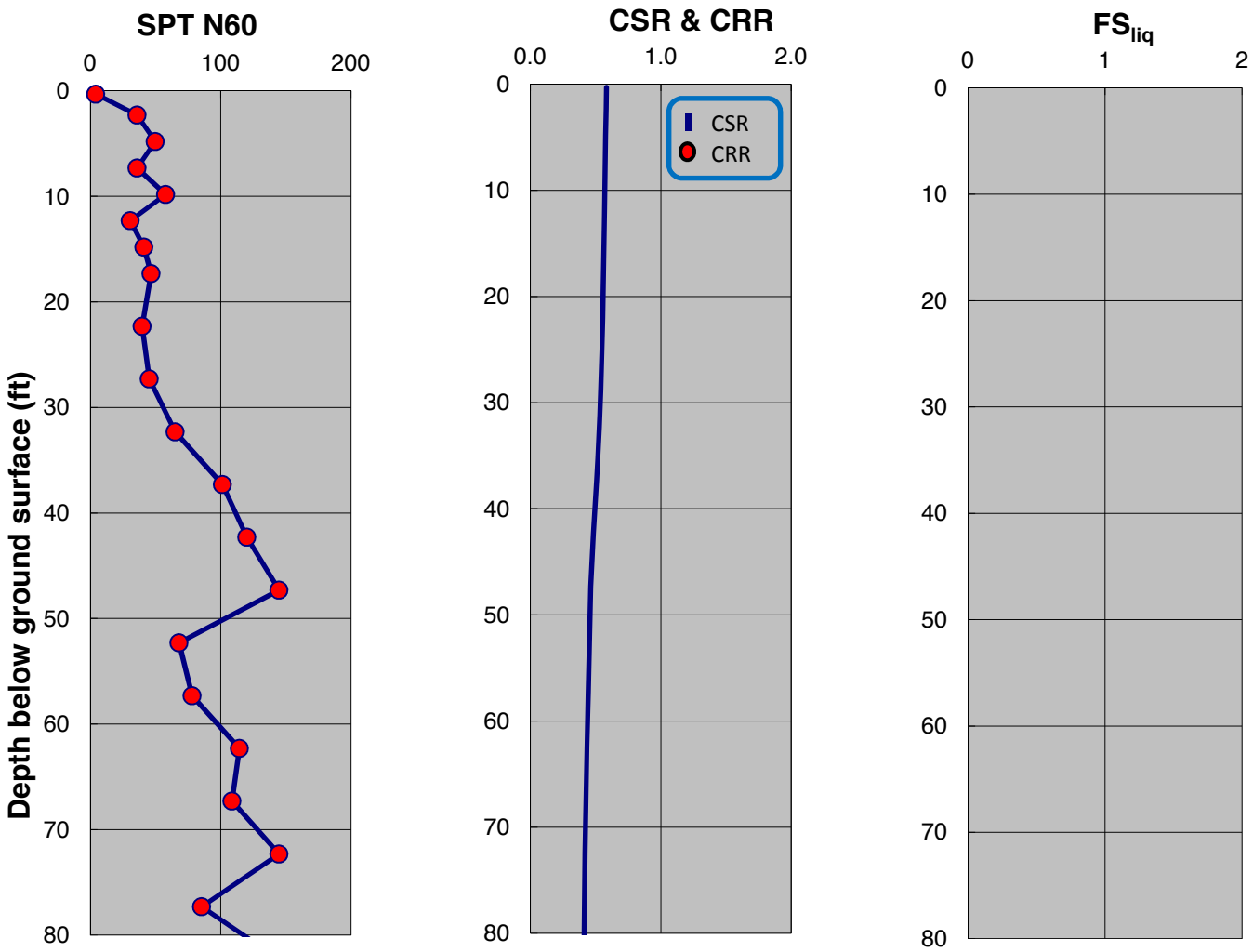
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-83 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



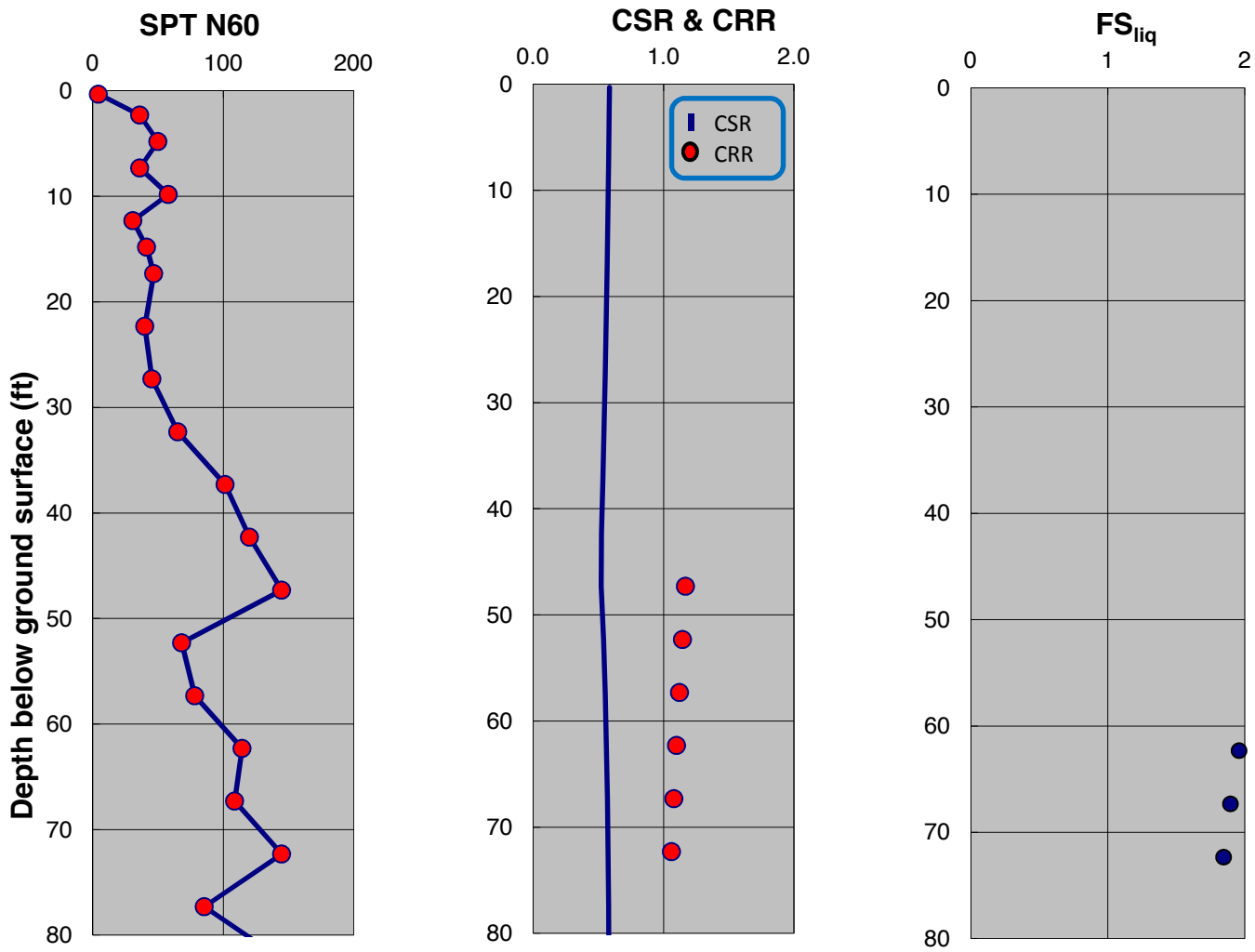
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-83 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



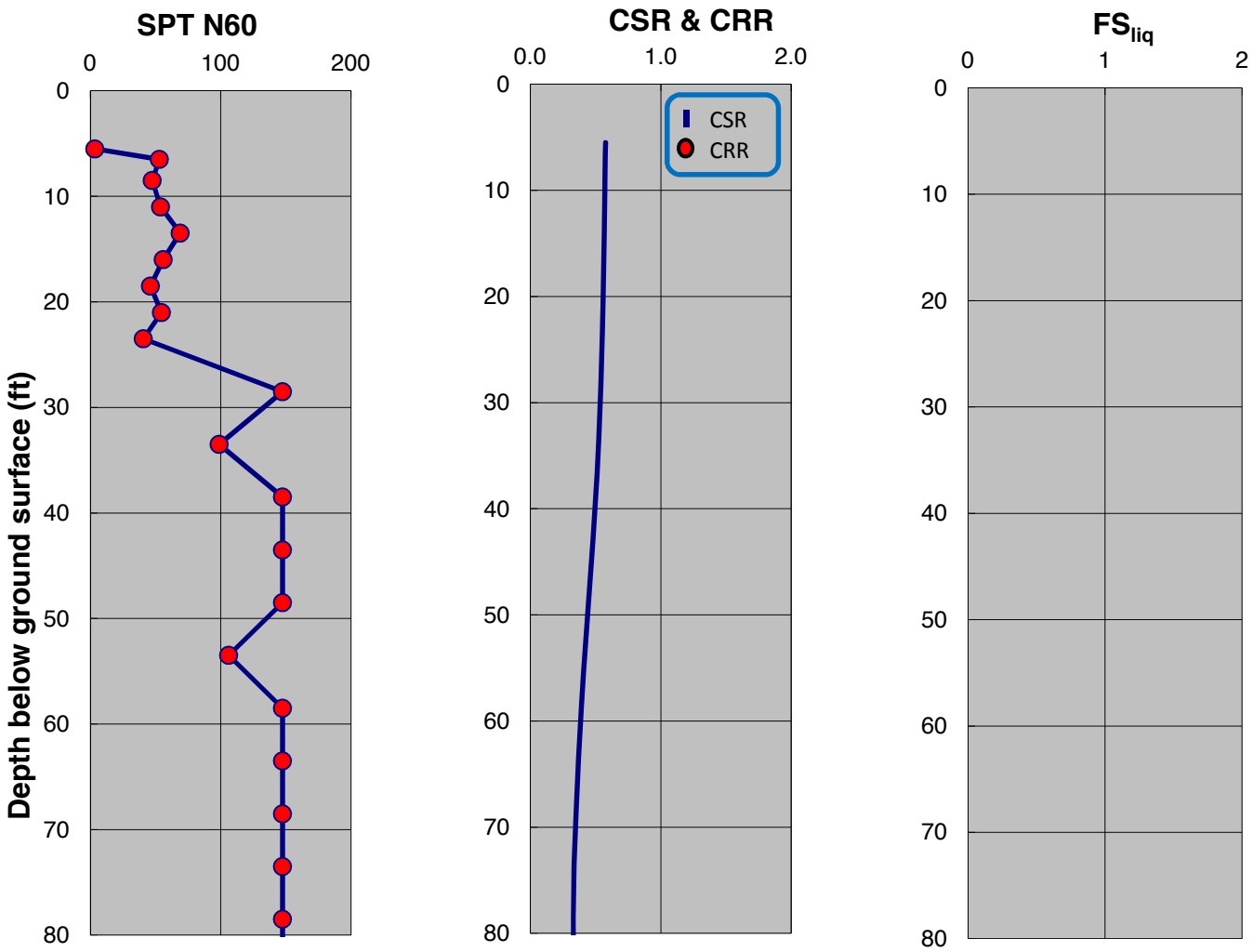
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-84 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



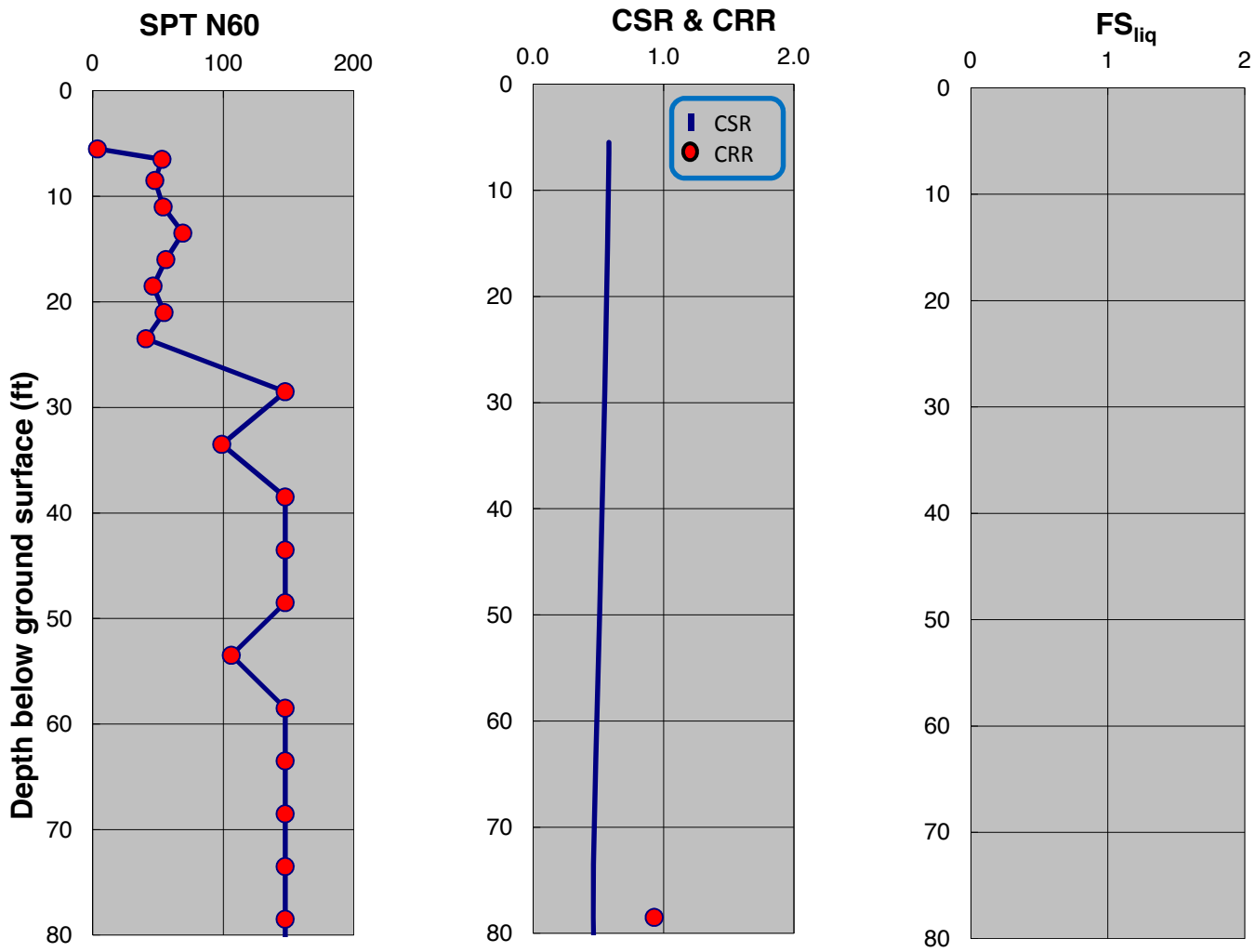
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-84 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



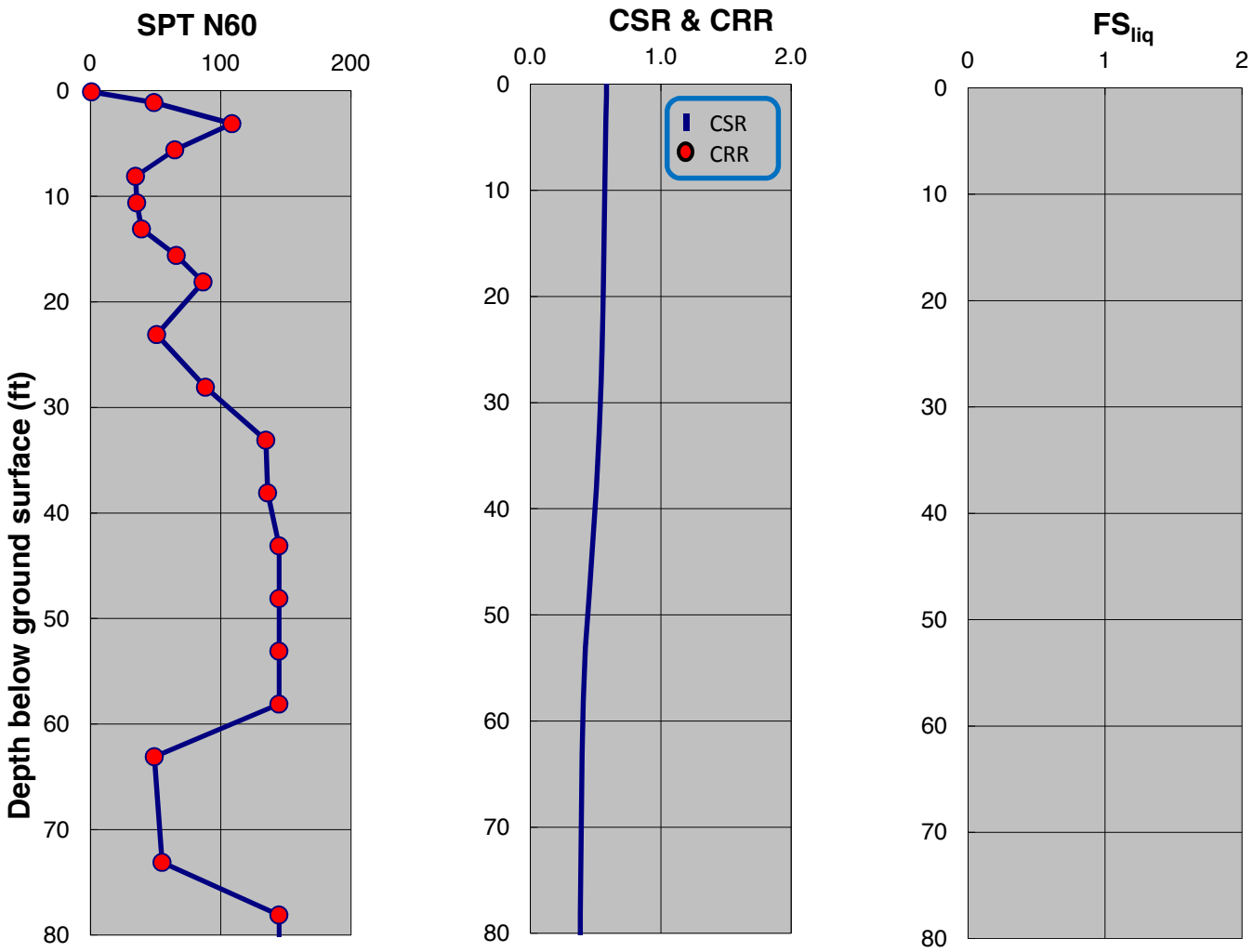
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-85 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



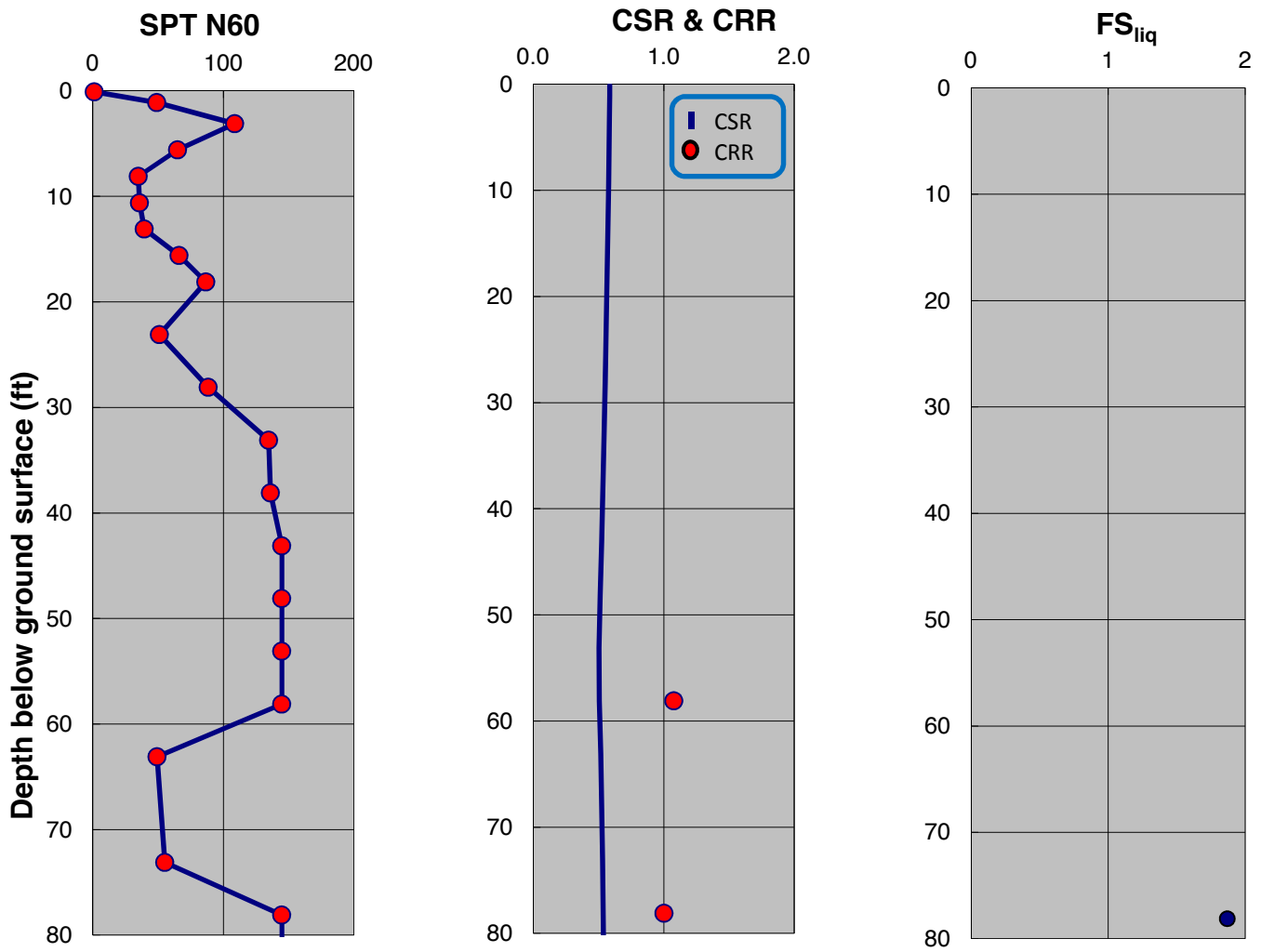
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-85 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



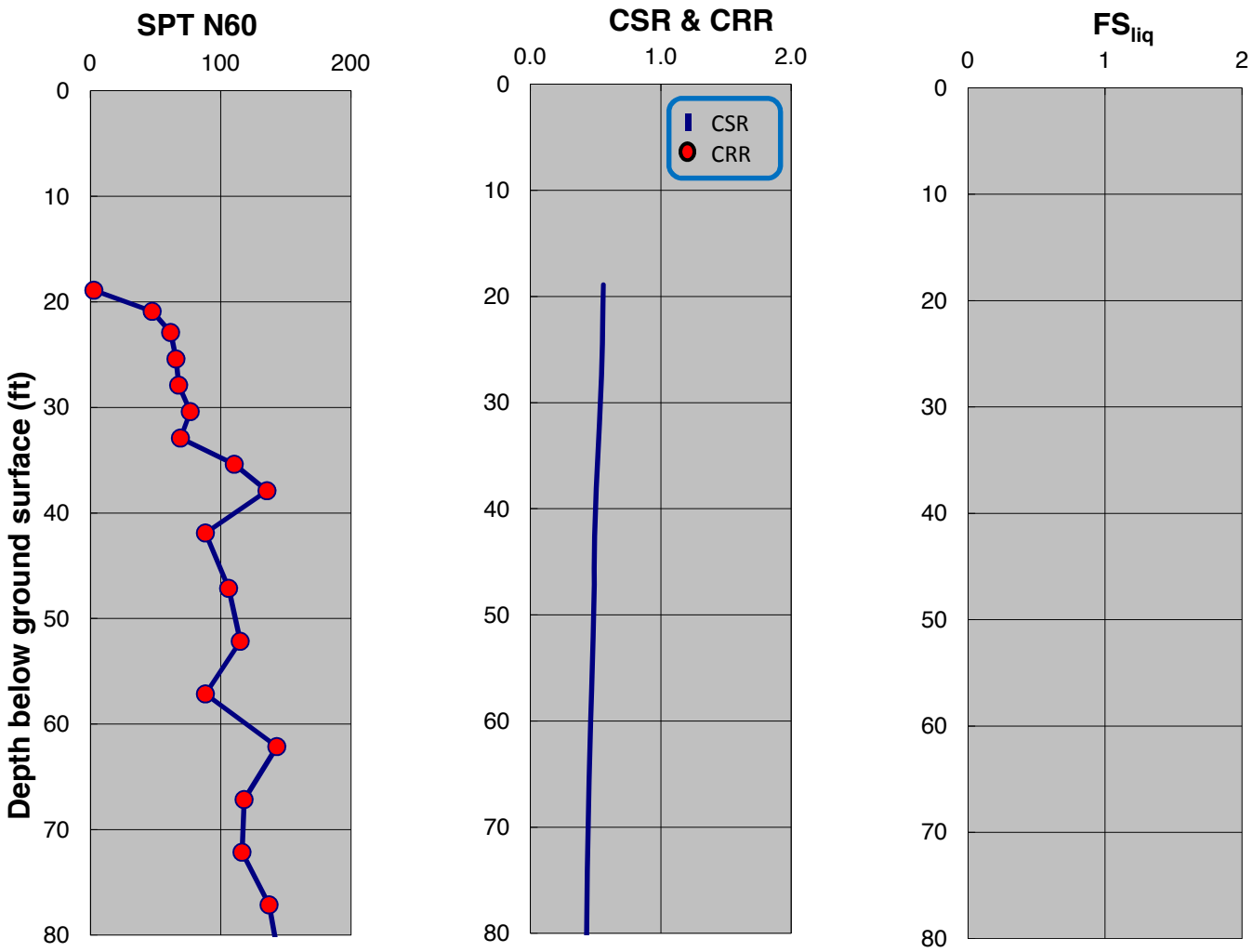
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-86 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



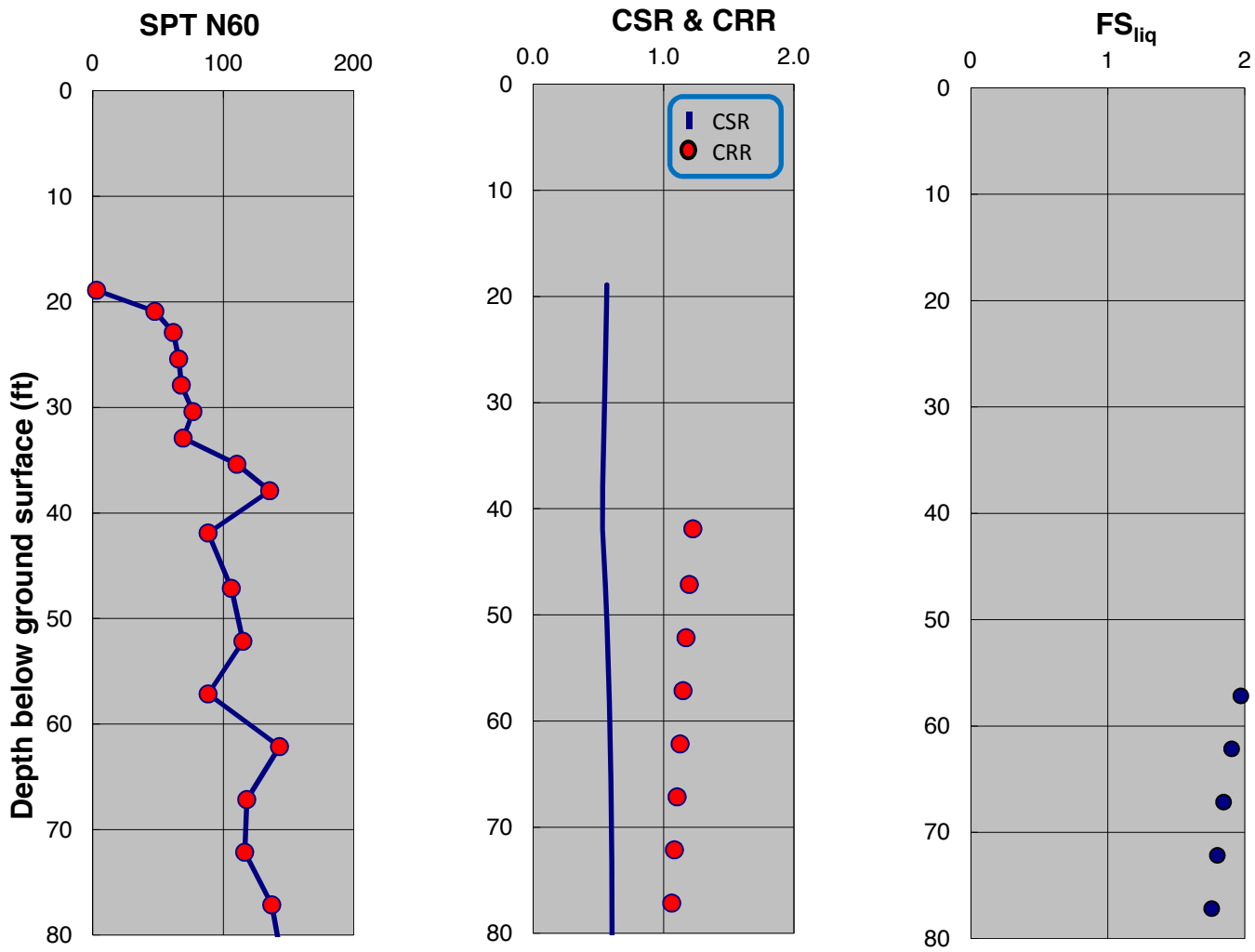
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-86 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



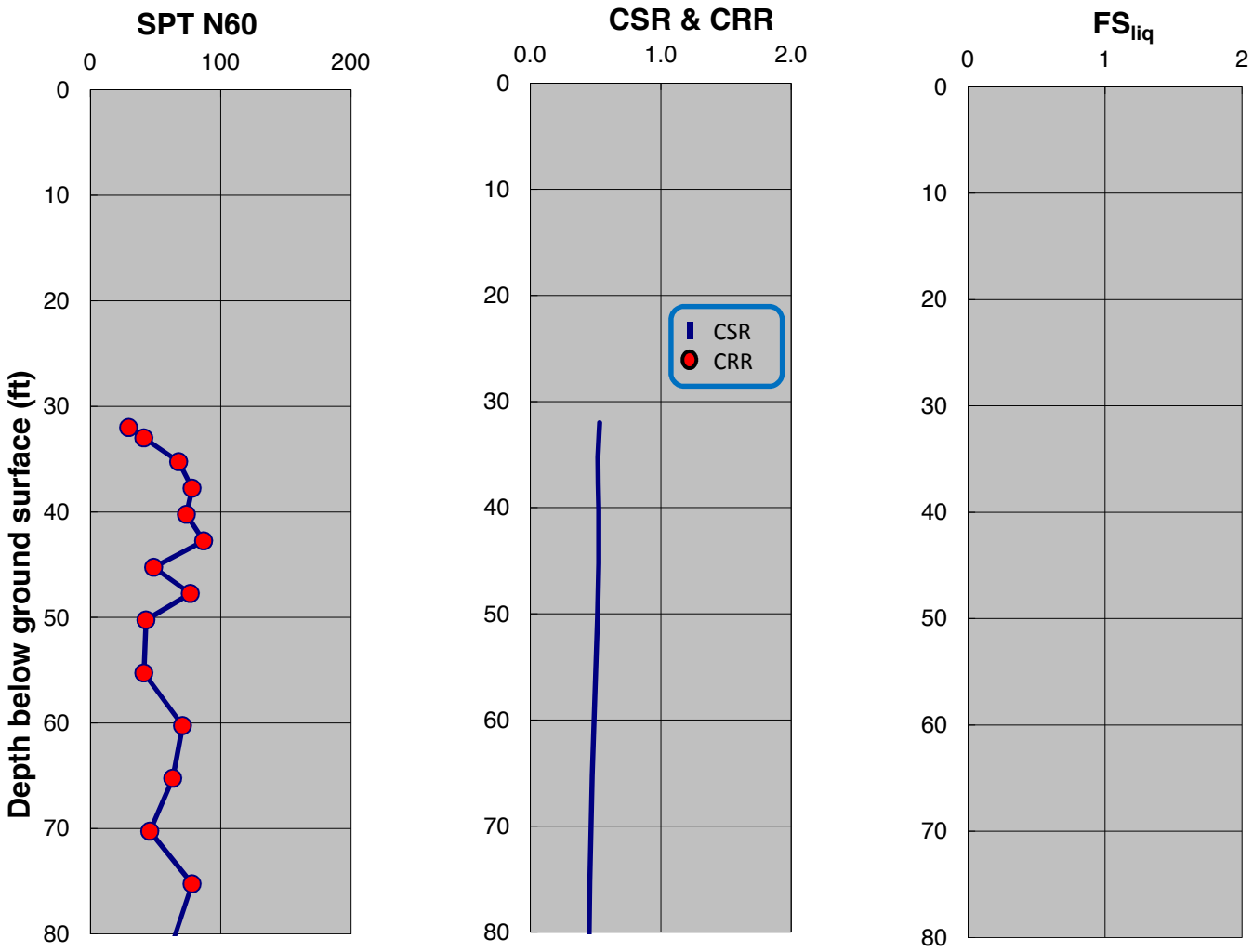
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-87 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



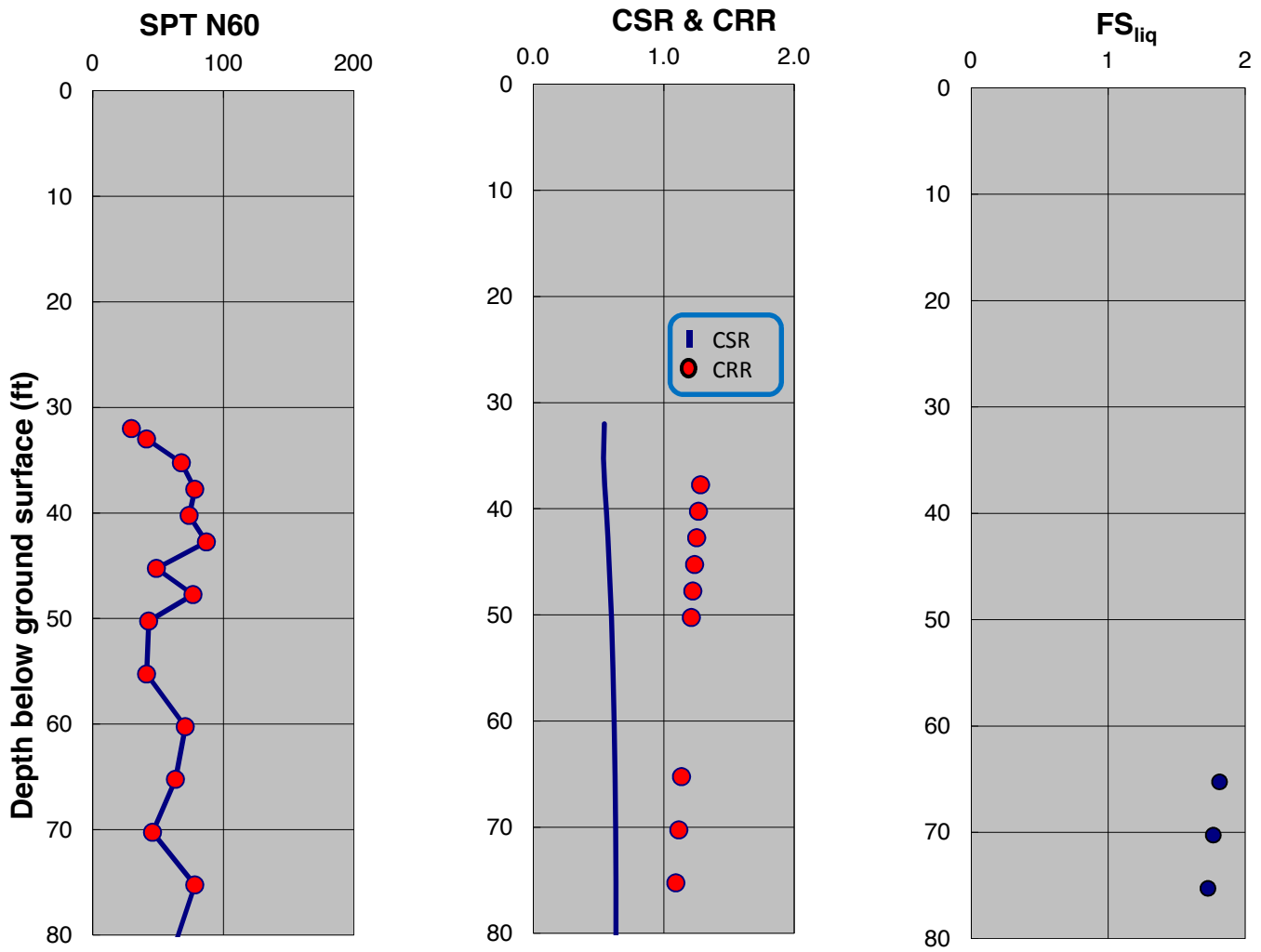
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-87 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



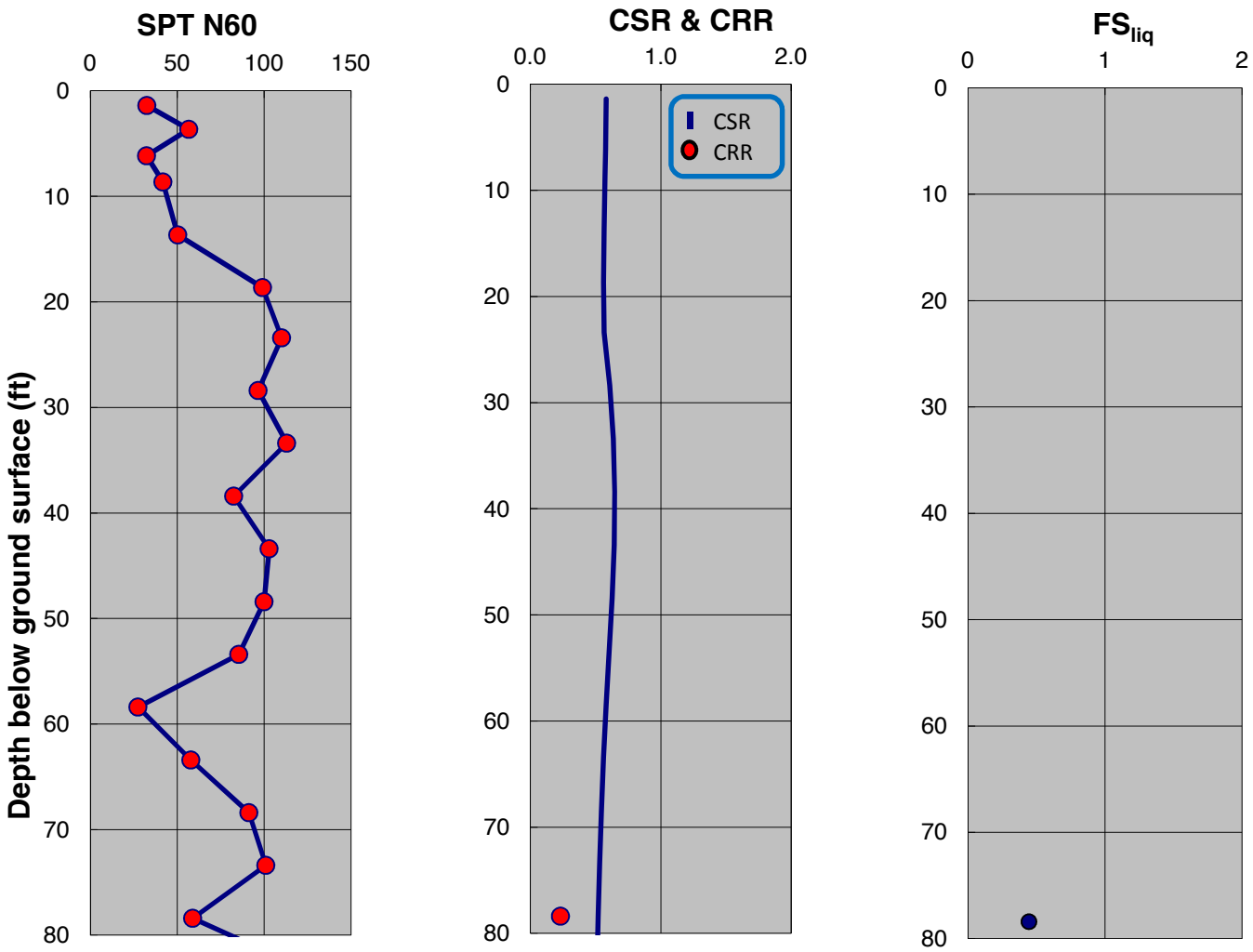
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-88 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



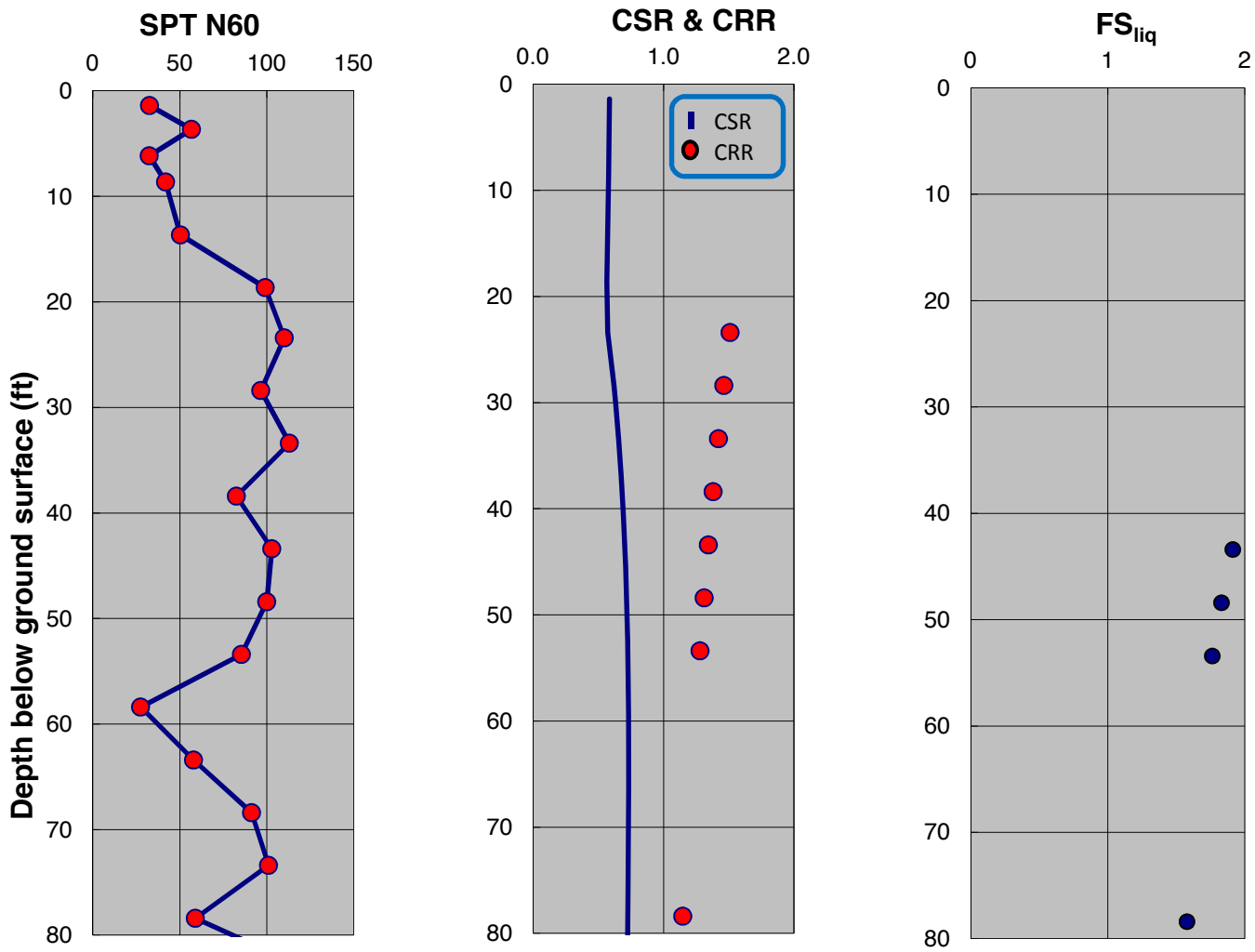
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-88 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



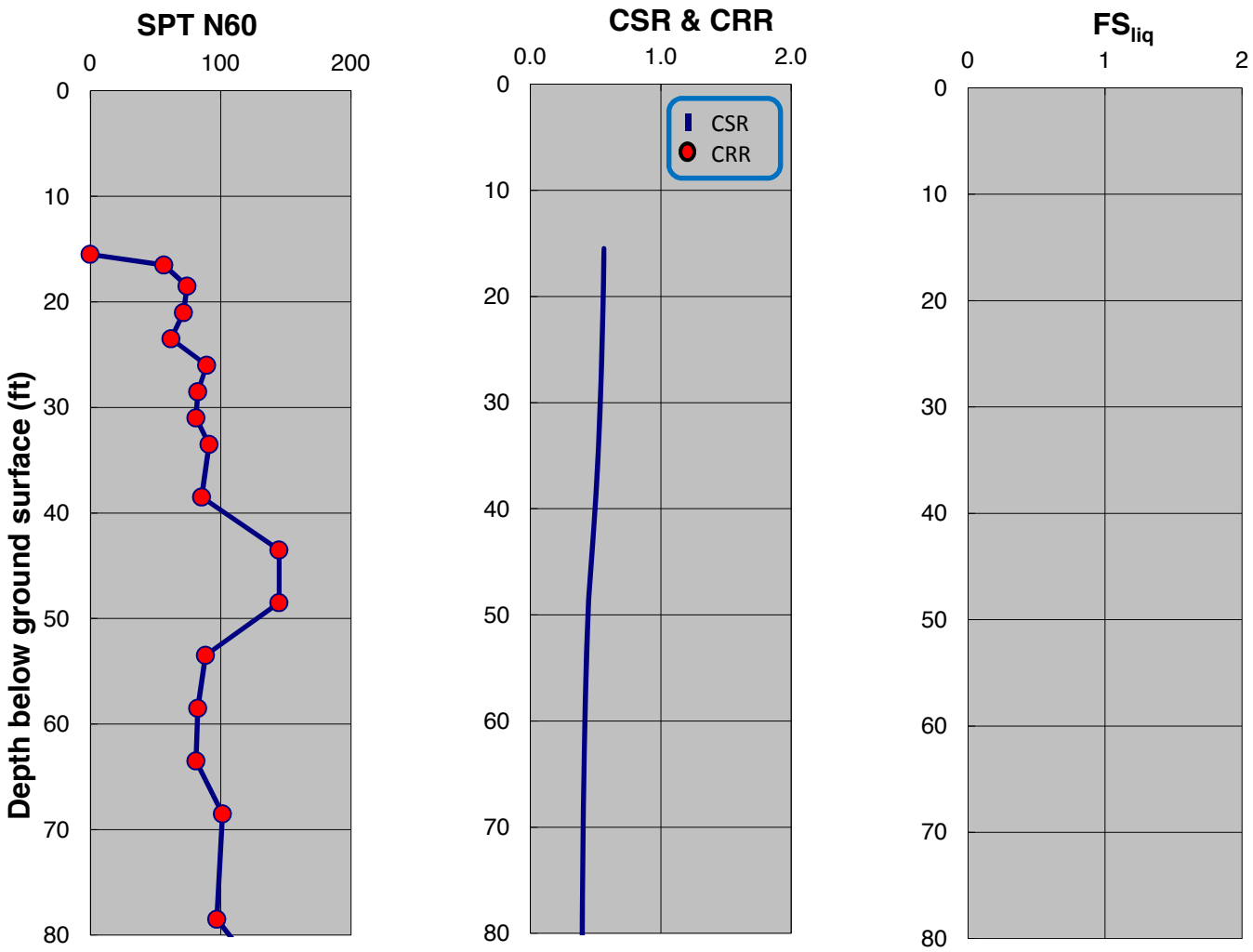
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-89 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



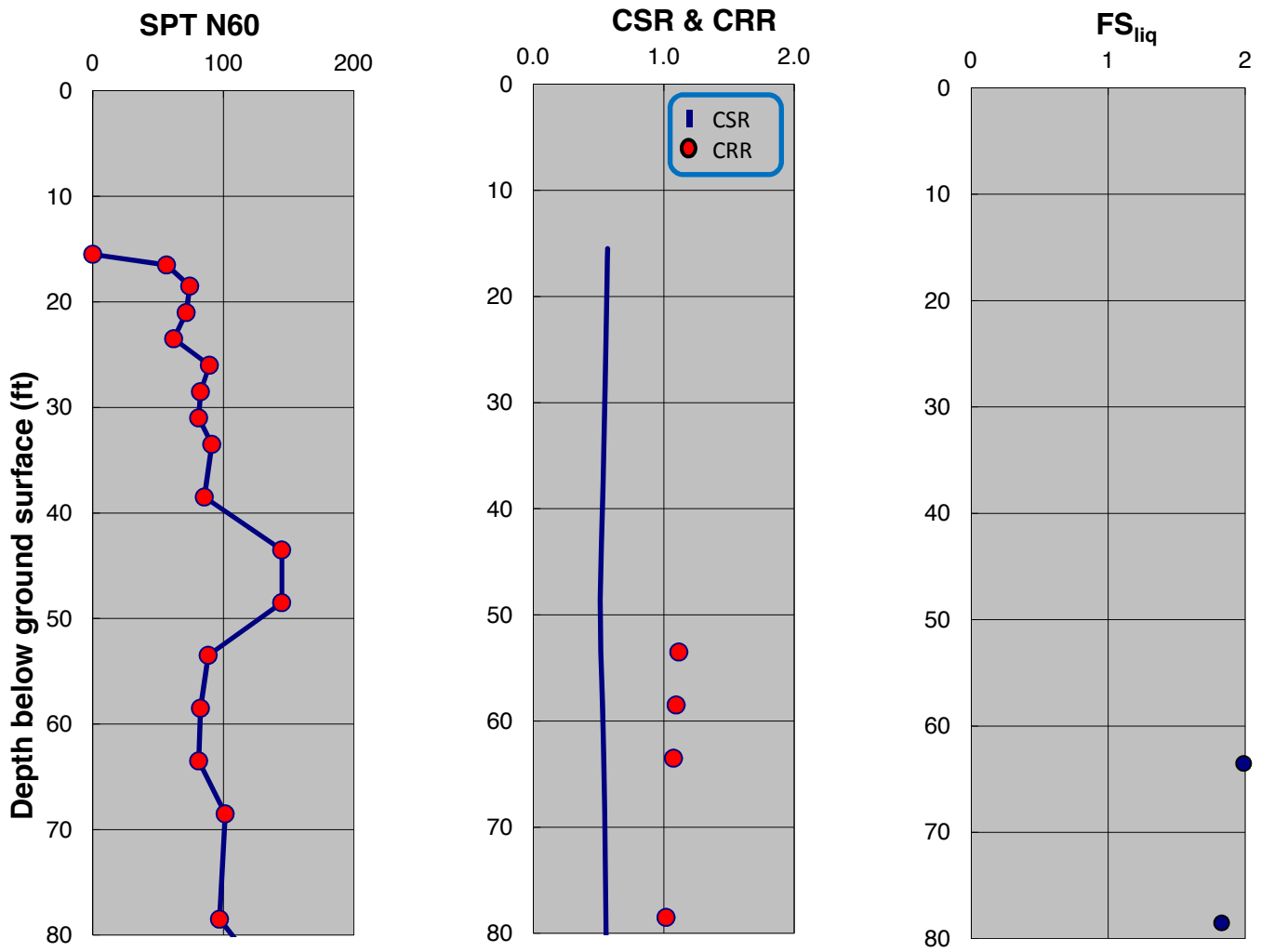
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-89 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



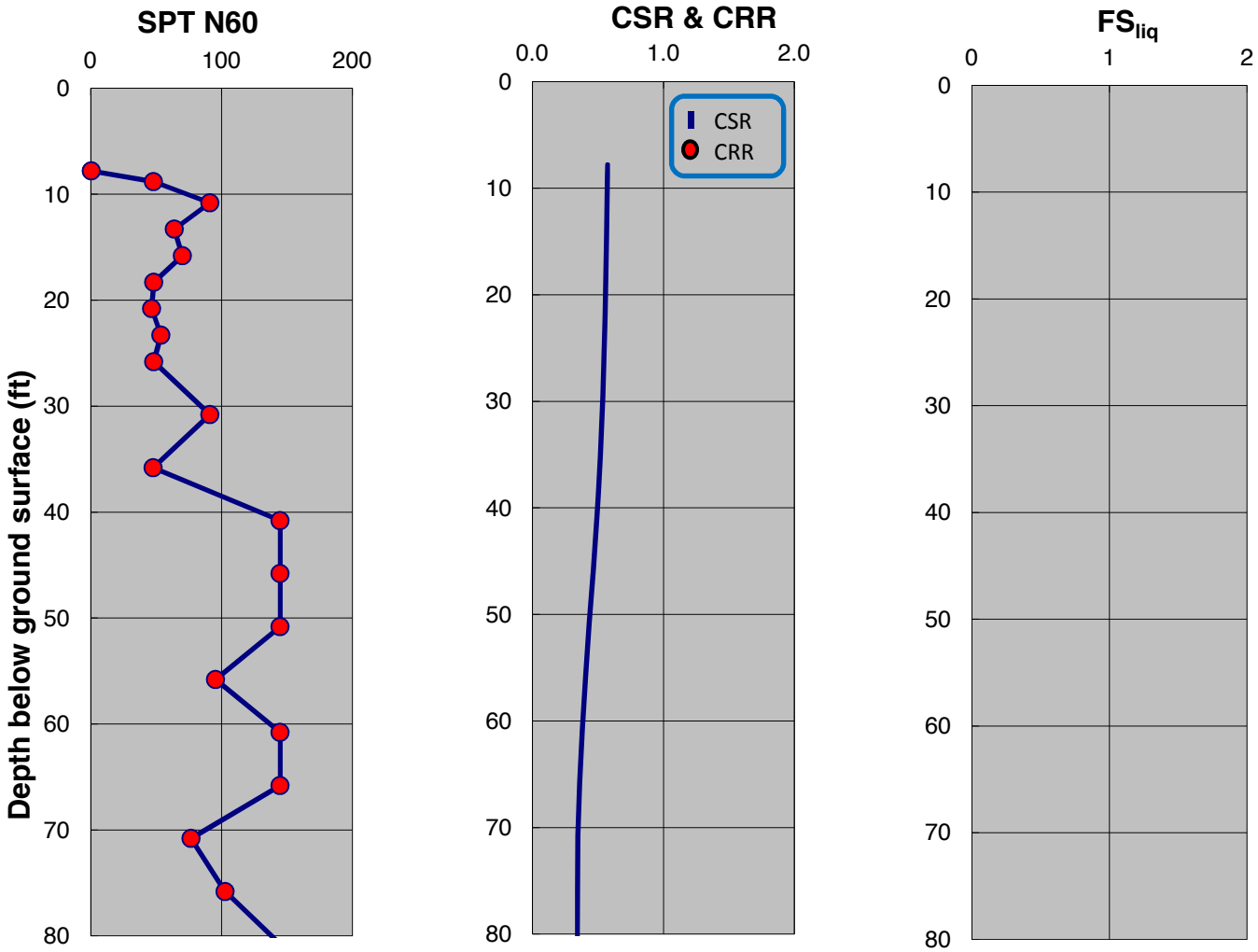
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-90 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



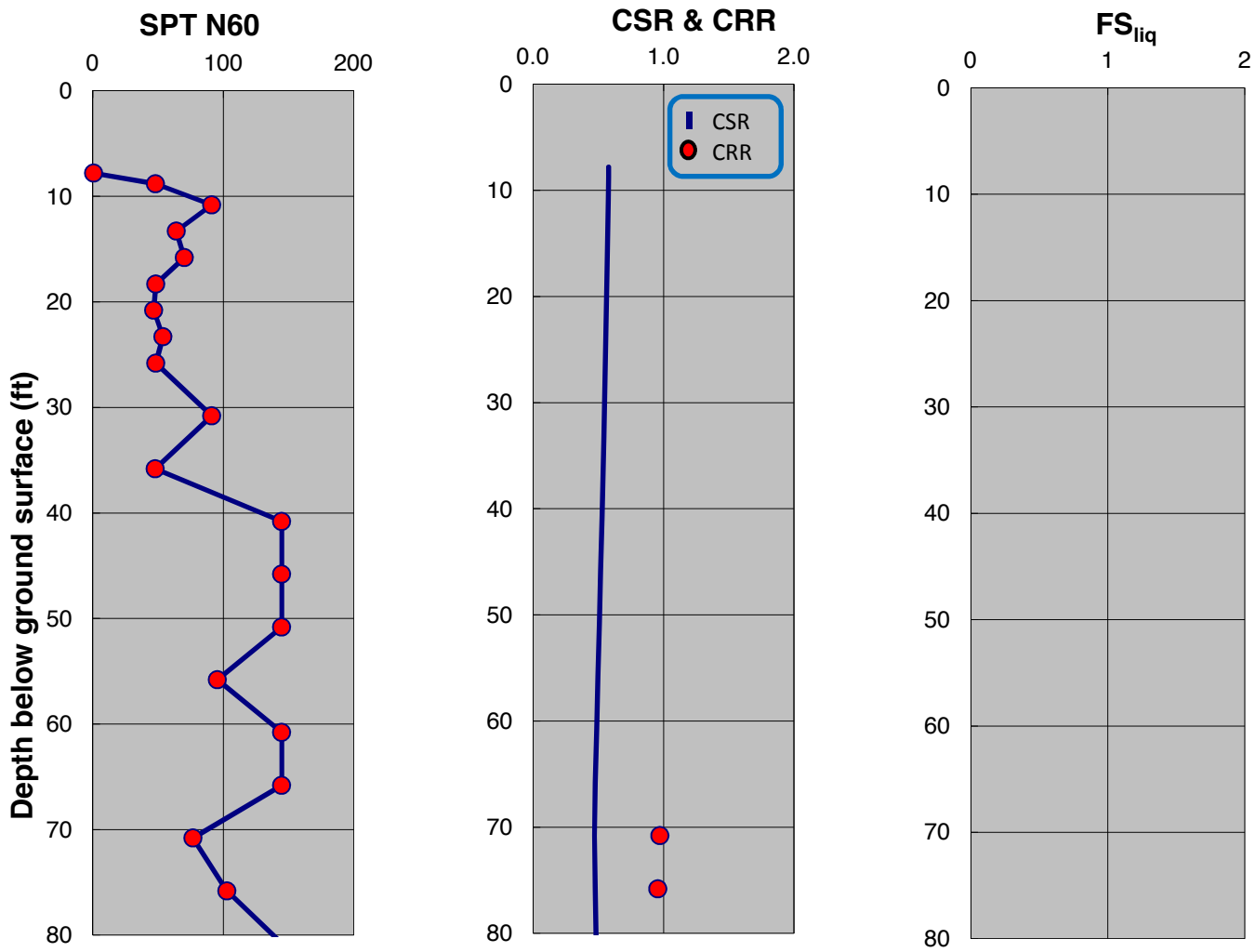
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-90 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



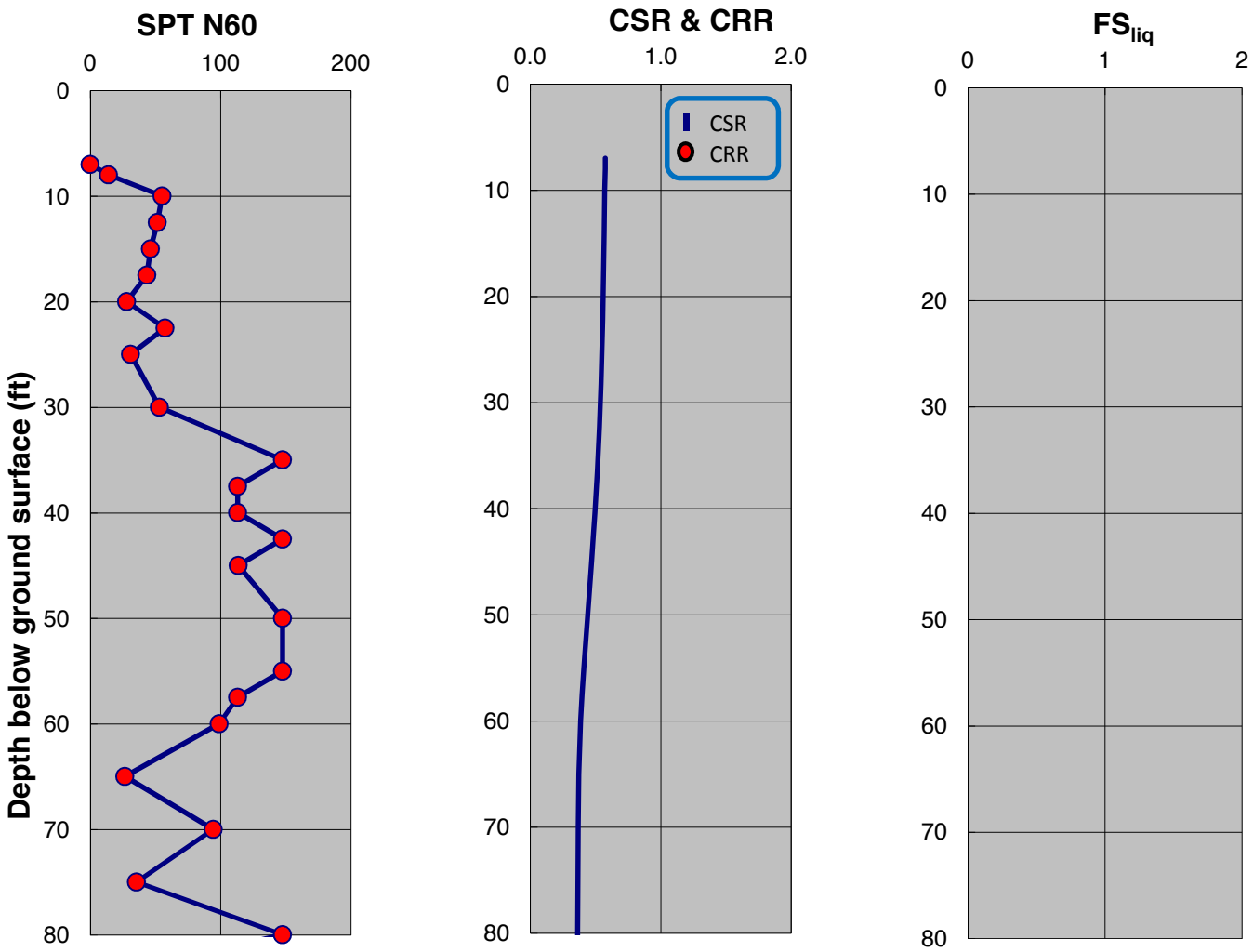
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-91 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



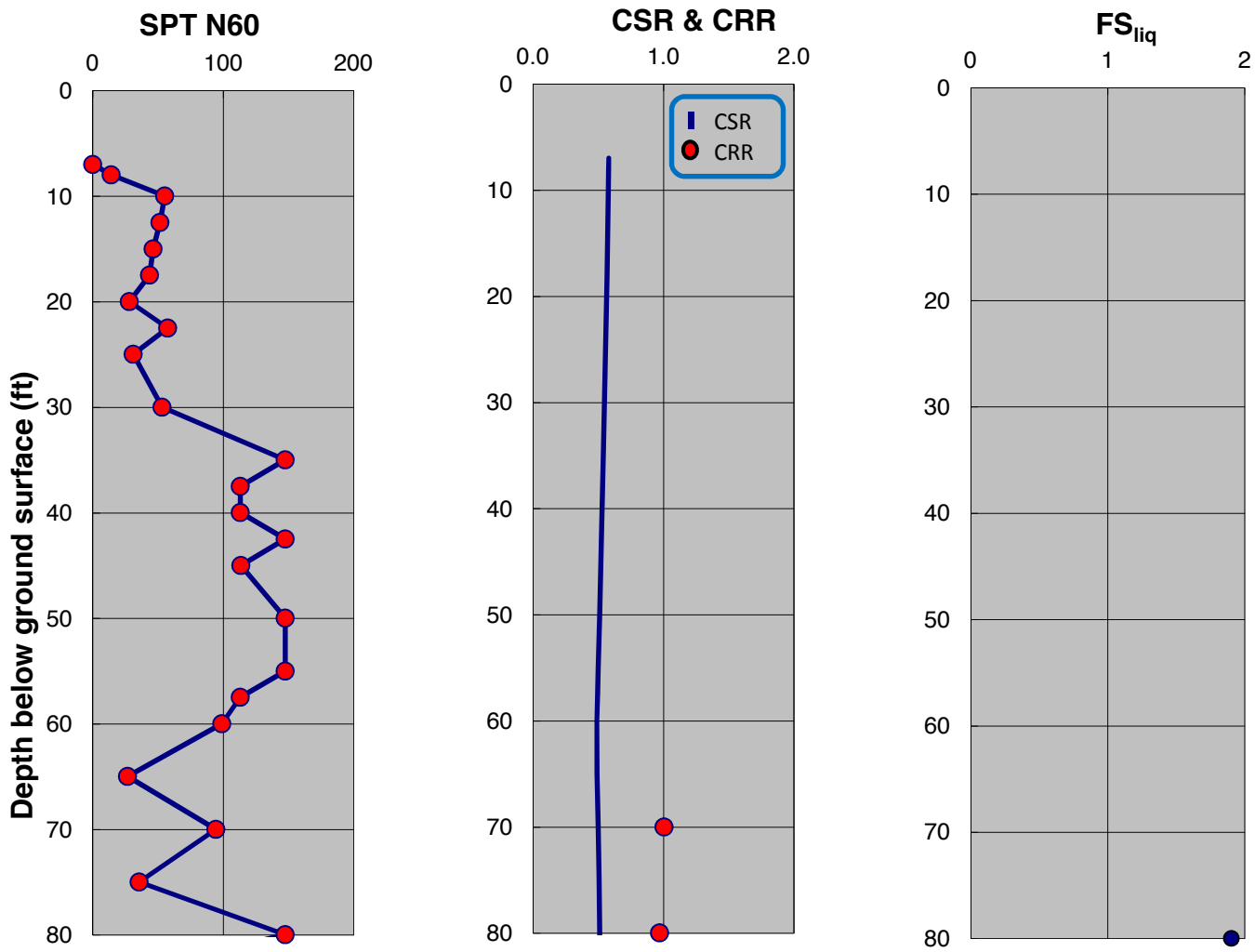
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-91 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



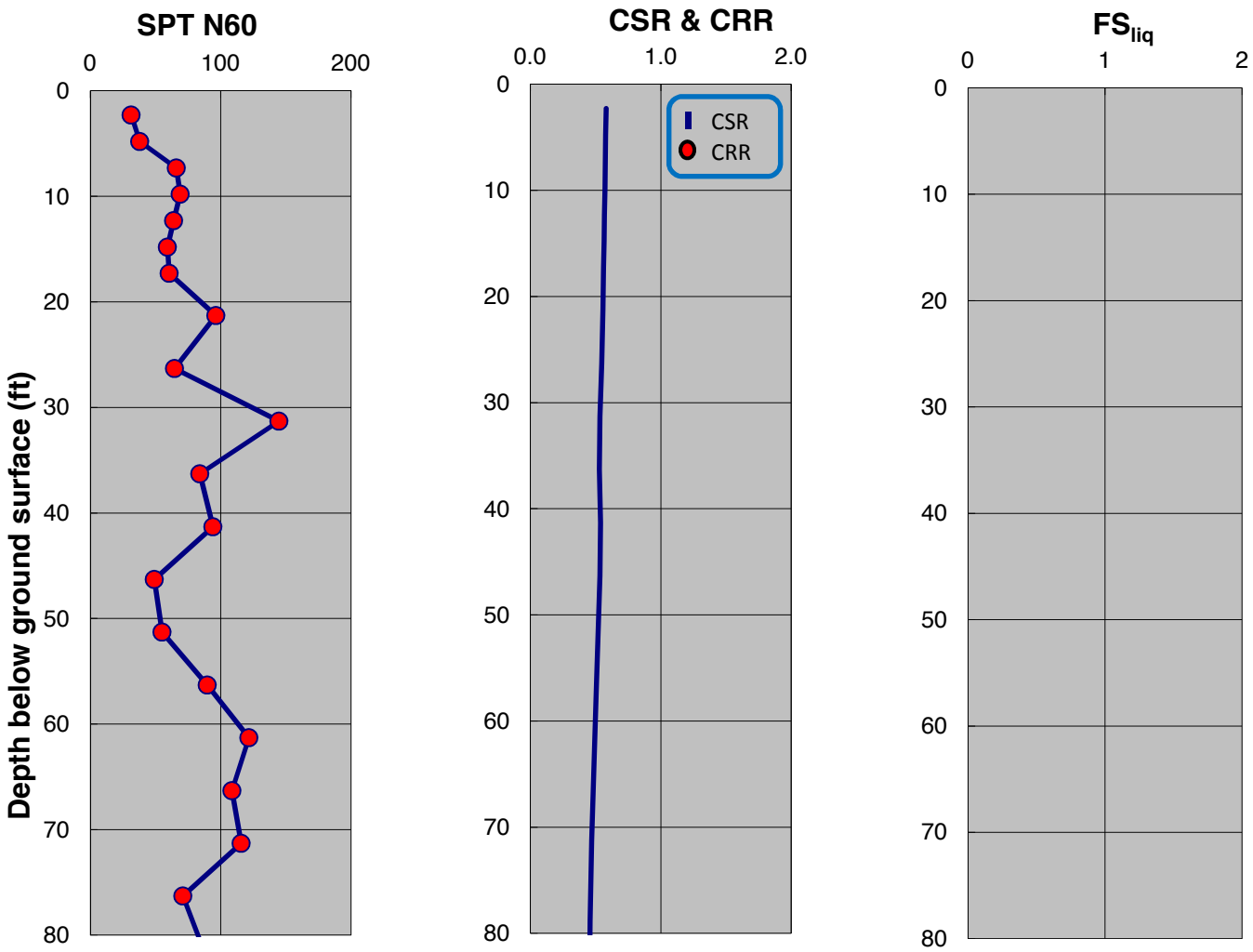
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-92 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



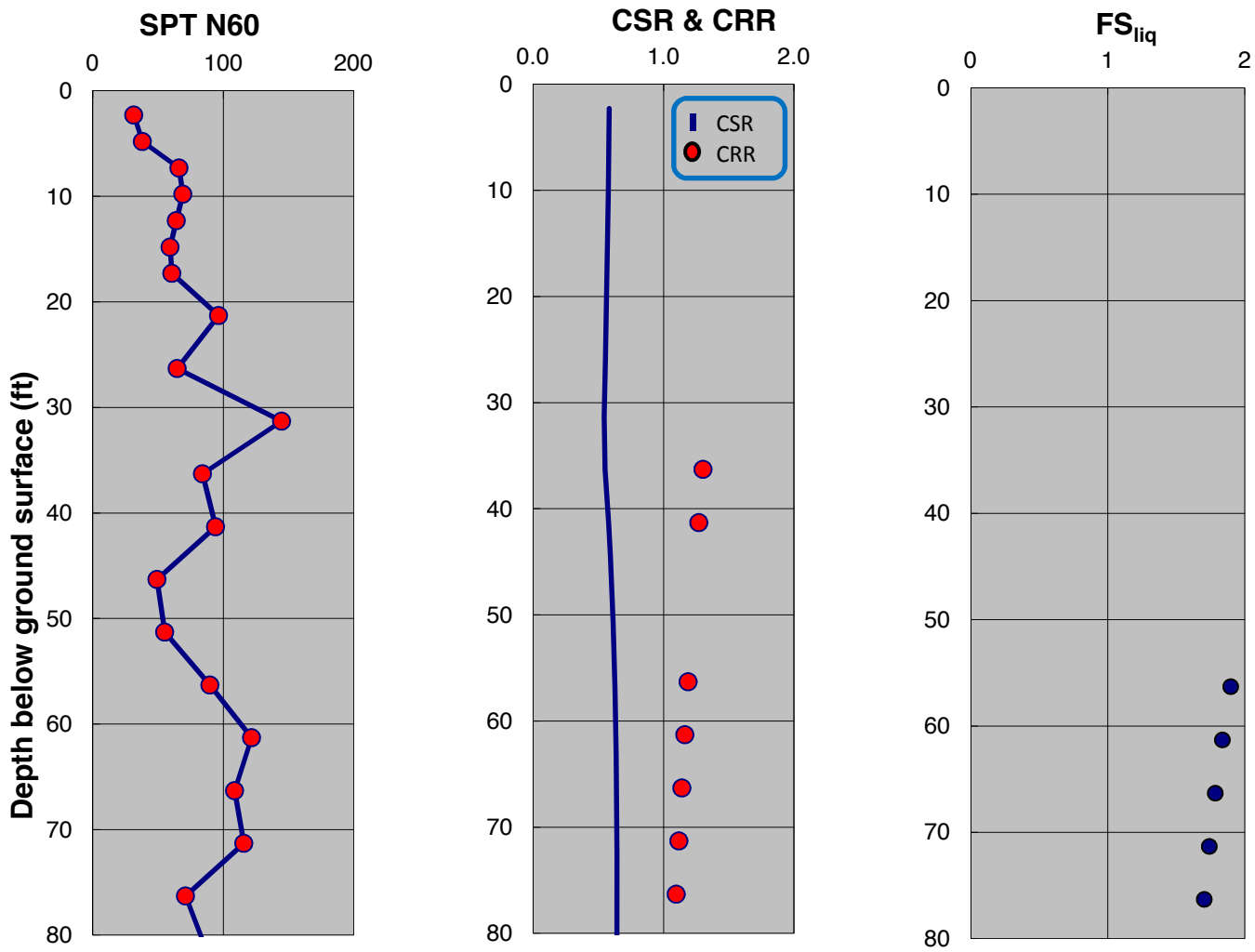
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-92 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



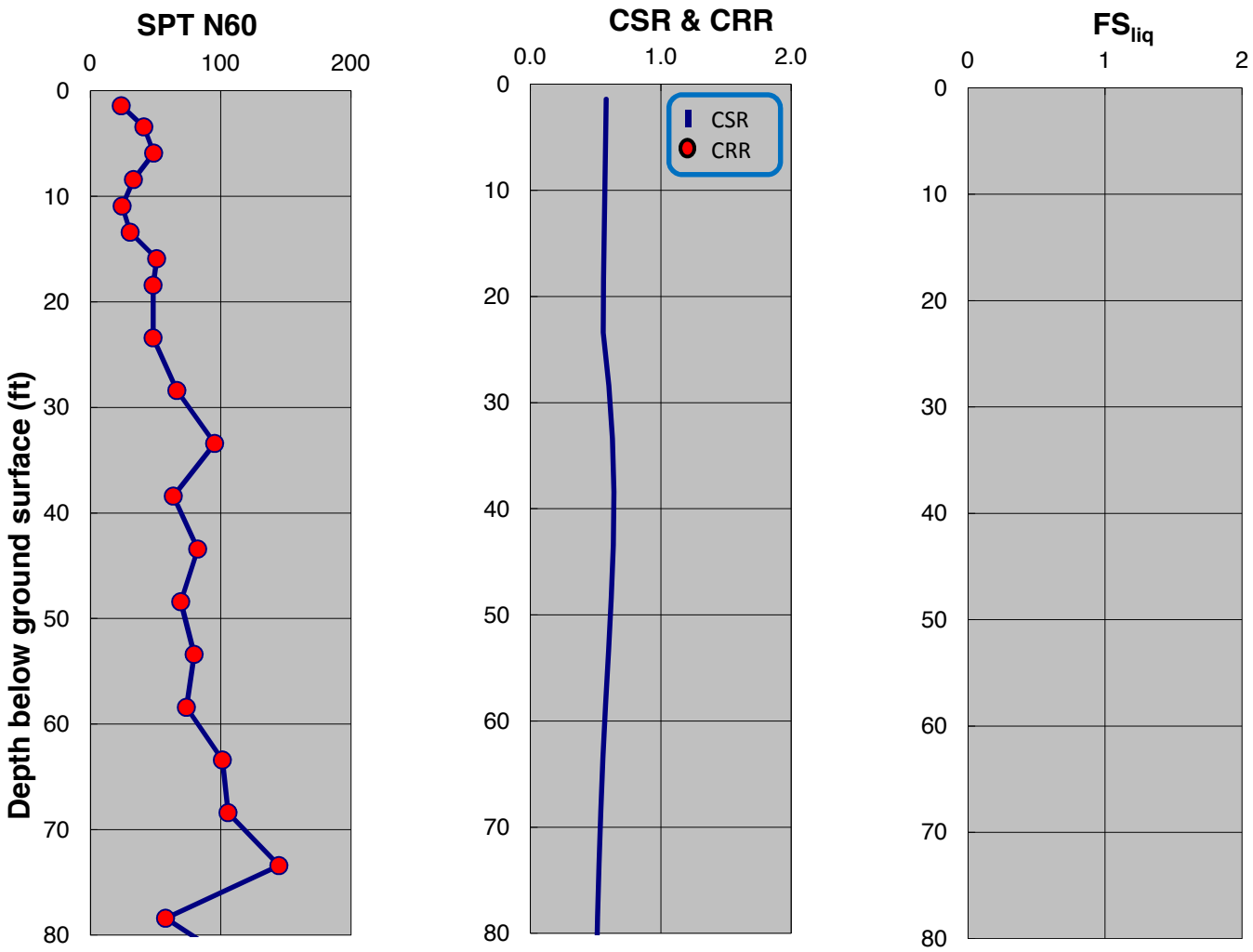
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-93 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



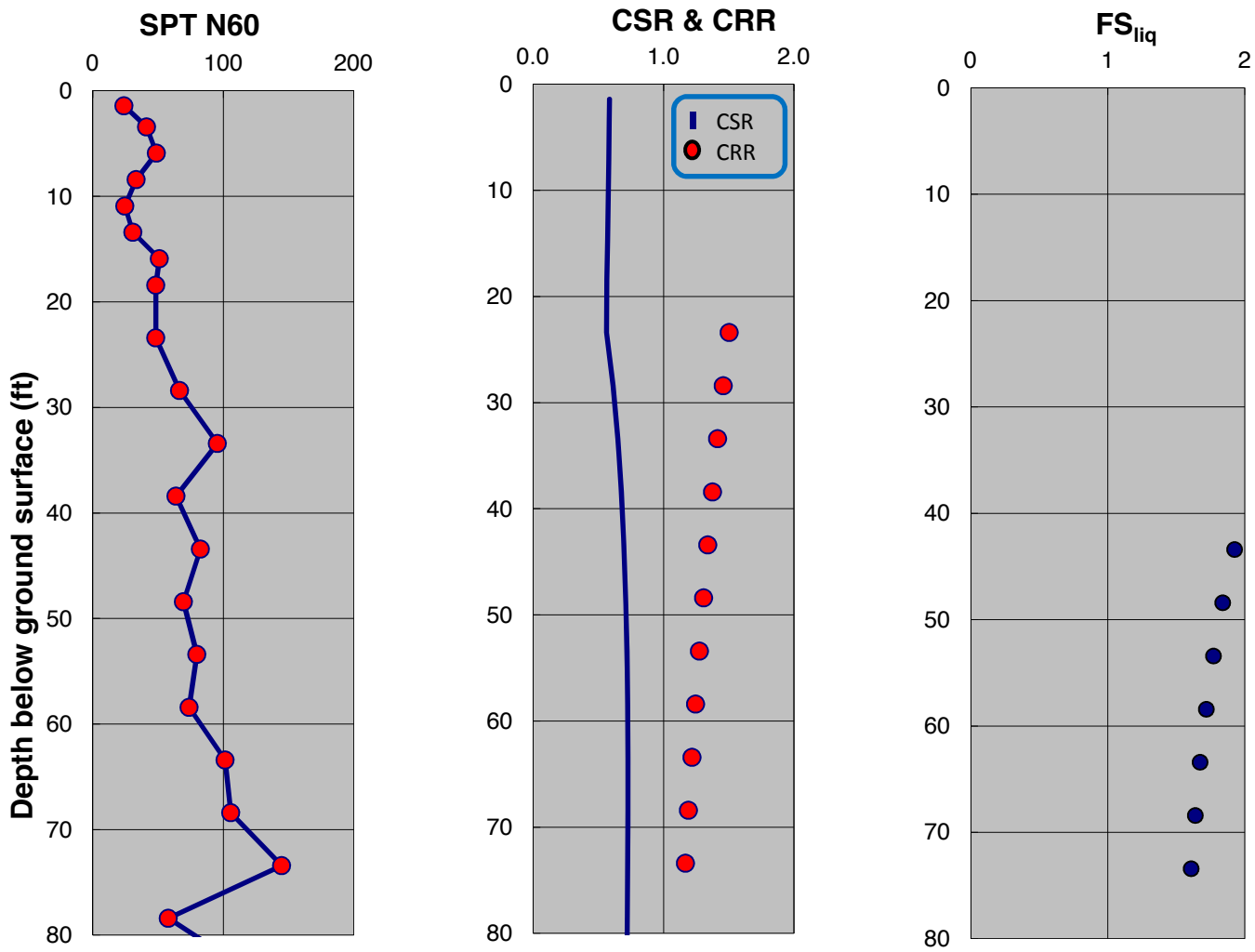
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-93 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



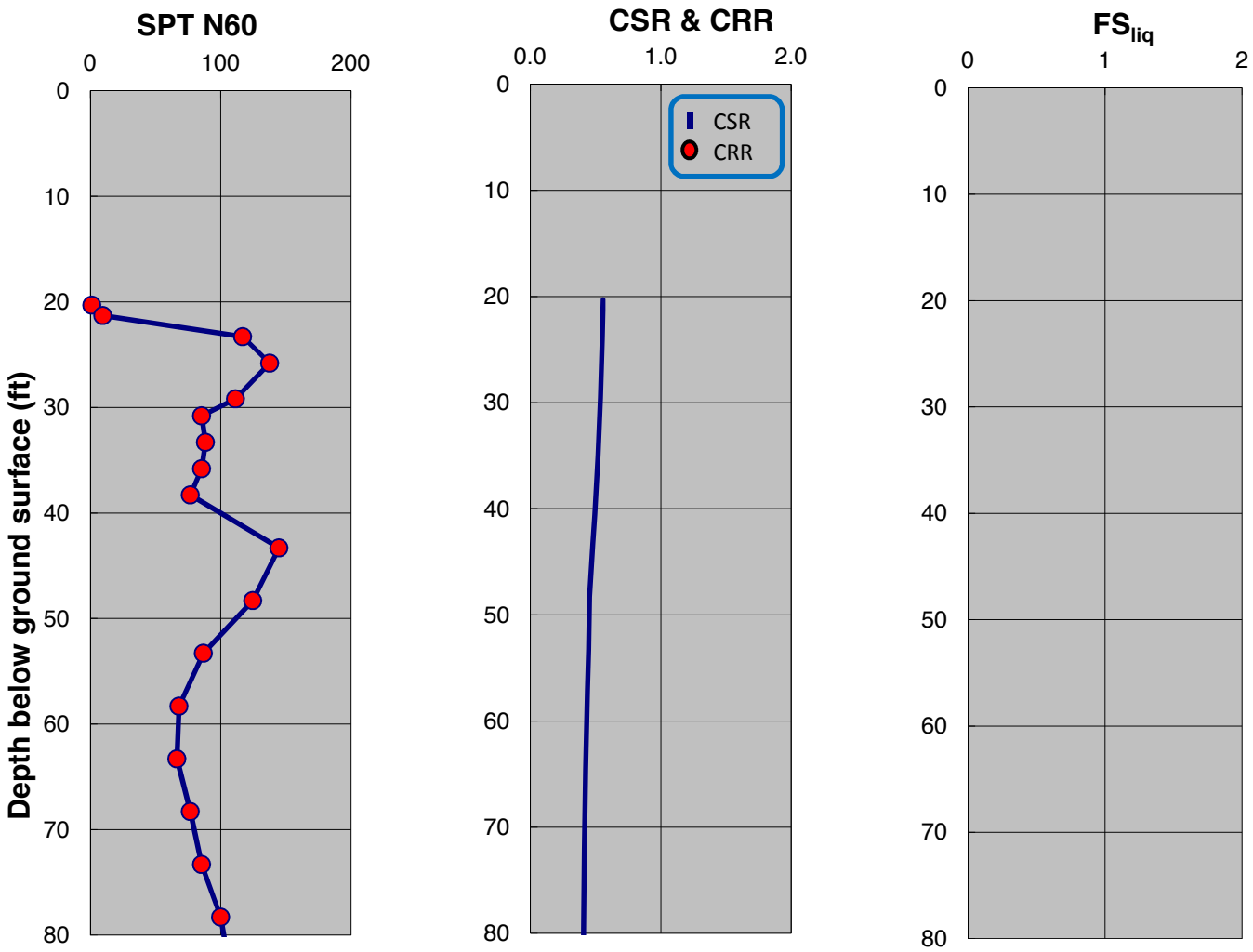
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-94 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



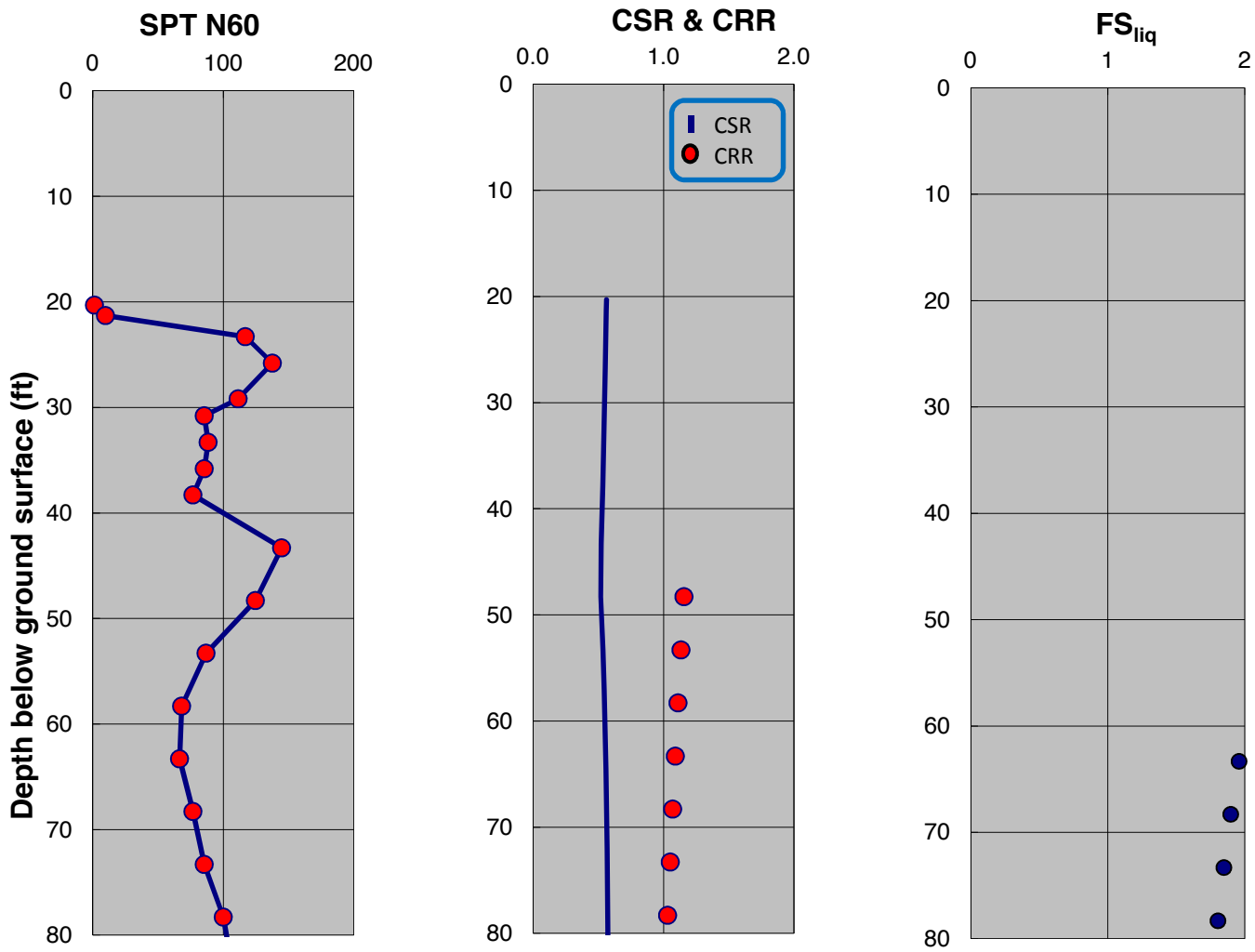
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-94 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



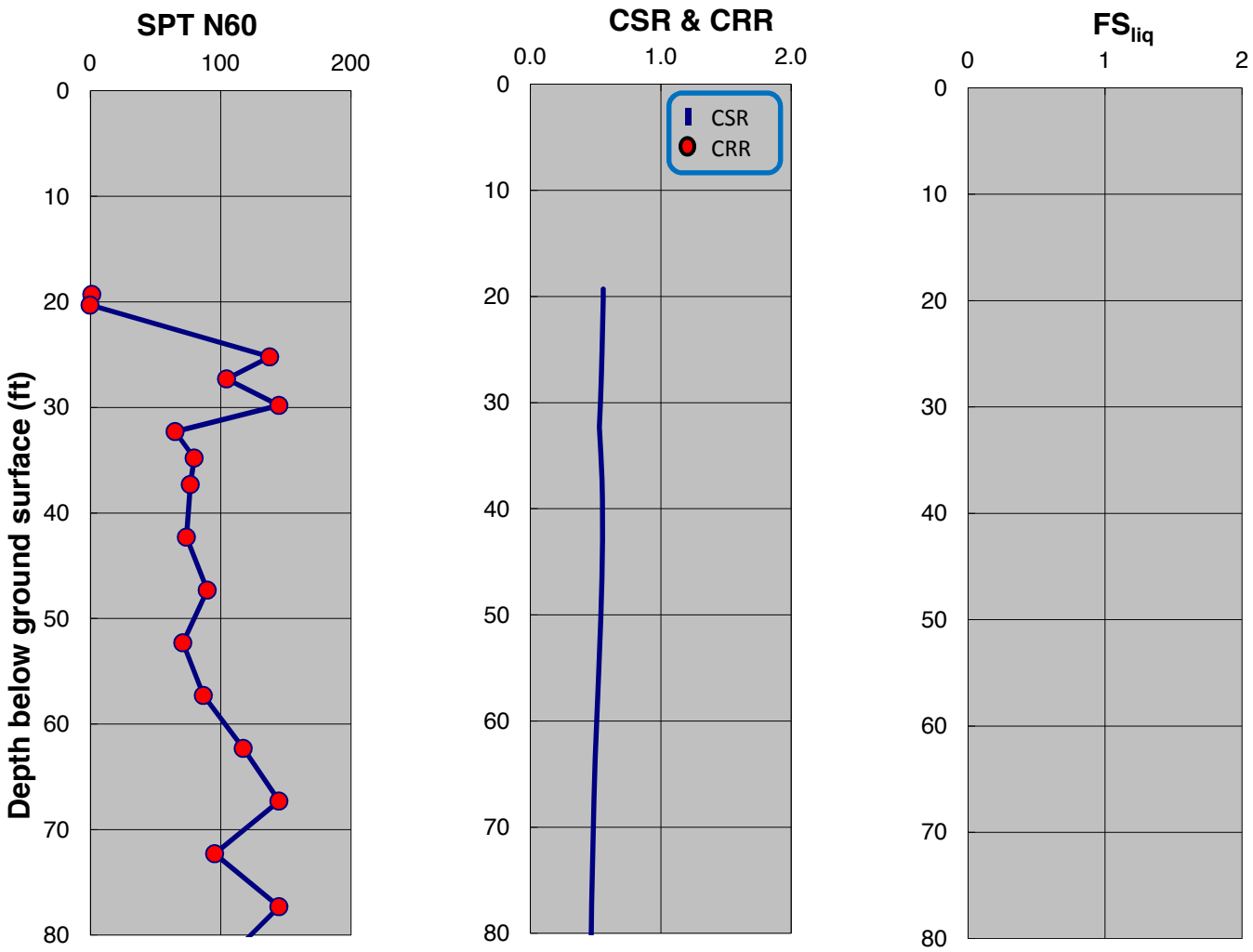
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-95 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



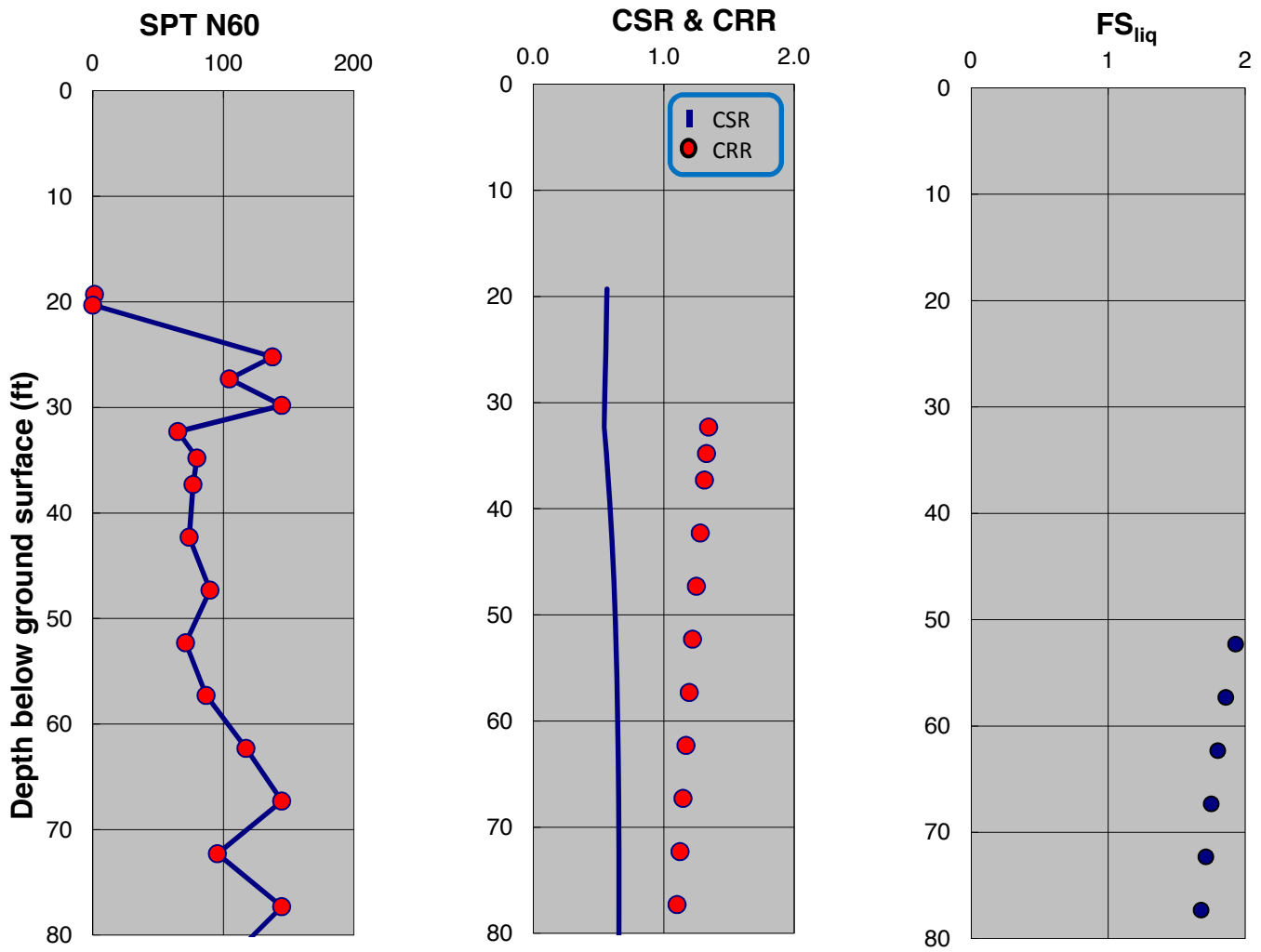
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-95 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



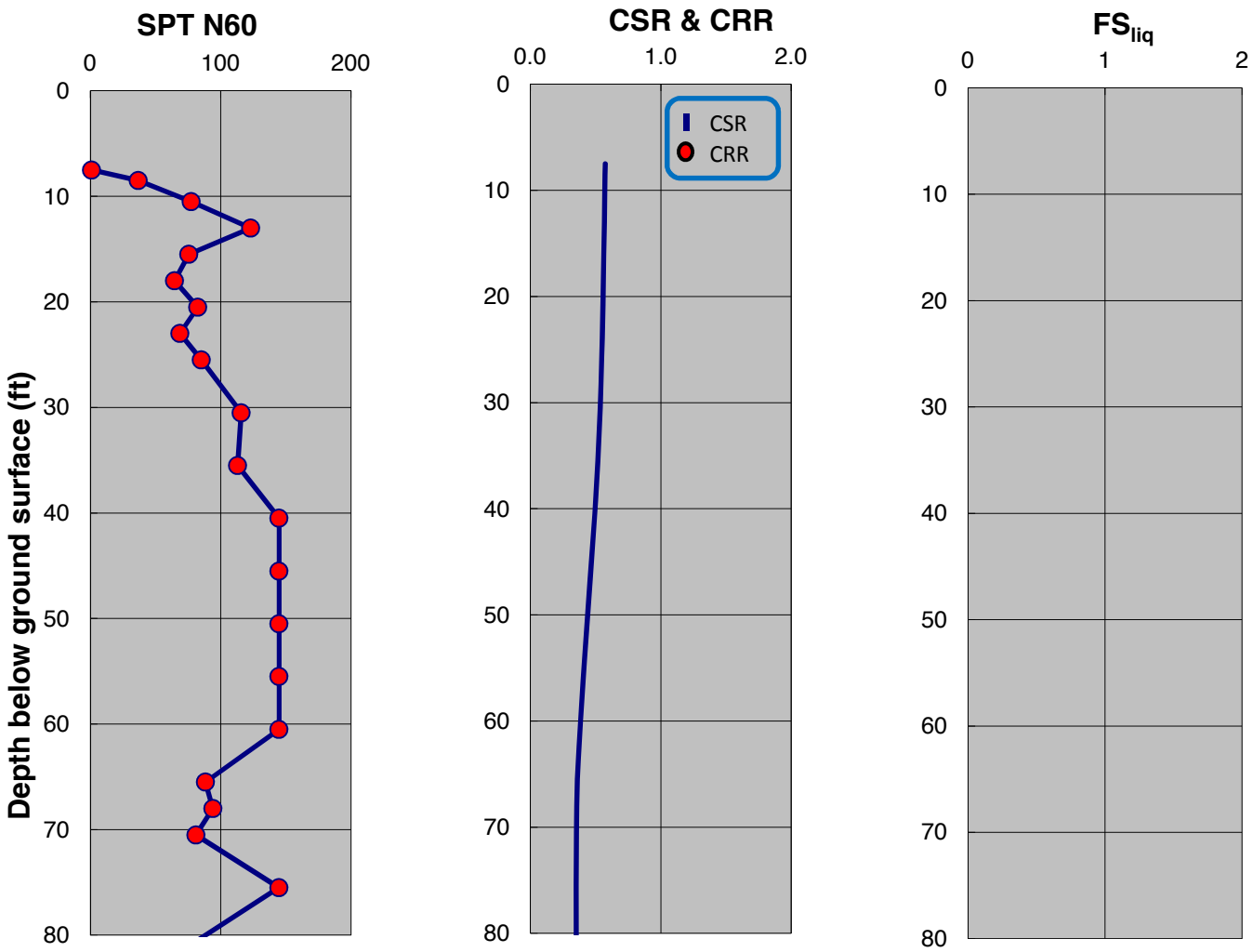
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-96 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



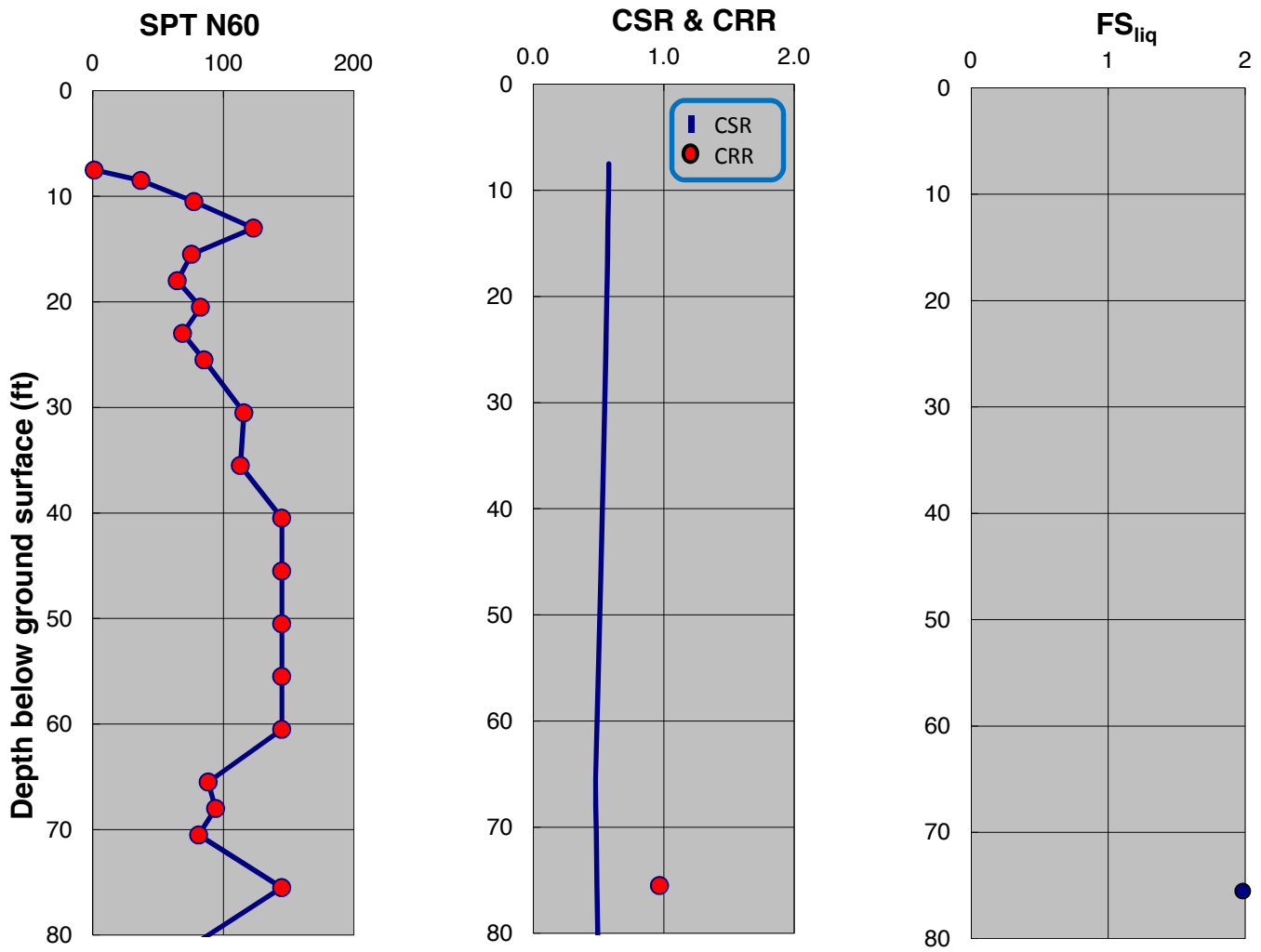
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-96 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



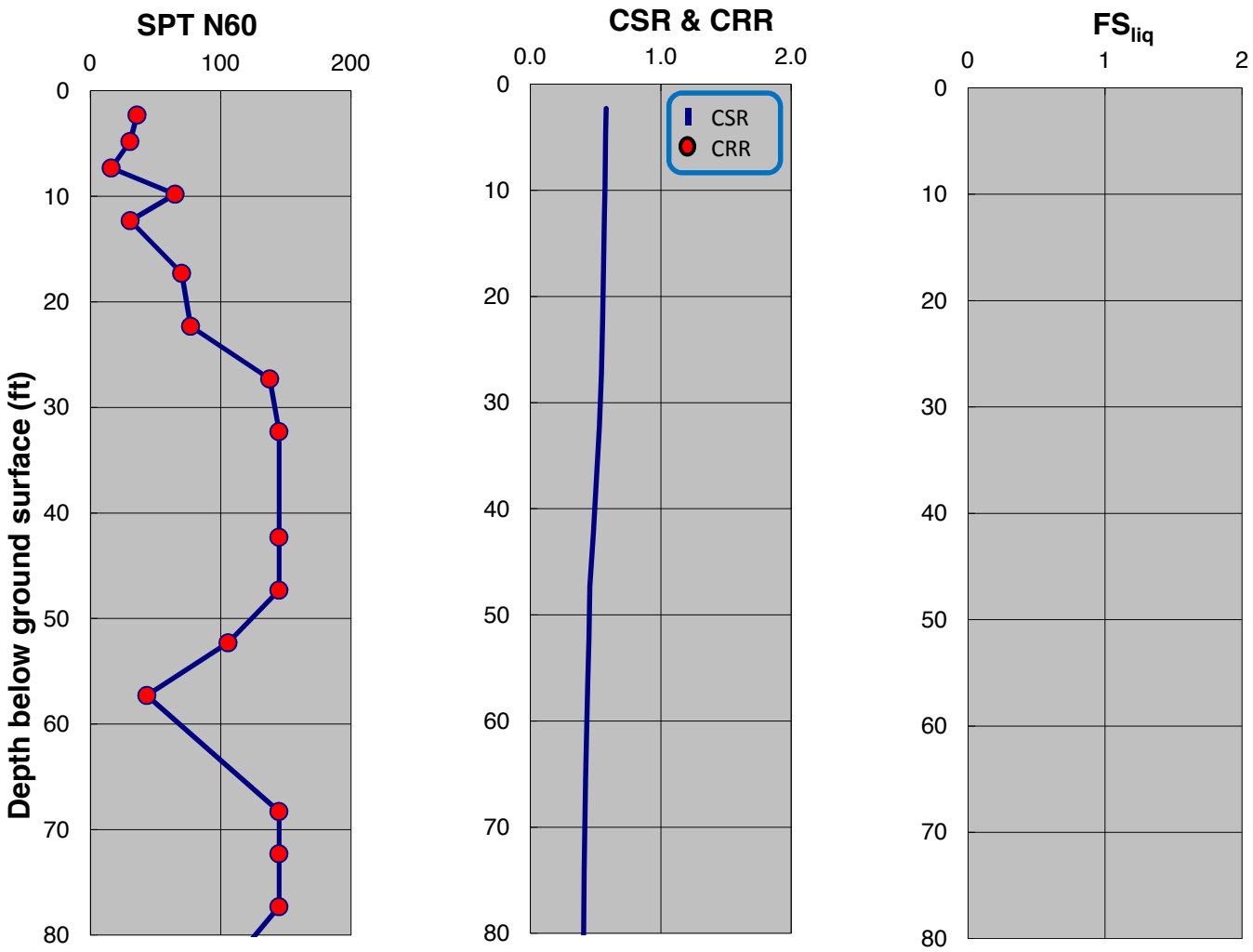
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-97 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



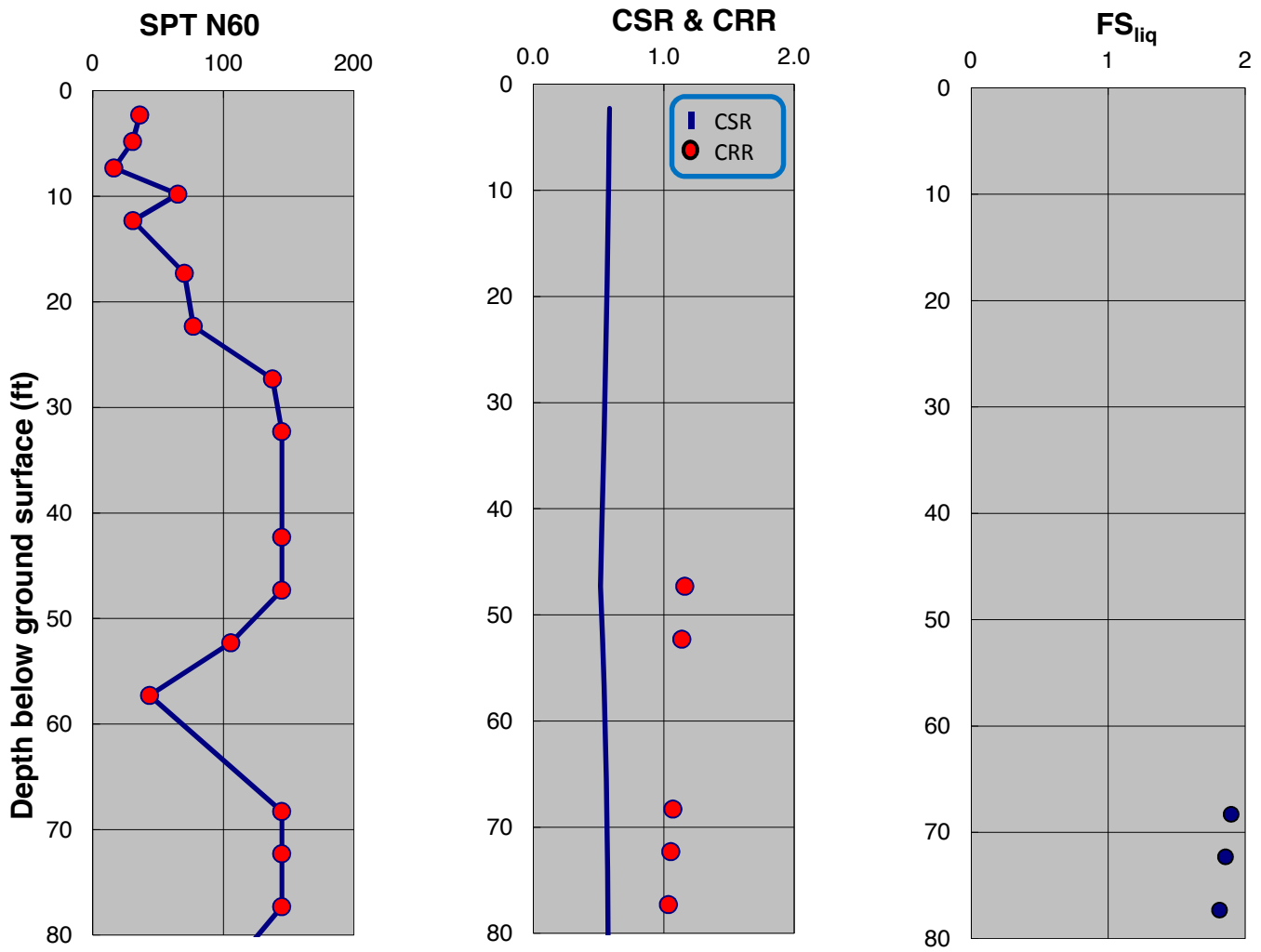
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-97 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



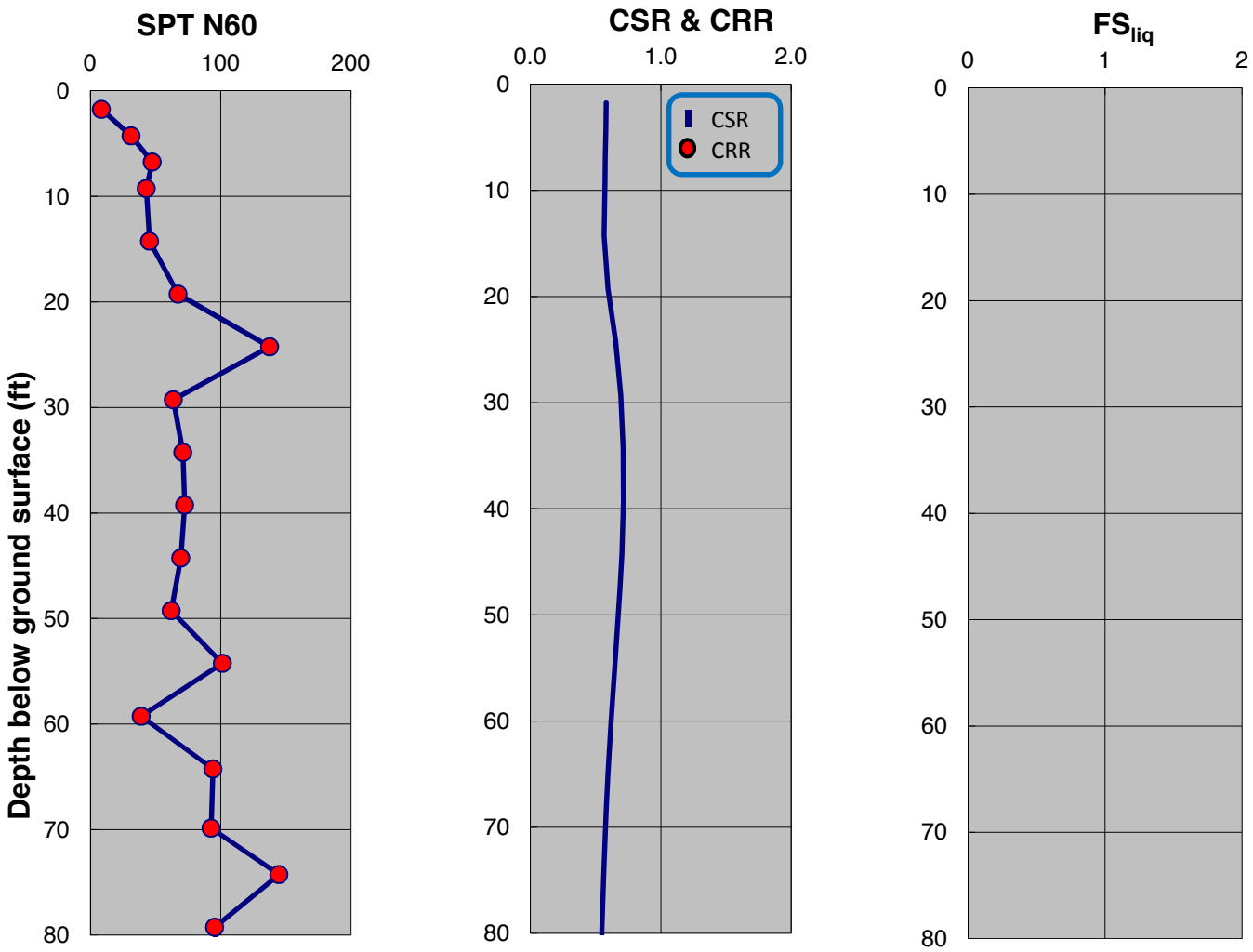
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-98 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



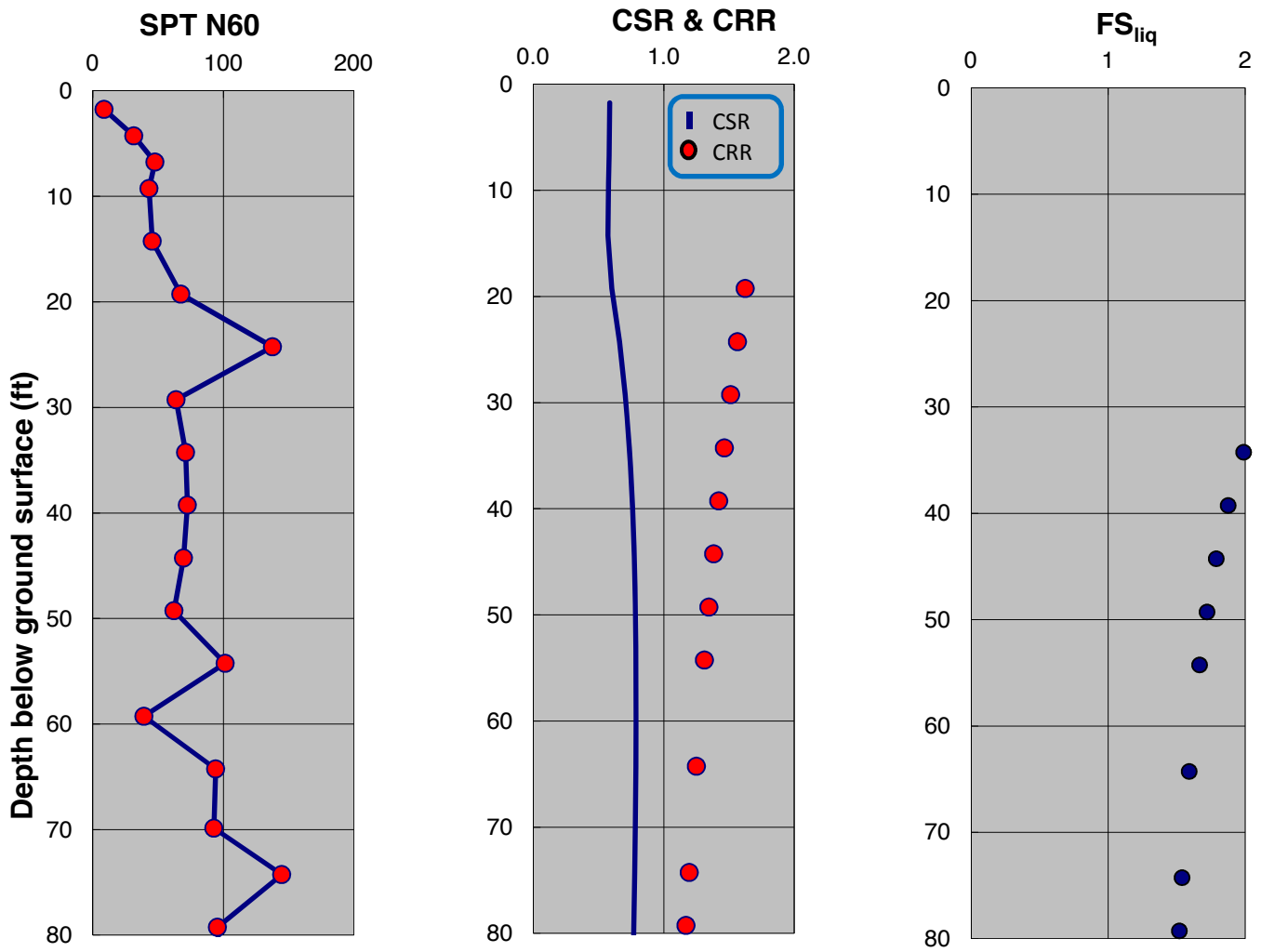
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-98 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



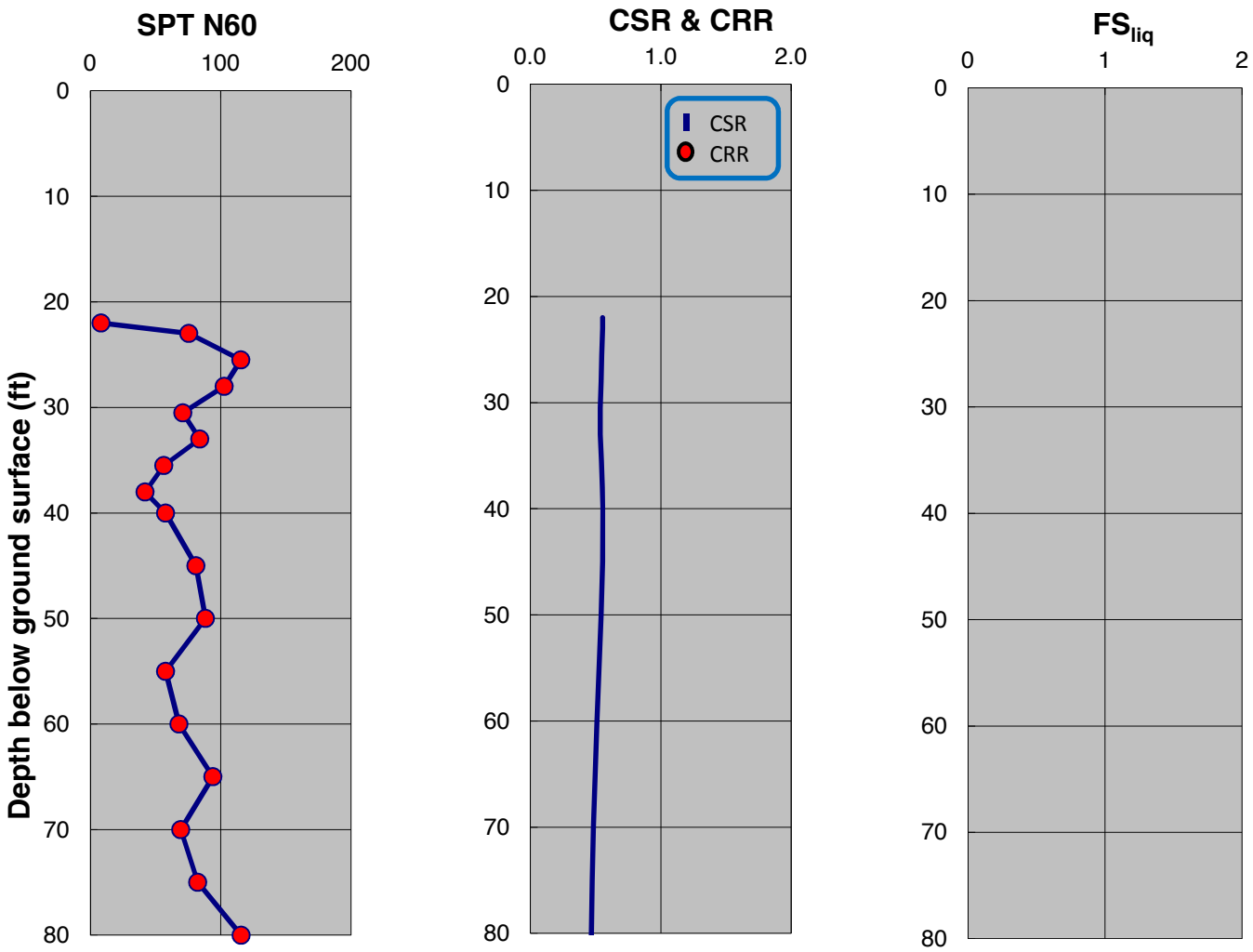
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-99 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



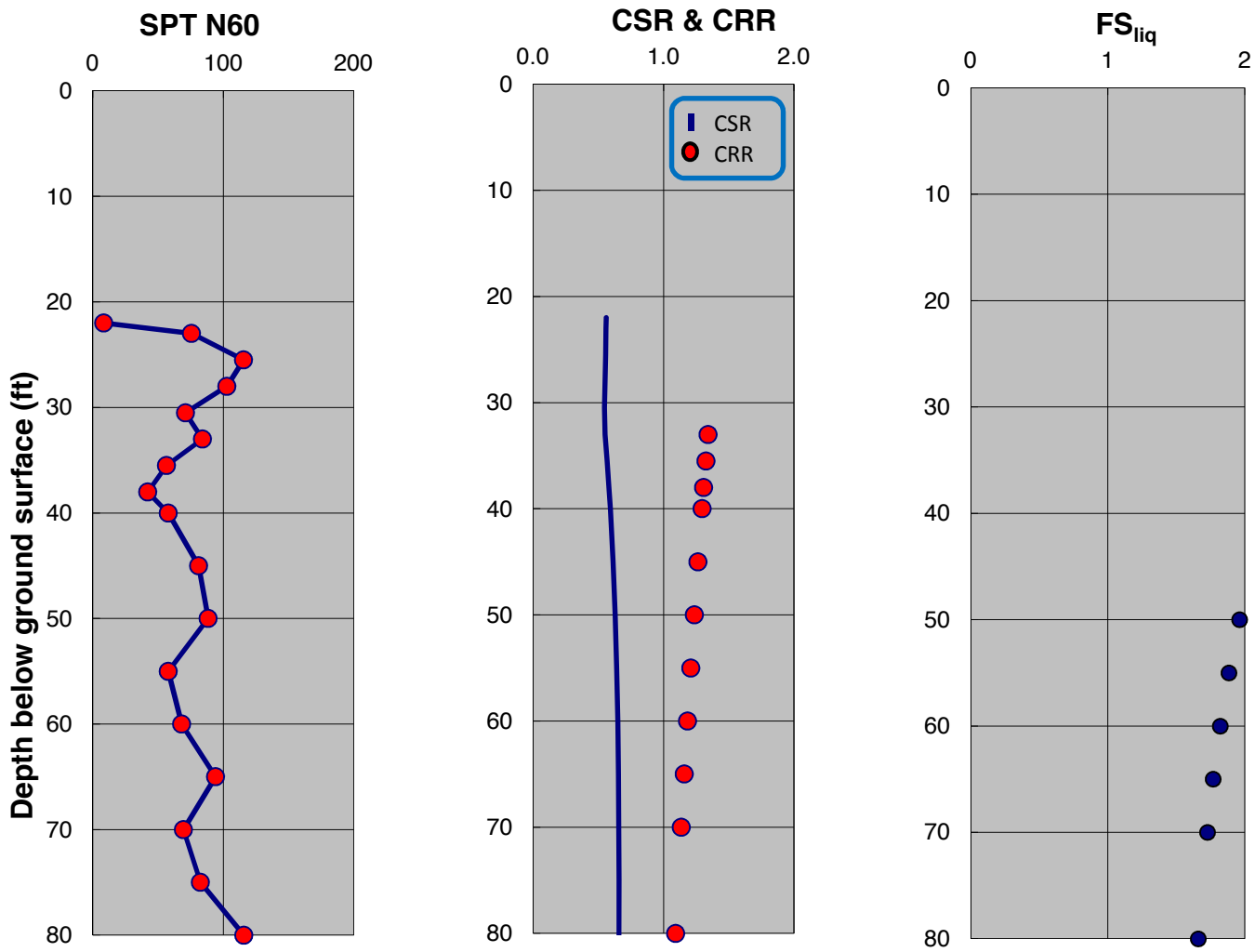
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-99 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



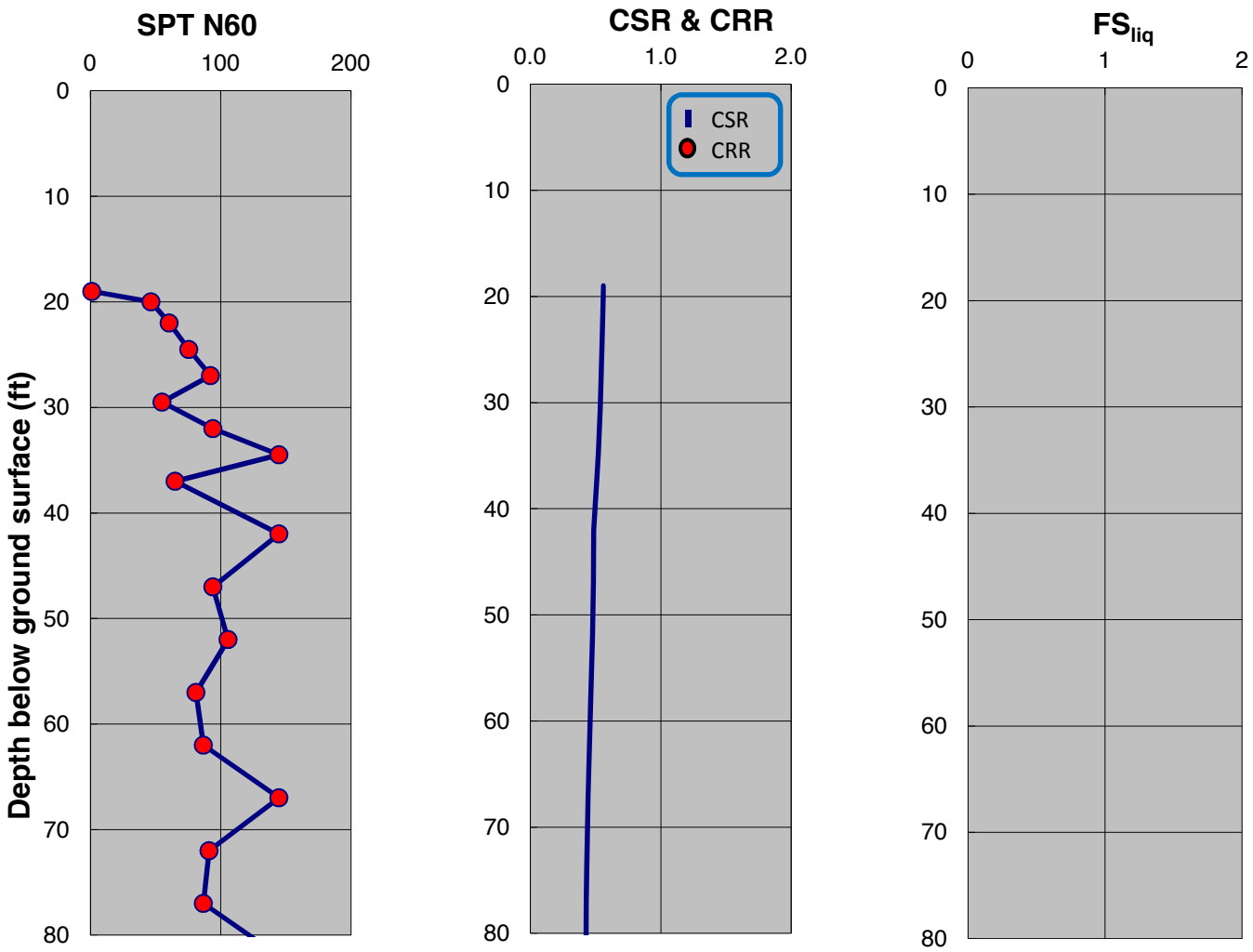
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-101 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



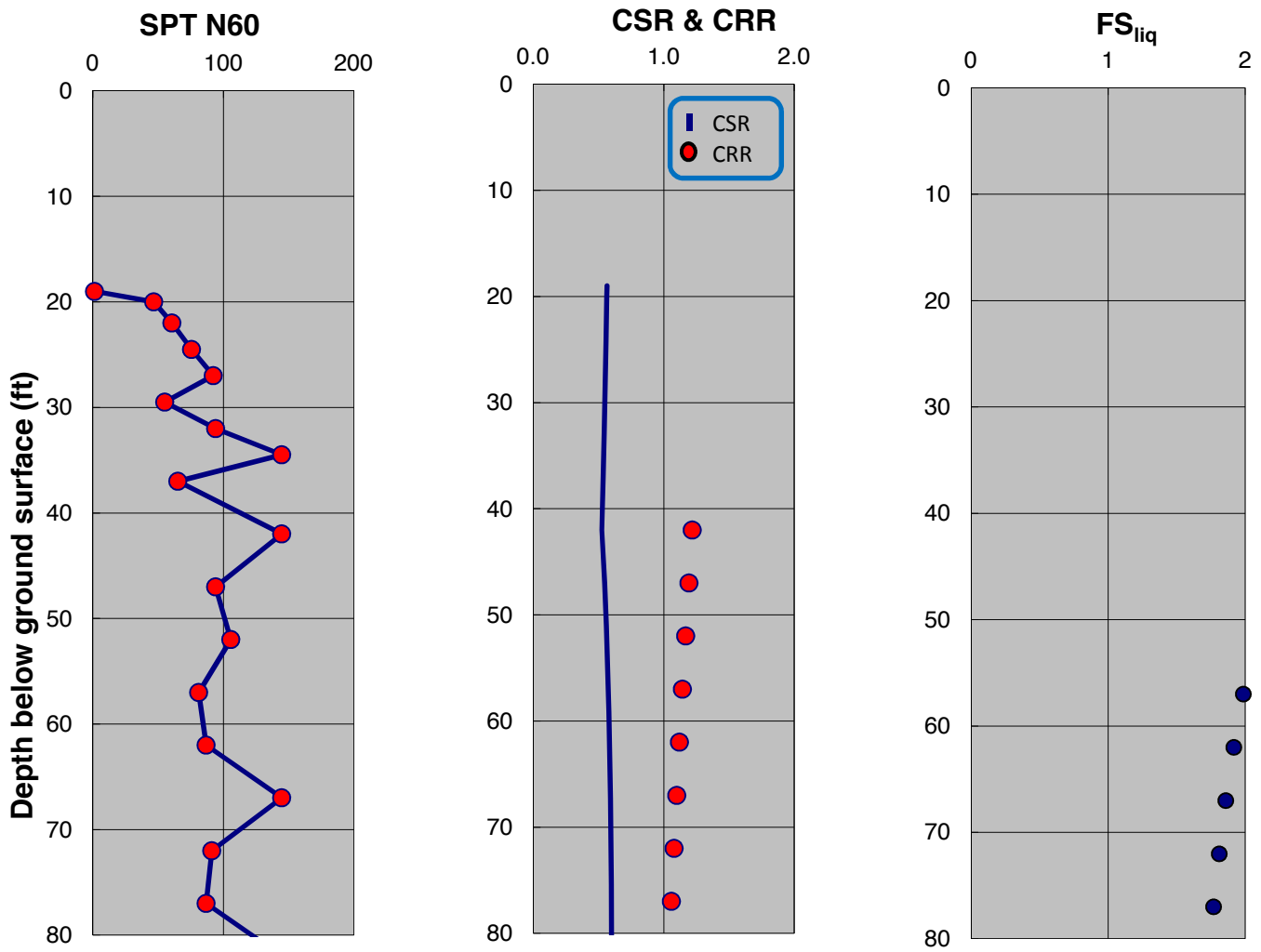
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-101 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



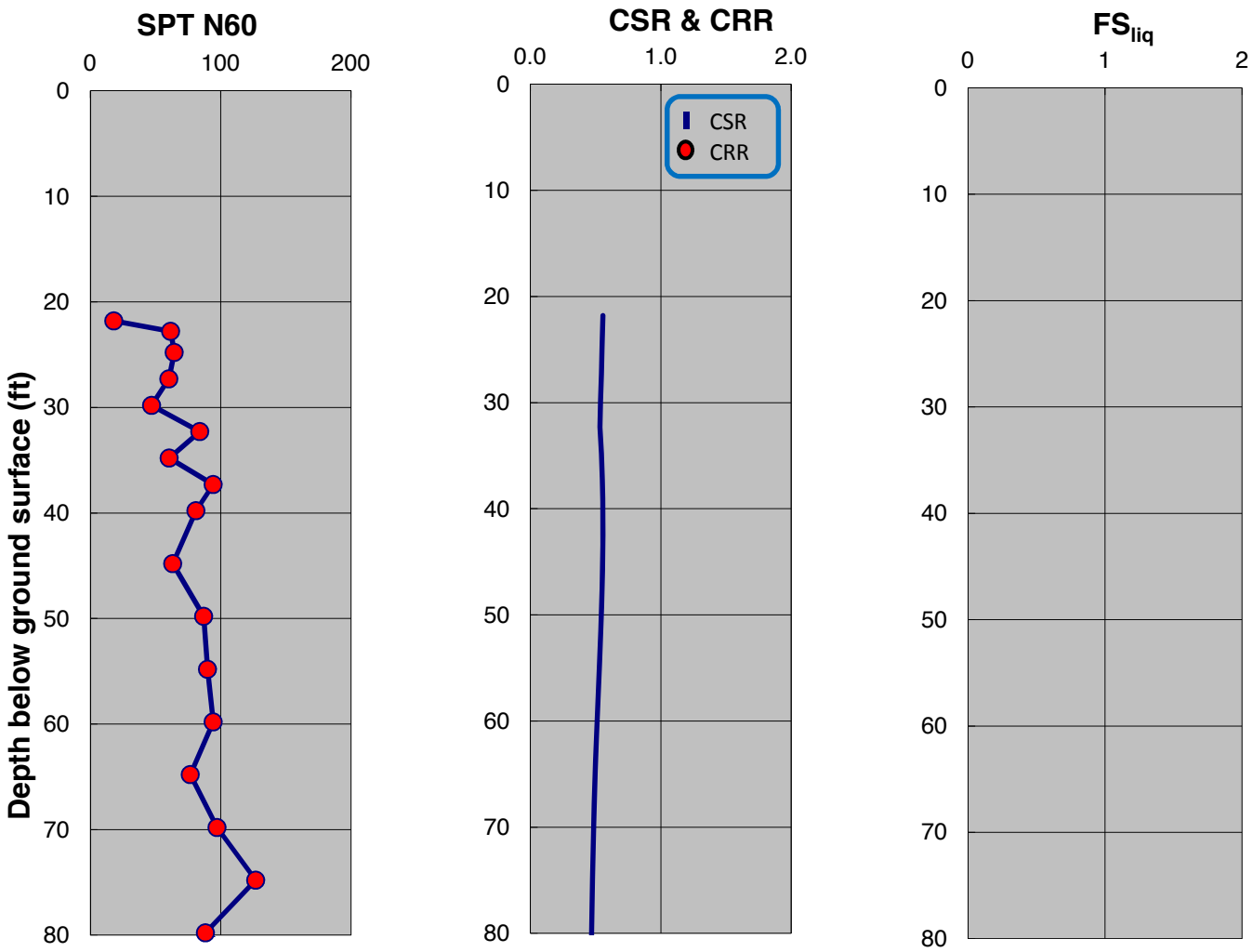
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-102 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



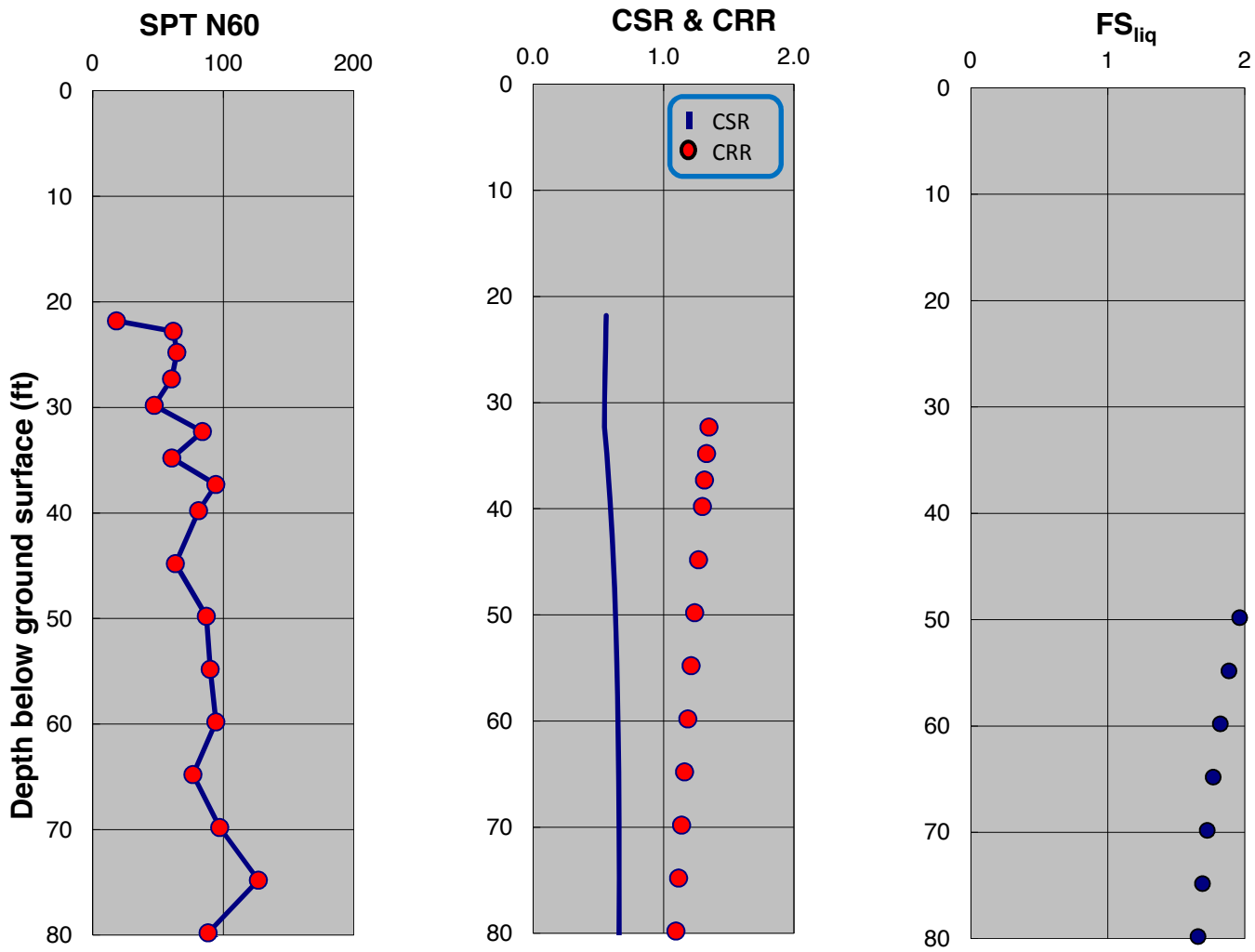
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-102 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



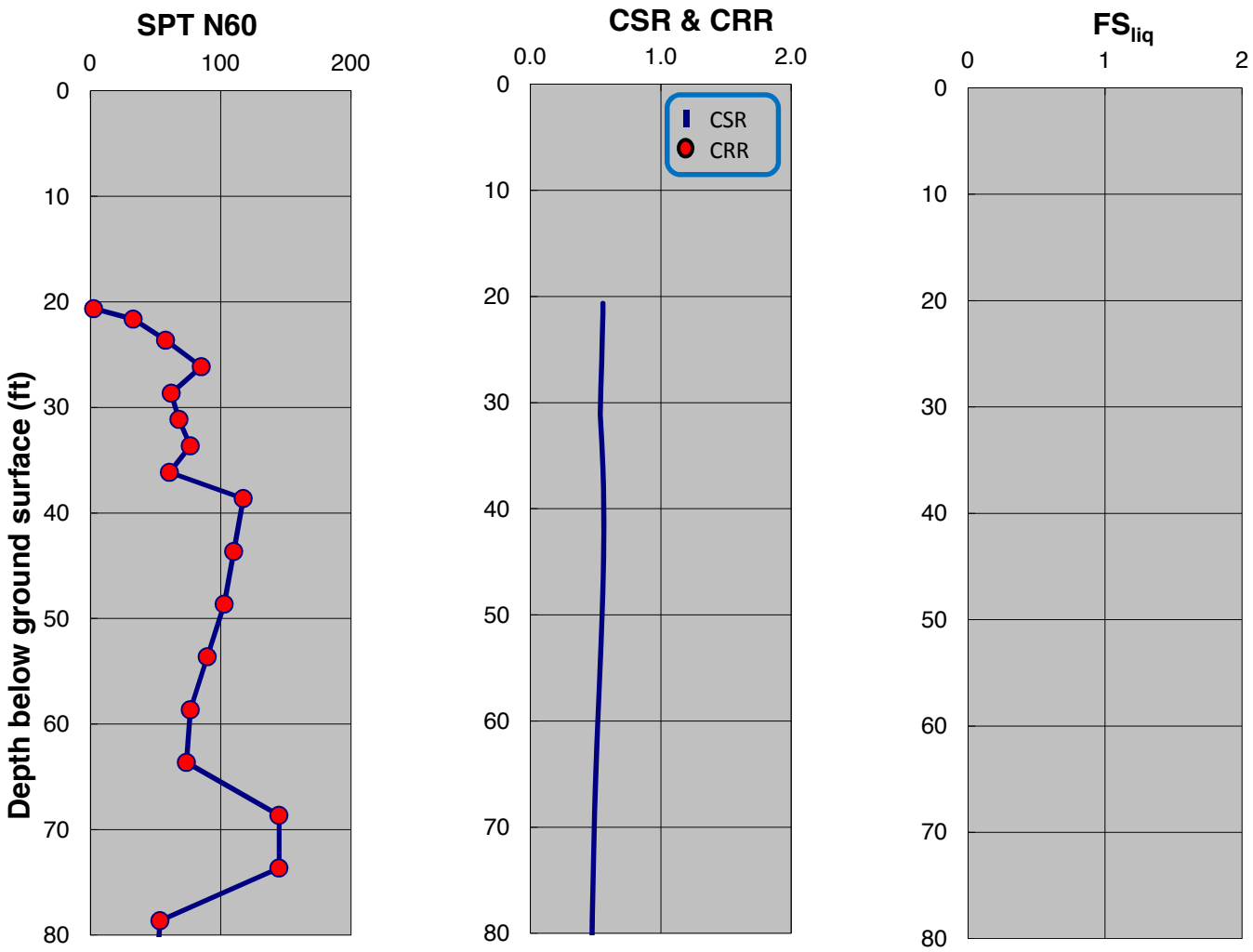
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-104 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



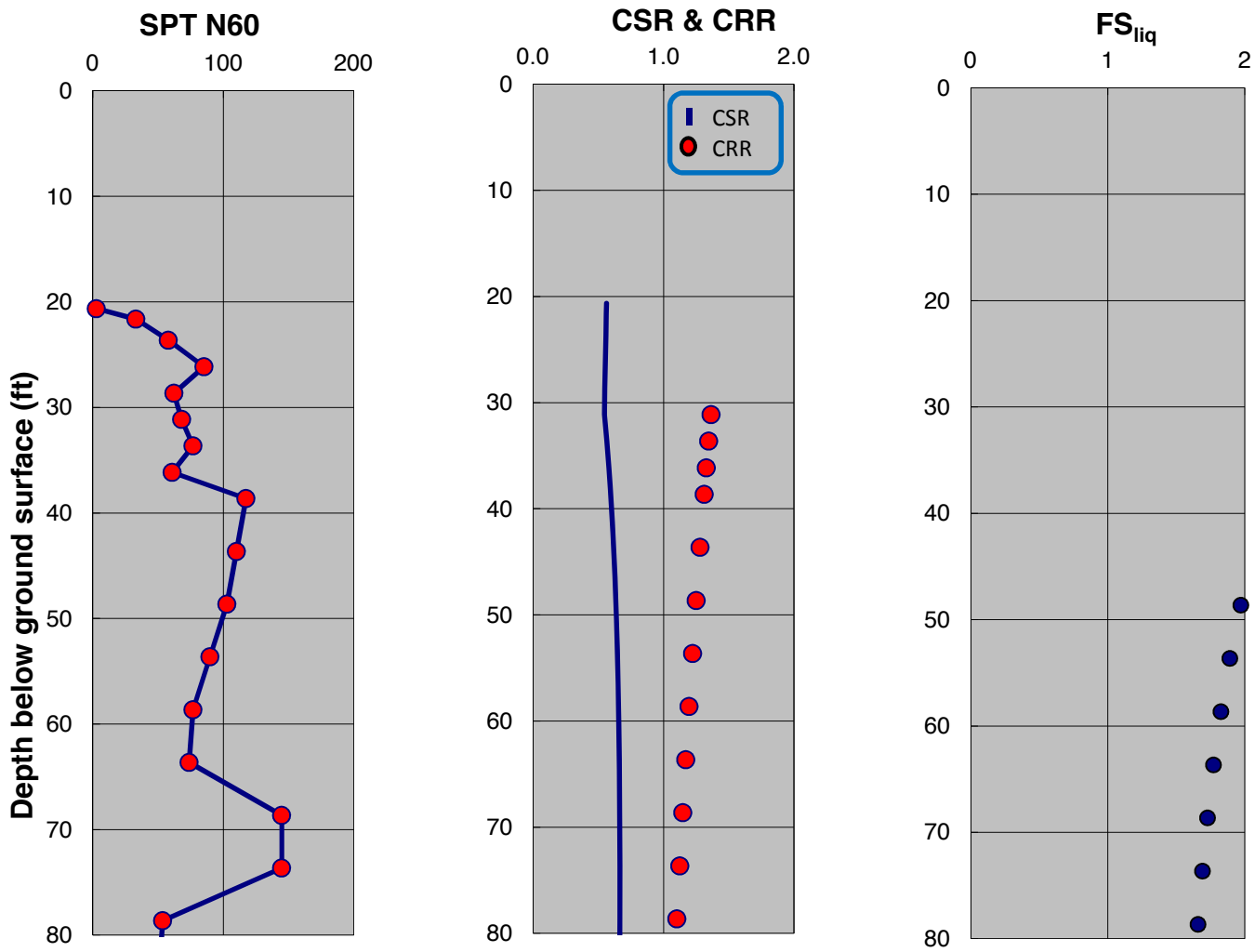
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-104 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



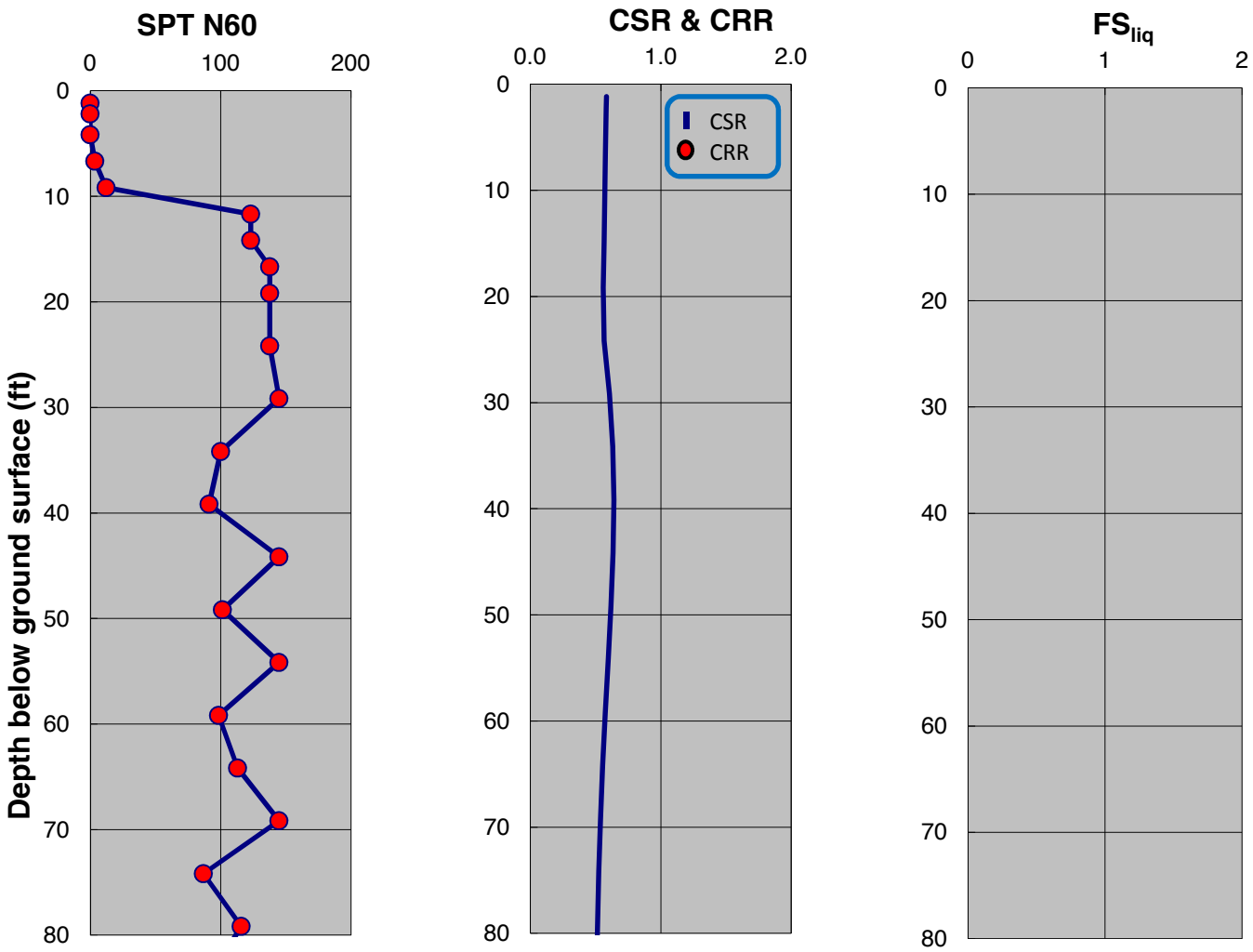
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-105 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



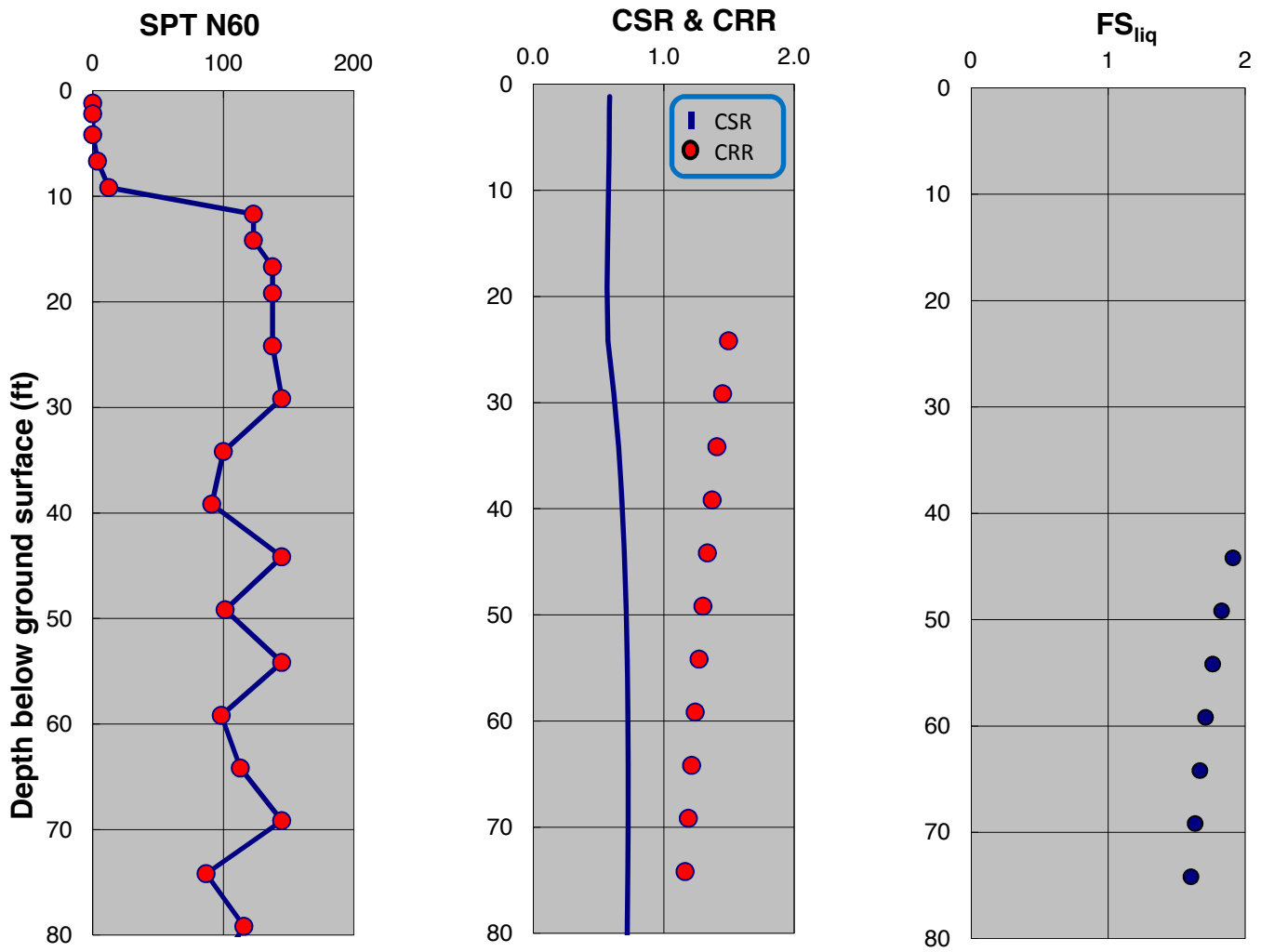
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-105 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



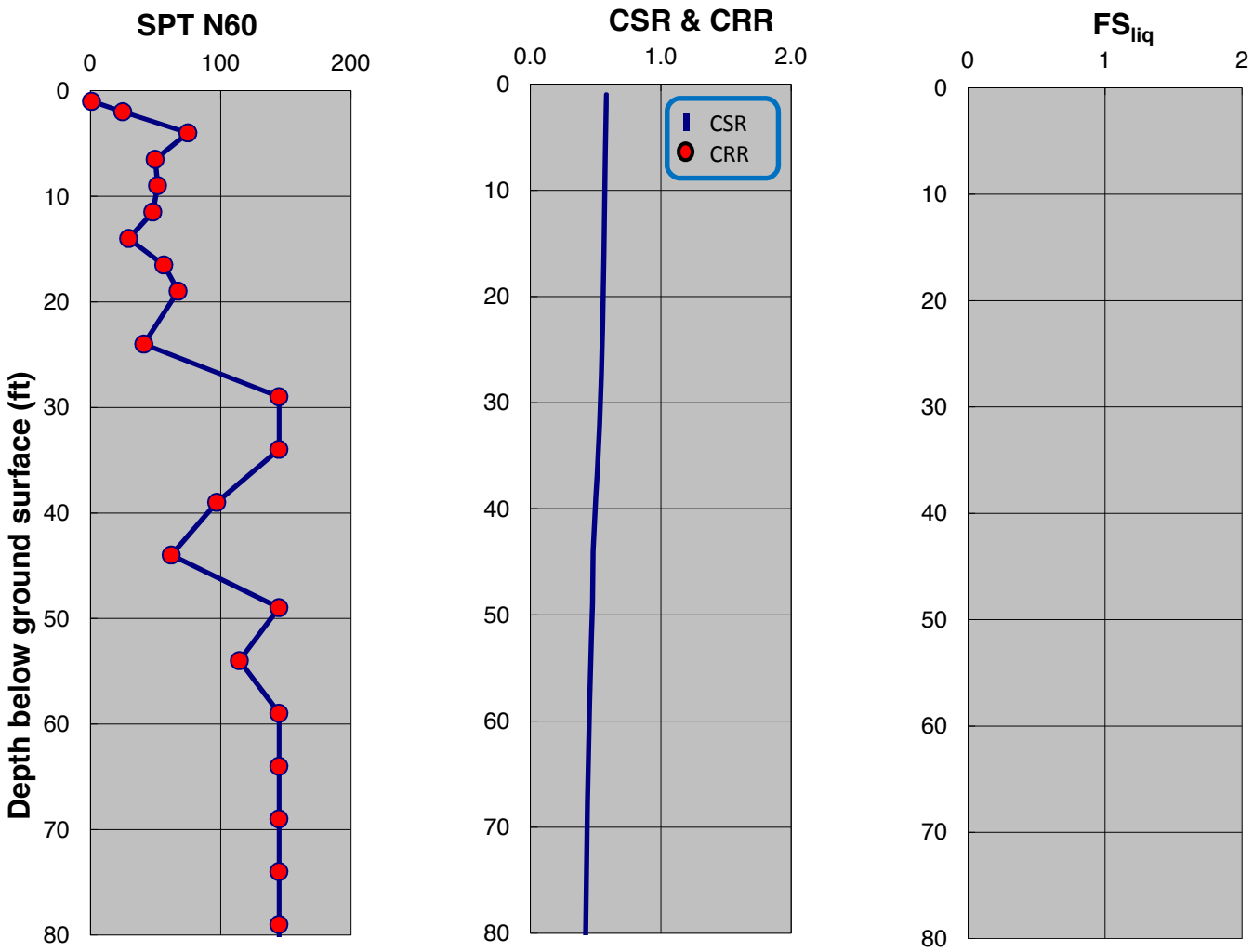
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-107 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



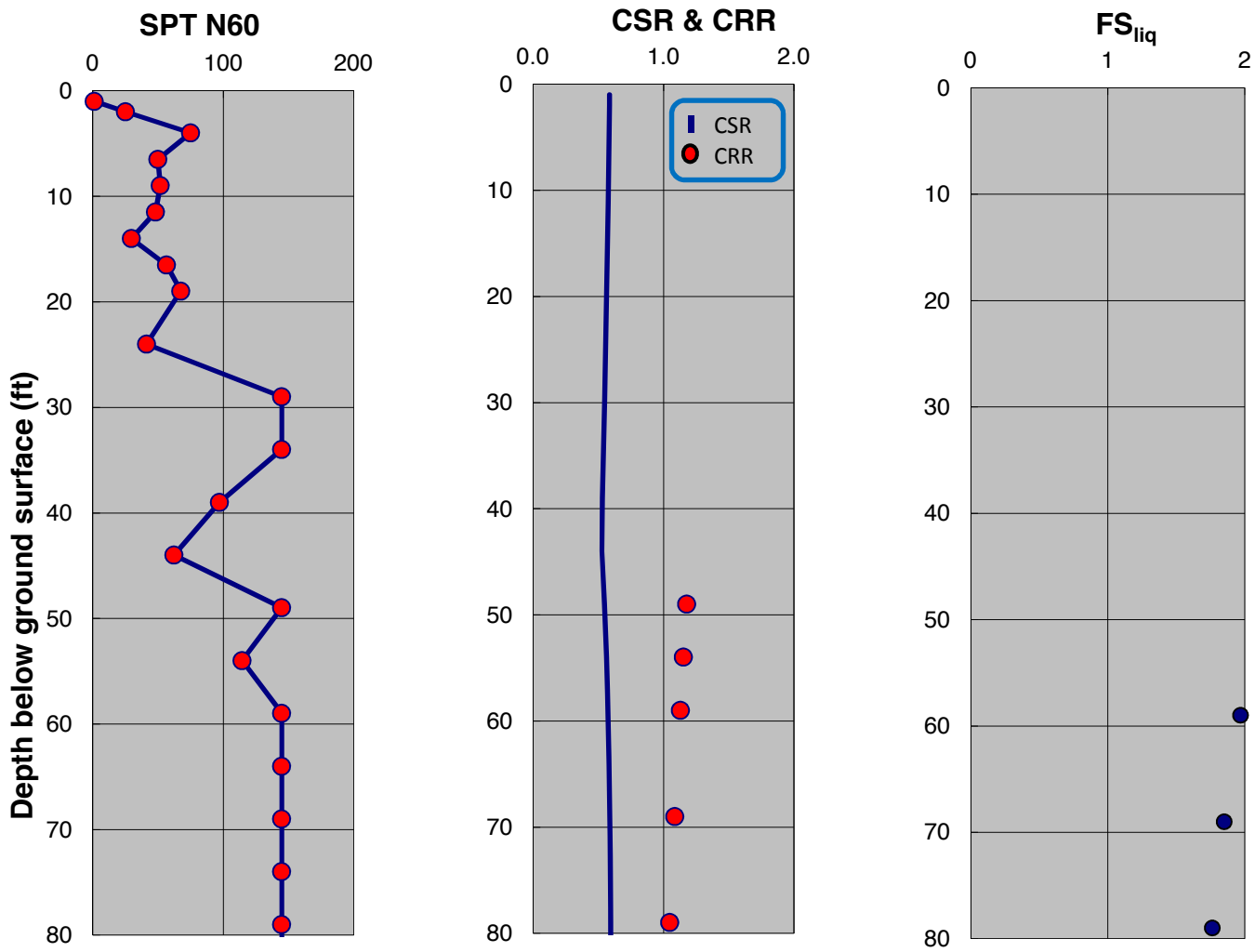
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-107 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



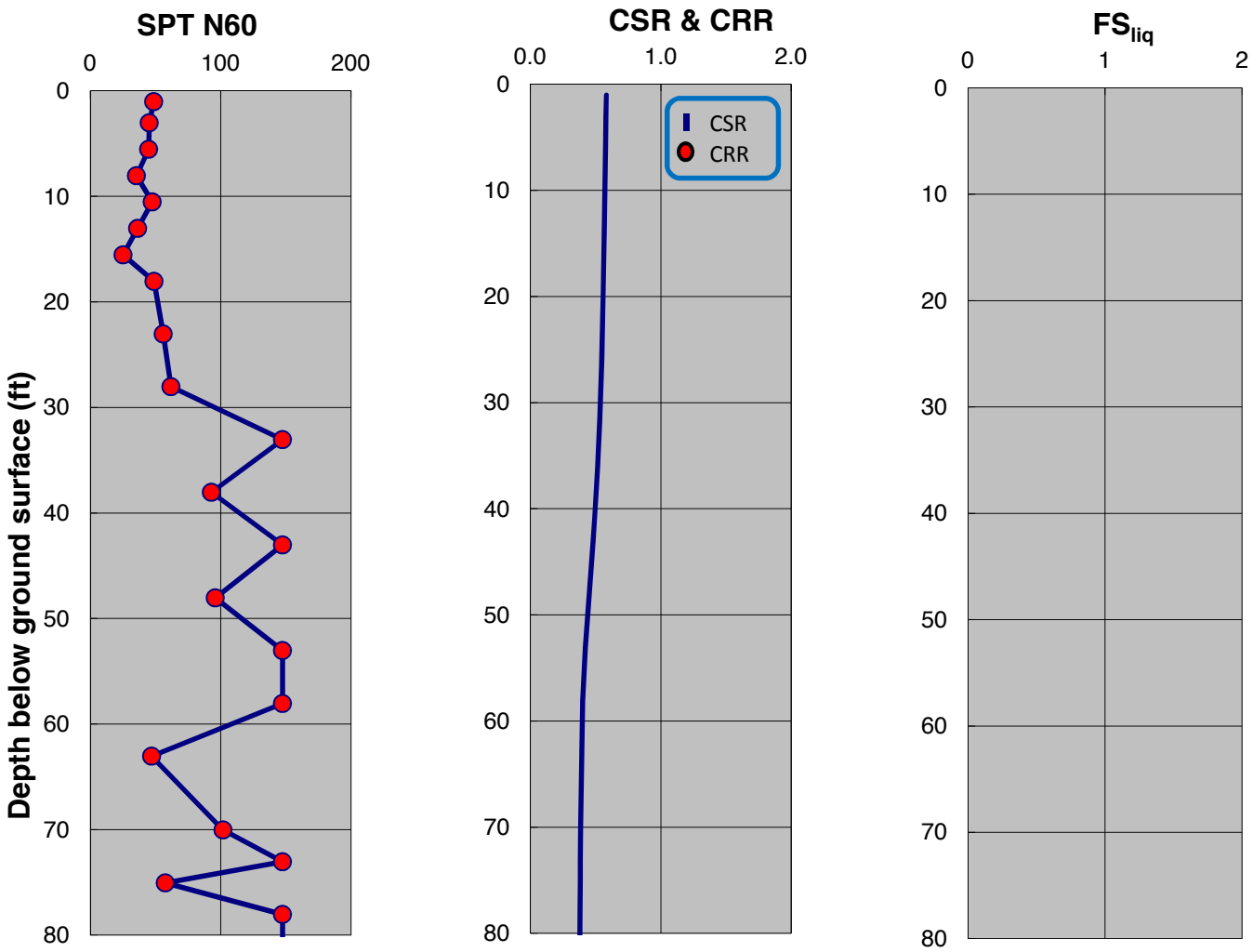
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-110 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



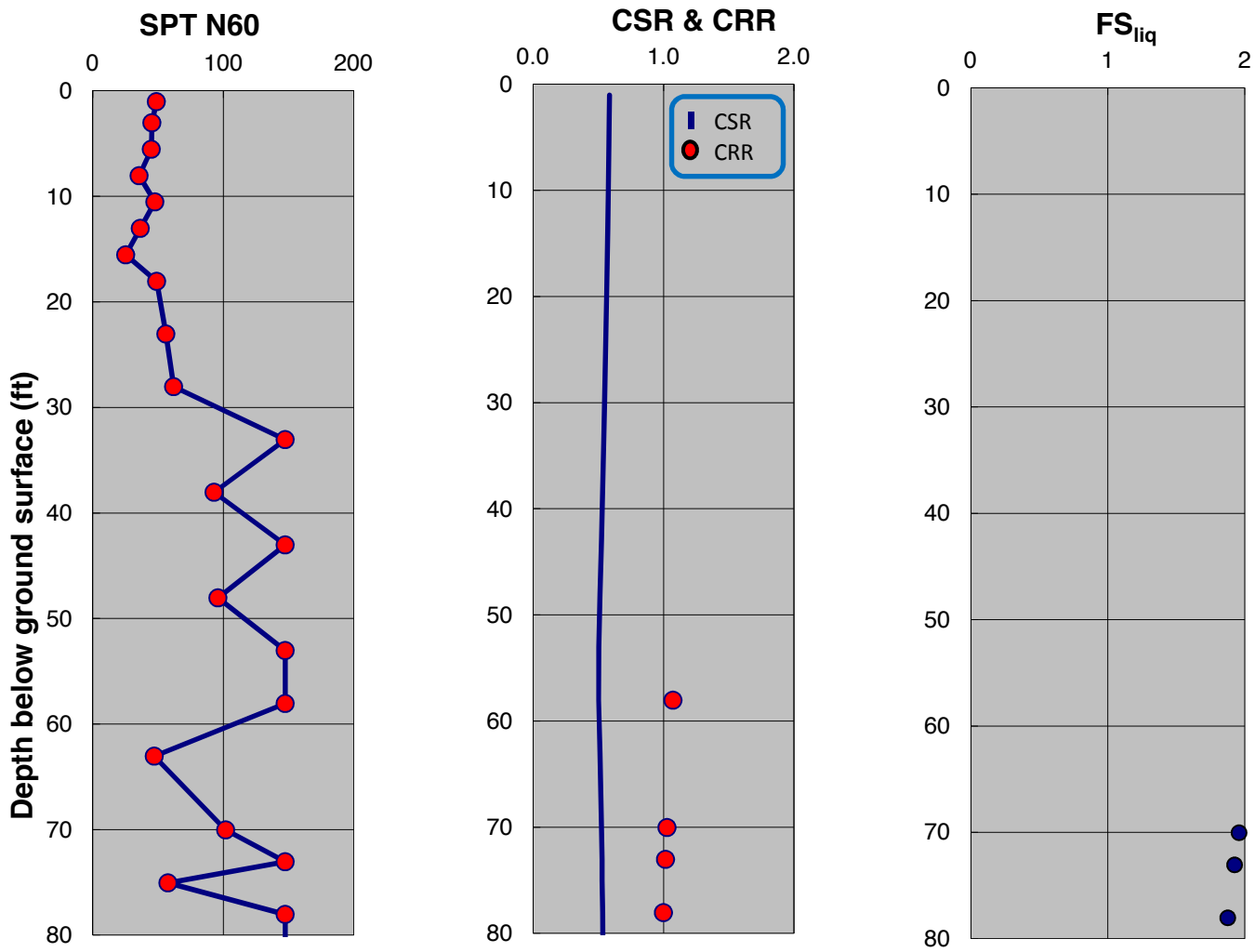
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-110 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



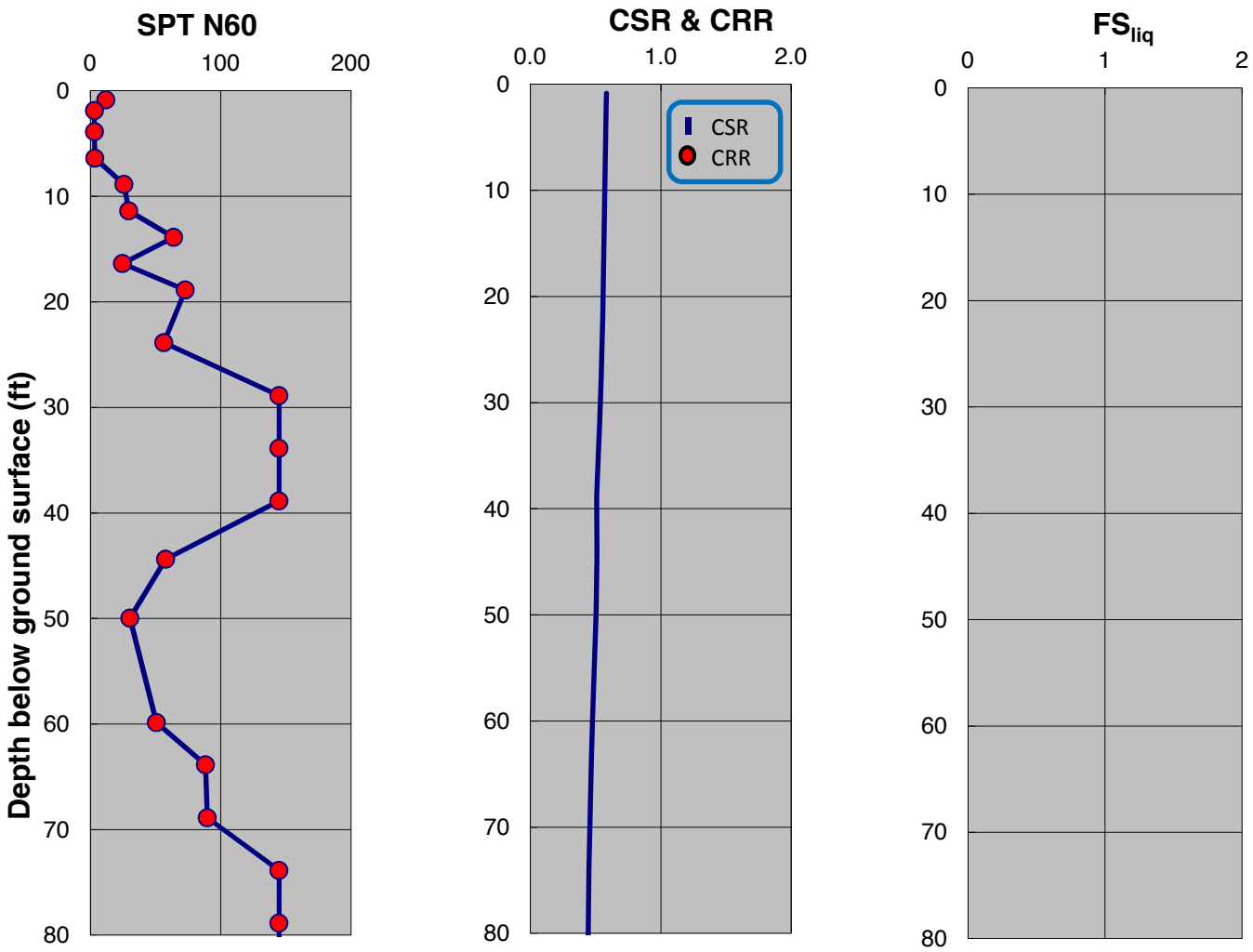
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-112 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



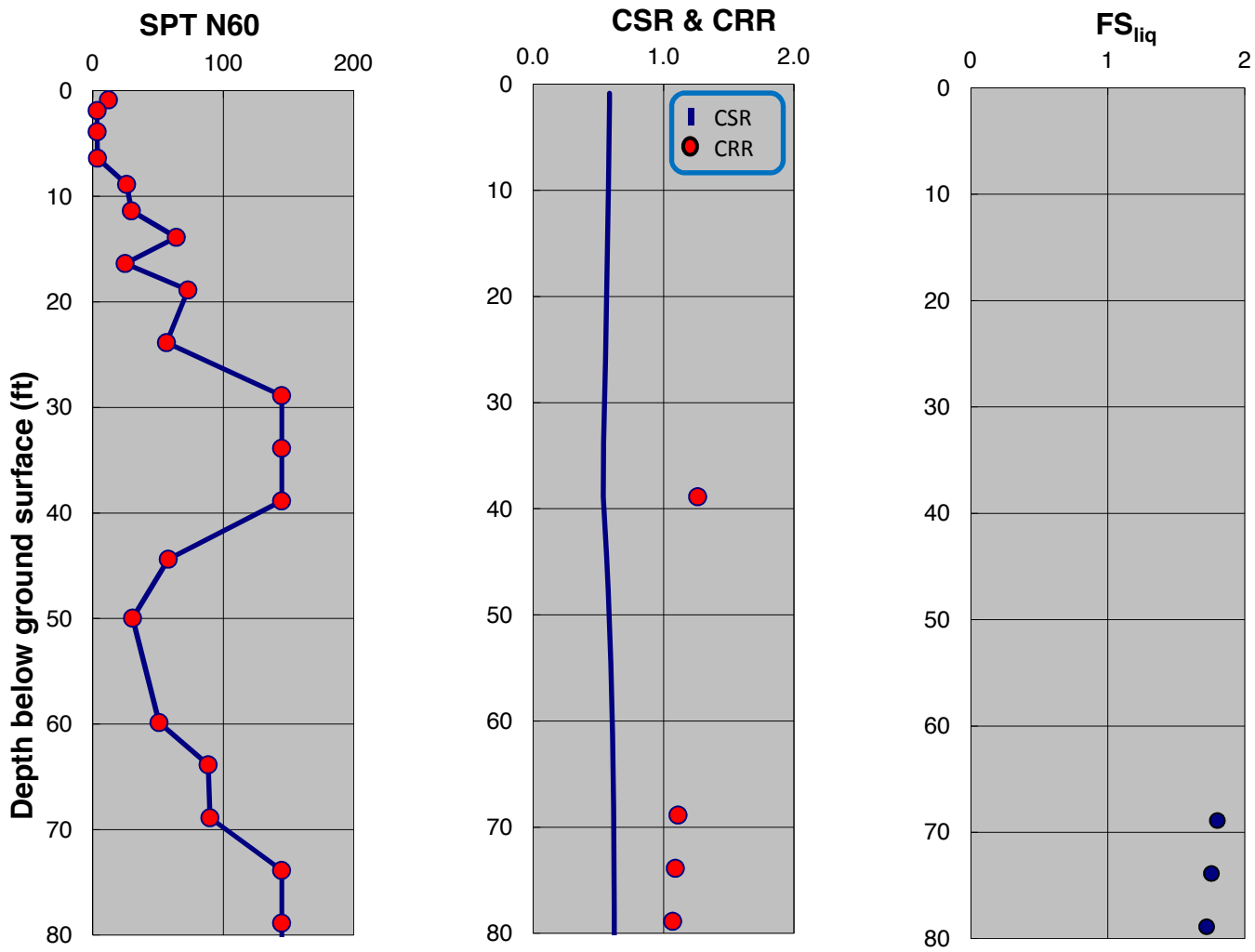
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-112 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-113 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

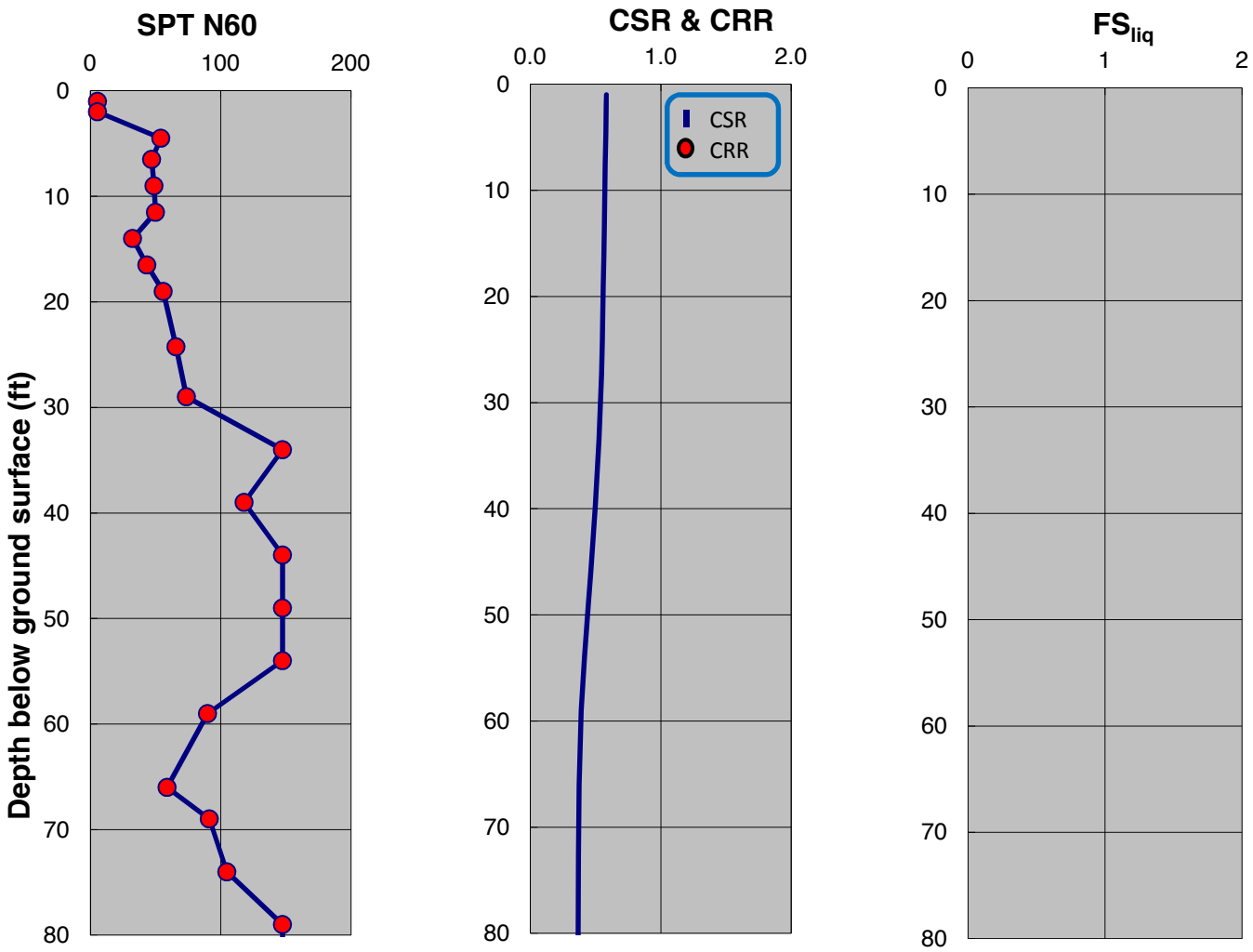
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-113 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

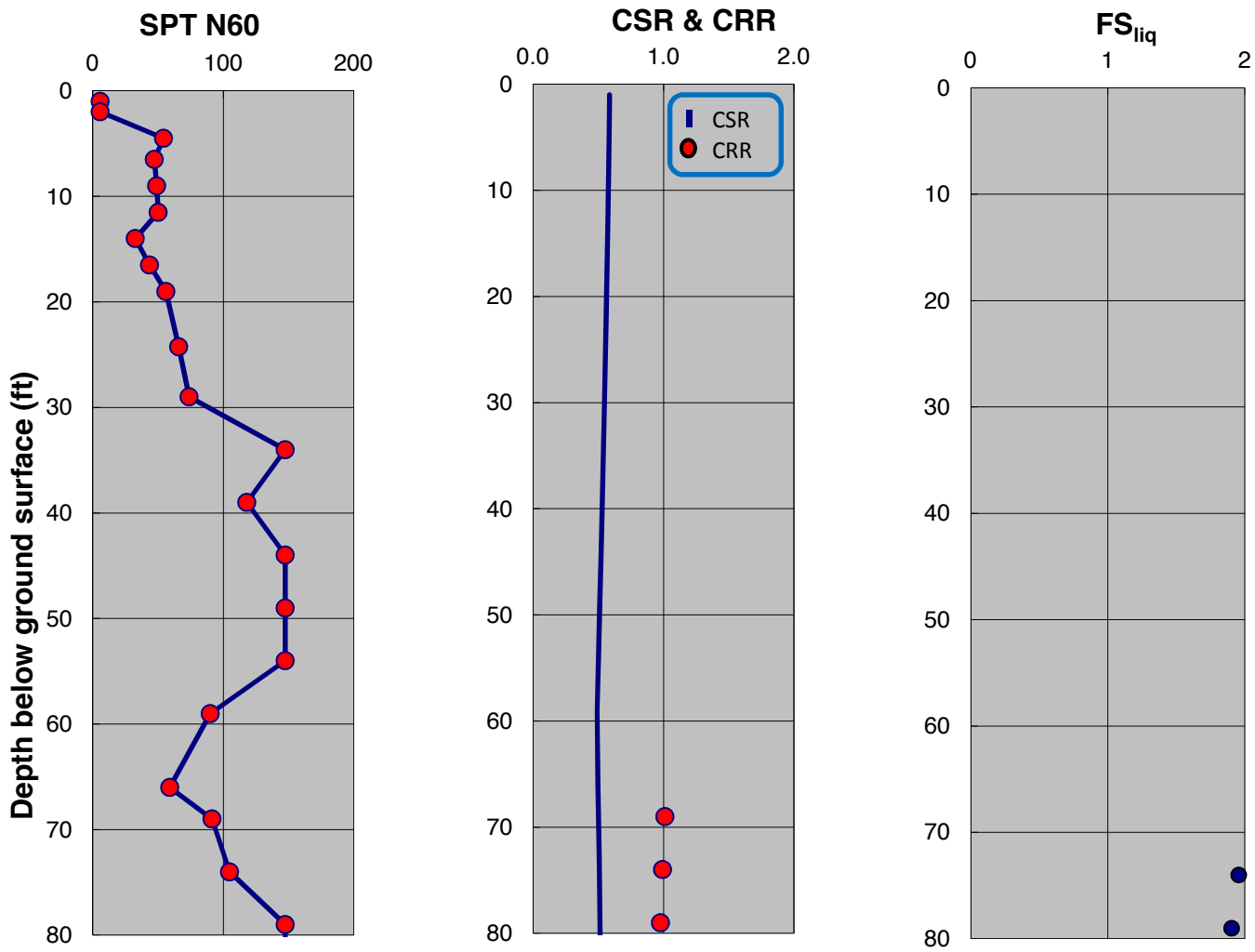
PLATE C.400



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-114 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

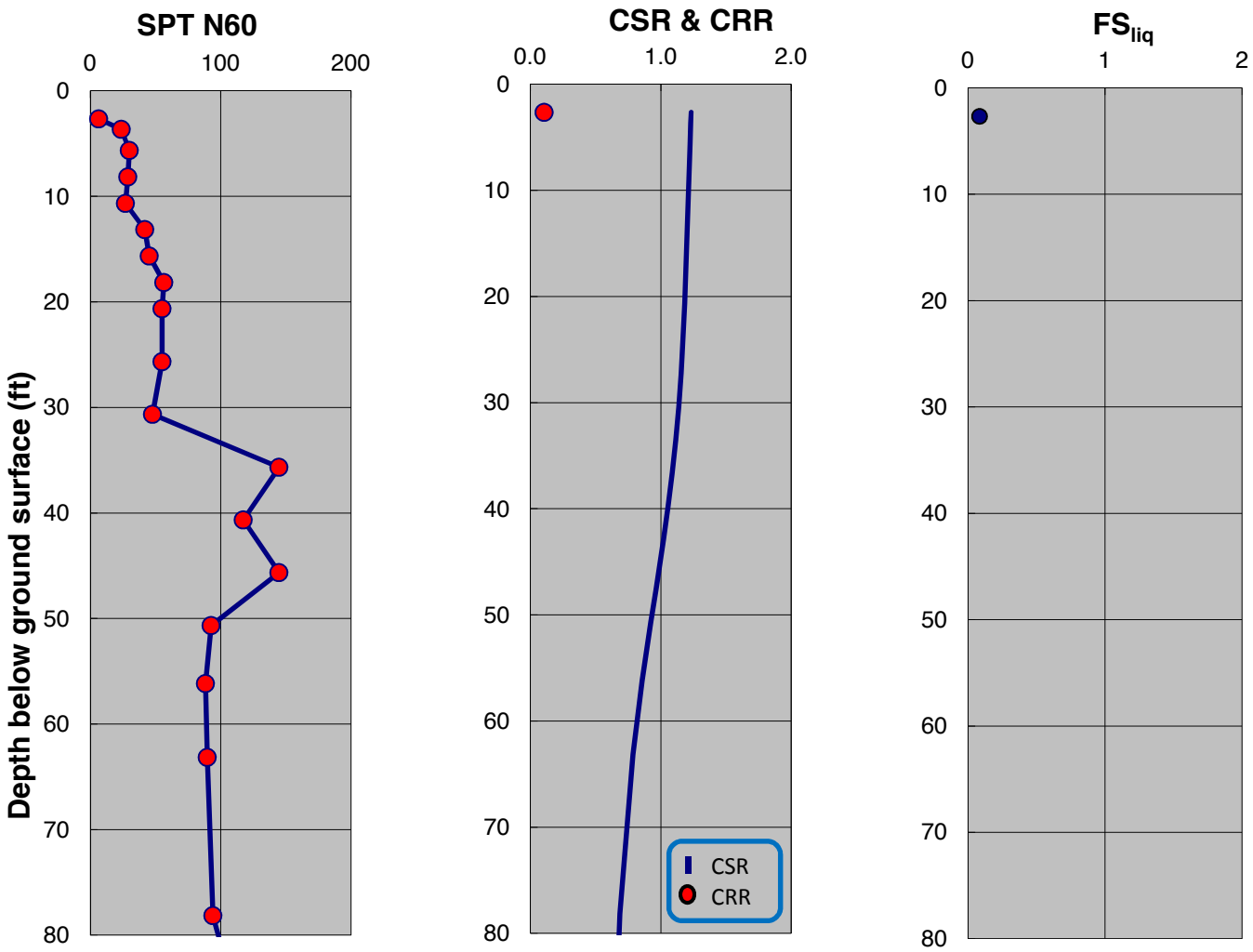
PLATE C.401



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-114 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

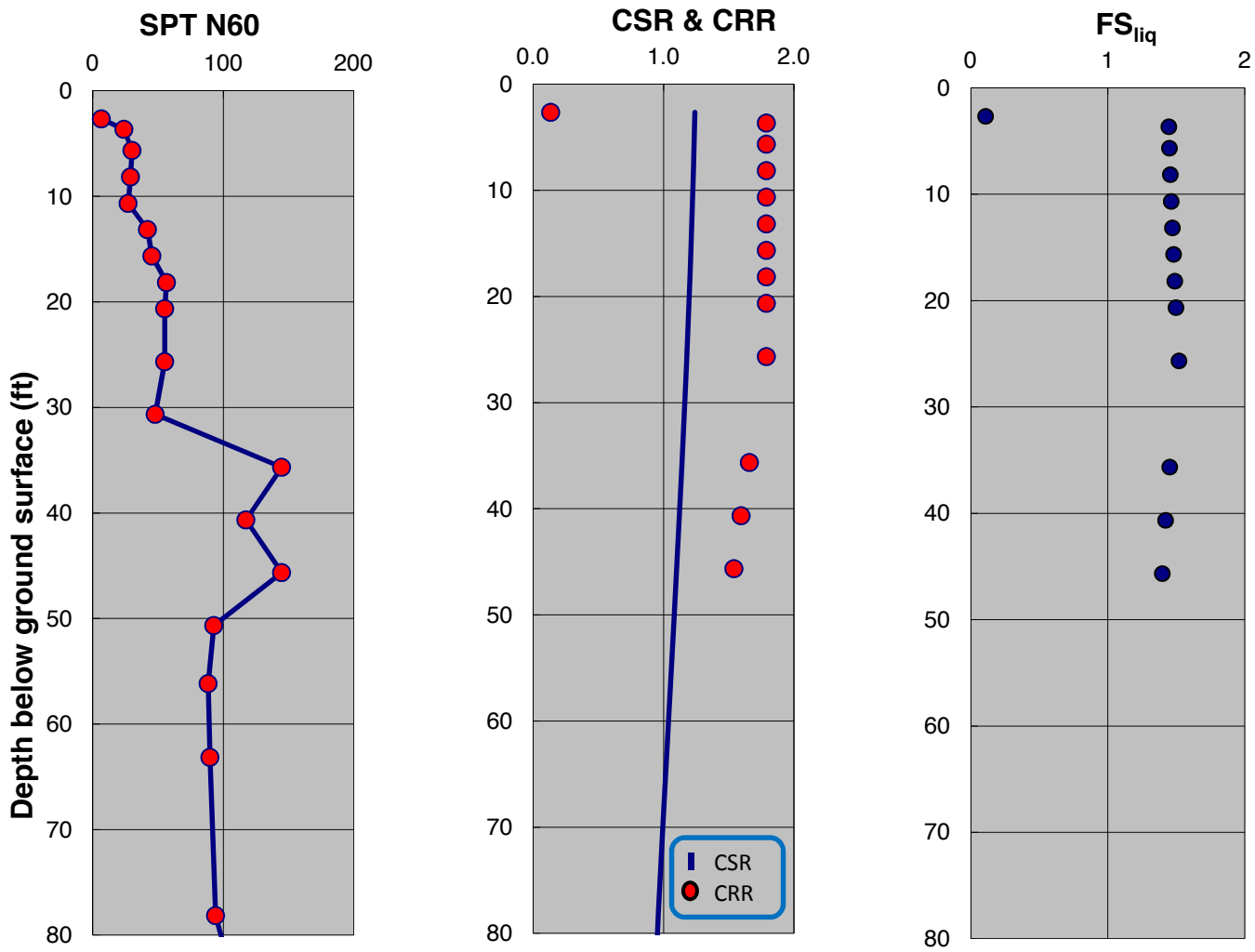
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.402



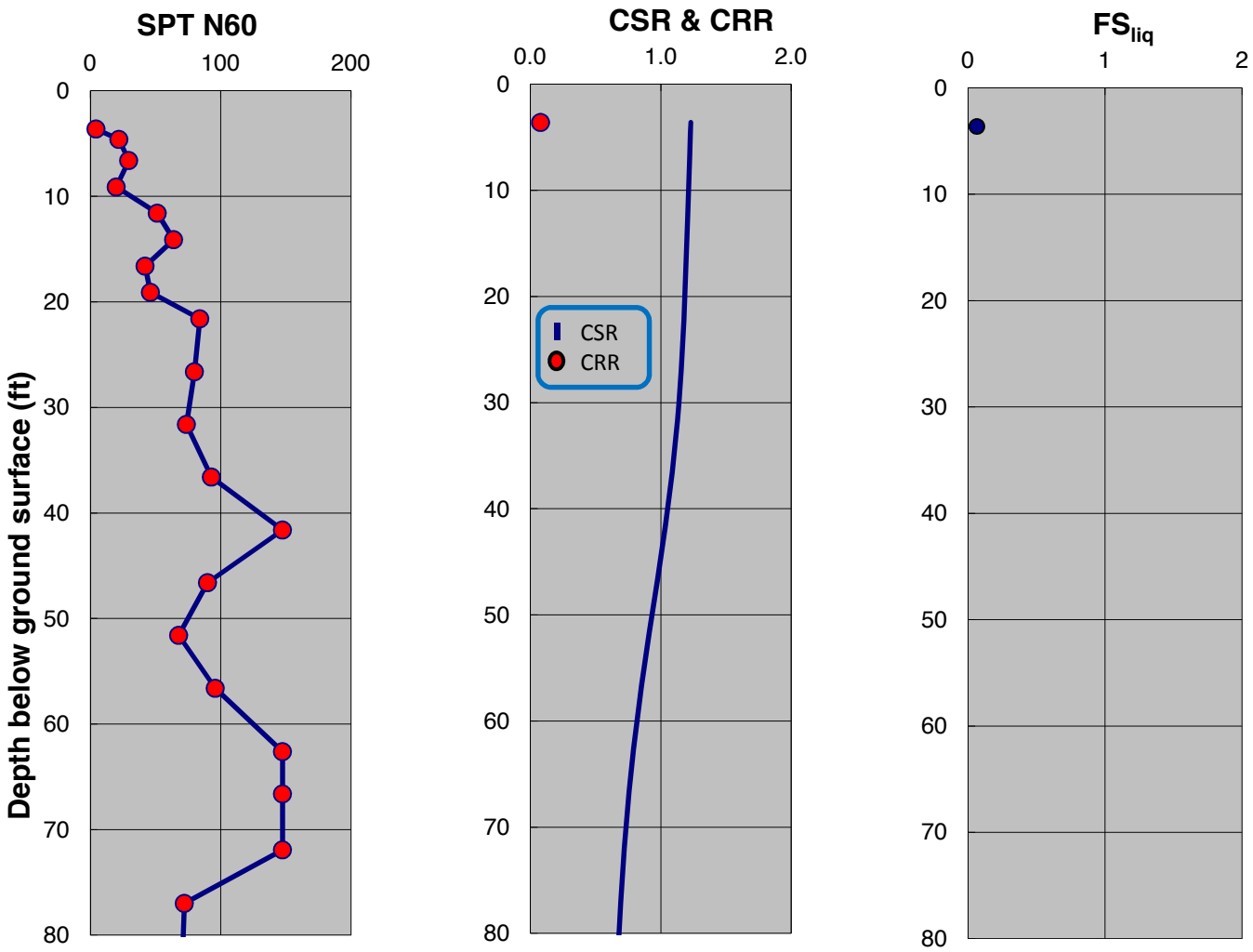
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-117 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



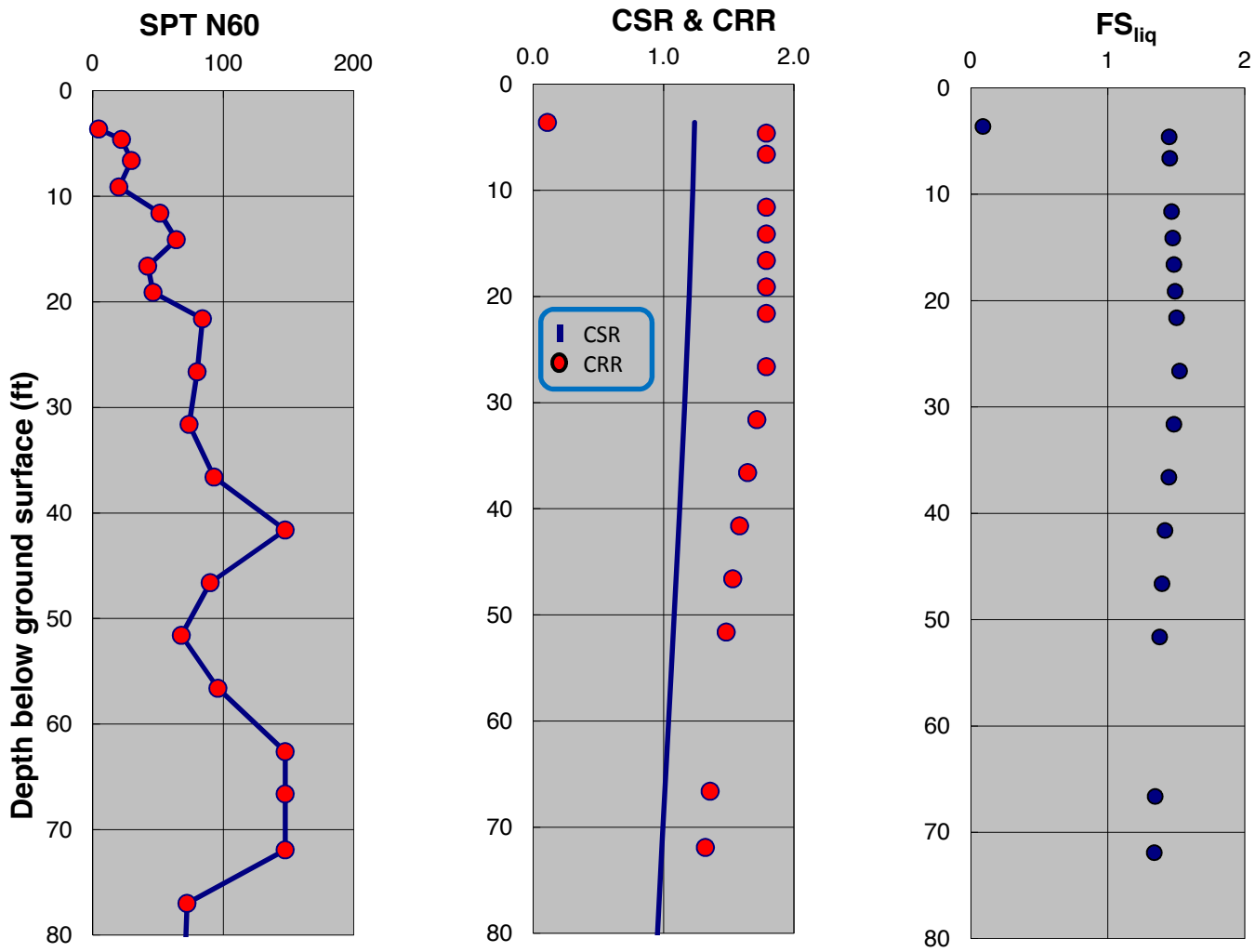
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-117 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



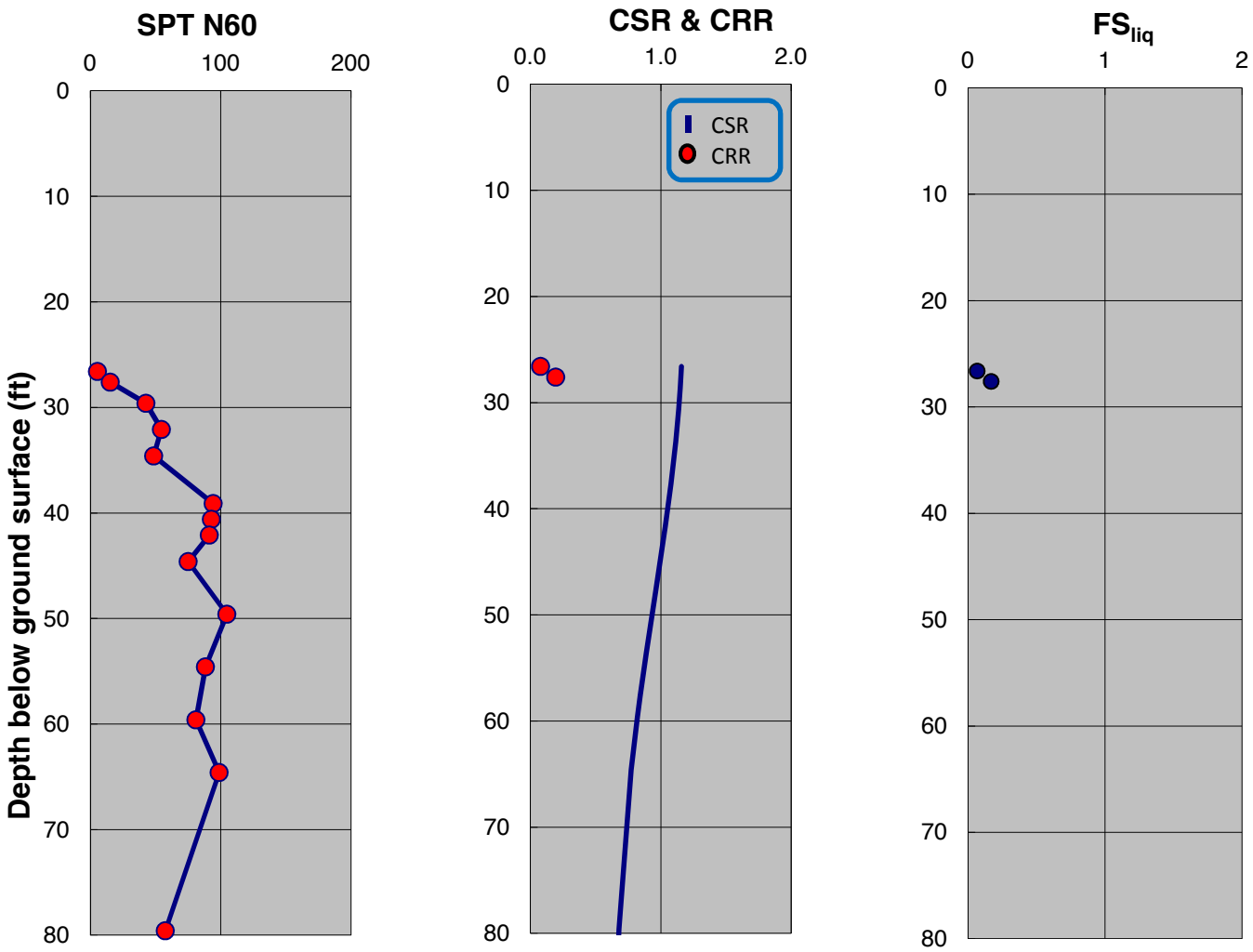
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-120 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



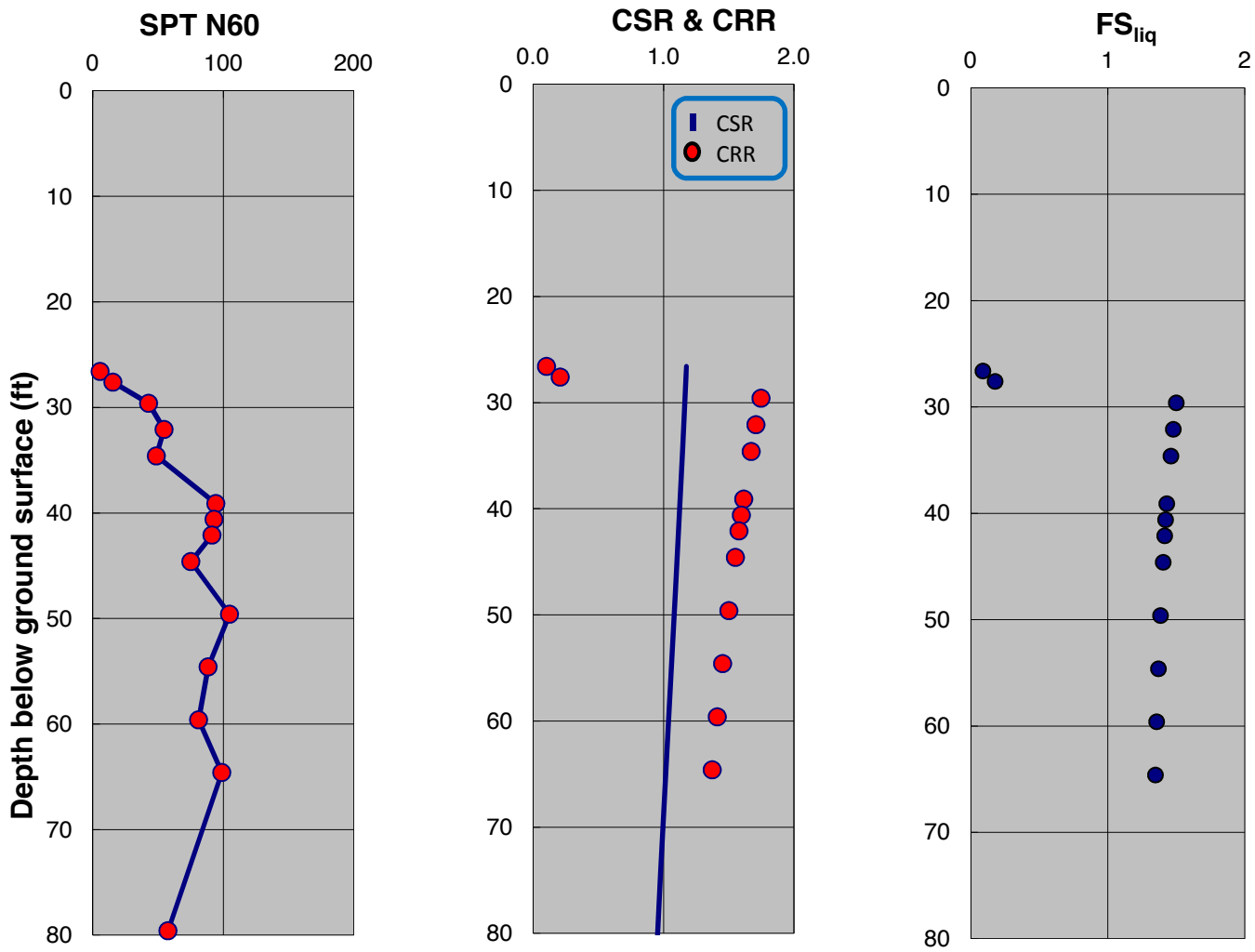
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-120 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



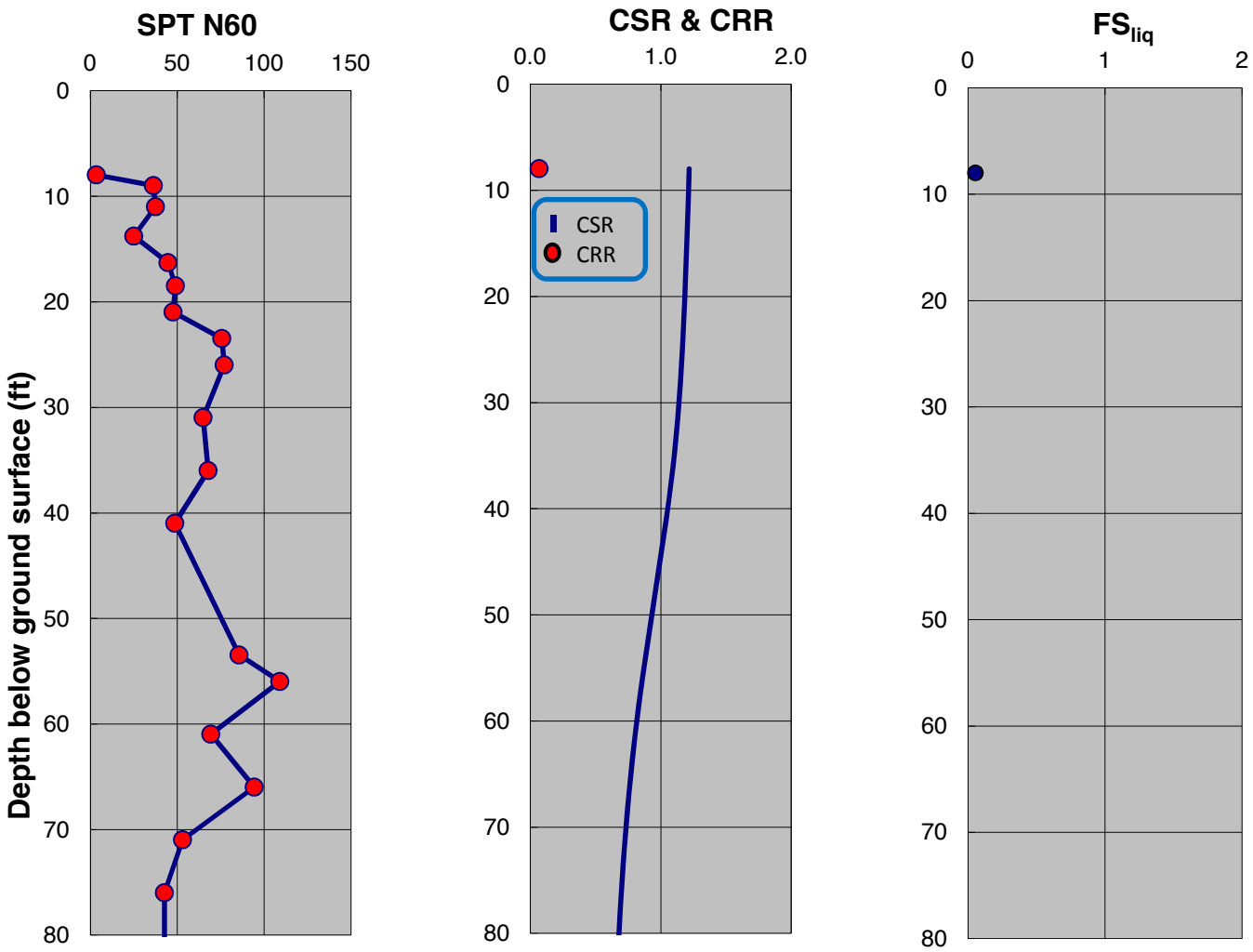
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-121 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



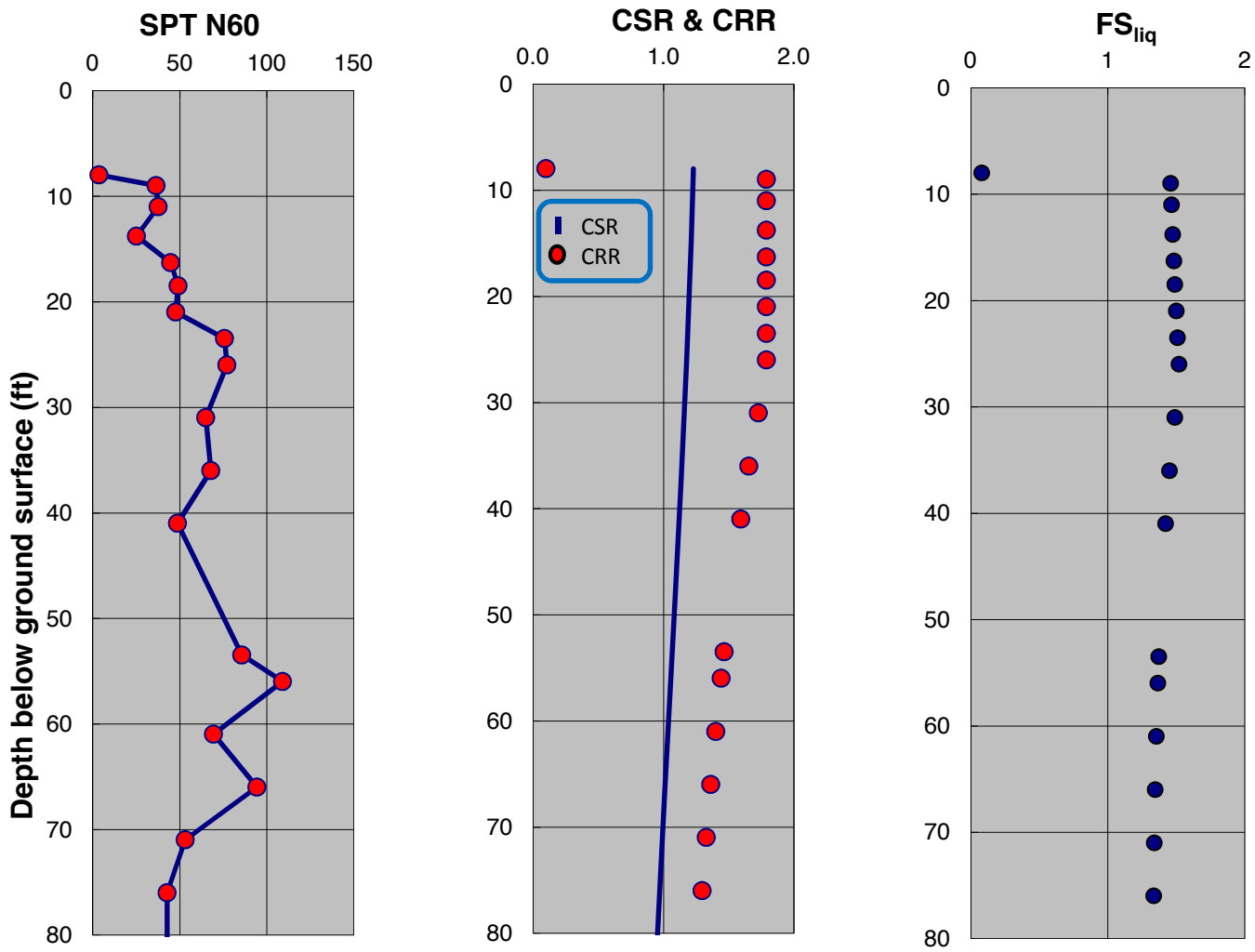
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-121 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-122 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

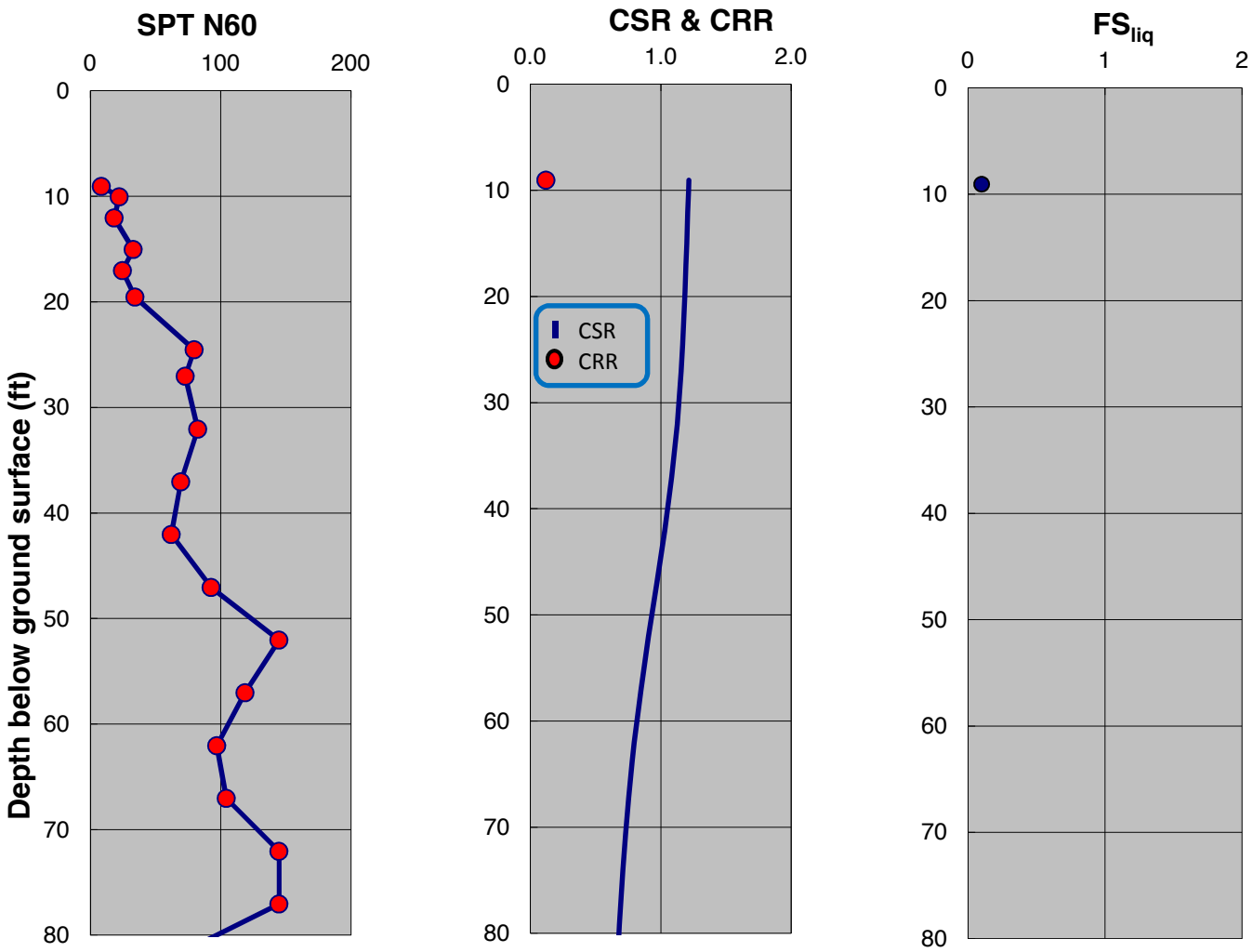
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-122 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

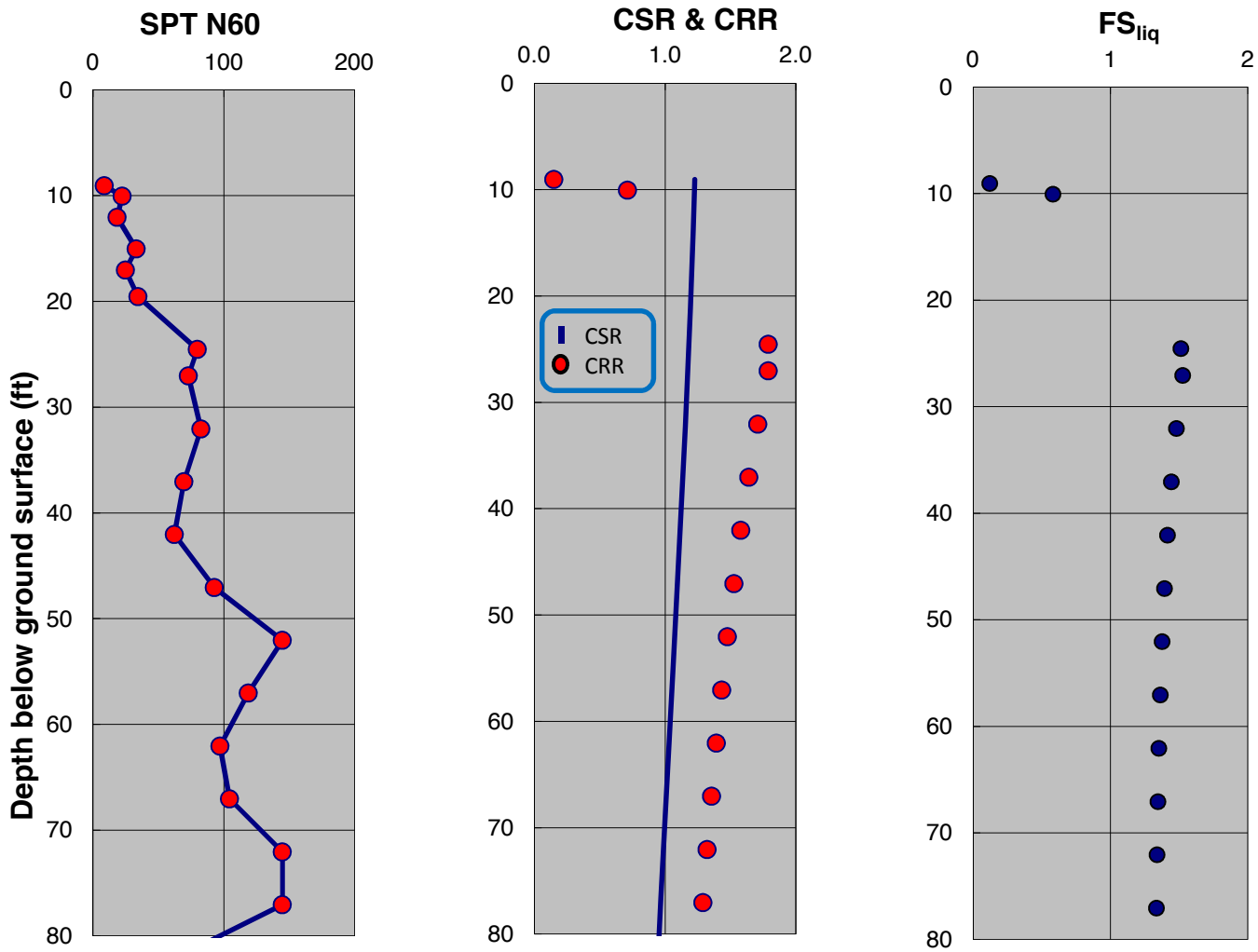
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.410



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-123 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

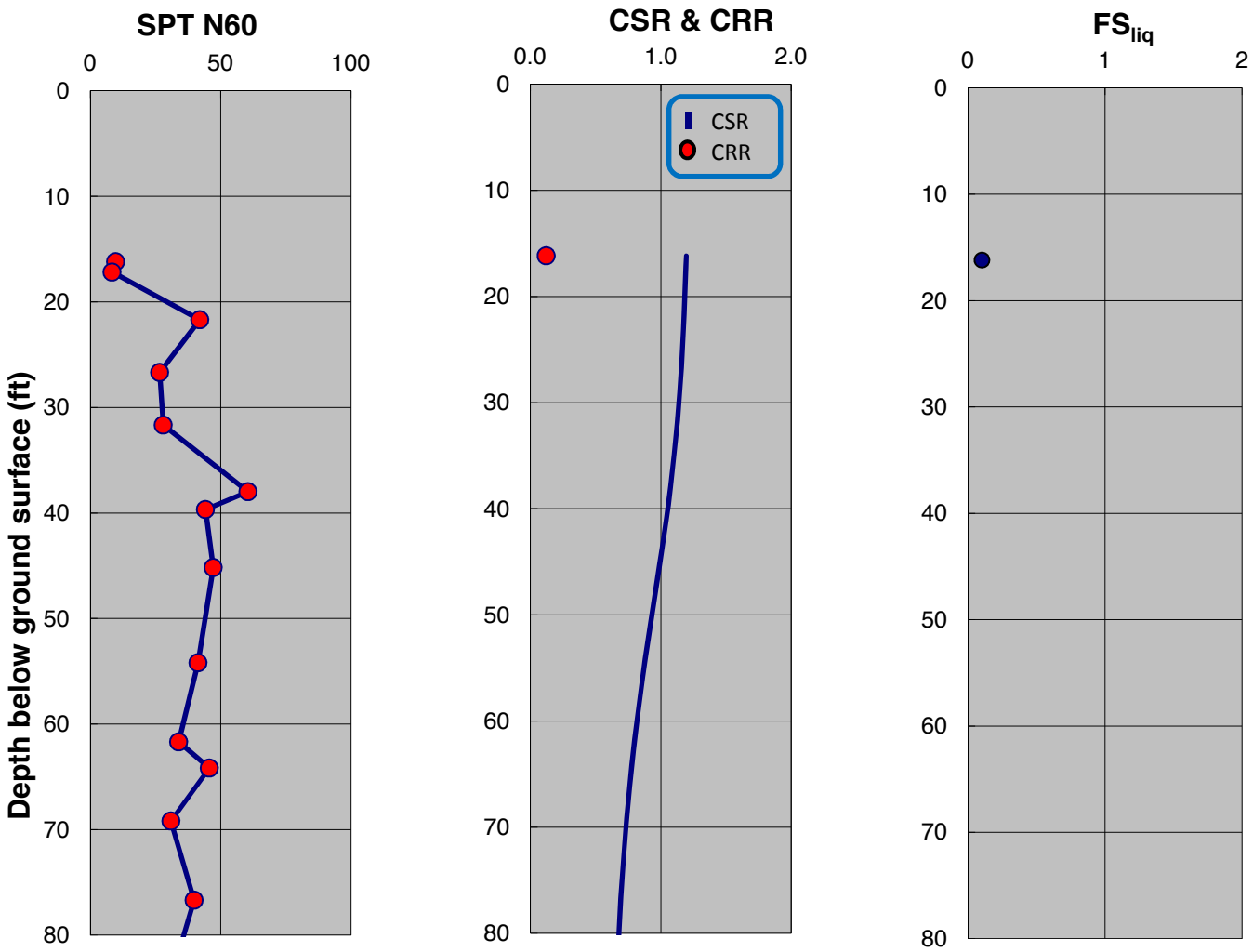
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-123 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

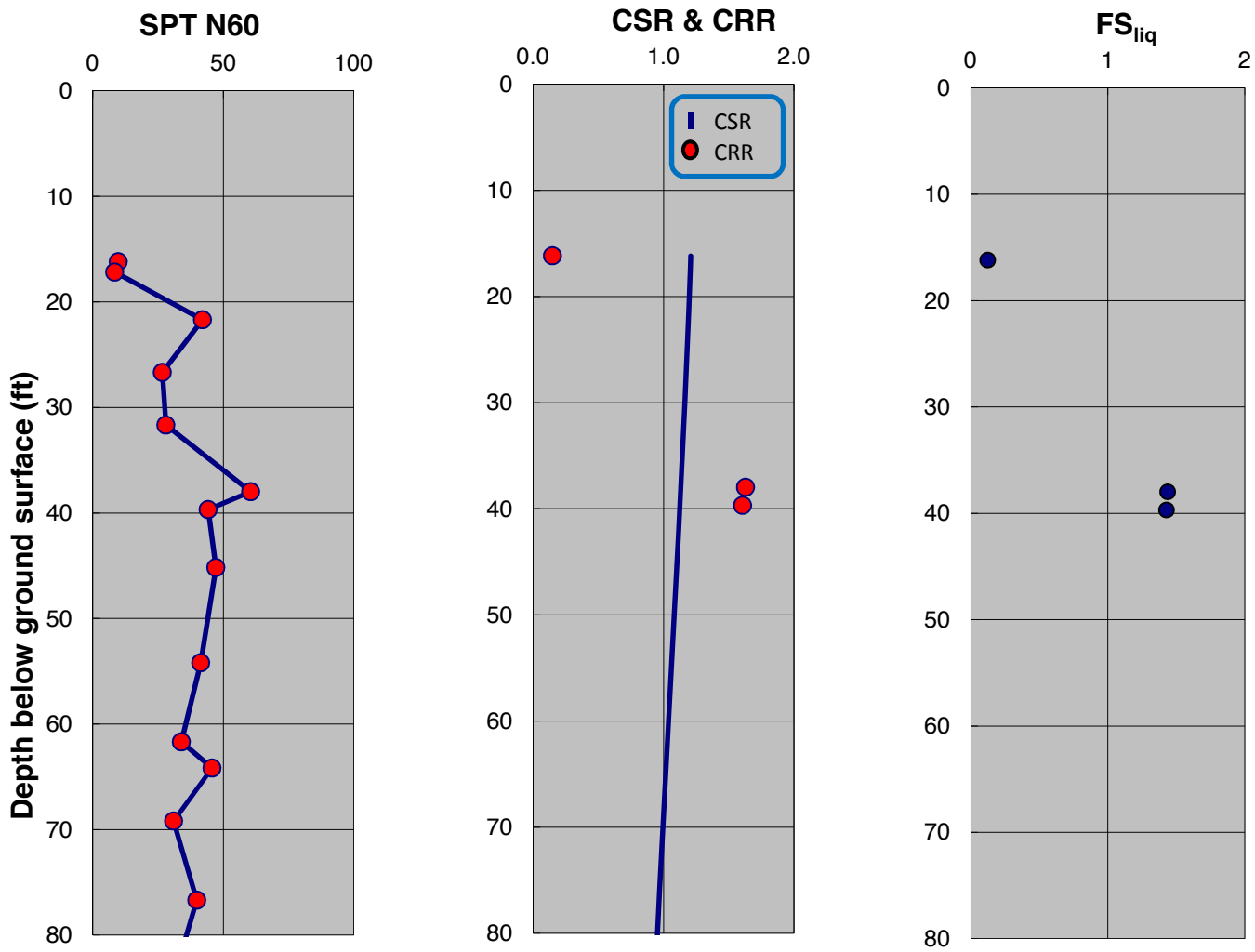
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.412



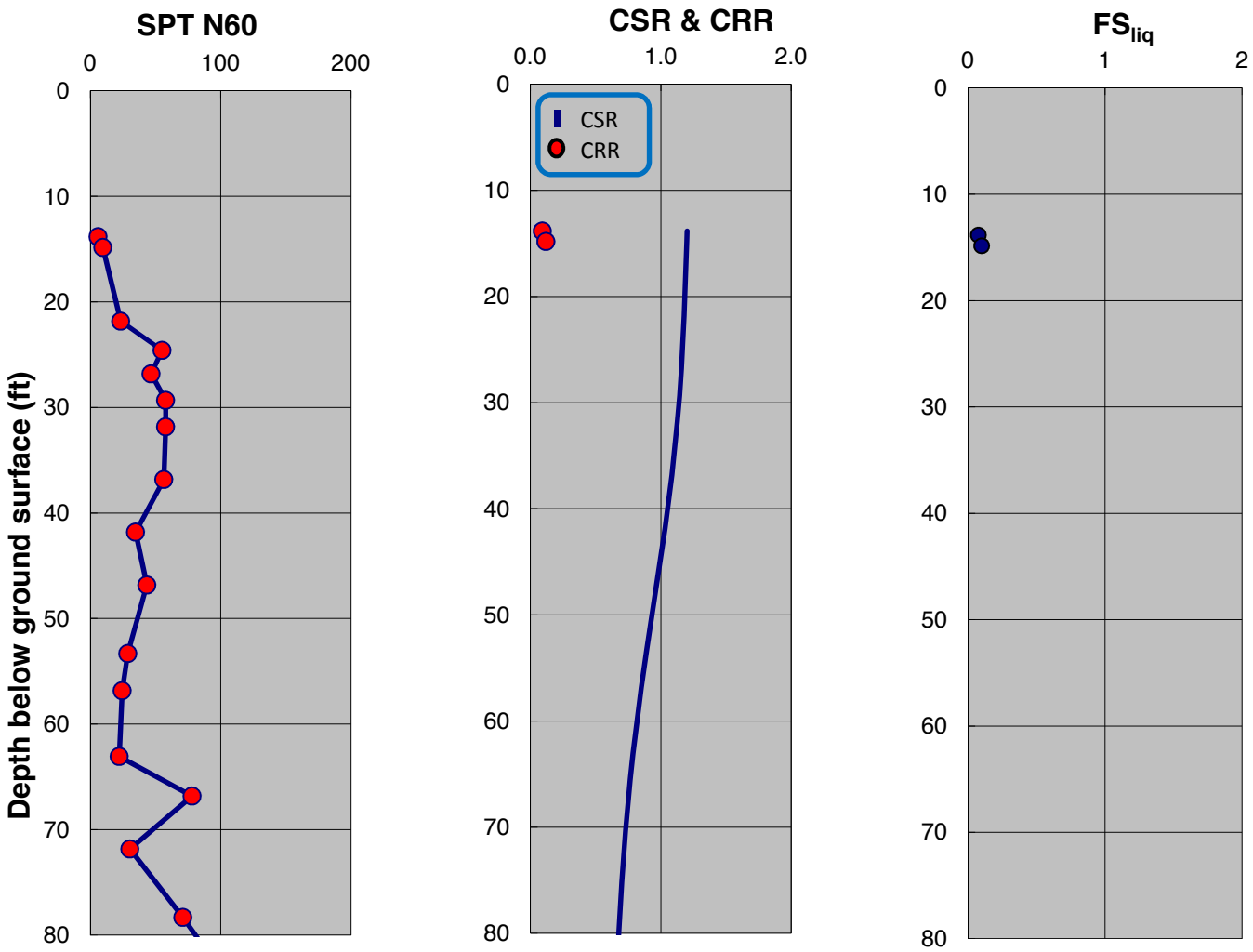
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-124 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



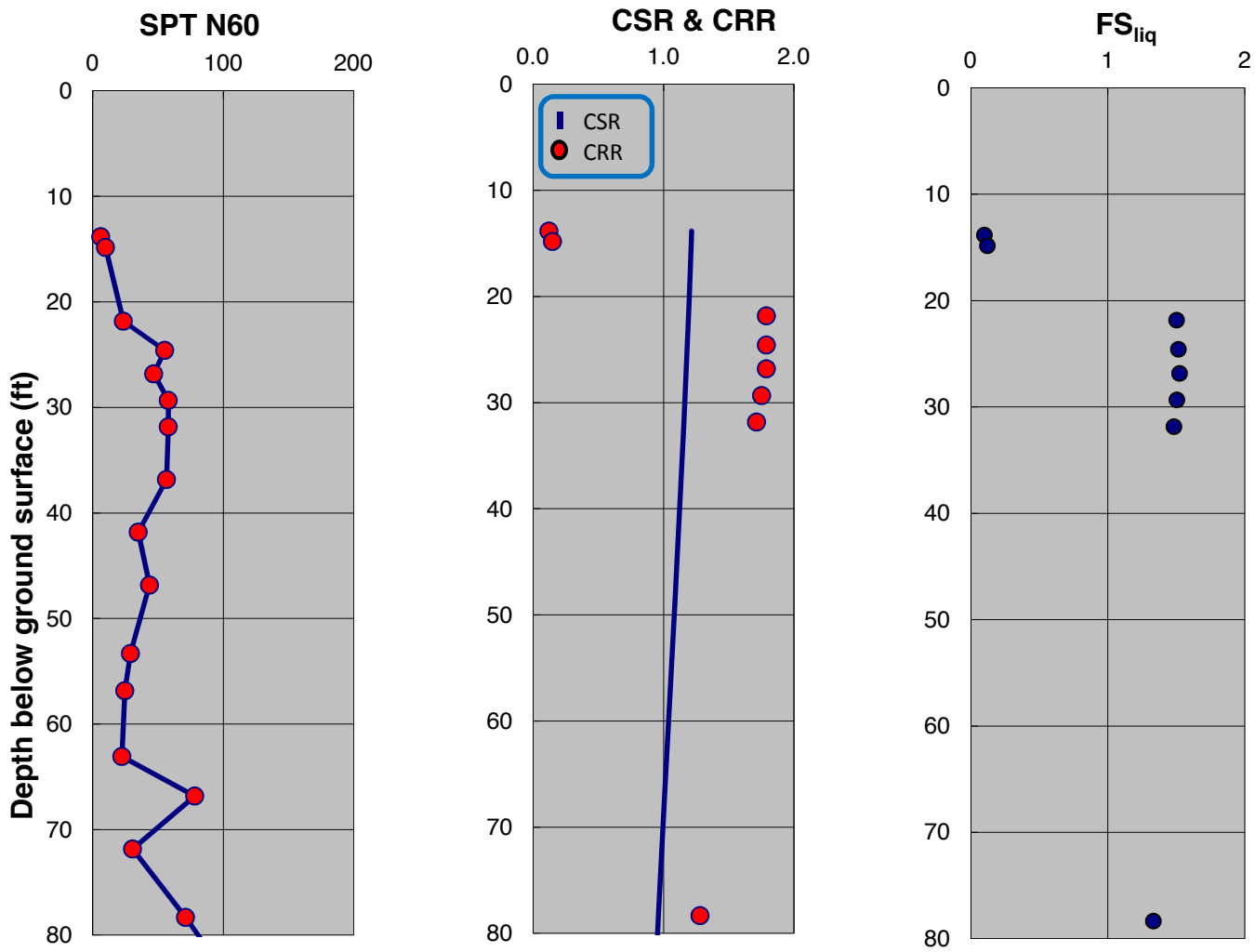
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-124 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



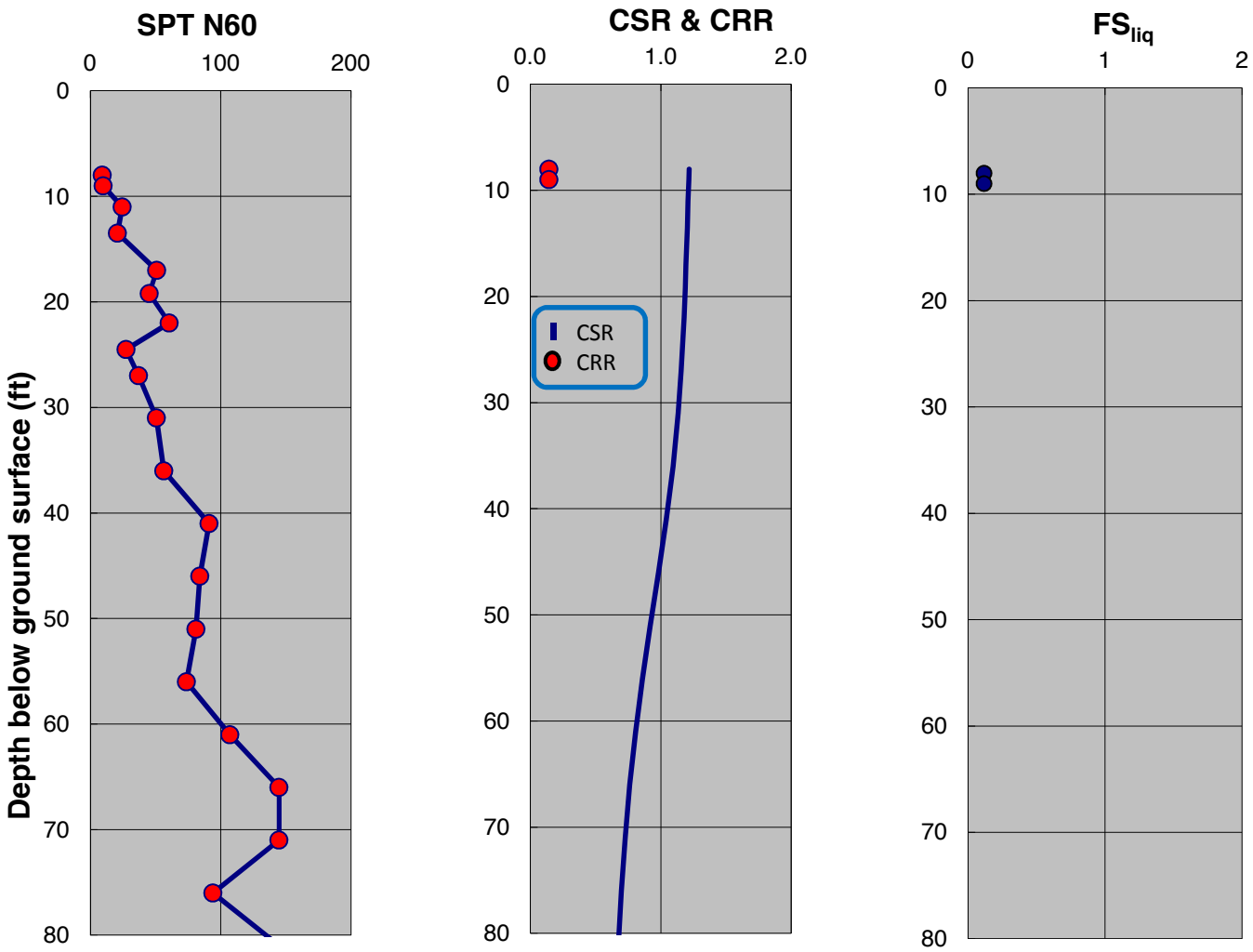
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-125 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



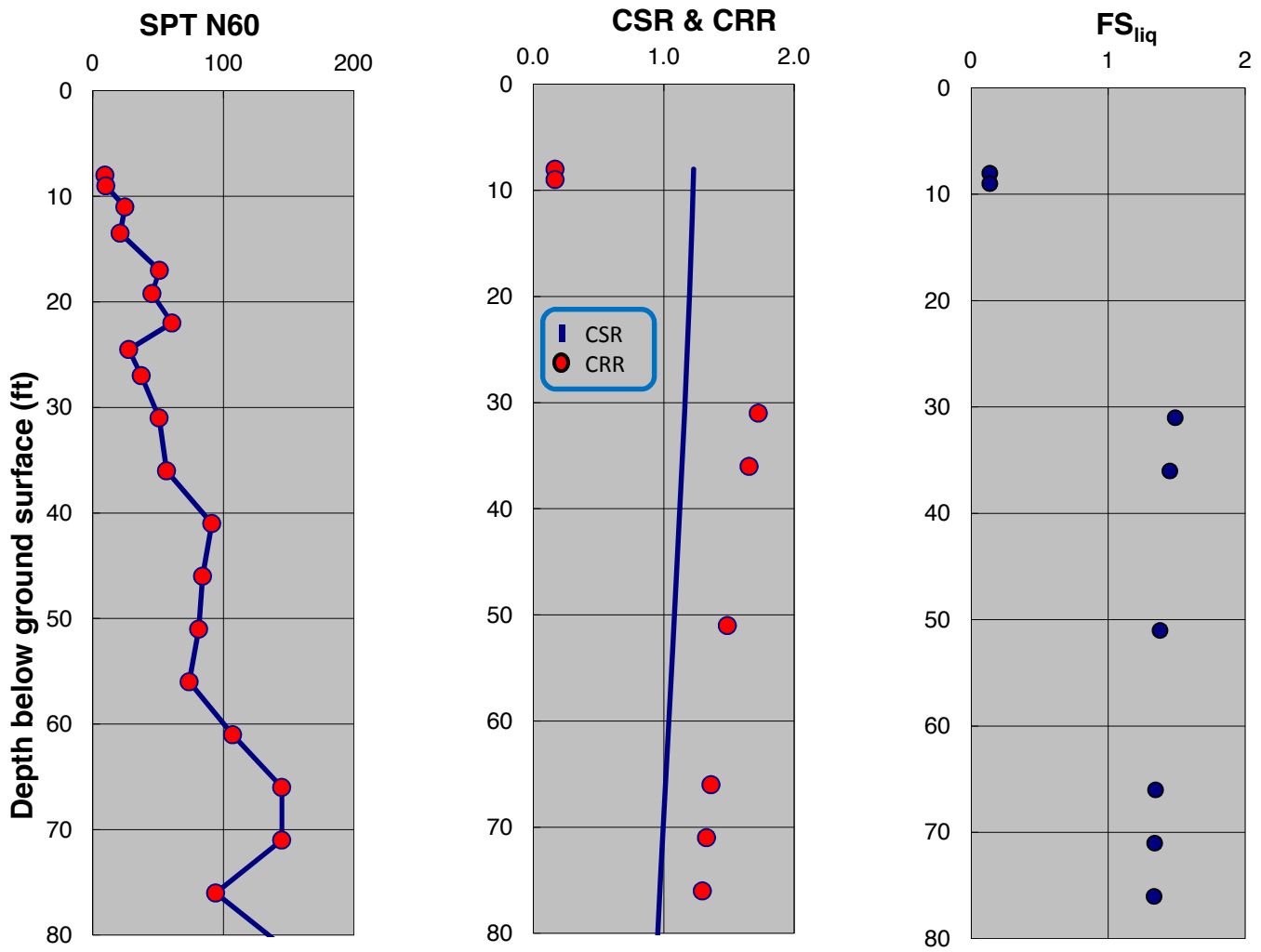
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-125 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



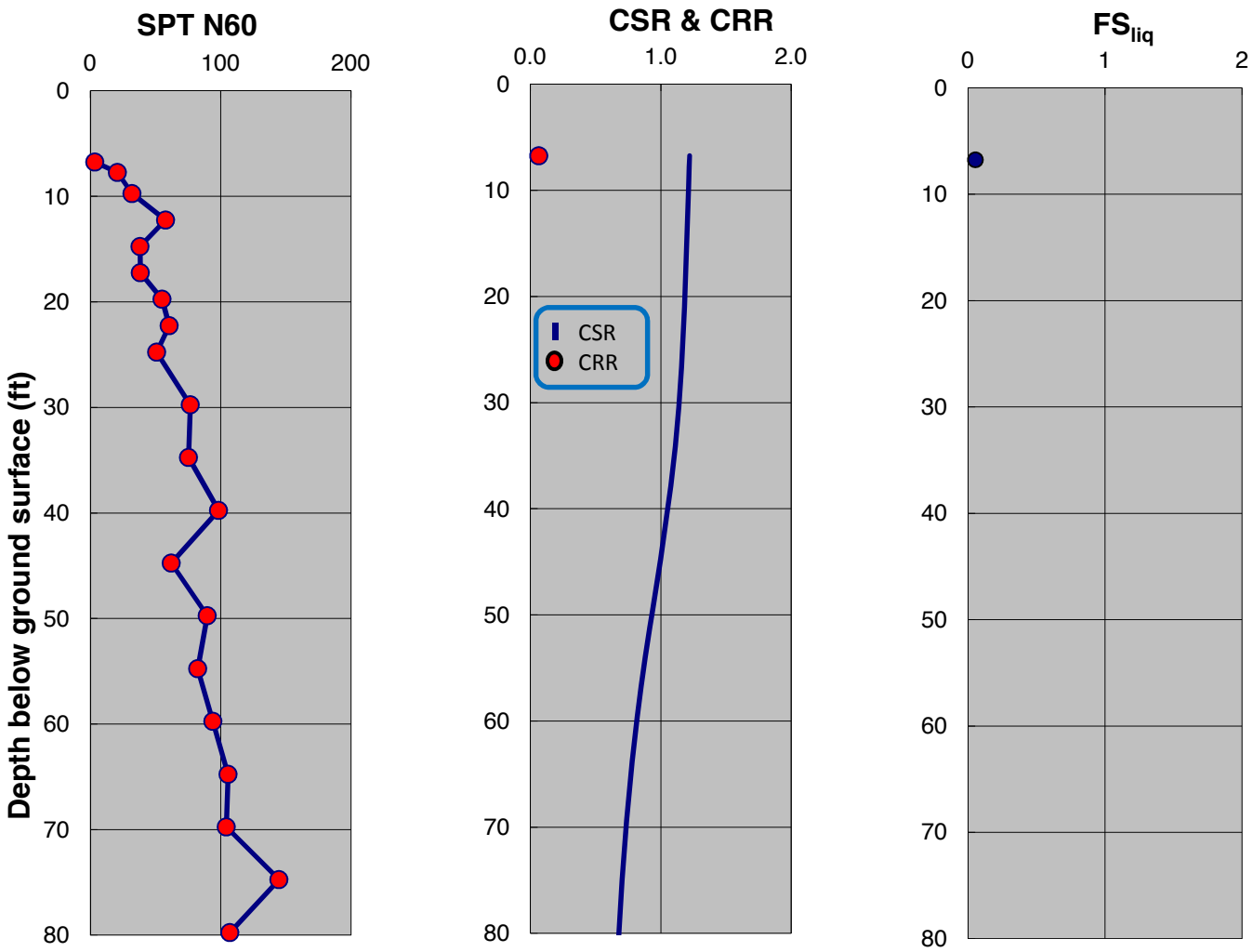
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-126 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-126 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

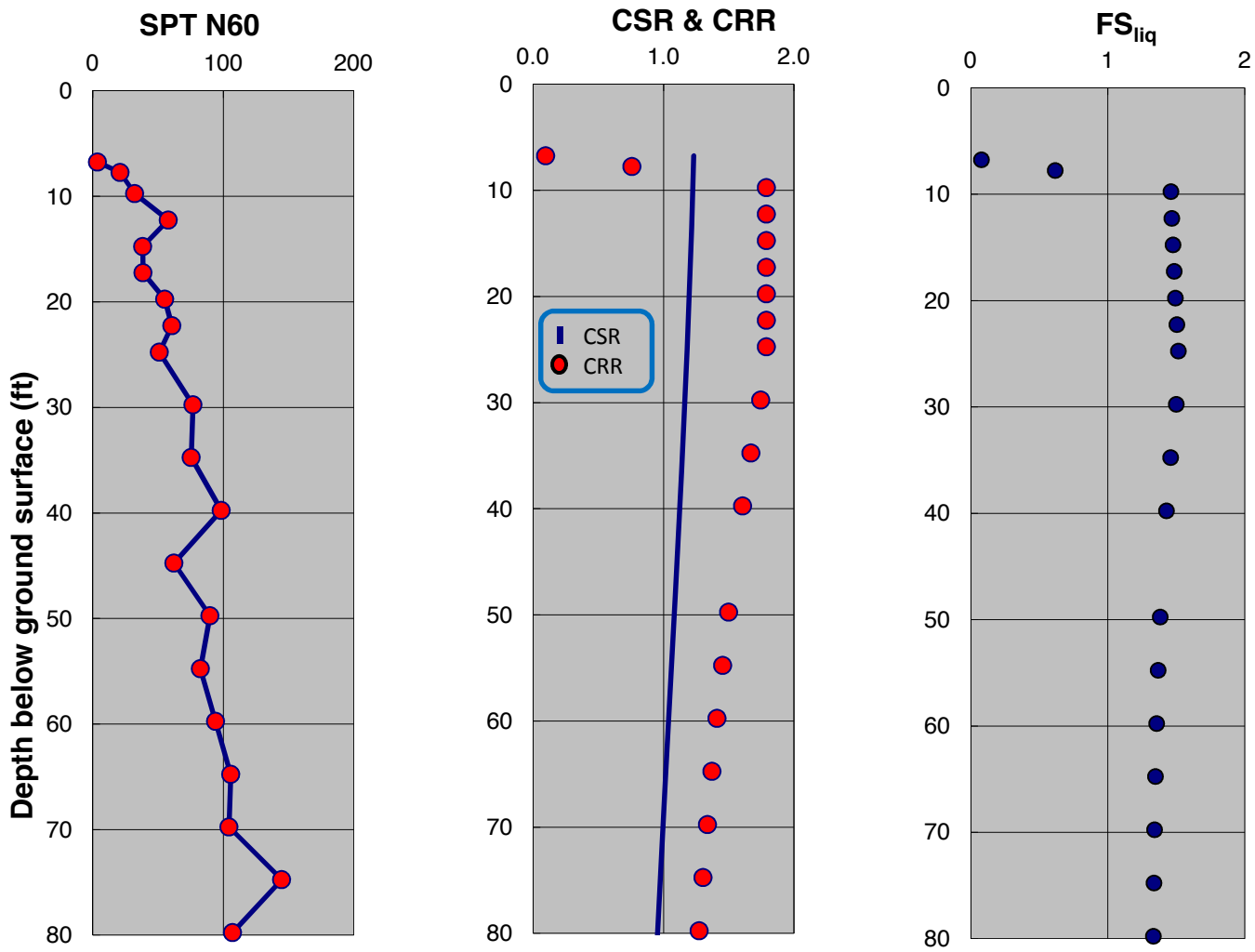
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-127 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

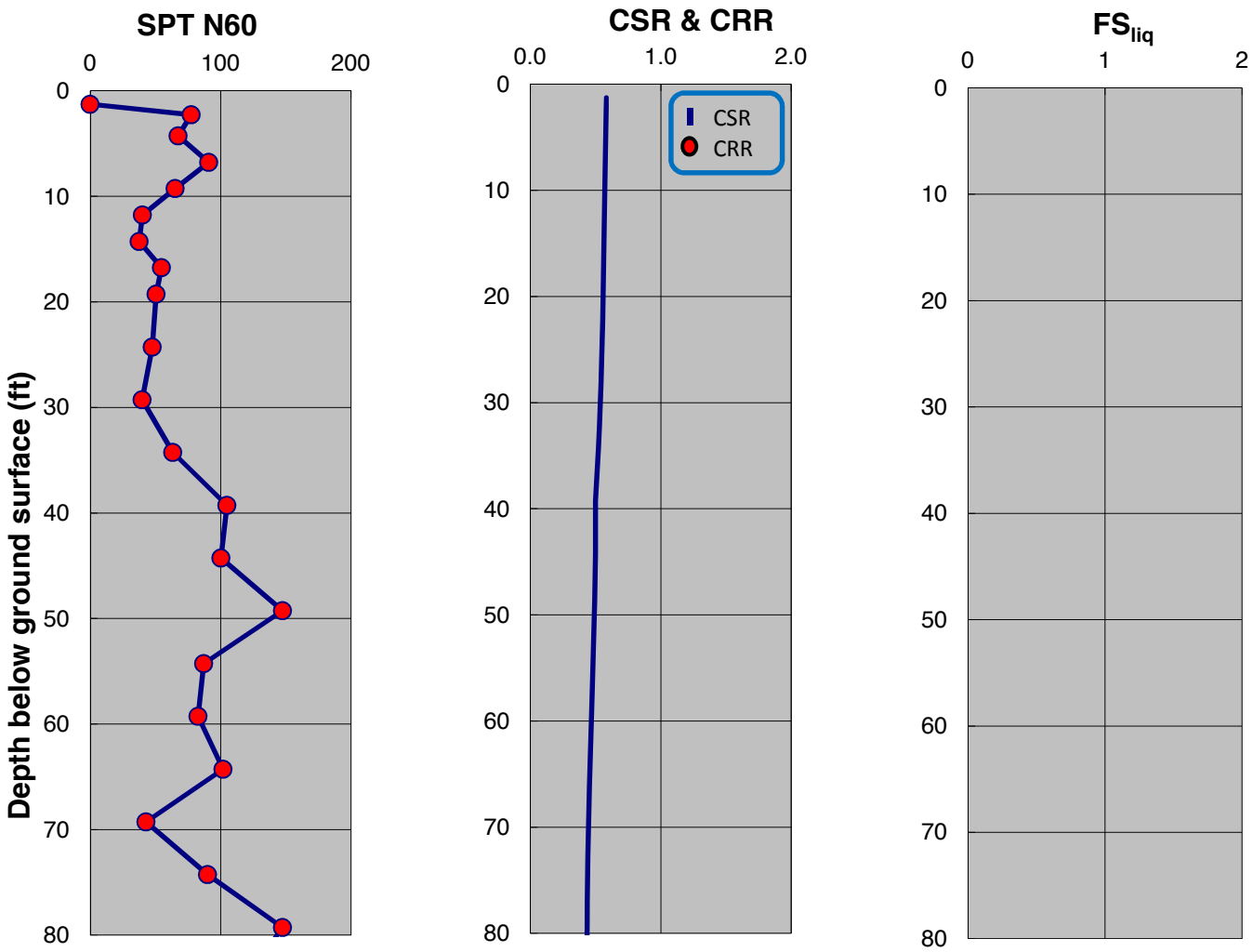
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.419



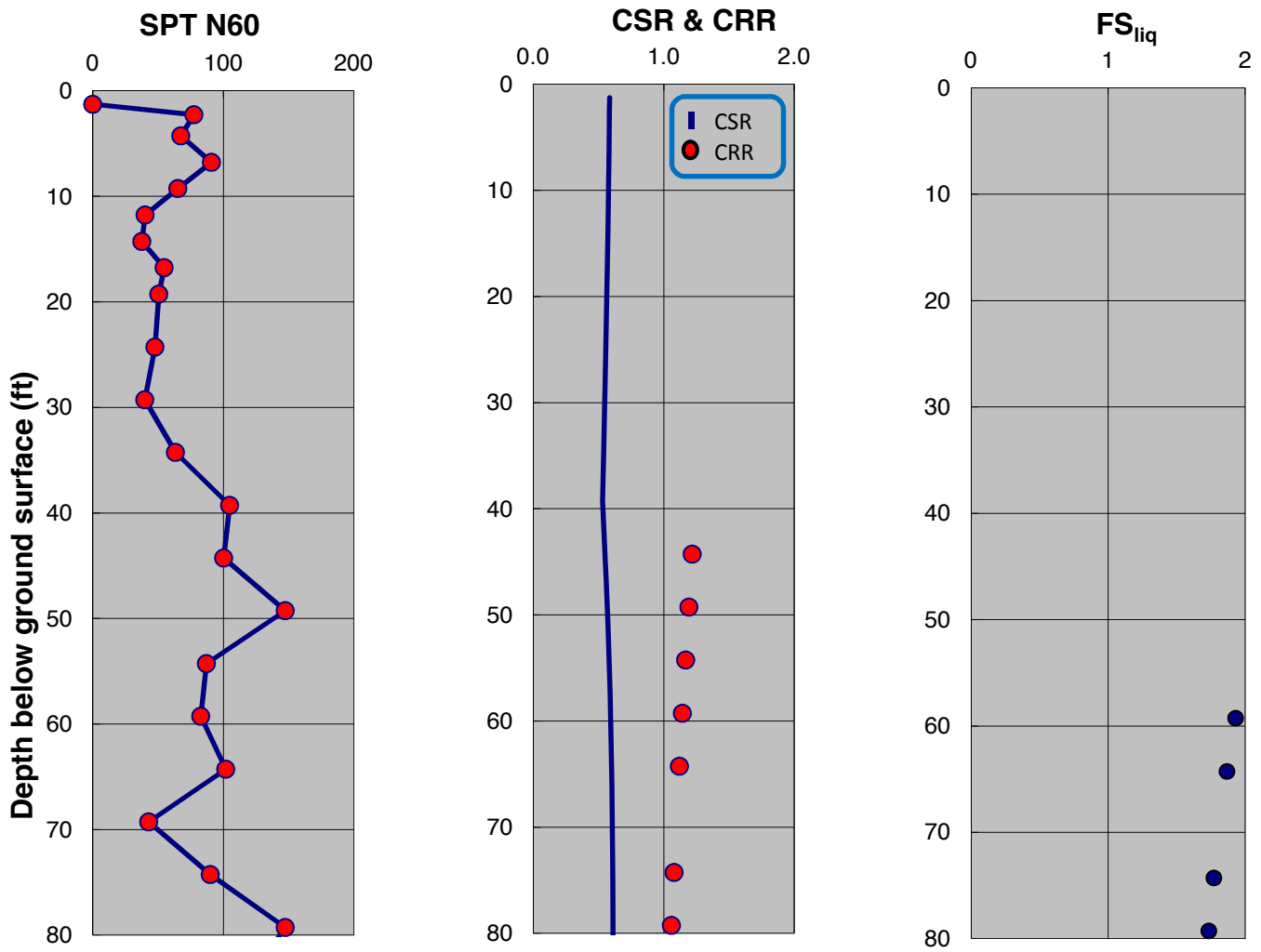
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-127 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



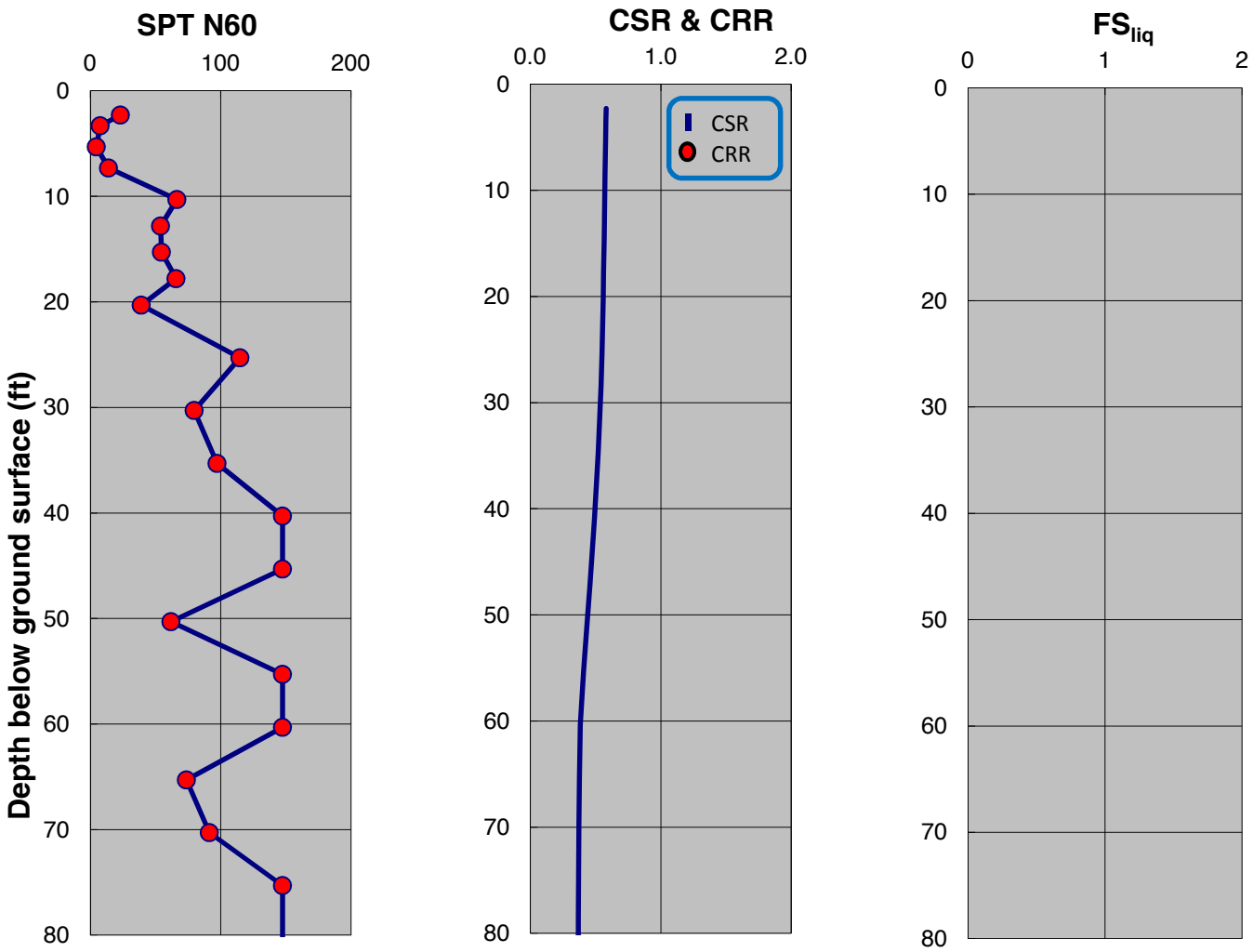
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-131 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



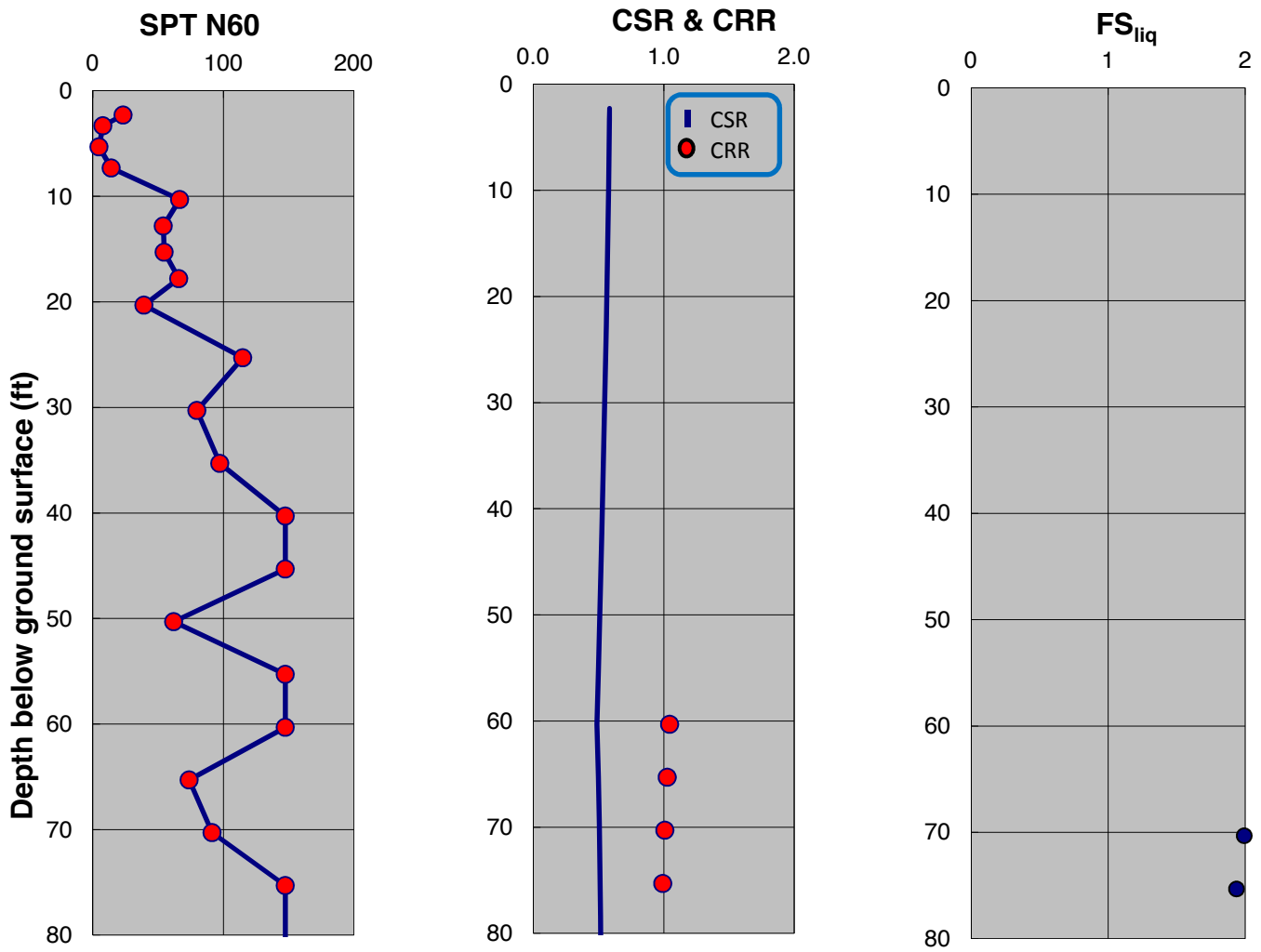
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-131 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



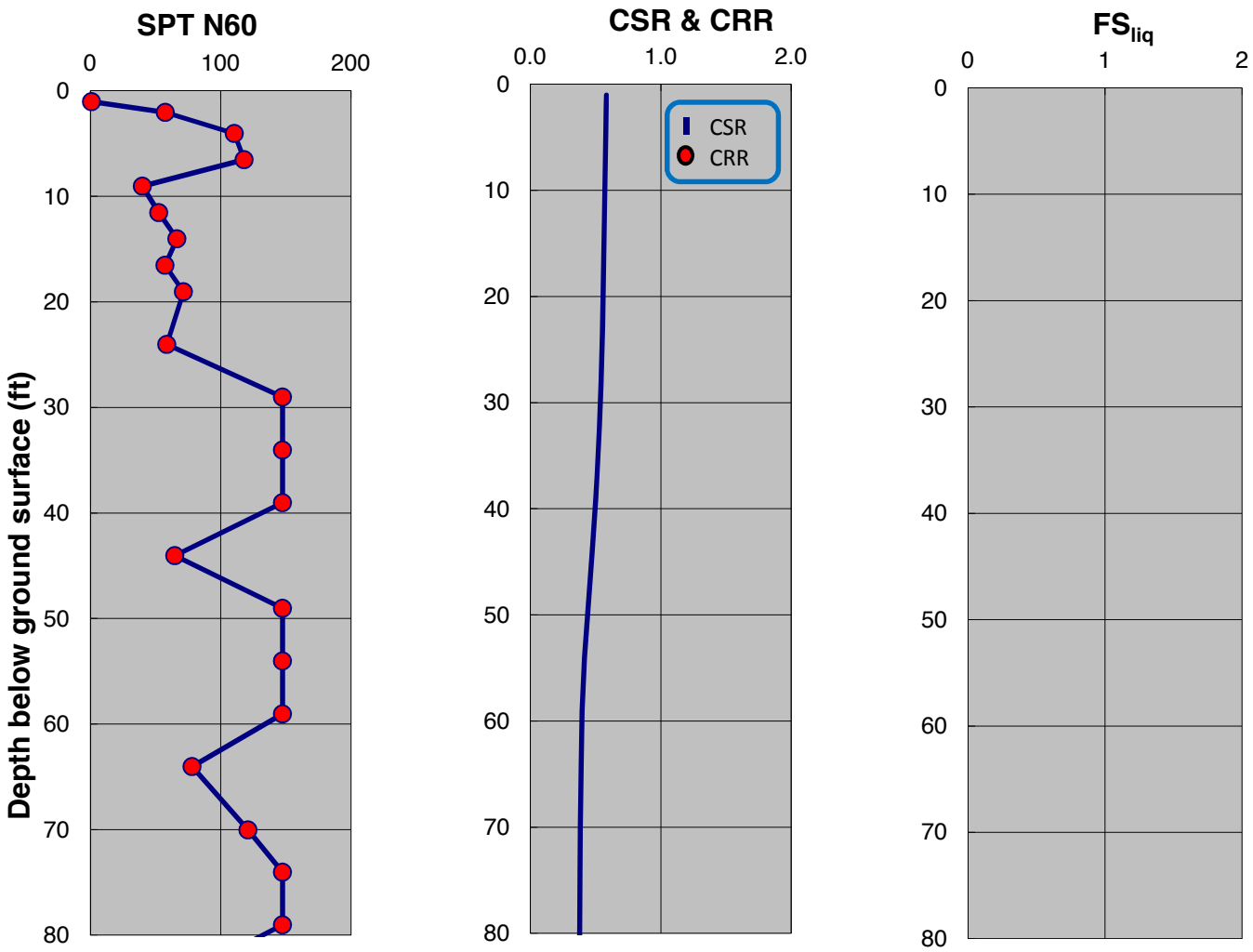
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-132 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



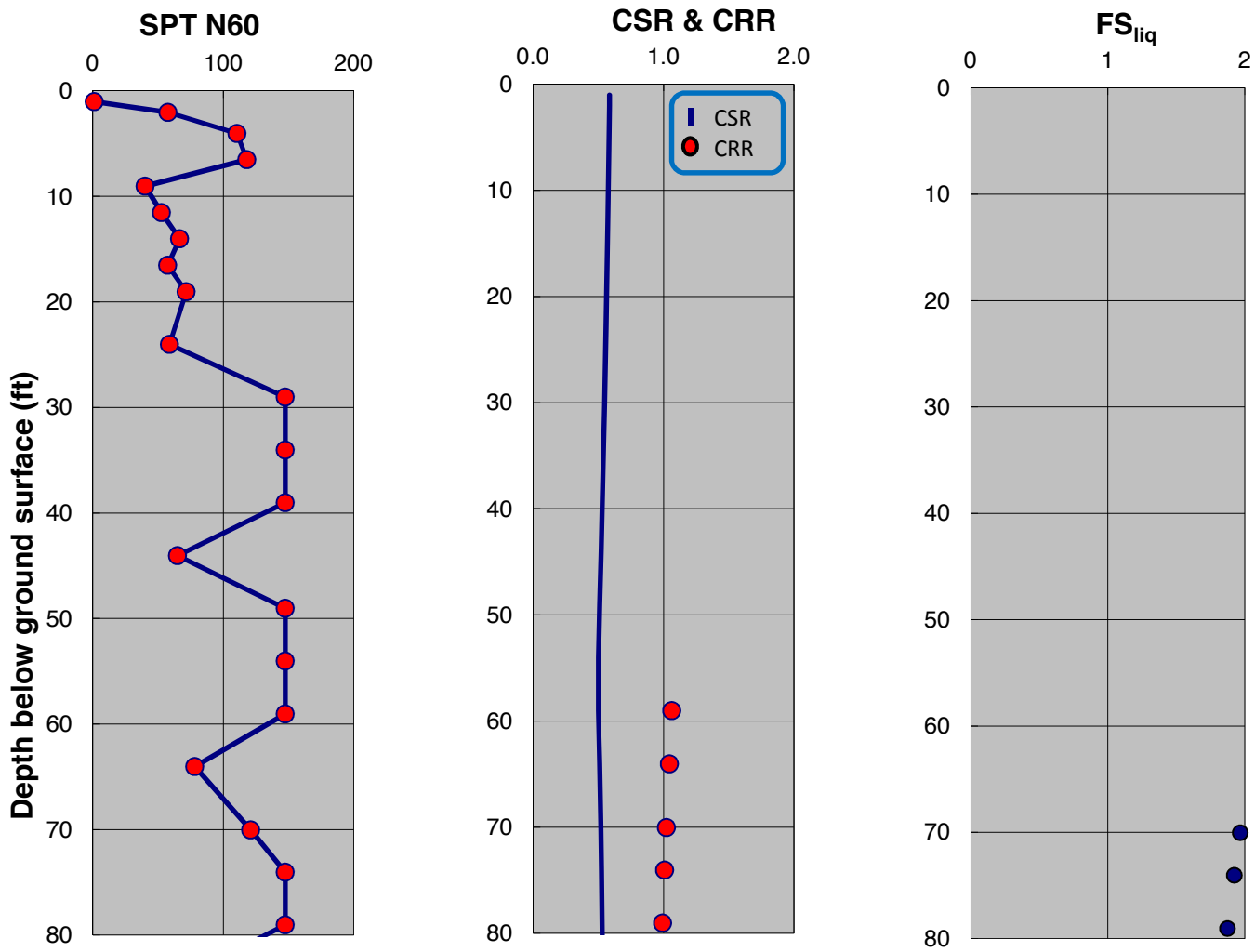
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-132 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



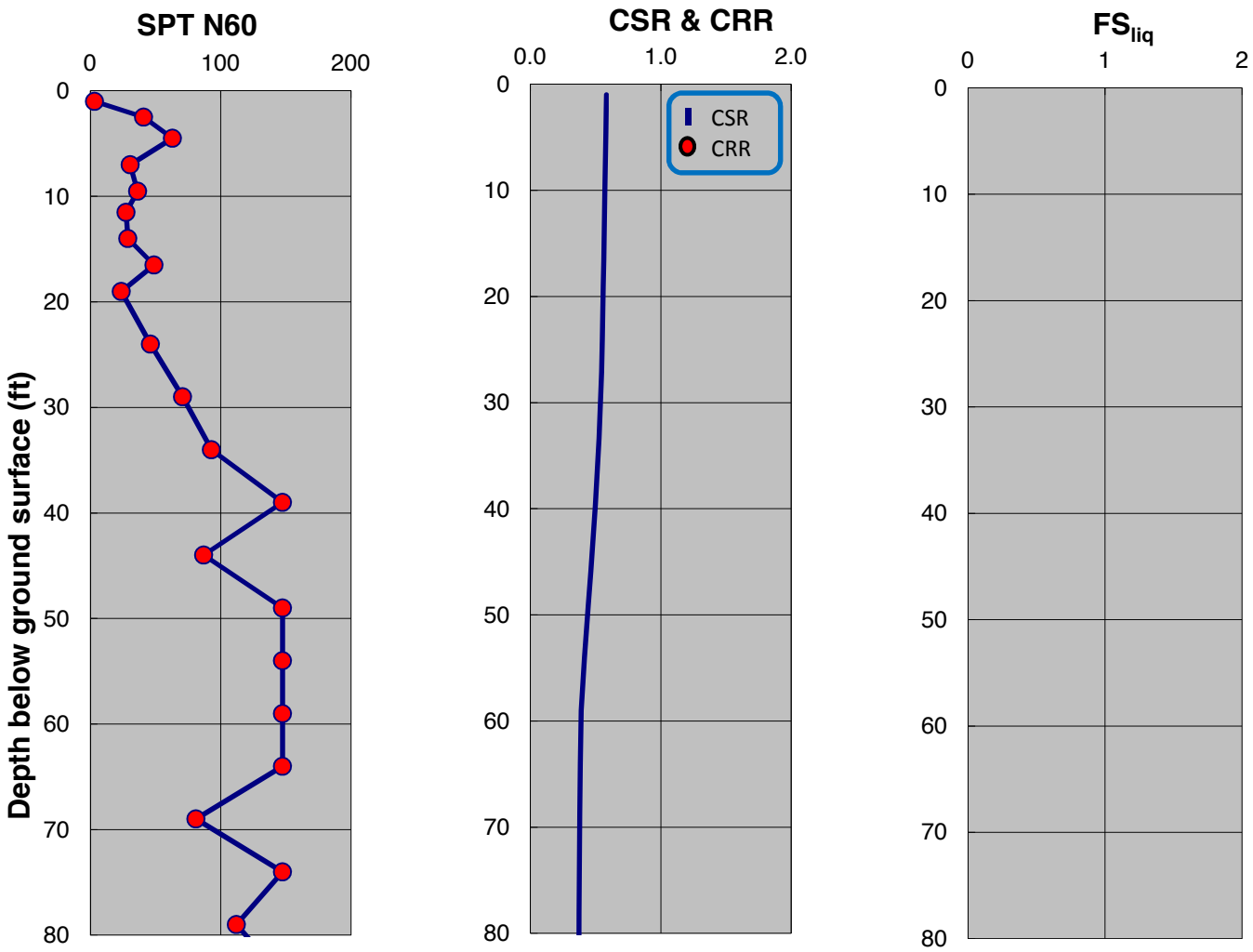
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-133 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



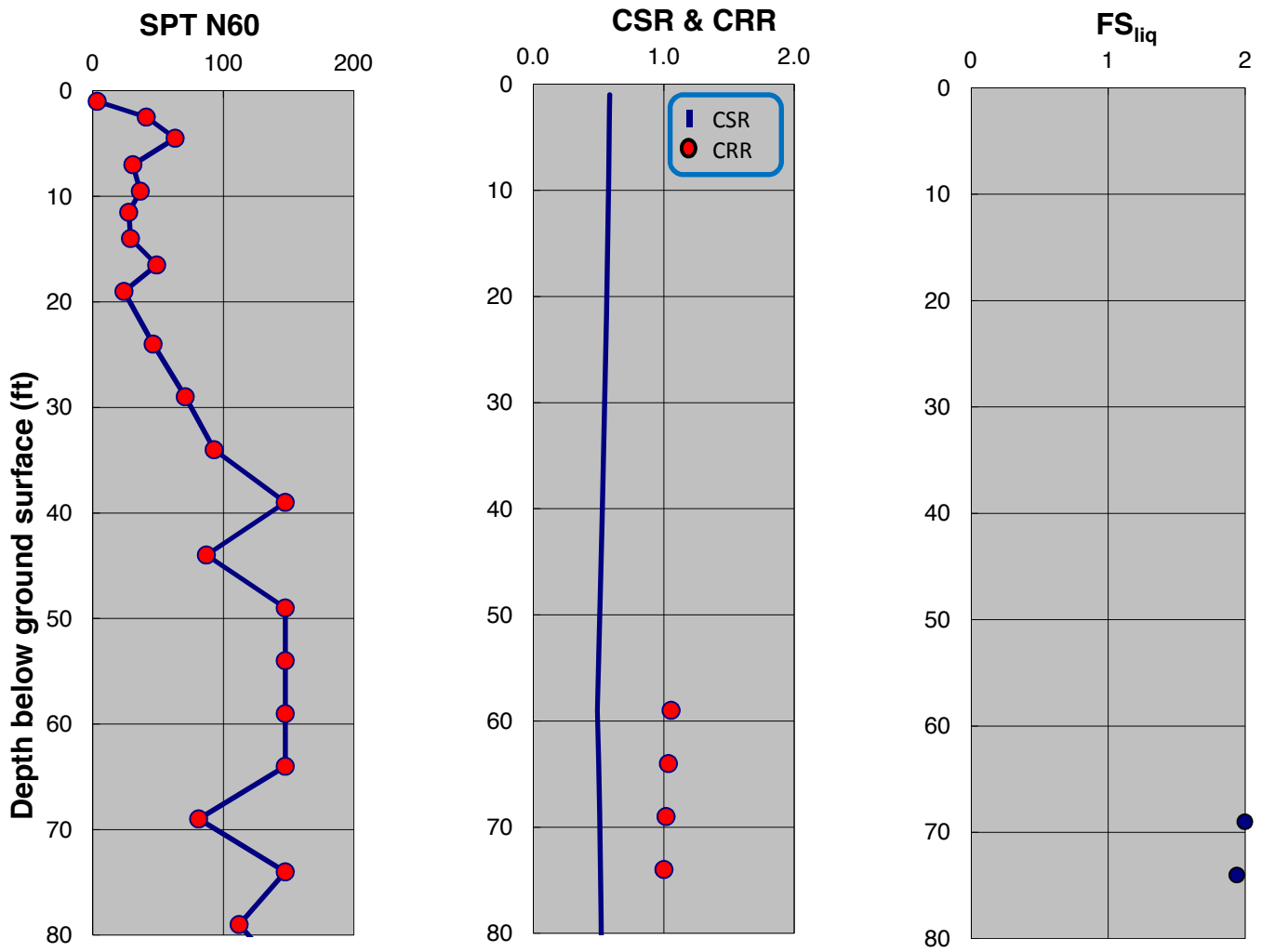
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-133 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



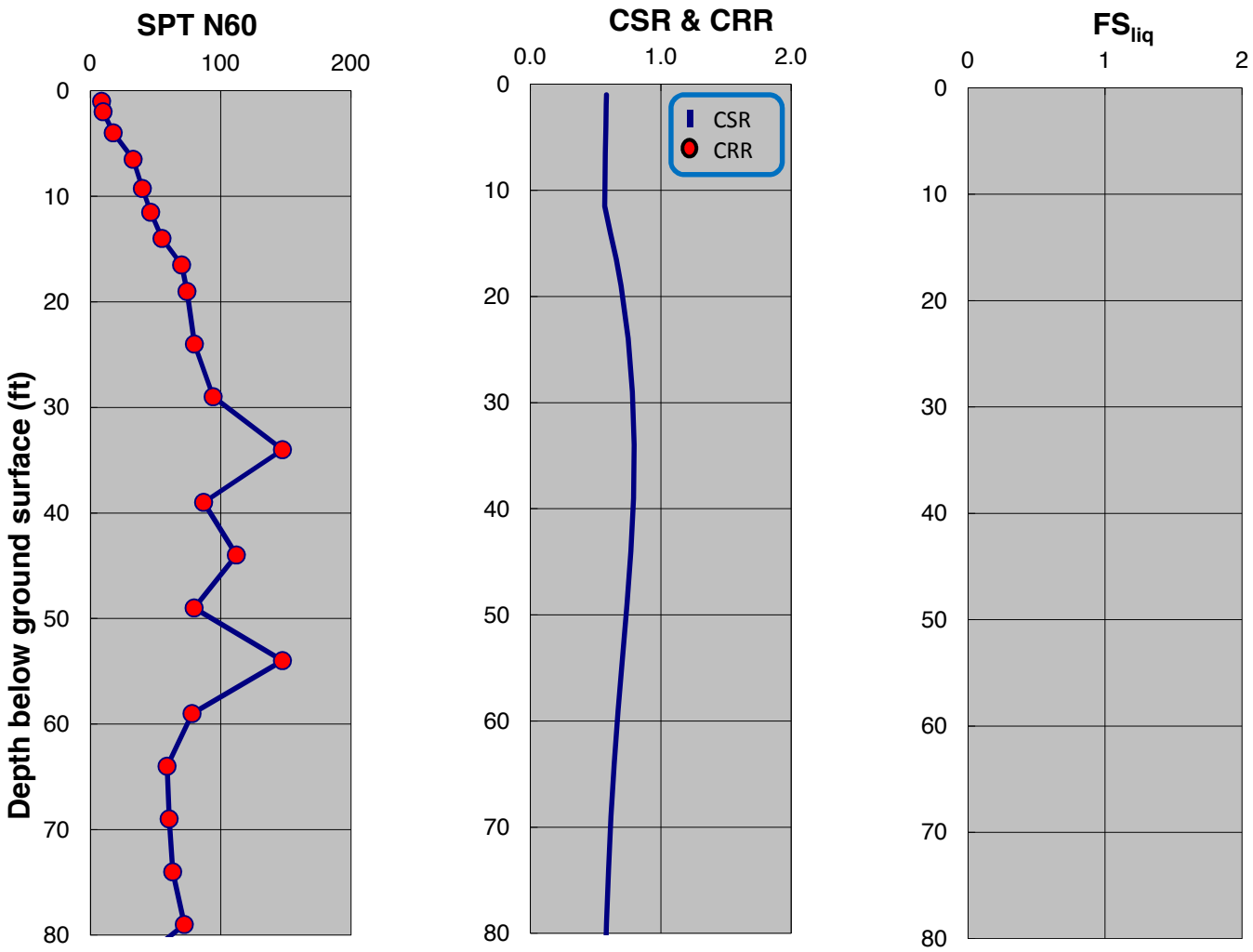
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-135 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



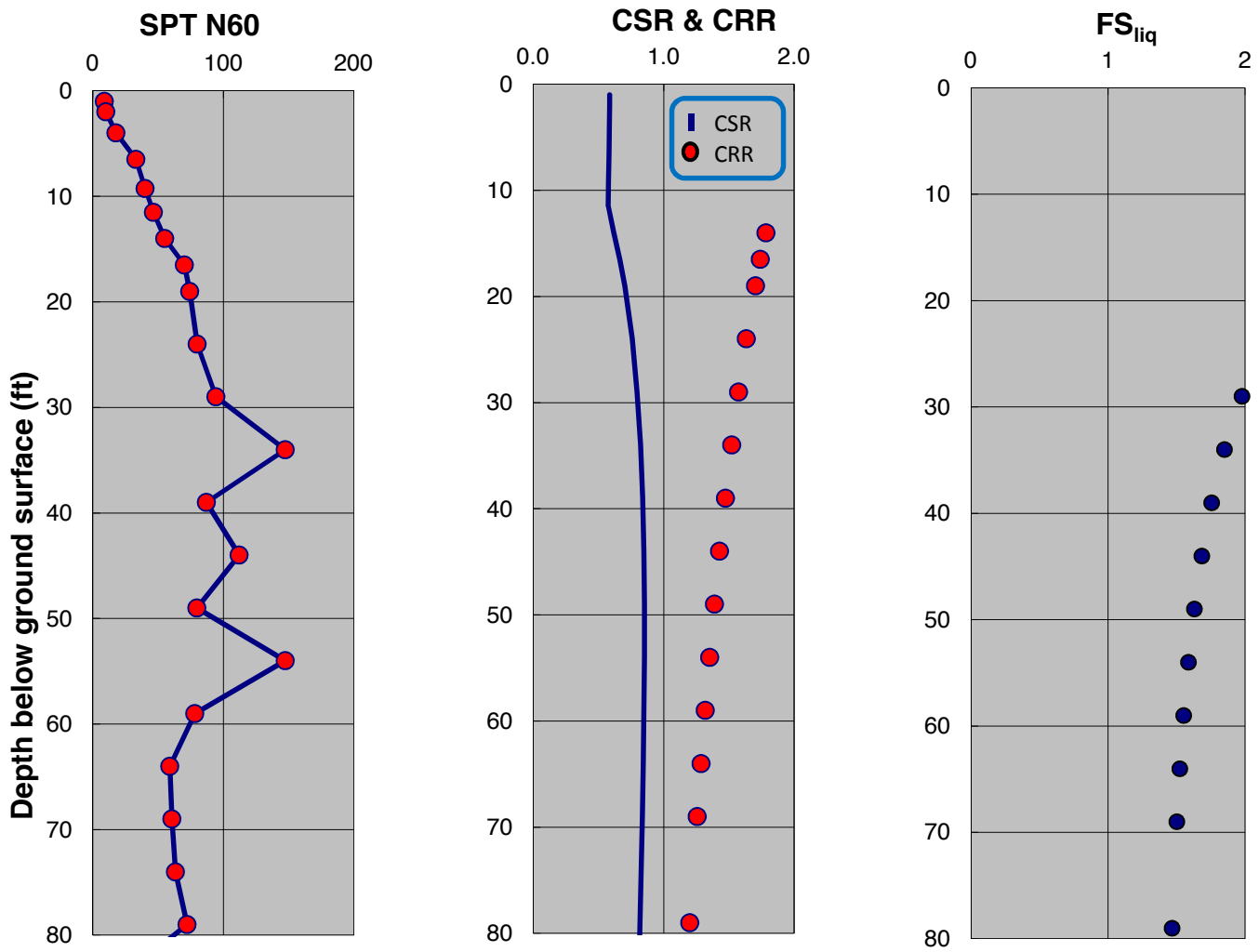
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-135 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



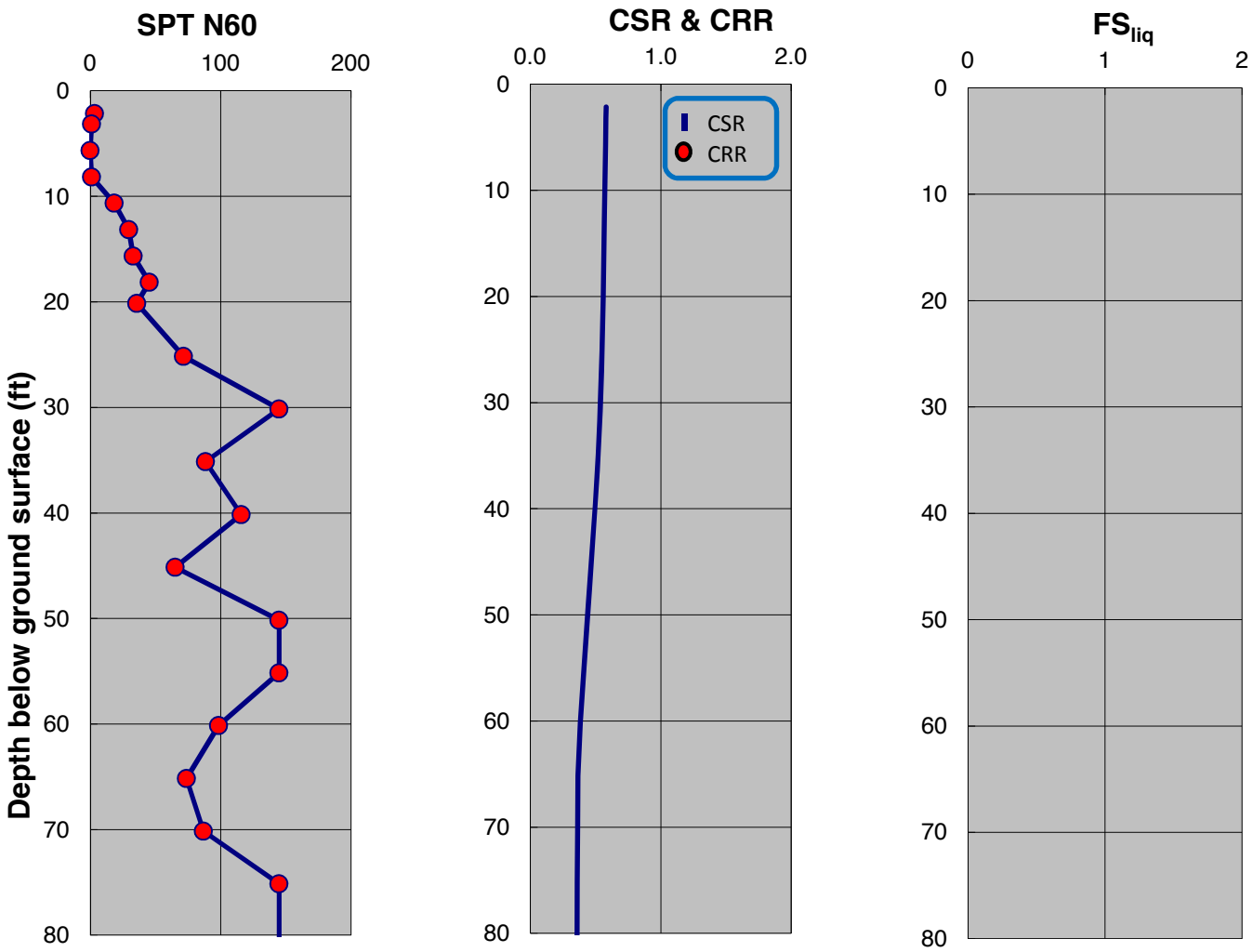
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-136 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



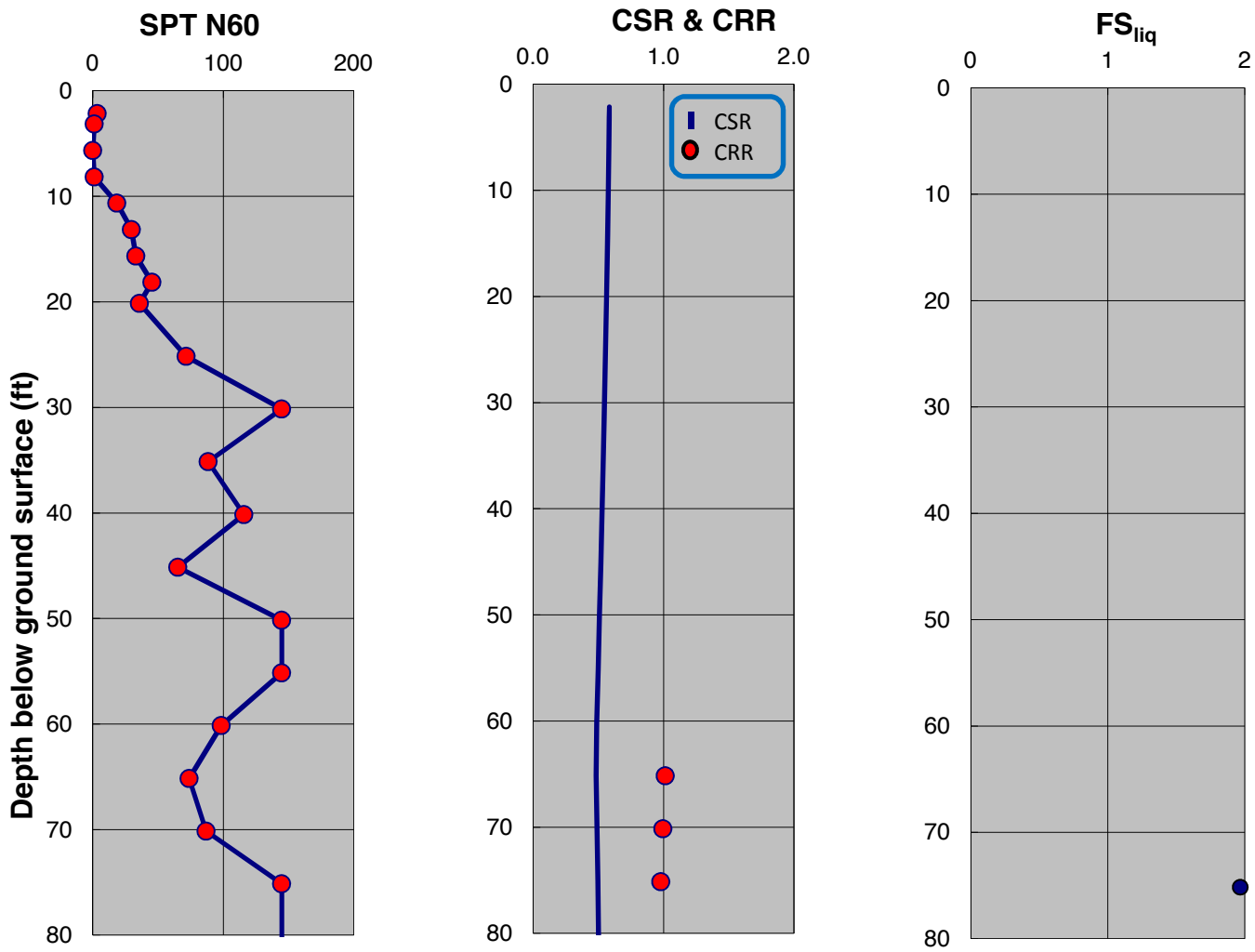
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-136 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



