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Part 3 of 19 of Appendices for Resource Report No. 13 LNG

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LNG Facilities Probabilistic Seismic Hazard Analysis (PSHA) Report
USAL-FG-GRHAZ-00-002015-001 Rev.0
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Report No. 04.10140334-6



APPENDIX A
TIME-DEPENDENT CALCULATIONS FOR THE ALASKA MEGATHRUST SEISMIC
SOURCE

APPENDIX A

TIME-DEPENDENT CALCULATIONS FOR THE ALASKA MEGATHRUST SEISMIC SOURCE

A time-dependent occurrence rate for a seismic source supports the concept that if the last earthquake occurred recently, the longer it will be until the next one, and vice versa. These rates thus should be lower and higher, respectively, than the average (Poissonian) rate. For this study we have employed time-dependent rates for the megathrust source of the 1964 **M** 9.2 earthquake. The annual Poissonian rate is simply the reciprocal of the average interevent time (535 years), and is constant from year to year.

Two time-dependent models are utilized, including:

- 1) the lognormal model, and
- 2) the Brownian Passage Time (BPT) model (Matthews et al., 2002).

The lognormal model assumes that interevent times are lognormally distributed about a mean value, with a standard deviation. The BPT model is more complex, and claims to be more realistic in modeling interevent times. Each requires a parameter quantifying the uncertainty in interevent times. For the lognormal model it is sigma (σ), the standard deviation, and for the BPT model it is alpha, the “aperiodicity parameter”. In California (Cramer et al., 2000) and Cascadia (Petersen et al., 2002) σ was found to be about 0.5. The BPT alpha parameter is more difficult to quantify, but here we also use 0.5, as suggested in Petersen et al. (2002). The other two parameters both models require are: (1) the exposure period, in this case the estimated life span of the structure, and (2) the number of years since the last earthquake exposure to the hazard begins.

Results from the two time-dependent calculations were weighted equally. The time-dependent and Poissonian rates were weighted 0.33 and 0.67, respectively. In other words, it was felt that the non-time dependent scenarios were twice as likely as the time-dependent scenarios. Time-dependent scenarios are currently not widely used in probabilistic seismic hazard analyses (PSHA), and are thus not highly weighted for this analysis.

[Table A-1](#) shows the input parameters and calculation results for the megathrust source. An exposure period of 50 years was assumed as the life of the structure, and a time-to-construct of 5 years from 2014.

[Figure A-1](#) shows probability of occurrence in the 50-year window on the y-axis, and probability of occurrence during that window as a function of fractional time into the average repeat time on the x-axis, for the megathrust source. The assumed “start date”, i.e., initiation of facility operation, is shown as the red triangle. The 50-year occurrence probabilities from the start date are the

intersections of the vertical projection of the start date with the two model results. Given that we are only 10% into the 535-year cycle, the probabilities of occurrence for the time-dependent models is very low. Those values are shown in rows 7 and 9. The Poissonian rate for a 50-year window is shown in row 6. The annual rates for the two time-dependent models are shown in rows 8 and 10 of [Table A.1](#). Row 12 contains the final weighted annual rate for the source, and row 13 contains the ratio of the final rate to the Poissonian rate. For the megathrust source the final rate is 67% of the Poissonian annual frequency. The effective return period is 802 years (row 13).

Table A.1: Time-Dependent and non-Time Dependent (Poissonian) Rates

Row No.	Detail	Megathrust
1	Magnitude	9.2
2	Return period for Magnitude (yrs)	535
3	Years since most recent event + time to construct	55
4	Exposure Period (yrs)	50
5	Poissonian annual frequency	1.87e-3
6	50-yr P(occurrence), Poissonian	0.244
7	50-yr P(occurrence), lognormal	5.99e-4
8	Annual rate, lognormal	1.20e-5
9	50-yr P(occurrence), BPT	2.66e-4
10	Annual rate, BPT	5.33e-6
11	Average annual time-dependent rate	8.66e-6
12	Weighted annual rate ¹	1.25e-3
13	Final effective return period (yrs)	802

Note: (1) Lognormal and BPT weighted equally, time-dependent vs. Poissonian weighted 0.33 – 0.67.

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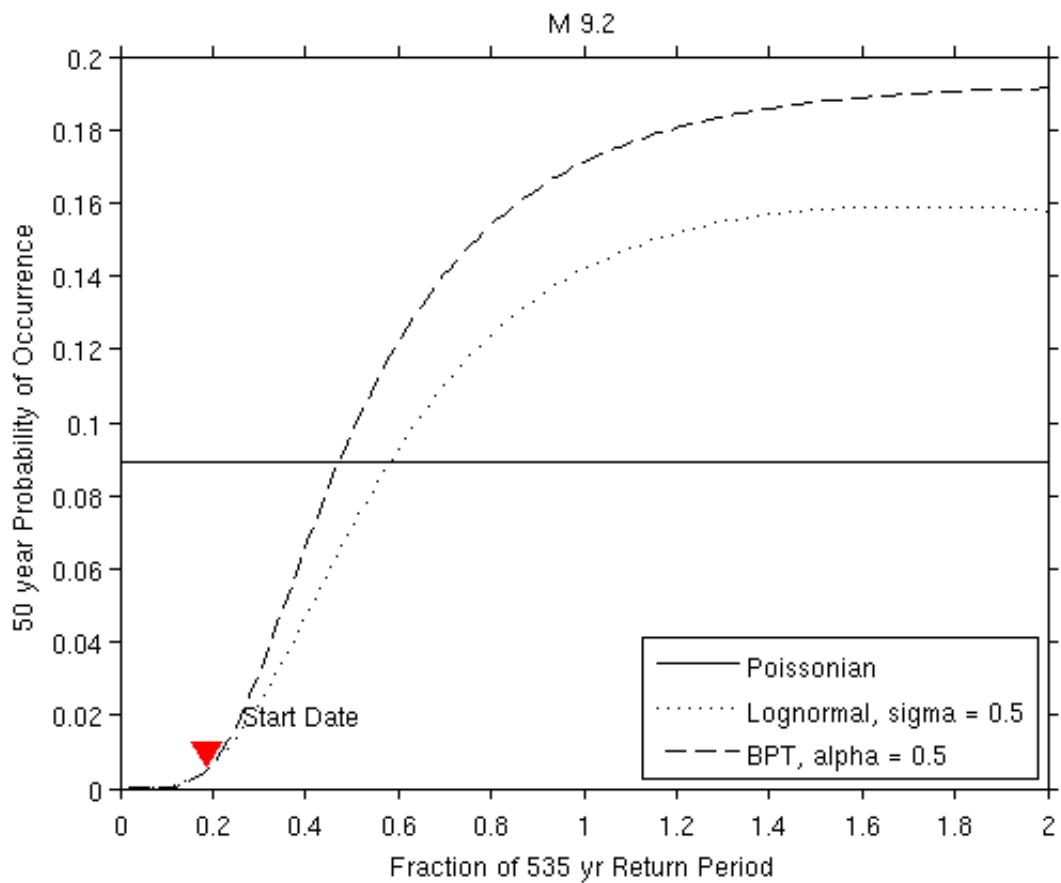


Figure A.1: Fifty-Year Probability of Occurrence of M 9.2 Megathrust

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APPENDIX B
SENSITIVITY ANALYSIS FOR THE DENALI FAULT PLANAR SOURCE

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SENSITIVITY ANALYSIS FOR THE DENALI PLANAR SOURCE

The Denali fault is a major fault to the north of the project site. Because of its great distance (145 mi / 232 km) from the site, sensitivity analyses were performed in order to quantify its contribution to the hazard for the site. Two strike-slip segments of the Denali Fault were modeled, including: (1) Denali – 2002 rupture, and (2) Denali – West segment. [Table B.1](#) presents the characteristics of the two examined fault segments.

Table B.1: Time-Dependent and non-Time Dependent (Poissonian) Rates

Name	Faulting Type	M relation	Dip (deg.)	Depth range in mi (km)	Geometry Weight	Slip Rate in in/yr (mm/yr)	Slip Rate Weight	Length in mi (km)	Area in mi ² (km ²)	Maximum magnitude (M _w)
F16, Denali – 2002 rupture	Strike-slip	WC94, M-L, Strike-slip	90	0.0 to 9.4 (0.0 to 15.0)	1.0	0.4764 (12.1)	1.0	192.2 (307.5)	1801.6 (4612)	7.9
F-17, Denali – West segment	Strike-slip	WC94, M-L, Strike-slip	90	0.0 to 9.4 (0.0 to 15.0)	1.0	0.1929 (4.9)	1.0	241.5 (386.4)	2263.7 (5795)	7.9

The Denali fault is divided into two segments, approximately equal in length, based on rupture history and slip rate ([Figure B.1](#)). The Denali rupture represents the extent of the 2002 M 7.9 rupture on the Denali fault, including the extent of the Totschunda fault where the rupture initiated. The Denali-west segment is characterized by a relatively lower slip rate which decreases to the west.

The sensitivity analyses for each planar source utilized parameters from previous PSHA analyses (FMMG, 2012a). The parameters derived from the previous study include: faulting type; magnitude area relationships; fault dip; depth range; slip rate; fault length; fault area; and maximum magnitude ([Table B.1](#)). Slip rates derived from the previous study (FMMG, 2012a) were averaged to create a single rate for each planar source.

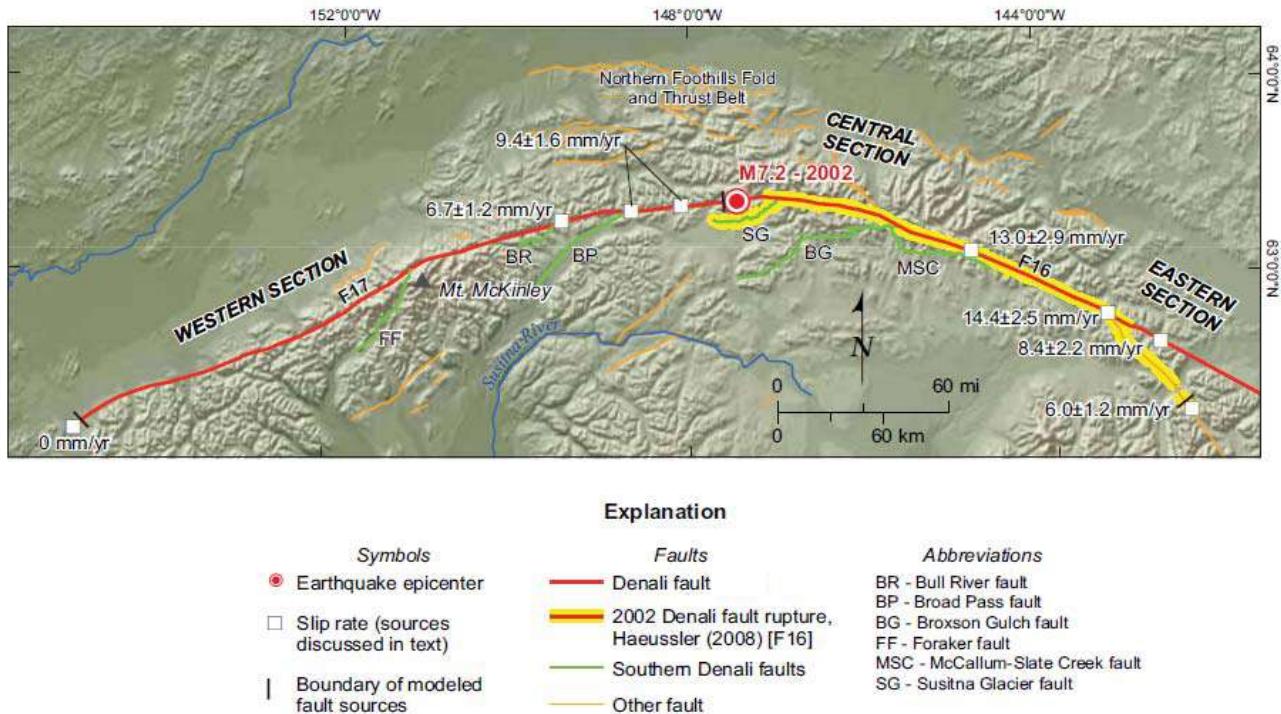


Figure B.1: Denali Fault characterization

Our sensitivity (PSHA) analysis was performed for onshore site 3 in order to explore the effect of the aforementioned segments on the seismic hazard. The distance of the project site from Denali - 2002 rupture is about 227 miles (365 km) and hence is outside the study region, while the distance from Denali – West segment is 144 miles (232 km). Figure B.2 compares the Uniform Hazard Spectra (UHS) for V_{s30} of 1100 ft/s and the 475- and the 2475-year return period events, for the seismotectonic model, including: with and without the Denali fault segments. The Uniform Hazard Spectra from both models are very similar. The analysis confirms that exclusion of Denali fault from the seismic source model does not affect the estimated ground motion hazard at the project site.

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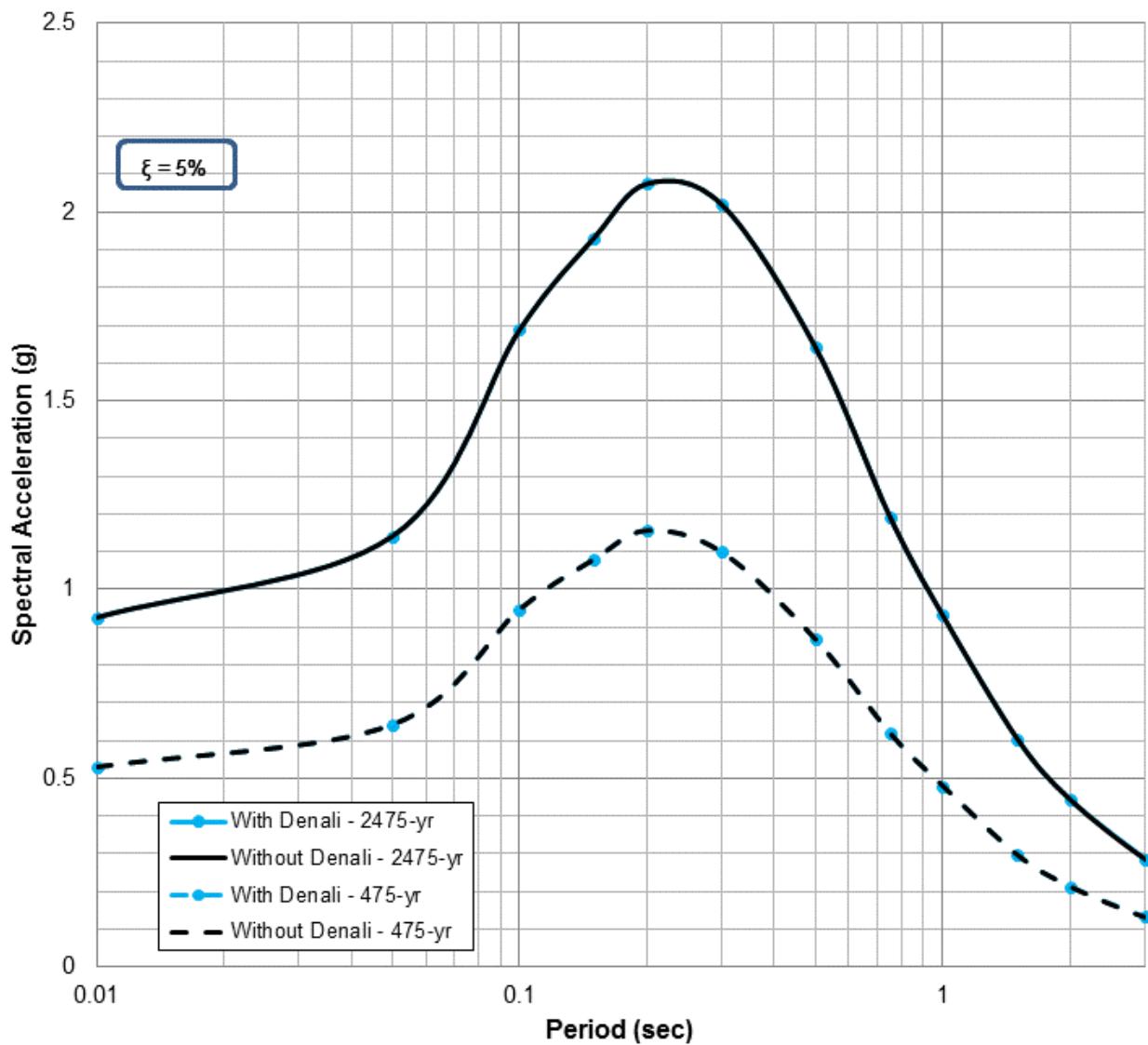


Figure B.2: 475- and 2475-Year Return Period Events Horizontal Acceleration Response Spectra Estimated for Site 3 ($V_{s30} = 1100$ ft/s)

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**APPENDIX C
DESIGN SPECTRA PER NFPA 59A 2013 AND ASCE 7-10**

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DESIGN SPECTRA PER NFPA 59A 2013 AND ASCE 7-10

C.1 Definition of Design Level Events

According to the requirements of the National Fire Protection Agency (NFPA) 59A 2013 ground motions are developed for three levels:

- The OBE (Operating Basis Earthquake) defined as mean hazard ground motion with a 10 percent probability of exceedance within a 50-year period (475 year return period).
- The Safe Shutdown Earthquake defined as the “Risk-adjusted Maximum Considered Earthquake” (MCE_R) ground motion per ASCE 7-10, and
- The ALE (Aftershock Level Earthquake) defined as 50% of the SSE ground motion.

Evaluating the MCE_R involves a combination of both probabilistic and deterministic analyses. The MCE_R corresponds to the lesser of: (a) the risk adjusted UHS corresponding to a return period of 2,475-years (i.e., 2 percent probability of exceedance in 50 years, Section 21.2.1 of ASCE 7-10); and (b) the median + 1 standard deviation deterministic spectrum calculated for characteristic earthquakes on all known active faults within the region (Section 21.2.2 of ASCE 7-10). The spectra are computed for the direction of the maximum component of ground motion.

Per ASCE 7-10 / IBC (2012) requirements, ground motions are developed for two levels: (a) Risk-adjusted Maximum Considered Earthquake (MCE_R), and (b) Design Earthquake (abbreviated for this project as DE to distinguish from other shaking levels) is defined as 2/3 of MCE_R , along with some other checks pertaining to spectral shape.

C.2 Horizontal Ground Motions per IBC (2012) / NFPA 59A 2013

C.2.1 Operational Basis Earthquake (OBE)

[Plate 53](#) presents the acceleration response spectra (fault normal (FN) and fault parallel (FP) components) at ground surface ($V_{s30} = 885$ ft/s) for OBE (475-years return period) for the project facilities and [Table 5.9](#) tabulates the spectral ordinates of the OBE spectra.

C.2.2 Risk Targeted Maximum Considered Earthquake (MCE_R) / Safe Shutdown Earthquake (SSE)

Both probabilistic and deterministic analyses were conducted to estimate the “Risk-adjusted” Maximum Considered Earthquake (MCE_R) ground motion, per the definition in ASCE 7-10. The spectra are computed for the direction of the maximum component of ground motion, hence no directivity components are calculated (fault normal and fault parallel components). The spectrum developed for the nearshore location is proposed as representative for the project site. The site-

specific hazard curve at each structural period was convolved with the generic structural fragility curve referred in ASCE 7-10 (Lucu et al, 2007) to achieve 1% probability of collapse in 50 years. The ASCE 7-10 requirements of using 10 percent probability of collapse at said ordinate of the probabilistic ground motion response spectrum and β of 0.6 were used in the PSHA.

The deterministic earthquake response spectrum must be calculated as the 84th percentile spectral response acceleration at each period of interest. Deterministic analyses for three earthquake scenarios: (1) the planar fault F7 (Middle Ground Shoal anticline and Granite Point anticline), (2) the planar fault F3 (Kenai – Cannery loop Anticline), and (3) the S2 interface (Prince William Sound) earthquake scenarios were conducted using the attenuation relationships according to [Table 5.4](#). The deterministic planar fault F3 scenario assumed a magnitude of 7.1 and a rupture distance of 5.8 mi (9.2 km) for the onshore site and 6.3 mi (10.1 km) for the nearshore site, while the deterministic planar fault F7 scenario assumed a magnitude of 7.2 and a rupture distance of 4.4 mi (7.1 km) for the onshore site and 3.8 mi (6.1 km) for the nearshore site. [Plate C.1](#) presents the development of the median plus 1 standard deviation (i.e., 84th percentile) deterministic response spectrum. As shown on [Plate C.1](#), 84th percentile deterministic spectrum is controlled by the subduction scenarios at short periods (mainly at PGA) and at long periods ($T > 0.6$ secs).

[Plate C.2](#) presents the procedure of development of acceleration response spectra for “Risk-adjusted” Maximum Considered Earthquake (MCE_R) for Site Class D, $V_{s30} = 885$ ft/s. The plate shows: (a) the risk adjusted UHS corresponding to a return period of 2,475-years (i.e., 2 percent probability of exceedance in 50 years); (b) the median + 1 standard deviation (i.e., 84th percentile) deterministic spectrum calculated for the characteristic magnitude event, from [Plate C.1](#); (c) the deterministic limit spectrum per ASCE 7-10, Section 21.2; and (d) the resulting project MCE_R spectrum. Per the ASCE 7-10 guidelines, deterministic MCE spectrum is the highest of the 84th percentile deterministic spectrum and the deterministic limit spectrum. Site specific MCE_R spectrum is the lowest of risk adjusted UHS corresponding to a return period of 2,475-years (i.e., 2 percent probability of exceedance in 50 years) and the deterministic MCE spectrum. As shown on the plate, the MCE_R spectral acceleration is controlled by the deterministic MCE spectrum at short periods and by the risk-adjusted probabilistic site-specific spectrum at long periods.

The risk-adjusted probabilistic spectrum presented on [Plate C.2](#) and the 84th percentile deterministic spectrum on [Plate C.2](#) corresponds to maximum rotated component of ground motions which was computed by applying the adjustment factors for the geometric mean to the direction of maximum horizontal ground motion per ASCE 7-10 Supplement No. 1. These factors were also used to compute the maximum rotated component of ground motion for the deterministic spectrum. [Table C.1](#) lists the adjustment factors for the geometric mean to the direction of maximum horizontal ground motion. The final SSE spectrum was smoothed as presented in [Plate C.3](#) for the development of spectrally matched motions. [Table C.2](#) tabulates the spectral ordinates

of the 5-percent damped smoothed horizontal spectra for SSE for the onshore and nearshore facilities.

The risk targeted MCE_R is for structural design and evaluation. However, for liquefaction potential evaluation, ASCE 7-10 requires the 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. The MCE_G values for the project area with V_{s30} value of 885 ft/s is 0.749g.

Table C.1: Adjustment Factors for the Geometric Mean to the Direction of Maximum Horizontal Ground Motion per ASCE 7-10 Supplement No.1

Period (sec)	Median Factor
PGA	1.100
0.03	1.100
0.075	1.100
0.1	1.100
0.15	1.100
0.2	1.100
0.3	1.125
0.5	1.175
0.6	1.200
0.75	1.238
1	1.300
1.5	1.325
2	1.350
3	1.400
4	1.450
5	1.500
6	1.500
7	1.500
8	1.500
9	1.500
10	1.500

Table C.2: 5-percent Damped Horizontal Acceleration Response Spectrum at Ground Surface for MCE_R / SSE per ASCE 7-10 / NFPA 59A 2013 for Onshore and Nearshore Facilities, $V_{s30} = 885 \text{ ft/s}$

Period (sec)	Spectral Acceleration for Risk Targeted Maximum Considered Earthquake (MCE_R) / Safe Shutdown Earthquake (SSE) (g)
PGA	0.824
0.03	0.836
0.075	1.162
0.1	1.350
0.15	1.650
0.2	1.797
0.3	1.970
0.5	1.960
0.75	1.469
1	1.234
1.5	0.828
2	0.625
3	0.412
4	0.320
5	0.265
6	0.221
7	0.189
8	0.166
9	0.147
10	0.133

C.2.3 Design Earthquake Spectrum (DE)

The aforementioned PSHA analyses were conducted for subsurface conditions with a time-weighted average shear wave velocity (V_{s30}) of 885 ft/s. ASCE 7-10 provides a procedure for the development of the “design spectrum” at the same soil conditions with those from the Risk-adjusted Maximum Considered Earthquake (MCE_R). The development of the “design spectrum” per IBC (2012) / ASCE 7-10 at ground surface ($V_{s30} = 885 \text{ ft/s}$) is shown on [Plate C.4](#): (a) the project MCE_R , and (b) 2/3 the project MCE_R for Site Class D which is the project DE spectrum. The developed spectrum cannot be less than 80% of the general spectrum (Section 11.4.5 of

ASCE 7-10). The IBC (2012) / ASCE 7-10 DE spectrum is two thirds of the site specific MCE_R spectrum. [Table C.3](#) tabulates the spectral ordinates of the 5-percent damped smoothed horizontal spectrum for DE.

Table C.3: 5-percent Damped Horizontal Acceleration Response Spectrum for DE at the Ground Surface per IBC (2012) / ASCE 7-10 for Onshore and Nearshore Facilities, V_{s30} = 885 ft/s

Period (sec)	Spectral Acceleration for Design Earthquake (DE) (g)
PGA	0.549
0.03	0.557
0.075	0.775
0.1	0.900
0.15	1.100
0.2	1.198
0.3	1.313
0.5	1.307
0.75	0.979
1	0.823
1.5	0.552
2	0.417
3	0.275
4	0.214
5	0.177
6	0.147
7	0.126
8	0.110
9	0.098
10	0.088

C.2.4 Aftershock Level Event (ALE)

As described above, the horizontal acceleration response spectrum for ALE is considered half of that corresponding to SSE. [Table C.4](#) tabulates the spectral ordinates of the 5-percent damped

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smoothed horizontal spectrum at ground surface ($V_{s30} = 885 \text{ ft/s}$) for ALE. [Plate C.5](#) presents the summary results of acceleration response spectra for OBE, SSE and ALE at the ground surface with a time-weighted average shear wave velocity (V_{s30}) of 885 ft/s per NFPA 2013 ground motion requirements. Similar results are presented on [Plate C.6](#) for MCE_R and DE at the ground surface with a time-weighted average shear wave velocity (V_{s30}) of 885 ft/s per IBC (2012) / ASCE 7-10 ground motion requirements. [Plate C.7](#) presents the comparison of the Risk-adjusted Maximum Considered Earthquake (MCE_R) Spectrum at ground surface ($V_{s30} = 885 \text{ ft/s}$) per ASCE 7-10 estimated for the onshore and nearshore locations to the nearshore fault normal ($V_{s30} = 885 \text{ ft/s}$) Maximum Considered Earthquake (MCE) ground motion, per the definition in ASCE 7-05. Similarly, [Plate C.8](#) presents the comparison of the Risk-adjusted Maximum Considered Earthquake (MCE_R) Spectrum at ground surface ($V_{s30} = 885 \text{ ft/s}$) per ASCE 7-10 estimated for the onshore and nearshore locations to the onshore Phase 1 PSHA Results ($V_{s30} = 900 \text{ ft/s}$) (Fugro Report No. 04.10140094-6).

Table C.4: 5-percent Damped Horizontal Acceleration Response Spectrum for ALE at the Ground Surface per NFPA 59 59A 2013 for Onshore and Nearshore Facilities, $V_{s30} = 885 \text{ ft/s}$

Period (sec)	Spectral Acceleration for Aftershock Level Earthquake (ALE) (g)
PGA	0.412
0.03	0.418
0.075	0.581
0.1	0.675
0.15	0.825
0.2	0.899
0.3	0.985
0.5	0.980
0.75	0.734
1	0.617
1.5	0.414
2	0.312
3	0.206
4	0.160
5	0.133
6	0.110
7	0.095
8	0.083
9	0.074
10	0.066

C.3 Vertical Ground Motions per IBC (2012) / NFPA 59A 2013

The vertical response spectra per NFPA 59A 2013 / ASCE 7-10 were developed by applying the vertical to horizontal (V/H) spectral ratios of [Section 5.10](#) to the horizontal response spectra. The lower threshold of one half per NPFA-59A (2013) guidelines is the same as the NPFA-59A (2006).

The vertical response spectra at surface for SSE / MCE_R and OBE, were developed by applying V/H ratios for Site Class D (developed based on recorded ground motion data in Alaska) to the horizontal response spectra at surface. The vertical response spectrum ALE at surface was estimated as ½ of SSE / MCE_R per NFPA-59A 2013 guidelines. Similarly, the vertical response

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spectrum DE at surface was estimated as two-thirds of SSE / MCE_R per ASCE 7-10/IBC (2012) guidelines. [Plate C.9](#) presents the vertical acceleration spectra at the ground surface estimated for SSE, OBE, and ALE for the planned facilities per NFPA-59A 2013 ground motion requirements. [Table C.5](#) lists the spectral ordinates of the vertical SSE, OBE, and ALE spectra at surface.

[Plate C.10](#) presents the vertical acceleration spectra at the ground surface estimated for “Risk-adjusted” MCE_R and Design Earthquake (DE) for planned onshore facilities, per ASCE 7-10/IBC (2012) ground motion requirements. [Table C.6](#) lists the spectral ordinates of the vertical MCE_R and DE spectra at surface.

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Table C.5: 5%-damped Vertical Spectra at Ground Surface for Onshore and Nearshore Facilities (NFPA 59A 2013)

Period (seconds)	Spectral Acceleration for OBE Level (g)	Spectral Acceleration for SSE (g)	Spectral Acceleration for ALE Level (g)
0.01	0.407	0.635	0.317
0.03	0.528	0.777	0.389
0.075	0.990	1.522	0.761
0.1	1.066	1.592	0.796
0.15	1.022	1.617	0.809
0.2	0.960	1.520	0.760
0.3	0.703	1.241	0.621
0.5	0.459	0.980	0.490
0.75	0.338	0.734	0.367
1	0.266	0.617	0.309
1.5	0.167	0.414	0.207
2	0.122	0.312	0.156
3	0.075	0.206	0.103
4	0.056	0.160	0.080
5	0.045	0.133	0.066
6	0.037	0.110	0.055
7	0.032	0.095	0.047
8	0.028	0.083	0.041
9	0.025	0.074	0.037
10	0.023	0.066	0.033

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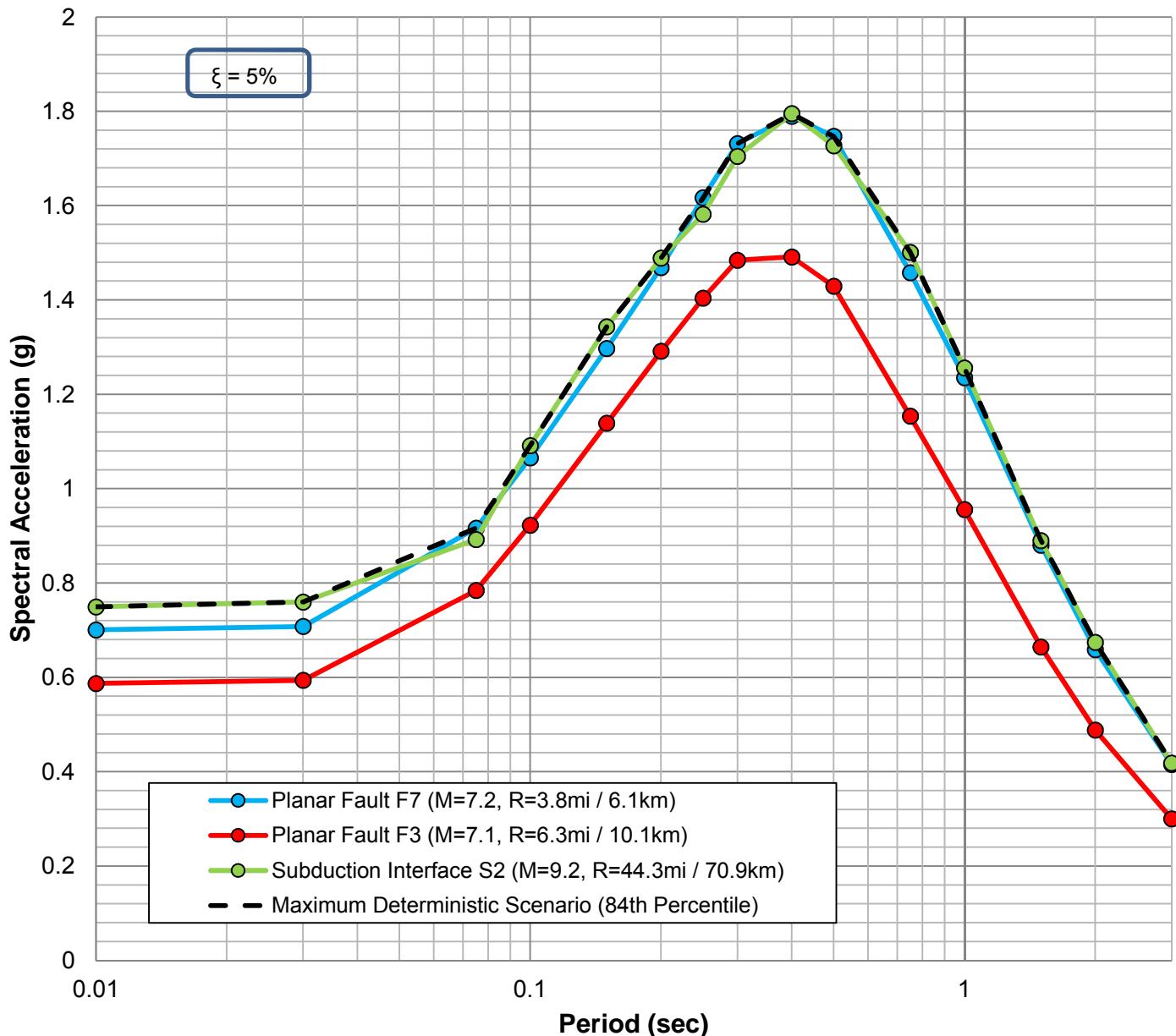
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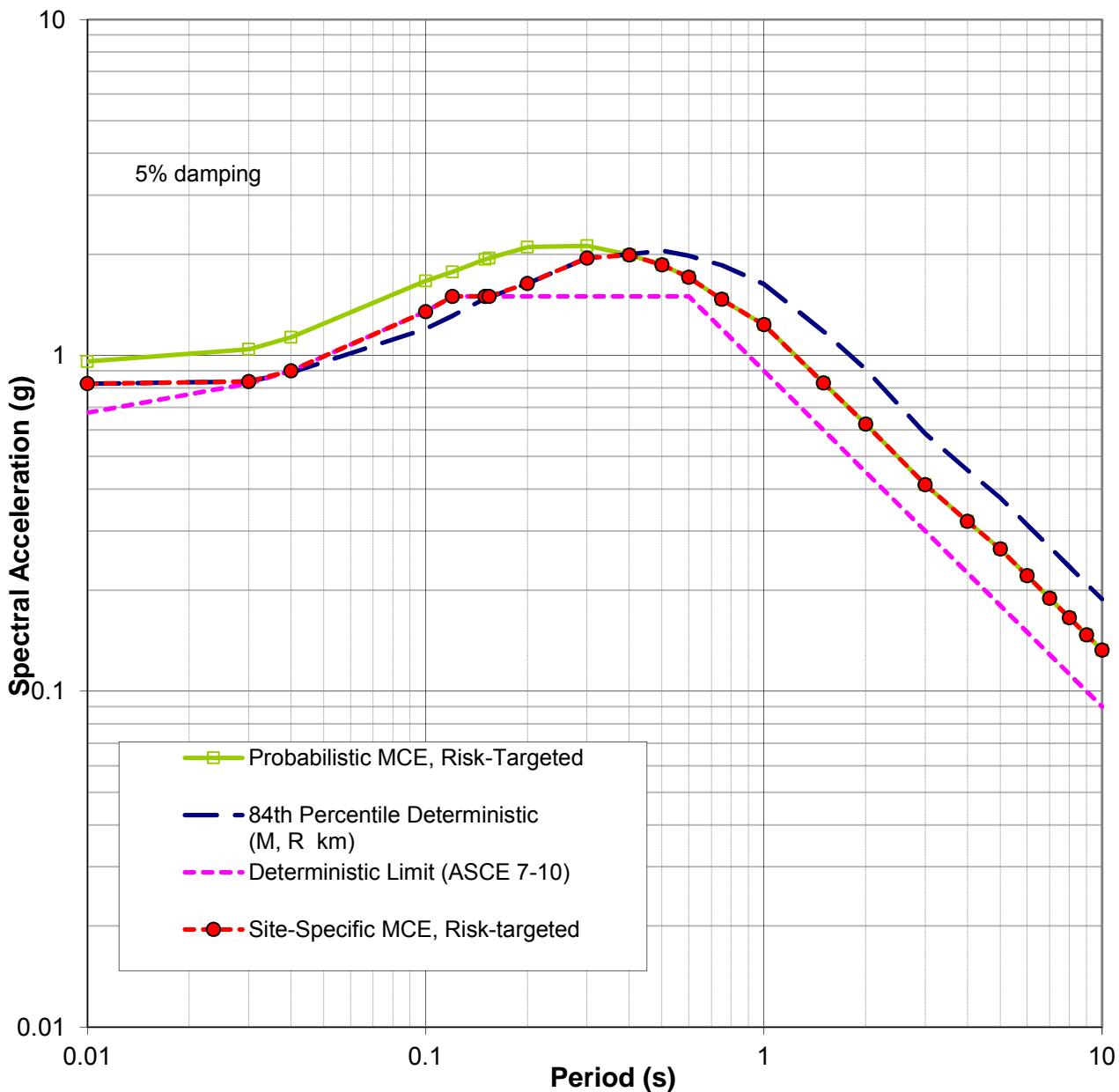
Table C.6: 5%-damped Vertical Spectra at Ground Surface for Onshore and Nearshore Facilities (IBC (2012) / ASCE 7-10)

Period (seconds)	Spectral Acceleration for MCE _R Level (g)	Spectral Acceleration for DE Level (g)
0.01	0.635	0.423
0.03	0.777	0.518
0.075	1.522	1.015
0.1	1.592	1.061
0.15	1.617	1.078
0.2	1.520	1.014
0.3	1.241	0.827
0.5	0.980	0.653
0.75	0.734	0.490
1	0.617	0.411
1.5	0.414	0.276
2	0.312	0.208
3	0.206	0.137
4	0.160	0.107
5	0.133	0.088
6	0.110	0.074
7	0.095	0.063
8	0.083	0.055
9	0.074	0.049
10	0.066	0.044



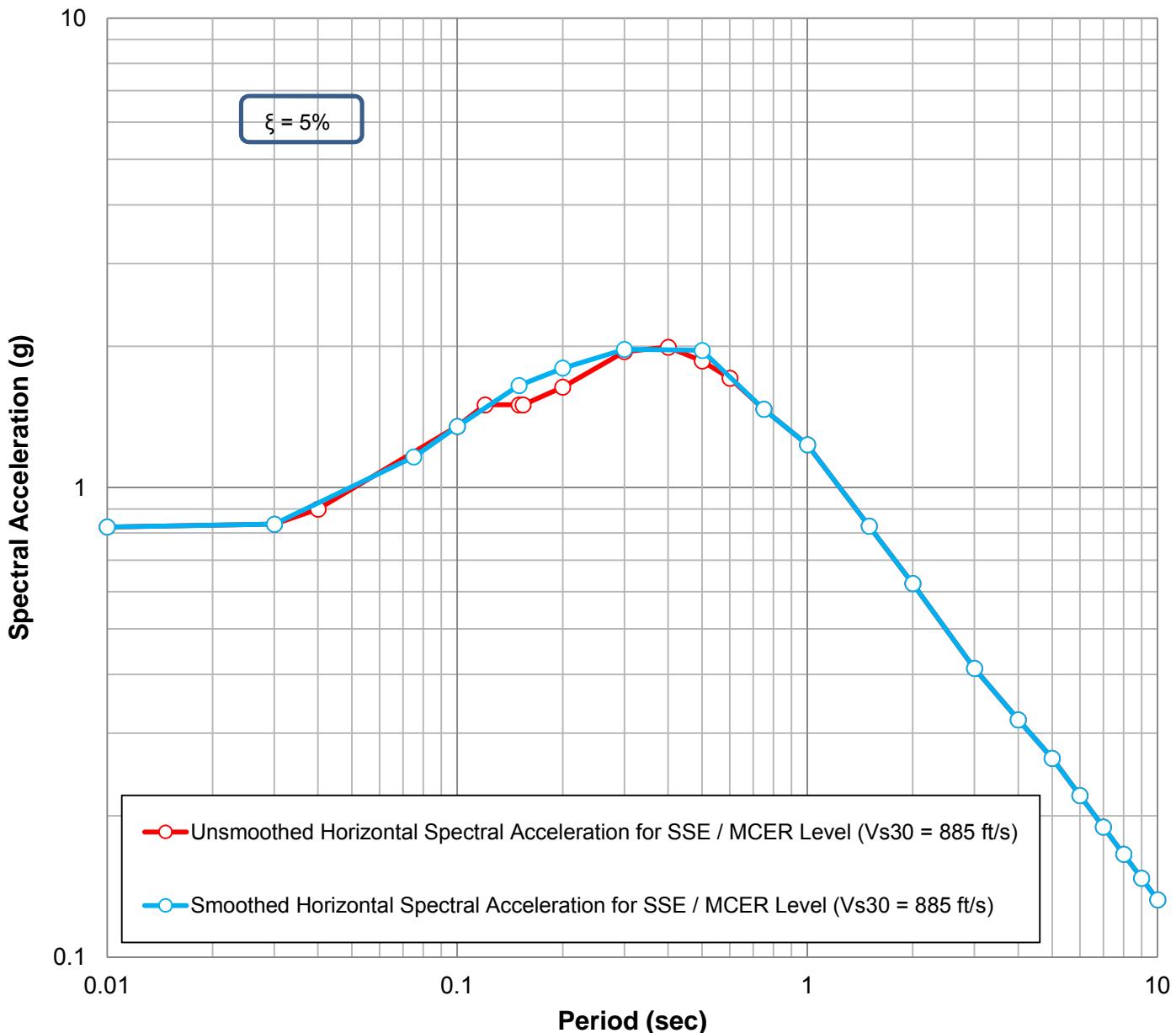
DEVELOPMENT OF THE MEDIAN + 1 STANDARD DEVIATION (84TH PERCENTILE) DETERMINISTIC RESPONSE SPECTRUM

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ALASKA LNG PROJECT
NIKISKI, ALASKA



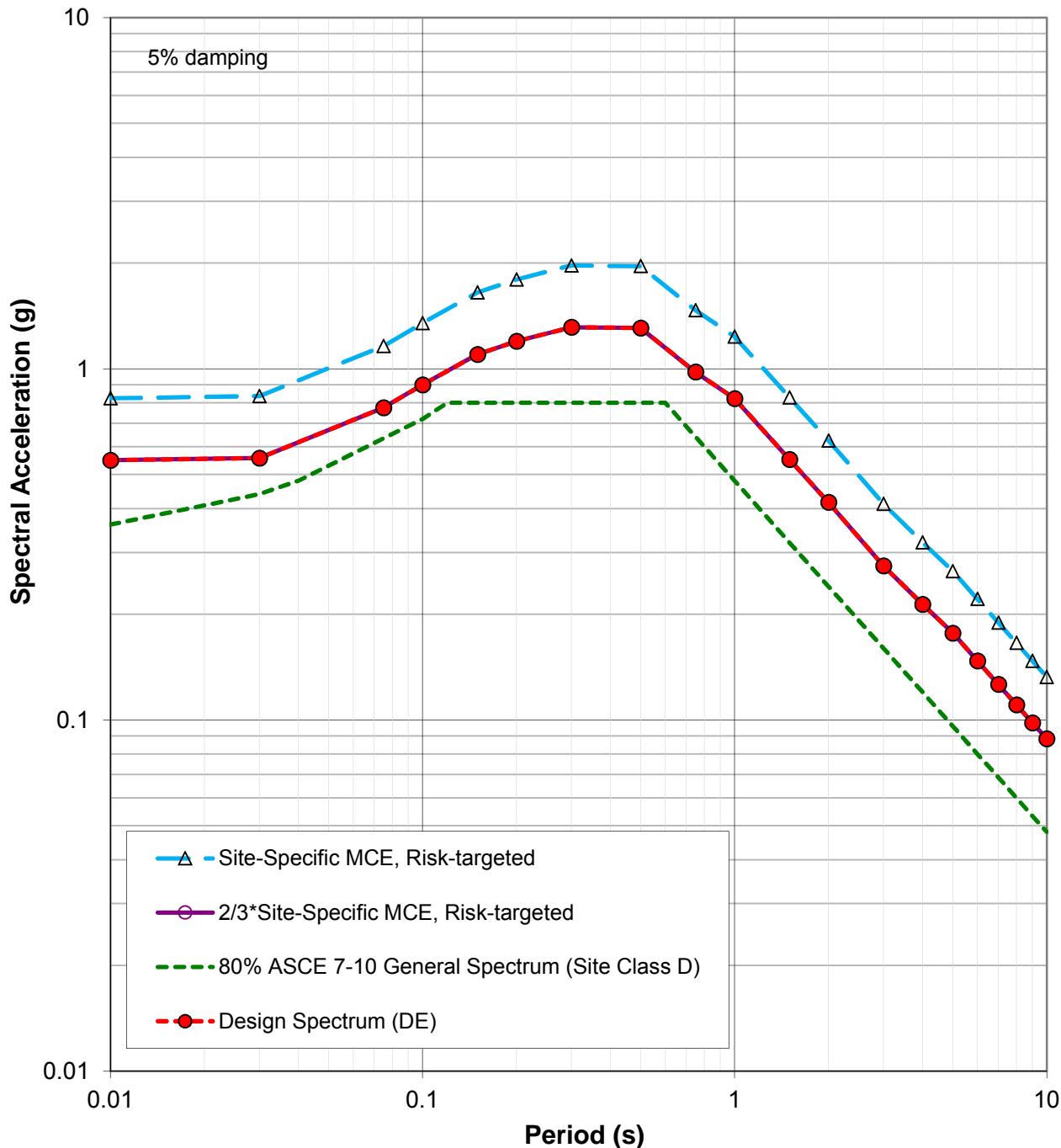
**DEVELOPMENT OF RISK-ADJUSTED MAXIMUM CONSIDERED EARTHQUAKE (MCER) SPECTRUM
AT GROUND SURFACE (VS30=885 FT/S) PER IBC (2012) / ASCE 7-10**

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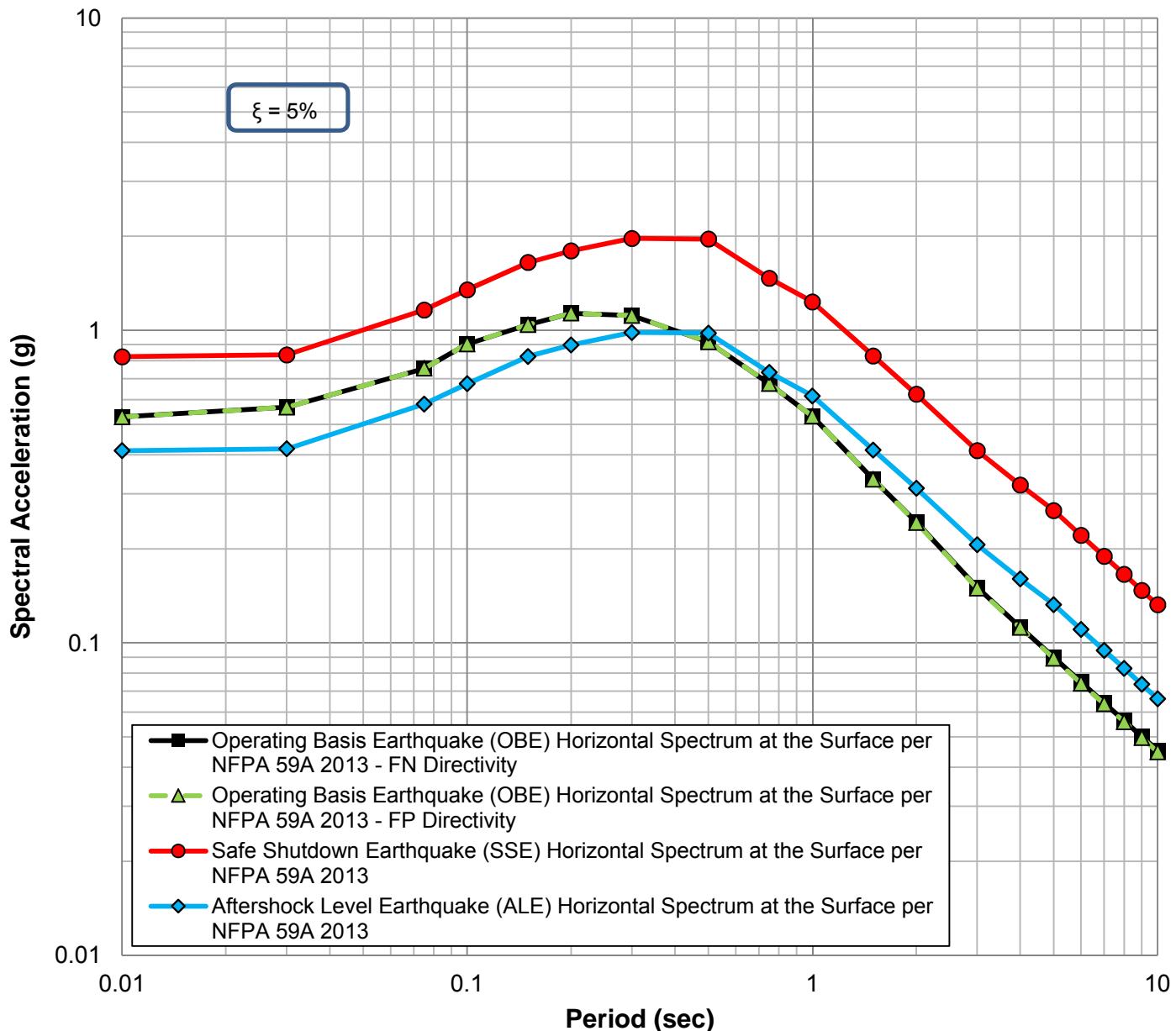
5-PERCENT DAMPED SMOOTHED HORIZONTAL ACCELERATION RESPONSE SPECTRUM AT GROUND SURFACE (VS30=885 FT/S) FOR SSE / MCER PER NFPA-59A 2013 AND IBC (2012) GUIDELINES

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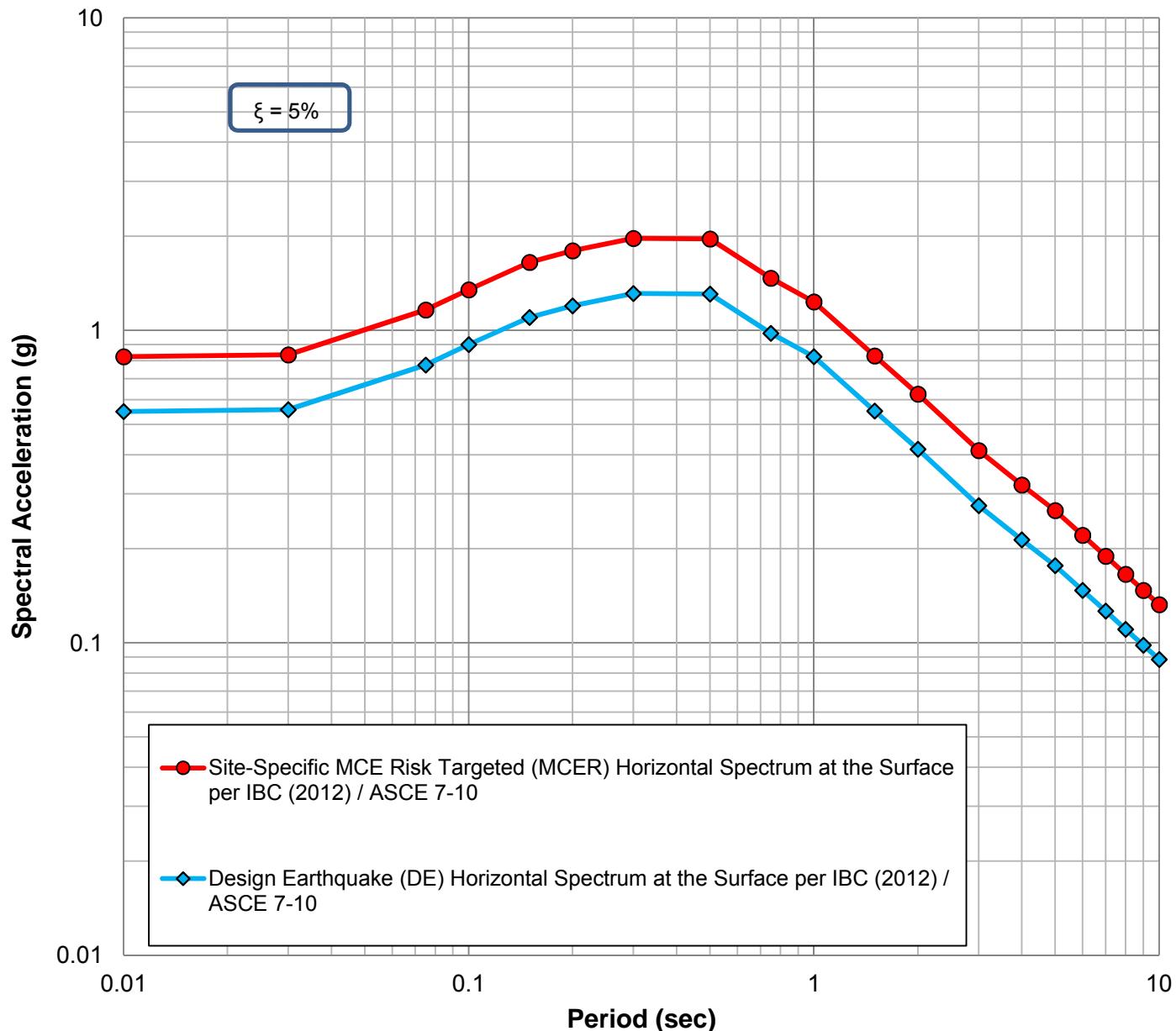
**DEVELOPMENT OF DESIGN EARTHQUAKE (DE) SPECTRUM AT GROUND SURFACE (VS30=885 FT/S)
PER IBC (2012) / ASCE 7-10**

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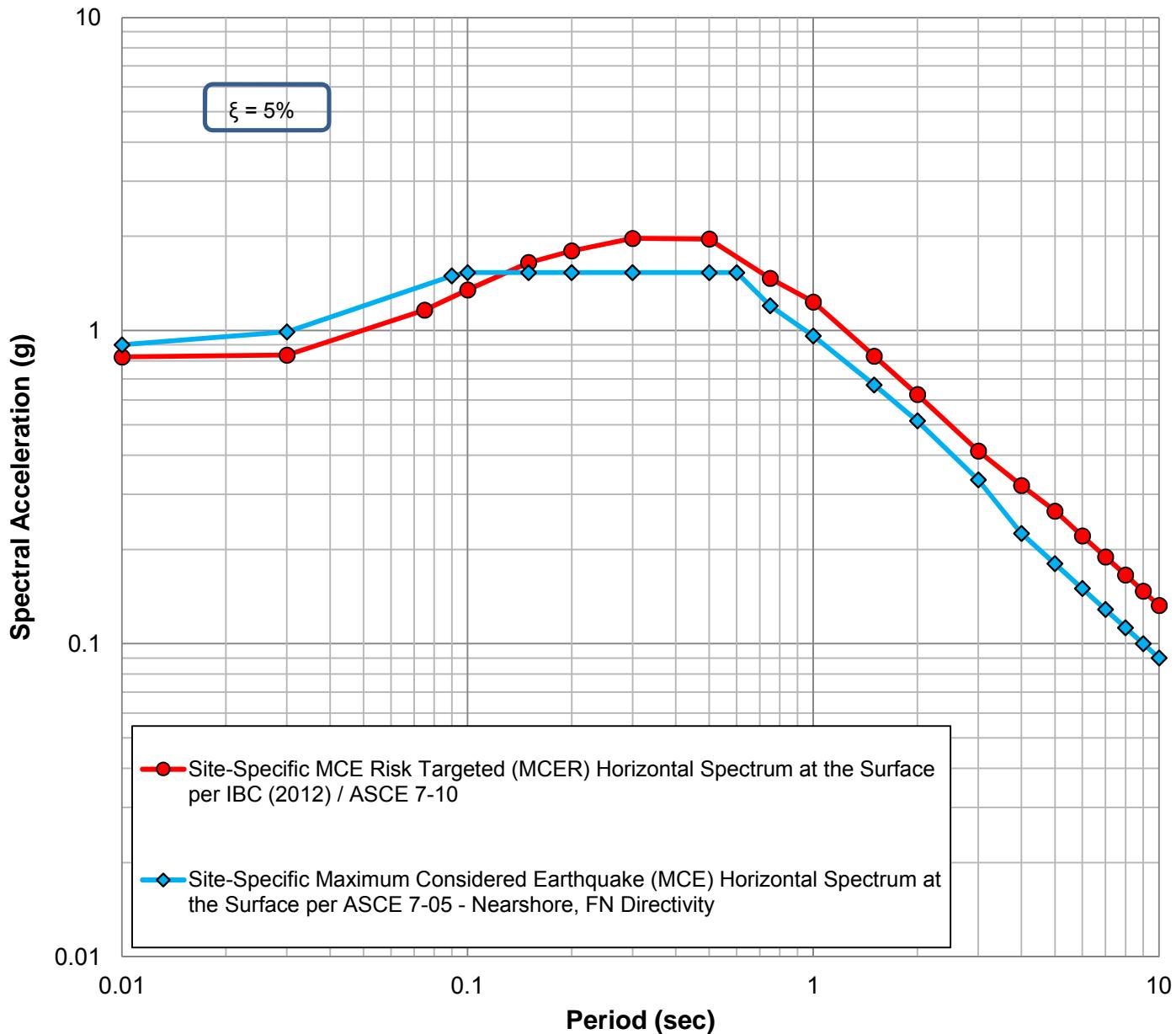
**5-PERCENT DAMPED HORIZONTAL ACCELERATION RESPONSE SPECTRA AT GROUND SURFACE
(VS₃₀=885 FT/S) PER NFPA-59A 2013 GUIDELINES**

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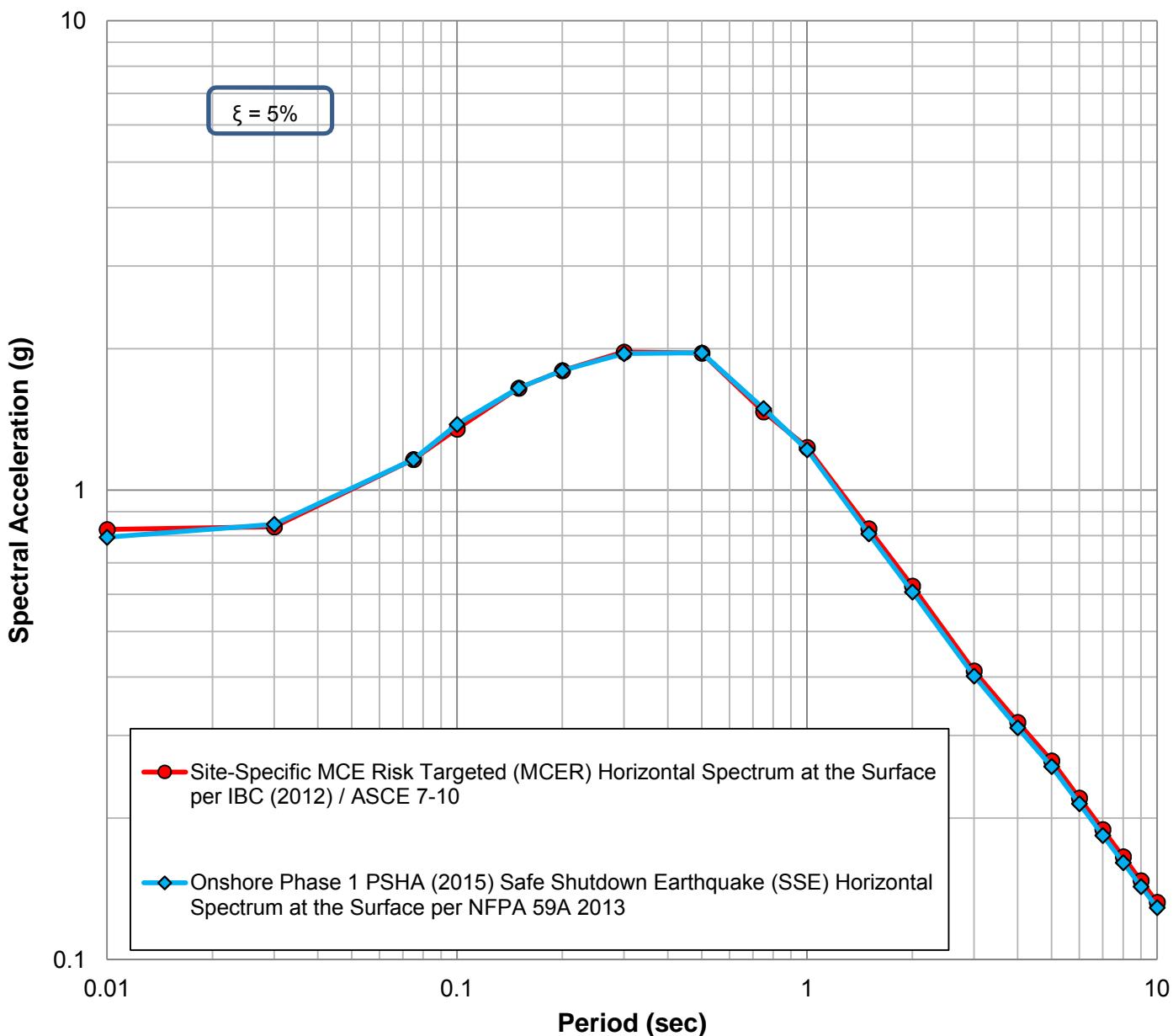
5-PERCENT DAMPED HORIZONTAL ACCELERATION RESPONSE SPECTRA AT GROUND SURFACE (VS30=885 FT/S) PER IBC (2012) / ASCE 7-10 GUIDELINES

LNG FACILITIES
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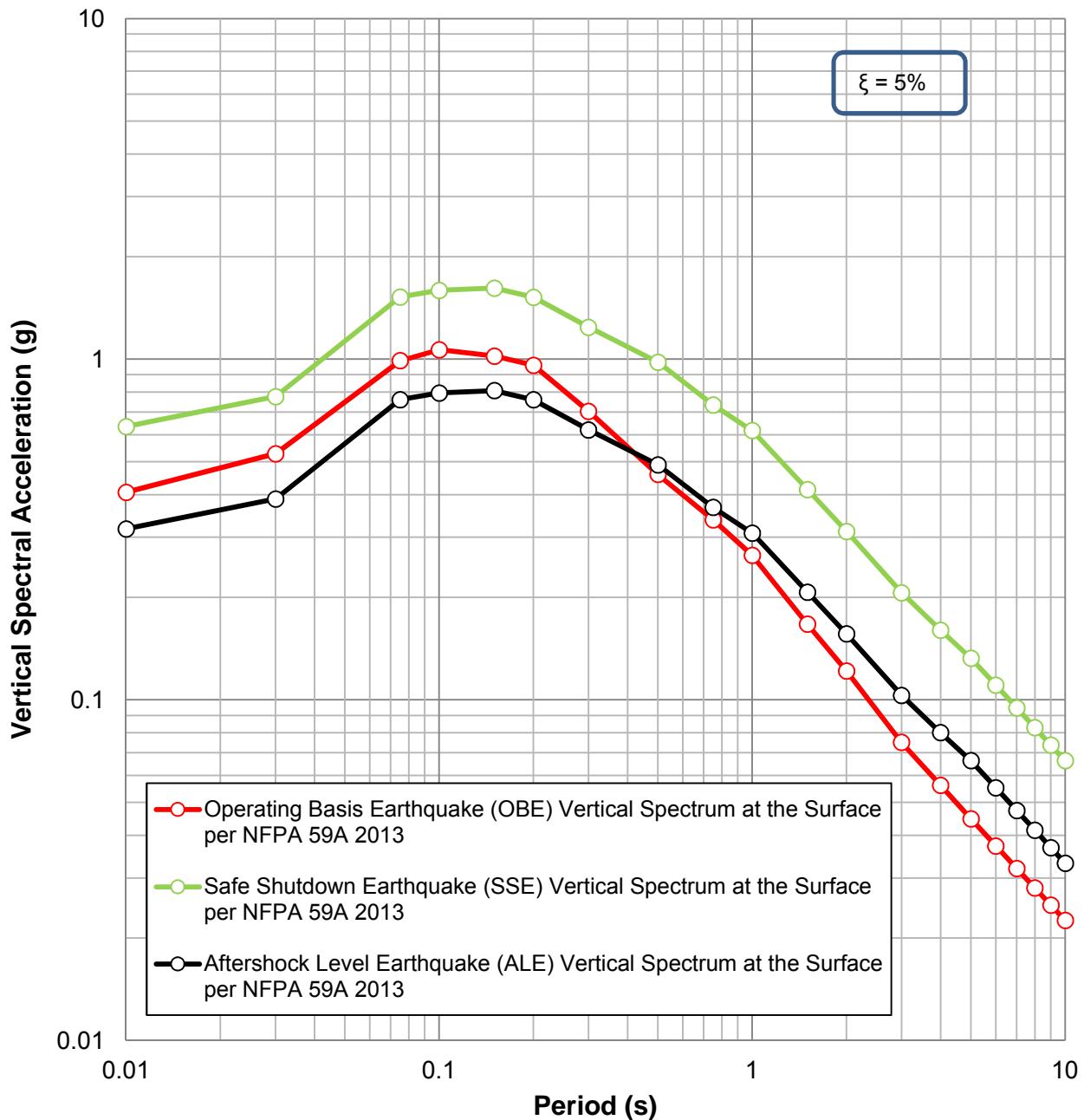
COMPARISON OF RISK-ADJUSTED MAXIMUM CONSIDERED EARTHQUAKE (MCER) SPECTRUM AT GROUND SURFACE (VS30=885 FT/S) PER ASCE 7-10 TO THE NEARSHORE FAULT NORMAL (VS30 = 885 FT/S) MAXIMUM CONSIDERED EARTHQUAKE (MCE) GROUND MOTION PER ASCE 7-05

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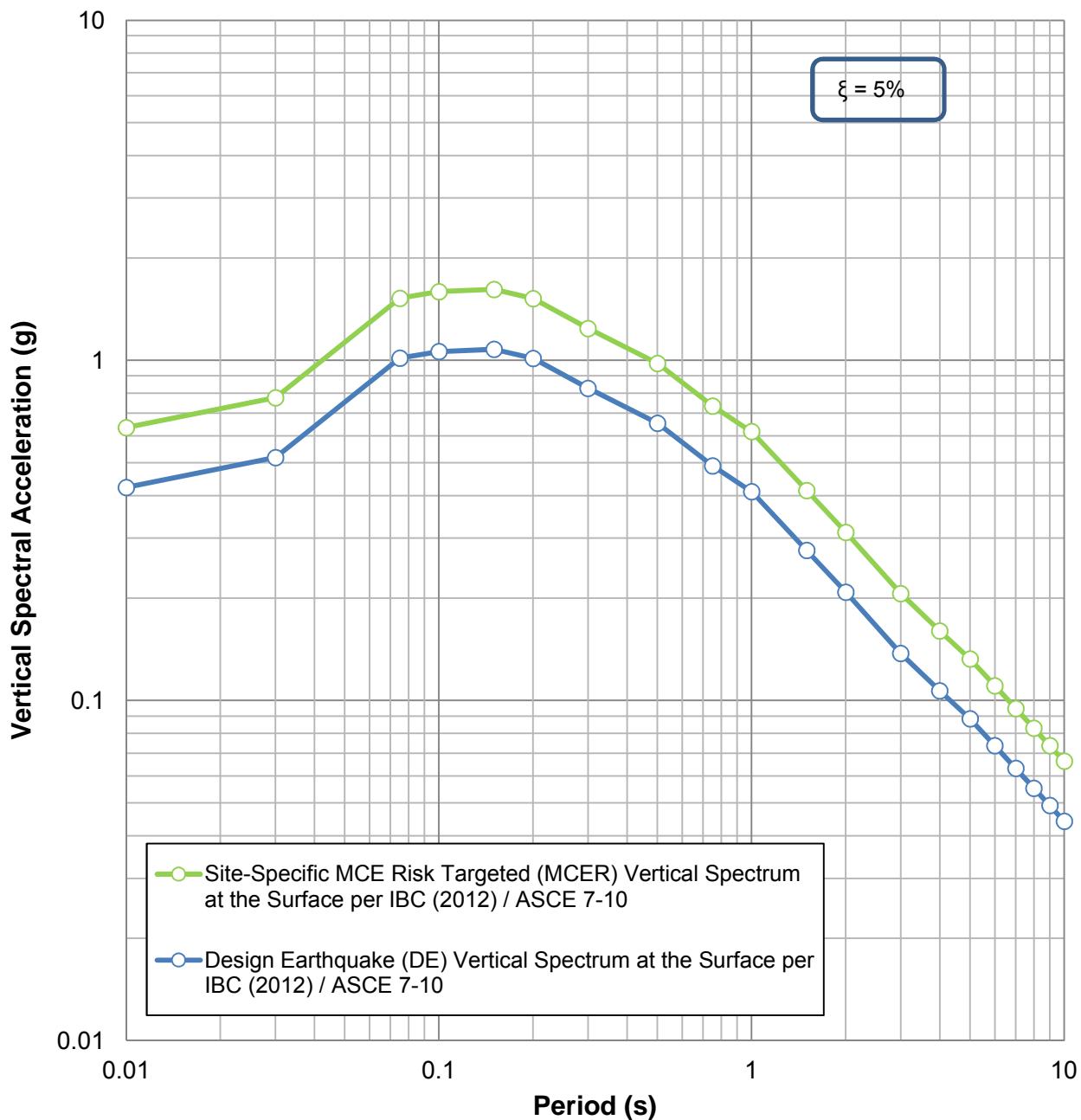
COMPARISON OF RISK-ADJUSTED MAXIMUM CONSIDERED EARTHQUAKE (MCER) SPECTRUM AT GROUND SURFACE (VS30=885 FT/S) PER ASCE 7-10 TO THE PHASE 1 PSHA RESULTS (VS30 = 900 FT/S)

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**5-PERCENT DAMPED VERTICAL ACCELERATION RESPONSE SPECTRA AT GROUND SURFACE
(VS₃₀=885 FT/S) PER NFPA-59A 2013 GUIDELINES**

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**5-PERCENT DAMPED VERTICAL ACCELERATION RESPONSE SPECTRA AT GROUND SURFACE
(VS30=885 FT/S) PER IBC (2012) / ASCE 7-10 GUIDELINES**

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USAL-FG-GRHAZ-00-002015-001 Rev.0

5-May-2016

Report No. 04.10140334-6



**APPENDIX D
DEVELOPMENT OF GROUND ACCELERATION TIME HISTORIES
PER NFPA 59A 2013**

APPENDIX D

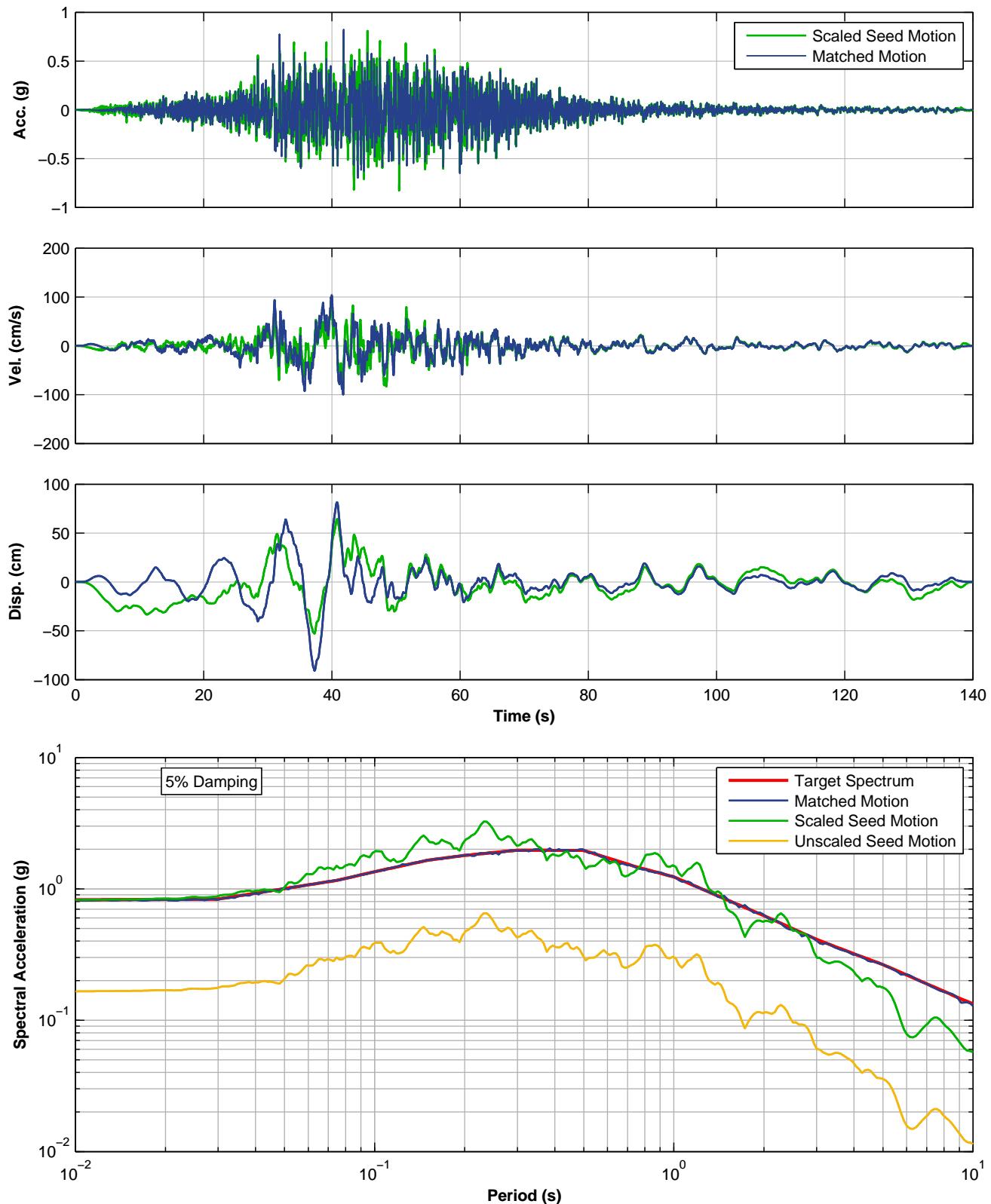
DEVELOPMENT OF GROUND ACCELERATION TIME HISTORIES PER NFPA 59A 2013

D.1 Spectrally Matched Motions Per NFPA-59A 2013

Five sets (each with three components) of accelerograms were selected and spectrally matched to ground surface ($V_{s30} = 885$ ft/s) OBE and SSE spectra per NFPA 59A 2013 guidelines. To incorporate near-source and rupture directivity effects, the original recorded Duzce motions were rotated to resolve a set of fault-normal and fault-parallel horizontal components and these motions were then used generate the design acceleration time histories for OBE event. No rotation was performed for the MCE_R event, since the maximum rotation factors for the maximum component of ground motion for the SSE/ MCE_R event results per (ASCE 7-10 Supplement 1) are higher than the directivity ratios presented on [Plate 39](#). The seed ground motions were the same as the ones used per NFPA 59A 2006 guidelines in [Section 6.0](#). OBE per NFPA 59A 2013 is defined as mean hazard ground motion with a 10 percent probability of exceedance within a 50-year period (475 year return period), which is identical to the OBE per NFPA 59A 2006. Hence, results for the spectrally matched motions for OBE level are presented in [Section 6.3](#). The spectrally matched motions for SSE level per NFPA 59A 2006 are shown on [Plates D.1 through D.15](#), which includes plots showing the target spectrum, acceleration response spectra for the seed motion as well as the matched motion for 5% damping. Also shown are plots of the associated acceleration, velocity, and displacement time histories of the seed motions and matched motions.

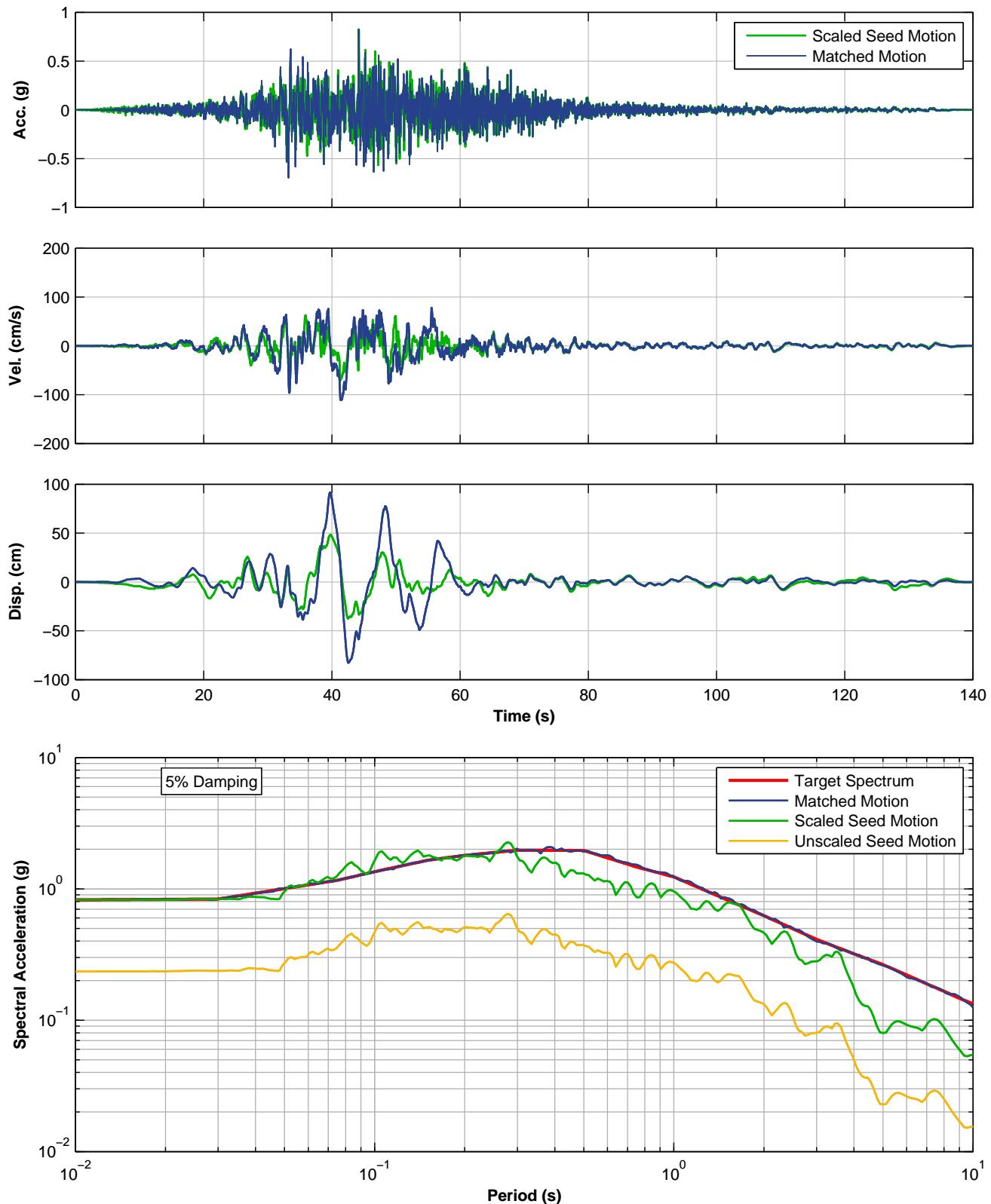
The significant duration (D_{5-95}) of the spectrally matched horizontal ground motions were compared to the deterministic estimates using empirical relationships (Abrahamson and Silva, 1996 and Bommer et al., 2009) for SSE level per NFPA 59A 2013 on [Plate D.16](#). Deterministic duration estimates were computed for the following three controlling scenarios: (a) $M_w = 9.2$ at distance of 43.8 mi (70 km), (b) $M_w = 8.0$ at distance of 37.5 mi (60 km), and (c) $M_w = 7.2$ at distance of 6.2 mi (10 km). Overall, the range of significant duration of the matched motions is representative of the range corresponding to the earthquake scenarios controlling the ground motion hazard at the site. Further, the average strong motion duration of the 10 spectrally matched ground motions (shown with the thick black dash line) is reasonably compares with the average of median estimates (shown with the solid yellow line).

[Appendix E](#) presents results in graphical form and details on the cross-correlation coefficients. These results indicate that all requirements per ASCE 4-98 are met for the spectral matching at both OBE (same as OBE per NFPA 59A 2006) and SSE level per NFPA 59A 2013.



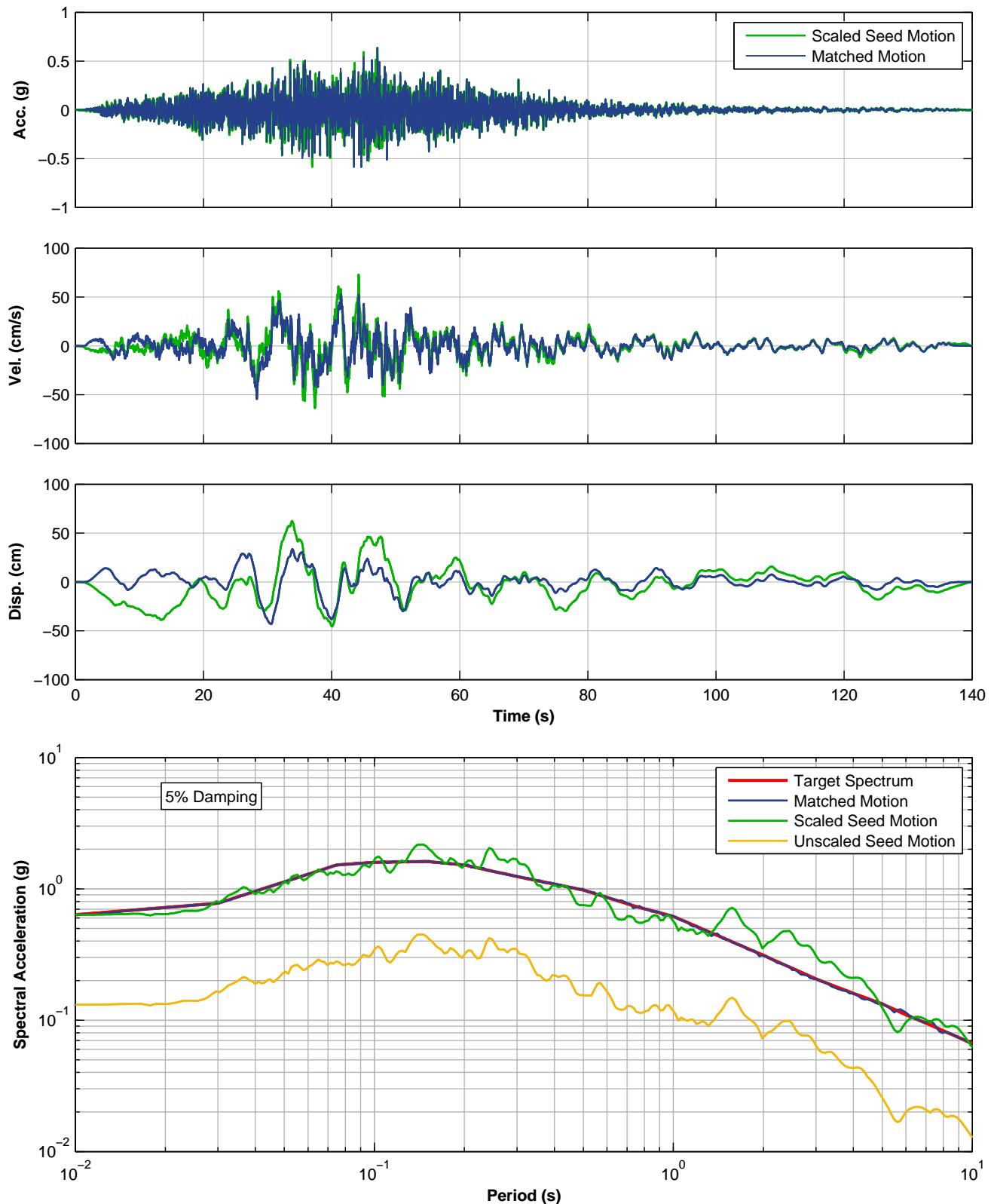
**SPECTRALLY MATCHED MEP MOTION, EW COMPONENT, 2010 CHILE EQ
SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**
LNG FACILITIES
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FIGURE D.1



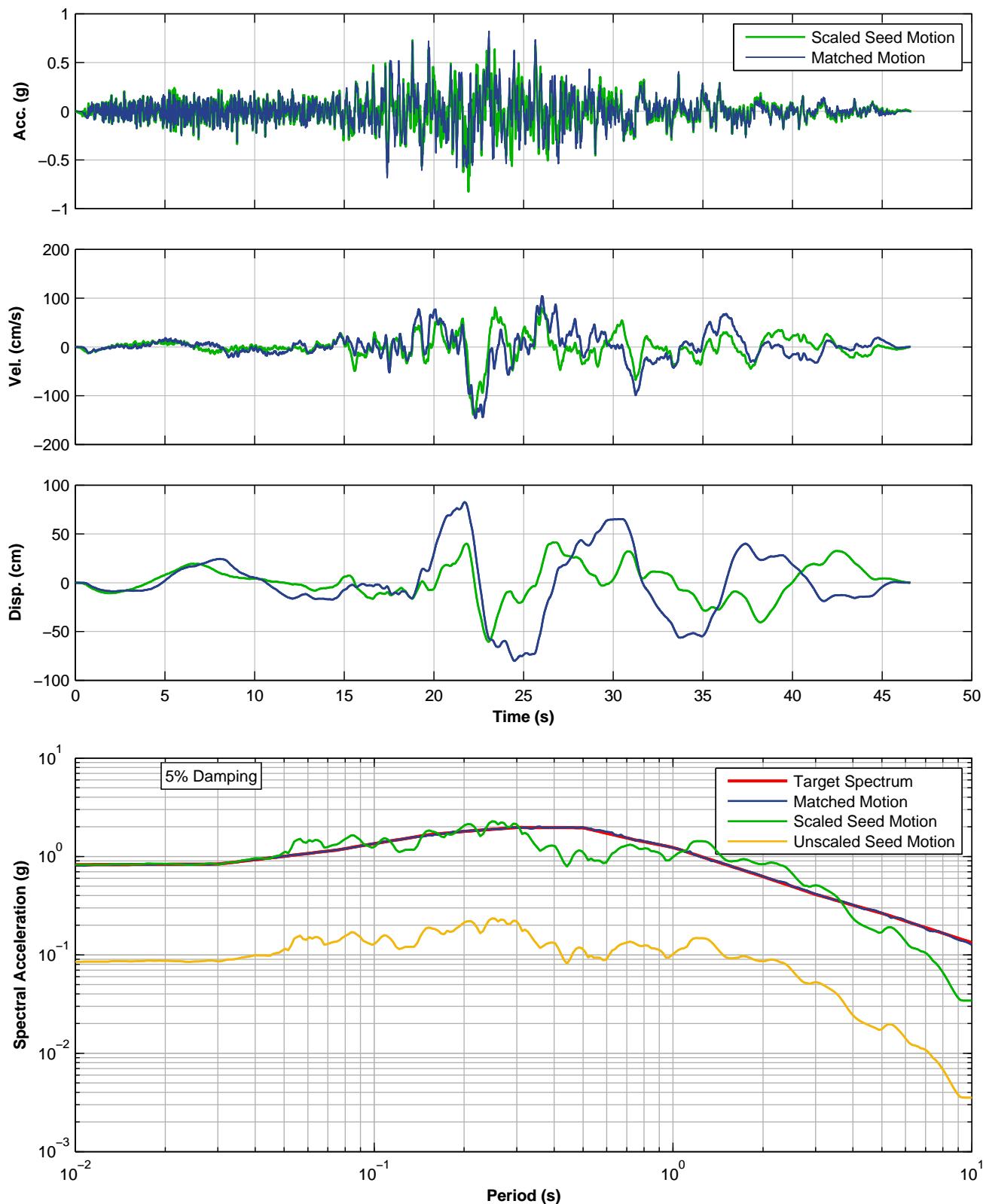
**SPECTRALLY MATCHED MEP MOTION, NS COMPONENT, 2010 CHILE EQ
 SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**
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FIGURE D.2



**SPECTRALLY MATCHED MEP MOTION, V COMPONENT, 2010 CHILE EQ
 SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**
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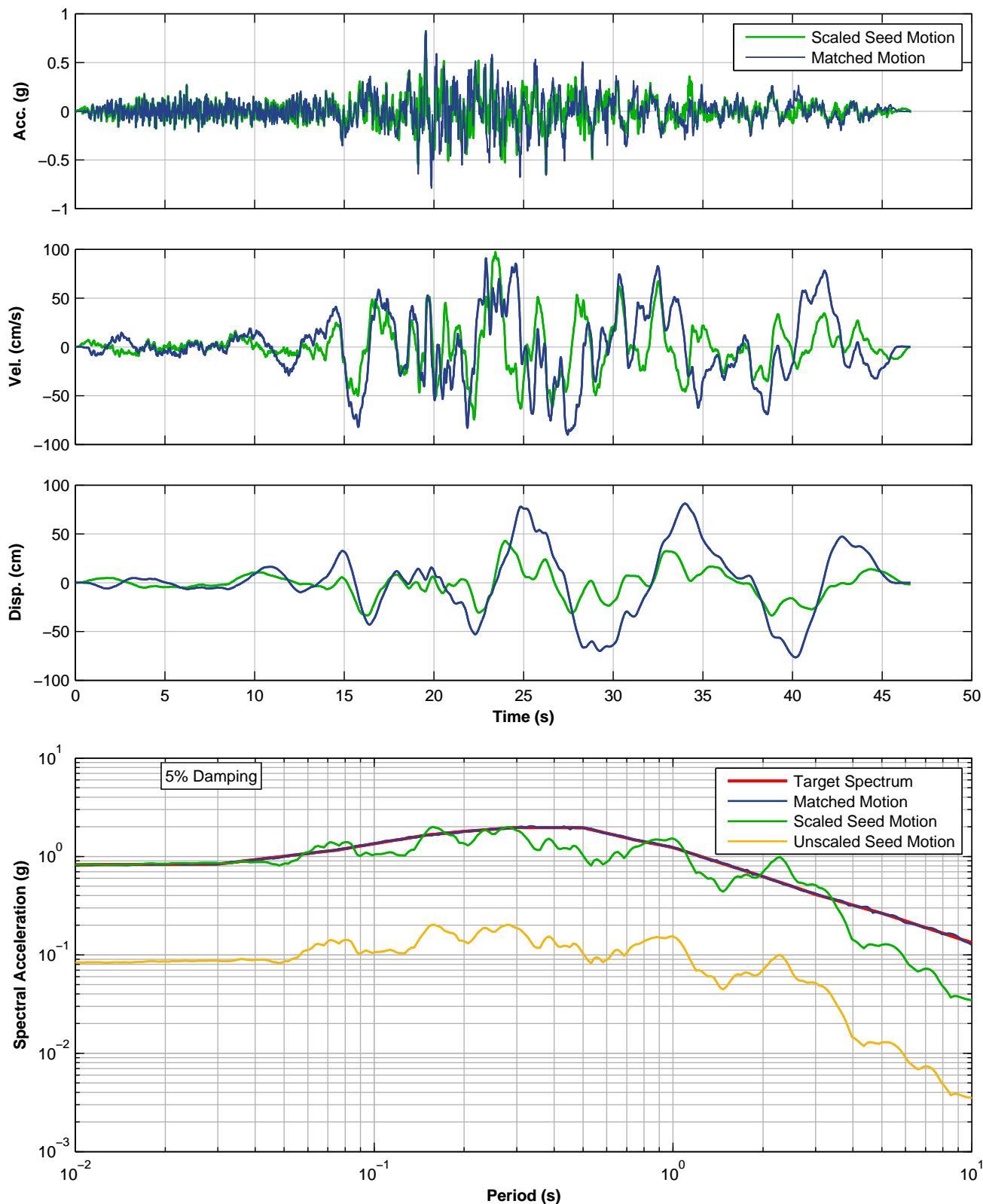
FIGURE D.3



**SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT, 2001 EL SALVADOR EQ
SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**

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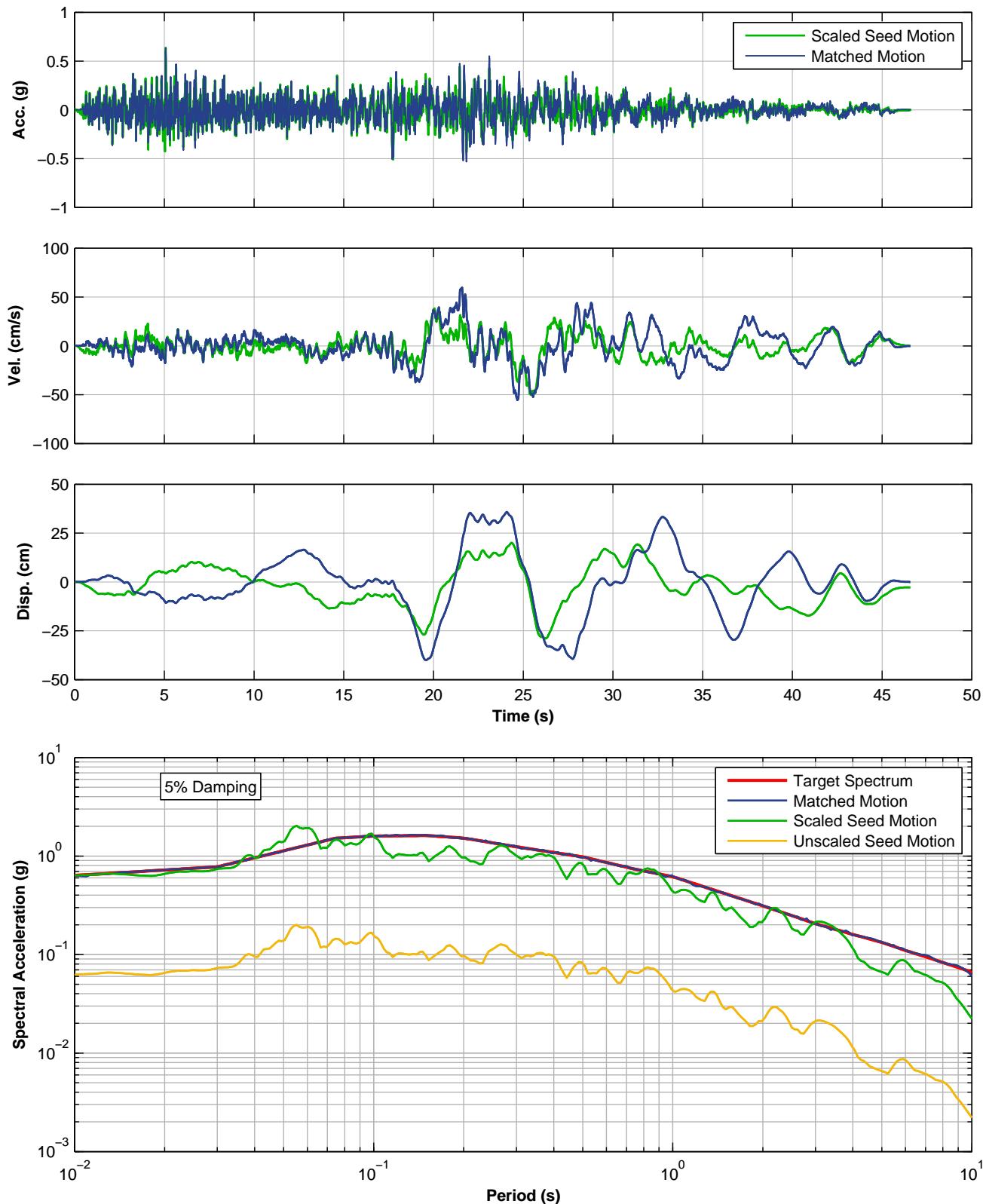
FIGURE D.4



**SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT, 2001 EL SALVADOR EQ
SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**

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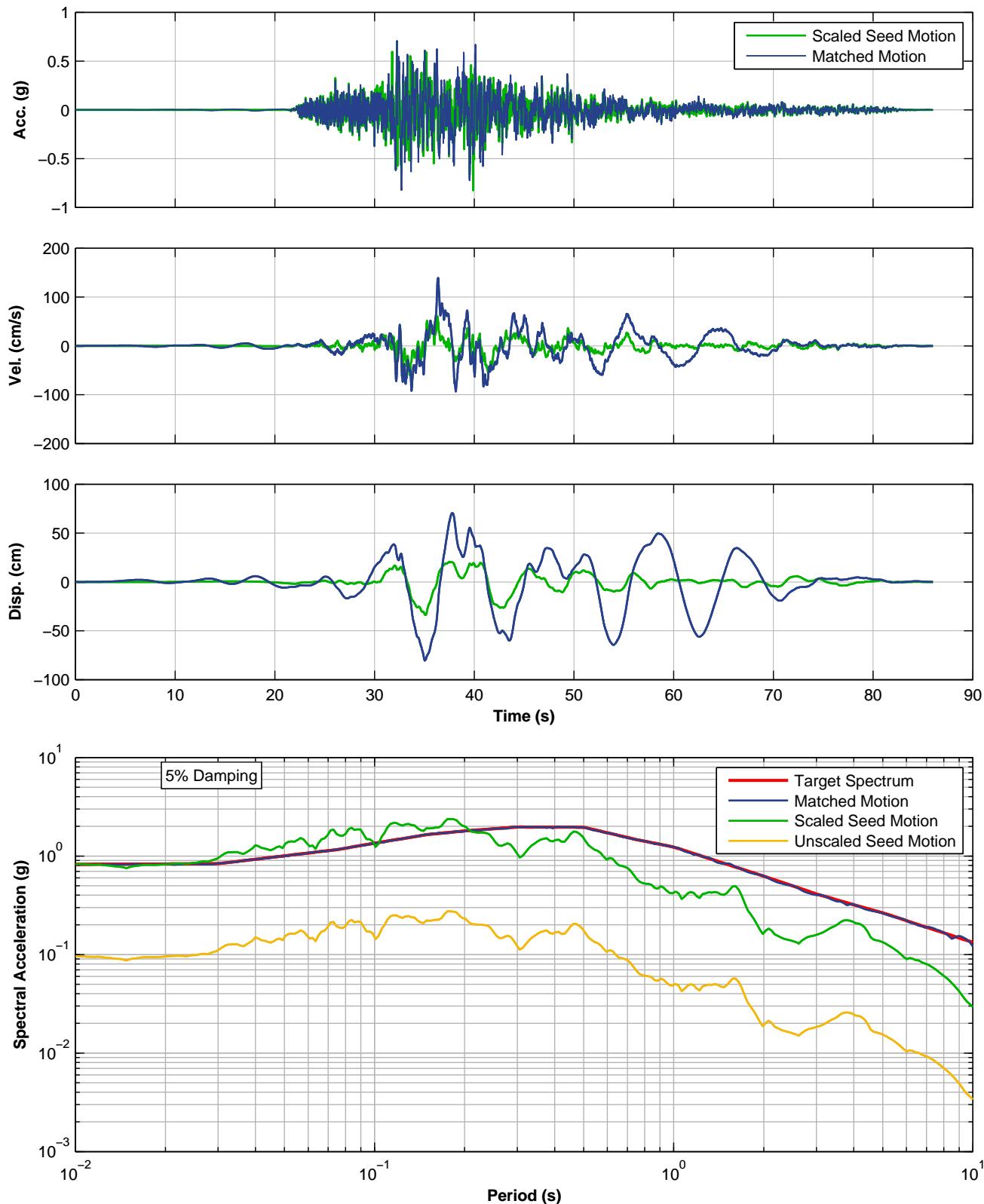
FIGURE D.5



**SPECTRALLY MATCHED CTO MOTION, UP COMPONENT, 2001 EL SALVADOR EQ
SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**

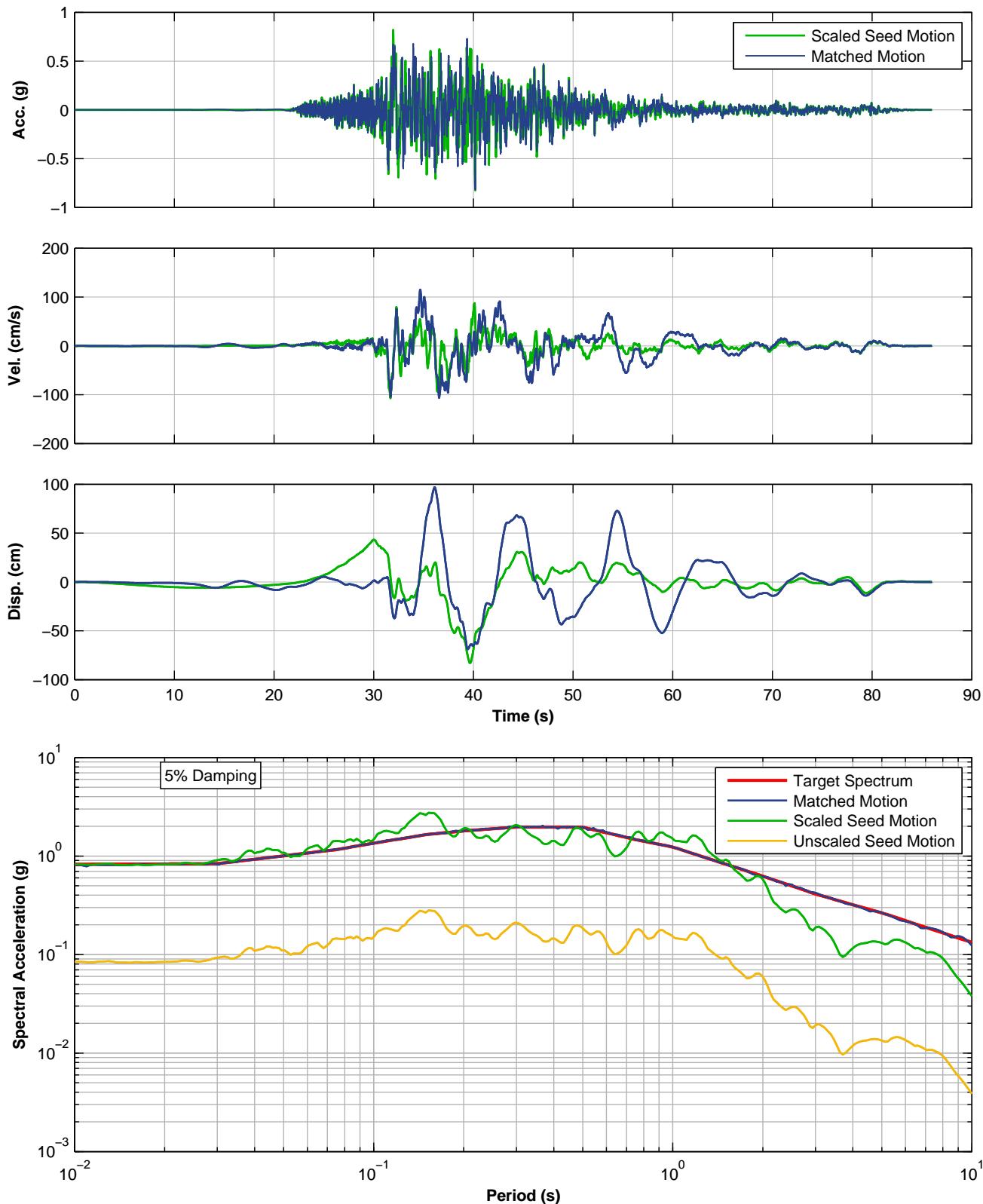
LNG FACILITIES
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FIGURE D.6



**SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT, 2002 DENALI EQ, ALASKA
 SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**
LNG FACILITIES
ALASKA LNG PROJECT
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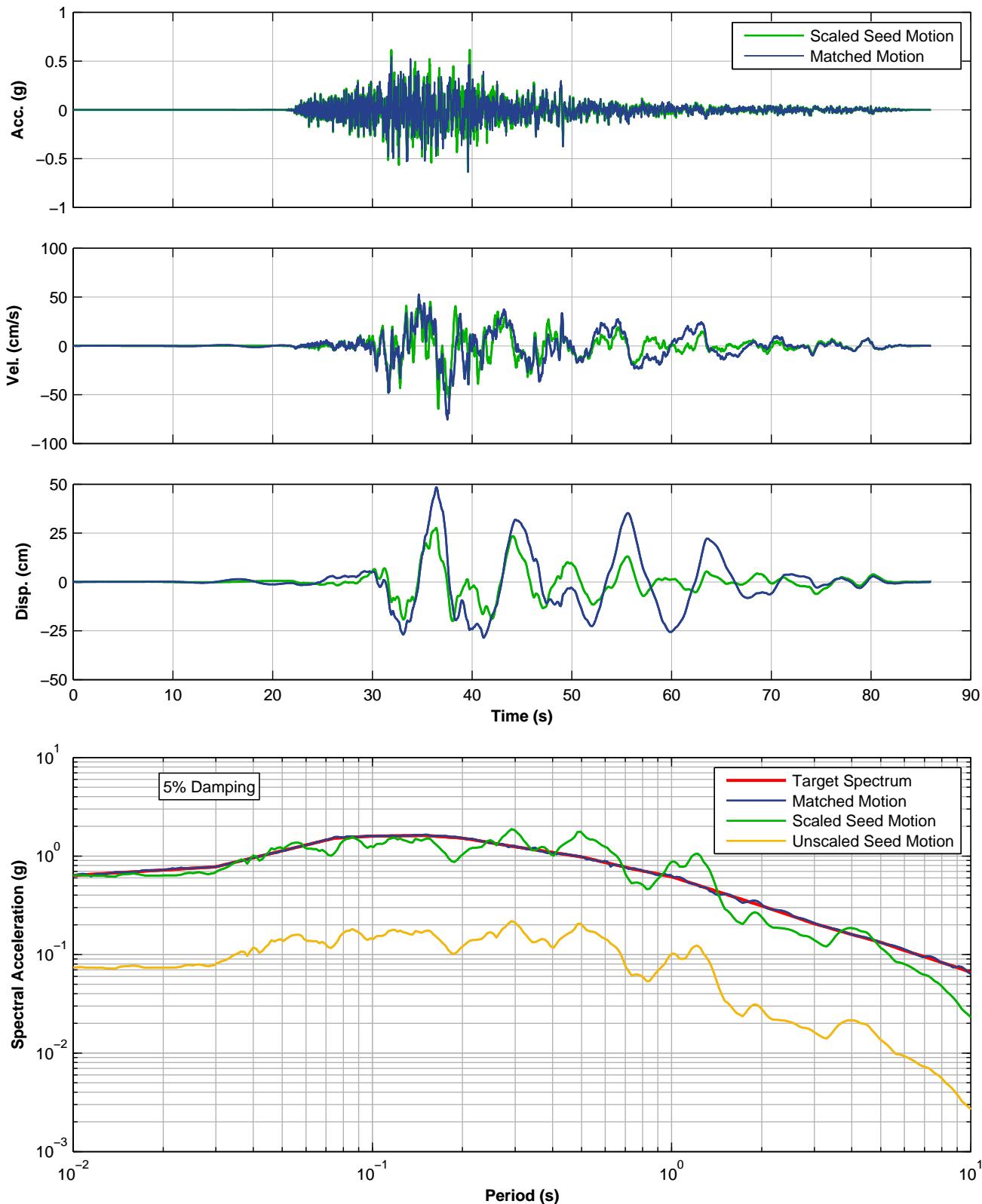
FIGURE D.7



**SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT, 2002 DENALI EQ, ALASKA
 SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**

LNG FACILITIES
 ALASKA LNG PROJECT
 NIKISKI, ALASKA

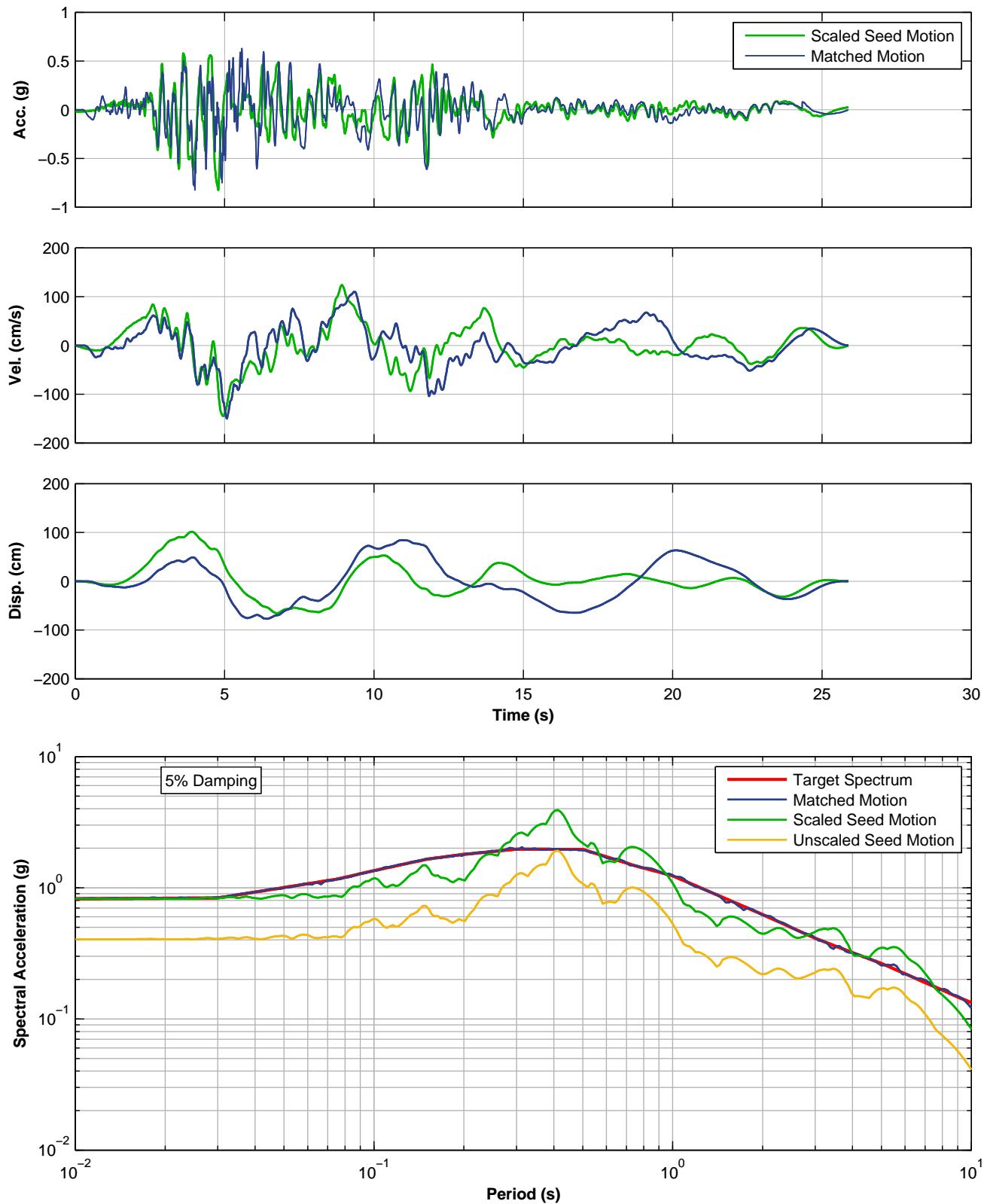
FIGURE D.8



**SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT, 2002 DENALI EQ, ALASKA
 SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**

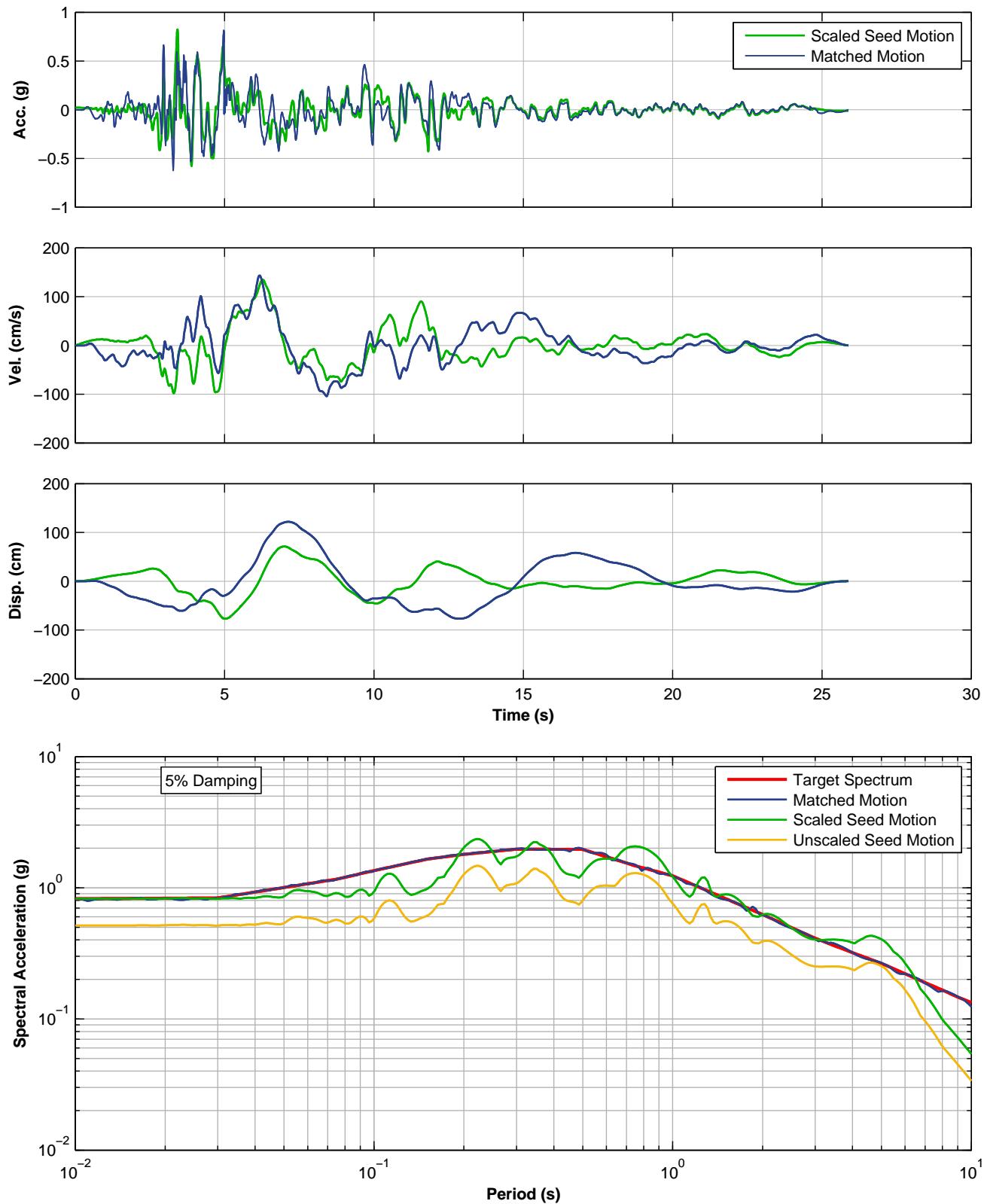
LNG FACILITIES
 ALASKA LNG PROJECT
 NIKISKI, ALASKA

FIGURE D.9



**SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT, 1999 DUZCE EQ, TURKEY
 SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**
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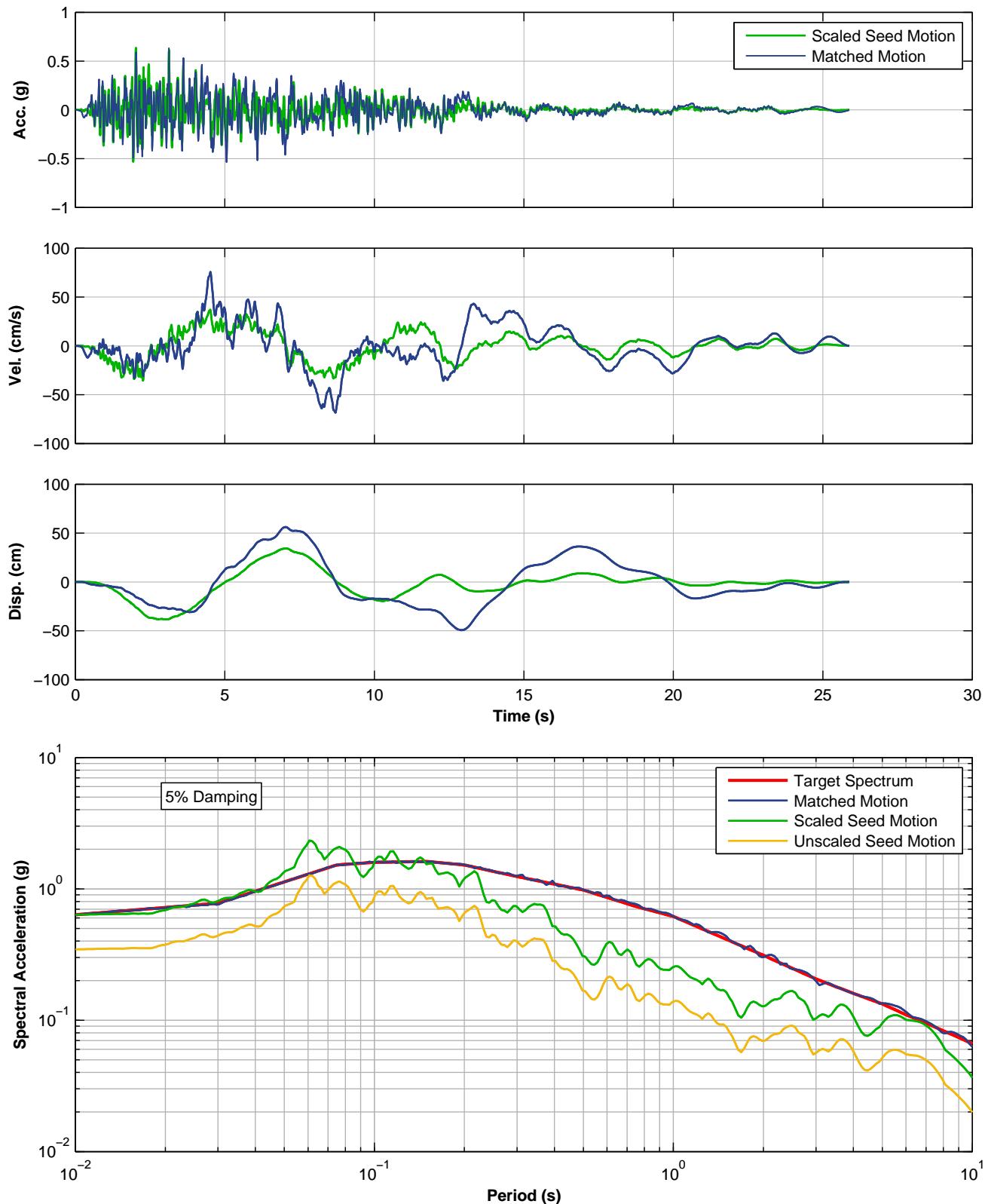
FIGURE D.10



**SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT, 1999 DUZCE EQ, TURKEY
 SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**

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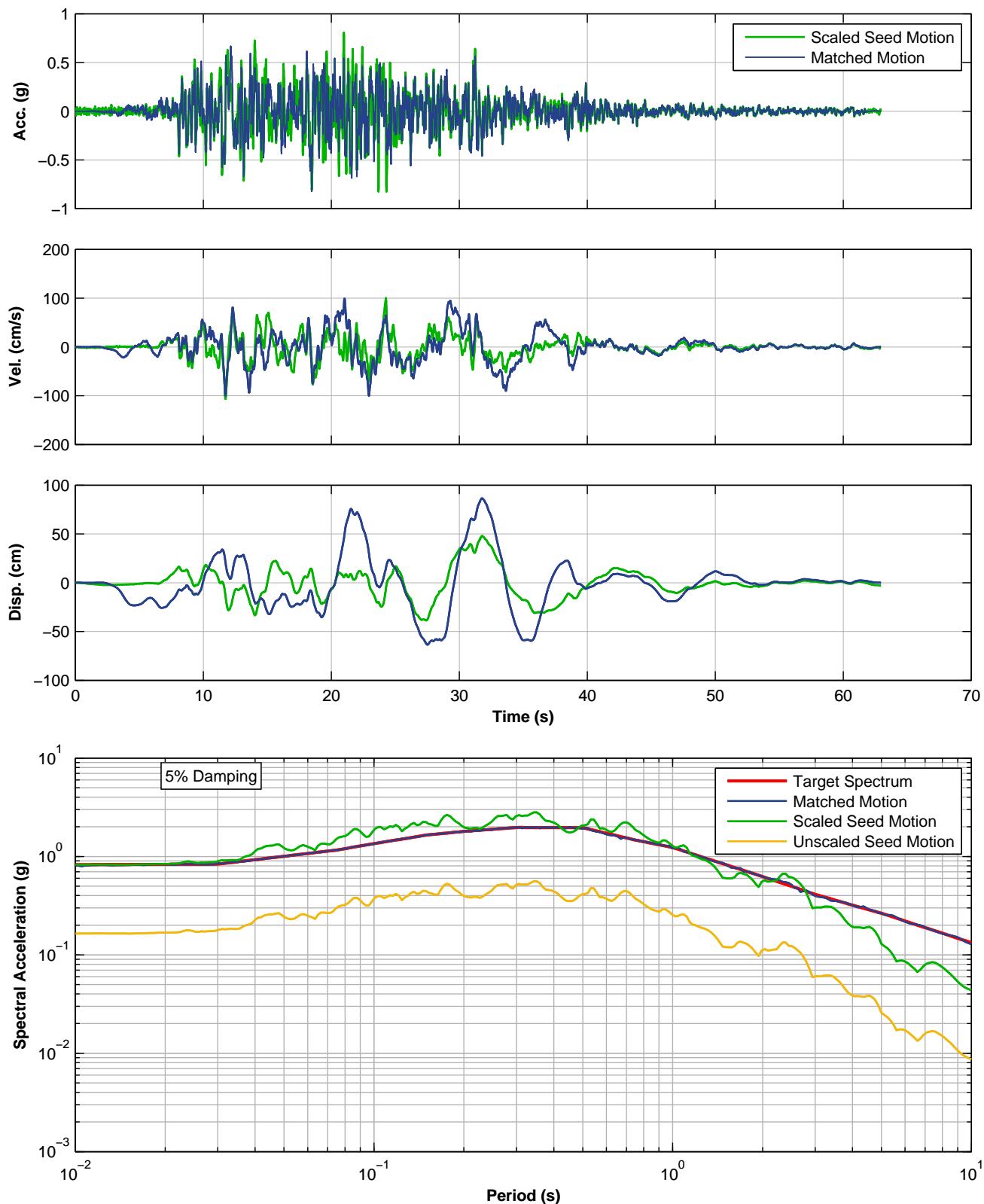
FIGURE D.11



**SPECTRALLY MATCHED DZC MOTION, UP COMPONENT, 1999 DUZCE EQ, TURKEY
 SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**

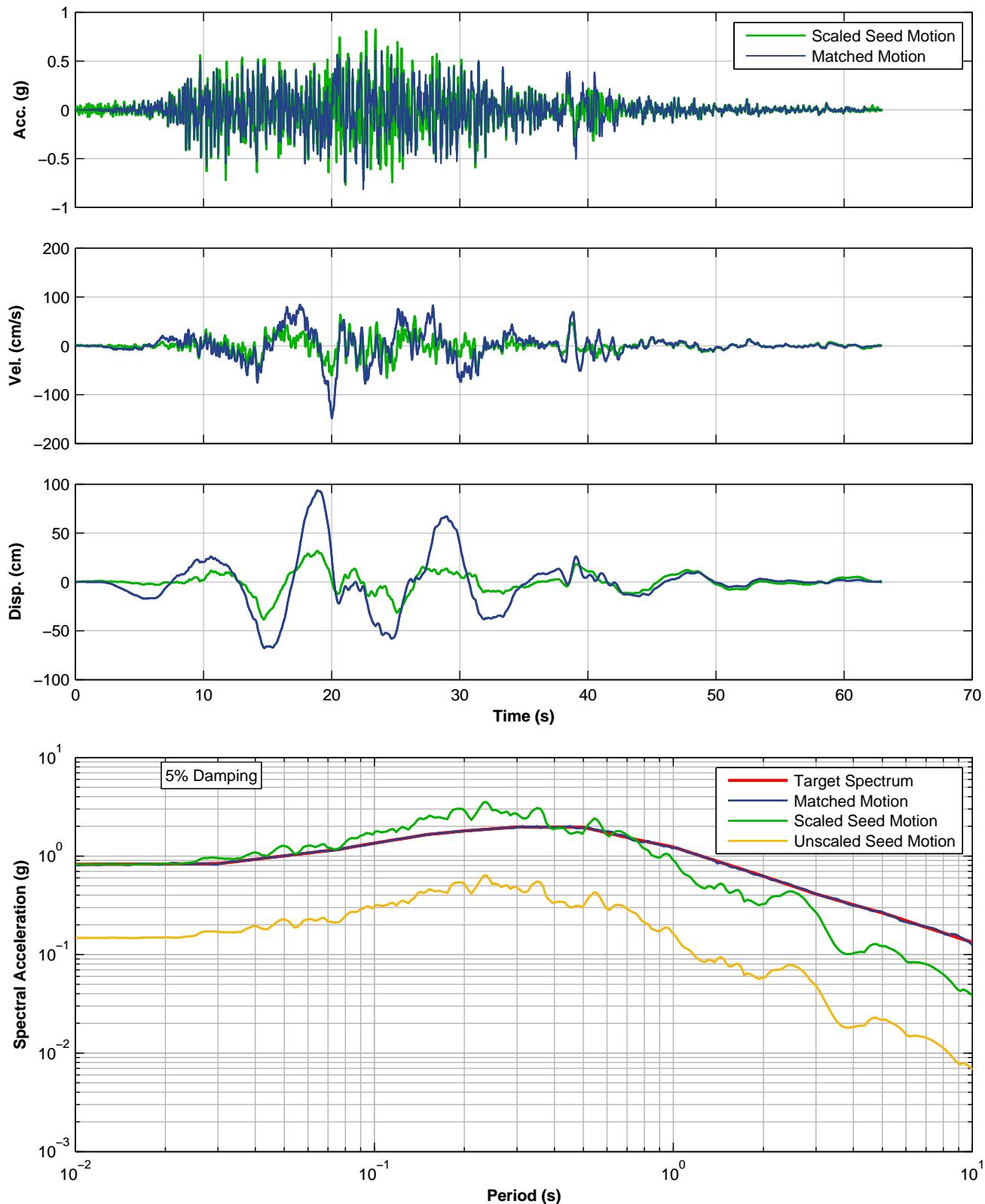
LNG FACILITIES
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FIGURE D.12



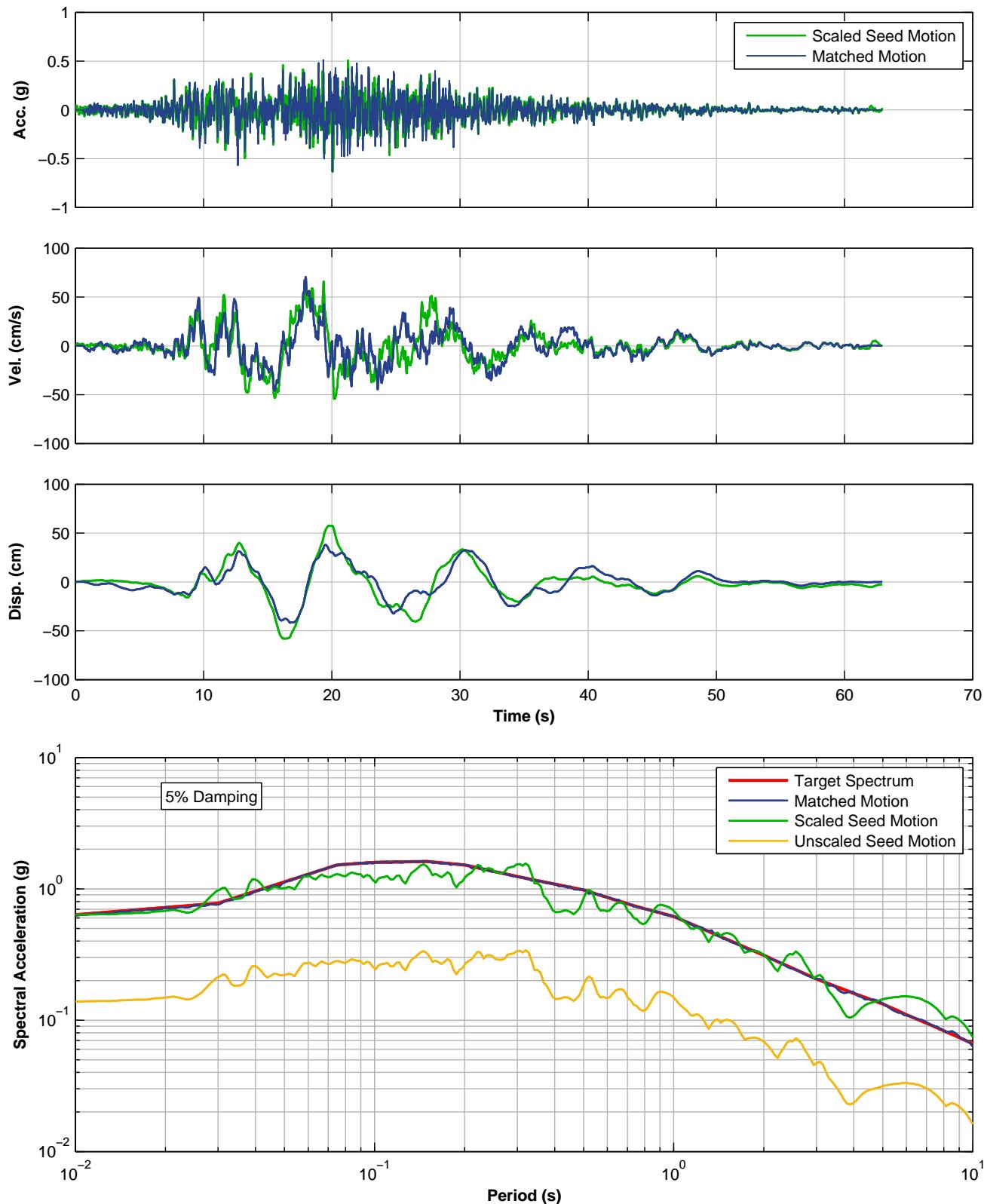
**SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT, 1985 MEXICO EQ
 SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**
LNG FACILITIES
ALASKA LNG PROJECT
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FIGURE D.13



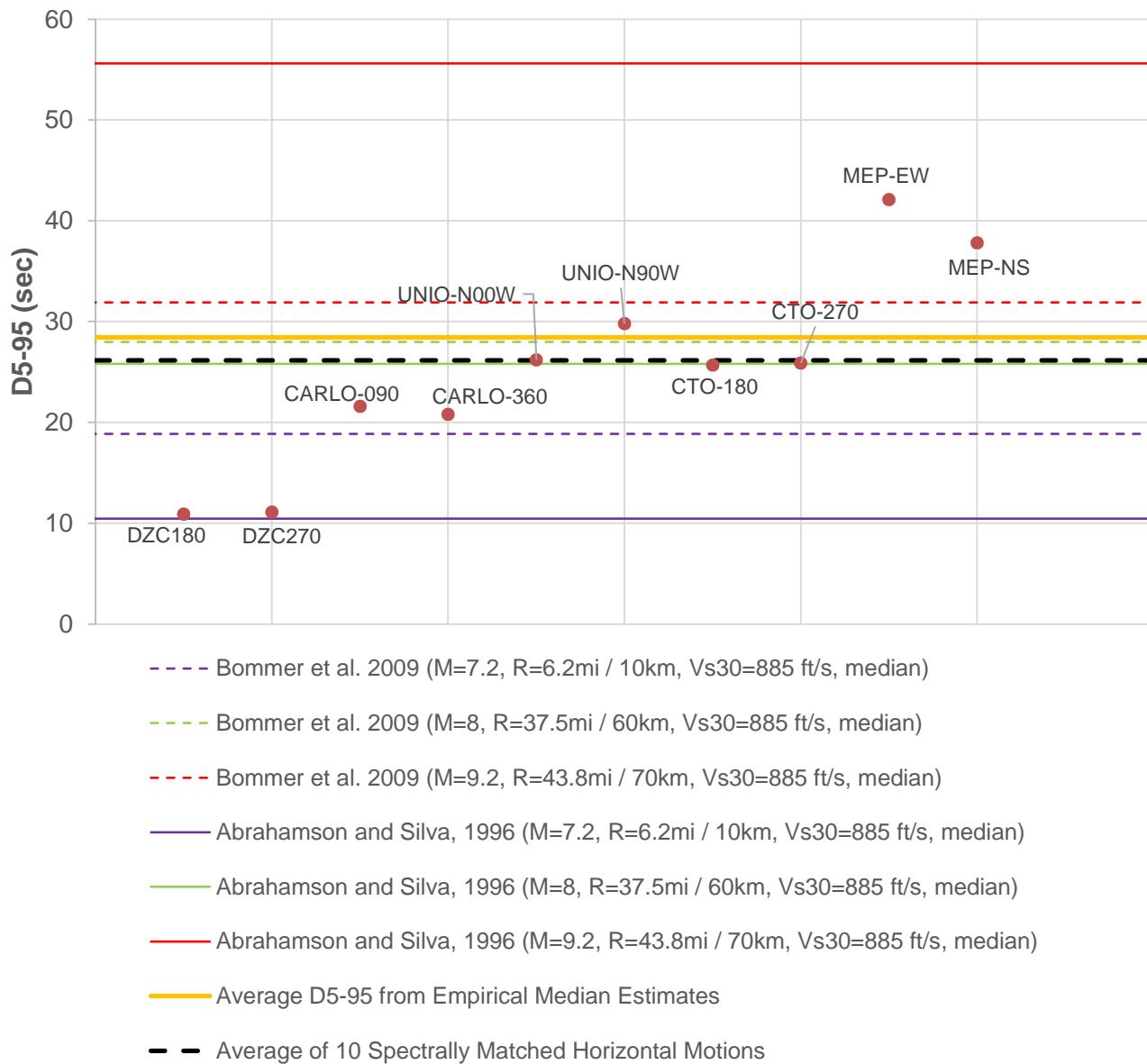
**SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT, 1985 MEXICO EQ
 SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**
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FIGURE D.14



**SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT, 1985 MEXICO EQ
 SSE LEVEL PER NFPA 59A 2013 – ONSHORE AND NEARSHORE**
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FIGURE D.15



COMPARISON OF SIGNIFICANT DURATION D(5-95) OF SPECTRALLY MATCHED HORIZONTAL GROUND MOTIONS FOR SSE LEVEL PER NFPA 59A 2013 WITH THE DETERMINISTIC ESTIMATES USING EMPIRICAL RELATIONSHIPS

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5-May-2016

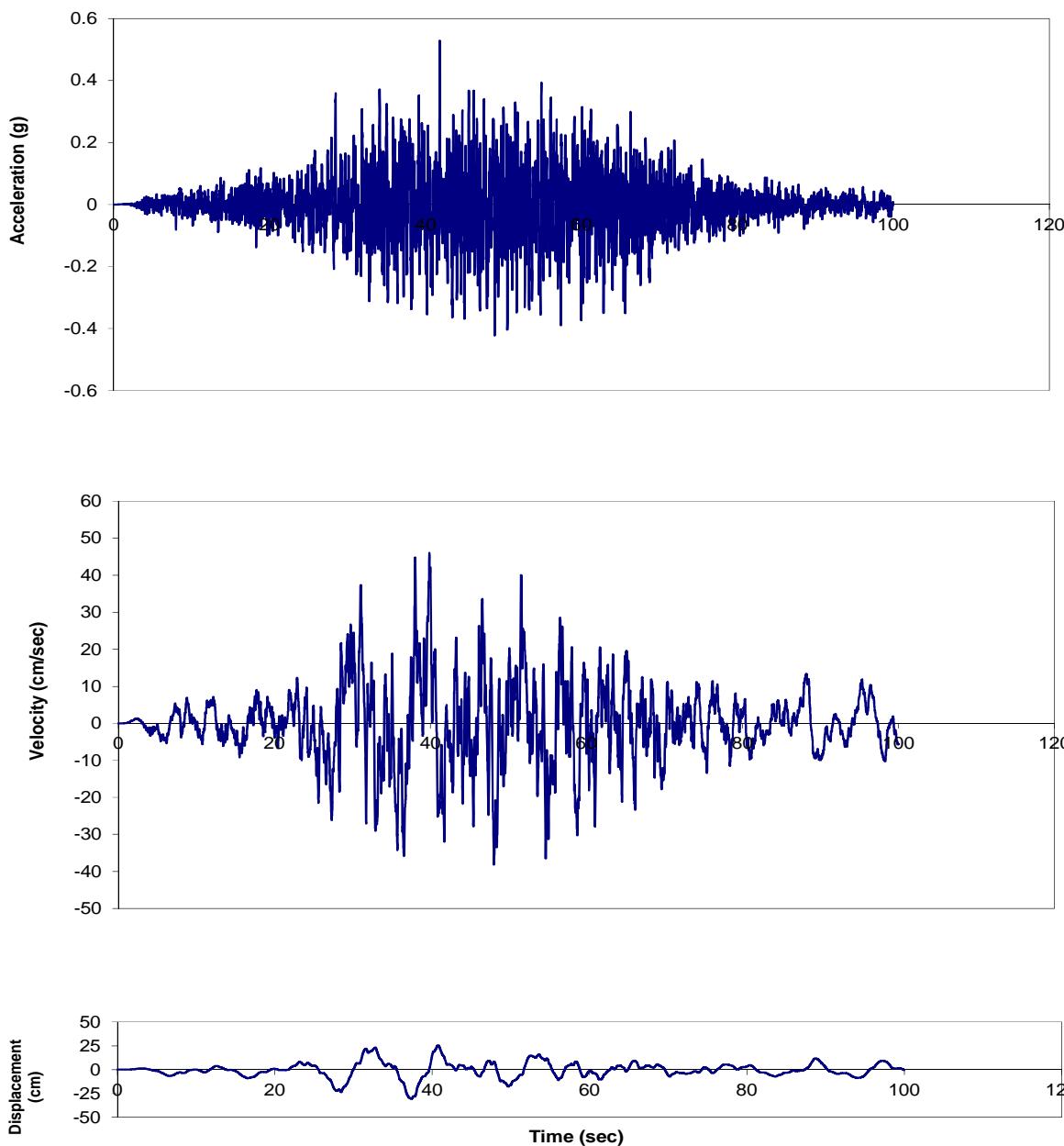
Report No. 04.10140334-6



APPENDIX E

CHARACTERISTICS OF SPECTRALLY MATCHED GROUND MOTIONS

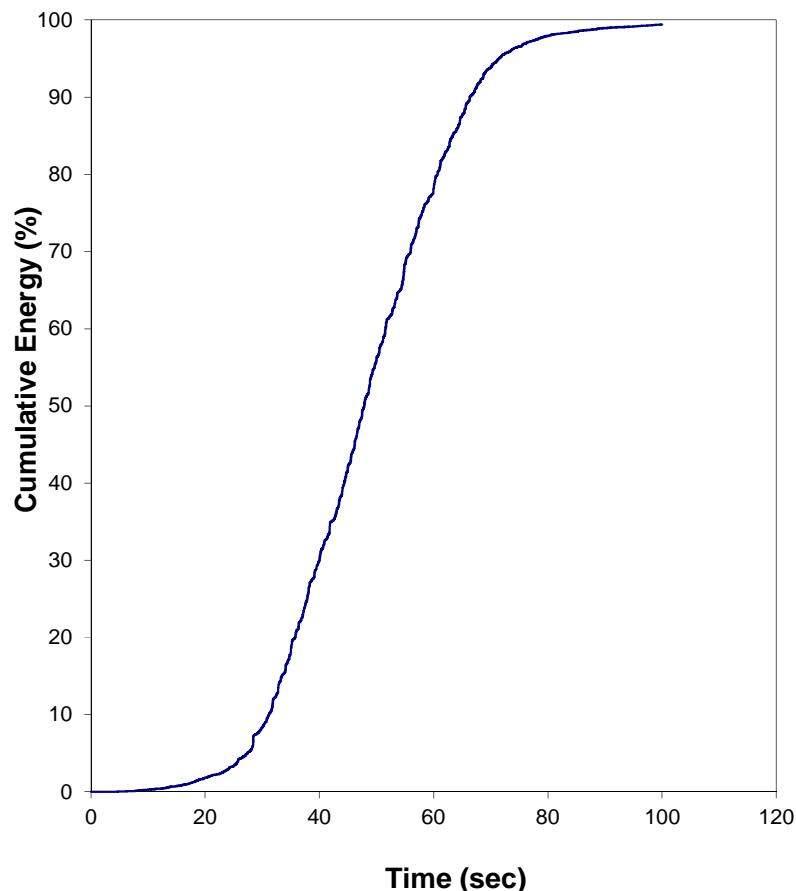
chile_mep_ew time history - Acceleration, Velocity, and Displacement Time Histories



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

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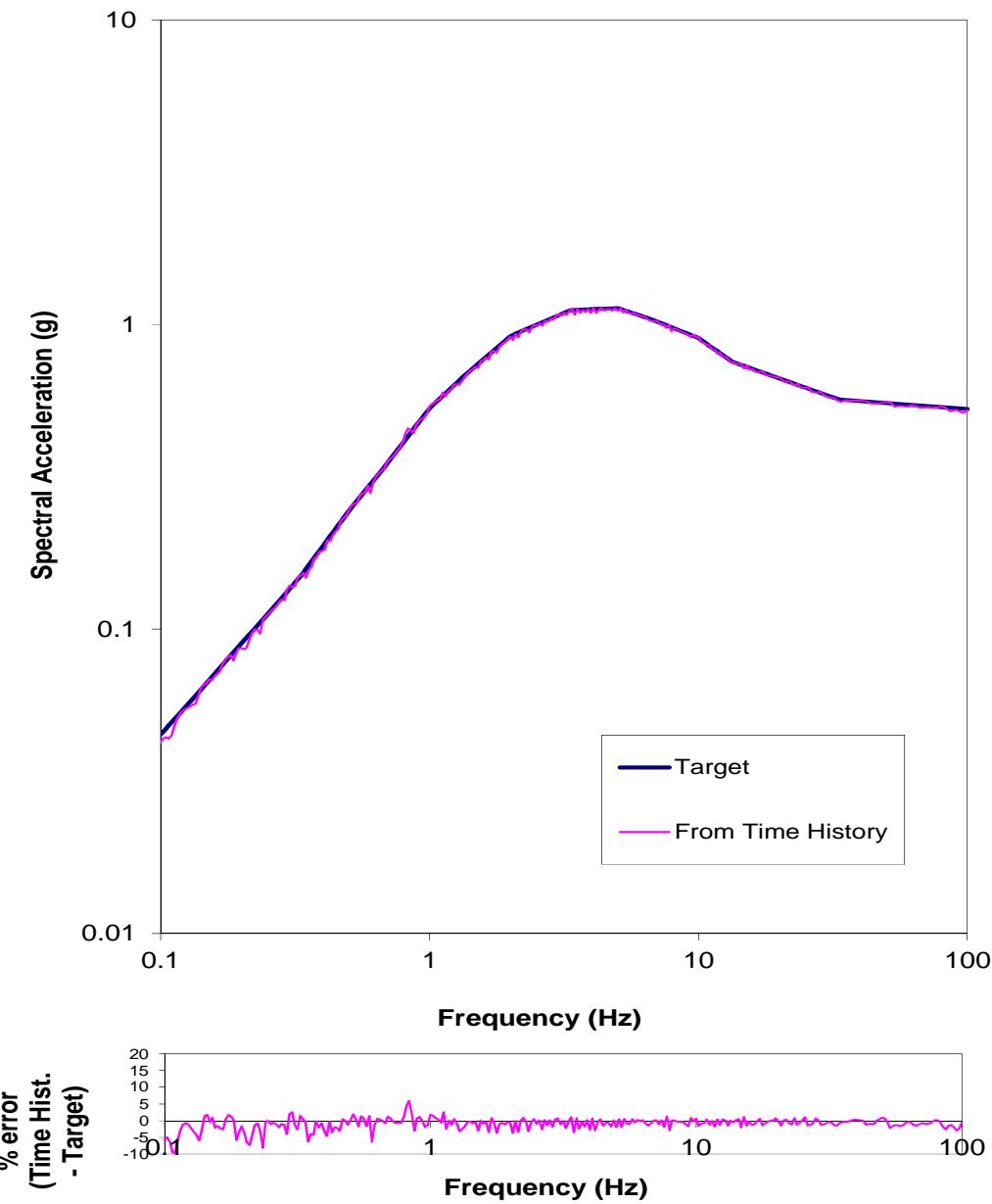
**chile_mep_ew time history - Cumulative Energy
(Husid) plot**



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT**

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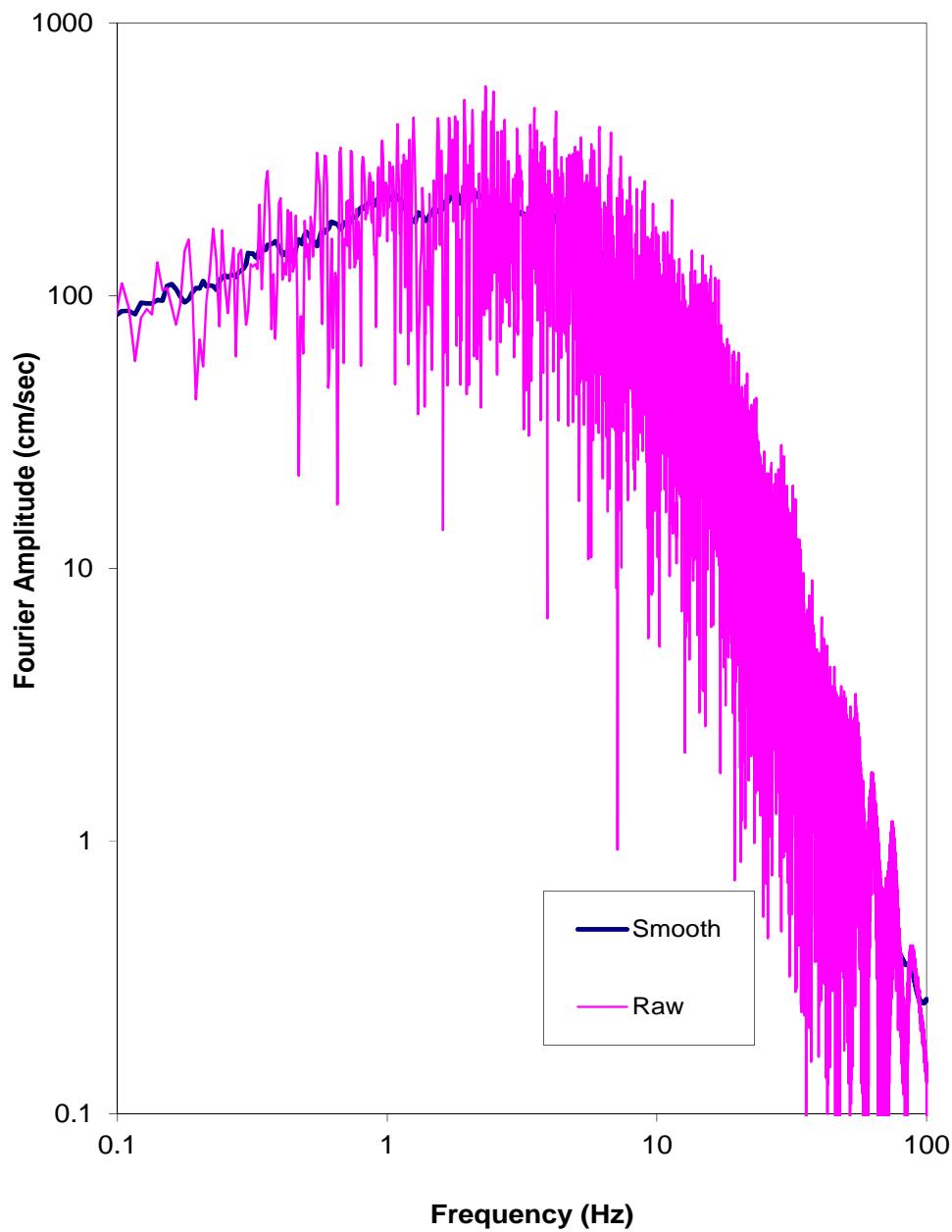
chile_mep_ew time history - Response Spectra



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – TARGET AND CALCULATED RESPONSE
SPECTRA**

