APPENDIX J WASTE MANAGEMENT PLAN

ALASKA LNG

PROJECT WASTE MANAGEMENT PLAN

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1.0 INTRODUCTION

This Draft *Project Waste Management Plan* (Plan) was developed for the Alaska LNG Project (Project) to outline the measures that would be implemented once the final design and execution details are complete. This Plan provides the overarching management, philosophy, procedures, potential waste volumes generated during construction and operations, and the potential means to address the waste streams. Regulatory summaries are for information only, and regulatory applicability determinations would be based on the regulations themselves. More-detailed waste management plans would be developed in later Project stages.

1.1 REGULATORY FRAMEWORK

Solid waste management in Alaska is regulated by the U.S. Environmental Protection Agency (EPA), the Alaska Department of Environmental Conservation (ADEC), and other local jurisdictions.

1.1.1 Federal Regulations

Applicable federal regulations include:

- 40 Code of Federal Regulations (CFR) 260 – Federal Resource Conservation and Recovery Act (RCRA), Hazardous Waste Regulations: Federal regulations that set forth the requirements for RCRA hazardous waste generators, transporters, or owners/operators of treatment, storage, or disposal facilities.
- 40 CFR 273 – Federal regulations that set forth the requirements for universal wastes, including: batteries, pesticides, mercury-containing equipment, and lamps.
- 49 CFR 100-185 – Federal Hazardous Materials Regulations (HMRs) issued by the Pipeline and Hazardous Materials Safety Administration that govern the transportation of hazardous materials and waste by highway, rail, vessel, and air. The HMRs address hazardous materials classification, packaging, hazard communication, emergency response information, and training.
- 40 CFR 144, 146, 148 – Federal regulations that set forth requirements for the Underground Injection Control (UIC) program.

1.1.2 Alaska Regulations

Applicable state regulations include:

- 18 Alaska Administrative Code (AAC) 60 – Alaska Solid Waste Management Regulations: State regulations governing the classification, accumulation, storage, and disposal of solid wastes. The regulations specify permit requirements for Municipal Solid Waste Landfills and wastes each classification of landfill can accept.
- 18 AAC 72 – Alaska Wastewater Disposal Regulations: State regulations governing wastewater treatment and disposal. The regulations specify permit requirements for UIC Class I wells.

1.2 REGULATORY DEFINITION OF WASTES

1.2.1 Solid Waste

When a material can no longer be used, or otherwise meets the definition of solid waste as defined by the EPA and ADEC, a determination must be made as to whether the solid waste is also a hazardous waste as defined by the EPA. Waste classification procedures are described in Section 2.0. Once a waste determination has been made, the appropriate management method for the waste can be selected.

1.2.1.1 Federal Definition

As defined by the EPA in 40 CFR § 261.2, a solid waste is any material, liquid, or solid, with the exception of materials excluded from the regulations that are a discarded material, meaning a material that is:

1. Abandoned:
   A. Disposed of.
   B. Burned or incinerated.
   C. Accumulated, stored, or treated (but not recycled) before, or in lieu of, being abandoned by disposal, burning, or incineration.
2. Recycled or accumulated, stored or treated before recycling if it is:
   A. Used in a manner constituting disposal.
   B. Burned for energy recovery.
   C. Reclaimed.
   D. Accumulated speculatively.
3. Considered inherently waste-like.
4. A military munition identified as a solid waste in 40 CFR § 266.202.

There are several exclusions to the definition of solid waste, as provided in 40 CFR § 261.4(a), such as domestic sewage and point source discharges subject to regulation under Section 402 of the Clean Water Act. Exploration and Production (E&P) exemptions in accordance with 40 C.F.R. § 261.4(b)(5) would be applicable to the Gas Treatment Plant (GTP) and Point Thomson Gas Transmission Line (PTTL).