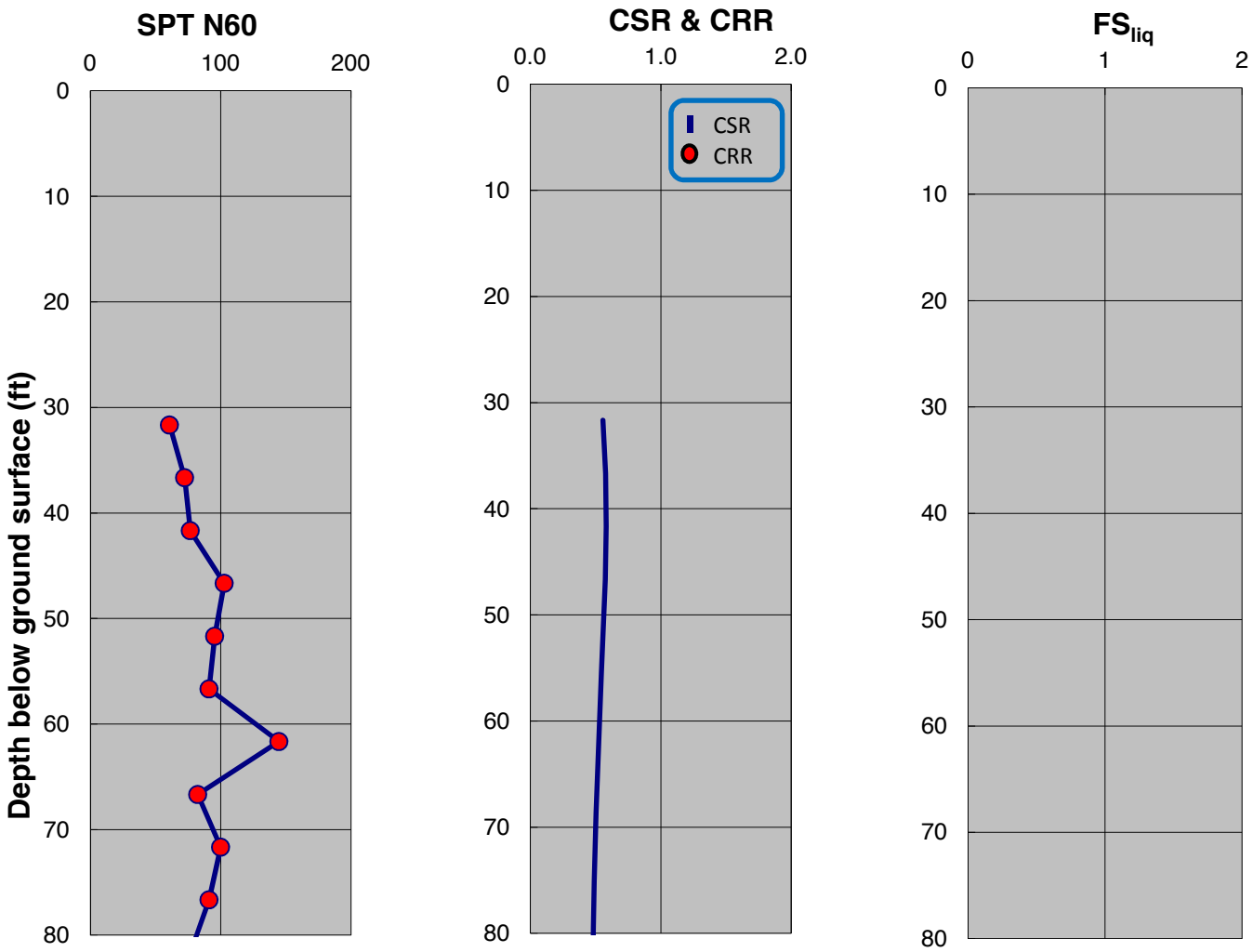
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-137 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



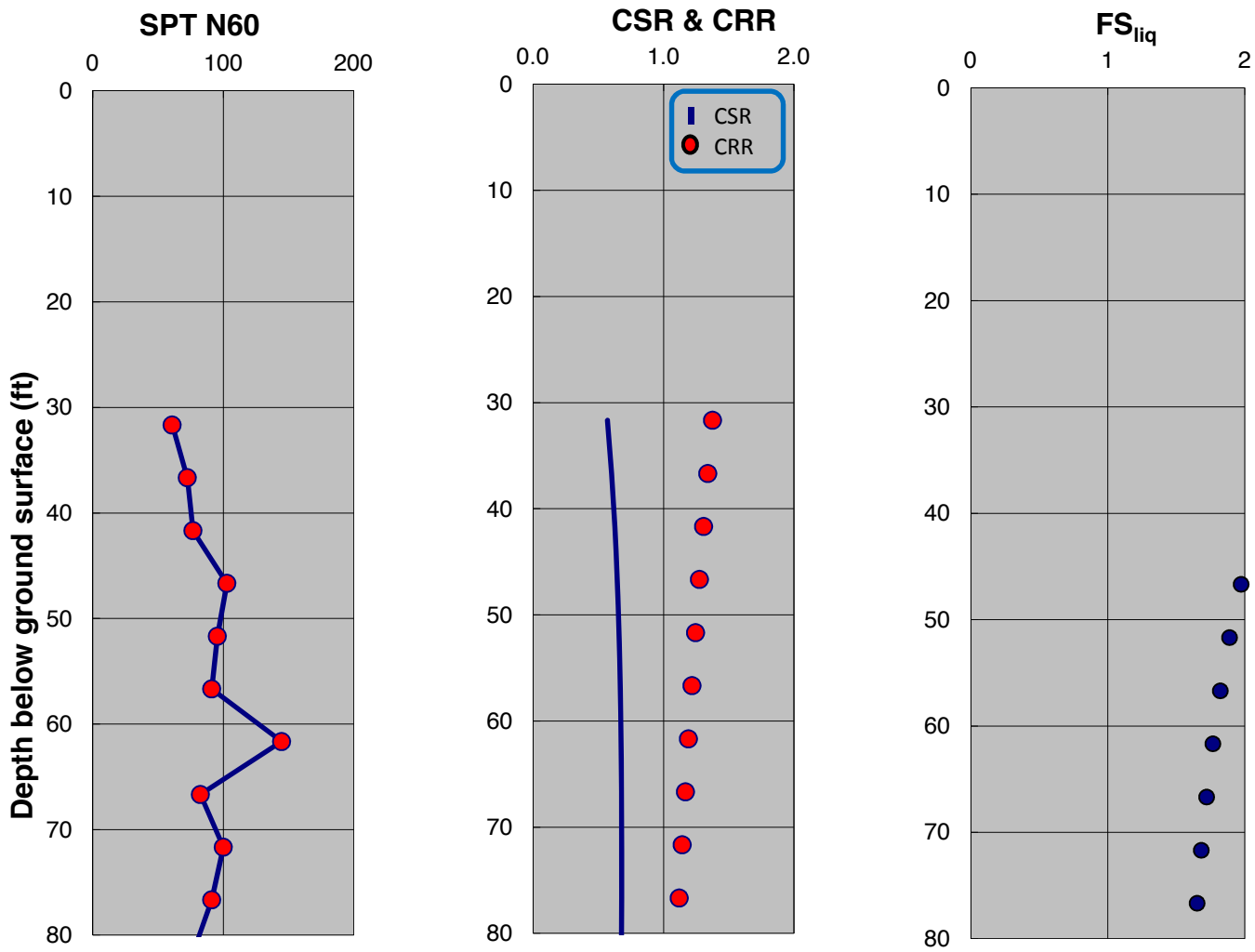
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-137 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



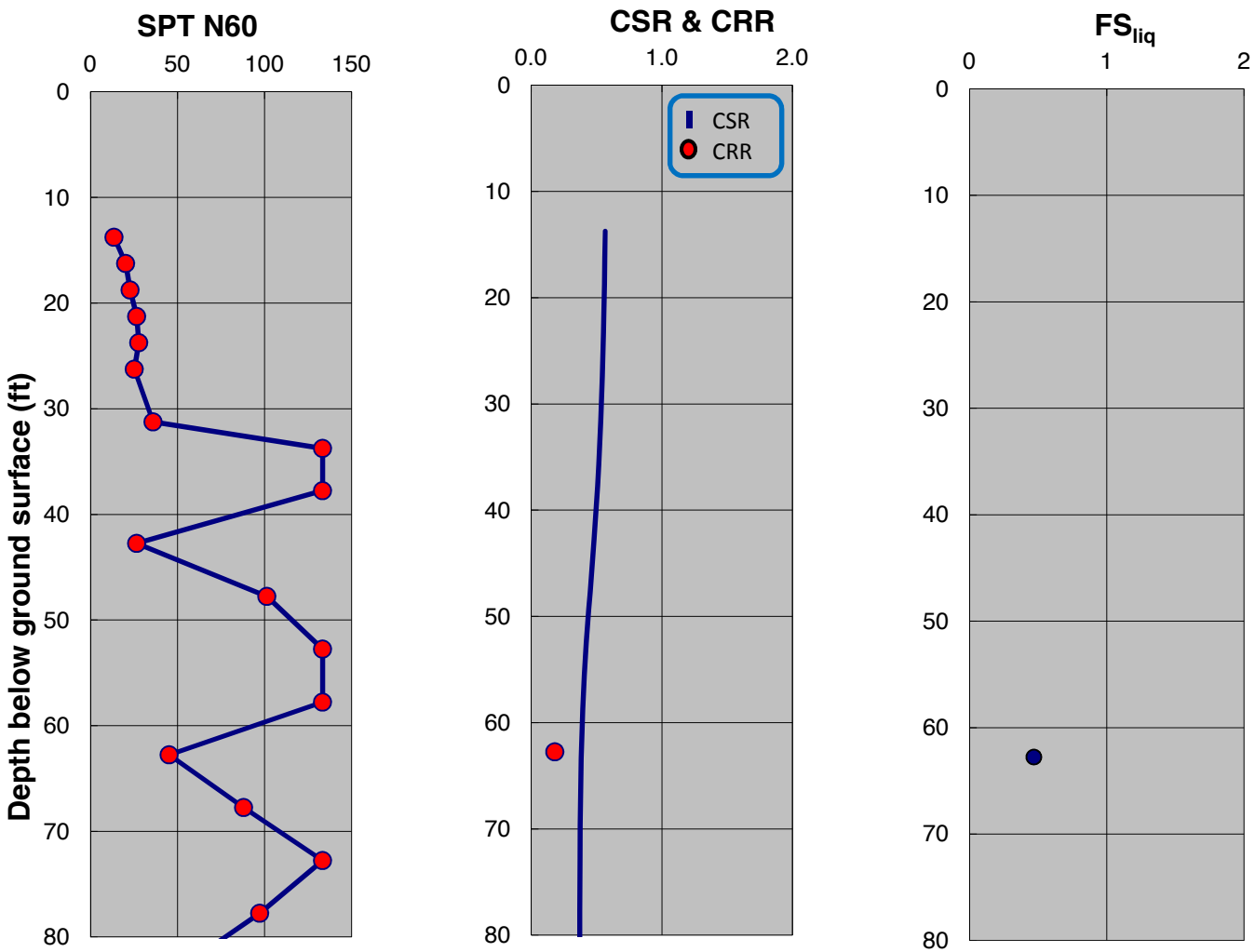
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-138 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



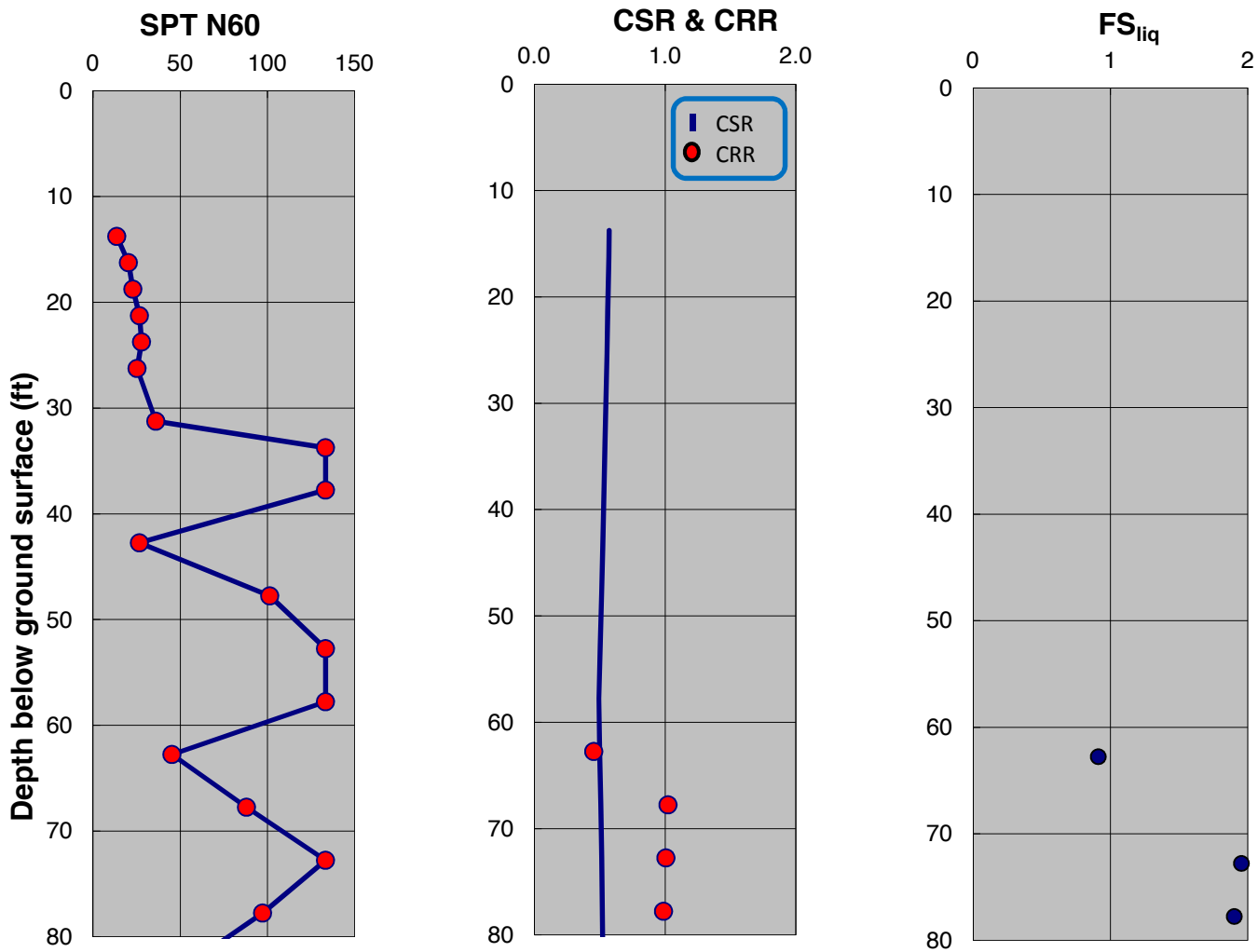
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-138 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



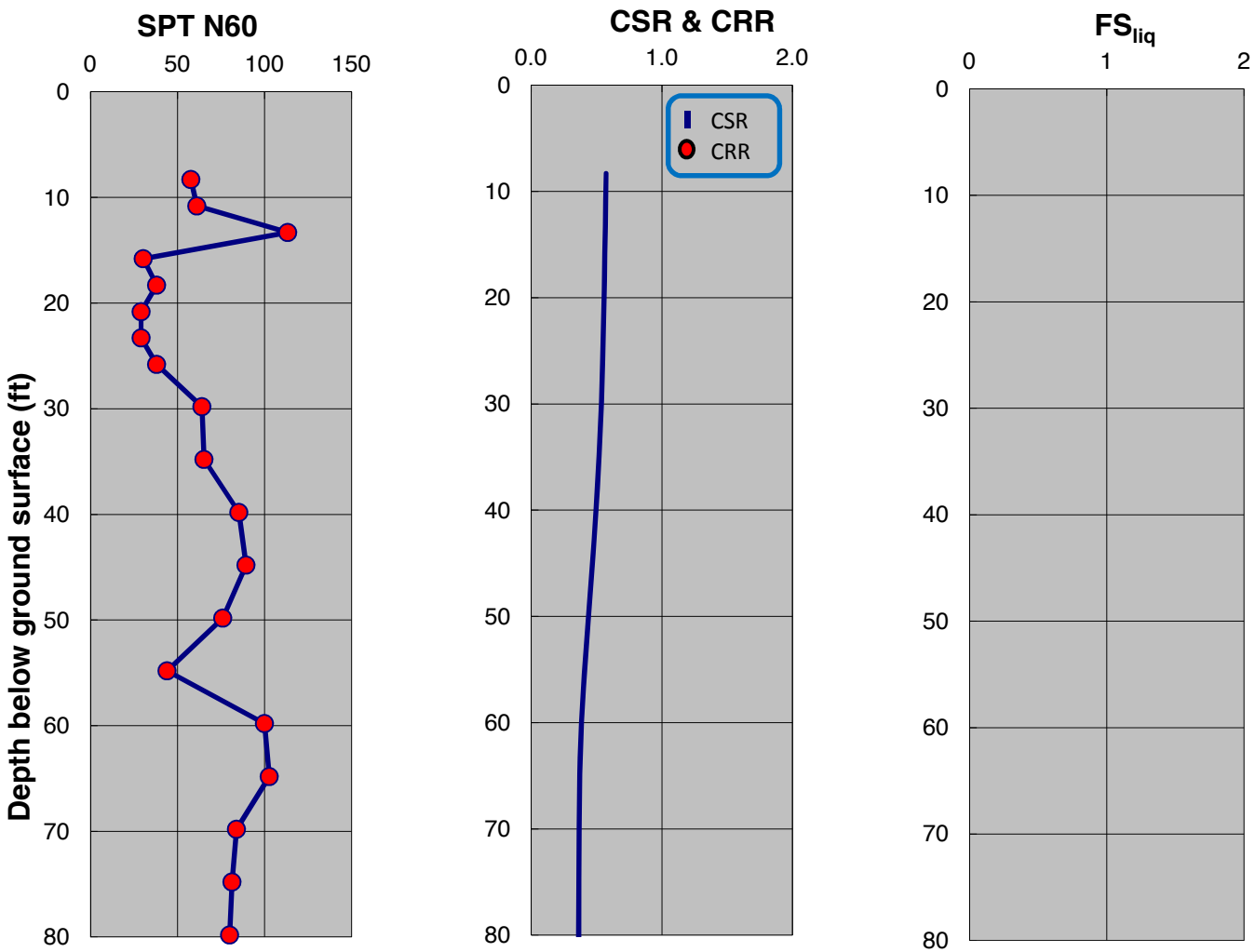
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-146 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



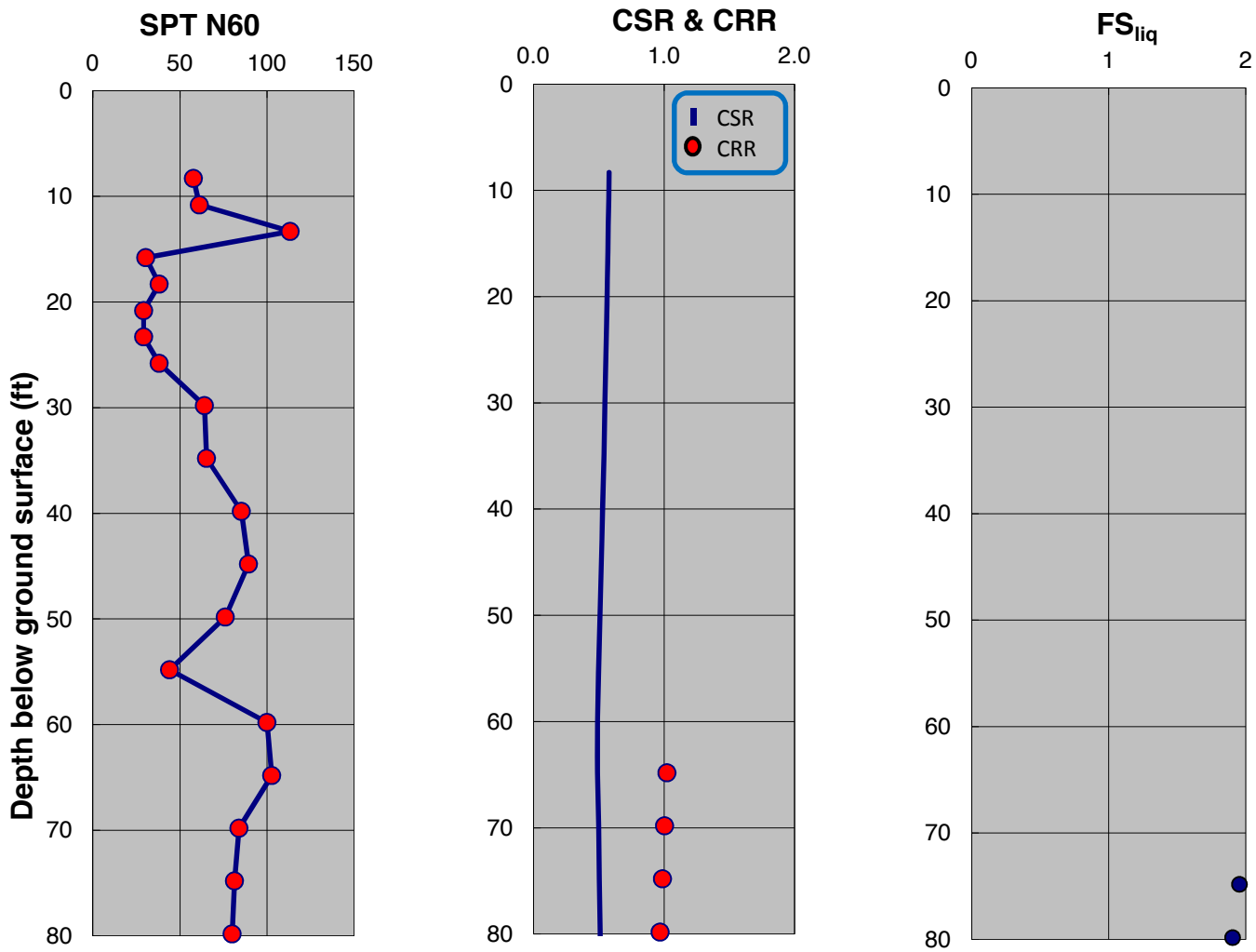
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-146 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



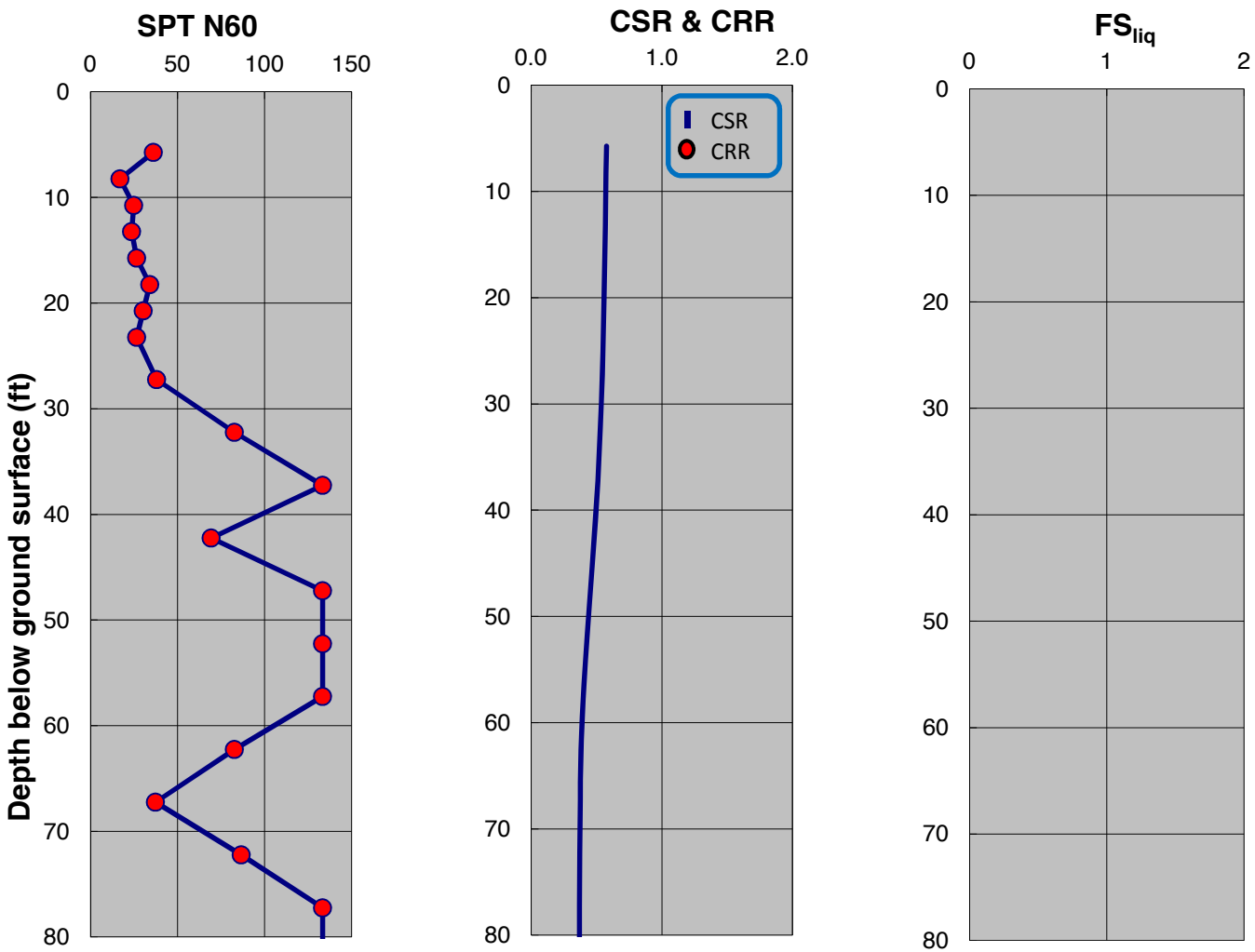
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-147 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



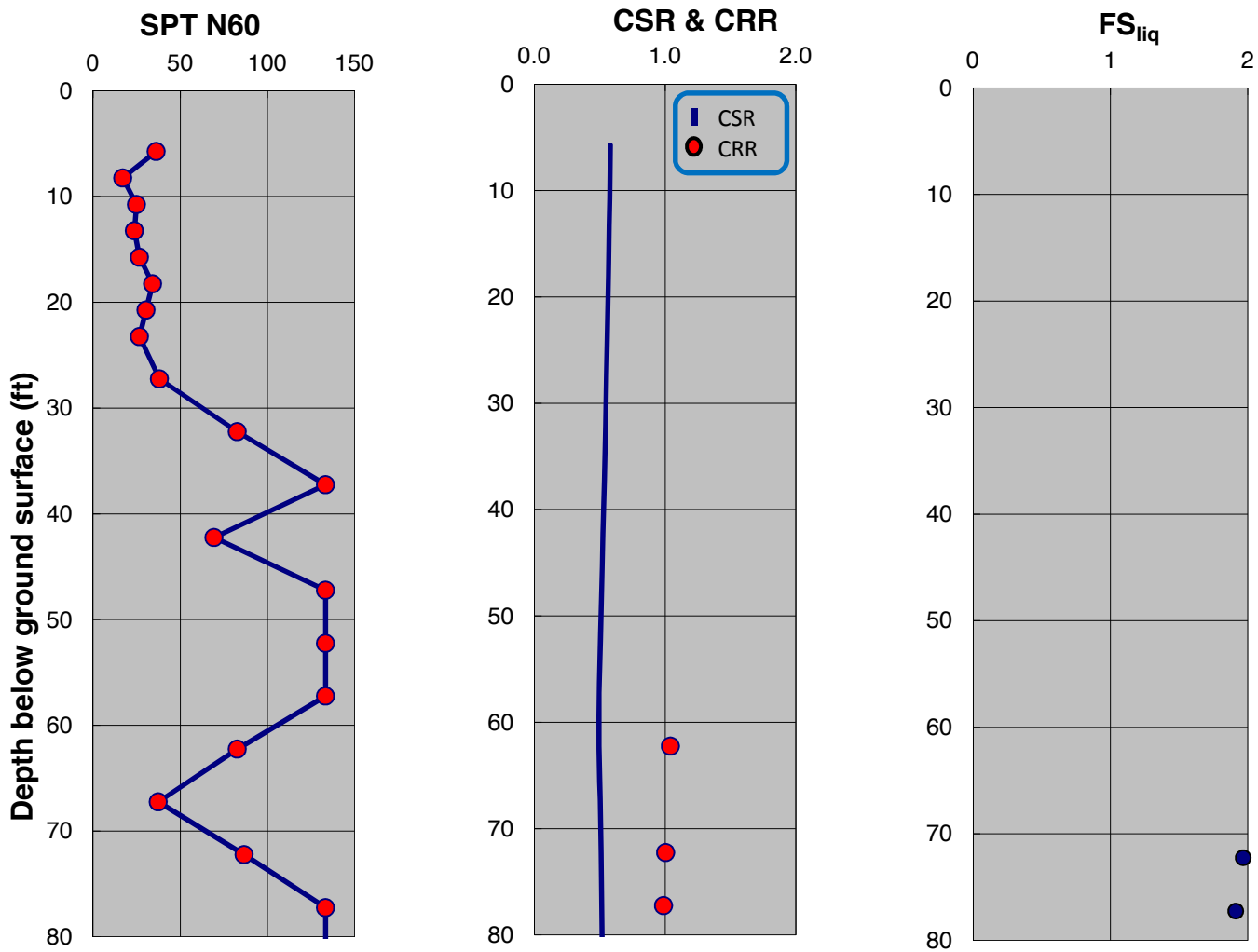
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-147 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



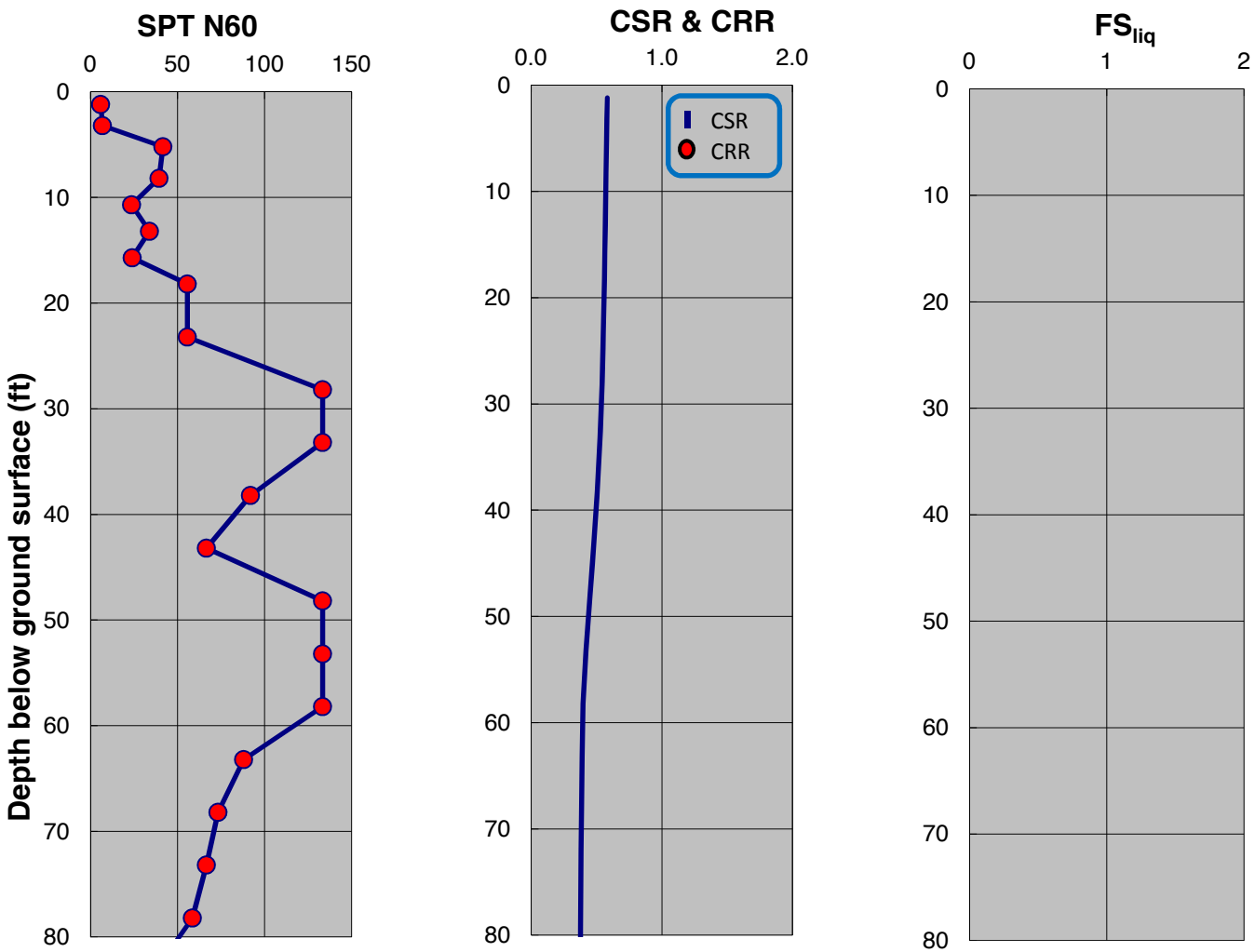
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-148 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-148 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

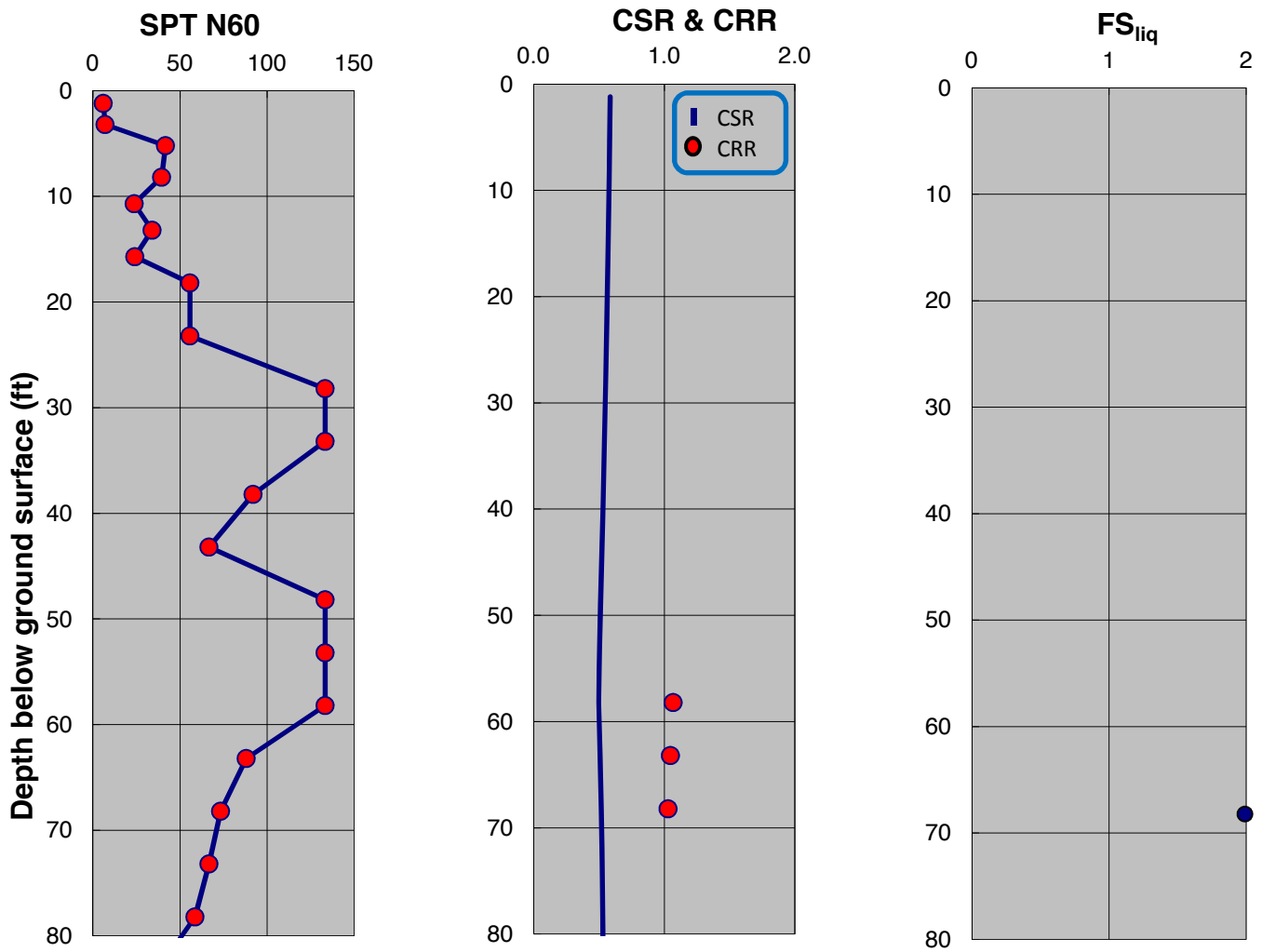
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-149 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

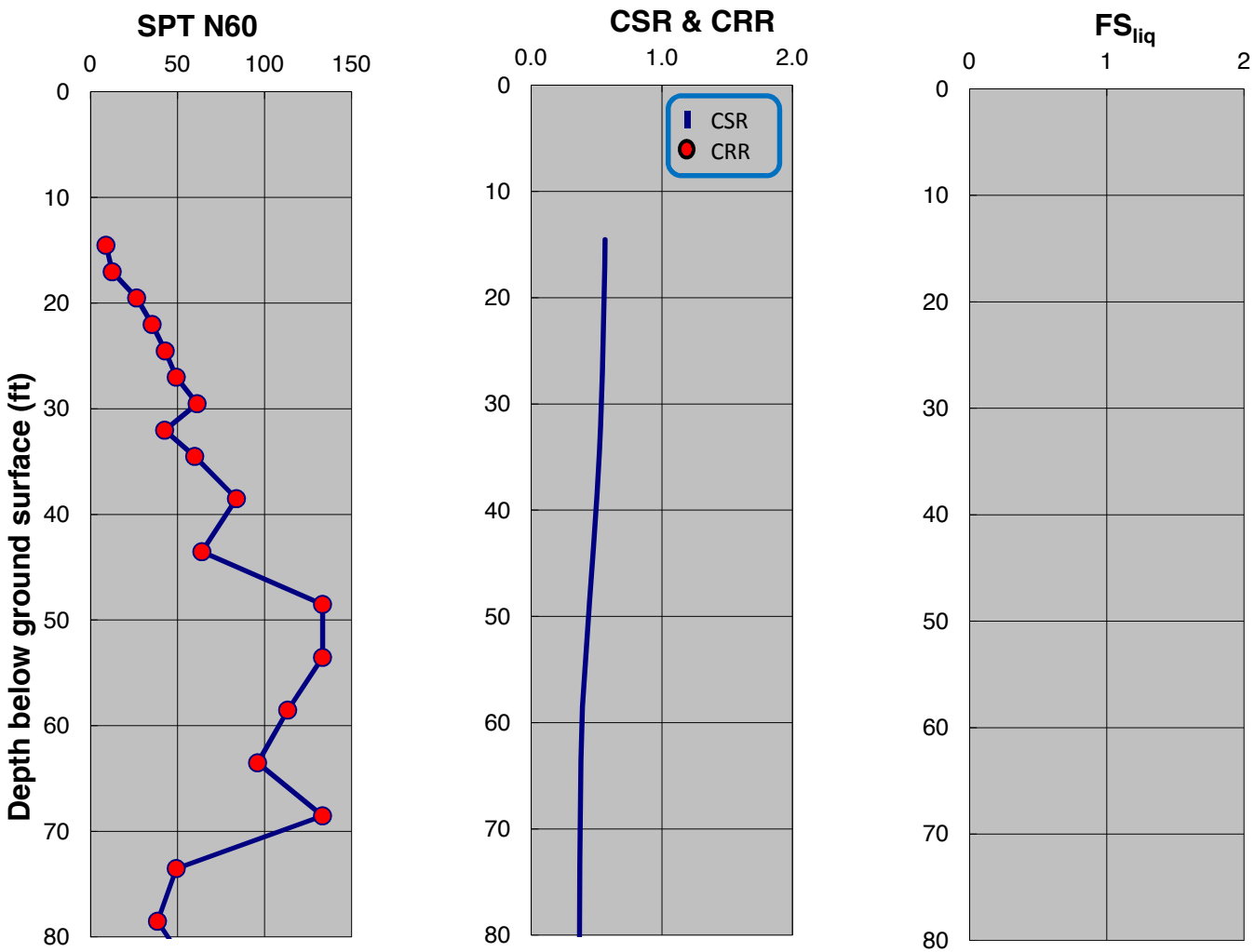
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.441



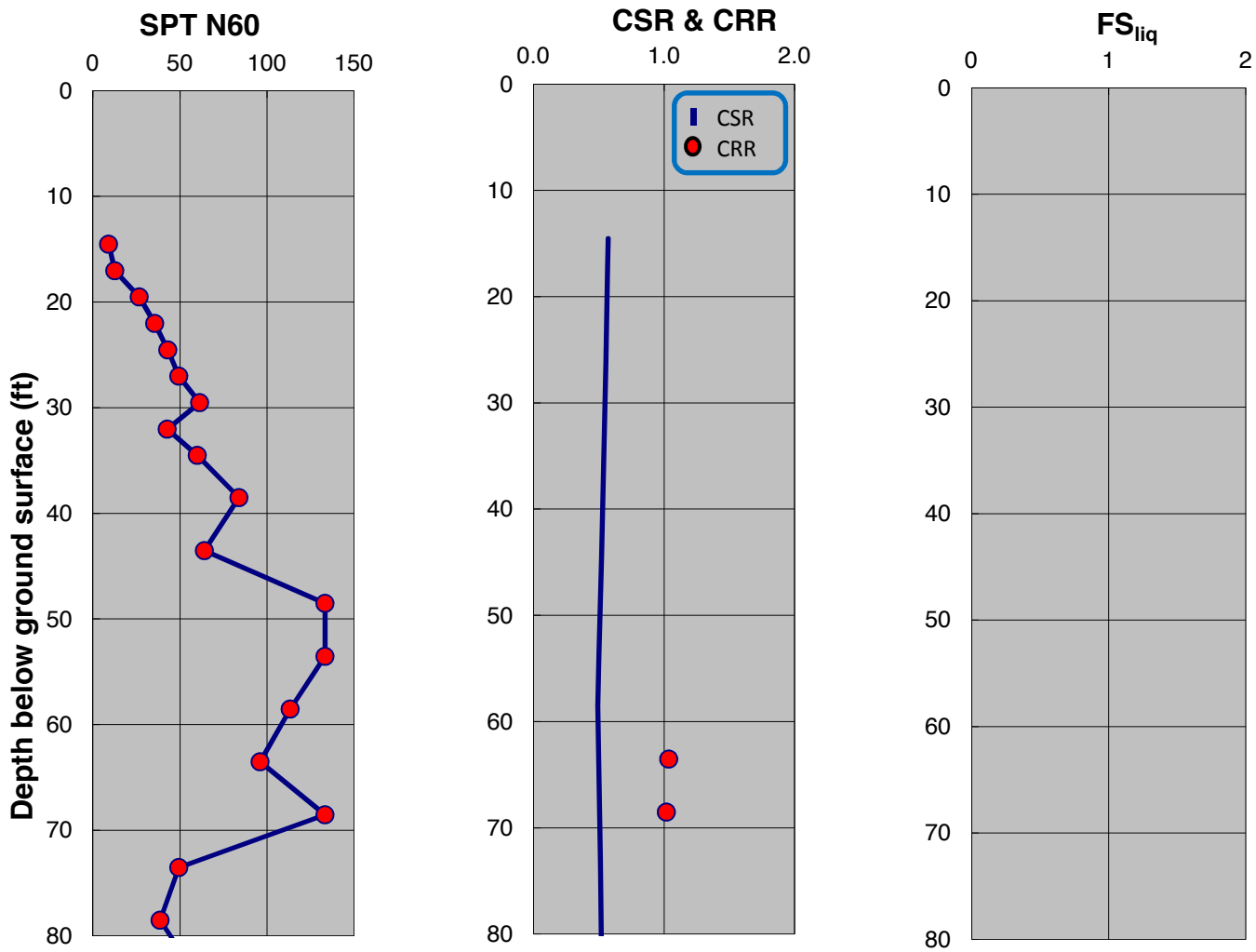
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-149 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



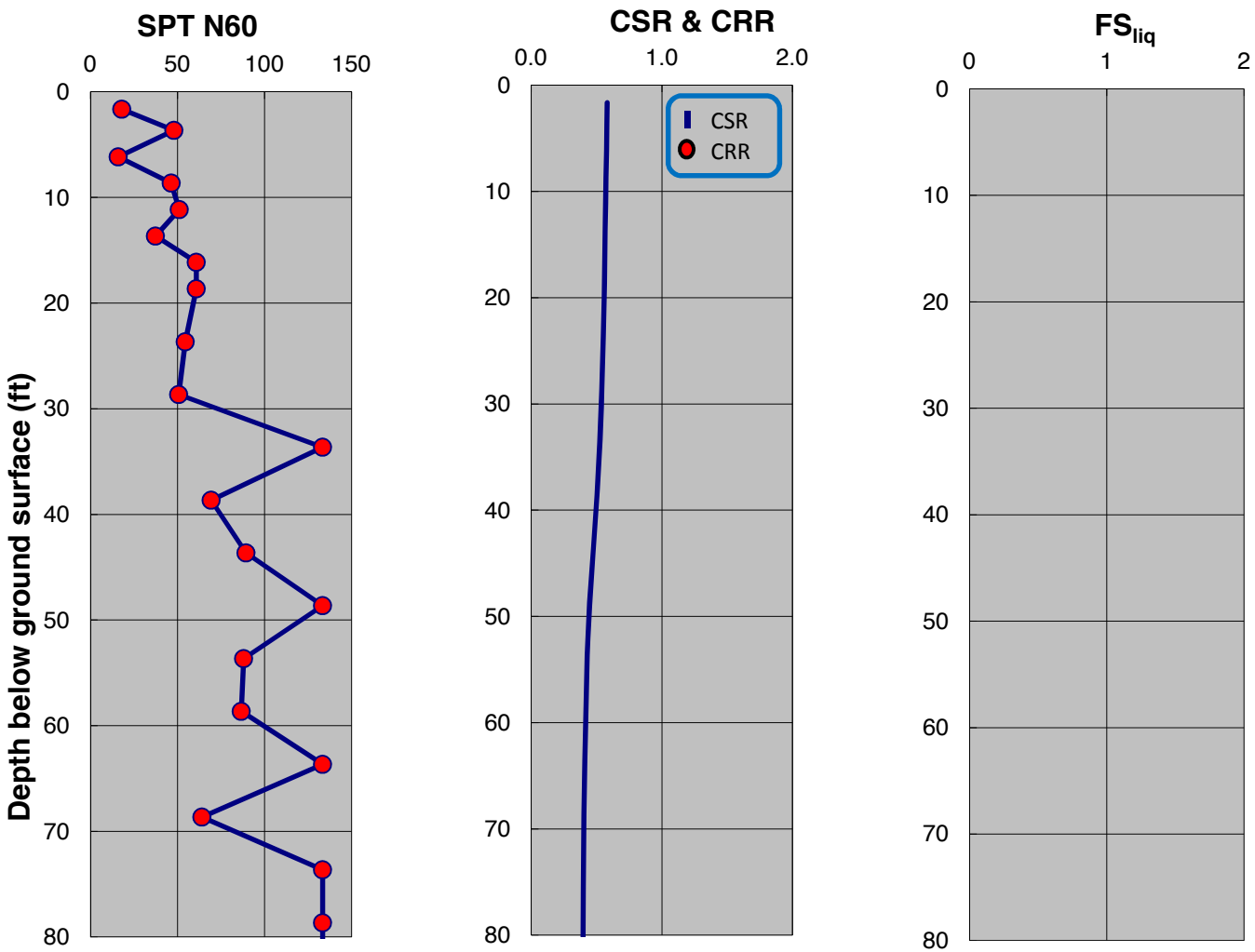
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-150 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-150 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

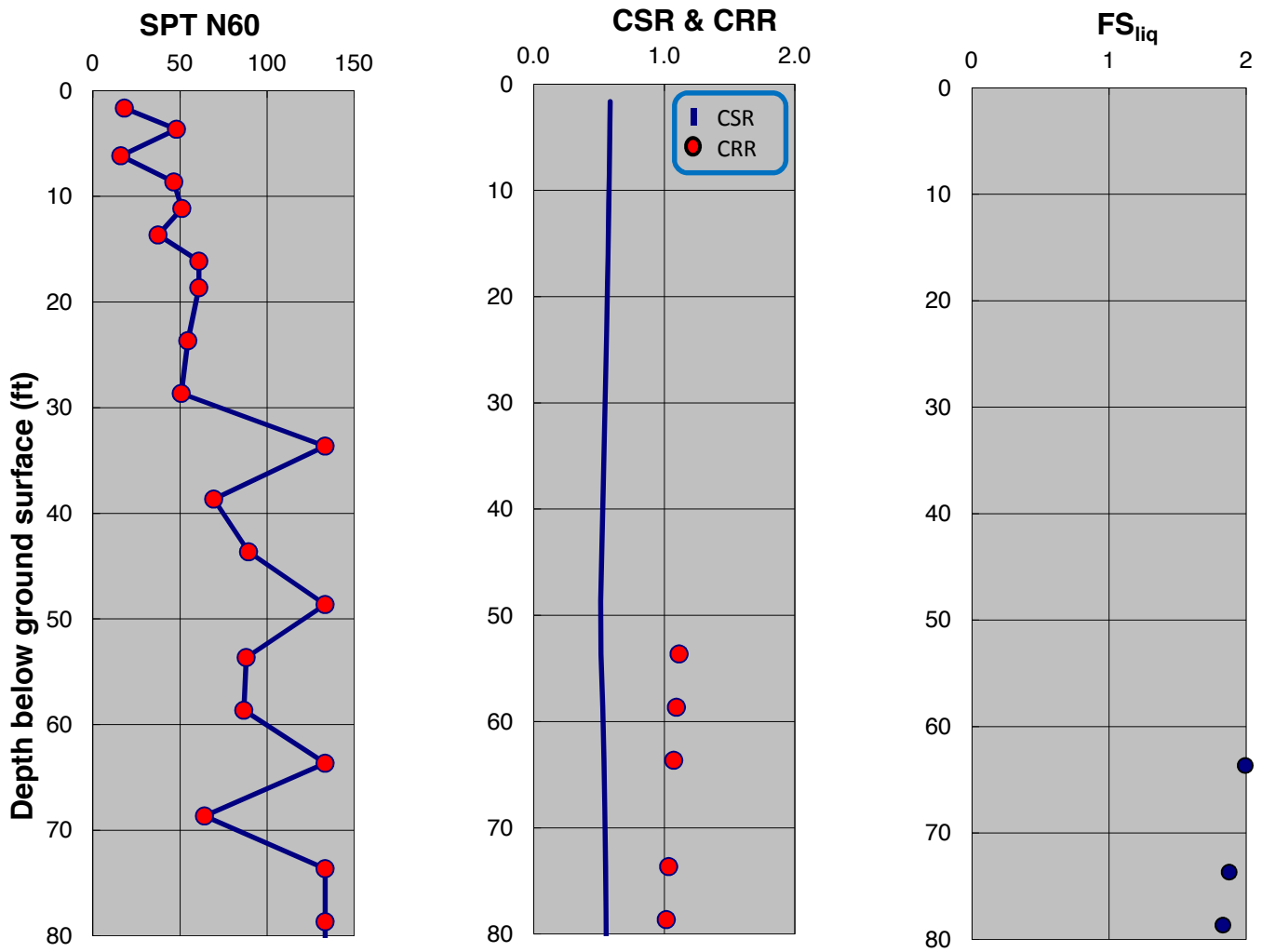
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-151 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

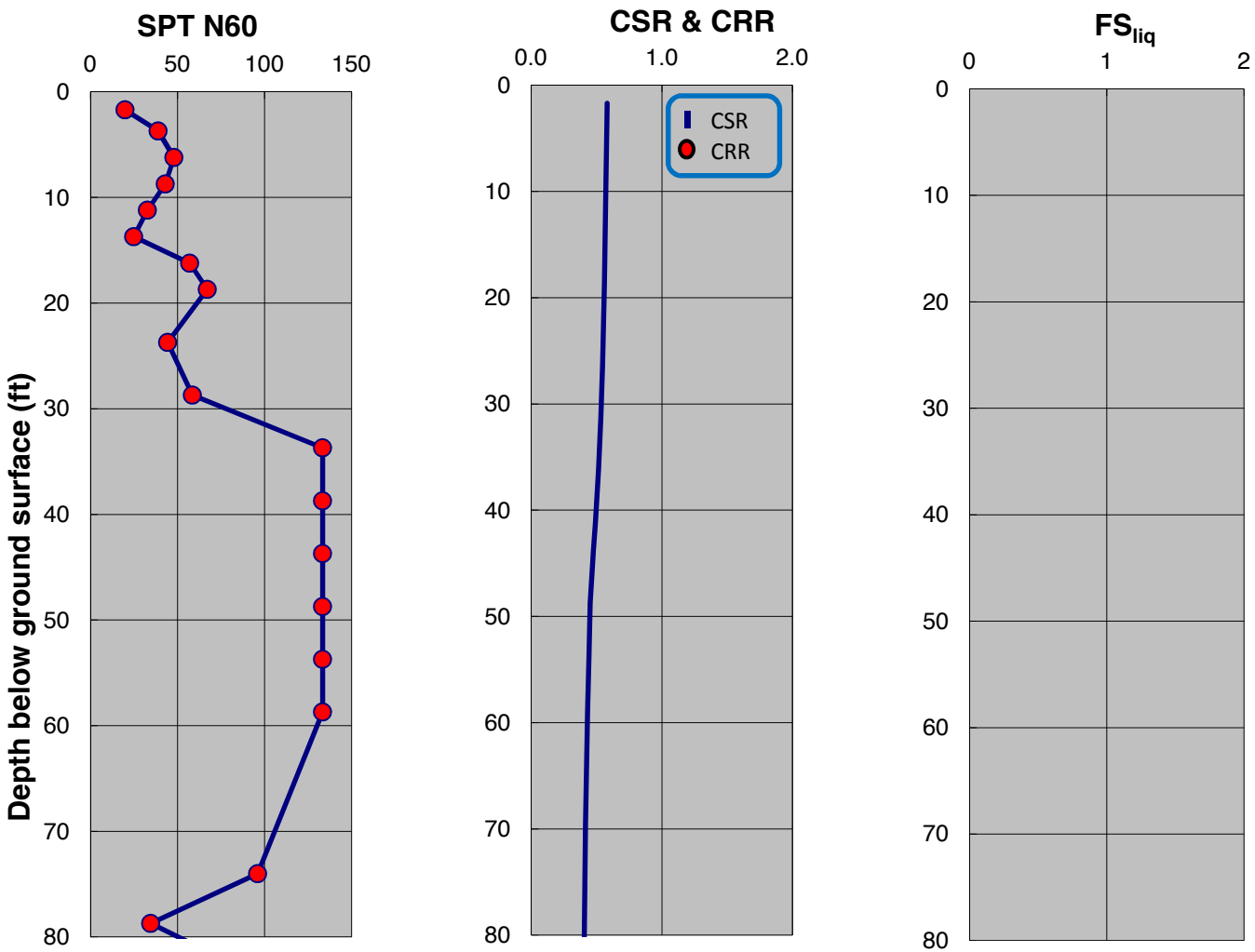
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.445



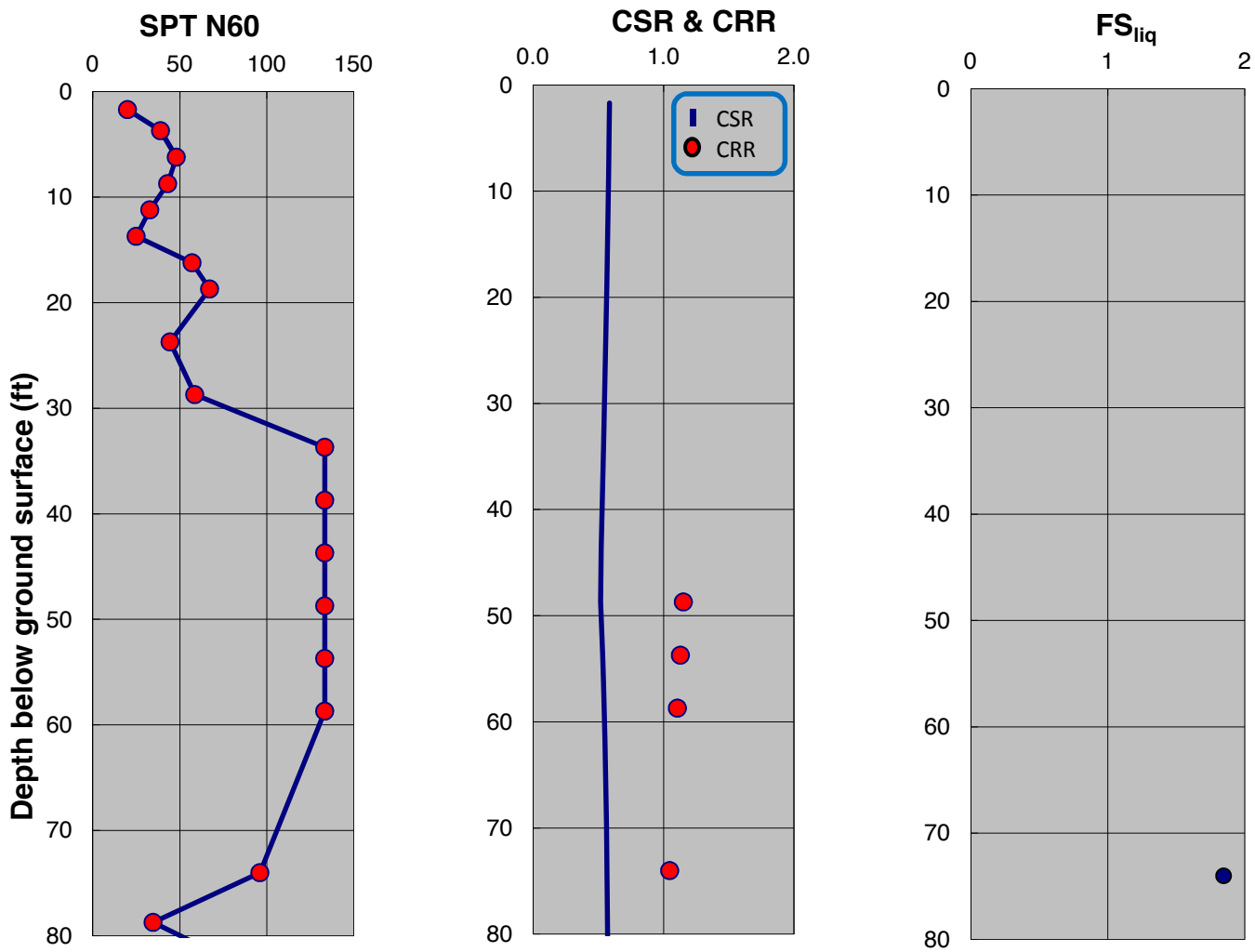
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-151 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



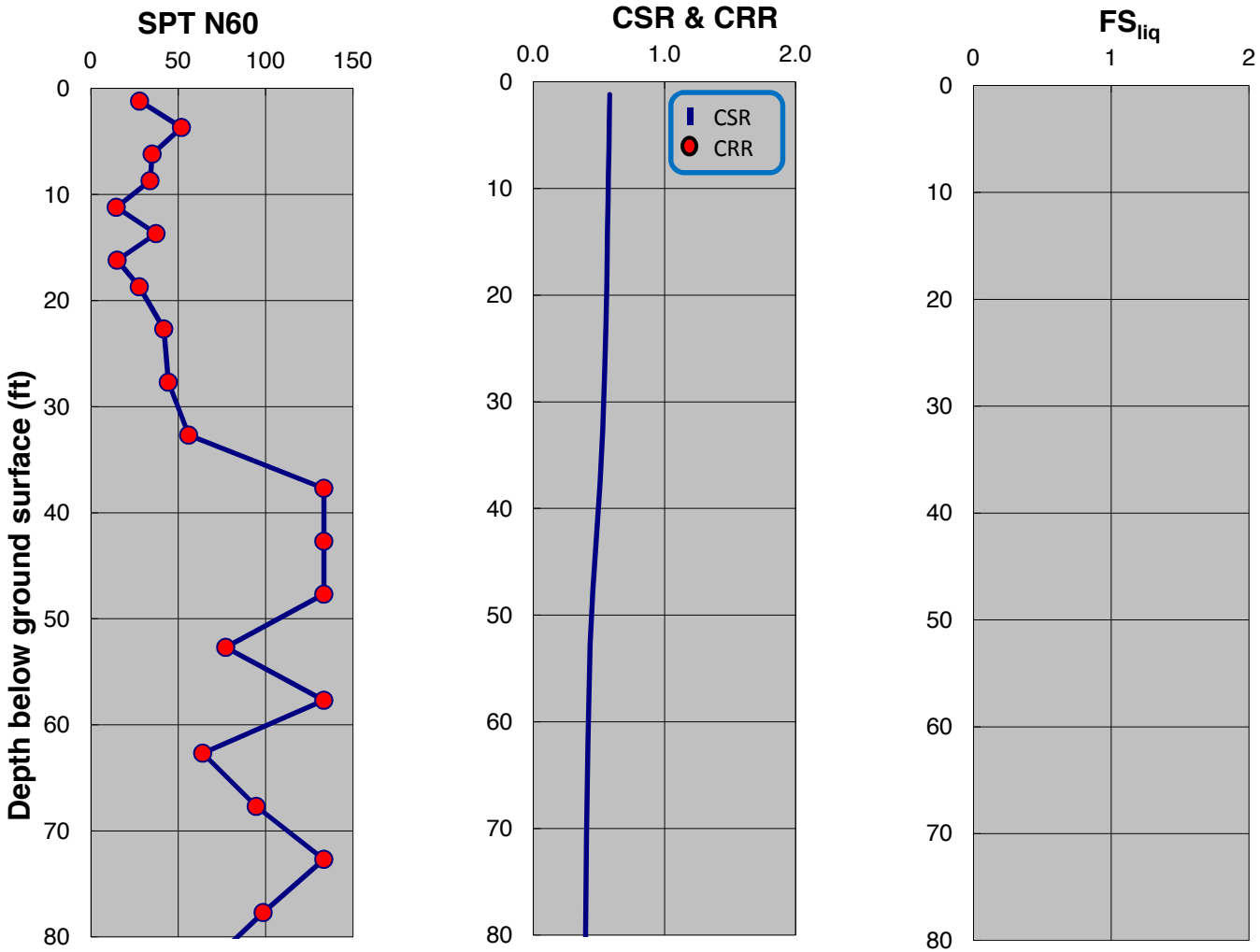
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-152 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



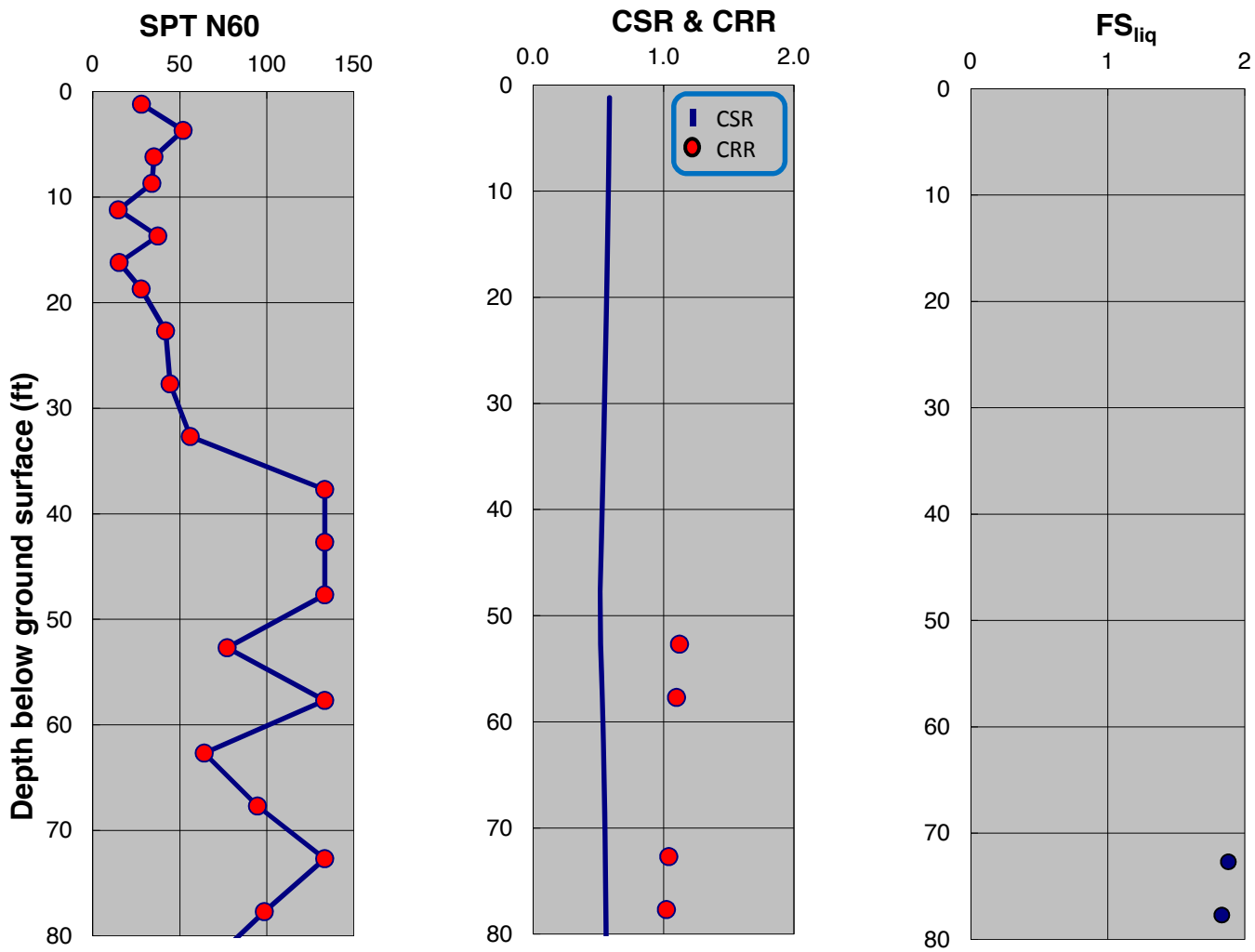
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-152 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-153 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

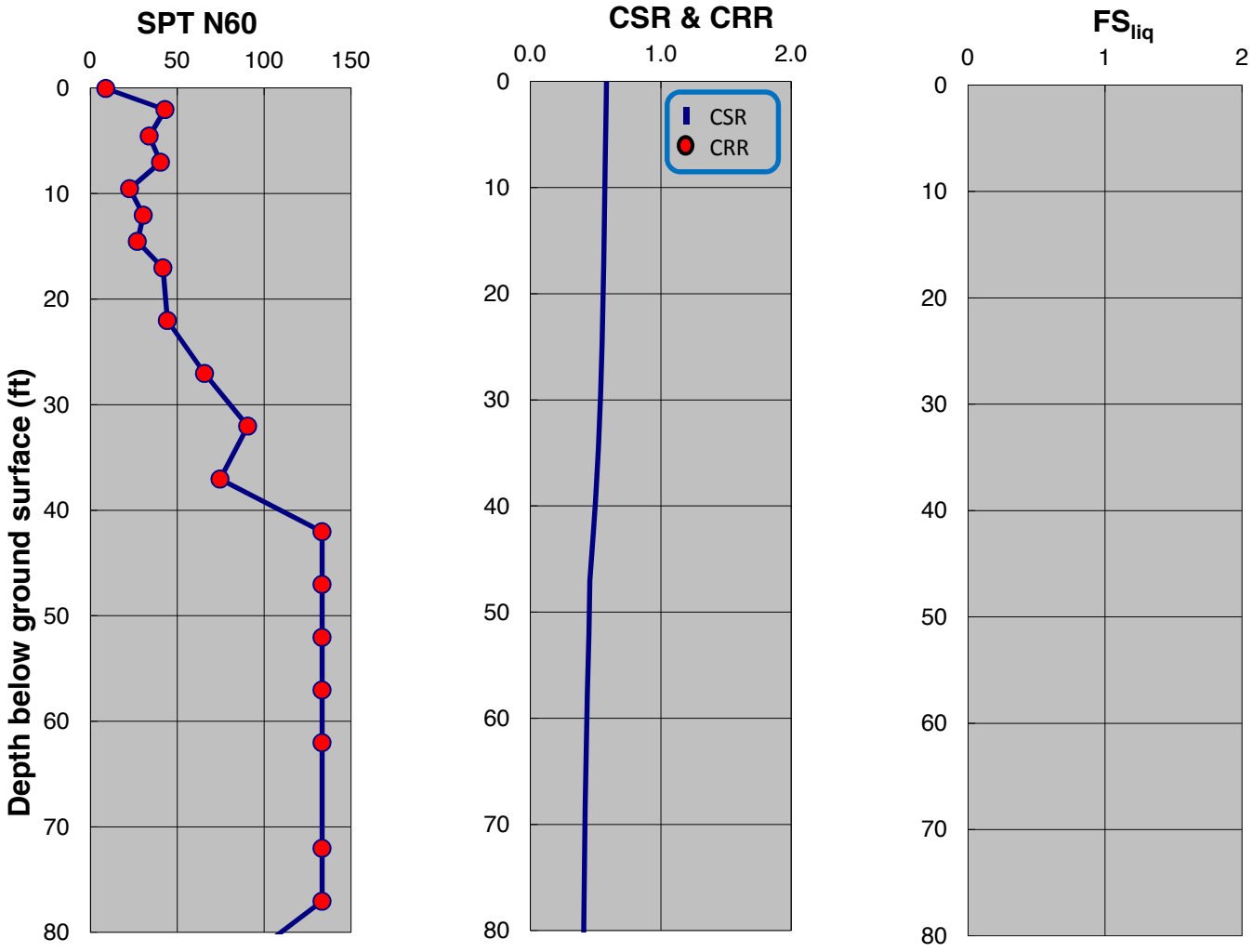
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-153 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

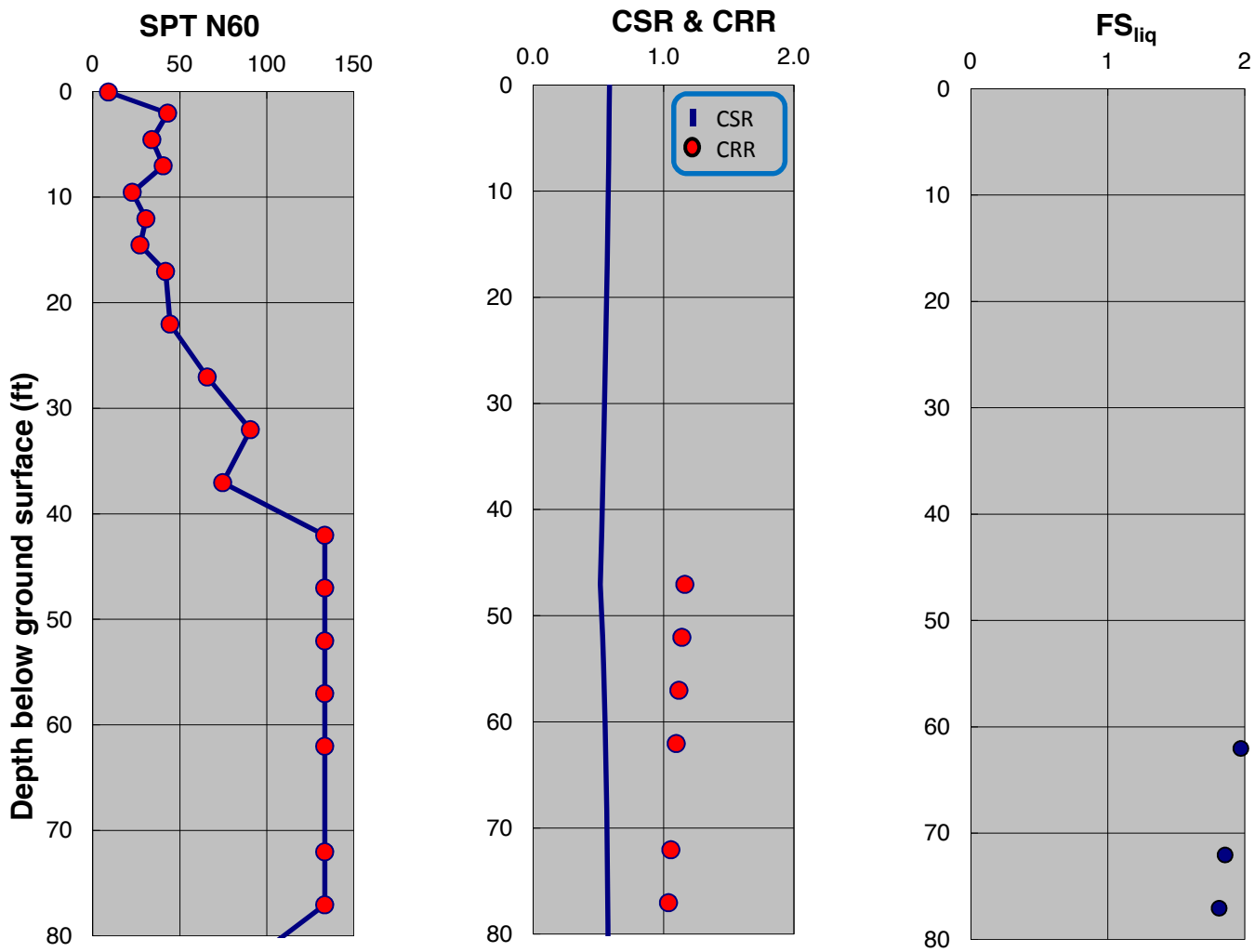
PLATE C.450



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-154 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

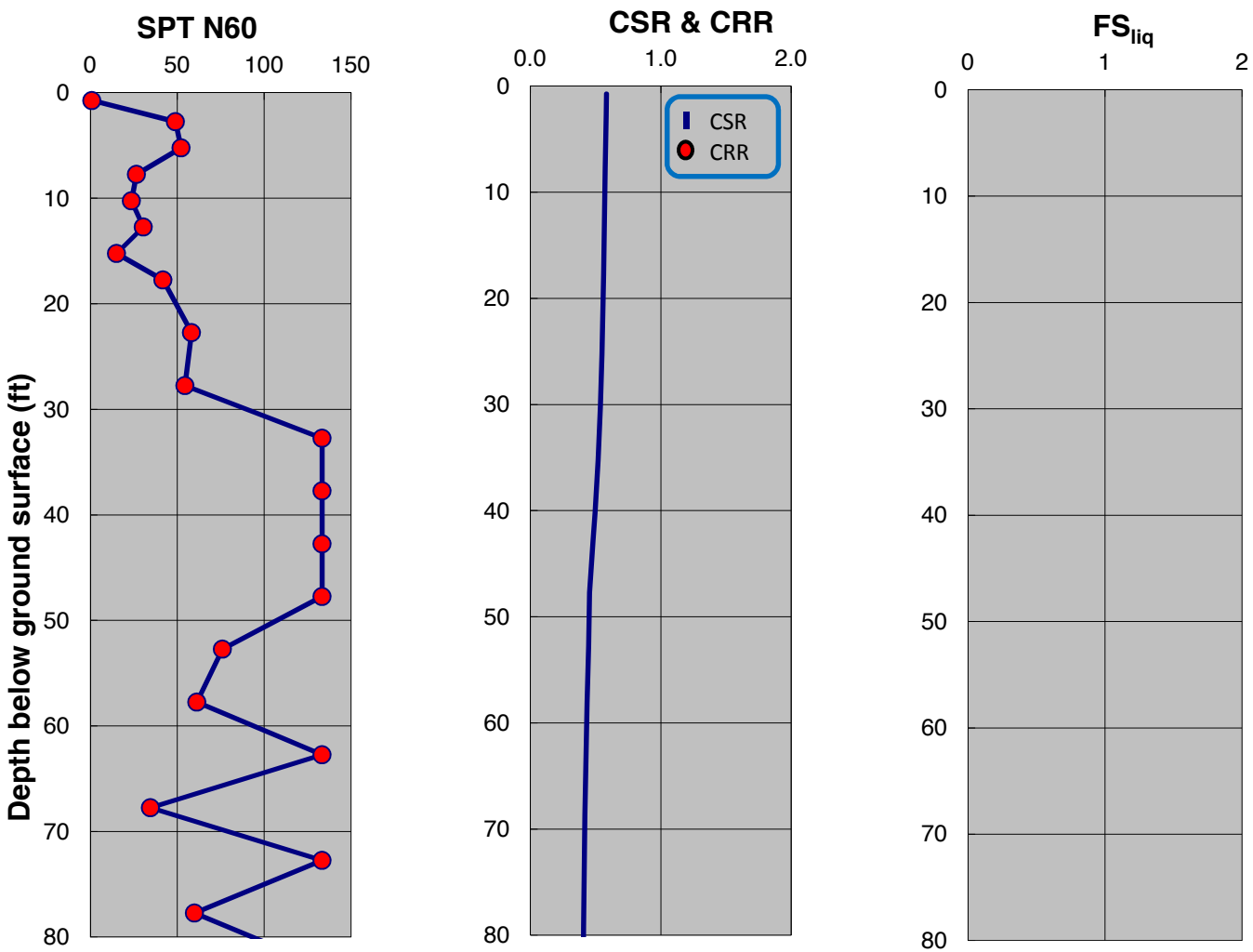
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.451



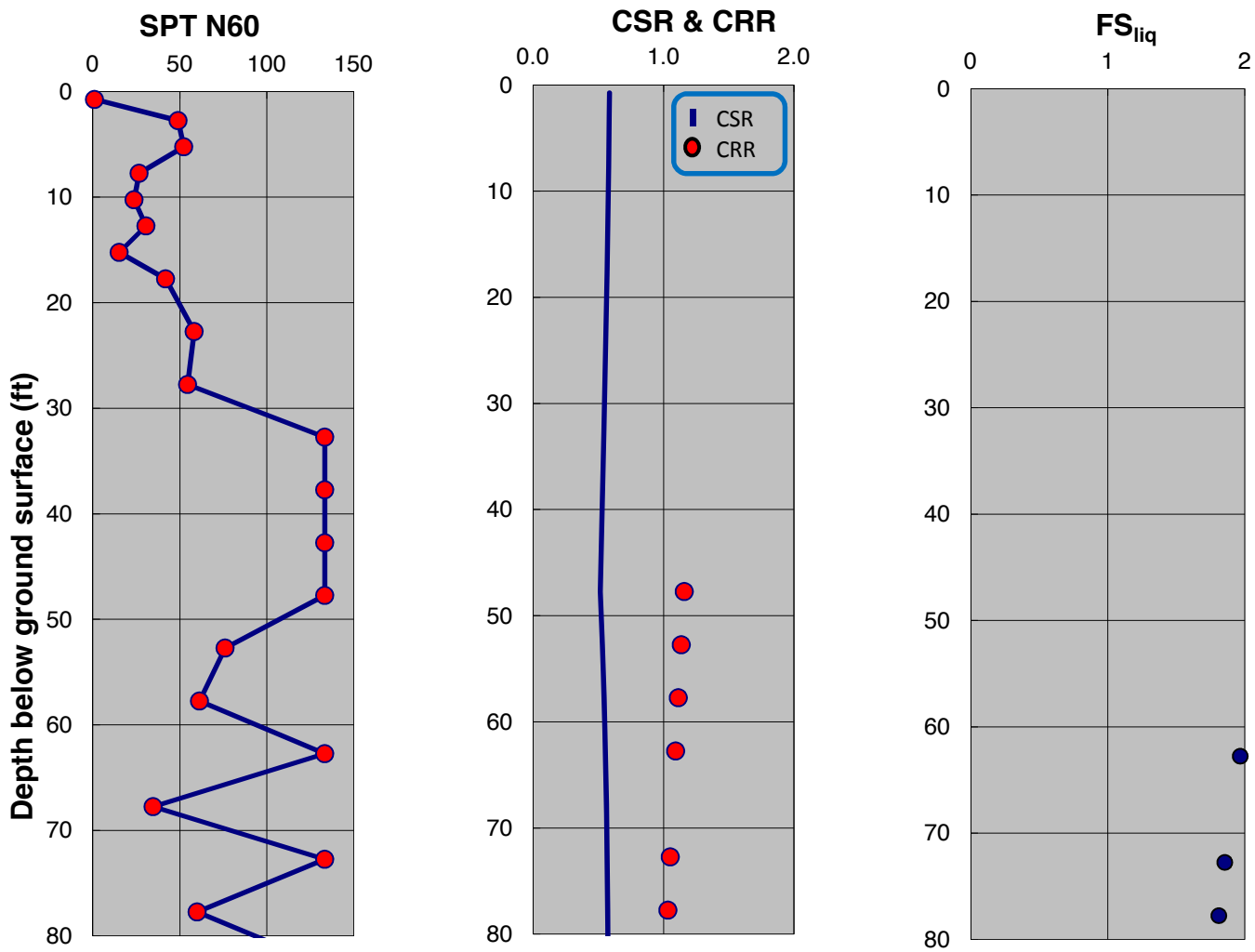
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-154 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



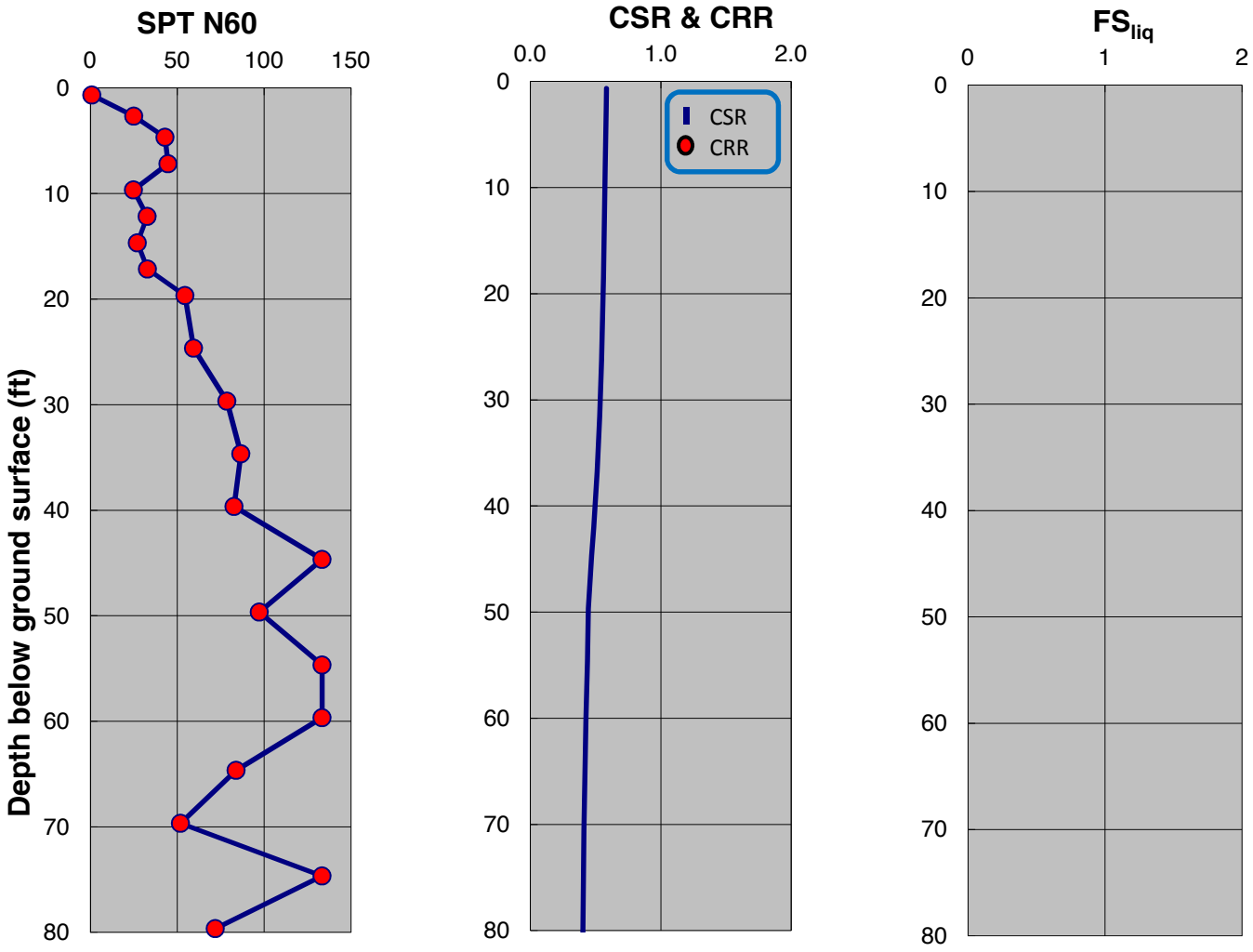
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-155 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



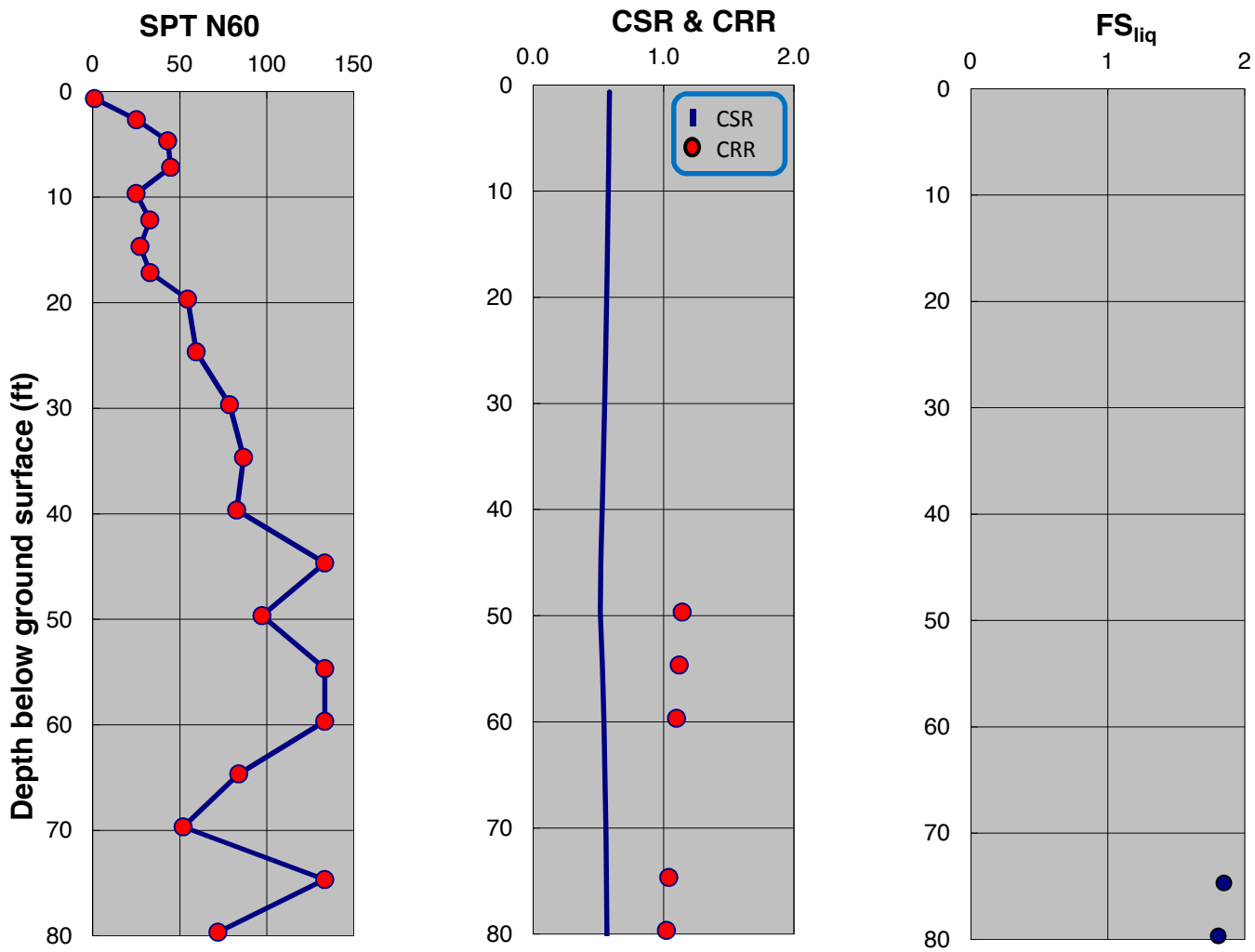
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-155 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



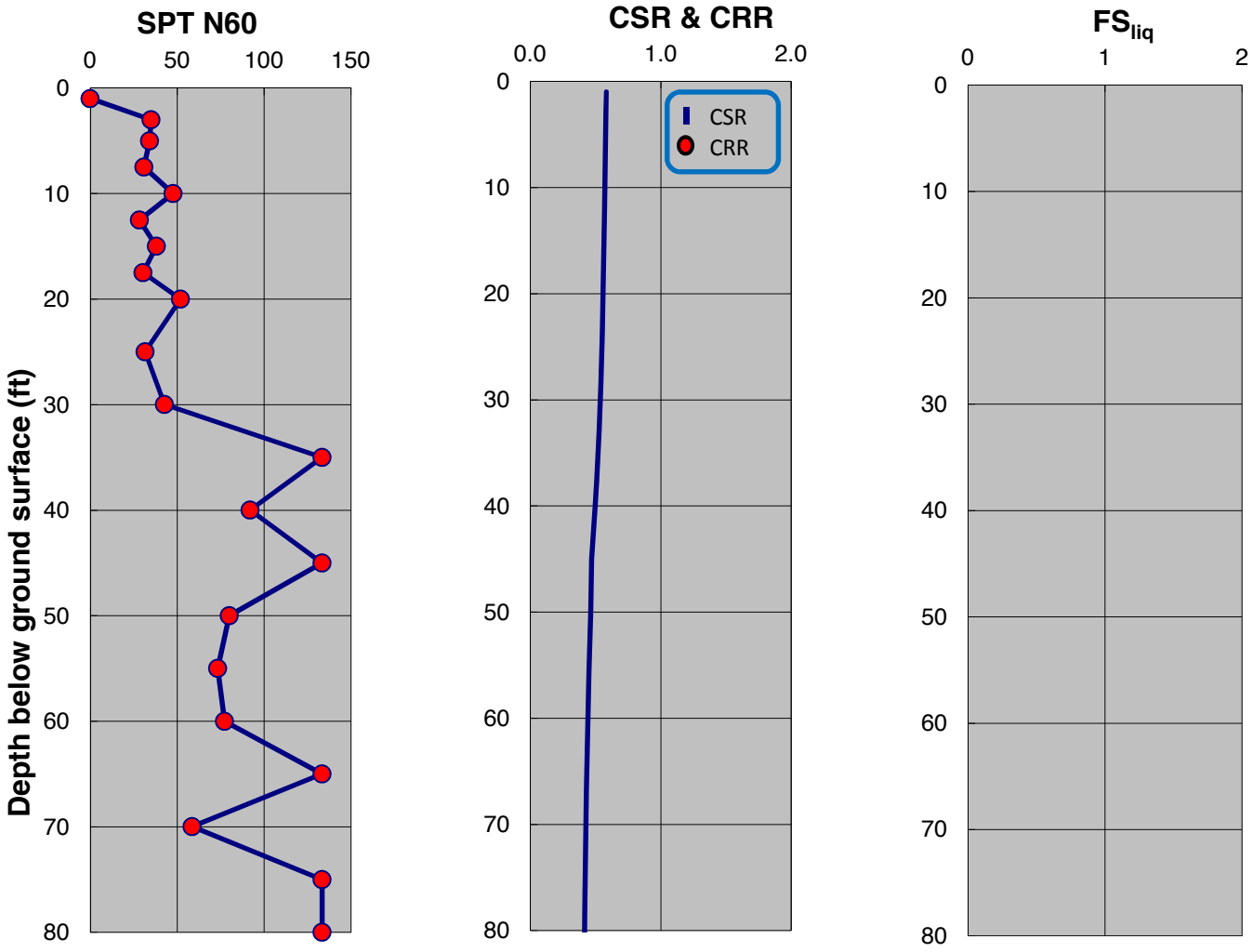
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-156 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



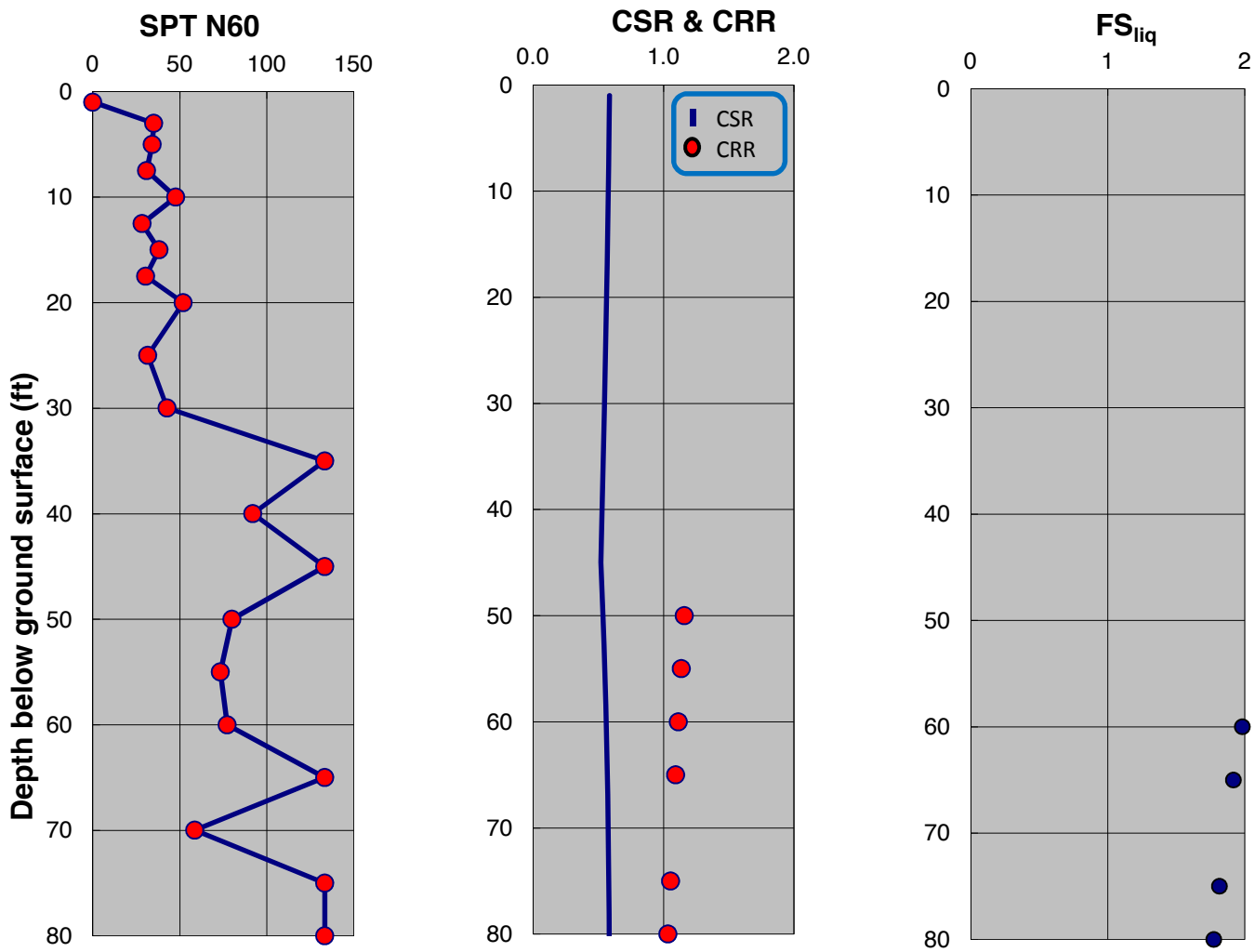
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-156 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



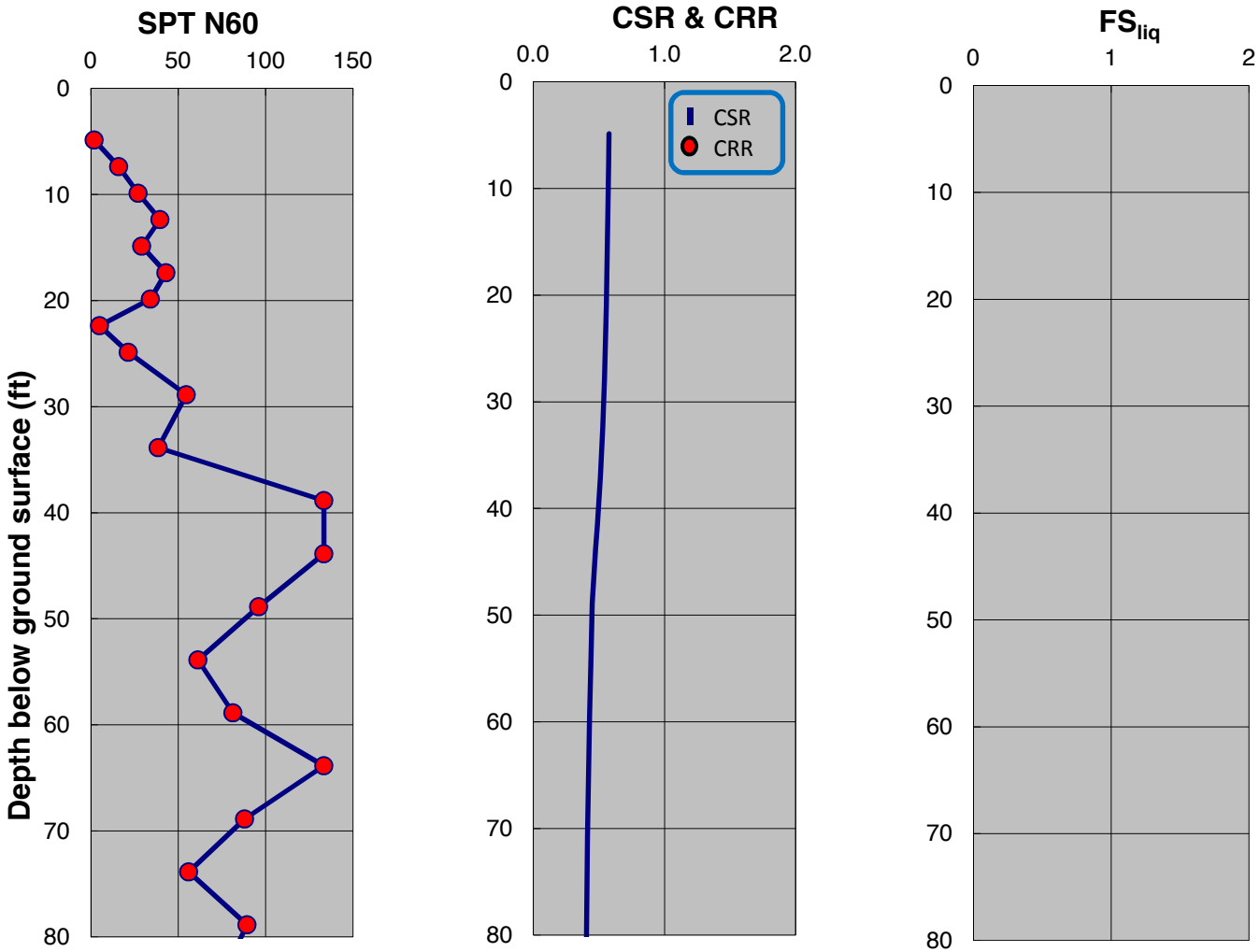
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-157 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



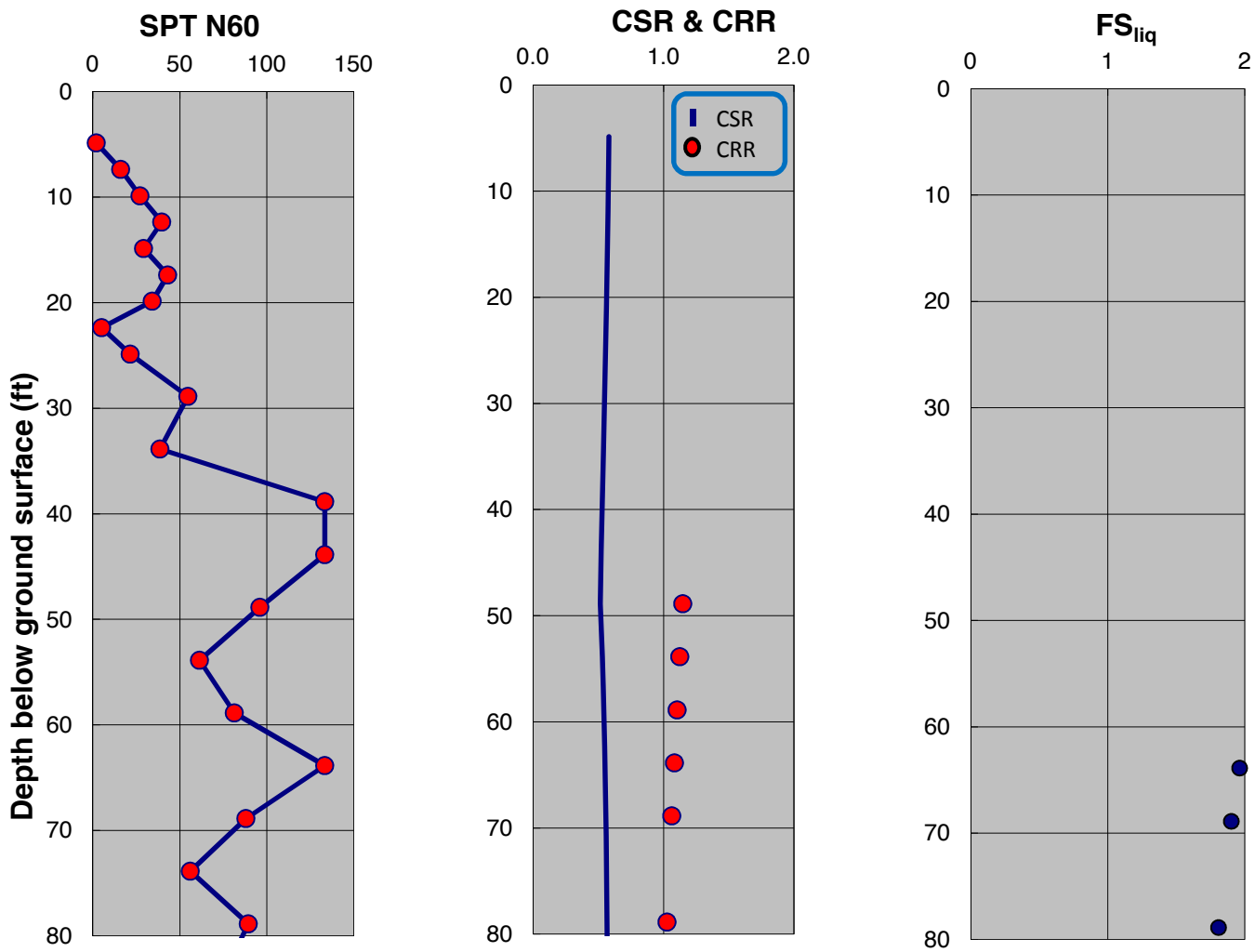
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-157 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-158 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

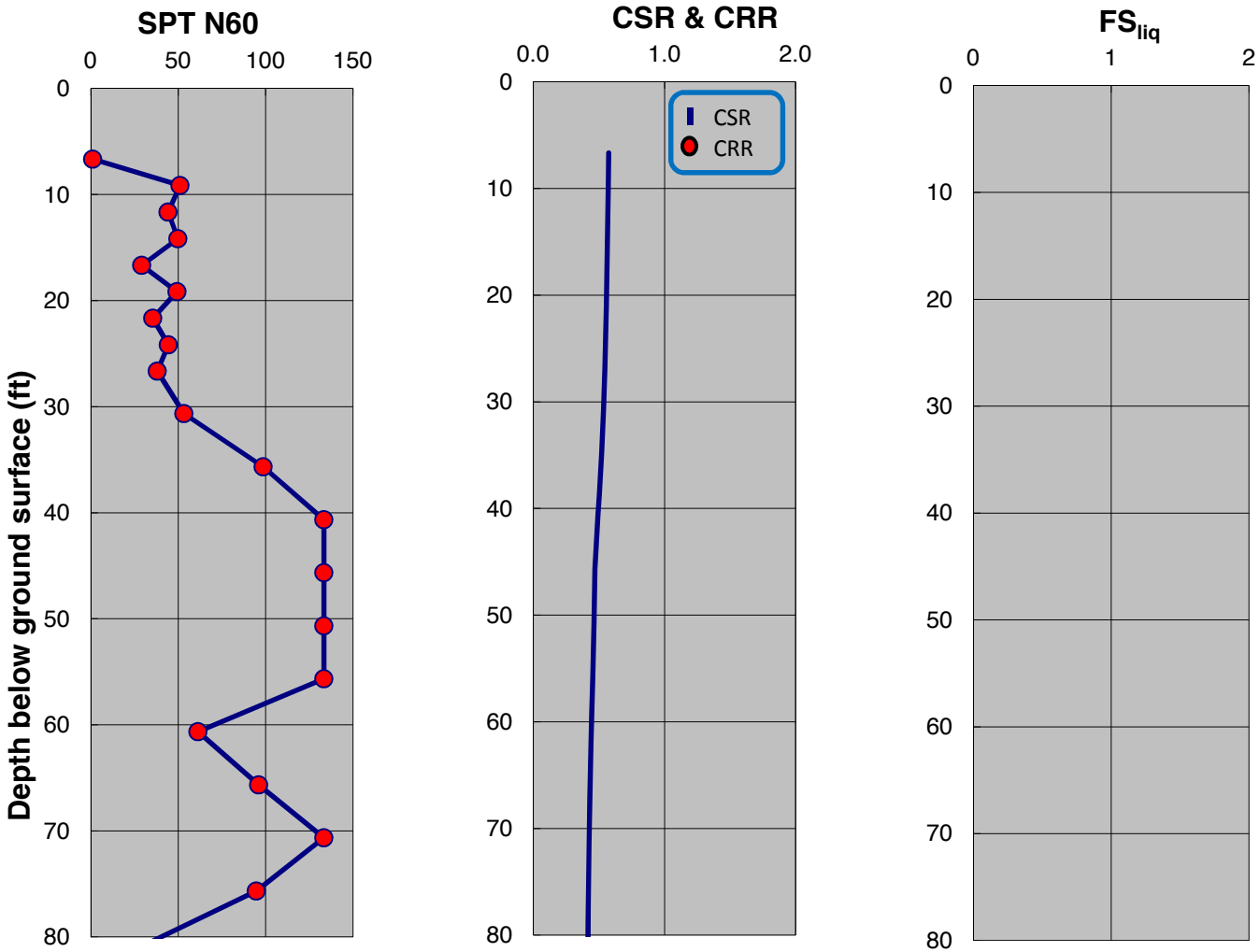
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-158 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

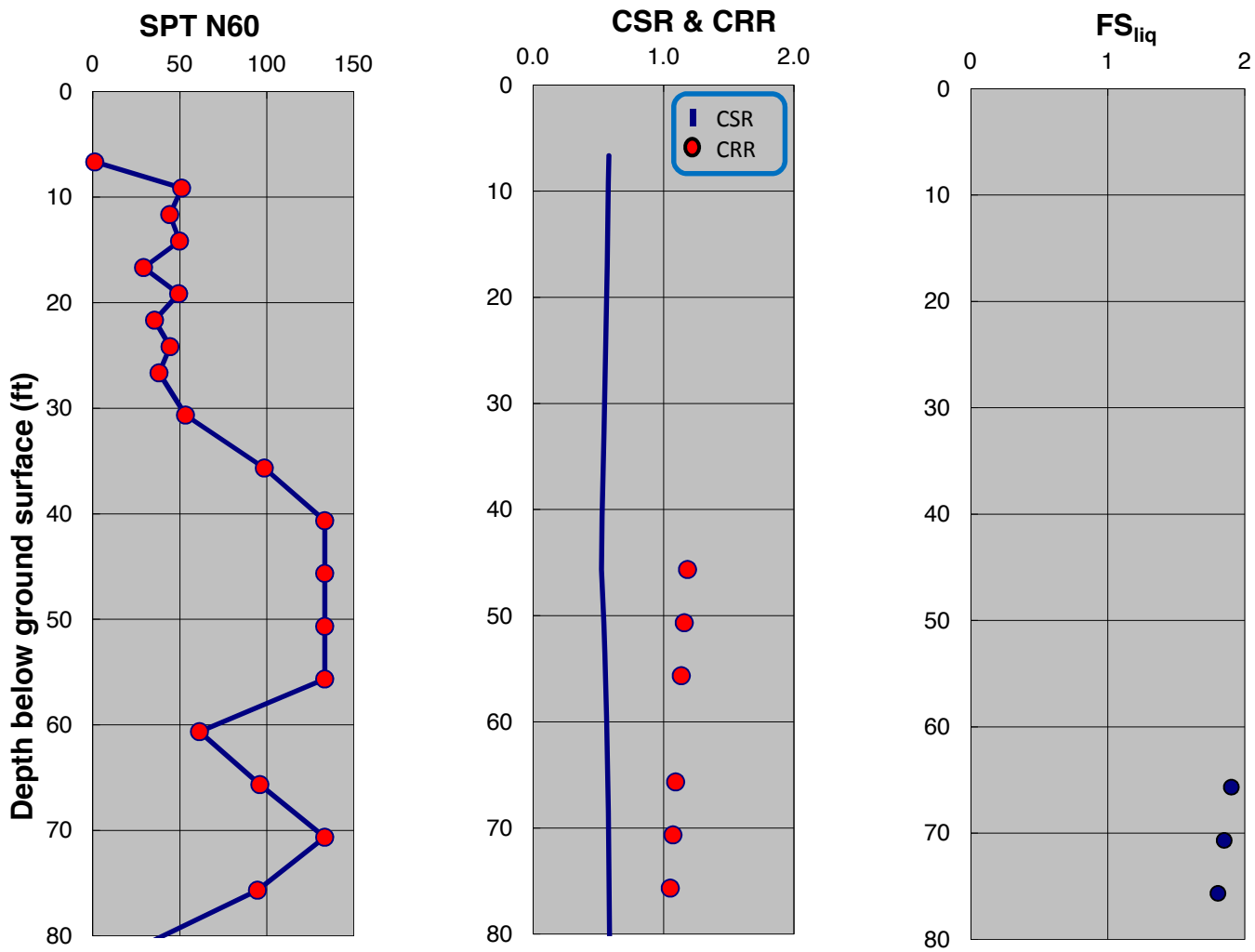
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.460



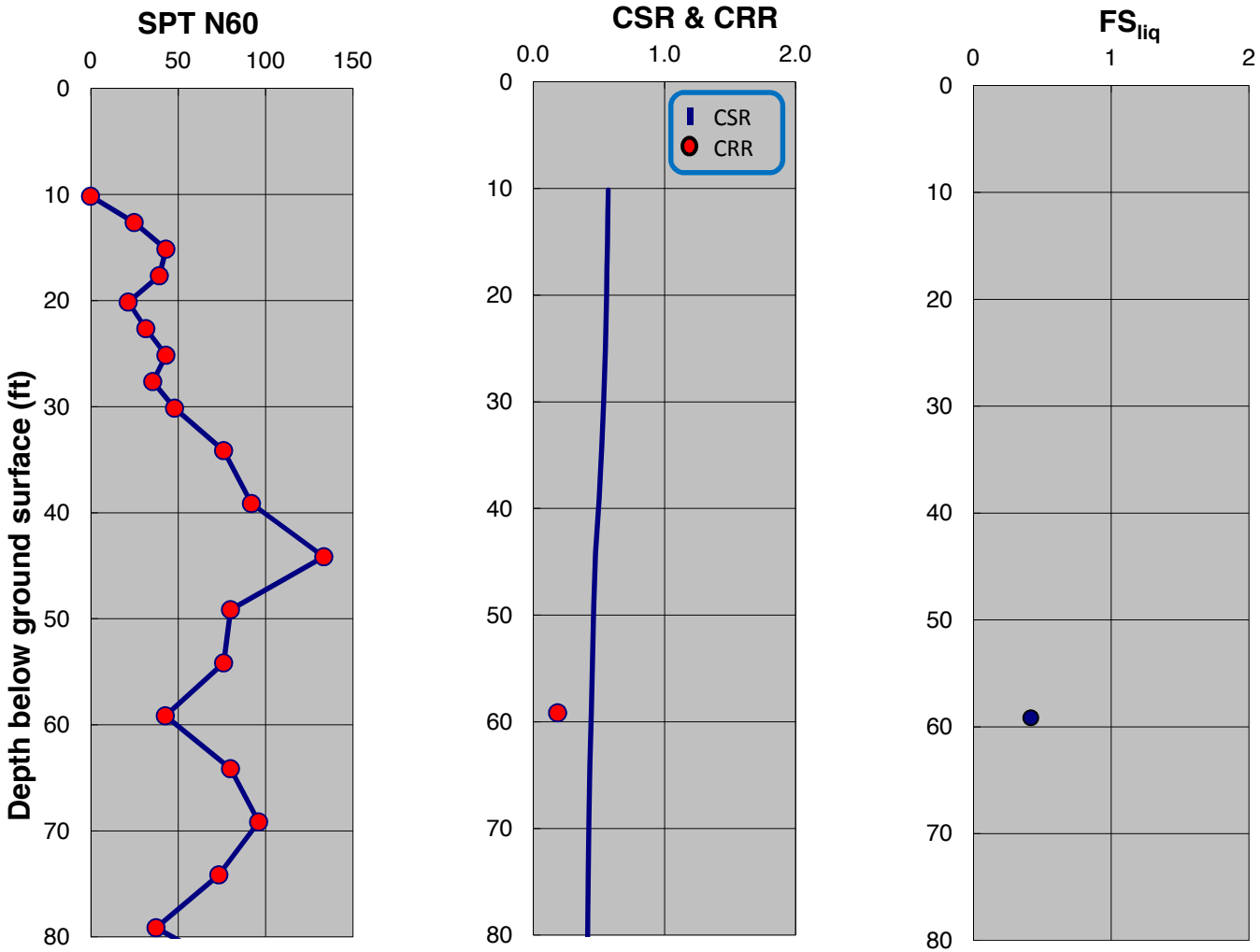
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-159 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



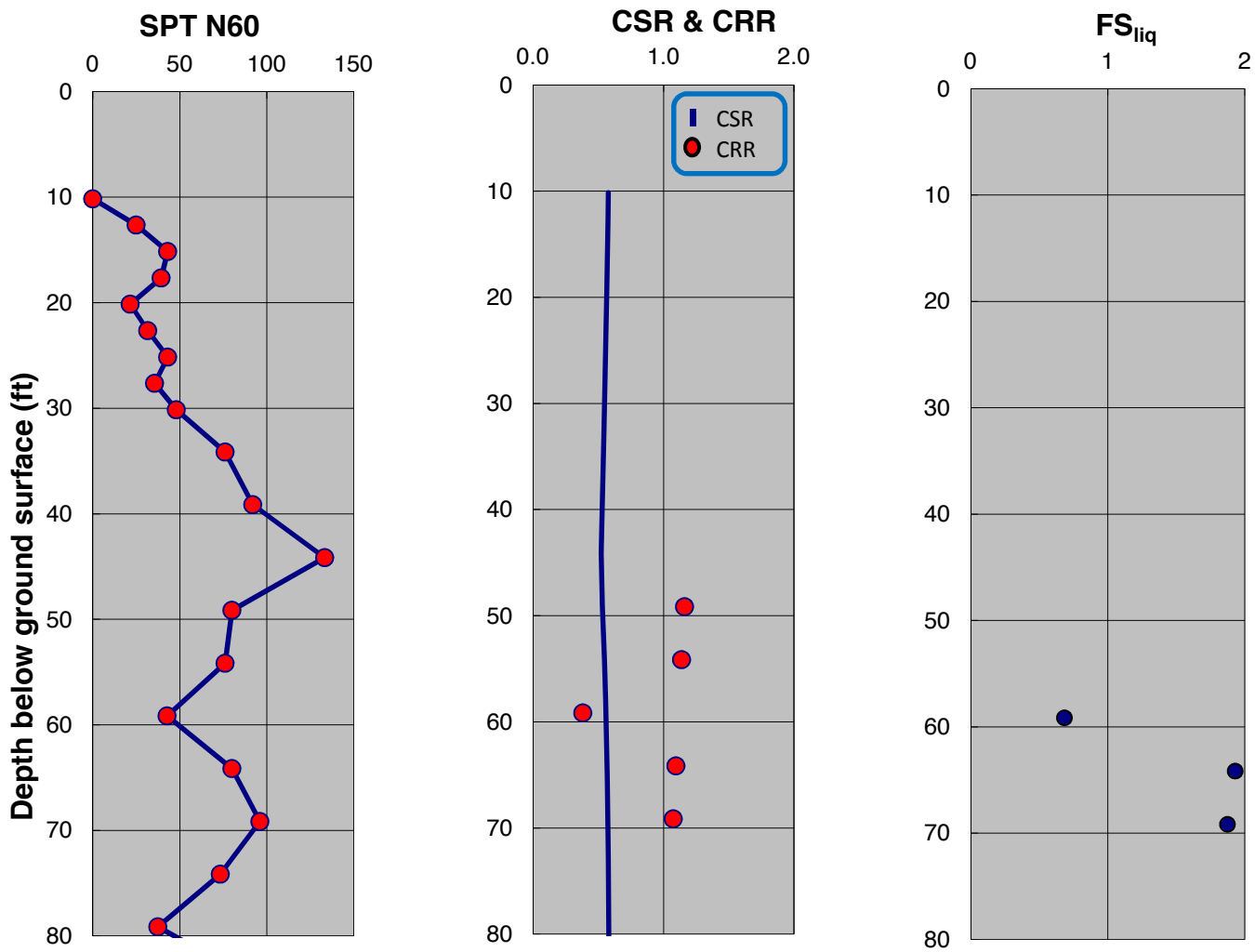
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-159 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



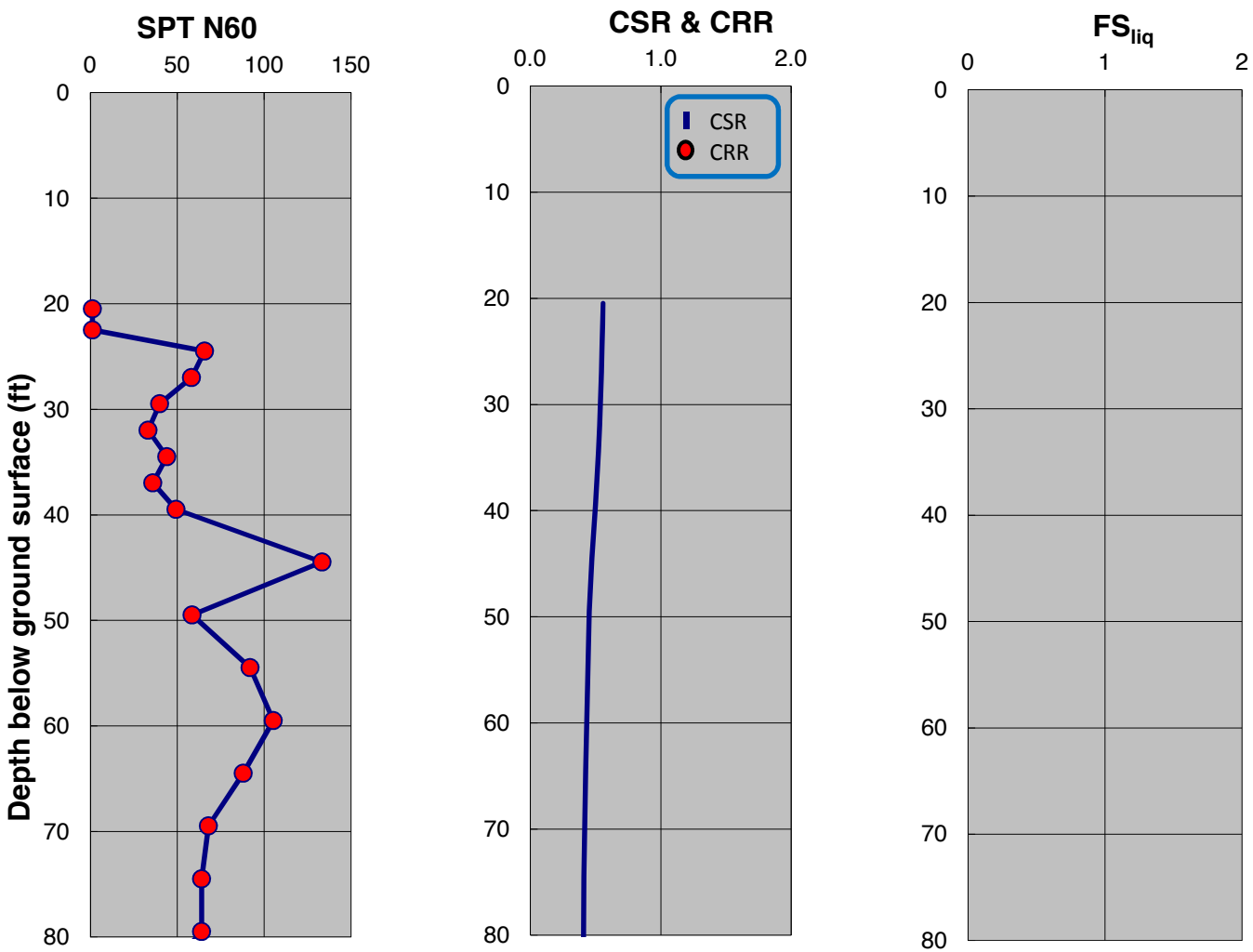
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-160 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



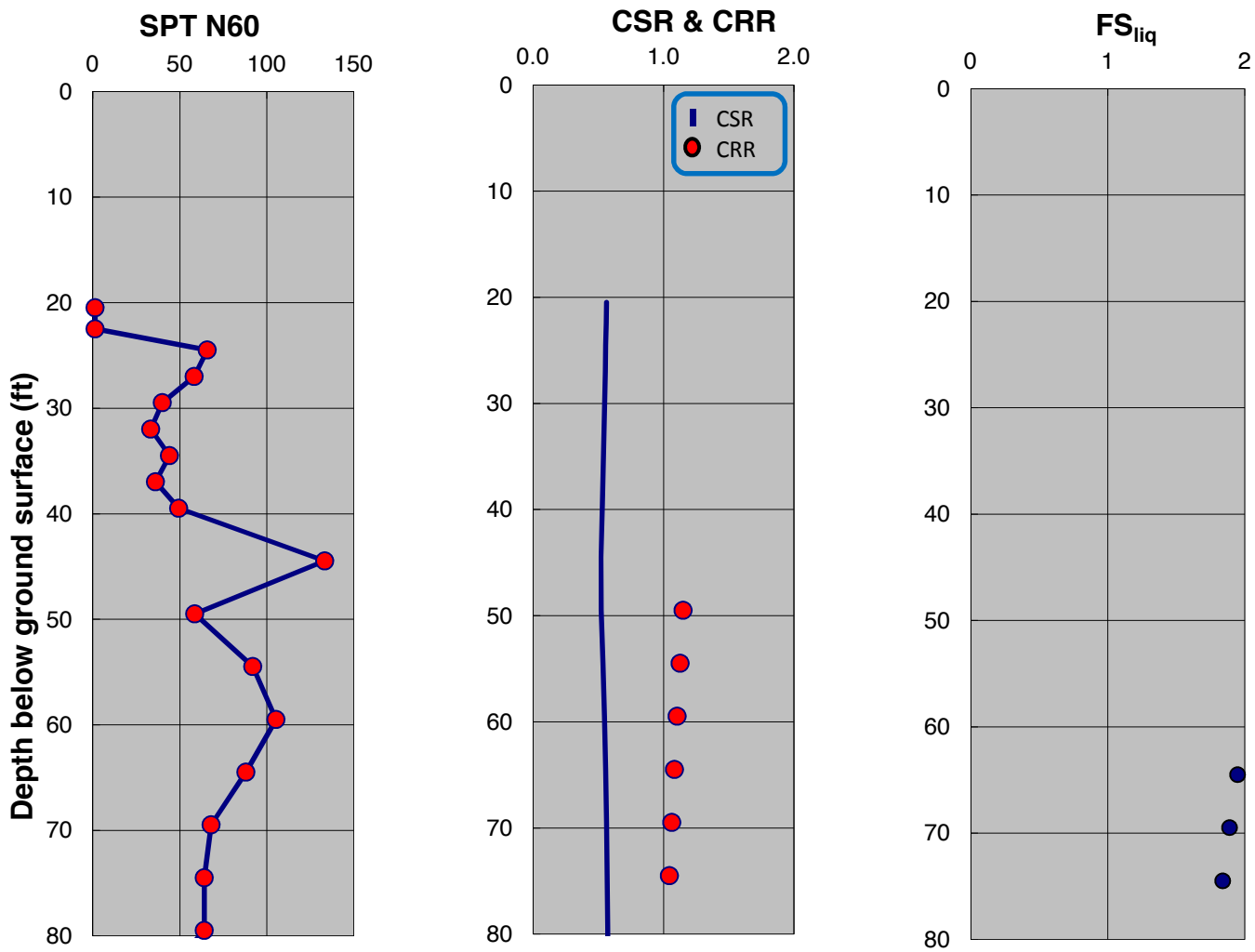
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-160 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



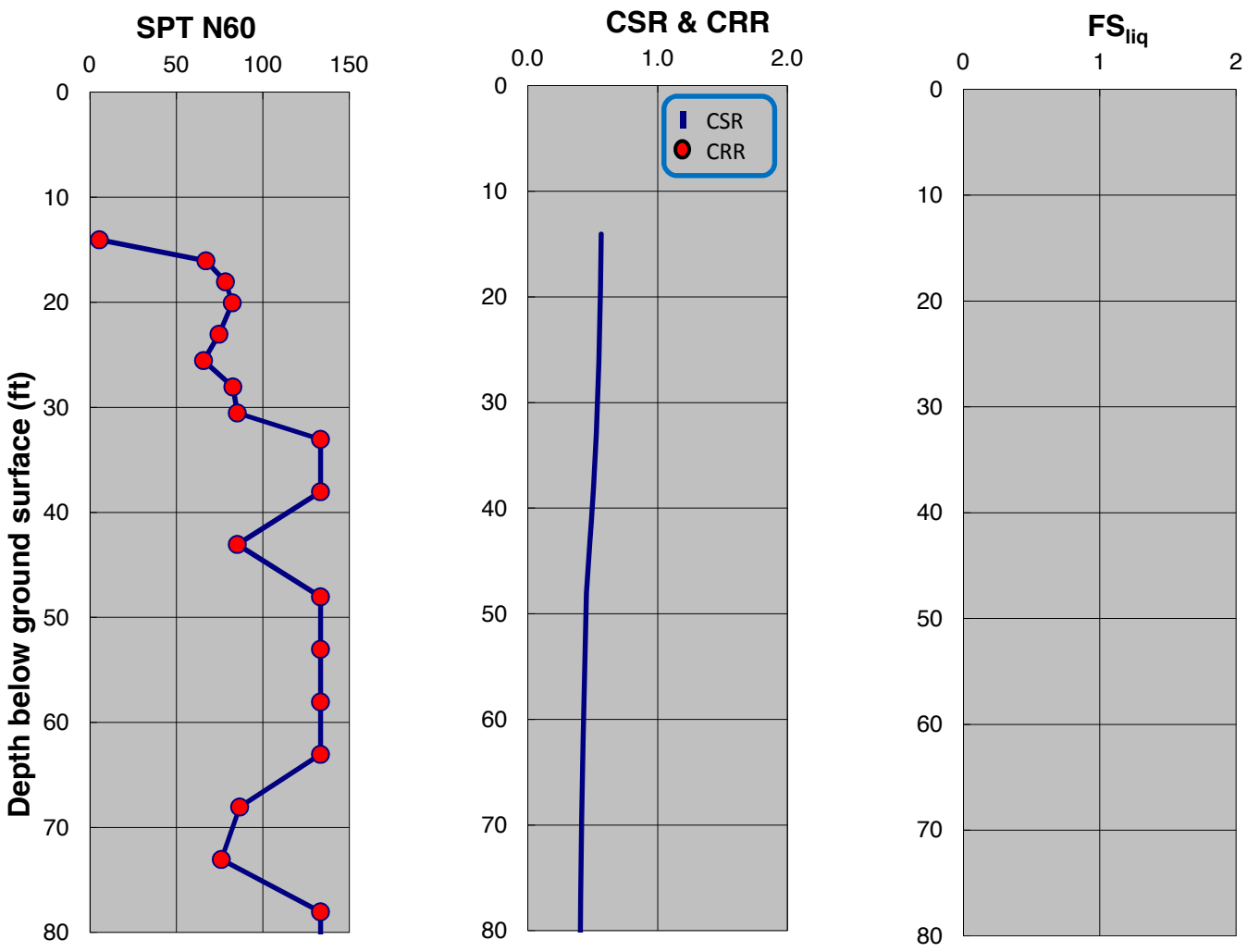
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-161 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



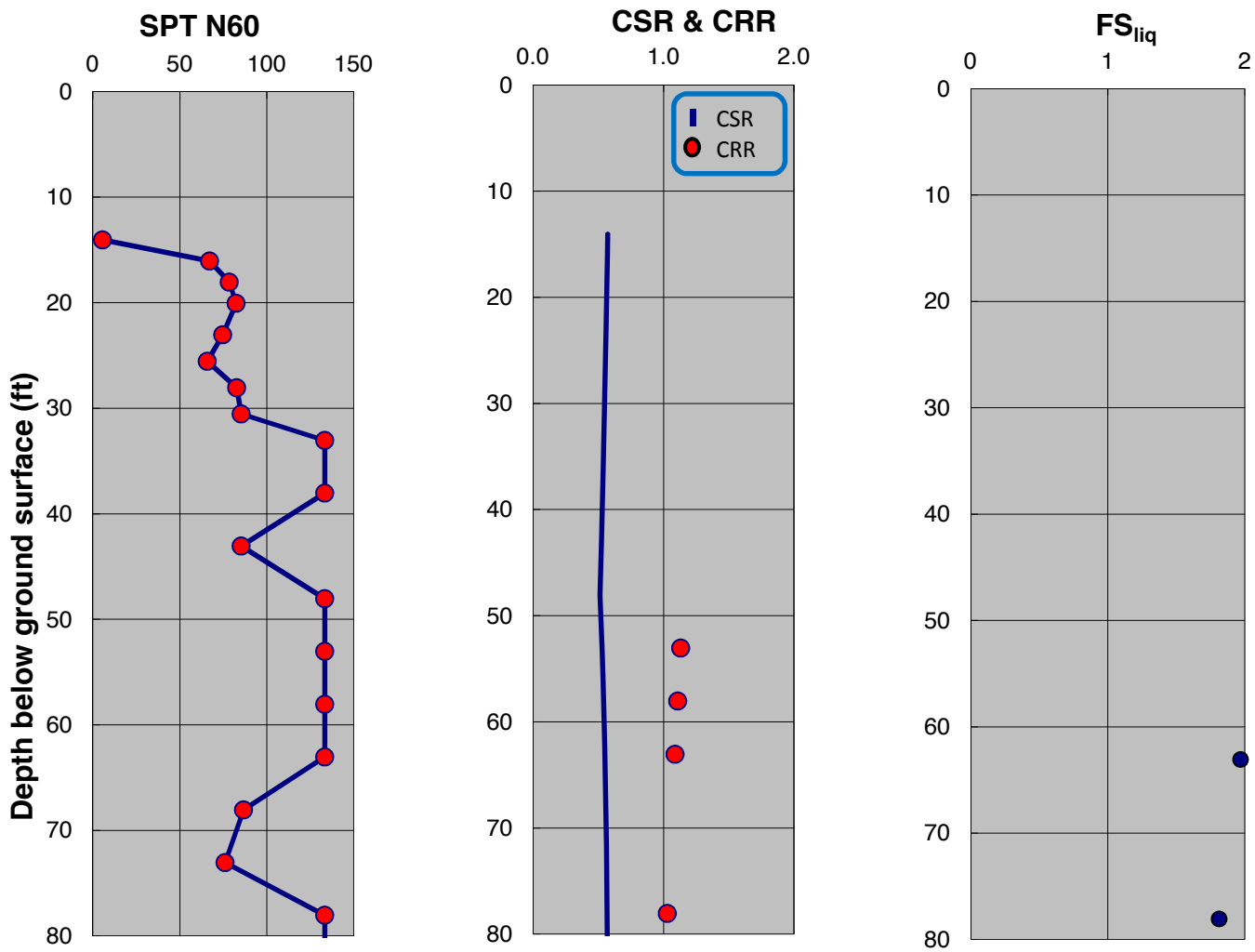
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-161 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



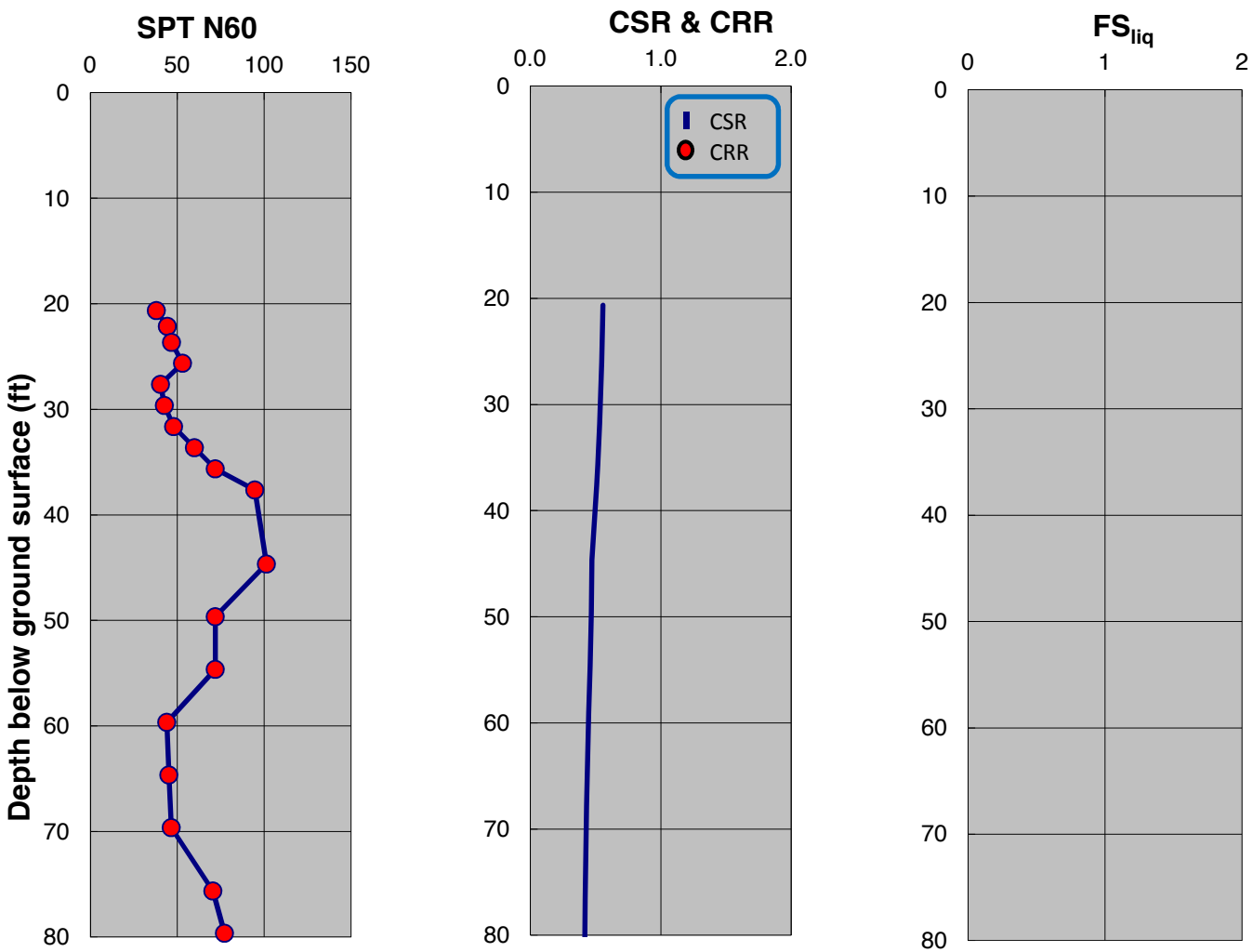
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-162 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



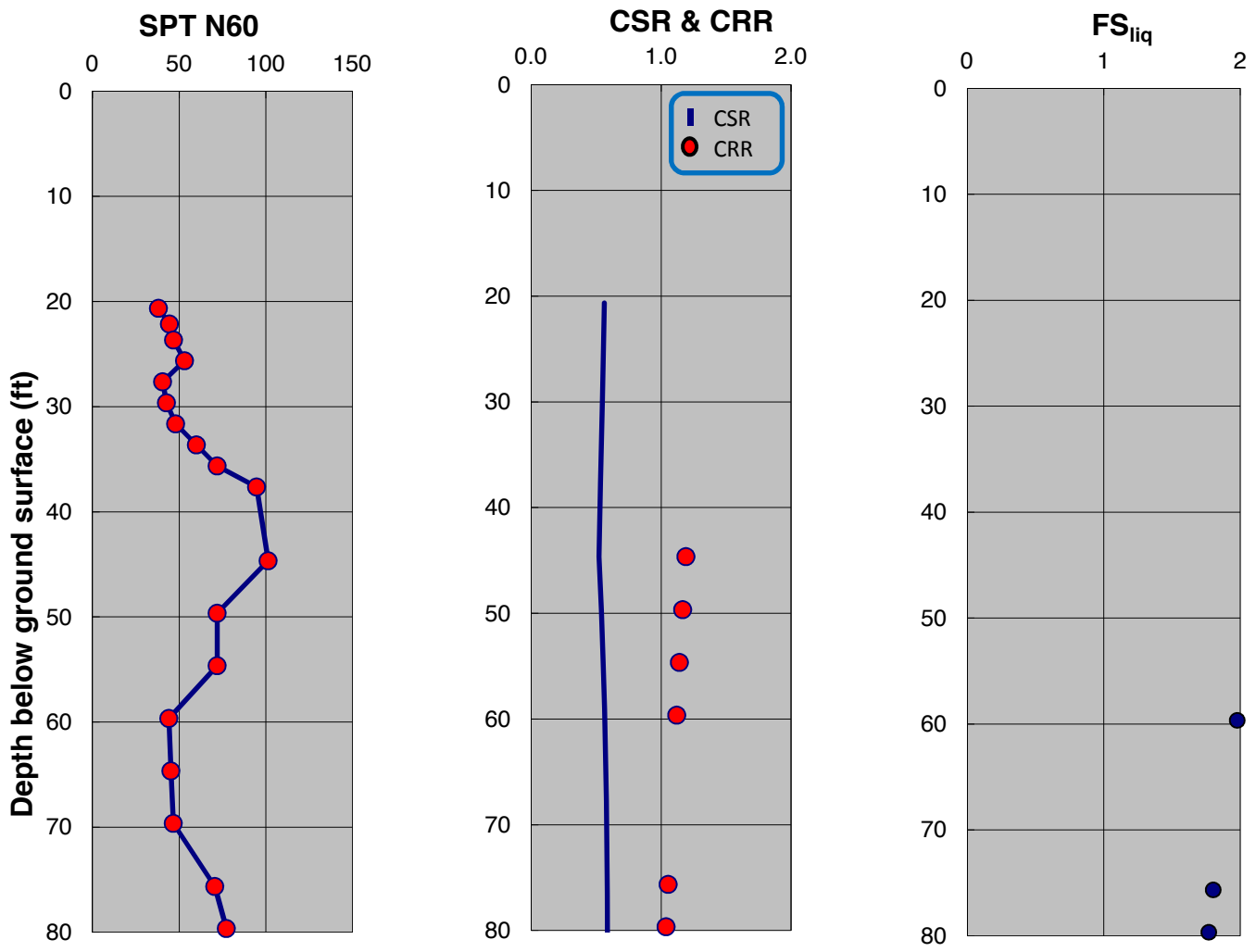
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-162 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-163 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

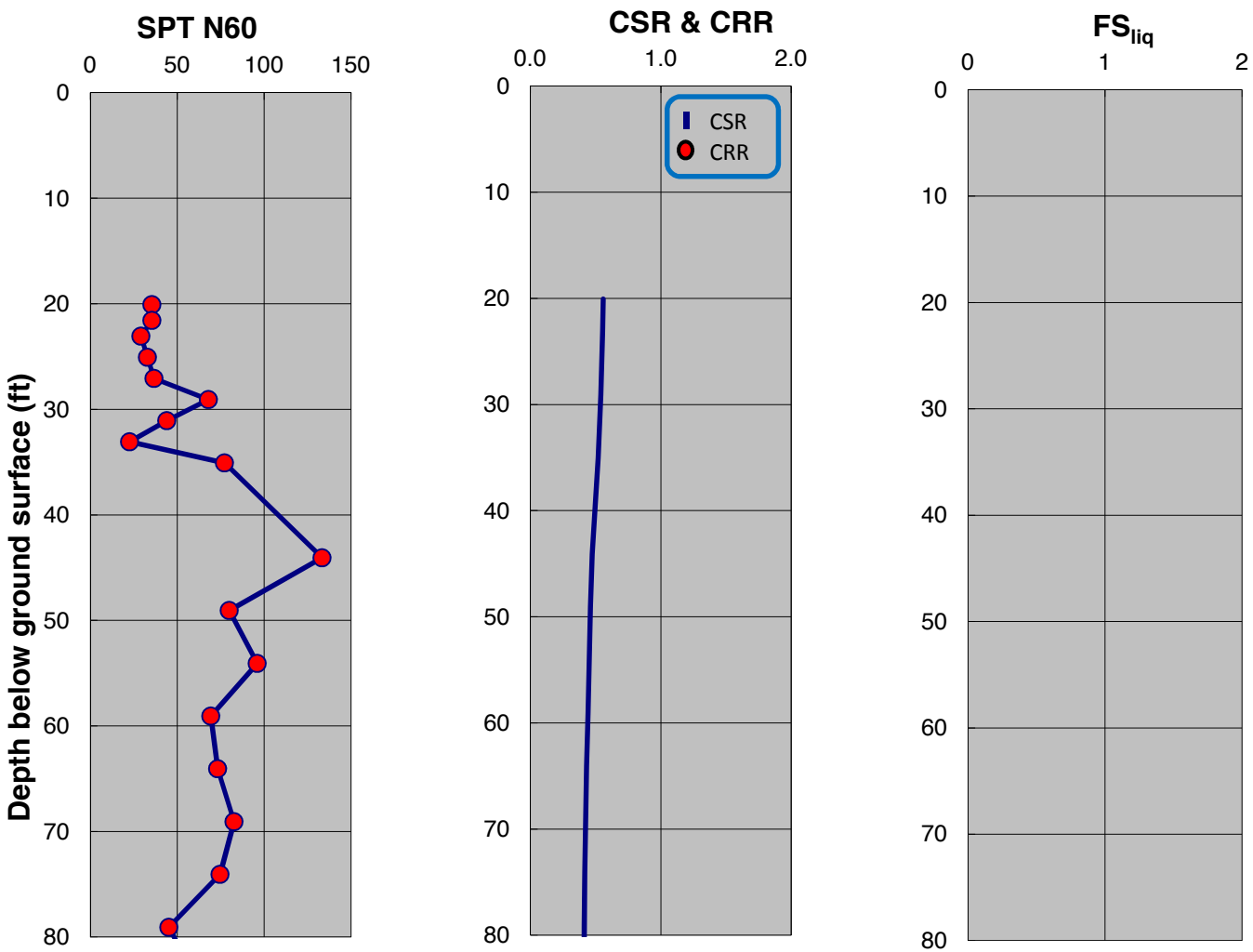
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-163 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

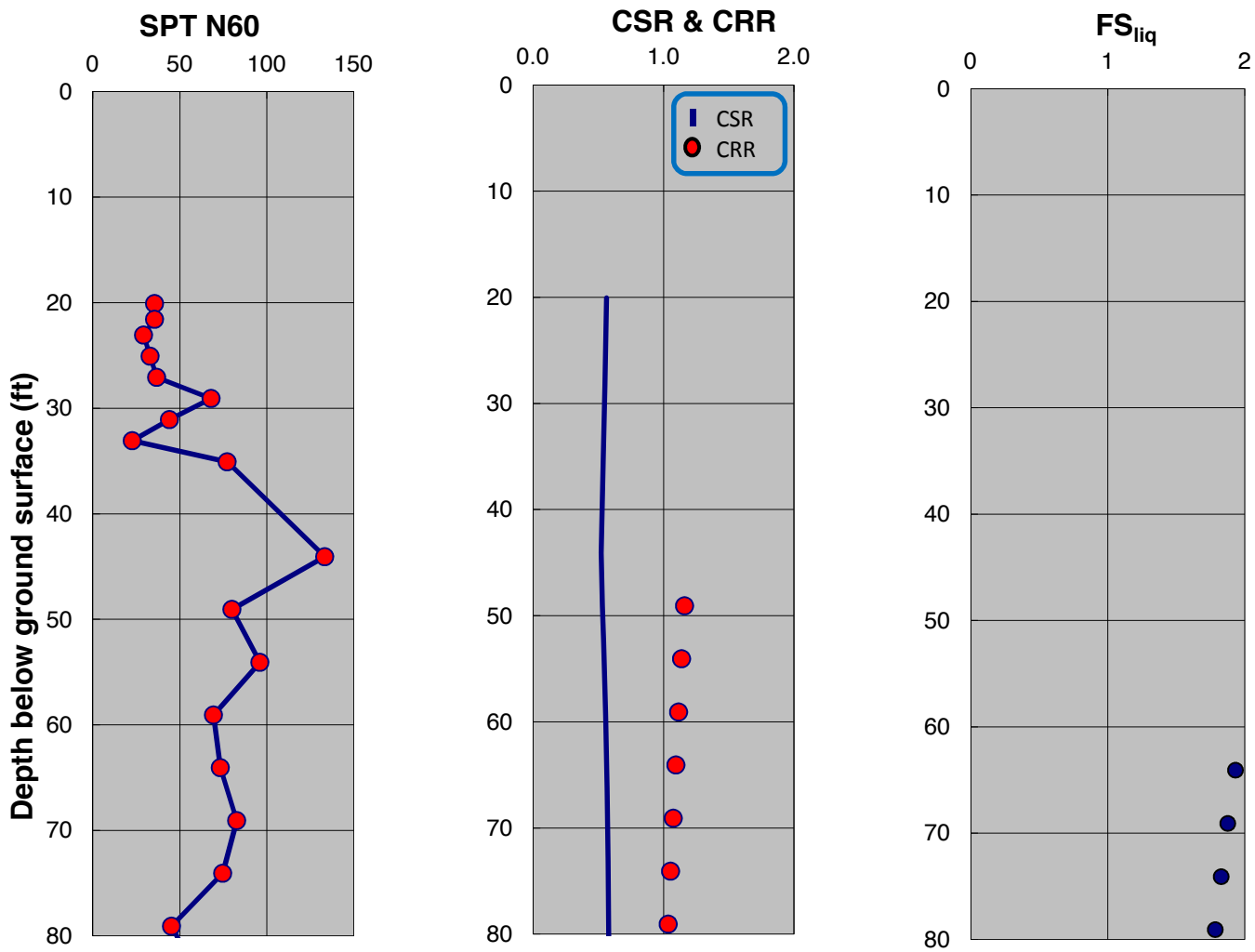
PLATE C.470



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-164 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

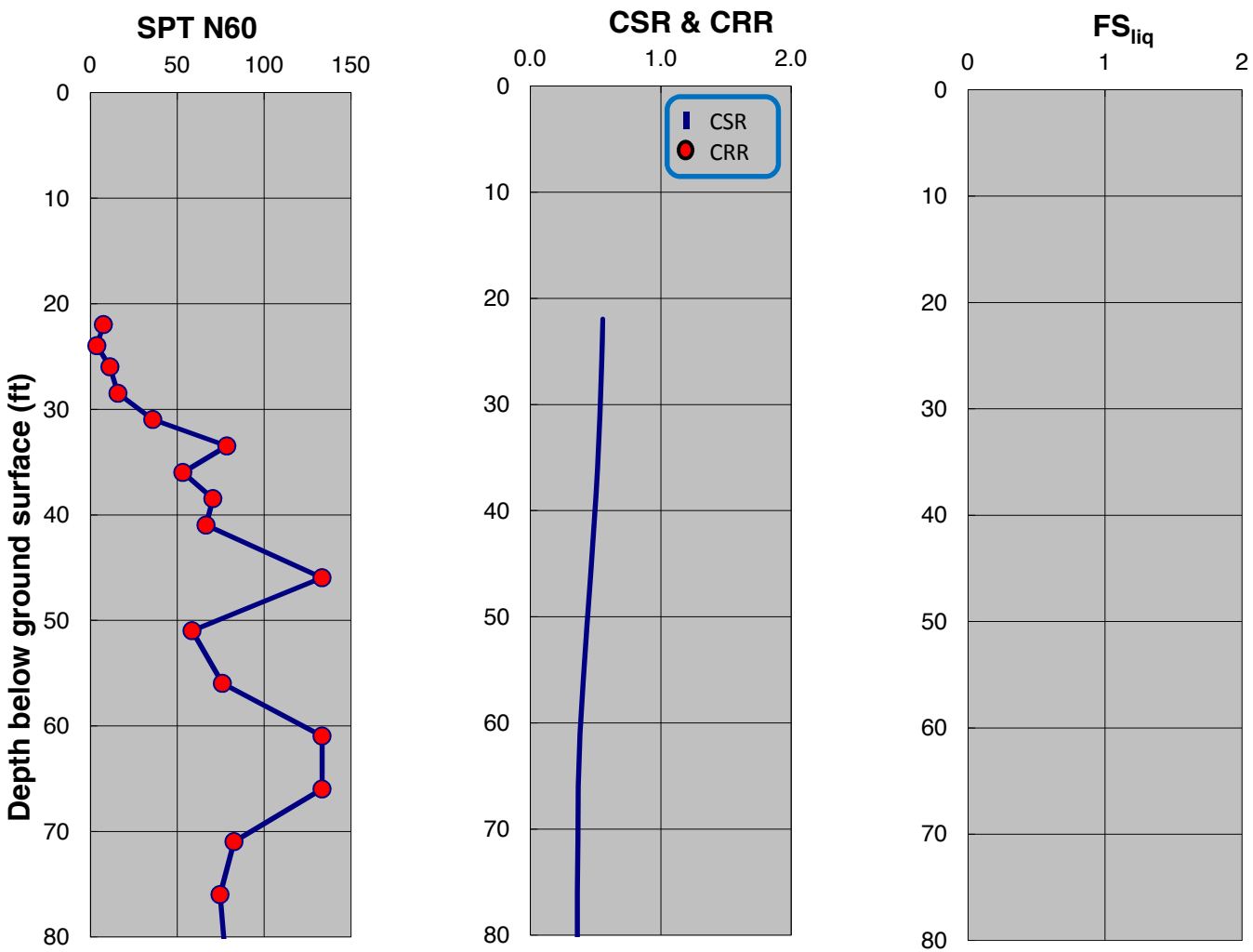
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.471



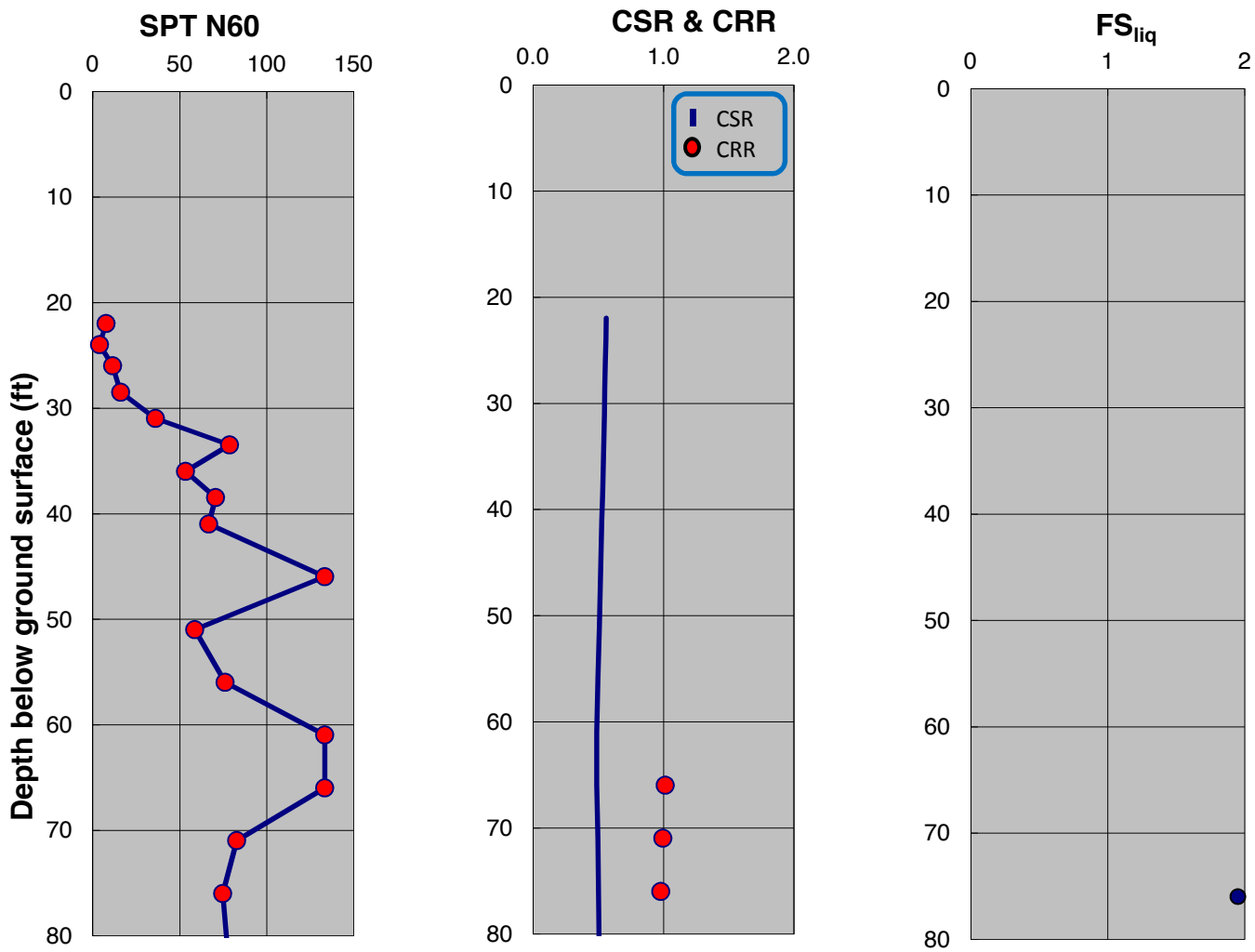
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-164 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



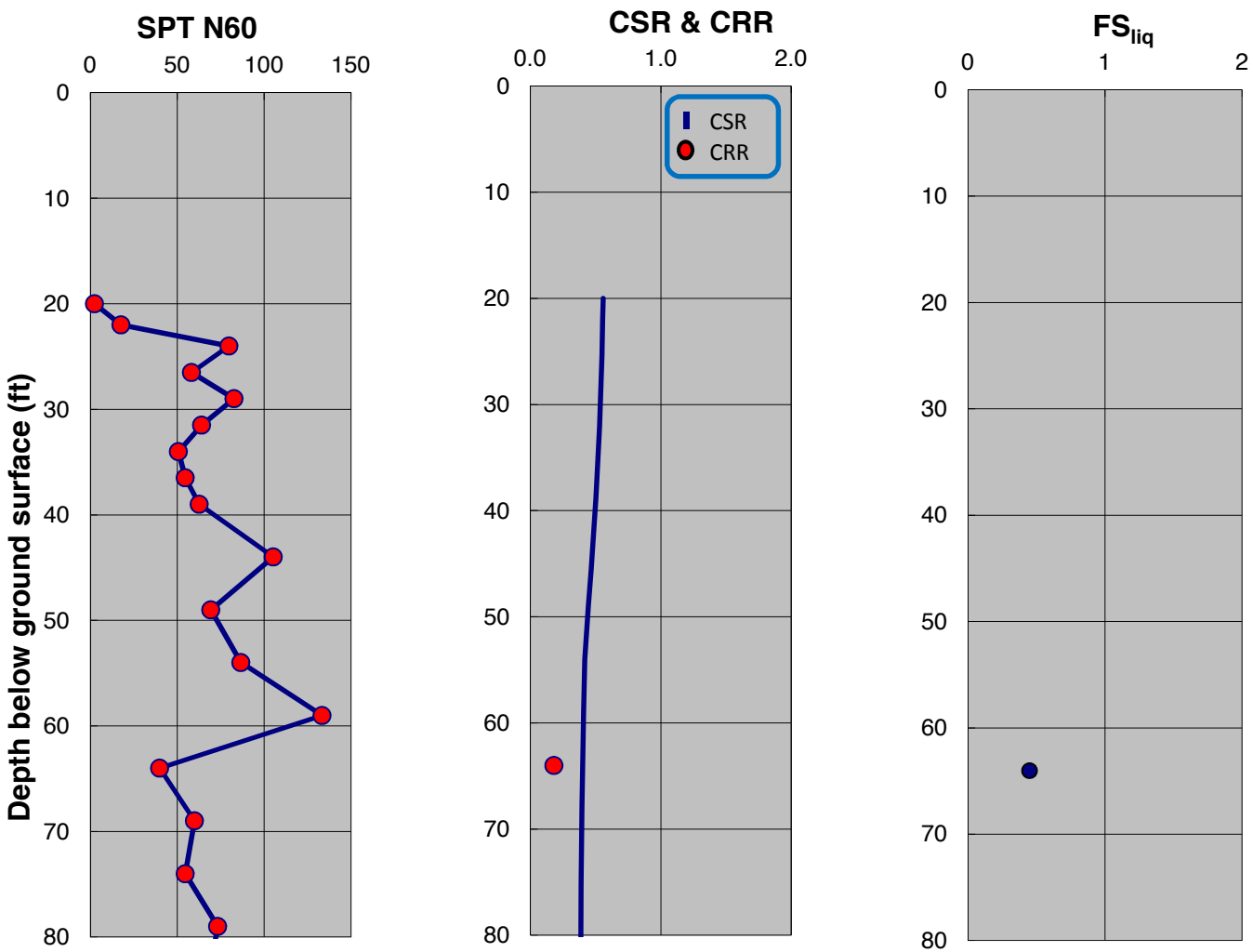
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-165 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



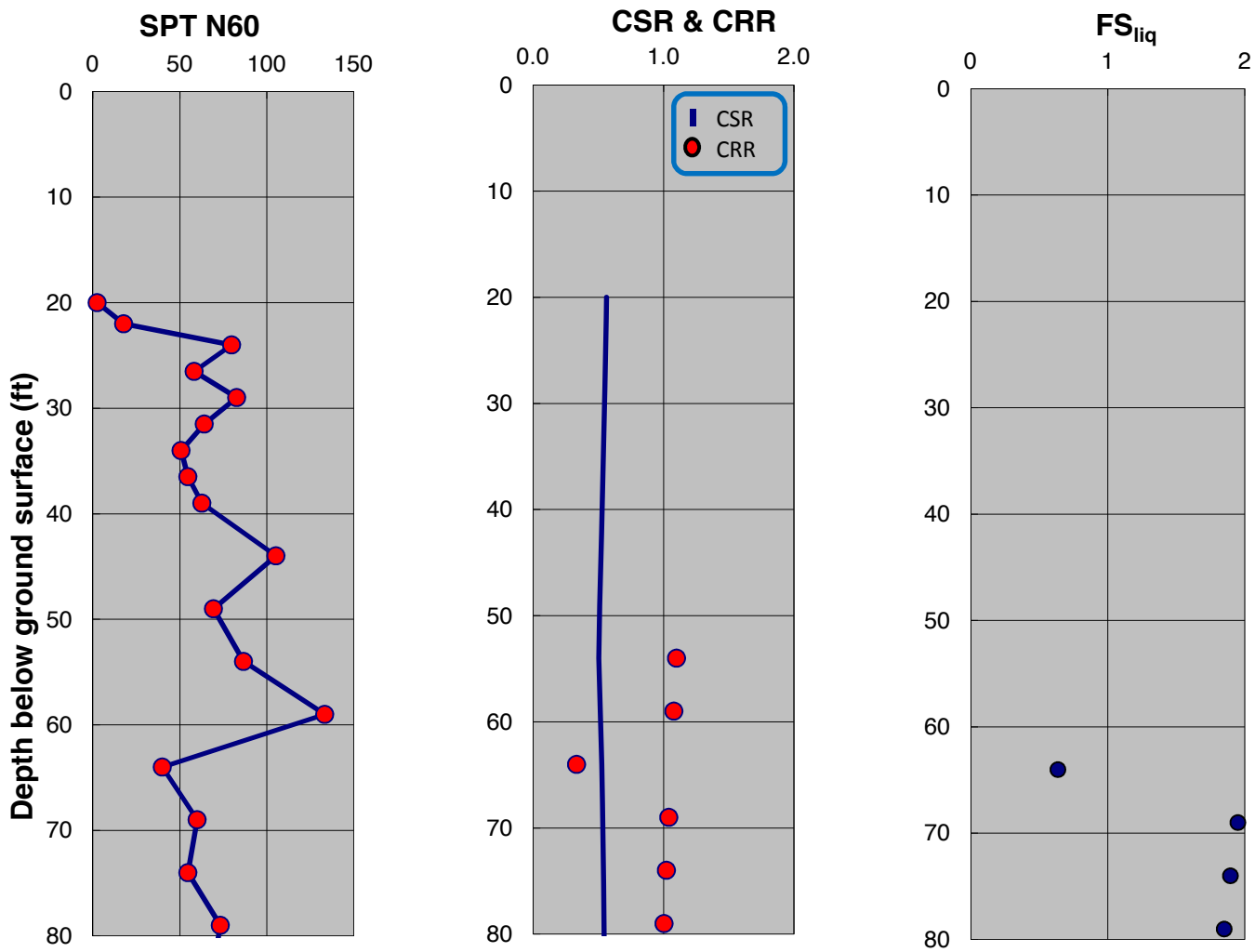
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-165 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



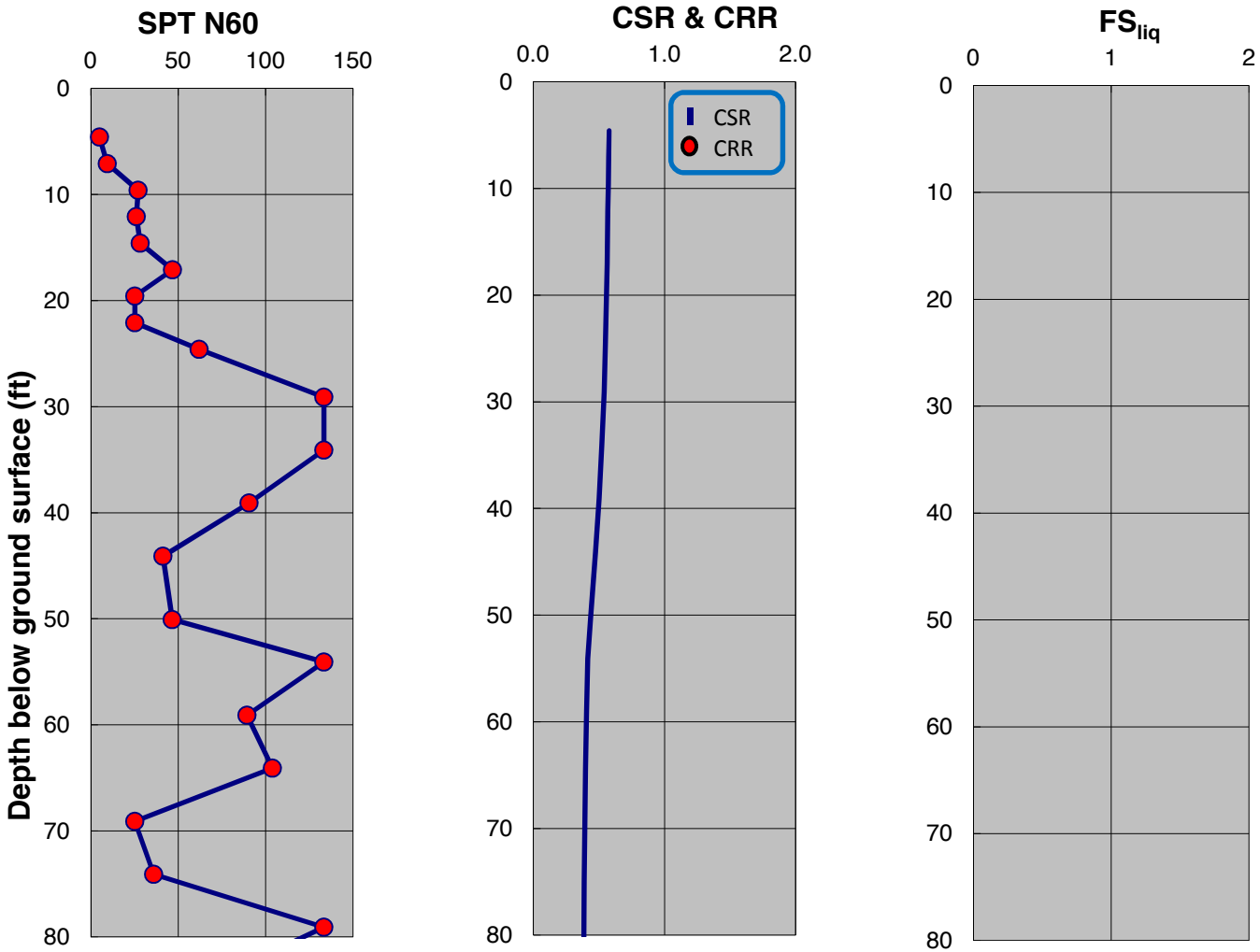
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-166 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



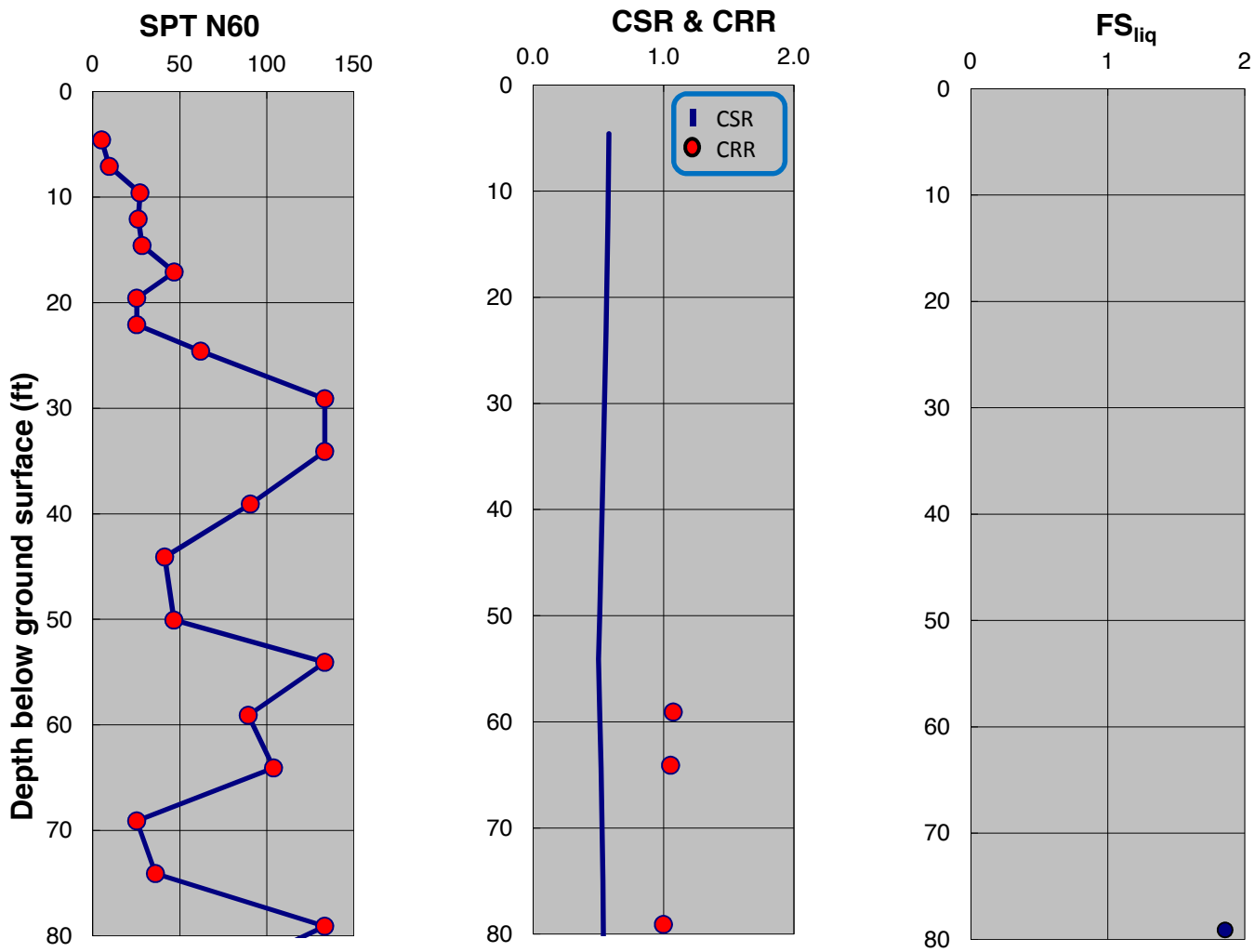
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-166 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



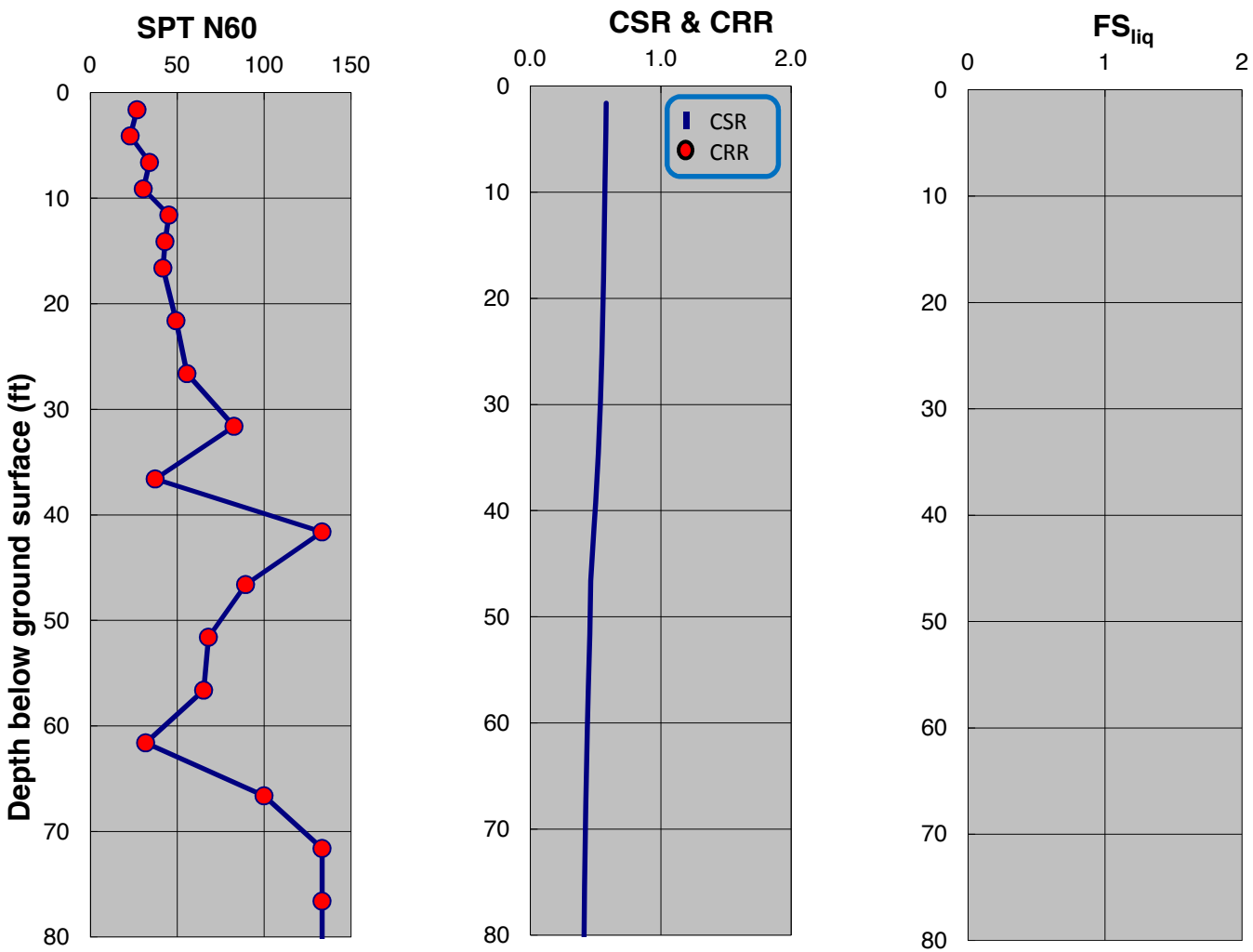
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-167 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



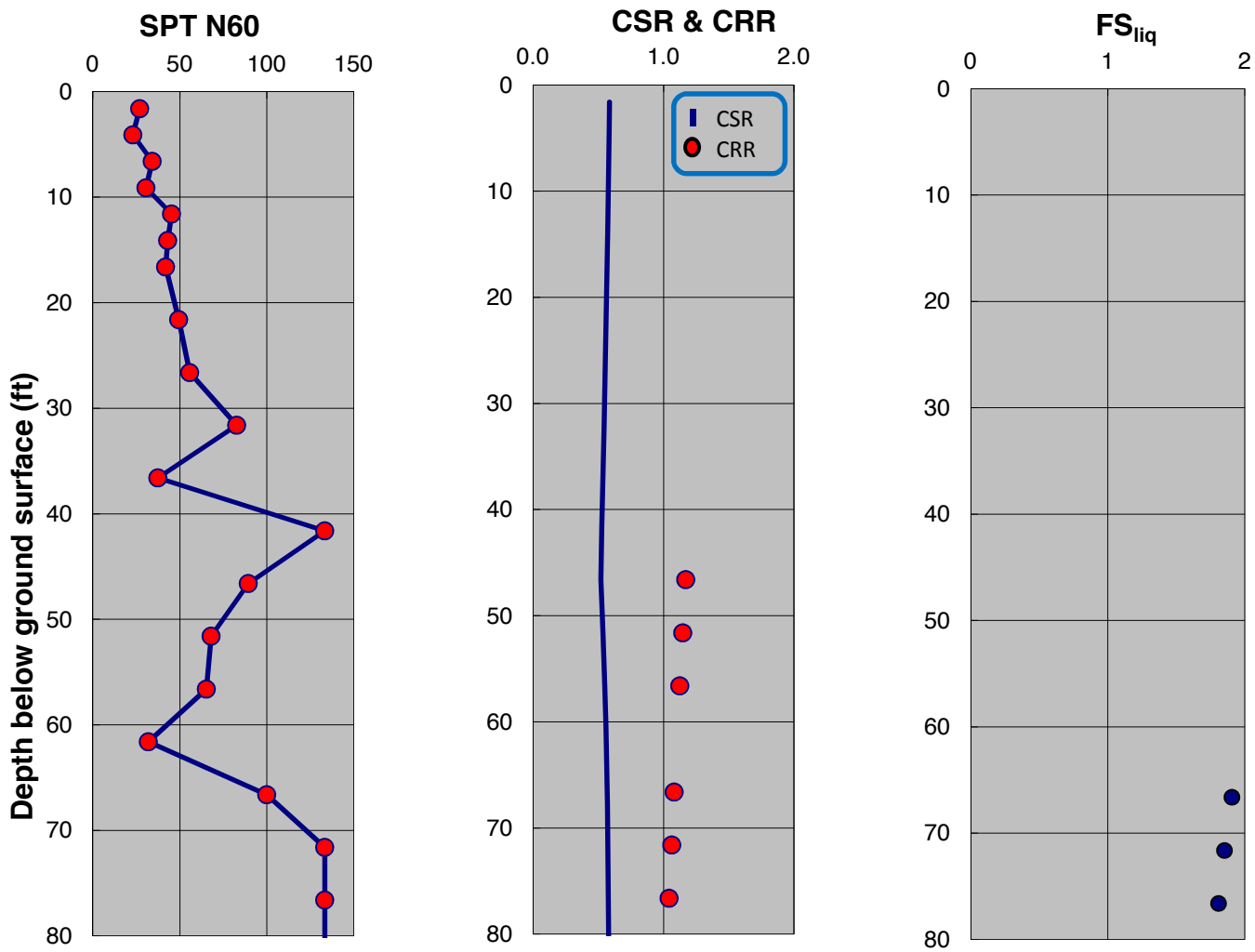
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-167 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-168 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

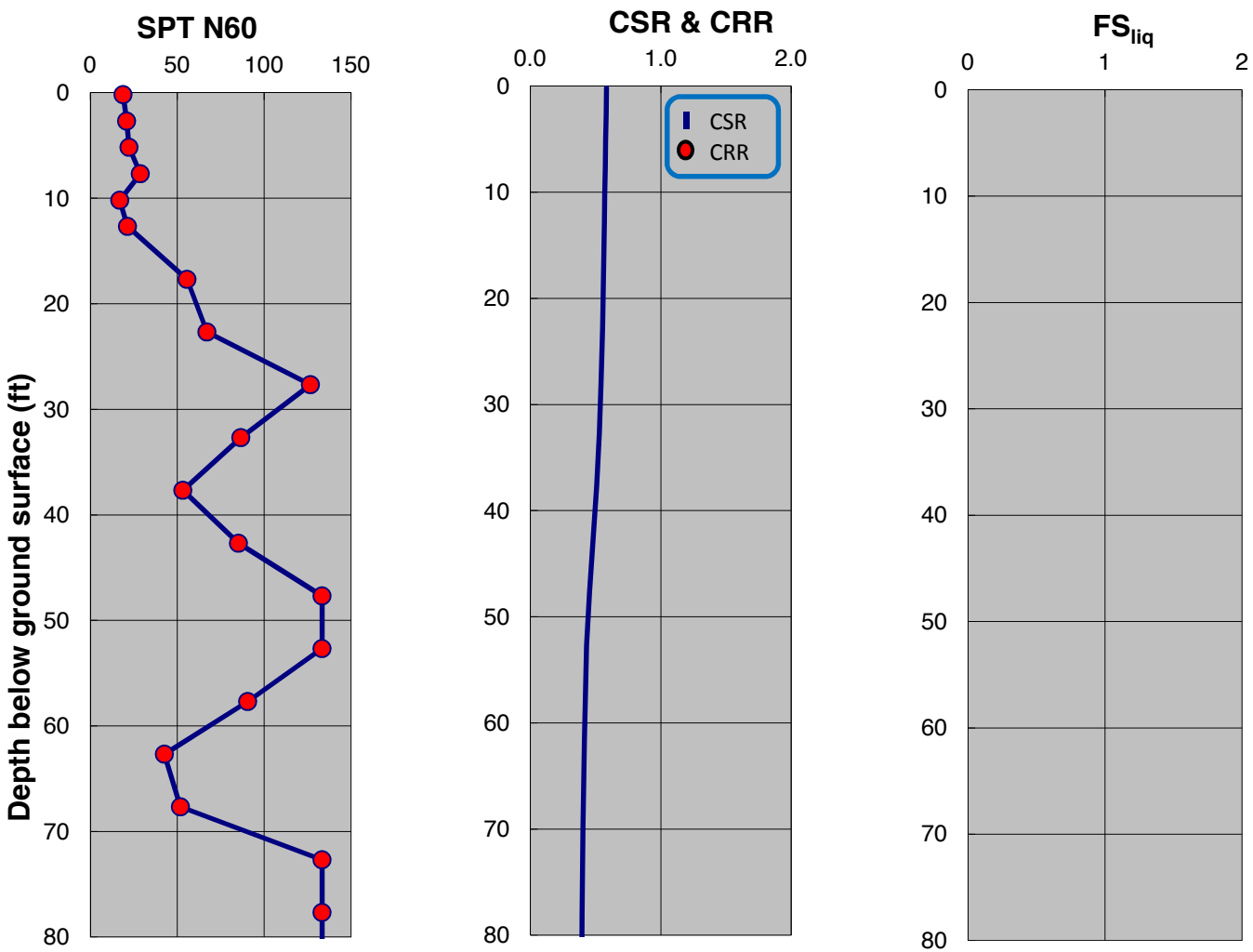
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-168 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

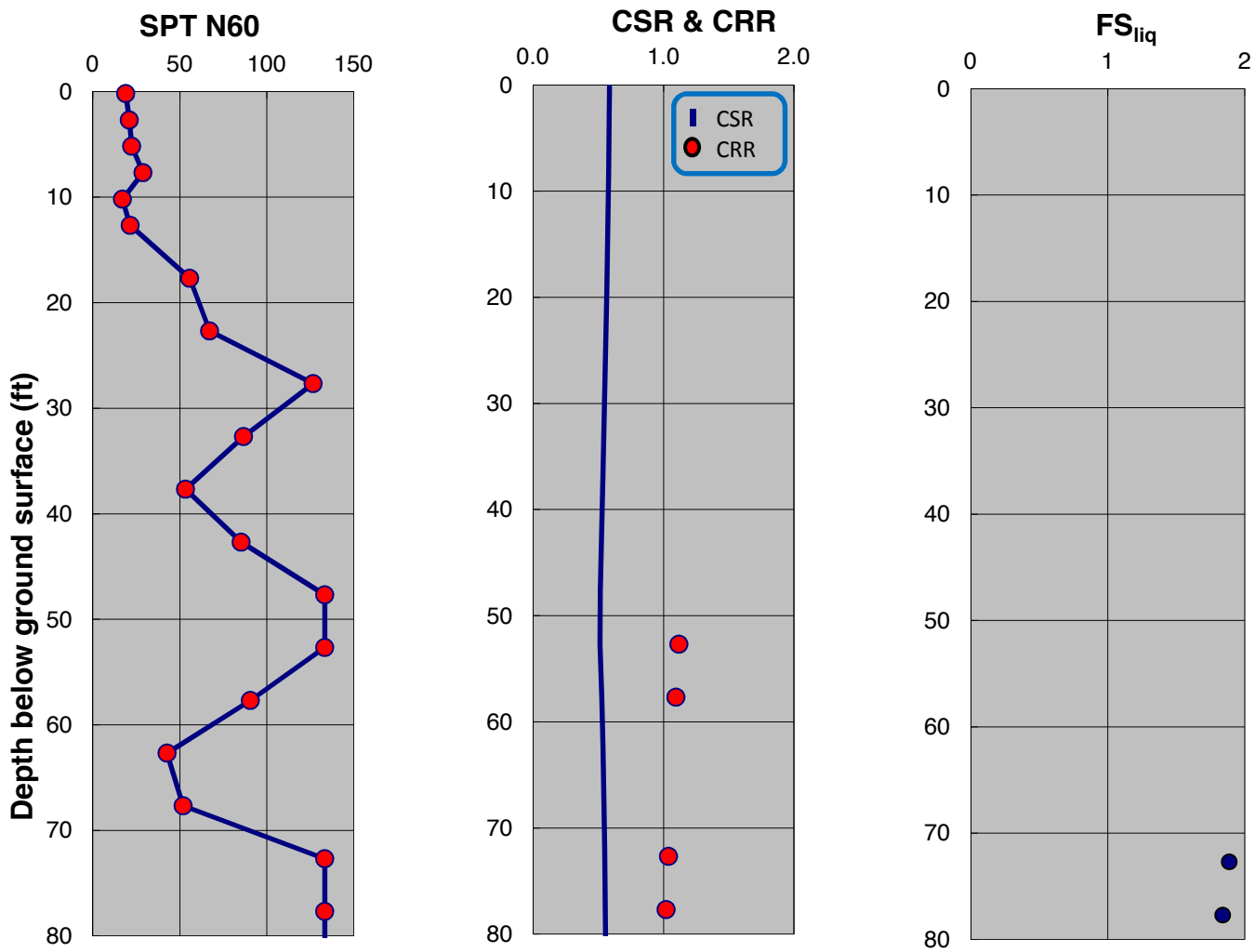
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.480



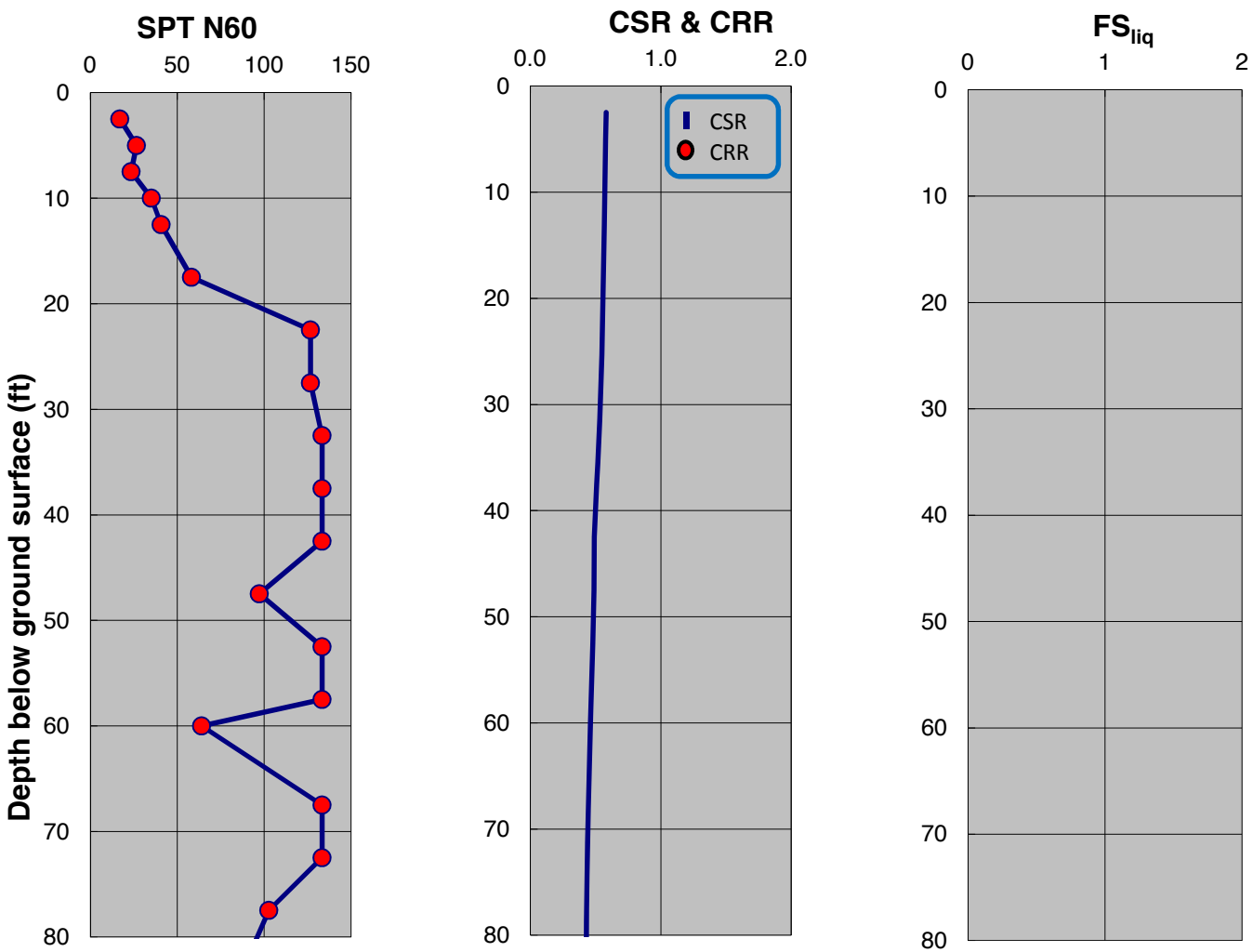
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-169 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



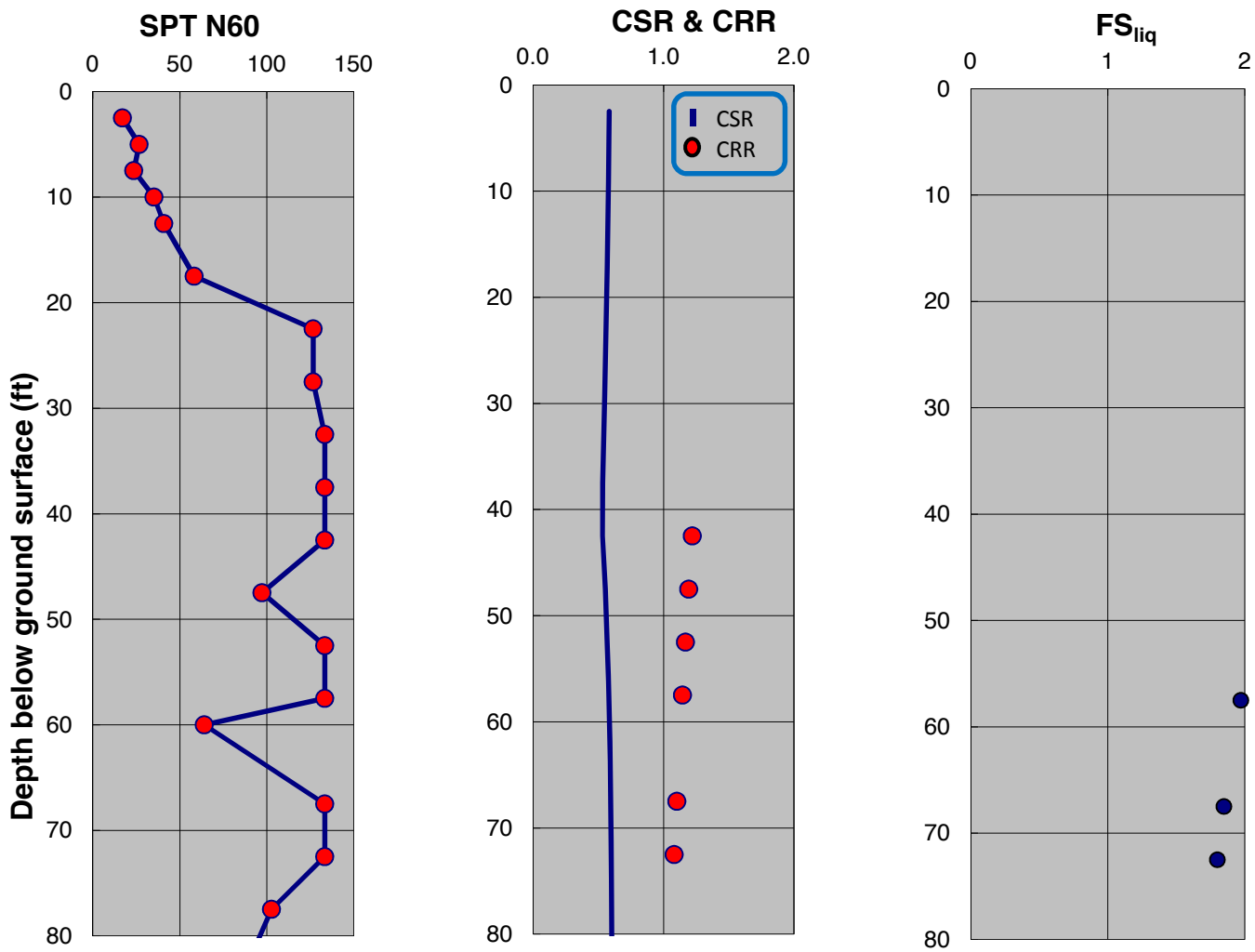
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-169 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



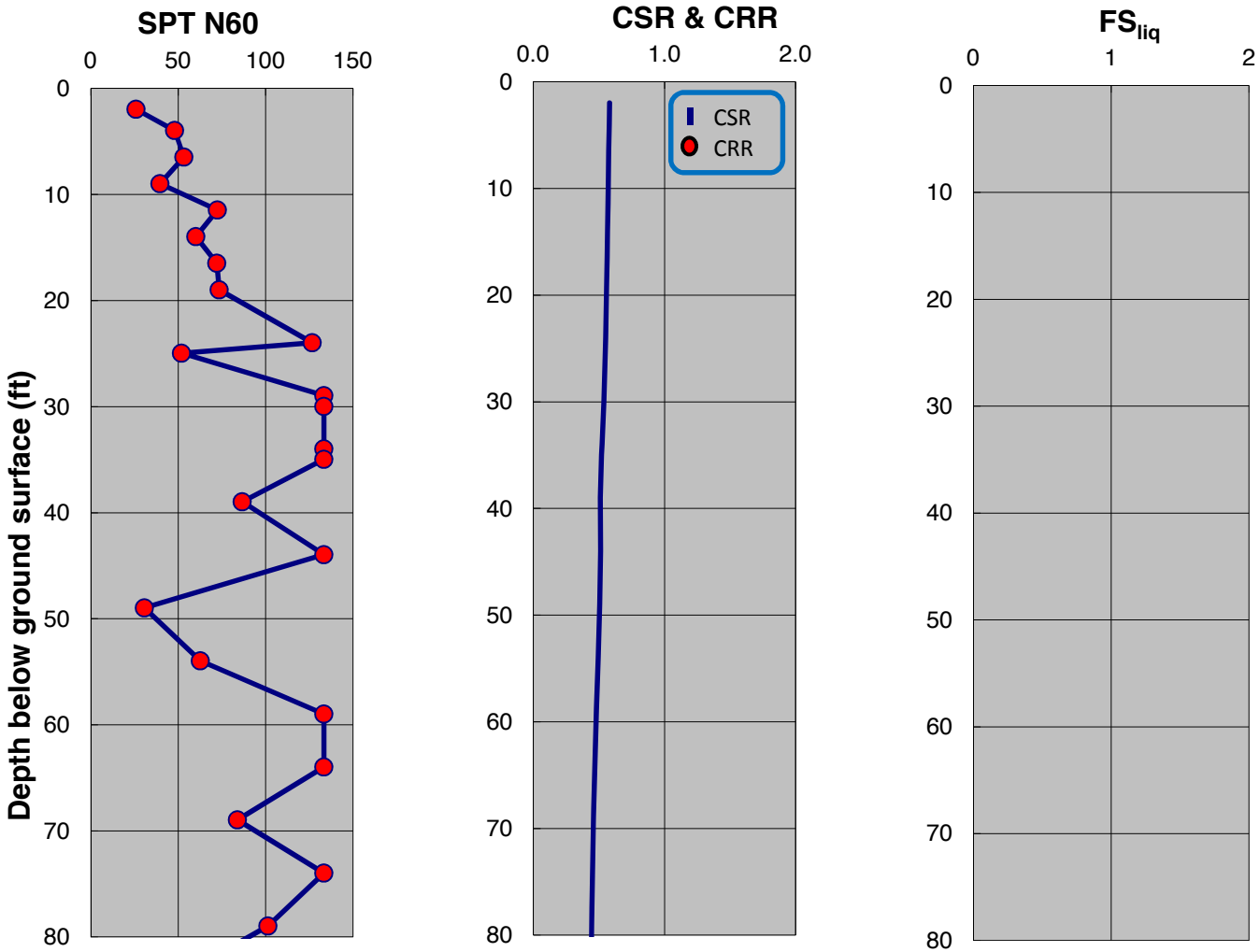
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-170 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



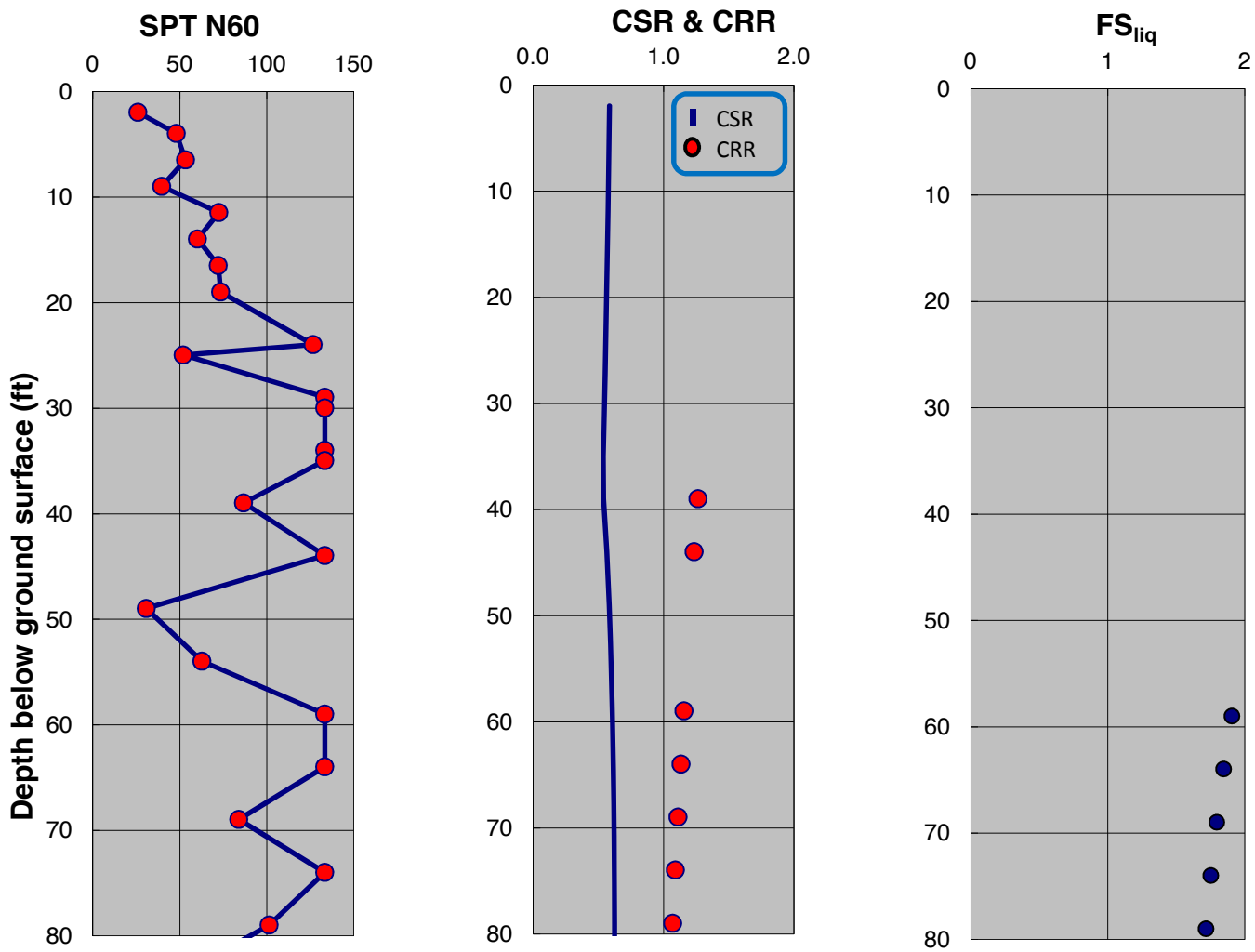
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-170 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



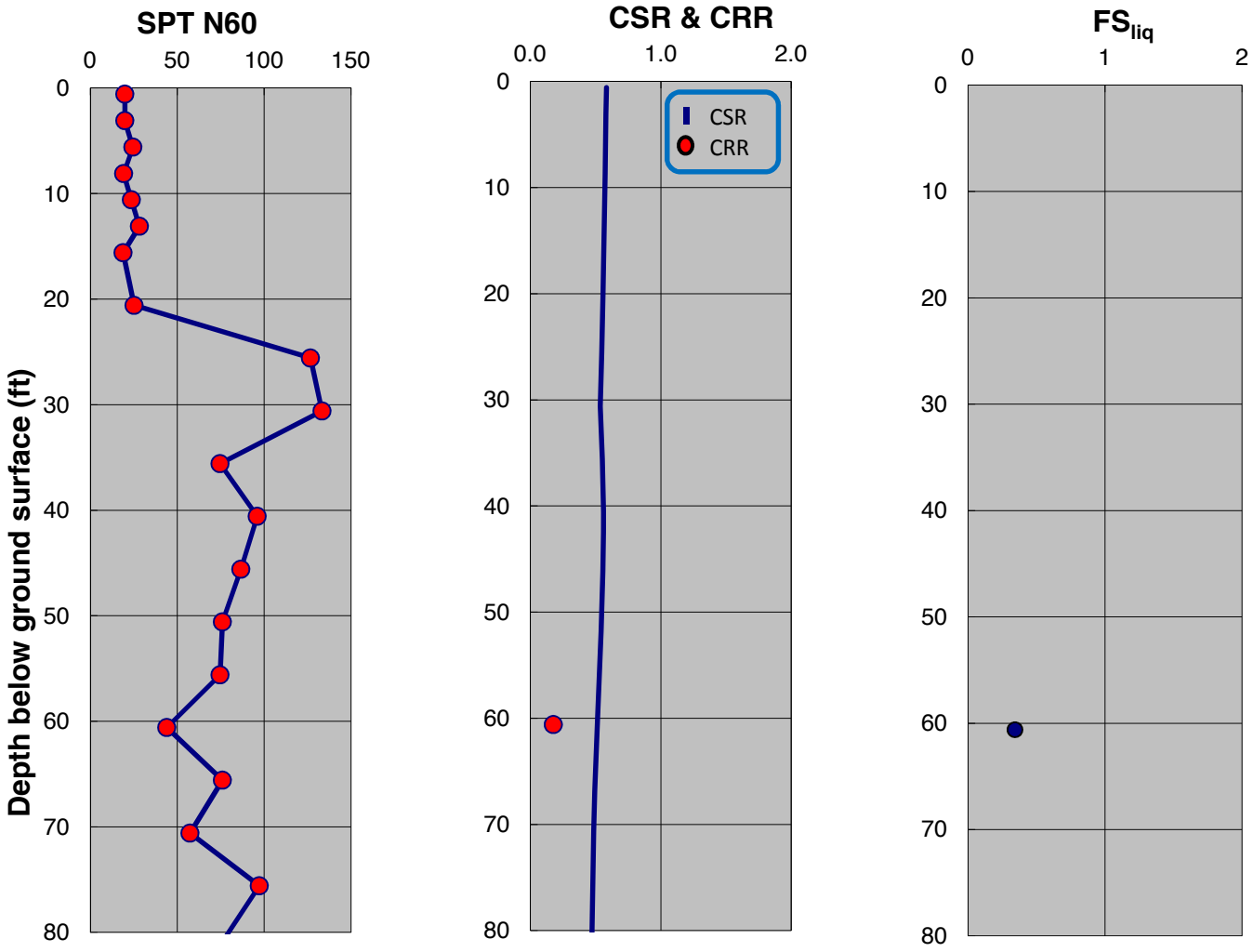
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-171 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



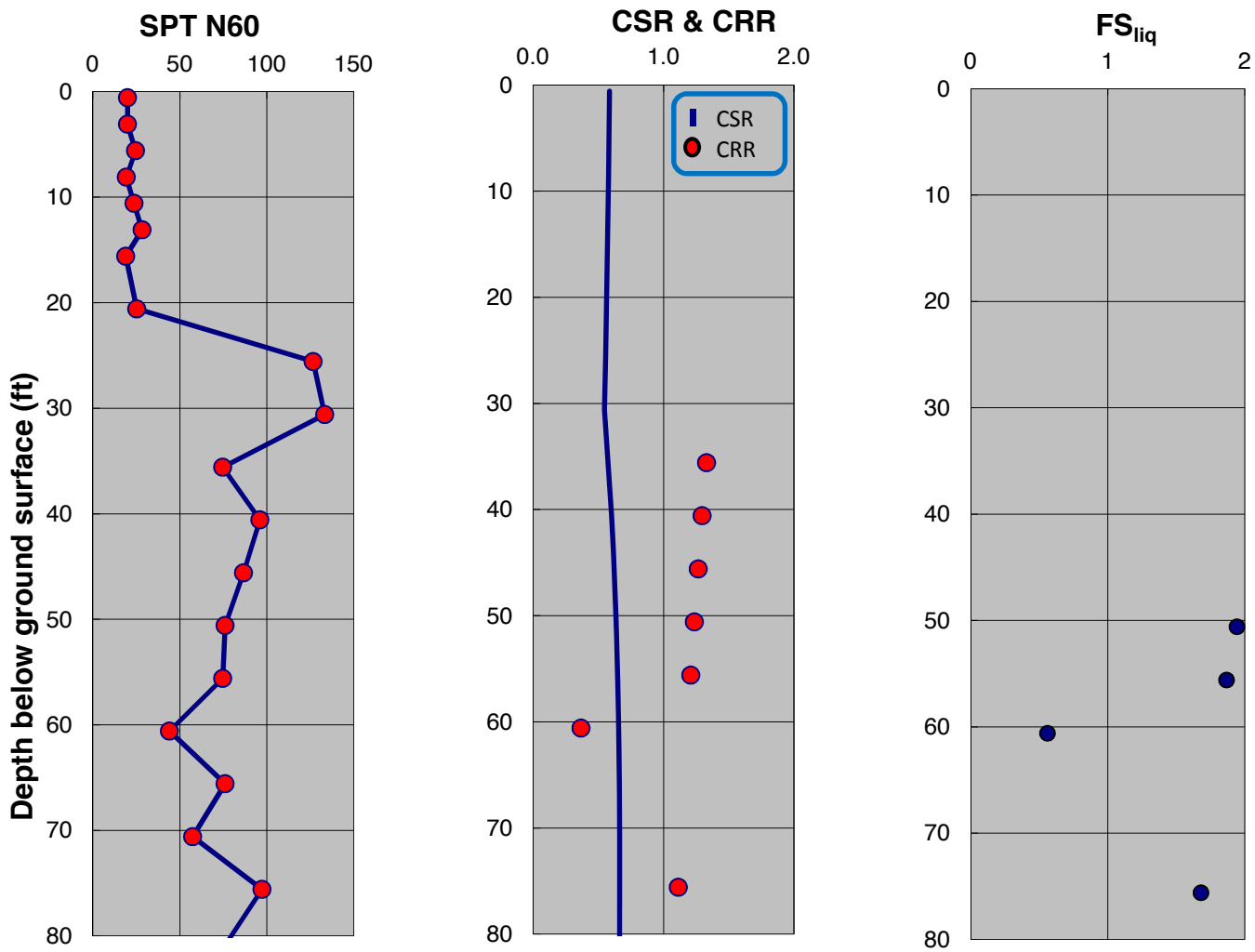
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-171 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



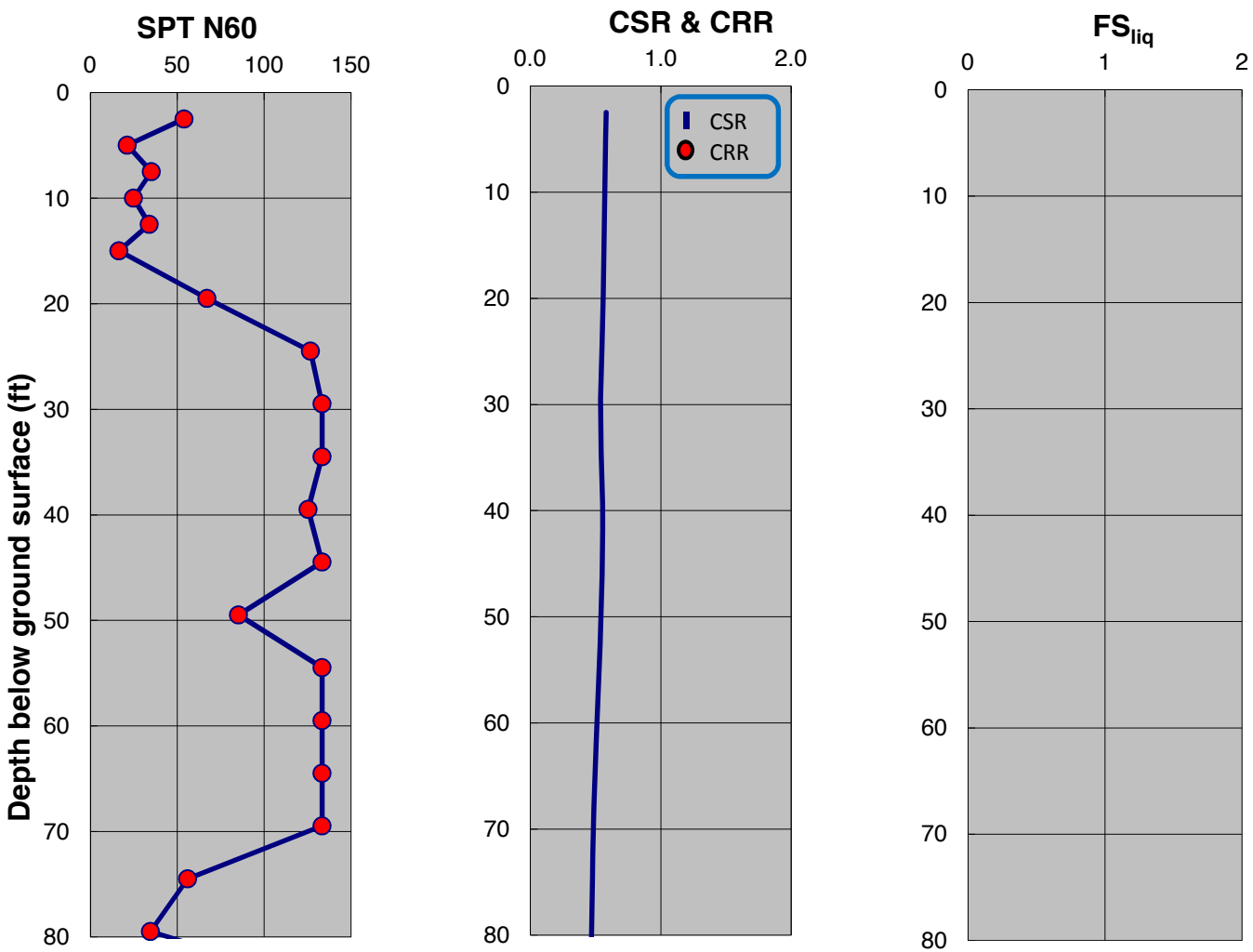
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-172 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



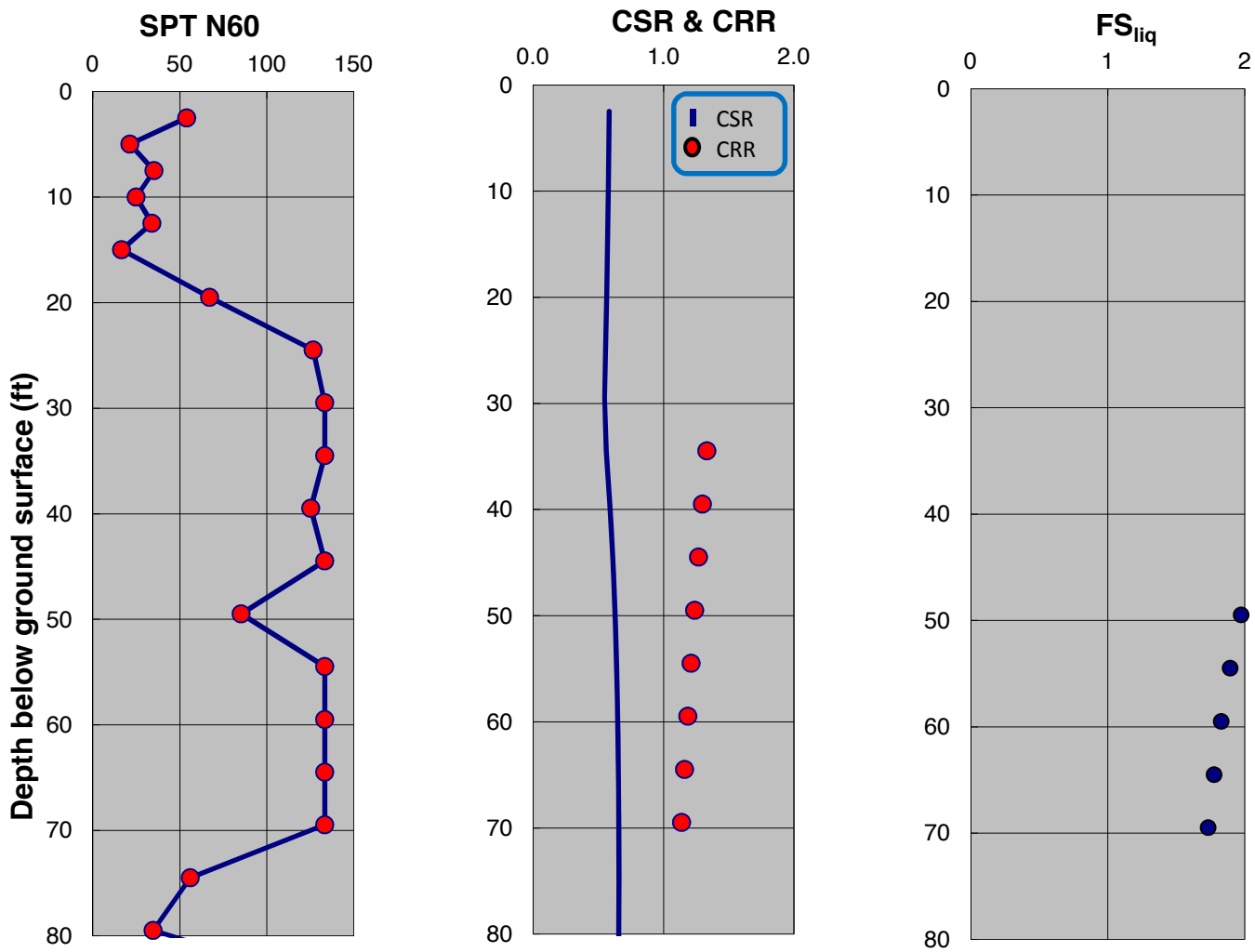
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-172 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



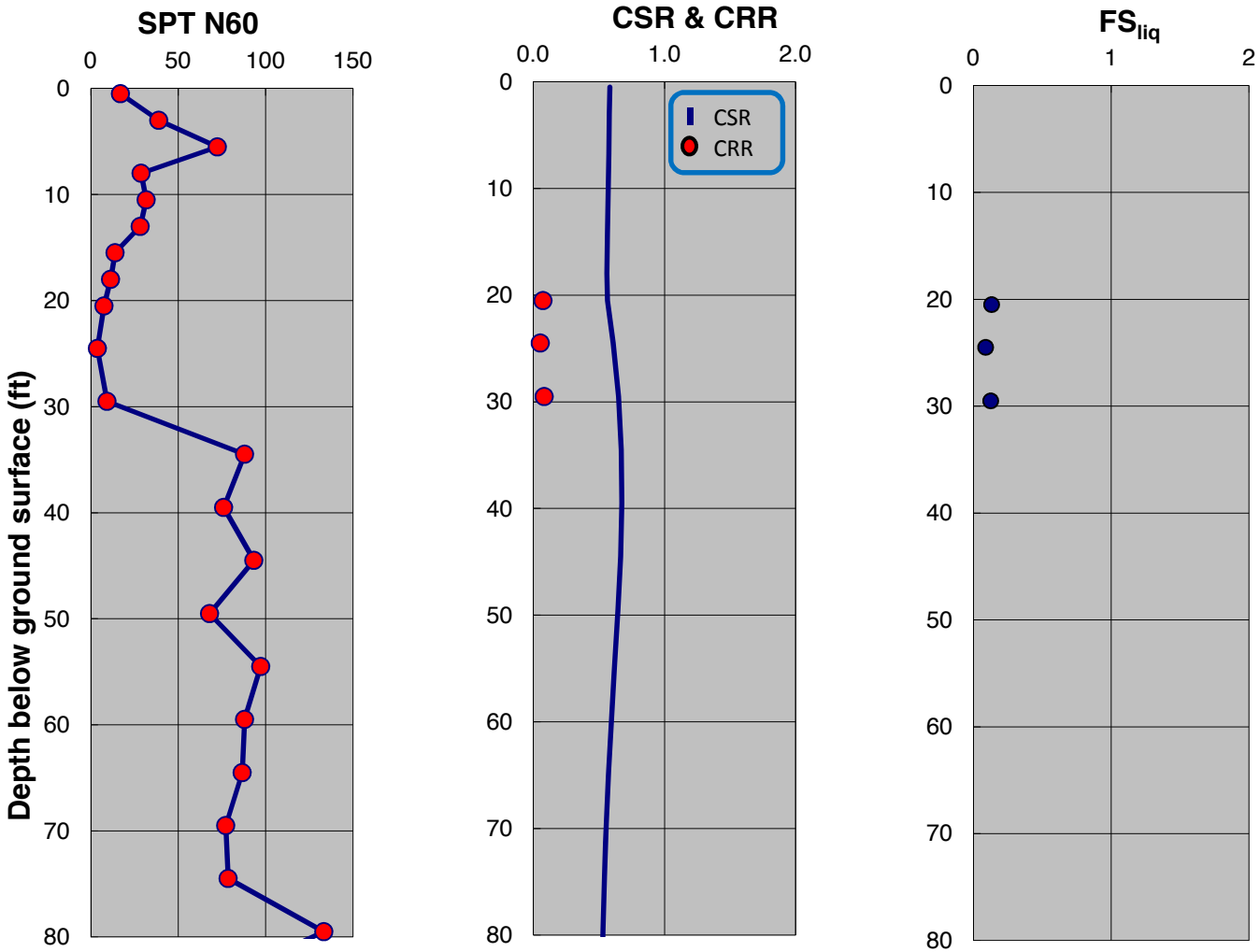
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-173 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



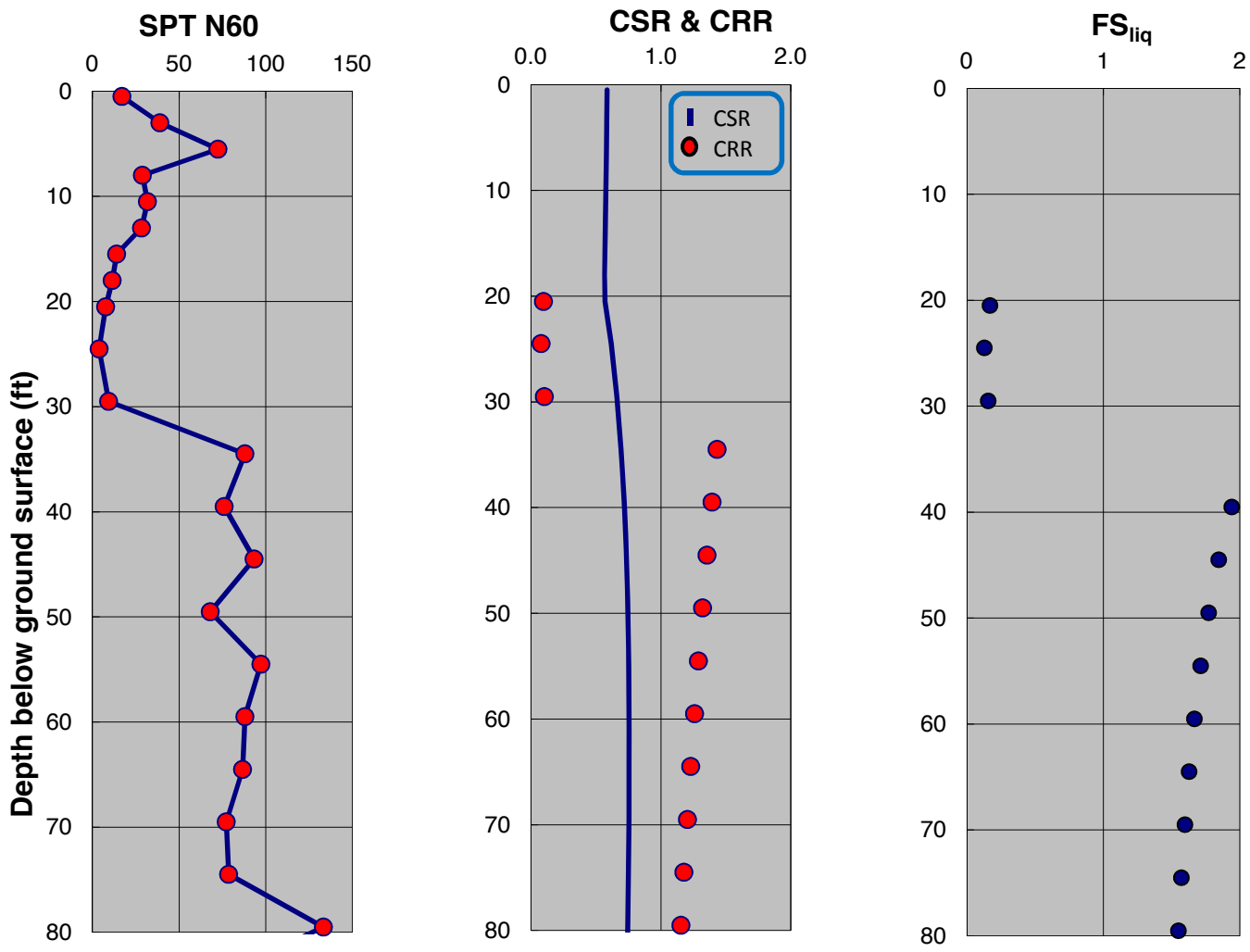
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-173 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



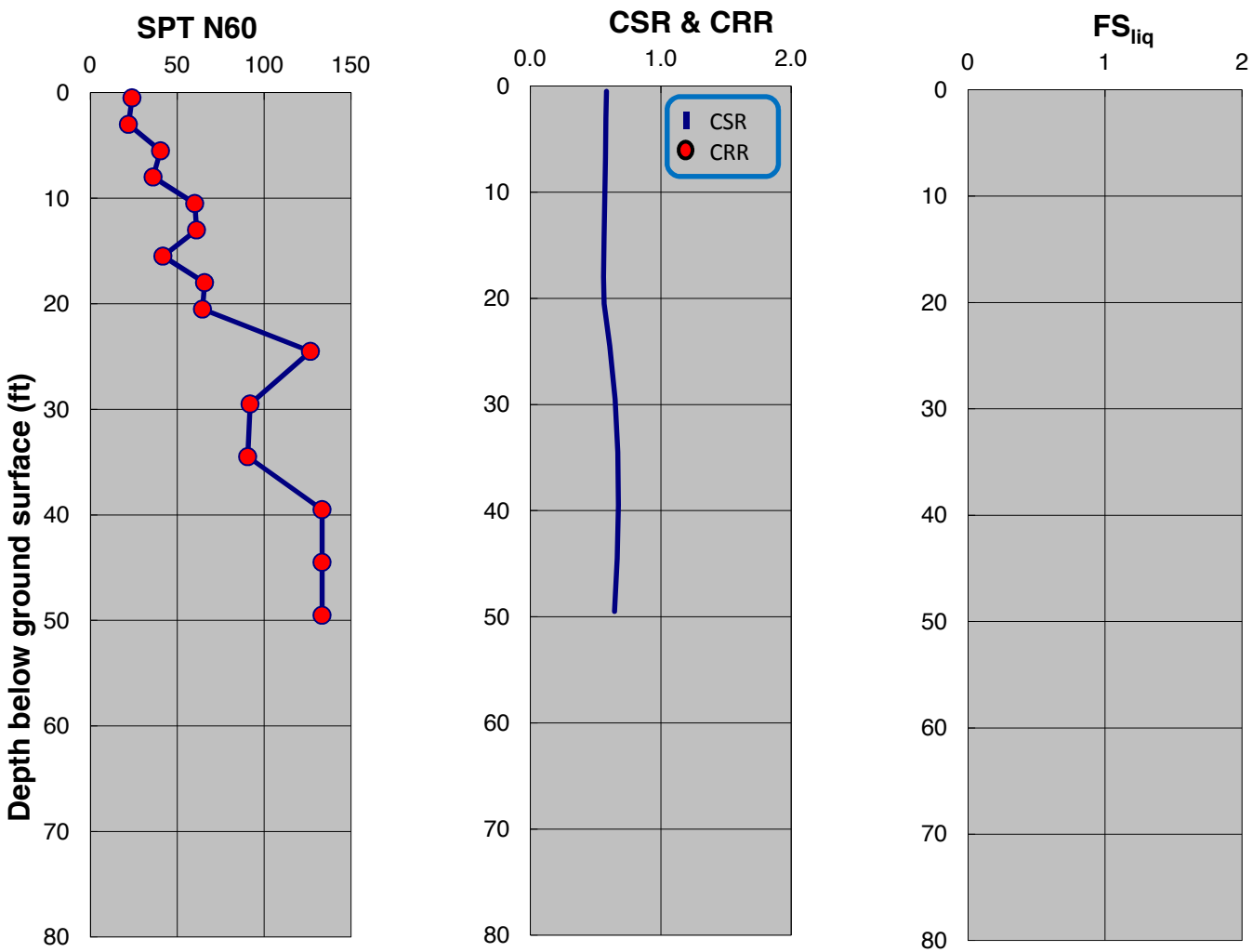
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-176 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



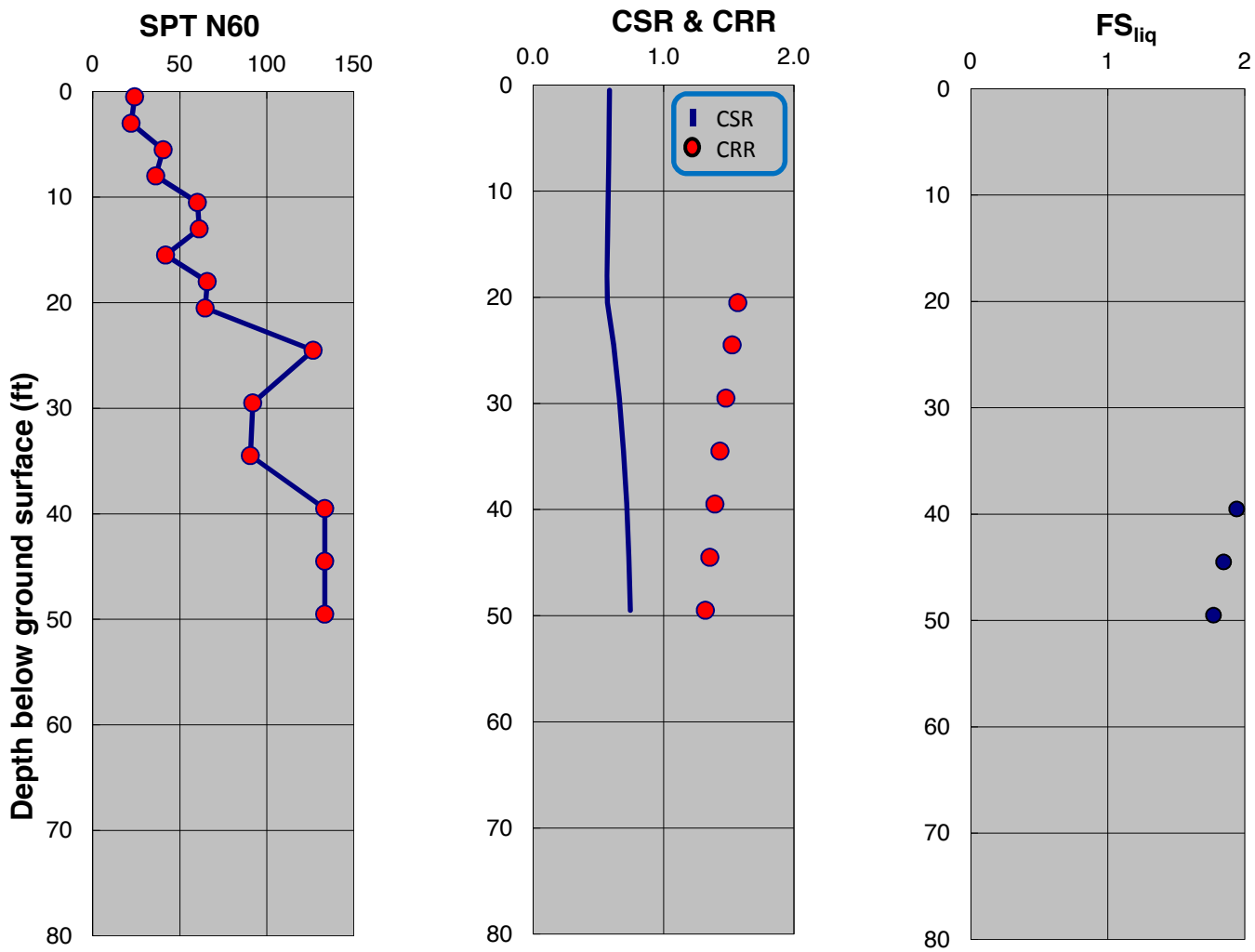
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-176 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



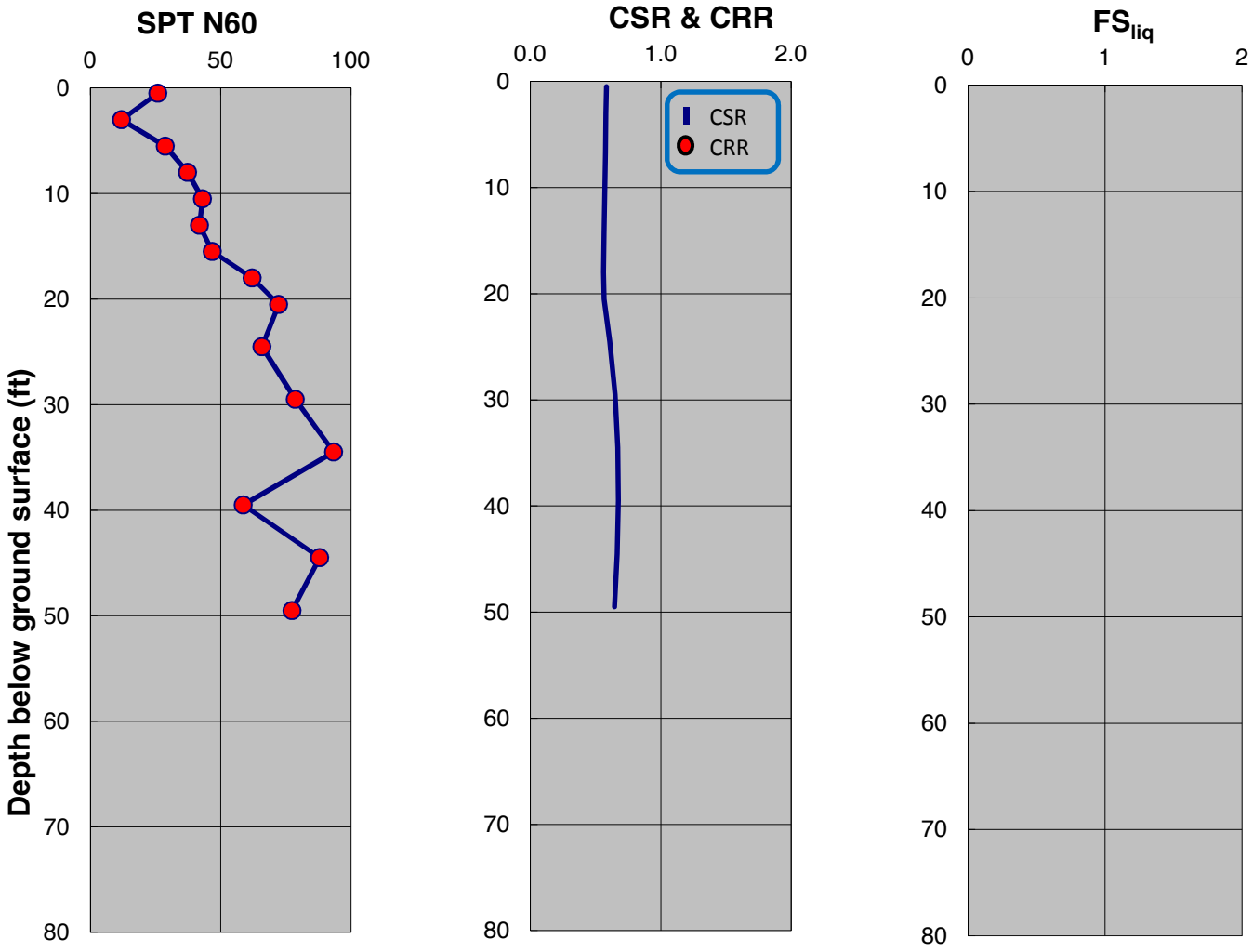
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-177 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



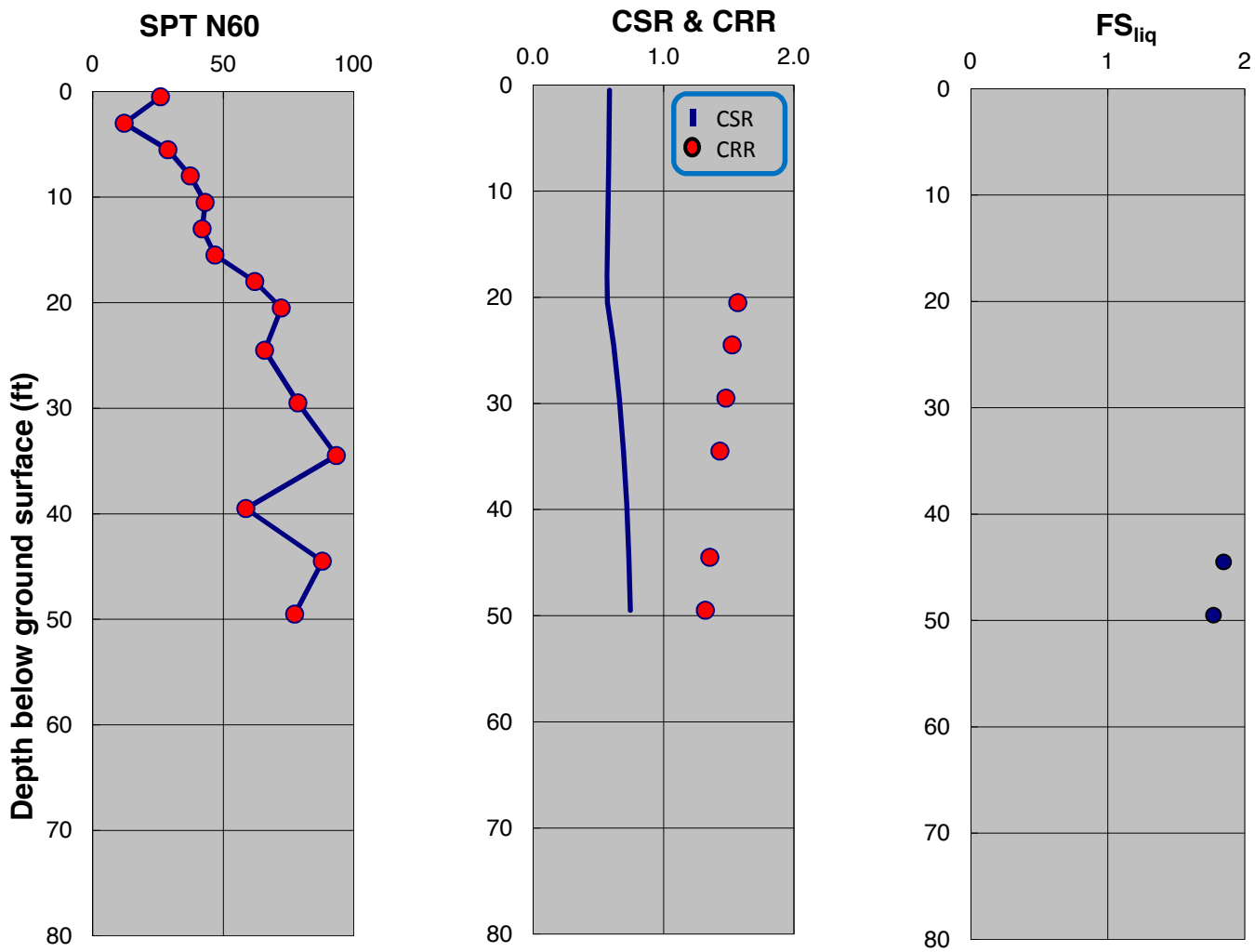
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-177 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



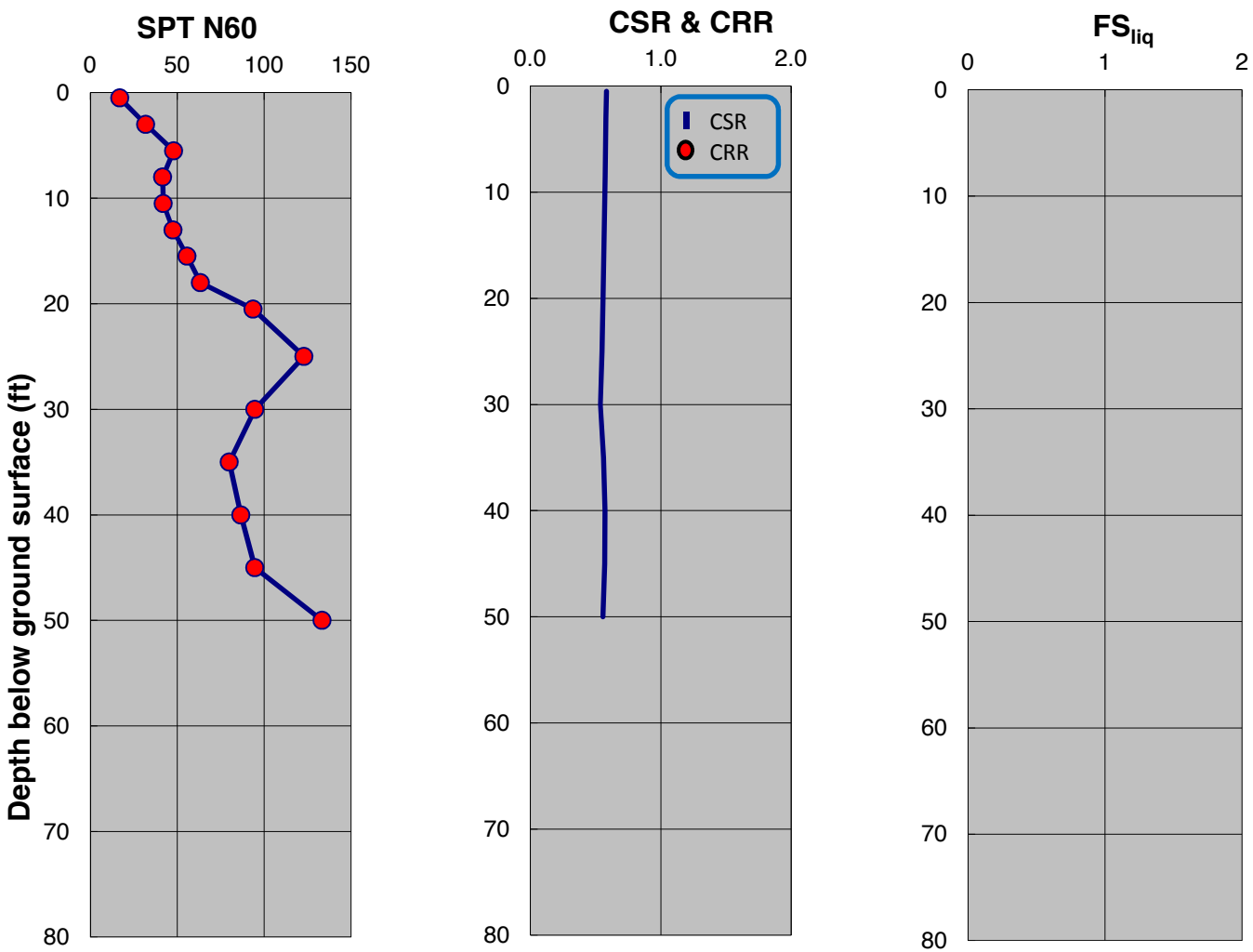
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-178 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



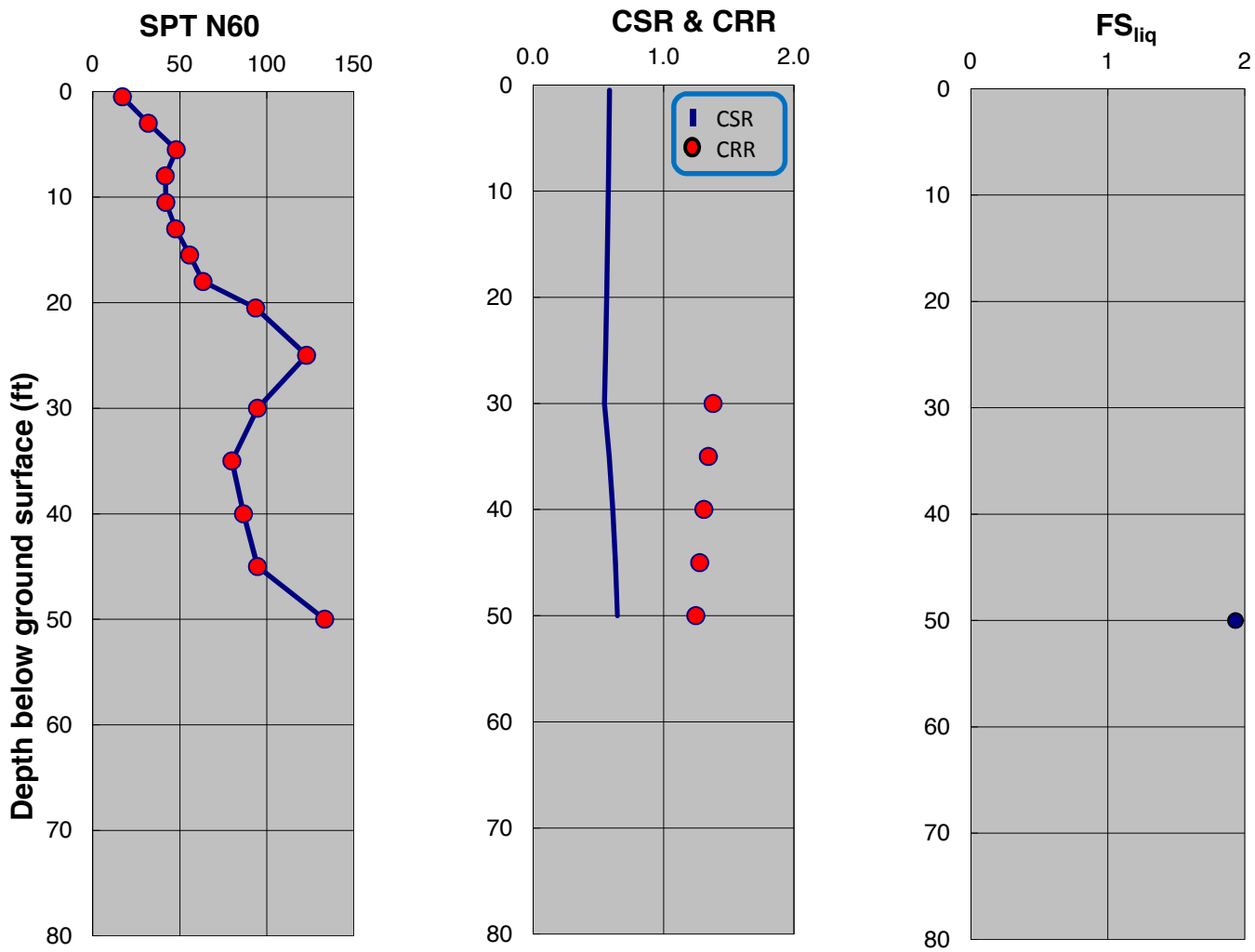
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-178 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



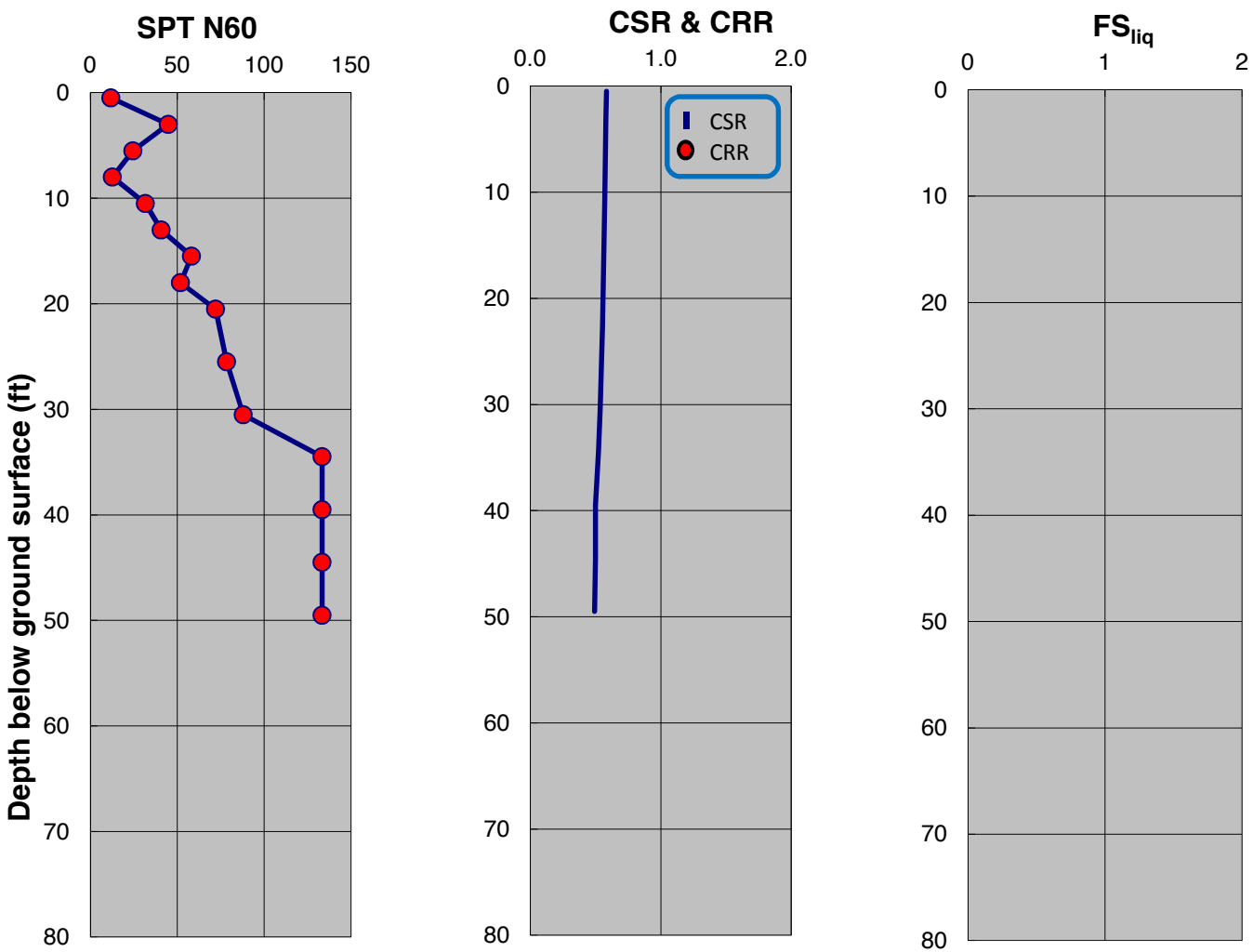
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-179 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



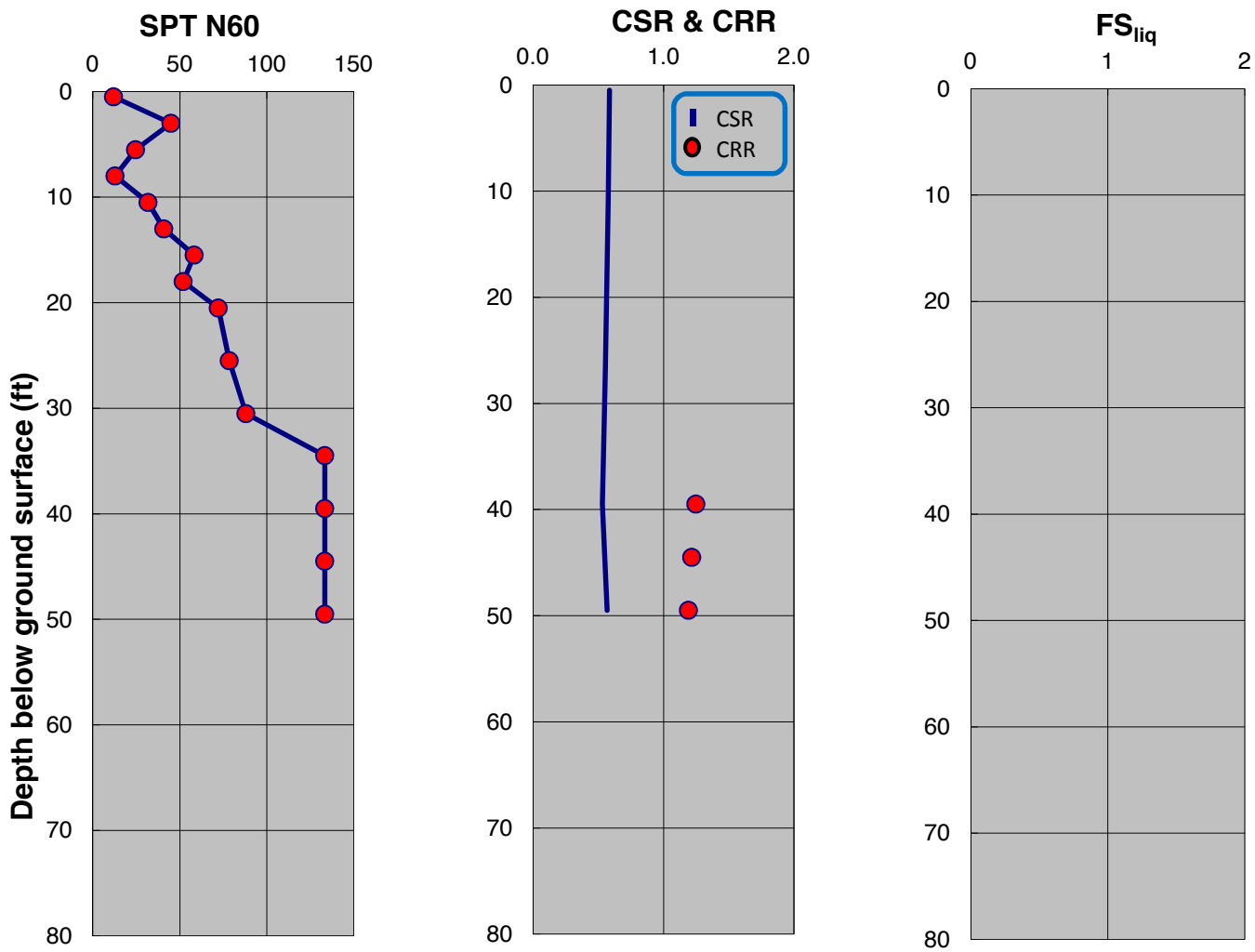
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-179 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-180 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

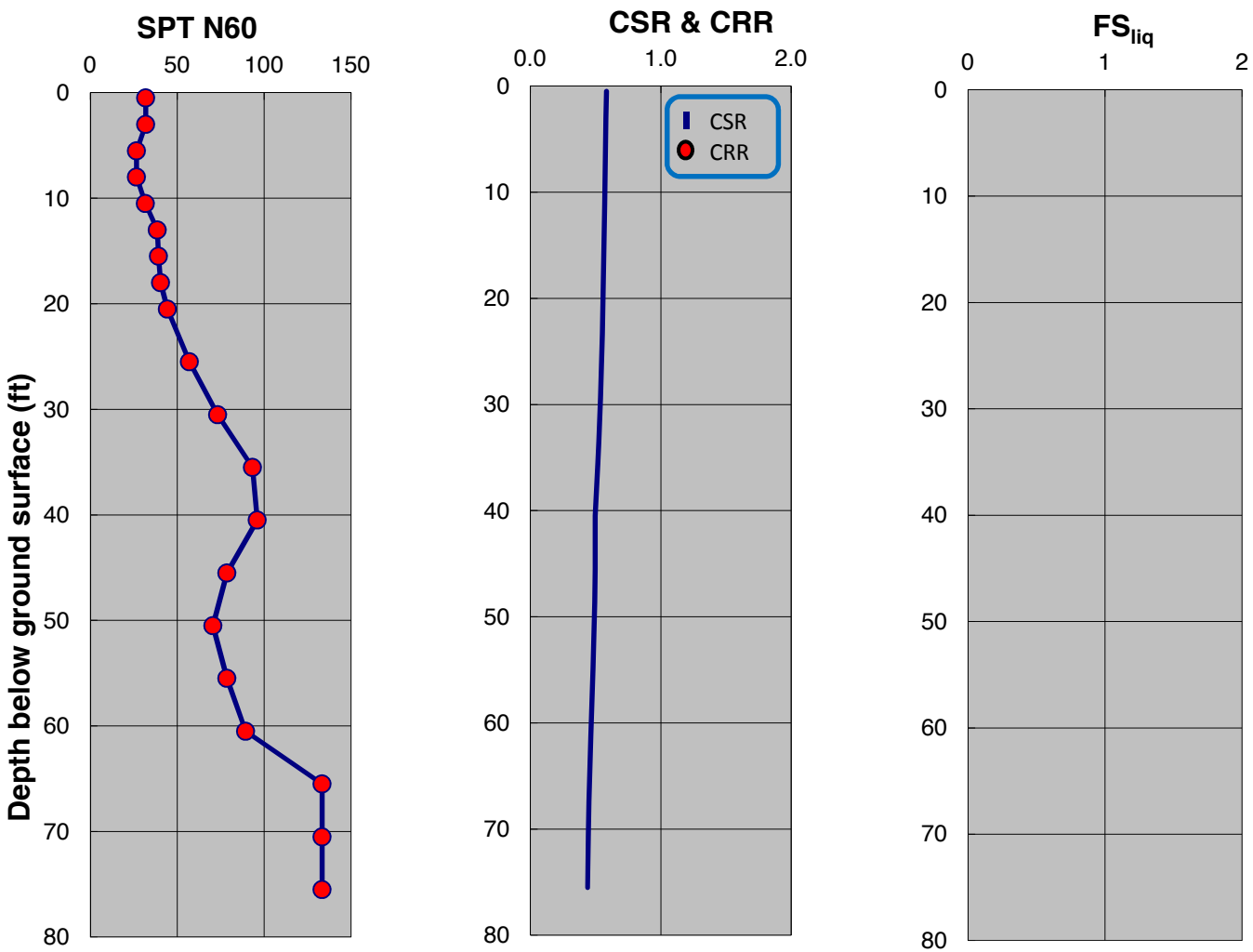
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-180 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

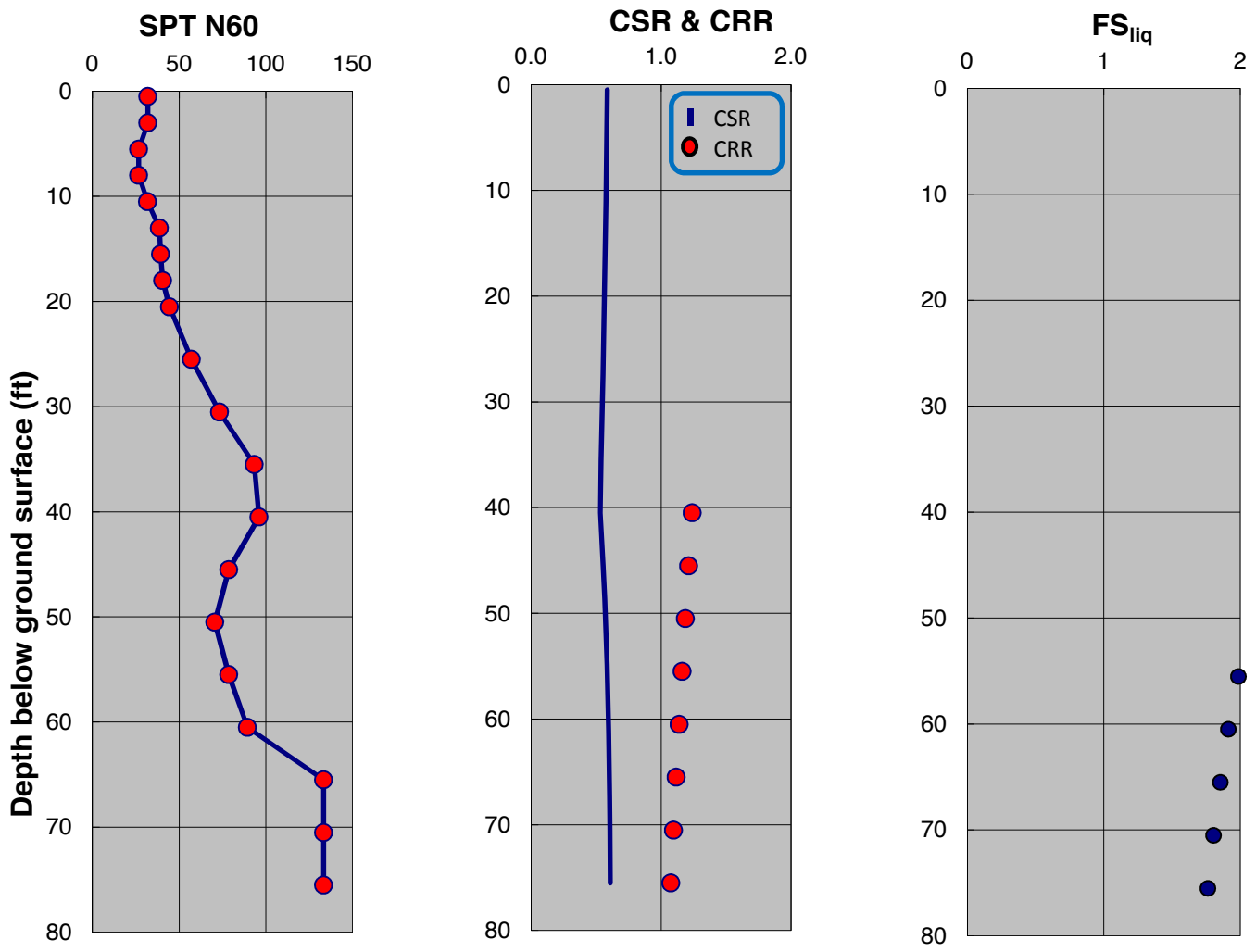
PLATE C.500



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-181 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

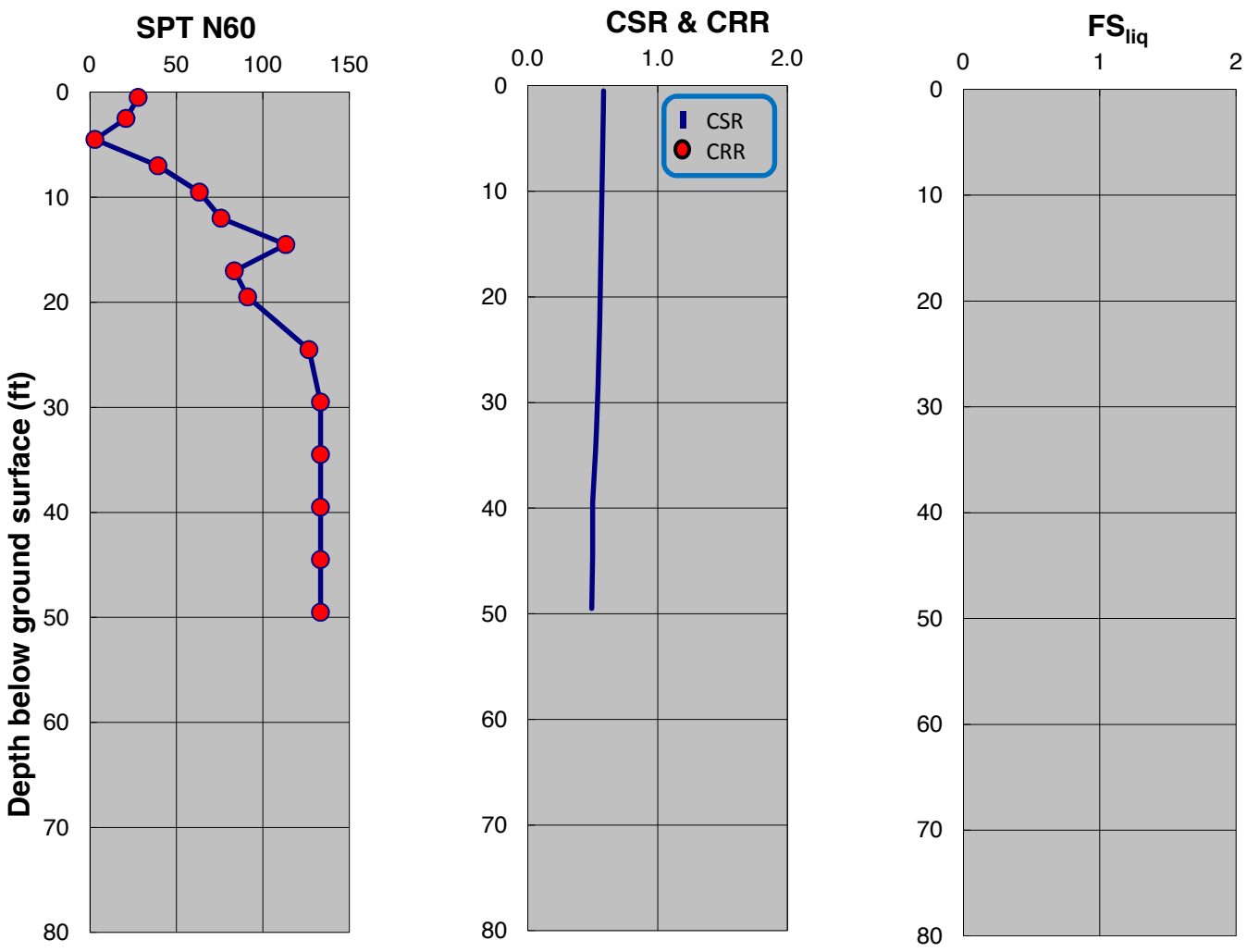
PLATE C.501



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-181 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

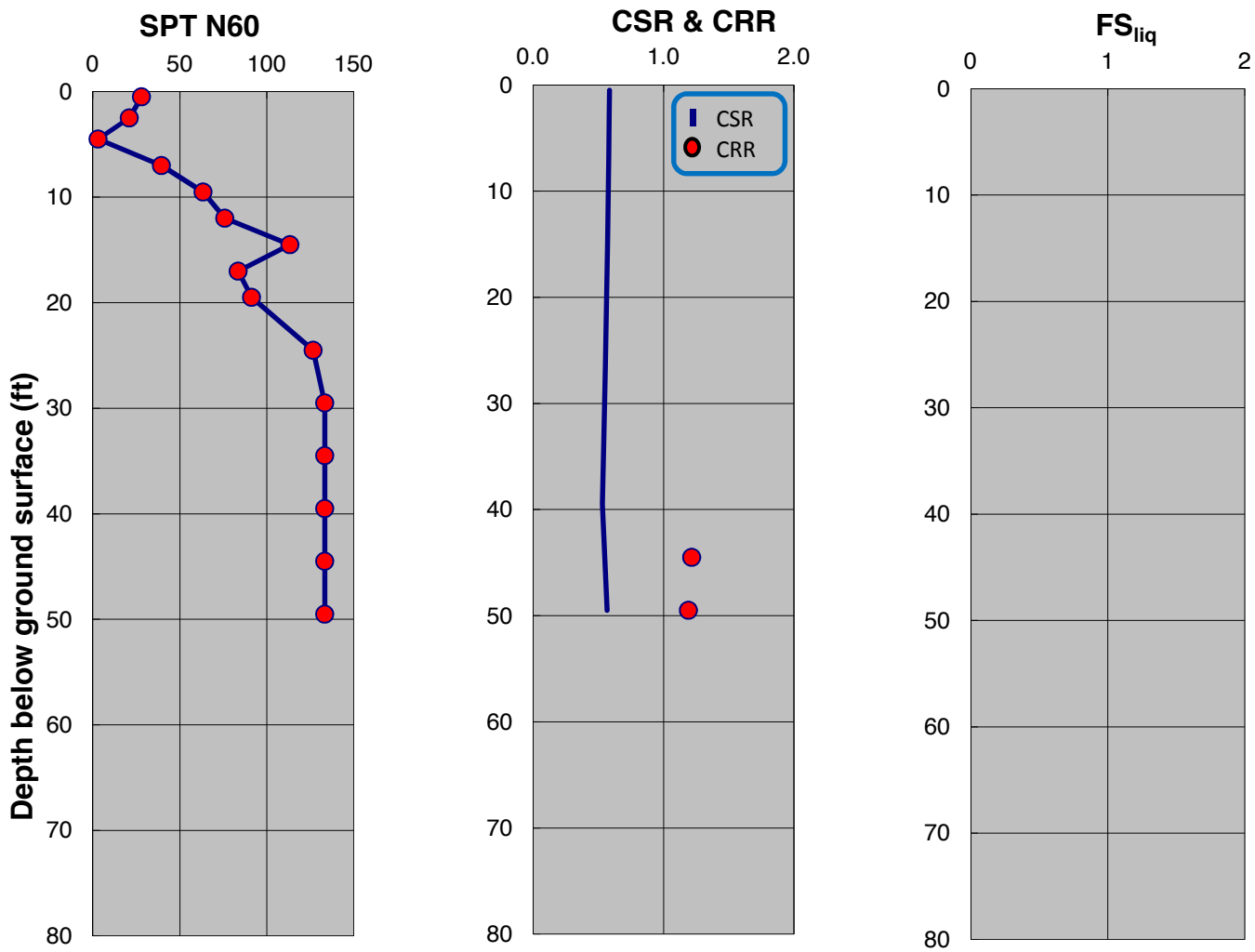
PLATE C.502



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-182 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

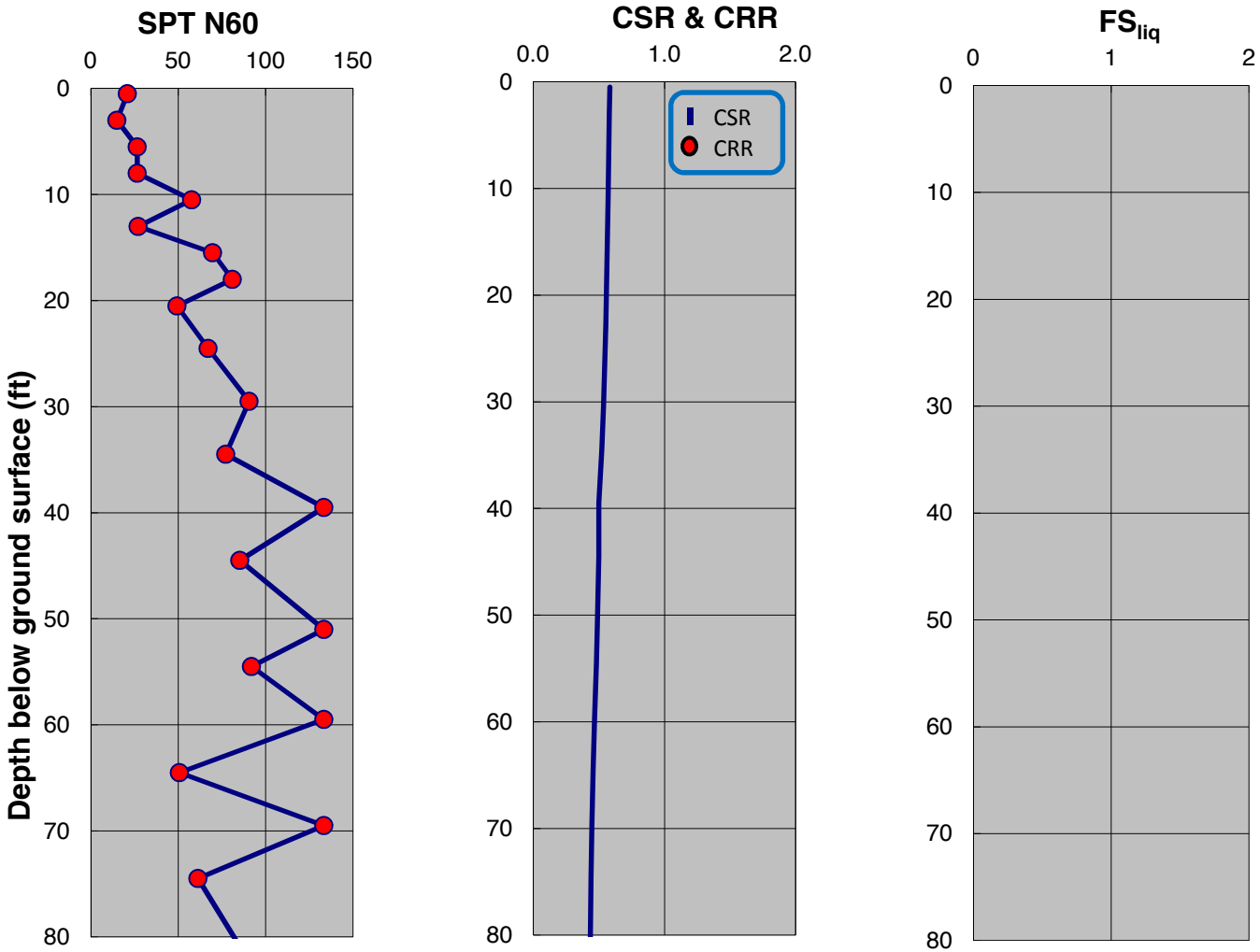
PLATE C.503



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-182 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

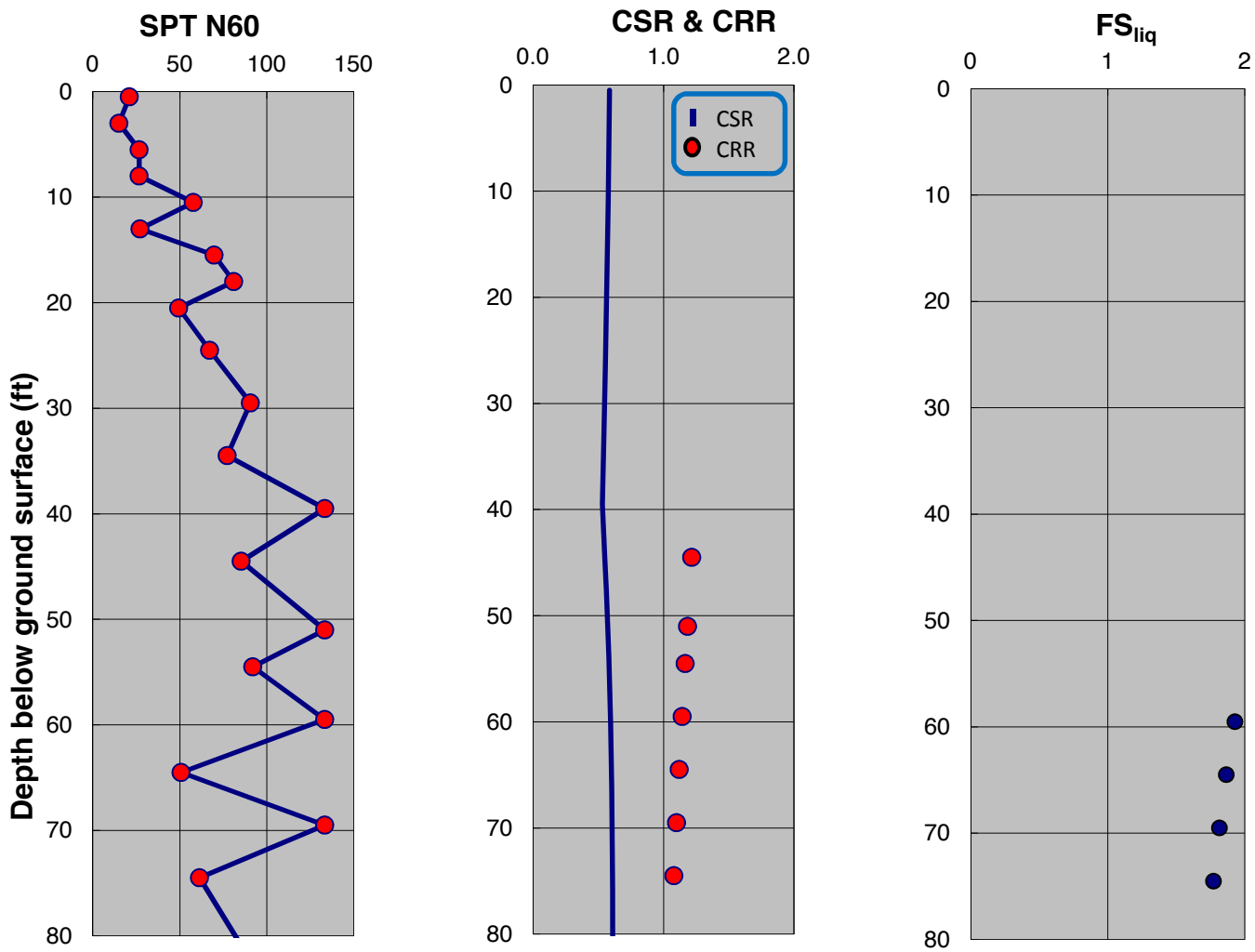
PLATE C.504



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-183 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

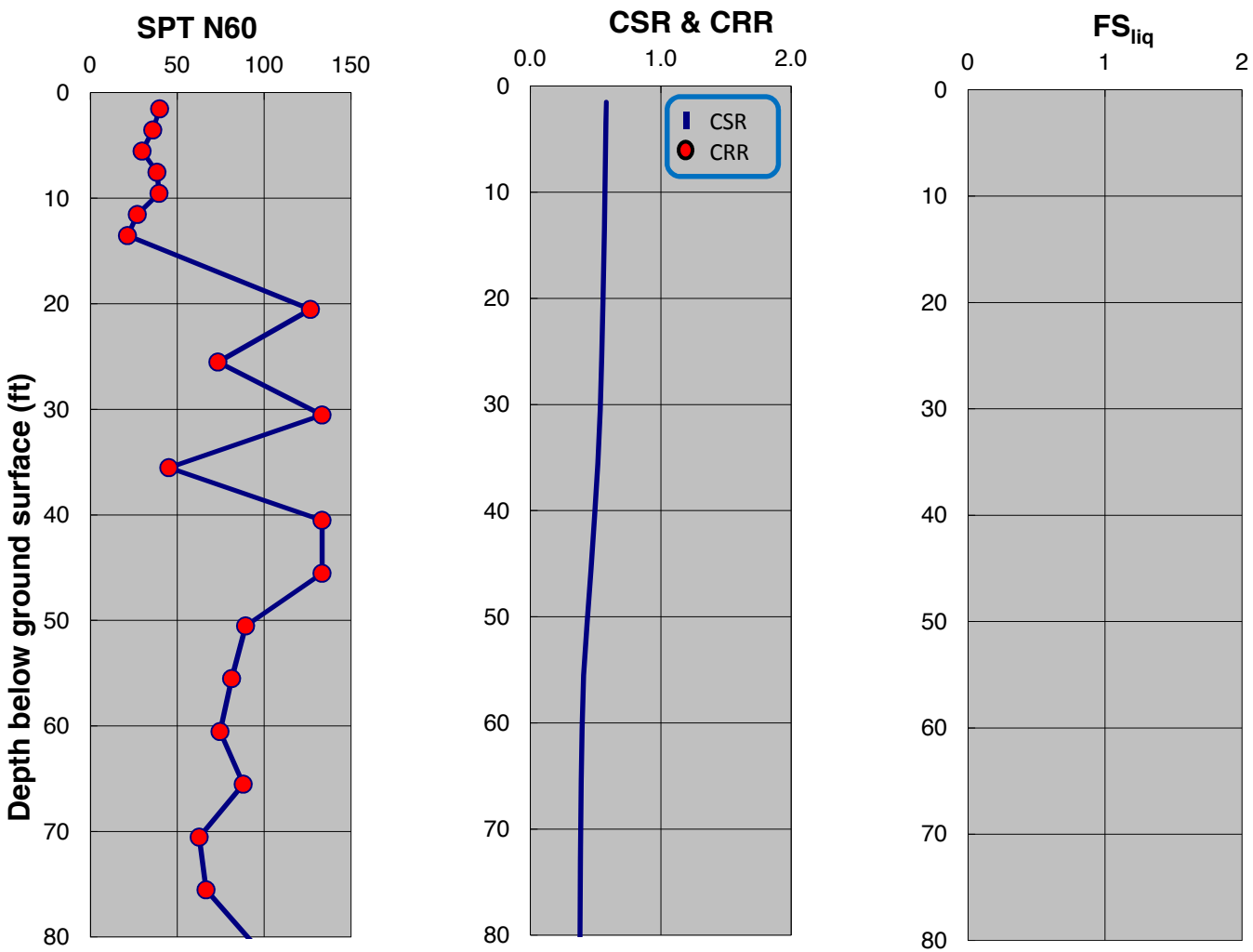
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.505



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-183 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

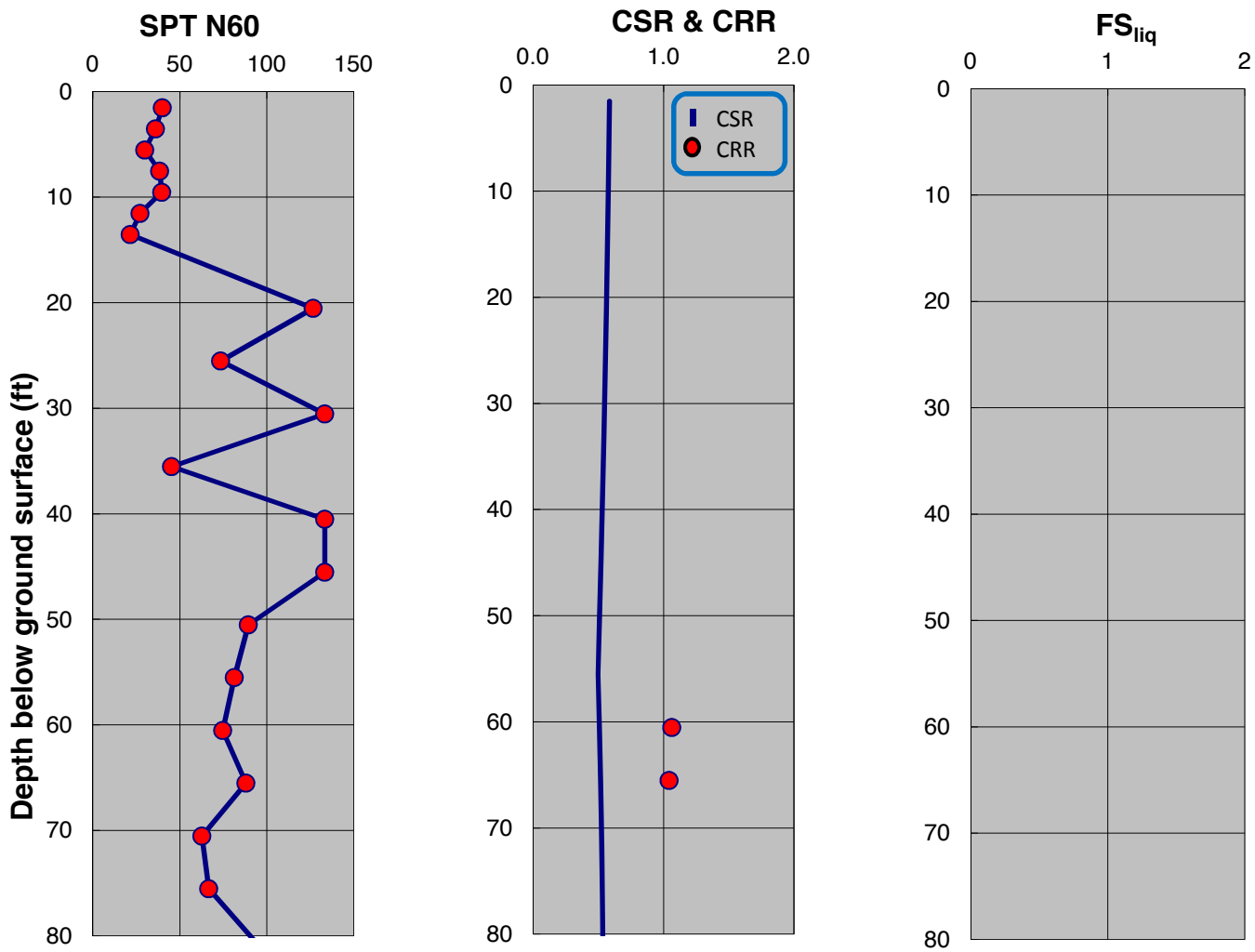
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-189 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

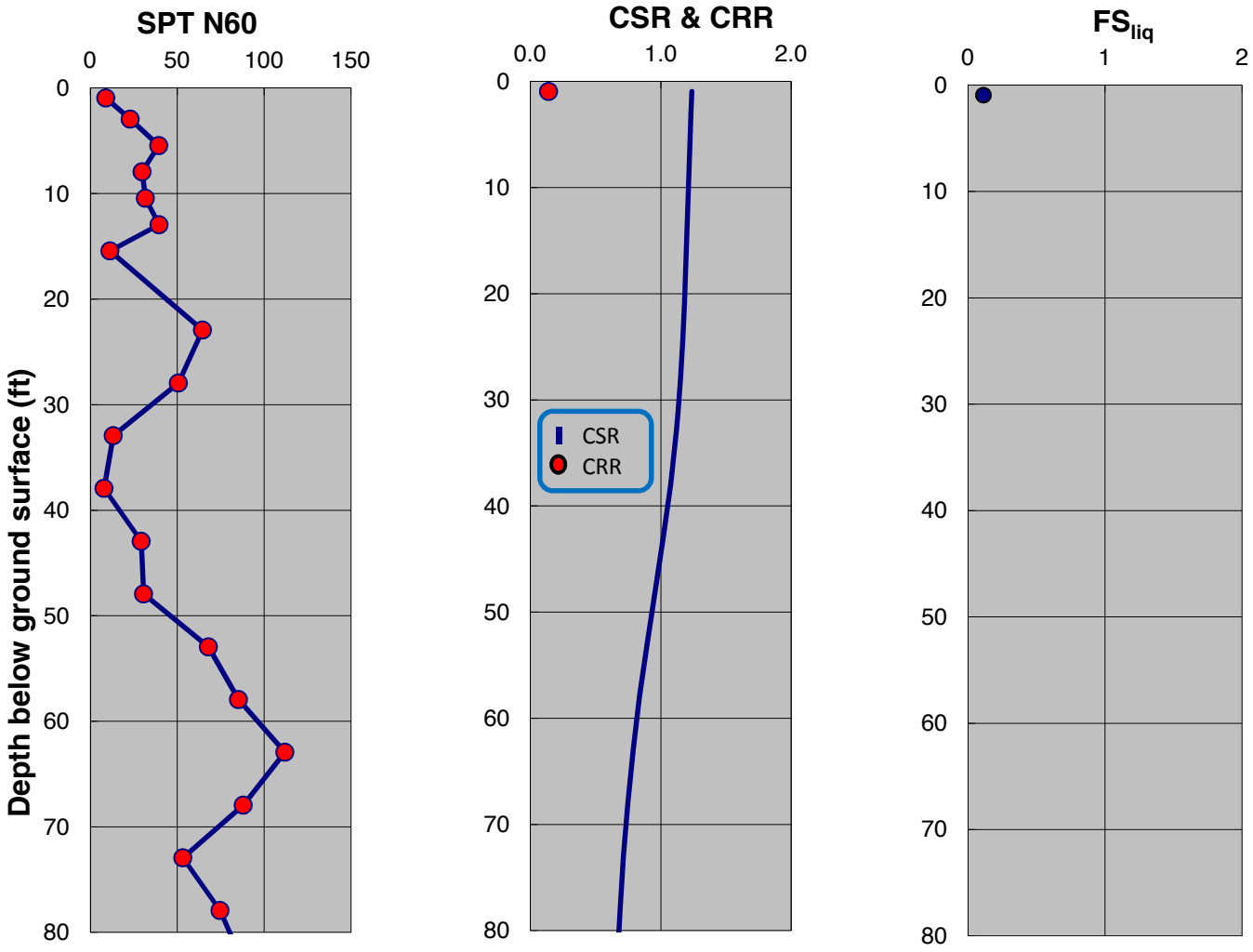
PLATE C.507



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-189 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

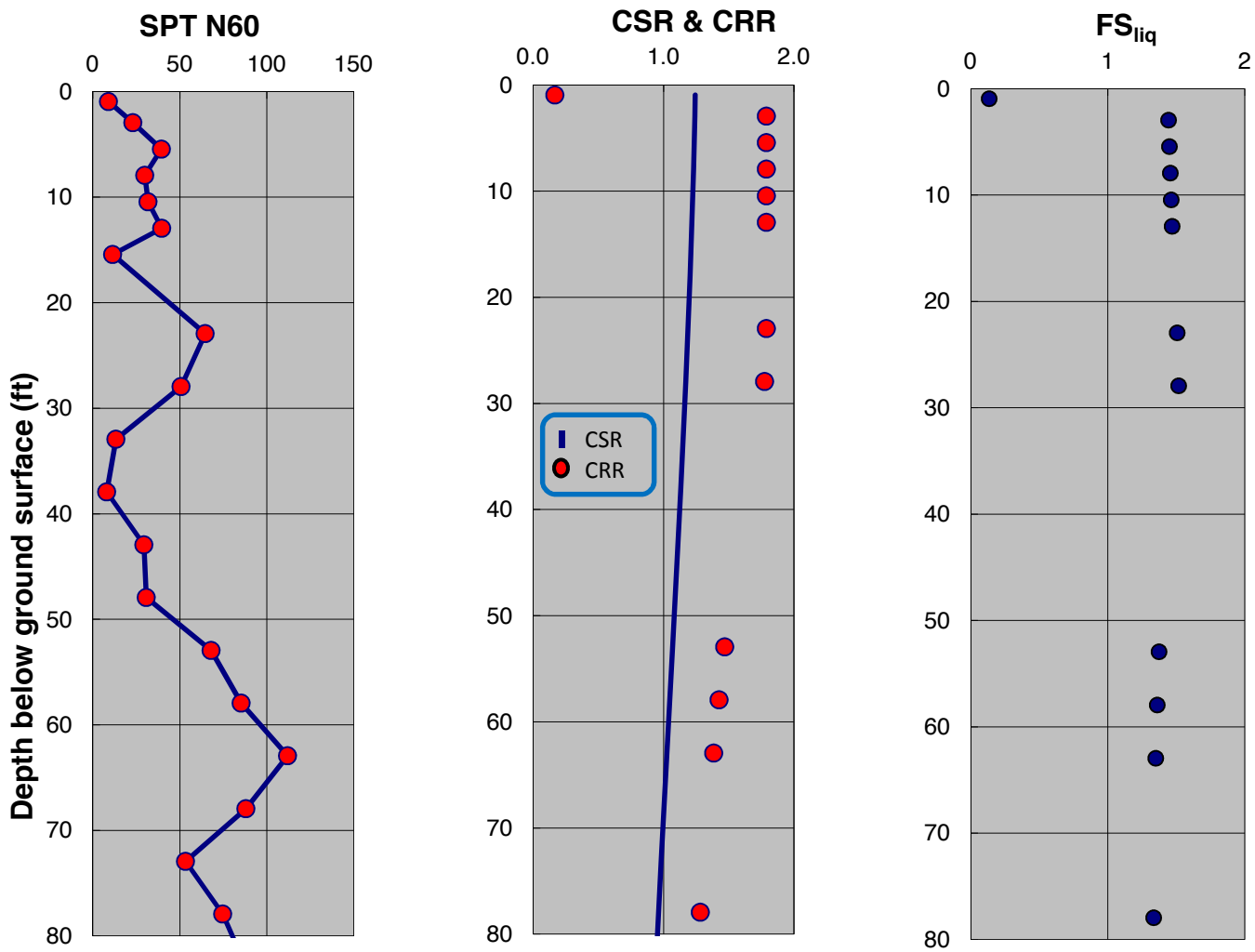
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.508



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-190 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

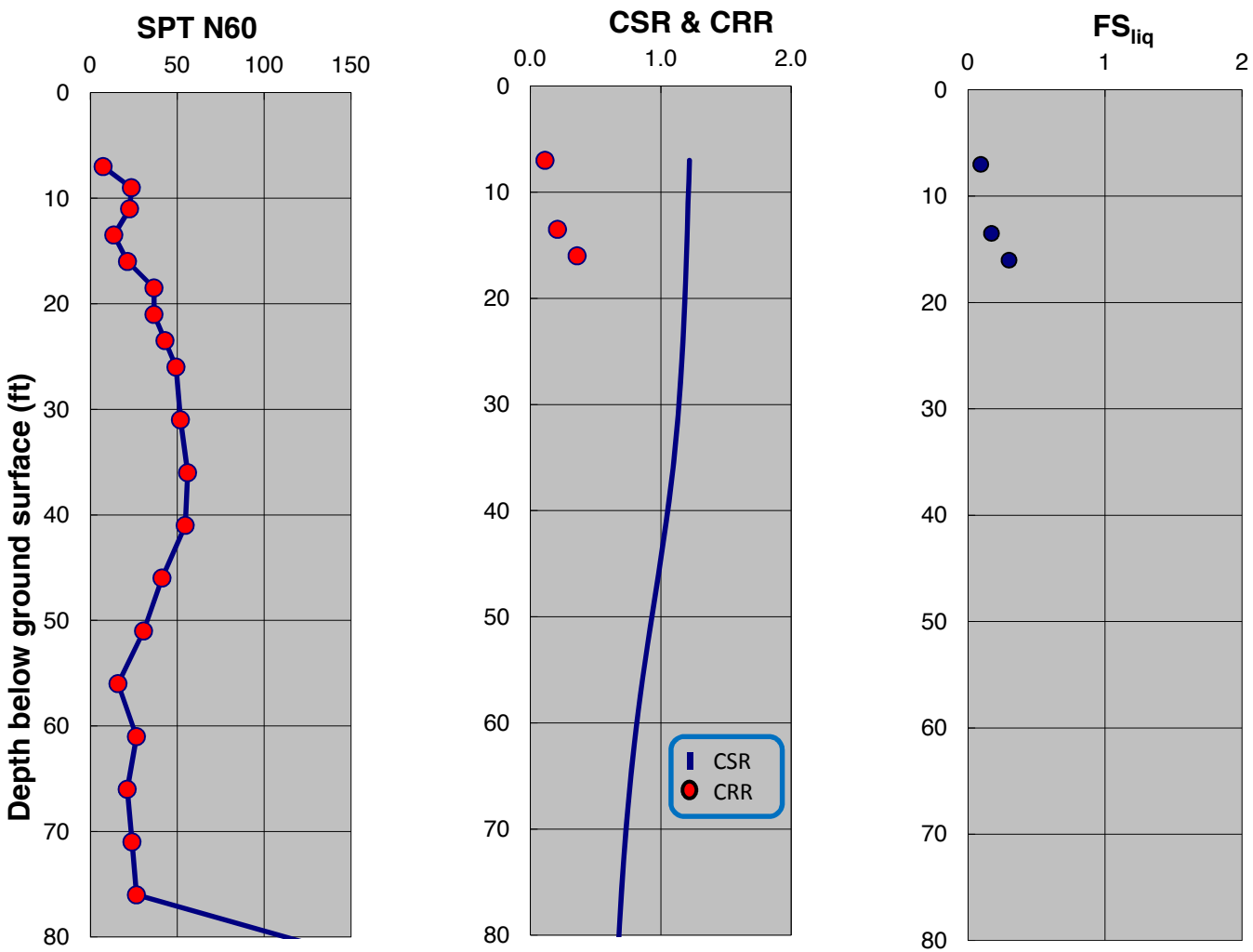
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-190 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

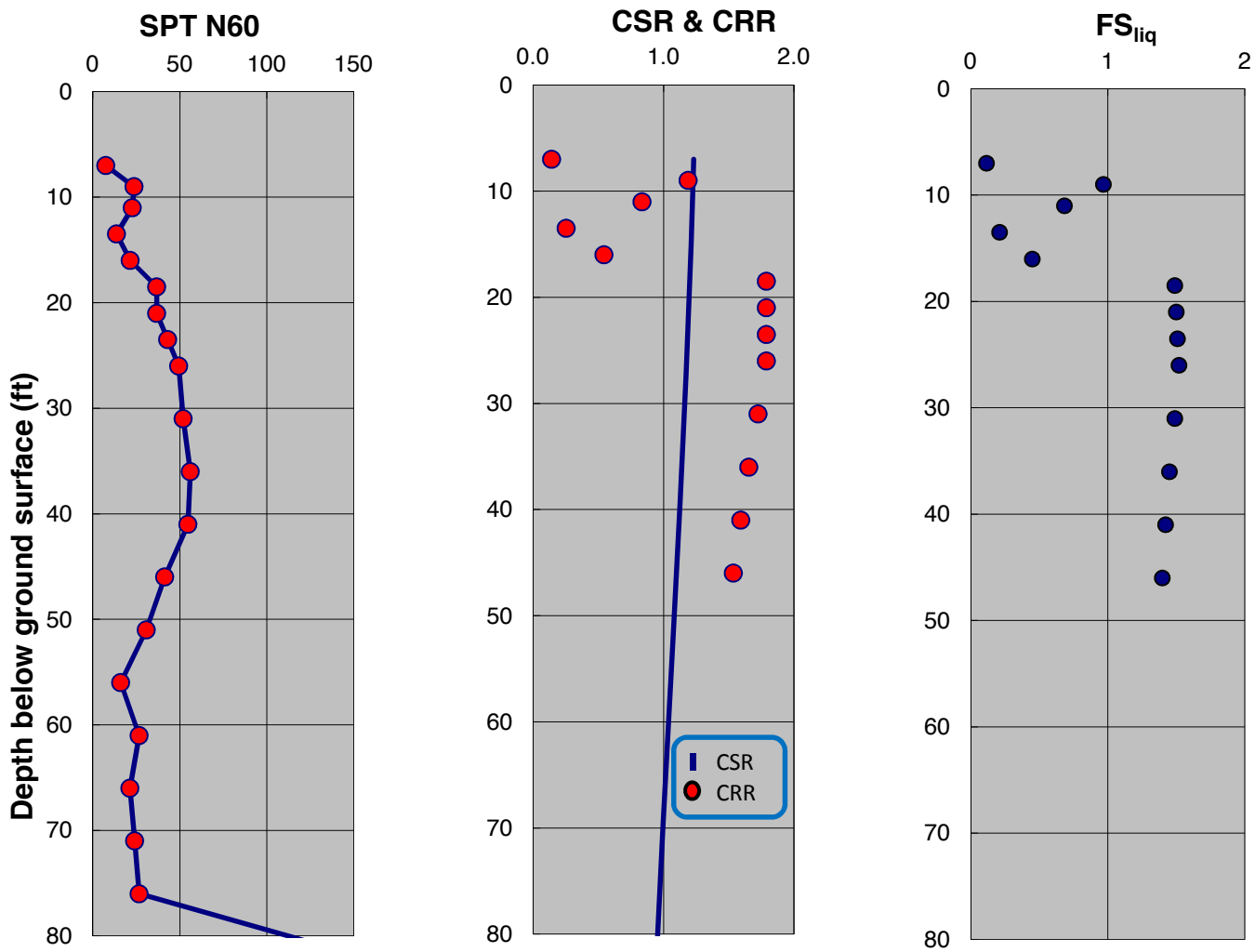
PLATE C.510



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-191 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

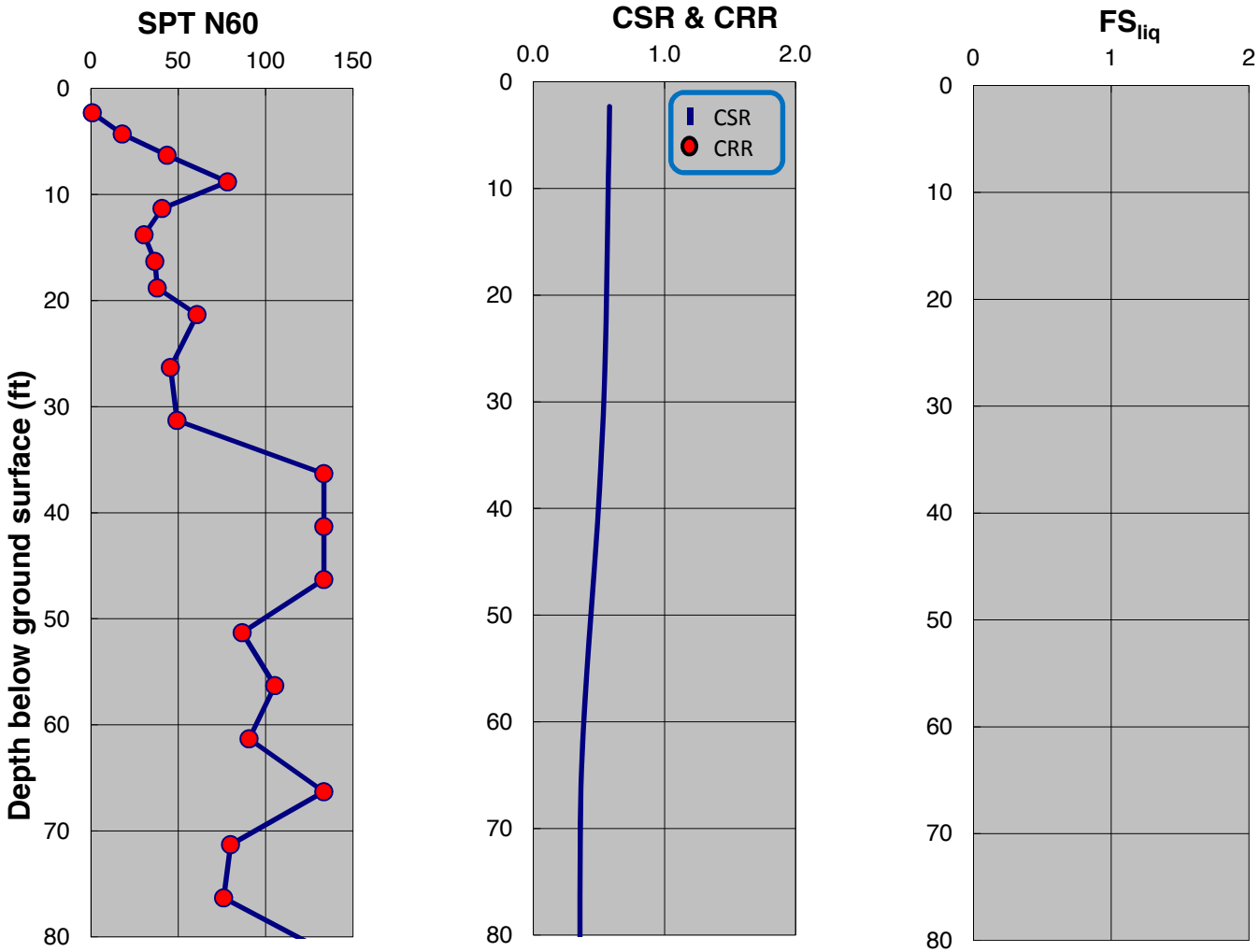
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.511



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-191 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

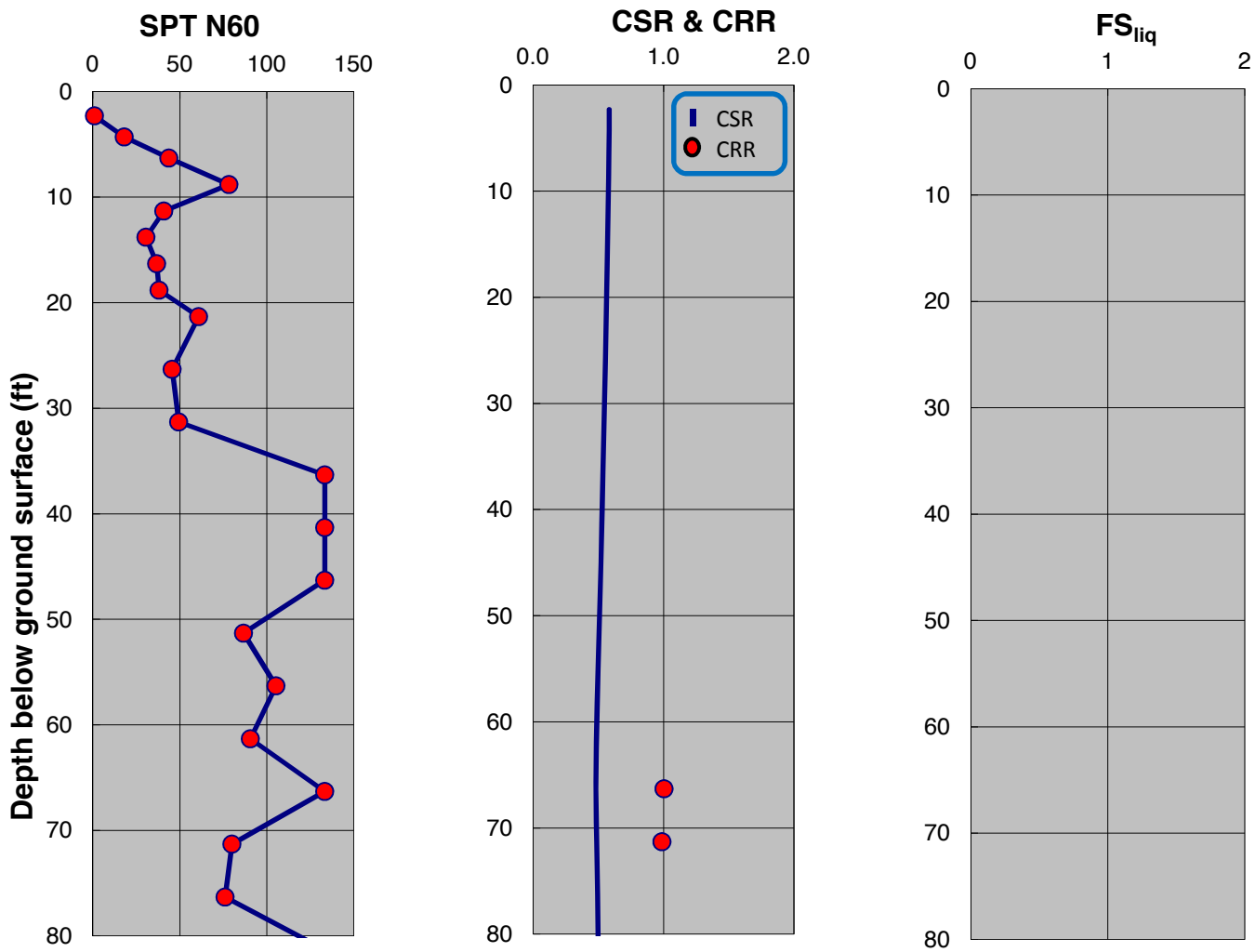
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-192 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

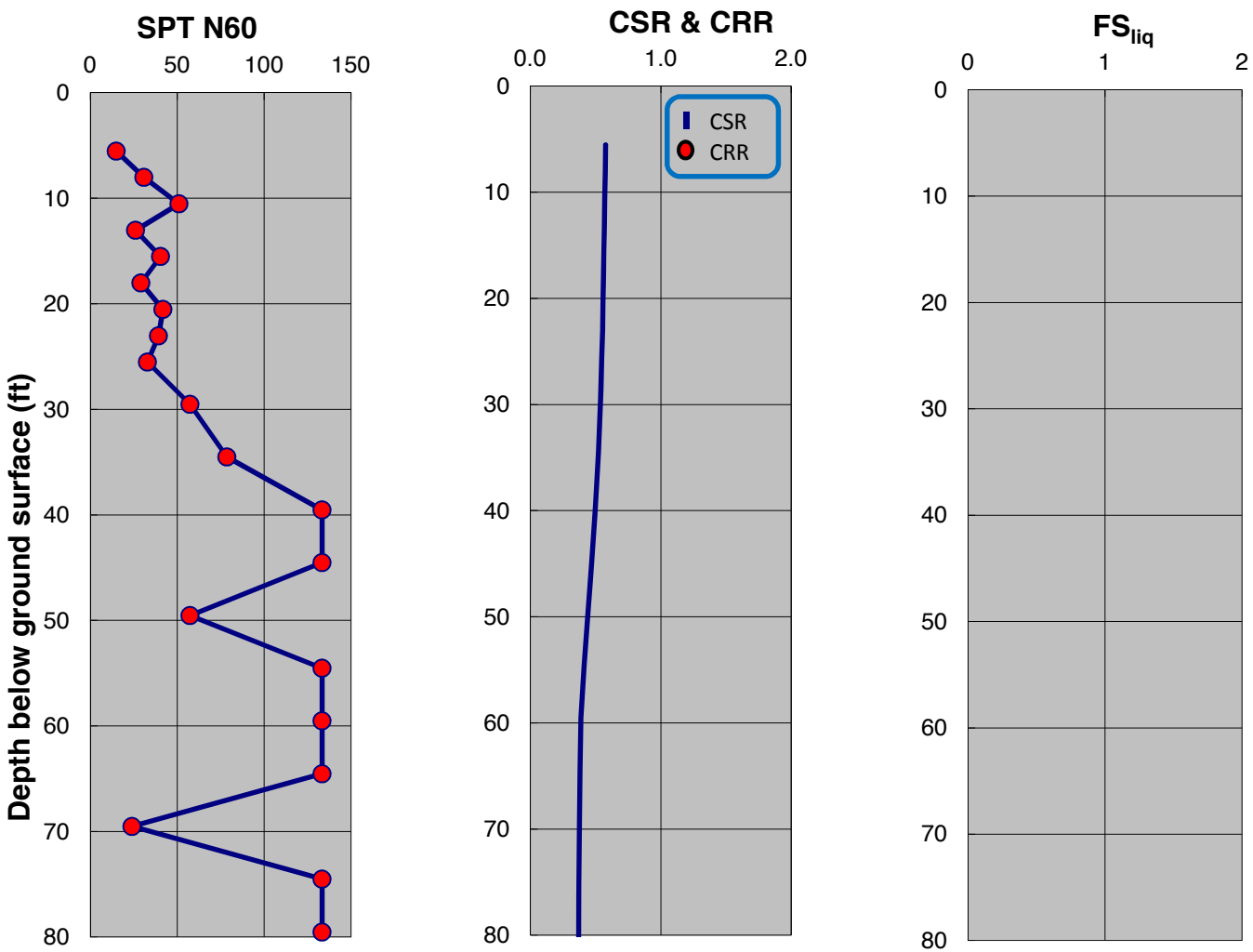
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.513



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-192 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

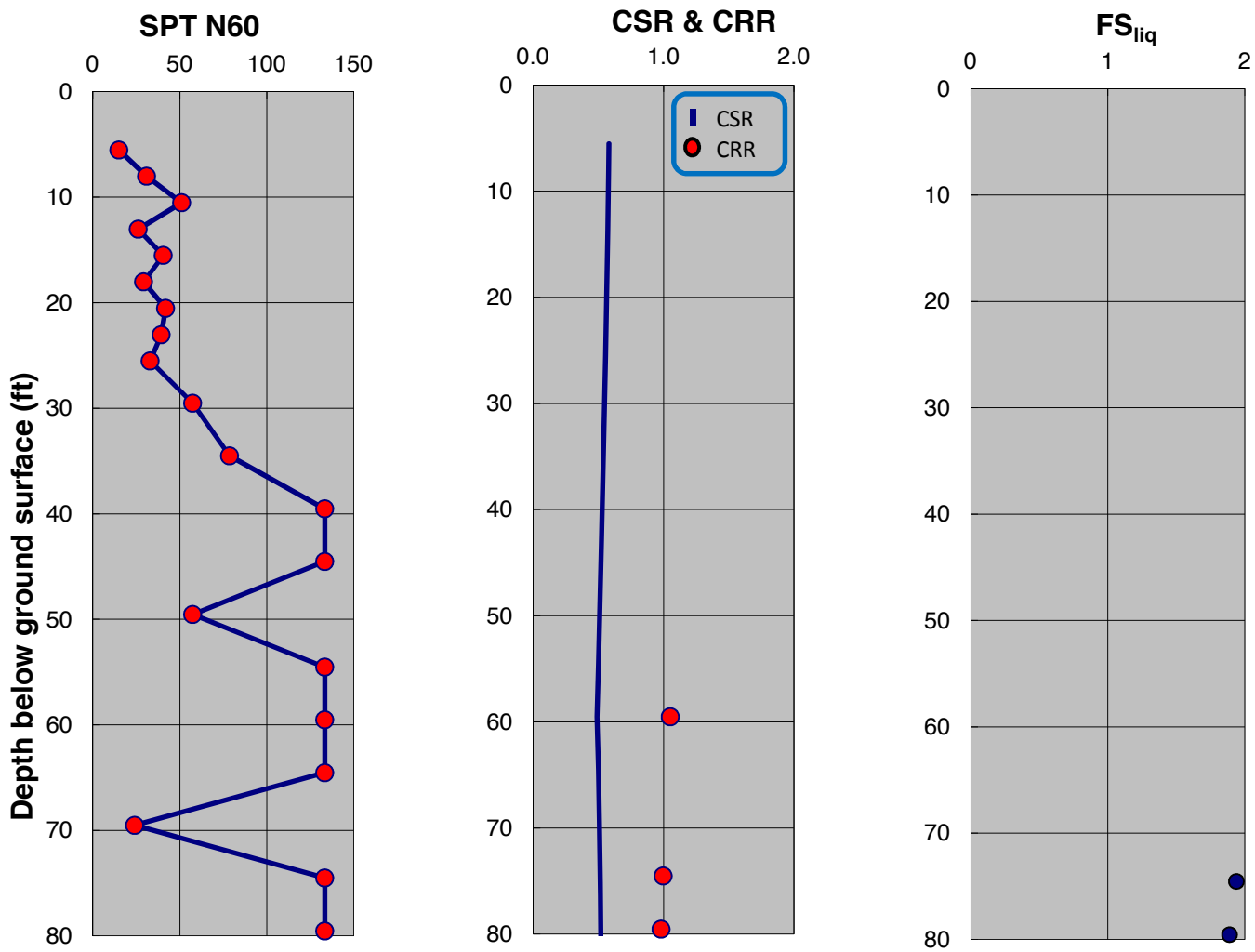
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-195 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

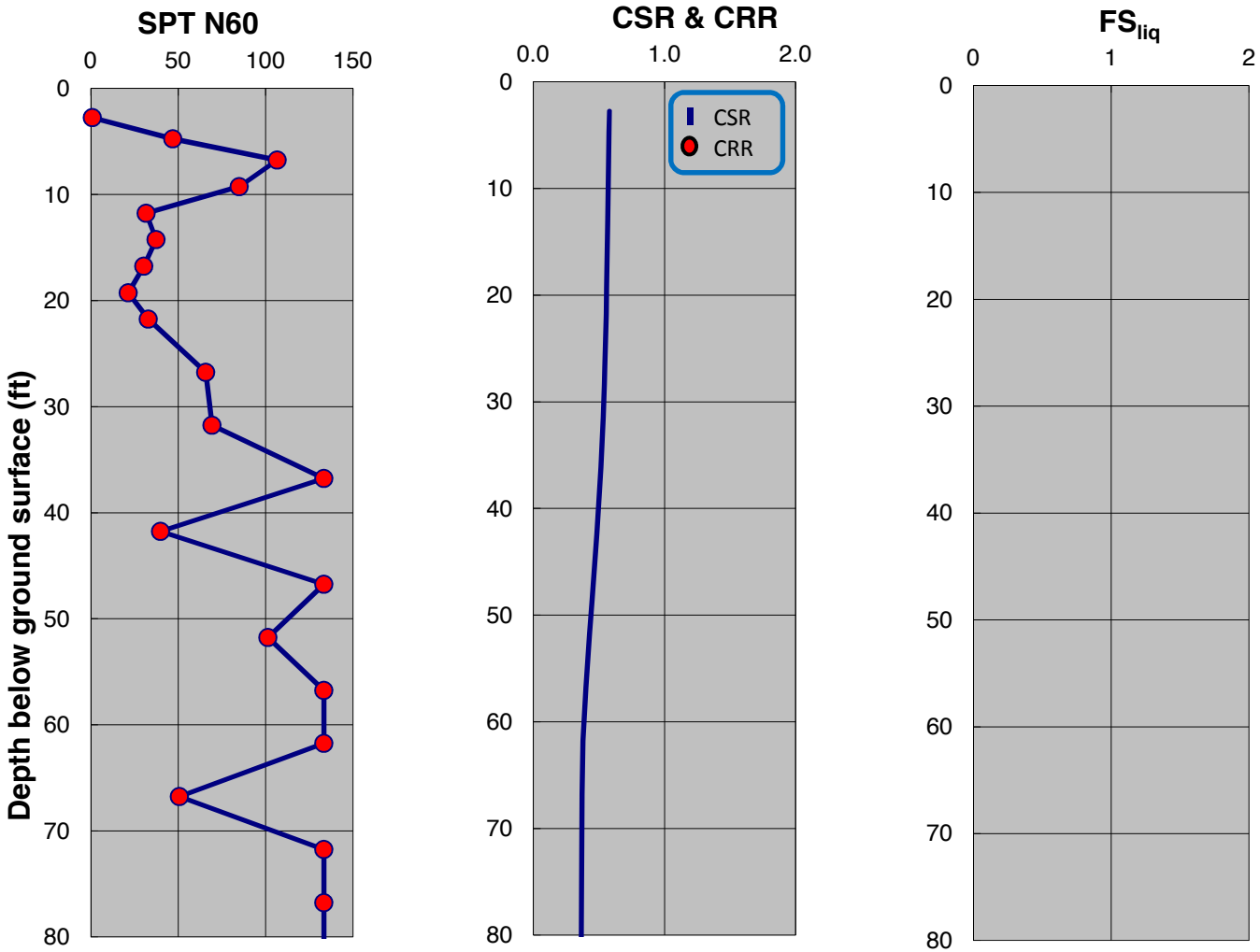
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.515



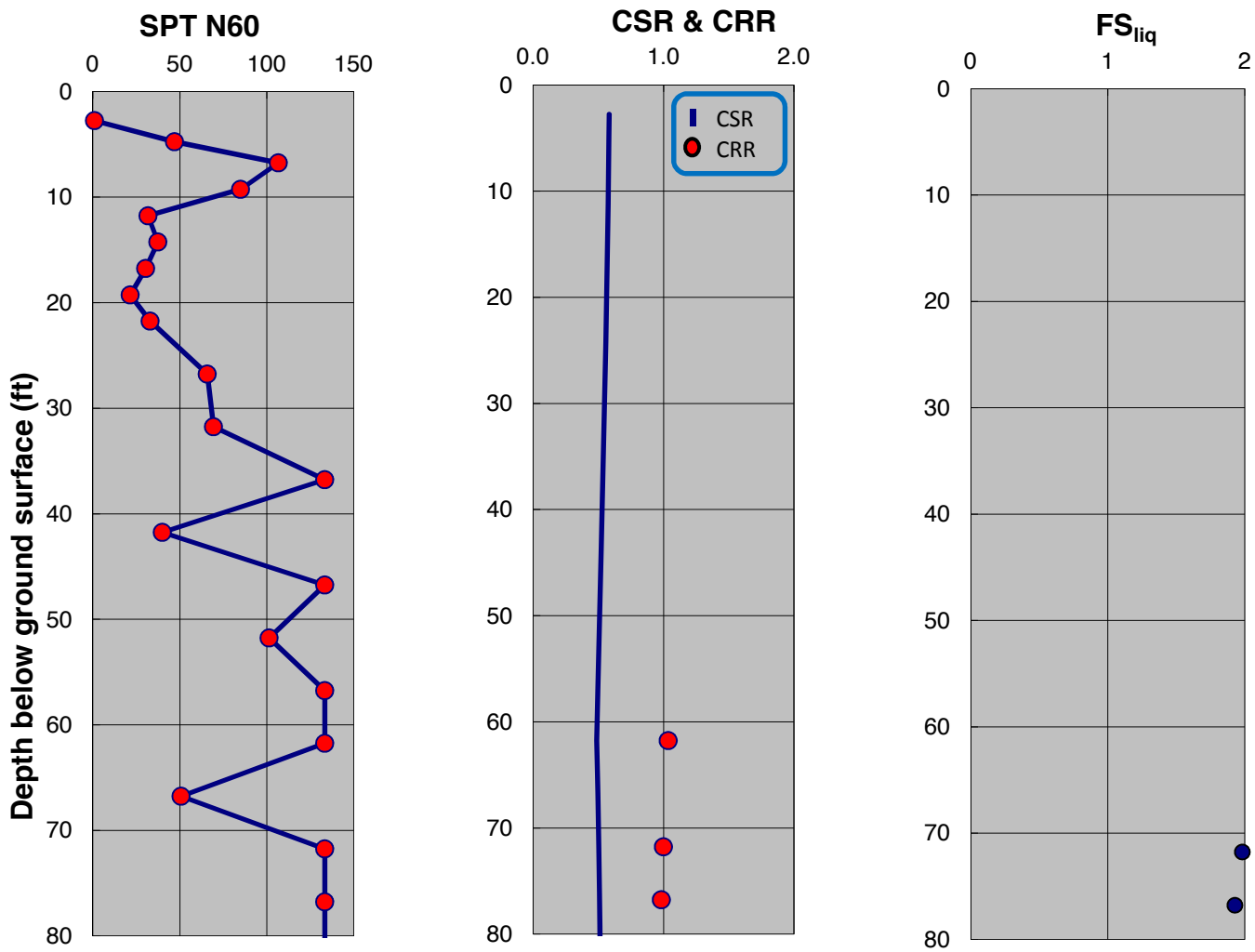
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-195 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



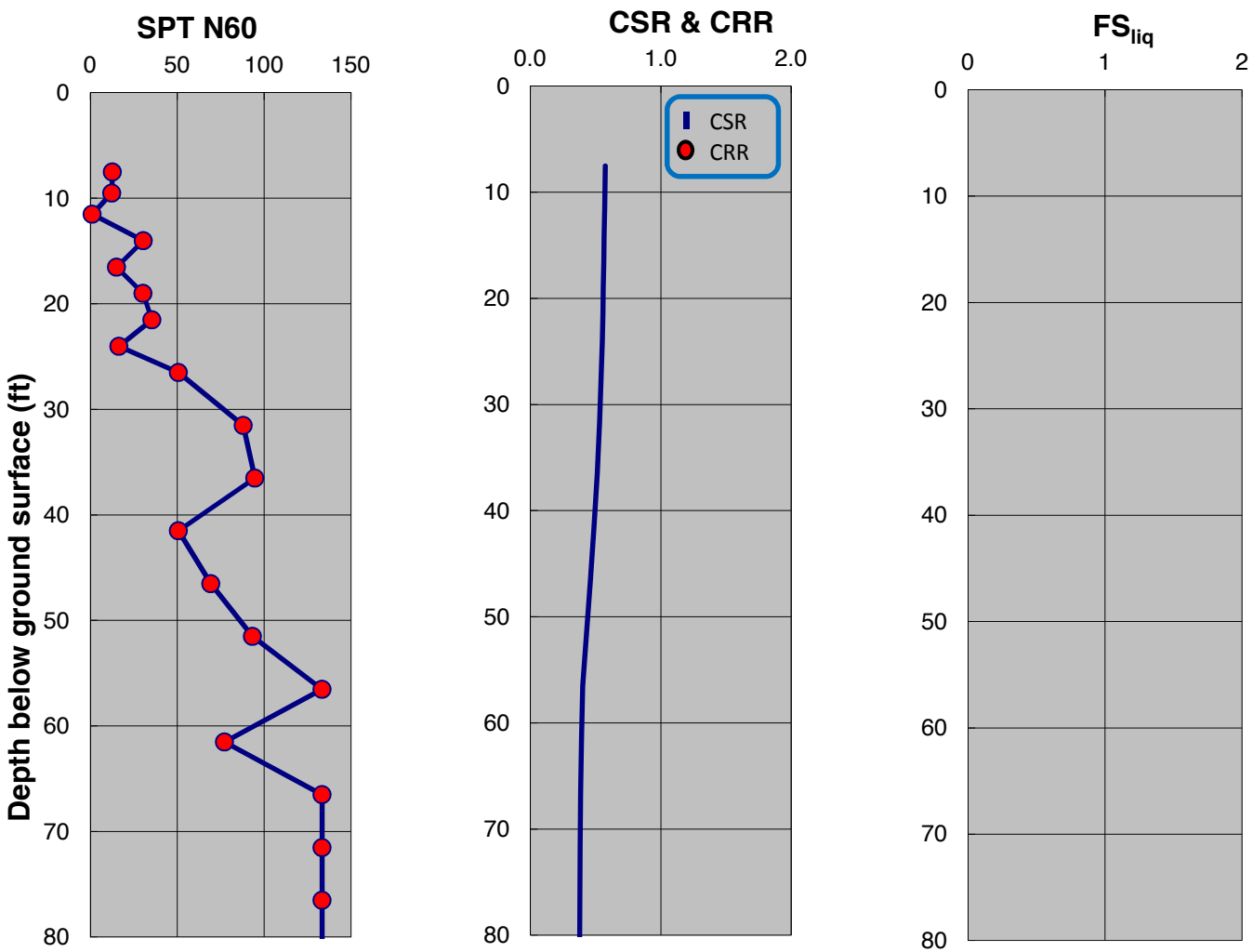
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-197 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



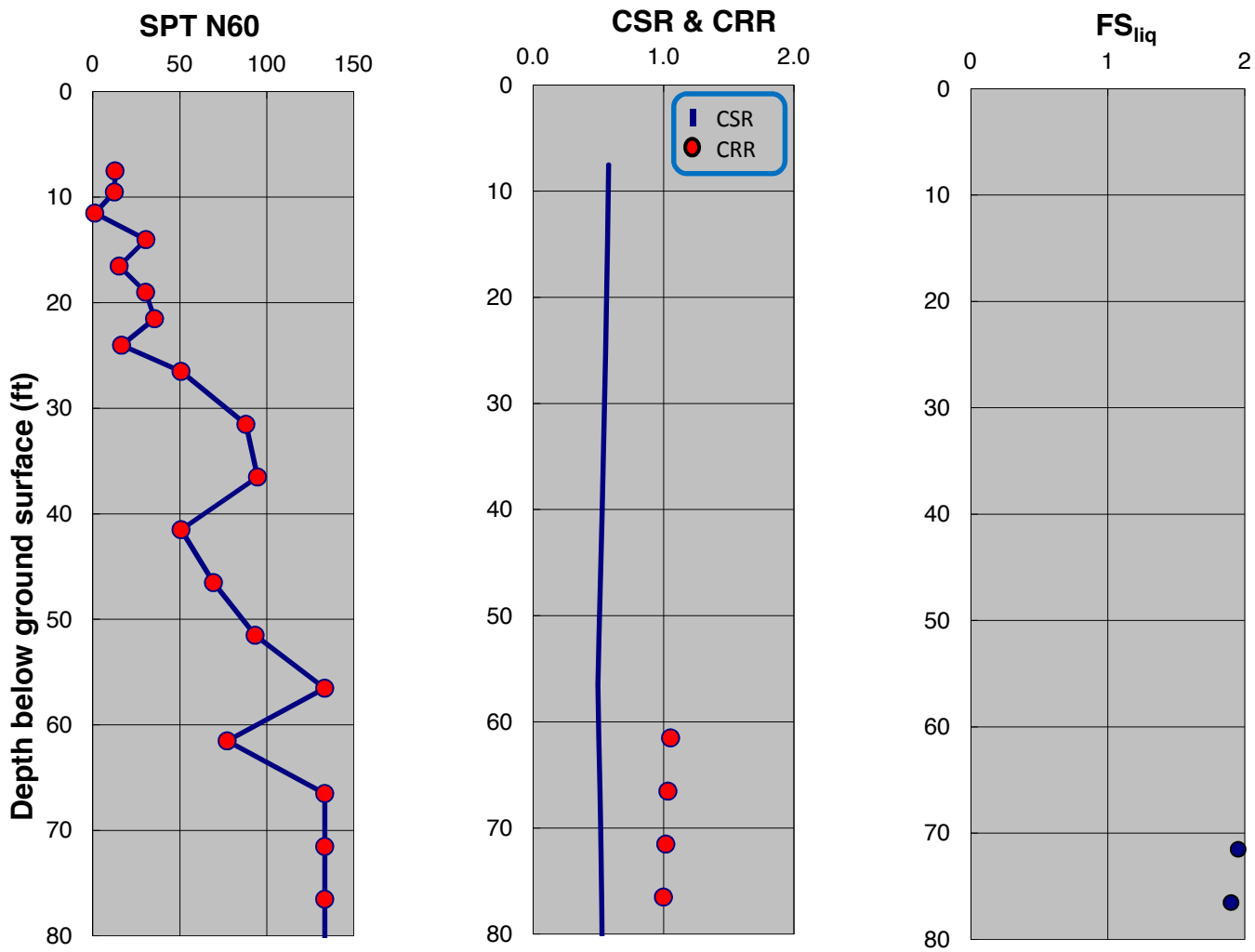
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-197 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-198 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-198 FOR SSE LEVEL PER IFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE C.520

APPENDIX D

SSE / MCE_G LEVEL LIQUEFACTION POTENTIAL EVALUATIONS PER NFPA 59A 2013 AND ASCE 7-10 FOR ONSHORE BORINGS, PROPOSED ELEVATION

APPENDIX D

SSE / MCE_G LEVEL LIQUEFACTION POTENTIAL EVALUATIONS PER NFPA 59A 2013 AND ASCE 7-10 FOR ONSHORE BORINGS, PROPOSED ELEVATION

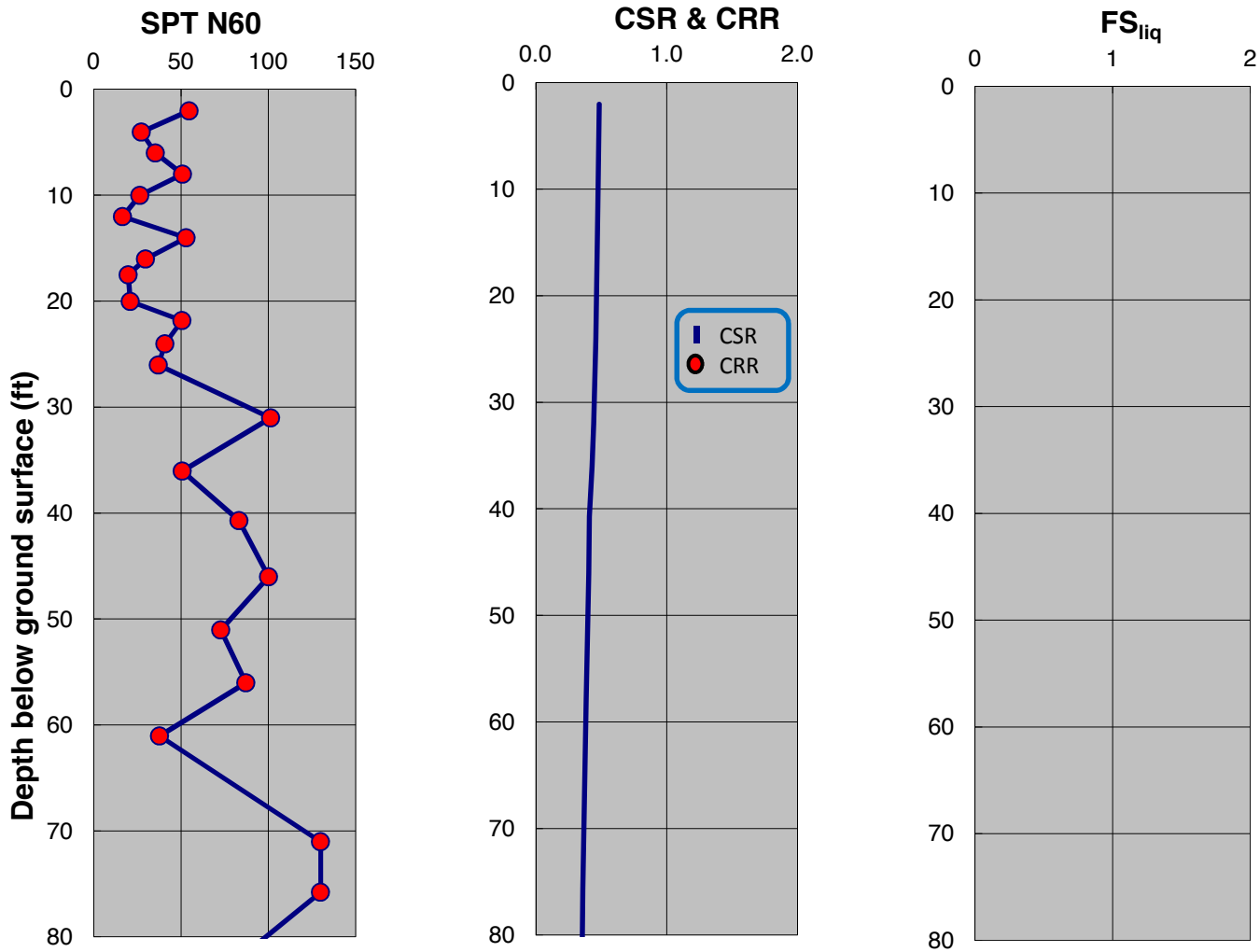
D.1 Liquefaction Triggering Hazard Assessment per NFPA 59A 2013 and IBC (2012) for the Proposed Site-grade Elevation

This appendix presents the liquefaction triggering hazard assessment results based on the SPT-based procedures proposed by NCEER (Youd et. al., 2001) and Boulanger and Idriss (2014) for the onshore borings and the proposed site-grade elevations (i.e., Plates 16 and 17 of the Onshore Integrated Site Characterization and Geotechnical Engineering report, Fugro Report No. 04.10140334-14, AKLNG Document No. USAL-FG-GRZZZ-00-002015-009) at each onshore boring as presented on Table 3.2 per the requirements of NFPA 59A 2013 and ASCE 7-10. These analyses assume the same $(N_1)_{60}$ blow counts (SPT blow counts corrected to energy ratio of 60% and an effective overburden stress of 1 atm) as the existing elevation conditions and that the additional fill required to reach the proposed elevations will be unsusceptible to liquefaction. SSE requirements per NFPA 59A 2013 are the same as ASCE 7-10 MCE requirements. ASCE 7-10 requires liquefaction potential evaluation to be conducted for Maximum Considered Earthquake geometric mean peak ground acceleration (MCE_G), which is geometric mean ground motion for the 84th percentile deterministic spectrum for the Alaska LNG project. Based on the PSHA results (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001), magnitude M_w 8.0 and PGA 0.75g were used for the MCE_G event (Table B.1). The OBE requirements per NFPA 59A 2013 are same as that of NFPA 59A 2006, which corresponds to a 475-year return period event. Results per NFPA 59A 2013 requirements are similar those per NFPA 59A 2006 requirements (Table 3.4).