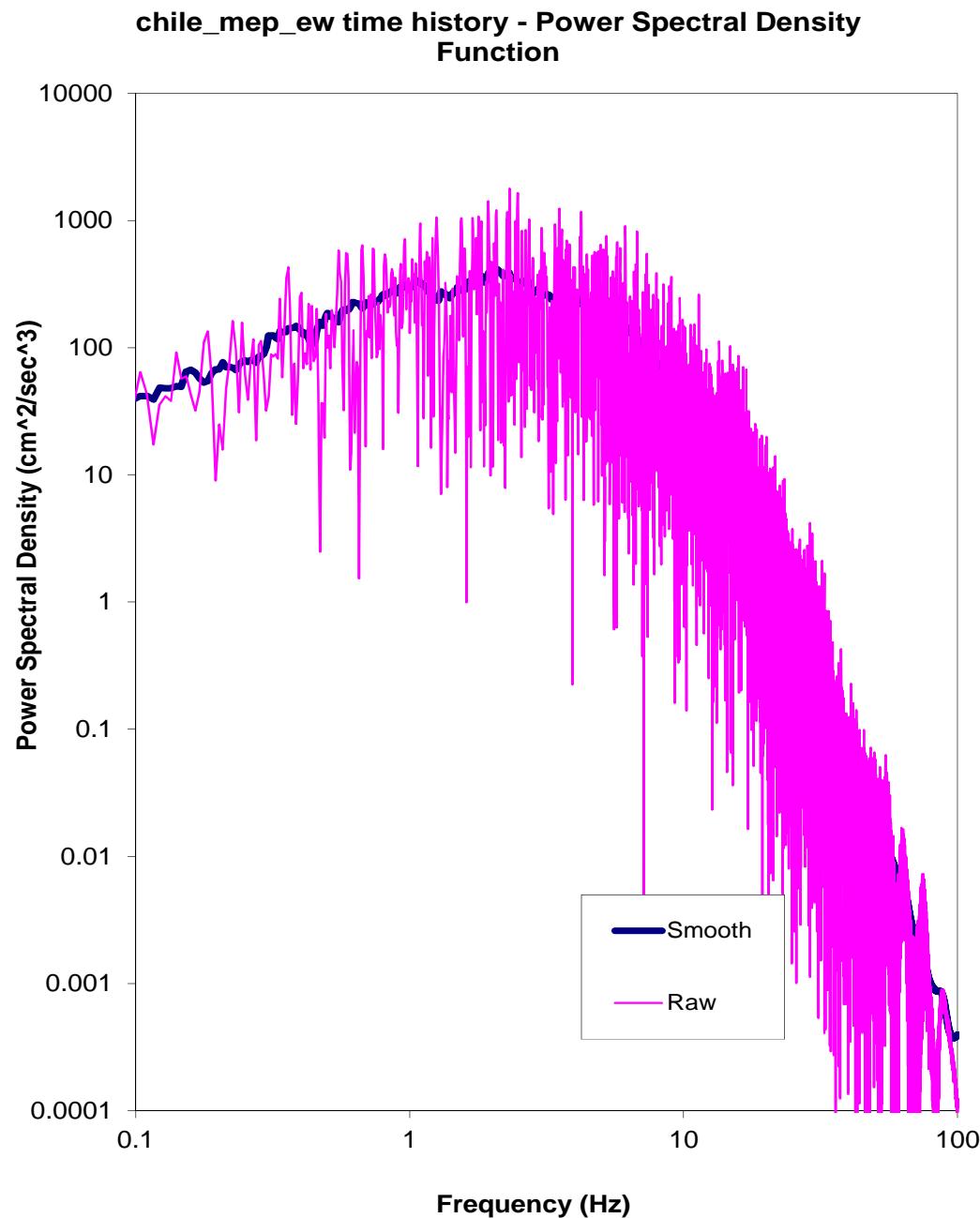
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chile_mep_ew time history - Fourier Amplitude Spectra



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – FOURIER AMPLITUDE SPECTRUM

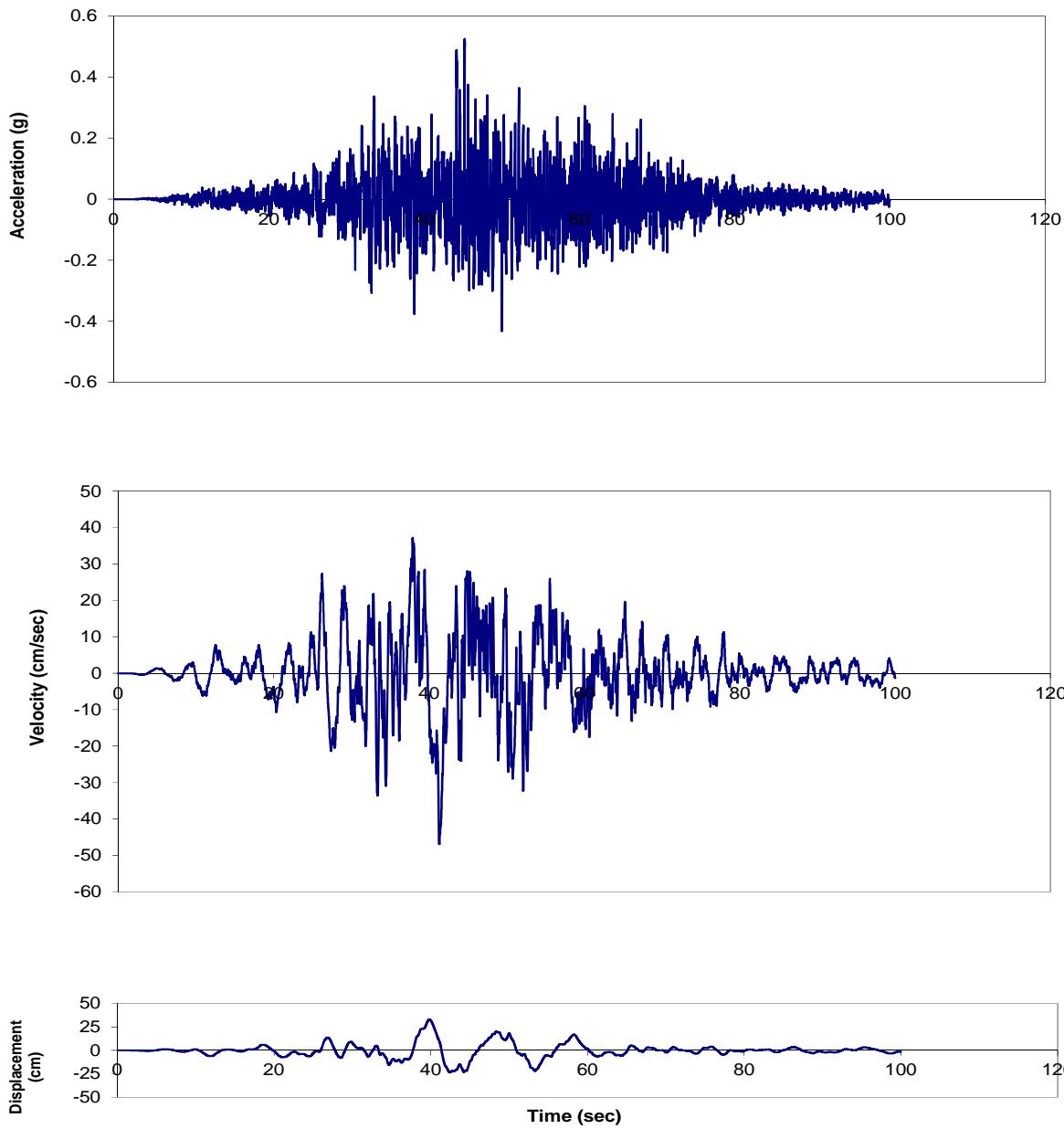
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OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – POWER SPECTRAL DENSITY FUNCTION

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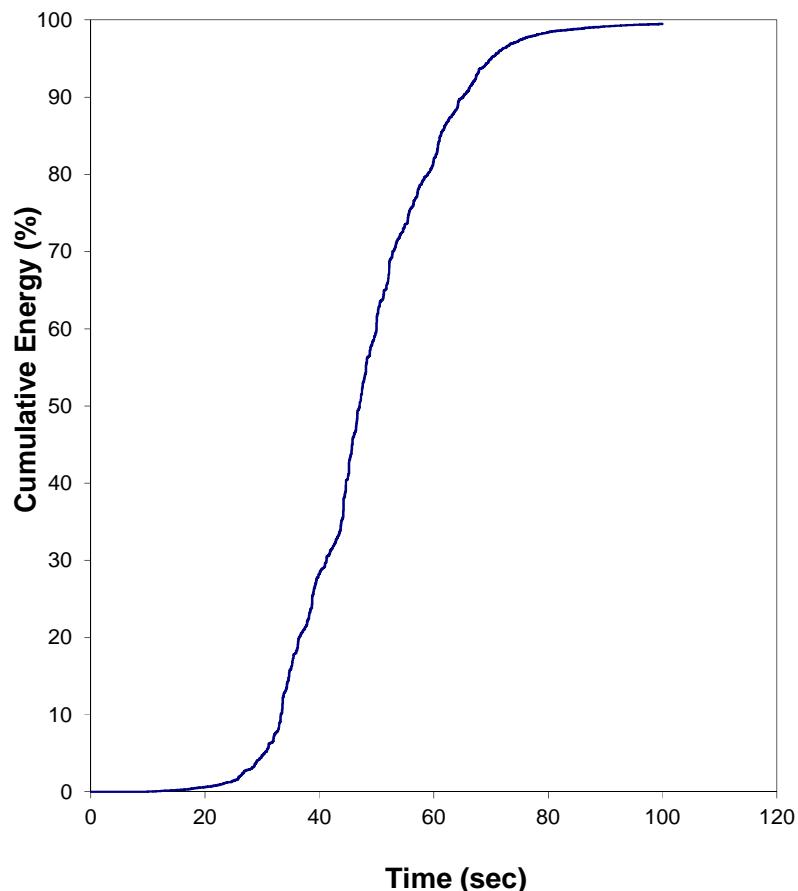
chile_mep_ns time history - Acceleration, Velocity, and Displacement Time Histories



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

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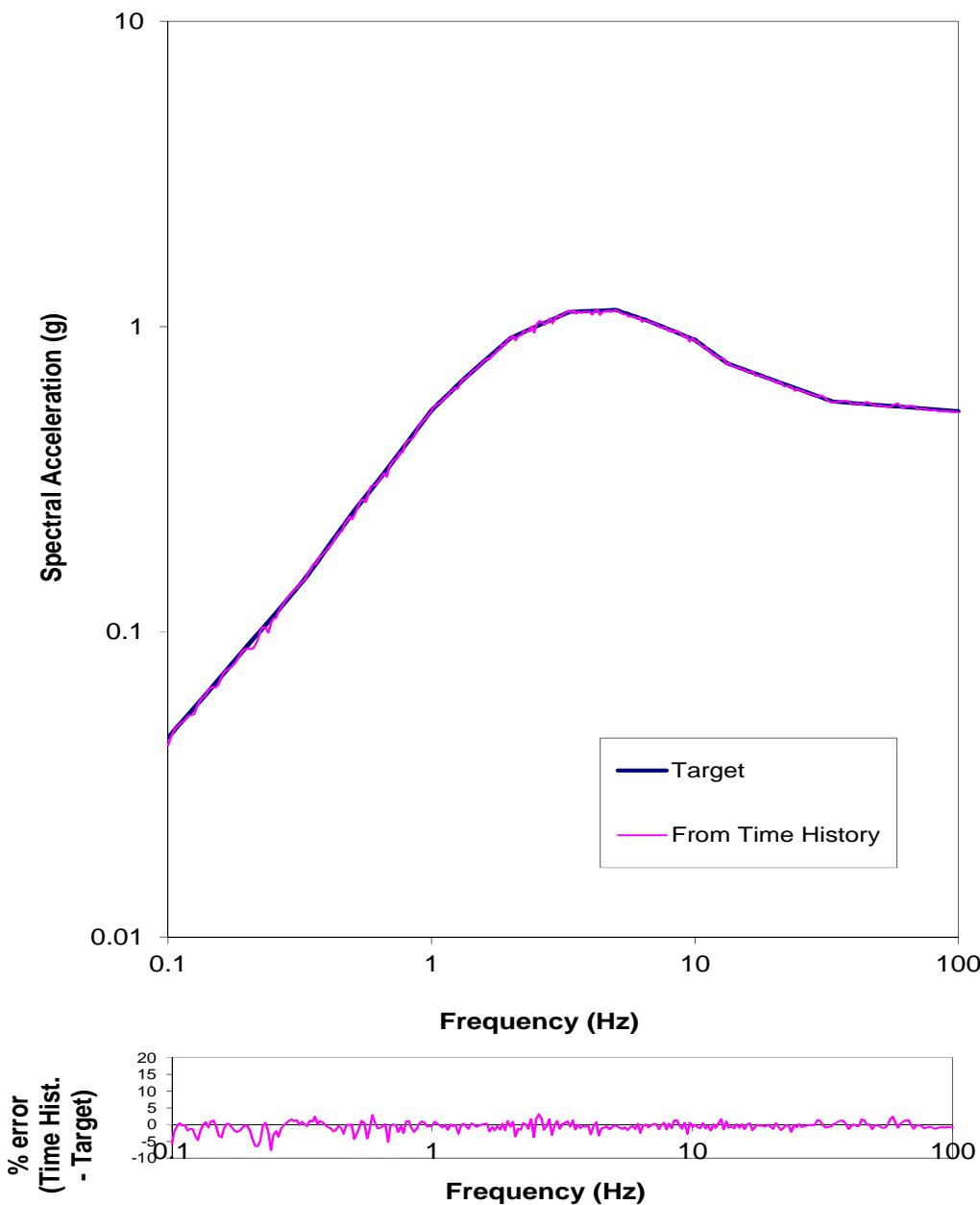
**chile_mep_ns time history - Cumulative Energy
(Husid) plot**



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT**

LNG FACILITIES
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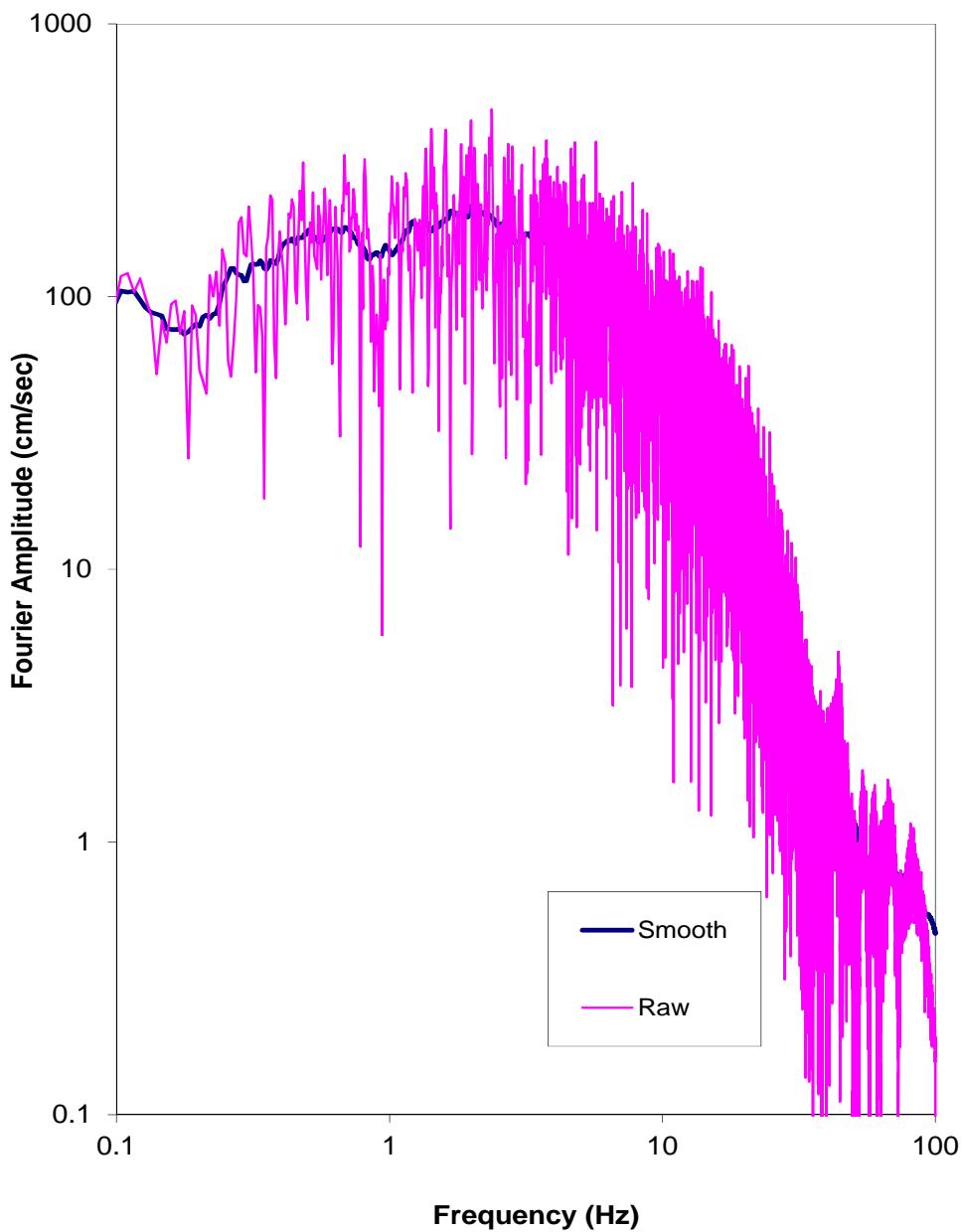
chile_mep_ns time history - Response Spectra



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – TARGET AND CALCULATED RESPONSE
SPECTRA**

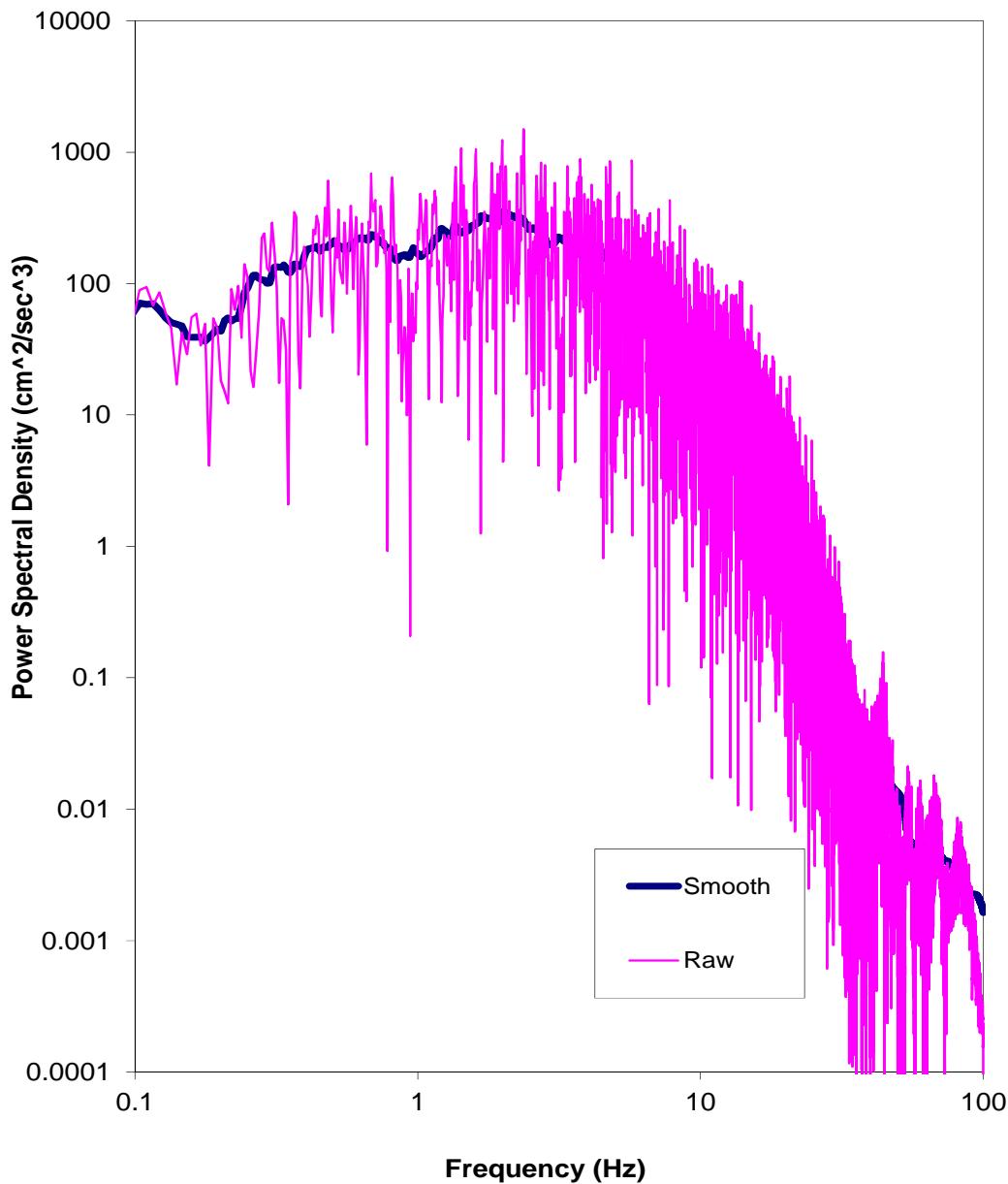
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_ns time history - Fourier Amplitude Spectra



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – FOURIER AMPLITUDE SPECTRUM

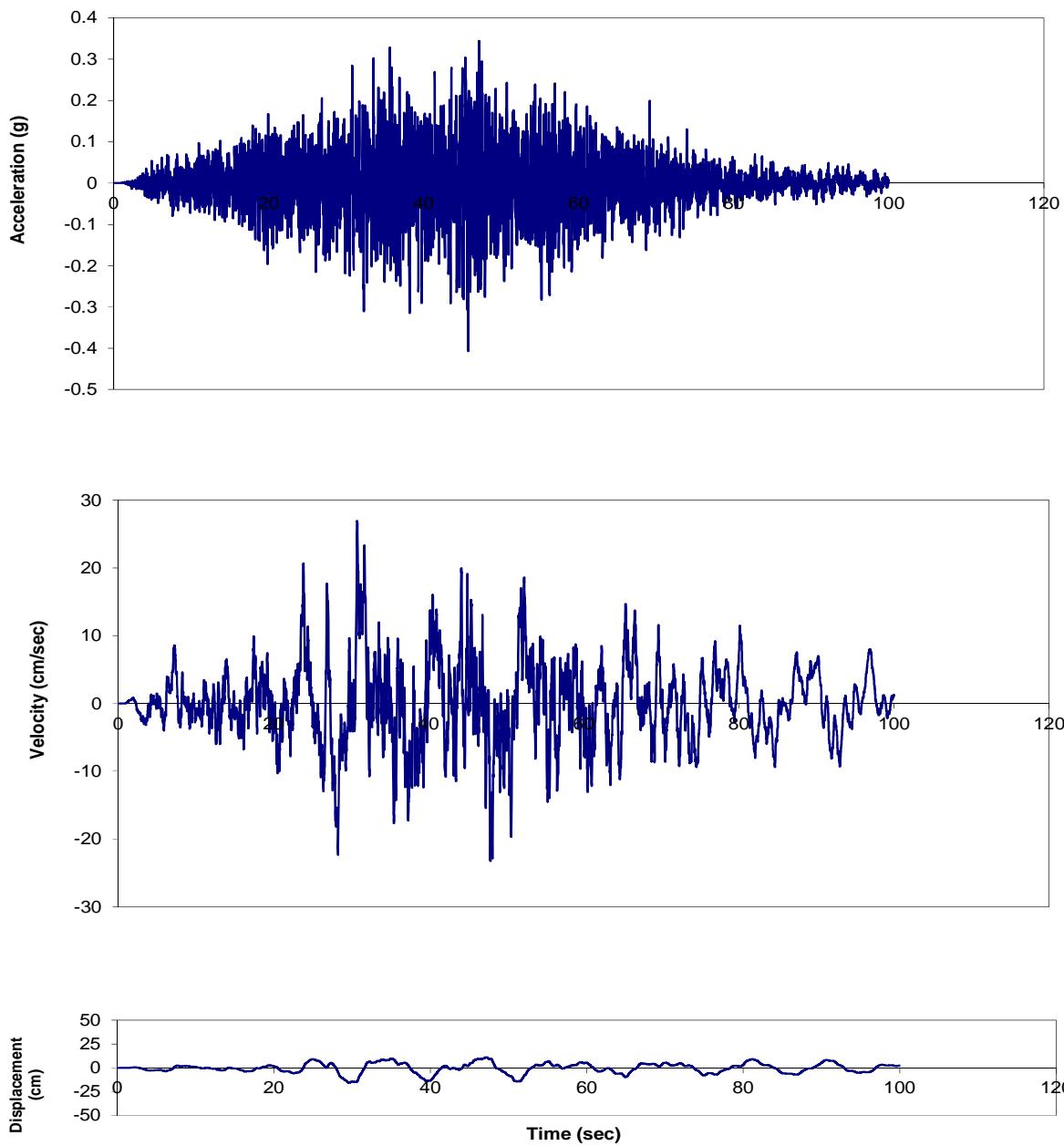
LNG FACILITIES
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chile_mep_ns time history - Power Spectral Density Function

OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – POWER SPECTRAL DENSITY FUNCTION

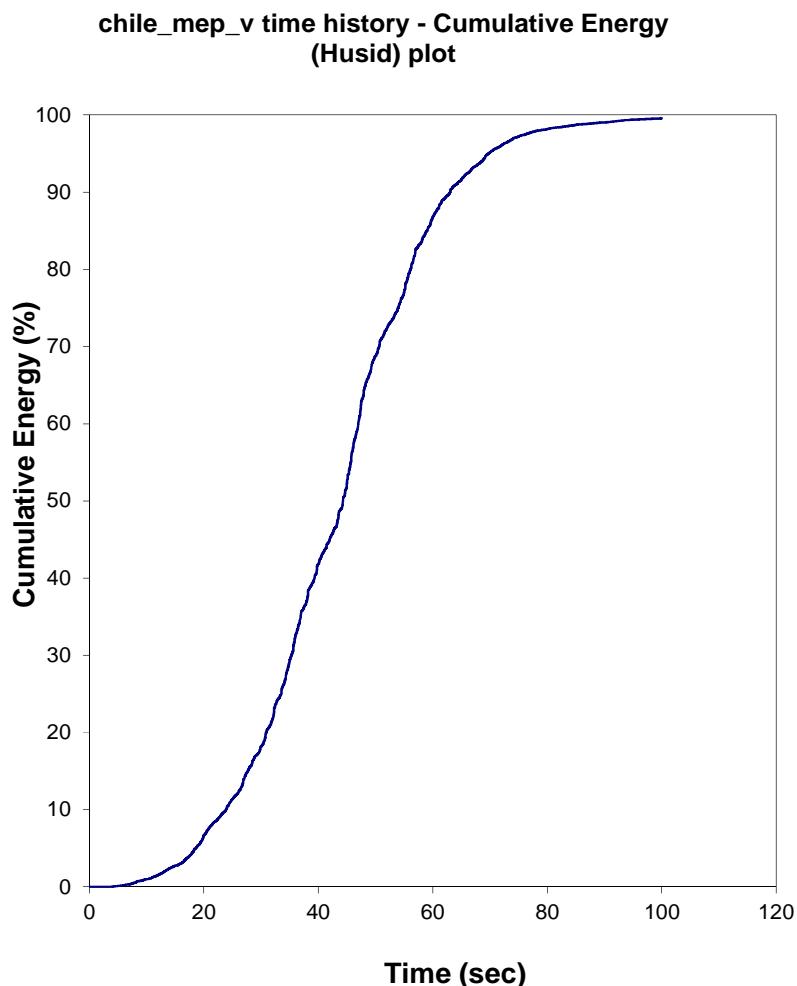
LNG FACILITIES
ALASKA LNG PROJECT
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chile_mep_v time history - Acceleration, Velocity, and Displacement Time Histories



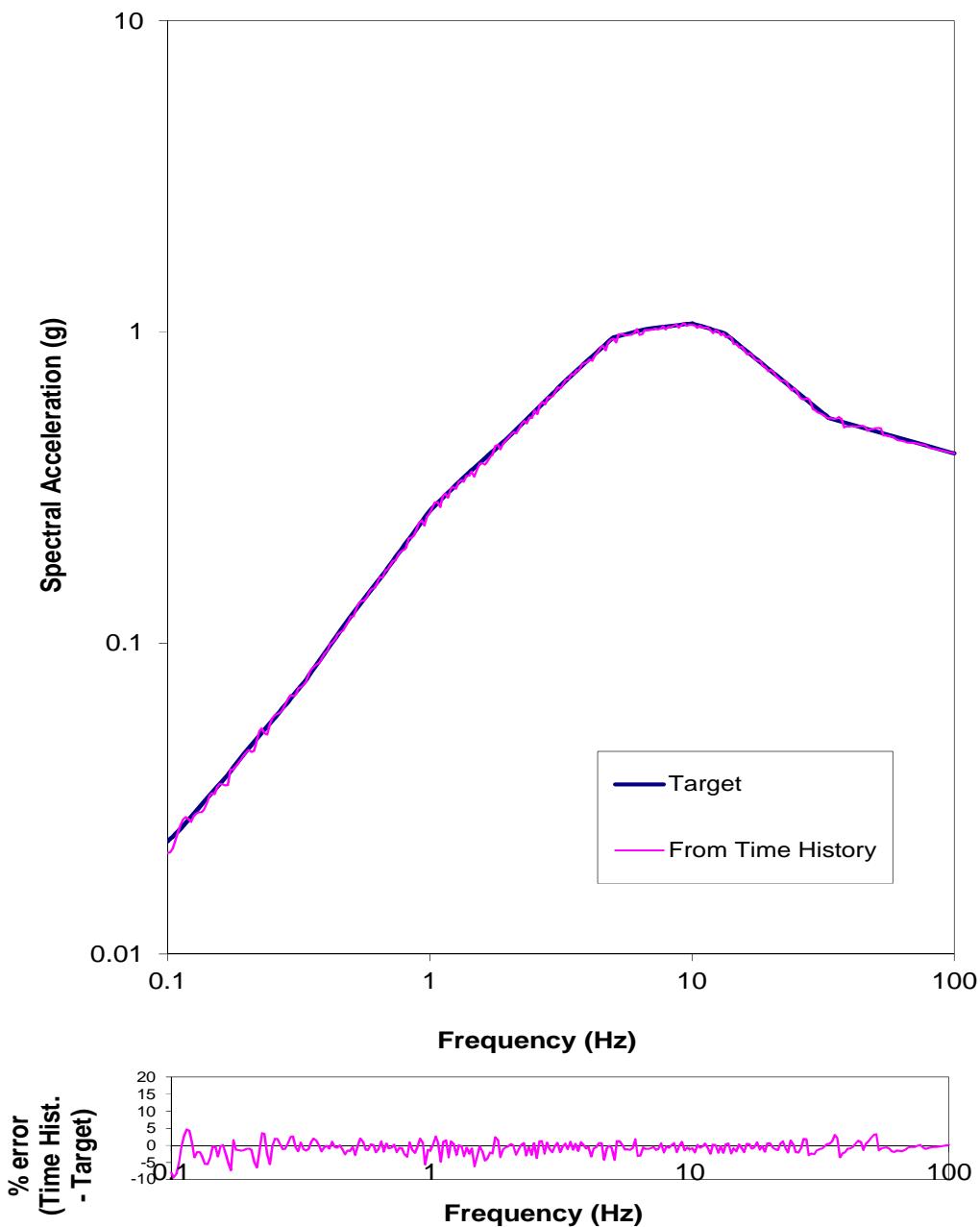
OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, V COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

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OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, V COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

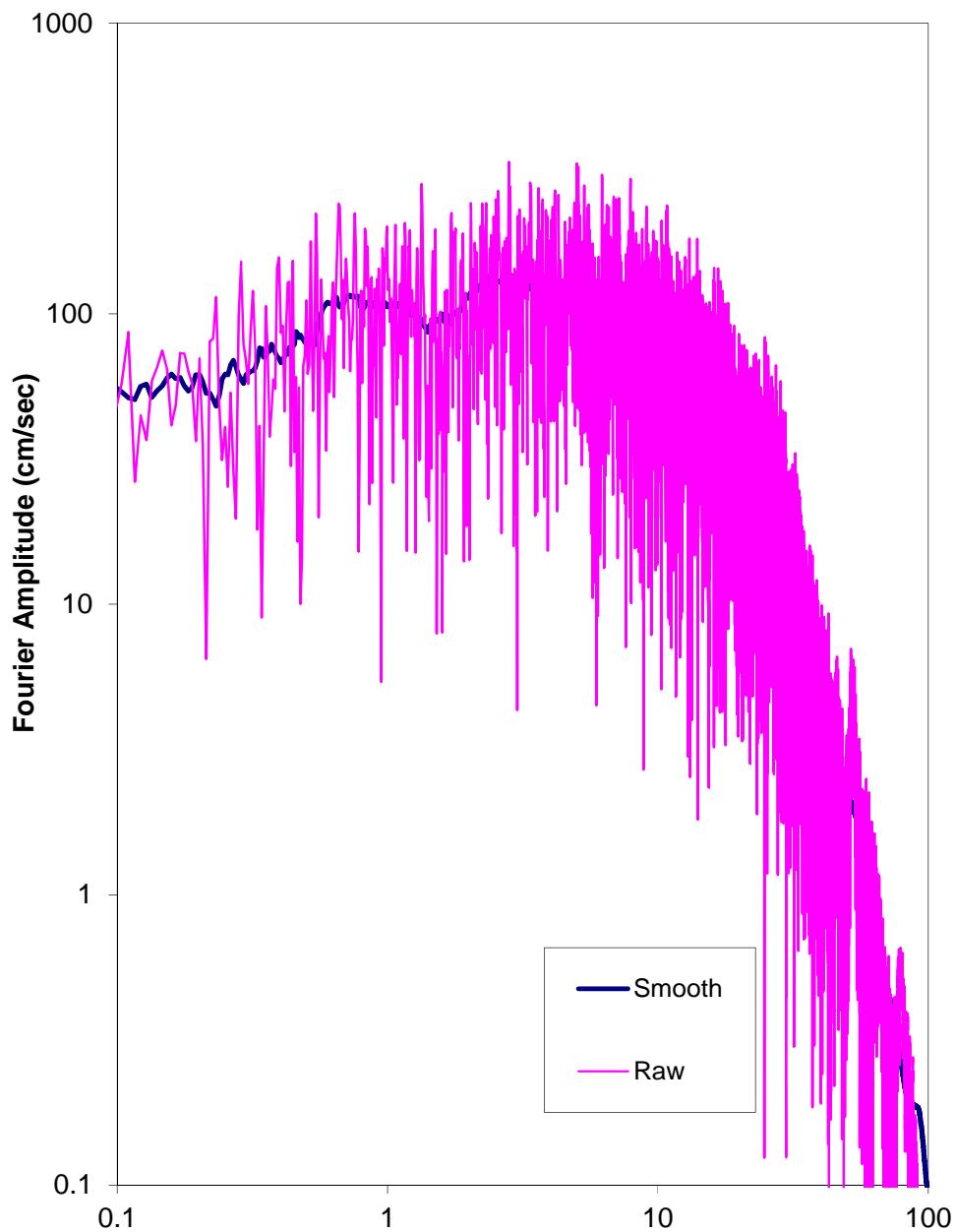
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_v time history - Response Spectra

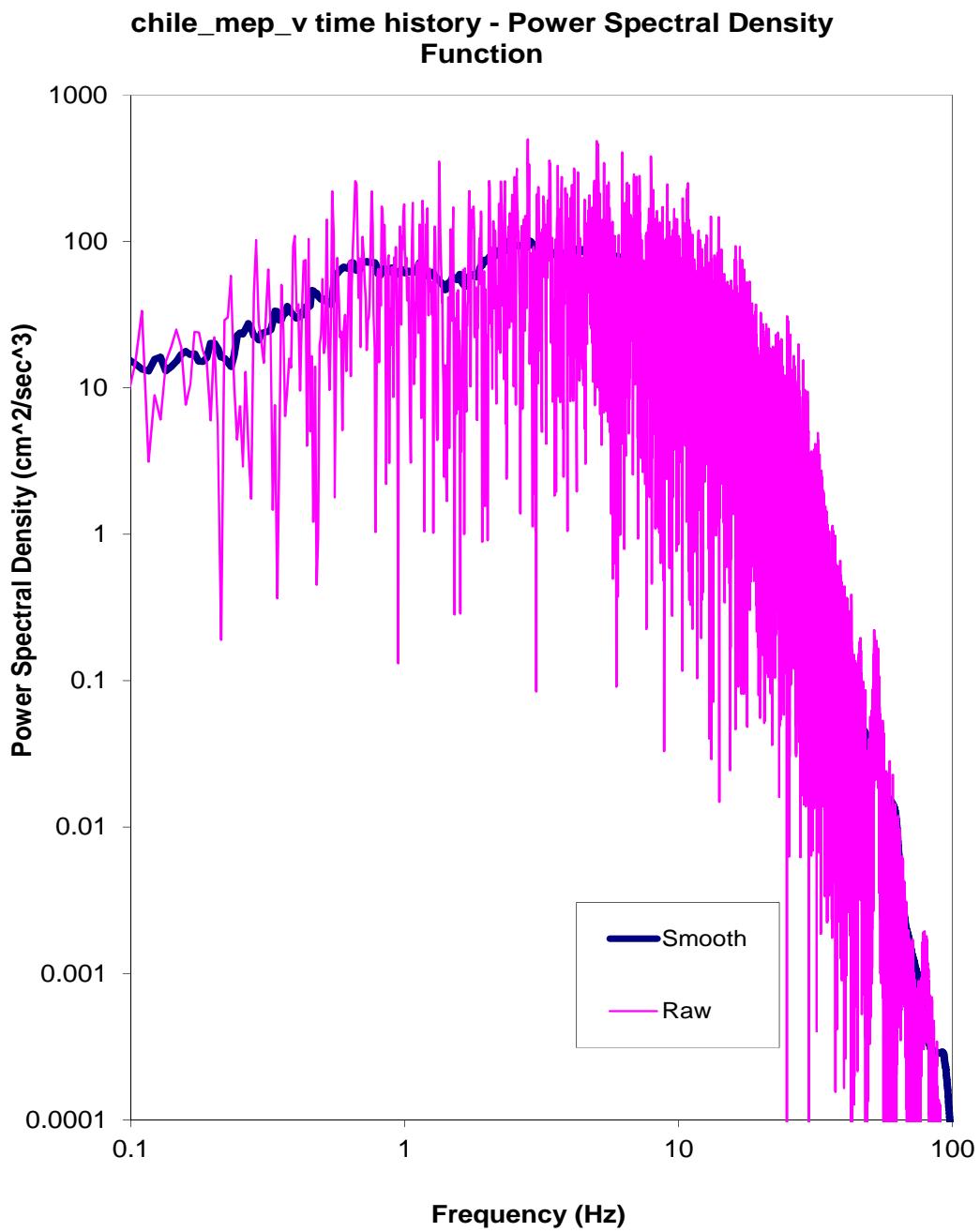
OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, V COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

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chile_mep_v time history - Fourier Amplitude Spectra



OBE LEVEL I Frequency (Hz) PECTRALLY
MATCHED MEP MOTION, V COMPONENT – FOURIER AMPLITUDE SPECTRUM
LNG FACILITIES
ALASKA LNG PROJECT
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OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, V COMPONENT – POWER SPECTRAL DENSITY FUNCTION

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Calculation of Correlation Coefficients

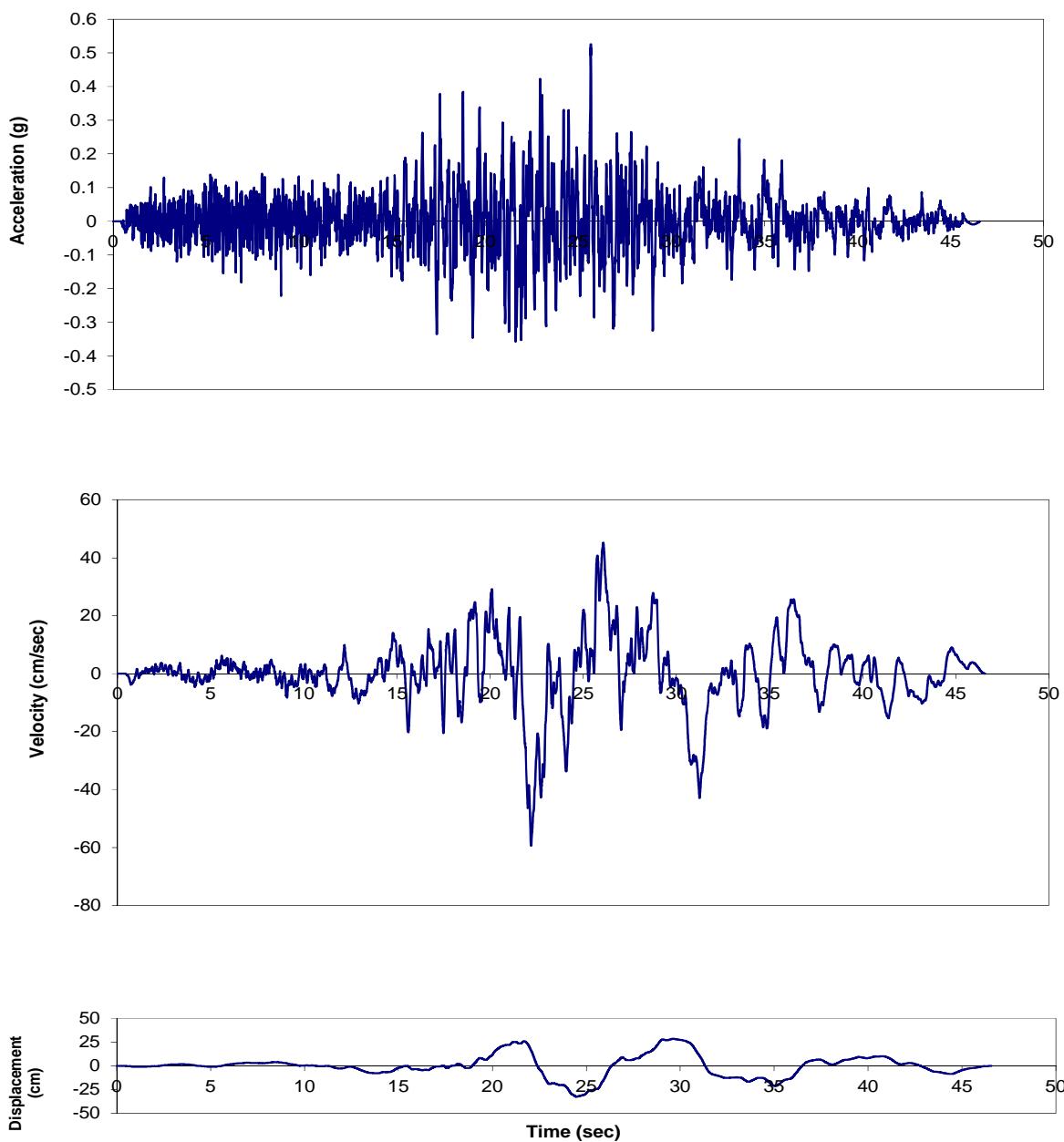
Cross-correlation check

Horizontal 1:	mep_ew
Horizontal 2:	mep_ns
Vertical:	mep_v
corr, H1-H2	-0.057
corr, H1-V	0.016
corr, H2-V	-0.034

OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION – CALCULATION OF CORRELATION COEFFICIENTS

LNG FACILITIES
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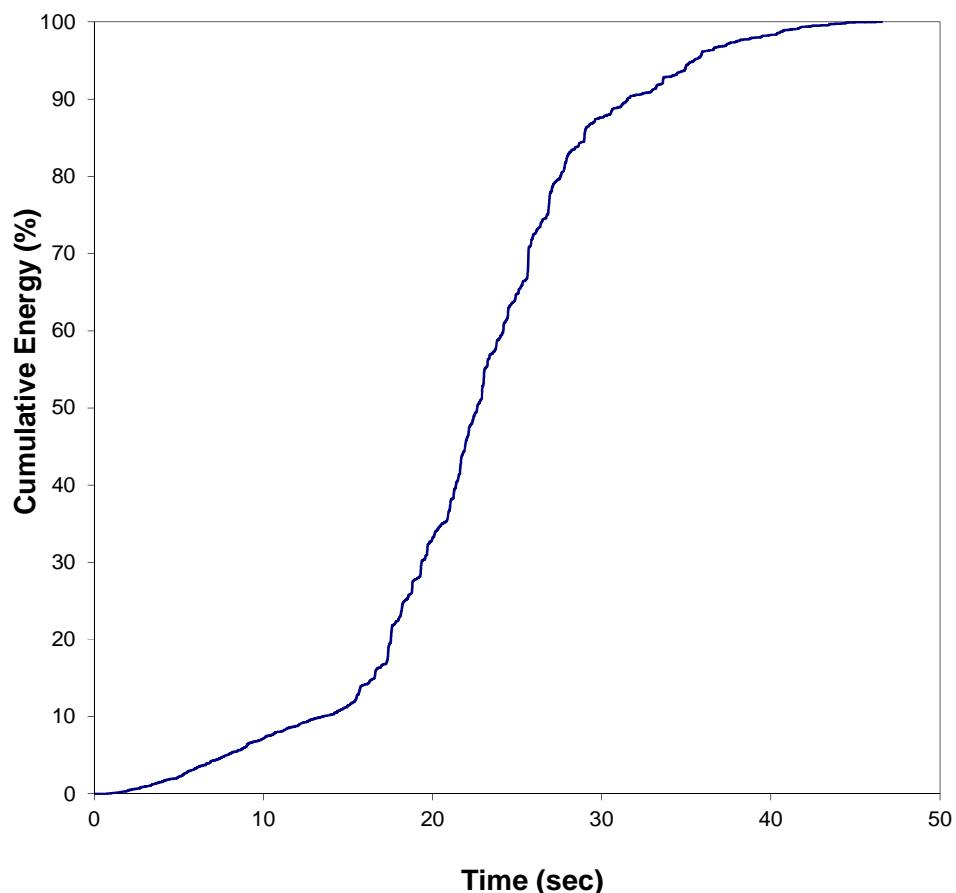
cto180 time history - Acceleration, Velocity, and Displacement Time Histories



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

LNG FACILITIES
ALASKA LNG PROJECT
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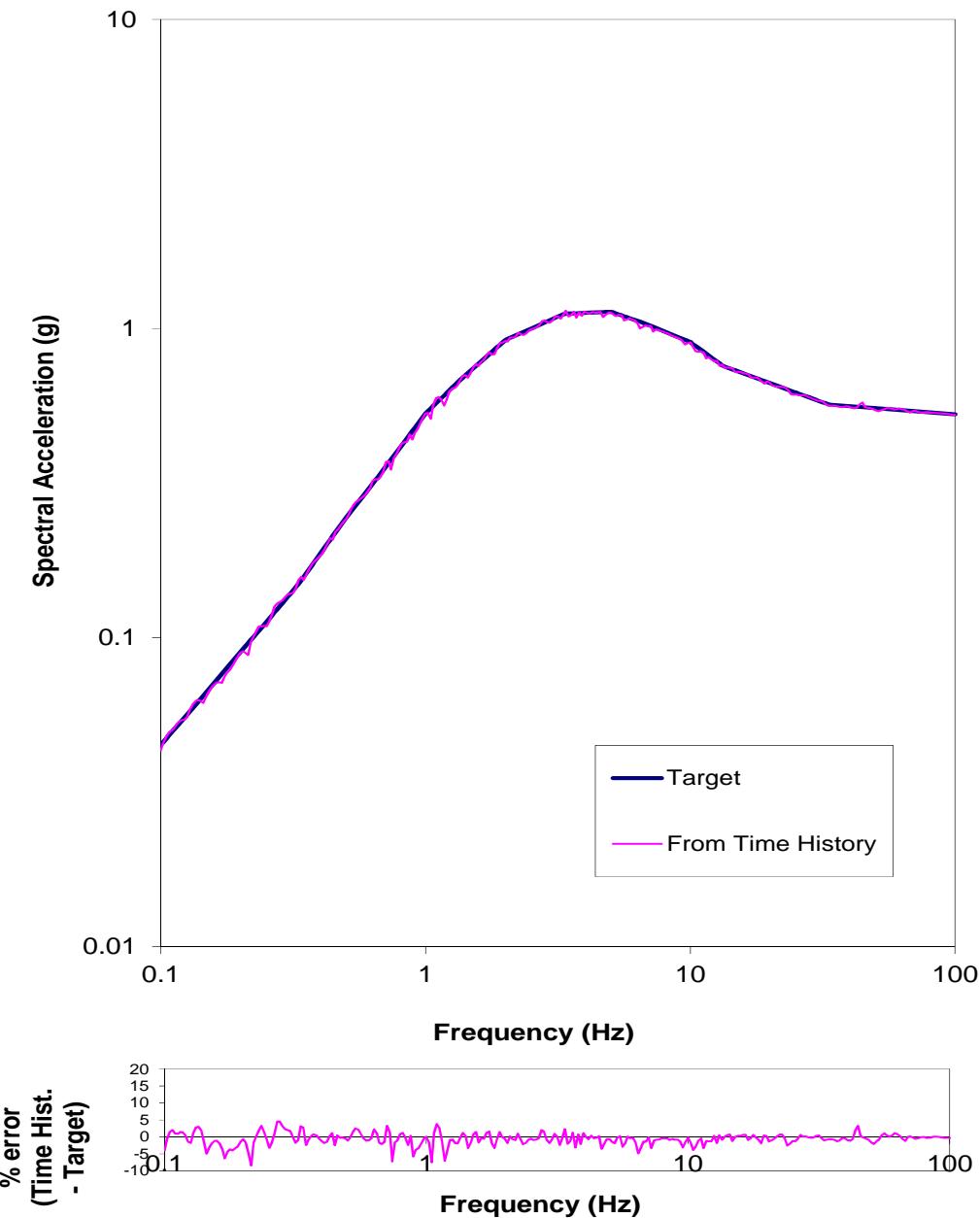
cto180 time history - Cumulative Energy (Husid) plot



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

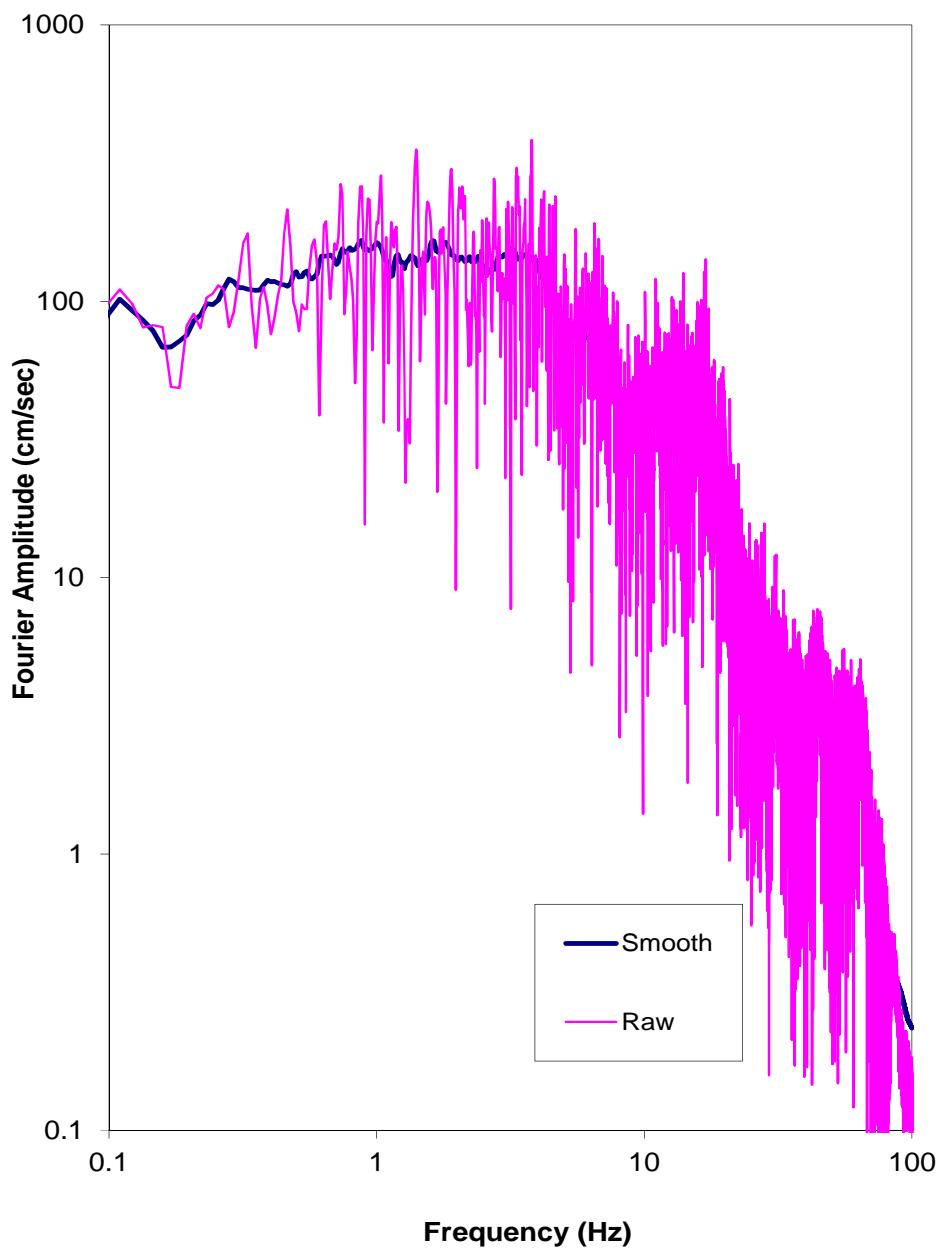
cto180 time history - Response Spectra



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – TARGET AND CALCULATED RESPONSE
SPECTRA**

LNG FACILITIES
ALASKA LNG PROJECT
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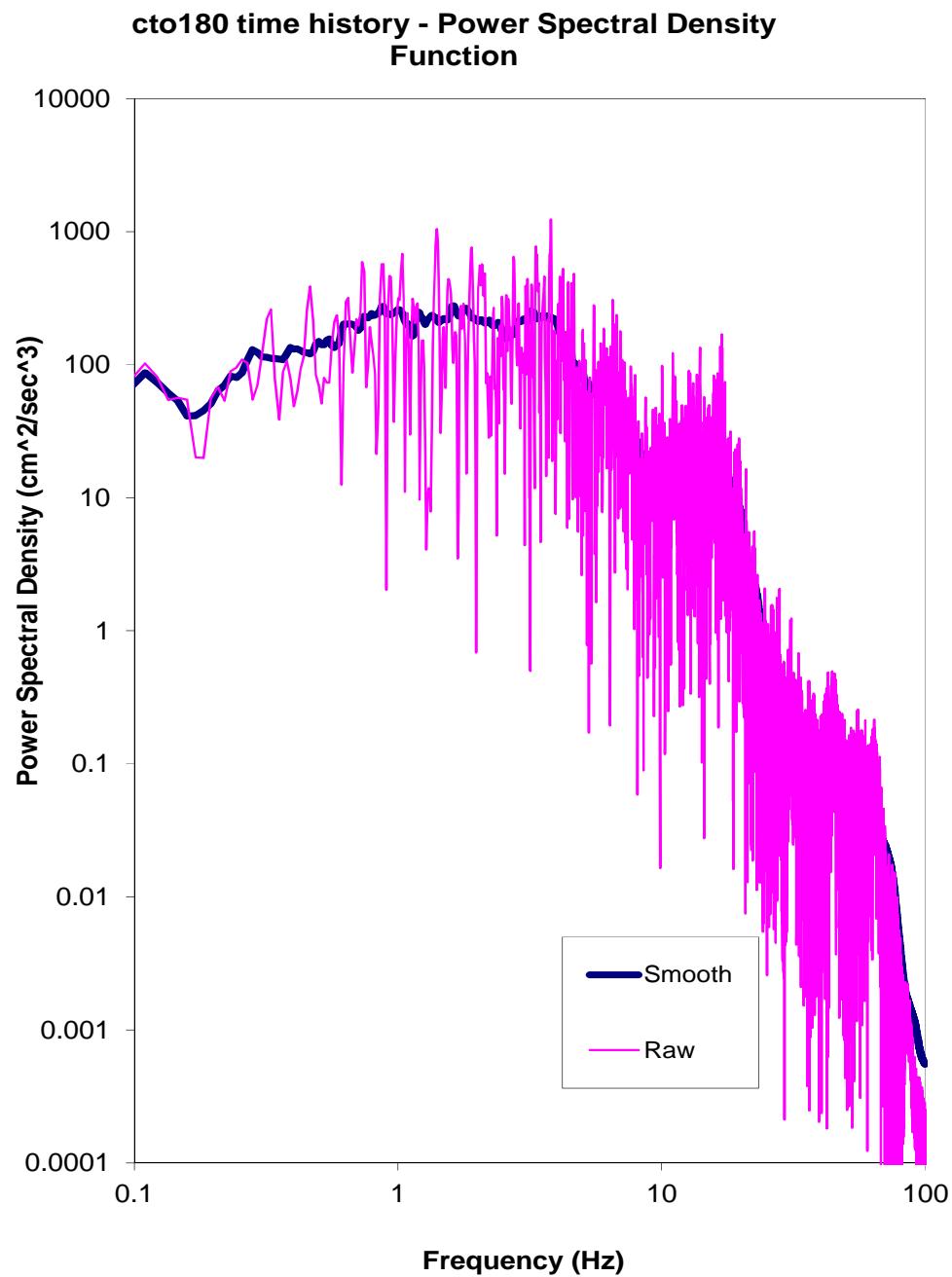
cto180 time history - Fourier Amplitude Spectra



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.20

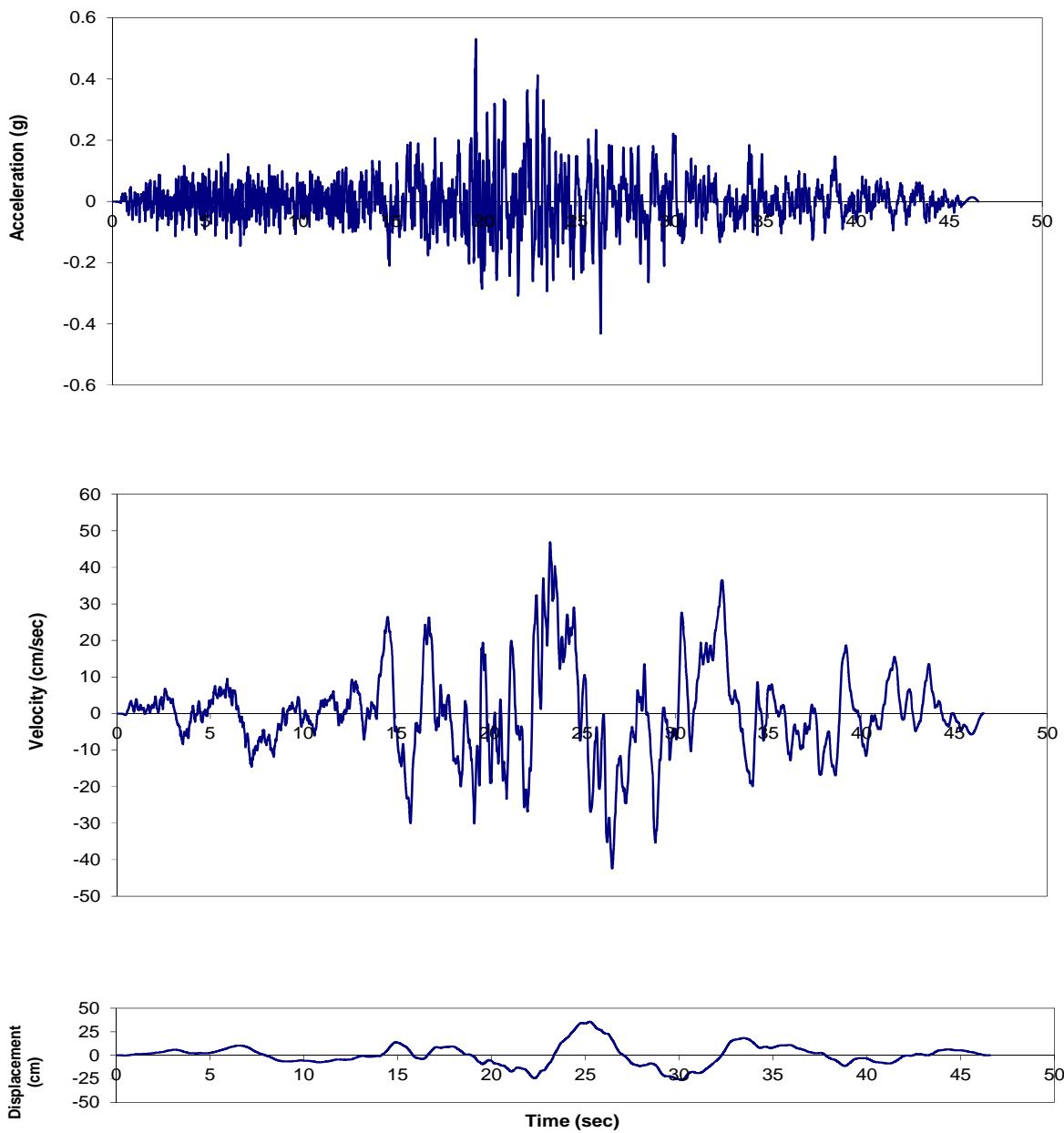


**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – POWER SPECTRAL DENSITY FUNCTION**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

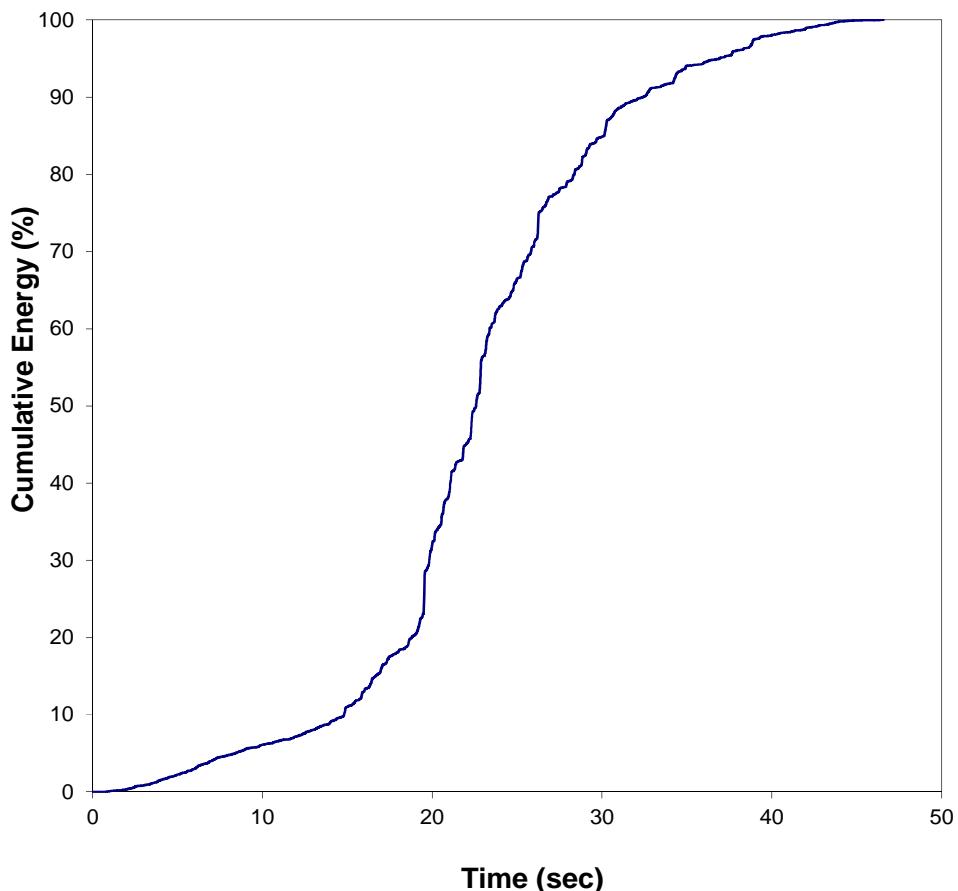
PLATE E.21

cto270 time history - Acceleration, Velocity, and Displacement Time Histories



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

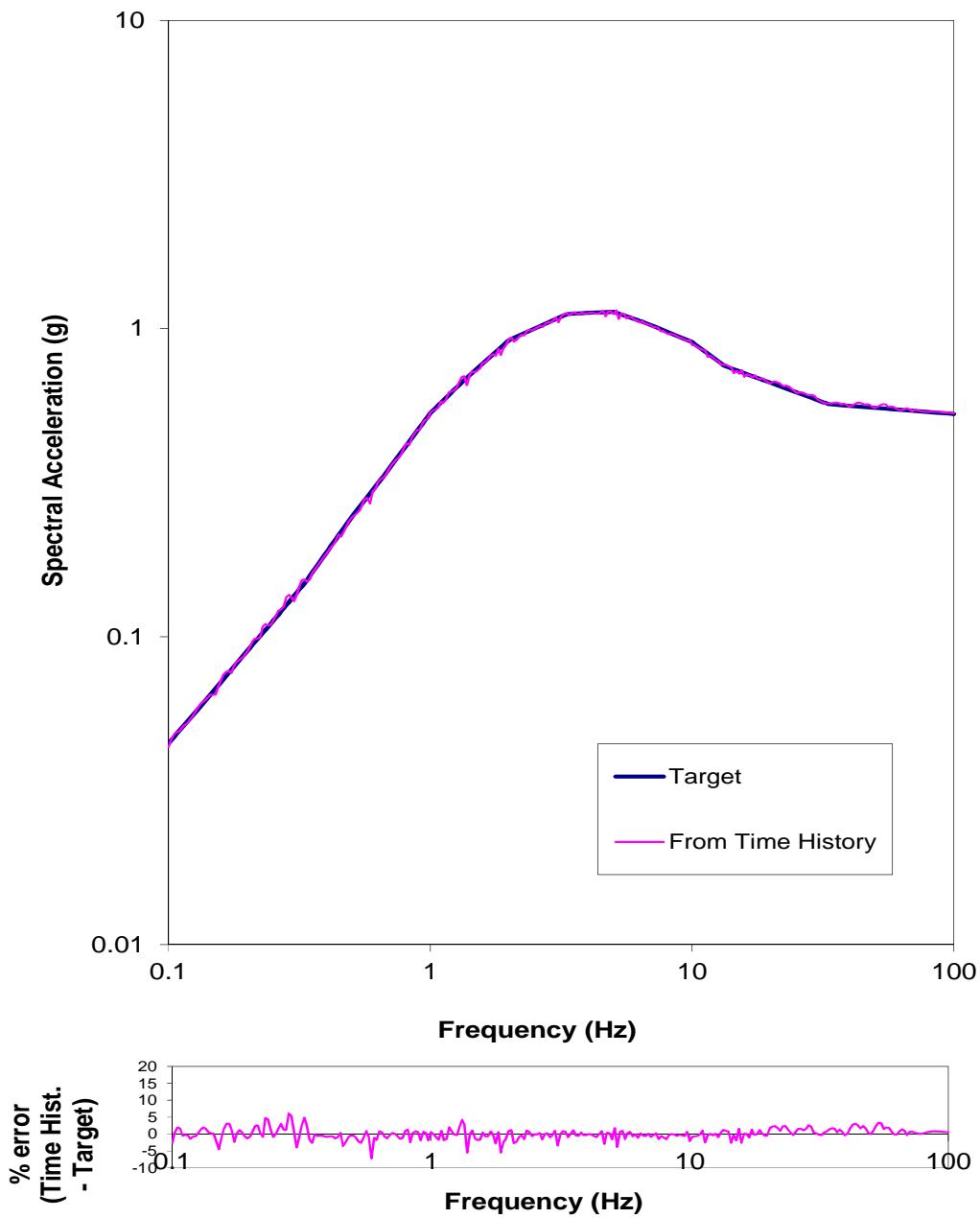
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

cto270 time history - Cumulative Energy (Husid) plot

**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

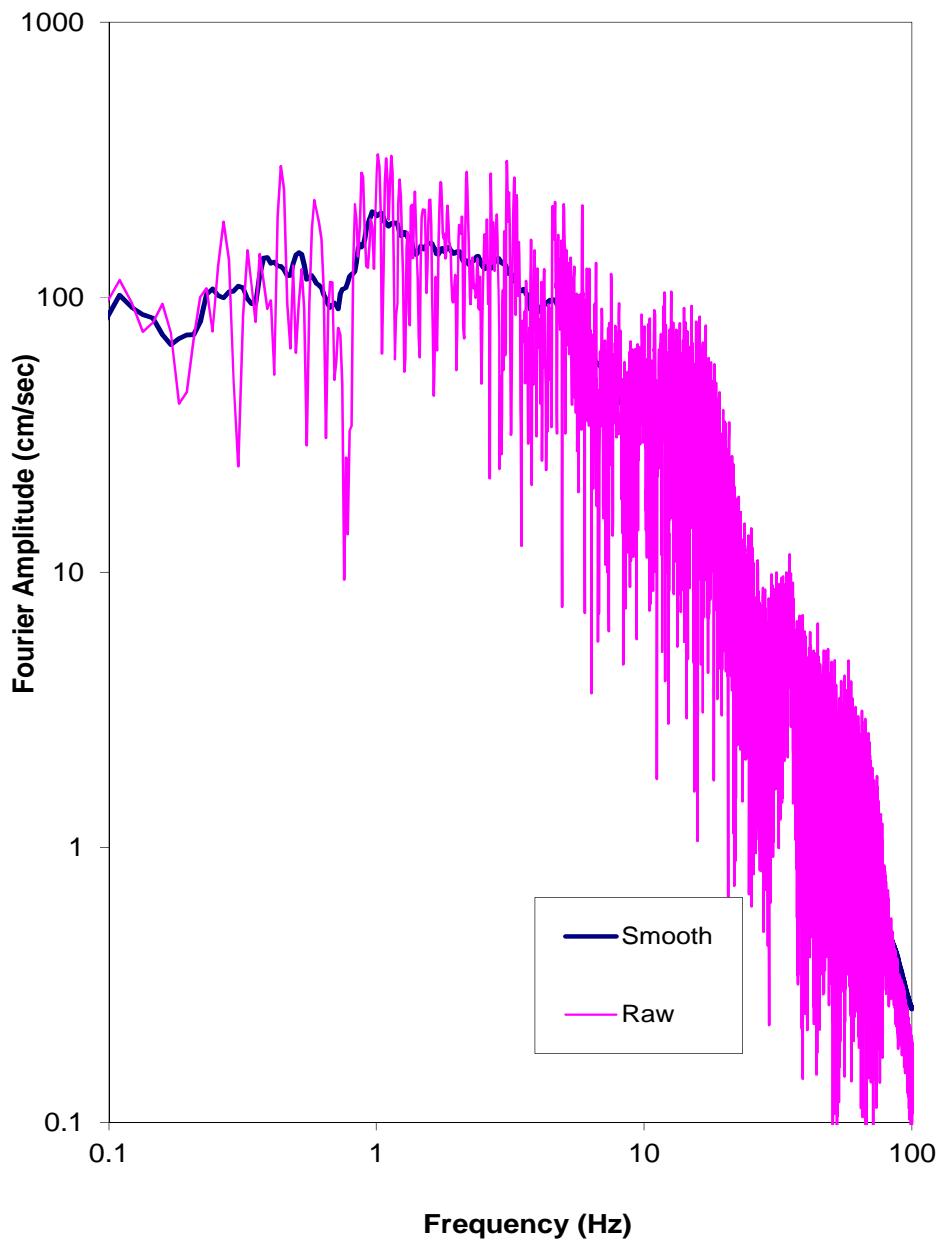
cto270 time history - Response Spectra



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – TARGET AND CALCULATED RESPONSE
SPECTRA

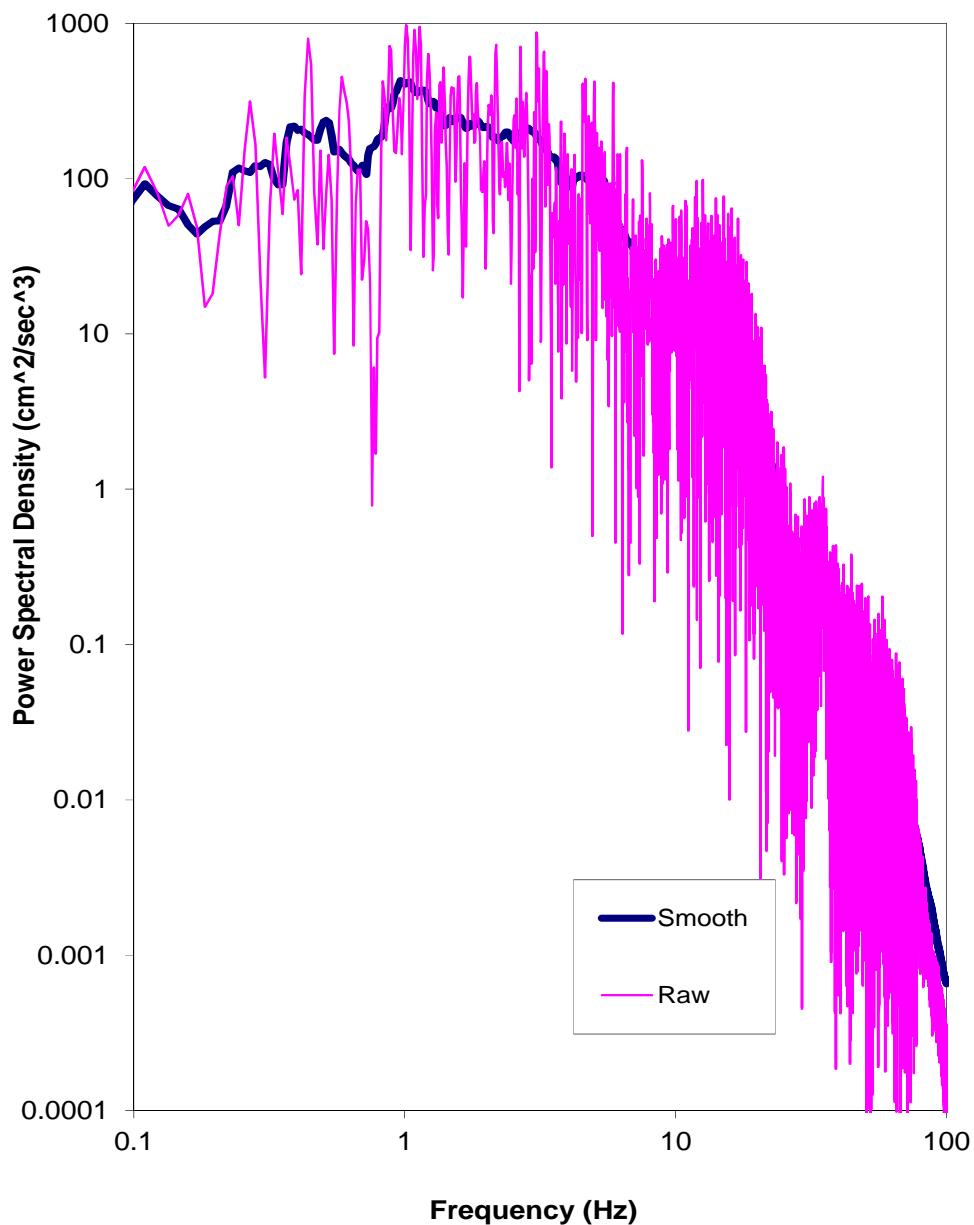
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

cto270 time history - Fourier Amplitude Spectra



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – FOURIER AMPLITUDE SPECTRUM**

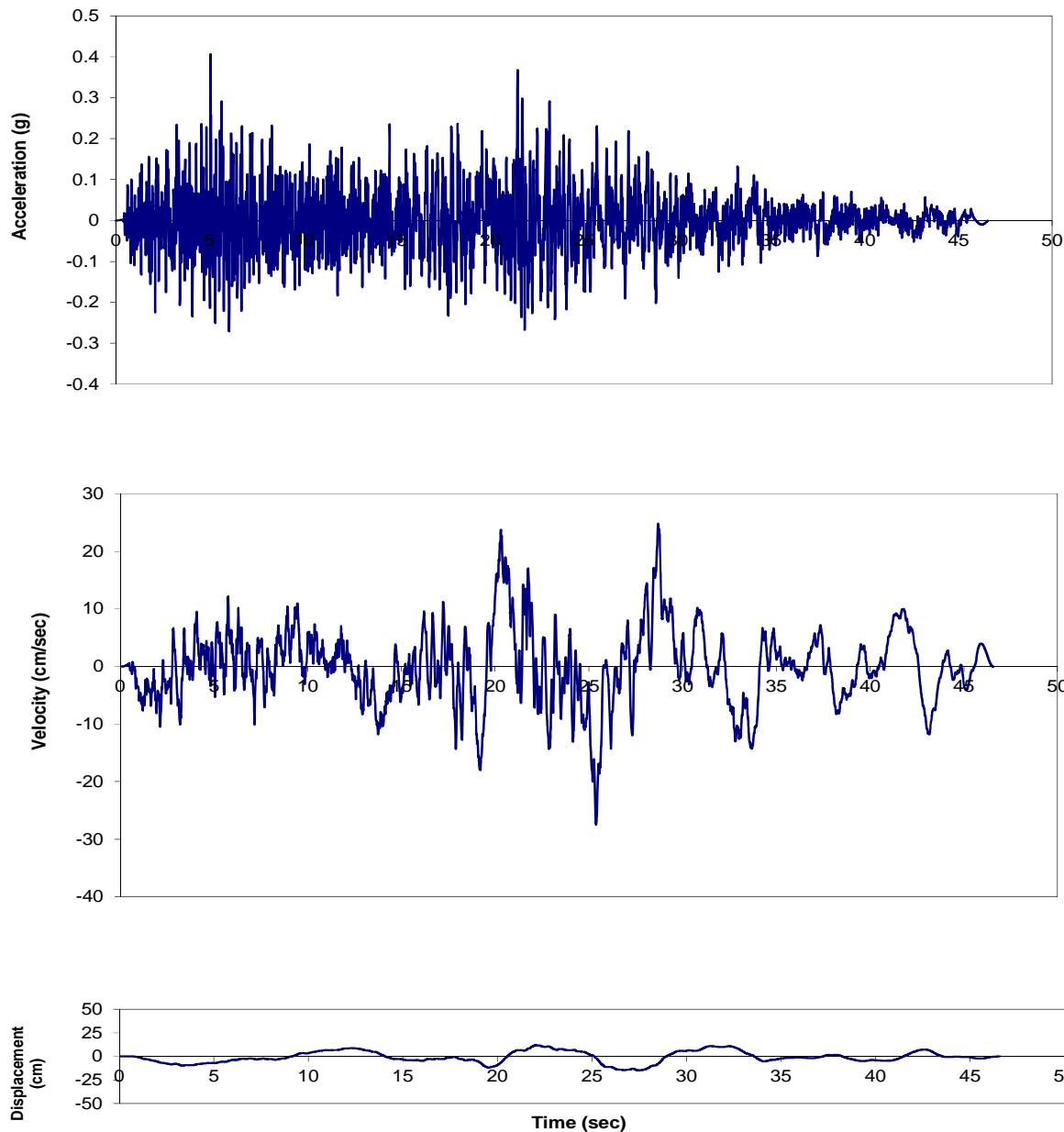
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

cto270 time history - Power Spectral Density Function

OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

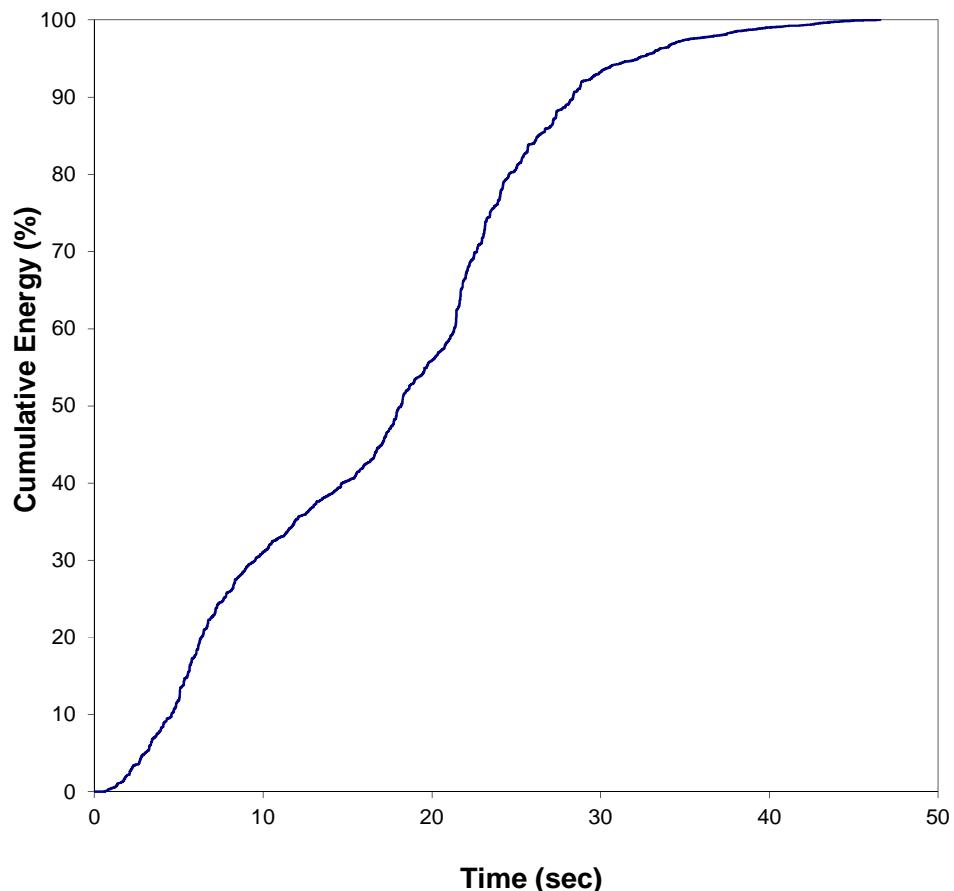
ctoup time history - Acceleration, Velocity, and Displacement Time Histories



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

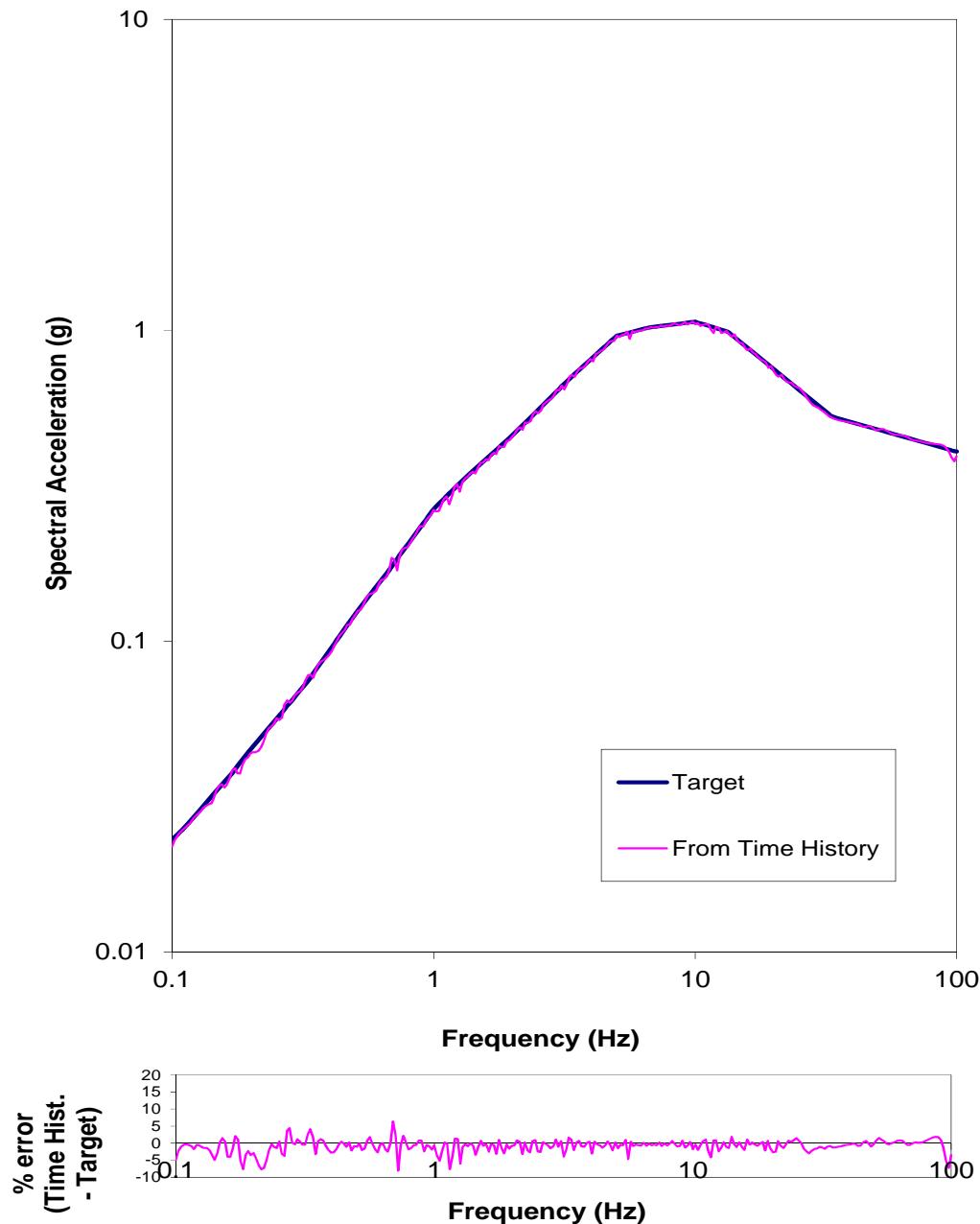
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

ctoup time history - Cumulative Energy (Husid) plot



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

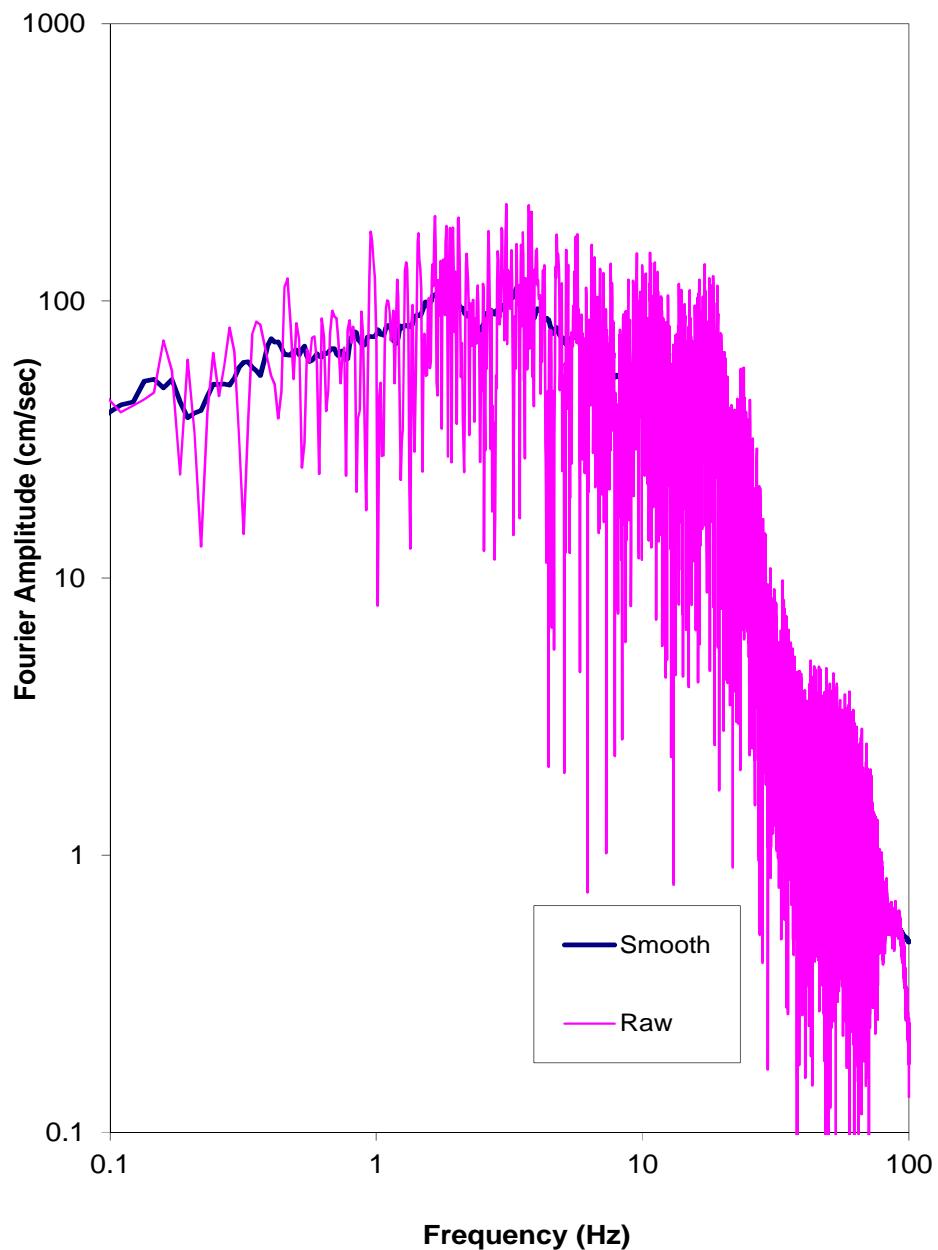
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

ctoup time history - Response Spectra


OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

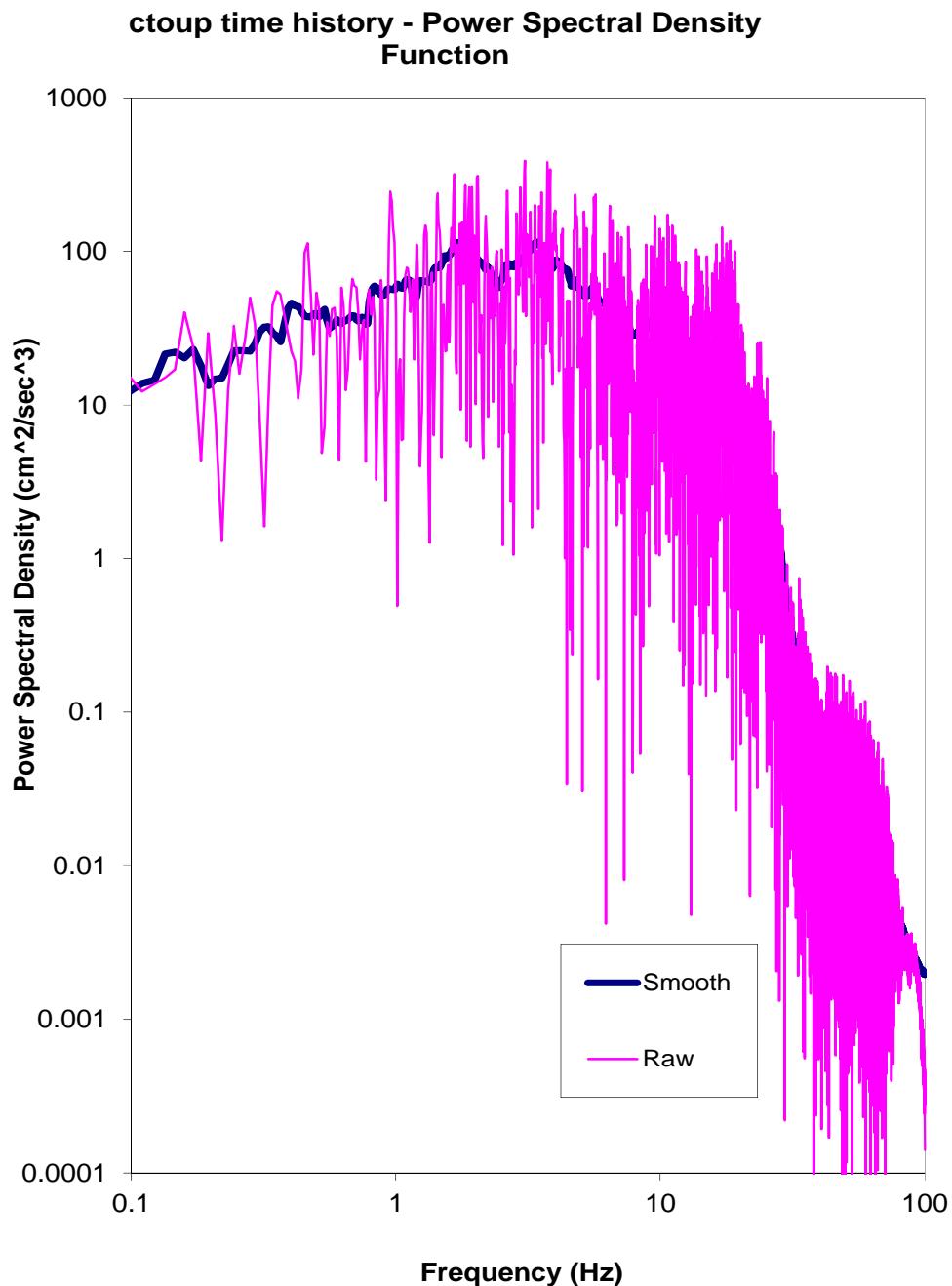
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

ctoup time history - Fourier Amplitude Spectra



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM

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ALASKA LNG PROJECT
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OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – POWER SPECTRAL DENSITY FUNCTION

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ALASKA LNG PROJECT
NIKISKI, ALASKA

Calculation of Correlation Coefficients

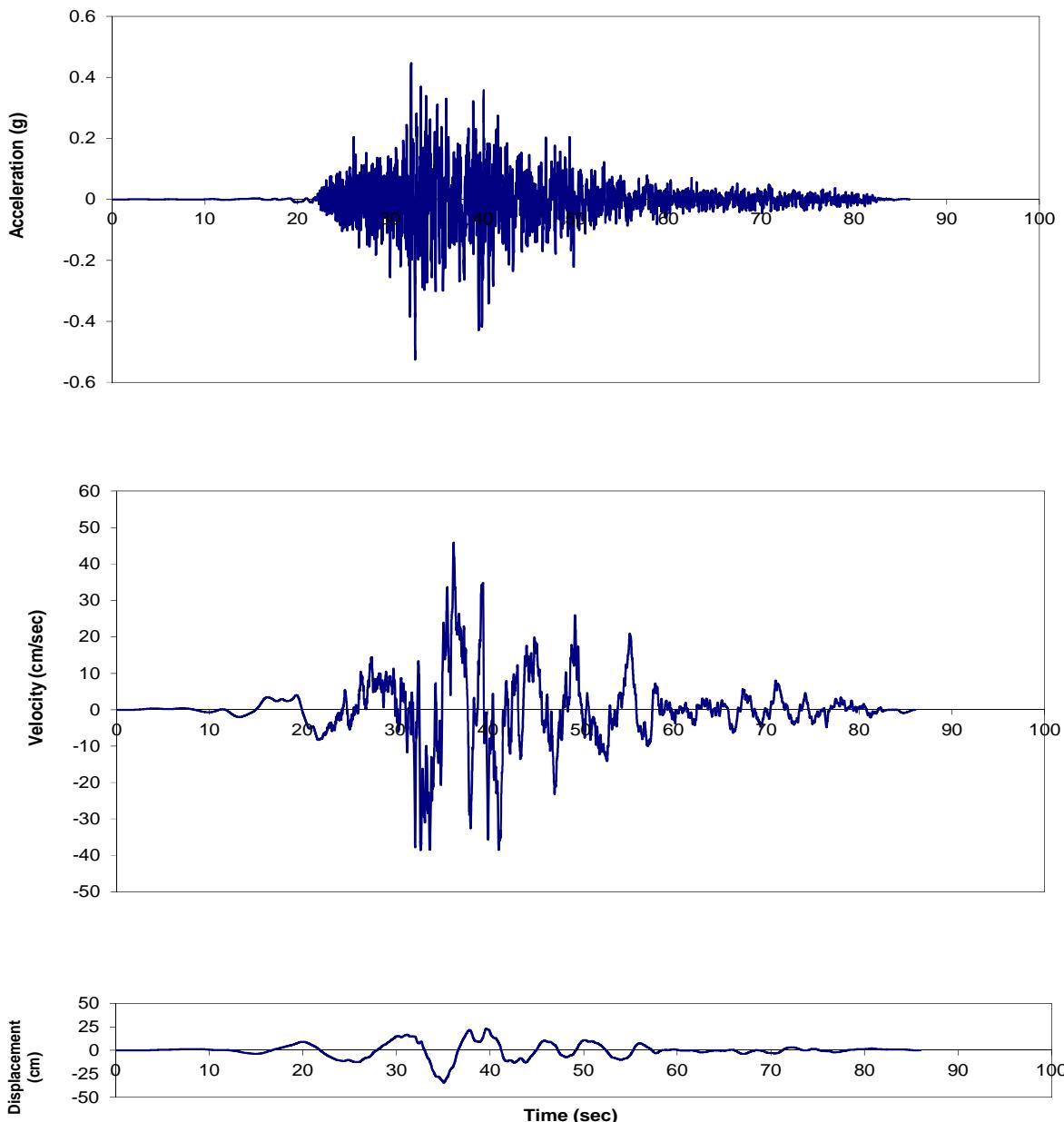
Cross-correlation check

Horizontal 1:	CTO180
Horizontal 2:	CTO270
Vertical:	CTOUP
corr, H1-H2	-0.009
corr, H1-V	0.056
corr, H2-V	-0.003

OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION – CALCULATION OF CORRELATION COEFFICIENTS

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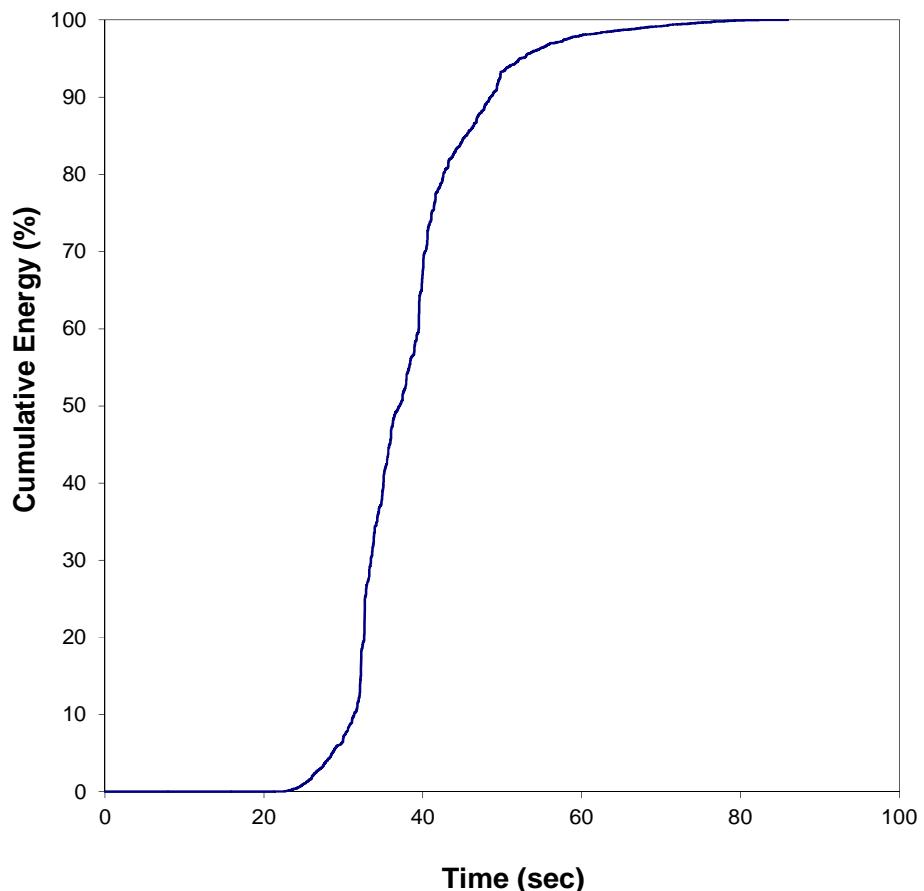
carlo_090 time history - Acceleration, Velocity, and Displacement Time Histories



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

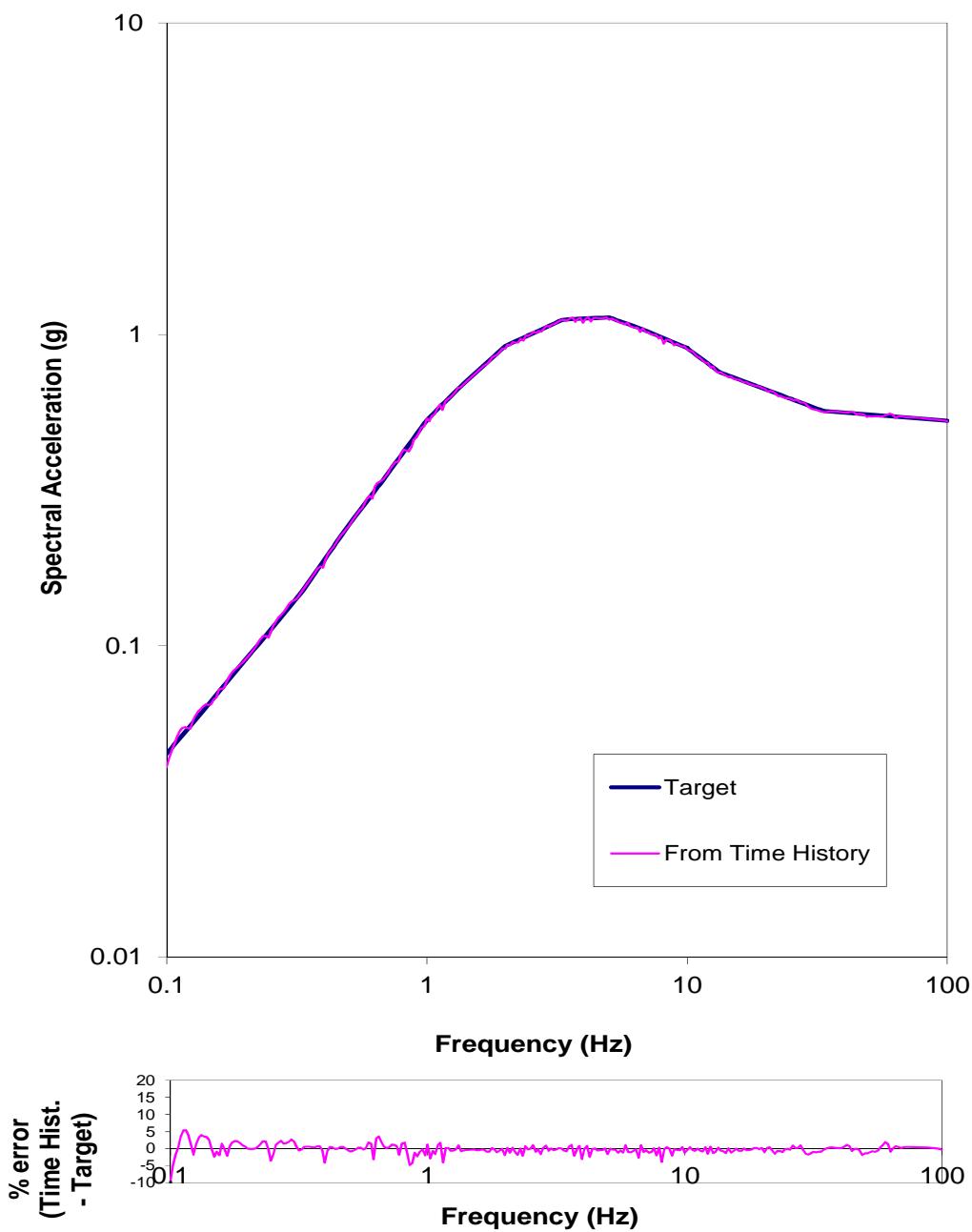
carlo_090 time history - Cumulative Energy (Husid) plot



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

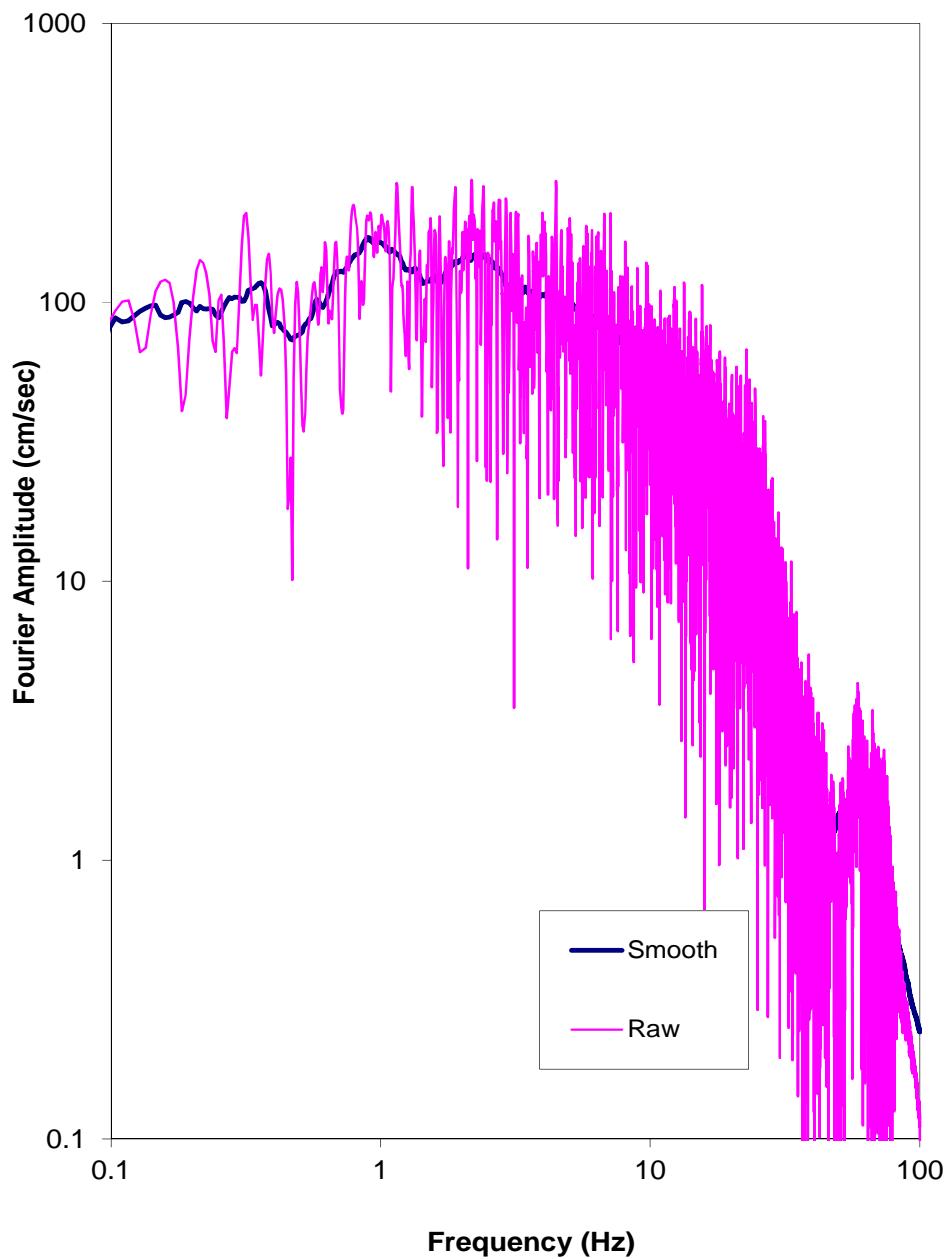
carlo_090 time history - Response Spectra



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – TARGET AND CALCULATED
RESPONSE SPECTRA

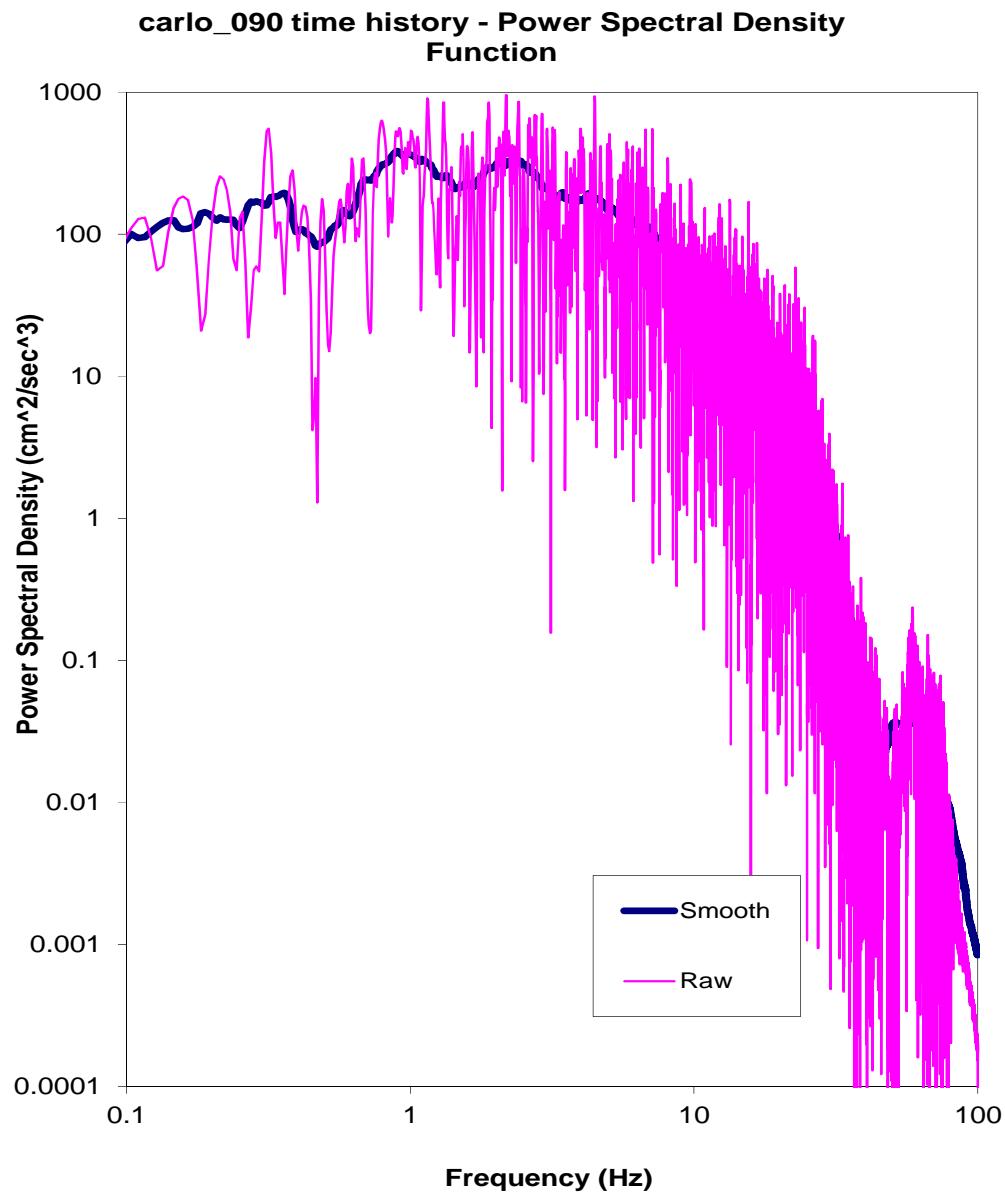
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

carlo_090 time history - Fourier Amplitude Spectra



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – FOURIER AMPLITUDE SPECTRUM

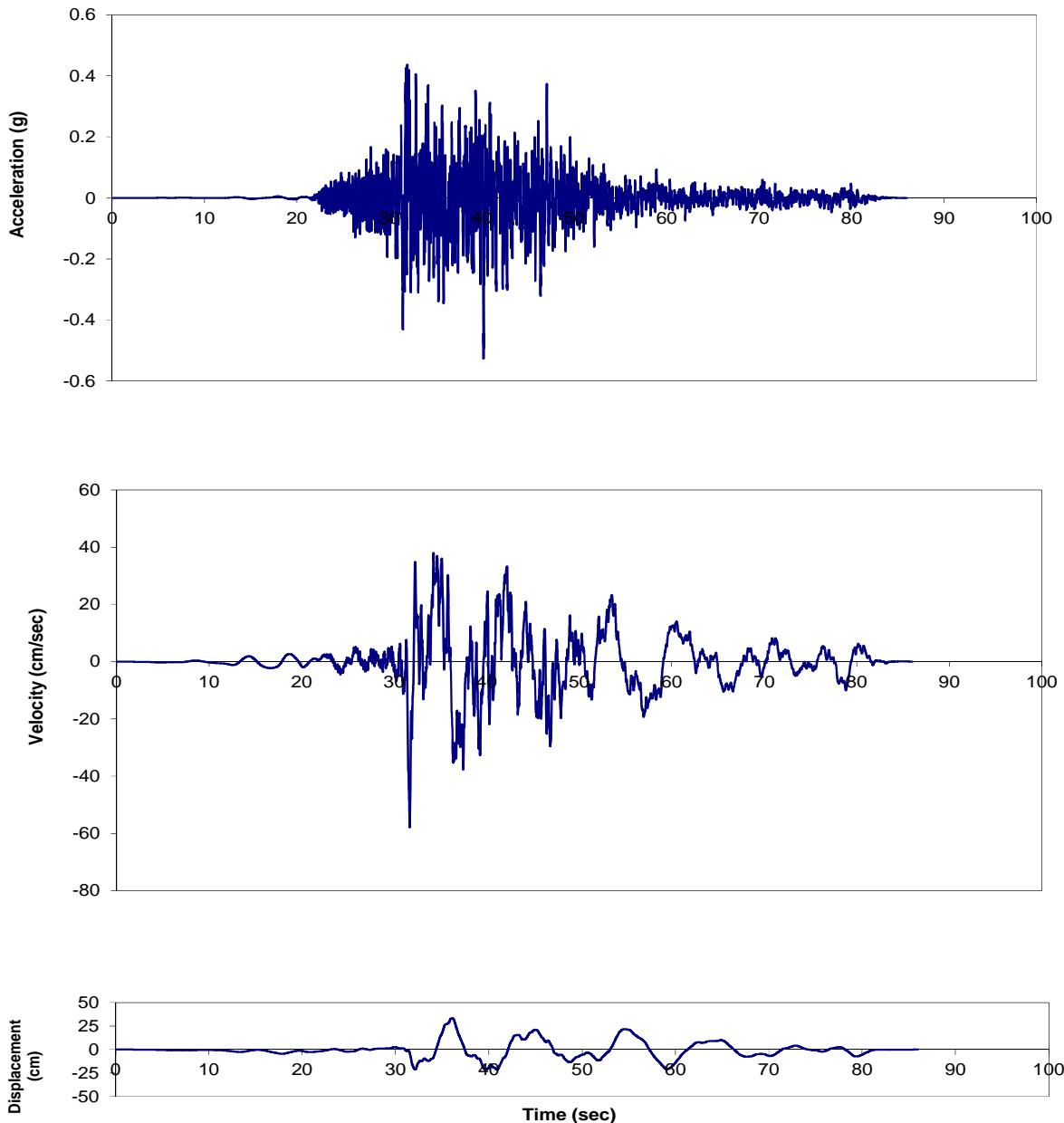
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – POWER SPECTRAL DENSITY
FUNCTION**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

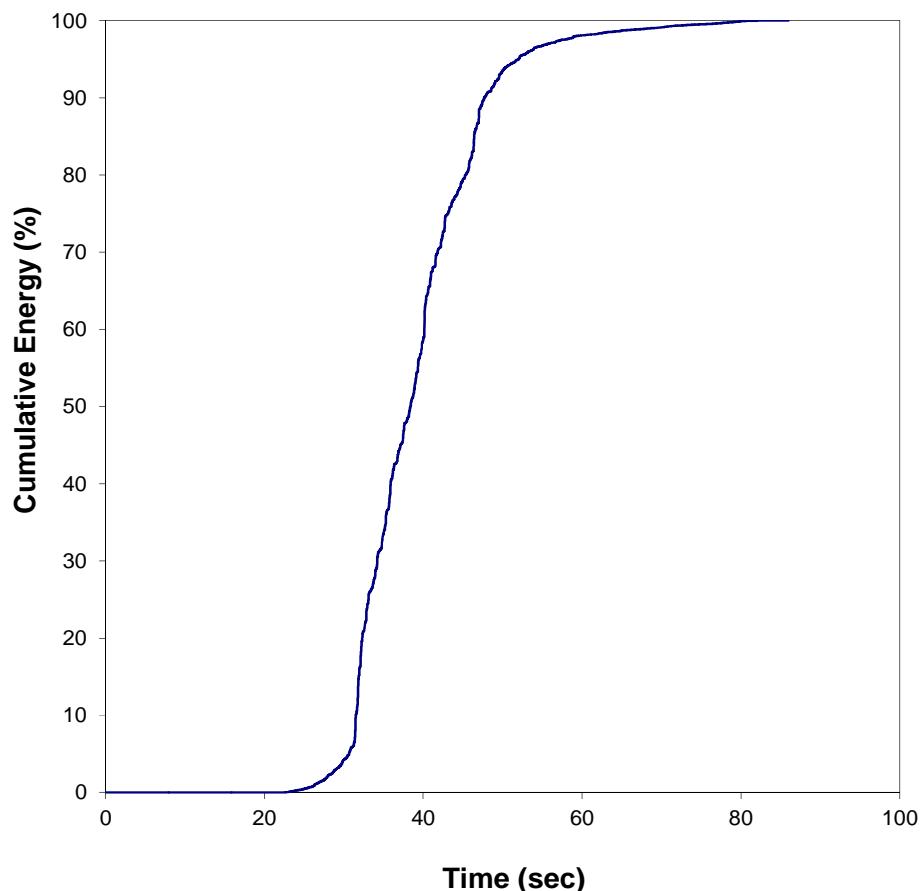
carlo_360 time history - Acceleration, Velocity, and Displacement Time Histories



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

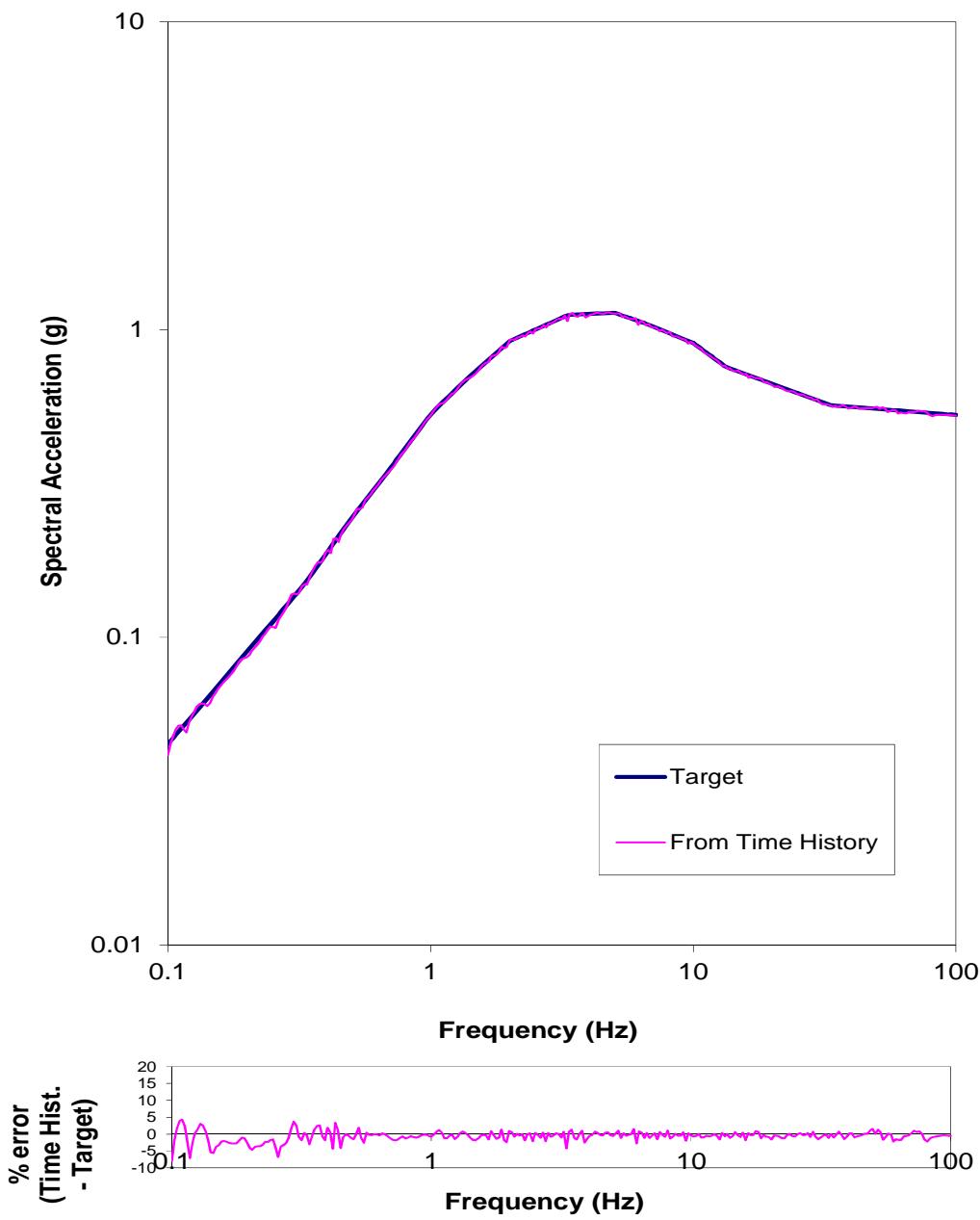
carlo_360 time history - Cumulative Energy (Husid) plot



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT

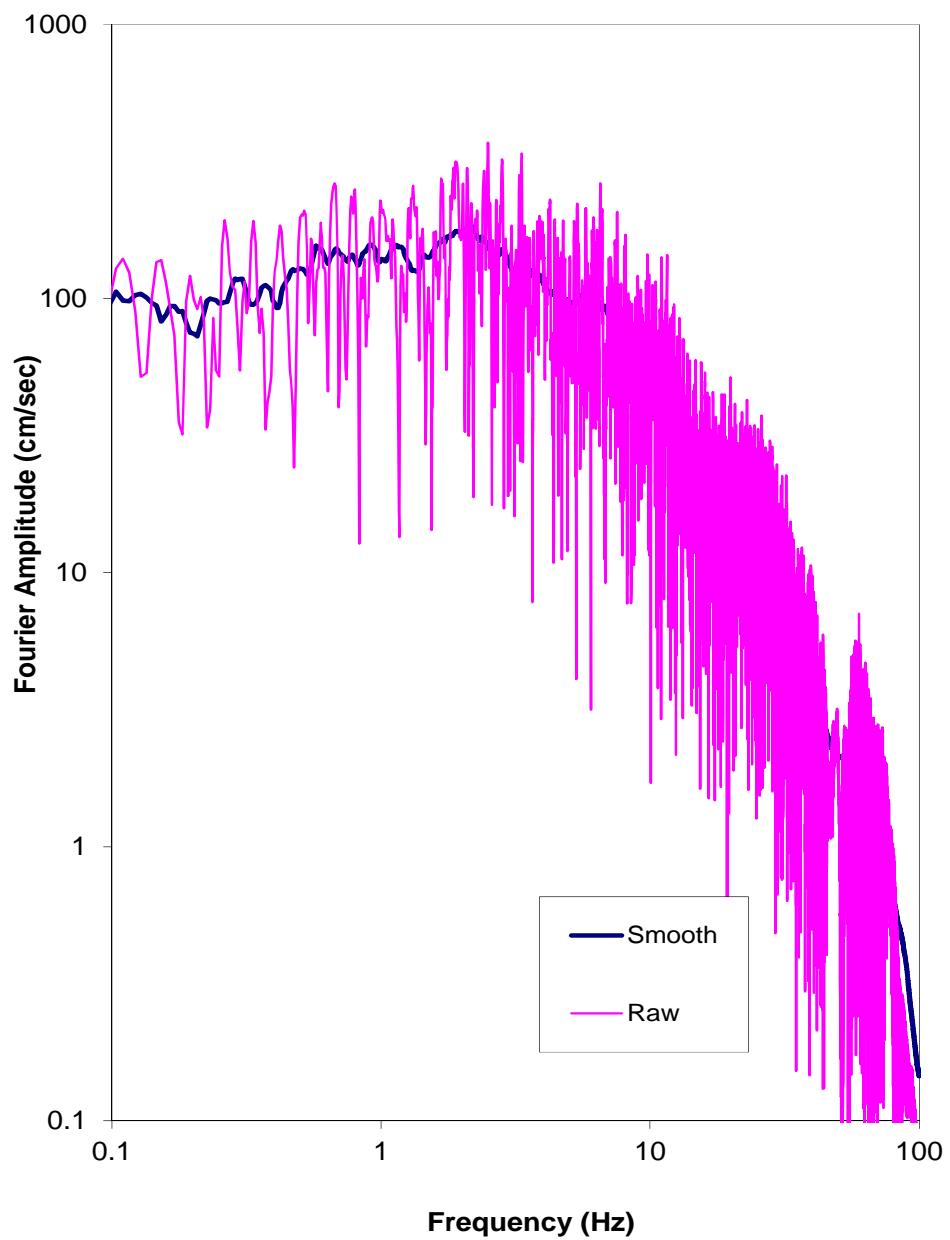
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

carlo_360 time history - Response Spectra



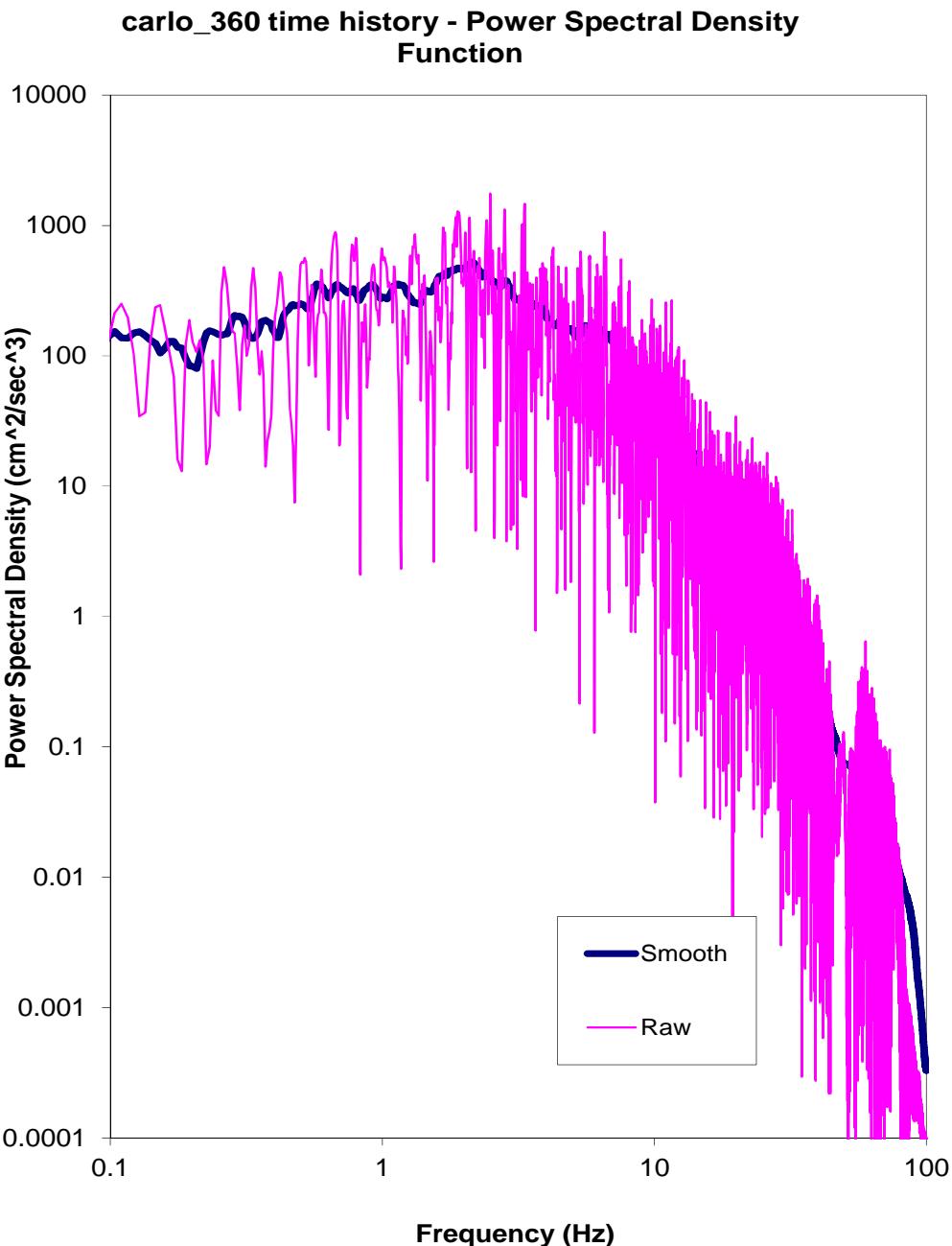
**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – TARGET AND CALCULATED
RESPONSE SPECTRA**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

carlo_360 time history - Fourier Amplitude Spectra

**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – FOURIER AMPLITUDE SPECTRUM**

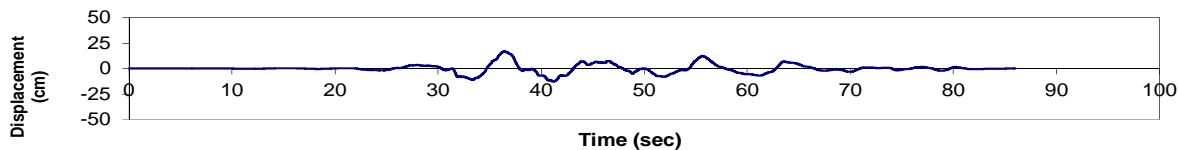
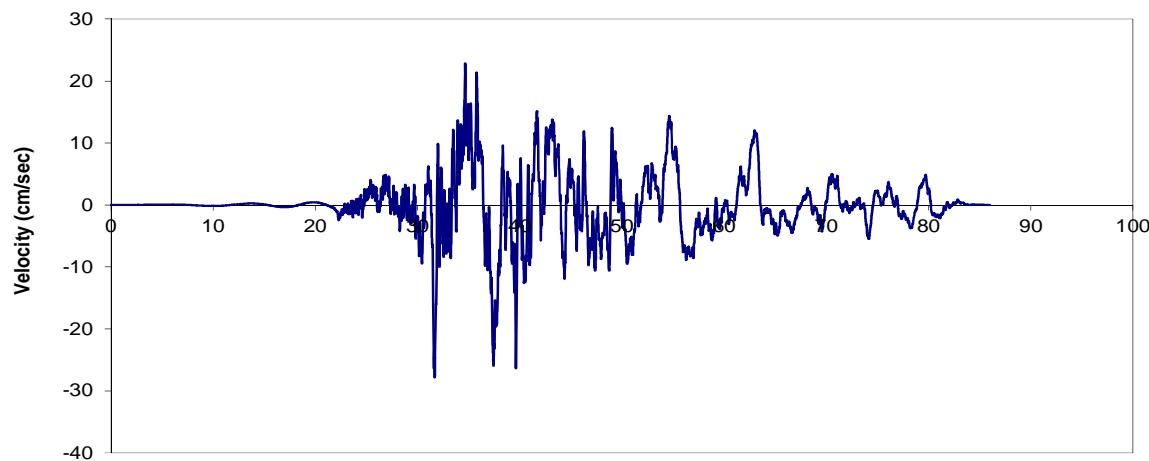
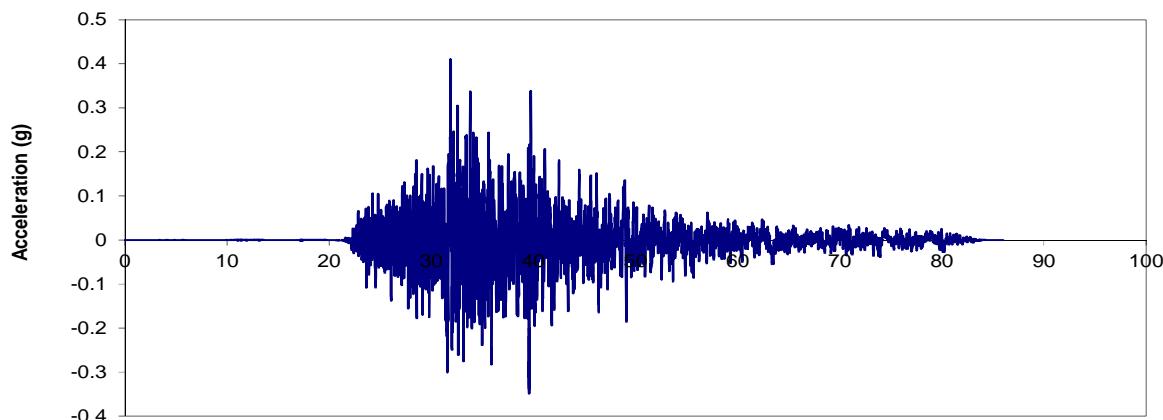
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – POWER SPECTRAL DENSITY
FUNCTION**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

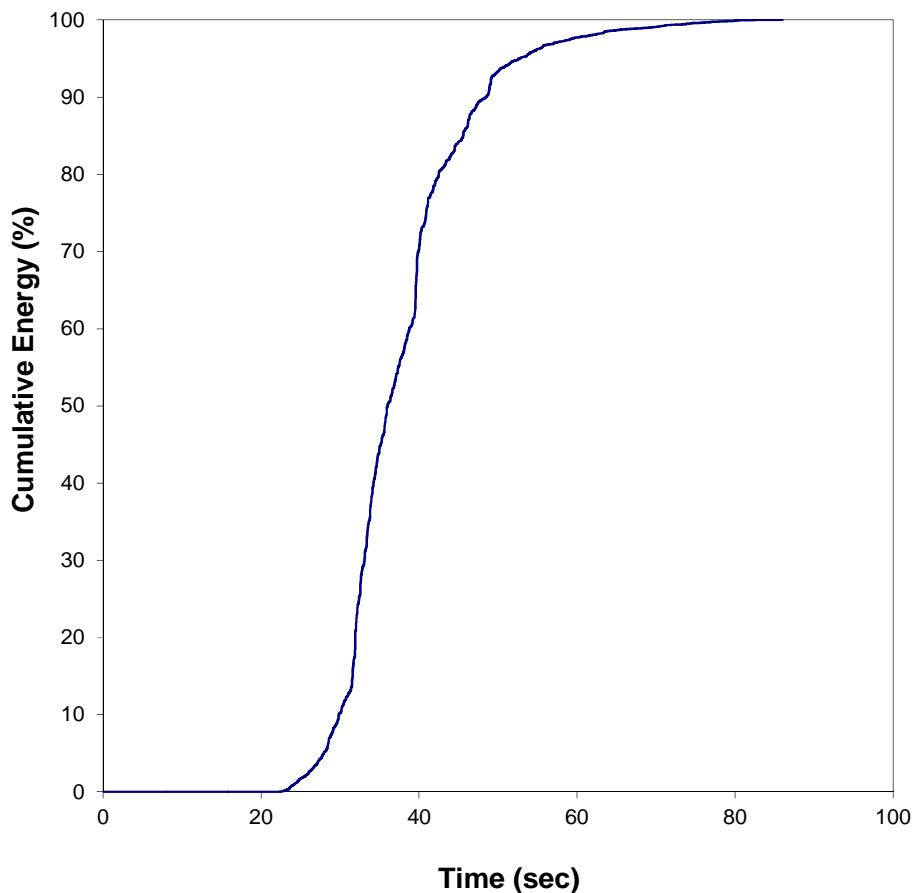
carlo_up time history - Acceleration, Velocity, and Displacement Time Histories



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

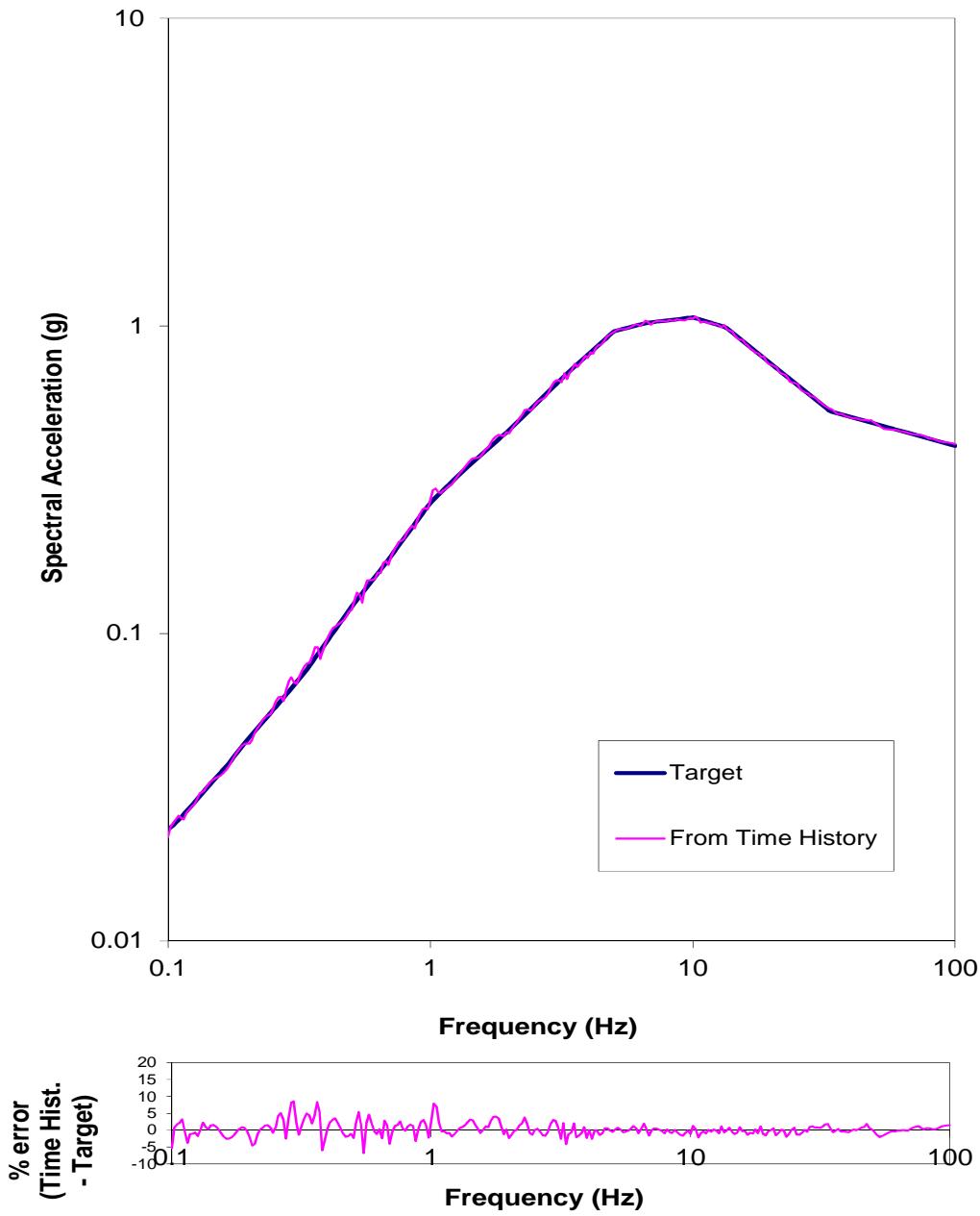
carlo_up time history - Cumulative Energy (Husid) plot



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

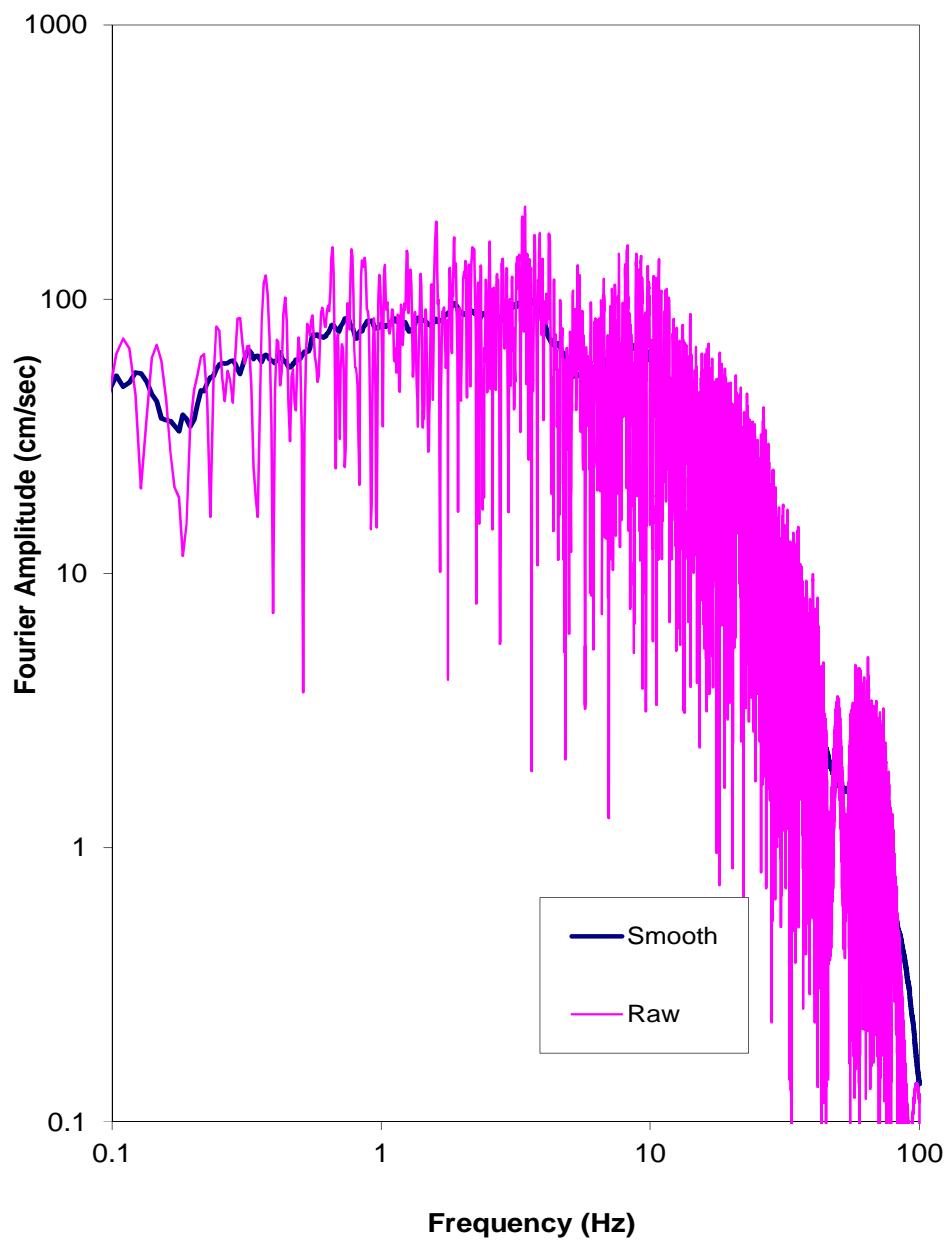
carlo_up time history - Response Spectra



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

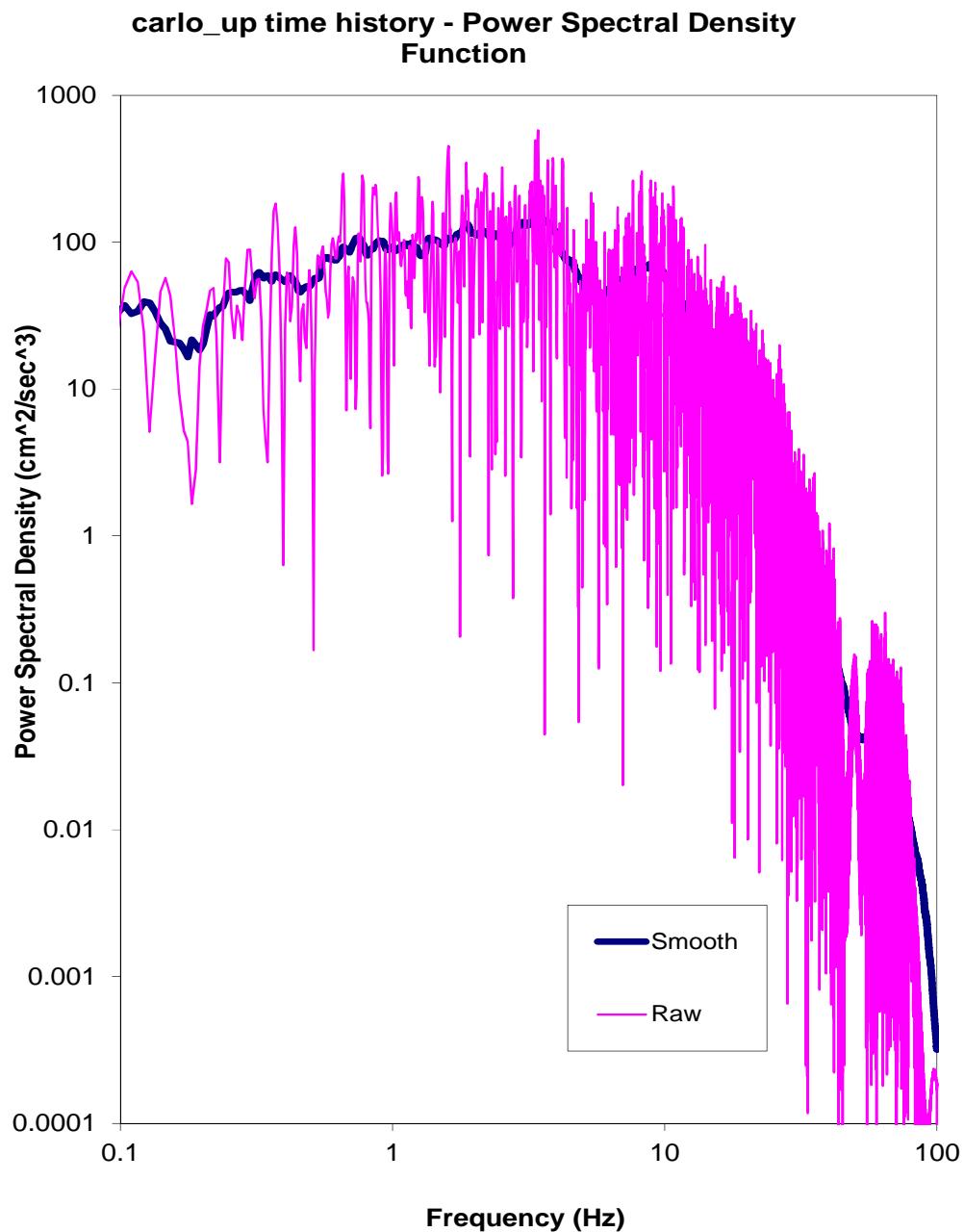
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

carlo_up time history - Fourier Amplitude Spectra



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM

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OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
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Calculation of Correlation Coefficients

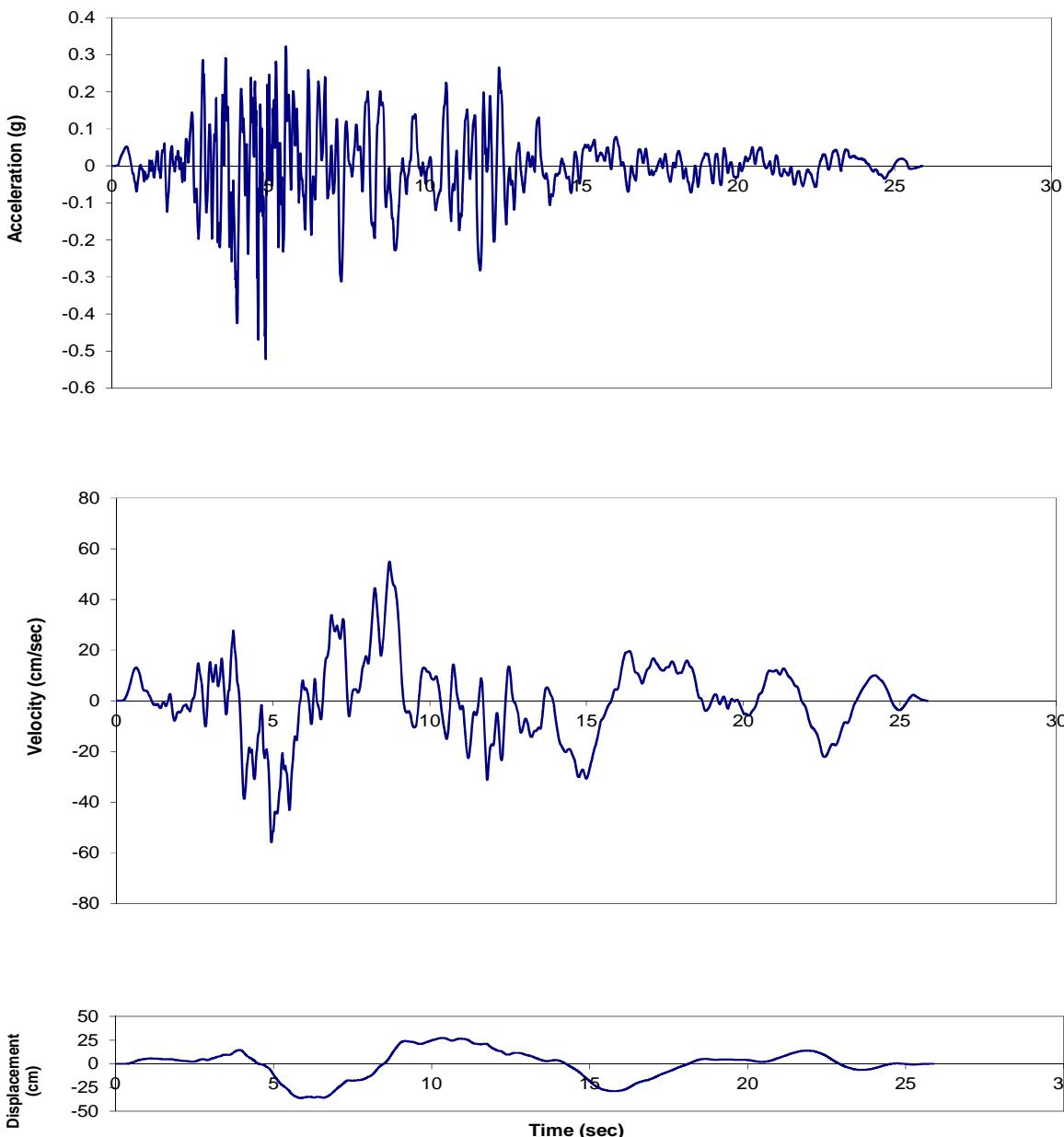
Cross-correlation check

Horizontal 1:	Carlo_090
Horizontal 2:	Carlo_360
Vertical:	Carlo_UP
corr, H1-H2	-0.055
corr, H1-V	-0.010
corr, H2-V	0.106

OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION – CALCULATION OF CORRELATION COEFFICIENTS

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

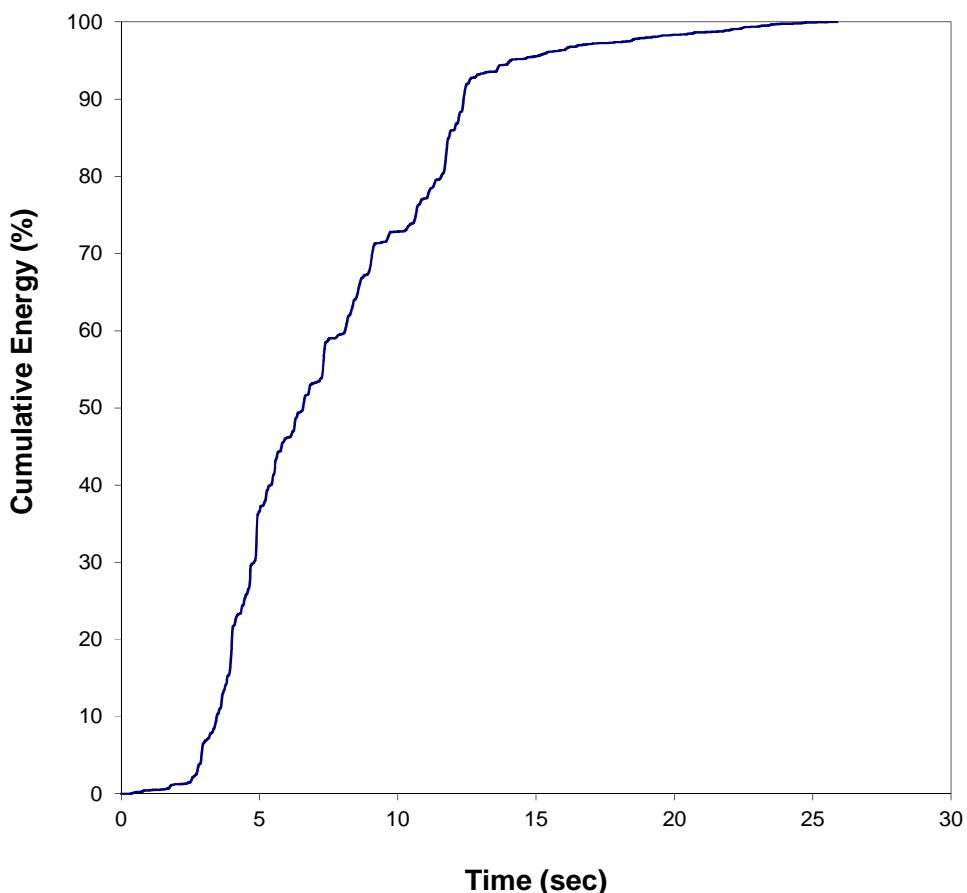
Duzce_DZC180 time history - Acceleration, Velocity, and Displacement Time Histories



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Duzce_DZC180 time history - Cumulative Energy (Husid) plot

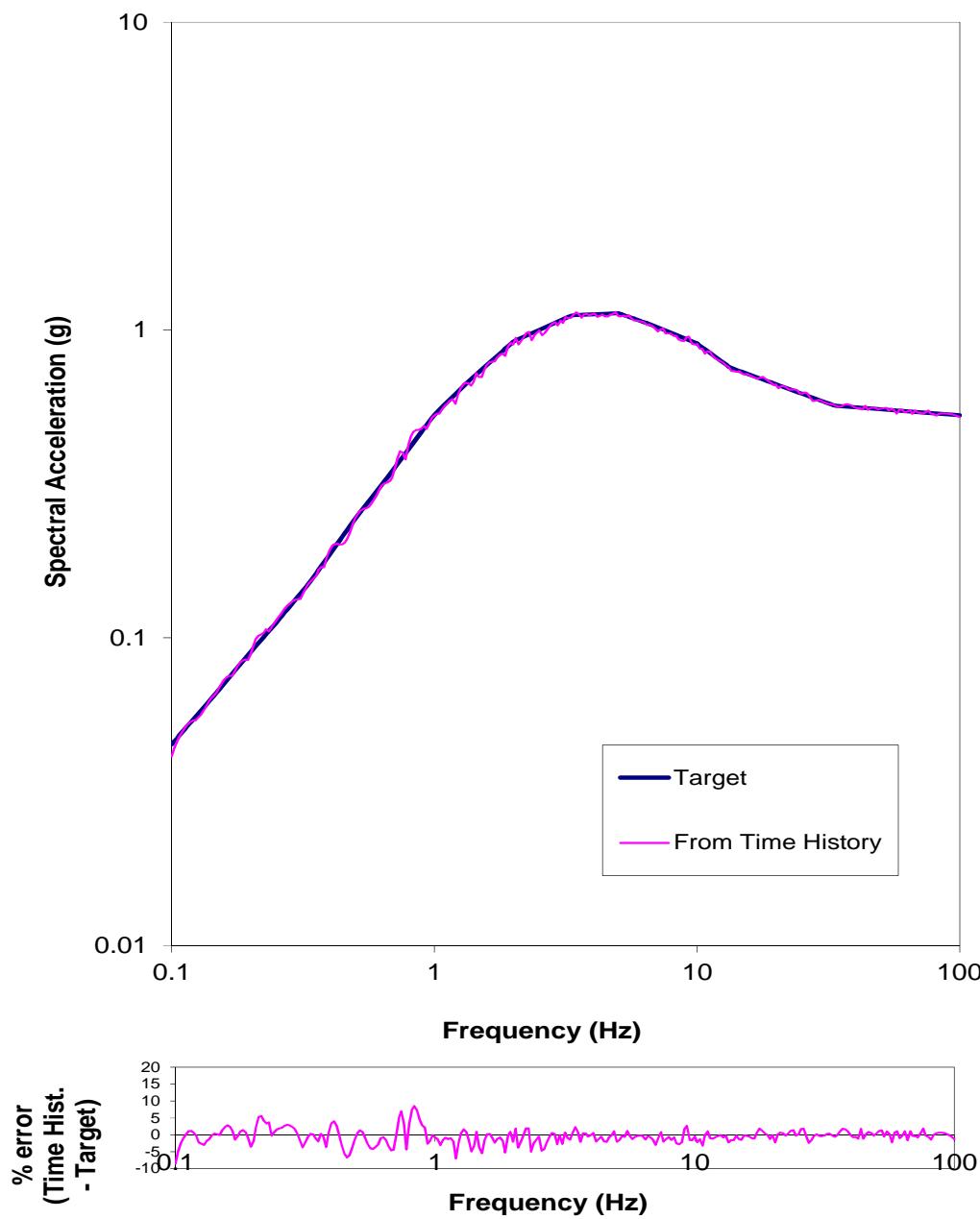


OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.50

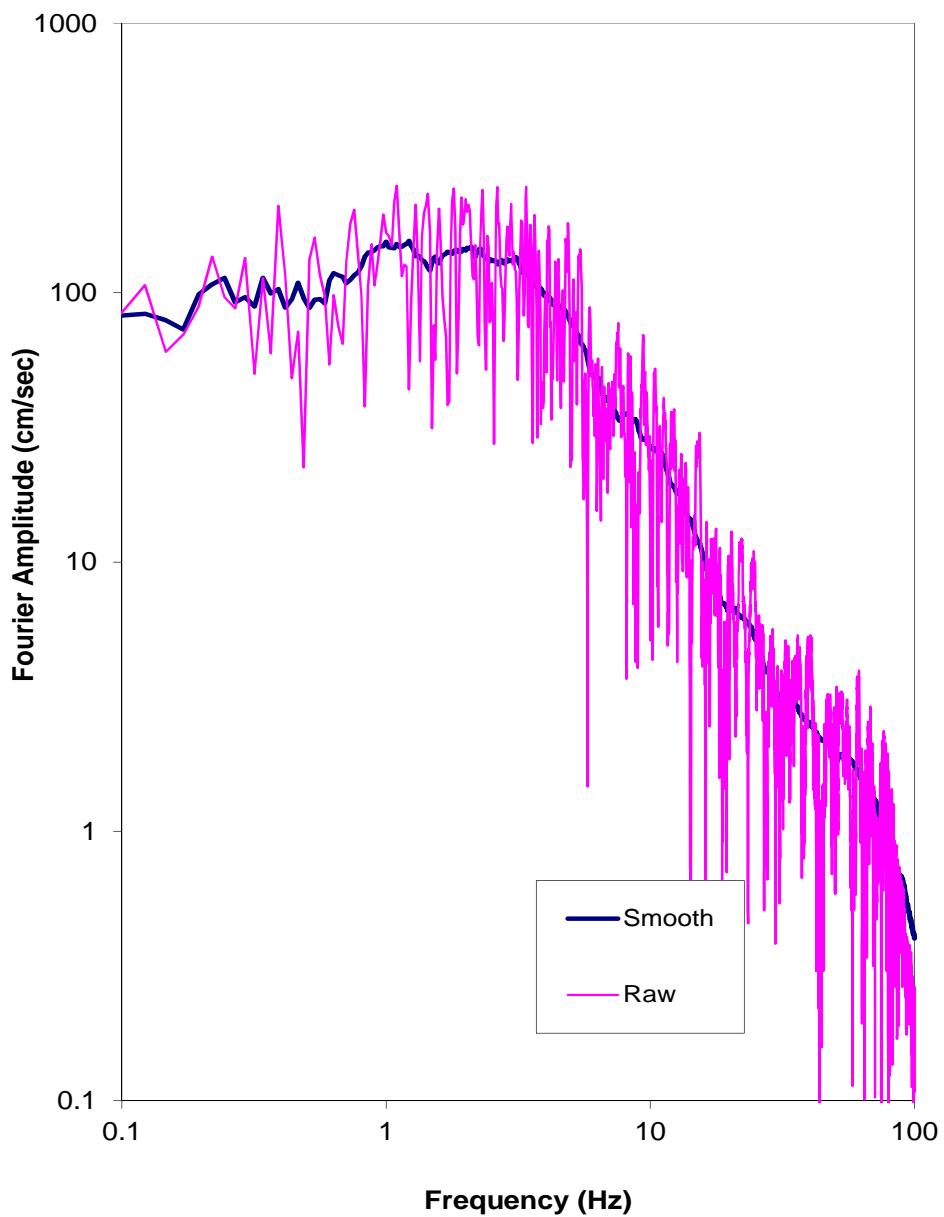
Duzce_DZC180 time history - Response Spectra



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – TARGET AND CALCULATED RESPONSE
SPECTRA

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Duzce_DZC180 time history - Fourier Amplitude Spectra

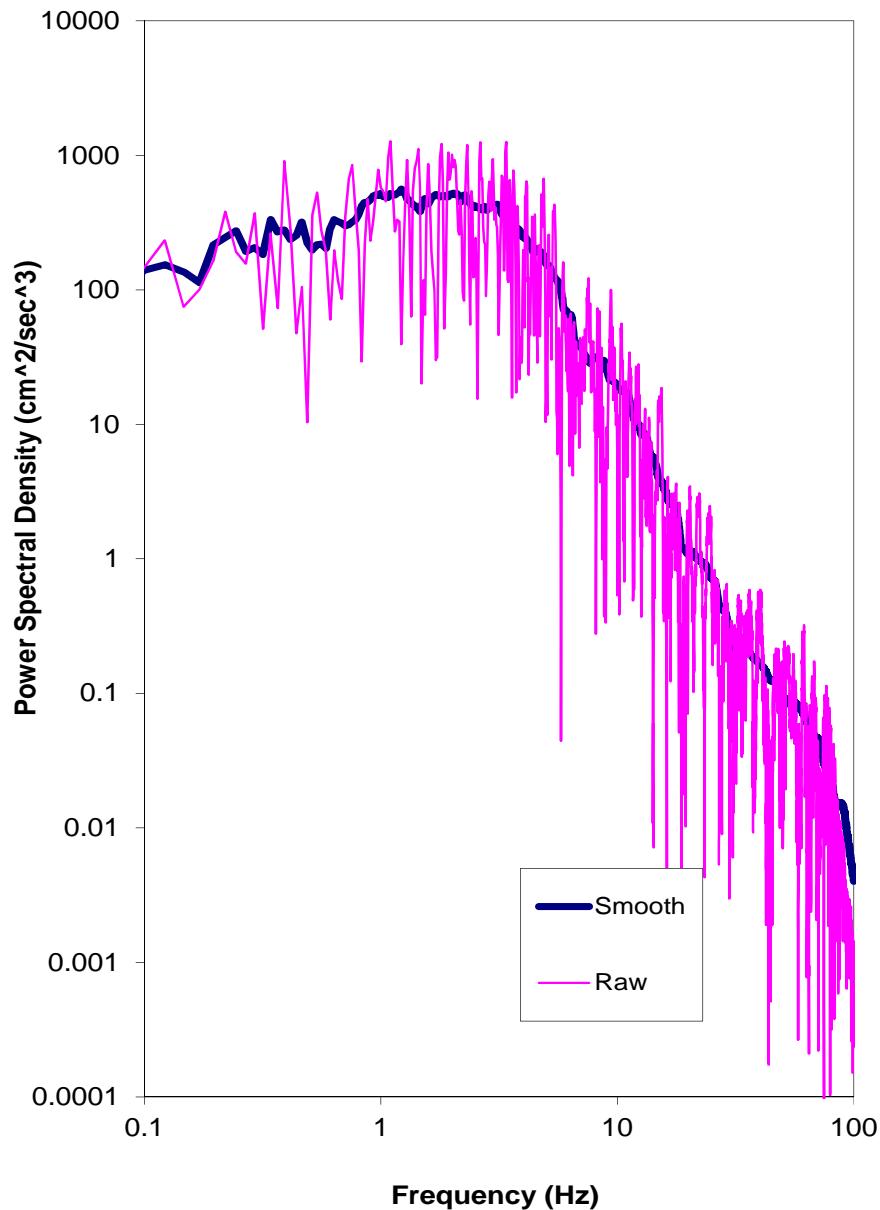


OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.52

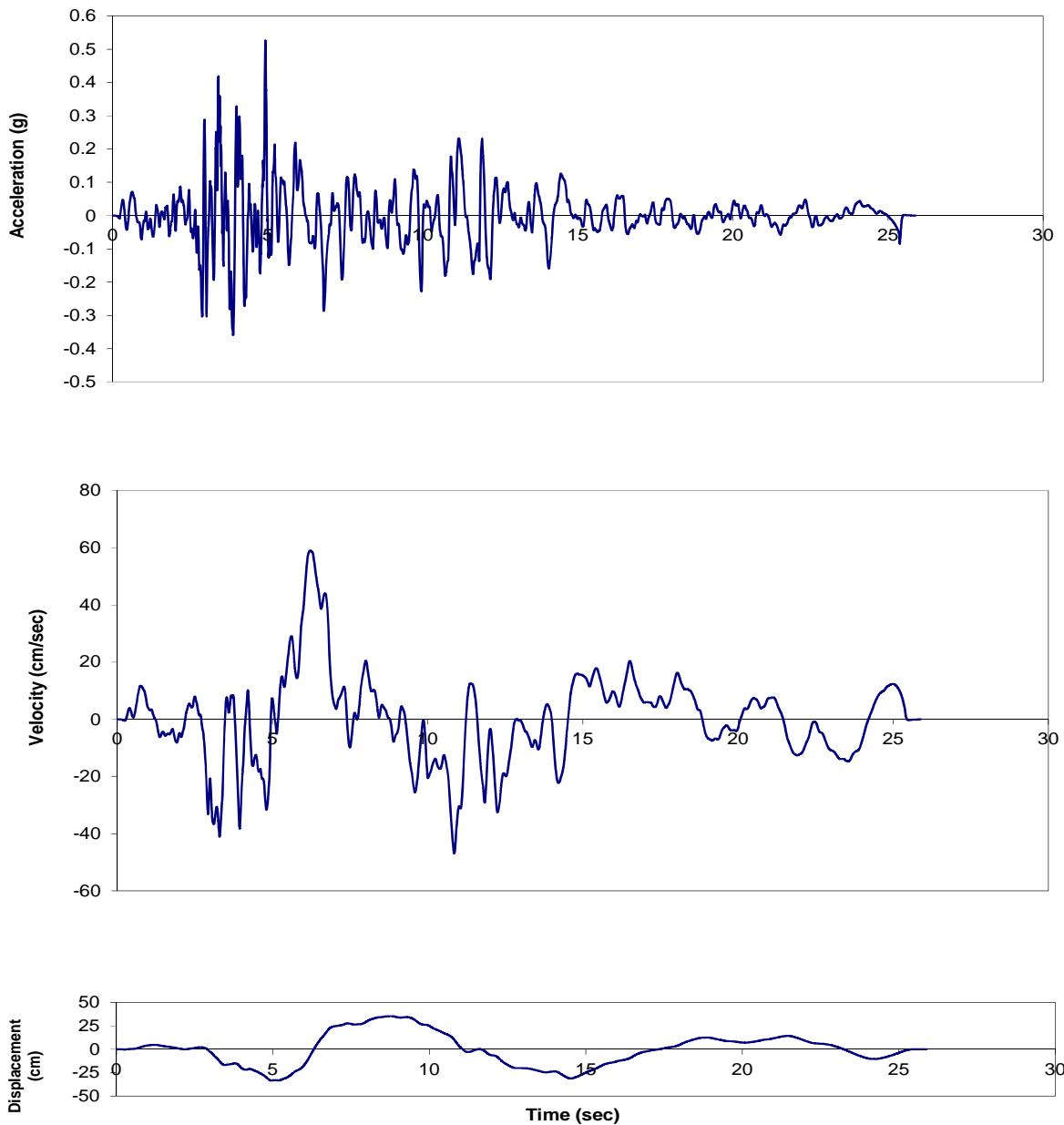
Duzce_DZC180 time history - Power Spectral Density Function



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

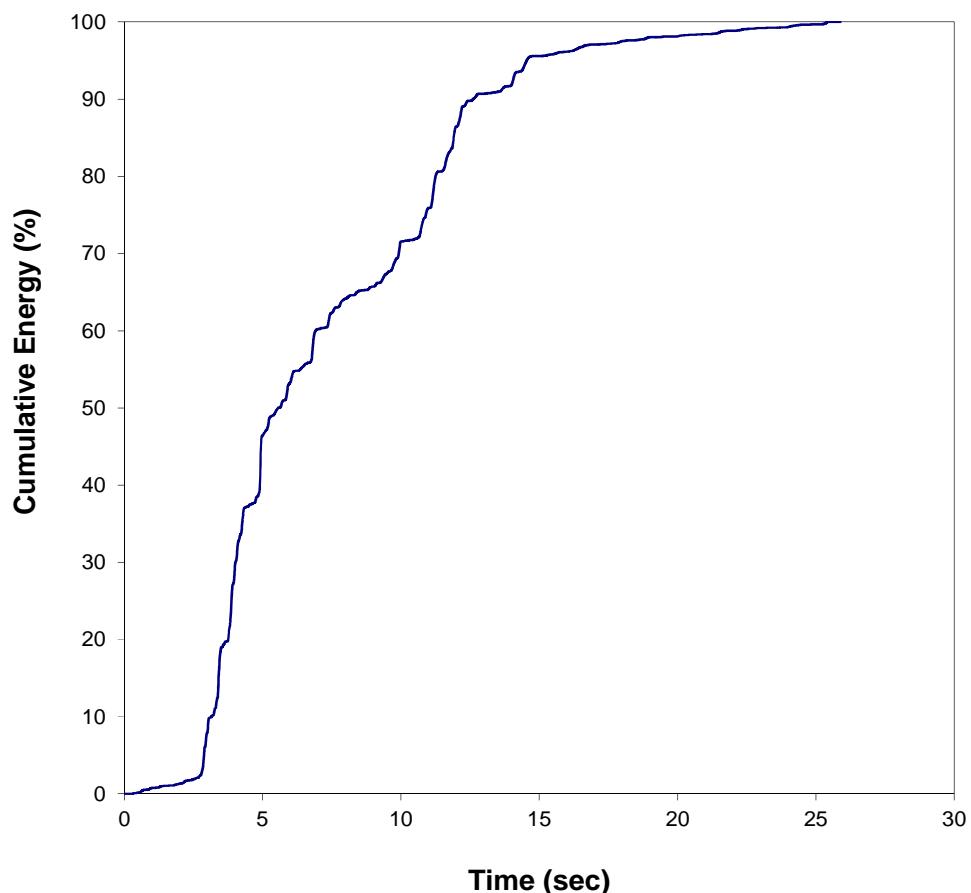
Duzce_DZC270 time history - Acceleration, Velocity, and Displacement Time Histories



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

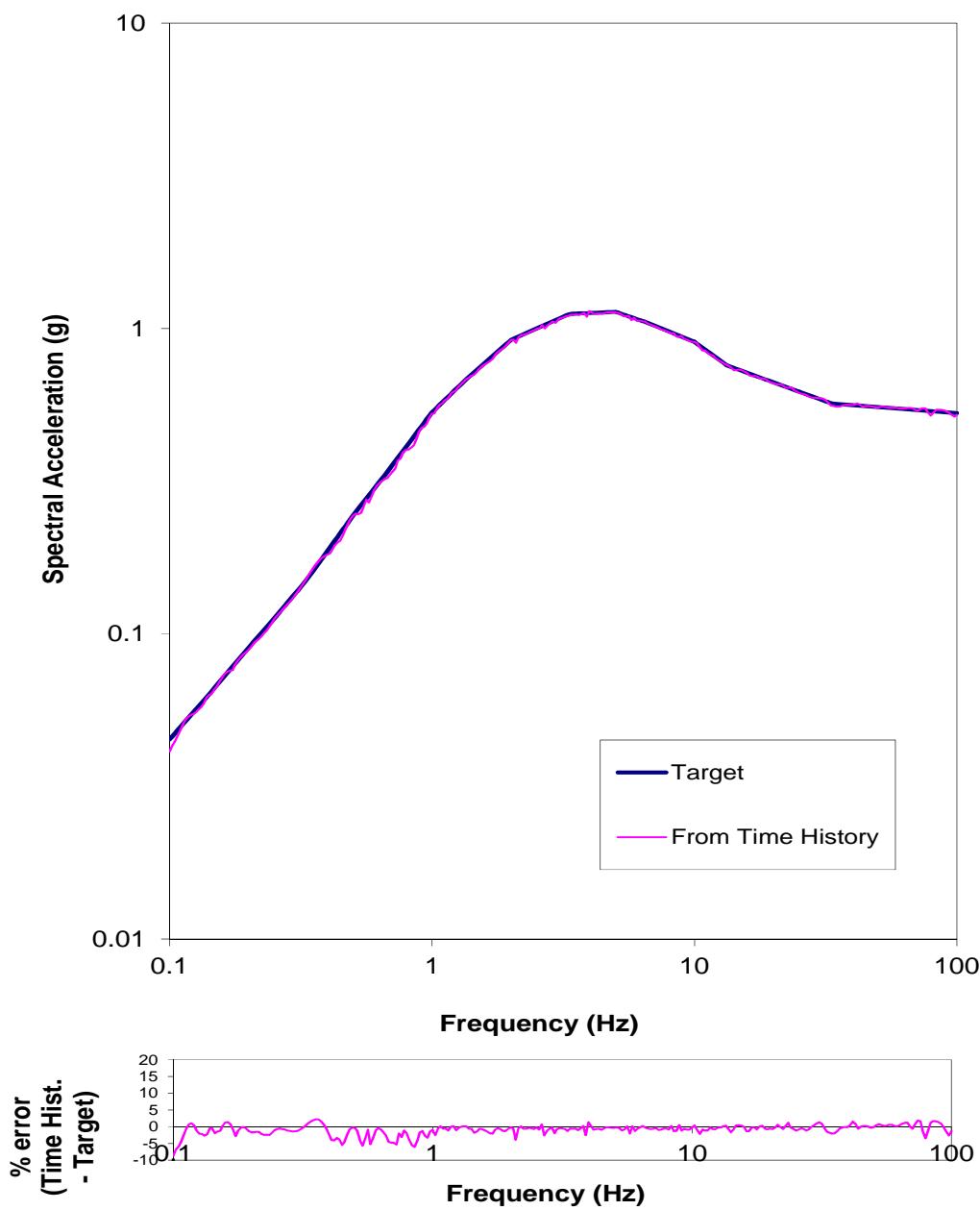
Duzce_DZC270 time history - Cumulative Energy (Husid) plot



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT

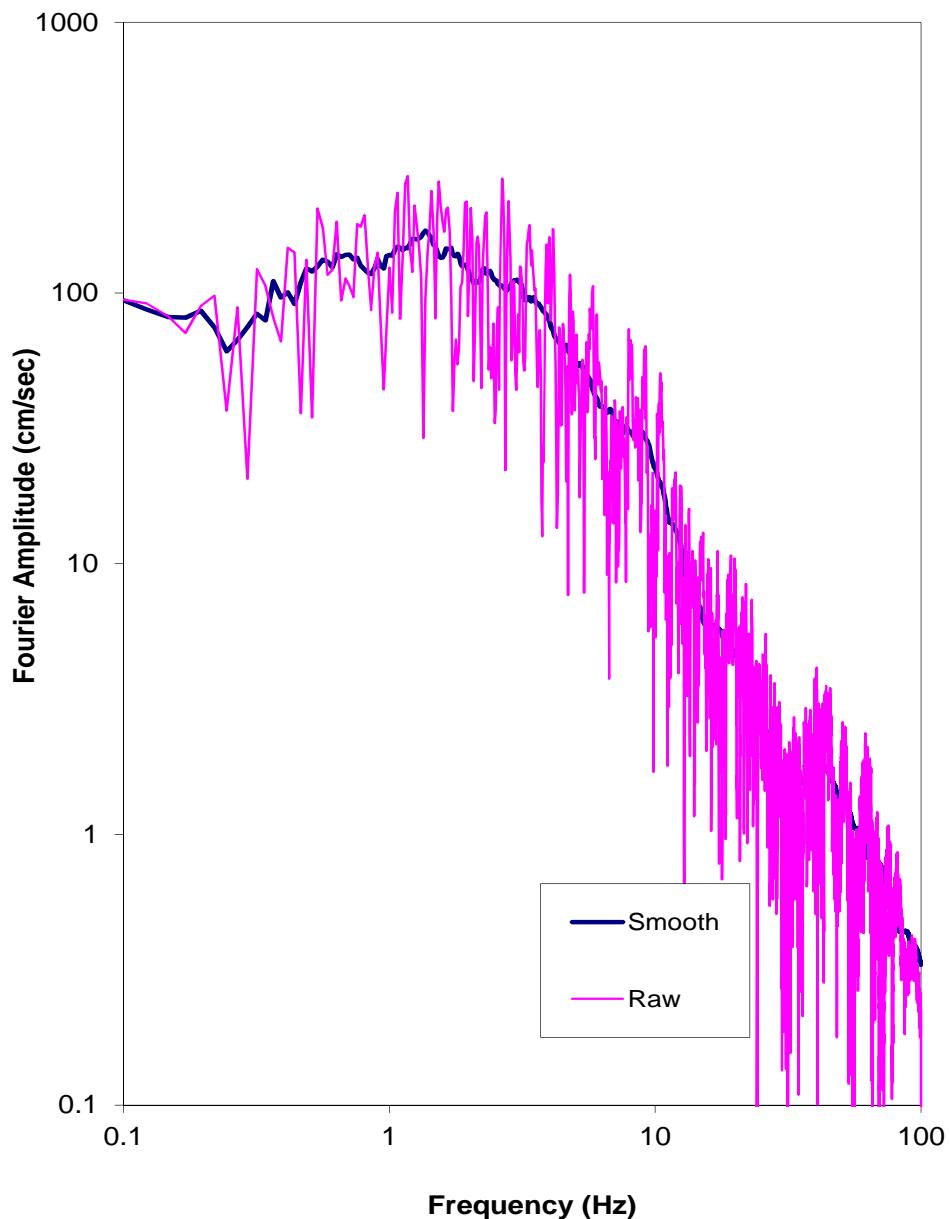
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Duzce_DZC270 time history - Response Spectra



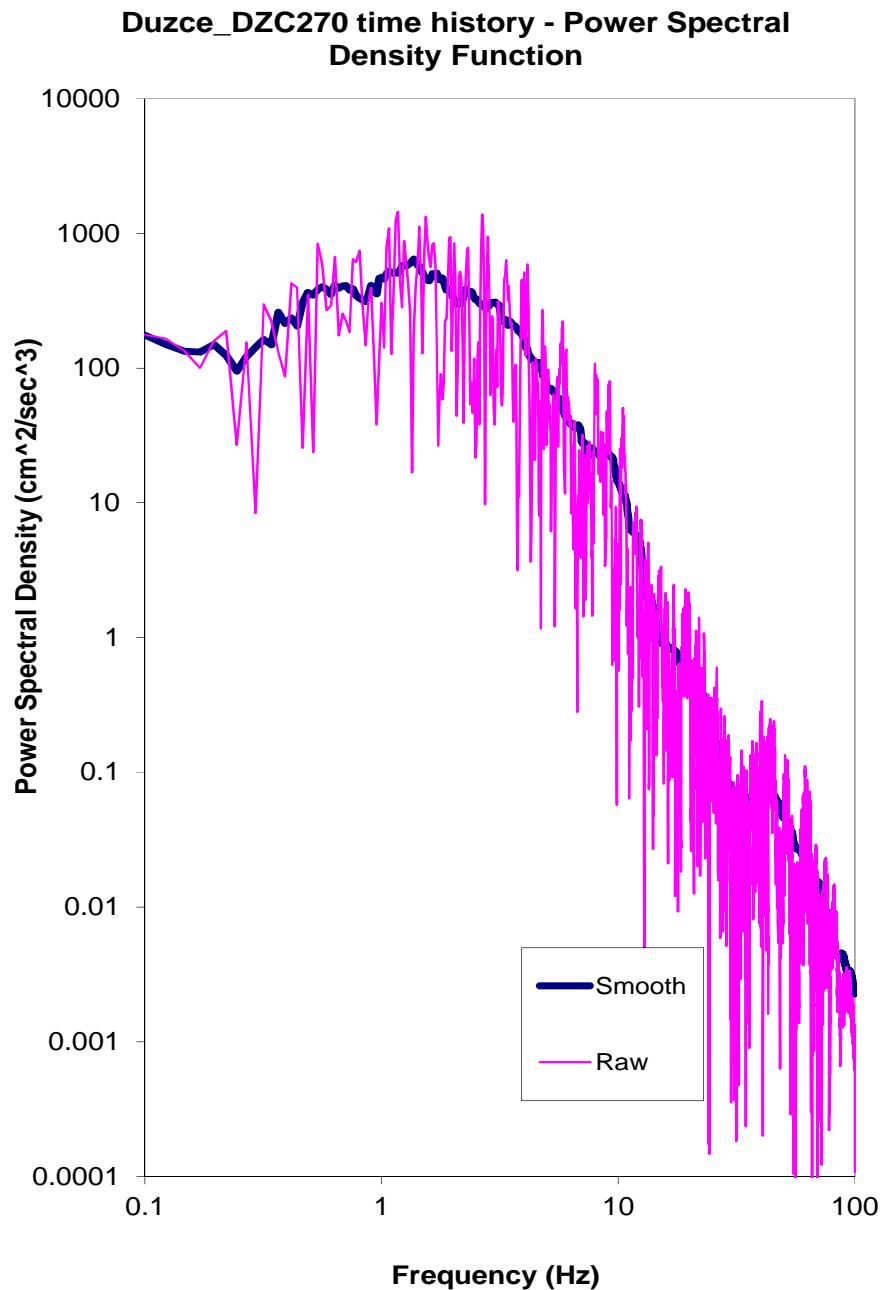
OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – TARGET AND CALCULATED RESPONSE
SPECTRA

LNG FACILITIES
ALASKA LNG PROJECT
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Duzce_DZC270 time history - Fourier Amplitude Spectra

**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – FOURIER AMPLITUDE SPECTRUM**

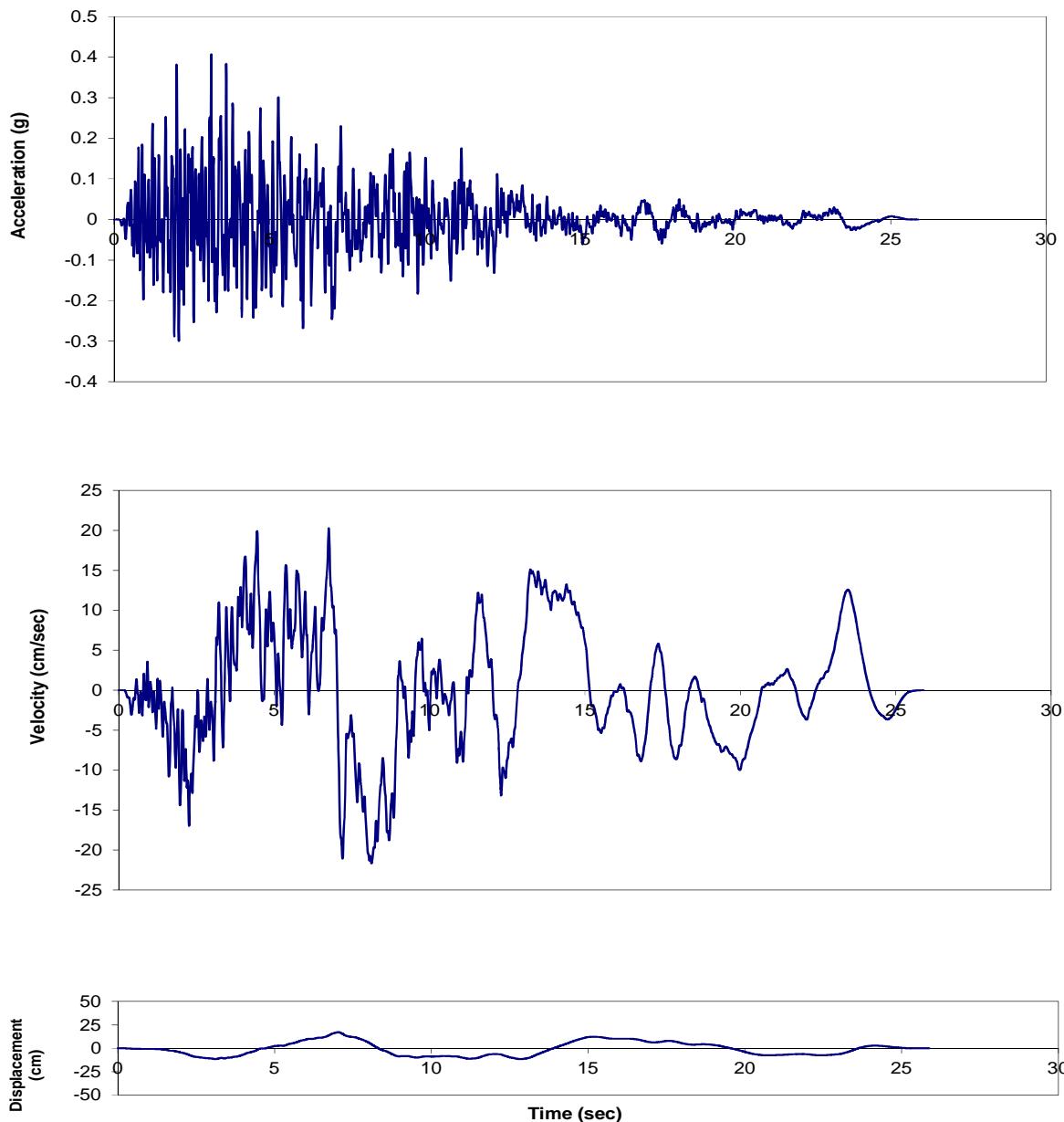
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

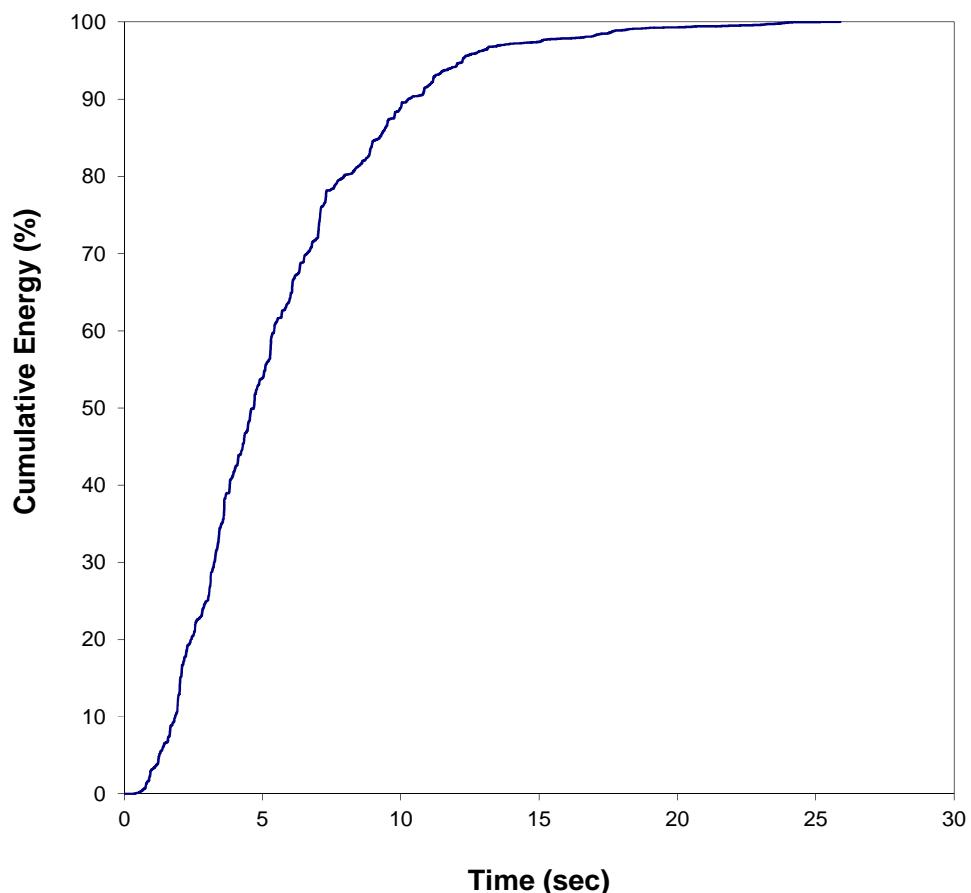
Duzce_DZCUP time history - Acceleration, Velocity, and Displacement Time Histories



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

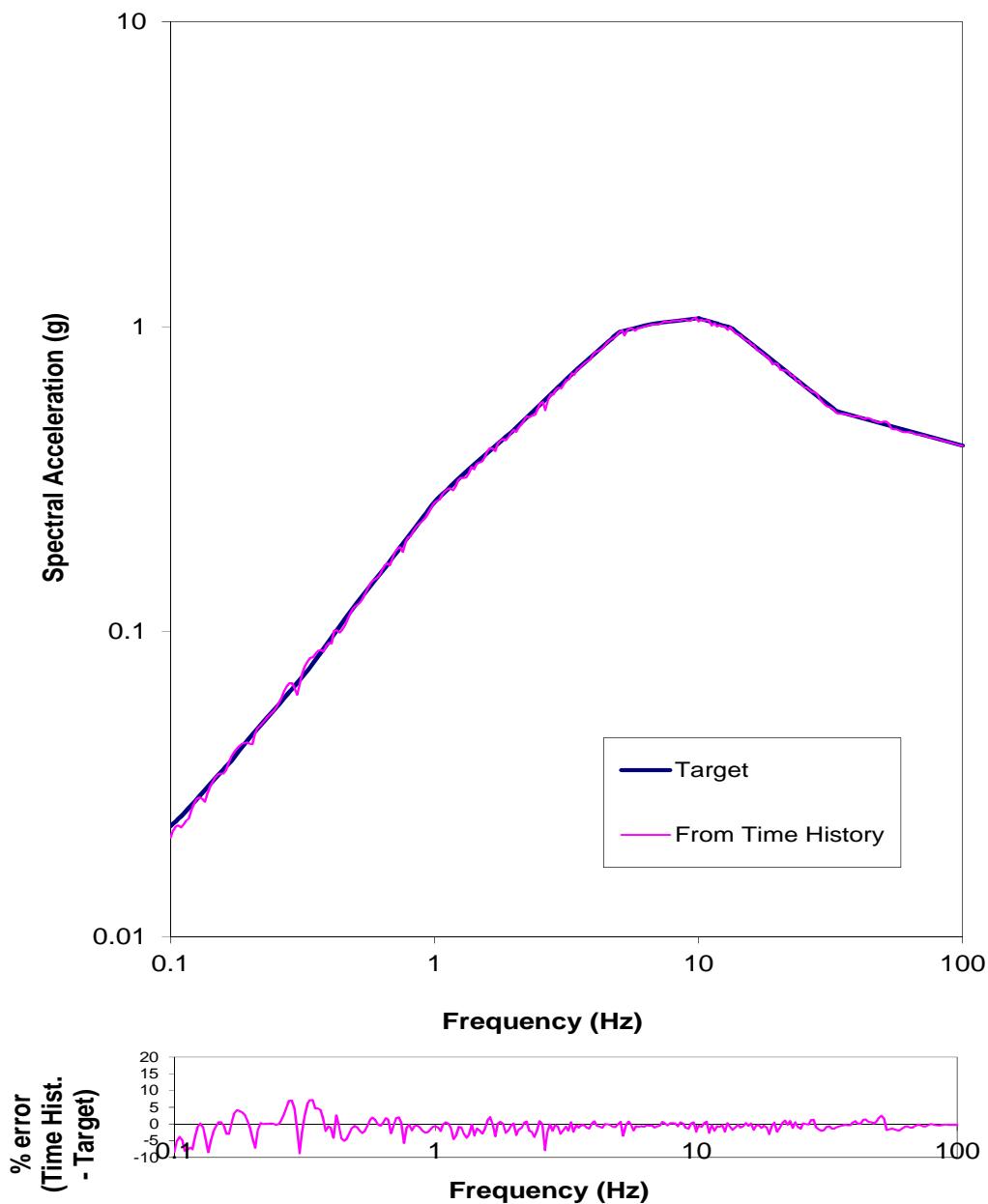
Duzce_DZCUP time history - Cumulative Energy (Husid) plot



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

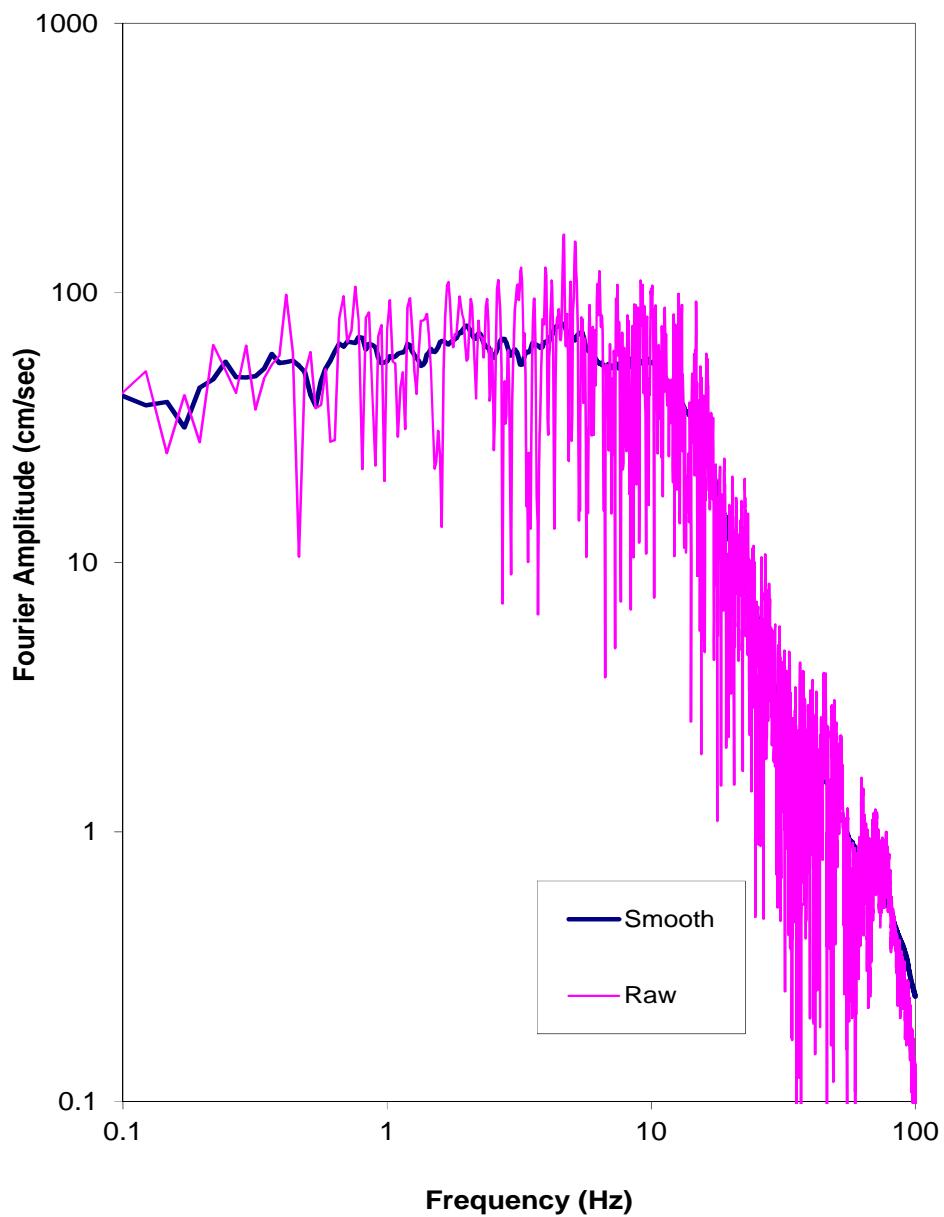
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Duzce_DZCUP time history - Response Spectra



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

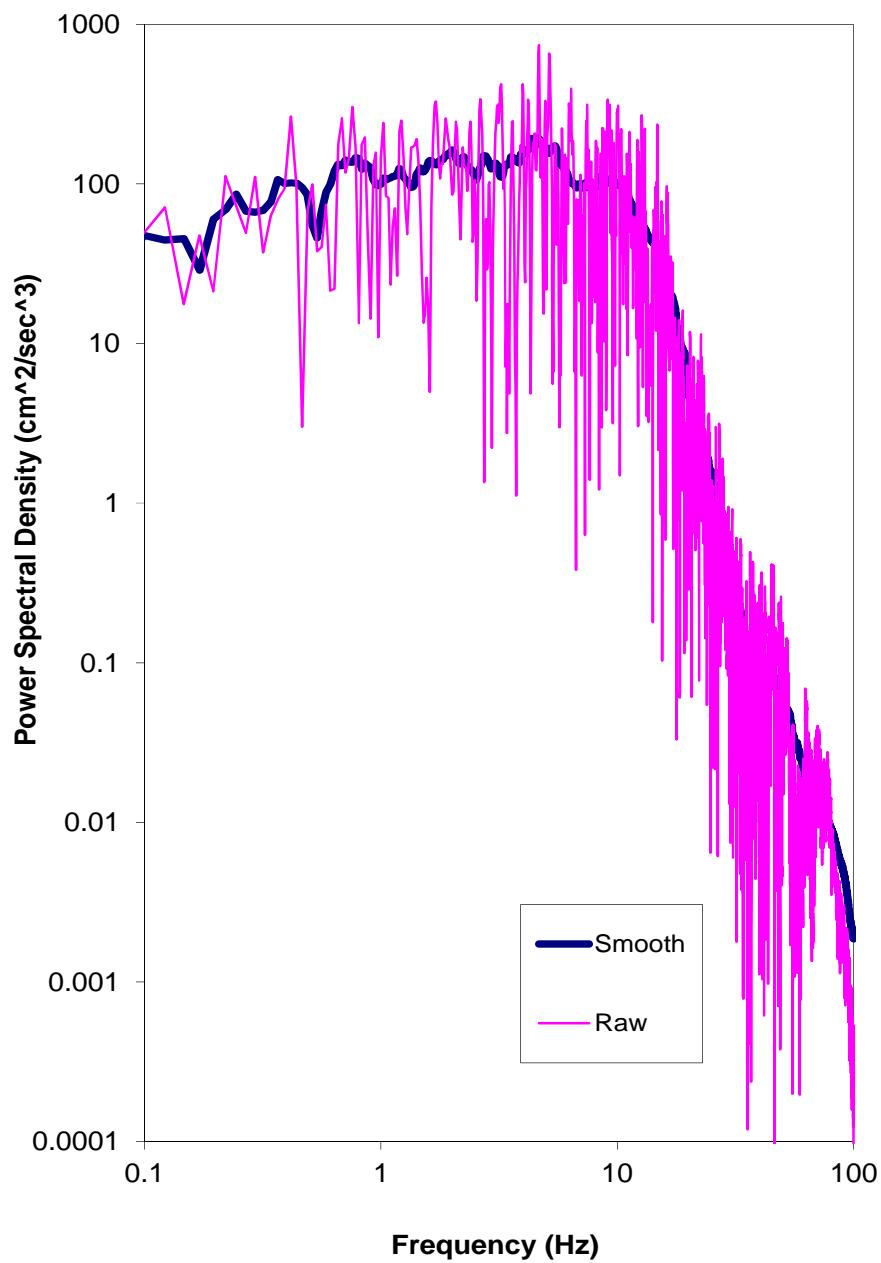
Duzce_DZCUP time history - Fourier Amplitude Spectra

**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY
MATCHED DZC MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.62

Duzce_DZCUP time history - Power Spectral Density Function



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

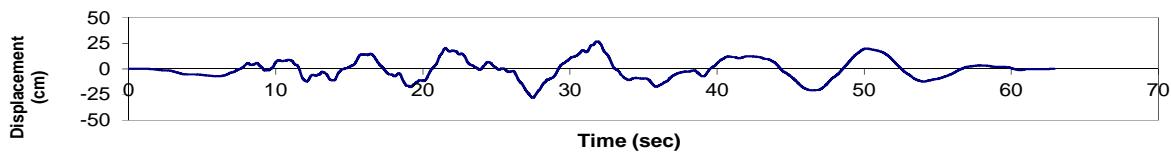
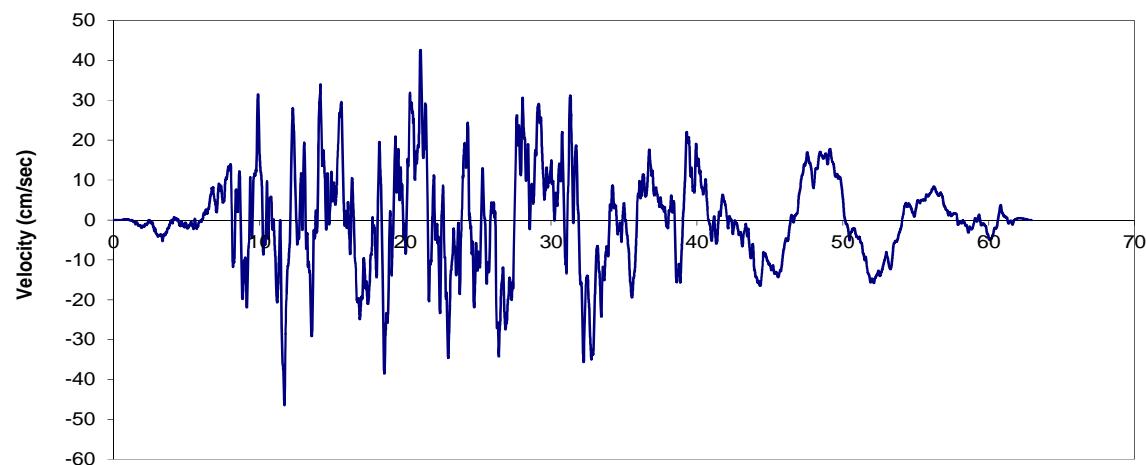
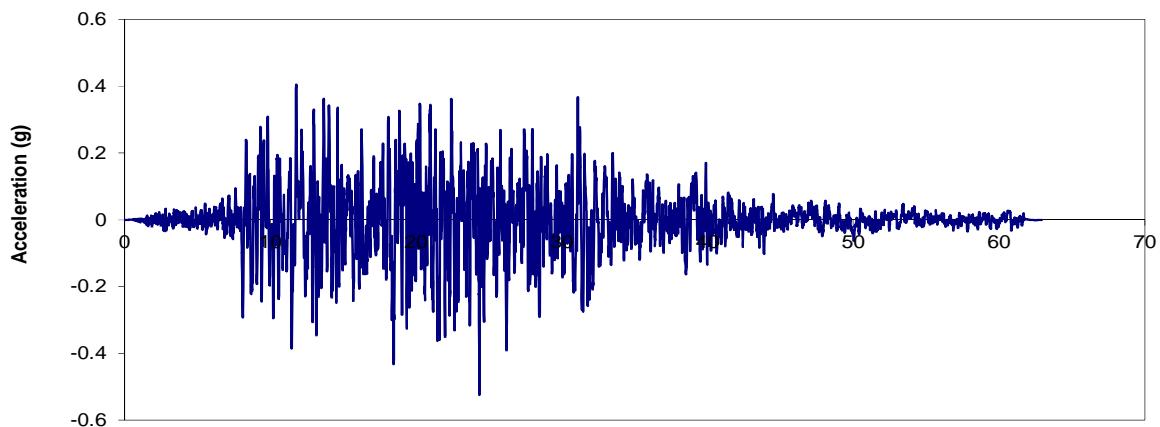
Calculation of Correlation Coefficients**Cross-correlation
check**

Horizontal 1:	DZC180
Horizontal 2:	DZC270
Vertical:	DZCUP
corr, H1-H2	-0.004
corr, H1-V	-0.116
corr, H2-V	0.036

**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY
MATCHED DZC MOTION – CALCULATION OF CORRELATION COEFFICIENTS**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

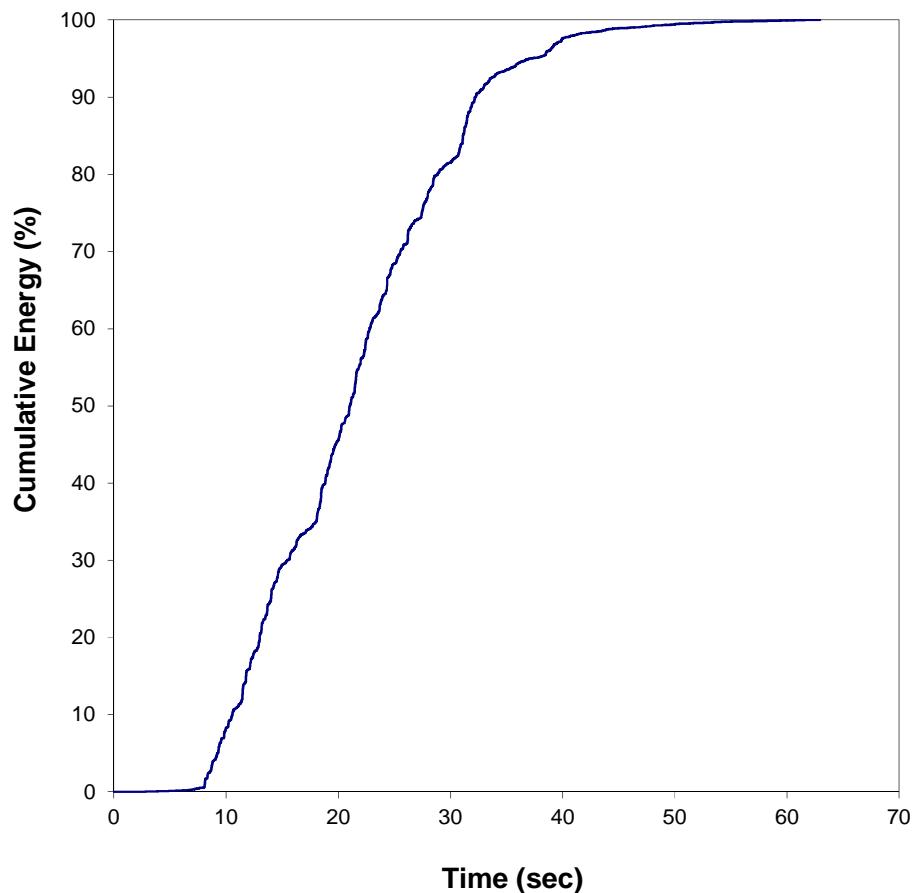
Unio_N00W time history - Acceleration, Velocity, and Displacement Time Histories



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Unio_N00W time history - Cumulative Energy (Husid) plot

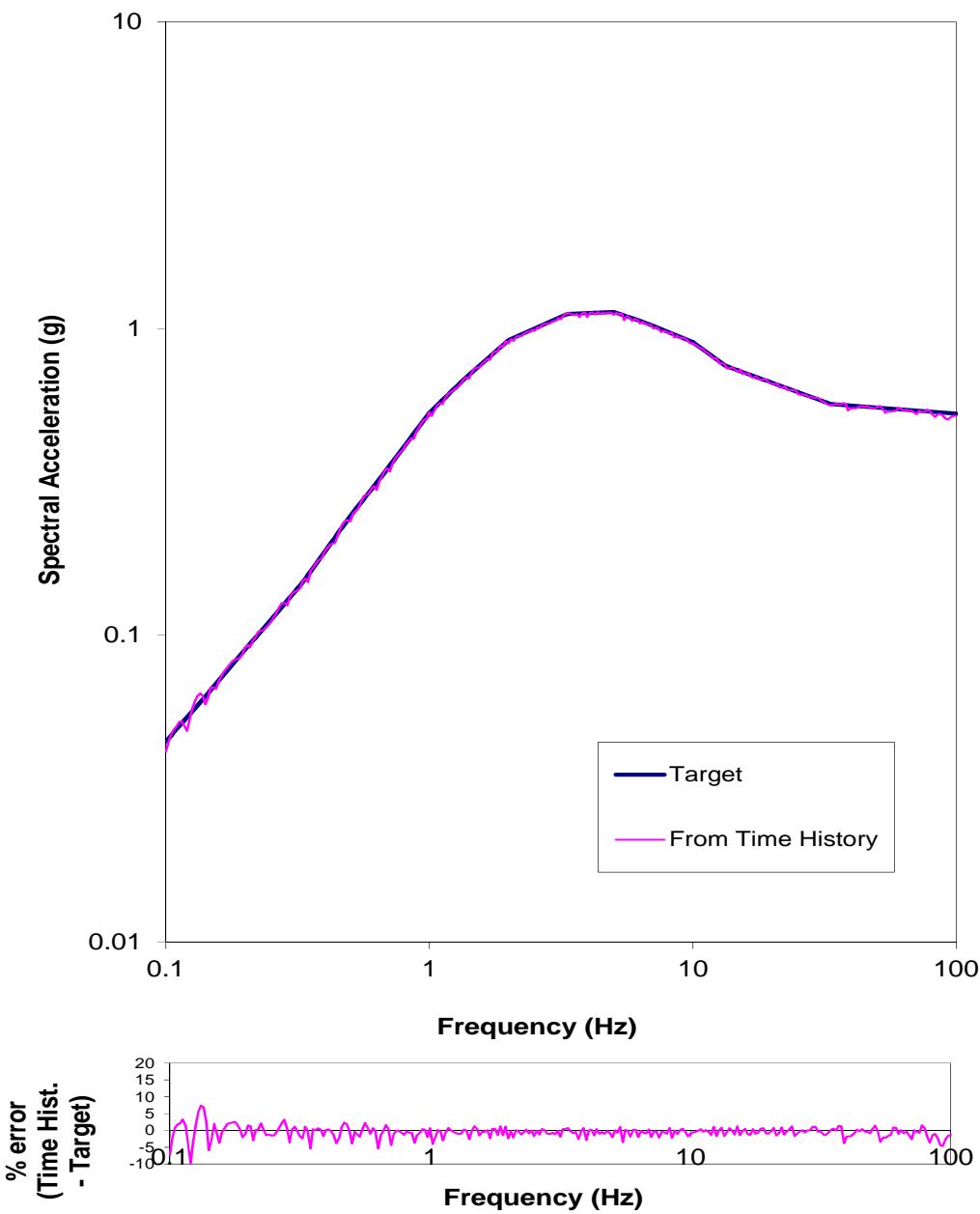


**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

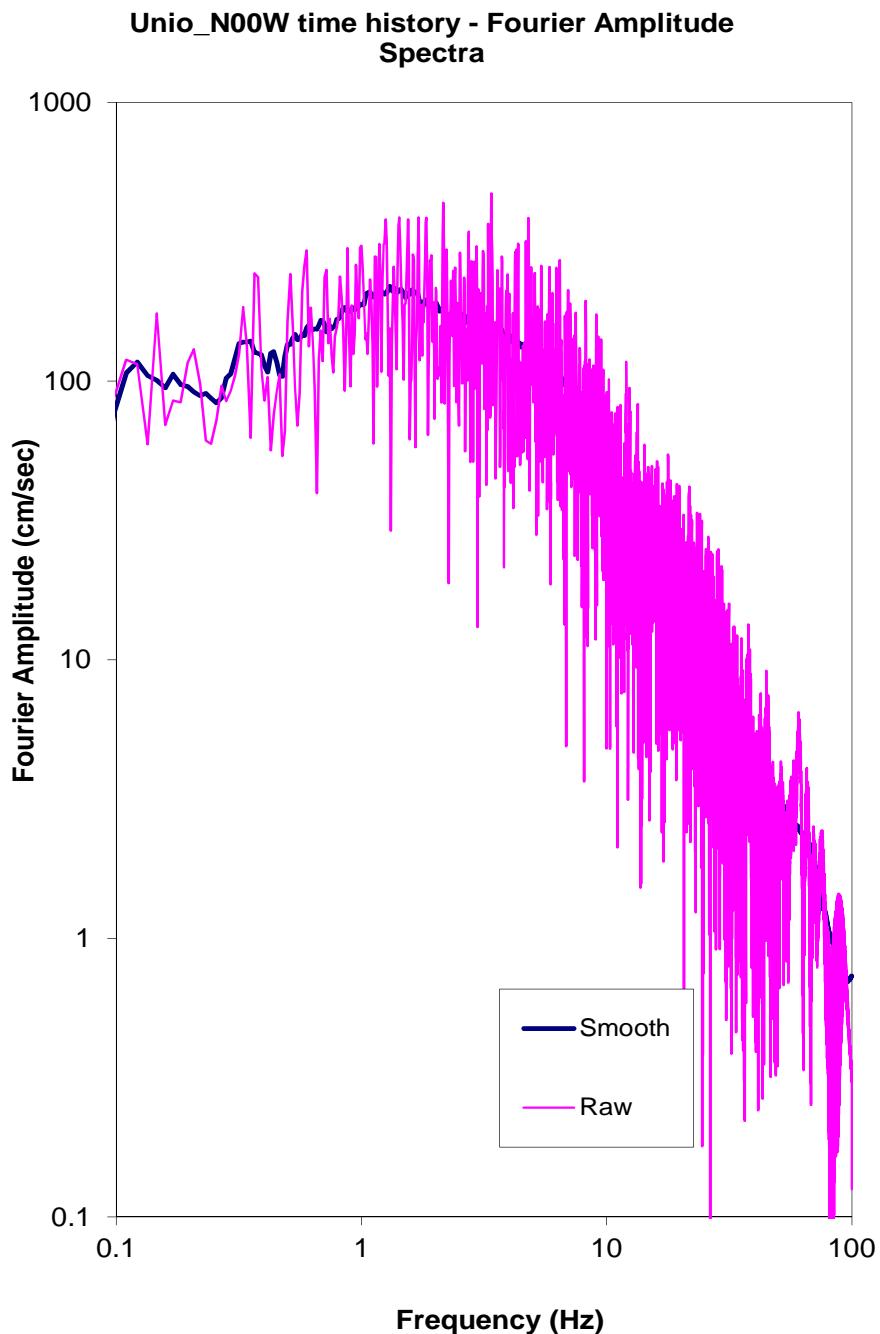
PLATE E.66

Unio_N00W time history - Response Spectra



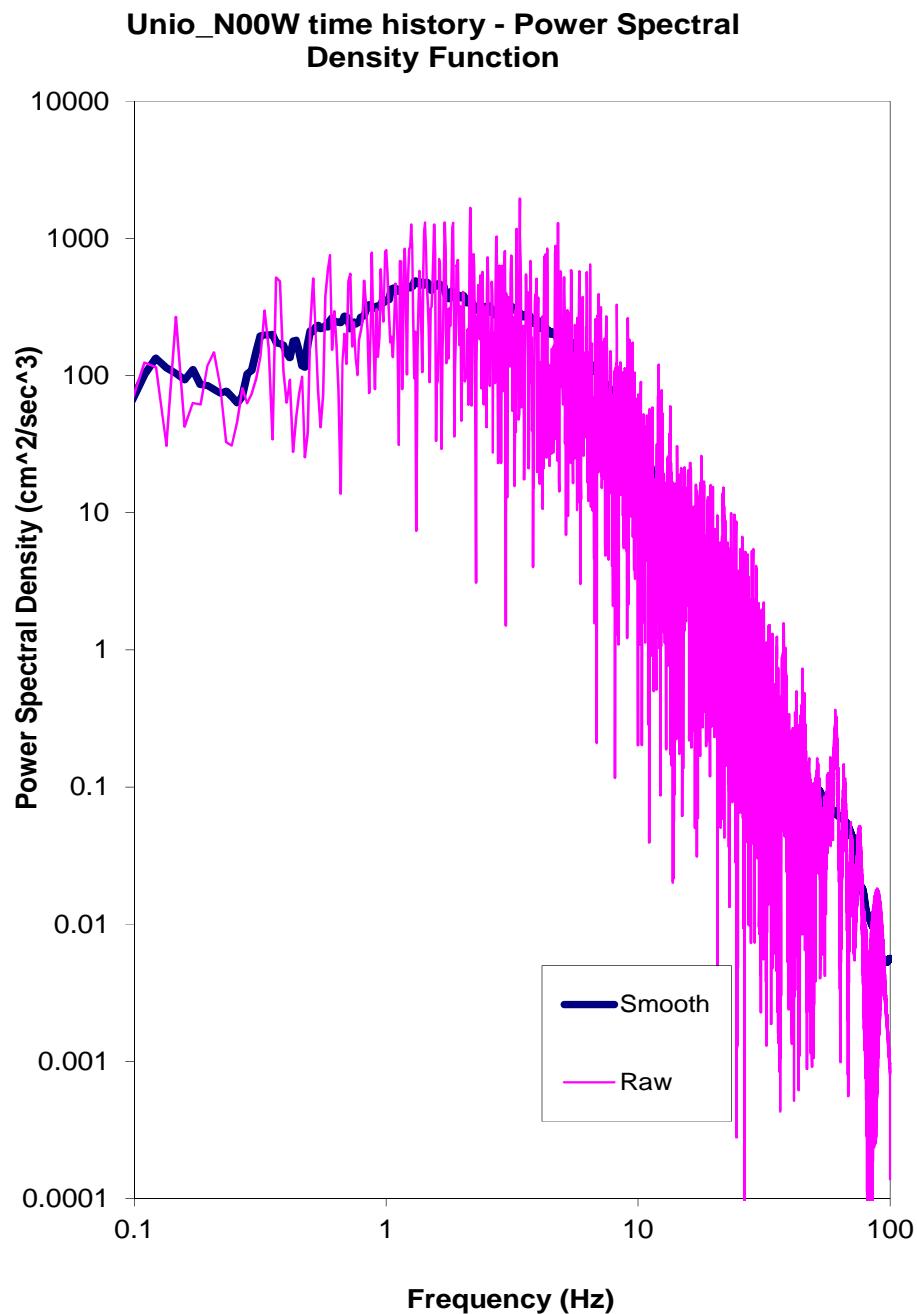
**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – TARGET AND CALCULATED
RESPONSE SPECTRA**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – FOURIER AMPLITUDE SPECTRUM**

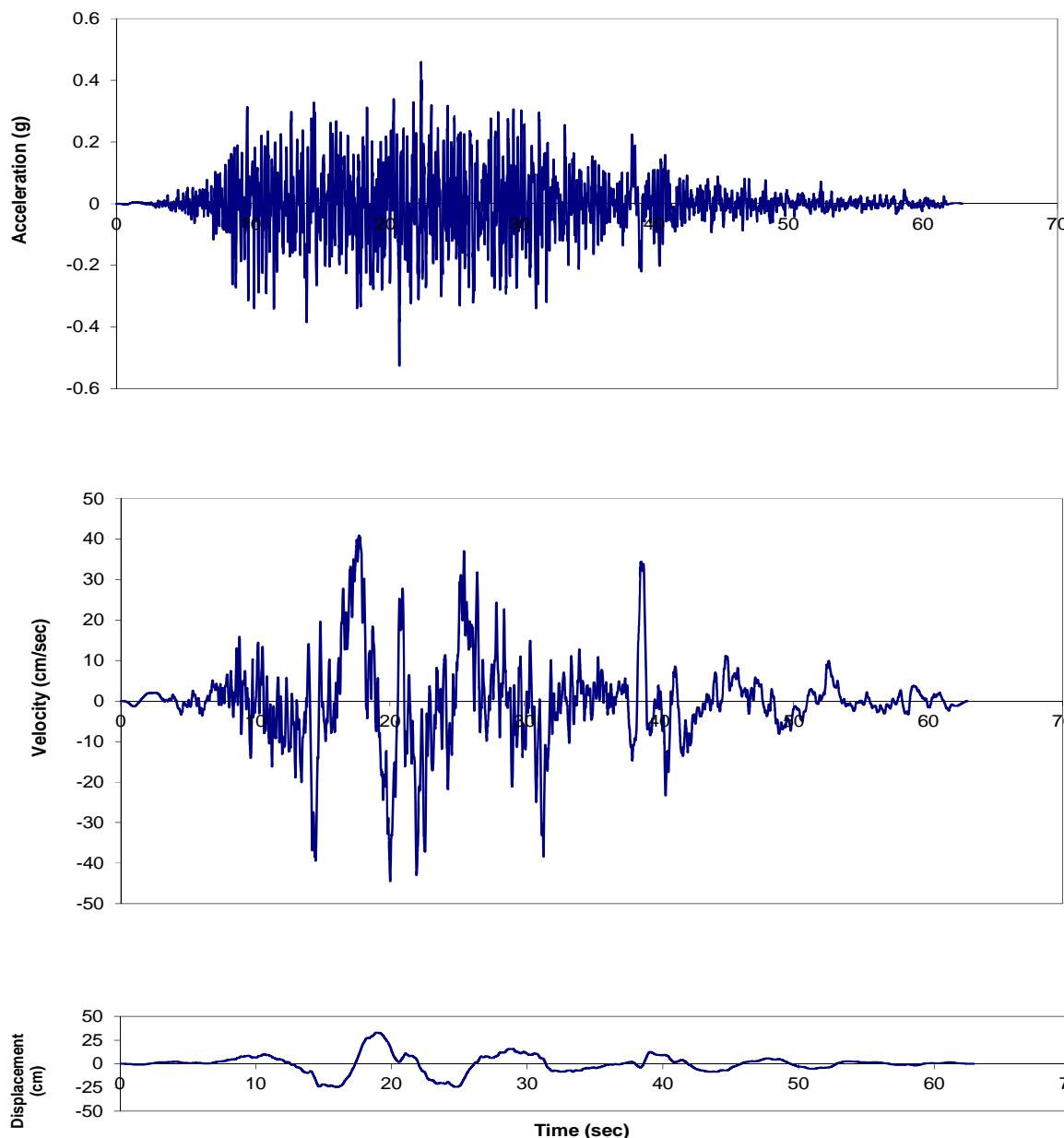
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT NORMAL –
SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – POWER SPECTRAL DENSITY
FUNCTION**

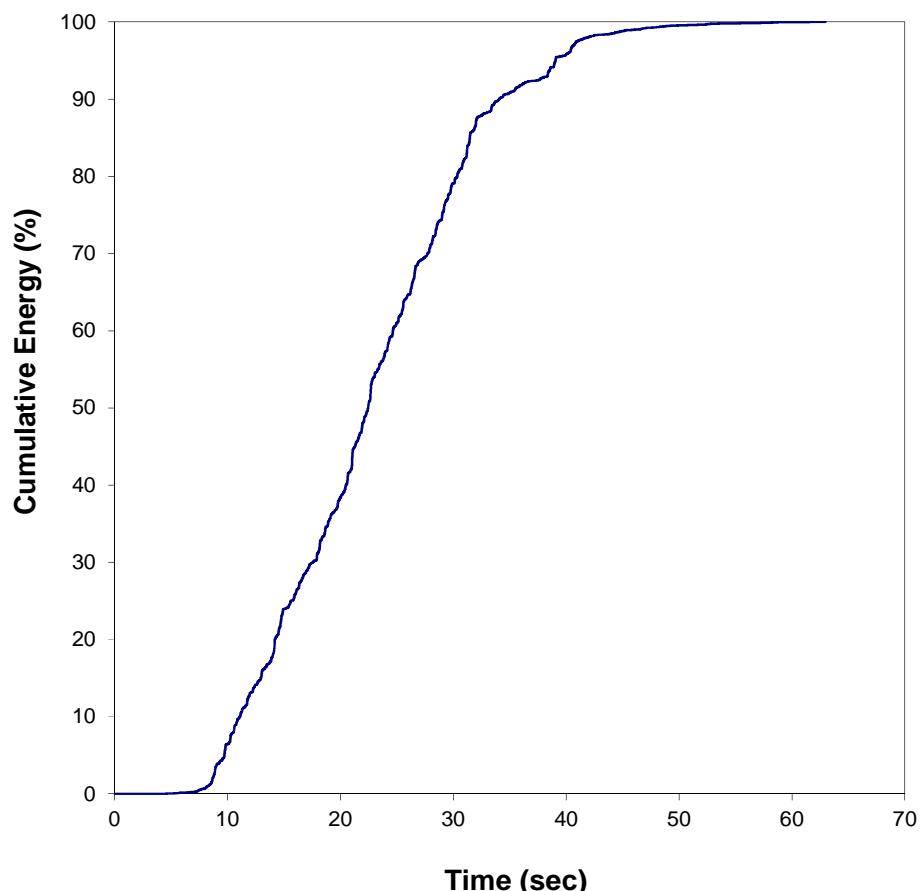
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Unio_N90W time history - Acceleration, Velocity, and Displacement Time Histories



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

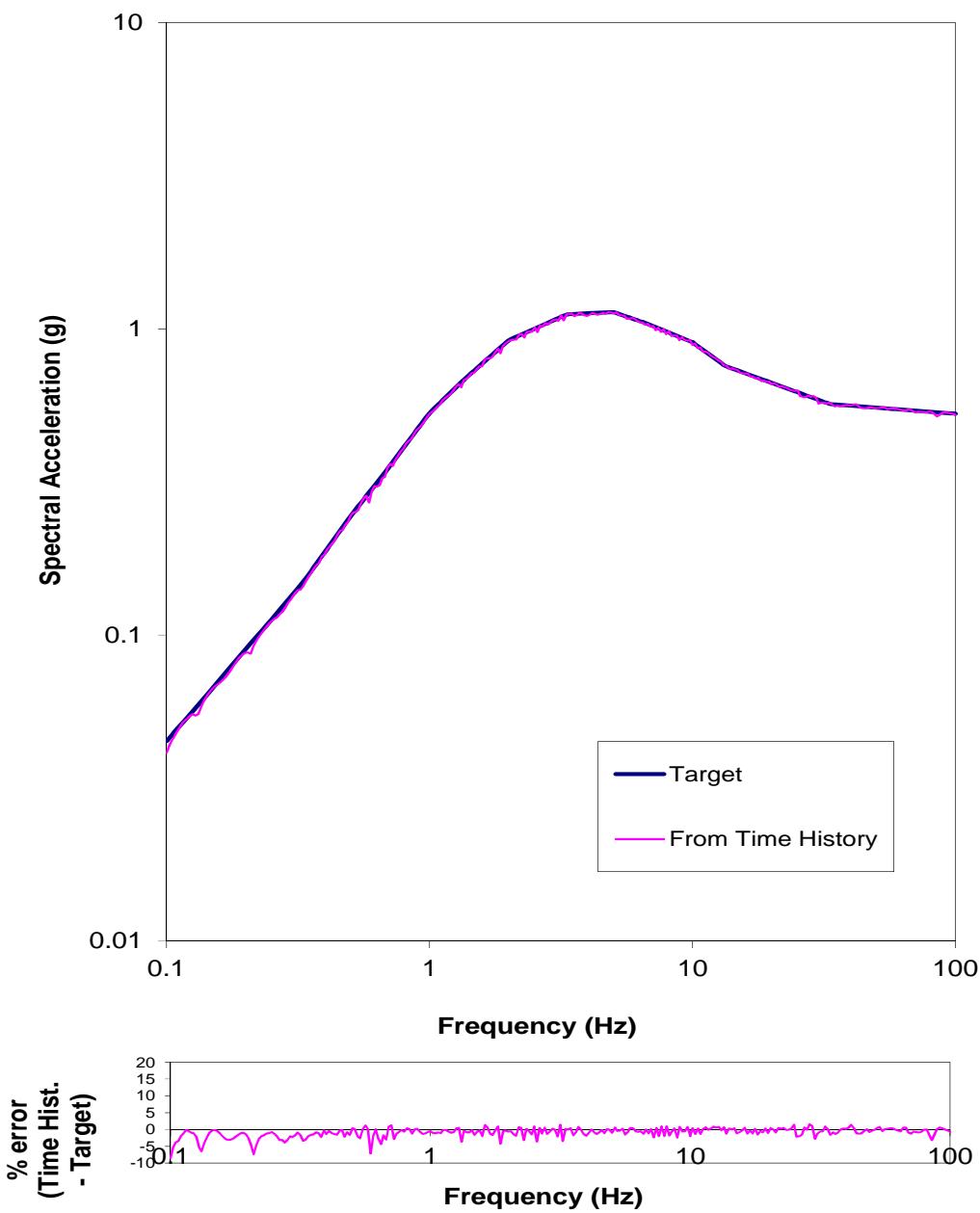
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Unio_N90W time history - Cumulative Energy (Husid) plot

**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

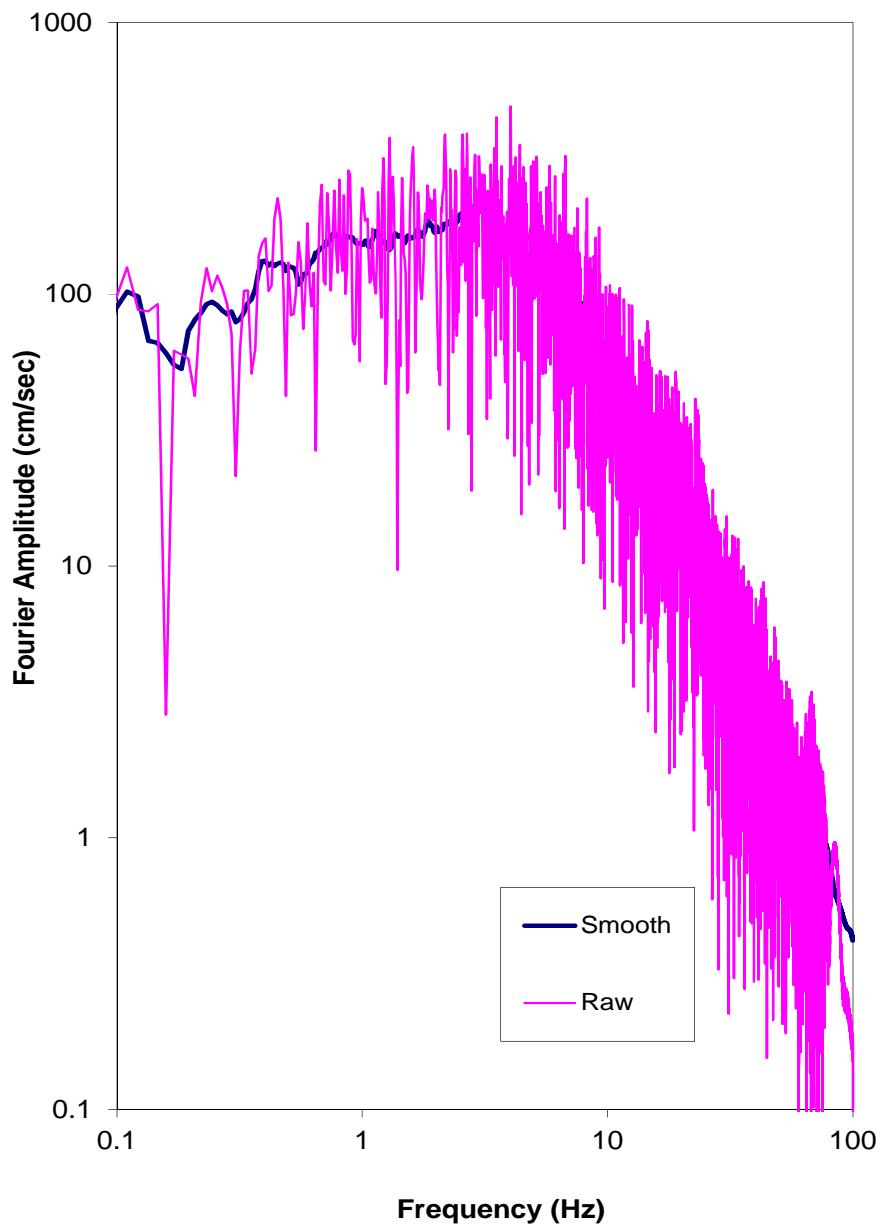
Unio_N90W time history - Response Spectra



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – TARGET AND CALCULATED
RESPONSE SPECTRA**

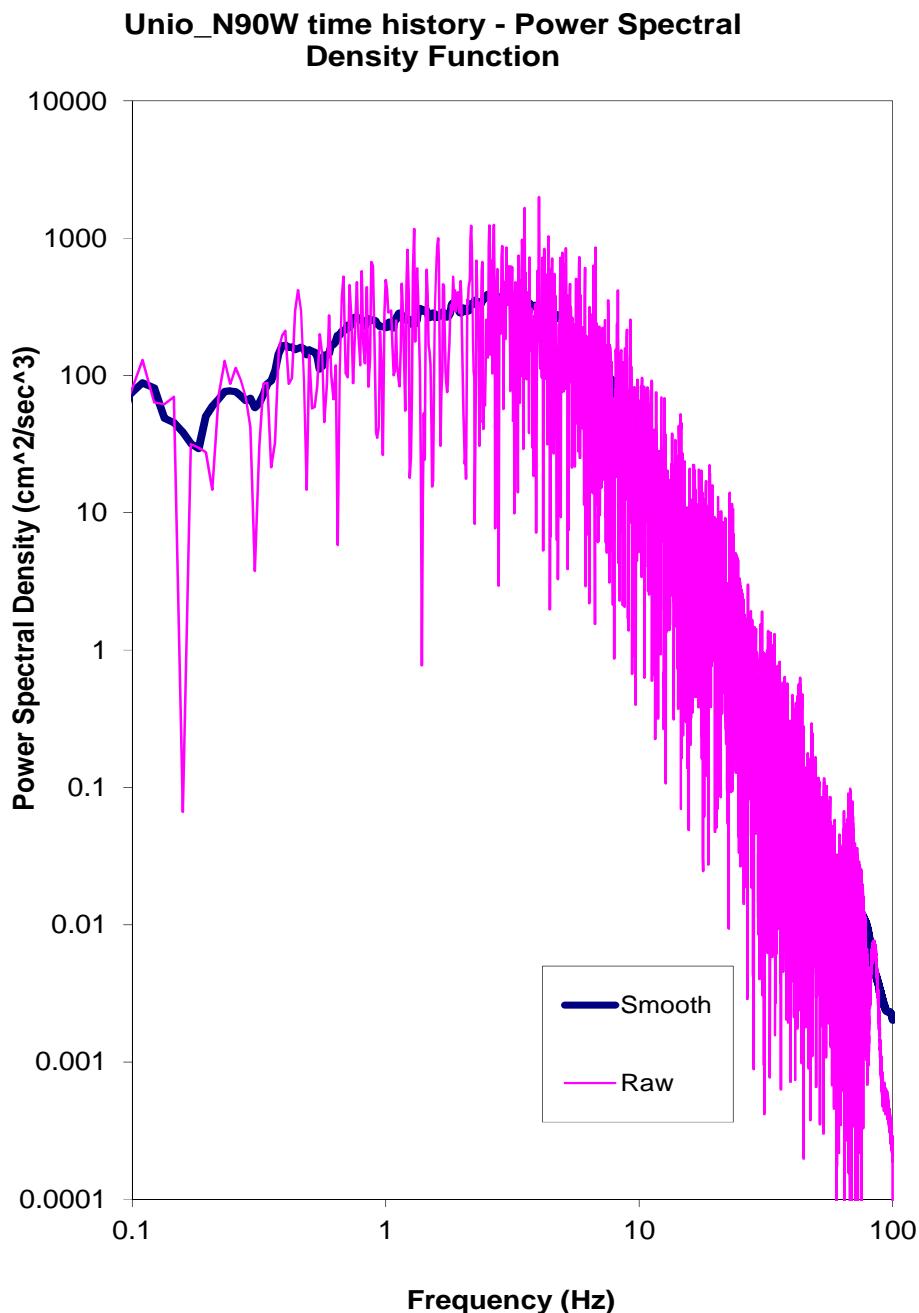
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Unio_N90W time history - Fourier Amplitude Spectra



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – FOURIER AMPLITUDE SPECTRUM

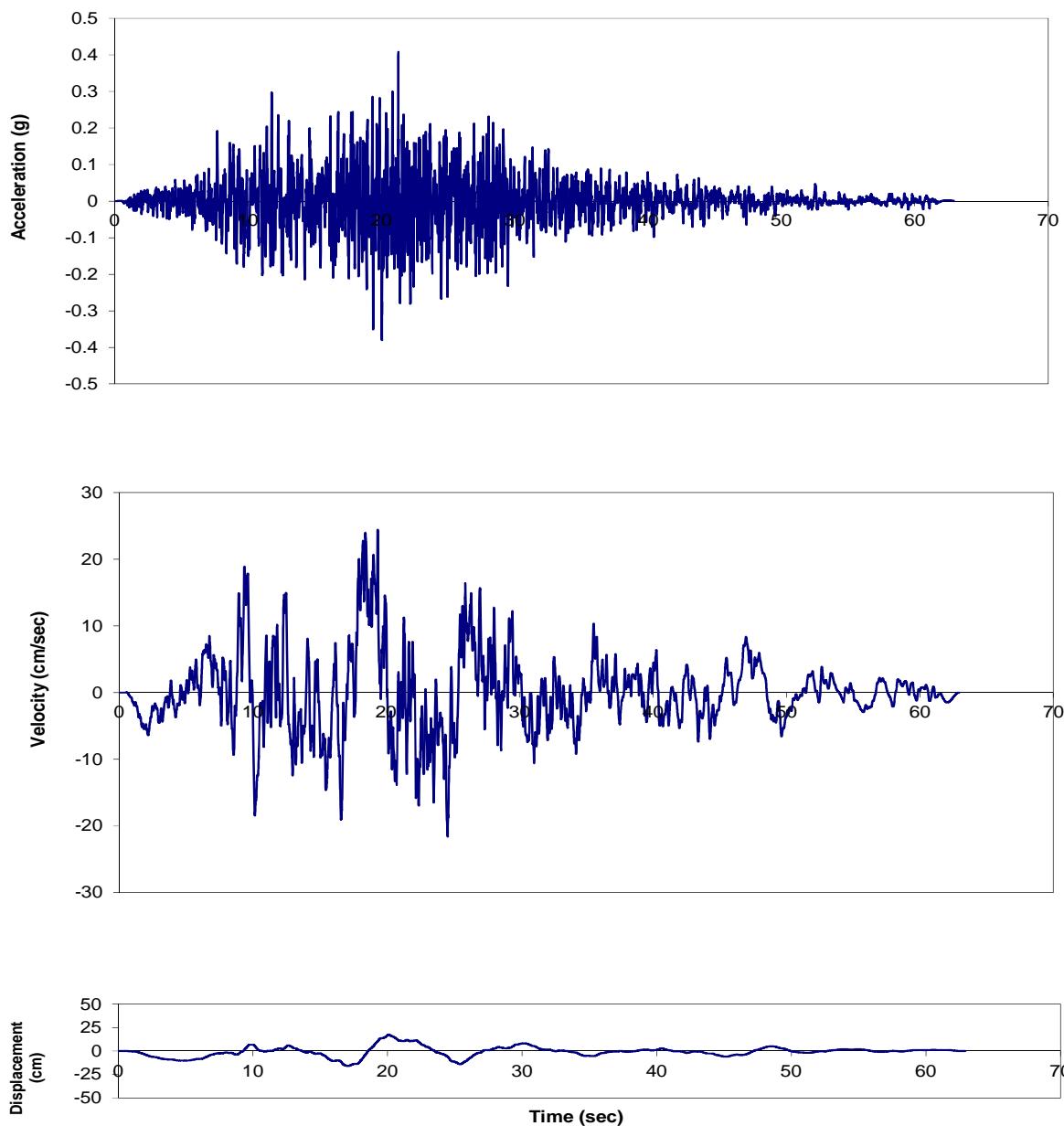
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS, FAULT PARALLEL –
SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – POWER SPECTRAL DENSITY
FUNCTION**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

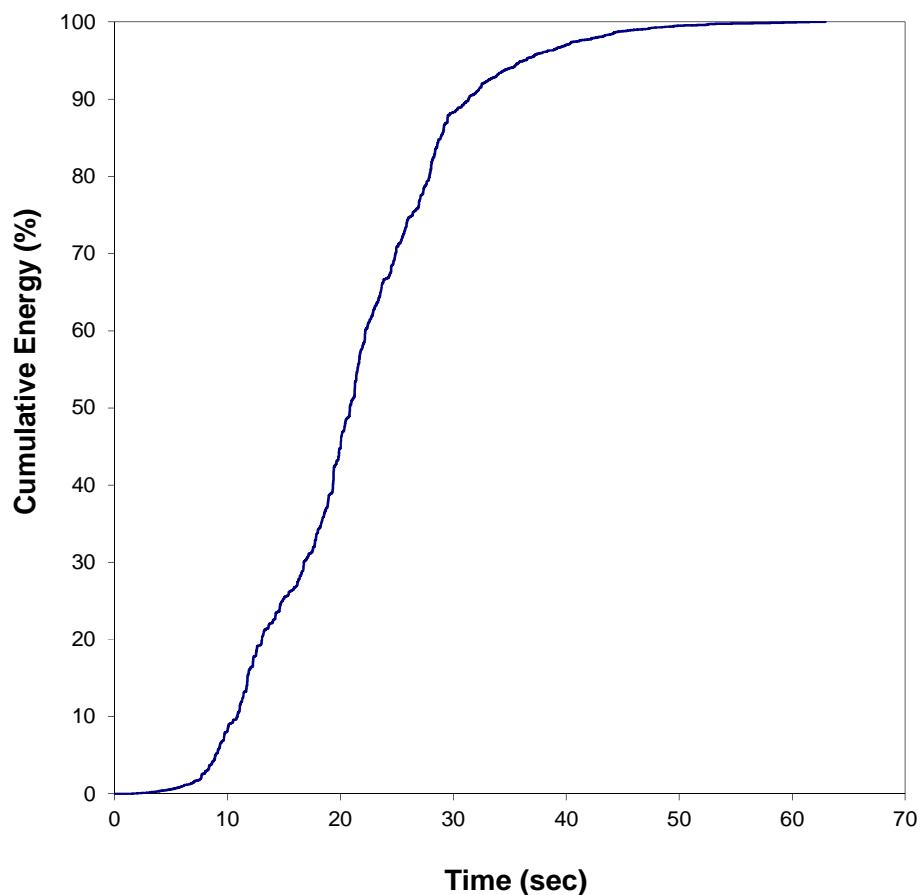
Unio_up time history - Acceleration, Velocity, and Displacement Time Histories



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Unio_up time history - Cumulative Energy (Husid) plot

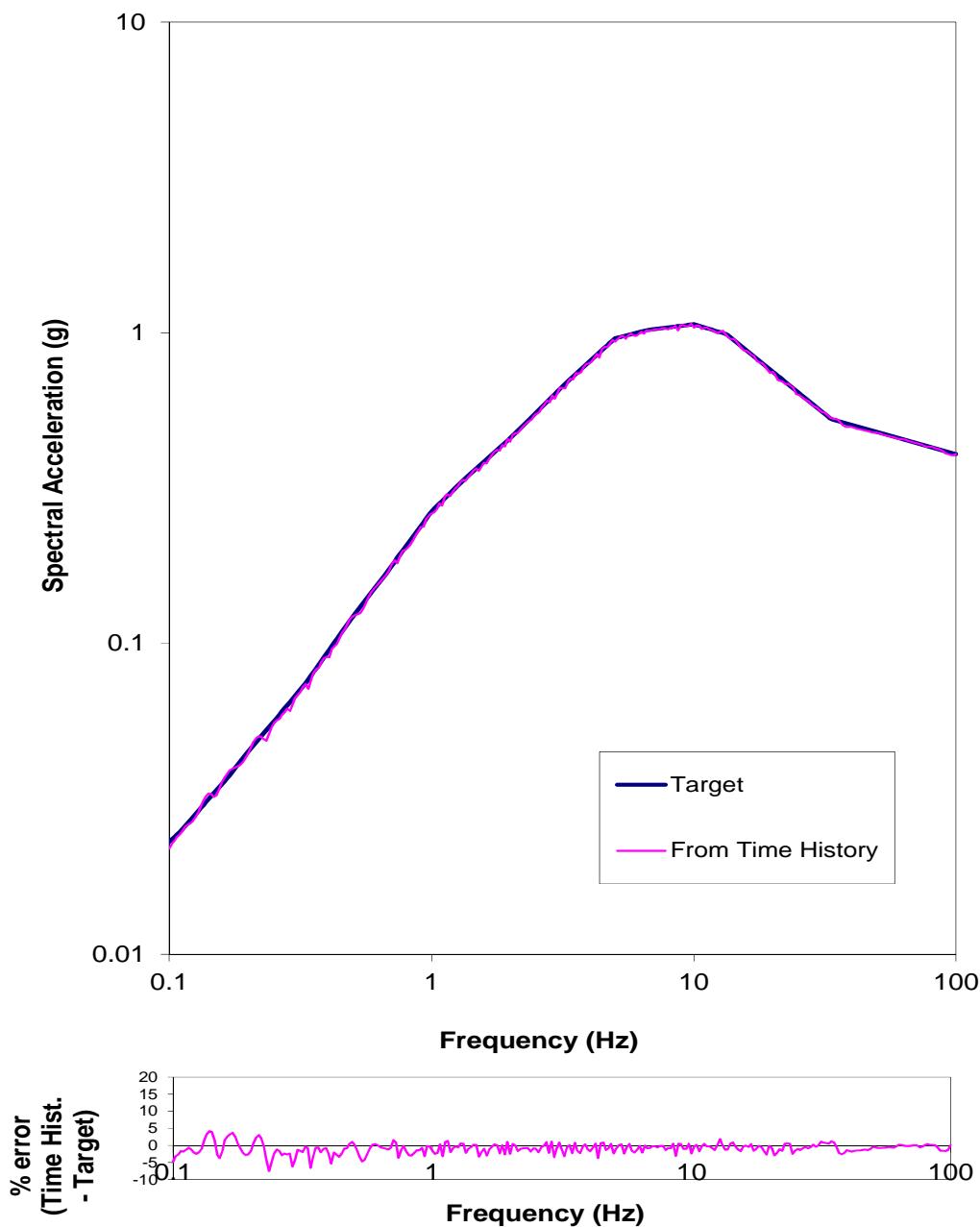


OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.76

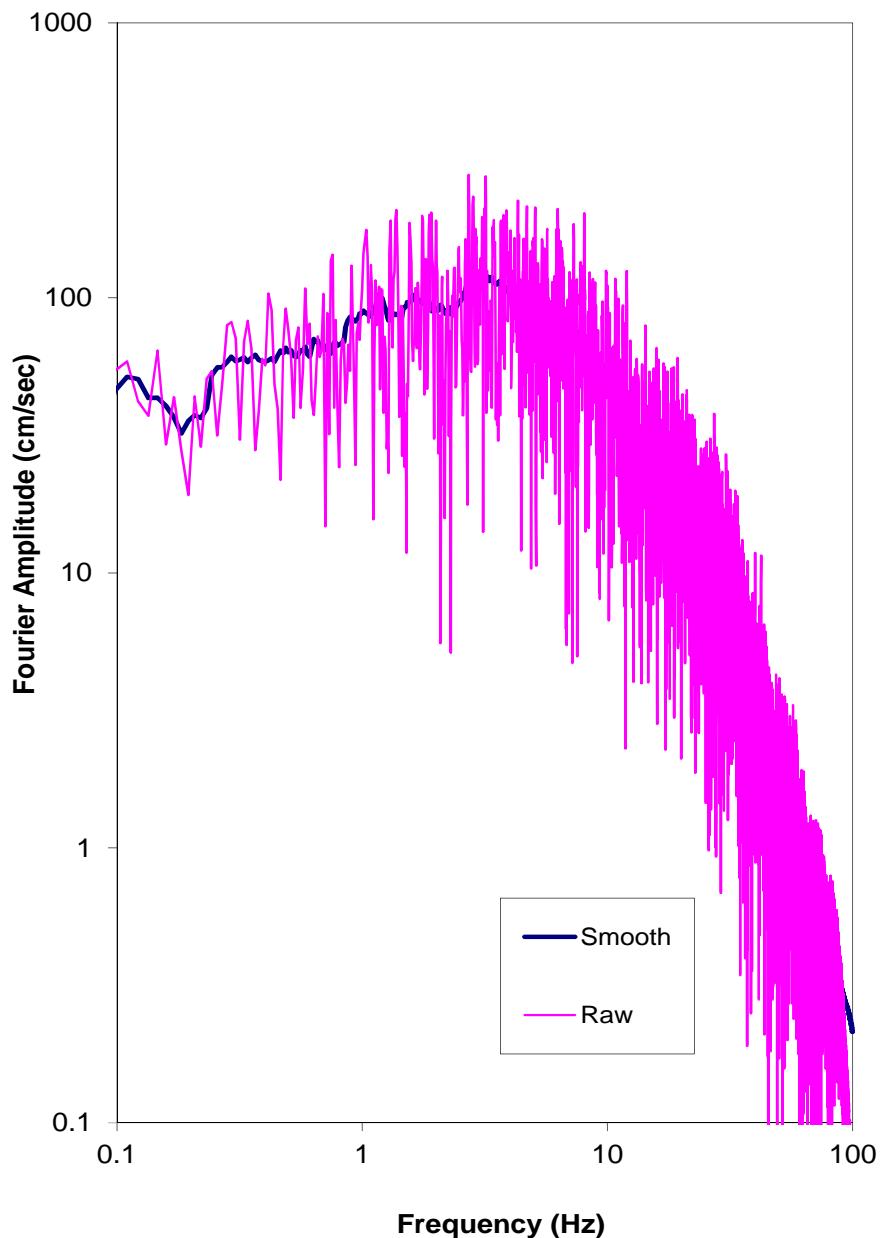
Unio_up time history - Response Spectra



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

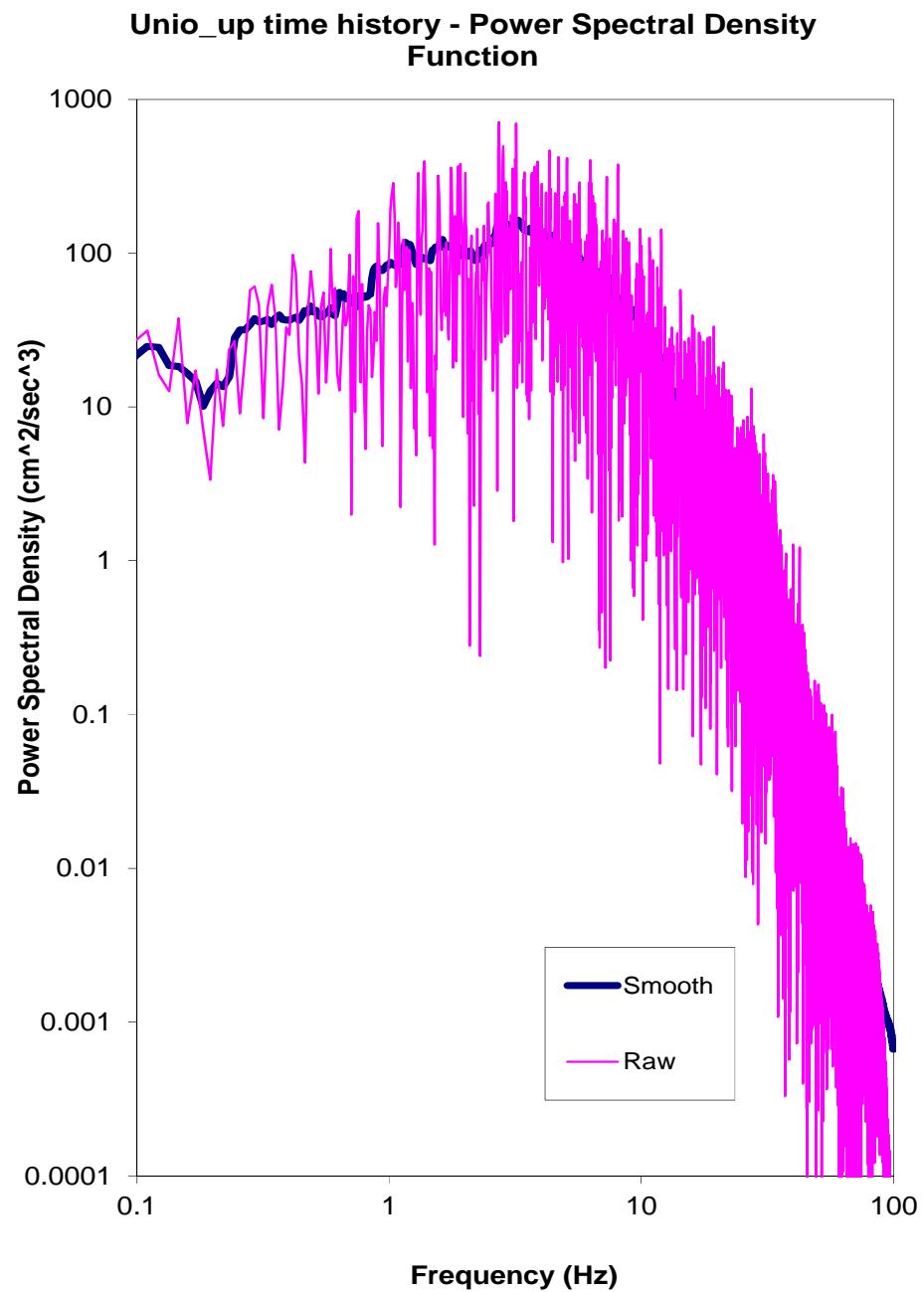
Unio_up time history - Fourier Amplitude Spectra



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.78



OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

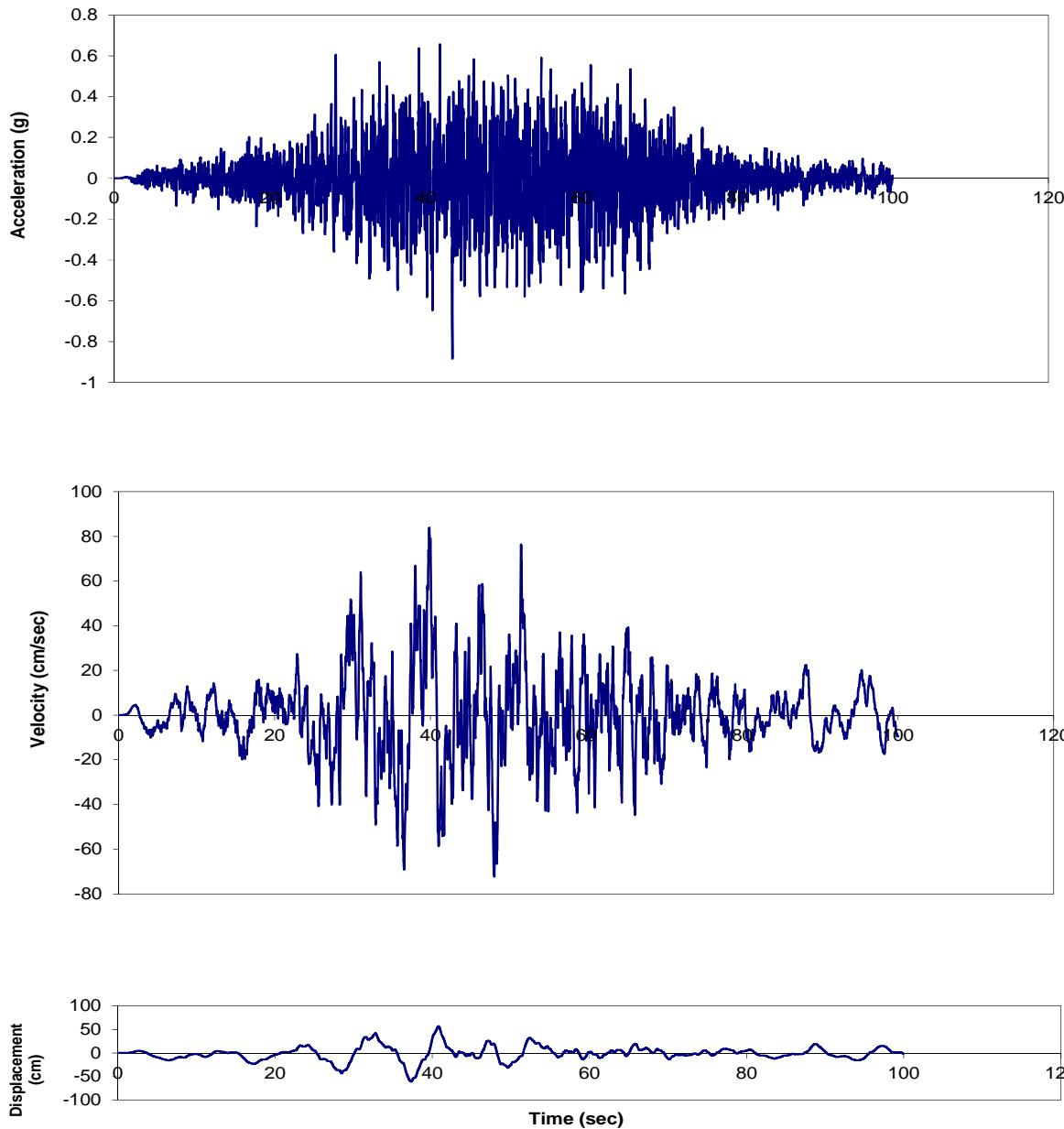
Calculation of Correlation Coefficients**Cross-correlation****check**

Horizontal 1:	UNIO_N00W
Horizontal 2:	UNIO_N90W
Vertical:	UNIO_up
corr, H1-H2	-0.156
corr, H1-V	0.013
corr, H2-V	0.003

**OBE LEVEL PER NFPA 59A 2006 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY
MATCHED UNIO MOTION – CALCULATION OF CORRELATION COEFFICIENTS**

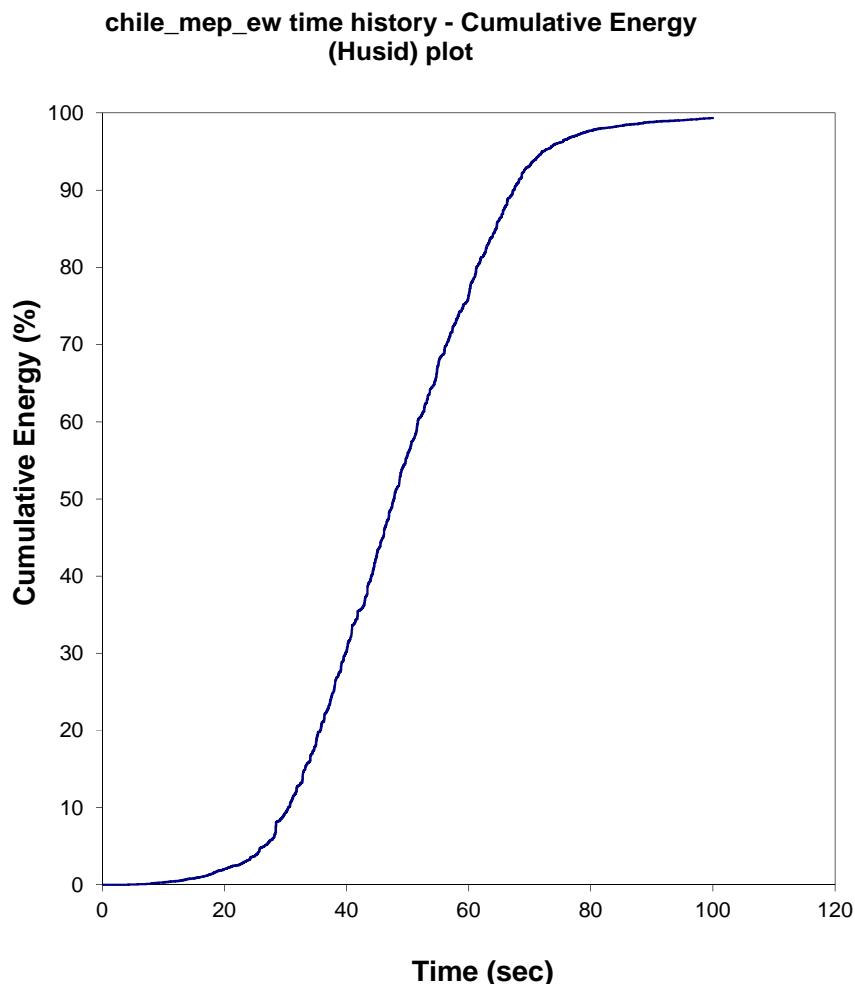
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_ew time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

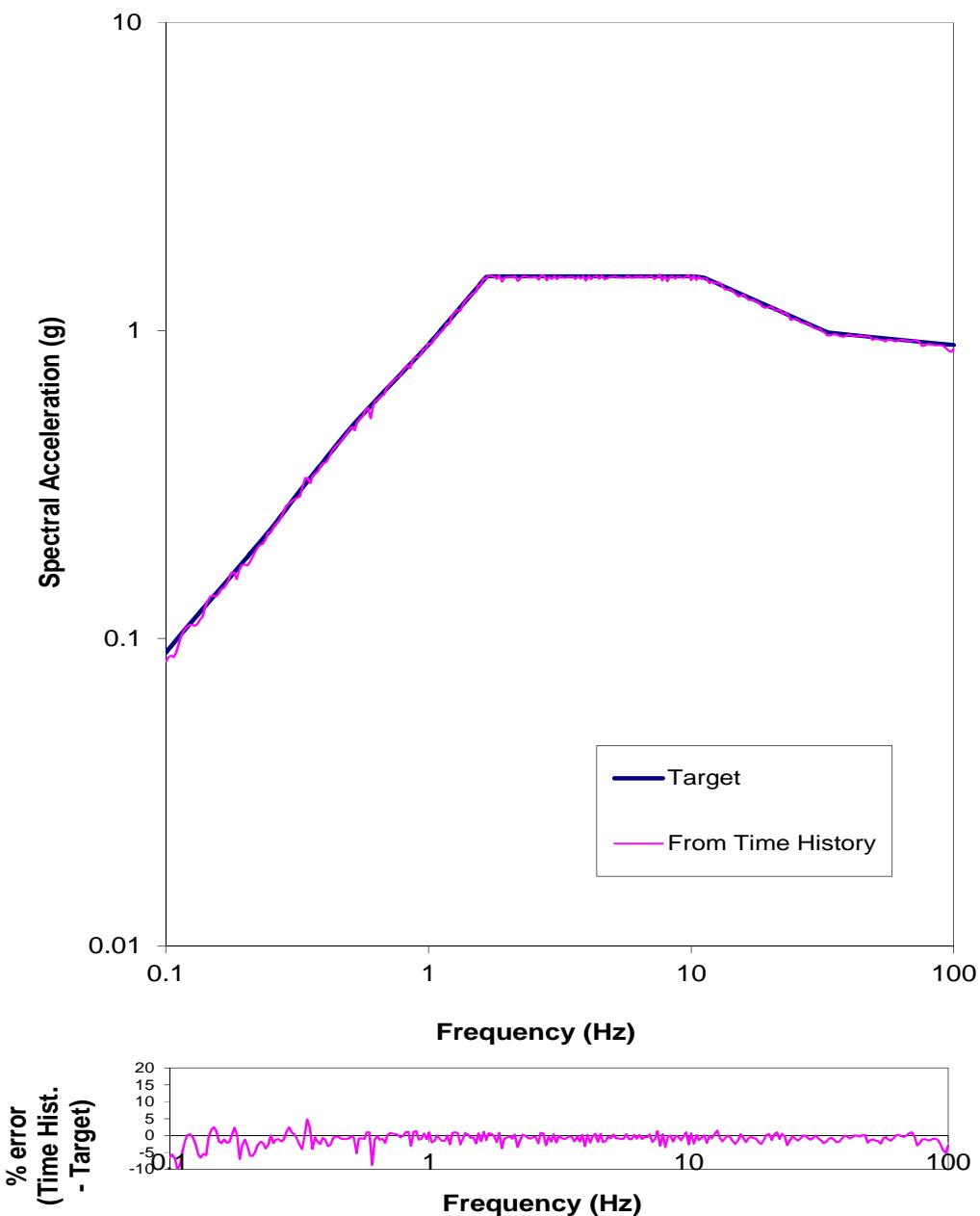
ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT
NORMAL – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – NORMALIZED CUMULATIVE
ENERGY PLOT**

ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

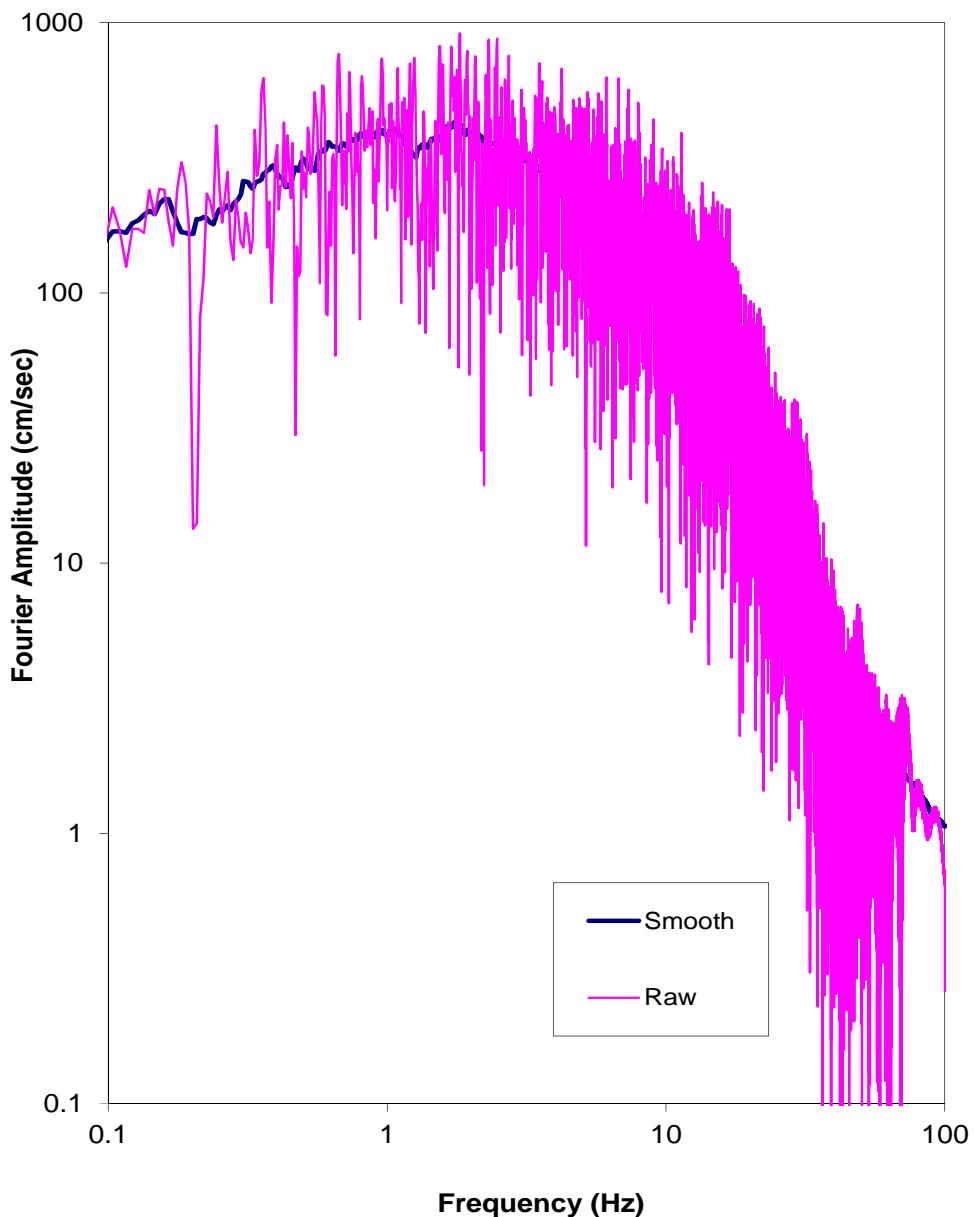
chile_mep_ew time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

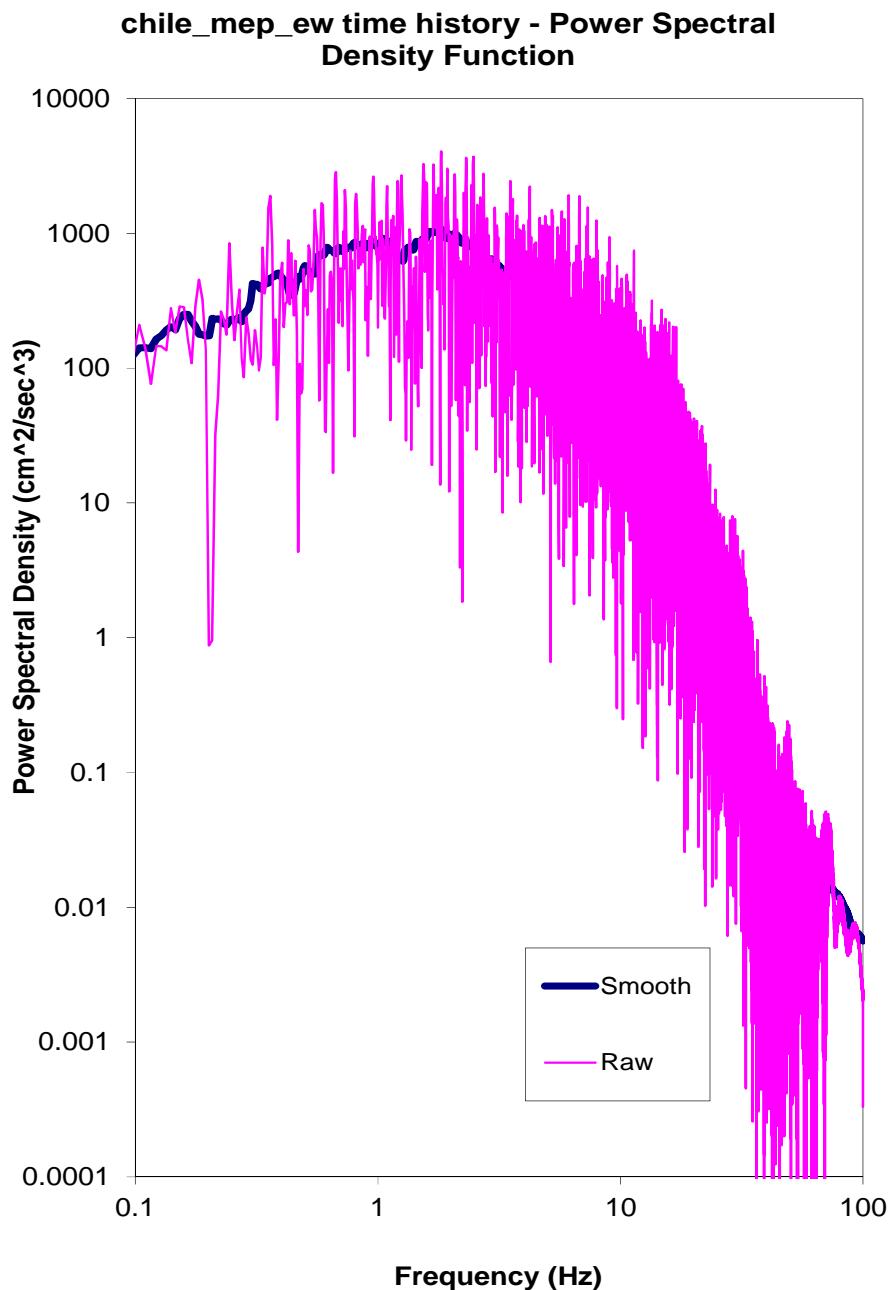
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_ew time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – FOURIER AMPLITUDE SPECTRUM

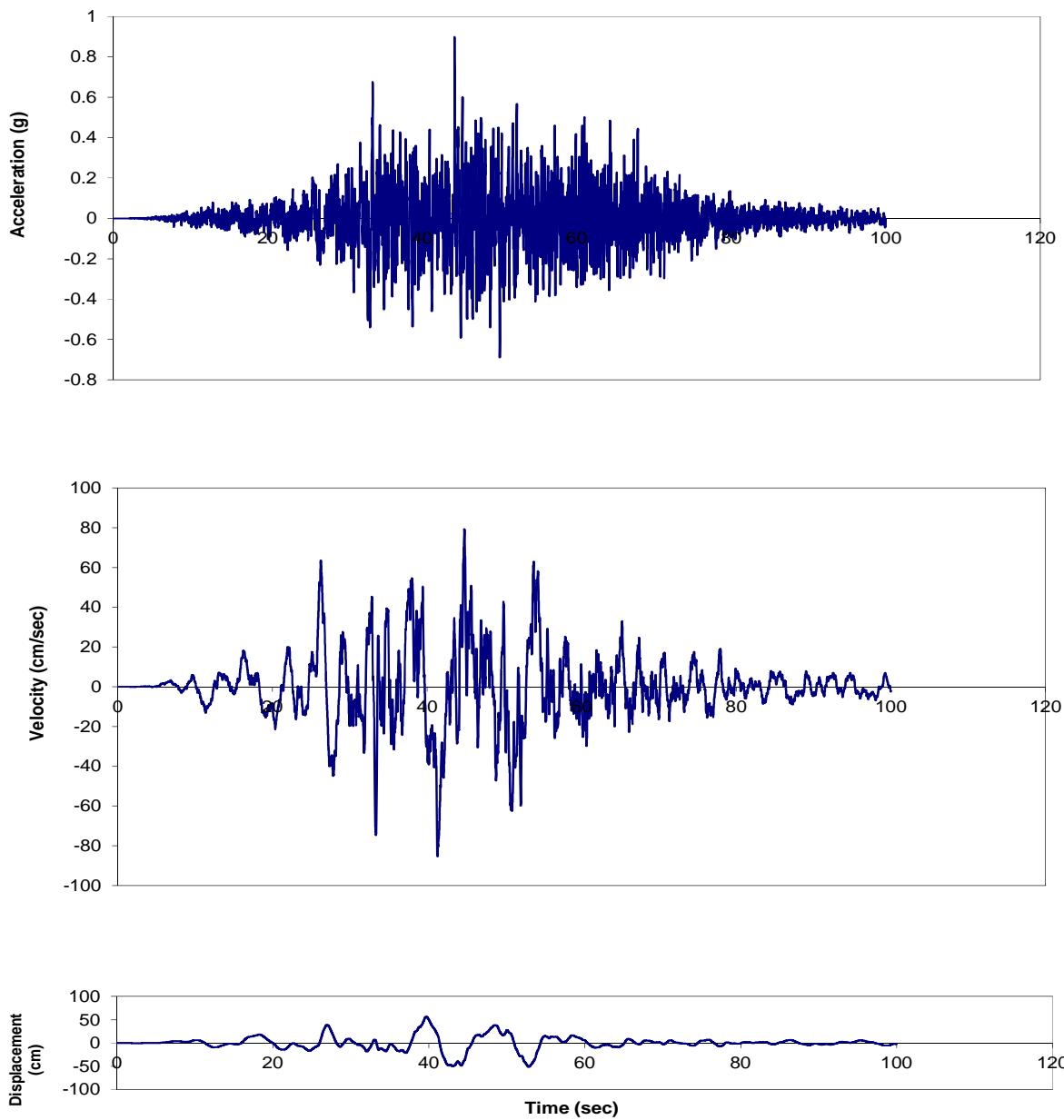
ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – POWER SPECTRAL DENSITY FUNCTION

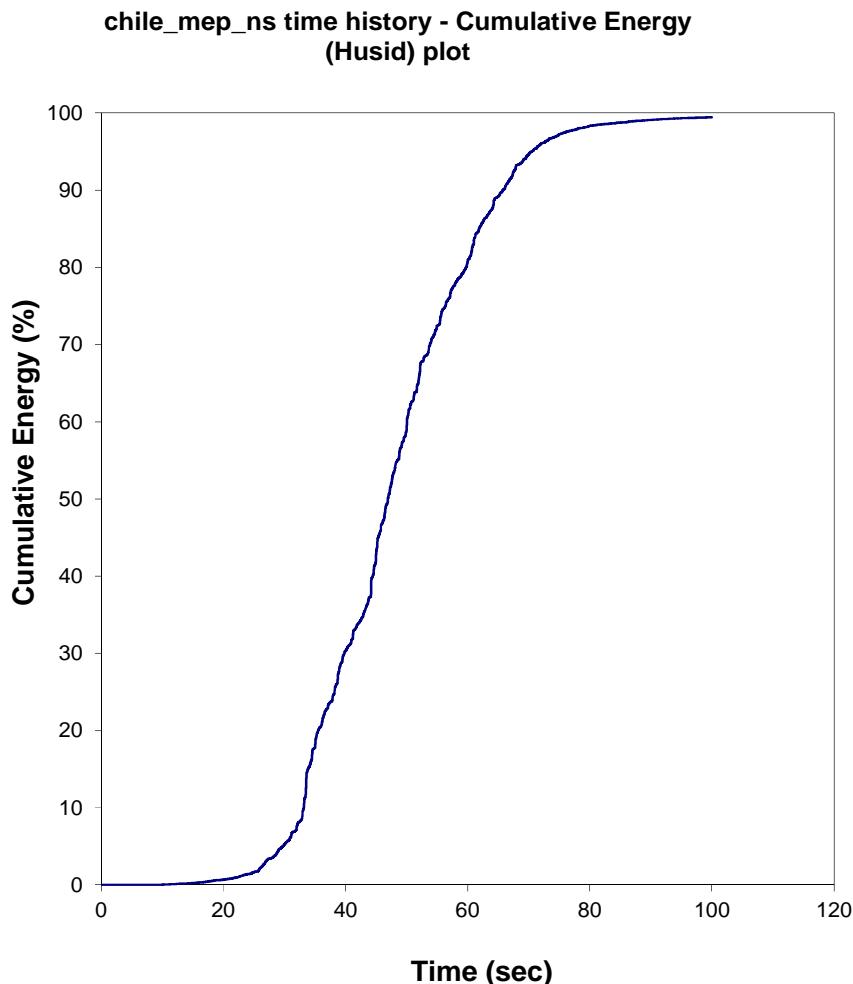
ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_ns time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

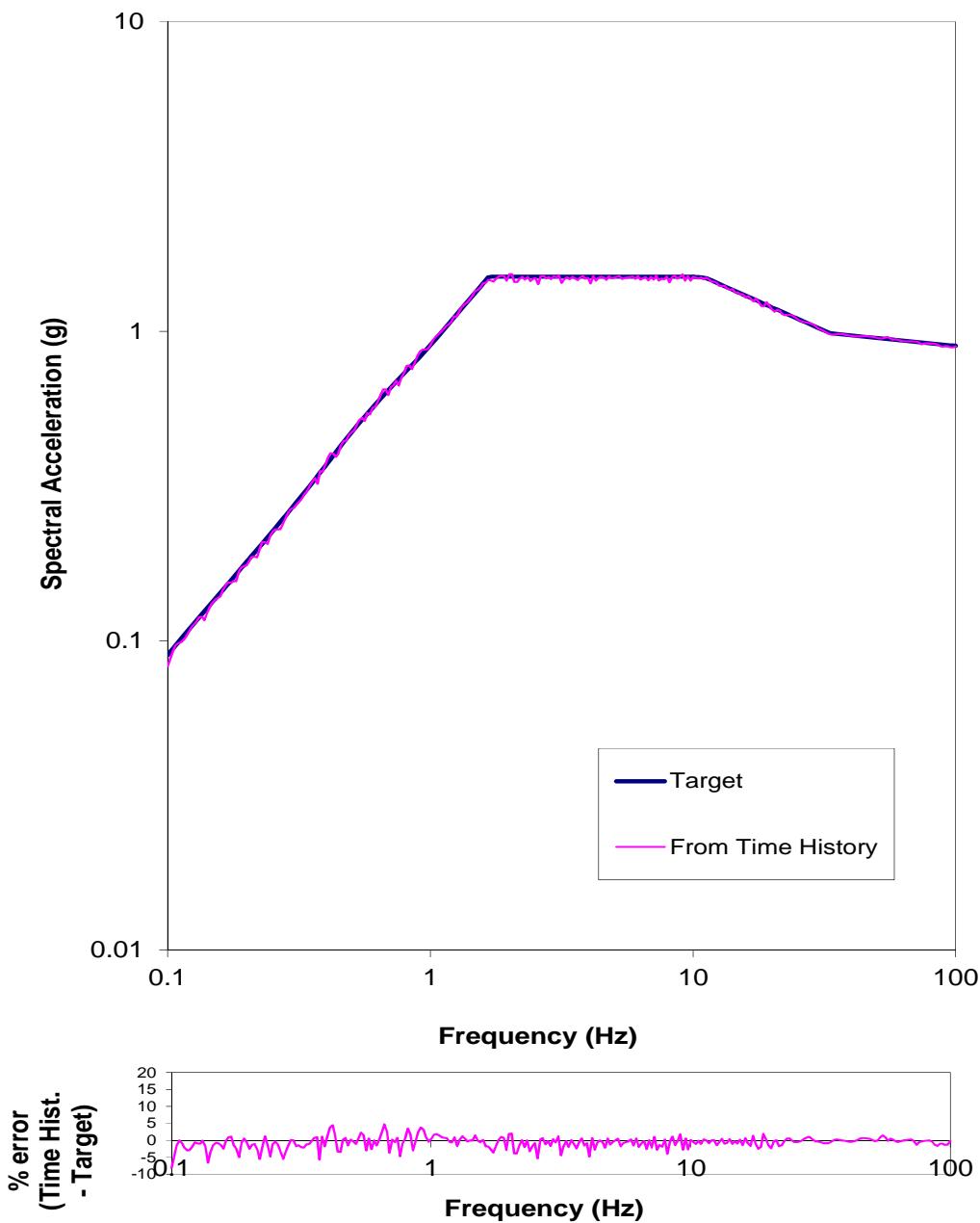
ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

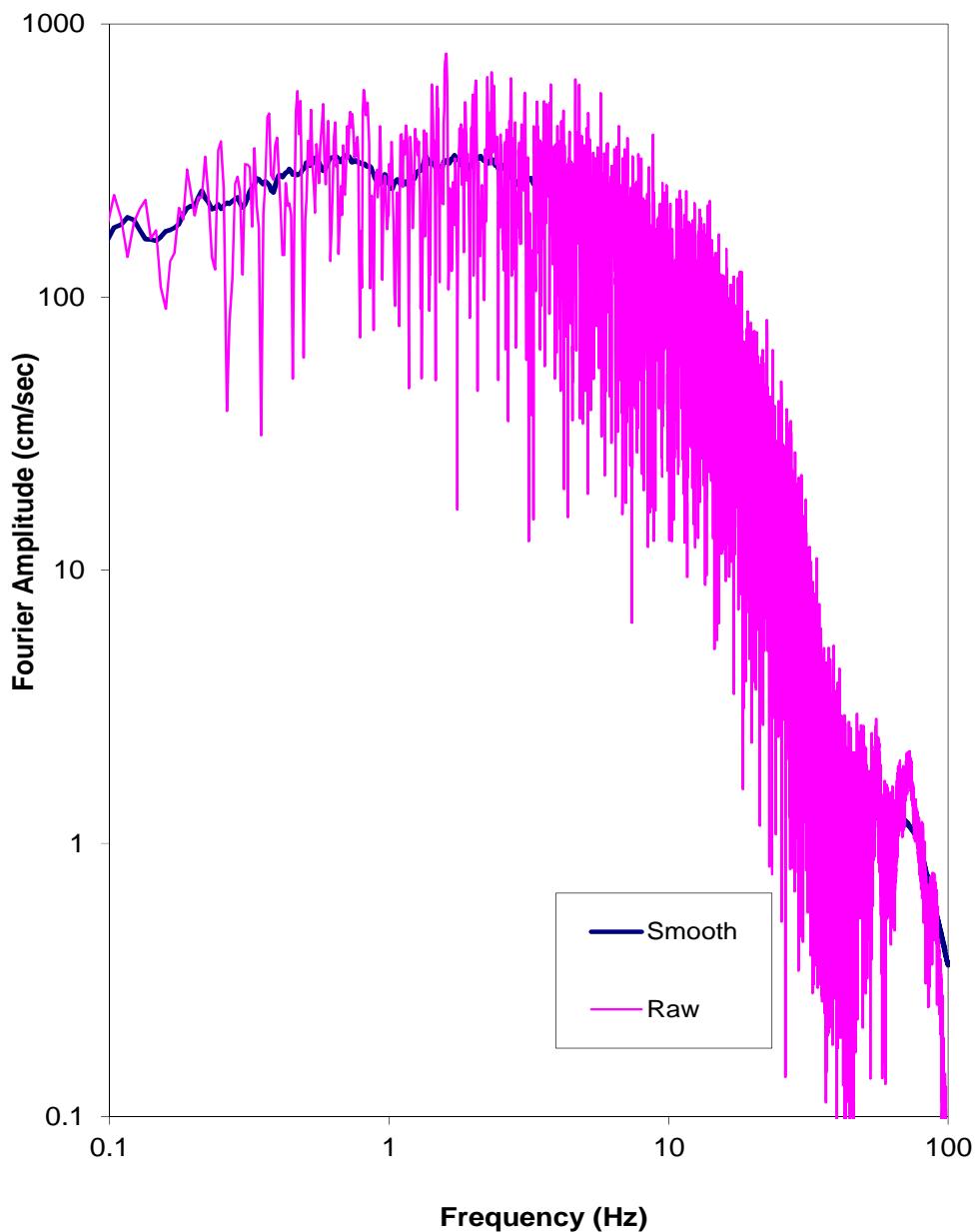
chile_mep_ns time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

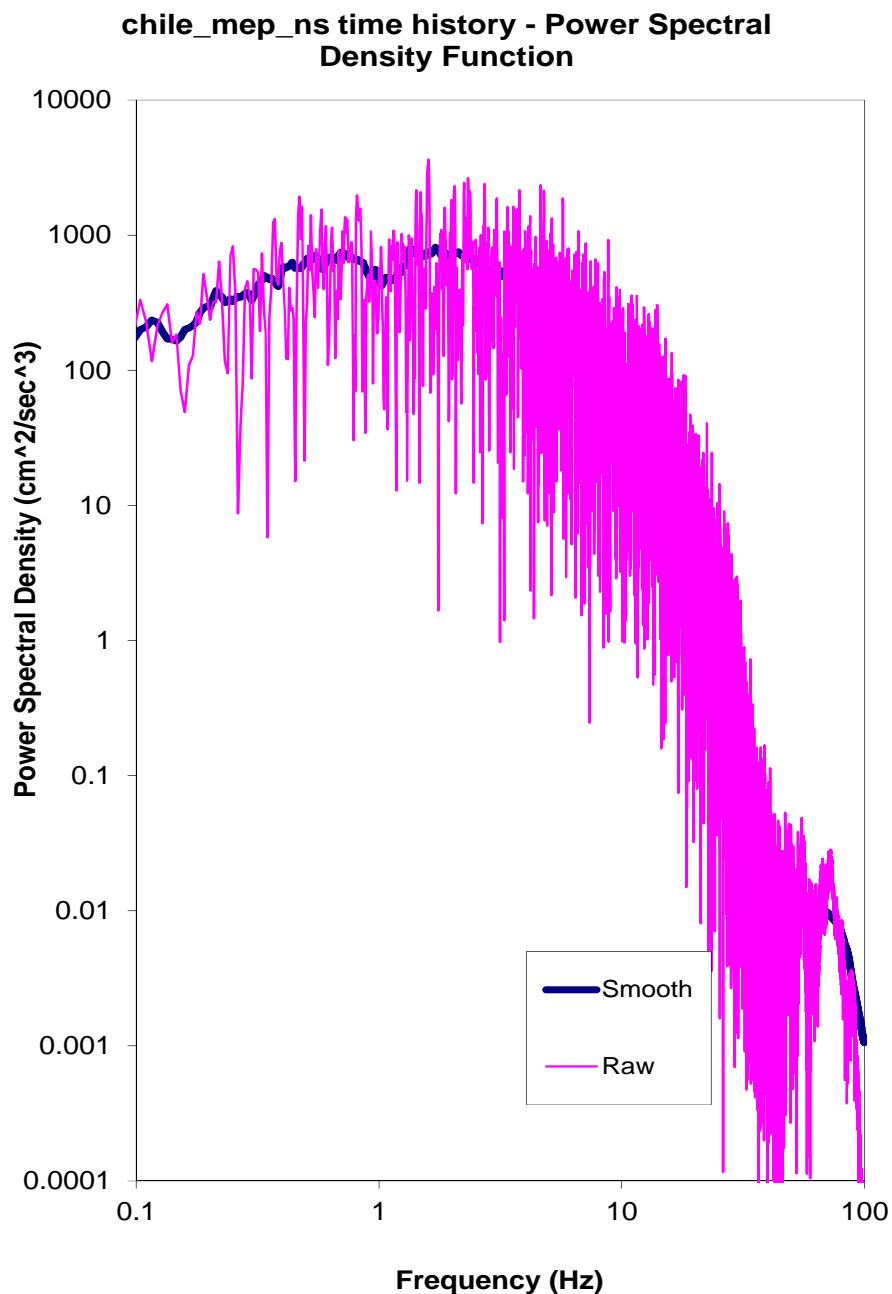
ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_ns time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – FOURIER AMPLITUDE SPECTRUM

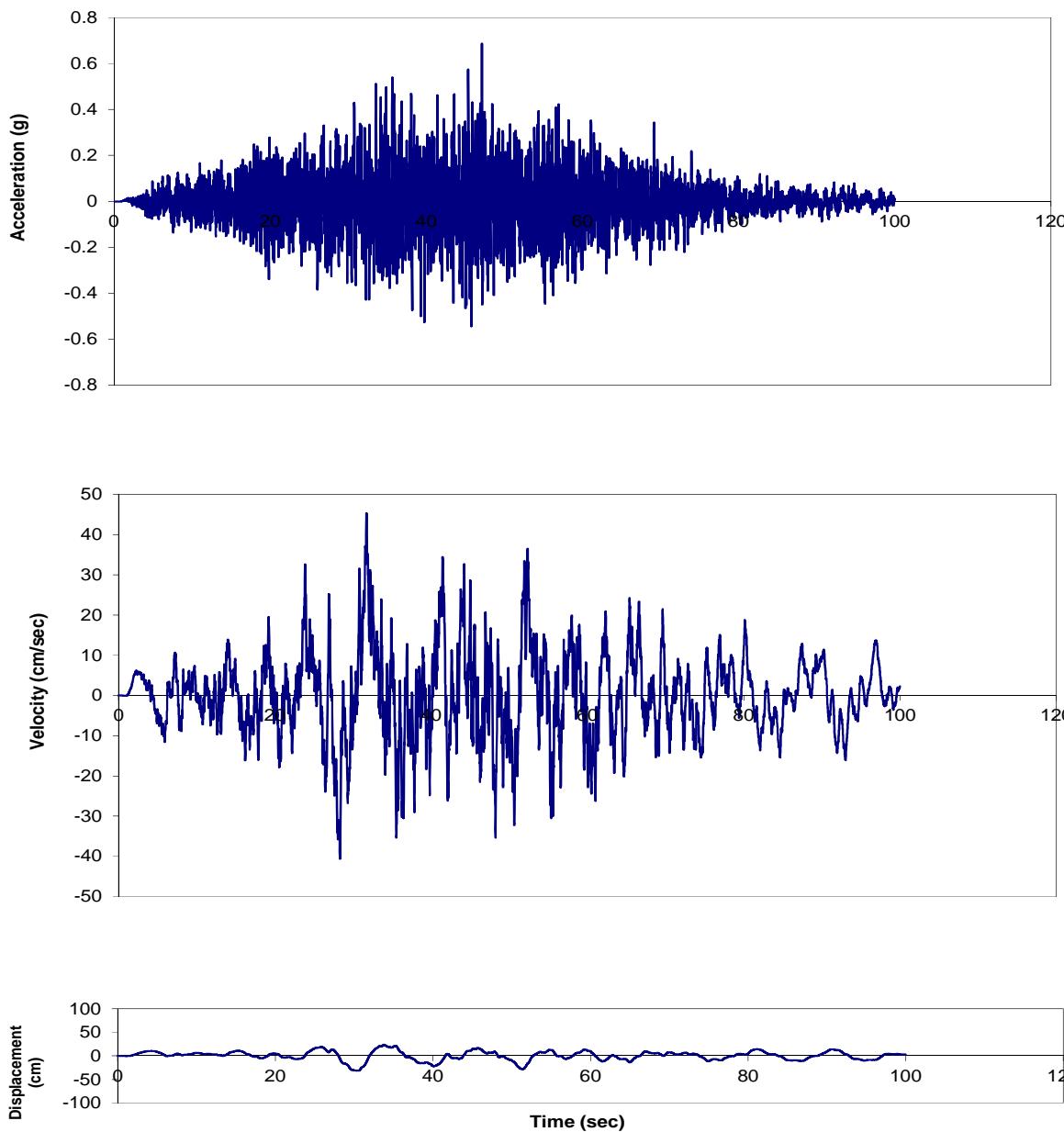
ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – POWER SPECTRAL DENSITY FUNCTION

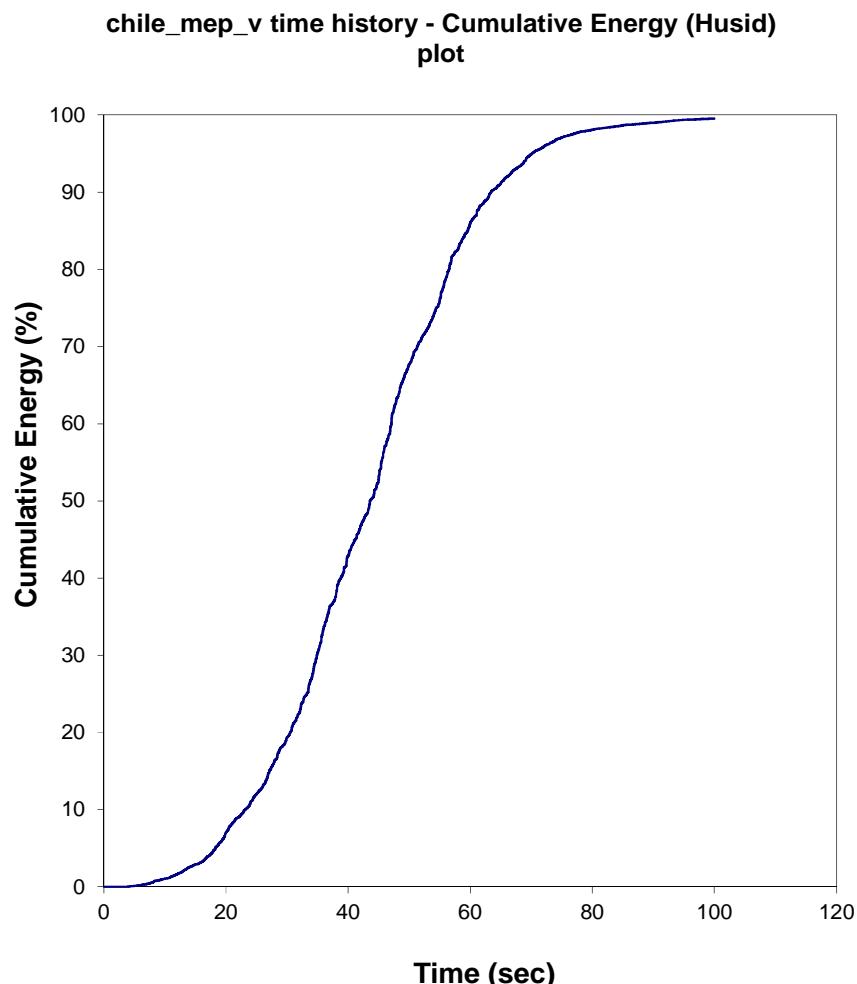
ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_v time history - Acceleration, Velocity, and Displacement Time Histories



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED MEP MOTION, V COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

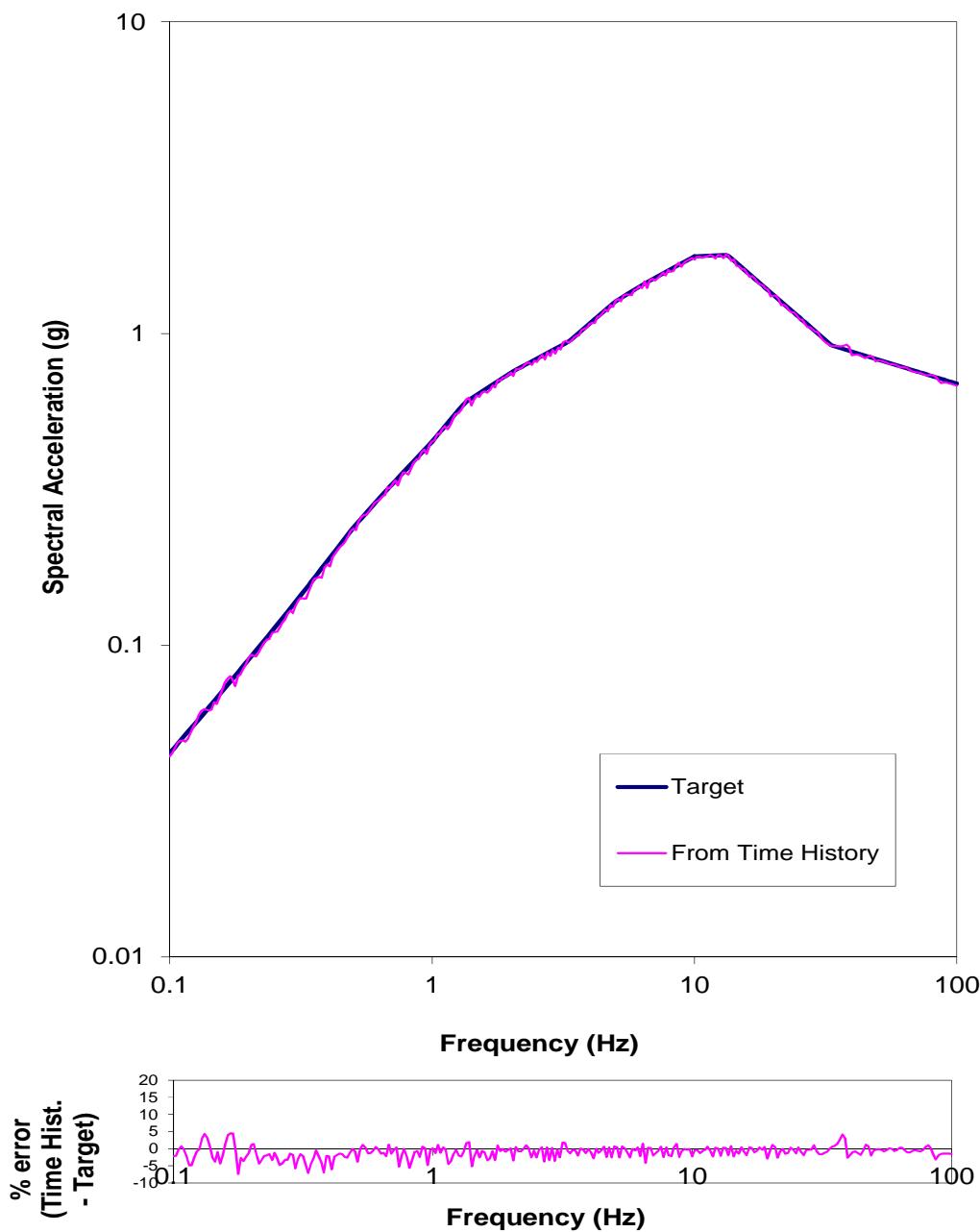
ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED MEP MOTION, V COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT**

ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

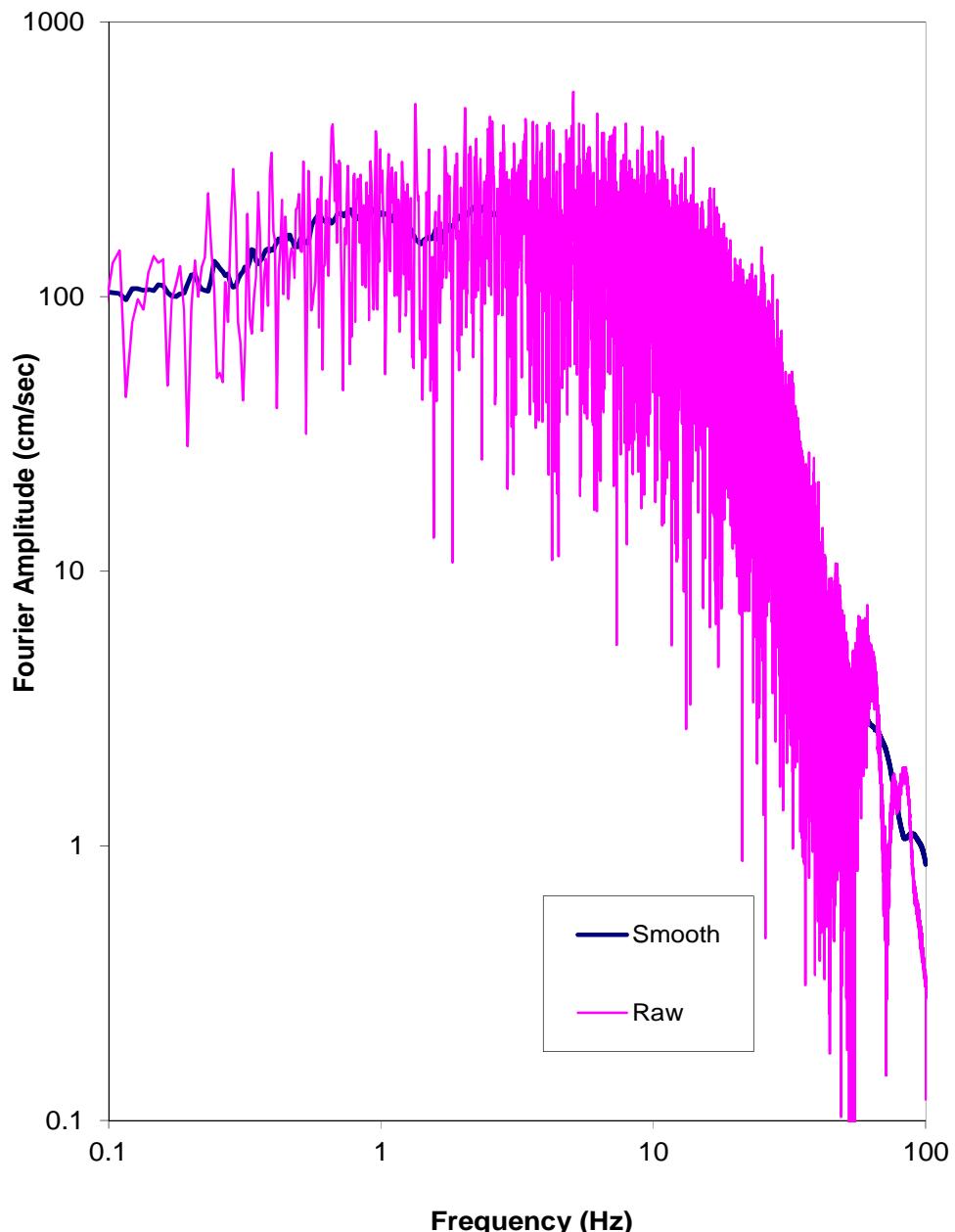
chile_mep_v time history - Response Spectra



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED MEP MOTION, V COMPONENT – TARGET AND CALCULATED RESPONSE
SPECTRA**

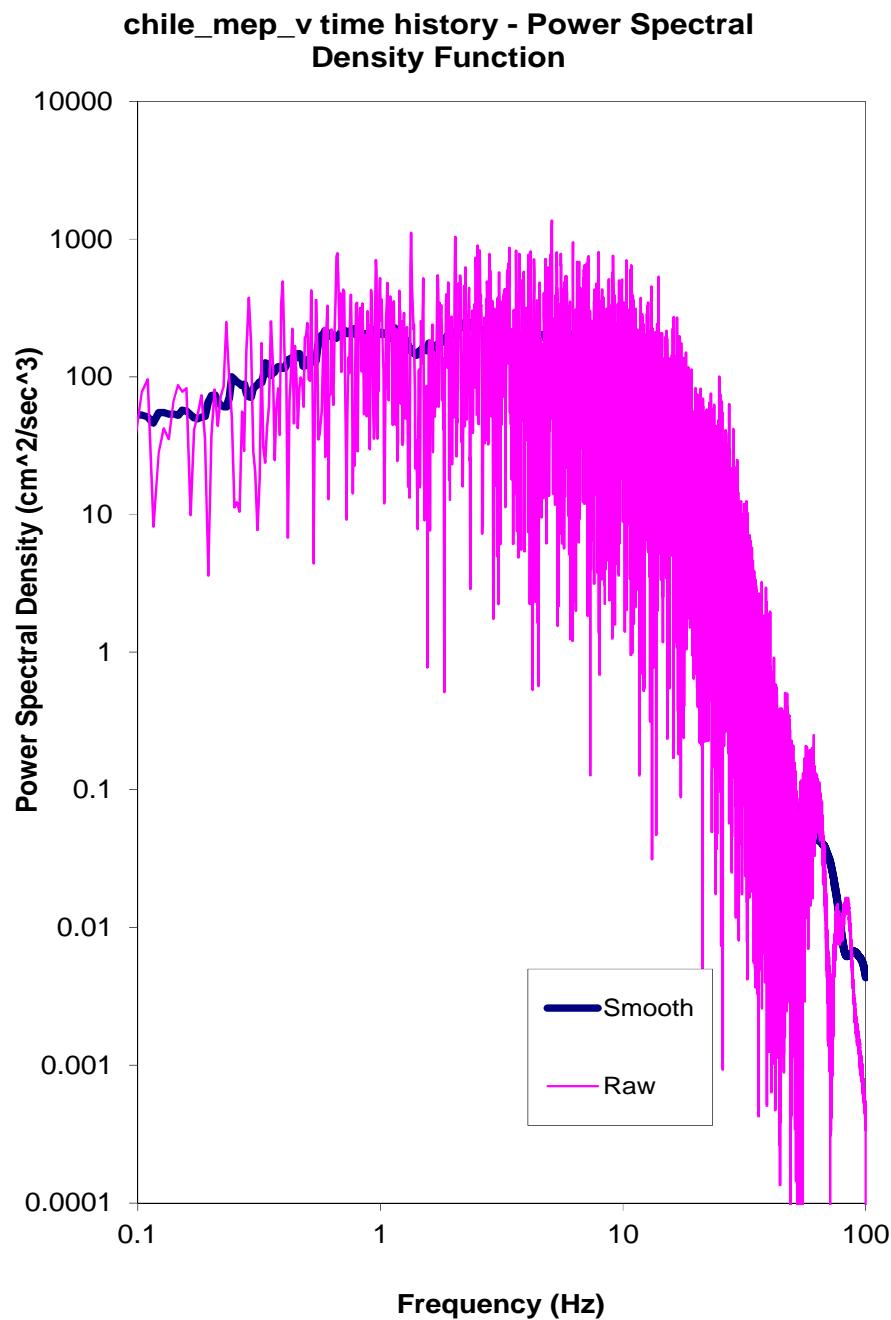
ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_v time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED MEP MOTION, V COMPONENT – FOURIER AMPLITUDE SPECTRUM

ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED MEP MOTION, V COMPONENT – POWER SPECTRAL DENSITY FUNCTION**

ONSHORE LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Calculation of Correlation Coefficients

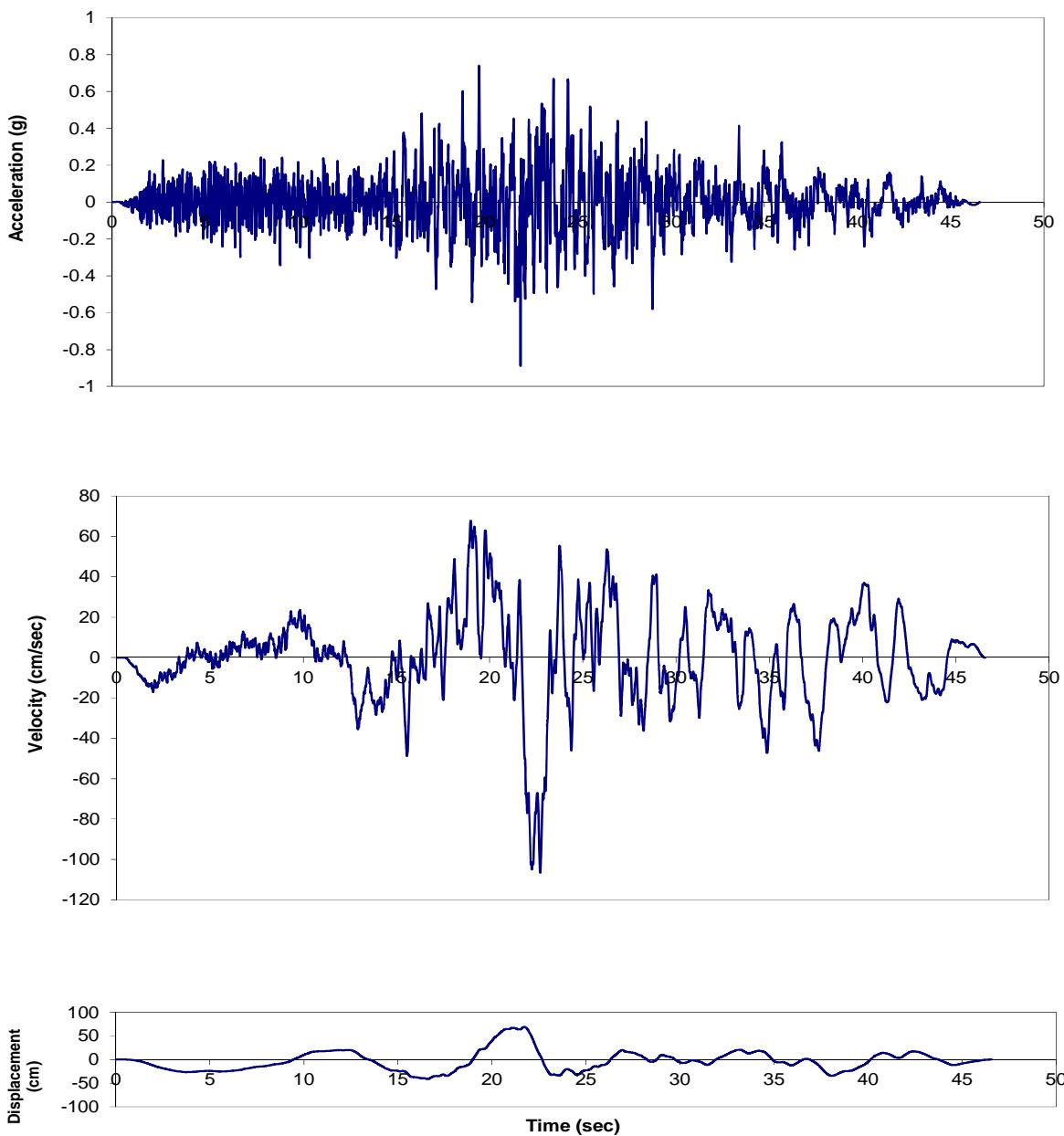
Cross-correlation check

Horizontal 1:	mep_ew
Horizontal 2:	mep_ns
Vertical:	mep_v
corr, H1-H2	-0.077
corr, H1-V	0.030
corr, H2-V	-0.021

SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION – SPECTRALLY MATCHED MEP MOTION – CALCULATION OF CORRELATION COEFFICIENTS

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

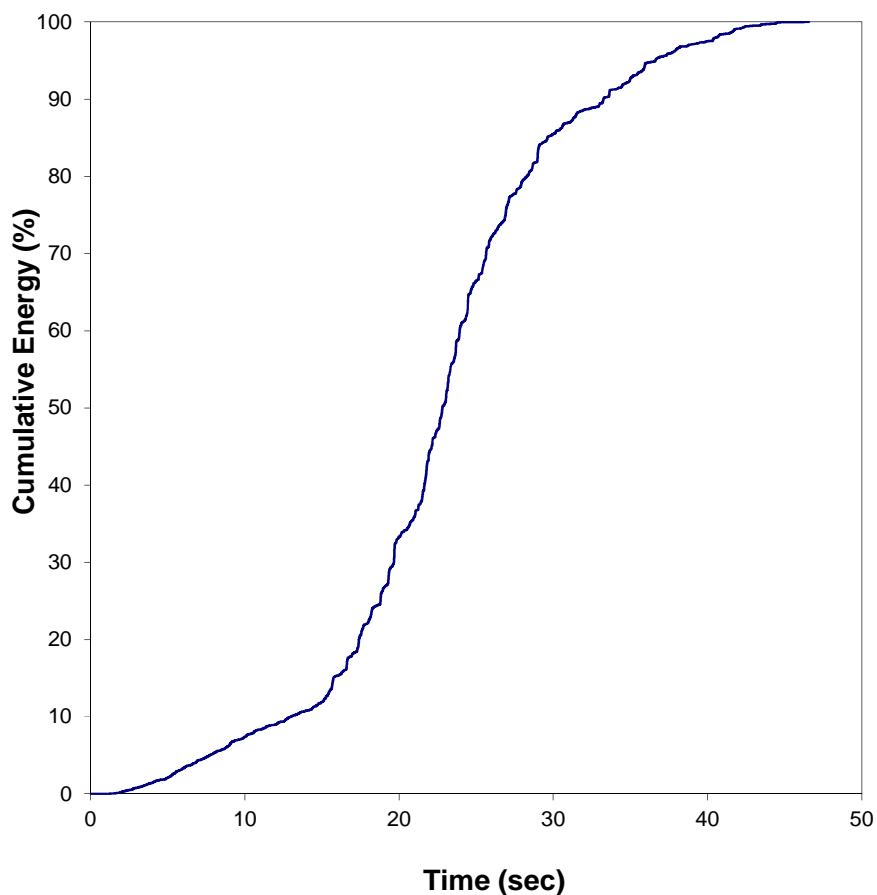
cto180 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

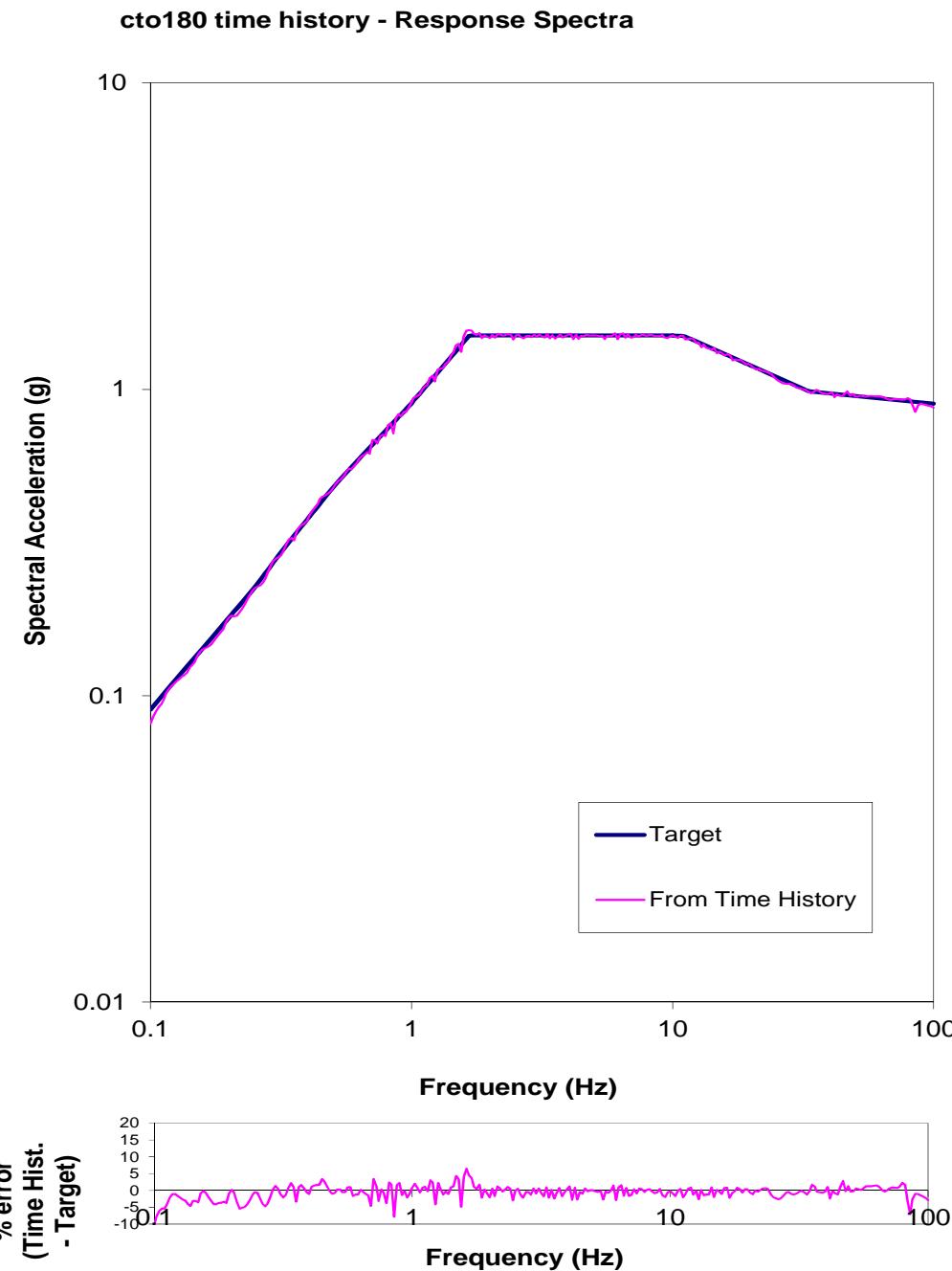
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

cto180 time history - Cumulative Energy (Husid) plot



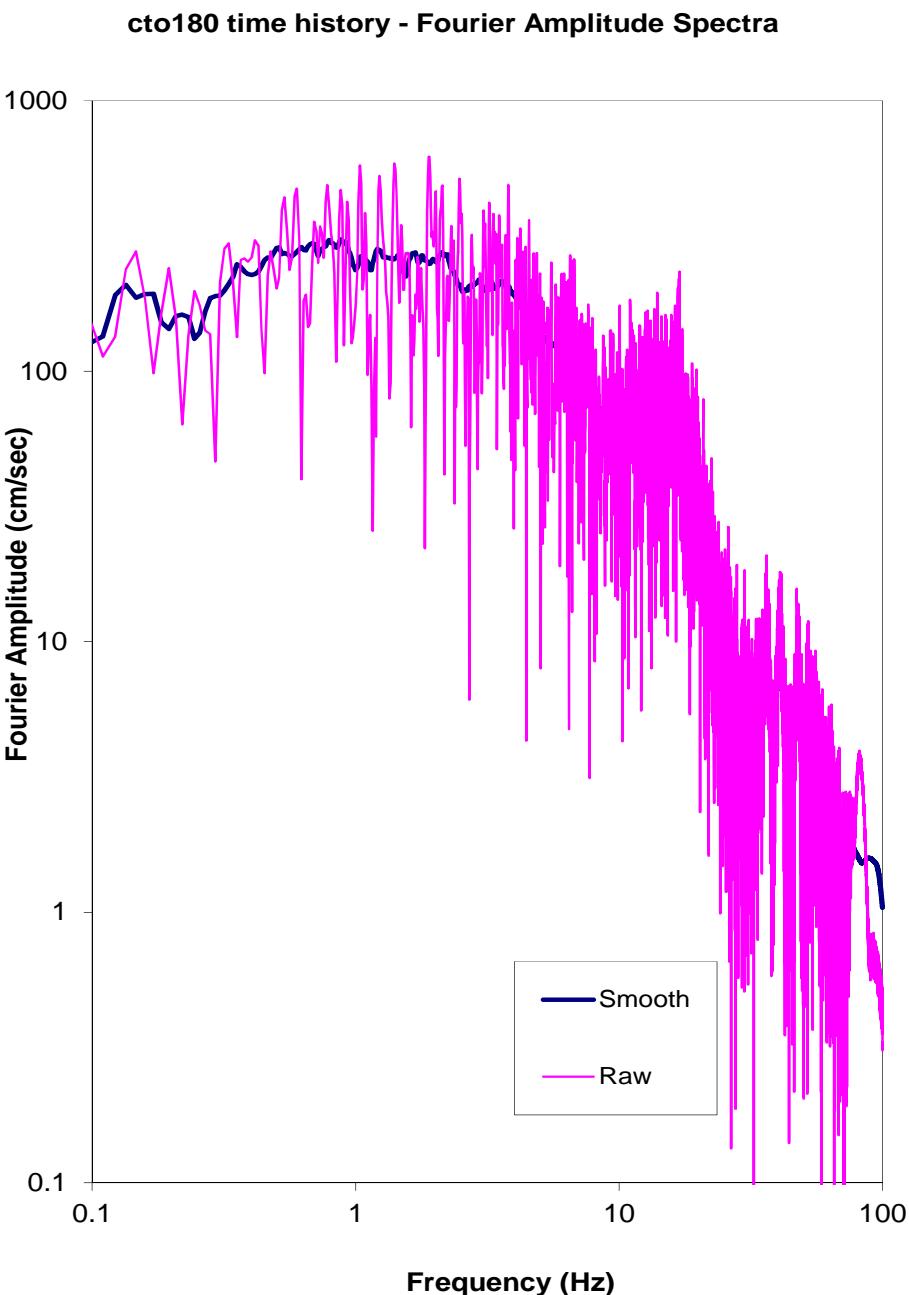
SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT
NORMAL – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – NORMALIZED CUMULATIVE
ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

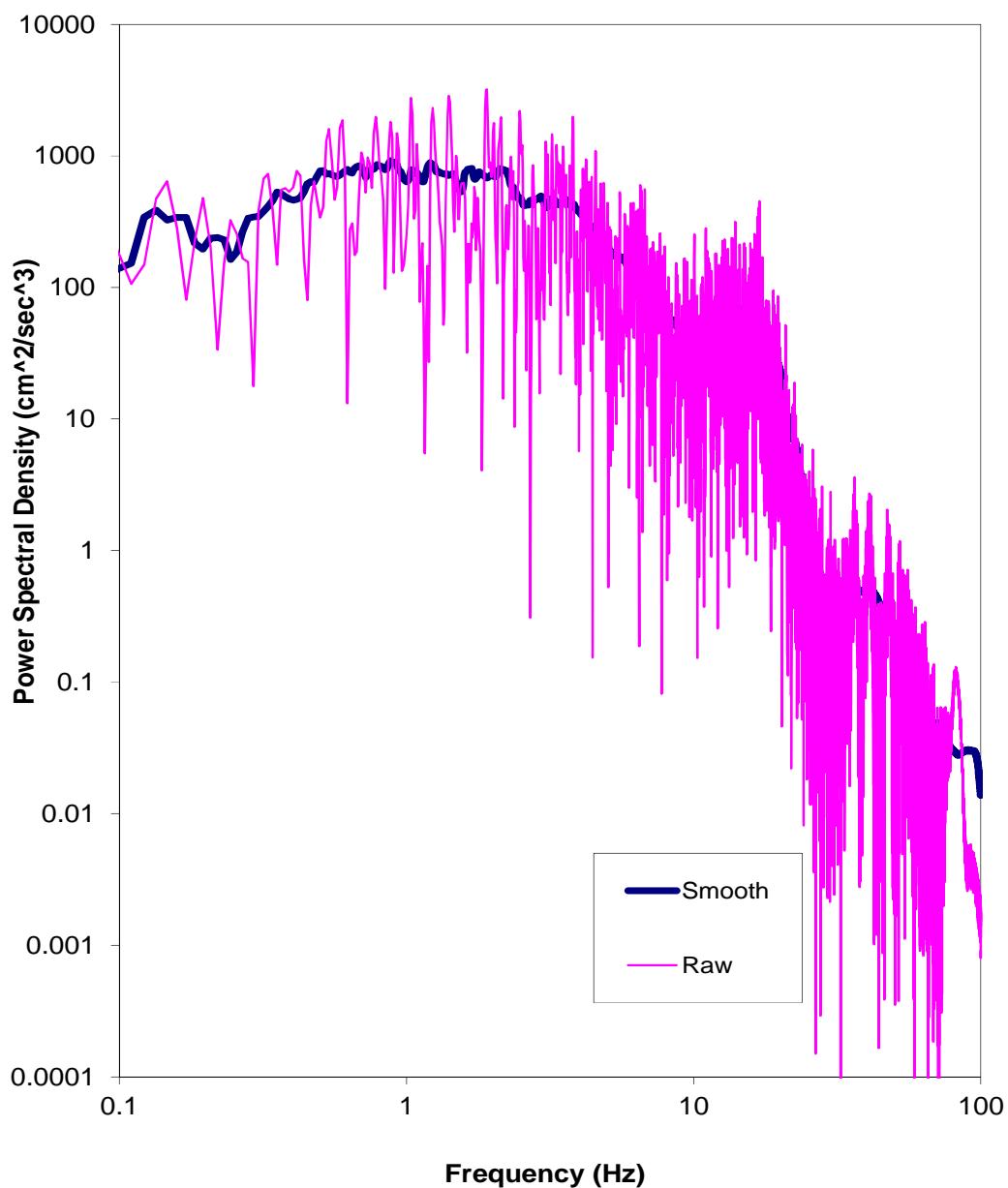
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

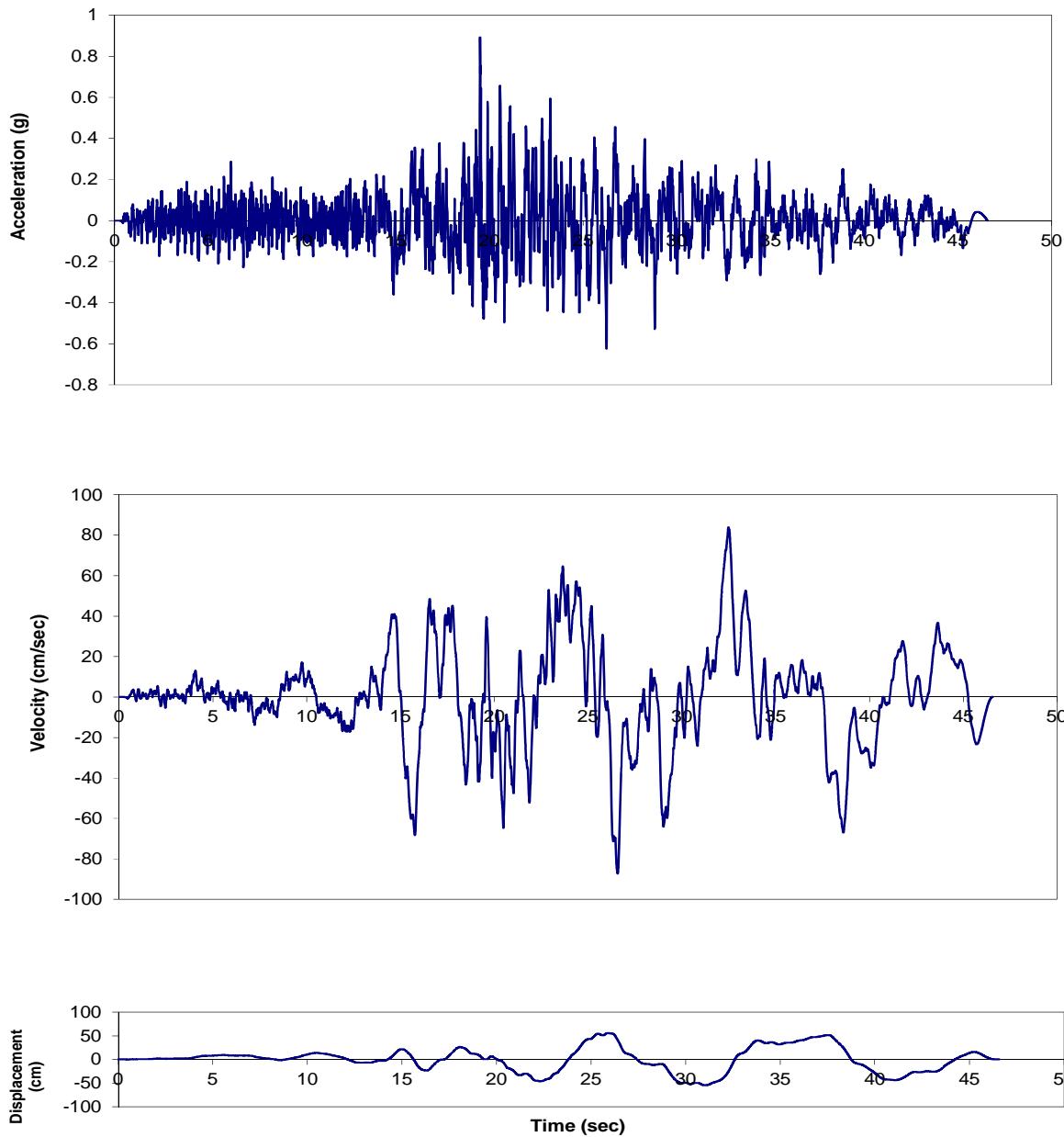
cto180 time history - Power Spectral Density Function



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

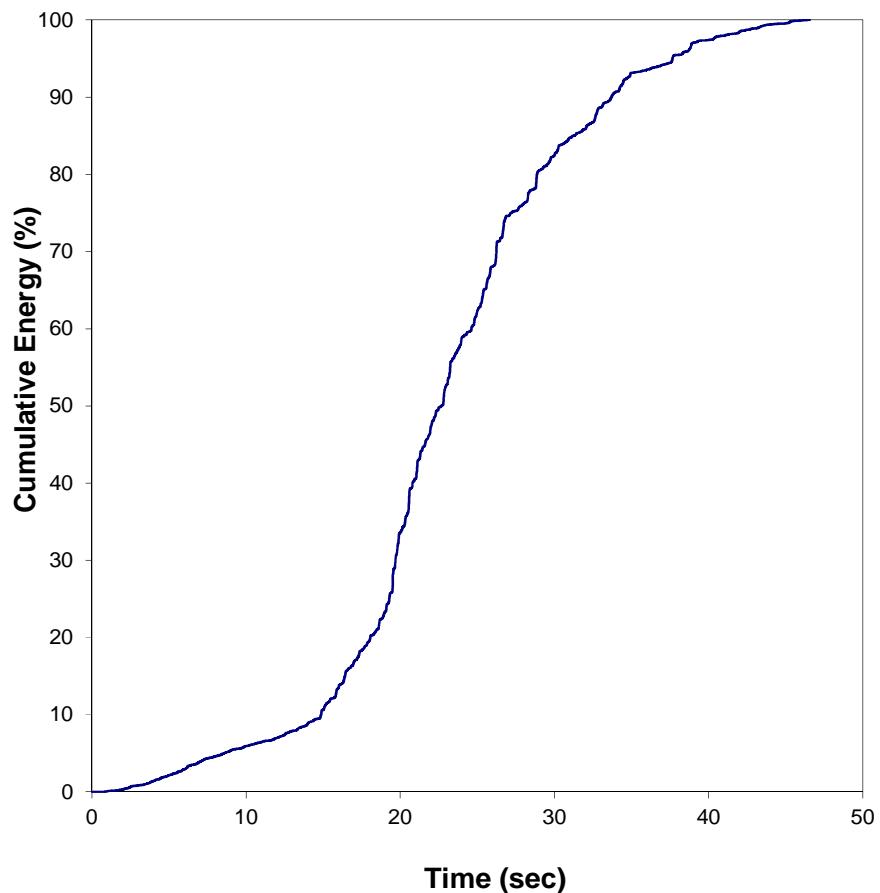
cto270 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

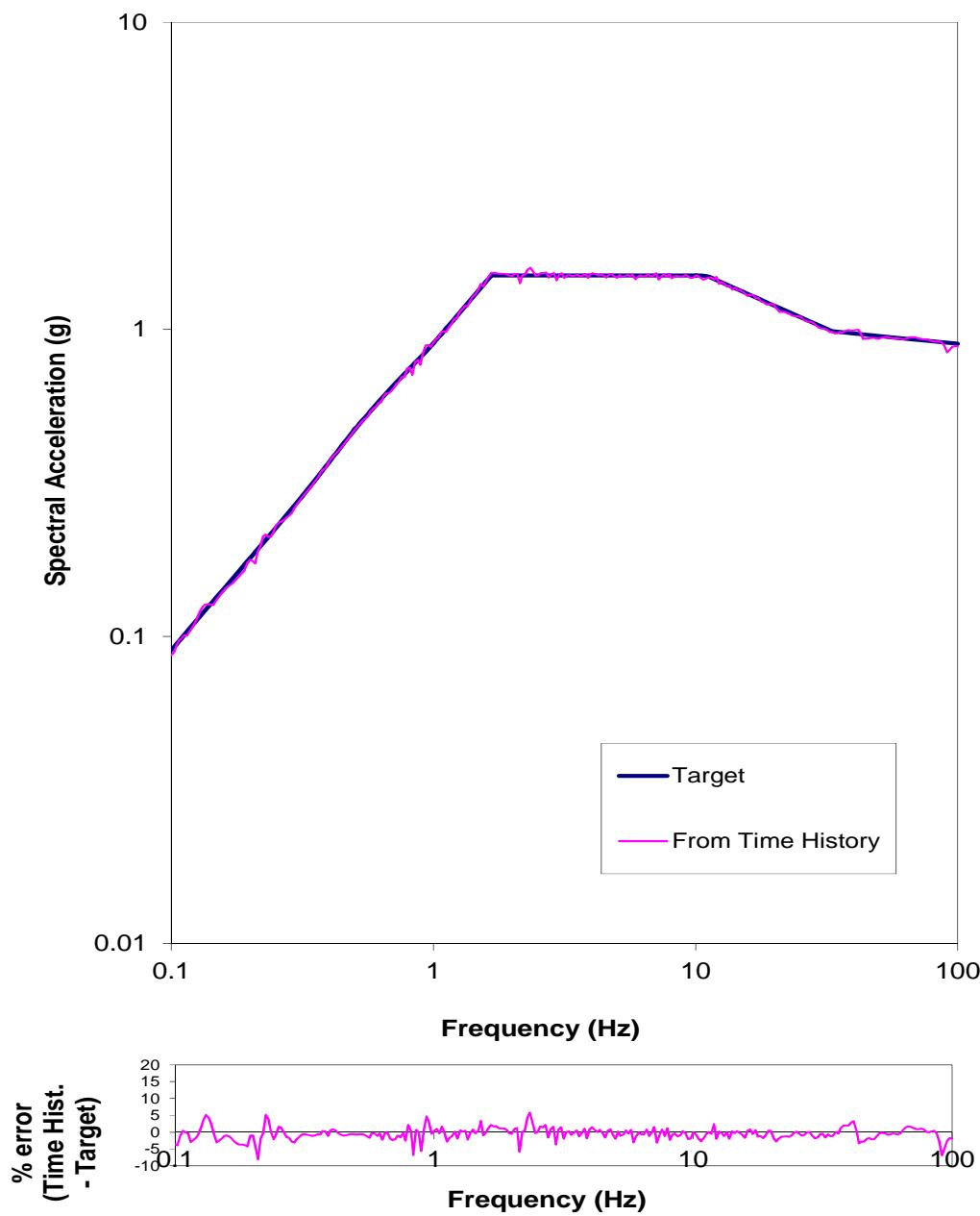
cto270 time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

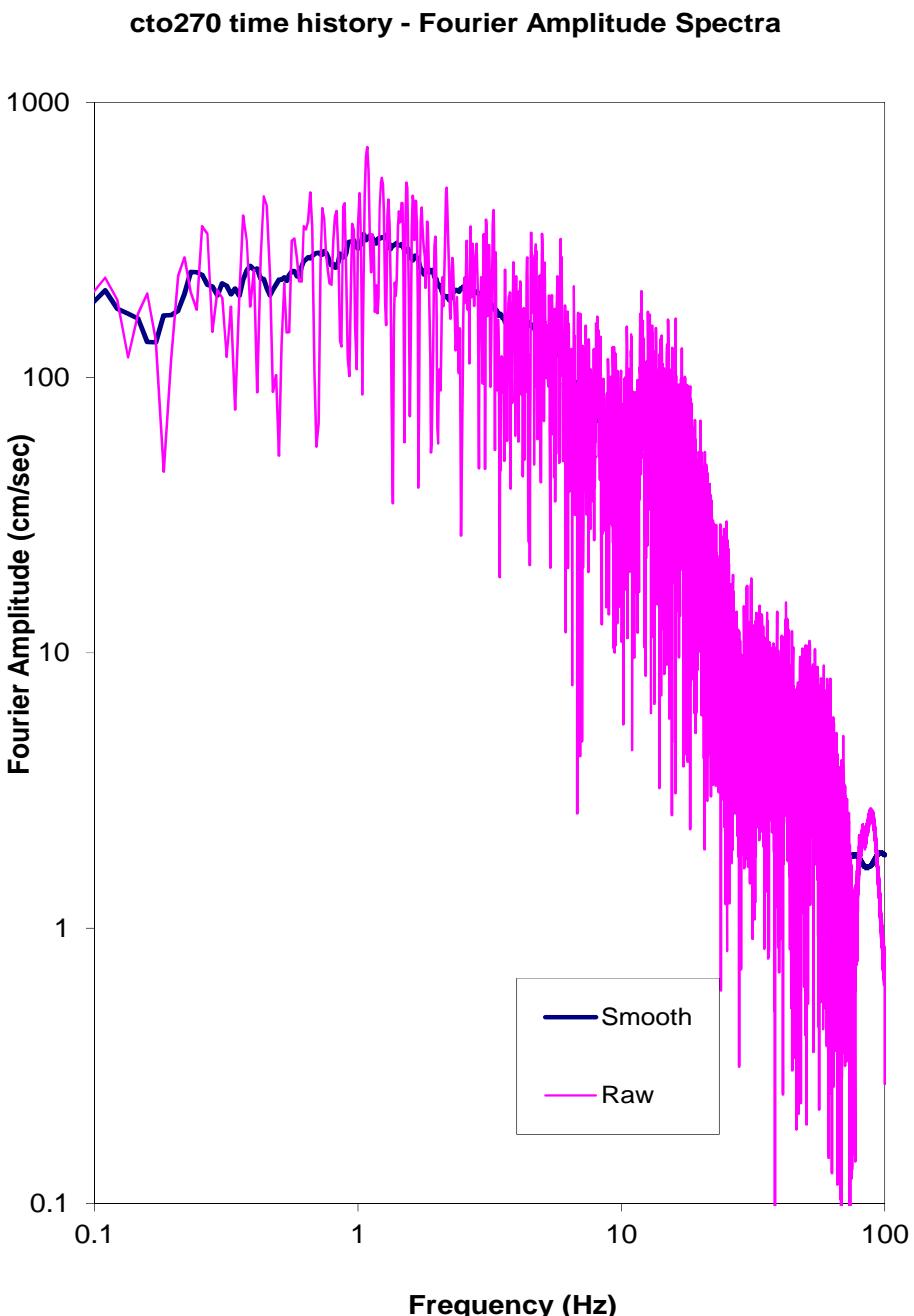
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

cto270 time history - Response Spectra



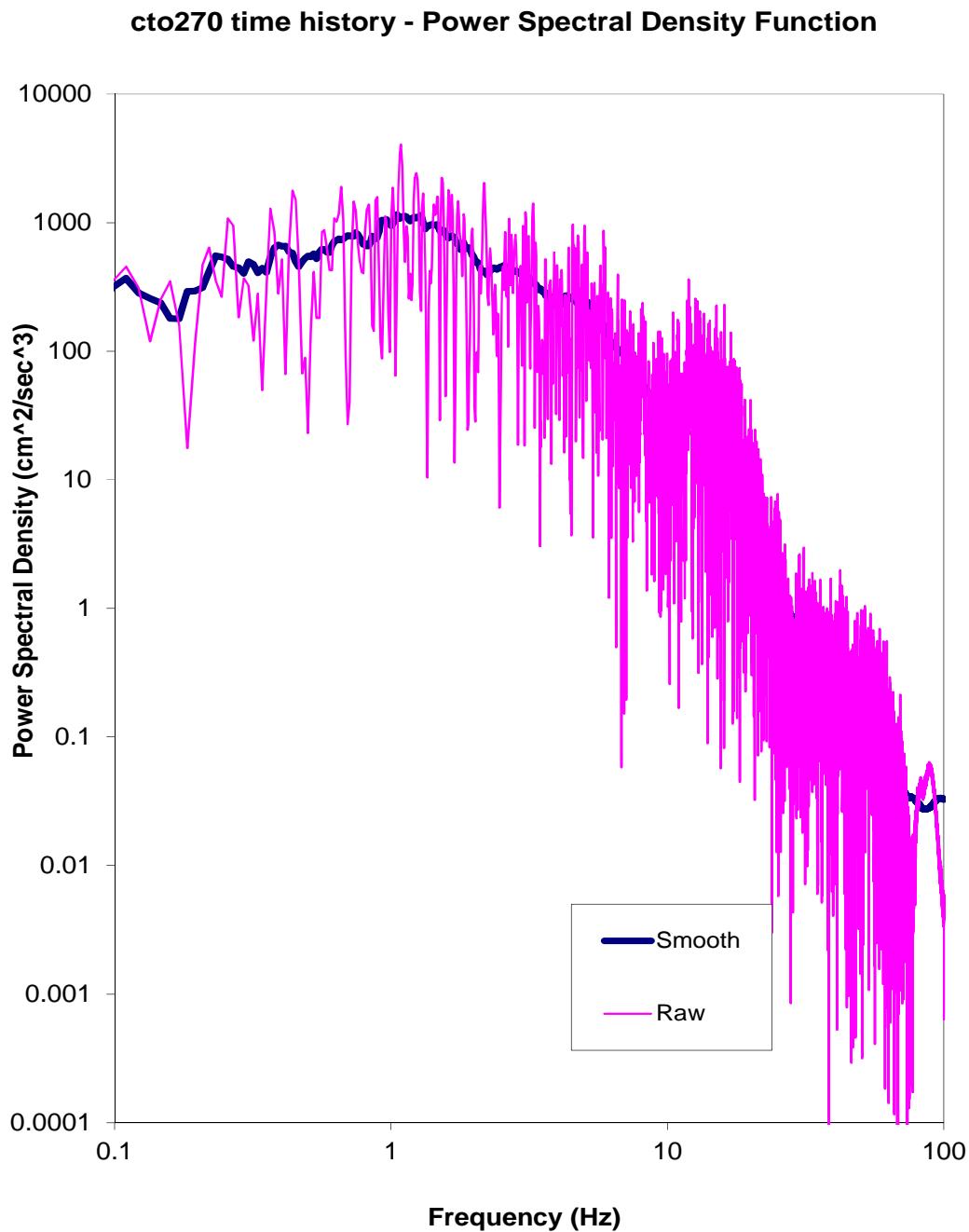
SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – FOURIER AMPLITUDE SPECTRUM

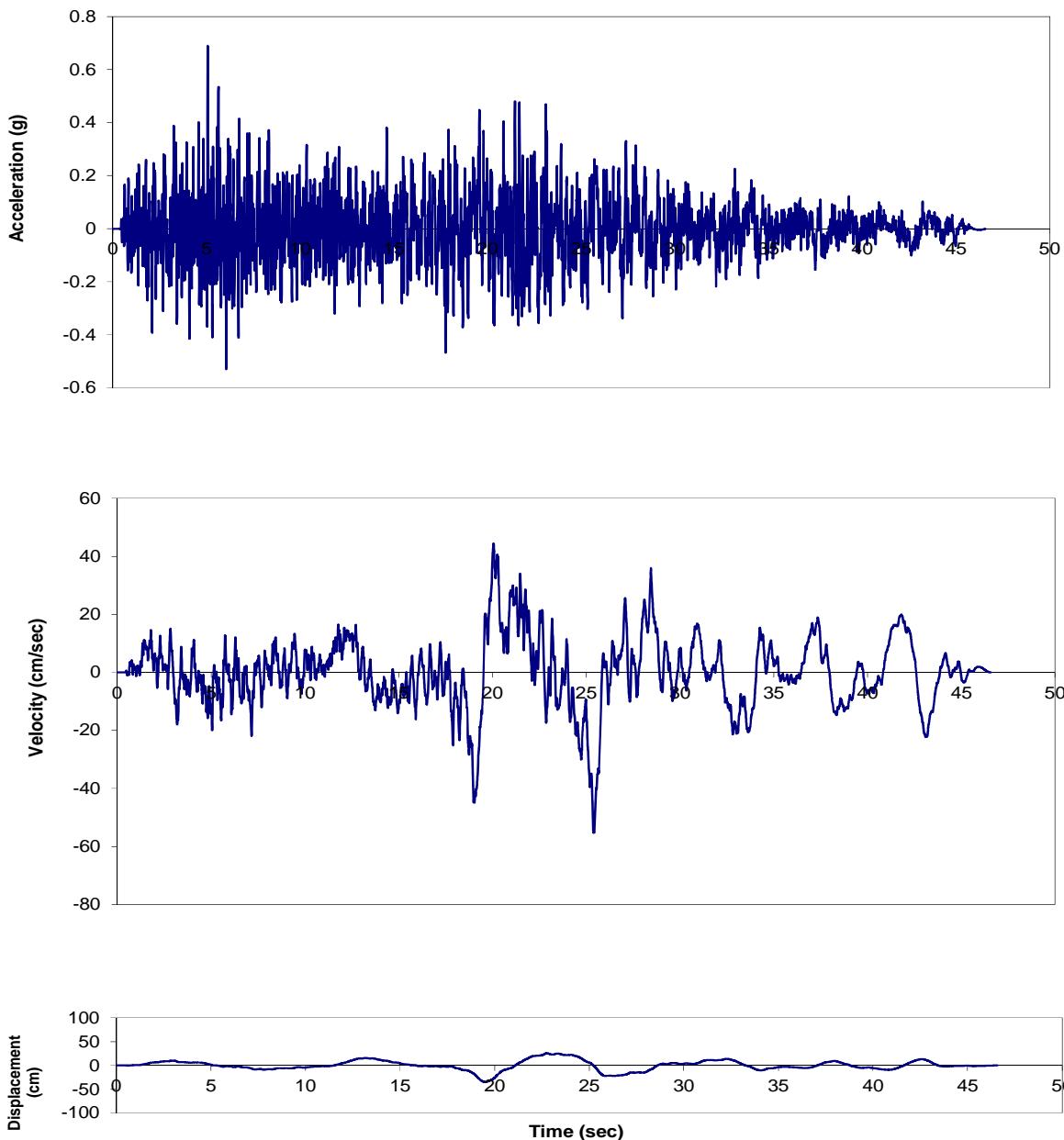
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

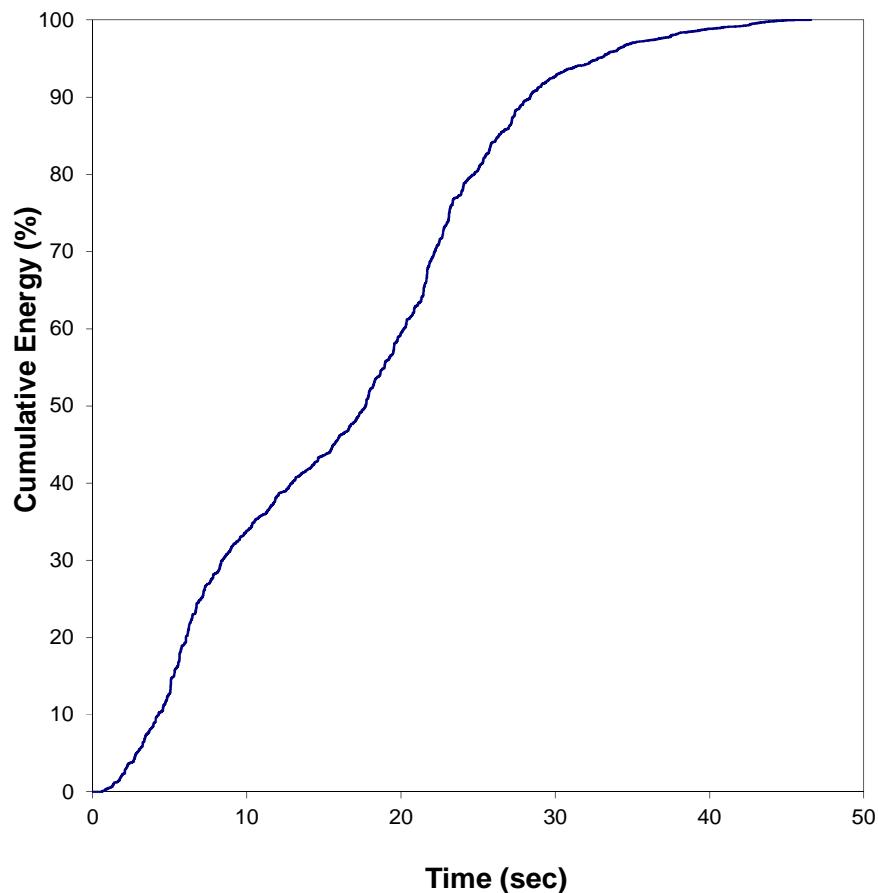
ctoup time history - Acceleration, Velocity, and Displacement Time Histories



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

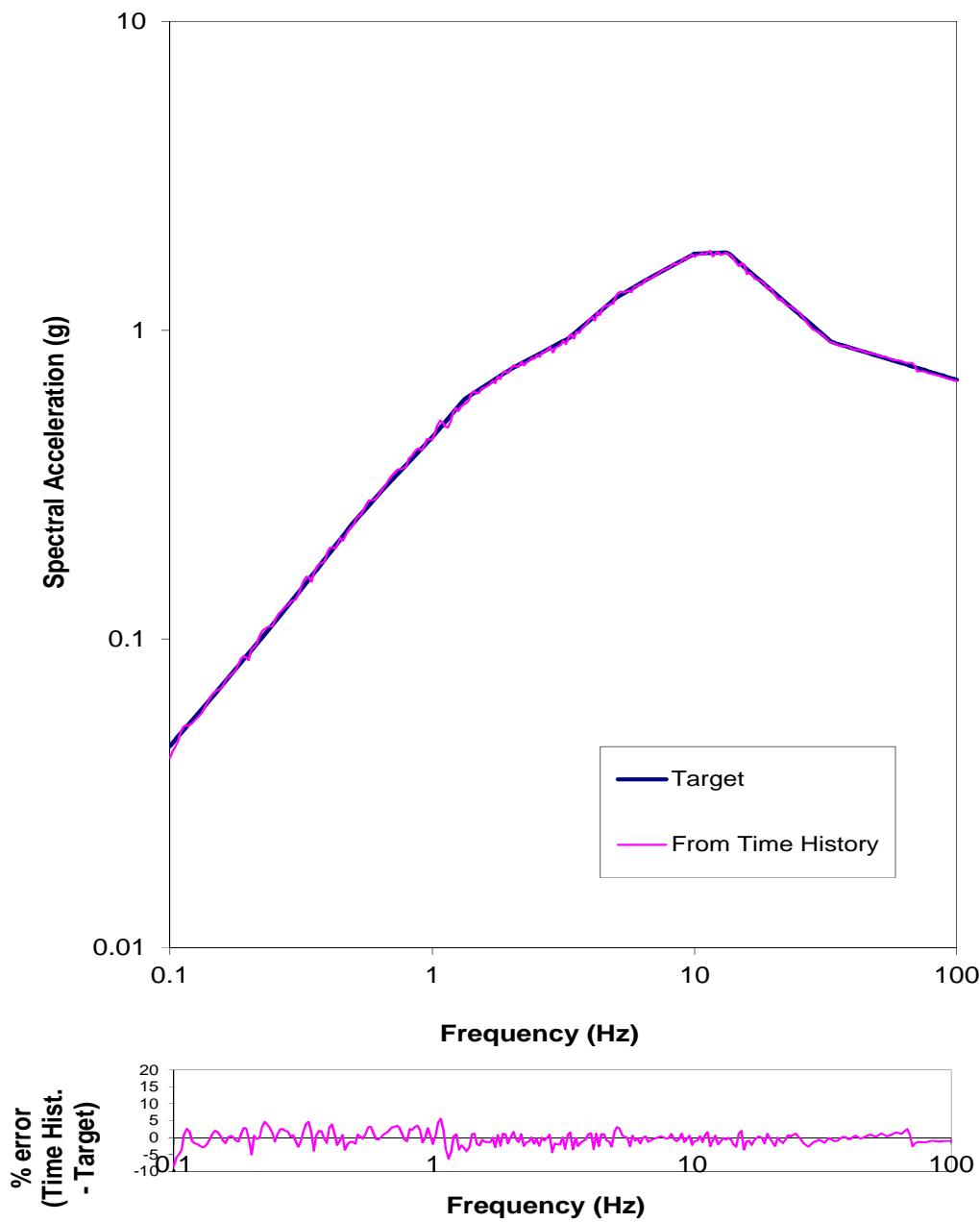
ctoup time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

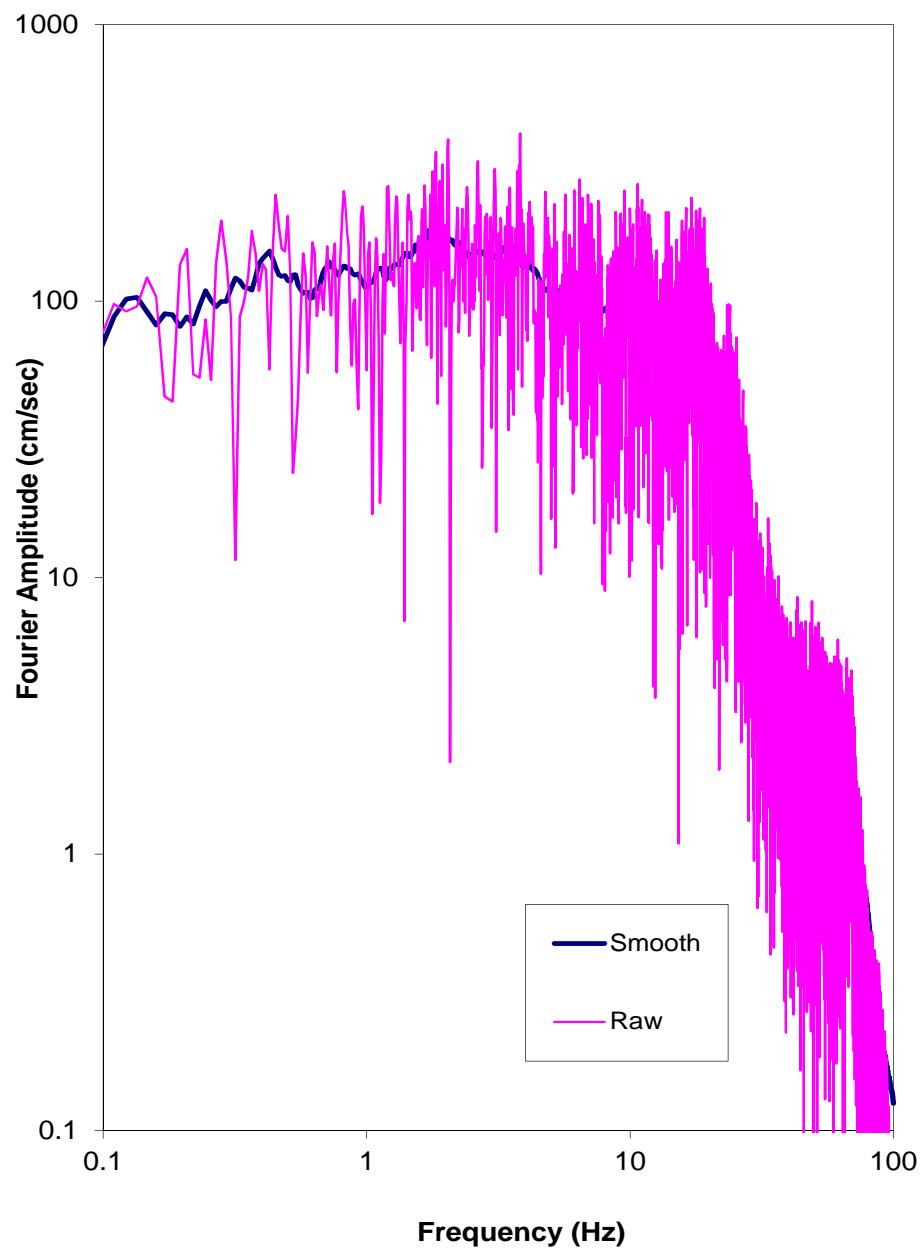
ctoup time history - Response Spectra



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – TARGET AND CALCULATED RESPONSE
SPECTRA**

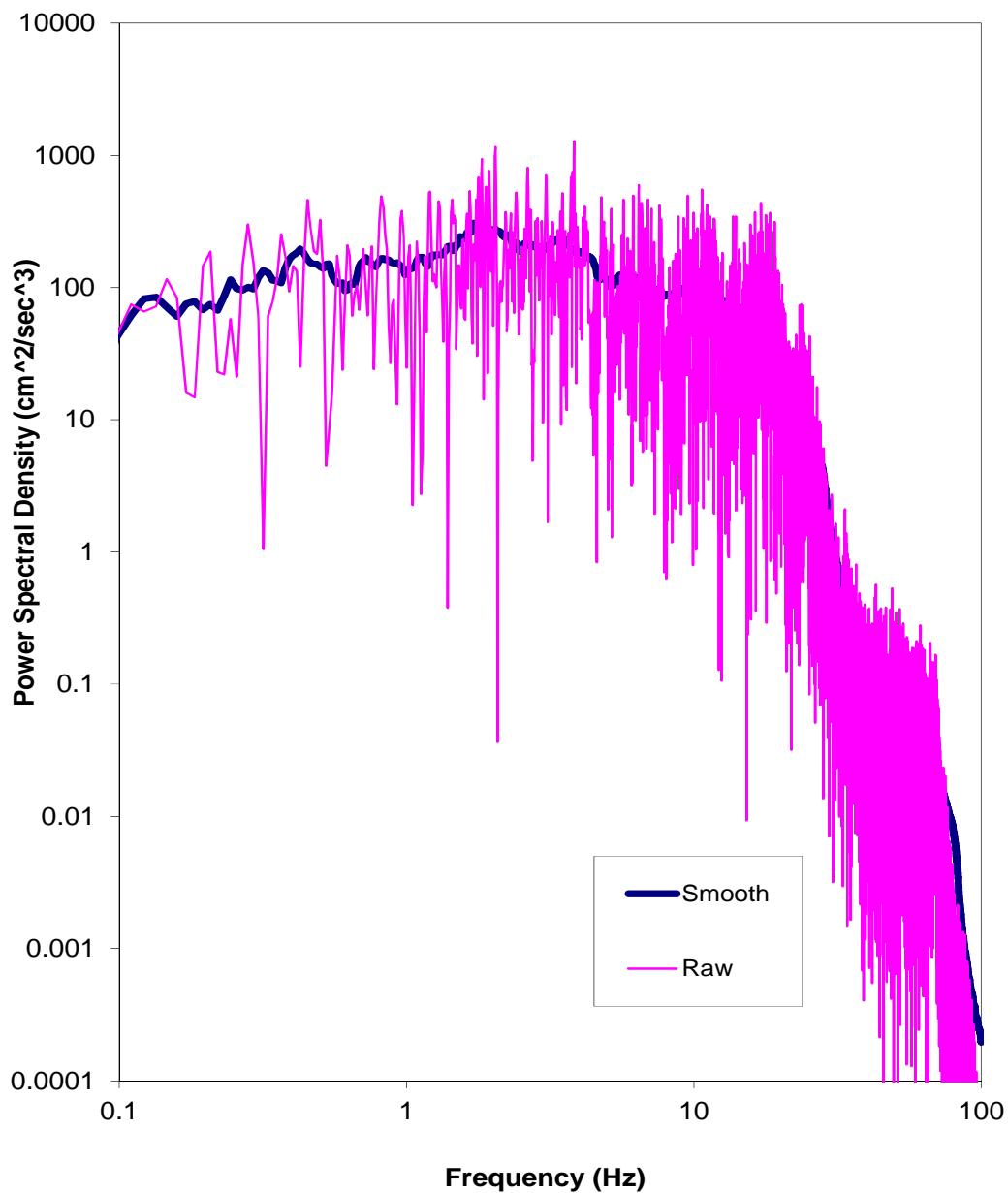
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

ctoup time history - Fourier Amplitude Spectra



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

ctoup time history - Power Spectral Density Function

**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – POWER SPECTRAL DENSITY FUNCTION**

LNG FACILITIES
ALASKA LNG PROJECT
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Calculation of Correlation Coefficients

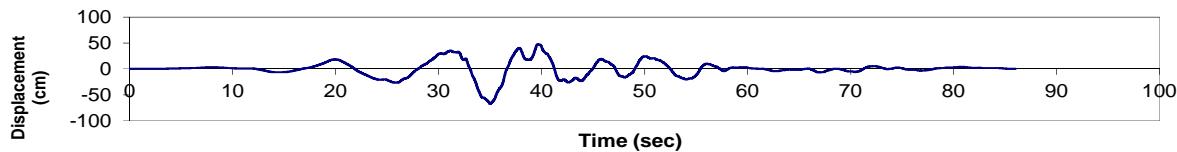
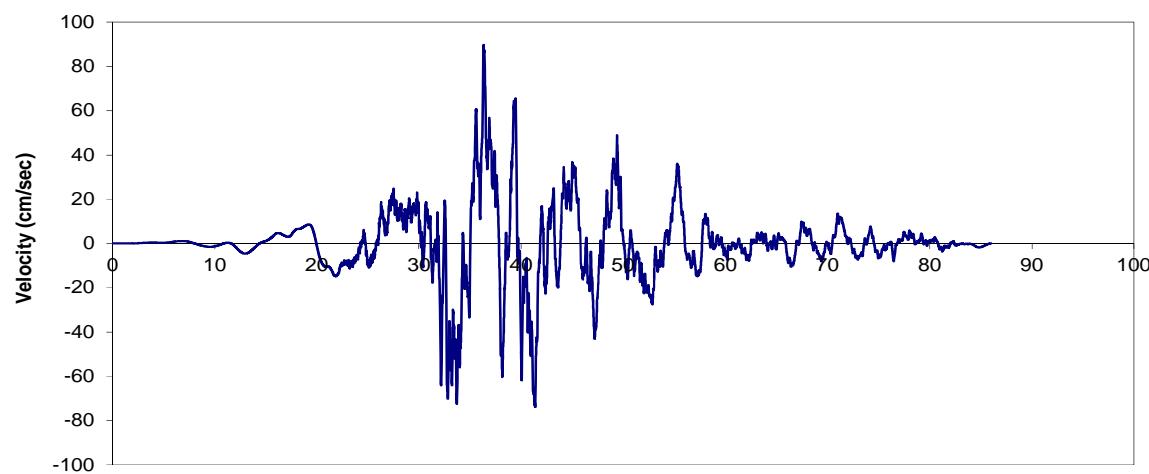
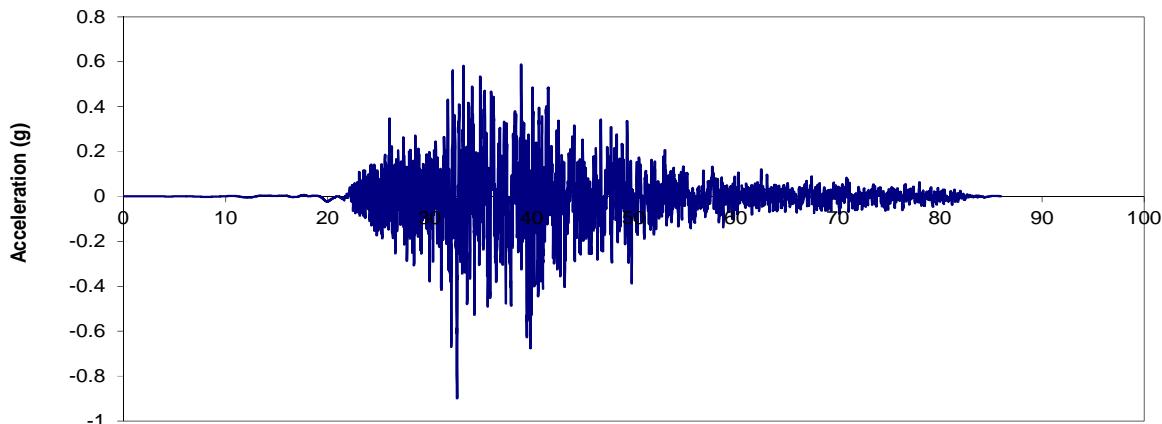
Cross-correlation check

Horizontal 1:	CTO180
Horizontal 2:	CTO270
Vertical:	CTOUP
corr, H1-H2	-0.020
corr, H1-V	-0.043
corr, H2-V	-0.006

SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION – SPECTRALLY MATCHED CTO MOTION – CALCULATION OF CORRELATION COEFFICIENTS

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

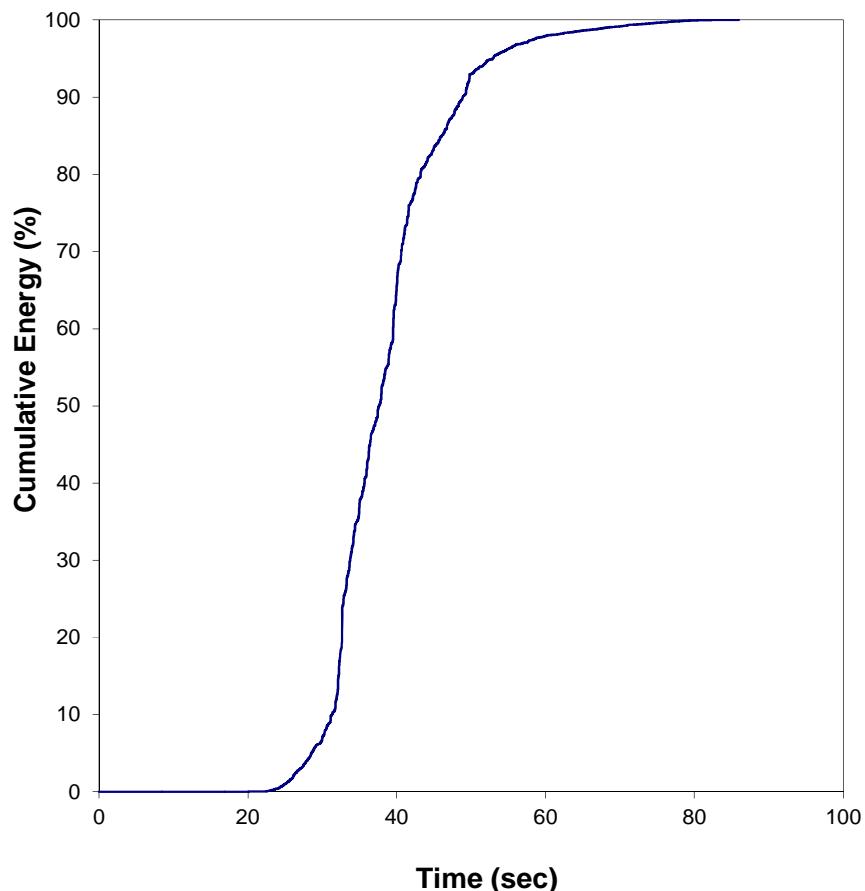
carlo_090 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

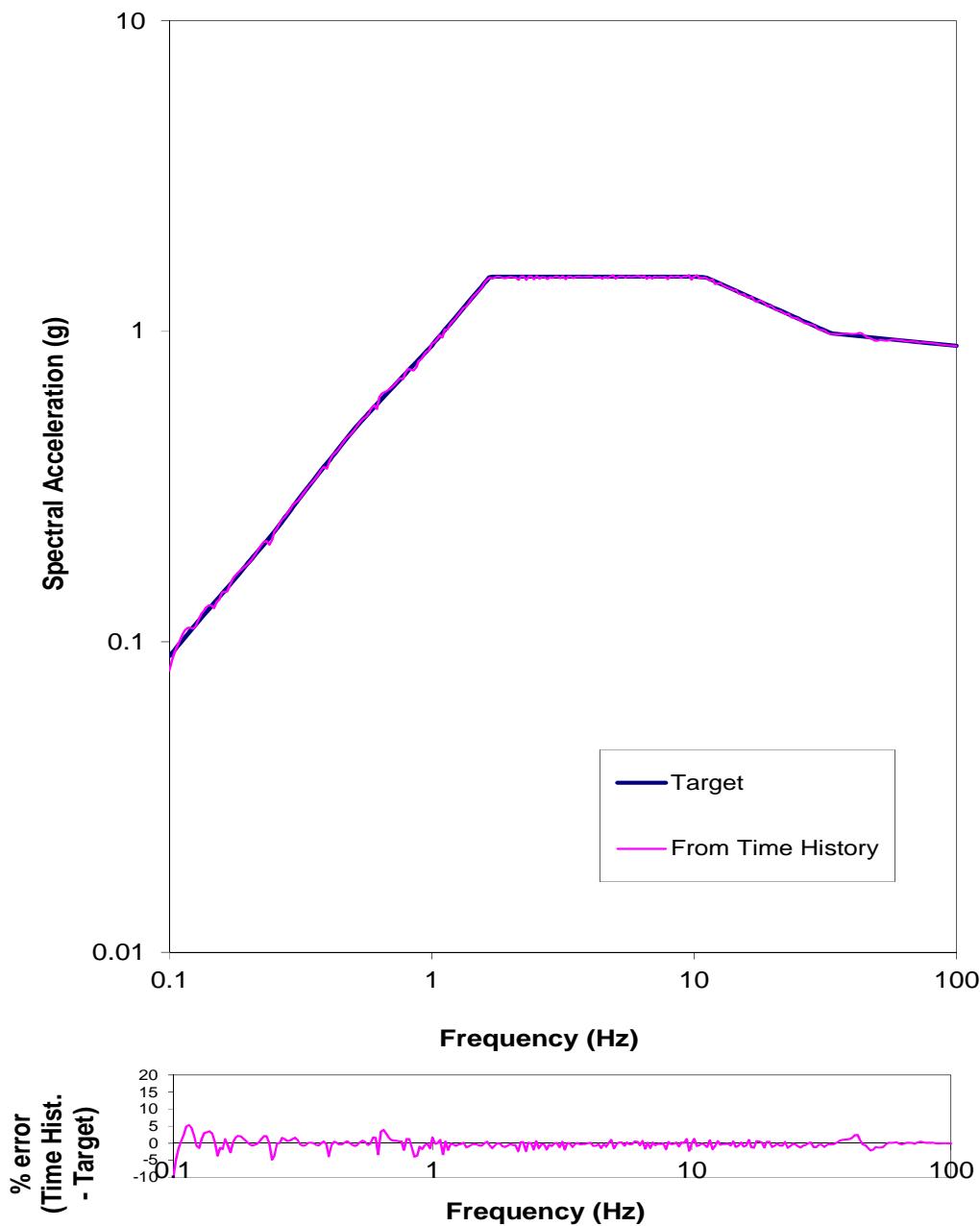
carlo_090 time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT
NORMAL – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – NORMALIZED
CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

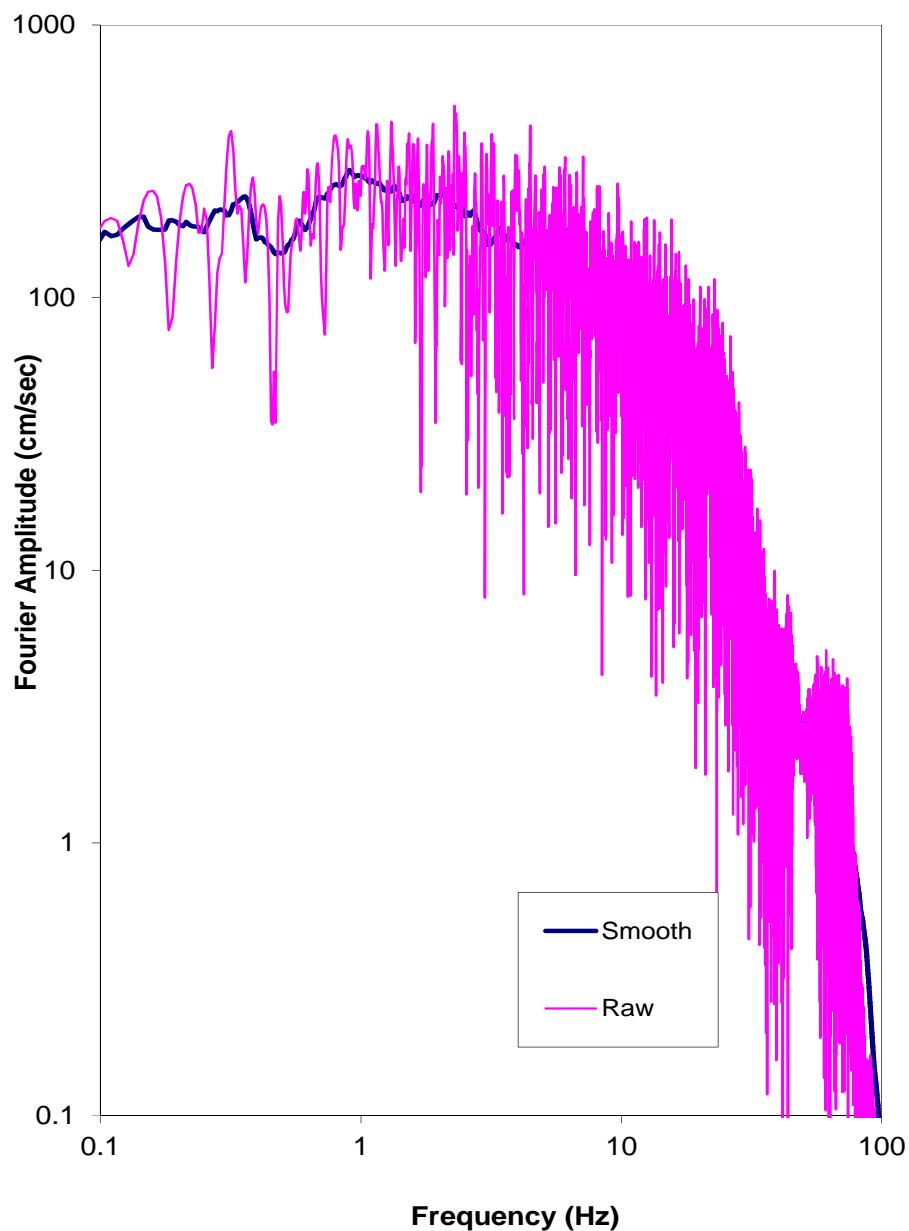
carlo_090 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

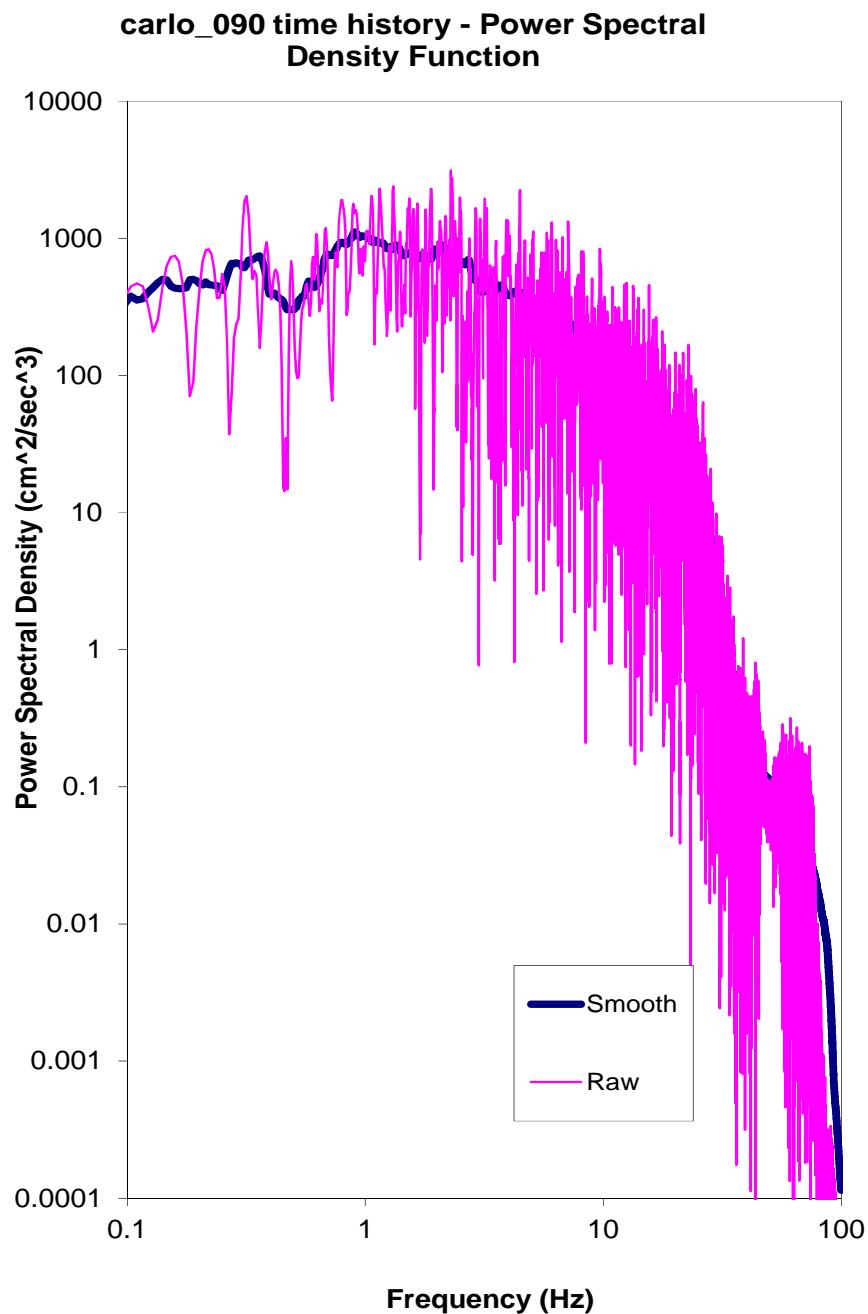
LNG FACILITIES
ALASKA LNG PROJECT
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carlo_090 time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – FOURIER AMPLITUDE SPECTRUM

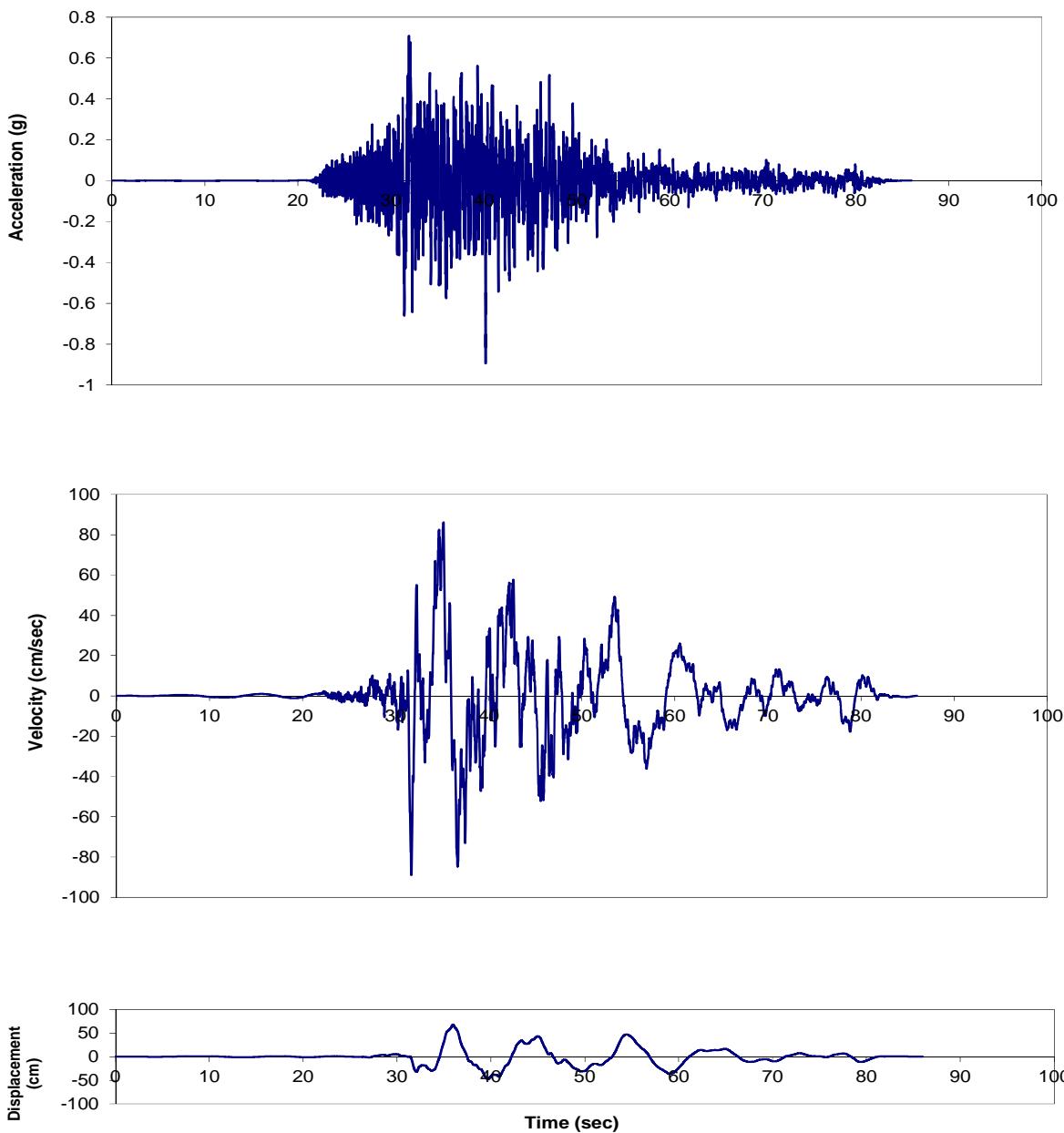
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

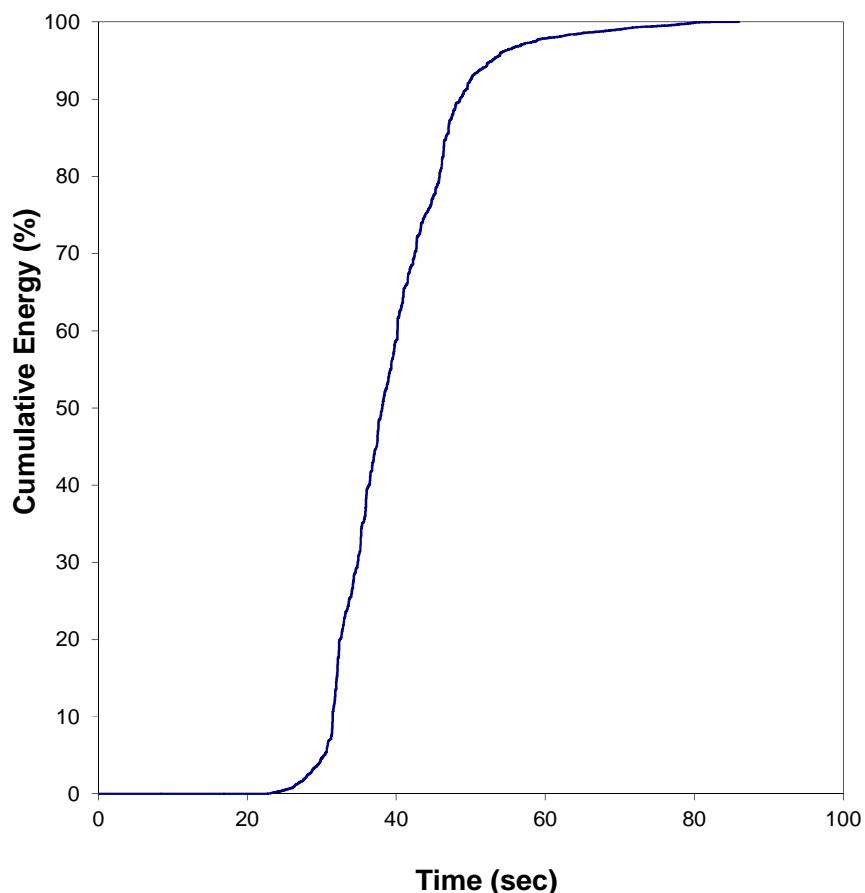
carlo_360 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

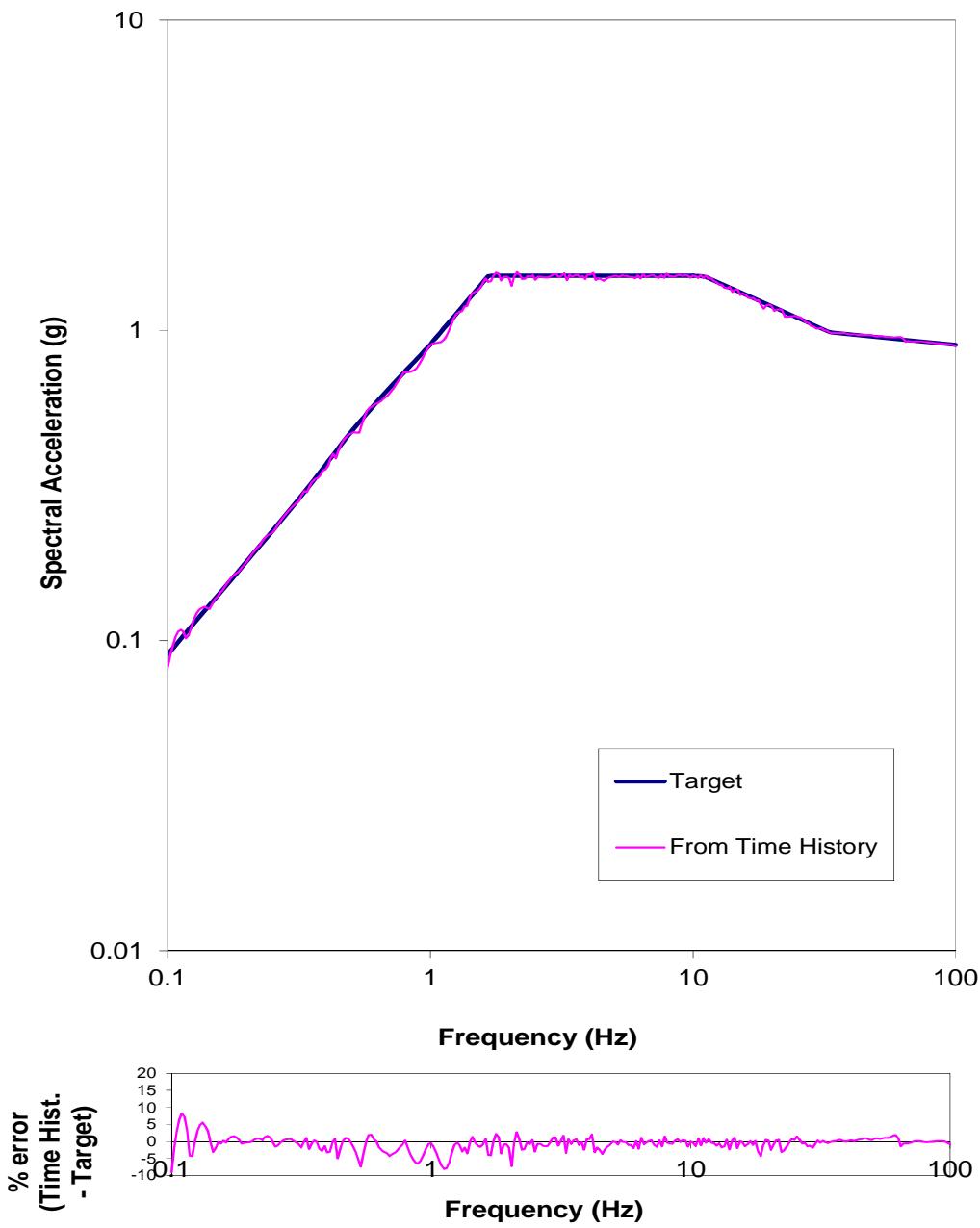
carlo_360 time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

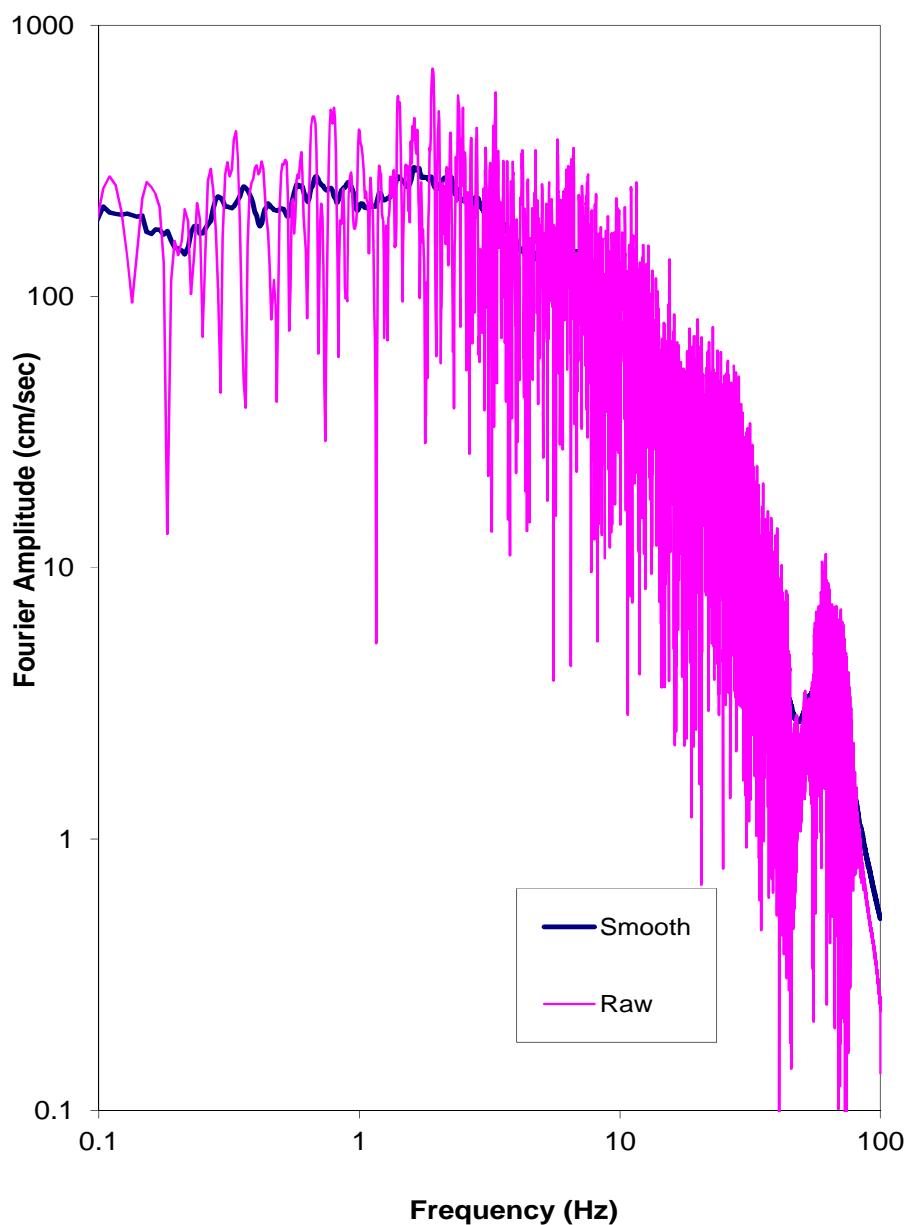
carlo_360 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

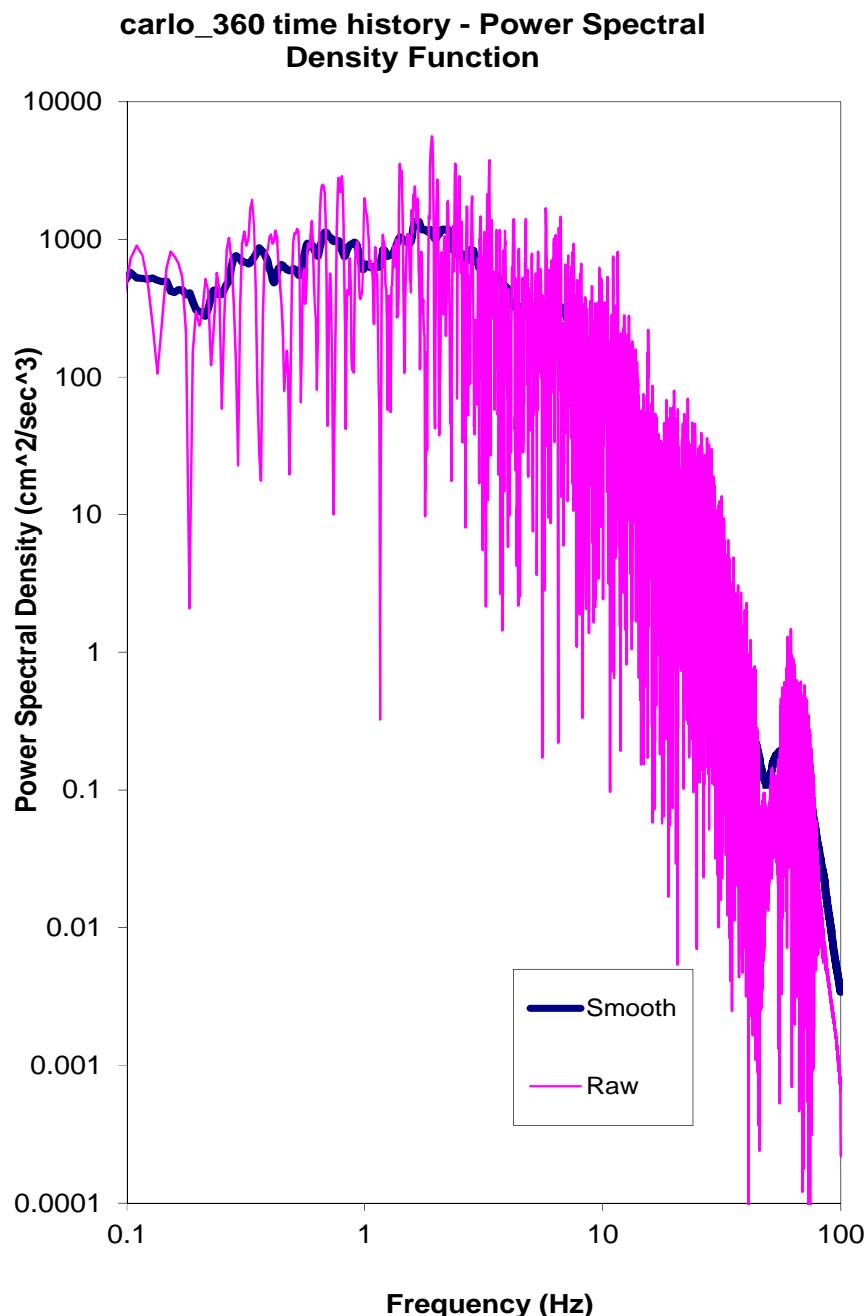
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

carlo_360 time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – FOURIER AMPLITUDE SPECTRUM

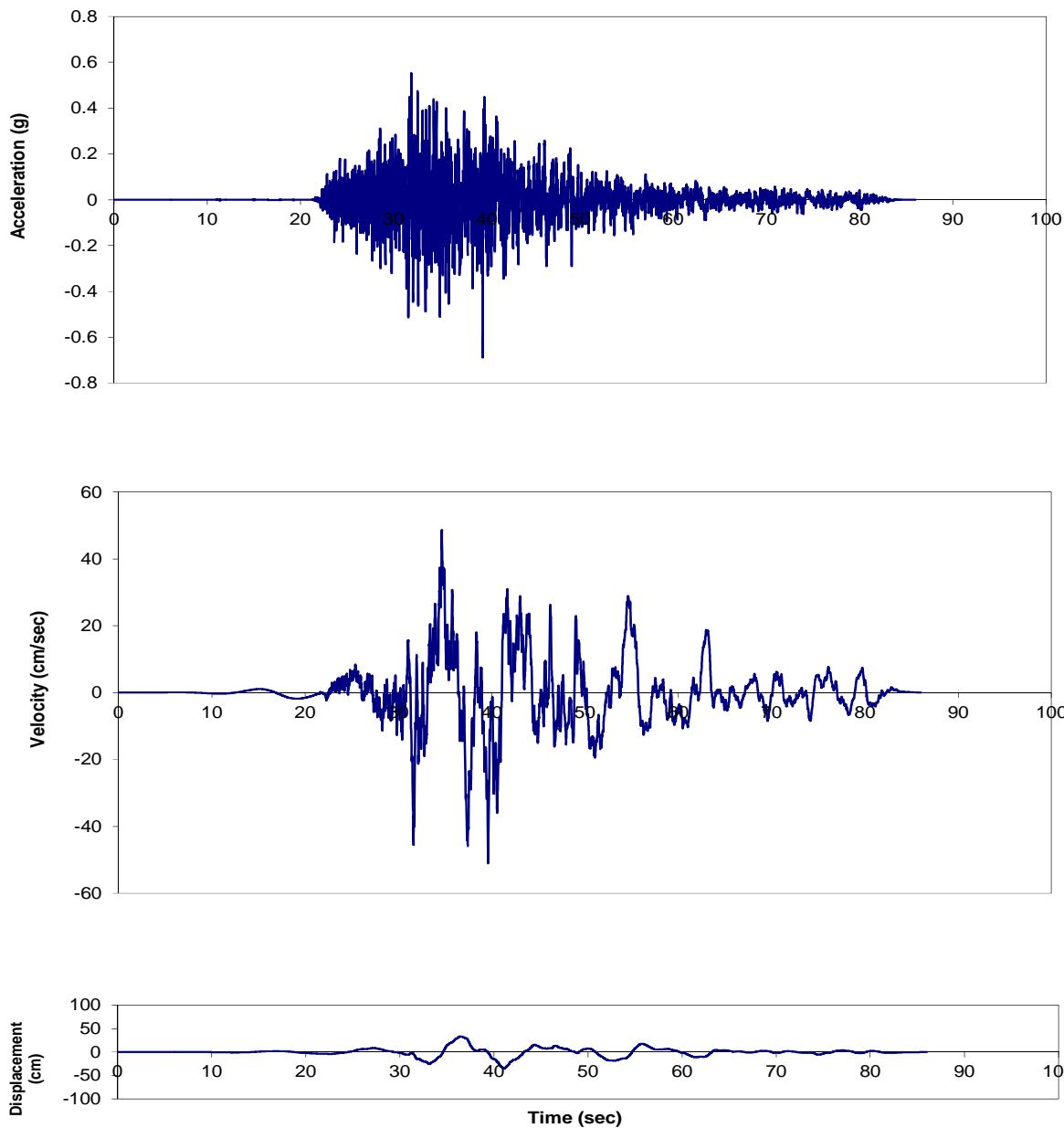
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

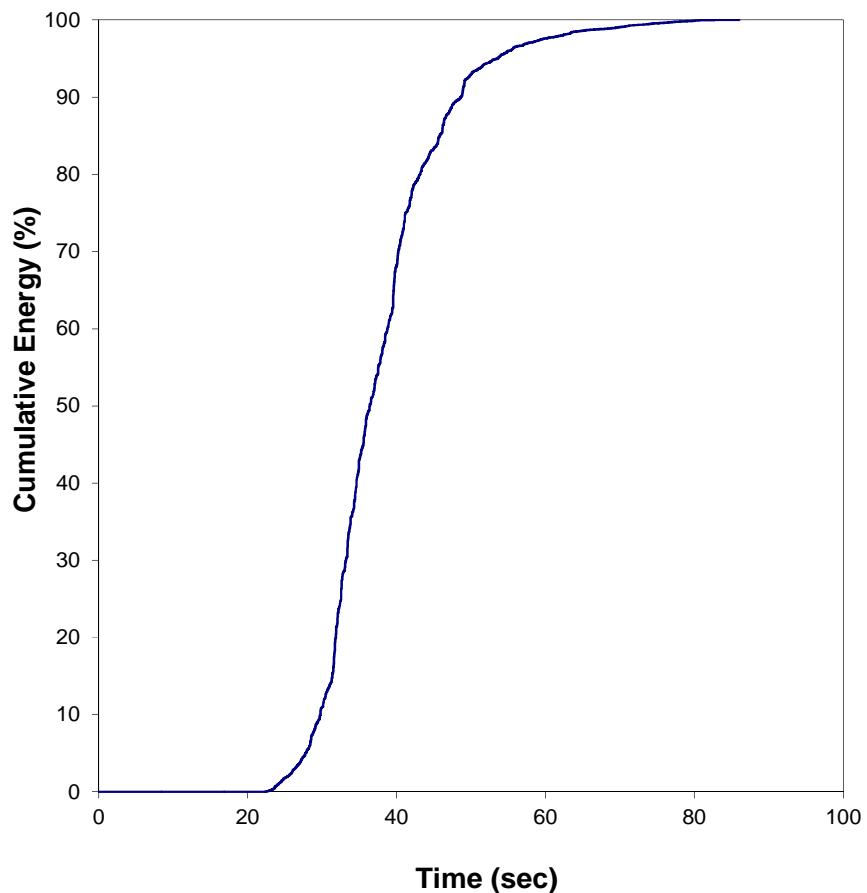
carlo_up time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
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carlo_up time history - Cumulative Energy (Husid) plot

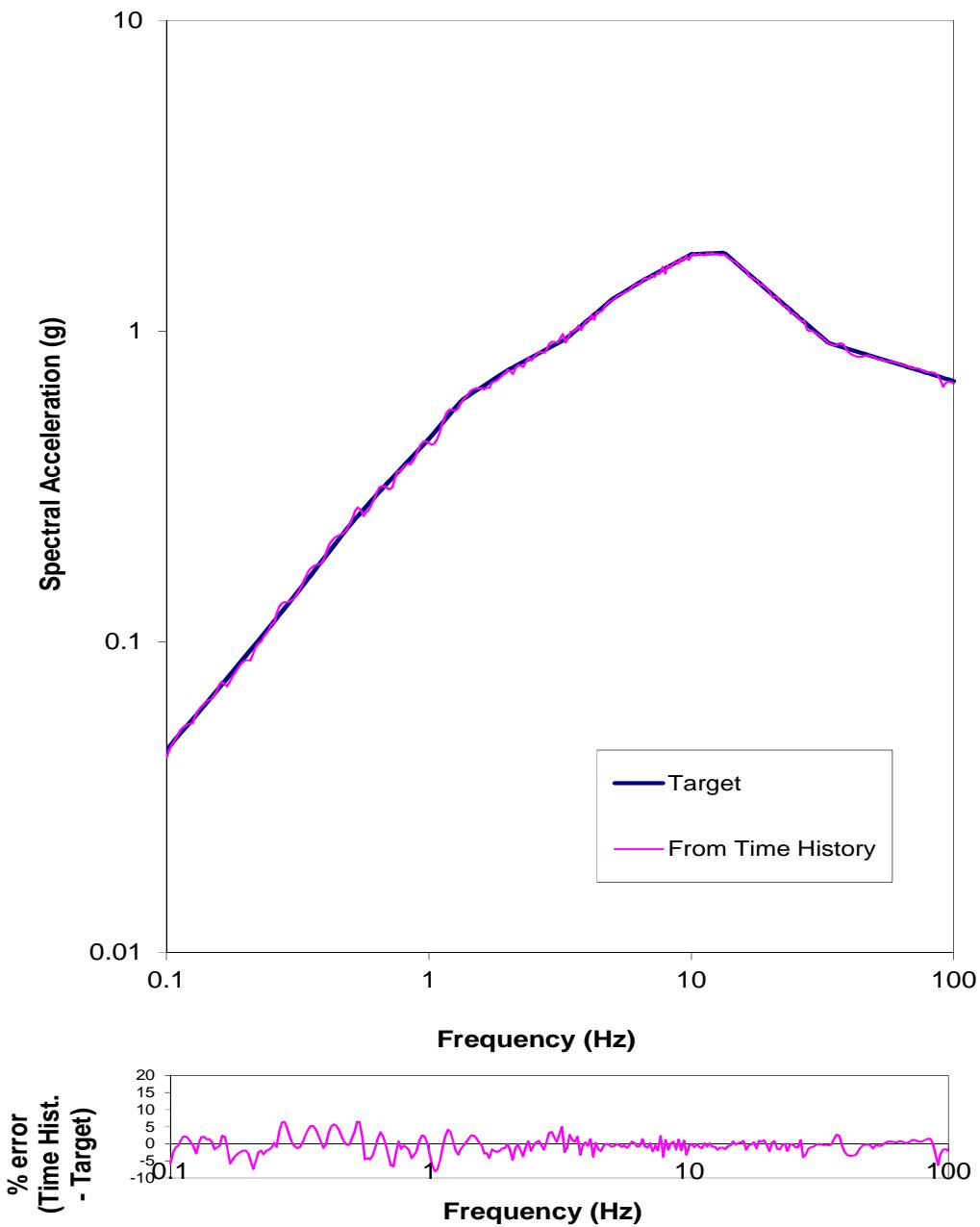


SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

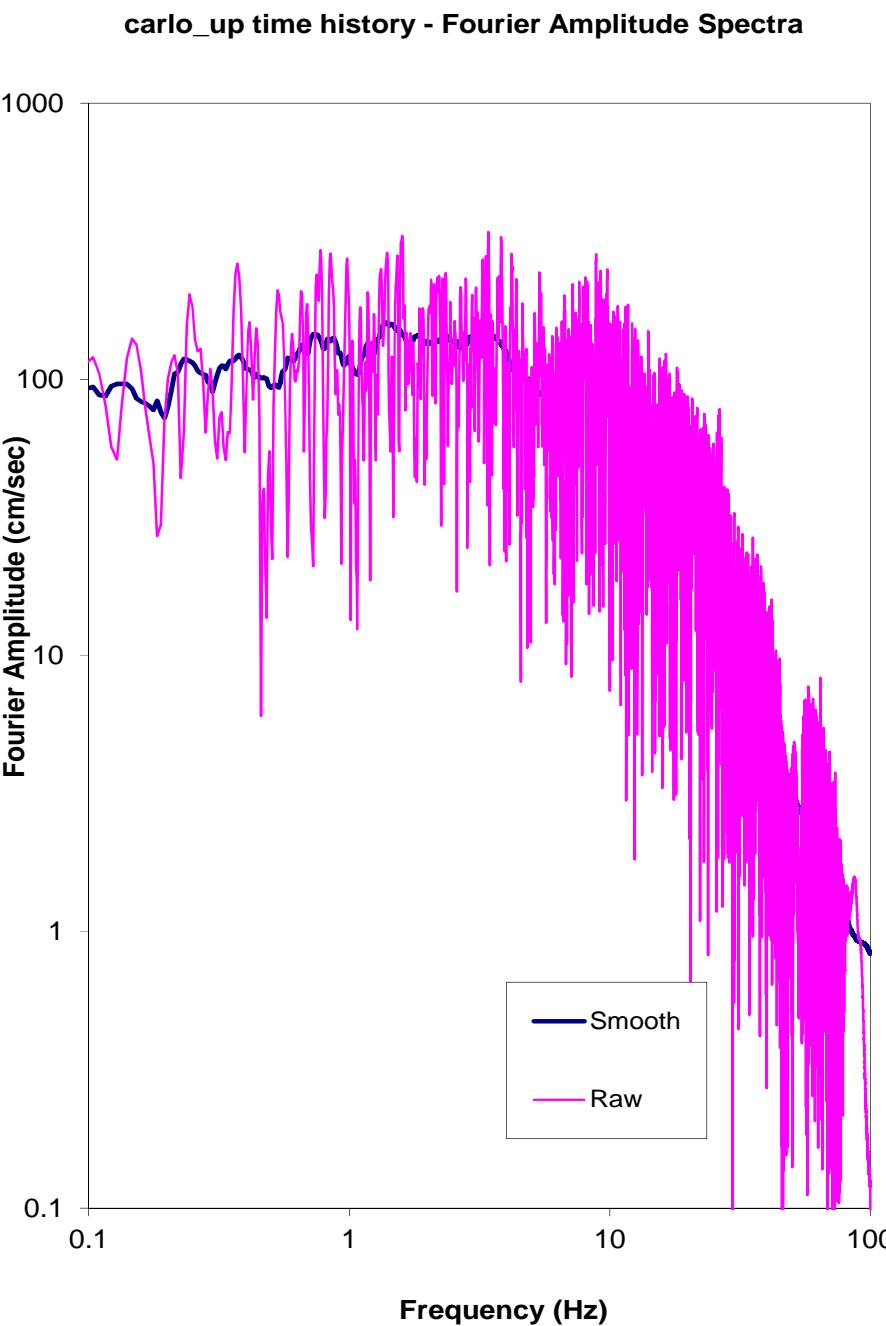
PLATE E.124

carlo_up time history - Response Spectra



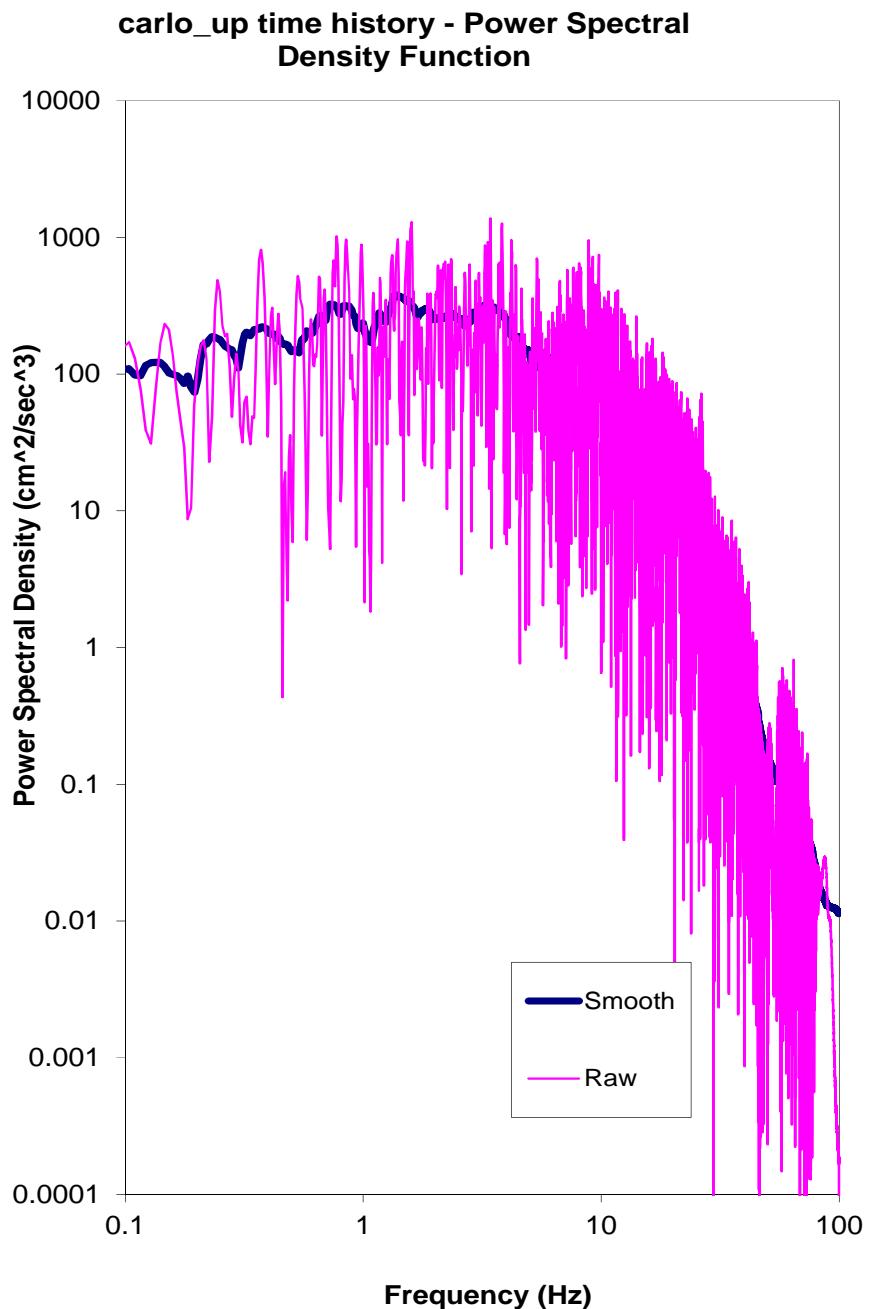
**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – TARGET AND CALCULATED
RESPONSE SPECTRA**

LNG FACILITIES
ALASKA LNG PROJECT
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**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM**

LNG FACILITIES
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**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – POWER SPECTRAL DENSITY
FUNCTION**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Calculation of Correlation Coefficients

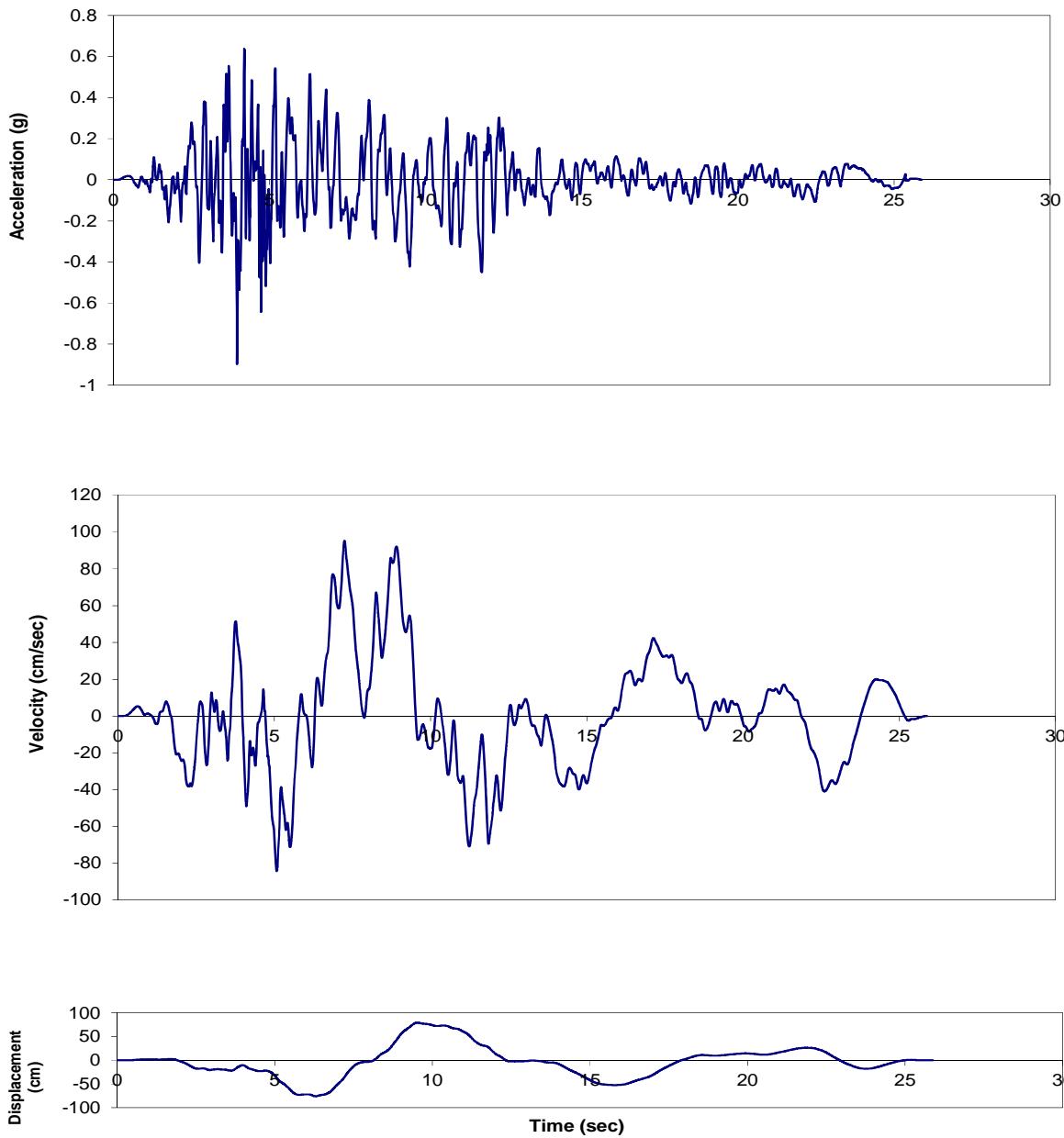
Cross-correlation check

Horizontal 1:	Carlo_090
Horizontal 2:	Carlo_360
Vertical:	Carlo_UP
corr, H1-H2	-0.042
corr, H1-V	-0.039
corr, H2-V	0.098

SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION – SPECTRALLY MATCHED CARLO MOTION – CALCULATION OF CORRELATION COEFFICIENTS

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

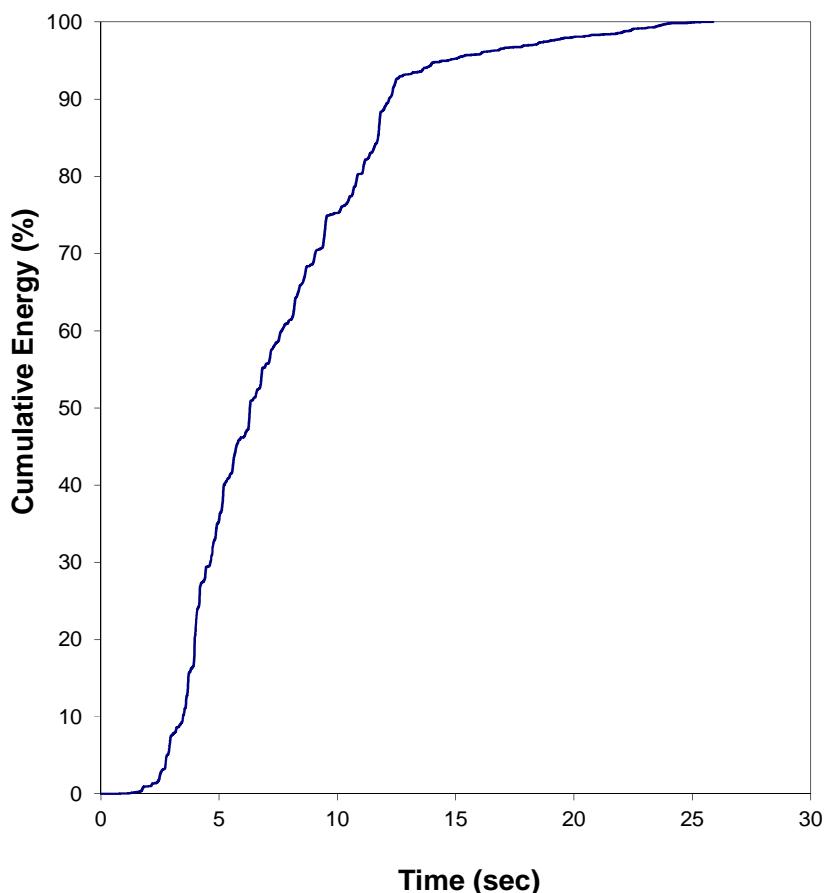
Duzce_DZC180 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

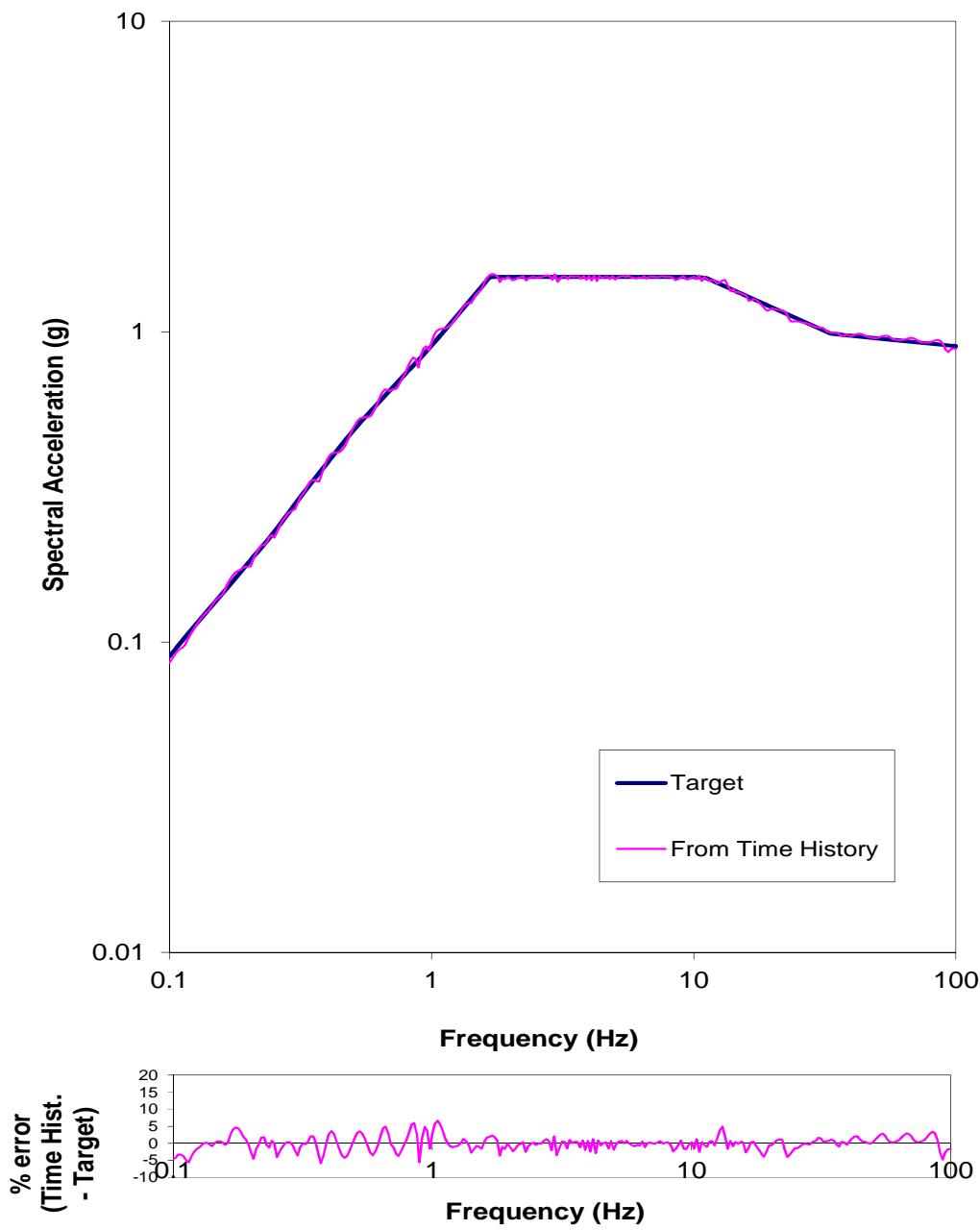
Duzce_DZC180 time history - Cumulative Energy
(Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT
NORMAL – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – NORMALIZED CUMULATIVE
ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

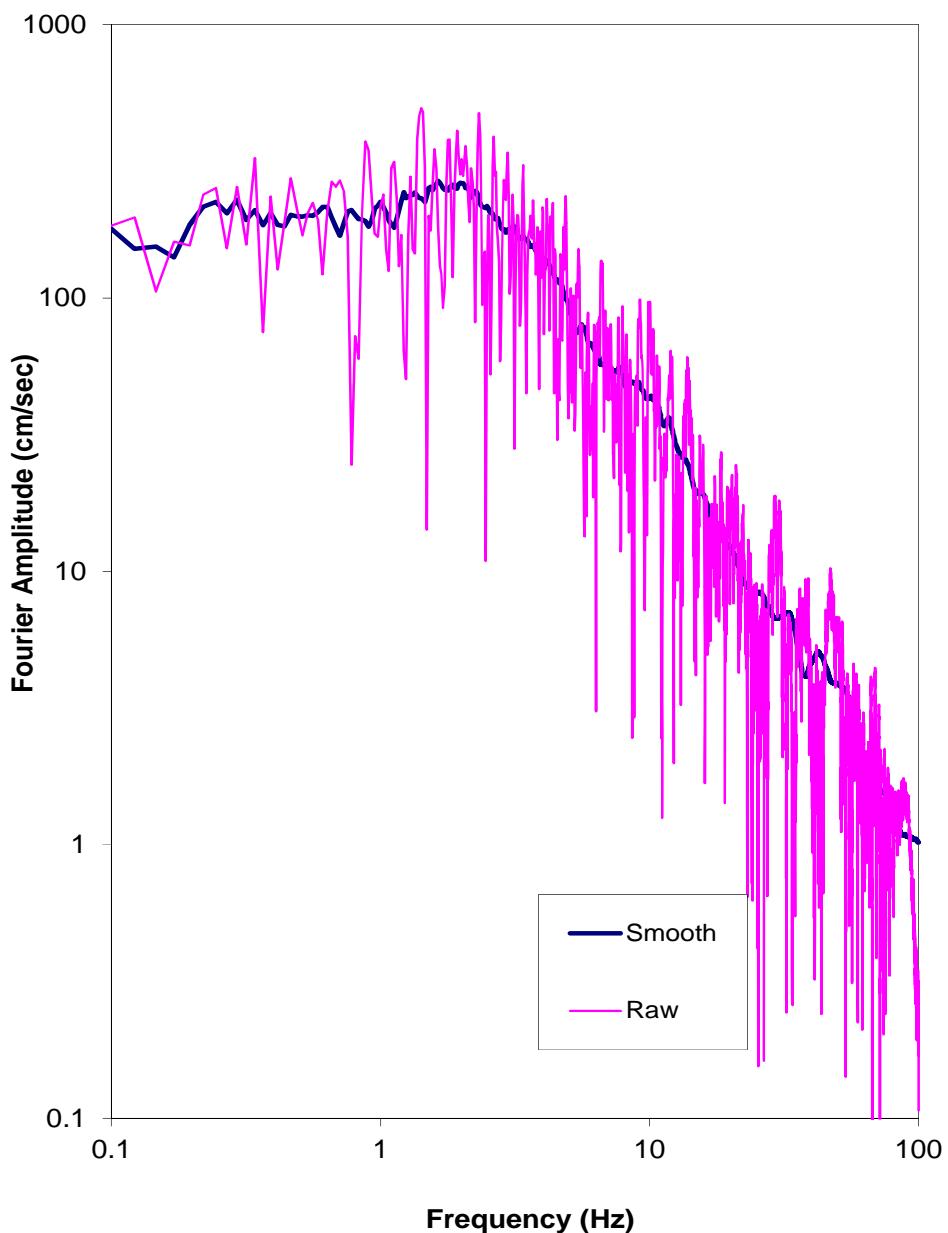
Duzce_DZC180 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

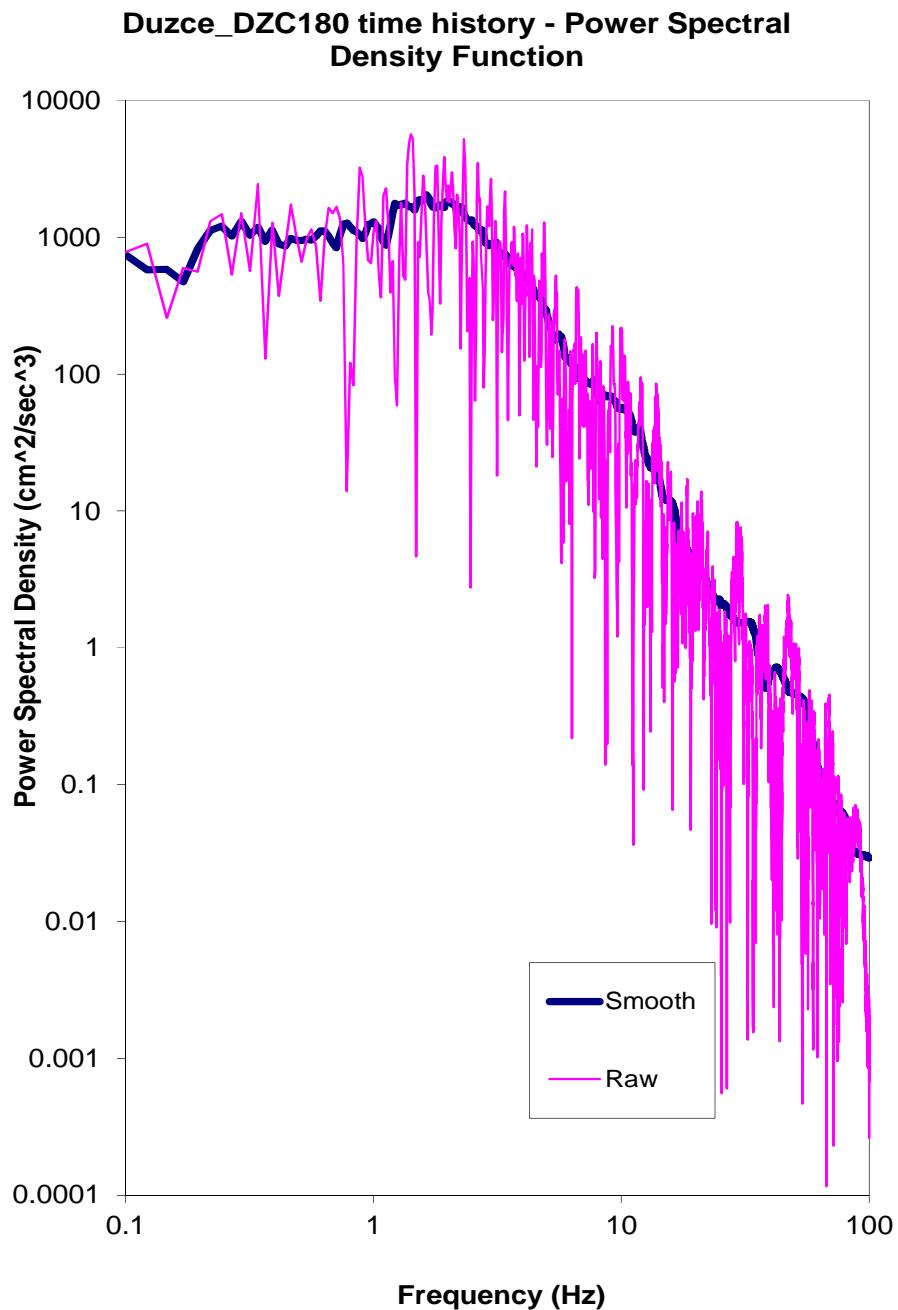
LNG FACILITIES
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NIKISKI, ALASKA

Duzce_DZC180 time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – FOURIER AMPLITUDE SPECTRUM

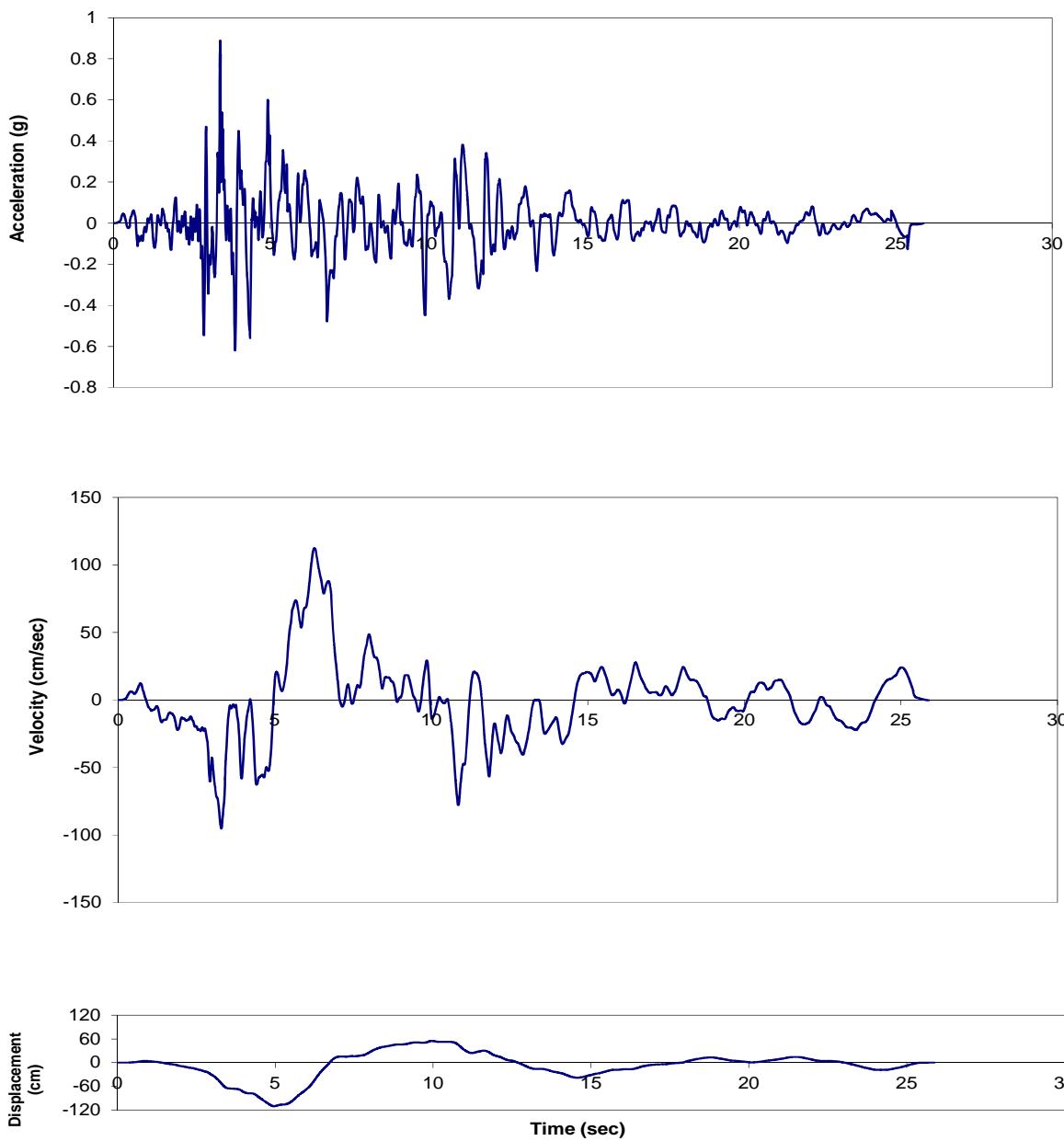
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

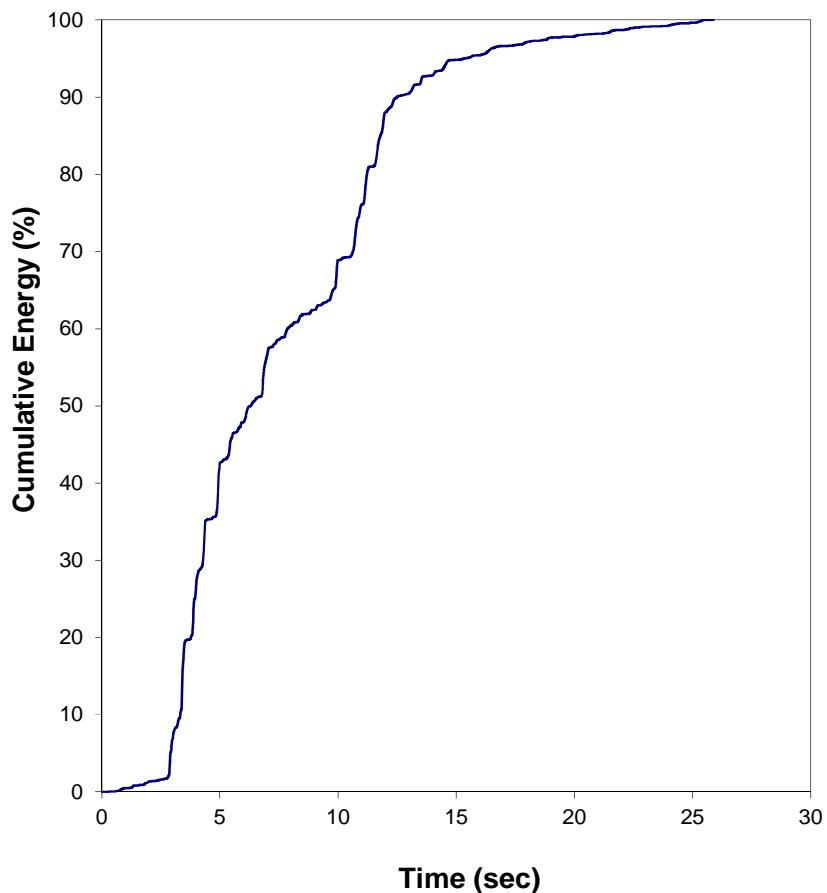
Duzce_DZC270 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

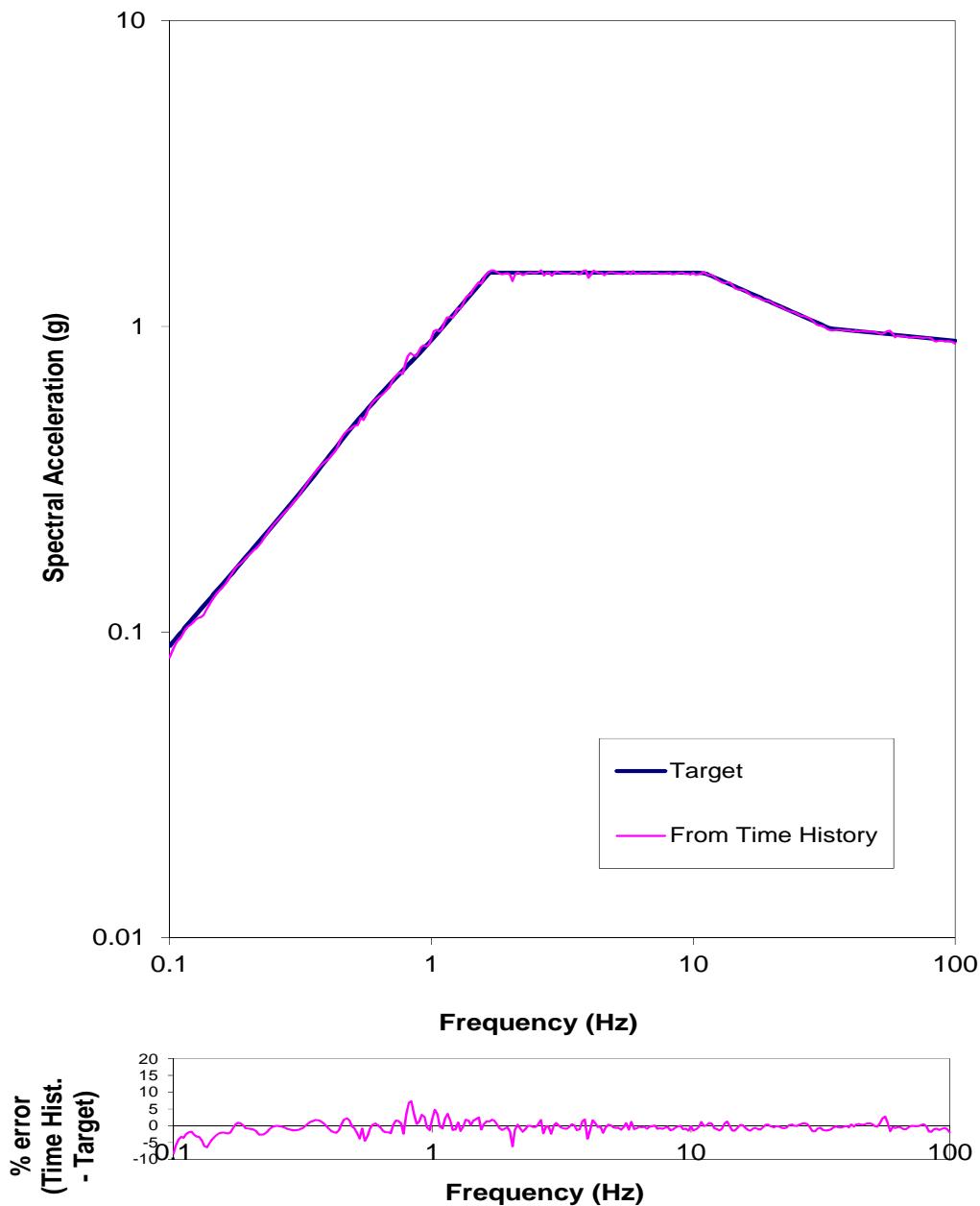
Duzce_DZC270 time history - Cumulative Energy
(Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

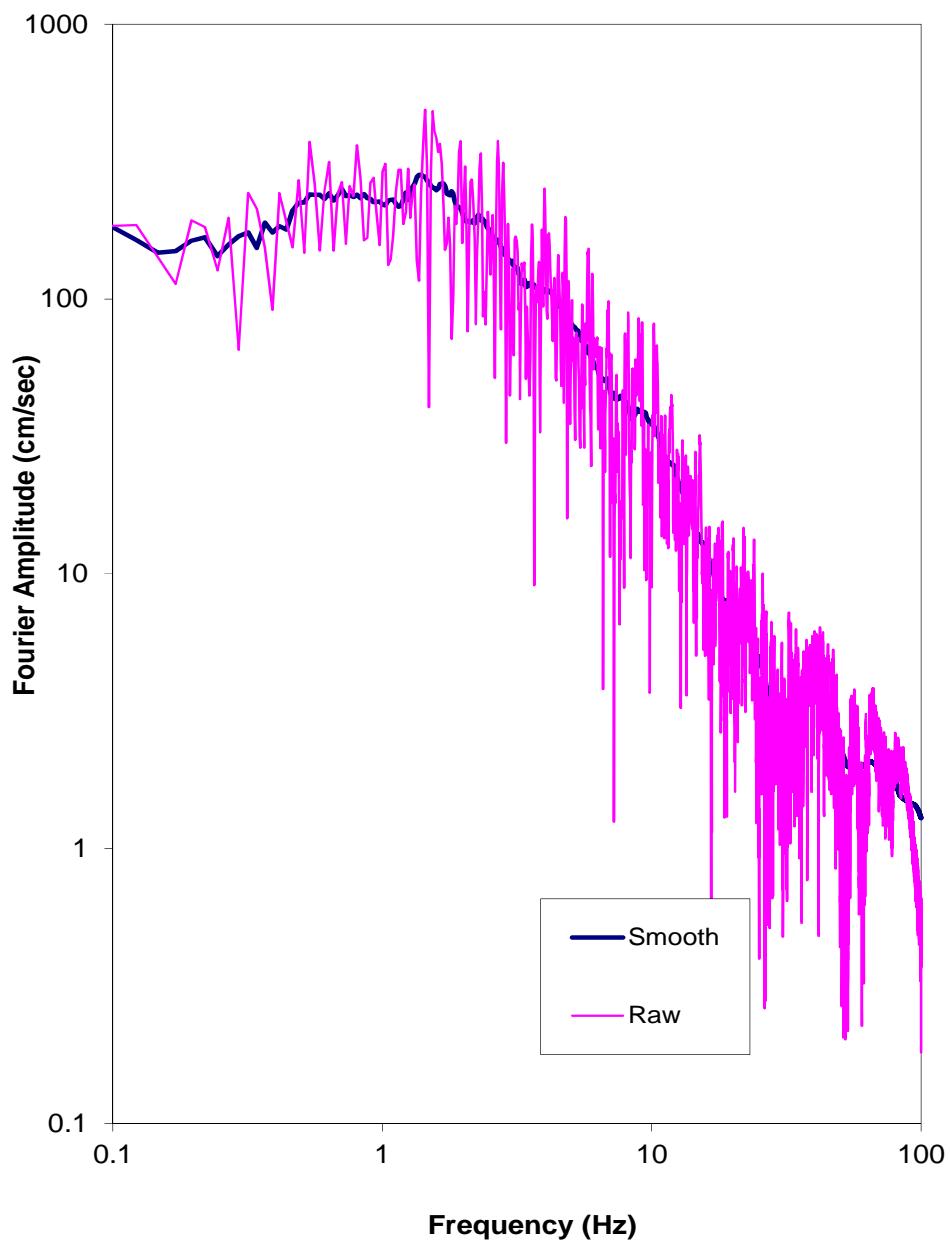
Duzce_DZC270 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

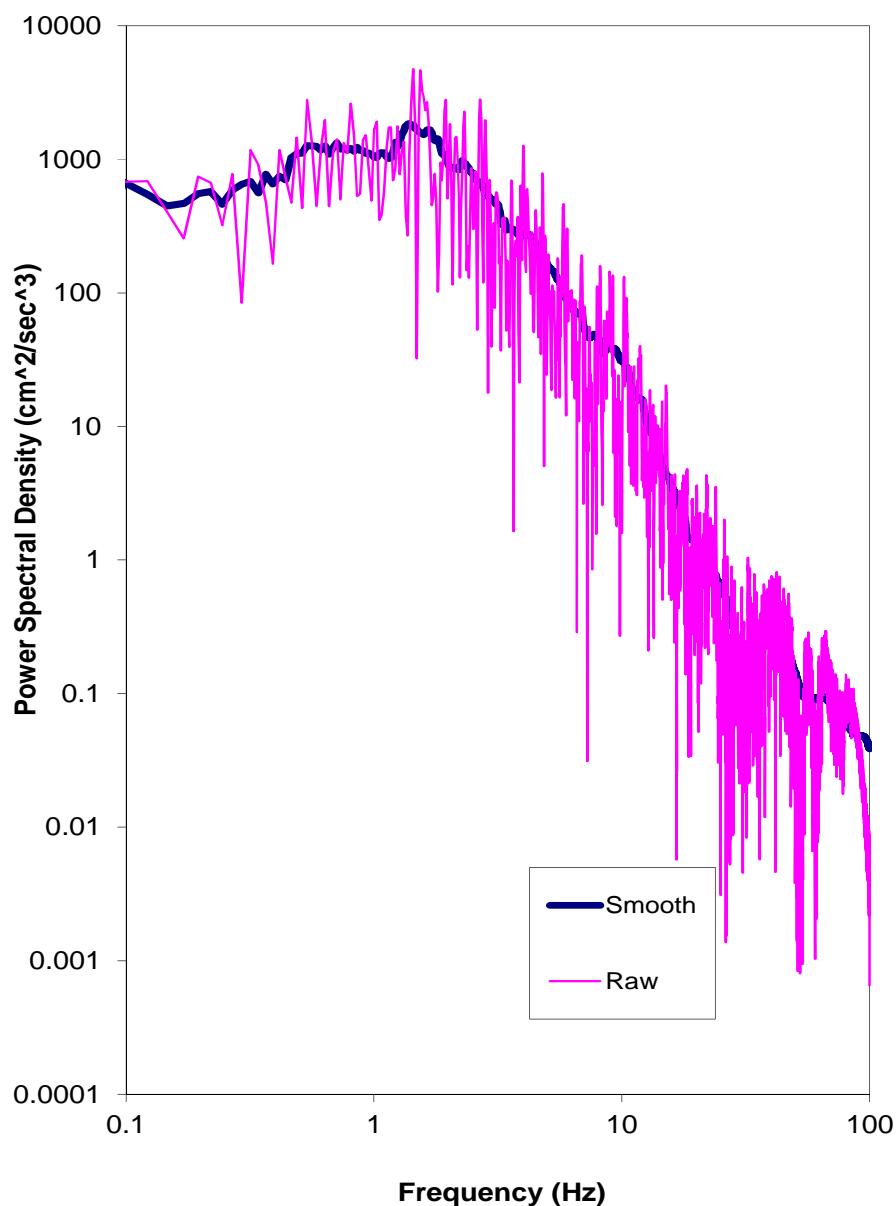
Duzce_DZC270 time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

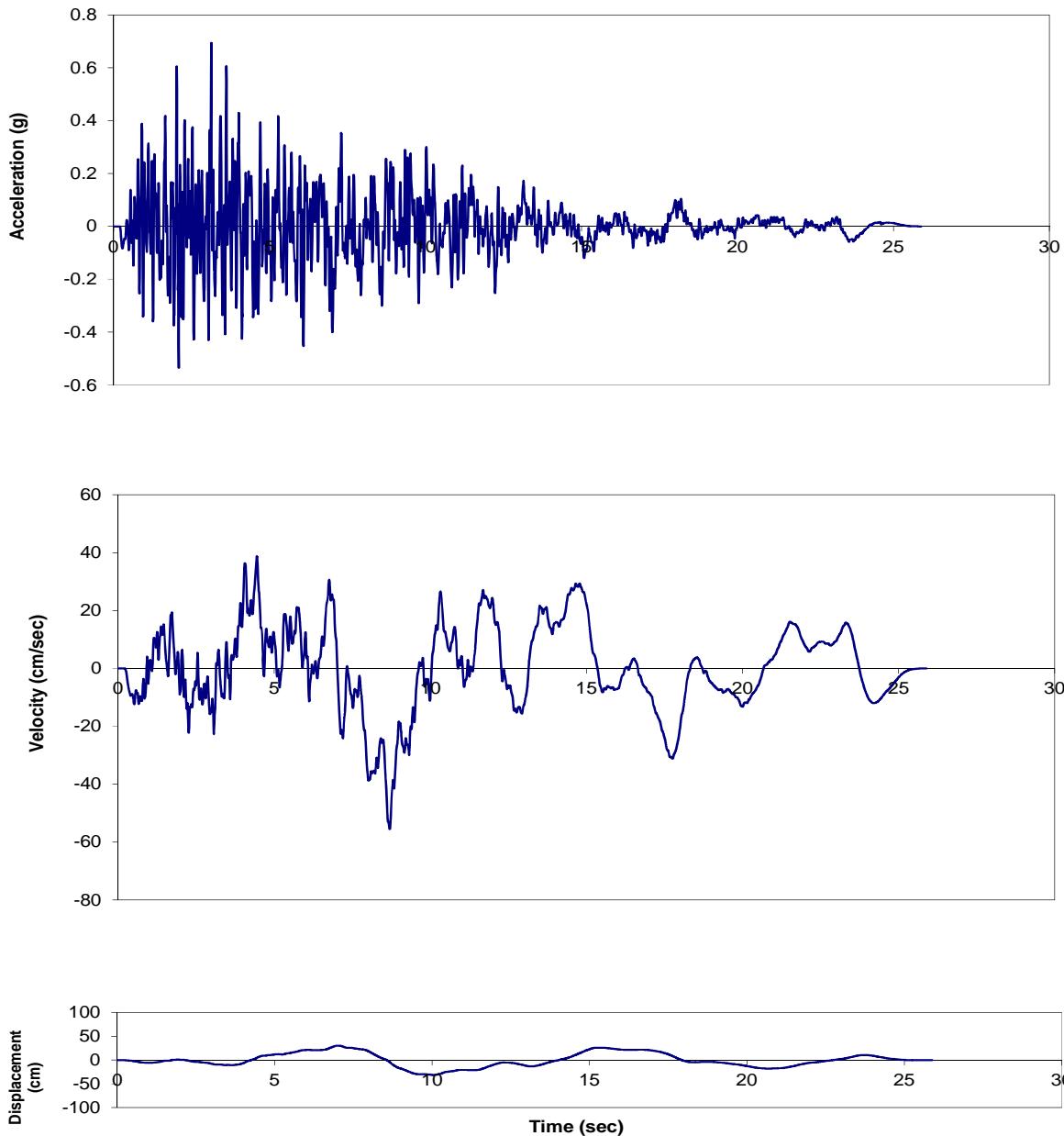
Duzce_DZC270 time history - Power Spectral Density Function