1.2.1.2 State of Alaska Definition

In accordance with 18 AAC 60.005(b), solid wastes are materials associated with the accumulation, storage, transportation, treatments, and disposal of solid waste. As defined in 18 AAC 60.005(c), there are several wastes that are exempt from the solid waste definition, if the wastes are disposed of or used as described. Examples of solid waste exclusions are included in Section 2.1.2.1. Wastewater is defined in 18 AAC 72.990 and includes both domestic and nondomestic wastewater.

1.2.2 Hazardous Waste

Hazardous wastes are regulated by EPA Region 10 in Alaska, in accordance with RCRA regulations.[1] As defined in 40 C.F.R. § 261.3, a solid waste is hazardous if:

1. It is not excluded from regulation as a hazardous waste under 40 C.F.R. § 261.4(b).
2. It is a characteristic hazardous waste (i.e., it exhibits one of the characteristics of hazardous waste defined in Subpart C of 40 C.F.R. 261) based on:
   A. Ignitability.
   B. Corrosivity.
   C. Reactivity.
   D. Toxicity.
3. It is a *listed hazardous waste* (i.e., a waste listed in Subpart D of 40 CFR 261 and has not been excluded in 40 CFR § 260.20 or 260.22).
4. It is a *mixture* of solid waste, and one or more listed hazardous wastes, and it has not been excluded from regulation as a hazardous waste by an exemption to the regulations.
5. It is used oil (i.e., used oil containing more than 1,000 parts per million {ppm} total halogens), which is presumed to be a hazardous waste because it has been mixed with halogenated hazardous waste listed in Subpart D of 40 CFR 261). Persons may rebut this presumption by demonstrating that the used oil does not contain hazardous waste.

It is important to note that mixing a hazardous waste with a non-hazardous solid waste can render the entire mixture a hazardous waste, subject to the full RCRA regulations and is not an acceptable method of waste disposal. There are a few exemptions to the mixture rule, however, they are only applicable under very specific circumstances and must be managed carefully to maintain compliance with RCRA.

1.3 TRANSPORT OF WASTES

Hazardous wastes, non-hazardous wastes, or recyclable materials generated during Project activities would be transported in accordance with state and federal regulations. Applicable regulations include, but are not limited to, the following:

- RCRA: 40 CFR Parts 260, 261, 262, 263, 268, and 279.
- Toxic Substances Control Act: 40 CFR Part 761.
- Hazardous Materials Transportation Act: 49 CFR Part: 171–179.
- Alaska Statues: AS 46.03, Environmental Conservation.
- AAC, Title 18, Chapter 60, Section 005 (18 AAC 60.005) – Solid Waste Management.
- AAC, Title 18, Chapter 62, (18 AAC 62.000) – Hazardous Wastes.

All hazardous wastes would be transported by licensed hazardous waste carriers to an out-of-state EPA-registered treatment, storage, and disposal facility. Such facilities would be identified once the full extent is known of the types and volumes of hazardous wastes that may be generated during construction.

[1] Non-hazardous solid wastes, tailings, and waste rock are mainly managed under the state regulations in 18 AAC 60, which include permitted solid waste inert landfills.

2.0 WASTE MANAGEMENT PRIORITIES

Waste management activities would be performed in accordance with the waste management hierarchy. In order of preference, the aim would be:

1. Avoidance – Avoid the generation of waste, and particularly hazardous waste, through applicable methods, practices, or materials substitution.
2. Minimization – Minimize the amount of generated waste where waste generation cannot be avoided or prevented.
3. Reuse – Reuse materials that would otherwise be relegated to a waste stream.
4. Recycle – Recycle wastes by delivering them to accessible and practicable recycling programs.
5. Recover – Recover energy from waste.
6. Disposal – Dispose of wastes responsibly at only properly licensed waste disposal facilities.

2.1 AVOIDANCE

Opportunities exist to avoid waste generation before completion of design or procurement of Project components. Where practicable, purchasing preference would be given to products that:

- Have reduced packaging and no polystyrene packaging.
- Are recycled or contain recycled content.
- Have long life-spans, in terms of performance and durability.
- Are biodegradable and have low toxicity components.