D.2 Evaluation of Liquefaction-Induced Reconsolidation Settlements per NFPA 59A 2013 and IBC (2012) for the Proposed Site-grade Elevation

Estimates of post-liquefaction reconsolidation settlements are computed using the procedure suggested by Ishihara and Yoshimine (1992) and described in Idriss and Boulanger (2008). Plate 12 presents the liquefaction-induced reconsolidation settlements for OBE per NFPA 59A 2013 and ASCE 7-10 requirements which is the same as the OBE event per NFPA 59A 2006 and ASCE 7-05 requirements. Plate D.261 presents similar results for SSE per NFPA 59A 2013 and ASCE 7-10. Liquefaction-induced reconsolidation settlements are in the range of approximately 0 to 0.5 inches during the SSE / MCE_G shaking level with the exception of borings B-61 and B-76, where they were estimated to be approximately 0.8 and 1.0 inches, respectively, for the SSE / MCE_G shaking level, and borings B-28 and B-39 where they were estimated to be approximately 1.8 and 1.3 inches, respectively, for the SSE / MCE_G shaking level. However, these borings are located outside the locations of the planned structures. The estimated settlements for boring B-176 are higher than 3 inches, but boring B-176 is located on the alternative heavy haul road area north from the project site. The estimated settlements at the

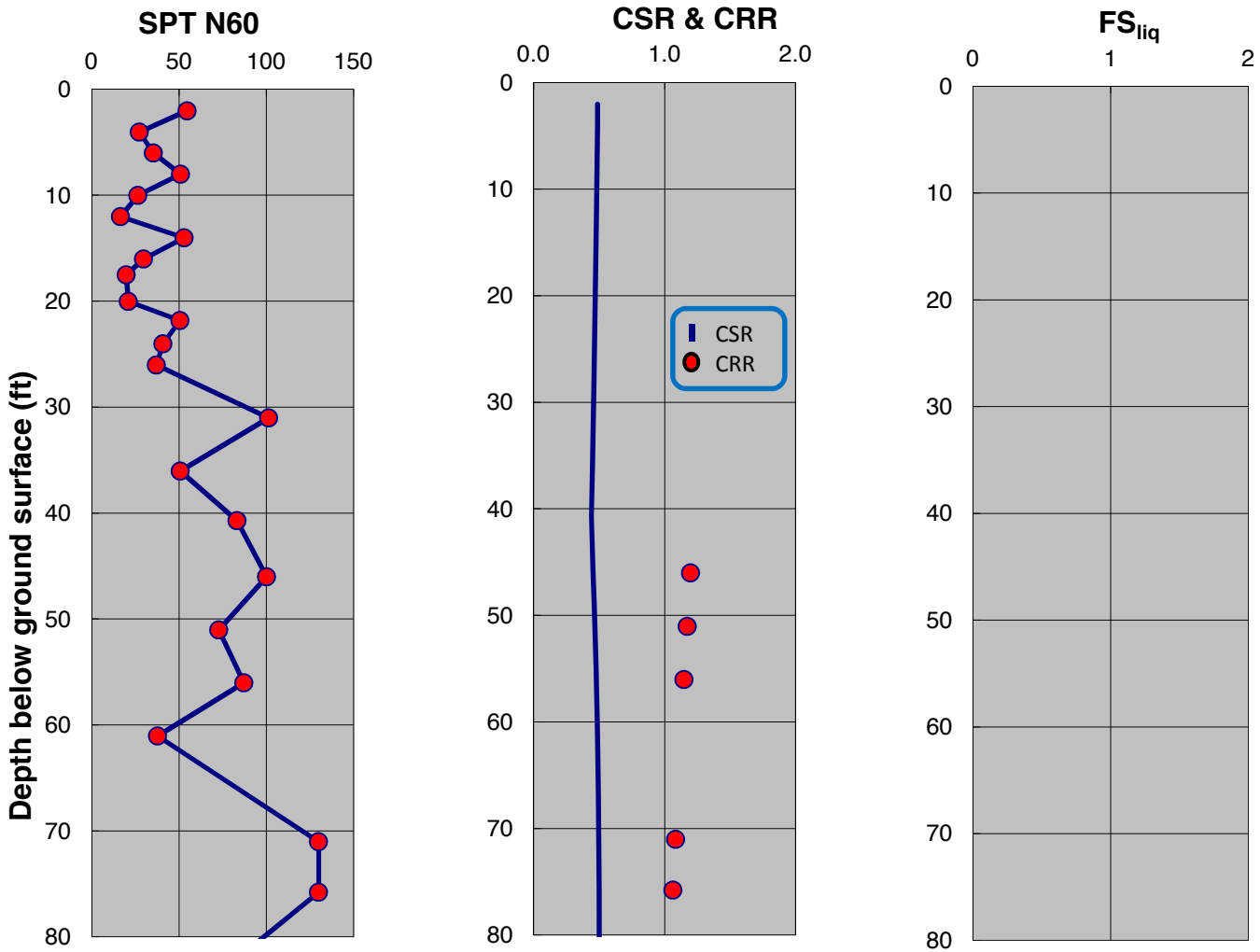
beach area (borings B-117, B-120, B-121, B-122, B-123, B-124, B-125, B-126, B-127, B-190 and B-191) are in the range of 0.6 to 1.9 inches during both the SSE / MCE_G shaking.



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-9 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

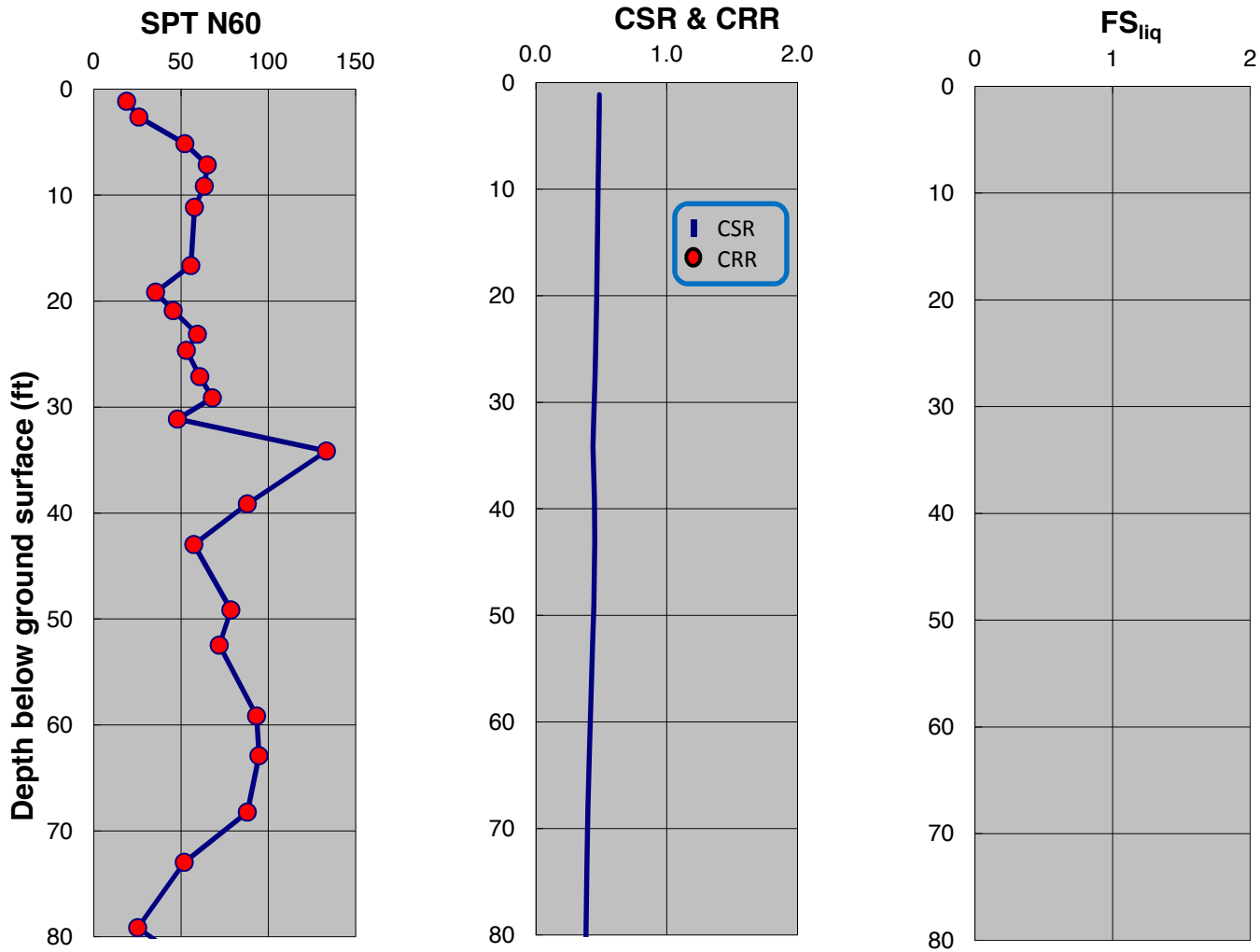
PLATE D.1



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-9 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

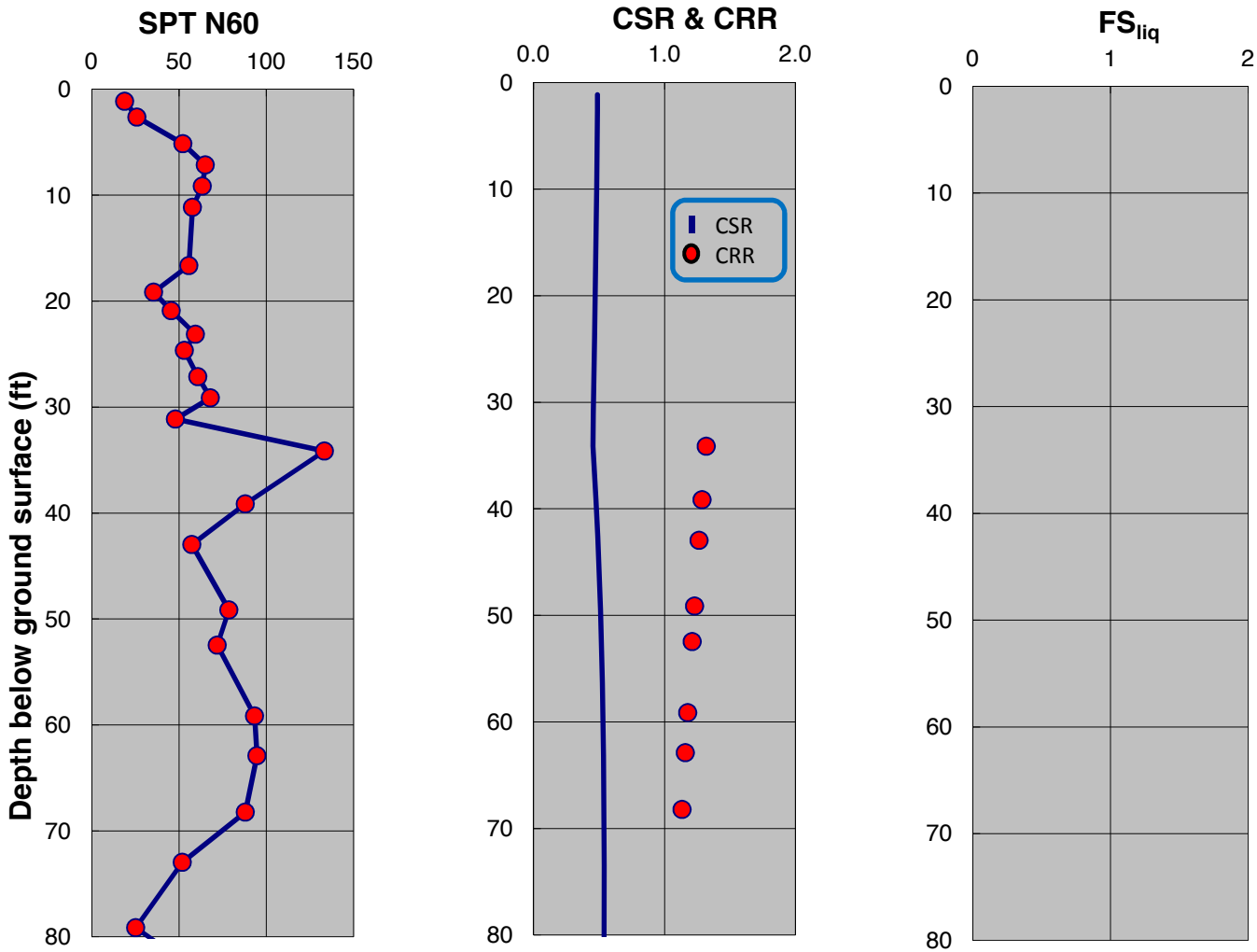
PLATE D.2



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-10 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

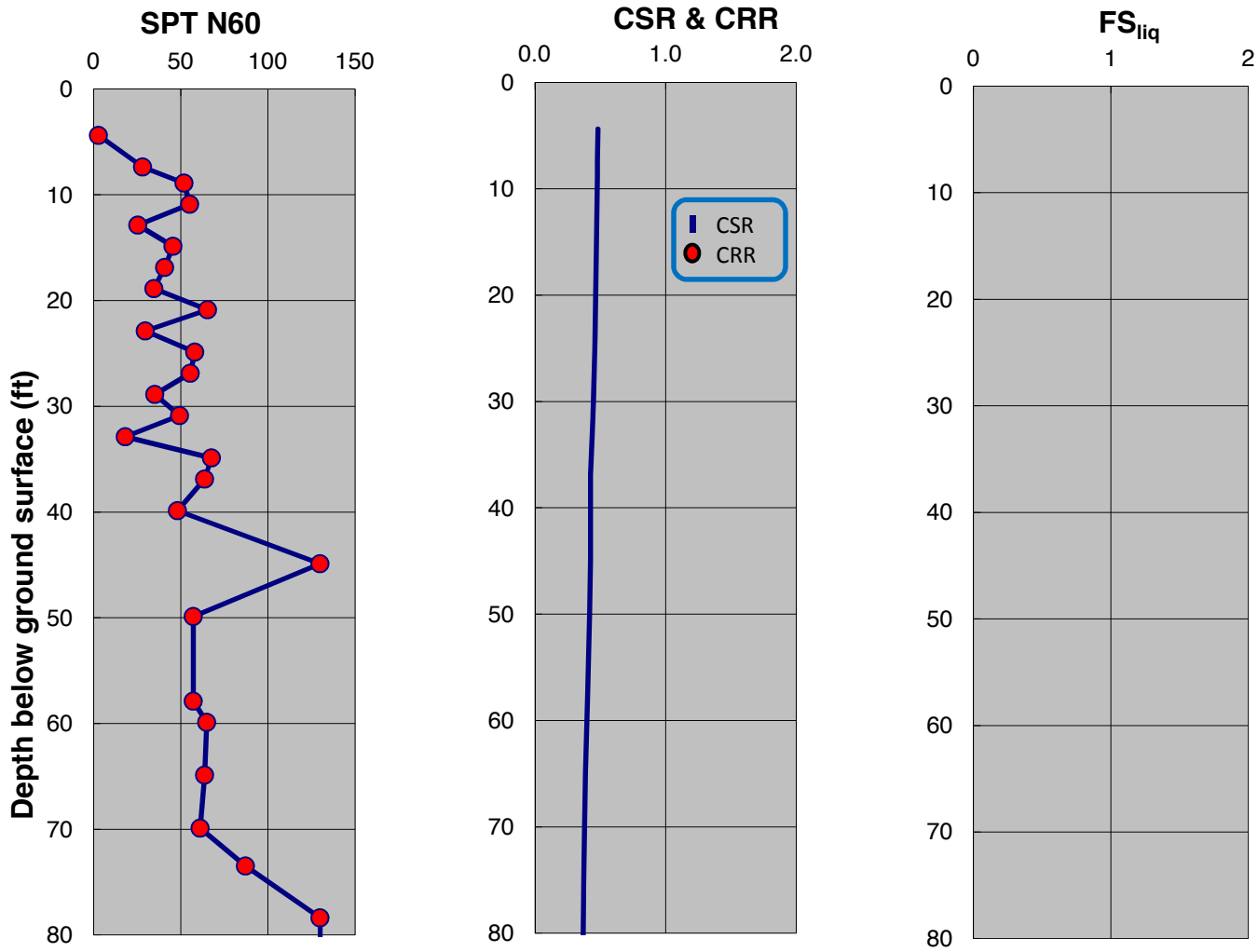
PLATE D.3



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-10 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

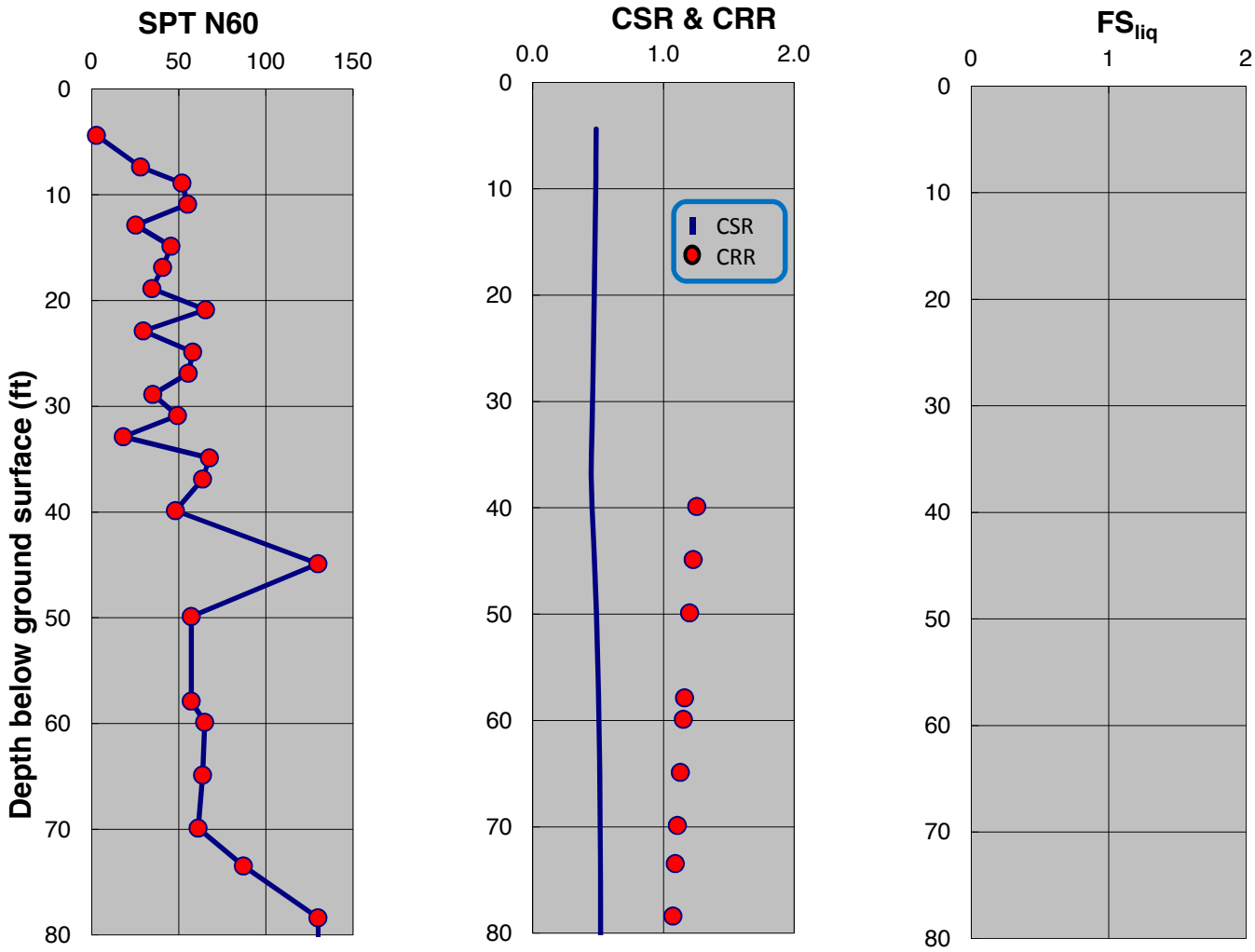
PLATE D.4



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-11 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

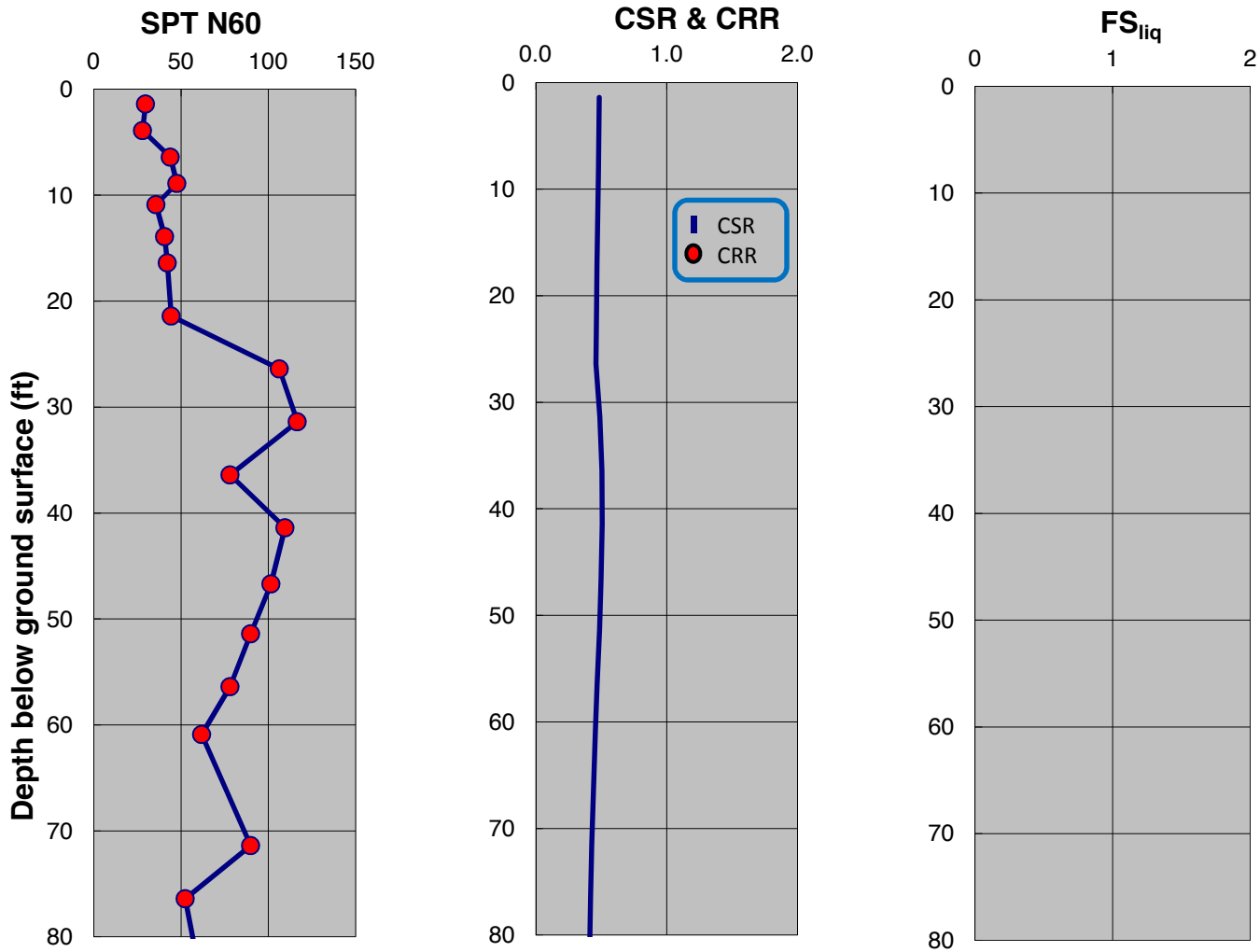
PLATE D.5



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-11 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

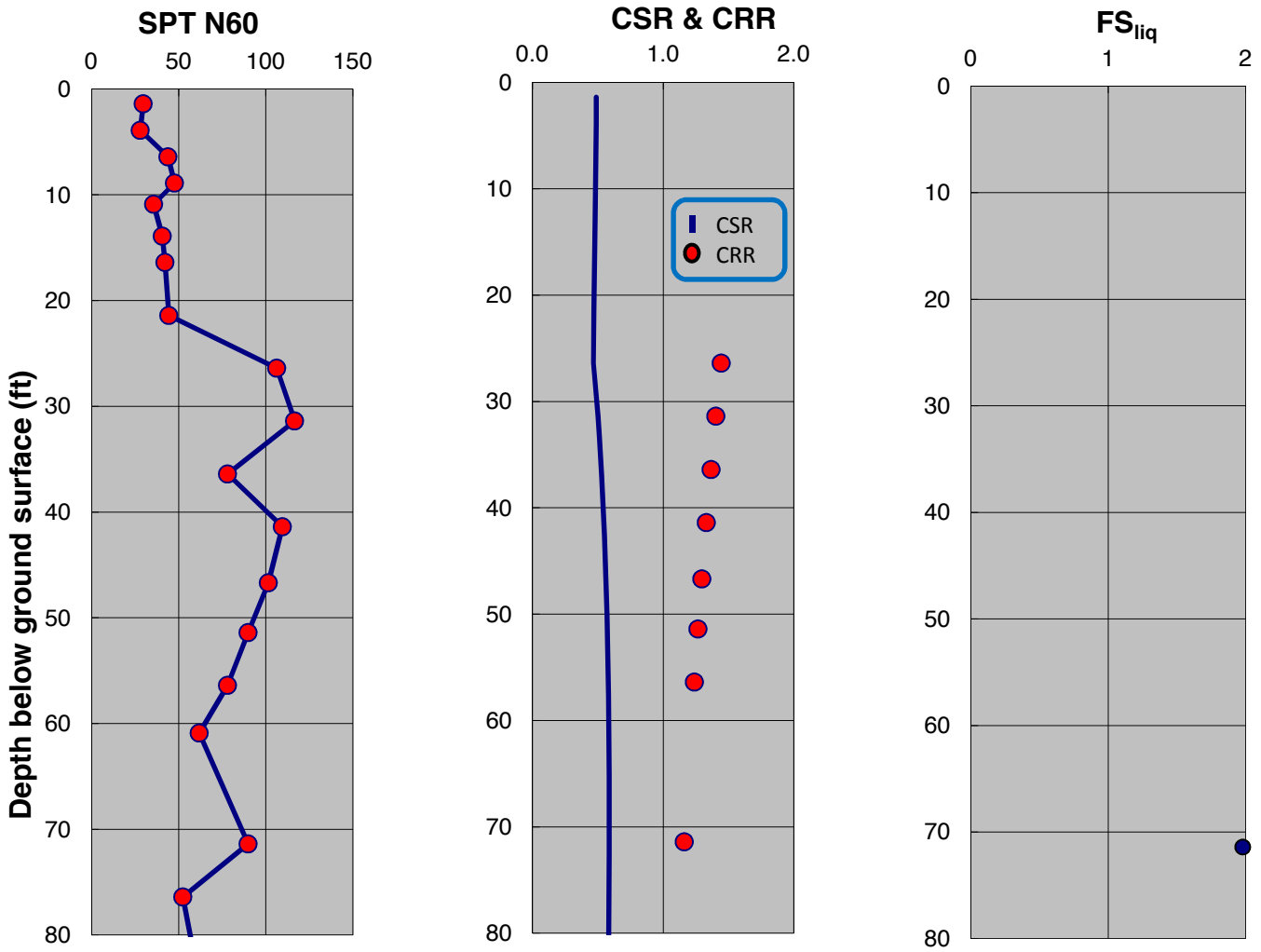
PLATE D.6



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-14 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

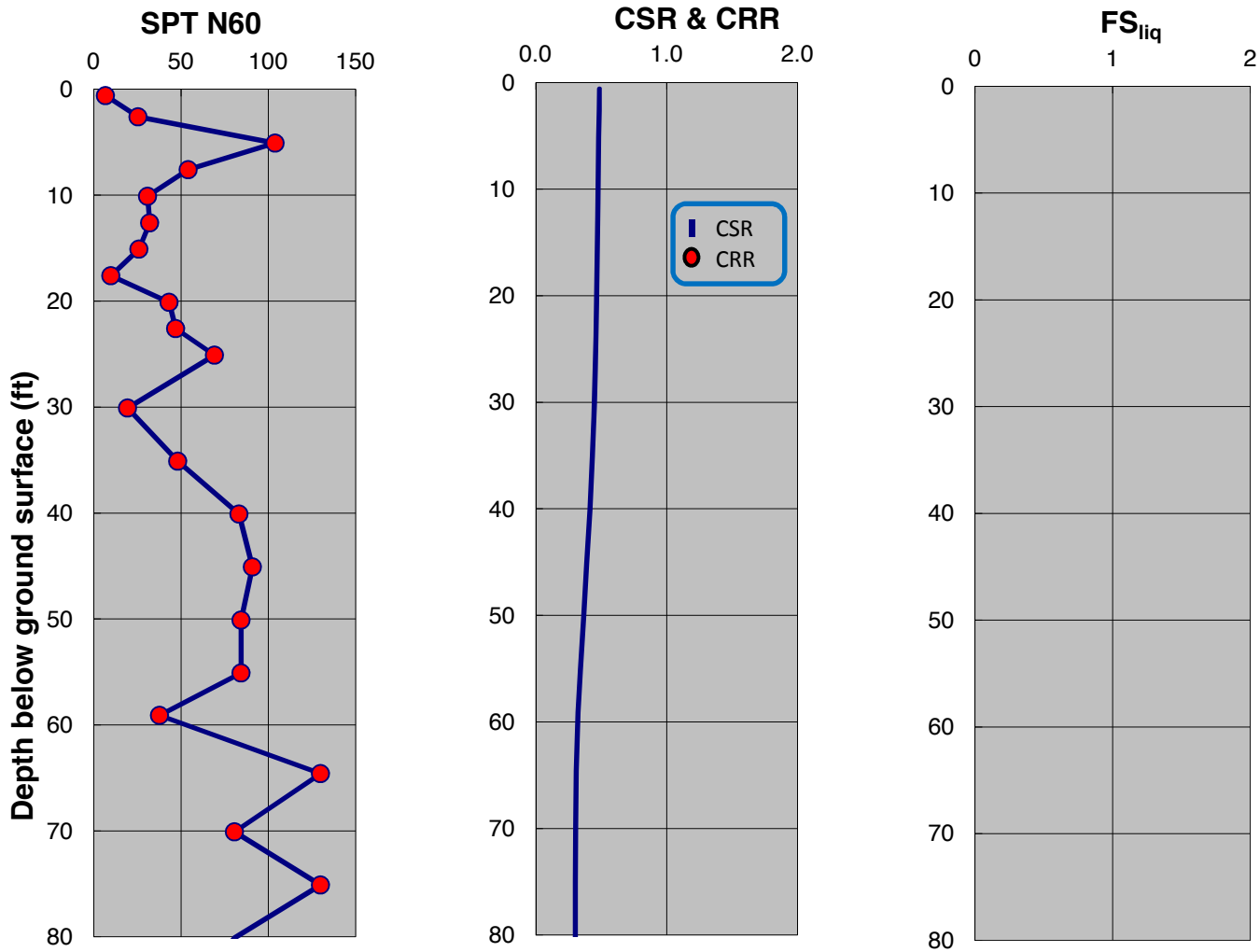
PLATE D.7



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-14 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

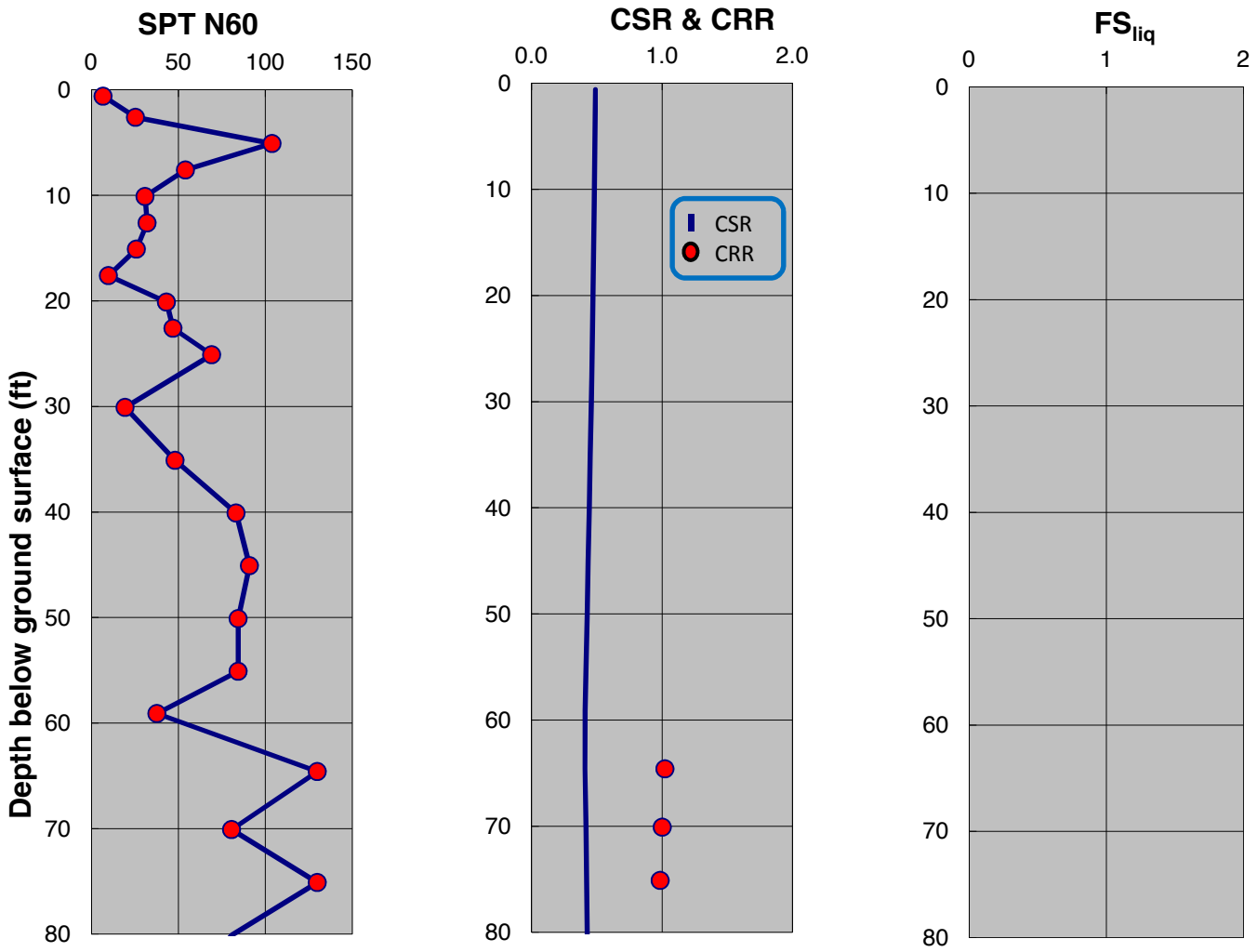
PLATE D.8



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-15 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

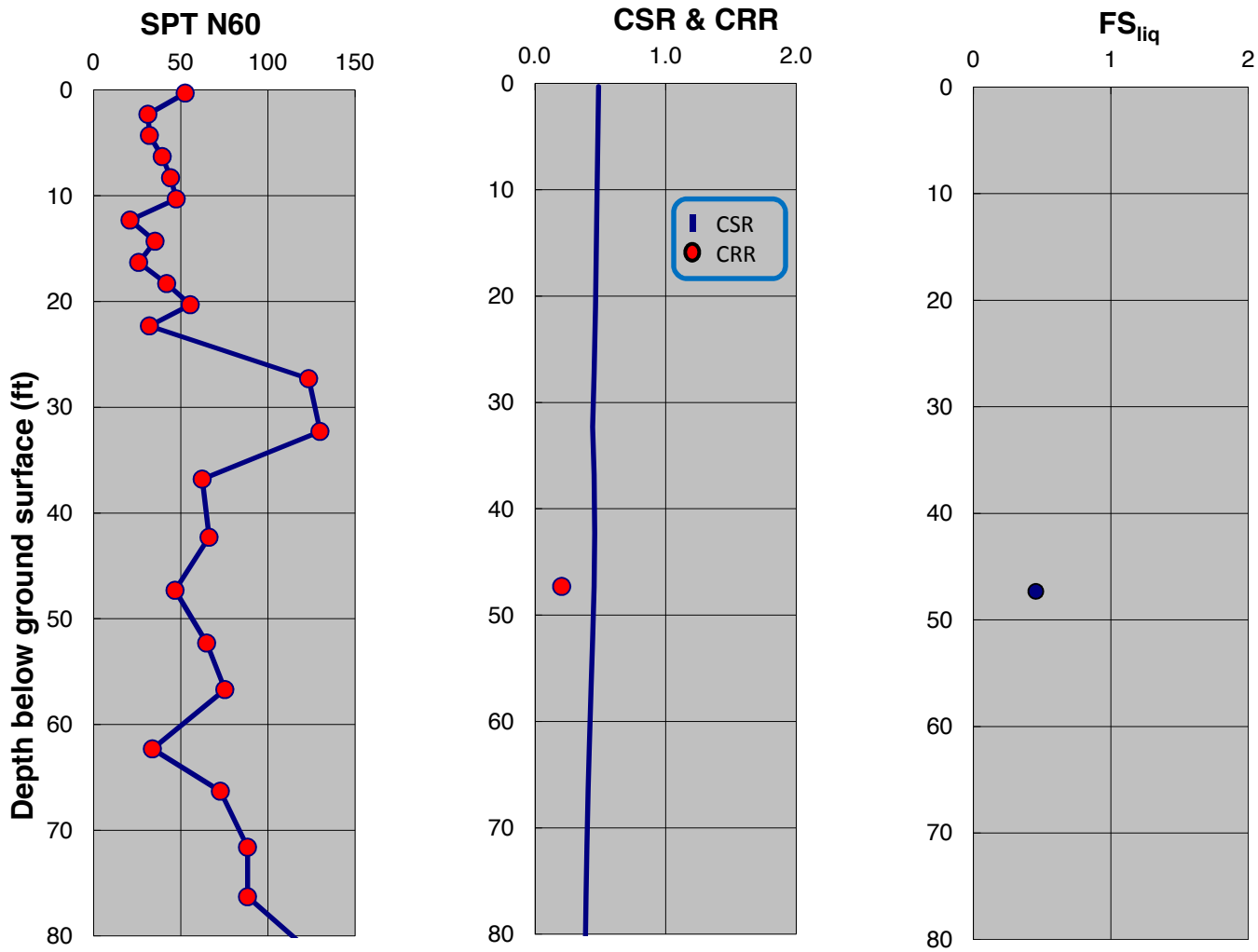
PLATE D.9



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-15 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

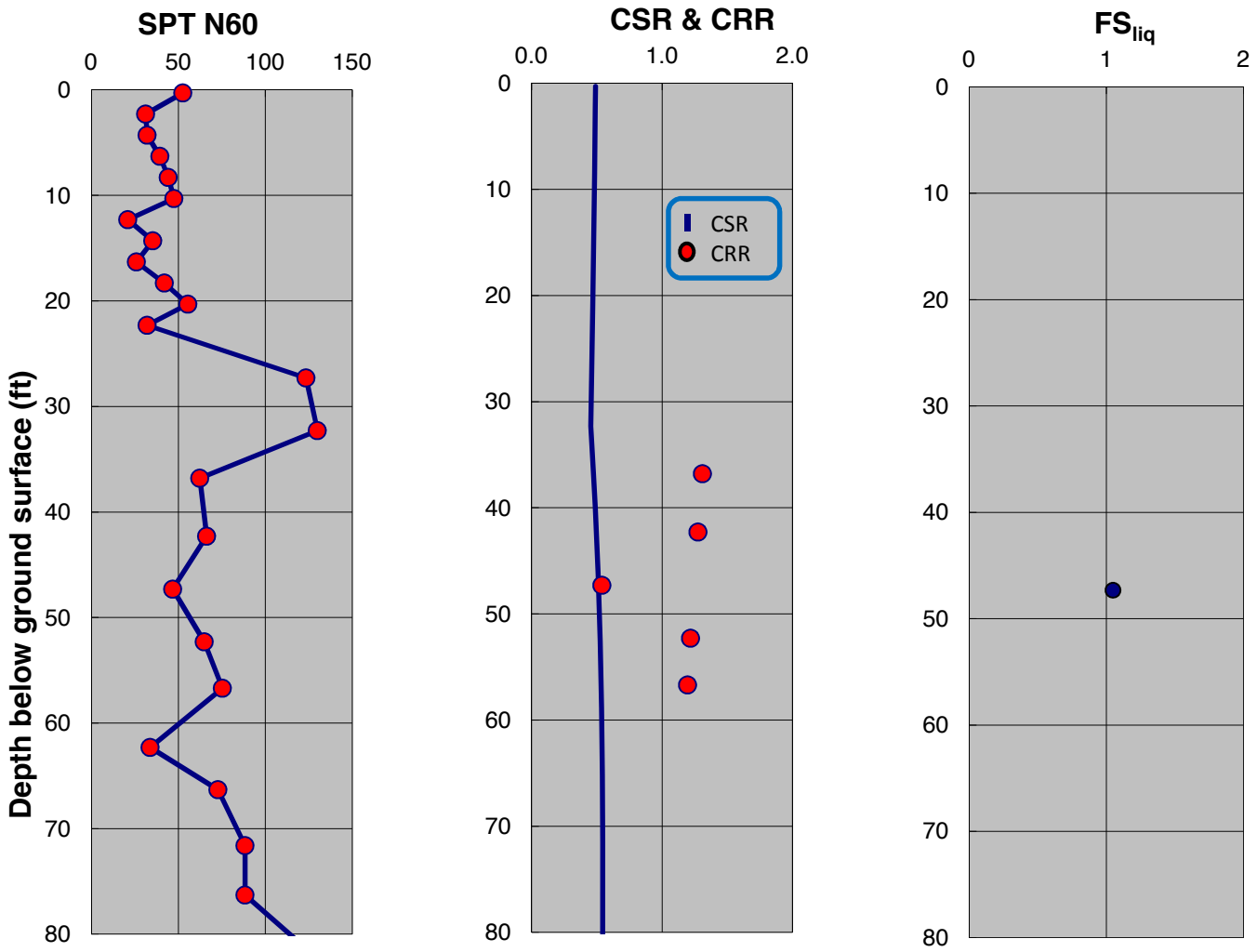
PLATE D.10



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-17 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

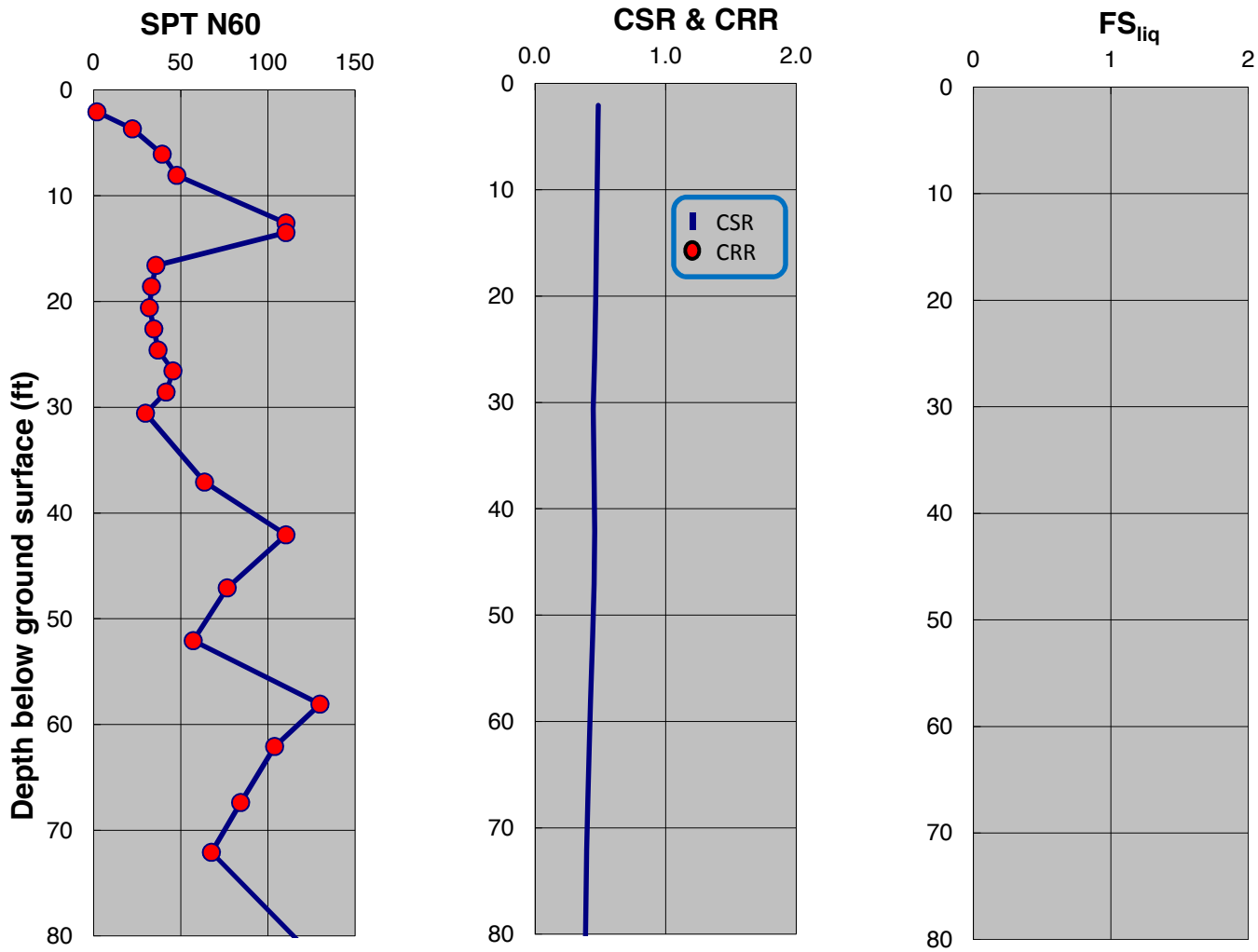
PLATE D.11



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-17 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

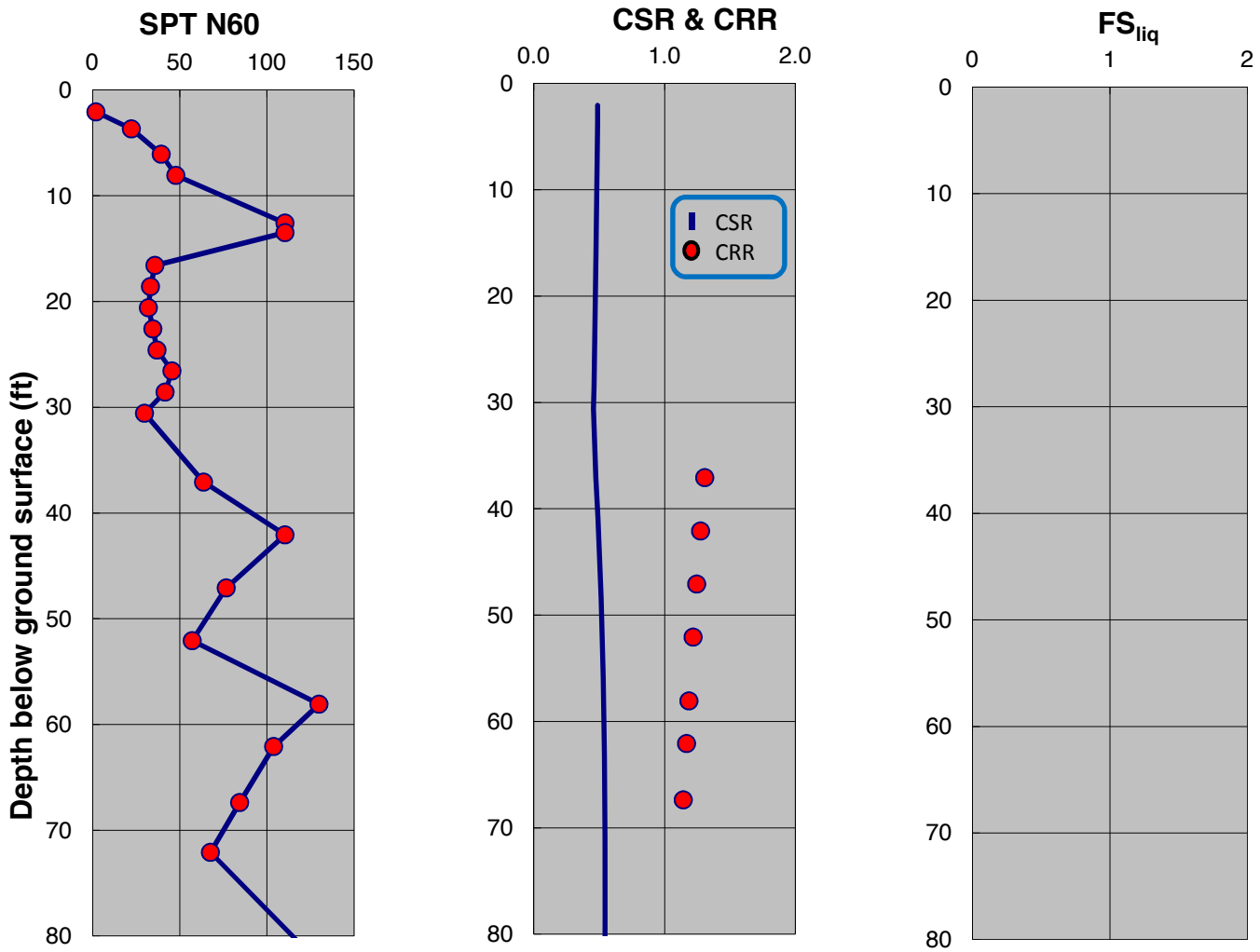
PLATE D.12



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-18 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

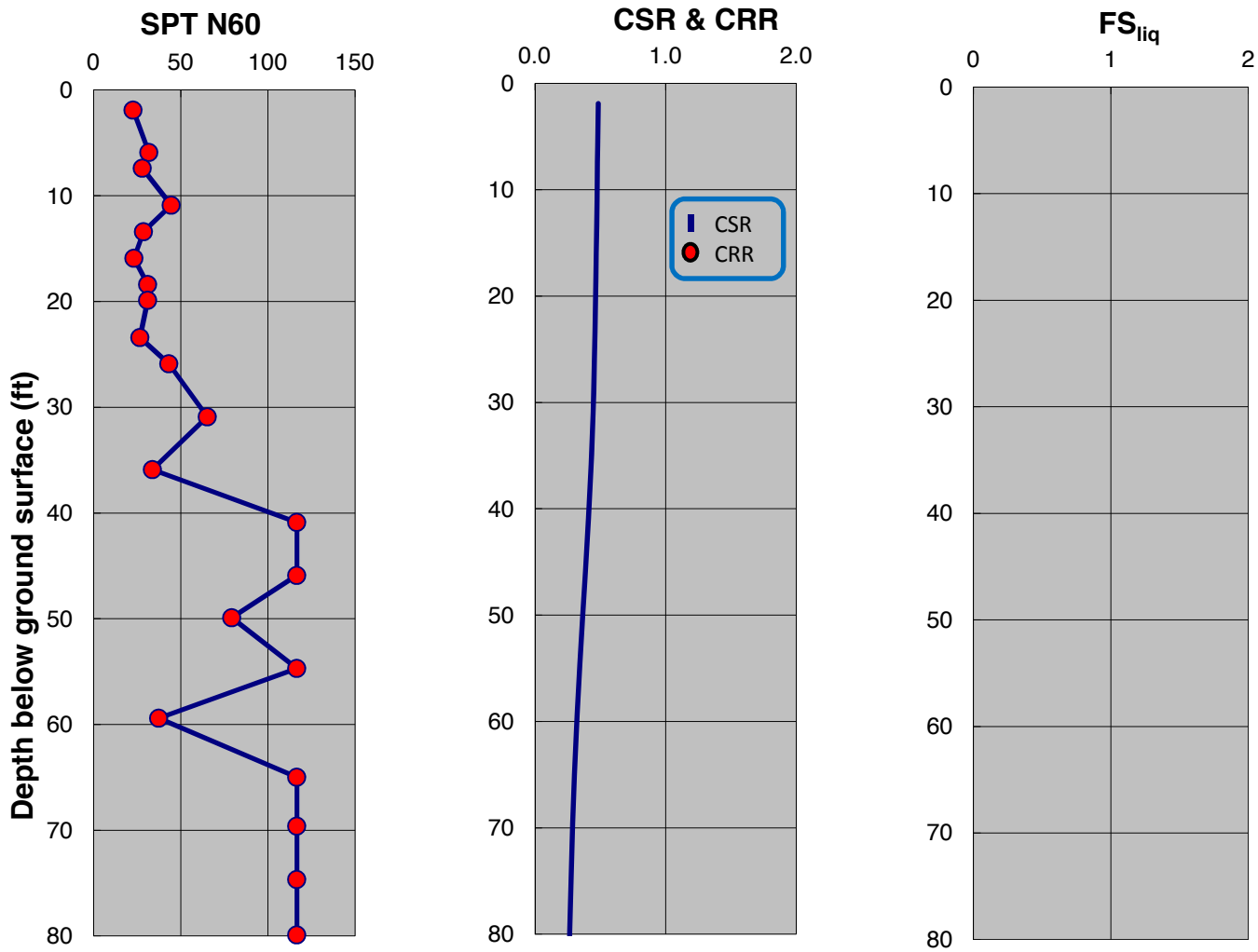
PLATE D.13



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-18 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

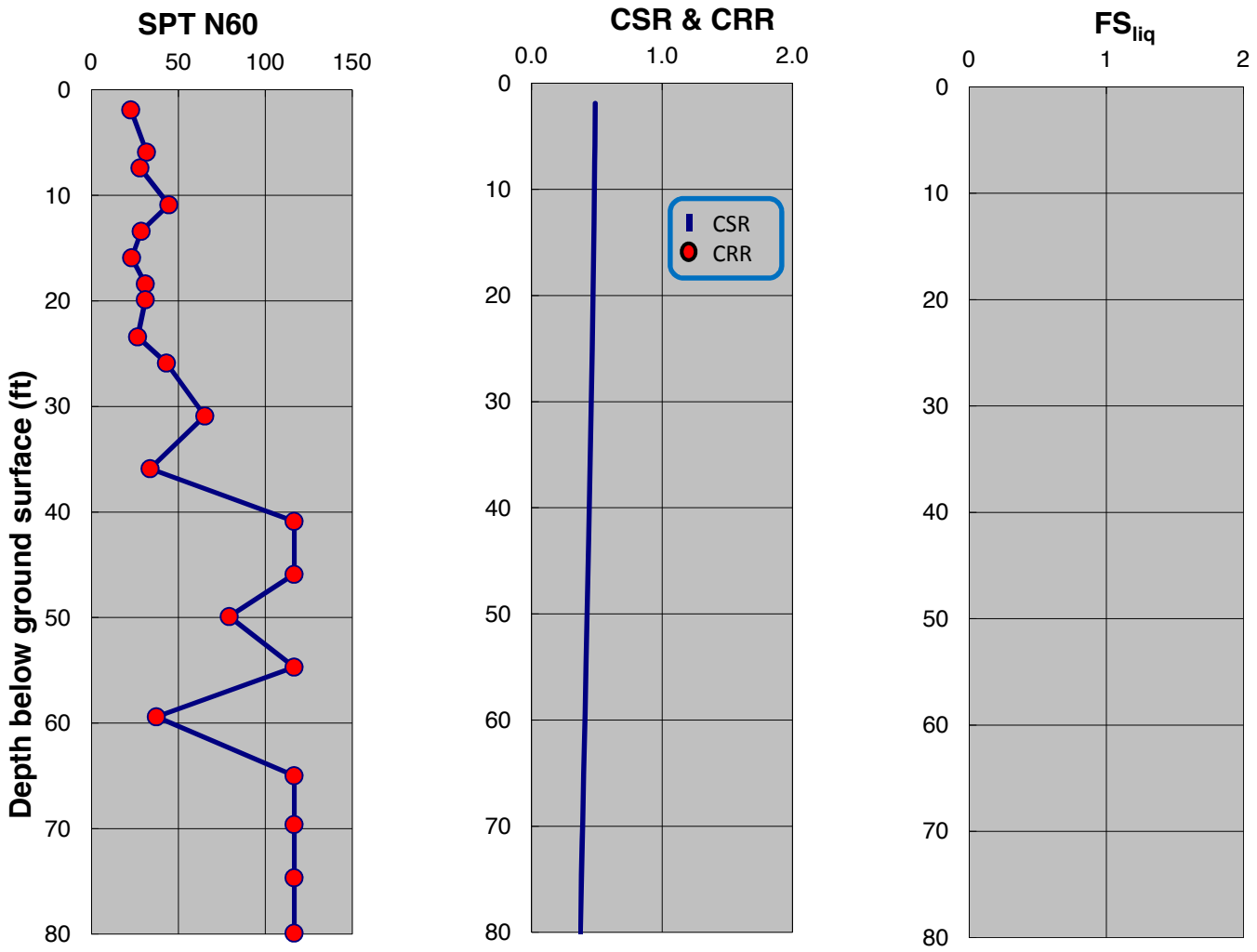
PLATE D.14



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-23 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

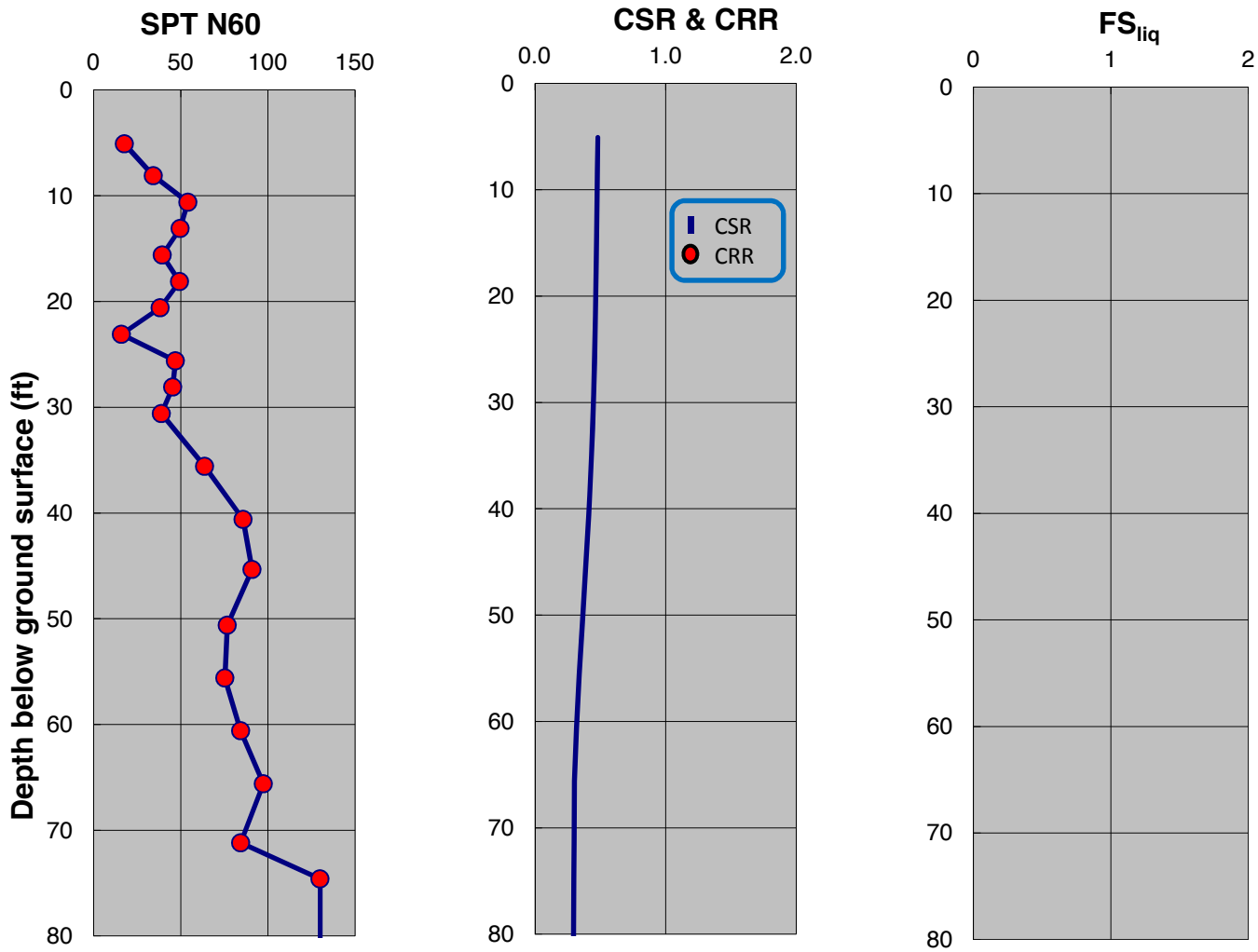
PLATE D.15



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-23 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

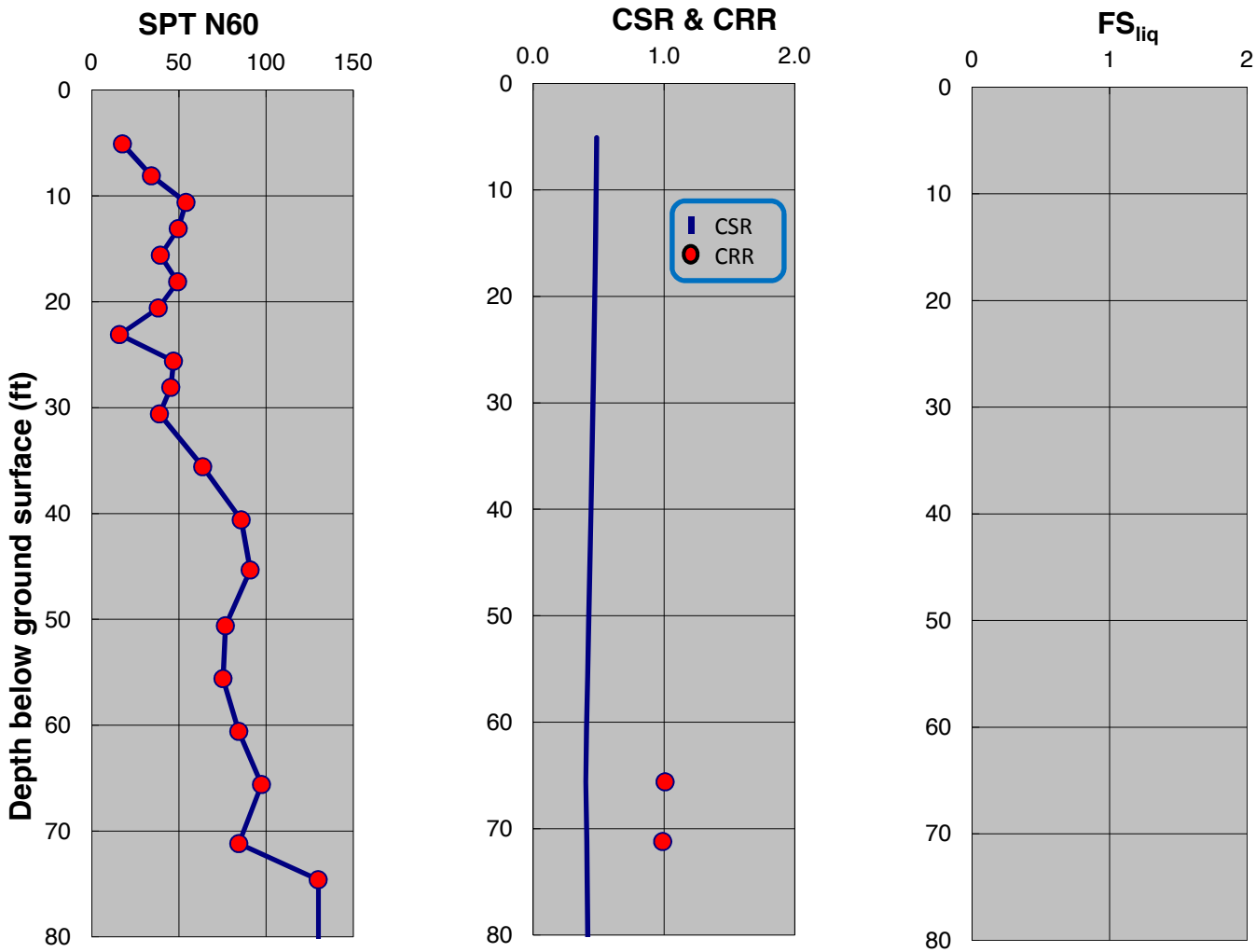
PLATE D.16



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-24 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

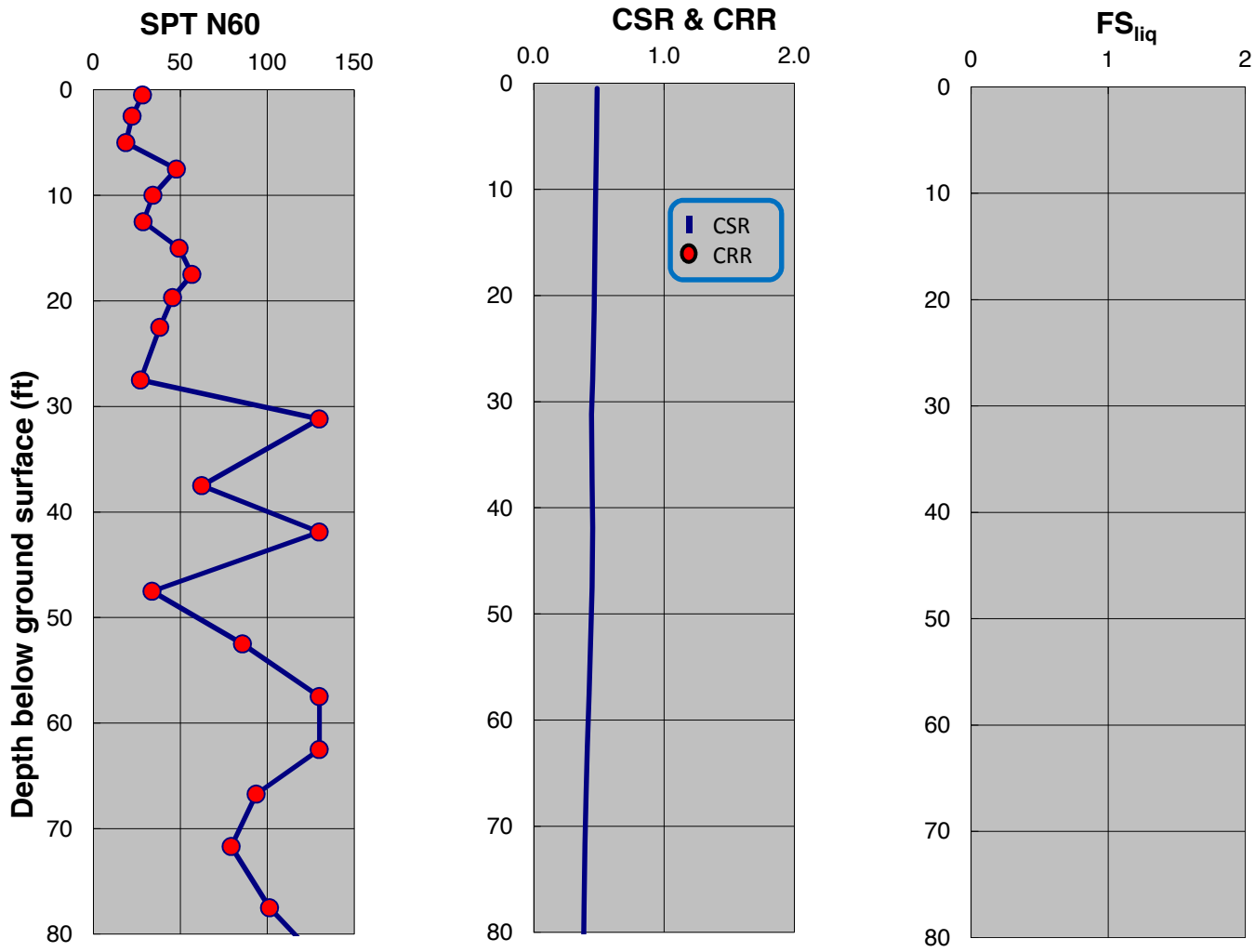
PLATE D.17



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-24 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

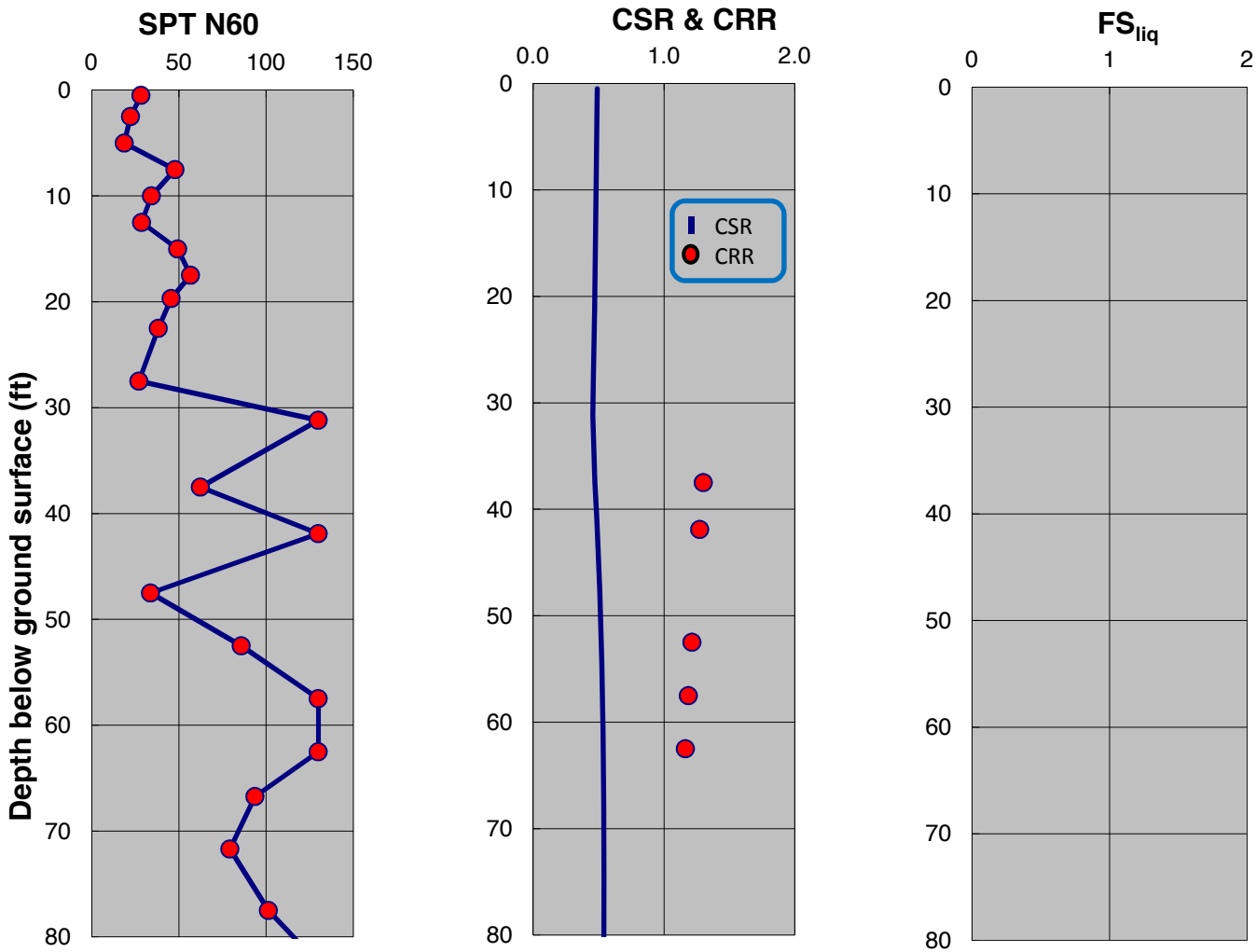
PLATE D.18



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-26 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

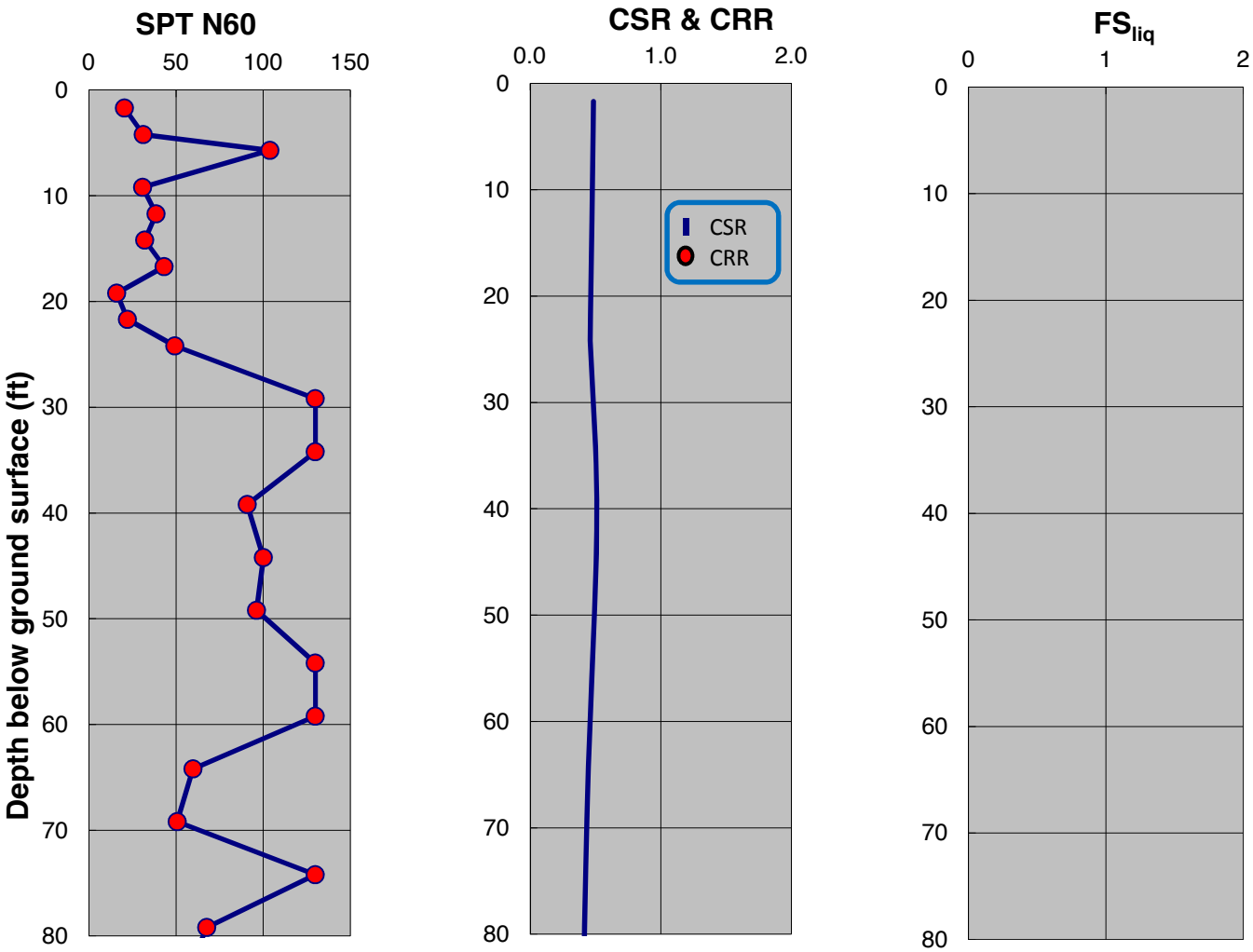
PLATE D.19



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-26 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

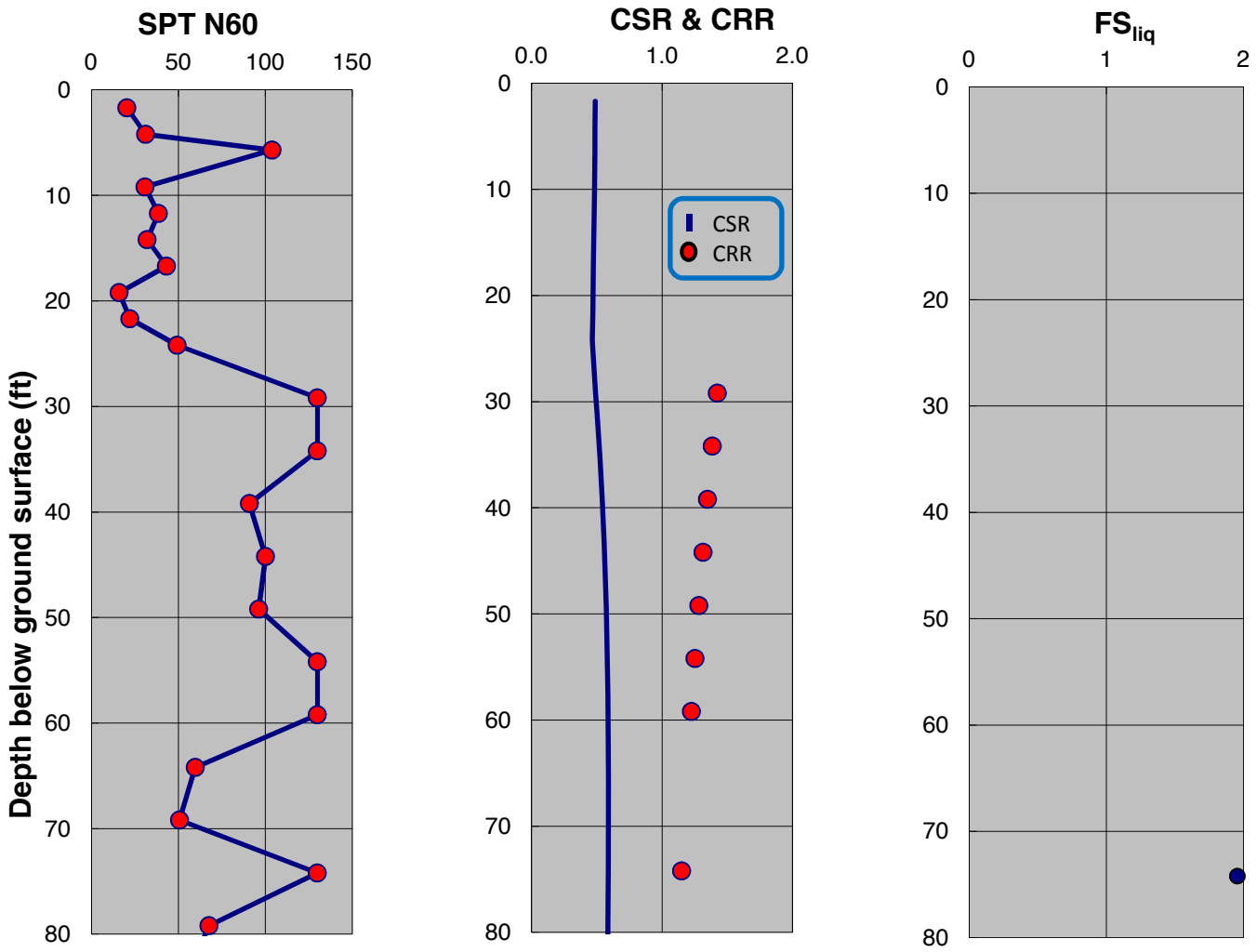
PLATE D.20



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-27 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

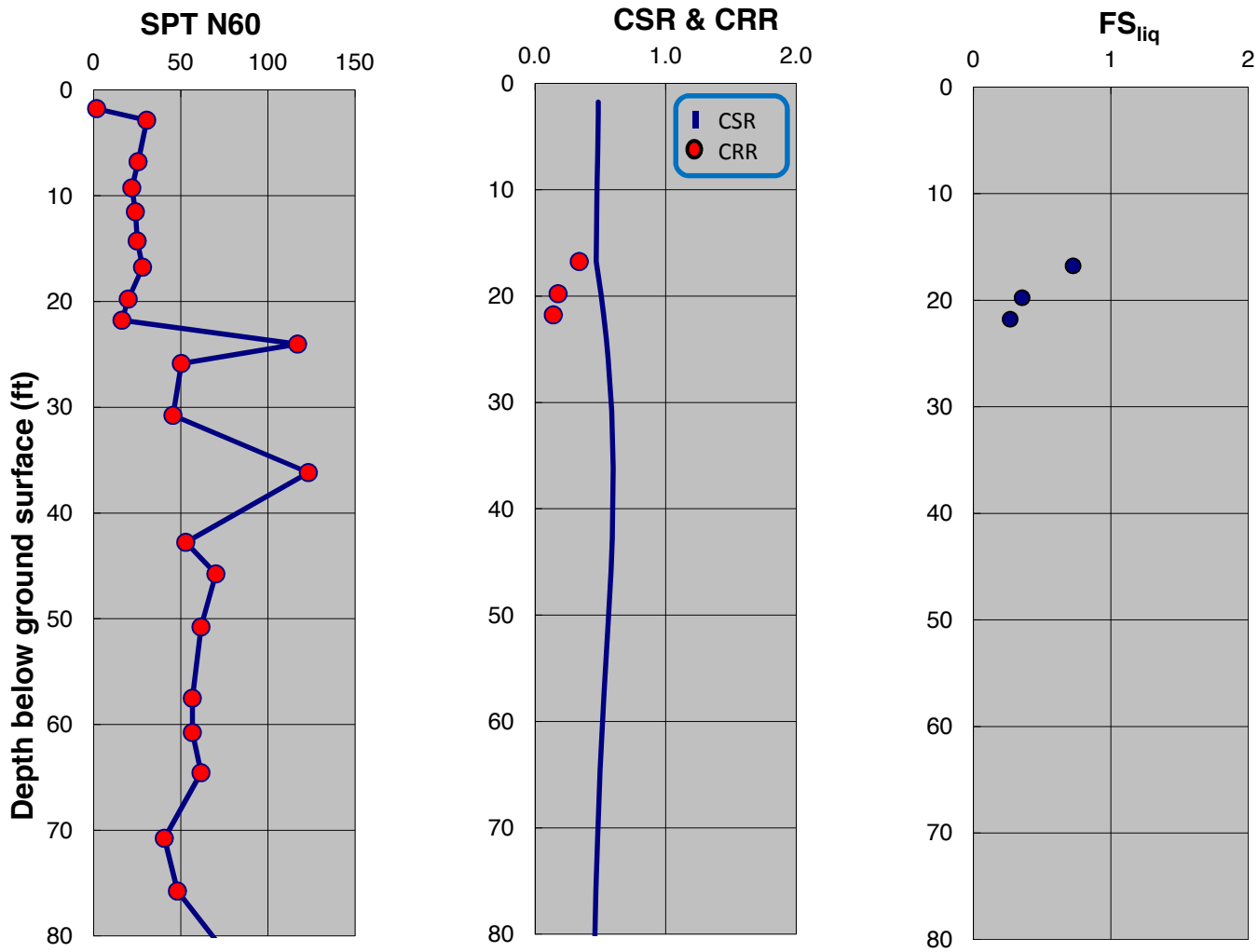
PLATE D.21



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-27 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

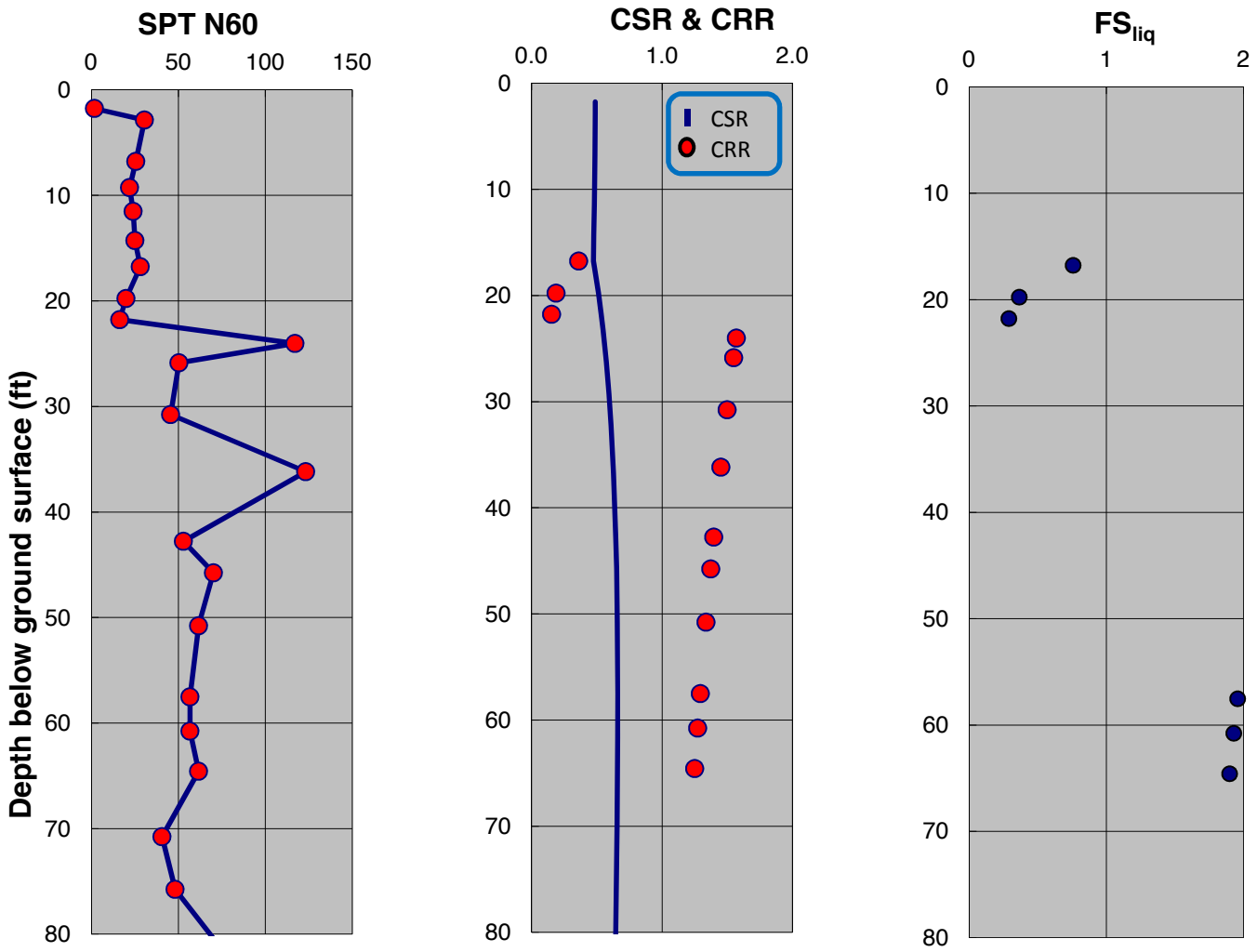
PLATE D.22



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-28 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

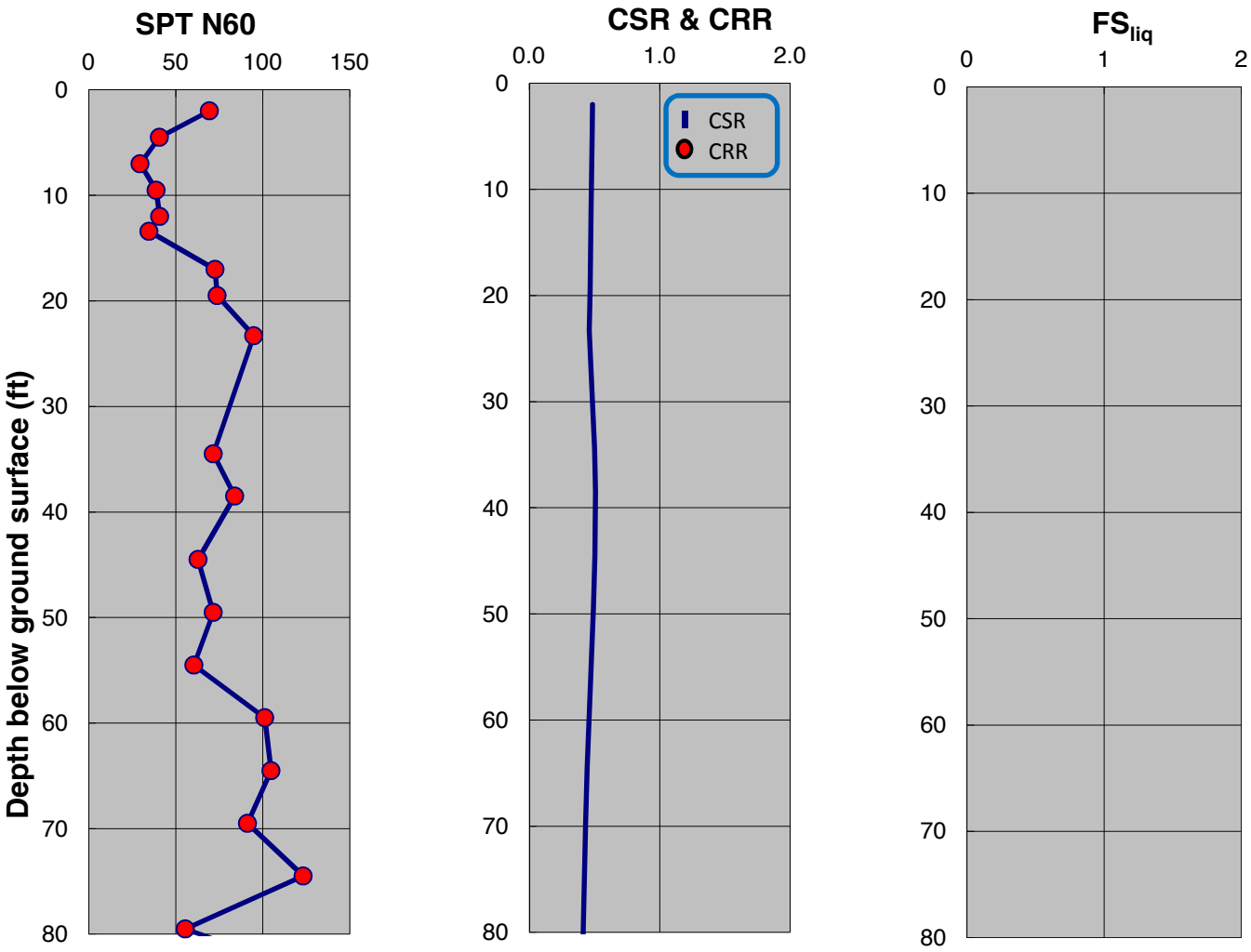
PLATE D.23



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-28 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

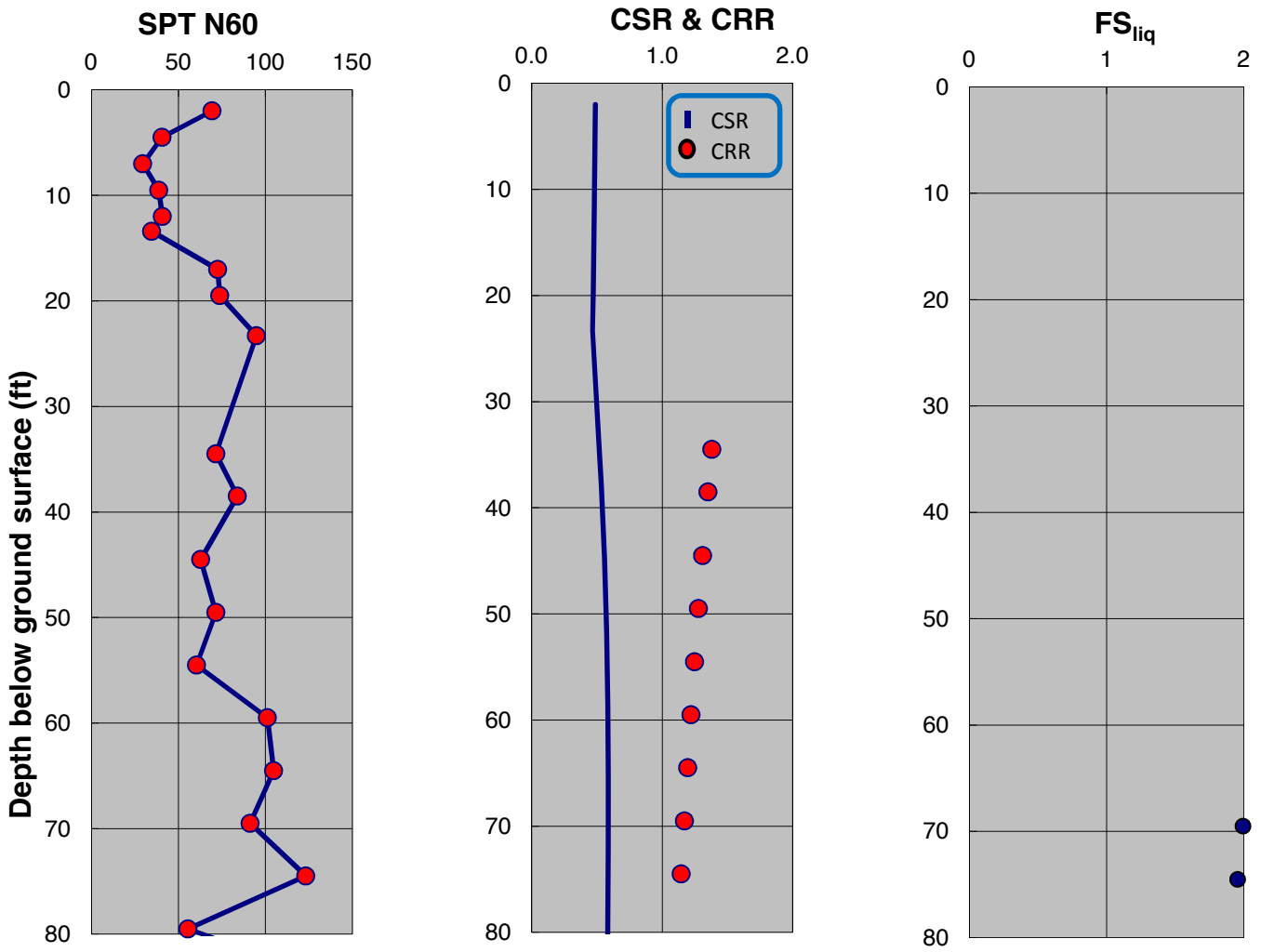
PLATE D.24



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-32 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

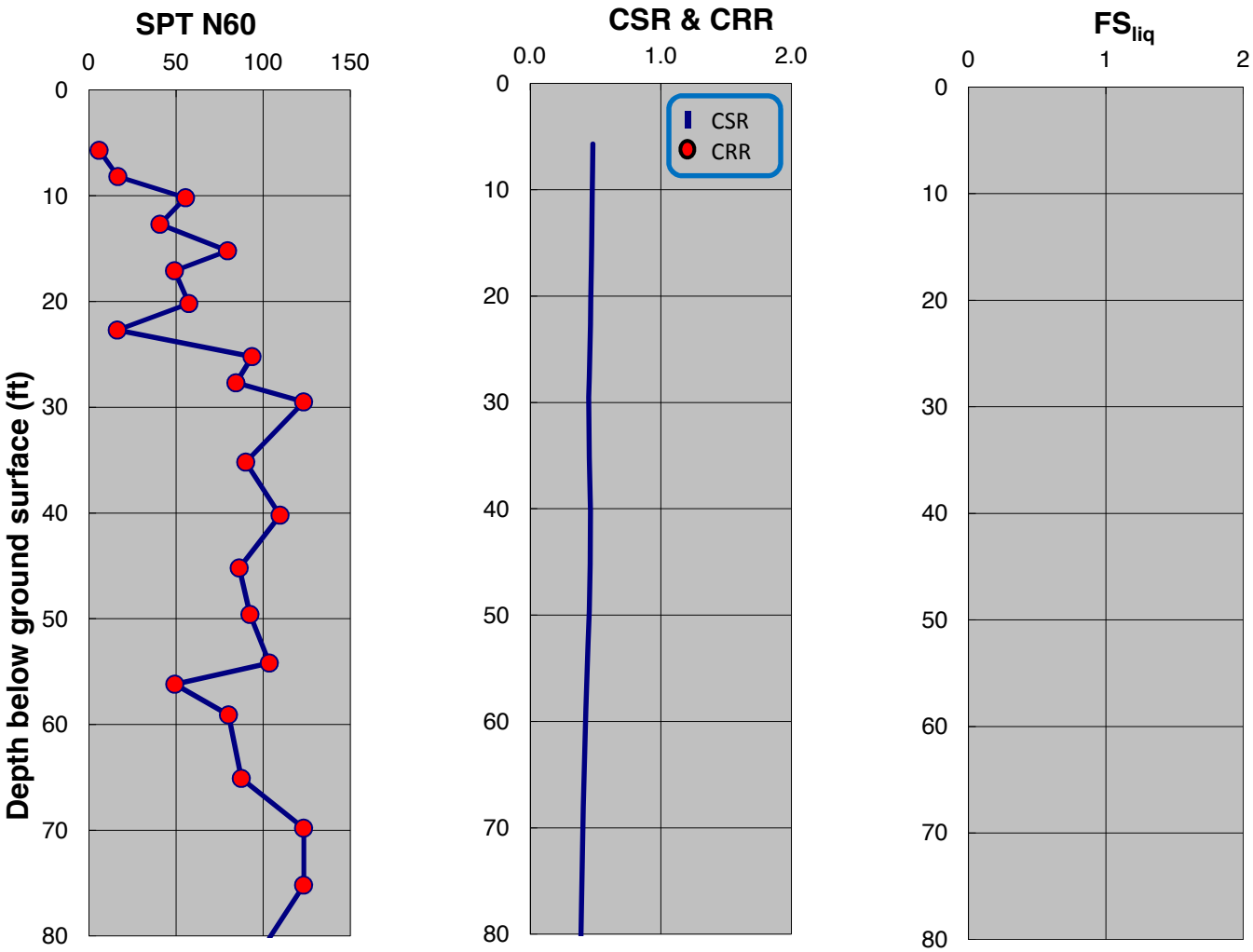
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.25



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-32 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

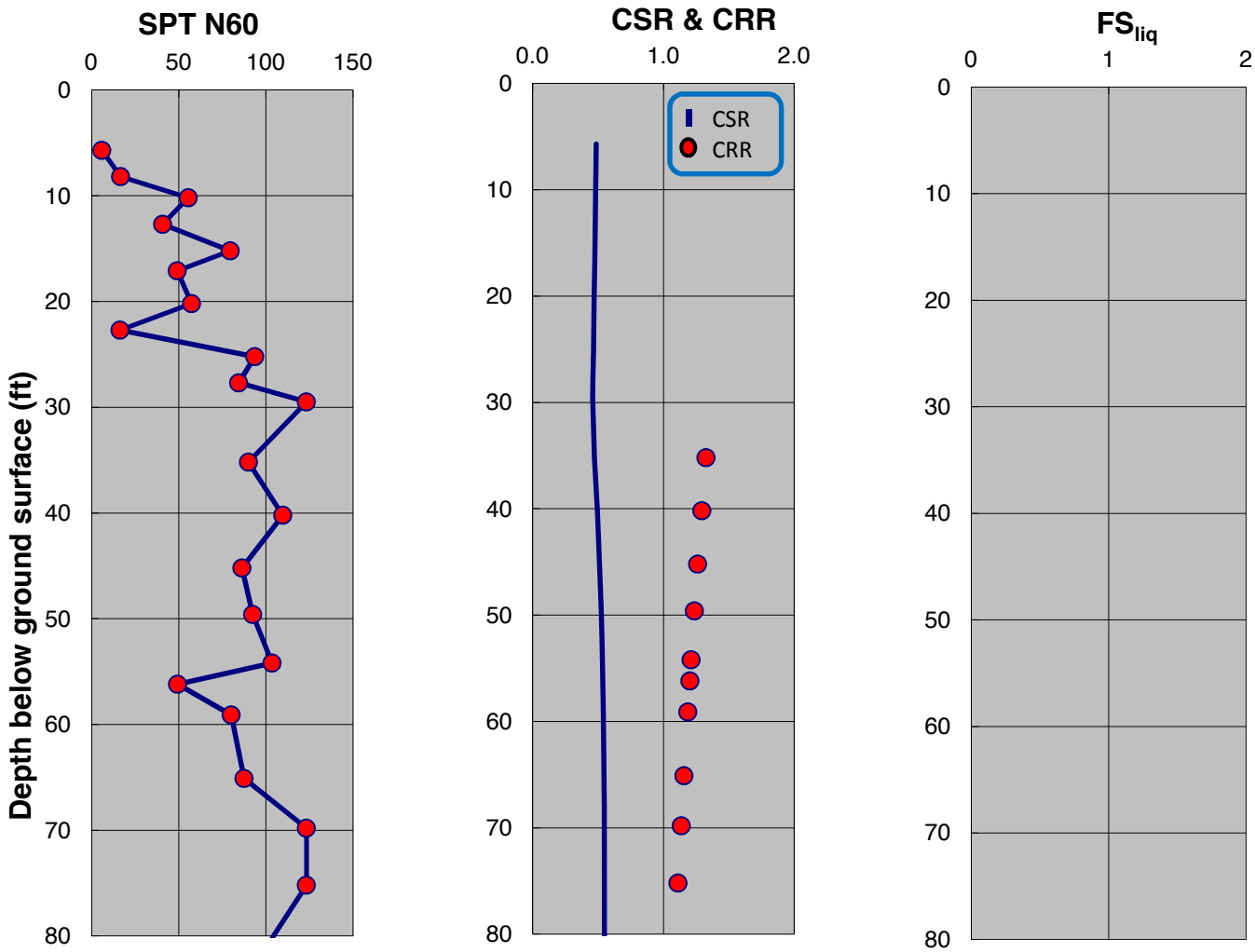
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-34 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

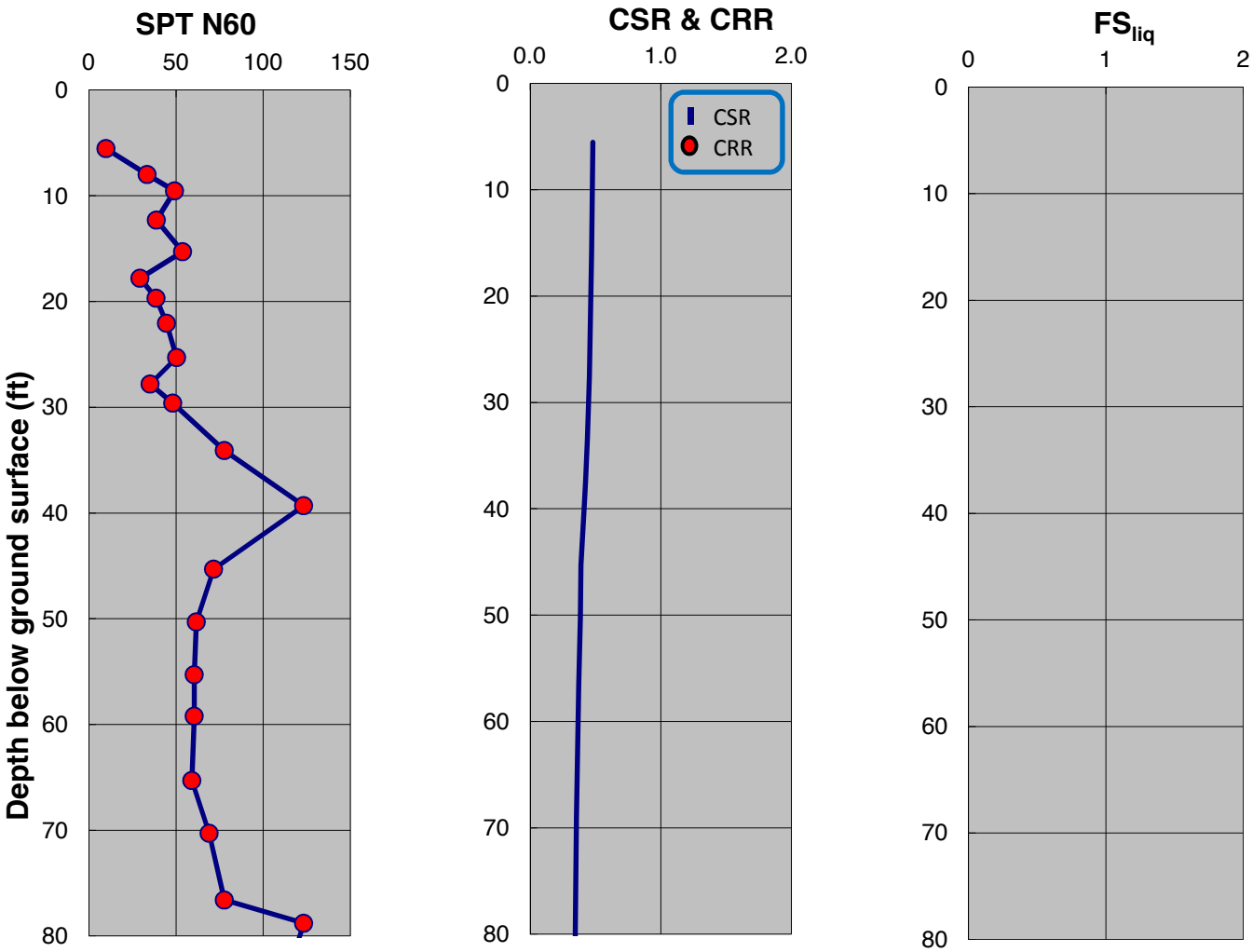
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.27



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-34 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

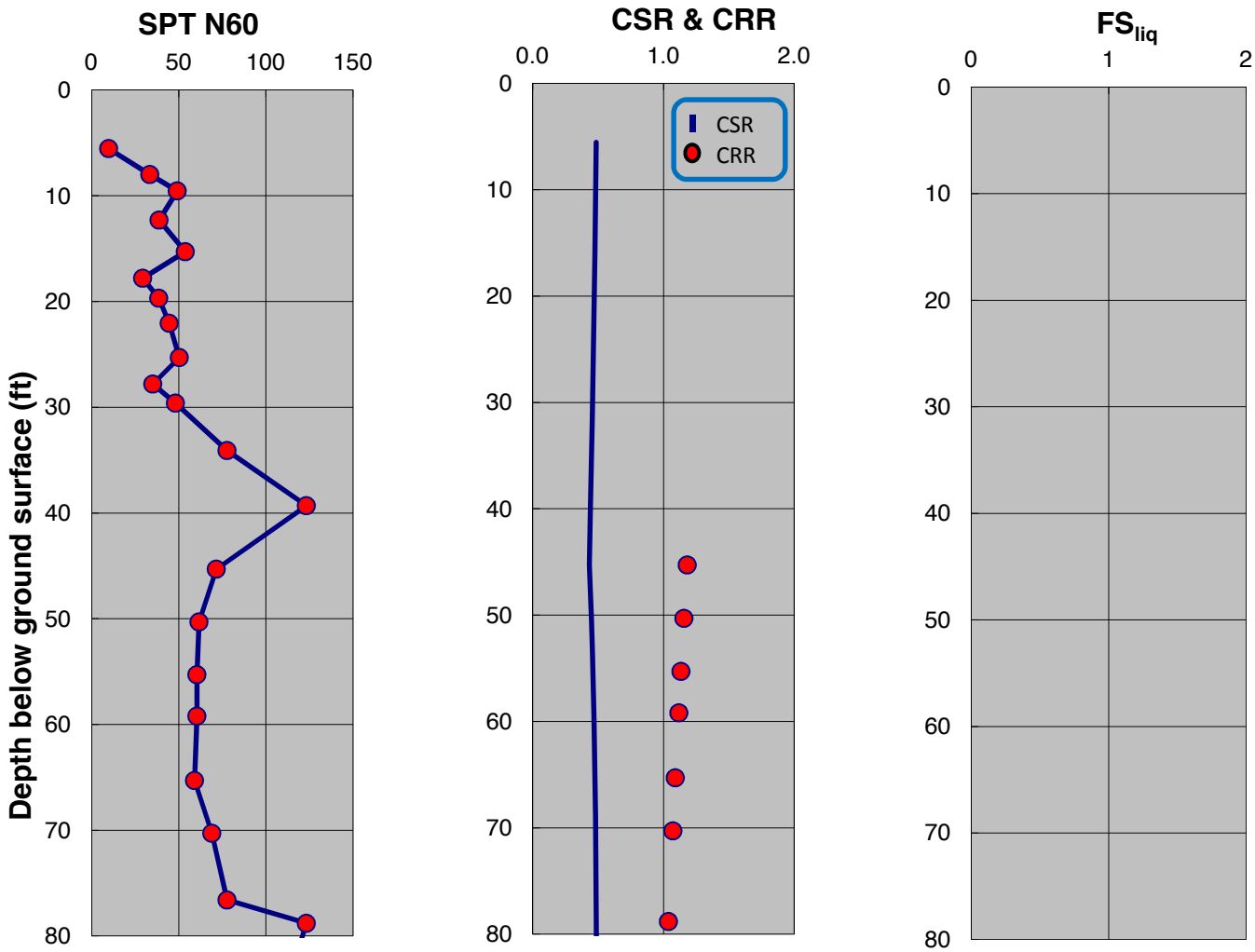
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-36 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

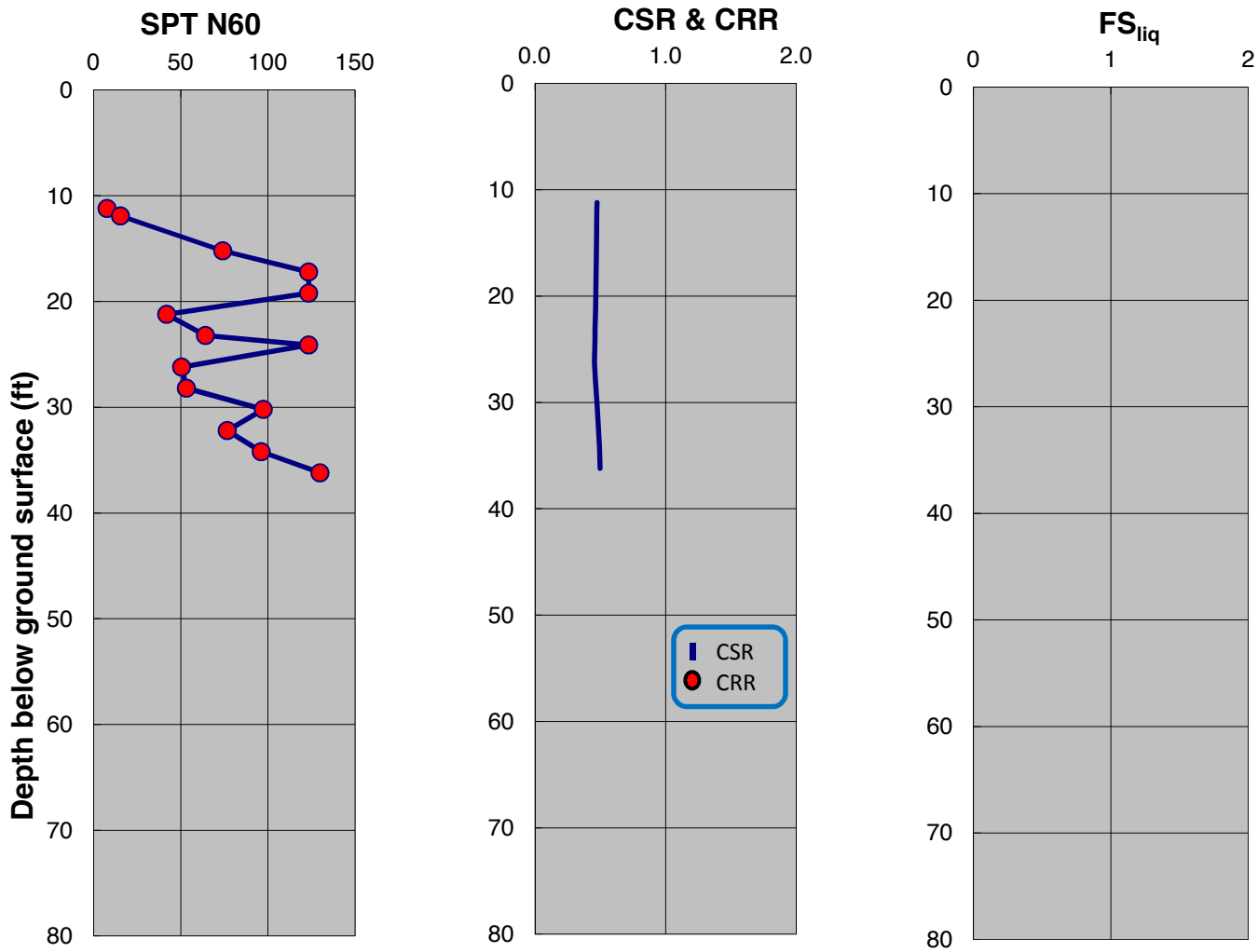
PLATE D.29



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-36 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

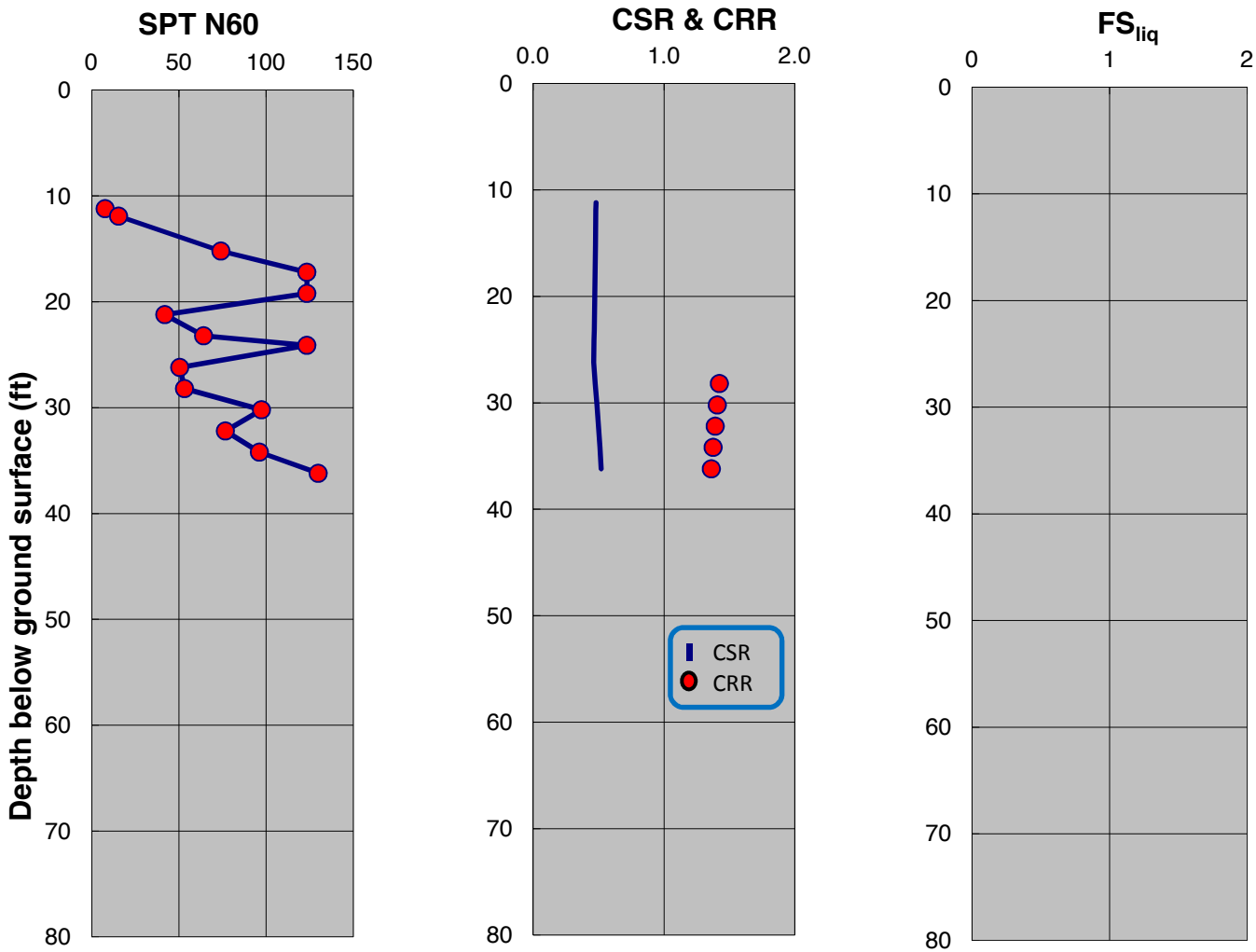
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.30



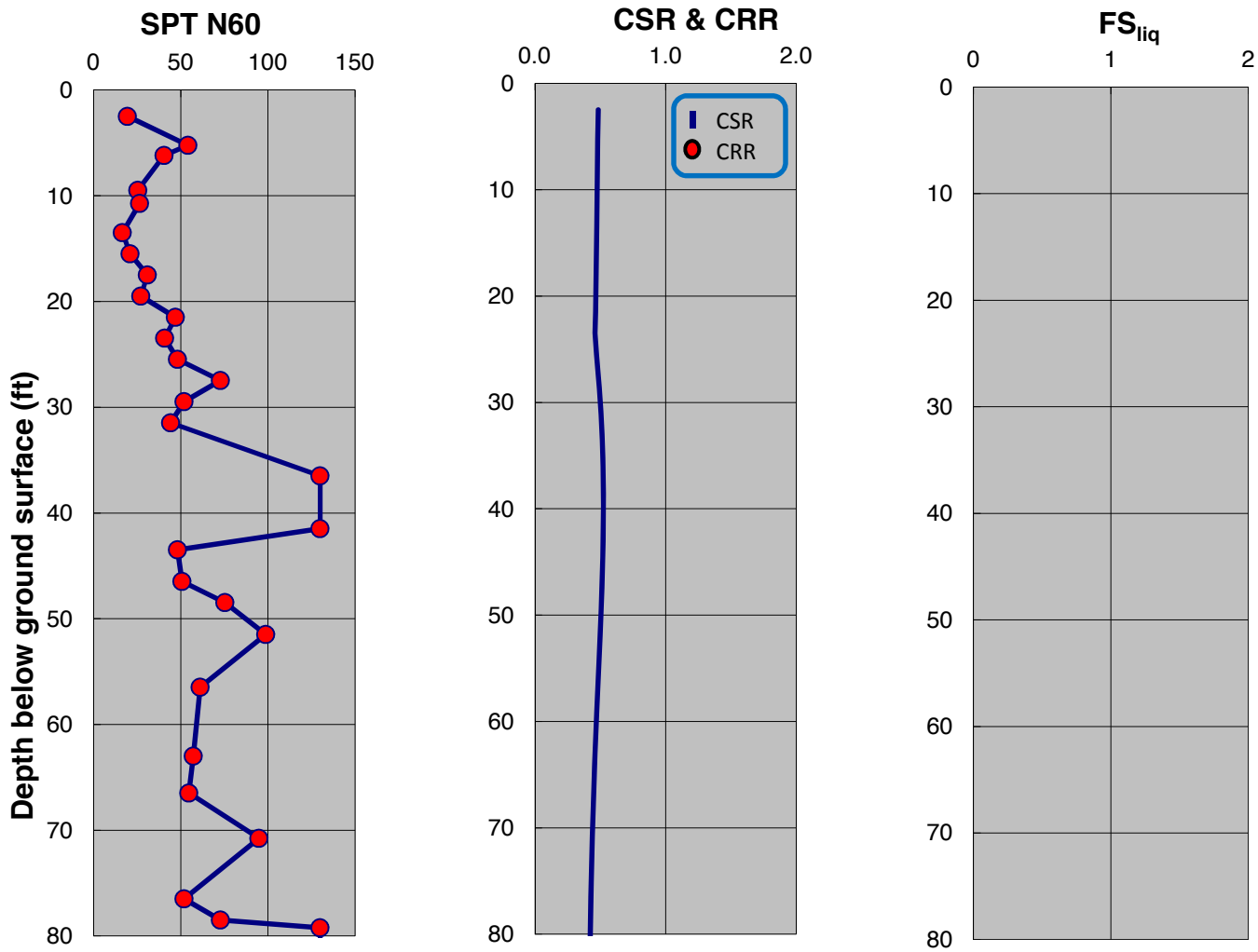
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-37 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-37 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

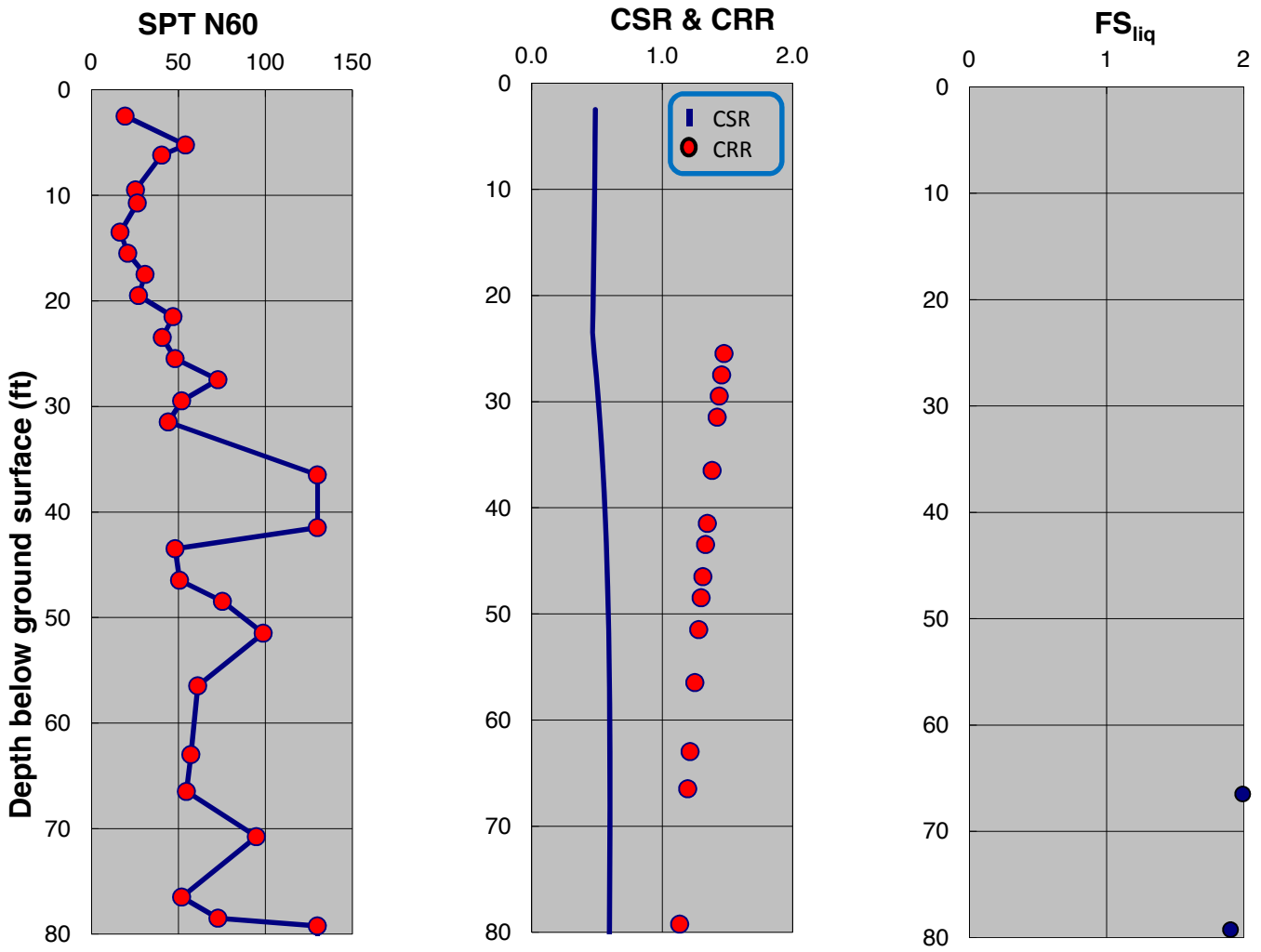
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-38 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

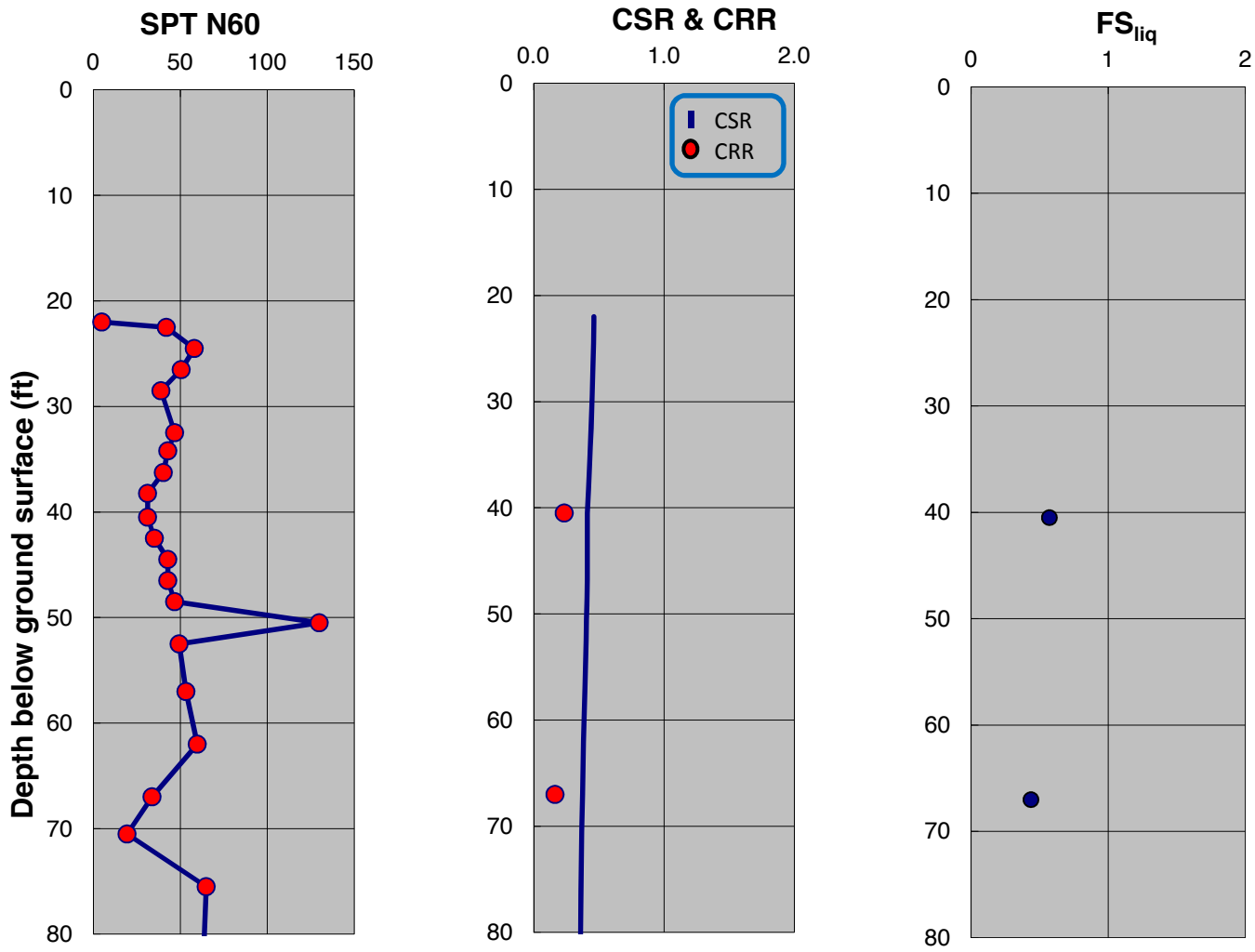
PLATE D.33



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-38 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

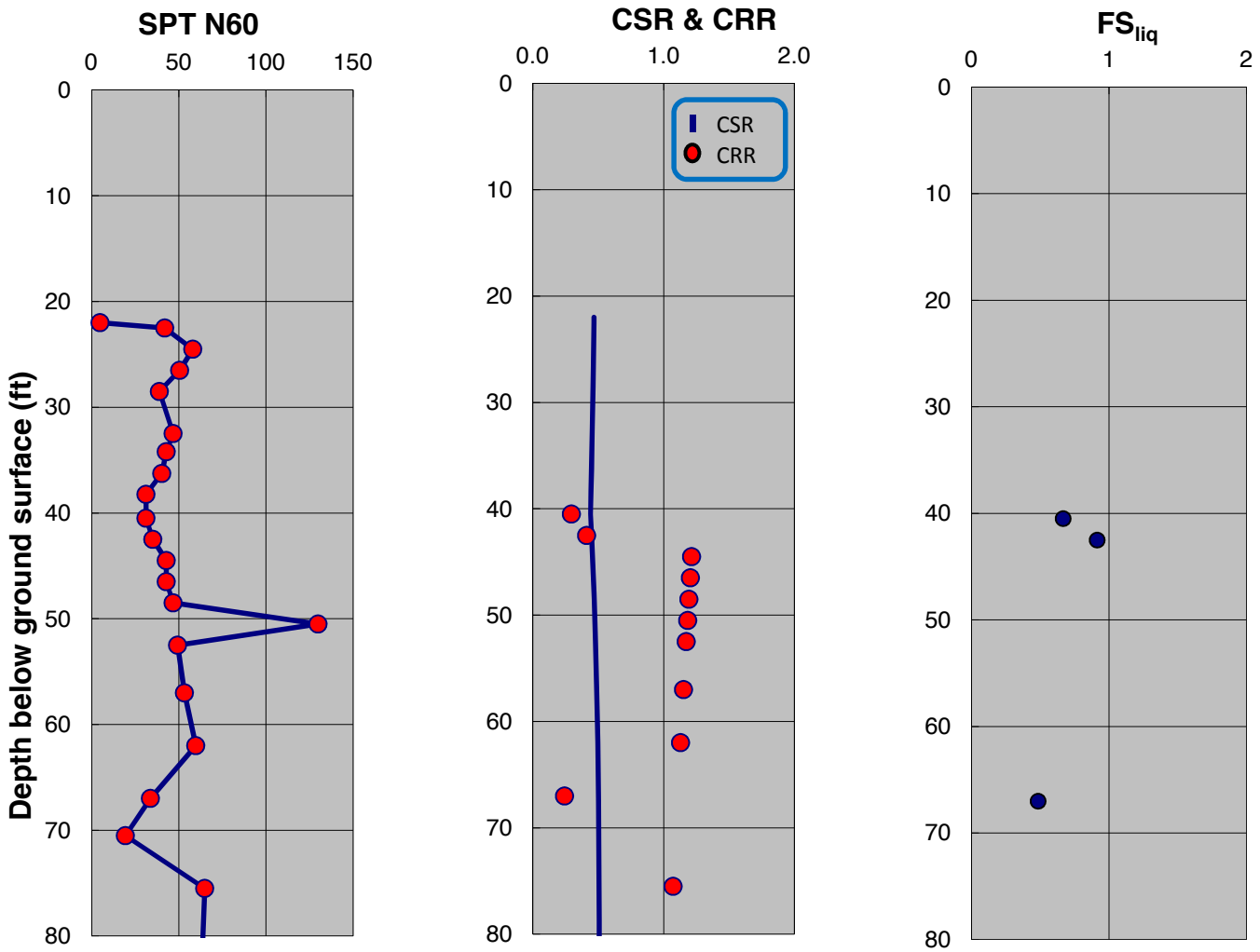
PLATE D.34



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-39 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

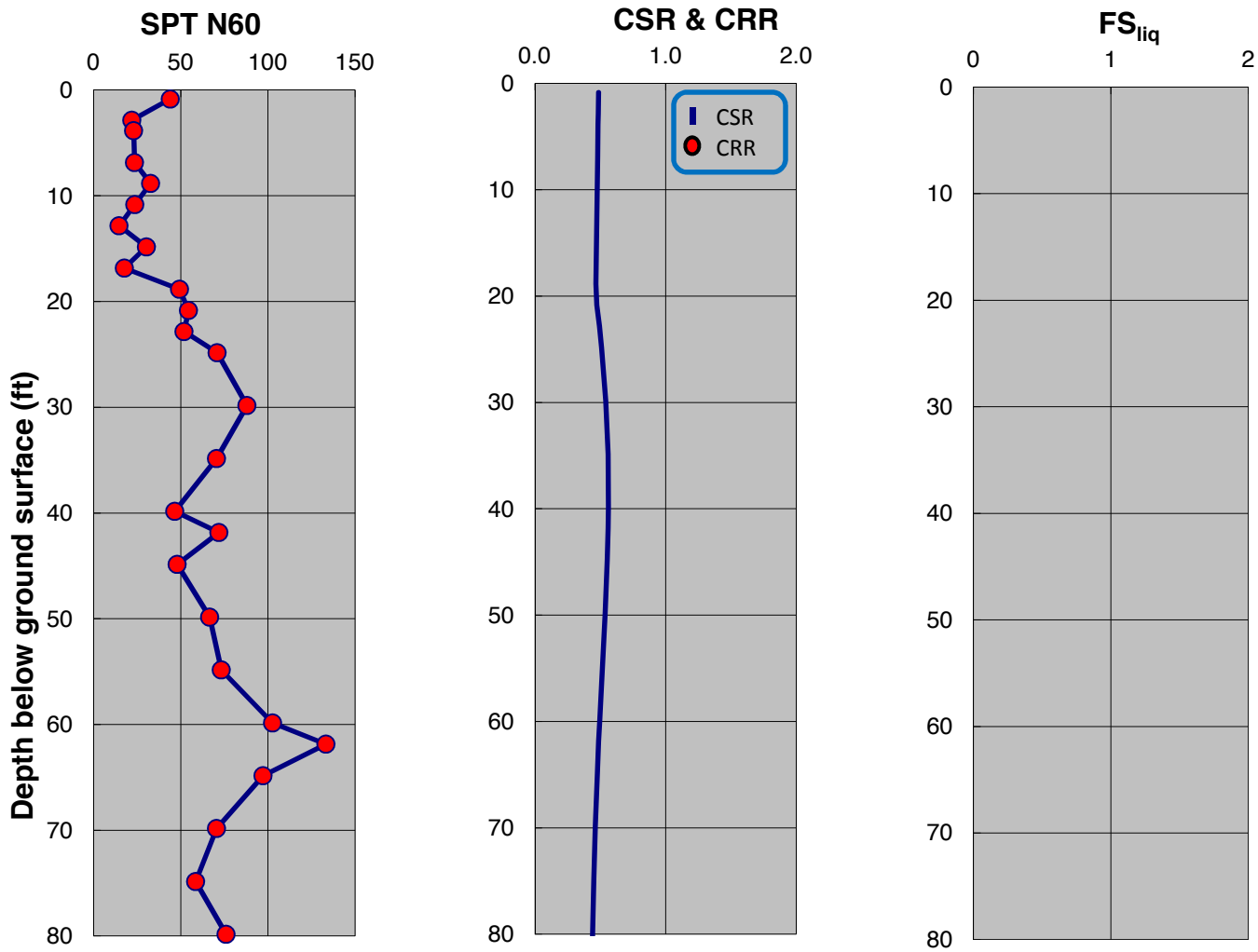
PLATE D.35



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-39 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

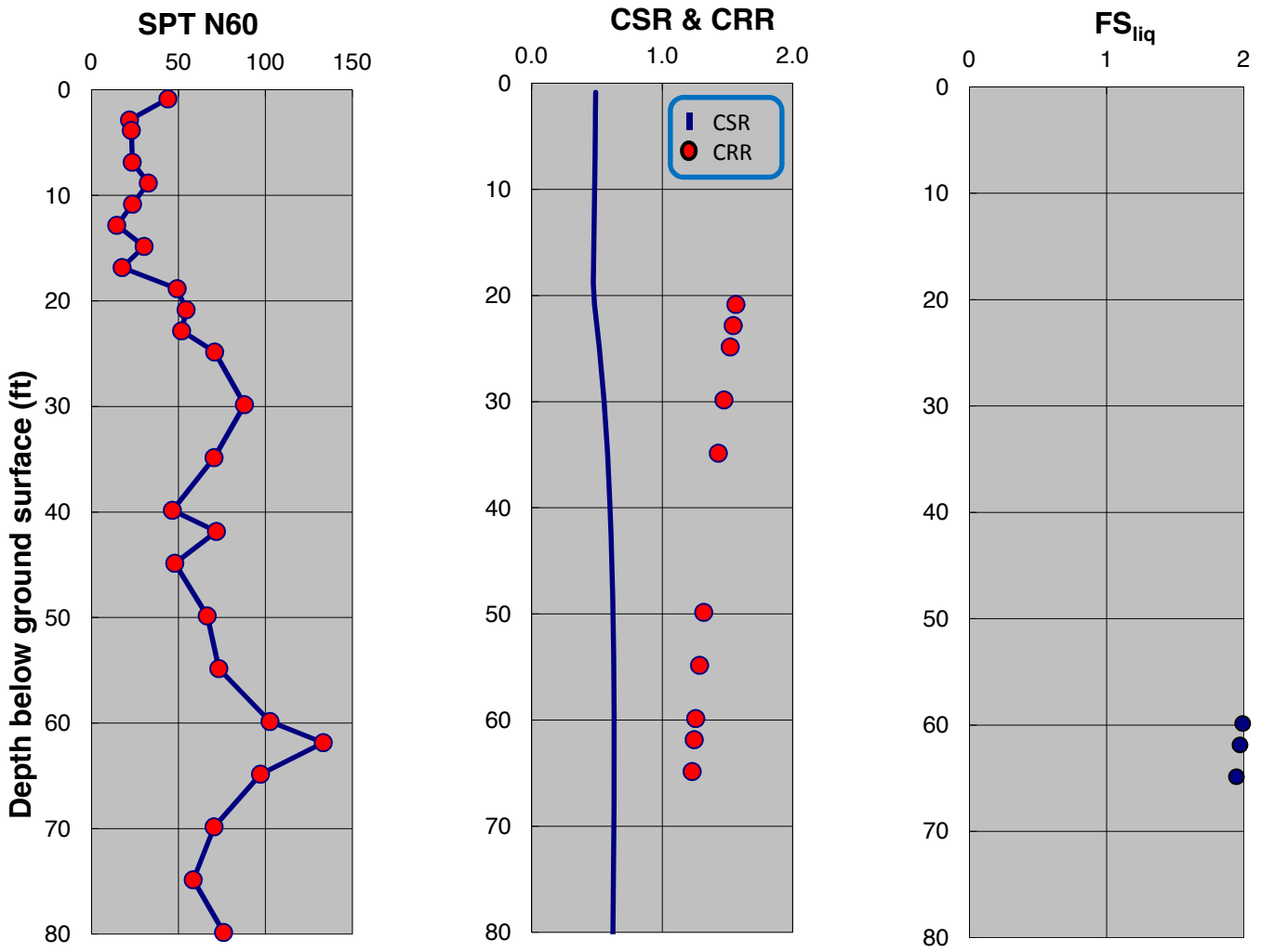
PLATE D.36



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-40 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

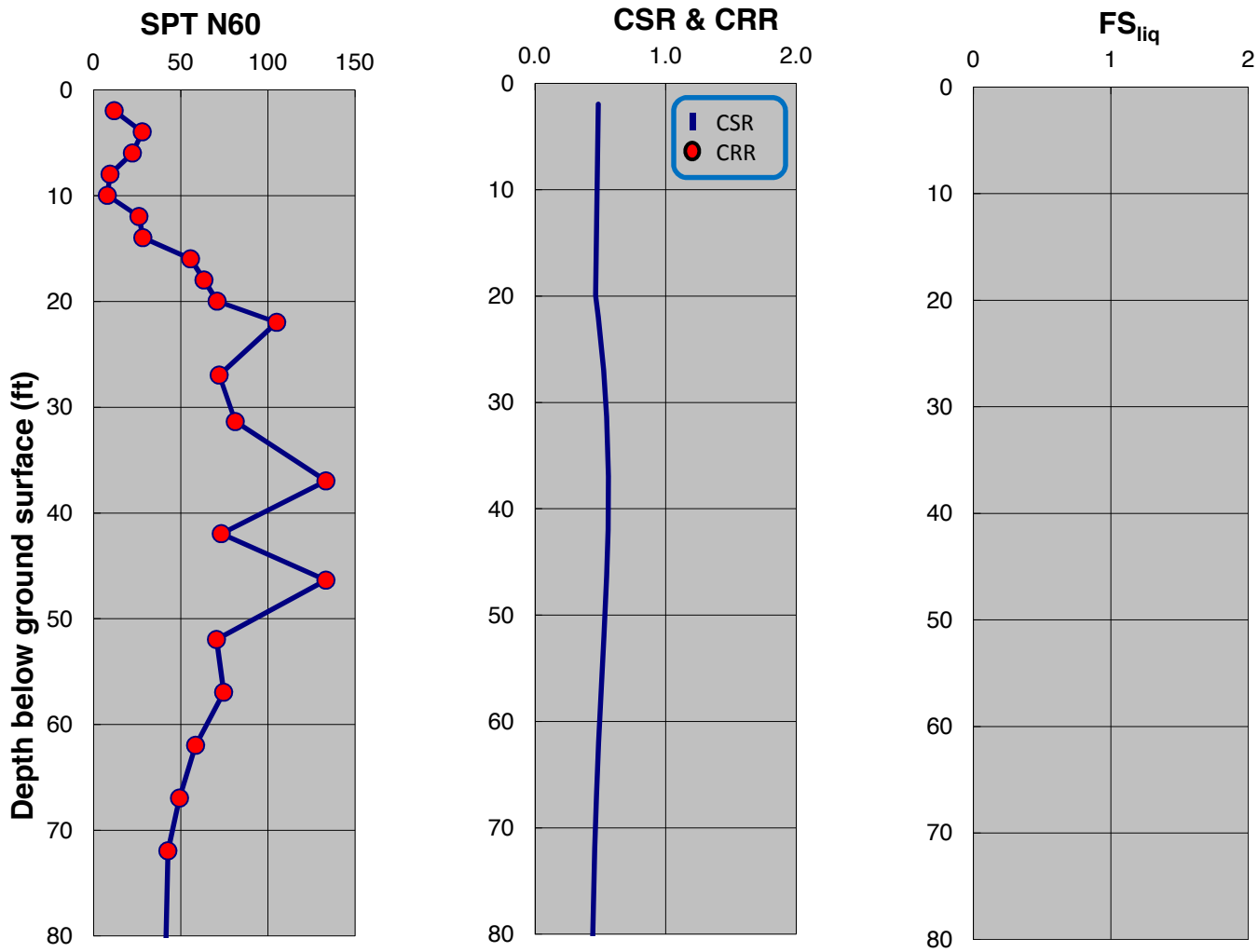
PLATE D.37



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-40 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

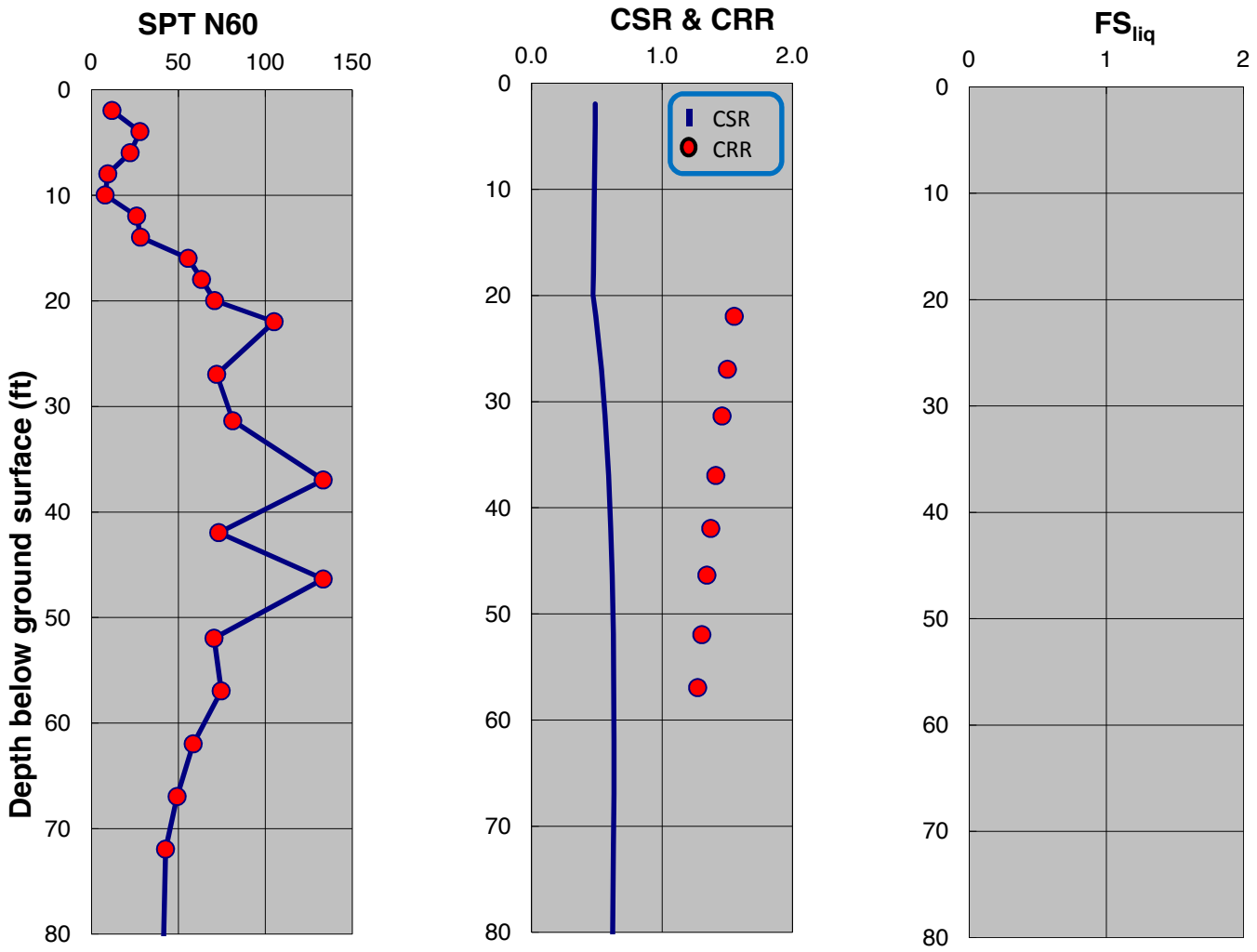
PLATE D.38



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-42 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

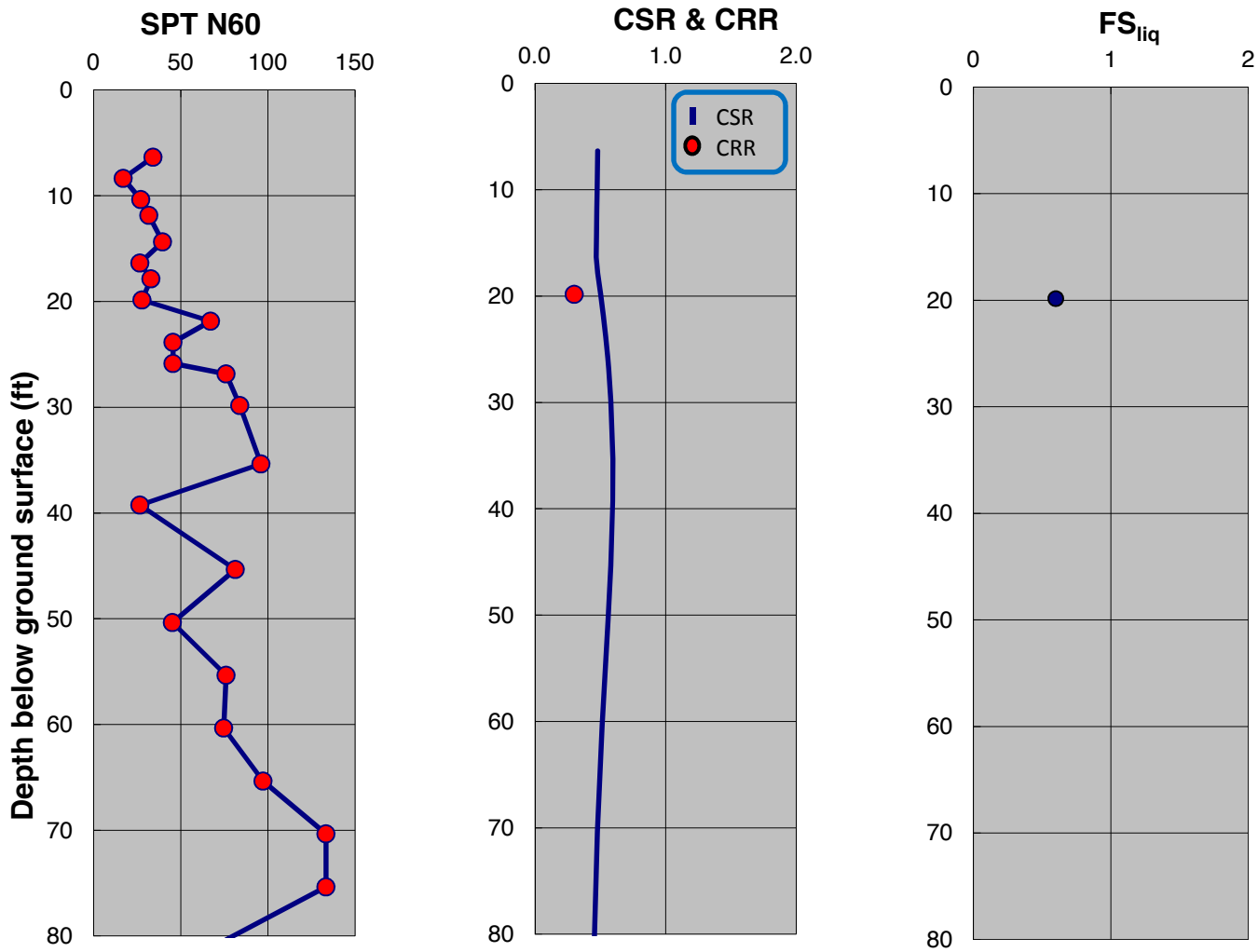
PLATE D.39



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-42 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

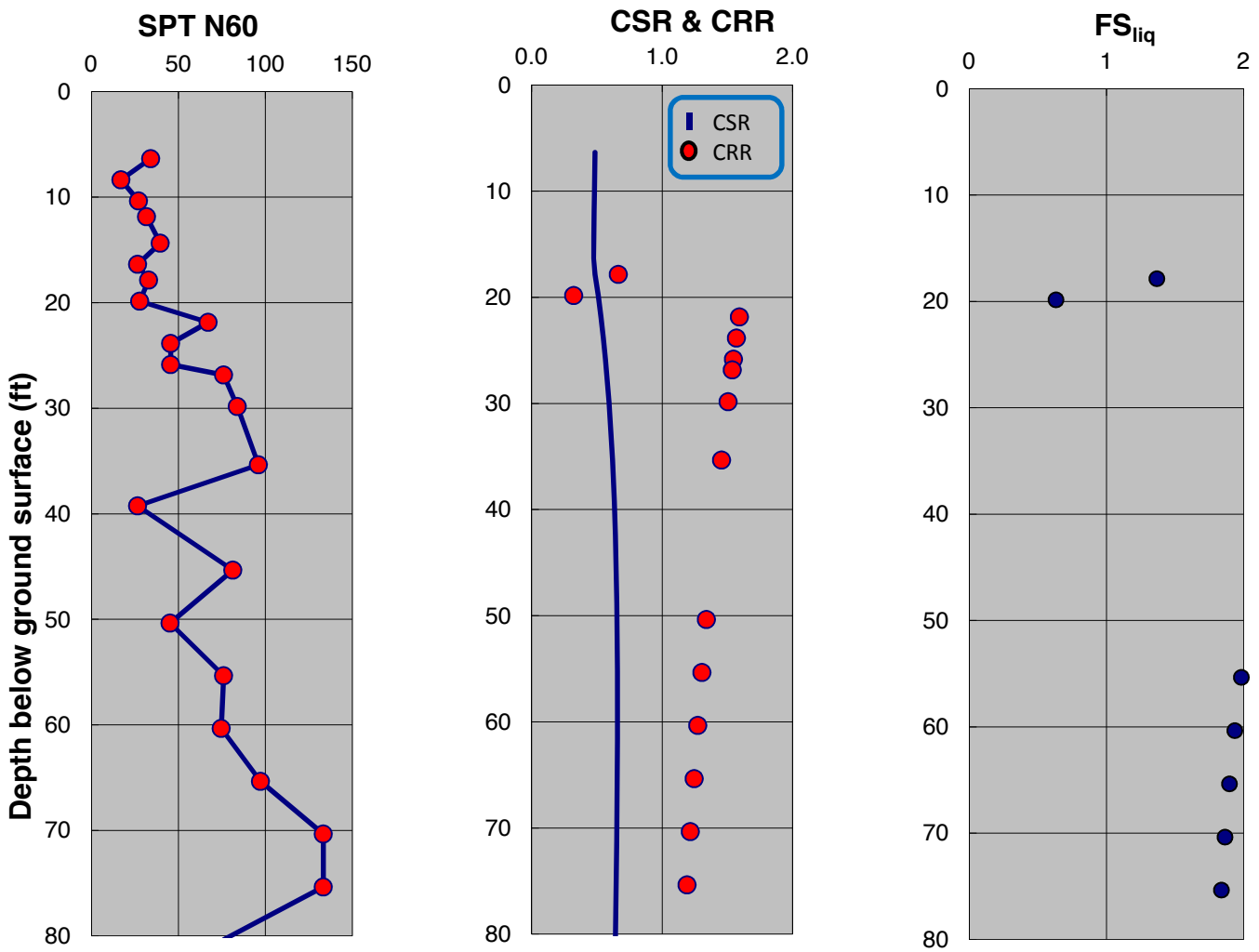
PLATE D.40



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-43 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

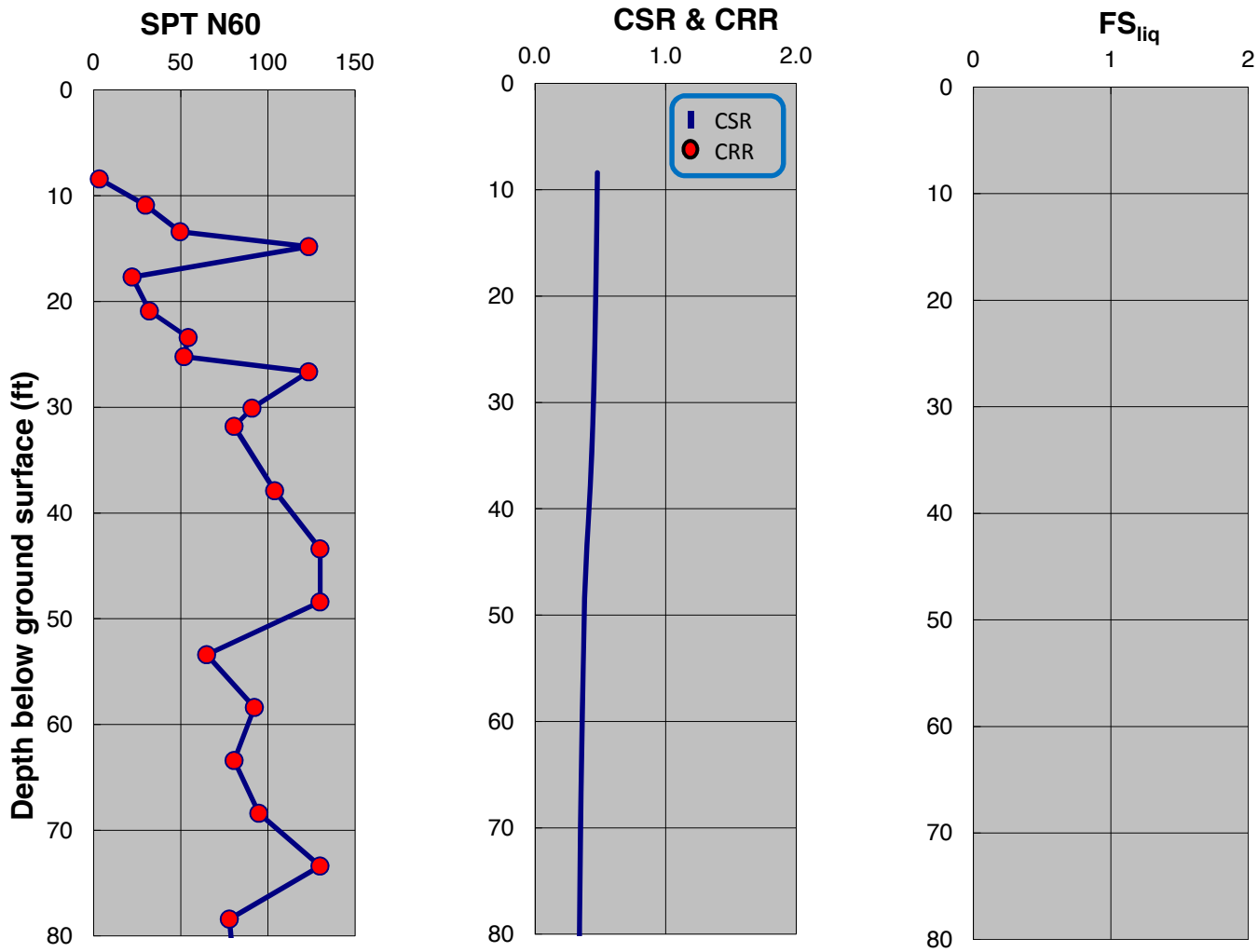
PLATE D.41



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-43 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

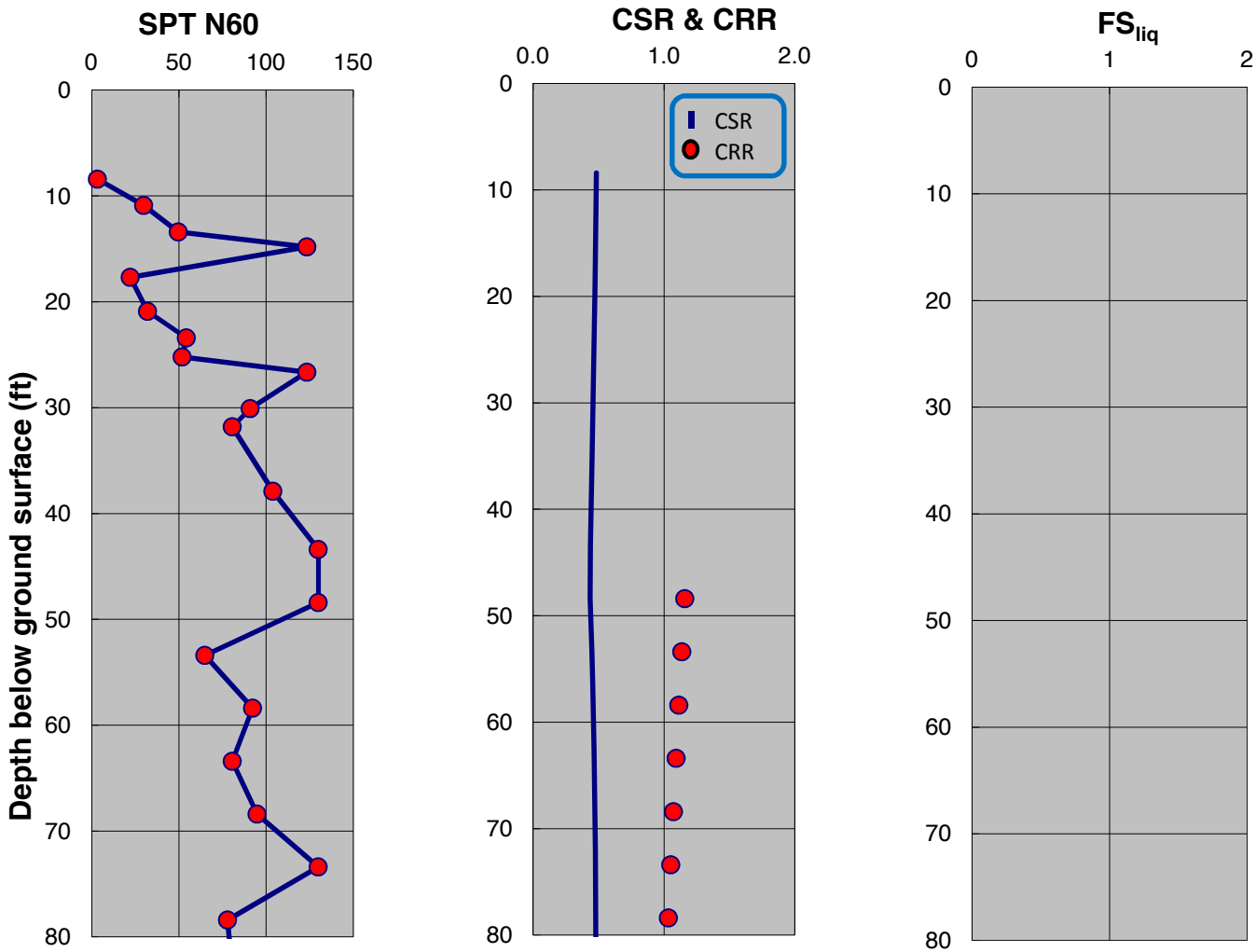
PLATE D.42



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-45 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

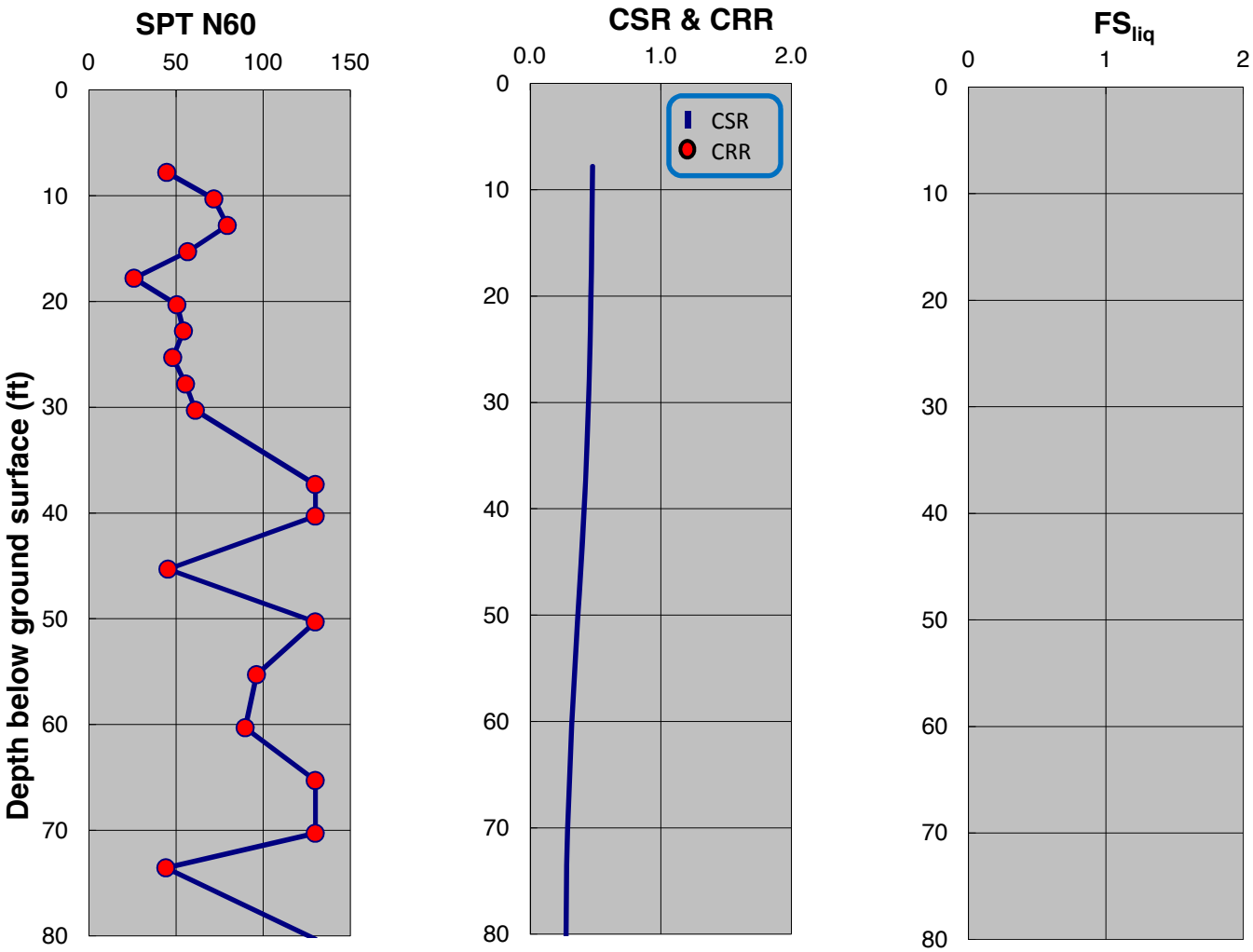
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.43



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-45 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

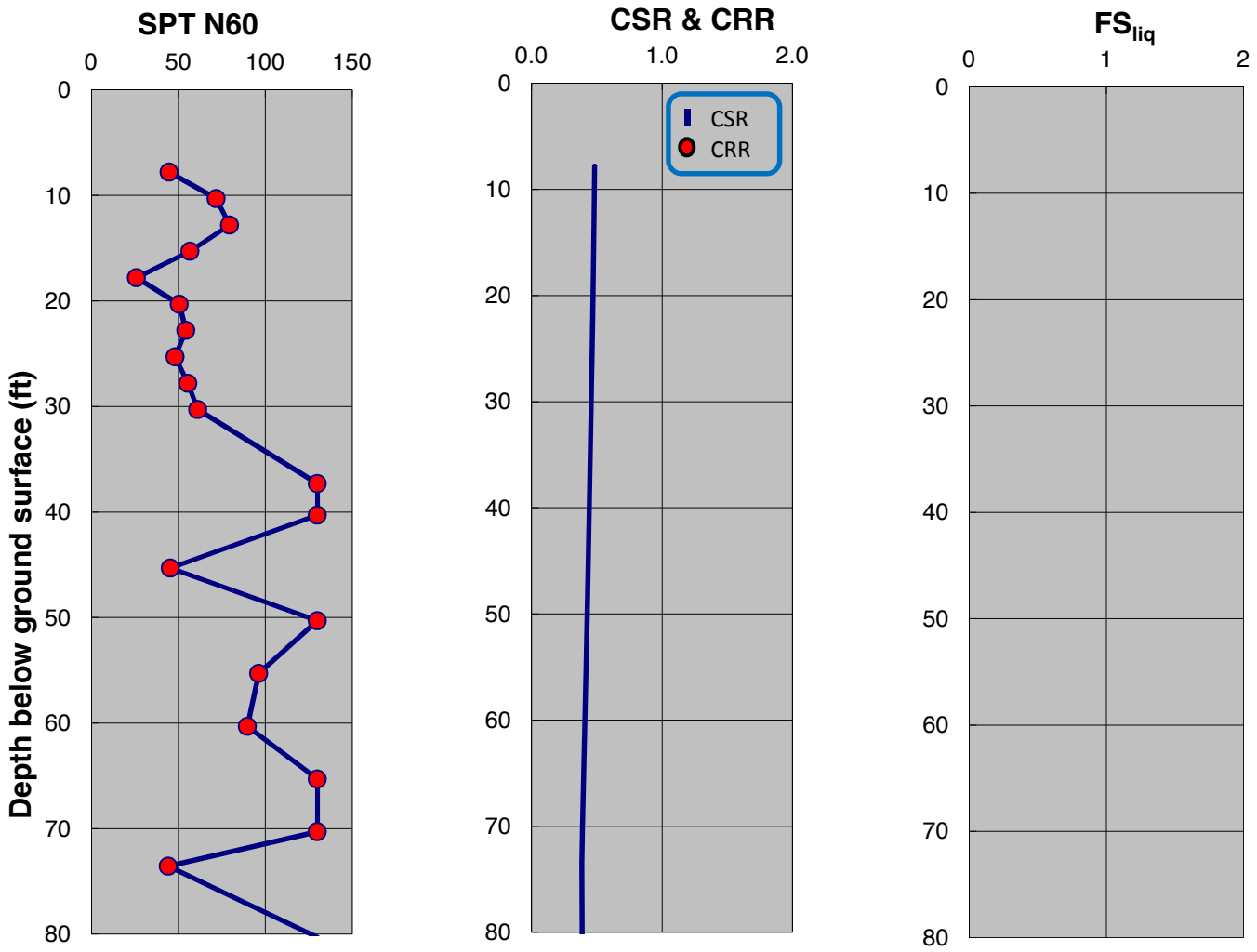
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-47 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

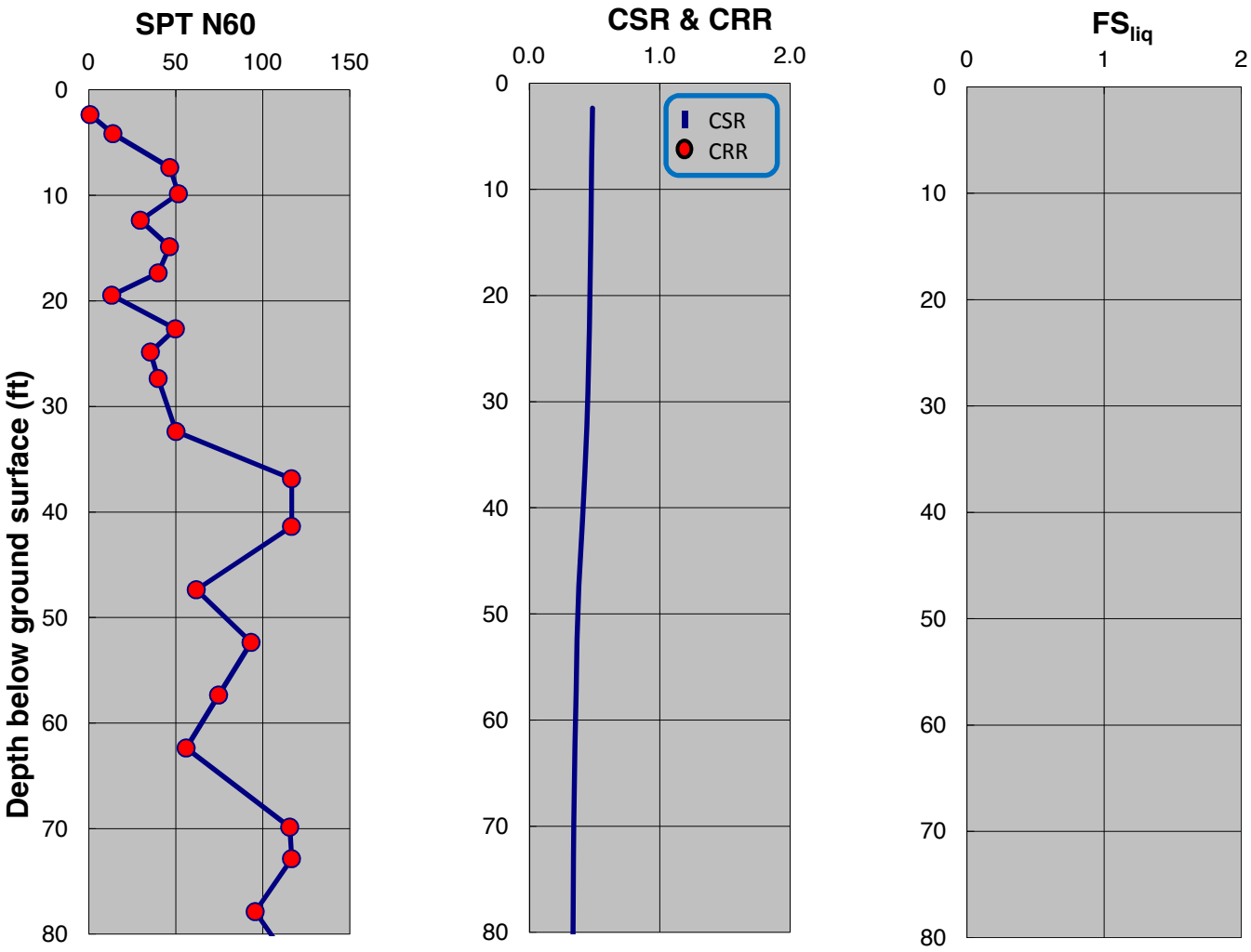
PLATE D.45



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-47 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

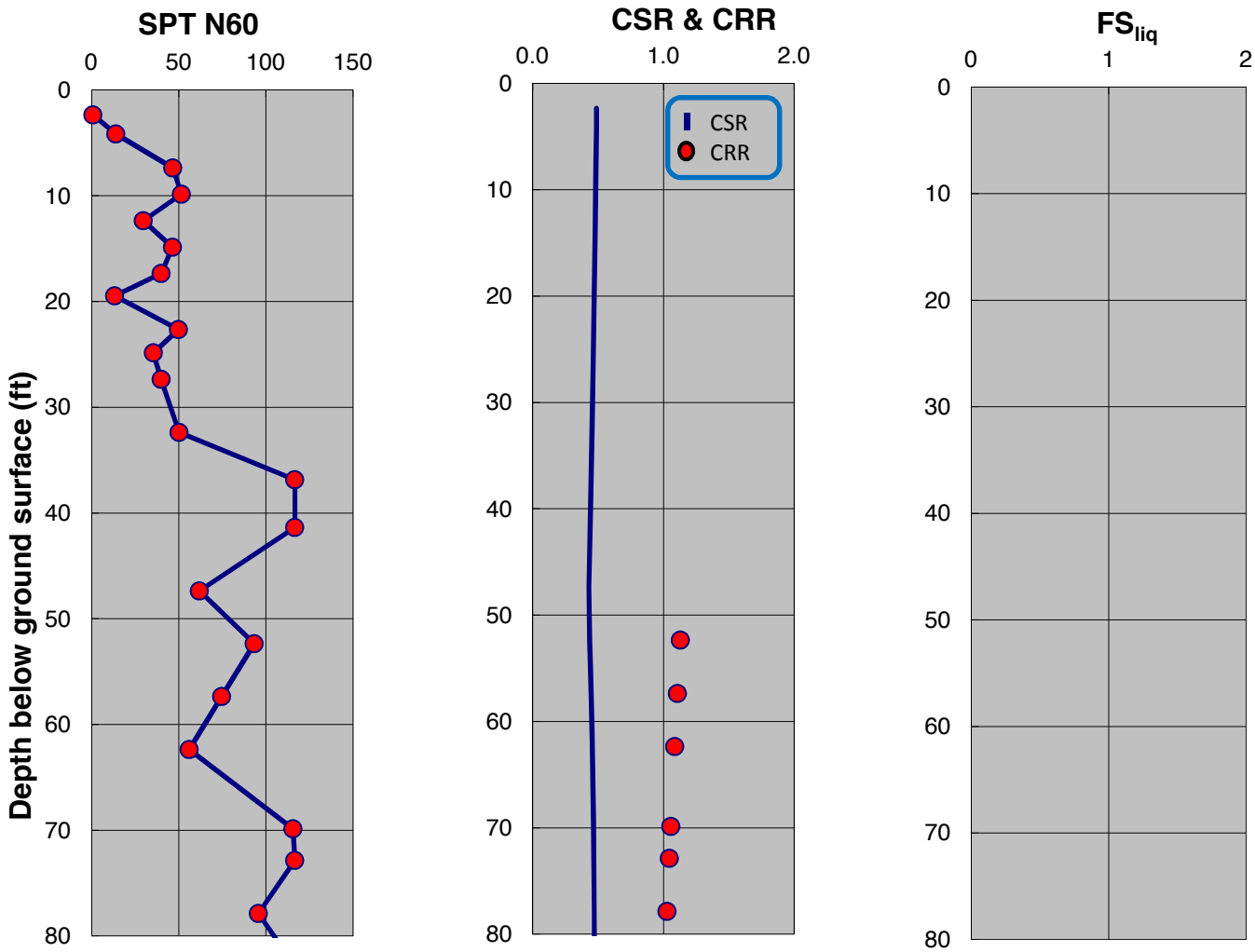
PLATE D.46



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-49 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

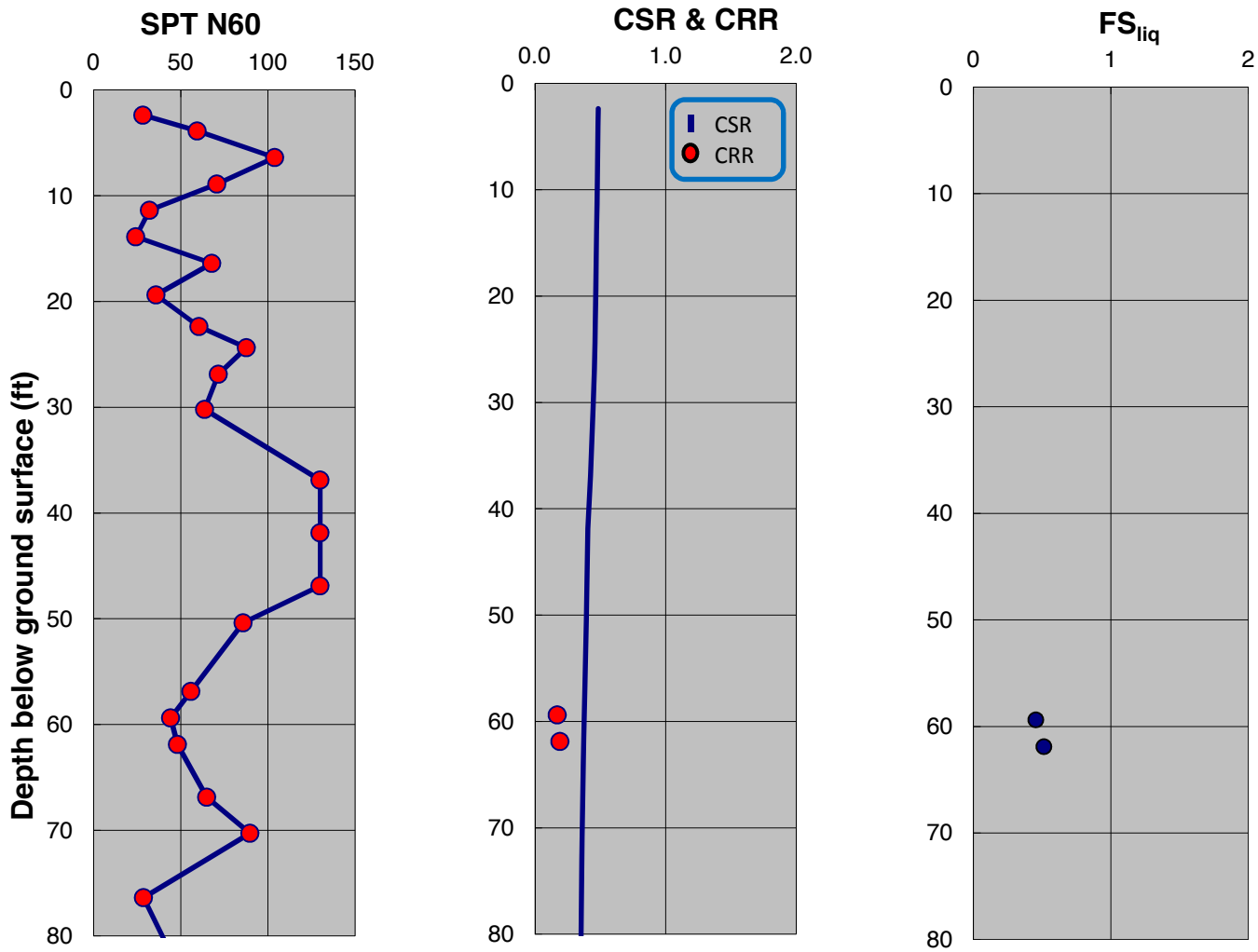
PLATE D.47



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-49 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

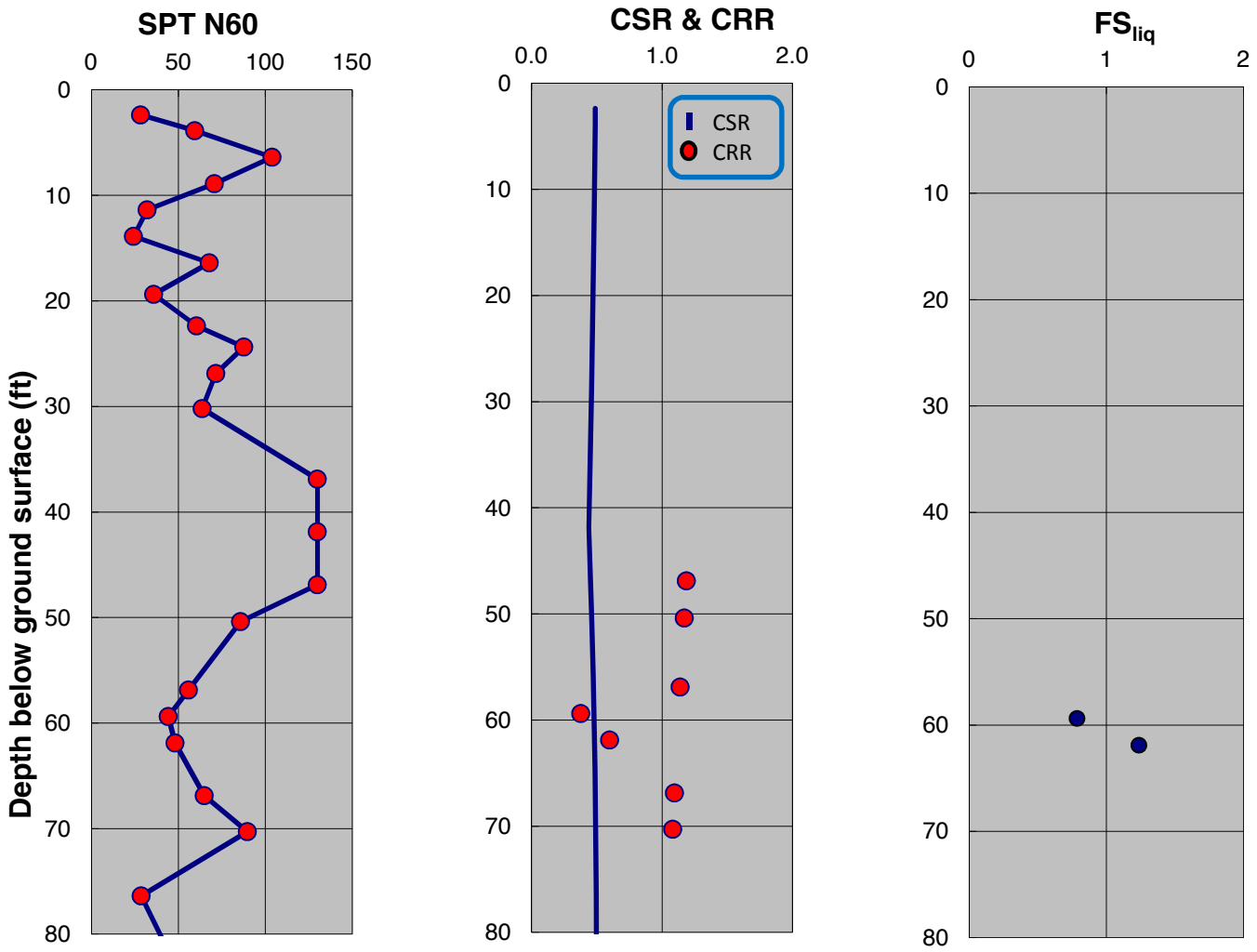
PLATE D.48



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-50 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

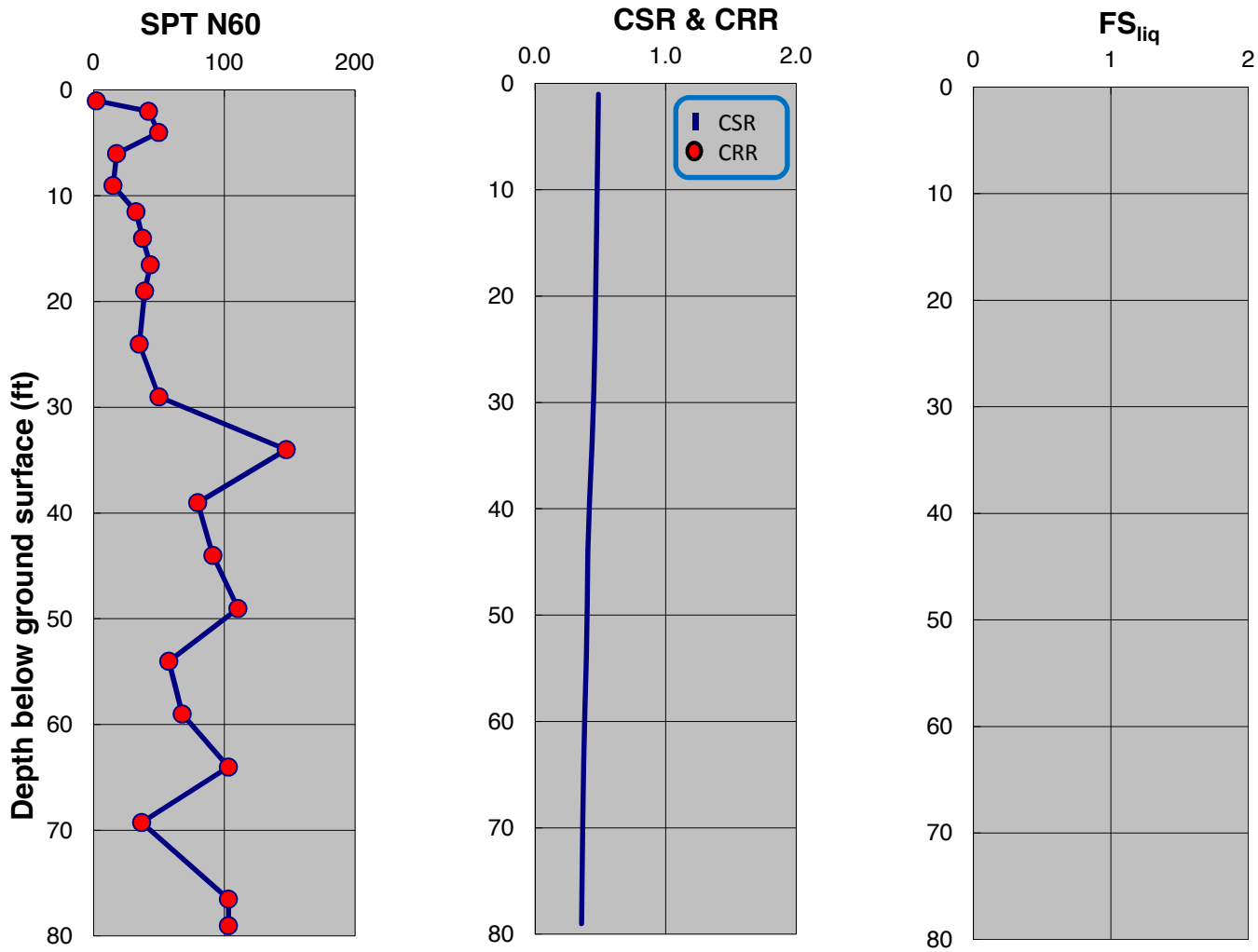
PLATE D.49



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-50 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

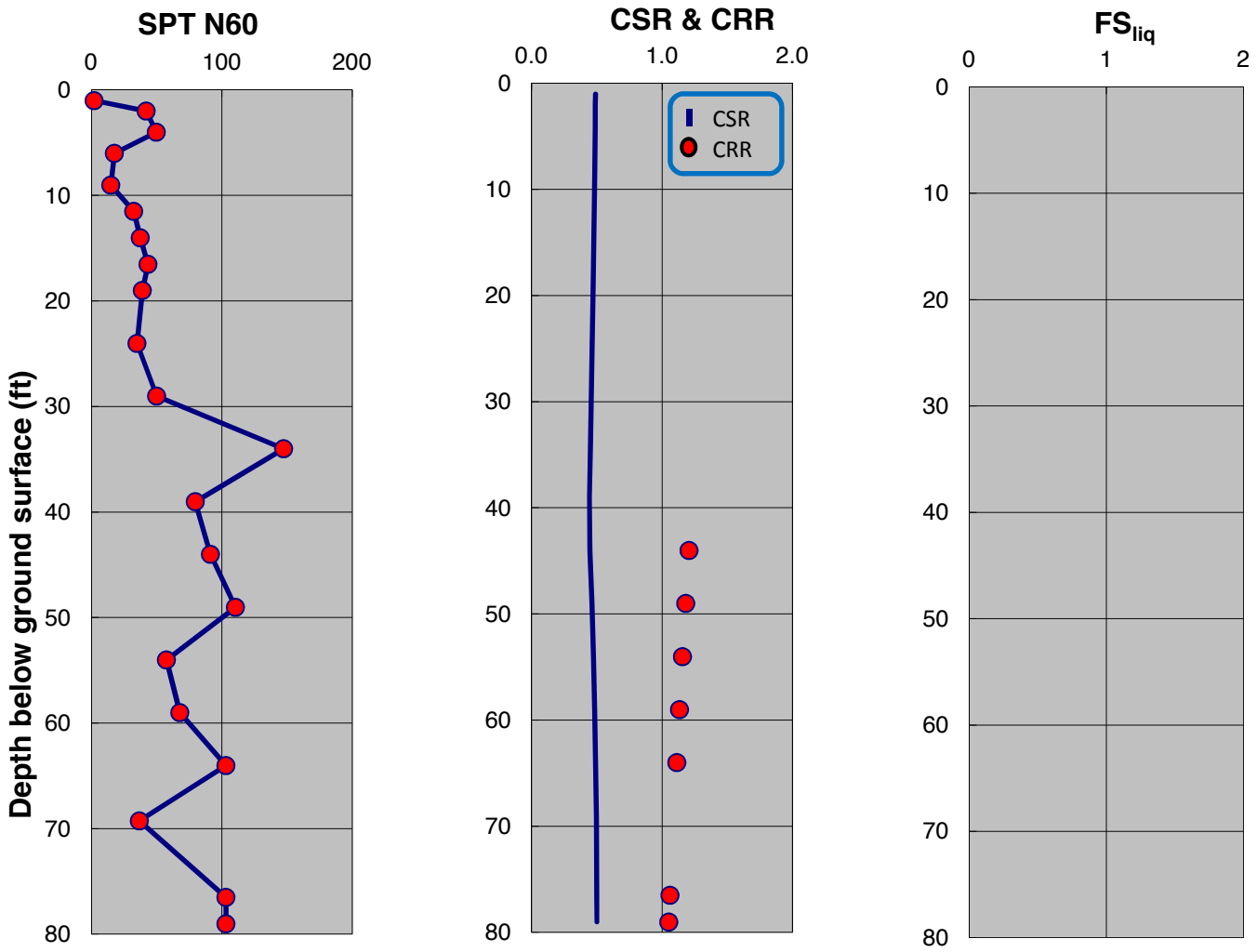
PLATE D.50



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-60 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

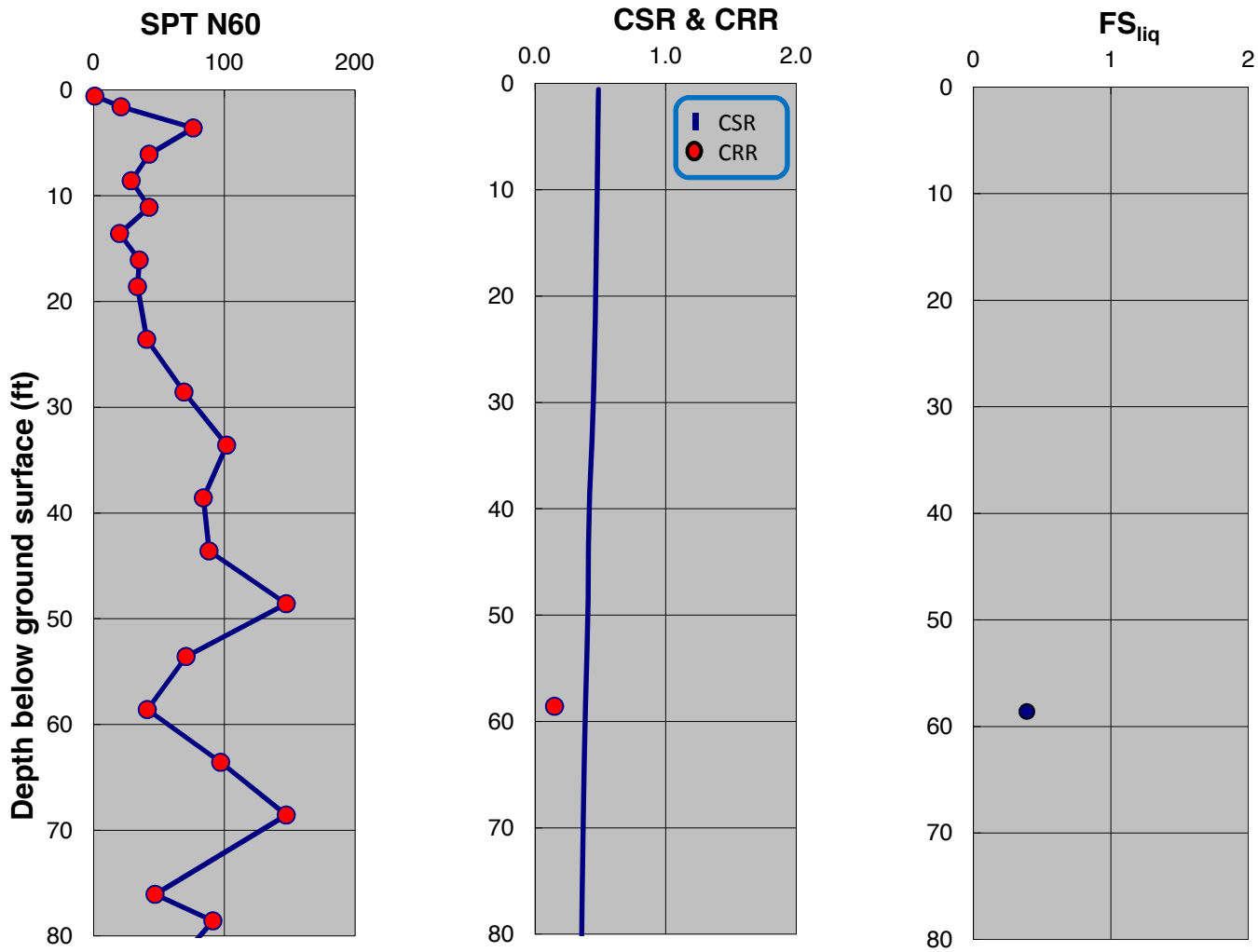
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.51



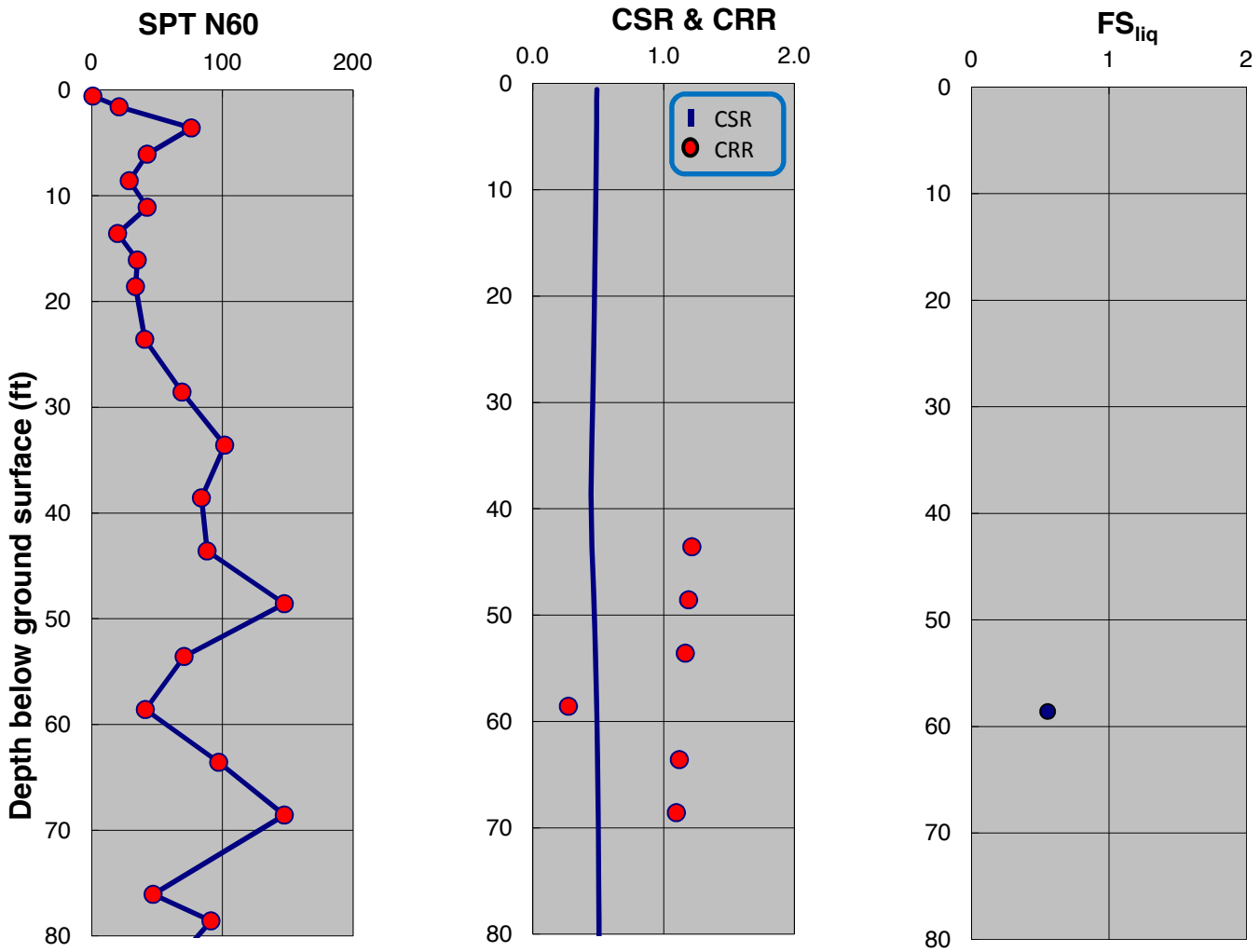
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-60 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



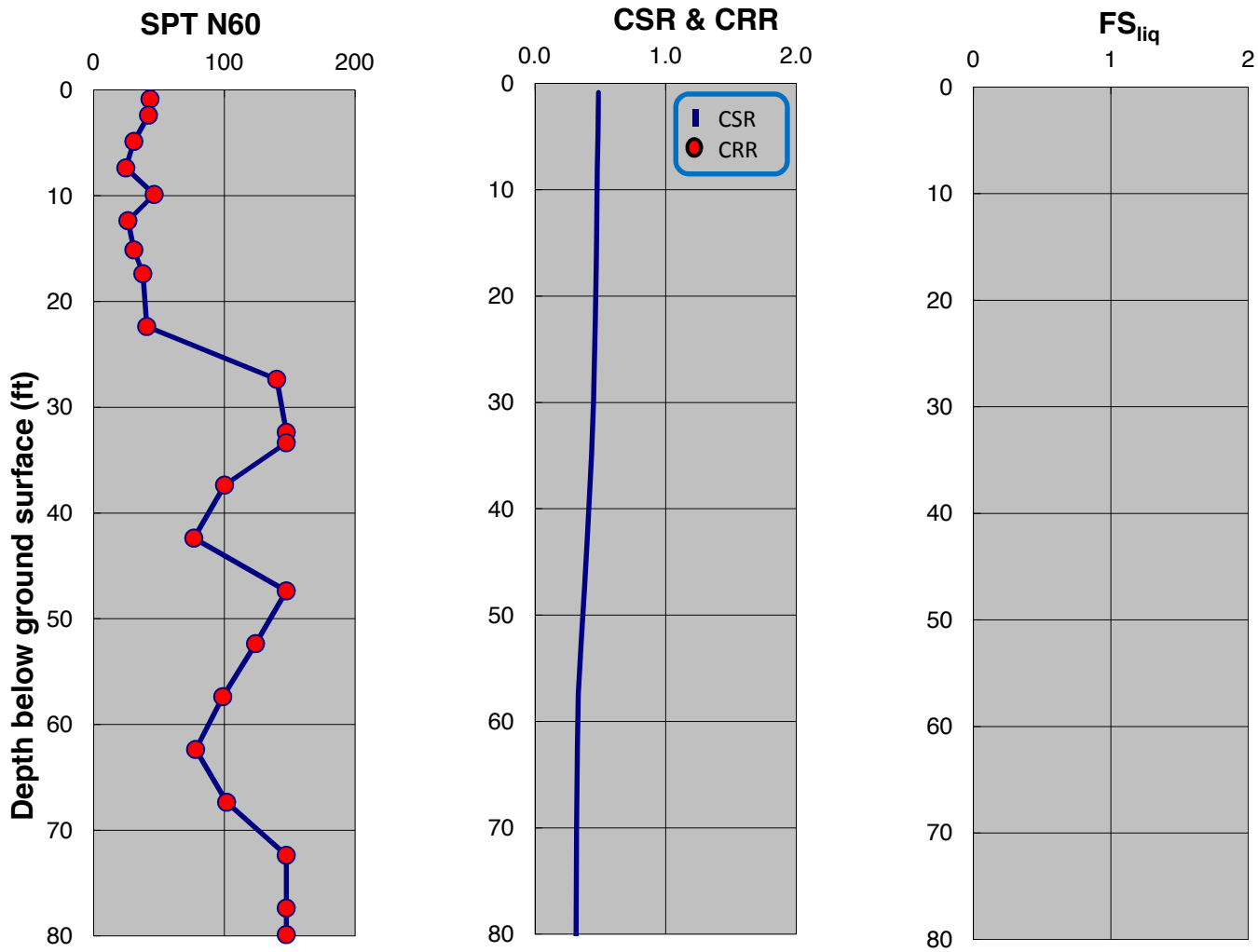
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-61 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-61 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

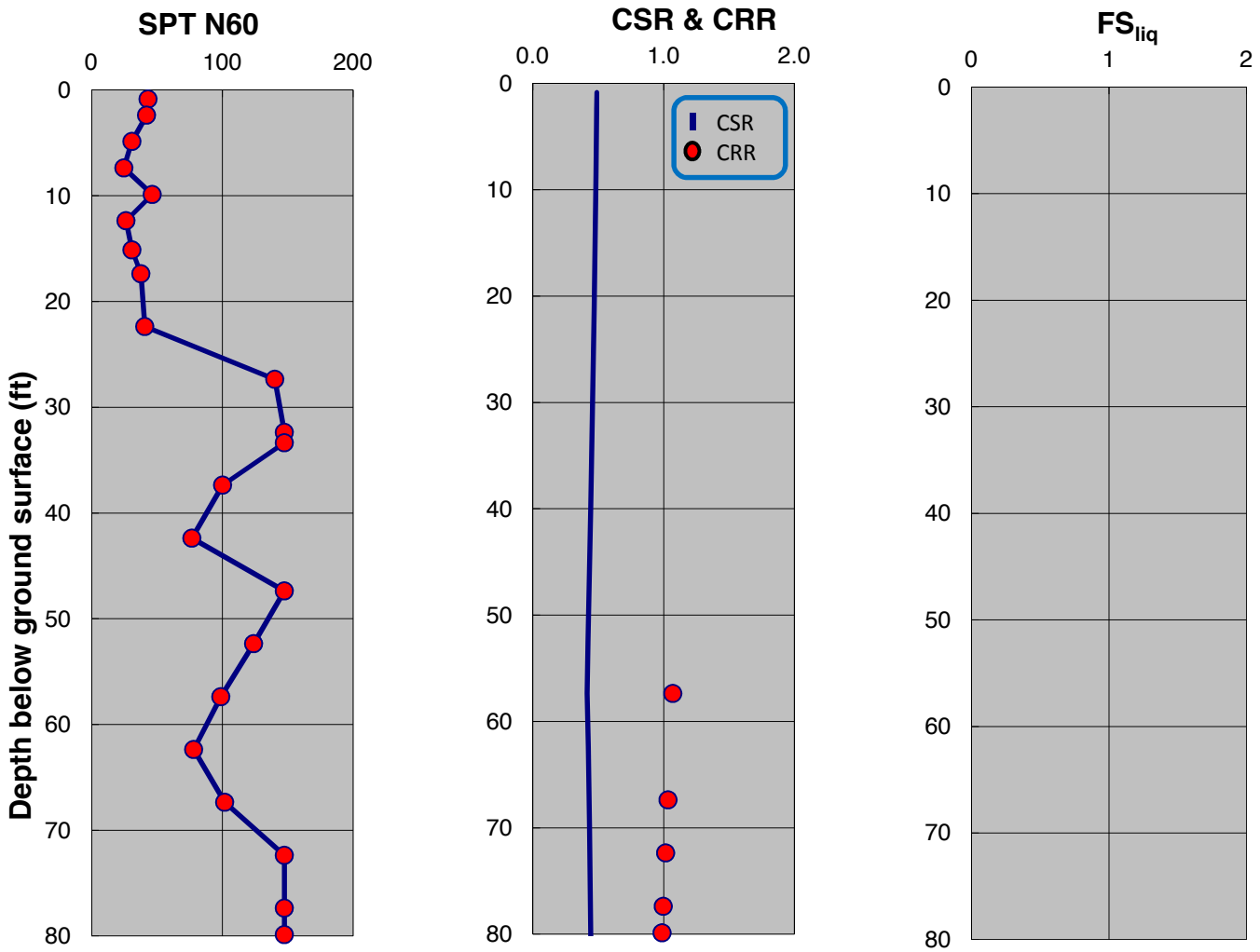
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-62 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

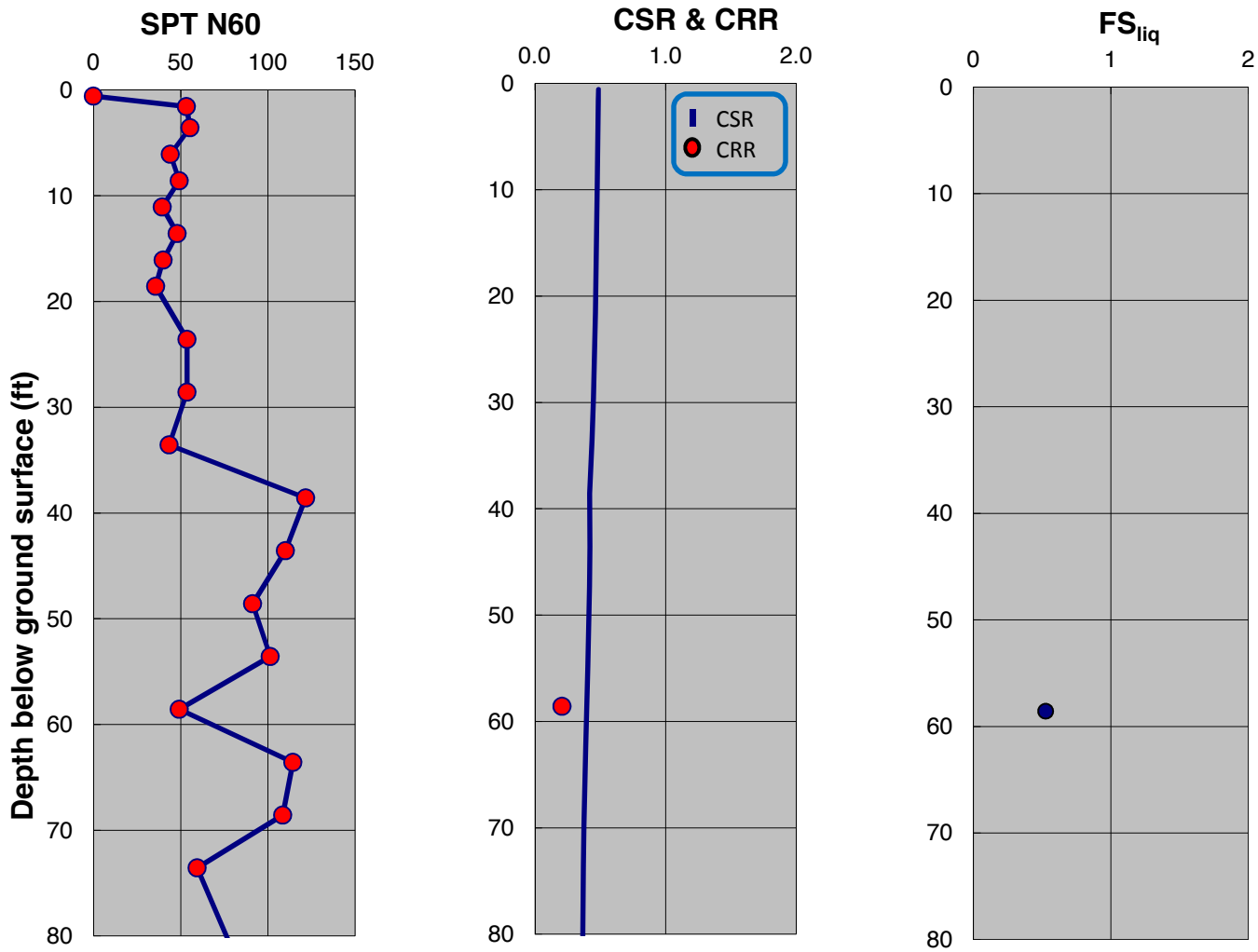
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.55



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-62 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

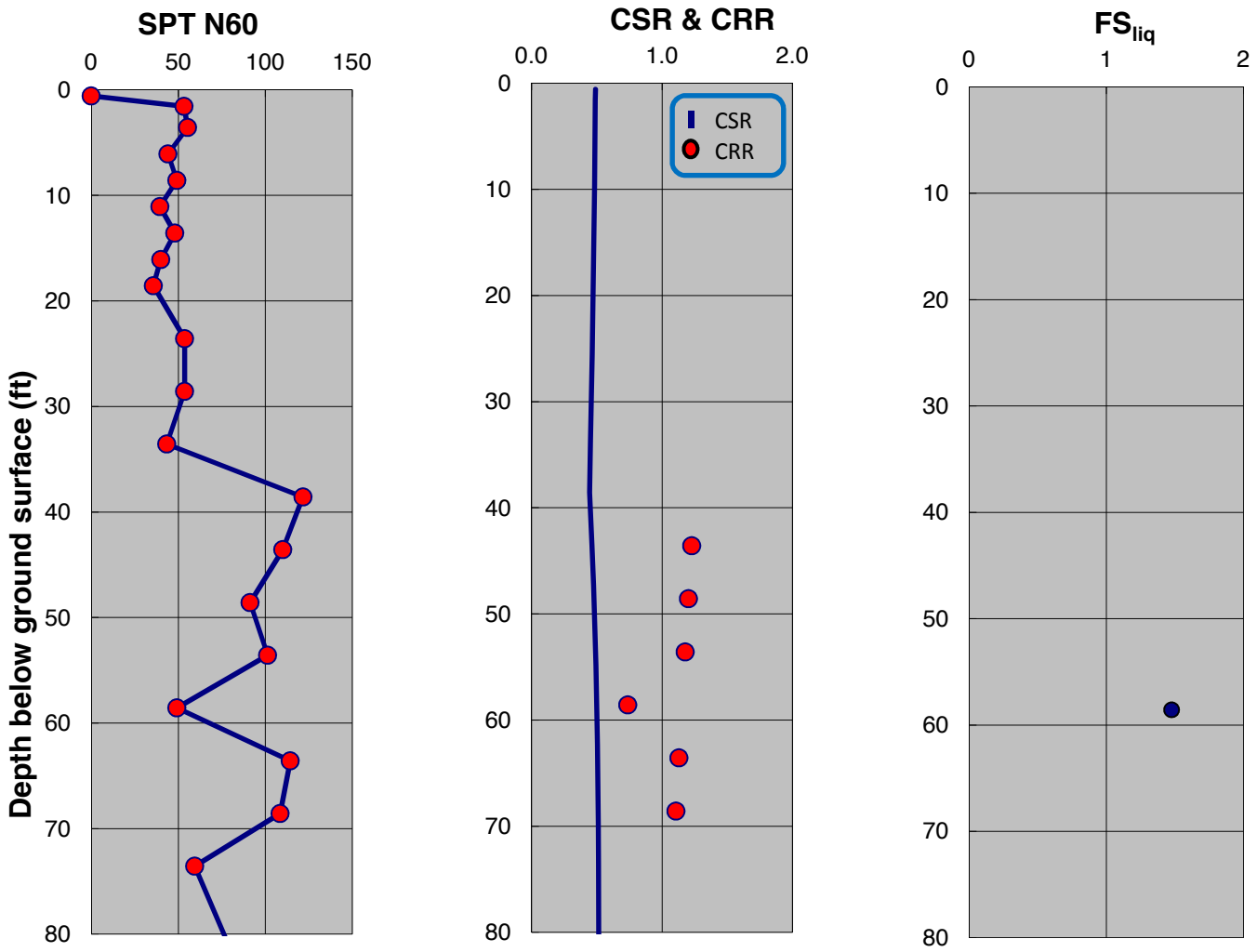
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-64 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

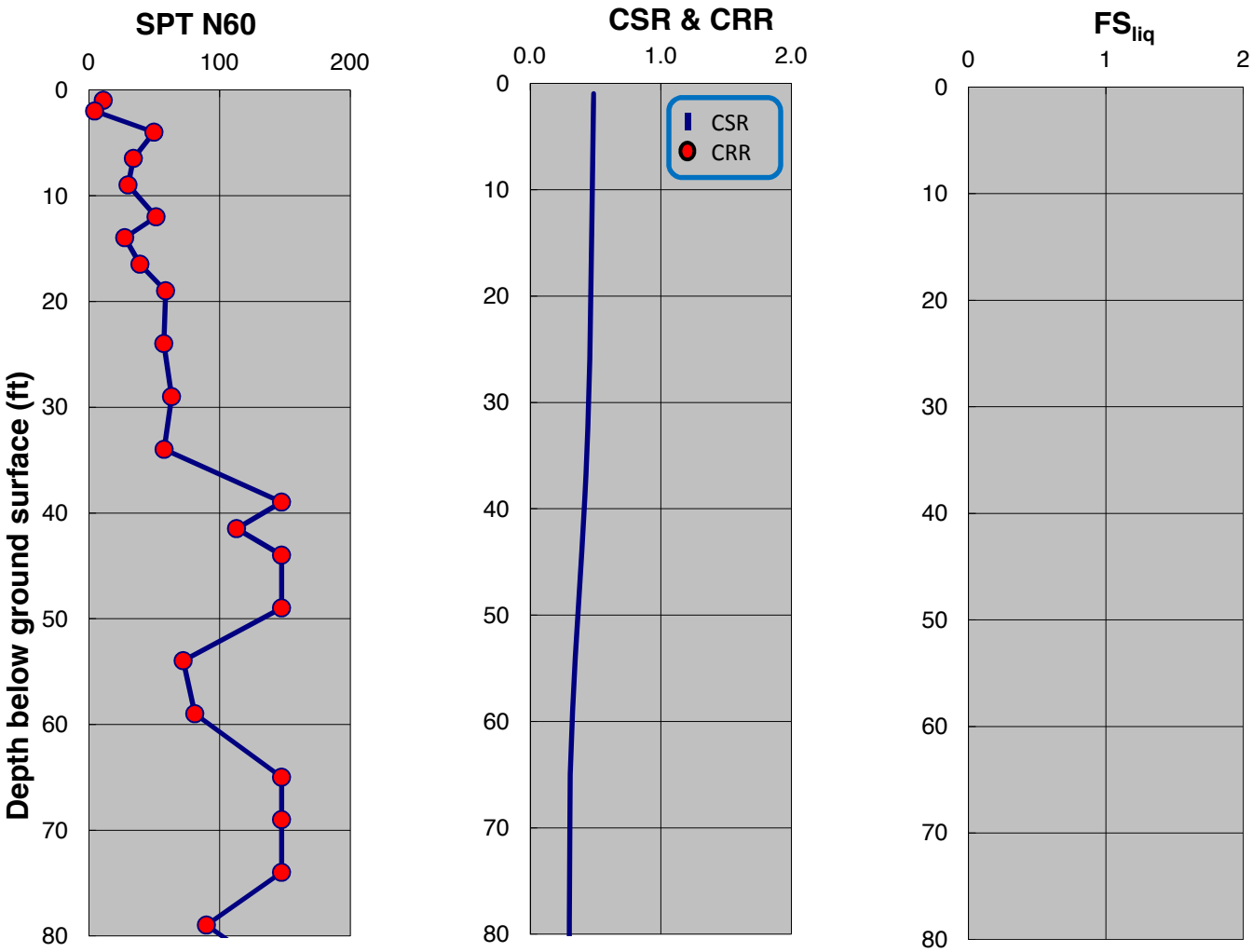
PLATE D.57



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-64 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

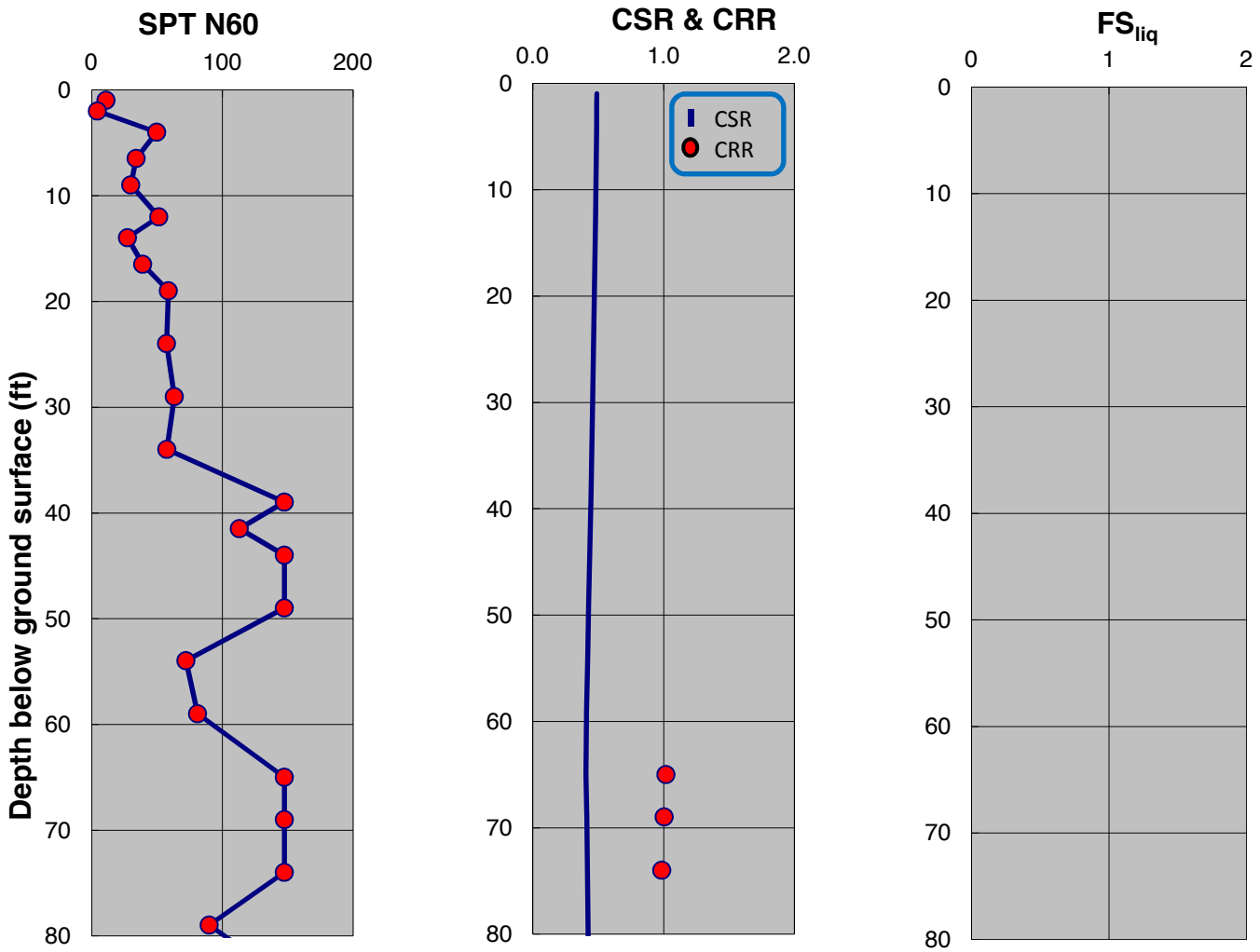
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.58



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-66 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

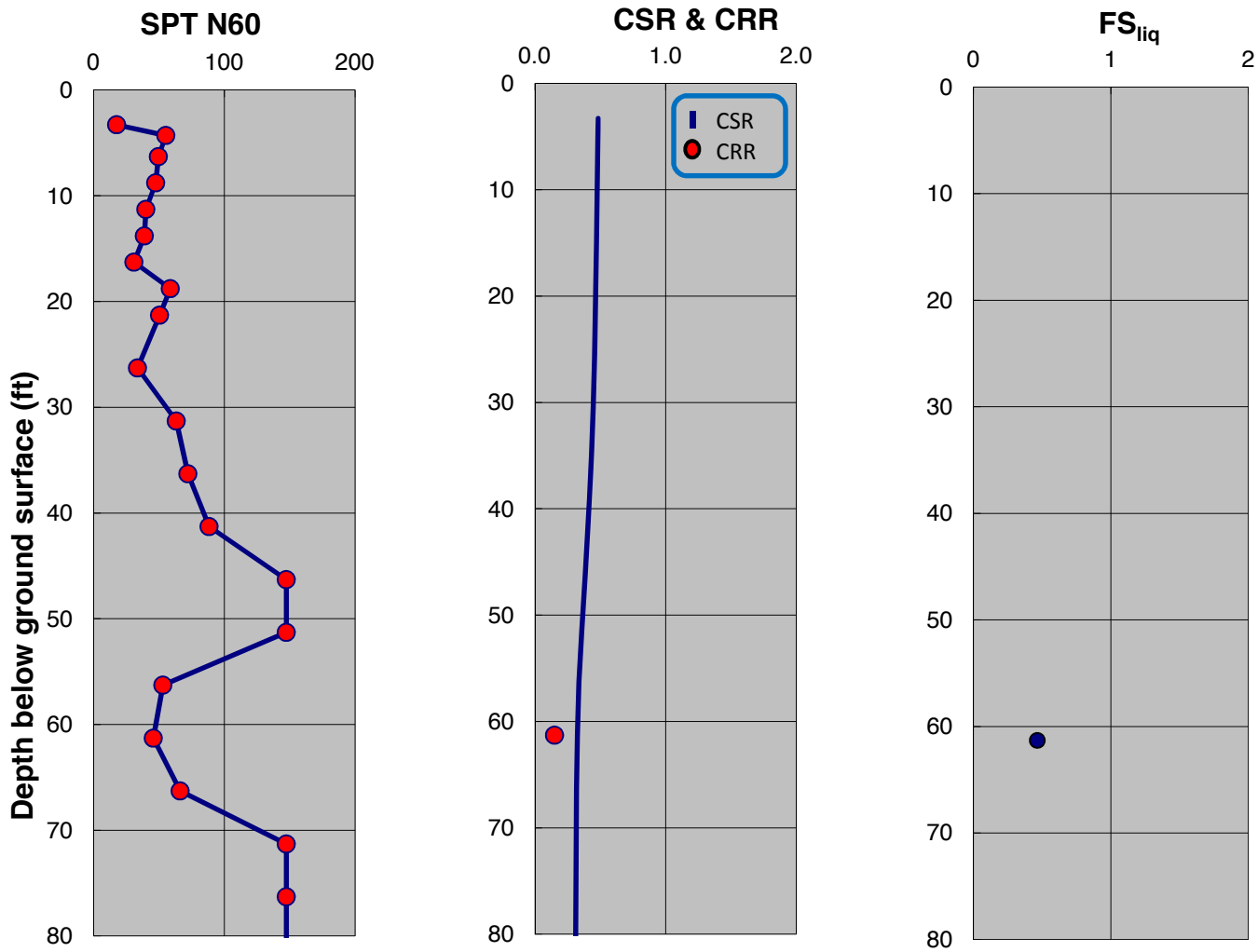
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-66 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

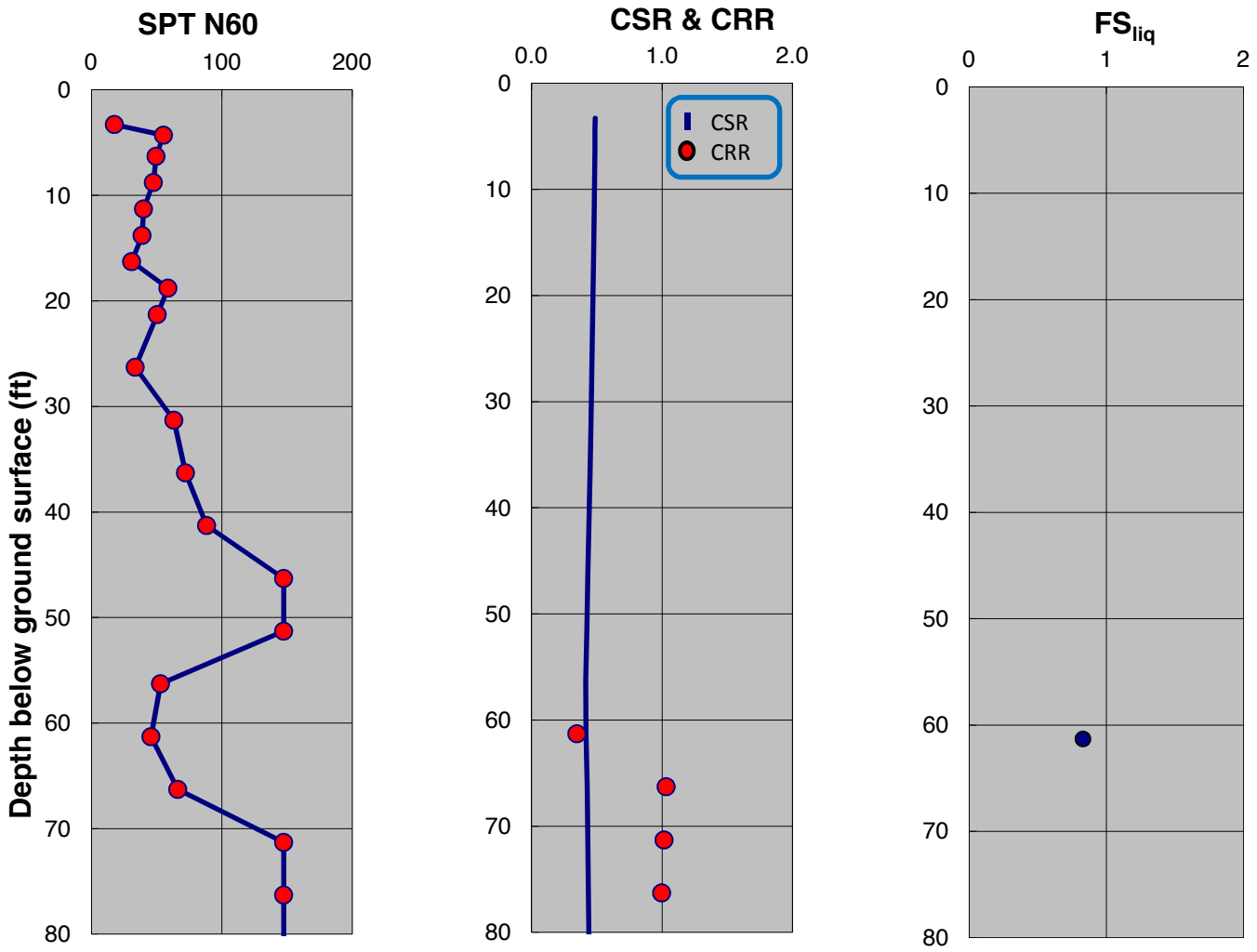
PLATE D.60



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-67 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

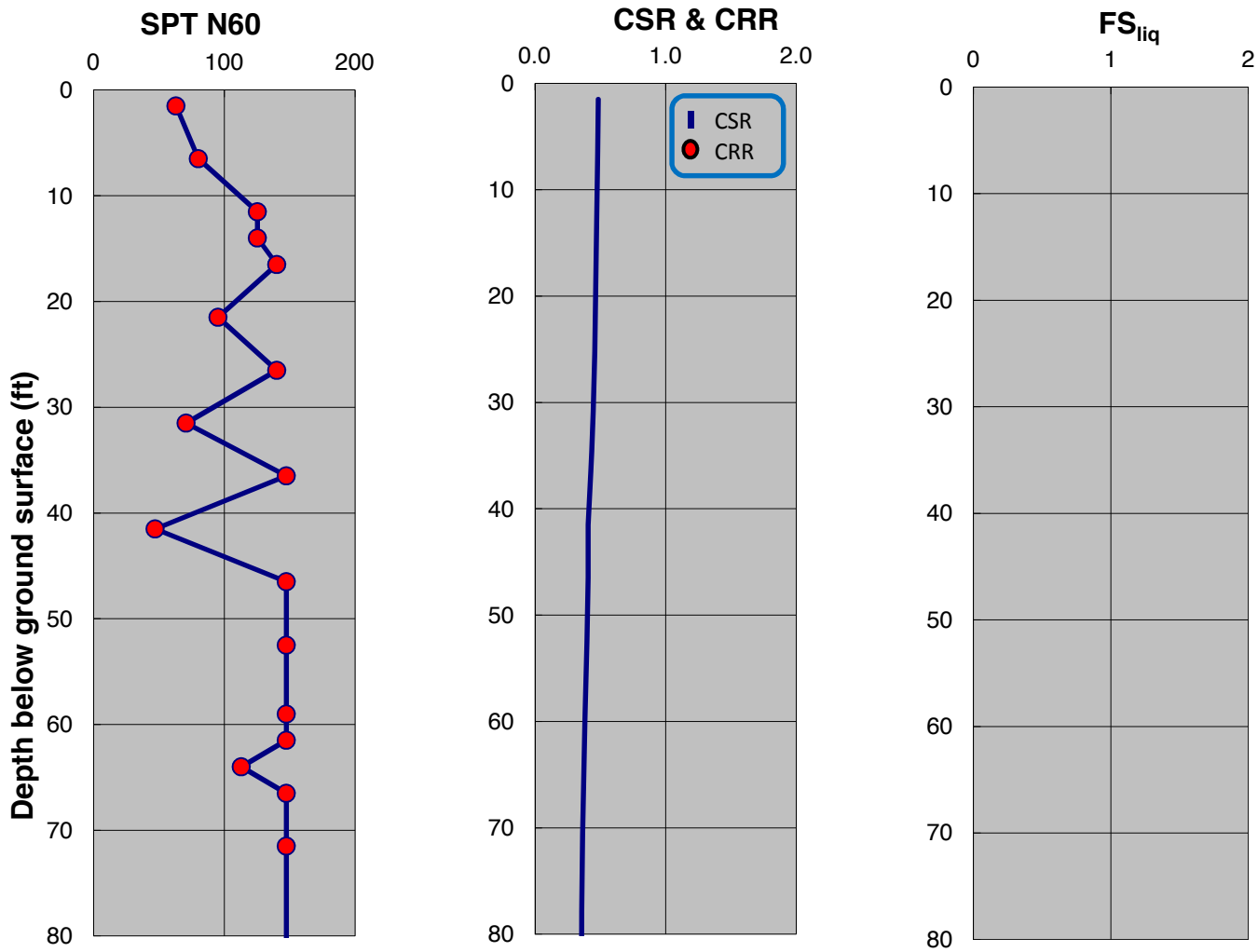
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.61



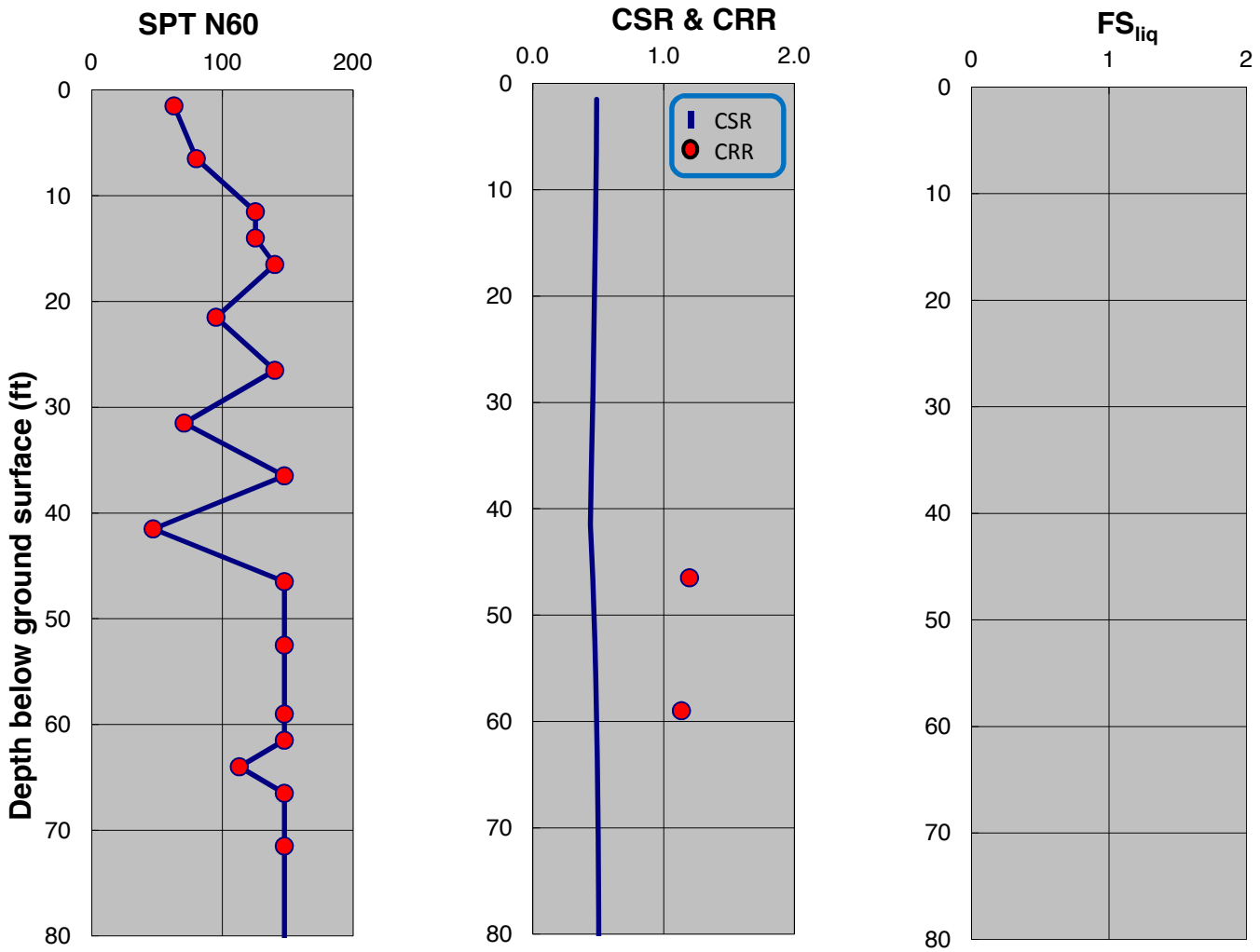
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-67 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



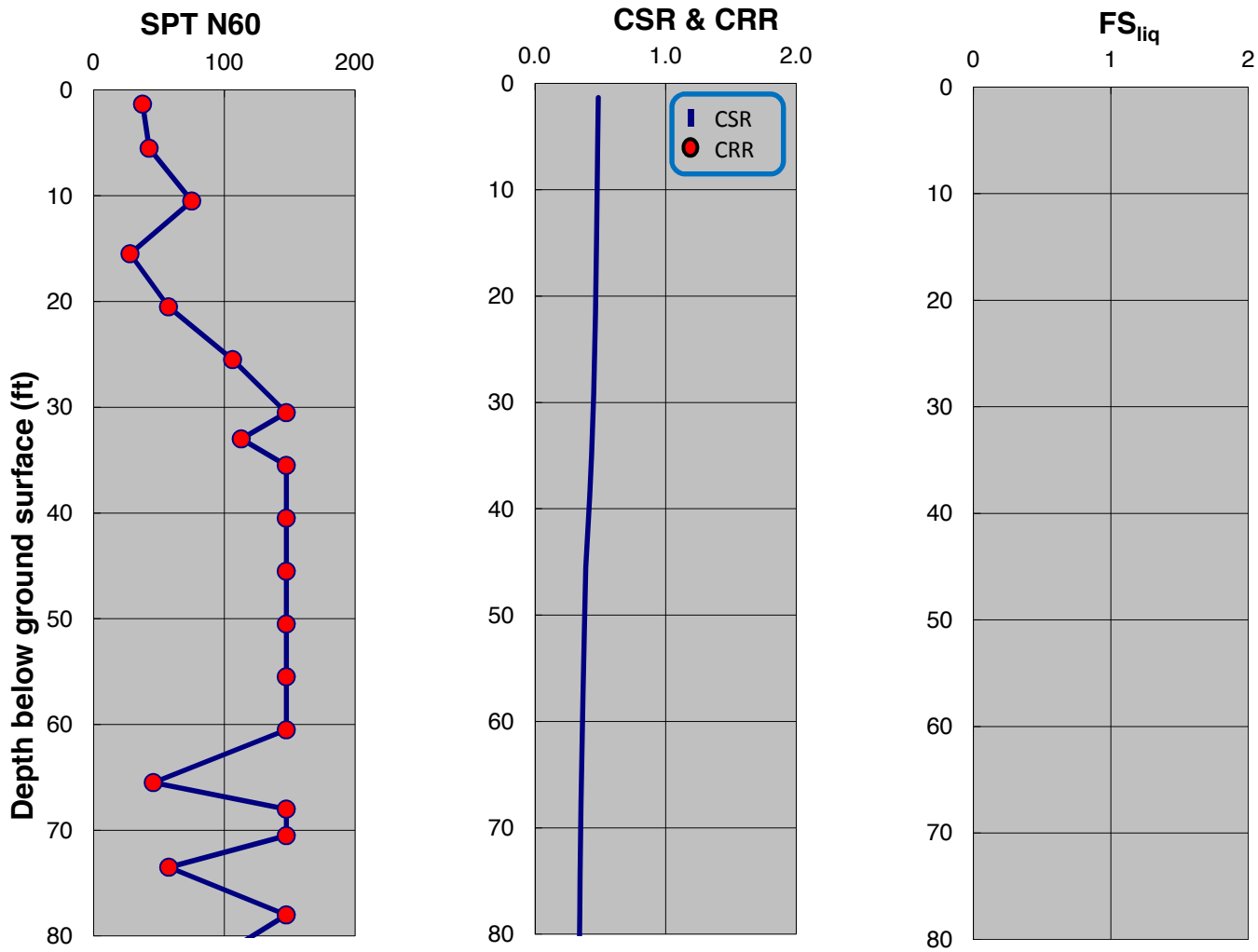
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-68 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-68 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

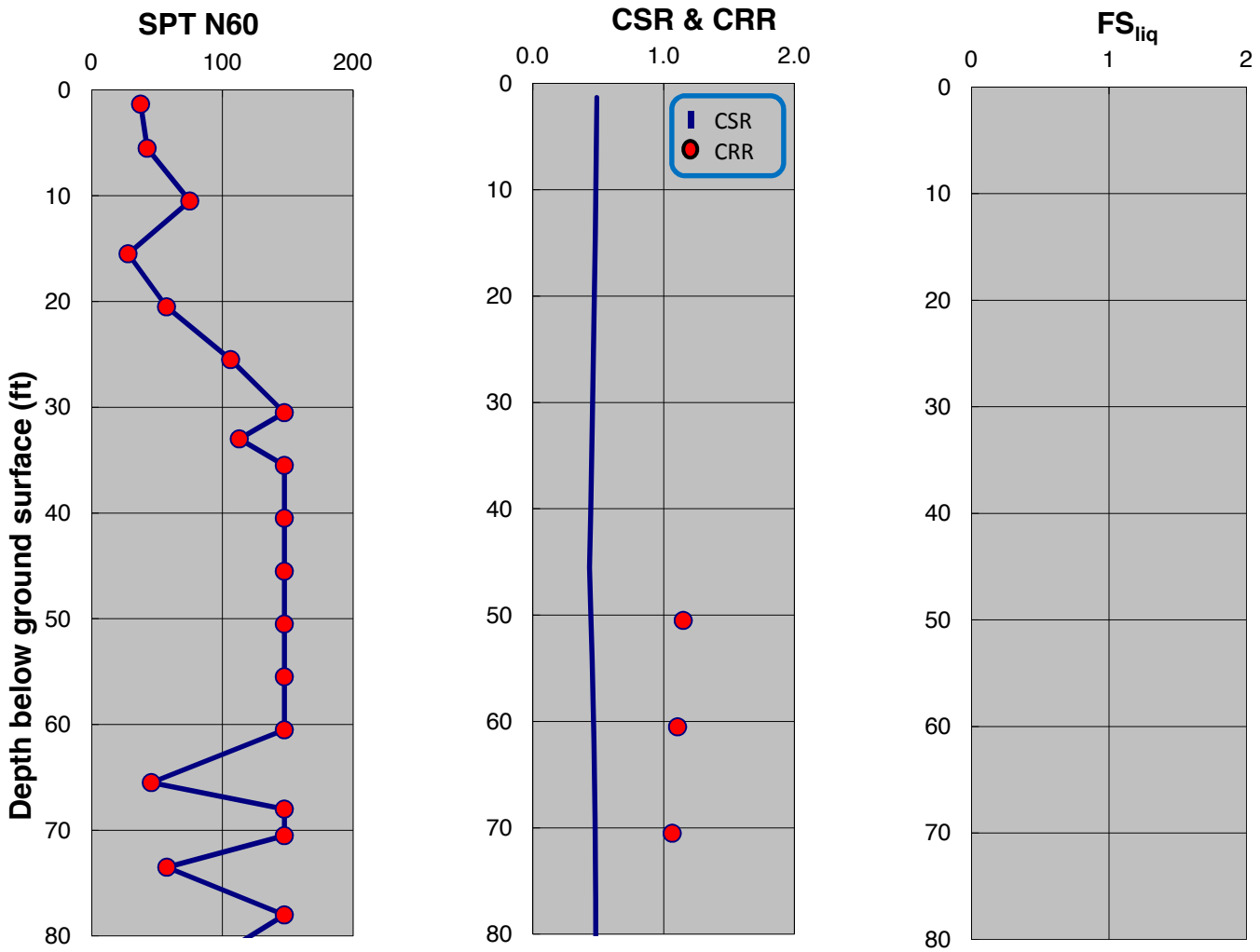
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-69 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

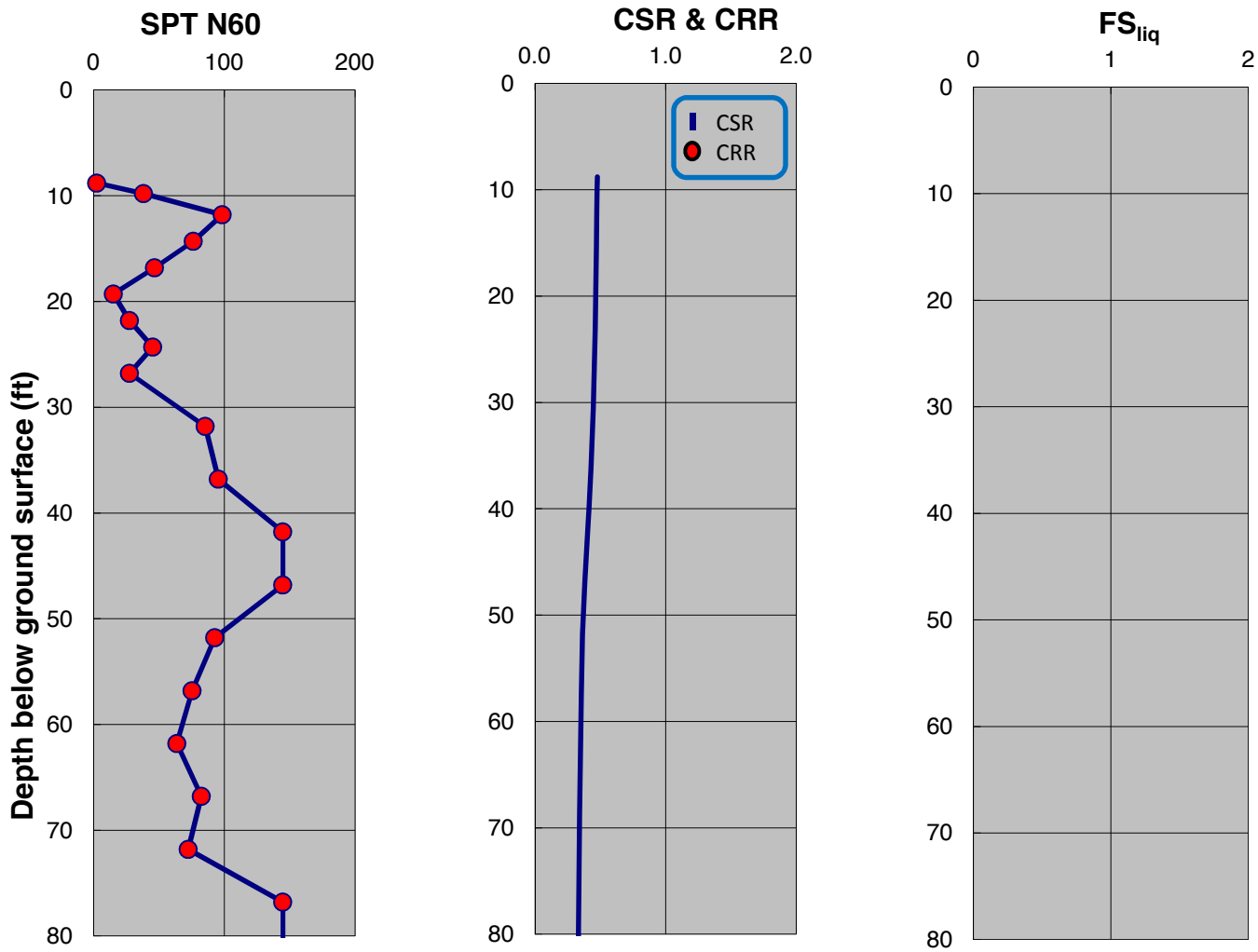
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.65



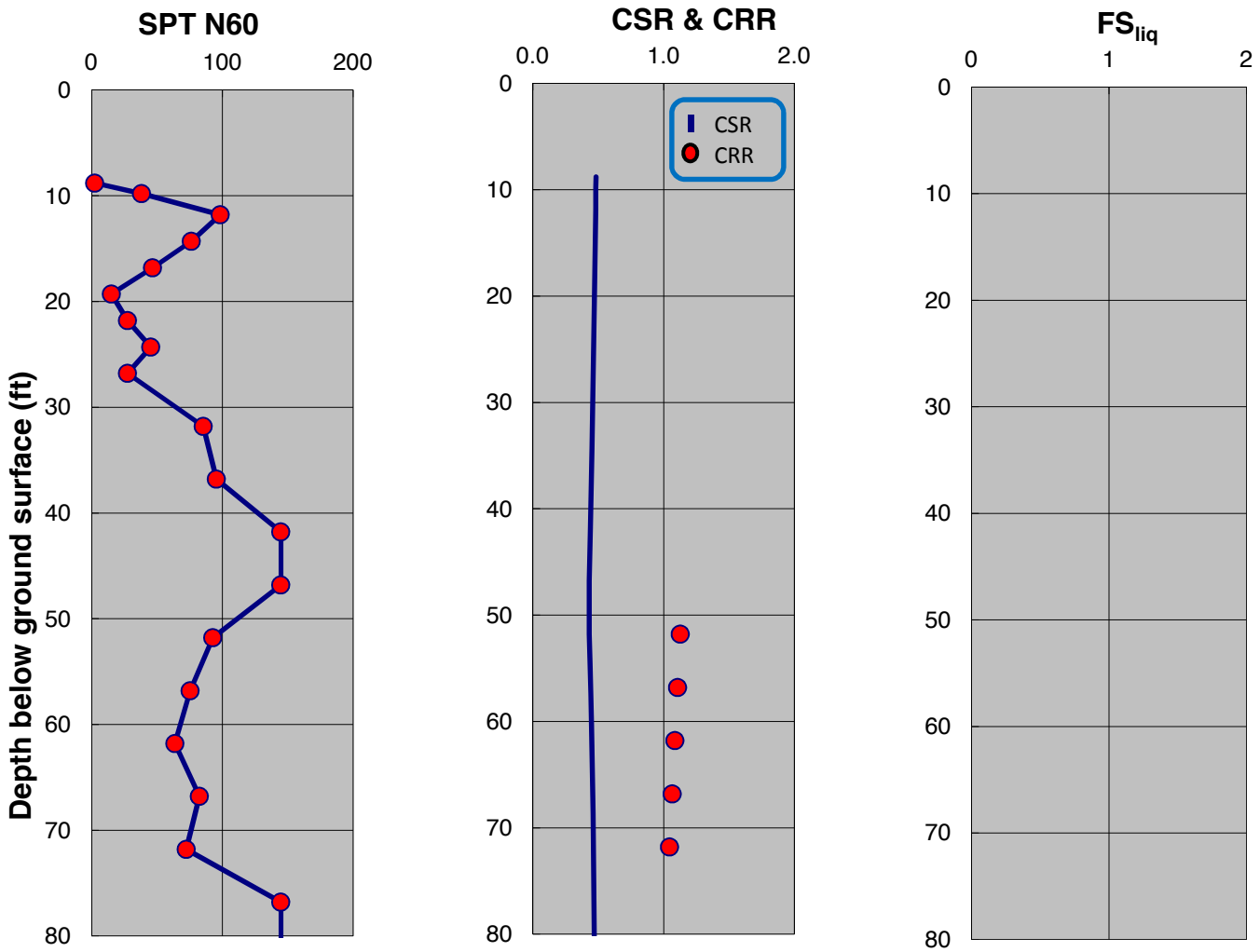
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-69 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-71 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

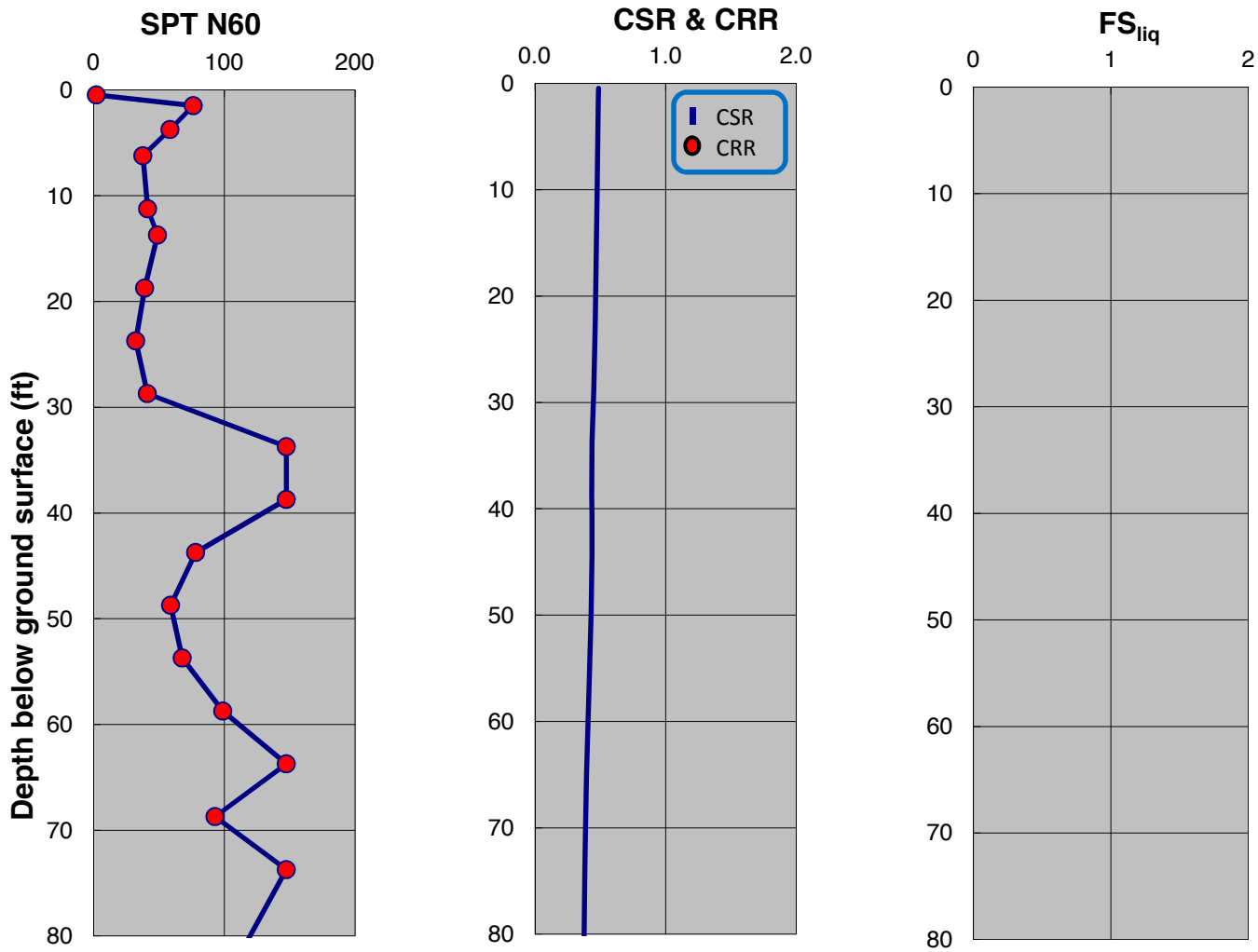
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-71 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

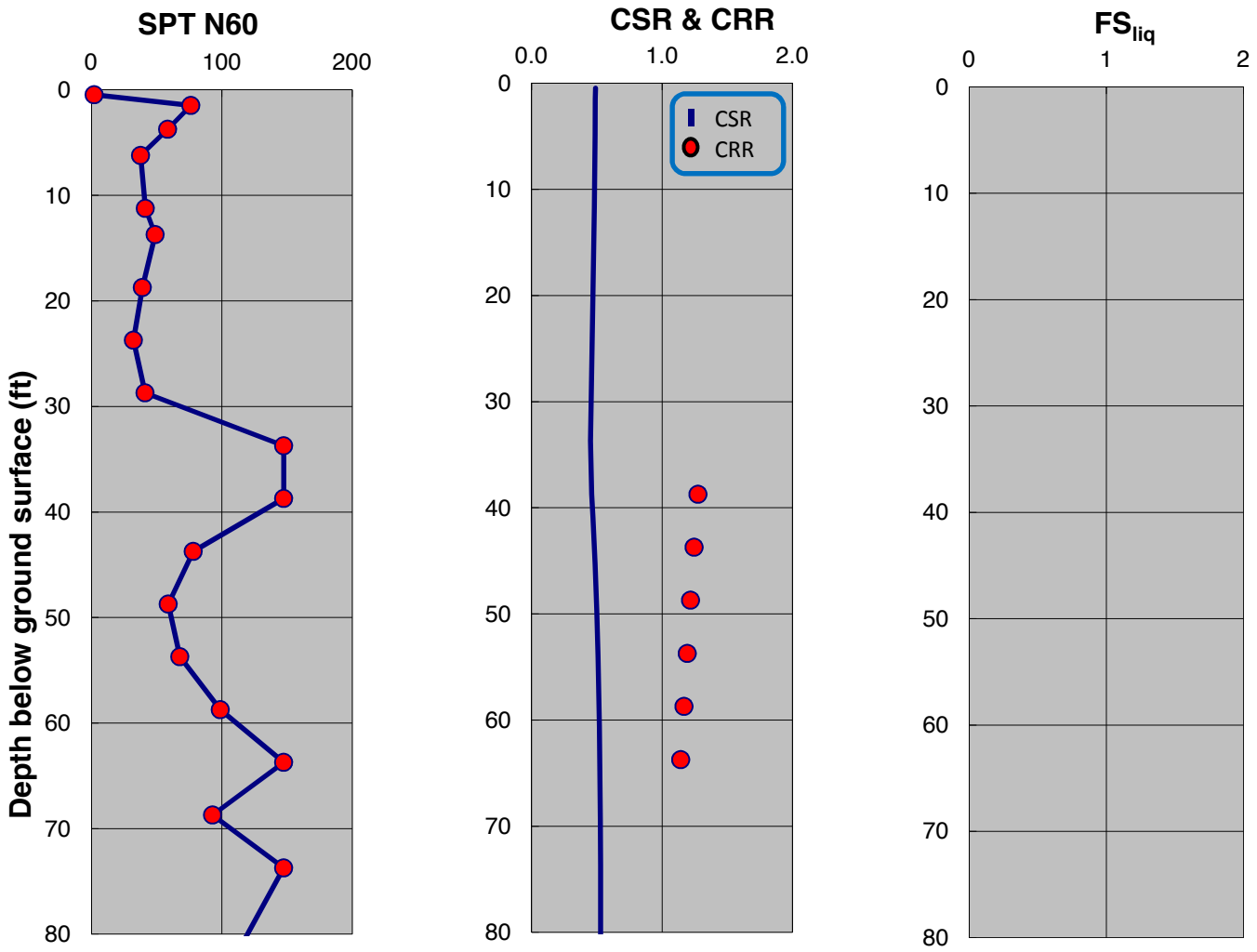
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.68