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

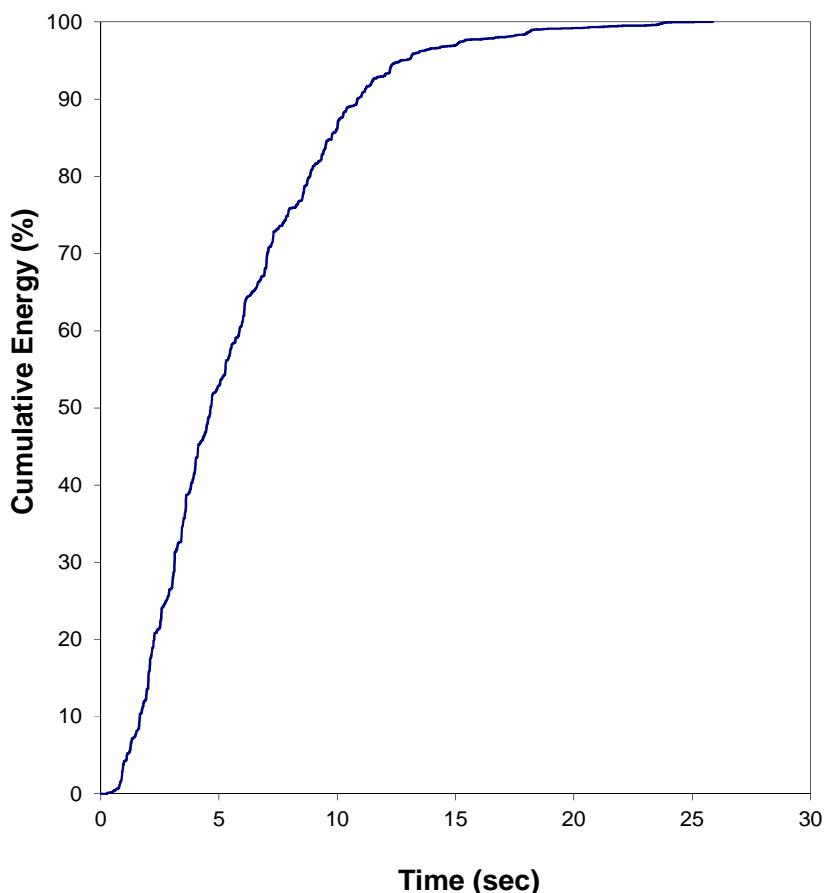
Duzce_DZCUP time history - Acceleration, Velocity, and Displacement Time Histories



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

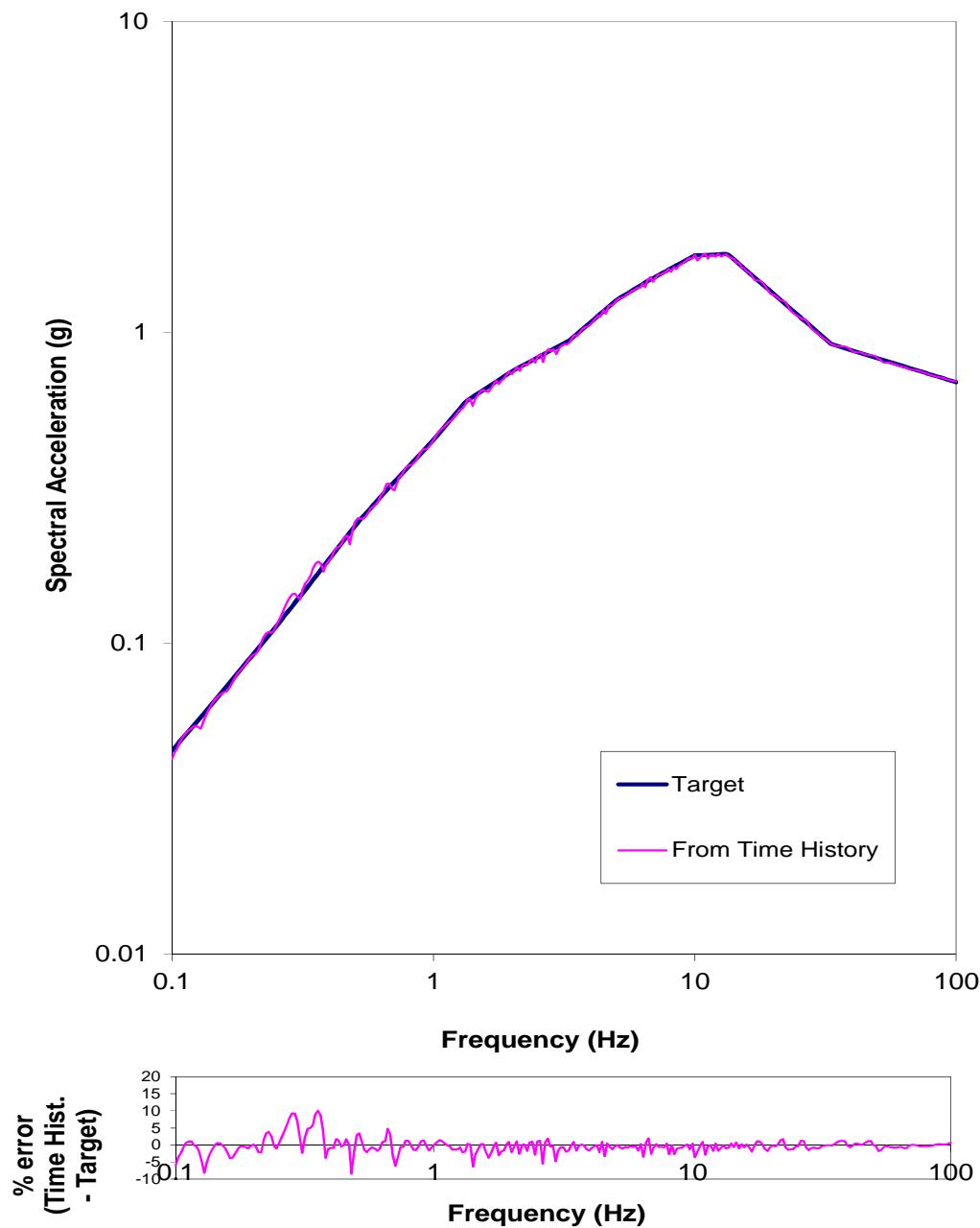
Duzce_DZCUP time history - Cumulative Energy
(Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

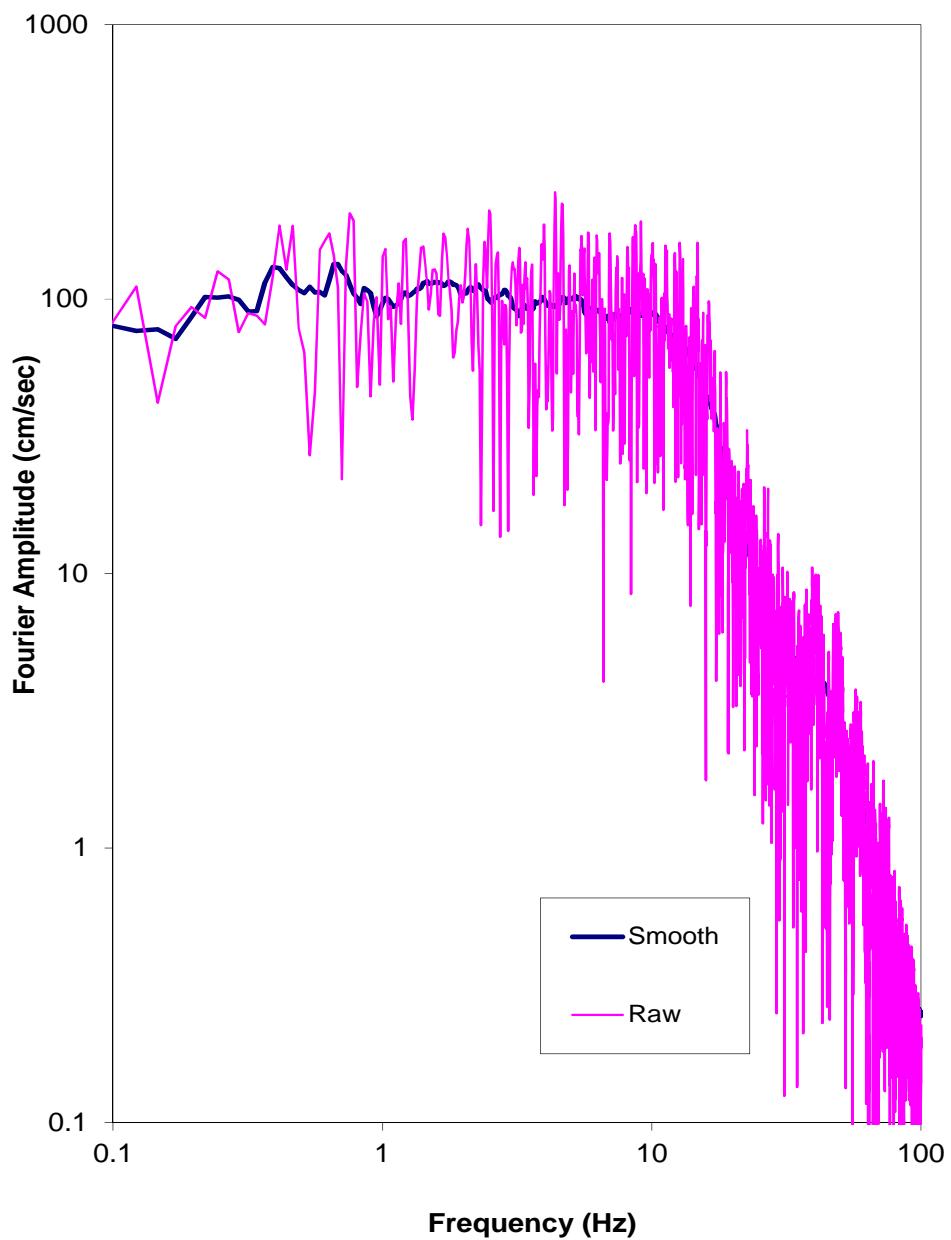
Duzce_DZCUP time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – TARGET AND CALCULATED RESPONSE
SPECTRA

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

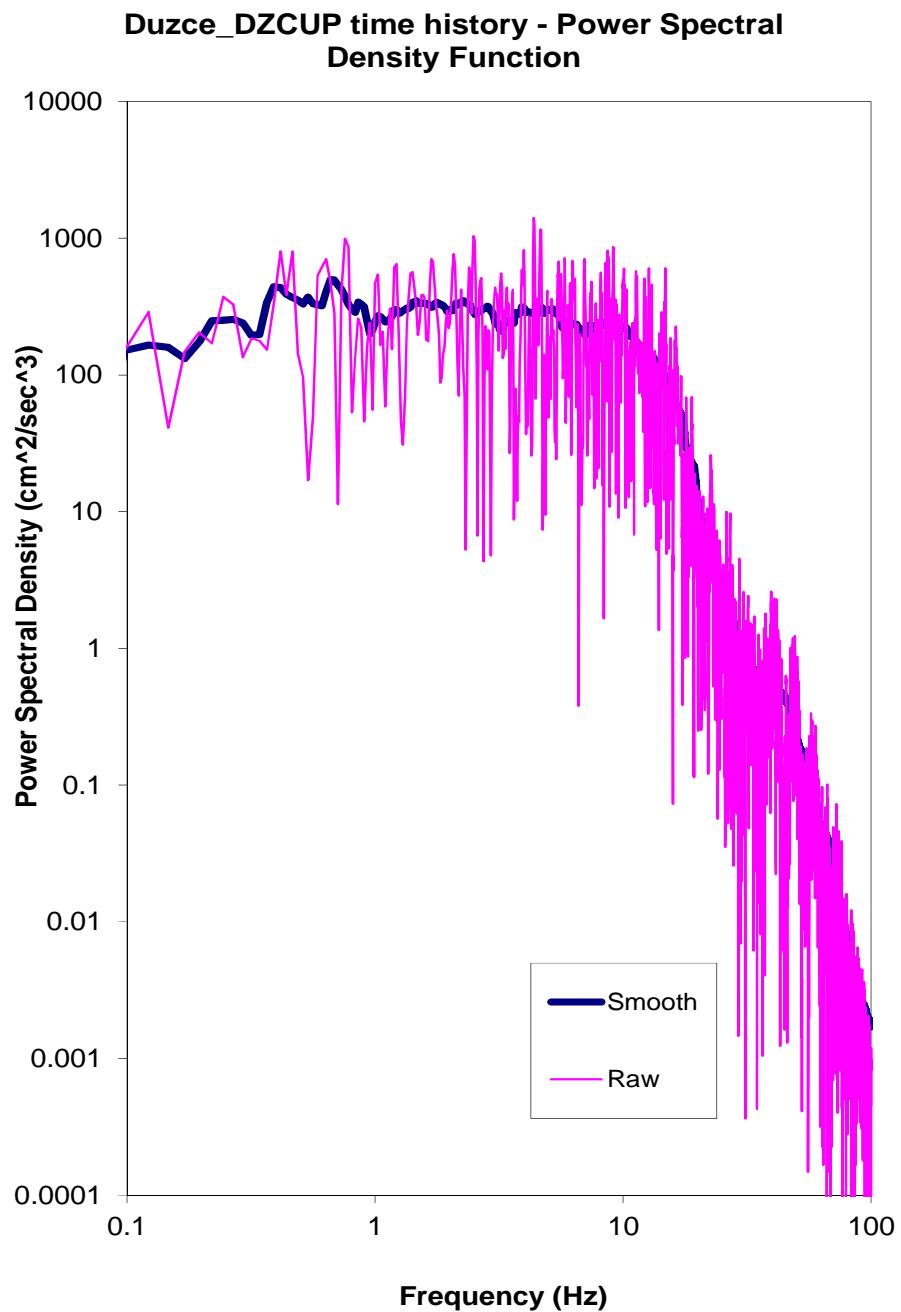
Duzce_DZCUP time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.142



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION – SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Calculation of Correlation Coefficients

Cross-correlation

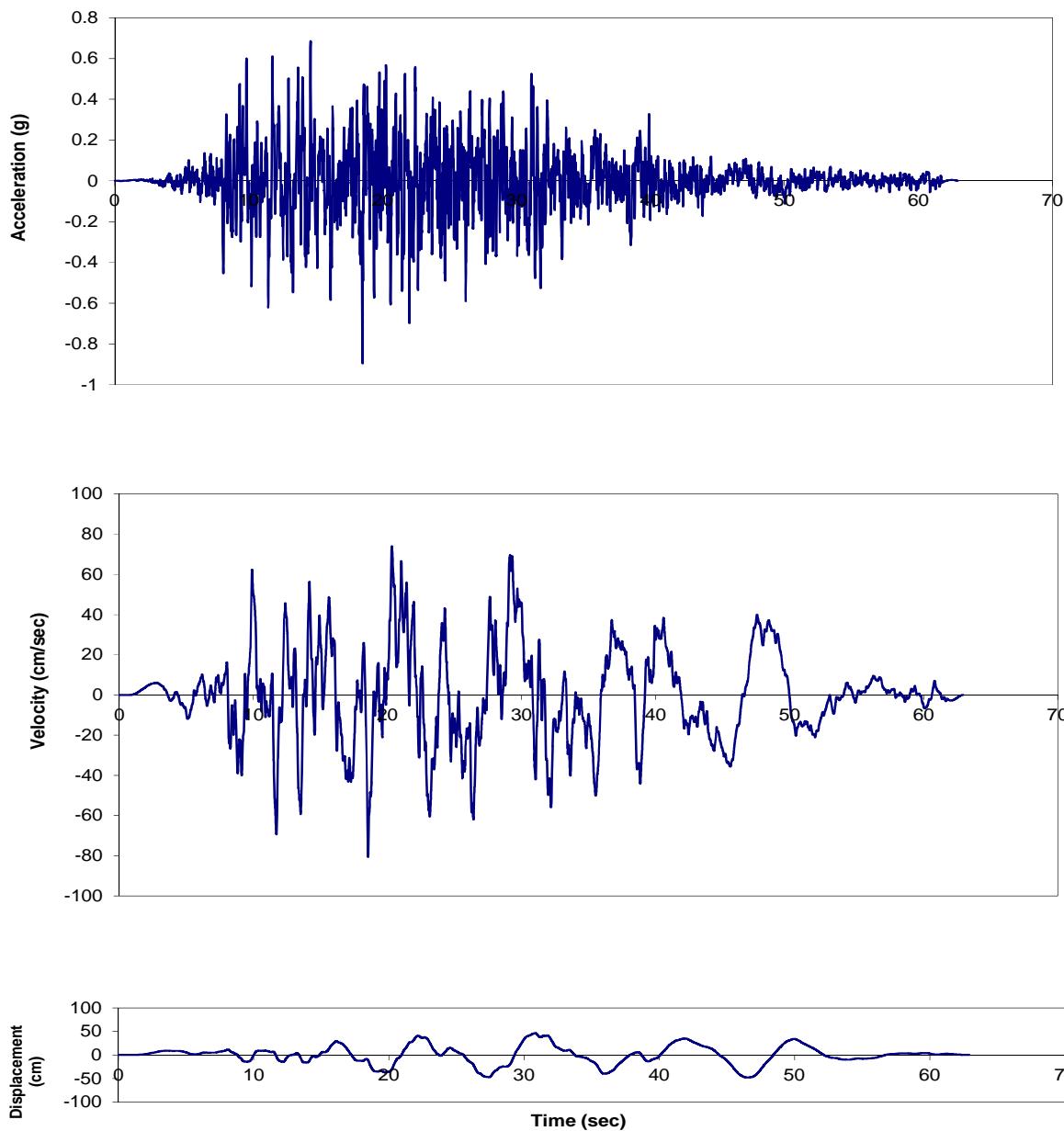
check

Horizontal 1:	Duzce_DZC180
Horizontal 2:	Duzce_DZC270
Vertical:	Duzce_DZCUP
corr, H1-H2	-0.107
corr, H1-V	-0.043
corr, H2-V	0.044

SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION – SPECTRALLY MATCHED DZC MOTION – CALCULATION OF CORRELATION COEFFICIENTS

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

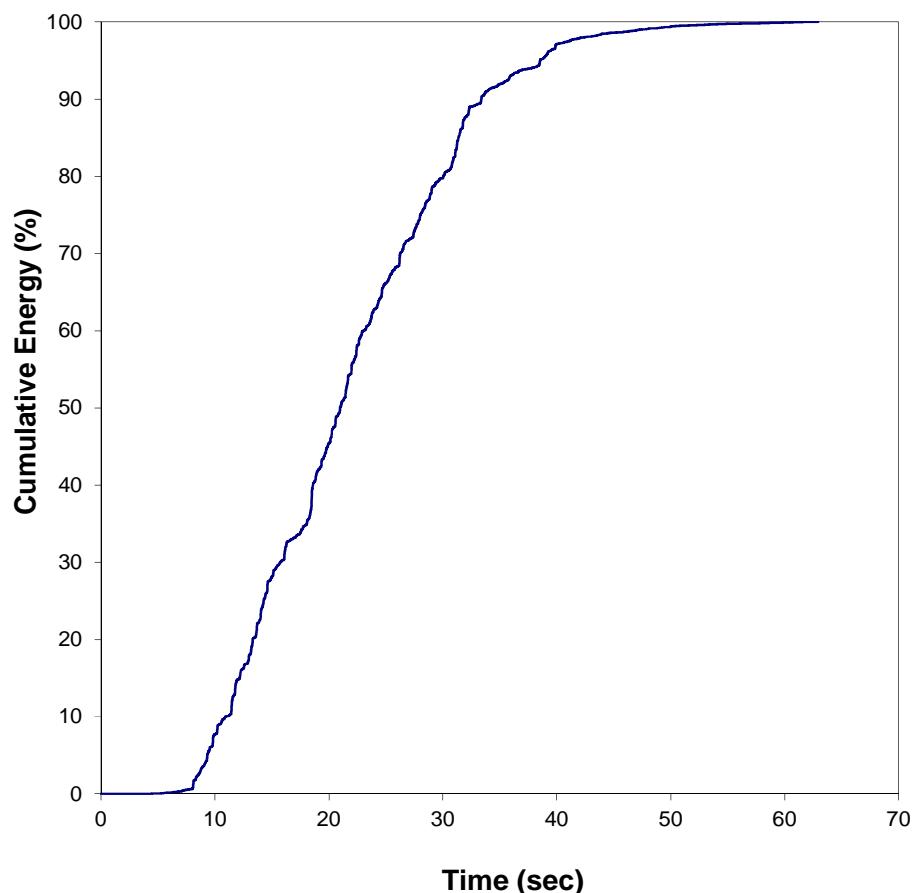
Unio_N00W time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

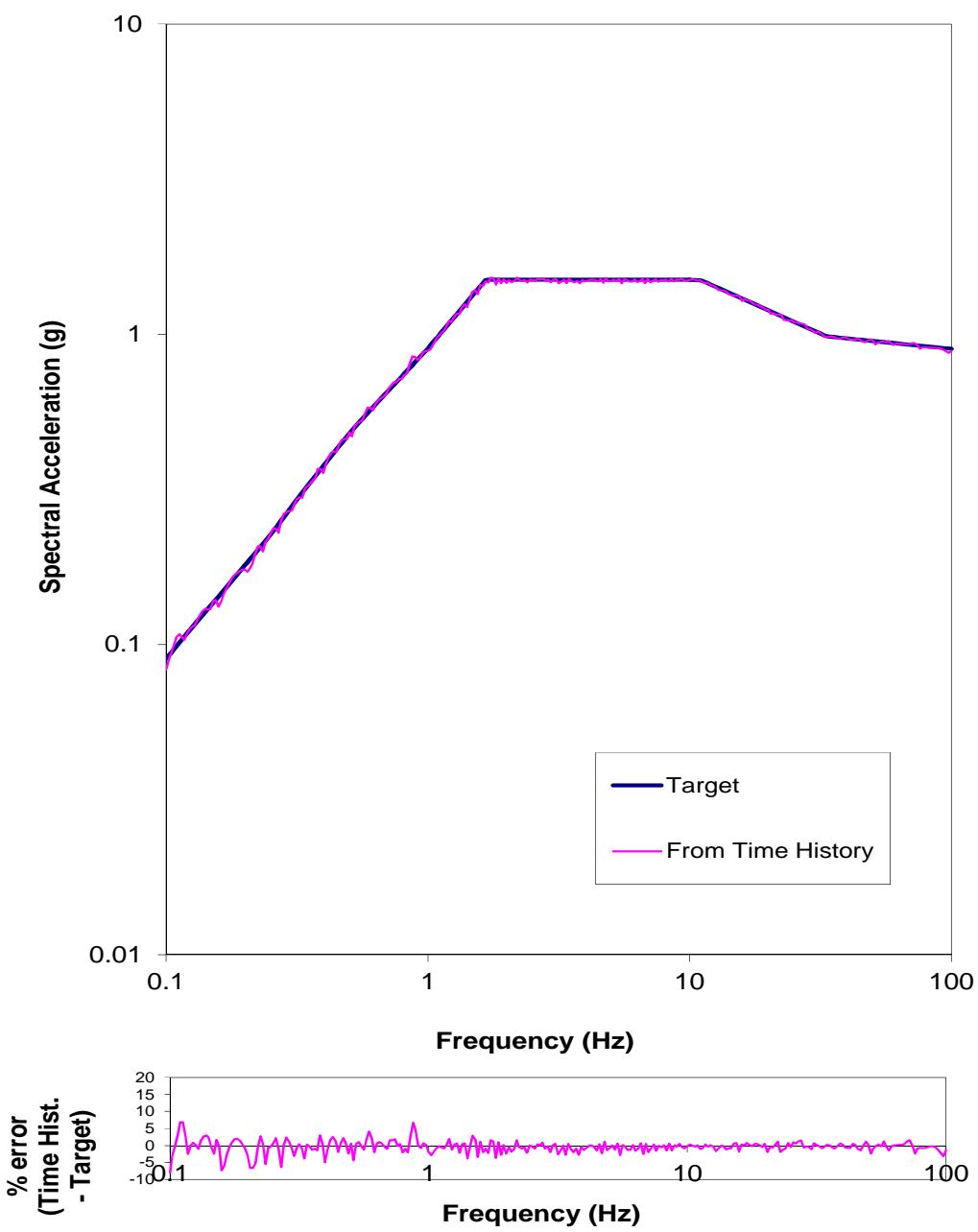
Unio_N00W time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT
NORMAL – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – NORMALIZED
CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

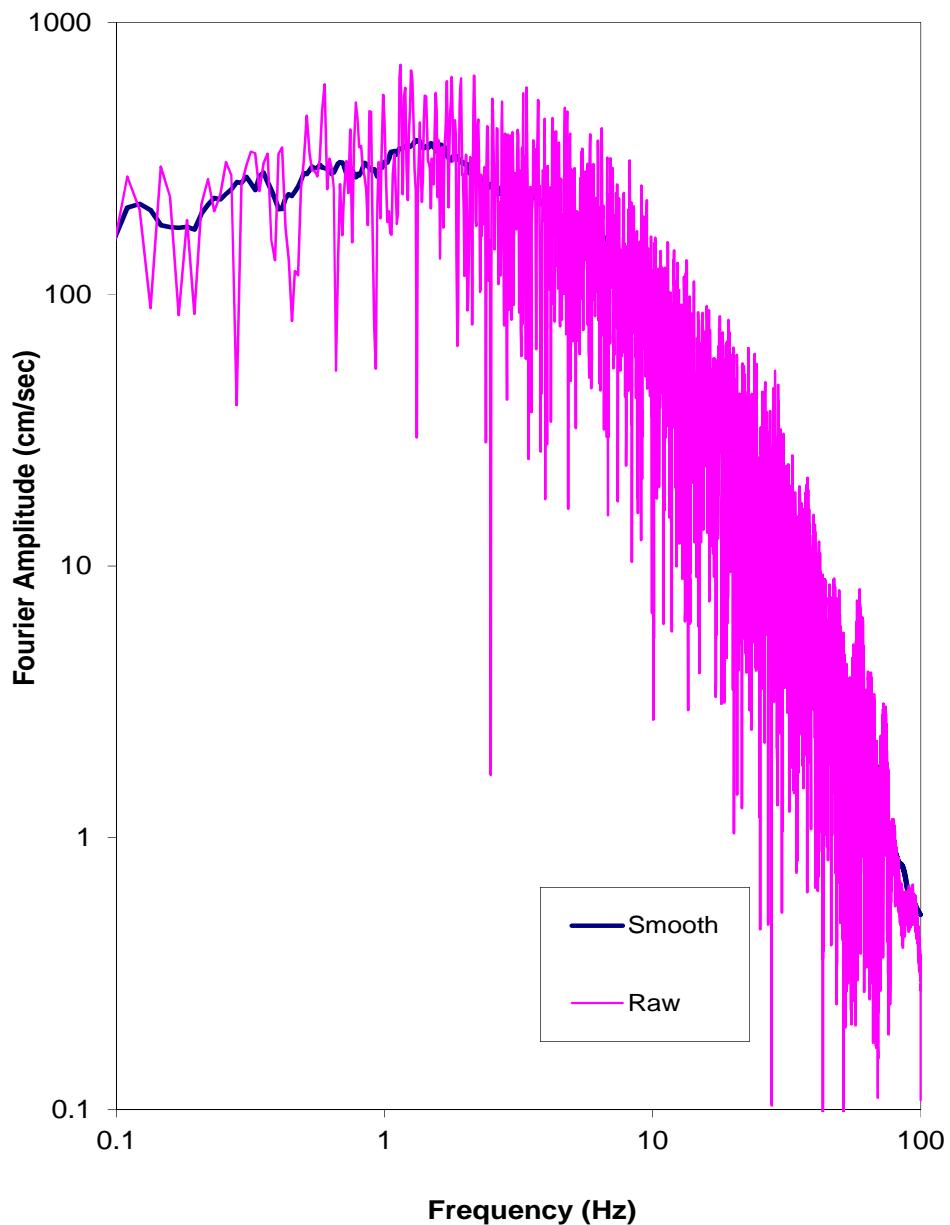
Unio_N00W time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

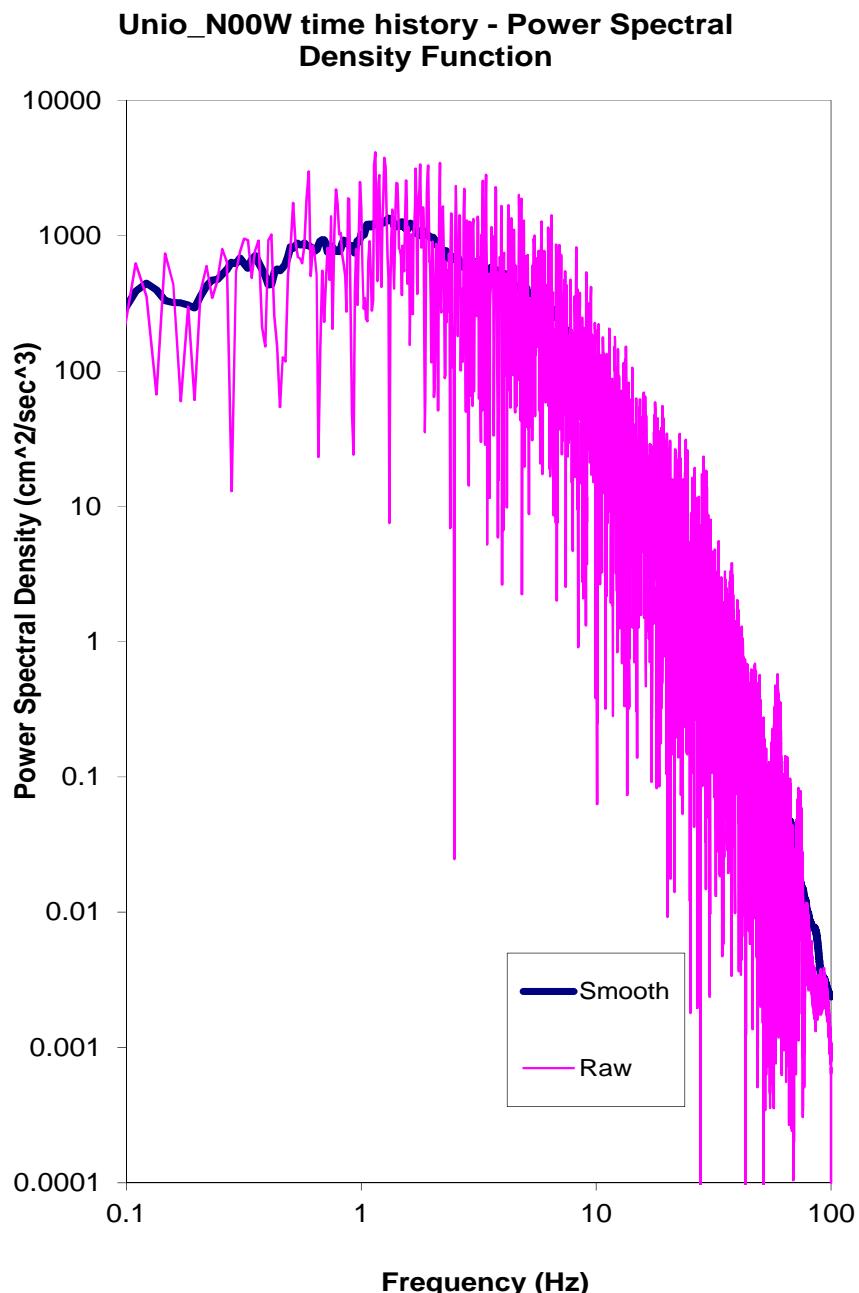
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Unio_N00W time history - Fourier Amplitude Spectra



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT
NORMAL – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – FOURIER AMPLITUDE
SPECTRUM**

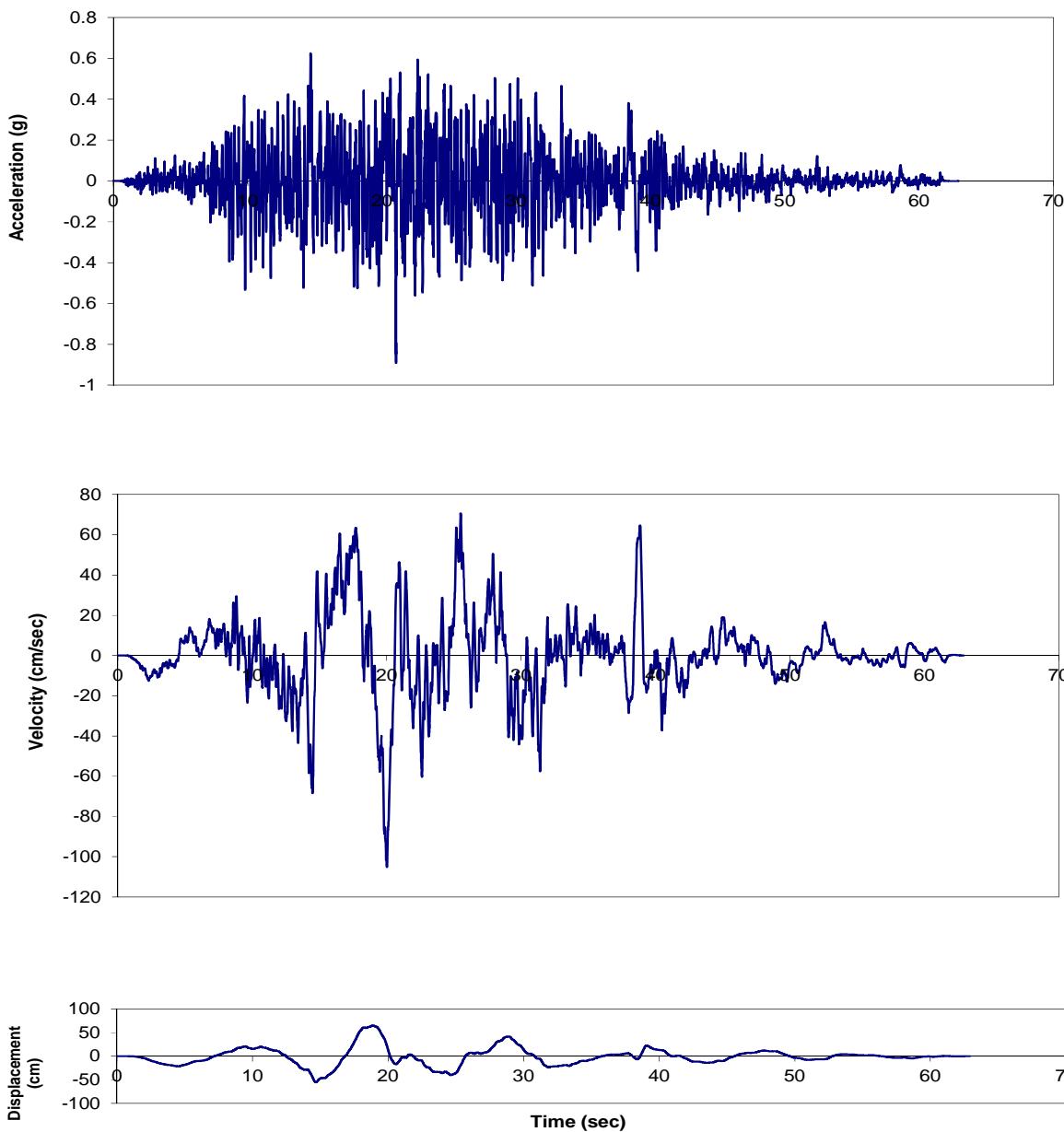
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

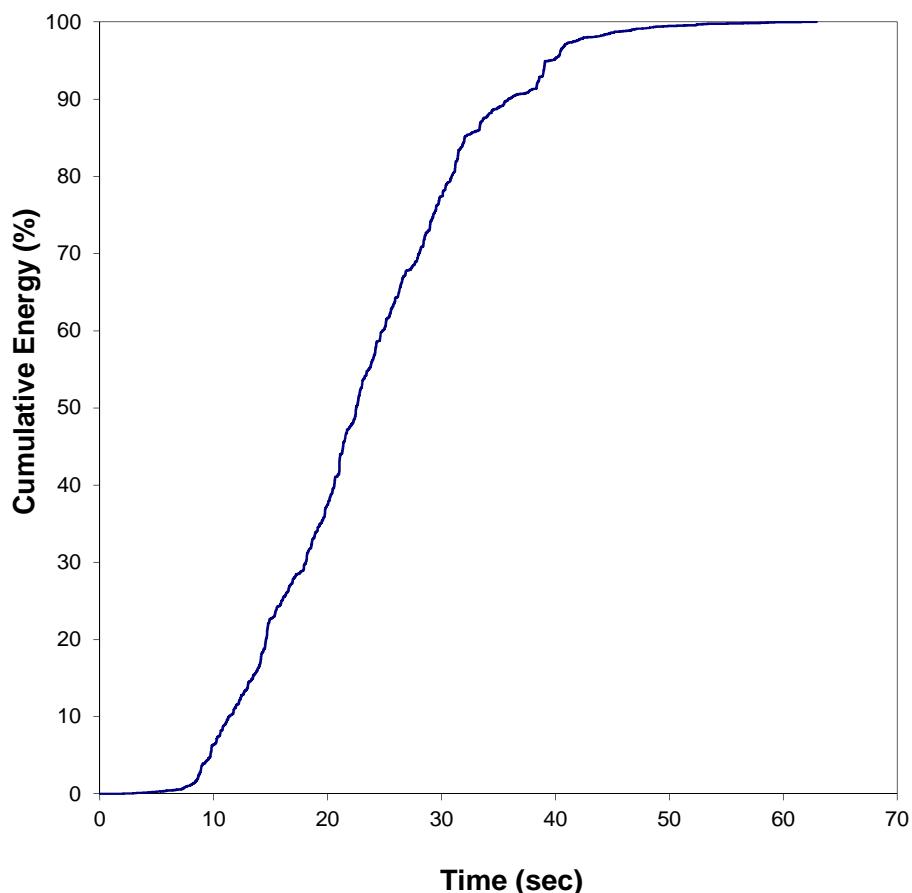
Unio_N90W time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

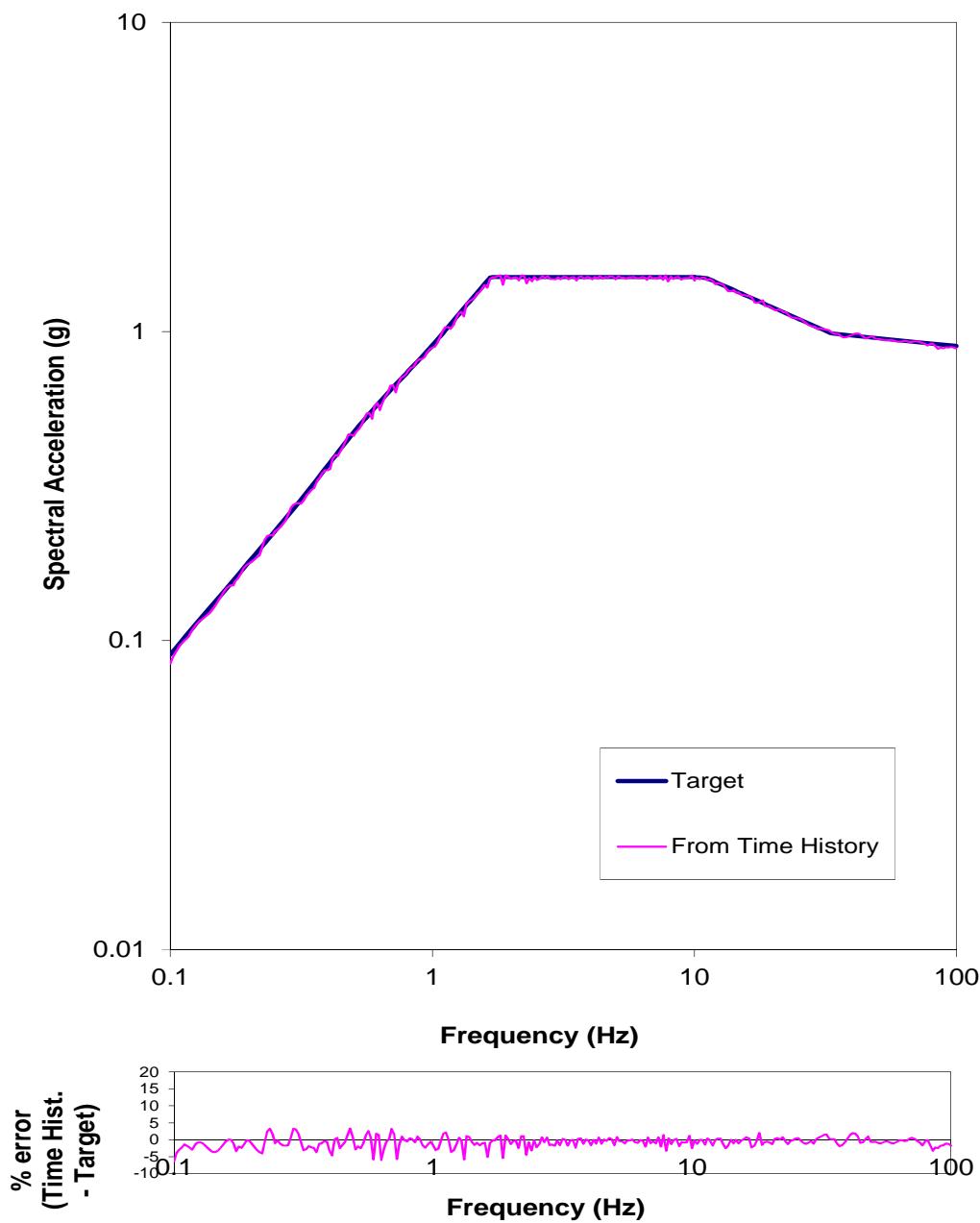
Unio_N90W time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

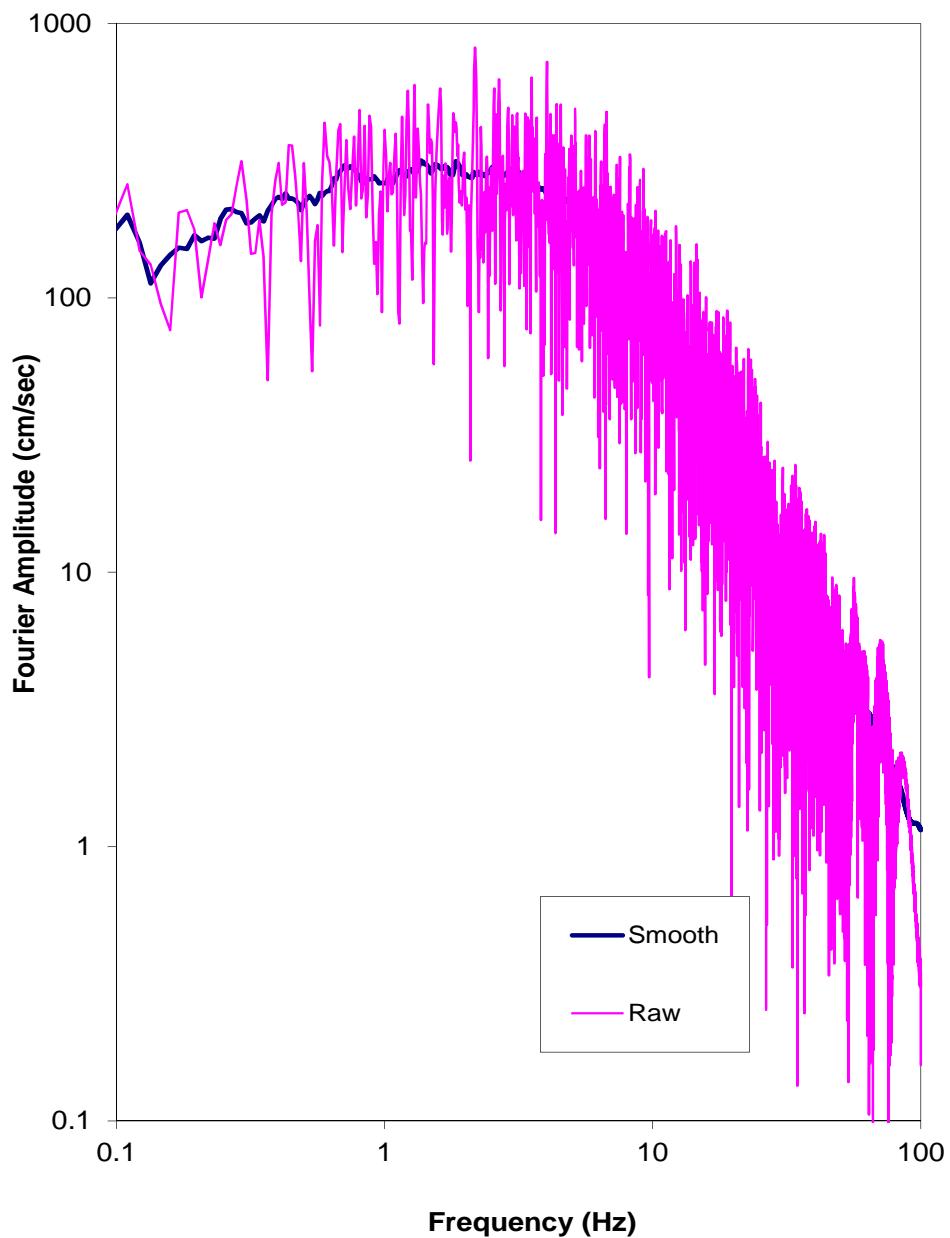
Unio_N90W time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

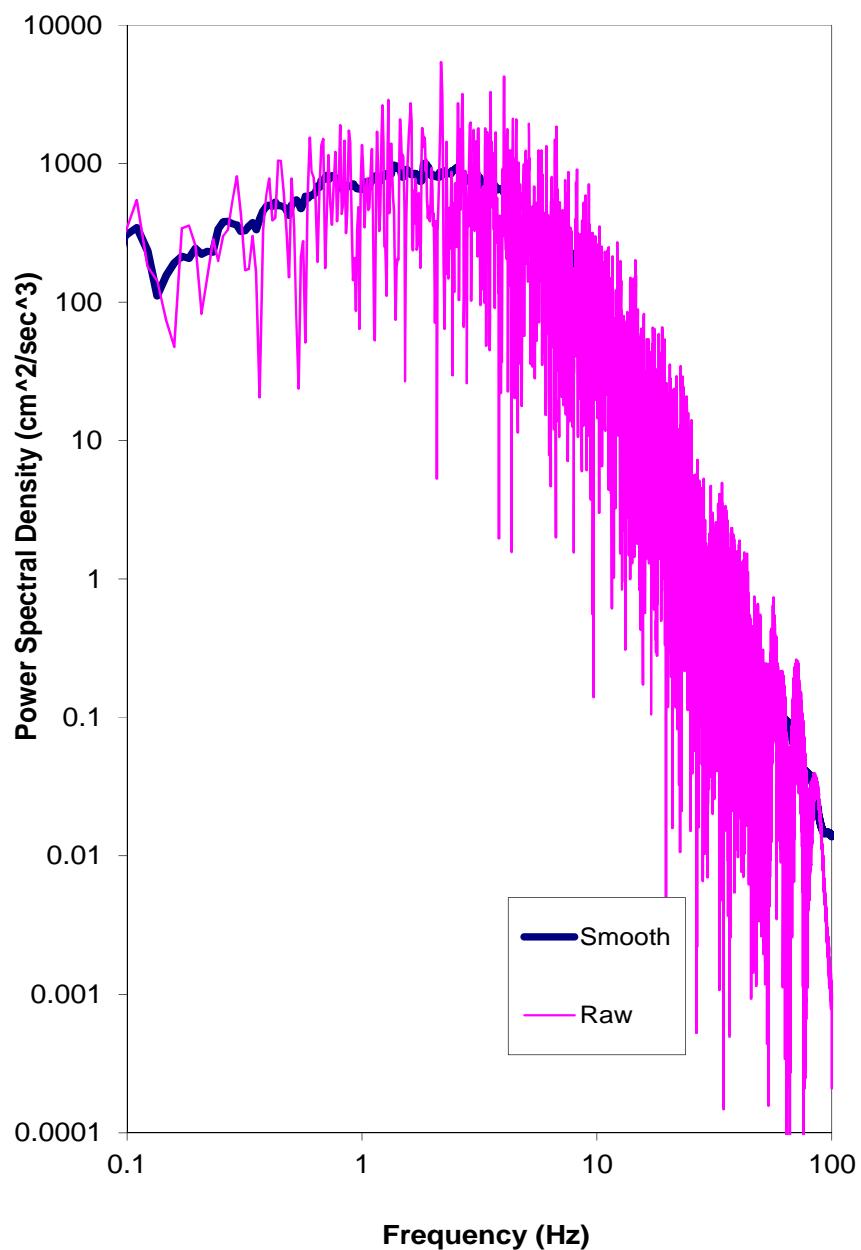
Unio_N90W time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

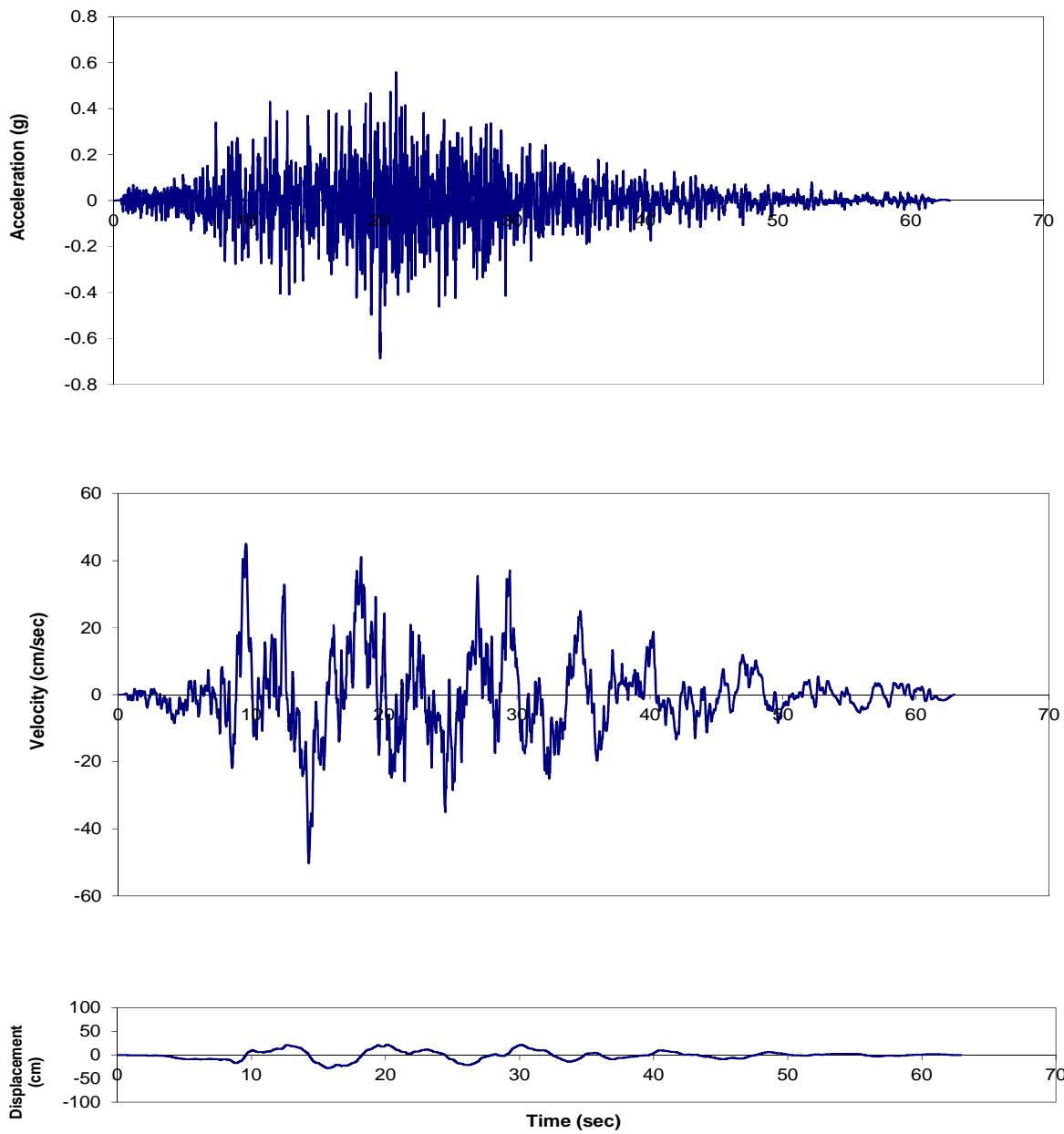
Unio_N90W time history - Power Spectral Density Function



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

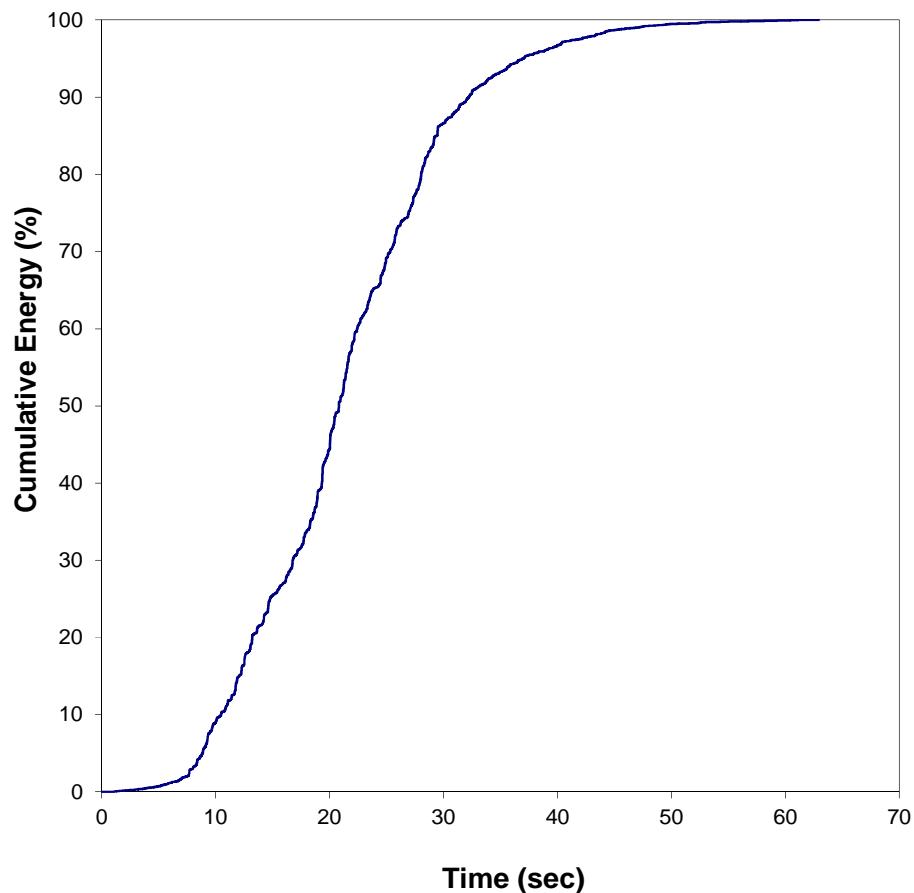
Unio_up time history - Acceleration, Velocity, and Displacement Time Histories



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

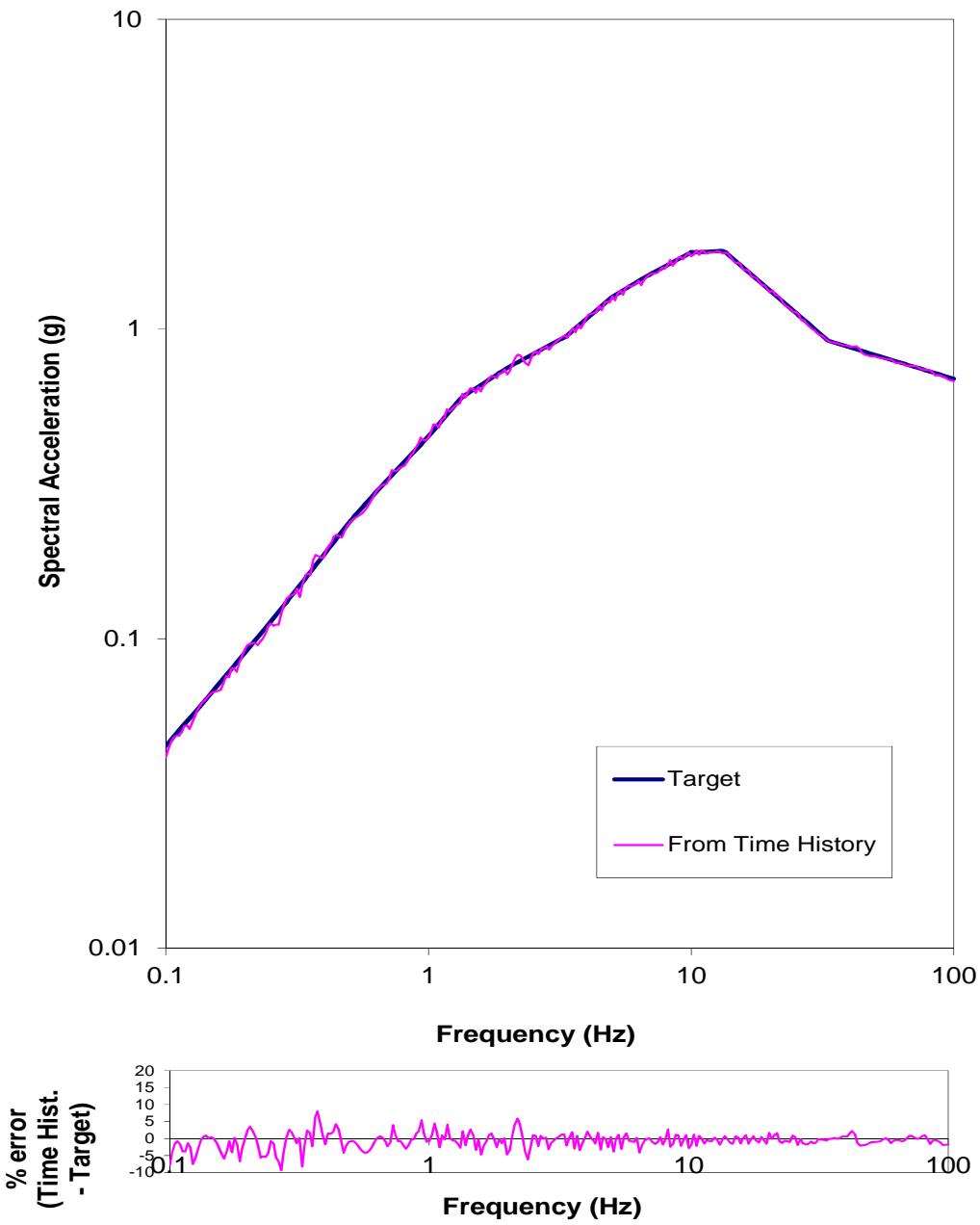
Unio_up time history - Cumulative Energy (Husid) plot



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

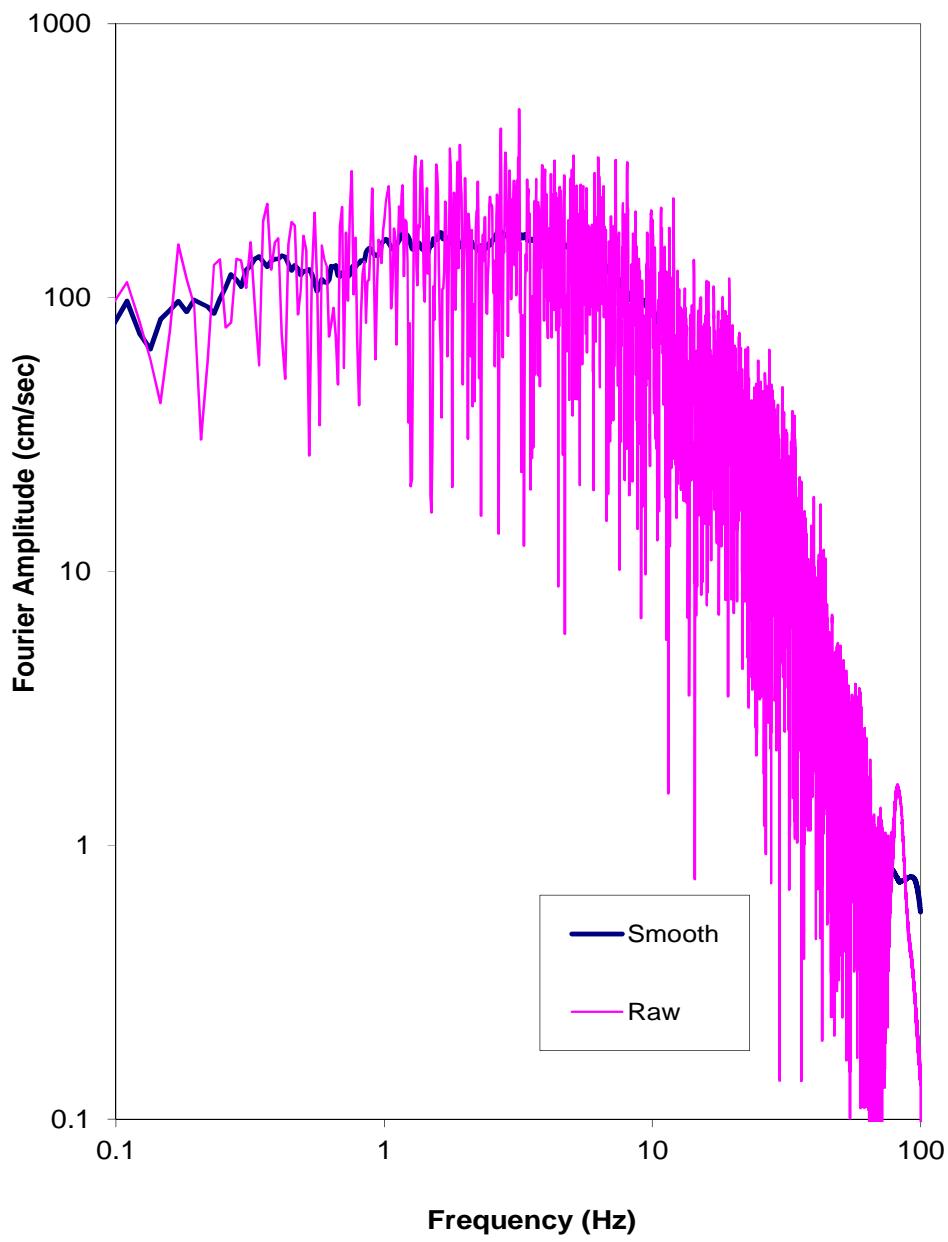
Unio_up time history - Response Spectra



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – TARGET AND CALCULATED RESPONSE
SPECTRA**

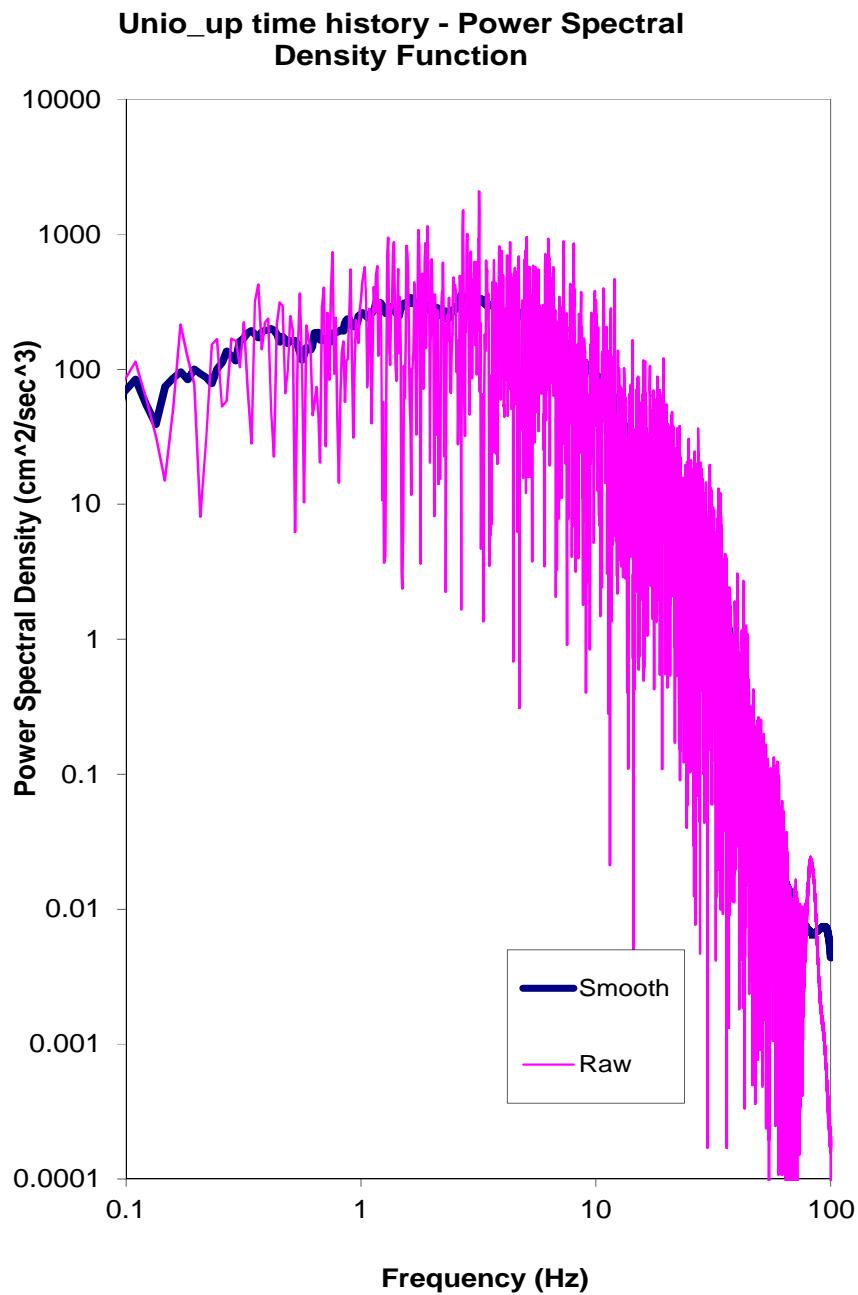
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Unio_up time history - Fourier Amplitude Spectra



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION –
SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – POWER SPECTRAL DENSITY FUNCTION**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Calculation of Correlation Coefficients

Cross-correlation

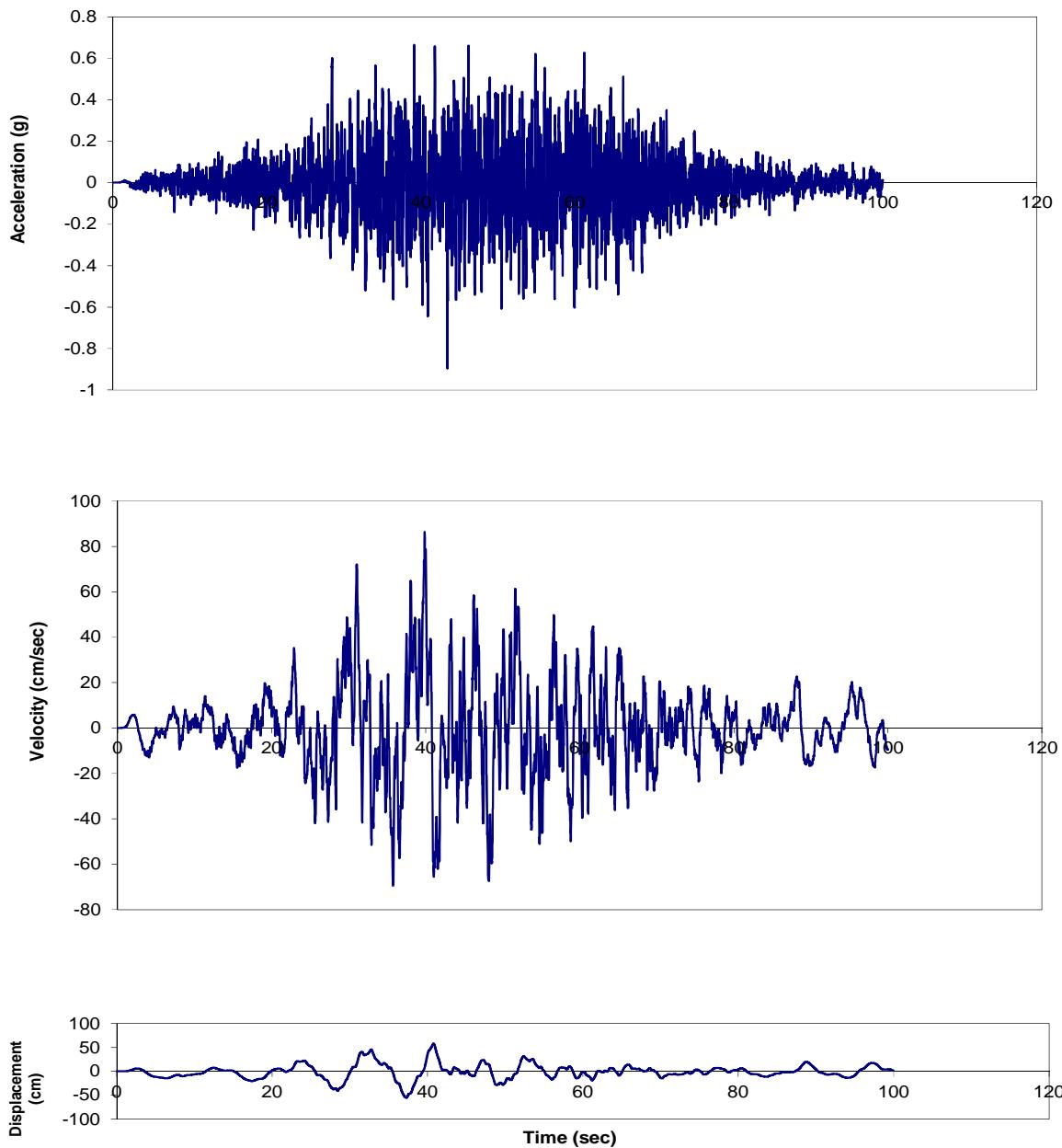
check

Horizontal 1:	UNIO_N00W
Horizontal 2:	UNIO_N90W
Vertical:	UNIO_up
corr, H1-H2	-0.123
corr, H1-V	0.026
corr, H2-V	-0.030

SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – ONSHORE LOCATION – SPECTRALLY MATCHED UNIO MOTION – CALCULATION OF CORRELATION COEFFICIENTS

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

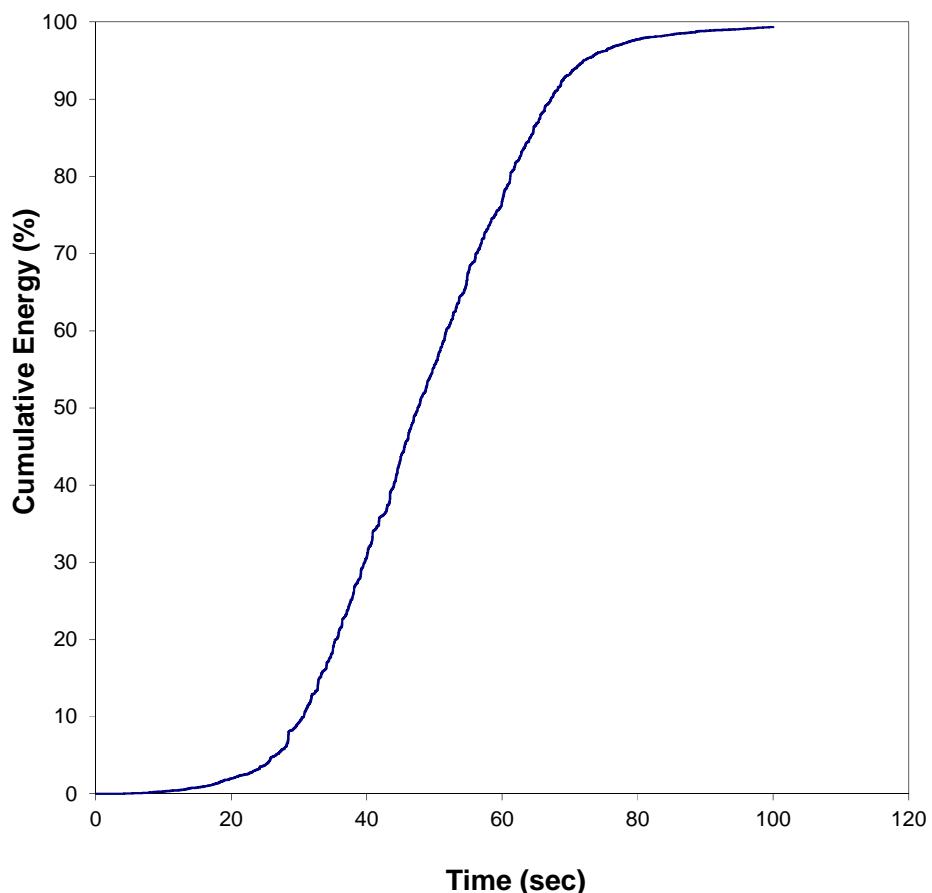
chile_mep_ew time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

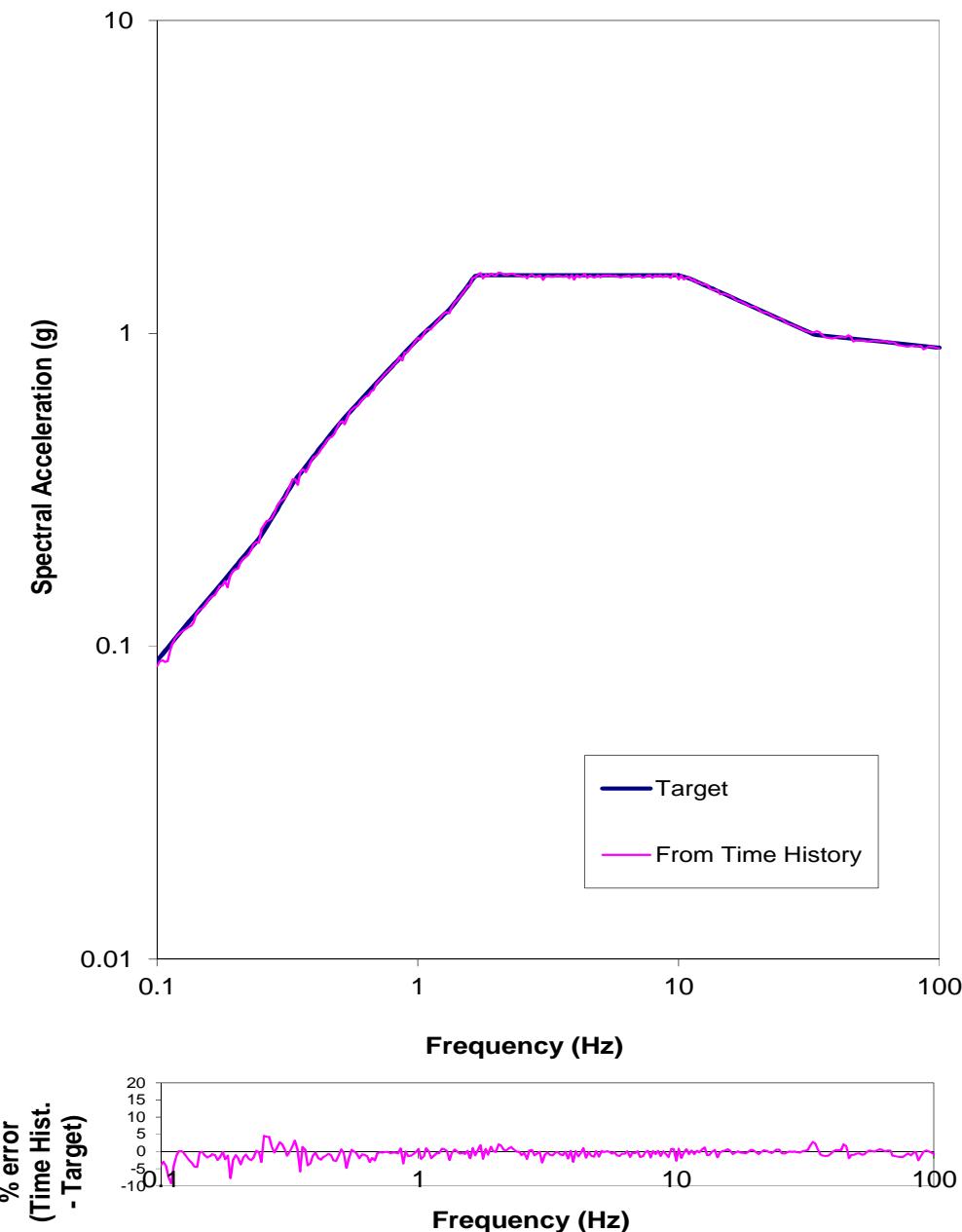
chile_mep_ew time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

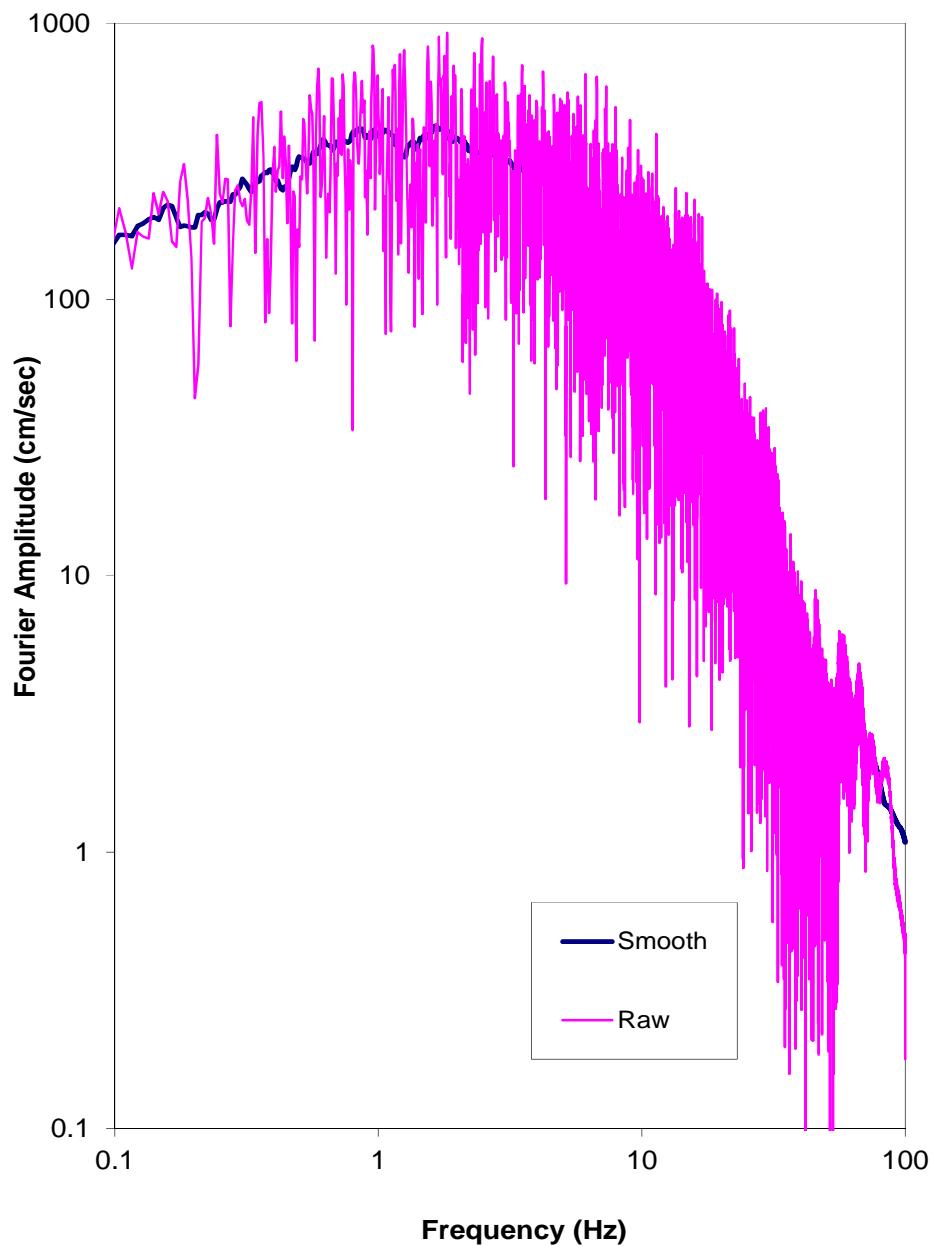
chile_mep_ew time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

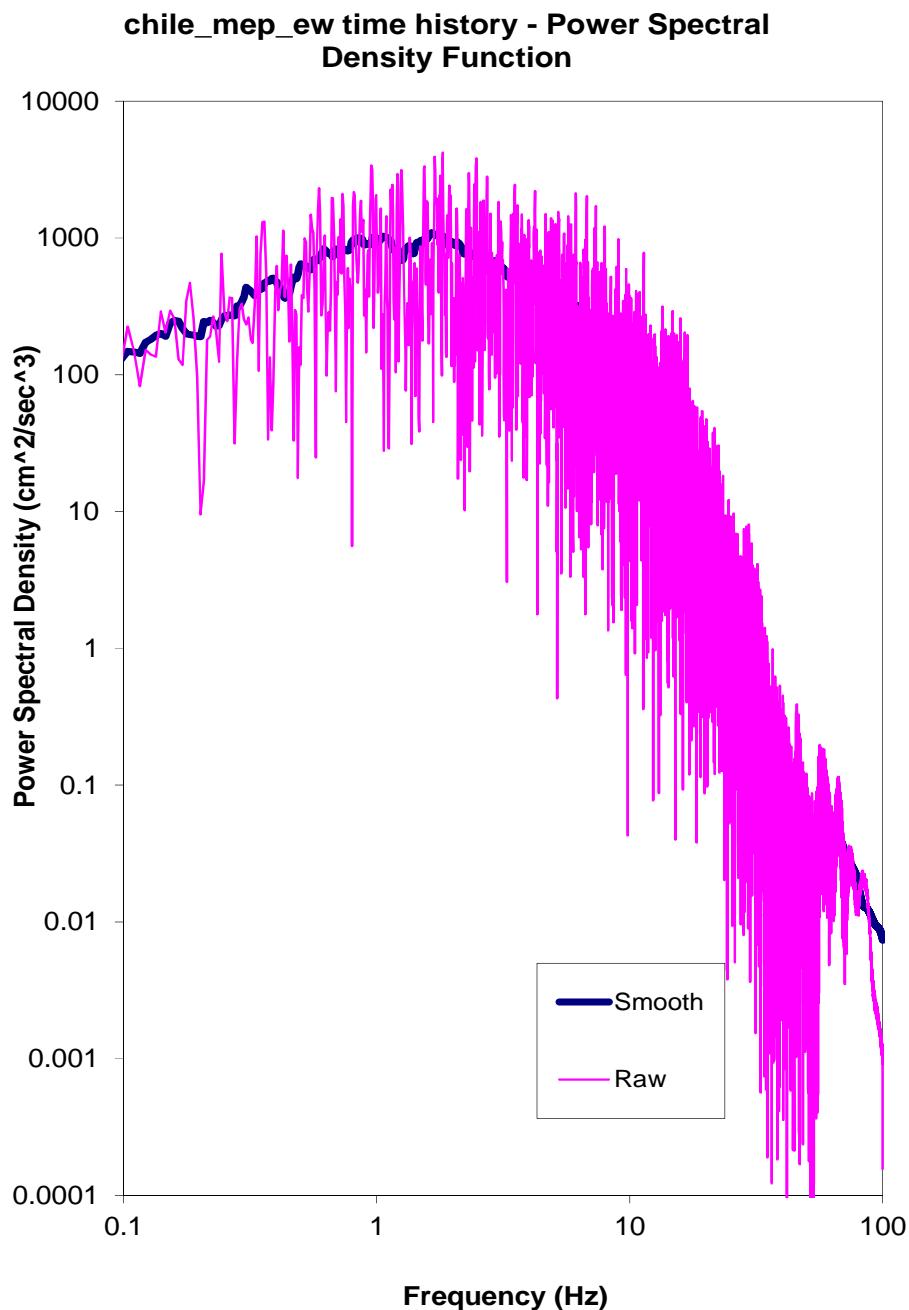
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_ew time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – FOURIER AMPLITUDE SPECTRUM

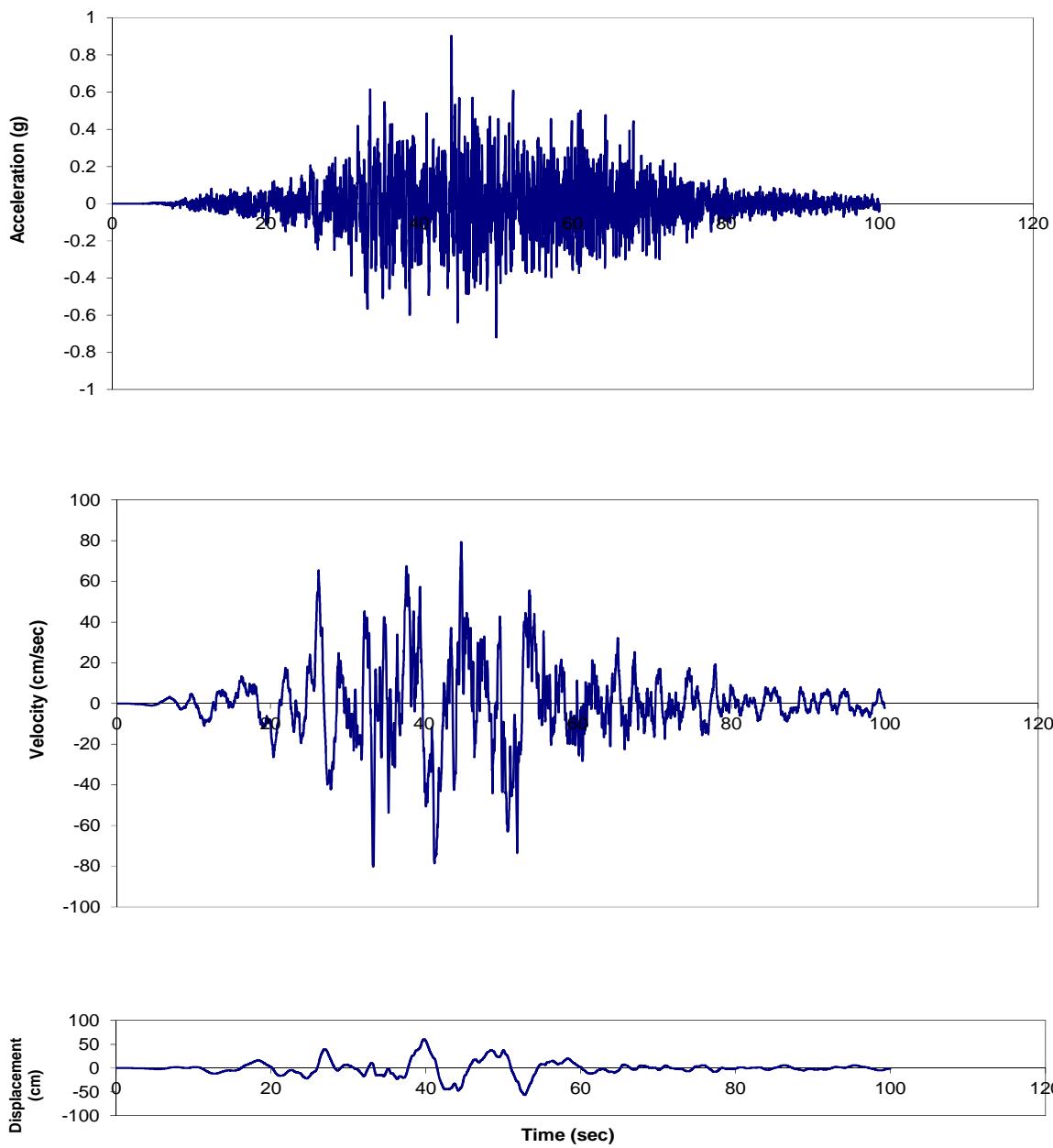
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – POWER SPECTRAL DENSITY FUNCTION

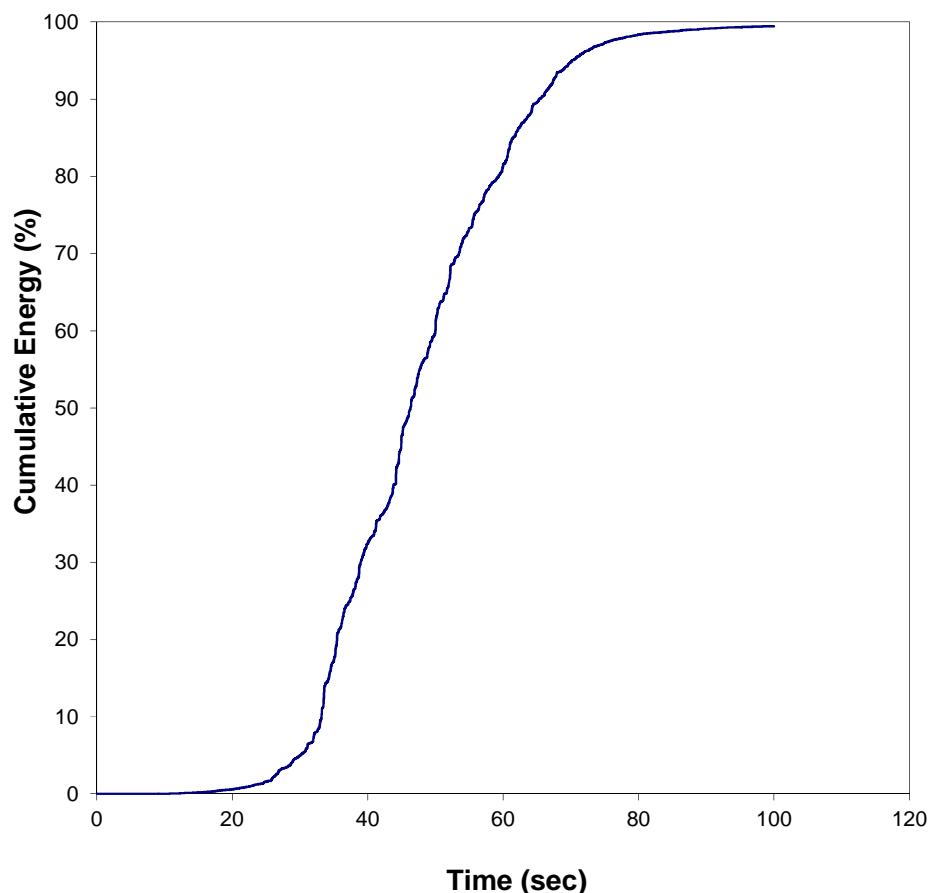
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_ns time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

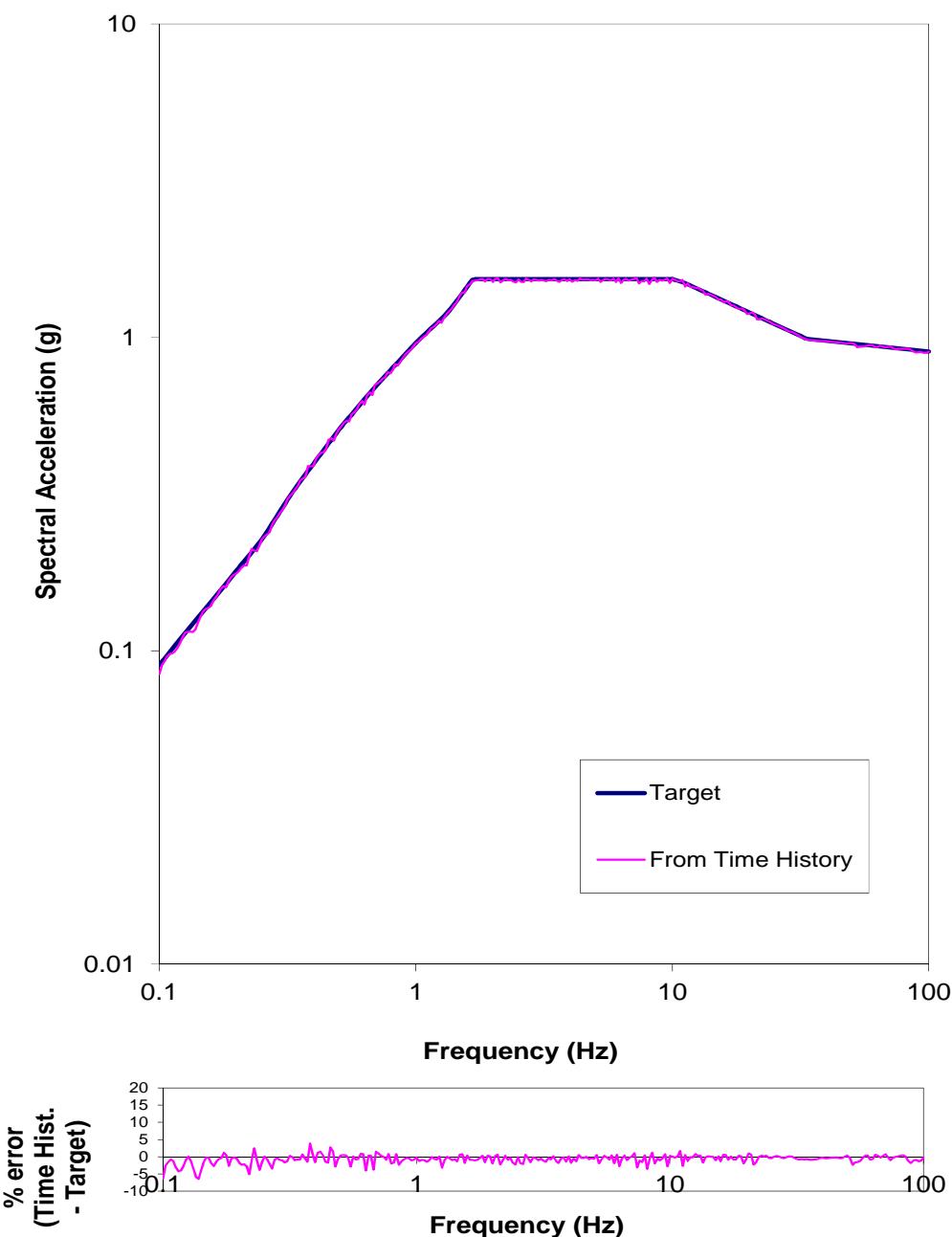
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_ns time history - Cumulative Energy (Husid) plot

SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

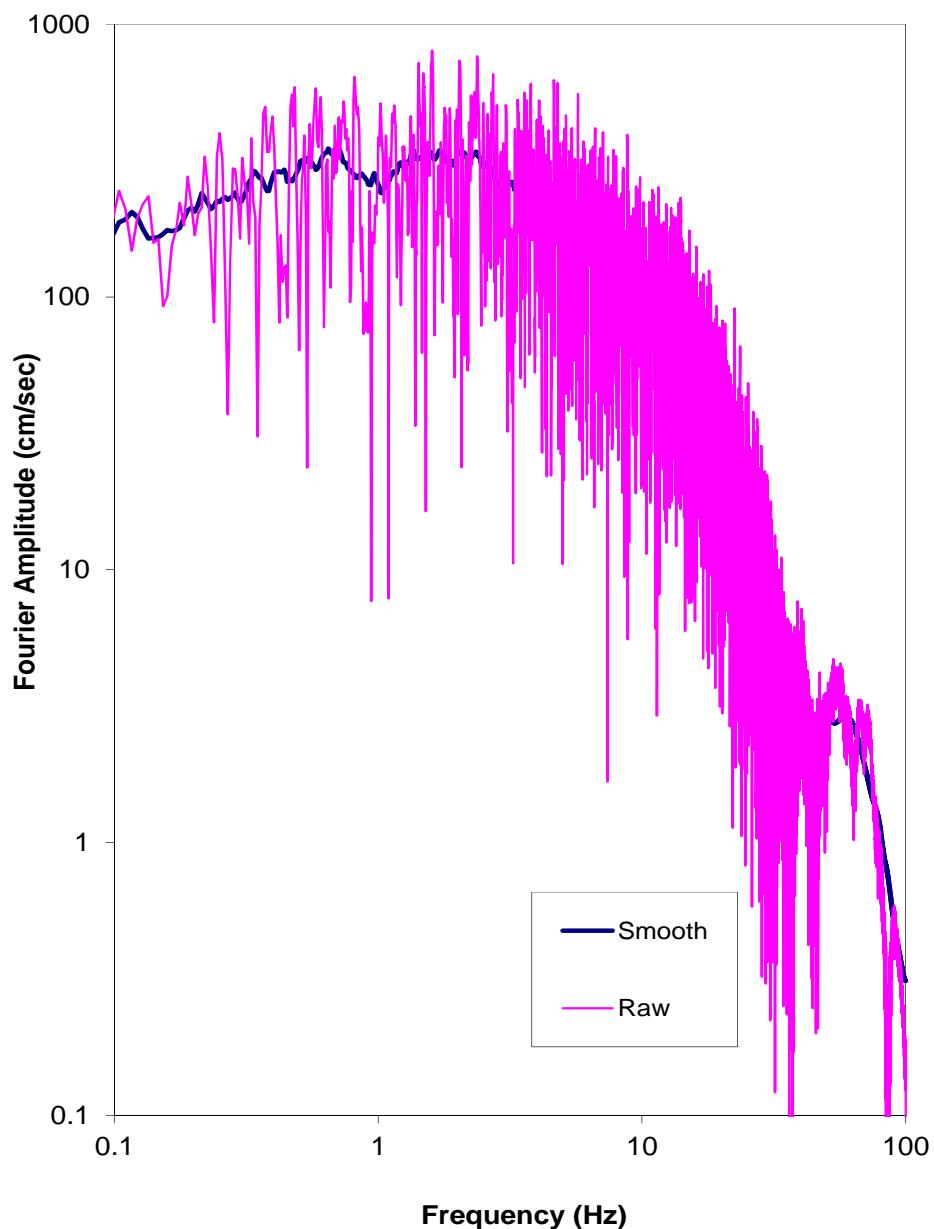
chile_mep_ns time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

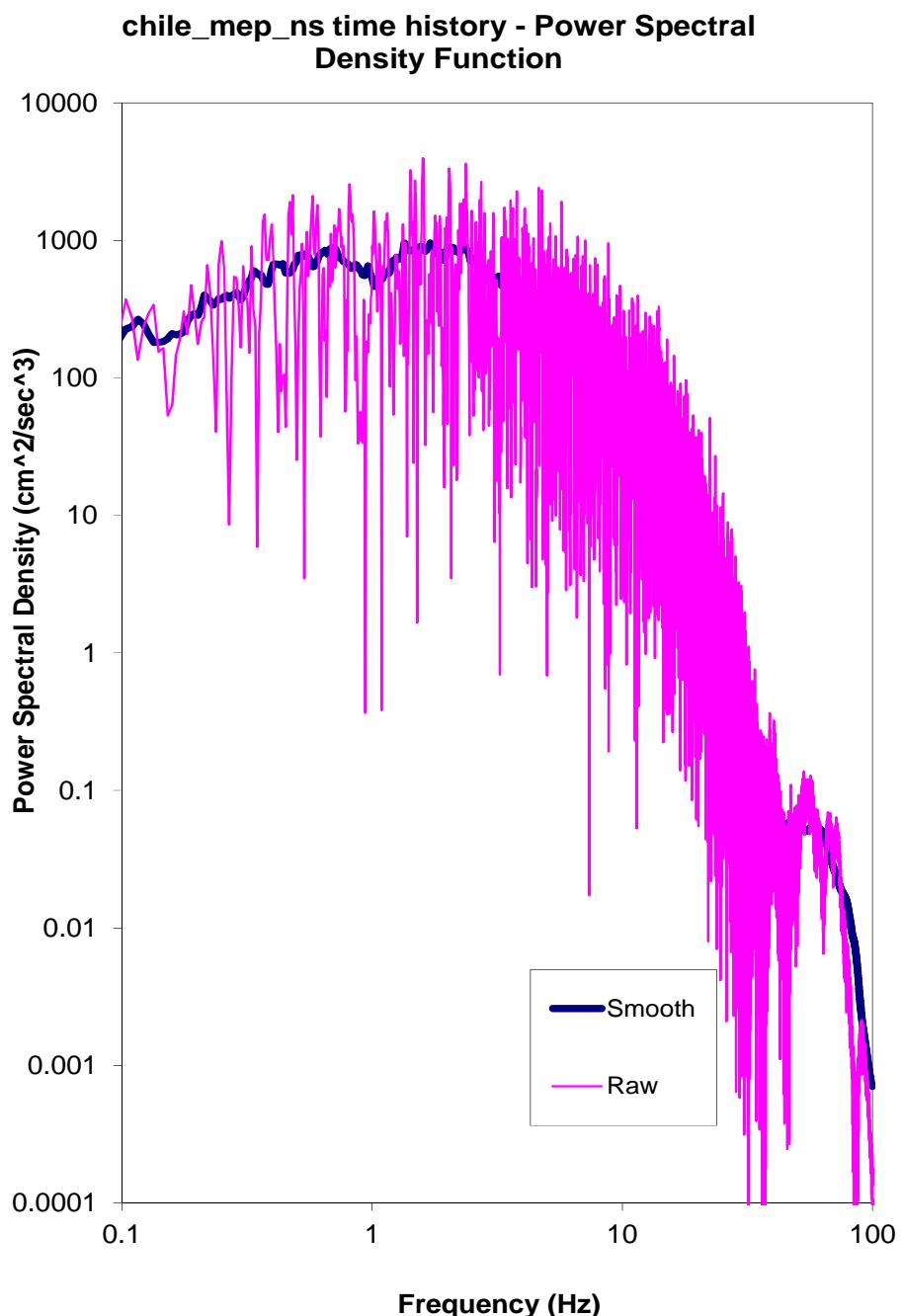
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_ns time history - Fourier Amplitude Spectra



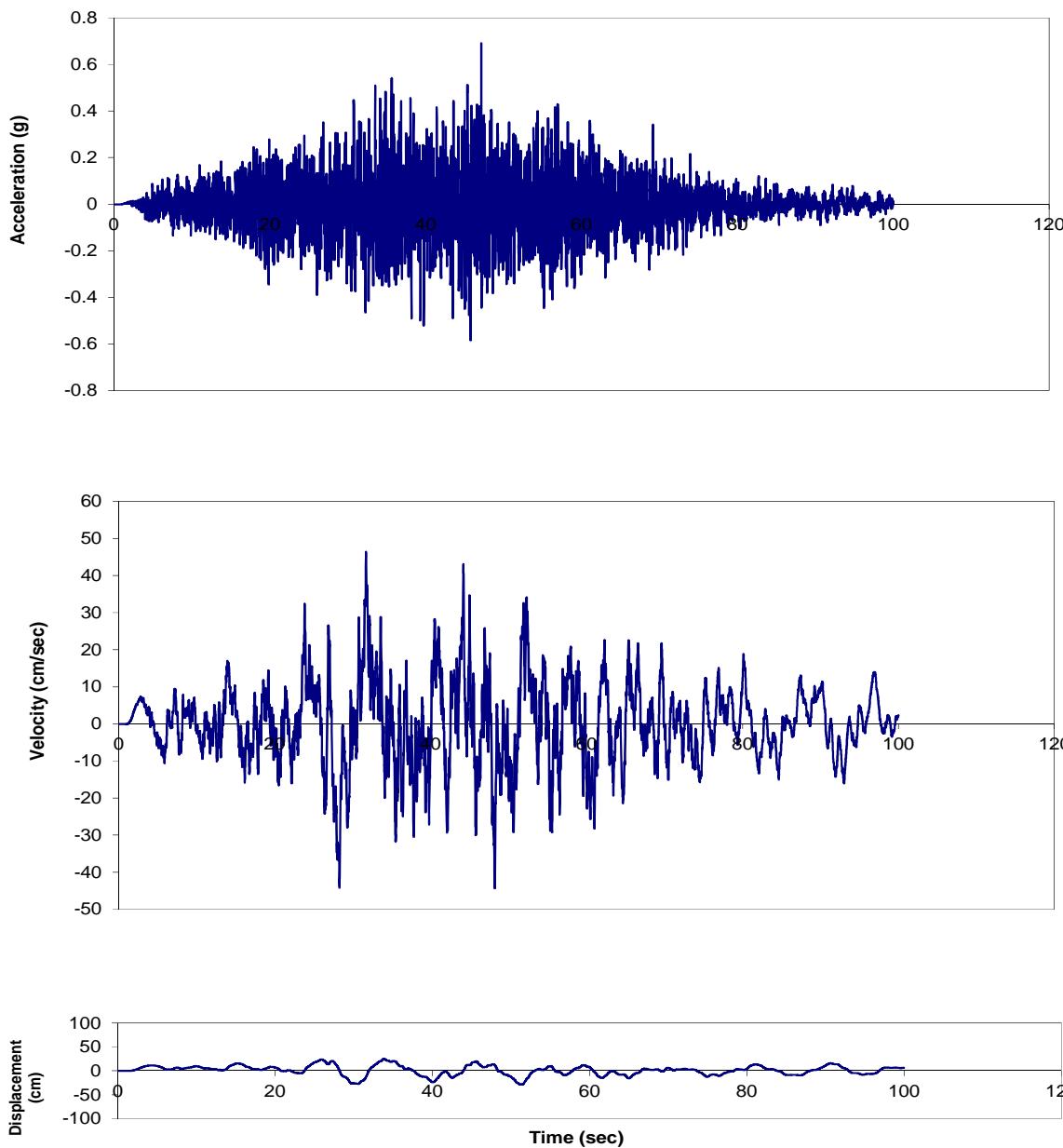
SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – POWER SPECTRAL DENSITY FUNCTION

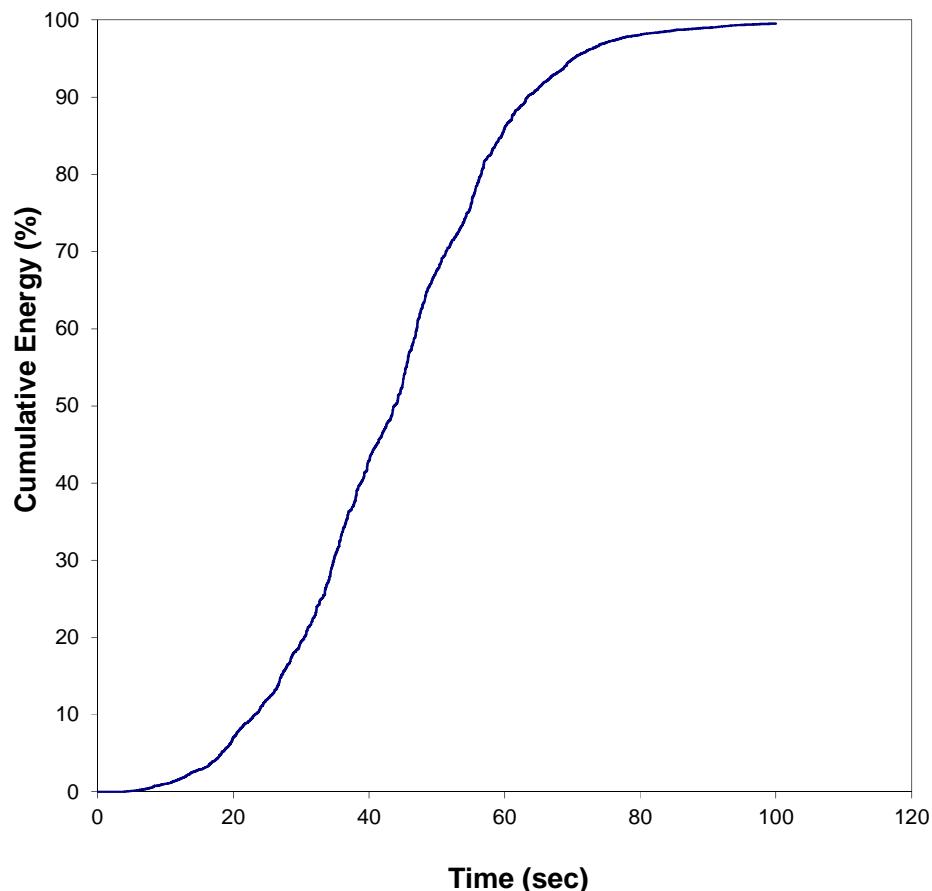
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_v time history - Acceleration, Velocity, and Displacement Time Histories


**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED MEP MOTION, V COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

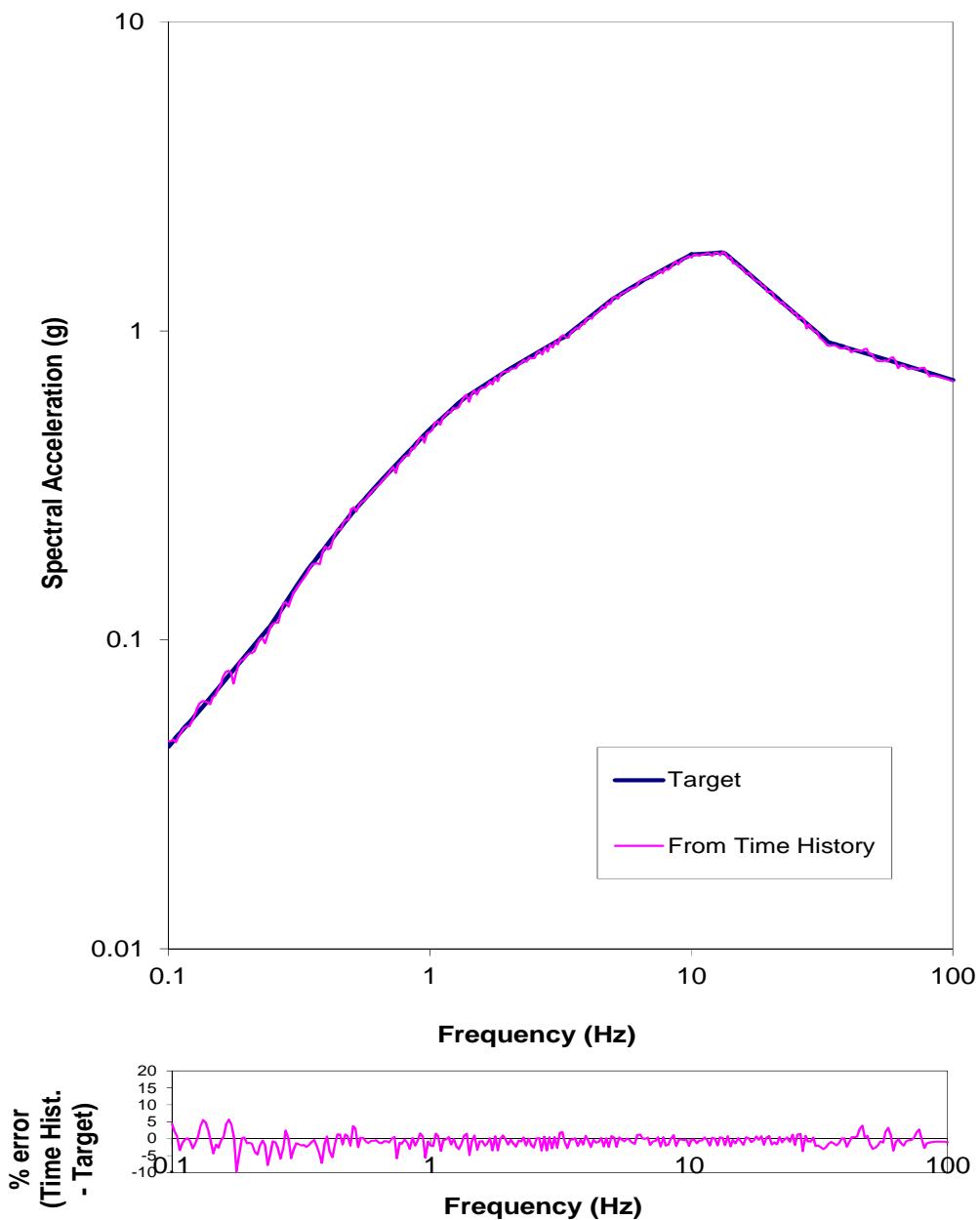
chile_mep_v time history - Cumulative Energy (Husid) plot



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED MEP MOTION, V COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT**

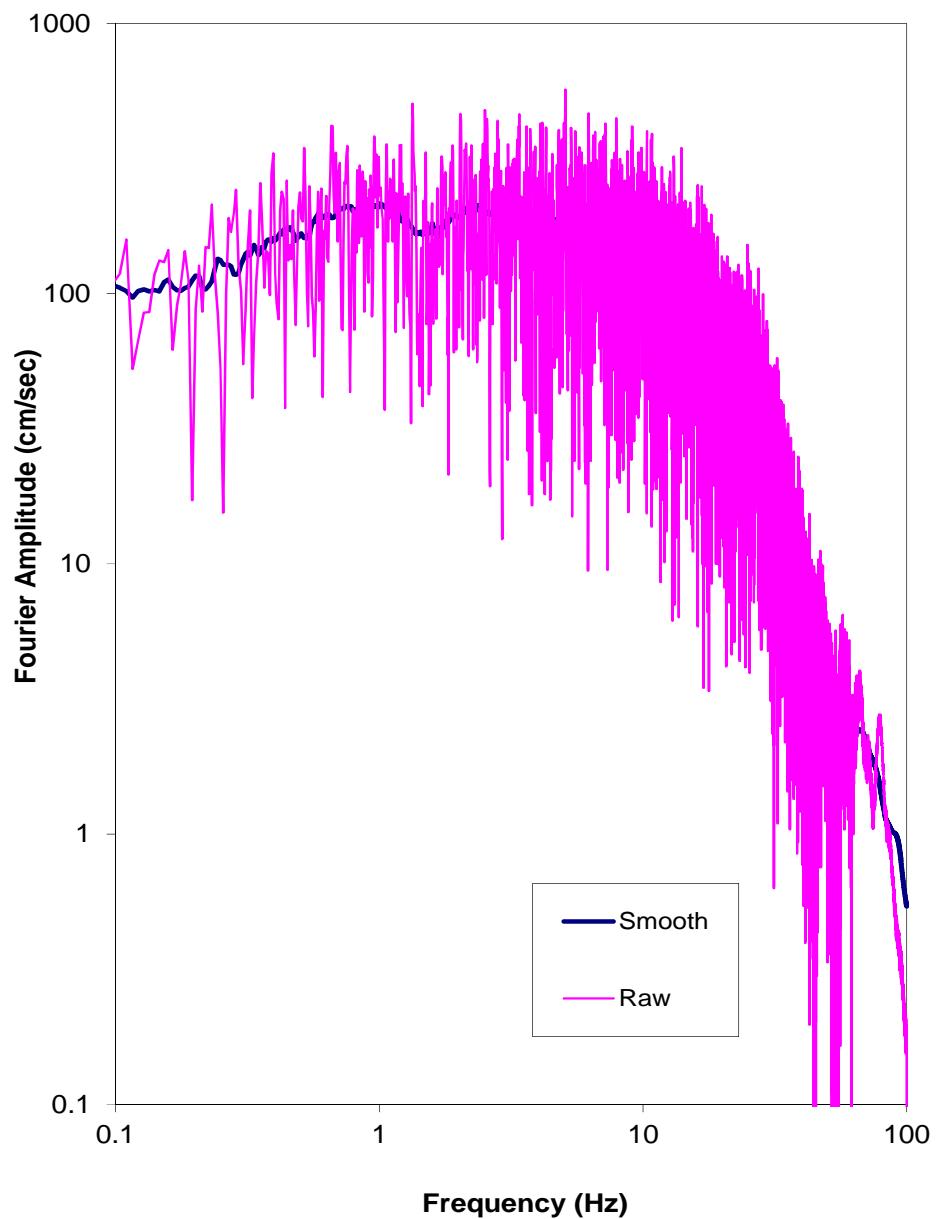
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_v time history - Response Spectra



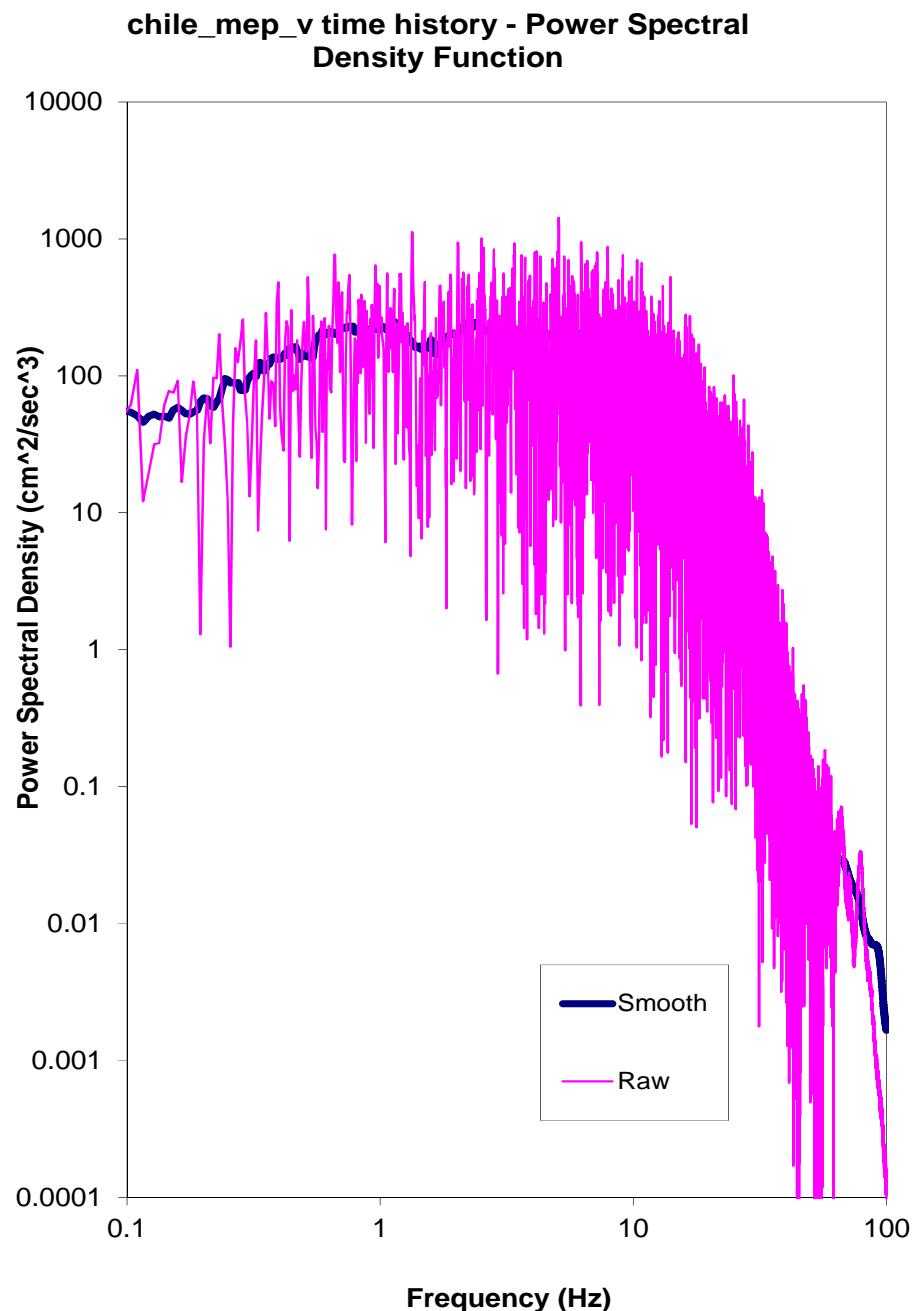
**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED MEP MOTION, V COMPONENT – TARGET AND CALCULATED RESPONSE
SPECTRA**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_v time history - Fourier Amplitude Spectra

**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED MEP MOTION, V COMPONENT – FOURIER AMPLITUDE SPECTRUM**

LNG FACILITIES
ALASKA LNG PROJECT
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**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED MEP MOTION, V COMPONENT – POWER SPECTRAL DENSITY FUNCTION**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Calculation of Correlation Coefficients

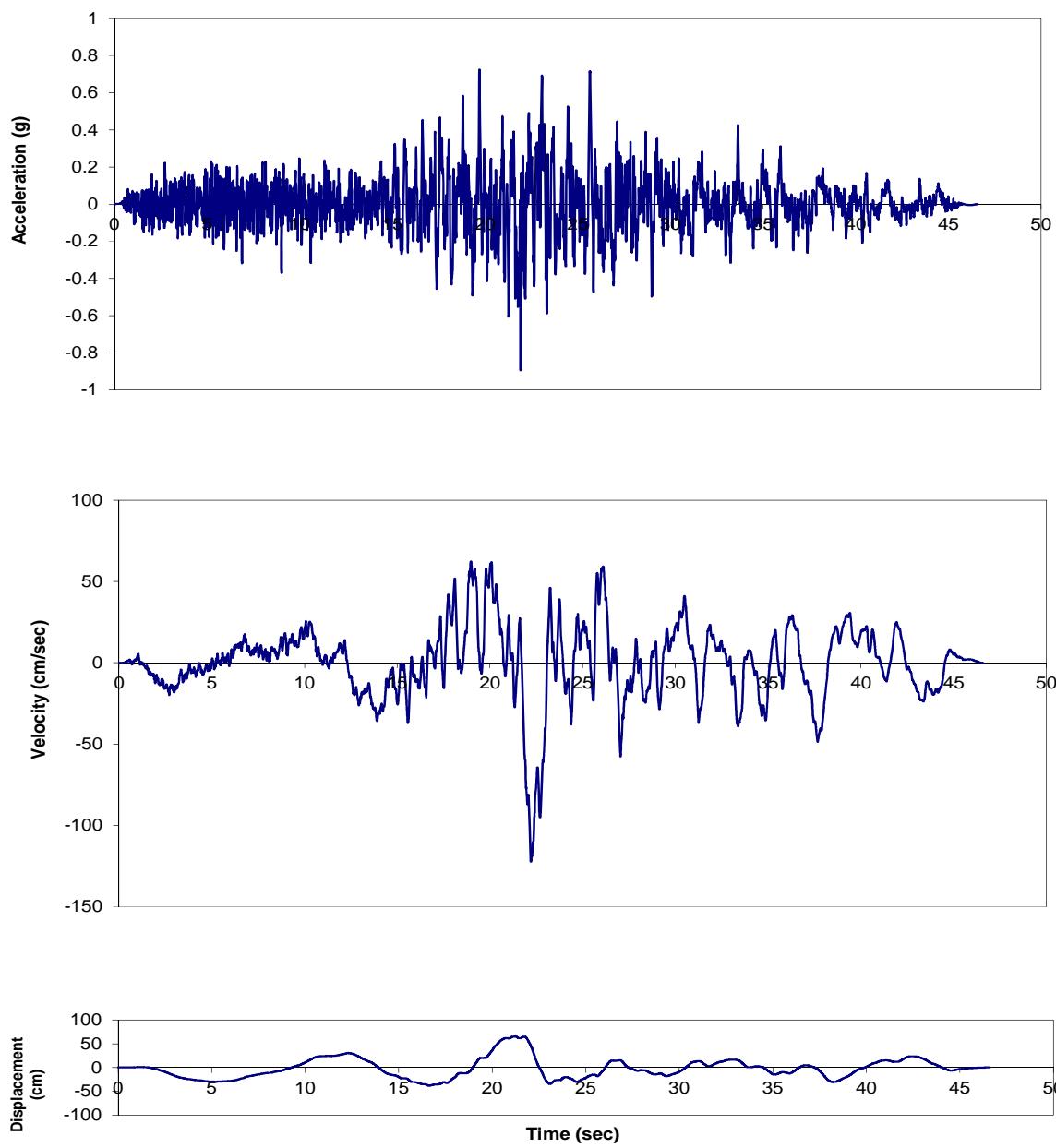
Cross-correlation check

Horizontal 1:	mep_ew
Horizontal 2:	mep_ns
Vertical:	mep_v
corr, H1-H2	-0.074
corr, H1-V	0.031
corr, H2-V	-0.026

SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION – SPECTRALLY MATCHED MEP MOTION – CALCULATION OF CORRELATION COEFFICIENTS

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

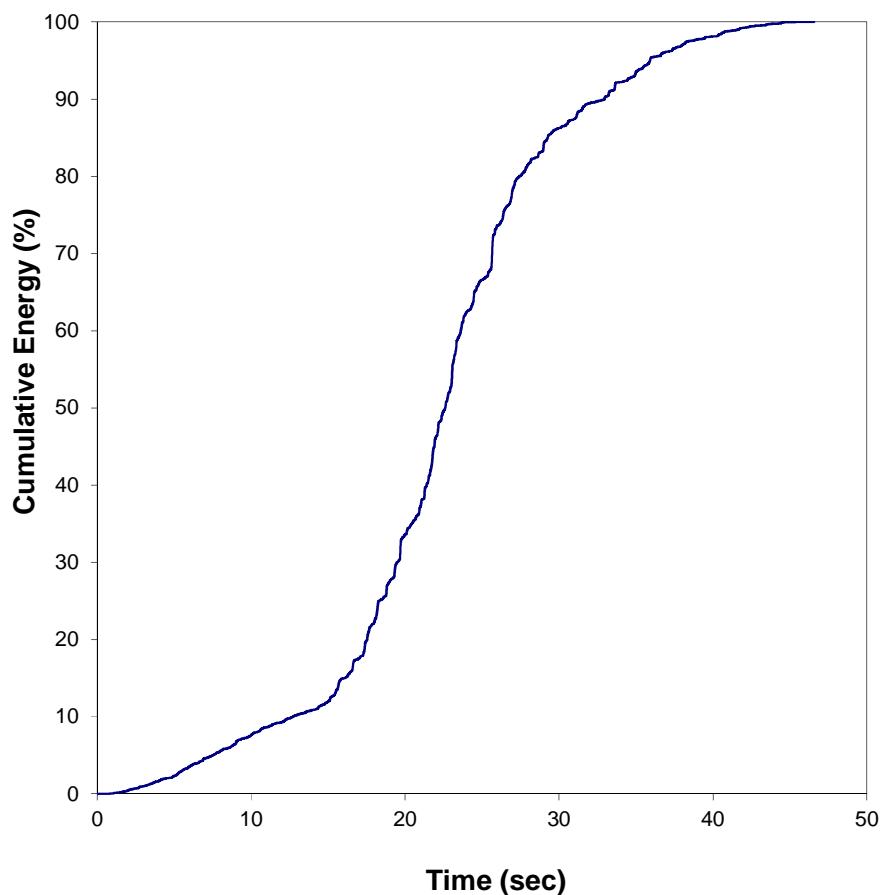
cto180 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

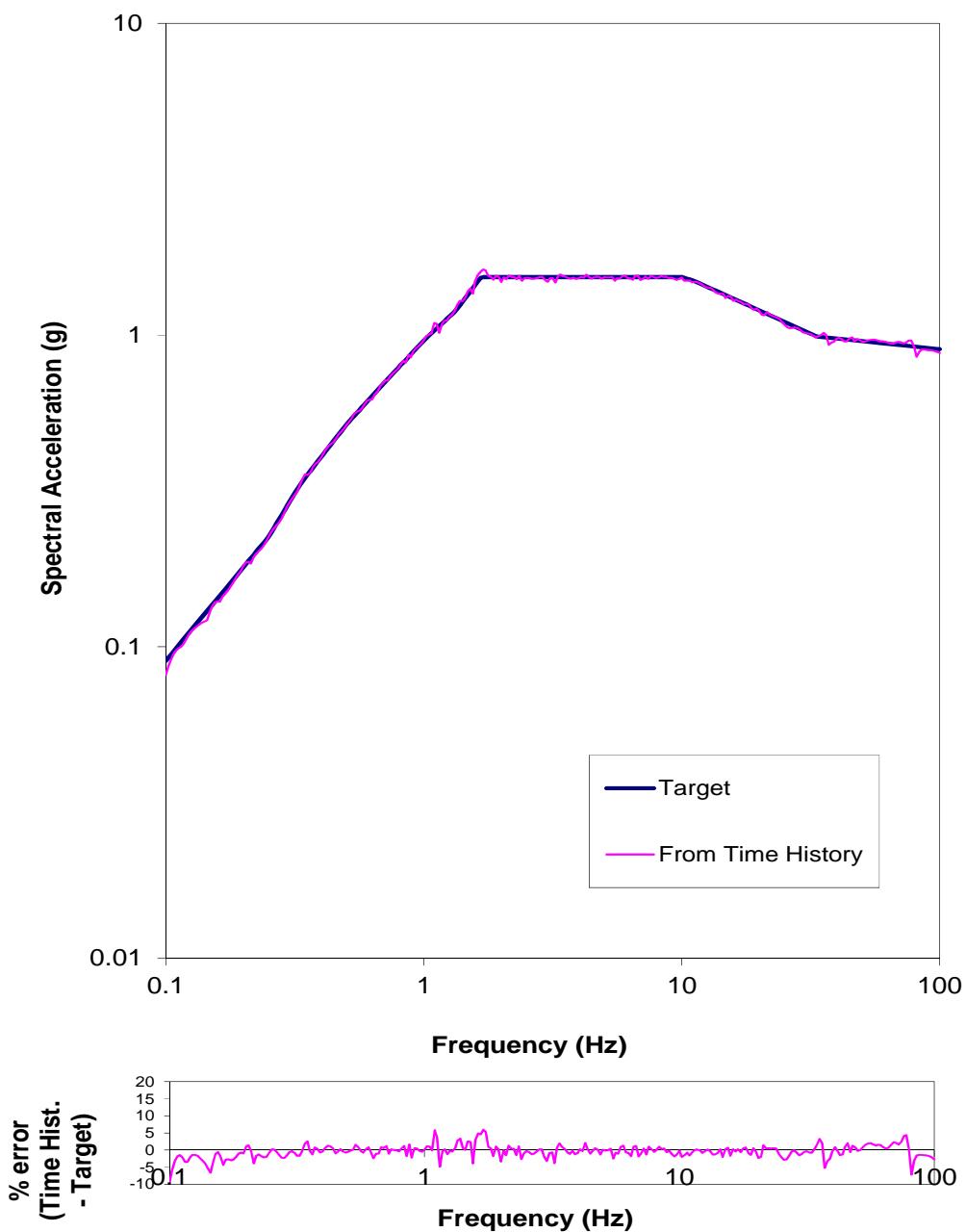
cto180 time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

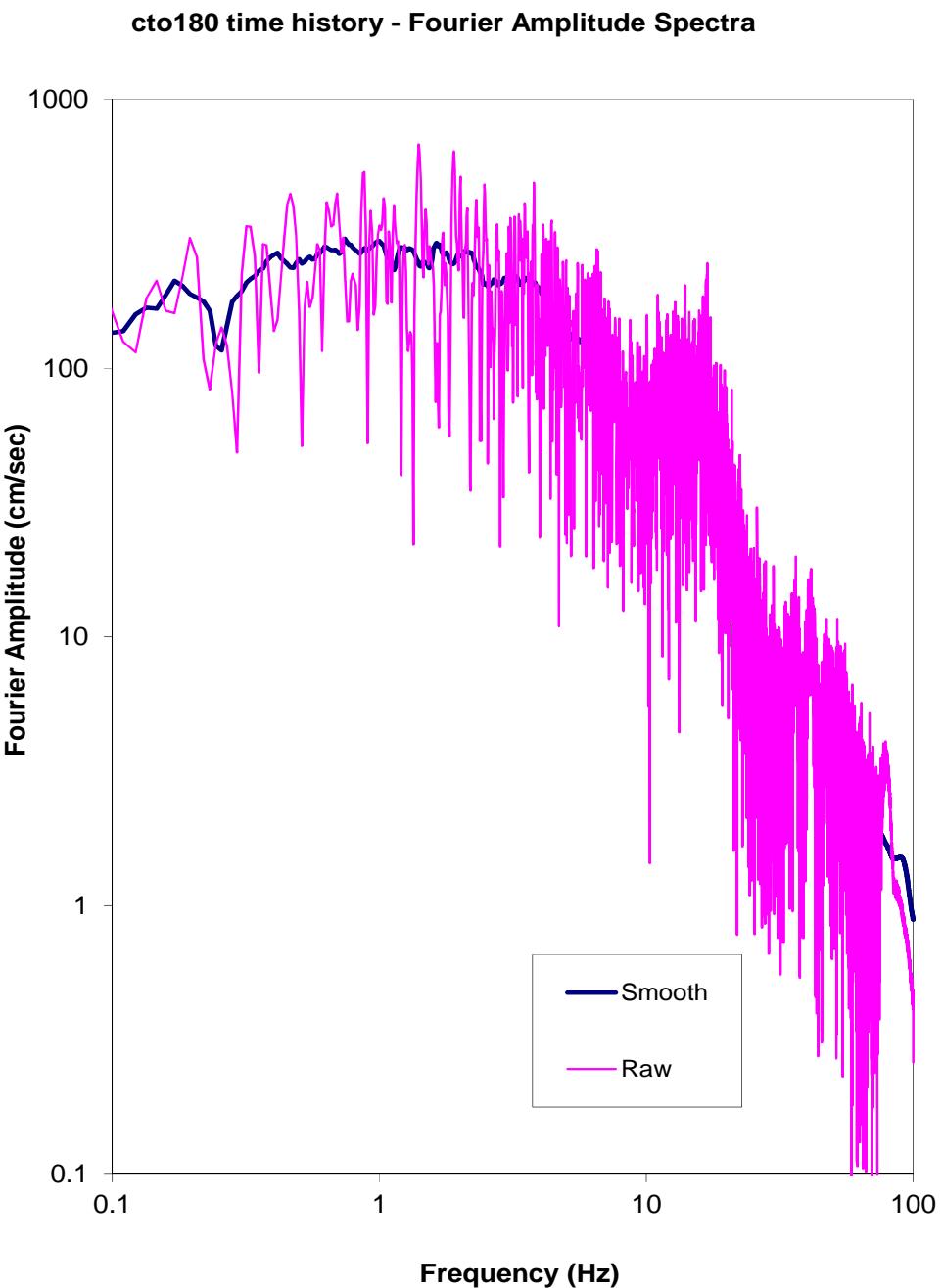
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

cto180 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

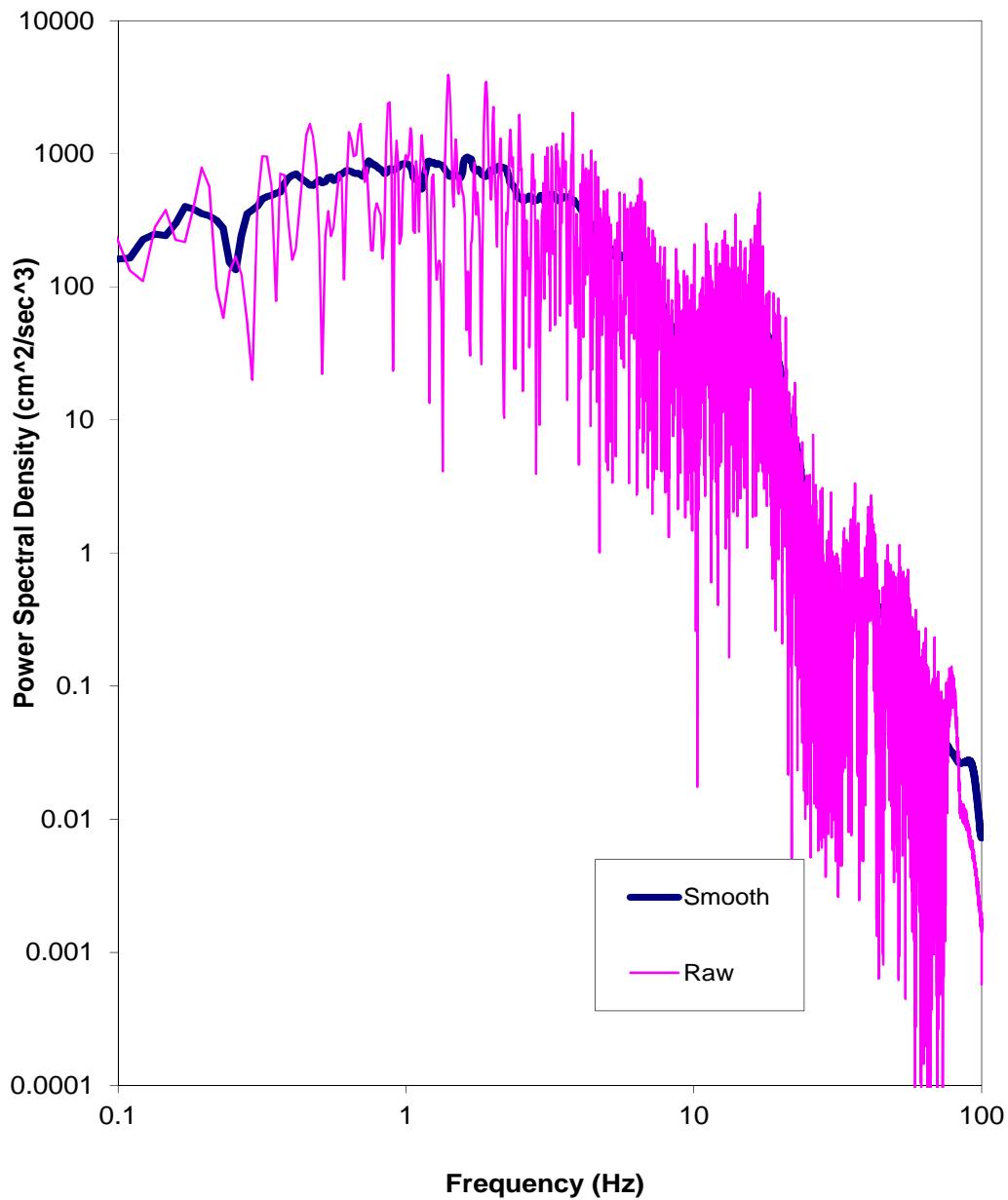
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

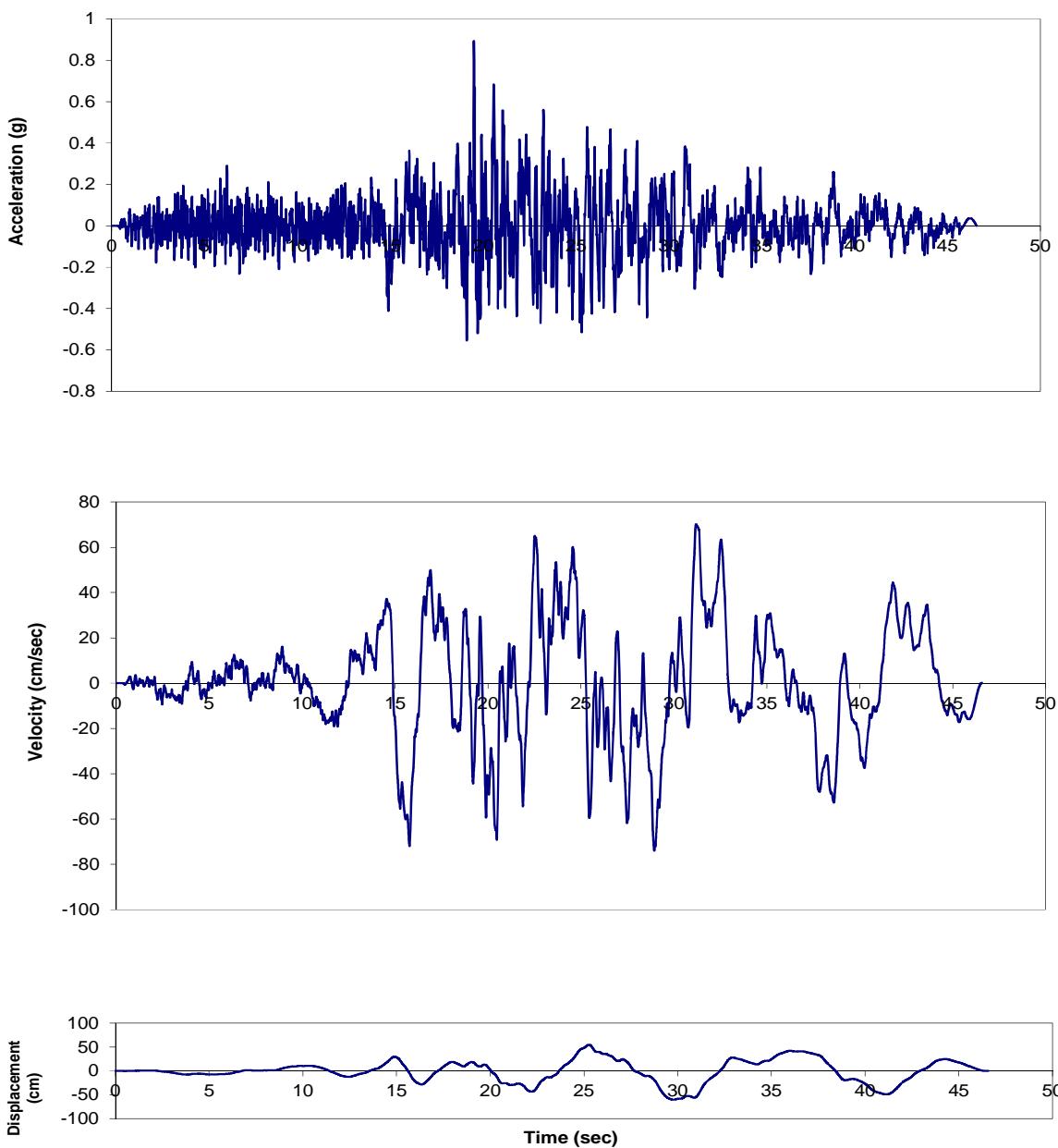
PLATE E.180

cto180 time history - Power Spectral Density Function

SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

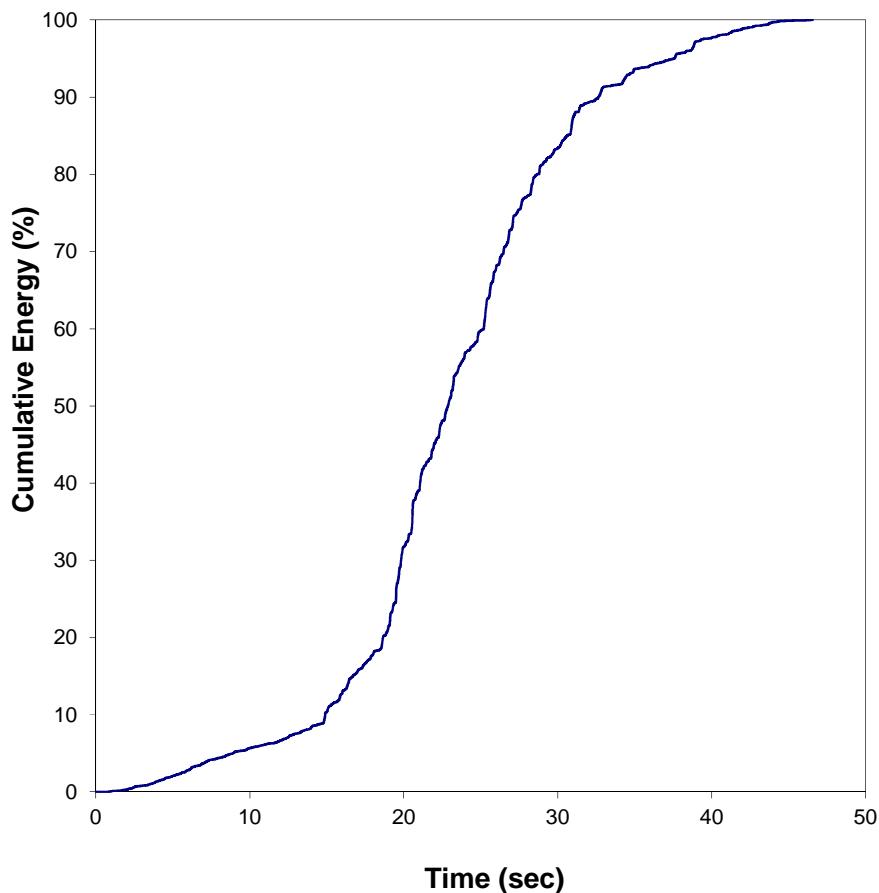
cto270 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

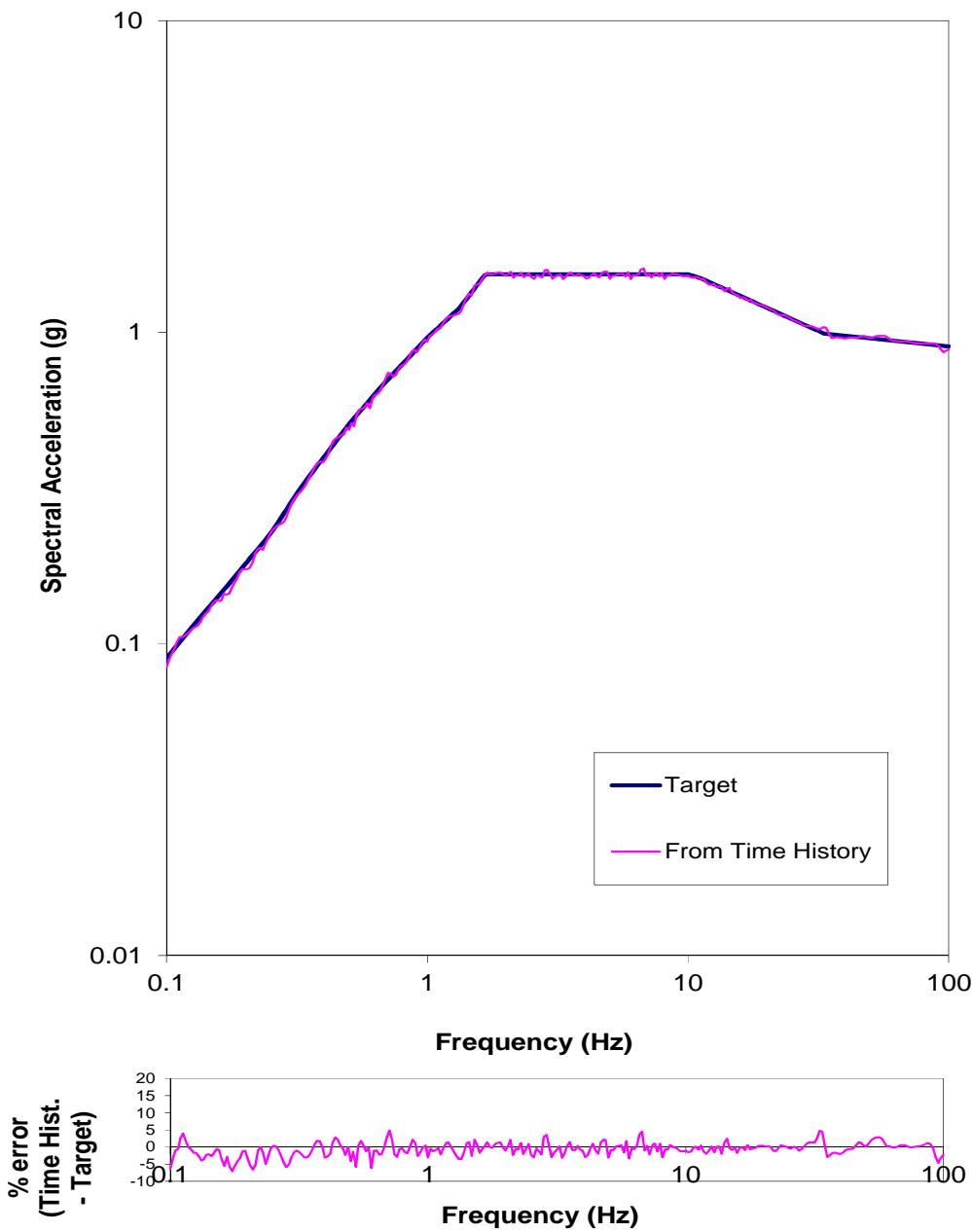
cto270 time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