2.2 MINIMIZATION

Efforts would be made to decrease where practicable, the volume, concentration, or toxicity of a waste stream through one or more of the following options:

- Optimization of processes and ensure proper maintenance.
- Substitution with less hazardous material, where possible.
- Material elimination.
- Management and control of inventories.
- Use and reuse of biodegradable container packaging.
- Purchase order considerations to avoid excessive packaging.
- Use of bulk quantities to minimize packaging.
- Use of recyclable materials.
- Requiring the contractor or vendor to reduce waste quantities at source.
- Proper housekeeping, including storage.

2.3 REUSE

Materials that may be reused include:

- Plastic containers.
- Wood timber waste.

- Excavated material.
- Metal supports used in shipping.
- Wooden pallets or timbers using in shipping.
- Blasting grit.
- Empty drums.

2.4 RECYCLING AND RECOVERY

Wherever practicable, recycling would be practiced to reduce the resource waste associated with simple disposal. Materials that would be considered for recycling include:

- Aluminum cans.
- Paper and cardboard.
- Plastic containers.
- Glass.
- Lumber and timbers used in shipping.
- Scrap metal.
- Batteries.
- Antifreeze.
- Electronics.
- Mercury-containing equipment.
- Used tires.
- Fluorescent bulbs and ballast.
- Used oil.

In addition, materials can be disposed of at facilities that combust wastes to recover energy where available and practicable.

2.5 DISPOSAL

Landfills are designed to protect the environment from contaminants while storing solid waste in an environmentally safe location. Landfills are often the final step of the waste management supply chain, accepting wastes such as: general debris, incinerator ash, industrial waste, and construction waste.

If incinerators are an accepted option for disposal, they can effectively act to decrease waste volume, facilitating transportation to landfills when transportation costs are high. Incineration is highly regulated, but is an effective disposal method for some waste streams. Combustion greatly reduces the volume of waste by breaking waste streams down to their elemental forms, releasing water and carbon strings. While incineration is impractical for many types of waste, including but not limited to metals, certain waste types such as sewage sludge, food waste, filters, small amounts of medical waste, and general debris can be suitable for incineration, subject to regulatory frameworks.

Disposal wells (UIC Class I non-hazardous injection wells) are also a waste management tool. These wells are used to dispose of wastewater, exempt fluids, and non-hazardous wastes, as well as eliminate transportation, remediation, and exposure risks. This is the safest and most cost-effective disposal method for many liquid industrial wastes.

3.0 WASTE IDENTIFICATION AND CHARACTERIZATION

Compliance with federal and state regulations begins with the proper identification and classification of the various types of wastes that would most likely be generated during construction and operation. Emphasis would be placed on avoiding the comingling of different waste streams. Each waste category would have specific requirements for proper handling, storage, and final disposition.

Construction would generate solid wastes that can be classified into two major categories:

- Domestic Solid Waste generated primarily from the operation and maintenance of personnel living quarters and support facilities, such as kitchens and cafeterias located at the compressor stations, GTP, and LNG maintenance and administrative facilities. Common office wastes also fall into the category of domestic solid wastes.
- Construction Waste generated during construction of Project facilities.

In order to properly classify and dispose of solid wastes, those wastes that could not be reused or recycled would be grouped into five sub-categories

- Hazardous waste.
- Non-hazardous waste.
- Exempt solid waste.
- Universal waste.
- Special waste.

3.1 HAZARDOUS WASTES

Hazardous wastes are defined in Section 1.2.2.

3.1.1 Universal Wastes

Universal wastes are certain specified, commonly generated hazardous wastes that have reduced regulatory requirements under RCRA hazardous waste management standards.