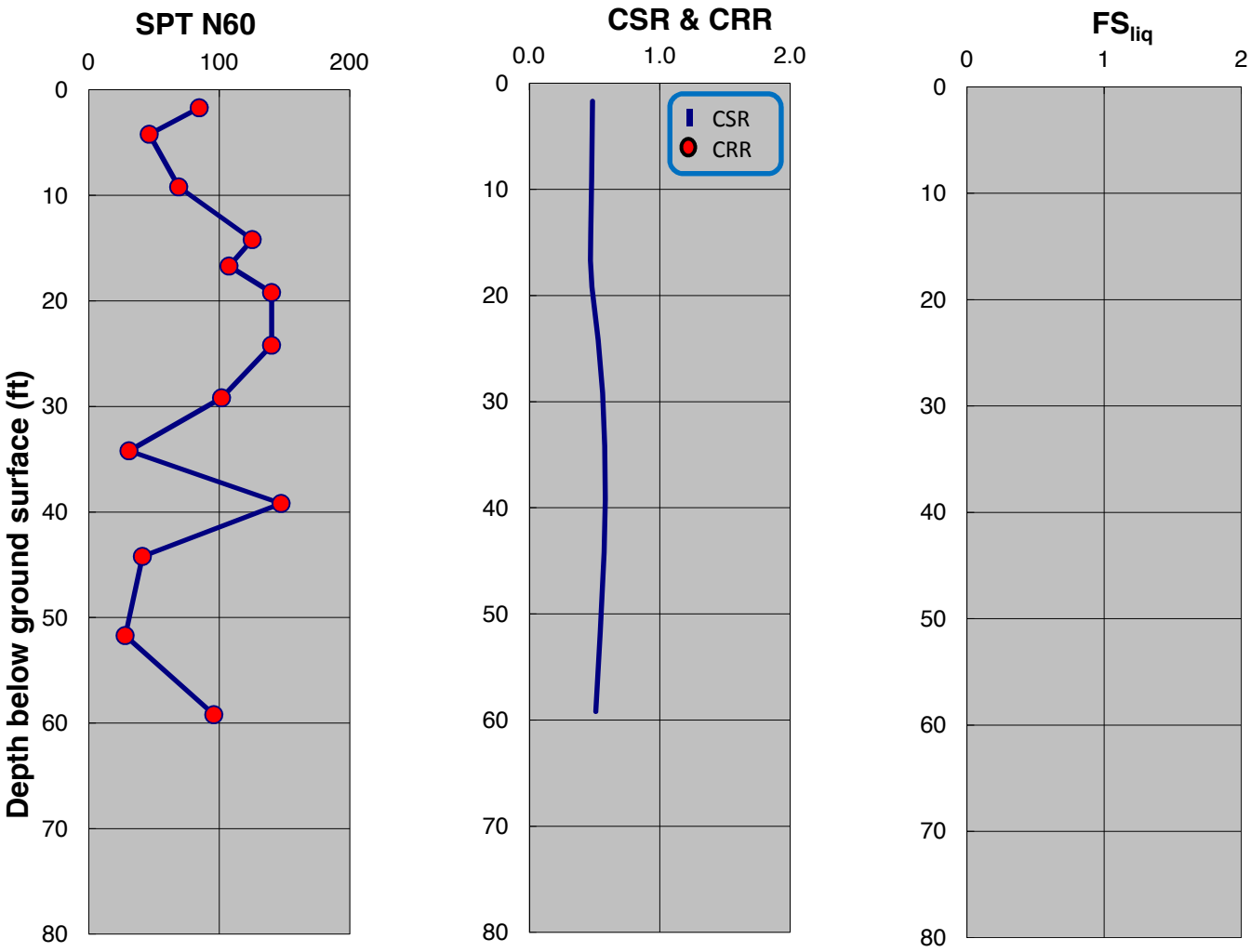
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-72 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-72 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

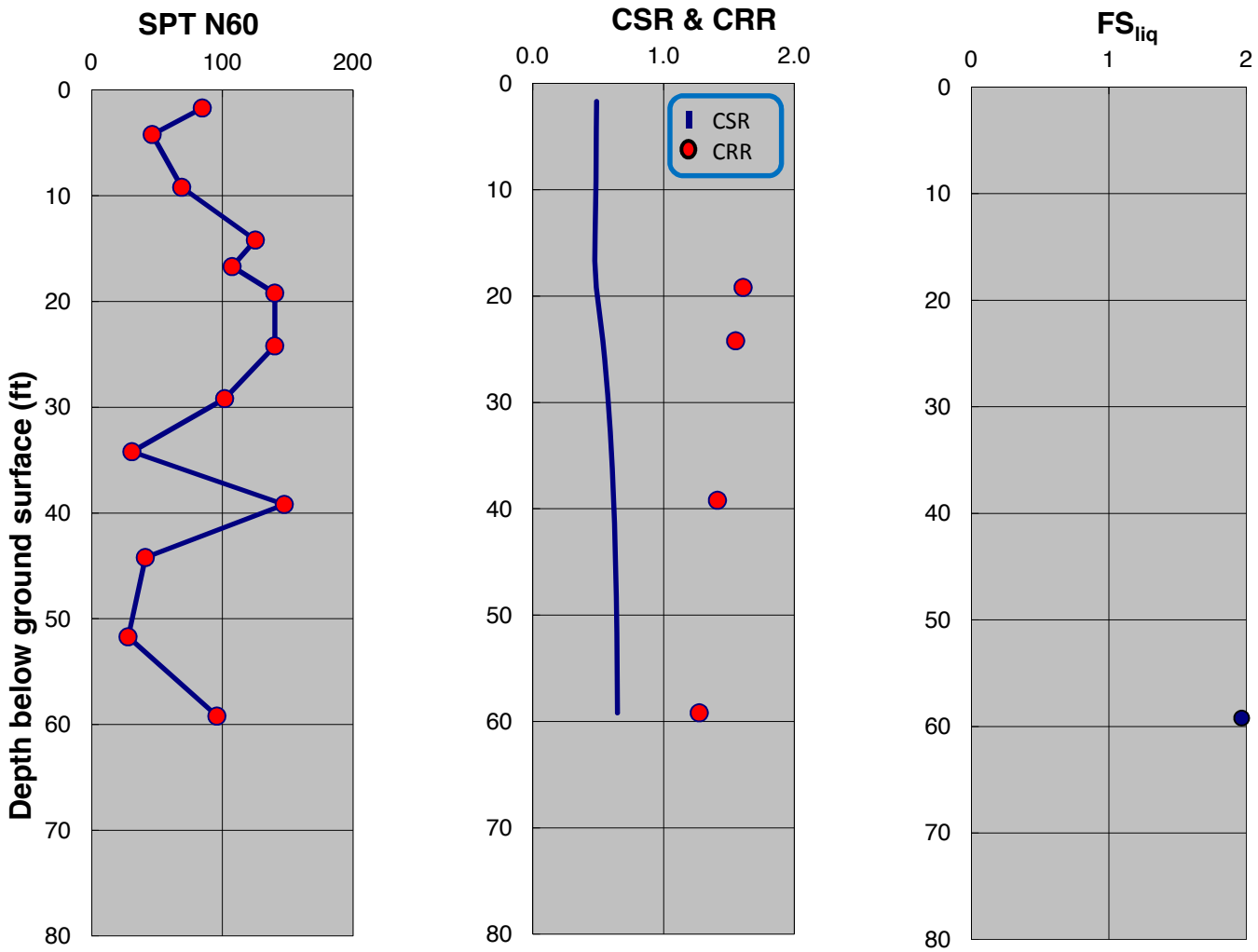
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-73 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

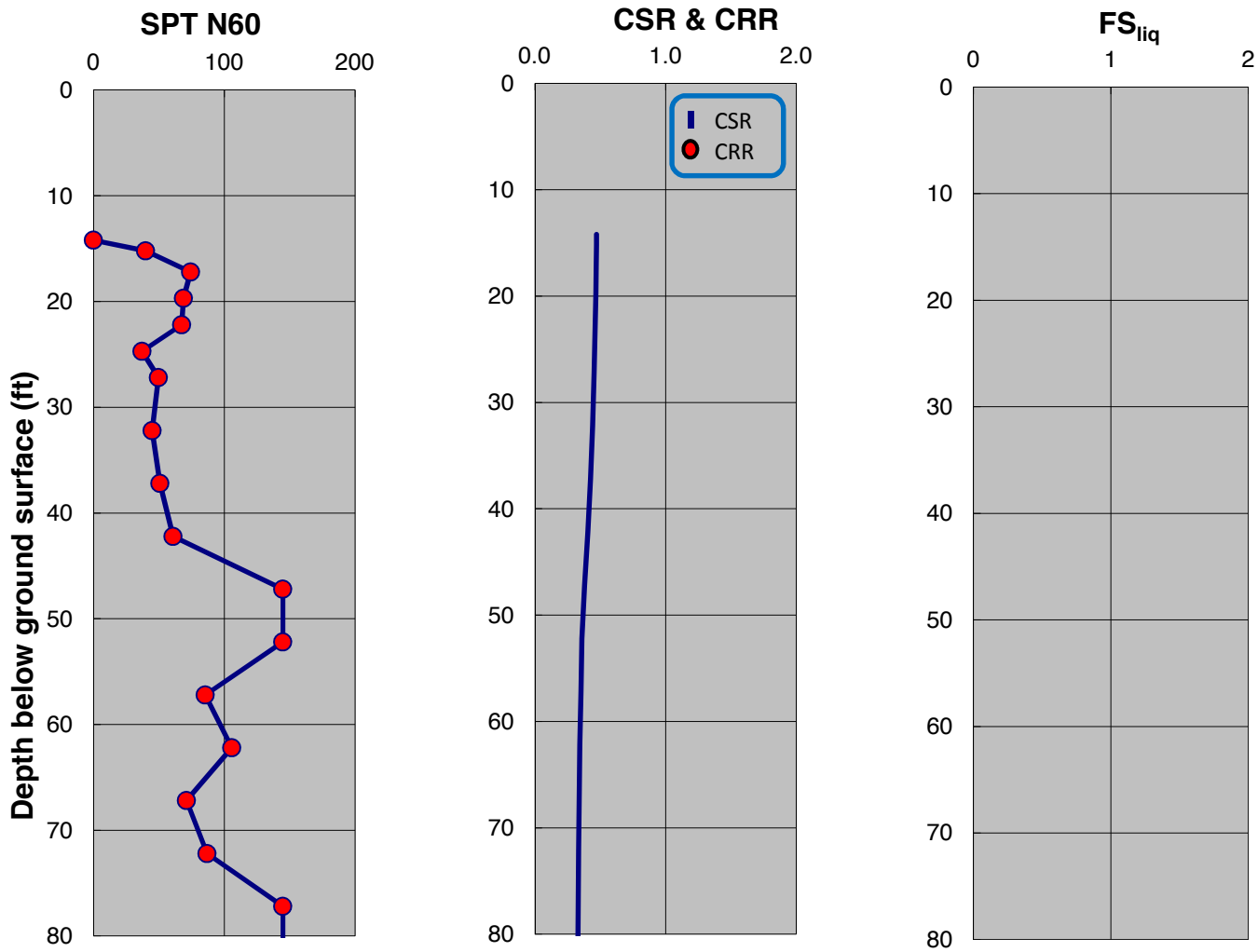
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.71



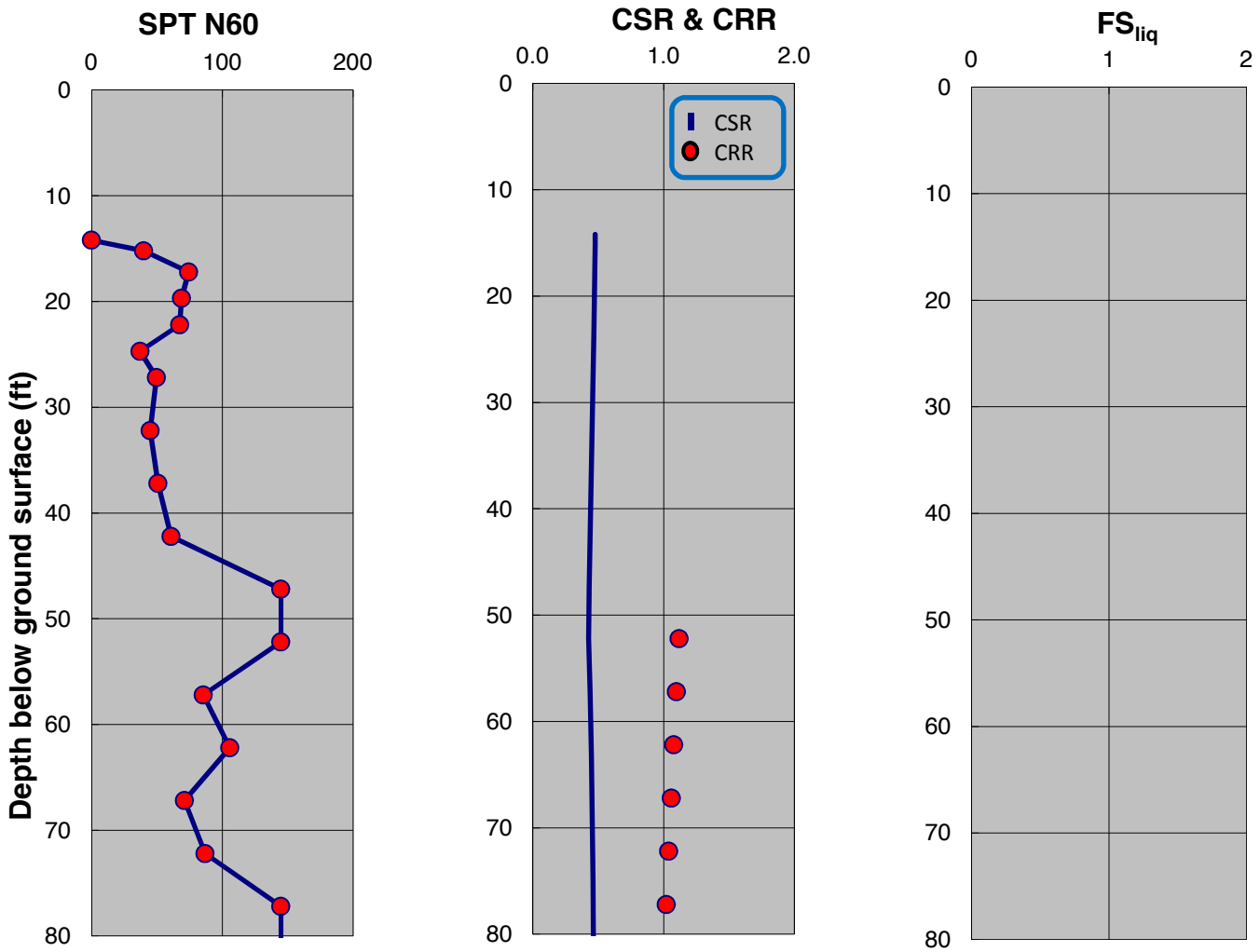
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-73 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-74 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

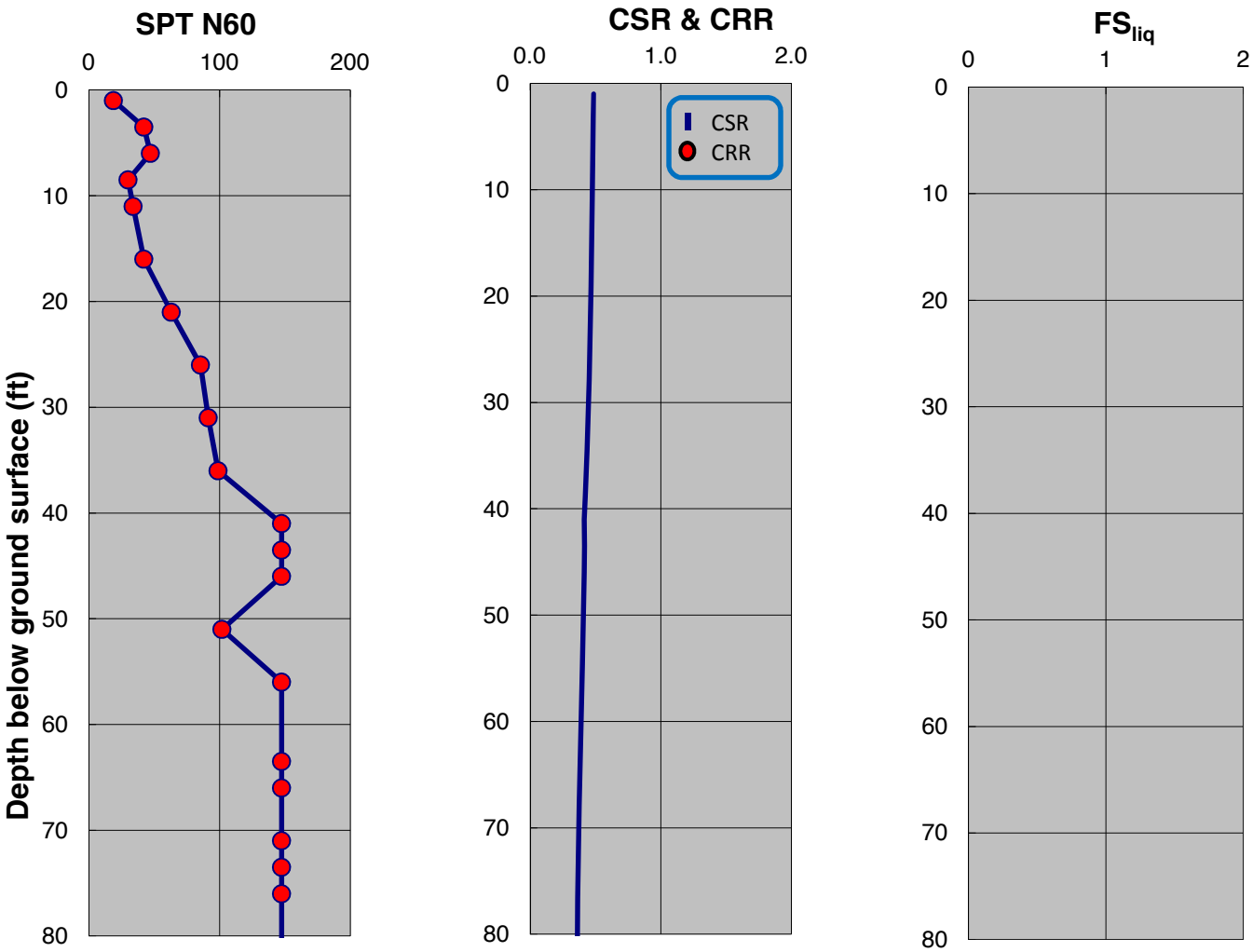
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-74 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

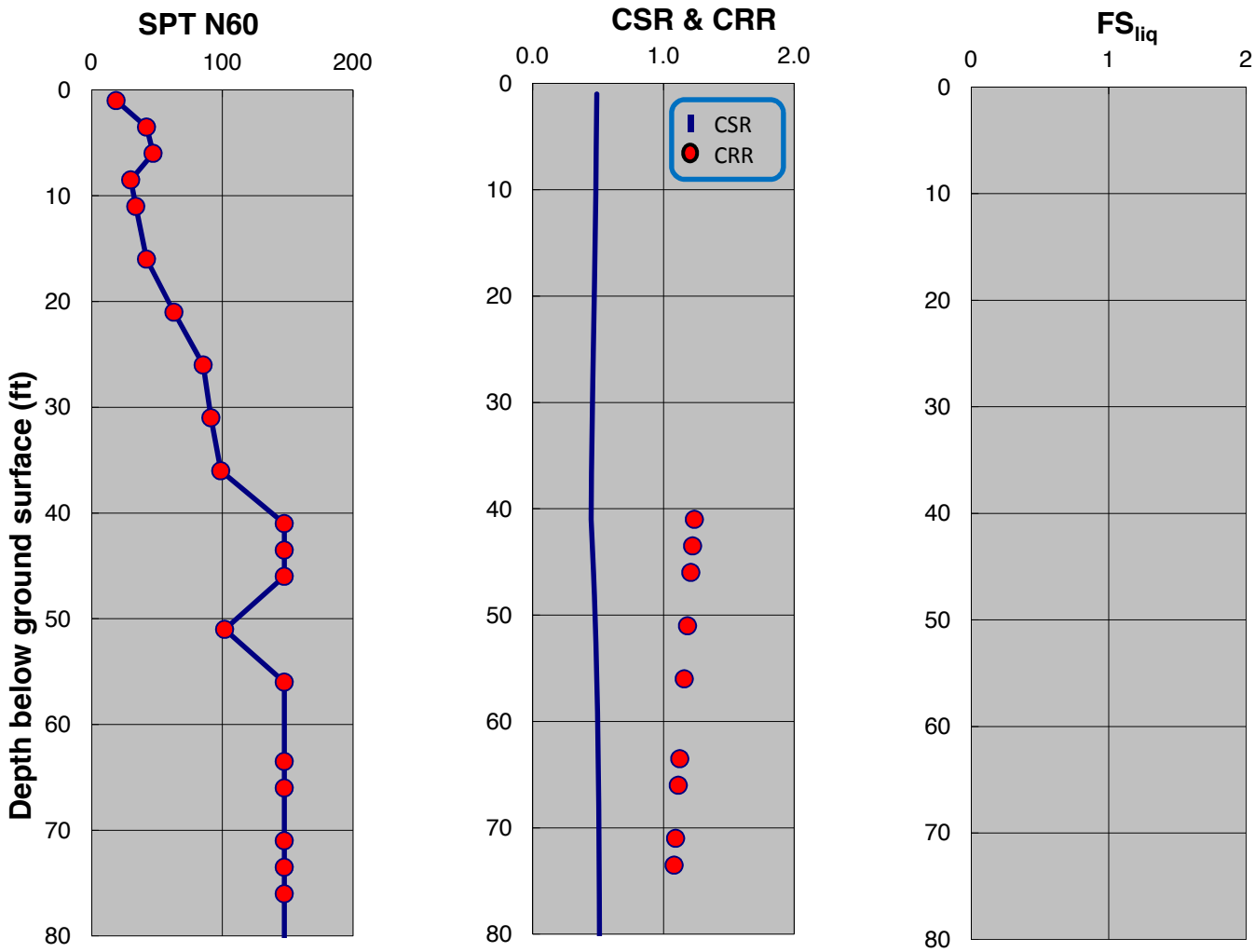
PLATE D.74



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-75 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

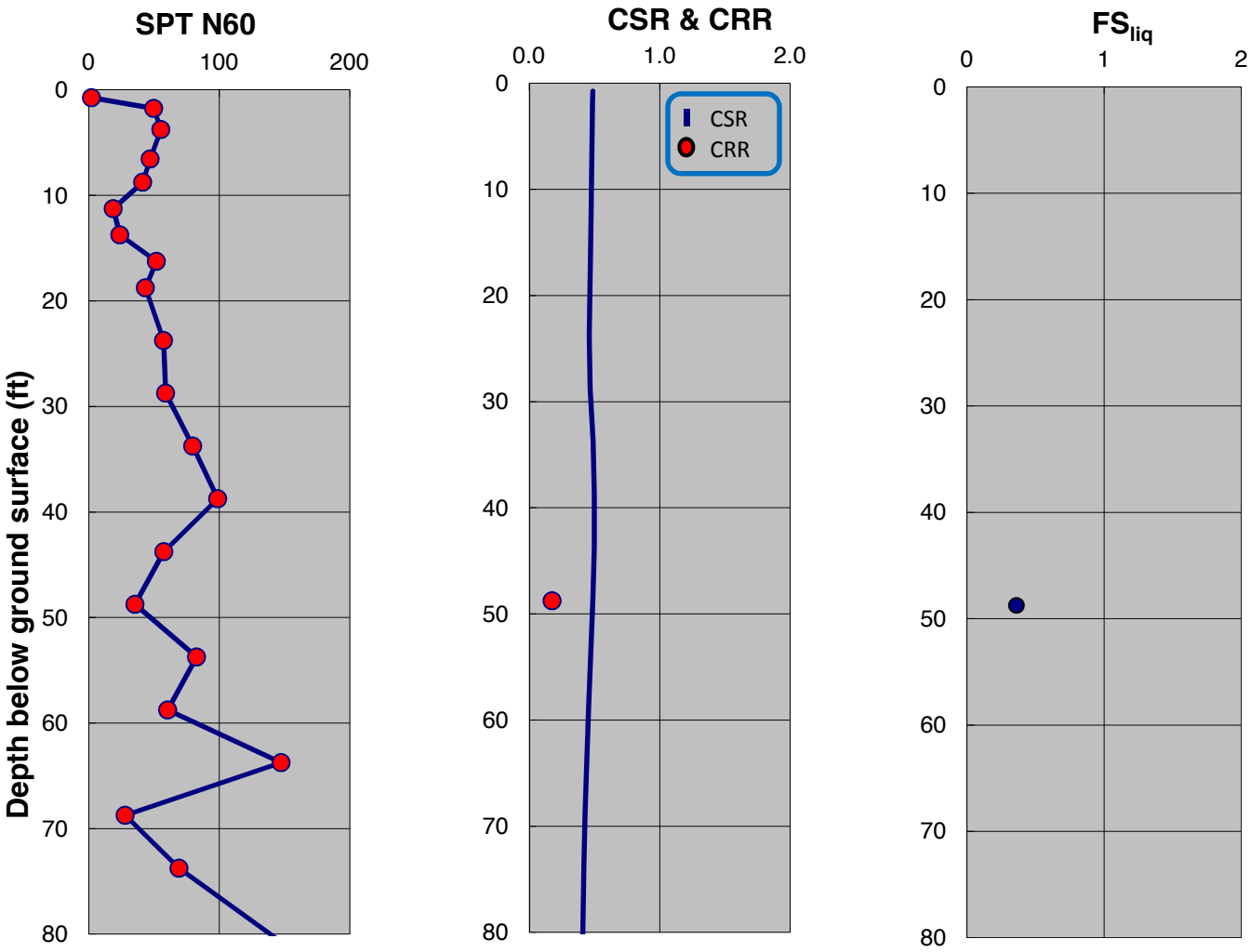
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.75



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-75 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

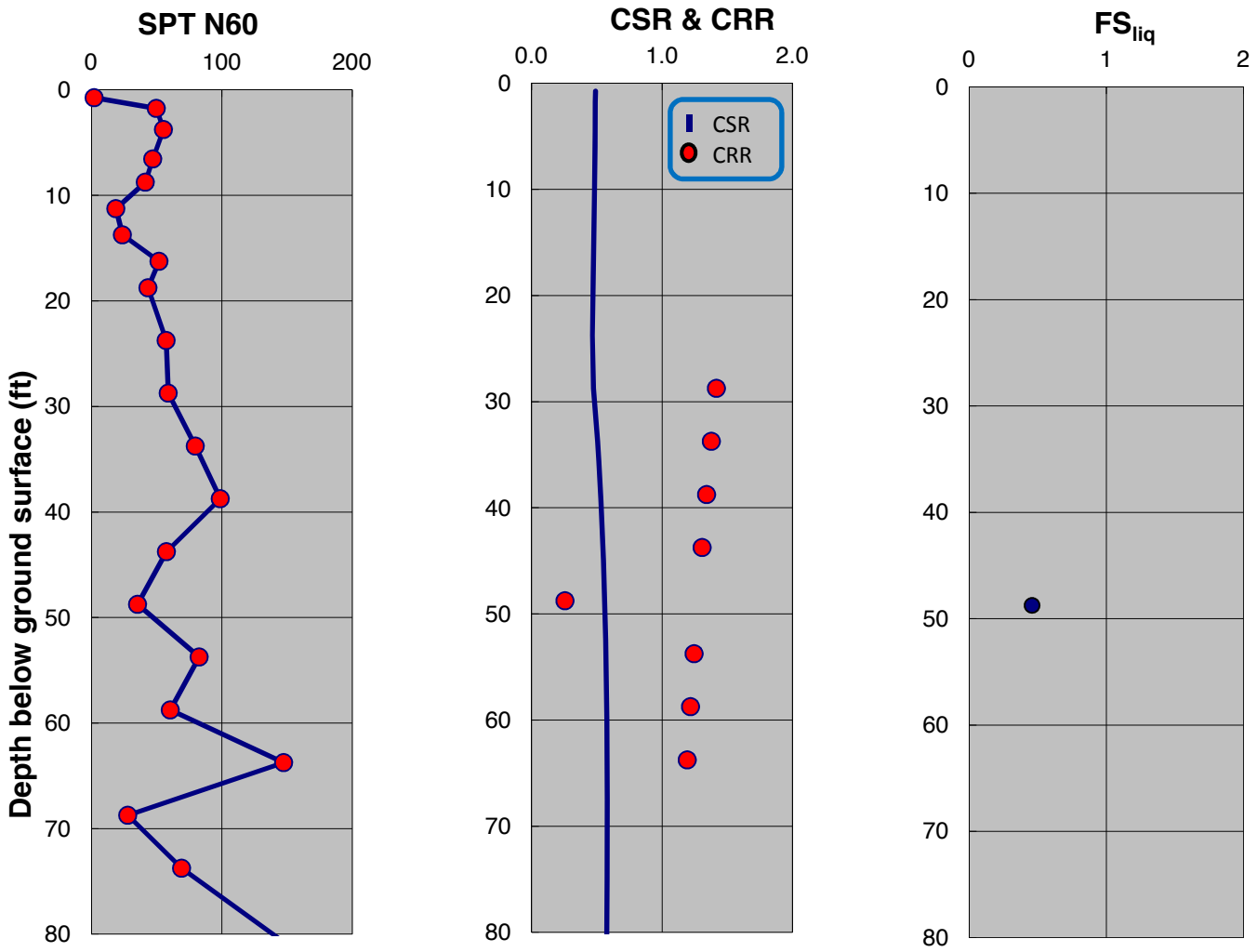
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-76 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

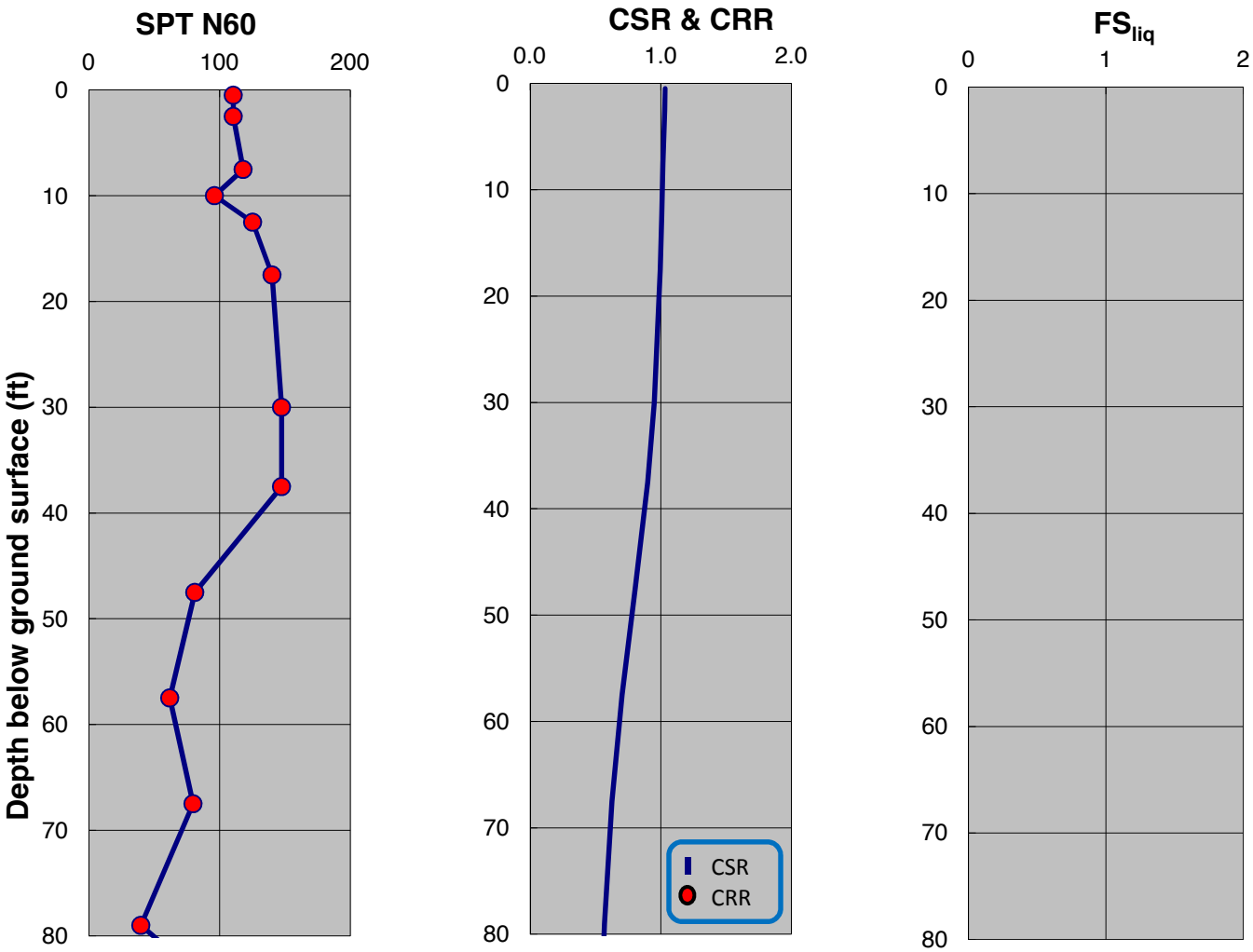
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.77



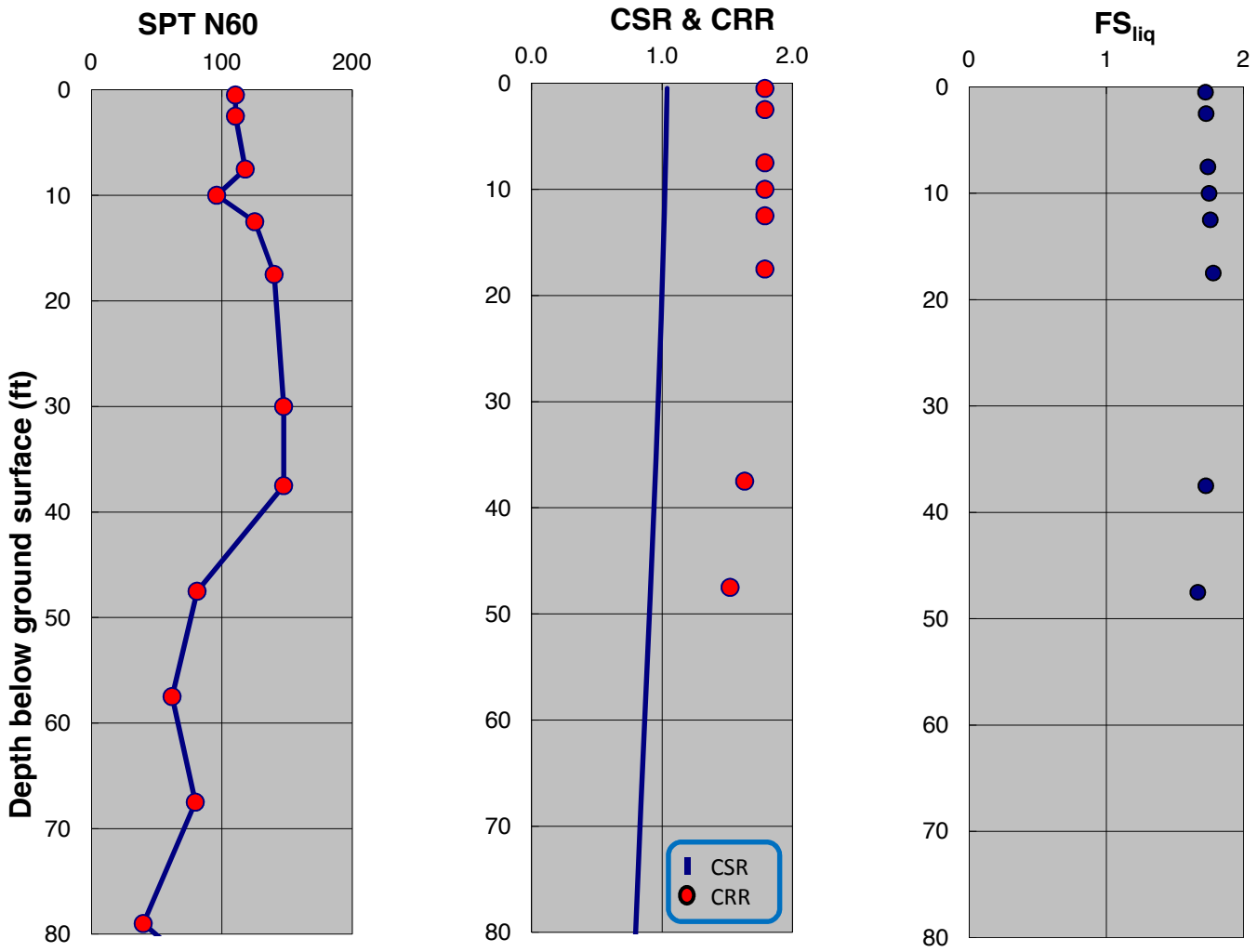
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-76 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



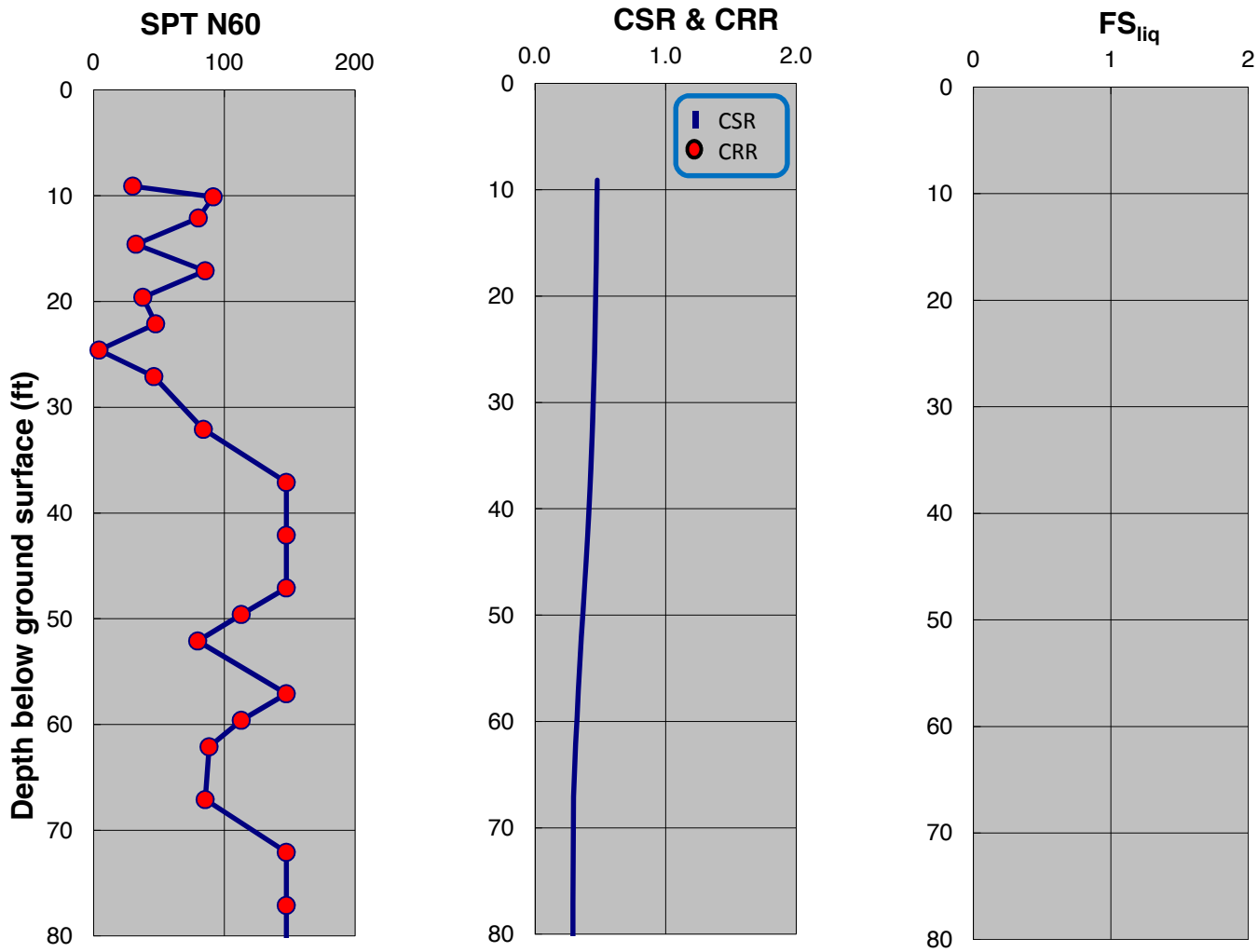
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-77 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



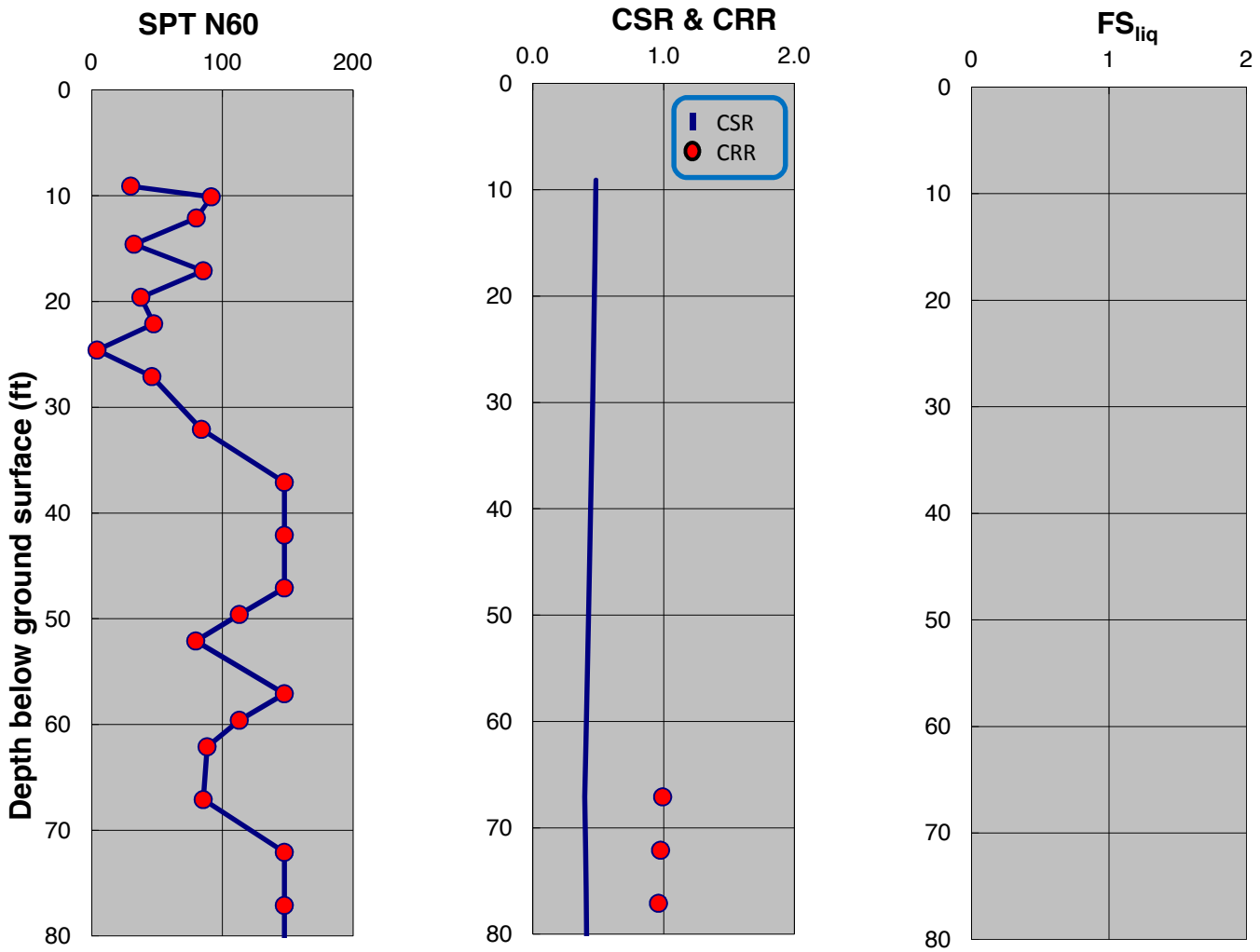
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-77 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



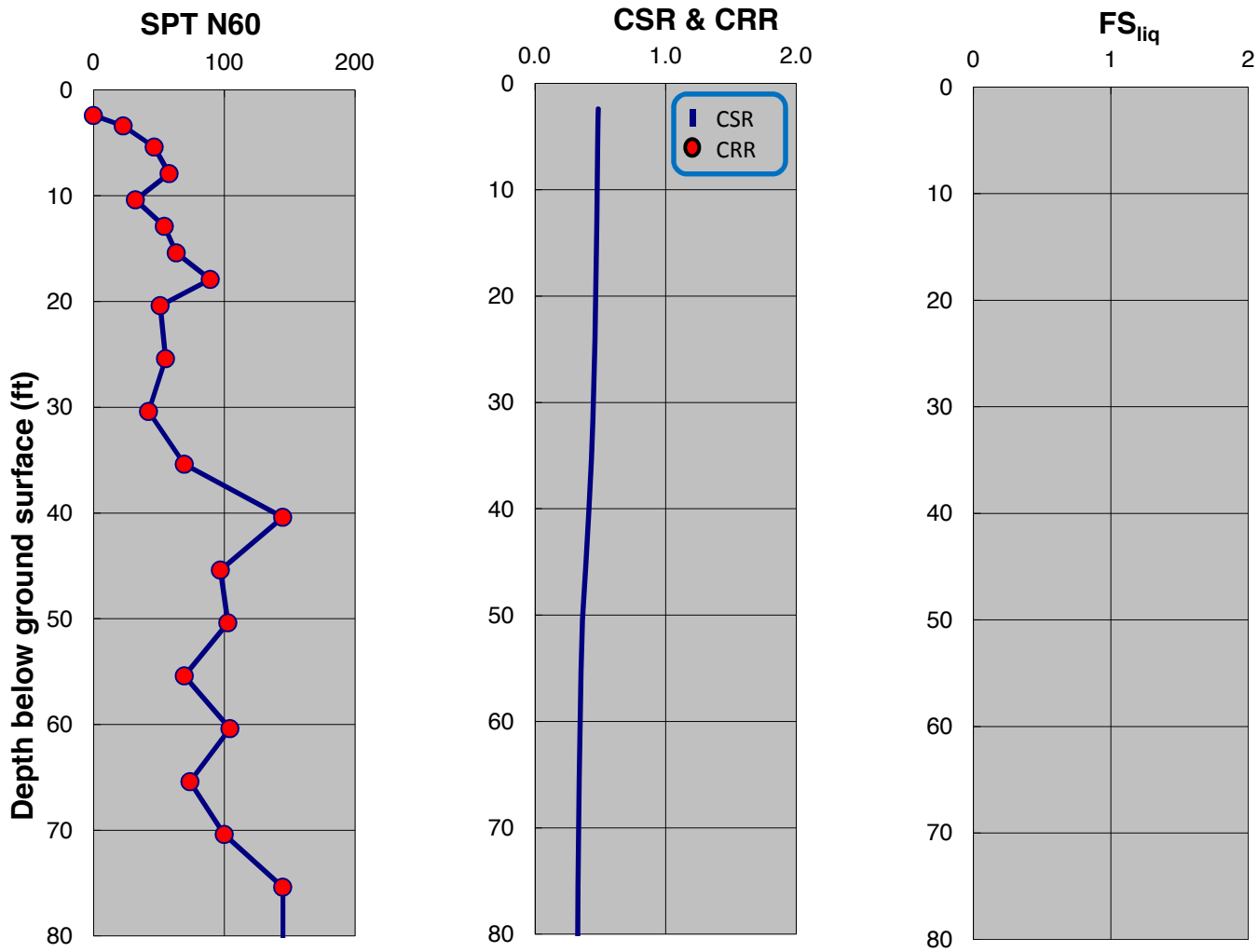
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-78 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



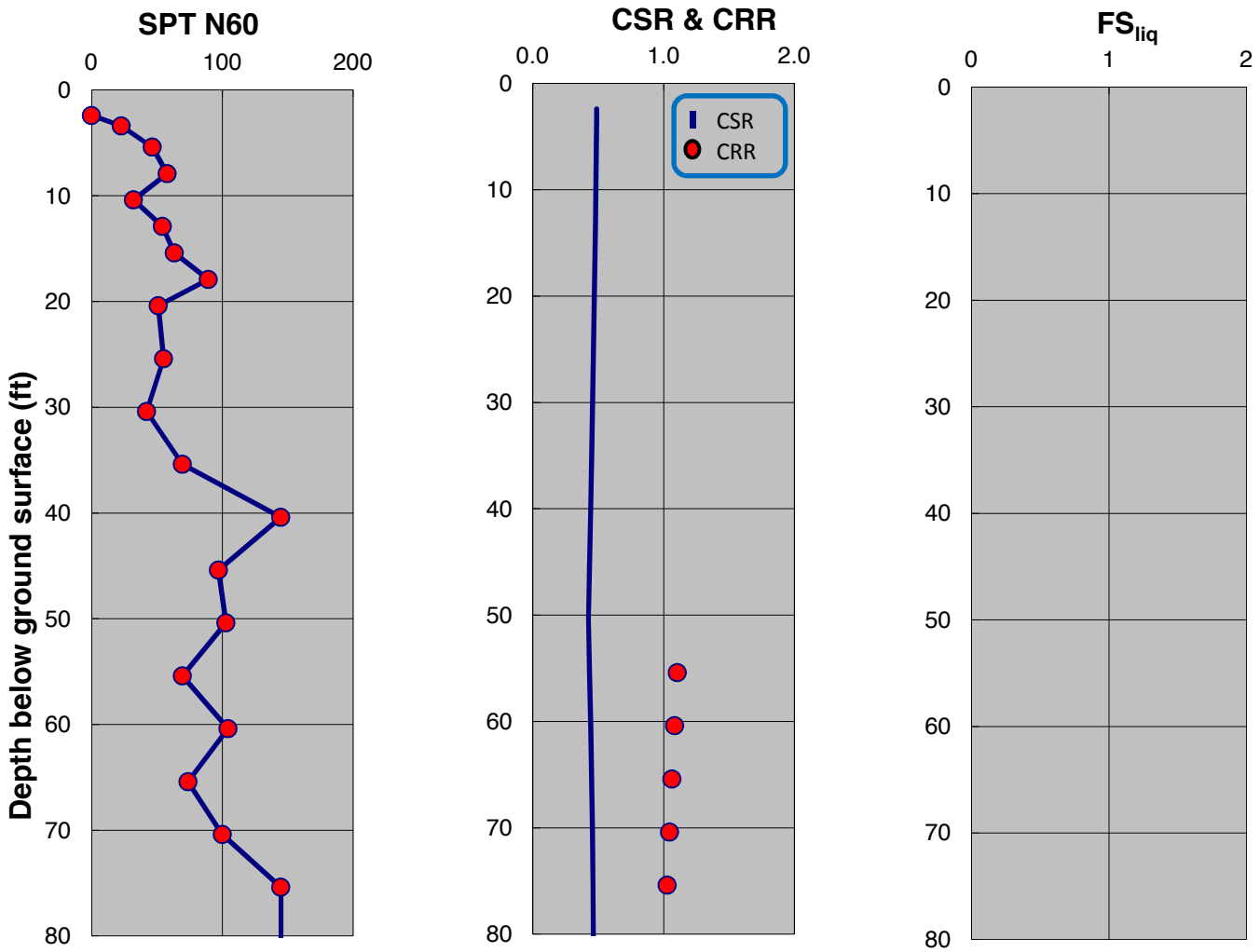
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-78 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



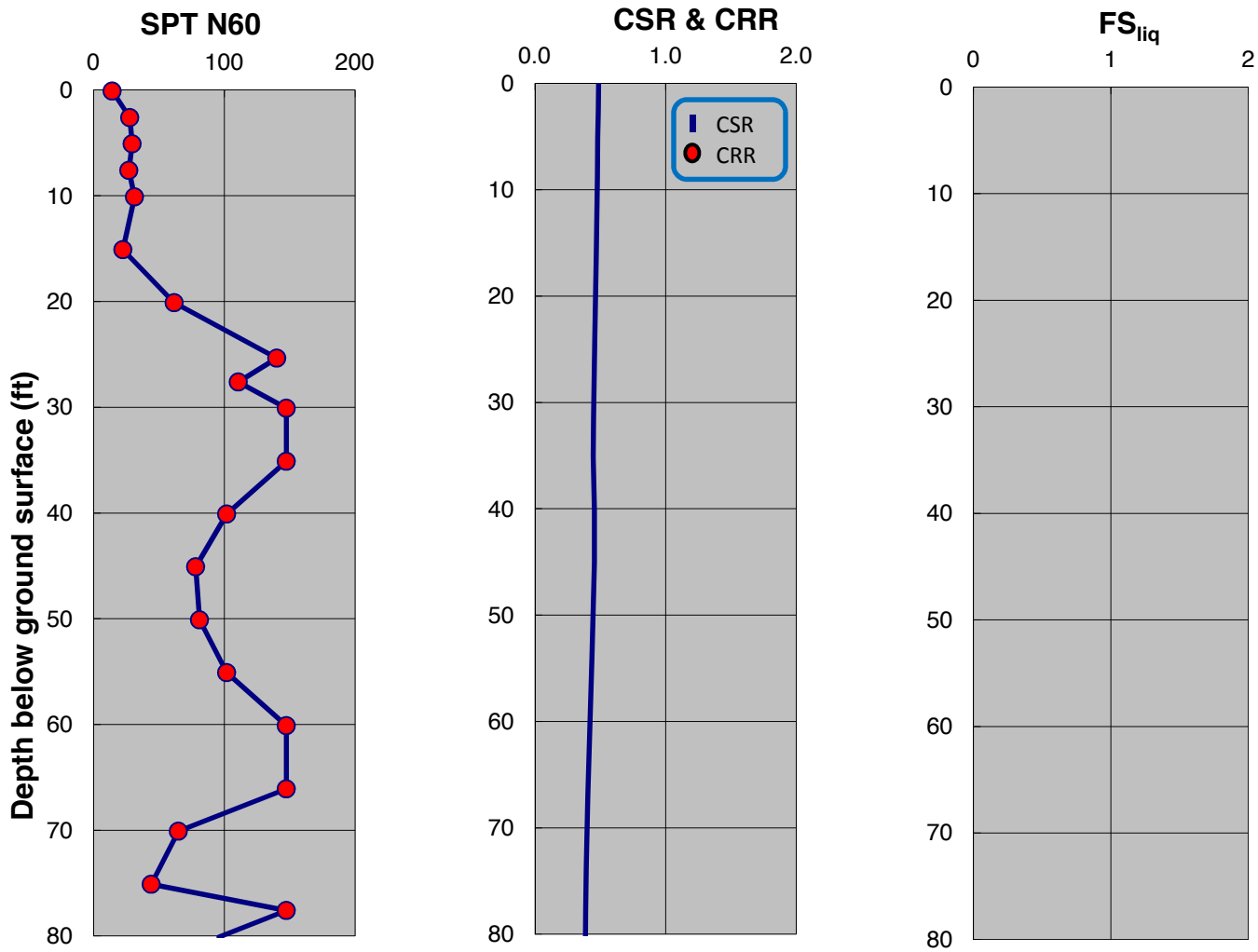
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-79 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-79 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

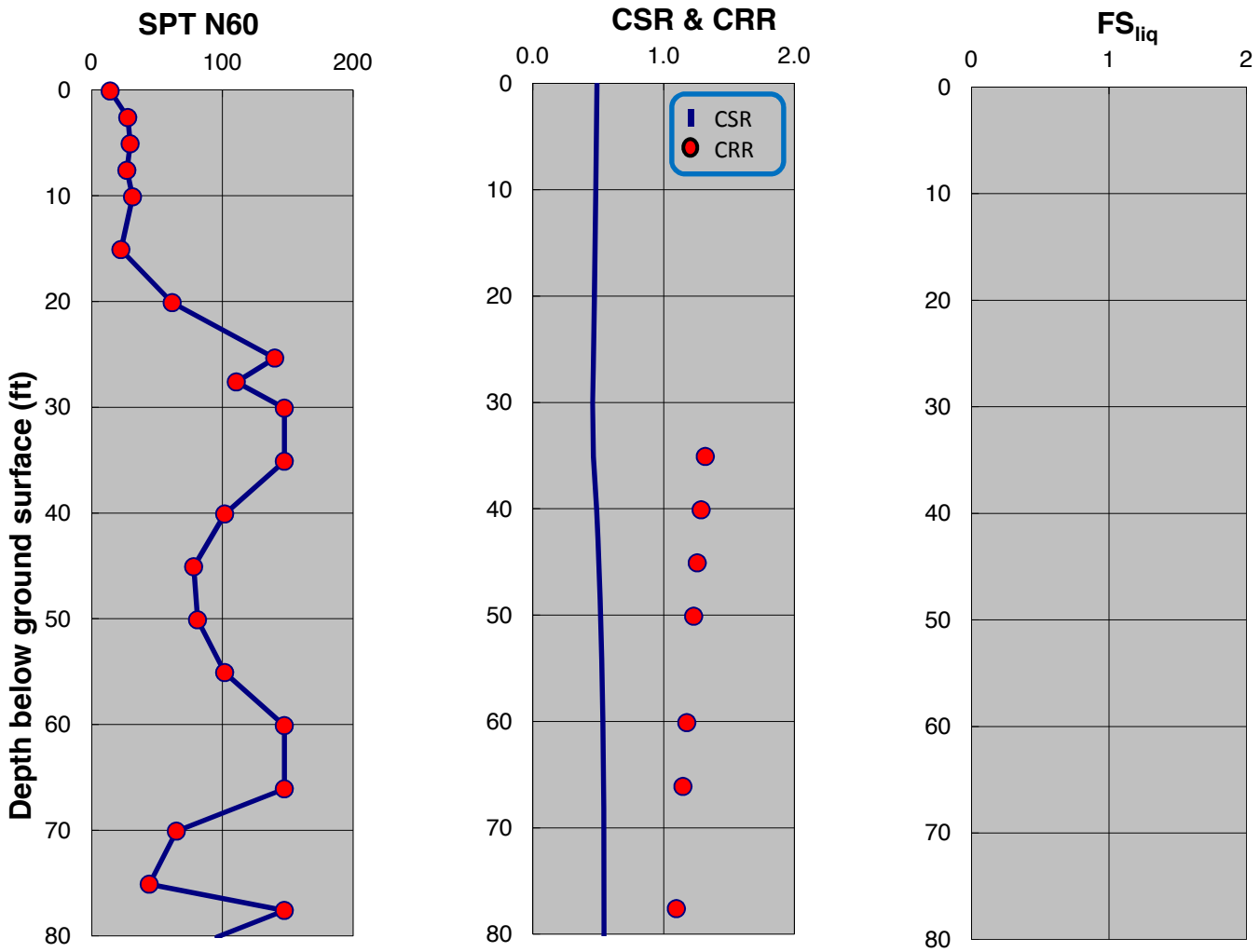
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-80 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

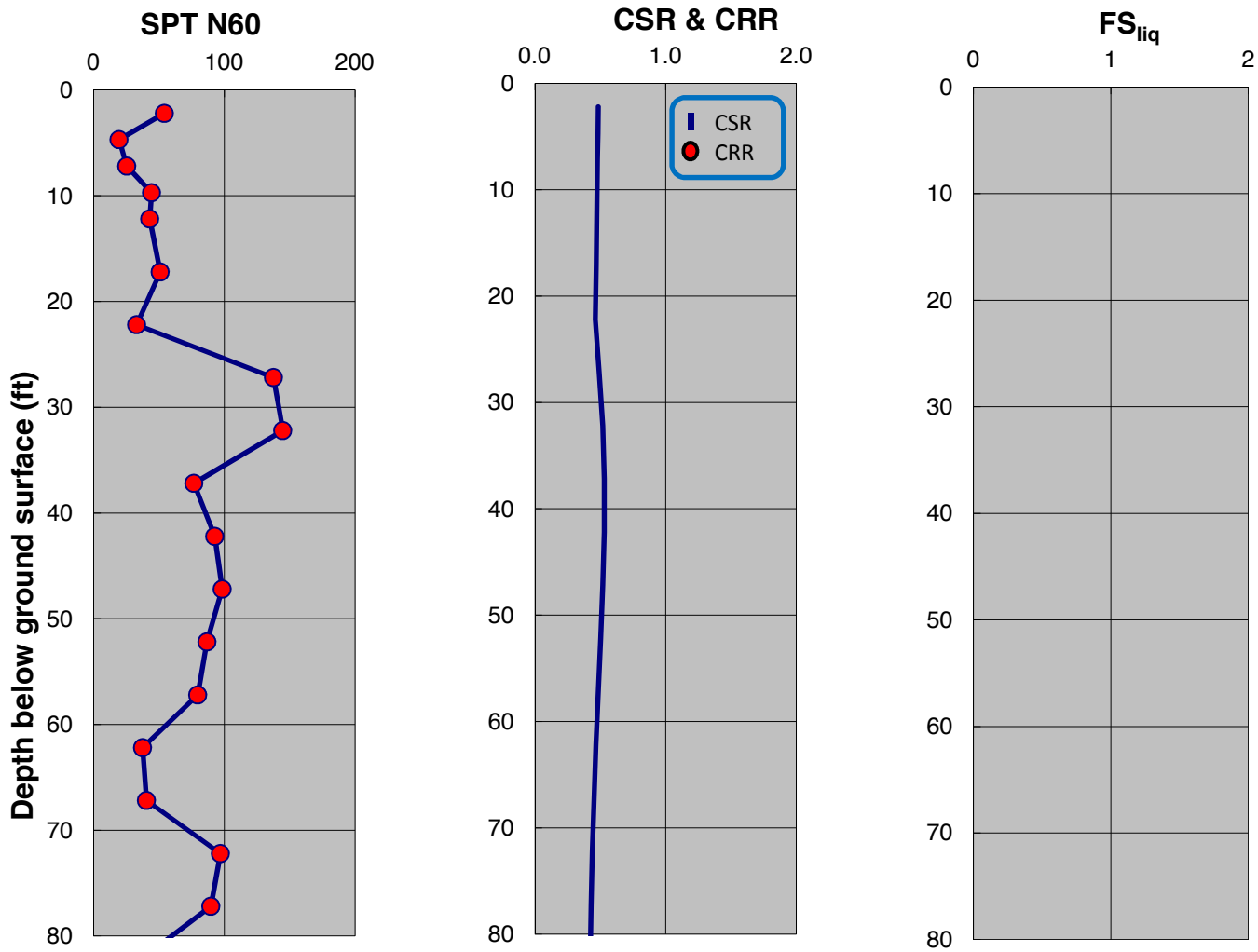
PLATE D.85



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-80 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

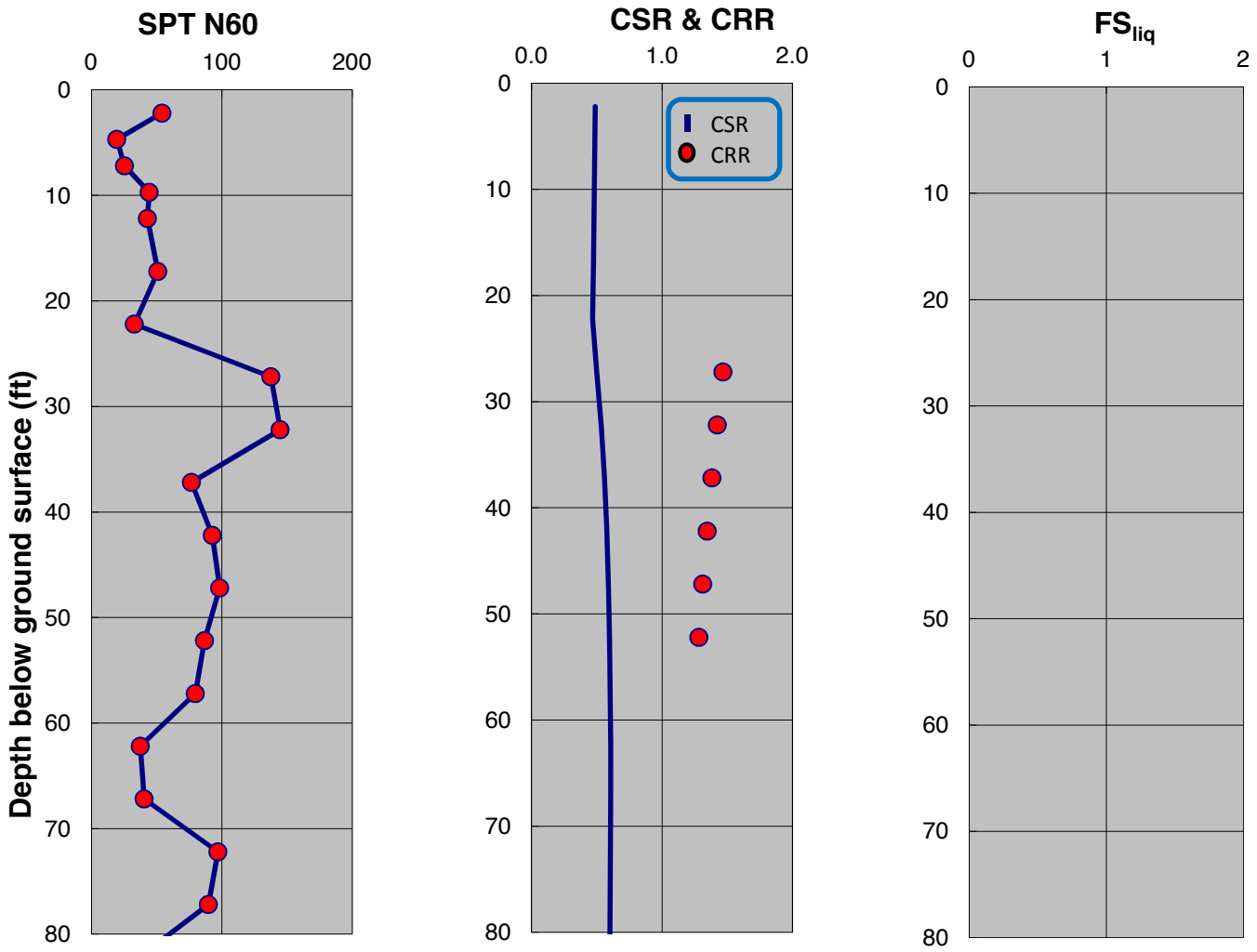
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.86



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-81 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

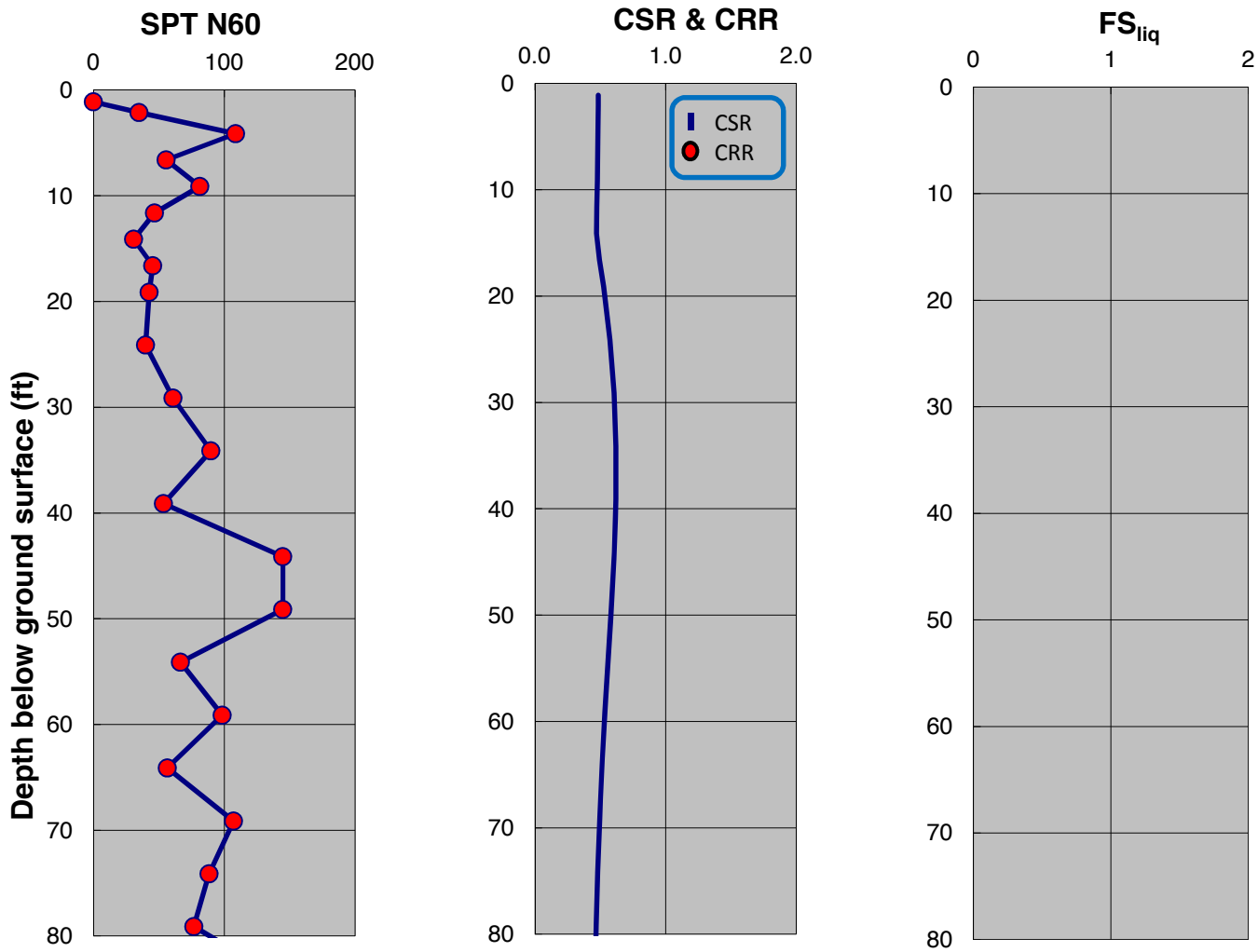
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-81 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

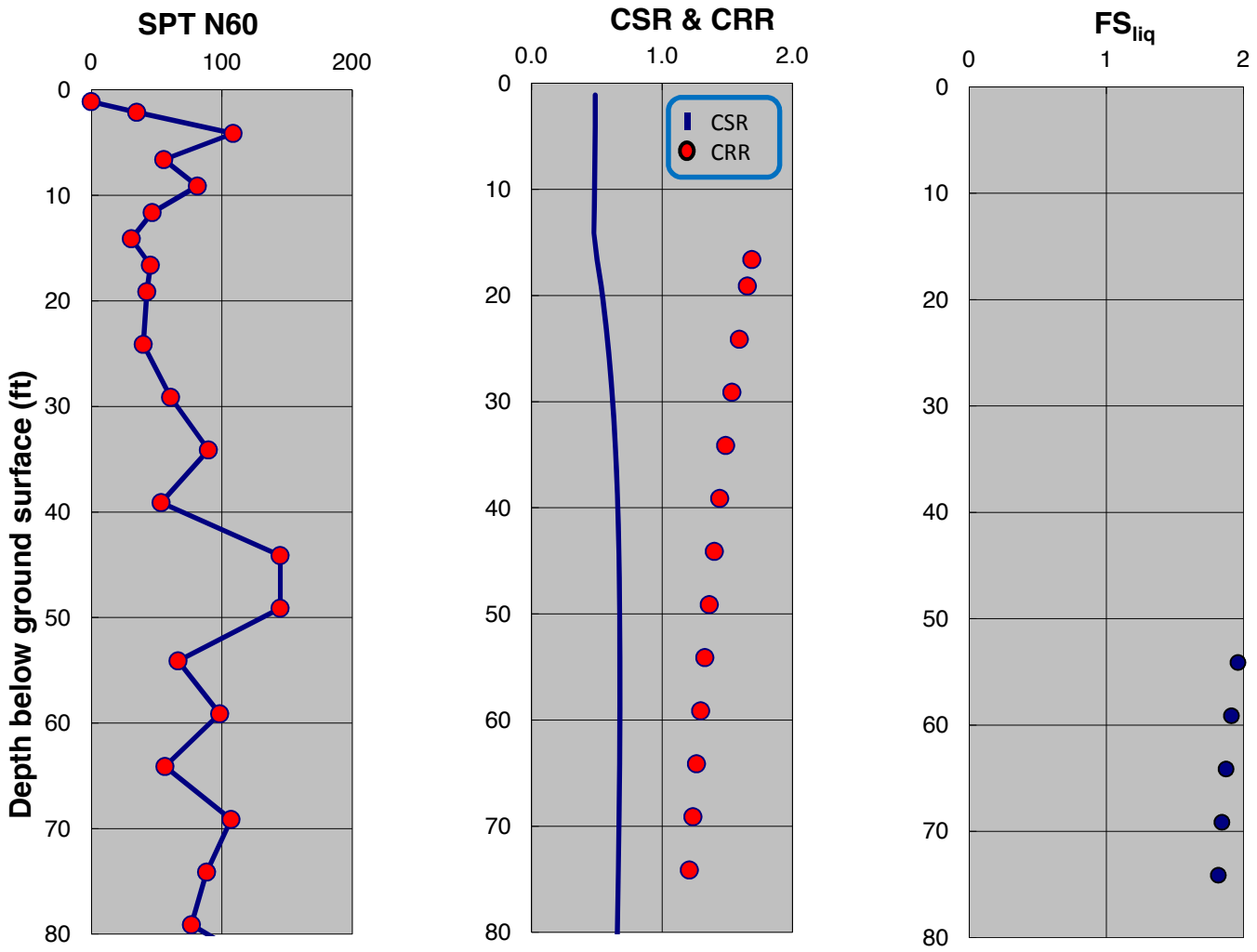
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.88



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-82 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

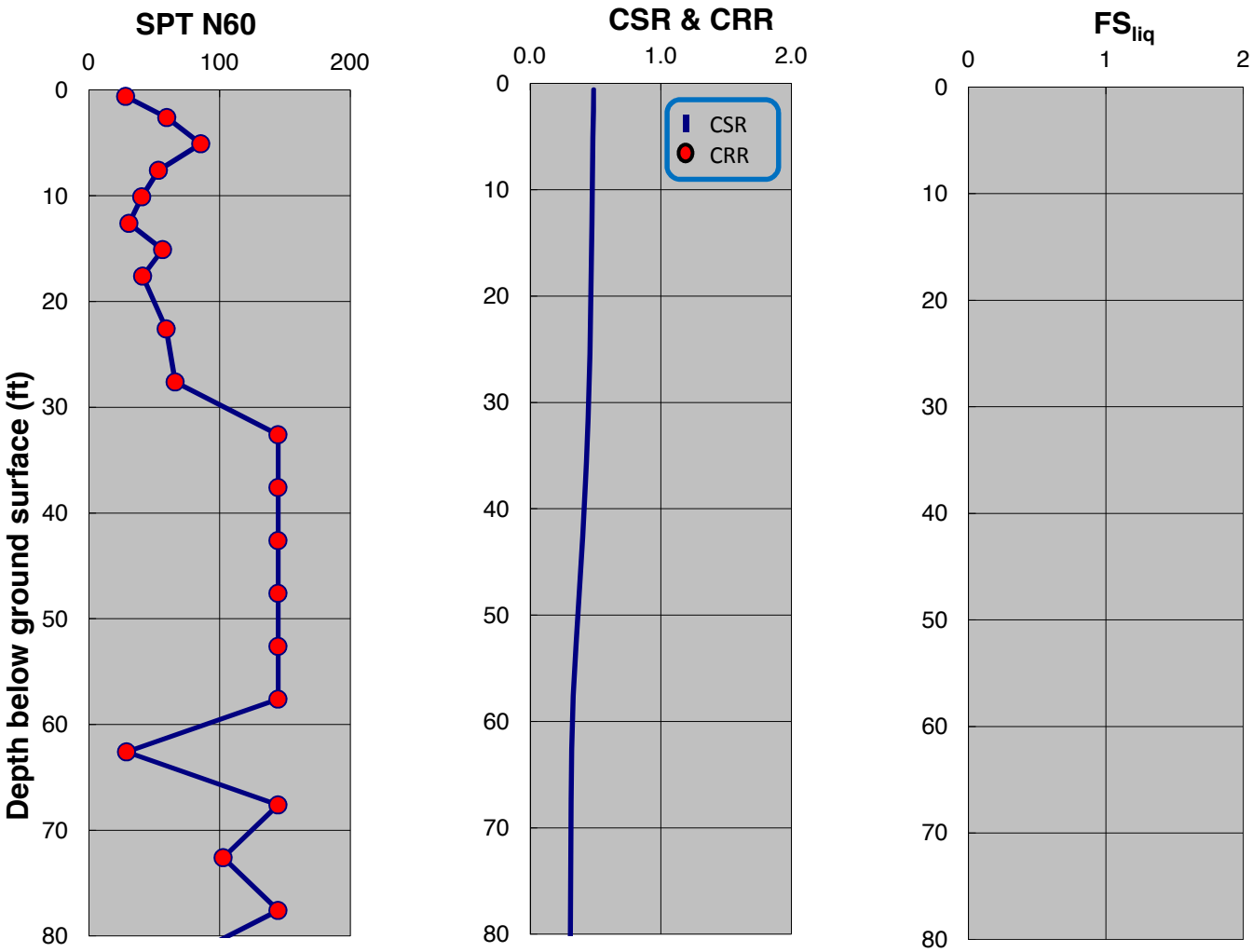
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-82 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

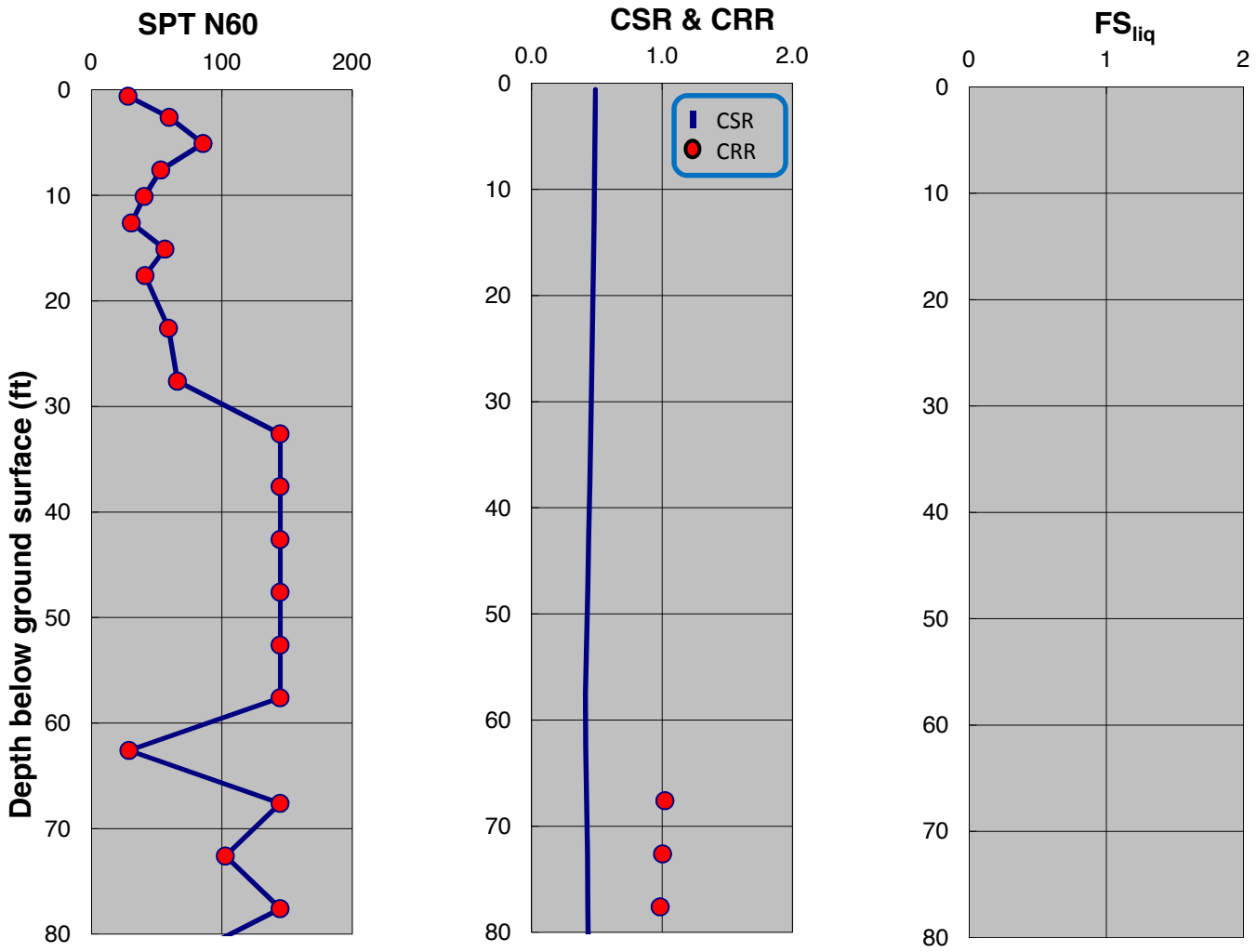
PLATE D.90



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-83 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

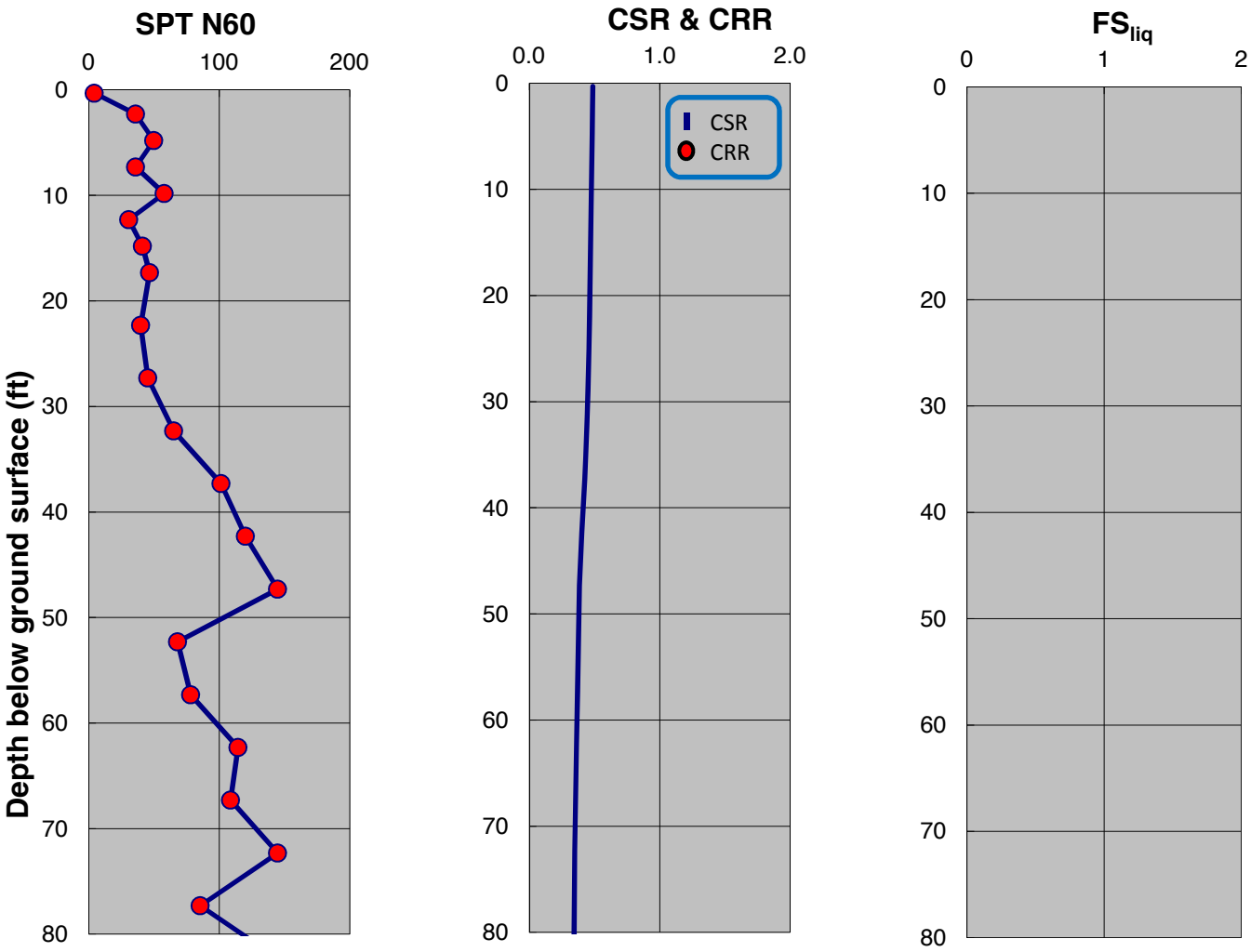
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.91



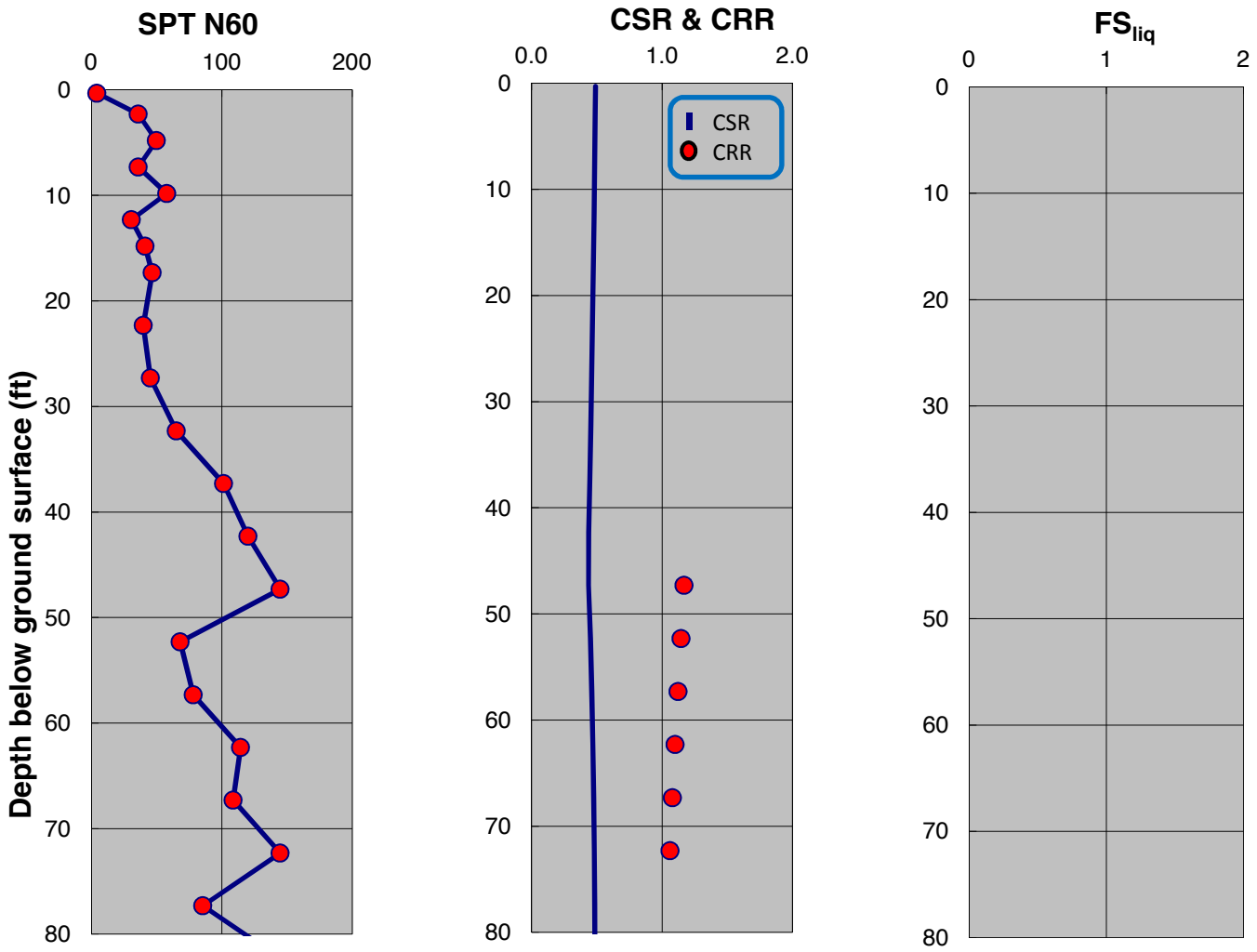
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-83 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



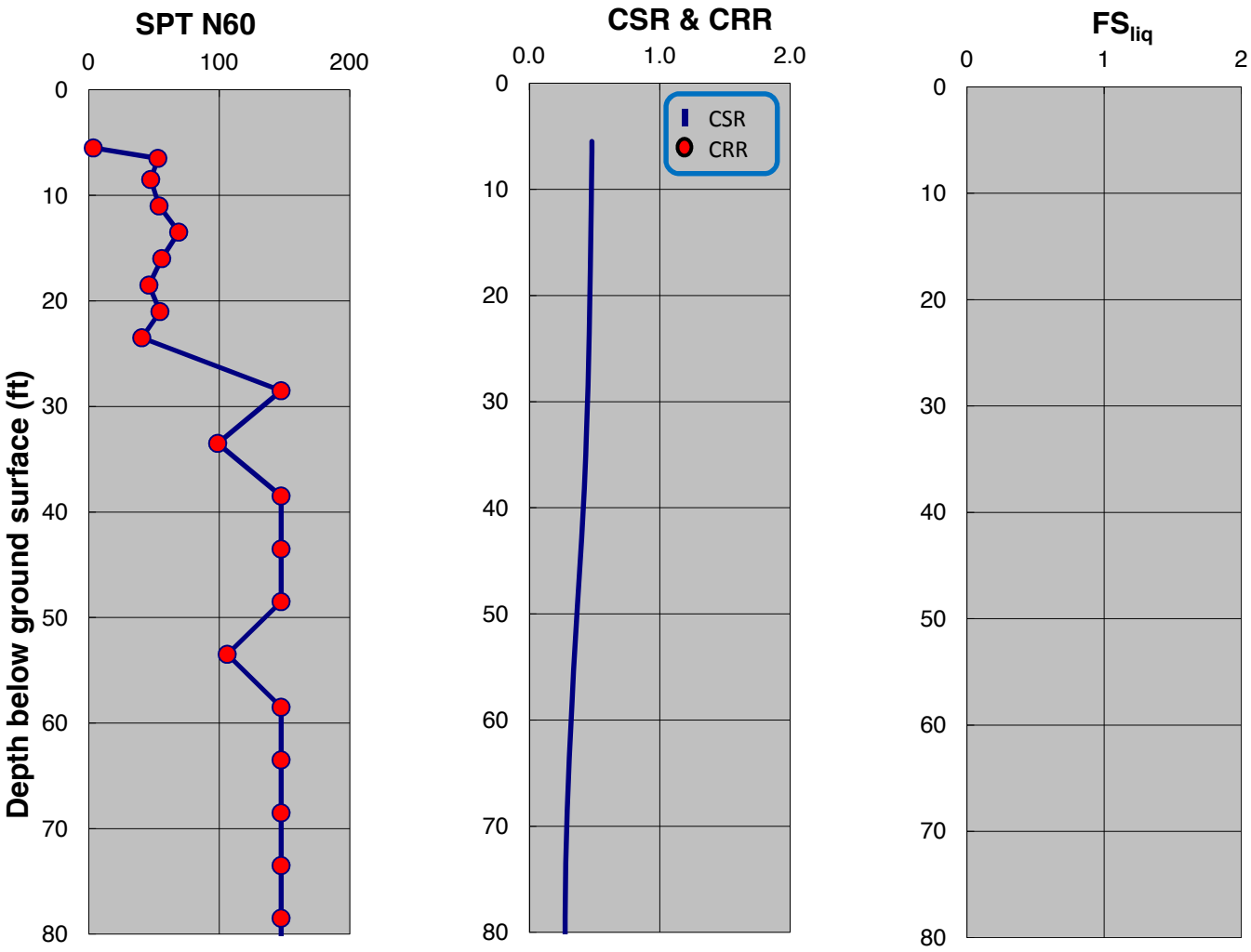
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-84 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-84 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

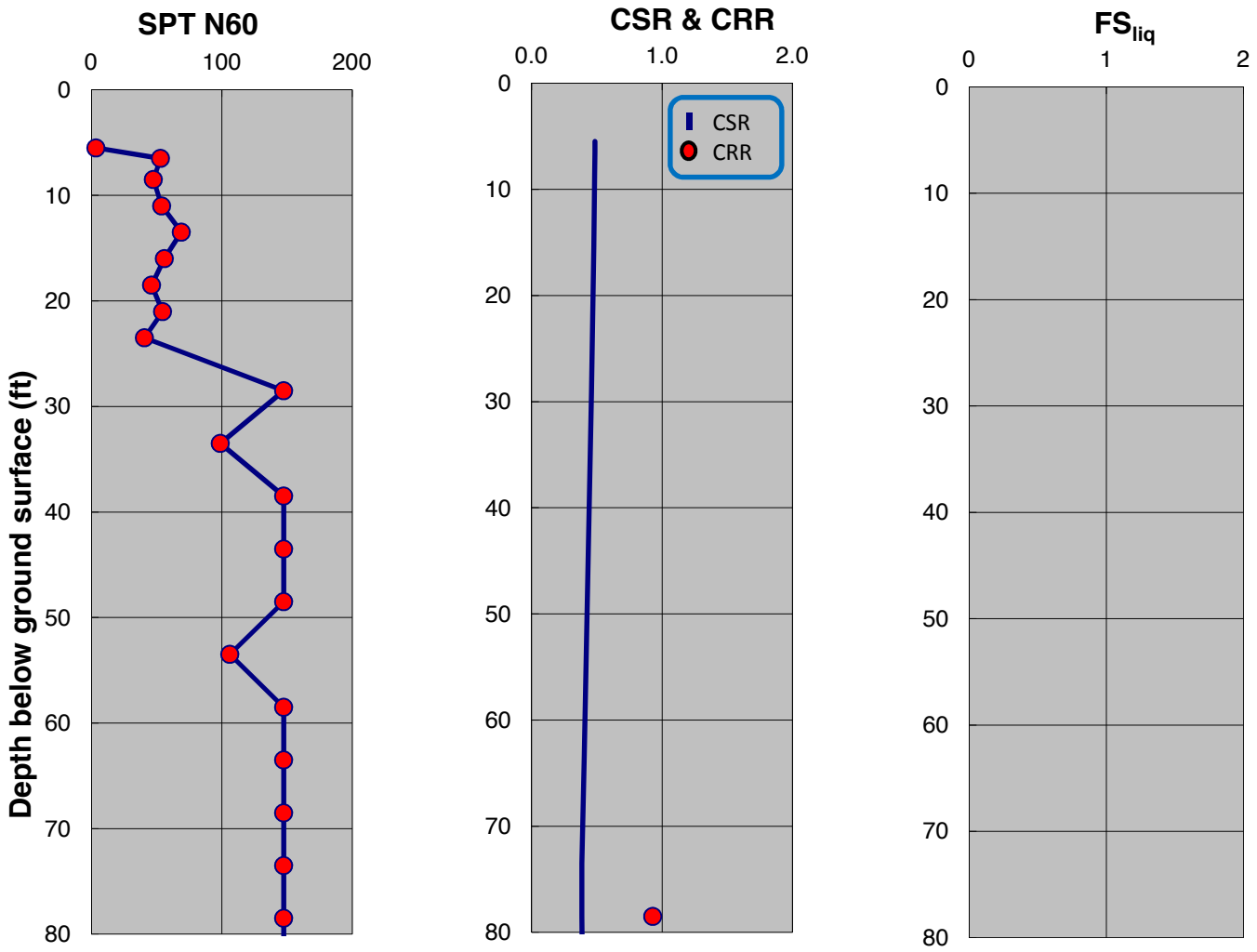
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-85 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

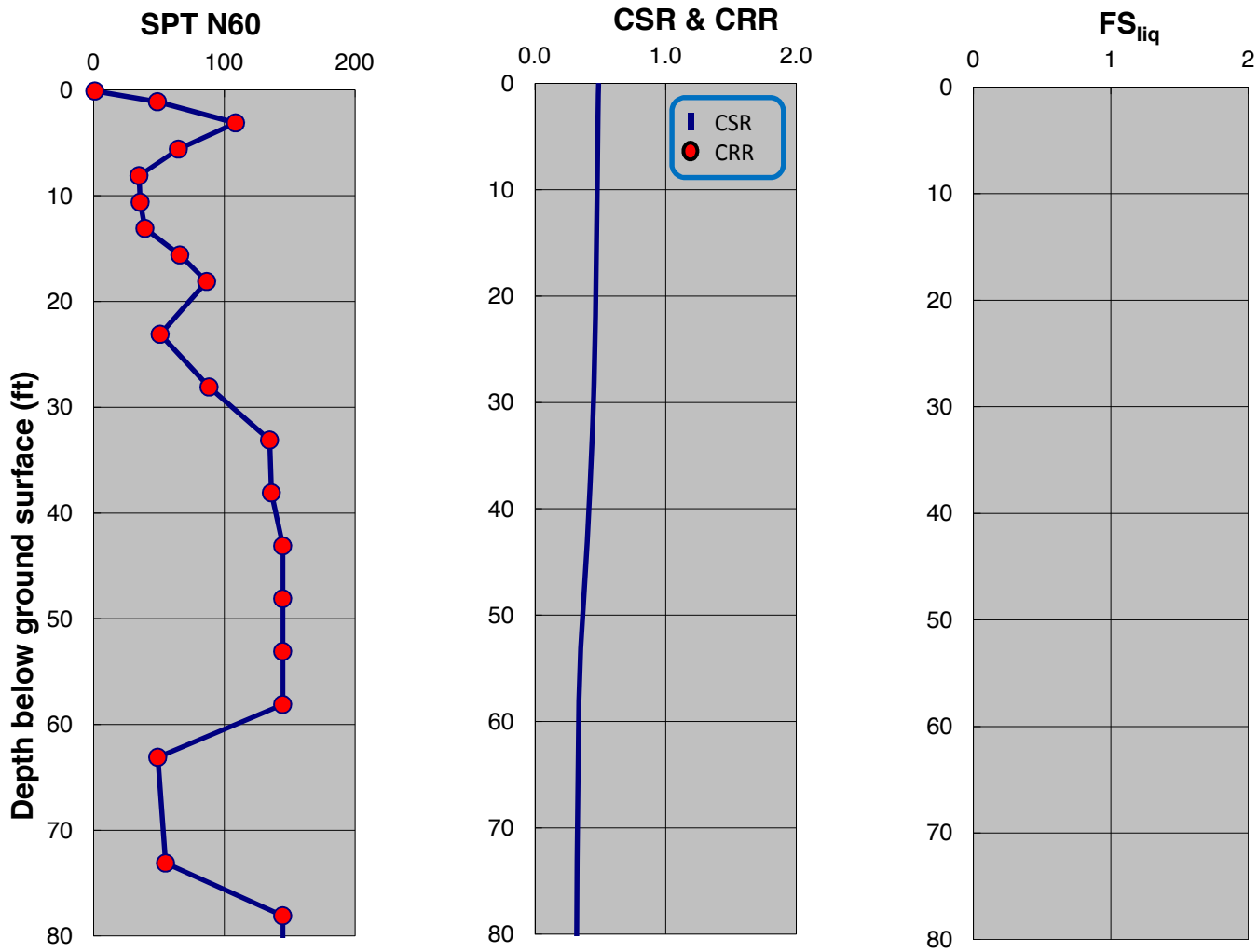
PLATE D.95



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-85 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

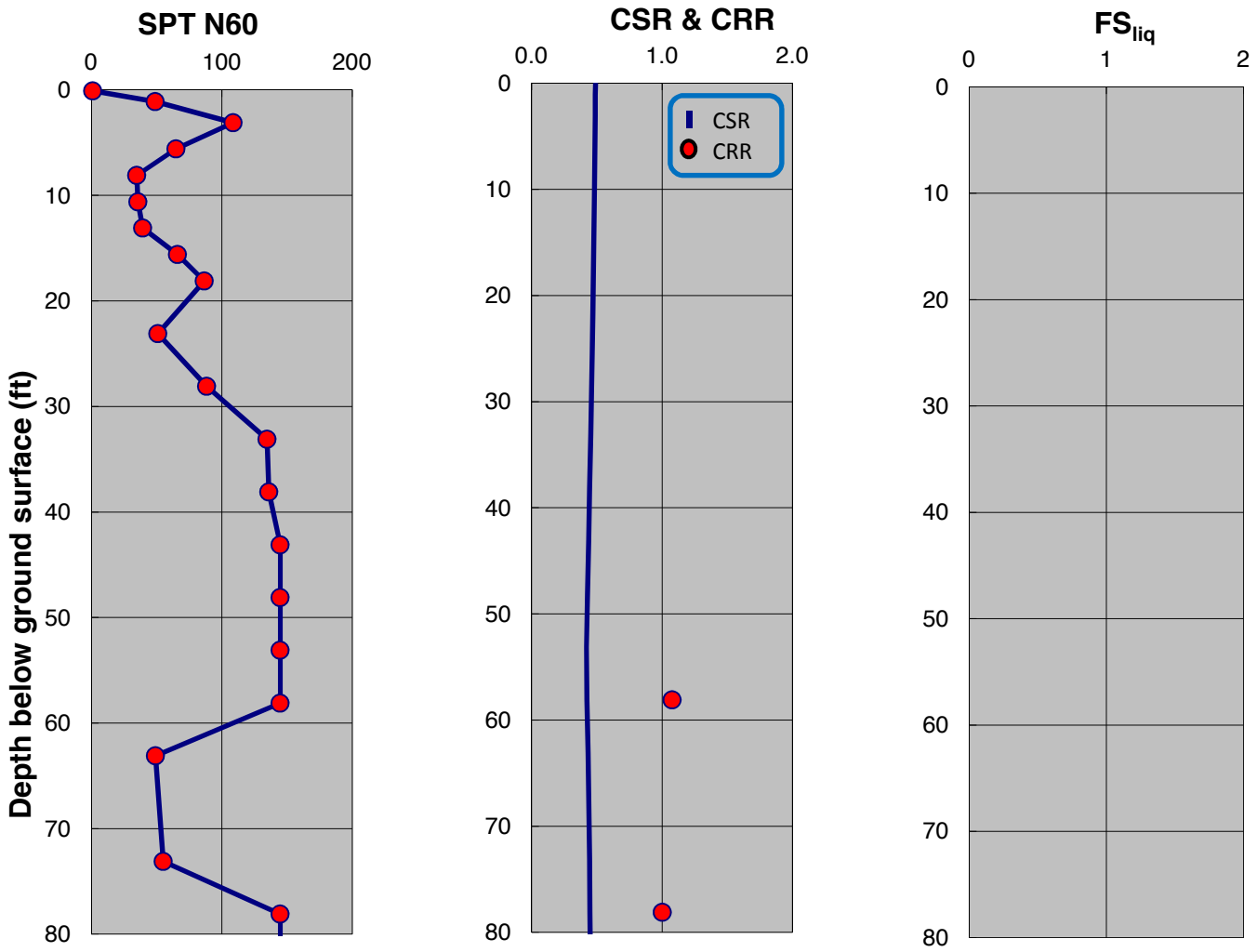
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.96



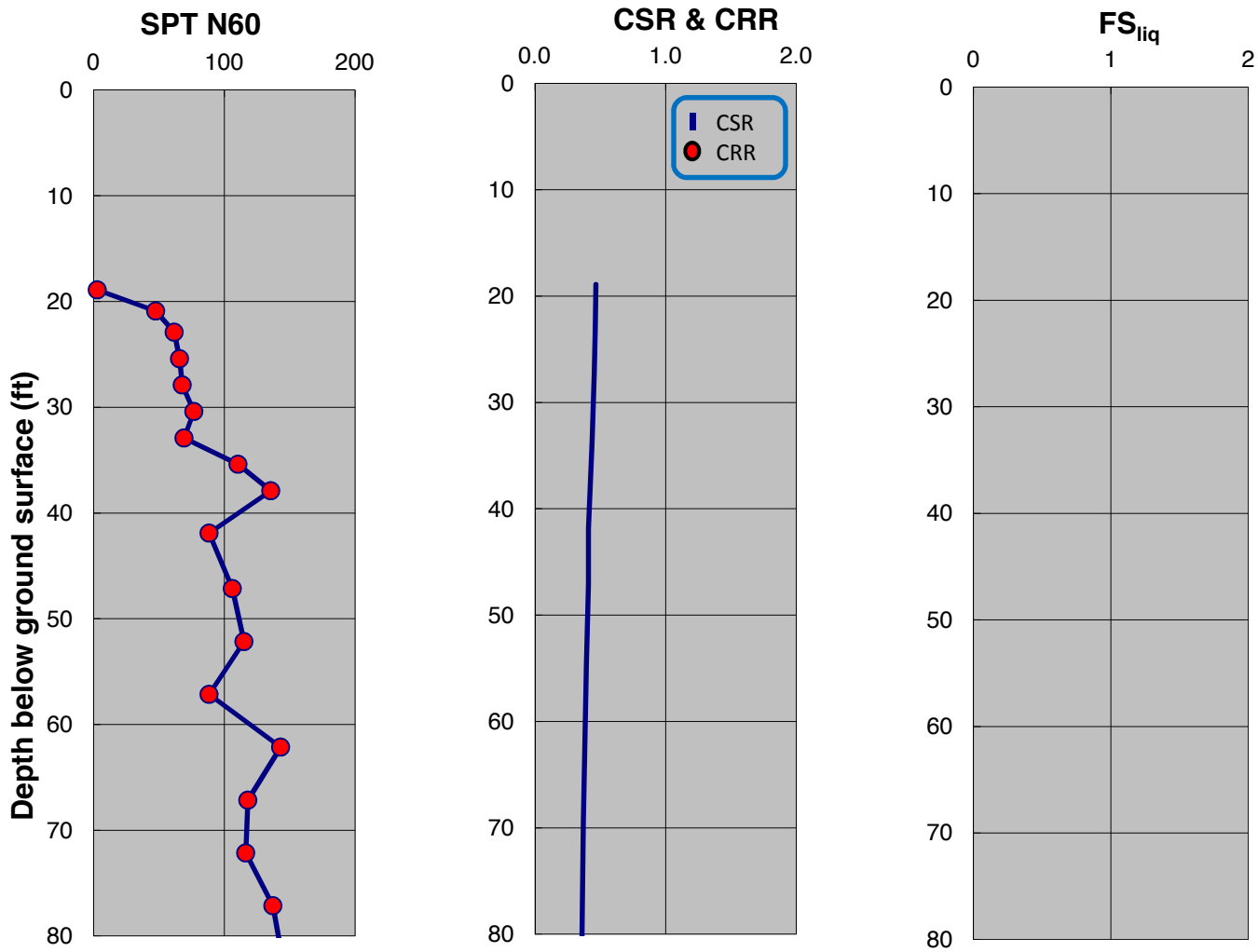
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-86 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-86 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

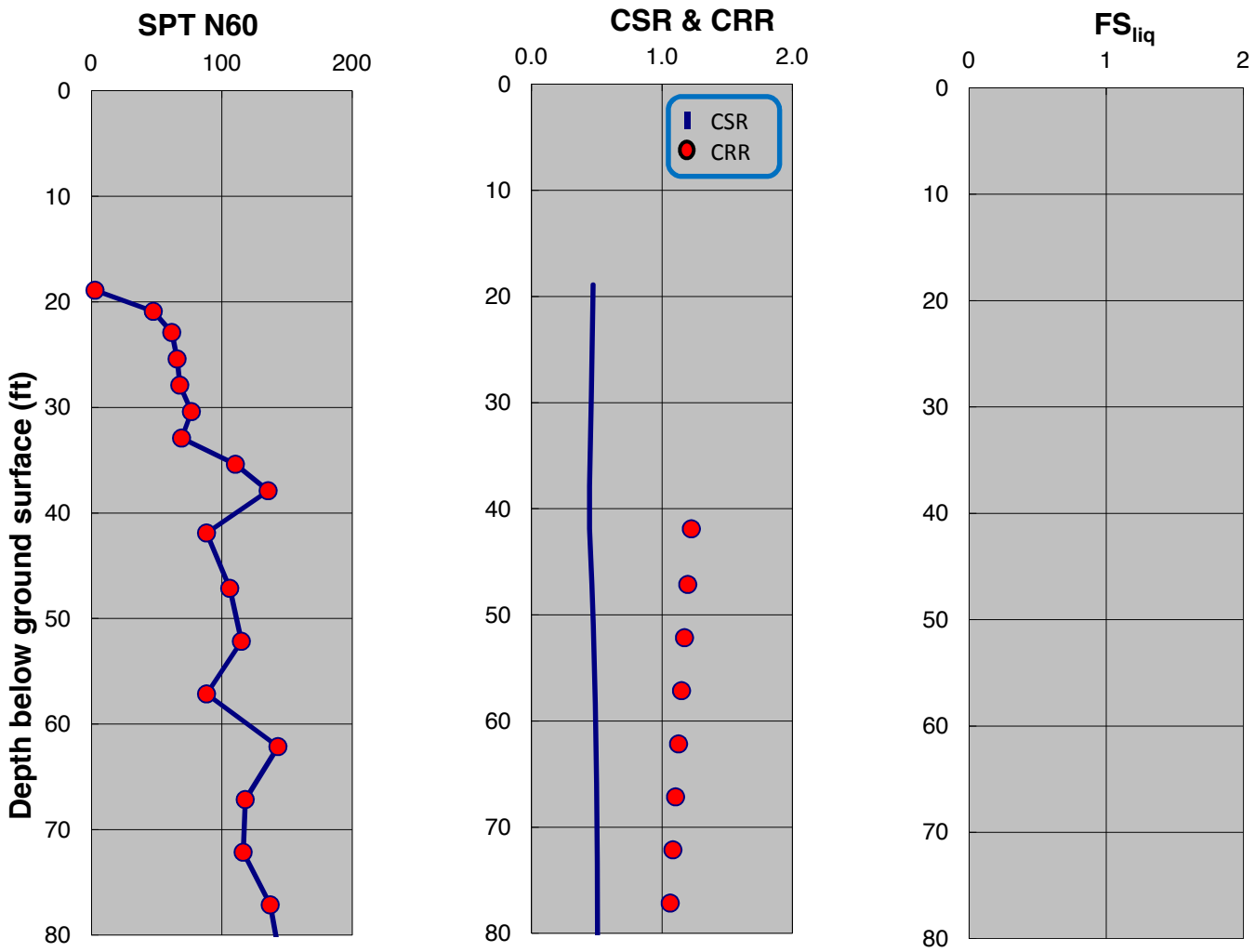
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-87 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

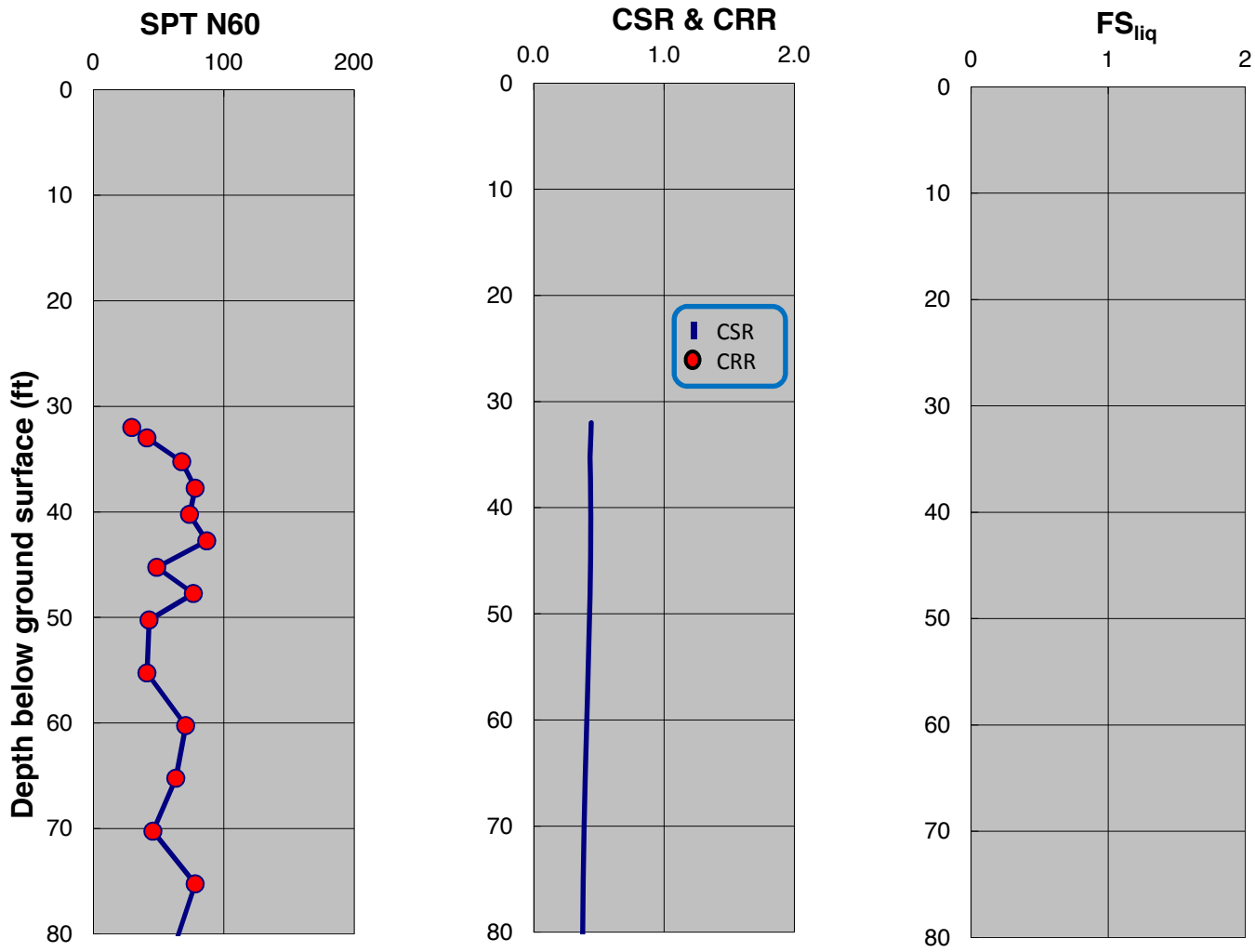
PLATE D.99



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-87 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

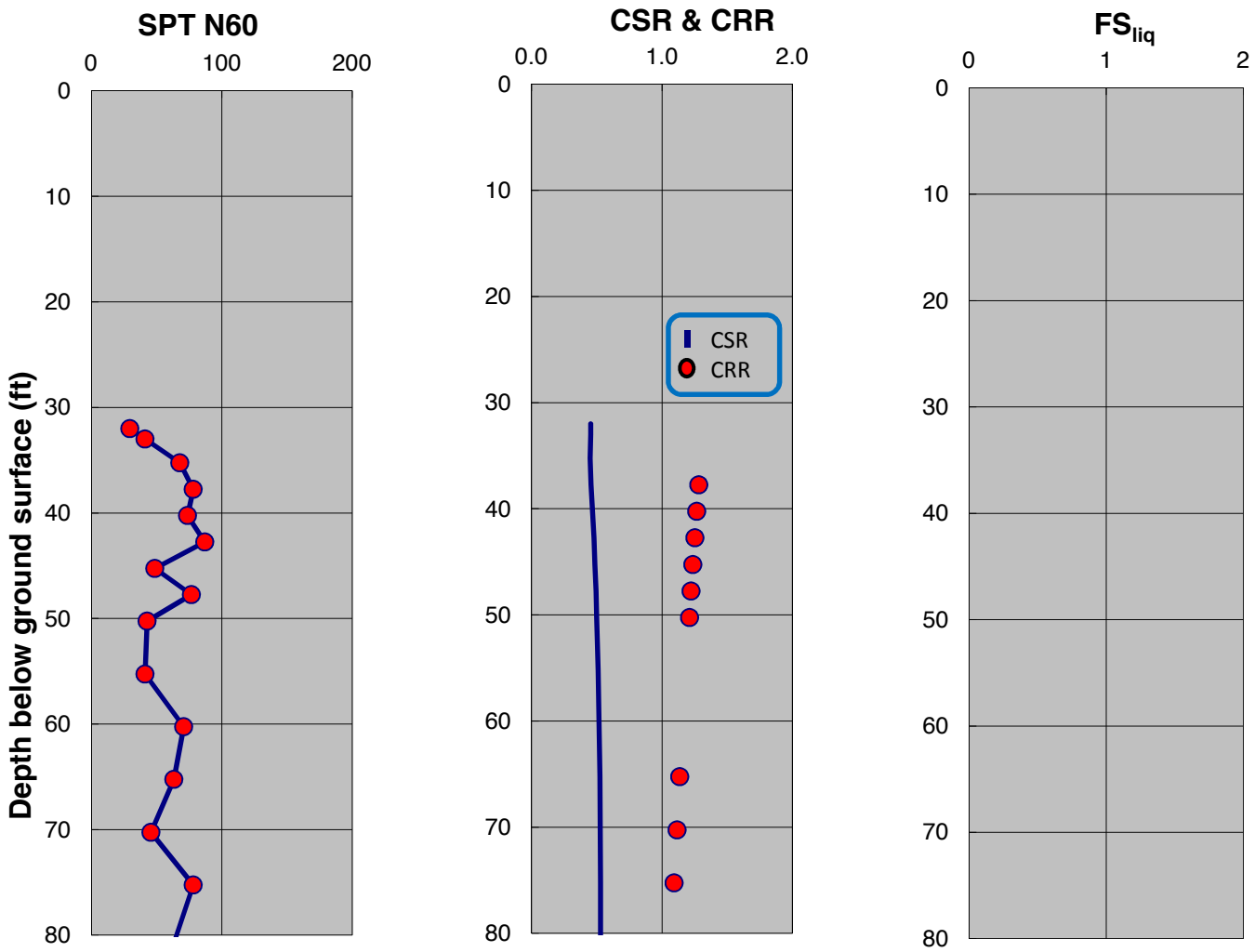
PLATE D.100



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-88 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

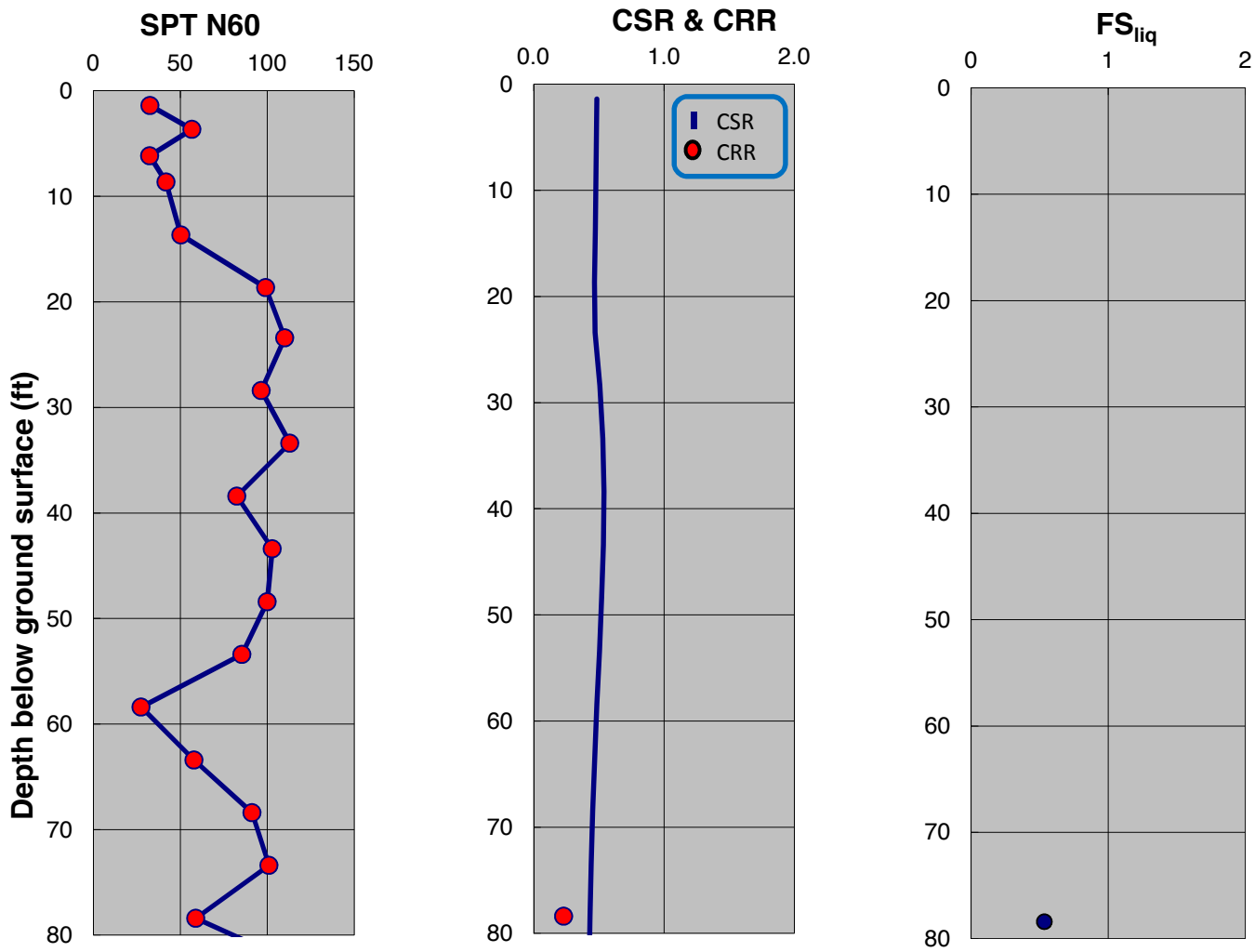
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.101



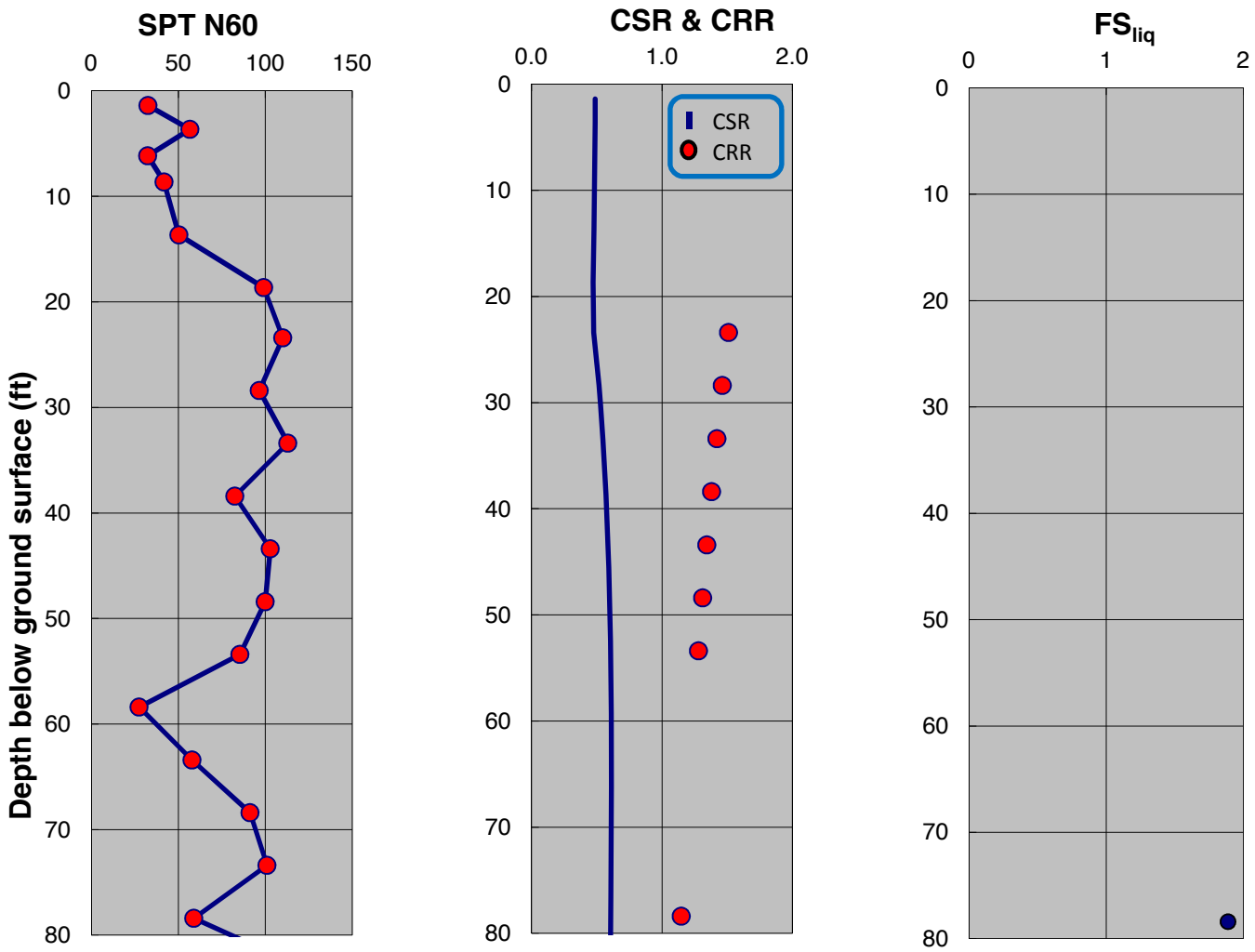
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-88 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



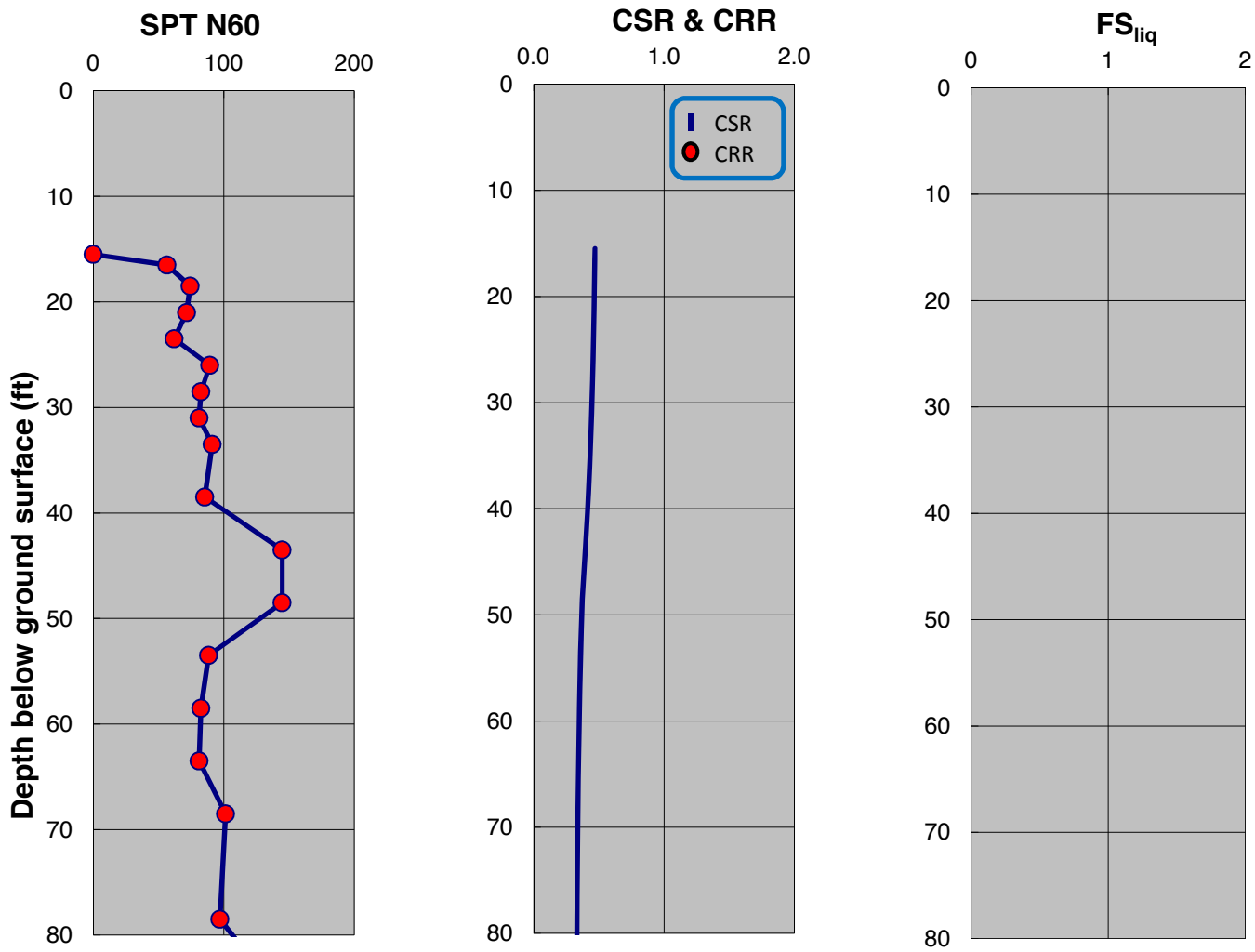
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-89 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-89 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

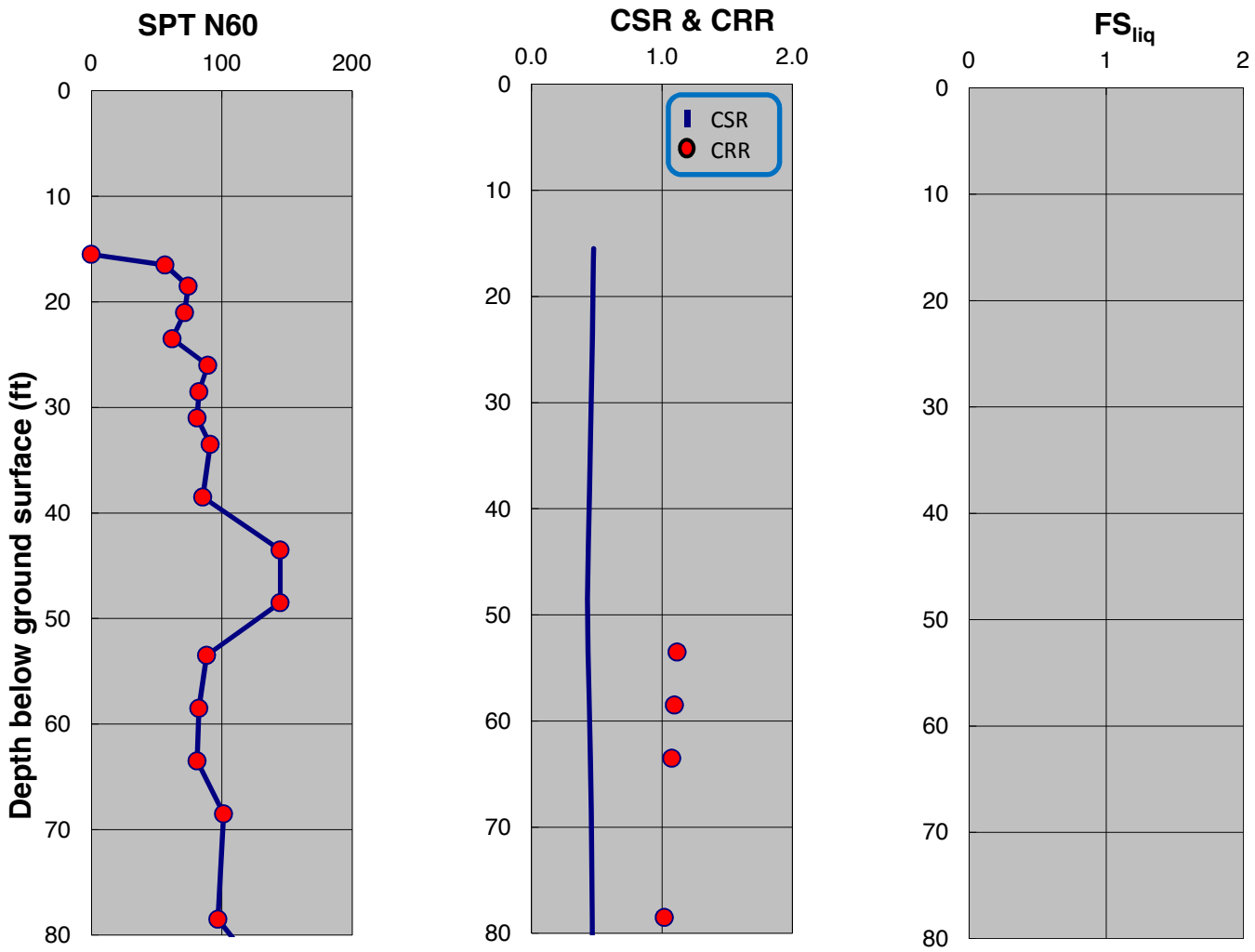
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-90 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

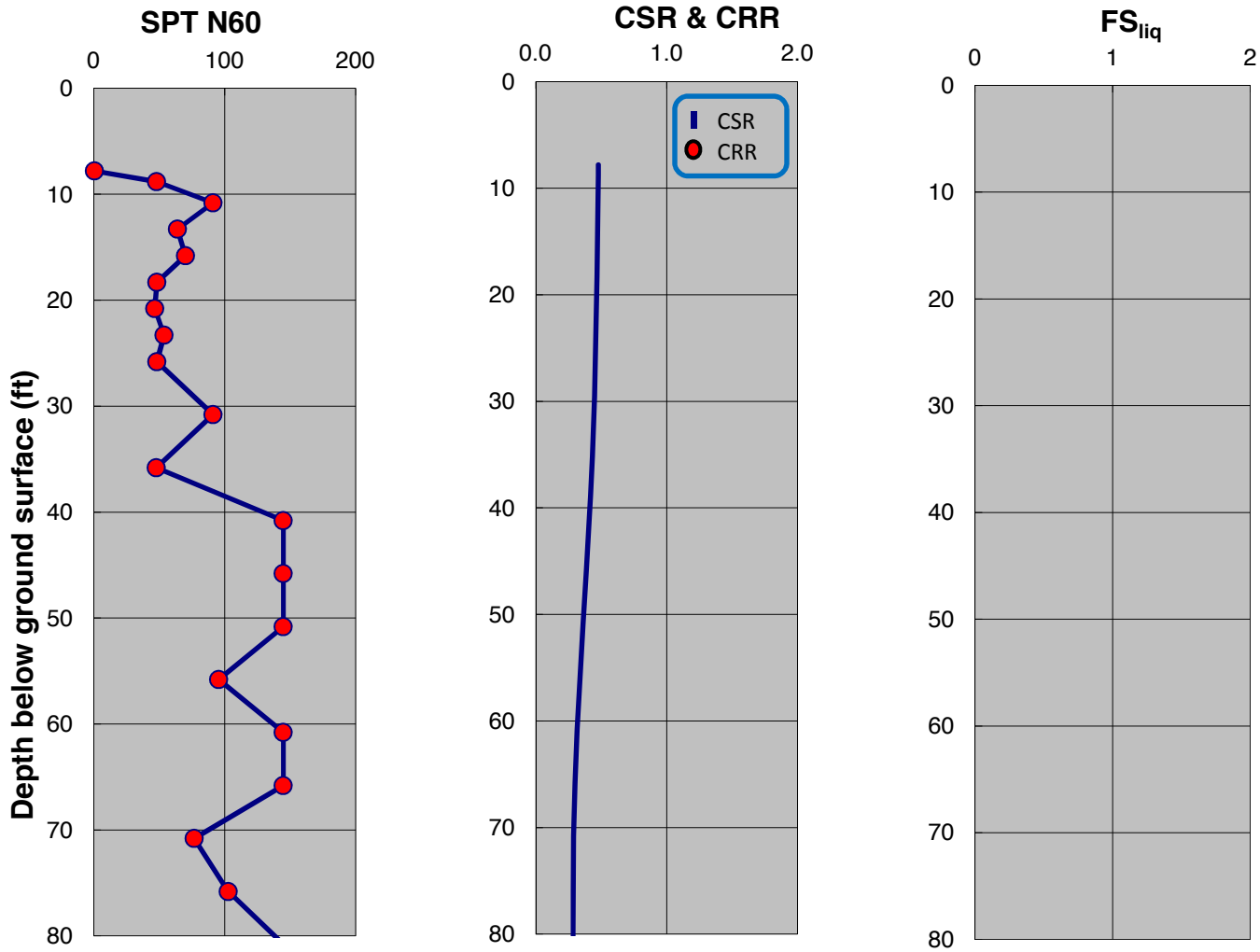
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.105



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-90 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

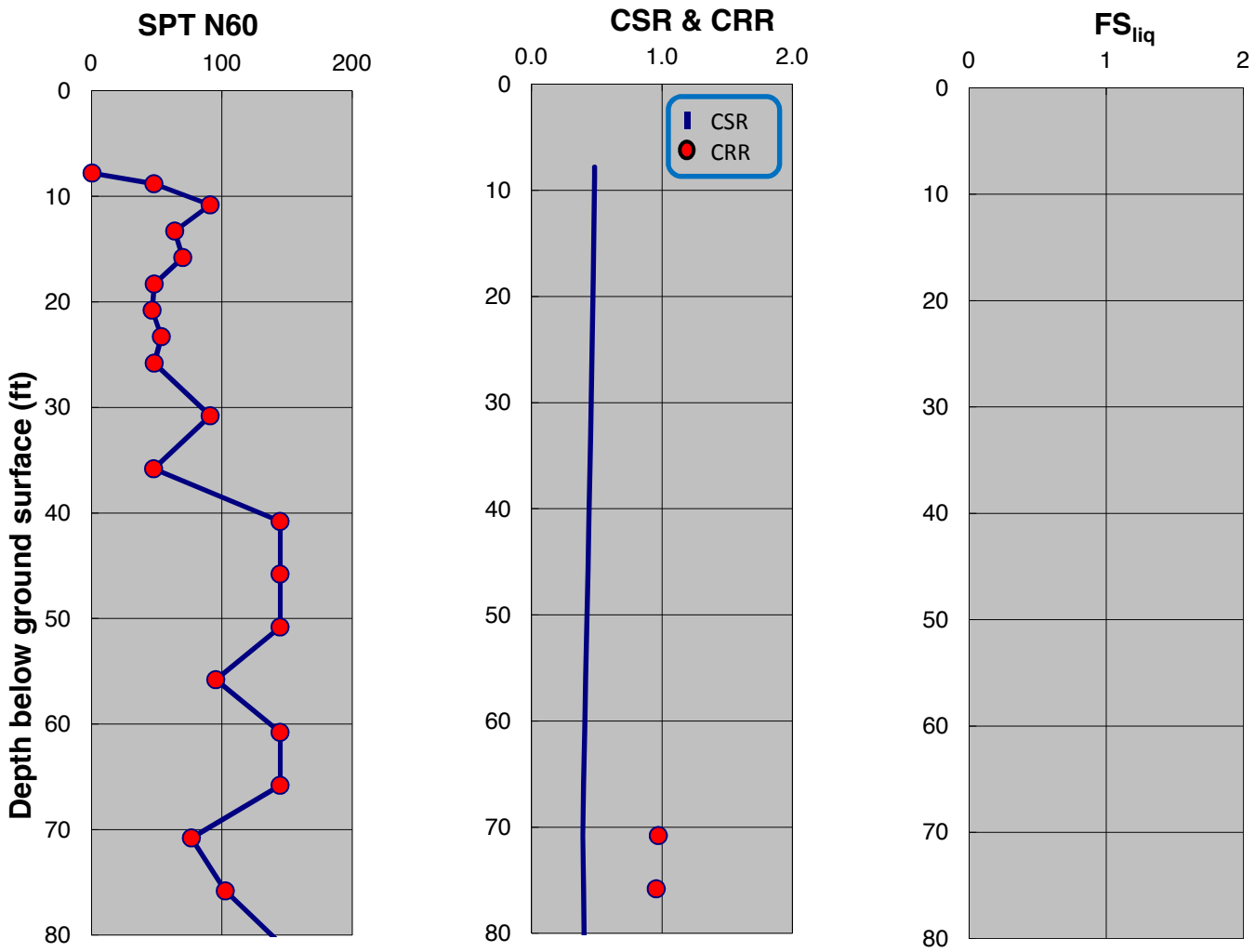
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-91 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

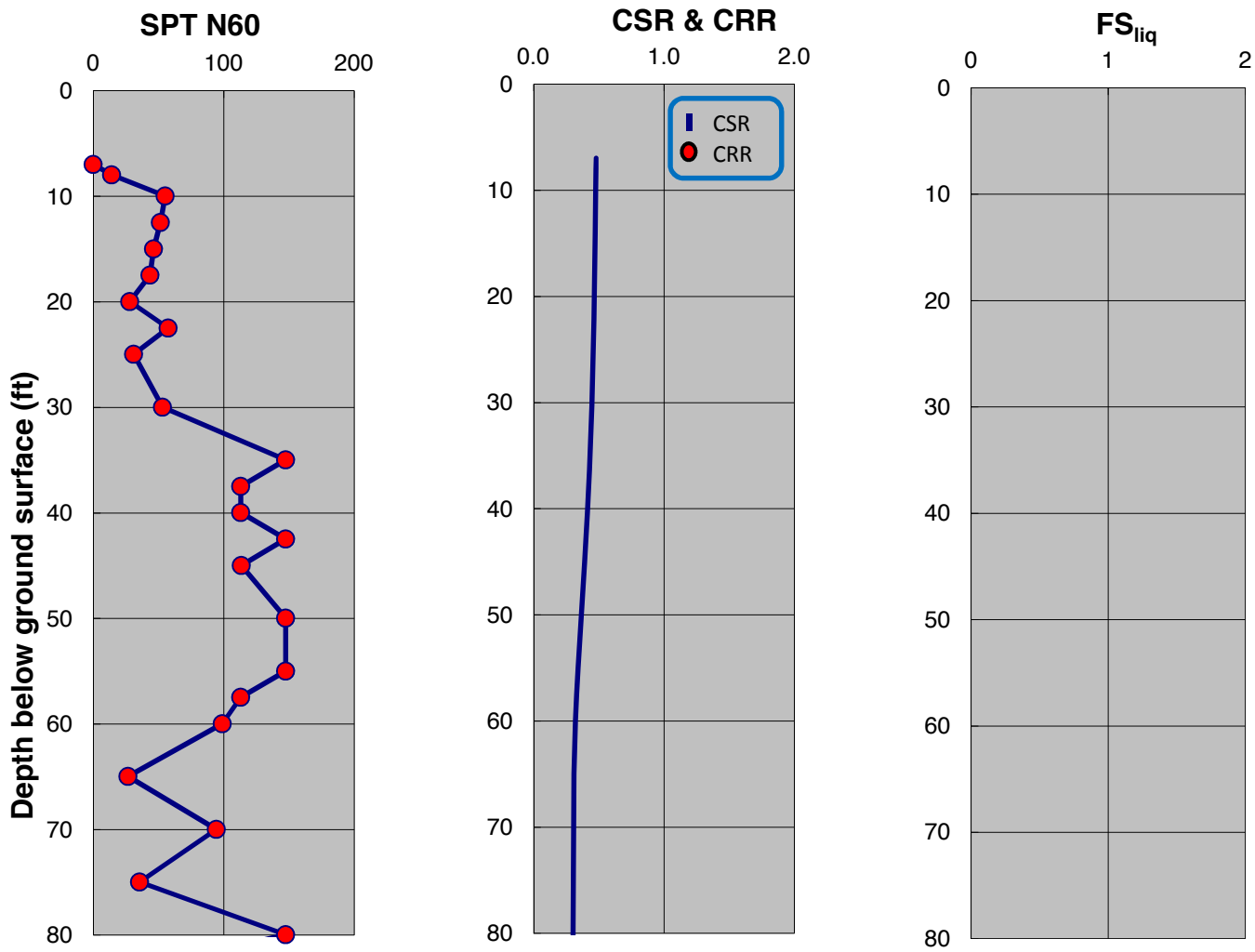
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.107



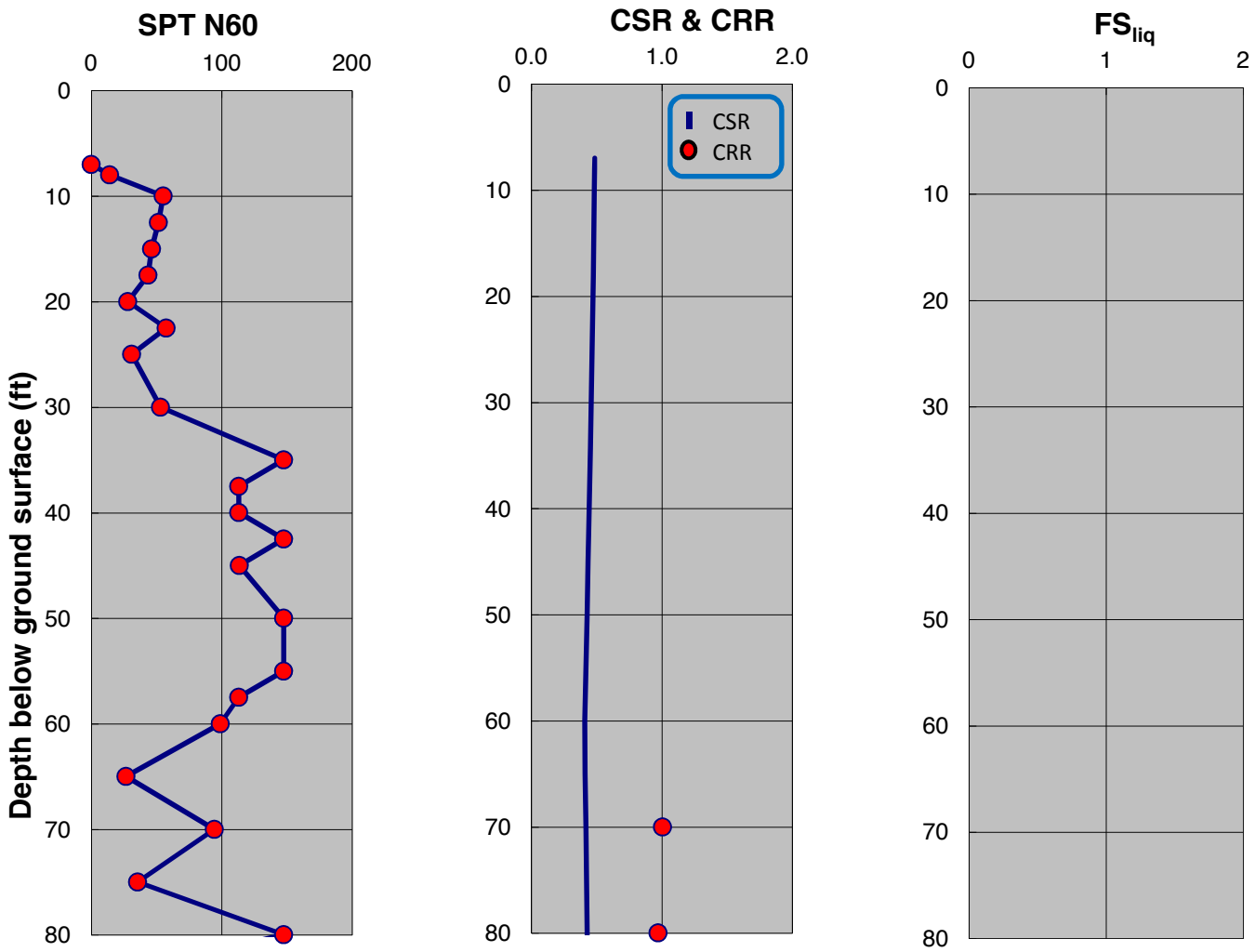
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-91 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



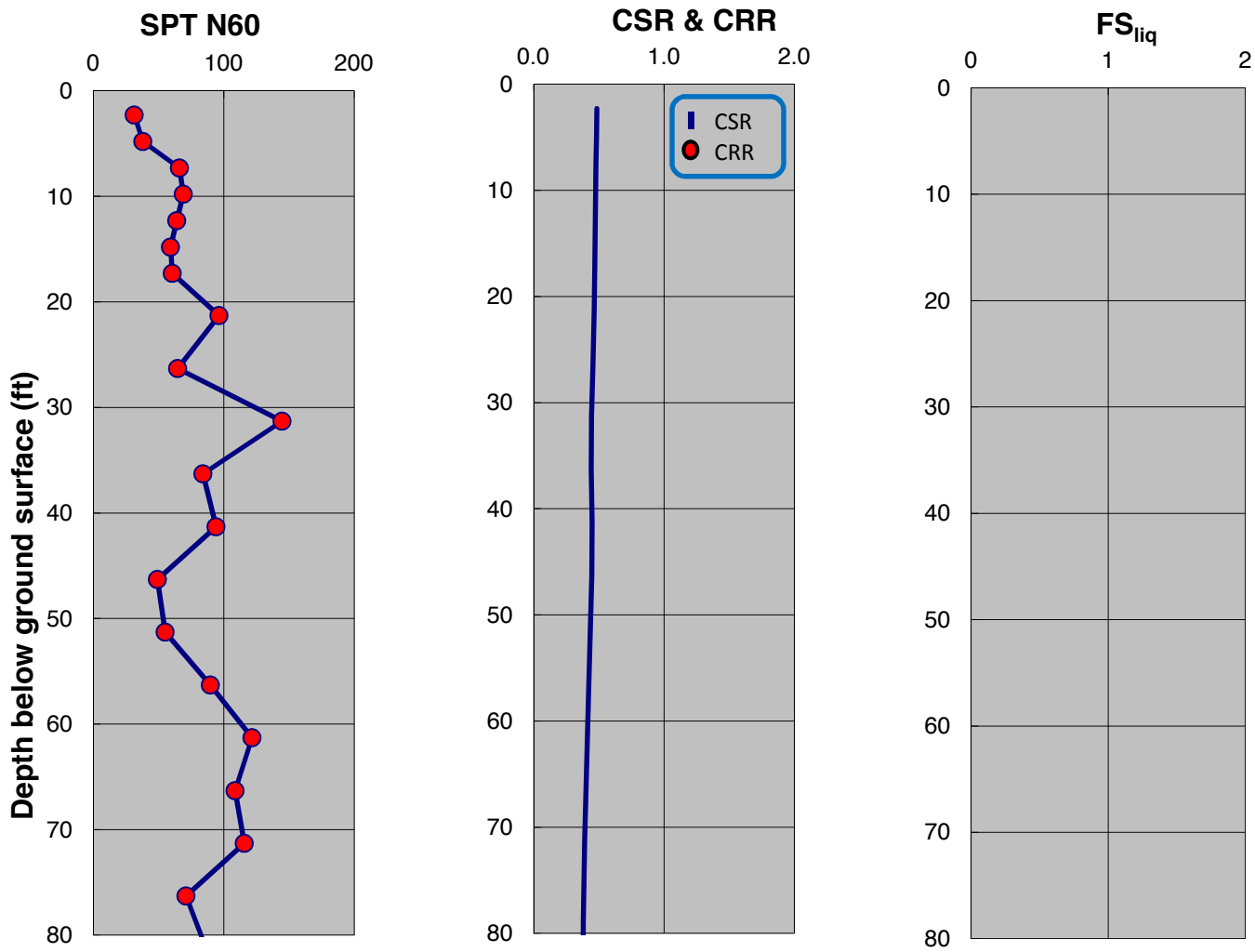
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-92 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



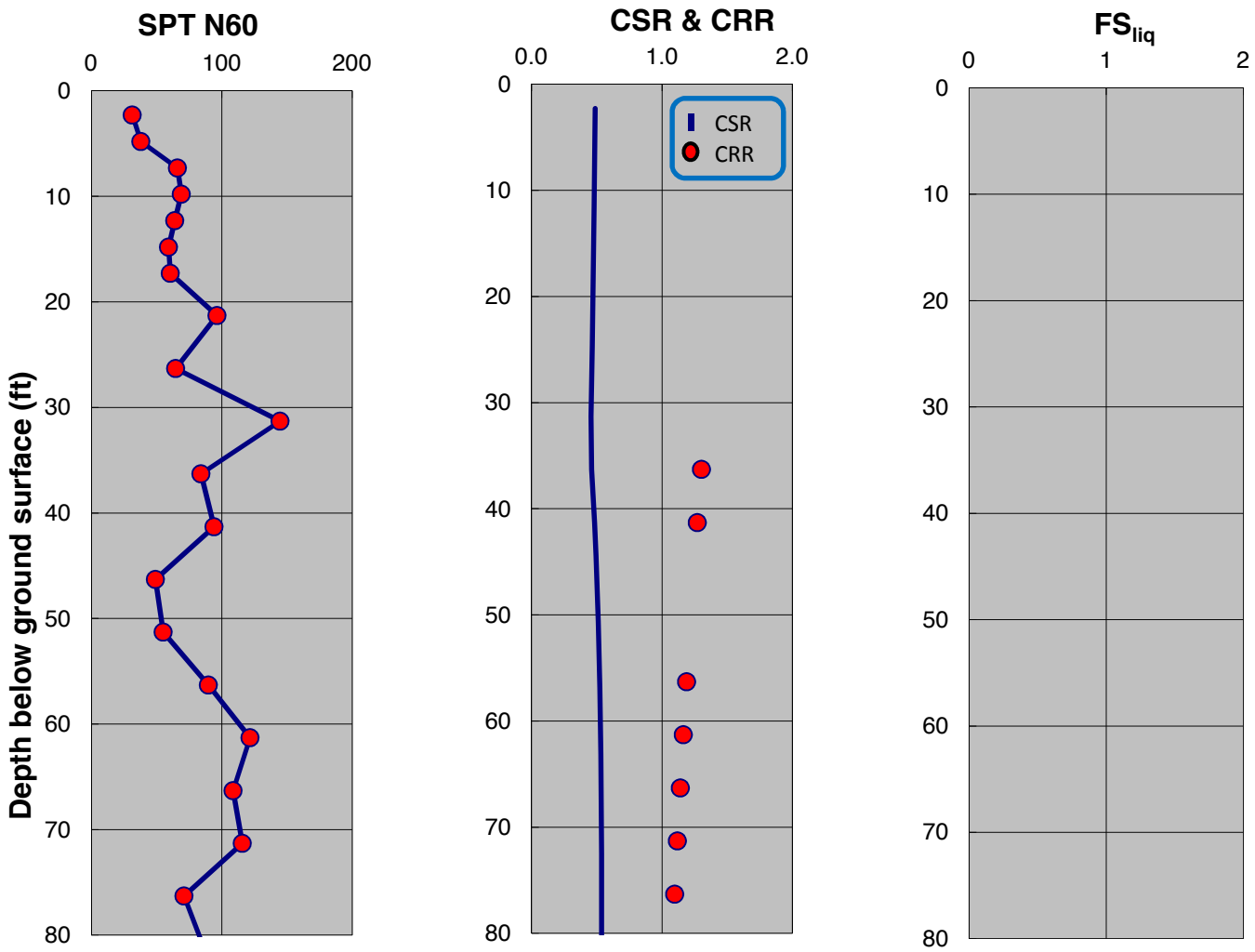
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-92 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



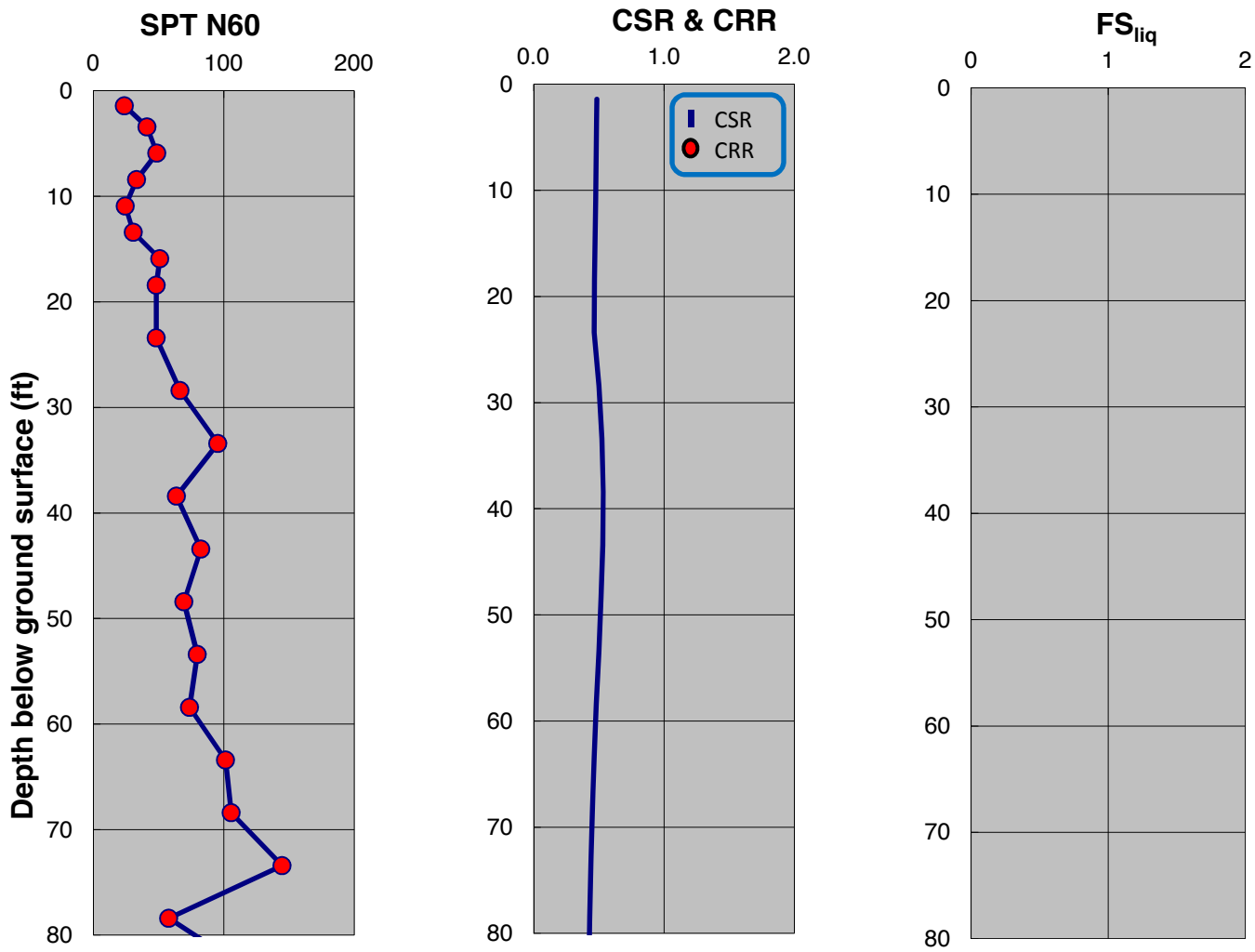
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-93 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



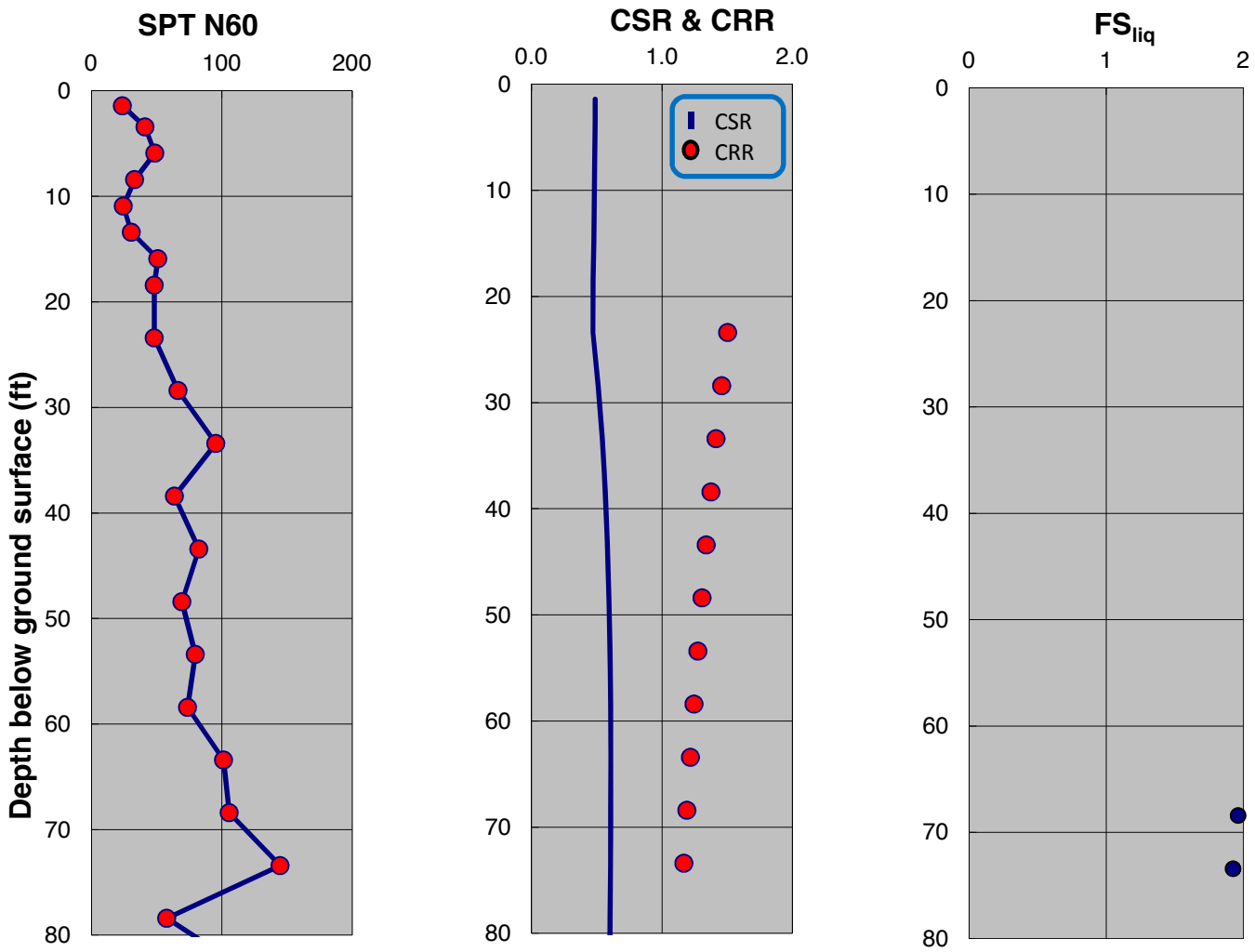
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-93 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



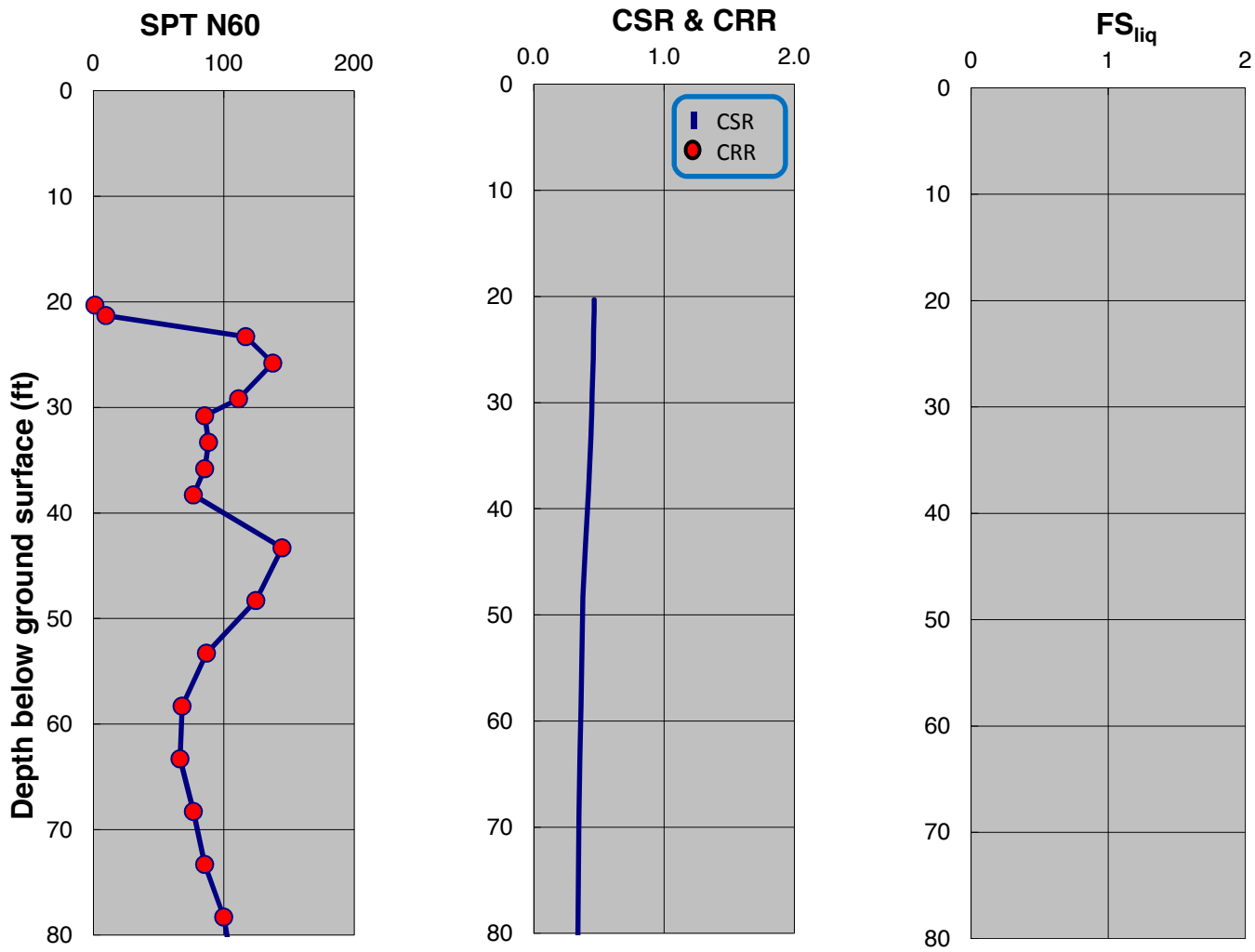
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-94 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-94 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

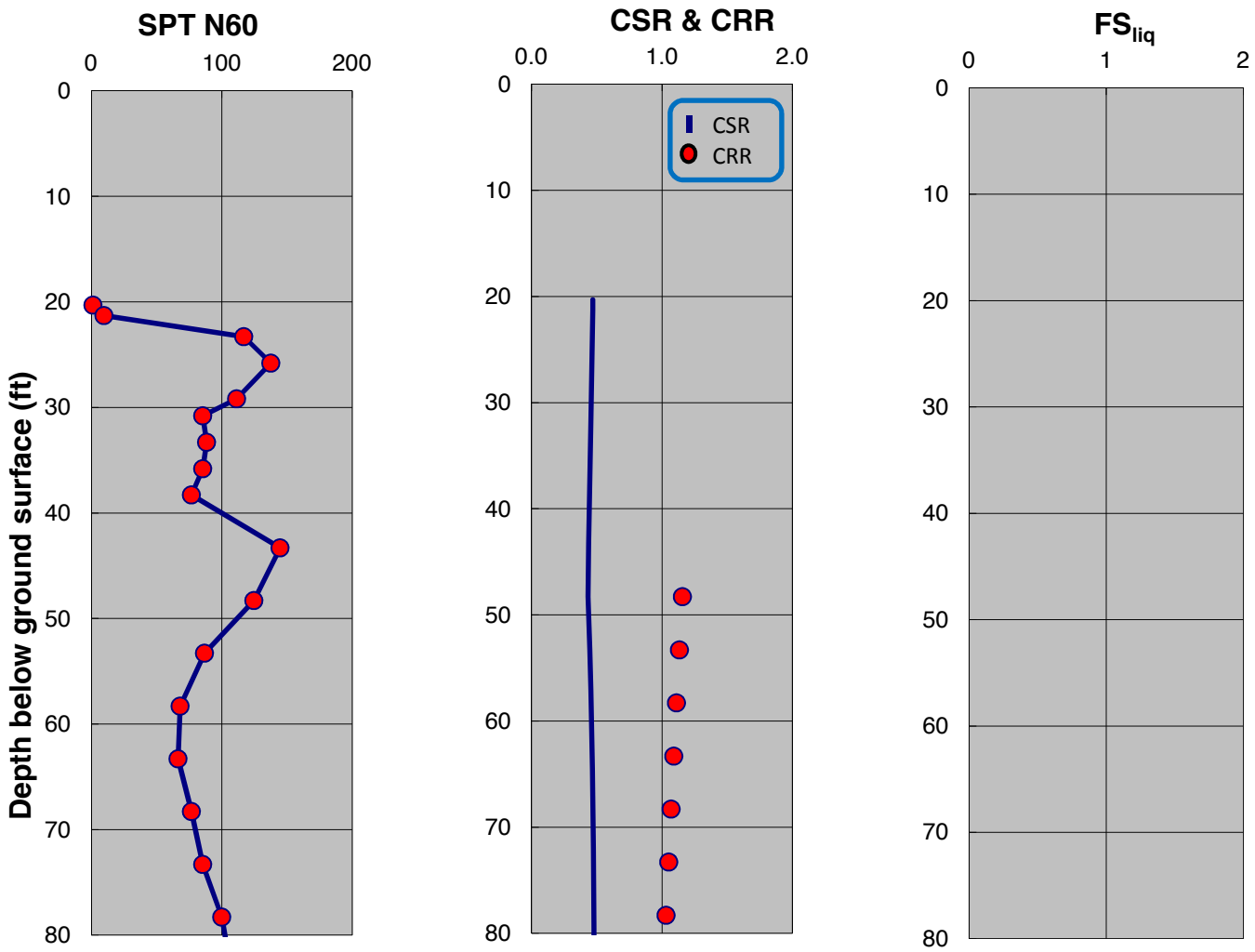
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-95 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

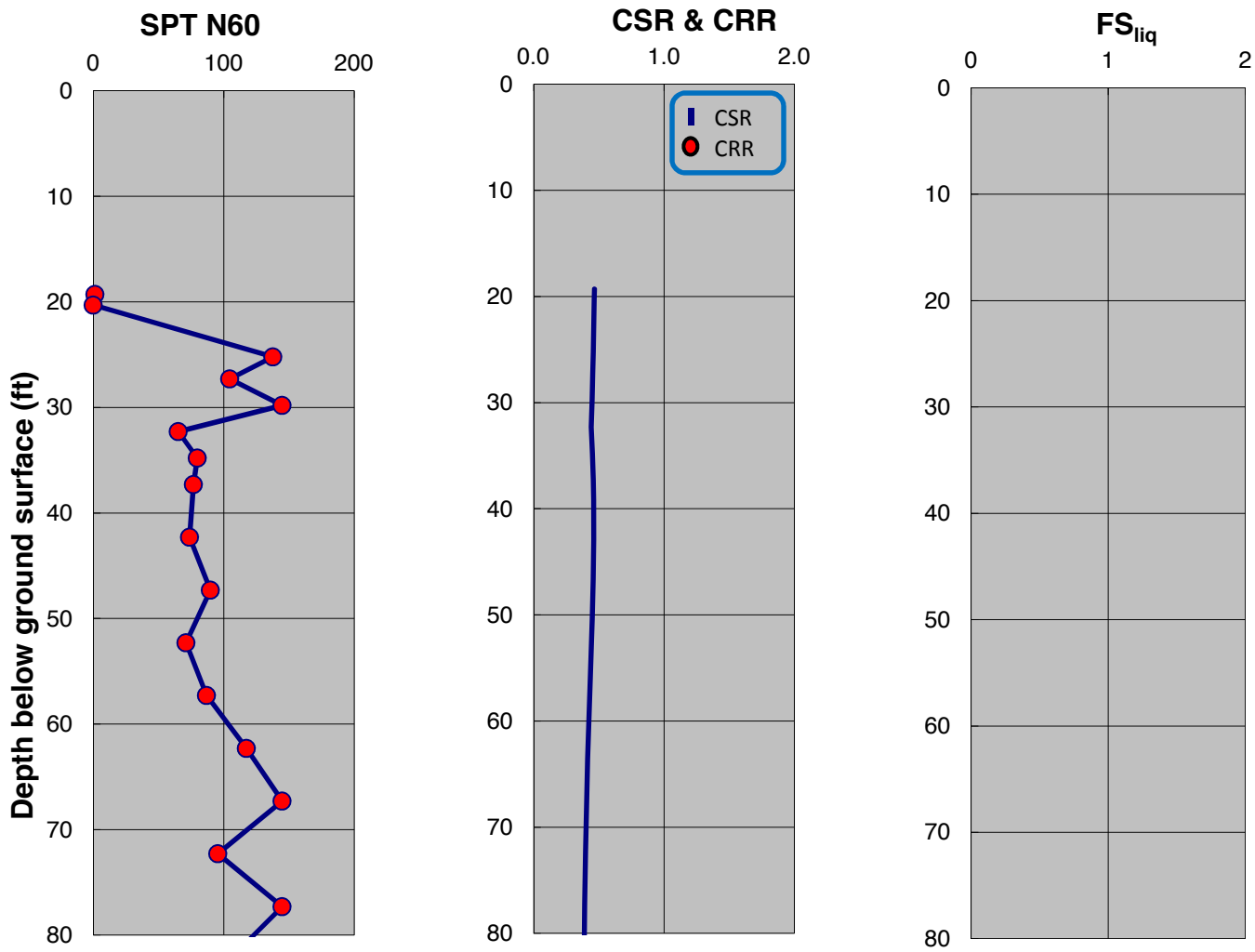
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.115



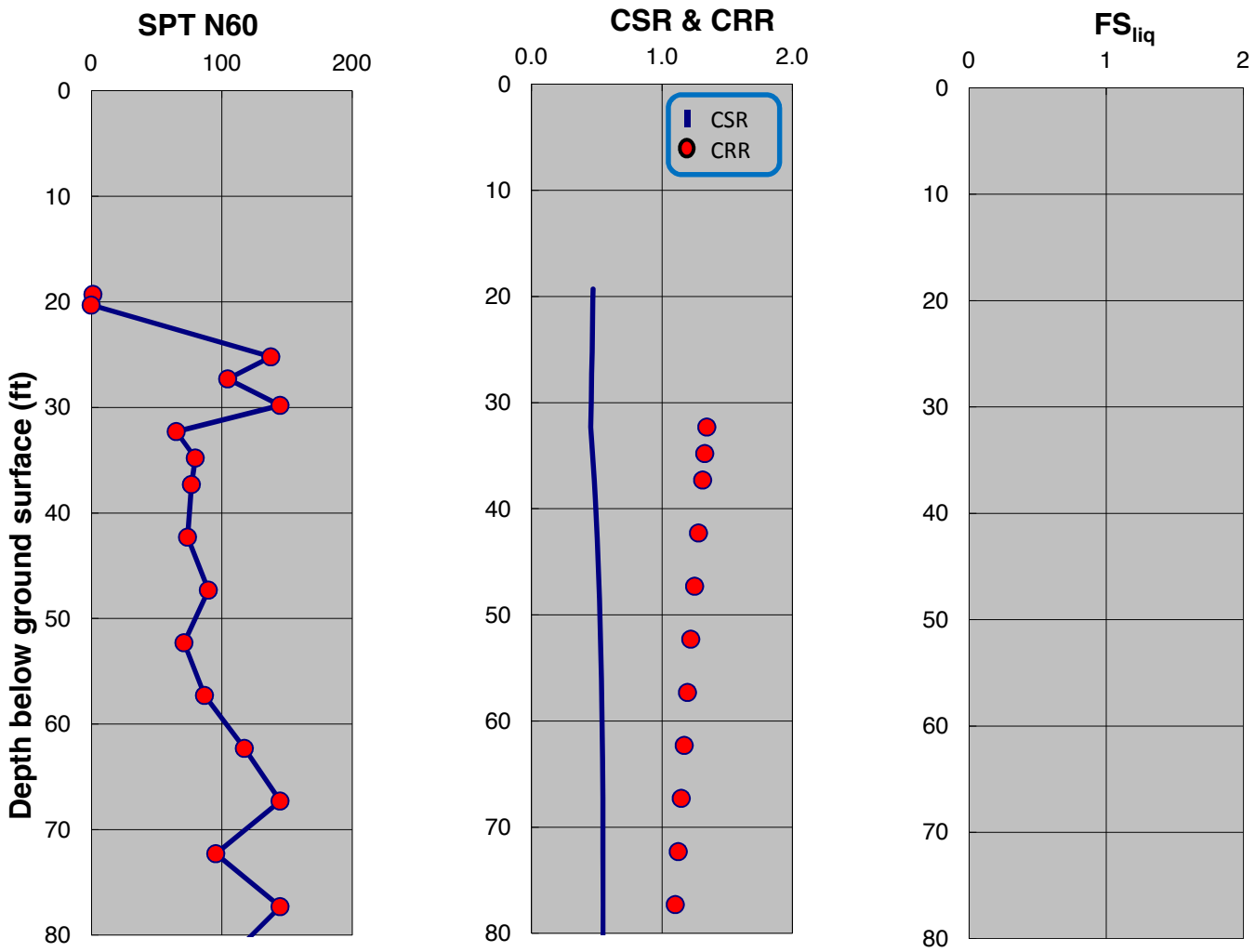
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-95 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



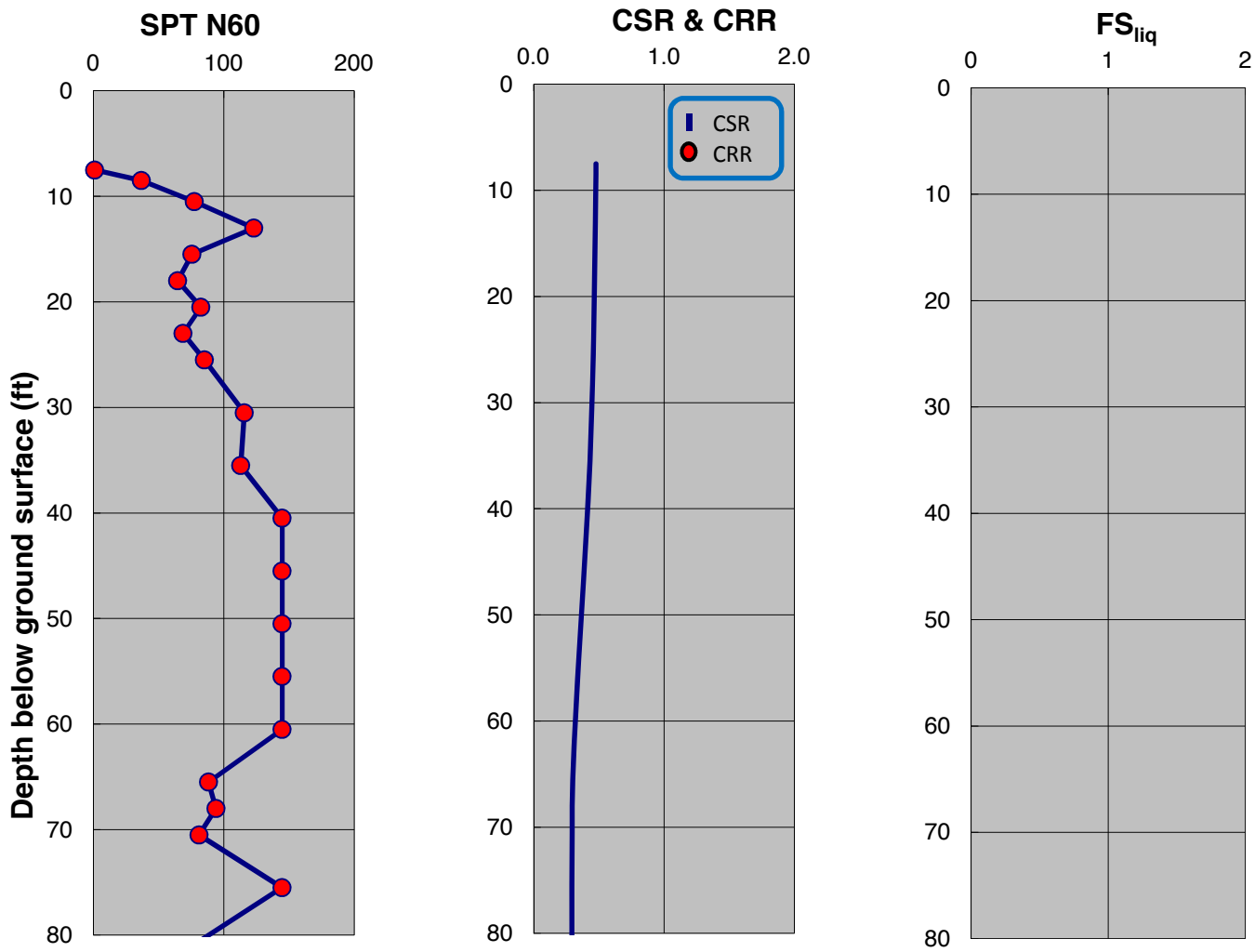
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-96 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



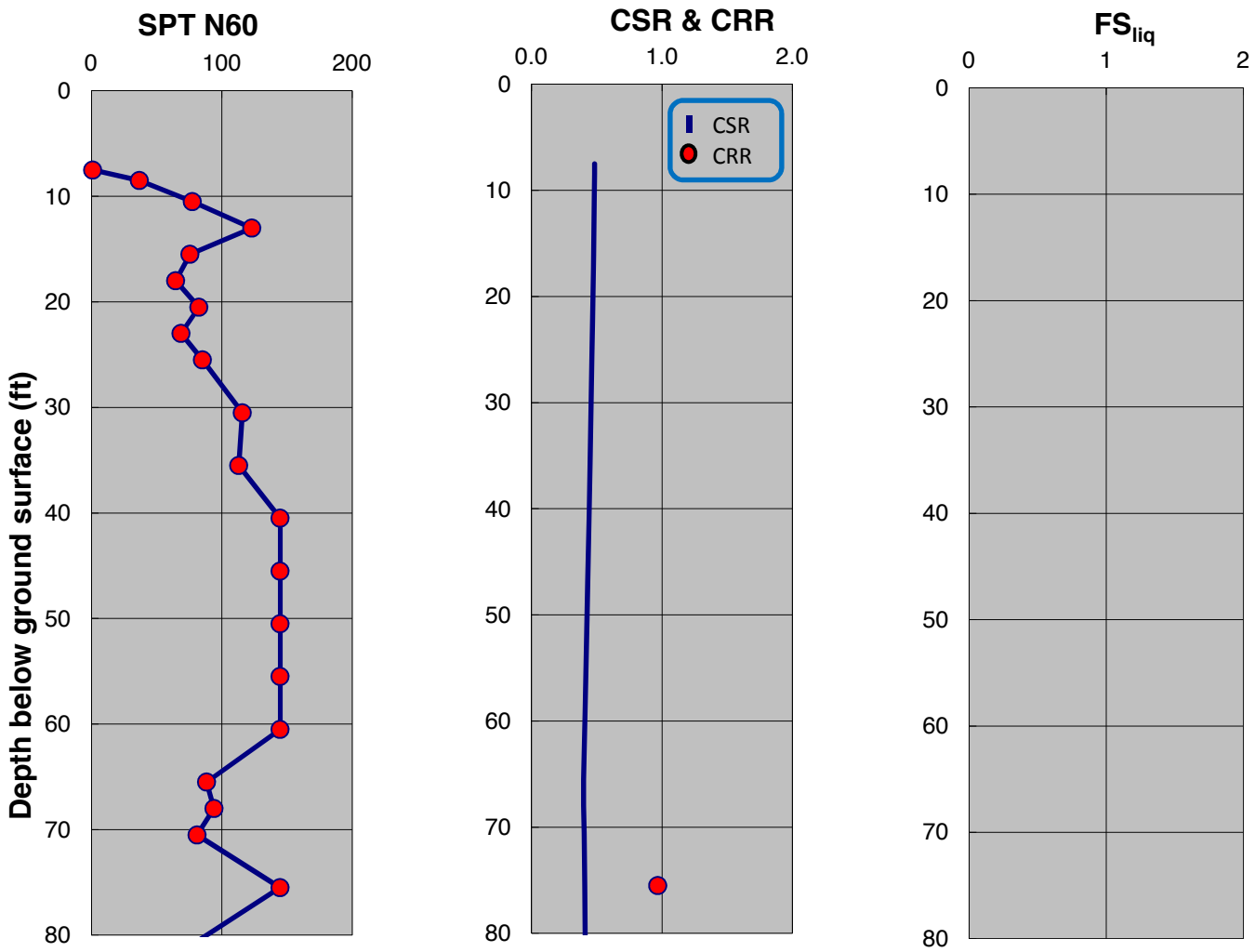
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-96 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



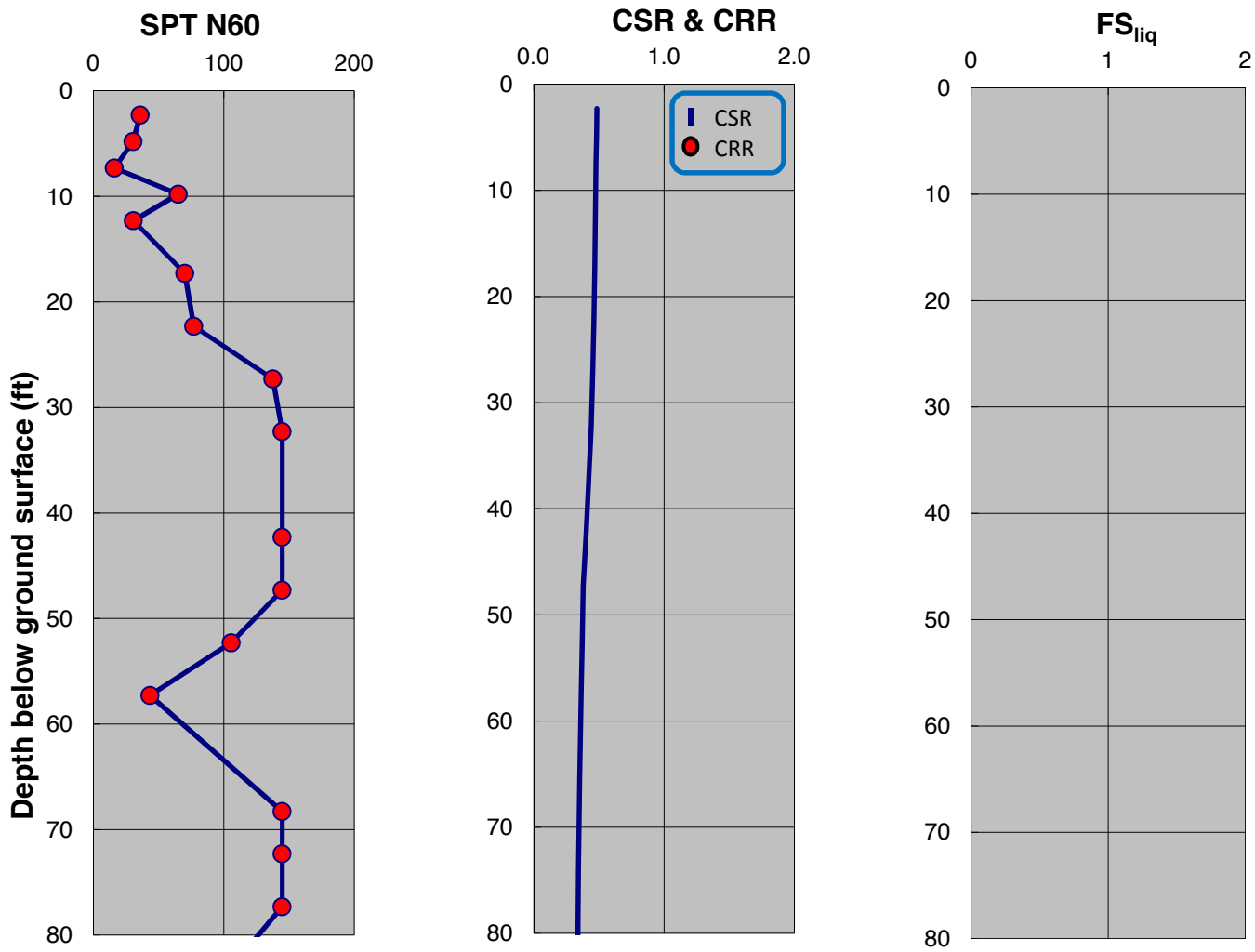
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-97 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



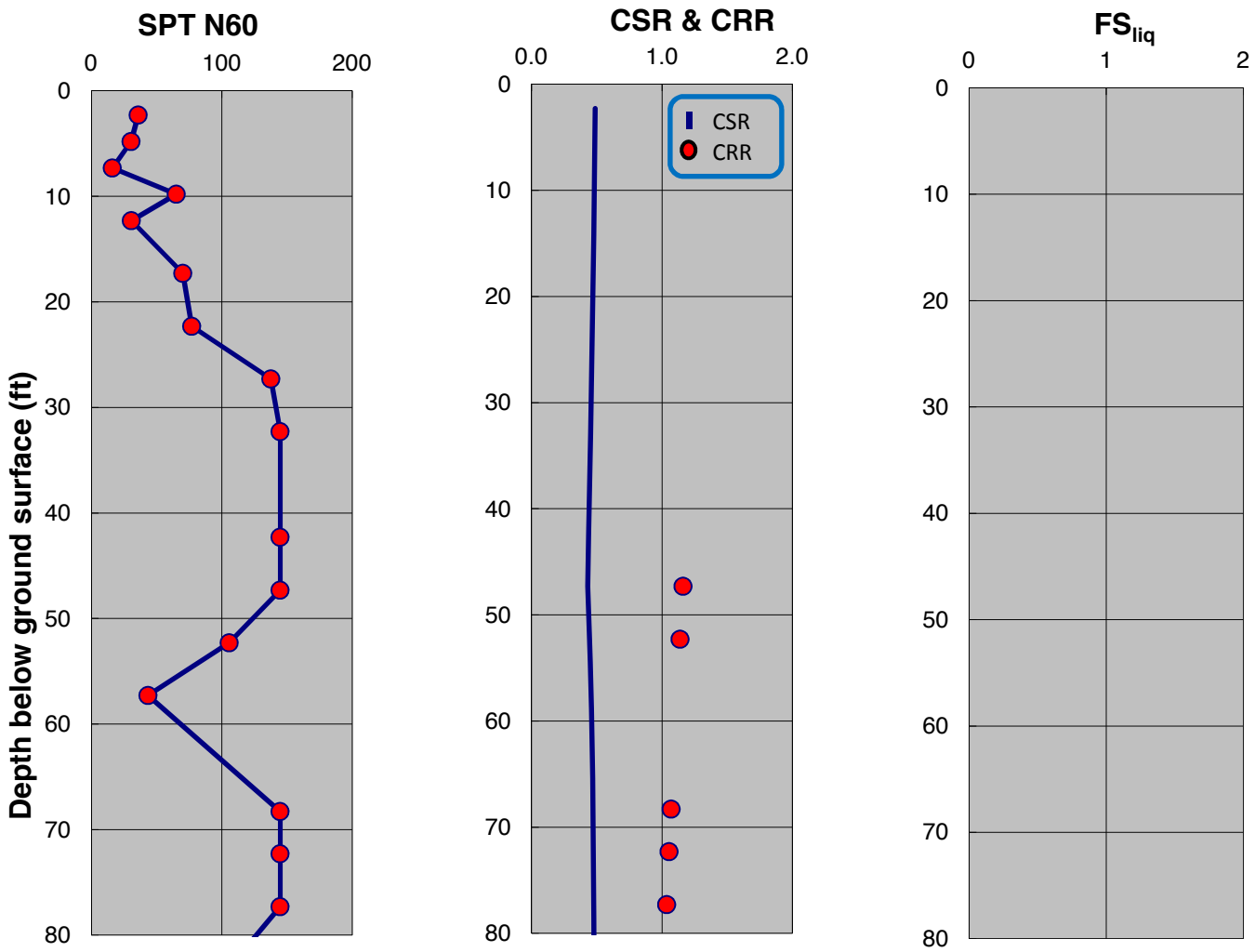
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-97 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



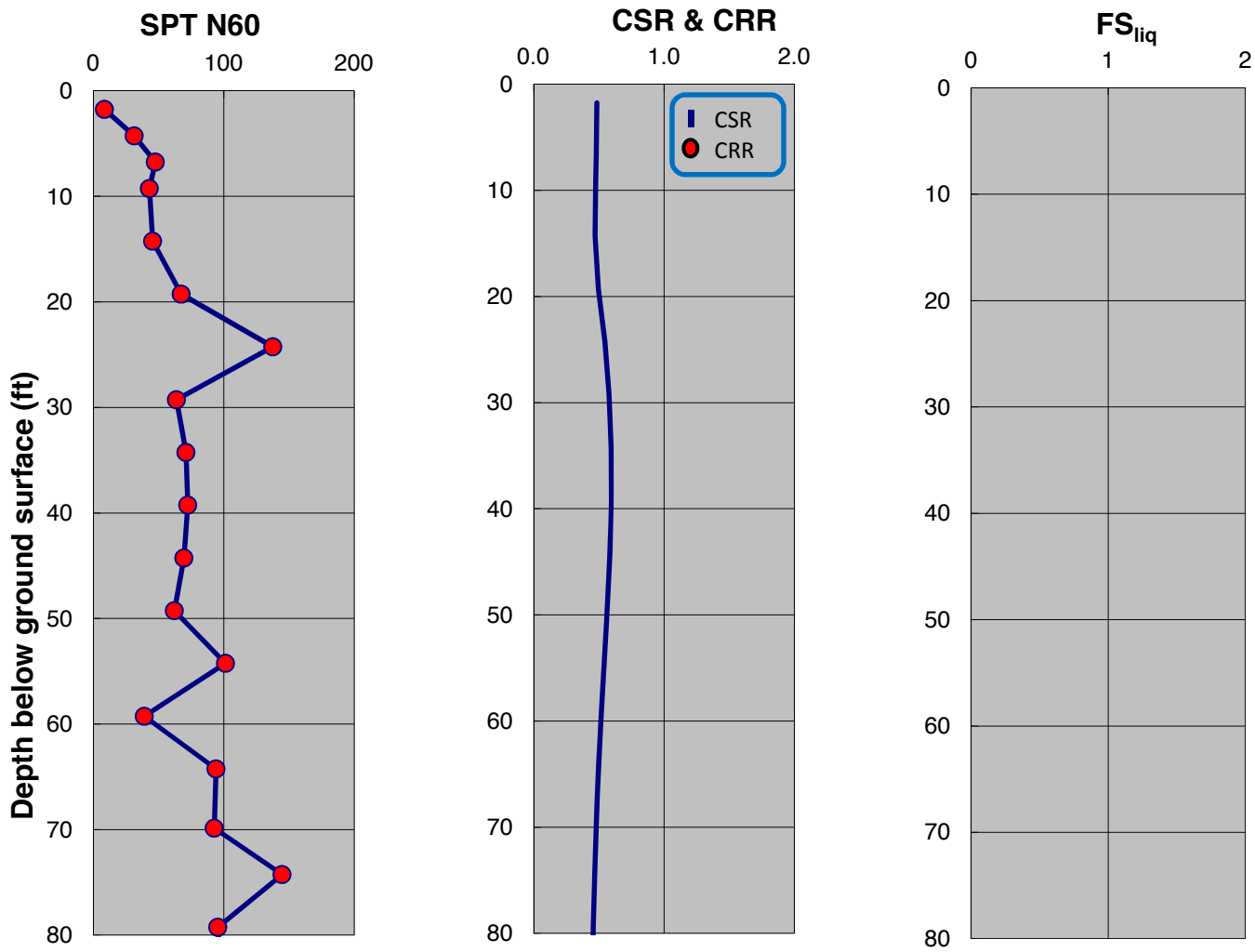
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-98 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



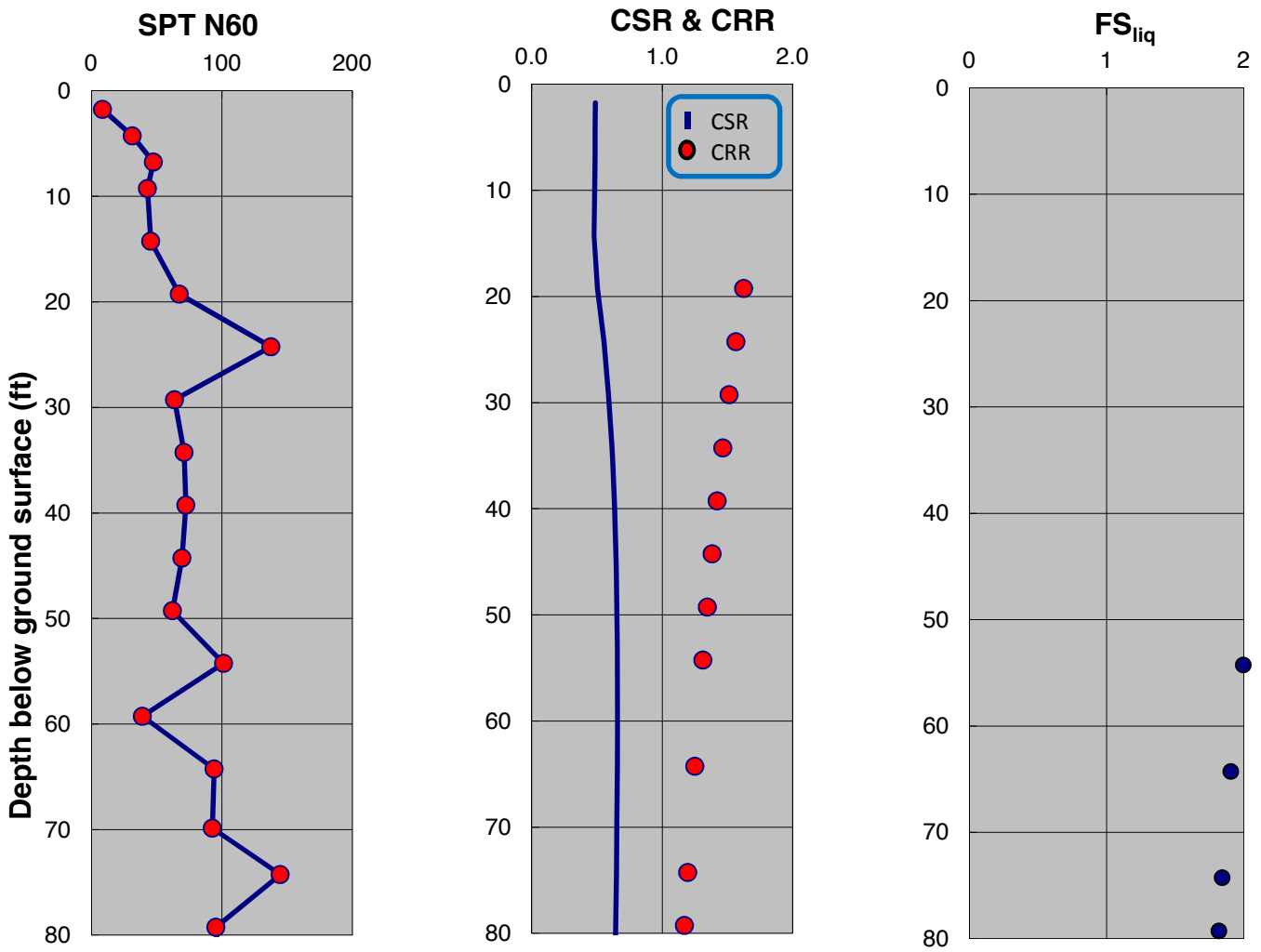
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-98 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



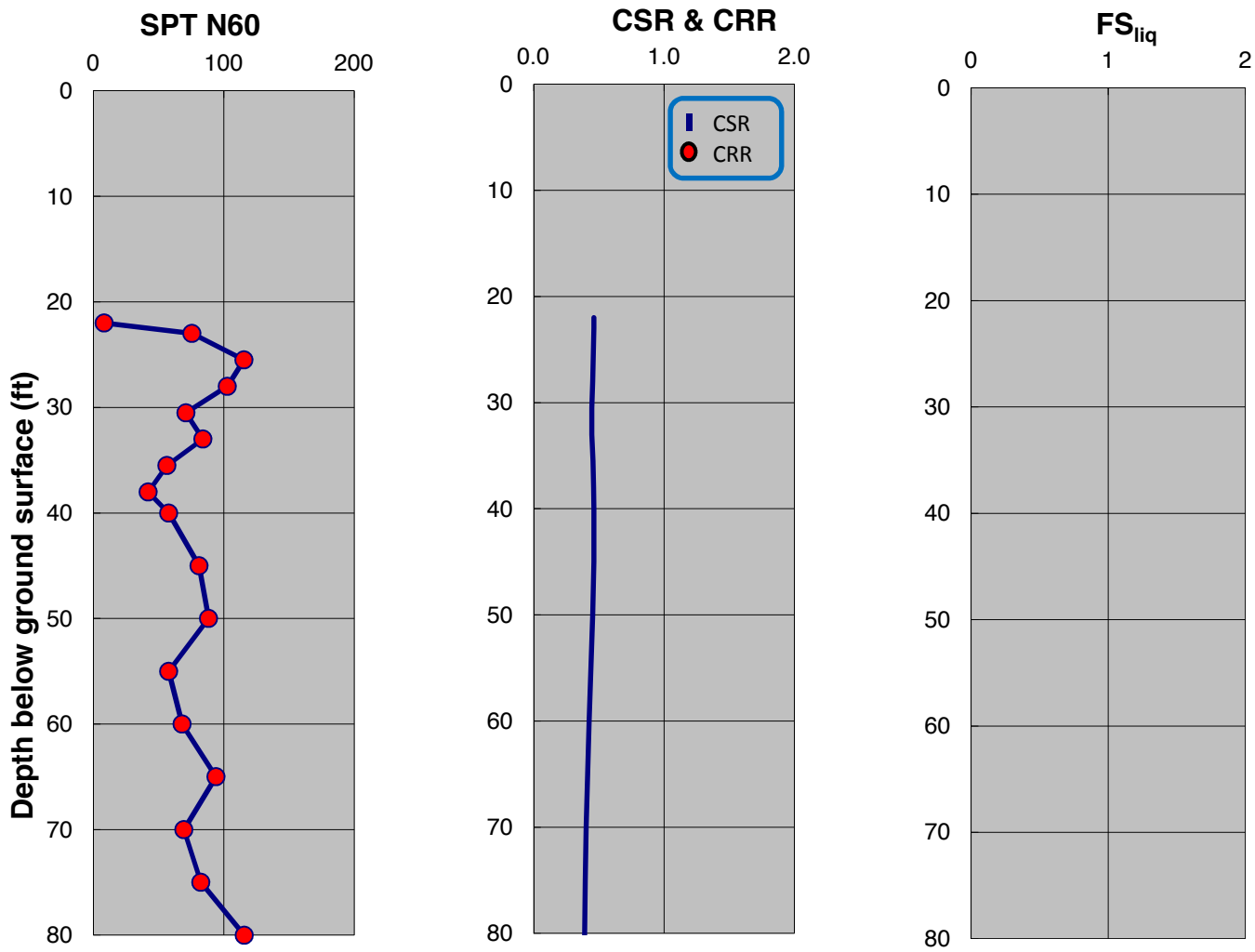
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-99 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-99 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

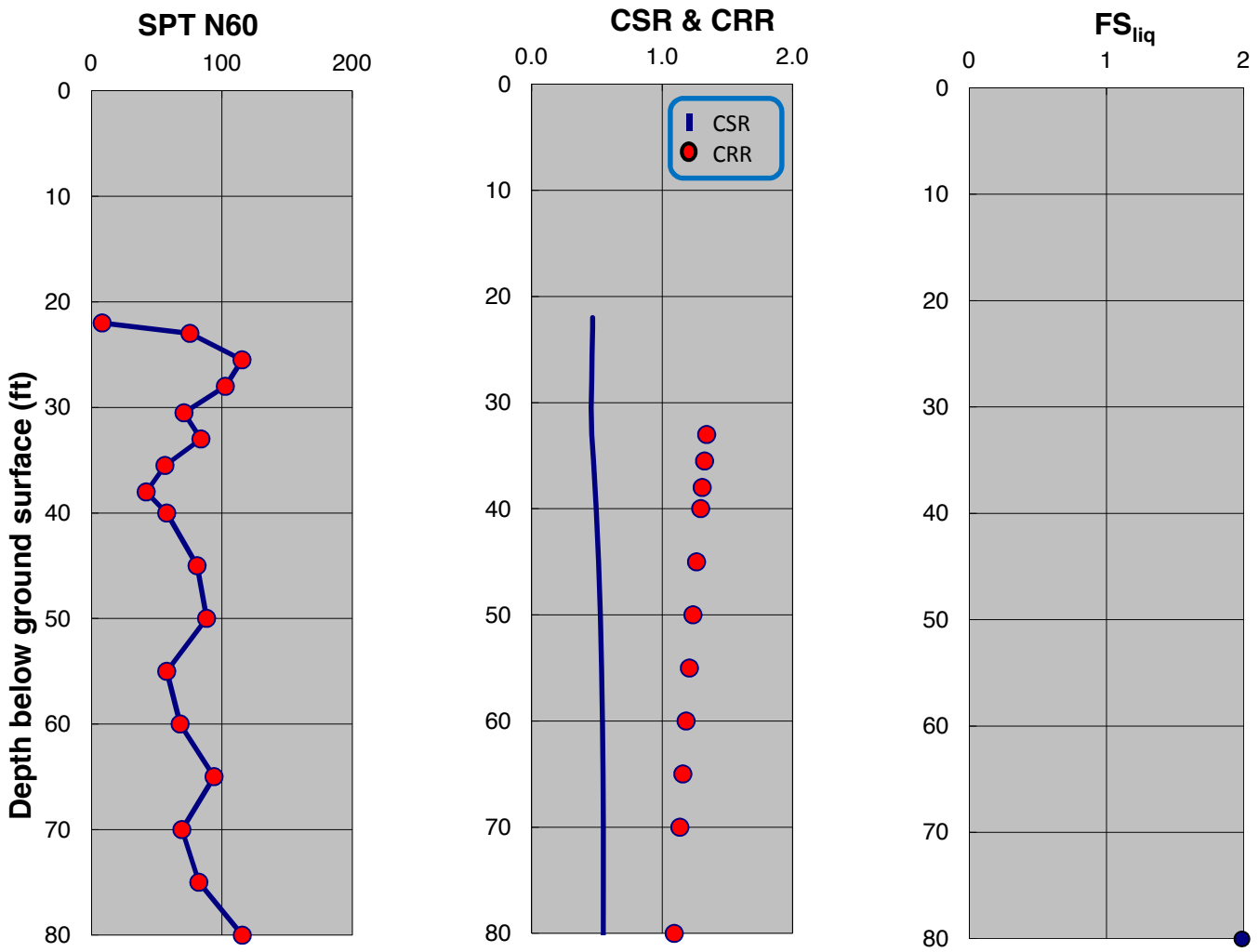
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-101 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

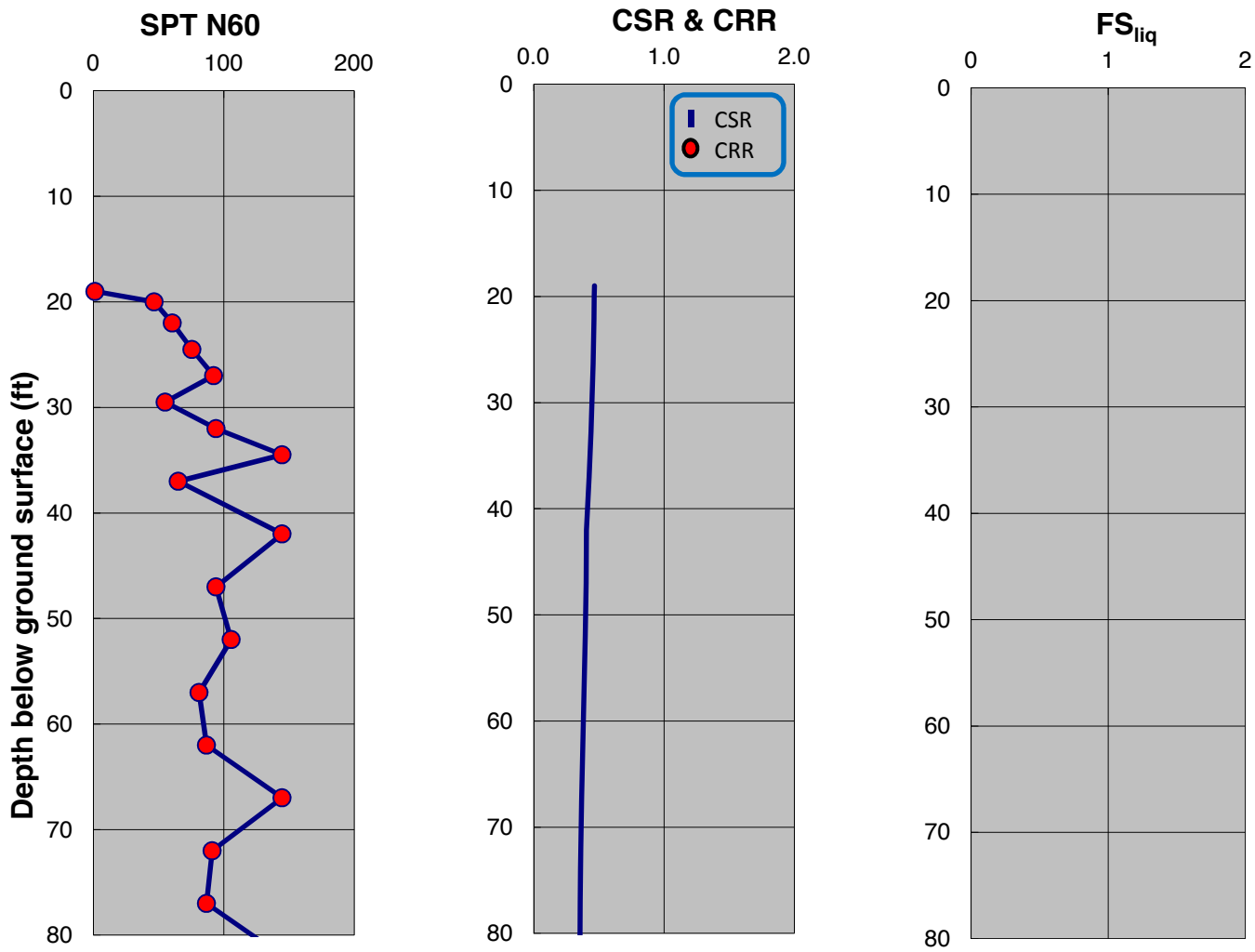
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.125



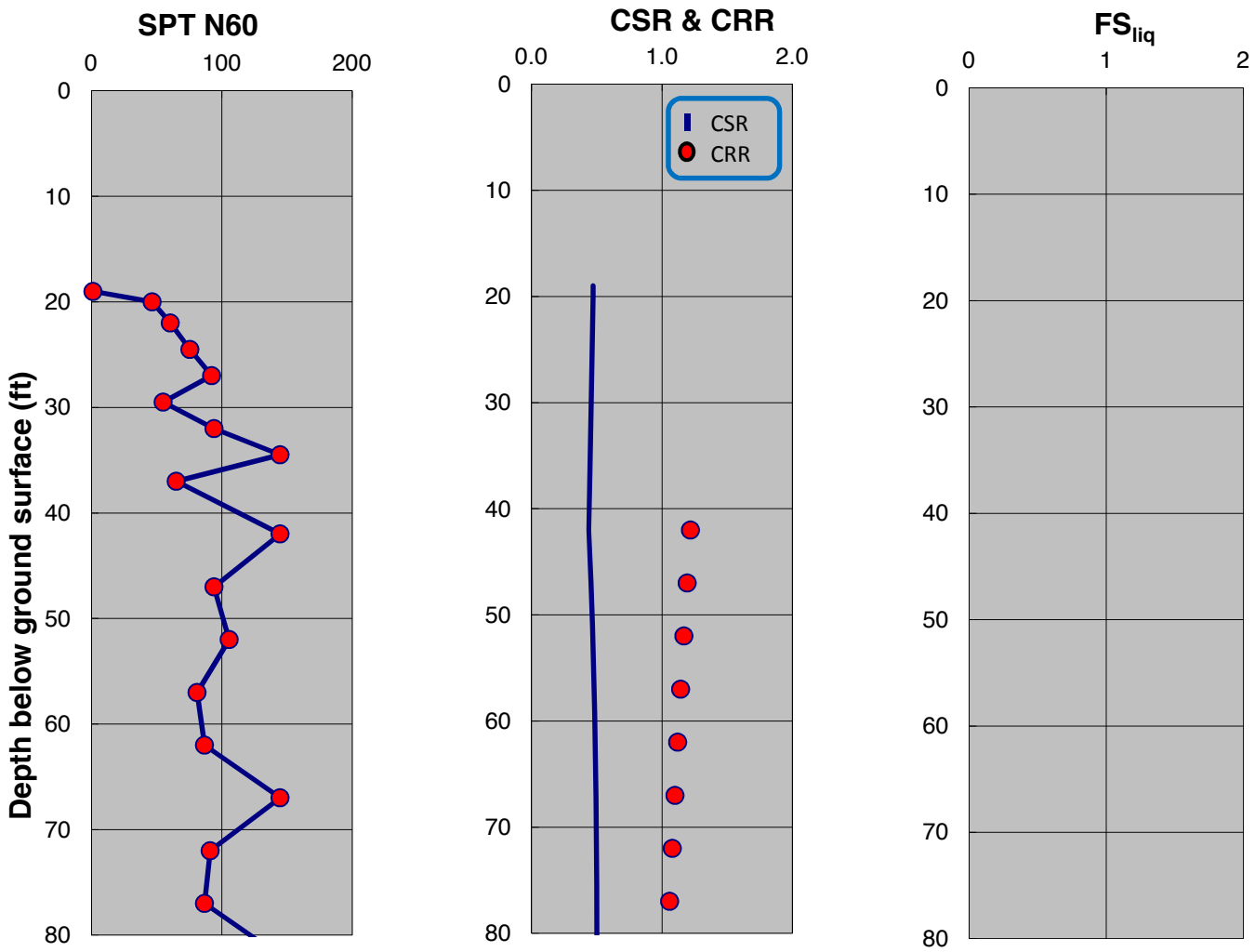
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-101 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



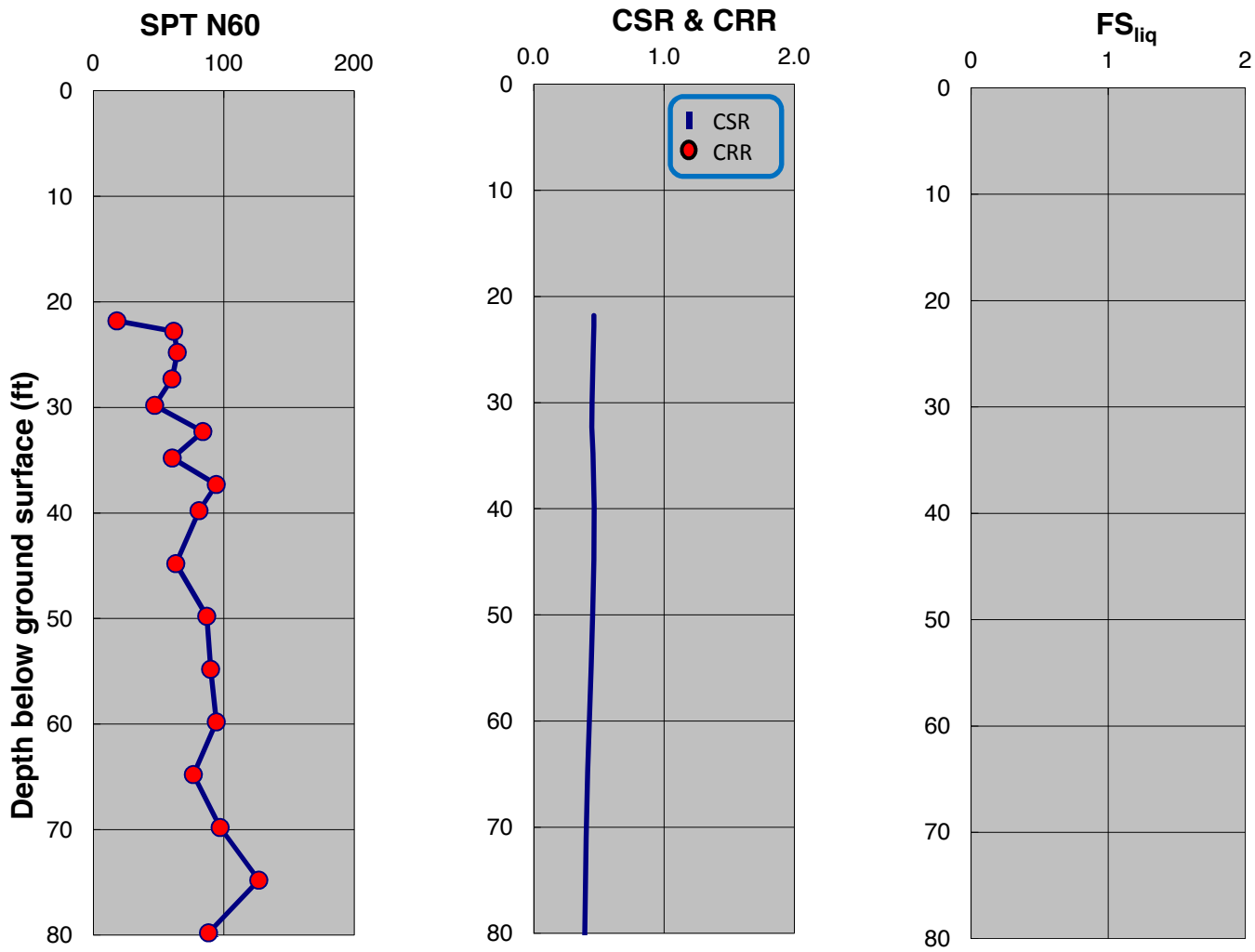
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-102 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



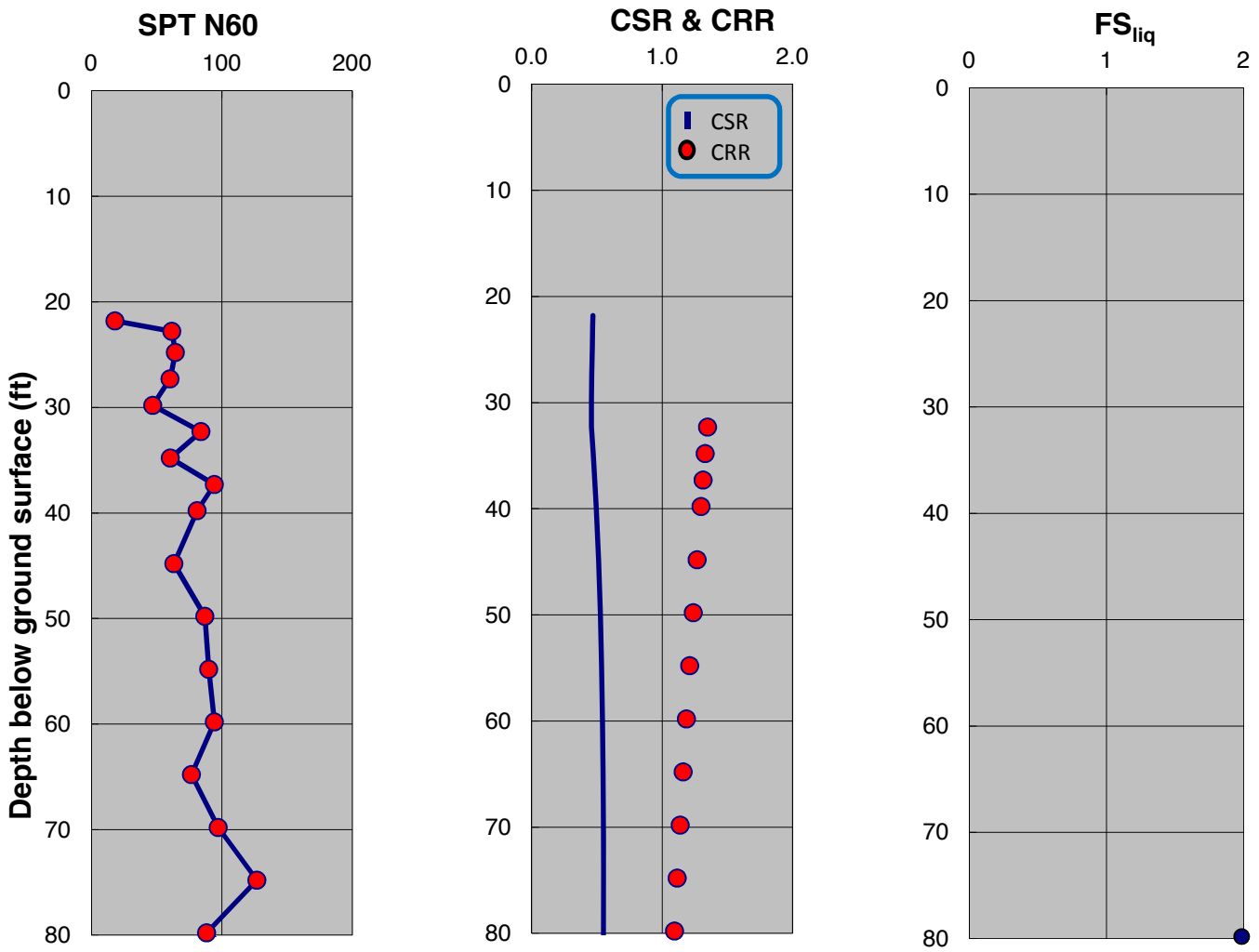
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-102 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



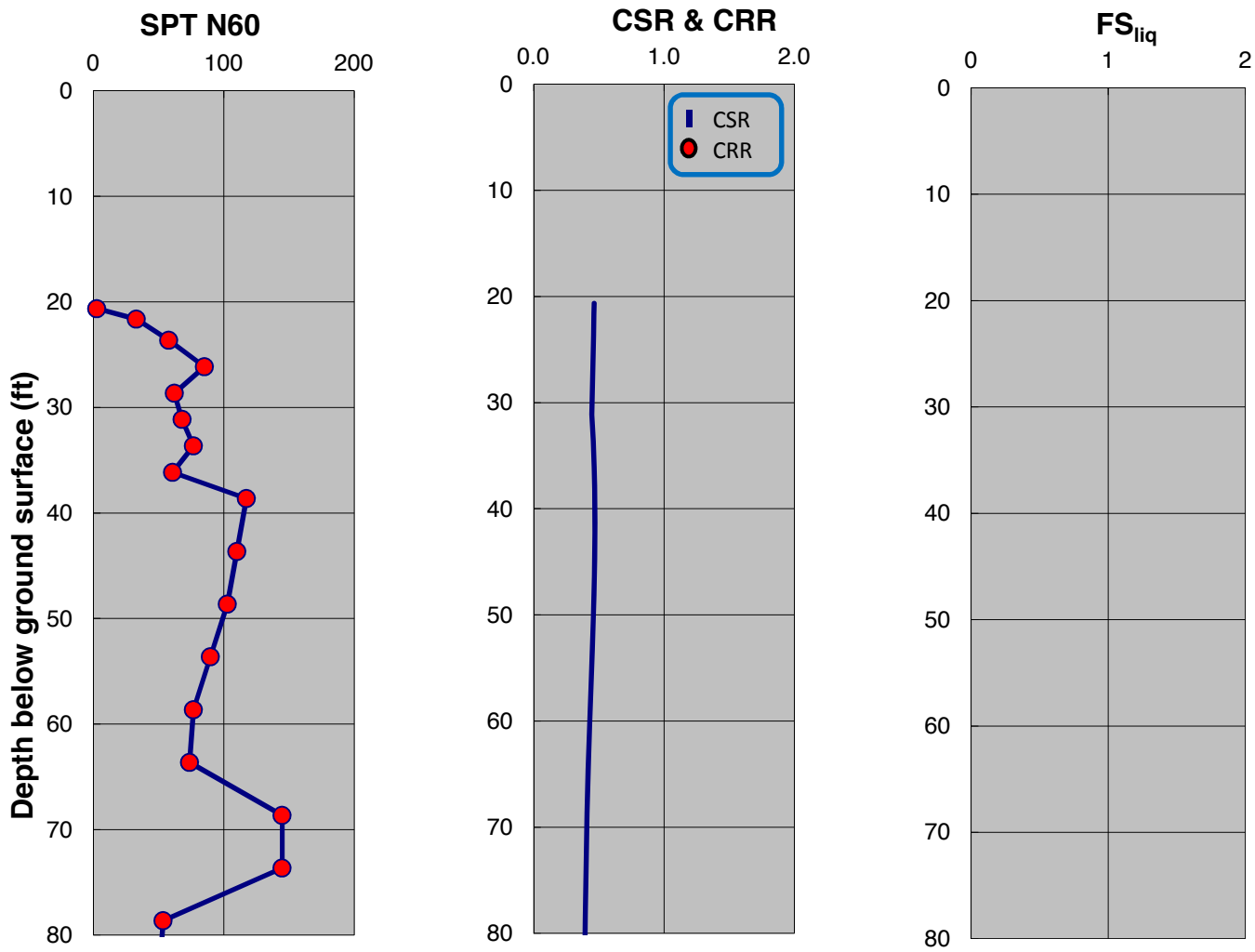
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-104 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



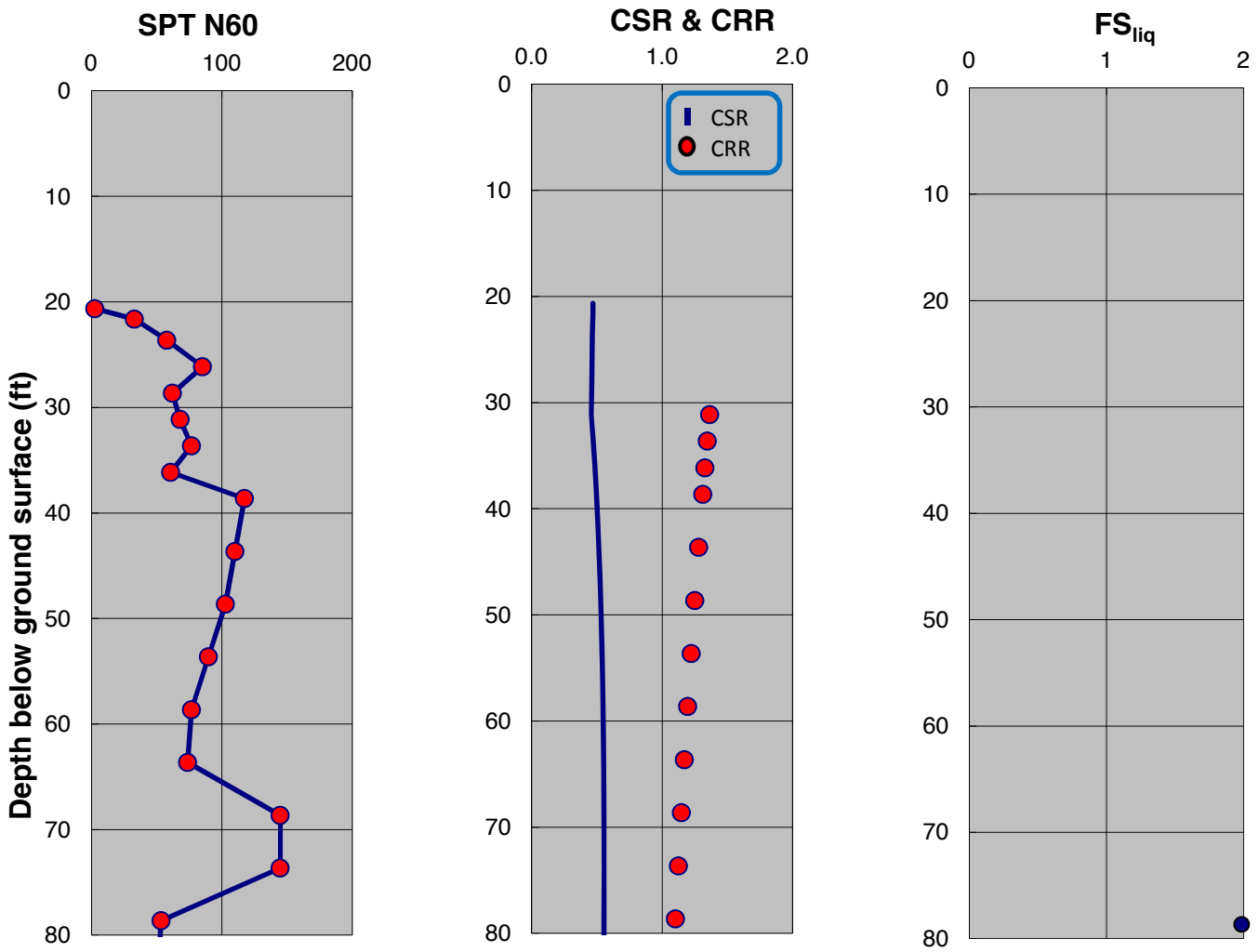
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-104 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



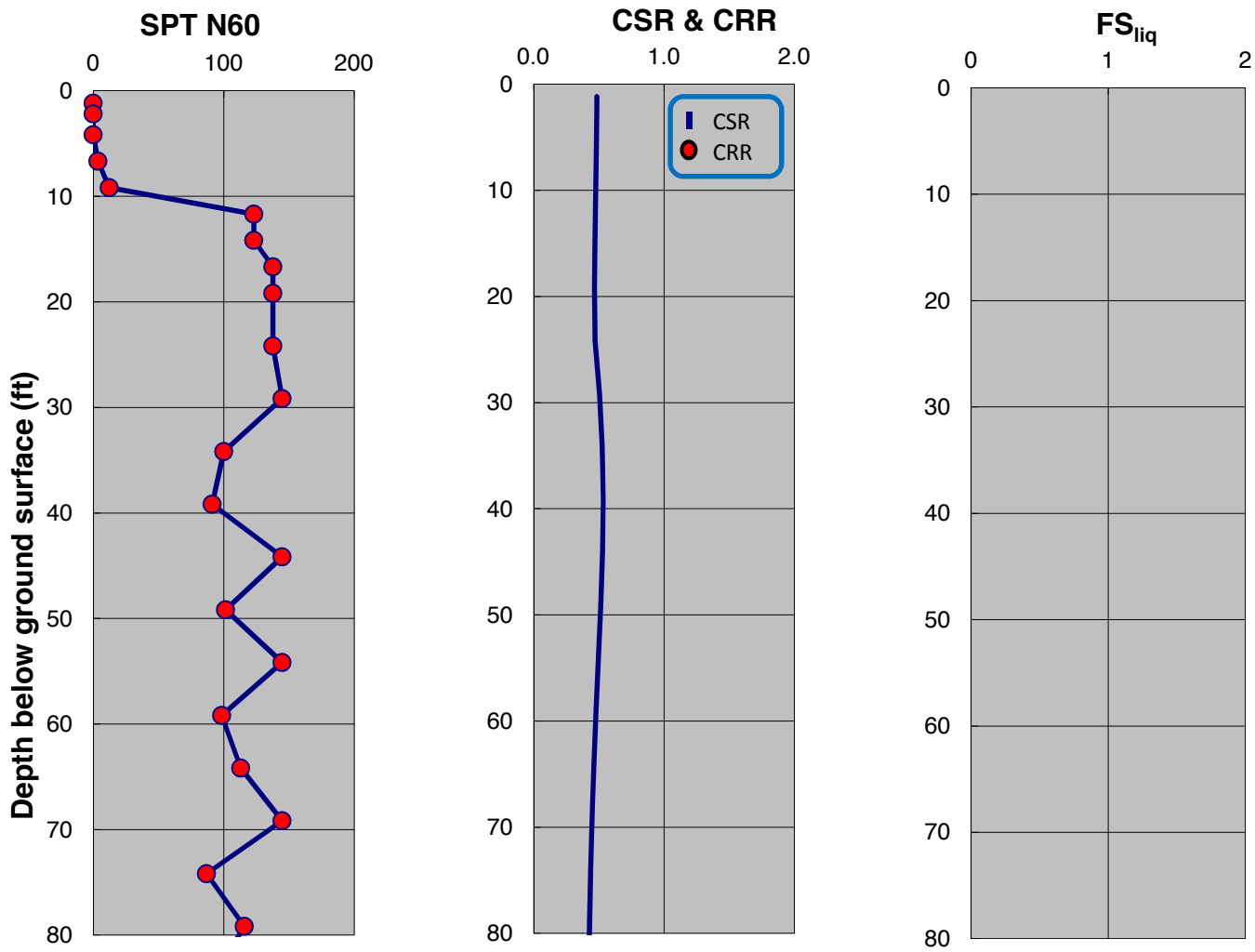
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-105 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



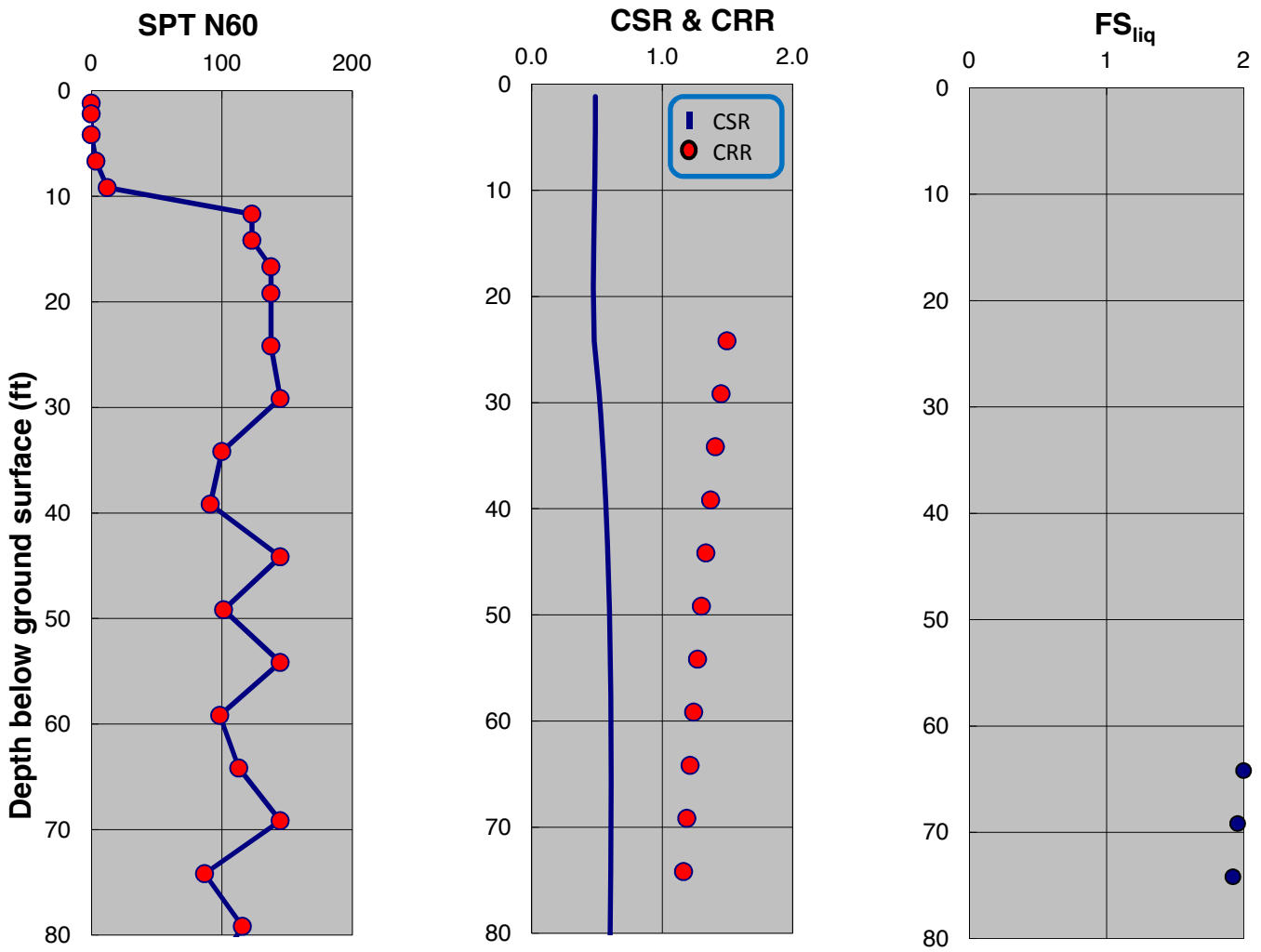
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-105 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



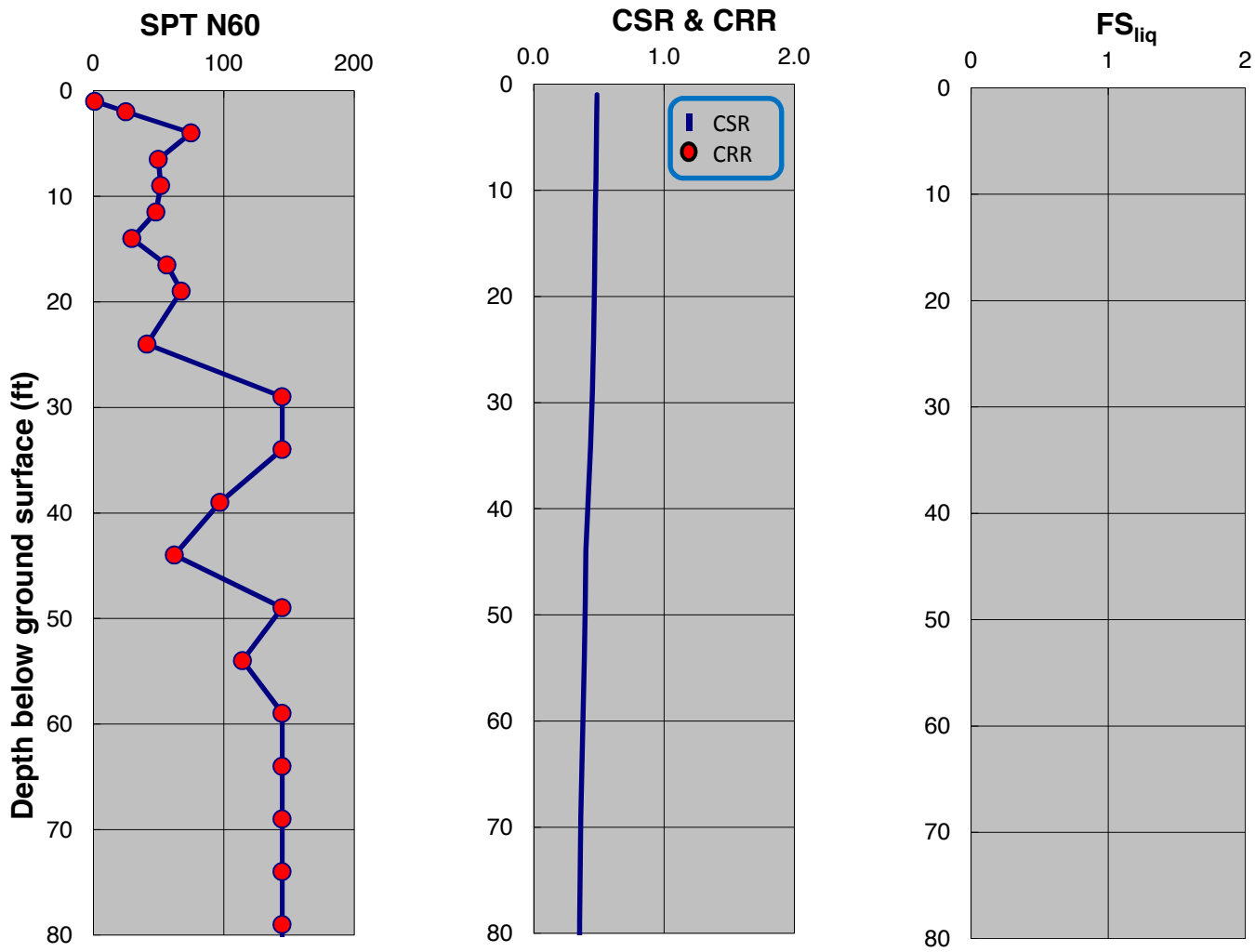
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-107 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



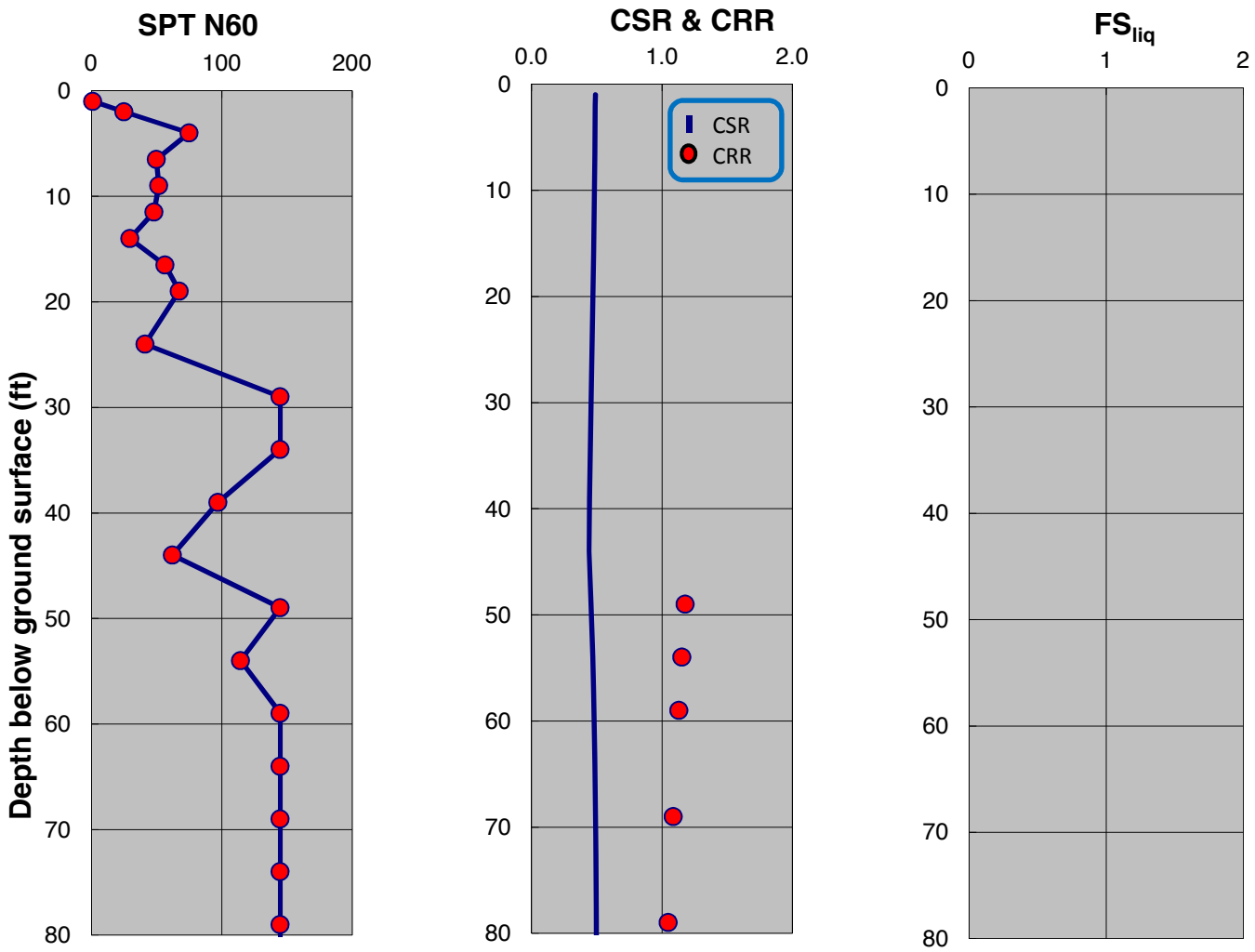
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-107 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



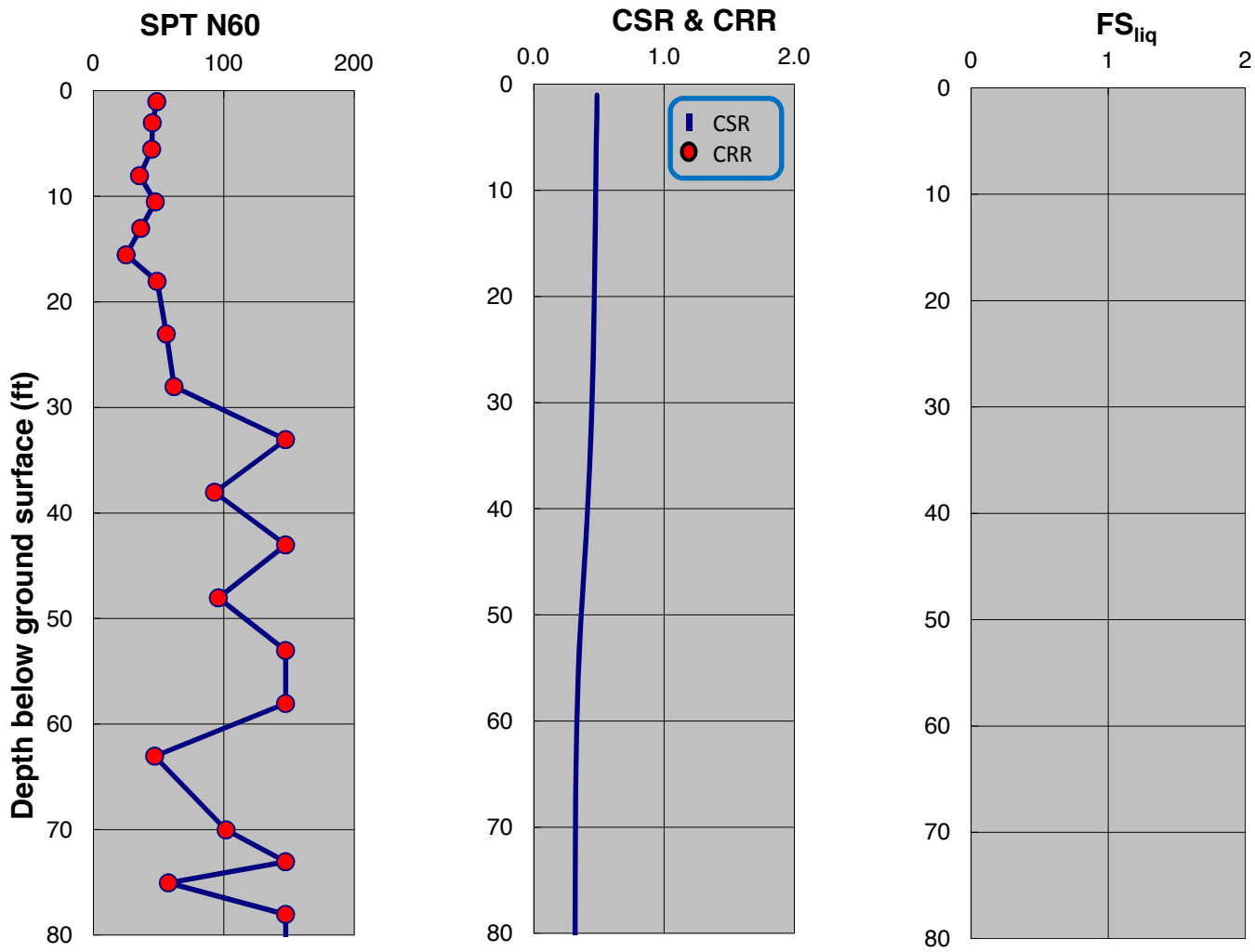
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-110 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



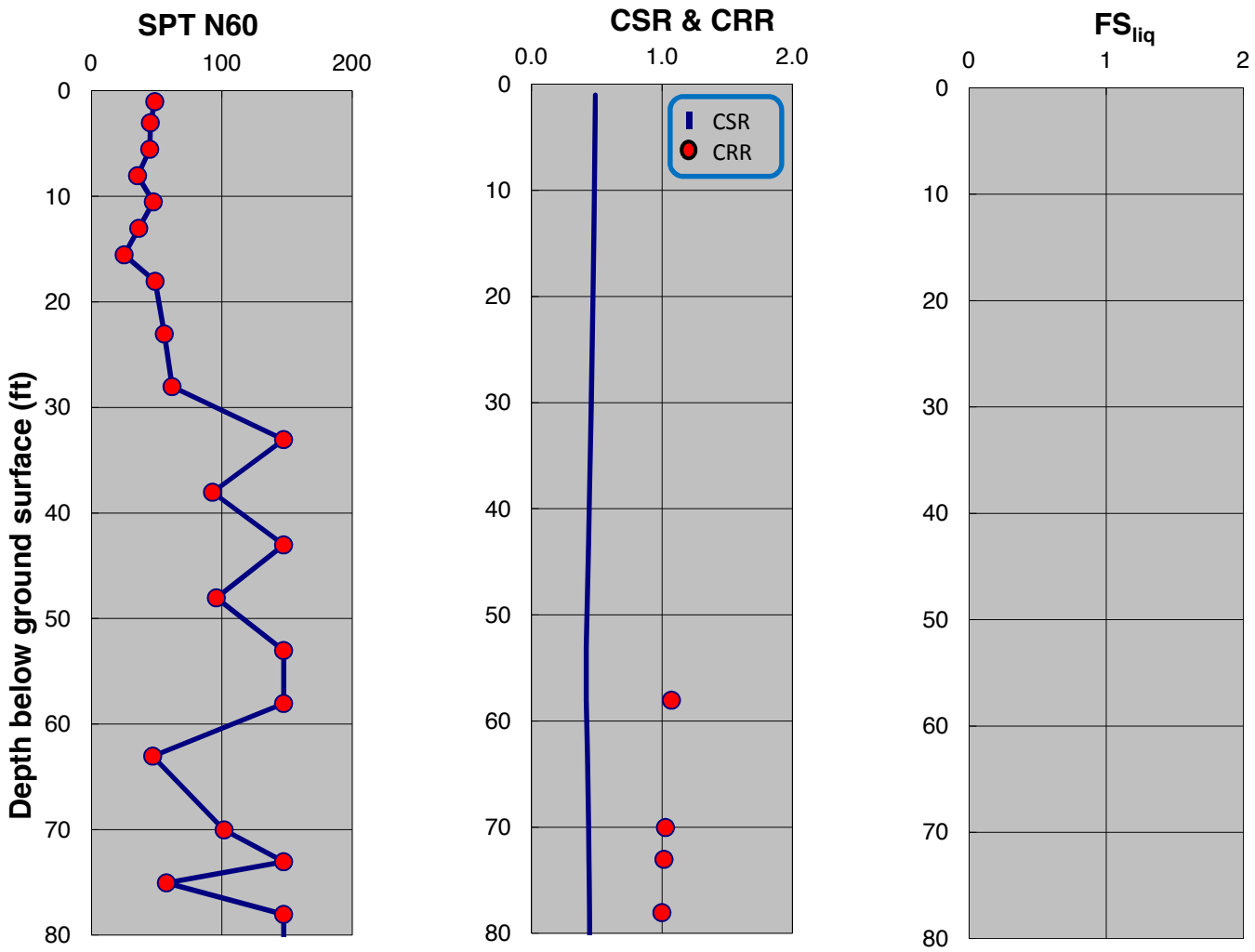
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-110 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



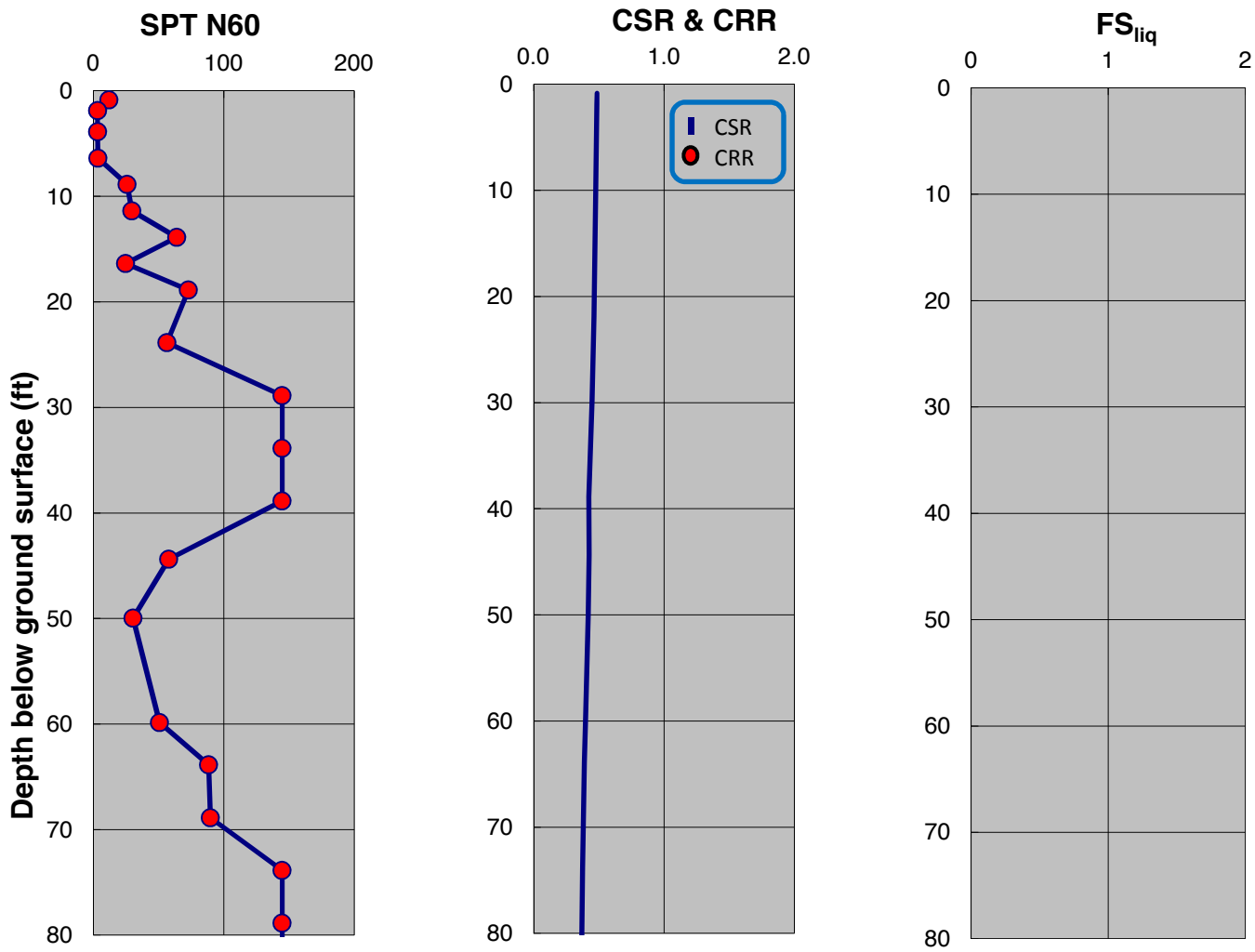
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-112 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



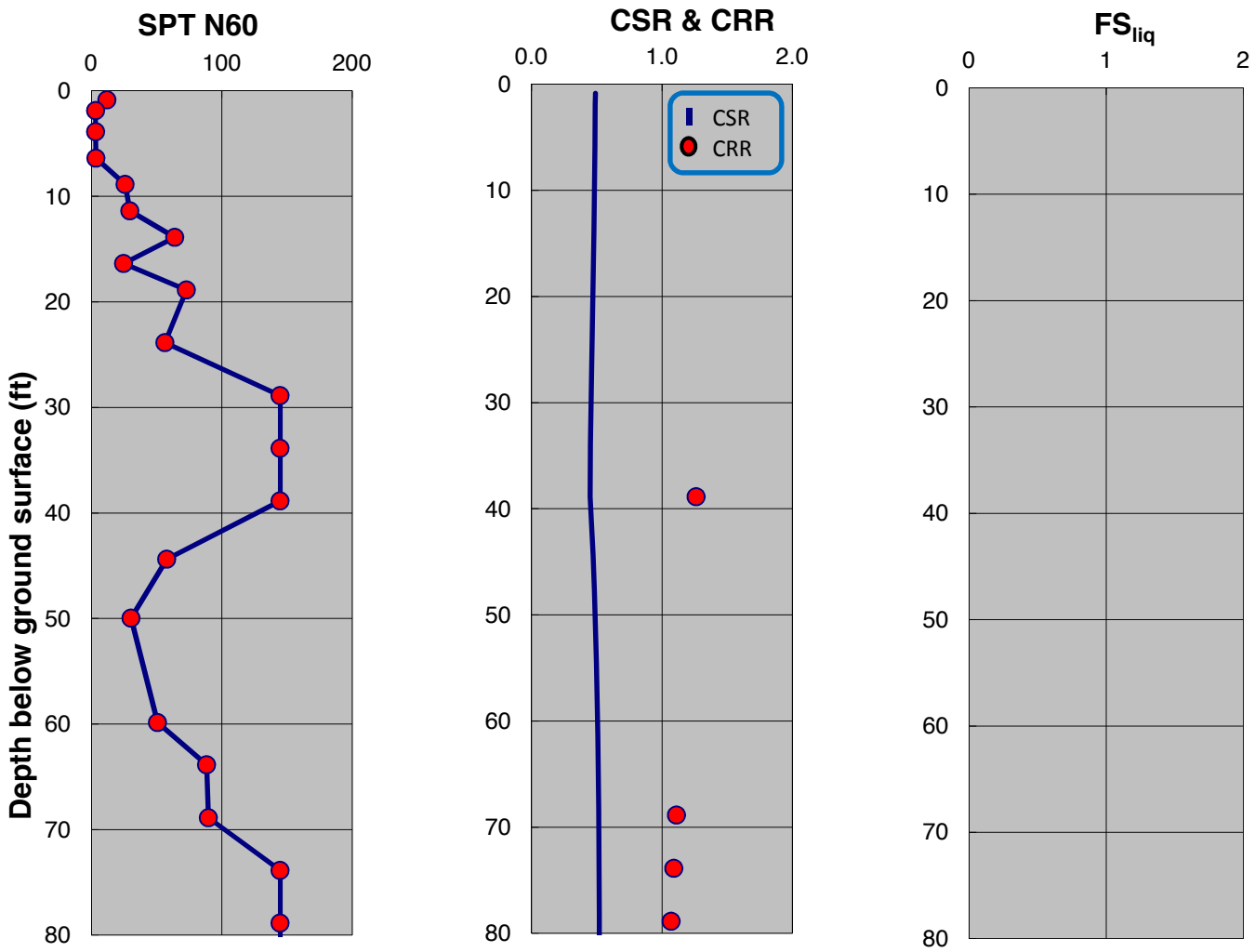
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-112 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



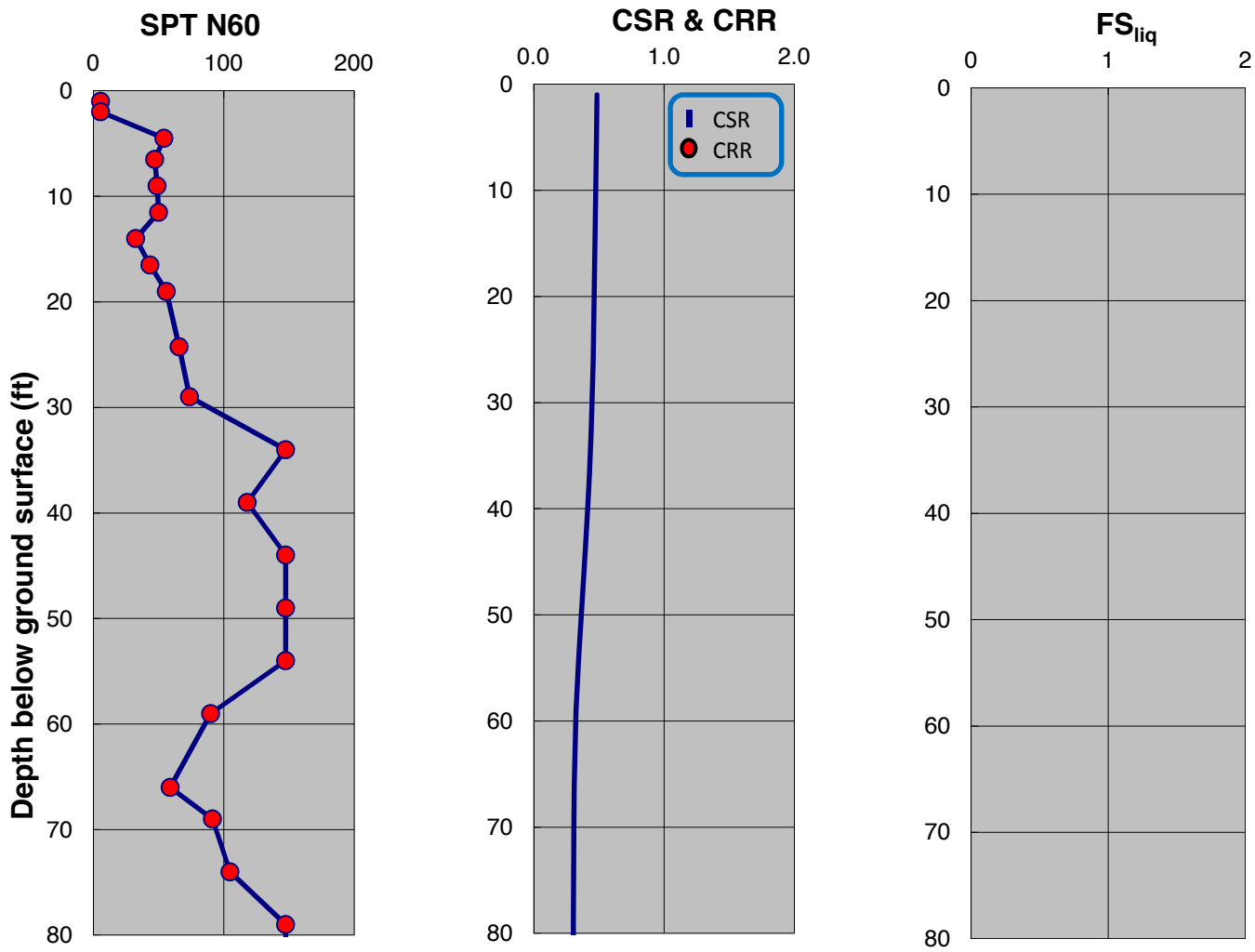
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-113 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



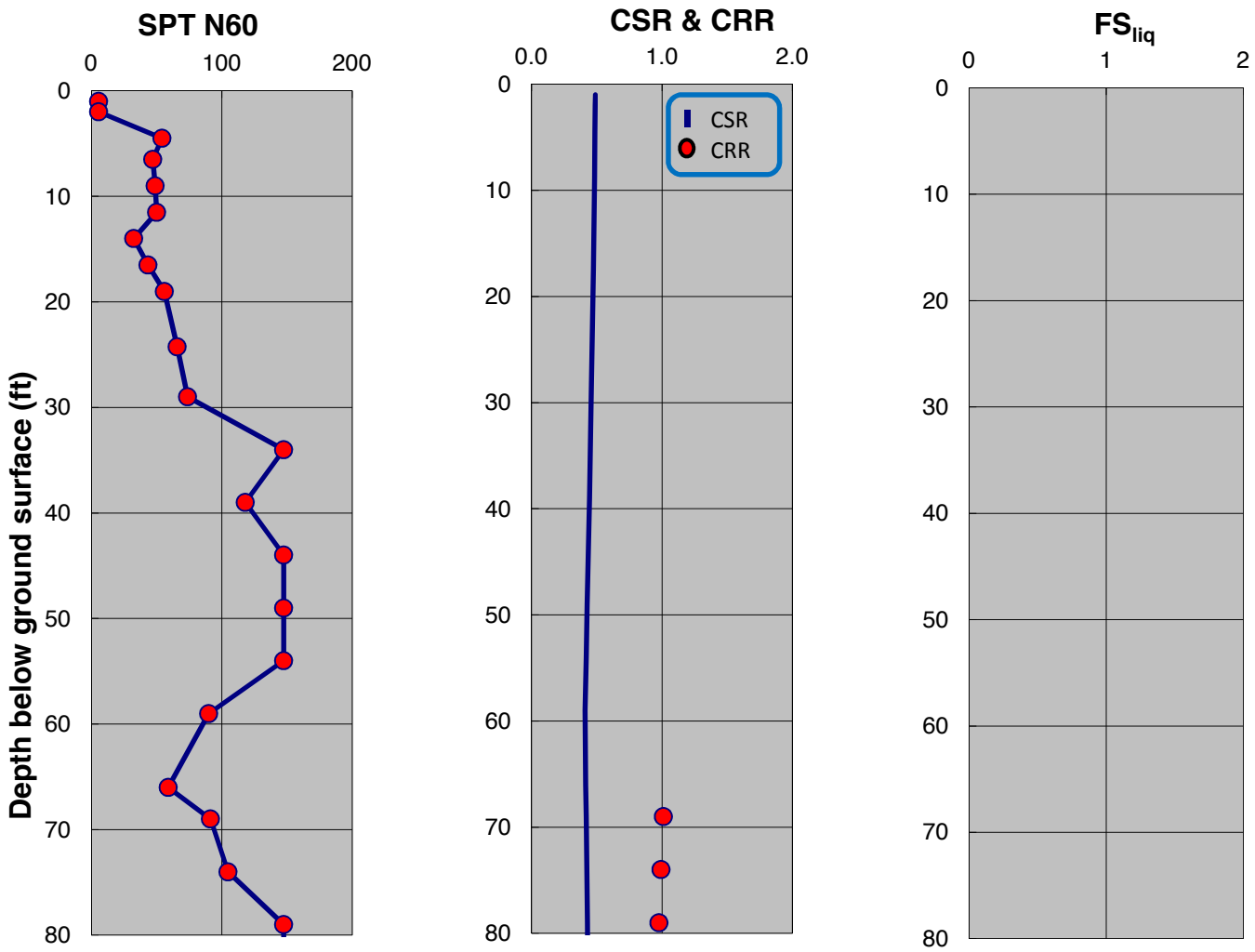
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-113 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



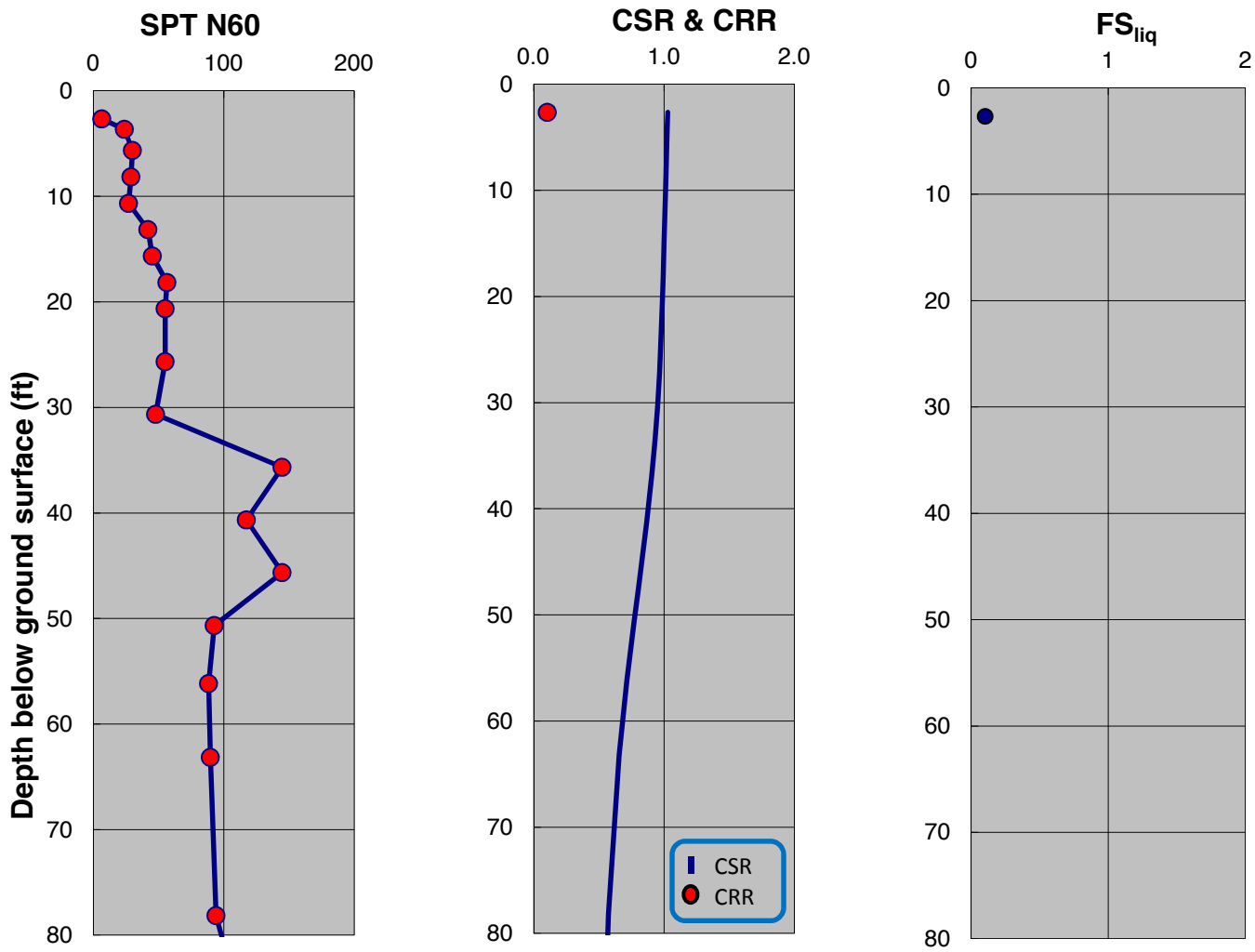
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-114 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



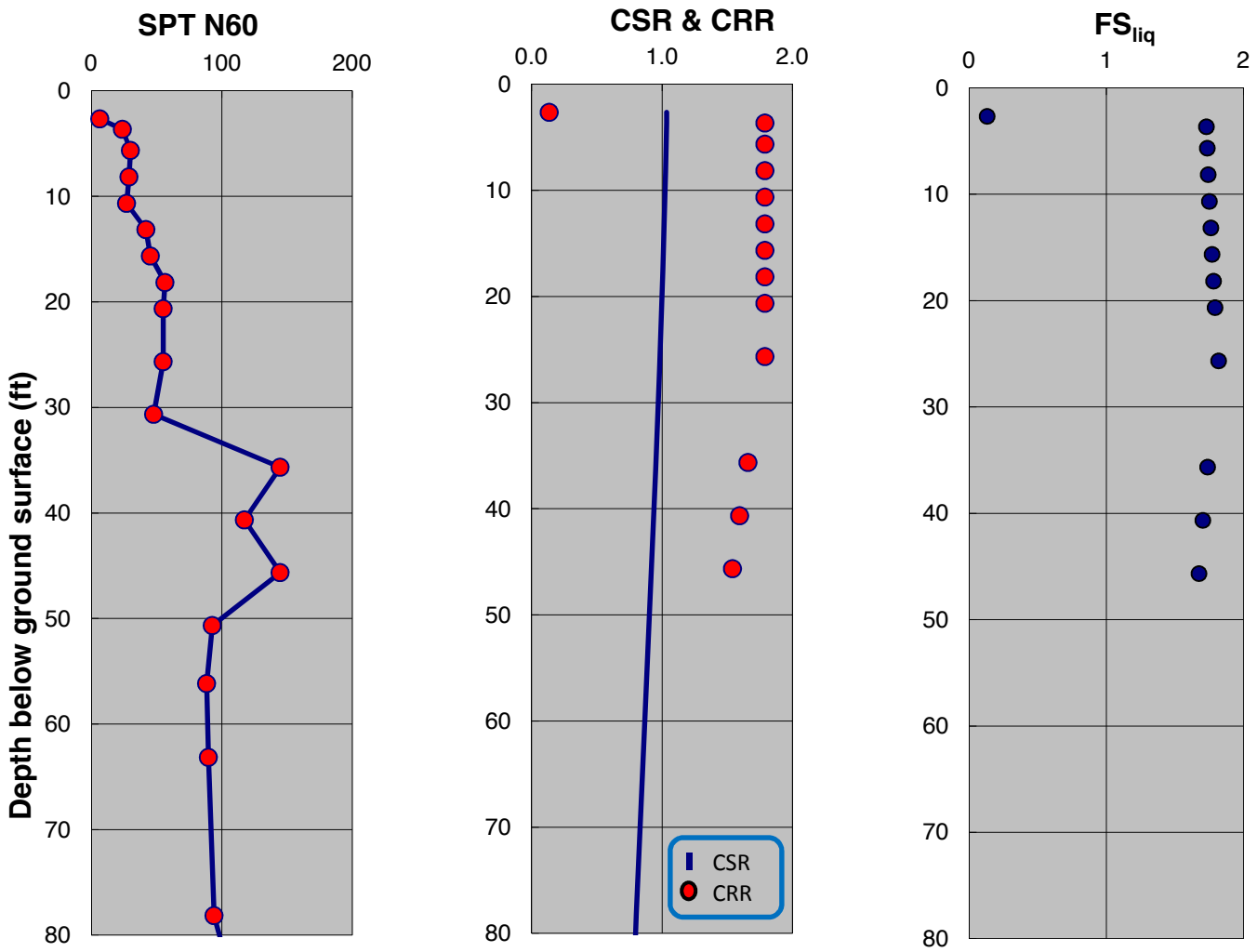
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-114 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



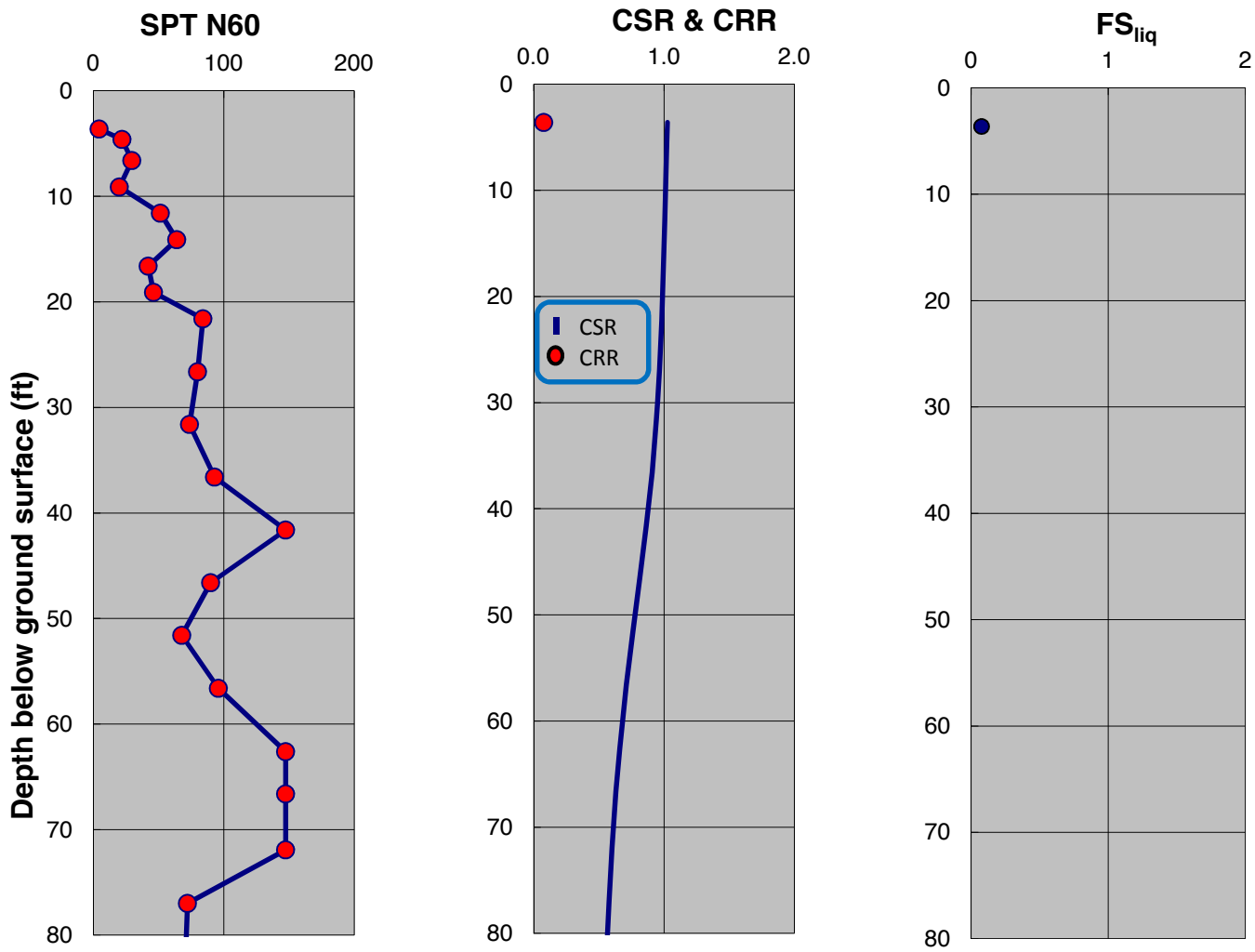
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-117 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



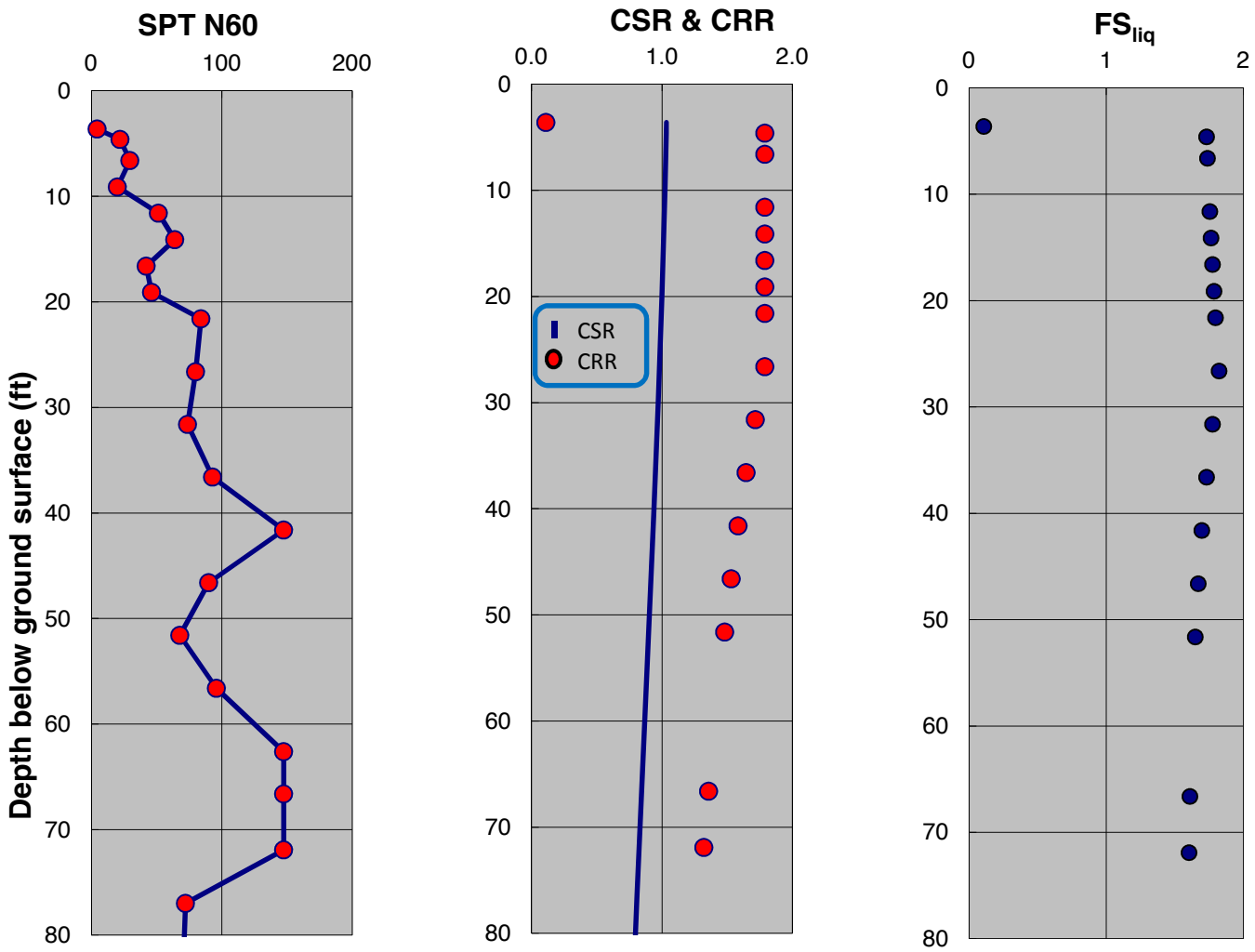
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-117 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



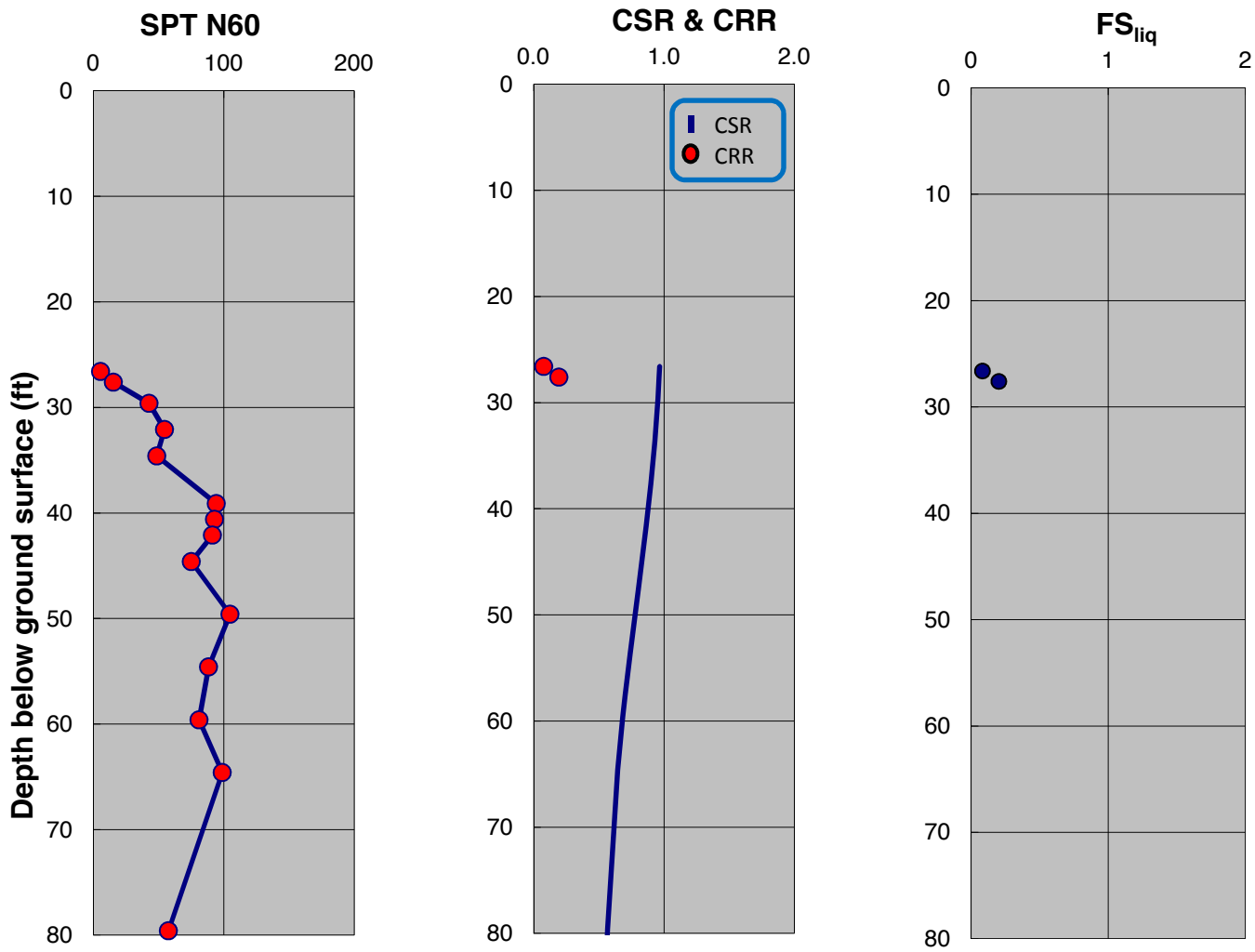
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-120 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



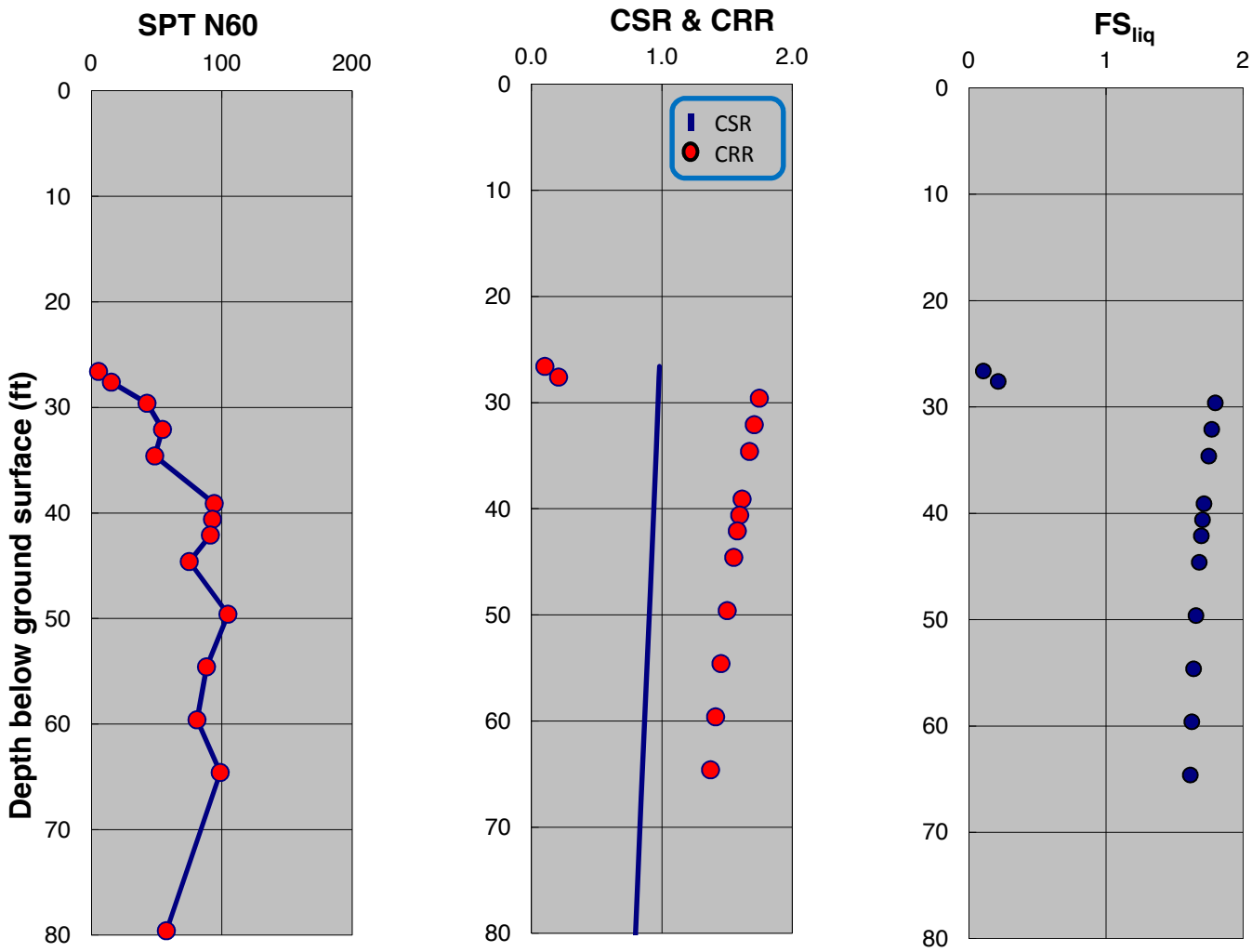
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-120 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



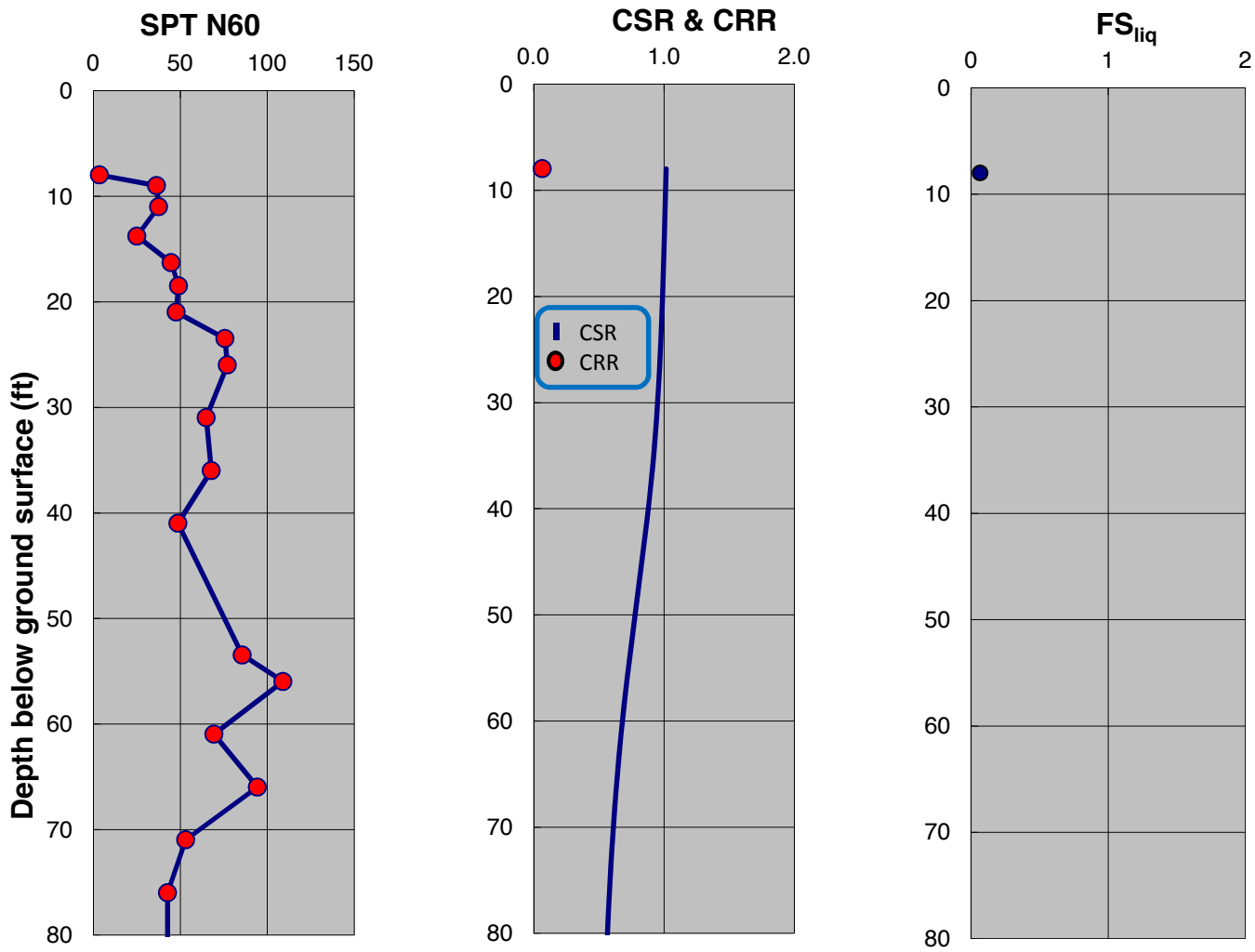
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-121 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



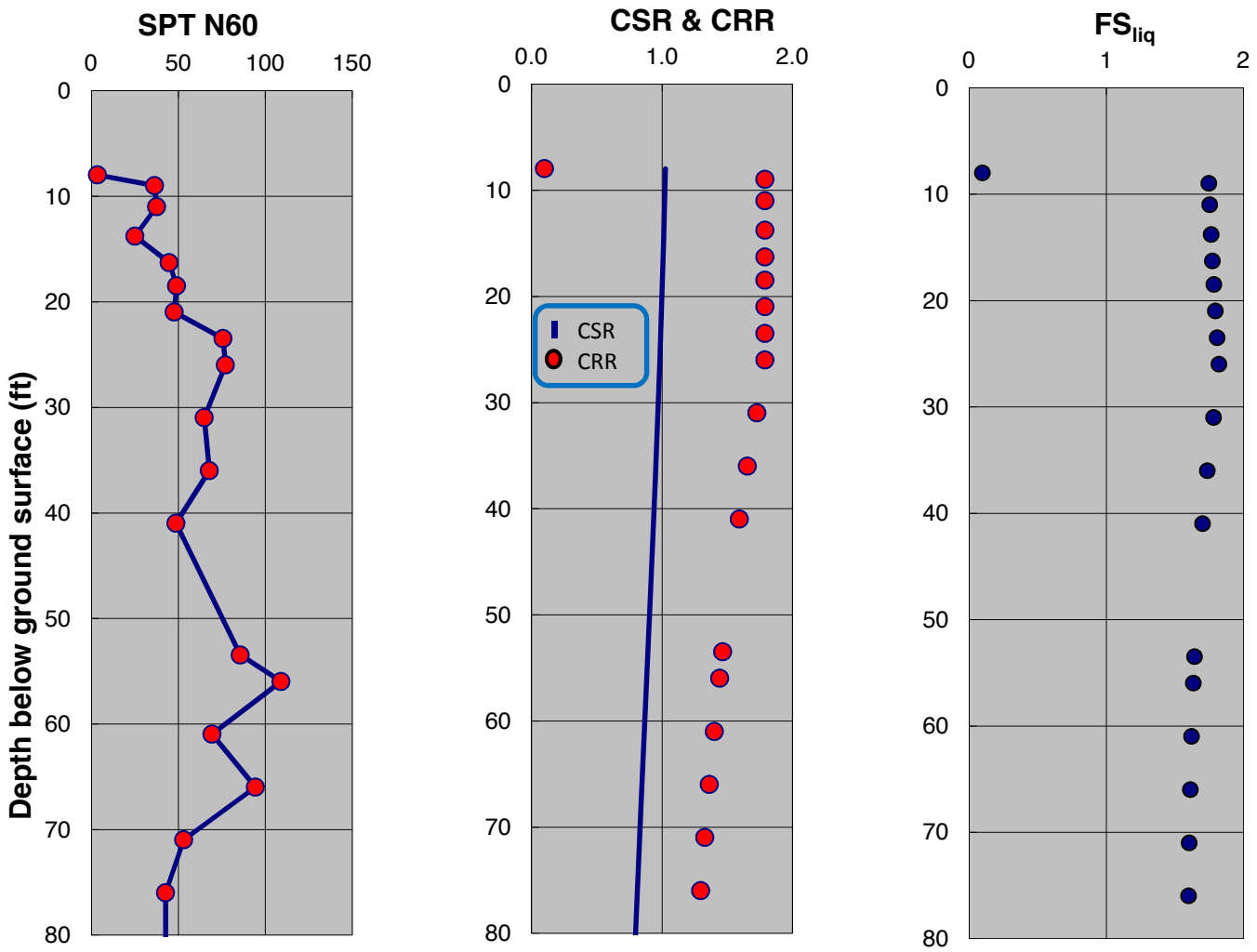
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-121 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