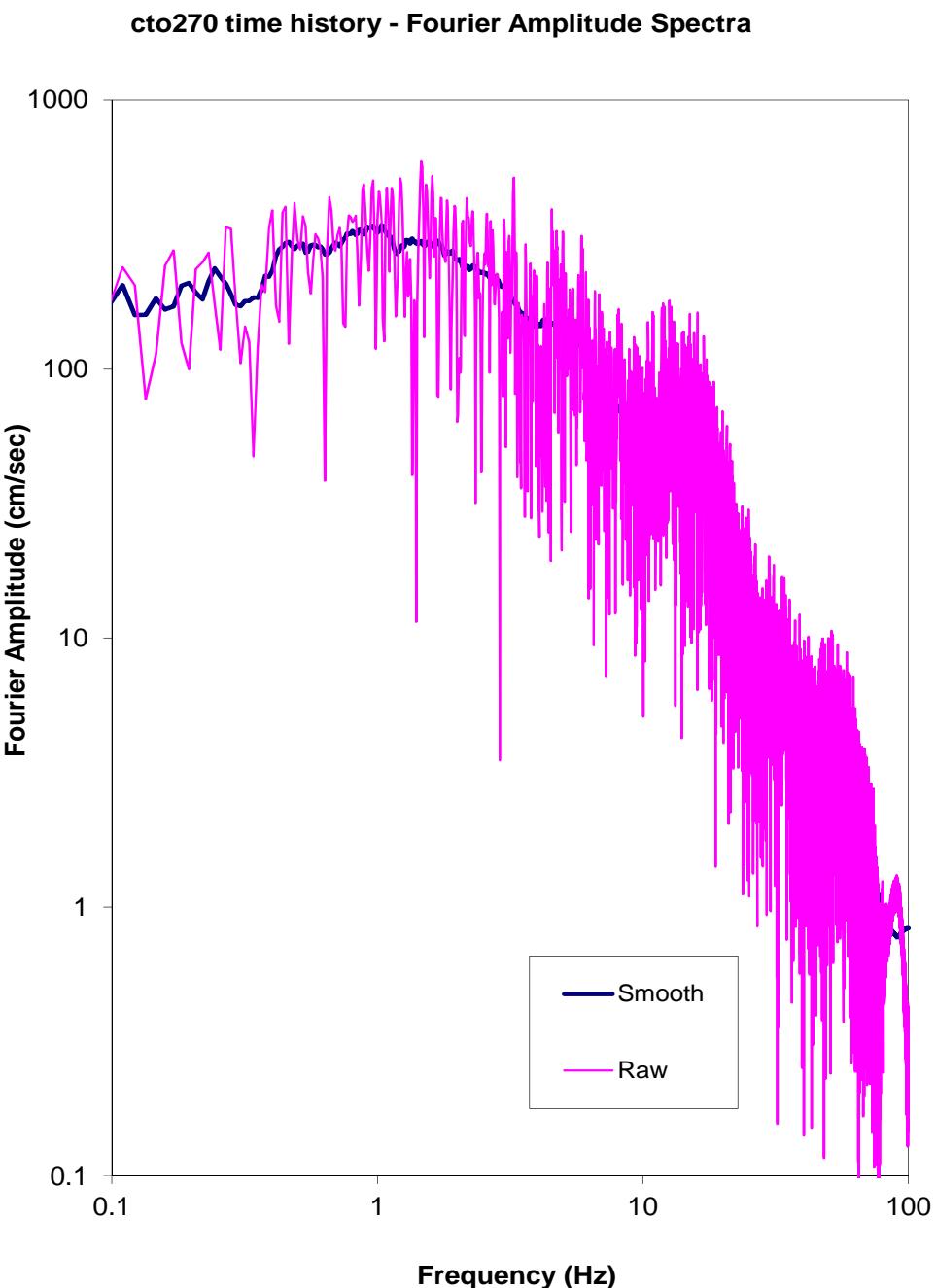
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

cto270 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

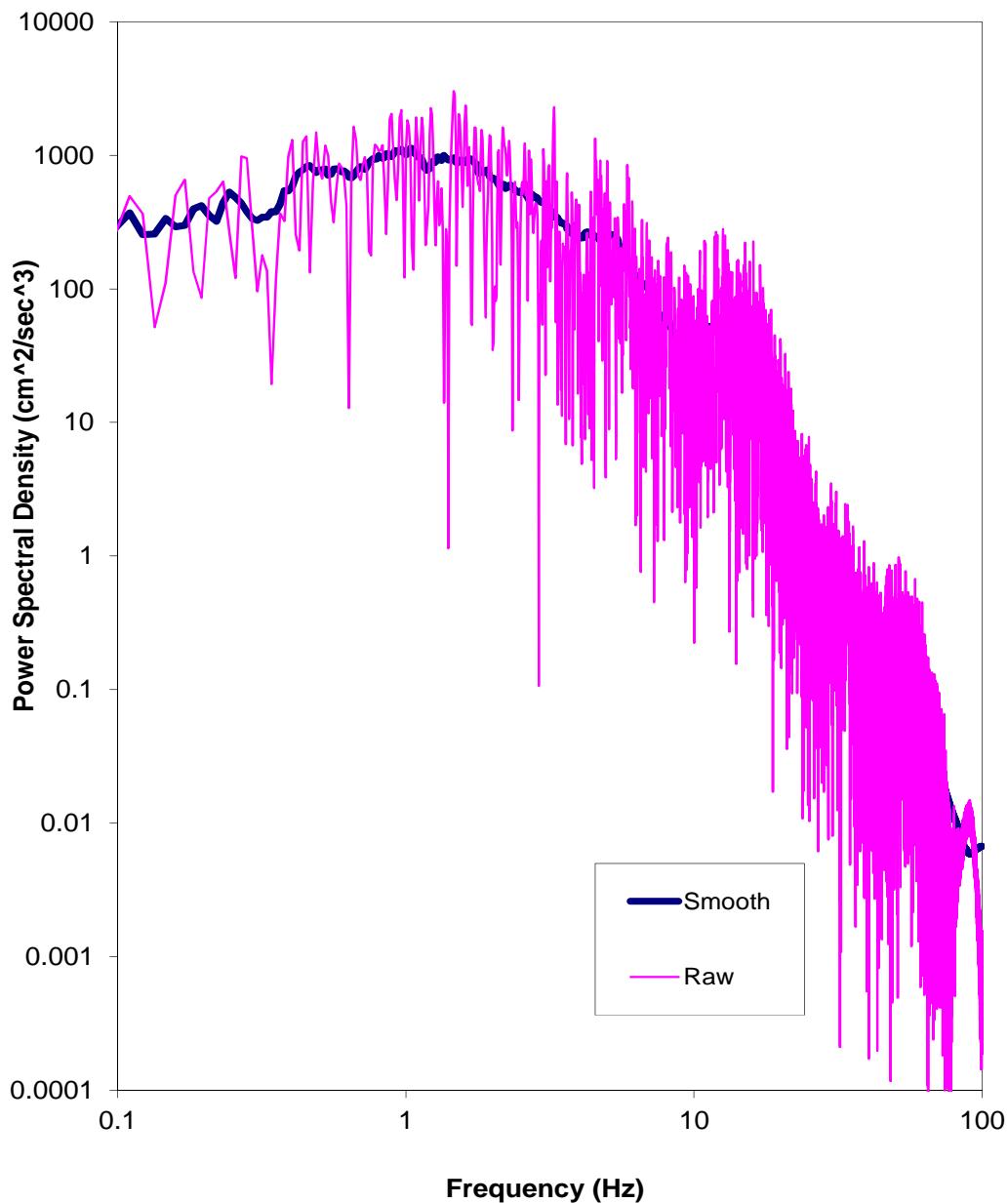
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

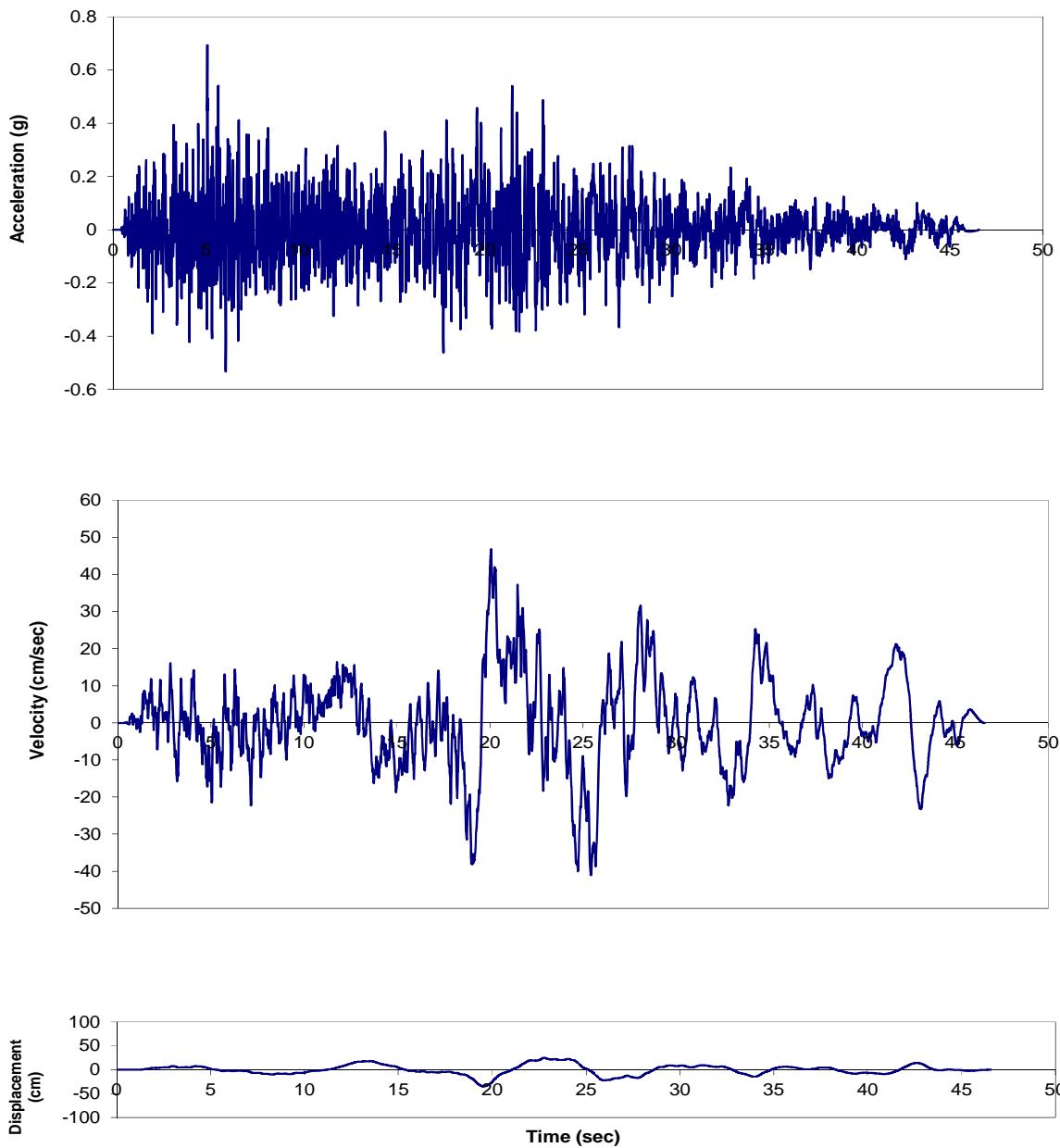
cto270 time history - Power Spectral Density Function



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

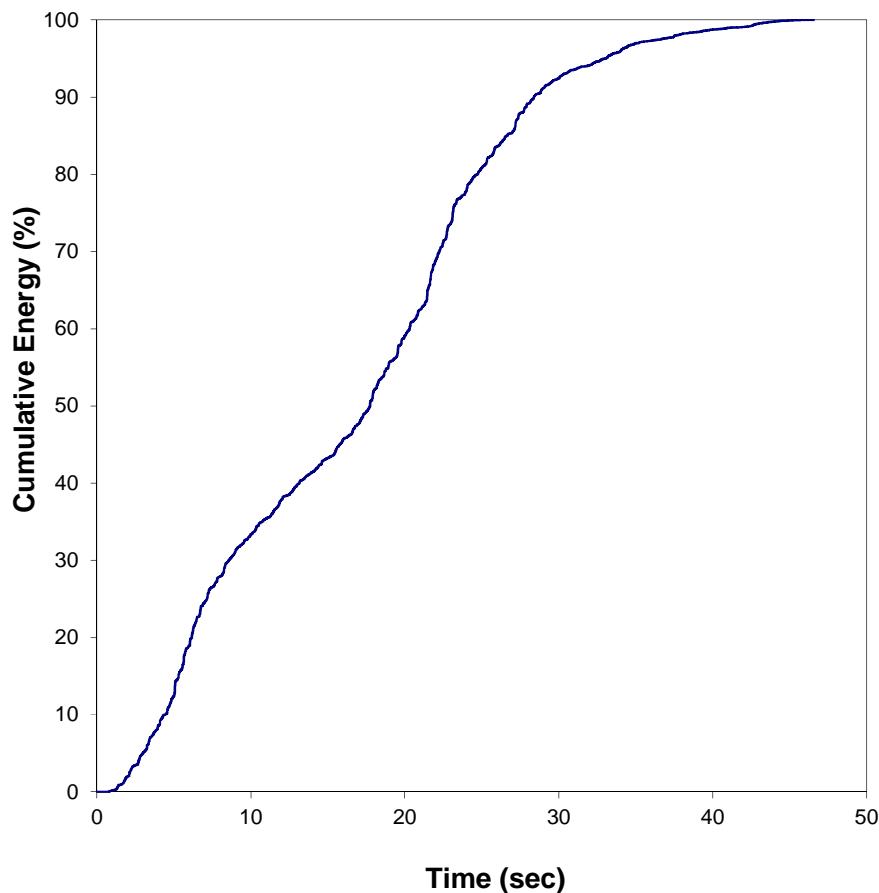
ctoup time history - Acceleration, Velocity, and Displacement Time Histories



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

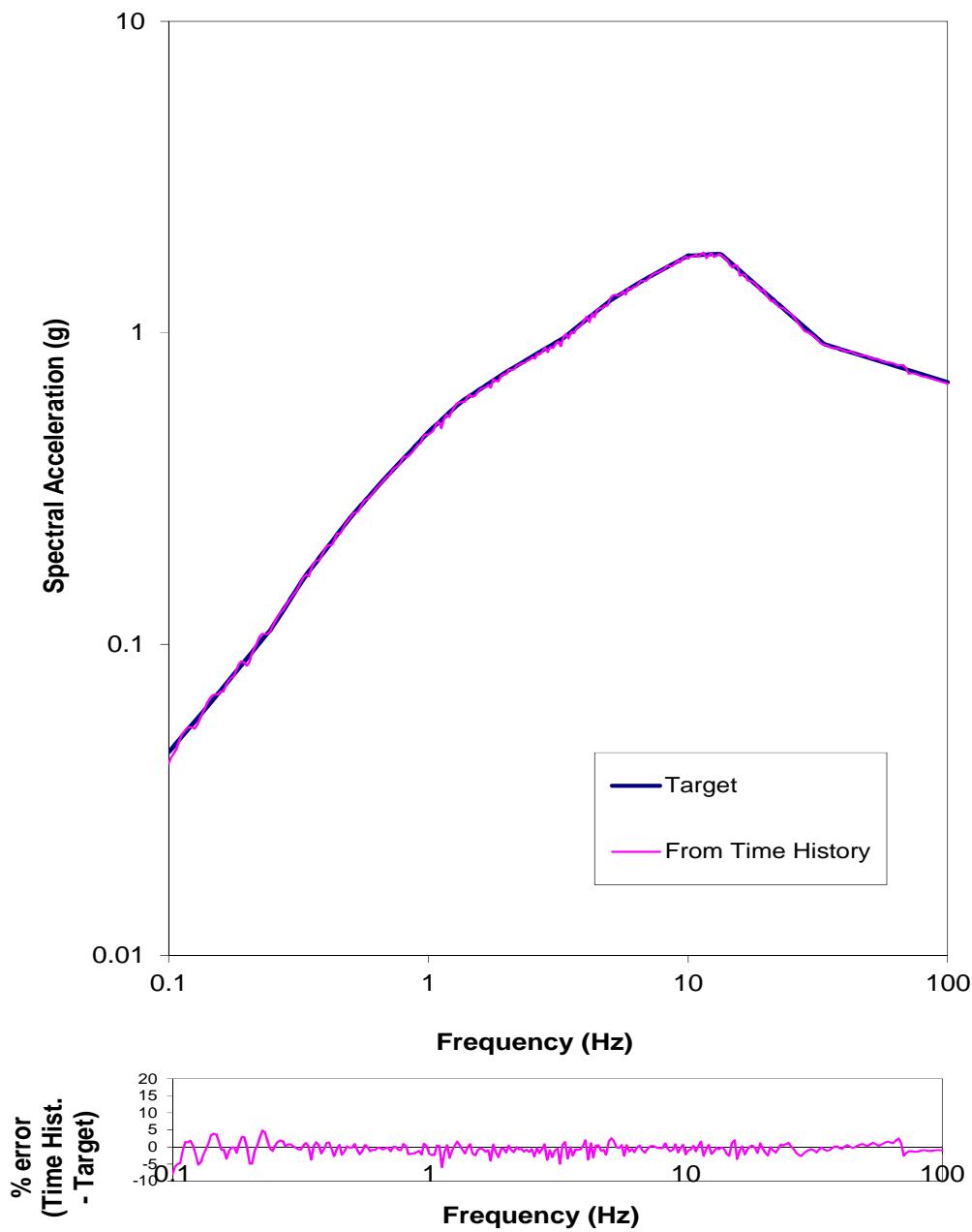
ctoup time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT

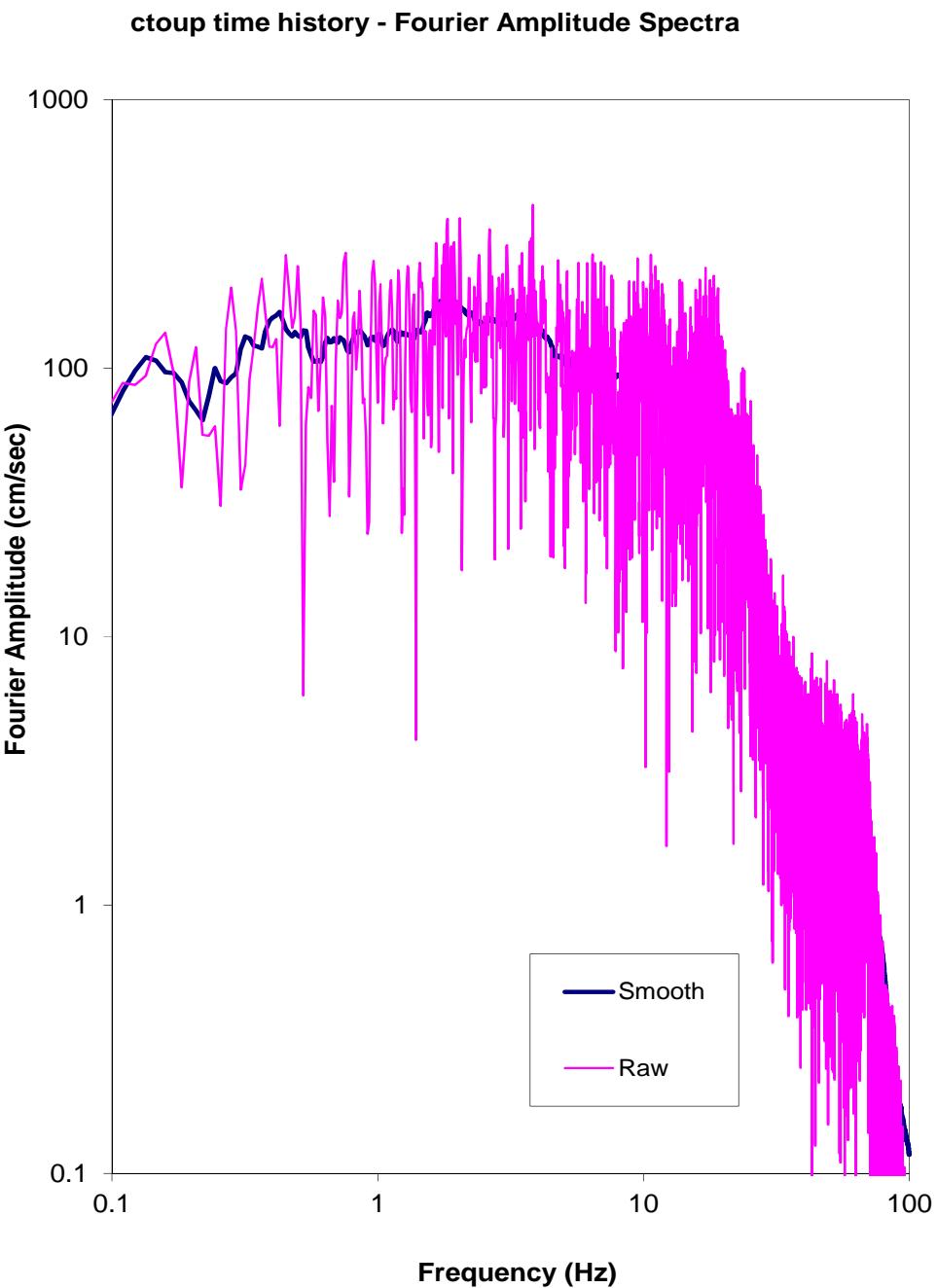
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

ctoup time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – TARGET AND CALCULATED RESPONSE
SPECTRA

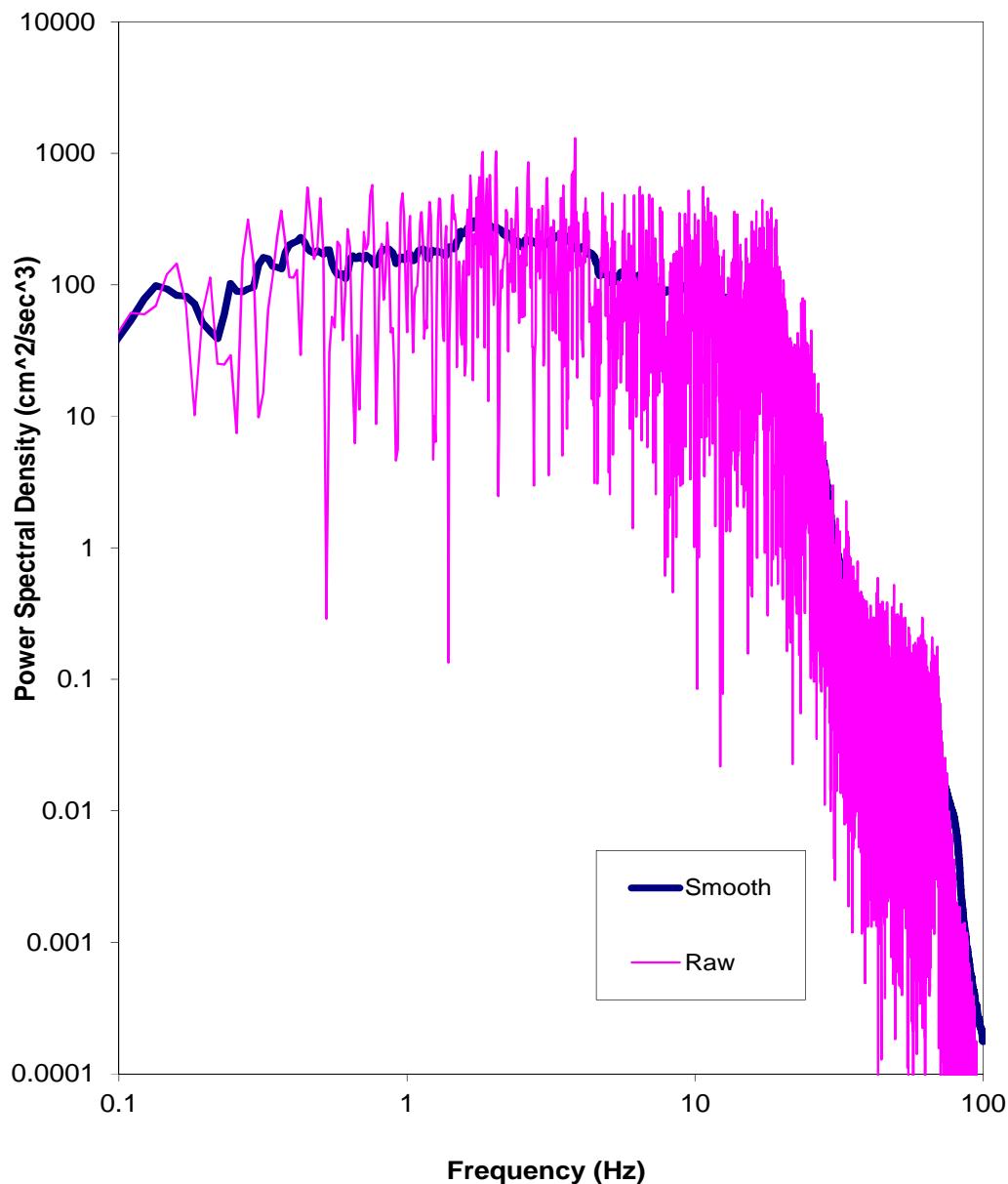
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

ctoup time history - Power Spectral Density Function



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – POWER SPECTRAL DENSITY FUNCTION**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Calculation of Correlation Coefficients

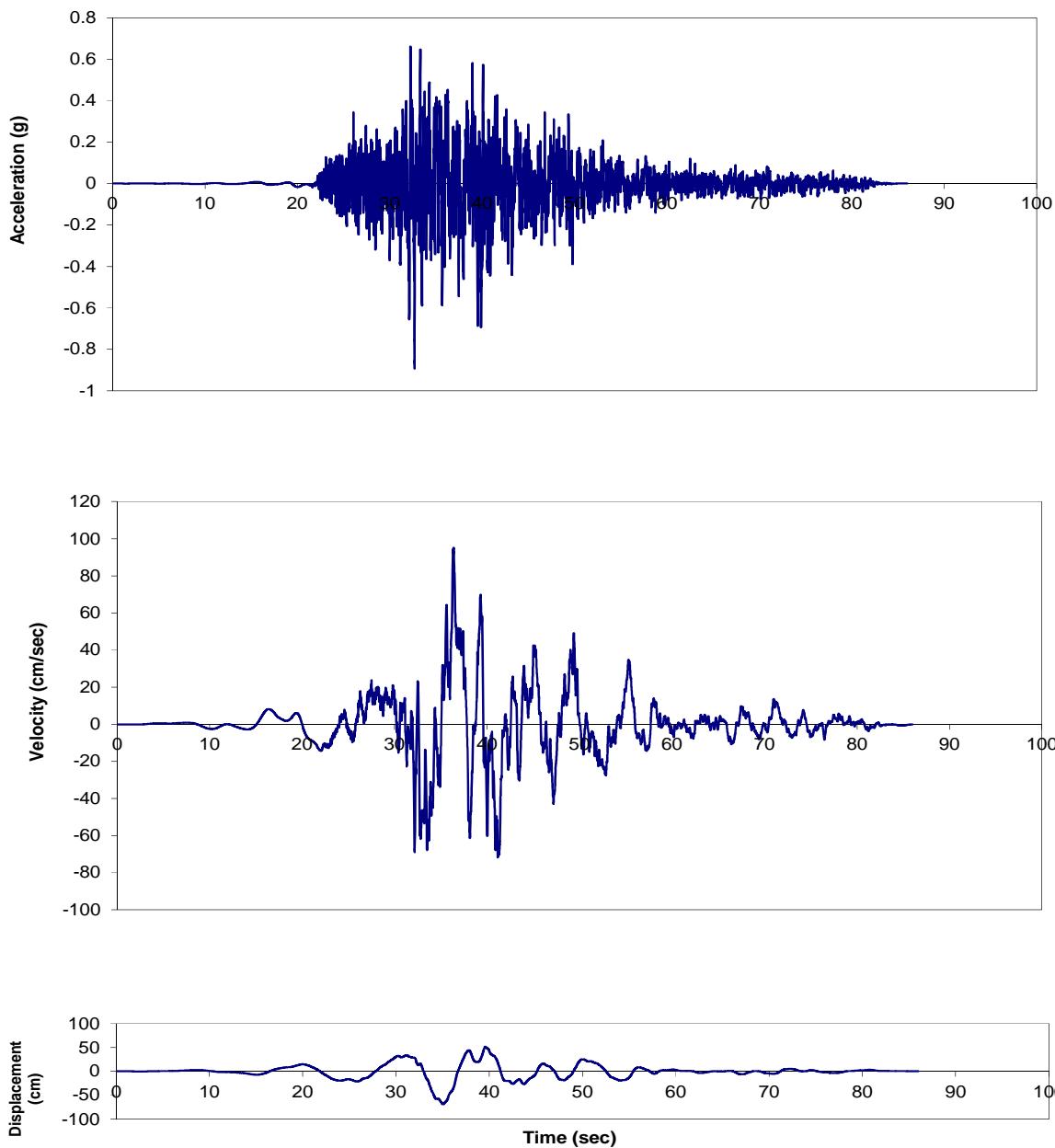
Cross-correlation check

Horizontal 1:	CTO180
Horizontal 2:	CTO270
Vertical:	CTOUP
corr, H1-H2	-0.014
corr, H1-V	0.003
corr, H2-V	-0.008

SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION – SPECTRALLY MATCHED CTO MOTION – CALCULATION OF CORRELATION COEFFICIENTS

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

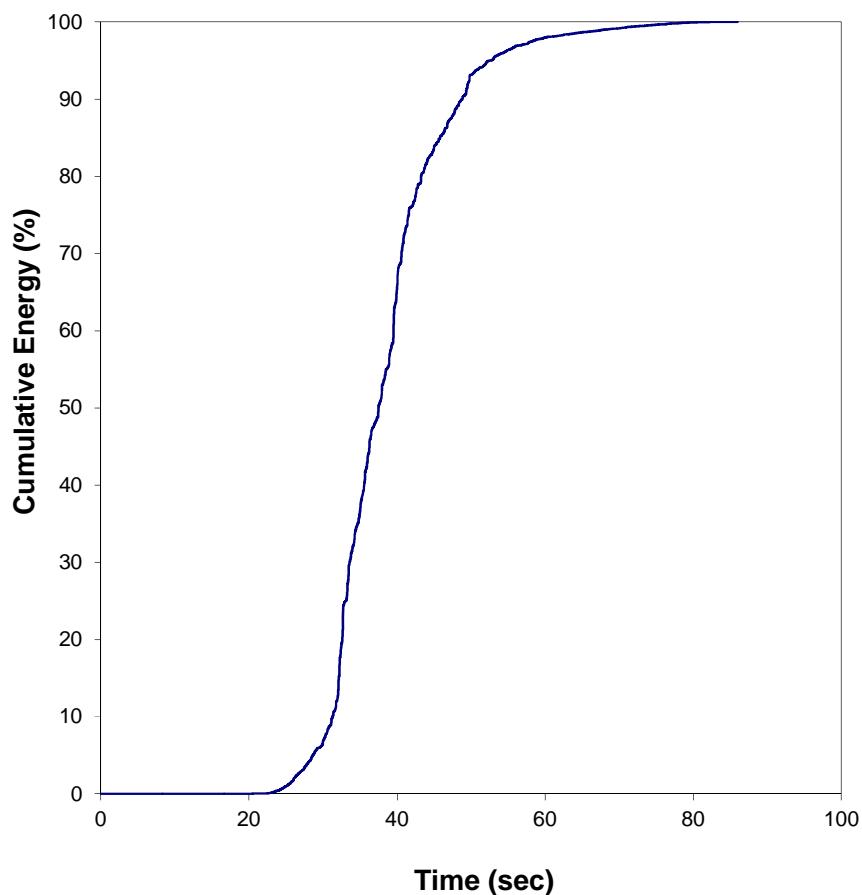
carlo_090 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

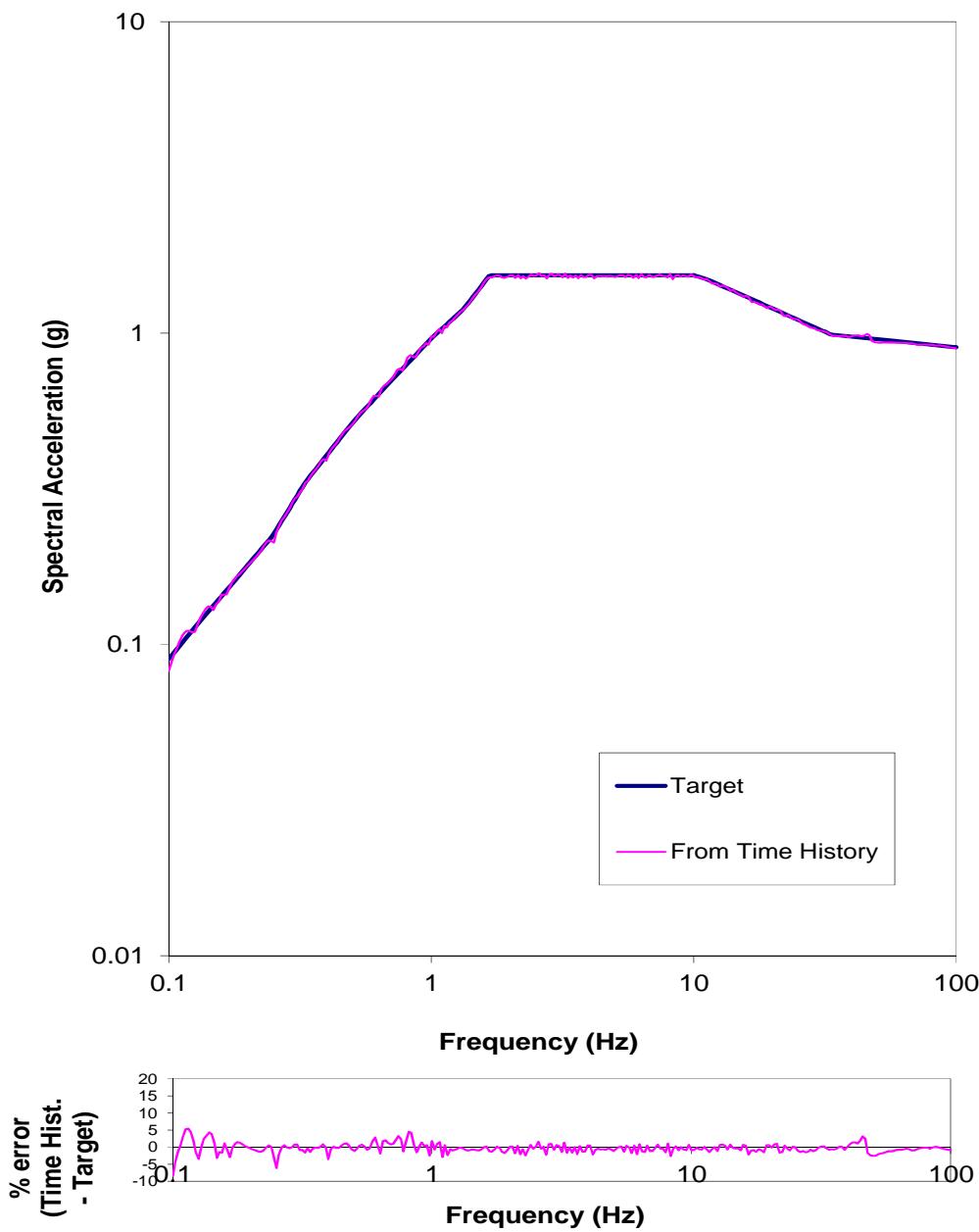
carlo_090 time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT
NORMAL – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – NORMALIZED
CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

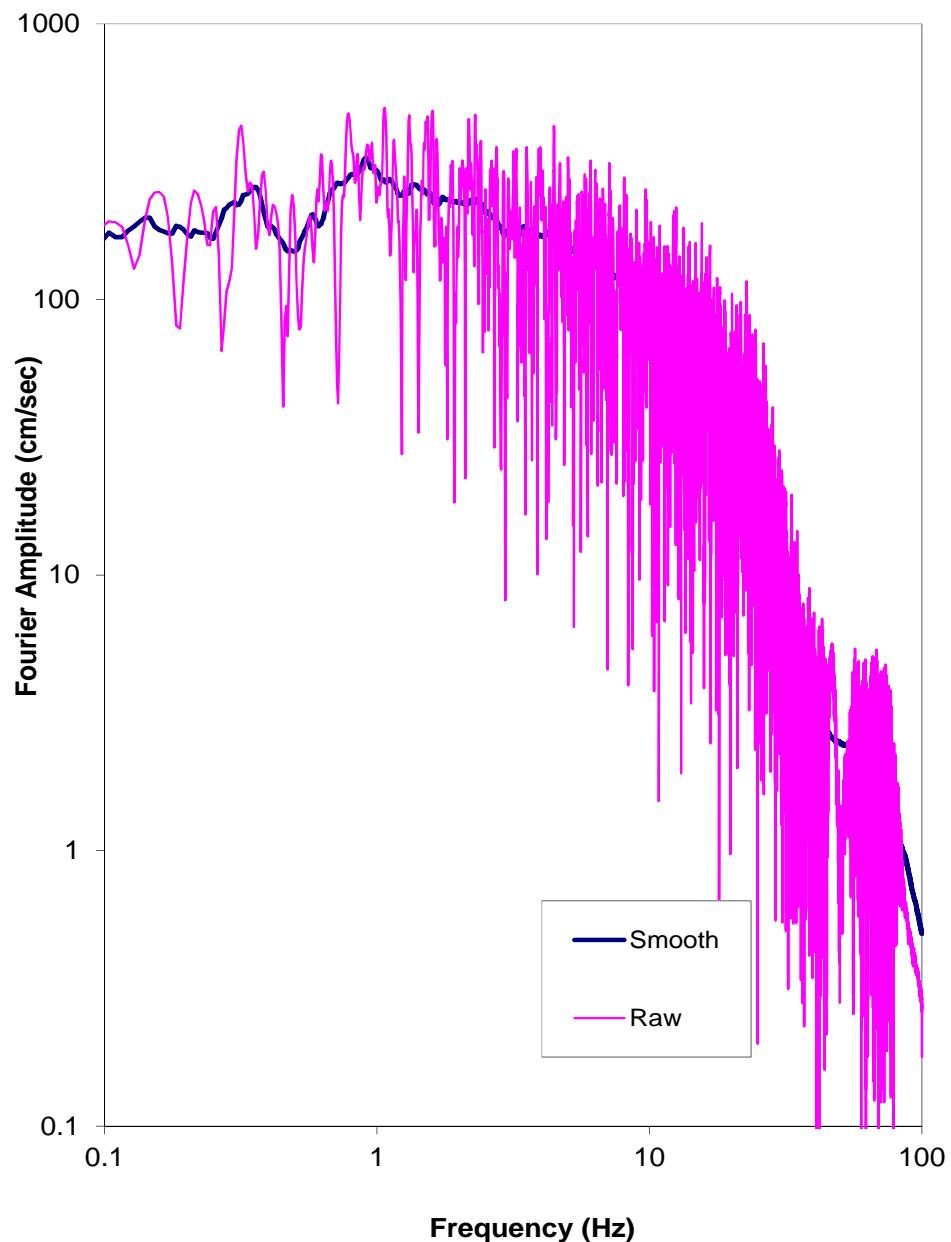
carlo_090 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

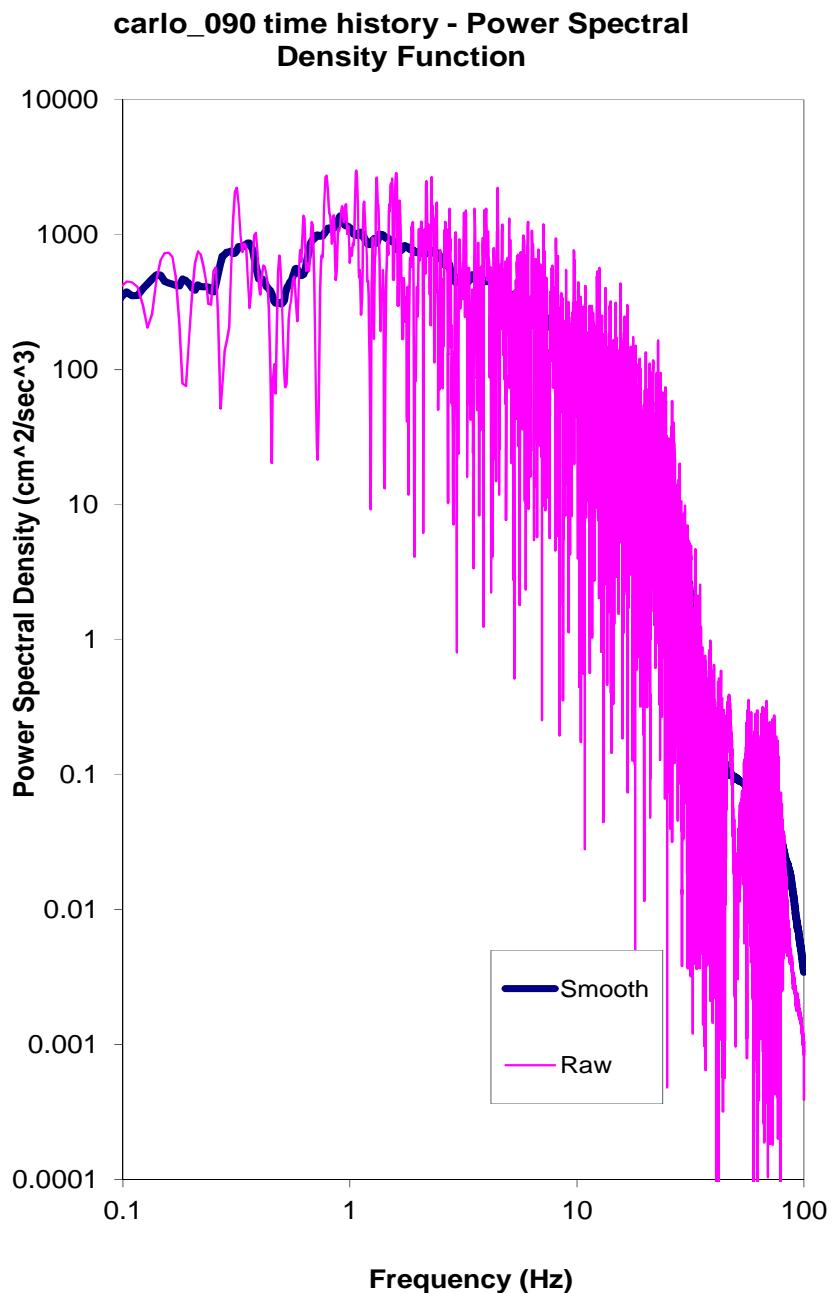
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

carlo_090 time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – FOURIER AMPLITUDE SPECTRUM

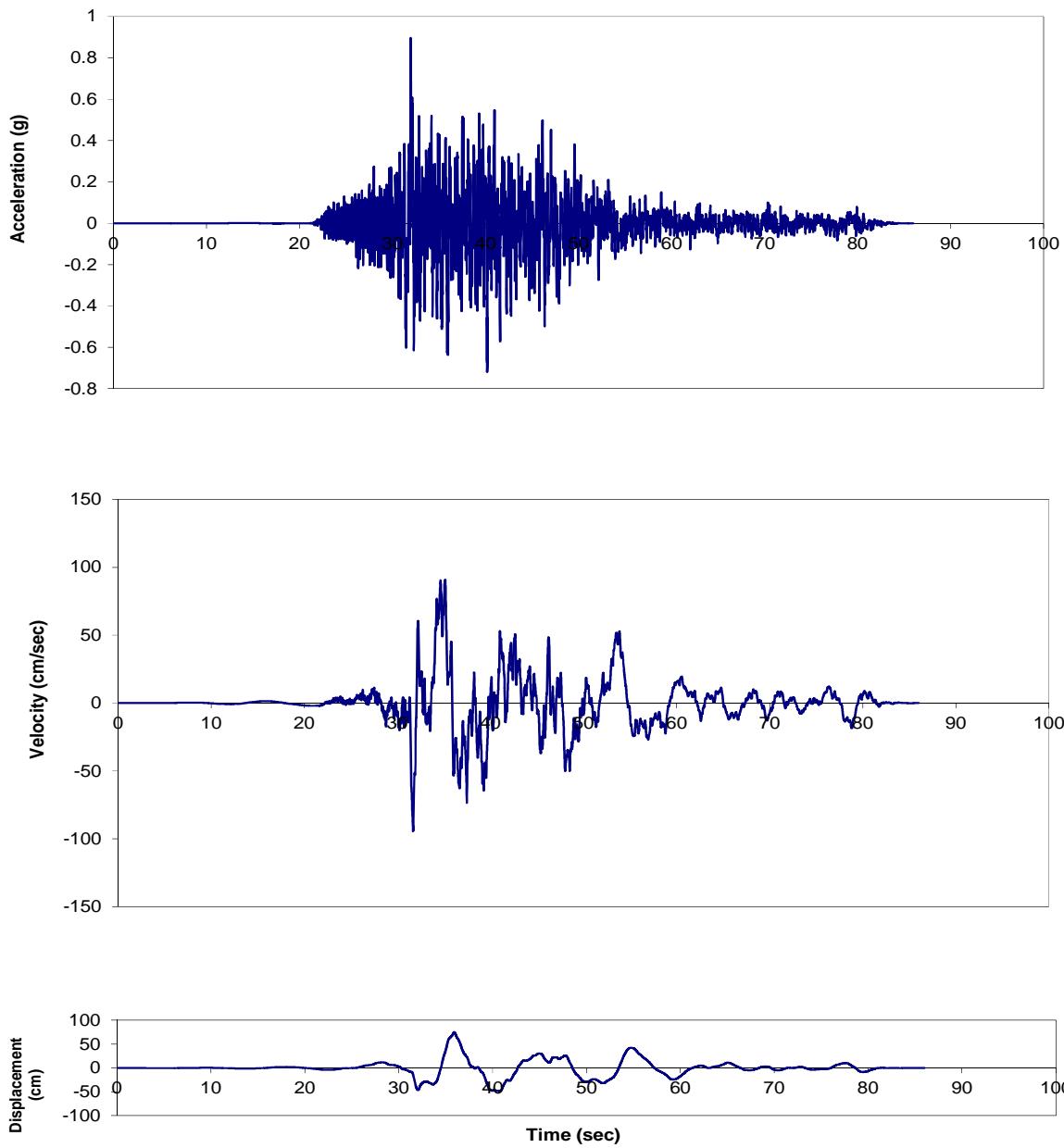
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

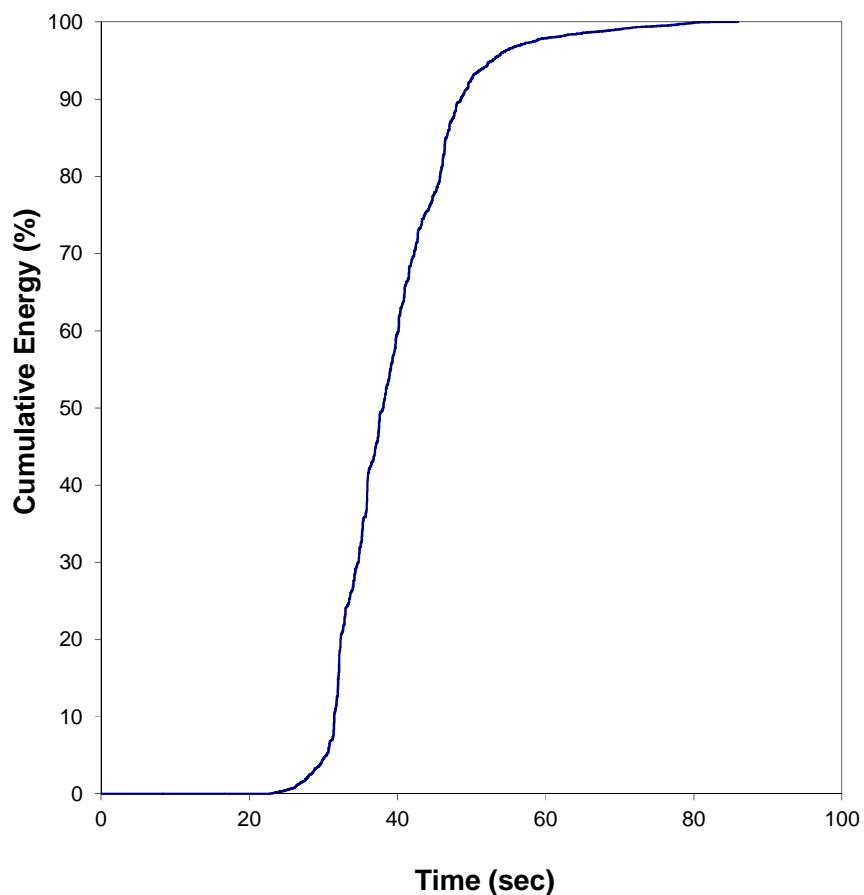
carlo_360 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

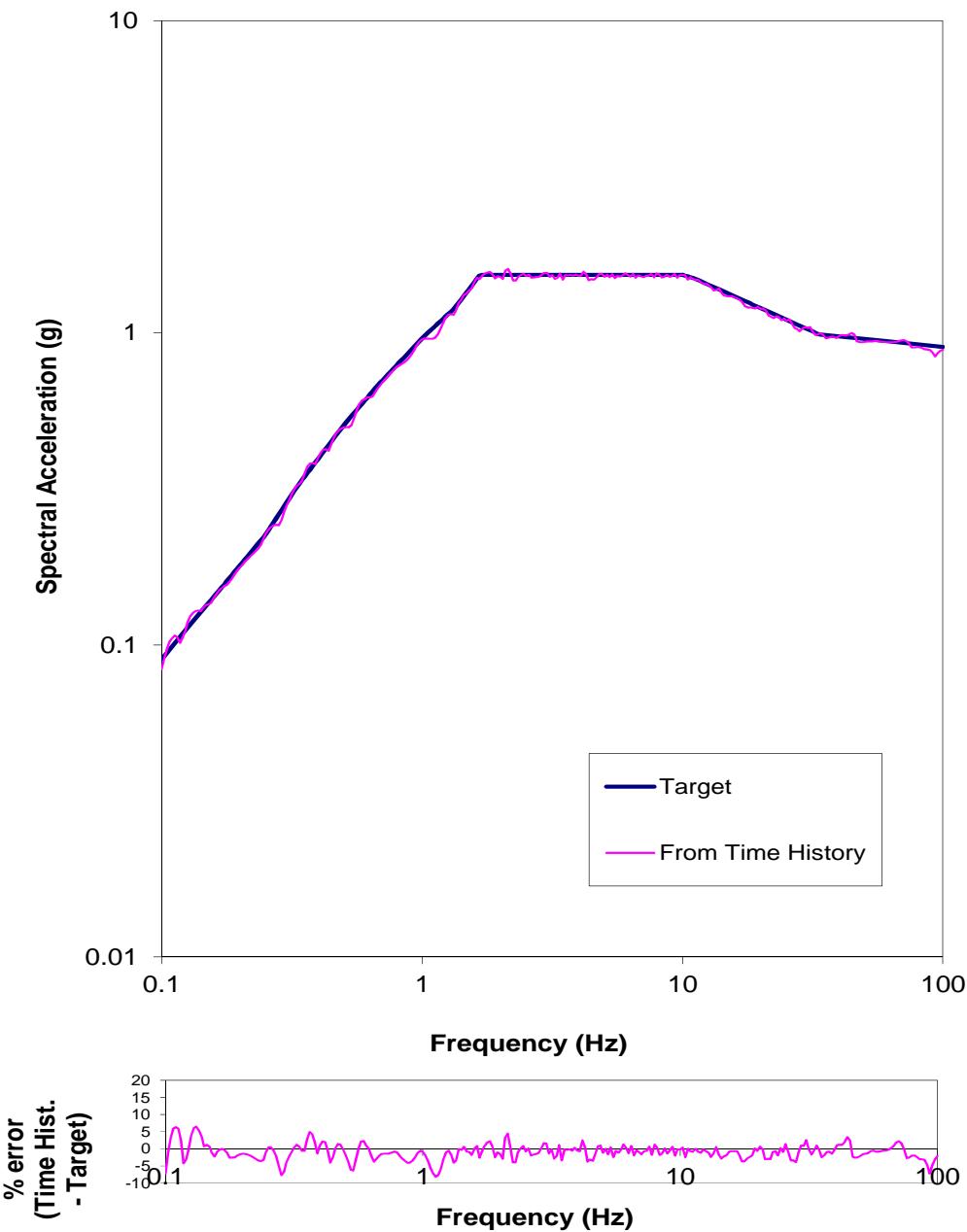
carlo_360 time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

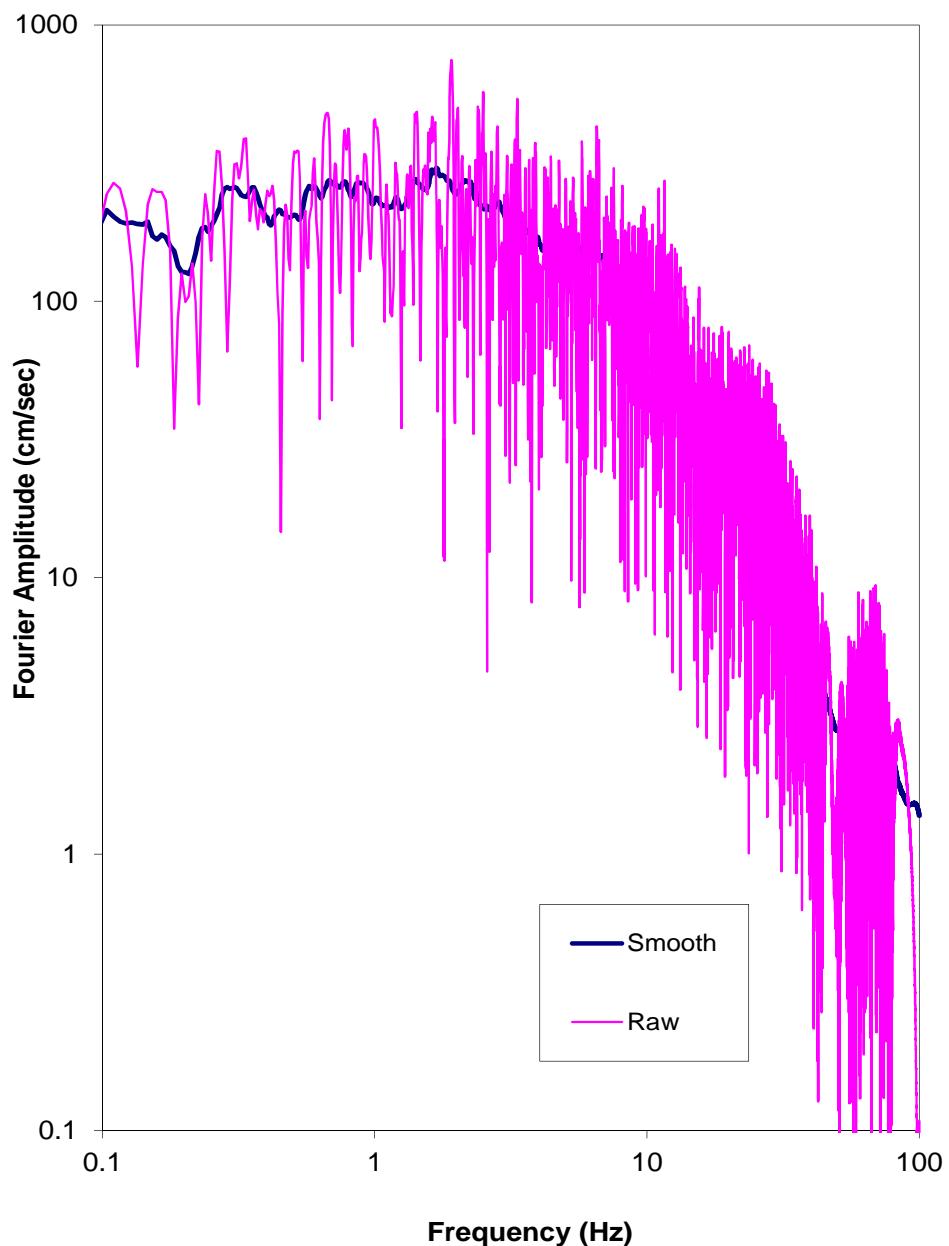
carlo_360 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

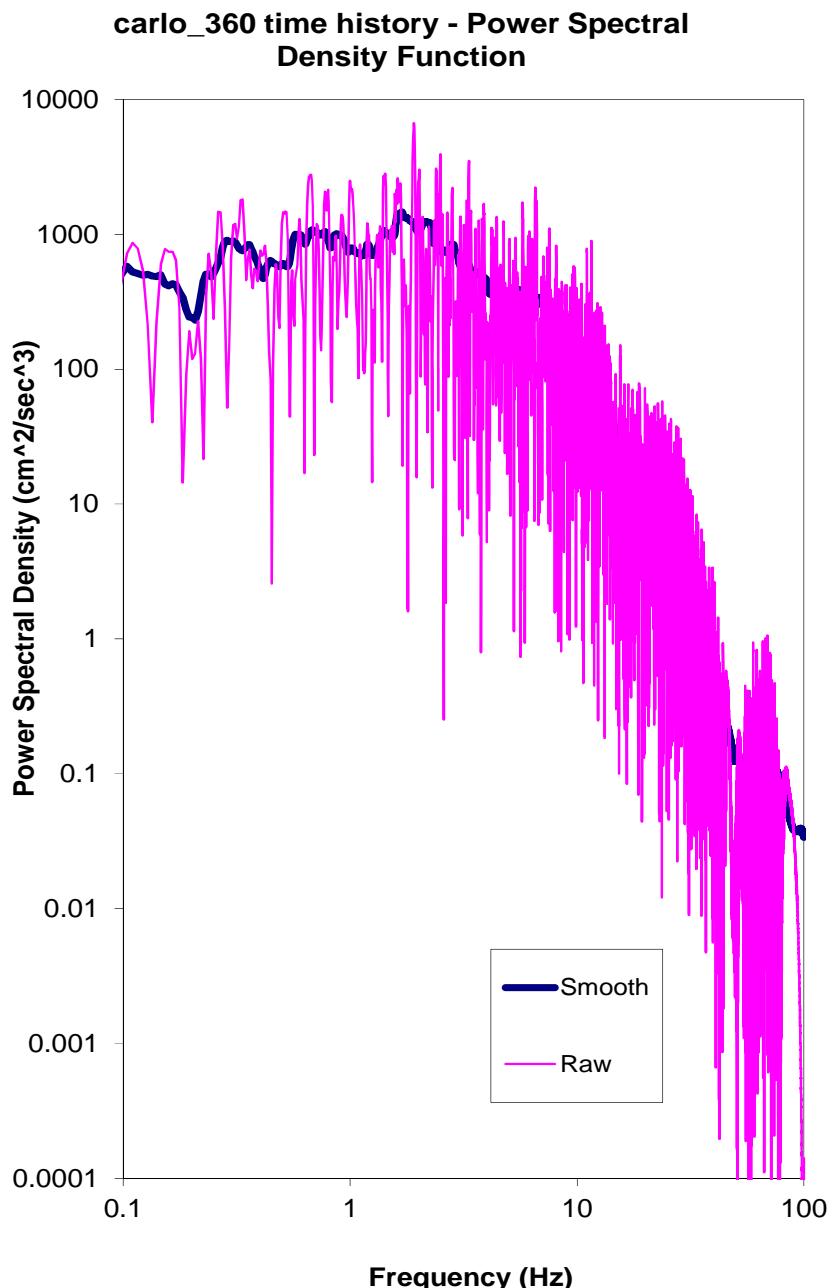
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

carlo_360 time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – FOURIER AMPLITUDE SPECTRUM

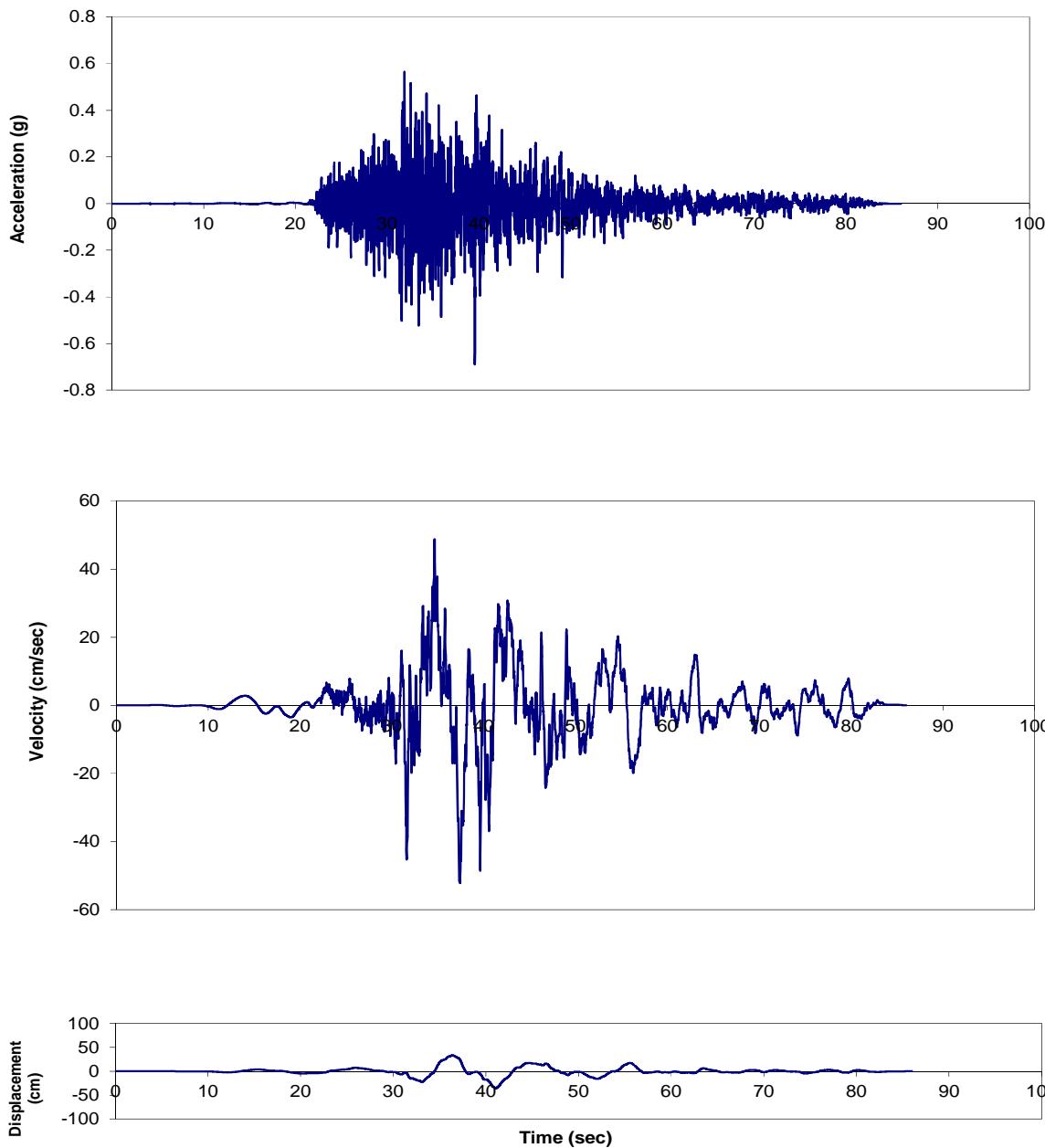
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

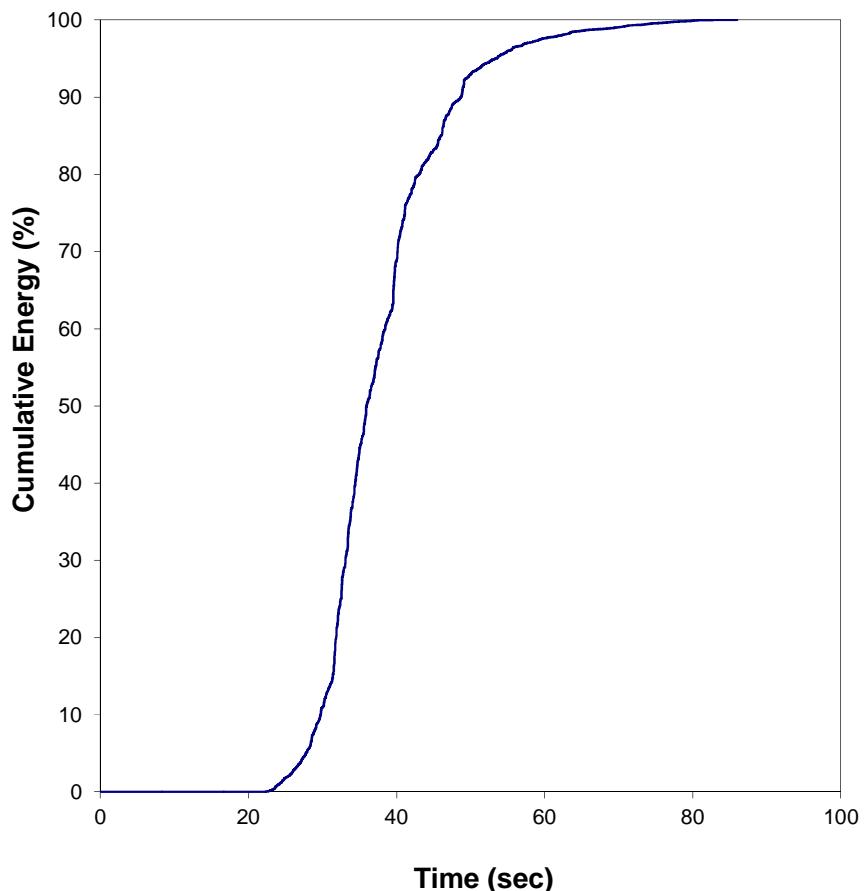
carlo_up time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

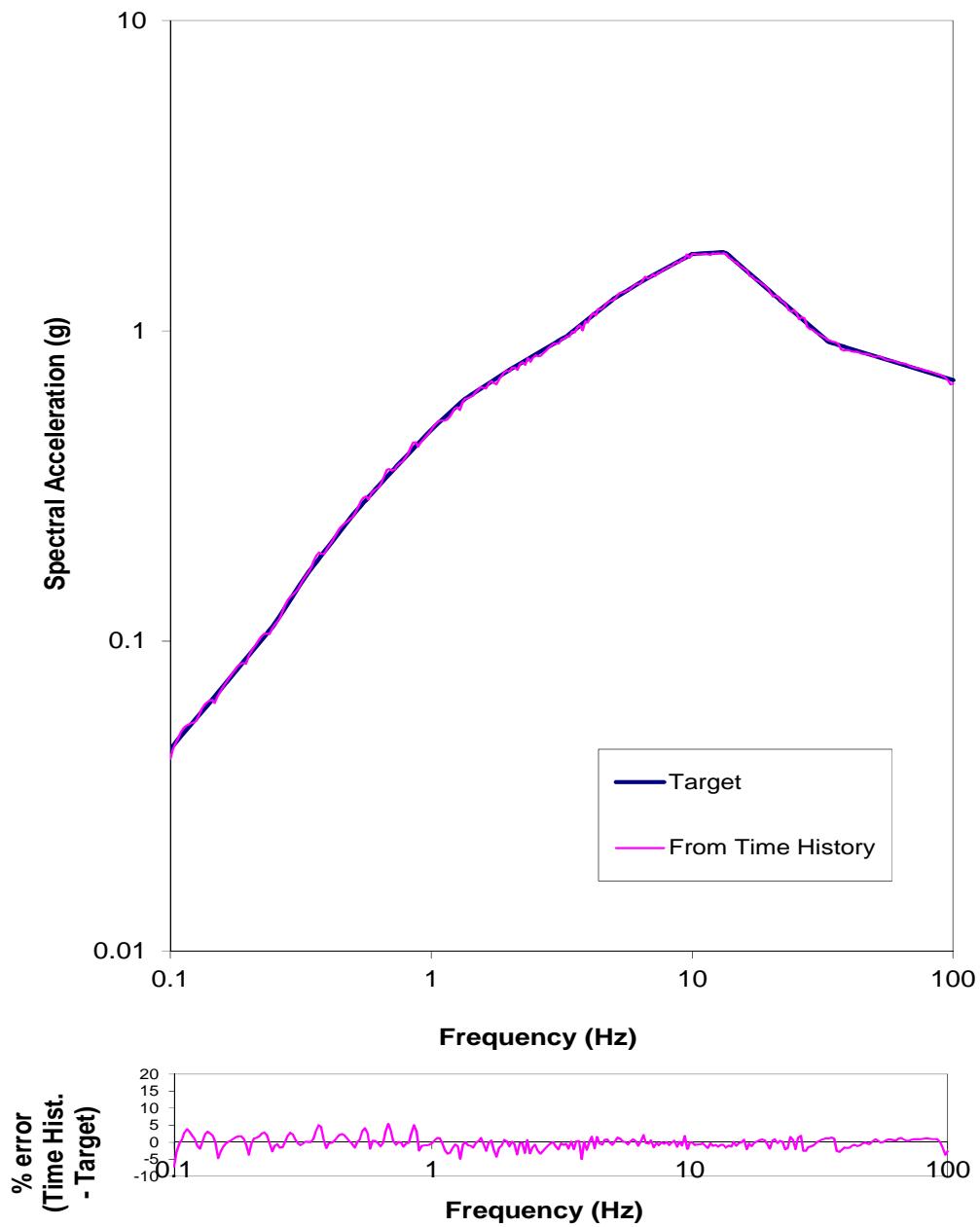
carlo_up time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

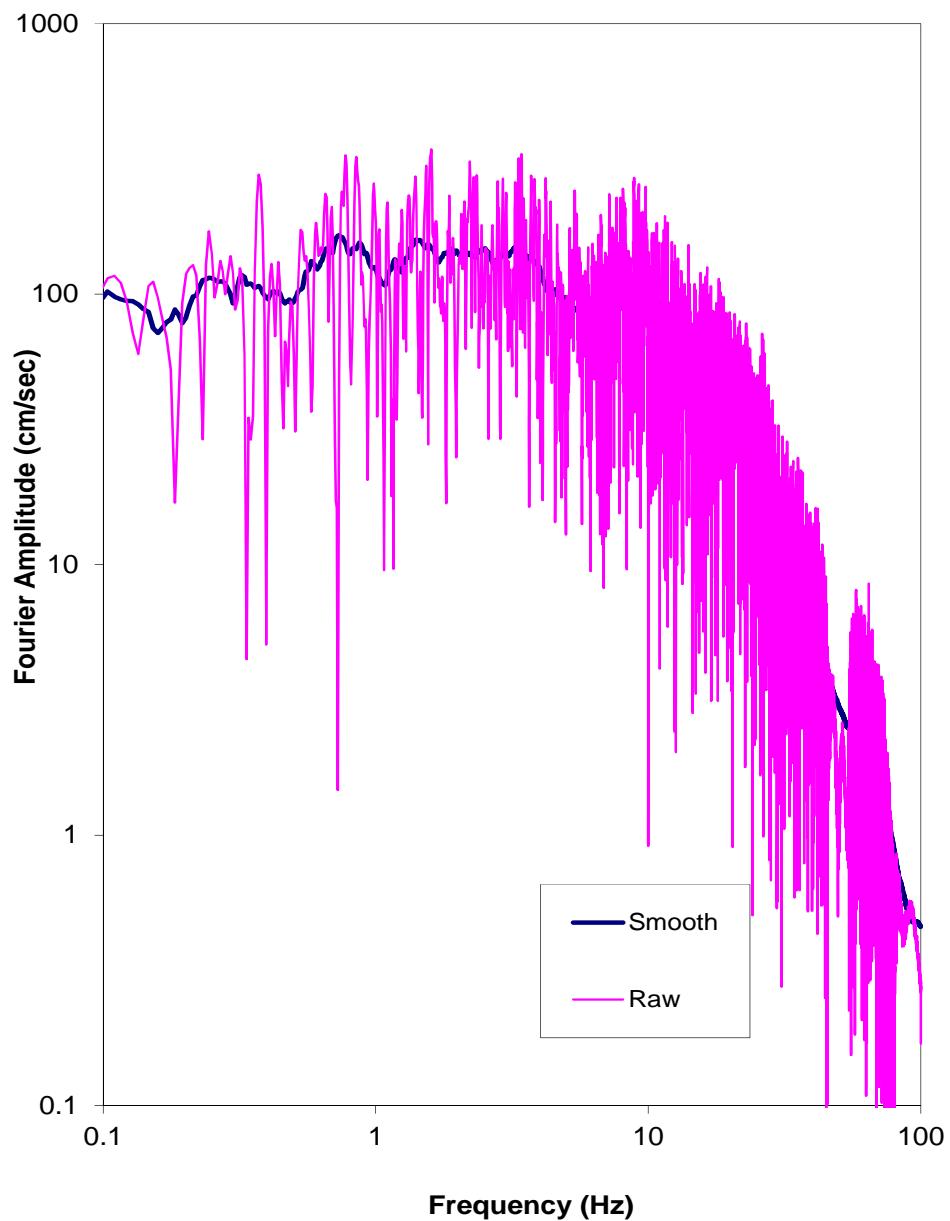
carlo_up time history - Response Spectra



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – TARGET AND CALCULATED
RESPONSE SPECTRA**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

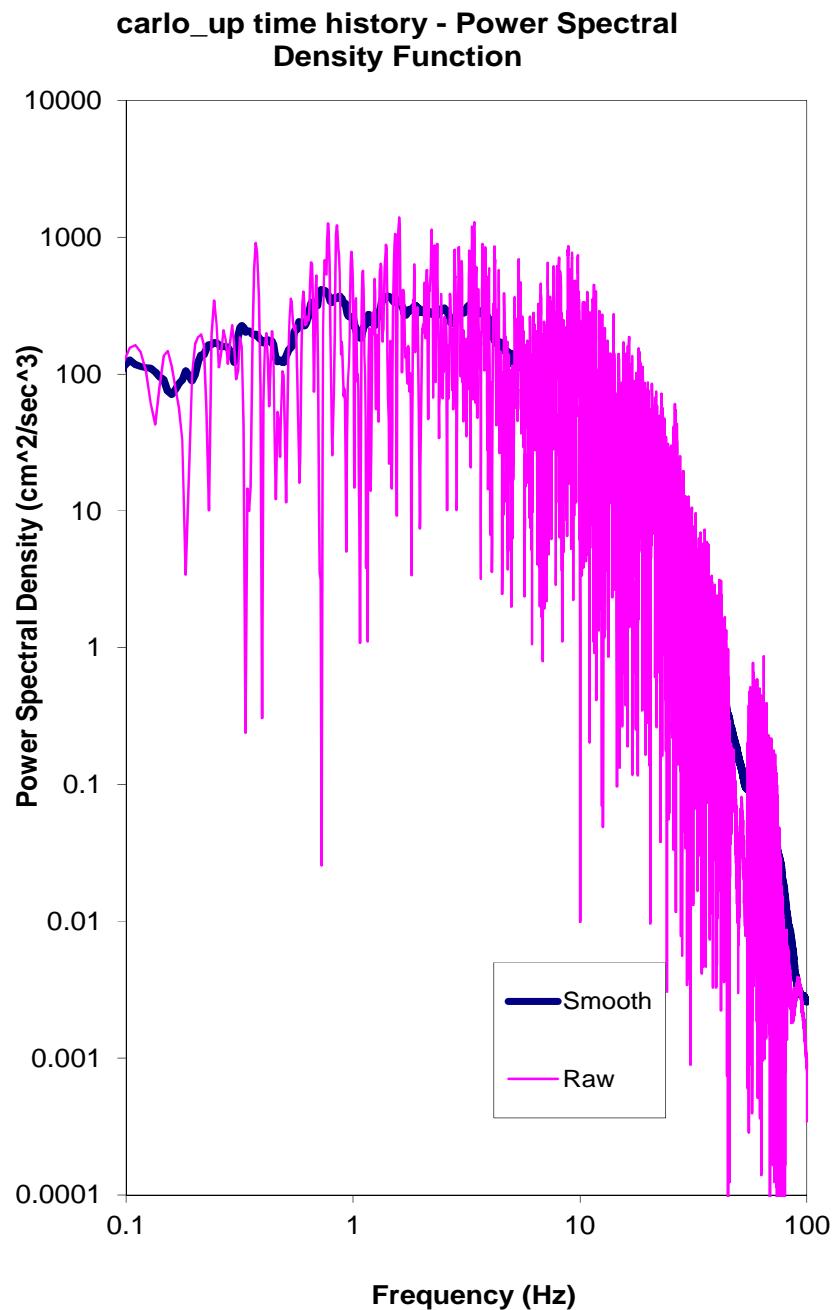
carlo_up time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.206



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – POWER SPECTRAL DENSITY
FUNCTION**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Calculation of Correlation Coefficients

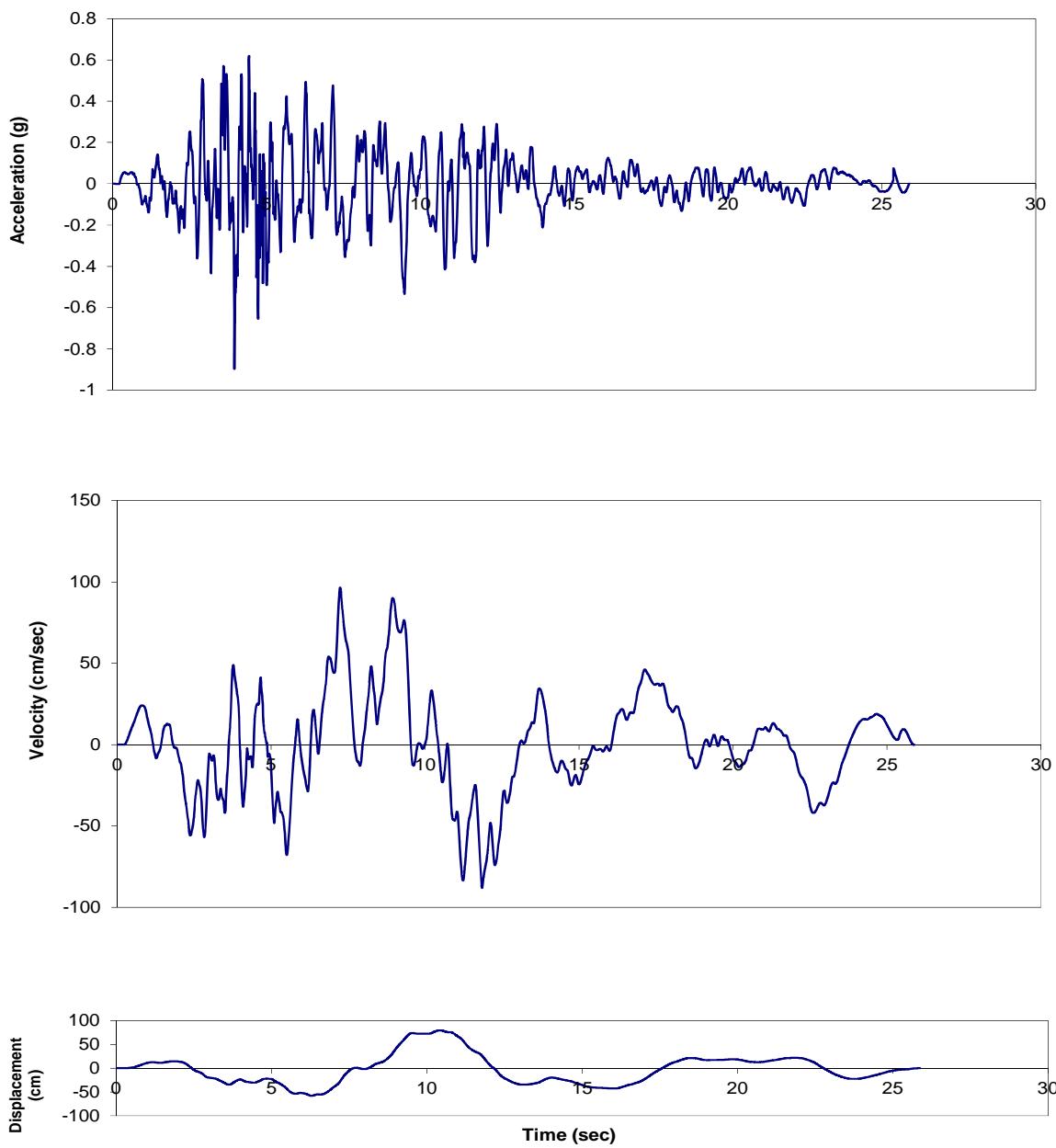
Cross-correlation check

Horizontal 1:	Carlo_090
Horizontal 2:	Carlo_360
Vertical:	Carlo_UP
corr, H1-H2	-0.072
corr, H1-V	-0.043
corr, H2-V	0.112

SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION – SPECTRALLY MATCHED CARLO MOTION – CALCULATION OF CORRELATION COEFFICIENTS

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

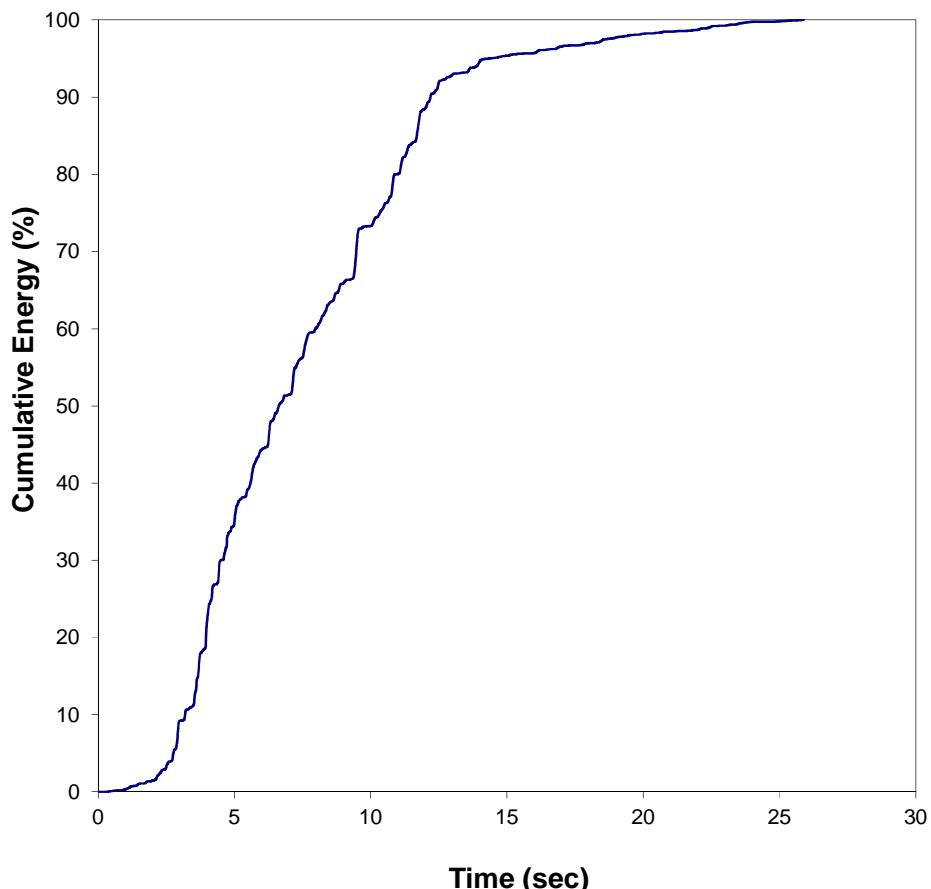
Duzce_DZC180 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

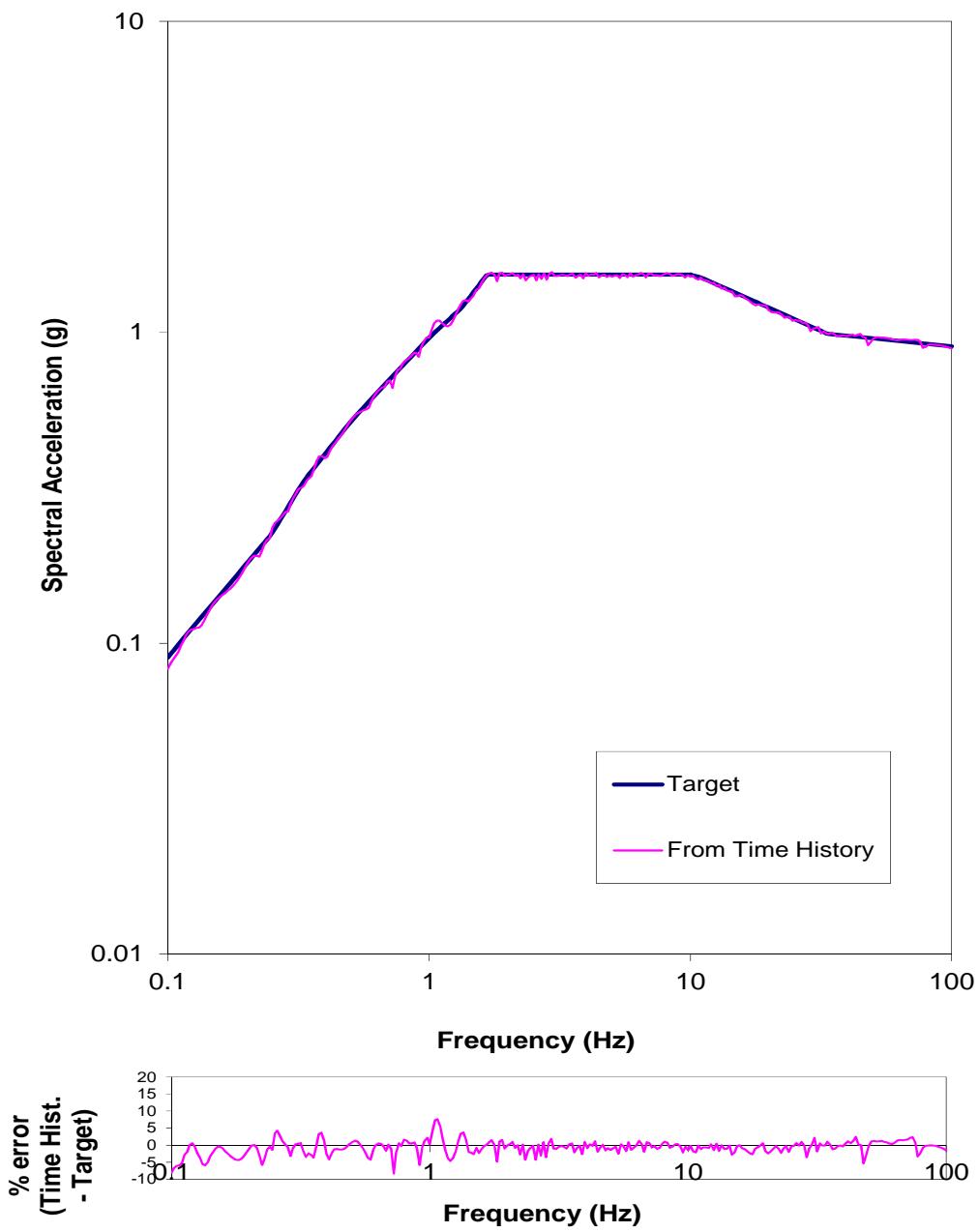
Duzce_DZC180 time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

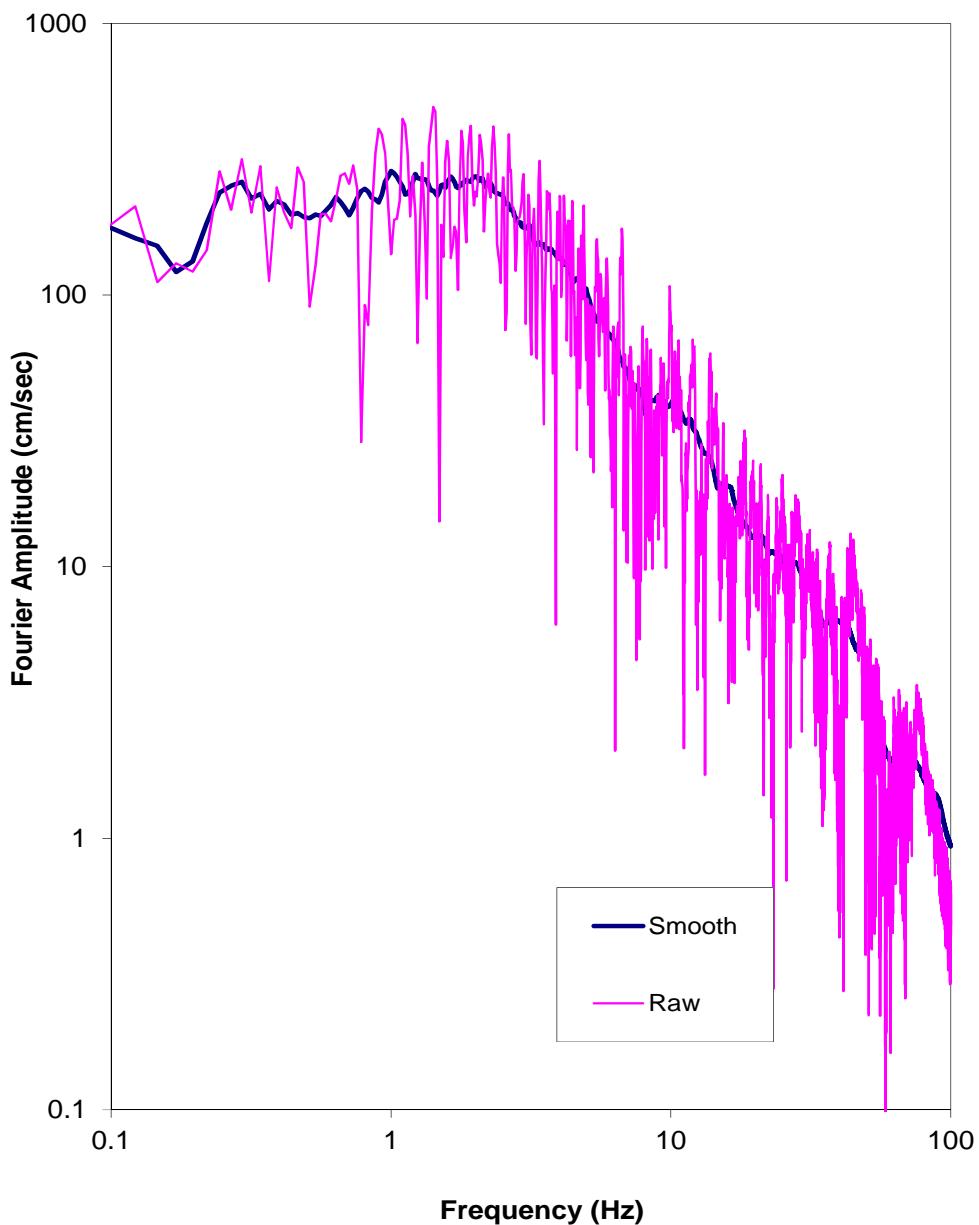
Duzce_DZC180 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Duzce_DZC180 time history - Fourier Amplitude Spectra

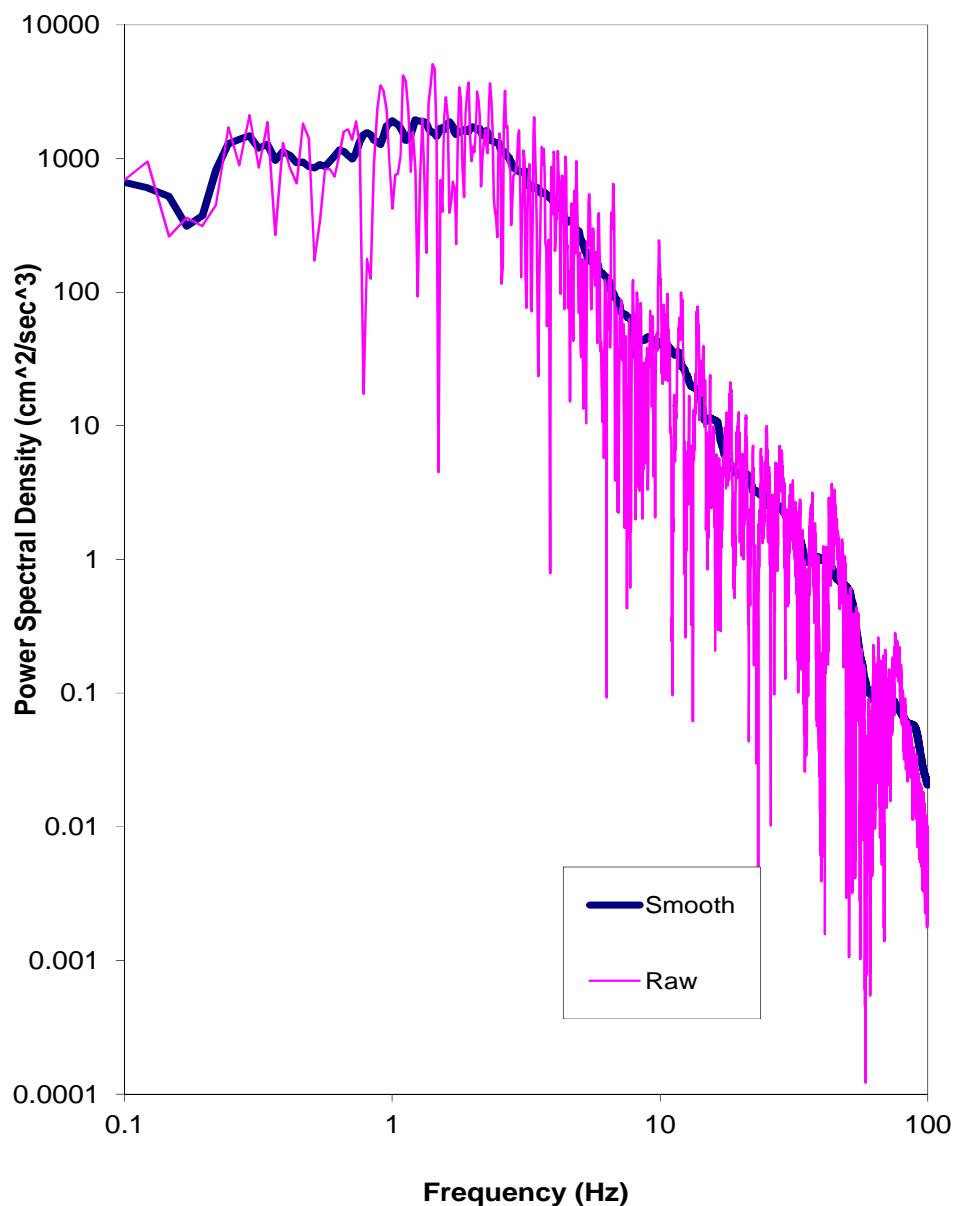


SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT
NORMAL – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – FOURIER AMPLITUDE
SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.212

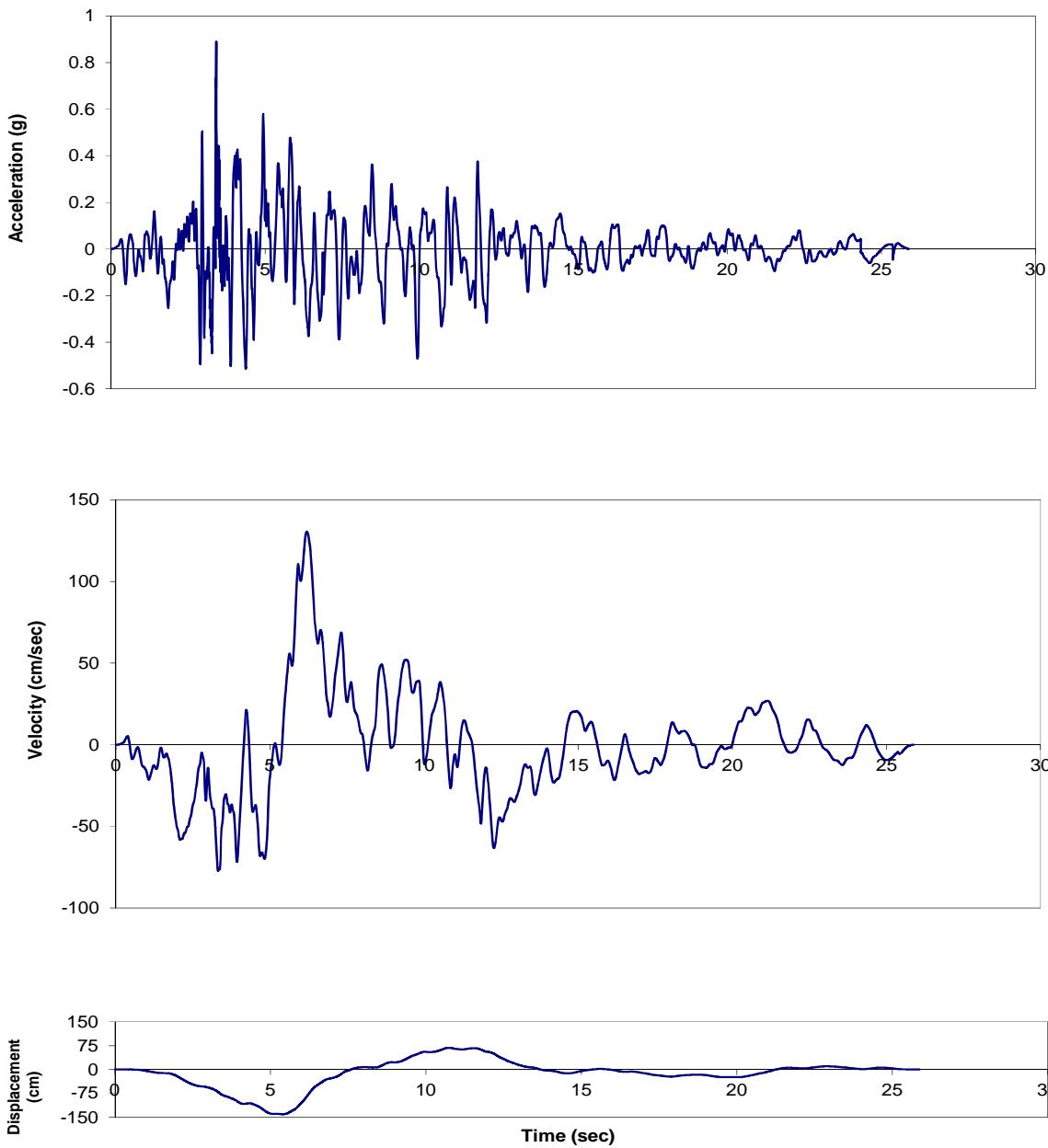
Duzce_DZC180 time history - Power Spectral Density Function



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

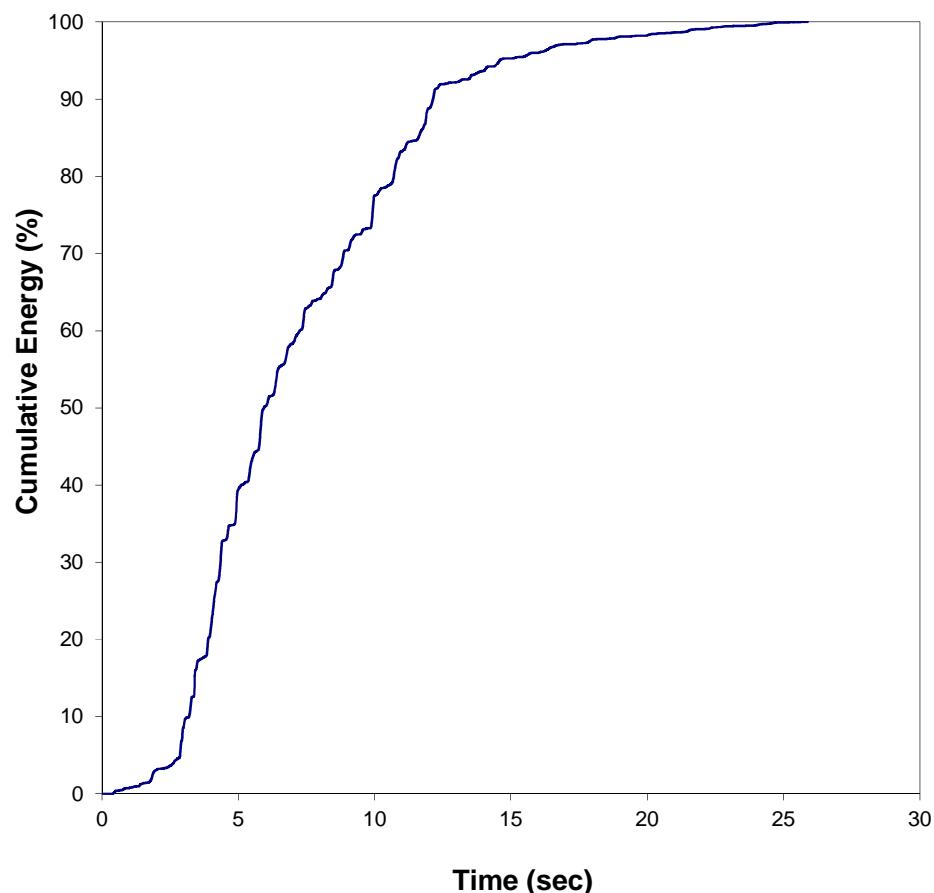
Duzce_DZC270 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

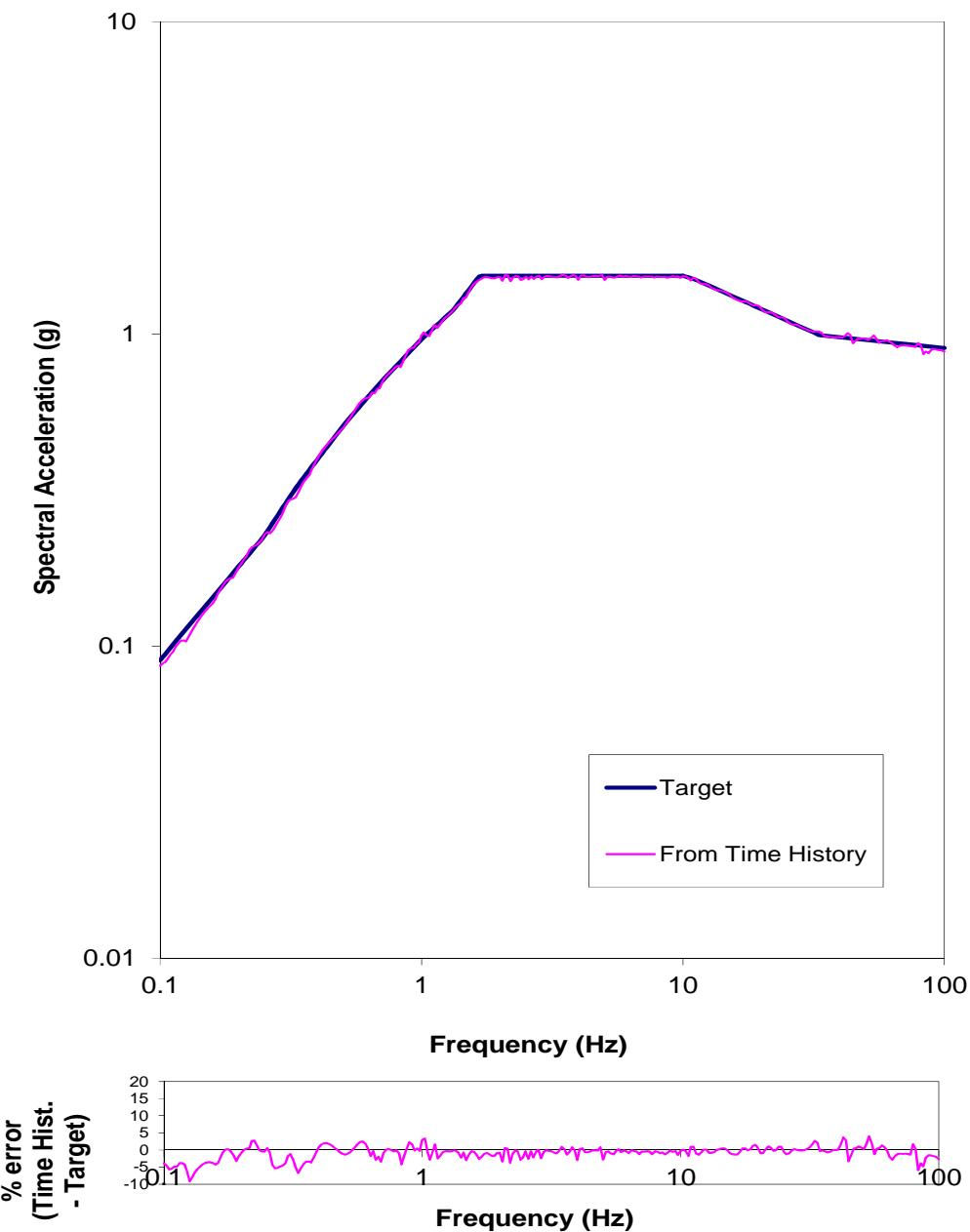
Duzce_DZC270 time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

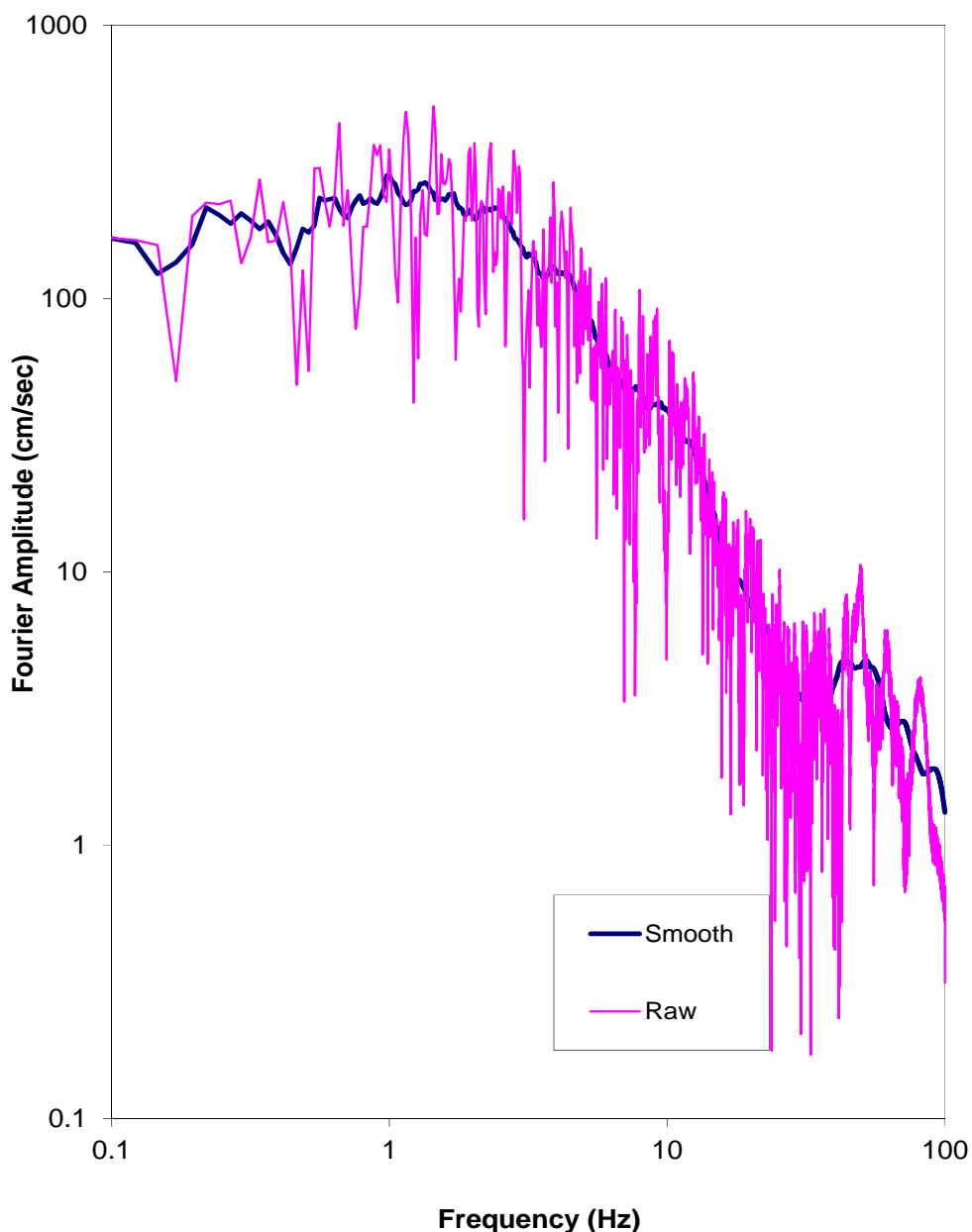
Duzce_DZC270 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

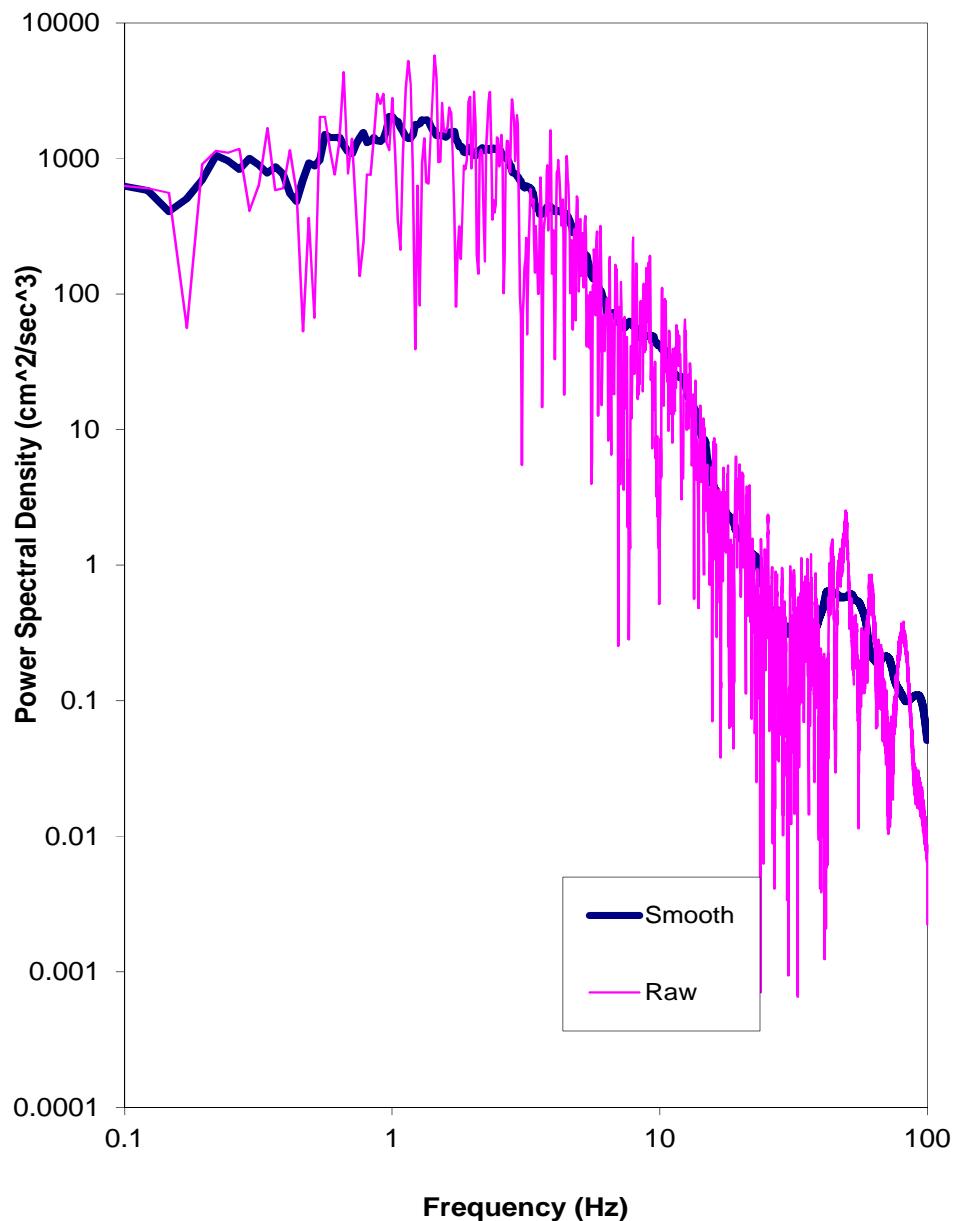
Duzce_DZC270 time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

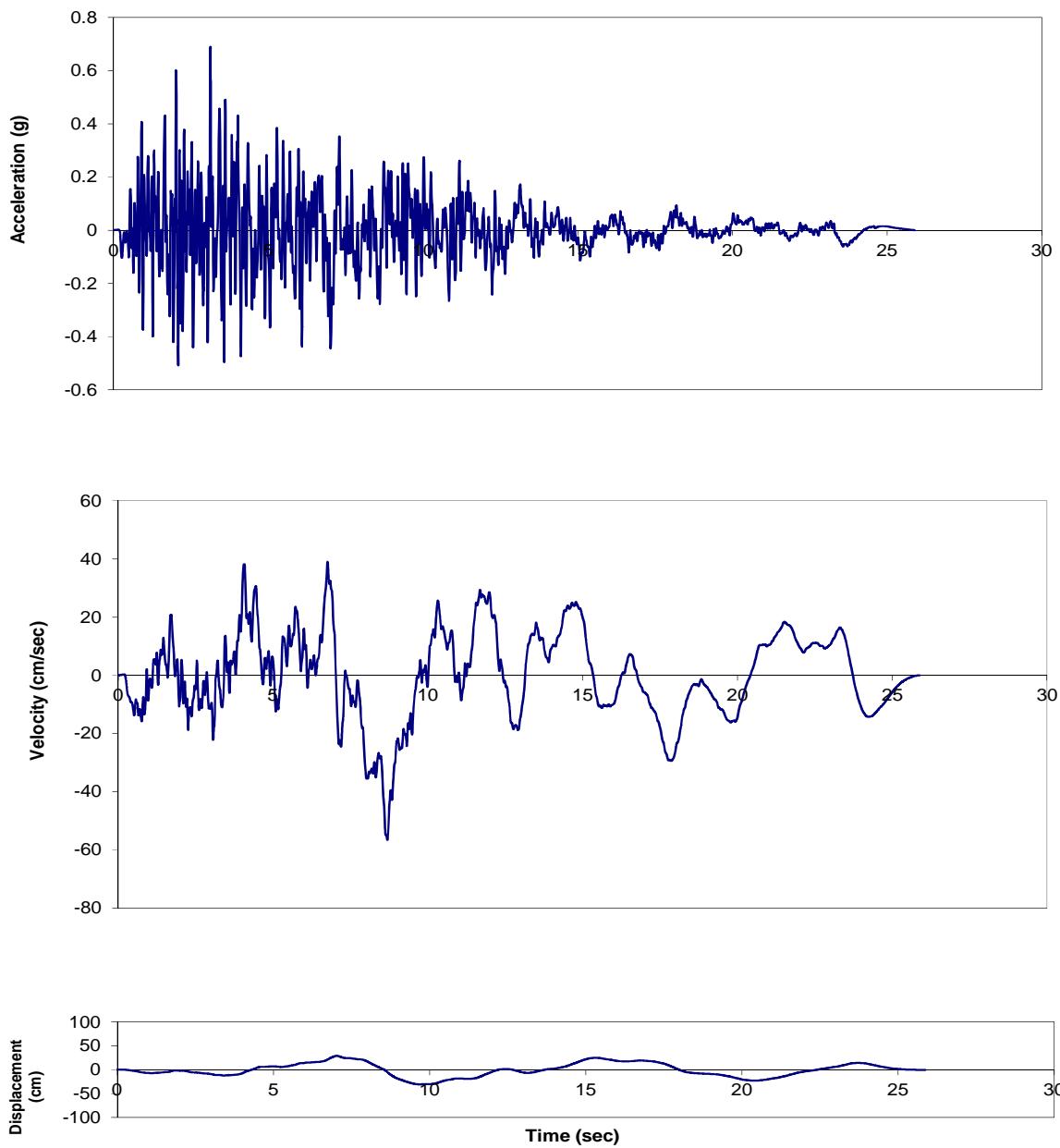
Duzce_DZC270 time history - Power Spectral Density Function



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

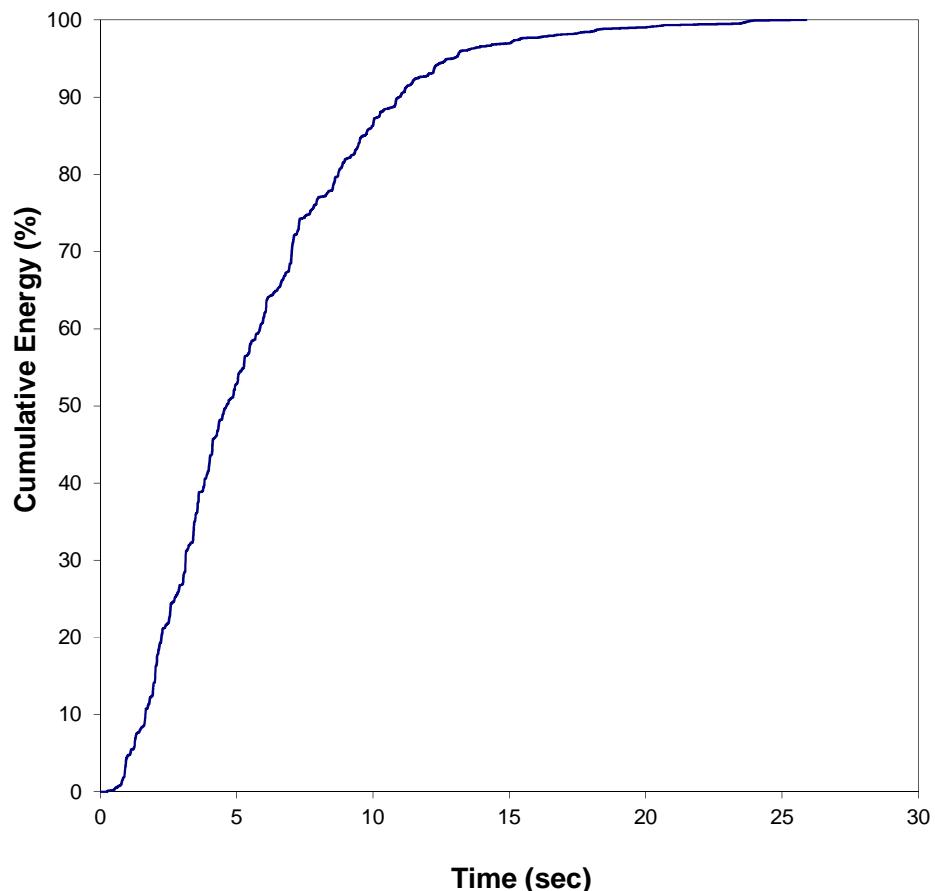
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Duzce_DZCUP time history - Acceleration, Velocity, and Displacement Time Histories



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

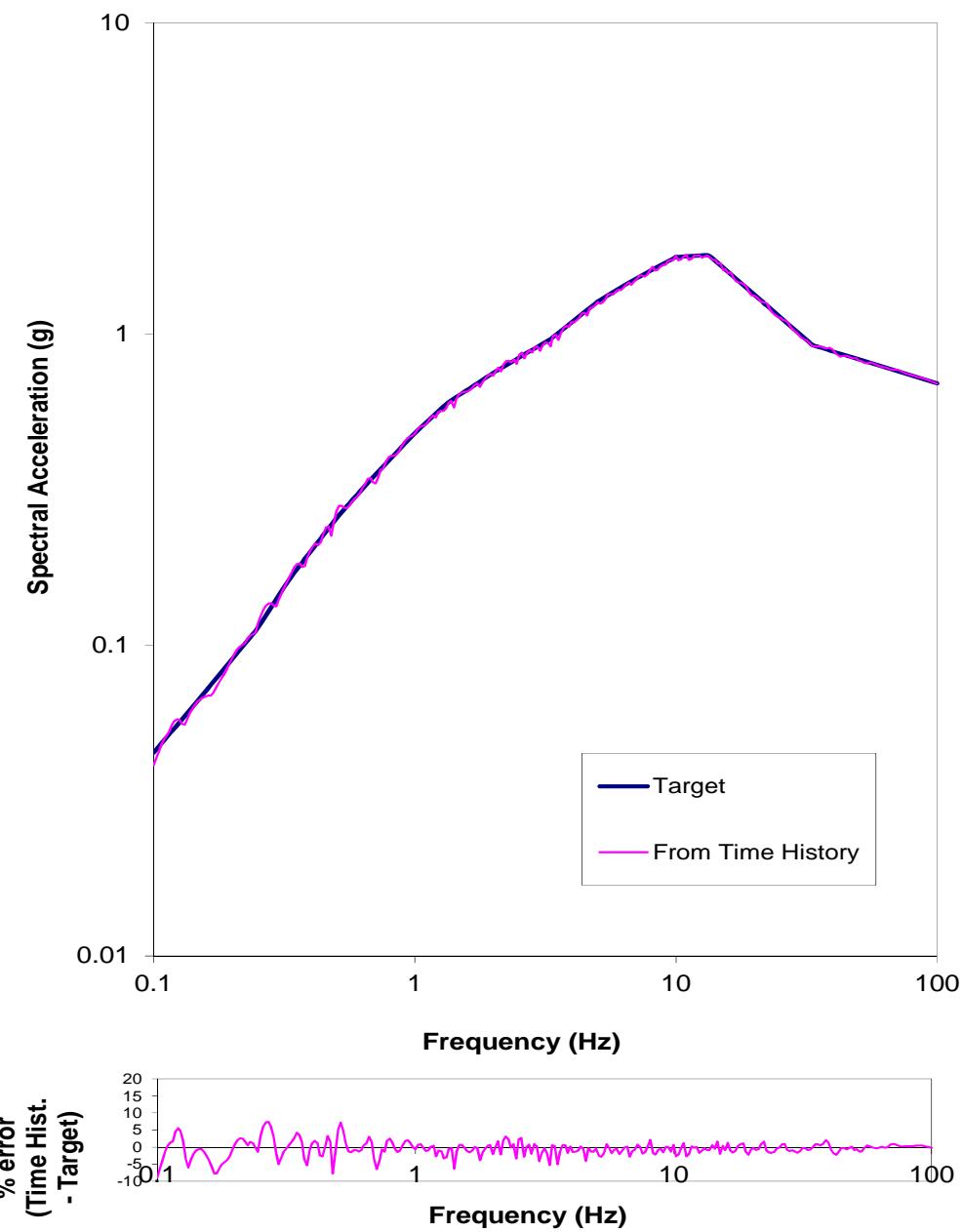
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Duzce_DZCUP time history - Cumulative Energy (Husid) plot

**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

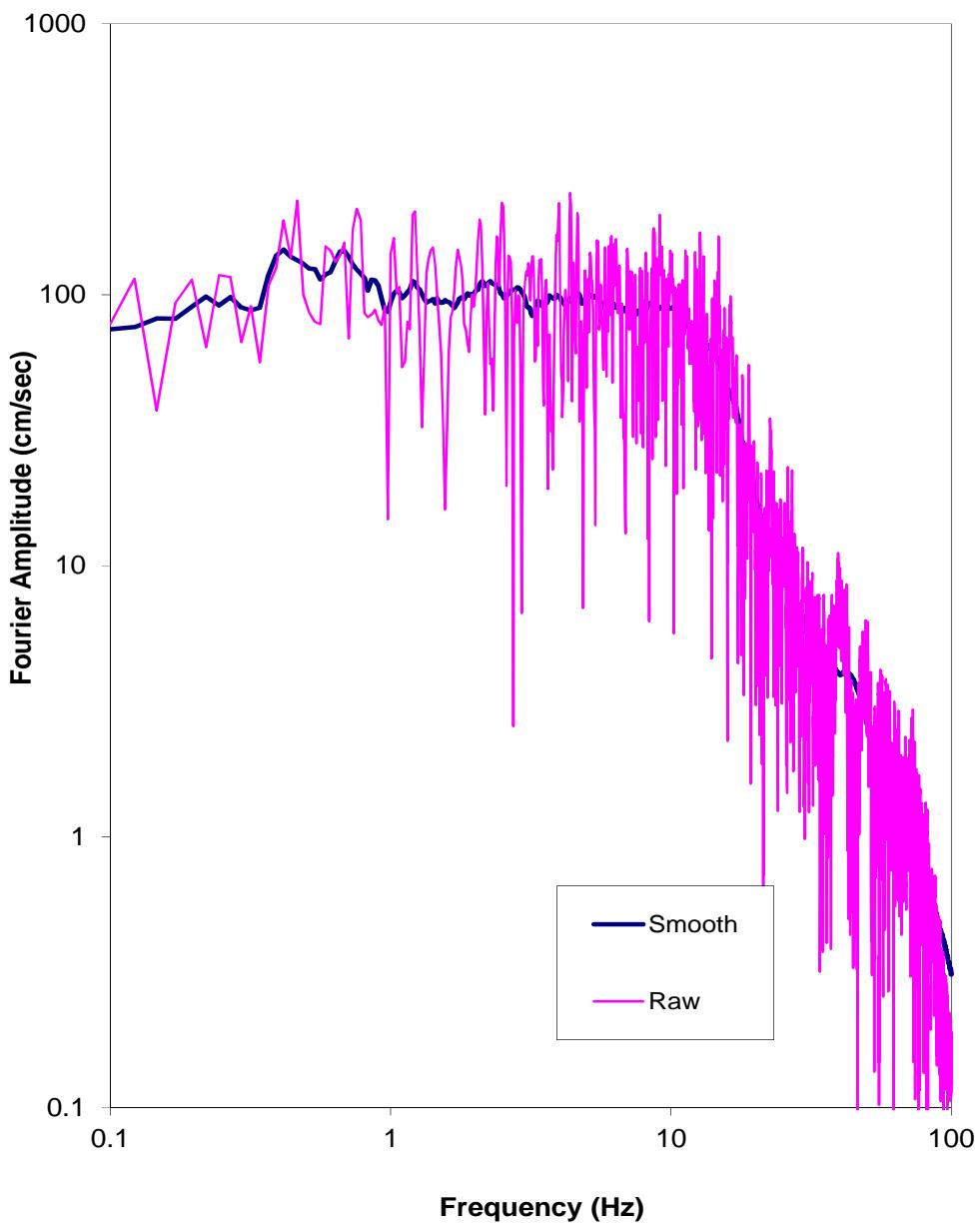
Duzce_DZCUP time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – TARGET AND CALCULATED RESPONSE
SPECTRA

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

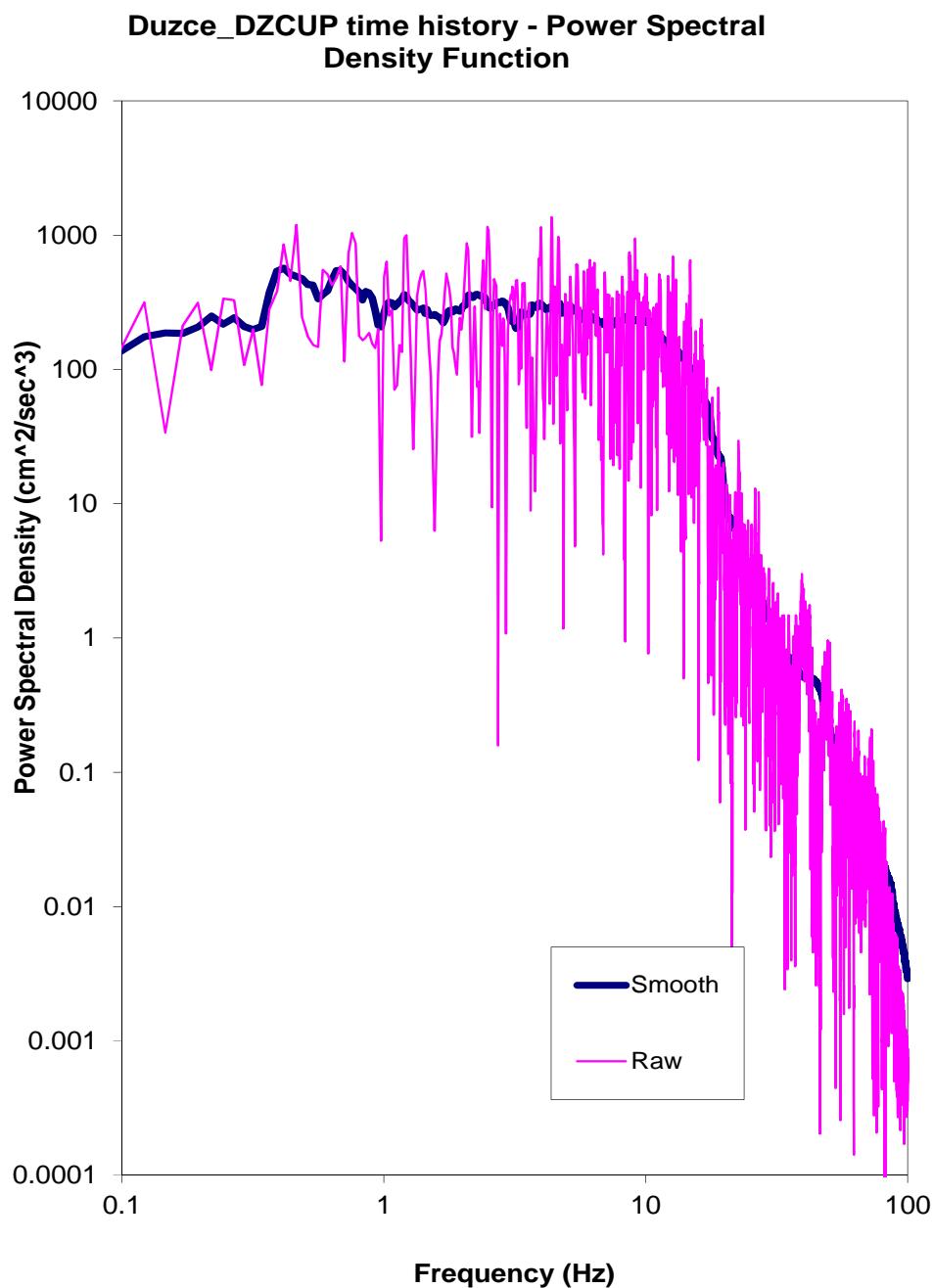
Duzce_DZCUP time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

PLATE E.222



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – POWER SPECTRAL DENSITY FUNCTION**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Calculation of Correlation Coefficients

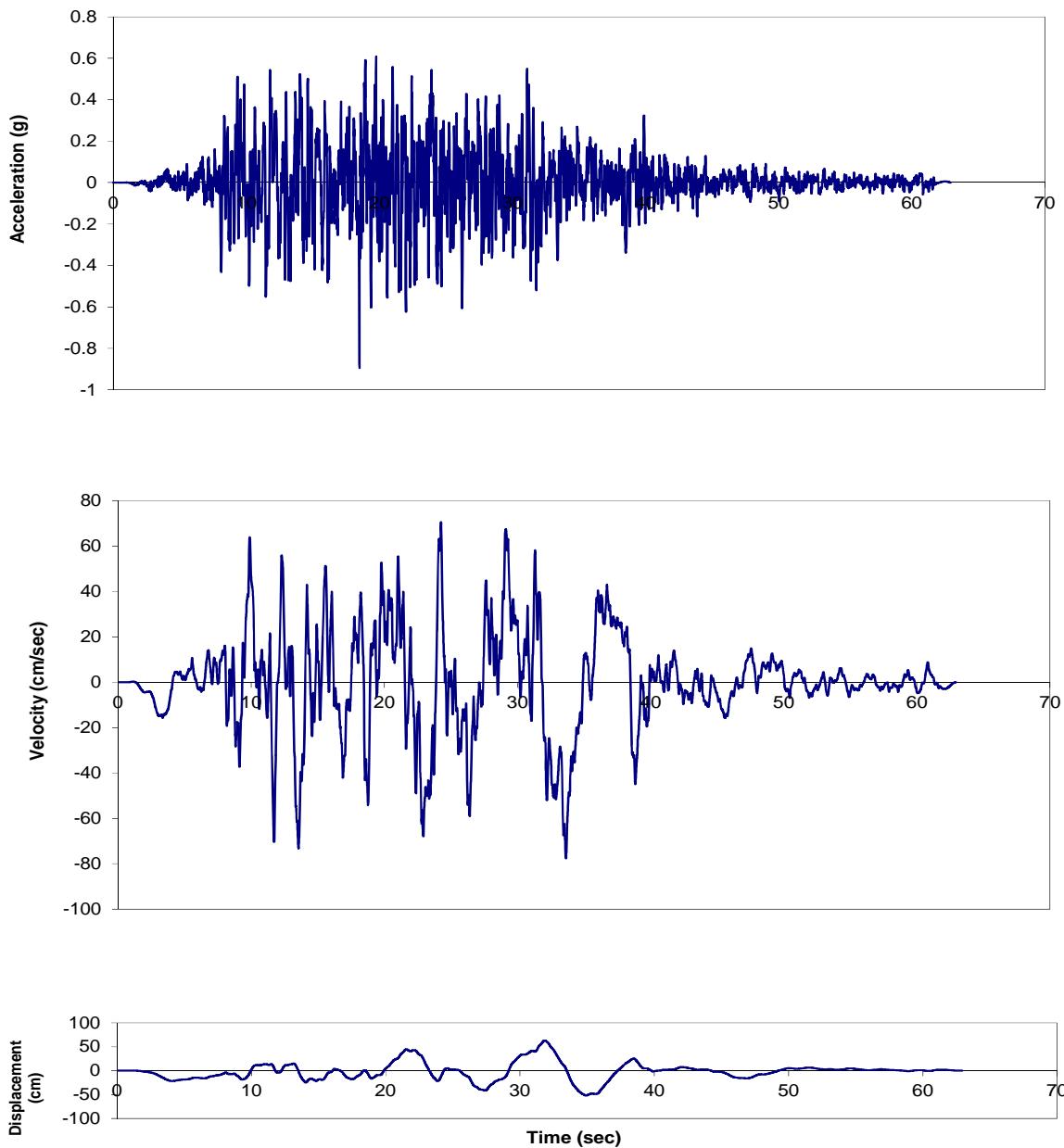
Cross-correlation check

Horizontal 1:	DZC180
Horizontal 2:	DZC270
Vertical:	DZCUP
corr, H1-H2	-0.011
corr, H1-V	-0.050
corr, H2-V	-0.005

SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION – SPECTRALLY MATCHED DZC MOTION – CALCULATION OF CORRELATION COEFFICIENTS

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

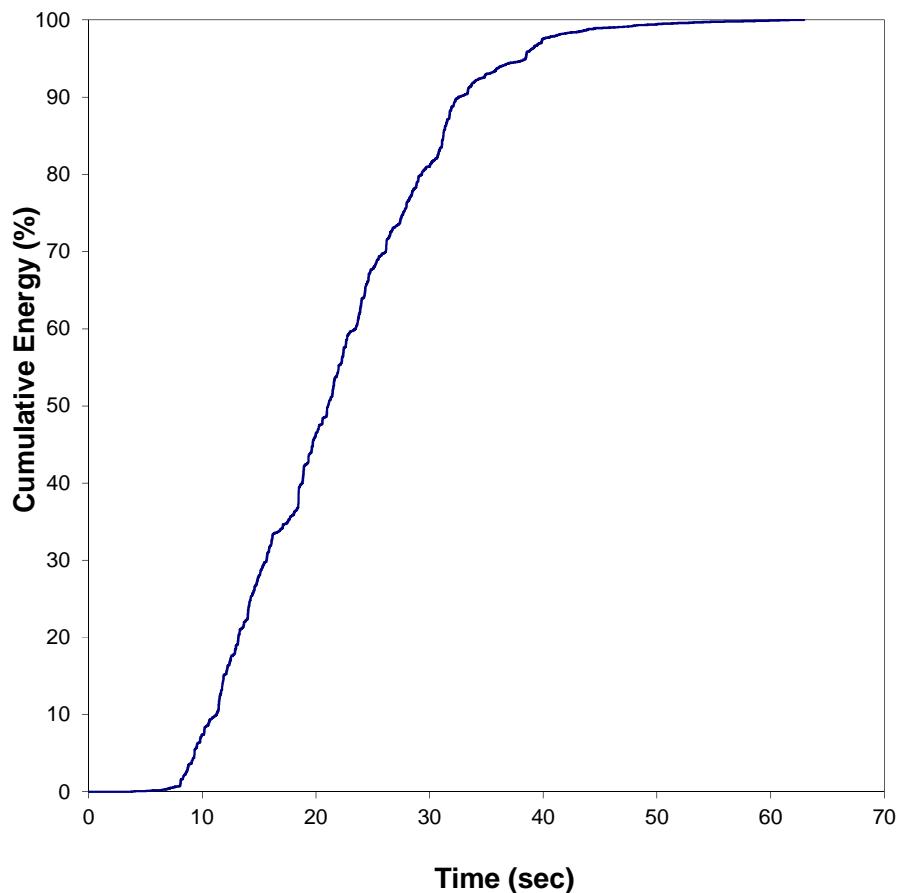
Unio_N00W time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

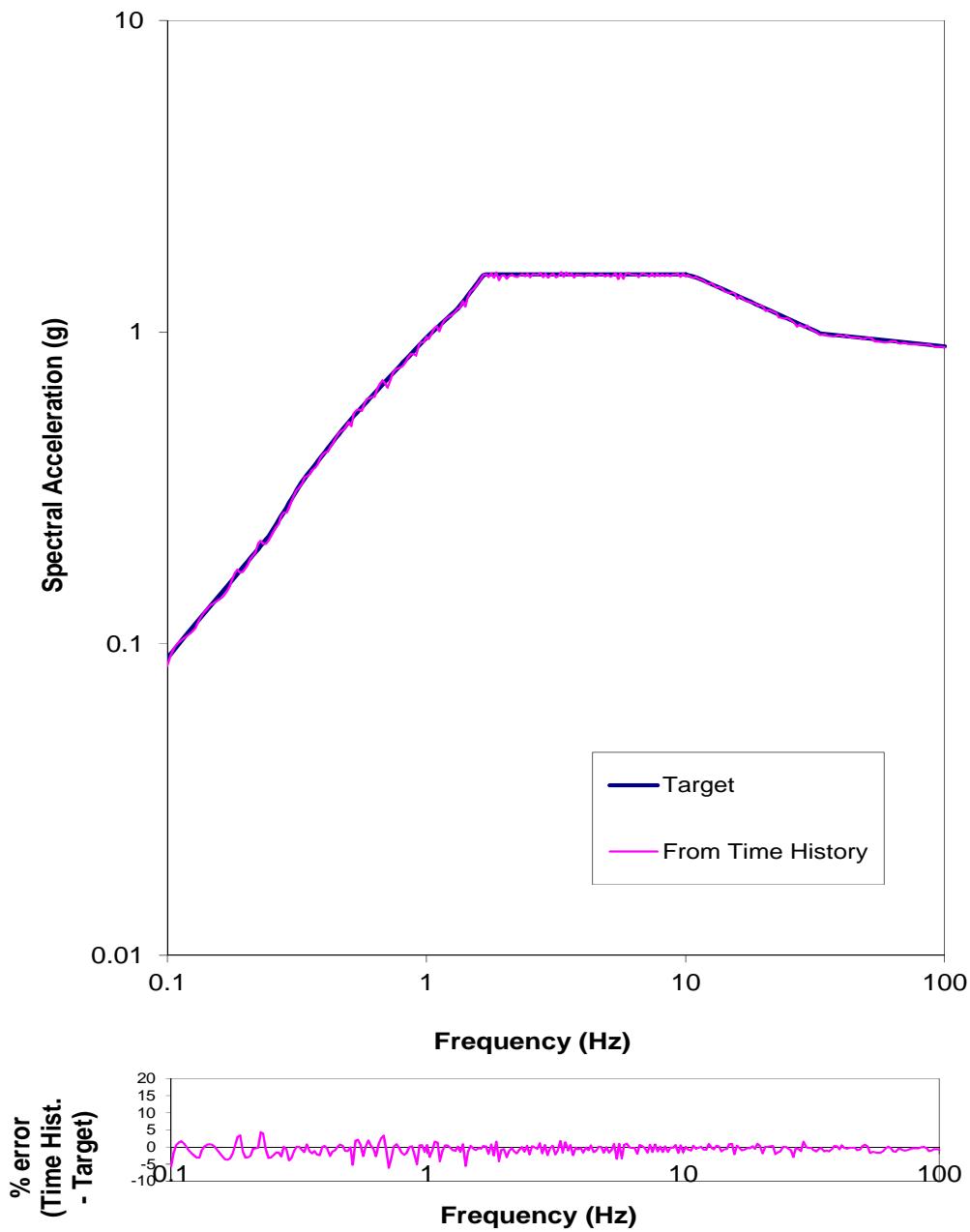
Unio_N00W time history - Cumulative Energy (Husid) plot



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT
NORMAL – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – NORMALIZED
CUMULATIVE ENERGY PLOT**

LNG FACILITIES
ALASKA LNG PROJECT
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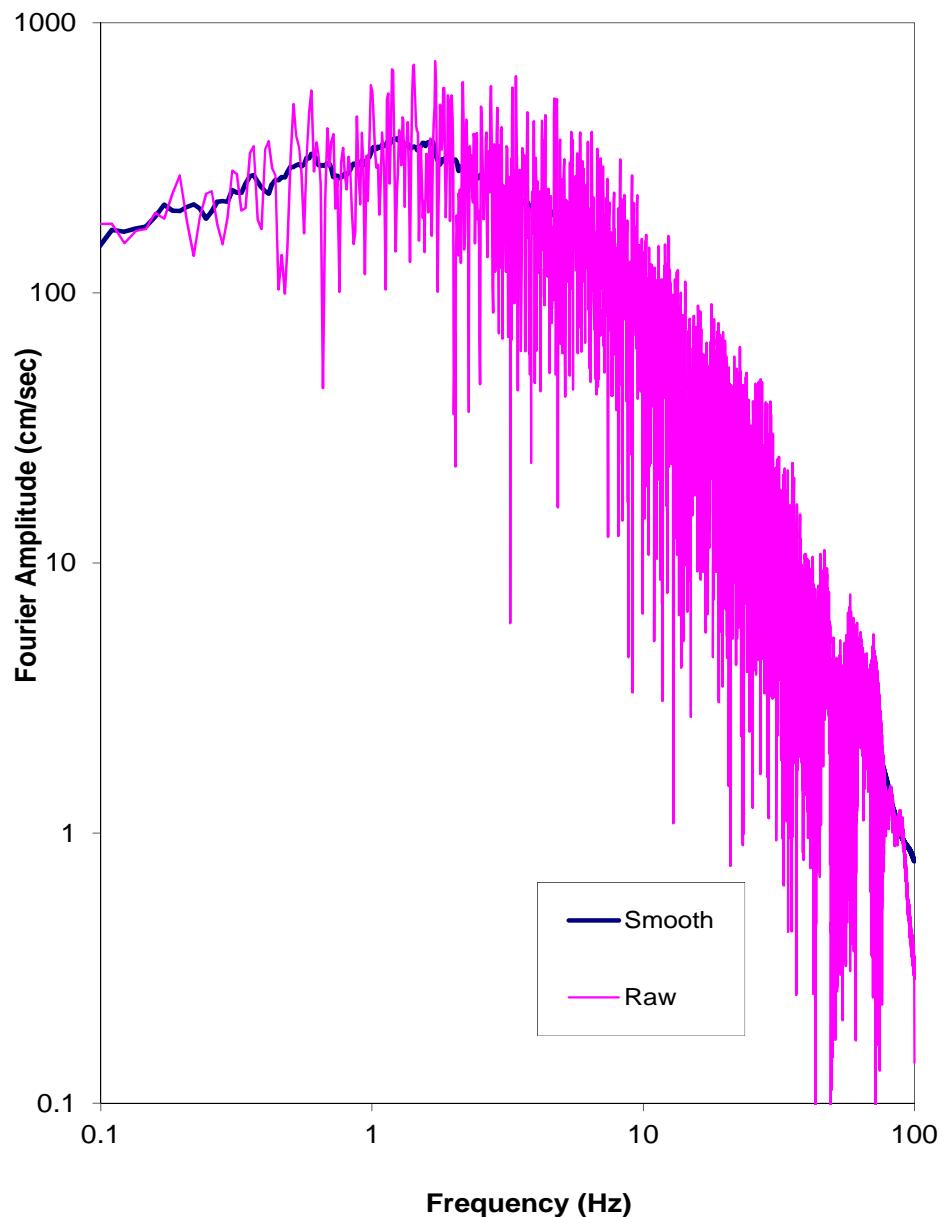
Unio_N00W time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT
NORMAL – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – TARGET AND
CALCULATED RESPONSE SPECTRA

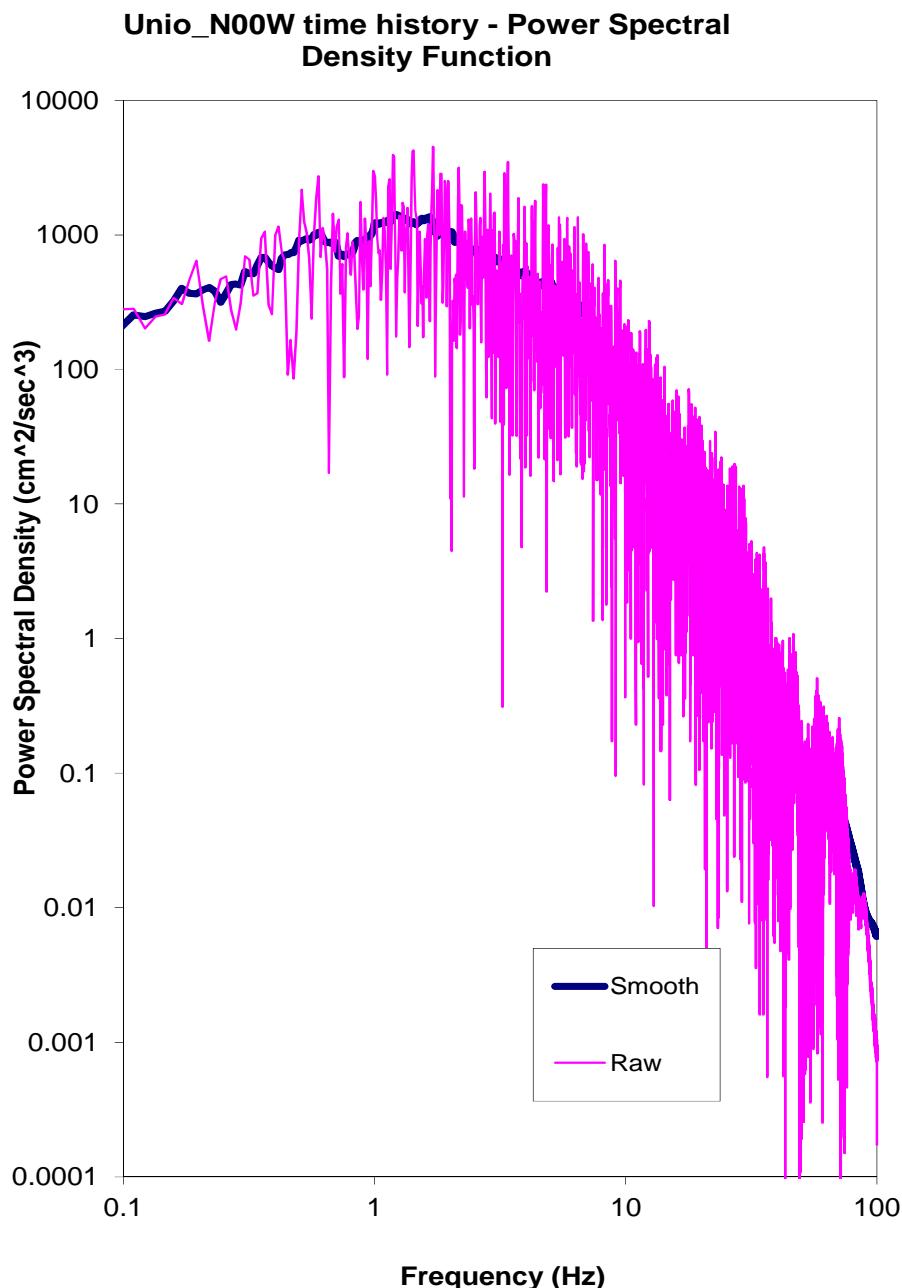
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Unio_N00W time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – FOURIER AMPLITUDE SPECTRUM