The Universal Waste Rule covers the following wastes:

- Batteries: (e.g., certain lead-acid batteries not recycled under other regulations; button silver-oxide and zinc-air; and 9-volt, C, AA, coin, and button rechargeable lithium). Alkaline and carbon zinc cell batteries are not classified as hazardous wastes.
- Pesticides.
- Mercury-containing devices (e.g., thermostats, switches).
- Electric lamps (e.g., fluorescent, high intensity discharge, sodium vapor, and mercury vapor).
- Electronics (e.g., televisions, computer monitors, cell phones, VCRs, computer CPUs, and portable DVD players).

3.2 NON-HAZARDOUS WASTES

Non-hazardous wastes include the following:

- Municipal solid waste: Includes household and commercial solid waste, trash and garbage.
- Household waste: Defined as any solid waste (including garbage, trash, and sanitary waste in septic tanks) derived from households (including single and multiple residences, hotels and motels, bunkhouses, campgrounds, picnic grounds, and day-use recreation areas).
- Trash or garbage: Consists of everyday items that are used and then thrown away
- Commercial solid waste: Similar to the wastes described above, but originating from business activities such as construction and demolition, offices, etc. Theses wastes are typically disposed at Municipal Solid Waste Landfills.

3.2.1 ADEC Exempt Solid Wastes

ADEC has listed certain wastes that do not pose a threat to human health or the environment as exempt (i.e., the disposal of these wastes is not regulated by Alaska Solid Waste regulations). These exempted materials include:

- Dirt, rocks, and soil.
- Tree limbs, stumps, foliage, and other woody debris.
- Bricks, mortar, Portland cement-type concrete (including reinforcing steel that cannot be easily removed).
- Crushed glass.
- Crushed asphalt, but only if the product is used as fill material in a building pad, road base, parking pad, or containment berm.
- Waste rock from mining operations (as long as it does not generate acid rock drainage, leach metals, or otherwise pose a risk to the environment).
- Some other types of mining waste and tailings.
- Wood waste from timber operations if less than 10 cubic yards is disposed per year or it is used for roads, building pads, or parking areas and would not cause a violation of the water quality standards.

Exempt solid wastes do not need to be disposed of at a licensed solid waste facility, subject to the following requirements:

- The exempt waste may not be mixed with non-exempt waste.
- The waste may not cause a public nuisance, environmental problem, or a threat to public health, safety, or welfare.

3.2.2 Special Wastes

Special wastes are wastes that do not meet the criteria for hazardous wastes, but may present special hazards or require special handling. Examples of special wastes are asbestos, polychlorinated biphenyls (PCBs), radioactive waste, and naturally occurring radioactive material (NORM). It is not expected that the Project construction would generate any of these types of wastes.

4.0 TYPICAL WASTE TYPES ASSOCIATED WITH THE PROJECT

Typical wastes and classifications that would be associated with the Project are provided in Table 1. A summary of the anticipated waste types and quantities generated during construction and operations of each Project component are provided in the tables below. Each Construction Contractor's individual waste management plan is expected to provide greater detail concerning the actual waste streams that would be generated, transported, reused, recycled, or disposed.

Table 1: Typical Construction and Operational Wastes and Classification Associated with the Project

Typical Waste Streams	Waste Classification
Consumables used in pipeline construction – welding gases, materials, welding rod stubs	Non-hazardous Solid[a,b]
Contaminated fuels	Hazardous Liquid[a,b]
Contaminated soils – either created by Project or found left by others	Non-hazardous Solid[a,b]
Chemicals	Hazardous Liquid[a,b]
Cut-outs, pups, end facing cuttings	Non-hazardous Solid[a,b]
Explosives	Hazardous Solid[a,b]
Lamps, batteries	Universal waste
Food waste, containers, wood, plastics	Non-hazardous Solid
Metals	Non-hazardous Solid
Cardboard	Non-hazardous Solid
Generator waste – filters	Hazardous Solid[c]
Ash	Non-hazardous Solid[b]
Medical waste	Non-hazardous Solid[a,b]
Pipeline test fluids – ethanol/water mix transportation, spillage and final disposal	Hazardous Liquid[a,b]
Rags – Oily	Non-hazardous Solid[a,b]
Rags –Solvent	Hazardous Solid[a,b]
Stormwater	Non-hazardous Liquid
Right-of-way cleanup debris (rock, soil, stumps, timber)	Exempt waste
Slash & Brush	Exempt Waste
Spillage/leakage – fuels, oils and other hazardous liquids [a, b]	Hazardous Liquid
Surplus materials	Non-hazardous Solid[a,b]
Test fluids or gases used during commissioning and start-up – hazardous or non-hazardous	Hazardous Liquid[a,b]
Used Oil	Used Oil, Non-hazardous Liquid[a,b]
Used oil filters	Hazardous Solid[c]
Waste Oil	Hazardous Liquid[a,b]
Wastewater – black and grey	Non-hazardous Liquid
Wastewater – chemicals associated with disinfection (if any)	Hazardous Liquid[a,b]
Wastewater – sludge	Non-hazardous Solid[a]