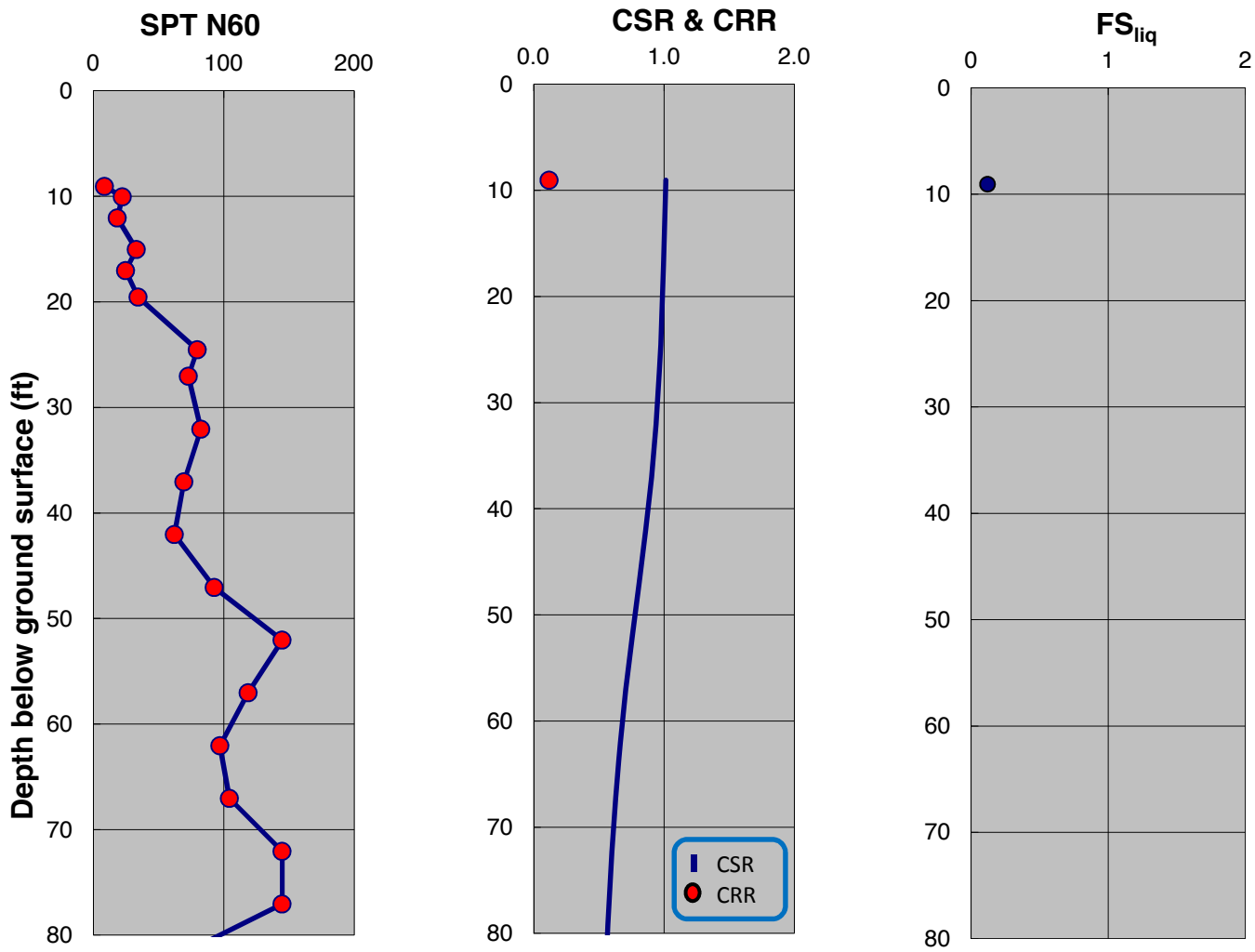
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-122 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



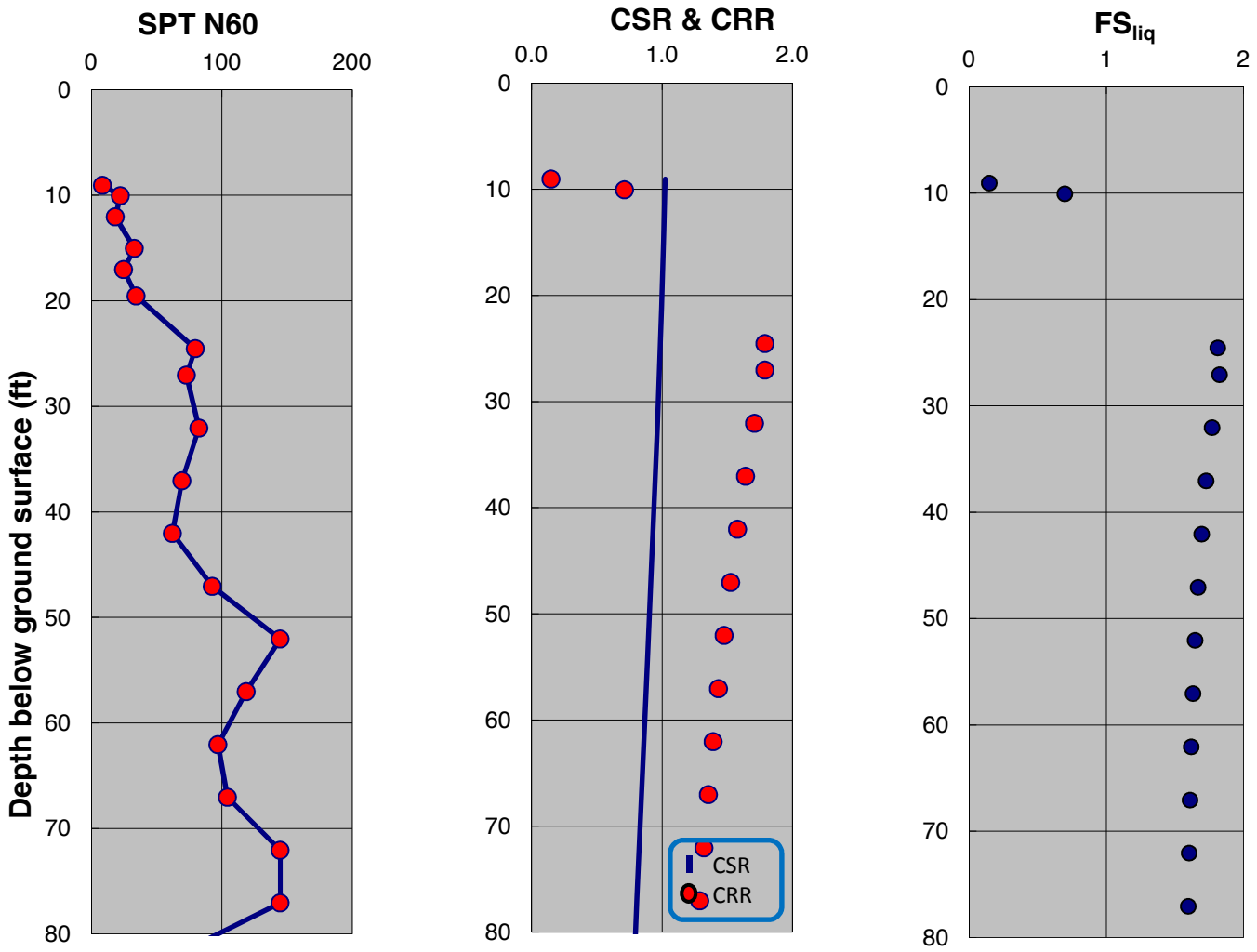
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-122 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



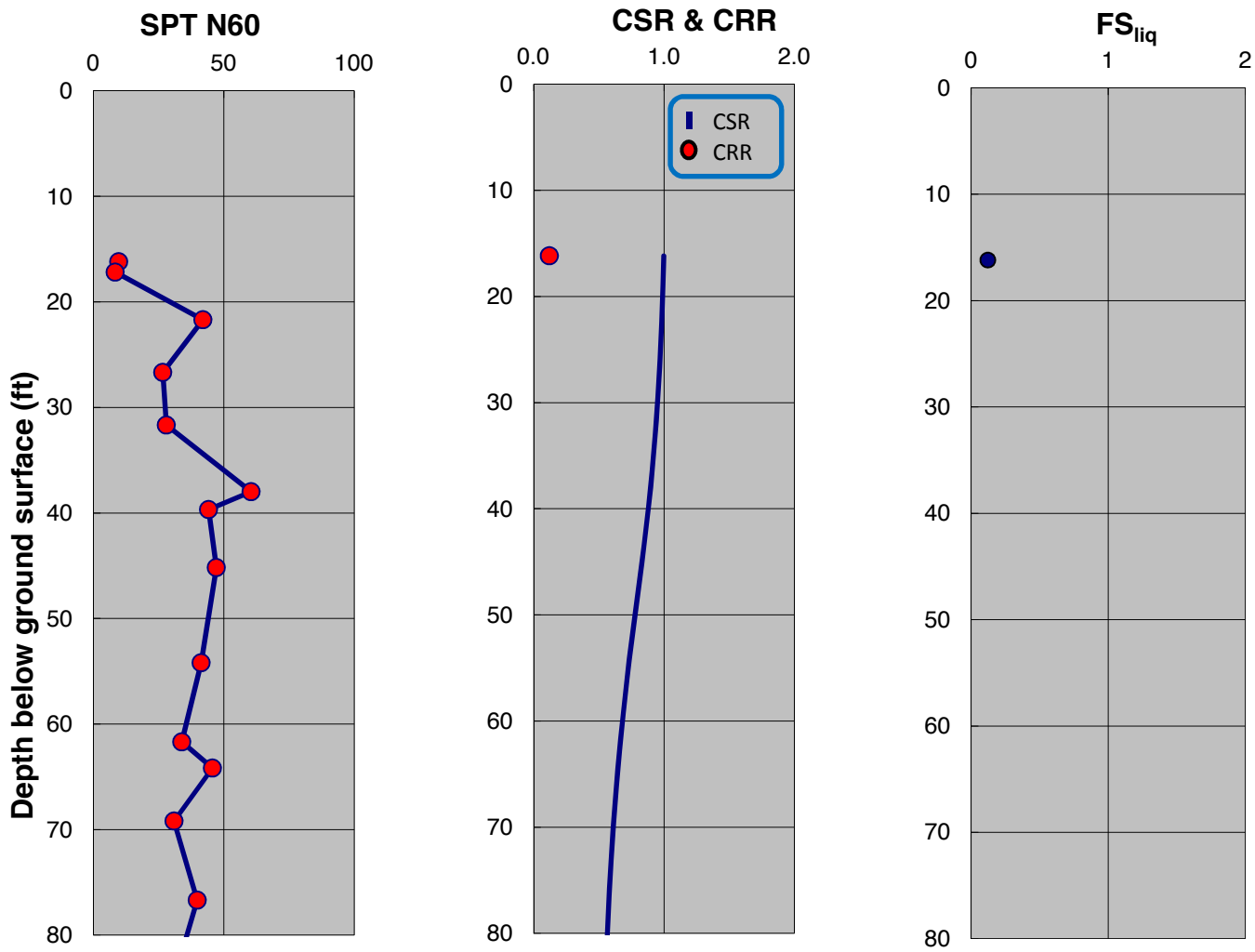
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-123 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



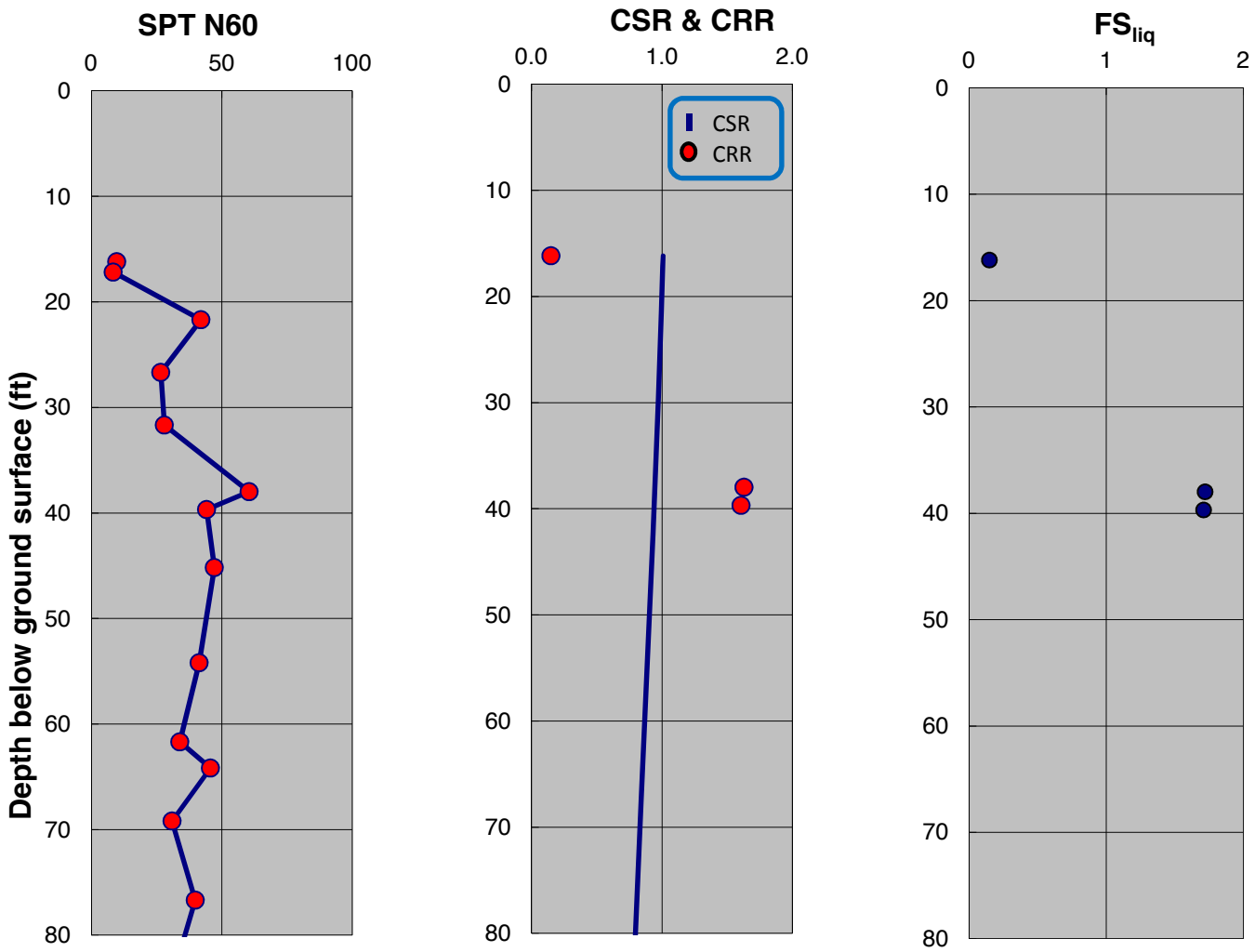
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-123 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



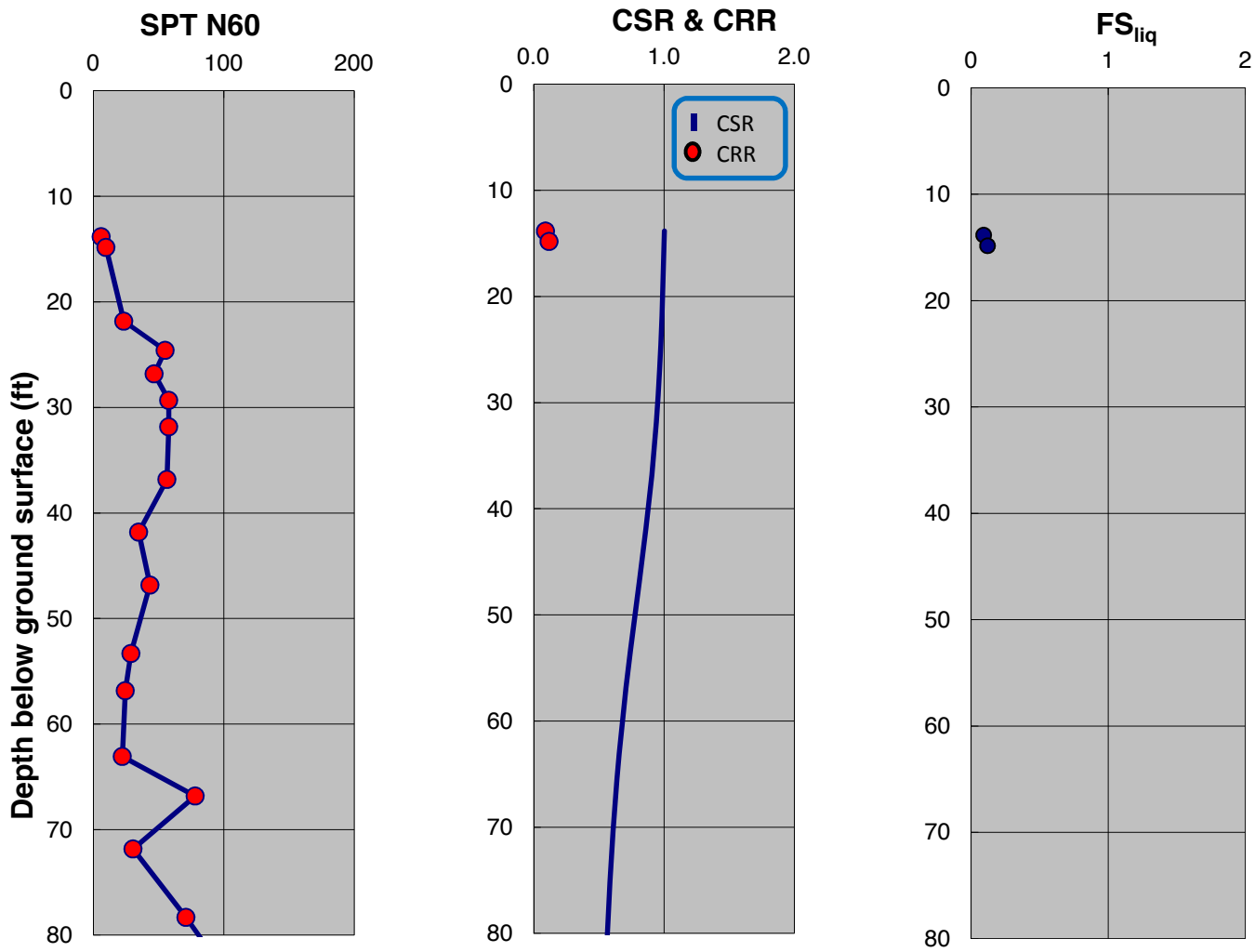
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-124 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



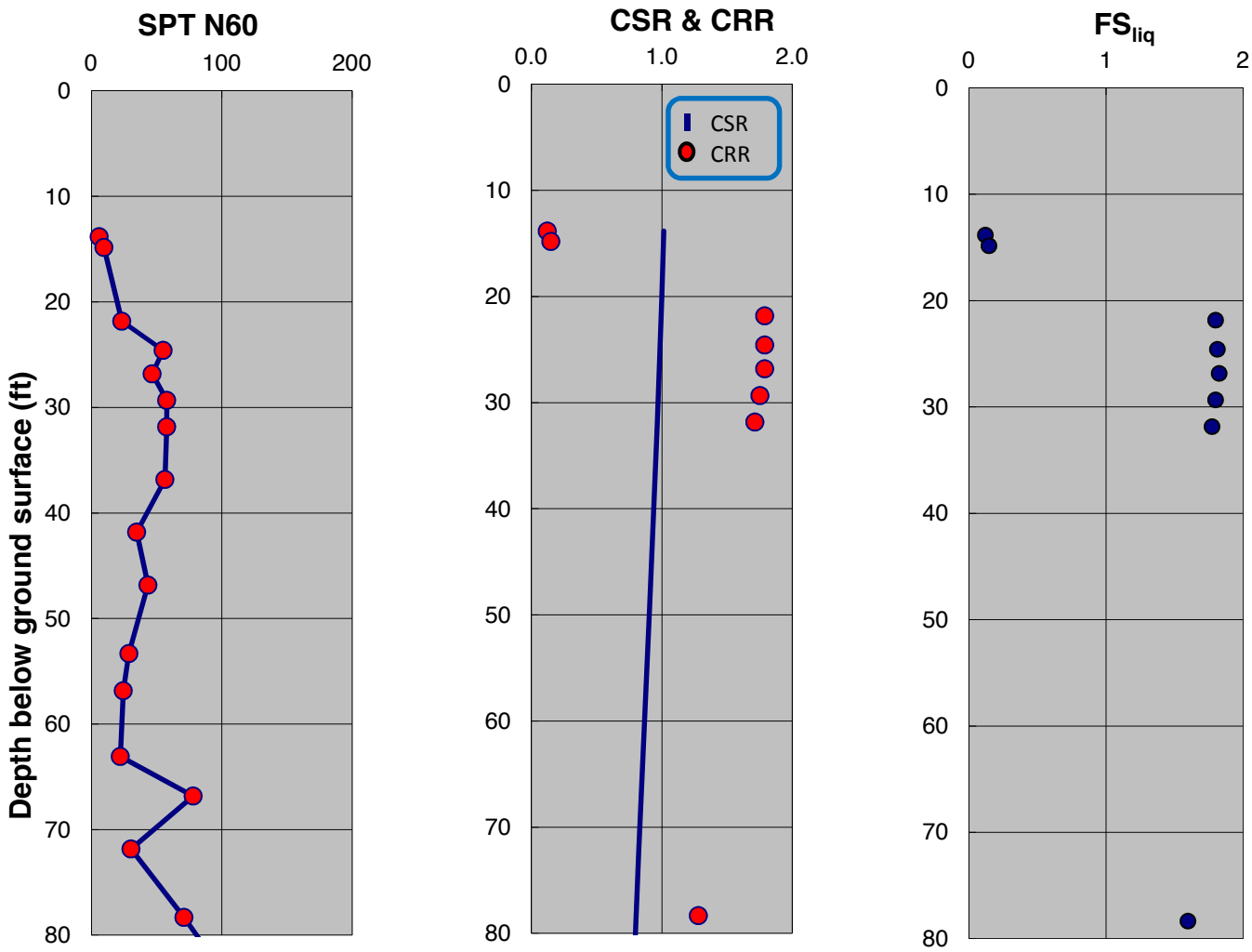
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-124 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



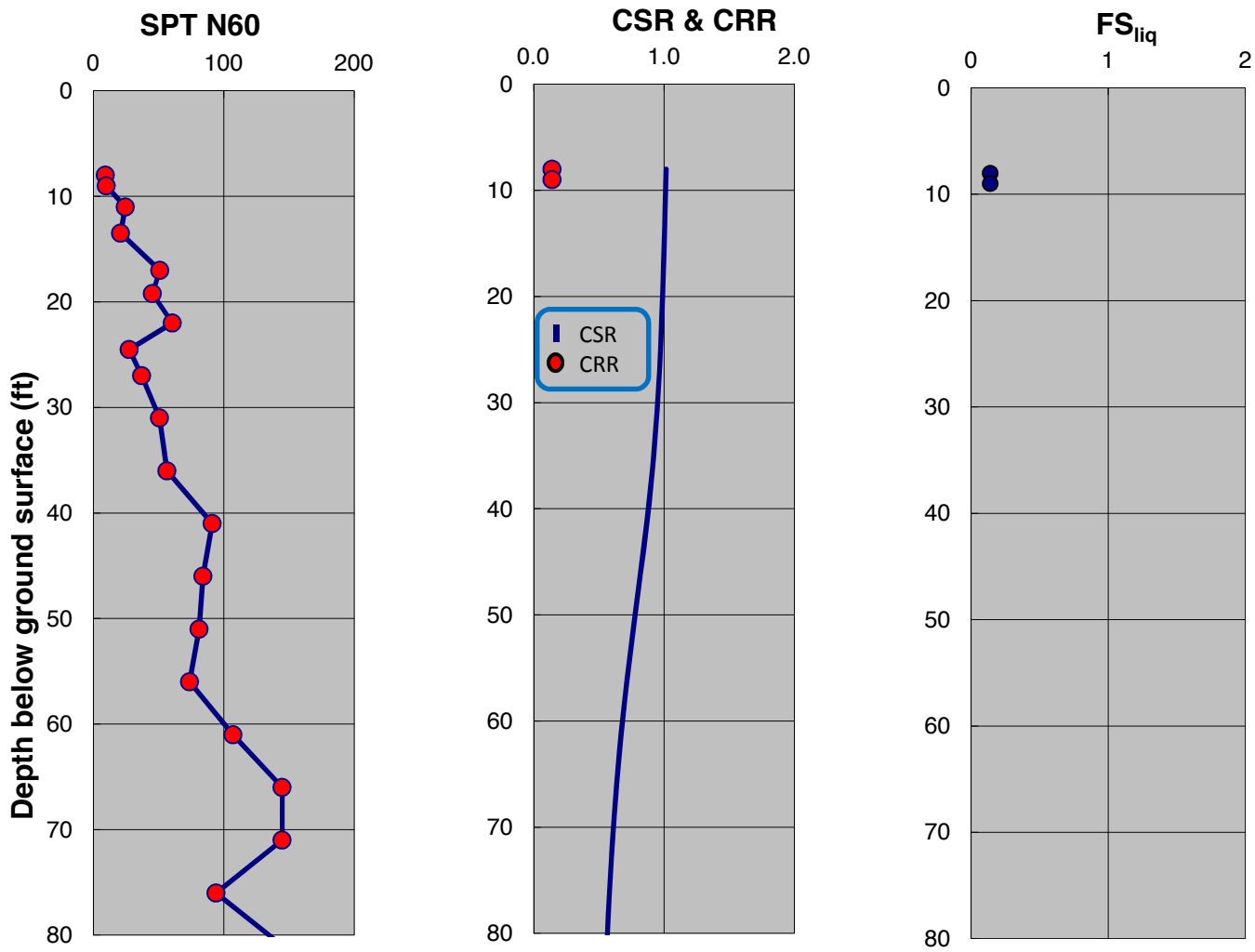
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-125 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



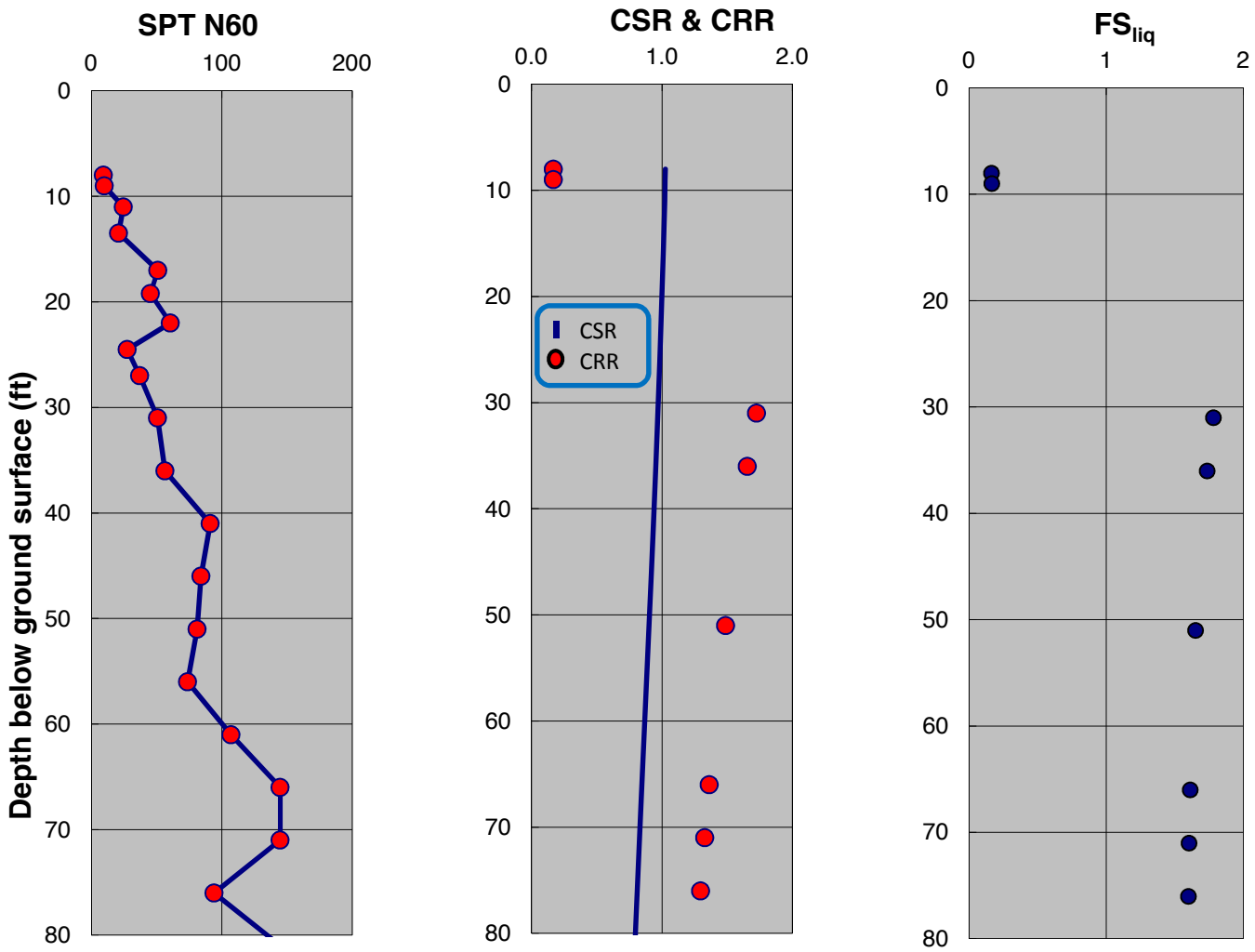
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-125 FOR SSE LEVEL PER NFPA 59A 2010 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



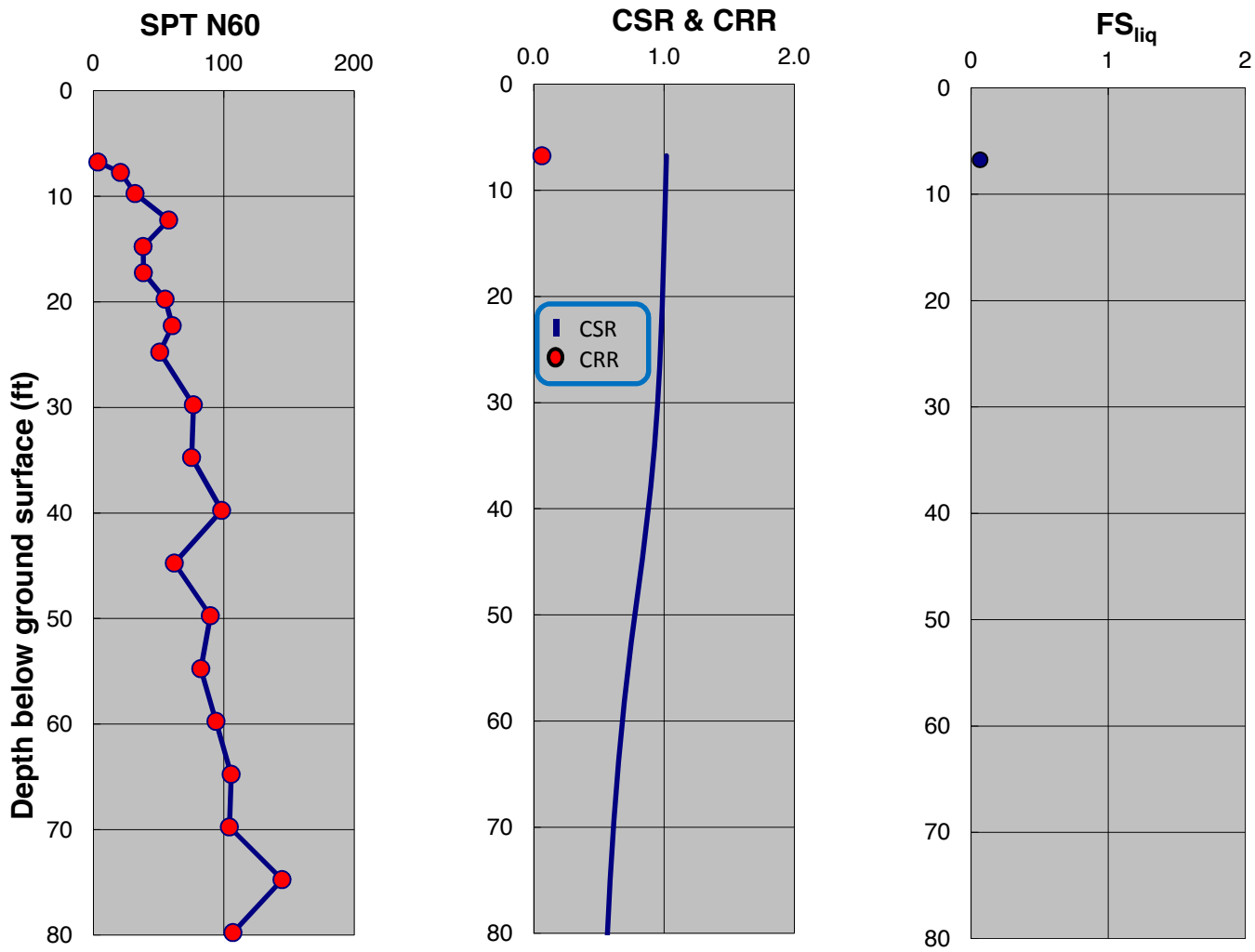
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-126 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



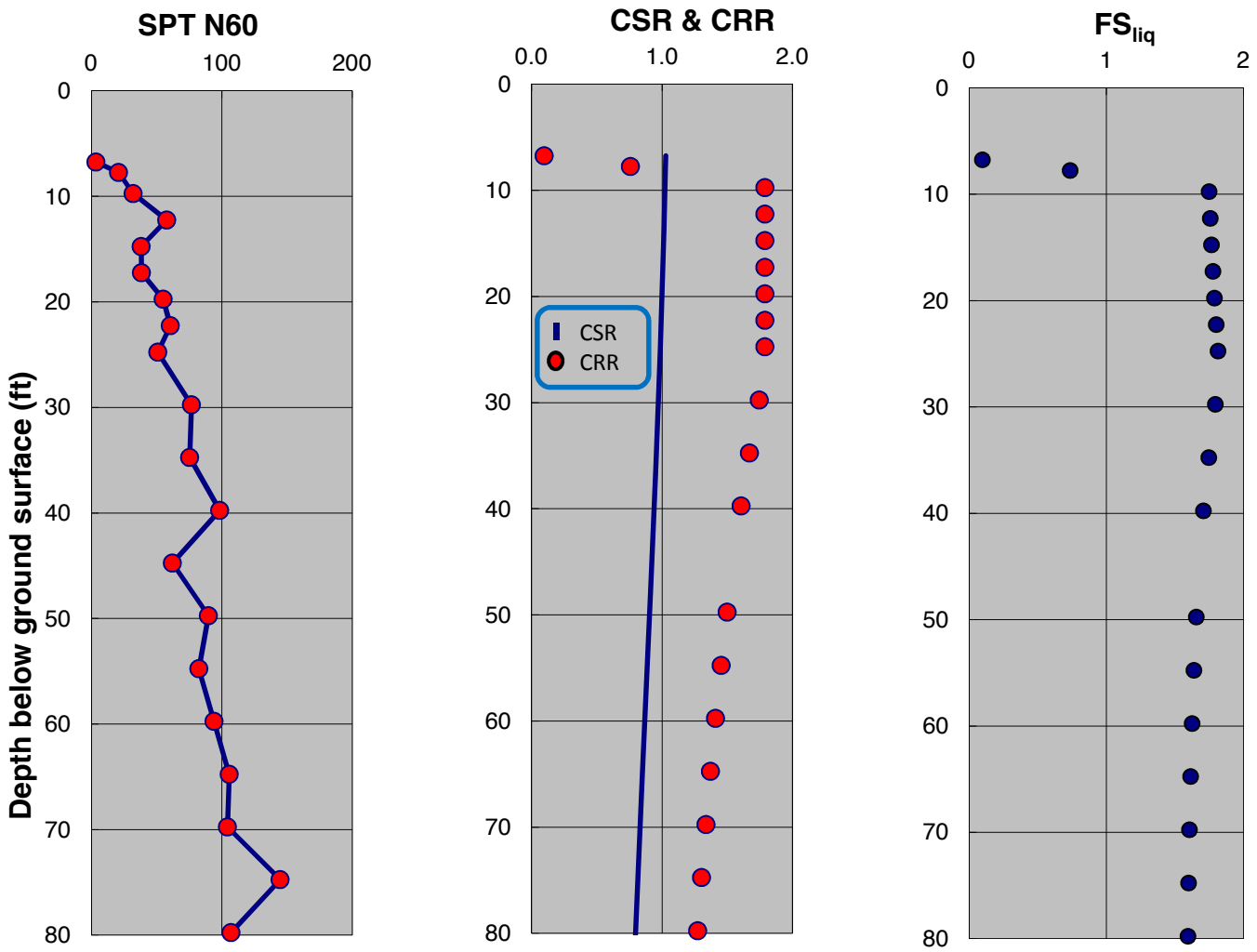
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-126 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



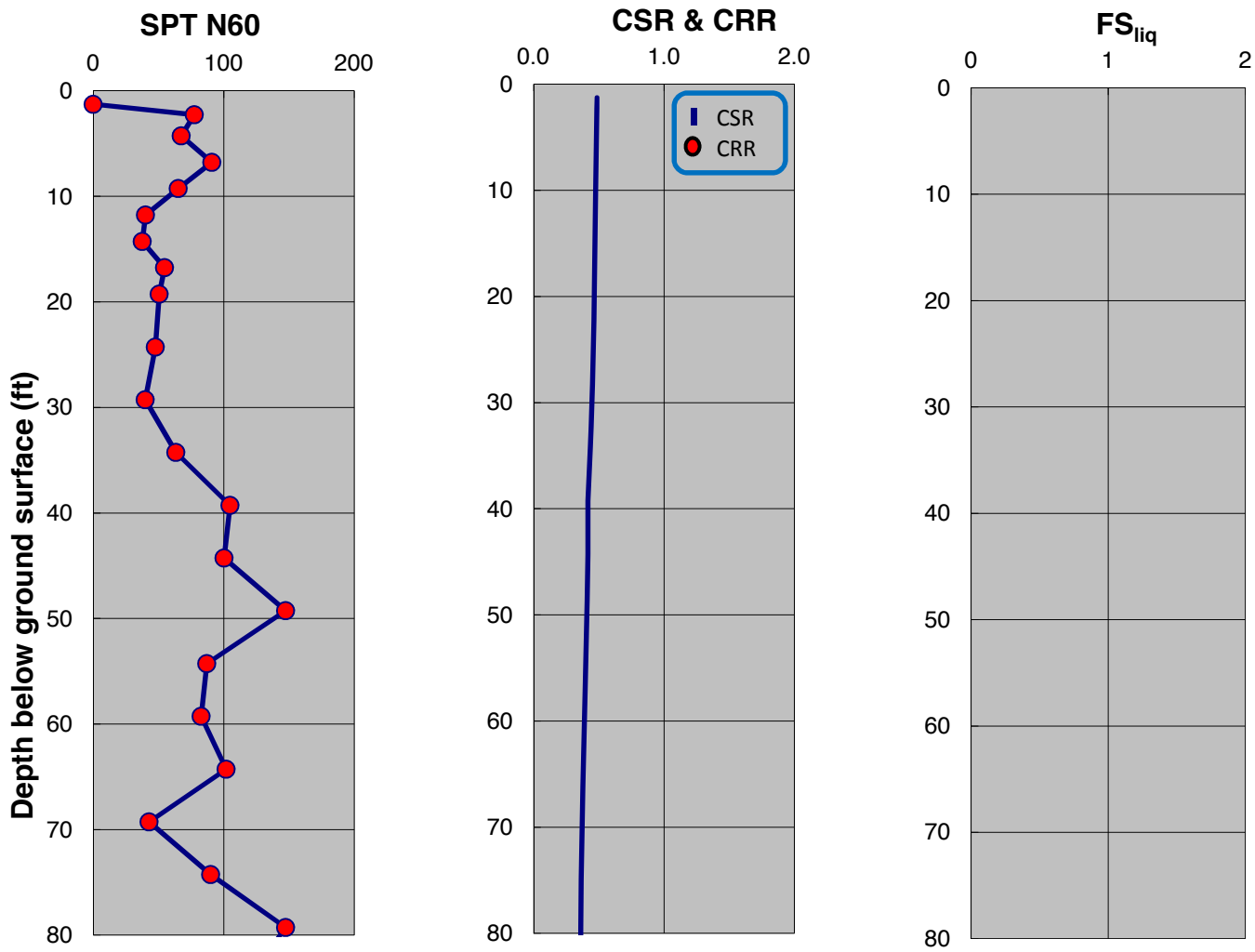
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-127 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



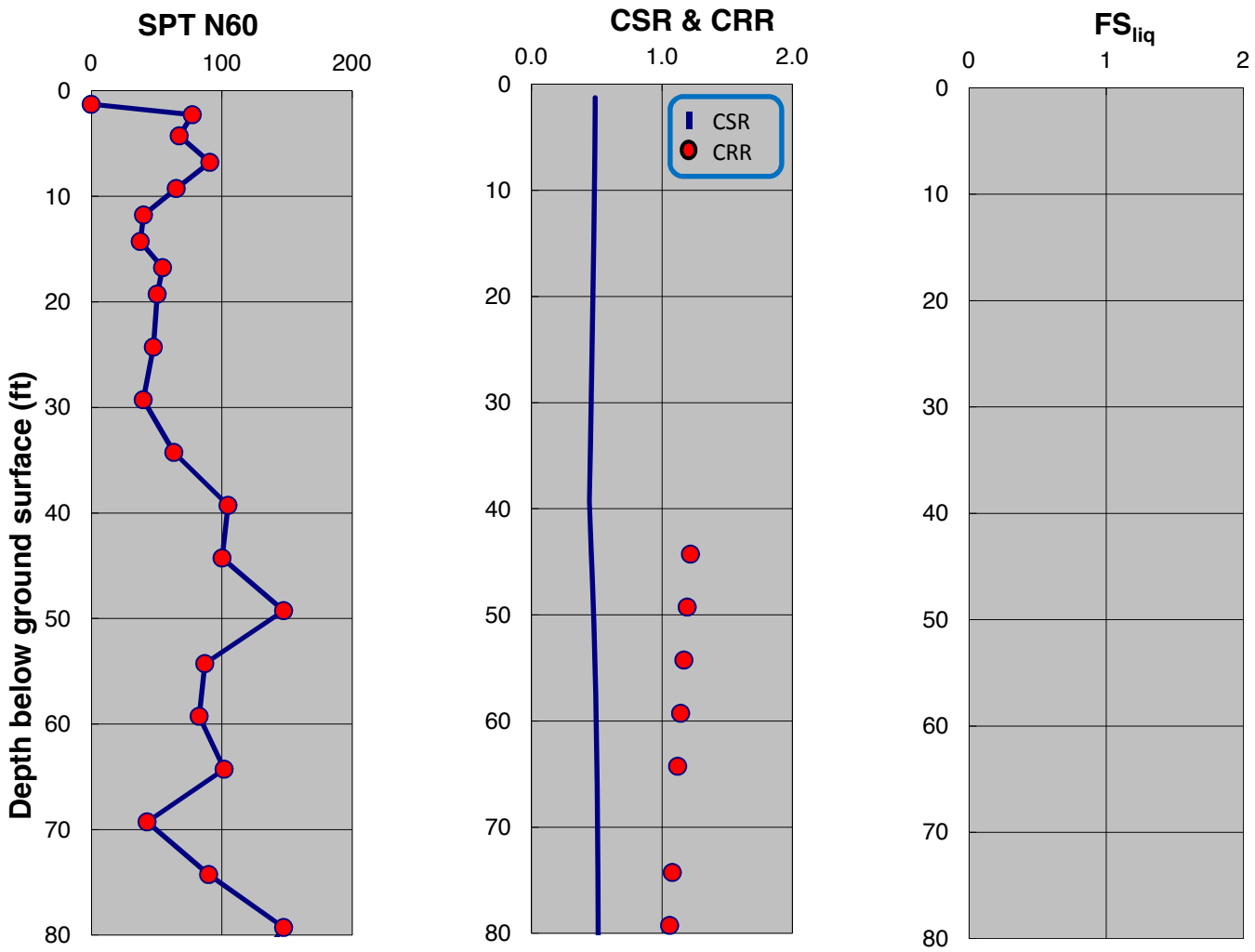
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-127 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



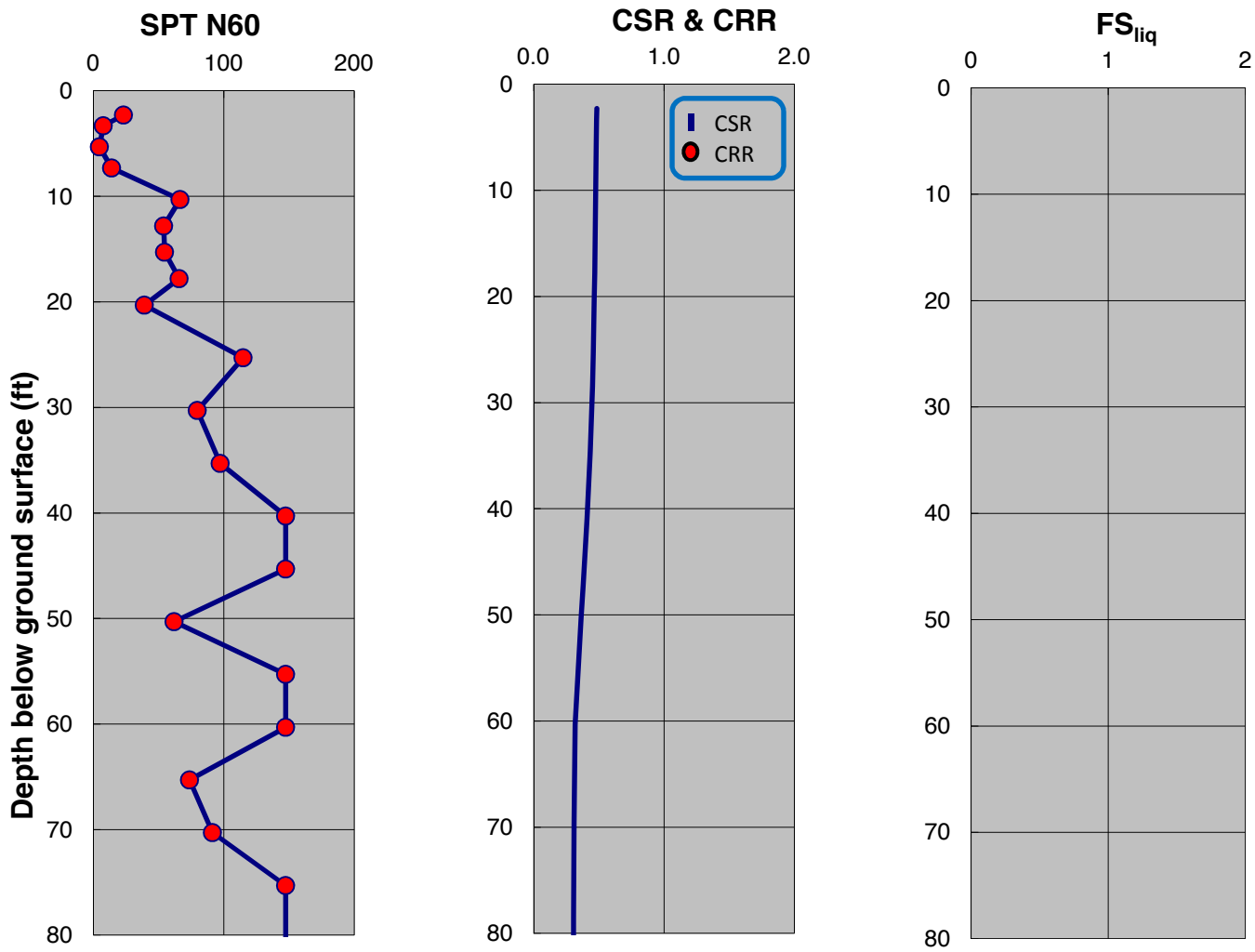
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-131 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



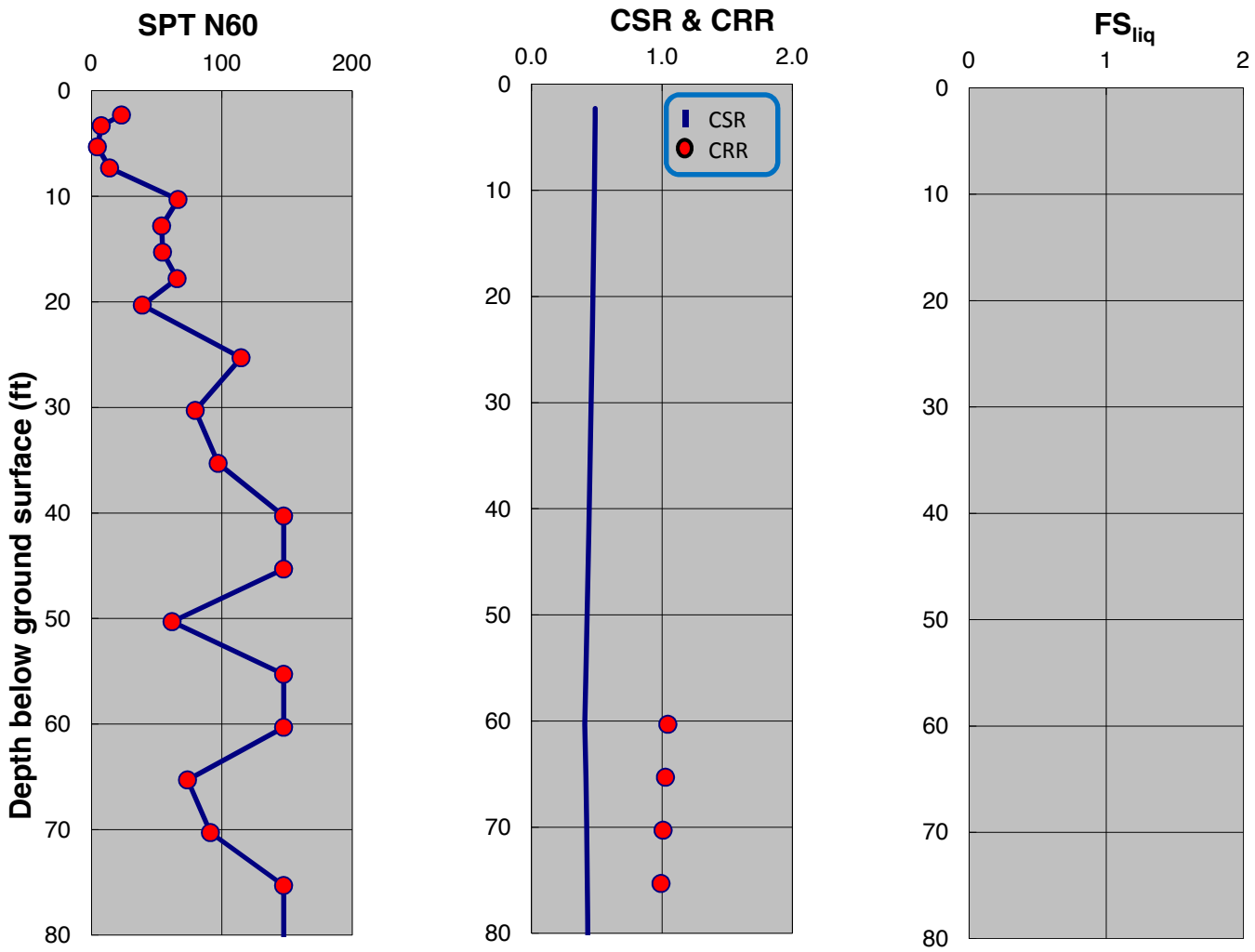
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-131 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



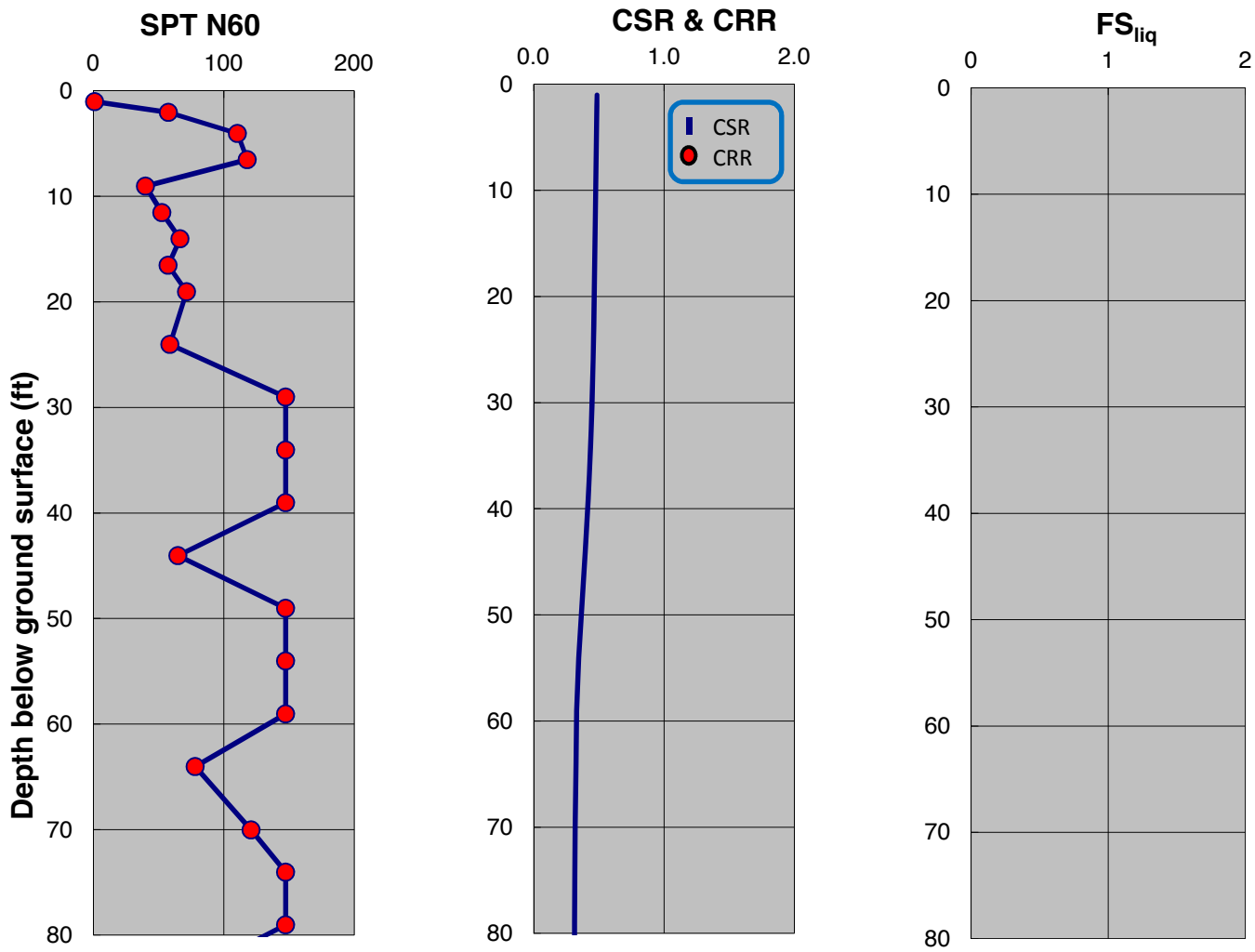
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-132 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



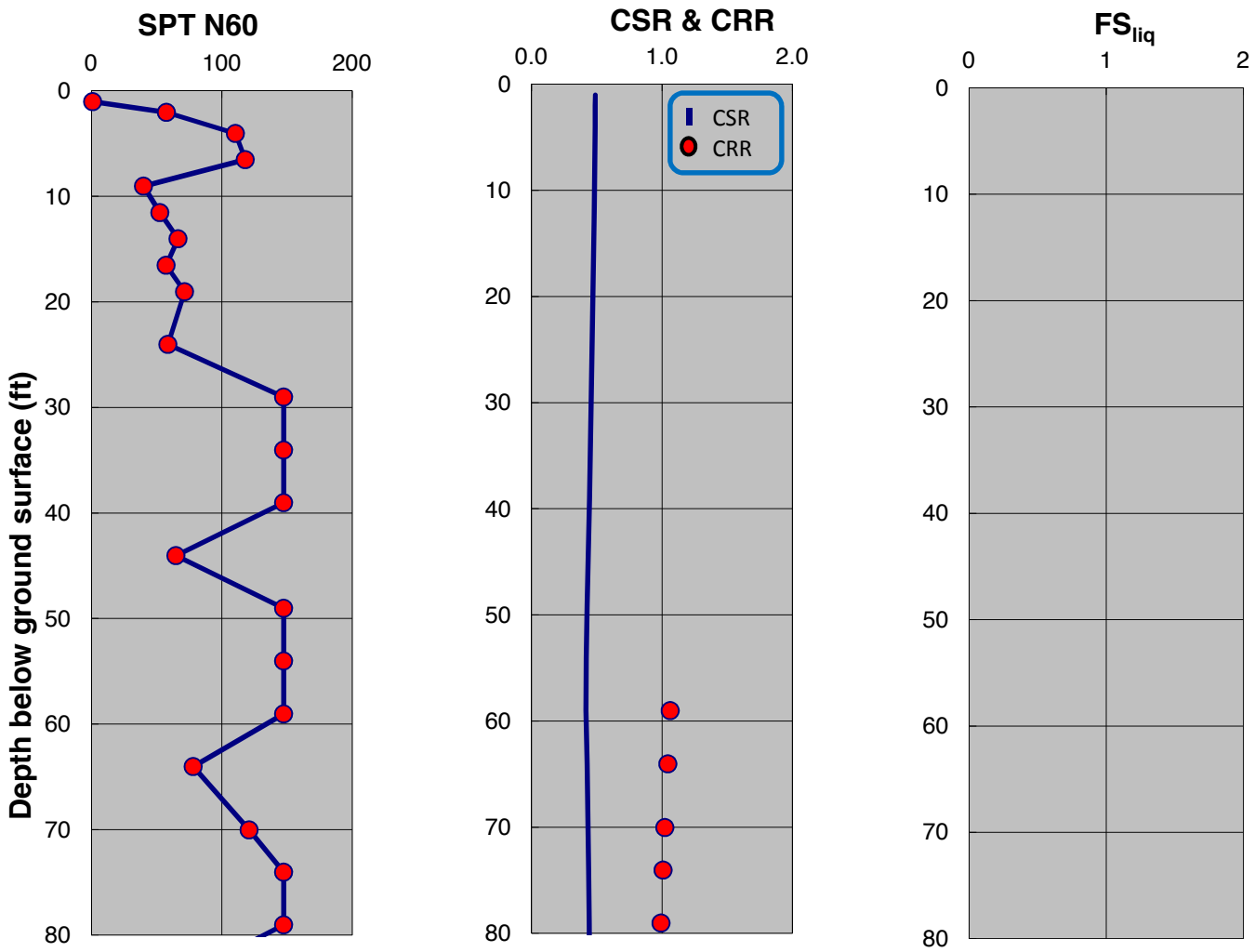
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-132 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



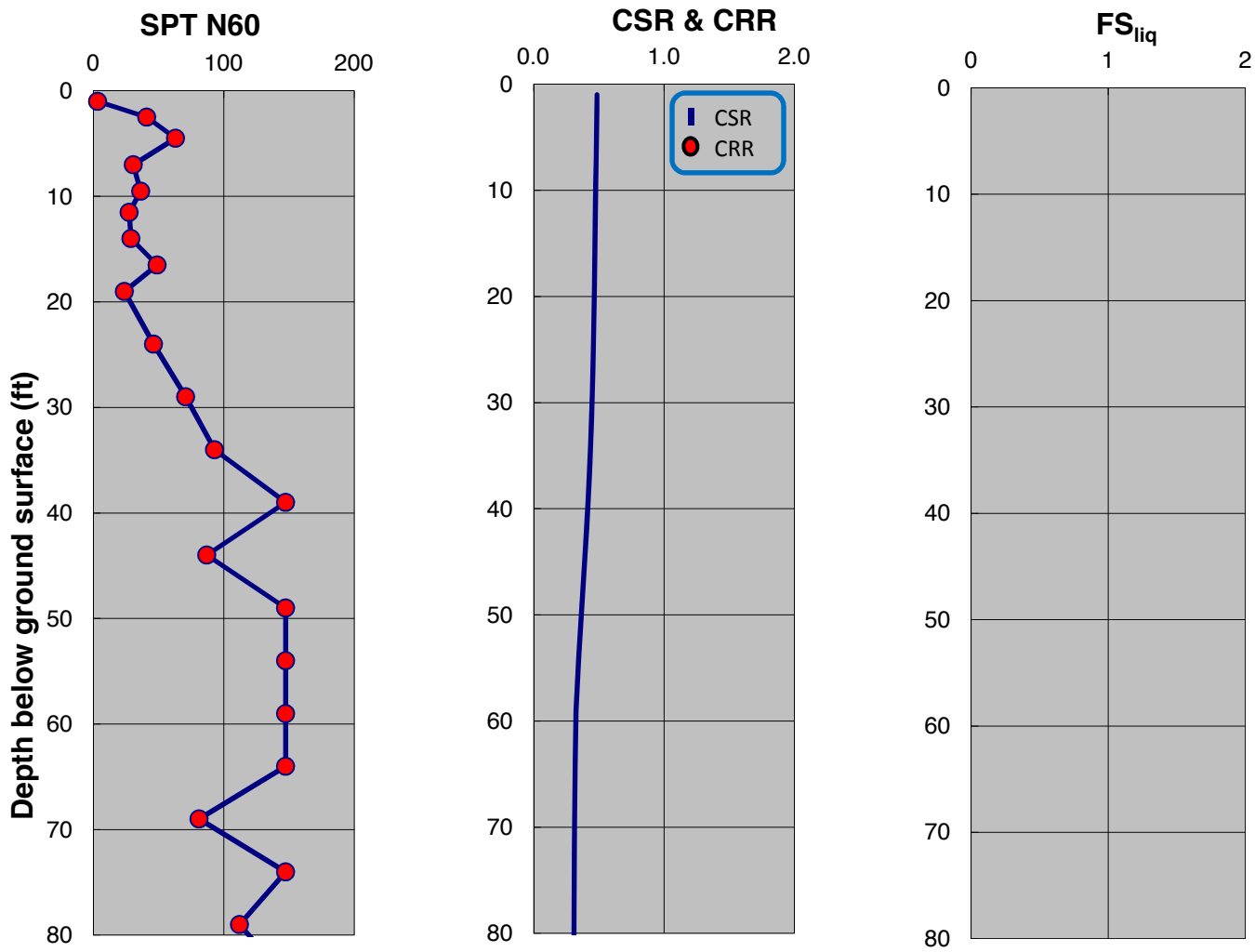
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-133 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



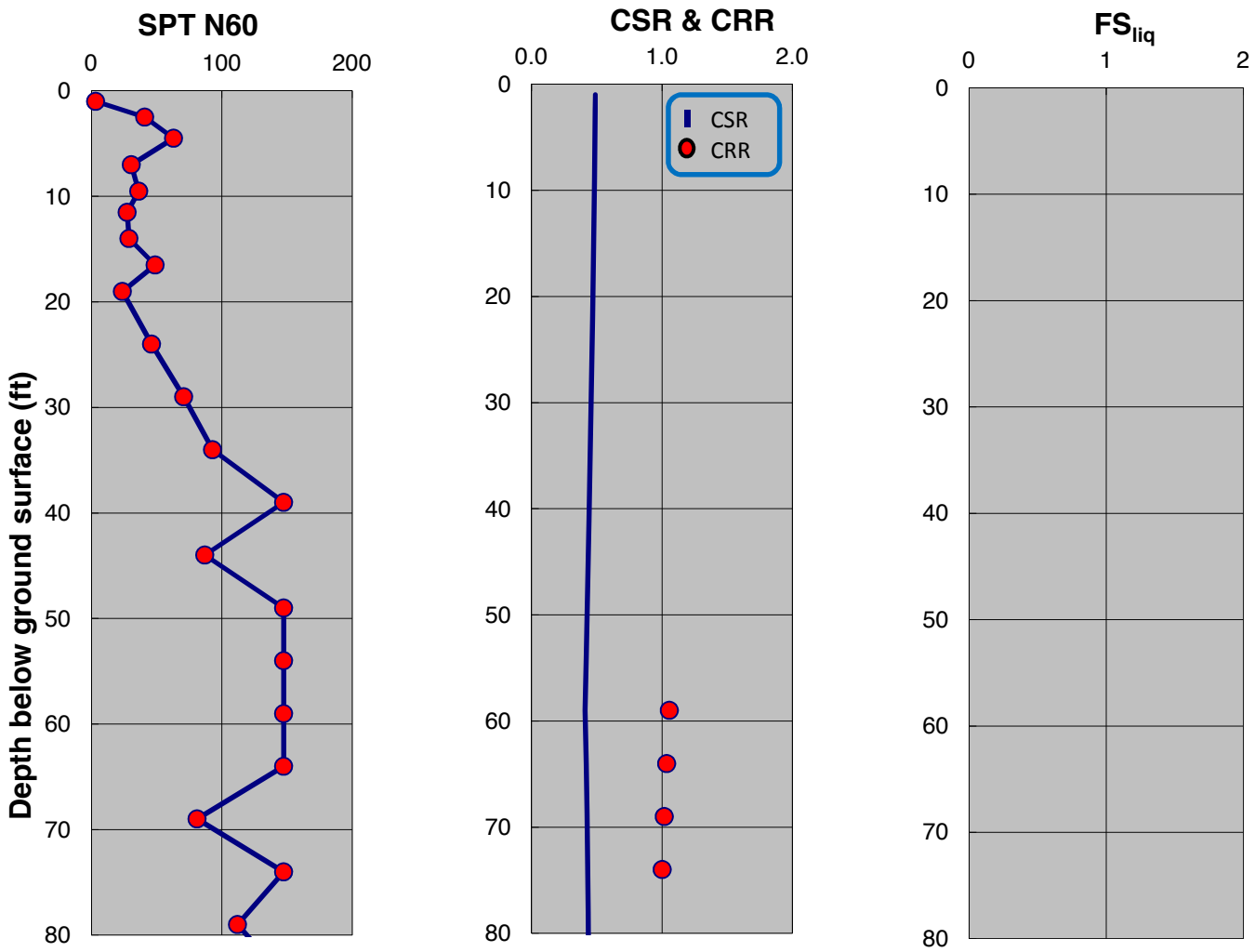
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-133 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



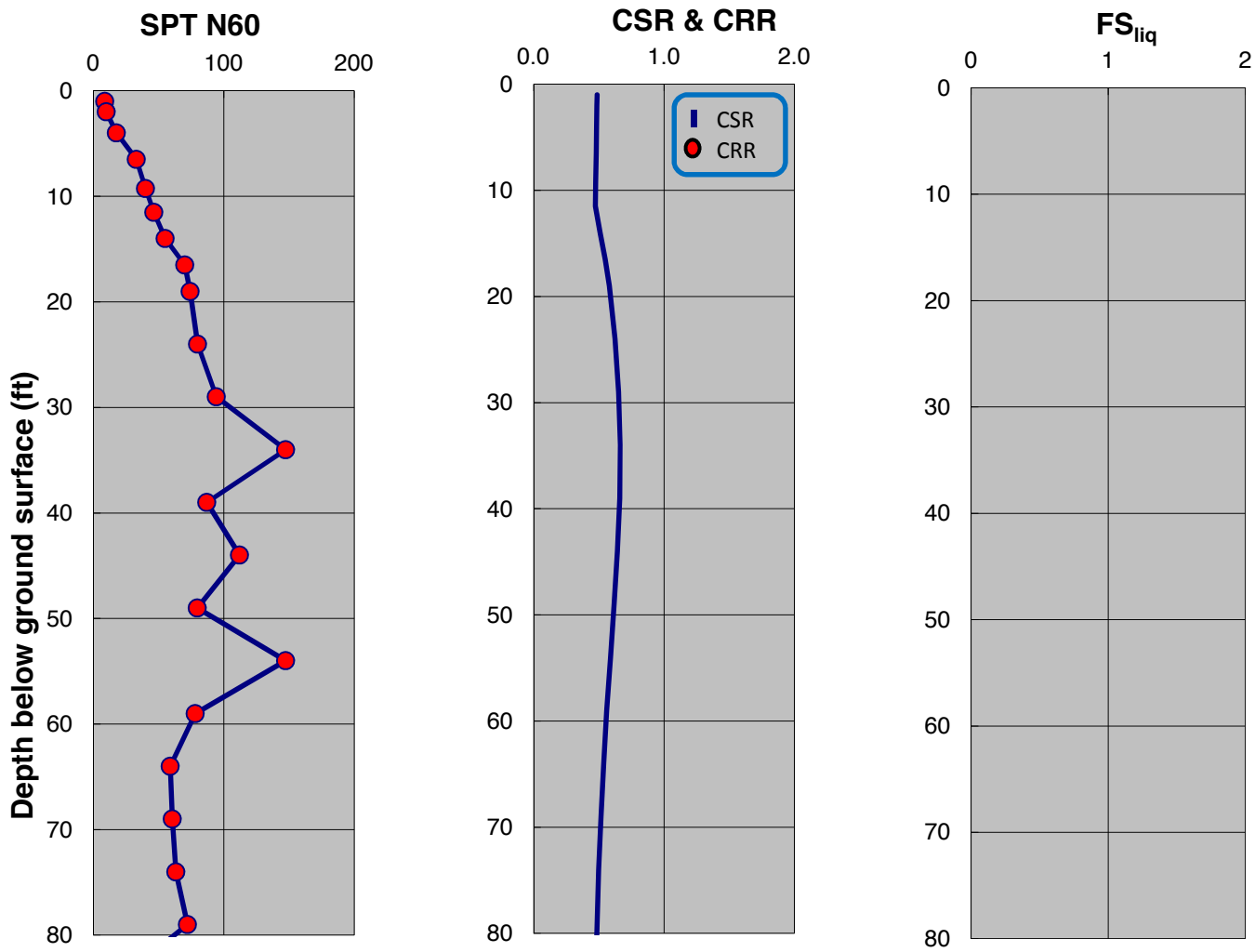
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-135 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



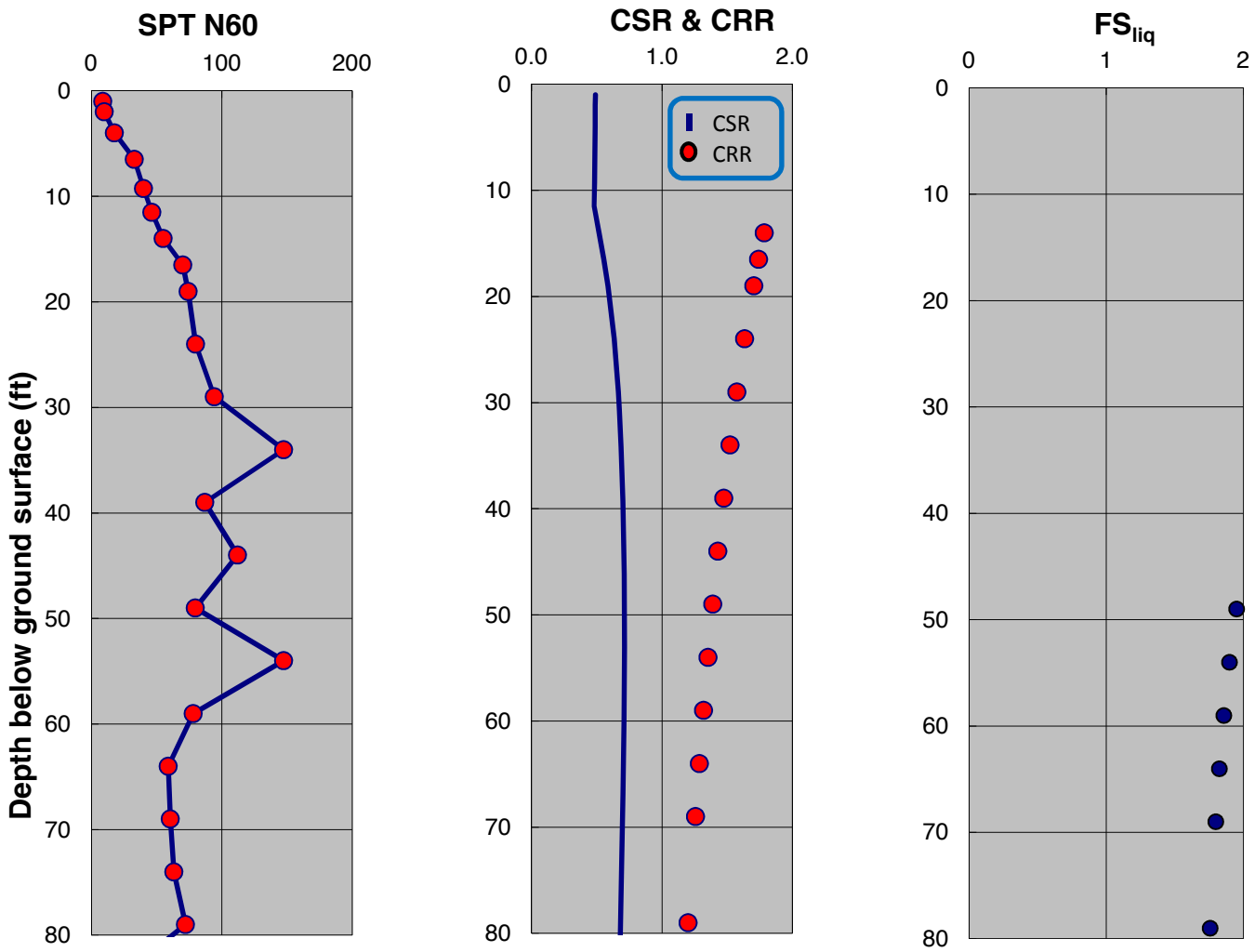
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-135 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



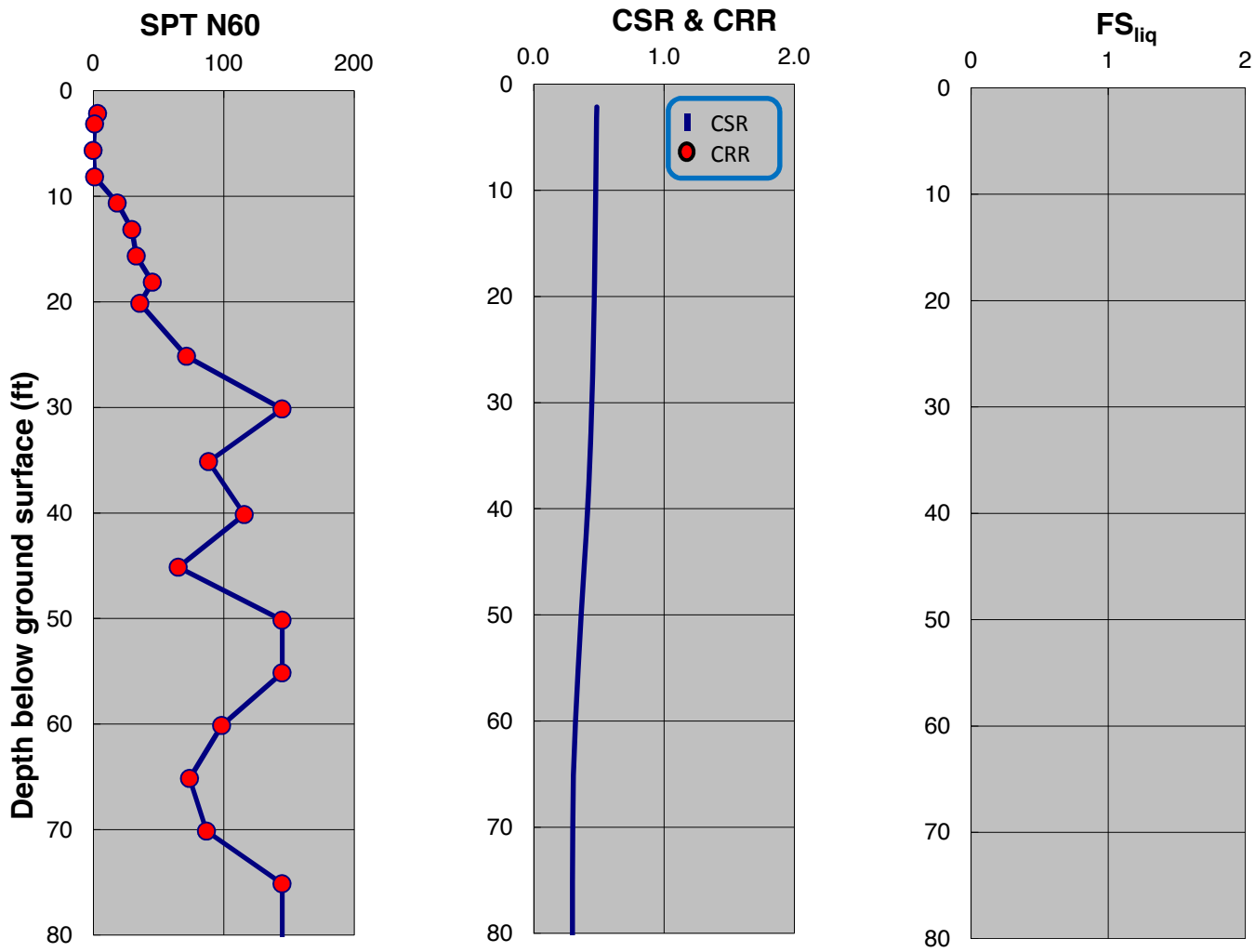
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-136 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



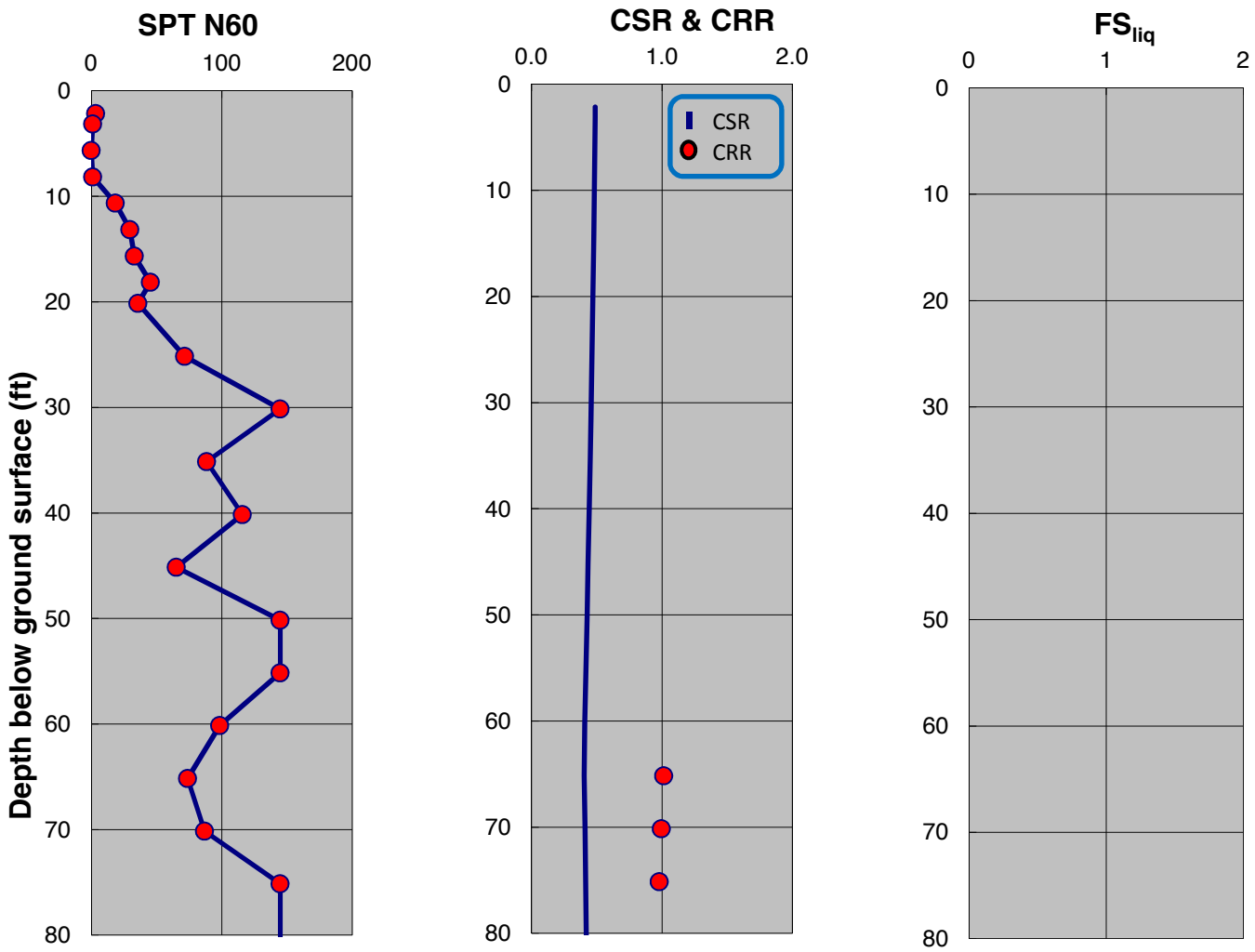
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-136 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



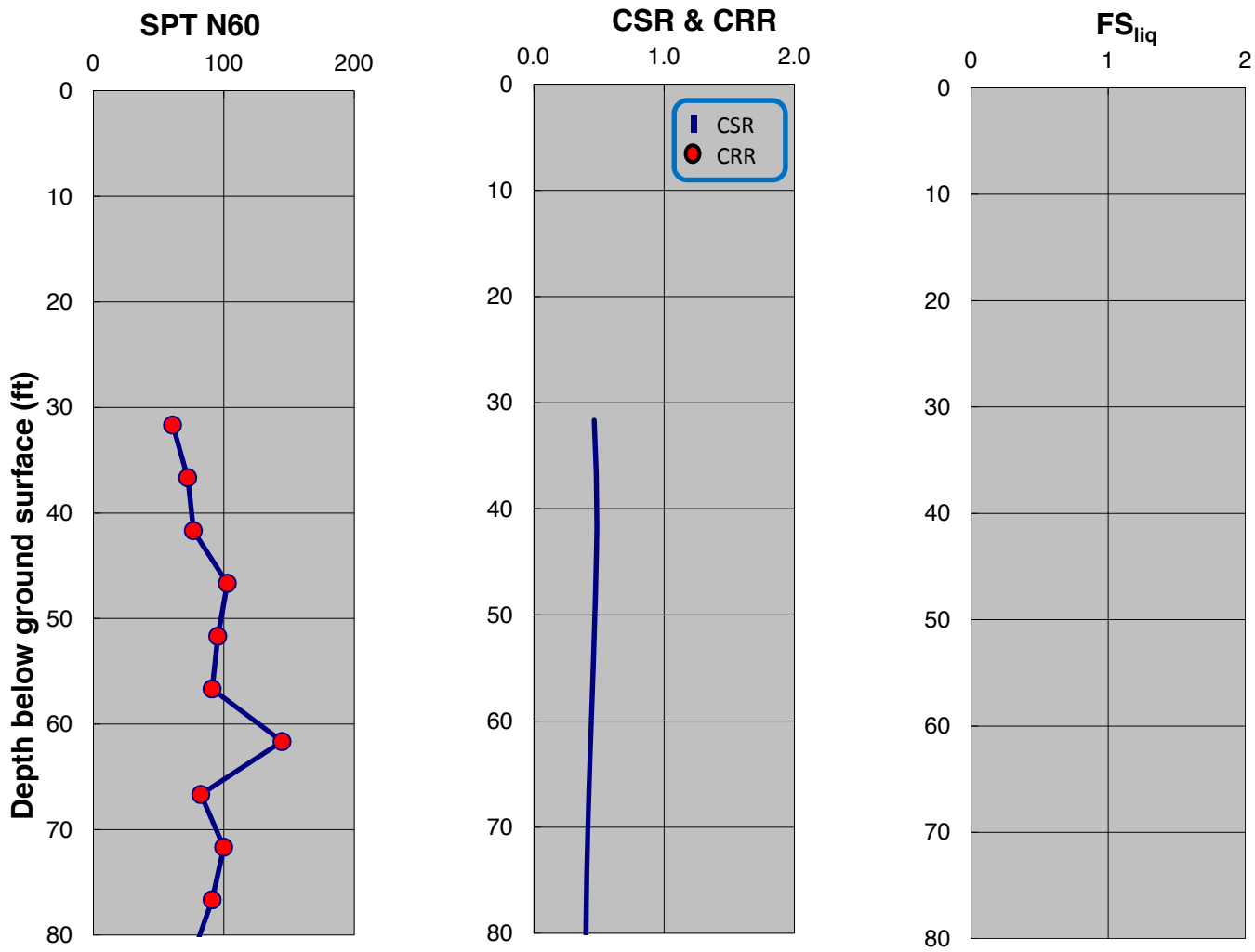
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-137 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



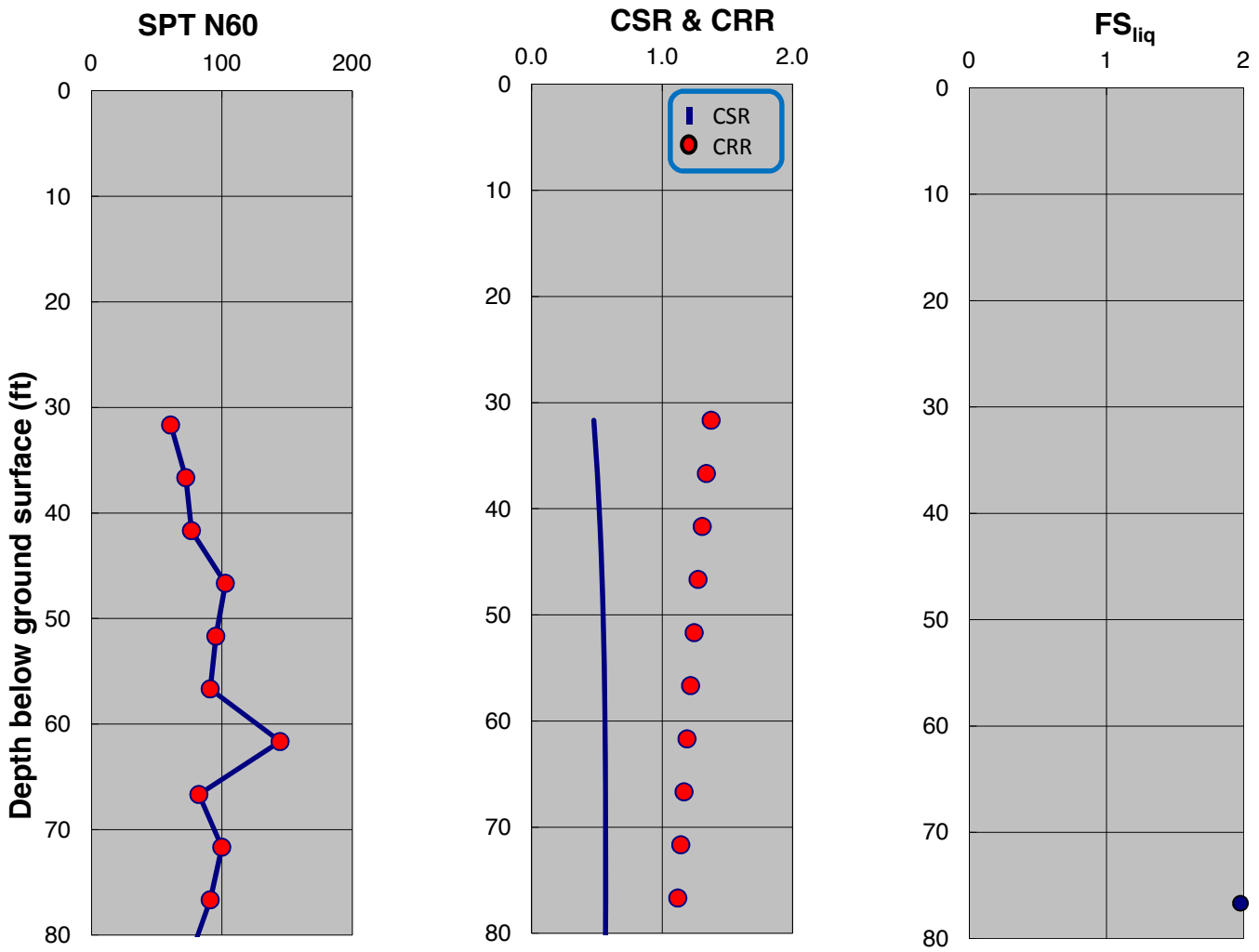
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-137 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



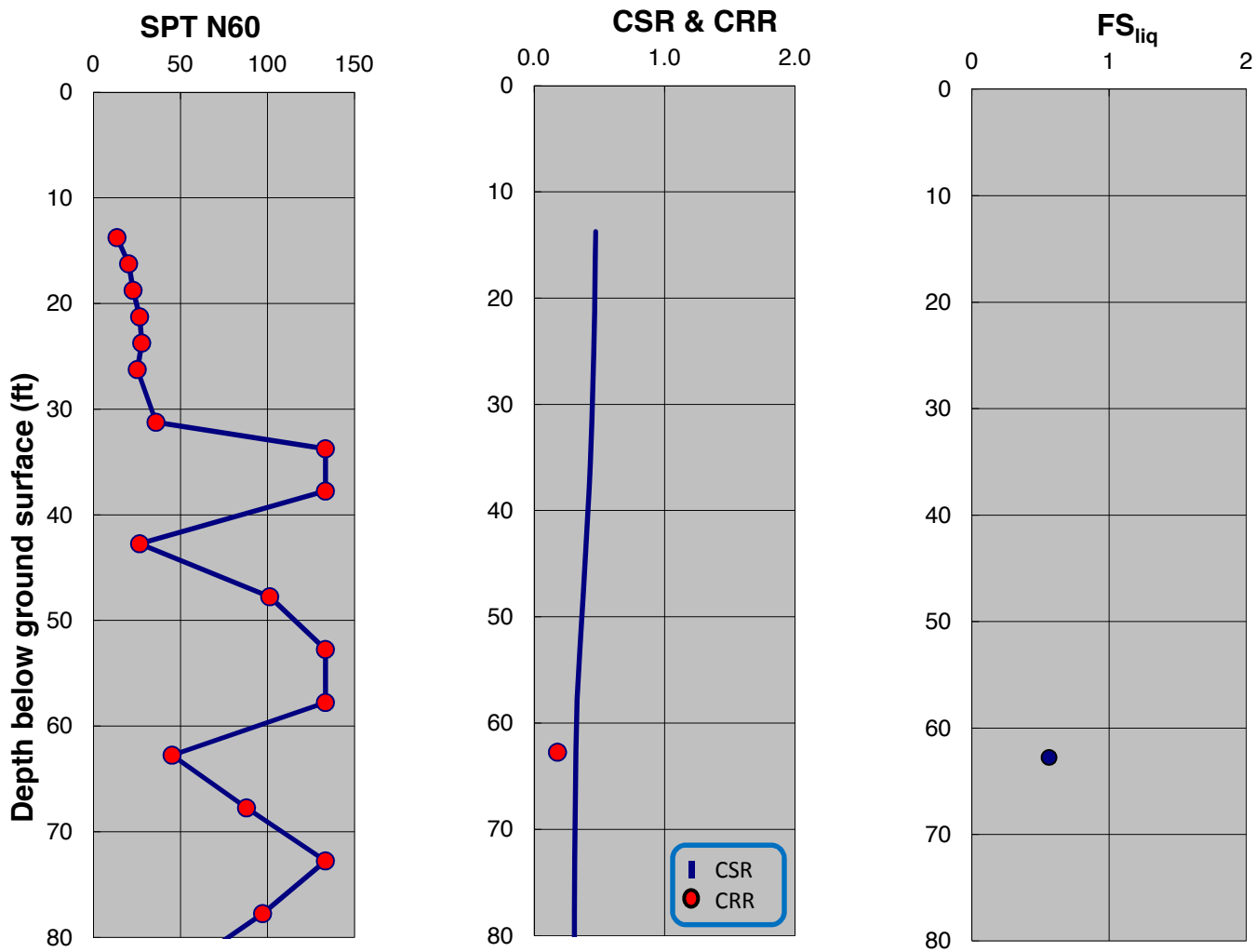
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-138 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



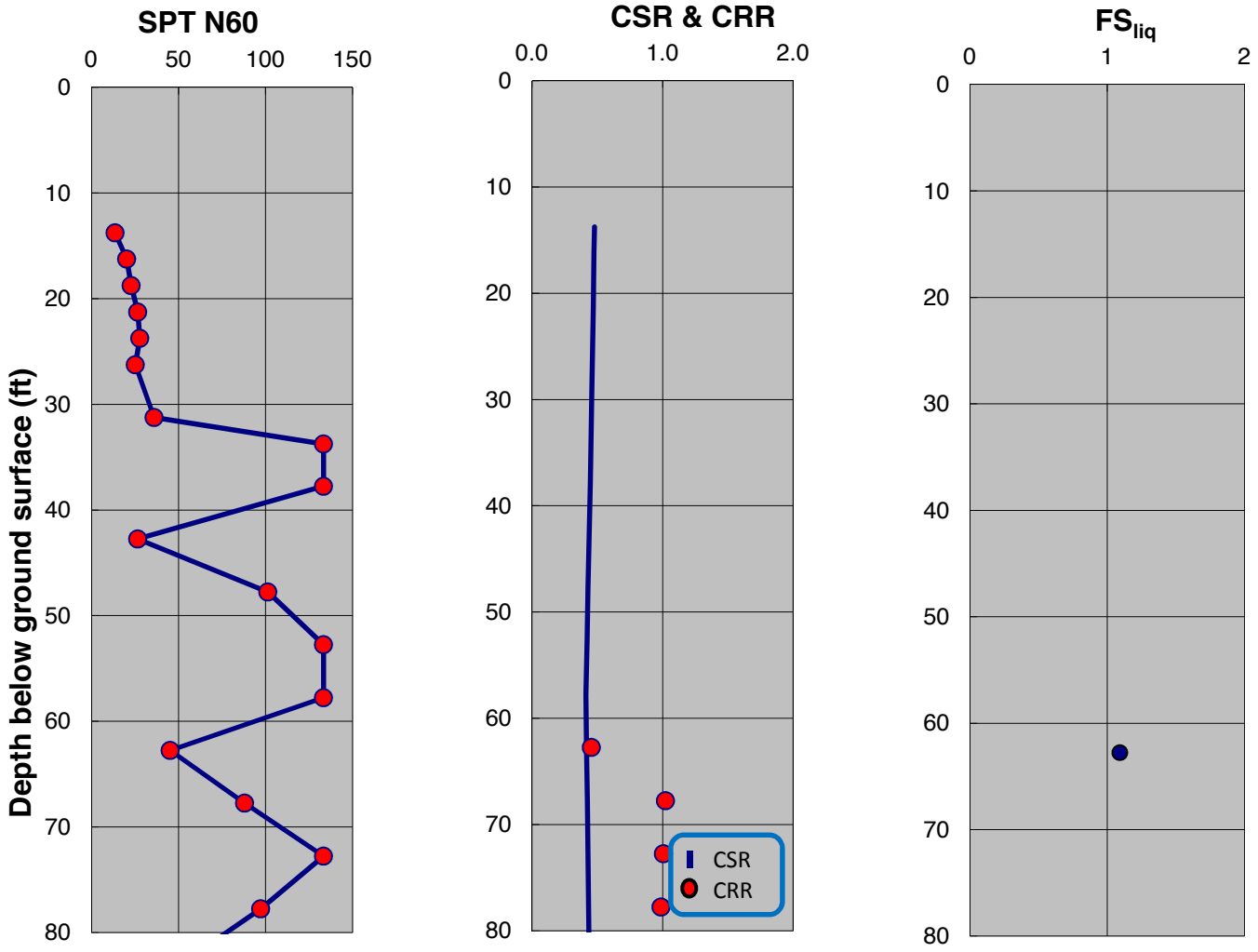
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-138 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



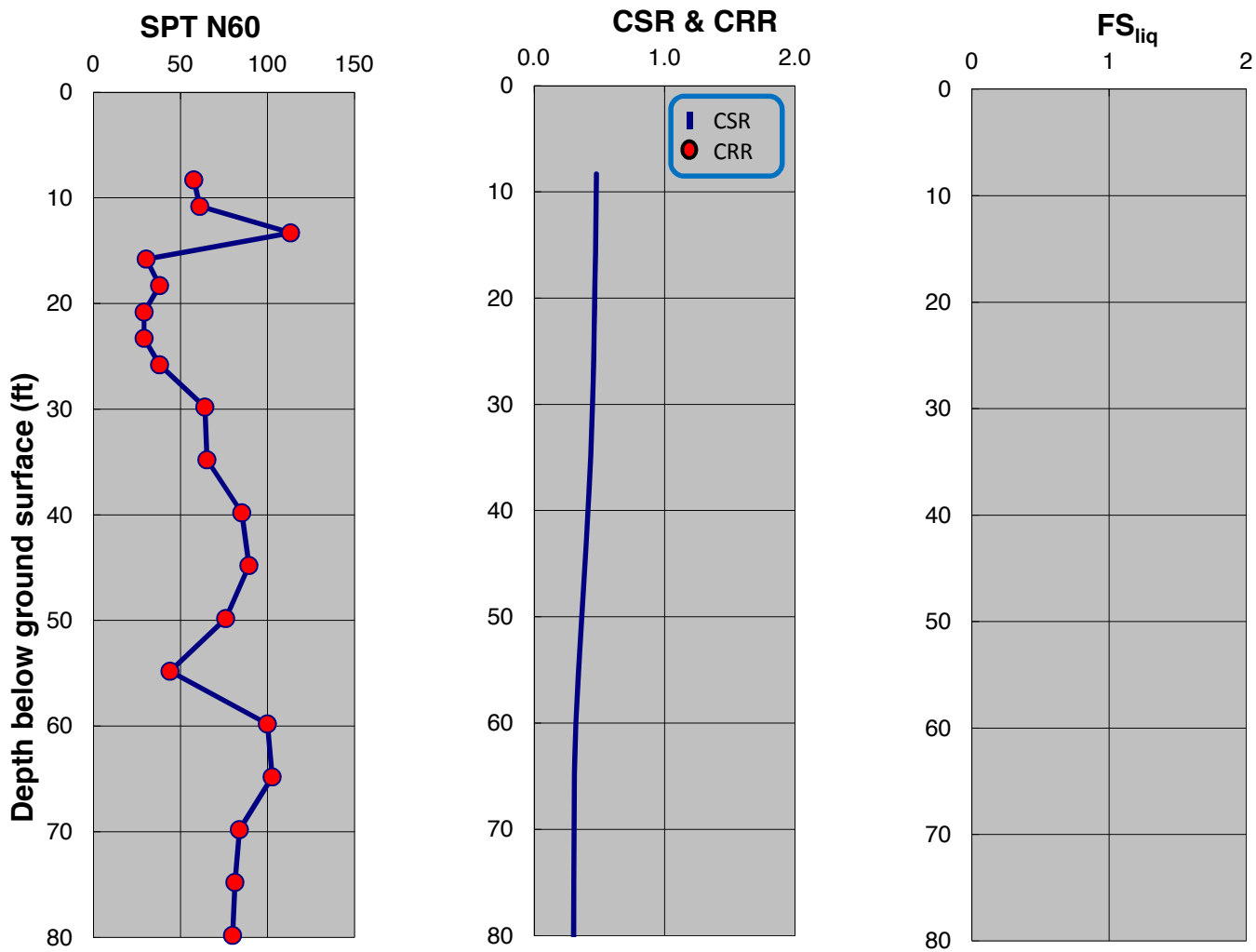
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-146 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



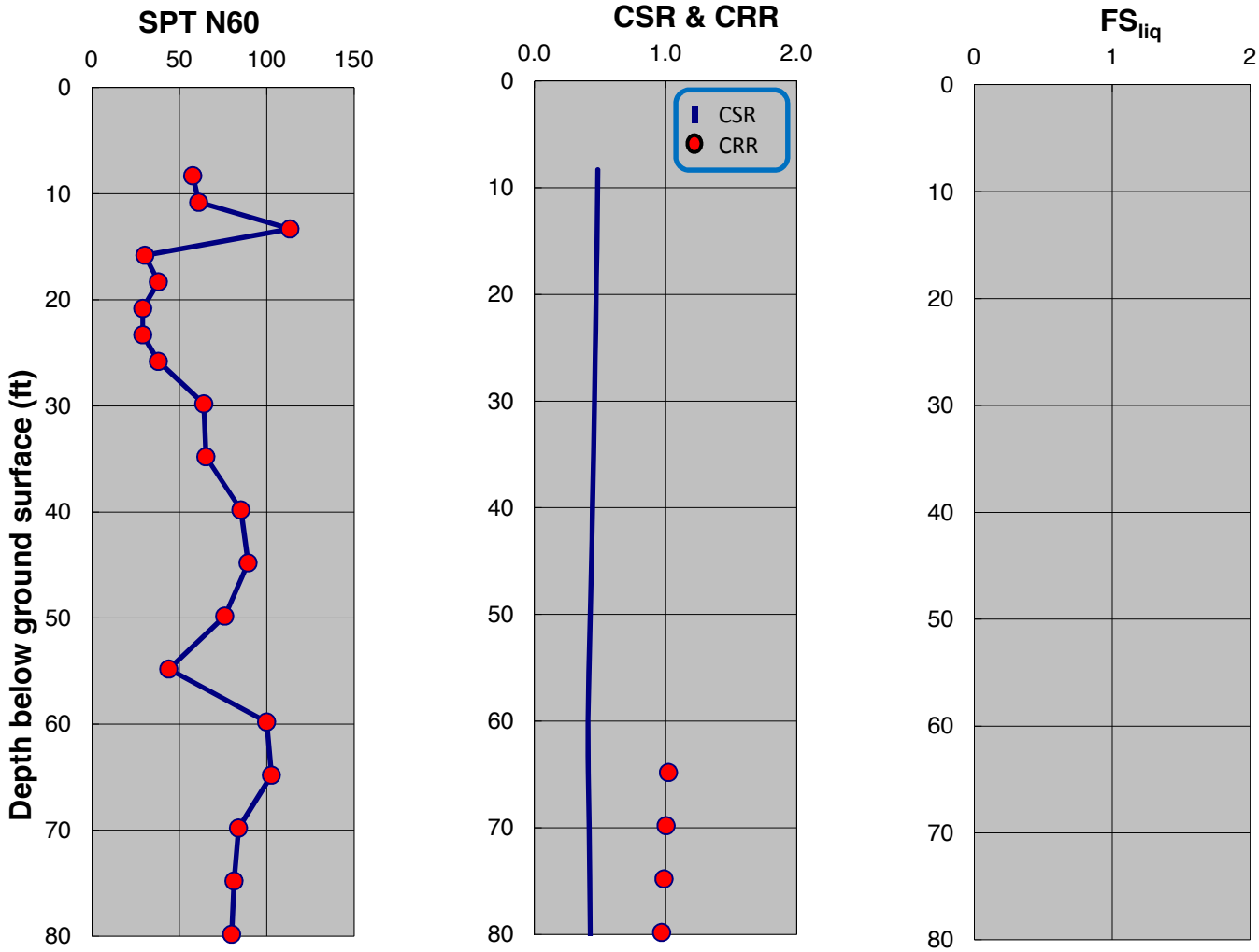
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-146 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



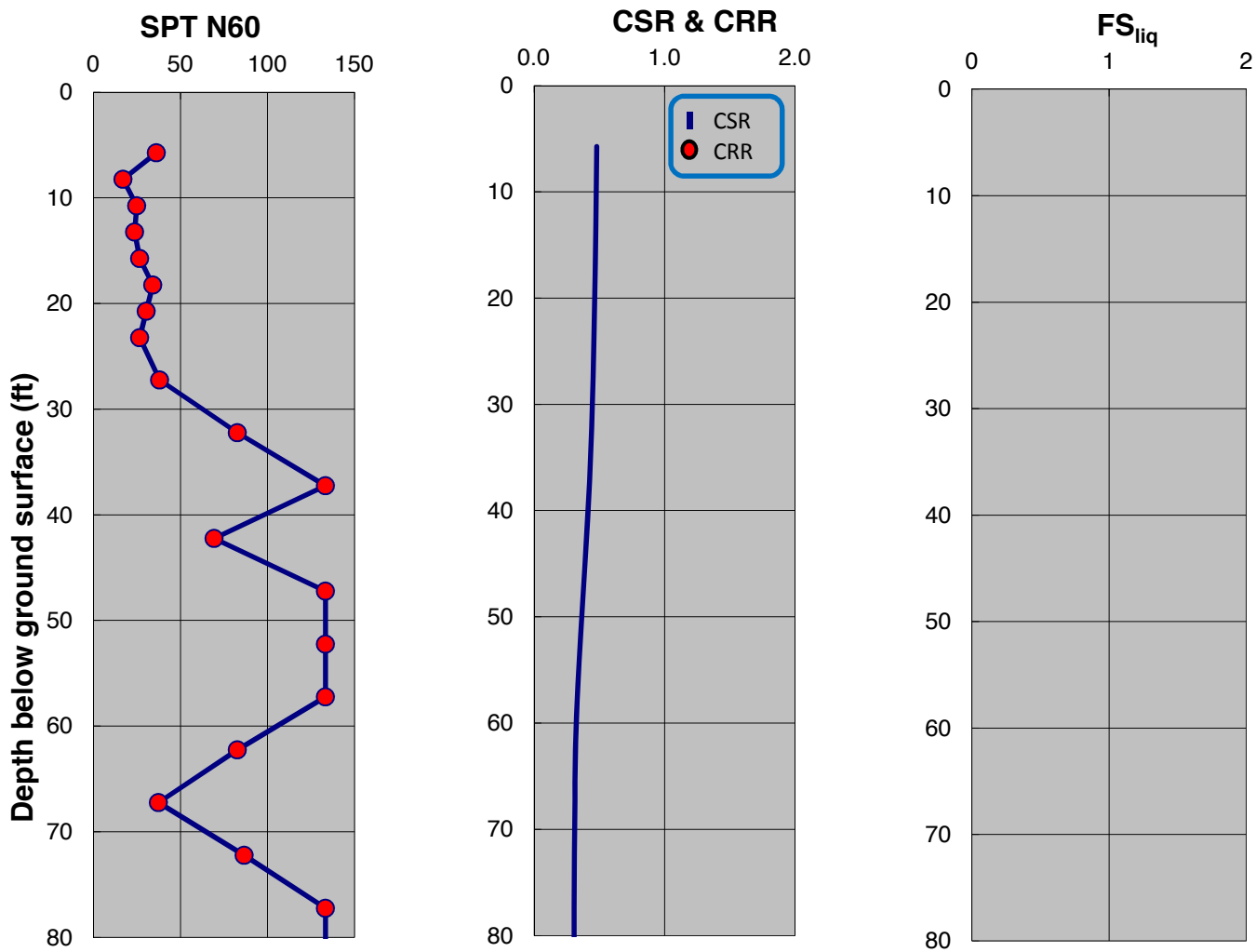
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-147 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



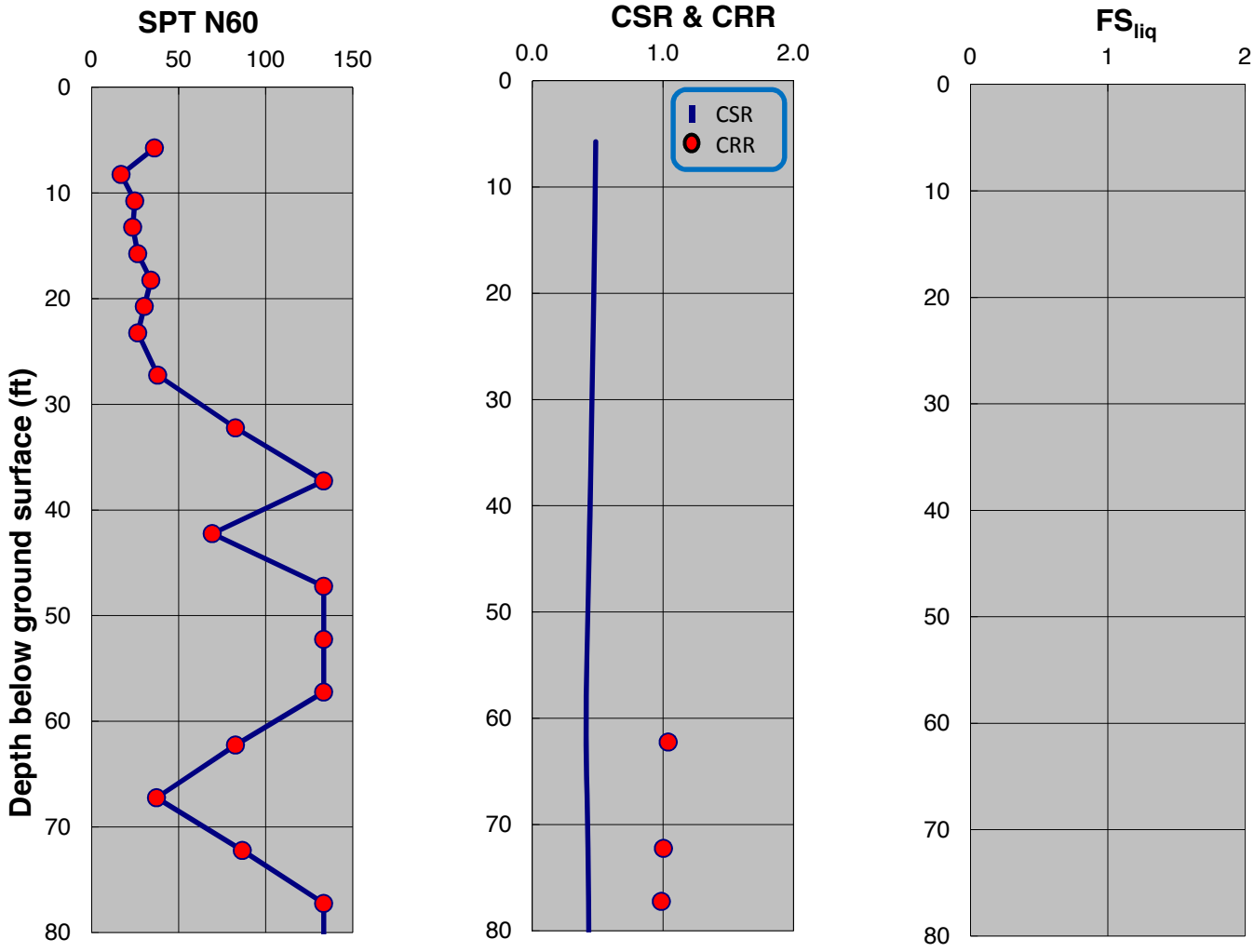
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-147 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



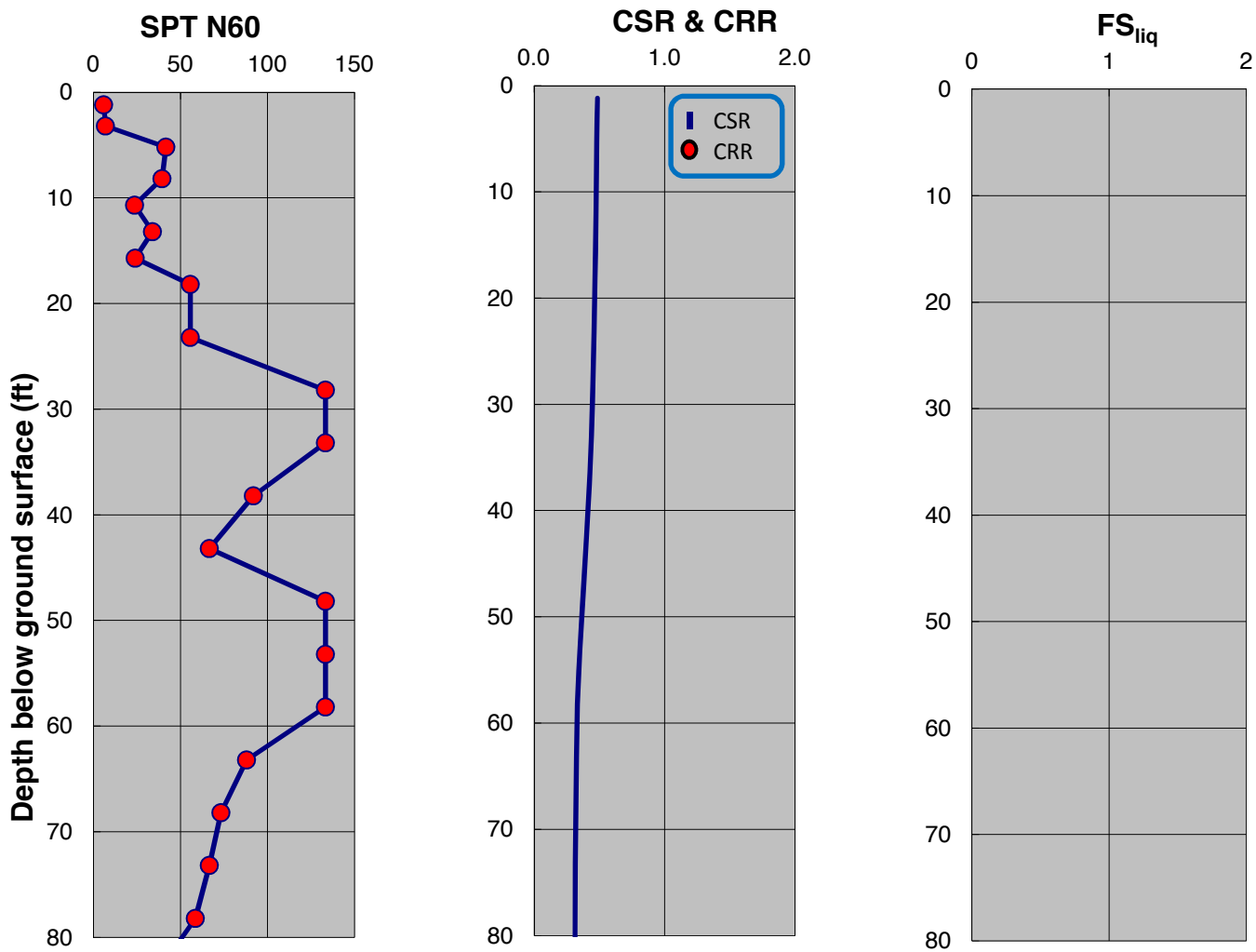
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-148 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



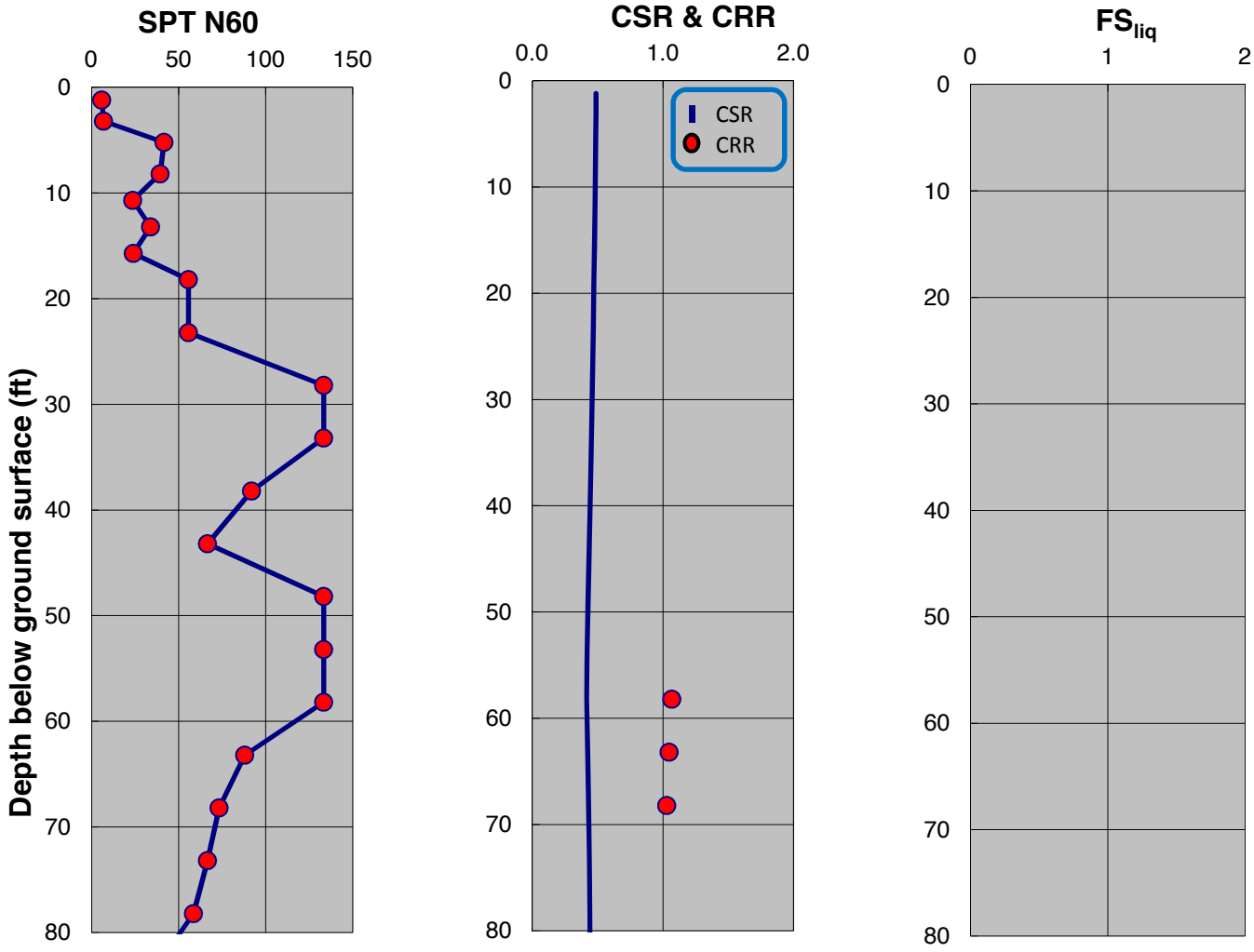
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-148 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



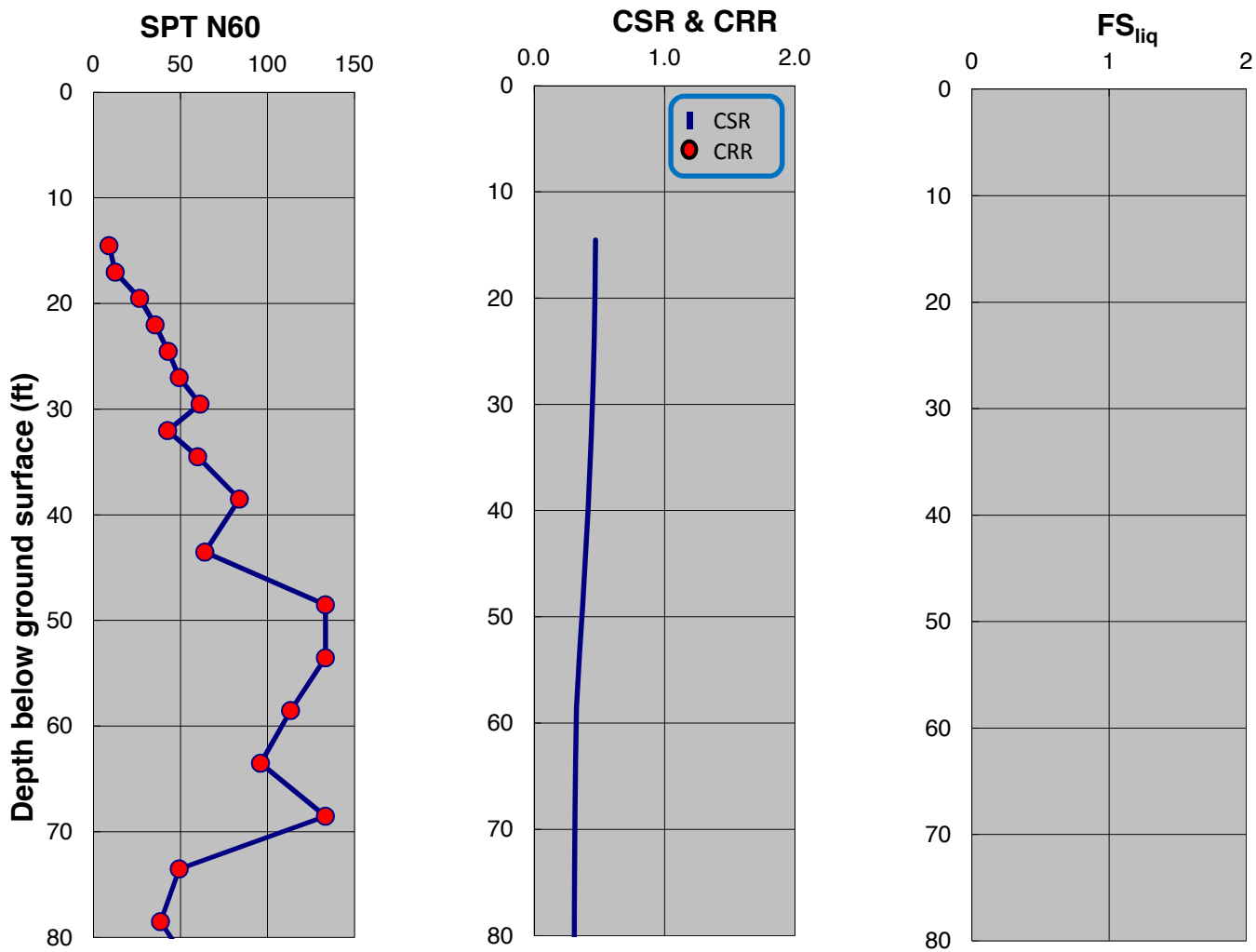
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-149 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



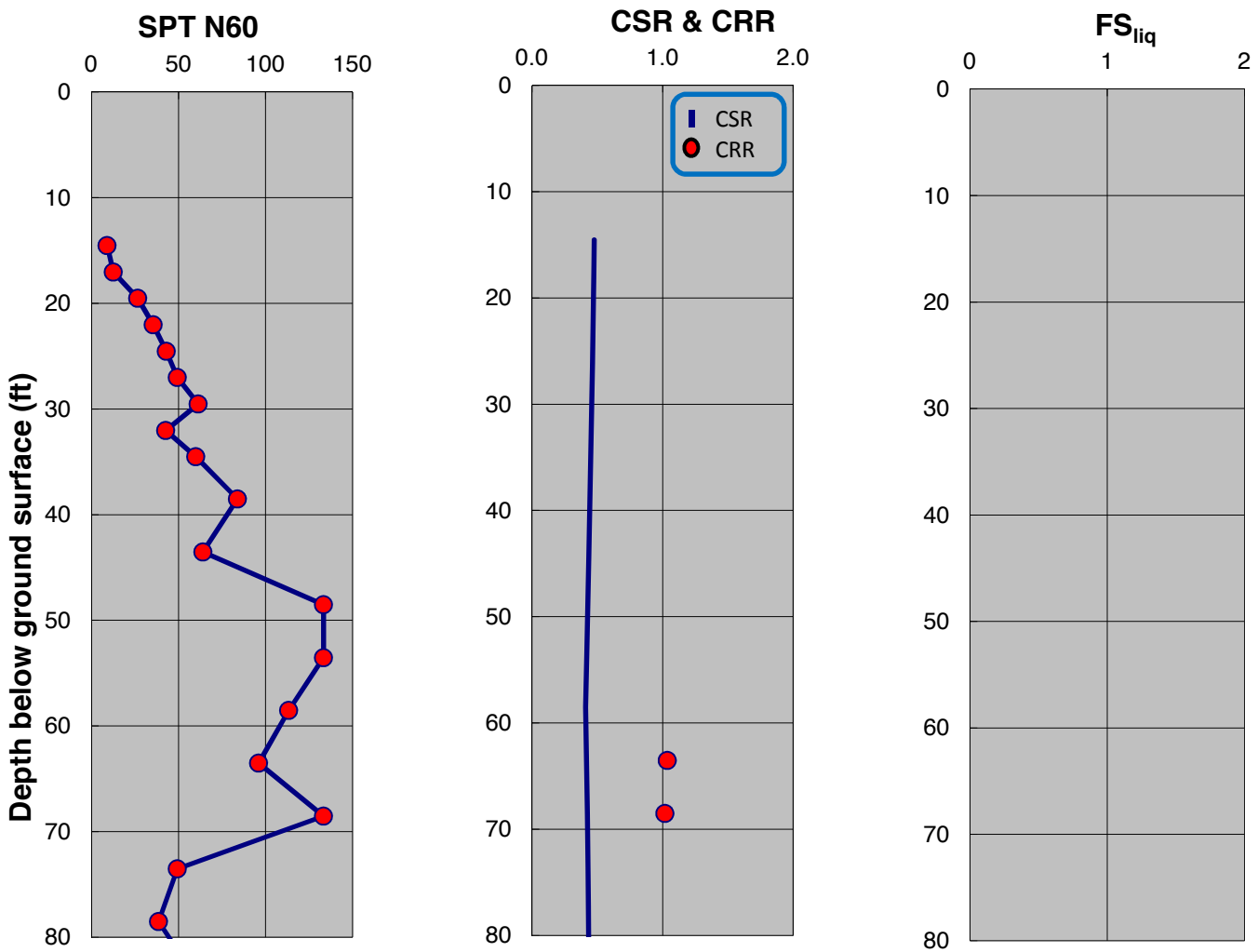
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-149 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



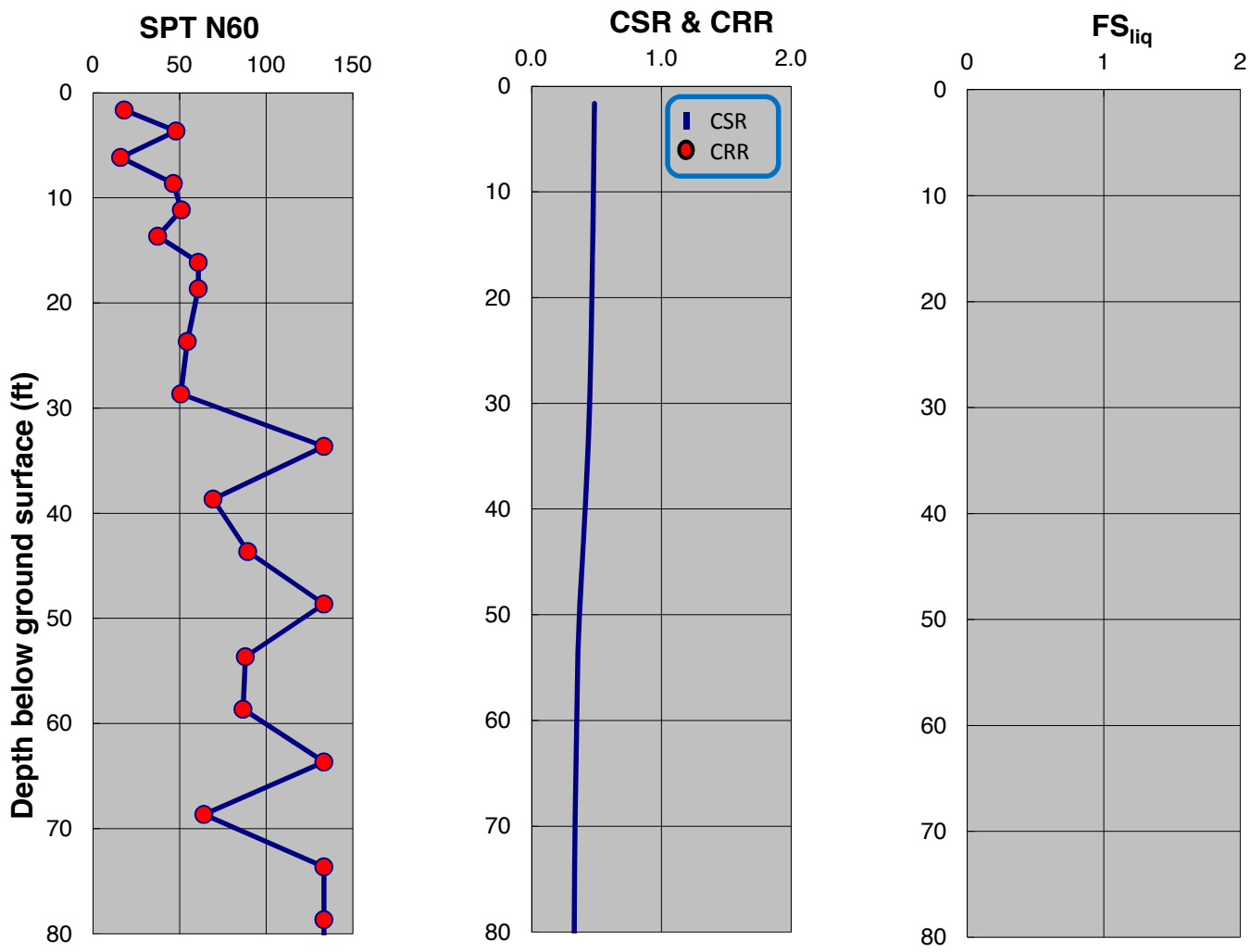
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-150 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



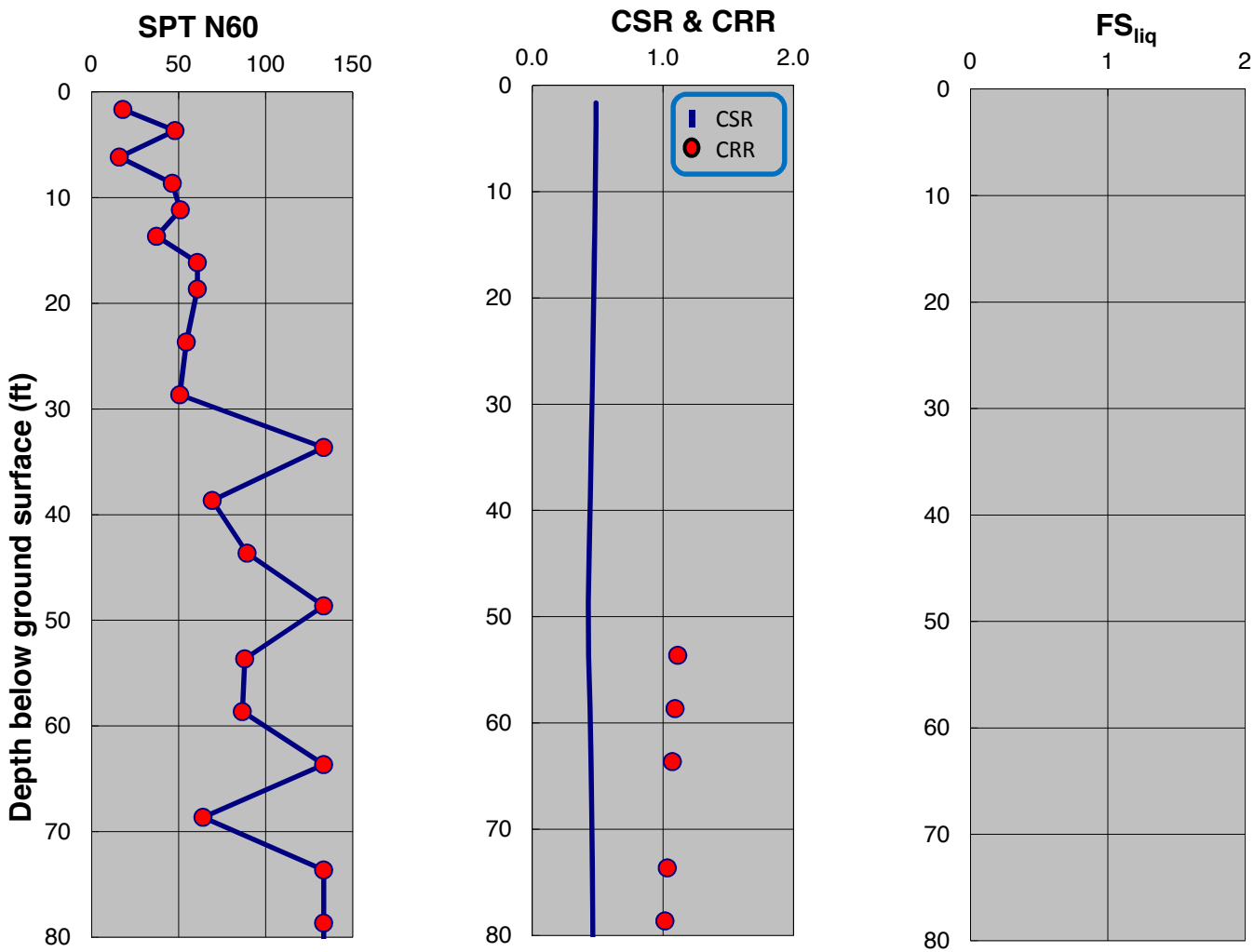
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-150 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



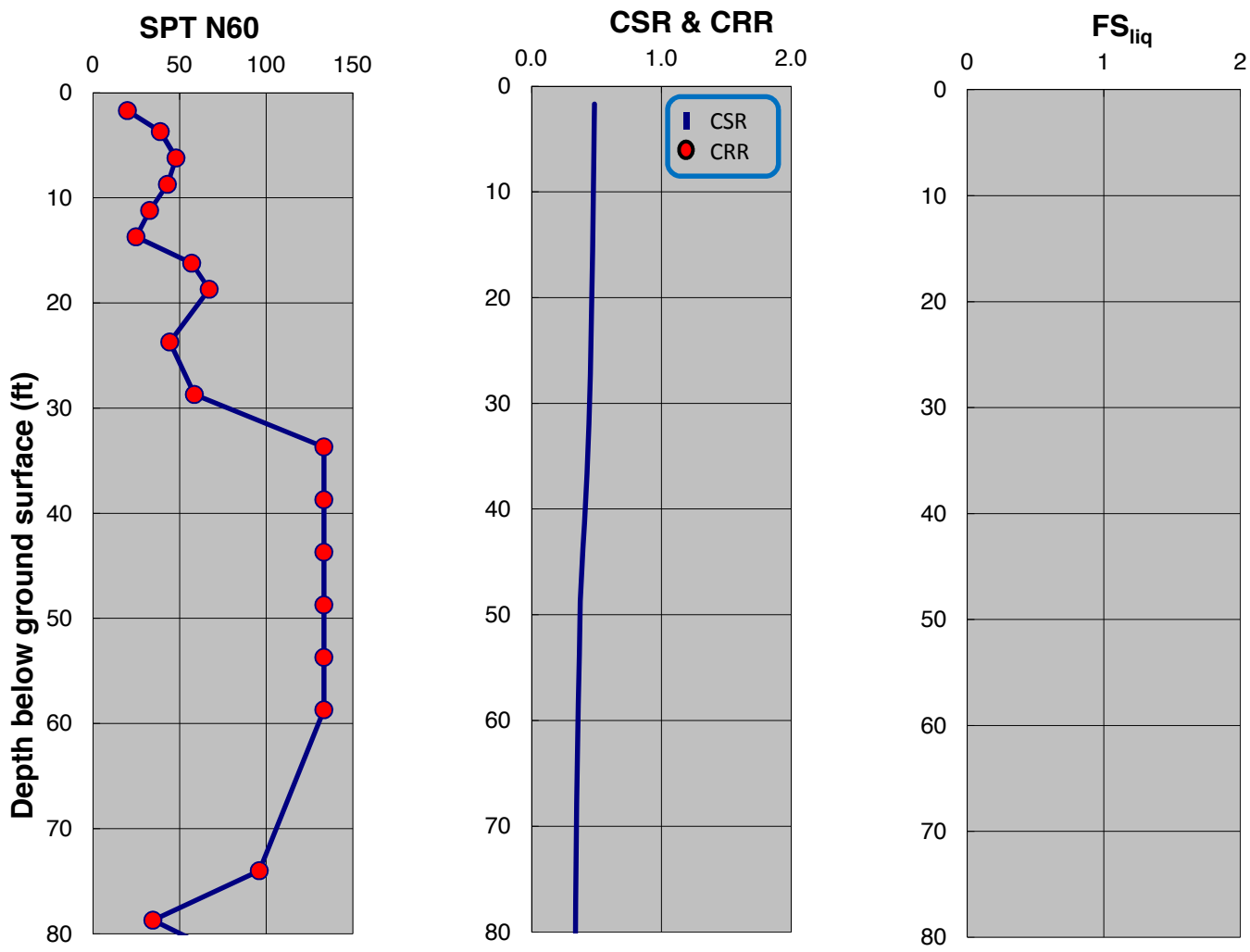
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-151 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



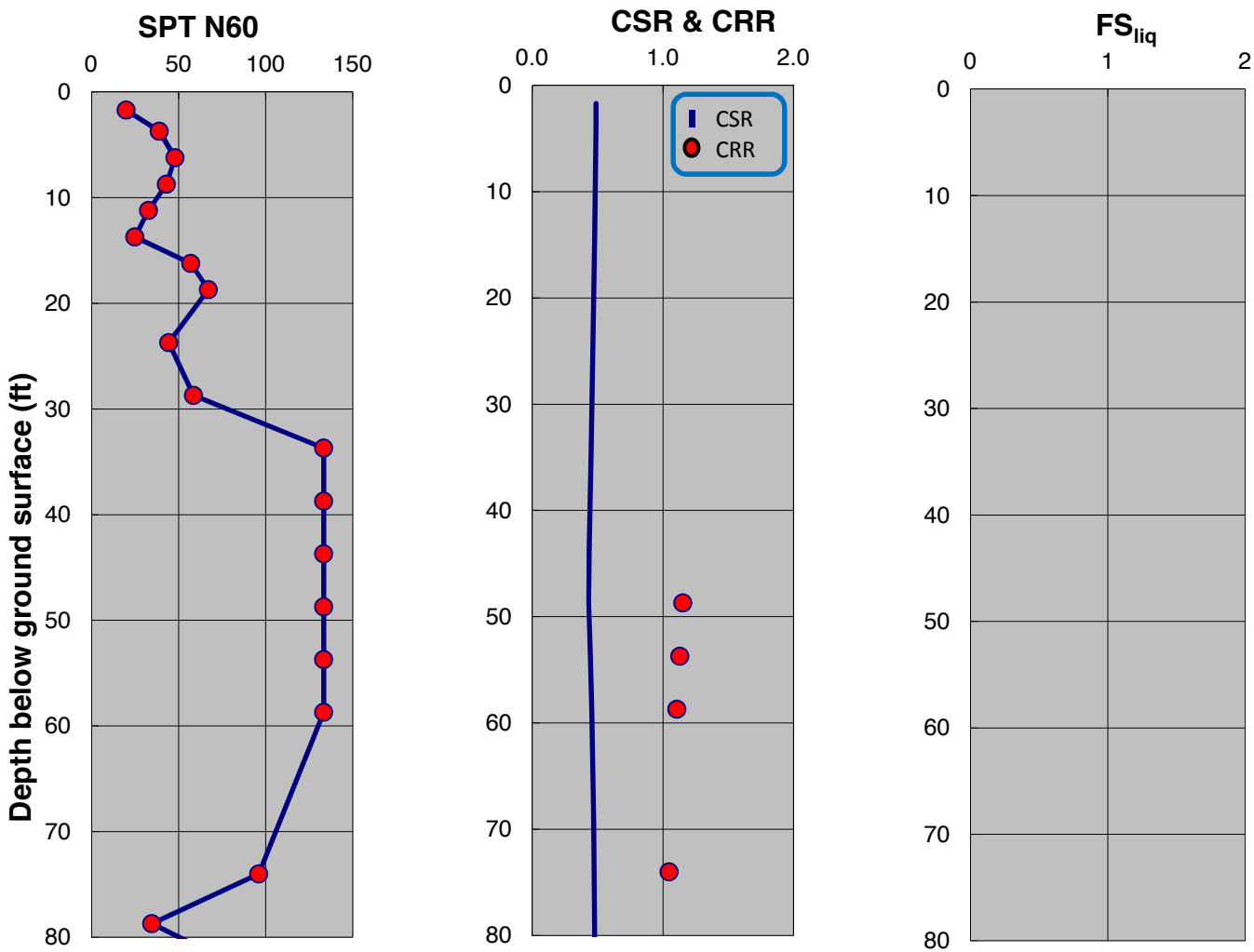
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-151 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



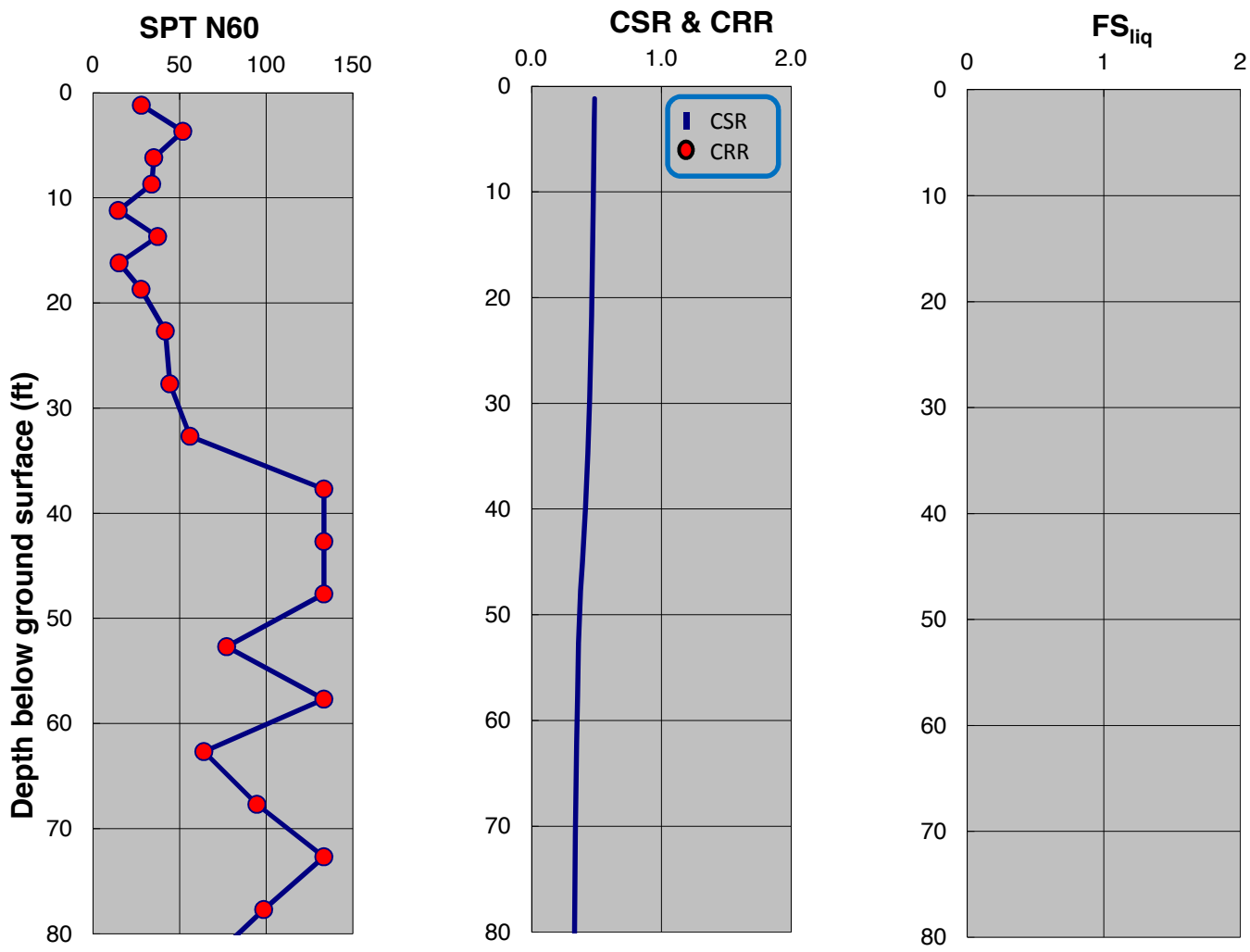
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-152 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



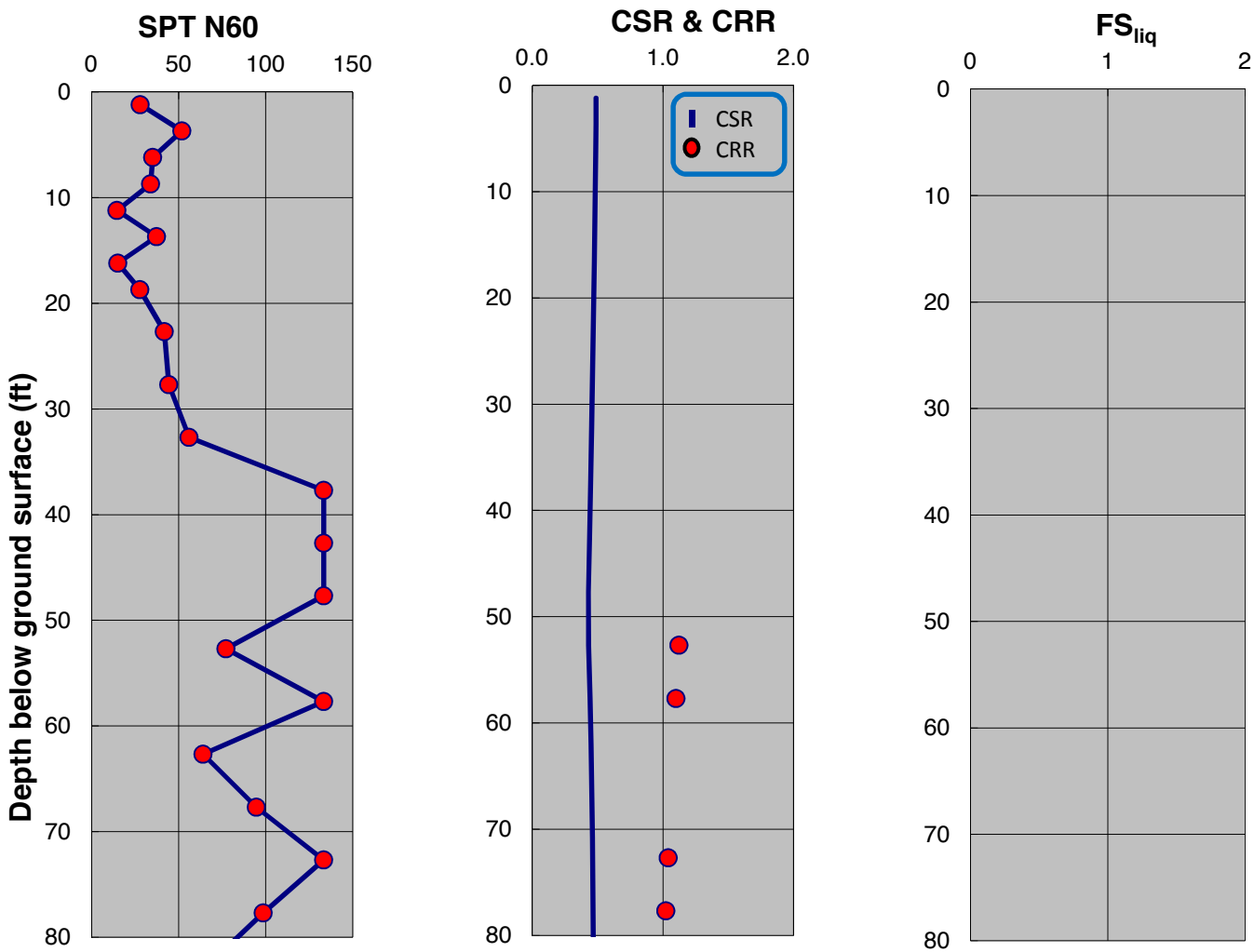
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-152 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



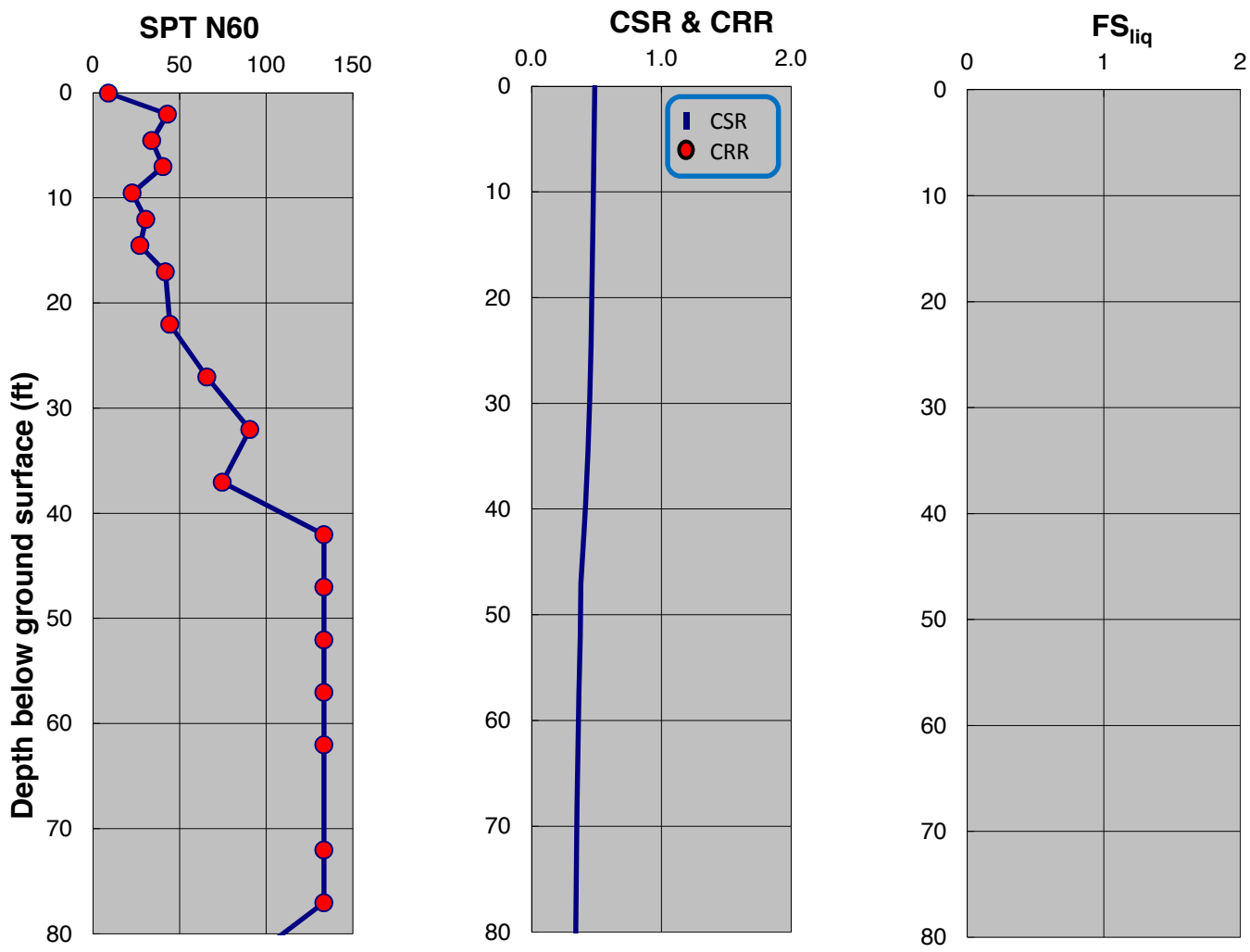
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-153 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



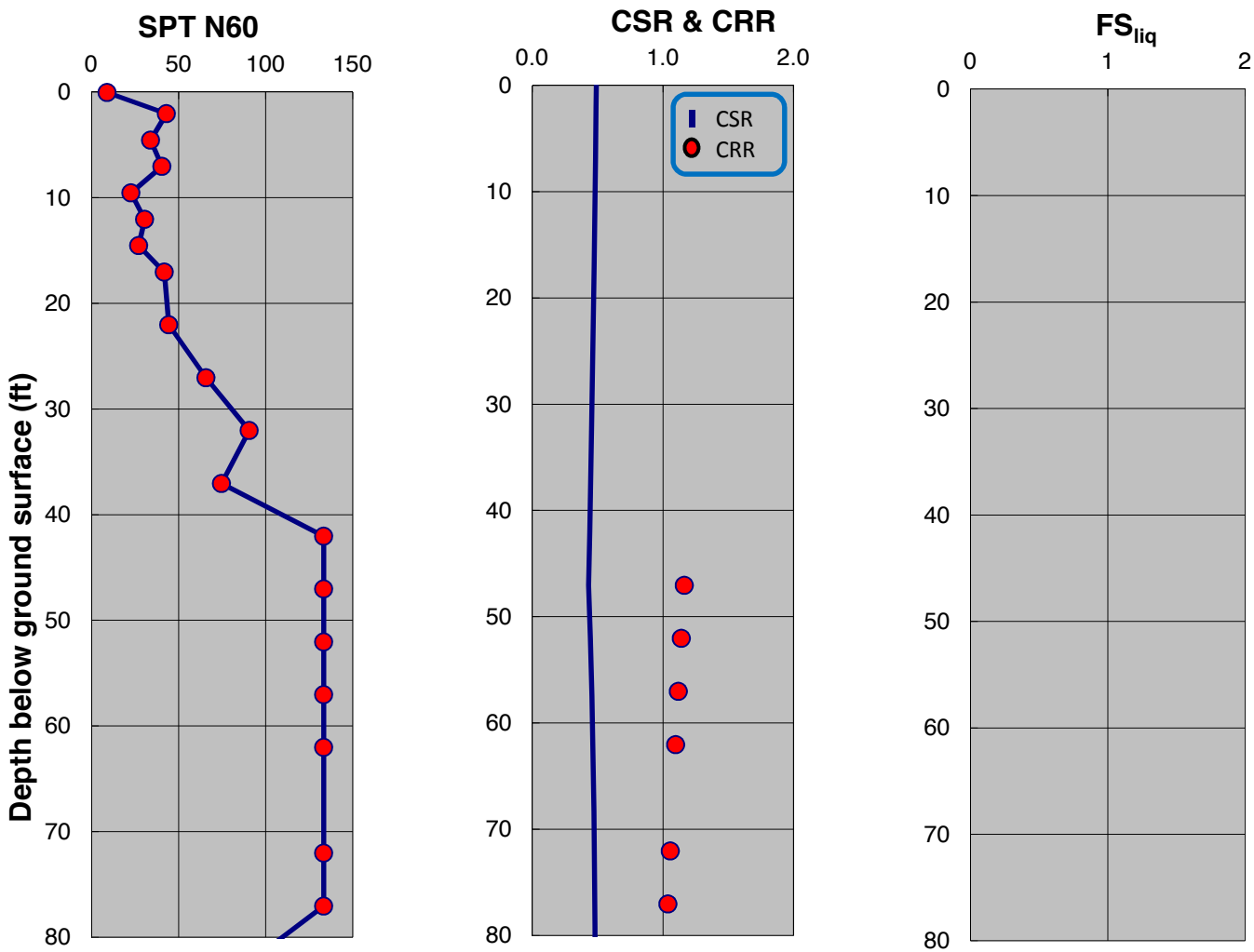
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-153 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



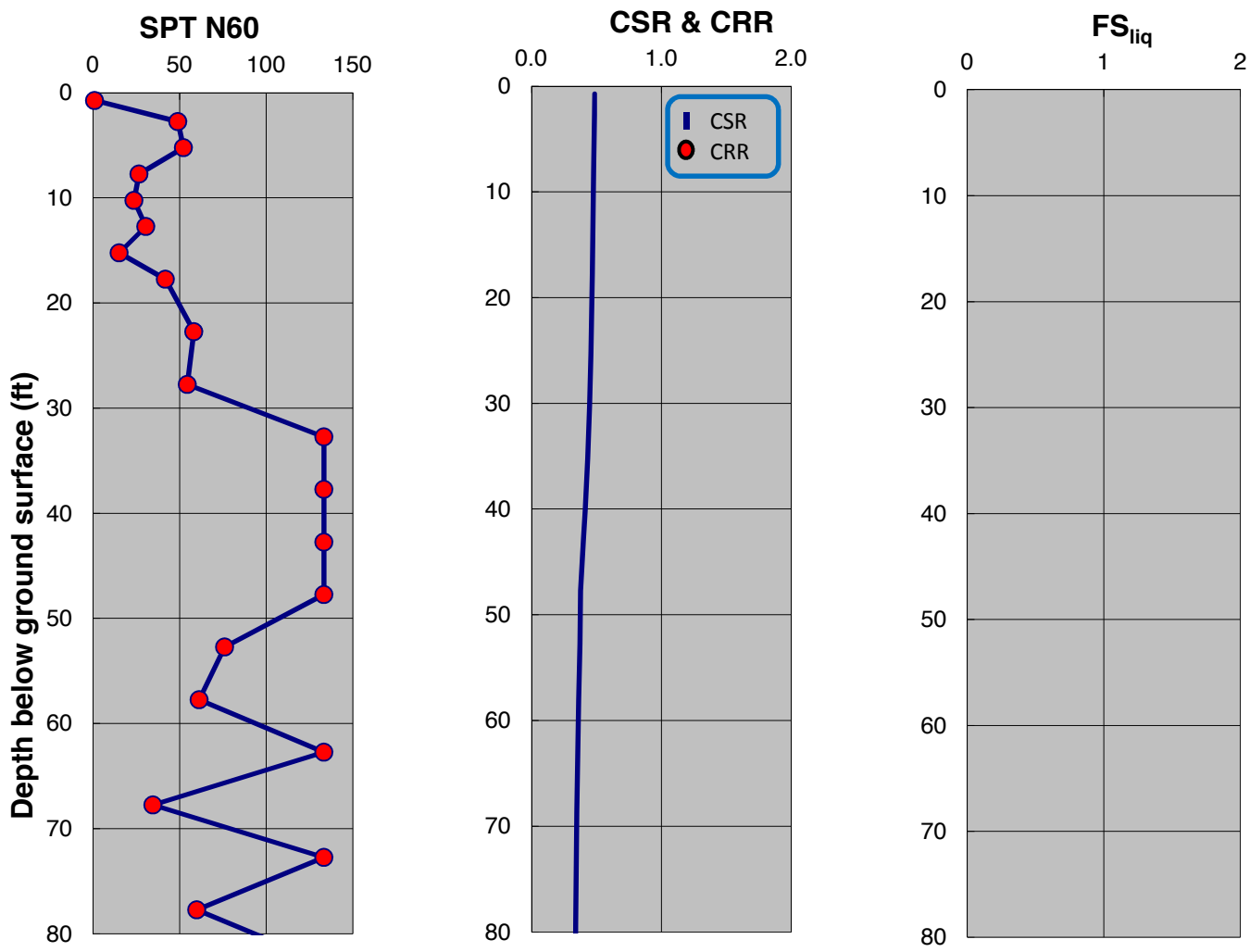
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-154 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



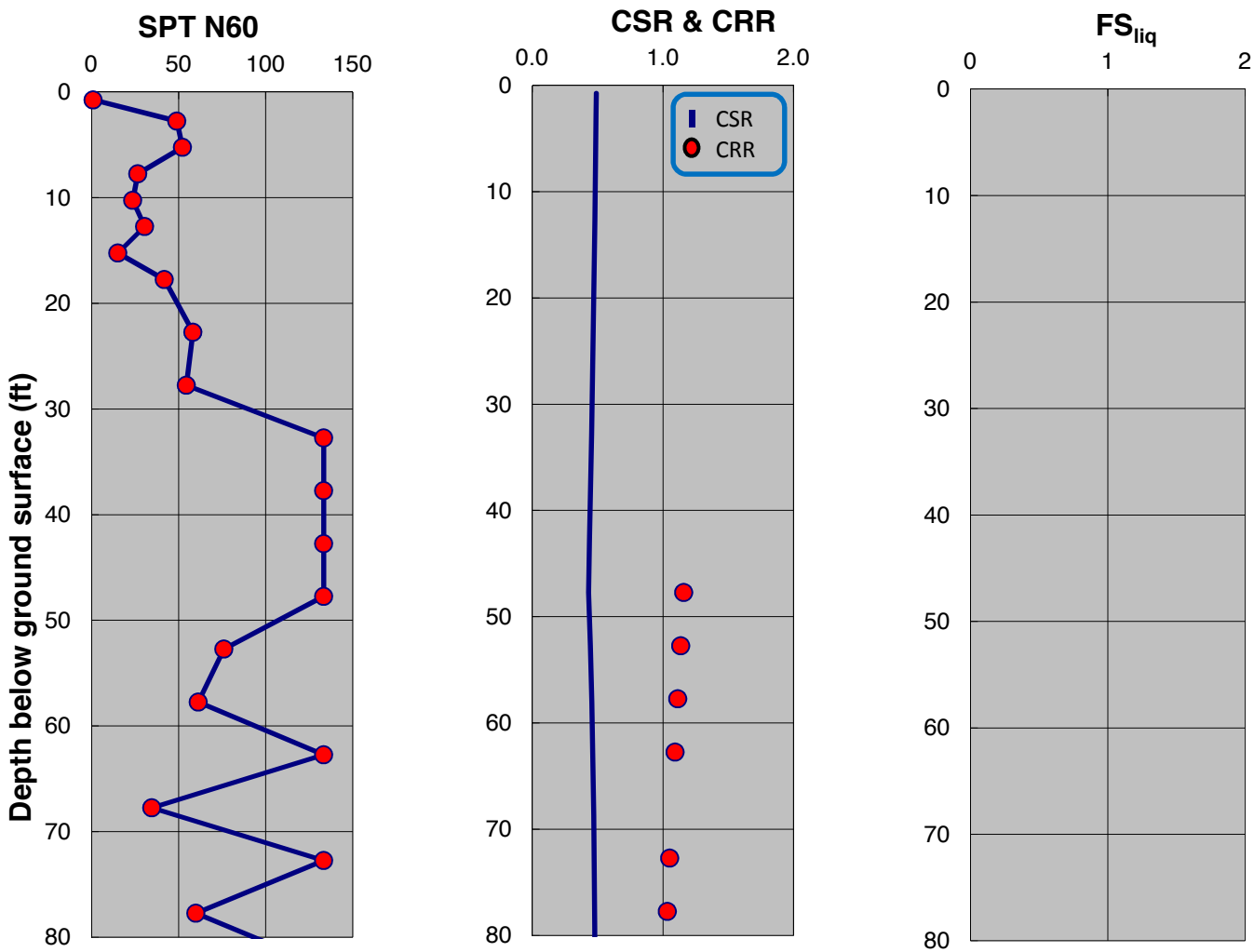
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-154 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



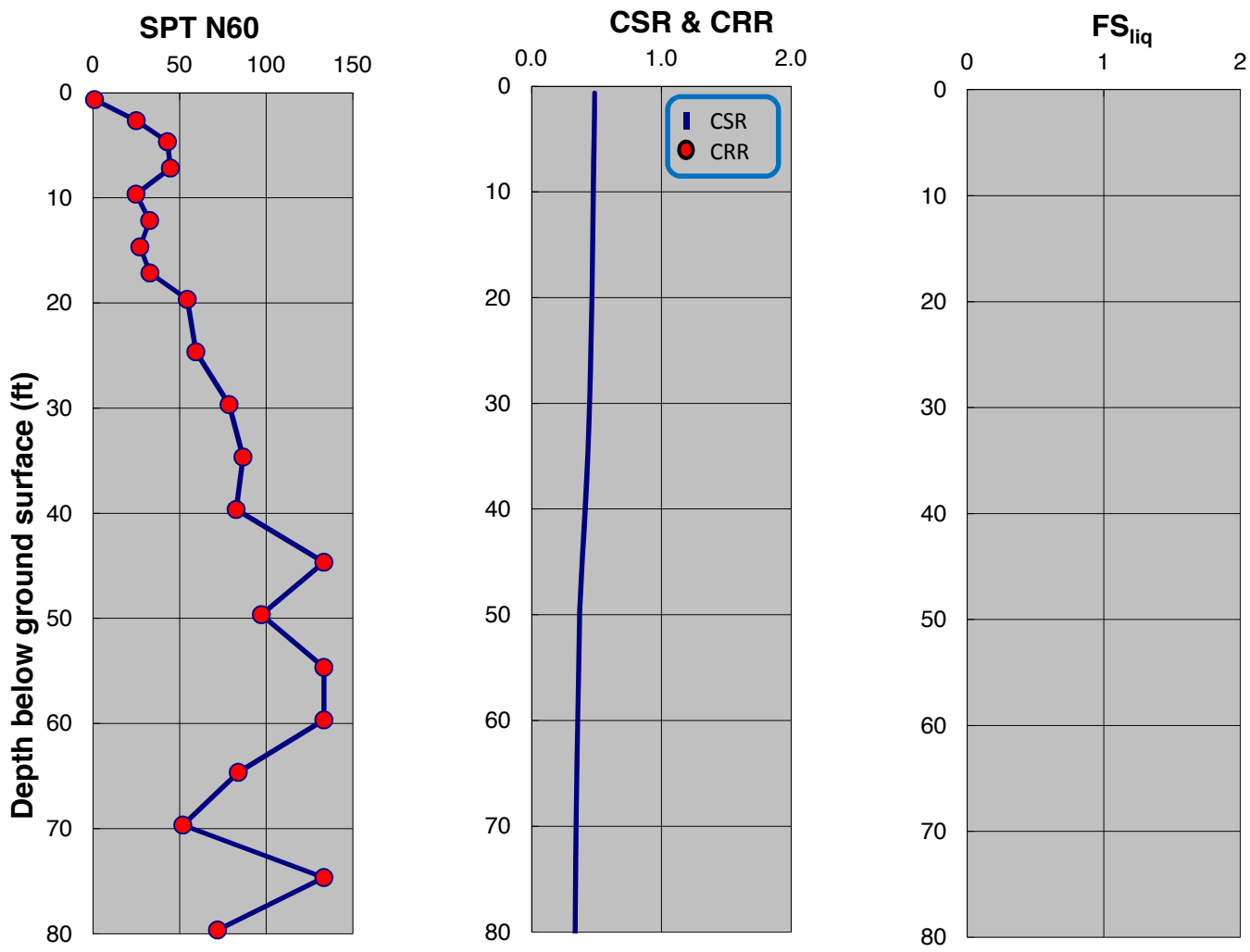
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-155 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



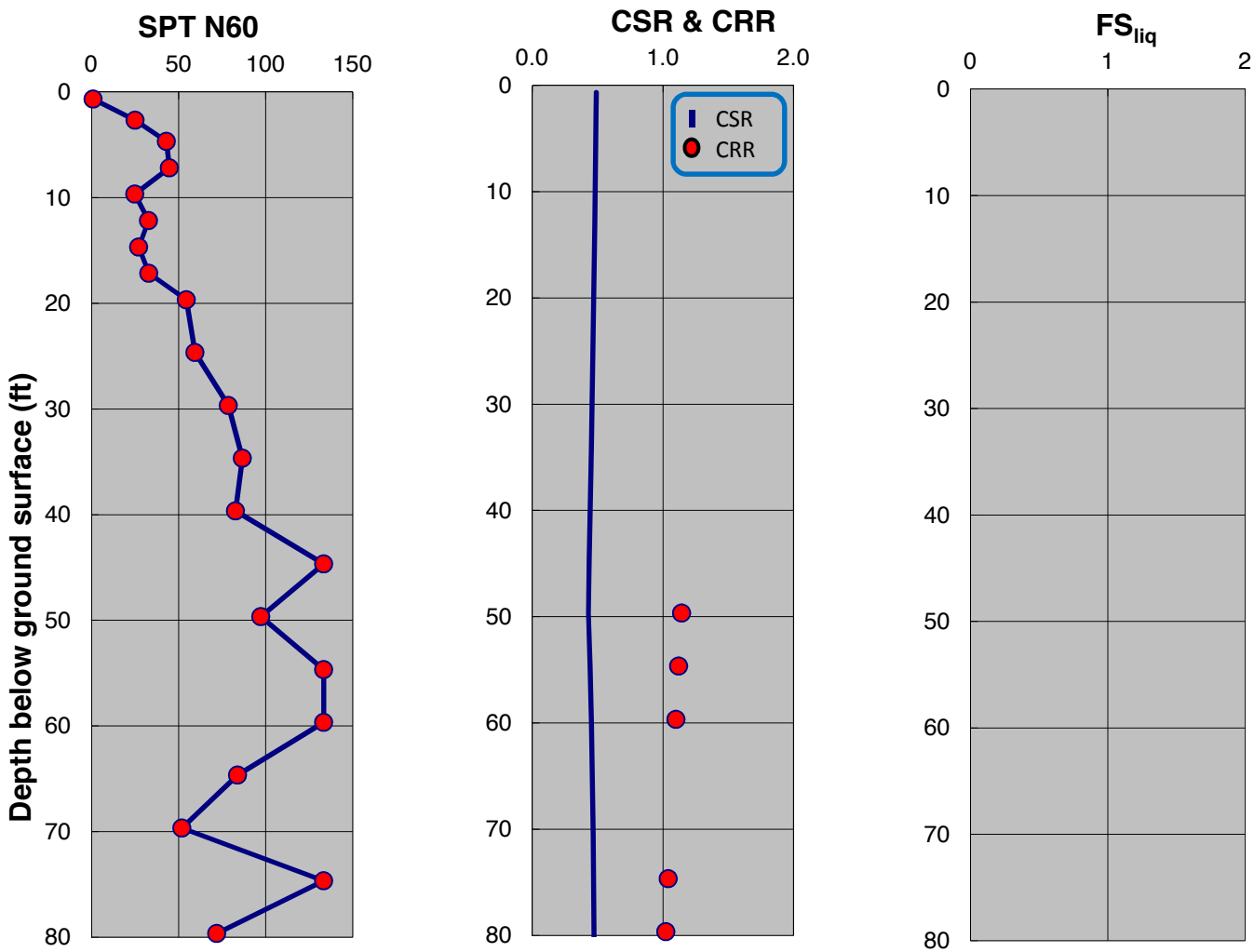
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-155 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



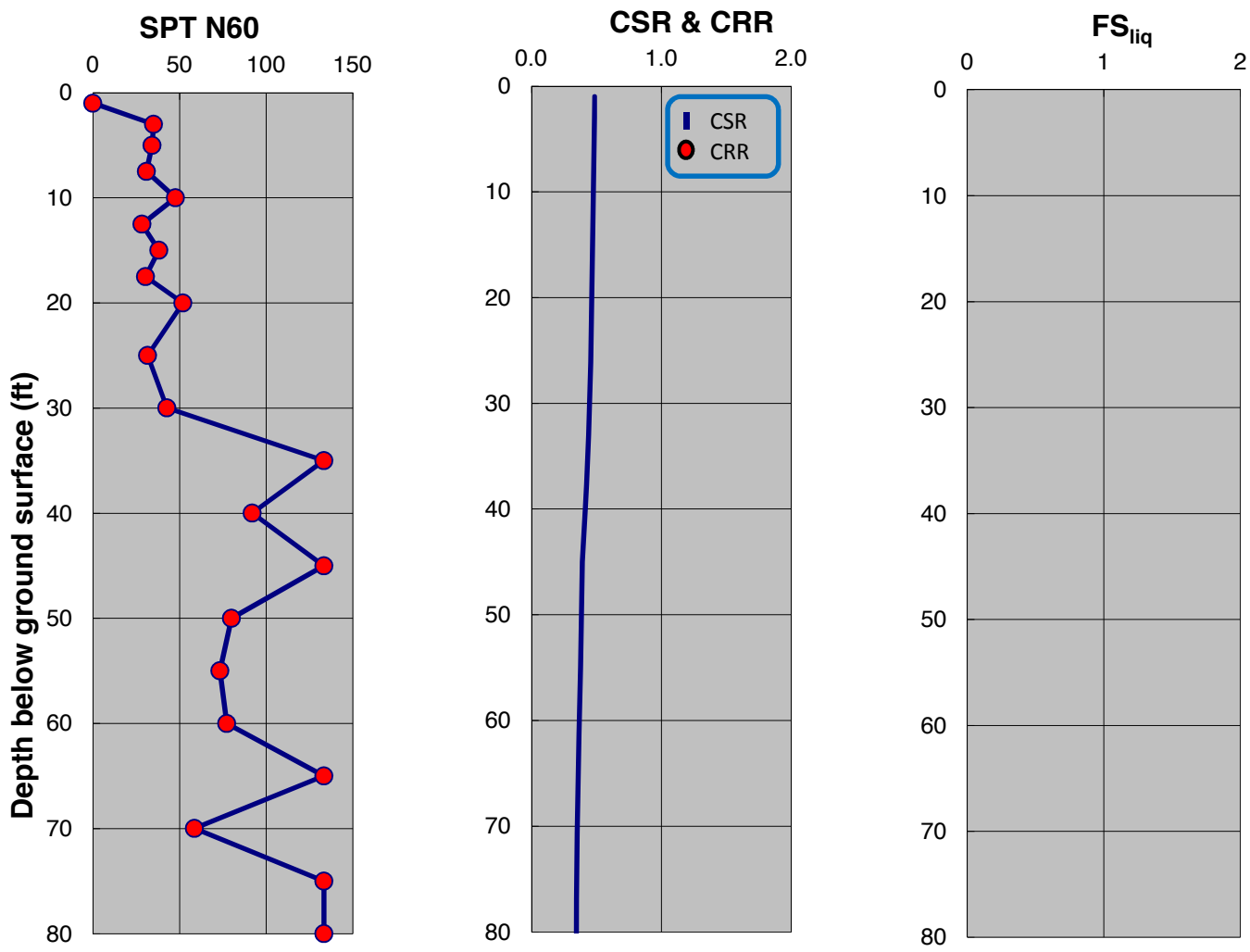
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-156 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



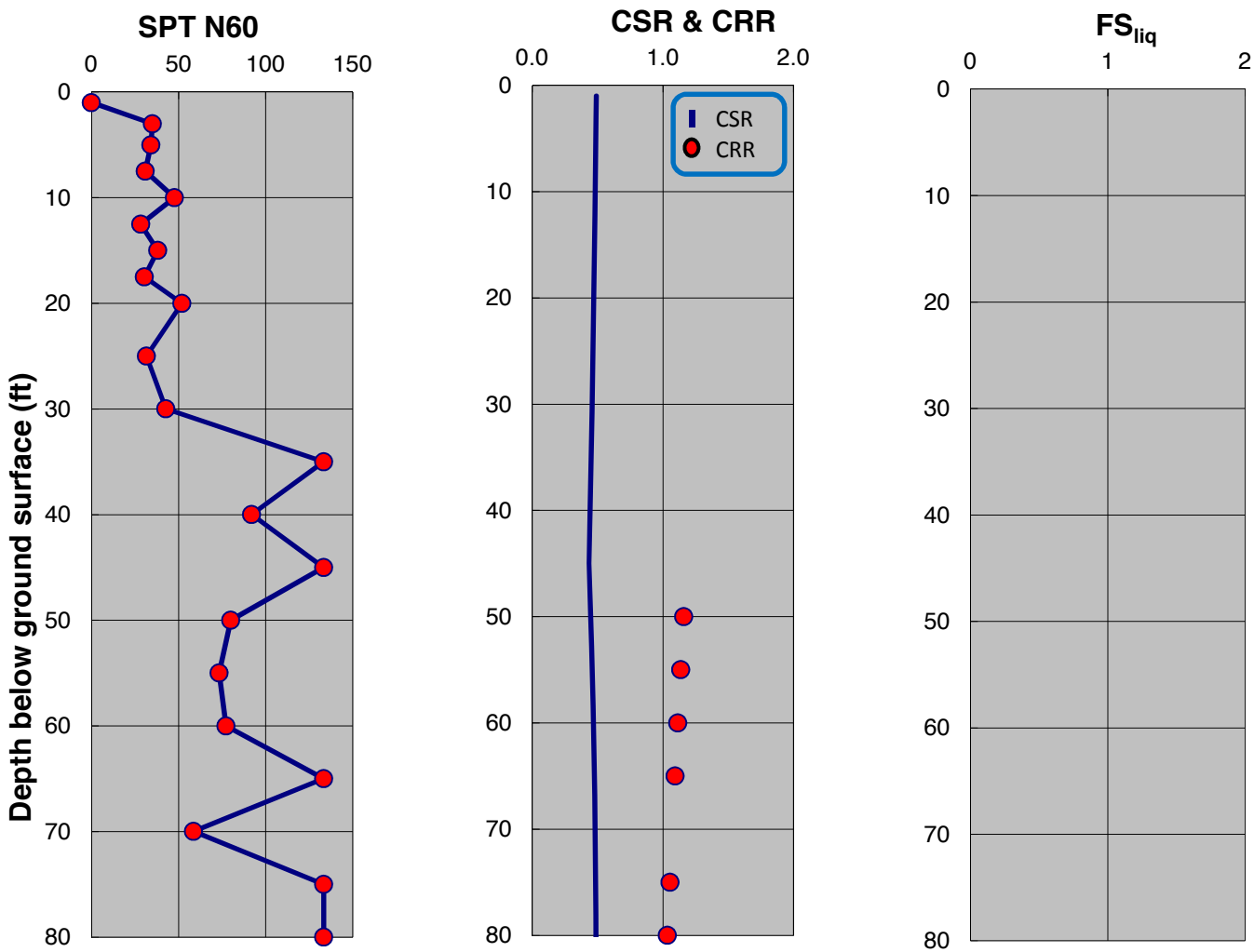
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-156 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



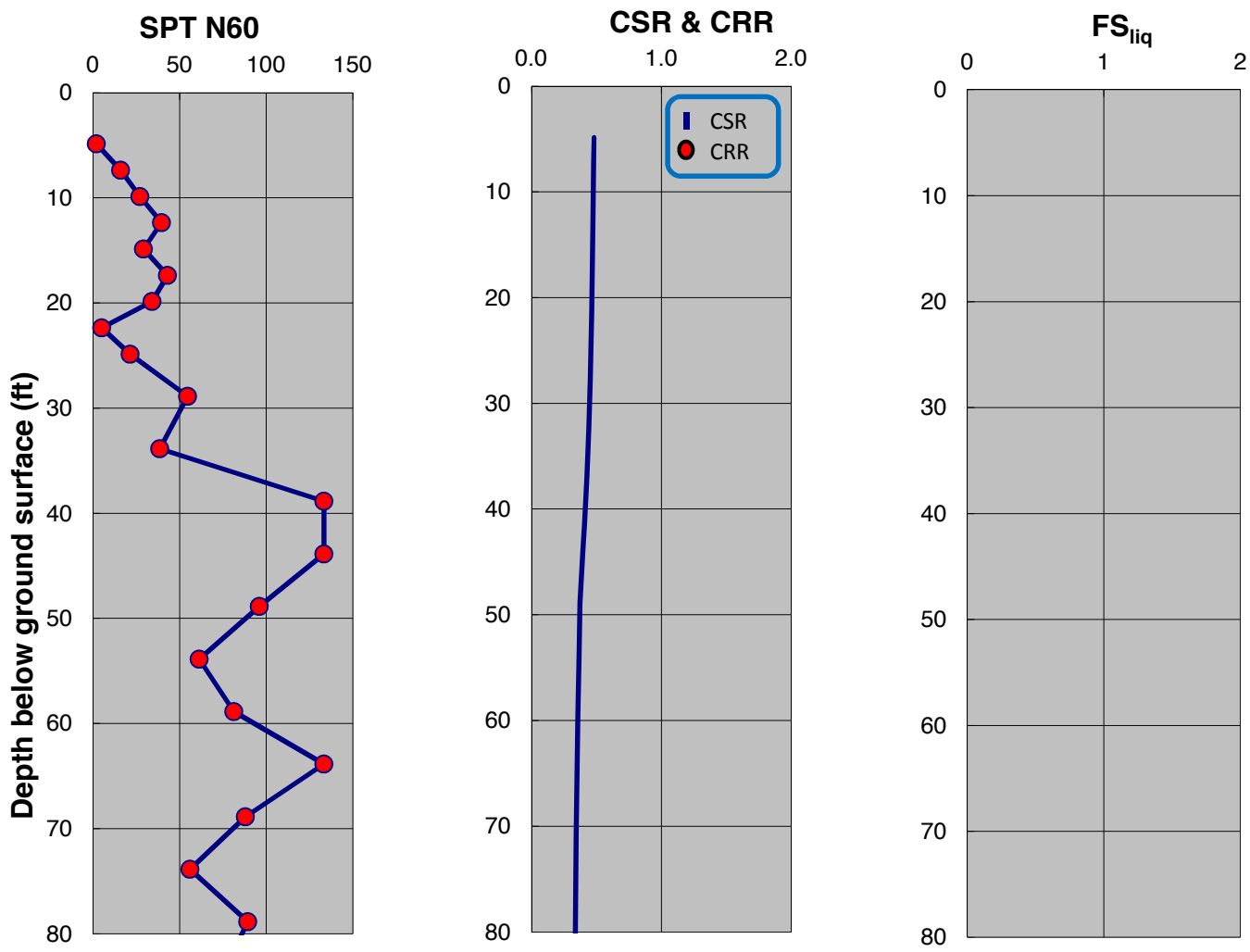
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-157 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



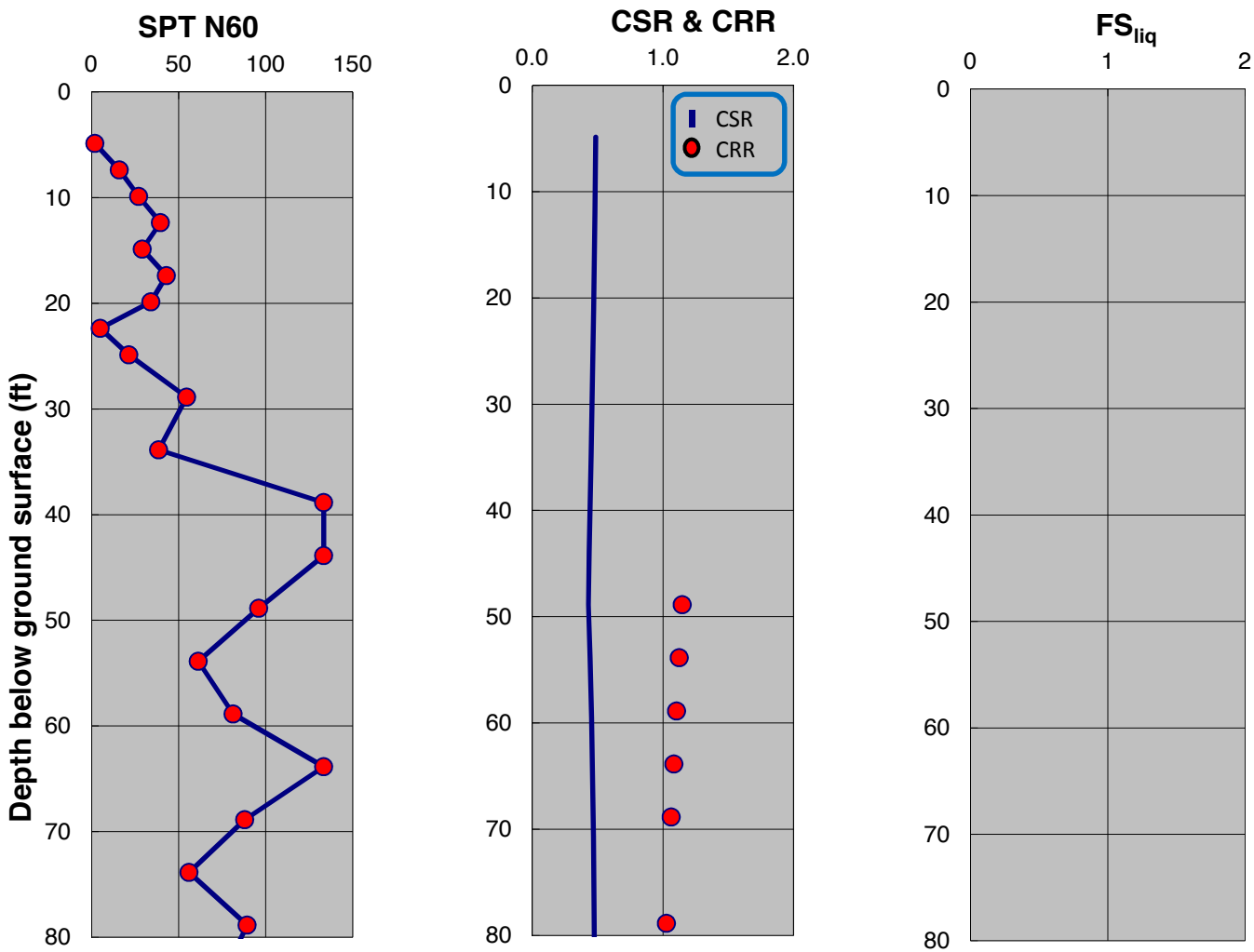
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-157 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-158 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

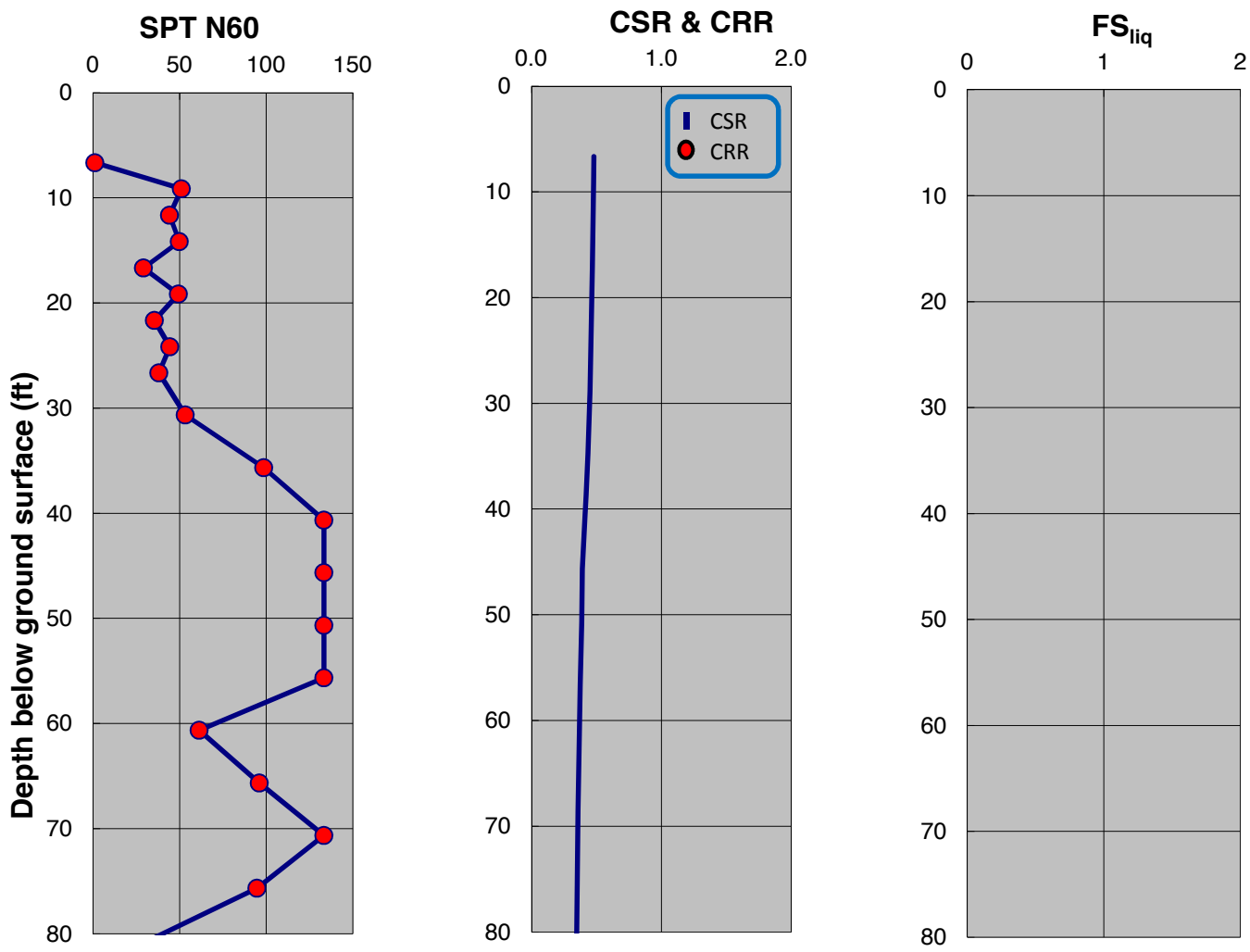
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-158 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

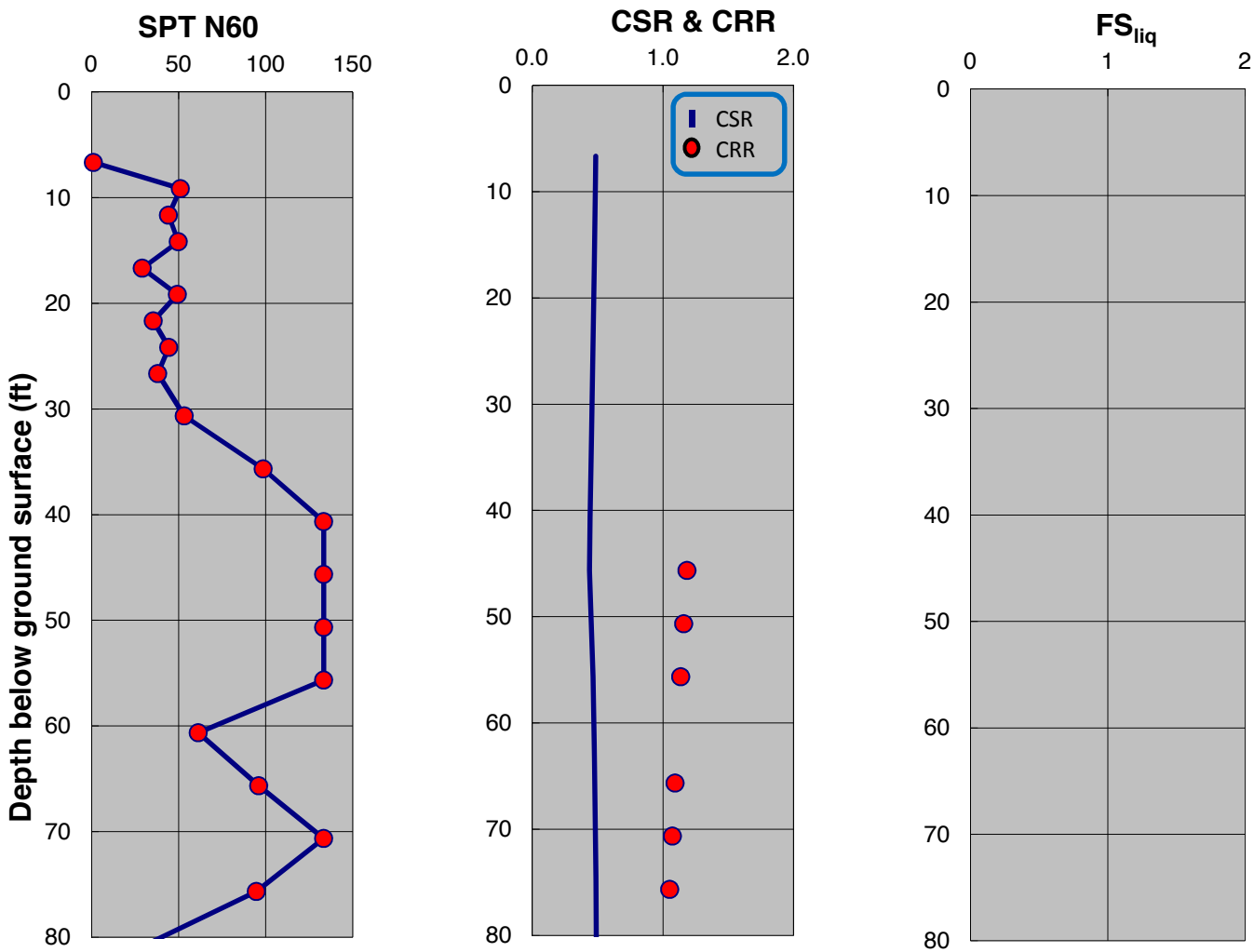
PLATE D.200



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-159 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

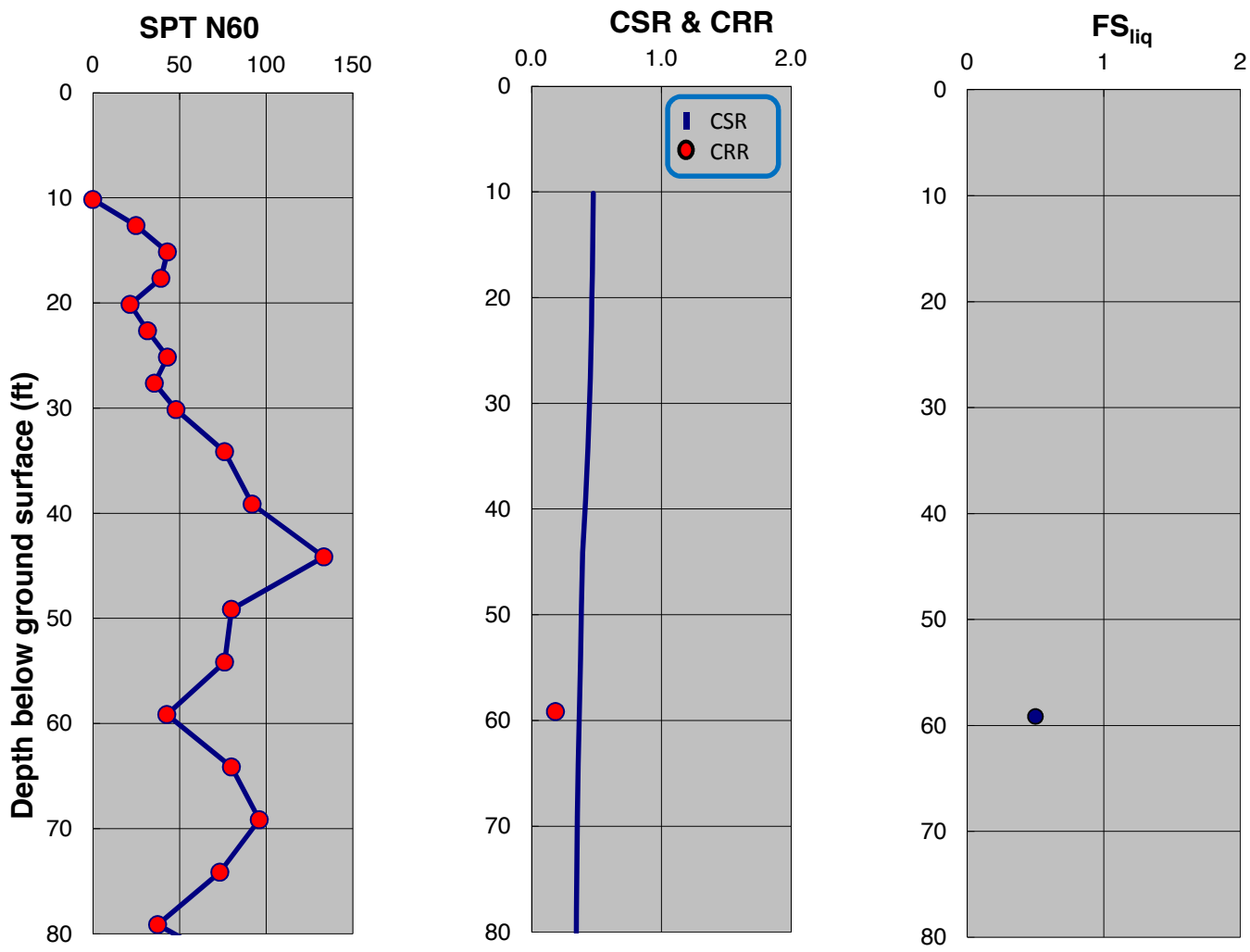
PLATE D.201



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-159 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

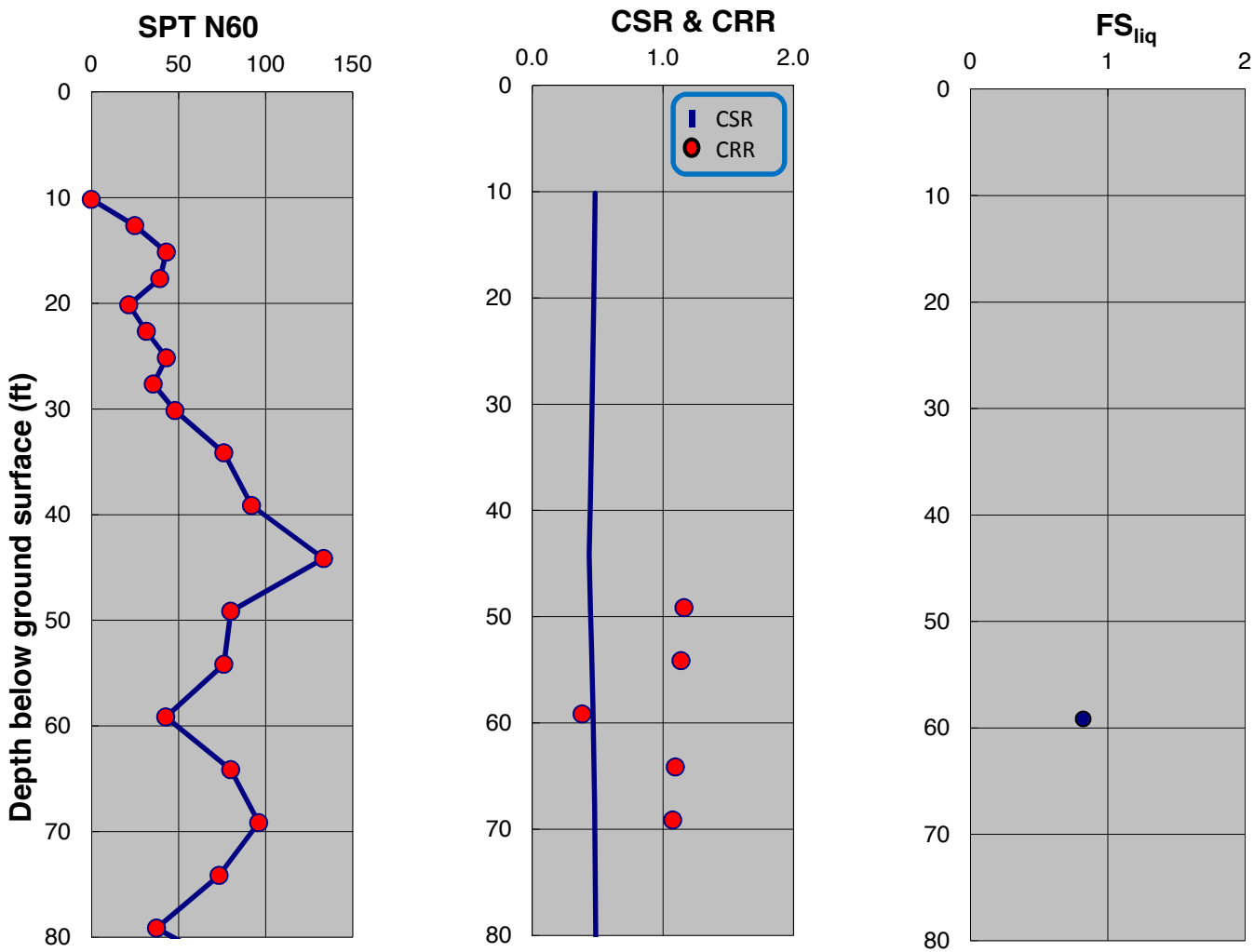
PLATE D.202



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-160 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

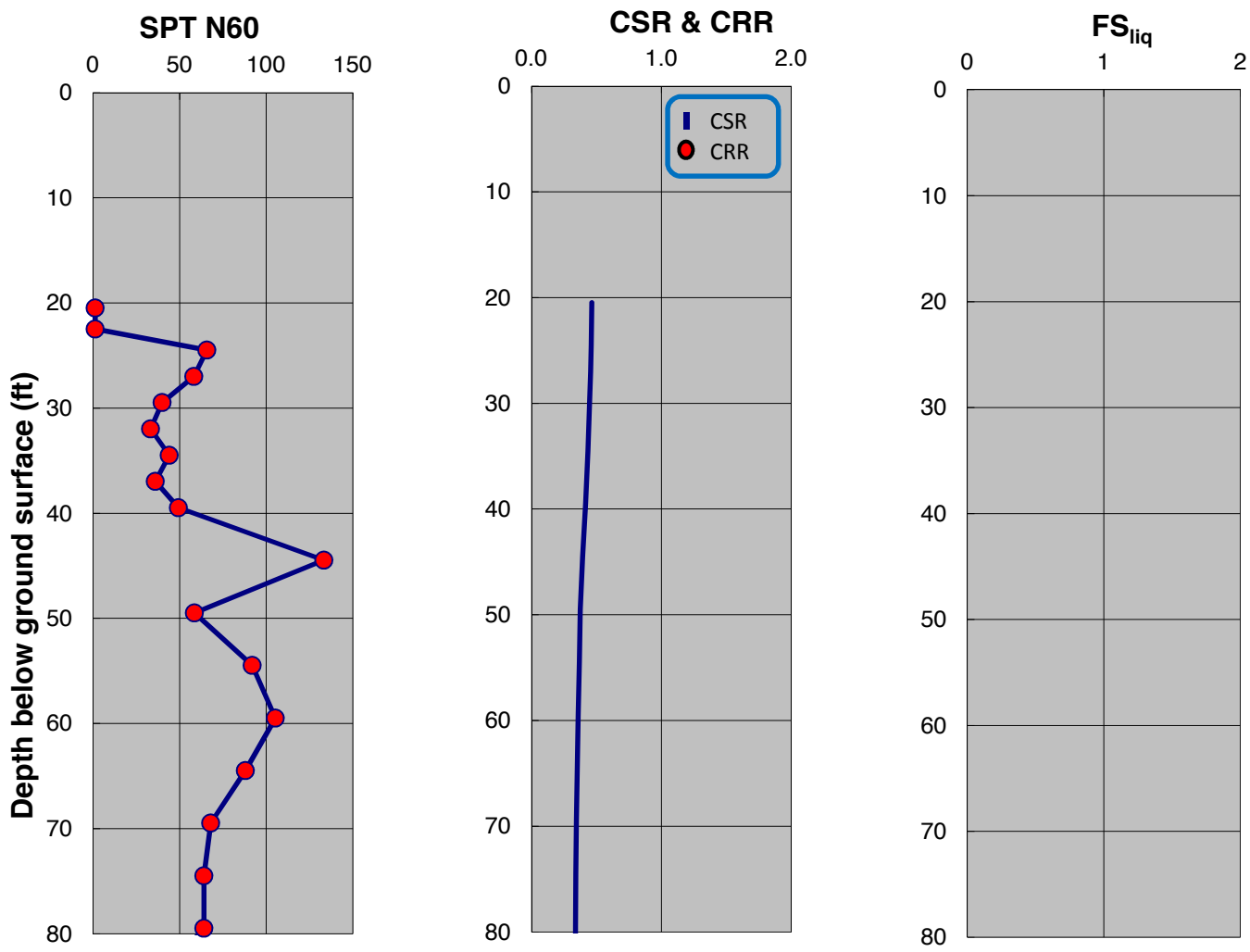
PLATE D.203



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-160 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

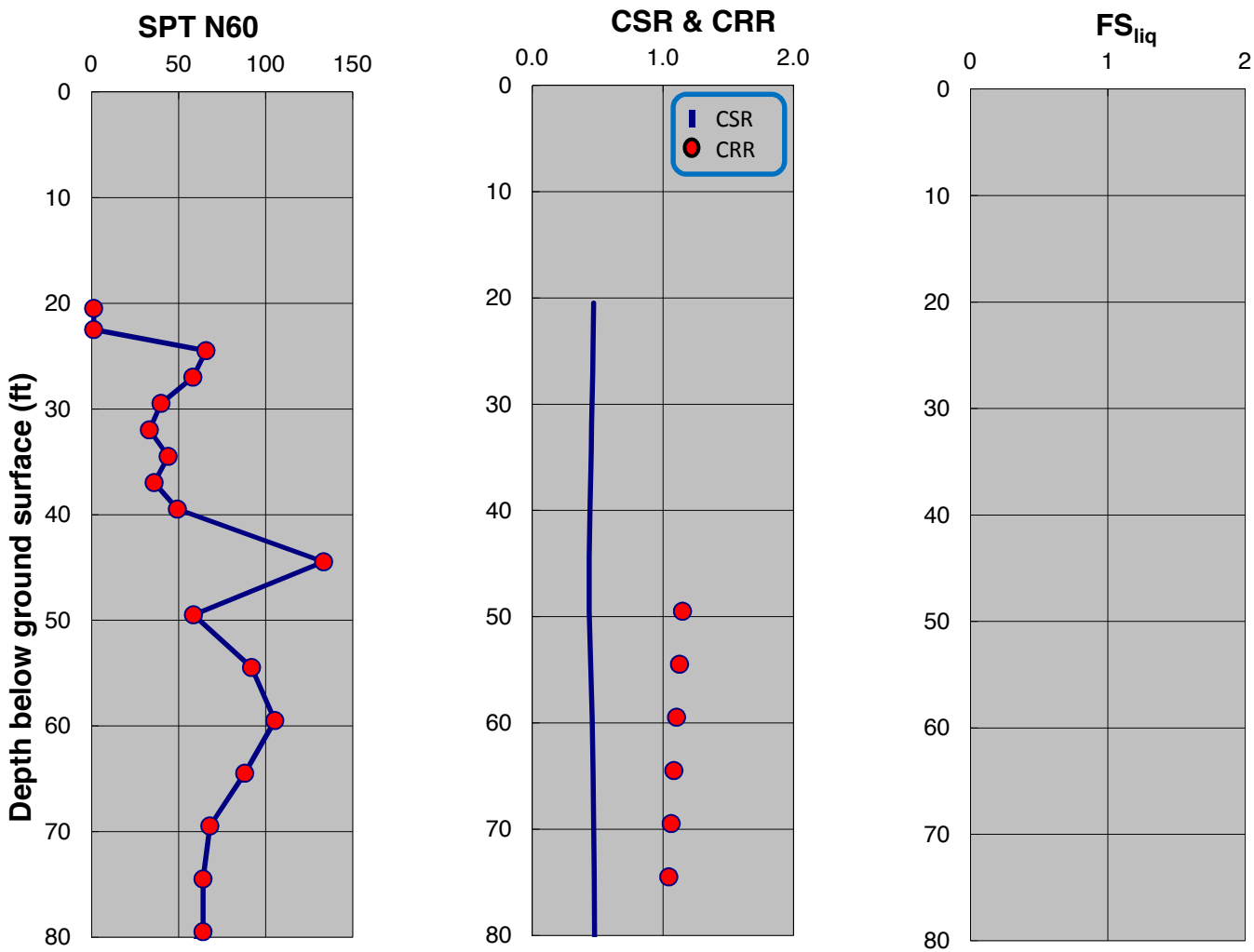
PLATE D.204



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-161 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

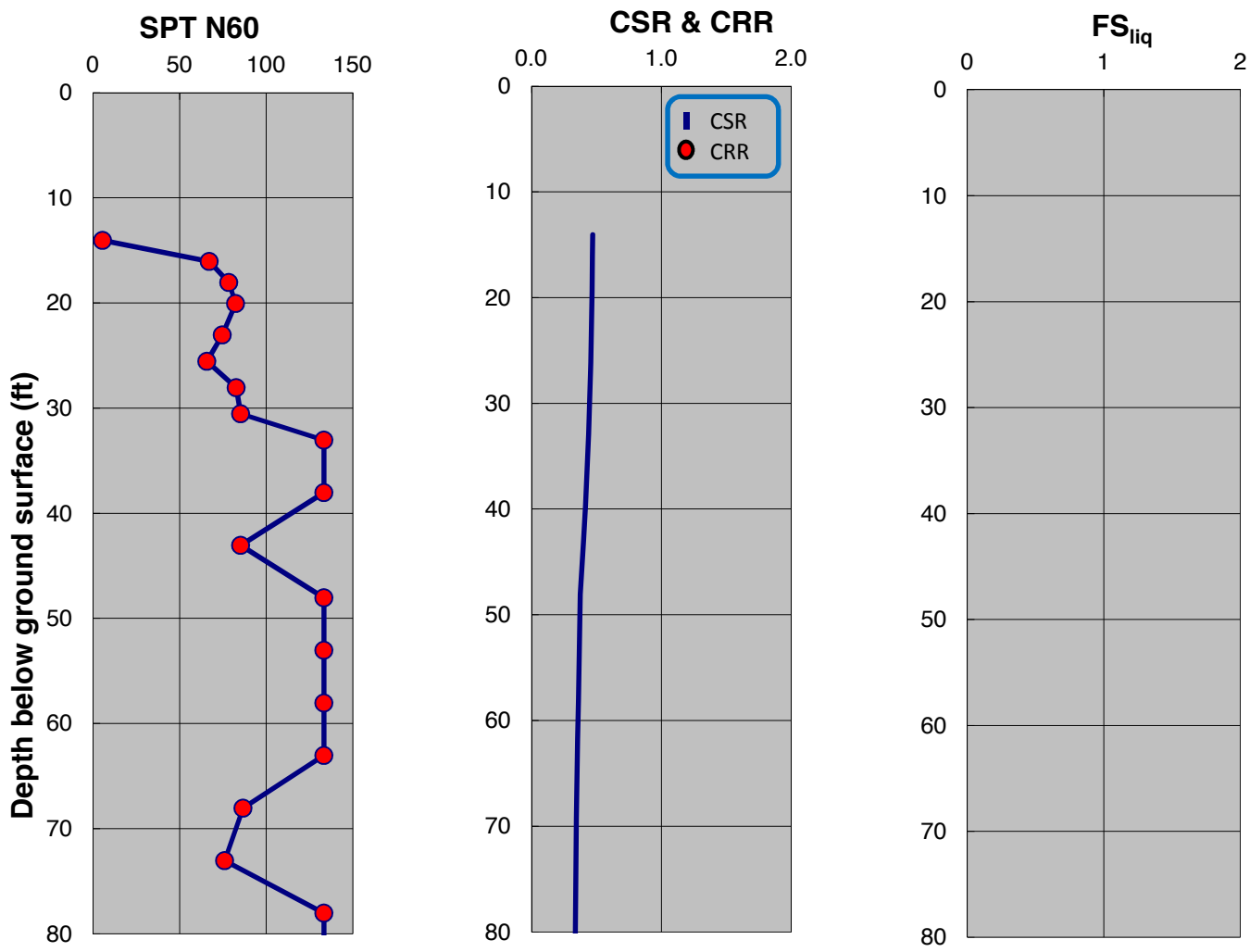
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.205



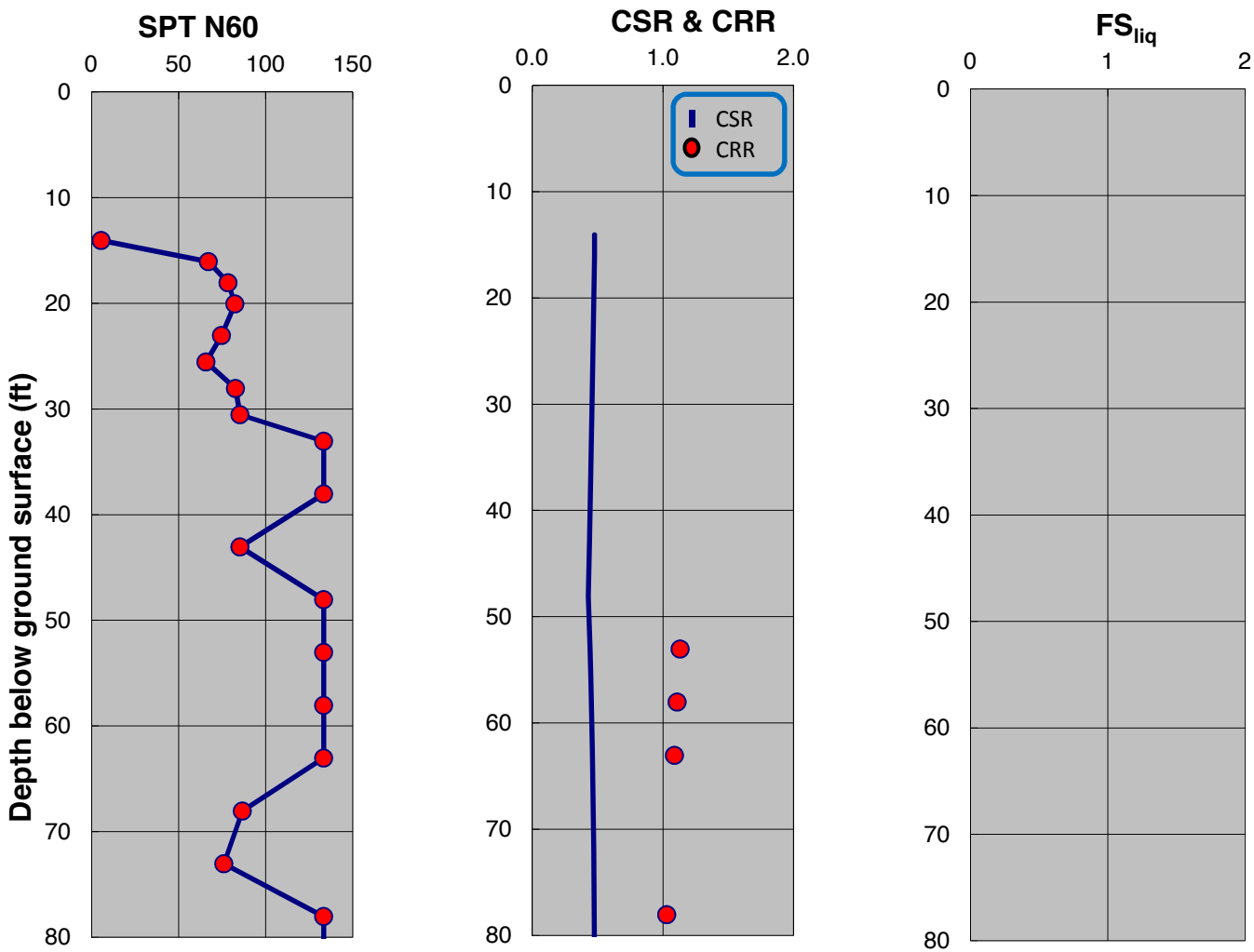
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-161 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



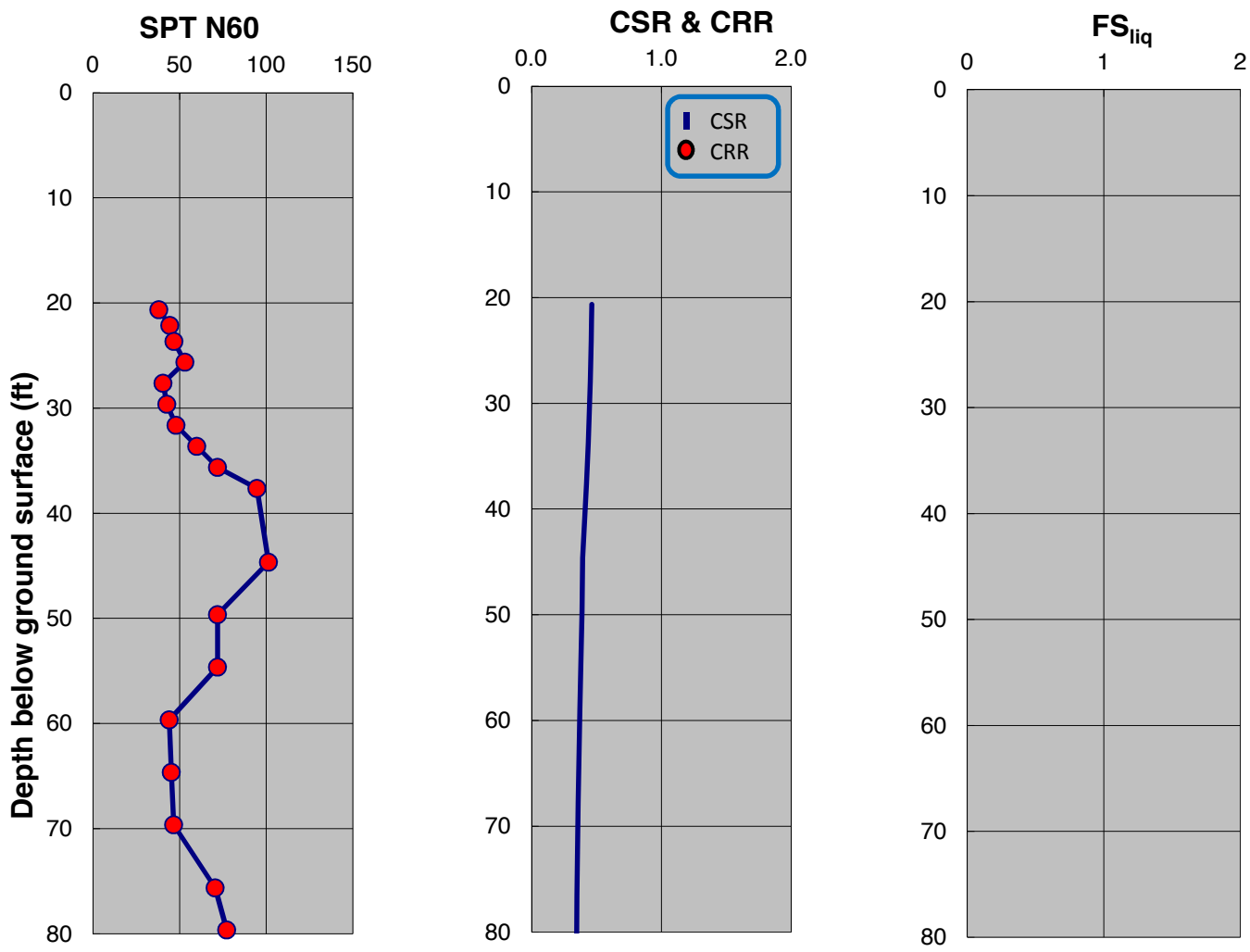
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-162 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



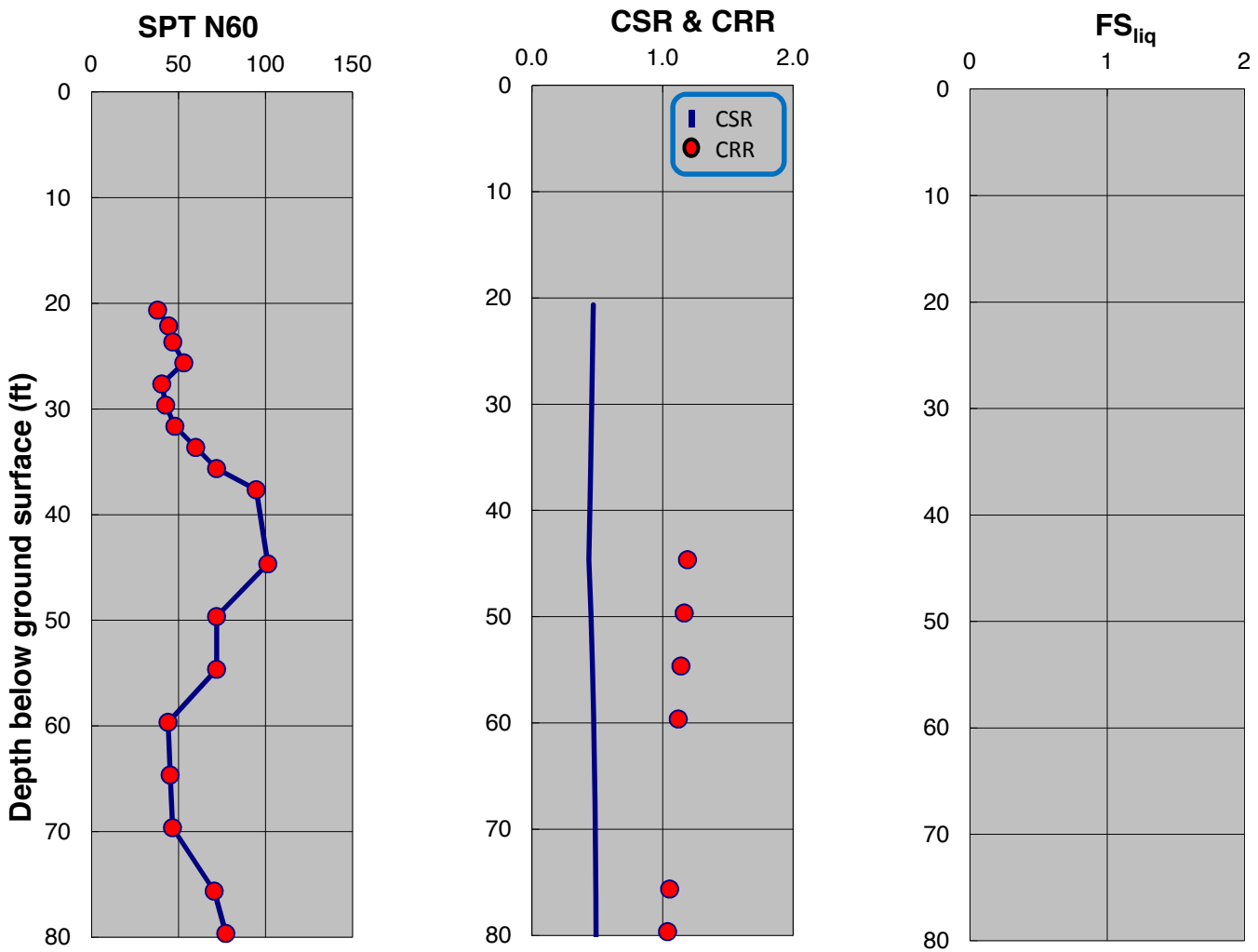
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-162 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-163 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

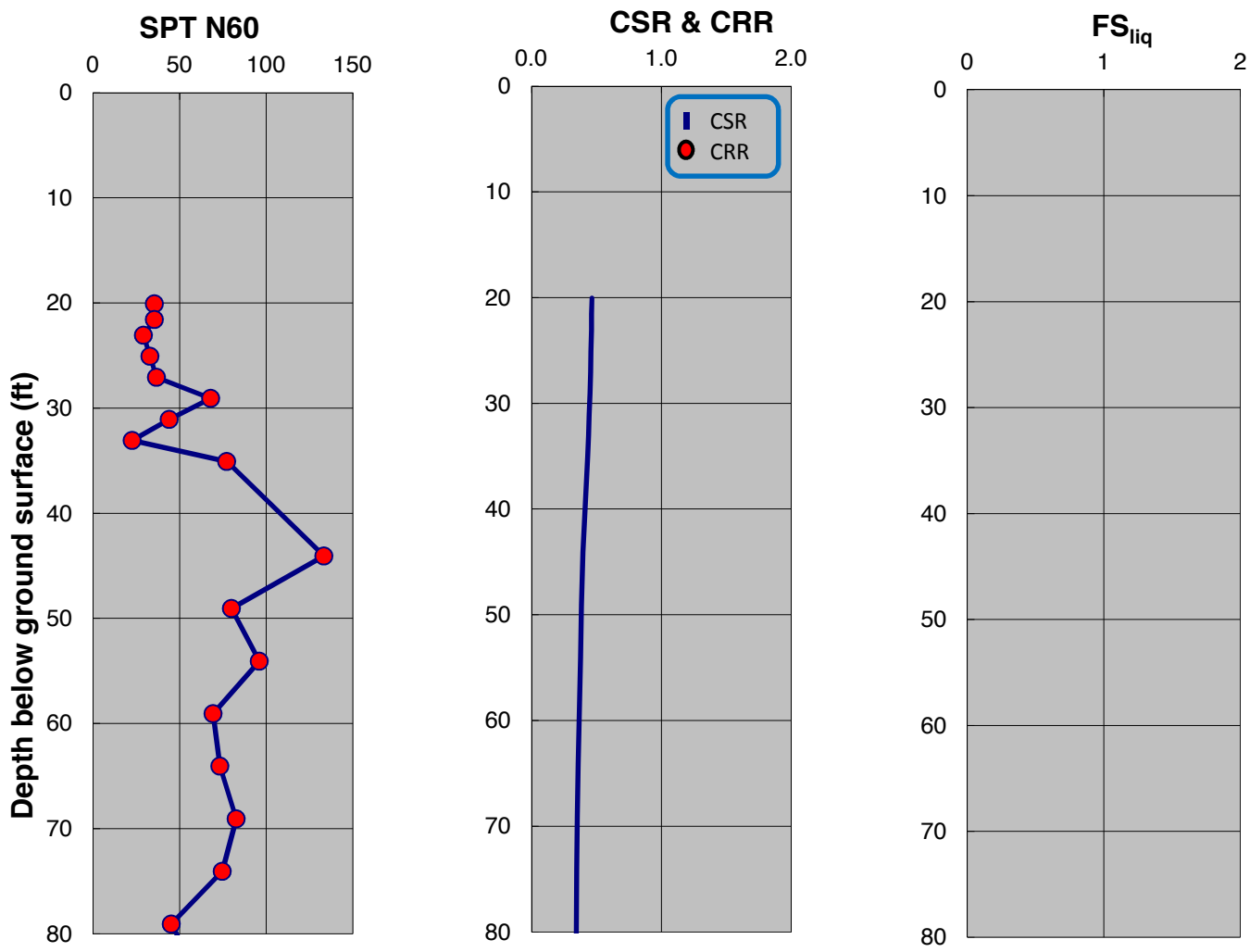
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-163 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

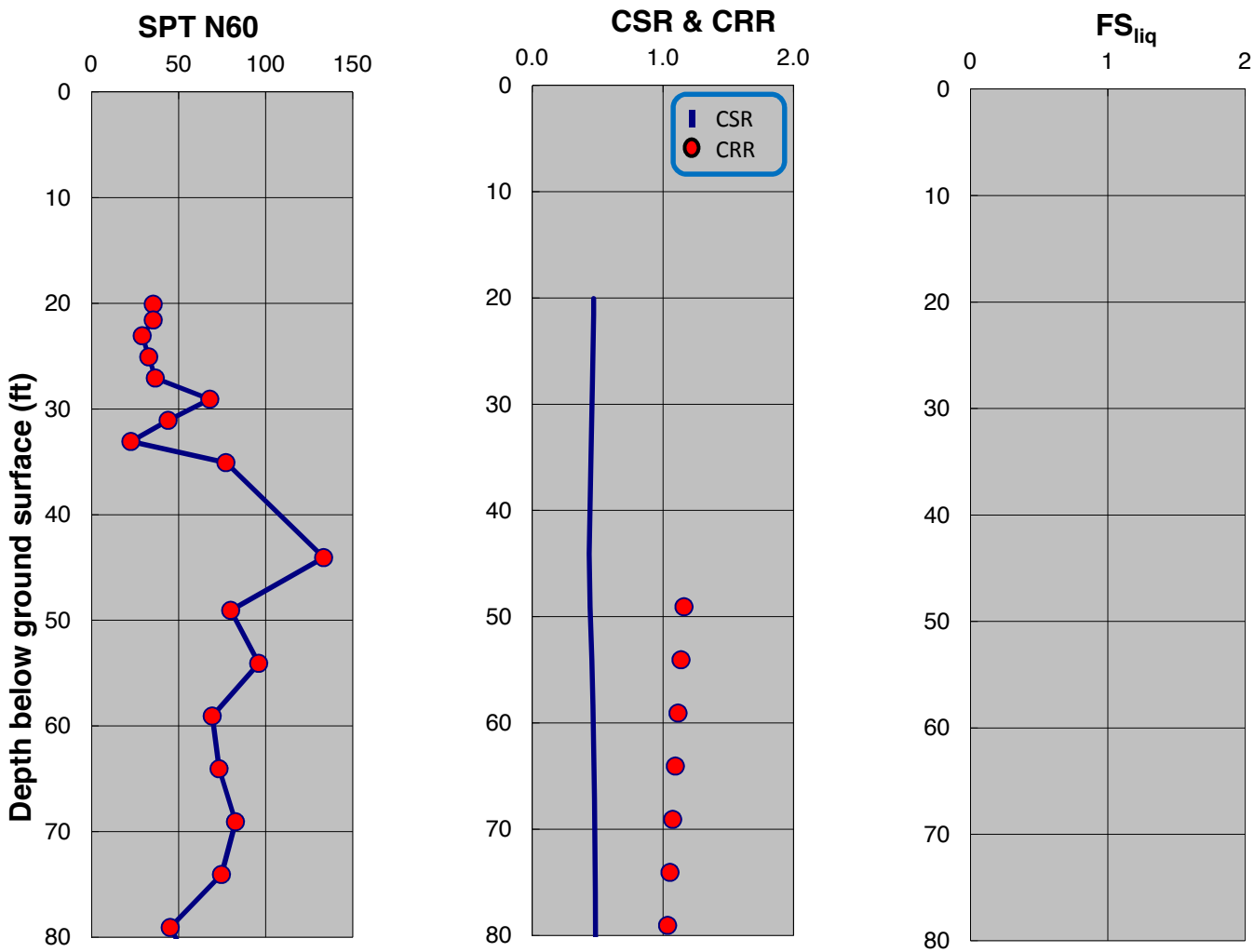
PLATE D.210



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-164 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

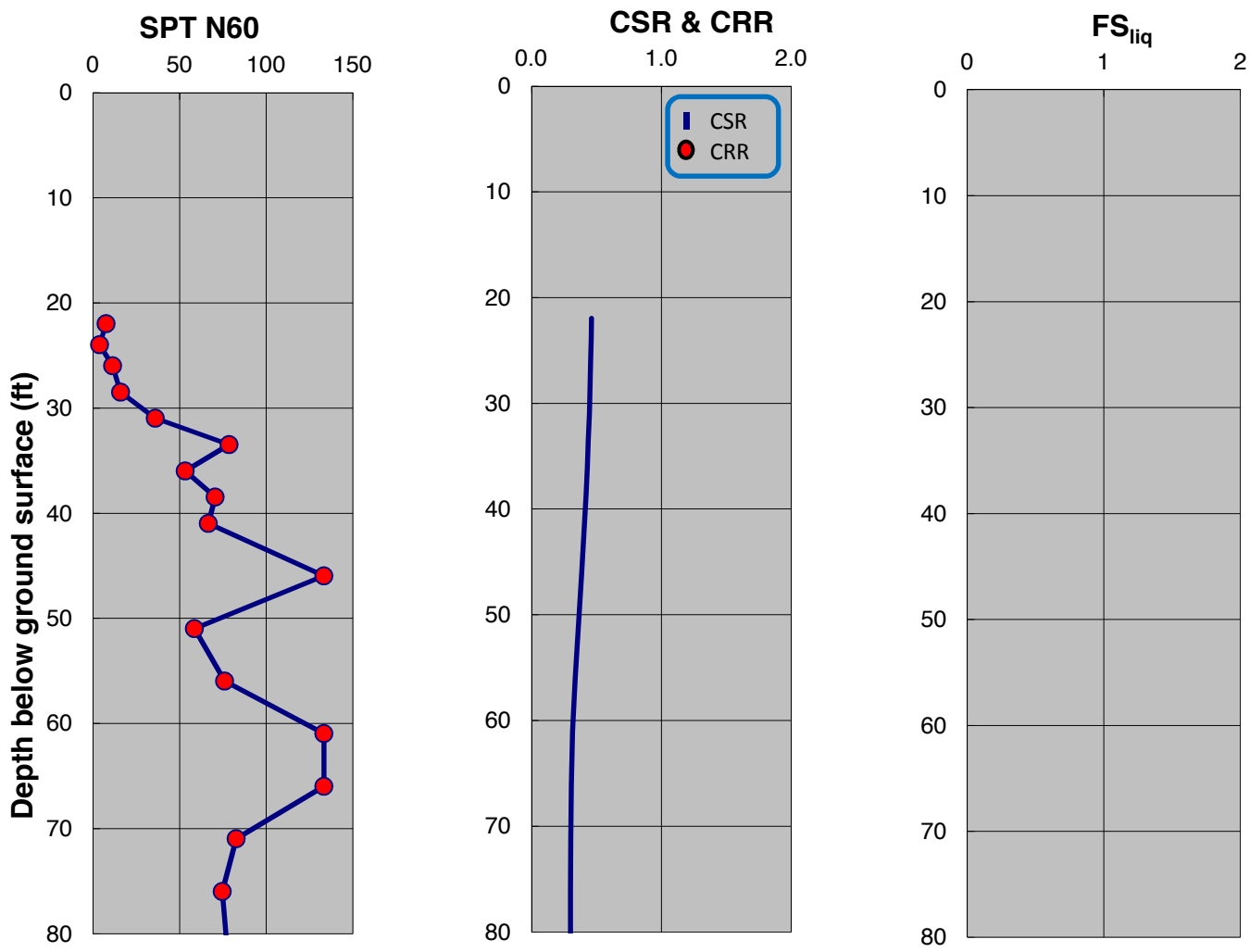
PLATE D.211



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-164 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

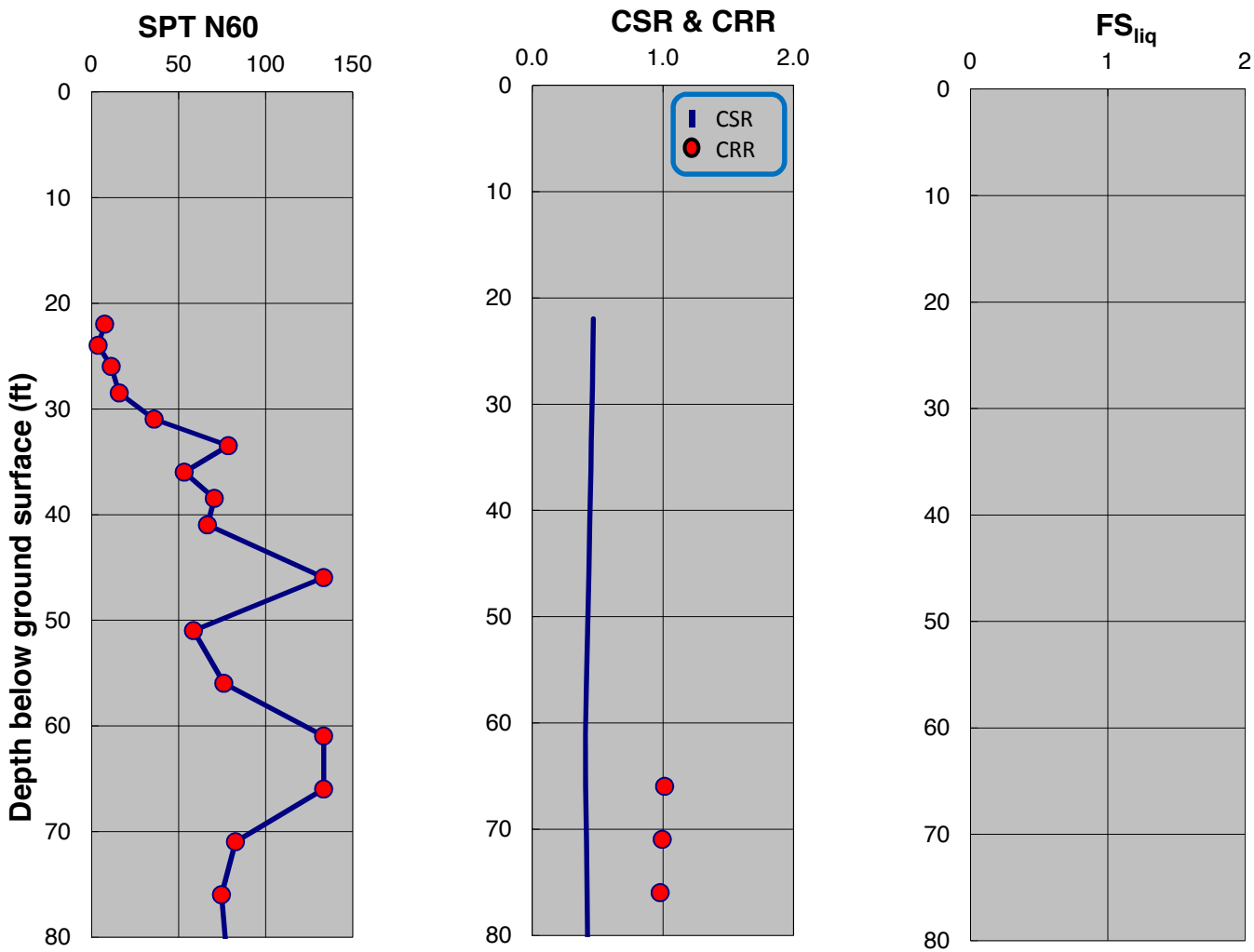
PLATE D.212



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-165 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

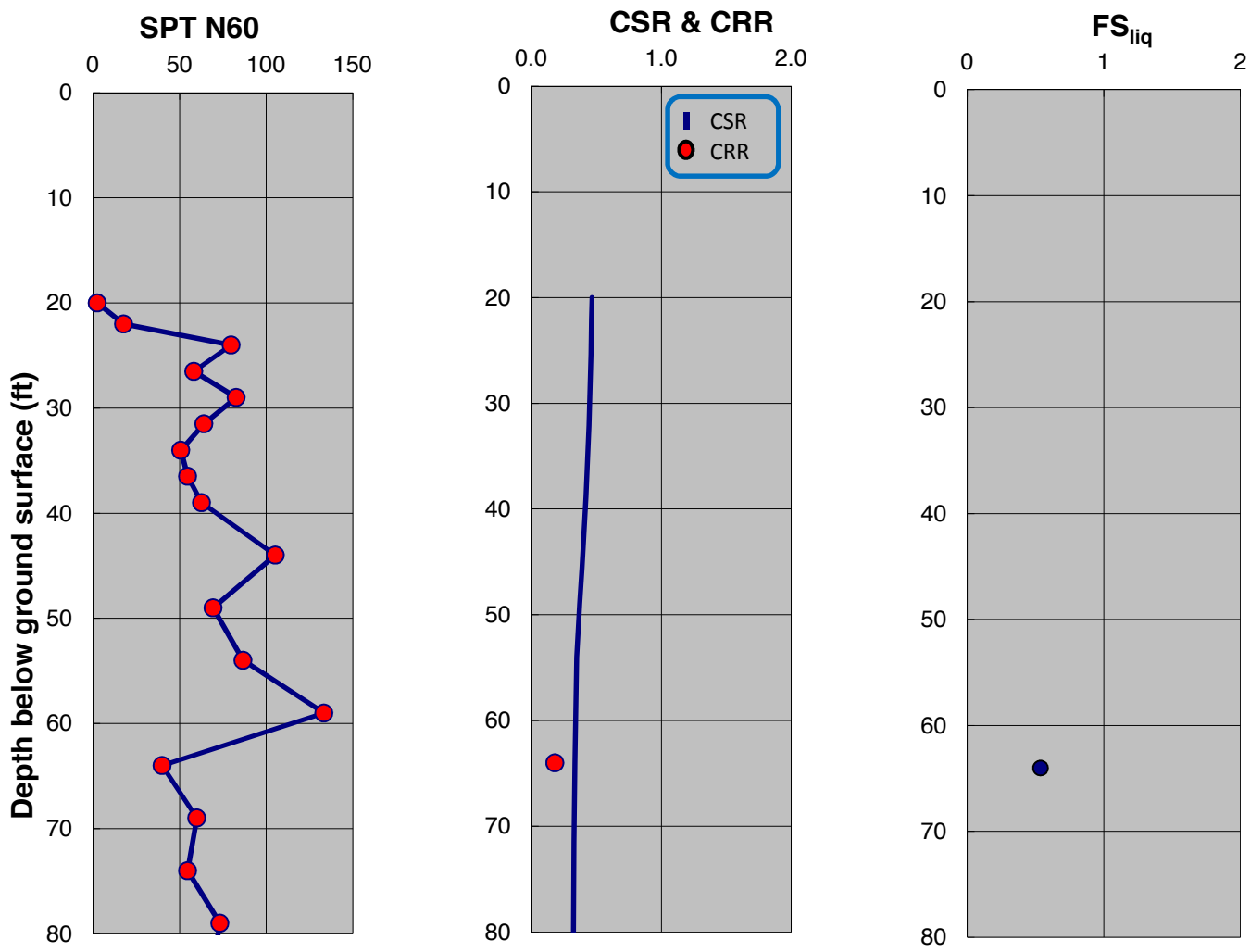
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.213



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-165 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

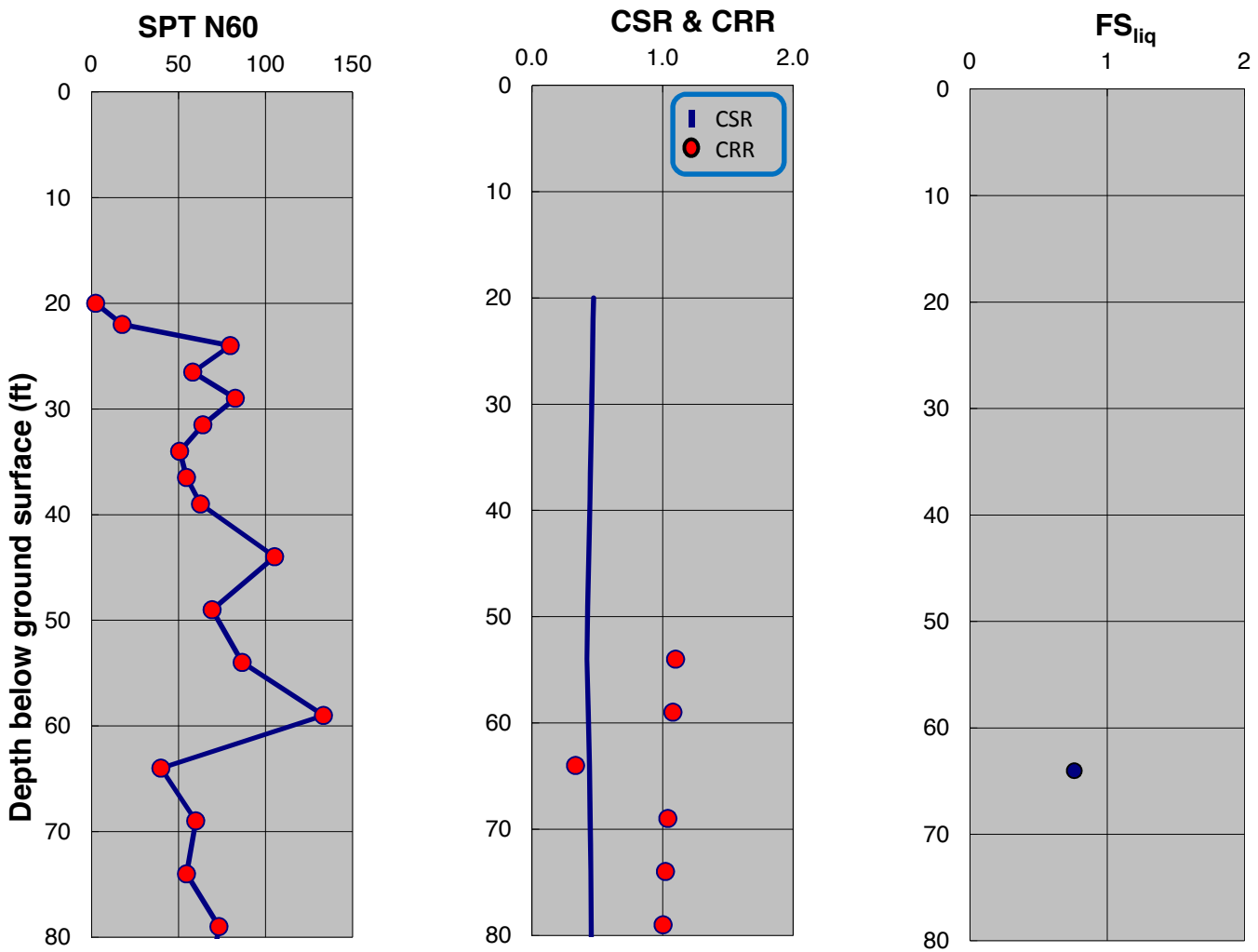
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-166 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

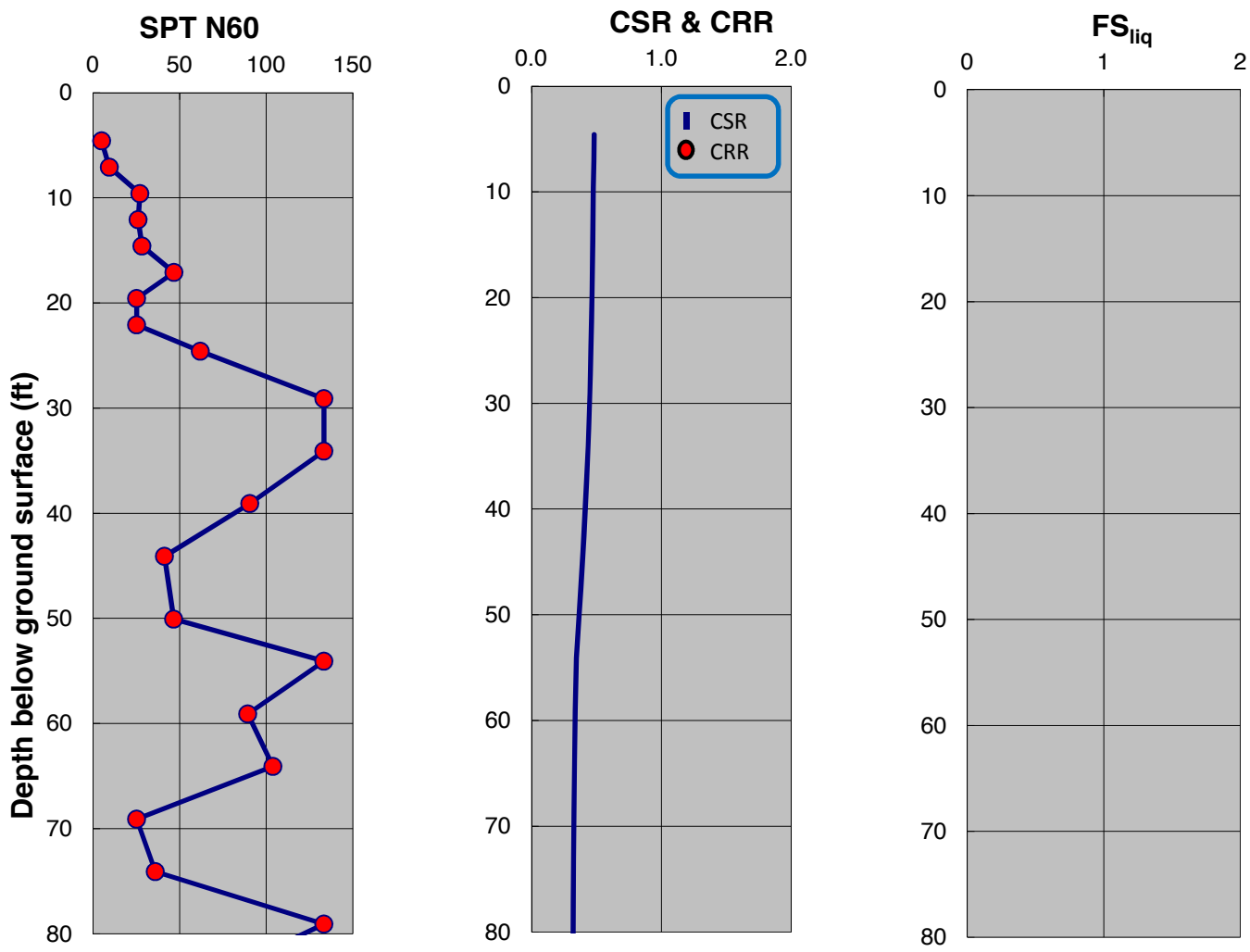
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.215



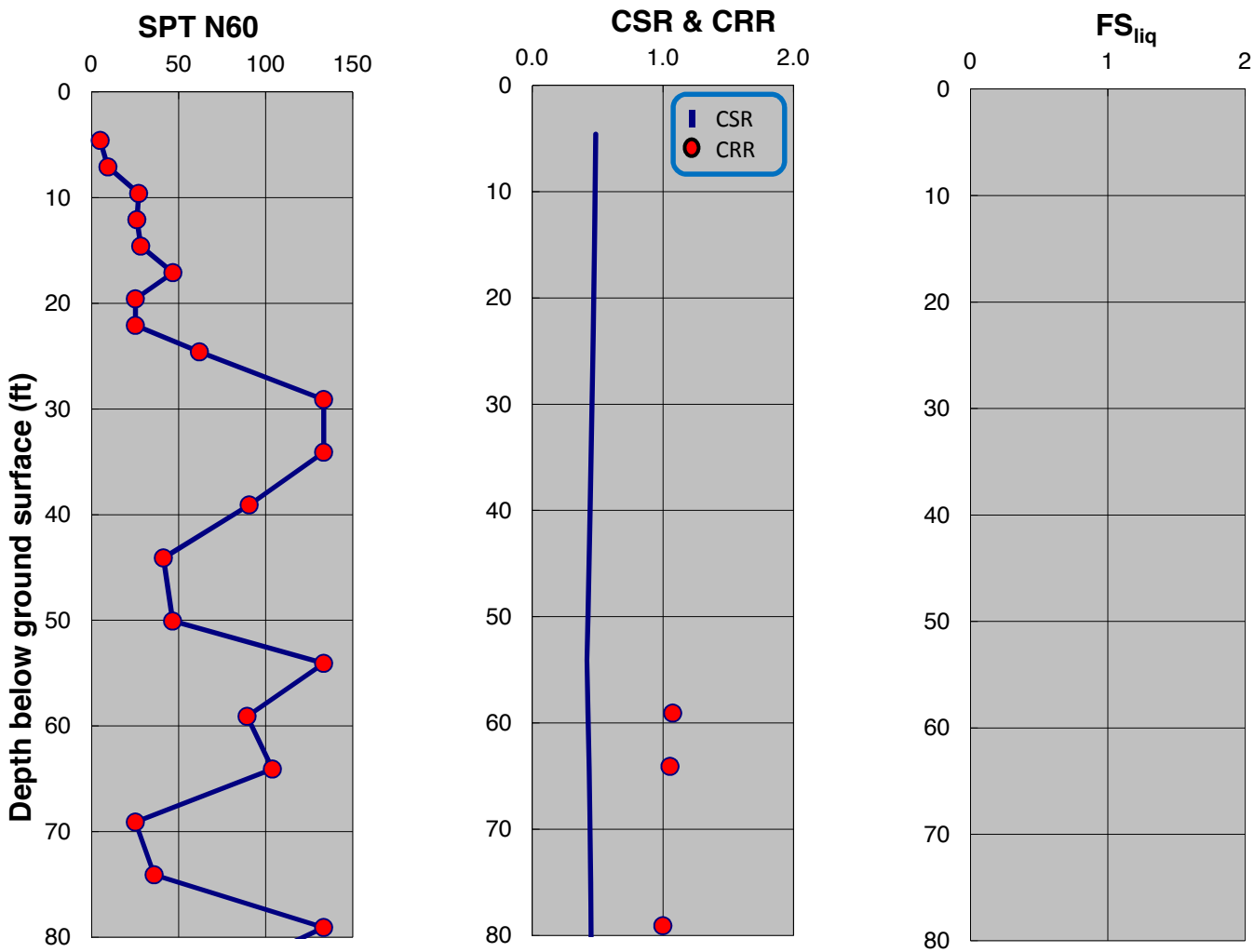
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-166 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



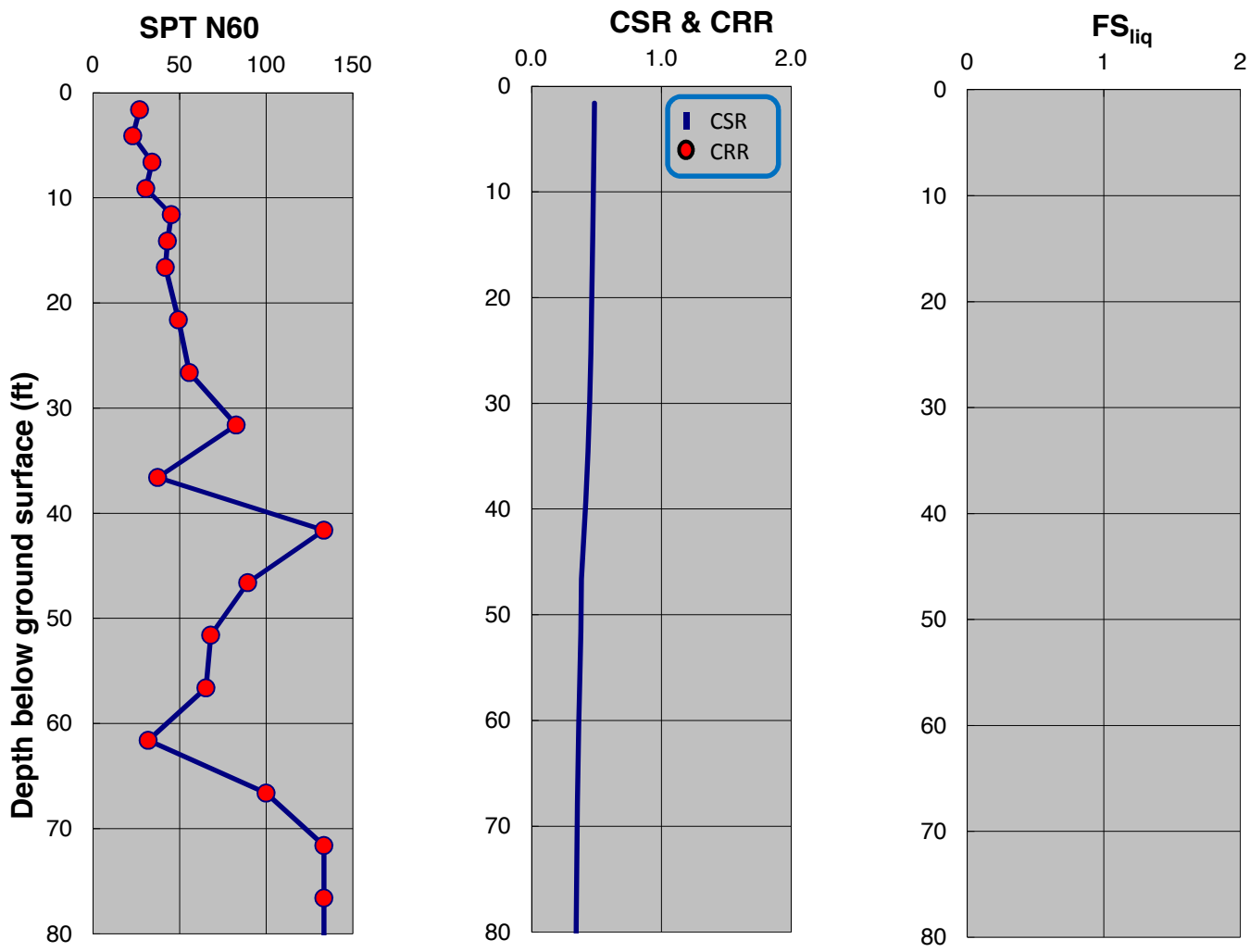
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-167 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



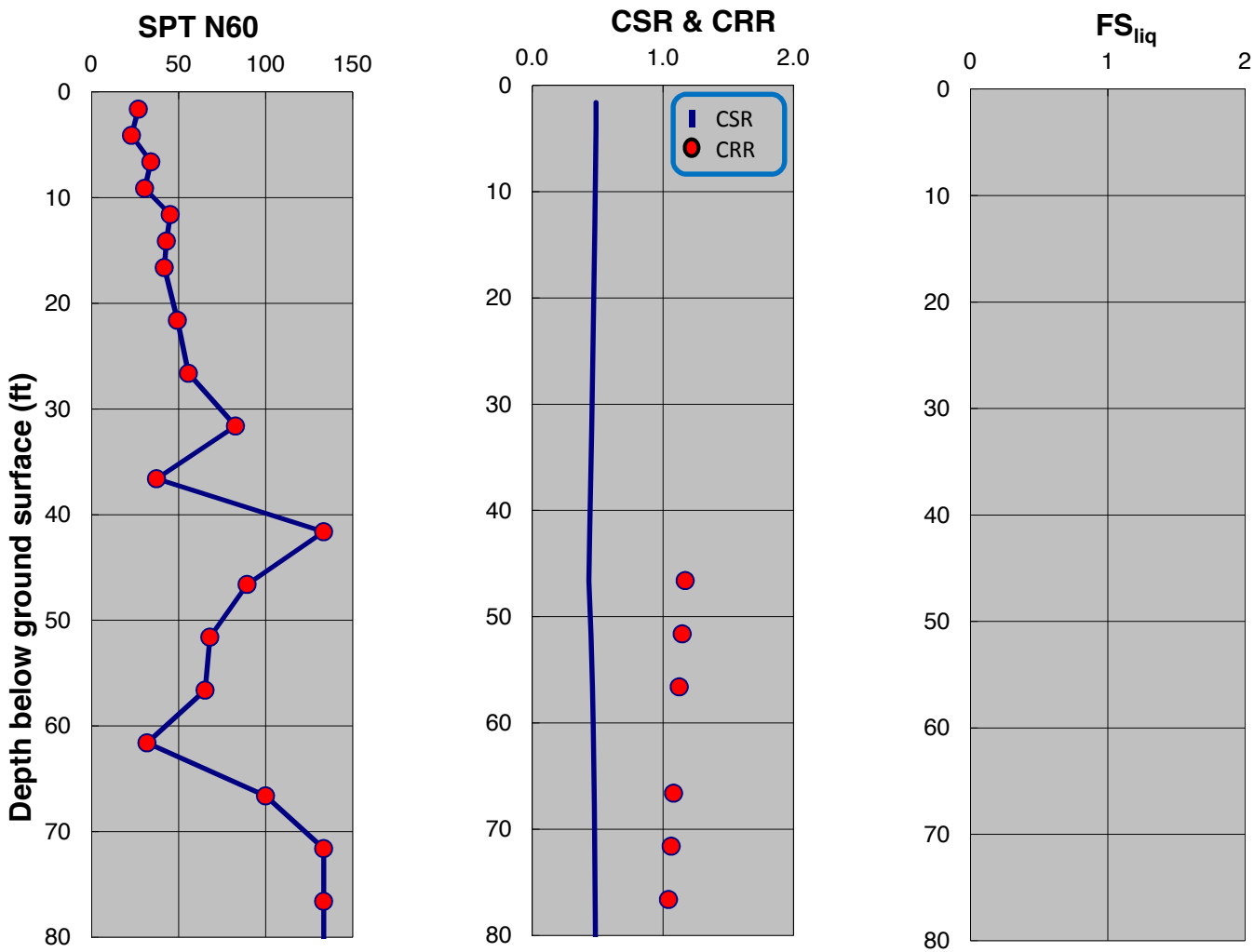
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-167 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



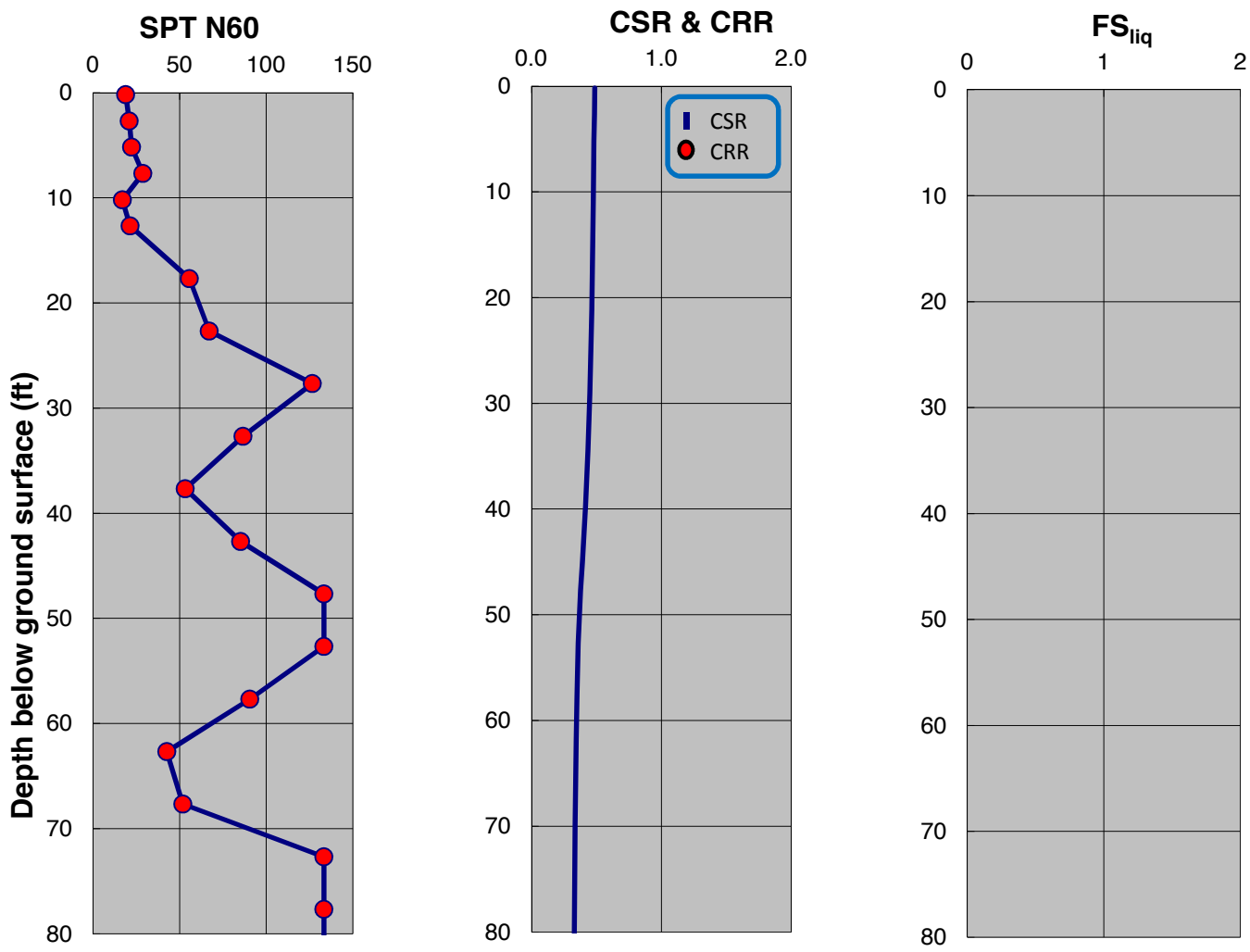
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-168 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-168 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

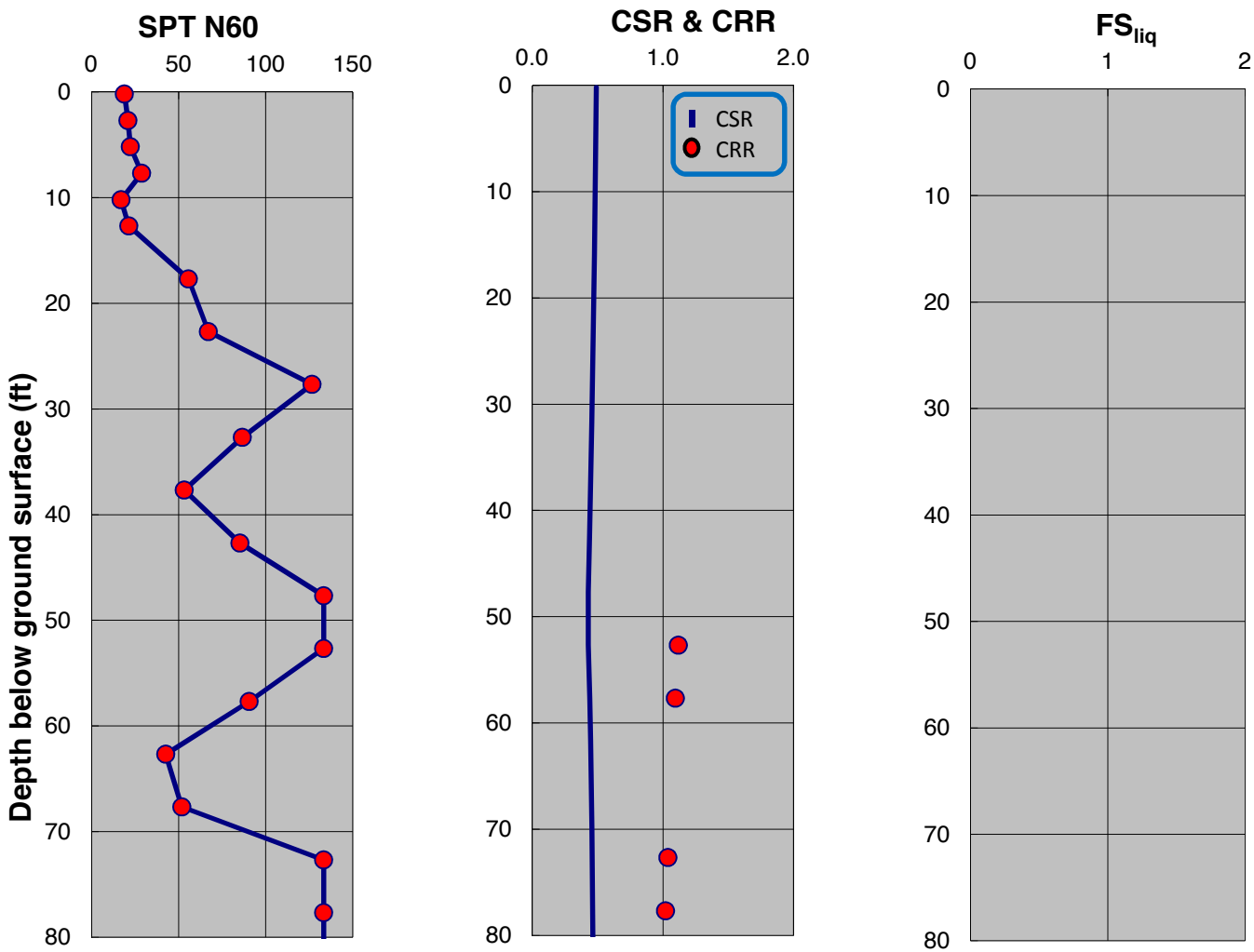
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-169 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

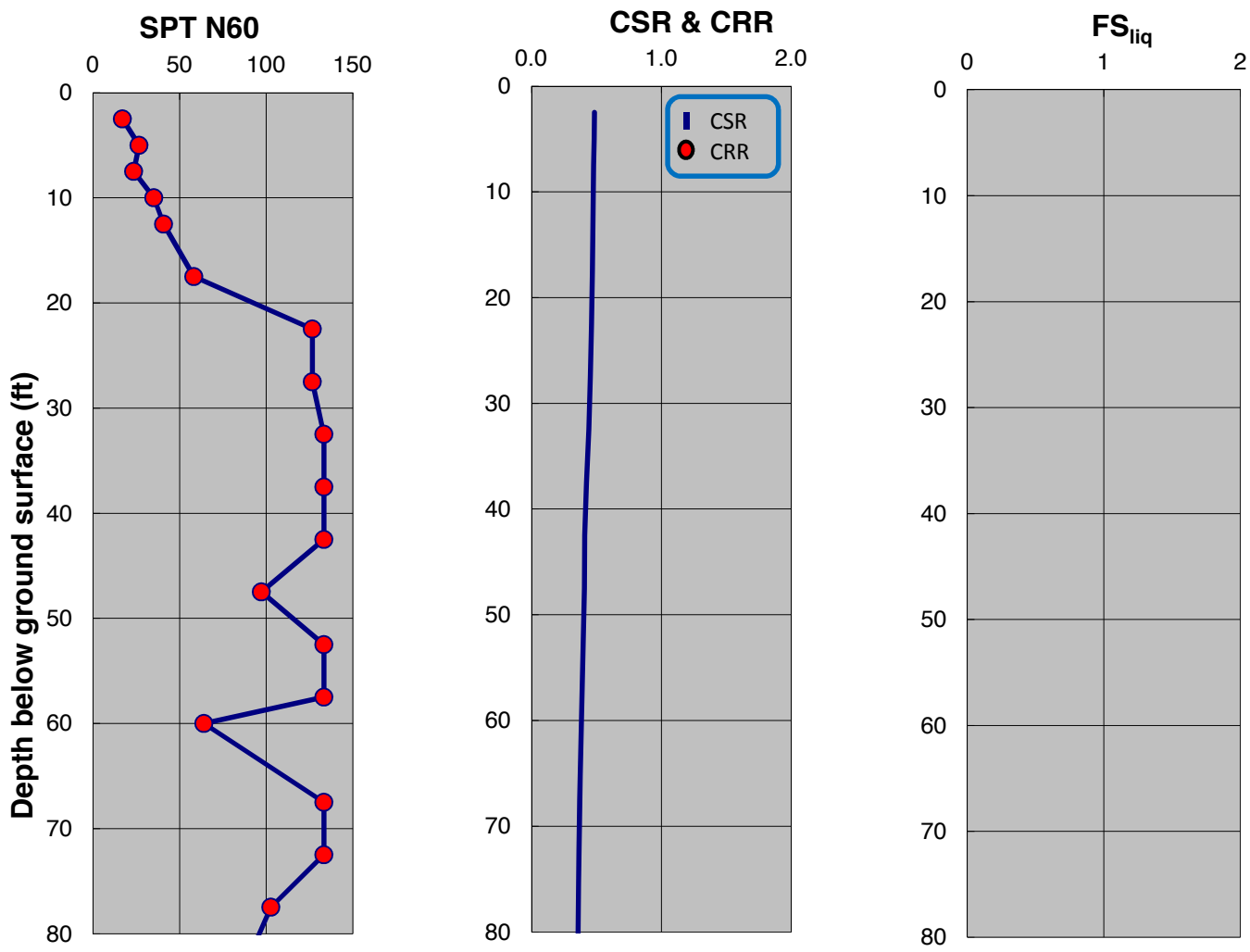
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.221



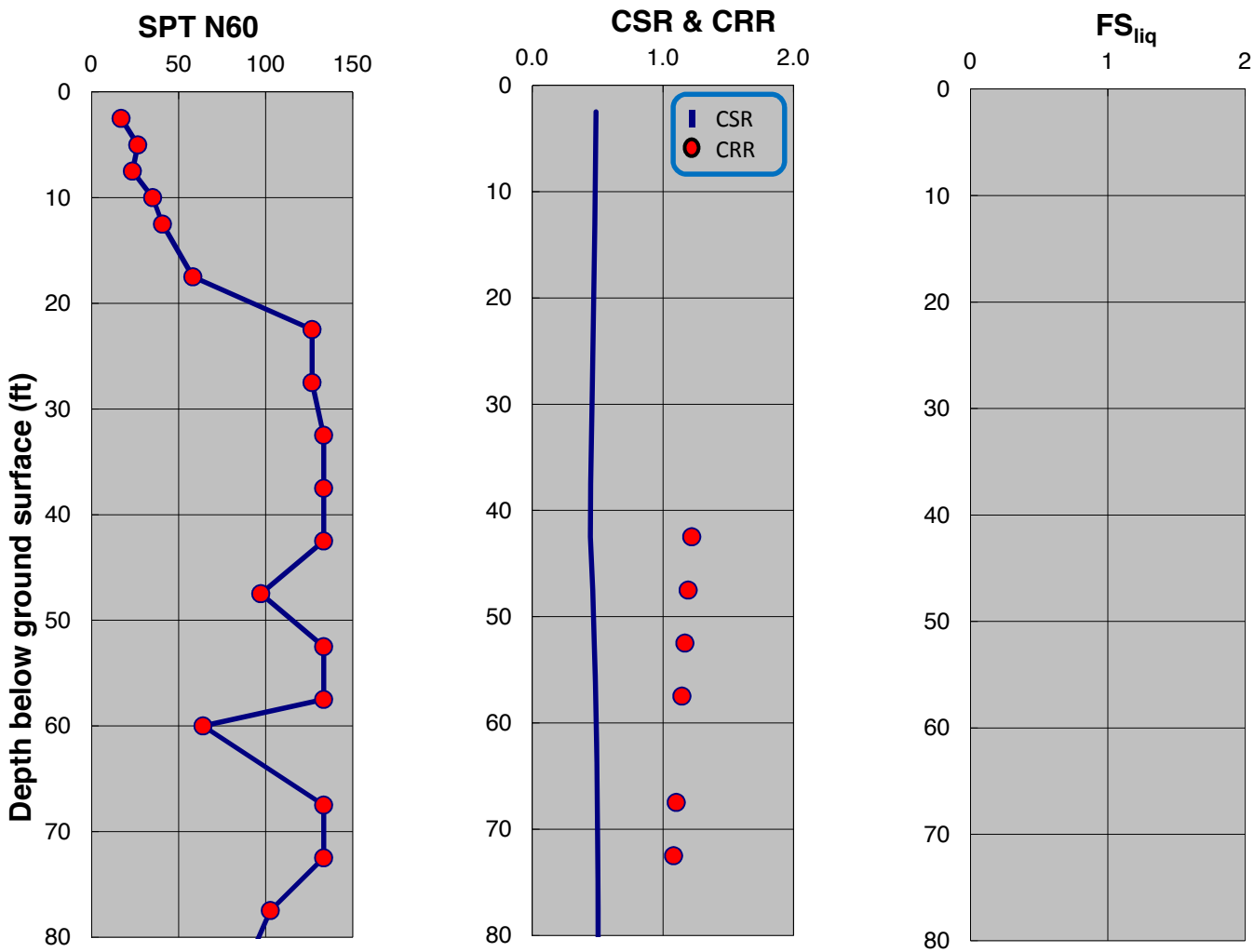
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-169 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



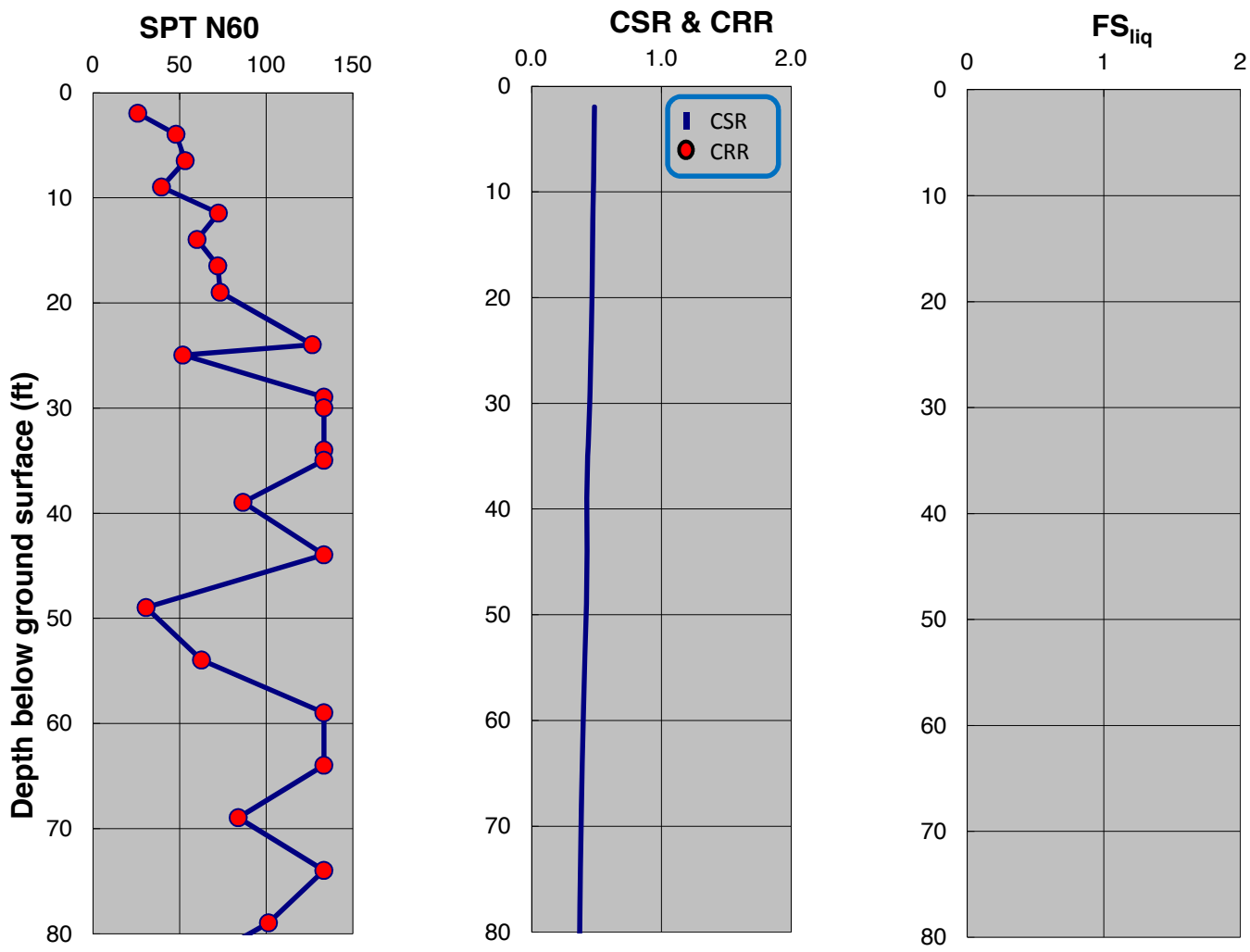
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-170 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



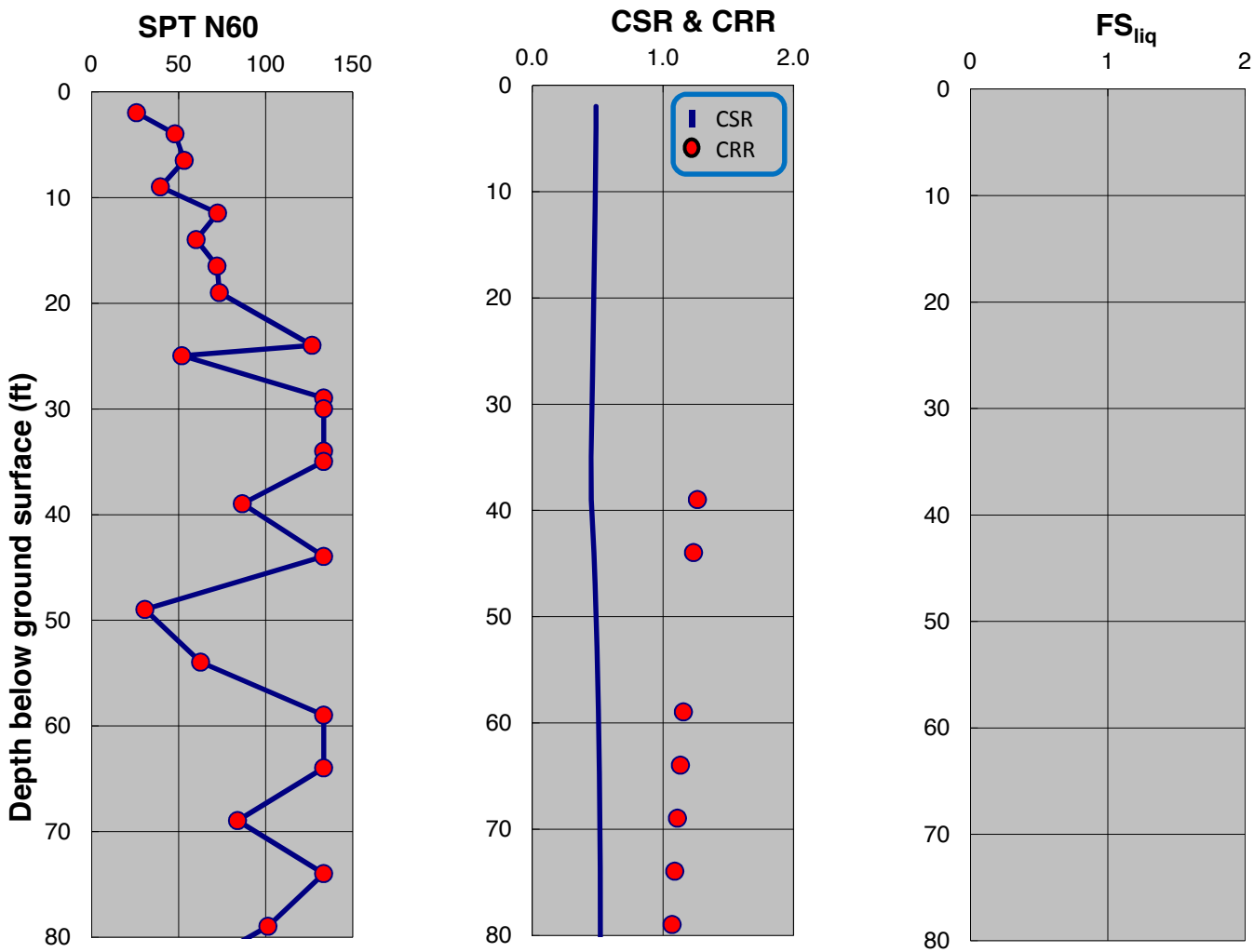
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-170 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



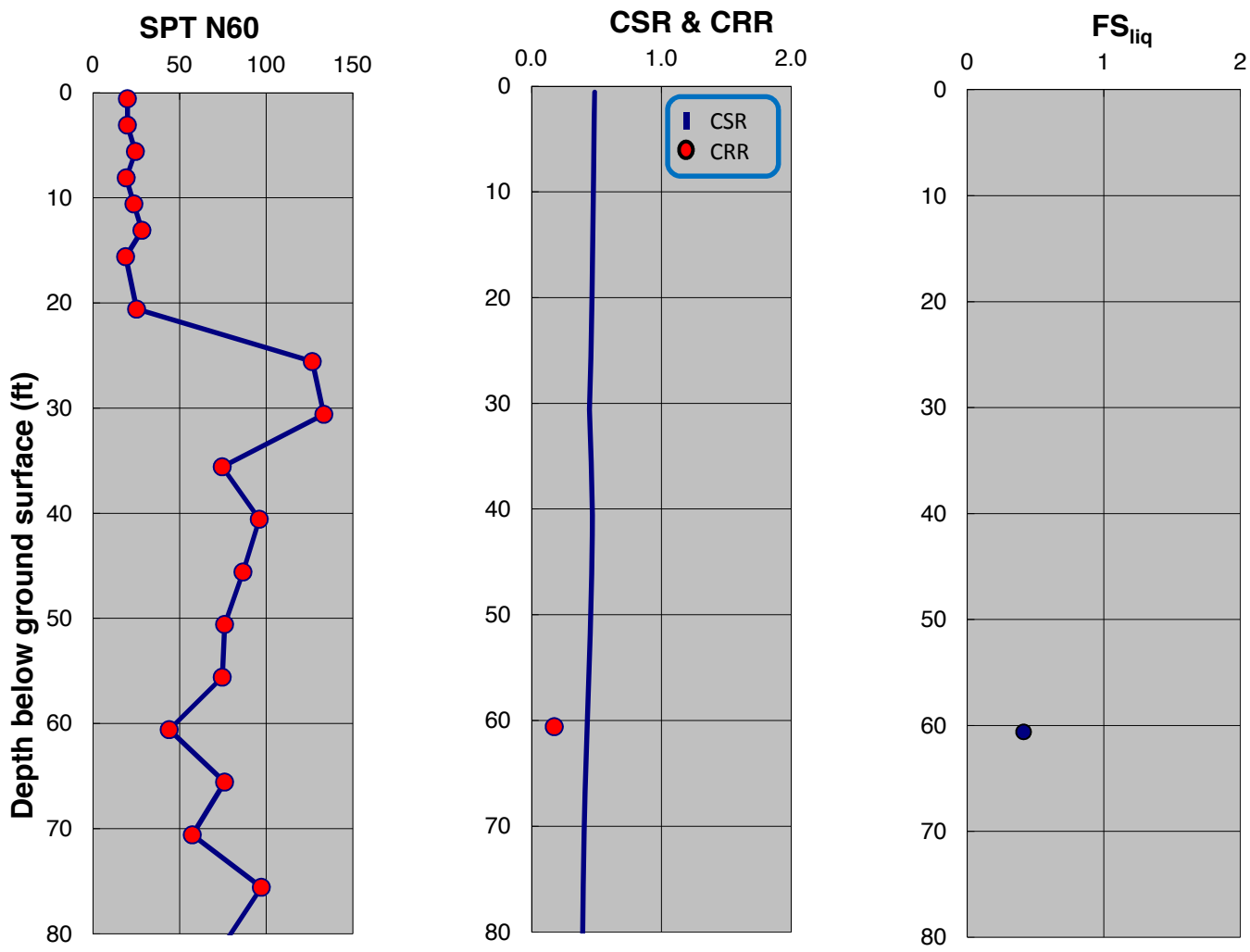
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-171 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



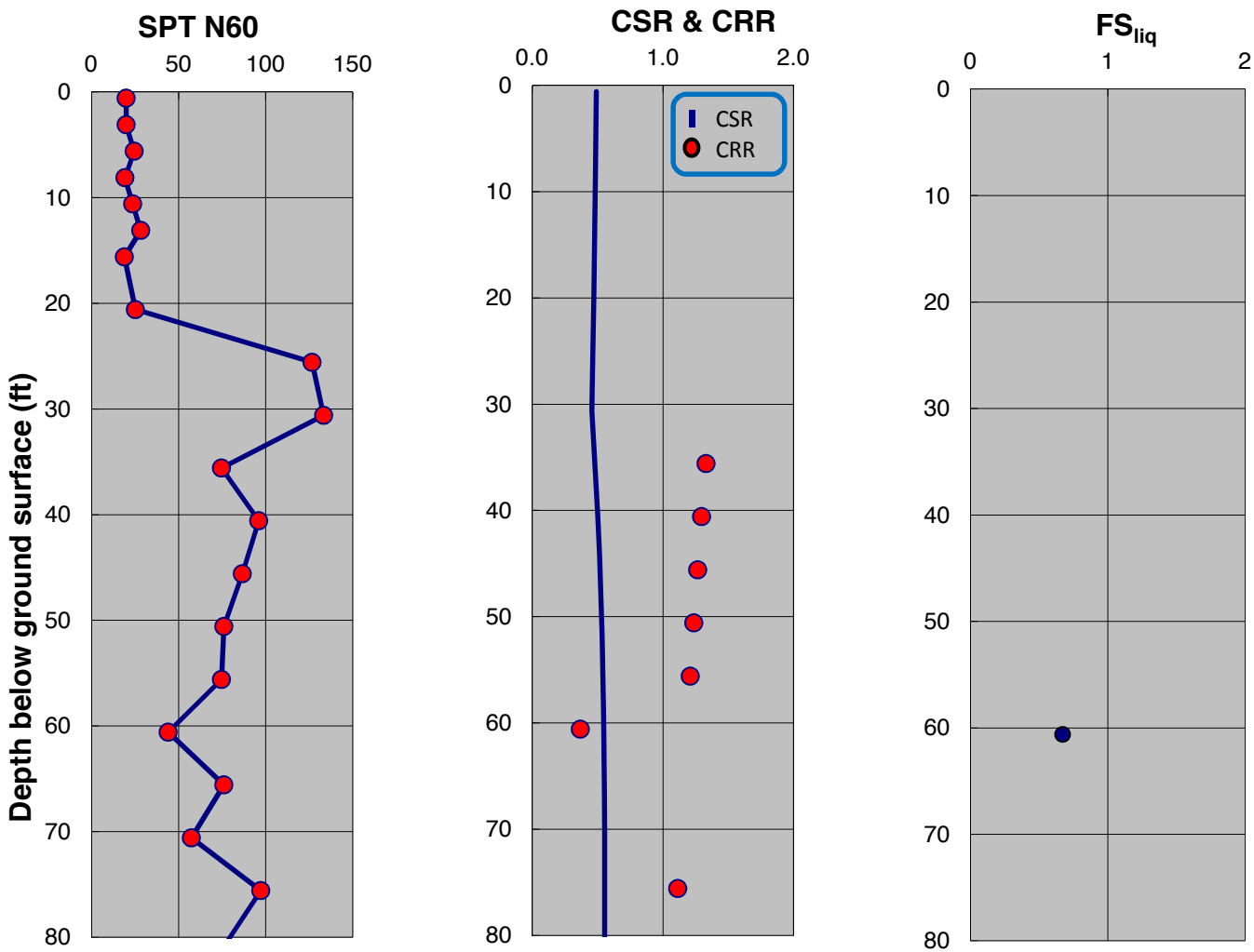
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-171 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



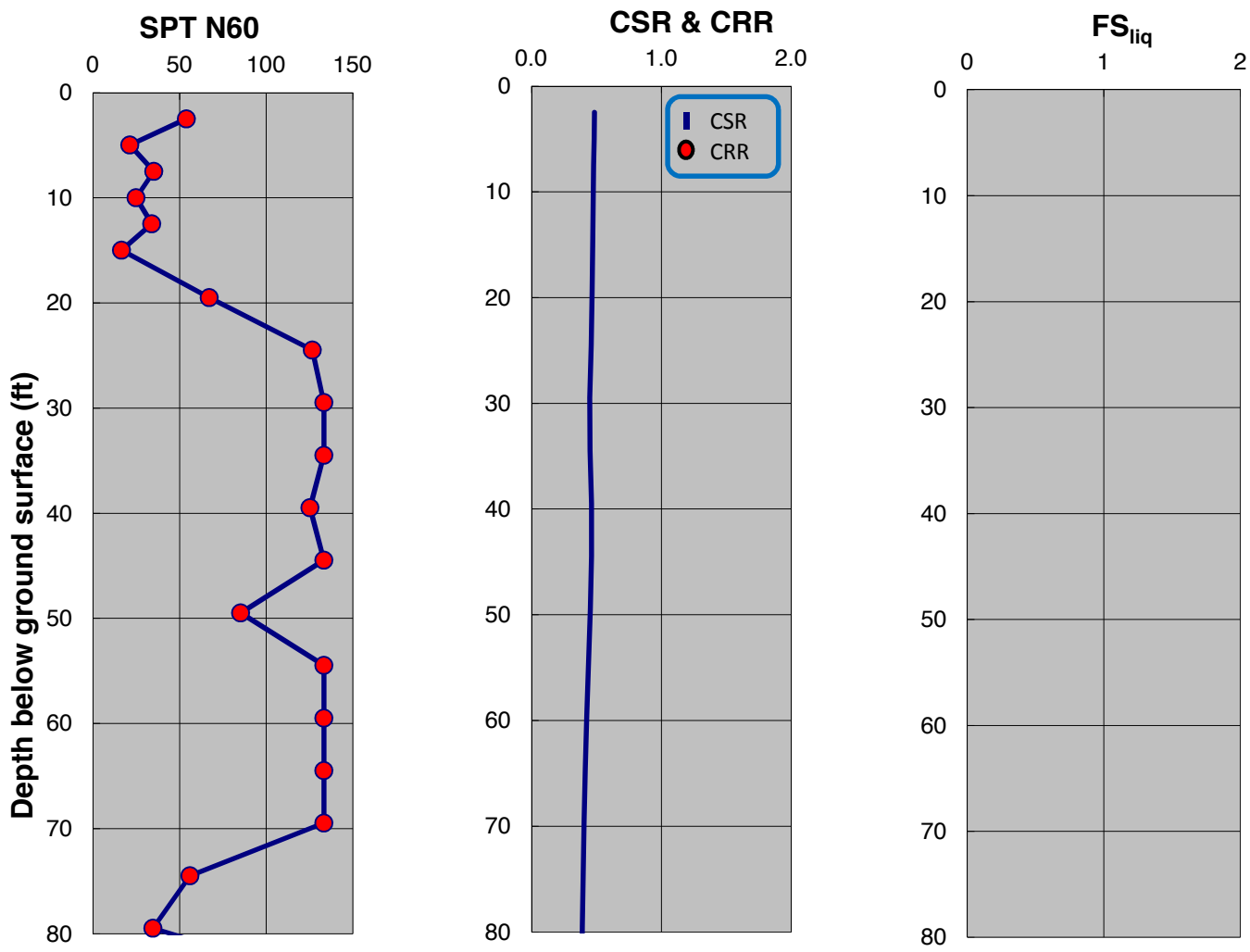
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-172 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