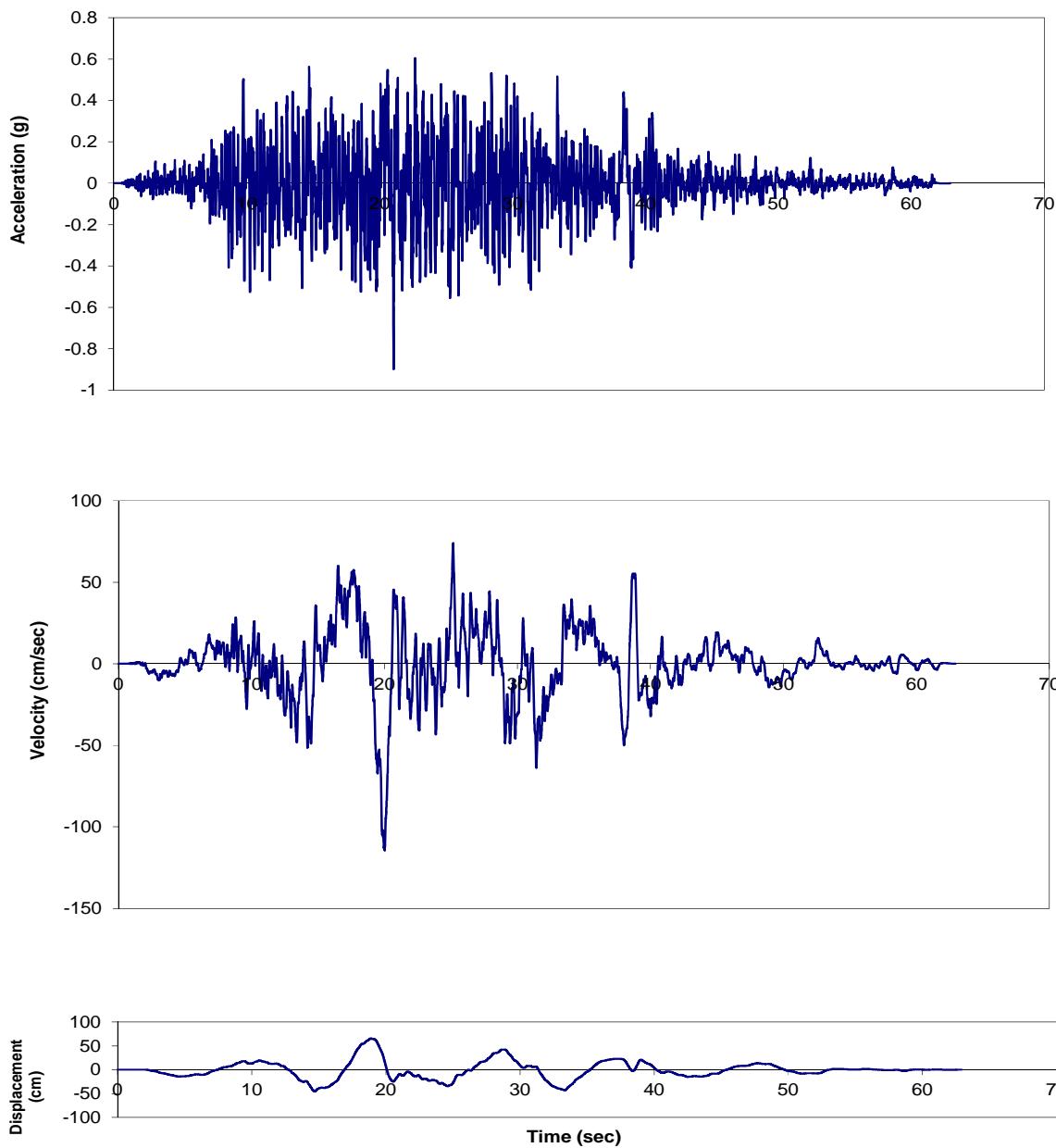
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT NORMAL – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

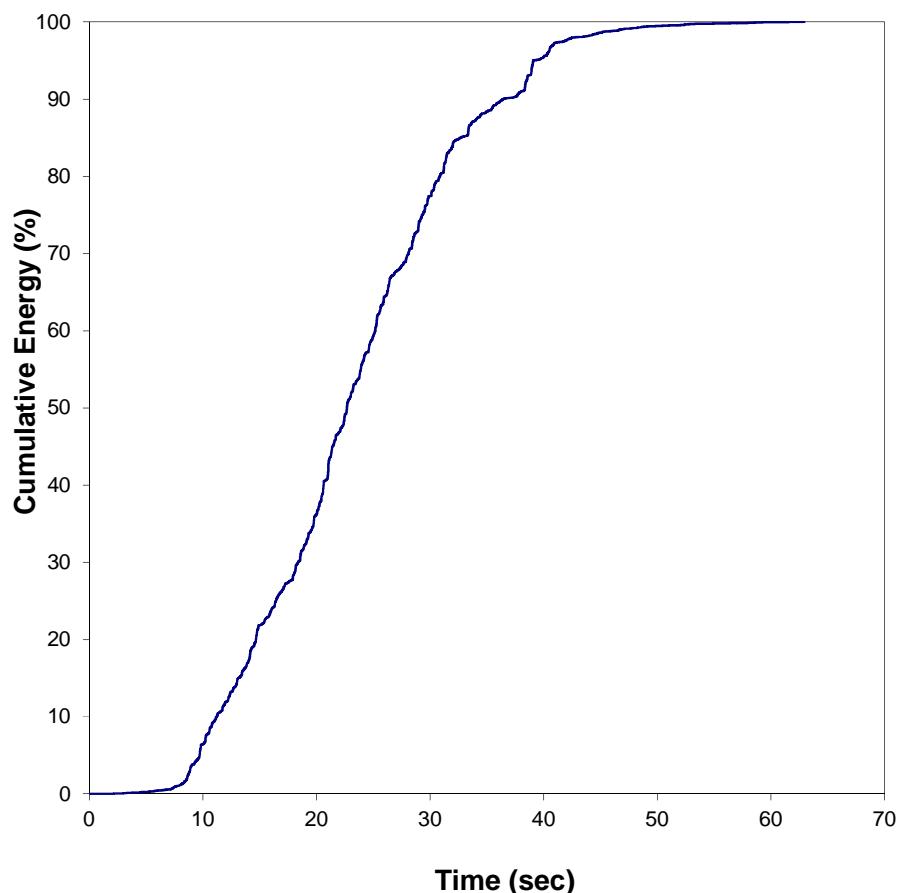
Unio_N90W time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

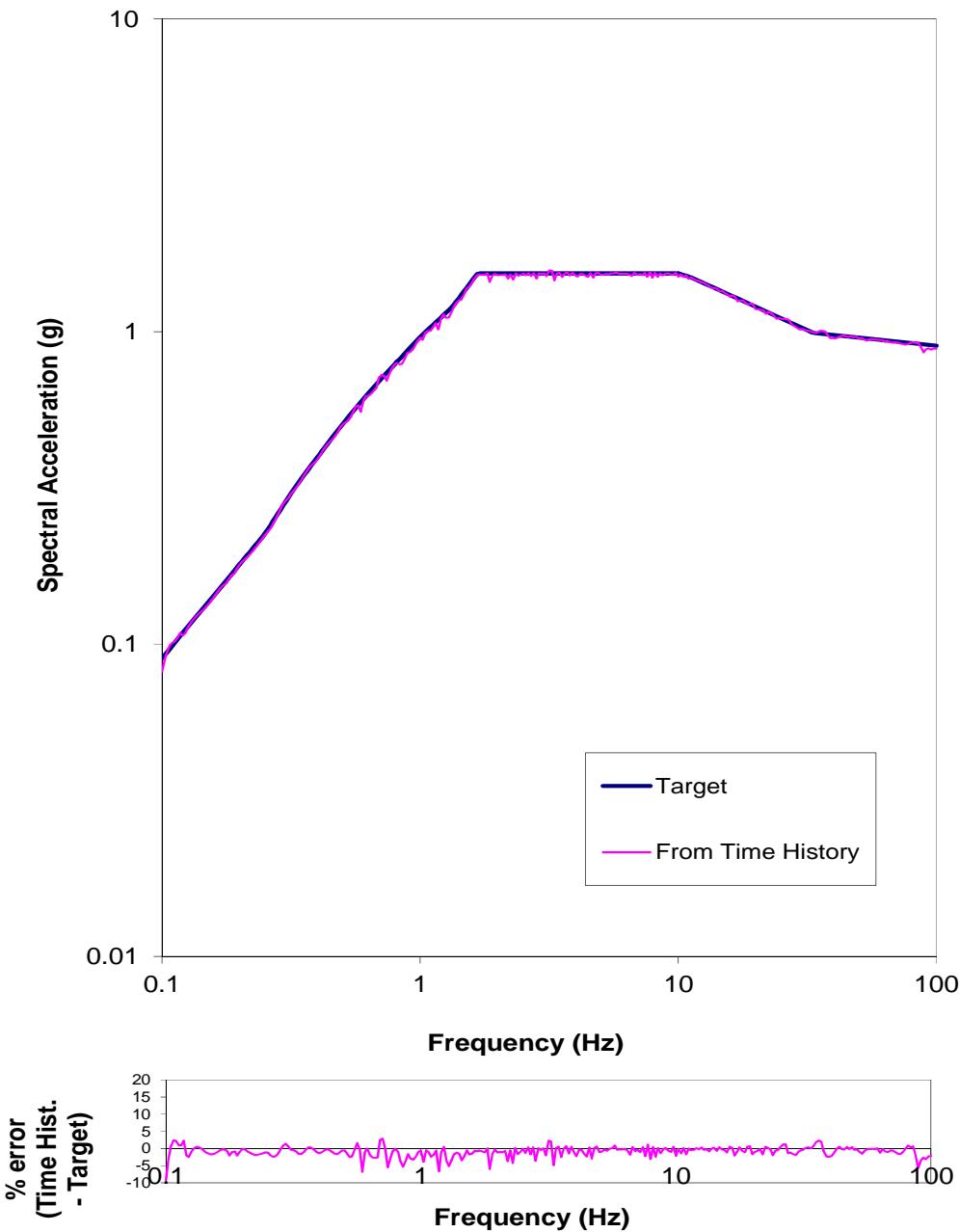
Unio_N90W time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

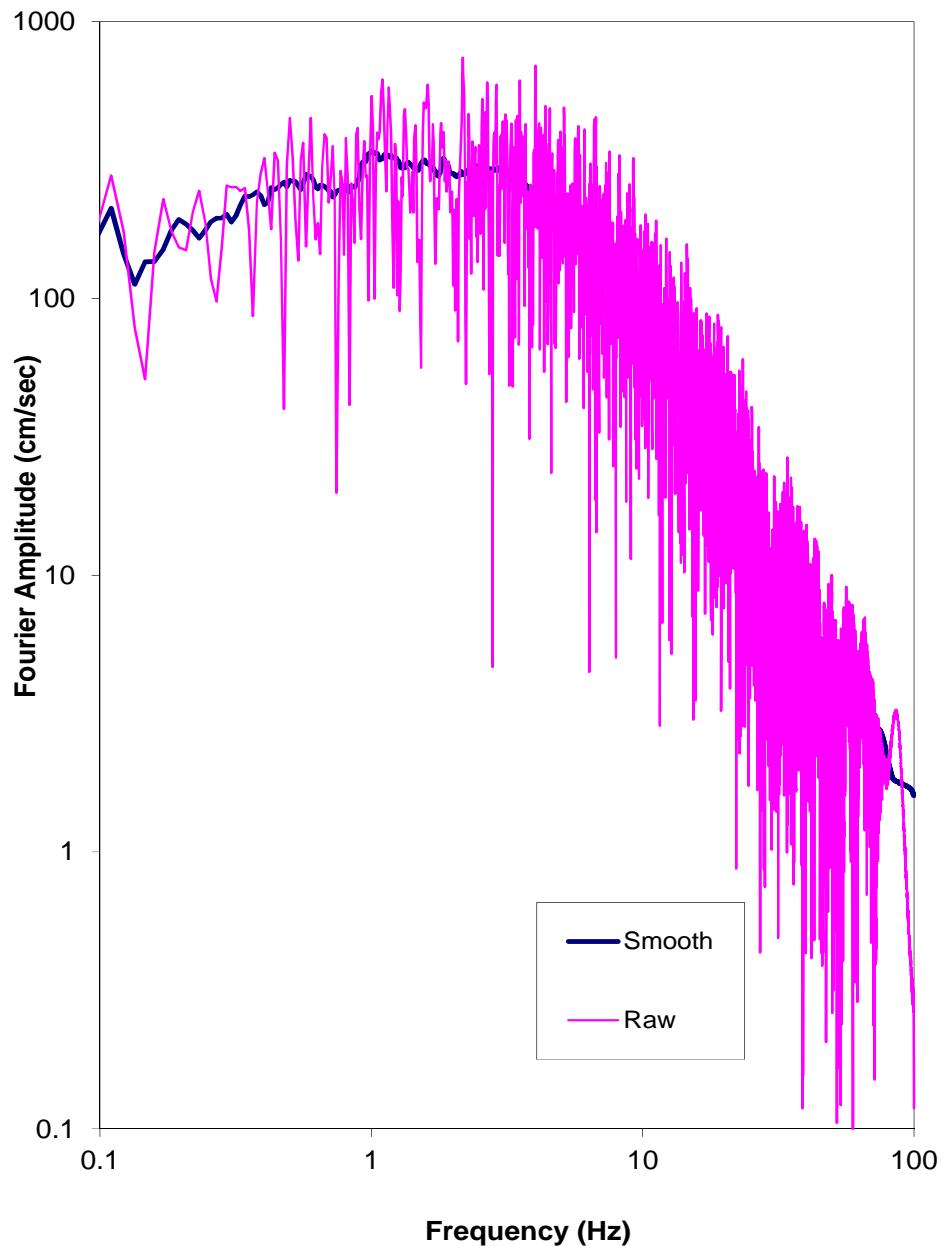
Unio_N90W time history - Response Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

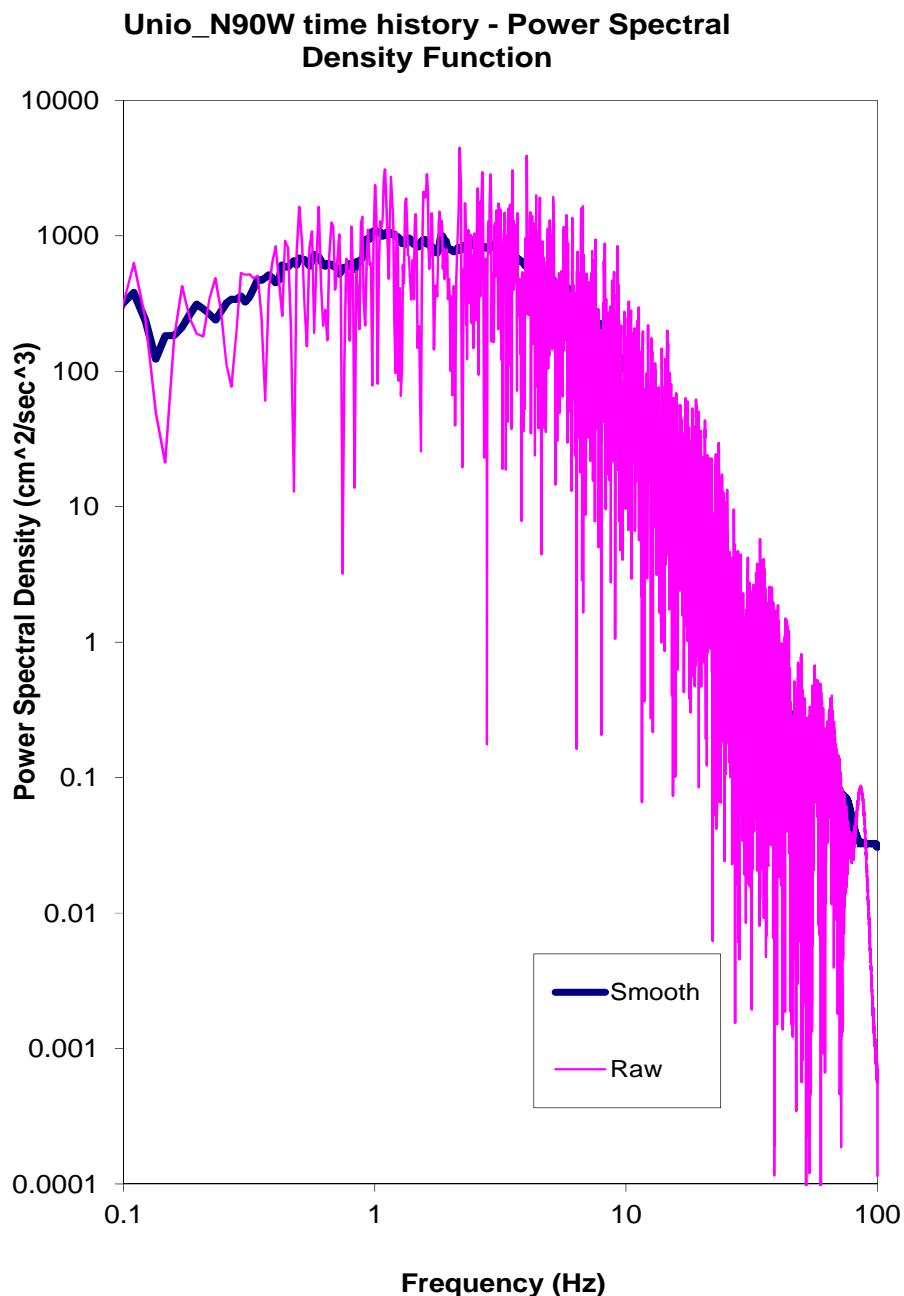
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Unio_N90W time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – FOURIER AMPLITUDE SPECTRUM

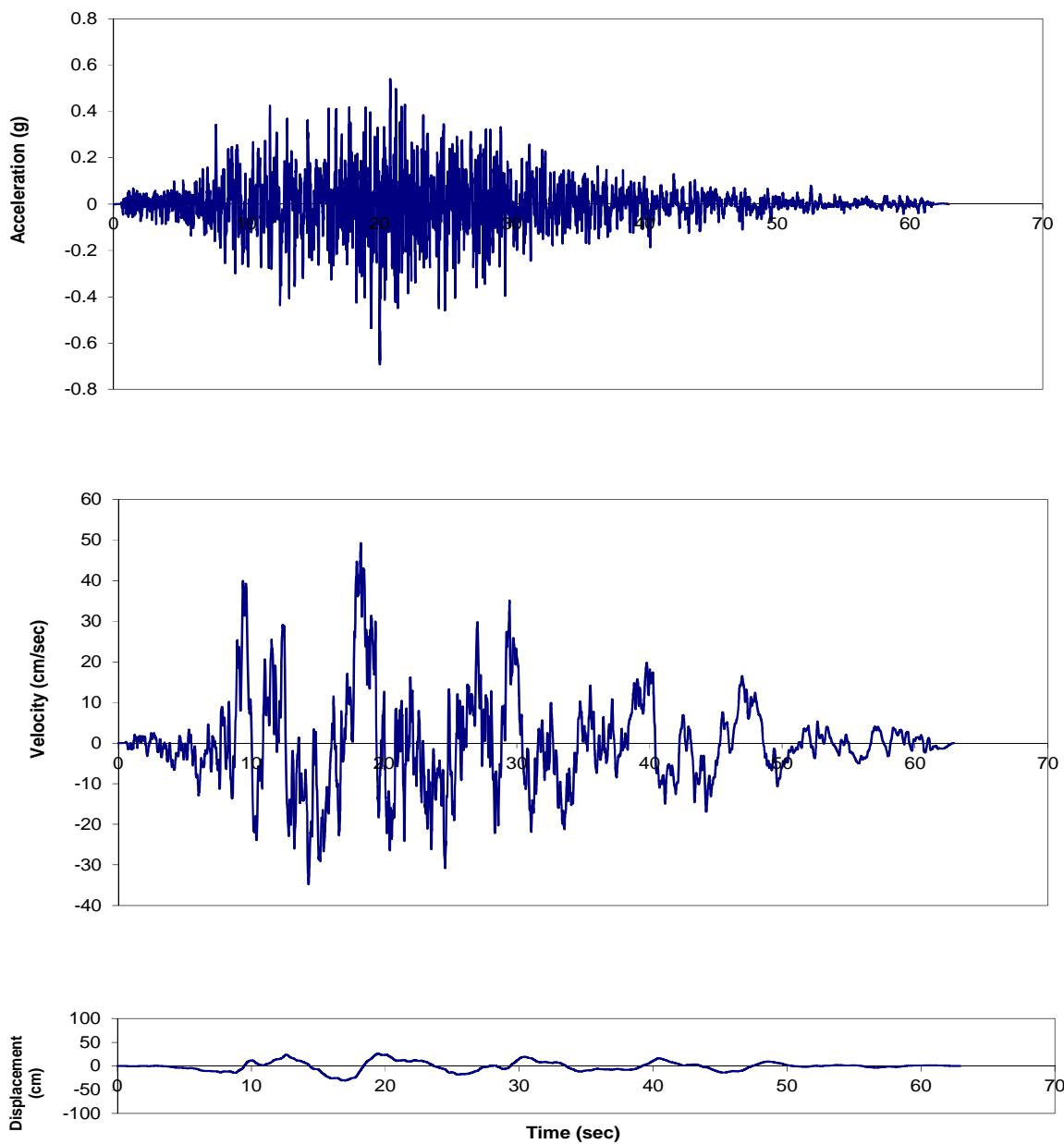
LNG FACILITIES
ALASKA LNG PROJECT
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SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION, FAULT PARALLEL – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

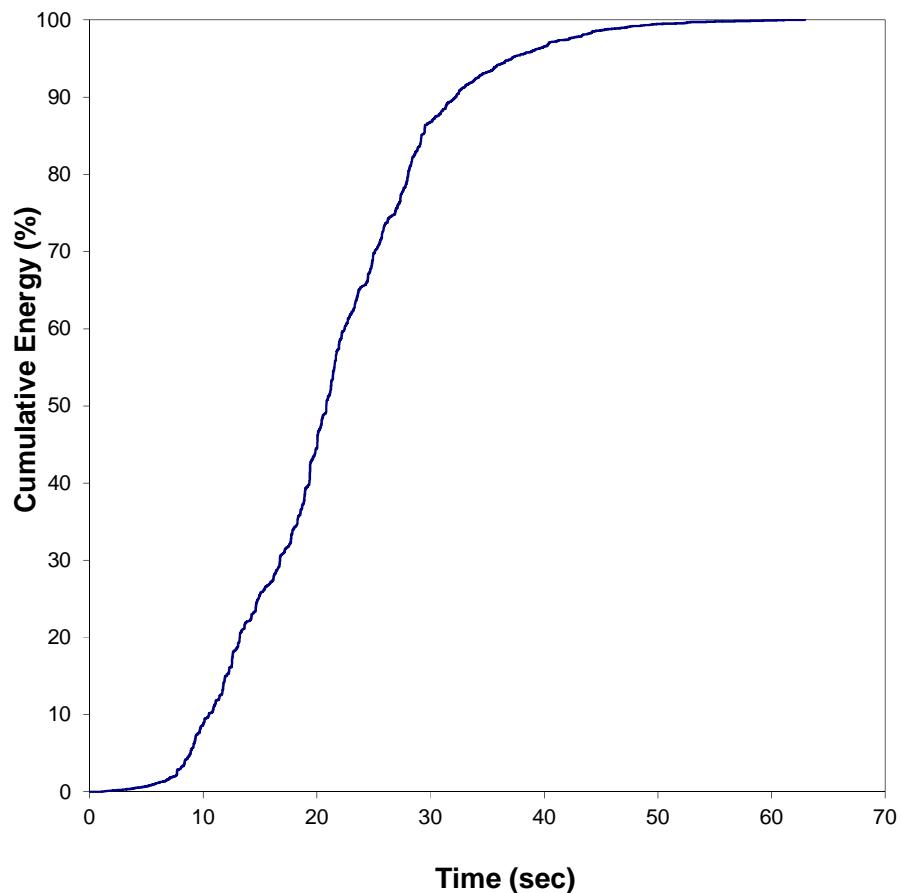
Unio_up time history - Acceleration, Velocity, and Displacement Time Histories



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION,
VELOCITY, AND DISPLACEMENT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

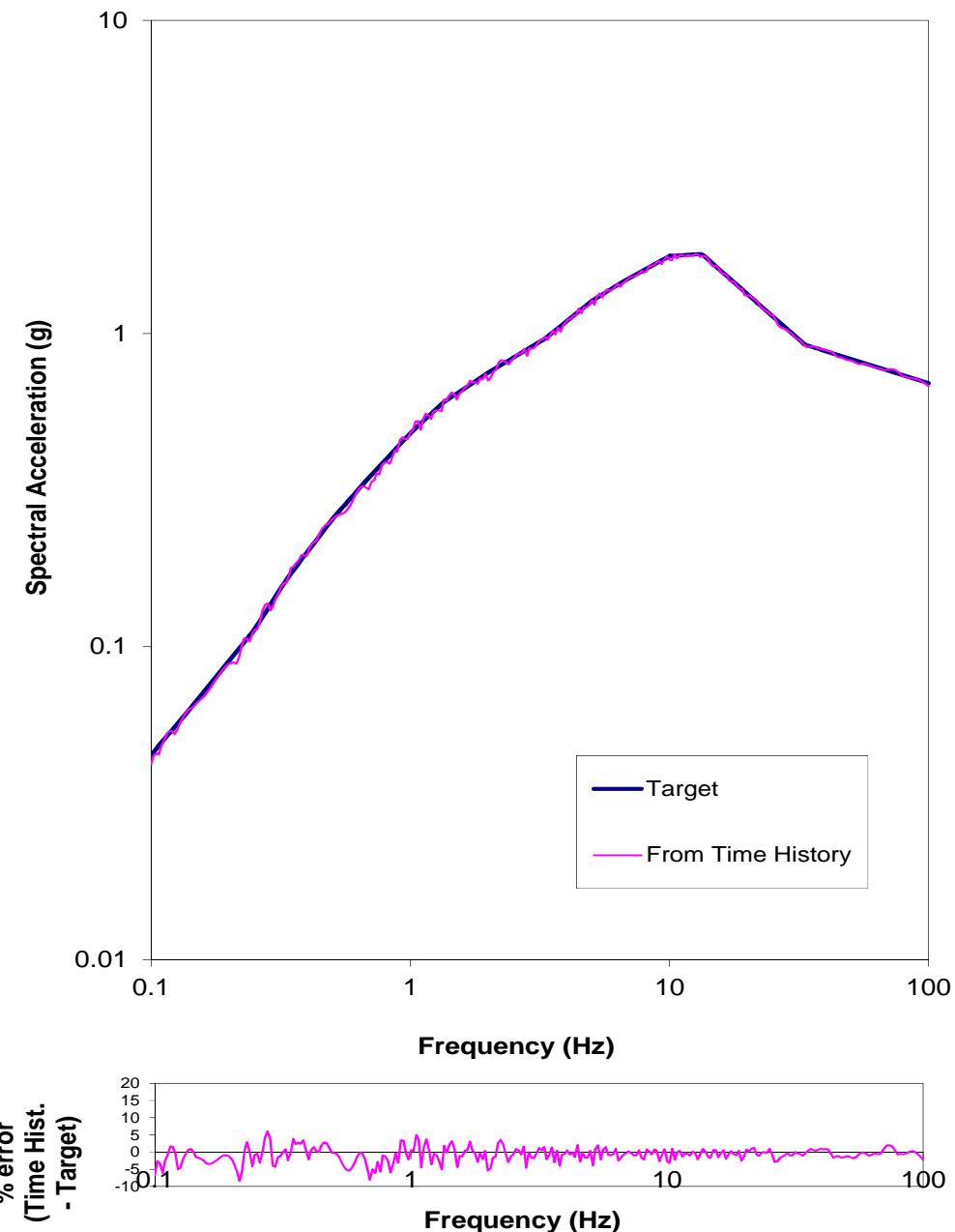
Unio_up time history - Cumulative Energy (Husid) plot



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY
PLOT**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

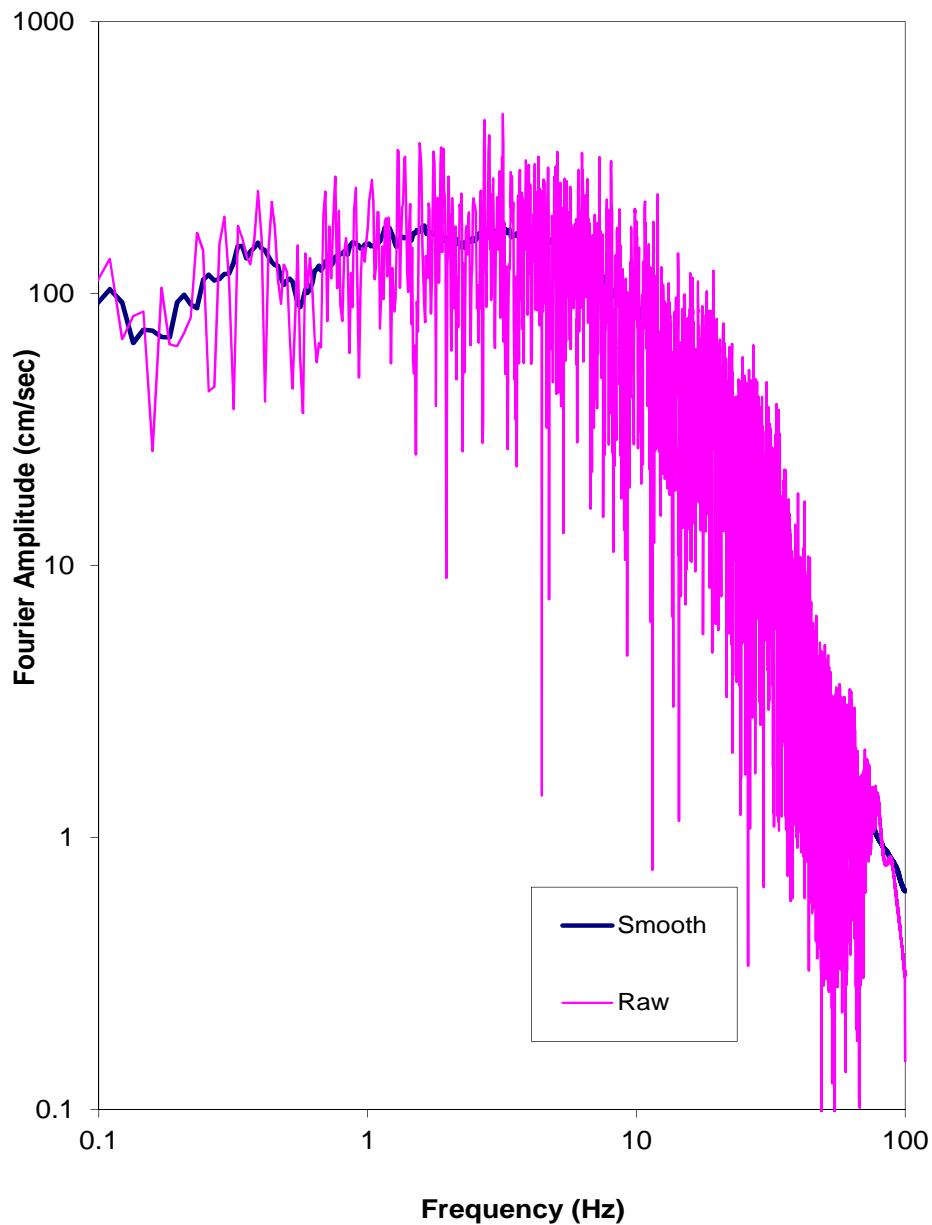
Unio_up time history - Response Spectra



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – TARGET AND CALCULATED RESPONSE
SPECTRA**

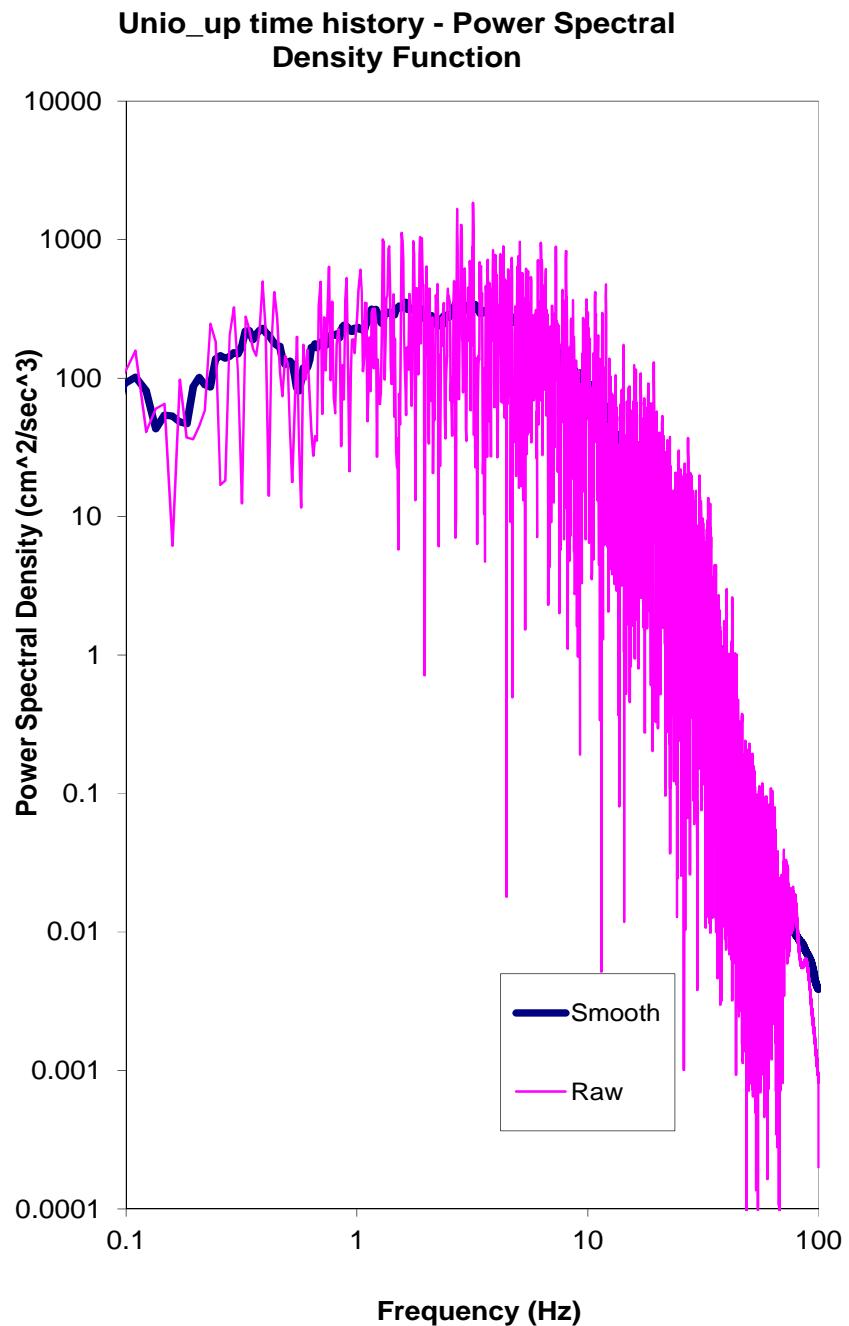
LNG FACILITIES
ALASKA LNG PROJECT
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Unio_up time history - Fourier Amplitude Spectra



**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM**

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**SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION –
SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – POWER SPECTRAL DENSITY FUNCTION**

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Calculation of Correlation Coefficients

Cross-correlation

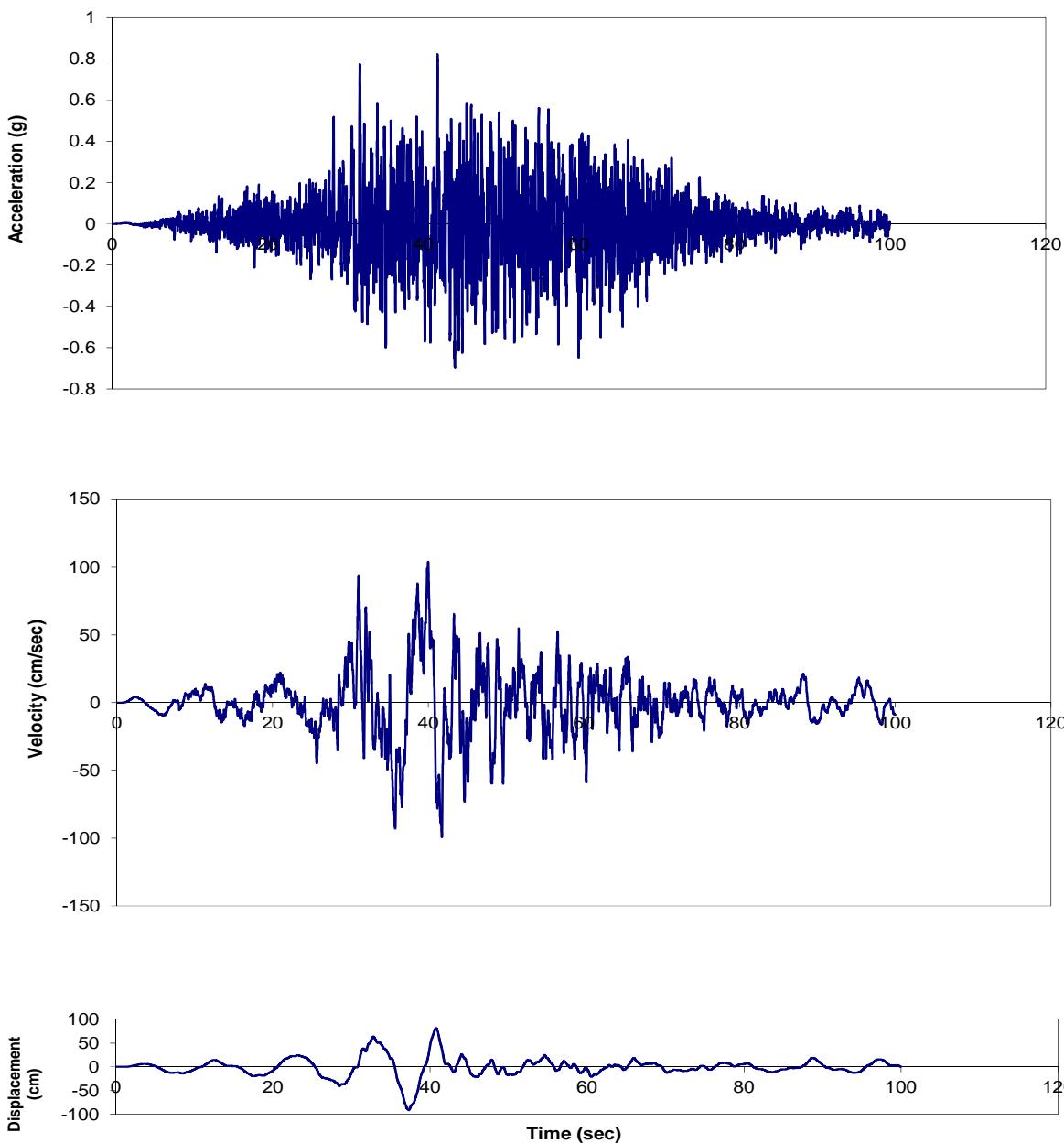
check

Horizontal 1:	UNIO_N00W
Horizontal 2:	UNIO_N90W
Vertical:	UNIO_up
corr, H1-H2	-0.132
corr, H1-V	0.012
corr, H2-V	-0.044

SSE LEVEL PER NFPA 59A 2006 / MCE LEVEL PER ASCE 7-05 – NEARSHORE LOCATION – SPECTRALLY MATCHED UNIO MOTION – CALCULATION OF CORRELATION COEFFICIENTS

LNG FACILITIES
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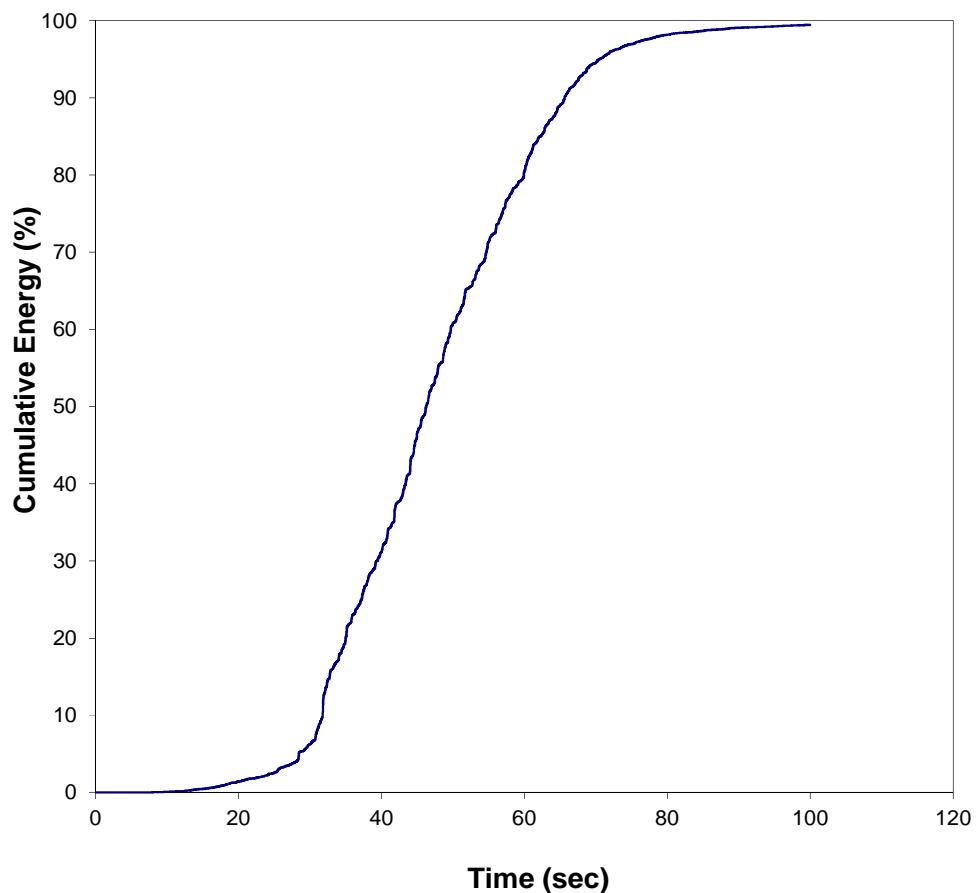
chile_mep_ew time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
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chile_mep_ew time history - Cumulative Energy (Husid) plot

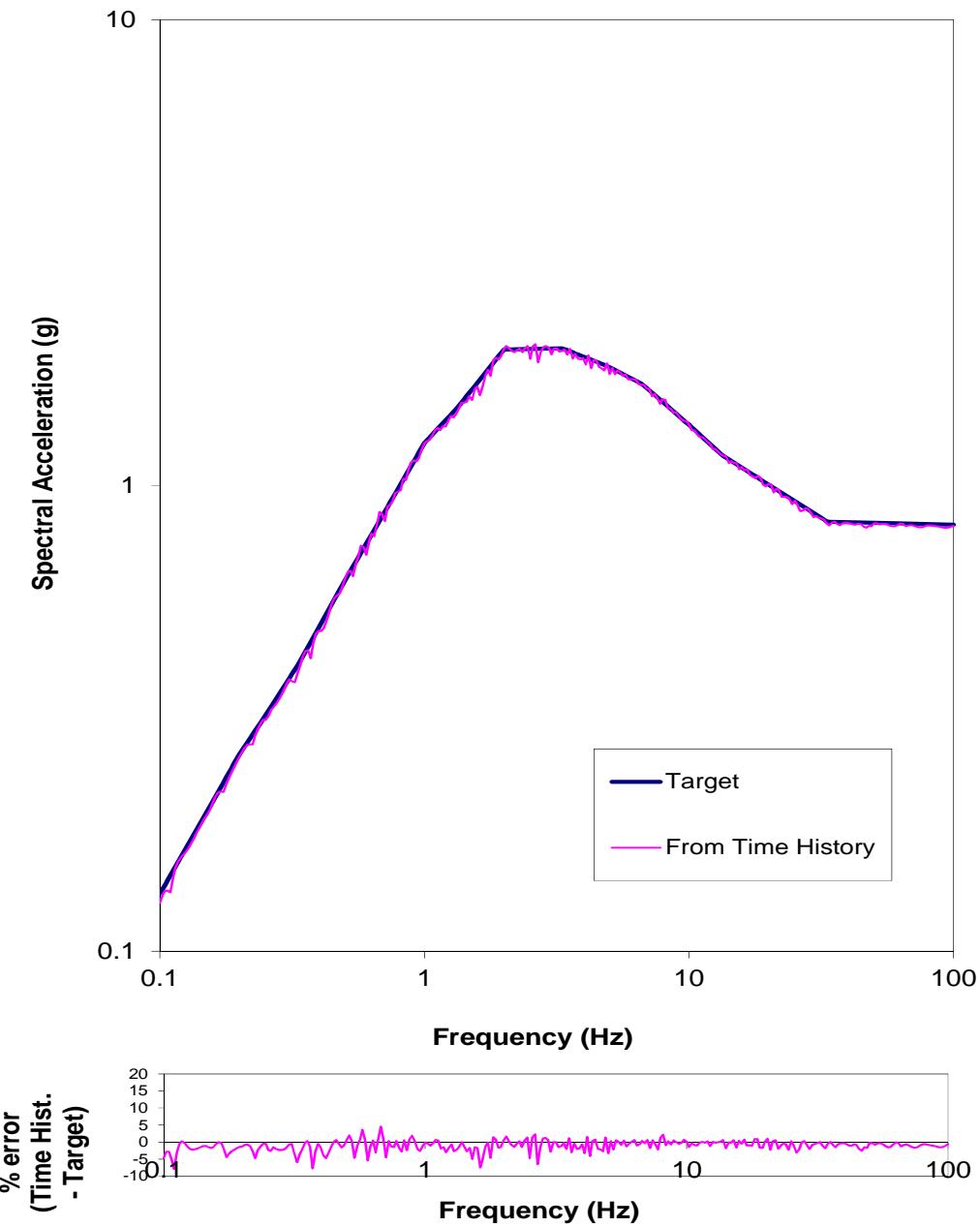


SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
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PLATE E.242

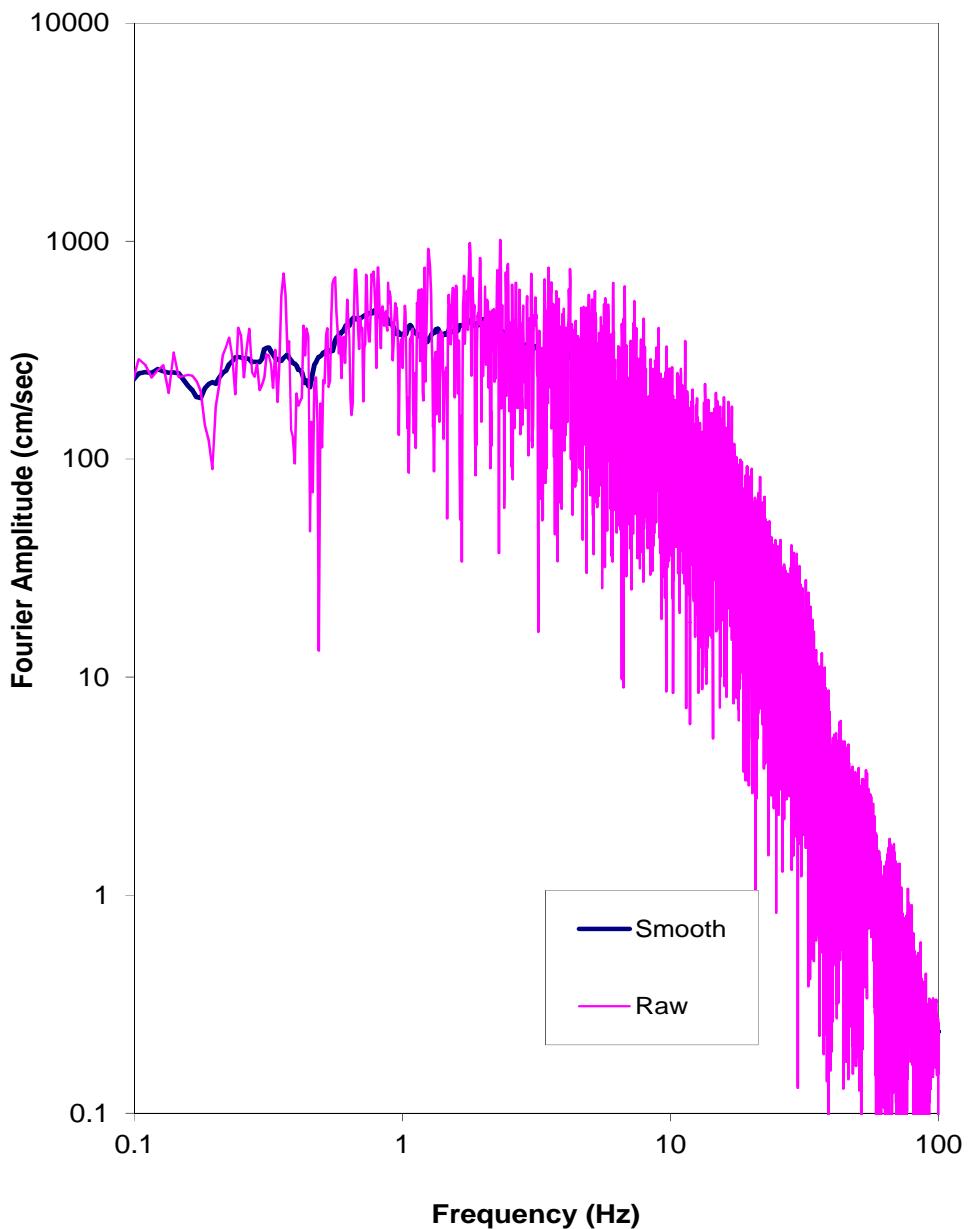
chile_mep_ew time history - Response Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

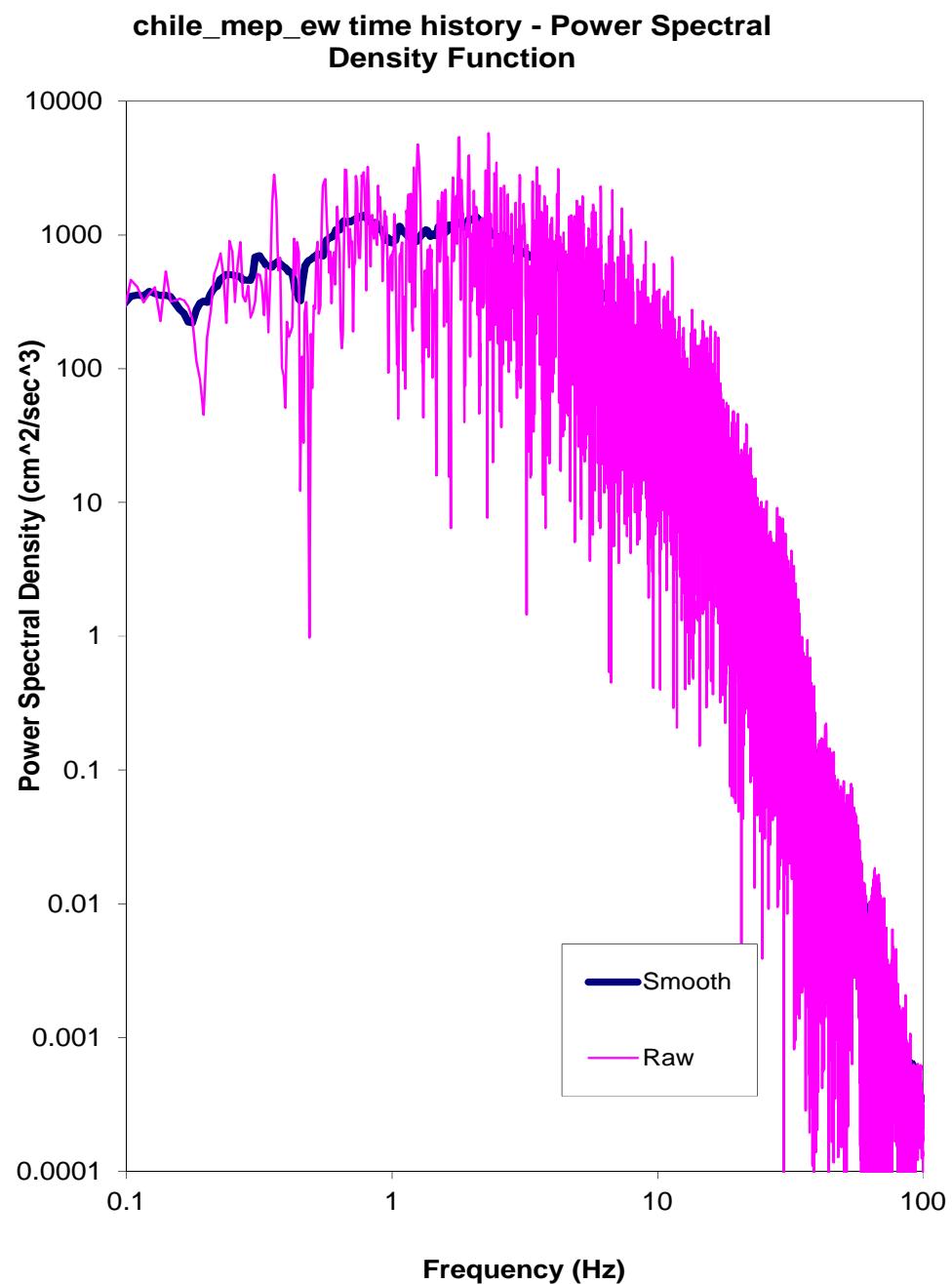
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_ew time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – FOURIER AMPLITUDE SPECTRUM

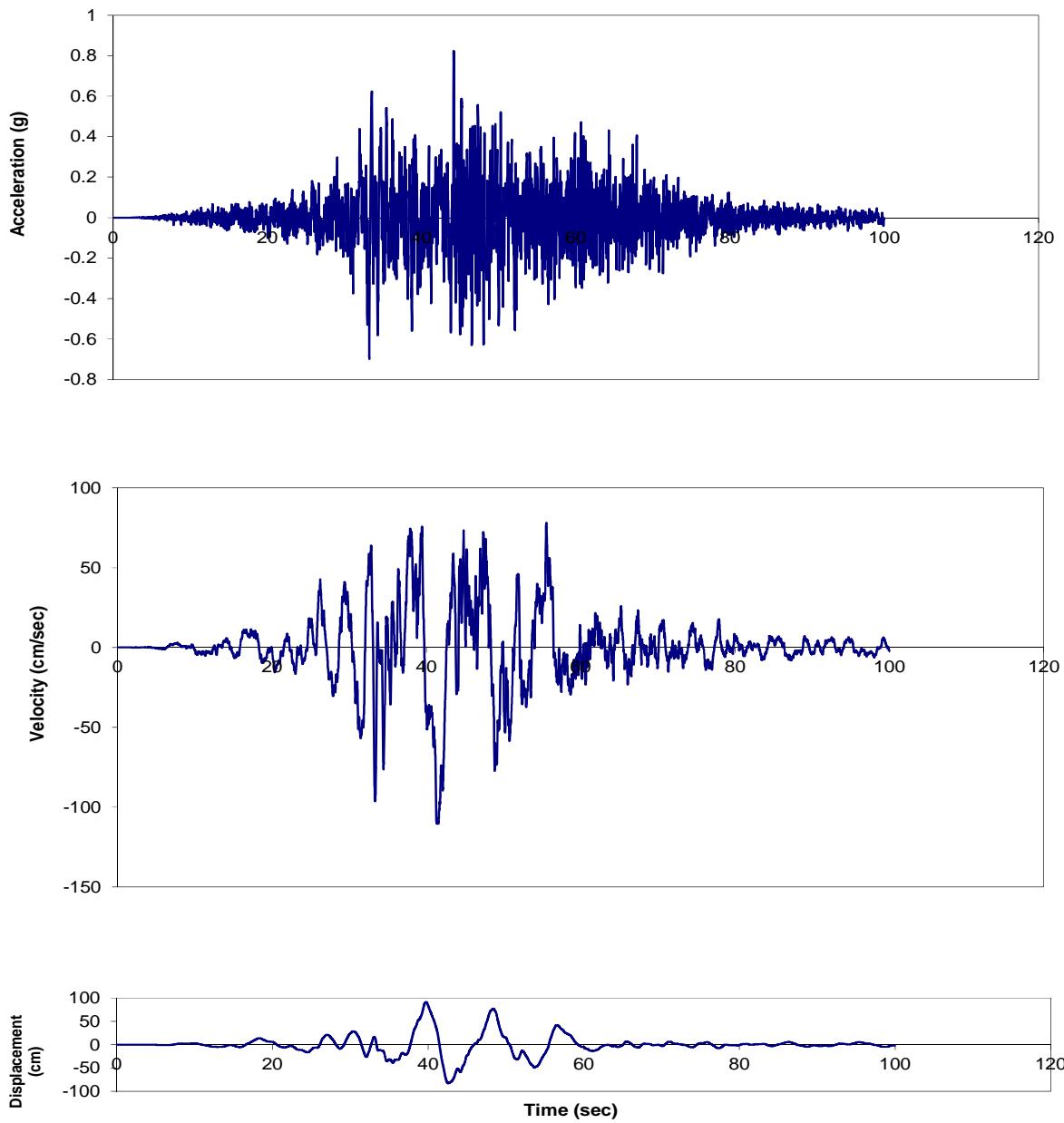
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, EW COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

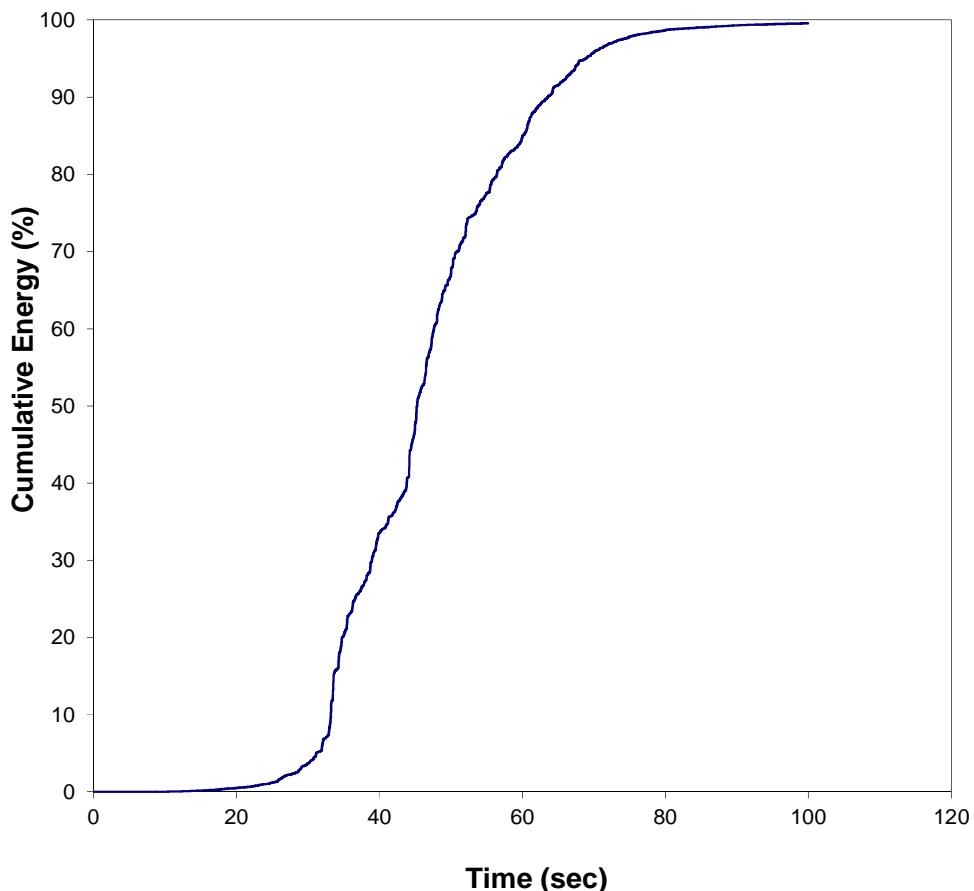
chile_mep_ns time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
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NIKISKI, ALASKA

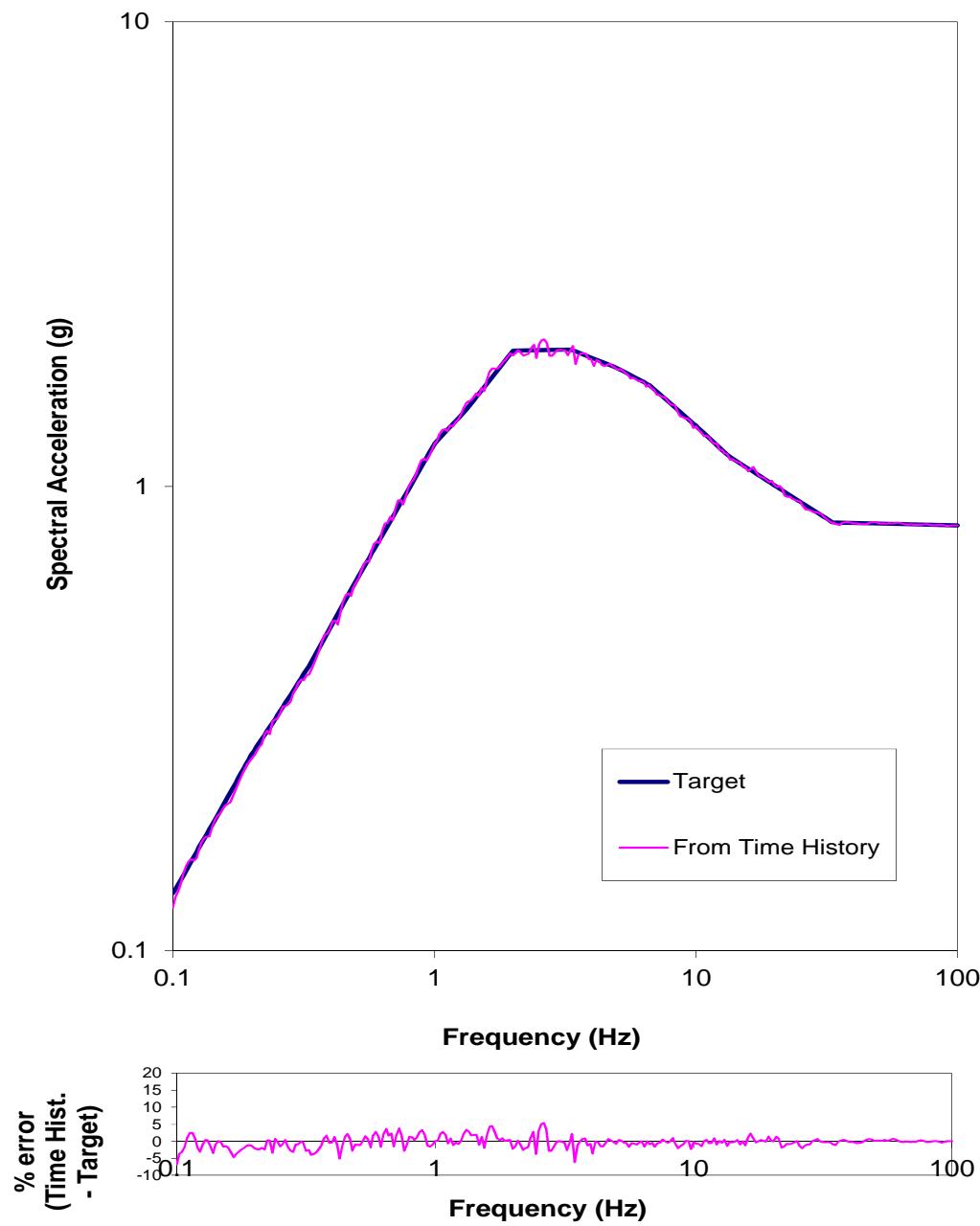
chile_mep_ns time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

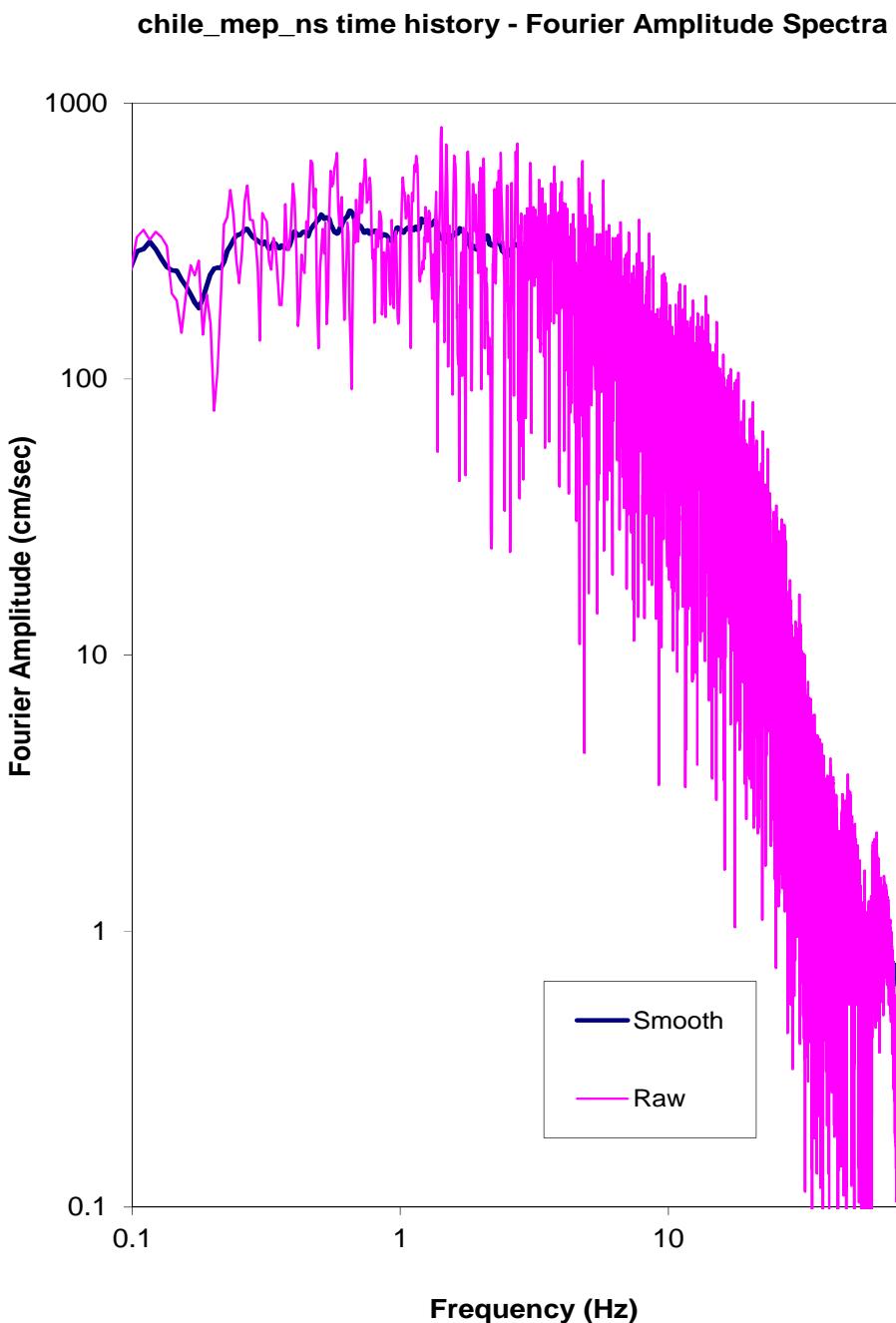
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_ns time history - Response Spectra



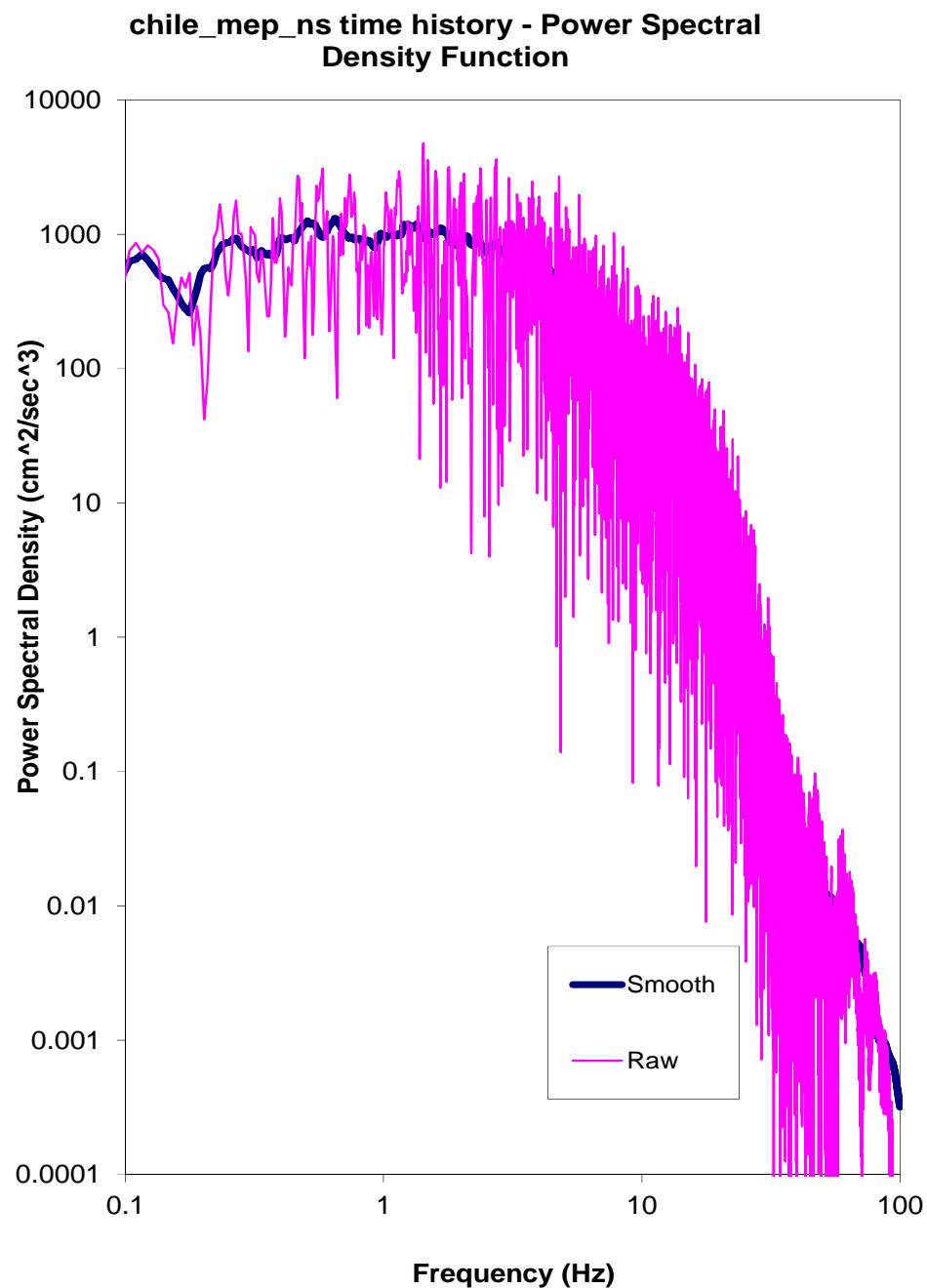
SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – FOURIER AMPLITUDE SPECTRUM

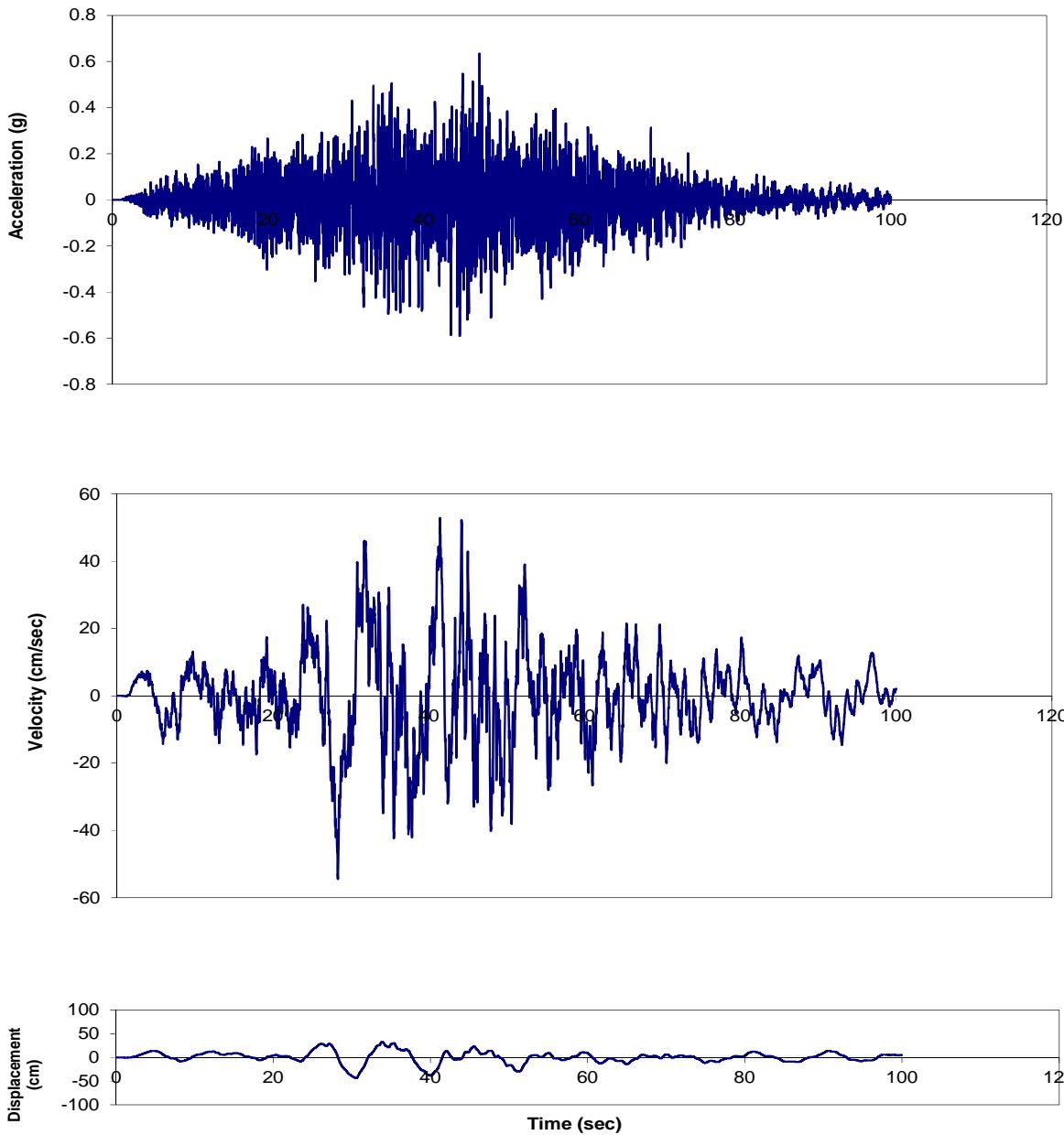
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, NS COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

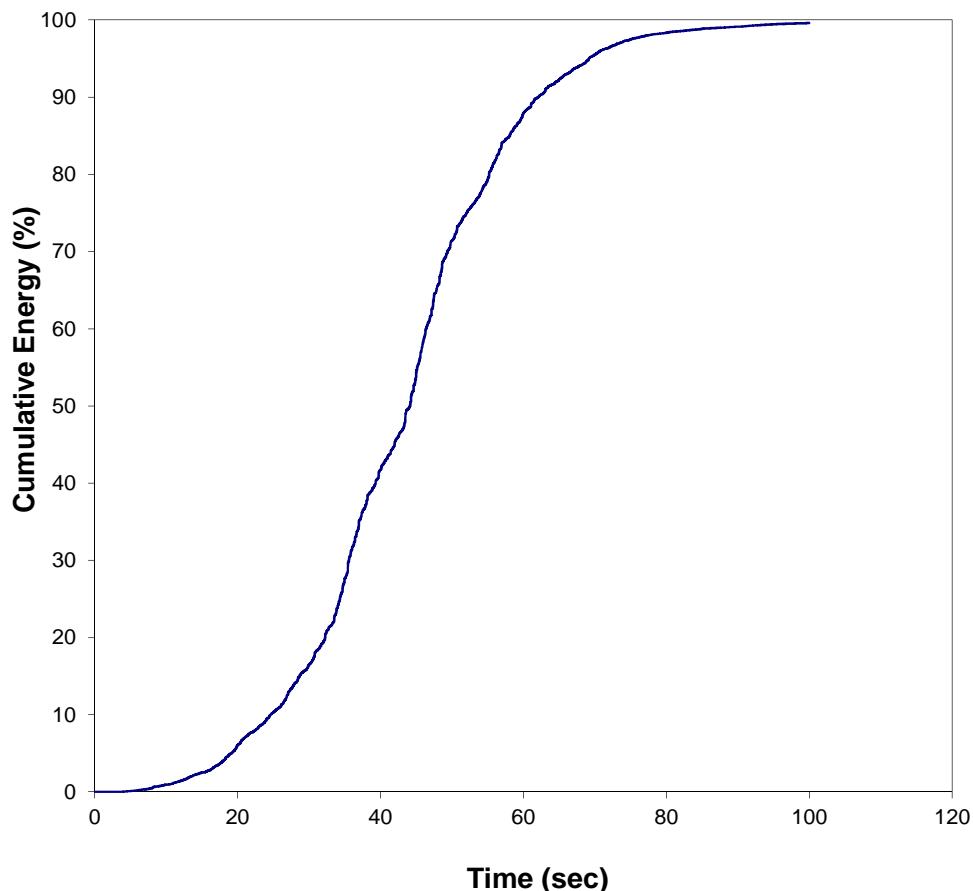
chile_mep_v time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, V COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

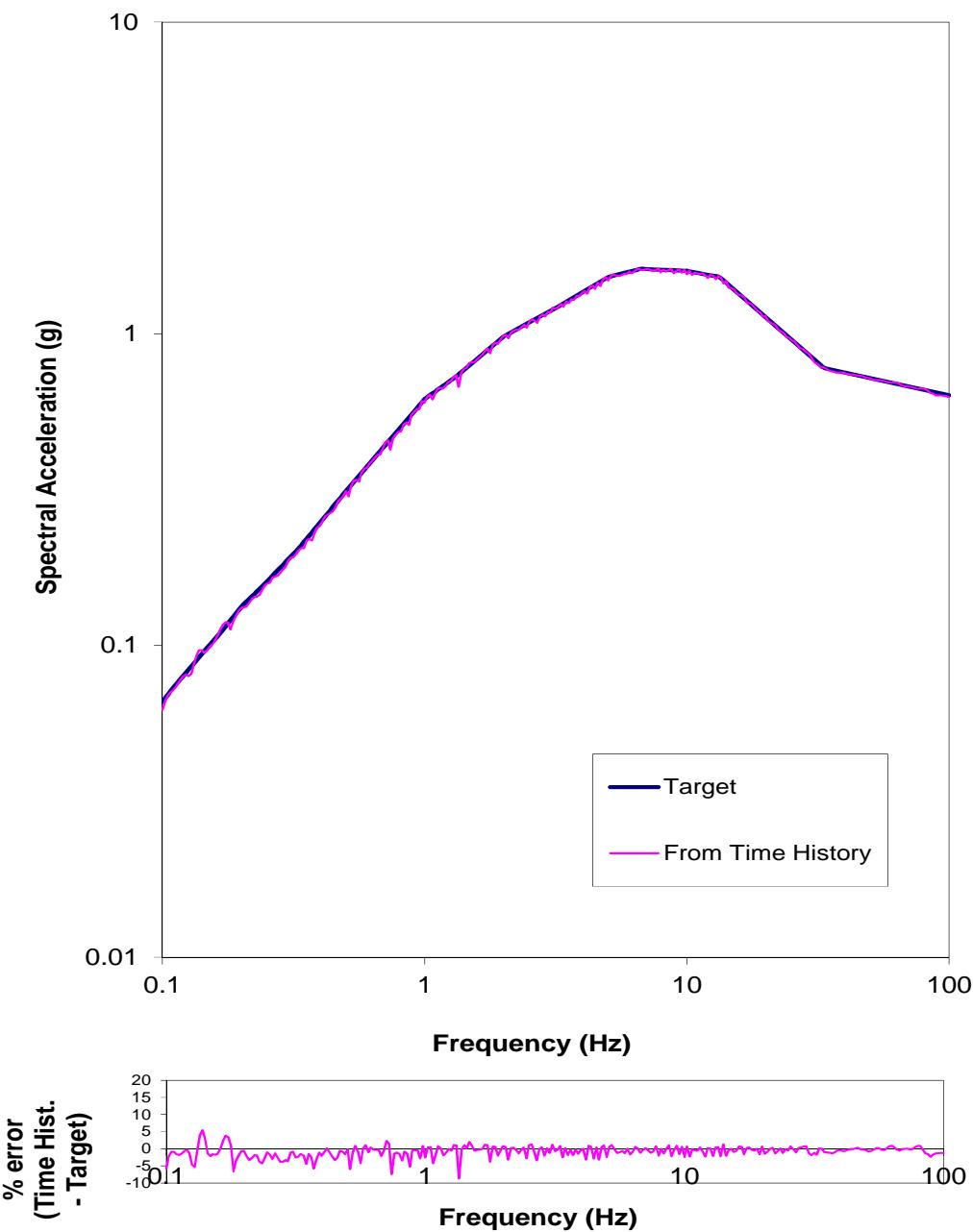
chile_mep_v time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, V COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

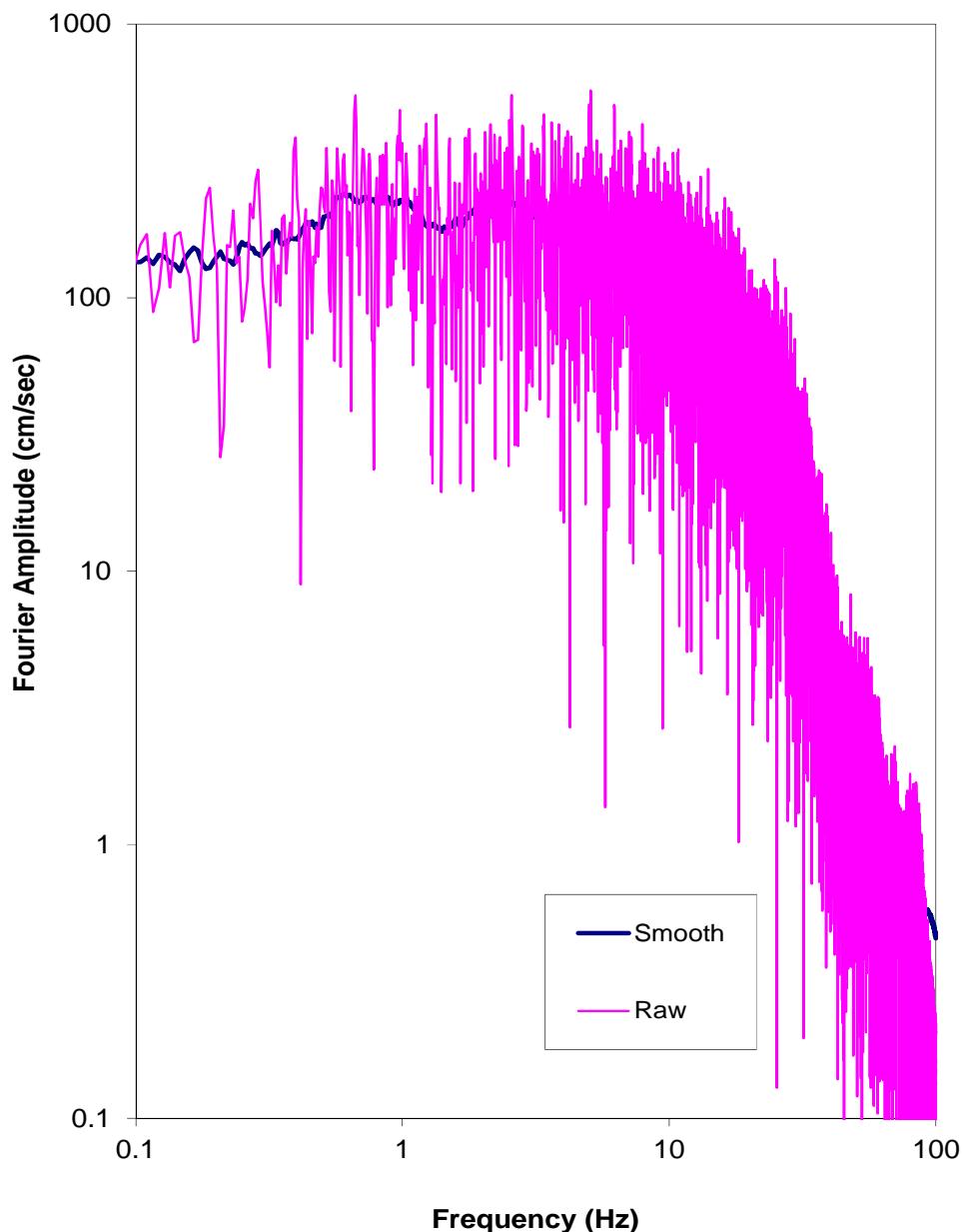
chile_mep_v time history - Response Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, V COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

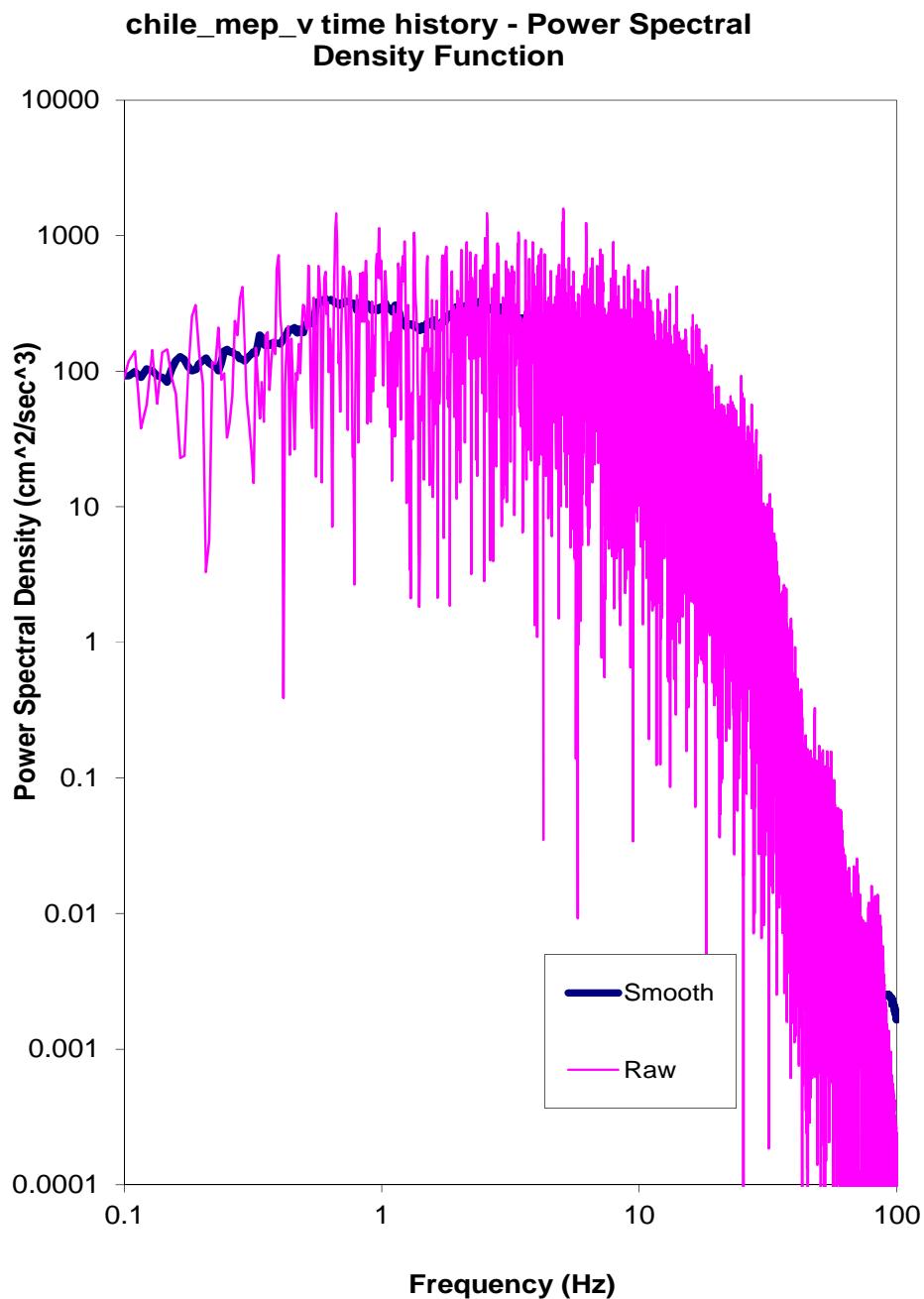
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

chile_mep_v time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, V COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
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SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION, V COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Calculation of Correlation Coefficients

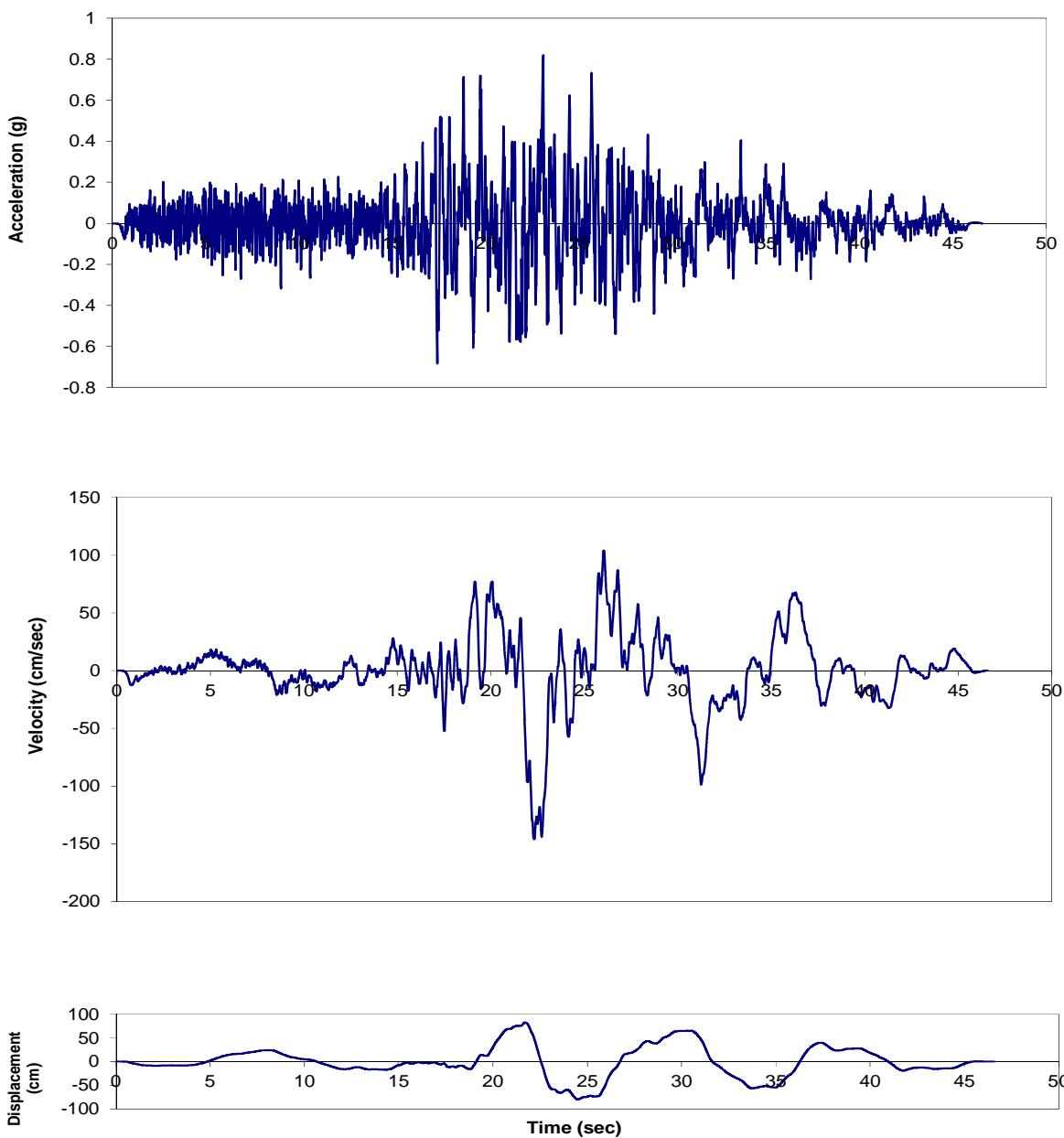
Cross-correlation check

Horizontal 1:	mep_ew
Horizontal 2:	mep_ns
Vertical:	mep_v
corr, H1-H2	-0.076
corr, H1-V	0.021
corr, H2-V	-0.045

SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED MEP MOTION – CALCULATION OF CORRELATION COEFFICIENTS

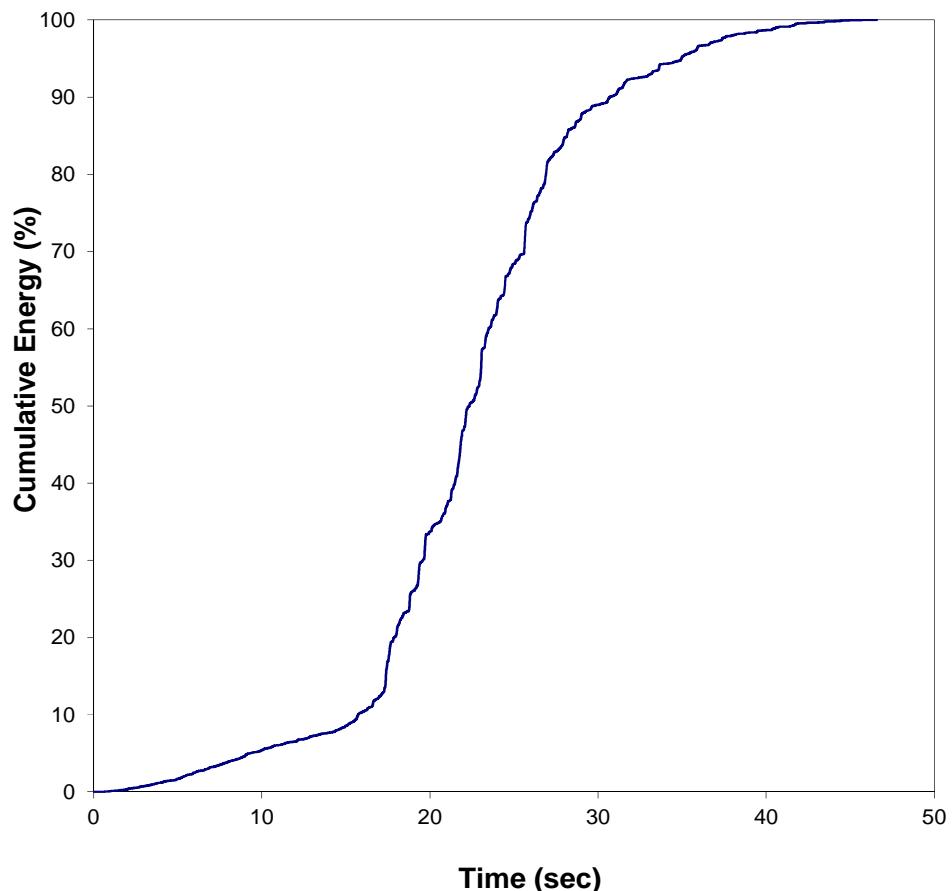
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

cto180 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

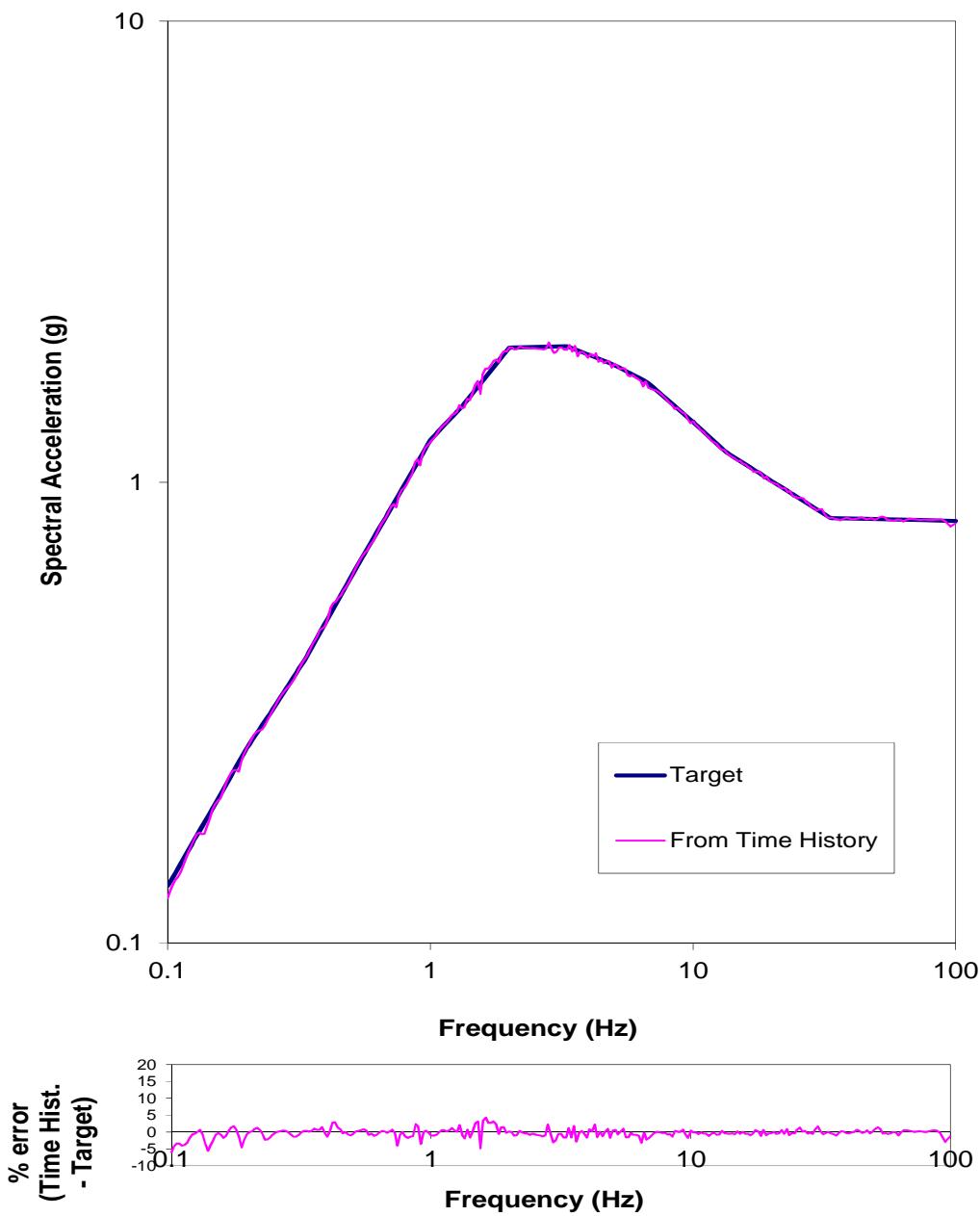
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

cto180 time history - Cumulative Energy (Husid) plot

SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

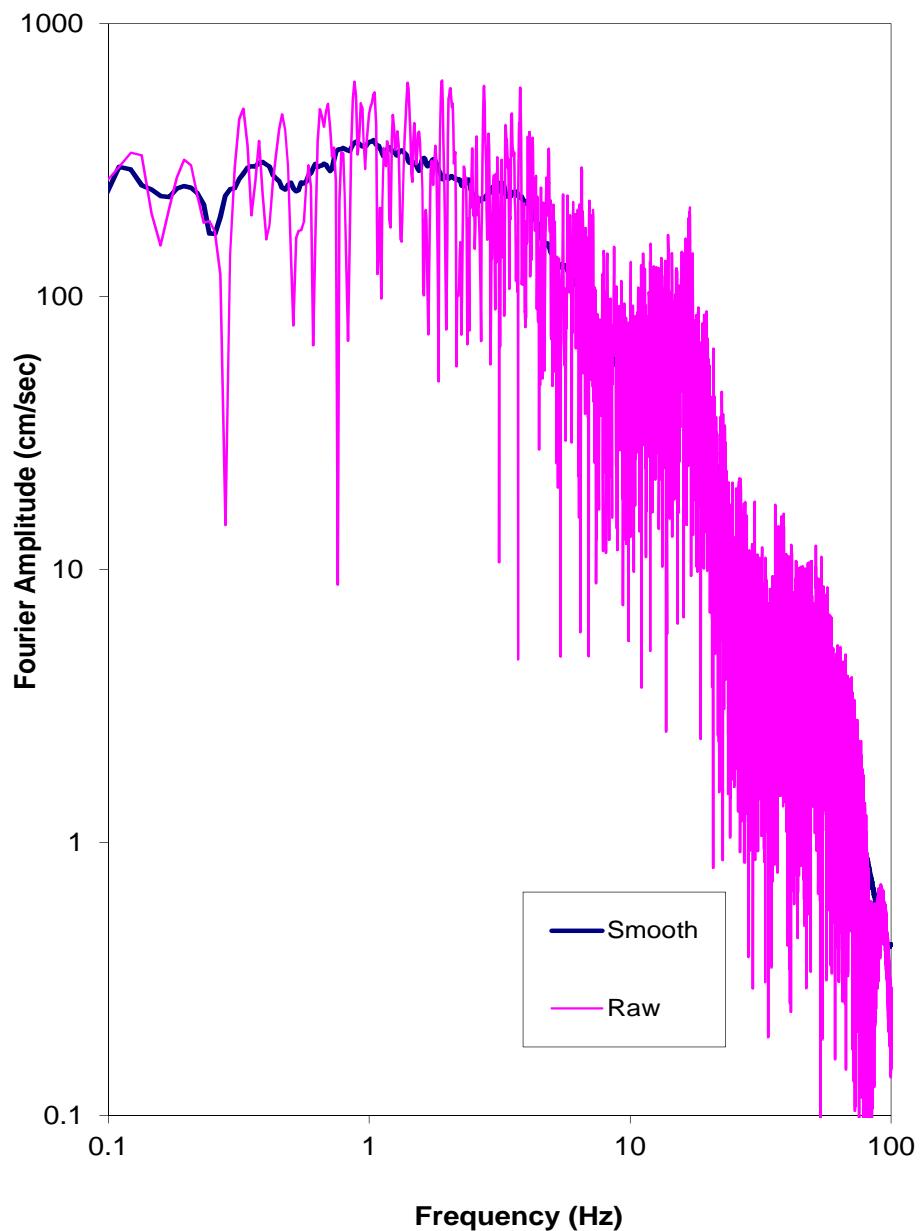
cto180 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

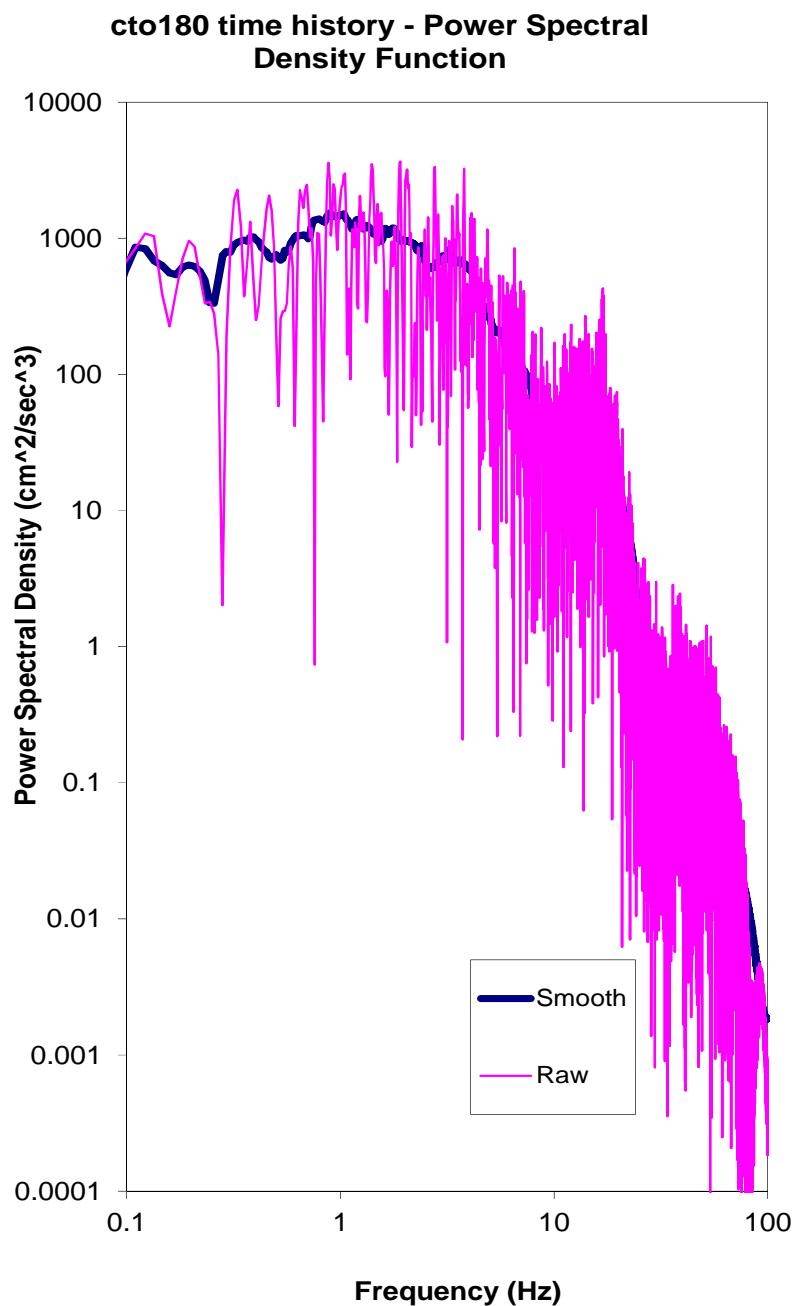
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

cto180 time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – FOURIER AMPLITUDE SPECTRUM

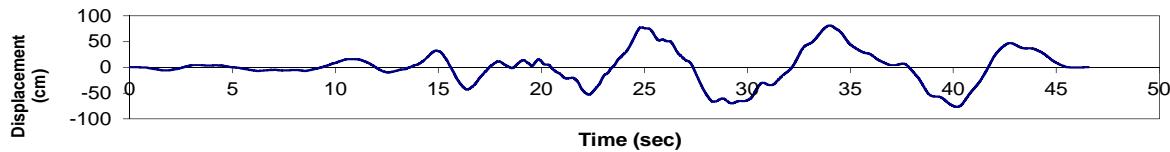
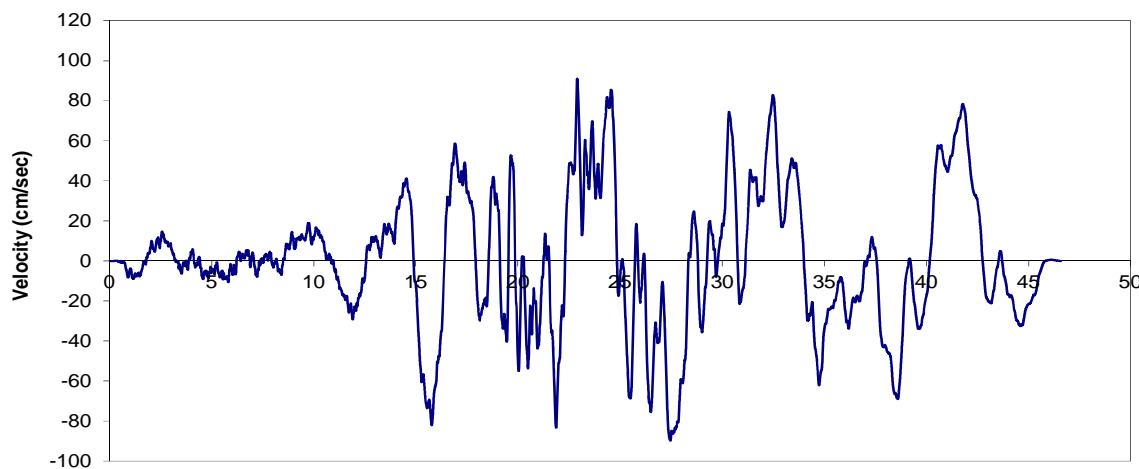
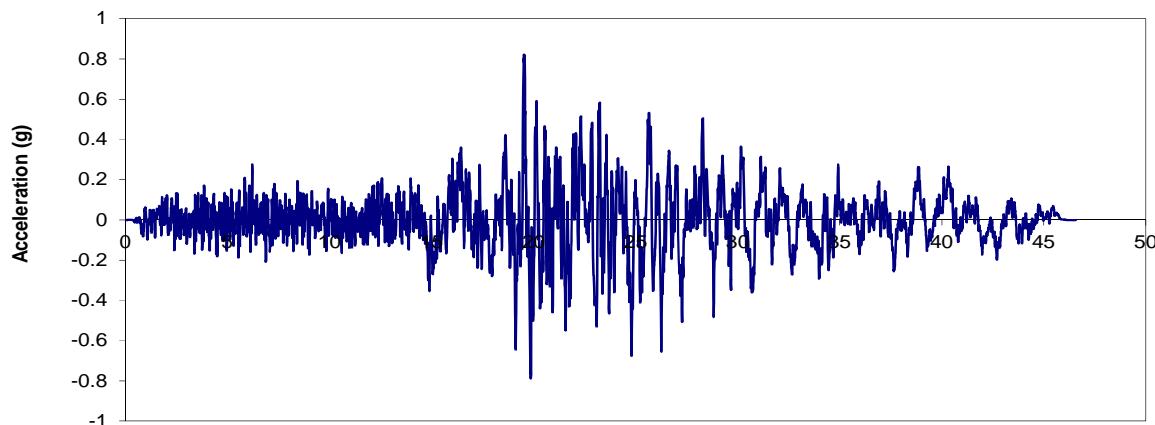
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, 180 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

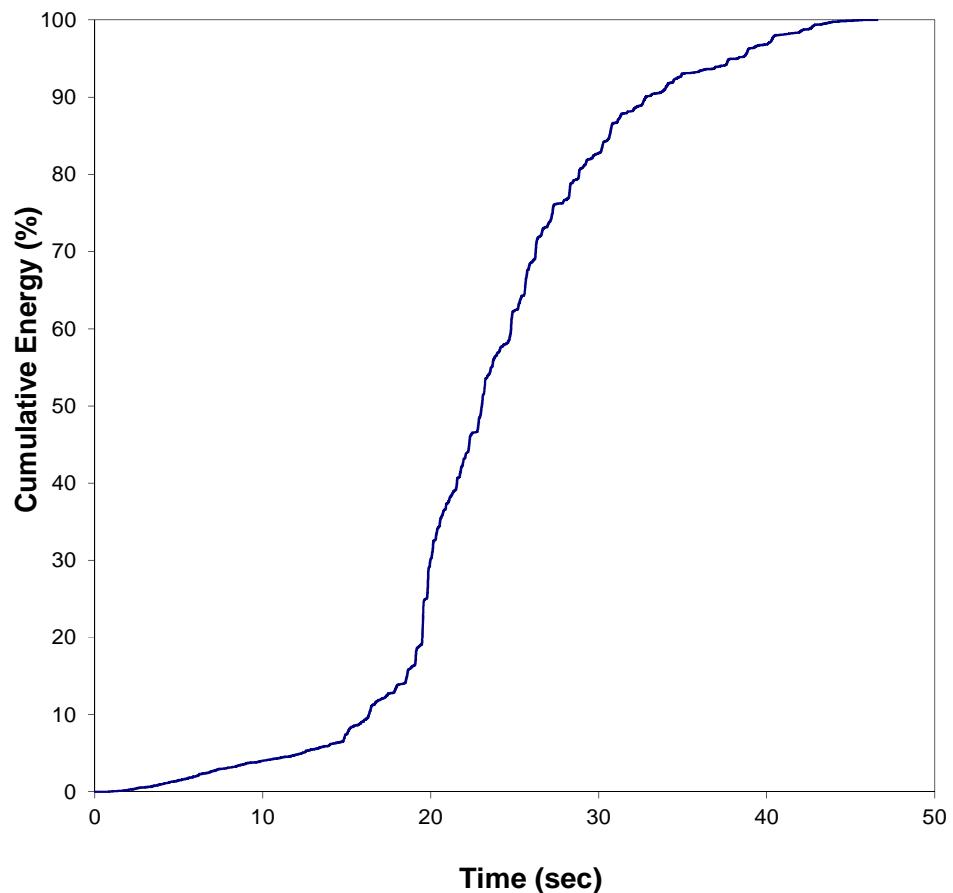
cto270 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

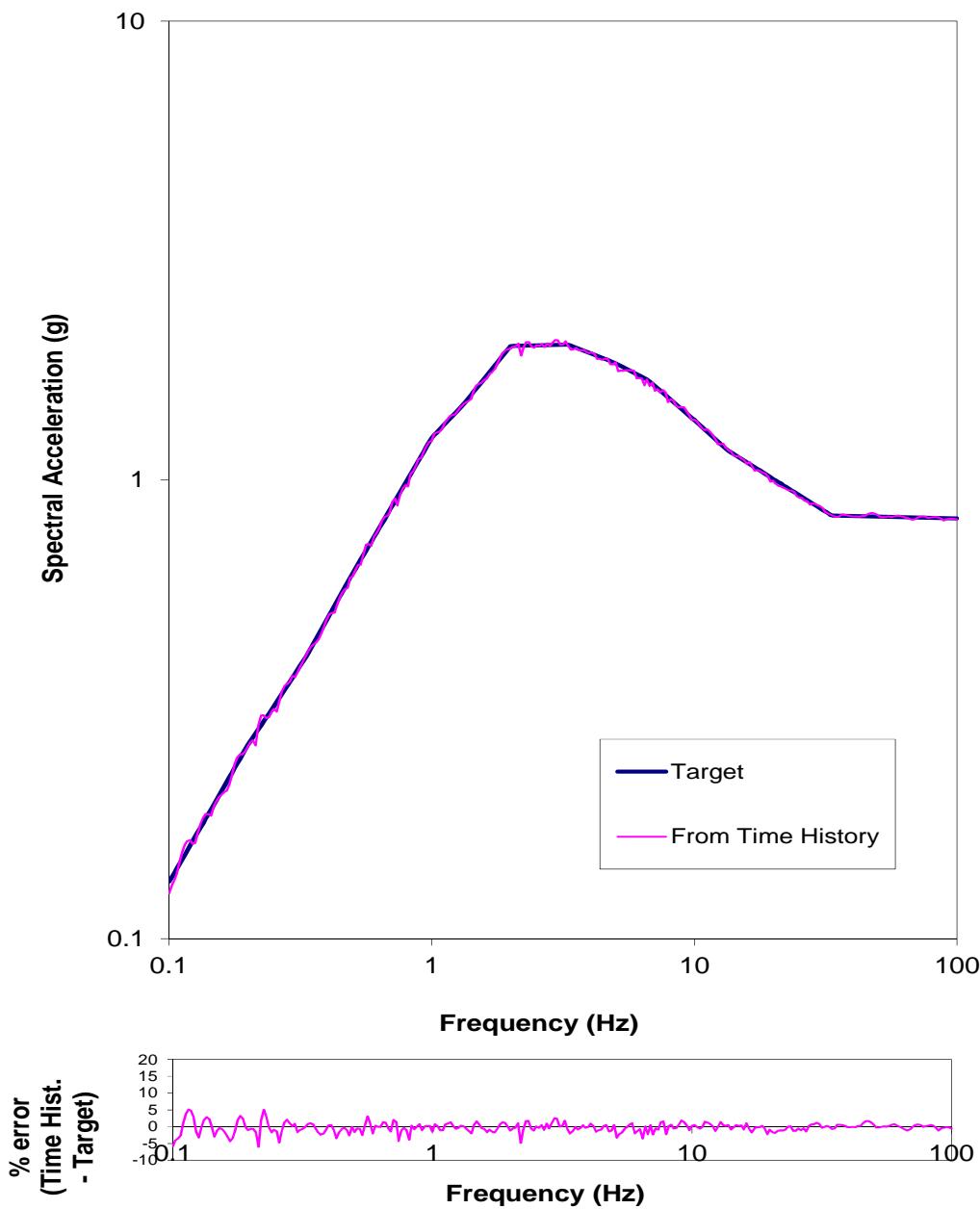
cto270 time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

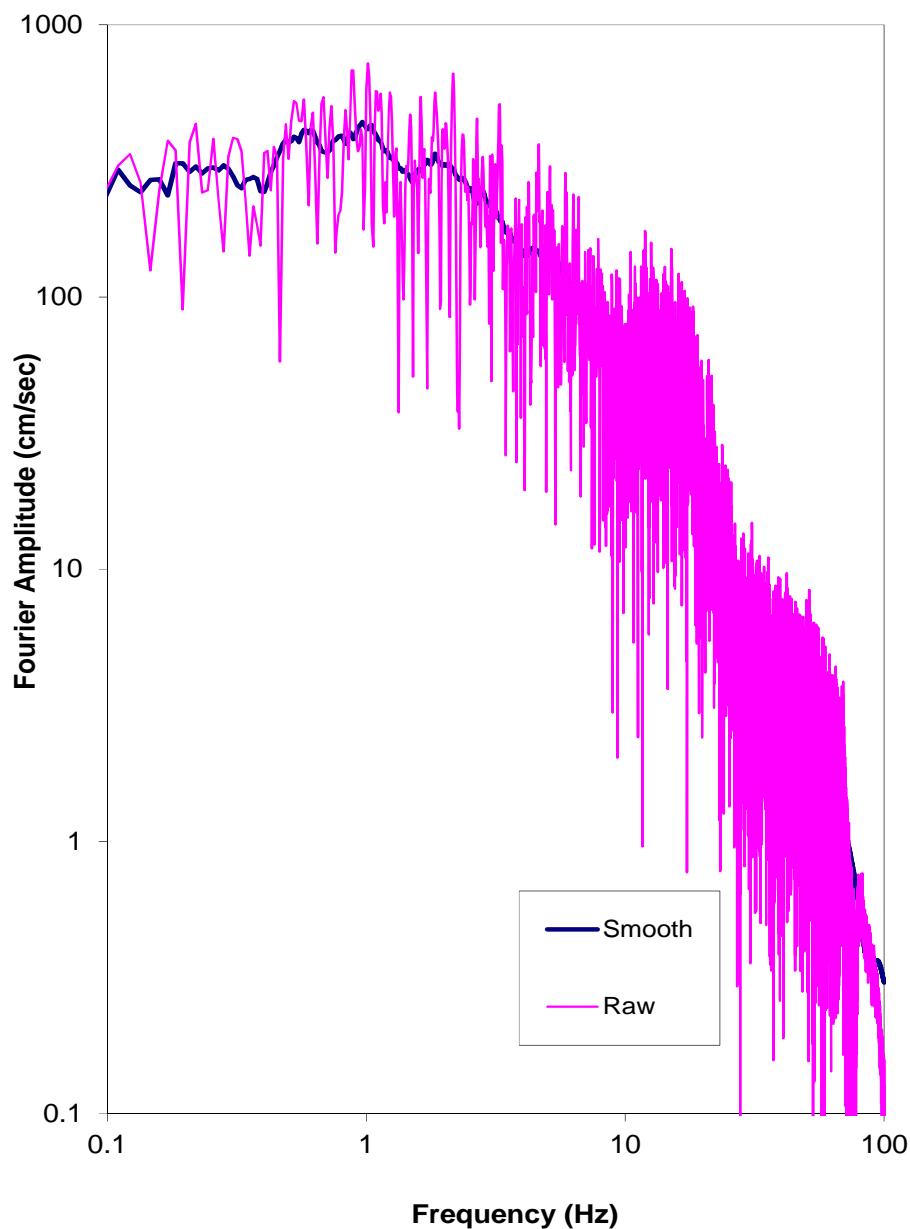
cto270 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

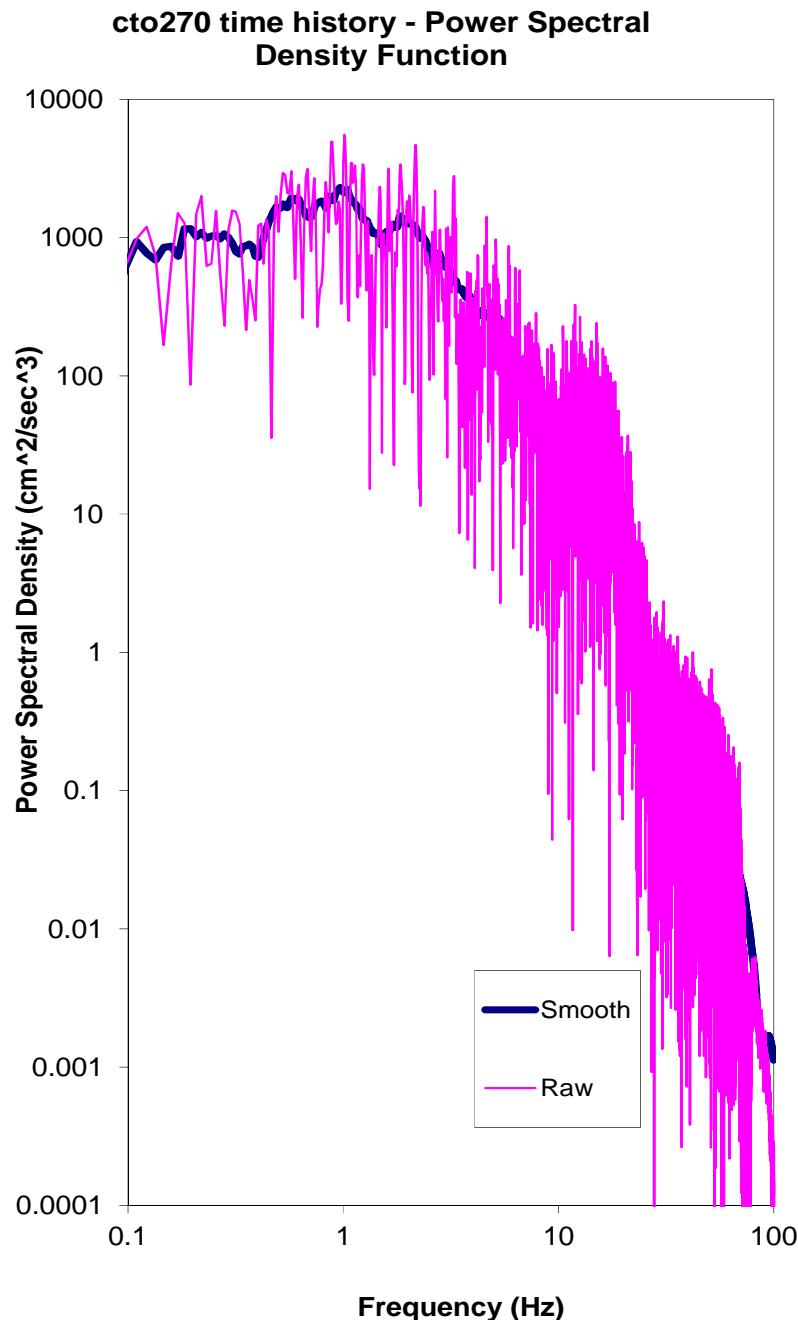
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

cto270 time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – FOURIER AMPLITUDE SPECTRUM

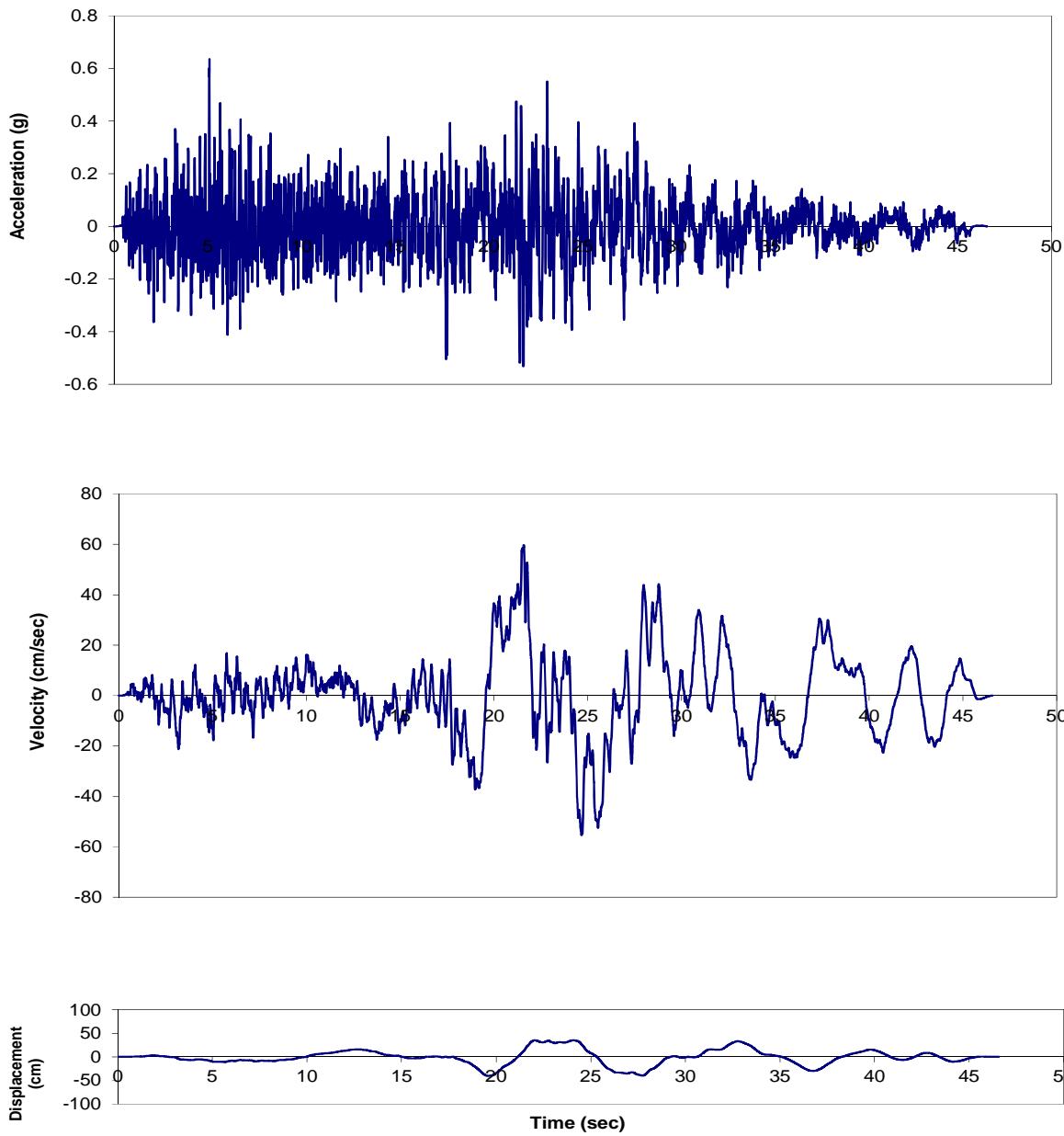
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, 270 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
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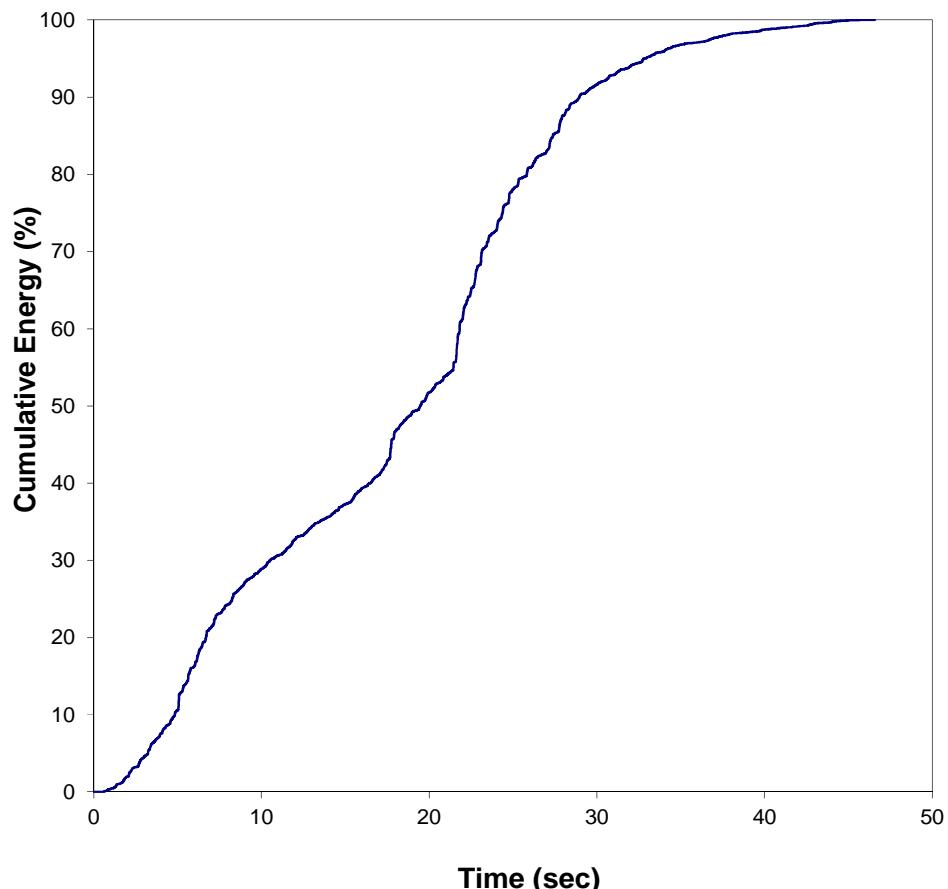
ctoup time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

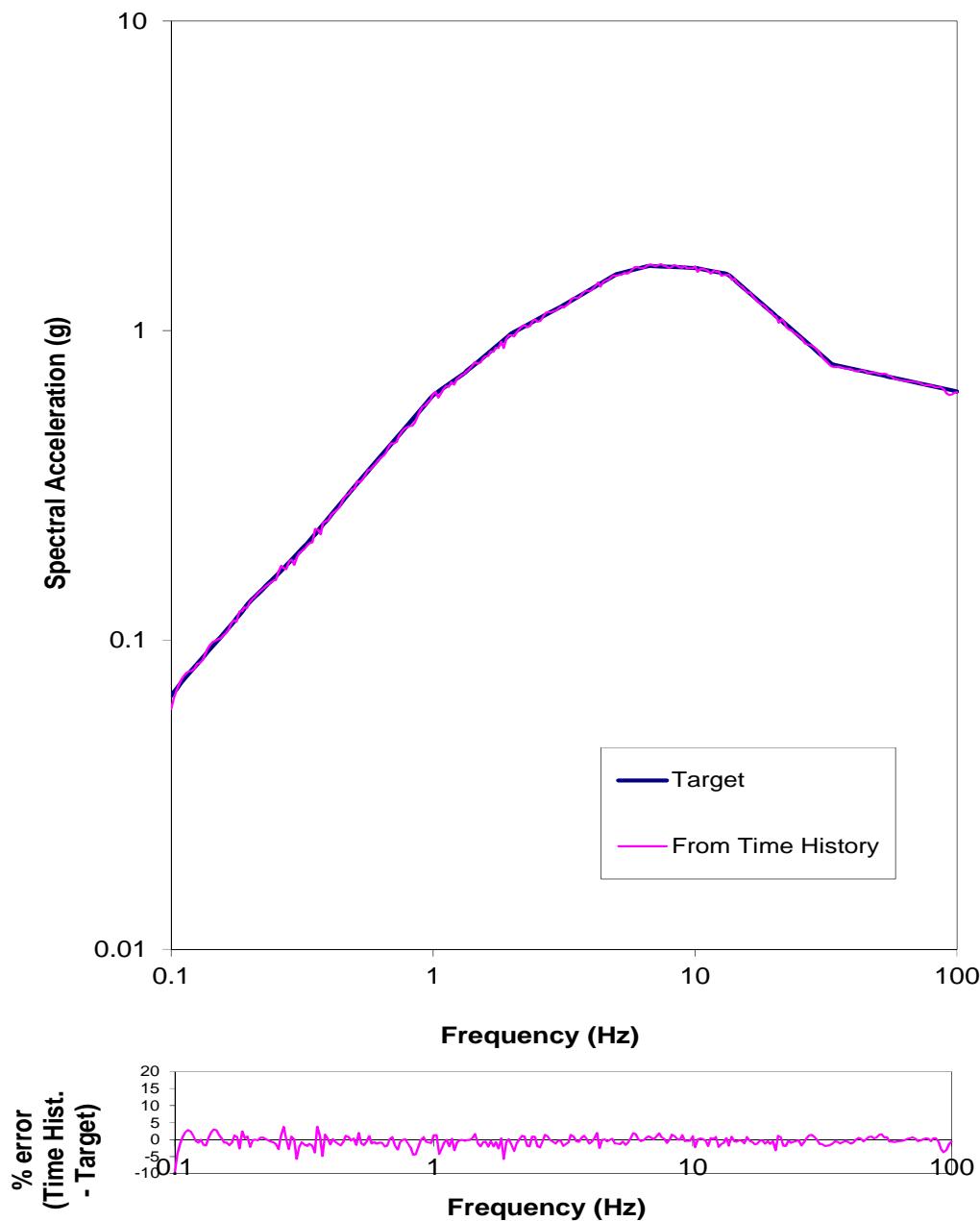
ctoup time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

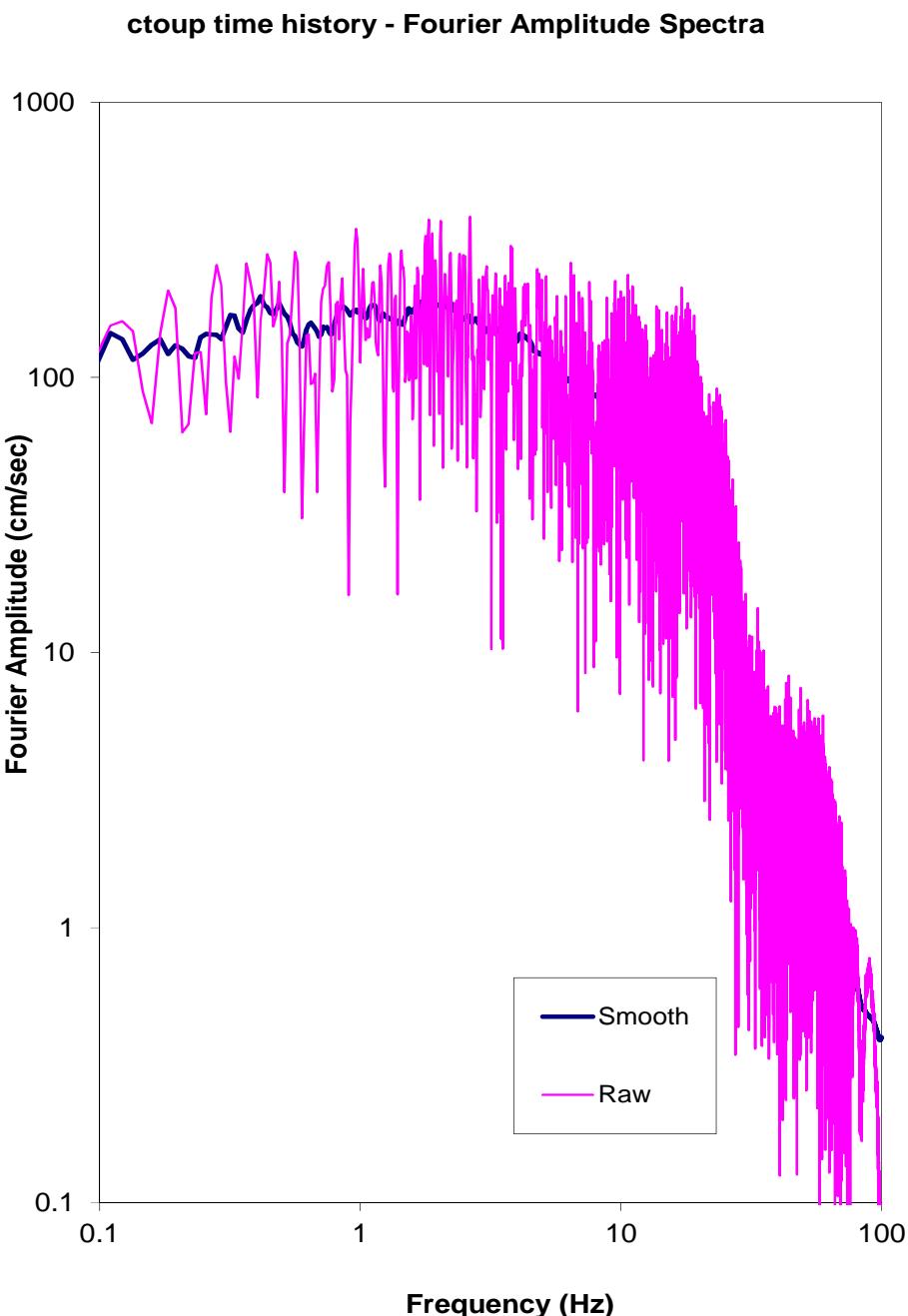
LNG FACILITIES
ALASKA LNG PROJECT
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ctoup time history - Response Spectra



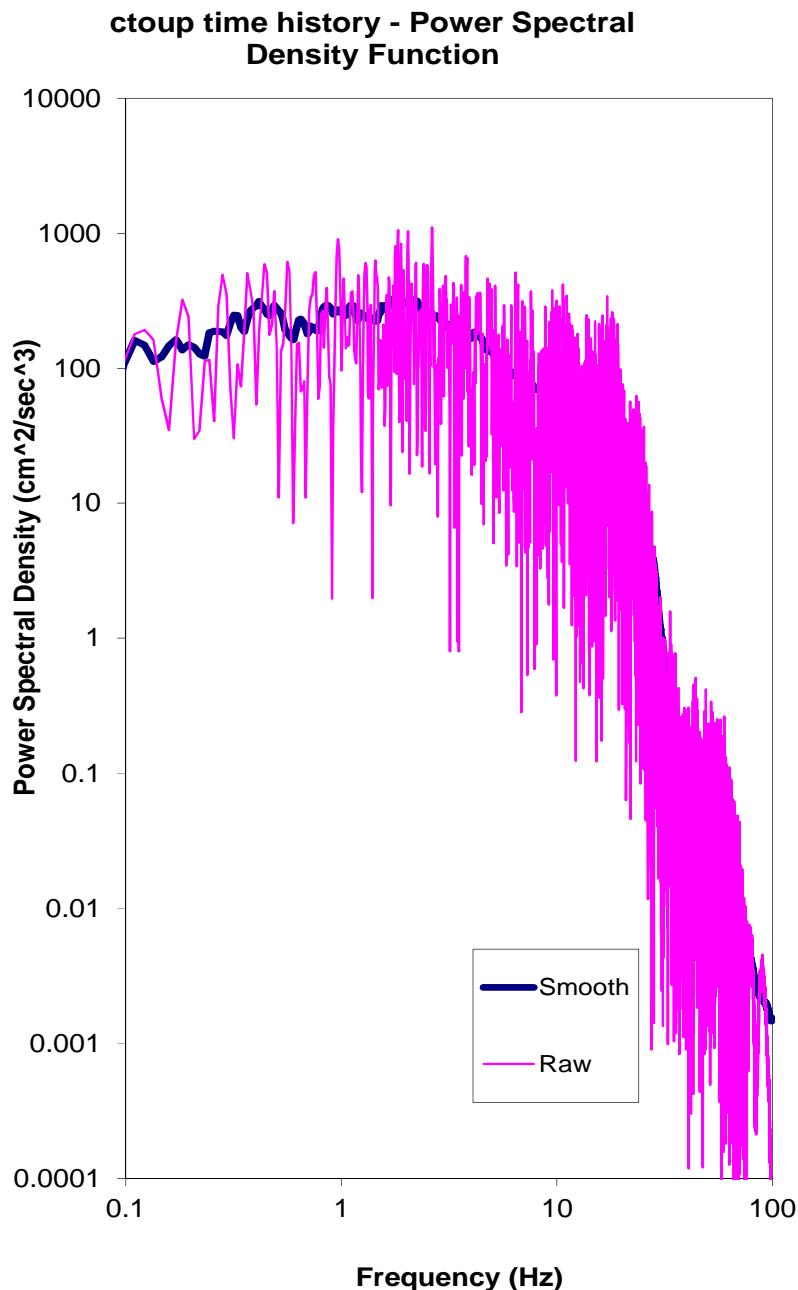
SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

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SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM

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SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION, UP COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Calculation of Correlation Coefficients

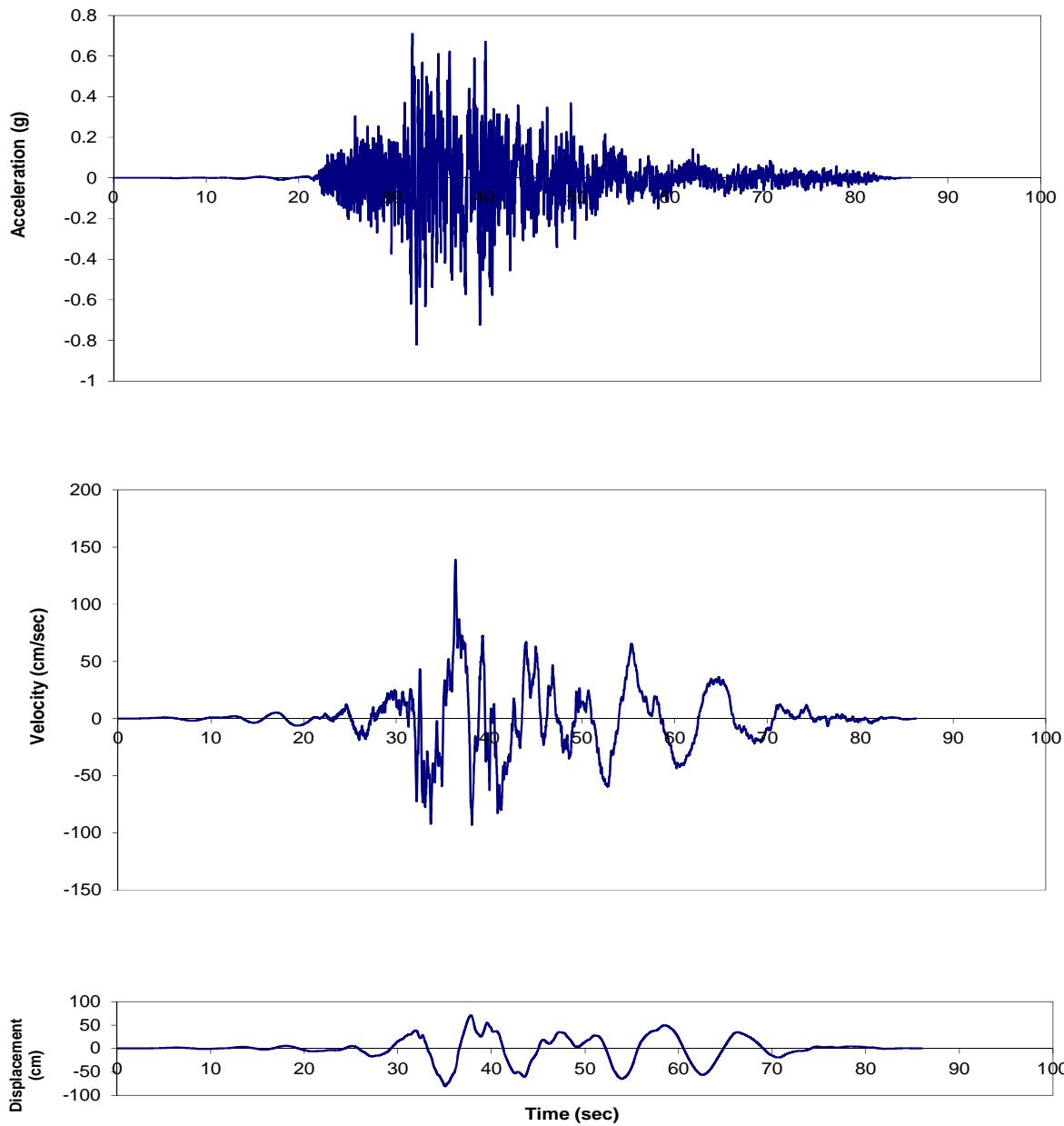
Cross-correlation check

Horizontal 1:	CTO180
Horizontal 2:	CTO270
Vertical:	CTOUP
corr, H1-H2	-0.002
corr, H1-V	0.011
corr, H2-V	-0.048

SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CTO MOTION – CALCULATION OF CORRELATION COEFFICIENTS

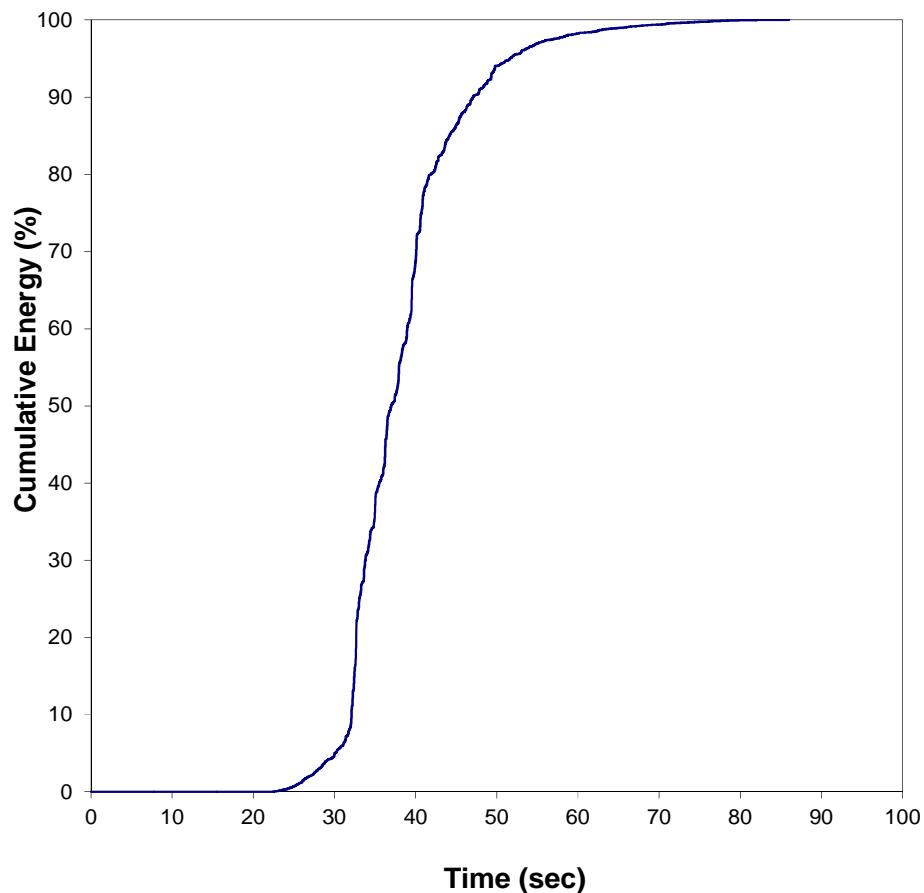
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

carlo_090 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

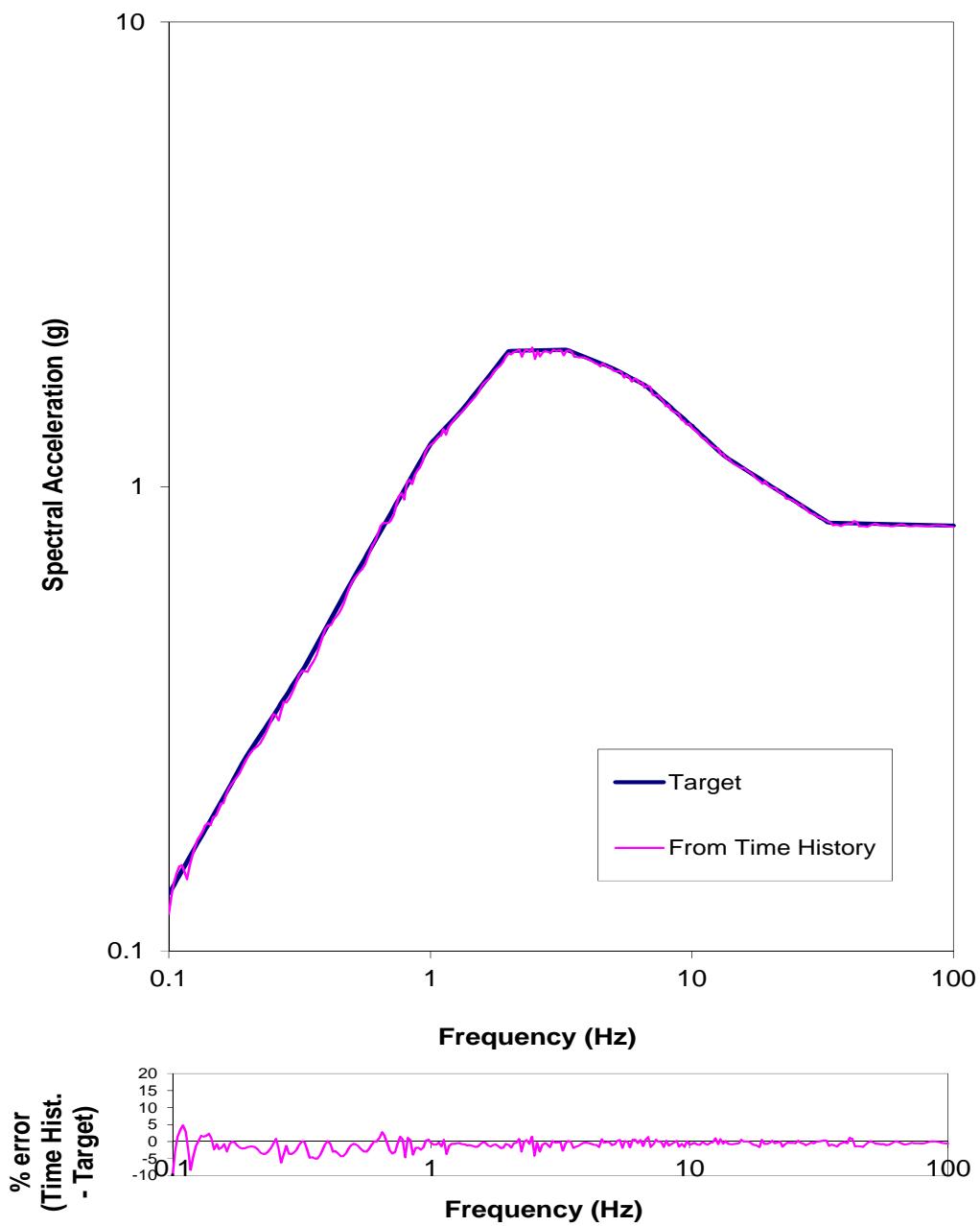
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

carlo_090 time history - Cumulative Energy (Husid) plot

SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

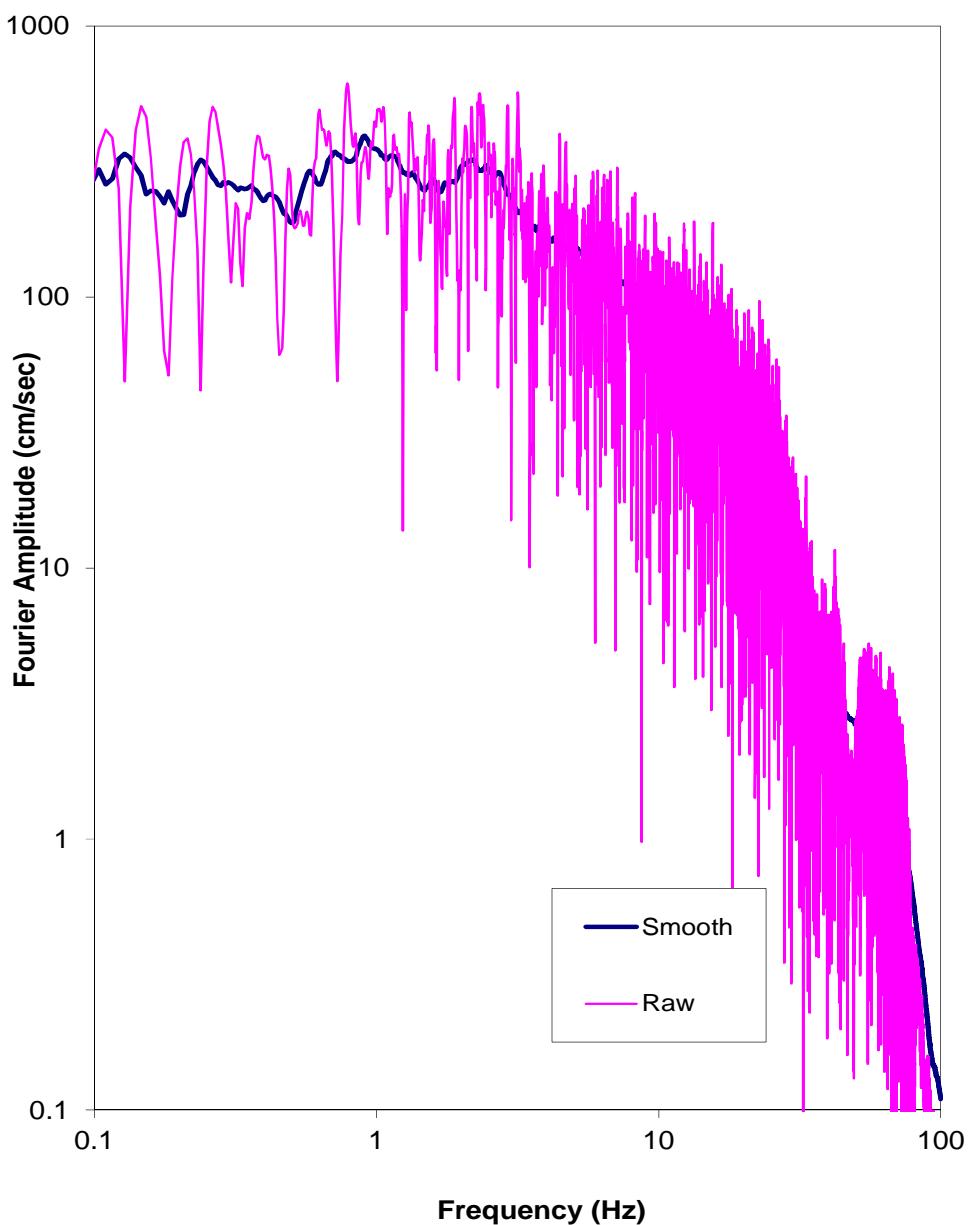
carlo_090 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