Typical Waste Streams	Waste Classification
Water treatment chemicals – if any	Hazardous Liquid[a,b]

[a] May require analytical testing to determine if waste exhibits hazardous characteristics per RCRA or a waste may be a listed hazardous waste per RCRA

[b] More definition needed to adequately characterize/classify the waste stream

[c] Oil filters may be punctured and hot-drained, which may eliminate the need for hazardous waste disposal.

4.1 LIQUEFACTION FACILITY

A preliminary estimate of wastes anticipated to be generated during construction of the Liquefaction Facility is provided below.

4.1.1 Construction

A summary of wastes and estimated quantities during construction of the Liquefaction Facility (both the LNG Plant and Marine Terminal) and its associated infrastructure is provided in Table 2.

Table 2: Estimated Waste Quantities from Construction of the Liquefaction Facility

Waste Stream	Estimated Quantity
Antifreeze (50% ethylene glycol solution)	3,000 gallons
Batteries	25 tons
Blasting abrasive	110 tons (Assumes approximately 30 tons per year for Years 2–4 and 20 tons per year for Year 5 of construction)
Chemical/solvent/ liquid paint waste	3 tons (Based on 50 percent of Conditionally Exempt Small Quantity Generator status limit of 220 pounds/month for 50 months, includes contaminated soils and clean-up materials from small spills)
Concrete rubble	13,000 cubic yards
Cooking grease	725 tons (Assumes approximately 20 tons per month and includes water)
Digested aerobic sludge (non-Hazardous)	810 tons (Assumes 0.2-pound sludge {dry}/pound biochemical oxygen demand {BOD} removed, 250 parts per million {ppm} BOD in and 30 ppm out, estimated quantity 95 percent wet digested sludge)
Domestic sewage	920,000 tons (Assumes 50 gallons per day of waste per camp resident)
e-Waste	6 tons
Empty aerosol containers	13 tons
Excess overburden	1.6 million cubic yards
Food waste	6,100 tons (Assumes approximately 2.5 pounds per day of waste per camp resident)
Lamps	1 ton
Glass	N/A
Medical waste	6 tons
Metal waste (used drums, pile, and piping cut-offs, and so forth).	1,000 tons
Oily absorbents and rags	175 cubic yards
Packaging material (other than wood)	1,200 tons
Paint waste (solids)	3 tons

Waste Stream	Estimated Quantity
Plastic	160 tons (Assumes approximately 40 tons per year for Years 2–4 and 20 tons per year for years 1 and 5 of construction)
Shipping containers (ISO and similar)	30 tons
Solvent/chemical/paint contaminated rags and sorbents	0.3 ton (Note, based on a 10 percent of chemical/solvent waste estimate)
Spent film developing solutions from Non-Destructive Testing	3 tons (Note, recovery of spent silver makes wastewater nonhazardous)
Spent filters	95 tons
Storm water runoff	57.5 million gallons per month (Note, does not include snow accumulation and breakup)
Trash, paper, cardboard. metal cans, plastics	4,400 tons (Assumes approximately 2 pounds per day of waste per camp resident)
Ash	1,200 tons
Used oil (uncontaminated)	450 tons
Used tires	80 tons
Waste insulation	1,200 cubic yards (Assumes approximately 10 percent of insulation is waste)
Wood waste (pallets, timbers and other wooden shipping containers)	7,500 tons
Vegetation clearing waste	3.9 million cubic yards

4.1.2 Operations

A summary of wastes and estimated quantities during commissioning and operation of the Liquefaction Facility and its associated infrastructure is provided in Table 3.