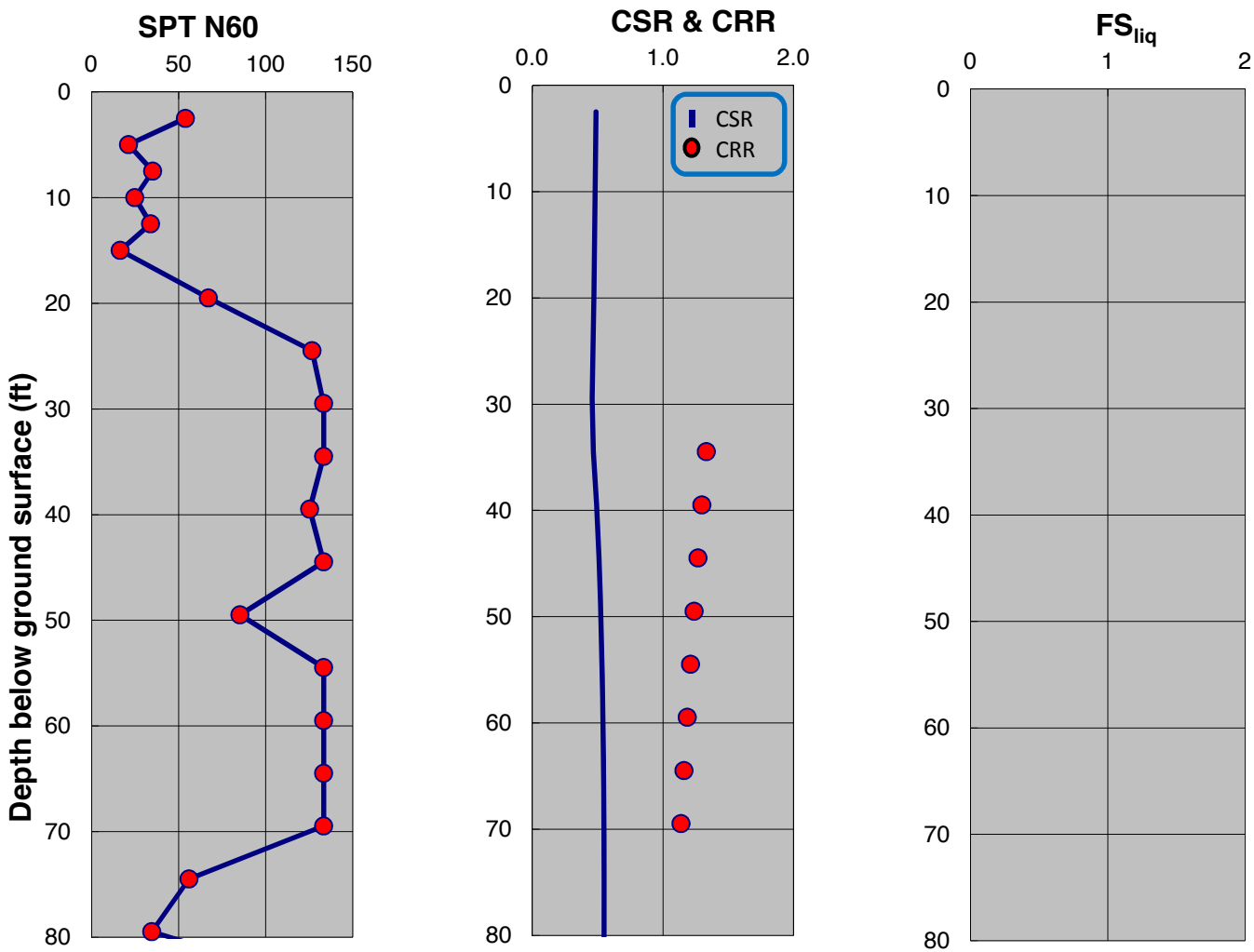
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-172 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-173 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

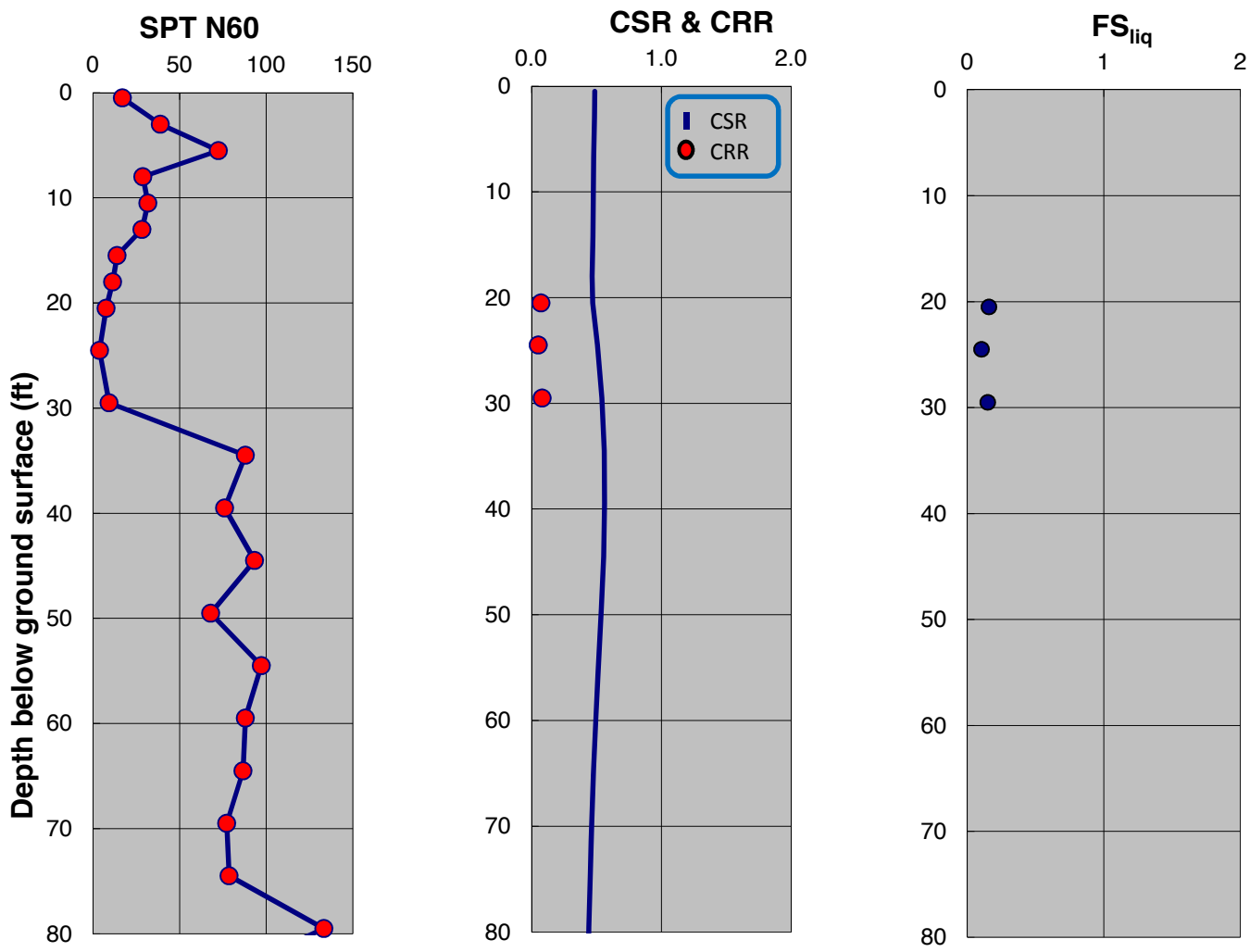
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-173 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

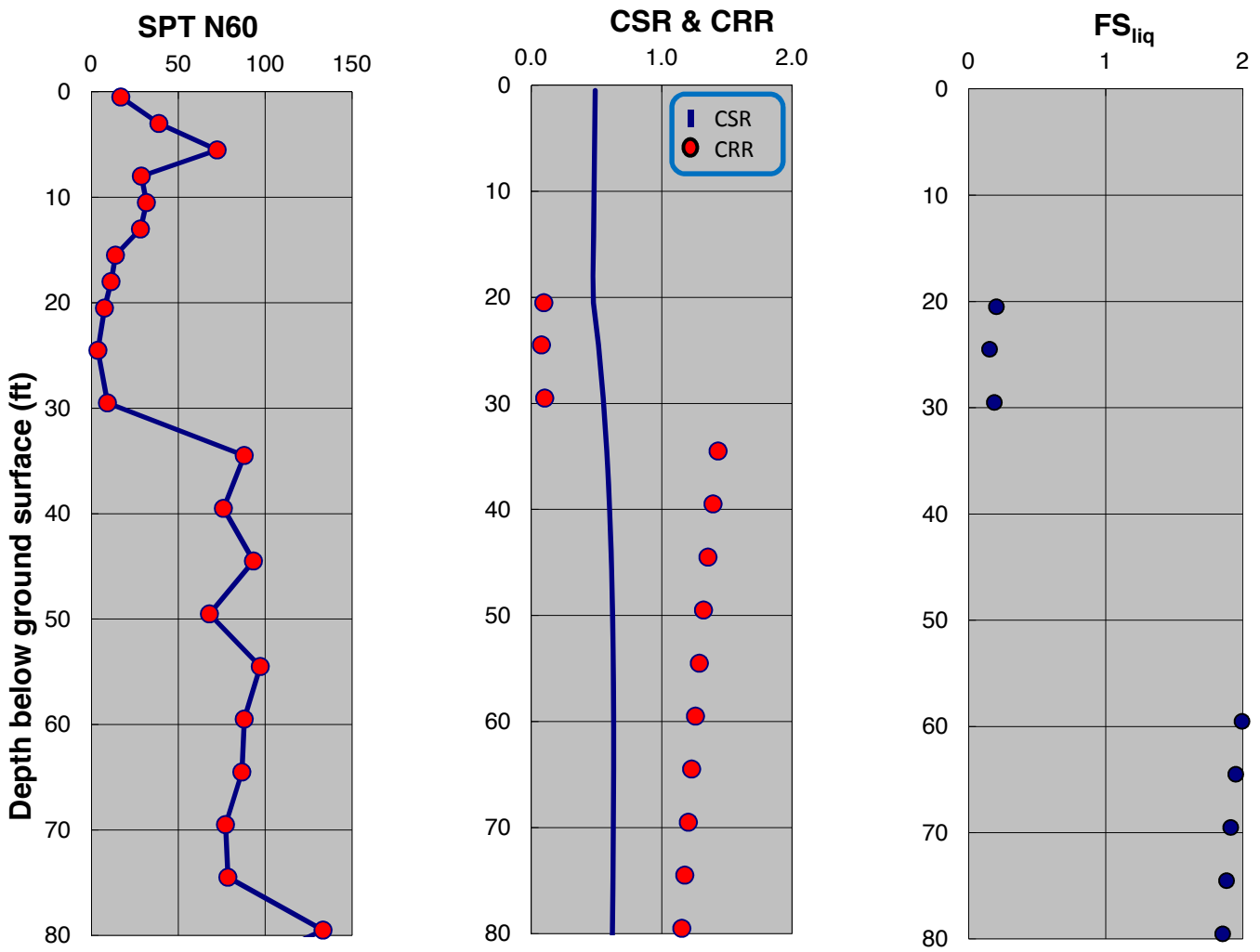
PLATE D.230



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-176 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

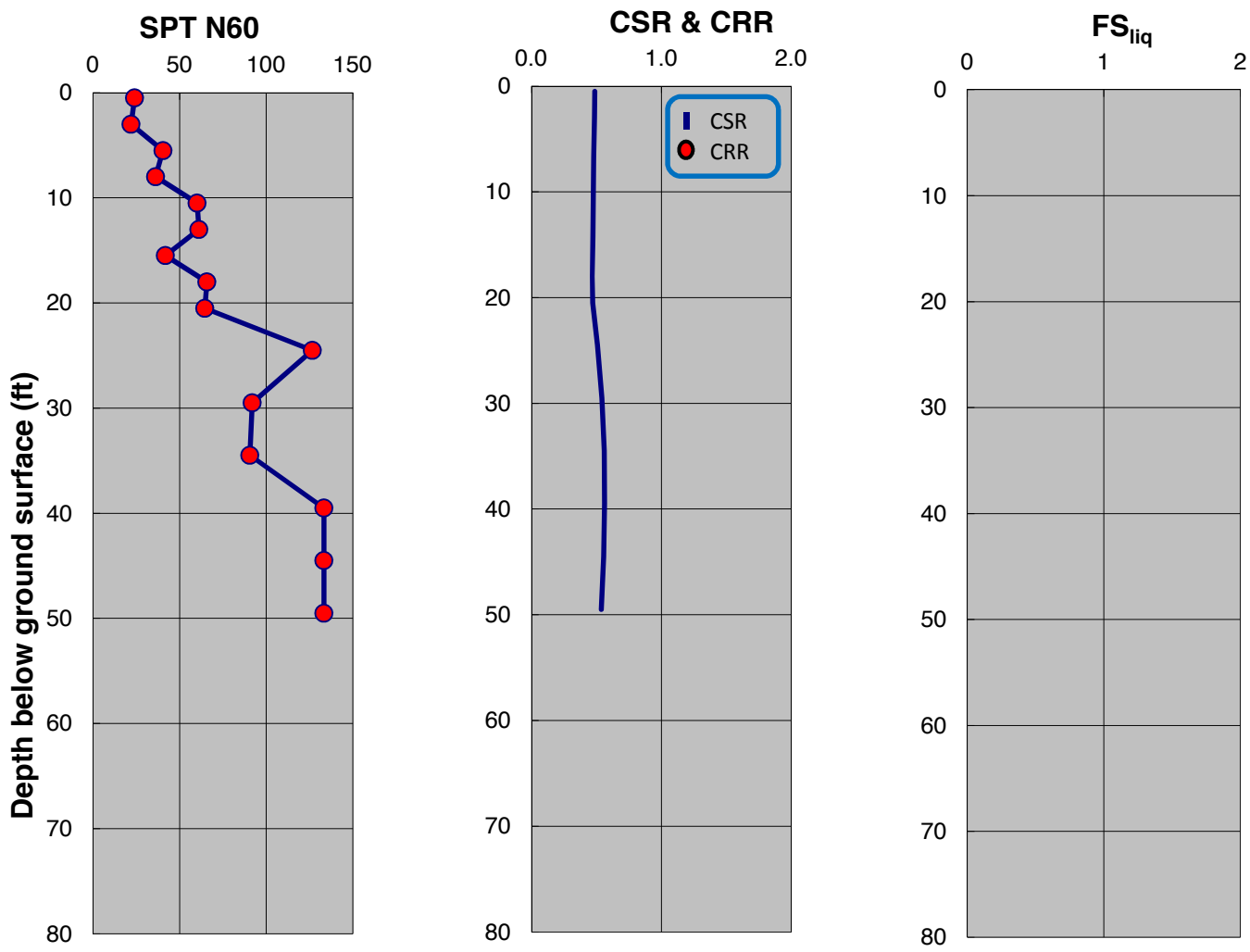
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.231



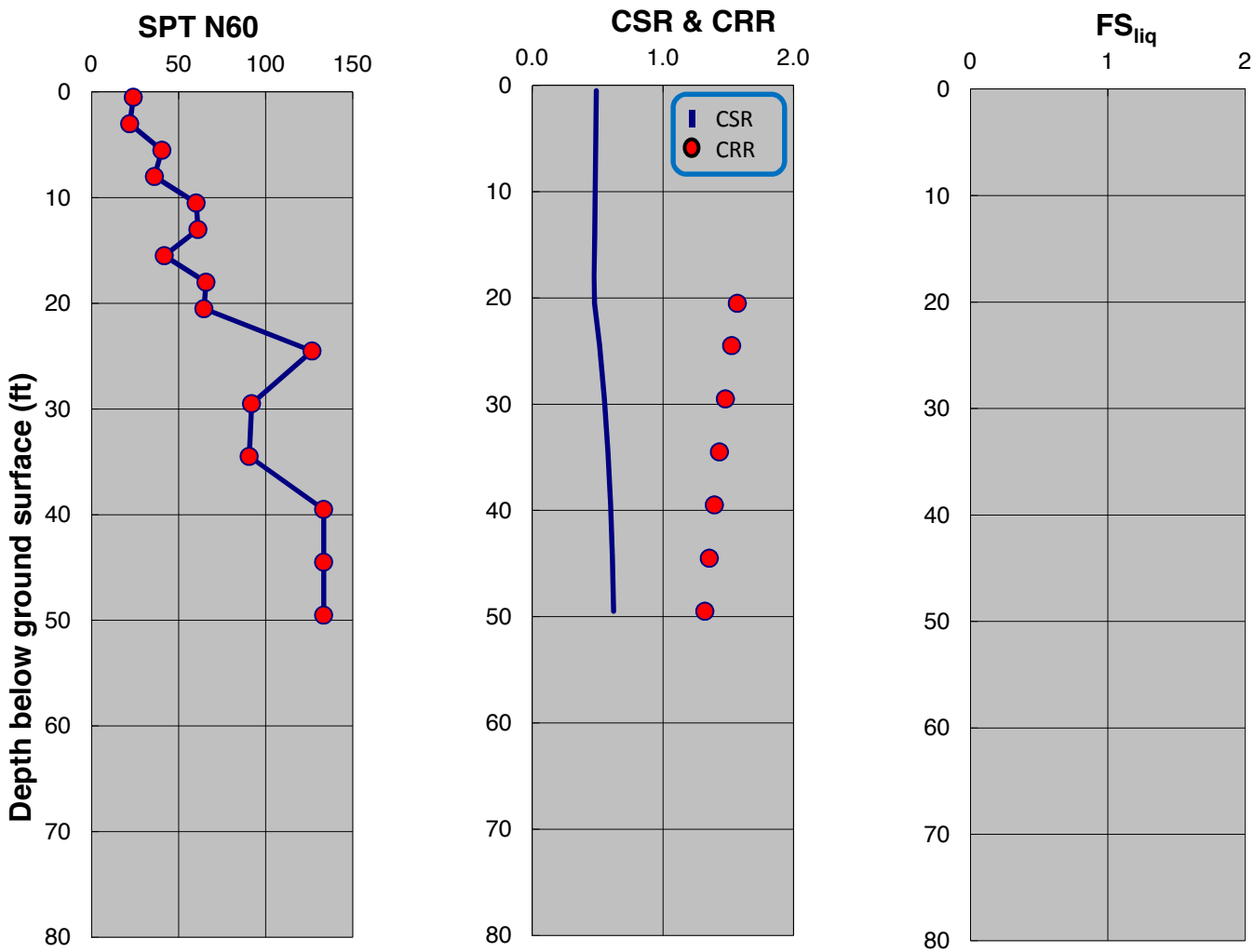
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-176 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



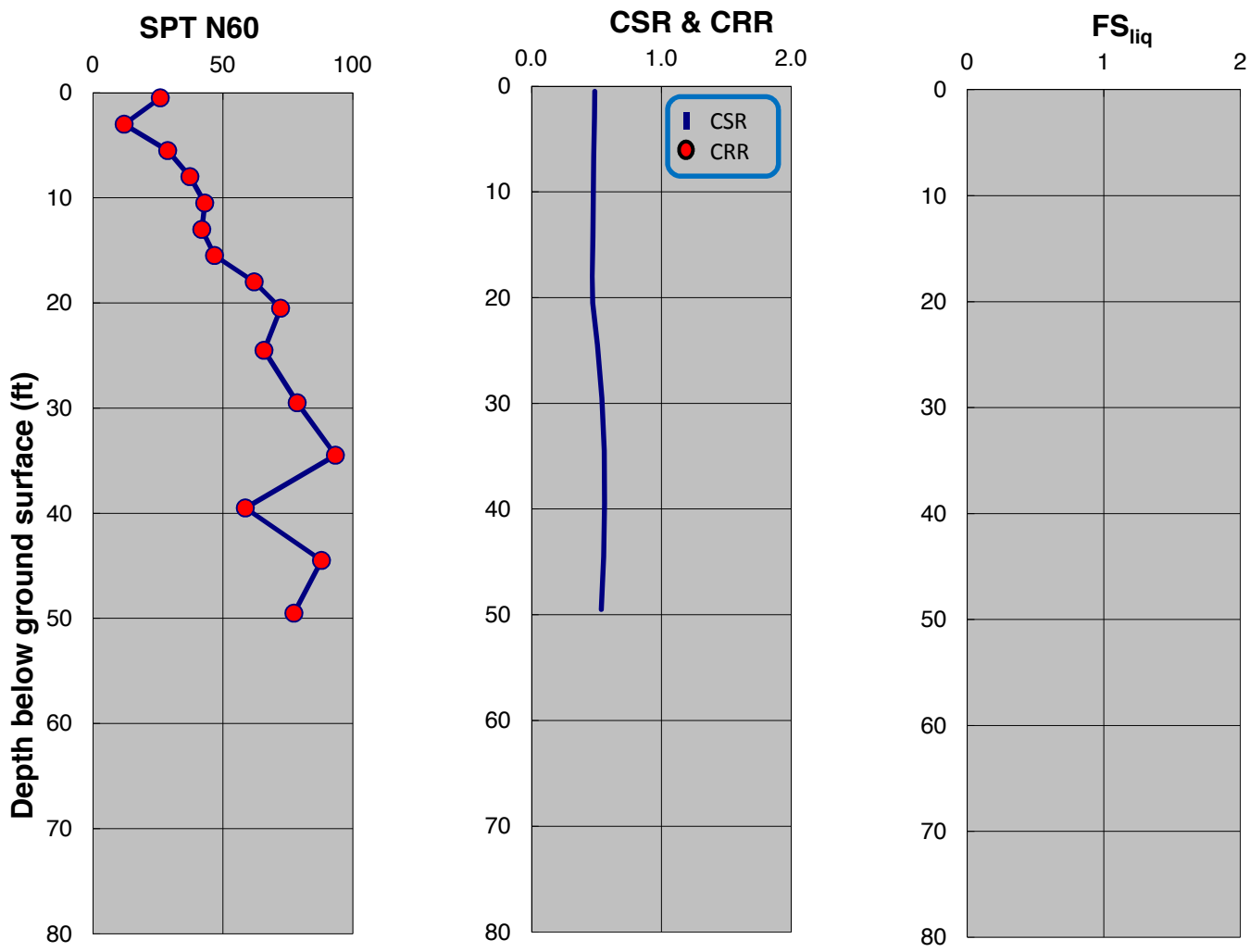
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-177 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-177 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

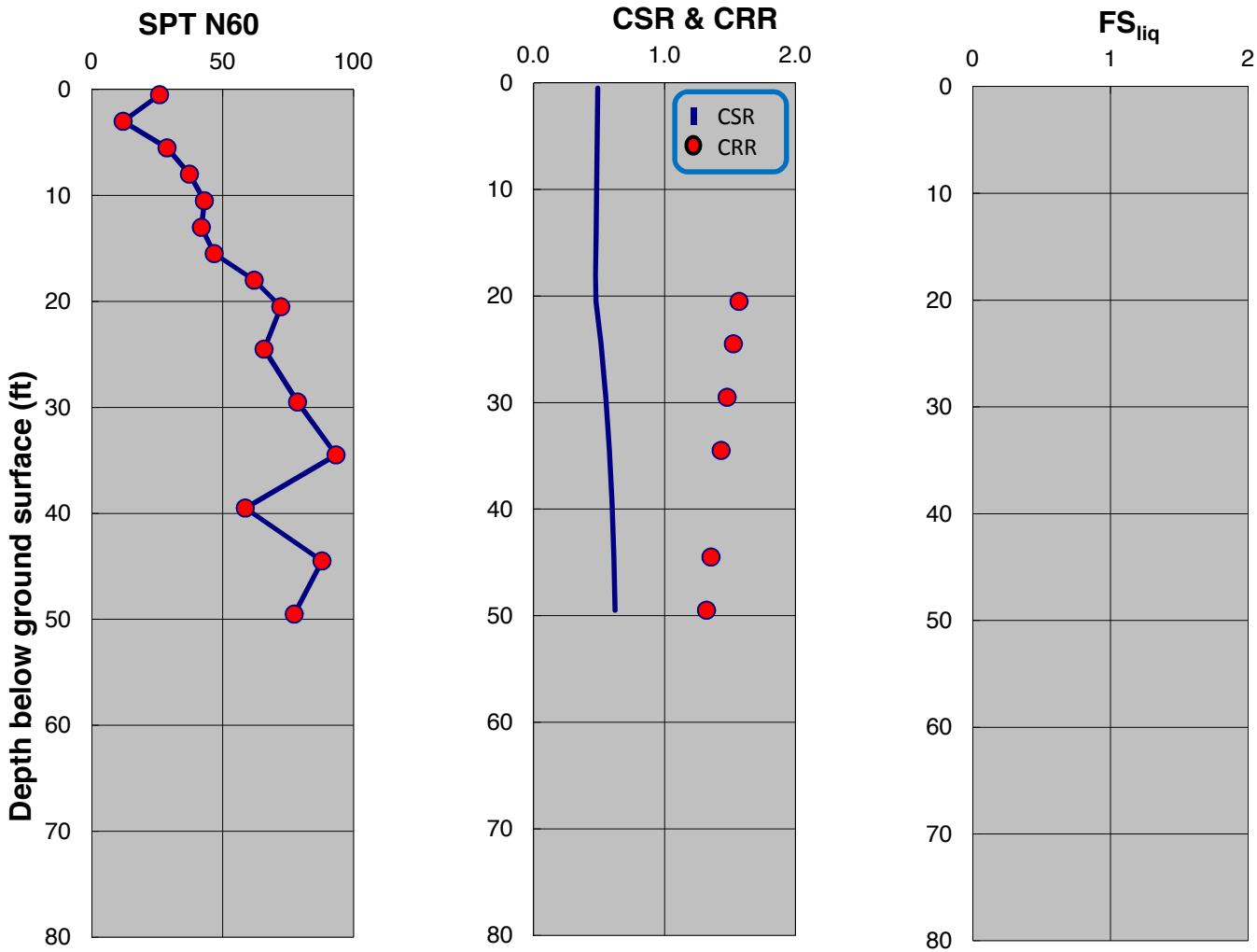
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-178 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

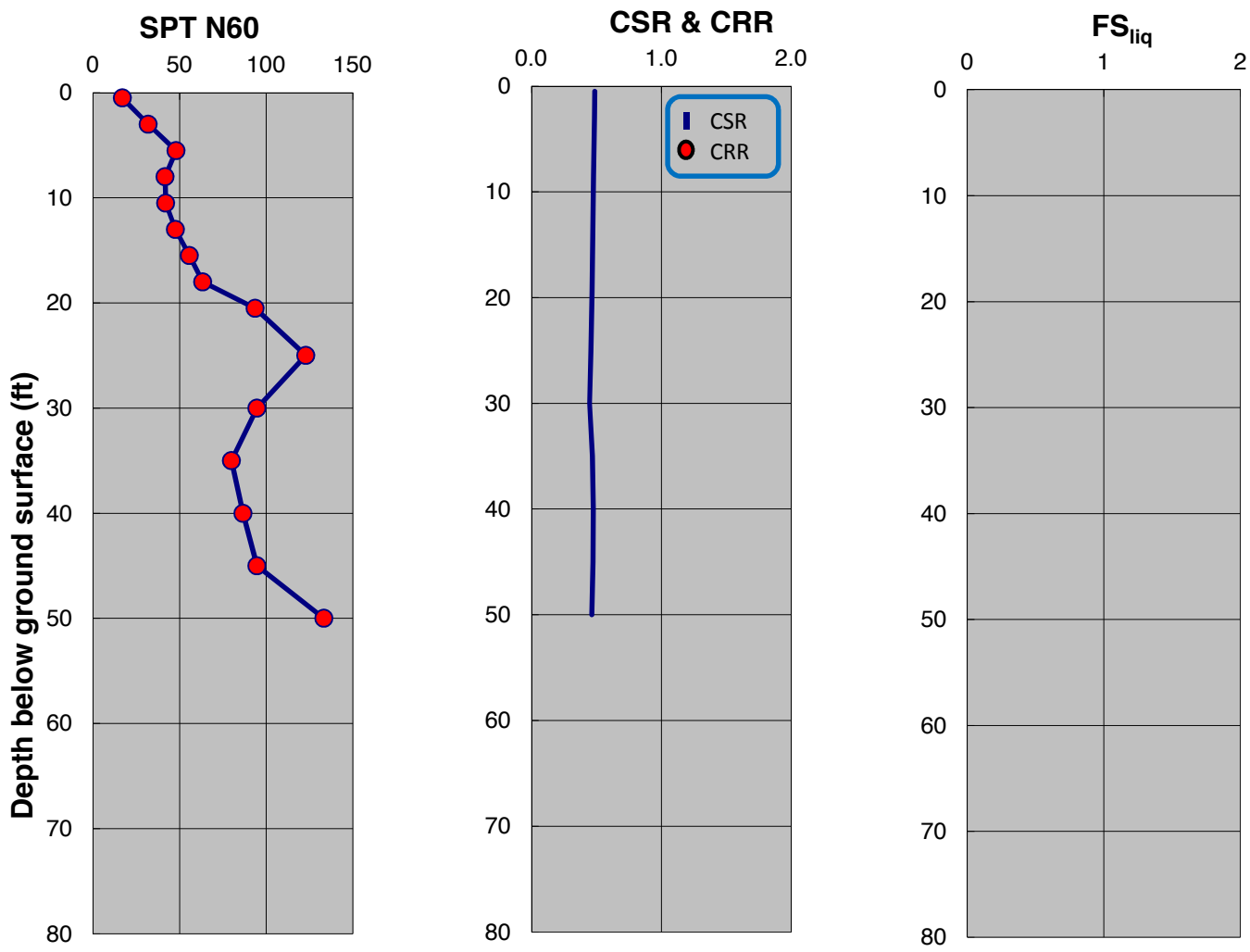
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.235



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-178 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

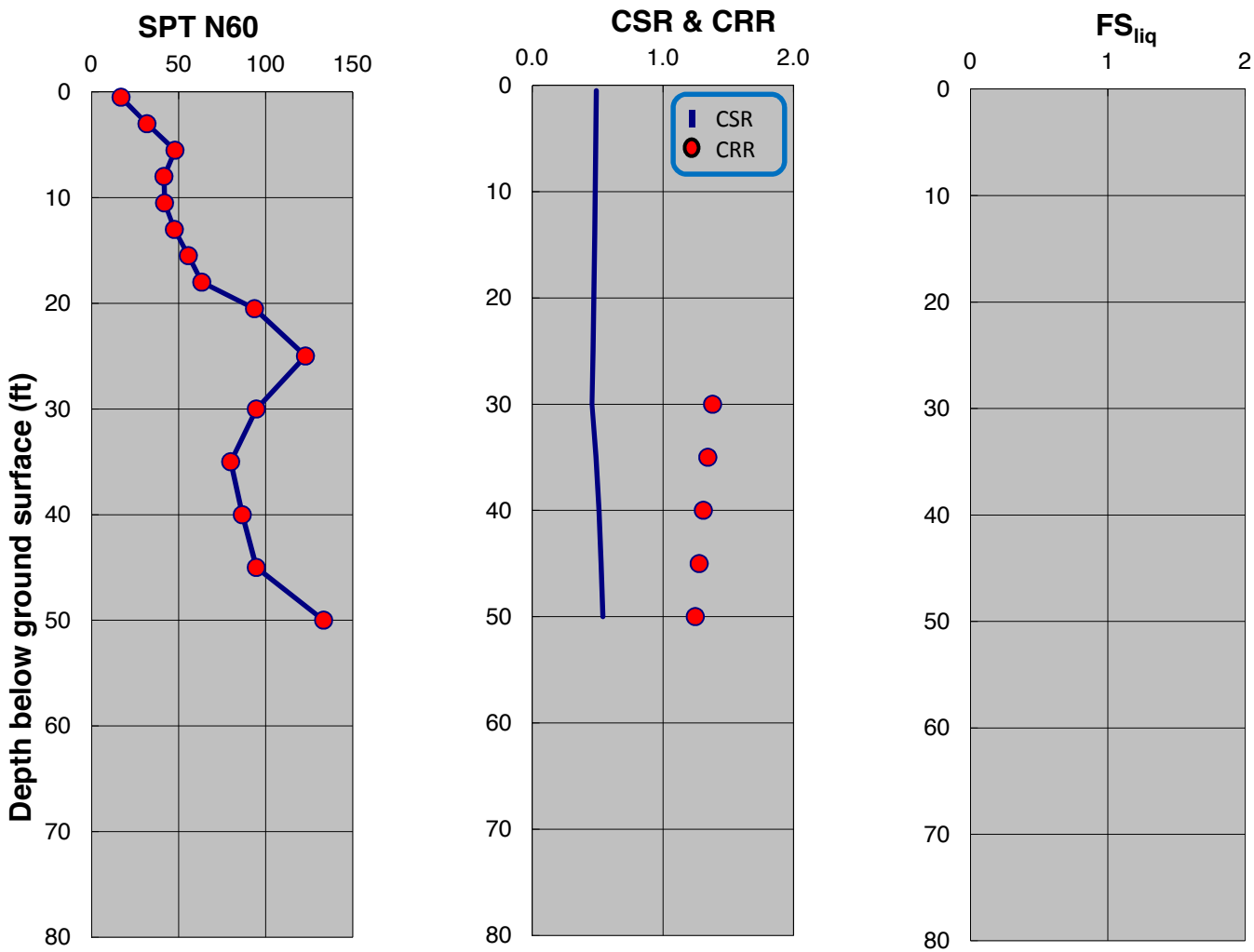
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-179 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

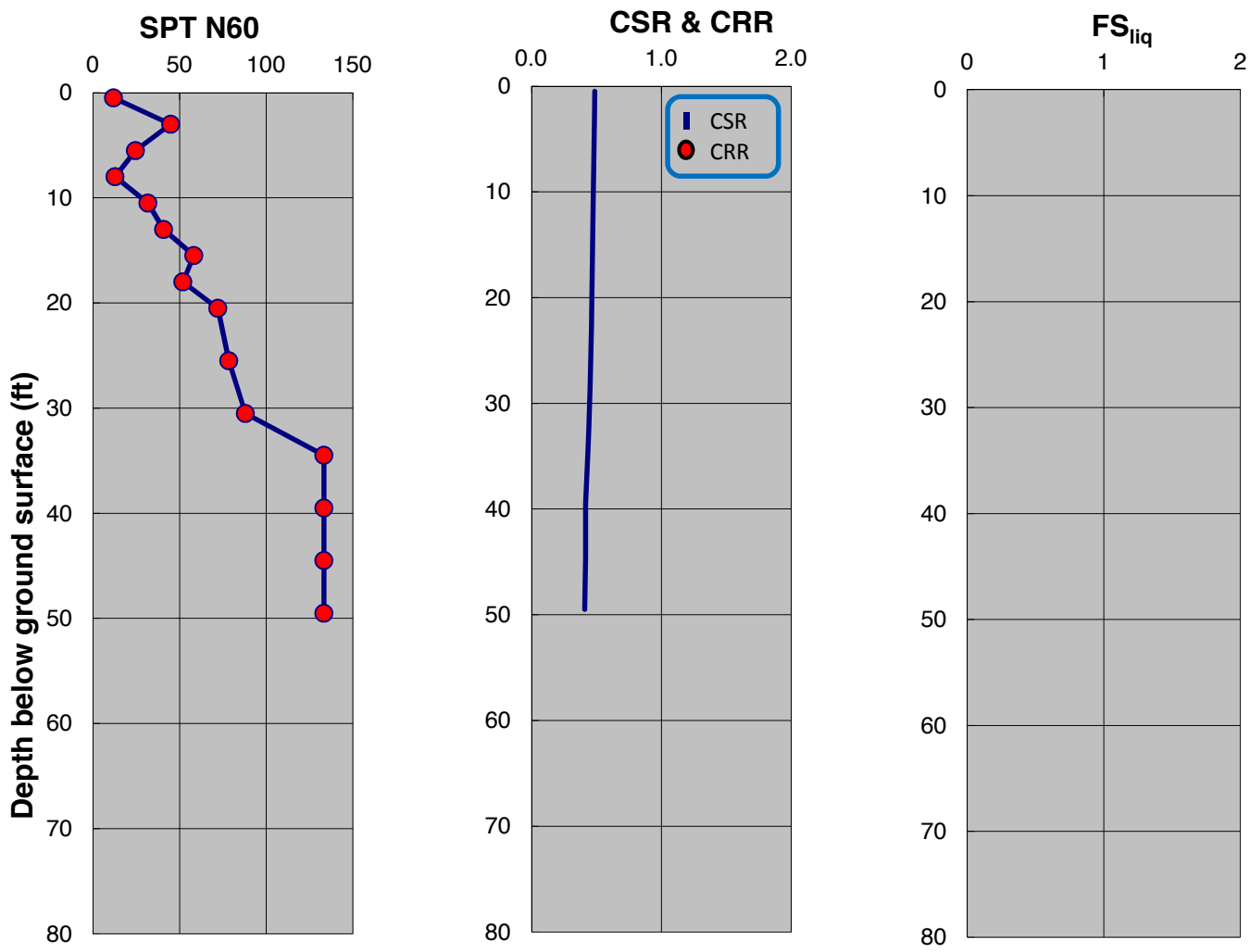
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.237



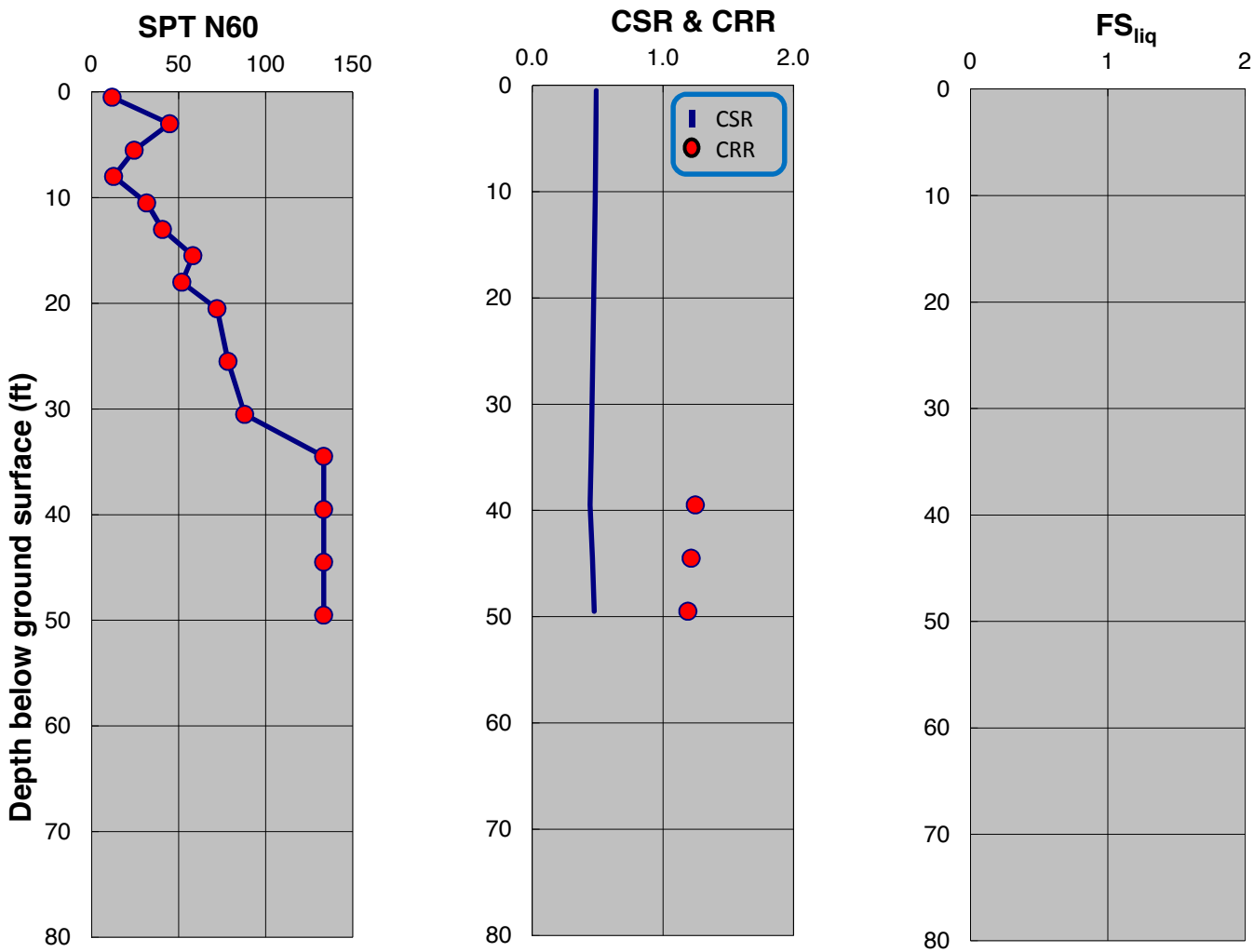
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-179 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-180 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

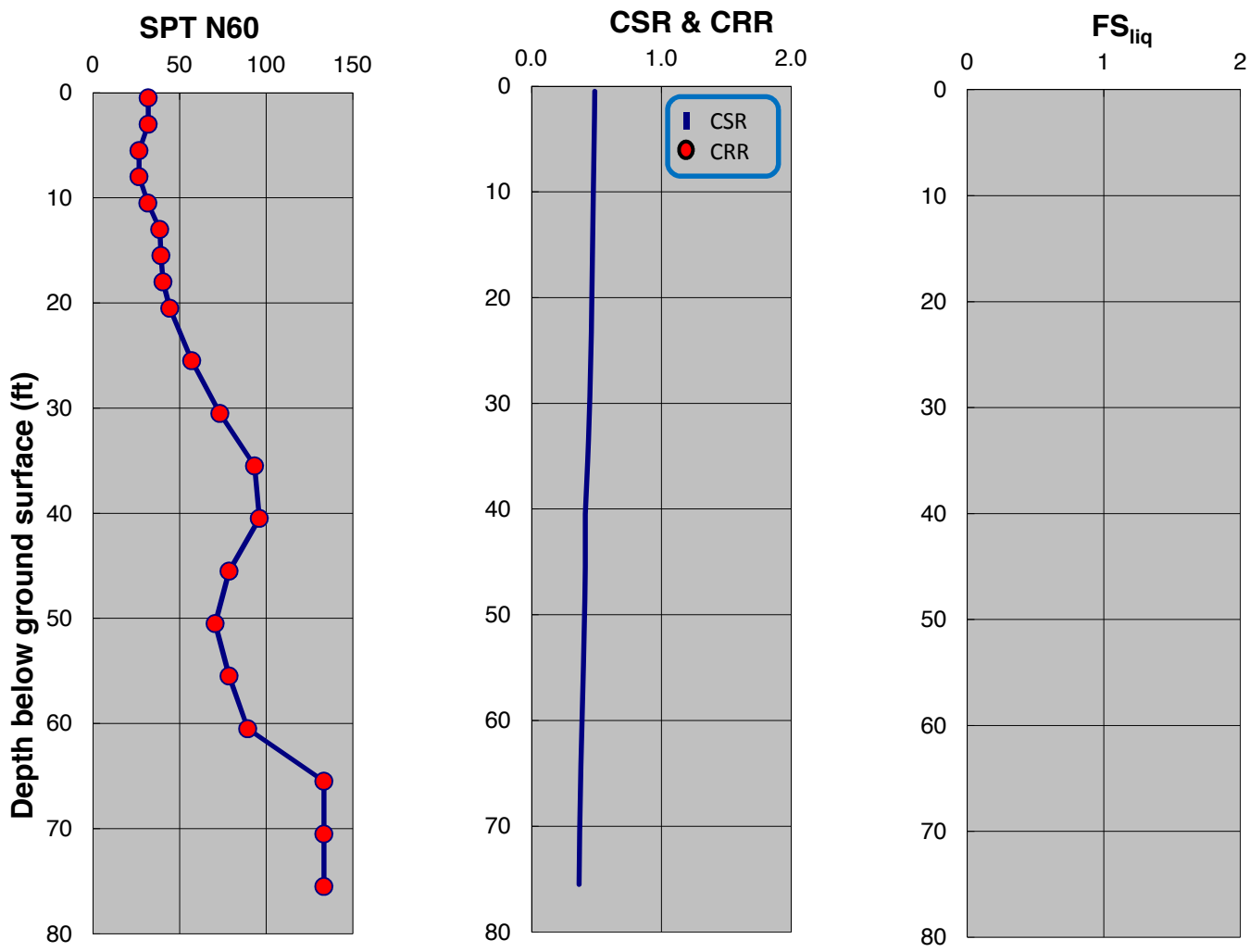
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-180 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

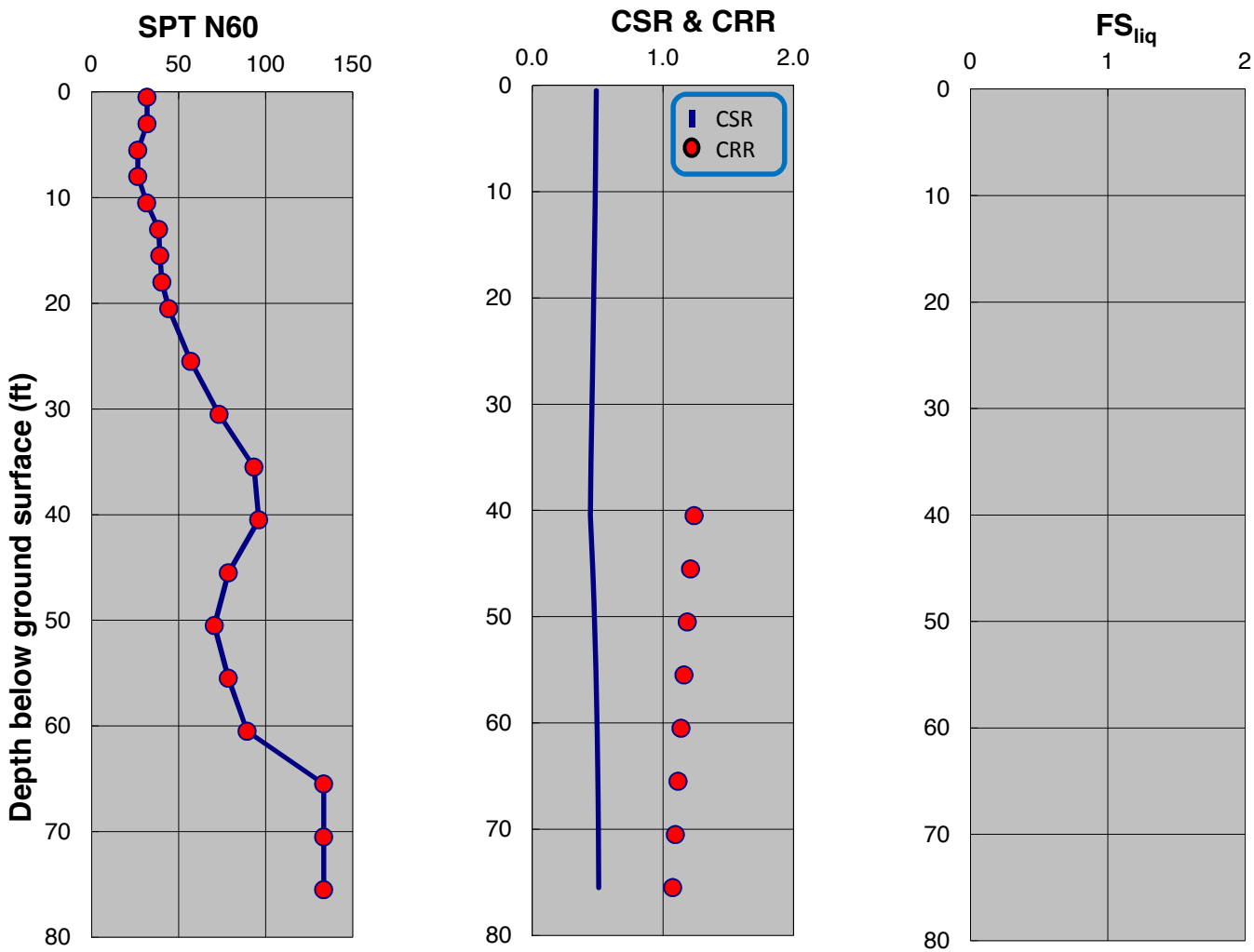
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.240



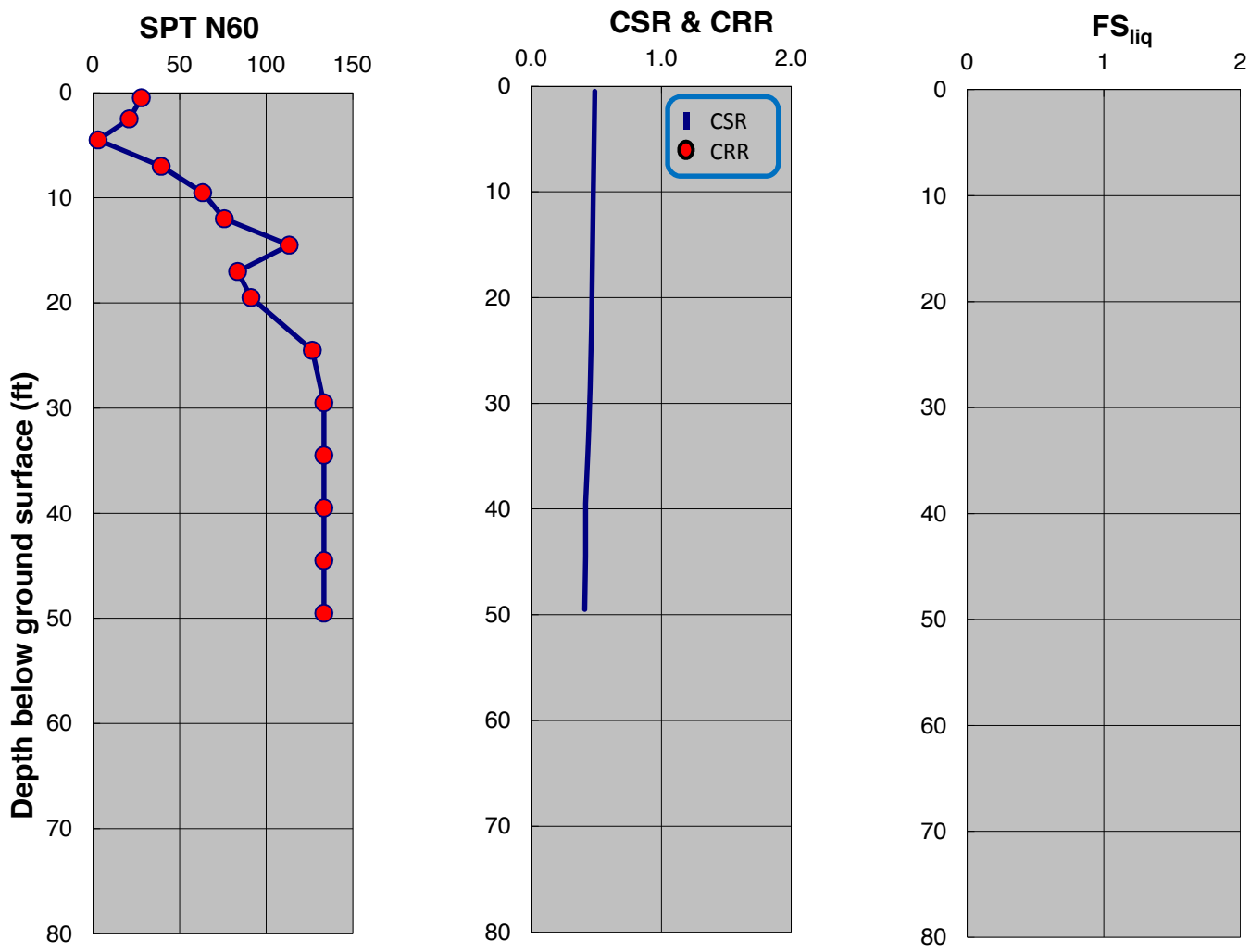
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-181 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



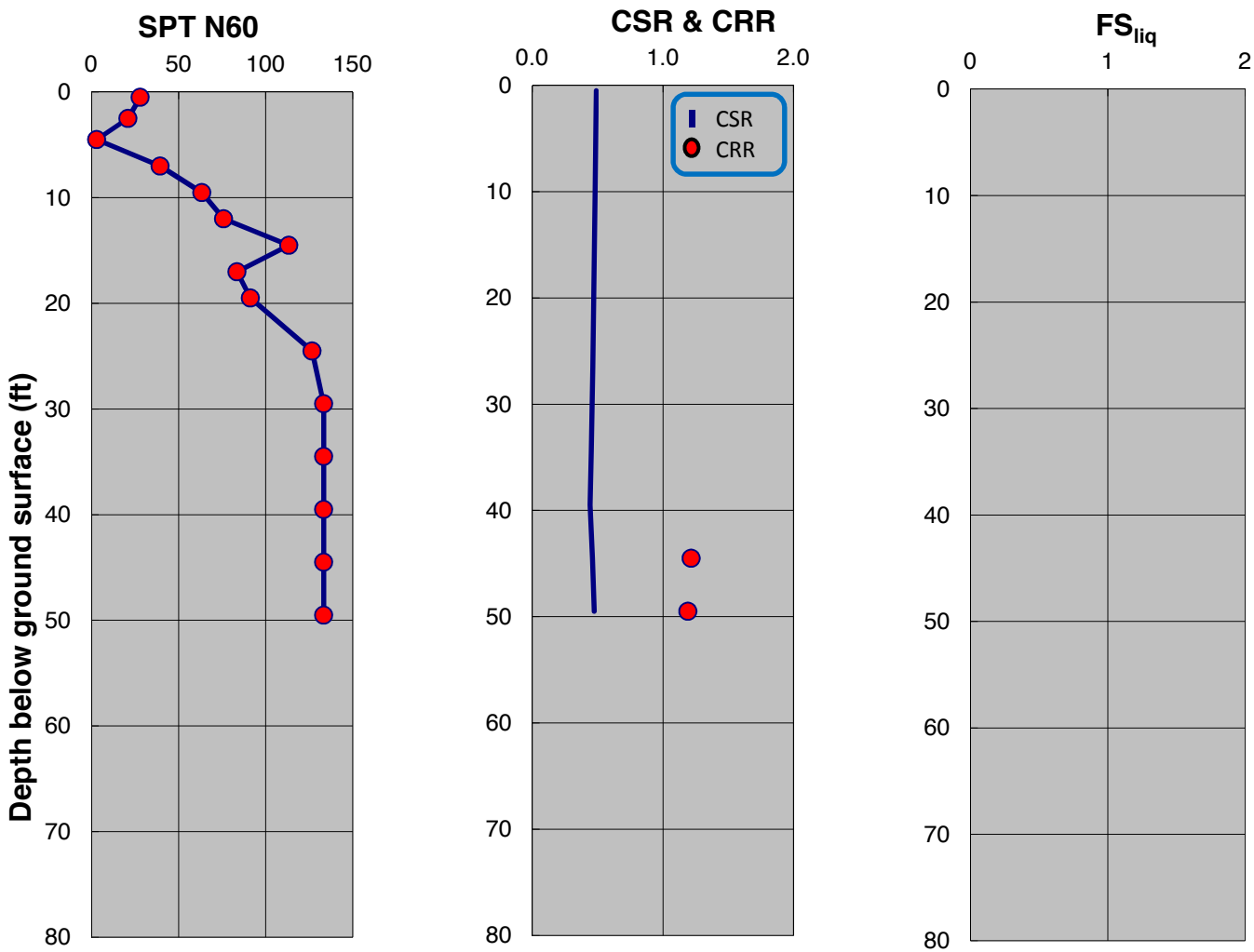
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-181 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



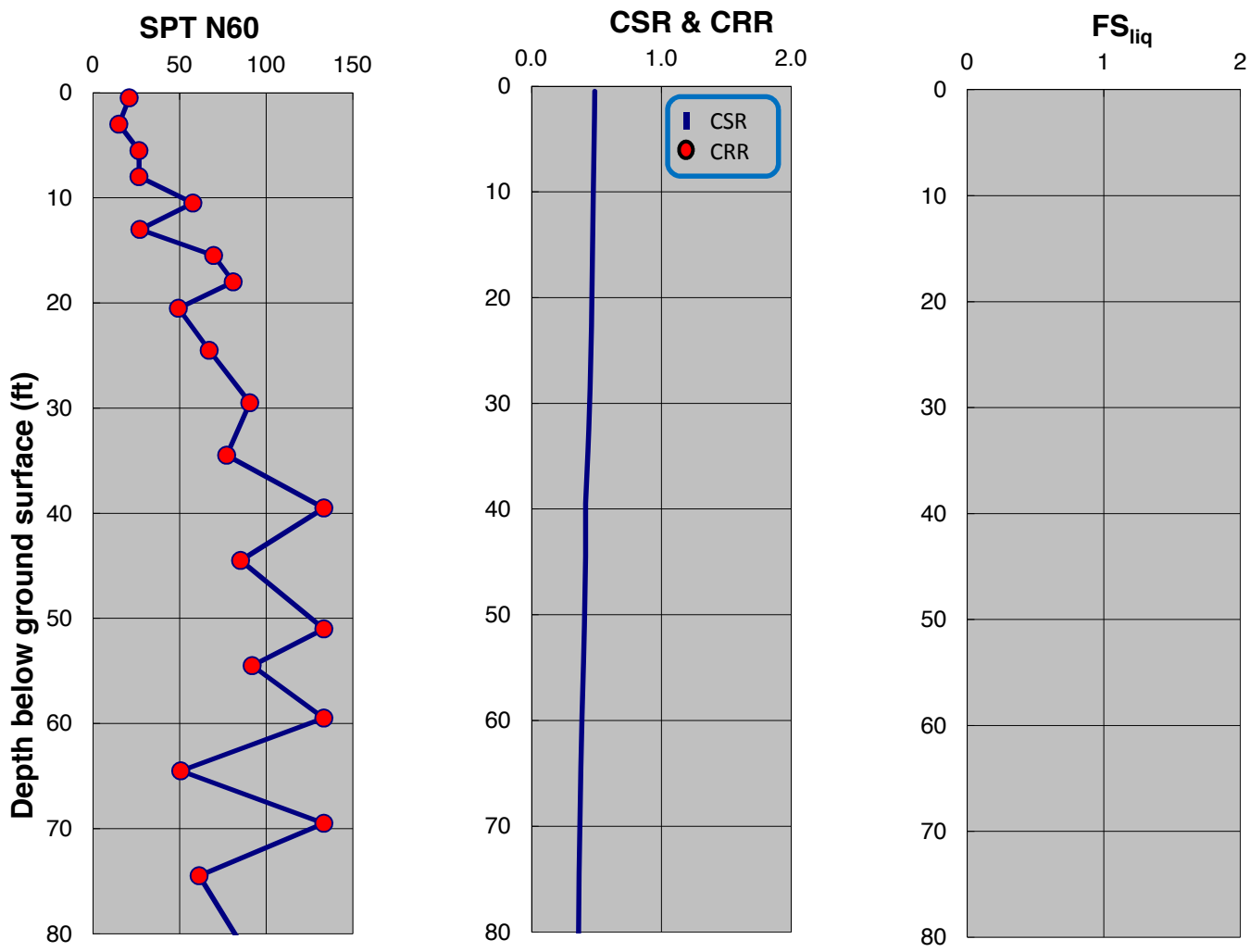
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-182 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



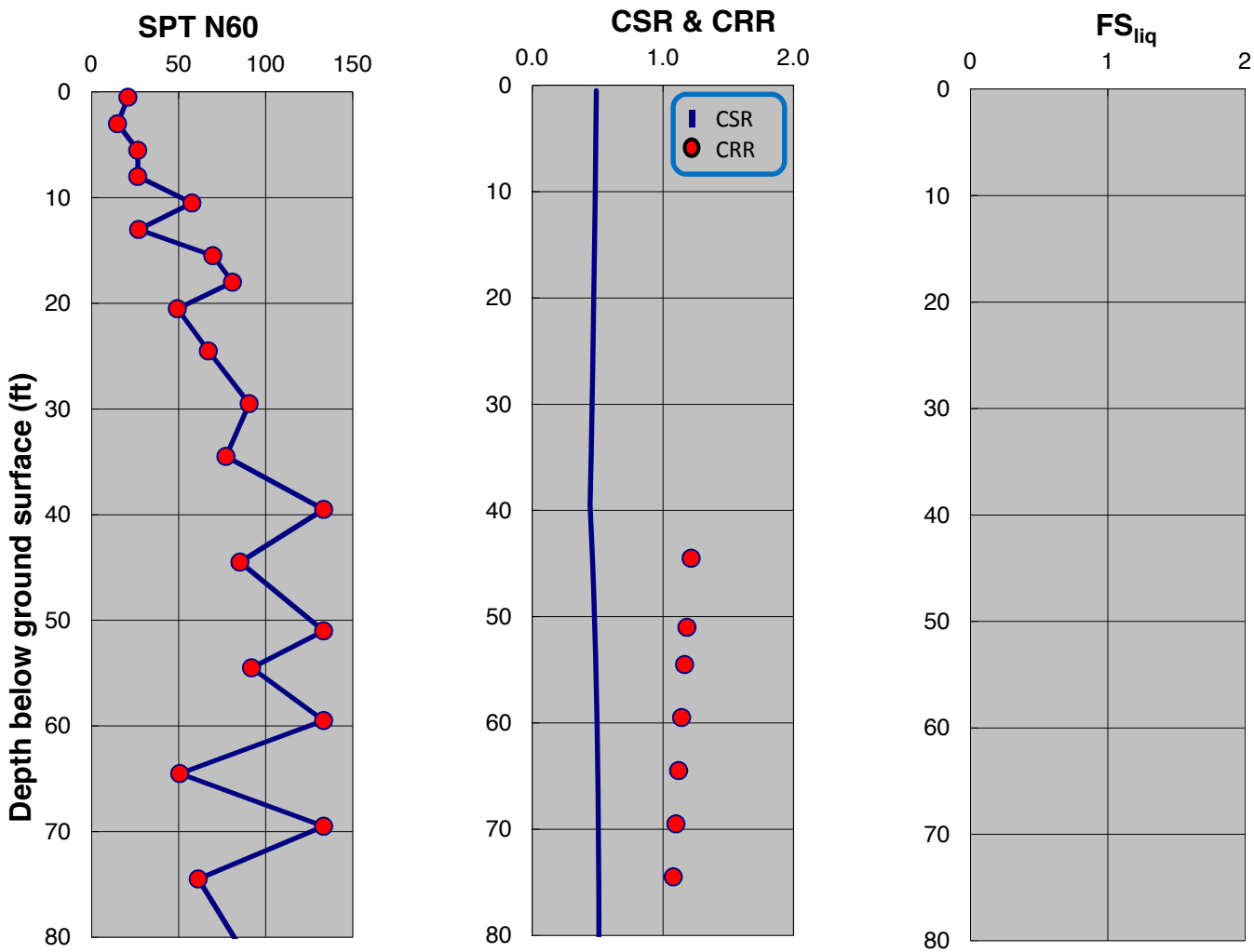
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-182 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



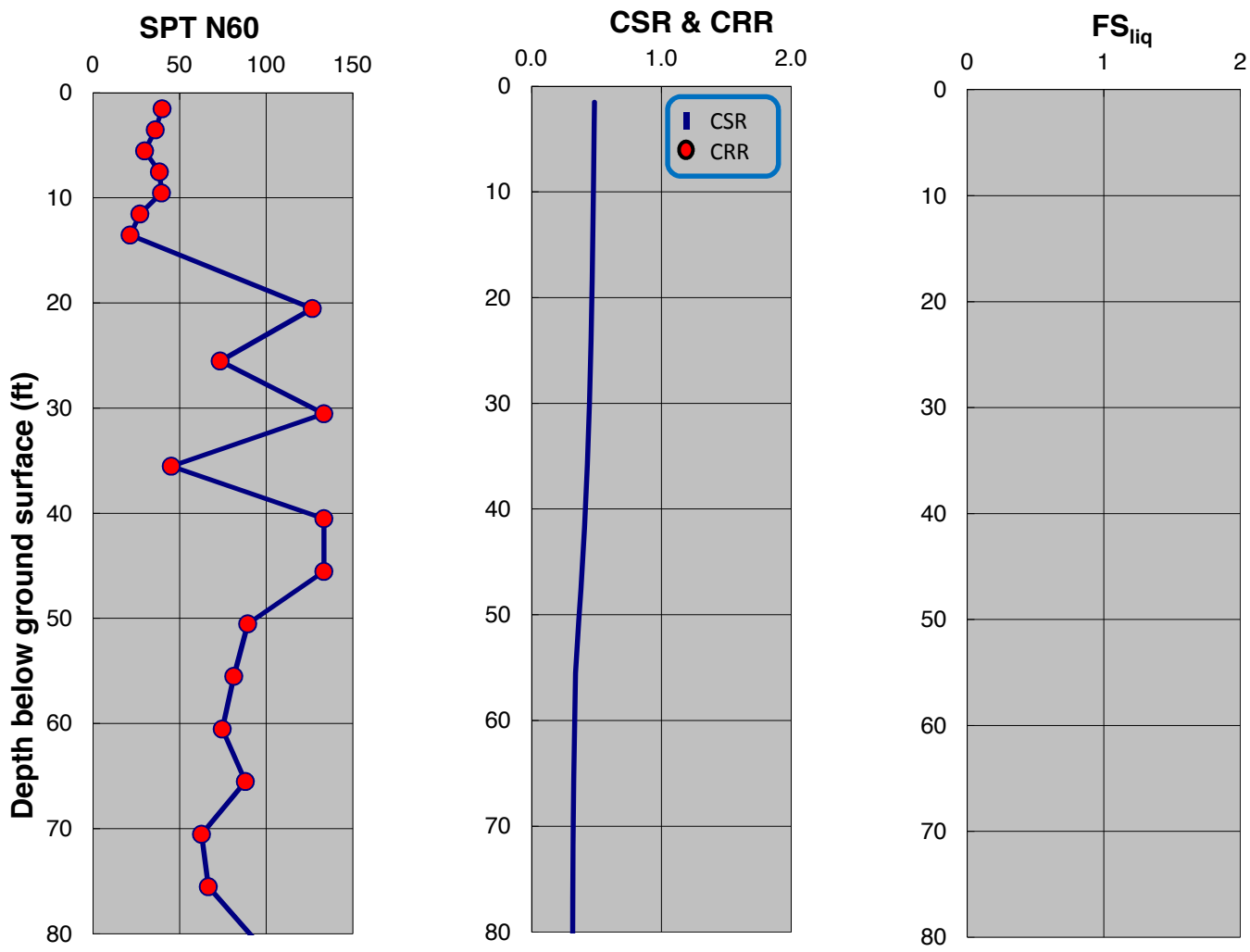
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-183 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



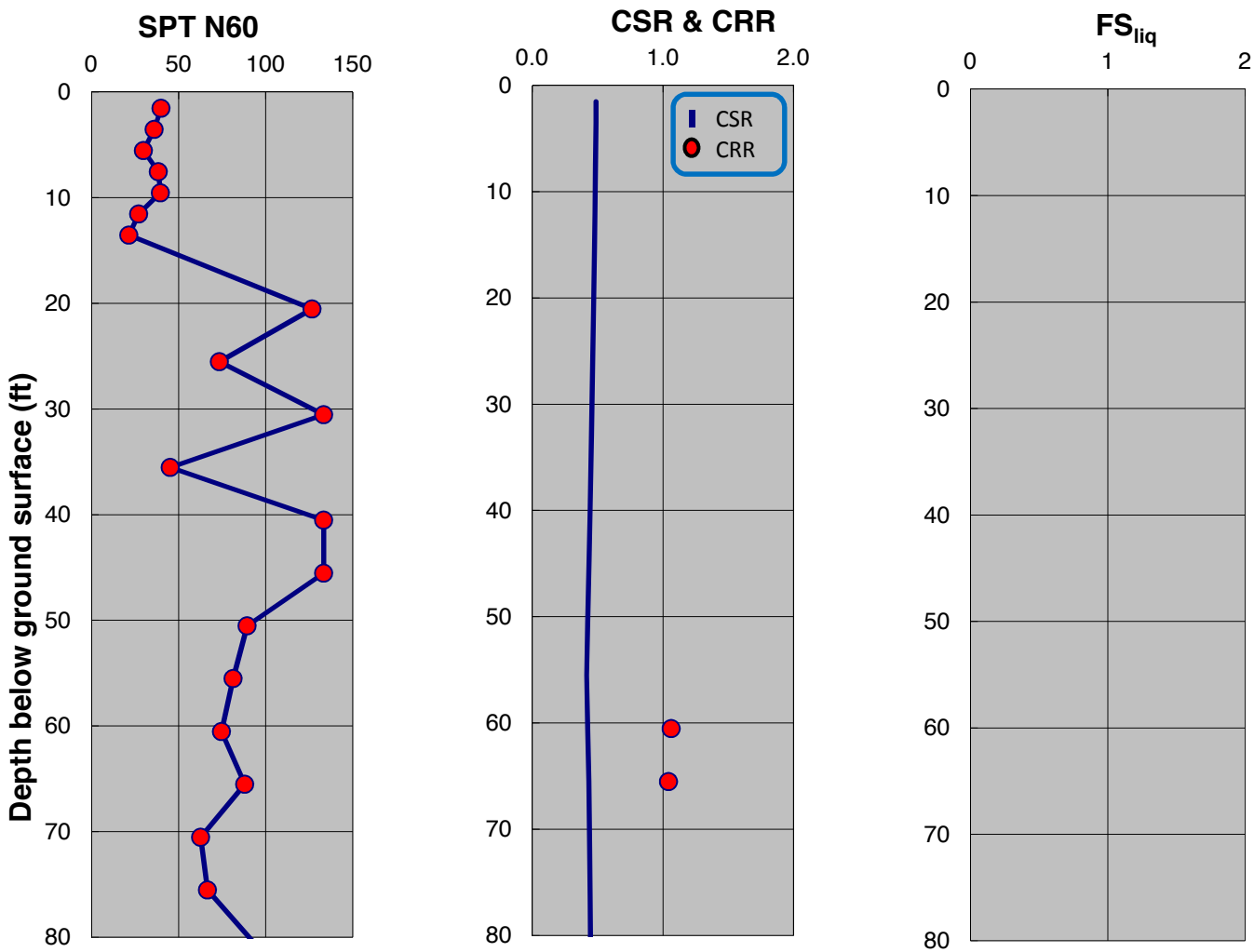
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-183 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



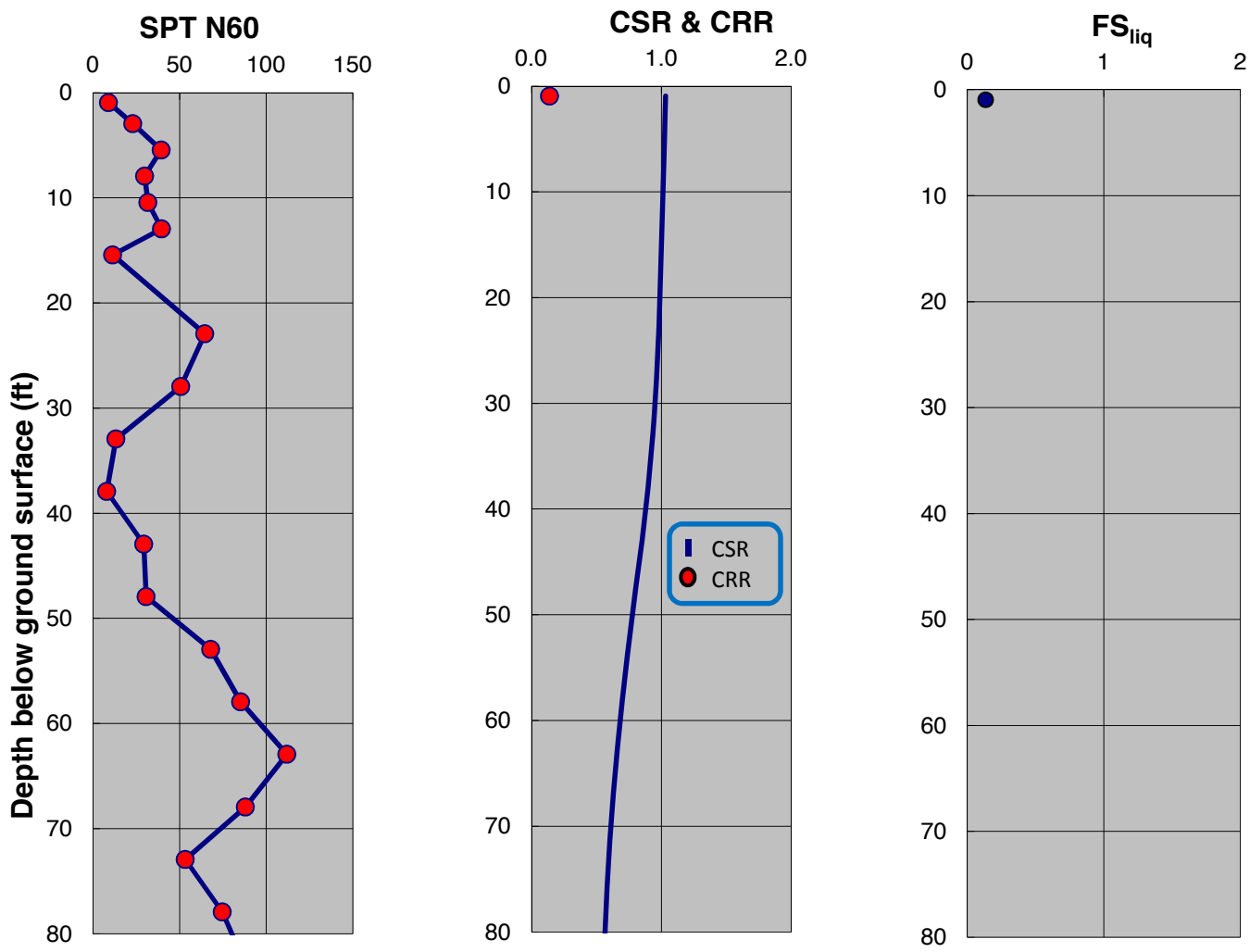
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-189 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



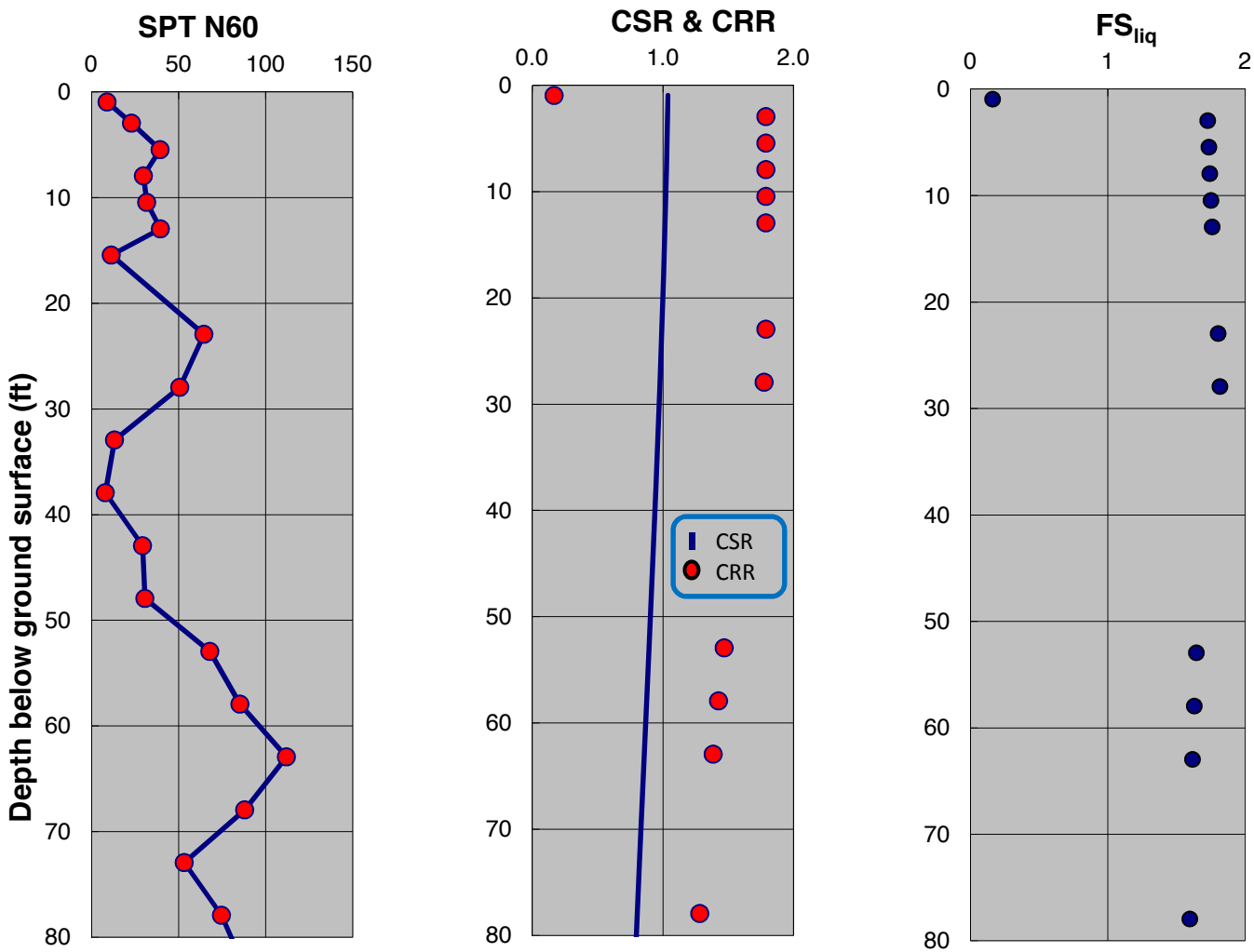
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-189 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-190 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

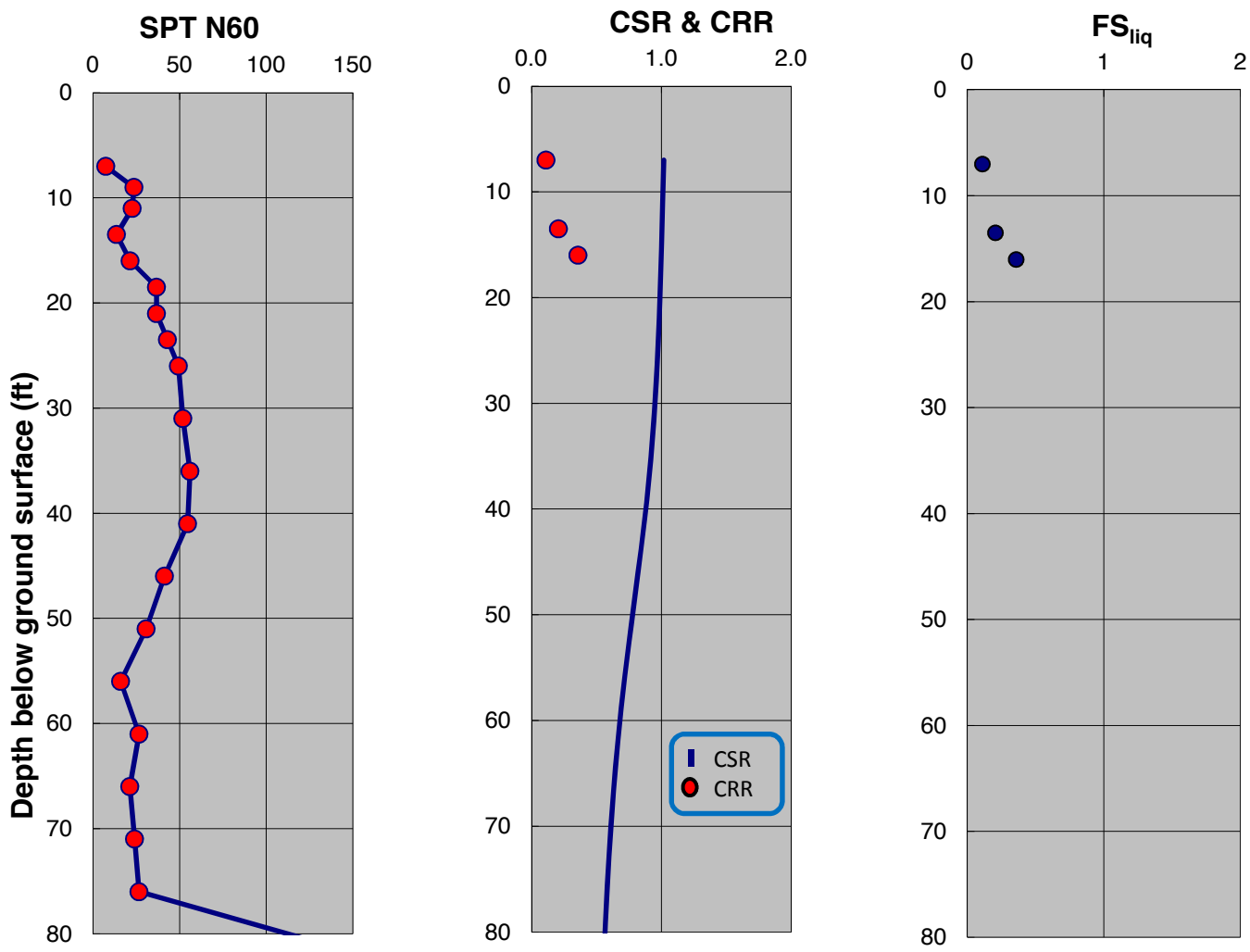
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-190 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

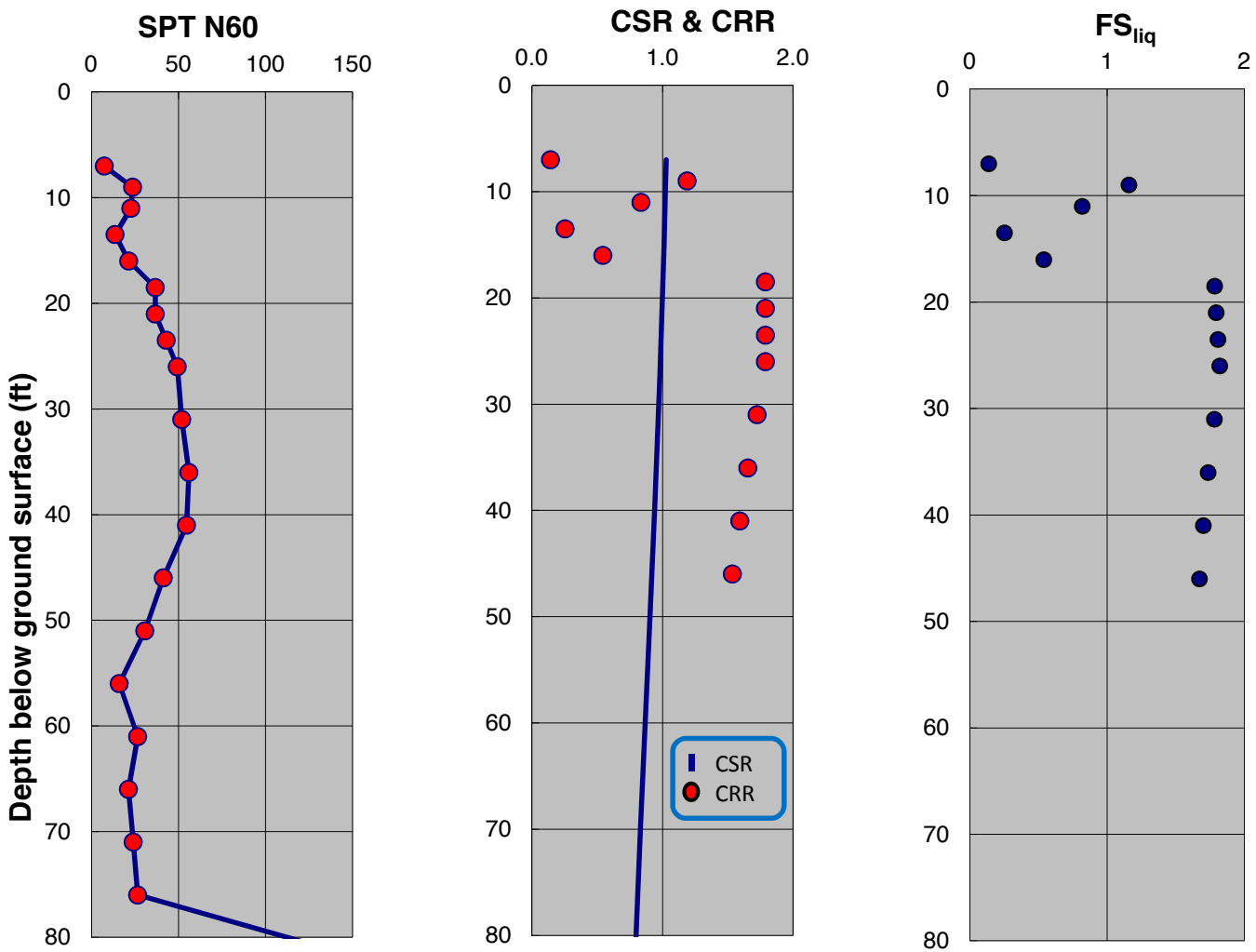
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.250



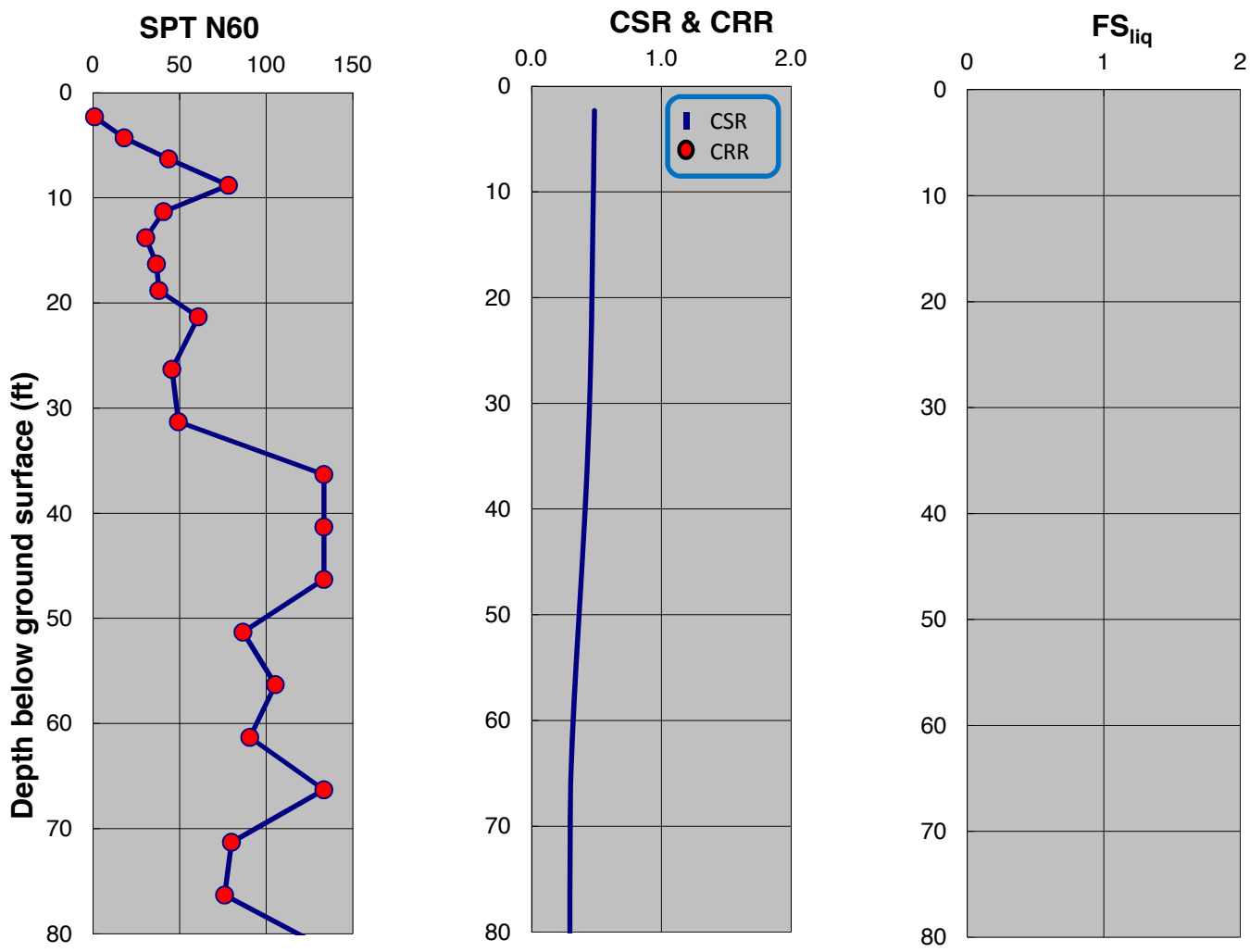
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-191 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-191 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

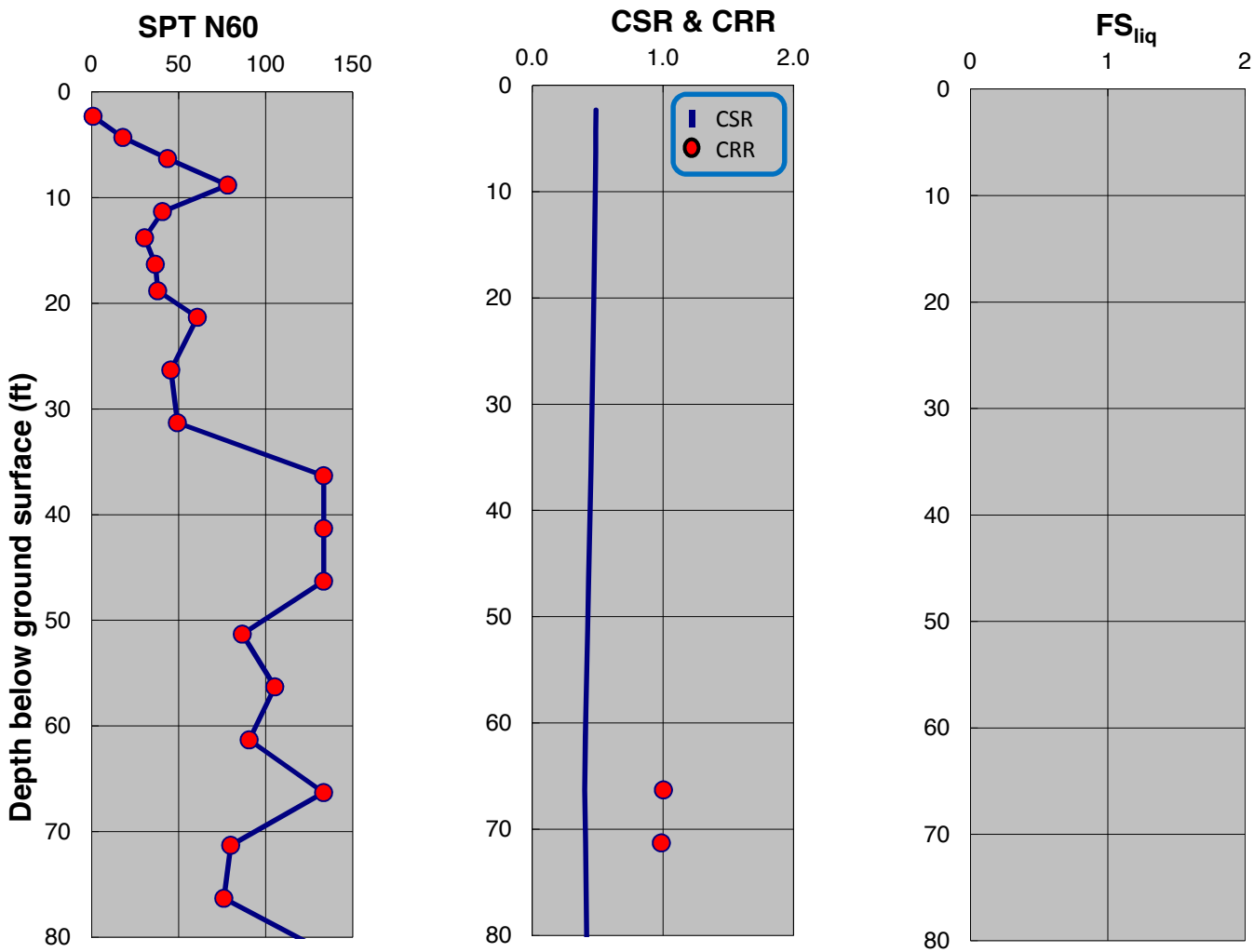
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-192 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

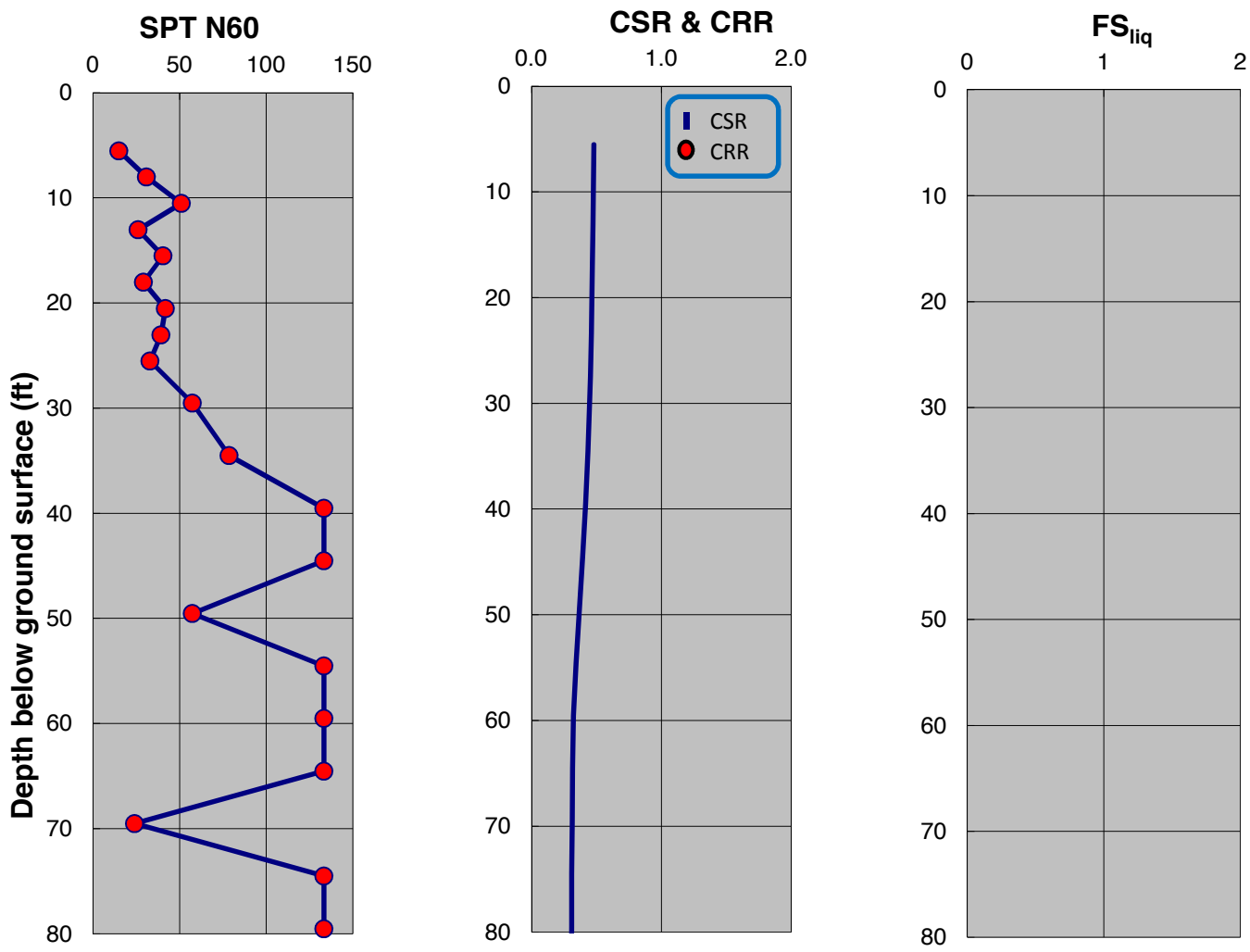
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.253



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-192 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

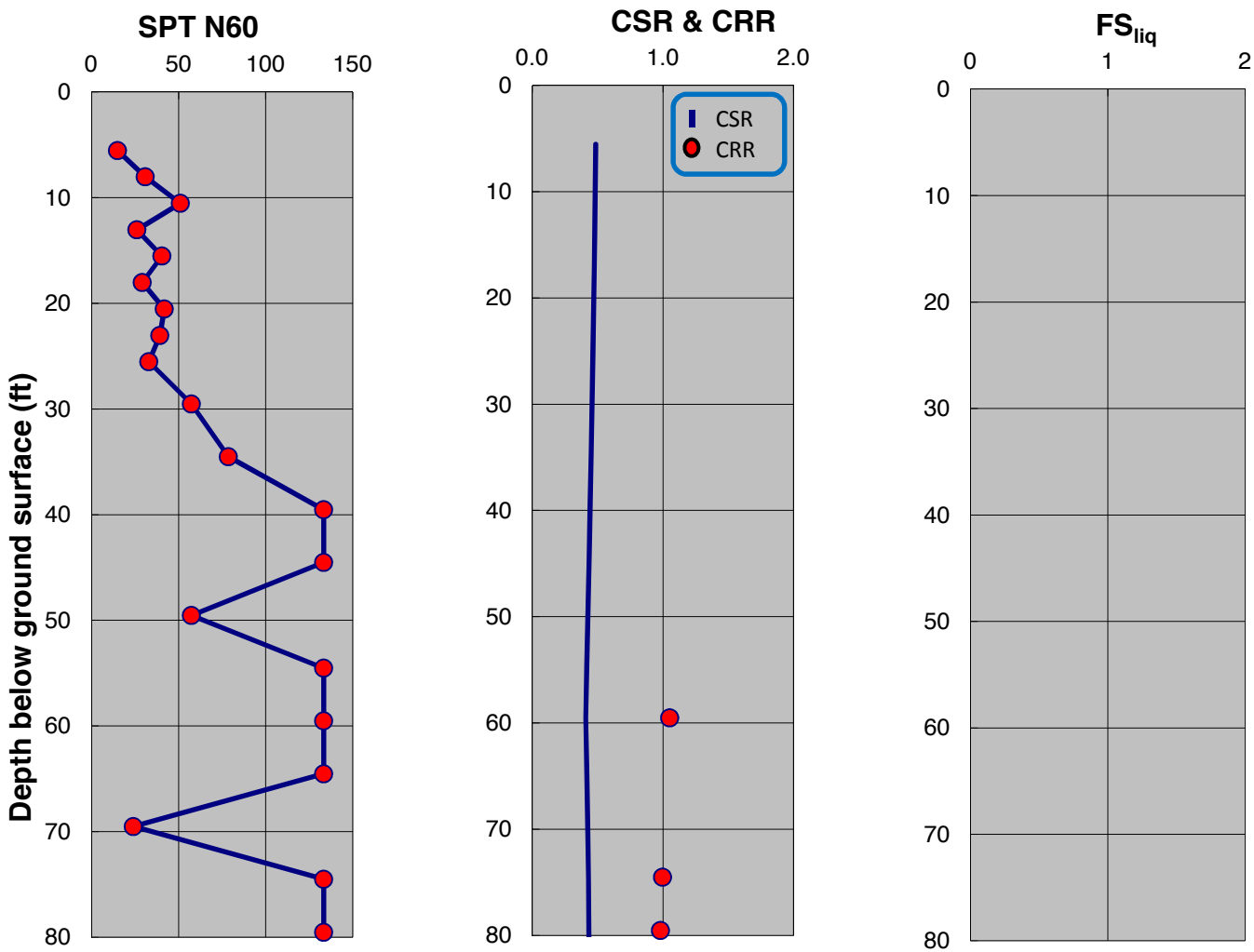
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-195 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

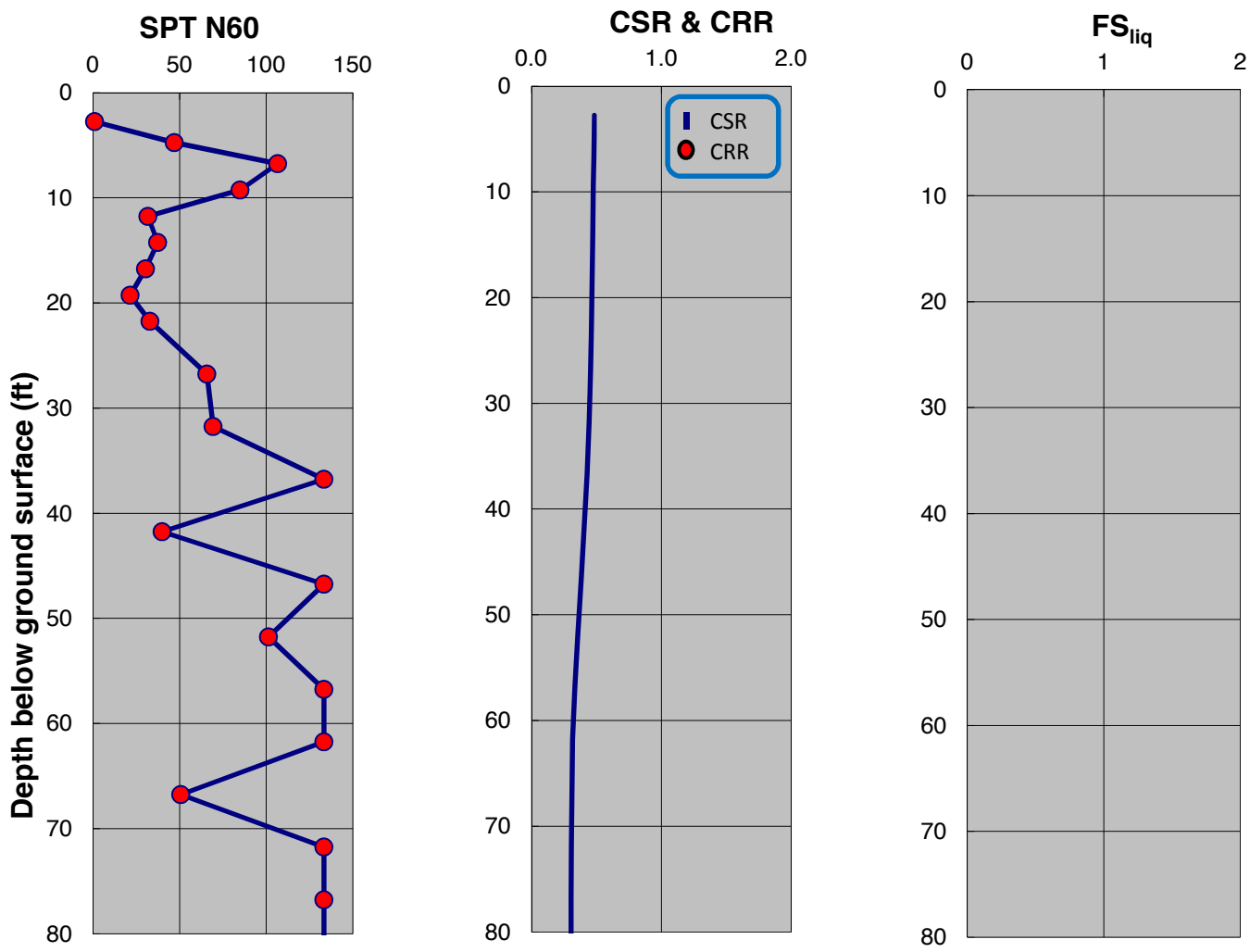
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.255



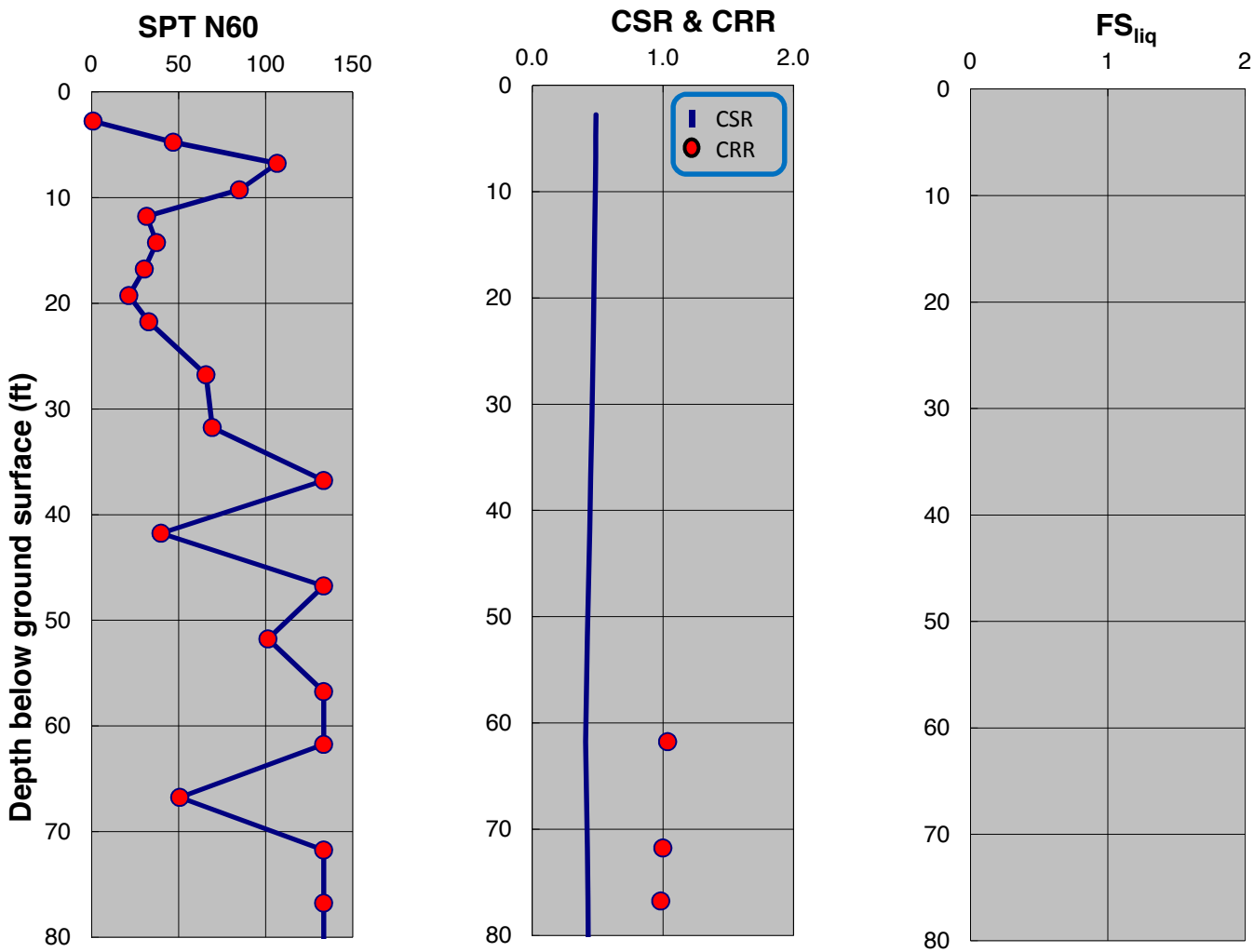
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-195 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



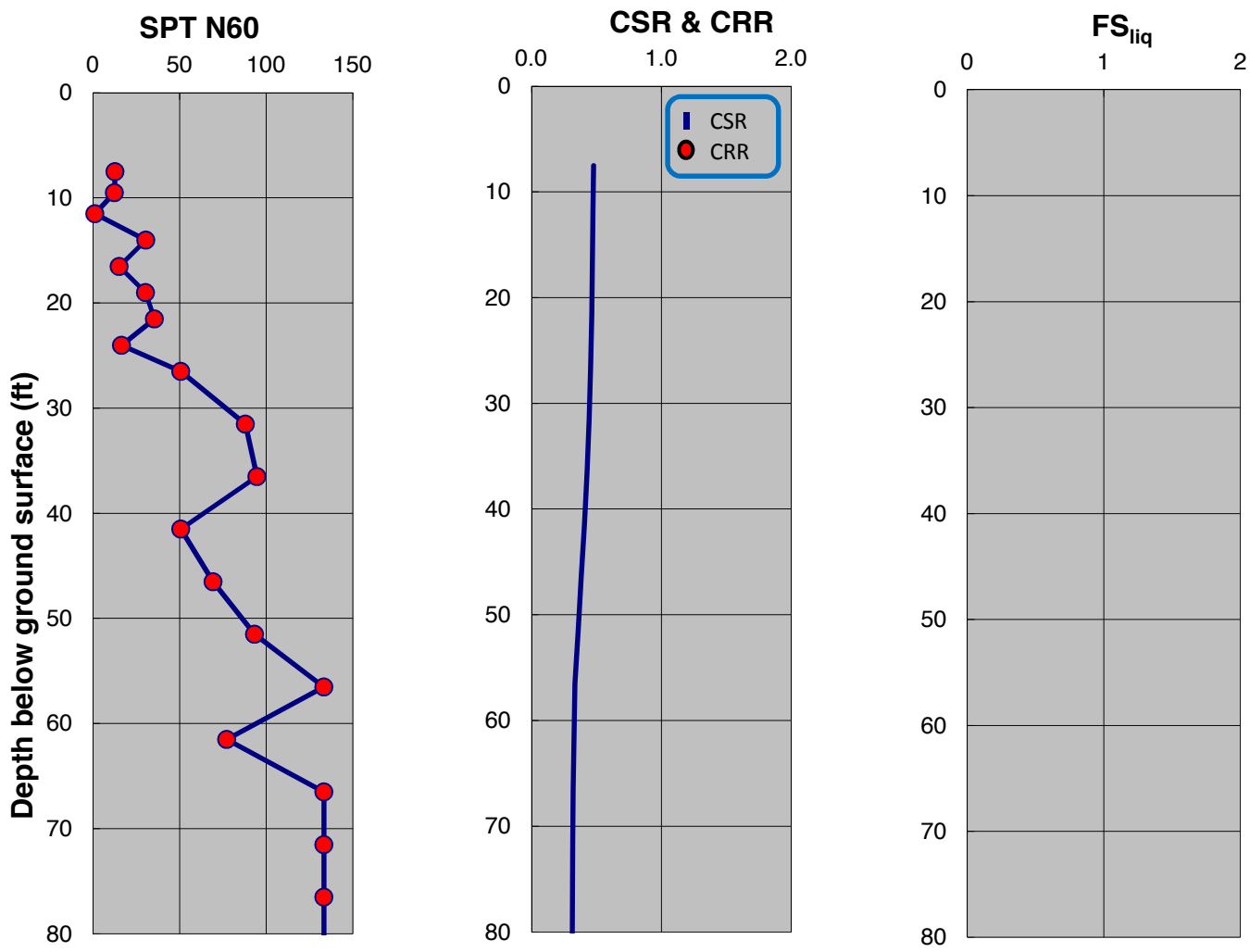
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-197 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



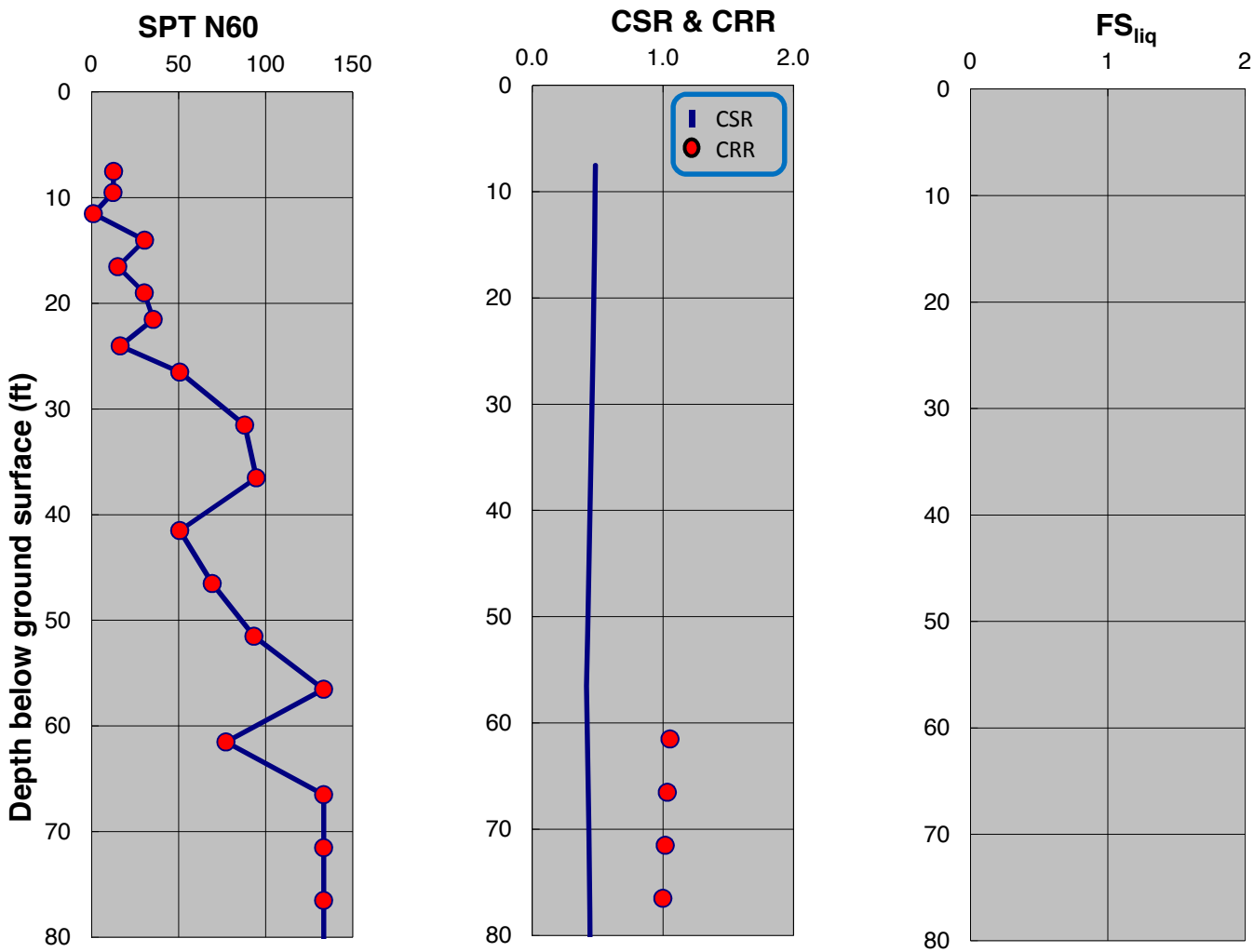
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-197 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-198 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), PROPOSED ELEVATION

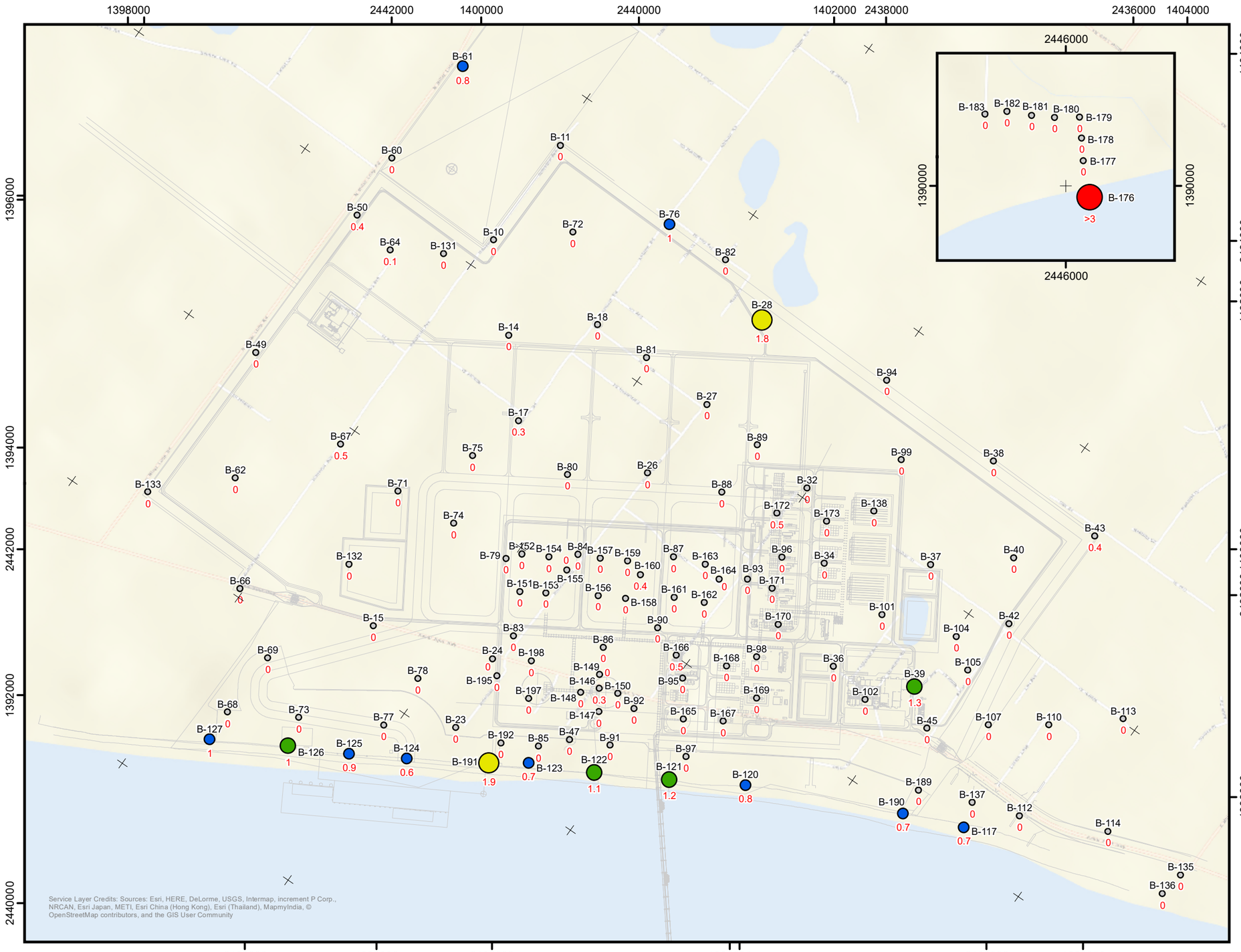
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING B-198 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), PROPOSED ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D.260



Legend

Estimated Cumulative Settlement (in)

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 3
- > 3

Site Layout

B-02 0.9 Boring location with boring name and settlement in Inches

Note: SSE Level per NFPA 59A 2013 / MCEG level per ASCE 7-10 (M=8.0, PGA=0.75g), Boulanger and Idriss (2014), Proposed Elevation

Coordinate System: Alaska State Plane, Zone 4, NAD83, NSRS 2007, Feet

N

1:12,000

0 375 750 1,500 Feet

ESTIMATED CUMULATIVE SETTLEMENT
ONSHORE LOCATIONS
PROPOSED ELEVATION
SSE/MCEG LEVEL

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2016\04.10160001_AKLNG_Phase3\05_GIS\Outputs\2016_10_19_SeismicReport_Ph3\mxd\PlateJ-87_Settlement_Onshore_wLoads_MCEG.mxd, 10/21/2016, c.dean

APPENDIX E

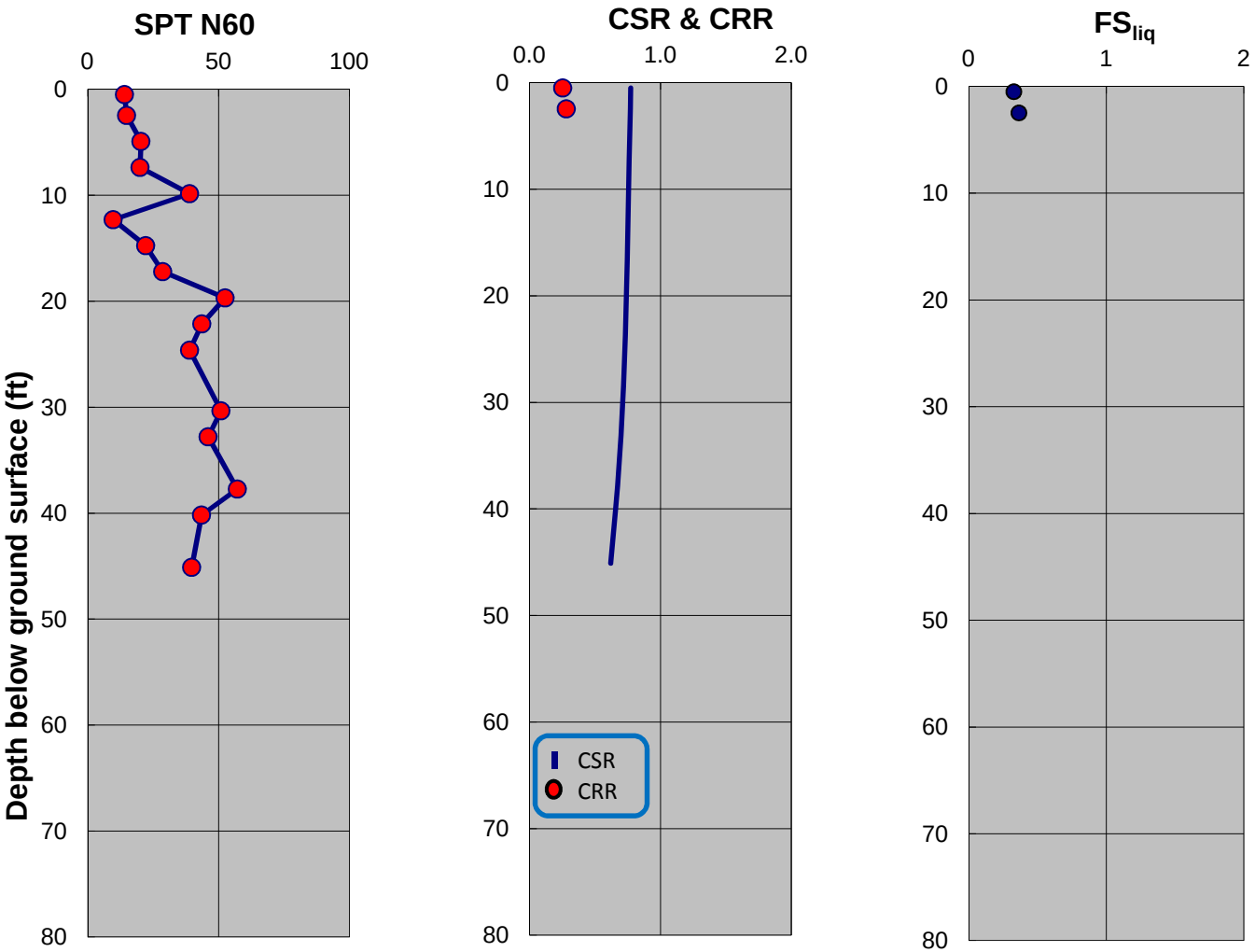
SPT-BASED LIQUEFACTION POTENTIAL EVALUATIONS PER NFPA 59A 2006 AND ASCE 7-05 FOR NEARSHORE BORINGS

APPENDIX E

SPT-BASED LIQUEFACTION POTENTIAL EVALUATIONS PER NFPA 59A 2006 AND ASCE 7-05 FOR NEARSHORE BORINGS

E.1 Liquefaction Triggering Hazard Assessment per NFPA 59A 2006

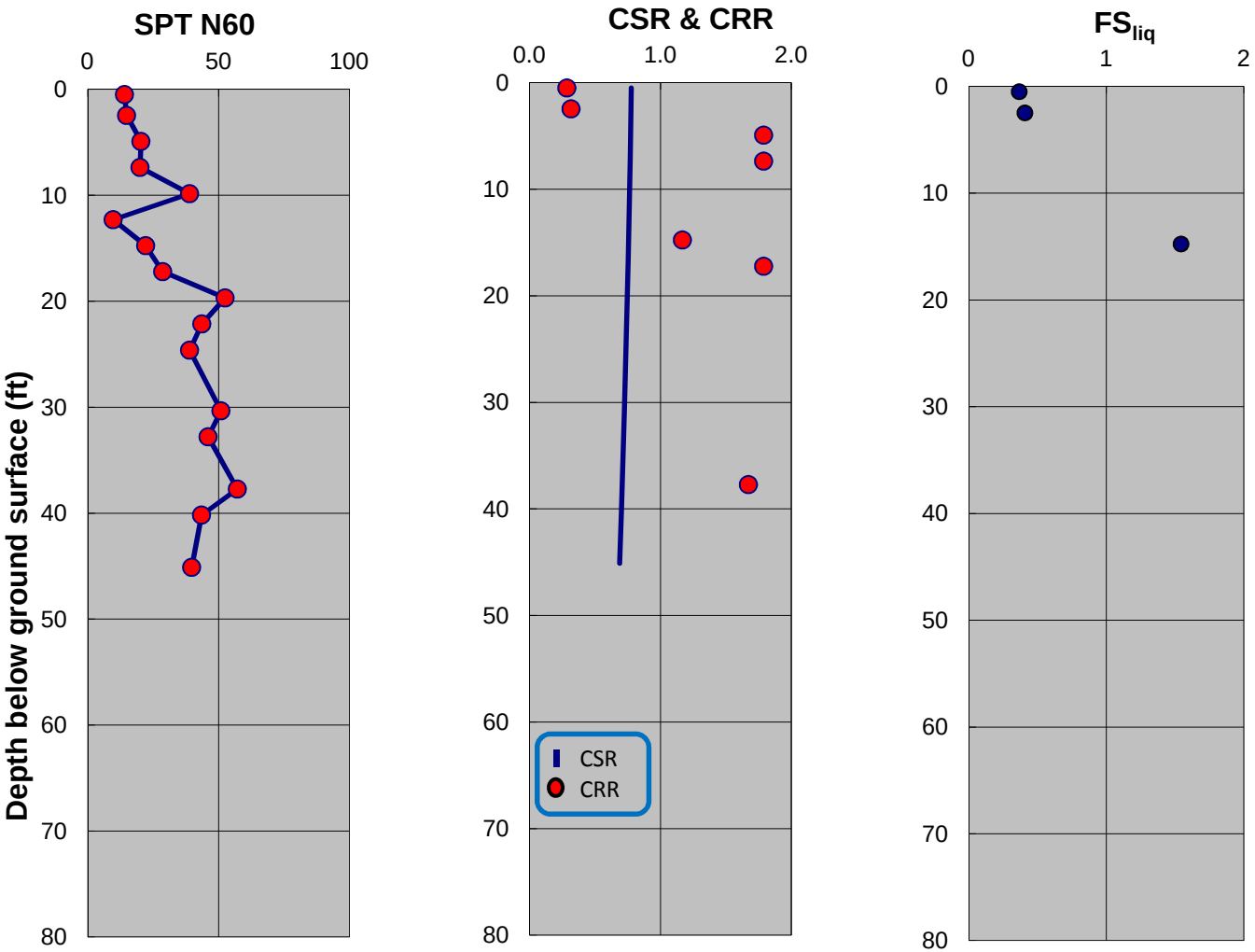
This appendix presents the liquefaction triggering hazard assessment results based on the SPT-based procedures proposed by NCEER (Youd et. al., 2001) and Boulanger and Idriss (2014) for the nearshore borings for the OBE and the SSE / MCE events per NFPA 59A 2006. Results are presented for the shallowest 80 ft. of each exploration and the safety factor is provided for the cases where it is less than two. Depth below ground surface in the plates of this appendix refers to depth below the seafloor at each boring location. Results are not shown for depths greater than 80 feet given the limitations of the simplified, empirical methods, which are calibrated to case history data that are, in general, available down to about 50-ft depth. In addition, the uncertainty of the shear stress reduction coefficient with depth r_d increases for depths higher than approximately 70 ft. Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-02 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

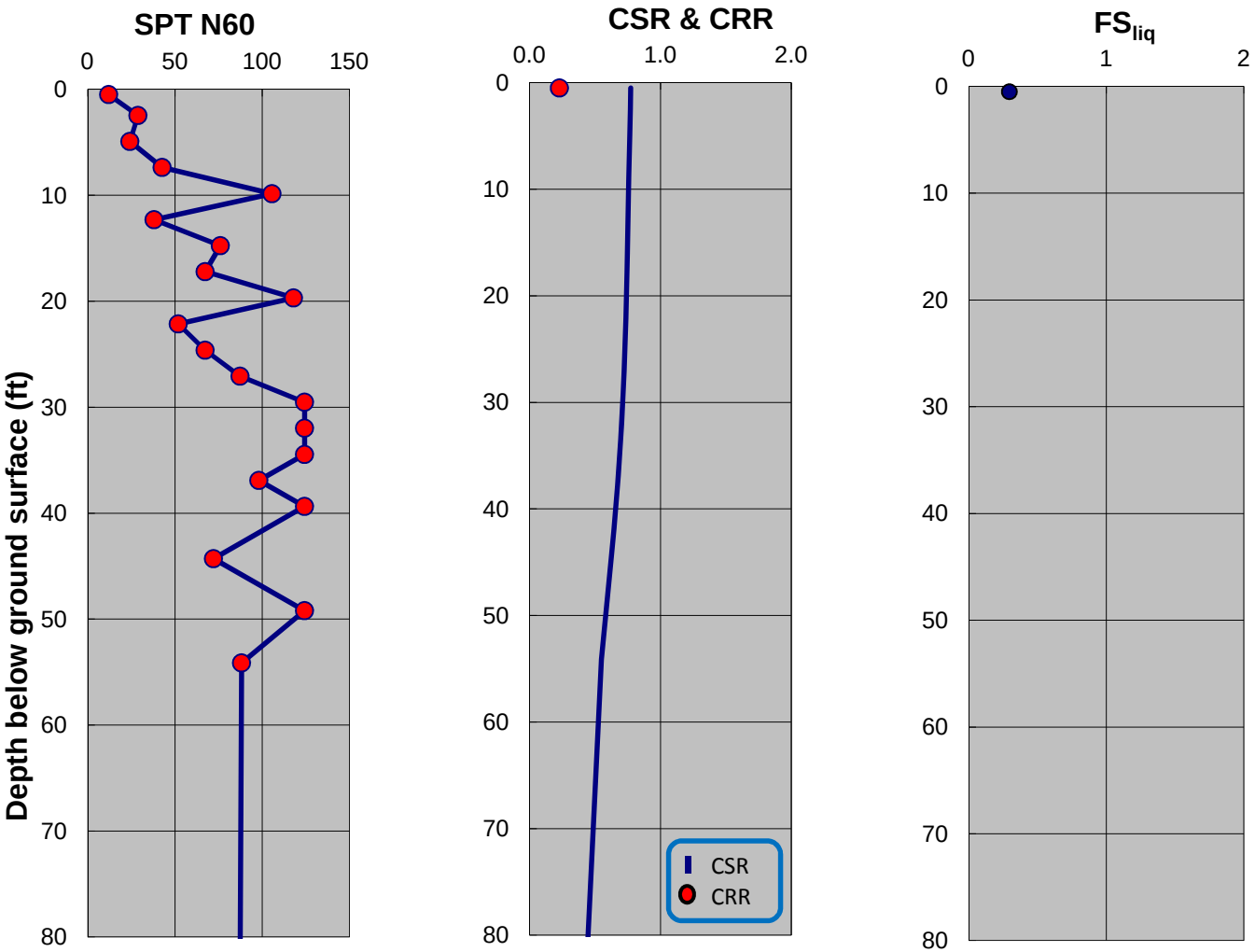
PLATE E.1



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-02 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

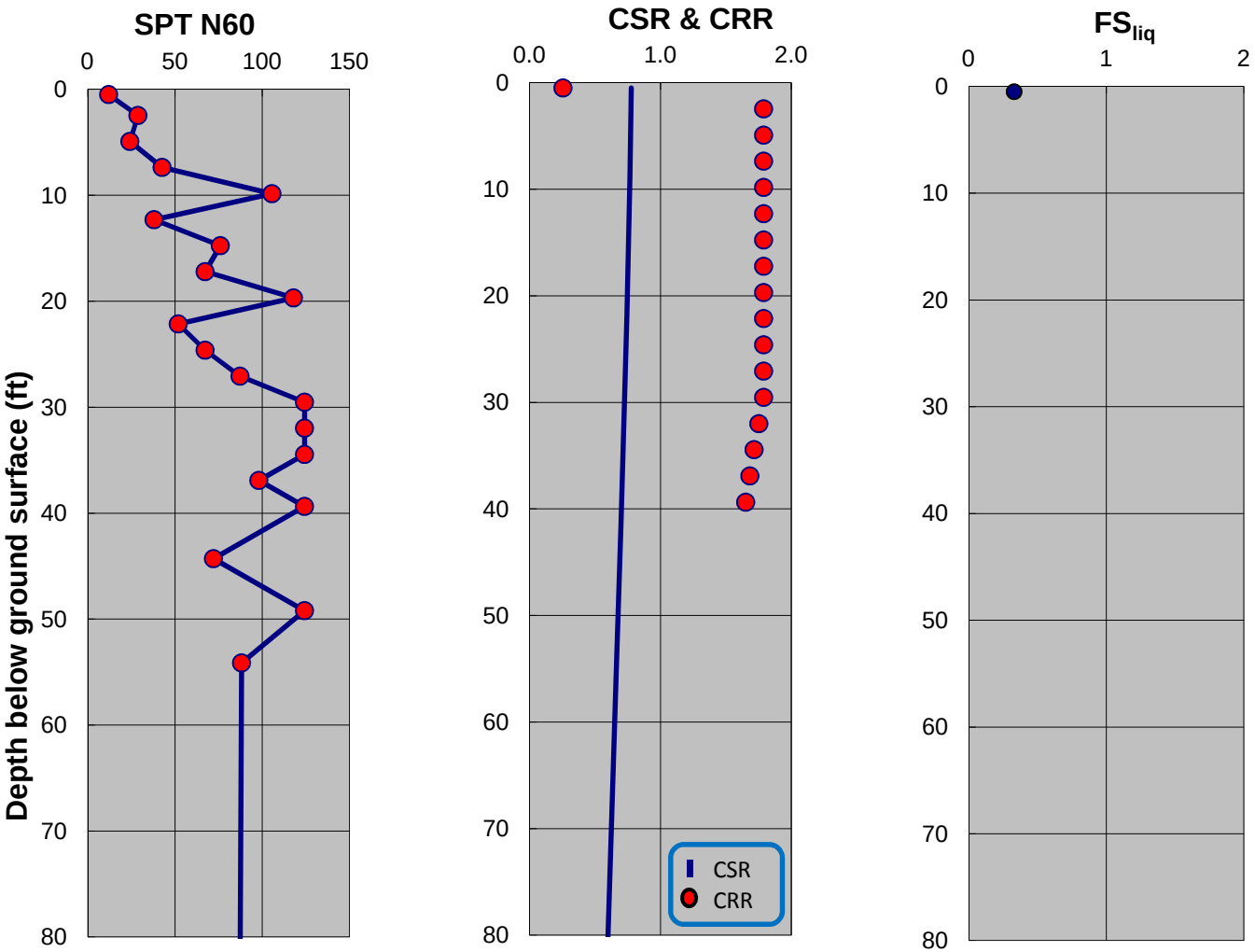
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.2



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-03 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

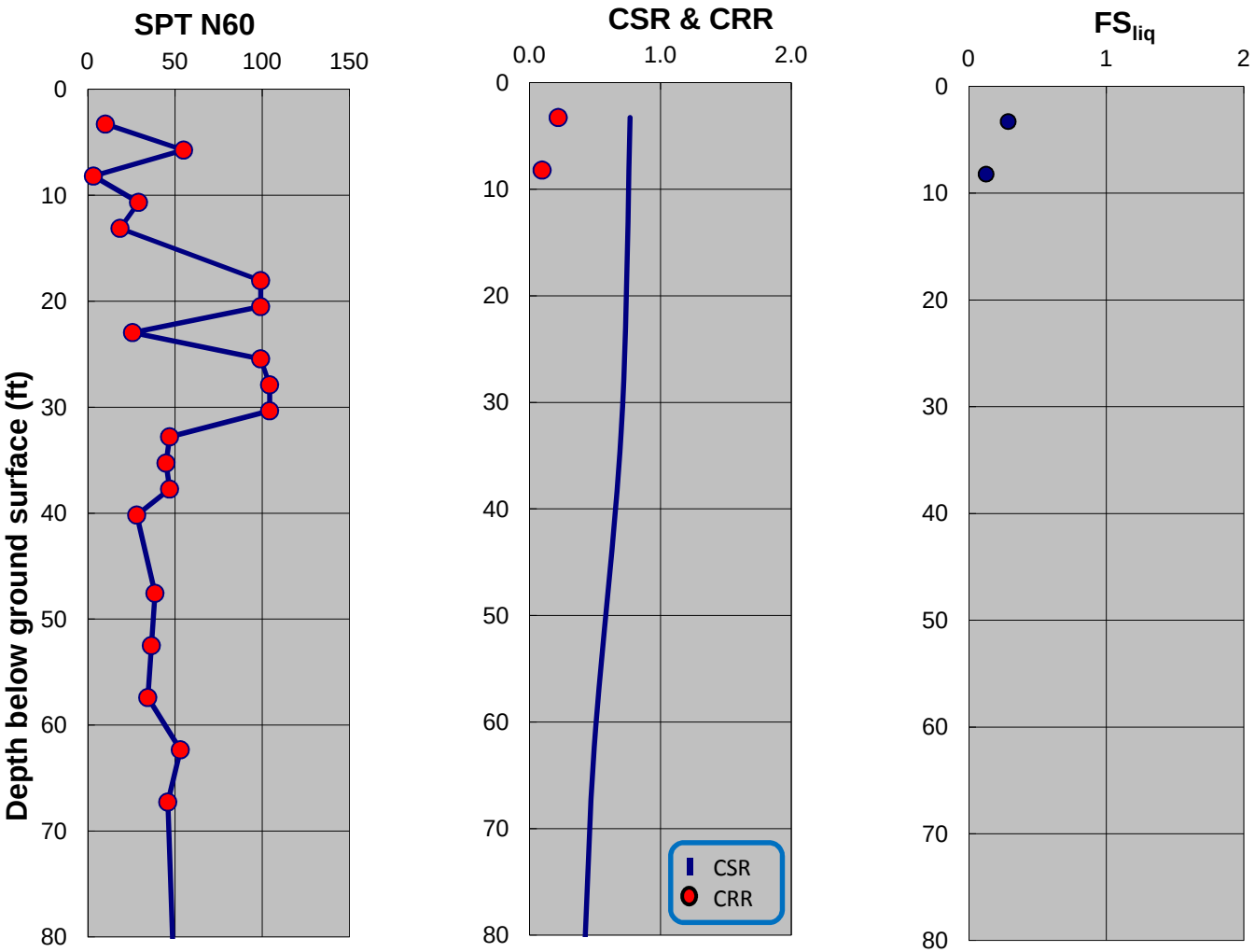
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-03 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

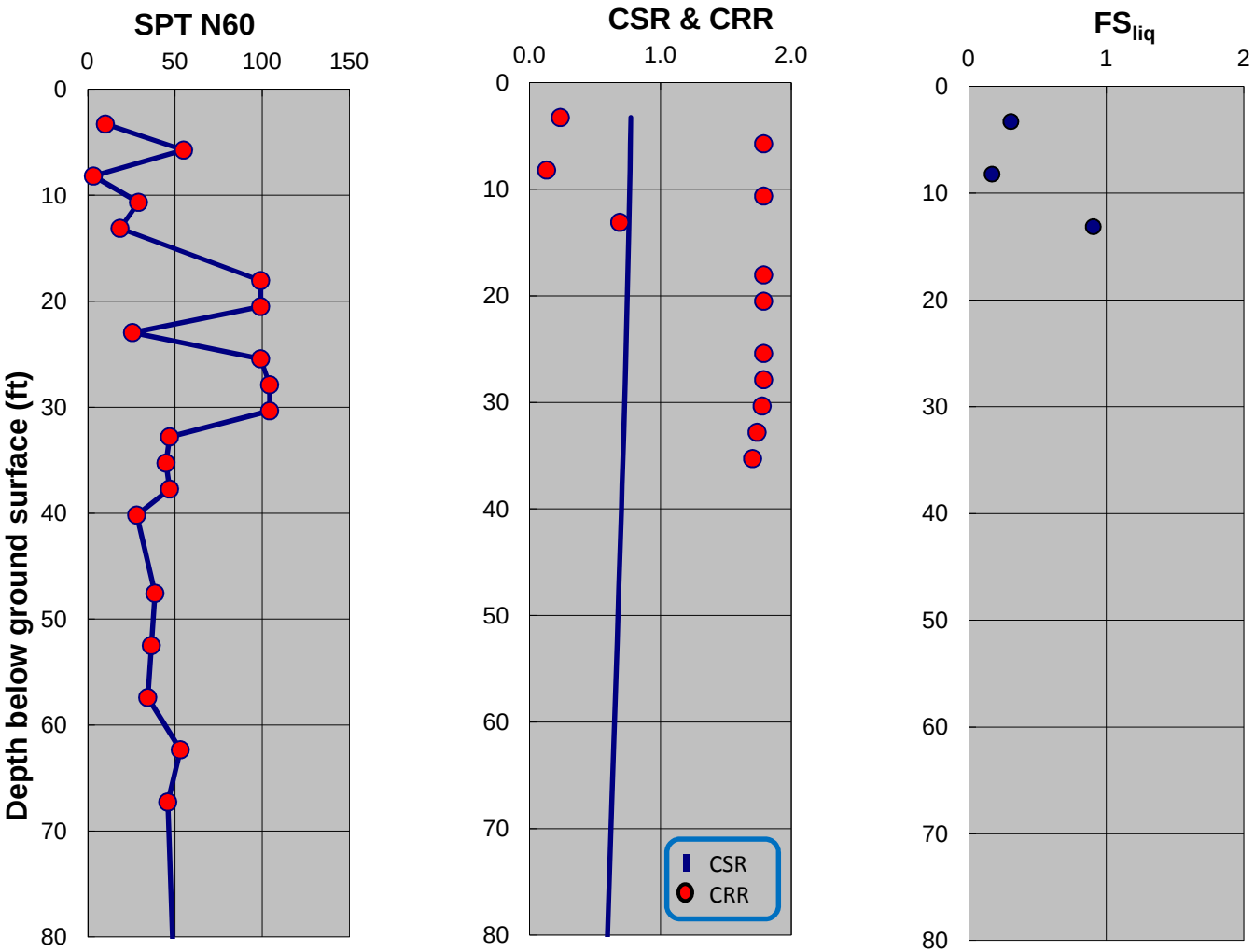
PLATE E.4



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-04 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

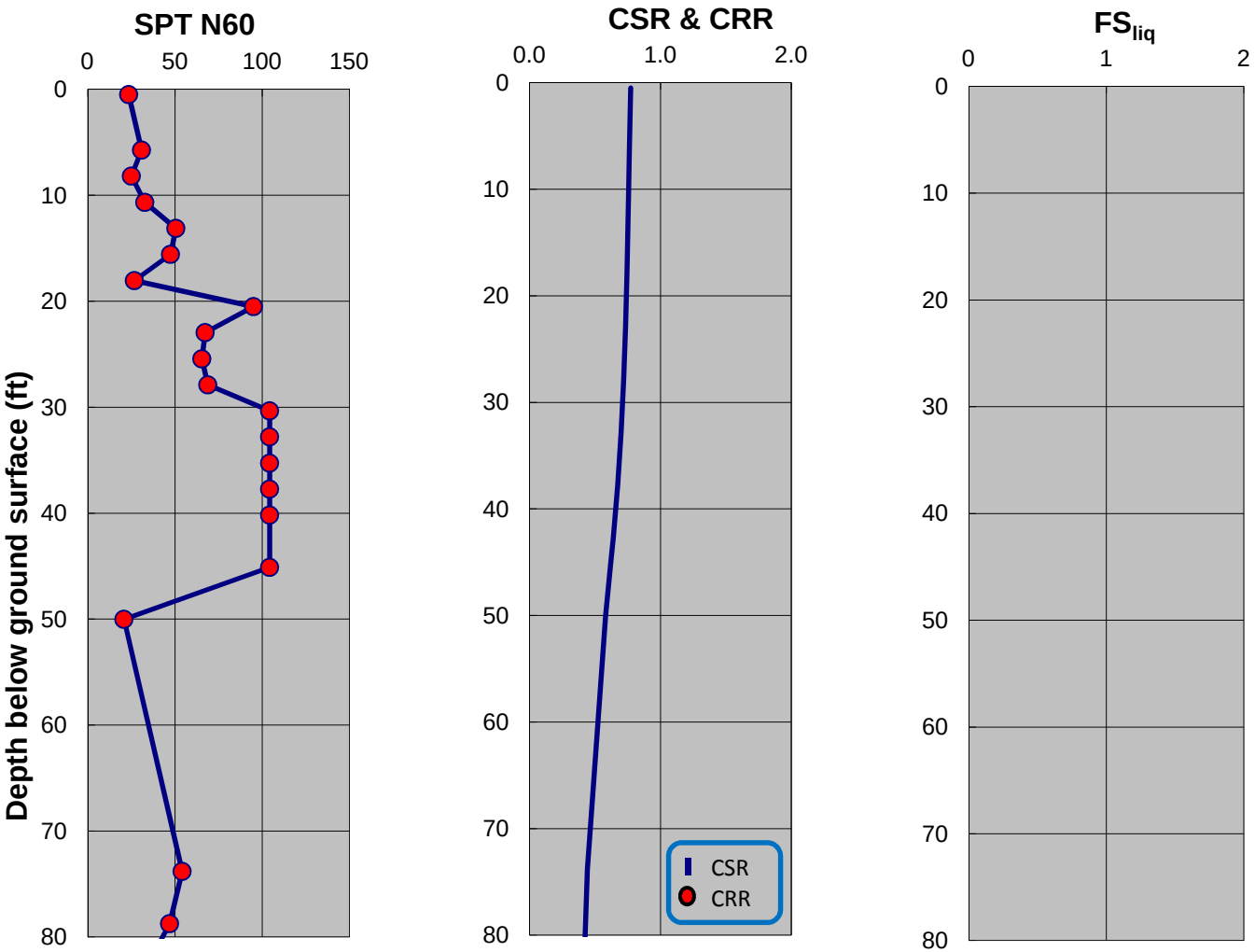
PLATE E.5



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-04 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

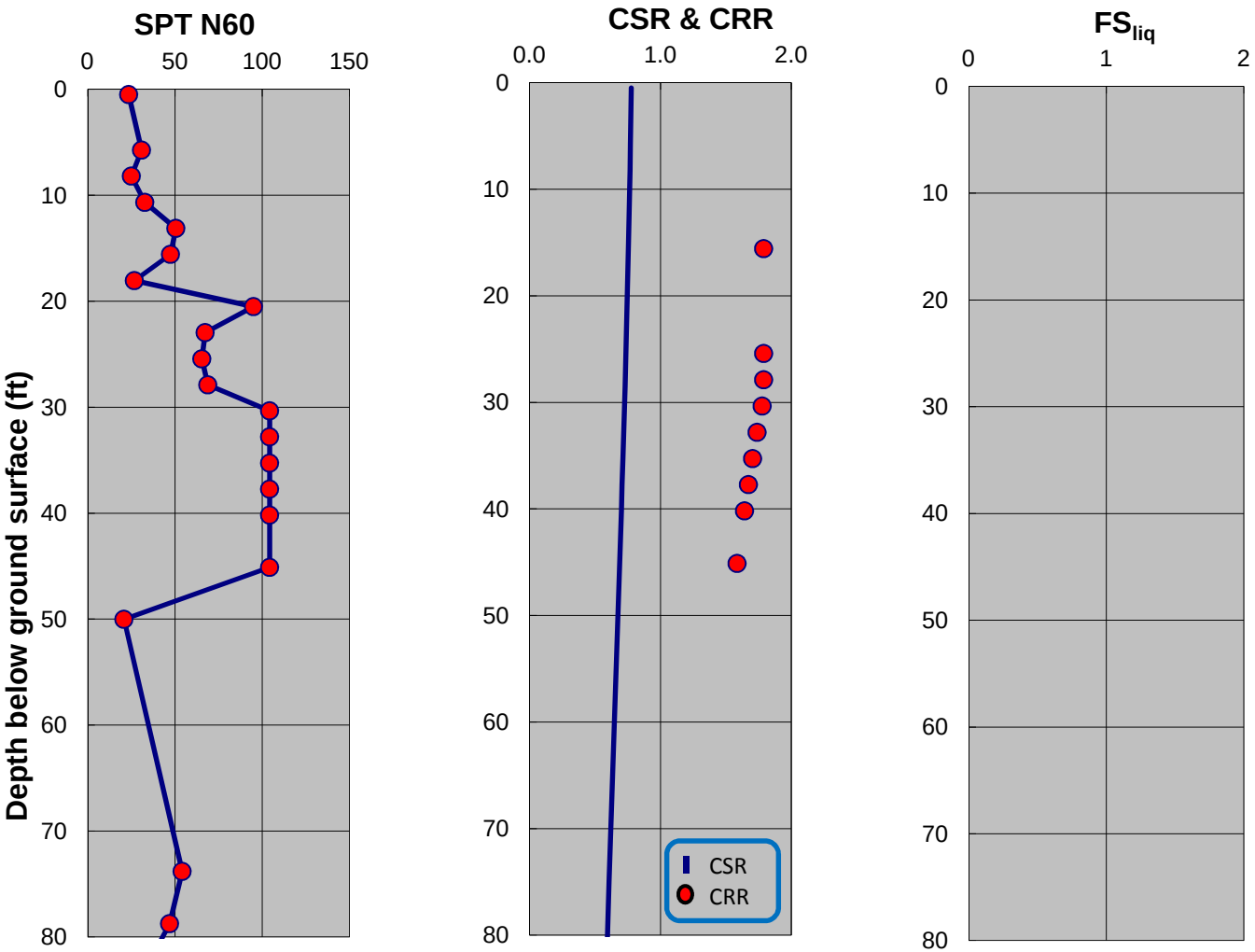
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.6



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-05 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

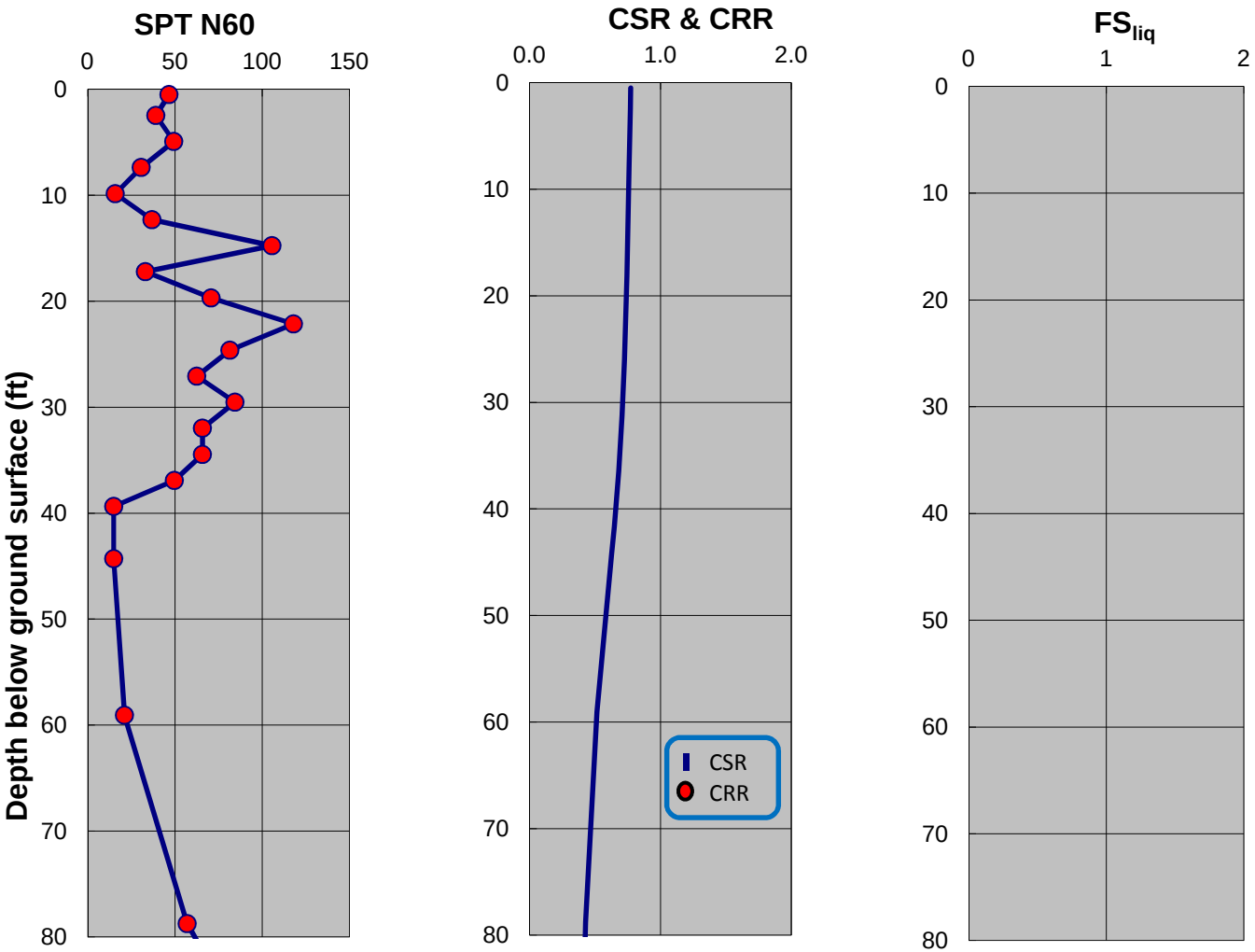
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-05 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

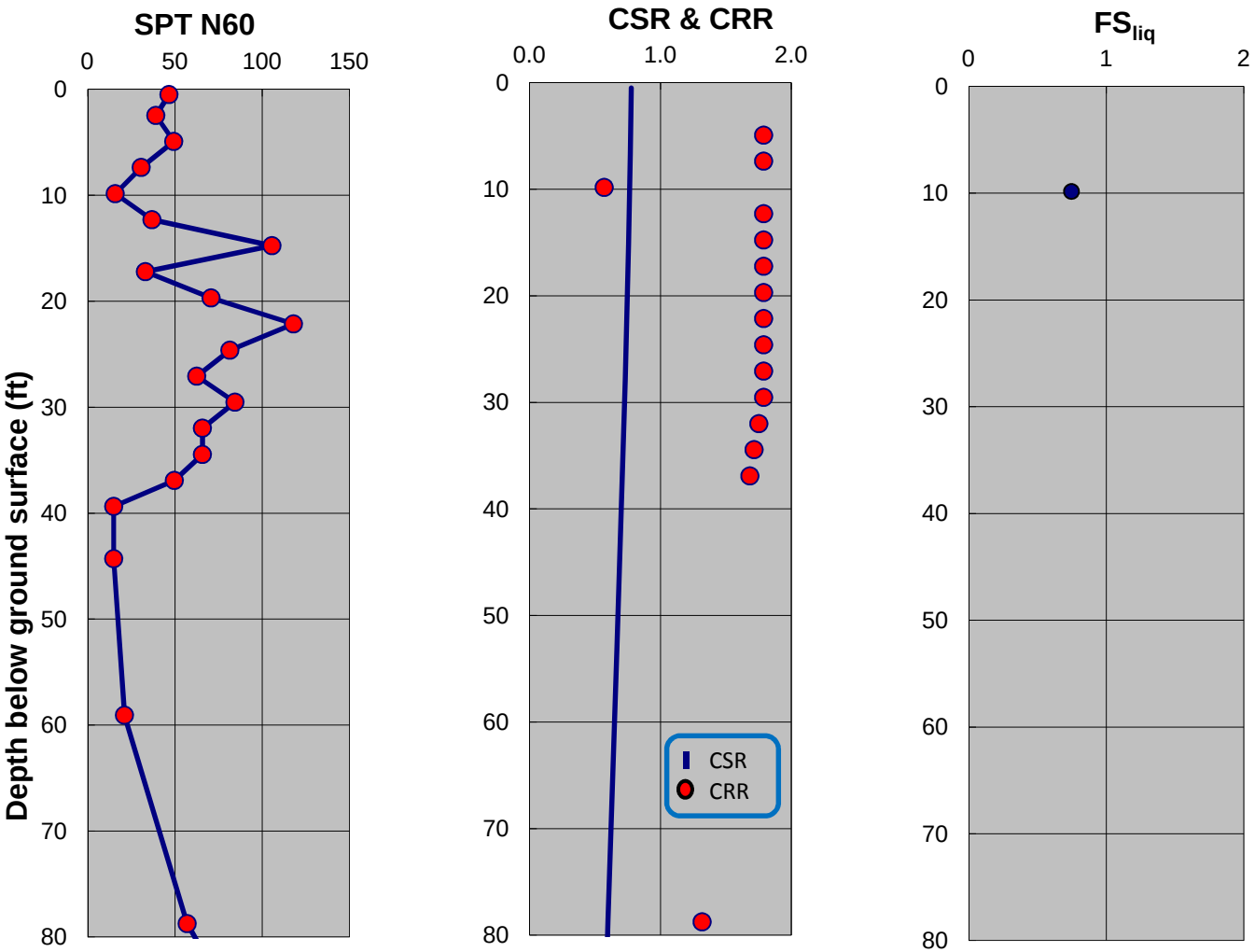
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.8



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-06 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

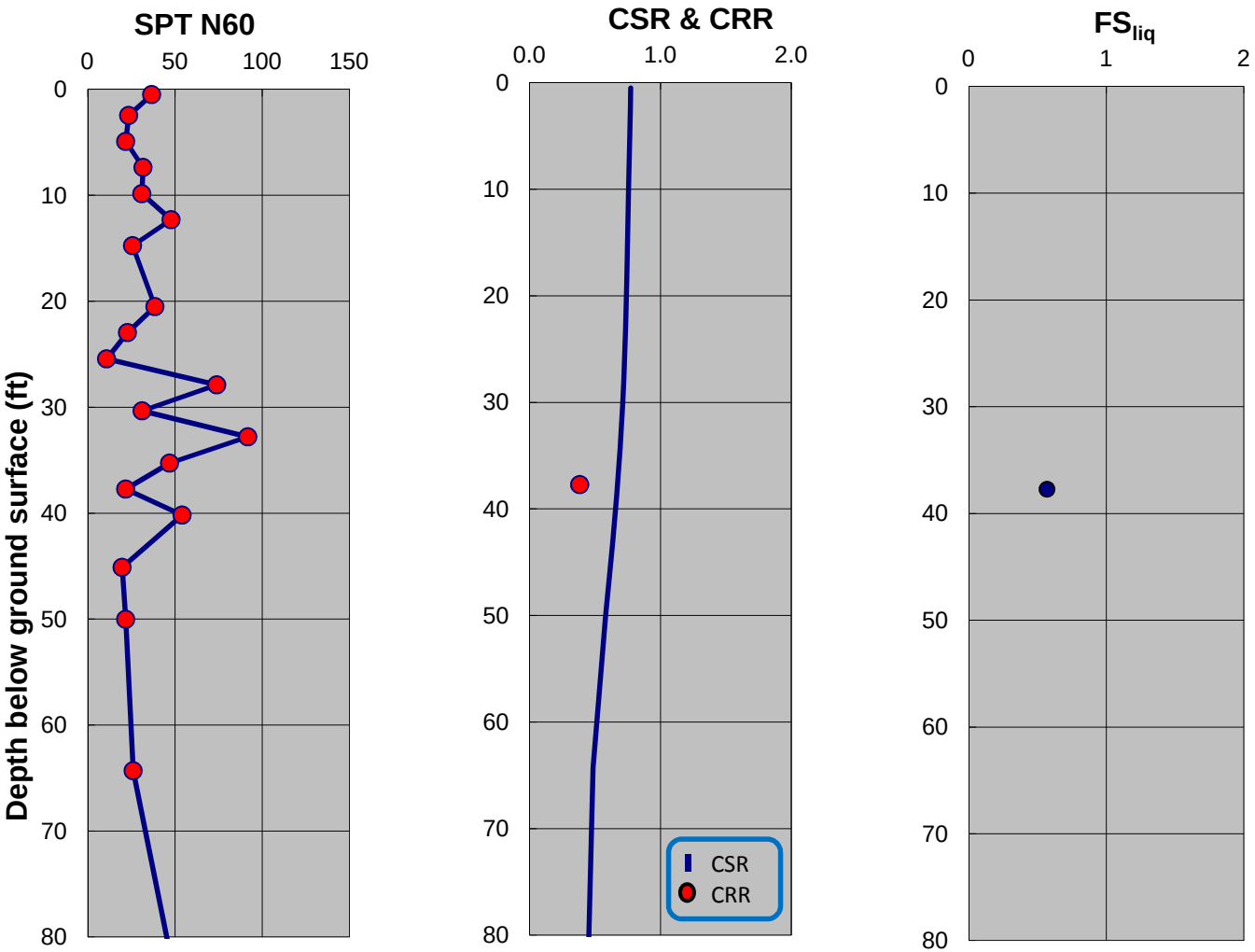
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-06 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

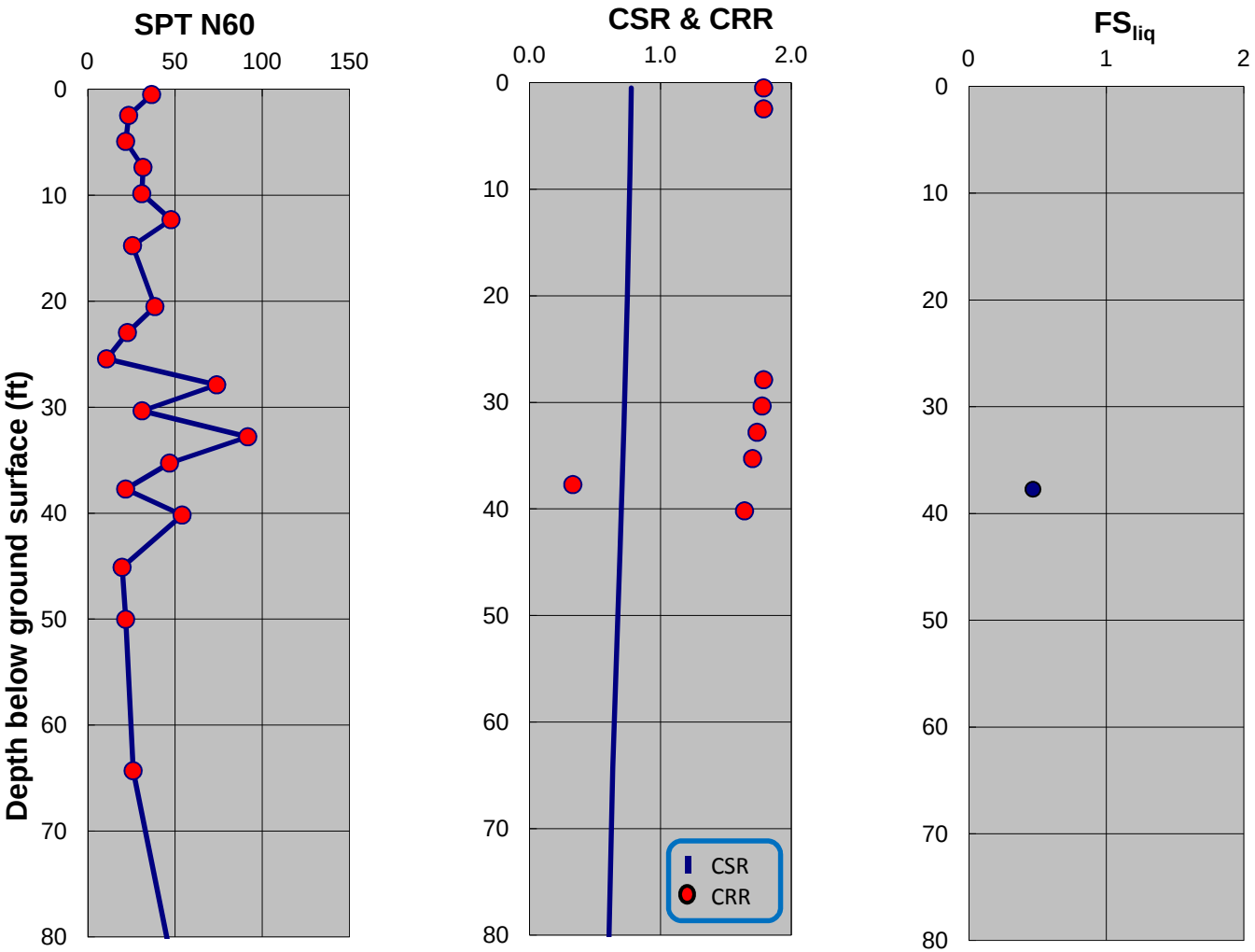
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.10



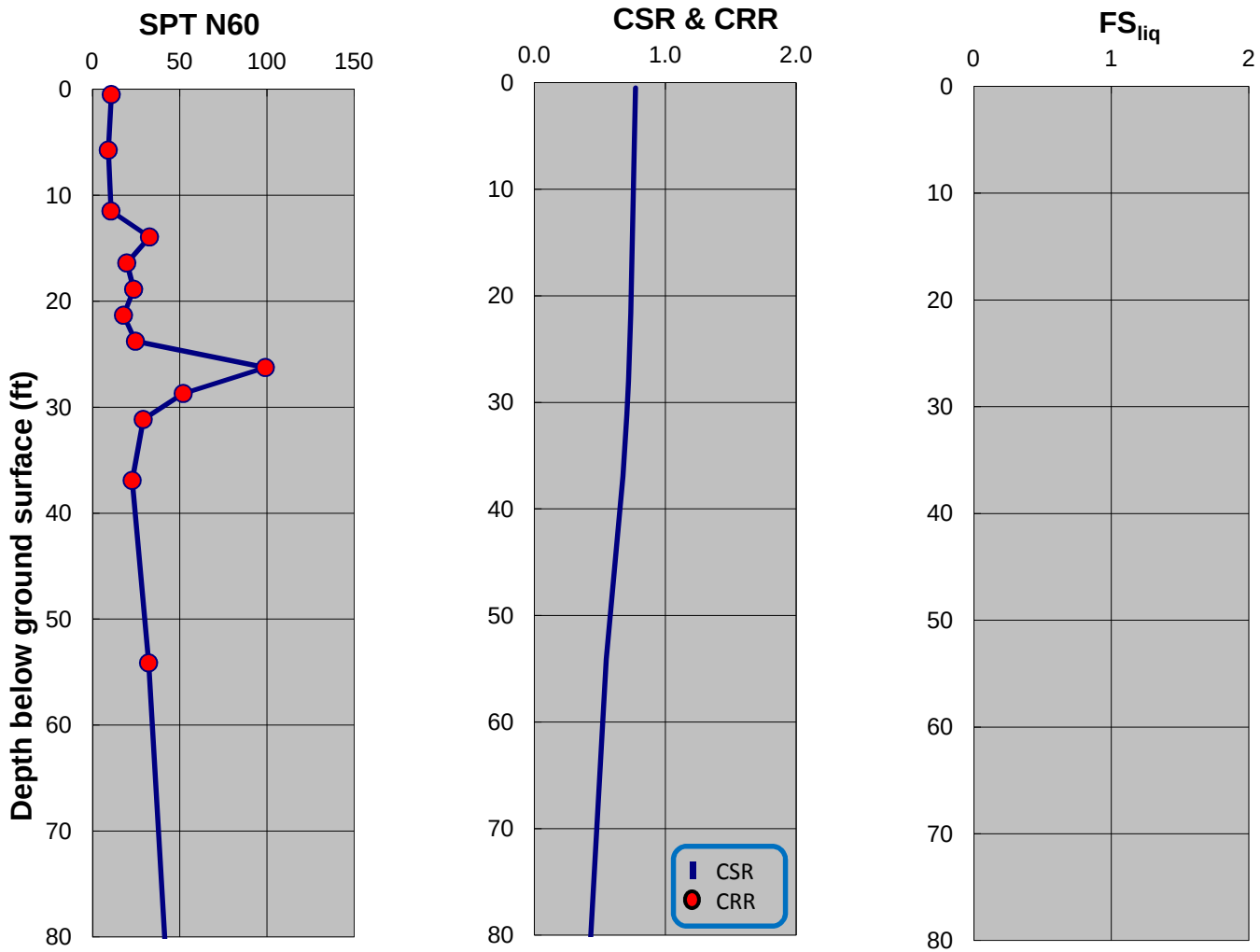
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-08 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



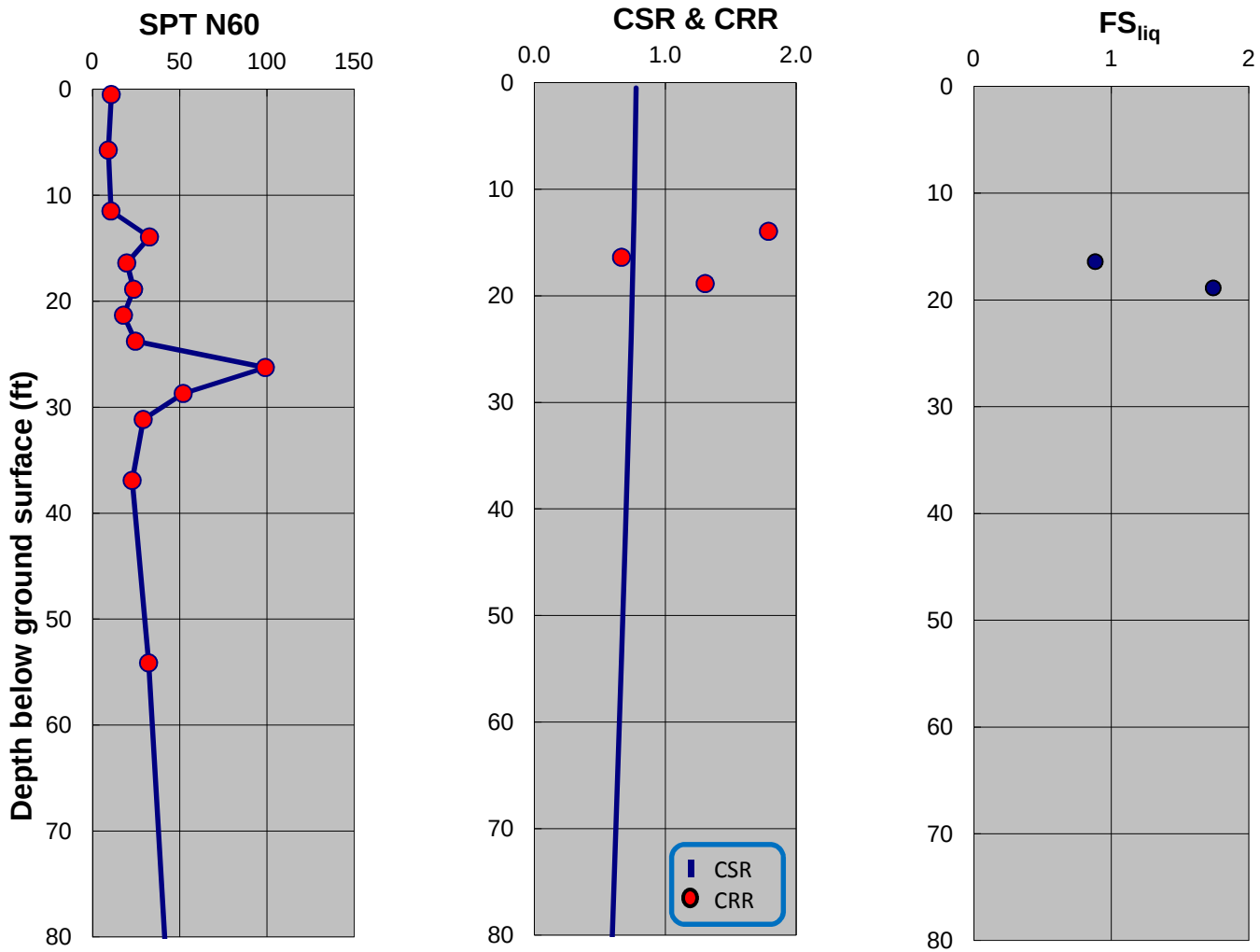
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-08 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



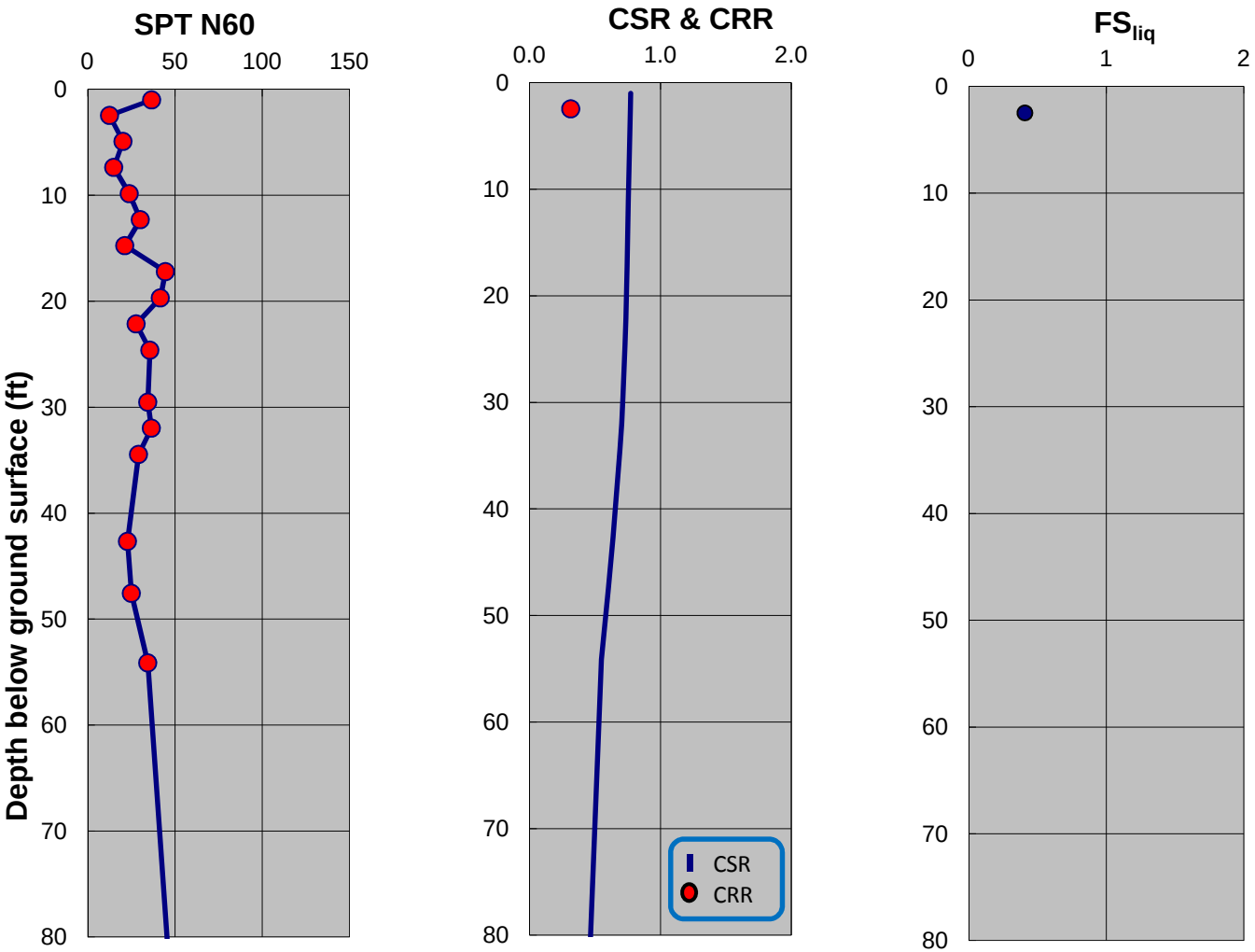
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-09 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



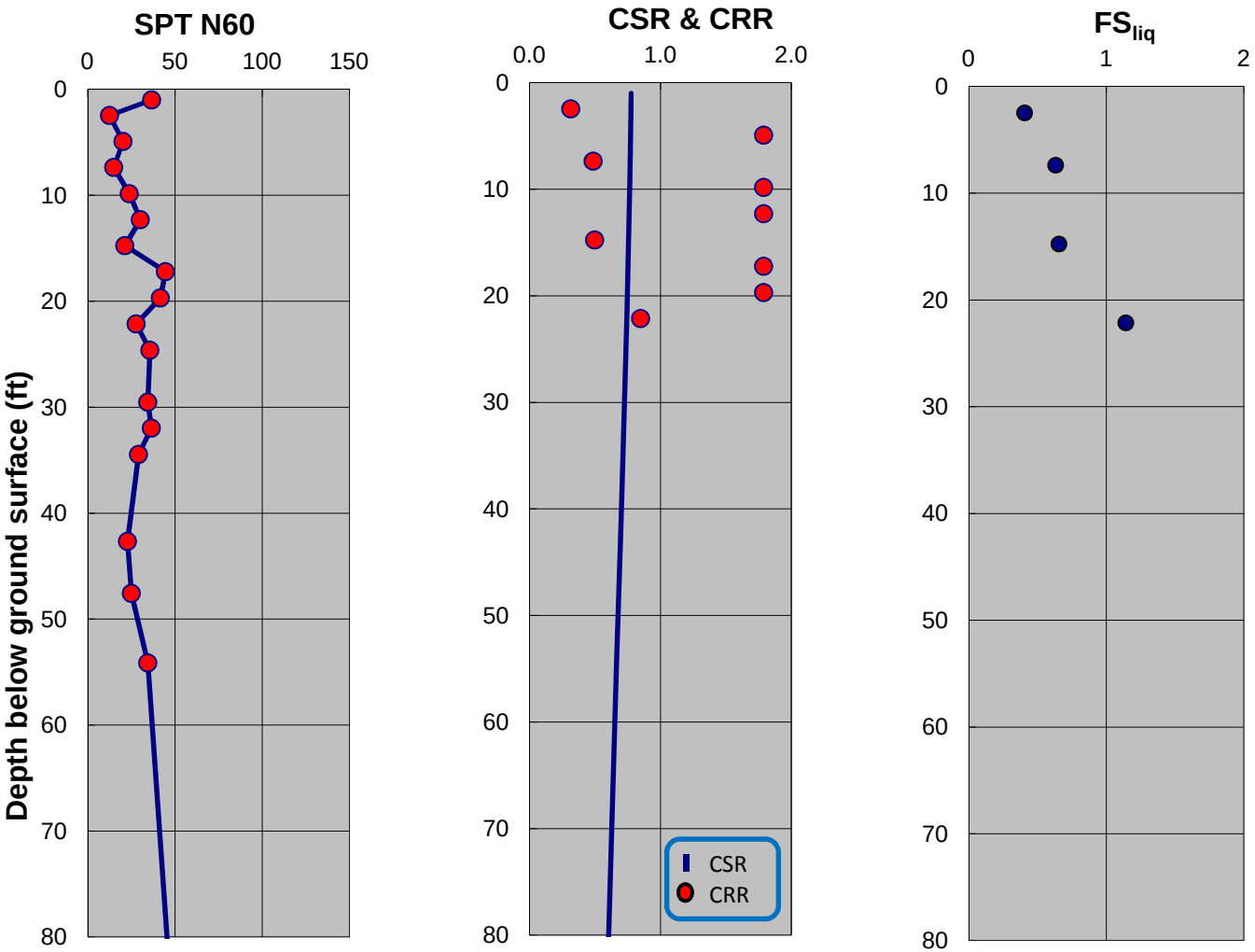
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-09 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



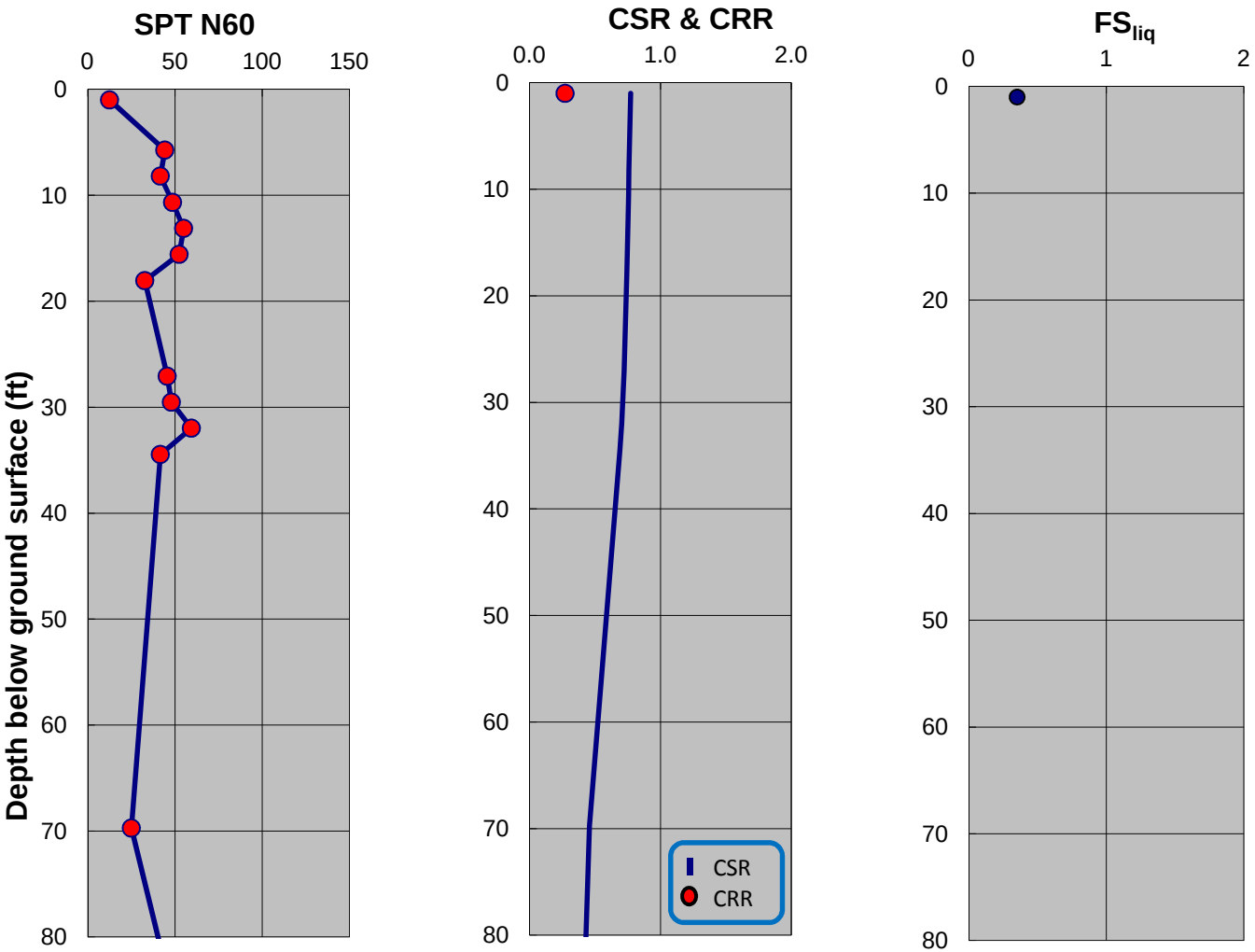
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-12 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



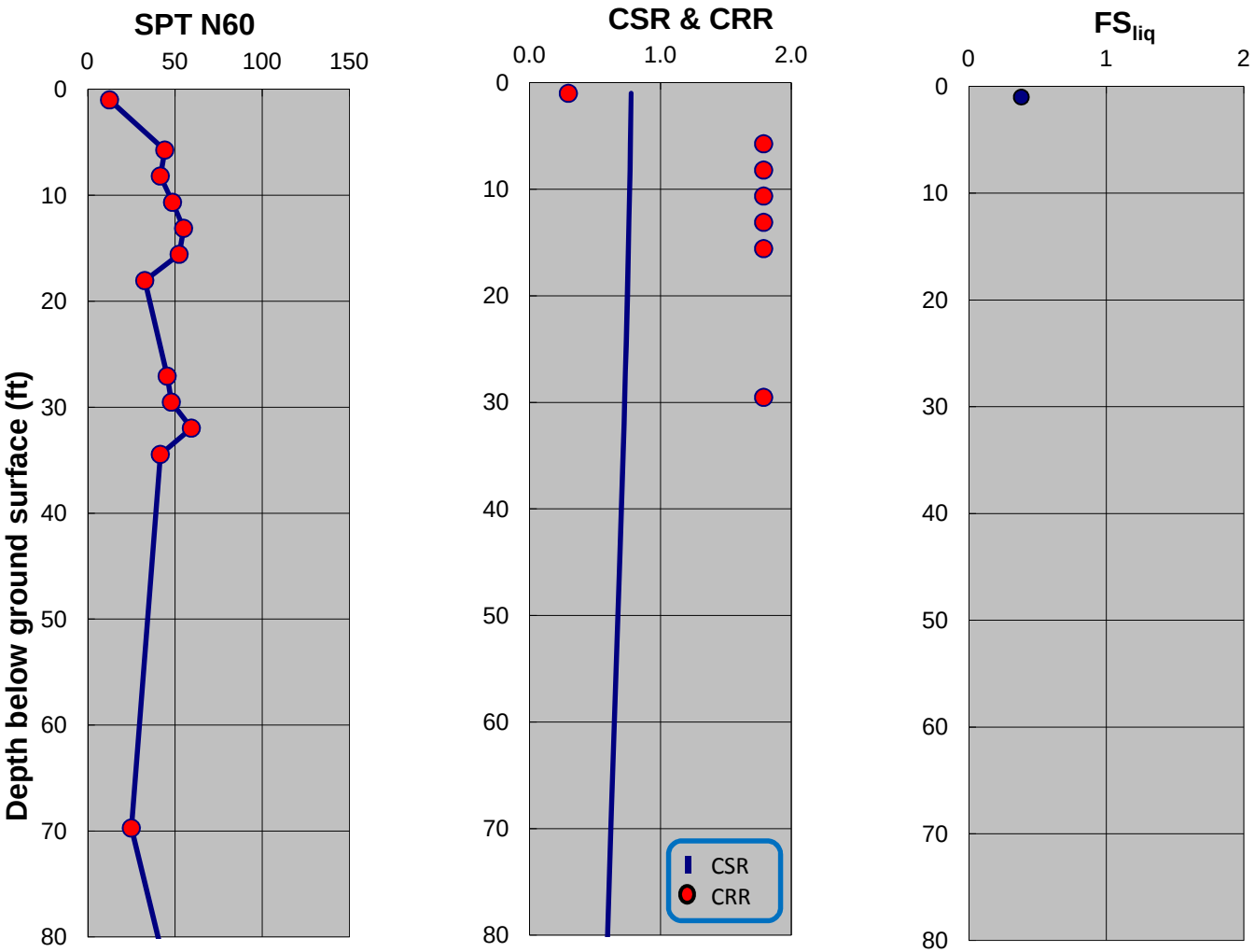
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-12 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



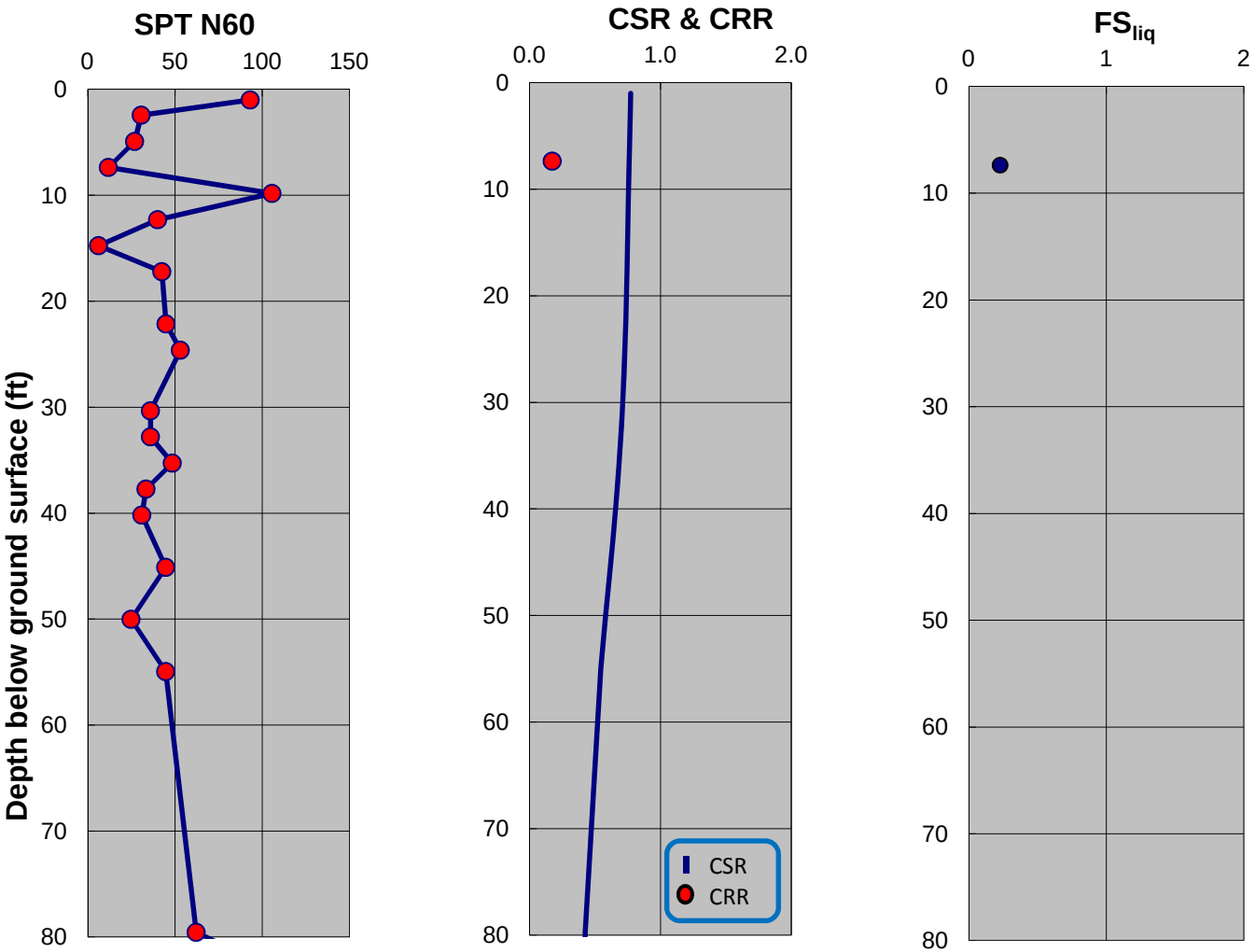
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-13 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



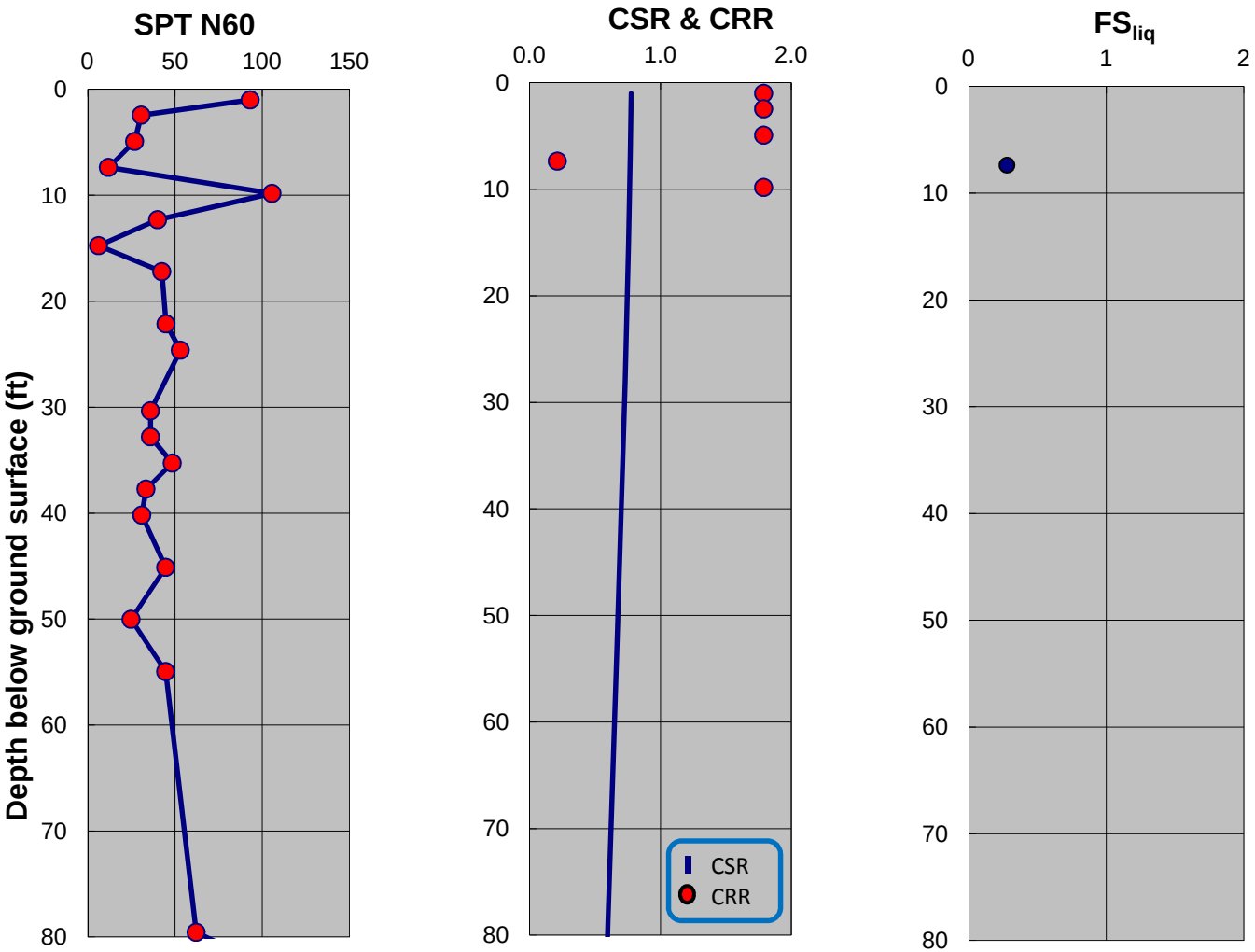
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-13 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



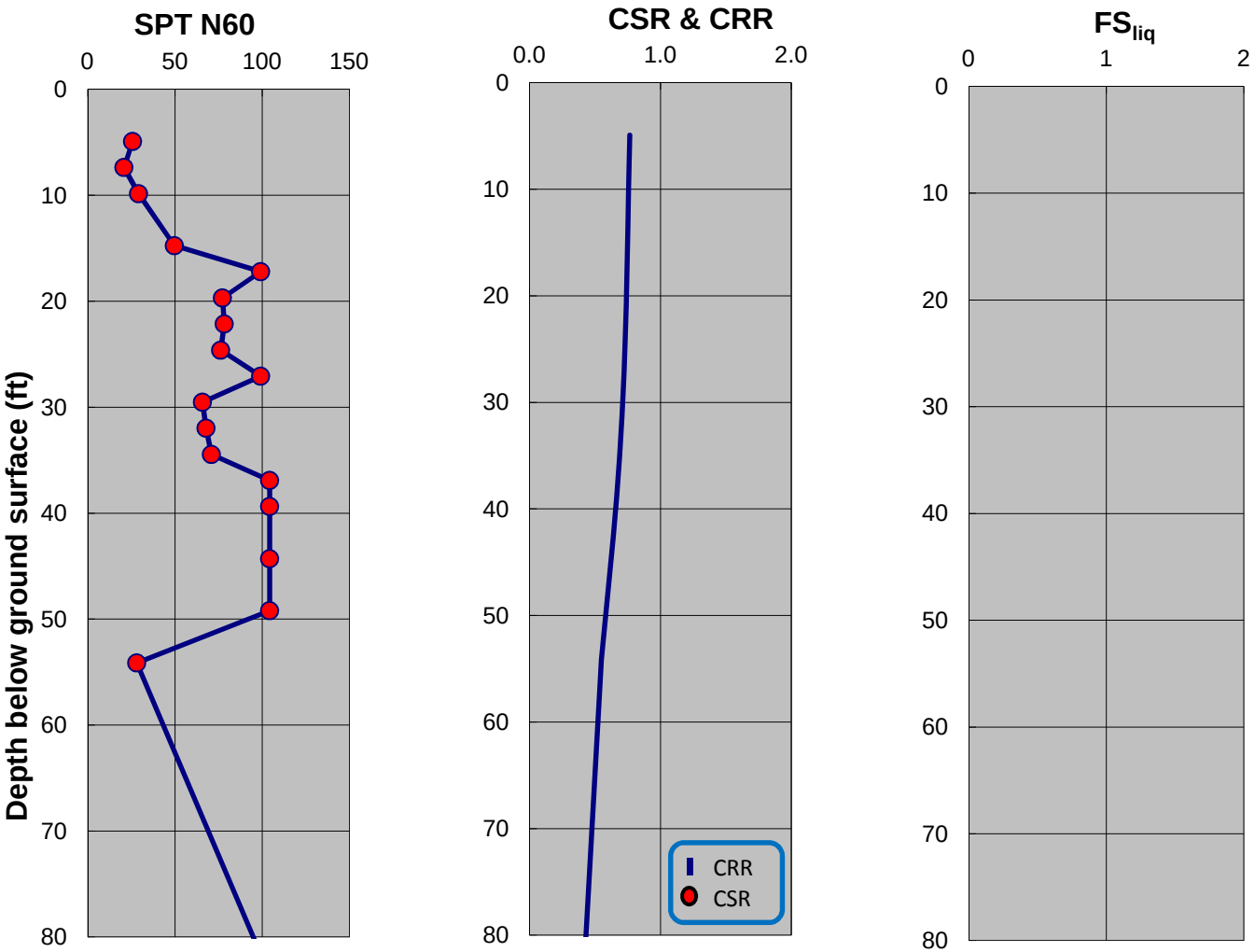
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-14 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



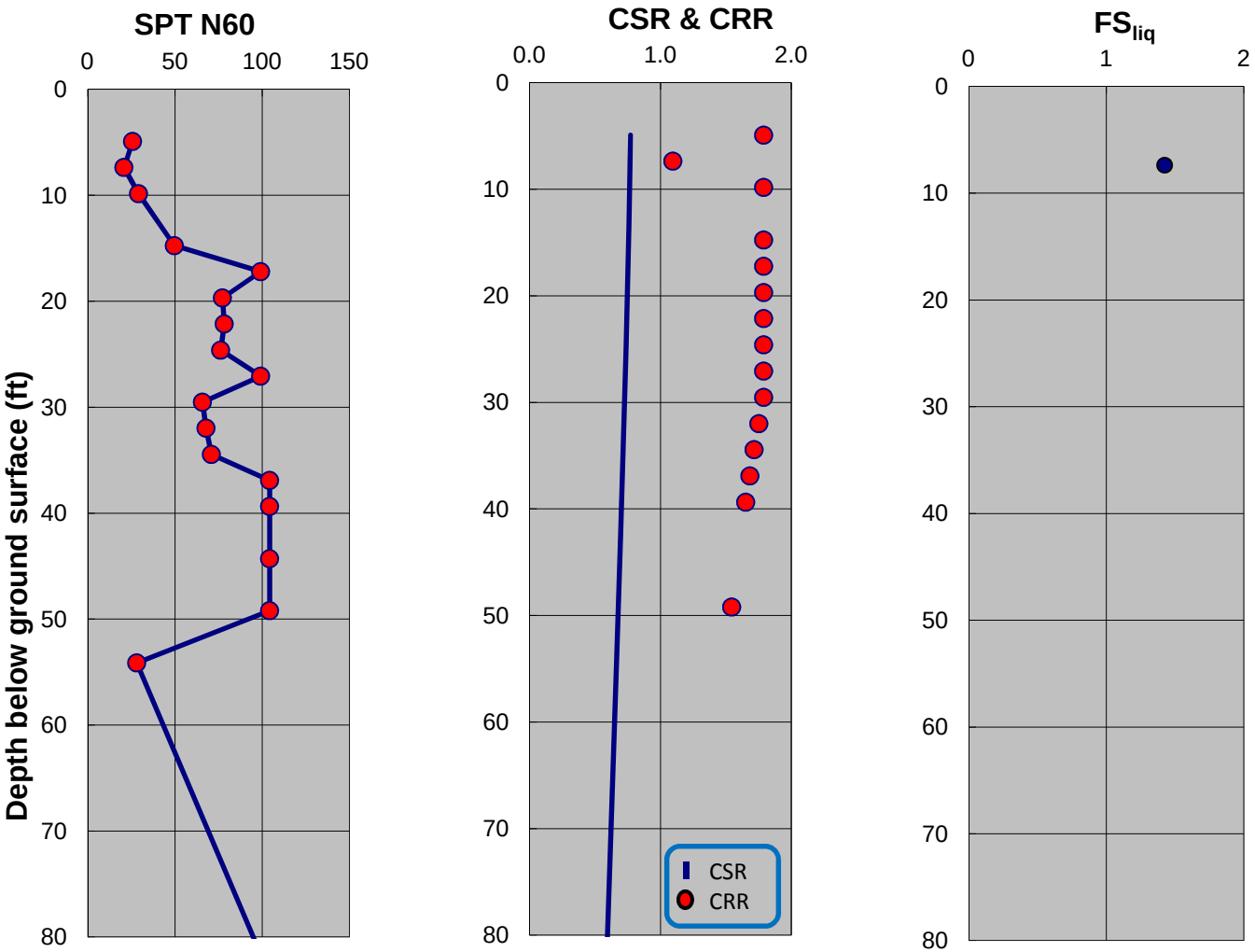
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-14 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



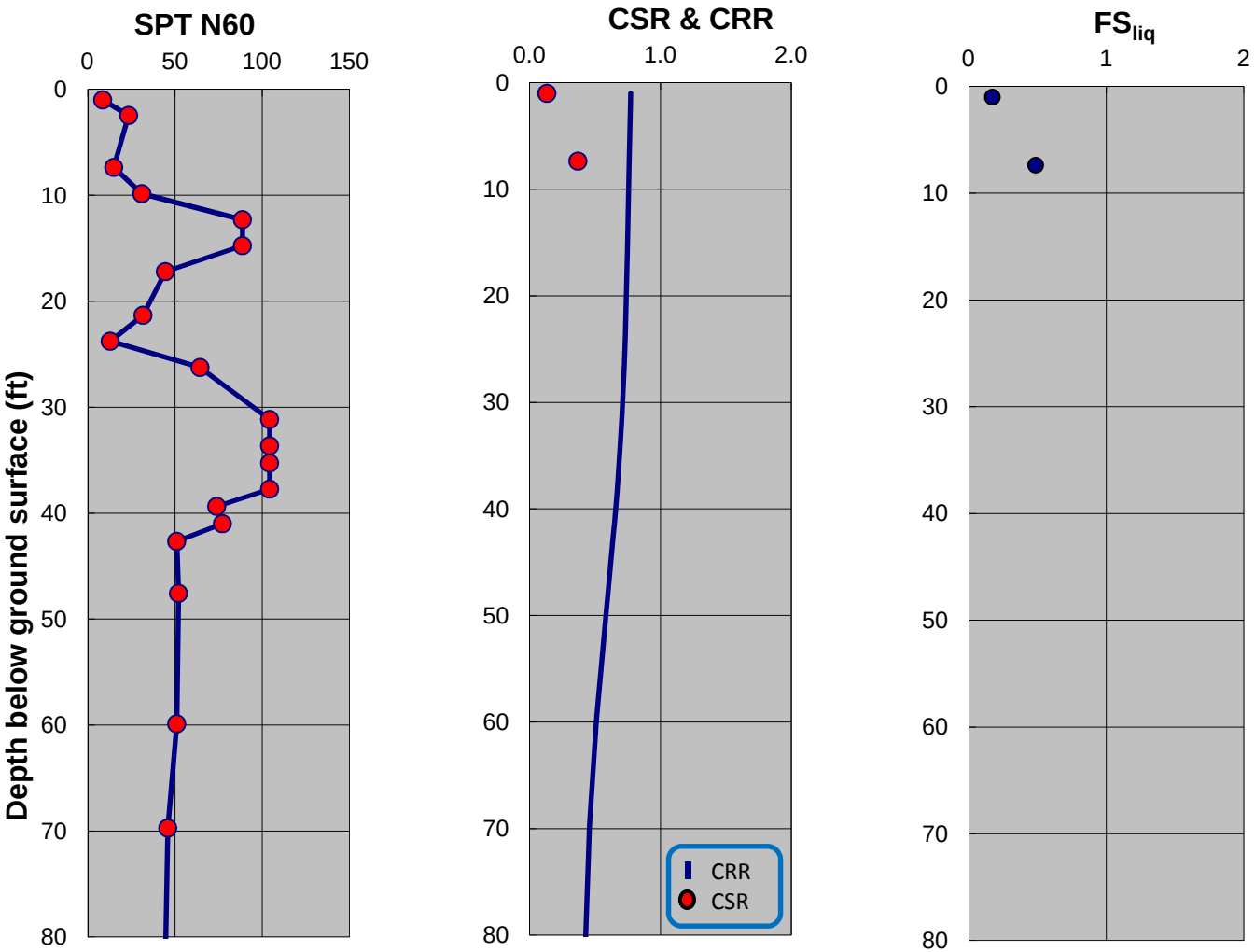
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-15 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



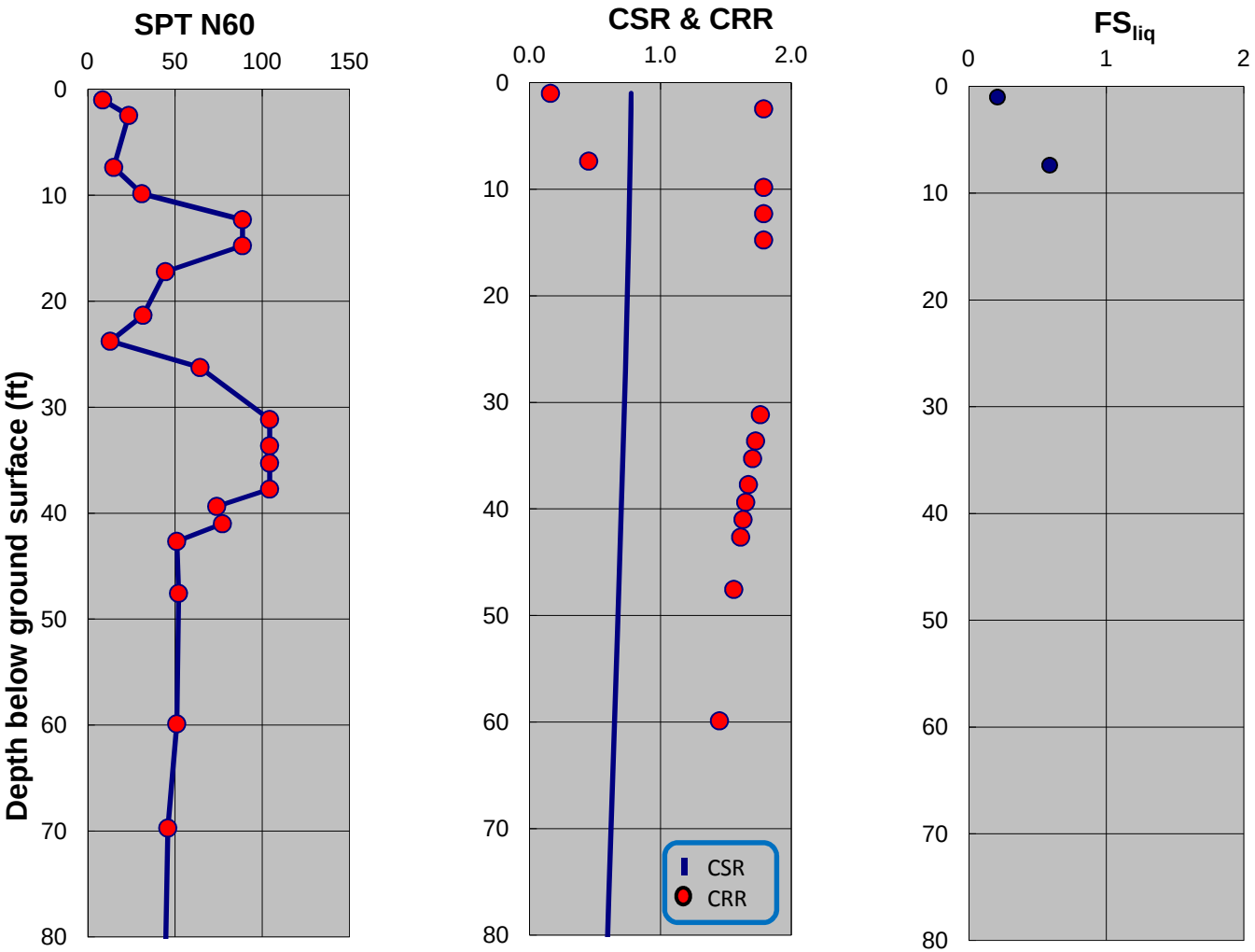
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-15 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



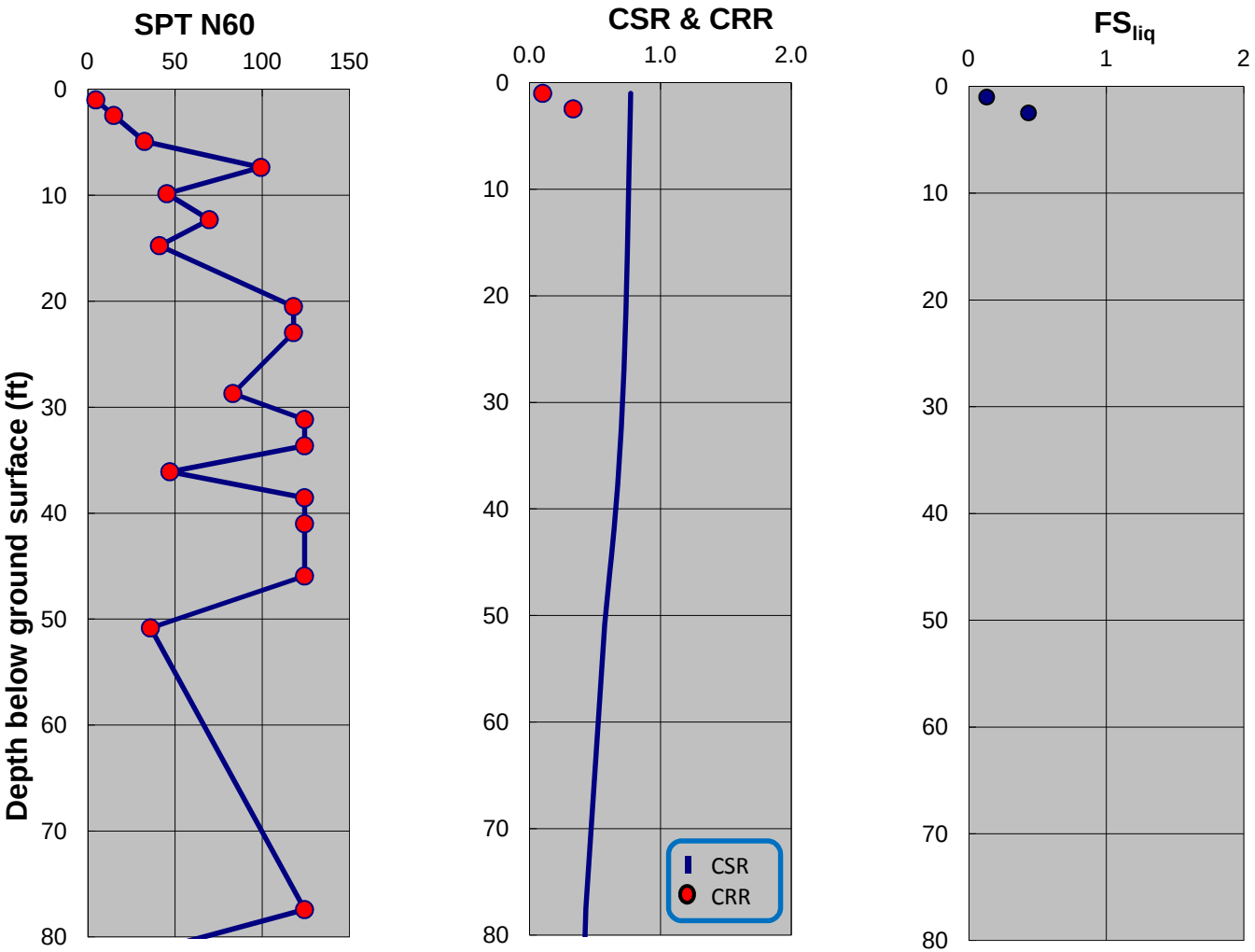
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-16 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



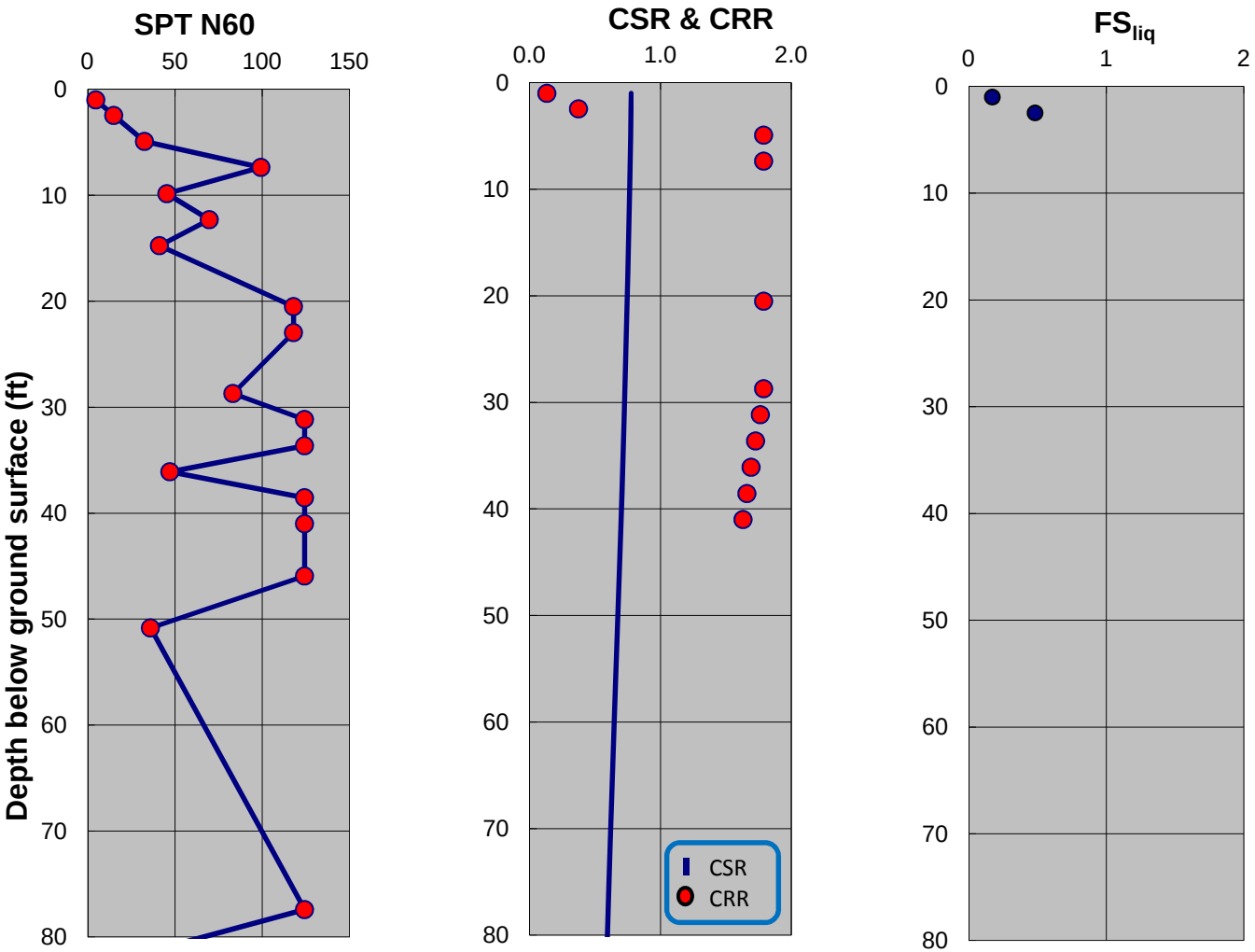
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-16 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



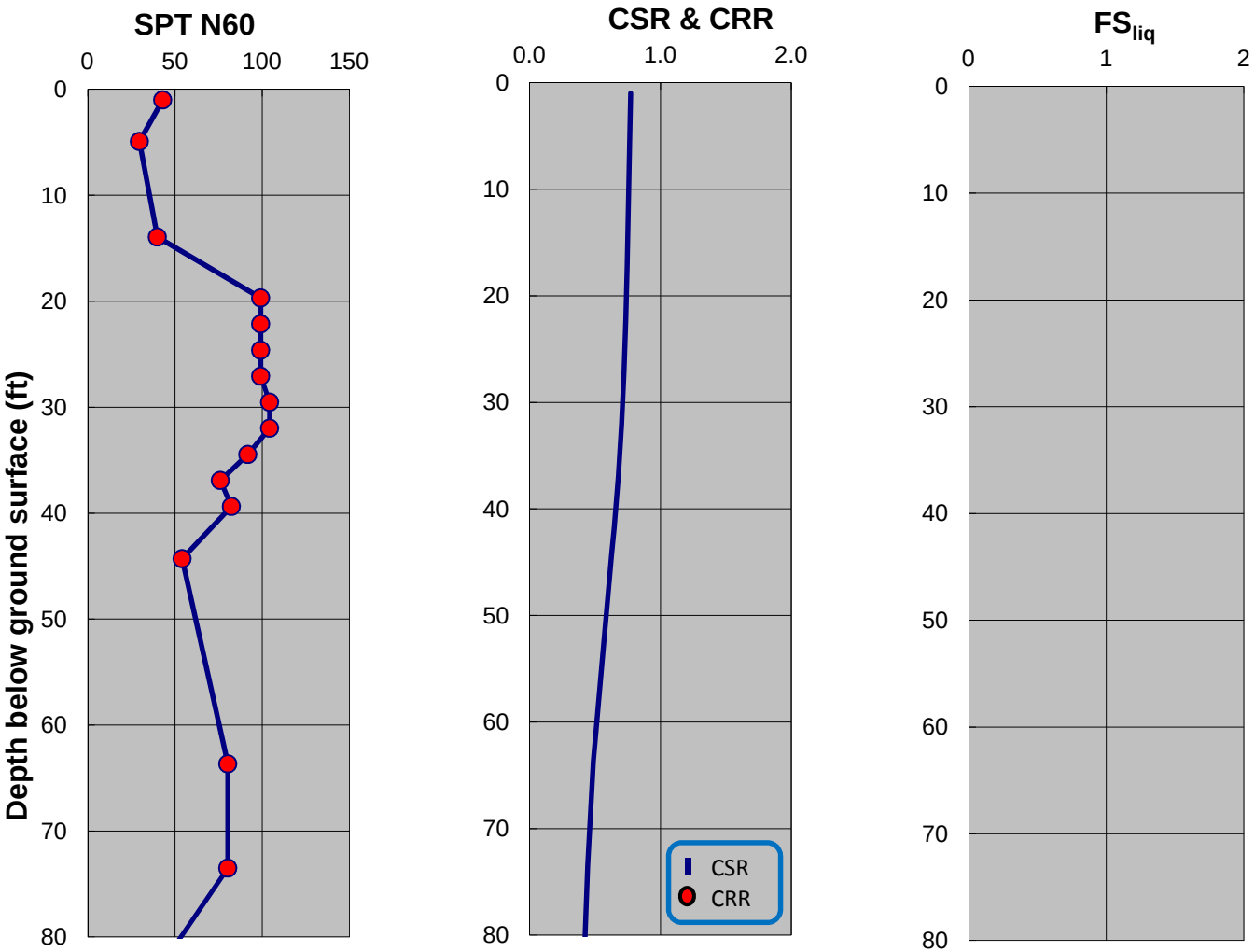
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-17 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



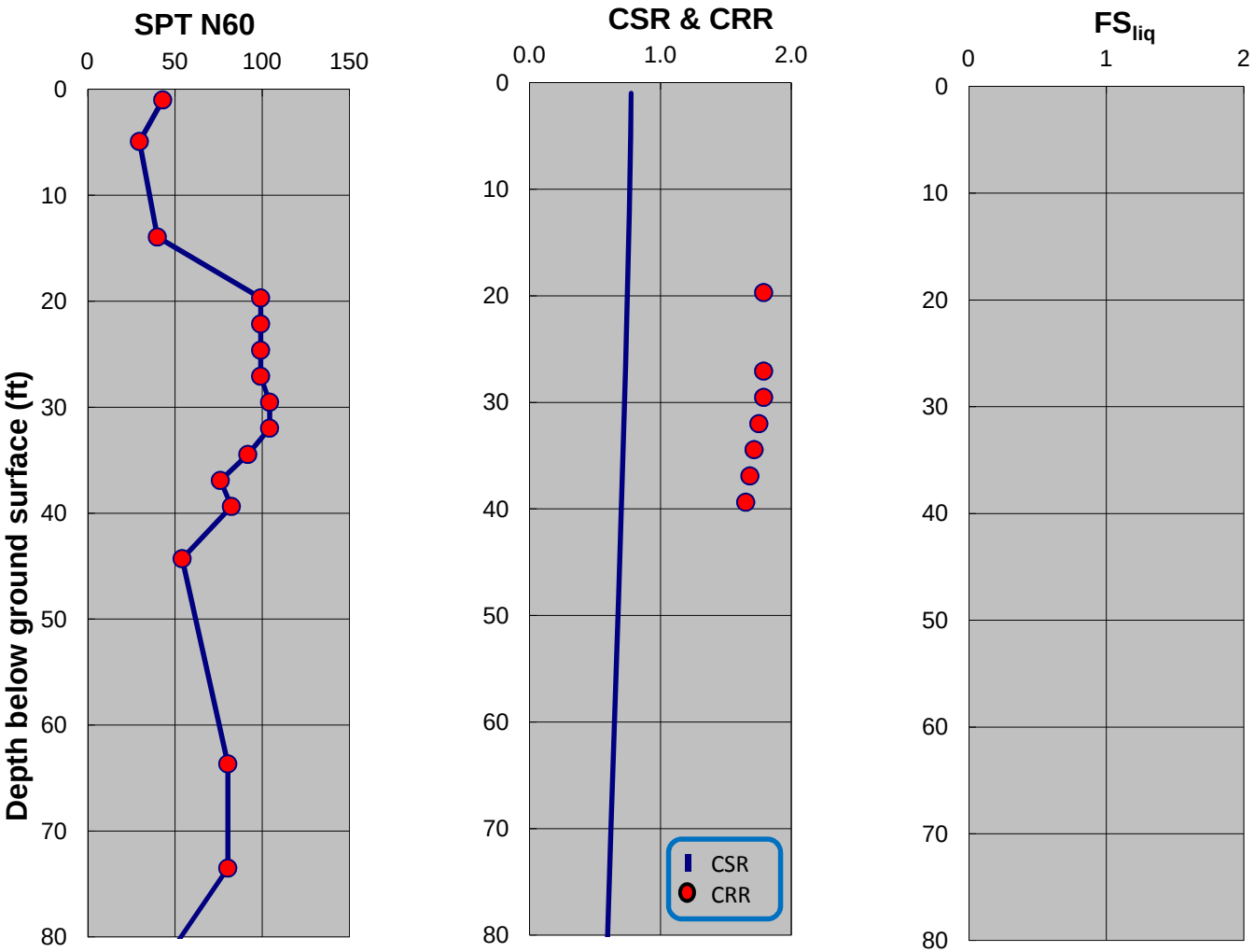
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-17 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



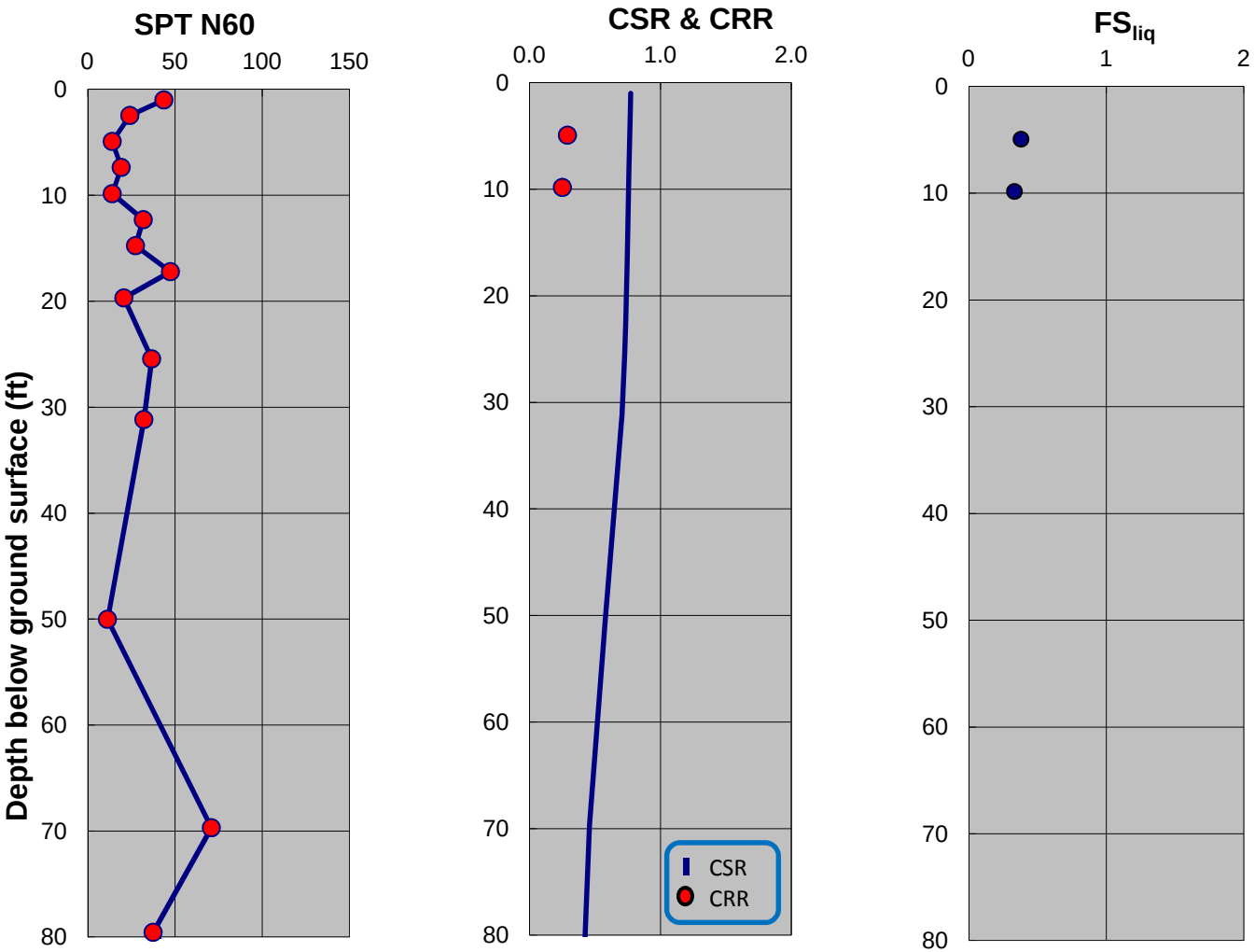
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-18 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



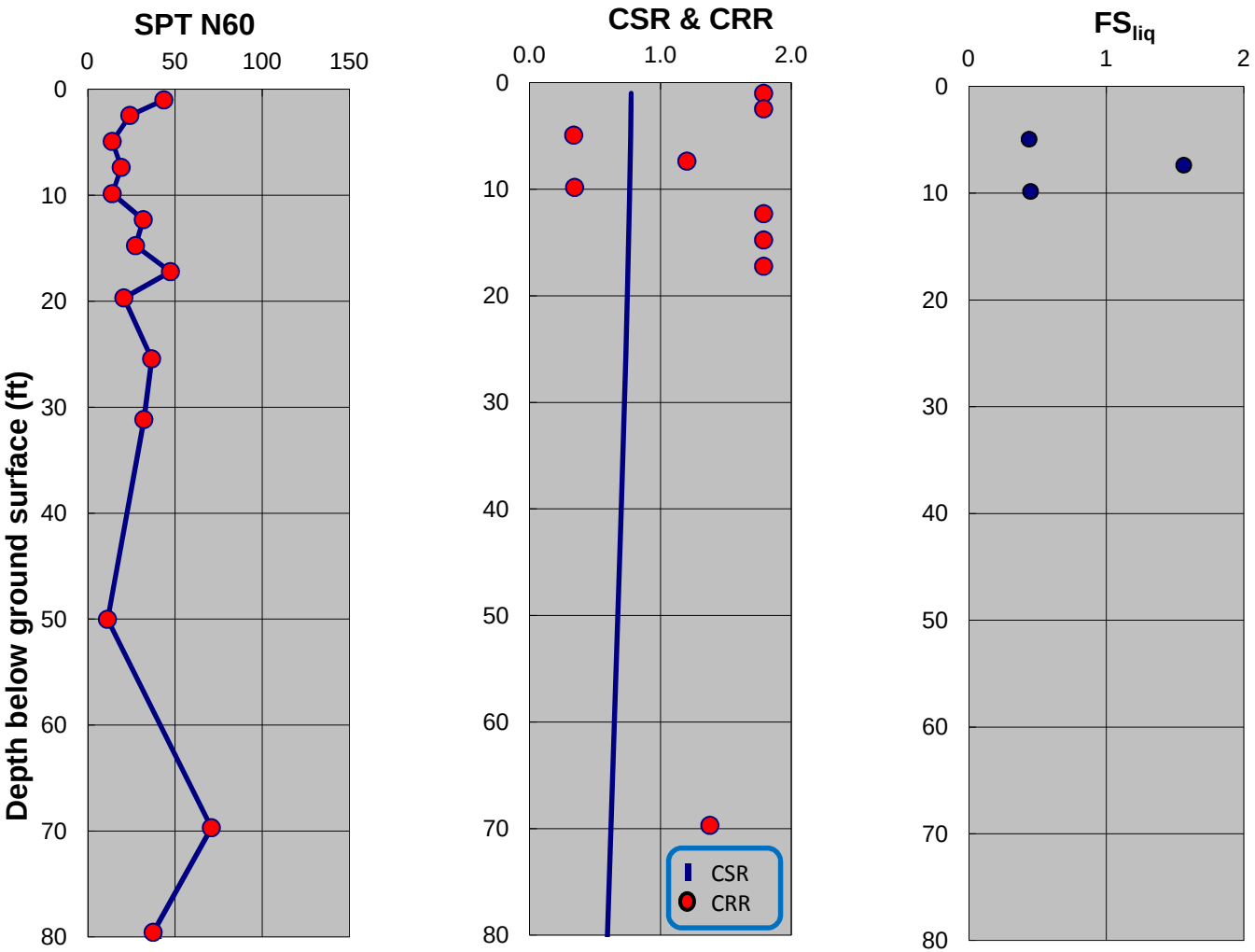
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-18 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



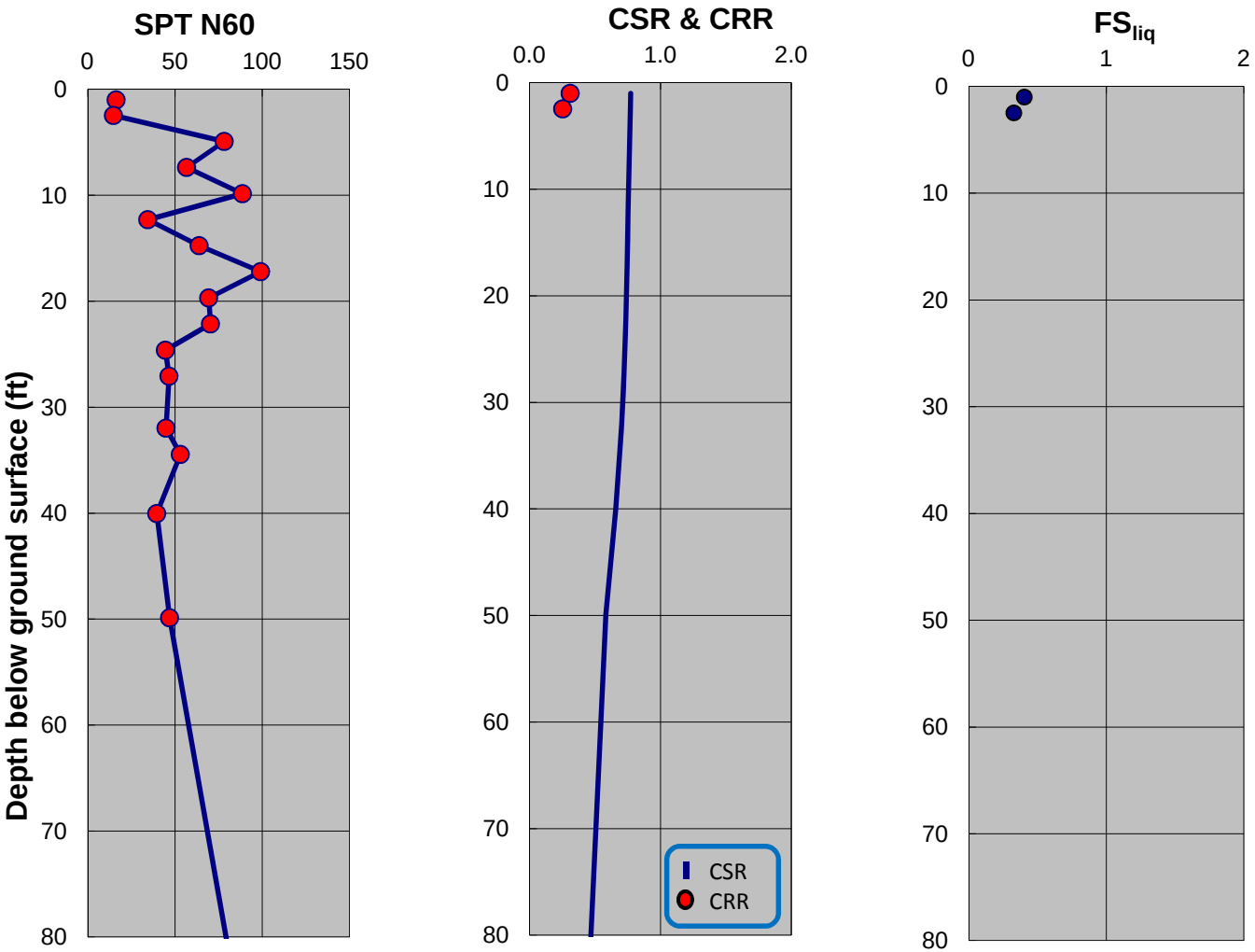
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-19 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



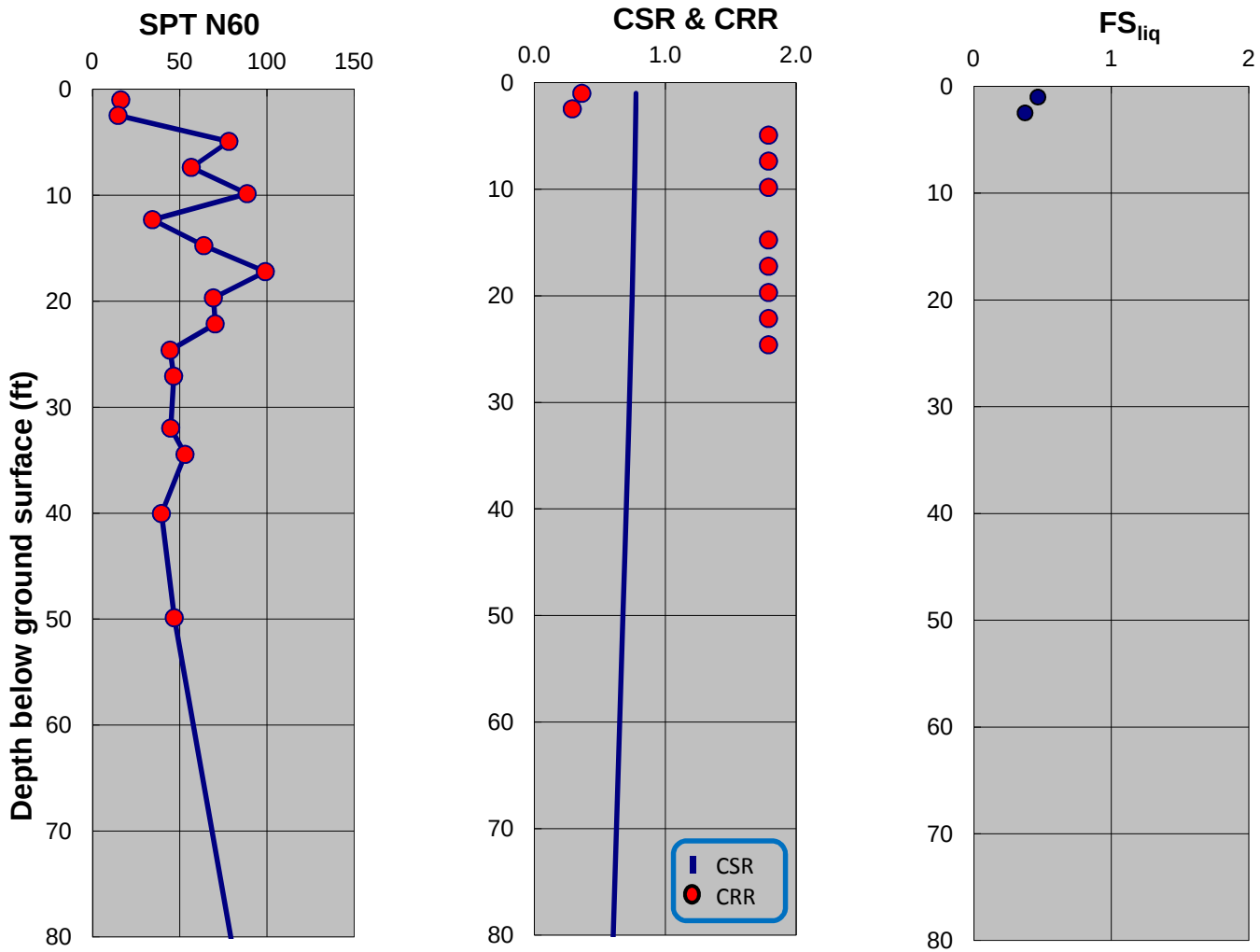
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-19 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



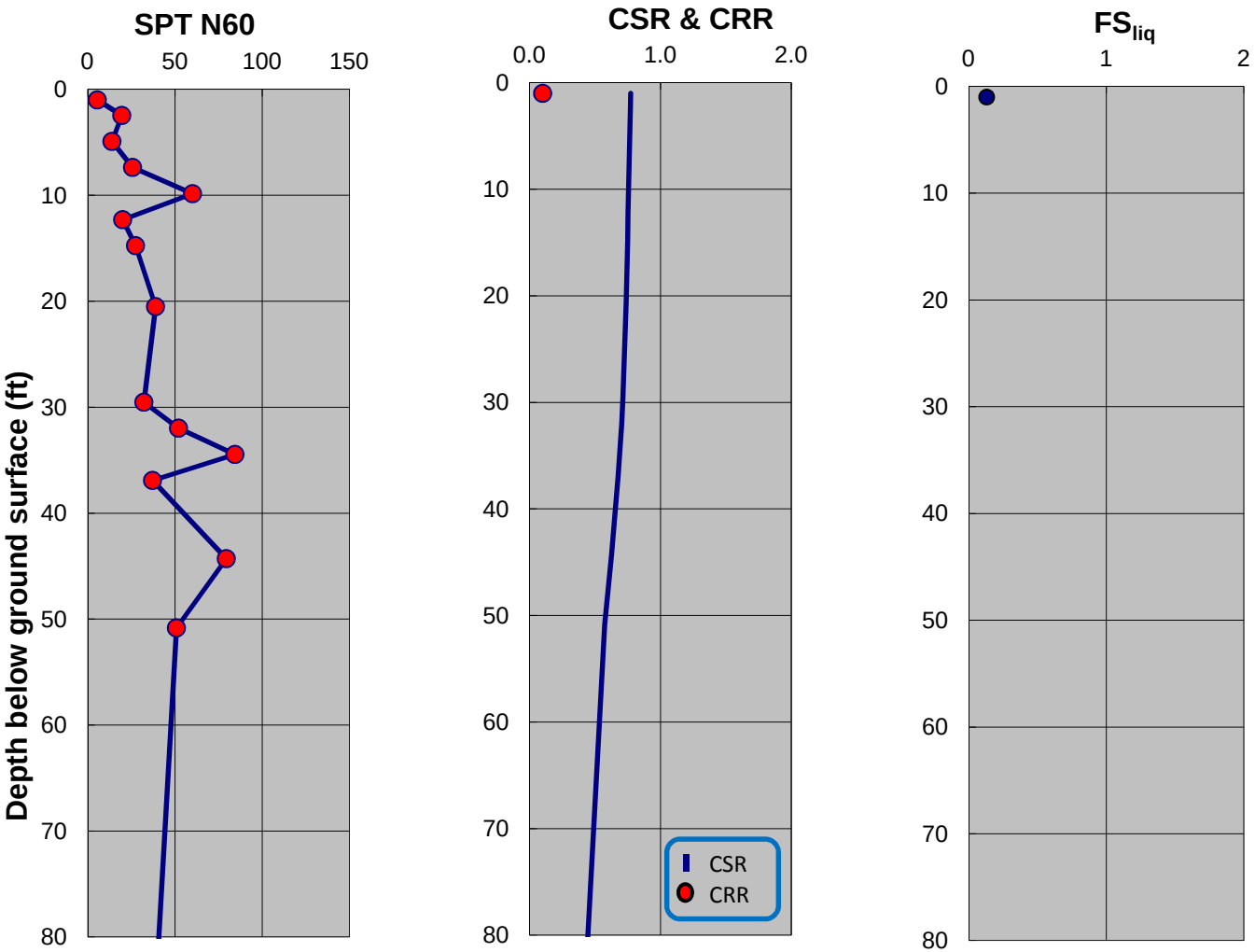
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-20 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



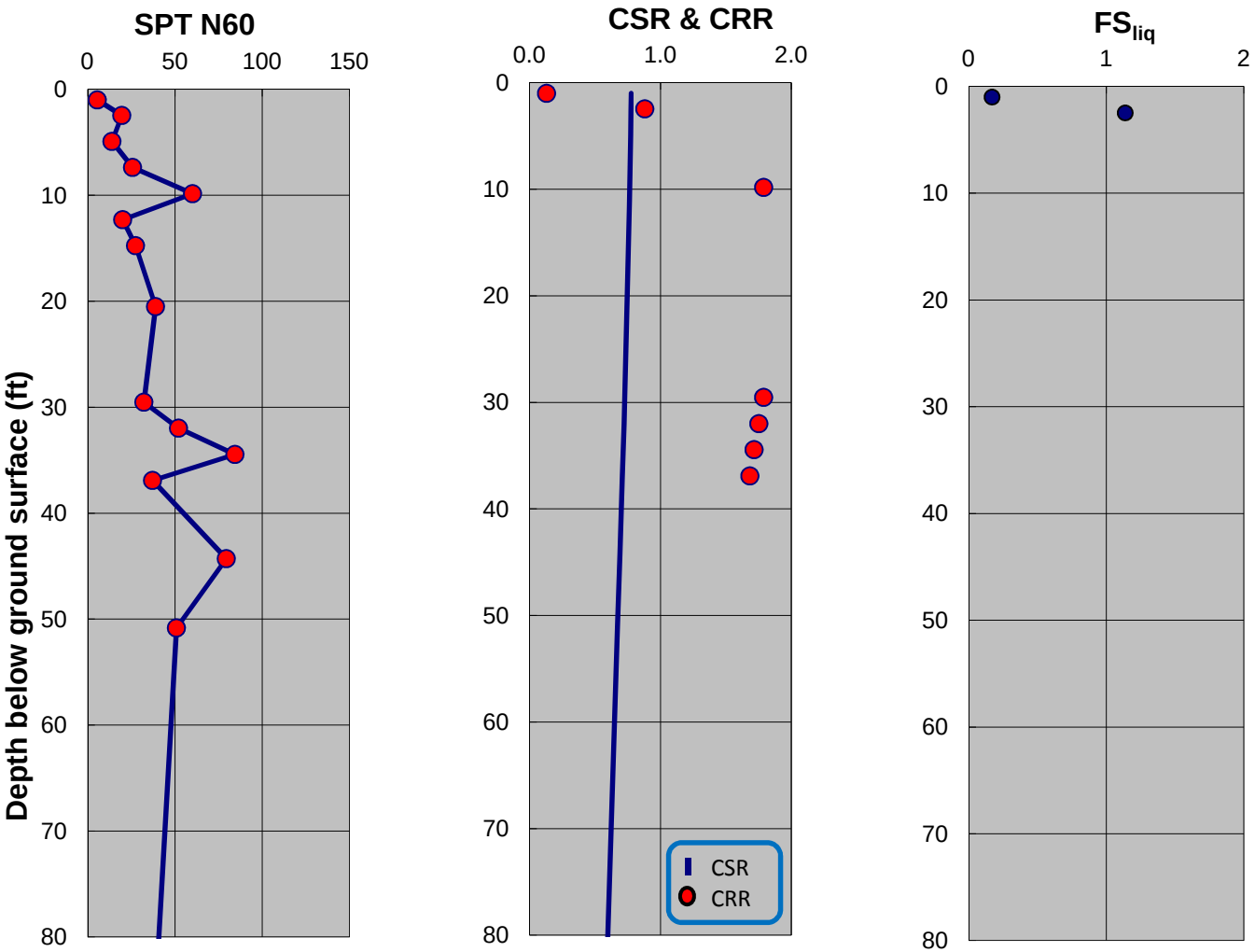
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-20 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



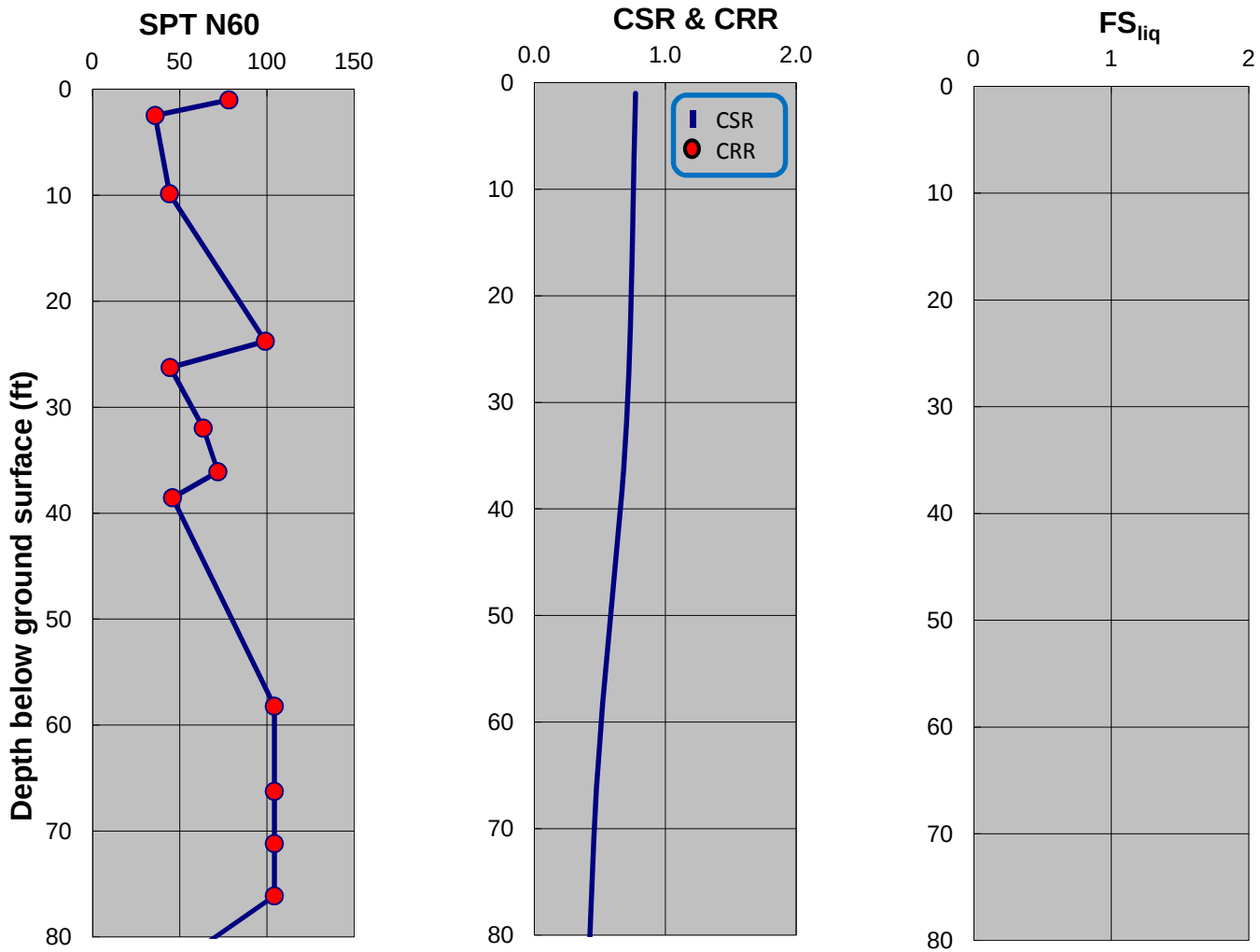
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-21 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



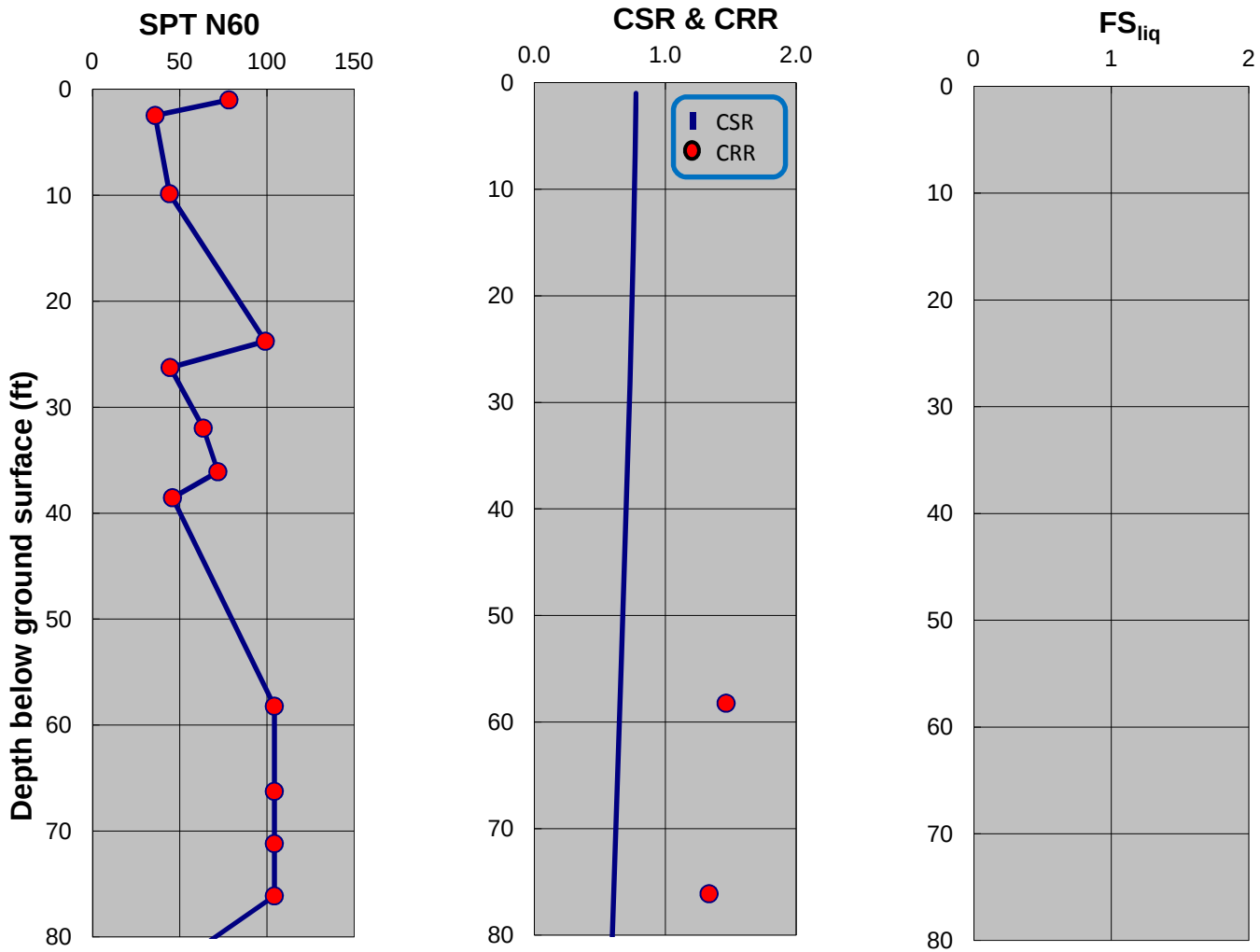
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-21 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



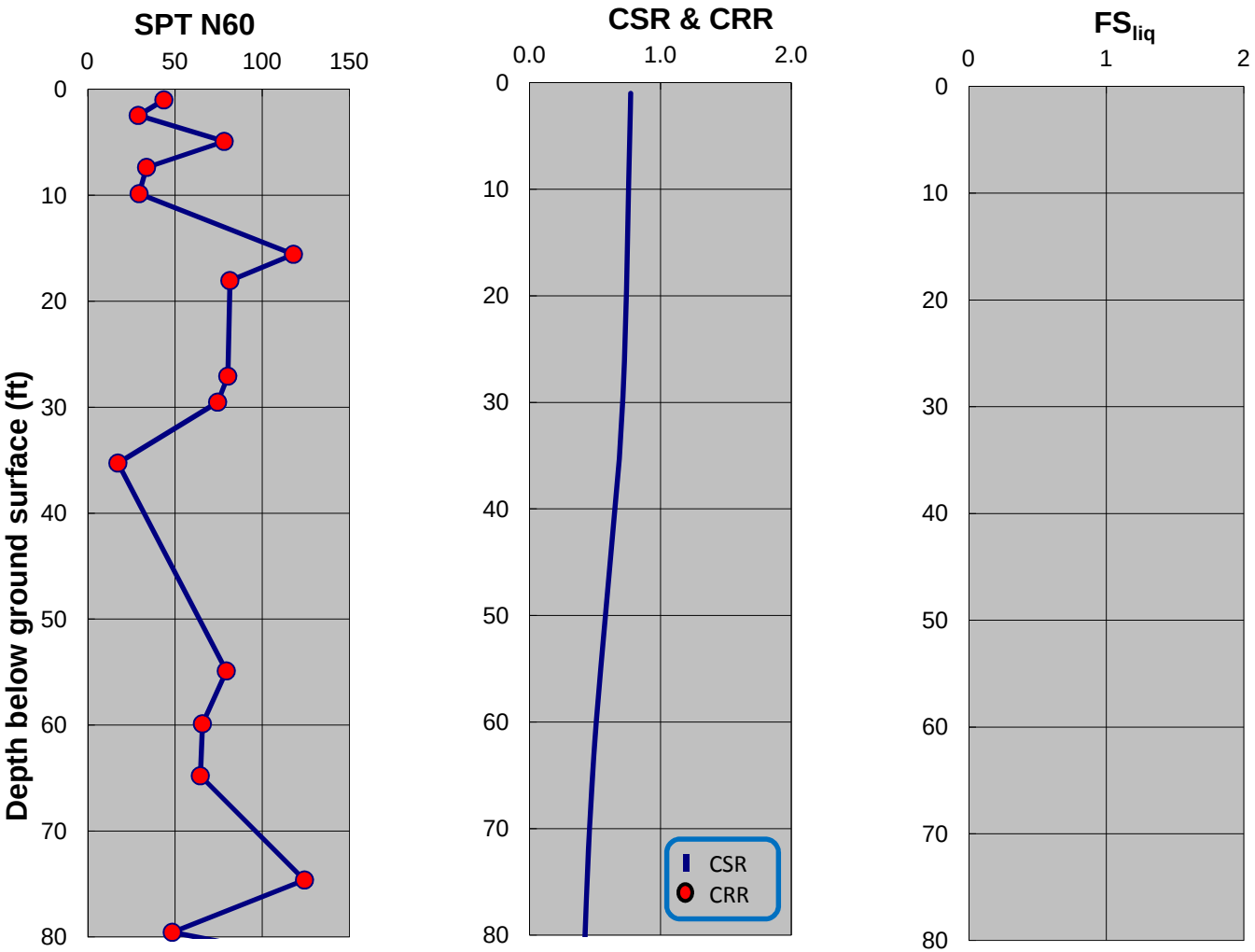
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-22 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



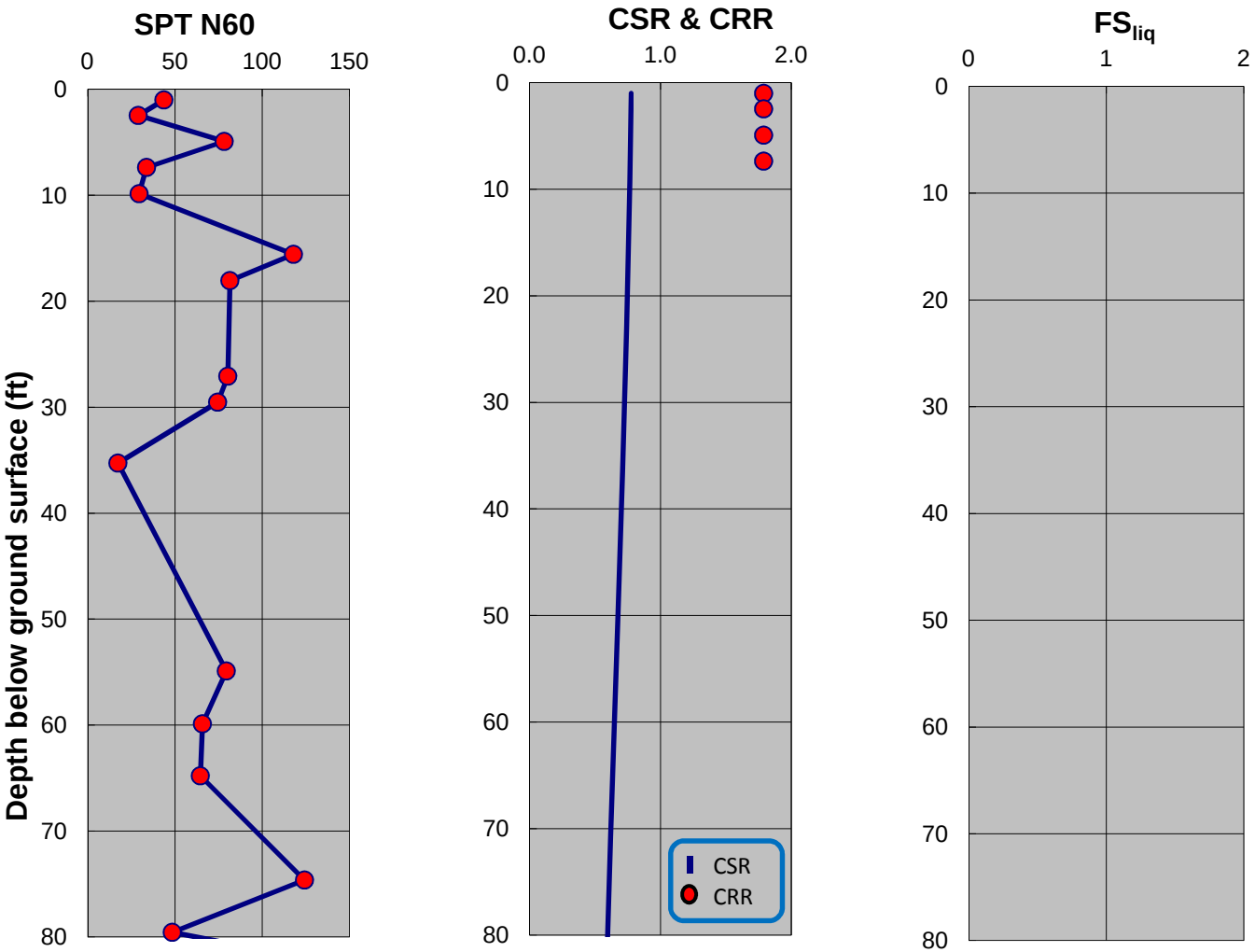
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-22 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



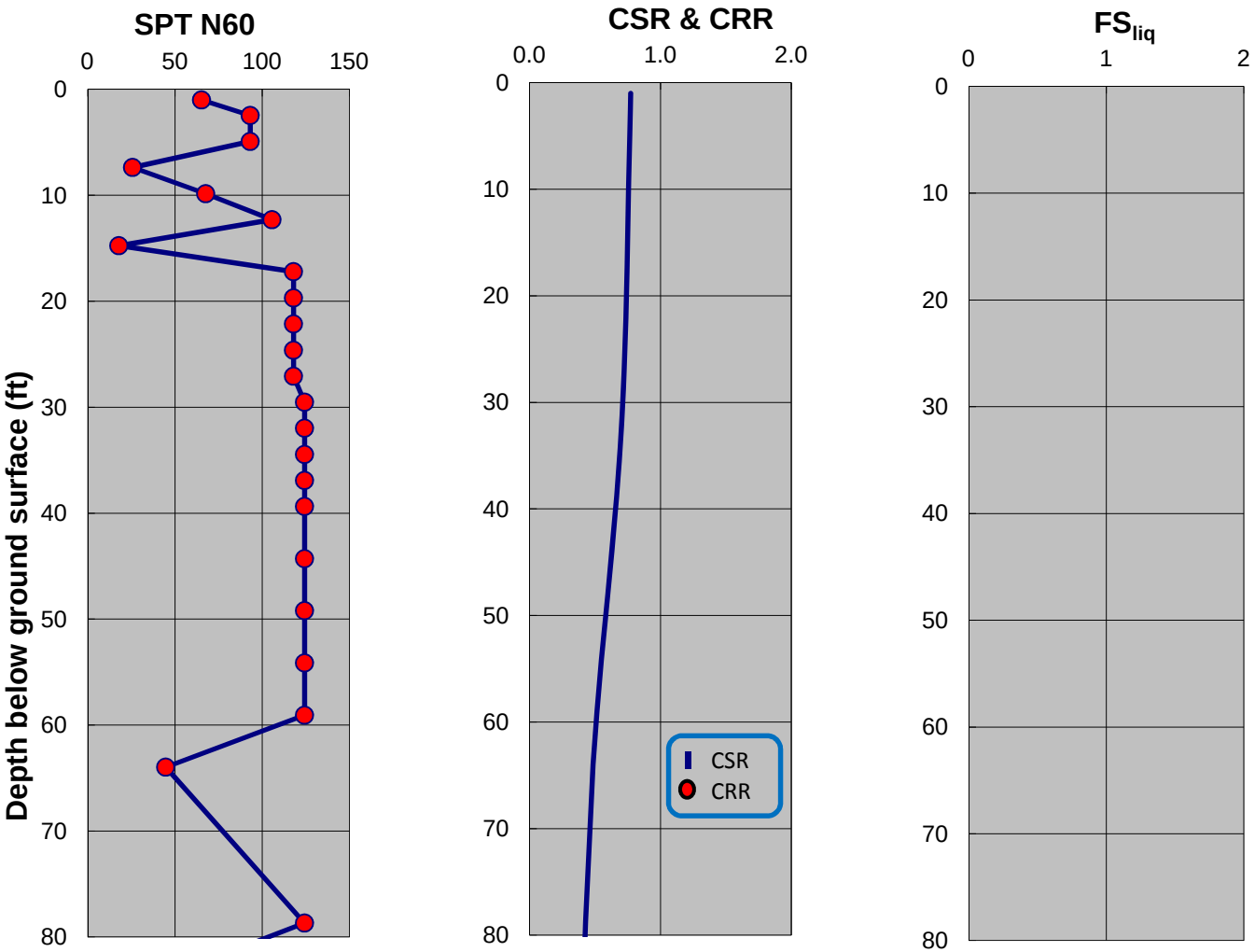
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-23 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



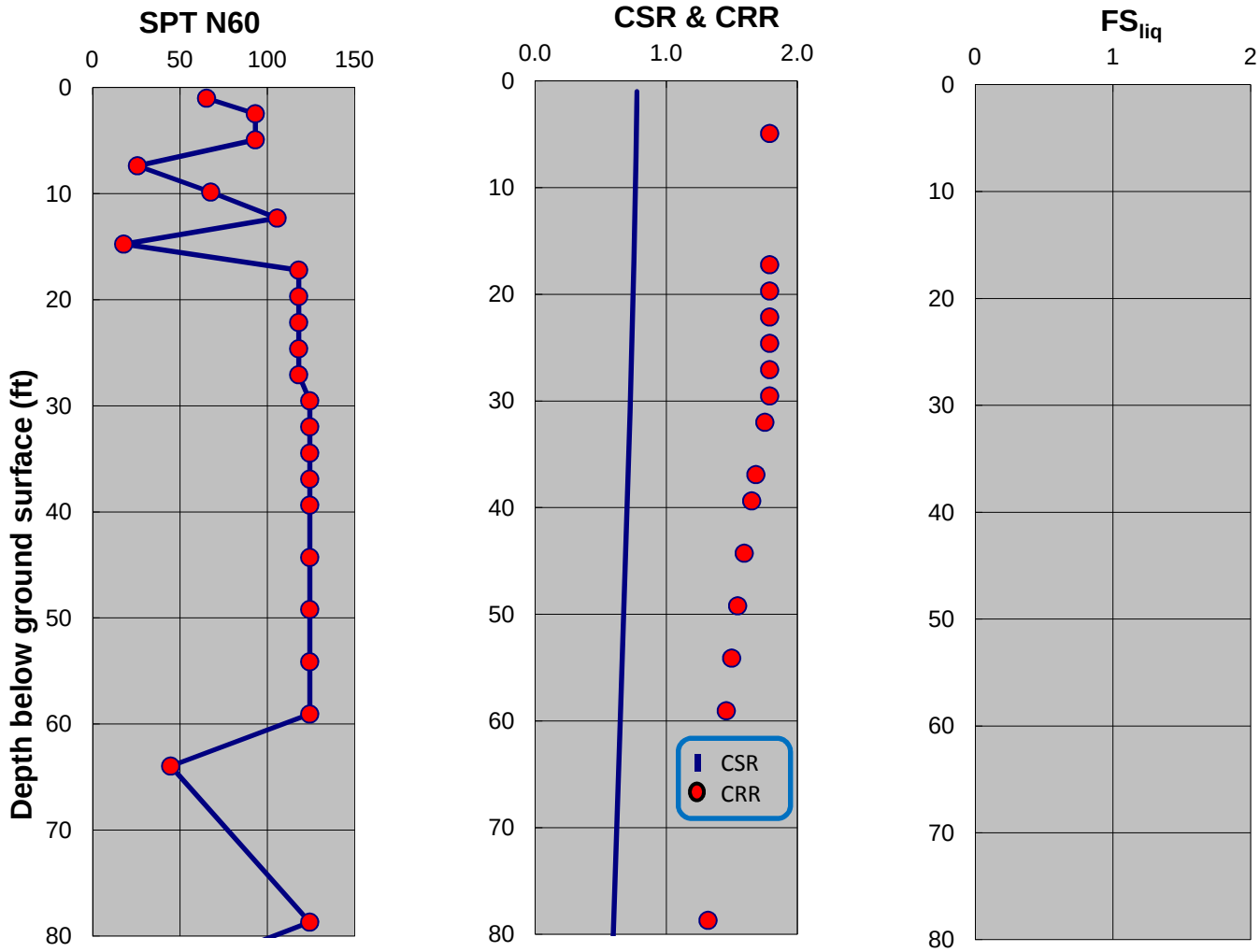
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-23 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



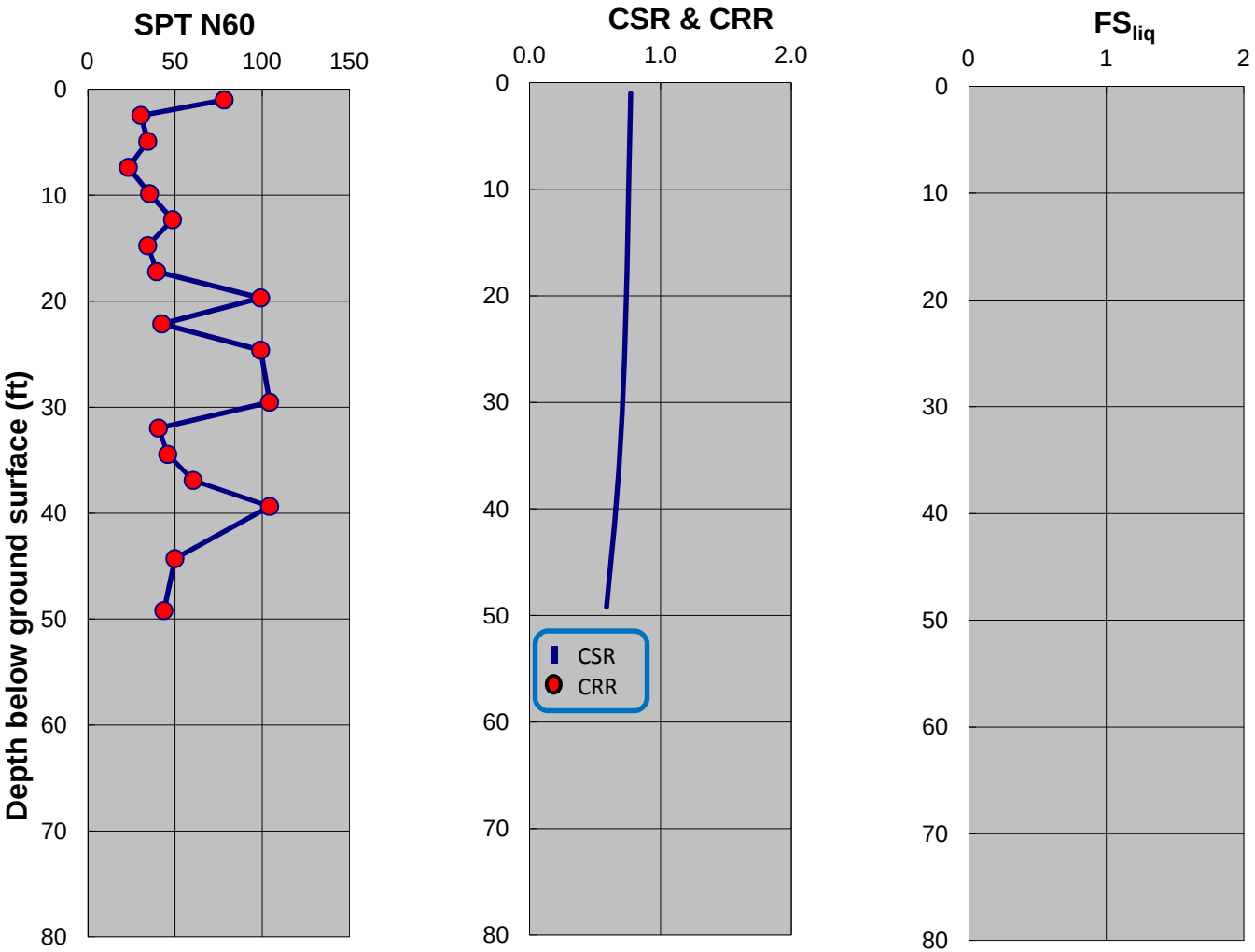
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-24 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



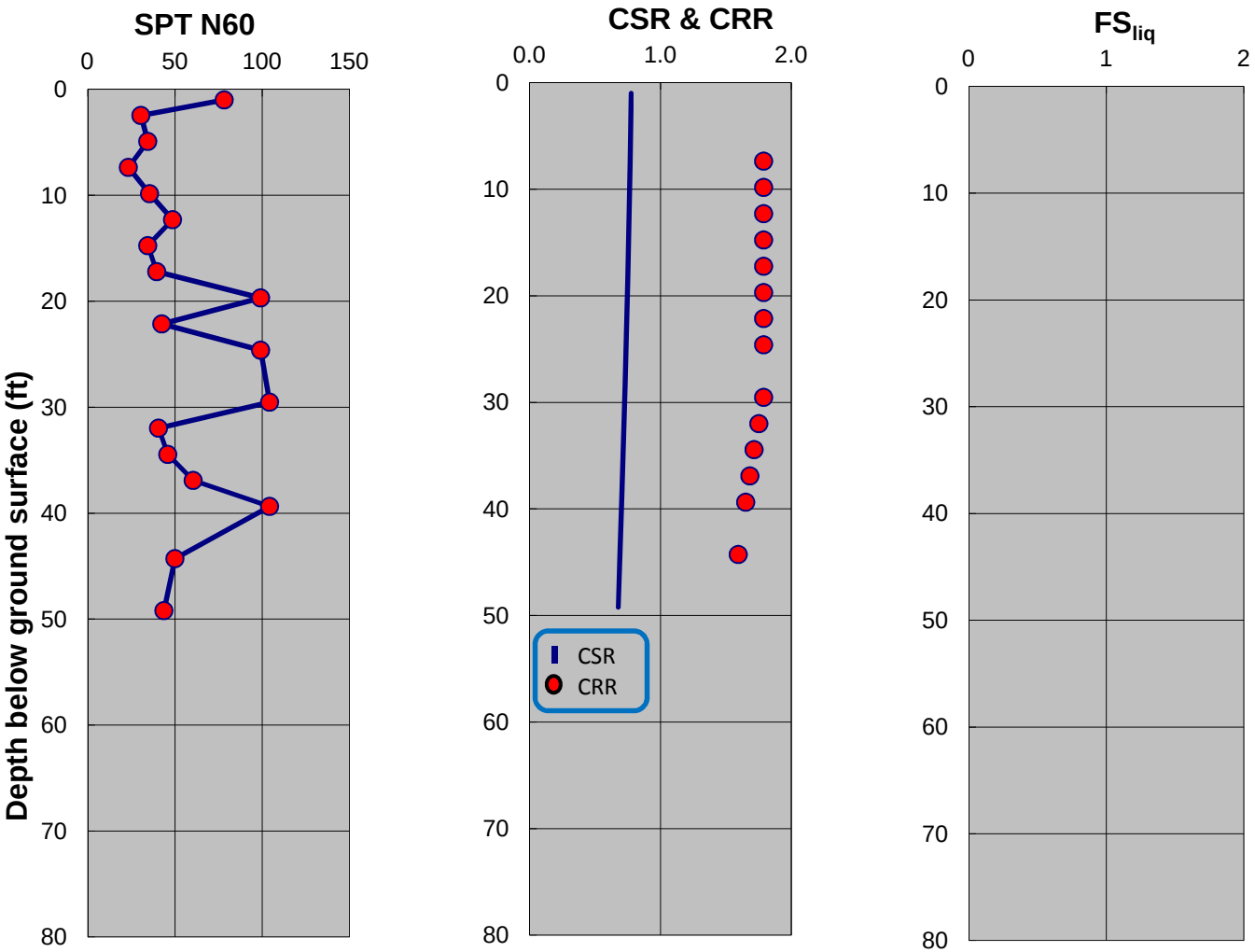
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-24 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



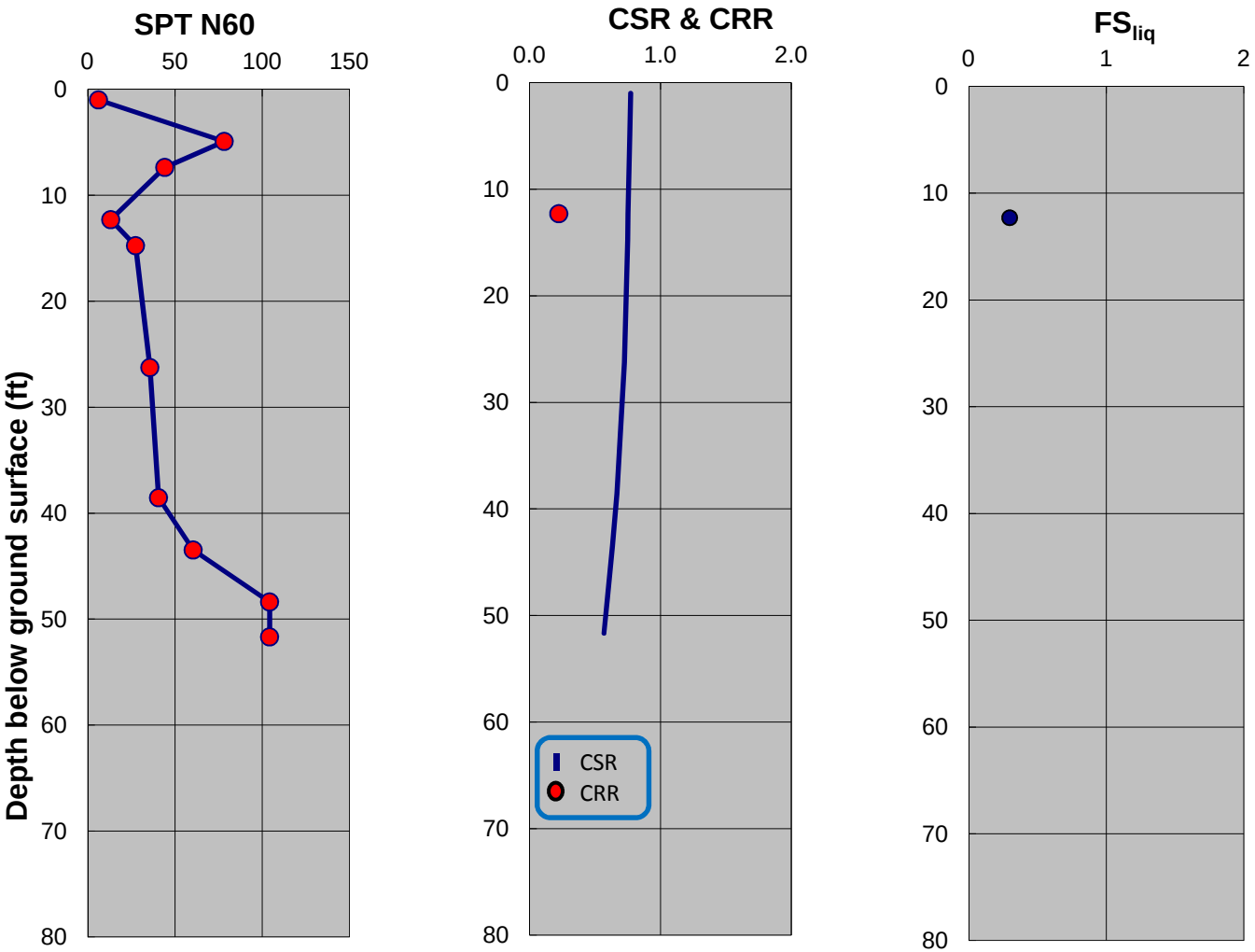
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-25 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



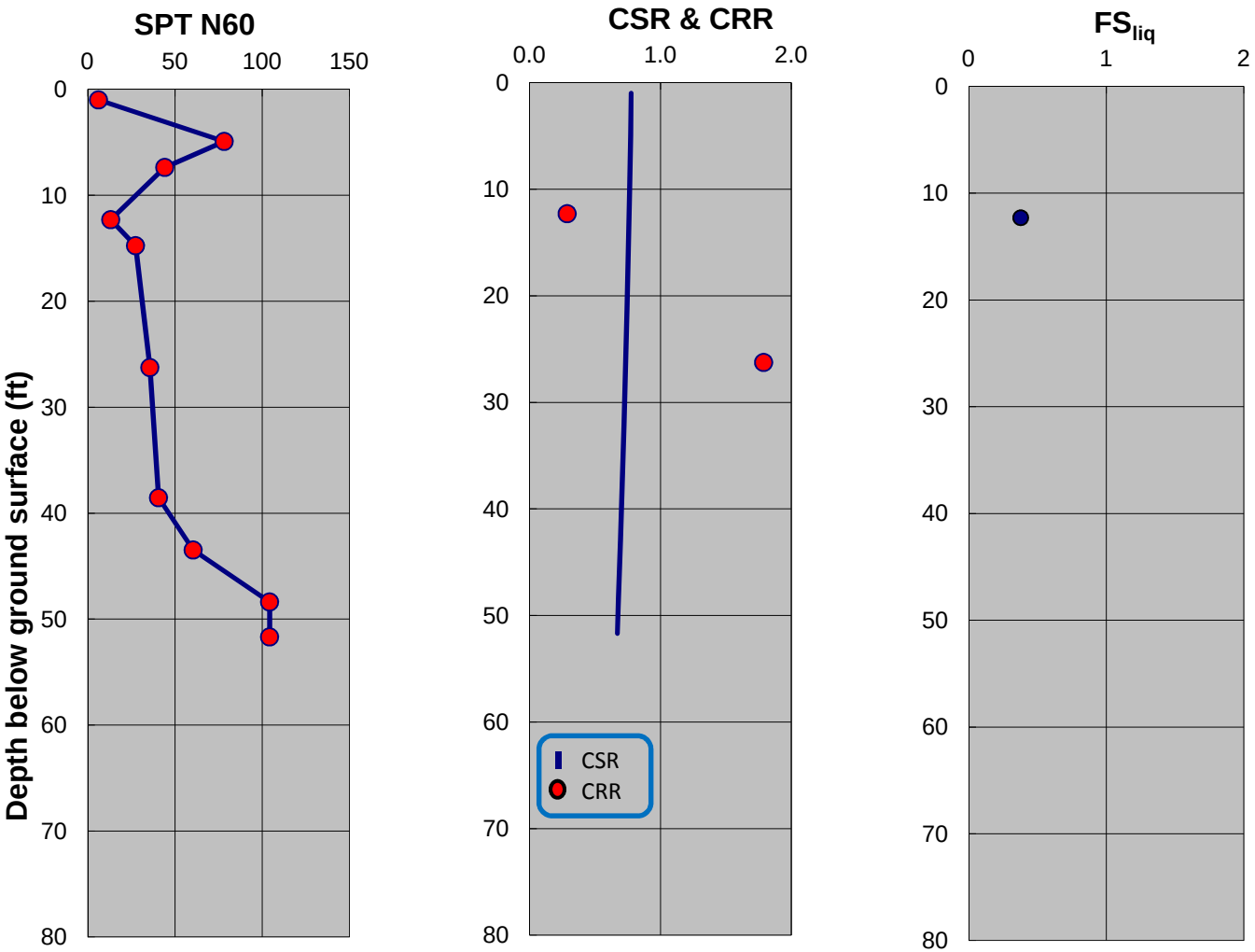
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-25 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



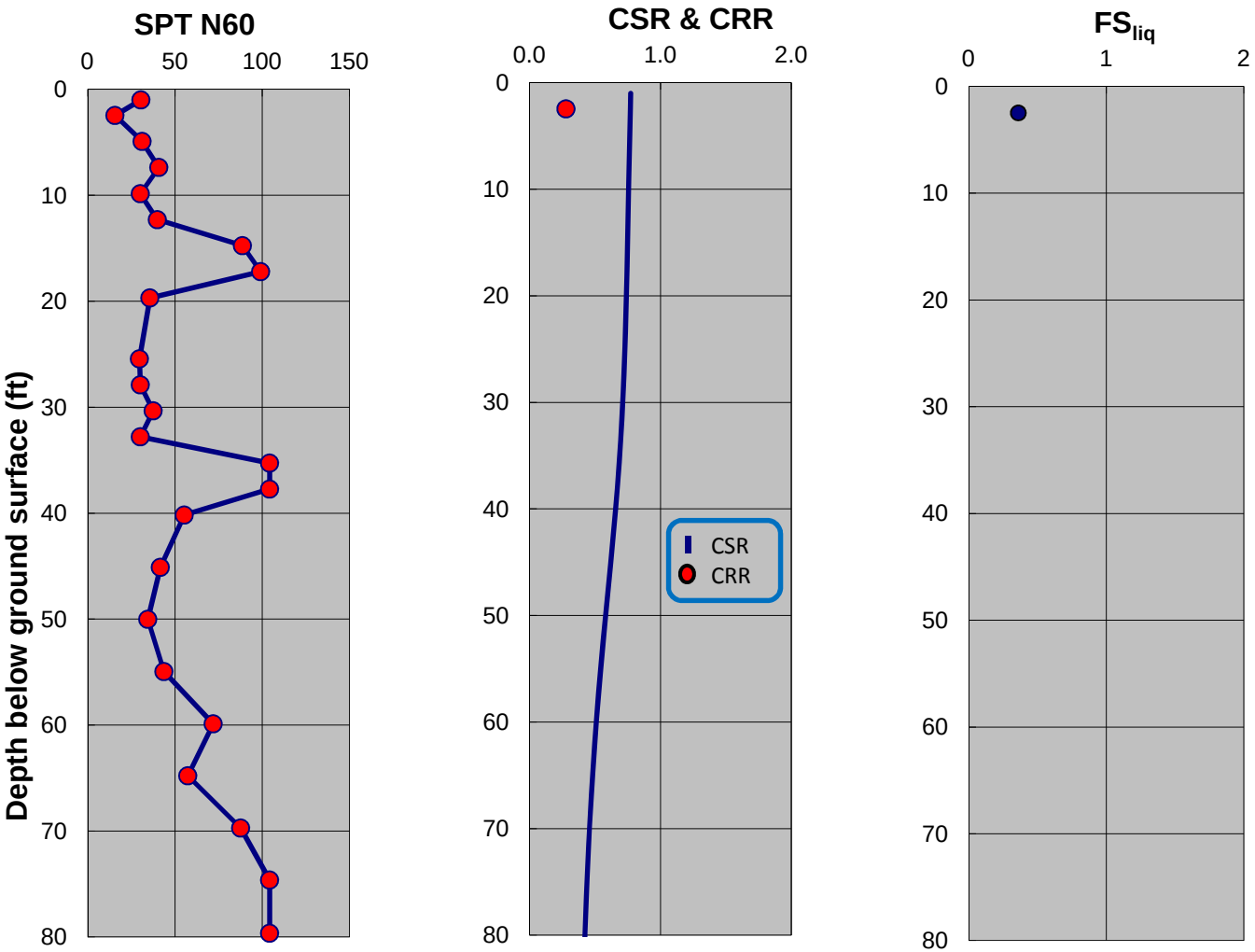
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-26 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



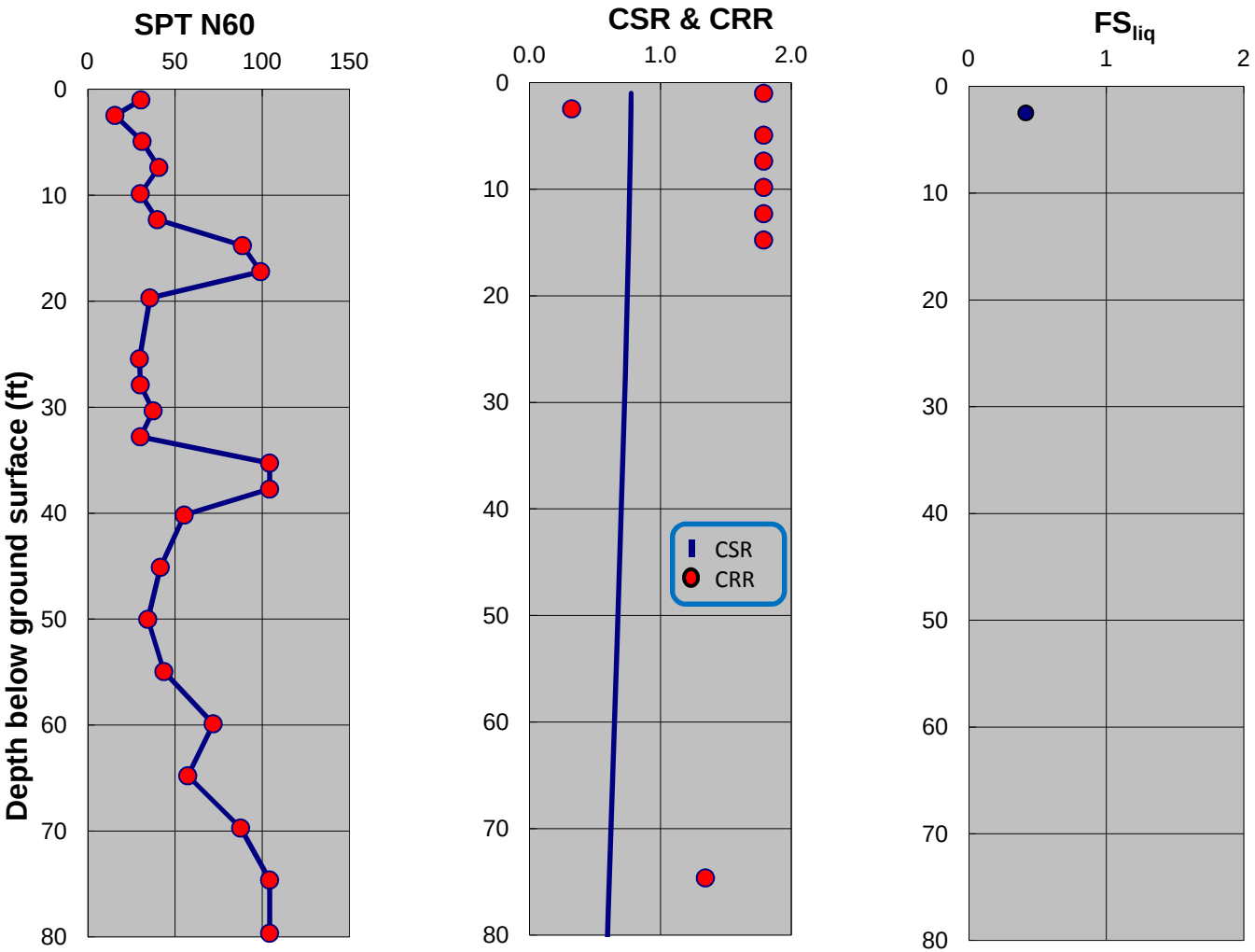
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-26 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



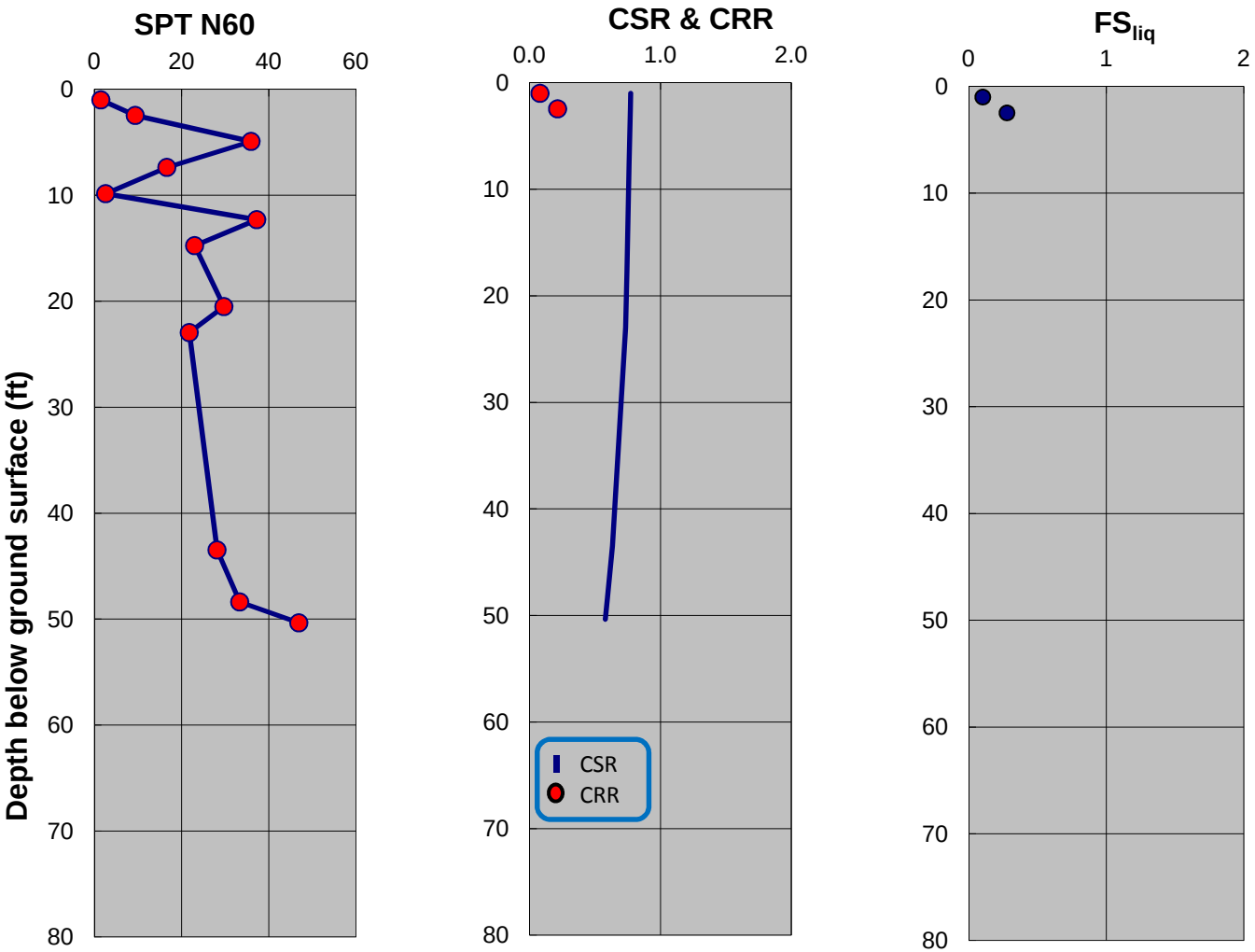
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-27 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



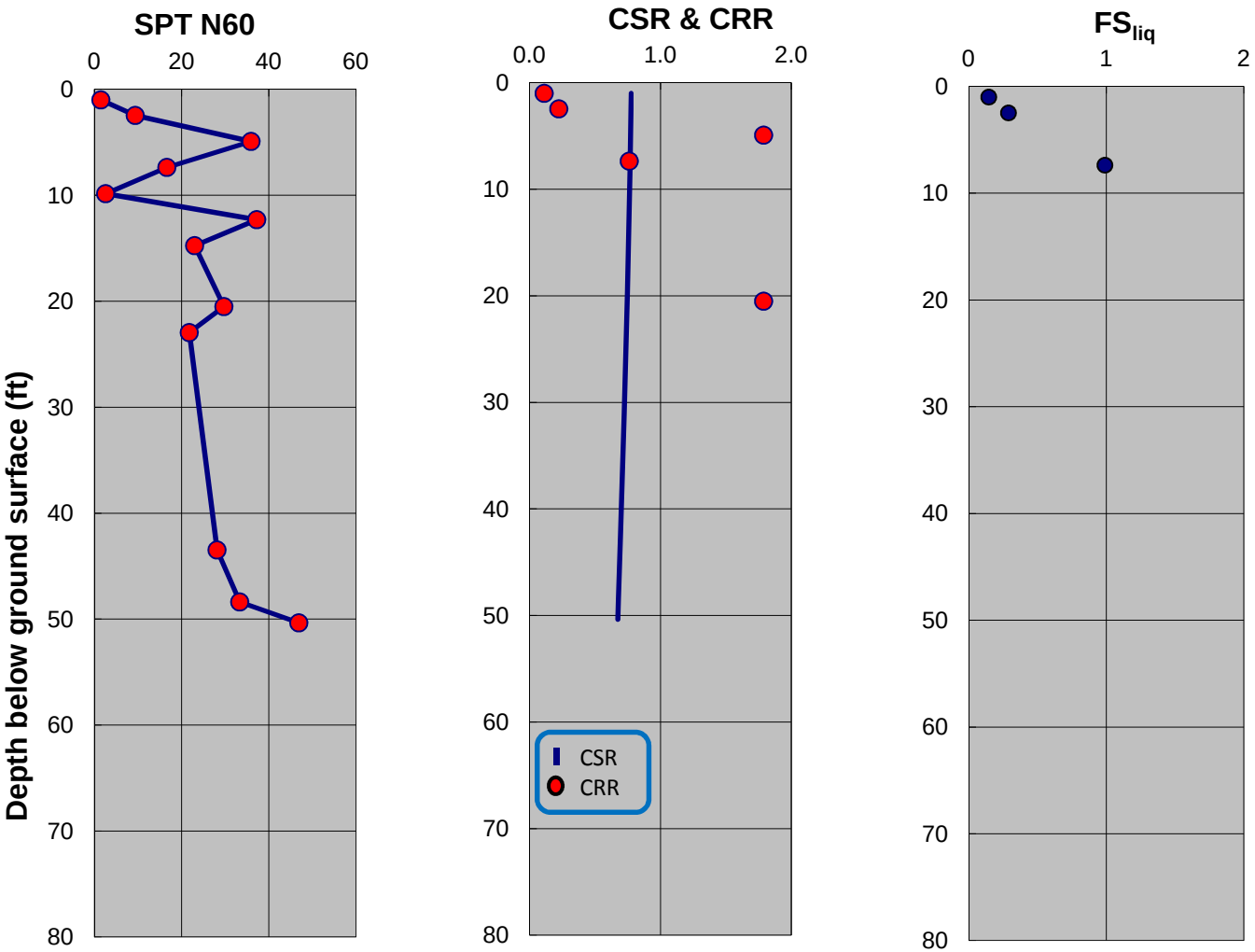
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-27 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