LNG FACILITIES
ALASKA LNG PROJECT
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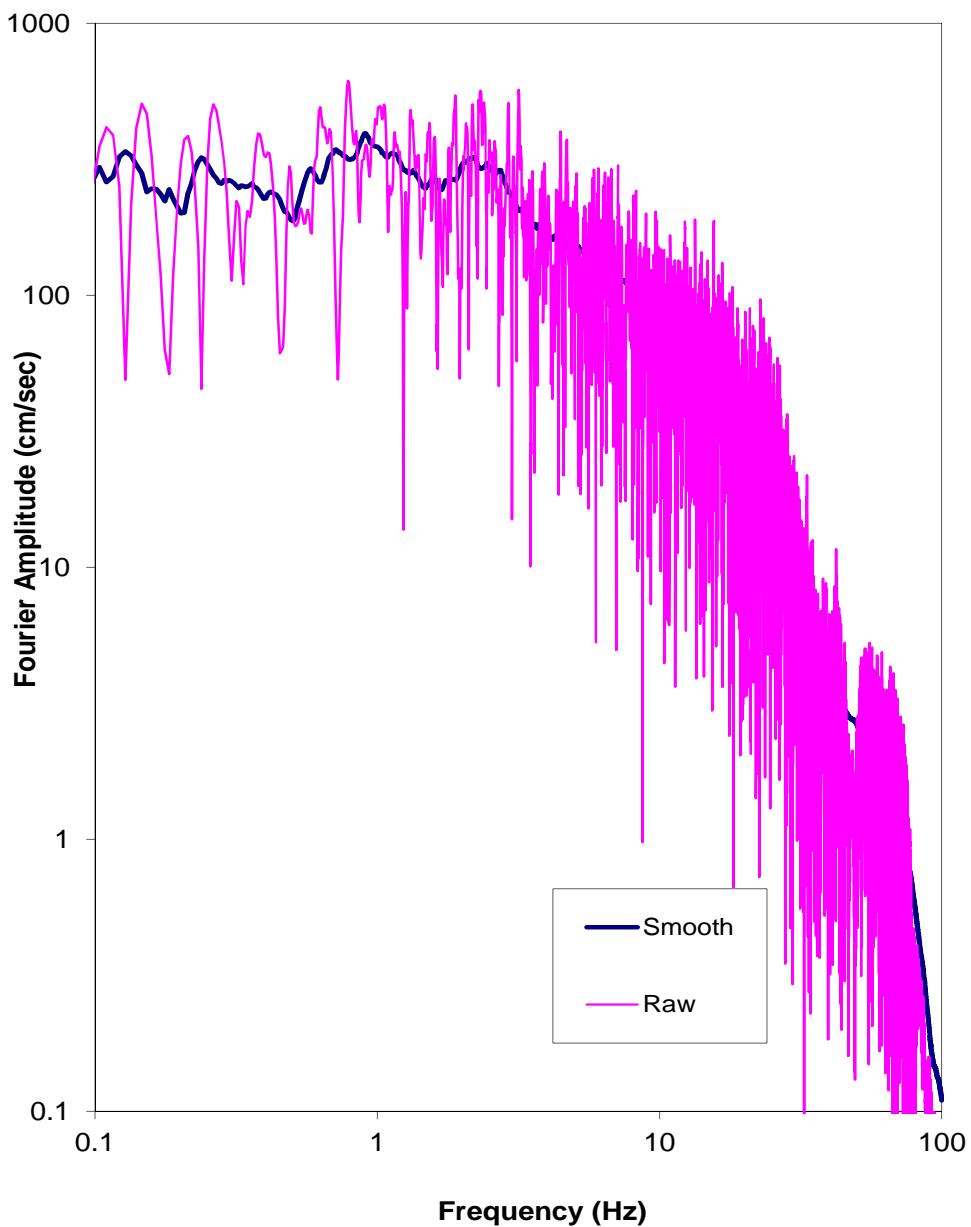
carlo_090 time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – FOURIER AMPLITUDE SPECTRUM

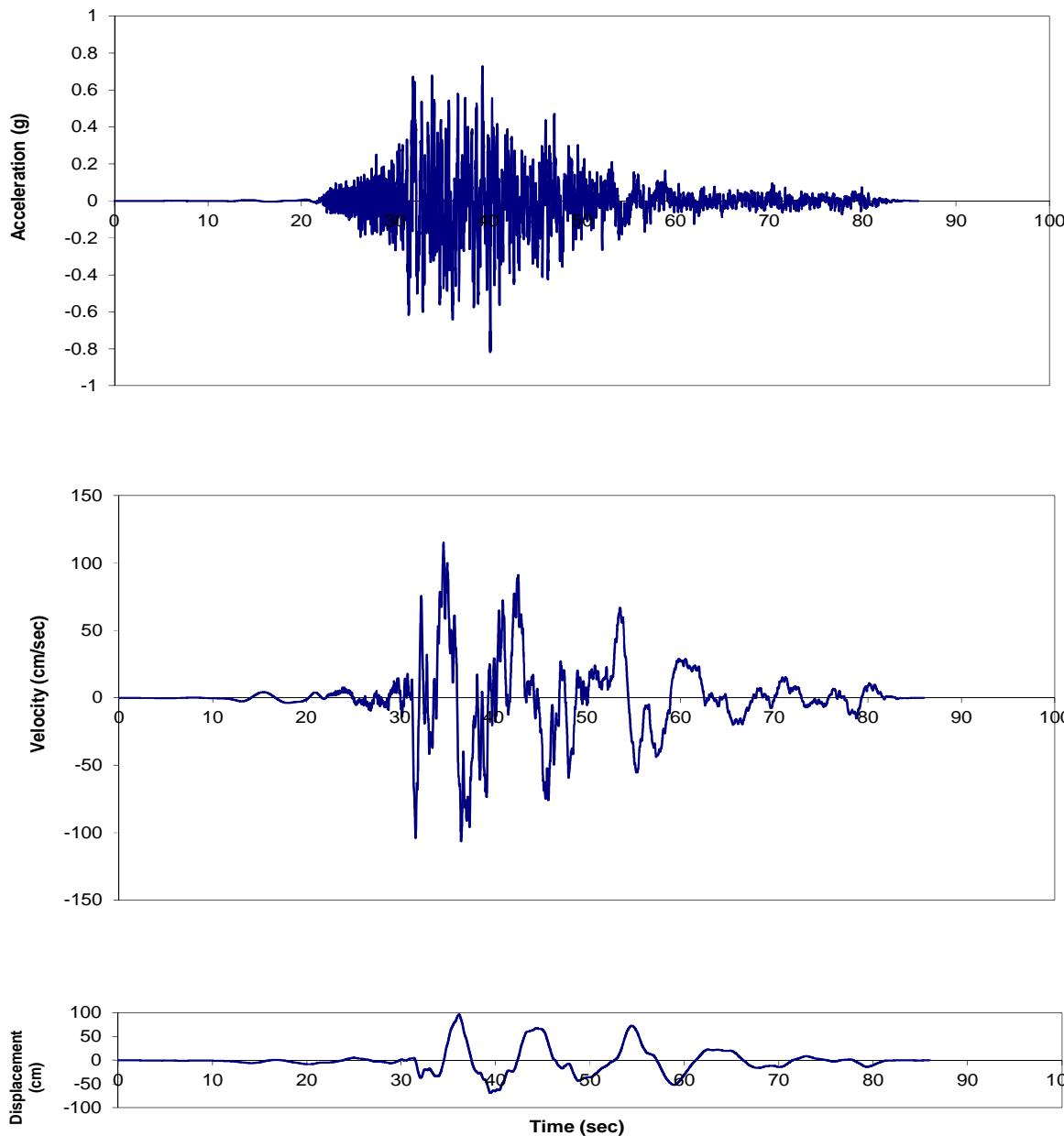
LNG FACILITIES
ALASKA LNG PROJECT
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carlo_090 time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, 090 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

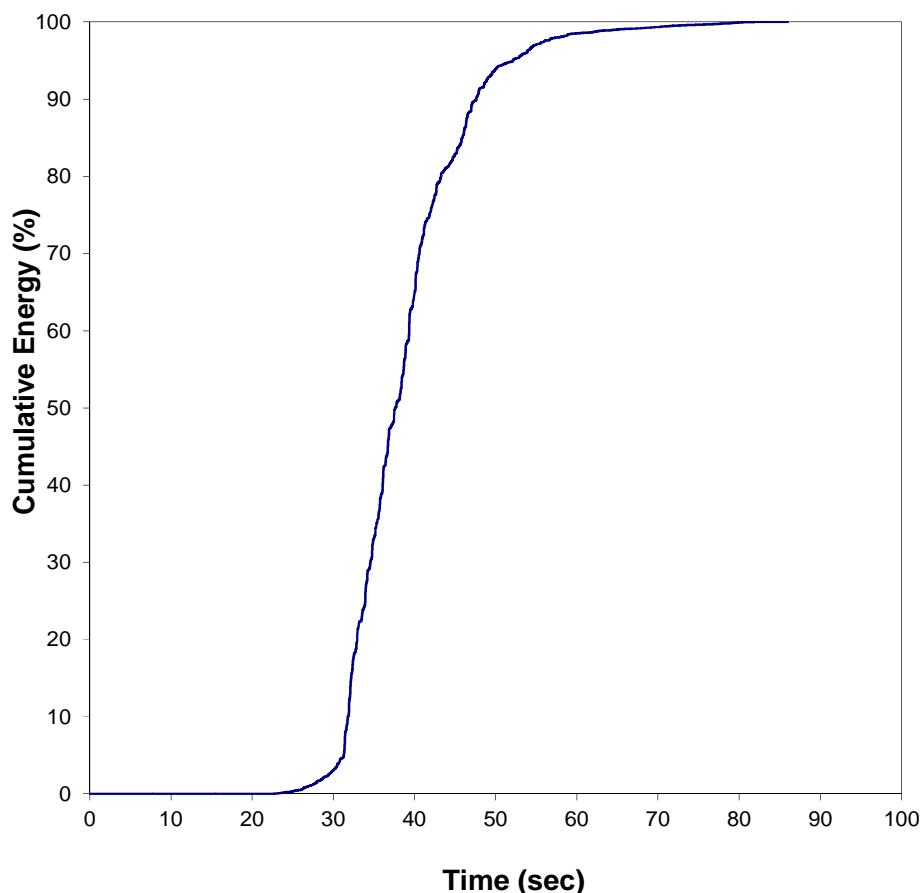
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

carlo_360 time history - Acceleration, Velocity, and Displacement Time Histories

SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
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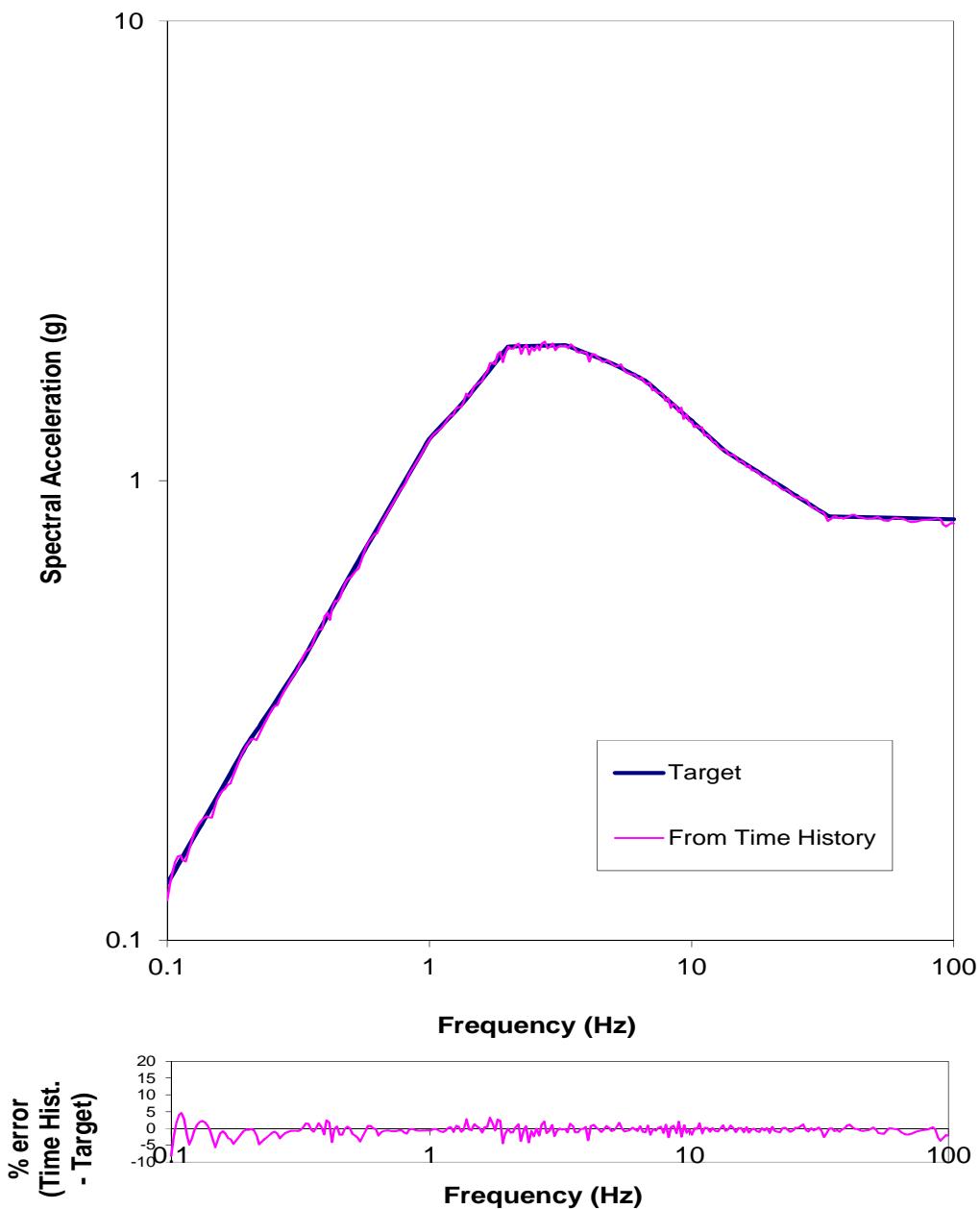
carlo_360 time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

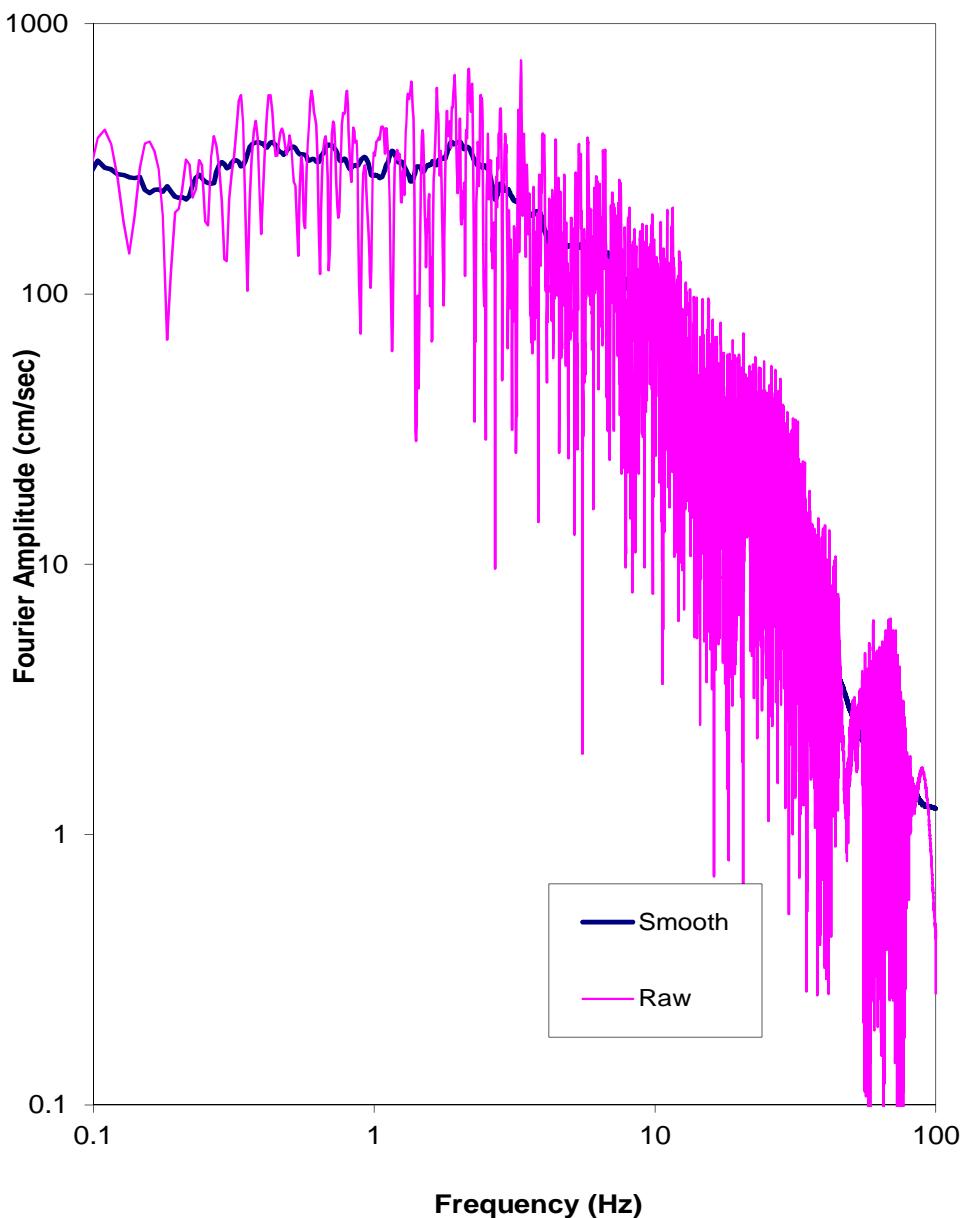
carlo_360 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

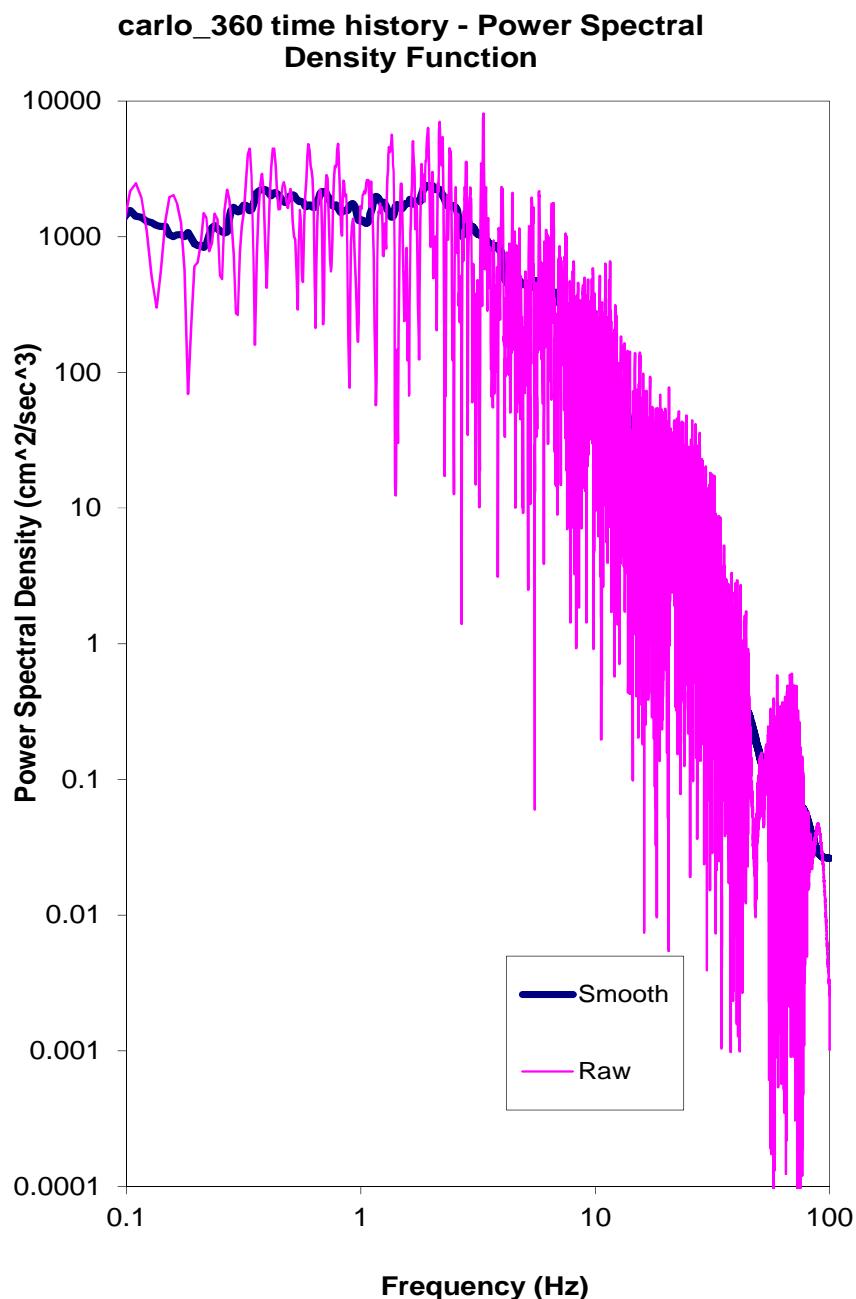
LNG FACILITIES
ALASKA LNG PROJECT
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carlo_360 time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – FOURIER AMPLITUDE SPECTRUM

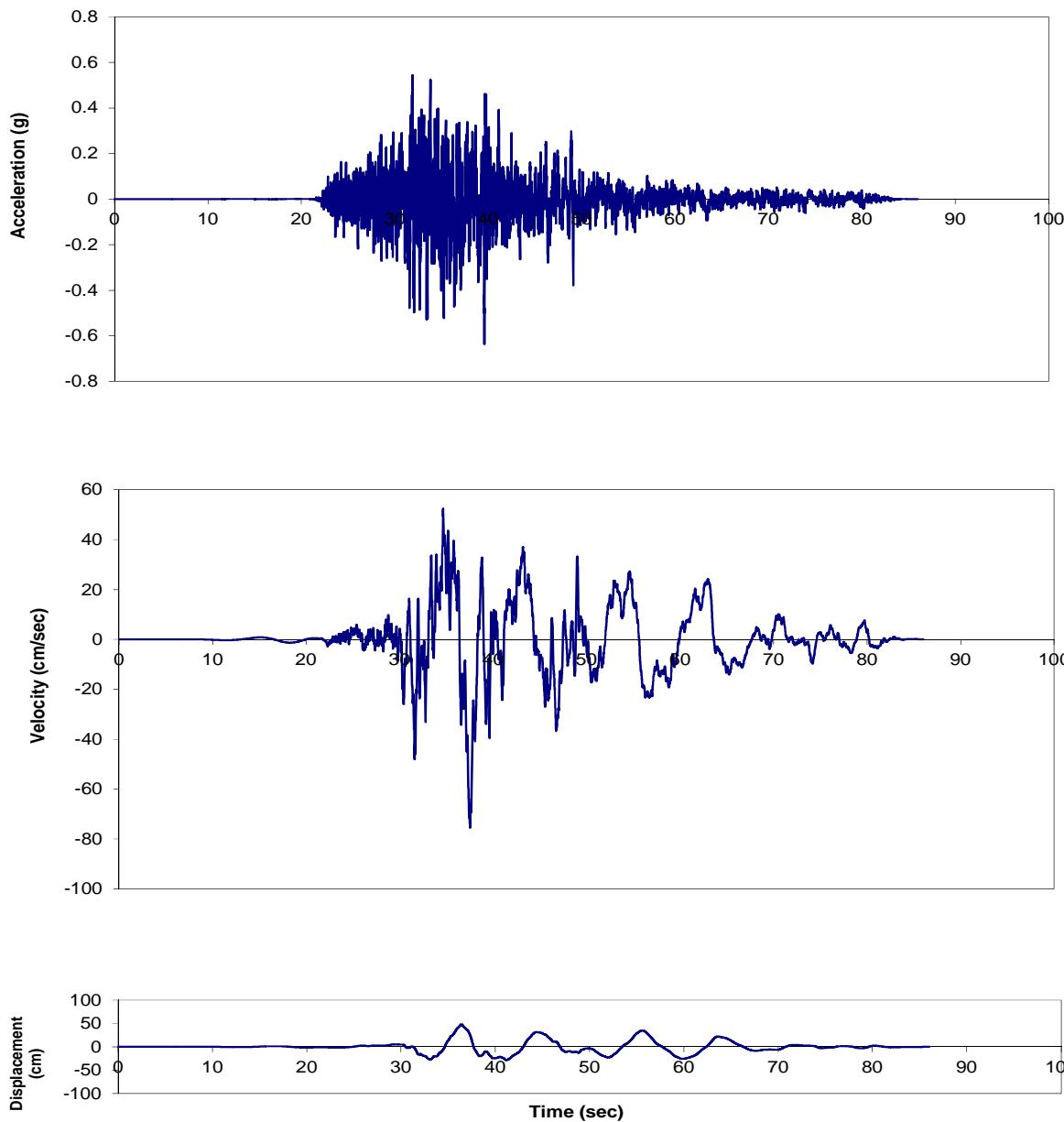
LNG FACILITIES
ALASKA LNG PROJECT
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SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, 360 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
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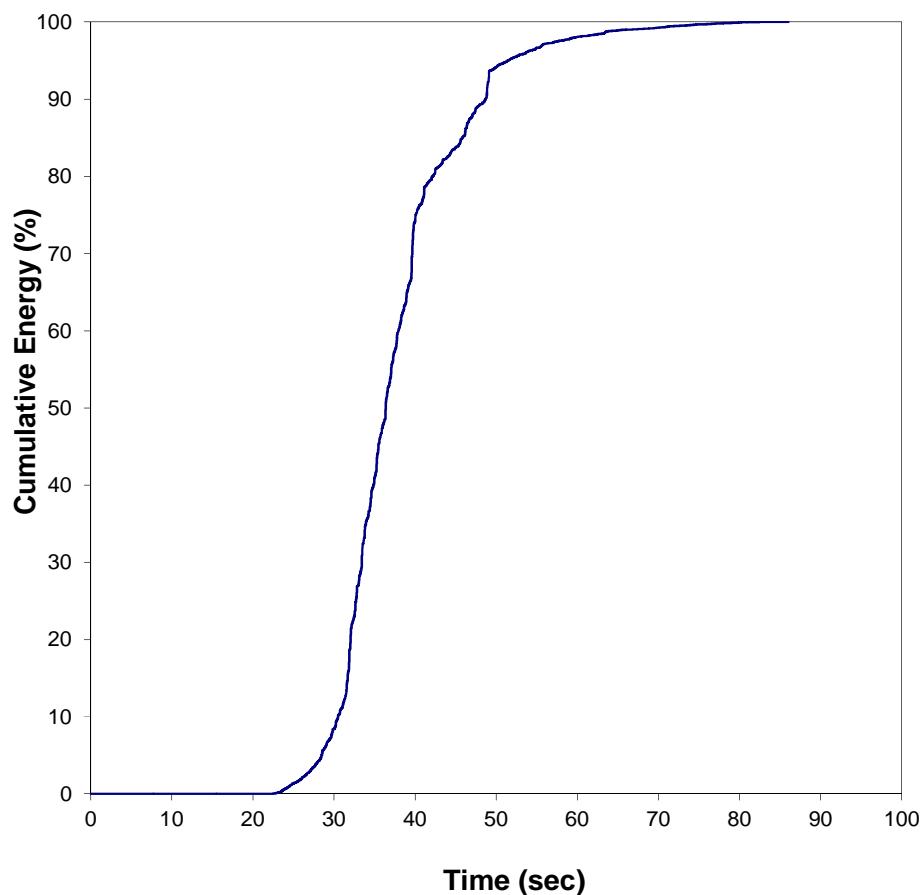
carlo_up time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
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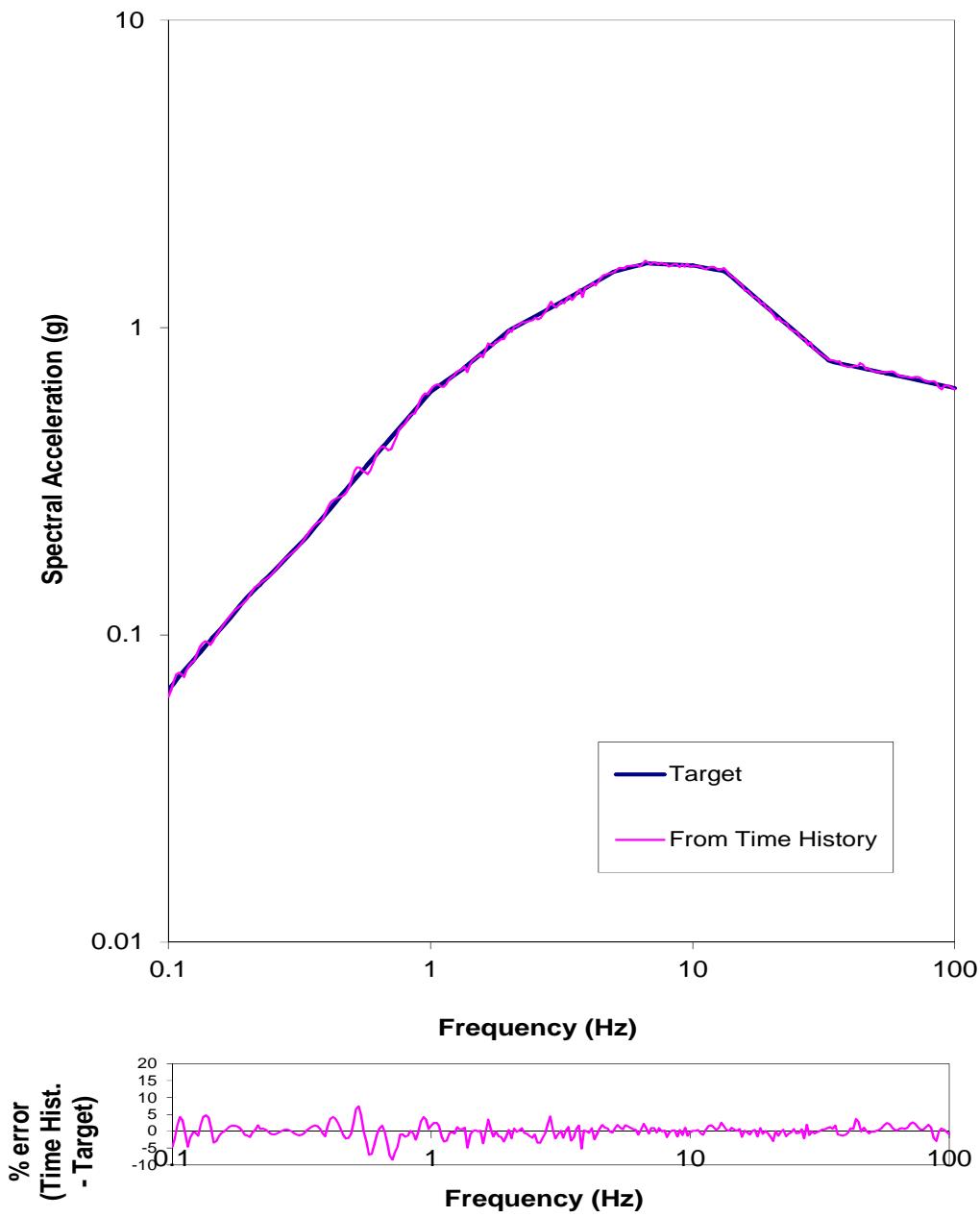
carlo_up time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
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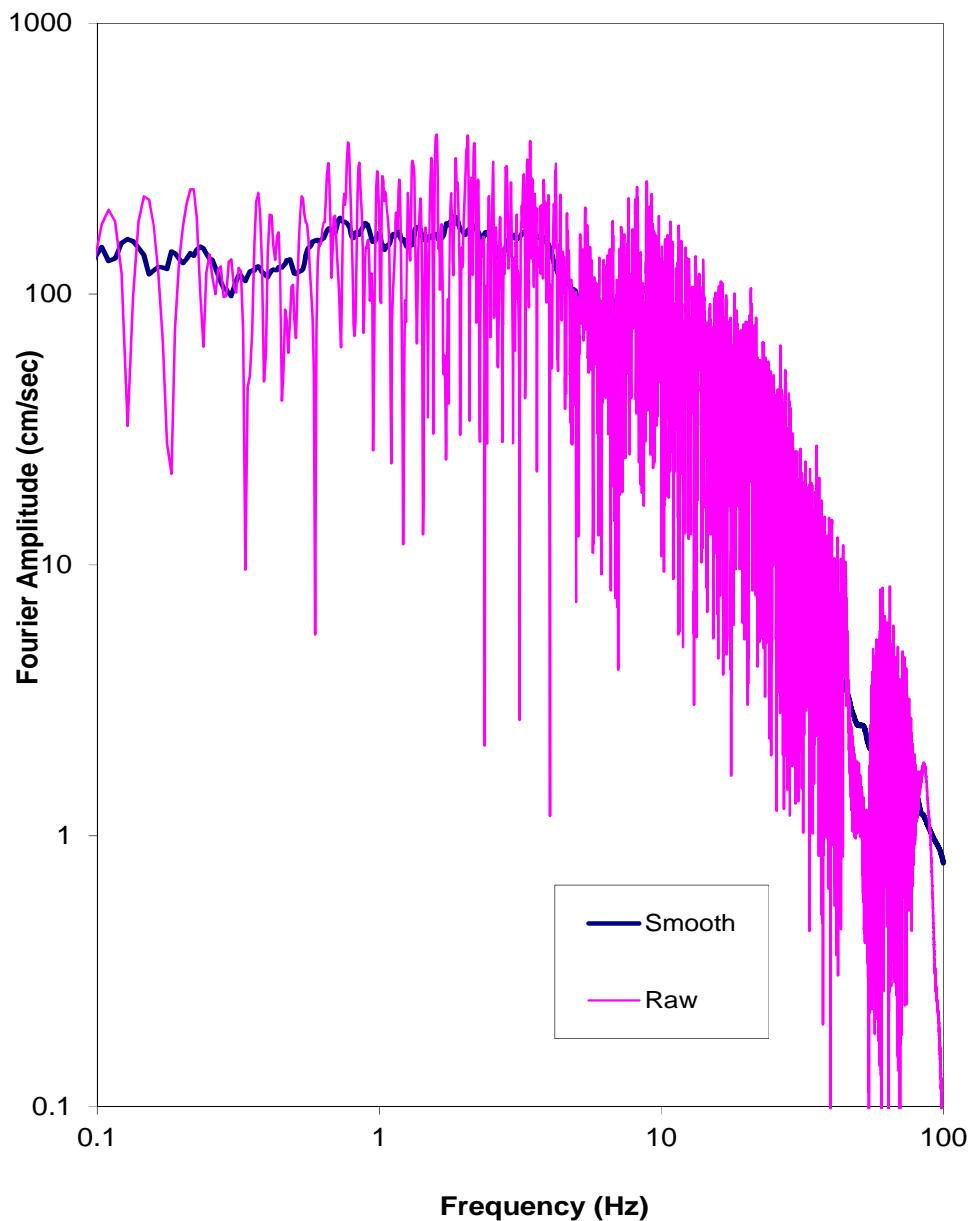
carlo_up time history - Response Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

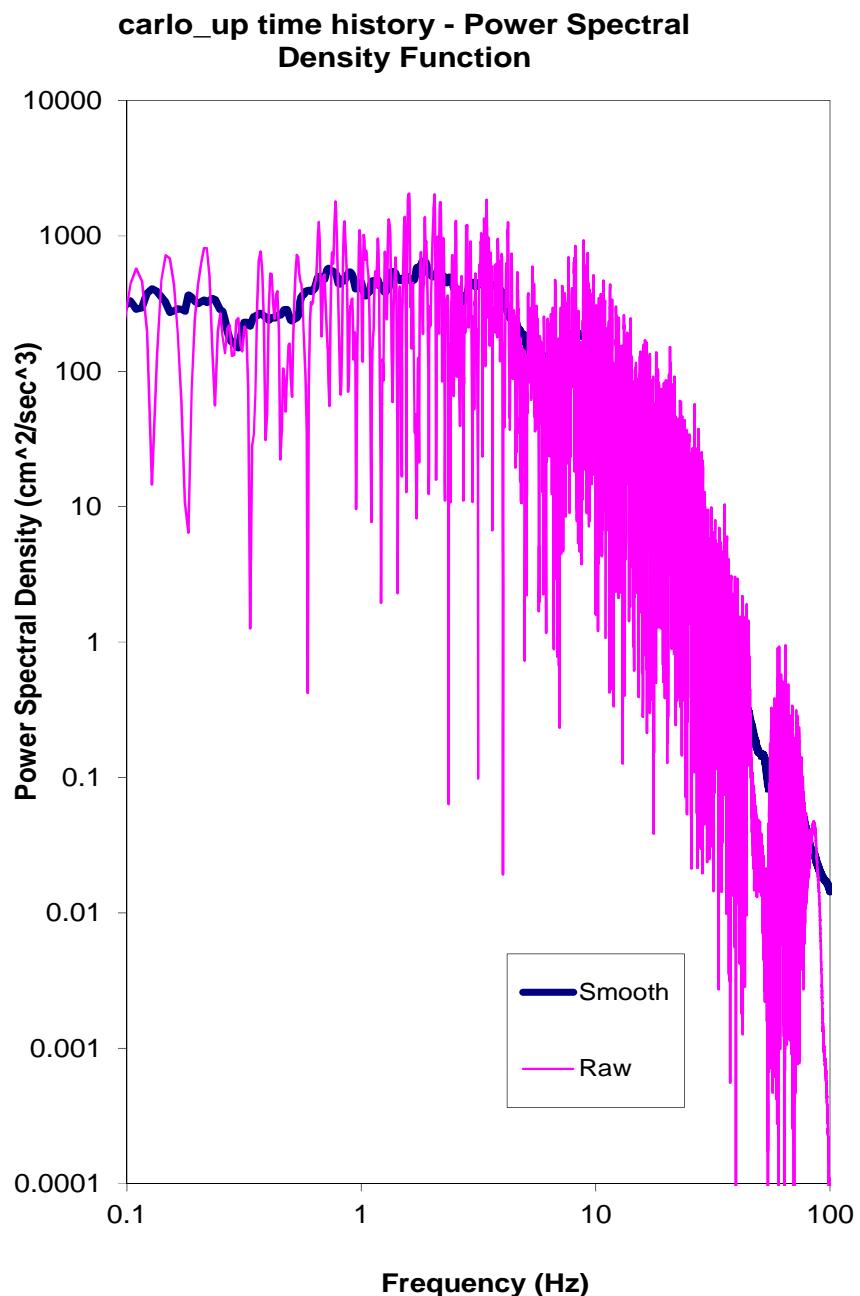
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

carlo_up time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM

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SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION, UP COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
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Calculation of Correlation Coefficients

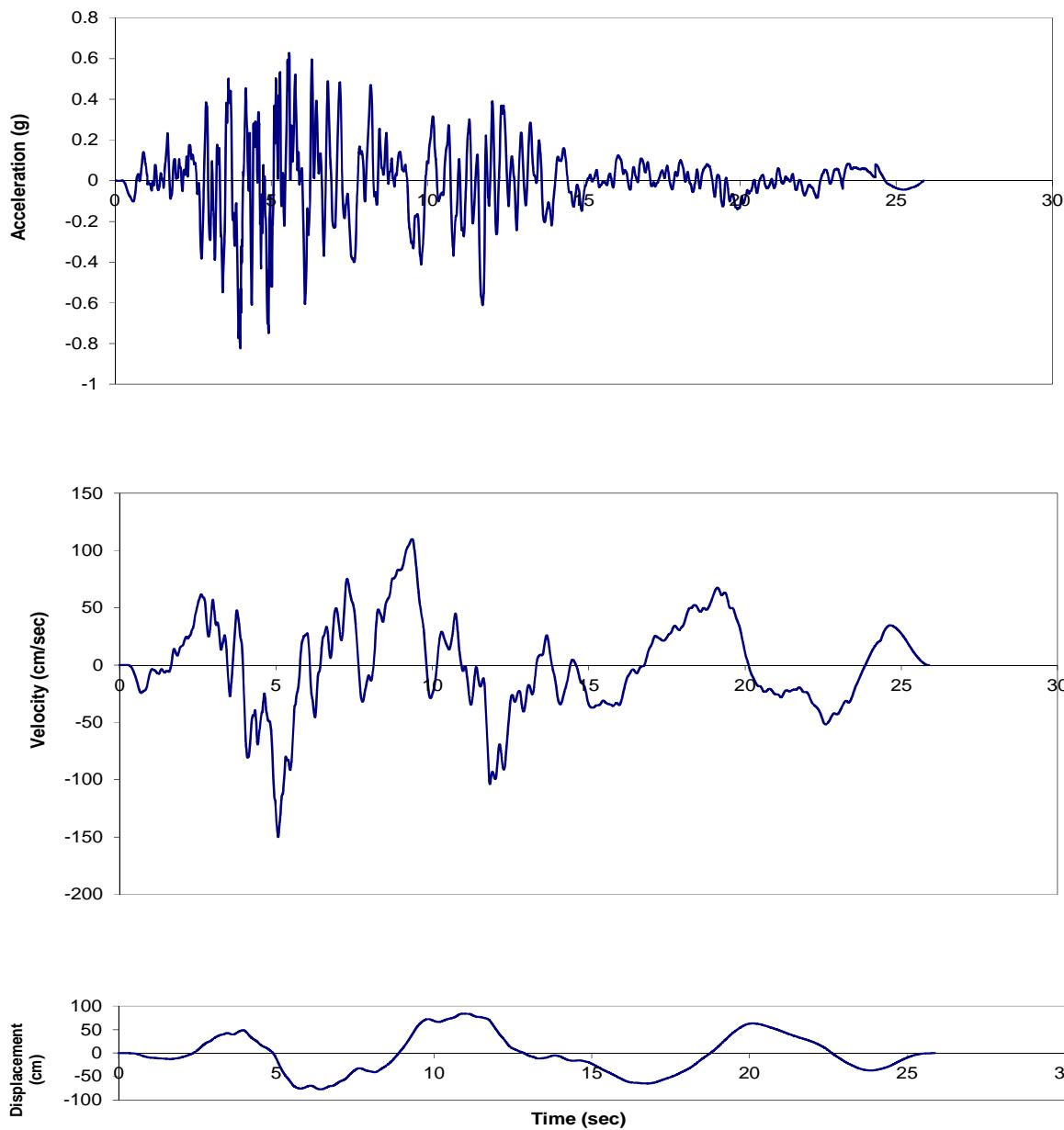
Cross-correlation check

Horizontal 1:	Carlo_090
Horizontal 2:	Carlo_360
Vertical:	Carlo_UP
corr, H1-H2	-0.144
corr, H1-V	0.048
corr, H2-V	0.111

SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED CARLO MOTION – CALCULATION OF CORRELATION COEFFICIENTS

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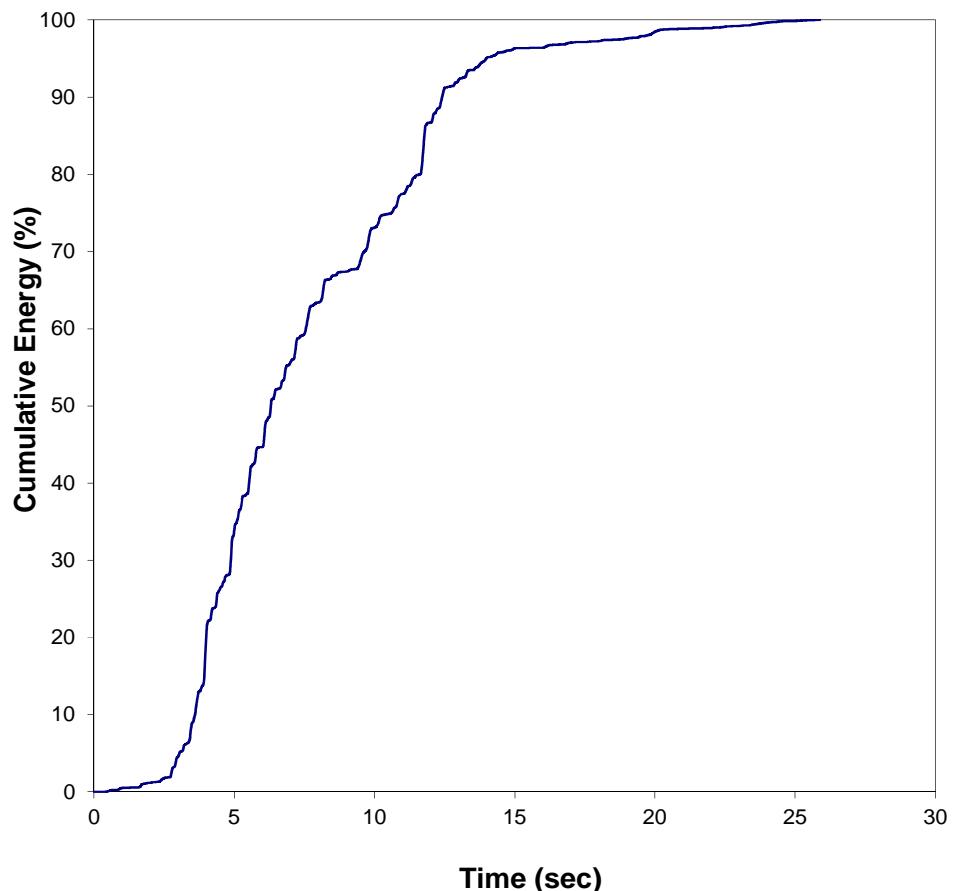
Duzce_DZC180 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

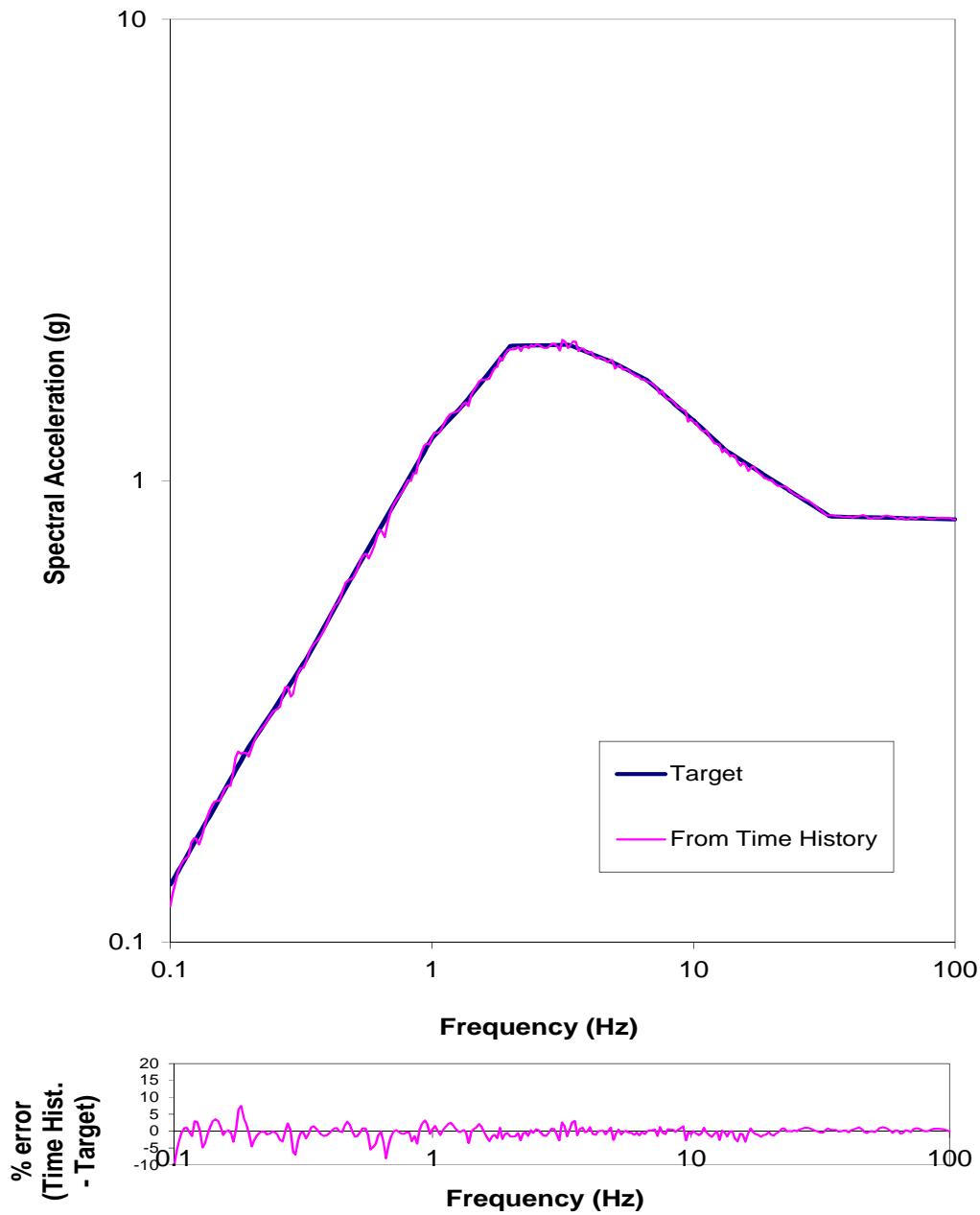
Duzce_DZC180 time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

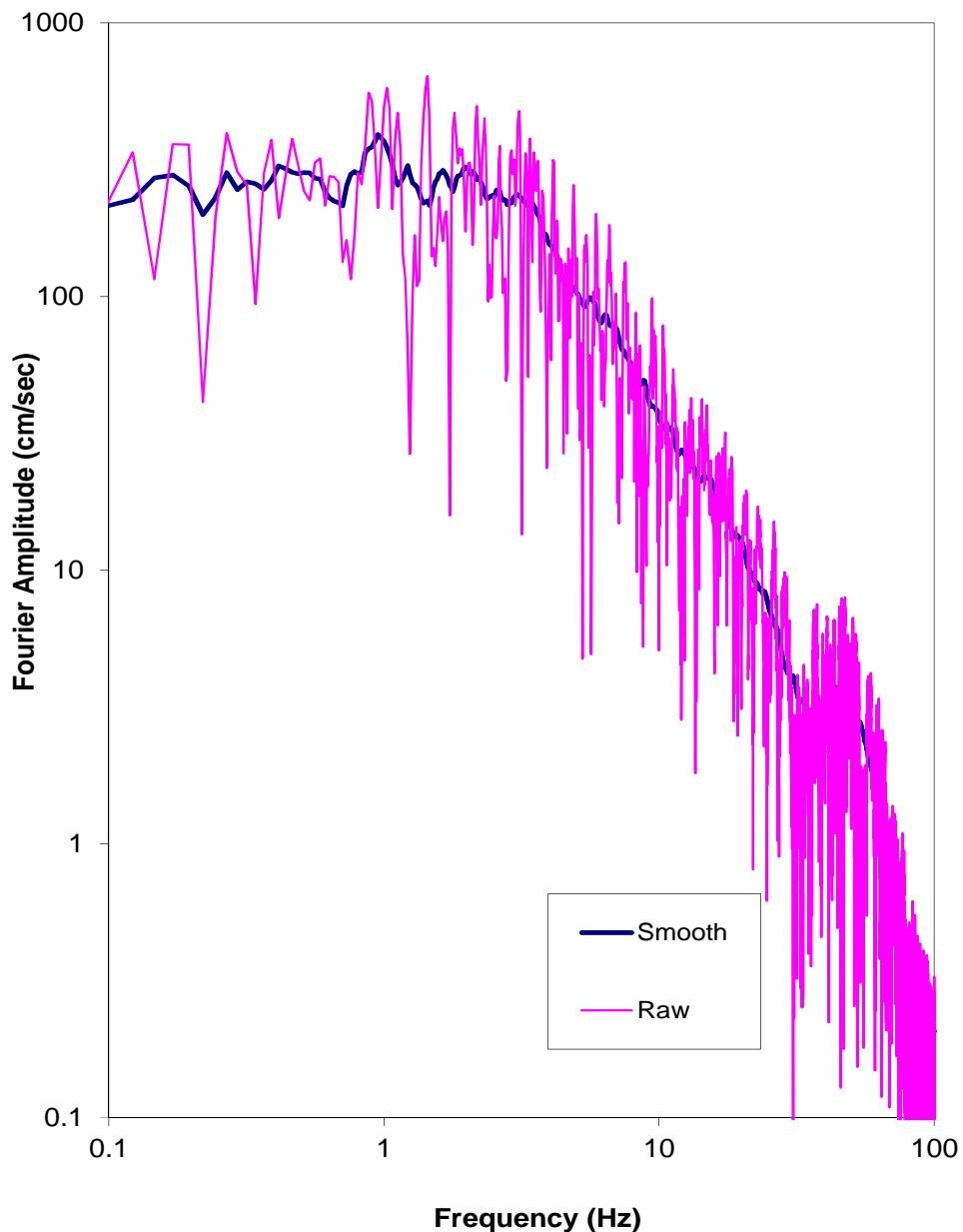
Duzce_DZC180 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

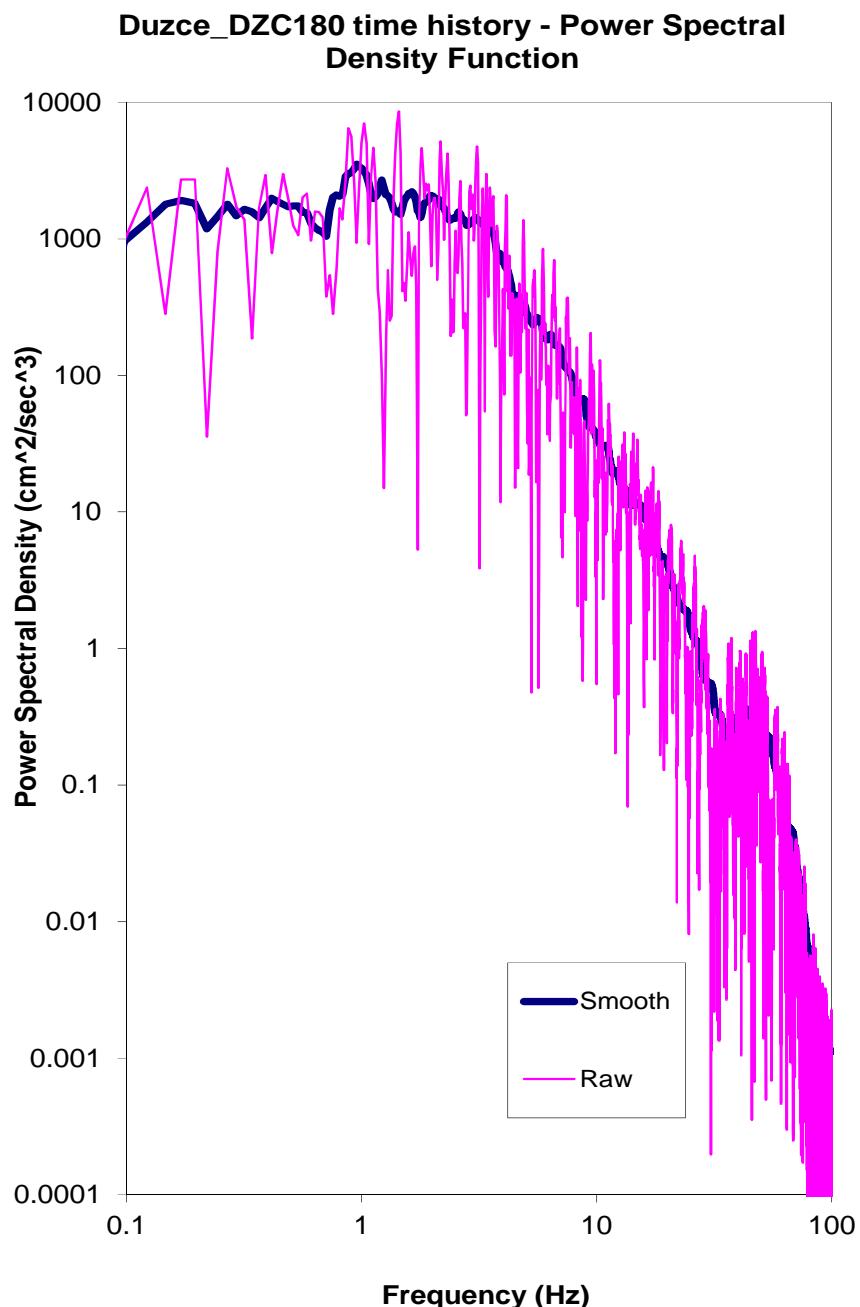
LNG FACILITIES
ALASKA LNG PROJECT
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Duzce_DZC180 time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – FOURIER AMPLITUDE SPECTRUM

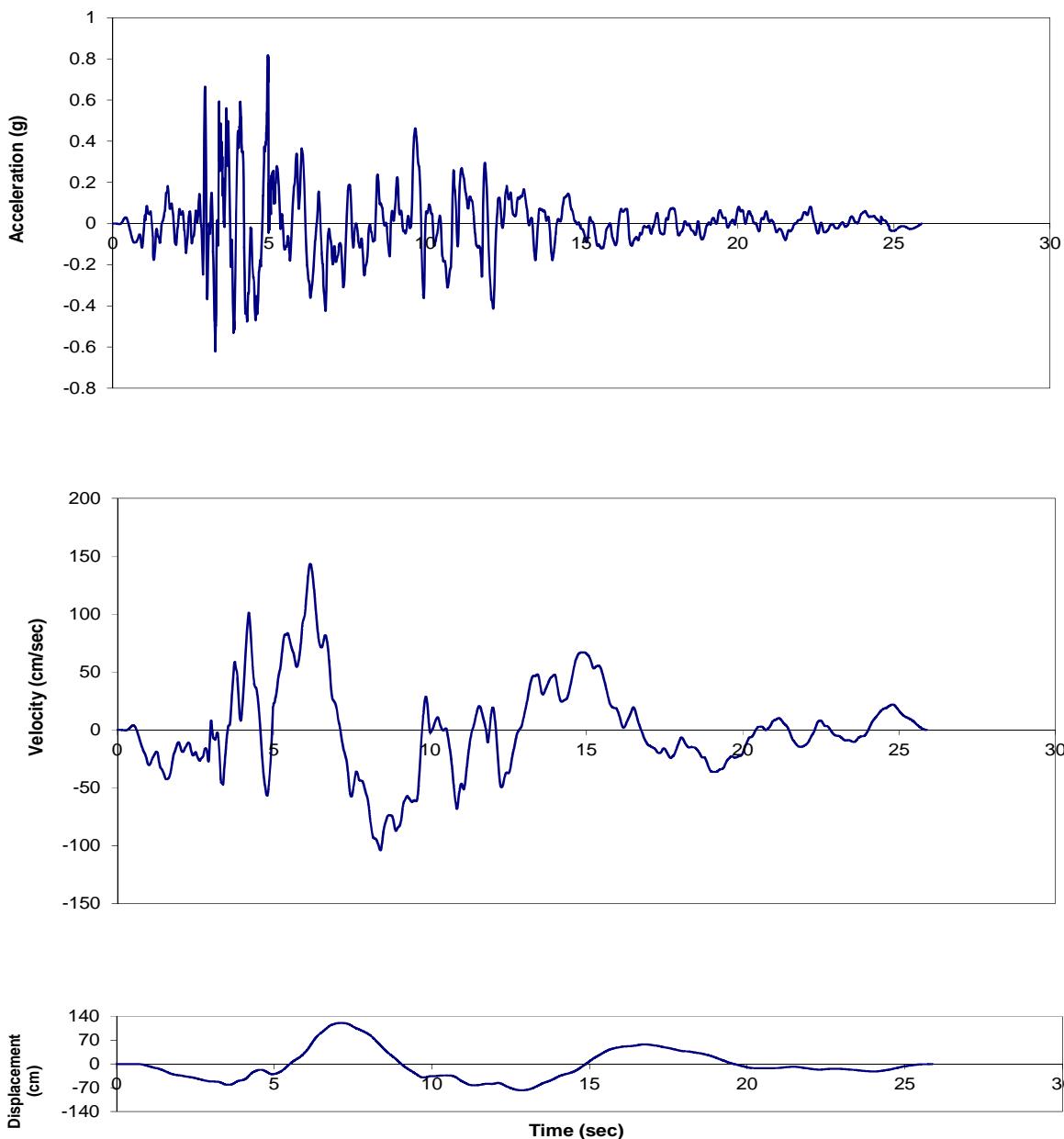
LNG FACILITIES
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NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, 180 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

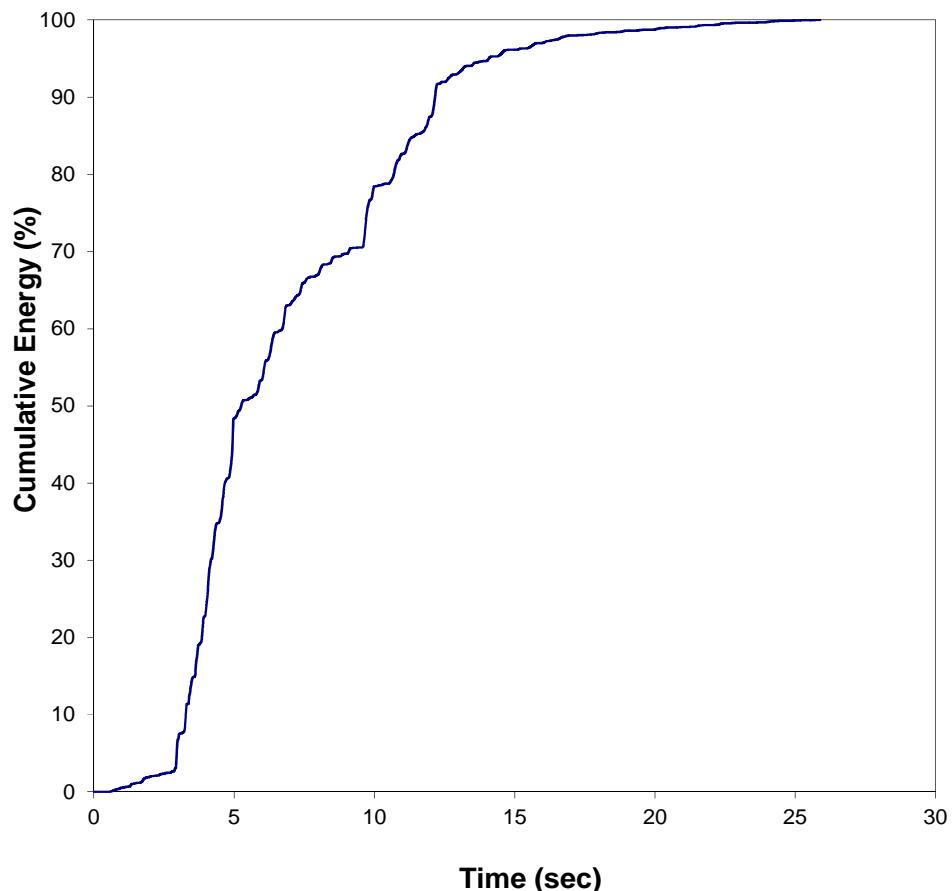
Duzce_DZC270 time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

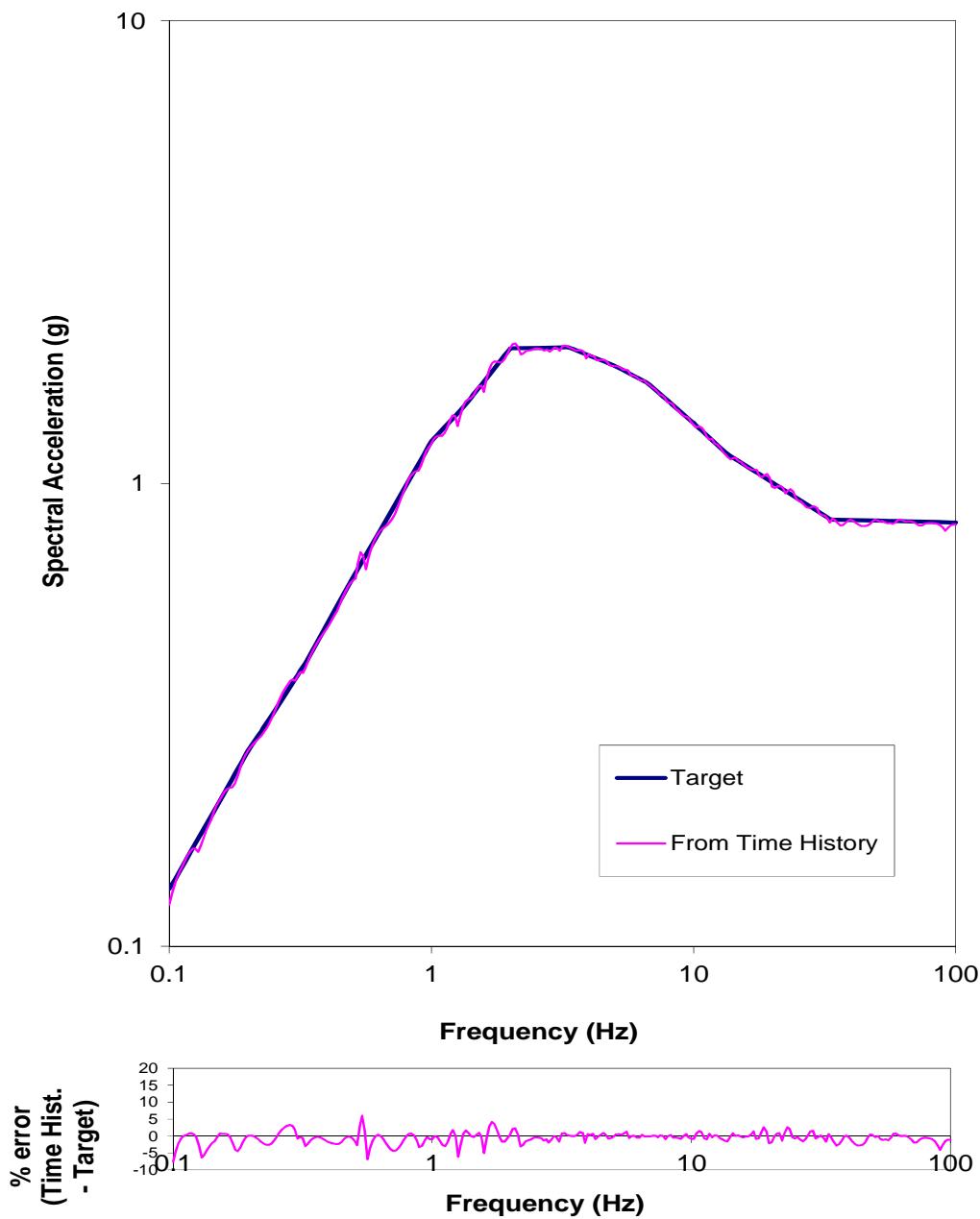
Duzce_DZC270 time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

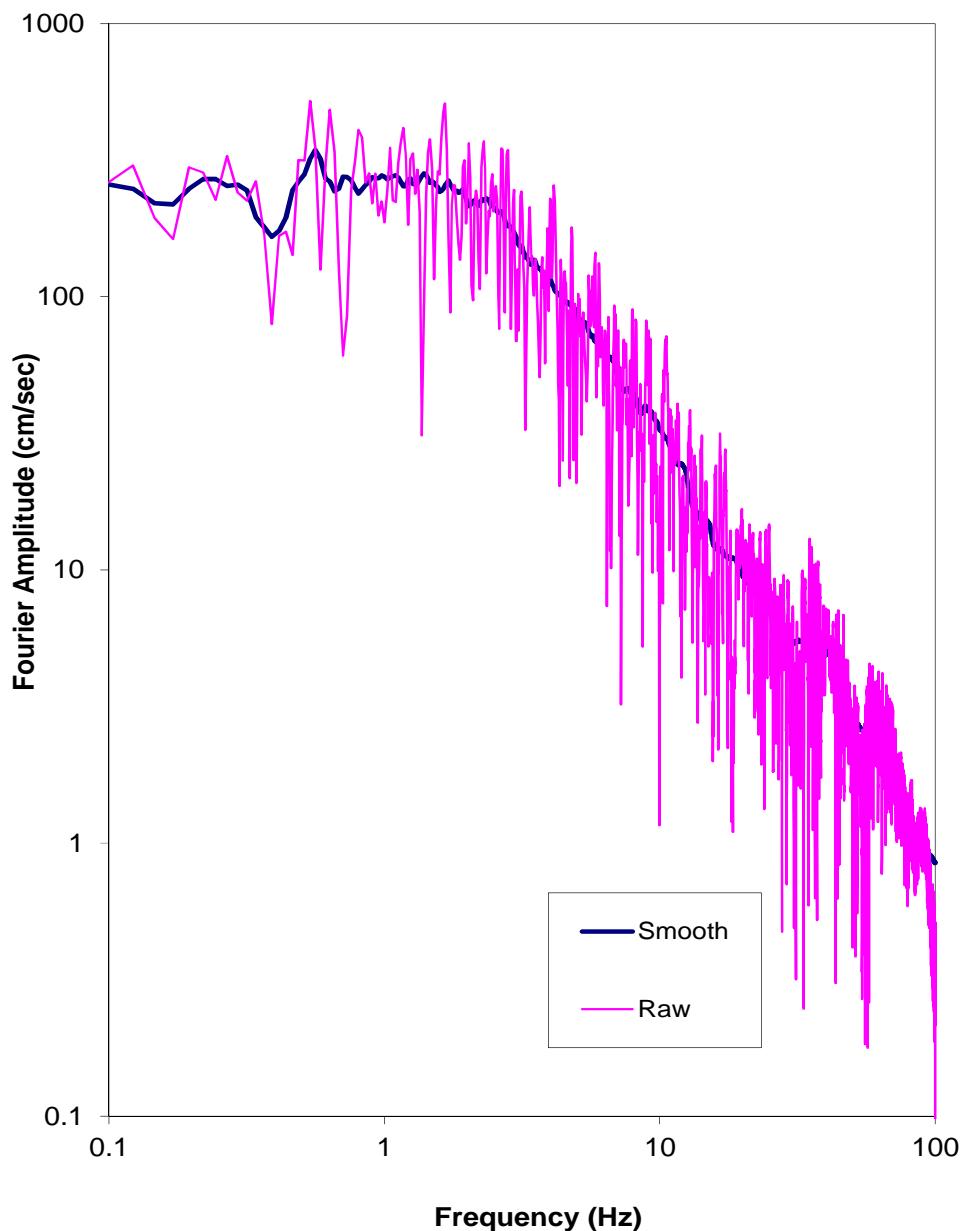
Duzce_DZC270 time history - Response Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

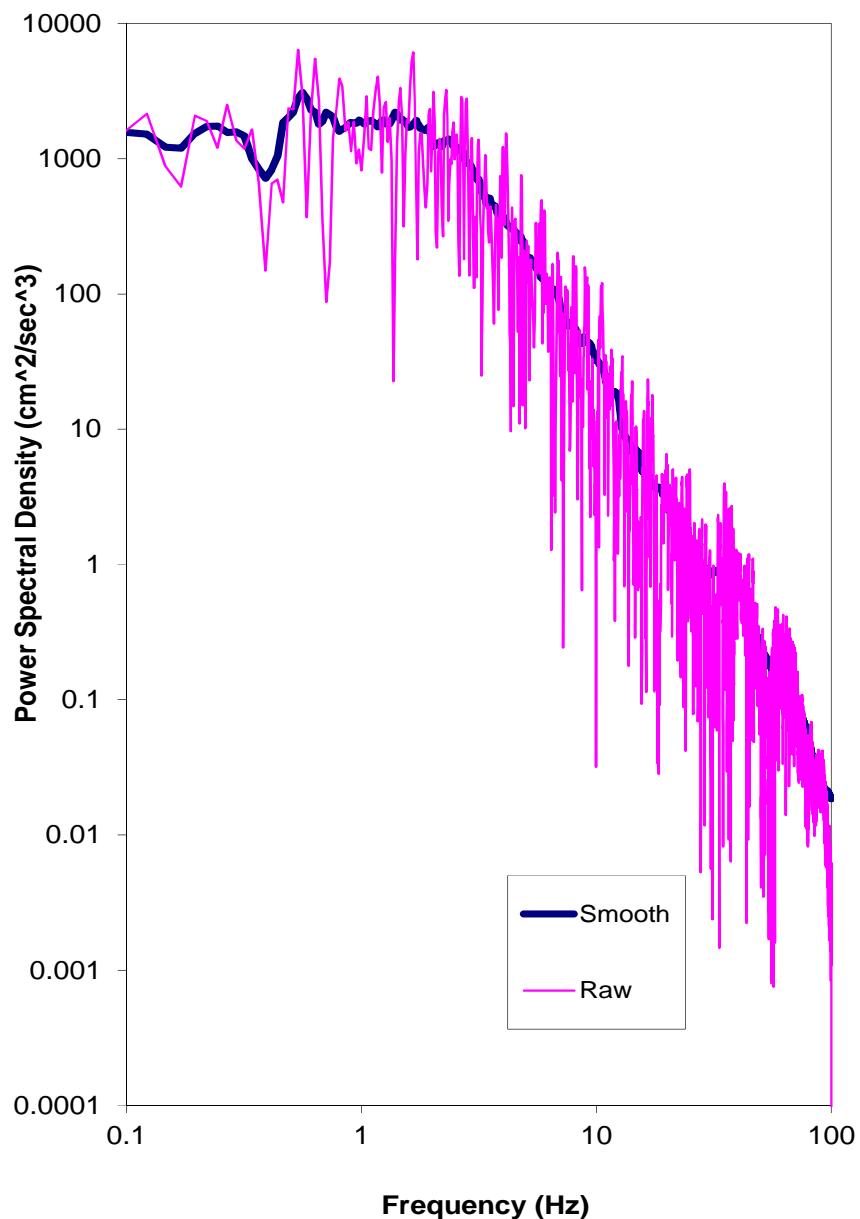
Duzce_DZC270 time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

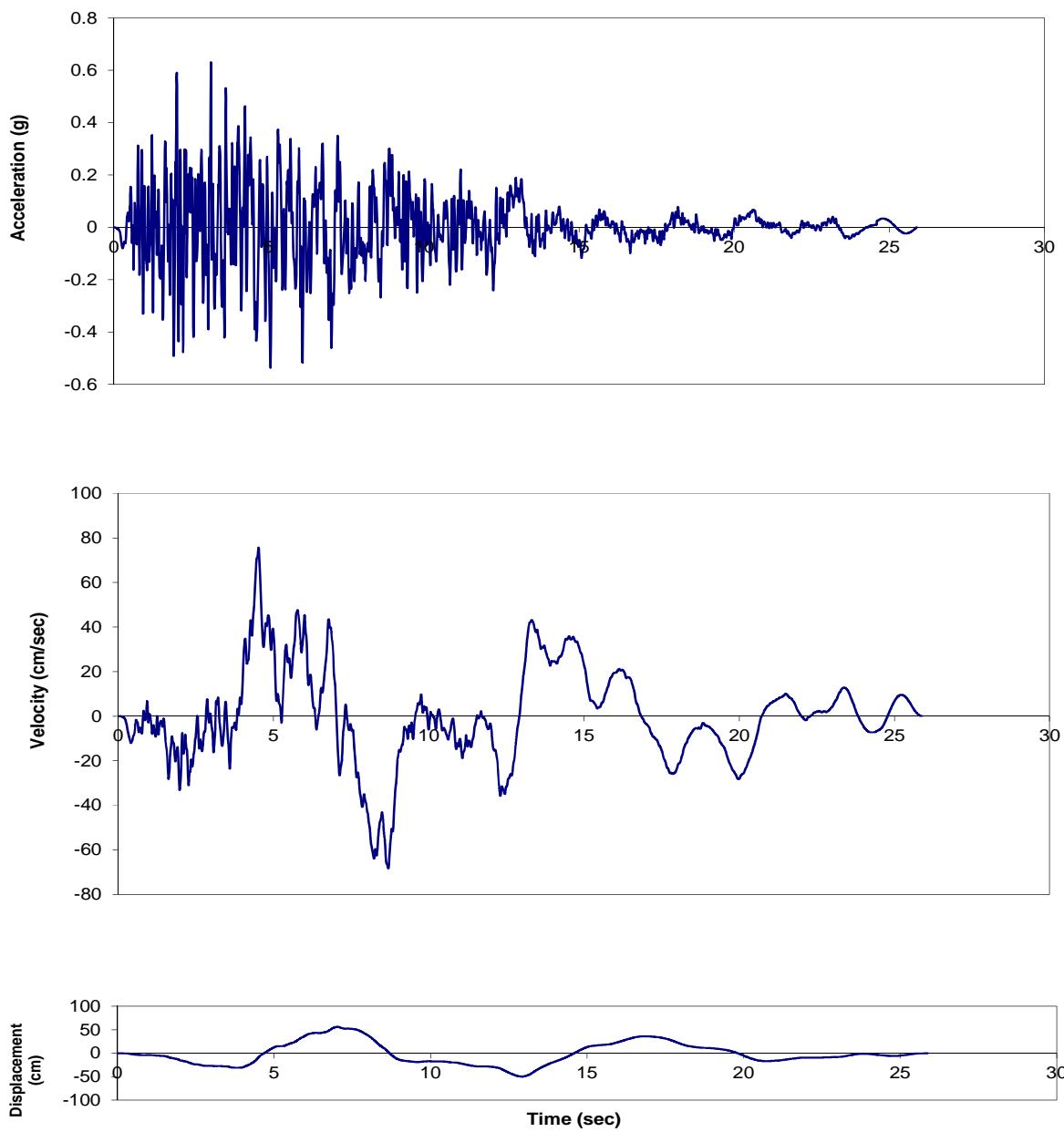
Duzce_DZC270 time history - Power Spectral Density Function



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, 270 COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
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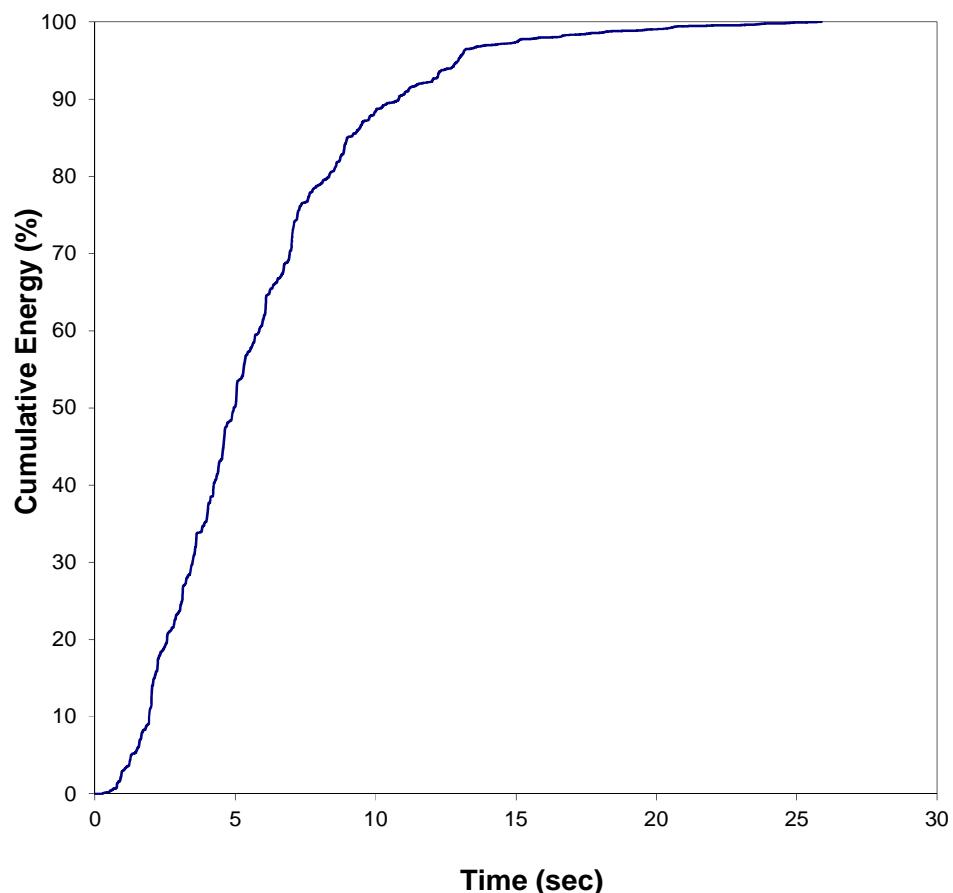
Duzce_DZCUP time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

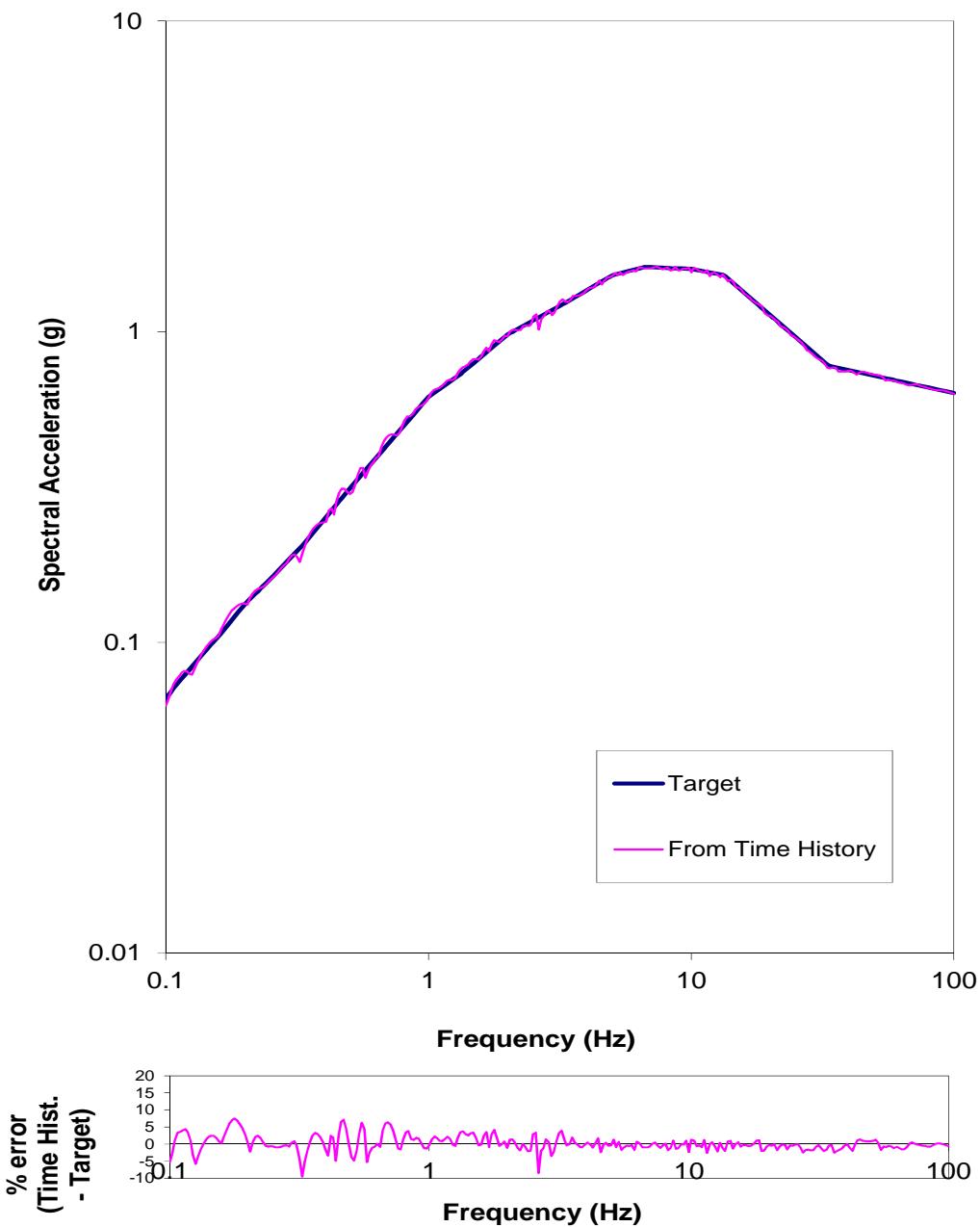
Duzce_DZCUP time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

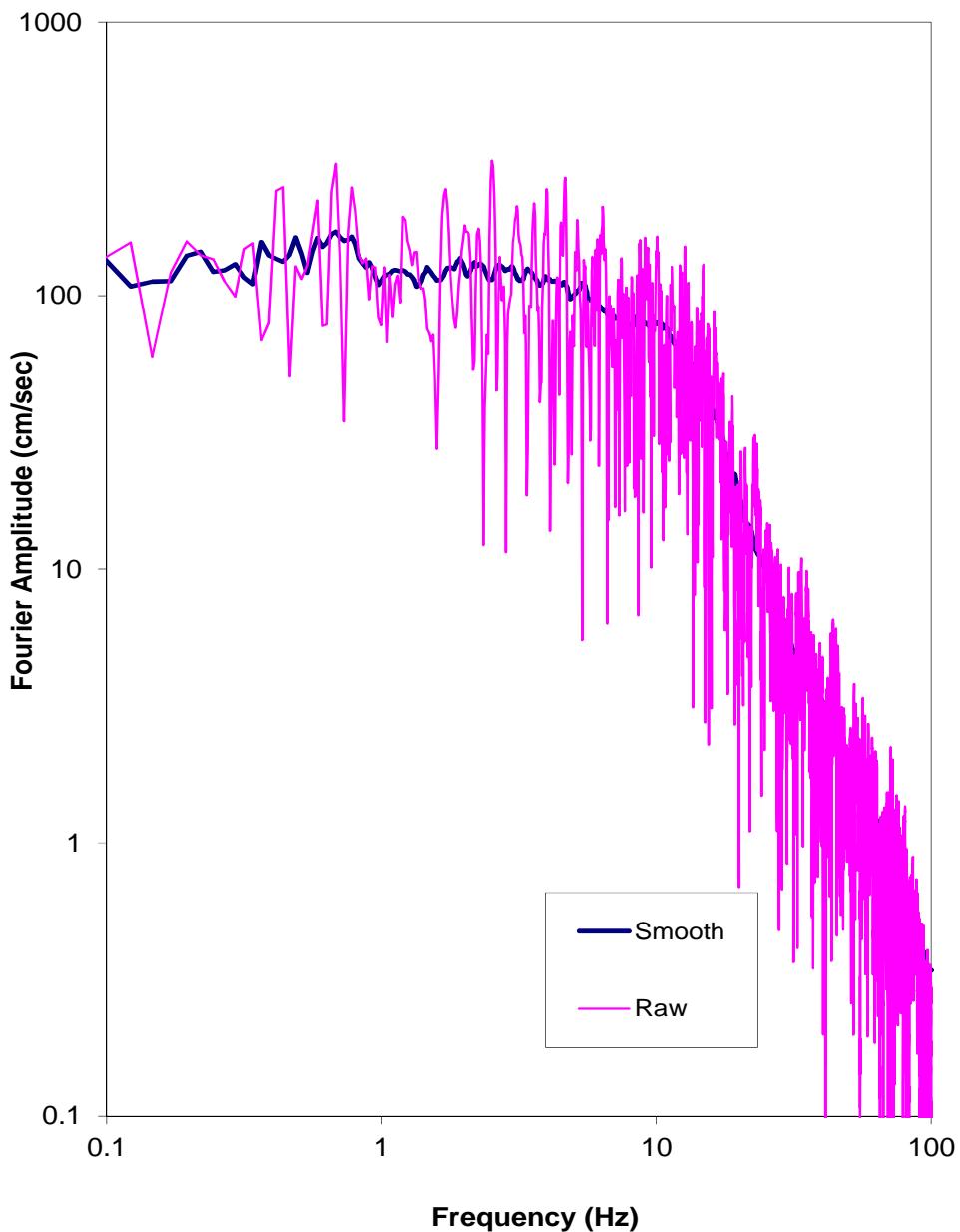
Duzce_DZCUP time history - Response Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

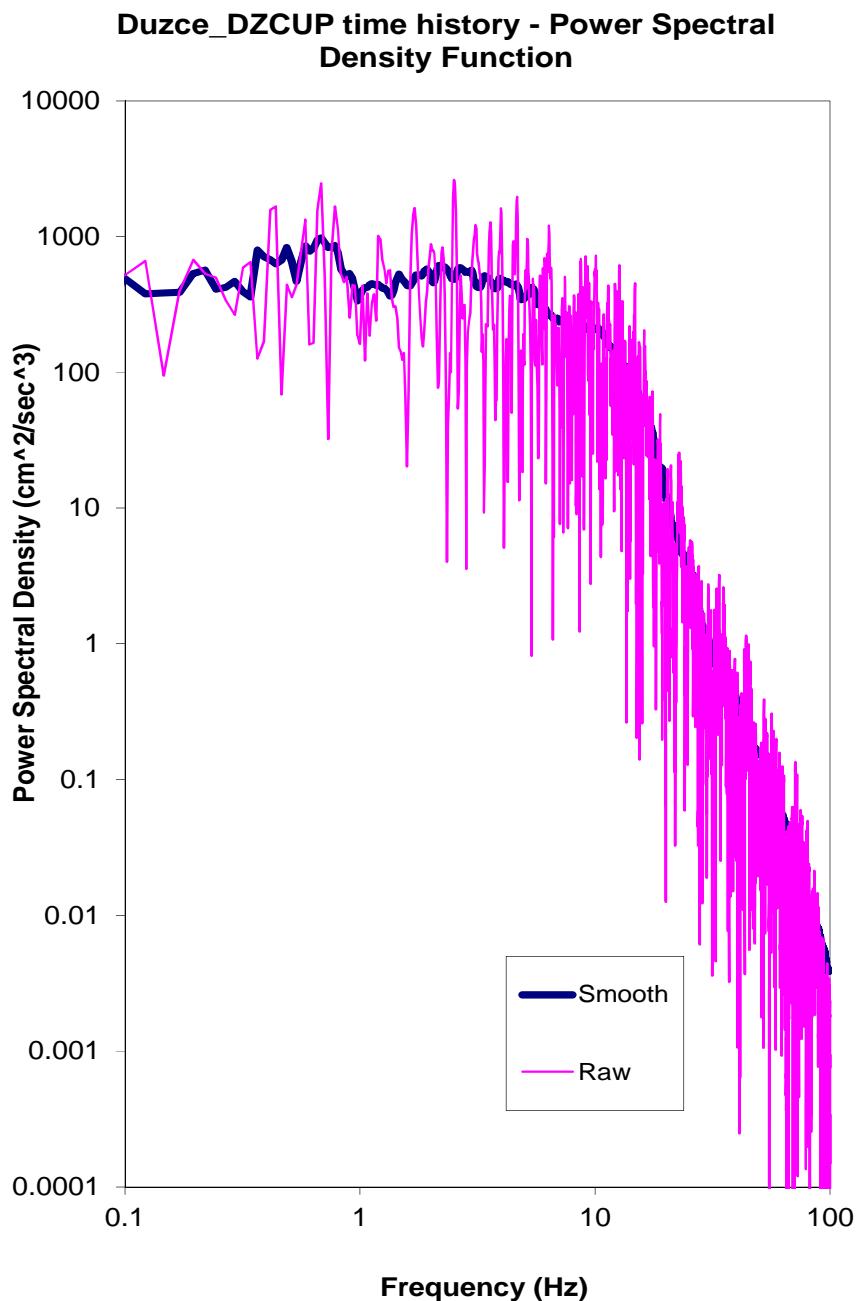
LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Duzce_DZCUP time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – FOURIER AMPLITUDE SPECTRUM

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION, UP COMPONENT – POWER SPECTRAL DENSITY FUNCTION

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

Calculation of Correlation Coefficients

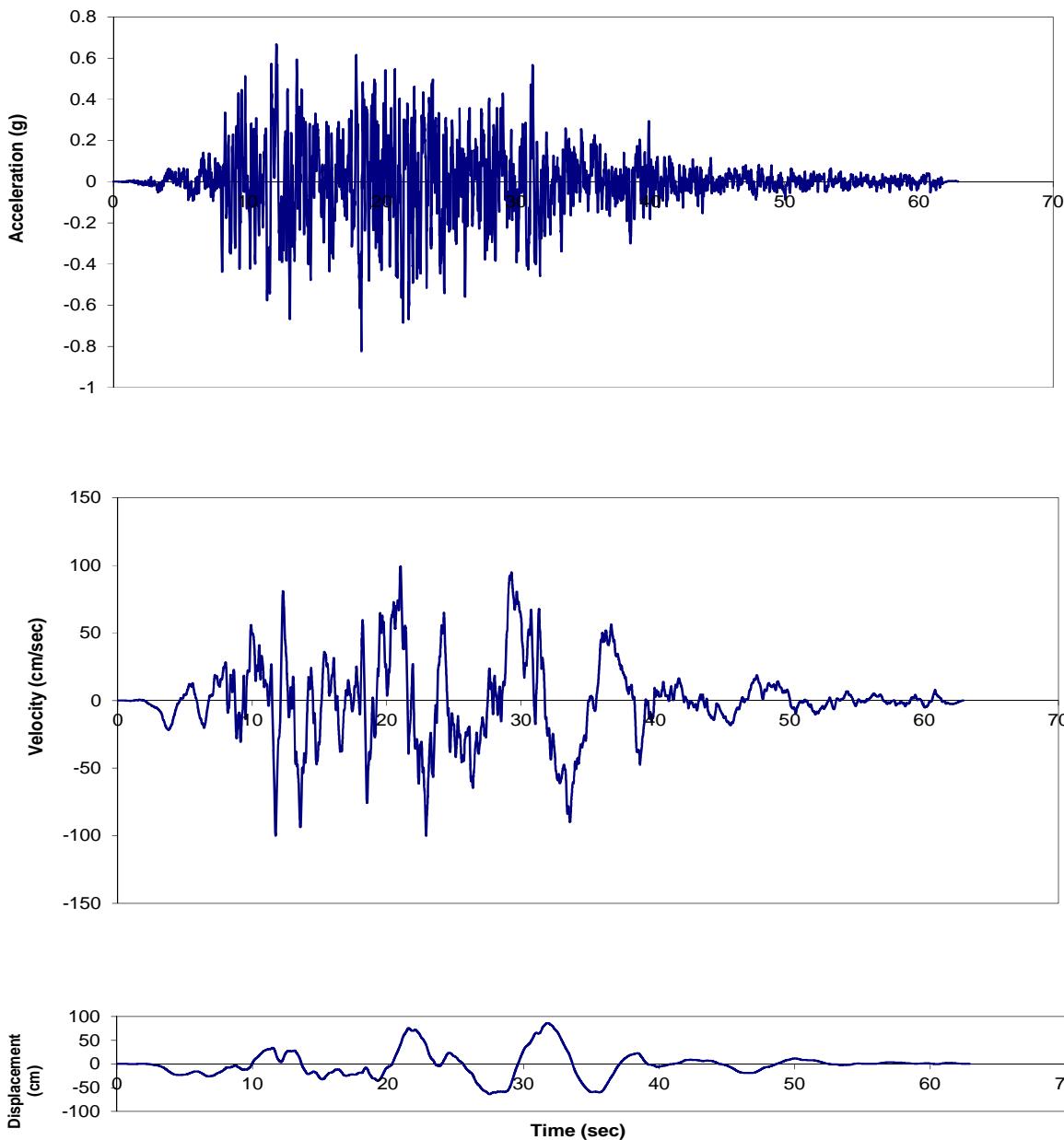
Cross-correlation check

Horizontal 1:	DZC180
Horizontal 2:	DZC270
Vertical:	DZCUP
corr, H1-H2	-0.151
corr, H1-V	0.054
corr, H2-V	0.106

SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED DZC MOTION – CALCULATION OF CORRELATION COEFFICIENTS

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

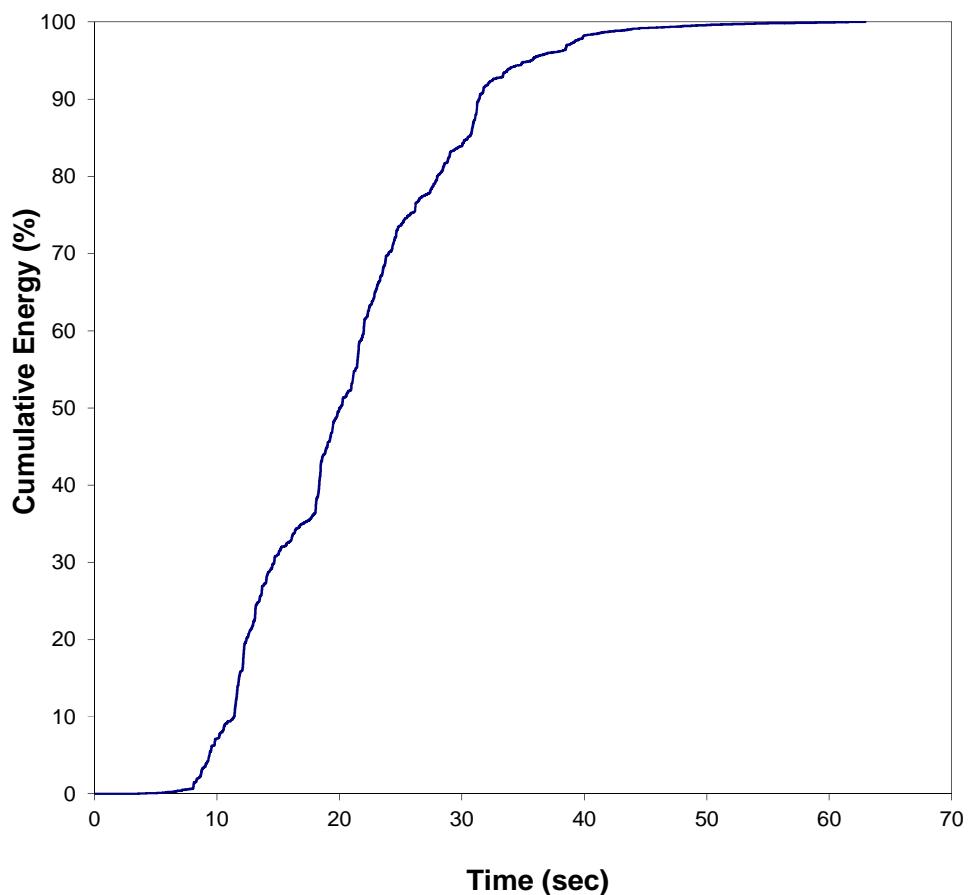
Unio_N00W time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

LNG FACILITIES
ALASKA LNG PROJECT
NIKISKI, ALASKA

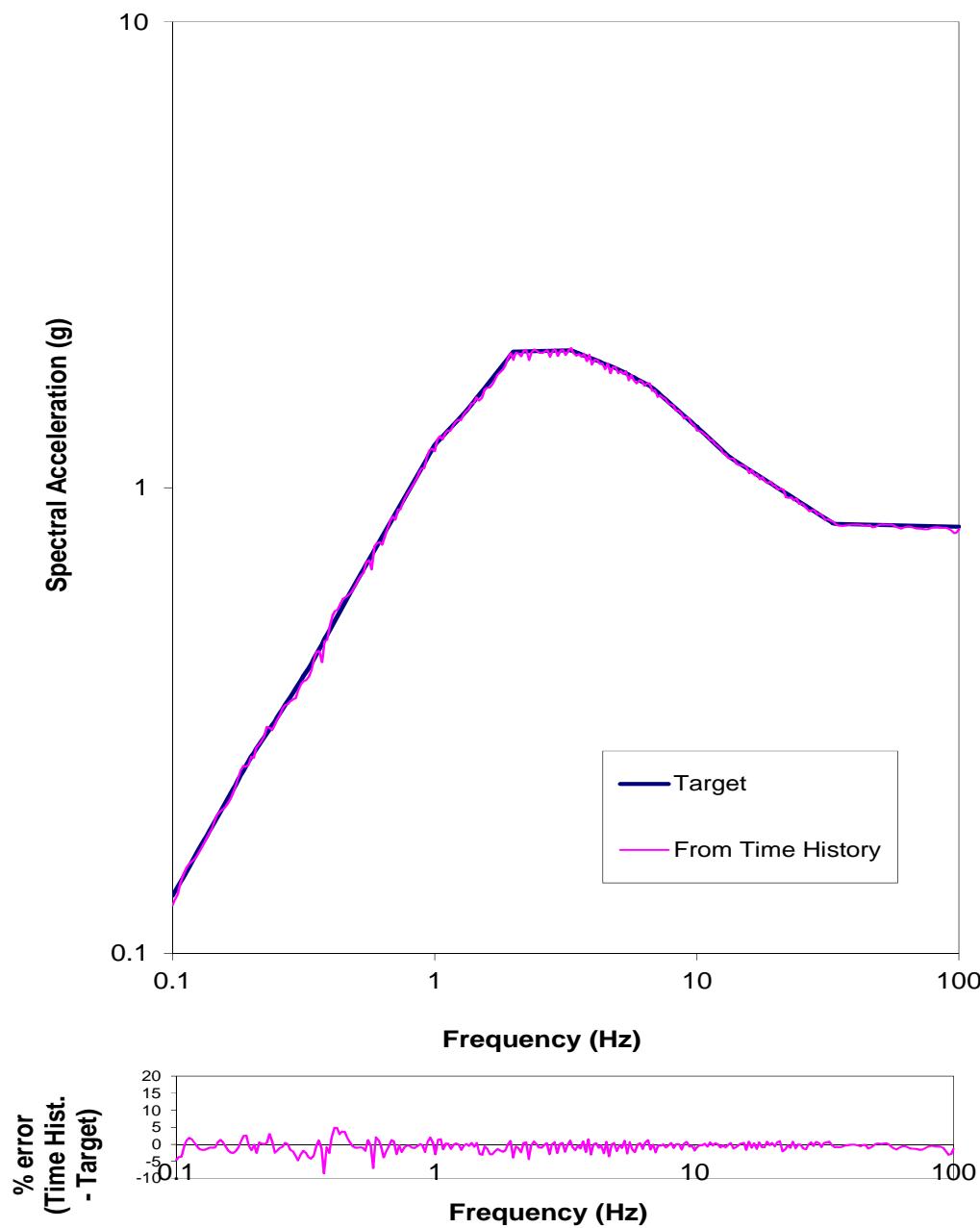
Unio_N00W time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

LNG FACILITIES
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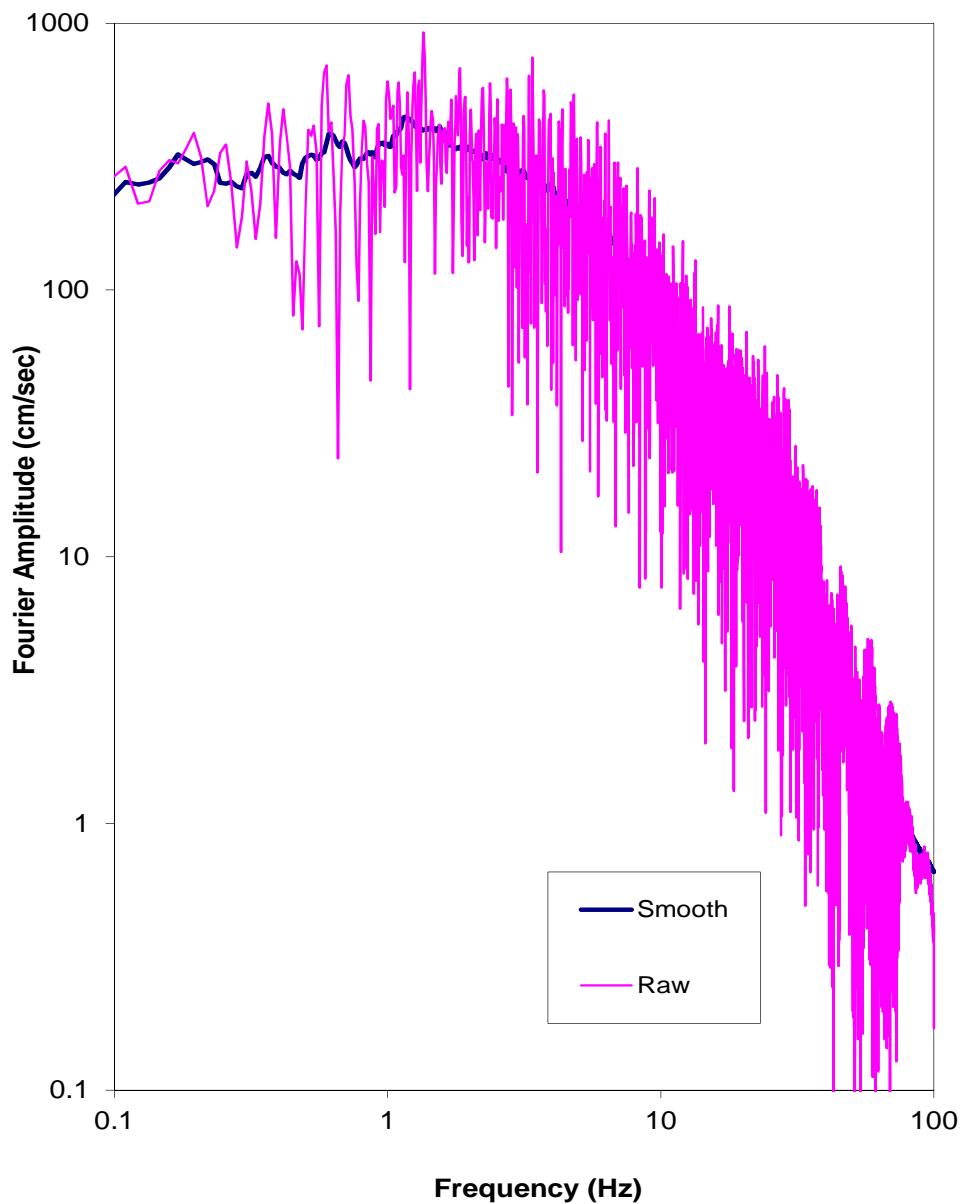
Unio_N00W time history - Response Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

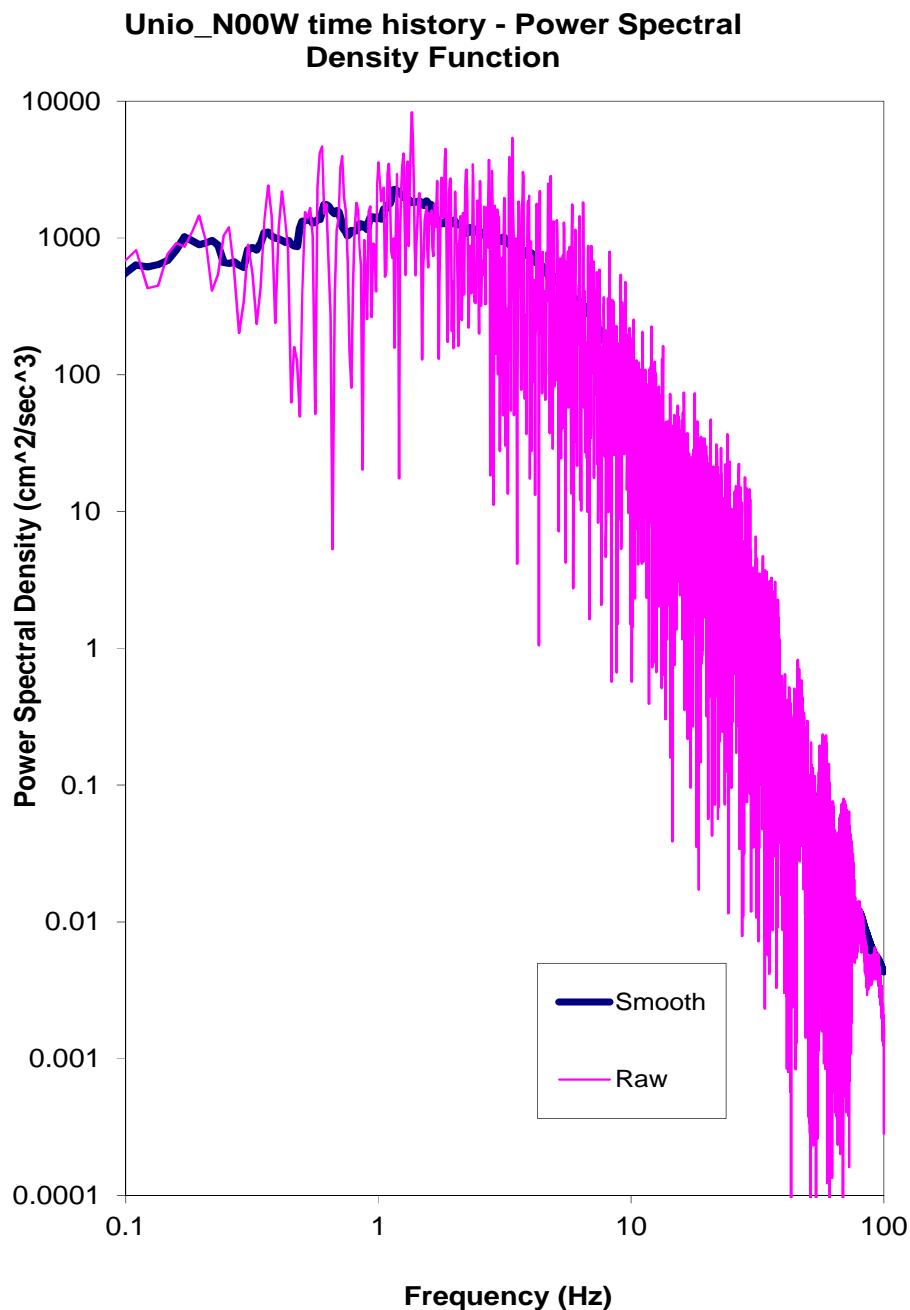
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ALASKA LNG PROJECT
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Unio_N00W time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – FOURIER AMPLITUDE SPECTRUM

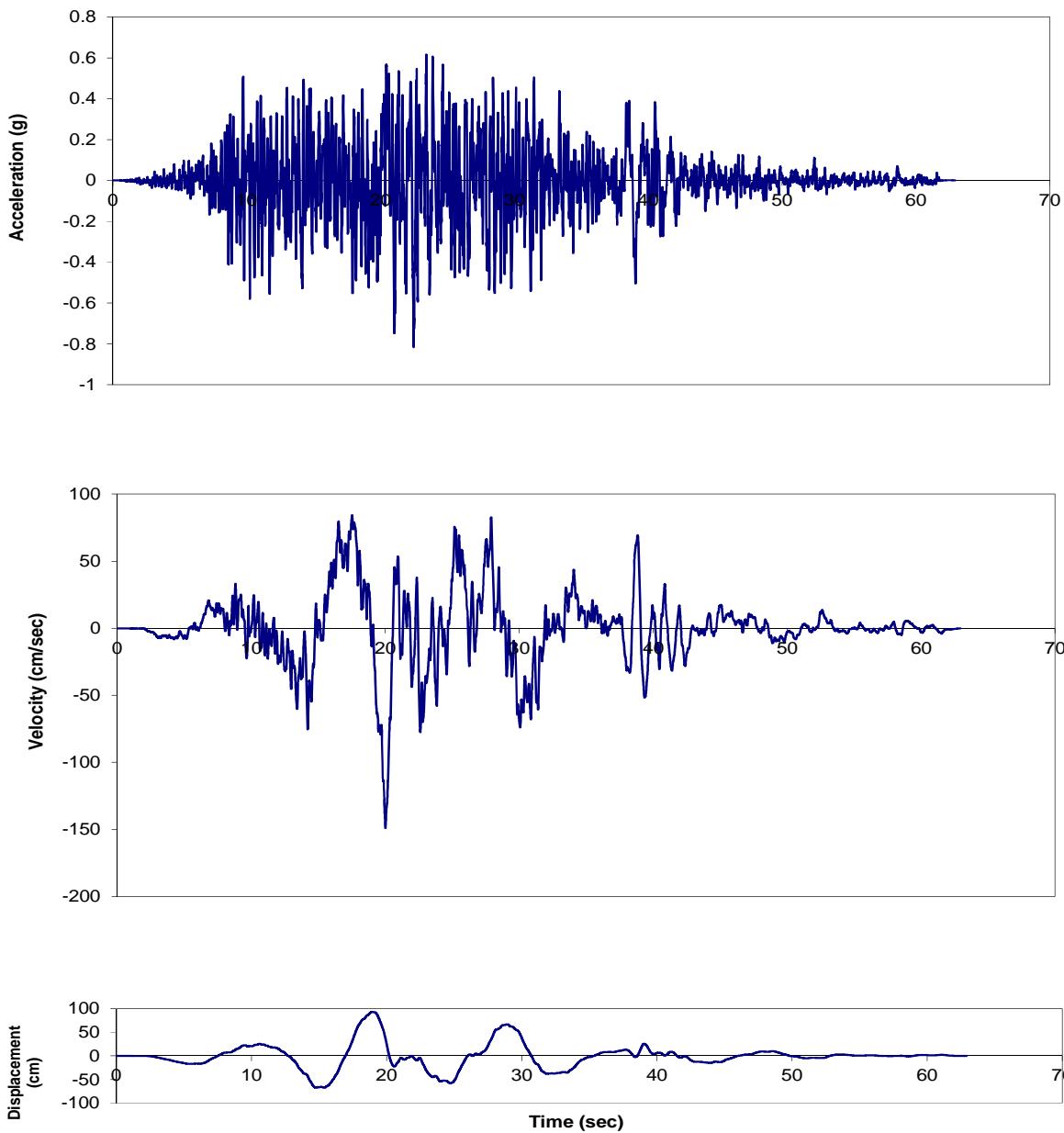
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SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, N00W COMPONENT – POWER SPECTRAL DENSITY FUNCTION

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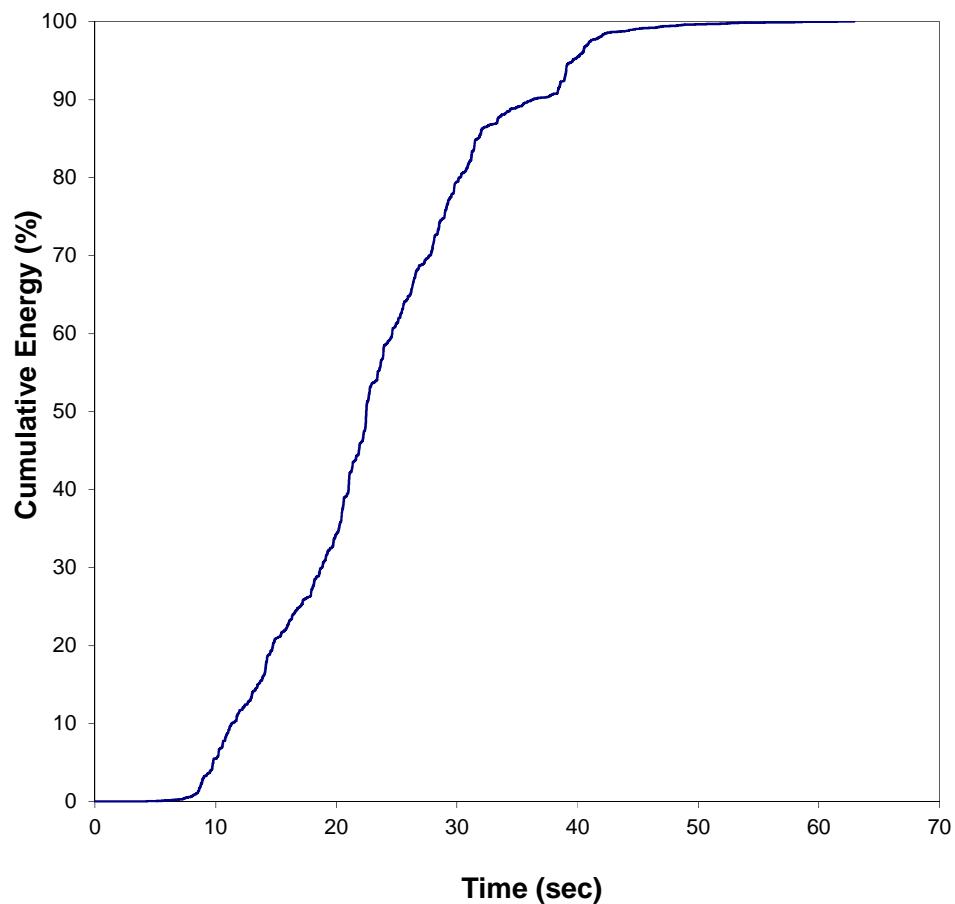
Unio_N90W time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

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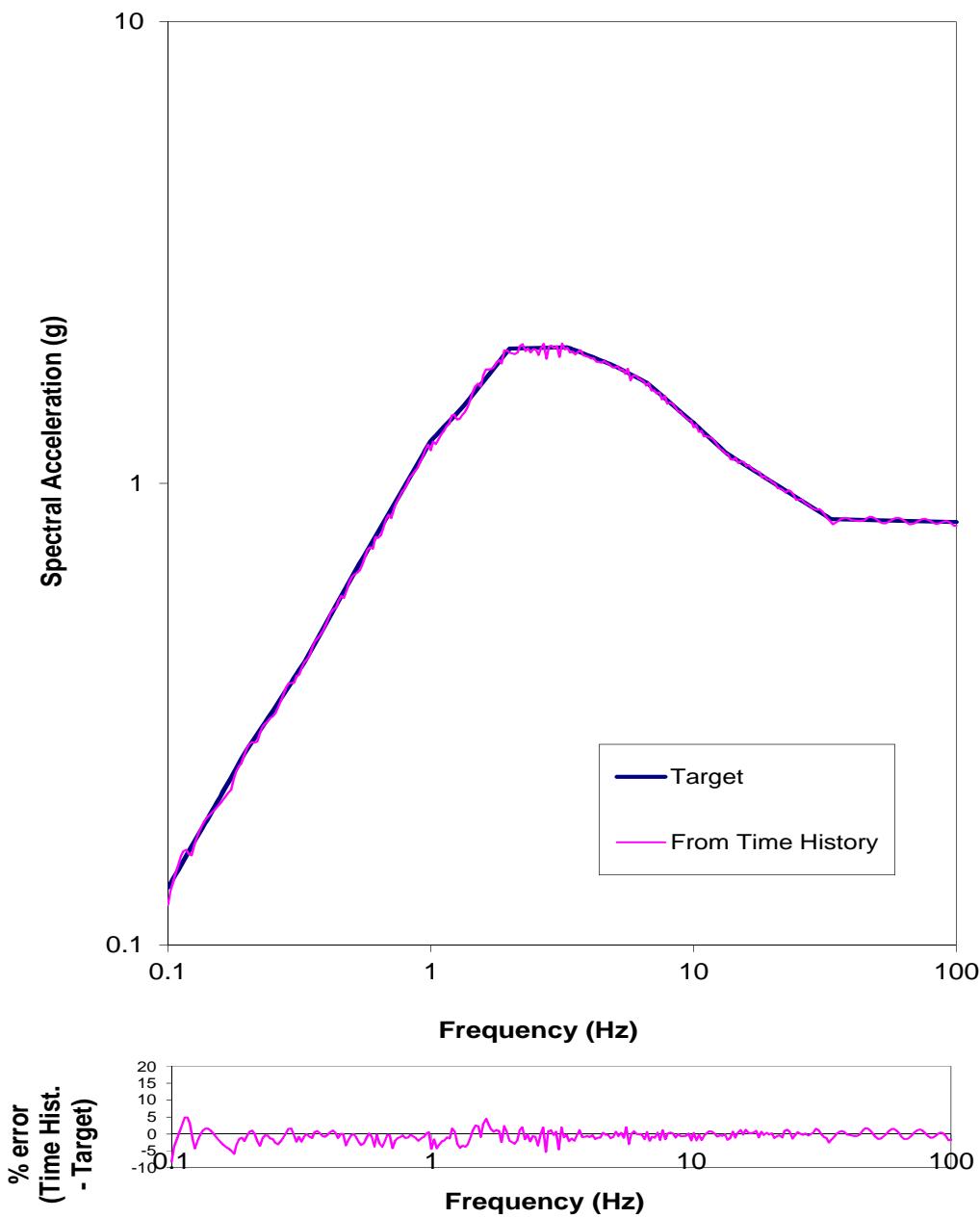
Unio_N90W time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

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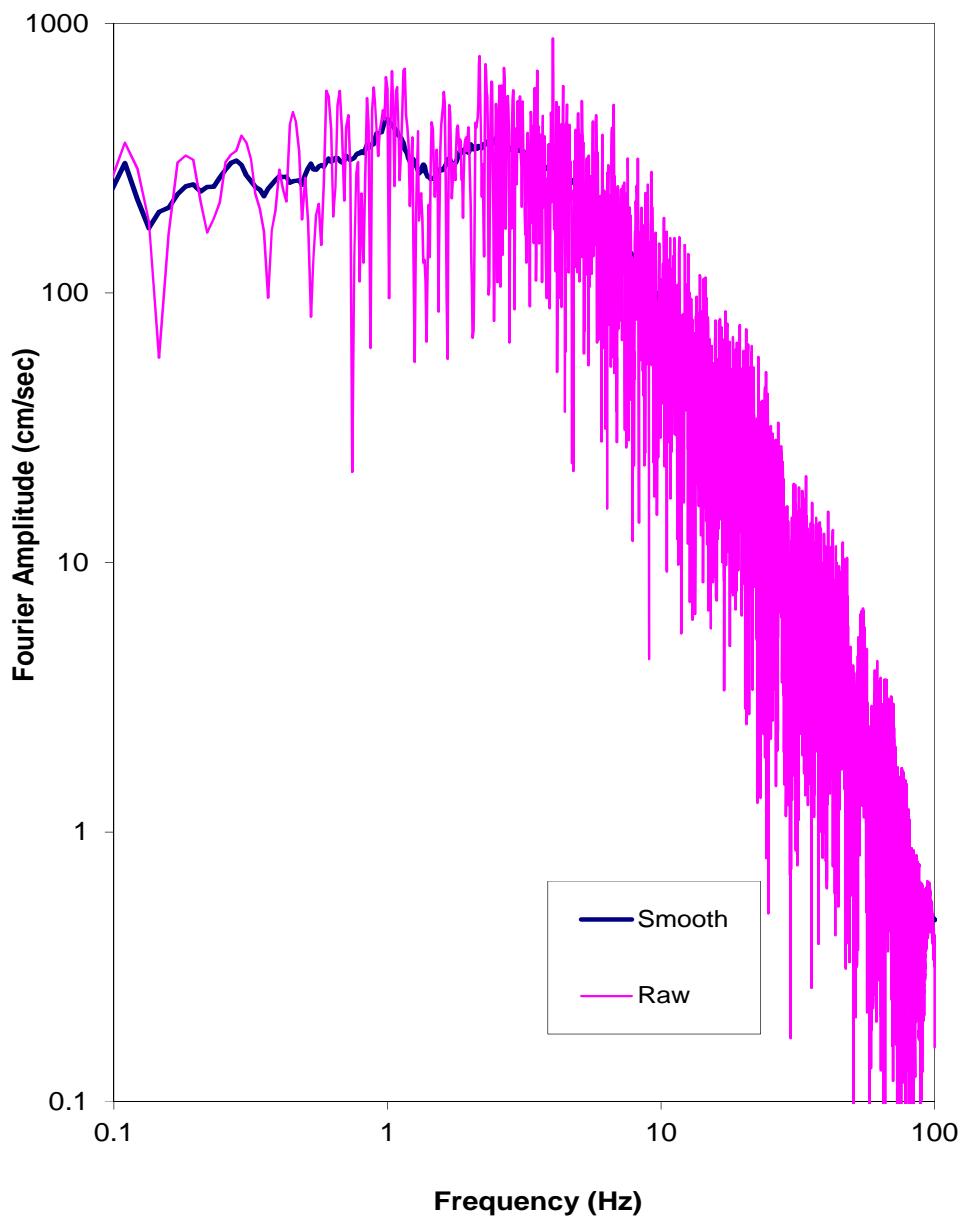
Unio_N90W time history - Response Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – TARGET AND CALCULATED RESPONSE SPECTRA

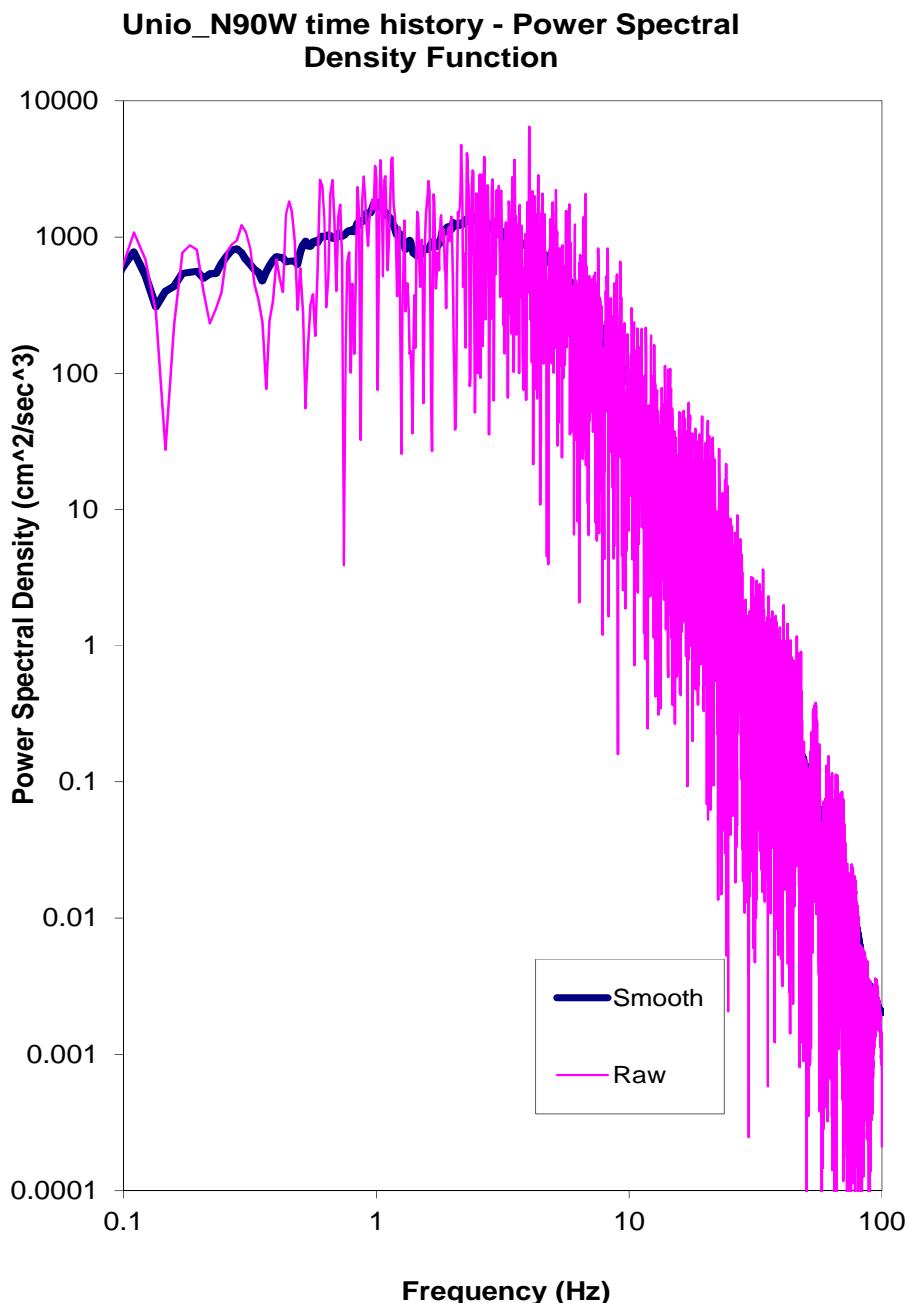
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Unio_N90W time history - Fourier Amplitude Spectra



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, N90W COMPONENT – FOURIER AMPLITUDE SPECTRUM

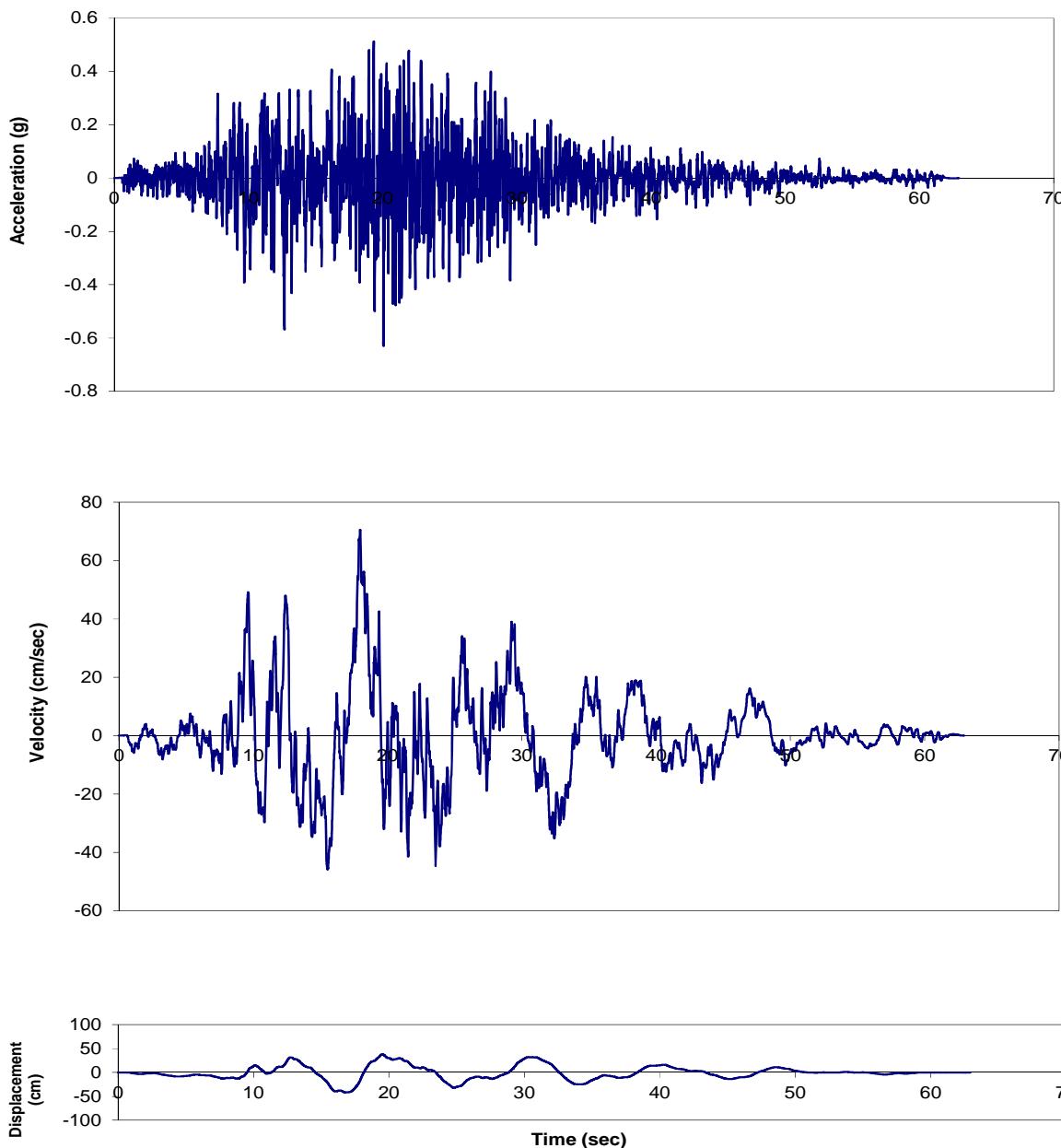
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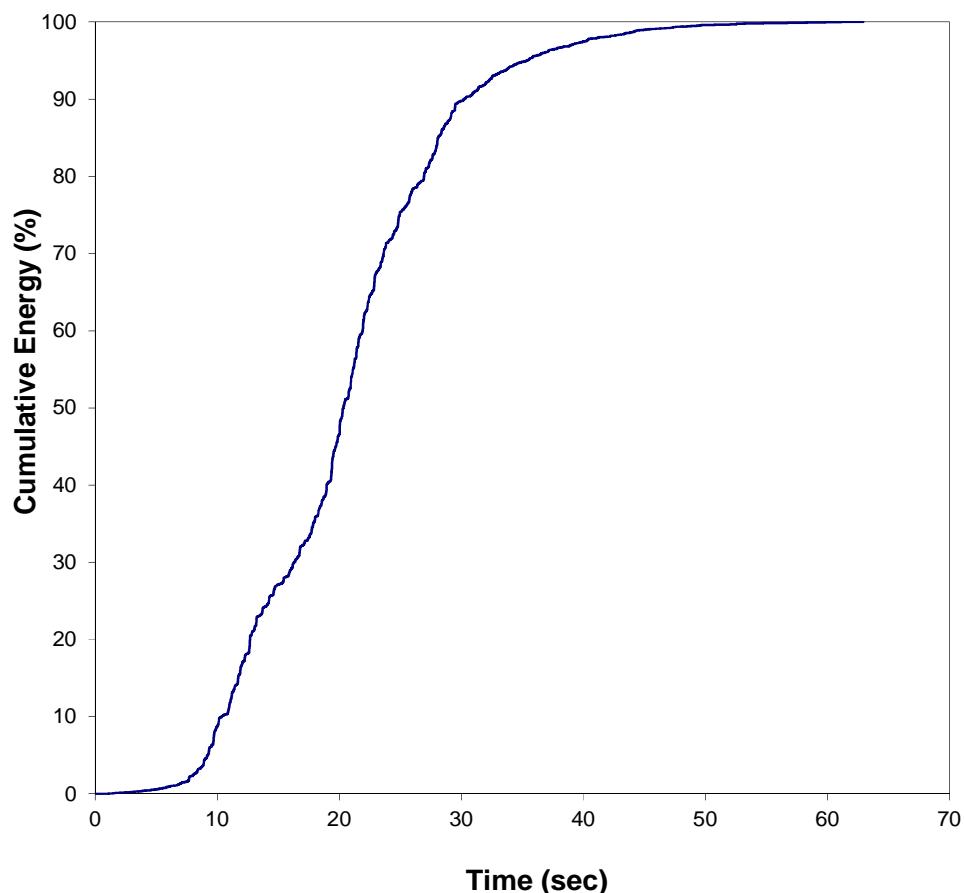
Unio_up time history - Acceleration, Velocity, and Displacement Time Histories



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – TIME HISTORIES OF ACCELERATION, VELOCITY, AND DISPLACEMENT

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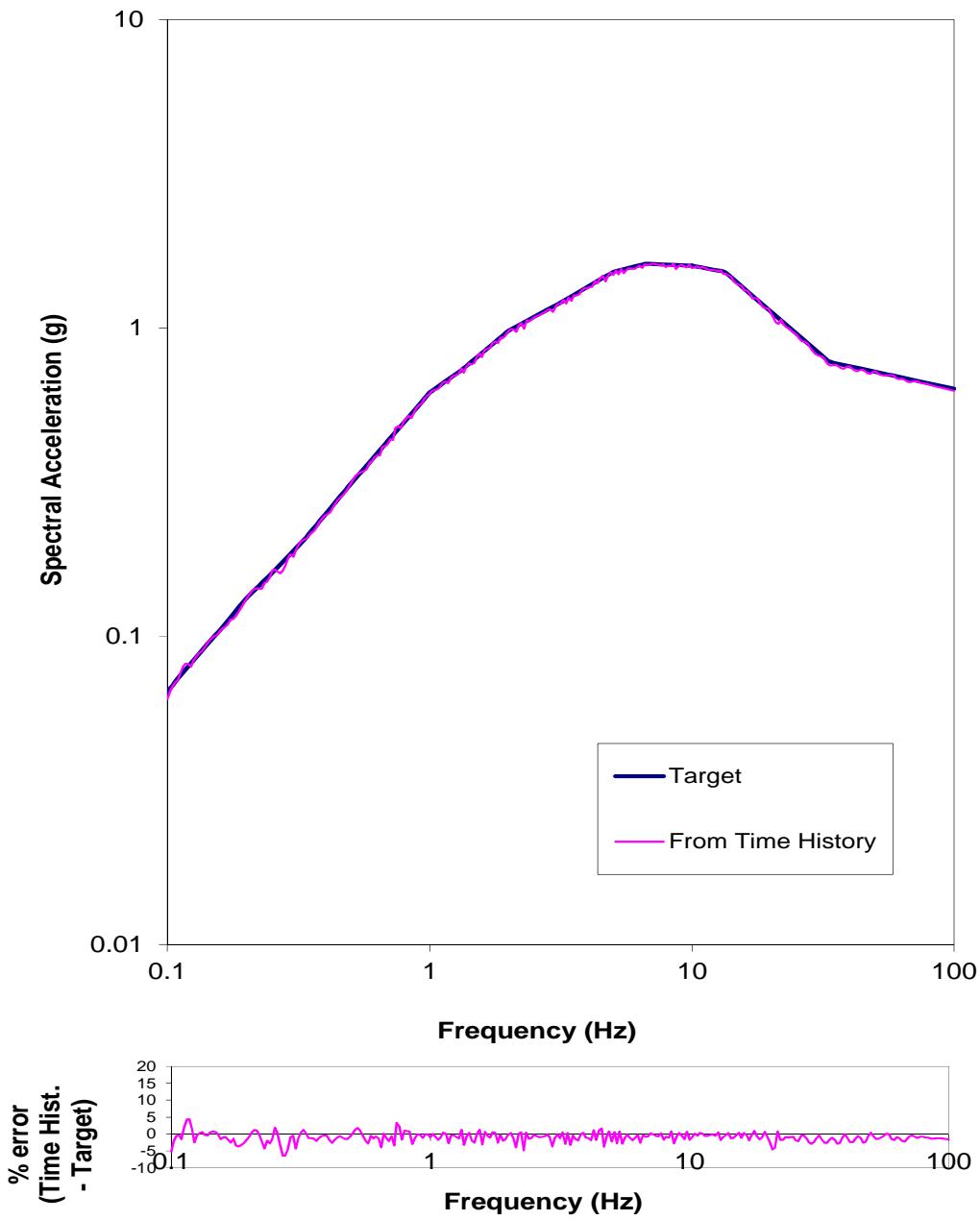
Unio_up time history - Cumulative Energy (Husid) plot



SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION, UP COMPONENT – NORMALIZED CUMULATIVE ENERGY PLOT

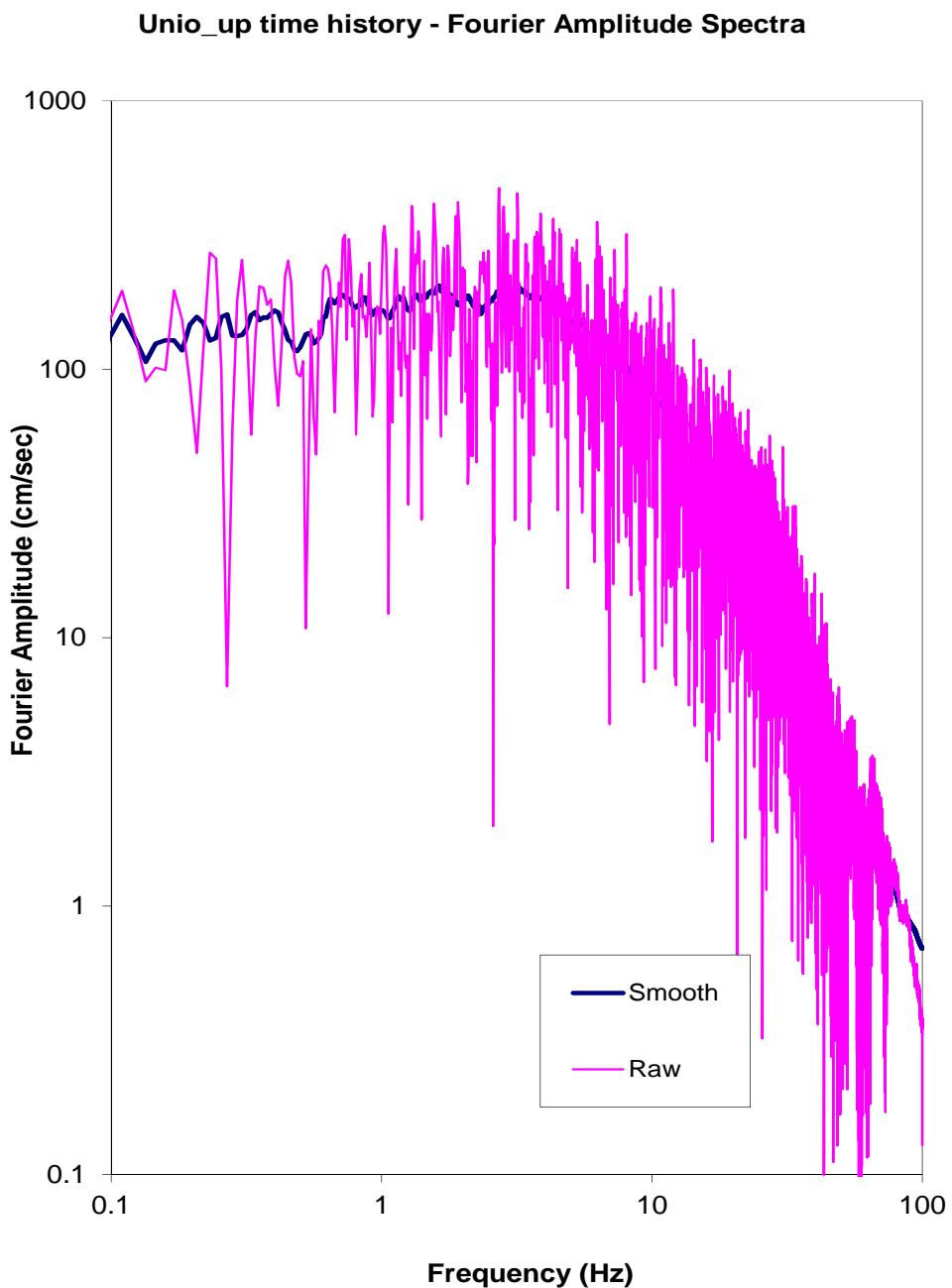
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Unio_up time history - Response Spectra



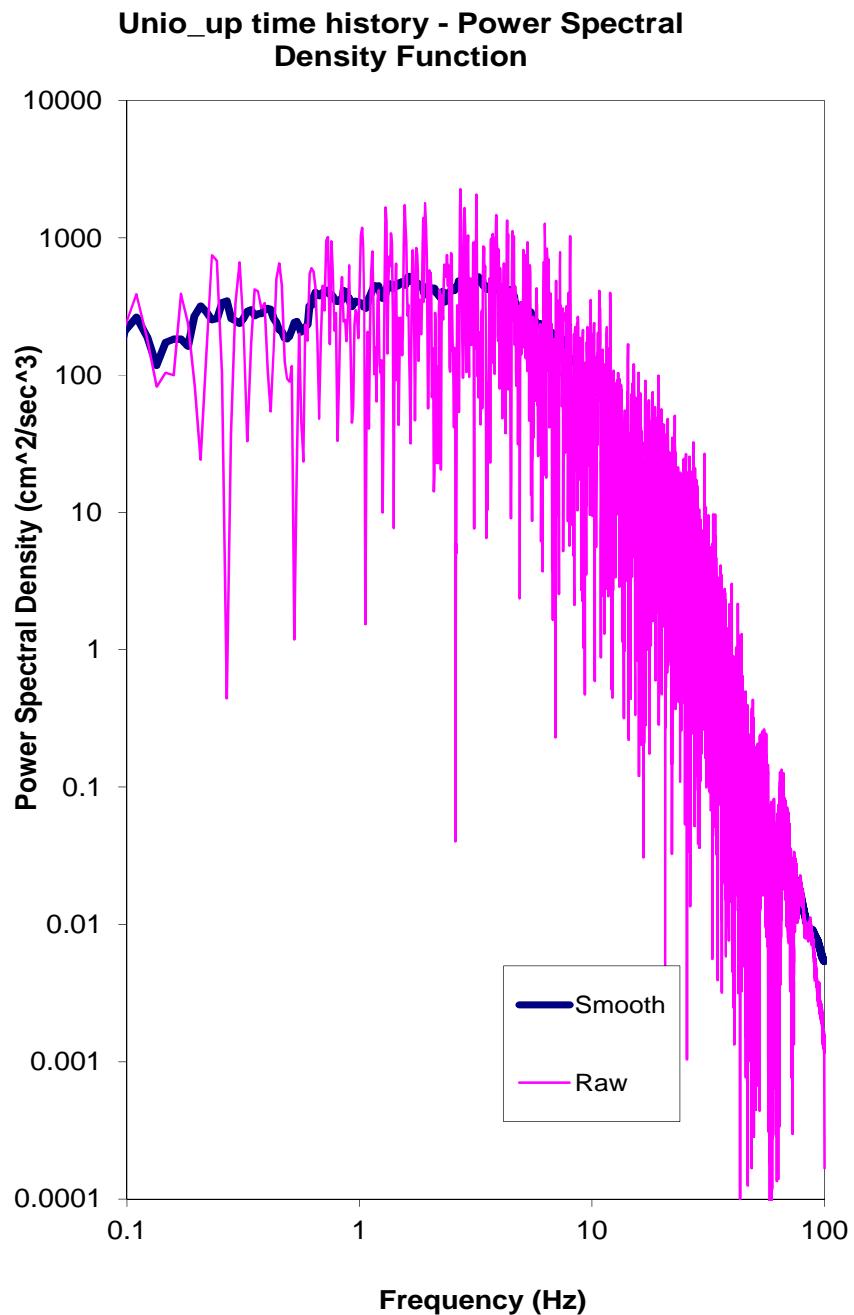
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Calculation of Correlation Coefficients

Cross-correlation

check

Horizontal 1:	UNIO_N00W
Horizontal 2:	UNIO_N90W
Vertical:	UNIO_up
corr, H1-H2	-0.142
corr, H1-V	-0.015
corr, H2-V	-0.049

SSE LEVEL PER NFPA 59A 2013 / MCER LEVEL PER ASCE 7-10 – ONSHORE AND NEARSHORE LOCATIONS – SPECTRALLY MATCHED UNIO MOTION – CALCULATION OF CORRELATION COEFFICIENTS

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