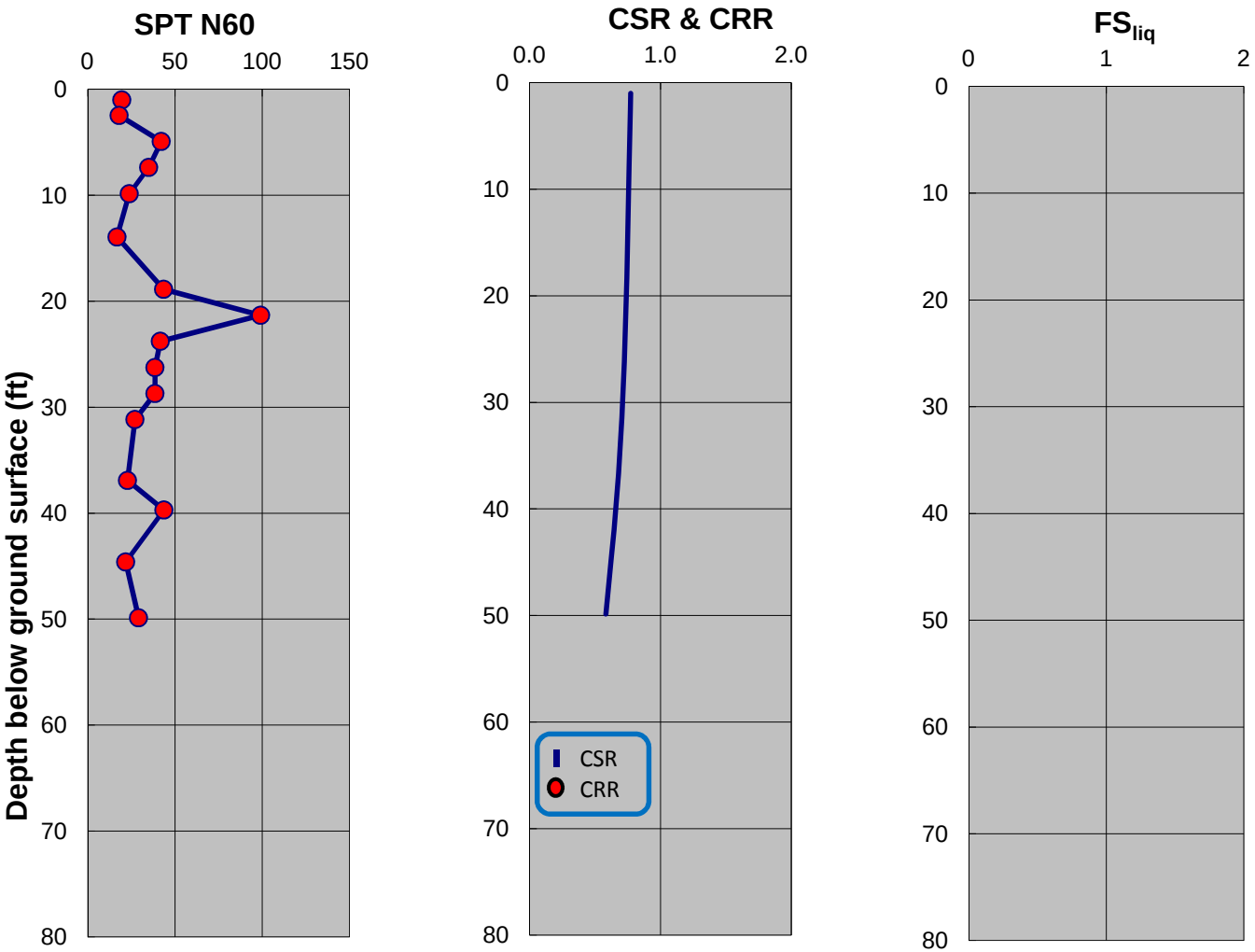
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-28 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



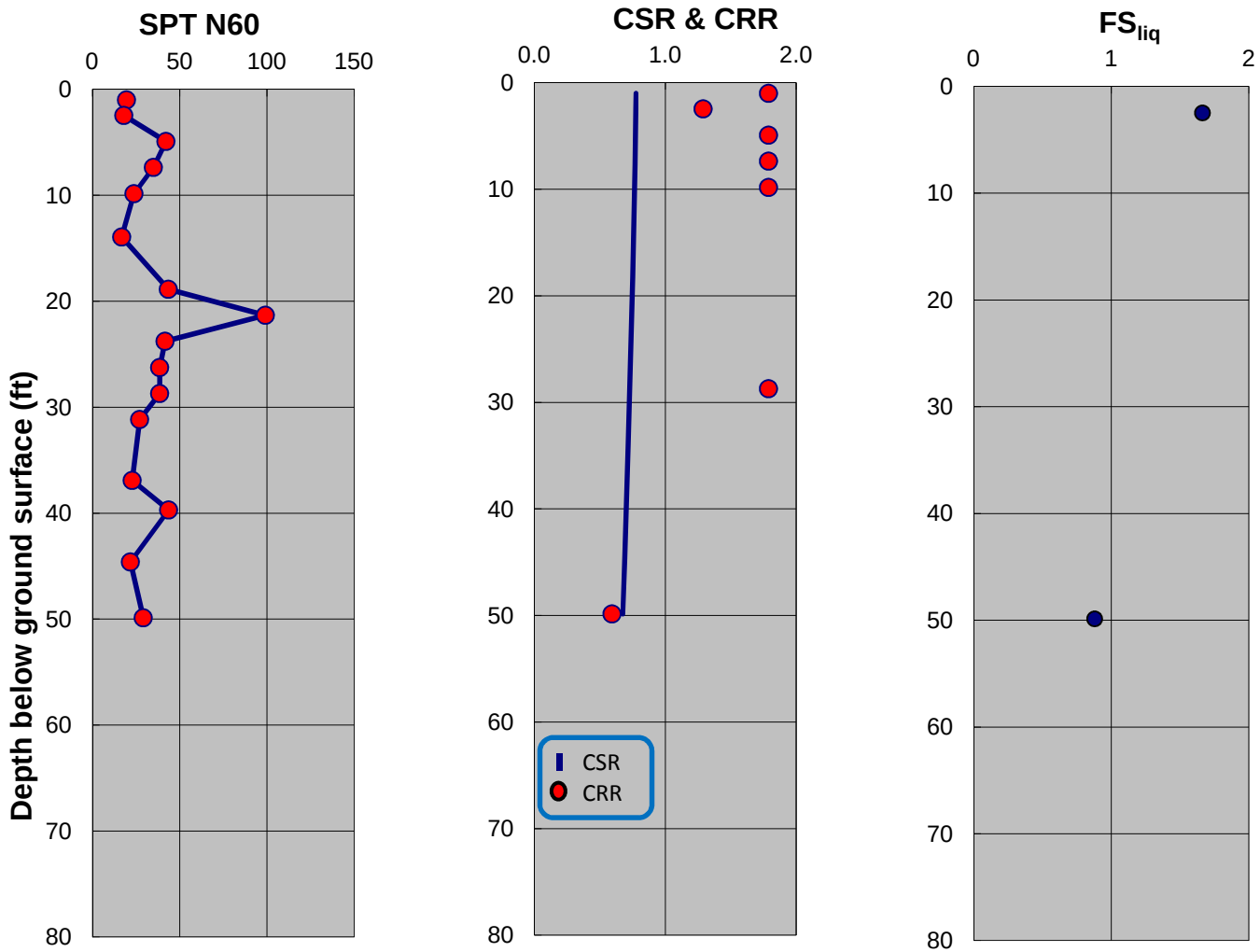
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-28 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



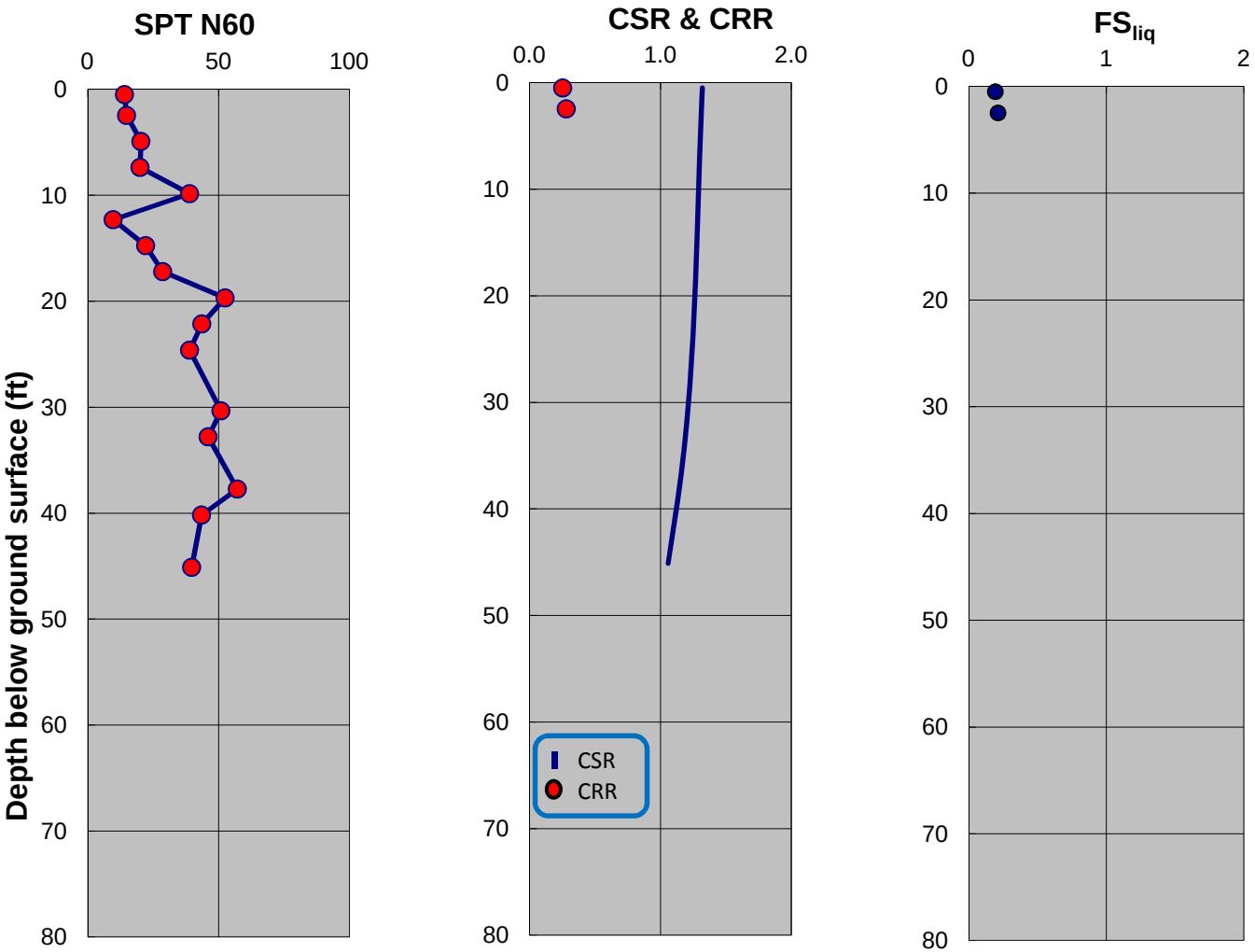
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-31 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



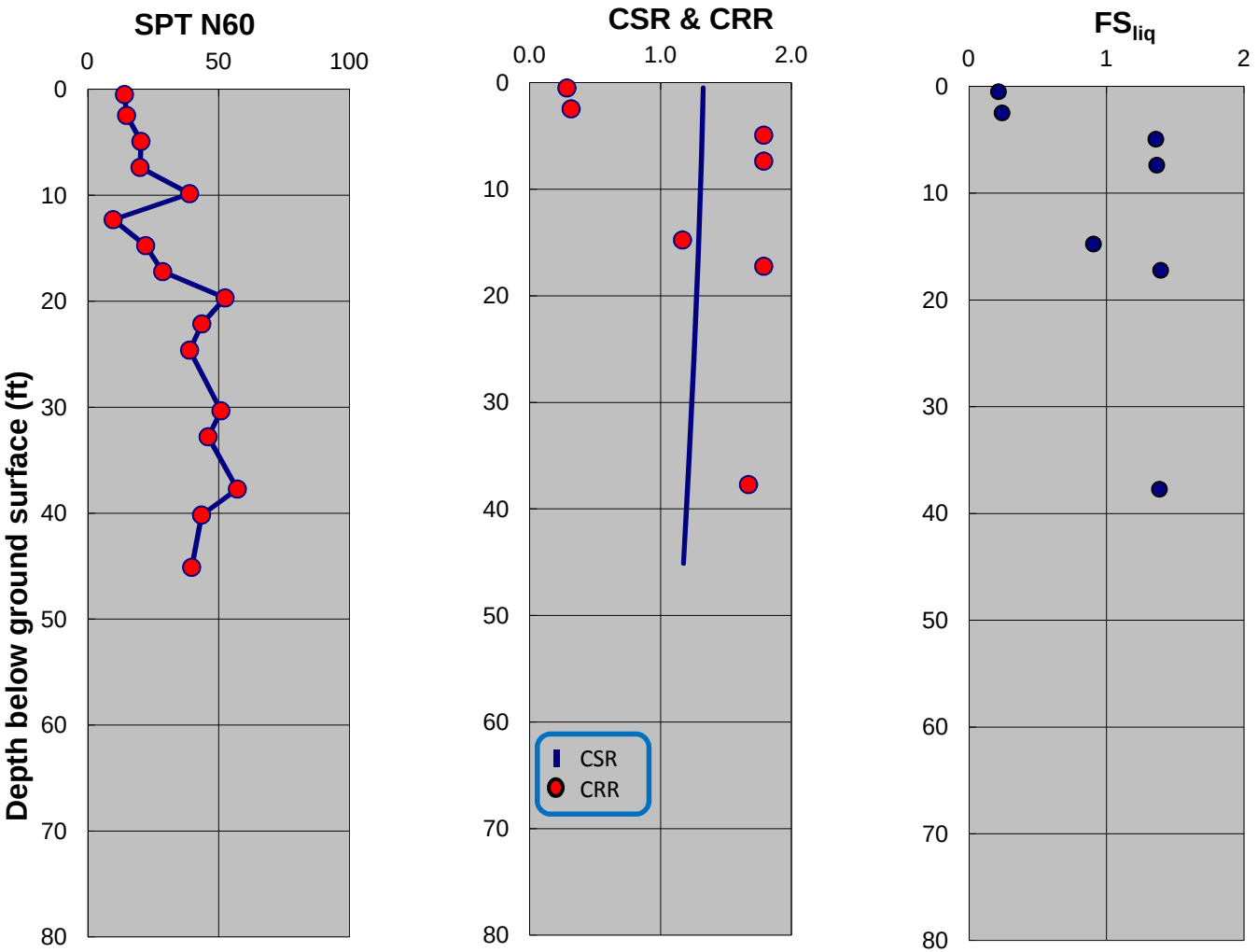
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-31 FOR OBE LEVEL PER NFPA 59A 2006 (M=8.0, PGA=0.53g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



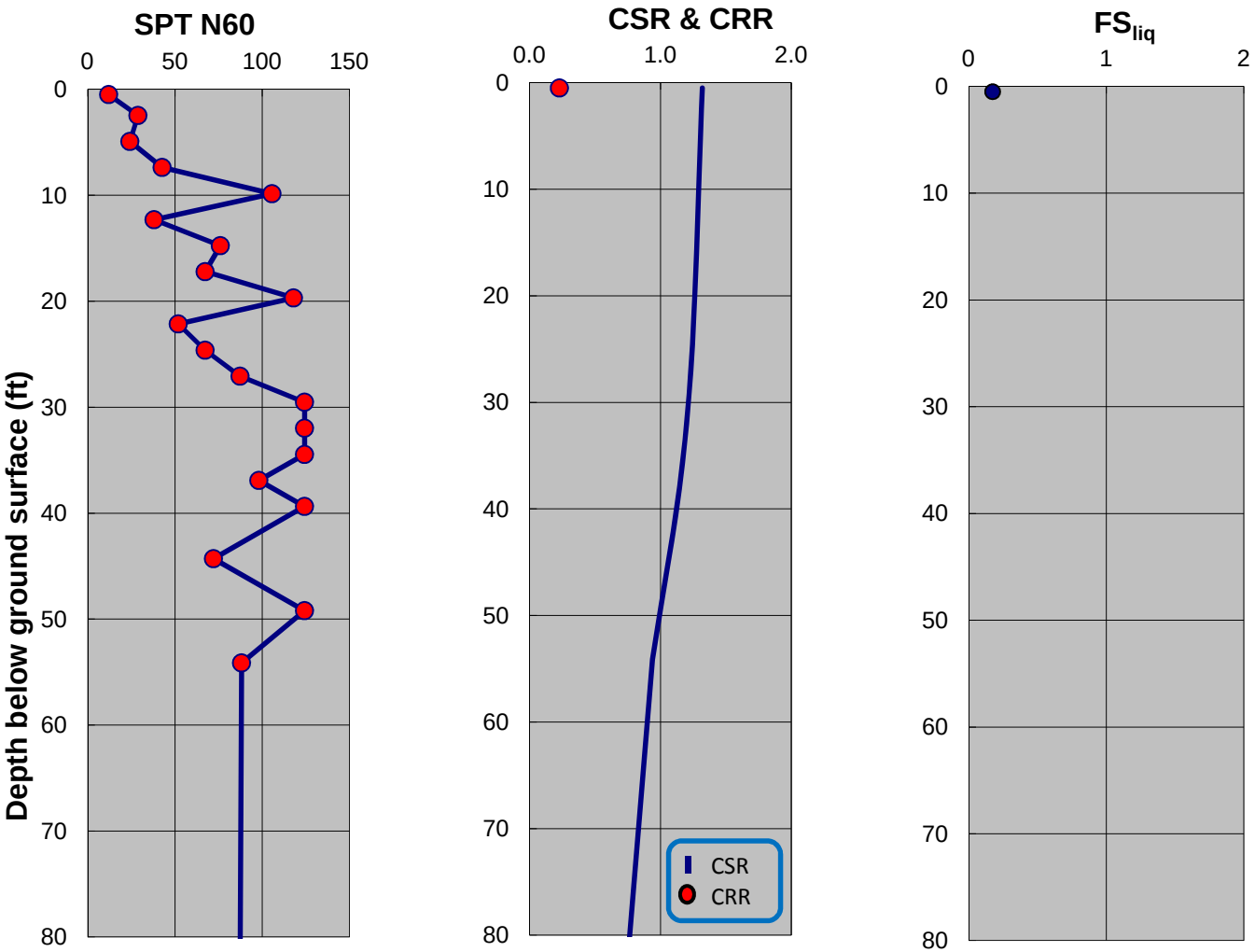
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-02 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



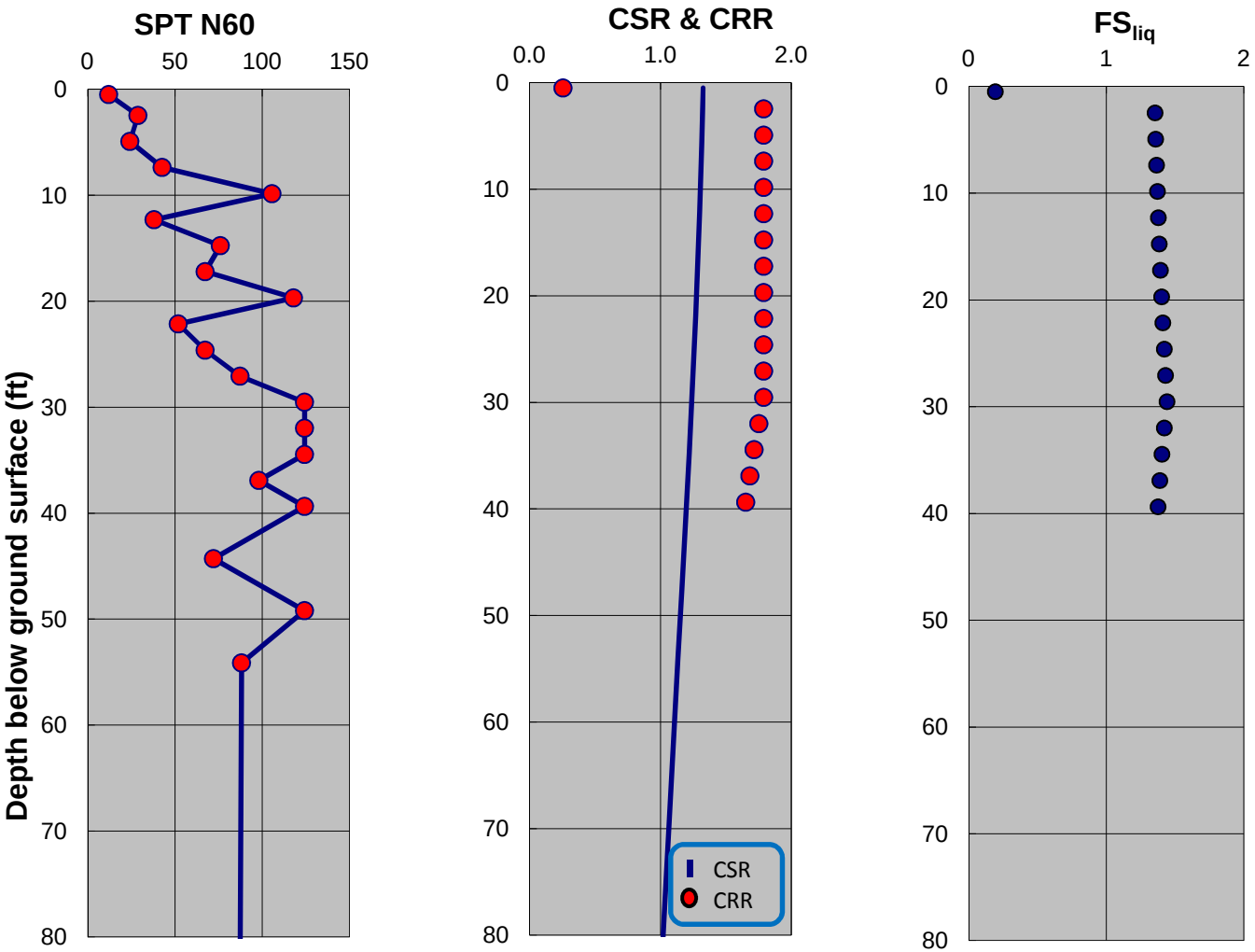
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-02 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



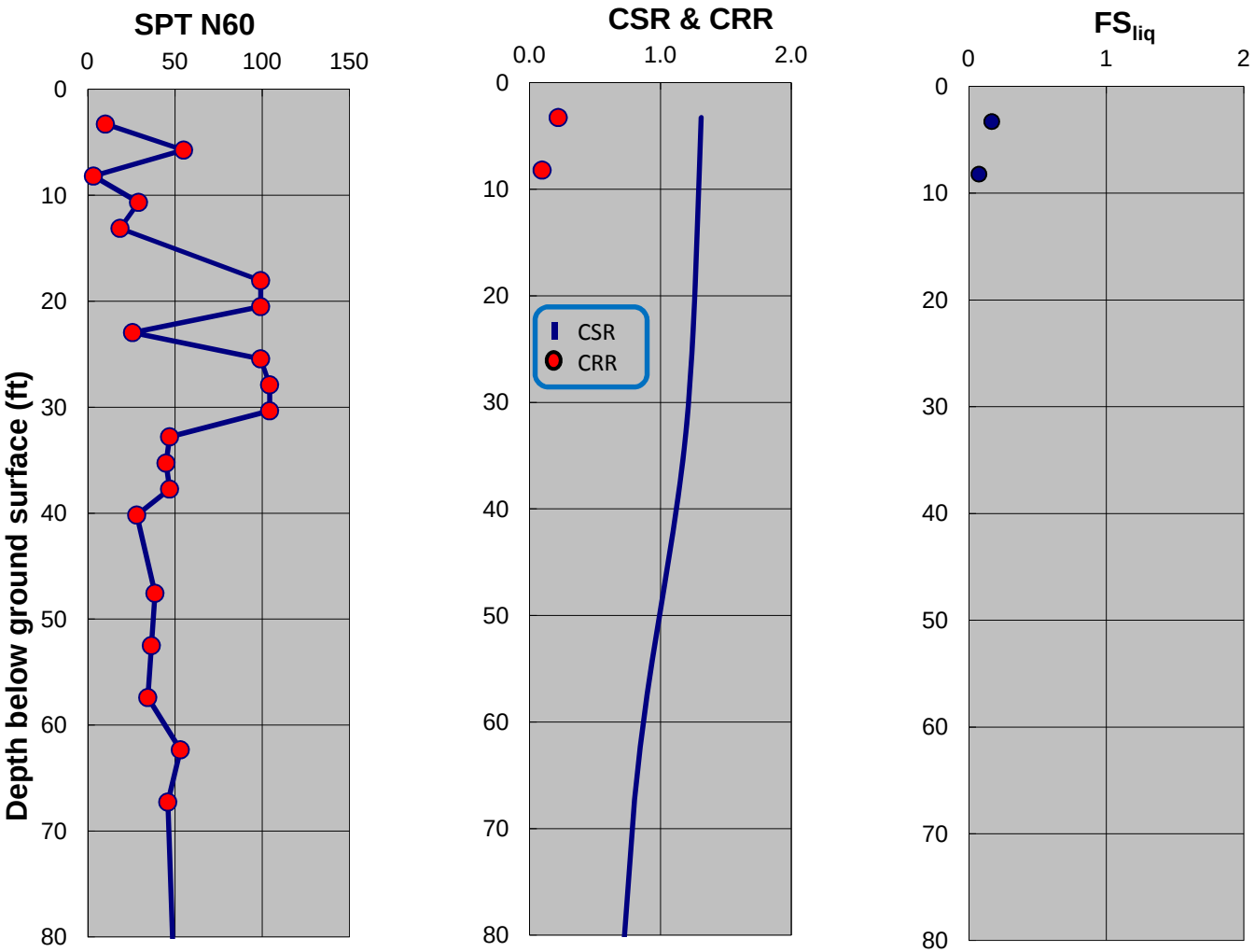
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-03 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



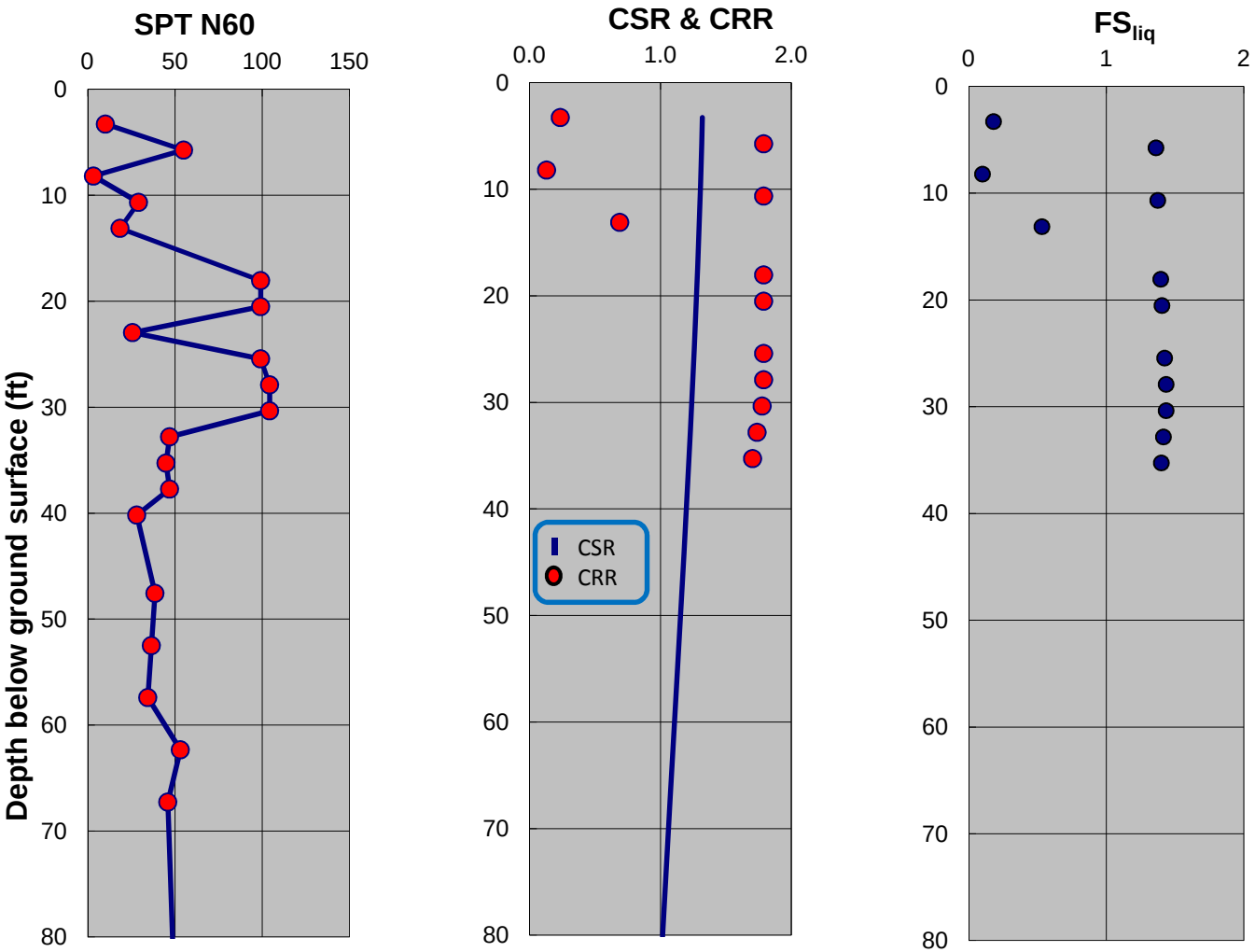
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-03 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



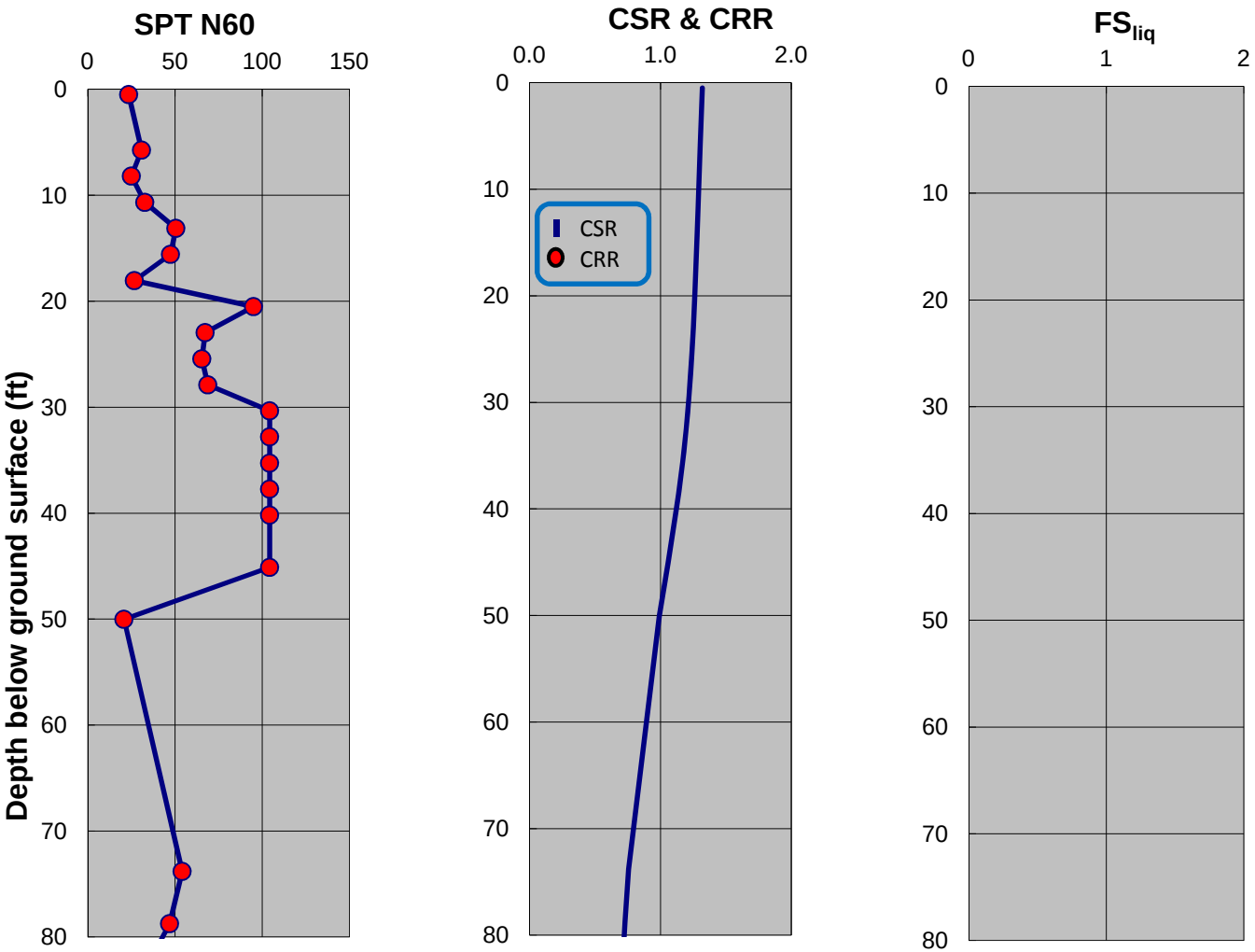
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-04 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



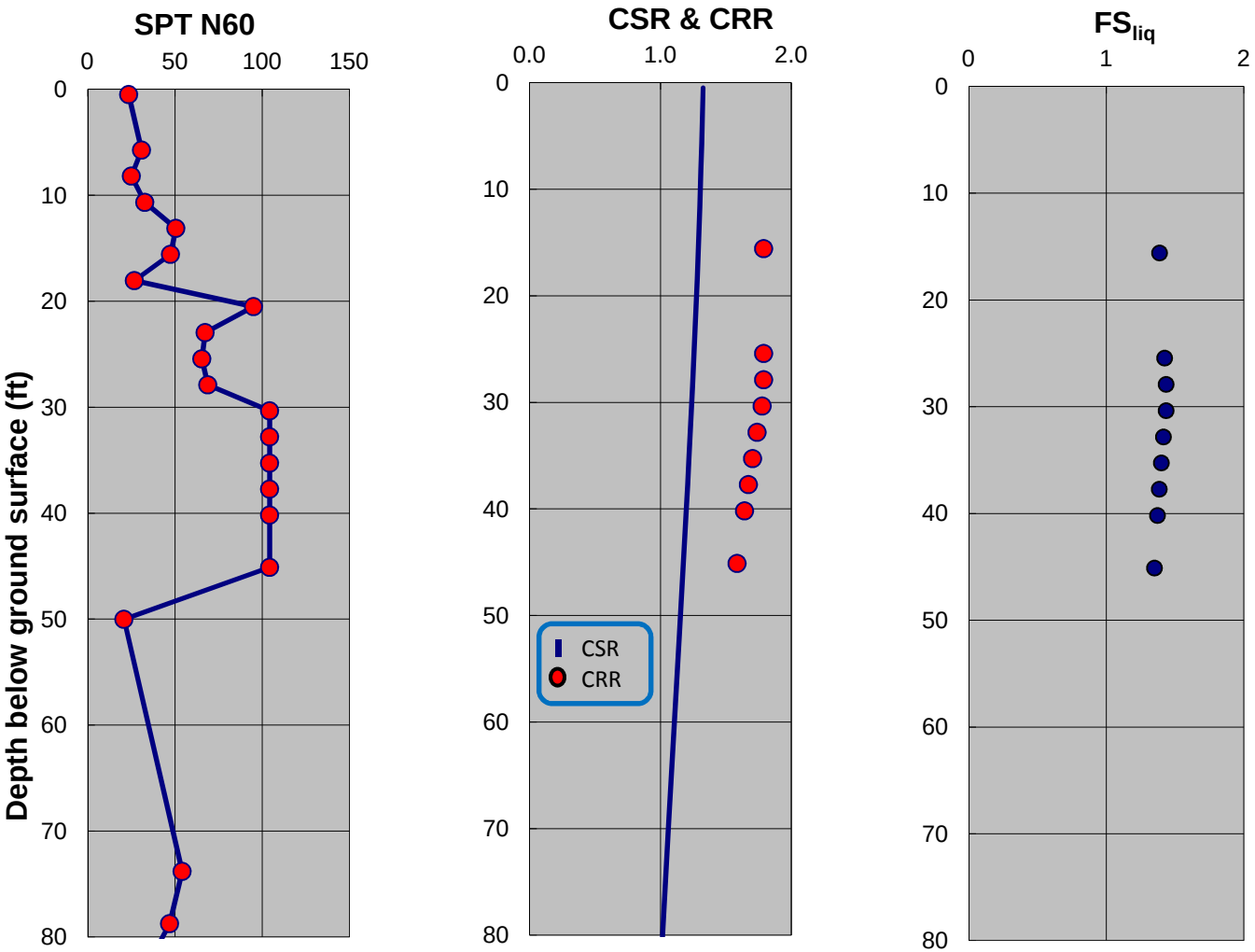
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-04 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



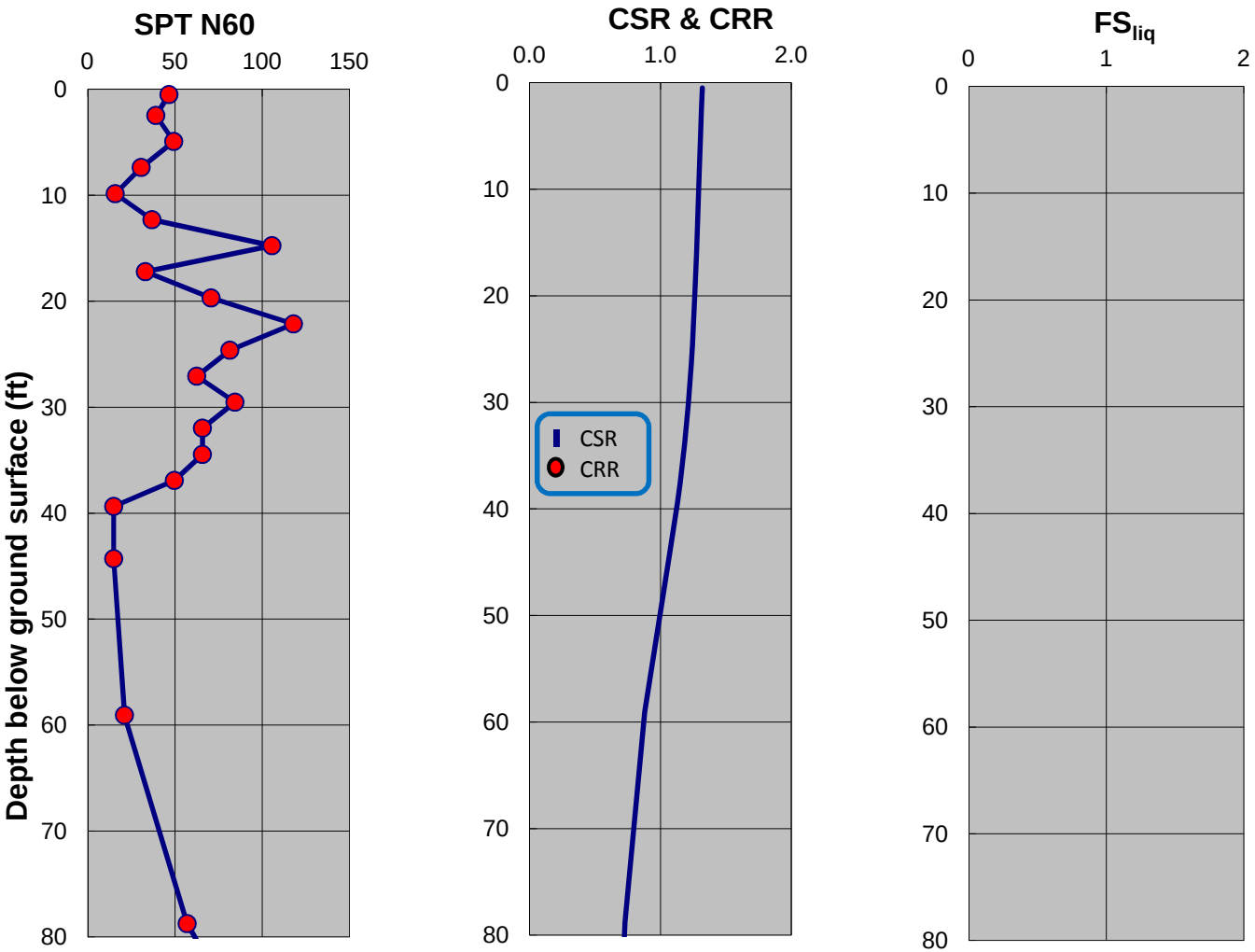
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-05 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



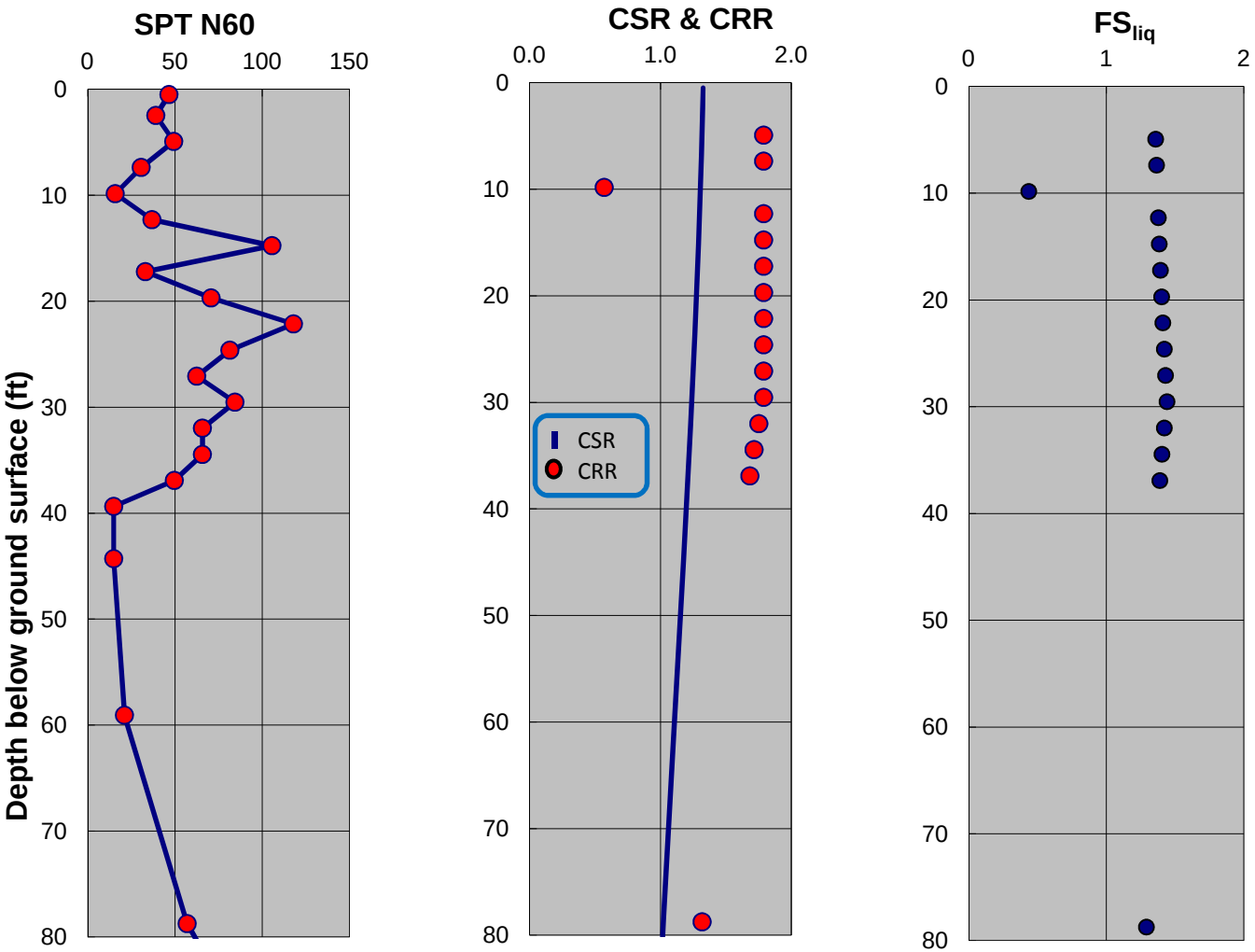
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-05 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



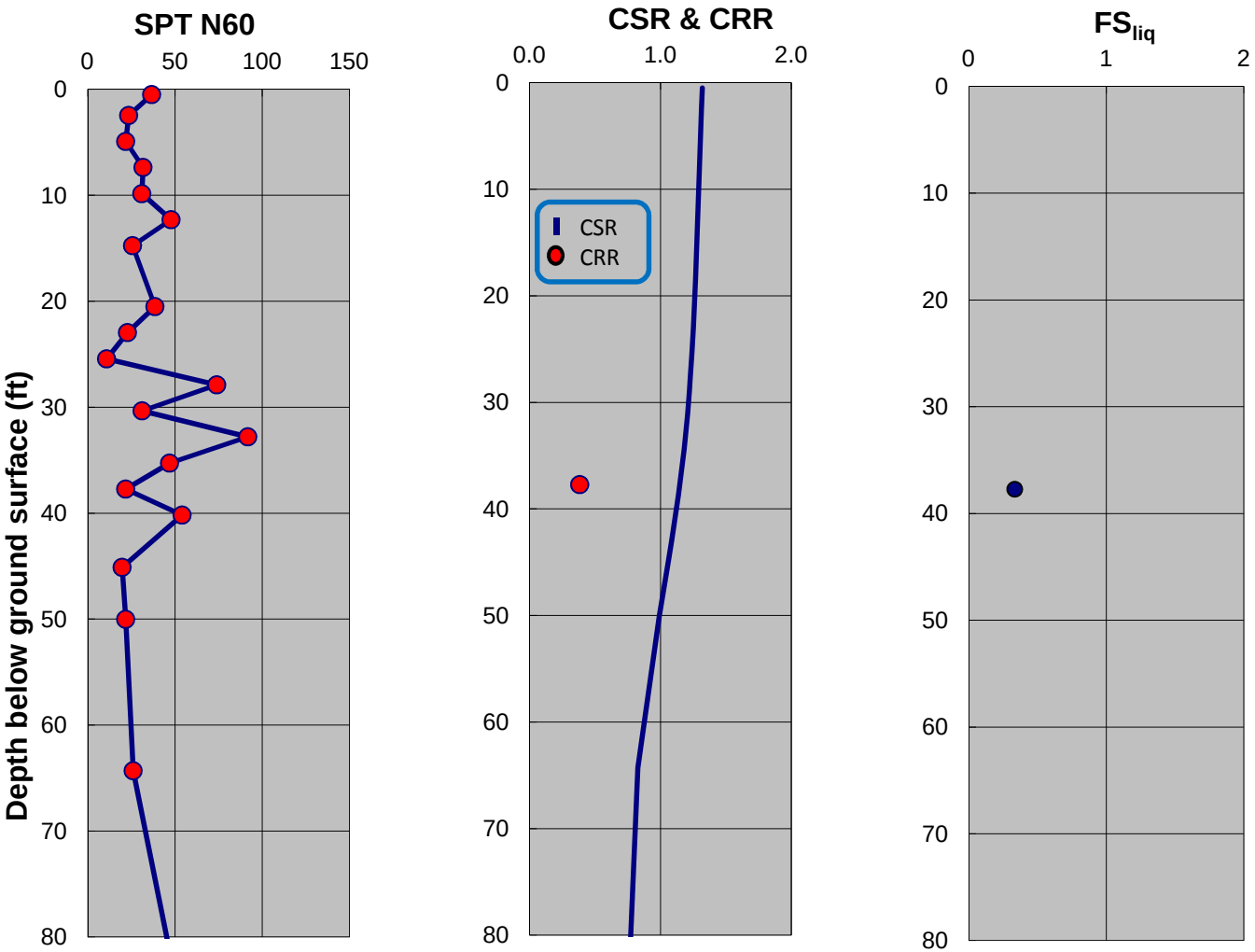
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-06 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



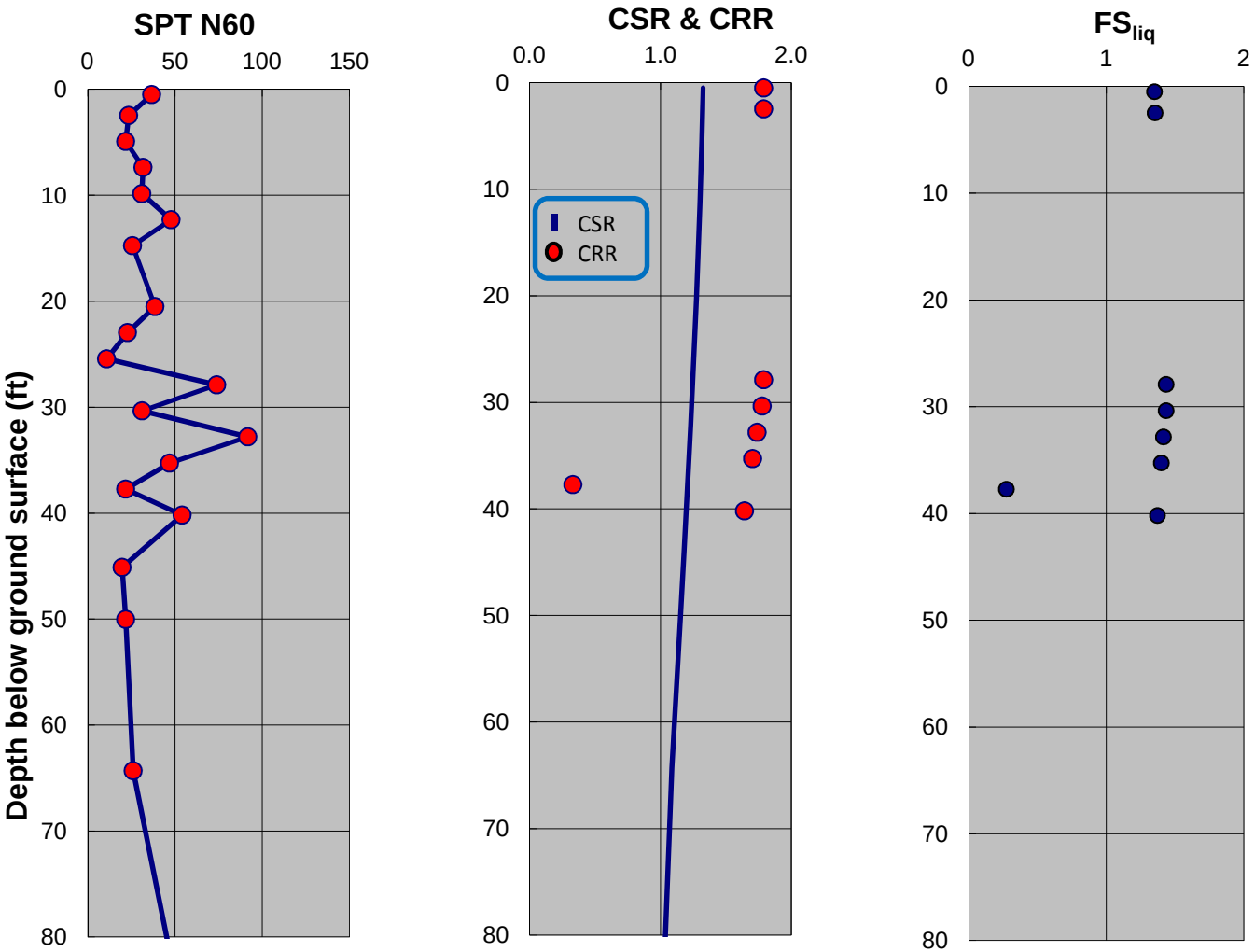
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-06 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



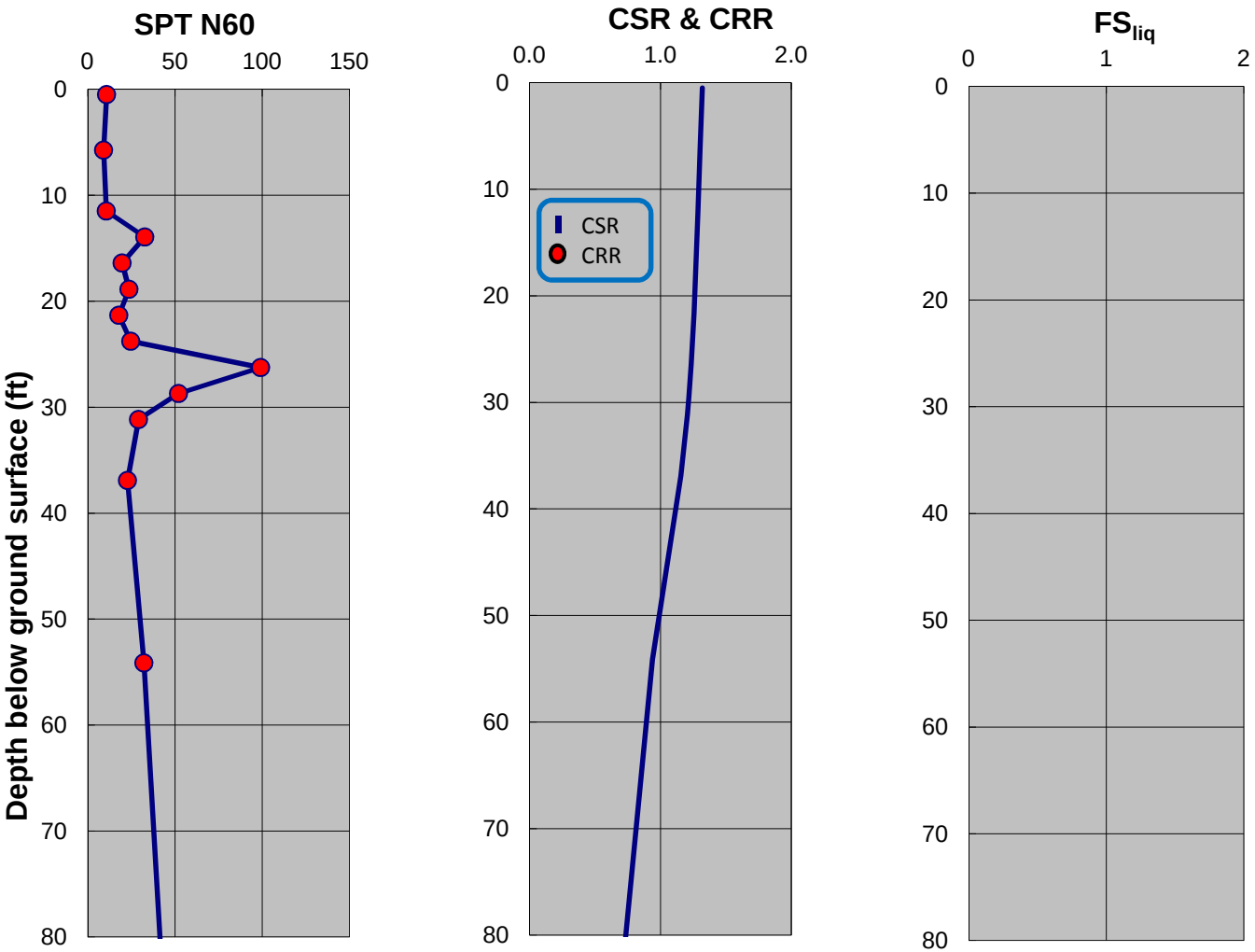
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-08 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



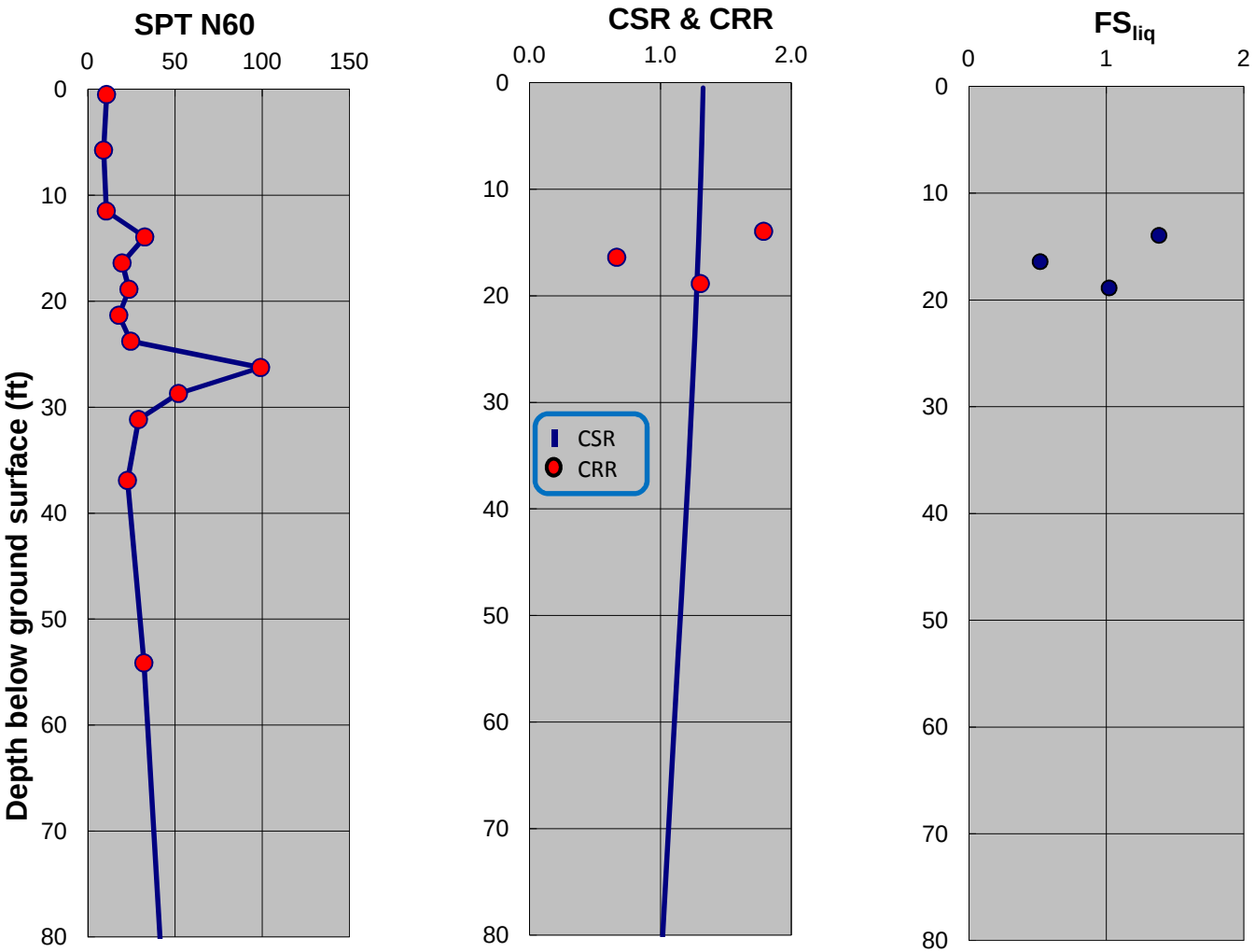
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-08 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



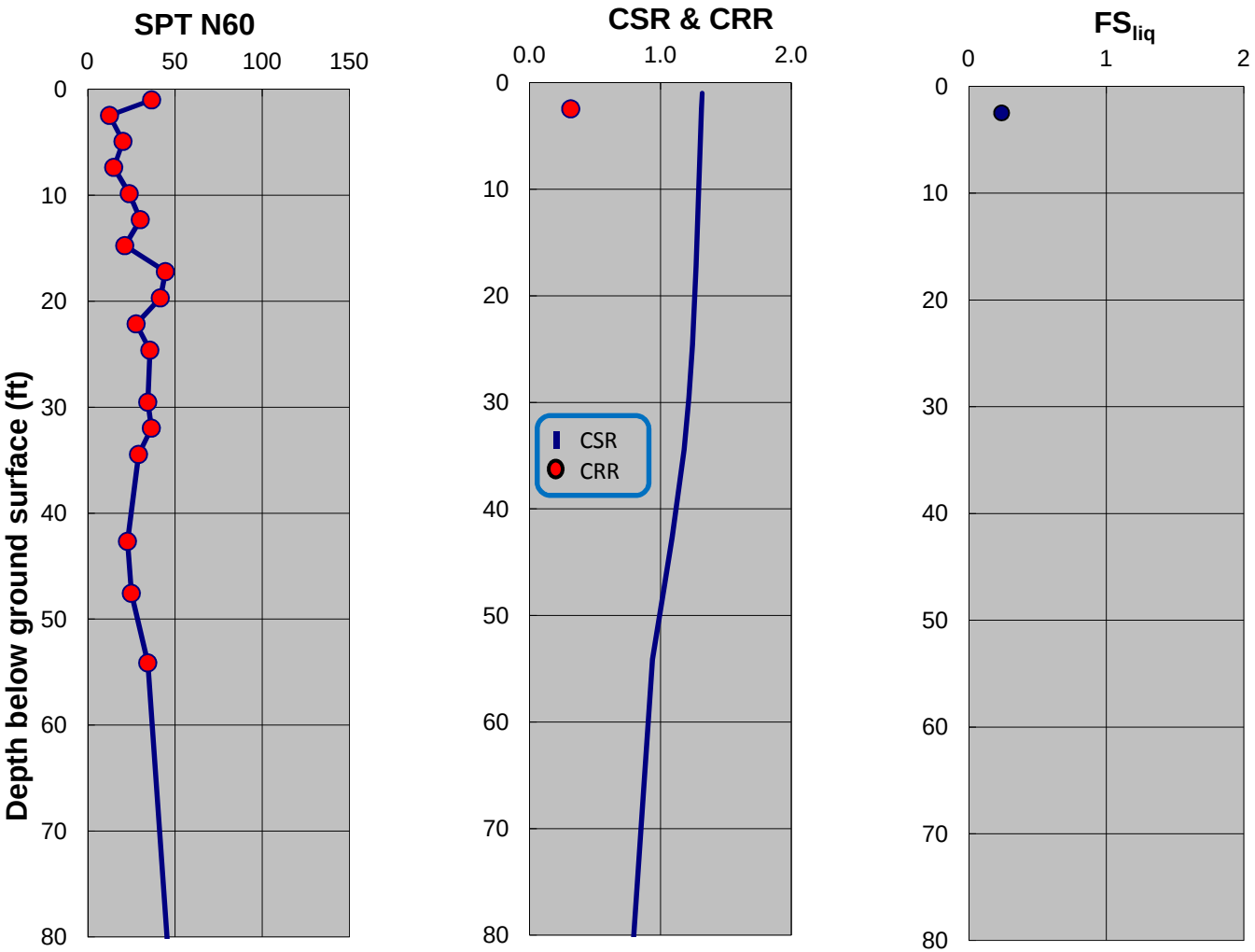
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-09 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



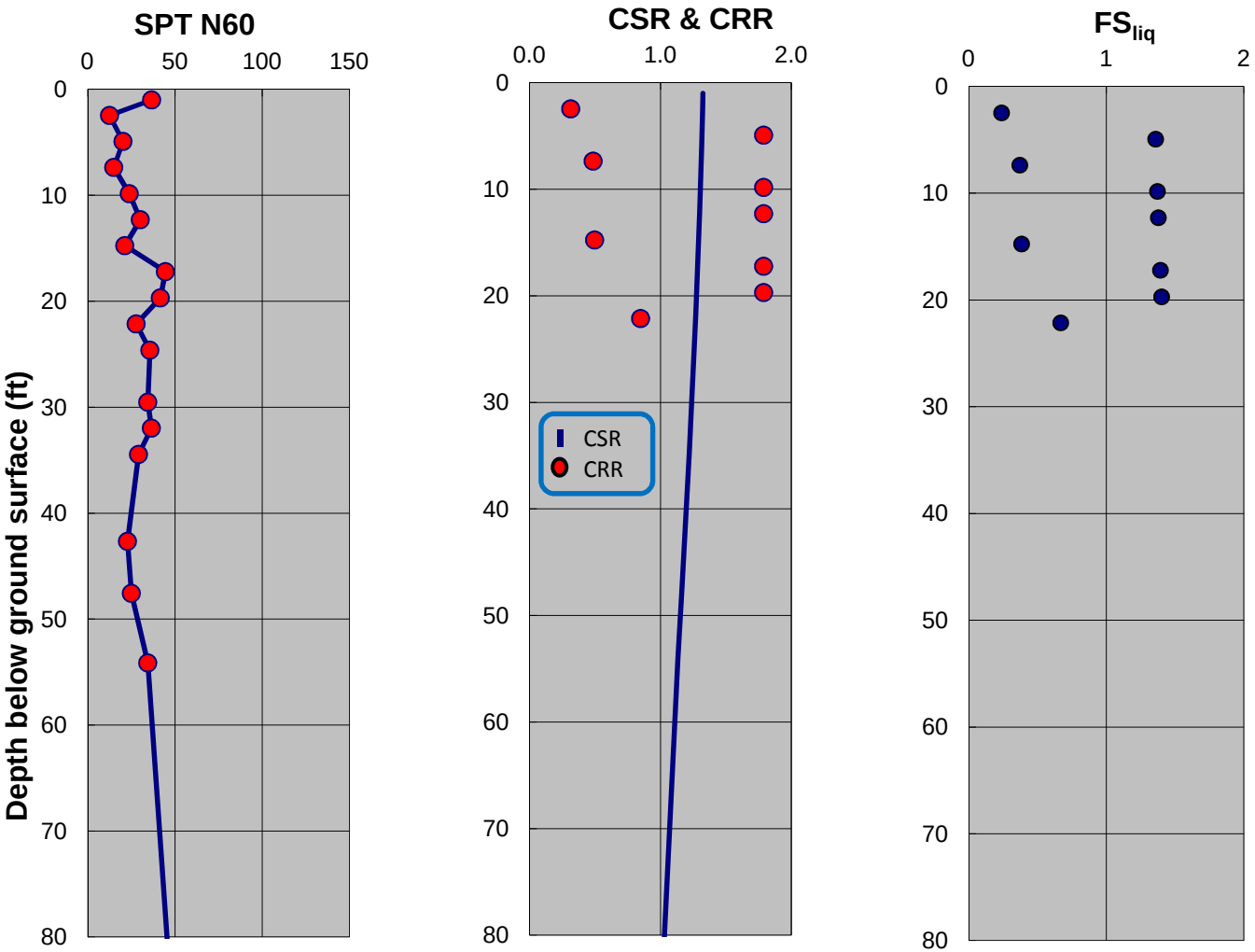
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-09 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



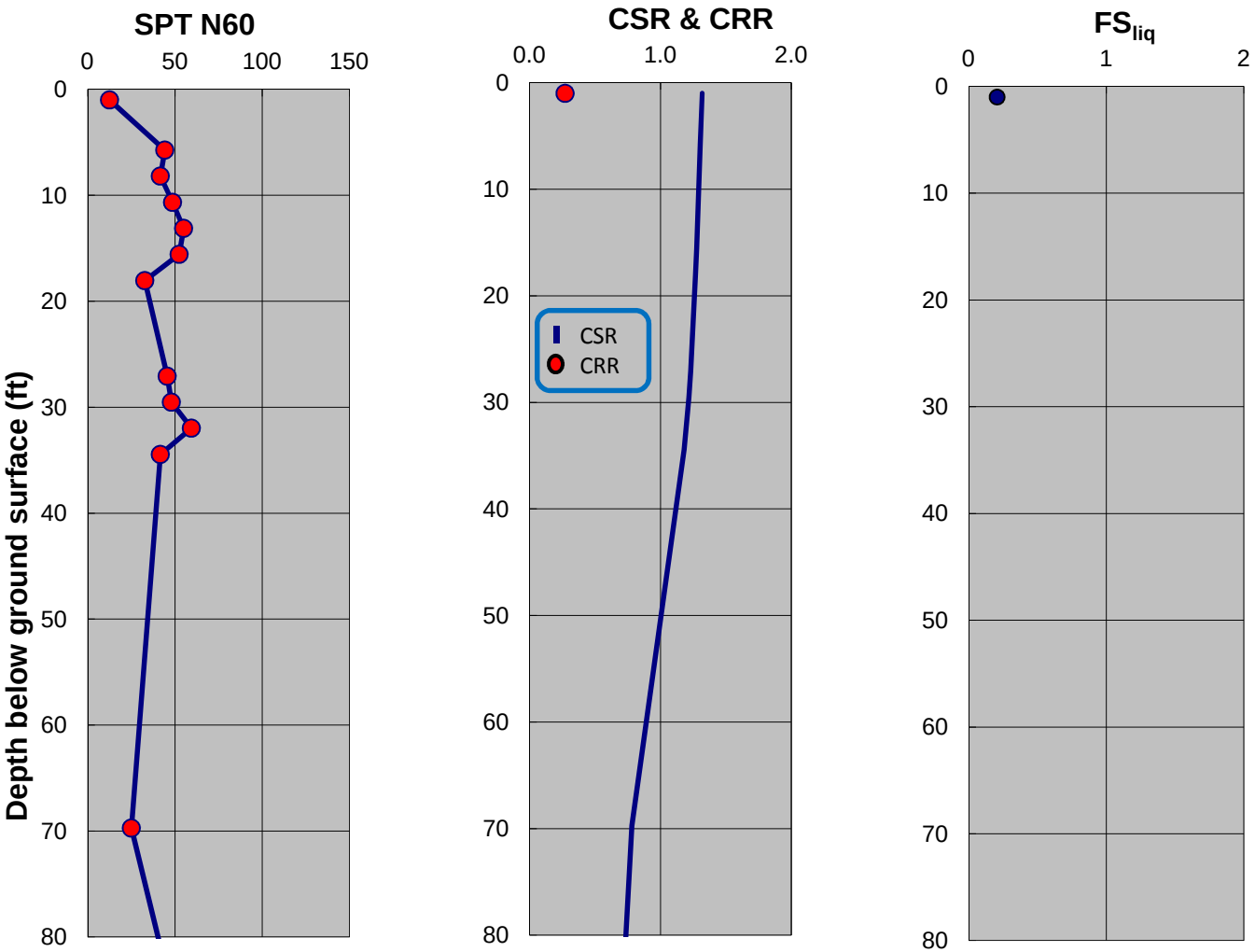
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-12 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



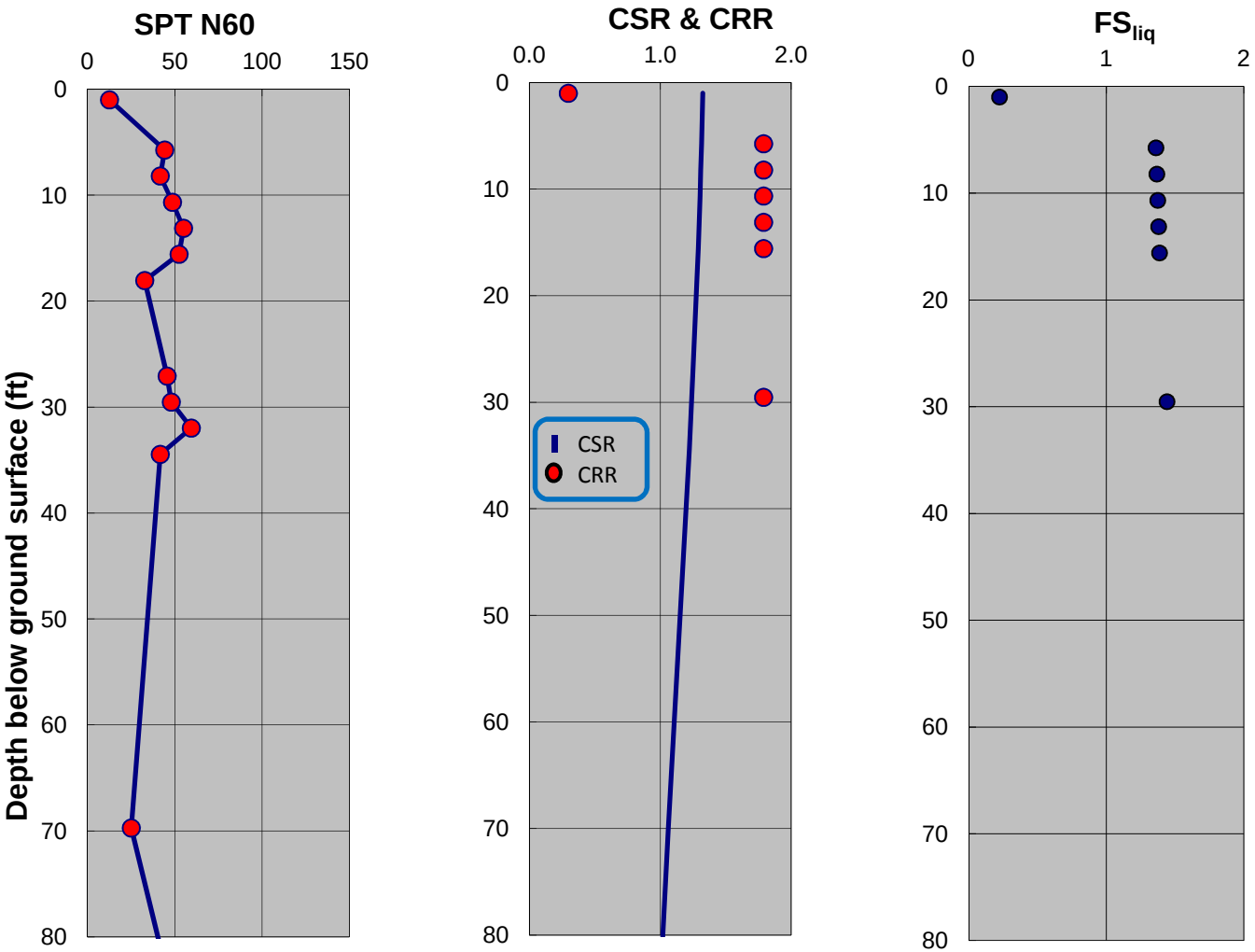
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-12 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



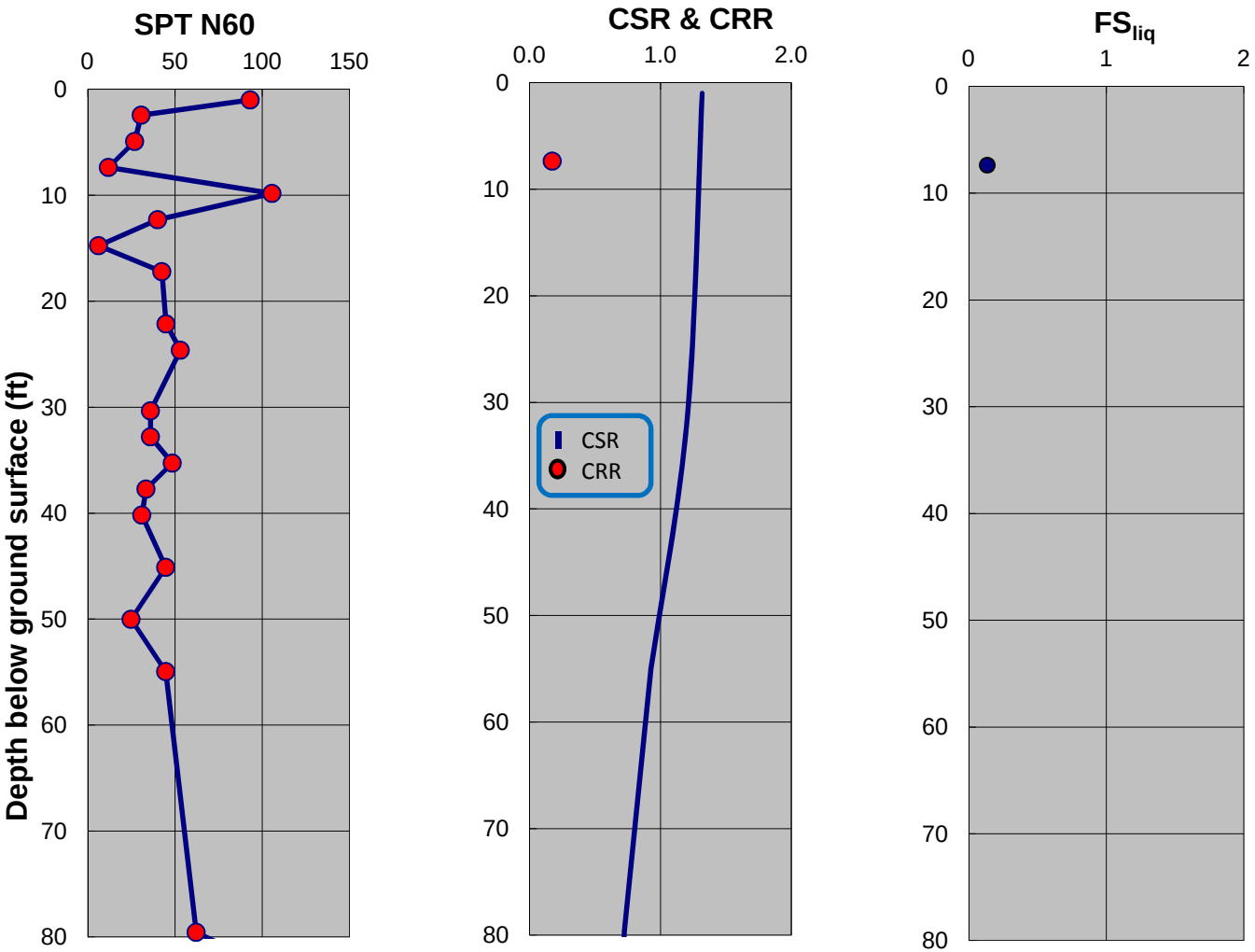
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-13 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



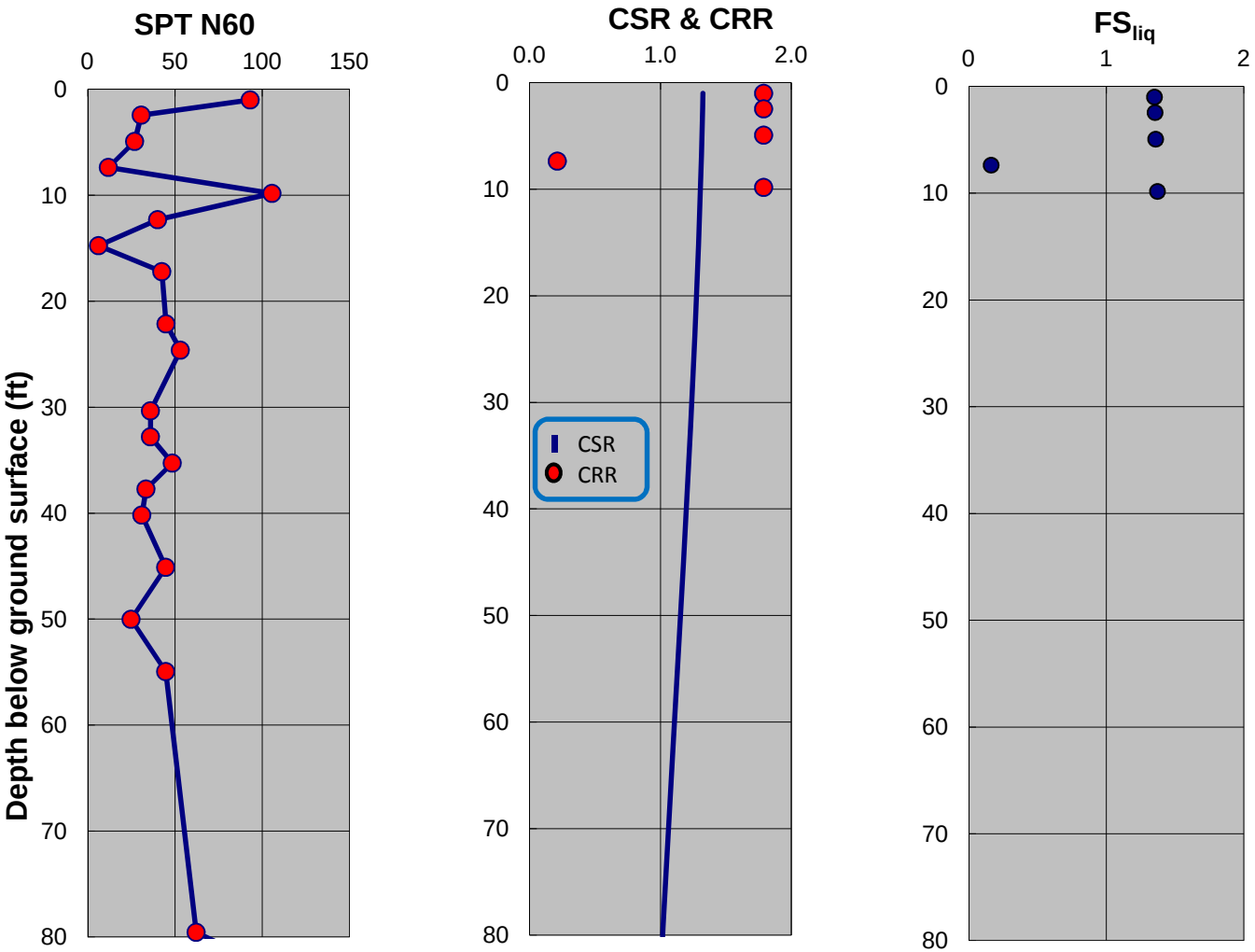
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-13 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



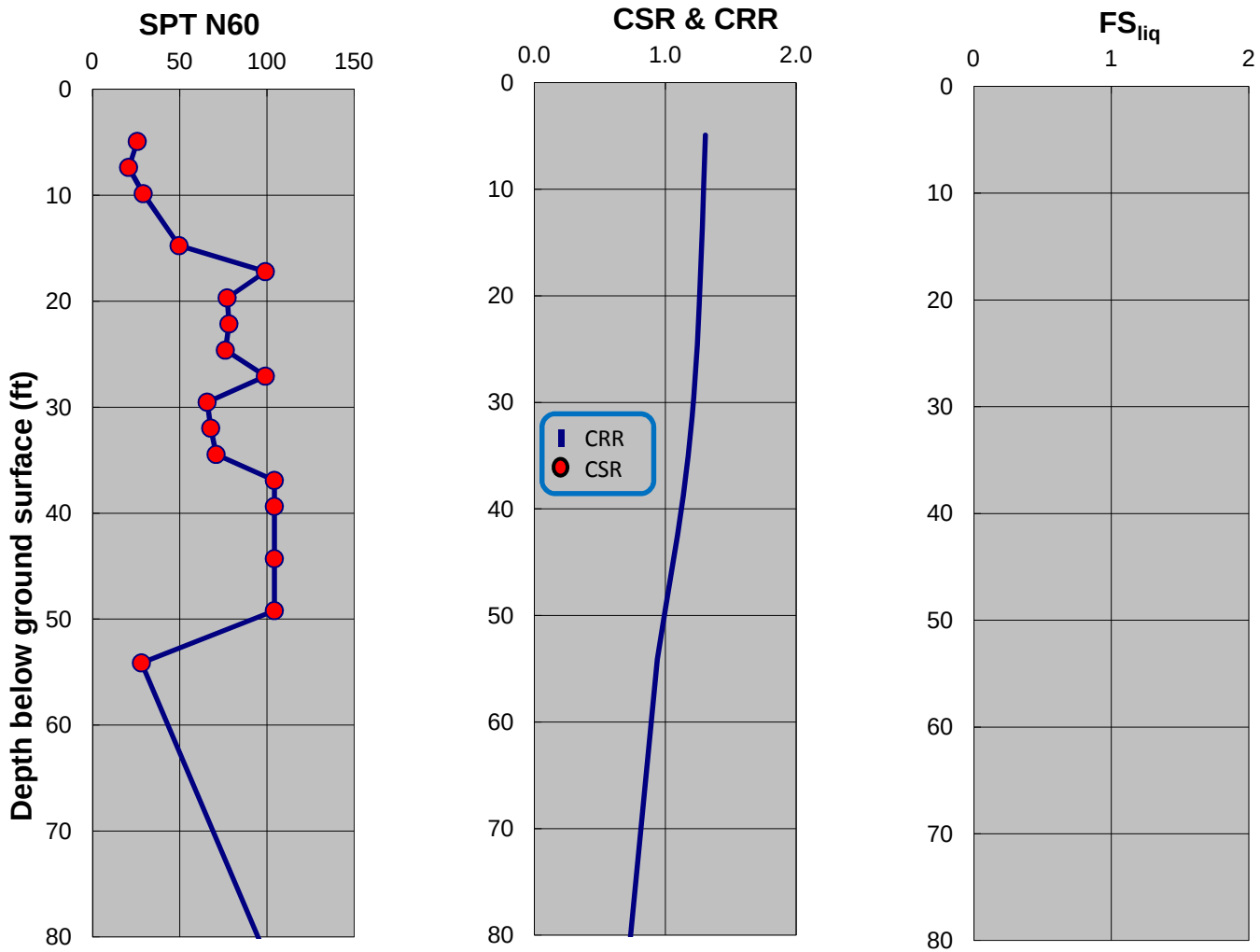
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-14 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



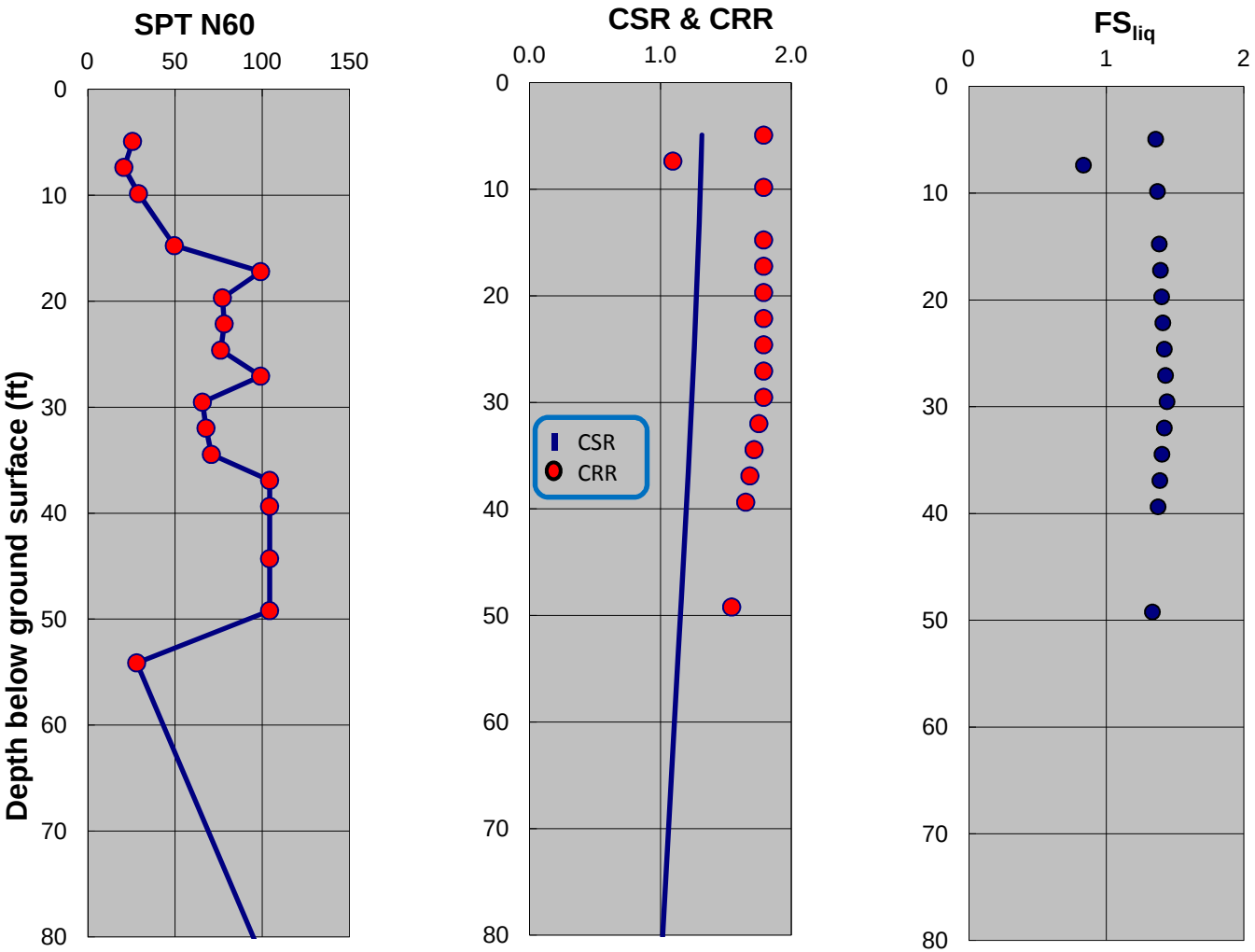
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-14 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



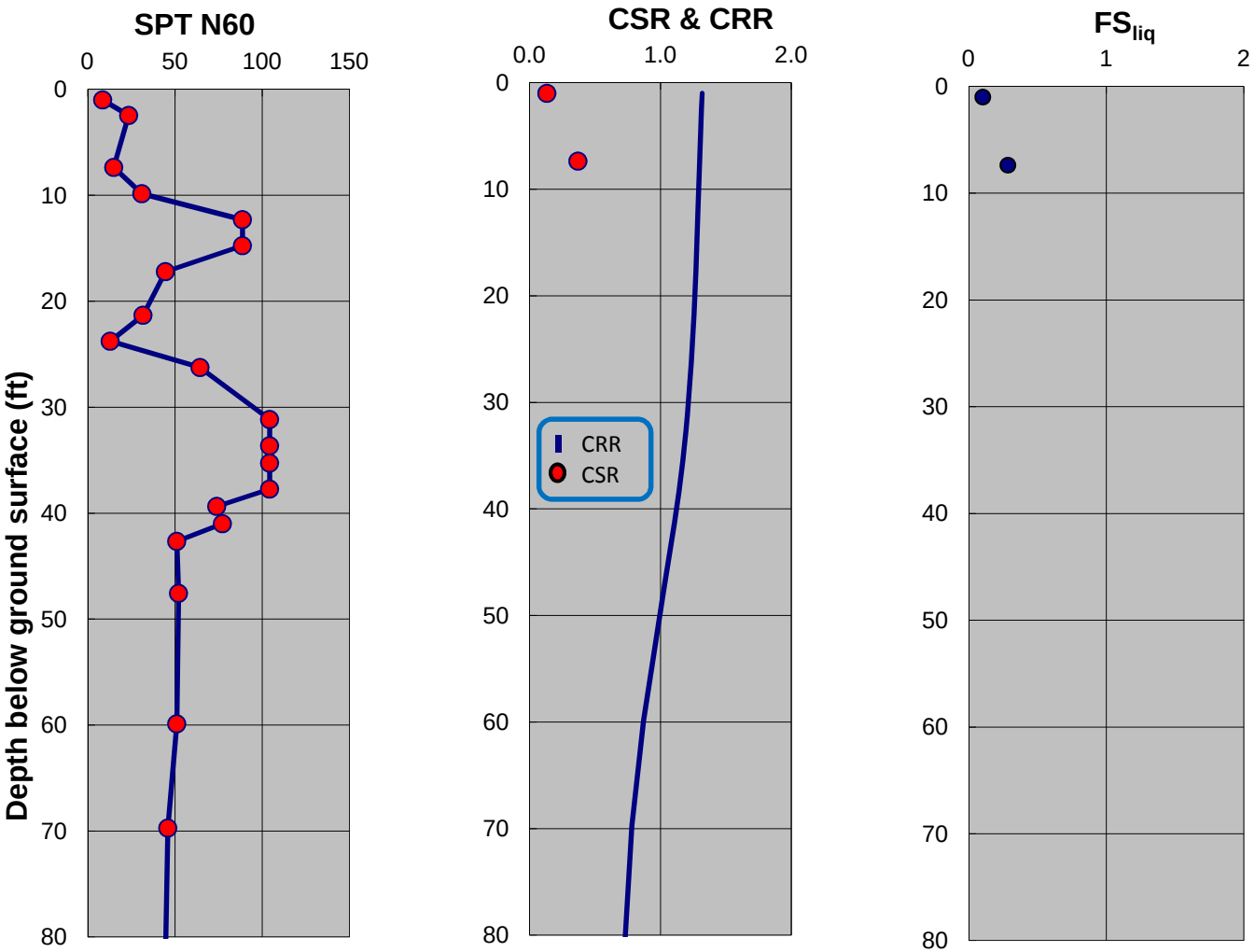
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-15 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



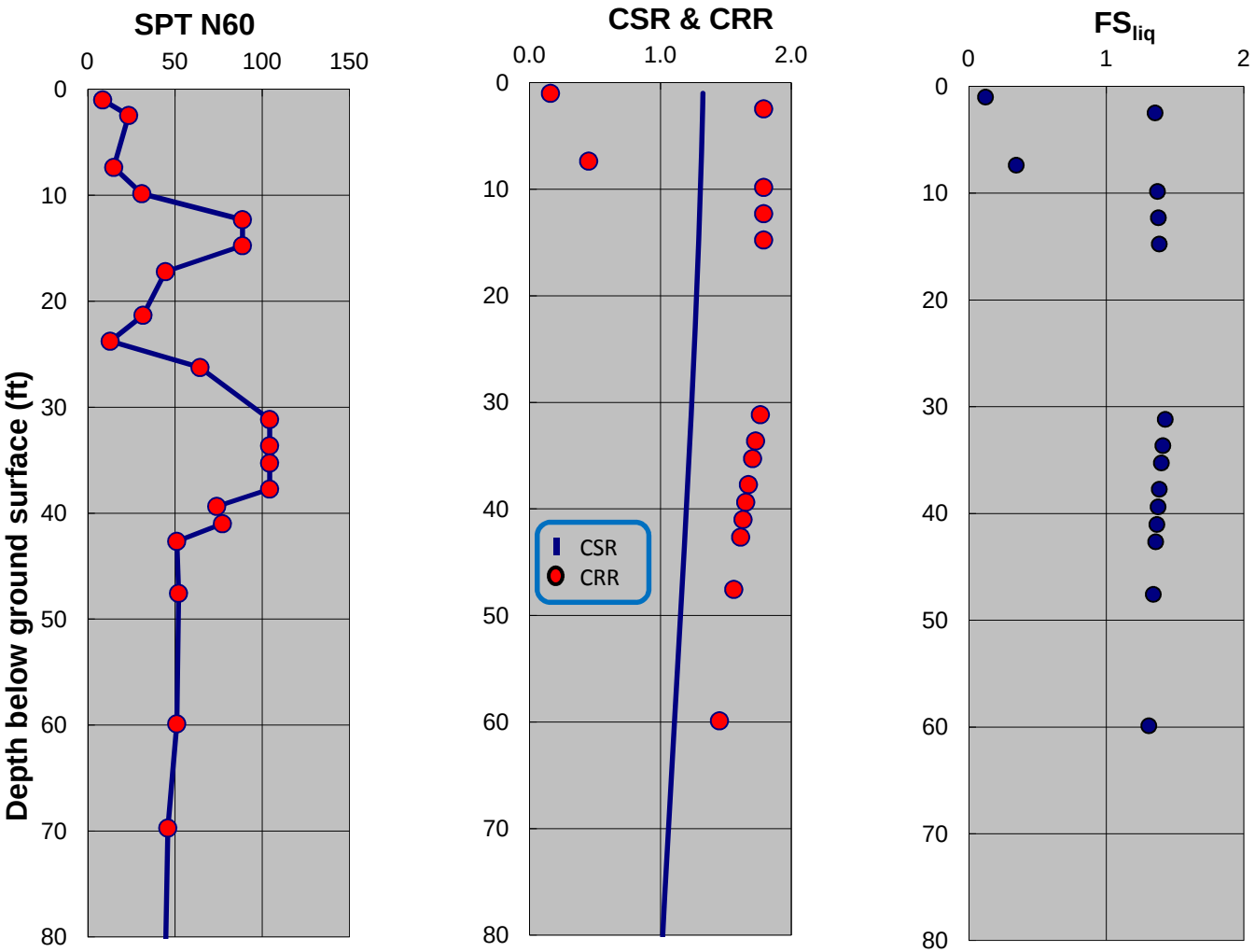
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-15 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



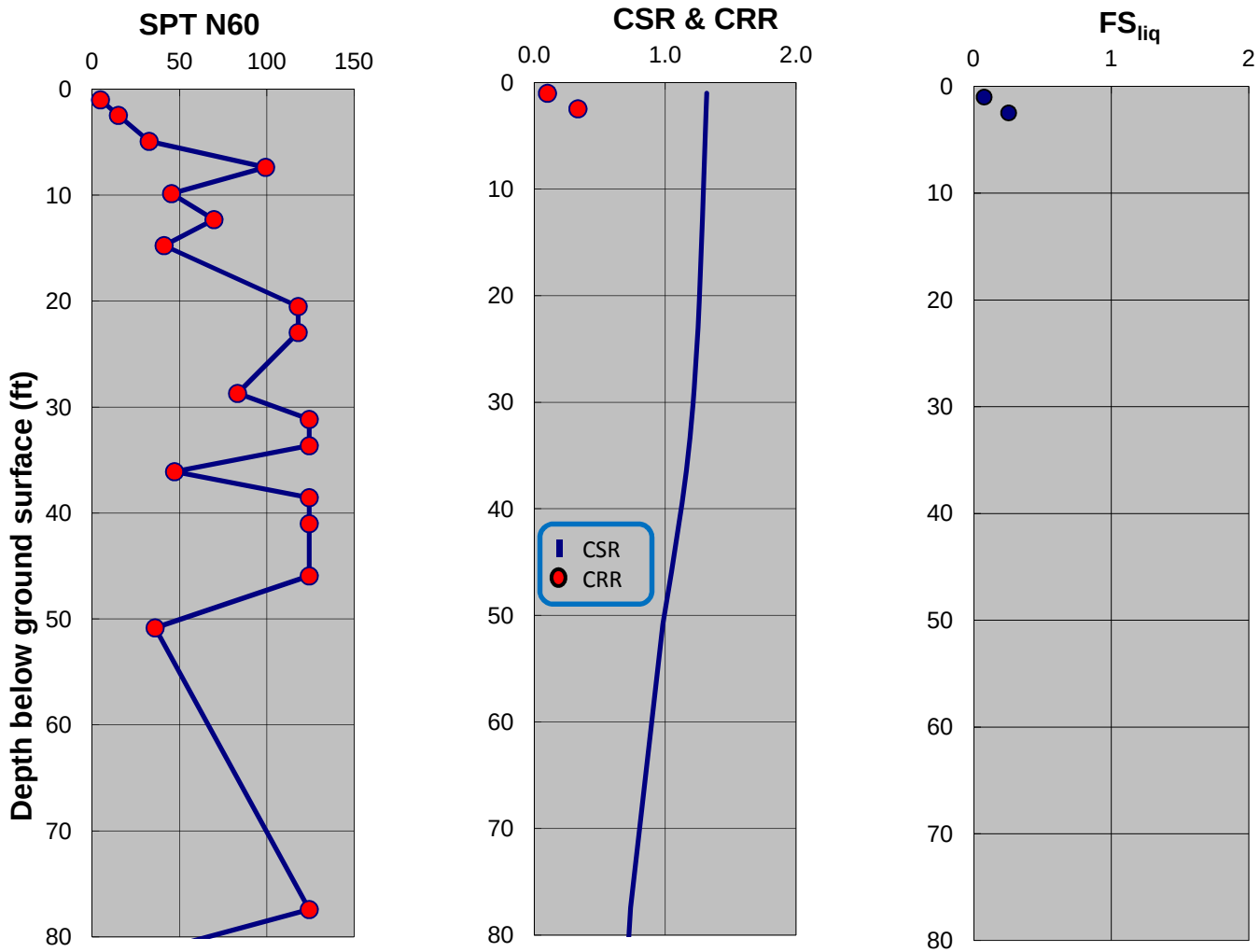
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-16 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



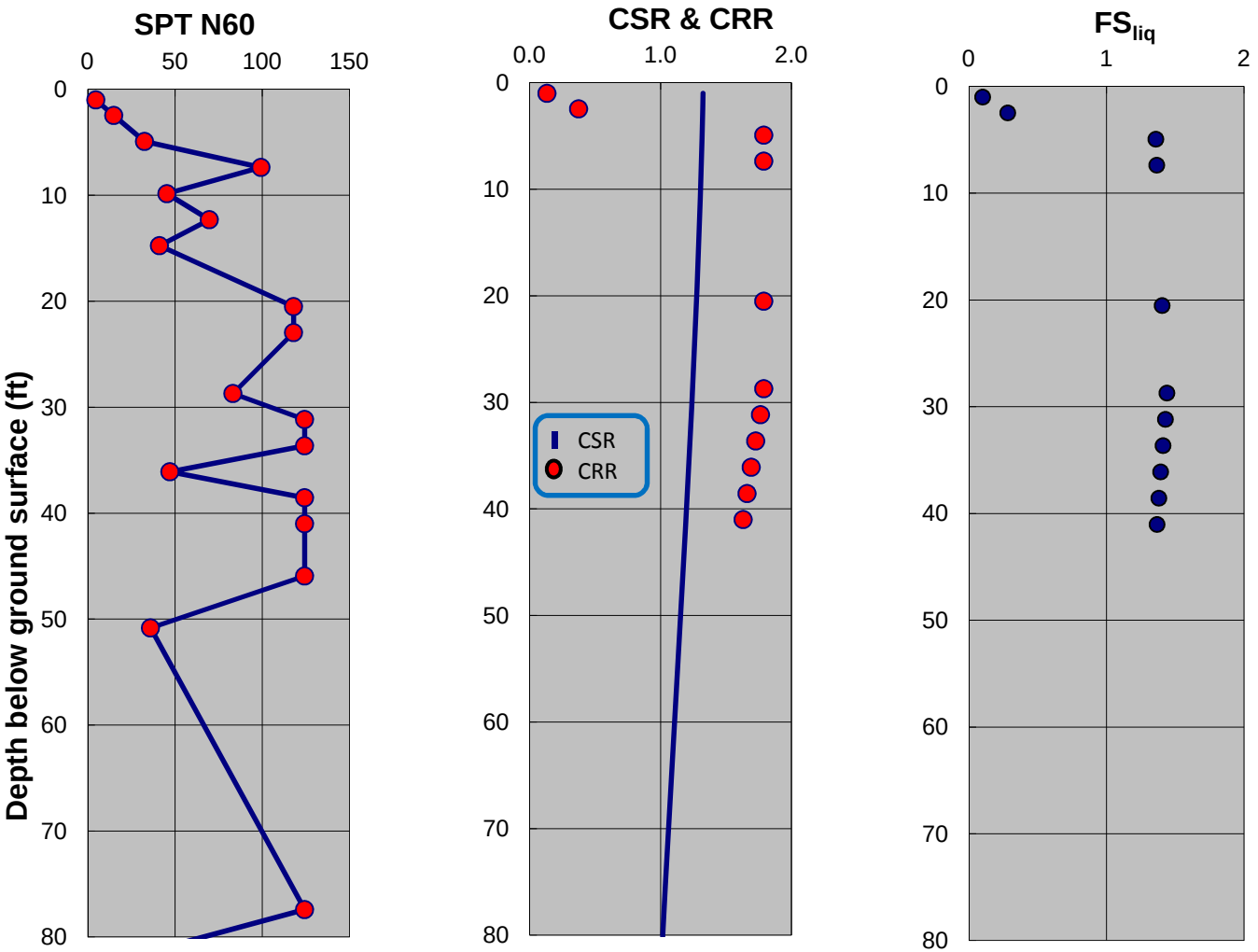
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-16 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



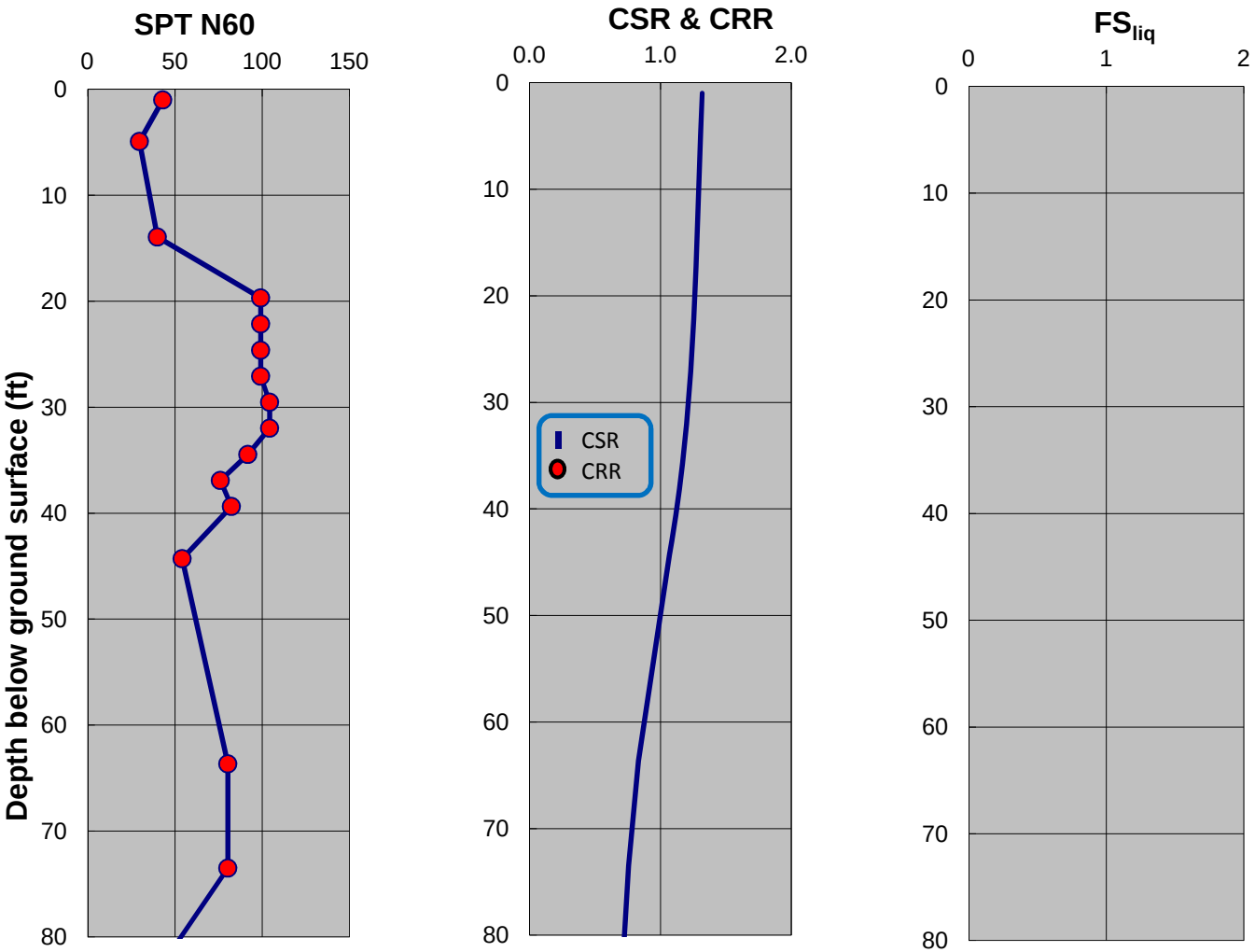
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-17 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



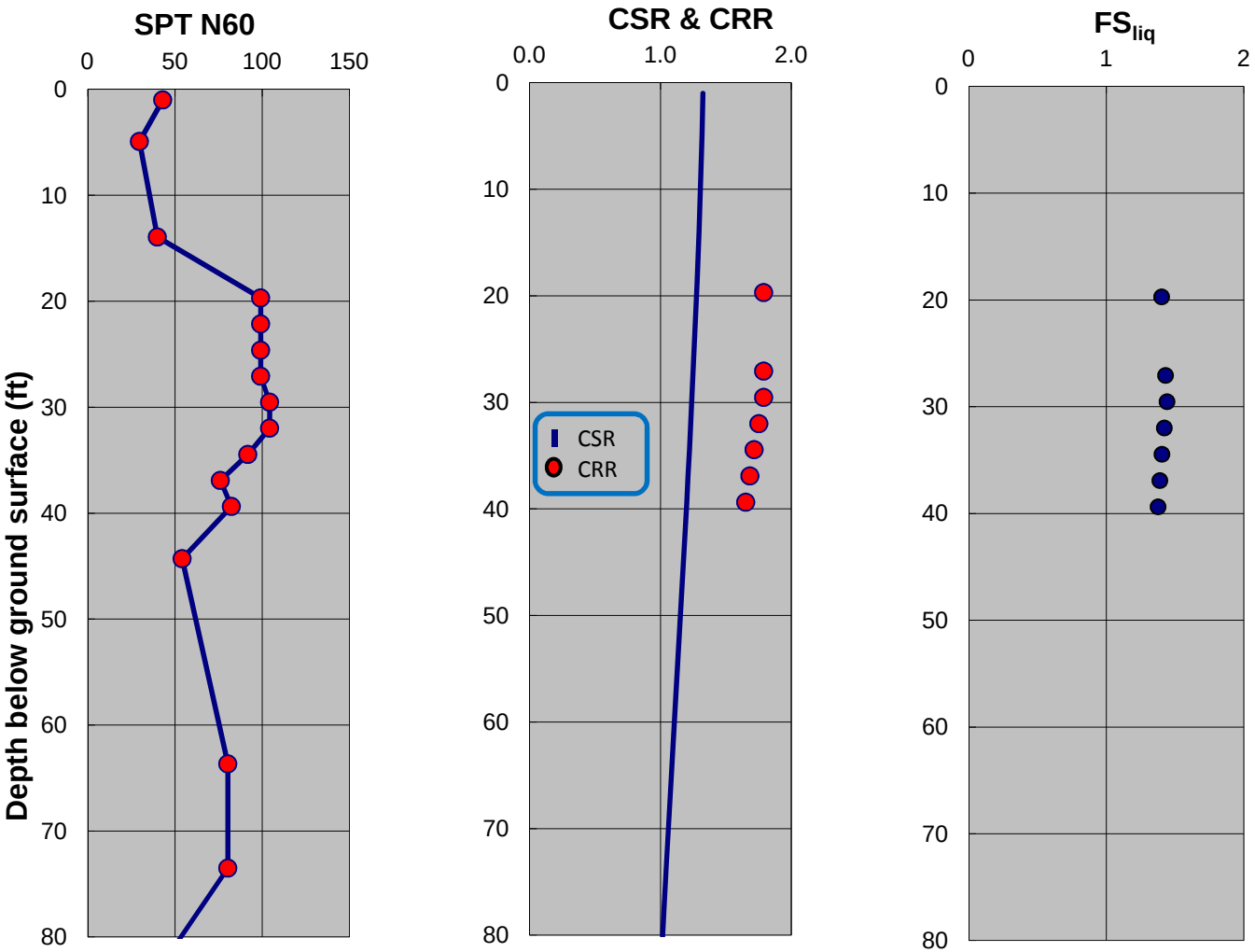
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-17 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



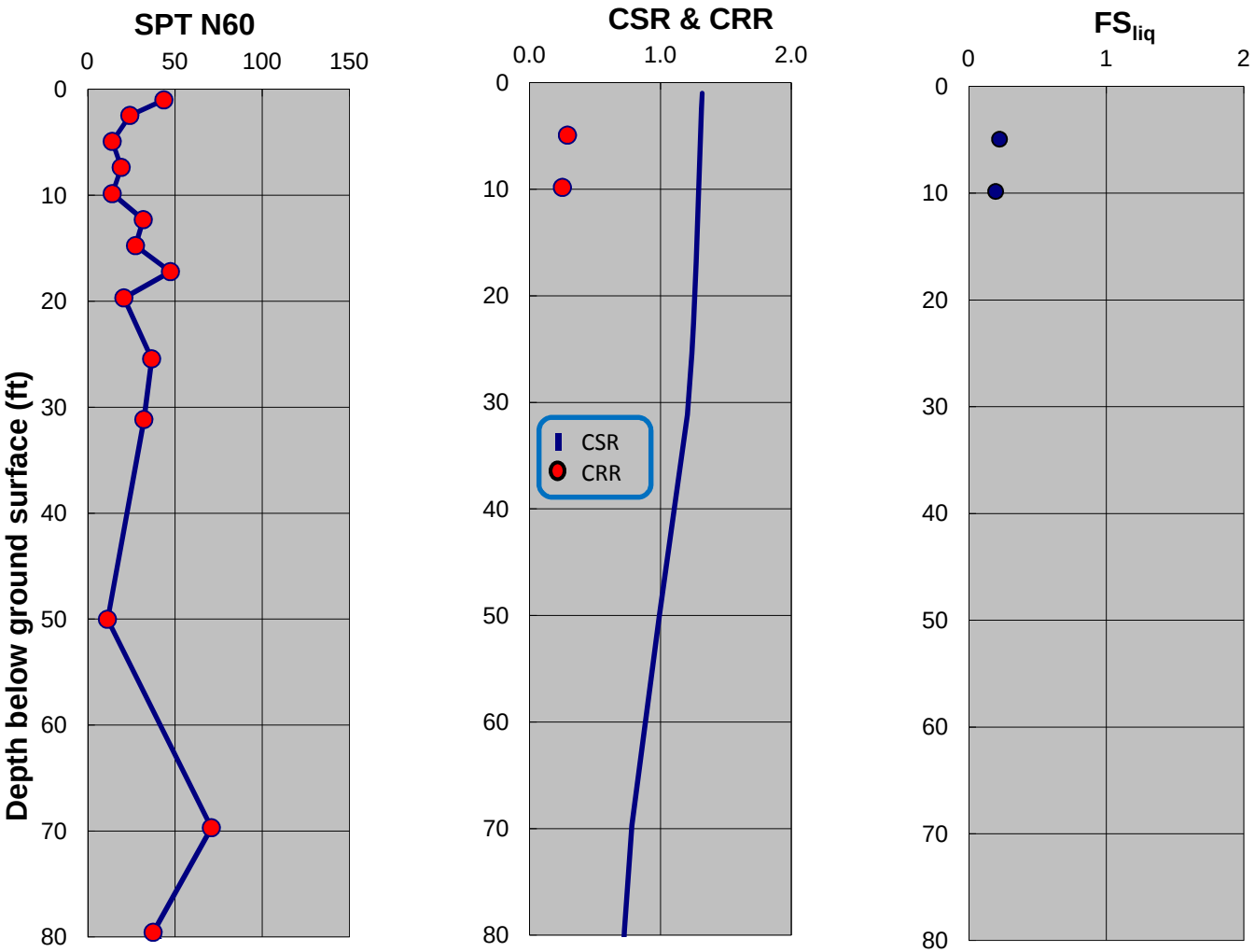
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-18 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



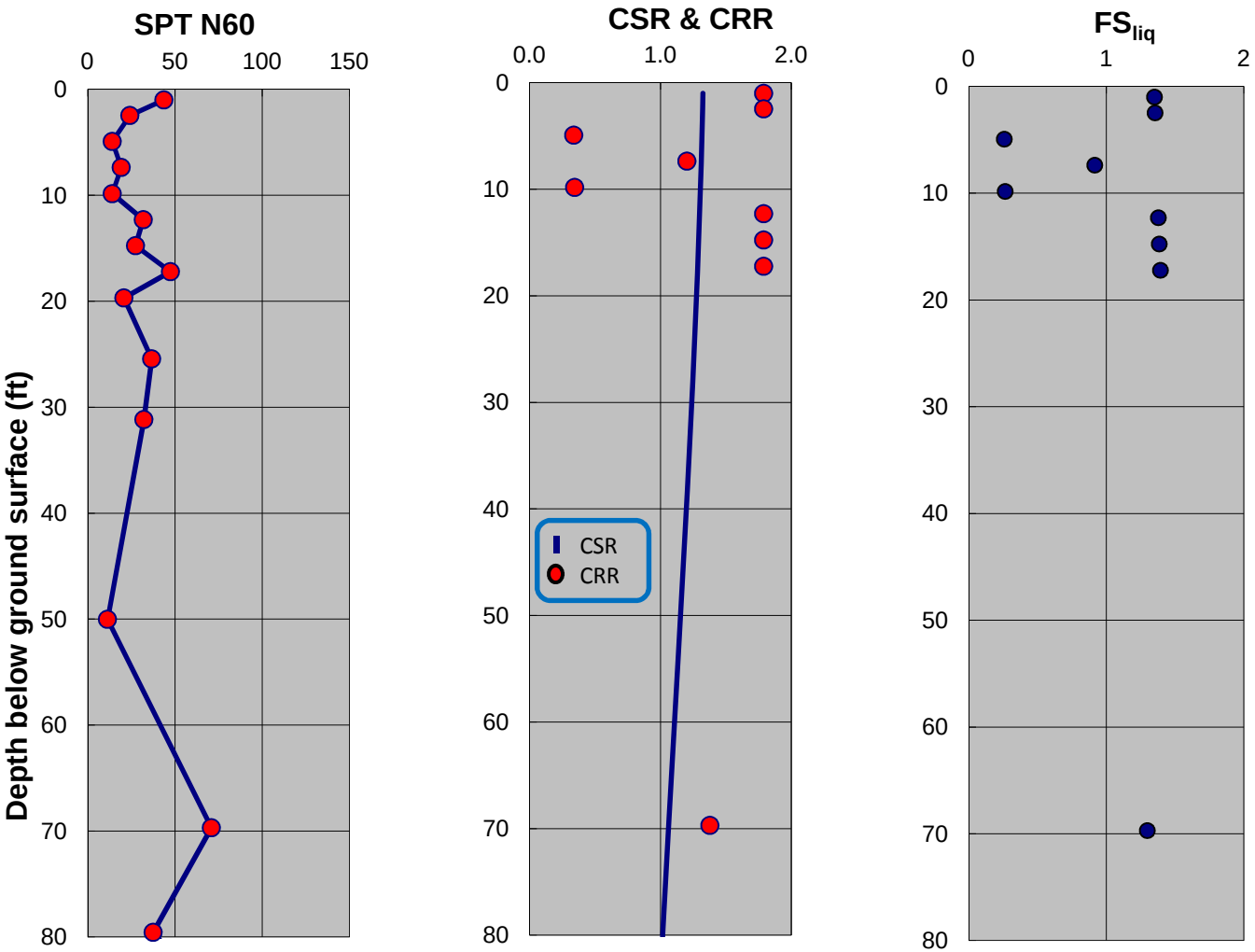
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-18 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



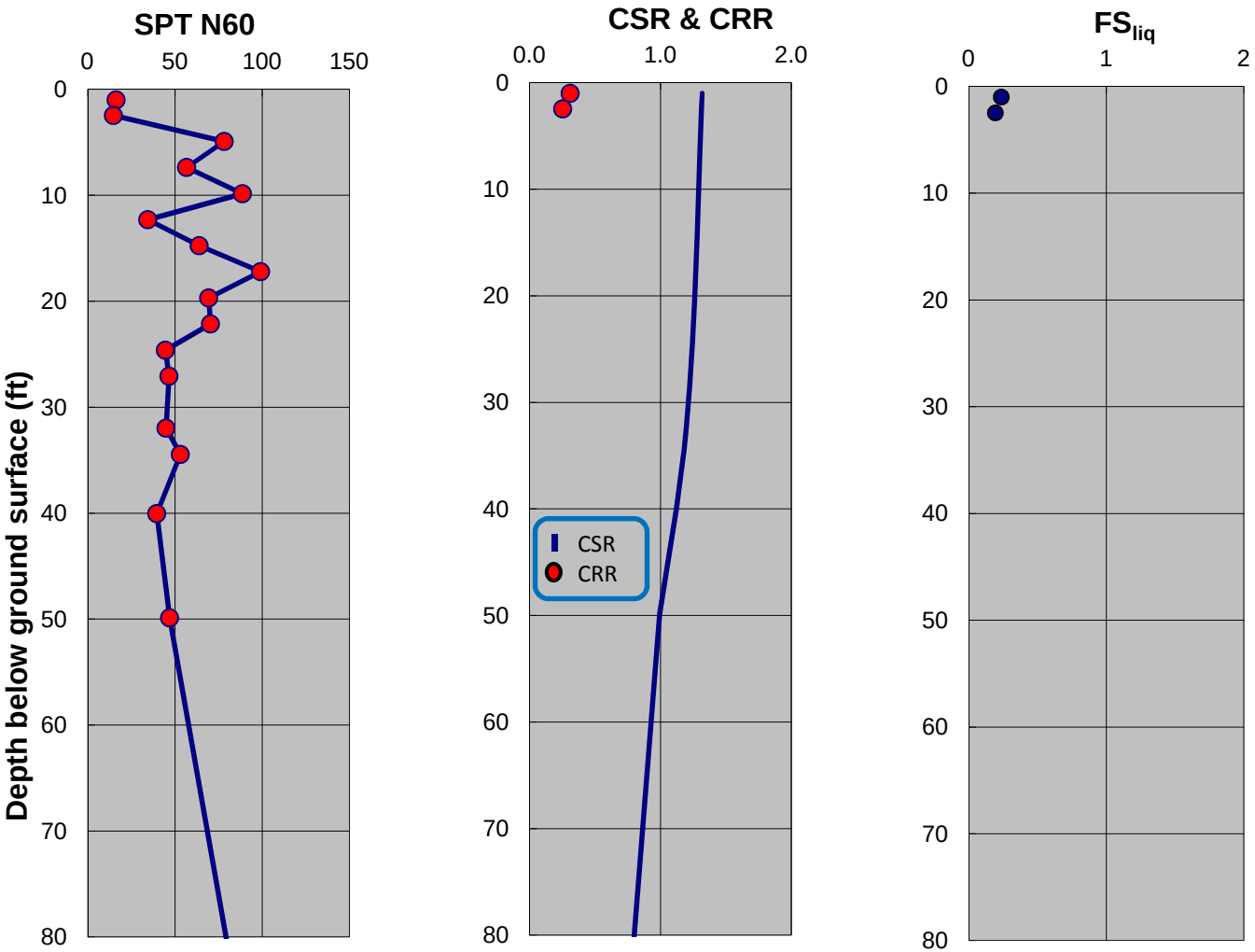
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-19 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



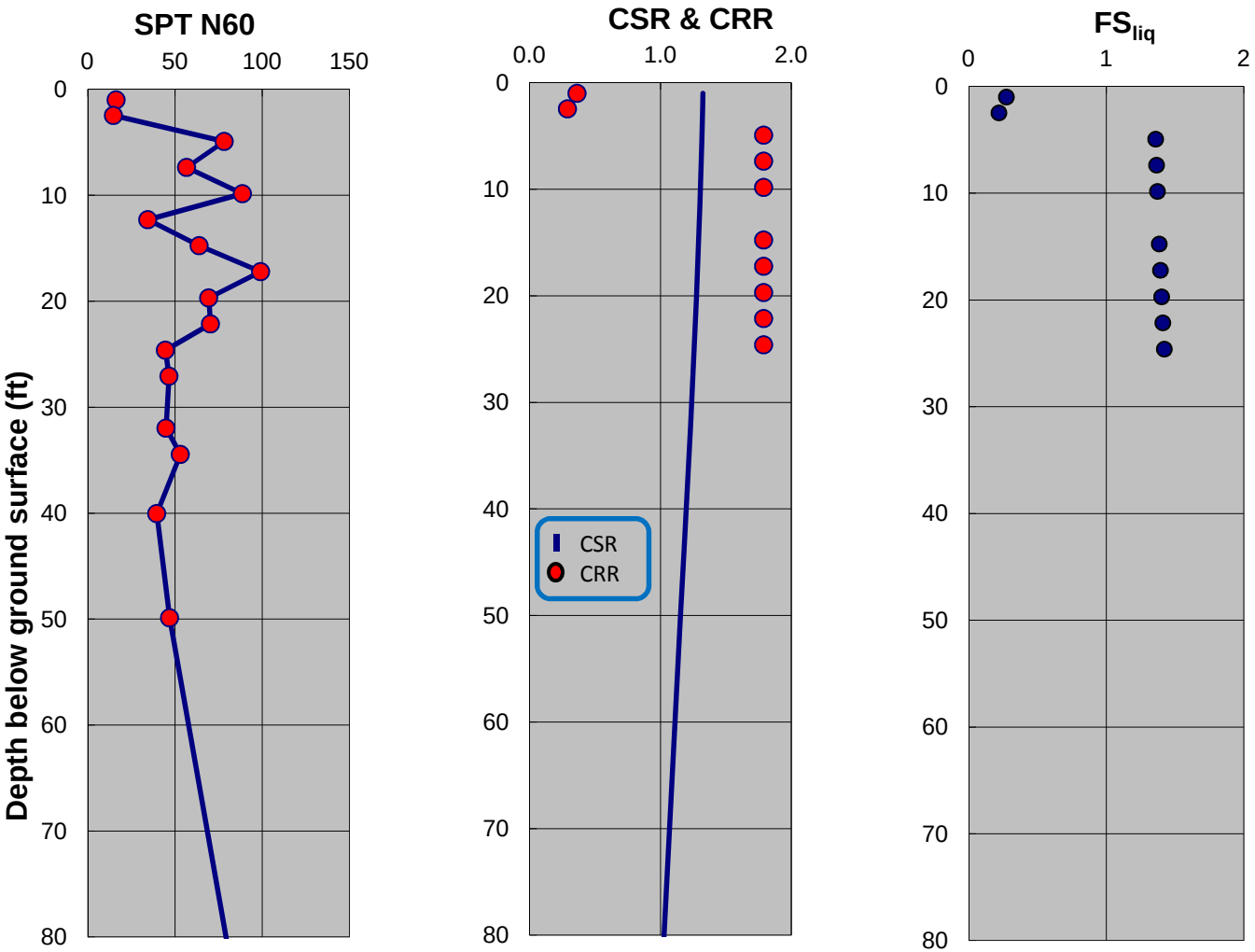
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-19 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



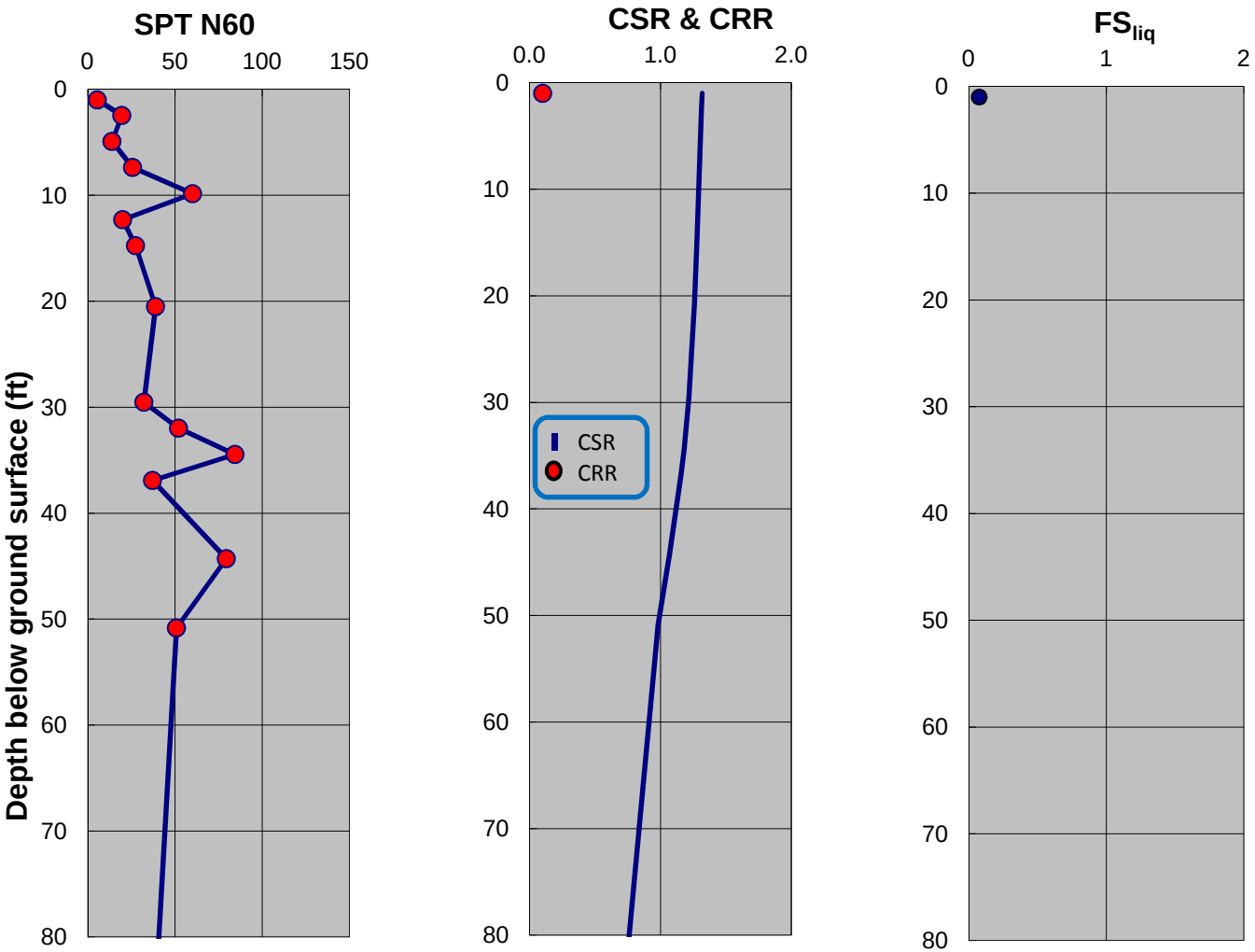
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-20 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



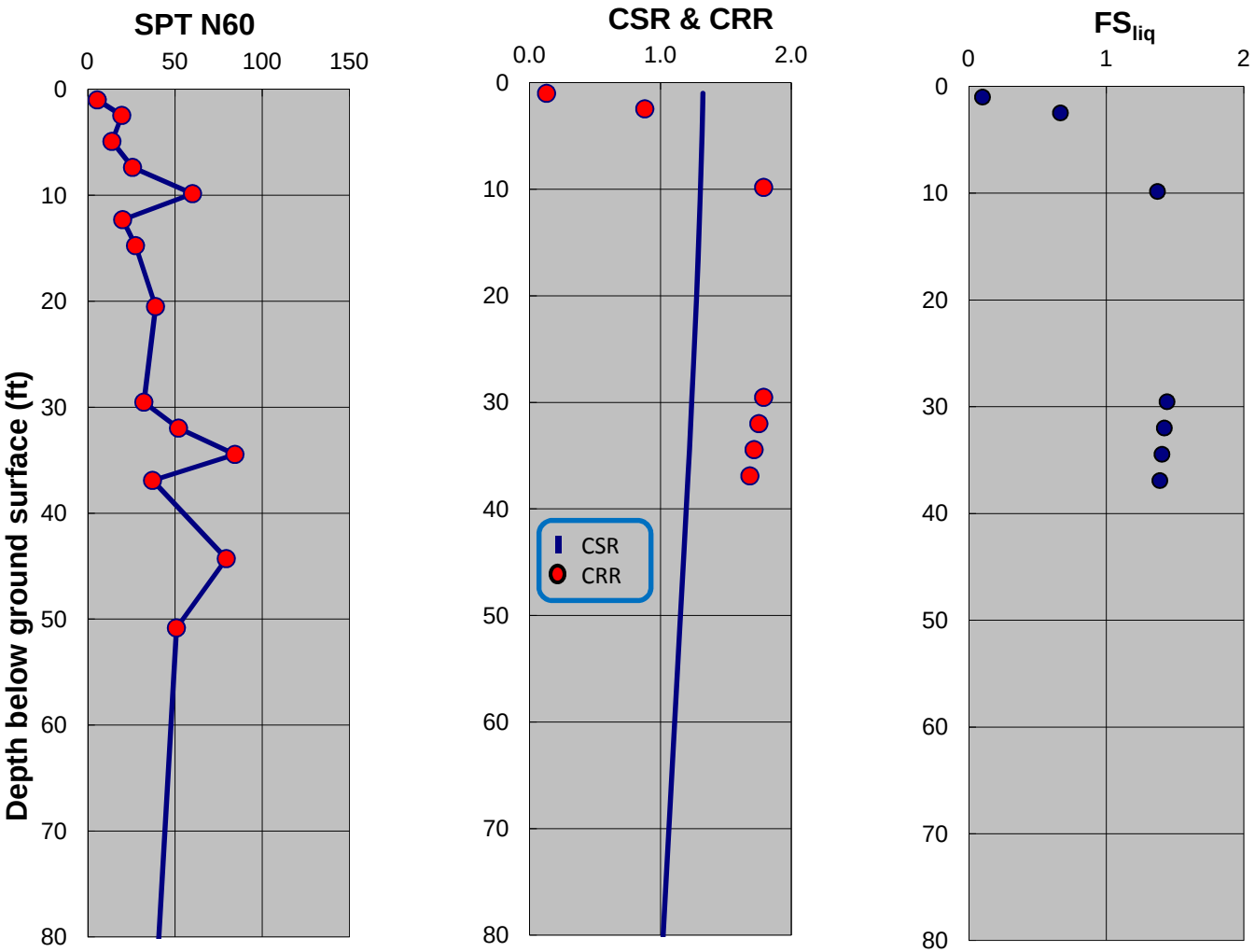
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-20 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



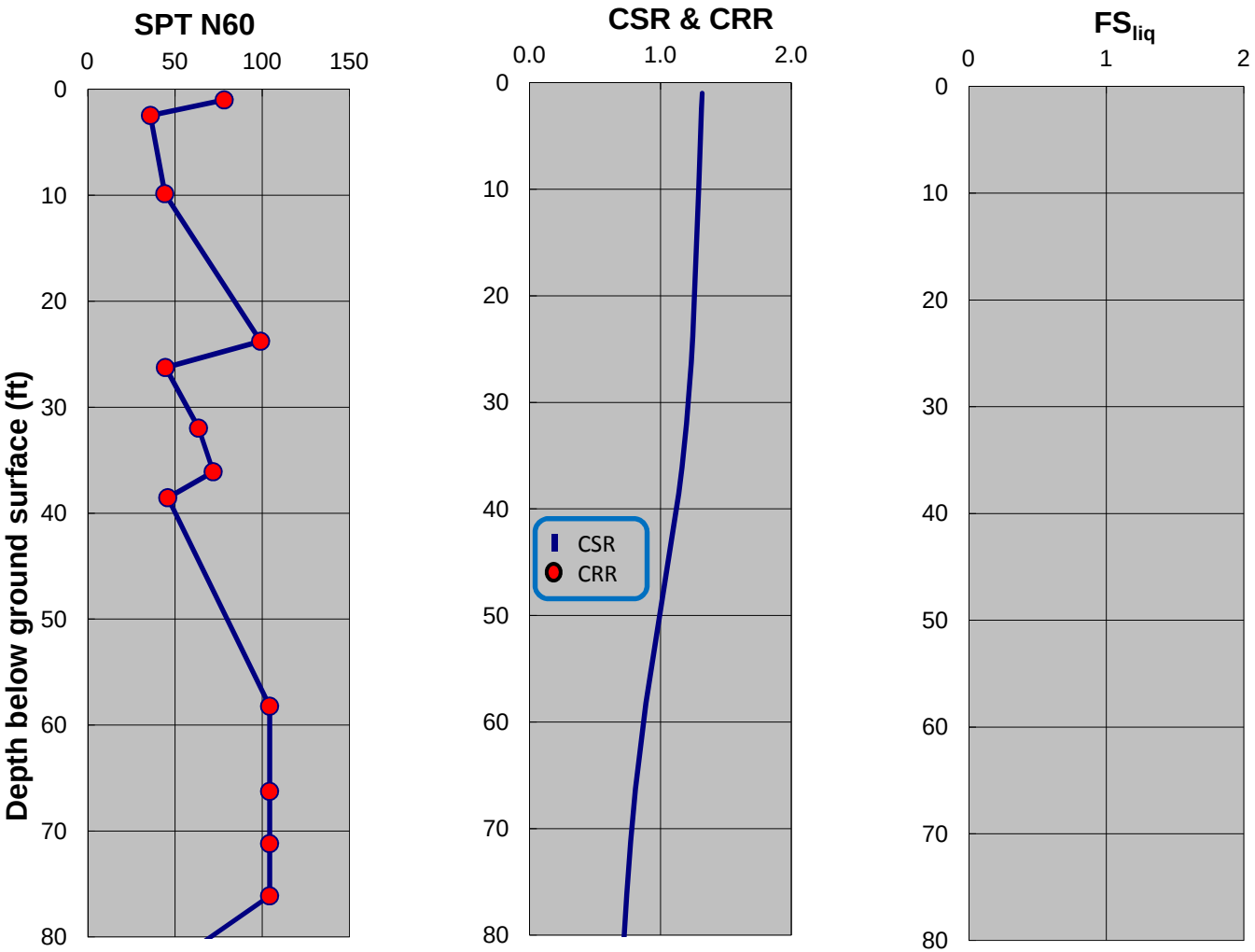
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-21 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



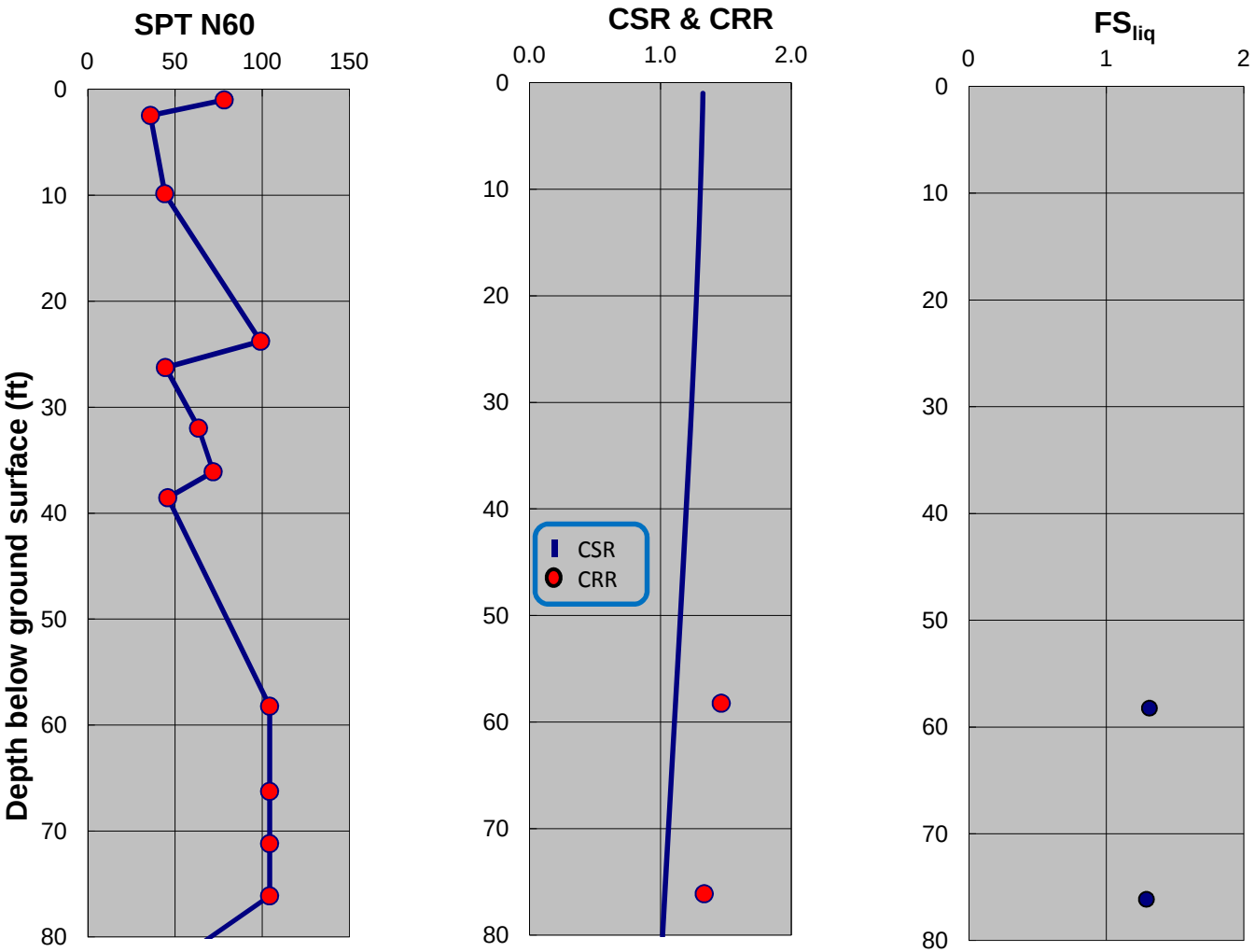
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-21 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



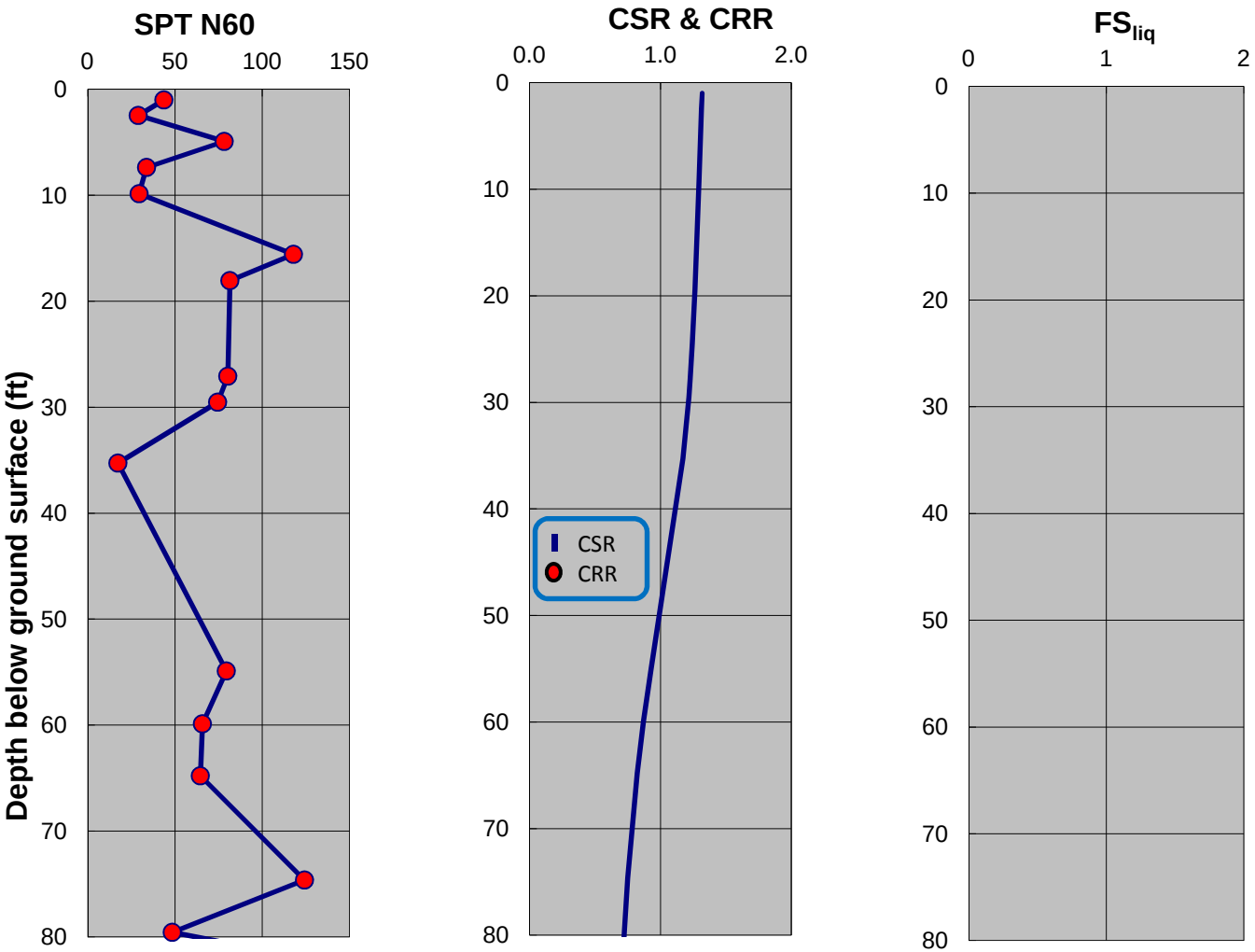
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-22 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



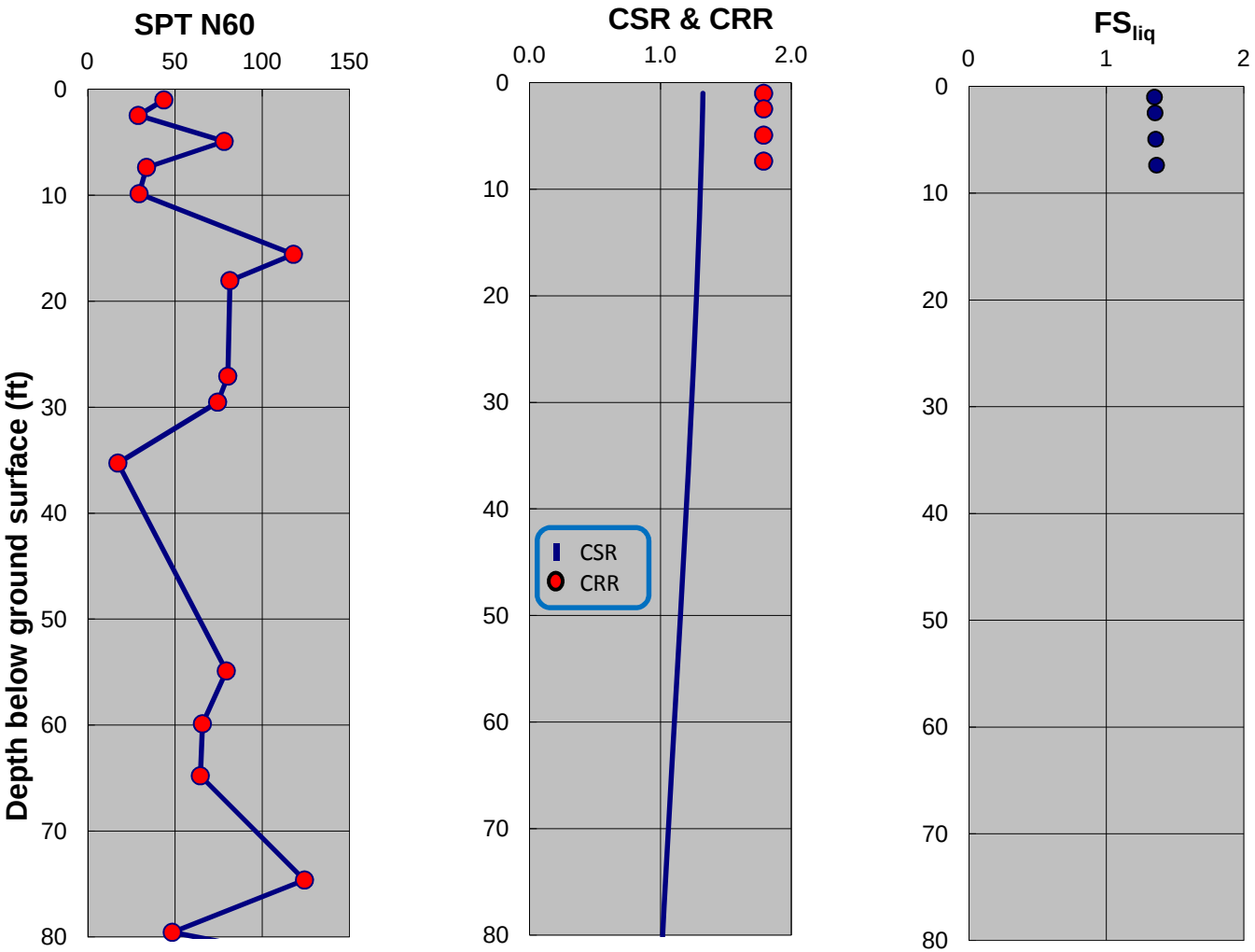
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-22 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



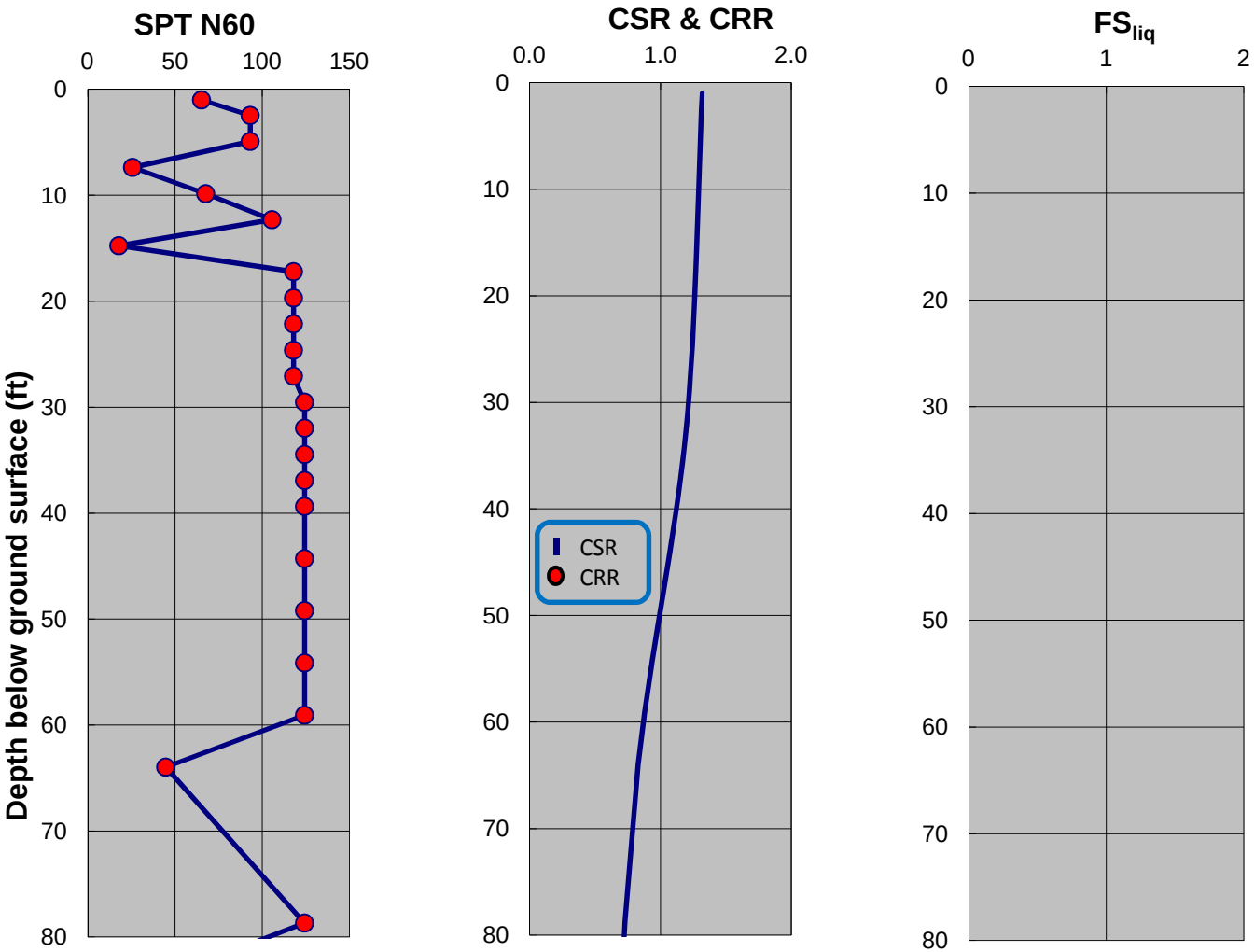
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-23 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



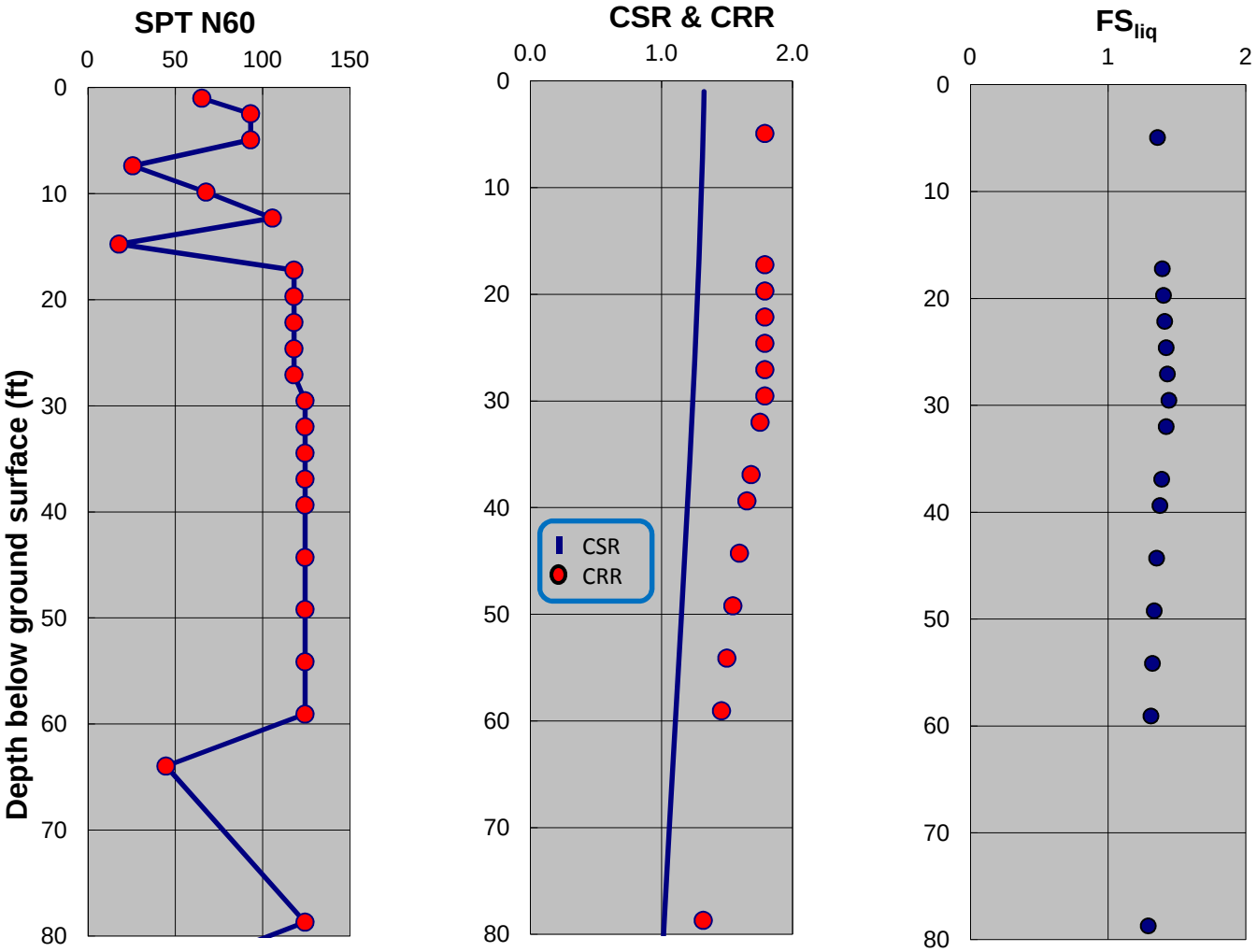
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-23 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



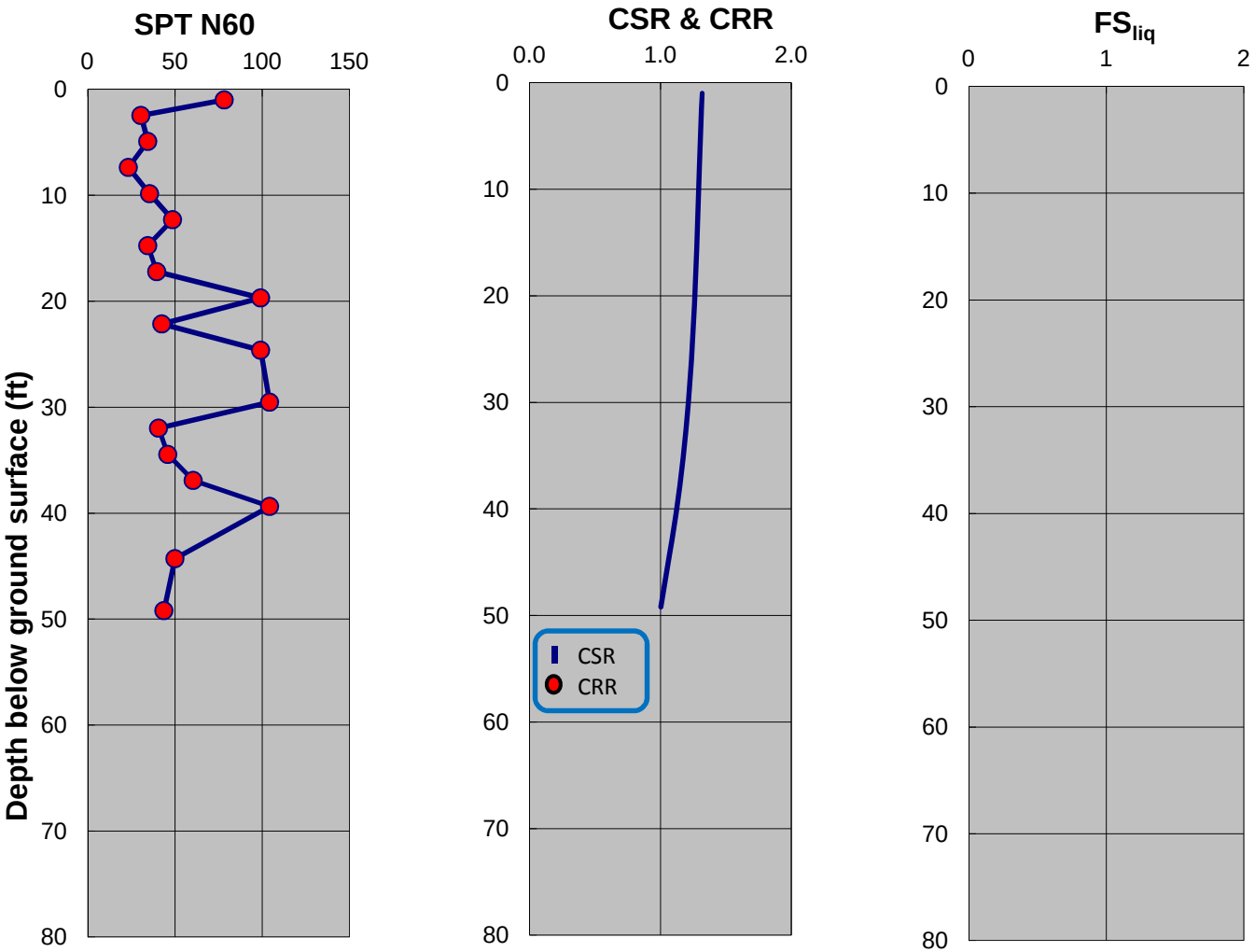
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-24 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



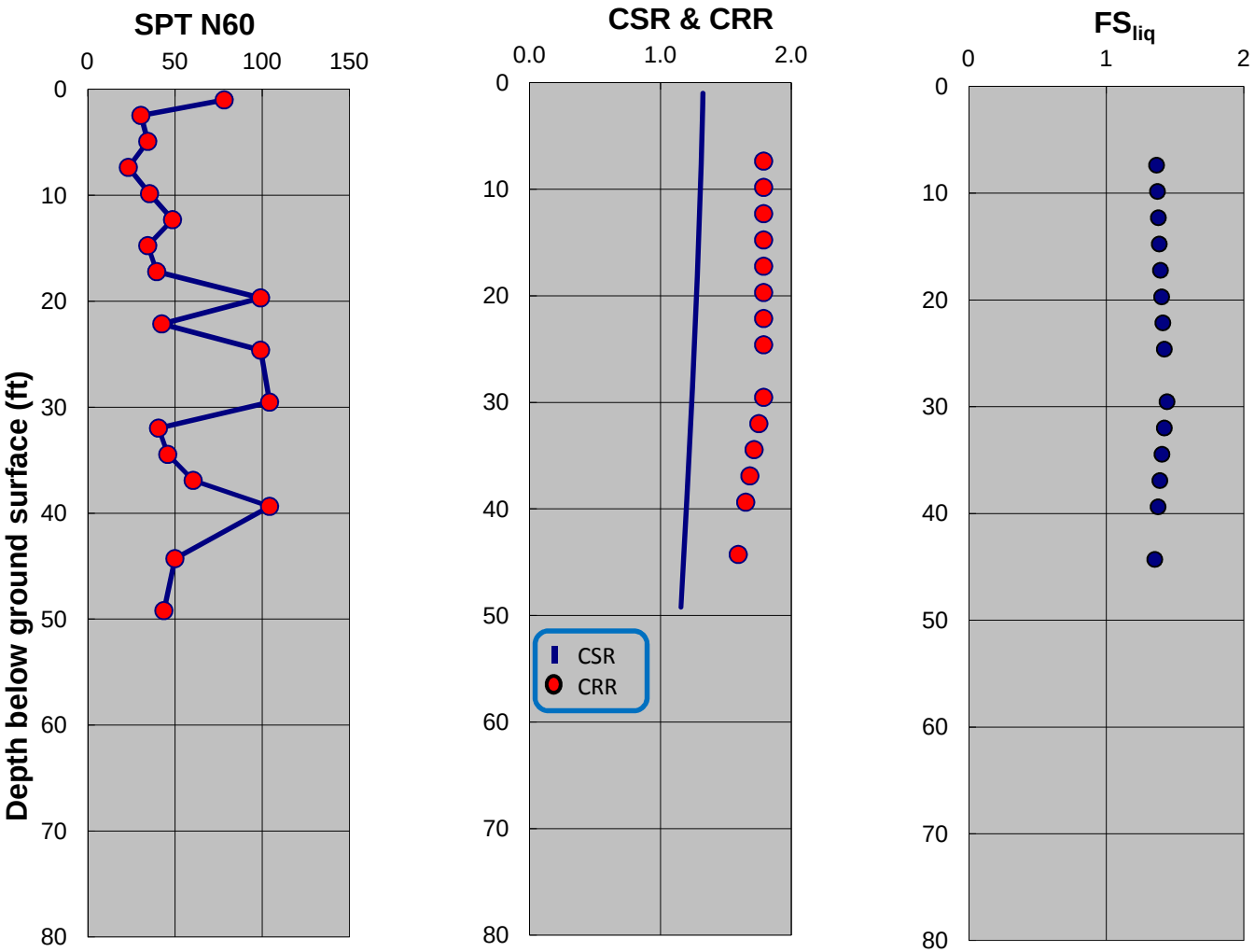
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-24 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



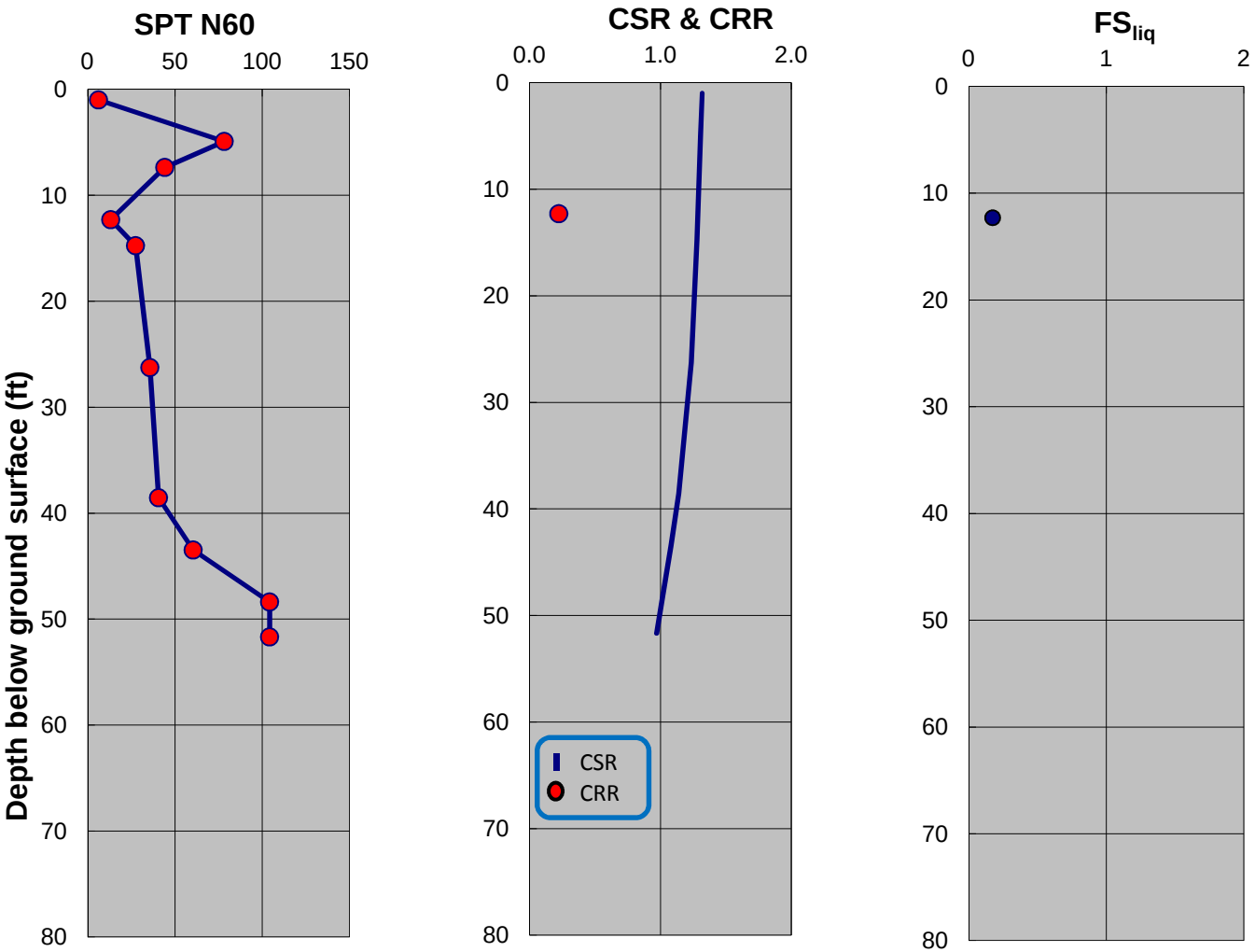
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-25 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



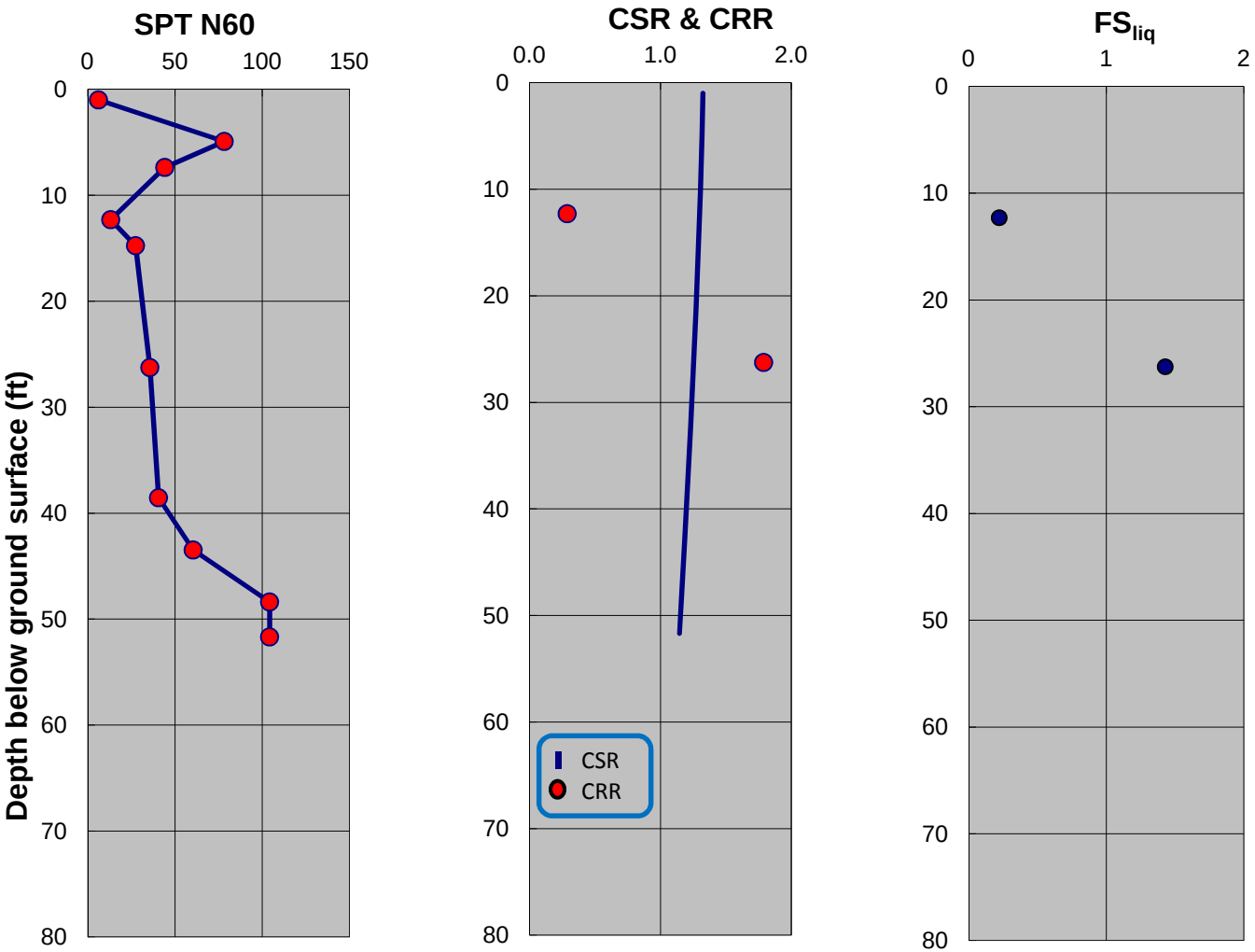
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-25 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



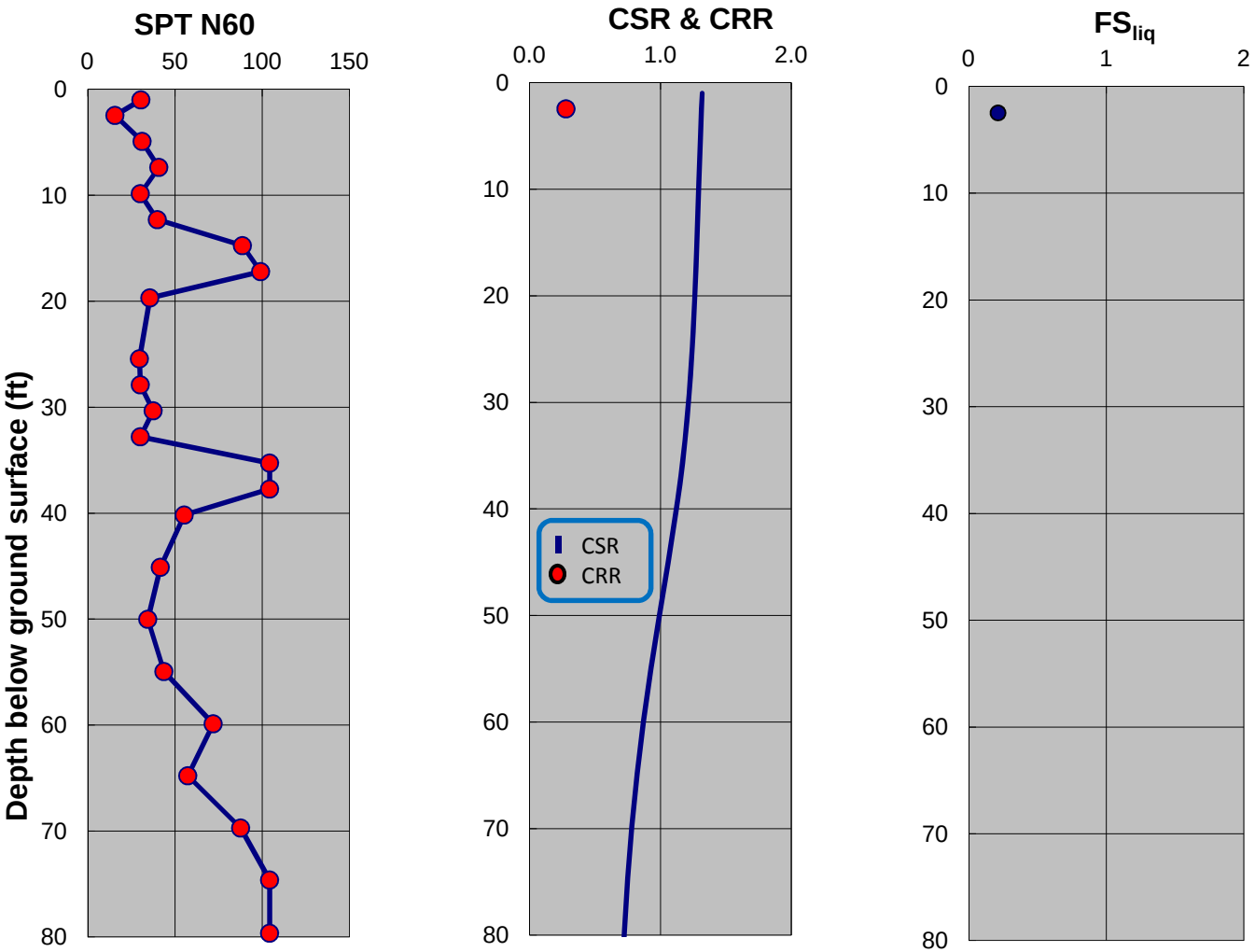
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-26 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



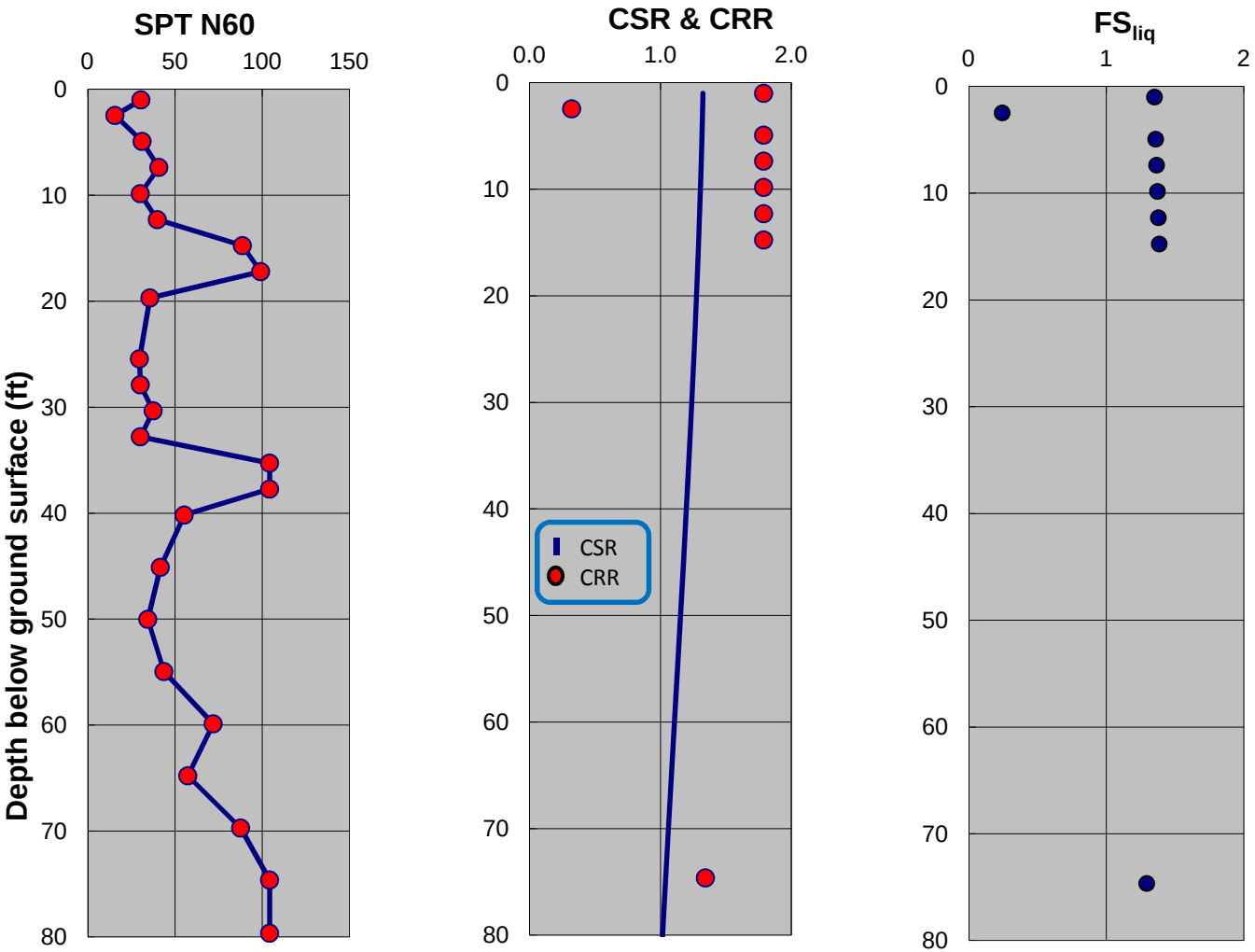
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-26 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



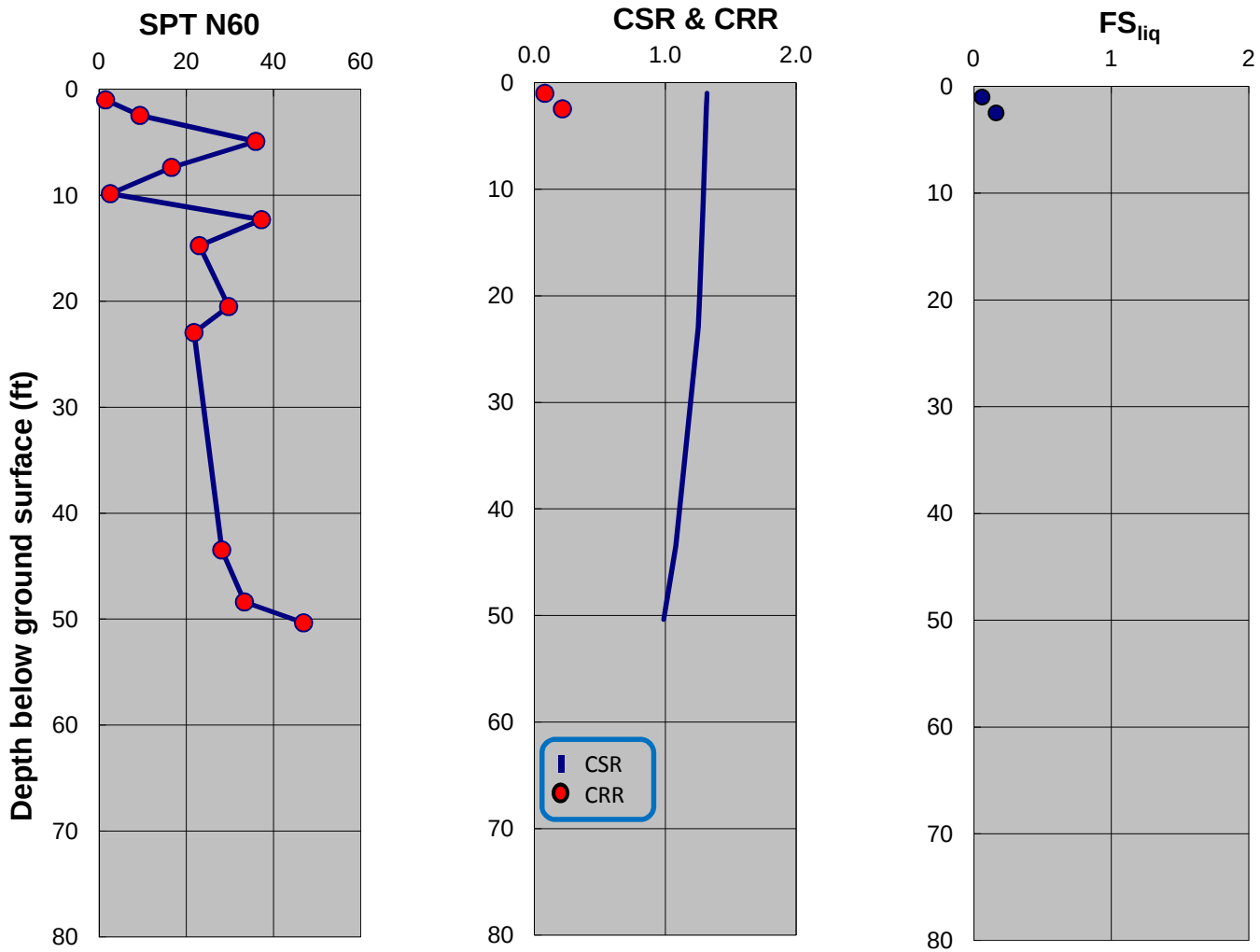
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-27 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



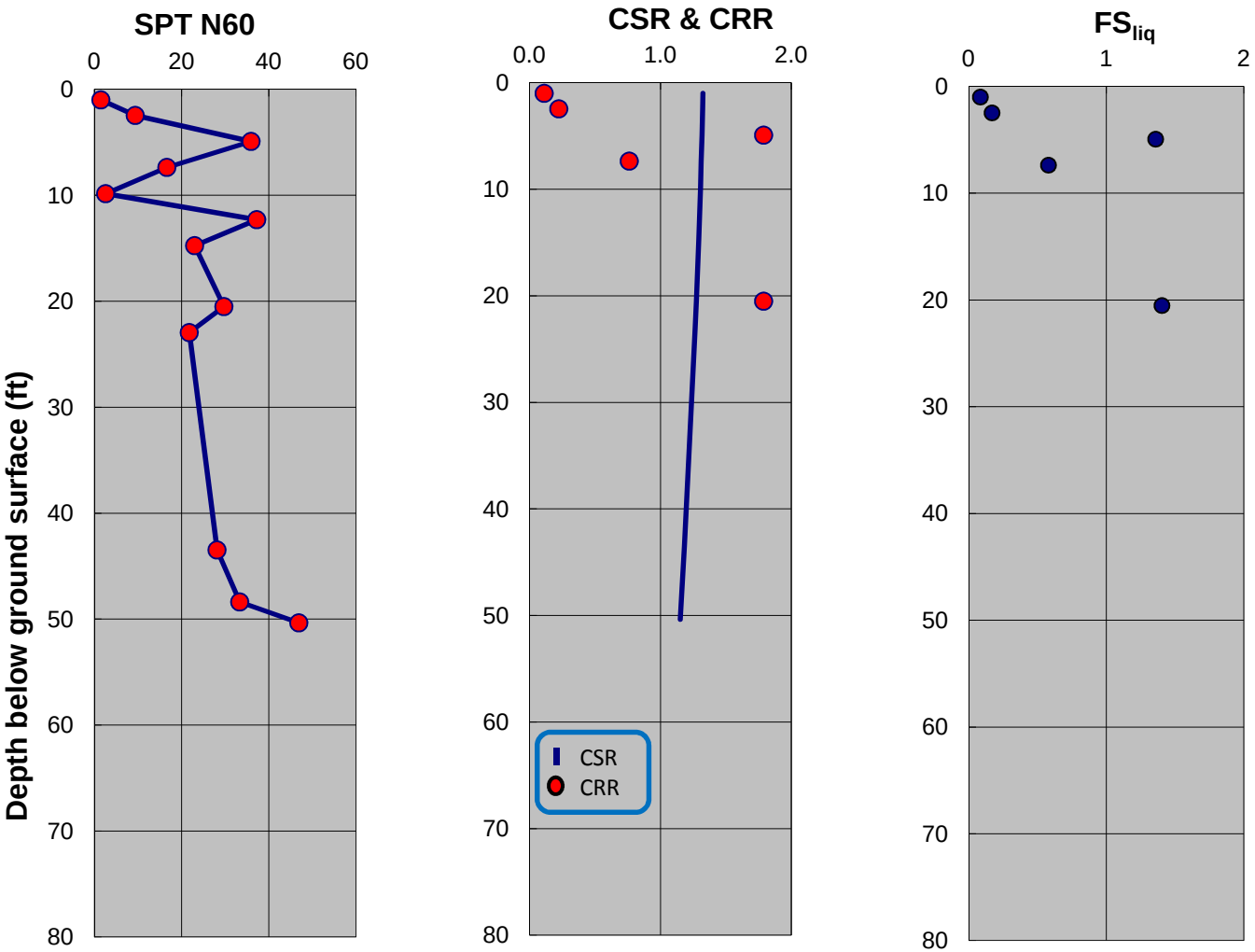
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-27 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



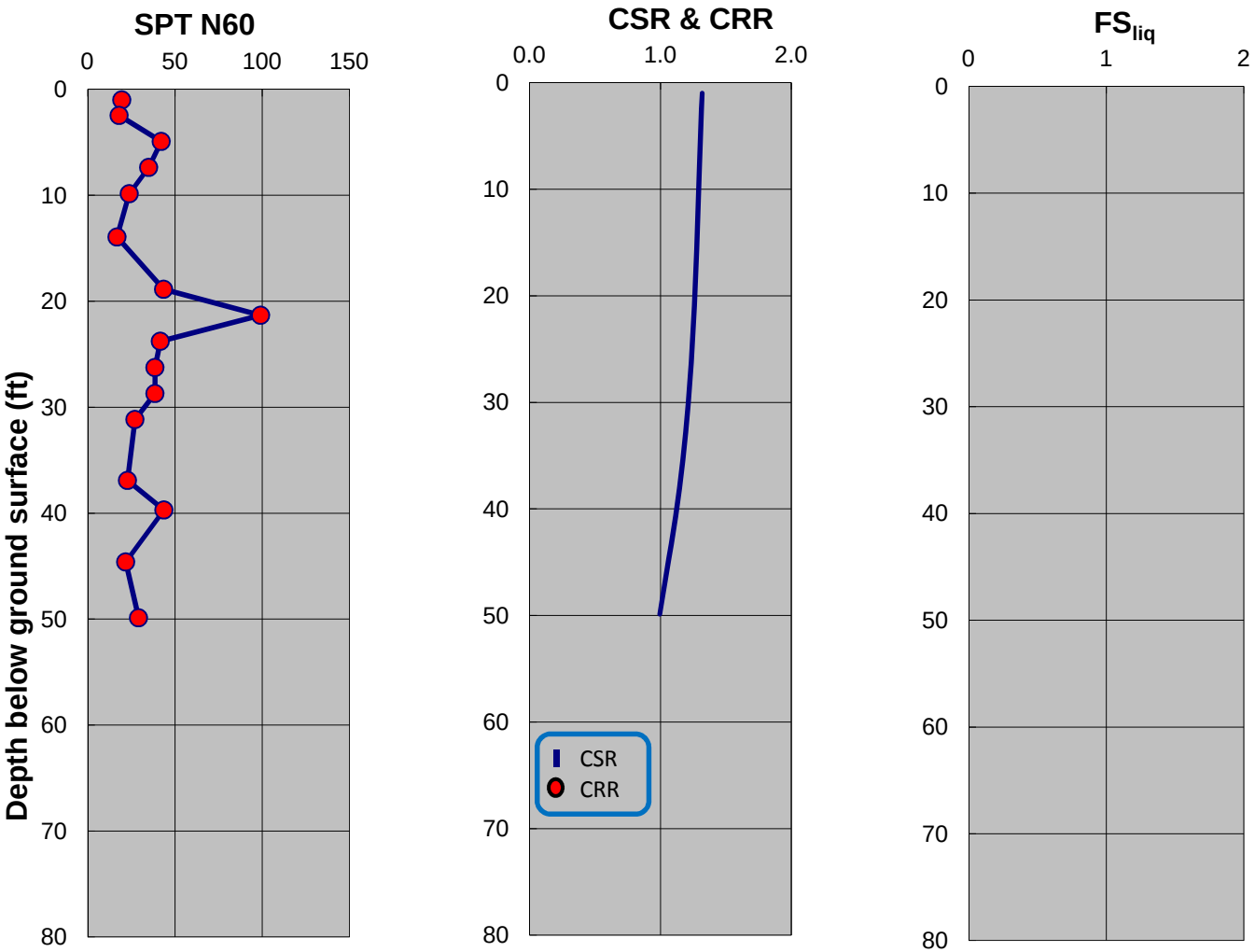
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-28 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



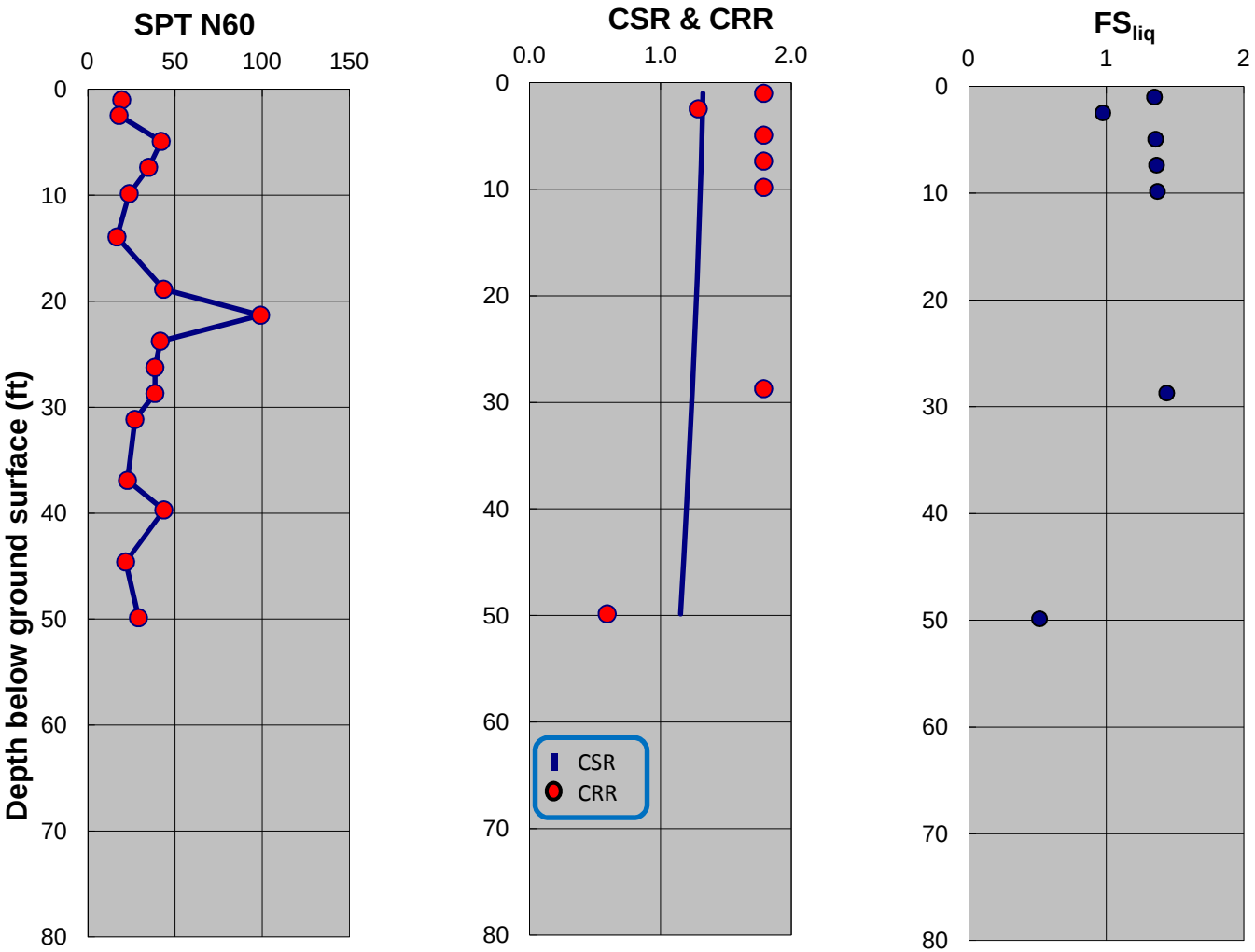
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-28 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-31 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-31 FOR SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 (M=8.0, PGA=0.90g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.100

APPENDIX F

SSE / MCE_G LEVEL LIQUEFACTION POTENTIAL EVALUATIONS PER NFPA 59A 2013 AND ASCE 7-10 FOR NEARSHORE BORINGS

APPENDIX F

SSE / MCE_G LEVEL LIQUEFACTION POTENTIAL EVALUATIONS PER NFPA 59A 2013 AND ASCE 7-10 FOR NEARSHORE BORINGS

F.1 Liquefaction Triggering Hazard Assessment per NFPA 59A 2013 and IBC (2012)

Liquefaction triggering hazard assessment was also performed for the nearshore area per the requirements of NFPA 59A 2013 and ASCE 7-10, per the request of EMALL. SSE requirements per NFPA 59A 2013 are same as ASCE 7-10 MCE requirements. ASCE 7-10 requires liquefaction potential evaluation to be conducted for Maximum Considered Earthquake geometric mean peak ground acceleration (MCE_G), which is geometric mean ground motion for the 84th percentile deterministic spectrum for the Alaska LNG project. Based on the PSHA results (Fugro Report No. 04.10140334-6, AKLNG Document No. USAL-FG-GRHAZ-00-002015-001), magnitude M_w 8.0 and PGA 0.75g were used for the MCE_G event (Table F.1). The OBE requirements per NFPA 59A 2013 are same as that of NFPA 59A 2006, which corresponds to a 475-year return period event.

Table F.1: Earthquake Scenarios for Liquefaction Evaluation Analyses of the Nearshore Area

EQ Event	PGA (g)	Magnitude
OBE	0.53	8.0
SSE / MCE_G	0.75	8.0

Liquefaction triggering assessment results are presented along A-A' through C-C' cross-section profiles covering the nearshore project area. Section 4.0 presents the results for the OBE event. Depth below ground surface in the plates of this appendix refers to depth below the seafloor at each boring location. Plates F.51 through F.56 present the boring logs along with the liquefaction assessment profiles based on NCEER (Youd et al., 2001) and Boulanger and Idriss (2014) for the SSE / MCE_G event. Table F.2 summarizes the depths of potentially liquefiable soil based on the results of the liquefaction triggering hazard assessment conducted using the SPT-based procedures proposed by NCEER (Youd et al., 2001) and Boulanger and Idriss (2014) per NFPA 59A 2013 for the nearshore borings.

Table F.2: SPT-based Liquefaction Triggering Hazard Assessment According to NCEER (Youd et al., 2001) and Boulanger and Idriss (2014): Depths of Potentially Liquefiable Localized Soil Pockets for the Nearshore Borings and the Existing Elevations for Both OBE and SSE / MCE_G Levels per NFPA 59A 2013

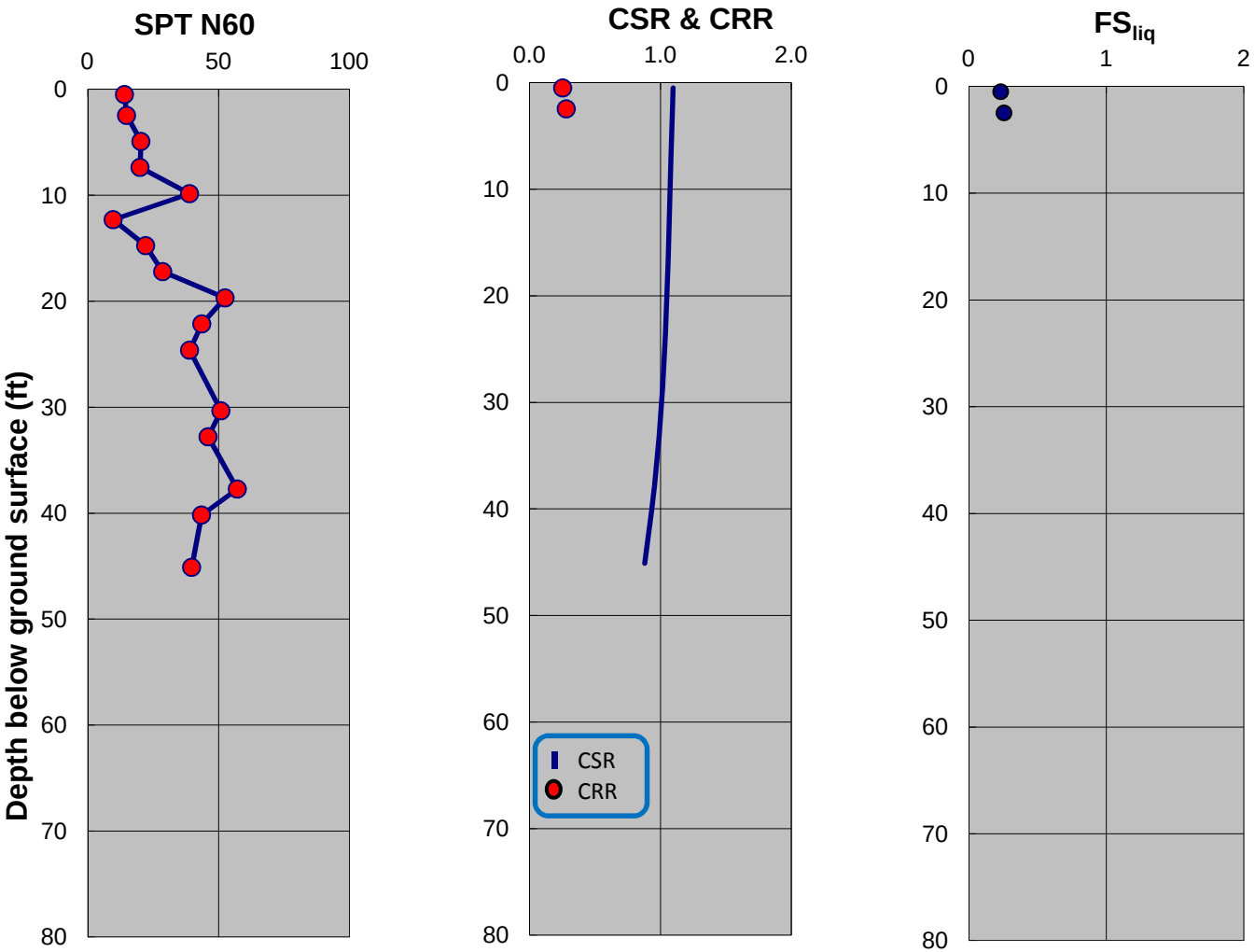
EQ Event	Boring	Depth (ft.)	Measured SPT-N
OBE and SSE / MCE_G	MB-02	0.5	18
		2.5	19
	MB-03	0.5	13
	MB-04	3.3	13
		8.2	4
		13.1	21
	MB-06	9.8	15
	MB-08	37.7	21
	MB-09	16.4	20
	MB-12	2.5	16
		7.4	18
		14.8	24
		22.2	28
	MB-13	0.5	16
	MB-14	7.4	12
	MB-15	7.4	25
	MB-16	0.5	11
		7.4	18
	MB-17	0.5	5
		2.5	16
	MB-19	4.9	18
		9.8	16
	MB-20	0.5	21
		2.5	19
	MB-21	0.5	6
		2.5	21
	MB-26	12.3	15
	MB-27	2.5	20
	MB-28	0.5	2
		2.5	12
		7.4	20
	MB-31	49.9	28

As presented in Table F.2, in general, the continuous potentially liquefiable soil layers are encountered at the top 2 to 10 ft. at the nearshore area (borings MB-02, MB-03, MB-04, MB-06, MB-13, MB-14, MB-15, MB-16, MB-17, MB-19, MB-20, MB-21, MB-27 and MB-28). Based on

the Marine Integrated Site Characterization and Geotechnical Engineering report (Fugro Report No. 04.10140334-15, AKLNG Document No. USAL-FG-GRZZZ-00-002015-012) dredging is expected to take place at the top part of borings MB-03, MB-05, MB-08, MB-09 and MB-28 up to an elevation of approximately -30 ft. (MLLW) which will remove some potentially liquefiable near-surface soils from borings MB-03 and MB-28. Limited and localized liquefaction is estimated during the OBE and SSE shaking levels for greater depths. Some localized pockets of potentially liquefiable coarse-grained soils were also identified in borings MB-08, MB-26, and MB-31. The measured SPT blow count values in these sublayers range between approximately 15 to 28 and they seem to be affected by the presence of lean clay at the sampler. Boring MB-12 which is potentially liquefiable at the top 22 ft. consists of clayey sand with gravel and loose sand with wood fragments. In addition, Boring MB-09 which is potentially liquefiable around 15 ft. depth consists of clayey sand with 50% fines content and is not expected to have significant liquefaction issues.

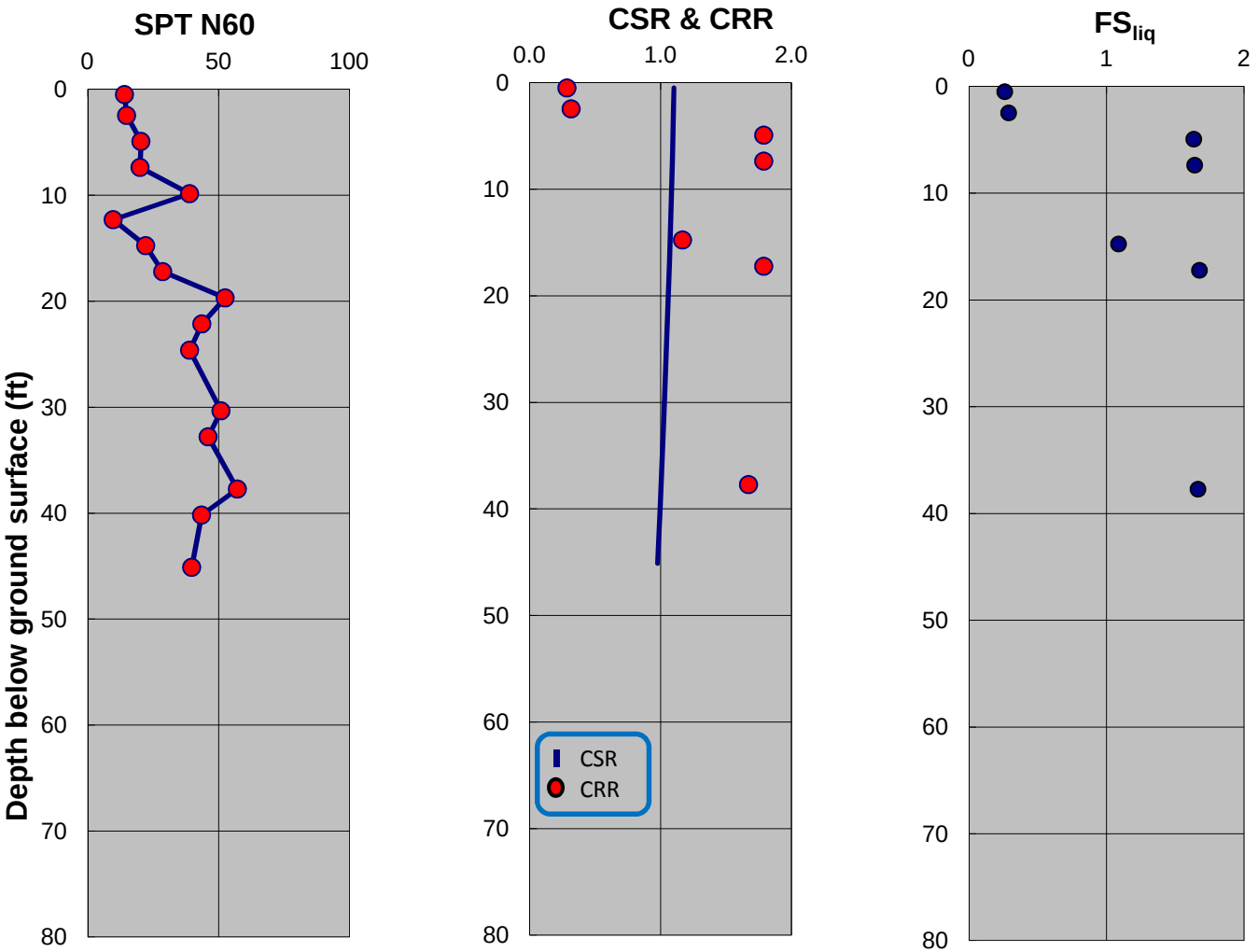
F.2 Evaluation of Liquefaction-Induced Reconsolidation Settlements per NFPA 59A 2013 and IBC (2012)

Estimates of post-liquefaction reconsolidation settlements are computed using the procedure suggested by Ishihara and Yoshimine (1992) and described in Idriss and Boulanger (2008). Plate 28 presents the liquefaction-induced reconsolidation settlements for OBE per NFPA 59A 2013 and ASCE 7-10 requirements which is the same as the OBE event per NFPA 59A 2006 and ASCE 7-05 requirements. Plate F.57 presents similar results for SSE per NFPA 59A 2013 and ASCE 7-10. Liquefaction-induced reconsolidation settlements are estimated in the range of approximately 0 to 0.5 inches during both the OBE and the SSE / MCE_G shaking level for borings MB-03, MB-05, MB-06, MB-08, MB-09, MB-13, MB-15, MB-18, MB-22, MB-23, MB-24, MB-25, MB-26, MB-27 and MB-31. Liquefaction-induced reconsolidation settlements are estimated in the range of 0.5 and 1.0 inches during both the OBE and the SSE / MCE_G shaking level for borings MB-02, MB-14, MB-16, MB-17, MB-19, MB-20 and MB-21. Liquefaction-induced reconsolidation settlements for borings MB-12, MB-28 and MB-04 are expected to be higher than 1 inch for both the OBE and the SSE / MCE_G shaking level.



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-02 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

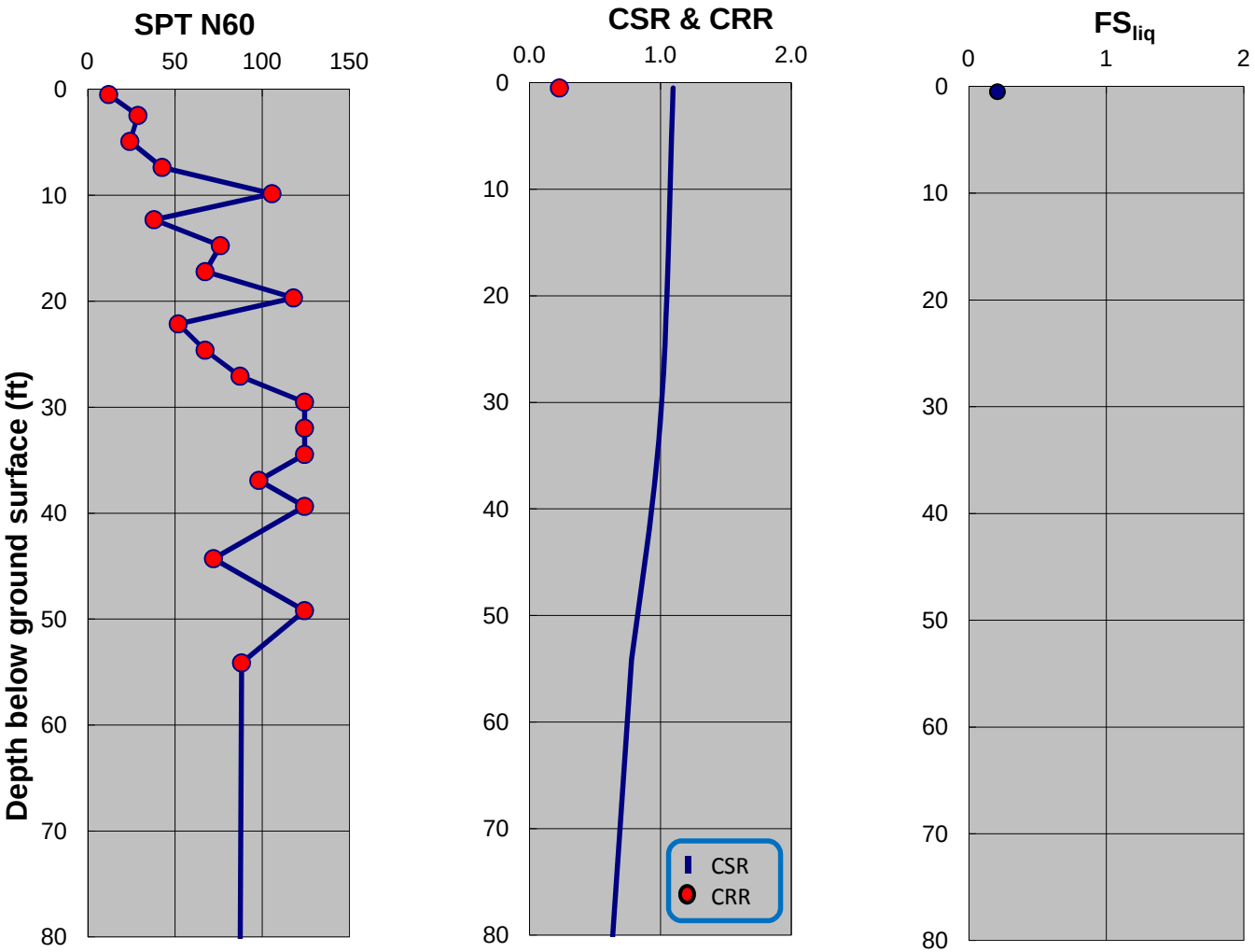
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-02 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

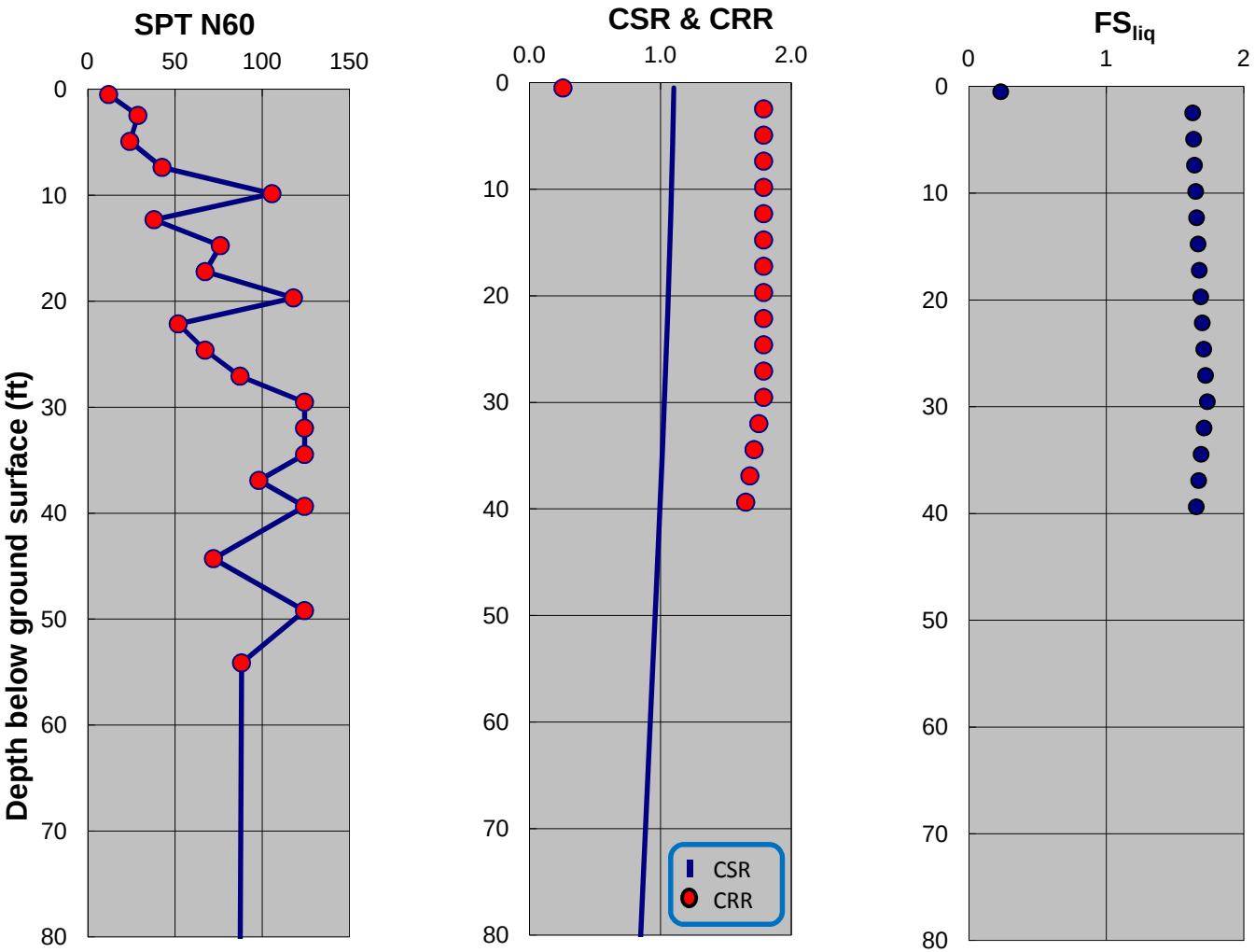
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE F.2



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-03 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

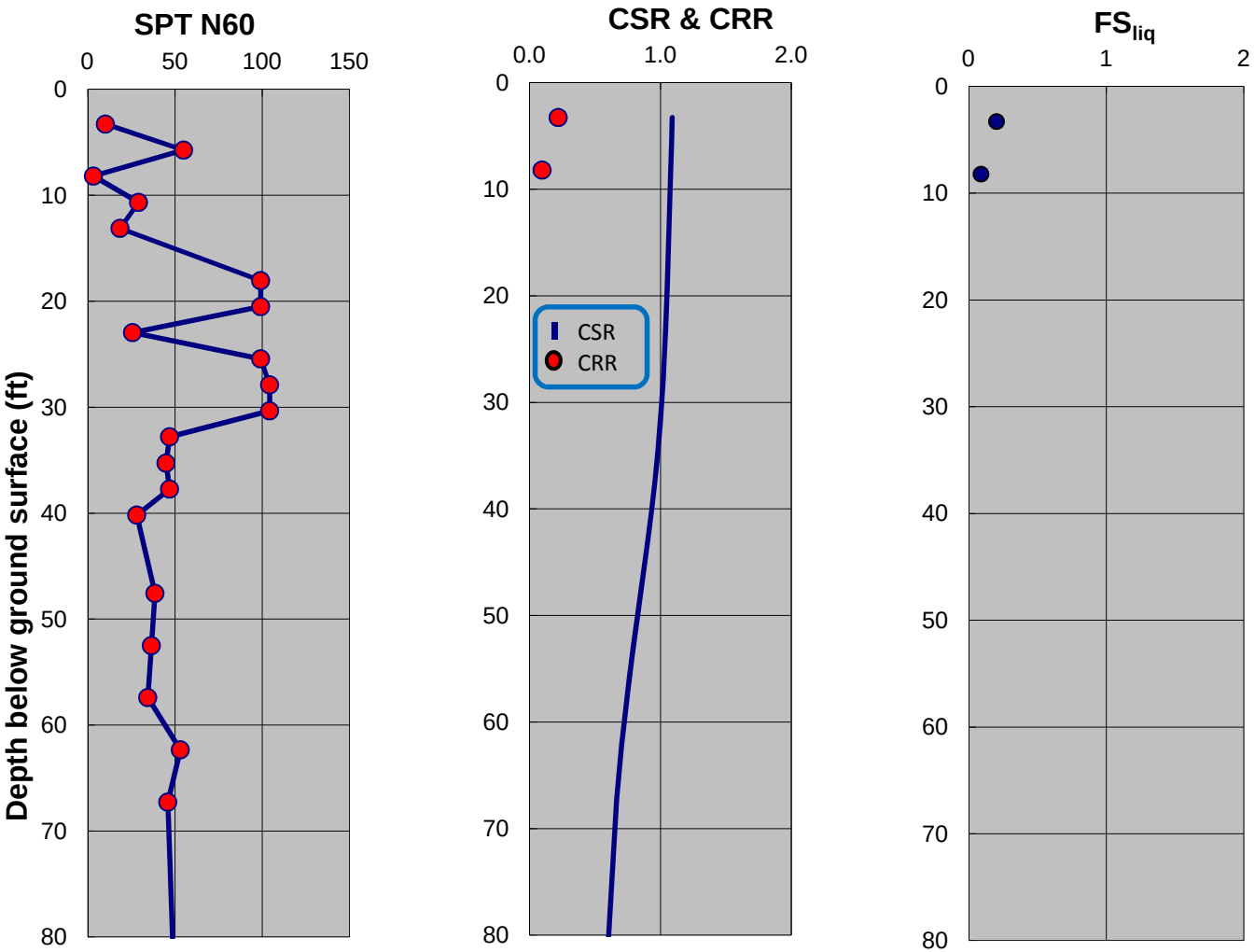
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-03 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

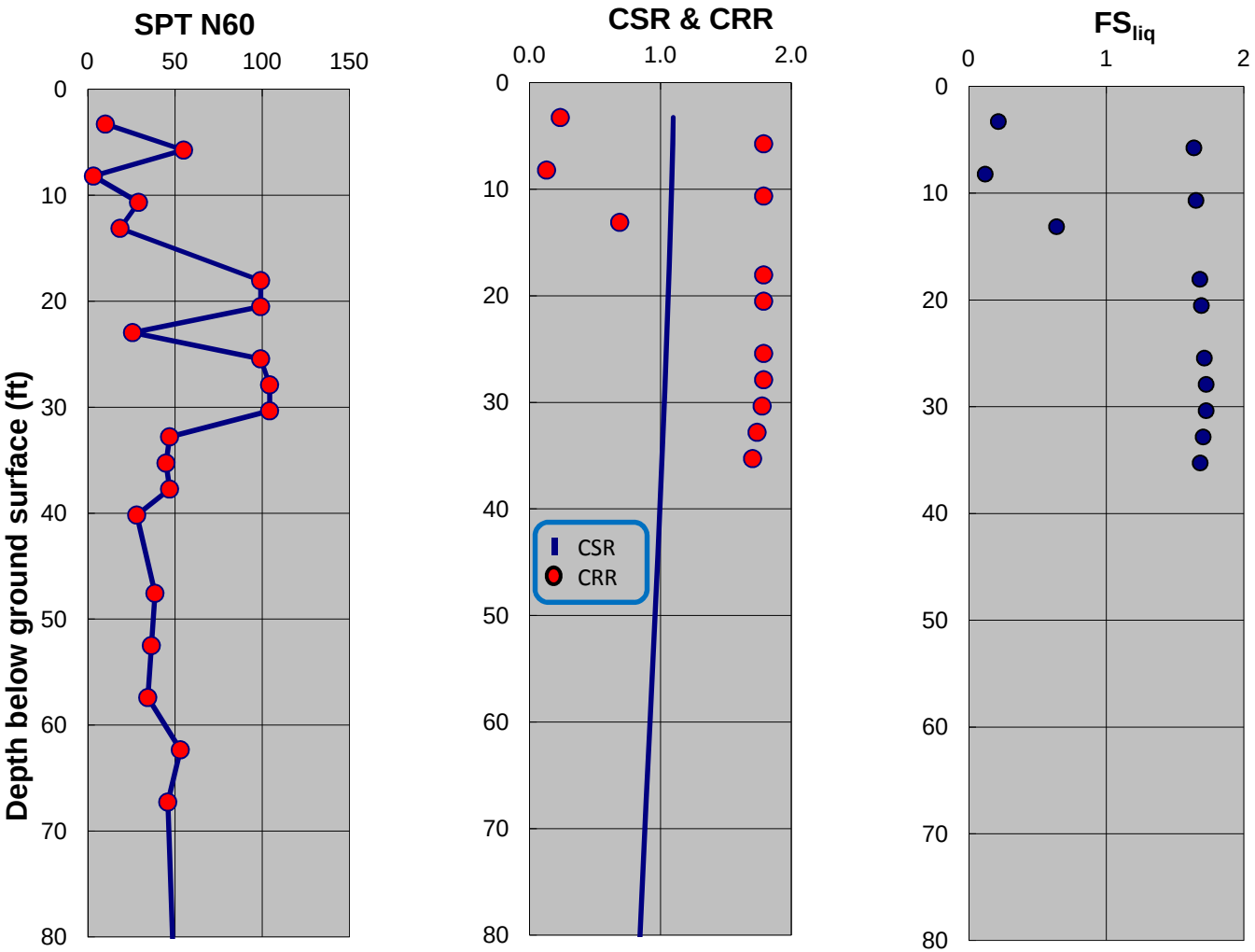
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE F.4



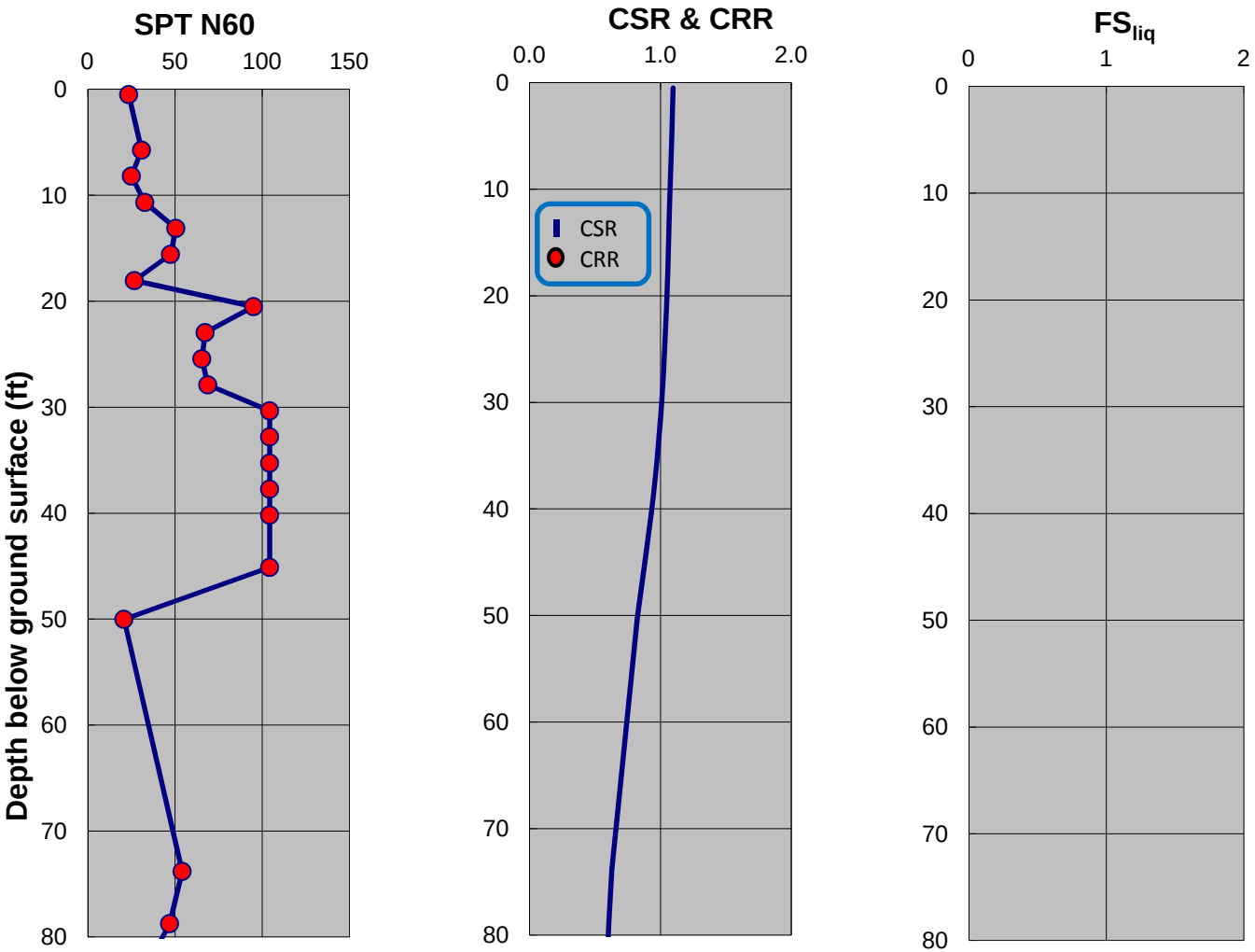
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-04 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



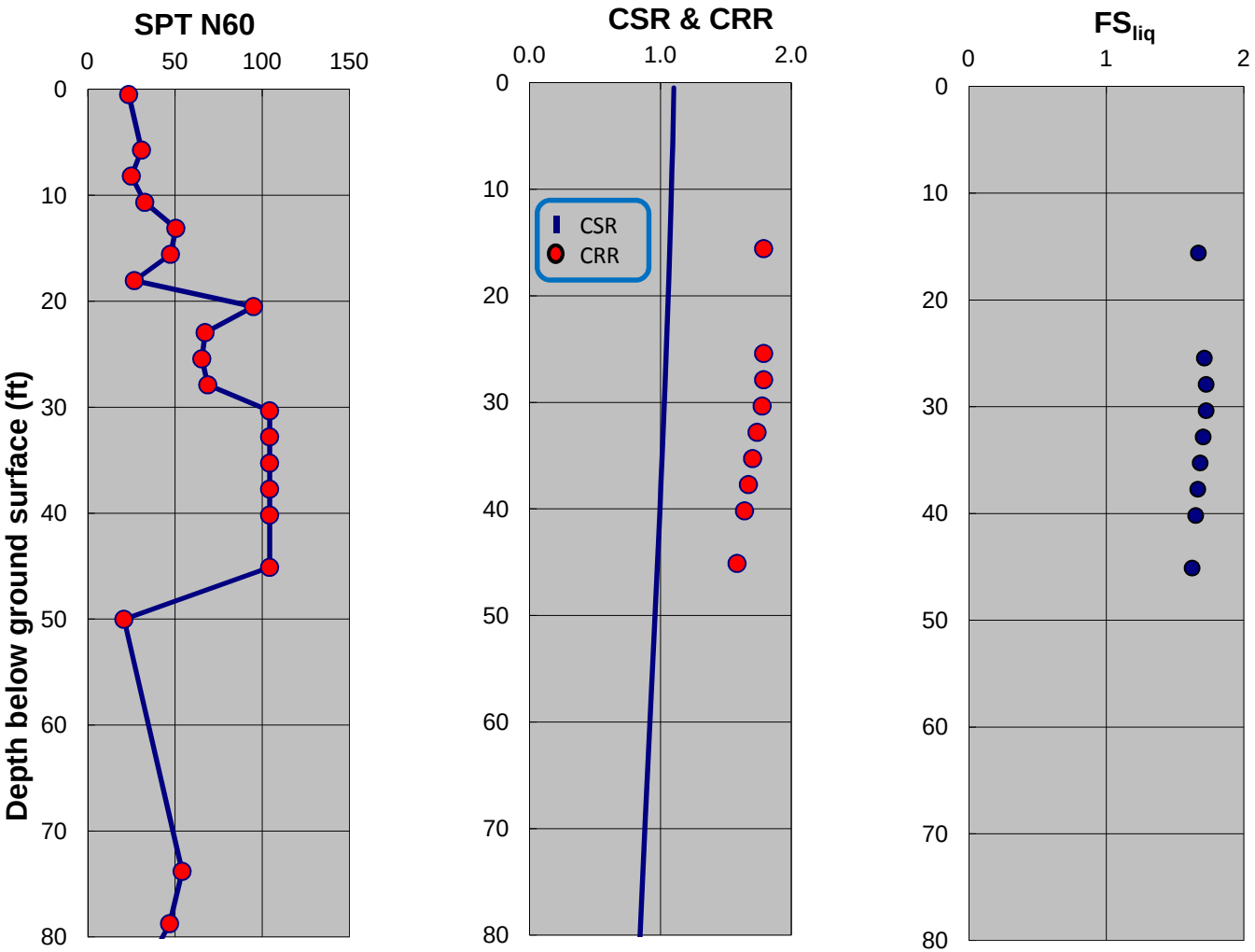
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-04 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-05 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

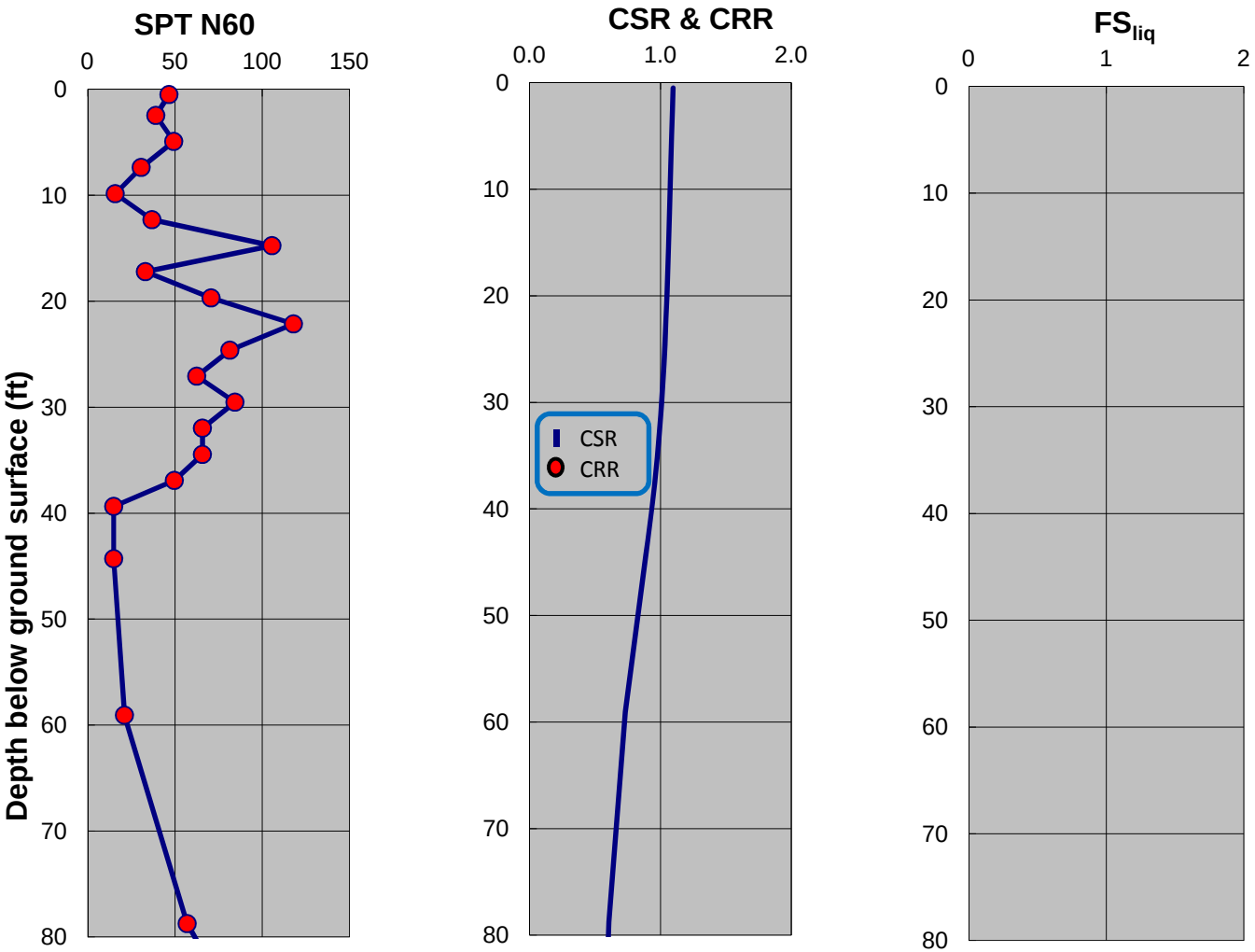
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-05 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

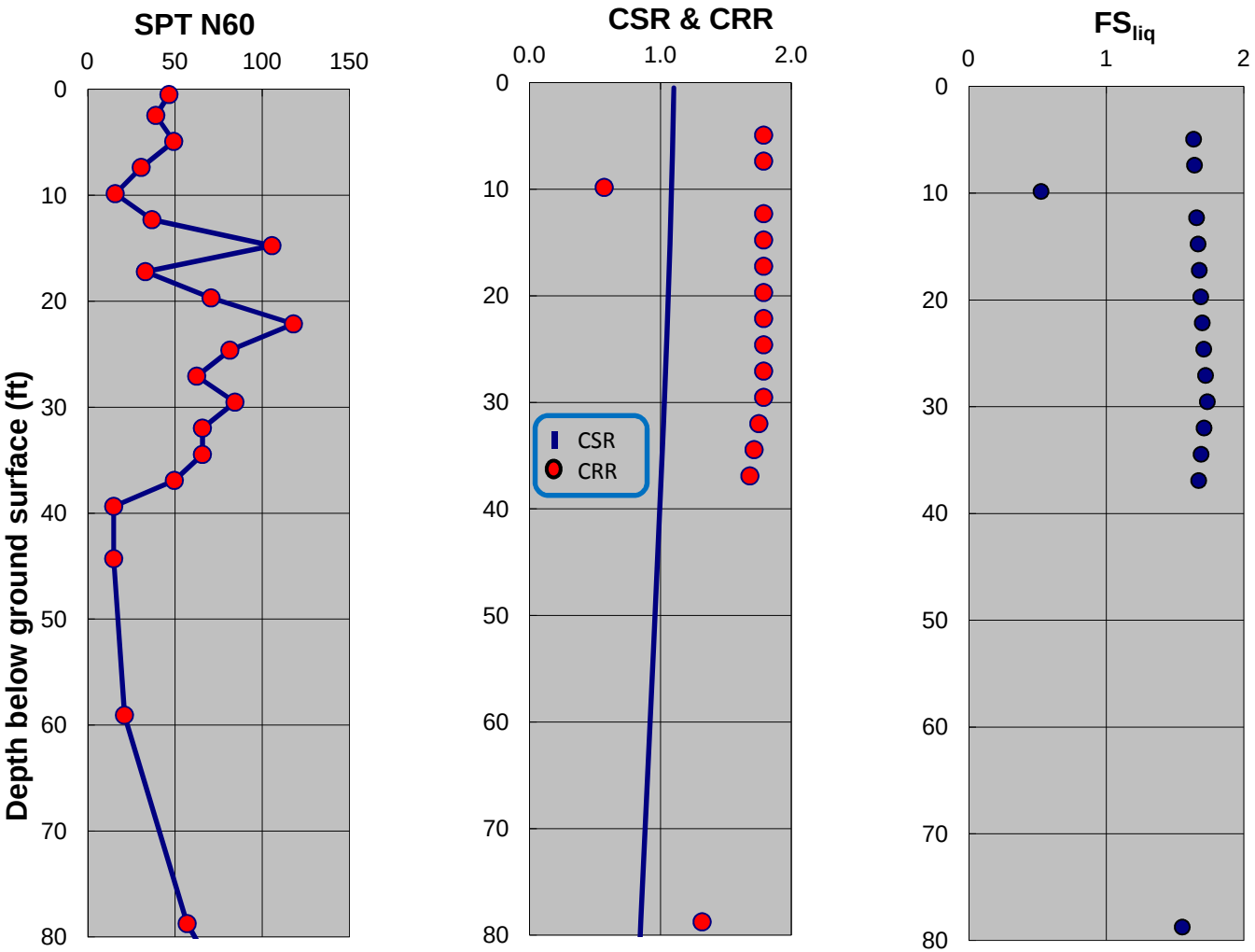
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE F.8



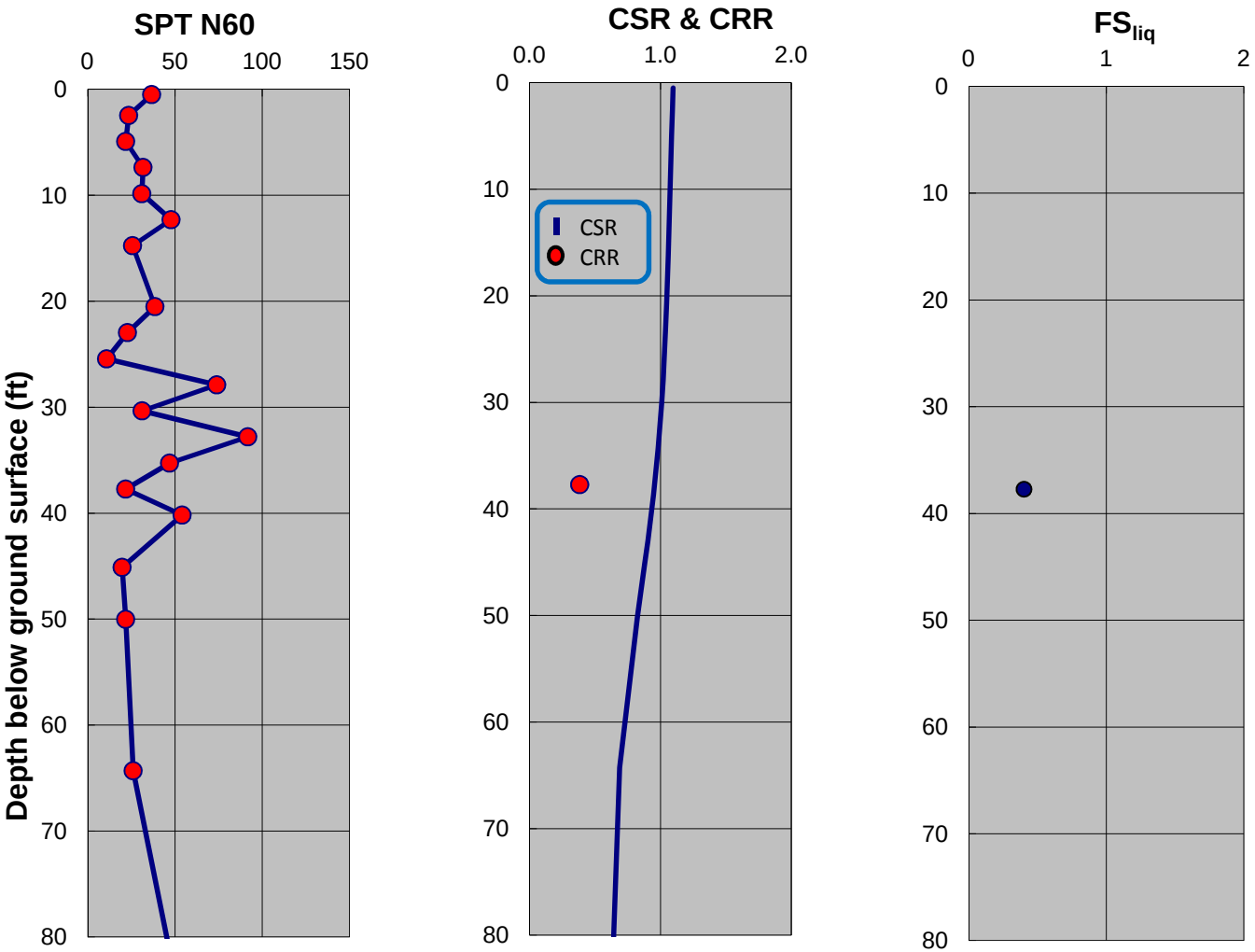
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-06 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



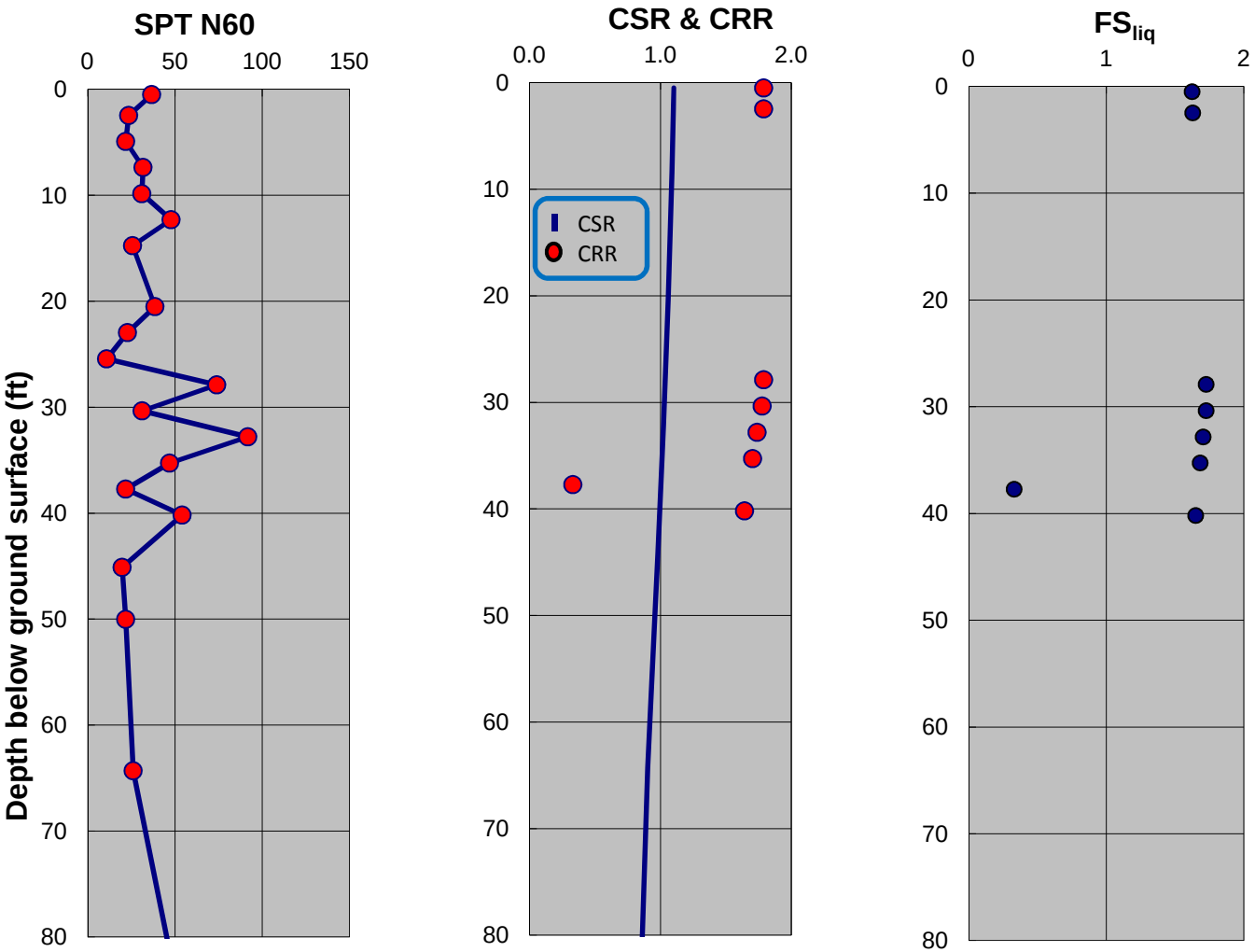
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-06 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



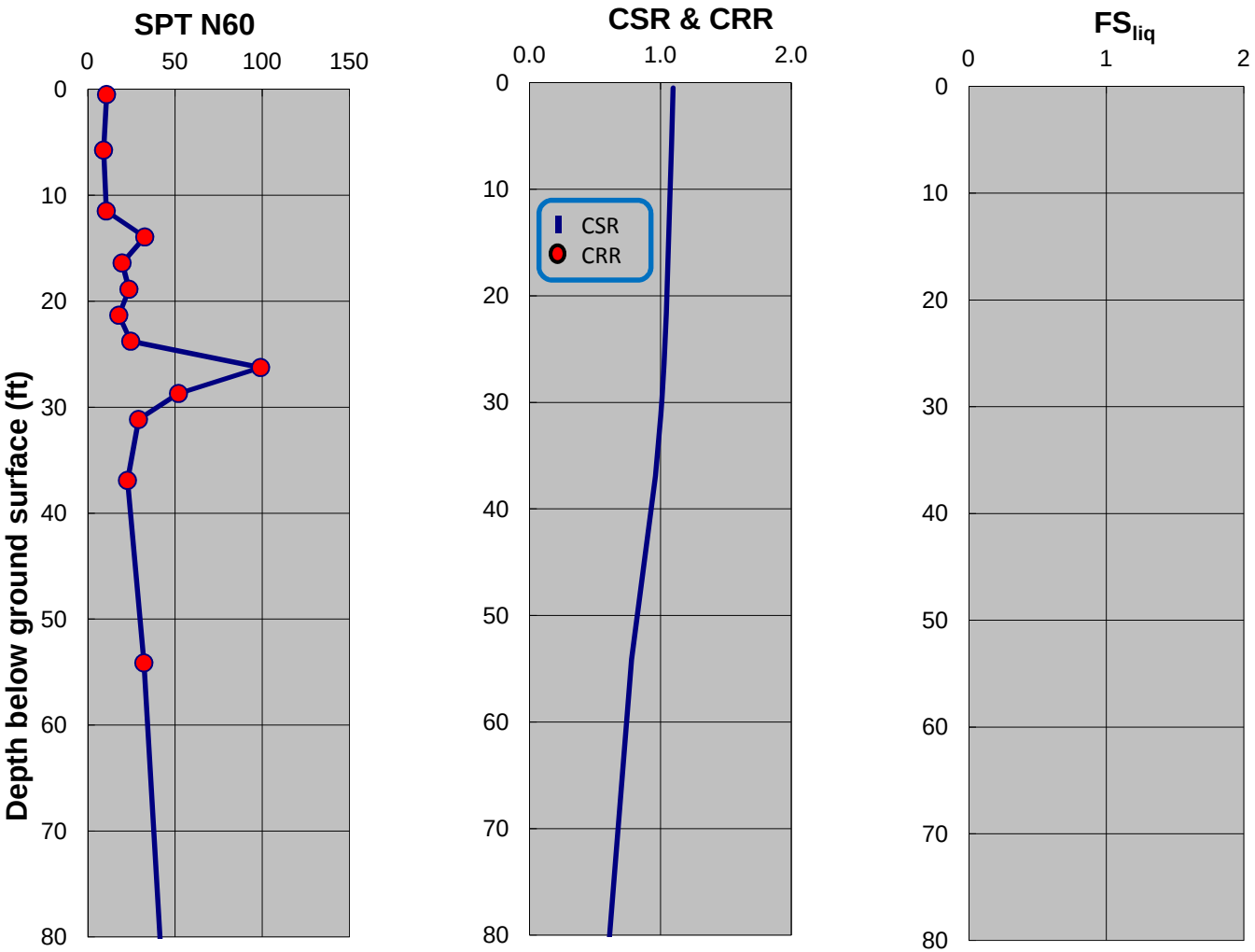
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-08 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



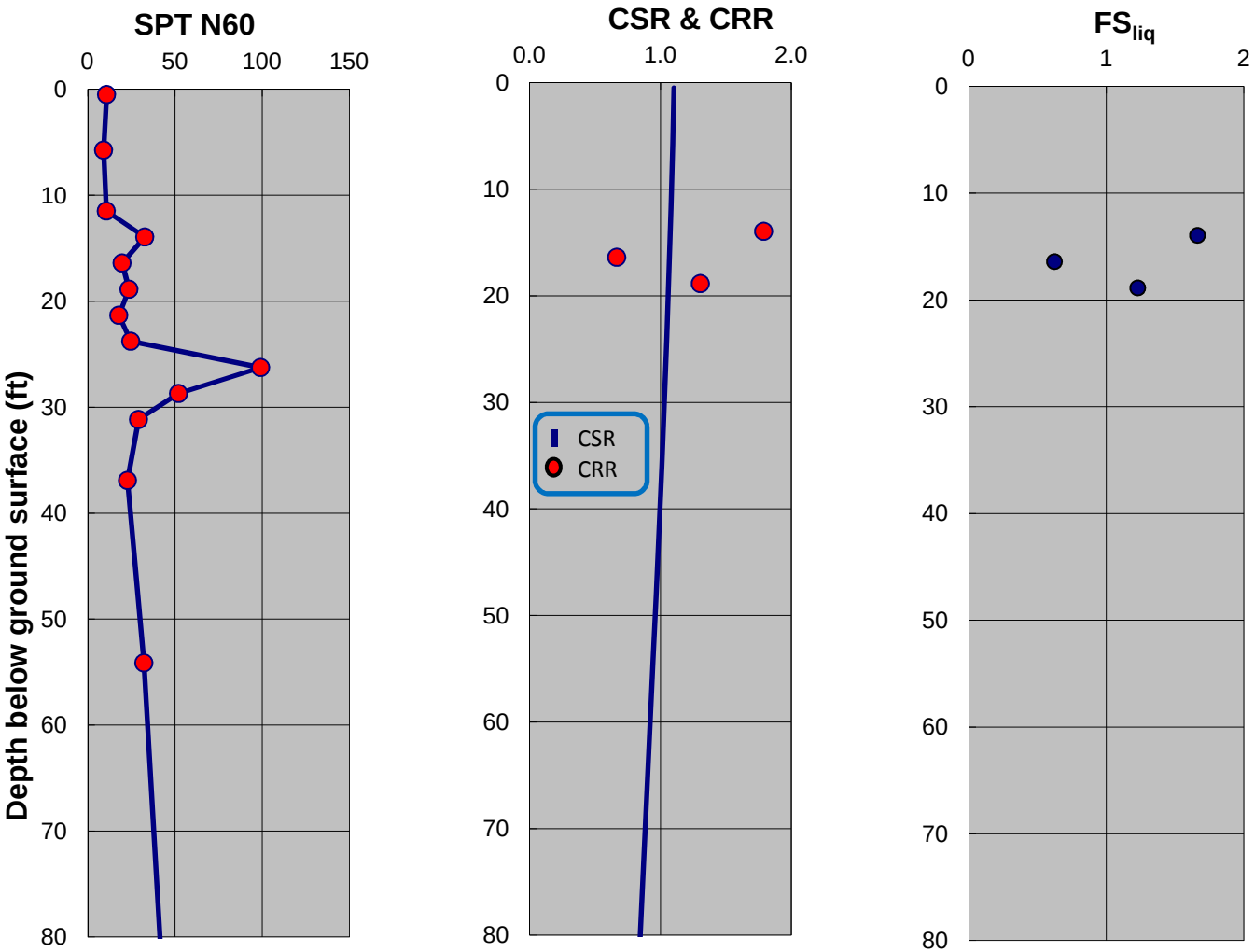
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-08 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



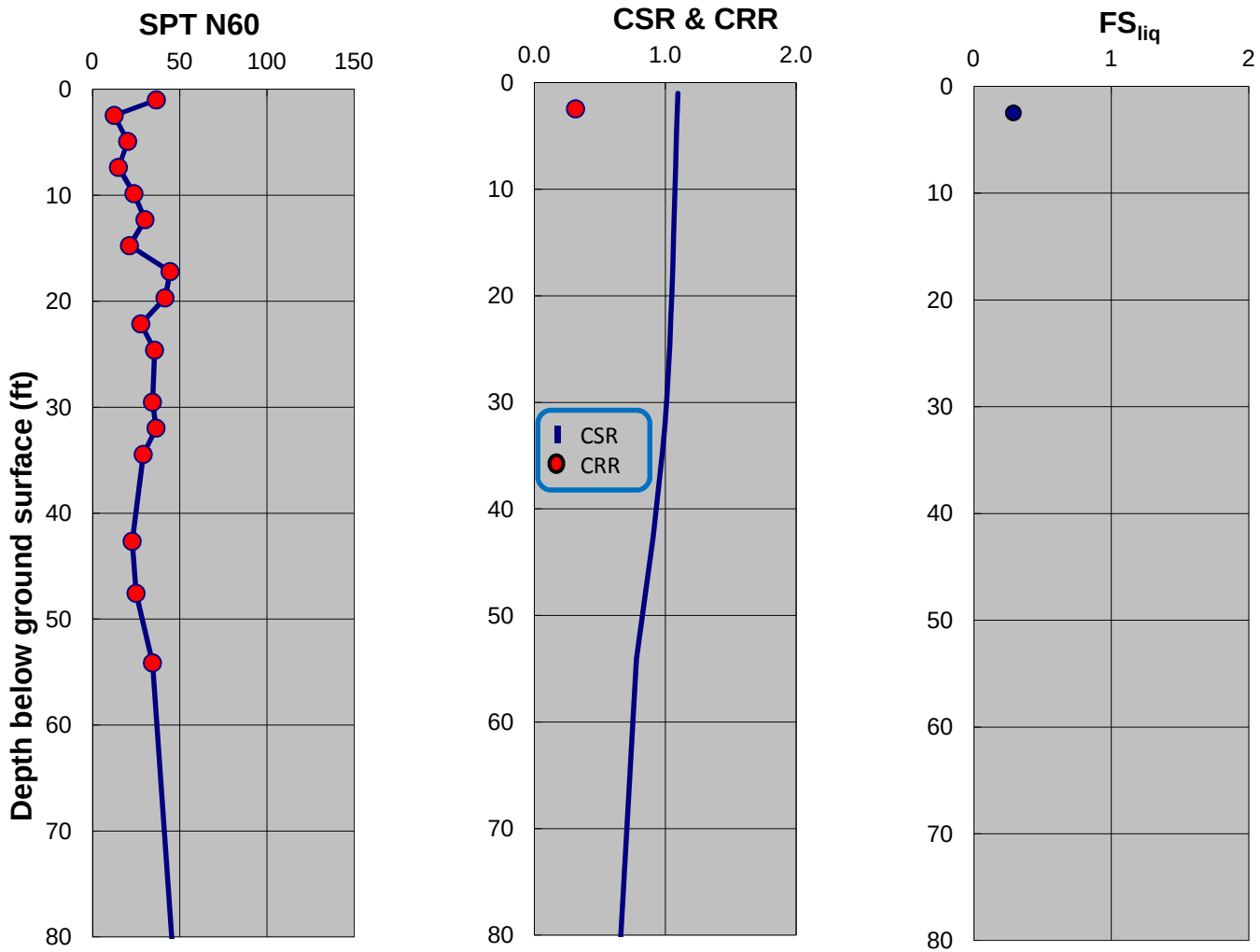
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-09 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



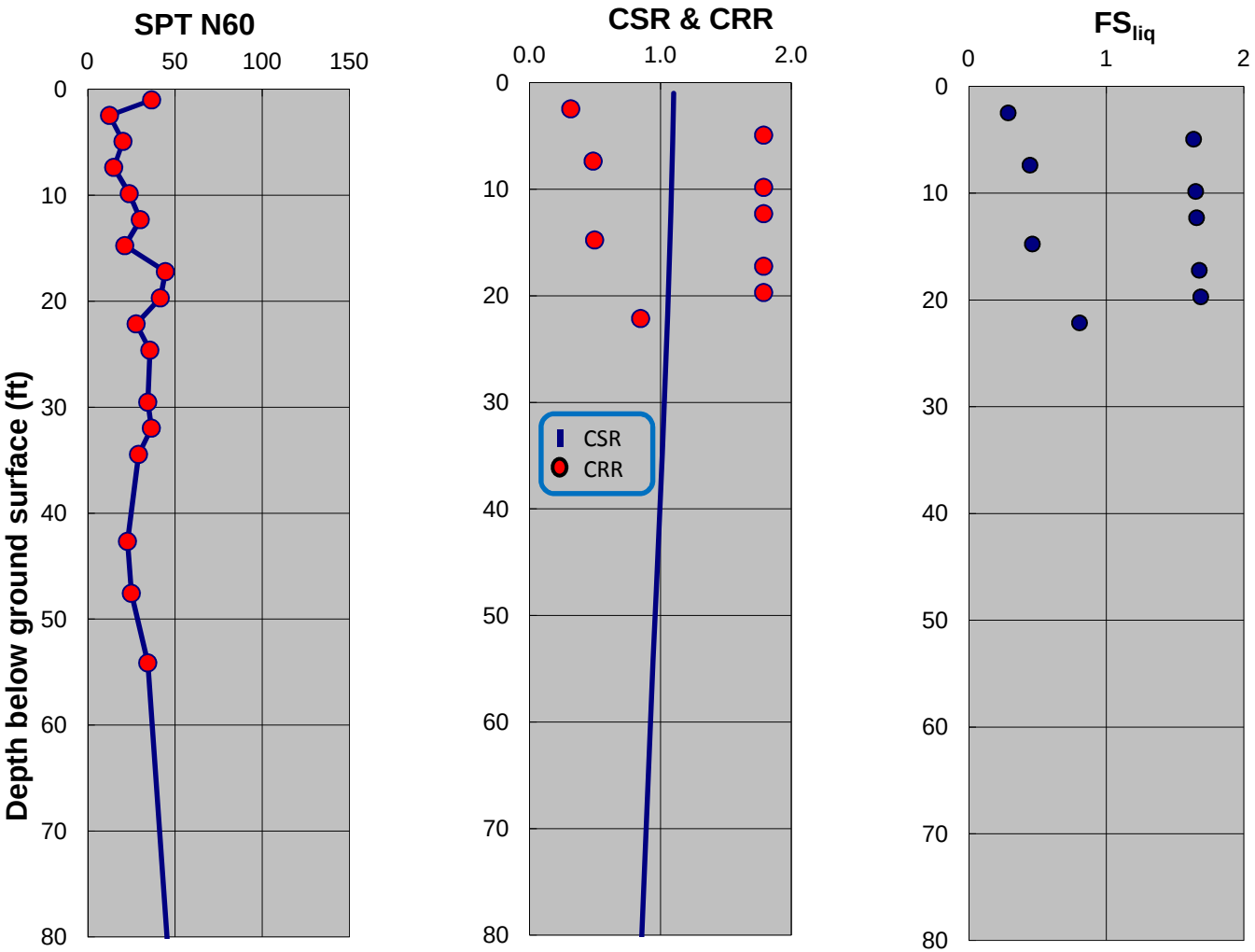
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-09 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



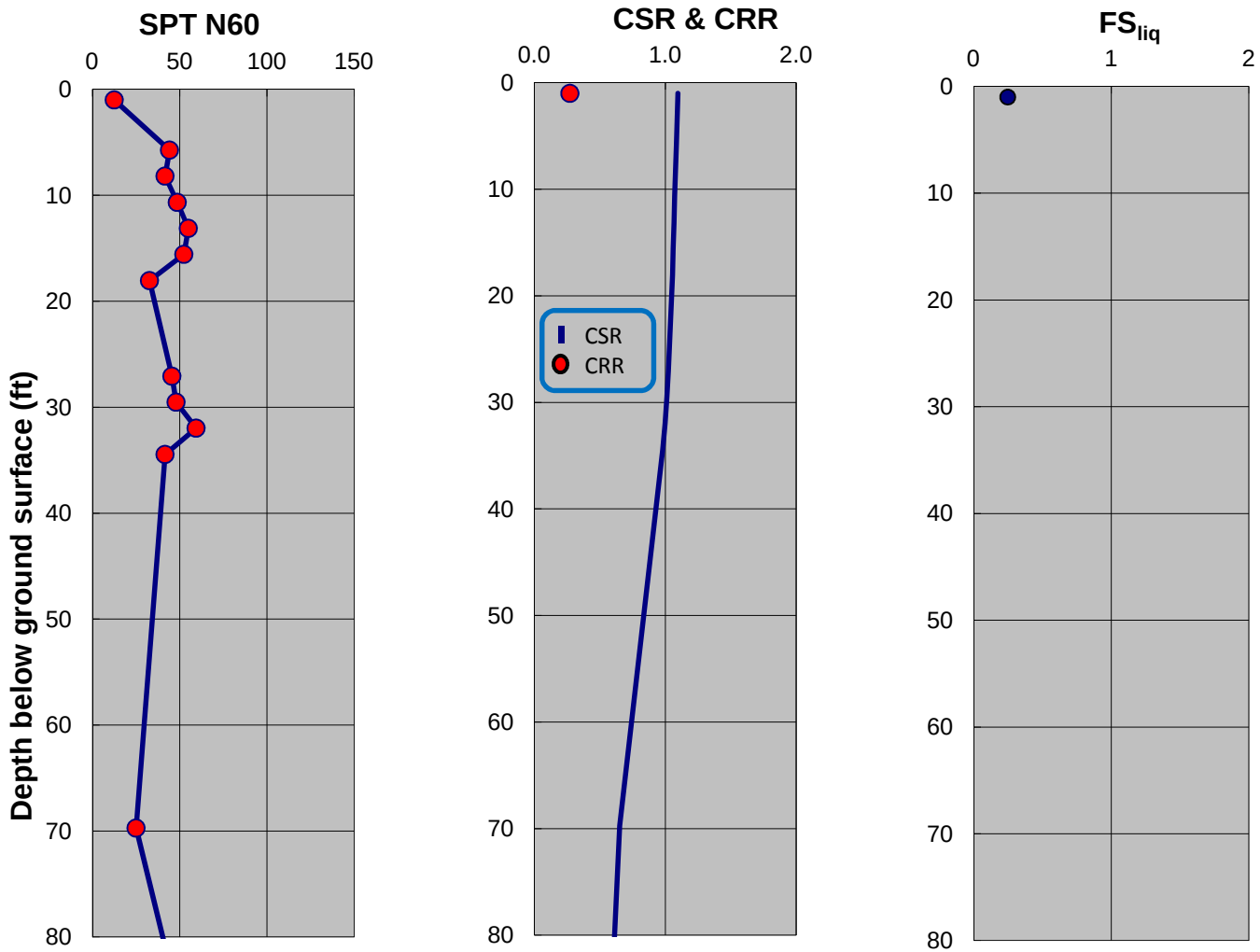
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-12 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



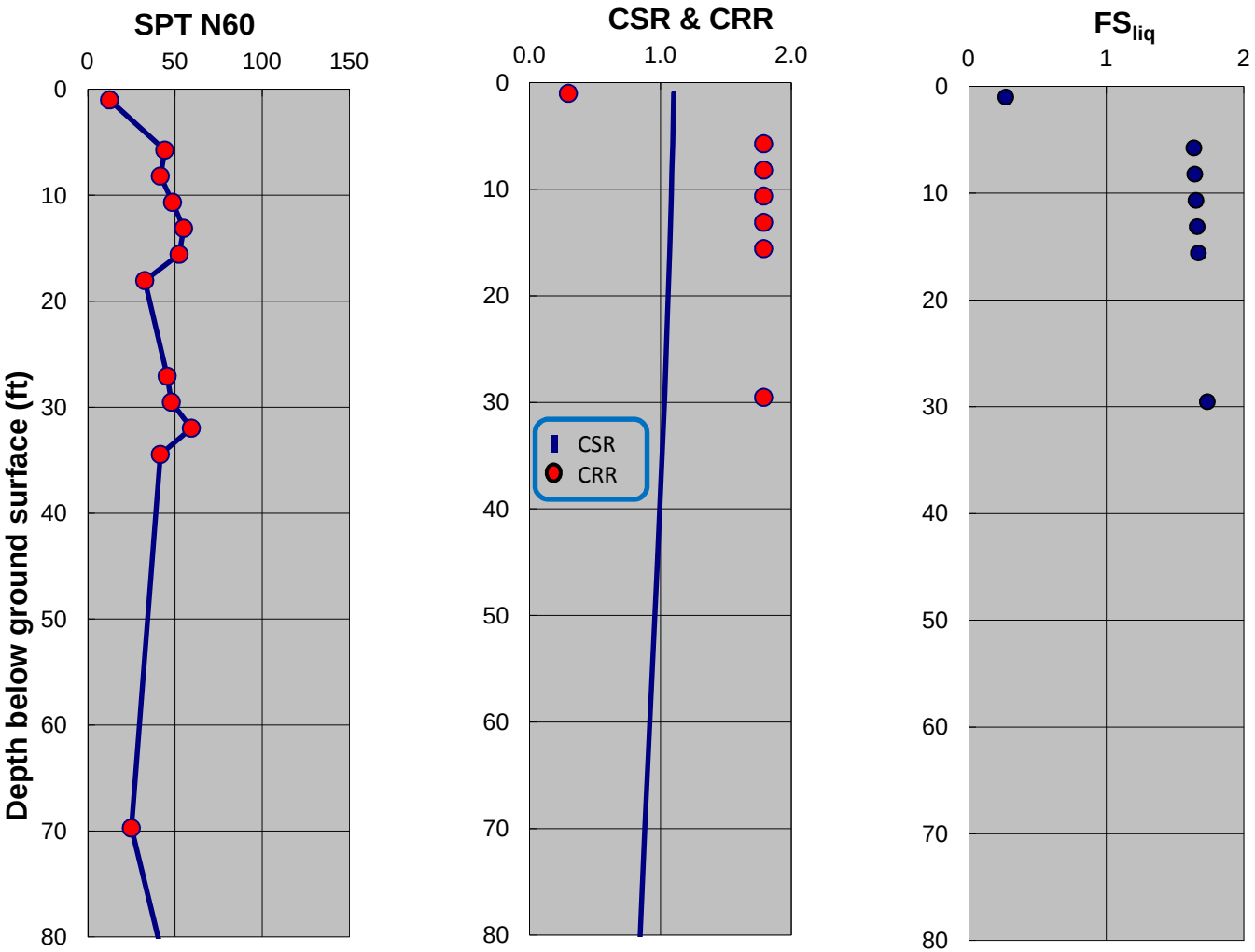
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-12 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



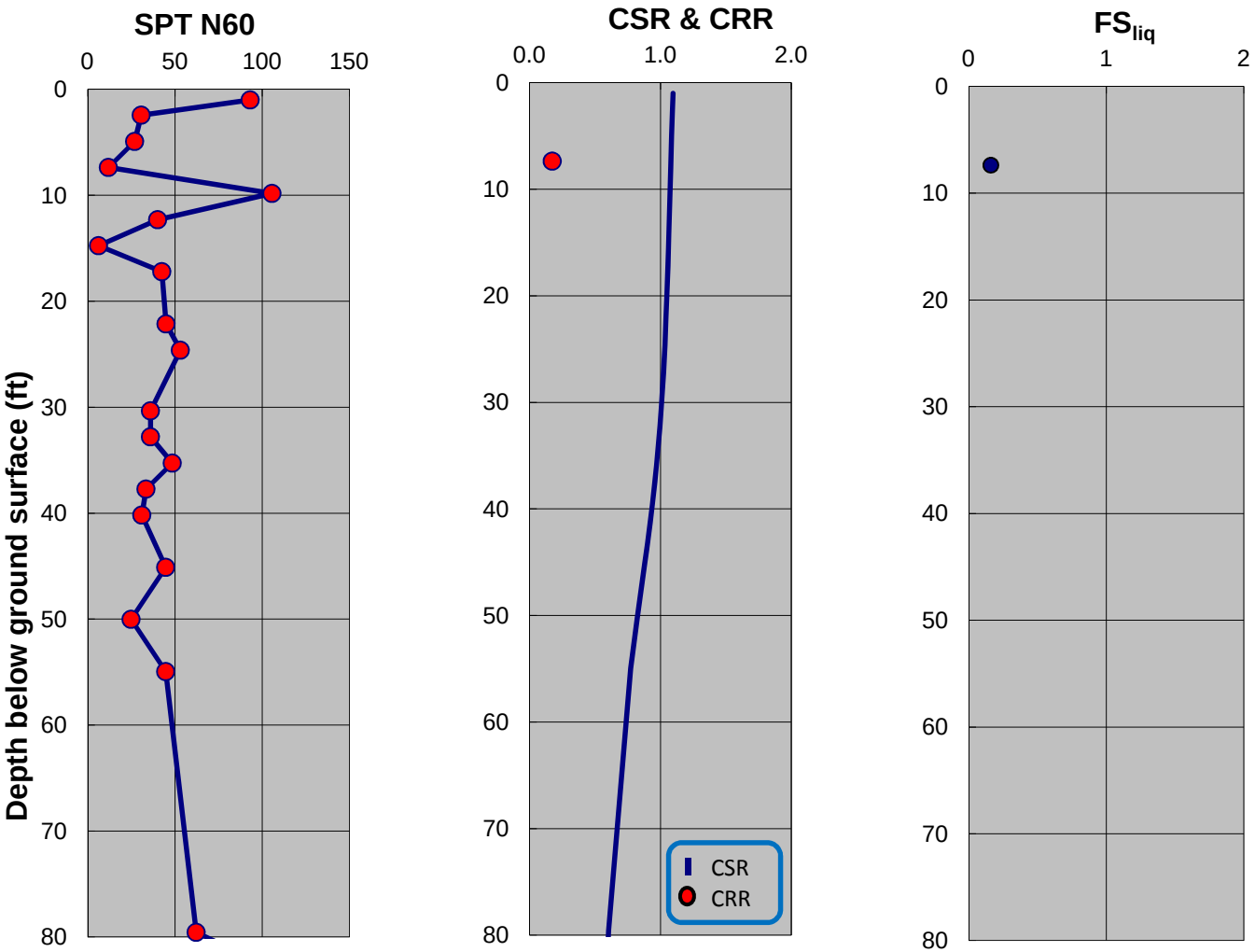
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-13 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



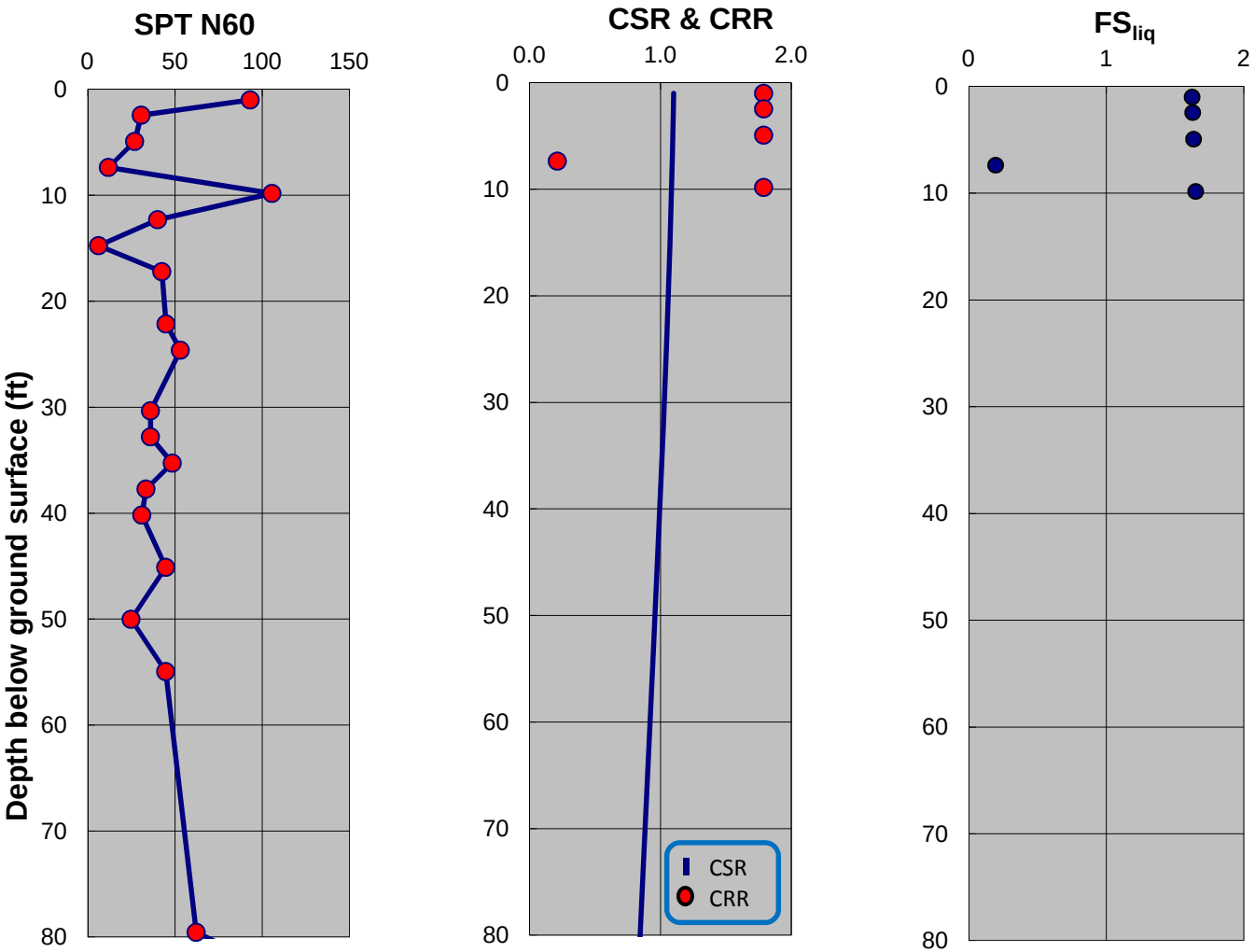
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-13 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



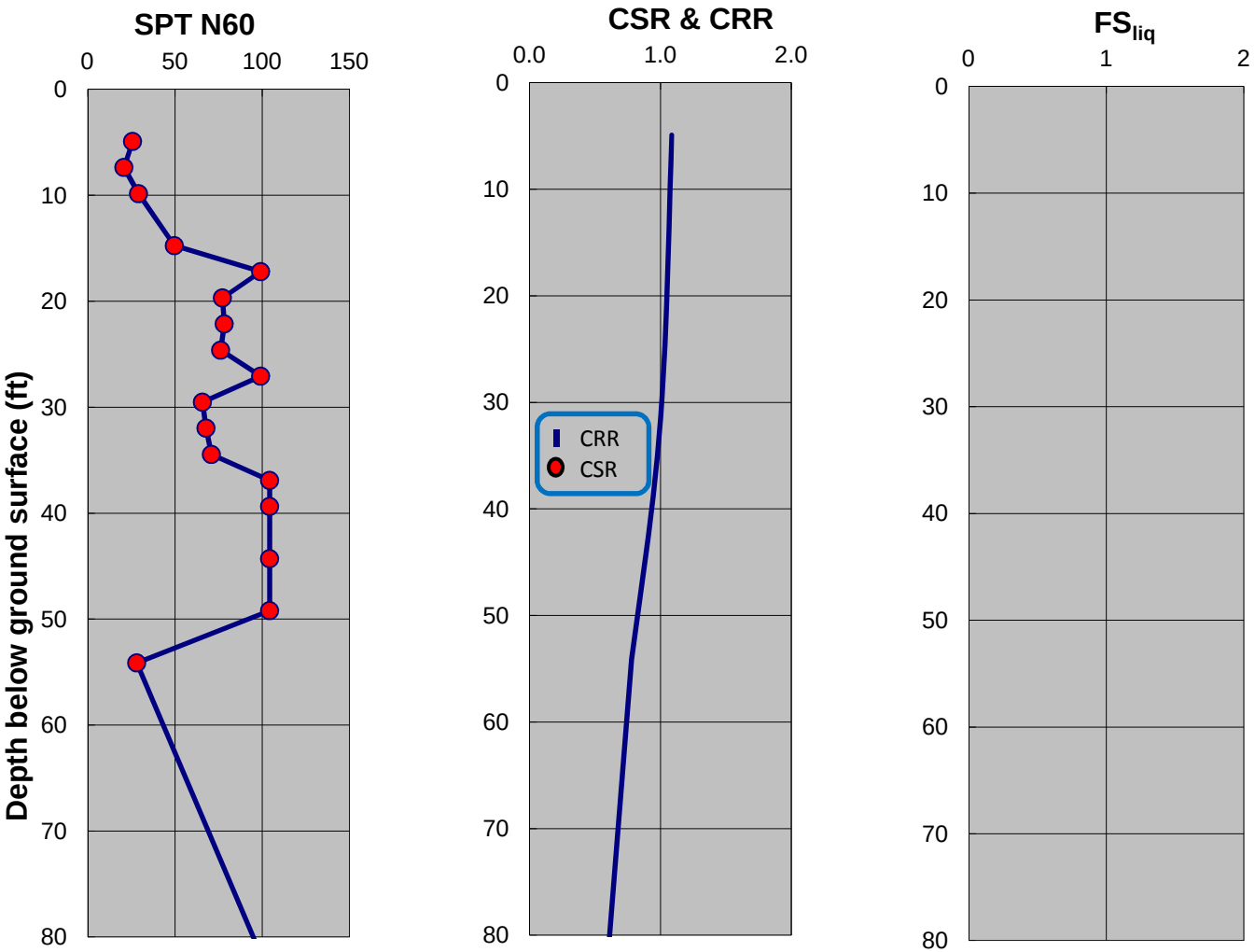
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-14 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



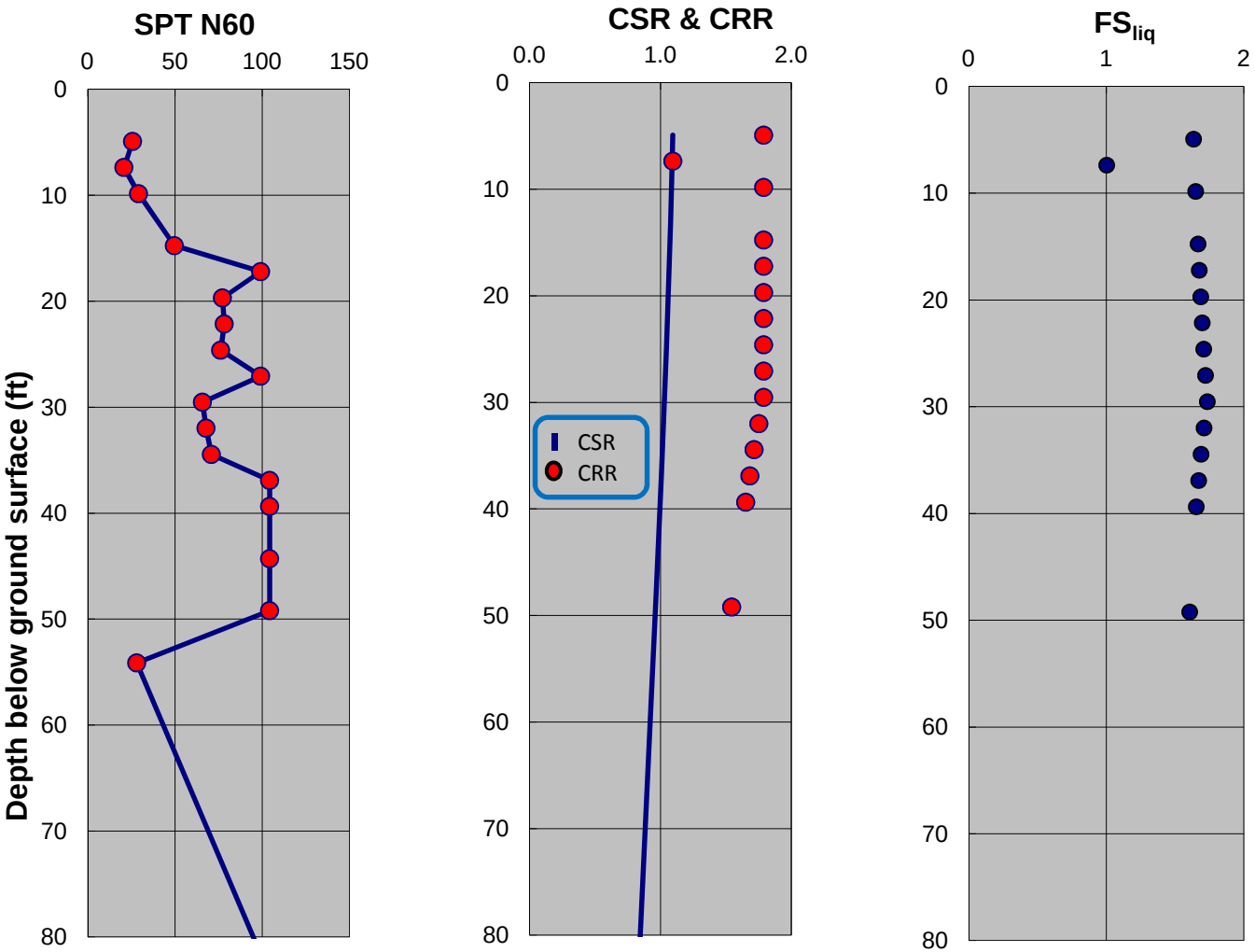
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-14 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



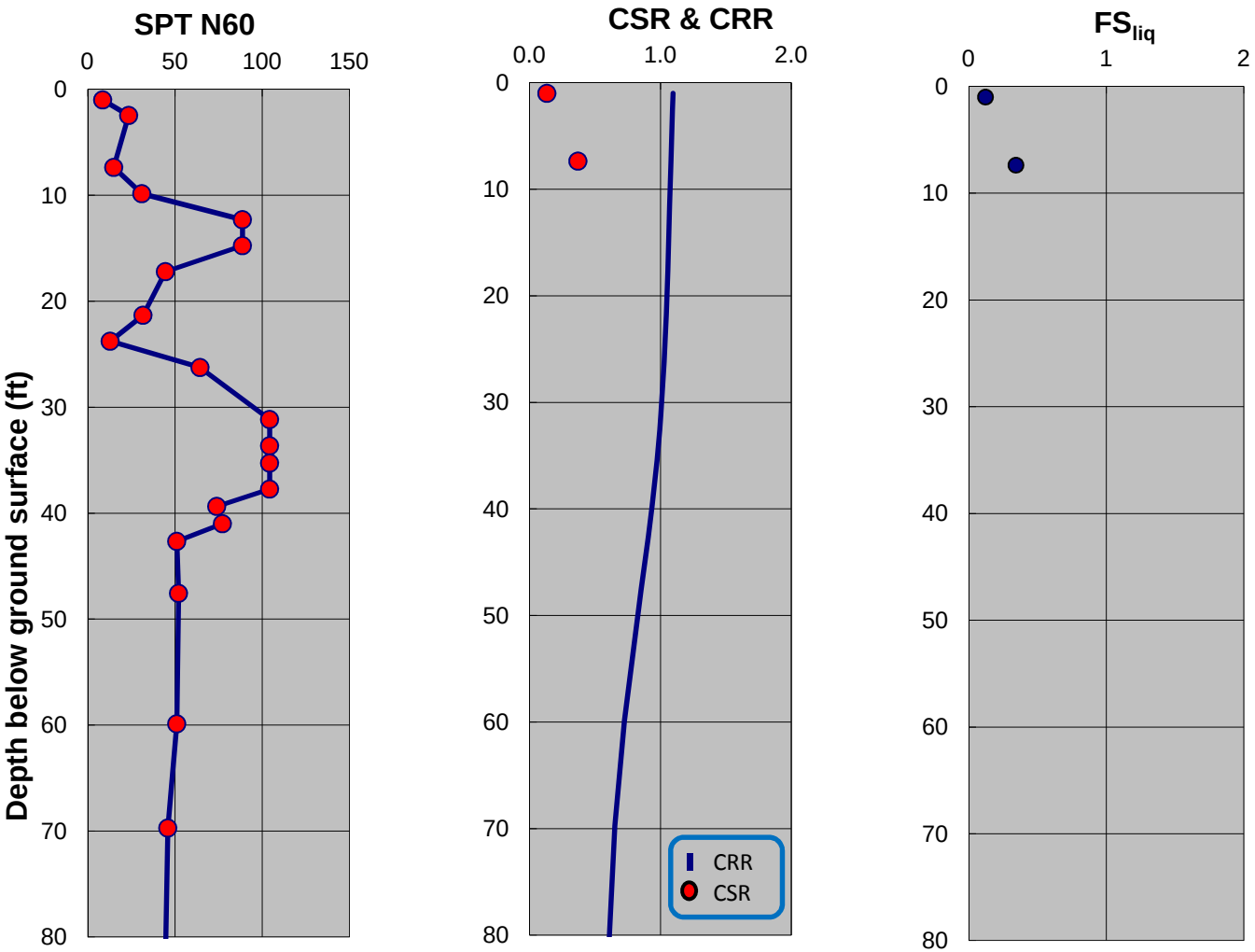
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-15 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



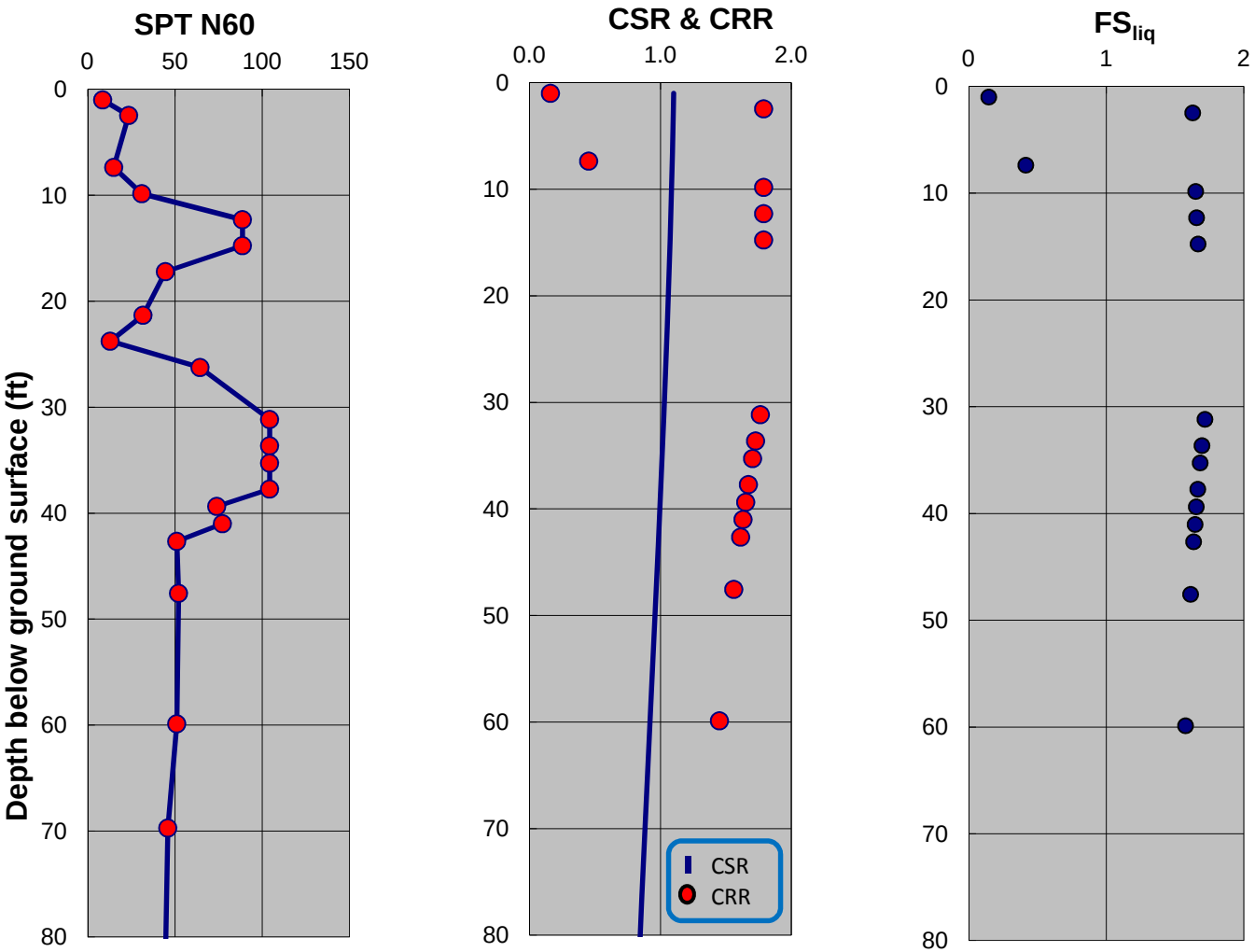
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-15 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



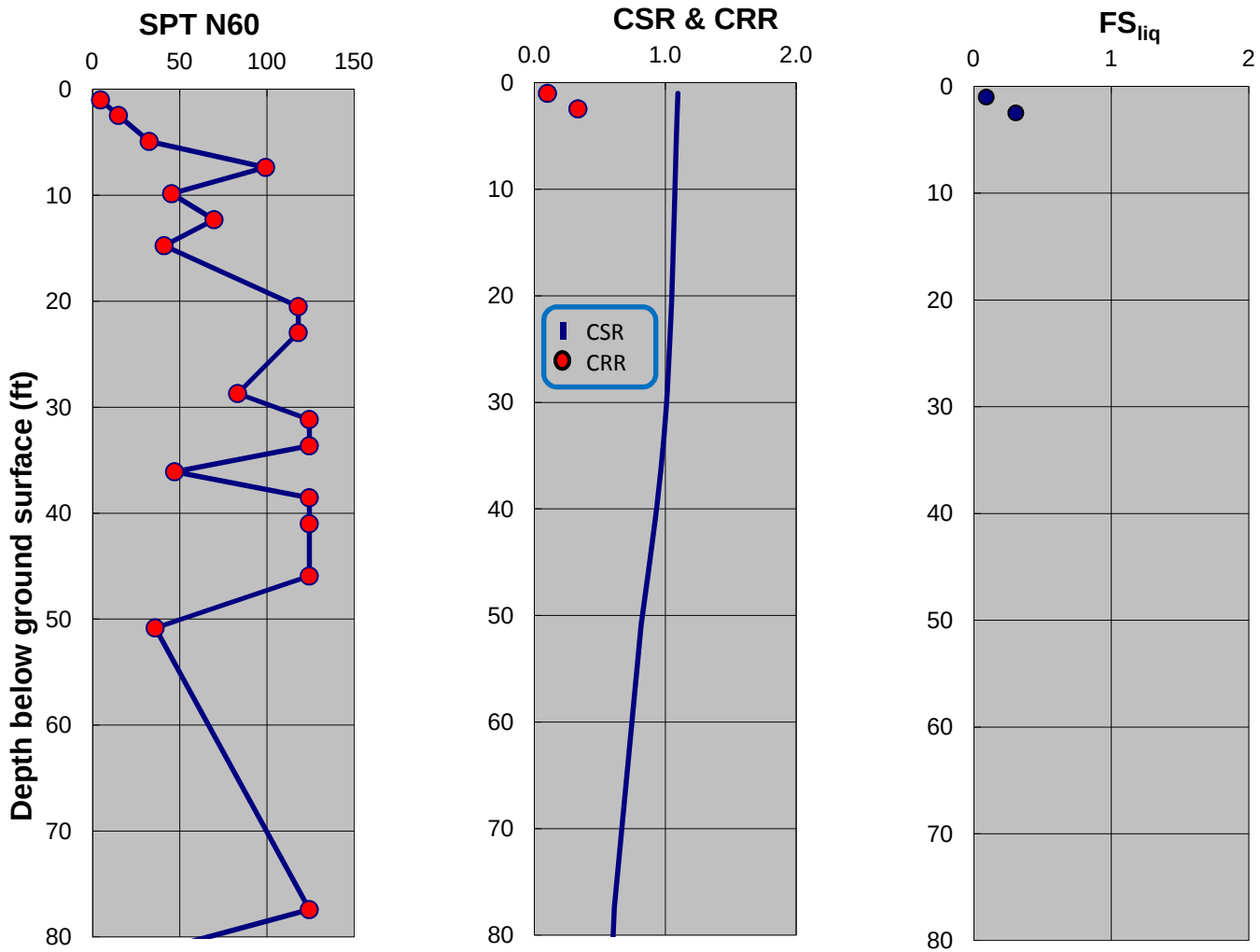
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-16 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



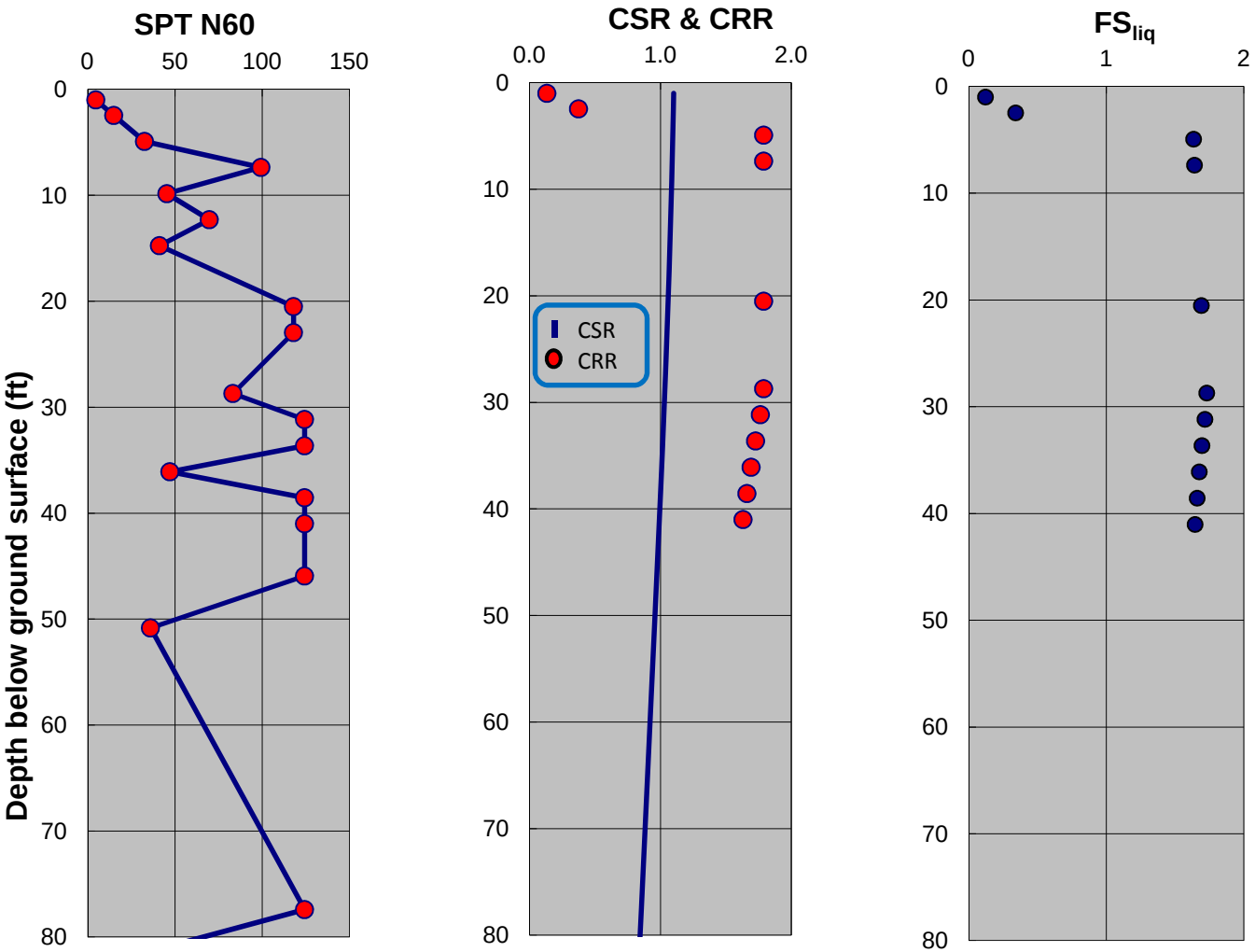
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-16 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



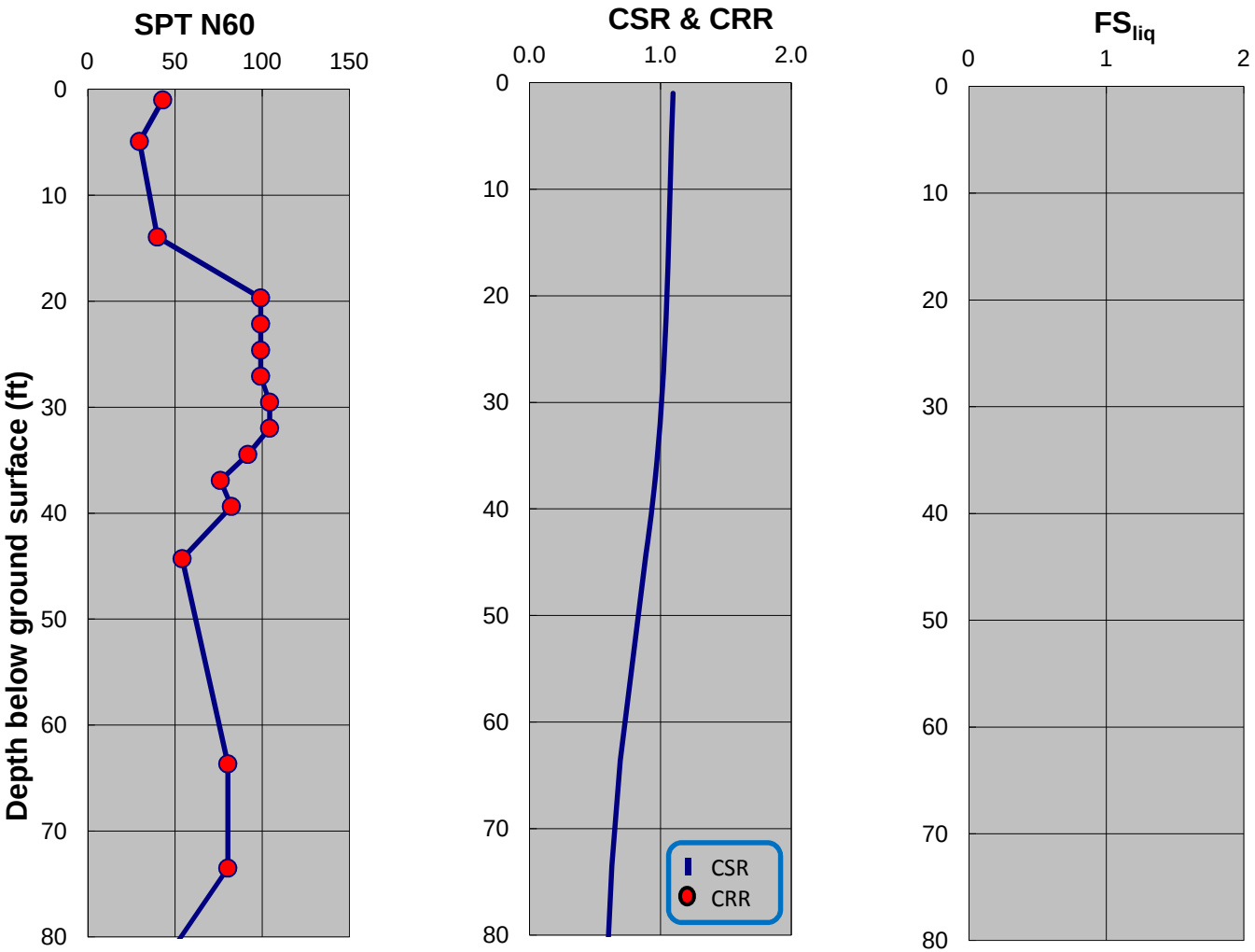
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-17 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



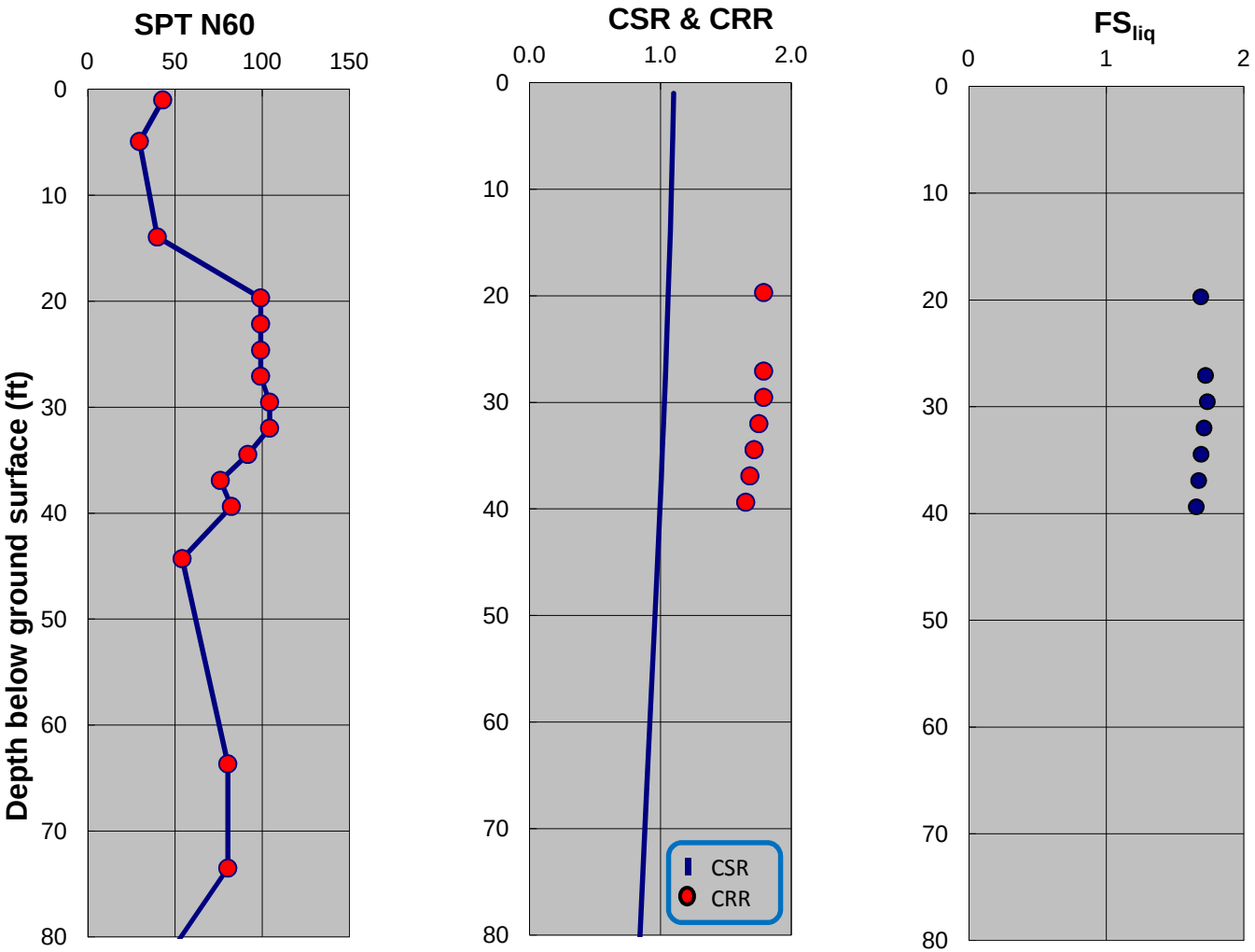
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-17 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



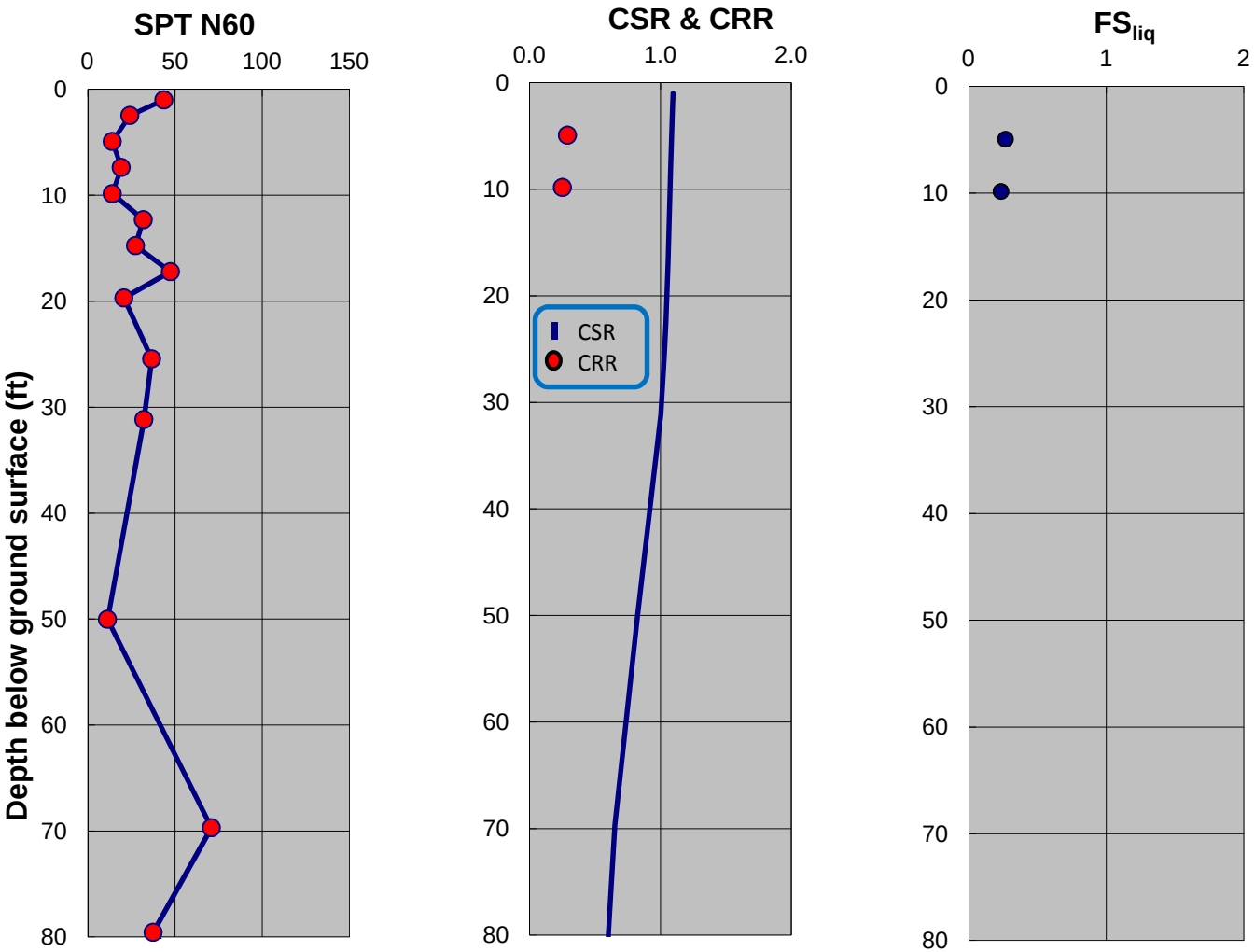
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-18 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



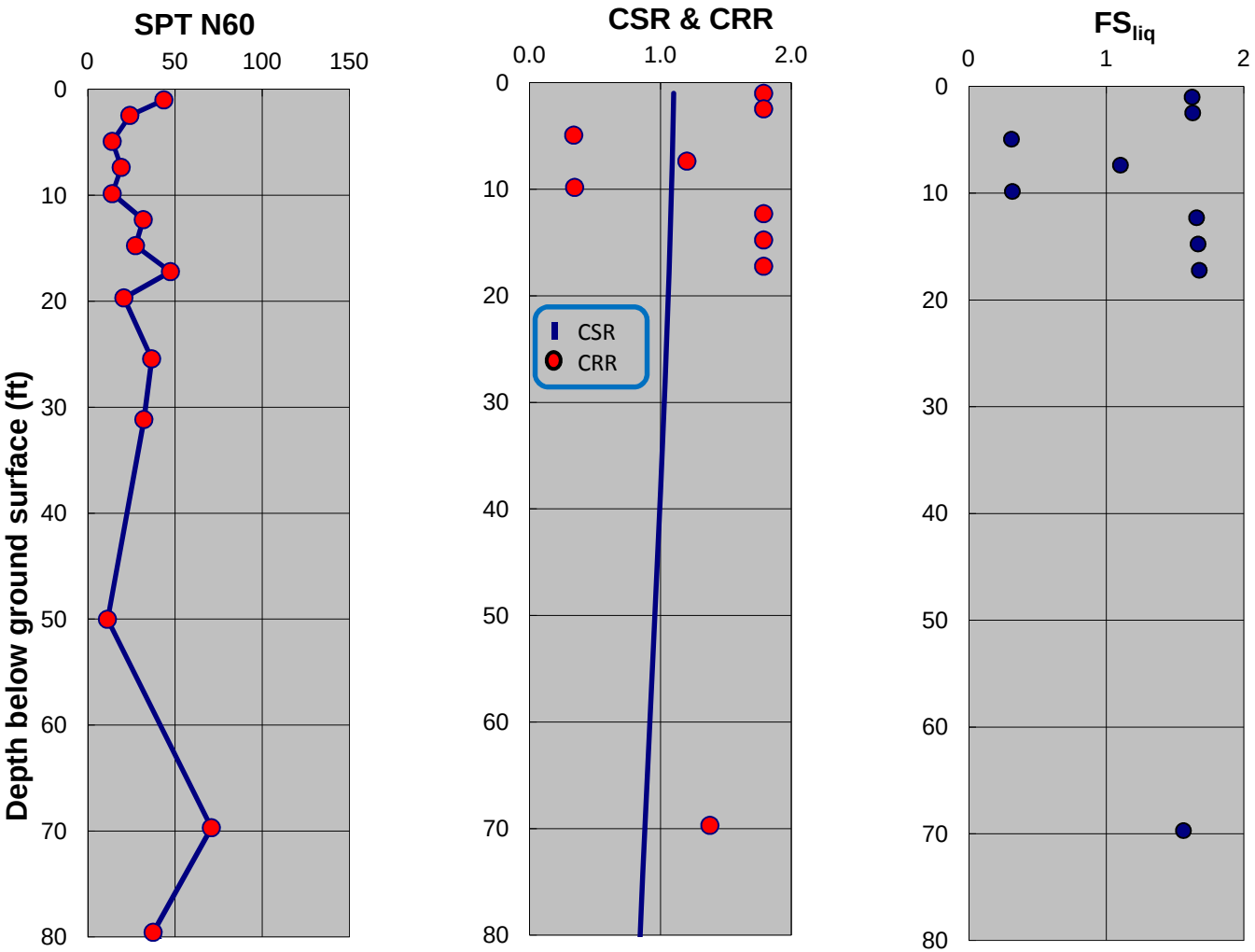
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-18 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



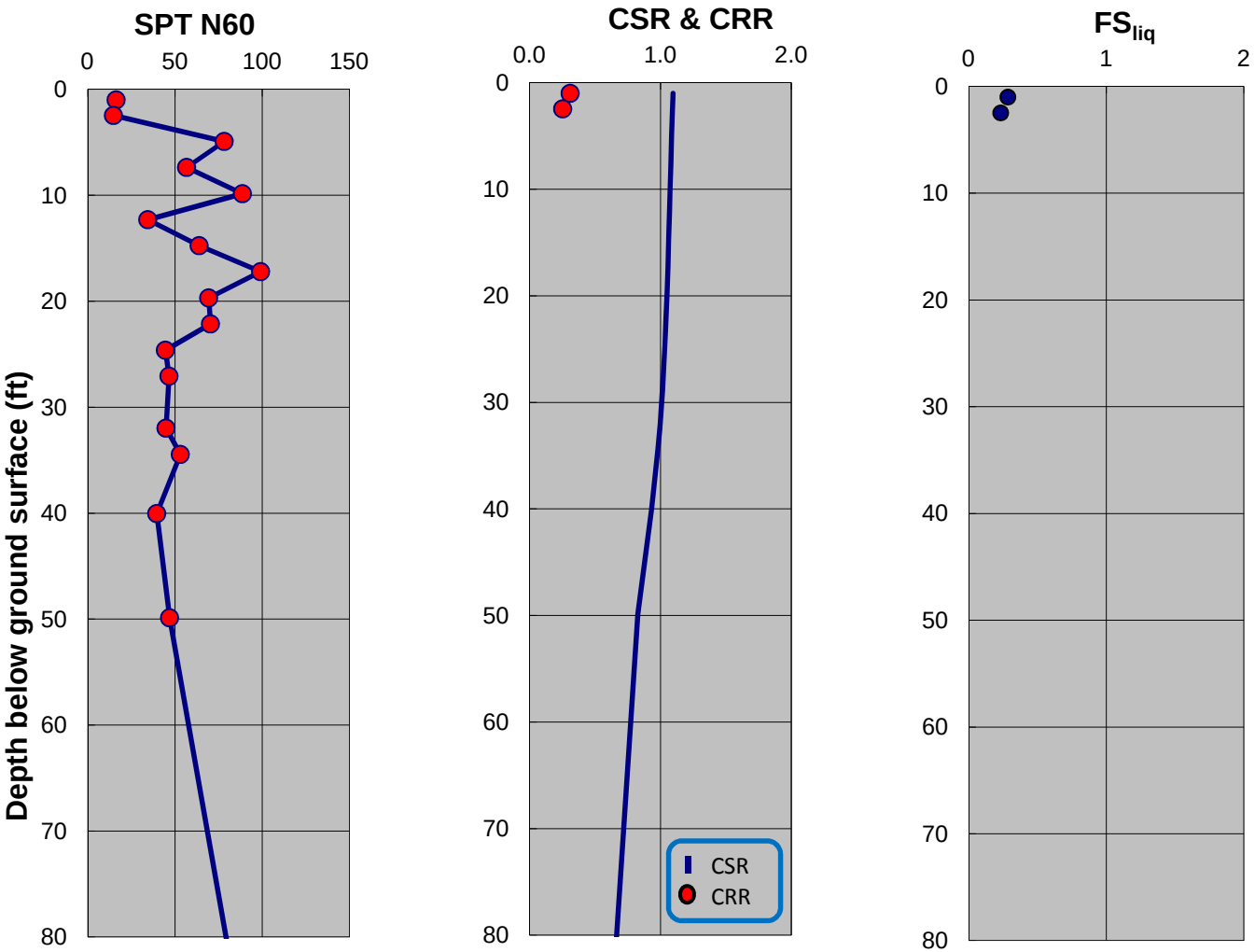
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-19 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



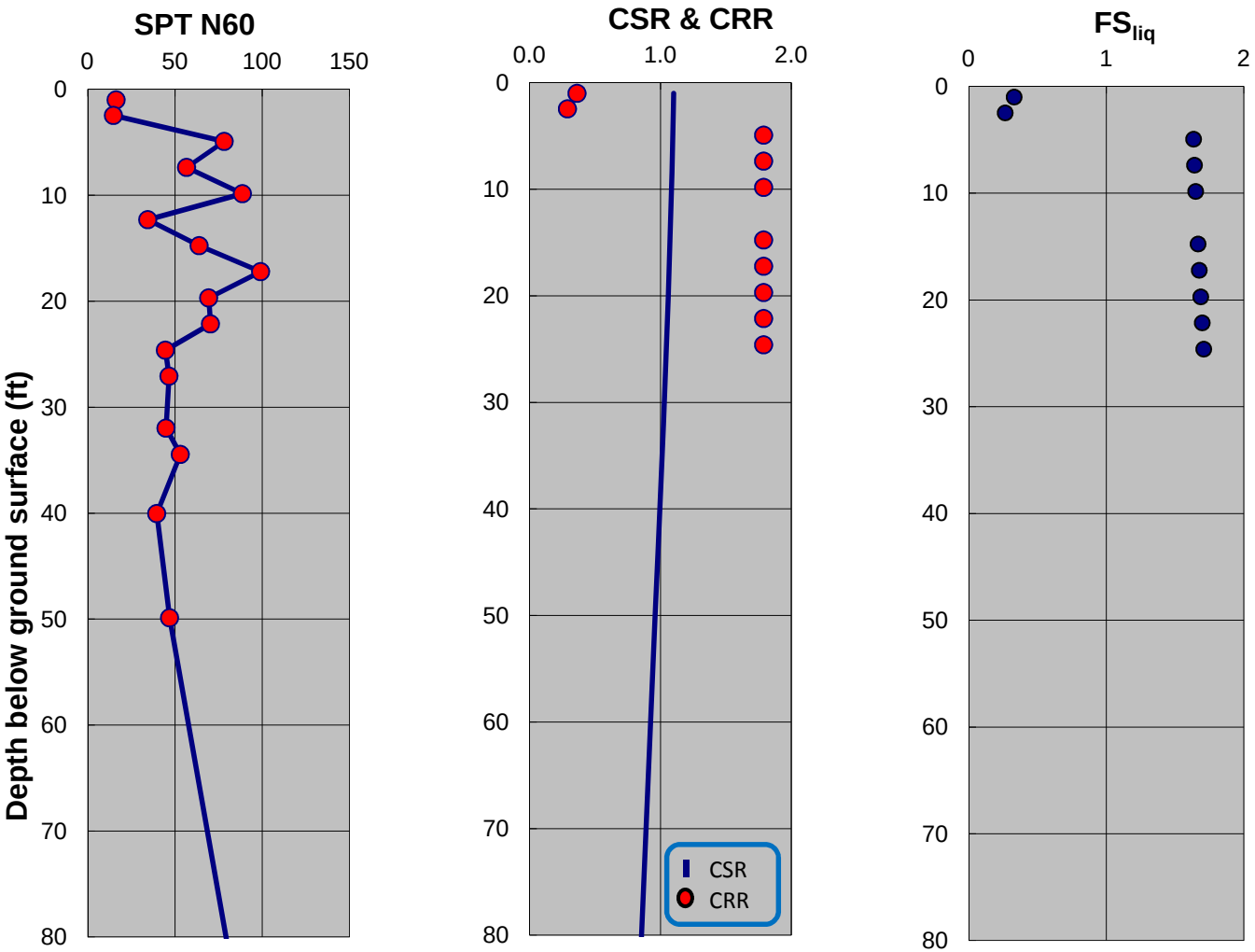
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-19 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



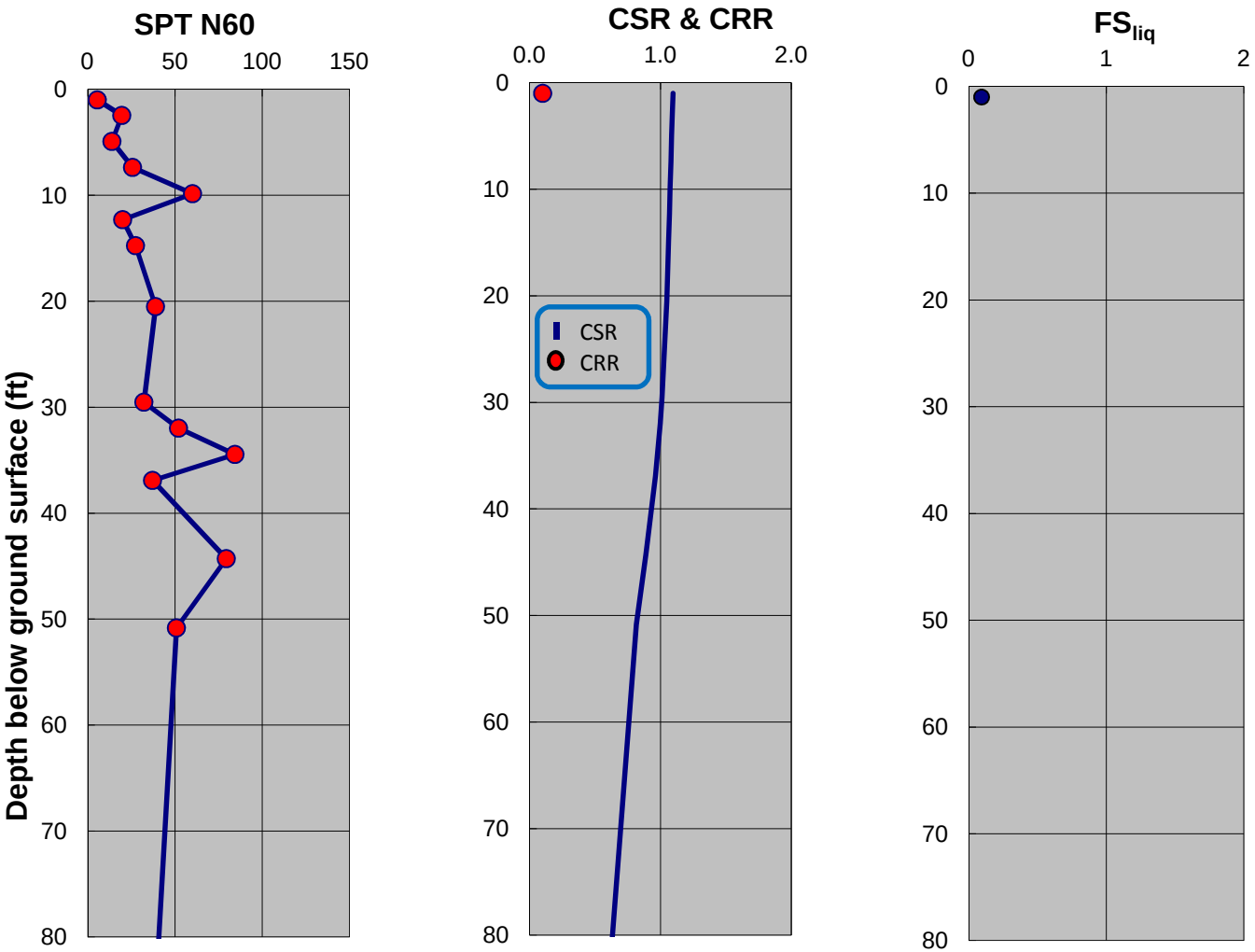
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-20 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



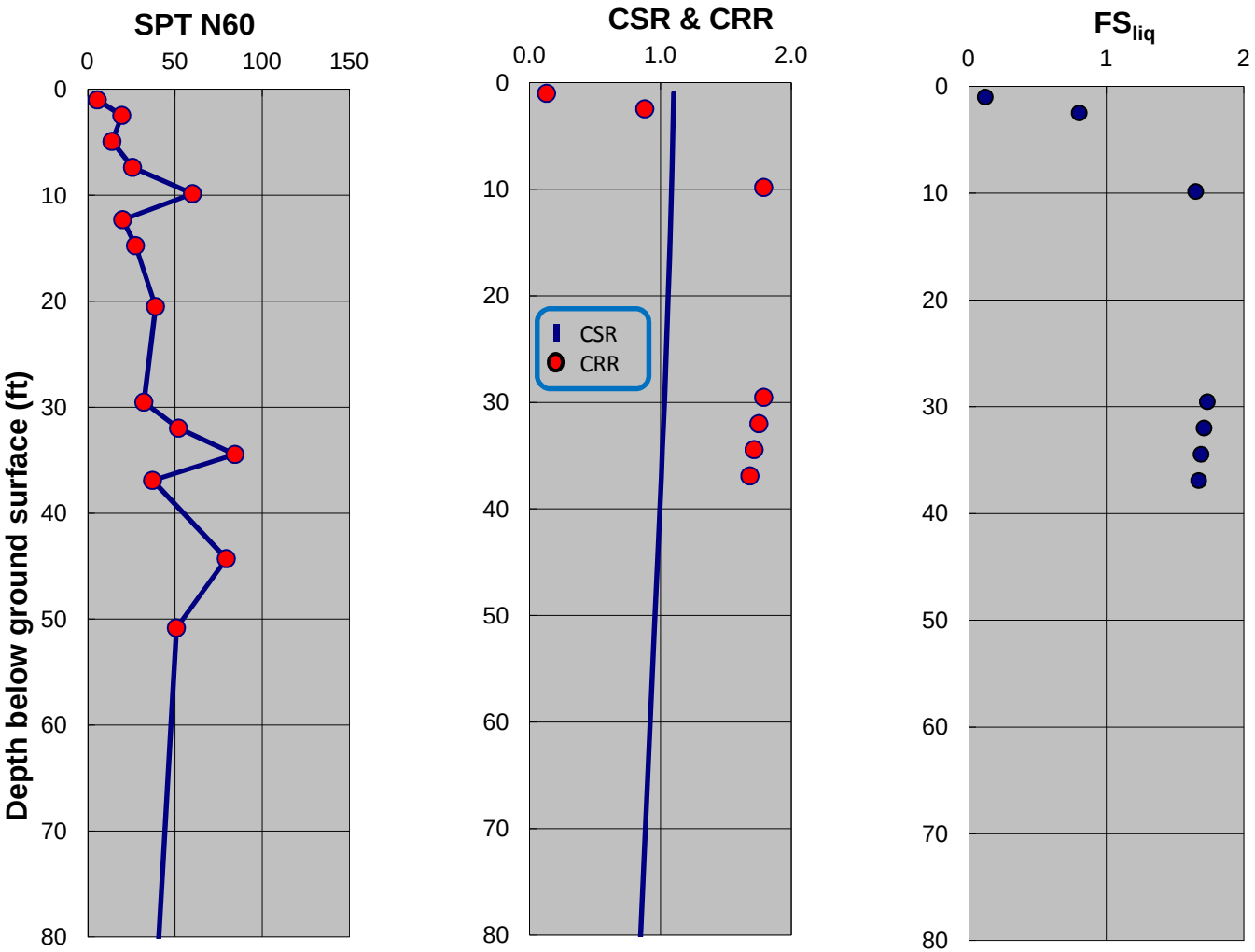
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-20 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



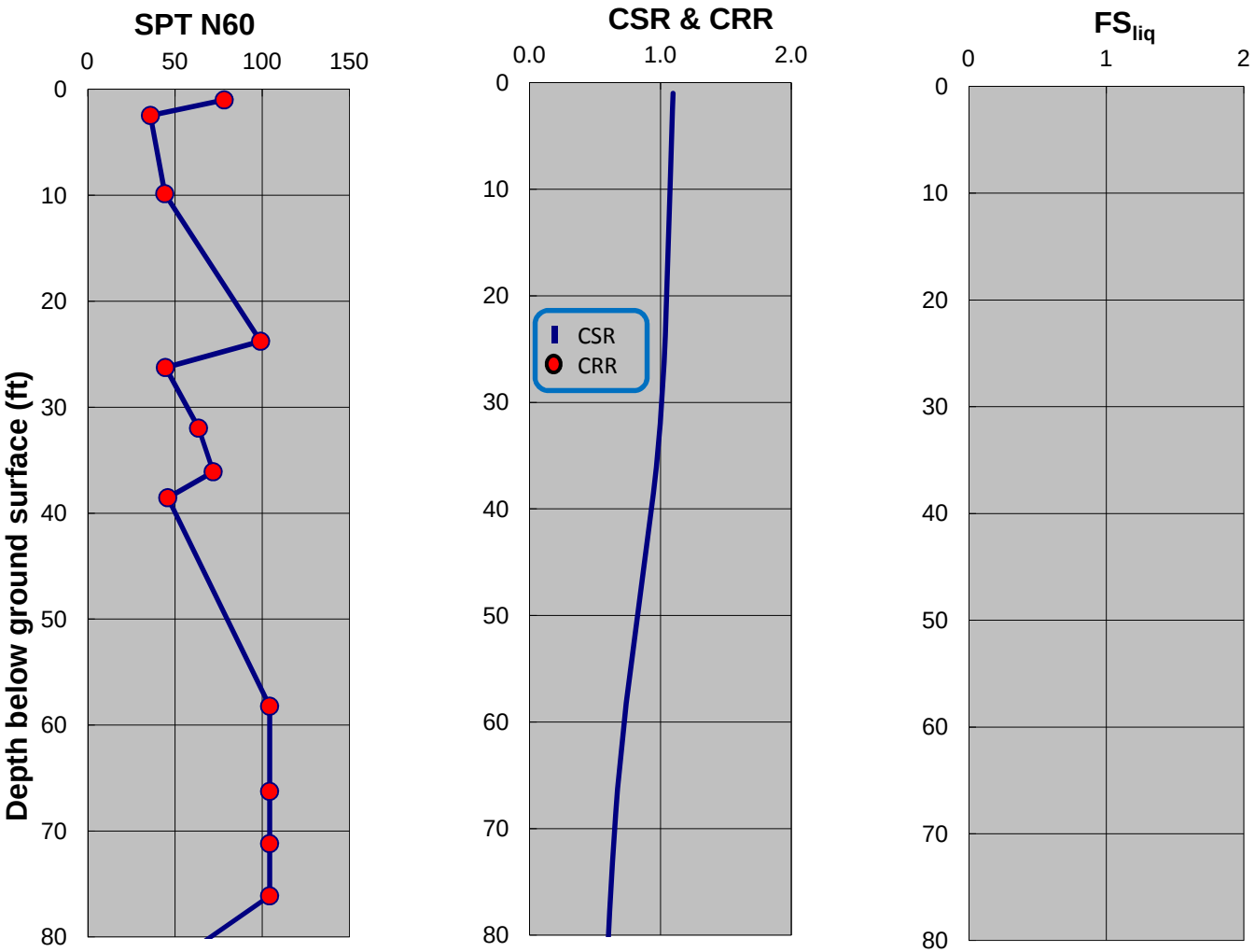
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-21 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



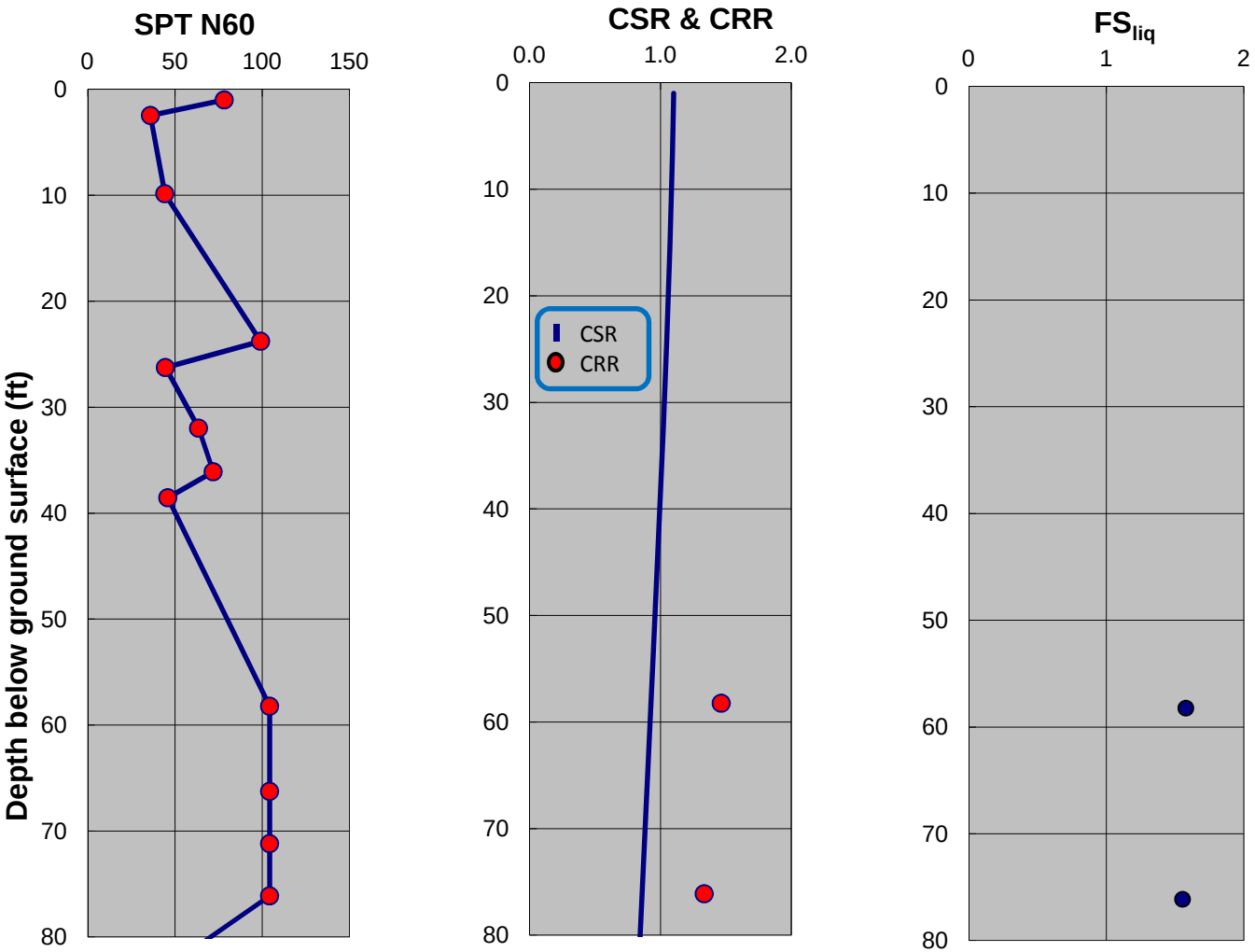
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-21 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



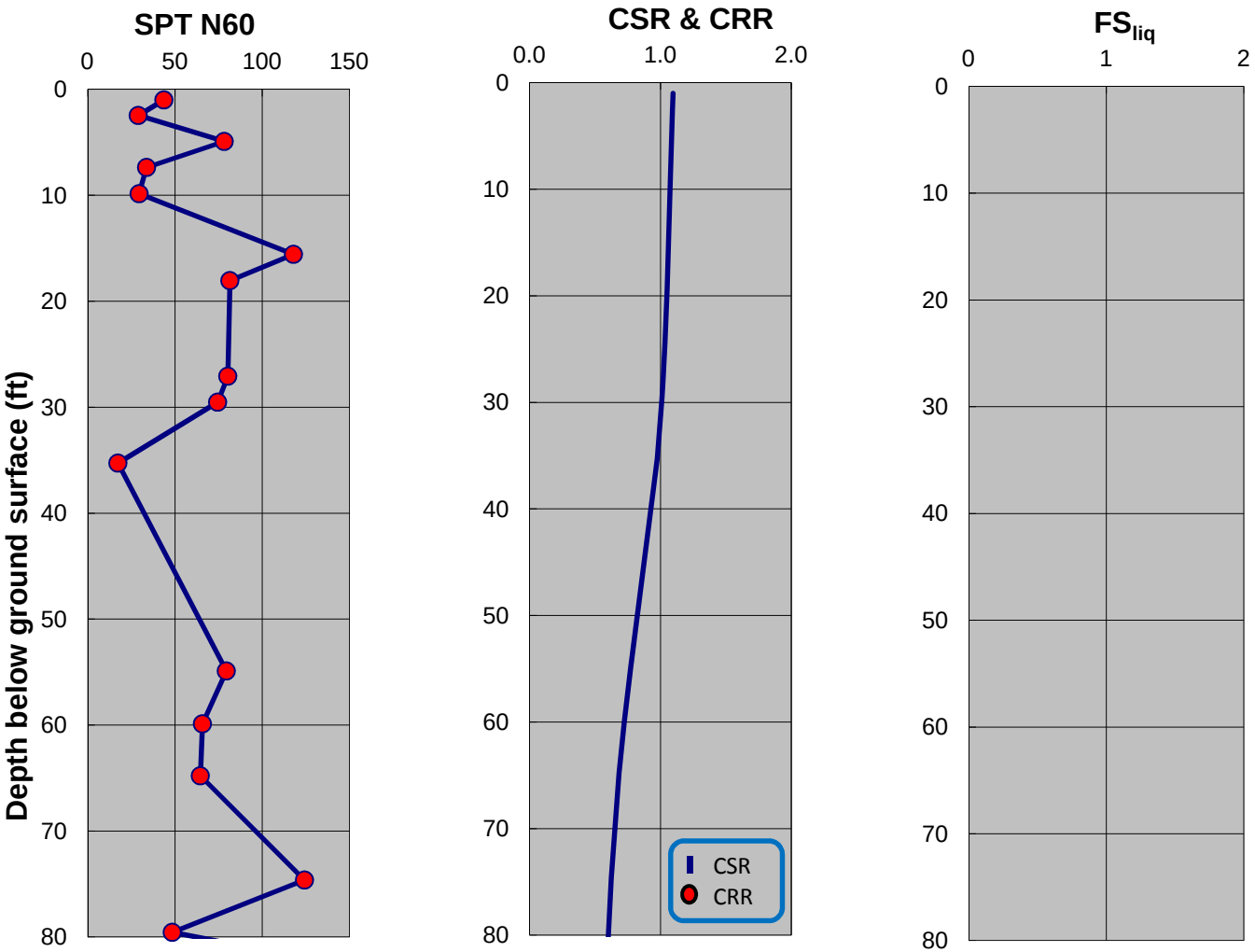
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-22 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



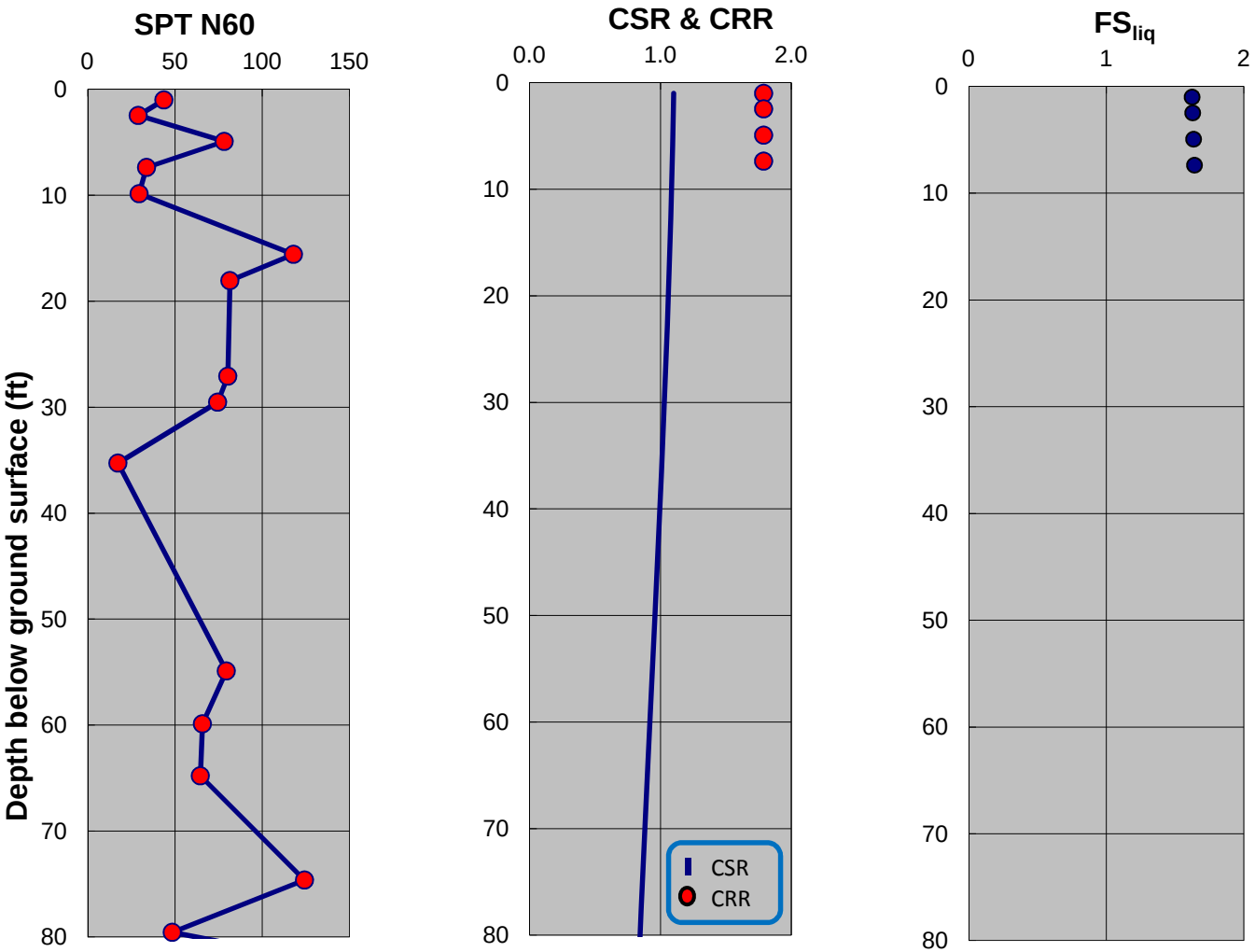
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-22 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



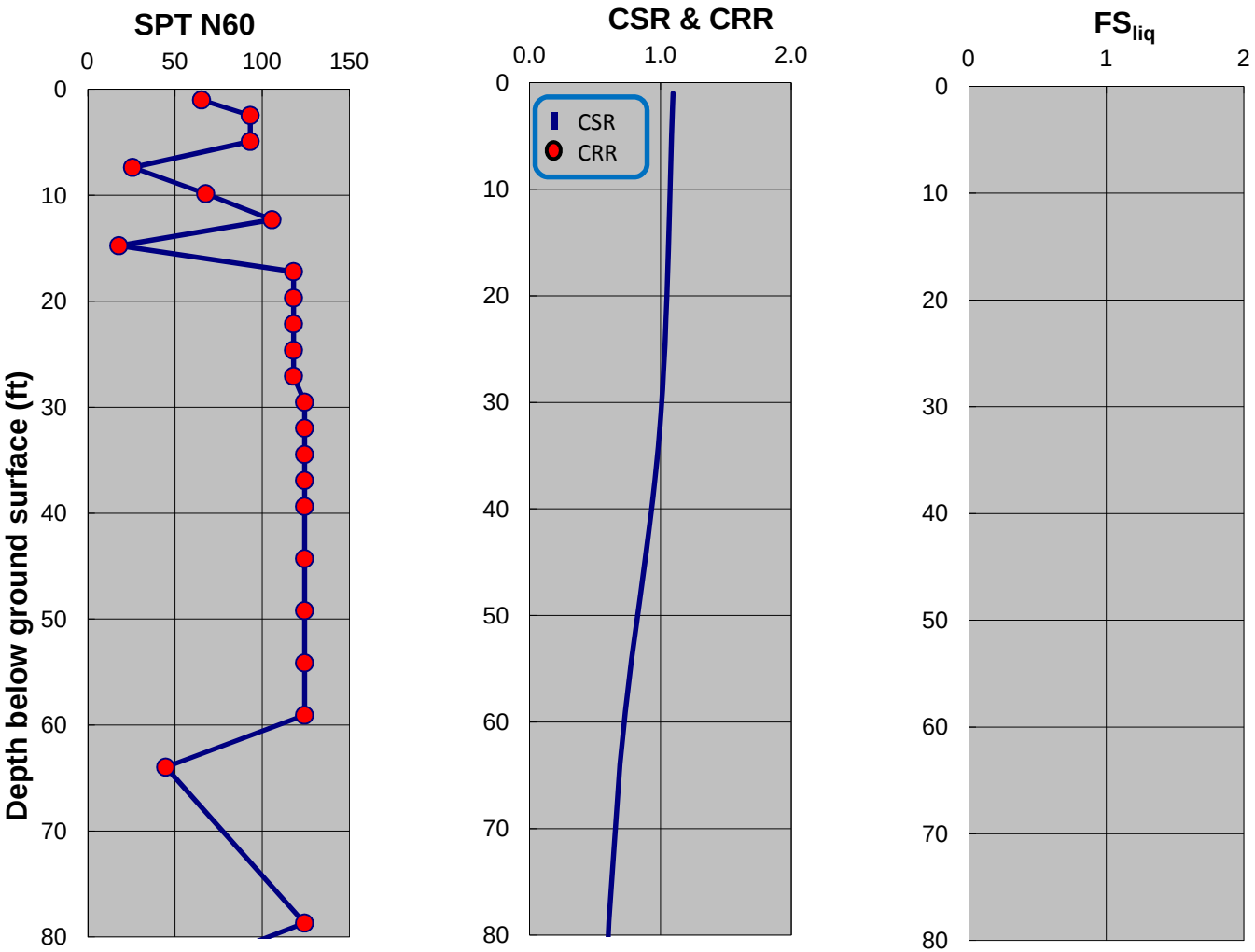
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-23 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



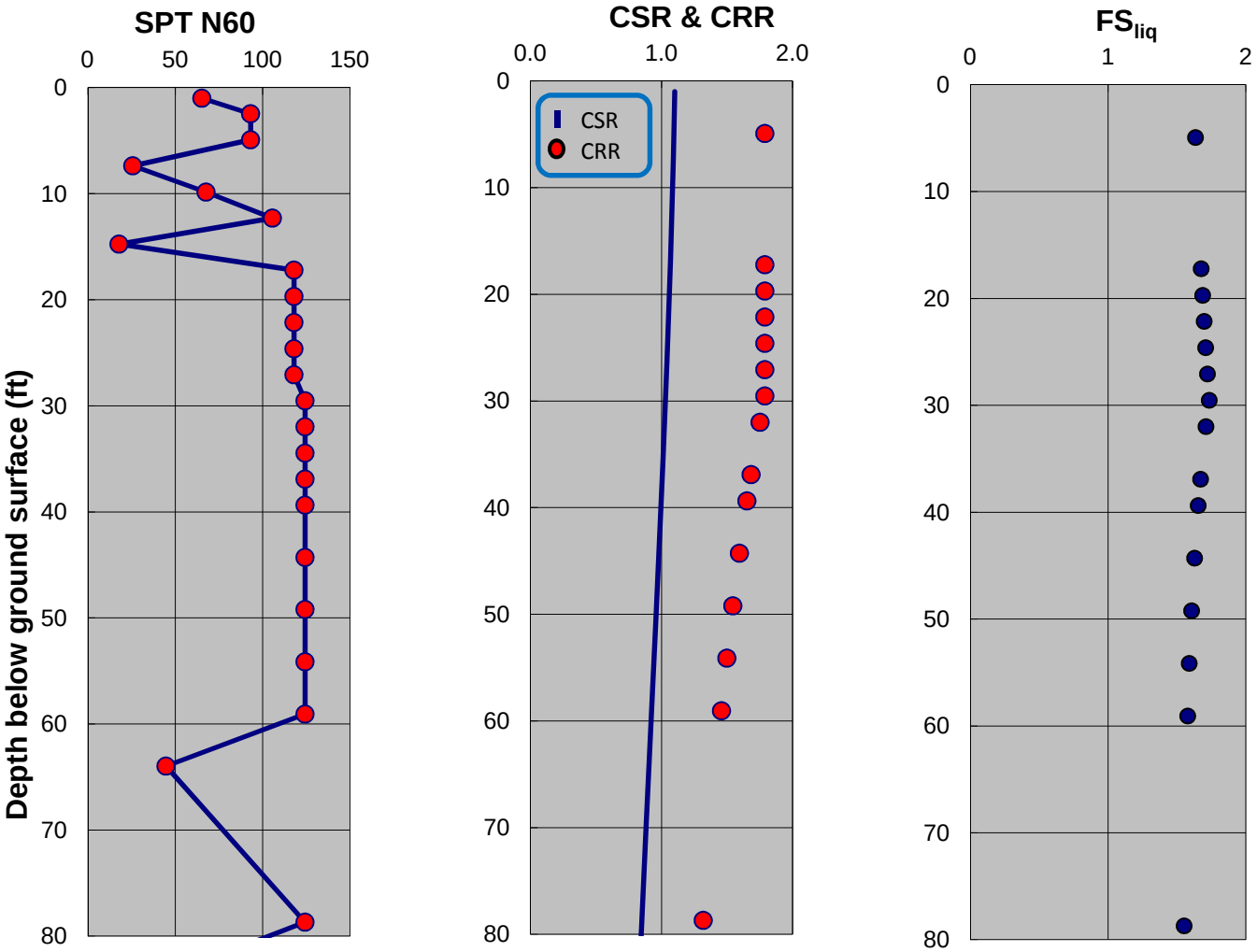
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-23 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



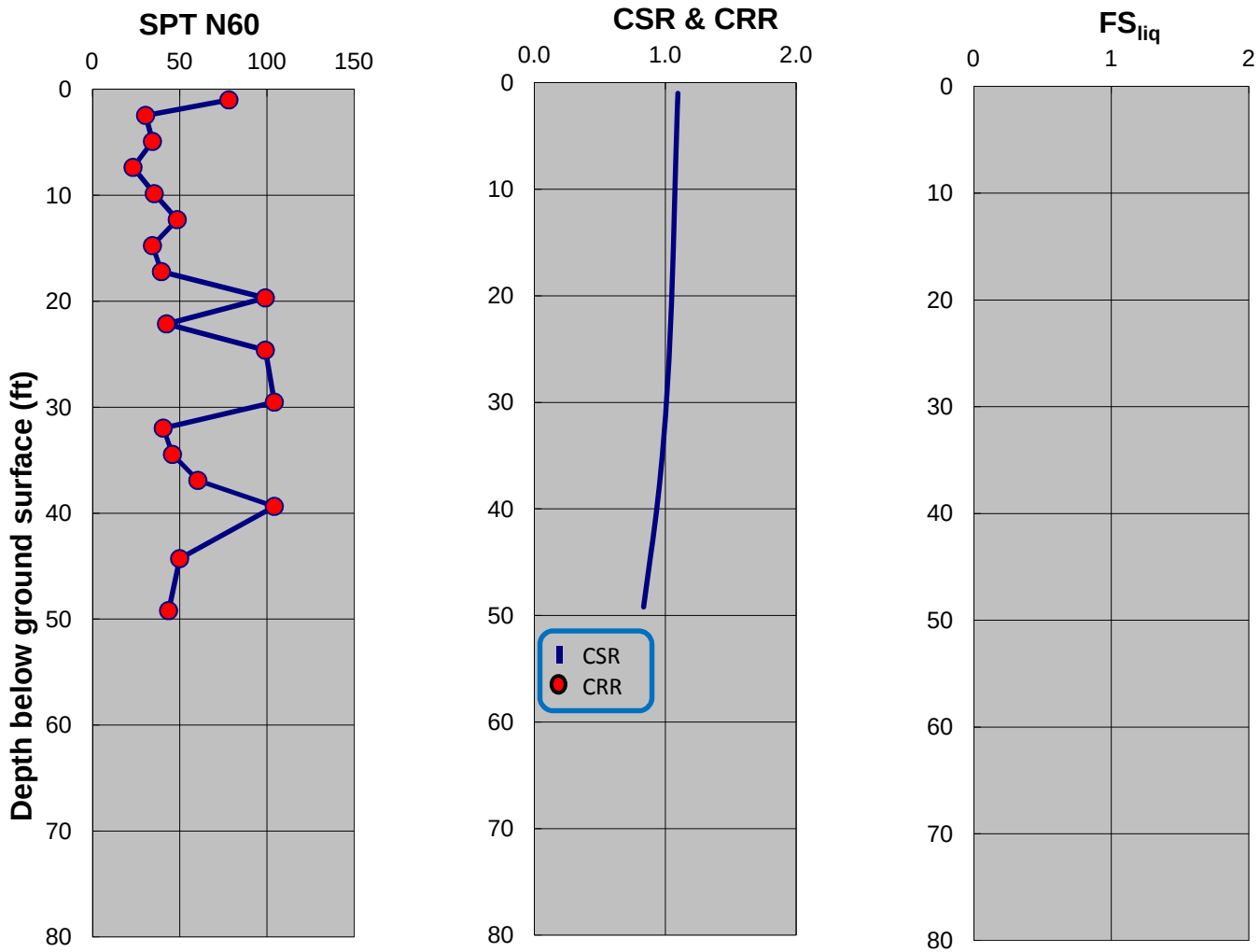
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-24 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



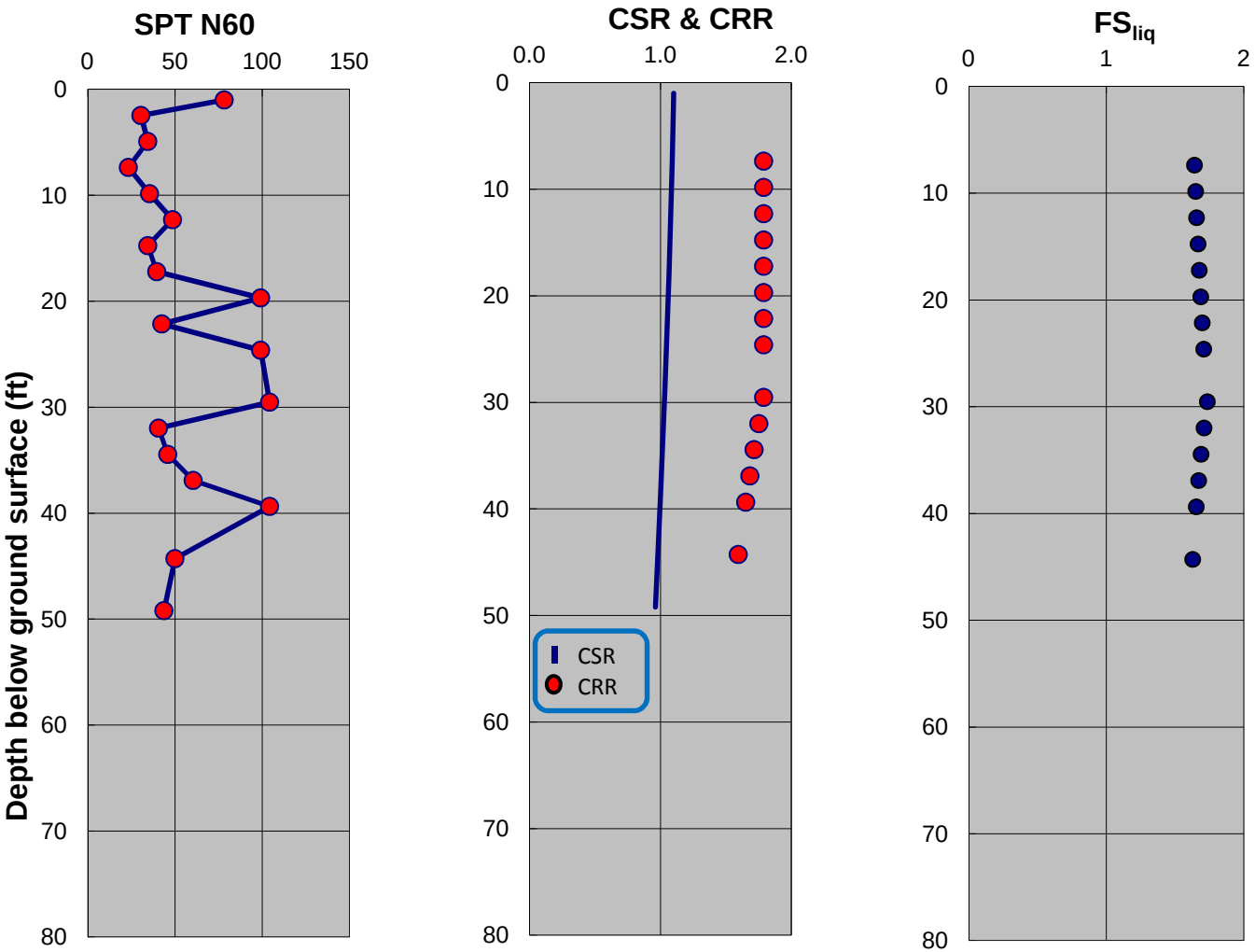
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-24 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



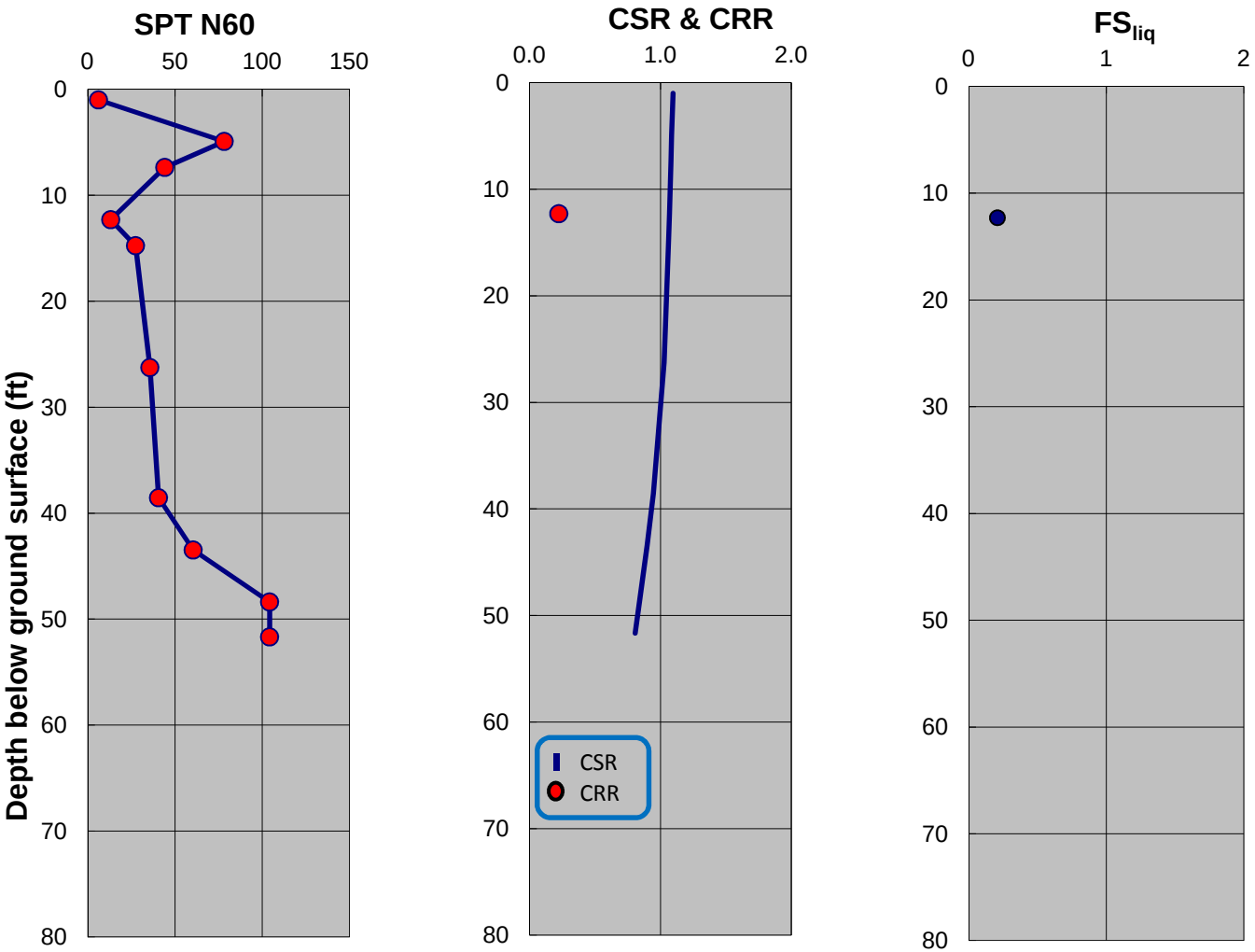
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-25 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



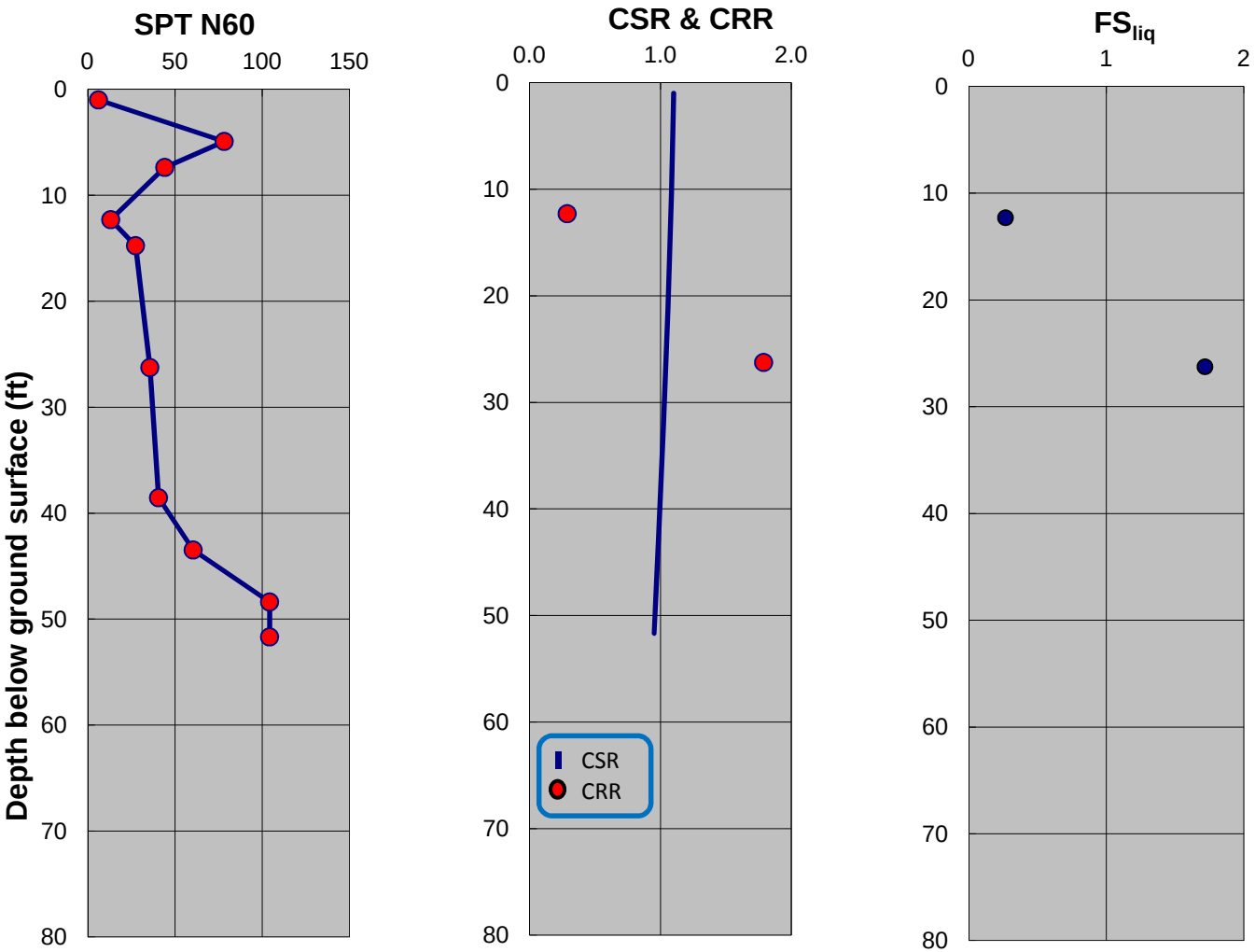
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-25 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



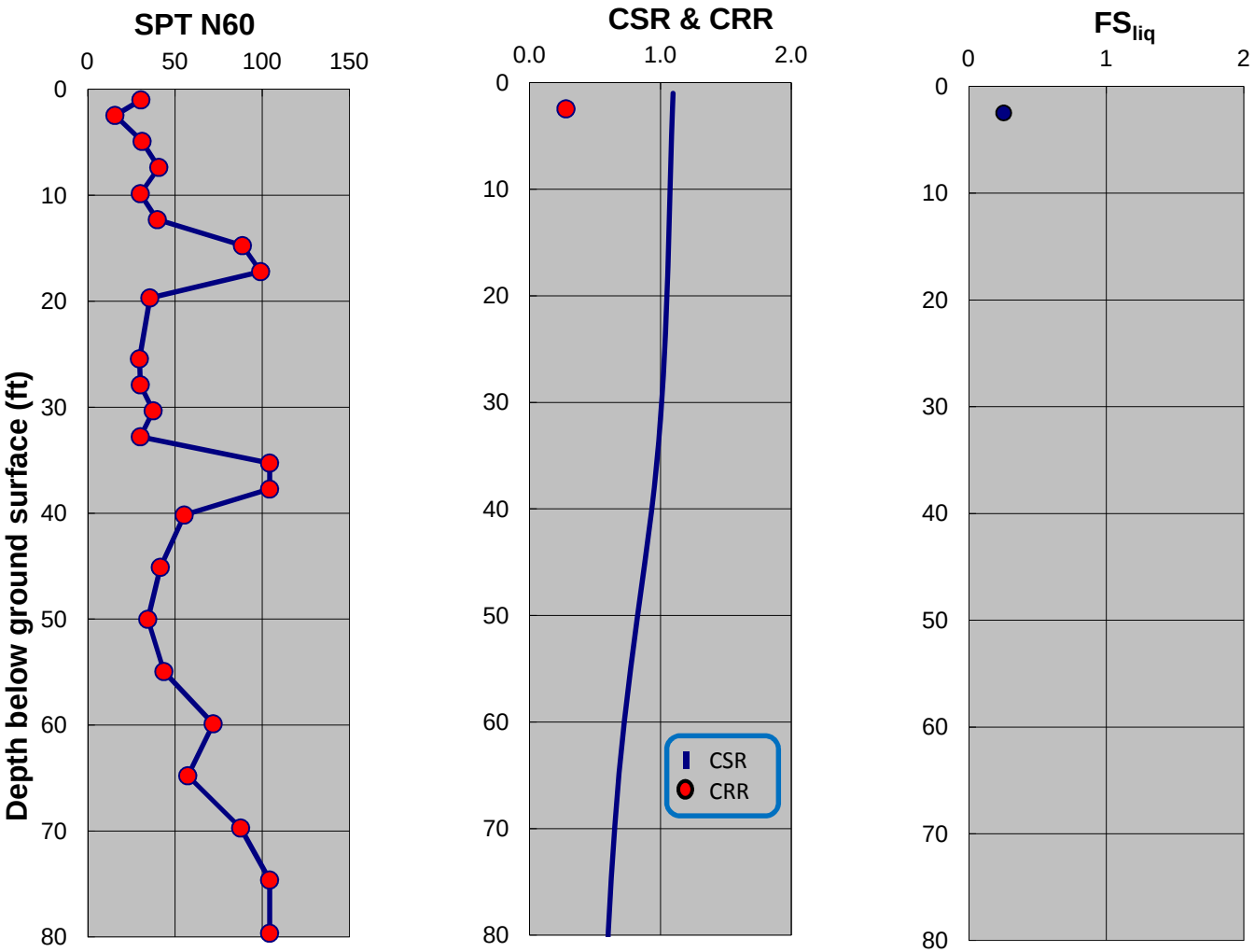
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-26 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



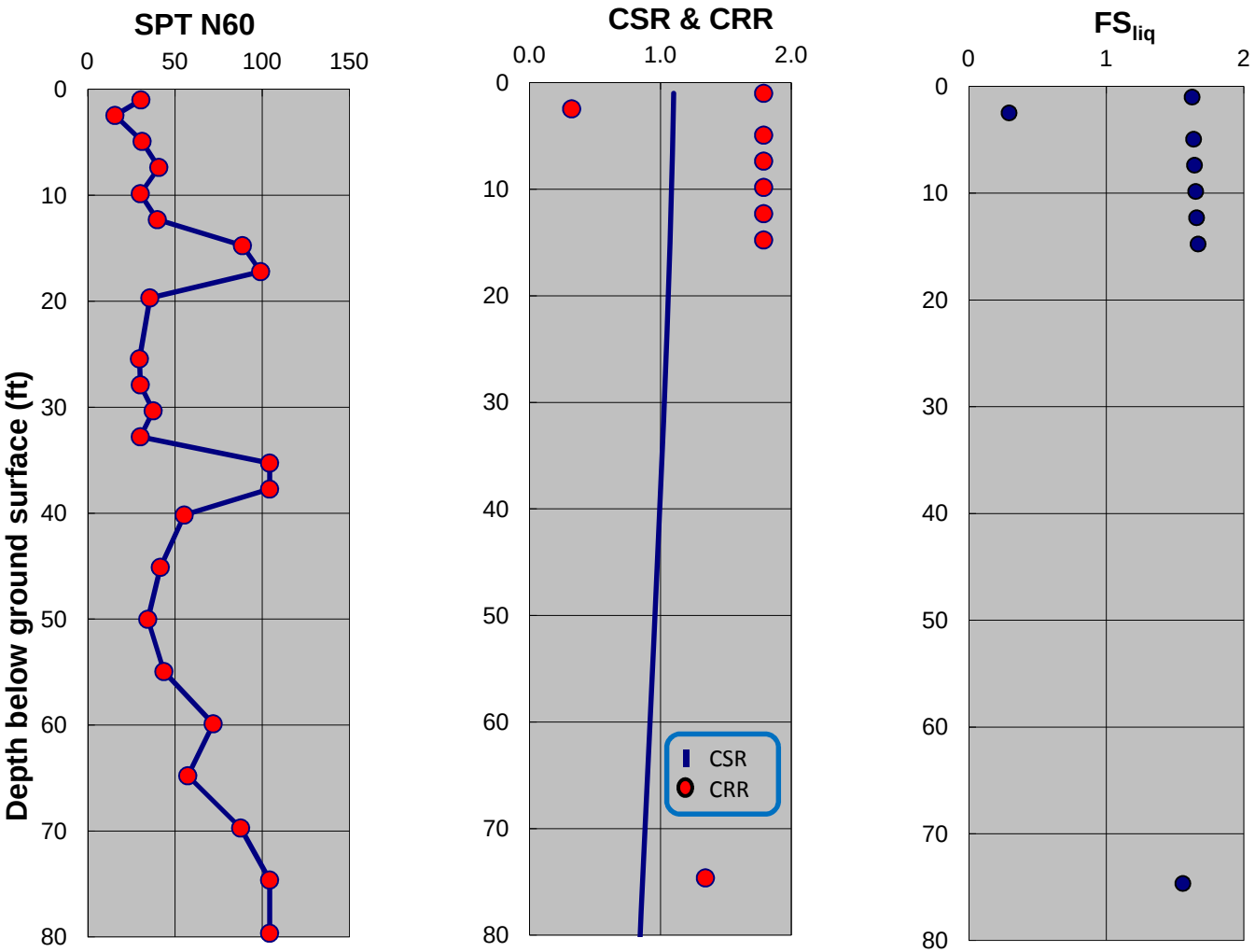
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-26 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



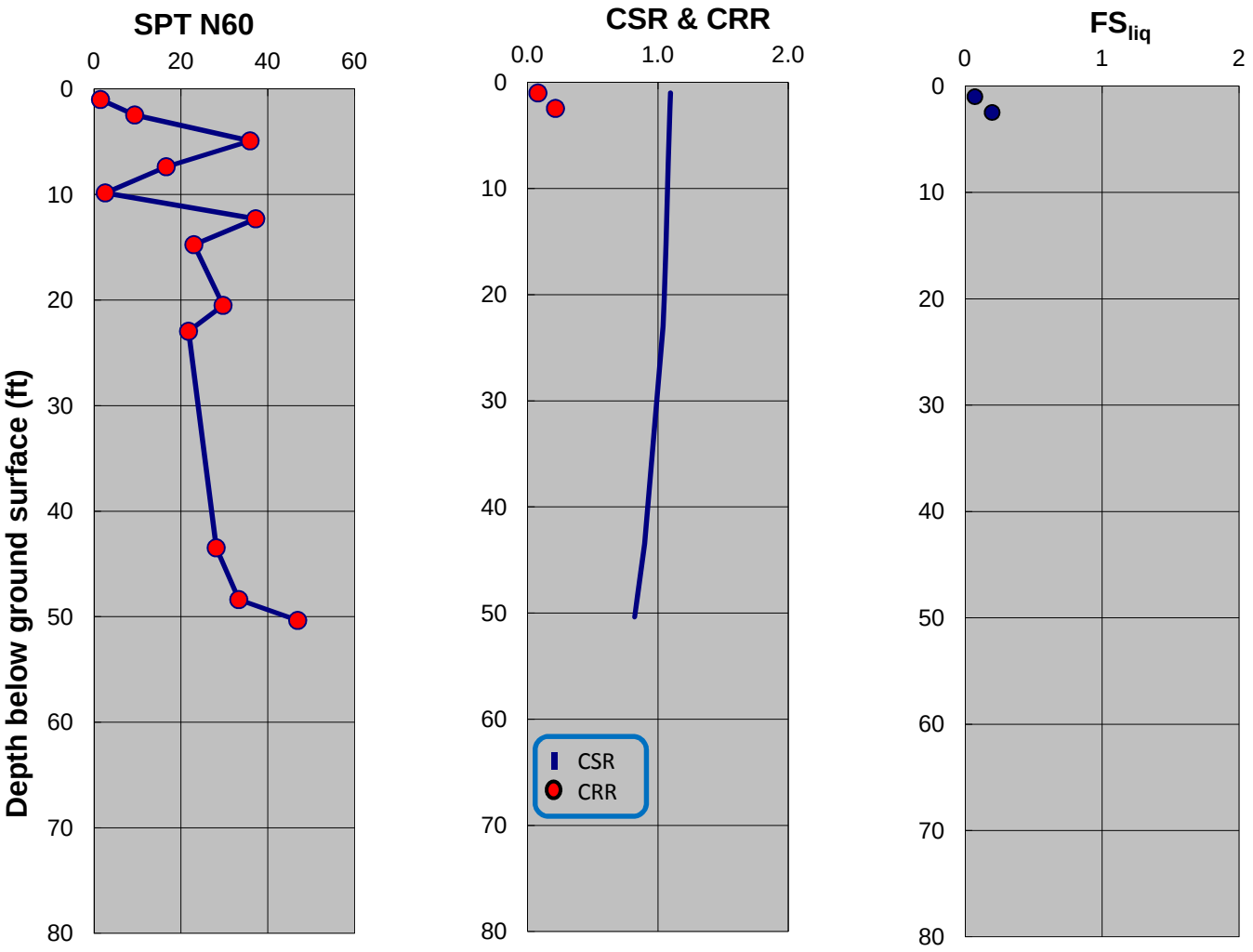
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-27 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



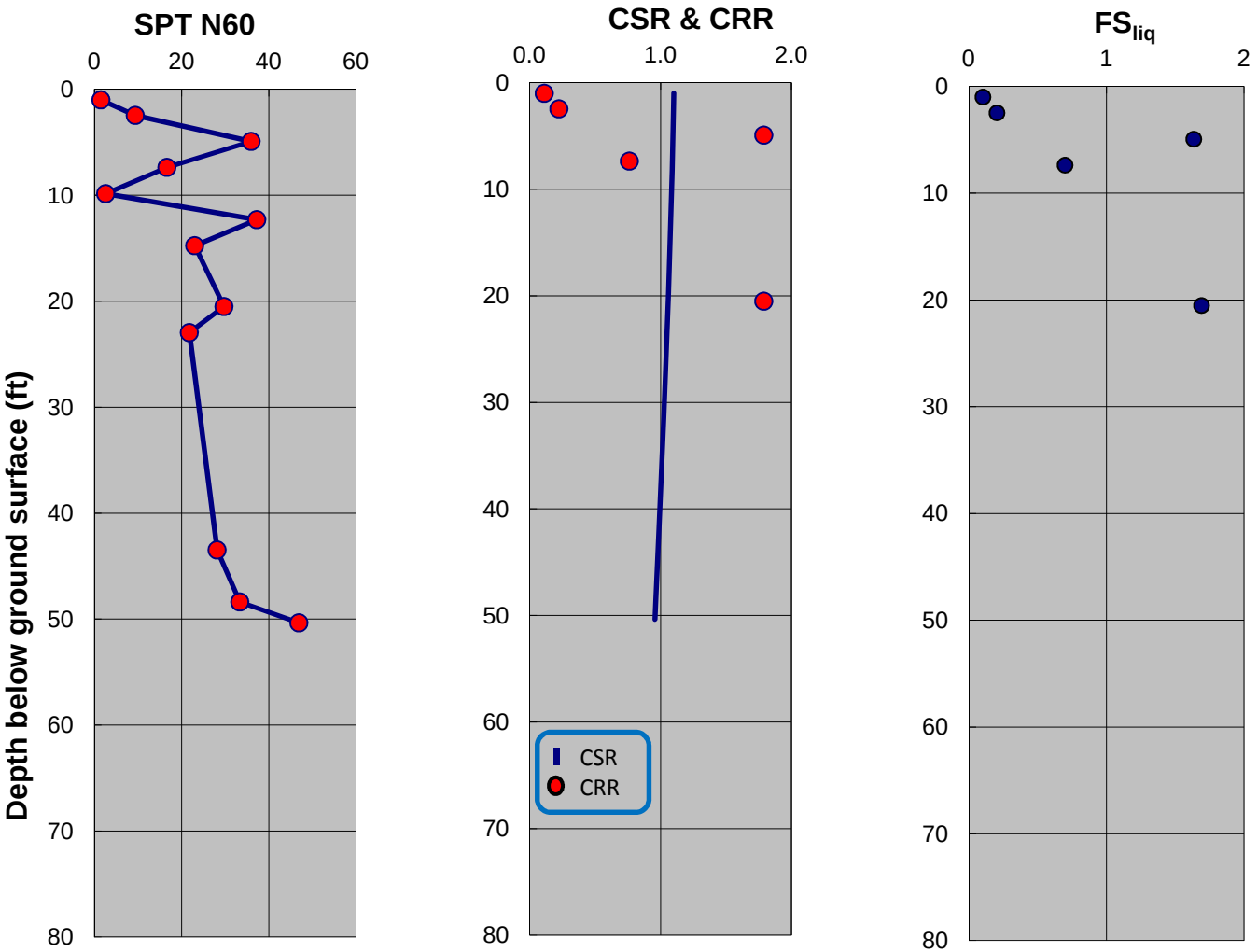
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-27 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



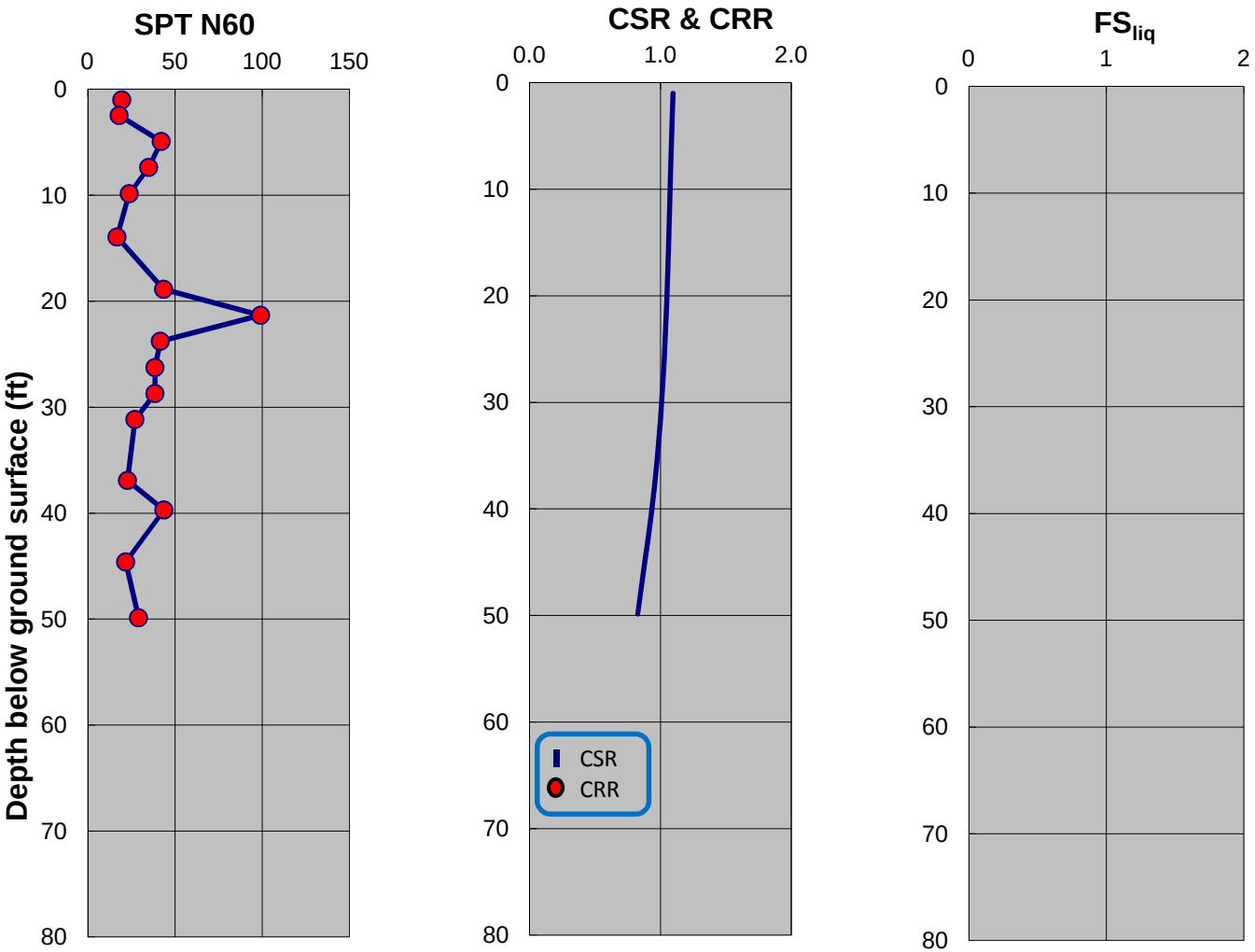
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-28 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



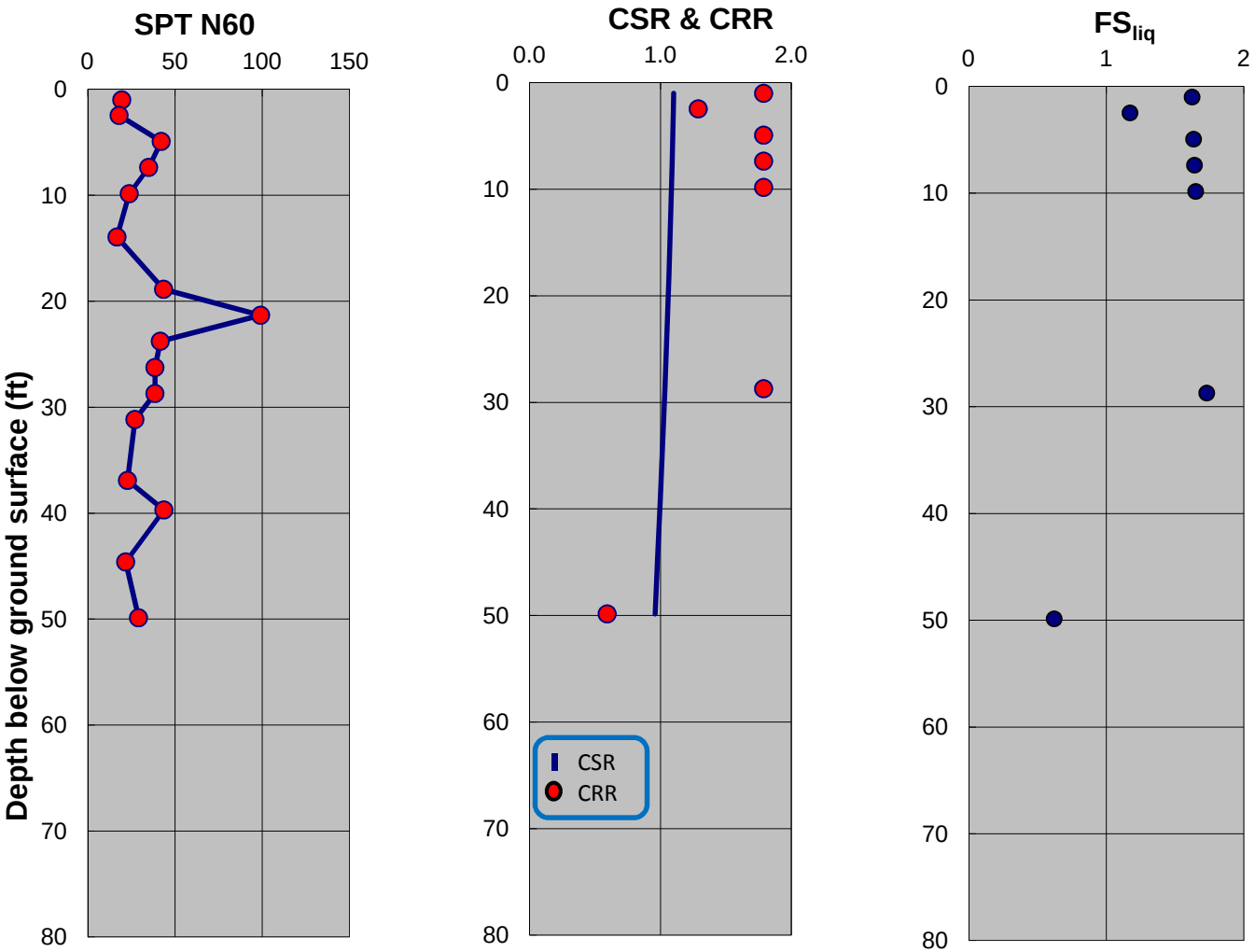
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-28 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



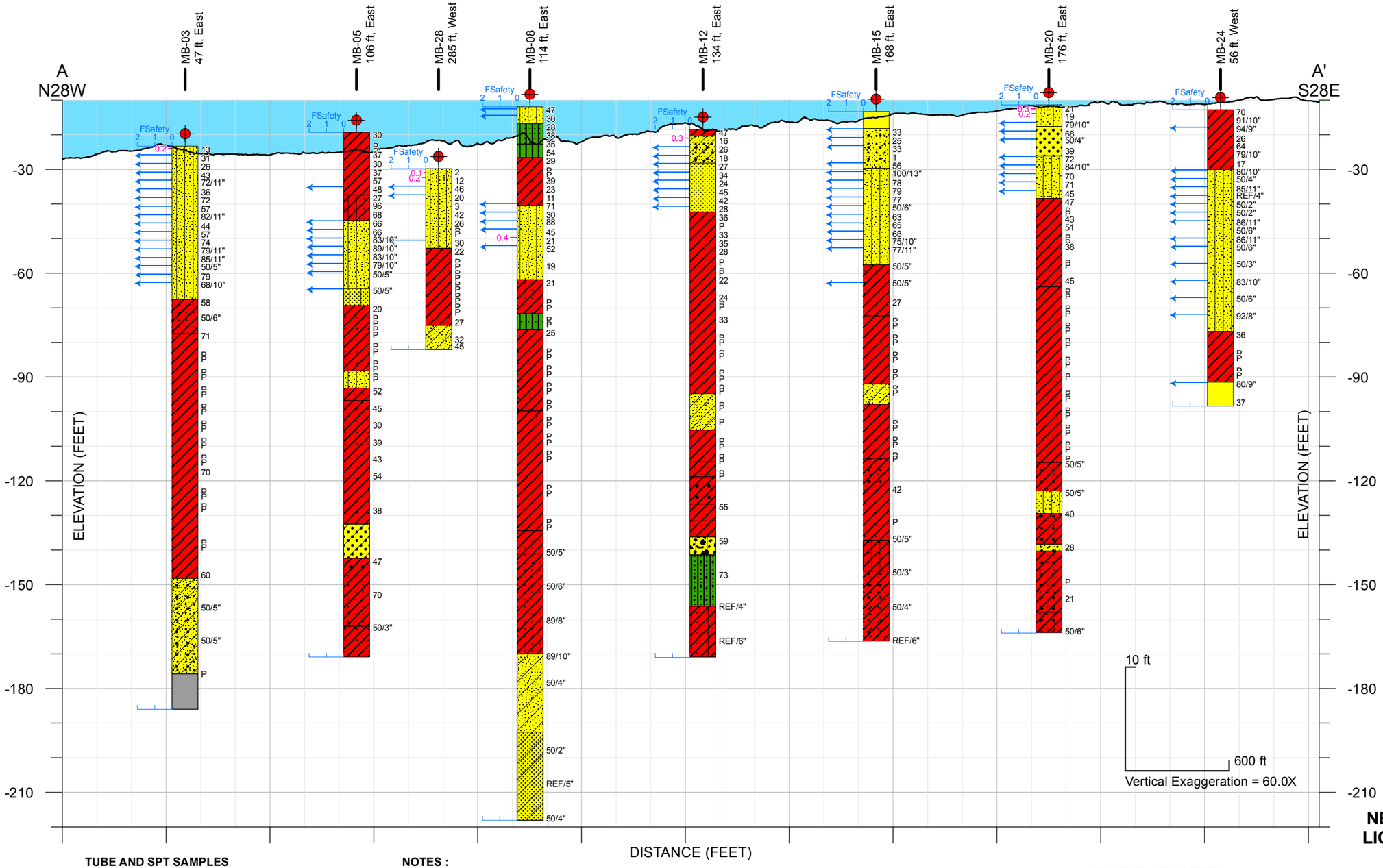
SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-31 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - NCEER (2001), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SPT-BASED LIQUEFACTION TRIGGERING ASSESSMENT OF BORING MB-31 FOR SSE LEVEL PER NFPA 59A 2013 / MCEG LEVEL PER ASCE 7-10 (M=8.0, PGA=0.75g) - BOULANGER AND IDRISS (2014), EXISTING ELEVATION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- SILT with Sand (ML)
- Sandy, Gravelly SILT (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Well-Graded SAND with Clay (SW-SC)
- Well-Graded SAND with Silt (SW-SM)
- Gravelly Well-Graded SAND (SW)
- Clayey SAND (SC)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Poorly-Graded GRAVEL (GP)
- Poorly-Graded GRAVEL with Clay (GP-GC)
- Well-Graded GRAVEL (GW)
- Well-Graded GRAVEL with Silt (GW-GM)
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 2 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

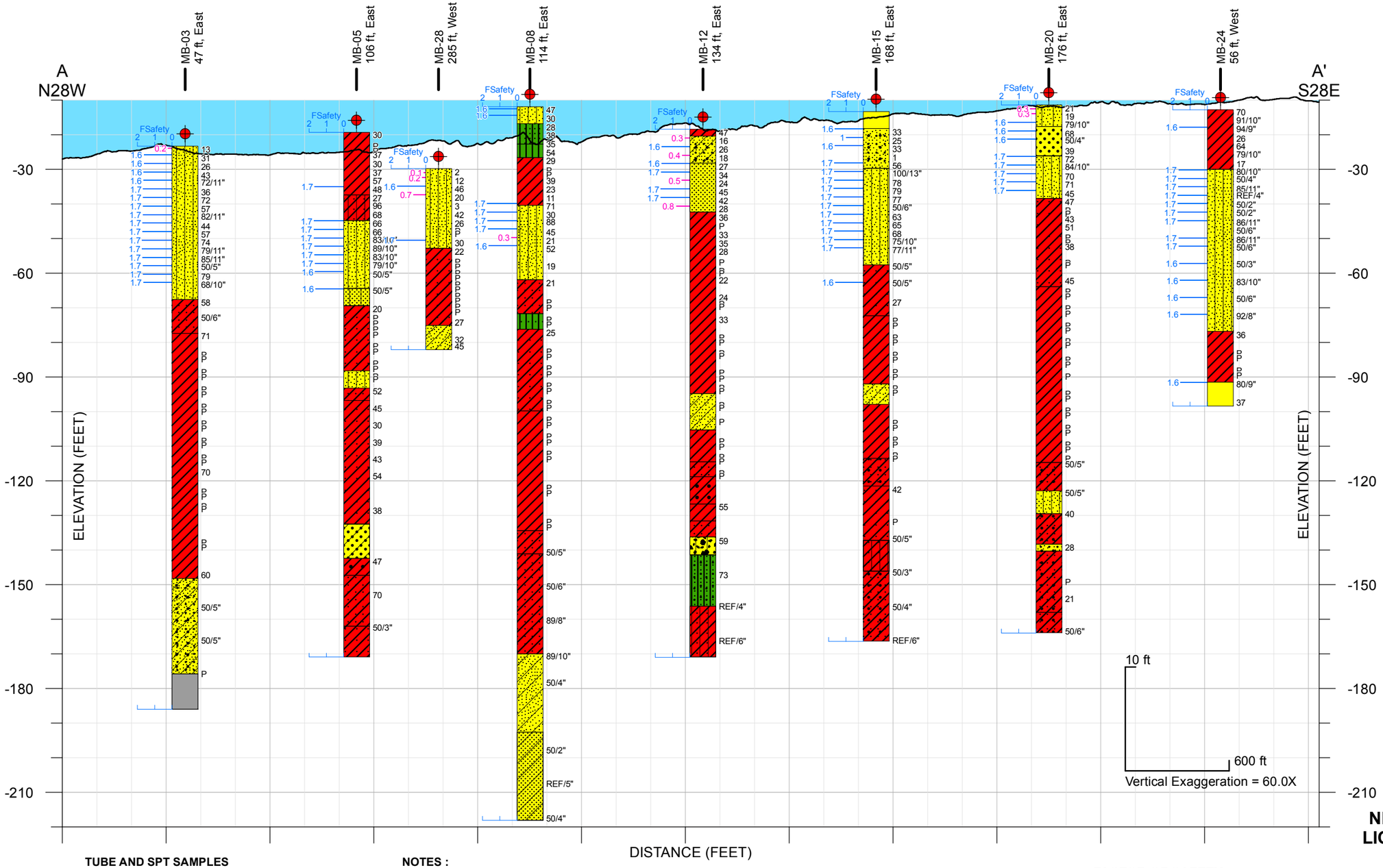
FACTOR OF SAFETY

- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE A-A'
MCEG LEVEL
(NCEER, 2001)

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate51_ProfA_MCEG_NCEER.mxd, 6/15/2016, ticci



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- SILT with Sand (ML)
- Sandy, Gravelly SILT (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Well-Graded SAND with Clay (SW-SC)
- Well-Graded SAND with Silt (SW-SM)
- Gravelly Well-Graded SAND (SW)
- Clayey SAND (SC)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Poorly-Graded GRAVEL (GP)
- Poorly-Graded GRAVEL with Clay (GP-GC)
- Well-Graded GRAVEL (GW)
- Well-Graded GRAVEL with Silt (GW-GM)
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 2 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

FACTOR OF SAFETY

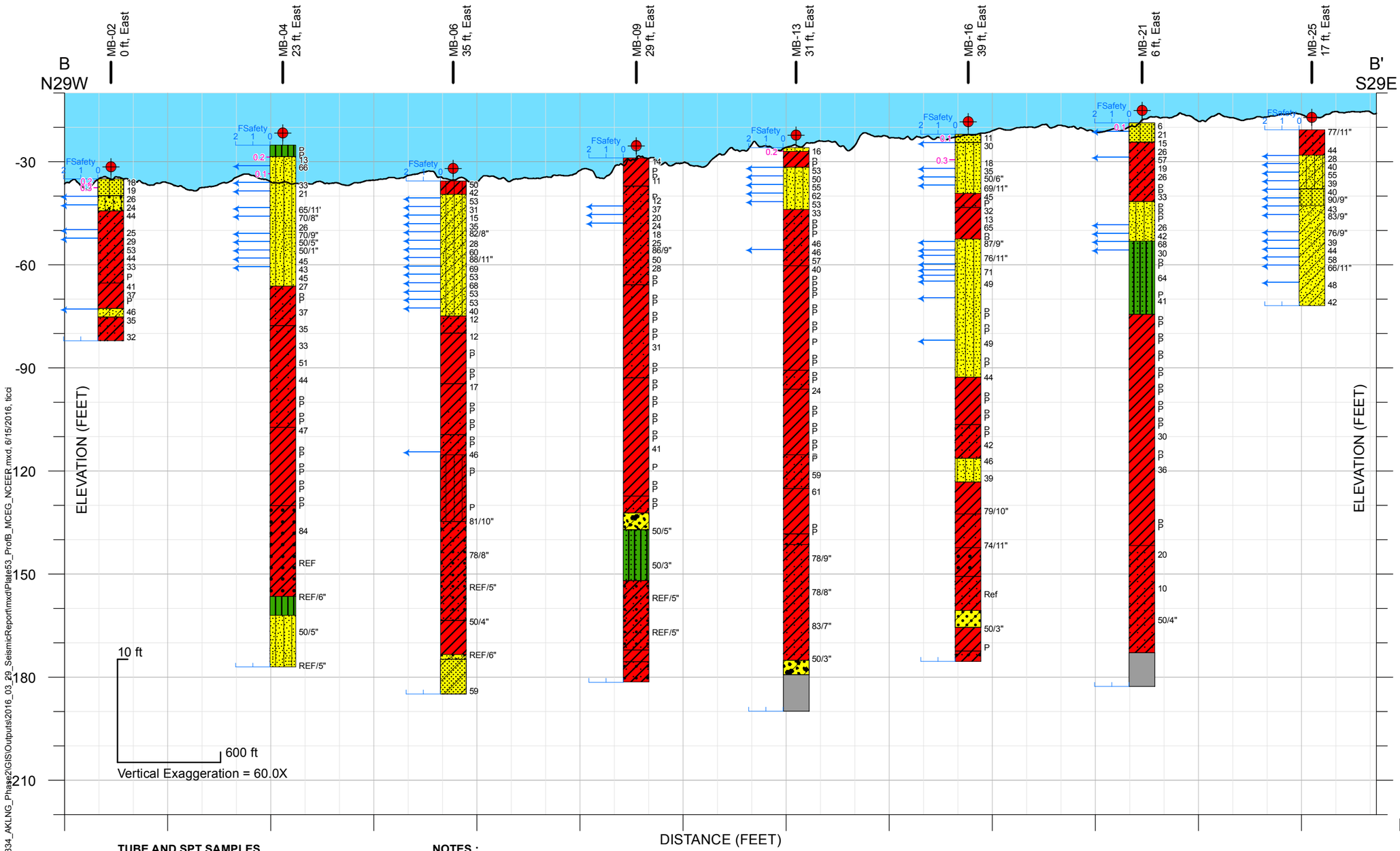
- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE A-A' MCEG LEVEL (BOULANGER AND IDRISS, 2014)

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE F.52

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate52_ProfA_MCEG_BI2014.mxd, 6/15/2016, ticci



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY (CL-ML)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Clayey SAND (SC)
- Clayey to Silty SAND (SC-SM)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Gravelly Silty SAND (SM)
- Poorly-Graded GRAVEL with Clay (GP-GC)
- Well-Graded GRAVEL with Clay (GW-GC)
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 2 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

FACTOR OF SAFETY

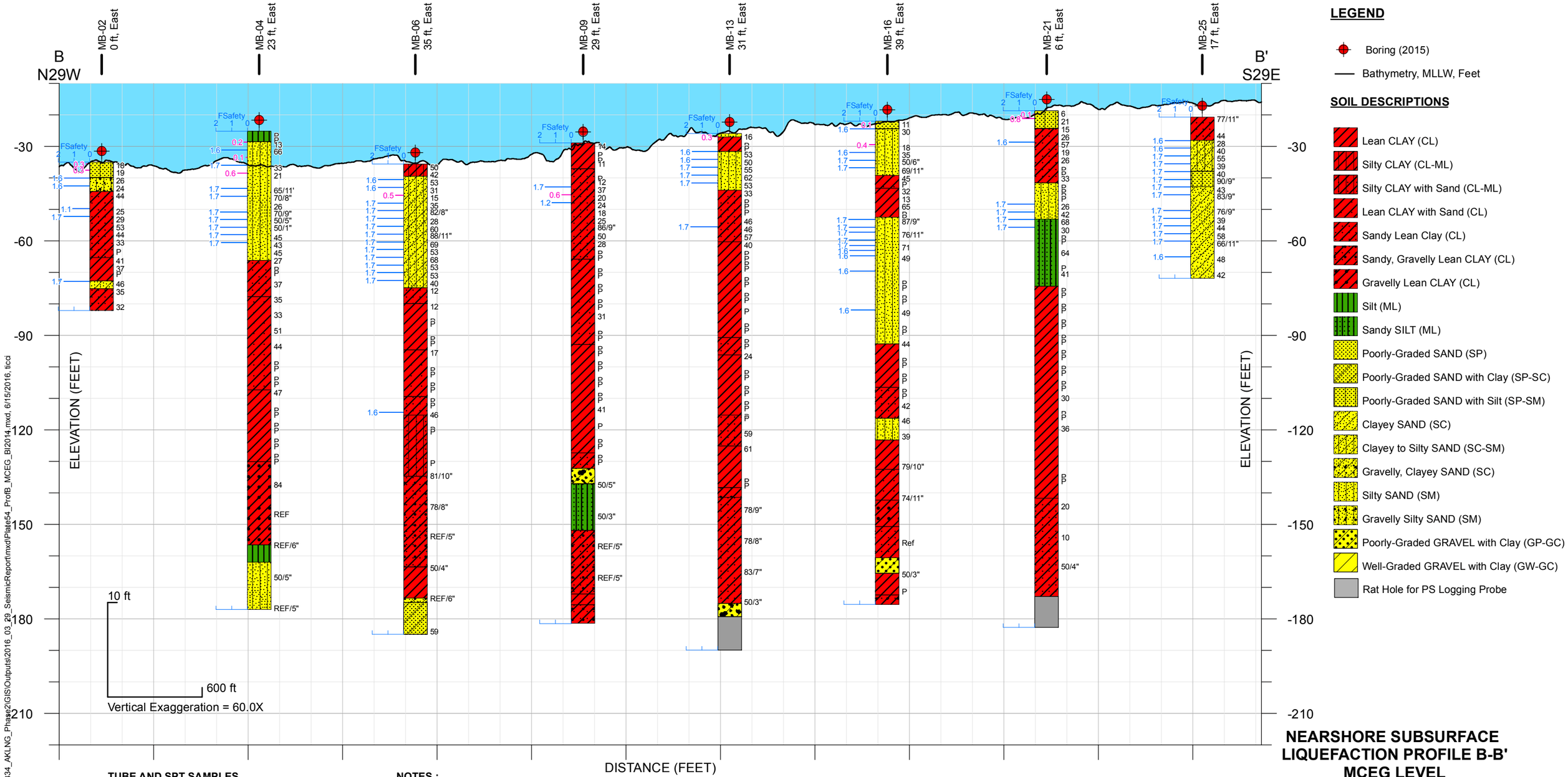
- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE B-B'
MCEG LEVEL
(NCEER, 2001)

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE F.53

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate53_ProfB_MCEG_NCEER.mxd, 6/15/2016, ticci



TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 2 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

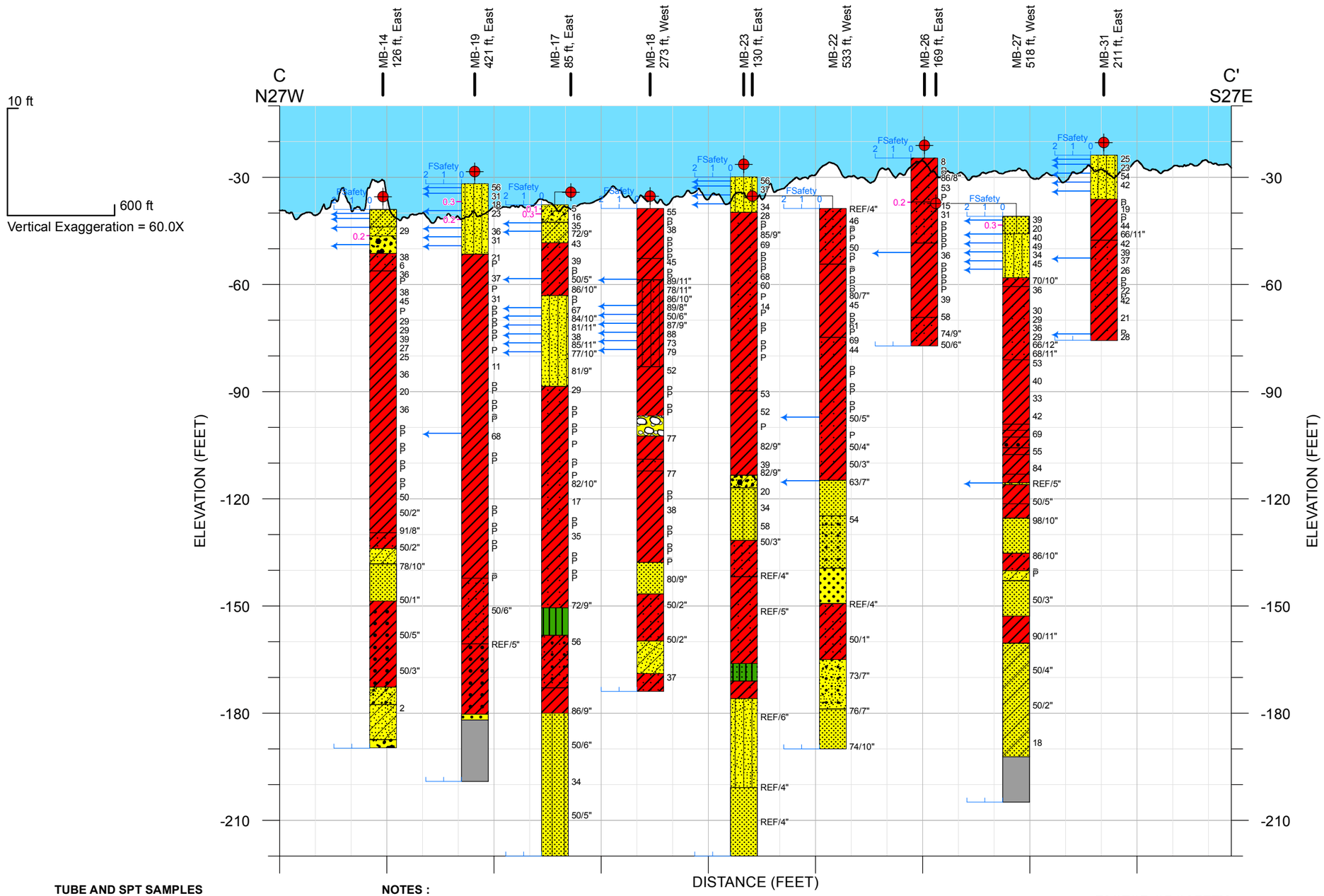
FACTOR OF SAFETY

0.2 — Factor of Safety < 1
1.4 — Factor of Safety > 2 and <= 1
← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE B-B'
MCEG LEVEL
(BOULANGER AND IDRISS, 2014)
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE F.54

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate54_ProfB_MCEG_Bl2014.mxd, 6/15/2016, ticci



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Gravelly Poorly-Graded SAND (SP)
- Gravelly Well-Graded SAND (SW)
- Clayey SAND (SC)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Poorly-Graded GRAVEL (GP)
- Well-Graded GRAVEL (GW)
- Sandy, Clayey GRAVEL (GC)
- Cobble
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

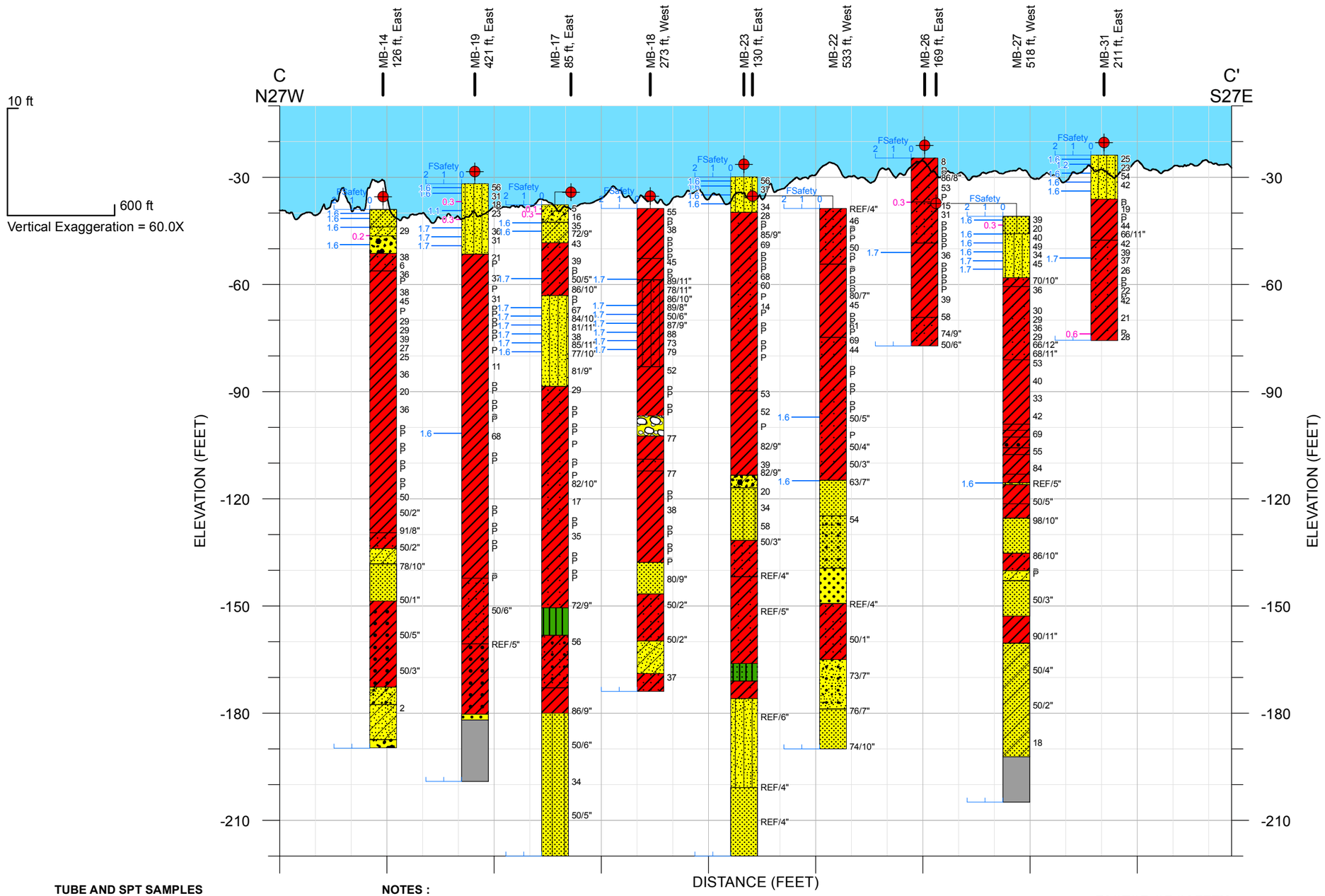
1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 2 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

FACTOR OF SAFETY

- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE C-C'
MCEG LEVEL
(NCEER, 2001)
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate55_ProfC_MCEG_NCEER.mxd, 6/15/2016, ticci



LEGEND

- Boring (2015)
- Bathymetry, MLLW, Feet

SOIL DESCRIPTIONS

- Lean CLAY (CL)
- Silty CLAY with Sand (CL-ML)
- Lean CLAY with Sand (CL)
- Sandy Lean Clay (CL)
- Sandy, Gravelly Lean CLAY (CL)
- Gravelly Lean CLAY (CL)
- Silt (ML)
- Sandy SILT (ML)
- Poorly-Graded SAND (SP)
- Poorly-Graded SAND with Clay (SP-SC)
- Poorly-Graded SAND with Silt (SP-SM)
- Gravelly Poorly-Graded SAND (SP)
- Gravelly Well-Graded SAND (SW)
- Clayey SAND (SC)
- Gravelly, Clayey SAND (SC)
- Silty SAND (SM)
- Poorly-Graded GRAVEL (GP)
- Well-Graded GRAVEL (GW)
- Sandy, Clayey GRAVEL (GC)
- Cobble
- Rat Hole for PS Logging Probe

TUBE AND SPT SAMPLES

P	Push thin-walled 3" tube.
20	Number of blows to produce 12" of penetration after the initial 6" of seating.
86/11"	Number of blows required to produce the indicated penetration after an initial 6" seating.
Ref/3"	50 blows produced the indicated penetration during the initial 6" interval.

NOTES :

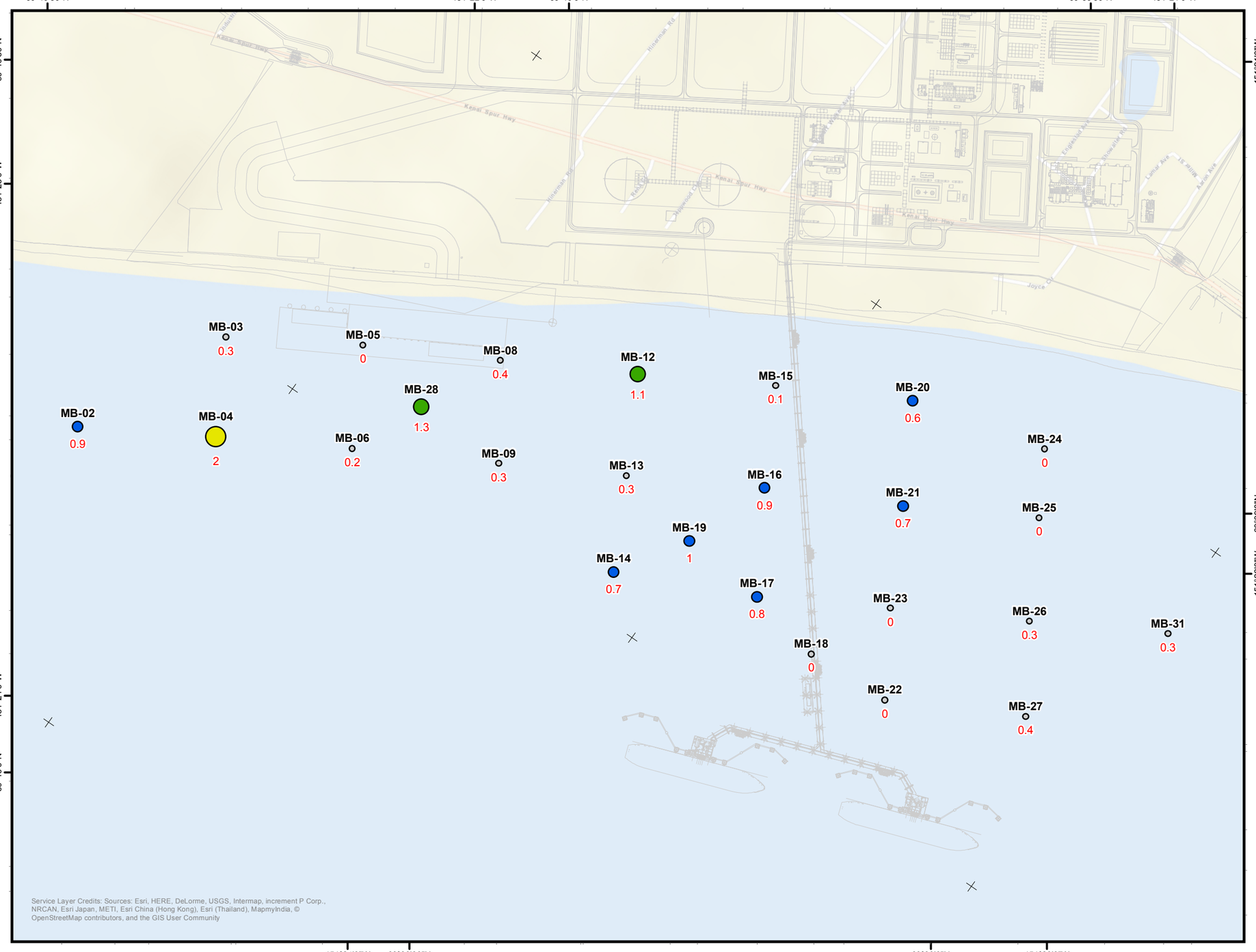
1) Bathymetry data was collected by Fugro in 2014 and 2015. Elevation is referenced to MLLW.
2) As-Built coordinates of the exploration locations were recorded by the Fugro Starfix Positioning System.
3) Existing elevations of the exploration locations are referenced to MLLW and calculated using bathymetry data (Fugro 2014 & 2015).
4) See Plate 2 for locations of explorations and cross section lines.
5) The following formula is used to convert the elevations from MLLW to NAVD88 for marine LNG Facilities area : EL in feet (NAVD88) = EL in feet (MLLW) - 7.32ft
6) Liquefaction assessment was also performed for sublayers of sandy materials encountered within the primary fine-grained strata.

FACTOR OF SAFETY

- 0.2 — Factor of Safety < 1
- 1.4 — Factor of Safety > 2 and <= 1
- ← Factor of Safety >= 2

NEARSHORE SUBSURFACE LIQUEFACTION PROFILE C-C'
MCEG LEVEL
(BOULANGER AND IDRISS, 2014)
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate56_ProfC_MCEG_BI2014.mxd, 6/15/2016, ticci



Legend

Estimated Cumulative Settlement (in)

- 0 - 0.5
- 0.5 - 1
- 1 - 1.5
- 1.5 - 3
- > 3

Site Layout

MB-02 / 0.9 — Boring location with boring name and settlement in Inches

Note: SSE Level per NFPA 59A 2013 / MCEG level per ASCE 7-10 (M=8.0, PGA=0.75g), Boulanger and Idriss (2014), existing elevation

Coordinate System: Alaska State Plane, Zone 4, NAD83, NSRS 2007, Feet

N

1:9,000

0 375 750 1,500 Feet

ESTIMATED CUMULATIVE SETTLEMENT
NEARSHORE LOCATIONS - SSE/MCEG LEVEL
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE F.57

Y:\Jobdocs\04_2015\04.10140334_AKLNG_Phase2\GIS\Outputs\2016_03_29_SeismicReport\mxd\Plate57_Settlement_Nearshore_MCEG.mxd, 6/15/2016, ticci

APPENDIX G

COOK INLET TSUNAMI HAZARD ASSESSMENT ADDENDUM: TSUNAMI-TIDAL CURRENT INTERACTIONS, OCTOBER 27, 2016, BY CLAYTON HILES AND ROY WALTERS

&

COOK INLET TSUNAMI HAZARD ASSESSMENT, APRIL 23, 2015, BY CLAYTON HILES AND ROY WALTERS

APPENDIX G

Cook Inlet, Alaska, Tsunami Hazard Assessment
Addendum: Tsunami - Tidal Current Interactions

Prepared by:
Clayton Hiles
Cascadia Coast Research, Ltd.

Roy Walters
Ocean-River Hydrodynamics

October 27, 2016

&

Cook Inlet, Alaska, Tsunami Hazard Assessment

Prepared by:
Clayton Hiles
Cascadia Coast Research, Ltd.

Roy Walters
Ocean-River Hydrodynamics

April 23, 2015

Cook Inlet, Alaska, Tsunami Hazard Assessment Addendum: Tsunami - tidal current interactions

Clayton Hiles
Cascadia Coast Research, Ltd.

Roy Walters
Ocean-River Hydrodynamics

October 26, 2016

Contents

1 Summary **3**

2 Introduction **4**

3 Methods **5**

3.1 Landslide Geometry 5

3.2 Landslide Density 5

3.3 Landslide Rheology 6

3.4 Tidal Heights 7

3.5 Tidal Currents 7

4 Results **8**

4.1 Landslide Density 8

4.2 Landslide Rheology 12

4.3 Tidal Currents 14

4.4 Combinations 16

5 Discussion **19**

A APPENDIX **21**

A.1 Tables Converted to Feet 21

A.2 Results at MSL 23

1 Summary

In 2014 Cascadia Coast Research provided a tsunami hazard assessment for a site near West Foreland in Cook Inlet, Alaska. Deterministic tsunami simulations were conducted, including the 1964 megathrust event and several hypothetical submarine landslide events. Of the scenarios investigated it was determined that the near-field submarine landslide generated tsunami present the greatest hazard to the study site.

The previous simulations of submarine landslides were based on conservative worst case scenarios and did not account for tidal currents. With this approach further work is not required if the maximum tsunami elevations are acceptable. Since the previous results were marginal in that respect, the current work seeks to access more detailed information and make better estimates of the important variables.

Submarine landslide variables which are important to tsunami generation include landslide volume, density, and rheology. Hence, we have conducted a series of sensitivity tests on the value and nature of the sensitive variables. In addition, the submarine landslide scenarios include realistic tidal currents at high and low tides.

The landslide volume used in this study is the same as used in the 2014 work. It was developed as a design case representing the largest credible event, directly across from the study site. Although this volume is much larger than apparent slumps detectable in the bathymetry, we can find no credible reason to reduce this volume. Hence the geometry of the landslide is the same as used in the earlier study.

At the time of the 2014 work, little was known about the sediment properties in the region of the design event so landslide density representing a worst case was used (1800 kg/m^3, including fluid and solid fraction). Laboratory data for pleistocene deposits sampled from 2015 borings indicate a sediment density in the range of 1954 to 2275 kg/m^3. After the sediment fractures and mixes with the ambient water to form a landslide, the solid fraction is in a range about 0.5 to 0.6. For the sediment density measured in the cores and a solid fraction of 0.6, the landslide density is then in the range of 1600 to 1800 kg/m^3. The sensitivity of tsunami crest elevation to the density of the landslide sediment is investigated for these two plausible cases.

In the 2014 study, the submarine landslide rheology was modeled as a fluid; that is, inter-grain forces were neglected. This behaviour is appropriate for a sediment mass that disassociates into small size fractions. However, if a sediment deposit disassociates into large fractions, then grain to grain interactions can become important. For this work, these interactions are modeled as a linear viscous term with a moderate viscosity coefficient. The sensitivity of tsunami crest elevation to landslide rheology is investigated for the case of a fluidized landslide and for a fluid-sediment mixture.

Results are presented for each landslide scenario at 7 sites in the study area: the 3 original sites (1, 2, and 3) and 4 additional sites (A, B, C, and D). Each new scenario is compared with the 2014 simulation results which are used as a baseline. In each of the sensitivities tested, modification of the sensitive parameter towards a more realistic value tends to reduce the tsunami crest elevation compared to the baseline. Tidal currents were found to have only a small influence on tsunami crest elevation at the study sites for both HAT and LAT; the main effect is to delay the arrival at HAT and modify the secondary trailing waves.

Based on the data available at this time, our best estimate of the largest credible landslide scenario uses a density of 1600 kg/m^3, a mixture rheology and tidal currents. With the configuration the maximum tsunami crest elevation is reduced 1 to 2 m (depending on location) compared to the baseline case.

This report is intended to accompany the 2014 report as an addendum and the two reports should be interpreted together.

2 Introduction

In 2014 Cascadia Coast Research (CCR) was contracted by Fugro Consultants Inc.(FCI) to provide a tsunami hazard assessment for a site near West Foreland in Cook Inlet, Alaska. Deterministic tsunami simulations were conducted as part of that work including the 1964 megathrust event and several hypothetical submarine landslide (SLS) events within Cook Inlet. Of the scenarios investigated it was determined that the submarine landslide generated tsunami present the greatest hazard to the study site.

The previous simulations for submarine landslides were based on conservative worst case scenarios that included large landslide volume, high landslide density, and a fluid rheology. All simulations conducted at that time did not account for tidal currents. With this approach further work is not required if the maximum tsunami elevations are acceptable. Since the previous results were marginal in that respect, the current work seeks to access more detailed information and make better estimates of the important variables.

Submarine landslide variables which are important to tsunami generation include landslide volume, density, and rheology (landslide material flow characteristics). In addition, the client is now interested in investigating the effects of tidal currents on the tsunami elevations. Hence, we have conducted a series of sensitivity tests on the value and nature of the sensitive variables. In addition, the SLS scenarios include realistic tidal currents at high and low tides. The resulting differences in the tsunami impact on the study sites are noted and discussed.

This report is intended to accompany the 2014 report as an addendum and the two reports should be interpreted together.

3 Methods

A submarine landslide characteristically has an initial rapid collapse that generates the leading freely-propagating large amplitude tsunami, and a slower downslope translation of the landslide mass that generates a smaller forced surface wave. The initial collapse is dependent on a number of parameters including, but not limited to, landslide geometry, density, and rheological behavior. The tsunami inundation at a given location is dependent on the landslide location and properties, the bathymetry, and any ambient water levels and currents.

Using the previous work as baseline, we examine the variation in tsunami crest elevation at selected sites in relation to the variables that are not fixed which includes density, rheological behavior, and tidal currents. We have used additional data and information to make a more precise estimate of these variables.

Finally, we have chosen values for the variables which produce a preferred scenario that gives rise to the maximum credible inundation at the sites.

3.1 Landslide Geometry

The landslide scenario used in this study is the same as used in the 2014 work (Figures 1 and 2). It was developed as a design case representing the largest credible event. Hence a location was chosen directly across the inlet from the study site to maximize the effects of the generated wave. The areal extent of the landslide was chosen to include a large part of the channel wall that directs a wave into the study site. The volume was derived by creating a parabolic failure surface typical of slumps. Although this volume is much larger than apparent slumps detectable in the bathymetry, we can find no credible reason to reduce this volume. Hence the geometry of the landslide is the same as used in the earlier study.

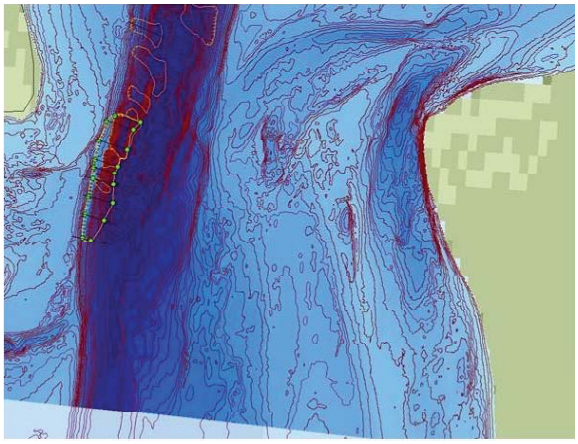


Figure 1: Probable sites of landslide deposits.

3.2 Landslide Density

Submarine landslide generated tsunami are sensitive to the properties of the landslide sediment, particularly density. At the time of the previous work, little was known about the sediment properties in the region of the design event

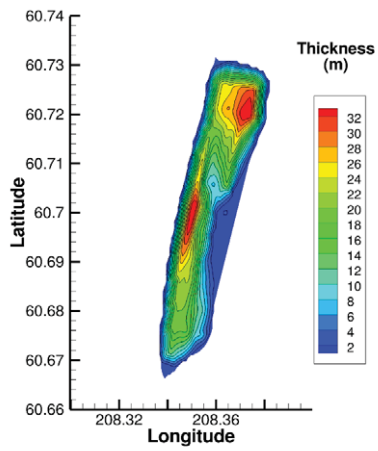


Figure 2: Details of landslide thickness (m).

so landslide density representing a worst case was used (1800 kg/m^3 or 112 pcf, including fluid and solid fraction). Laboratory data for pleistocene deposits sampled from the 2015 marine LNG terminal borings give a rough indication of the sediment density which is in the range of to 122 to 142 pcf (1954 to 2275 kg/m^3). After the sediment fractures and mixes with the ambient water to form a landslide, the solid fraction cannot be specified precisely but is in a range about 0.5. Close-packed spheres have a solid fraction of 0.74 whereas random-packed spheres have a solid fraction of about 0.6. Allowing for a larger inter-grain distance while moving results in a solid fraction of about 0.5 or less. For the sediment density measured in the cores, the landslide density is then in the range of 1600 to 1800 kg/m^3 (100 to 112 pcf) for a solid fraction of 0.6, and in the range of 1400 to 1600 kg/m^3 (87 to 100 pcf) for a solid fraction of 0.5. In this work we investigate the sensitivity of the tsunami inundation to the density of the landslide sediment for the two plausible cases of 1600 and 1800 kg/m^3 (100 and 112 pcf).

3.3 Landslide Rheology

The other important property of a landslide, a sediment and water mixture, is the rheological behavior. In the broadest sense of the term, rheology deals with the relation between force and deformation in materials. This relation depends on the nature of the material. It is customary to represent the deformation behavior of fluids as a linear-viscous (Newtonian) fluid. In a solid and water mixture, an additional force is present that accounts for the grain to grain interactions. The importance of this force depends on several variables including density, solid fraction, geometry, pressure, and others.

In the original study, the submarine landslide was modeled as a fluid; that is, inter-grain forces were neglected and the SLS behaved as a dense fluid such as a turbidite. For a sediment mass that disassociates into small size fractions like a suspended sediment, this rheological behavior is appropriate. However, if a sediment deposit disassociates into large fractions, then grain to grain interactions can become important. For this work, these interactions are modeled as a linear viscous term with a moderate viscosity coefficient that includes the additional stresses (approximately 100 m^2/s). For presentation purposes, the landslide rheology (R_{sls}) is indicated as either *fluid* (as is the original study) or a *mix* of fluid and solid particles (new simulations).

3.4 Tidal Heights

Maximum tsunami inundation (η_{max}) results from the combination of the tsunami wave crest and the ambient water level (η_{tide}). In this case the most significant driver of the ambient water level is the tides. Three different tidal scenarios were selected for tsunami simulation: high water approximating highest astronomical tide (4.23m, 13.88ft), low water approximating lowest astronomical tide (-5.20m, -17.07ft) and the flood and ebb tides near mean sea level (0m, 0ft). The high water scenario is selected because combination of high water and the tsunami wave crest likely present the greatest flooding hazard to the study site. The low water scenario is selected because the combination of the low water and the tsunami wave trough likely present the greatest grounding hazard to ships docked at the study site. The mean sea level cases are chosen for comparative purposes.

3.5 Tidal Currents

At first inspection, tidal currents would not appear to be significant factors in the propagation and runup from the submarine landslide modeled here. The phase speed of the wave in the channel is about 30 m/s (98 ft/s) whereas the maximum tidal currents are approximately 3 m/s (9.8 ft/s). In addition, the tsunami propagates across the channel at a right angle to the tidal velocity so wave steepening or flattening would not be expected. However, the effects of complex geometry are hard to predict so it is prudent to examine the effects of tidal currents.

The tides near the study site are an equal mixture of progressive and standing waves with a maximum flood approximately 45 degrees (1.5 hrs) before high water. Hence the flood current magnitude at MSL and HAT are comparable. The spatial distribution of the currents at HAT are similar to a stationary distribution with larger velocity in the channel, whereas the currents at MSL on flood are more uniform because of the rapidly varying tide. The characteristics are similar at LAT and MSL on the ebb.

The time for propagation of the submarine landslide generated tsunami wave to the study site is only approximately 10 minutes, a very short time compared to the characteristic period of the tide (12 hrs). Therefore, the tide over the period of tsunami propagation can reasonably be approximated as stationary.

The stationary approach was used to simulate tidal currents at HAT and LAT within the submarine landslide tsunami model. The grid used in the previous work was extended to the north and the south. A discharge boundary condition was placed on the north boundary and a water level boundary condition was placed on the south boundary. For each tidal scenario, discharge past the study site was calculated using depth-velocity transects provided by project contractor CH2M Hill based on a depth-averaged tidal model. Each simulation was run for a time to allow flow to reach steady state conditions; the steady state current field was then saved. For each tsunami scenario, the simulation was initialized with the appropriate current fields and boundary conditions before running the landslide event.

Because of the rapidly varying tide near MSL, the velocity field cannot be approximated as stationary. The spatial distribution of velocity is more uniform than a stationary case which has higher currents in the deep channels. The correct velocities could be simulated by running our model with tides, but that requires considerable additional work and is beyond the present scope. Since the currents at MSL were not sufficiently accurate, they were not included in the set of tsunami scenarios. However, the general magnitude of the flood current at MSL is similar to the current at HAT, therefore a similar sensitivity is expected. The same is true for the ebb current at MSL and the currents at LAT.

4 Results

In this section, we present results for the different scenarios at 7 sites in the study area (Figure 3, Table 1): the 3 original sites (1, 2, and 3) and 4 additional sites (A, B, C, and D). Each new scenario is compared with the original (2014) simulation configuration which are used here as the **baseline**. The 2014 simulations used the same landslide geometry (Figure 1), a landslide density of 1800 kg/m^3 (112 pcf) , rheological behavior of a fluid, and no tidal currents.

All elevations are relative to mean sea level (AMSL). When a site is dry the site land elevation is reported, hence the straight line at site D in many of the figures.

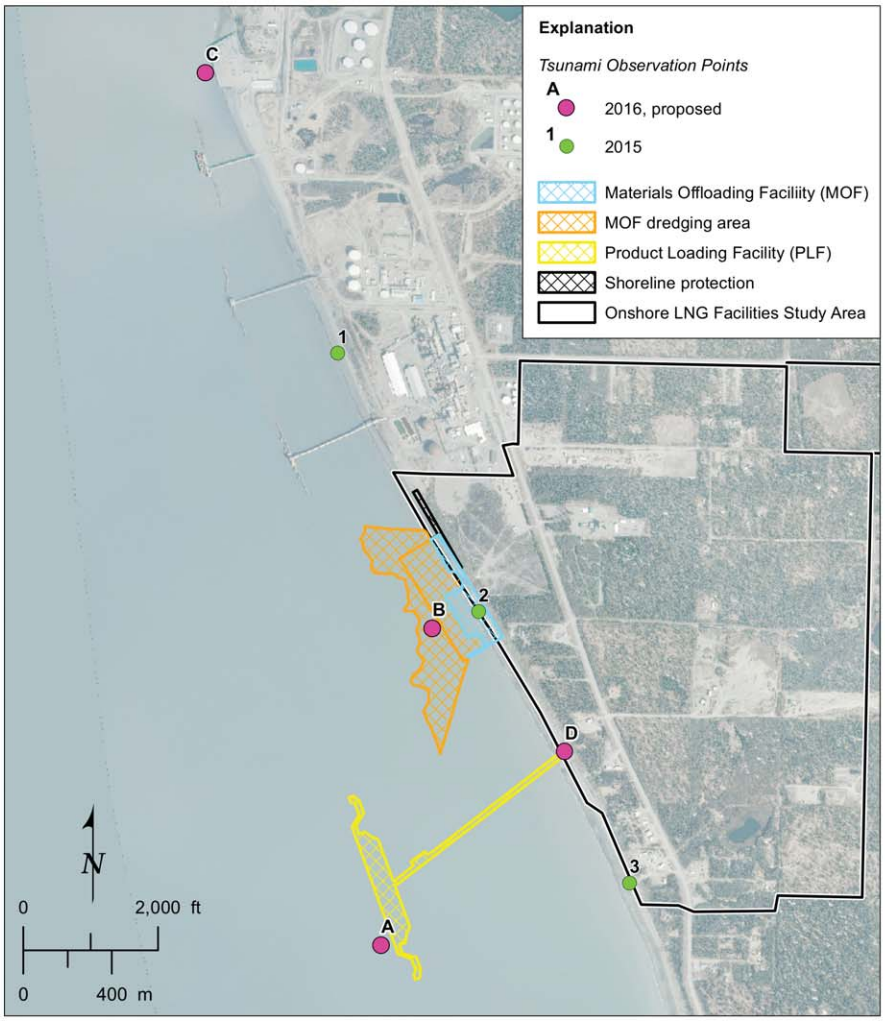
Table 1: Location of simulation output points (WGS84).

ID	Lat (°)	Long (°)
1	60.67561532	-151.3880428
2	60.66522763	-151.3759392
3	60.65434973	-151.3629709
A	60.65160571	-151.3834203
B	60.66449418	-151.3797286
C	60.68687975	-151.3995050
D	60.65962489	-151.3685743

4.1 Landslide Density

A reduction in landslide density results in a reduction in the gravitational driving force which is proportional to the density differential $(\rho_{sls} - \rho_{water})$. As a consequence, the submarine landslide will accelerate more slowly and hence create a smaller tsunami than the original simulation. By changing the landslide density from $1800kg/m^3$ to $1600kg/m^3$, the maximum water elevation is reduced by approximately 0.5 m (1.6 ft) compared to the baseline as is shown in Figures 4 to 6. Appendix A.2 contains the same figures at MSL.

Cascadia Coast Research Ltd. October 26, 2016



TSUNAMI OBSERVATION POINTS, 2015 AND 2016
ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE D-399

Figure 3: Study site with data output locations.

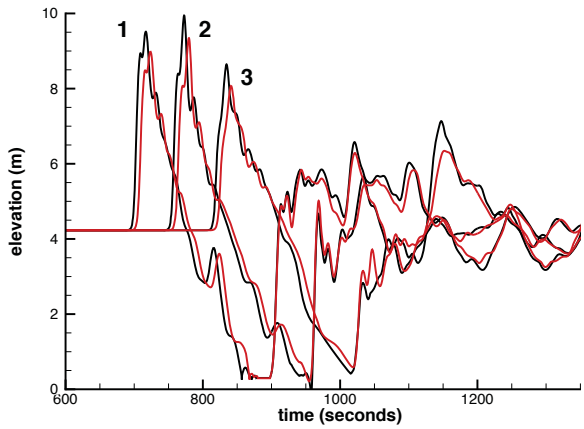


Figure 4: Water elevation (relative to AMSL) during tsunami event. Effects of changing density at $\eta_{tide} = HAT$ for sites 1 to 3. $\rho_{sls} = 1800kg/m^3$ (black), $\rho_{sls} = 1600kg/m^3$ (red)

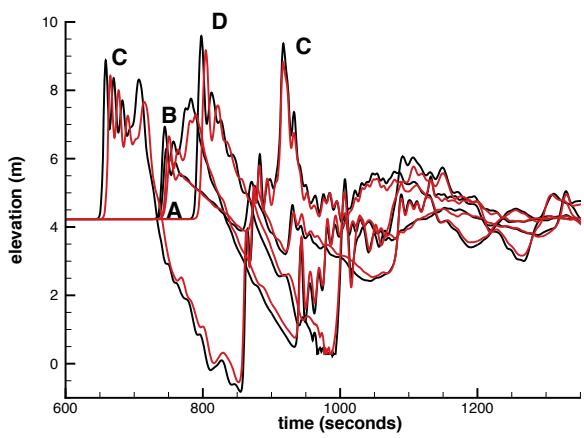


Figure 5: Water elevation (relative to AMSL) during tsunami event. Effects of changing density at $\eta_{tide} = HAT$ for sites A to D. $\rho_{sls} = 1800kg/m^3$ (black), $\rho_{sls} = 1600kg/m^3$ (red)

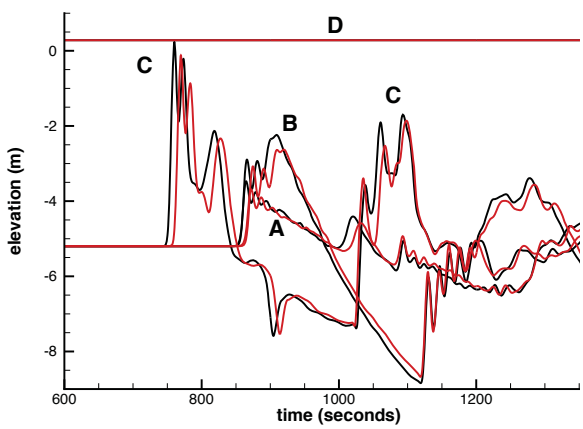


Figure 6: Water elevation (relative to AMSL) during tsunami event. Effects of changing density at $\eta_{tide} = LAT$ for sites A to D. $\rho_{sls} = 1800kg/m^3$ (black), $\rho_{sls} = 1600kg/m^3$ (red)

4.2 Landslide Rheology

The results when using a fluid model and a mixture model for the landslide dynamics are shown in Figures 7 to 9 for HAT and LAT. Appendix contains the same results at MSL. In general, the inclusion of additional stress in the mixture model slows the initial collapse of the landslide and results in smaller wave crest elevations. Using the mixture rheology at HAT, the elevations are approximately 1 m (3.3 ft) lower and at LAT are 0.4 m (1.3 ft) lower compared to the baseline. The wave trough is also not as deep.

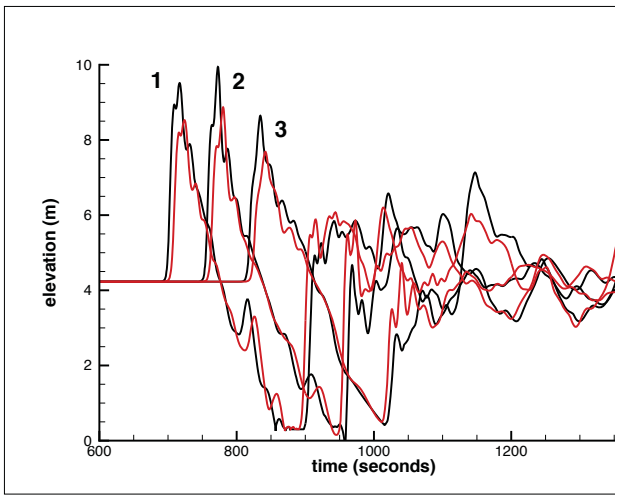


Figure 7: Water elevation (relative to AMSL) during tsunami event. Effects of adding internal stresses at $\eta_{tide} = HAT$ for sites 1 to 3. $R_{sls} = fluid$ (black), $R_{sls} = mix$ (red)

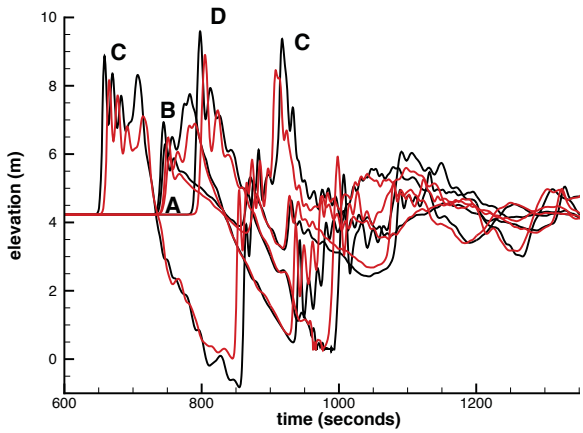


Figure 8: Water elevation (relative to AMSL) during tsunami event. Effects of adding internal stresses at $\eta_{tide} = HAT$ for sites A to D. $R_{sls} = fluid$ (black), $R_{sls} = mix$ (red)

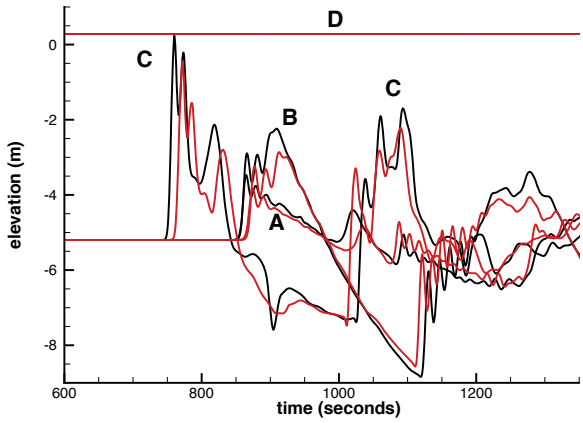


Figure 9: Water elevation (relative to AMSL) during tsunami event. Effects of adding internal stresses at $\eta_{tide} = LAT$ for sites A to D. $R_{sls} = fluid$ (black), $R_{sls} = mix$ (red)

4.3 Tidal Currents

Tidal currents have only a small influence on tsunami crest elevation at the study sites for both HAT and LAT (Figures 10 to 12). The main effect is to delay the arrival at HAT and modify the secondary trailing waves compared to the baseline case. From this we can infer that the influence of tidal currents at MSL is also small because the flood currents at HAT and MSL are of similar magnitude. The same inference applies to the ebb currents at LAT and MSL.

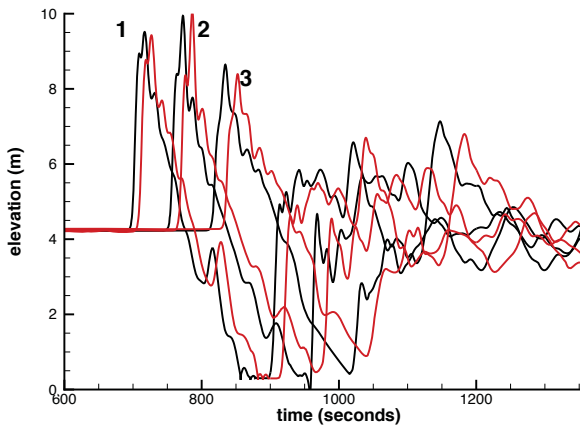


Figure 10: Water elevation (relative to AMSL) during tsunami event. Effects of adding tidal currents at $\eta_{tide} = HAT$ for sites 1 to 3. No currents (black line), tidal currents (red line)

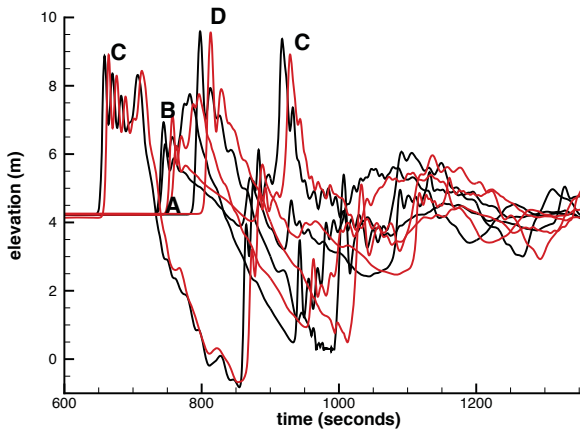


Figure 11: Water elevation (relative to AMSL) during tsunami event. Effects of adding tidal currents at $\eta_{tide} = HAT$ for sites A to D. No currents (black line), tidal currents (red line)

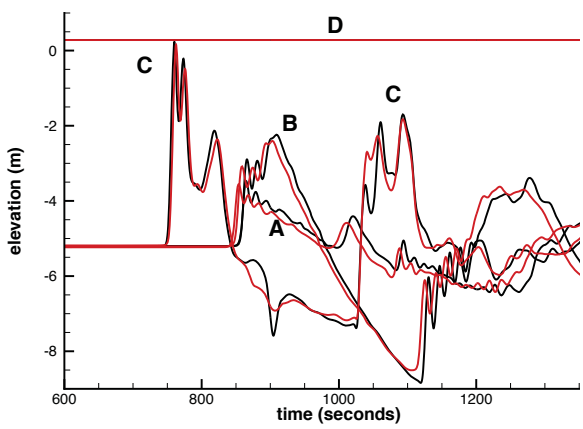


Figure 12: Water elevation (relative to AMSL) during tsunami event. Effects of adding tidal currents at $\eta_{tide} = LAT$ for sites A to D. No currents (black line), tidal currents (red line)

4.4 Combinations

Since tsunami generation, propagation, and runup is a nonlinear problem, several combinations of density, rheology, and currents also warrant examination. One of these is a combination of reducing density to 1600 kg/m^3 (100 pcf), using mixture rheology with internal stresses, and including tidal currents. Using this combination at HAT, the elevations are approximately 1 to 2 m (3.3 to 6.6 ft) lower and at LAT are 0.5 to 1 m (1.7 to 3.3 ft) lower compared to the baseline case. The wave trough is also not as deep.

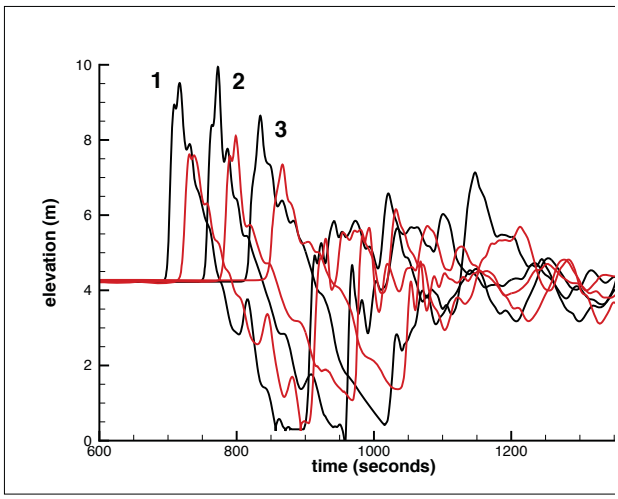


Figure 13: Water elevation (relative to AMSL) during tsunami event. Effects of combining $\rho_{sls} = 1600kg/m^3$ and $R_{sls} = mix$ with tidal currents at $\eta_{tide} = HAT$ for sites 1 to 3. Baseline (black line), combination (red line)

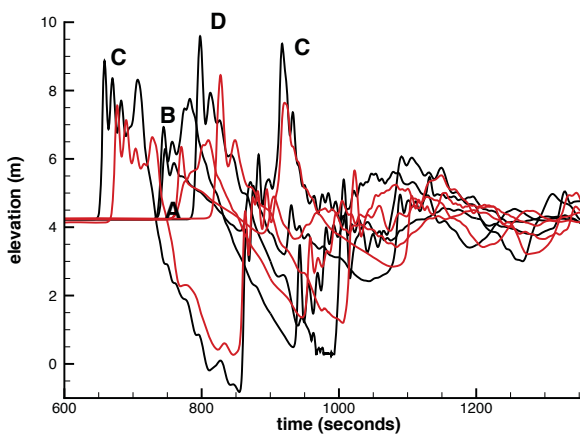


Figure 14: Water elevation (relative to AMSL) during tsunami event. Effects of combining $\rho_{sls} = 1600kg/m^3$ and $R_{sls} = mix$ with tidal currents at $\eta_{tide} = HAT$ for sites A to D. Baseline (black line), combination (red line)

In another combination, density has the baseline value of 1800 kg/m^3 (112 pcf), mixture rheology is used, and tidal currents are included. Using this combination at HAT, the elevations are approximately 1 m (3.3 ft) lower and at LAT are 0.5 m (1.7 ft) lower compared to the baseline case. The wave trough is also not as deep.

These are the two combinations of most interest. Other combinations are listed in the tables in the Discussion.

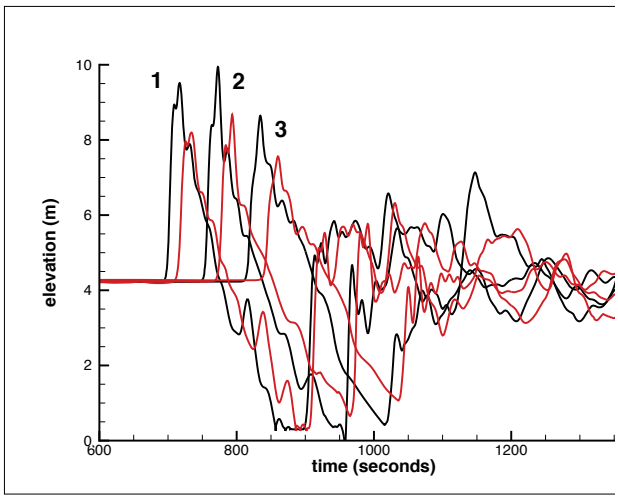


Figure 15: Water elevation (relative to AMSL) during tsunami event. Effects of combining $\rho_{sls} = 1800 kg/m^3$ and $R_{sls} = mix$ with tidal currents at $\eta_{tide} = HAT$ for sites 1 to 3. Baseline (black line), combination (red line)

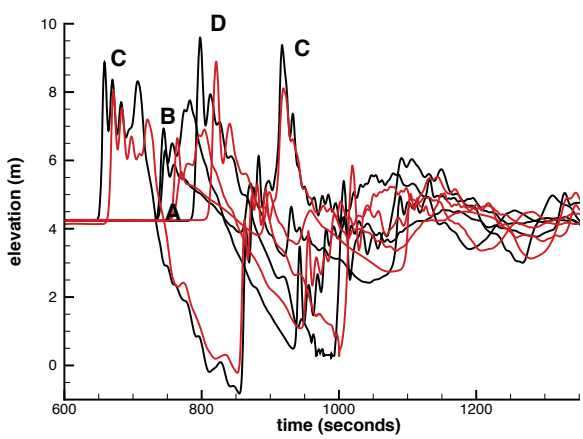


Figure 16: Water elevation (relative to AMSL) during tsunami event. Effects of combining $\rho_{sls} = 1800 kg/m^3$ and $R_{sls} = mix$ with tidal currents at $\eta_{tide} = HAT$ for sites A to D. Baseline (black line), combination (red line)

5 Discussion

The baseline simulations are very conservative and were intended to put an upper bound on wave crest elevation. The additional results in this report reflect an attempt to derive a better estimate of the important factors controlling the submarine landslide and the tsunami that is generated. A summary of extremal tsunami crest elevations (η_{max}) and trough elevations (η_{min}) for a variation in these factors are listed in Tables 2 and 3. The four factors that were considered here include submarine landslide density (ρ_{sls}), and rheology (R_{sls}) as well as the influence of tidal elevation (η_{tide}) and currents (U_{tide}).

Table 2: Maximum tsunami crest elevation (η_{max}) relative to MSL for each tsunami scenario.

Tide		Land Slide		η_{max} (m) at Site:						
η_{tide}	U_{tide}	ρ_{sls}	R_{sls}	1	2	3	A	B	C	D
LAT	no	1800	fluid	dry	dry	dry	-3.47	-2.24	0.23	dry
LAT	no	1800	mix	dry	dry	dry	-3.83	-2.86	-0.44	dry
LAT	no	1600	fluid	dry	dry	dry	-3.69	-2.63	-0.12	dry
LAT	no	1600	mix	dry	dry	dry	-3.96	-3.08	-0.75	dry
LAT	yes	1800	fluid	dry	dry	dry	-3.56	-2.41	0.16	dry
LAT	yes	1800	mix	dry	dry	dry	-3.88	-2.97	-0.56	dry
LAT	yes	1600	fluid	dry	dry	dry	-3.76	-2.75	-0.22	dry
LAT	**yes**	**1600**	**mix**	**dry**	**dry**	**dry**	**-4.02**	**-3.18**	**-0.86**	**dry**
HAT	no	1800	fluid	9.51	9.95	8.65	6.29	7.76	9.37	9.59
HAT	no	1800	mix	8.53	8.87	7.69	5.91	6.89	8.46	8.90
HAT	no	1600	fluid	8.98	9.34	8.07	6.05	7.29	8.82	9.17
HAT	no	1600	mix	7.90	8.25	7.37	5.66	6.54	8.07	8.57
HAT	yes	1800	fluid	9.43	10.06	8.39	6.24	7.75	8.91	9.56
HAT	yes	1800	mix	8.20	8.68	7.56	5.66	6.90	8.11	8.89
HAT	yes	1600	fluid	8.77	9.25	7.89	5.85	7.28	8.43	9.18
HAT	**yes**	**1600**	**mix**	**7.62**	**8.11**	**7.35**	**5.35**	**6.55**	**7.64**	**8.45**
MSL	no	1800	fluid	5.44	5.19	4.43	1.93	3.37	4.75	5.70
MSL	no	1800	mix	4.67	4.51	3.29	1.58	2.68	4.08	4.92
MSL	no	1600	fluid	5.02	4.82	3.86	1.72	2.97	4.37	5.30
MSL	no	1600	mix	4.24	4.16	2.92	1.41	2.39	3.74	4.60

The landslide geometry which includes areal extent and thickness has a first-order effect on the size of the resultant tsunami. For a similar location, a larger volume will generate a larger tsunami. The landslide geometry used in this analysis is shown in Figure 1 along with a number of probable landslide deposits. The former is denoted with the colored line with markers. Note that the the choice of this particular geometry results in a landslide considerably larger than any of the probable deposits. The location and size were chosen to have a maximal effect at the study site. At present, there is no known data or other information that would suggest that this geometry should be reduced in size. Hence we have used the same geometry in the previous and present analysis so that it does not appear as a variable quantity in the tables.

Landslide density is directly proportional to the gravitational forcing on the landslide. Reduced density results in slower acceleration and hence smaller tsunami crest elevation. Density of a landslide mixture is calculated from the solid fraction of the sediment that has failed and a fluid fraction of the ambient seawater. A typical value for solid fraction is approximately 0.5 which is a value for loose gravel. From the sediment density range reported for core samples from the study site, the landslide density then is in the range of 1400 to 1600 kg/m^3 (87 to 100 pcf). This value is accepted as the most probable density in this analysis. However, in the early stages of landslide failure, the higher value of 1800 kg/m^3 (112 pcf) cannot be ruled out. Hence the latter is the most conservative estimate.

Table 3: Minimum tsunami trough elevation (η_{min}) relative to MSL for each tsunami scenario.

Tide		Land Slide		η_{min} (m) at Site:						
η_{tide}	U_{tide}	ρ_{sls}	R_{sls}	1	2	3	A	B	C	D
LAT	no	1800	fluid	dry	dry	dry	-6.51	-8.84	-7.59	dry
LAT	no	1800	mix	dry	dry	dry	-6.44	-8.57	-7.48	dry
LAT	no	1600	fluid	dry	dry	dry	-6.49	-8.67	-7.53	dry
LAT	no	1600	mix	dry	dry	dry	-6.40	-8.35	-7.36	dry
LAT	yes	1800	fluid	dry	dry	dry	-6.42	-8.51	-7.18	dry
LAT	yes	1800	mix	dry	dry	dry	-6.39	-8.24	-8.08	dry
LAT	yes	1600	fluid	dry	dry	dry	-6.39	-8.41	-7.33	dry
LAT	**yes**	**1600**	**mix**	**dry**	**dry**	**dry**	**-6.30**	**-8.03**	**-7.93**	**dry**
HAT	no	1800	fluid	dry	-0.11	0.42	2.42	0.49	-0.82	0.28
HAT	no	1800	mix	dry	0.15	0.49	2.68	0.72	0.02	0.28
HAT	no	1600	fluid	dry	0.21	0.59	2.53	0.76	-0.54	0.28
HAT	no	1600	mix	dry	0.48	0.75	2.82	1.00	0.50	0.28
HAT	yes	1800	fluid	dry	0.46	0.89	2.47	0.93	-0.68	0.49
HAT	yes	1800	mix	dry	0.66	1.07	2.74	1.09	-0.21	0.28
HAT	yes	1600	fluid	dry	0.54	1.03	2.53	1.12	-0.39	0.84
HAT	**yes**	**1600**	**mix**	**dry**	**1.08**	**1.37**	**2.85**	**1.36**	**0.27**	**1.20**
MSL	no	1800	fluid	dry	dry	dry	-1.61	-3.85	-4.05	dry
MSL	no	1800	mix	dry	dry	dry	-1.42	-3.57	-4.03	dry
MSL	no	1600	fluid	dry	dry	dry	-1.57	-3.57	-4.03	dry
MSL	no	1600	mix	dry	dry	dry	-1.29	-3.26	-3.56	dry

The rheological behavior of a landslide depends on its composition. Unconsolidated sediments, mudslides, and suspended sediments behave as fluids with high density and low viscosity. For a given density, this rheology results in rapid acceleration of the landslide mass and generates a large tsunami compared to other viscoelastic rheology models. Landslides composed of a mixture of water and larger solid particles have additional internal stresses due to solid to solid interactions. They are typically modeled with Coulomb, Voellmy, or Bingham rheology with a critical stress to initiate deformation. For our analysis, we have used a viscous model with a large coefficient to approximate the internal stresses. The coefficient scales with landslide velocity and has a value of approximately 100 m^2/s during the early stages of the landslide evolution. This approximation is still conservative but is a more realistic choice than a fluid model.

The effects of a flow that replicates tidal currents is generally negligible. The phase speed of the wave is large compared to the tidal velocity so that the propagation of the wave is little affected.

Based on the information and data available, we have made a more precise estimate of tsunami wave crest and trough elevation. Of the scenarios presented, the best estimate uses a density of 1600 kg/m^3 (100 pcf), a mixture rheology, and inclusion of tidal currents. This estimate is denoted by bold text in the tables.

To advance this analysis further, two steps are required. The first is to examine the initial failure in more detail through a literature survey. This will provide information that can quantify the transition from solid material to a mixture in more detail, including time-scales and solid fraction. The second is to extend the landslide model to include a Coulomb rheology. This will provide a more accurate and less conservative estimate of the landslide deformation and tsunami generation.

A APPENDIX

A.1 Tables Converted to Feet

Table 4: Maximum tsunami crest elevation (η_{max}) relative to AMSL for each tsunami scenario.

Tide		Land Slide		η_{max} (ft) at Site:						
η_{tide}	U_{tide}	ρ_{sls}	R_{sls}	1	2	3	A	B	C	D
LAT	no	1800	fluid	dry	dry	dry	-11.39	-7.35	0.77	dry
LAT	no	1800	mix	dry	dry	dry	-12.56	-9.39	-1.45	dry
LAT	no	1600	fluid	dry	dry	dry	-12.10	-8.62	-0.40	dry
LAT	no	1600	mix	dry	dry	dry	-12.99	-10.11	-2.45	dry
LAT	yes	1800	fluid	dry	dry	dry	-11.67	-7.89	0.52	dry
LAT	yes	1800	mix	dry	dry	dry	-12.73	-9.75	-1.82	dry
LAT	yes	1600	fluid	dry	dry	dry	-12.33	-9.02	-0.72	dry
LAT	**yes**	**1600**	**mix**	**dry**	**dry**	**dry**	**-13.18**	**-10.44**	**-2.82**	**dry**
HAT	no	1800	fluid	31.22	32.63	28.37	20.63	25.45	30.75	31.46
HAT	no	1800	mix	27.98	29.10	25.22	19.40	22.61	27.74	29.20
HAT	no	1600	fluid	29.47	30.66	26.48	19.84	23.92	28.95	30.09
HAT	no	1600	mix	25.93	27.08	24.19	18.59	21.44	26.48	28.12
HAT	yes	1800	fluid	30.93	33.01	27.53	20.47	25.44	29.25	31.36
HAT	yes	1800	mix	26.89	28.47	24.81	18.58	22.65	26.60	29.16
HAT	yes	1600	fluid	28.77	30.36	25.89	19.18	23.87	27.66	30.12
HAT	**yes**	**1600**	**mix**	**24.99**	**26.60**	**24.10**	**17.56**	**21.48**	**25.07**	**27.73**
MSL	no	1800	fluid	17.84	17.03	14.54	6.34	11.06	15.58	18.70
MSL	no	1800	mix	15.32	14.79	10.78	5.18	8.80	13.38	16.13
MSL	no	1600	fluid	16.45	15.81	12.66	5.63	9.75	14.35	17.40
MSL	no	1600	mix	13.90	13.65	9.59	4.61	7.85	12.27	15.09

Table 5: Minimum tsunami trough elevation (η_{min}) relative to AMSL for each tsunami scenario.

Tide		Land Slide		η_{min} (ft) at Site:						
η_{tide}	U_{tide}	ρ_{sls}	R_{sls}	1	2	3	A	B	C	D
LAT	no	1800	fluid	dry	dry	dry	-21.36	-29.01	-24.89	dry
LAT	no	1800	mix	dry	dry	dry	-21.14	-28.10	-24.53	dry
LAT	no	1600	fluid	dry	dry	dry	-21.29	-28.46	-24.72	dry
LAT	no	1600	mix	dry	dry	dry	-20.99	-27.39	-24.16	dry
LAT	yes	1800	fluid	dry	dry	dry	-21.08	-27.91	-23.54	dry
LAT	yes	1800	mix	dry	dry	dry	-20.95	-27.03	-26.49	dry
LAT	yes	1600	fluid	dry	dry	dry	-20.96	-27.59	-24.06	dry
LAT	**yes**	**1600**	**mix**	**dry**	**dry**	**dry**	**-20.66**	**-26.36**	**-26.03**	**dry**
HAT	no	1800	fluid	dry	-0.35	1.37	7.93	1.61	-2.70	0.92
HAT	no	1800	mix	dry	0.50	1.62	8.78	2.35	0.06	0.92
HAT	no	1600	fluid	dry	0.70	1.92	8.31	2.49	-1.78	0.92
HAT	no	1600	mix	dry	1.58	2.46	9.25	3.29	1.63	0.92
HAT	yes	1800	fluid	dry	1.51	2.92	8.10	3.06	-2.22	1.61
HAT	yes	1800	mix	dry	2.15	3.50	9.00	3.56	-0.70	0.92
HAT	yes	1600	fluid	dry	1.77	3.38	8.29	3.66	-1.29	2.76
HAT	**yes**	**1600**	**mix**	**dry**	**3.53**	**4.49**	**9.34**	**4.46**	**0.87**	**3.94**
MSL	no	1800	fluid	dry	dry	dry	-5.27	-12.62	-13.28	dry
MSL	no	1800	mix	dry	dry	dry	-4.66	-11.70	-13.23	dry
MSL	no	1600	fluid	dry	dry	dry	-5.16	-11.70	-13.24	dry
MSL	no	1600	mix	dry	dry	dry	-4.24	-10.69	-11.67	dry

A.2 Results at MSL

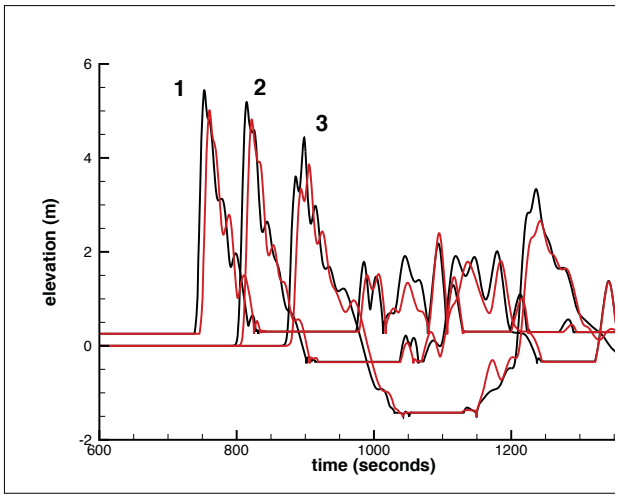


Figure 17: Water elevation (relative to AMSL) during tsunami event. Effects of changing density at $\eta_{tide} = MSL$ for sites 1 to 3. $\rho_{sls} = 1800kg/m^3$ (black), $\rho_{sls} = 1600kg/m^3$ (red)

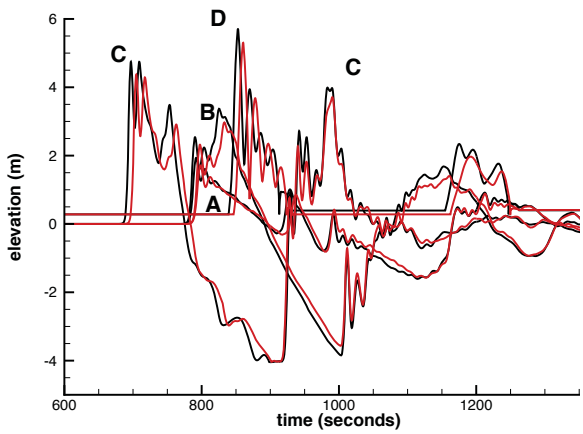


Figure 18: Water elevation (relative to AMSL) during tsunami event. Effects of changing density at $\eta_{tide} = MSL$ for sites A to D. $\rho_{sls} = 1800kg/m^3$ (black), $\rho_{sls} = 1600kg/m^3$ (red)

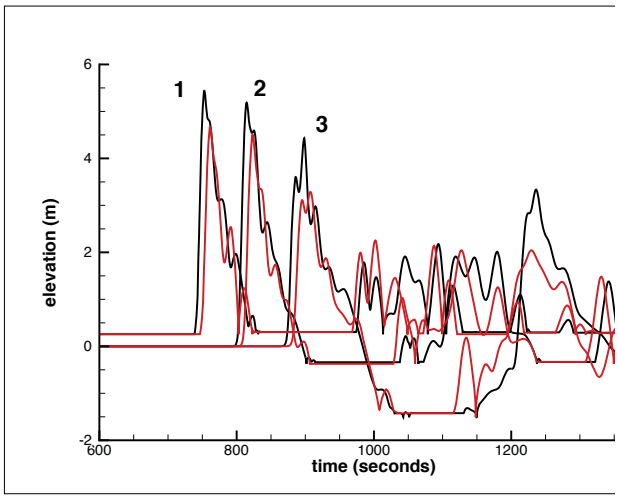


Figure 19: Water elevation (relative to AMSL) during tsunami event. Effects of adding internal stresses at $\eta_{tide} = MSL$ for sites 1 to 3. $R_{sls} = fluid$ (black), $R_{sls} = mix$ (red)

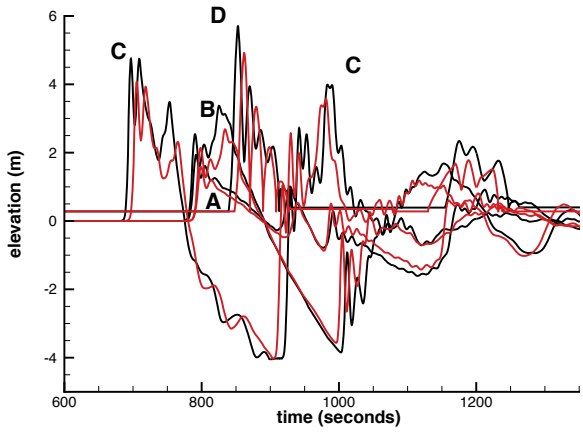


Figure 20: Water elevation (relative to AMSL) during tsunami event. Effects of adding internal stresses at $\eta_{tide} = MSL$ for sites A to D. $R_{sls} = fluid$ (black), $R_{sls} = mix$ (red)

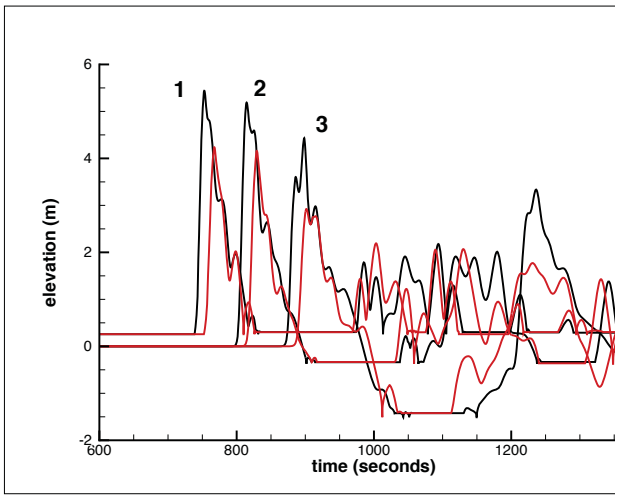


Figure 21: Water elevation (relative to AMSL) during tsunami event. Effects of combining $\rho_{sls} = 1600kg/m^3$ and $R_{sls} = mix$ without tidal currents at $\eta_{tide} = MSL$ for sites 1 to 3. Baseline (black line), combination (red line)

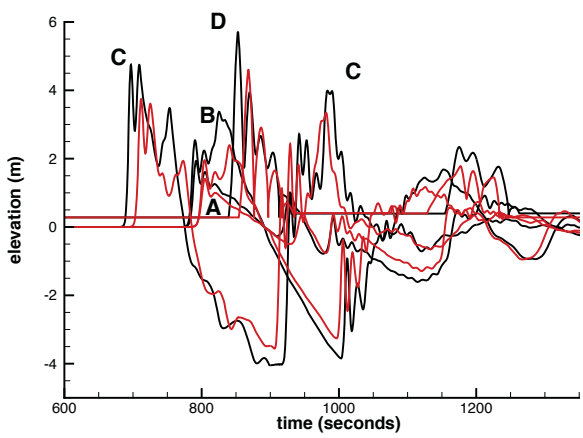


Figure 22: Water elevation (relative to AMSL) during tsunami event. Effects of combining $\rho_{sls} = 1600kg/m^3$ and $R_{sls} = mix$ without tidal currents at $\eta_{tide} = MSL$ for sites A to D. Baseline (black line), combination (red line)

Cook Inlet, Alaska, Tsunami Hazard Assessment

Clayton Hiles
Cascadia Coast Research, Ltd.

Roy Walters
Ocean-River Hydrodynamics

April 23, 2015

Summary

Fugro Consultants Inc.(FCL) has been contracted to provide a tsunami hazard assessment for a site in Cook Inlet, Alaska. This task requires identifying significant regional and local tsunamigenic sources, and a quantitative estimate of the maximum wave height above mean sea level (MSL). For this study, FCL has teamed with Cascadia Coast Research Ltd. to complete the quantitative modeling.

The study site in Cook Inlet lies in a tectonically active area located along the northeast Pacific Ocean. Possible remote tsunami sources are located at the subduction zone stretching from Japan to the Aleutian Trench in the North Pacific Ocean and west to Indonesia. Of these sources the Alaskan event of 1964 is the defining megathrust event for this area. Local sources include normal and reverse faults near the study site, submarine landslides, and local volcanic flank collapse with subaerial landslides.

Two scenarios were identified for quantitative modelling: (1) the megathrust fault event of 1964 and (2) a potential landslide across the Inlet from the study site (and two variations on this landslide). Flank collapses of Augustine and Redoubt Volcanoes were also considered, but the project team judged that sufficient information was available in published literature to assess the hazard from these scenarios.

An unstructured computational grid was developed for the tsunami models. The resolution is variable, from 2km (1.24mi) grid spacing at the open ocean boundary to 500m (1600ft) within Cook inlet to 50m (164ft) at the study site. Bathymetry and topography was assembled by FCL and interpolated onto the computational grid. The shoreline boundaries of the grid follow the 20m (66ft) topographic contour.

The tsunami were simulated using the RiCOM (River and Coastal Ocean Model), which is based on the Reynolds-averaged Navier-Stokes equations and continuity equation. For the fault simulation a 2-dimensional (horizontal) hydrostatic version is used (Walters and Casulli (1998)). The submarine landslide simulation also uses a vertically-integrated hydrostatic version of the model which includes a submodel for the submarine landslide.

The vertical displacement resulting from the 1964 faulting was estimated using the methods of Okada (1985). Initially the deformation model of Ichinose et al (2007) was proposed for the calculation of vertical displacement. It was found that the tsunami resulting from the Ichinose et al (2007) model was too small by a factor of 2. After much

investigation, the deformation model of Johnson et al. (1996) was modified similar to Suito and Freymueller (2009).

The 1964 megathrust tsunami simulation was run using the vertical displacement calculated with the modified Johnson et al. (1996) deformation model as an initial condition. The event produces a maximum displacement of about 9m (30ft). The resulting tsunami agrees reasonably well with data from Yakutat and observations at Seward and Kodiak (Wilson and Torum (1968)). Through the 12 hours simulation, the maximum tsunami elevation and current speed adjacent the study site is about 0.8m (2.6ft) and 0.7m/s (2.3ft/s) respectively.

From the bathymetry, several probable landslide traces were identified in the area on the west side of the Inlet, opposite the study site. The submarine landslide is modelled as a fluidized sediment mass with specified density and does not mix with the overlying sea water. The motion is governed by the shallow water equations with additional stress terms that approximate the internal stresses. The landslide model is coupled to the free surface water model through the continuity equation.

The landslide scenario with the largest volume also has the largest maximum water surface elevation, primarily because the length of the slide minimizes loss at the ends of the tsunami. The amplitude of the wave is approximately 5.5m (18ft) in the channel. As the wave traverses the shoals on the east side of the channel, there is approximately a 50% loss in amplitude from reflection and dispersion. As the wave runs up in the shoal water near the eastern shore, the amplitude increases up to approximately 4m (13 ft). Similarly maximum current speeds are 7m/s (23ft/s) in the area of tsunami generation and 3.5m/s (11.5ft/s) over the shoals.

Tsunami interaction with the tide can be important in Cook Inlet. Work by Kowalik indicates that at Anchorage, maximum tsunami elevation occurs when the tide is near mean sea level (Kowalik and Proshutinsky (2010)). Concurrent modelling of tides and tsunami was beyond of the scope of this work, but given the above findings, all tsunami simulations were run with a static ambient water level equal to mean sea level. Some testing of this simplification was performed by re-running some of the simulations at highest astronomical tide, 4.23m (14ft). We found negligible difference in the maximum tsunami elevation for the 1964 event, and a small (10-20cm, 0.3-0.6ft) increase in tsunami elevation for the landslide scenarios.

Joint tsunami-tide maximum inundation probability distributions were calculated at three locations along the shoreline of the study site using the methods of Lane et al (2012). For the long period, small amplitude waves resulting from the 1964 megathrust event, the probability distribution is dominated by the maximum tidal water level during the tsunami. For the short period, higher amplitude waves resulting from the landslide events, the probability distribution strongly resembles the instantaneous tidal probability distribution with an offset equal to the maximum tsunami amplitude.

Contents

1 Introduction **4**

2 Background **5**
2.1 Study site 5
2.2 Remote Sources 7
2.3 Regional Sources 7
2.4 Local Sources 7
2.5 Methods 7

3 Tsunamigenic Sources **9**
3.1 Fault Sources 9
3.2 Subaerial Landslide Sources 13
3.3 Submarine Landslide Sources 15

4 Tsunami Simulation **19**
4.1 Grid generation 19
4.2 Initial and boundary conditions 19
4.3 Numerical model 20

5 Results and Discussion **21**
5.1 Fault Sources 22
5.2 Submarine Landslide 31

6 Tsunami Tide Interactions **45**
6.1 Effect of Ambient Water Level 45
6.2 Combined Probability Distributions 45

A APPENDIX **51**
A.1 Model description 51
A.1.1 Time discretization 52
A.1.2 Space discretization 53
A.1.3 Wetting and drying algorithm 53

1 Introduction

Fugro Consultants Inc.(FCL) has been contracted to provide a tsunami hazard assessment for a site in Cook Inlet, Alaska. This task requires identifying significant regional and local tsunamigenic sources, and a quantitative estimate of the maximum wave height above mean sea level (MSL). For this study, FCL will team with Cascadia Coast Research Ltd. to complete the quantitative modeling.

The tasks for completion by CCR include:

1. Calculate displacement using an elastic dislocation model along with fault parameters for the significant faults affecting the study site. The fault parameters are provided by FCL with some discussion with CCR

2. Generate a computational grid with sufficient resolution of the wave generated by the fault rupture in item 1. Bathymetric data will be compiled from publicly and privately available data and will be provided by FCL. FCL and CCR will quality control the data and make changes or additions where appropriate.

3. Calculate wave response for the range of faults and fault parameters as specified by FCL

4. Identify areas where submarine landslides may occur. Calculate wave response for a range of significant landslide events.

5. Calculate the joint tide and tsunami probability distributions using the results for water surface elevation and the tidal harmonics at the observational sites.

6. Prepare a summary report to include background information, methods, model summary, results for wave crest height at the study site, and summary discussion of these results.

7. Revise summary report to take into account review comments.

2 Background

The purpose of this study is to identify the tsunami hazard at a site in Cook Inlet, Alaska. Once the significant sources are identified, a range of events are simulated to provide the underpinning data for a tsunami hazard assessment.

2.1 Study site

The study site in Cook Inlet lies in a tectonically active area located along the northeast Pacific Ocean. As a result, numerous sources are capable of generating waves that may have significant impact at the study area. For convenience, these sources may be grouped by distance from the study site into remote, regional, and local sources. A useful definition here is

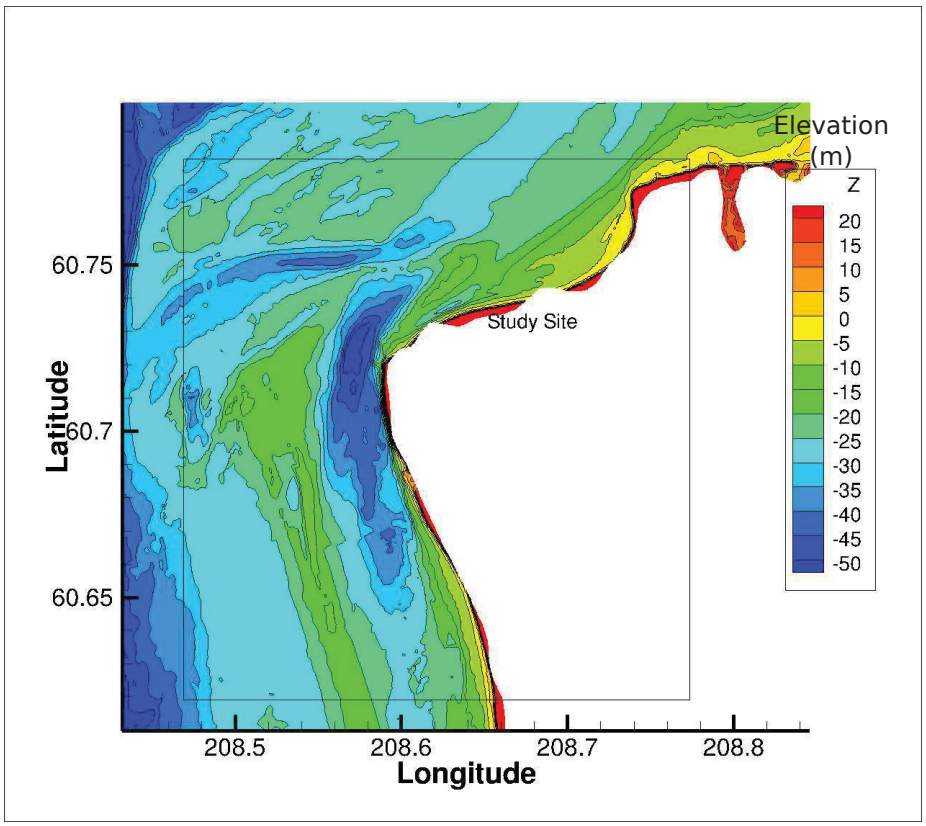


Figure 1: Study area.

- local source – within 30 minutes travel time and affecting tens of km of coast

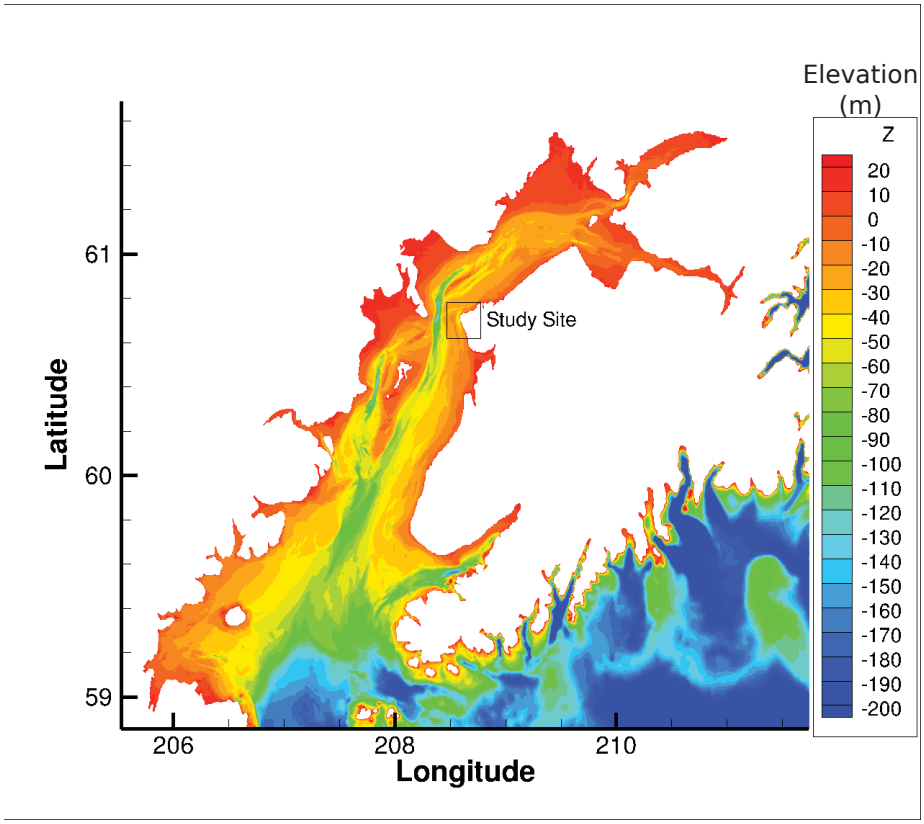


Figure 2: Cook Inlet.

- regional source – within three hours travel time and likely to affect a region or several regions
- distant (remote) source – longer than three hours travel time and likely to affect many regions.

There are numerous ways to define the water surface elevation associated with tsunami. Wave height is the vertical distance between successive crests and troughs of a wave. This is not a useful measure for tsunami because the waves are very asymmetric and the quantity of interest is the maximum water elevation. Wave crest elevation is the maximum value for water level with respect to some fixed reference such as mean sea level or a land reference. However, this quantity includes tides and other sea level variations so must be corrected for site comparisons. Tsunami amplitude is the maximum elevation of the wave crest with respect to the ambient or prevailing water levels. Thus tsunami observations must be corrected for tide and other variations to derive this quantity.

2.2 Remote Sources

The largest remote sources are located at the subduction zone stretching from Japan to the Aleutian Trench in the North Pacific Ocean and west to Indonesia. There have been 4 major events in the recent past when recording instruments were available: the Chile event in 1960, the Alaskan event in 1964, the Sumatra event in 2004, and the Japanese (Tōhoku) event in 2011. Except for the Alaskan event, these are remote events and are not considered in this study.

2.3 Regional Sources

The largest regional events are associated with the subduction zone that follows the edge of the Pacific plate. In this study, the Alaskan event of 1964 is the defining megathrust event for this area.

2.4 Local Sources

Local sources include normal and reverse faults near the study site, submarine landslides, and local volcanic flank collapse with subaerial landslides. Submarine landslides usually occur seaward from the shelf break and along the sides of incised channels where steep slopes occur, or where unstable sediment is deposited in large quantities such as in relict channels crossing the continental shelf.

2.5 Methods

This study was designed to provide the necessary data for a tsunami hazard assessment for the study site on Cook Inlet. The methodology is composed of several parts. First, scenarios are defined for the local and regional sources. Remote sources are not considered because they are less significant than the regional megathrust event in 1964.

Having defined the sources, submodels translate the source characteristics to a water surface displacement that is used in subsequent numerical modeling. For fault ruptures, the methods of Okada (1985) are used to calculate the deformation from finite fault segments. For submarine landslides, a submodel calculates the movement of the landslide mass and defines a bed deformation. Then a numerical model is used to propagate the water surface displacement to the study site where water surface elevation and velocity are recorded. These tasks are described in detail in the following sections.

3 Tsunamigenic Sources

3.1 Fault Sources

The defining fault event for this area was the 1964 Prince William Sound, Alaska megathrust event. This earthquake was the second largest event ever recorded (M 9.2), larger than Sumatra 2004 (M 9.1) and smaller than Chile 1960 (M 9.5). All these events occurred in the subduction zone where the oceanic plate is forced beneath the continental plate. For the Alaskan event, the Pacific Plate is subducted beneath the continental plate. This event caused massive uplifts, landslides, lateral spreading, severe ground shaking and a destructive ocean wide tsunami which inundated Alaskan cities and ports at Seaward and Kodiak, as well as distant places including Hilo, Hawaii, and Crescent City, California.

Ichinose et al (2007) reexamined the Alaskan earthquake using a combined inversion of seismic, tsunami, and geodetic data. They assumed there were three major fault segments for the subduction zone which were divided into subfaults with a size of 50 by 50 km and a dip of 6 to 12 degrees based on geologic and geodetic observations. The Patton Bay fault was assigned a subfault size of 20 by 20 km and a dip of 60 degrees. In total, there were 95 fault segments. Of the several models derived, the fault parameters for the preferred model (IDM) are shown in Tables 1 and continued in Table 2.

Once the fault parameters have been defined, some form of elastic dislocation model is generally used to calculate the vertical displacement due to a fault rupture. These models require specification of location, length, width, strike, dip, slip, and rake for each fault segment. The location consists of longitude, latitude, and depth at the centroid of the fault plane. Length and width define the area and slip is the average displacement, all measured in the fault plane. Strike is the fault trace direction defined so that the fault dips to the right side of the trace. Dip is the angle between the fault and a horizontal plane. Rake is the direction the hanging wall moves during rupture, measured relative to the fault strike.

The elastic dislocation model used in this study is a version of the method derived by Okada (1985) which has been extended to multiple fault segments. This submodel reads the fault parameter data, translates the location to the local reference used internally in the submodel, then sums the contributions from all segments. The Lamé constants describing the elastic media have values of $\lambda = \mu = 2 \times 10^{10}$ in this study. The vertical displacement is used as the initial conditions for the tsunami model by displacing both the bed elevation and water surface elevation.

Initial tests with the Ichinose et al (2007) model (IDM) showed that tsunami observations were poorly reproduced at the key sites of Yakutat, Seward, and Kodiak. Generally, wave amplitudes were at least a factor of 2 too small. Although beyond the scope of this study, we examined other displacement models to find a more accurate source. The other models included Holdahl and Sauber (1994) denoted as (HDM), Johnson et al. (1996) denoted as (JDM), and Suito and Freymueller (2009) denoted as (SDM). We were unable to reproduce the fault in HDM, presumably because of some fault in the published fault parameters. Thus far, we have not been able to obtain the data for SDM but the fault displacement is plotted in Suleimani et al. (2011).

Table 1: Fault parameters. Length, width, depth and slip are in units of meters. Other quantities are in degrees.

Longitude	Latitude	Length	Width	Depth	Dip	Strike	Slip	Rake
215.2210	60.222	50000	50000	5200	12	218	0.8	89.3
214.5160	60.492	50000	50000	15590	12	218	0.4	135.0
213.7990	60.757	50000	50000	25990	12	218	7.0	108.8
214.6710	59.865	50000	50000	5200	12	218	1.9	122.3
213.9740	60.134	50000	50000	15590	12	218	0.2	45.0
213.2660	60.400	50000	50000	25990	12	218	3.1	64.6
214.1340	59.505	50000	50000	5200	12	218	0.9	135.0
213.4440	59.775	50000	50000	15590	12	218	4.0	69.3
212.7430	60.041	50000	50000	25990	12	218	8.2	51.3
213.6070	59.144	50000	50000	5200	12	218	11.0	78.05
212.9250	59.413	50000	50000	15590	12	218	11.0	114.99
212.2320	59.679	50000	50000	25990	12	218	8.3	135.0
213.0920	58.780	50000	50000	5200	12	218	1.4	103.4
212.4170	59.049	50000	50000	15590	12	218	1.8	45.5
211.7310	59.315	50000	50000	25990	12	218	2.2	78.5
212.5870	58.414	50000	50000	5200	12	218	2.9	135.0
211.9190	58.684	50000	50000	15590	12	218	1.1	133.3
211.2410	58.950	50000	50000	25990	12	218	2.2	118.1
212.0930	58.047	50000	50000	5200	12	218	0.6	86.3
211.4320	58.316	50000	50000	15590	12	218	6.5	69.4
210.7610	58.582	50000	50000	25990	12	218	13.0	87.40
211.6090	57.677	50000	50000	5200	12	218	1.1	108.3
210.9550	57.946	50000	50000	15590	12	218	9.2	70.1
210.2910	58.213	50000	50000	25990	12	218	6.7	89.1
213.0260	61.068	50000	50000	34610	6	216	1.8	54.6
212.2710	61.329	50000	50000	39840	6	216	1.8	59.1
211.5030	61.586	50000	50000	45070	6	216	2.8	46.7
212.4880	60.701	50000	50000	34610	6	216	9.5	107.1
211.7420	60.962	50000	50000	39840	6	216	0.6	45.0
210.9830	61.219	50000	50000	45070	6	216	5.3	45.0
211.9630	60.332	50000	50000	34610	6	216	6.9	98.1
211.2250	60.593	50000	50000	39840	6	216	1.0	135.0
210.4740	60.851	50000	50000	45070	6	216	0.0	0.0
211.4490	59.961	50000	50000	34610	6	216	4.9	99.2
210.7190	60.223	50000	50000	39840	6	216	2.0	98.4
209.9770	60.480	50000	50000	45070	6	216	1.5	135.0
210.9460	59.589	50000	50000	34610	6	216	3.9	127.3
210.2250	59.850	50000	50000	39840	6	216	0.1	45.0
209.4920	60.107	50000	50000	45070	6	216	4.2	49.6
210.4550	59.214	50000	50000	34610	6	216	4.1	100.6
209.7410	59.476	50000	50000	39840	6	216	4.7	67.6
209.0160	59.733	50000	50000	45070	6	216	3.0	135.0
209.9740	58.838	50000	50000	34610	6	216	3.3	128.2
209.2680	59.099	50000	50000	39840	6	216	0.4	45.0
208.5510	59.357	50000	50000	45070	6	216	1.5	75.9

Table 2: Fault parameters (continued). Length, width, depth and slip are in units of meters. Other quantities are in degrees.

Longitude	Latitude	Length	Width	Depth	Dip	Strike	Slip	Rake
209.2770	58.378	50000	50000	36380	12	237	2.1	80.1
208.8010	58.742	50000	50000	46780	12	237	2.5	48.4
209.9590	57.028	50000	50000	5200	12	237	1.9	127.8
209.5130	57.396	50000	50000	15590	12	237	1.4	57.1
209.0590	57.764	50000	50000	25990	12	237	4.1	49.2
208.5950	58.129	50000	50000	36380	12	237	4.0	120.9
208.1220	58.493	50000	50000	46780	12	237	2.1	69.0
209.2760	56.775	50000	50000	5200	12	237	0.0	0.0
208.8340	57.144	50000	50000	15590	12	237	8.0	100.6
208.3830	57.511	50000	50000	25990	12	237	4.1	121.5
207.9220	57.876	50000	50000	36380	12	237	2.8	91.7
207.4520	58.240	50000	50000	46780	12	237	0.4	45.7
208.6030	56.518	50000	50000	5200	12	237	7.4	85.1
208.1640	56.887	50000	50000	15590	12	237	6.2	85.3
207.7160	57.254	50000	50000	25990	12	237	13.0	72.54
207.2590	57.620	50000	50000	36380	12	237	2.1	45.0
206.7920	57.984	50000	50000	46780	12	237	0.4	45.0
207.9390	56.258	50000	50000	5200	12	237	12.0	89.28
207.5020	56.627	50000	50000	15590	12	237	10.0	92.57
207.0570	56.994	50000	50000	25990	12	237	7.7	88.6
206.6040	57.360	50000	50000	36380	12	237	1.8	52.7
206.1410	57.723	50000	50000	46780	12	237	0.7	135.0
207.2830	55.994	50000	50000	5200	12	237	3.2	62.2
206.8500	56.363	50000	50000	15590	12	237	5.1	91.7
206.4080	56.730	50000	50000	25990	12	237	7.2	103.3
205.9580	57.096	50000	50000	36380	12	237	3.5	98.1
205.4990	57.460	50000	50000	46780	12	237	0.0	0.0
206.6370	55.727	50000	50000	5200	12	237	2.6	63.9
206.2070	56.096	50000	50000	15590	12	237	5.8	83.6
205.7680	56.463	50000	50000	25990	12	237	4.7	77.1
205.3210	56.829	50000	50000	36380	12	237	2.2	45.0
204.8650	57.193	50000	50000	46780	12	237	0.4	130.7
206.0000	55.457	50000	50000	5200	12	237	0.0	0.0
205.5720	55.825	50000	50000	15590	12	237	0.0	0.0
205.1370	56.193	50000	50000	25990	12	237	0.5	84.2
204.6930	56.558	50000	50000	36380	12	237	0.2	127.9
204.2410	56.922	50000	50000	46780	12	237	0.9	135.0
212.9890	60.394	20000	20000	8660	60	218	2.6	65.0
212.7680	60.251	20000	20000	8660	60	218	4.4	45.0
212.5480	60.107	20000	20000	8660	60	218	2.6	83.0
212.3310	59.963	20000	20000	8660	60	218	9.9	48.5
212.1160	59.819	20000	20000	8660	60	218	17.4	124.4
211.9020	59.675	20000	20000	8660	60	218	5.6	127.6
211.6910	59.530	20000	20000	8660	60	218	4.0	117.5
211.4810	59.385	20000	20000	8660	60	218	1.3	55.4

Table 3: Fault parameters for JDM. Length, width, depth and slip are in units of meters. Other quantities are in degrees. Note that the reference location is at the top upstrike end of the fault.

Longitude	Latitude	Length	Width	Depth	Dip	Strike	Slip	Rake
209.0500	56.43	100000	100000	3000	8	218	0.0	90
209.8700	56.97	100000	100000	3000	8	218	5.5	90
210.9000	57.67	100000	100000	3000	8	218	14.5	90
211.9500	58.38	100000	100000	3000	8	218	0.7	90
213.3700	58.58	90000	100000	2000	8	230	18.5	62.87
214.5500	58.95	90000	100000	1000	8	242	10.8	75.02
215.8800	59.17	90000	100000	1000	8	256	4.1	87.44
207.5000	56.98	100000	100000	17000	9	218	4.1	90
208.6700	57.52	100000	100000	17000	9	218	0.0	90
209.7000	58.22	100000	100000	17000	9	218	4.6	90
210.7200	58.93	100000	100000	17000	3	218	8.0	90
212.3800	59.32	120000	100000	16000	3	229	22.1	64.16
213.8700	59.77	120000	100000	15000	3	241	17.9	74.15
215.6000	60.03	120000	100000	15000	3	256	5.7	86.38
211.0800	60.35	130000	100000	21000	3	219	0.7	65.92
213.2700	60.57	130000	100000	20000	3	241	20.9	73.33
215.3500	60.92	130000	100000	20000	3	256	7.9	85.56
212.6700	60.05	72000	30000	100	60	219	8.5	90

Table 4: Fault parameters for additional splay fault for JDM. Length, width, depth and slip are in units of meters. Other quantities are in degrees.

Longitude	Latitude	Length	Width	Depth	Dip	Strike	Slip	Rake
212.0100	59.54	250000	50000	100	30	230	8.5	90

We initially evaluated IDM and JDM (Table 3). As noted the results for IDM were poor. For JDM, the amplitude was sightly reduced and arrival time approximately correct at Yakutat. At Seward, the amplitude was correct but the arrival time was poorly reproduced. At Kodiak, the amplitude was within reasonable bounds but the first wave was poorly shaped. The deficiencies with JDM were that the tsunami at Seward was generated by the main fault rather than a splay/Patton fault so the arrival time was too long (70 minutes rather than the observed 25 minutes). In addition, the fault offshore from Kodiak was not correct (the asperity noted in Ichinose et al (2007)).

The fault sources IDM, JDM, and SDM were compared in an evaluation by Suleimani et al. (2011) for the Seward tsunami. They found that SDM best reproduced the observations. SDM was created from JDM by adjusting the slip on the fault segments and

adding a splay fault that extends the Patton Fault. The result was a displacement that had variations similar to the asperities in IDM, but also had a ridge near Kenai Peninsula. This ridge is similar to an early map of displacement made by Pflaker (1969) which shows a much longer extension of the Patton Fault and is responsible for the earlier arrival times and correct subsidence at Seward.

With this information, our only option was to add a splay fault to the JDM model (see Table 4). This modification to the JDM is hereafter referred to as MJDM. Although we could not reproduce or benefit from the fine tuning in SDM, we could reproduce the main features of the fault displacement. As expected, the tsunami from the MJDM reproduced the correct amplitude at Yakutat, too large an amplitude at Seward, and correct at Kodiak. Hence, the general rendition of the fault displacement was correct and we reproduced the proper sources for the wave entering Cook Inlet.

3.2 Subaerial Landslide Sources

Eruptions and flank collapse at volcanoes and volcanic islands act as point sources for tsunami generation. Hence, their location must be close to the study site in order to generate significant tsunami amplitudes. Underwater emplacement of lava is another important tsunamigenic mechanism. Krakatoa is a classic example of this where approximately 100 cubic km of magma was injected suddenly at the sea bed.

For the study site at Cook Inlet, the two most important sources are volcano flank collapse at Augustine and Redoubt Volcanoes. The mechanism for generation of a tsunami is an eruption followed by a flank collapse and subaerial landslide that enters water at the base of the volcano. This scenario has been studied and published in several reports for Augustine Volcano (Kienle et al, 1987, 1996; Waythomas and Waitt, 1998; Waythomas et al, 2006; Beget and Kowalik, 2006) and for Redoubt Volcano (Waythomas et al, 1997). Of these 2 volcanoes, Augustine Volcano has a greater hazard than that inferred for Redoubt Volcano.

Assessing tsunami hazard resulting from volcano flank collapse is a complicated process. For simplicity, this process can be divided into 3 tasks: Estimating the dynamic geometry of a subaerial landslide, estimating the coupling between the landslide and water when the tsunami is generated, and calculating propagation and runup for the tsunami.

The first task is to evaluate the subaerial landslide with the objective being to define its speed, geometry, and material properties as it enters water at the base of the volcano. After estimating the initial landslide volume from observations or experience, some method must be used to route this mass to the waters edge. Unfortunately there are few models which can accommodate this level of complexity and experimental data have severe problems with scaling to field-scale problems. The current state-of-the-art is presented in Iverson and George (2014) for the physical basis and George and Iverson (2014) for model calculations and experimental data. Although the basic equations resemble the familiar shallow water equations, they are complicated by stresses that depend on a number of factors including material properties, solid volume fraction, and pore pressure. An accurate approximation of these internal stresses is required to properly simulate landslide motion.

The second task brings together the coupling of the landslide source and the free surface water model and is probably the most difficult of all the tasks. Thus far, there are no known attempts to calculate subaerial landslide intrusion into water. For this situation, form drag at the landslide head must be included as well as changes in pressure which modify the flow dynamics. At present, this problem is unresolved. From the water perspective, the dynamics are governed by the full Navier-Stokes equations with multiple free surfaces, something which can be called a "flying water" model. These types of models exist but tend to be computationally expensive.

The third task includes propagating the tsunami which has been generated to a study site where runup will be important and is probably the best understood of all the tasks. Traditional tsunami models apply to the period after the free surface has settled down to a single-valued function. These models generally solve the shallow water equations and may contain extra terms to account for dispersion for short waves. For instance, Waythomas et al (2006) use a Boussinesq model where higher-order terms are added to the equations to approximate dispersive effects. On the other hand, Walters (2005) derives a vertically-integrated nonhydrostatic model which solves an extra equation for dynamic pressure. This method tends to be more accurate and efficient than the Boussinesq model approach. Leaving off the extra terms, both models reduce to the standard shallow water equations. The type of model used depends to a large degree on the type of source. Subduction zone ruptures tend to have long wavelength so are approximated with standard shallow water models. Submarine landslides in deep water can have a wavelength comparable to the water depth and hence require a dispersive model. There are also many methods to treat wetting and drying during runup. Many of these methods are not mass conservative and have stability issues. Here, we use a robust and accurate method that solves the nonlinear finite volume continuity equation (Casulli, 2008).

Several studies that use different approximations have assessed the tsunami hazard due to various flank collapse scenarios for Augustine Volcano (Kienle et al, 1987, 1996; Waythomas et al, 2006; Beget and Kowalik, 2006). All of these studies have avoided the complexities of the dynamics of the landslide and coupling to the water by either assuming that the landslide geometry and velocity are known (Kienle et al, 1987, 1996; Beget and Kowalik, 2006) or scaling an initial condition for the tsunami from experimental data (Waythomas et al, 2006). The studies also considered landslides in several directions down the volcano. Of these, the eastward landslide scenarios are the most relevant to our study since they generated the largest tsunami in the direction of the study site. It is worthwhile noting that the tsunami generated by the different studies differed by a factor of 2 in maximum wave crest elevation. Because of the fundamentally different methods by which the initial wave was generated, it is difficult to ascertain why the results were different. From all these results, the largest tsunami at the study site would probably result from a landslide down the northeast flank.

None of the existing studies show results for a modelled Augustine volcano flank collapse as far up Cook Inlet as the study site. From the available data, a tsunami amplitude of 0.5 to 1 m can be inferred although local effects at the site could make this larger. Beget and Kowalik (2006) show an amplitude of less than 0.5 m at the study site (their Figure 4).

3.3 Submarine Landslide Sources

There are two important features of tsunami generated by submarine landslides. First, the major part of the wave amplitude is created during the initial collapse of the landslide. The wave speed is generally much larger than the landslide speed so the initial wave is radiated away before the landslide accelerates. Second, the largest waves are generated along the axis of the direction of the slide. The largest (positive) wave propagates in the direction of the landslide, and a negative wave and wave train propagate in the opposite direction. Off axis, the wave amplitude diminishes rapidly.

The implication here is that a landslide on the opposite side of the mid-inlet channel should be capable of generating the largest tsunami at the study site. From the bathymetry, several probable landslide traces were identified in the area opposite the study site (Figure 3). Although these landslides have relatively small volume, the area delineated with the yellow line will be used as an upper limit of possible tsunamigenic landslides.

The details of the thickness of the landslide are shown in Figure 4 and its location is shown in Figure 5. Three scenarios were considered. The first is the total landslide mass and is meant to estimate an upper limit for tsunami amplitude. Then the landslide volume was split into the upper and lower thickness lobe. Each of these parts was then used to estimate tsunami amplitude for the characteristic volume of landslide features inferred from the bathymetry.

The submarine landslide is modeled as a fluidized sediment mass with specified density and does not mix with the overlying sea water. The motion is governed by the shallow water equations with additional stress terms that approximate the internal stresses. By reducing the basal stress, the landslide will essentially hydroplane. The landslide model is coupled to the free surface water model through the continuity equation so that movement of the landslide displaces the water surface and generates a tsunami.

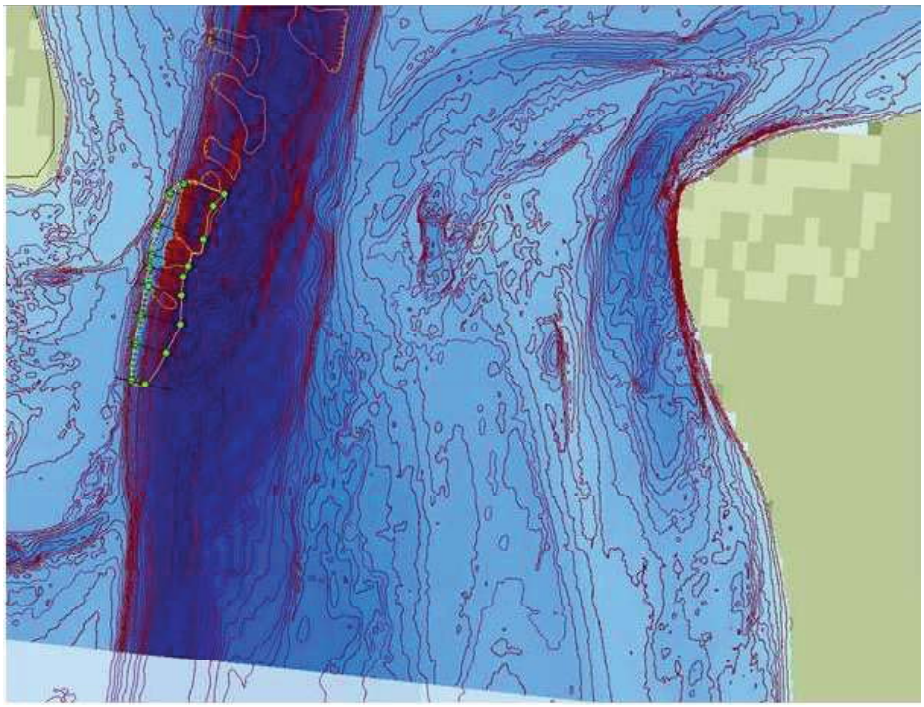


Figure 3: Probable sites of landslide deposits.

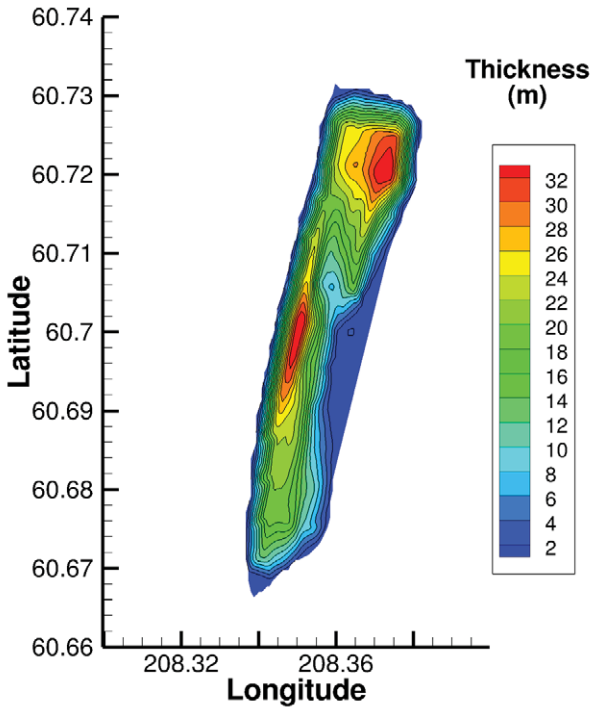
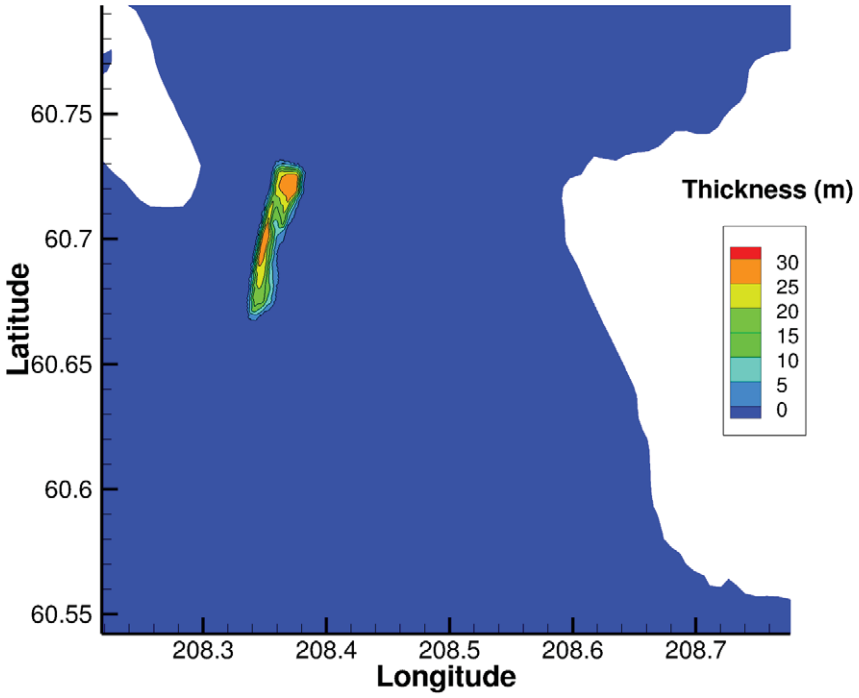

Thickness
(m)
32
30
28
26
24
22
20
18
16
14
12
10
8
6
4
2
Latitude
60.74
60.73
60.72
60.71
60.7
60.69
60.68
60.67
60.66
208.32
208.36
Longitude

PLATE G.43


Thickness (m)
30
25
20
15
10
5
0
Latitude
60.75
60.7
60.65
60.6
60.55
Longitude
208.3
208.4
208.5
208.6
208.7

4 Tsunami Simulation

Modeling tsunami propagation requires generating a computational grid with land and seabed topography, specifying the initial condition on sea level from the various sources, and calculating wave propagation using a numerical model based on the shallow water equations. For submarine landslides, a landslide submodel is coupled to the tsunami model so the sea surface evolves dynamically in response to the deformation and movement of the landslide.

4.1 Grid generation

The computational grid was constructed using the TQGG grid generation software (see Henry and Walters (1992) for a description of an older program). A triangular unstructured computational grid is used to allow flexibility in the representation of complex coastlines and allow variability in the grid resolution. Bathymetric and topographic data were provided by FCL as a large composite data-set. The model domain was developed from this data set as follows.

The model domain is composed of open boundaries which are set in the open ocean away from the influence of the source displacements, shoreline boundaries where there are no topographic data, and land boundaries at the 20 m contour where there are topographic data. First the open boundaries were defined. Then shoreline boundaries were sampled with spacing related to the location with respect to the study site. Most of Cook Inlet was sampled at 500m whereas outside Cook Inlet shoreline sampling distance was 1km. The land boundary was created by first smoothing the the topographic data and then calculating a 20 m countour. This procedure provides a smooth boundary for the grid generation algorithm but has no effect on the simulations because wave runup never reaches this elevation. Including land topography allows the tsunami wave to run-up in a natural manner without interface boundaries. In general, node spacing on the outer edge of the model domain was specified in such a way as to maintain accuracy while minimizing the number of nodes. An 'advancing front' generation algorithm was used to create the grid. At the study site, the generated grid was refined in steps down to 50m spacing. At the subduction zone displacements, there are 100 elements from the crest to the trough of the wave for the largest event. There are approximately 20 elements across the highest 10% of the wave. At over 100 points per wavelength, this would be considered high resolution. As the wave shoals, the wave speed decreases but the grid becomes more refined in the shoal areas with the result that the resolution increases.

4.2 Initial and boundary conditions

For the fault scenarios, the vertical displacement is calculated with the elastic dislocation model of Okada (1985) and interpolated onto the computational grid. This displacement is used as the initial condition on sea level and to displace the bed elevation. The assumption is that the fault ruptures instantaneously with respect to the time scales for wave propagation and nonhydrostatic forces have insignificant effects. This assumption has been verified in many different tsunami studies in the last decades. In

addition, the vertical displacement is added to the bottom elevation to reflect deformation of the bottom topography.

For landslide scenarios, a constant sea level is specified as an initial condition. The seabed displacement is calculated in the landslide submodel and applied as a displacement of the water column at each time step.

For boundary conditions, radiation conditions are specified at all open boundaries so that the tsunami is free to propagate out of the source area without spurious reflections. At land boundaries there is no flow normal to the boundary so only reflections are allowed. Where land topography is included, the wave will inundate the land until it reaches the run-up limit or reaches the boundary of the grid. For this study, land topography up to 20 m elevation is included so the wave will propagate over land according to the model algorithm described in the appendix. This method is fully nonlinear and conservative.

4.3 Numerical model

The numerical model used here is RiCOM (River and Coastal Ocean Model), which is based on the Reynolds-averaged Navier-Stokes equations and continuity equation. For the simulations in this study, a 2-dimensional (horizontal) hydrostatic version is used (Walters and Casulli, 1998). This approximation is suitable for long-wave (tsunami) propagation. For these simulations, the bottom drag coefficient defined in equation 7 of the appendix is $C_D = 0.0025$, a commonly accepted value. For water depth greater 50 m or so, bottom friction is negligible. The time step varied between 0.5 seconds (landslide) and 5 seconds (fault), rather small for tidal simulation but necessary for the shorter period tsunami. The methods are second order in time so this is a very accurate range.

Details about the model are contained in the appendix. Reference to earlier studies using this model can be found in Walters et al. (2006a) (fault rupture), Walters et al. (2006b) (submarine landslide), and Walters et al. (2006c) (a variety of scenarios).

5 Results and Discussion

Most of the simulations were made with a background water elevation equal to mean sea level (MSL) at the study site. Work studying tsunami-tide interactions in Cook Inlet indicate that tsunami arrival at MSL produces the largest tsunami elevation Kowalik and Proshutinsky (2010).

From a dynamical point of view, the initial surface displacement for each fault displacement can be considered as 2 waves traveling in opposite directions such that the water velocity vanishes everywhere. One wave will then propagate offshore away from the study site and the other will propagate onshore toward the site. A good summary of the wave dynamics is contained in a plot of maximum water surface elevation for each fault where the maximum water surface elevation is tabulated during the total period of simulated time. These results are contained in the following subsections for each scenario.

The plot of maximum water surface elevation is also a good summary of the wave dynamics for submarine landslides. The source generation area and the directional aspects of the wave field can be readily identified for each scenario.

5.1 Fault Sources

In this study, the Alaskan event of 1964 is the defining megathrust event. Using the fault parameter values in Table 3 combined with the splay fault in Table 4, the sea-bed displacement in the vertical was calculated using the elastic dislocation model. The vertical displacement for the fault segments are shown in Figure 6. Calculations with these fault parameters results in a maximum vertical displacement of approximately 9m.

The maximum water surface elevation during the 12 hrs of simulated time is shown in figures 7 and 8. As may be noted, the tsunami wave crest height at the mid reaches of Cook Inlet is relatively small with a maximum of less than 1m. The small amplitude is a consequence of the protection that Cook Inlet provides the study site from this tsunami source.

The solid square in Figure 8 denotes where a time series of sea level was recorded. The time series is shown in Figure 9. The initial wave arrives at approximately 3.3 hours after the fault rupture and is preceded by a large wave trough that developed north of the fault rupture. The initial water elevation is at MSL, and the tsunami is superimposed with this ambient water level.

The water level time series is somewhat atypical for tsunami events. The initial wave contains a higher frequency components due to reflections. The leading wave trough diffracts around the Kenai Peninsula. As the following primary wave propagates into Cook Inlet most of its energy is refracted to shore. The primary wave that does reach the study site is superimposed with reflections from Kodiak Island and Kamishak Bay. In this simulation the maximum tsunami elevation adjacent the study site is less than 0.8m.

Maximum current speeds during the 12 hours of simulated in Figure 10. The currents are in general less than 1m/s and likely smaller in magnitude than the tide generated currents. Overall, these are small values and are not expected to present any hazard.

Three shoreline sites were selected by FCL for detailed investigation. The locations of these site are listed in Table 5 and shown in Figure 11. The time-series of water elevation at the three shoreline sites with ambient water level equal to MSL and HAT are given in Figures 12 and 13. The water elevation at all three sites is about equal throughout both simulations. The time-series shows very similar character to that given in Figure 9. With an ambient water level of MSL, the maximum elevation reached at all three sites is about 0.8m. With an ambient water level of HAT, the maximum elevation reached at all three sites is about 5.0m, or about 0.8m above HAT.

Table 5: Location and elevation of shoreline site within study area. Note that the elevation corresponds to the minimum elevation within the corresponding grid cell.

Site	Lon	Lat	Elevation (m, GD)
1	208.6119572	60.67561532	0.60
2	208.6240608	60.66522763	-3.19
3	208.6370291	60.65434973	-0.19

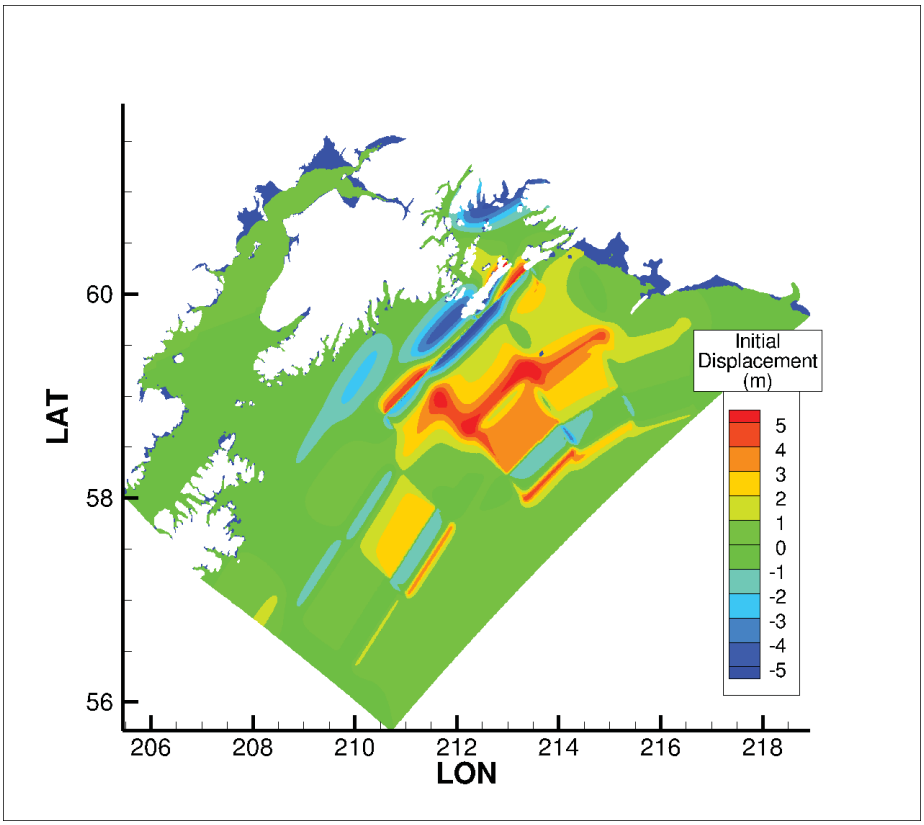


Figure 6: Surface displacement for MJDM fault.

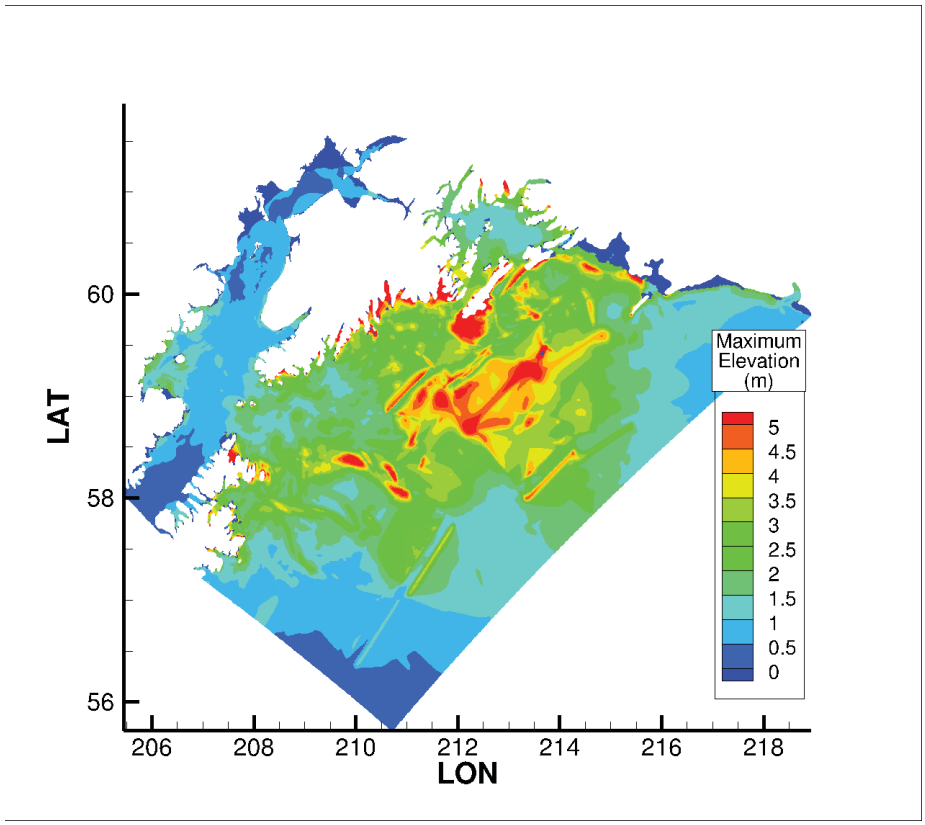


Figure 7: Maximum water surface elevation during the simulation for MJDM fault.

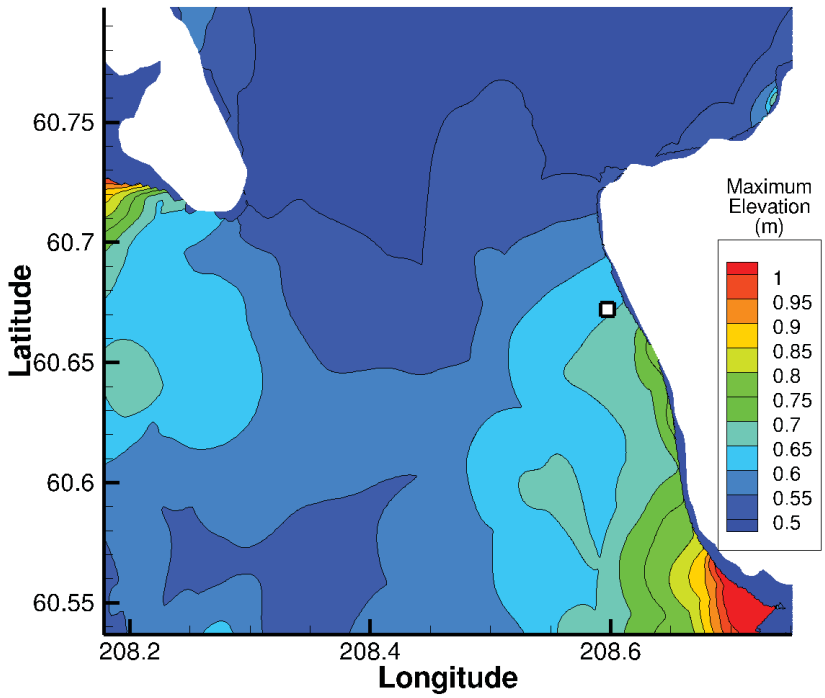


Figure 8: Maximum water surface elevation near study site during the simulation for MJDM fault. Square box indicates location of time-series output.

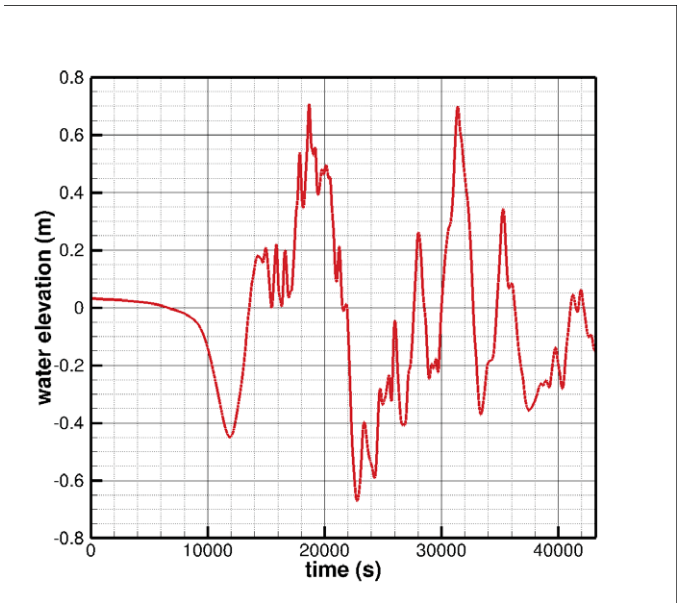


Figure 9: Time-series of sea level at location adjacent study site (see Figure 8).

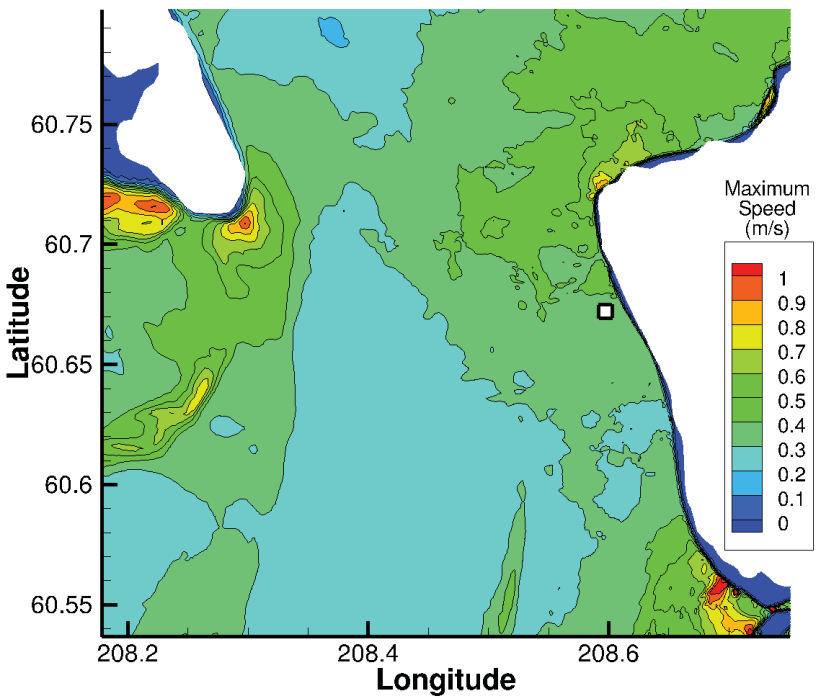


Figure 10: Maximum depth average water velocity near study site during the simulation for MJDM fault.

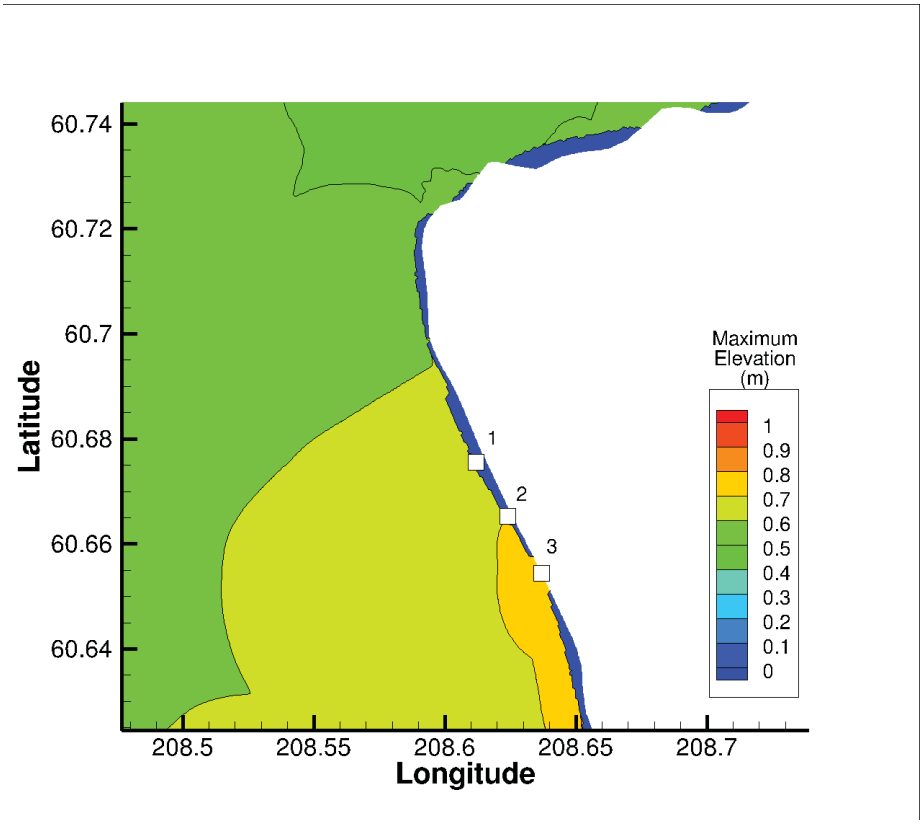


Figure 11: Maximum water surface elevation near study site during the simulation for MJDM fault. Numbered boxes indicate location of shoreline sites for time-series output (see figures 12 and 13).

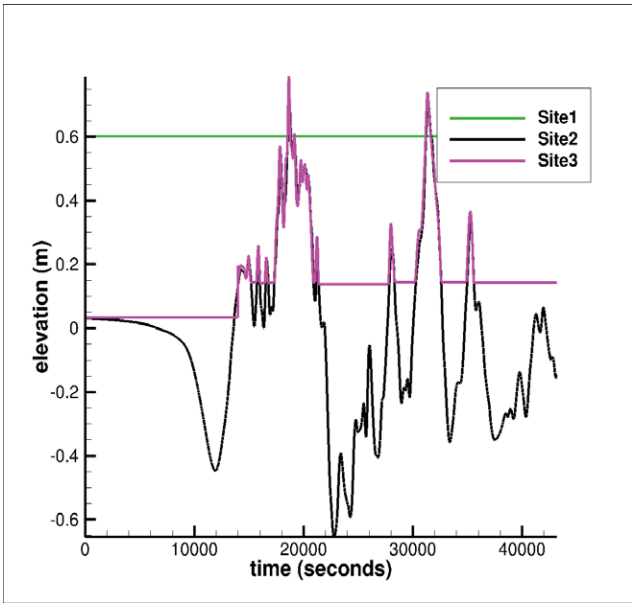


Figure 12: Time-series of sea level at shoreline locations within the study site (see Figure 11). Ambient water level are set equal to mean sea level.

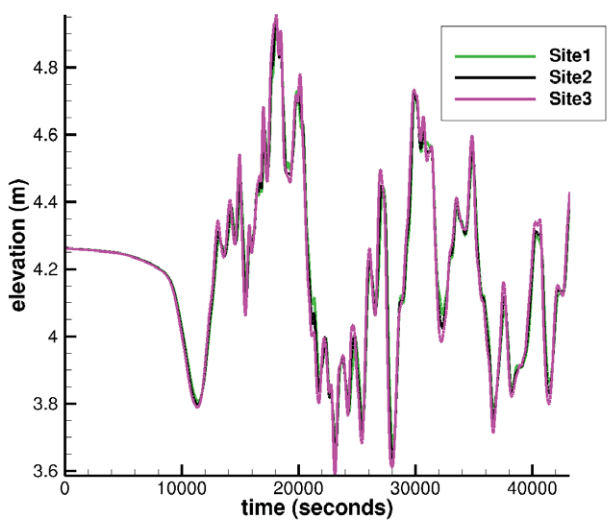


Figure 13: Time-series of sea level at shoreline locations within the study site (see Figure 11). Ambient water level are set equal to highest astronomical tide.

5.2 Submarine Landslide

Simulations were made using the 3 landslide scenarios described earlier (Section 3.3). The results were processed to derive the maximum water surface elevation for the entire length of the simulation (Figures 14, 16, and 18) and to derive the maximum water speed during the simulation (Figures 20 to 22).

The maximum water elevation and speed depend on the size of the source and the local water depth (Figure 23). The scenario with the largest landslide also has the largest maximum water surface elevation primarily because the length of the slide minimizes loss at the ends of the tsunami. The landslide occurs on the opposite side of the main channel from the study site (Figure 23). The amplitude of the wave is approximately 5.5 m in the channel. As the wave traverses the shoals on the east side of the channel, there is approximately a 50 % loss in amplitude from reflection and dispersion. As the wave runs up in the shoal water near the eastern shore, the amplitude increases up to approximately 4 m (Figure 15).

The second scenario using the southern part of the landslide mass generates the second largest tsunami. Because of the shorter length of the wave crest, the dispersive loss at the ends reduces the amplitude to a greater extent than the previous case. The resulting maximum water surface elevation is shown in Figure 16 and the time series at selected sites is shown in Figure 17.

The third scenario uses the northern part of the landslide mass and generates the smallest tsunami. This scenario has the smallest landslide mass and generates a tsunami with a relatively short length of the wave crest. Hence the tsunami radiates in more of a circular pattern with greater loss of amplitude. In addition, the wave directly impacts the shallow part of the shoal on the east side of the channel, further dissipating the wave.

In a sense, the maximum water speed shown in Figure 20 to 22 mimics the results for maximum elevation. In general, the speed is highest in the source area, over the shoals, and along the shoreline as is expected. There are large local currents in the source area during the generation of a tsunami. For the first and largest landslide scenario, the maximum speed is approximately 7 m/s. The other 2 cases exhibit smaller water speeds of 6.5 and 4 m/s. The maximum speed over the shoals follows a similar pattern with values of 3.5 m/s for the largest case, 3 m/s for the southern part of the landslide, and 2.5 m/s for the northern part of the landslide. Water speed along the shoreline is highly variable and ranges from small to 4 m/s.

Three locations on the eastern shoreline were identified as sites of special interest (Figure 11). At those sites, the tsunami amplitude is increased due to shoaling as shown in Figures 24 to 29. Two sets of figures are shown: one where the ambient water elevation is mean sea level (MSL) (Figures 24, 26 and 28) and one where the ambient water elevation is highest astronomical tide (HAT) (Figures 25, 27 and 29). For this area, HAT is 4.23 m.

The main difference between tsunami occurring at MSL and HAT is the travel time with the latter arriving earlier due to the larger propagation speed in deeper water. The wave amplitude for tsunami occurring at HAT is roughly the amplitude for the MSL case plus HAT, with some variation between sites.

Based on the results presented here, there are two other locations where subma-

fwla-wc-file1/Project:Projects:10_0000:10_160001_AKLNG_2016:05_Graphics:04.10160001_Seismic_Engineering_Report:10_140334_Appendix_G.indd

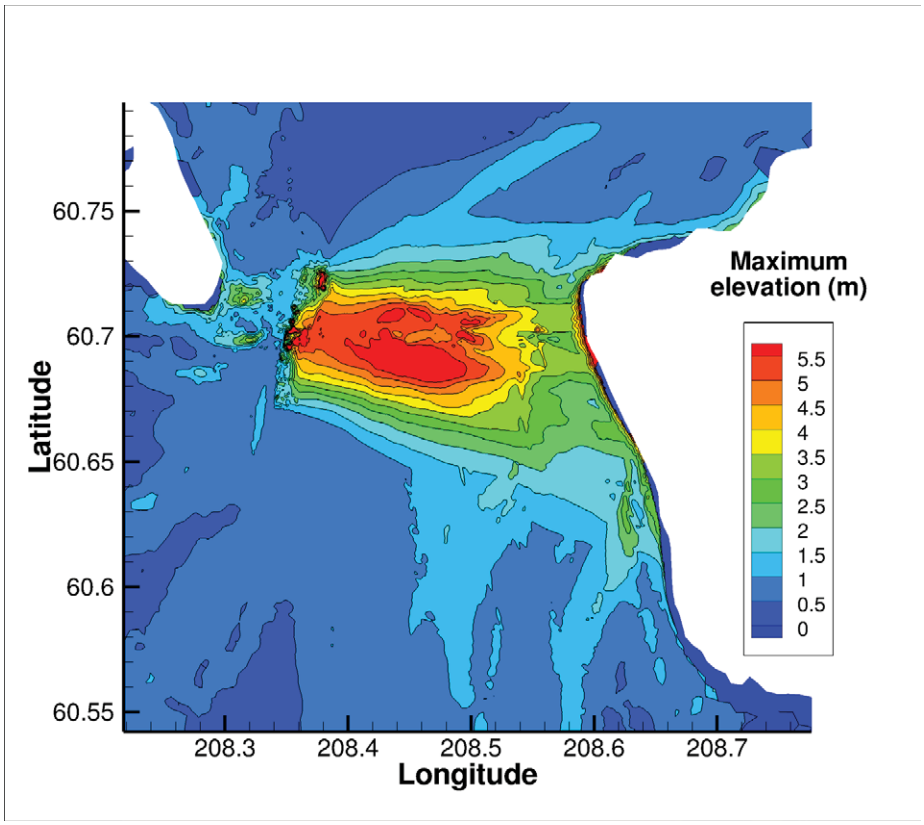


Figure 14: Maximum water surface elevation for the simulation using the entire landslide mass.

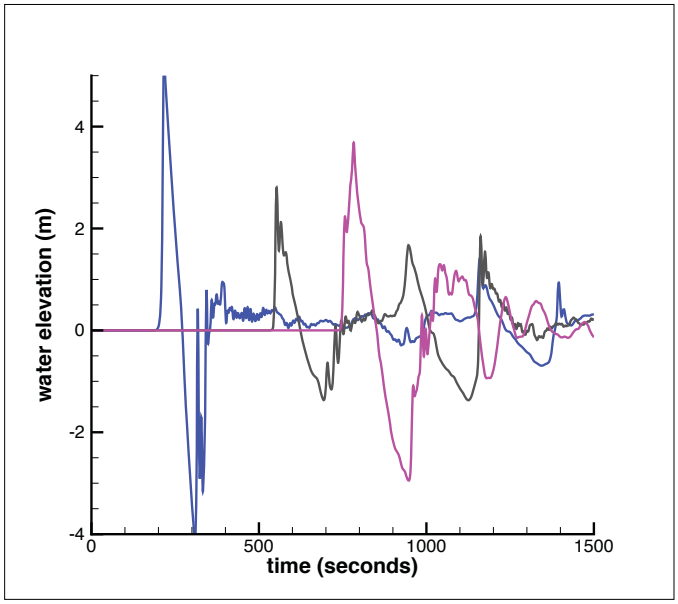


Figure 15: Water surface elevation for the simulation using the entire landslide mass. (blue) in the channel, (gray) over the shoals, (magenta) near the study site.

rine landslides may generate comparable or slightly larger tsunami. One location is farther south on the west wall of the channel. The channel is not as deep here, so the landslide volume would be somewhat smaller. However, the tsunami would propagate directly toward the study site across a deeper part of the shoal and hence experience less dissipation.

The second location is a landslide occurring on the east side of the channel adjacent to the study site. This case would probably have similar amplitude to the landslides on the west side of the channel due to the closer proximity to the site. The maximum water speed would probably be comparable to the larger scenarios. However, this approximation is based entirely on observing the response from landslide generated tsunami on the west side of the channel.

Considerable uncertainties exist when assessing potential landslides in this area. On the one hand, those that were shaken loose during the 1964 Prince William Sound earthquake should have left visible scars as an indicator. On the other hand, sedimentation particularly at deltas may have primed the system for more slides. In the end, there would need to be a detailed geologic survey of the area to determine sediment stability and deposition surfaces to reduce this uncertainty.

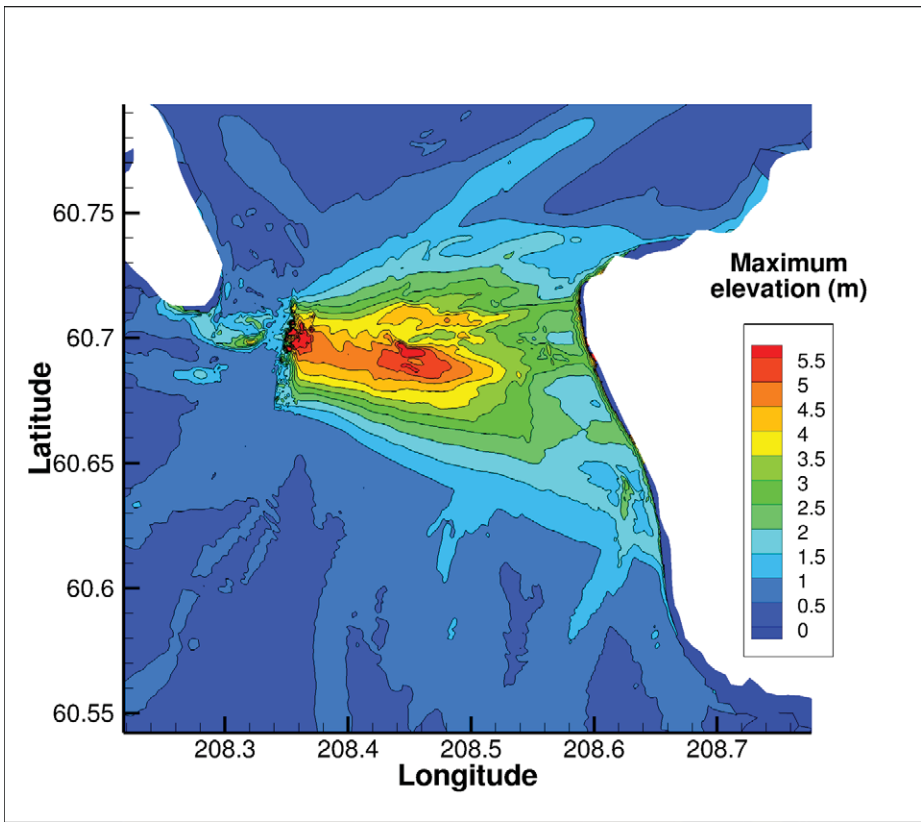


Figure 16: Maximum water surface elevation for the simulation using the southern part of the landslide mass.

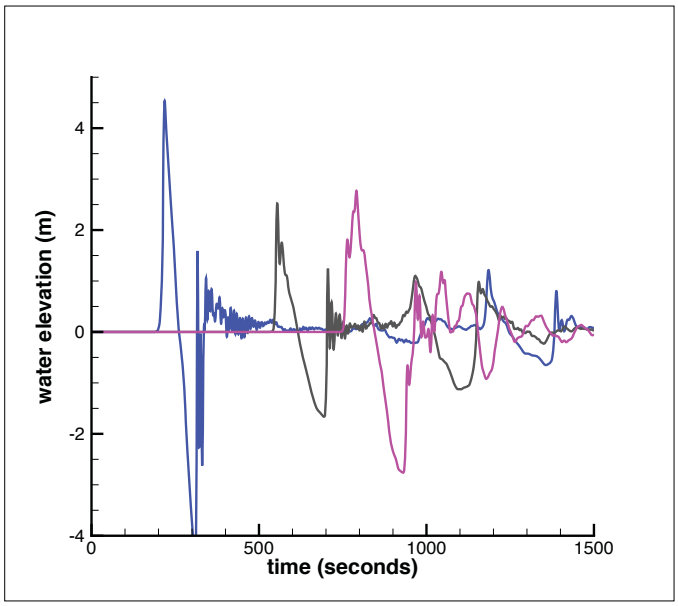


Figure 17: Water surface elevation for the simulation using the the southern part of the landslide. (blue) in the channel, (gray) over the shoals, (magenta) near the study site.

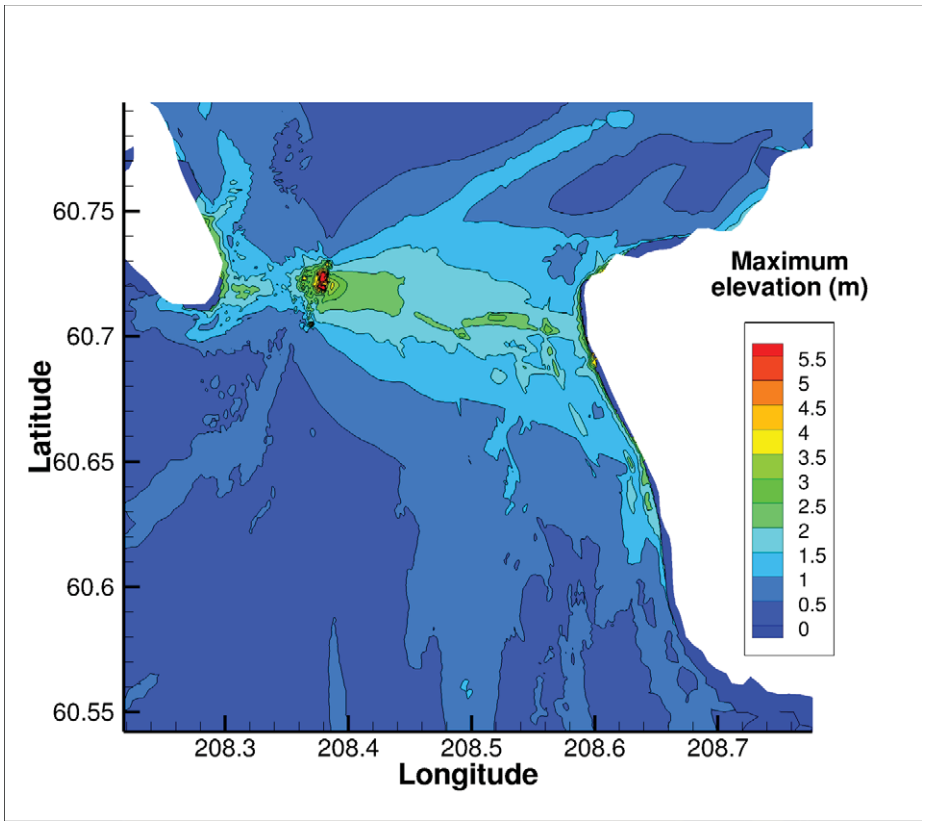


Figure 18: Maximum water surface elevation for the simulation using the northern part of the landslide mass.

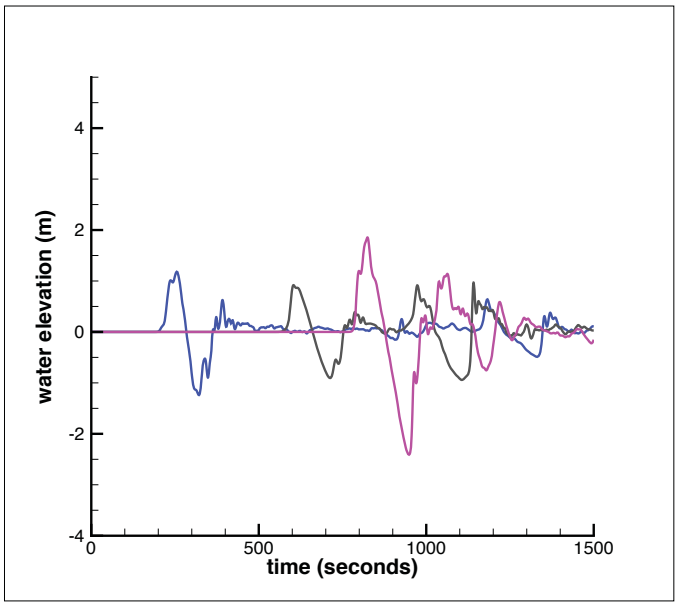


Figure 19: Water surface elevation for the simulation using the the northern part of the landslide. (blue) in the channel, (gray) over the shoals, (magenta) near the study site.

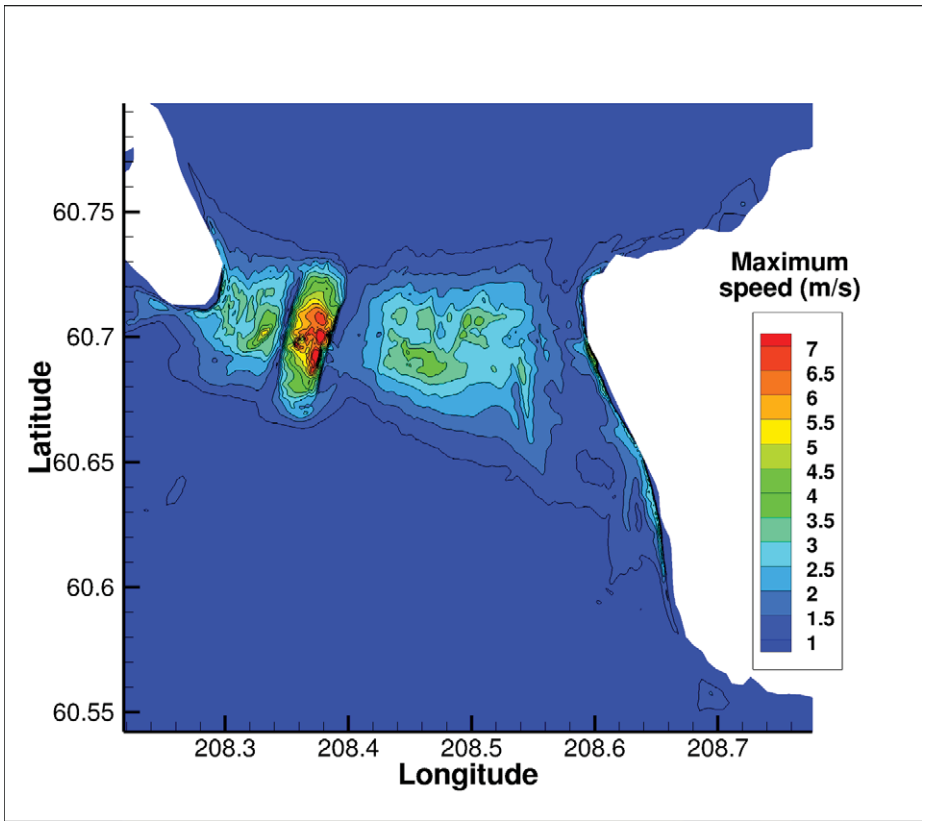


Figure 20: Maximum water speed for the simulation using the entire landslide mass.

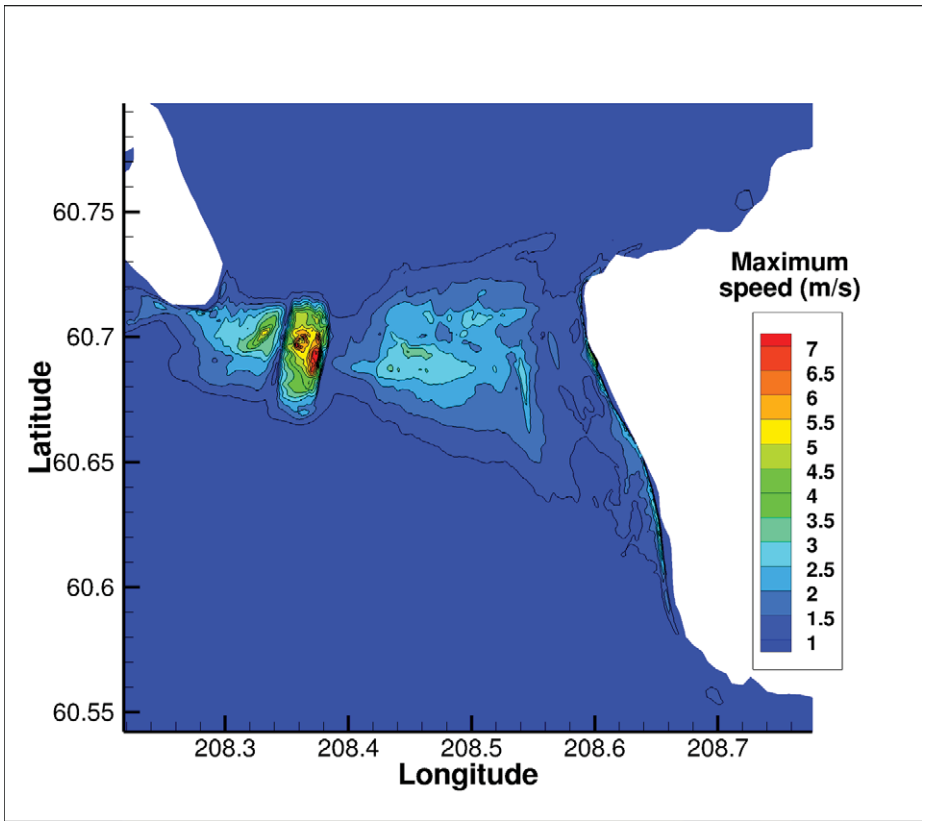


Figure 21: Maximum water speed for the simulation using the southern part of the landslide mass.

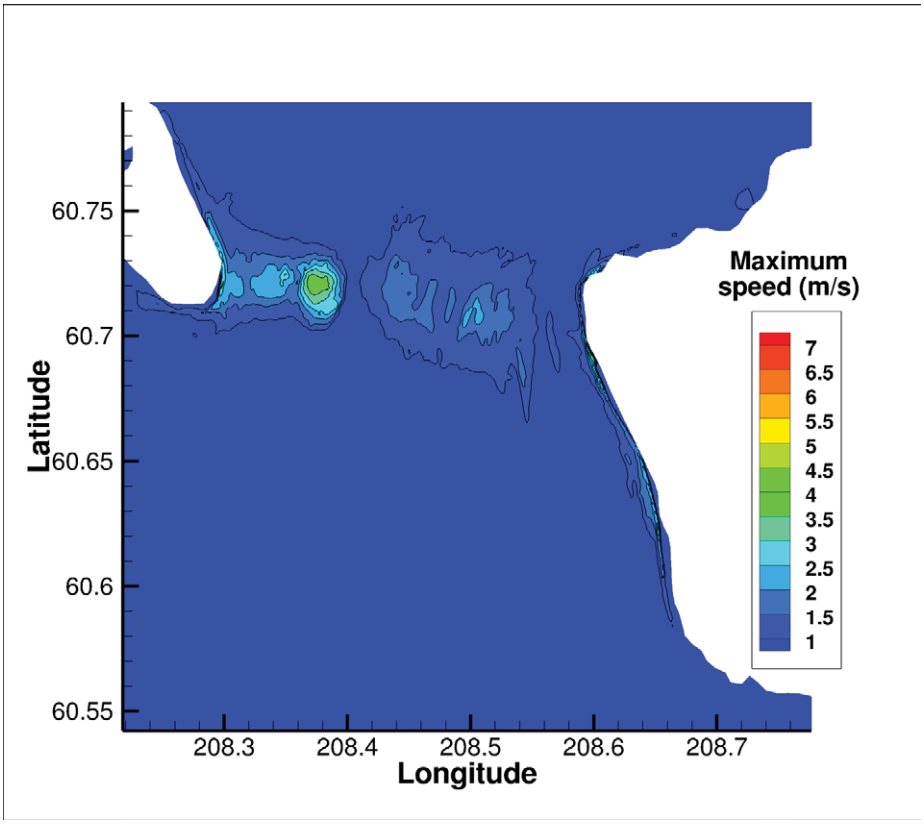


Figure 22: Maximum water speed for the simulation using the northern part of the landslide mass.

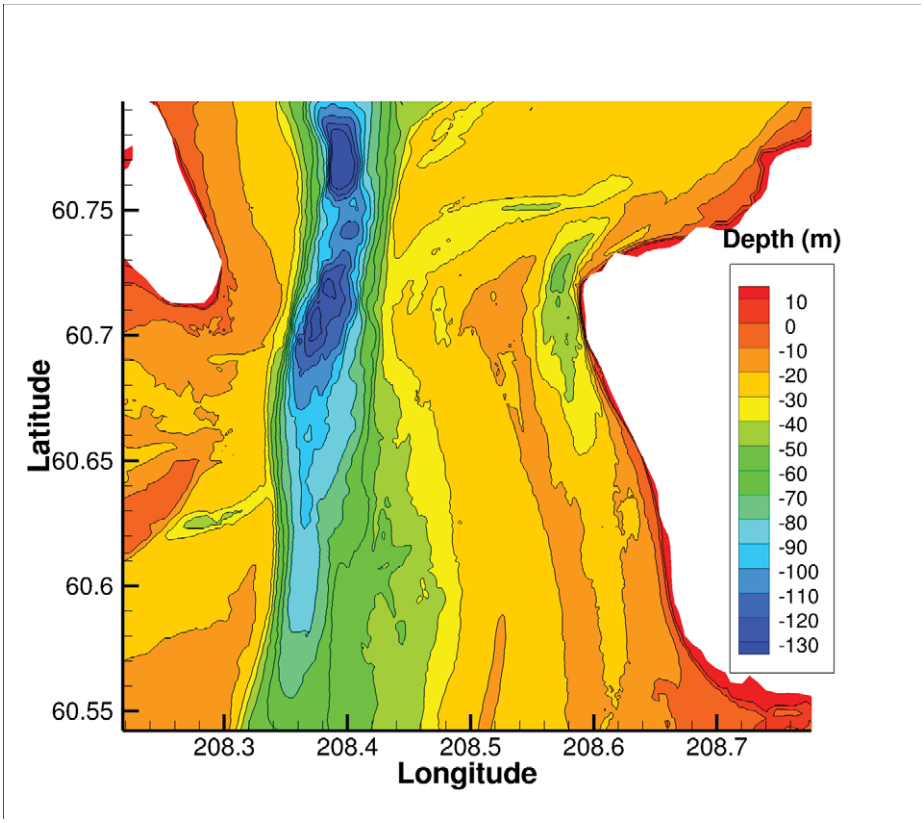


Figure 23: Water depth in the area around the submarine landslides.

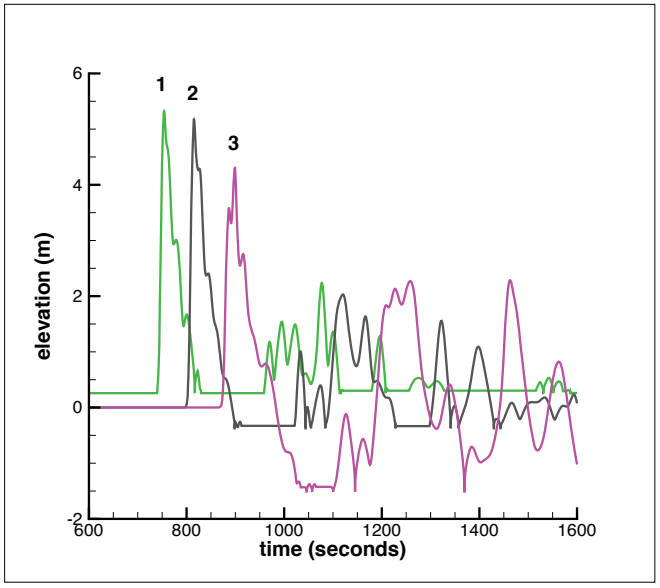


Figure 24: Water surface elevation at sites 1, 2 and 3 for the simulation using the entire landslide and initial water surface at MSL.

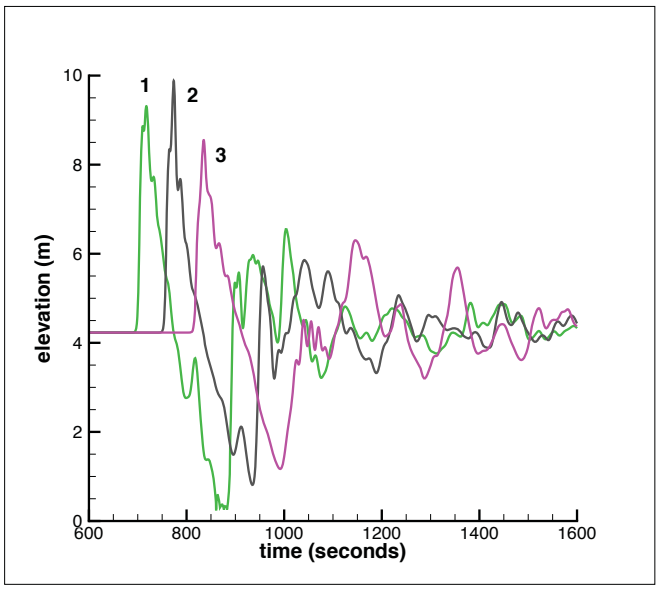


Figure 25: Water surface elevation at sites 1, 2 and 3 for the simulation using the entire landslide and initial water surface at HAT.

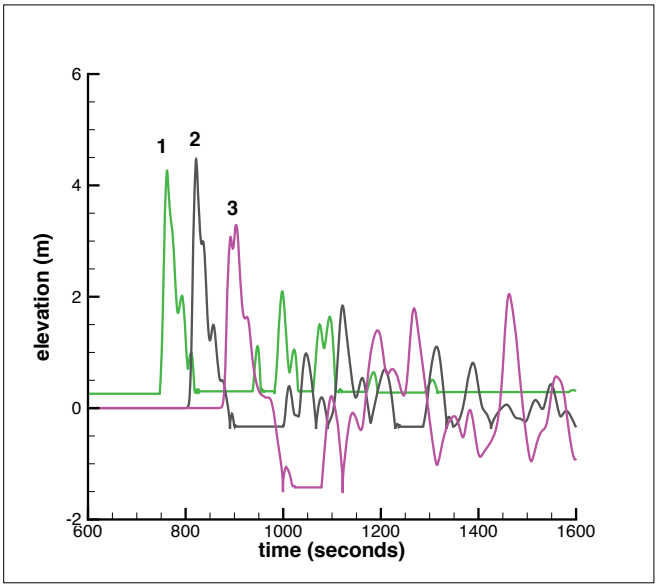


Figure 26: Water surface elevation at sites 1, 2 and 3 for the simulation using the southern part of the landslide and initial water surface at MSL.

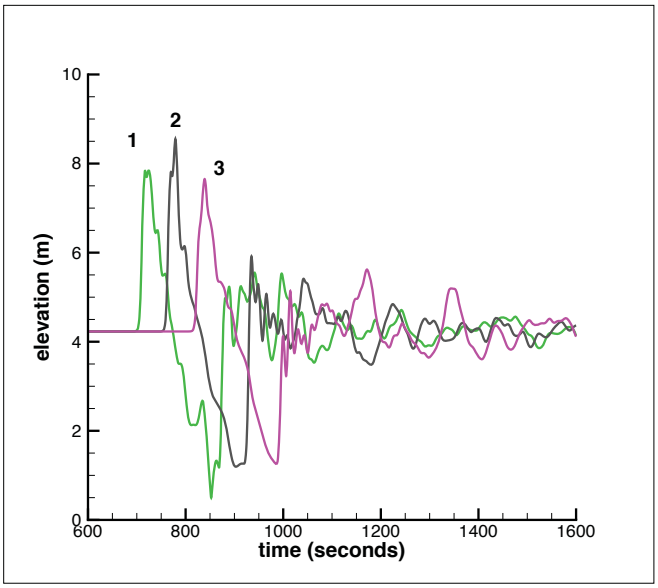


Figure 27: Water surface elevation at sites 1, 2 and 3 for the simulation using the southern part of the landslide and initial water surface at HAT.

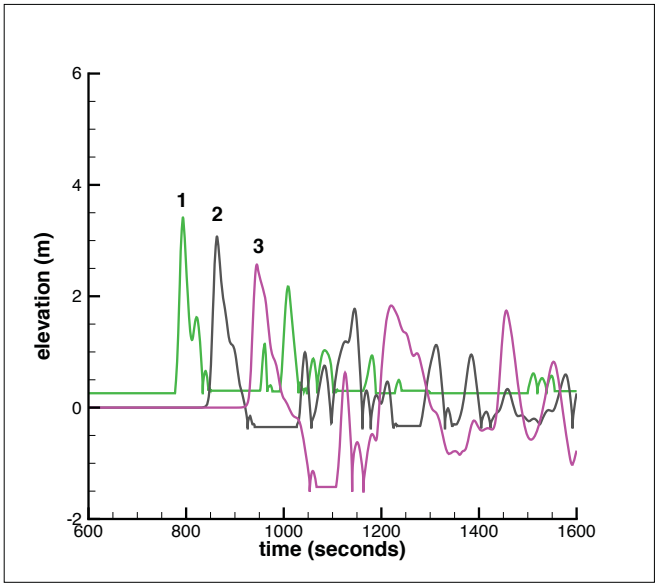


Figure 28: Water surface elevation at sites 1, 2 and 3 for the simulation using the northern part of the landslide and initial water surface at MSL.

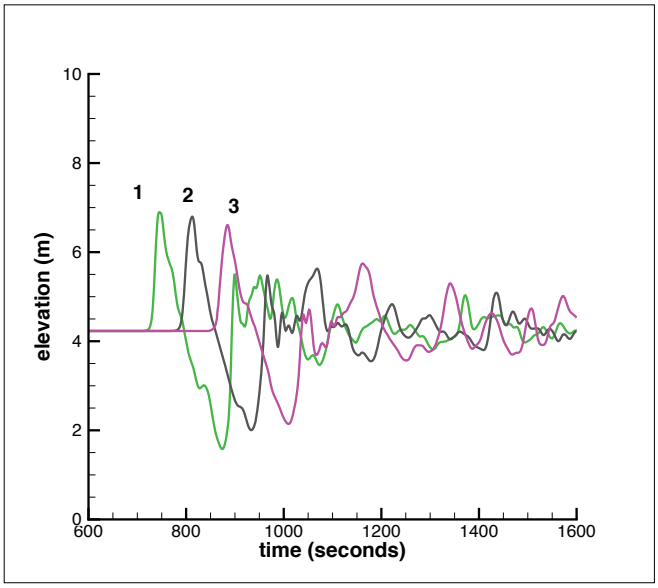


Figure 29: Water surface elevation at sites 1, 2 and 3 for the simulation using the northern part of the landslide and initial water surface at HAT.

6 Tsunami Tide Interactions

6.1 Effect of Ambient Water Level

Tsunami interaction with the tide can be important in Cook Inlet. Kowalik and Proshutinsky (2010) studied these interactions by concurrently modelling tides and an idealized tsunami wave. Their results indicate that at Anchorage, maximum tsunami elevation occurs when the tide is near mean sea level.

Concurrent modelling of tides and tsunami was beyond of the scope of the current work. Given the findings of Kowalik and Proshutinsky (2010), all previously described simulations in this work performed with a static ambient water level corresponding to mean sea level, so as to target the largest response at the study site.

To investigate the effect of ambient water level on tsunami amplitude, the simulations were re-run with a static ambient water level corresponding to highest astronomical tide at Nikiski (4.23m relative to MSL).

In the 1964 fault scenario, the increase in water level reduces the travel time to the study site. There is little difference in the initial wave, and the maximum elevation relative to the ambient wave level remains essentially unchanged. The smaller reflected waves that follow are more significantly affected but are less important. It appears that the differences in tsunami amplitude observed in Kowalik and Proshutinsky (2010) may be due to more complex interactions between the tidal and tsunami wave.

For the landslide scenarios, the increased water depth results in an initial wave which is a somewhat smaller. However, there is less dissipation over the shoals due to greater depth. The final wave is a somewhat larger (10-20cm higher) near the site compared to the case with ambient water level equal to mean sea level.

6.2 Combined Probability Distributions

A tsunami may strike at any tidal stage. Further complicating the situation is the long period of the tsunami wave; the largest wave crest does not necessarily result in the largest water level (for example, if the largest crest arrives at low tide). To estimate the probable maximum water level (tide and tsunami) at the time of arrival, joint probability distributions are calculated for each tsunami scenario.

In this work all tsunami simulations were performed with a sea level corresponding to highest astronomical tide (HAT), about 4.23m above mean sea level. This approach ensures that all sites that have a probability of being inundated for a specific event, will be inundated. Using the results at HAT, the joint probability distributions were calculated following the methods presented in Lane et al (2012). Since the tides are deterministic with a longest cycle of approximately 19 years, the combined probability distributions can be calculated directly from the summed time-series.

Tidal constituents were downloaded from the National Oceanic and Atmospheric Administration for Nikiski, Ak[1]. This gauge is very close to the study site. The tidal constituents were used to predict the tides over a 19 year tidal epoch at a time step of 15min. For each landslide tsunami scenario the time series of observations is available at 0.25 second time-step; for the megathrust scenario the results were available at

[1] http://tidesandcurrents.noaa.gov/stationhome.html?id=9455760

5 second time-step. The maximum total inundation level (water elevation here) was evaluated for the tsunami source occurring at every time-step in the tidal time-series. The resulting population of inundation levels was then used to construct a probability distribution. The inundation population is calculated by:

$$I_{max}(i) = max(x(i : i + Nj) + \eta(1 : Nj) - HAT) \tag{1}$$

where I_{max} is the maximum total inundation (water level) for the tsunami source occurring at time-step i, x is the tidal water level time series (interpolated to the same time-step as the tsunami time-series), η is the tsunami time-series, HAT is highest astronomical tide and Nj is the total number of time-steps in the tsunami time-series. The notation $max()$ indicates the maximum value of the enclosed time-series.

The probability distributions are constructed using a 10cm bin-width. Bins with an elevation less than the ground elevation at the observation site are set to zero (the site does not get wet). Because of this adjustment not all probability distributions sum to 1.

The probability distribution of the tides alone is given in Figure 30. The combined probability distributions for each of the tsunami scenarios is given in Figures 31-34. The combined probability distribution of the mega-thrust event has a characteristic bell shape. This occurs because the duration of this tsunami is very long (12+ hours), so the maximum water level over the tsunami duration is dominated by the strong diurnal tide. The landslide events occur over a much shorter time-scale, less than 1 hour. Because of their short duration, the combined distributions for the landslide events are similar to the instantaneous tidal probability distribution (Figure 30), but with a positive shift corresponding to the inundation achieved in the tsunami. The probability distributions are also provided as text files accompanying this report.

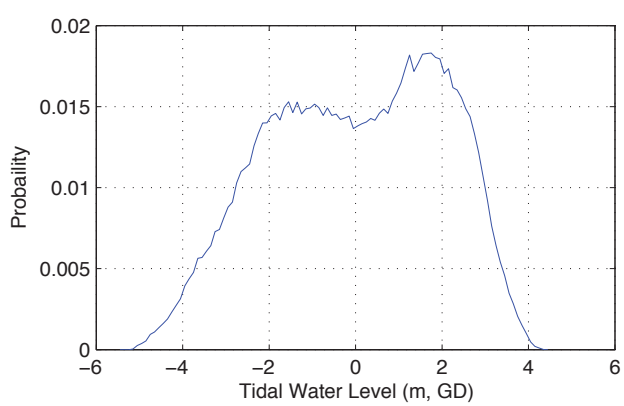


Figure 30: Probability distribution of instantaneous tidal water levels at Nikiski, AK. Bins of 0.1m.

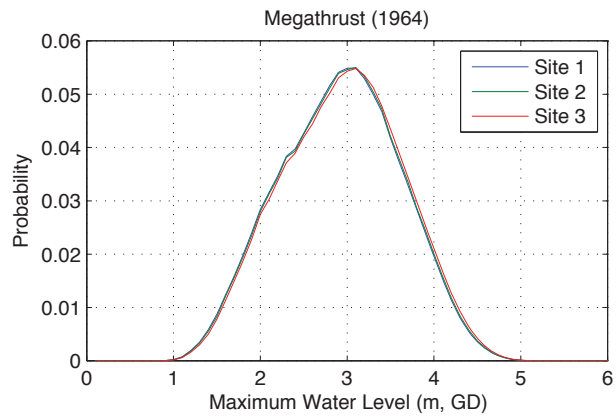


Figure 31: Probability distribution of maximum combined tidal-tsunami water levels due to the 1964 mega-thrust fault event (MJDM). Bins of 0.1m.

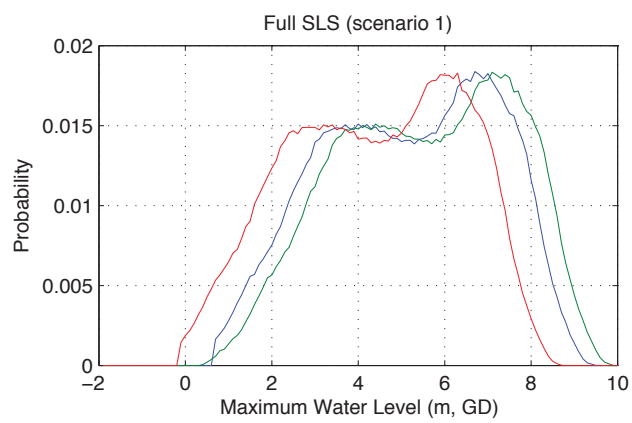


Figure 32: Probability distribution of maximum combined tidal-tsunami water levels due to submarine landslide, scenario 1 (the full slide mass). Bins of 0.1m.

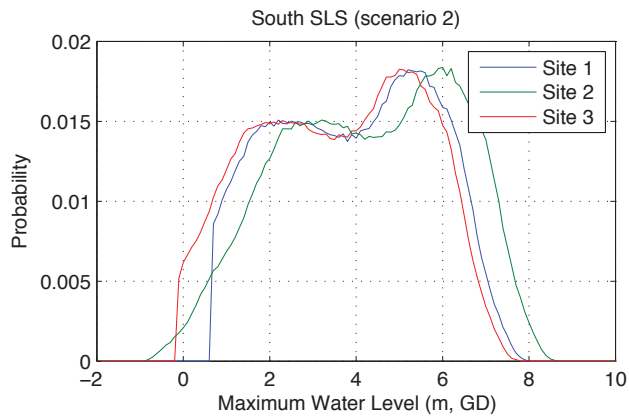


Figure 33: Probability distribution of maximum combined tidal-tsunami water levels due to submarine landslide, scenario 2 (the south slide mass). Bins of 0.1m.

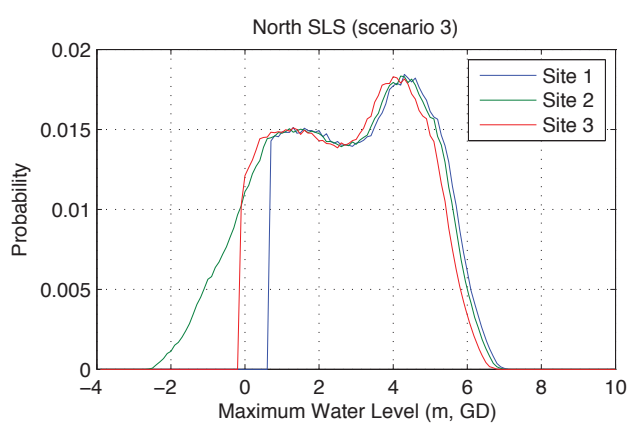


Figure 34: Probability distribution of maximum combined tidal-tsunami water levels due to submarine landslide, scenario 3 (the north slide mass). Bins of 0.1m.

References

Beget, J.E., and Kowalik, Z (2006) Confirmation and calibration of computer modeling of tsunamis produced by Augustine volcano, Alaska. Science of Tsunami Hazards 24 (4): 257-266.

Kowalik, Z, and Proshutinskym, A, (2010) Tsunamitide interactions: A Cook Inlet case study. Continental Shelf Research 30: 633642.

Casulli, V., A high-resolution wetting and drying algorithm for free-surface hydrodynamics, Int. J. Numer. Meth. Fluids 60 (2008) 391–408. DOI: 10.1002/fld.1896

George DL, Iverson RM. 2014 A depth-averaged debris-flow model that includes the effects of evolving dilatancy. II. Numerical predictions and experimental tests. Proc. R. Soc. A 470: 20130820. http://dx.doi.org/10.1098/rspa.2013.0820

Henry, R.F., Walters, R.A.,1992. A geometrically-based, automatic generator for irregular triangular networks. Communications in Applied Numerical Methods 9: 555–566.

Holdahl S.R., and Sauber, J. (1994). Coseismic Slip in the 1964 Prince William Sound Earthquake: A New Geodetic Inversion Pure Appl. Geophys. 142 (1): 55-82.

Ichinose, G., P. Somerville, H. K. Thio, R. Graves, and D. OConnell (2007) Rupture process of the 1964 Prince William Sound, Alaska, earthquake from the combined inversion of seismic, tsunami, and geodetic data. J. Geophys. Res. 112: B07306, doi:10.1029/2006JB004728.

Iverson RM, George DL. 2014 A depth-averaged debris-flow model that includes the effects of evolving dilatancy. I. Physical basis. Proc. R. Soc. A 470: 20130819. http://dx.doi.org/10.1098/rspa.2013.0819

Johnson, J.M., Satake, K., Holdahl S.R., and Sauber, J. (1996). The 1964 Prince William Sound earthquake: Joint inversion of tsunami and geodetic data. Journal of Geophysical Research 101 (BI): 523-532.

Kienle, J., Kowalik, Z., and Murty, T.. (1987) Tsunamis Generated by Eruptions from Mount St. Augustine Volcano, Alaska Science 236: 1442-1447.

Kienle, J., Kowalik, Z., and Troshina, E. (1996) Propagation and runup of tsunami waves generated by Mt. St. Augustine Volcano, Alaska. Science of Tsunami Hazards 14 (3): 191-206.

Lane, E., Gillibrand, P., Power, W., and Wang, X. (2012) A Probabilistic Tsunami Hazard Study of the Auckland Region, Part II: Inundation Modelling and Hazard Assessment. Pure and Applied Geophysics.

Okada, Y. (1985). Surface deformation due to shear and tensile faults in a half-space. Bulletin of the Seismological Society of America 75: 1135-1154.

Plafker,G.(1969). Tectonics of the March27, 1964 Alaska earthquake. U.S. Geol.Survey. Prof. Pap.543-1: 1-74.

Suito, H., and Freymueller, J.T. (2009) A viscoelastic and afterslip postseismic deformation model for the 1964 Alaska earthquake. Journal of Geophysical Research 114: B11404. doi:10.1029/2008JB005954

Suleimani, E., Nicolsky, D.J., Haeussler, P.J., and Hansen, R. (2011). Combined Effects of Tectonic and Landslide-Generated Tsunami Runup at Seward, Alaska During the MW 9.2 1964 Earthquake. Pure Appl. Geophys. 168: 10531074.

Walters, R.A., (2005), A semi-implicit finite element model for non-hydrostatic (dispersive) surface waves, International Journal for Numerical Methods in Fluids 49, 721-737.

Walters, R.A., Barnes, P., and Goff, J. (2006a). Locally generated tsunami along the Kaikoura coastal margin: Part 1. Fault ruptures. New Zealand Journal of Marine and Freshwater Research 40 (1): 1-16.

Walters, R.A., Barnes, P., Lewis, K., Goff, J., and Fleming, J (2006b). Locally generated tsunami along the Kaikoura coastal margin: Part 2. Submarine landslides. New Zealand Journal of Marine and Freshwater Research 40 (1): 17-28.

Walters, R.A. and Casulli, V., 1998, A robust, finite element model for hydrostatic surface water flows. Communications in Numerical Methods in Engineering 14: 931-940.

Walters, R., Goff, J., and Wang, K. (2006c). Tsunamigenic sources in the Bay of Plenty, New Zealand. Science of Tsunami Hazards 24 (5): 339-347.

Waythomas, C. F., Dorava, J. M., Miller, T. P., Neal, C. A., and McGimsey, R. G. (1997) Preliminary Volcano-Hazard Assessment for Redoubt Volcano, Alaska. Open-File Report 97-857, U.S. Geological Survey: 40p.

Waythomas, C. F. and Waitt, R.B. (1998) Preliminary Volcano-Hazard Assessment for Augustine Volcano, Alaska. Open-File Report 98-106, U.S. Geological Survey: 39p.

Waythomas, C. F., Watts, P., and Walder, J. S. (2006) Numerical simulation of tsunami generation by cold volcanic mass flows at Augustine Volcano, Alaska. Nat. Hazards Earth Syst. Sci., 6: 671-685.

Wilson, B, and Torum, A, (1968) THE TSUNAMI of the Alaskan Earthquake,1964: Engineering Evaluation. Technical Memorandum No. 25, U.S. Army Corps of Engineers.

A APPENDIX

A.1 Model description

The model, RiCOM, is based on the 3-dimensional shallow water equations which are derived from the Reynolds-averaged Navier-Stokes equations by using the hydrostatic assumption and the Boussinesq approximation. For incompressible flows the continuity equation (incompressibility constraint) is

$$\nabla \cdot \mathbf{u} + \frac{\partial w}{\partial z} = 0, \tag{2}$$

and the momentum equation expressed in nonconservative form is

$$\frac{D\mathbf{u}}{Dt} + f\hat{\mathbf{z}} \times \mathbf{u} + g\nabla\eta - \frac{\partial}{\partial z}(A_v \frac{\partial \mathbf{u}}{\partial z}) - \nabla \cdot (A_h \nabla \mathbf{u}) = 0, \tag{3}$$

where the coordinate directions (x, y, z) are aligned in the east, north, and vertical directions; $\mathbf{u}(x, y, z, t)$ is the horizontal velocity with components (u, v); $w(x, y, z, t)$ is the vertical velocity; f is the Coriolis parameter; $\hat{\mathbf{z}}$ is the upward unit vector; $\eta(x, y, t)$ is the distance from a reference elevation (mean sea level in this case) to the free surface; g is the gravitational acceleration; A_v and A_h are the kinematic vertical and horizontal viscosities, respectively; and ∇ is the horizontal gradient operator ($\partial/\partial x$, $\partial/\partial y$).

The free surface equation is derived by vertically-integrating the continuity equation and using the kinematic free surface and bottom boundary conditions:

$$\frac{\partial \eta}{\partial t} + \nabla \cdot (\int_h^\eta \mathbf{u} dz) = 0, \tag{4}$$

where $h(x, y)$ is the bottom elevation measured from a reference elevation such that $H(x, y, t)$ is the total water depth given by $H = \eta - h$.

In this study, the vertically integrated 2-dimensional shallow water equations are used. The continuity equation is the same as the free surface equation given by (4), and the momentum equation is given by the vertical integral of (3). The continuity equation is

$$\frac{\partial \eta}{\partial t} + \nabla \cdot (H\mathbf{u}) = 0 \tag{5}$$

and the momentum equation expressed in nonconservative form is

$$\frac{d\mathbf{u}}{dt} + f\hat{\mathbf{z}} \times \mathbf{u} + g\nabla\eta + \frac{\tau_b}{\rho H} = 0 \tag{6}$$

where $\mathbf{u}(x, y, t)$ is now the depth-averaged horizontal velocity with components (u, v); $h(x, y)$ is the water depth measured from a reference elevation; $H(x, y, t)$ is the total water depth, $H = \eta - h$; and ρ is a reference density. The bottom stress τ_b is given by

$$\frac{\tau_b}{\rho} = C_D|\mathbf{u}|\mathbf{u} = \gamma H\mathbf{u} \qquad (z = h), \tag{7}$$

where C_D is a bottom drag coefficient, and γ is defined by this equation.

Lateral boundary conditions for (2) - (4) generally fall into two categories: conditions at open (sea) boundaries and conditions at solid (land) boundaries. At open boundaries sea level η, radiation conditions, or a combination of these two are generally set. For this study, radiation conditions are used. At land boundaries, the normal component of velocity vanishes so that $(\mathbf{u} \cdot \widehat{\mathbf{n}}) = 0$ where $\widehat{\mathbf{n}}$ is the unit normal.

A.1.1 Time discretization

The equations are discretized in time using a semi-implicit method such that some of the terms in the equations are treated implicitly and some terms explicitly. The equations are evaluated in the time interval $\Delta t = t^{n+1} - t^n$ where the superscript denotes the time level. The distance through the time interval is given by the weight θ. Using this approximation, the free surface equation becomes

$$\frac{\eta^{n+1} - \eta^n}{\Delta t} + \nabla \cdot \left[\theta H^{n+1}\mathbf{u}^{n+1} + (1-\theta)H^n\mathbf{u}^n\right] = 0 \tag{8}$$

The material derivative in the momentum equation is approximated using Eulerian-Lagrangian methods (ELM) or semi-Lagrangian methods (SLM) which take advantage of the simplicity of Eulerian methods and the enhanced stability and accuracy of Lagrangian methods. With ELM, only the term at time level n in the material derivative is evaluated at the foot of the trajectory. With SLM, all terms evaluated at time level n are evaluated at the foot of the trajectory so the entire equation is treated in a Lagrangian sense.

Using an ELM approach, the momentum equation becomes

$$\frac{\mathbf{u}^{n+1} - \mathbf{u}^*}{\Delta t} + \gamma\mathbf{u}^{n+1} + f\hat{\mathbf{z}} \times \mathbf{u}^m = g\nabla\left[\theta\eta^{n+1} + (1-\theta)\eta^n\right] \tag{9}$$

where the superscripts $n+1$ and n denote variables evaluated at the fixed nodes in the Eulerian grid at times t^{n+1} and t^n, respectively. At each time step, the velocity is integrated backwards with respect to time to determine where a particle starts at time t^n in order to arrive at a grid node at time t^{n+1}. This point is referred to as the foot of the trajectory. The superscript $*$ denotes a variable evaluated at the foot of the trajectory. The material derivative, the first term, thus has a very simple form.

The proper choice of tracking and interpolation methods is critical for maintaining accuracy with SLM and ELM approximations. Here, a power-series approach in time is used to calculate the trajectory and the global-quadratic interpolation method is used to evaluate the velocity at the foot of the trajectory (Walters et al., 2008).

Note that the viscosity term is treated implicitly to remove stability constraints whereas the horizontal viscosity term is neglected. The Coriolis term is integrated using a 3rd-order Adams-Bashforth scheme that is both efficient and avoids any major stability constraints (Walters et al., 2009).

A.1.2 Space discretization

The governing equations, (8) and (9), are approximated in space using finite element methods. The interpolation functions on each element are a piecewise constant approximation for sea level, η, and a linear approximation for velocity such that the normal velocity is constant on each edge. This element is known as the RT_0 element, the Raviert-Thomas element of lowest order.

Both the continuity equation and free surface equation reduce to a finite volume approximation using the RT_0 element. The free surface equation can be written in a finite volume form that conserves mass both locally and globally,

$$A_e \frac{{\eta_e}^{n+1} - {\eta_e}^{n}}{\Delta t} = \int_{\Gamma_e} \left[\theta(H^{n+1}{u_n}^{n+1}) + (1-\theta)(H^n {u_n}^n)\right] d\Gamma_e, \qquad (10)$$

where subscript e denotes the value for a specific element, subscript n denotes a normal component, A is the area in the x-y plane, and Γ_e is the bounding surface along the edges of the element. The last term has been converted from a volume divergence to a surface integral using the Gauss Divergence Theorem.

Likewise, the momentum equation becomes

$$\mathbf{A}\mathbf{u}_n^{n+1} = \mathbf{G} - g\theta\Delta t \boldsymbol{\Delta}\eta^{n+1}\mathbf{Z}, \qquad (11)$$

where $\mathbf{A}$ is a block tridiagonal matrix that contains the mass matrix and the implicit terms arising from the vertical component of stress, $\mathbf{u}_n$ is the vector of normal velocity on each edge, $\mathbf{G}$ contains all the explicit terms and the known component of the implicit terms, and the last term is the implicit part of the surface pressure gradient term such that $\boldsymbol{\Delta}\eta$ is a vector of the difference in element values across an edge and $\mathbf{Z}$ is a vector of depth increments. The mass matrix is lumped using the technique for finite element node point integration (FE-NPI) described in Walters et al. (2009). This is equivalent to discretising the pressure gradient term using the distance between element centroids as measured orthogonal to an element edge.

The tridiagonal matrix at each velocity node can be inverted and u_n^{n+1} substituted into the free surface equation (10) to derive a discrete form of a wave equation that has only η at the $n+1$ time level. Typically, η^{n+1} is solved for first, followed by a calculation of $\mathbf{u}_n^{n+1}$ from (11). This method provides an efficient means to solve the equations. The specific forms of the matrices are shown in detail in Walters et al. (2009).

A.1.3 Wetting and drying algorithm

Note that in the free surface equation and the discrete wave equation, water depth H is a factor in all the side flux terms. When $H = 0$ (i.e. the side is dry), there is automatically no water flux through that side. When all sides of an element are dry, the water level is stationary in time. Hence, wetting and drying can be implemented as a linear problem without any special treatment but are limited by the Courant number.

However, RiCOM now uses a nonlinear approach. Writing the free-surface equation in terms of finite volumes

$$\mathbf{V}_i(\eta_i^{n+1}) = \mathbf{V}_i(\eta_i^n) - \Delta t \sum_{l=1}^{S_i} s_{i,l} A_j^n [\theta u_j^{n+1} + (1 - \theta u_j^n] \tag{12}$$

where $\mathbf{V}_i(\eta_i^n)$ is the volume in the ith column delimited by the free surface η^n, Δt is the time step size, $s_{i,l}$ is a sign function to identify the positive normal direction, θ is the implicitness factor, and u_j^n is the normal velocity on side j and time t^n.

Solving the momentum equation for u_j^{n+1} and substituting into (12), the resulting discrete wave equation can be written in compact form as

$$\mathbf{V}(\zeta) + \mathbf{T}\zeta = \mathbf{b} \tag{13}$$

where $\zeta_i = \eta_i^{n+1}$, $\mathbf{V}_i(\zeta) = \mathbf{V}_i(\eta_i^{n+1})$, and $\mathbf{T}$ is the pressure gradient flux matrix.

Note that if the surface elevation is greater than the depth at any of the vertices of the element, the method reduces to the linear method. Otherwise, $\mathbf{V}(\eta)$ is a nonlinear function of η. An efficient Newton-type algorithm for solving 13 is given by Casulli (2008)

$$[\mathbf{P}(\zeta^m) + \mathbf{T}]\Delta\zeta^{m+1} = [\mathbf{V}(\zeta^m) + \mathbf{T}\zeta^m - \mathbf{b}] \tag{14}$$

where m is the iteration index, $\mathbf{P}$ is the wetted area, and $\Delta\zeta^{m+1} = \zeta^{m+1} - \zeta^m$. In practice, this formulation converges rapidly so presents little overhead.

References

Casulli, V., A high-resolution wetting and drying algorithm for free-surface hydrodynamics, Int. J. Numer. Meth. Fluids 60 (2008) 391–408. DOI: 10.1002/fld.1896

Walters, R.A., Hanert, E., Pietrzak, J.D., Le Roux, D.Y., Comparison of unstructured, staggered grid methods for the shallow water equations. Ocean Modelling 28 (2009) 106–117.

Walters, R.A., Lane, E.M., Henry, R.F., Semi-Lagrangian methods for a finite element coastal ocean model, Ocean Modelling 19 (2008) 112–124.

Walters, R.A., Lane, E.M., Hanert, E., Useful time-stepping methods for the Coriolis term in a shallow water model, Ocean Modelling 28 (2009) 66–74. doi:10.1016/j.ocemod.2008.10.004