Table 3: Estimated Waste Quantities from Liquefaction Facility Commissioning and Operations

Waste Name	Estimated Quantity
Activated carbon[f]	26 tons/6 years (Note, return to manufacturer)
Boiler blowdown	4,700 tons/month
Contaminated high-density polyethylene (HDPE) liners[e]	None
Corrugated plate interceptors (CPI) oil/water separator residual	6 tons per year
Digested aerobic sewage sludge	3 tons per month (Assumes 0.2-pound sludge {dry}/pound BOD removed, 250 ppm BOD in and 30 ppm out, estimated quantity 95 percent wet digested sludge)
Domestic sewage	750,000 gallons per month for commissioning; 502,500 gallons per month for operations (Assumes 50 gallons per day)
Firewater testing runoff	160,000 gallons per month (Assumes 4,000 gallons per minute for 10 minutes each week)
Food waste	19 tons per month for commissioning; 13 tons per month for operations (Assumes 2.5 pounds per day)
Lubricant oil – air compressor (used oil)[a]	181 tons per year
Lubricant oil – change-out for six Frame 7 Gas Turbine Generators (used oil) [a]	100 tons per year

Waste Name	Estimated Quantity
Lubricant oil – compressor (used oil) [a]	16 tons per year
Lubricant oil – expander/ compressor (used oil) [a]	3 tons per year
Lubricant oil – detergent/biocides [a]	2,400 gallons per year
Lubricant oil – misc. pumps (generators used oil) [a]	10 tons per year
Lubricant oil – residue gas compressor (2) (used oil) [a]	13 tons per year
Lubricant oil – solvent recirculation pump (used oil) [a]	12 tons per year
Lubricant oil – stabilizer overhead compressor (used oil) [a]	8 tons per year
Metal waste (such as used drums)[b]	1 ton per year
Packaging material[c]	20 cubic yards/month
Reverse Osmosis Reject	7,200 tons per month (Assumes first run reverse osmosis reject = 25 percent of demin feed at 159 gallons per minute)
Sludge – CPI	160 tons per year
Sludge – effluent treatment[g]	None
Sludge – feed gas inlet	To be determined
Spent chemical cleaning solutions	700 tons (Assumes three tank trucks per train would be generated from chemical cleaning)
Spent Catalytic Oxidation catalyst	14 cubic yards/5 years (Note, returned to manufacturer, recover platinum catalyst)
Spent selective catalytic reduction catalyst (if required)	40 cubic yards/5 years (Note, returned to manufacturer)
Storm water runoff	57.5 million gallons per month
Tank bottoms/oily sludge	None
Trash, paper, cardboard, plastic, metal	15 tons per month for commissioning; 11 tons per month for operations (Assumes 2 pounds per day per camp resident)
Used filters	200 spent filters

[a] Liquefaction Facility may elect to purchase an oil treatment skid that can centrifuge and filter the oil to prolong the life of the oil and minimize the change out requirements. This would have a significant reduction in the waste disposal load and minimize the environmental impact with related cost saving. Volume reduction might range from 75% up to 95%.

[b] Estimated quantity. Any drums identified for disposal would be empty, rinsed, and tested for residuals. Gaskets are from flushing or air blows.

[c] Materials would be wood (from pallets and crates), and plastics from packaging.

[d] After field fabrication, all tanks would be cleaned mechanically with brooms to remove any debris. There would not be any oily sludge present.

[e] Assumes HDPE liners would be used extensively for spill containment for all mobile gas or diesel powered equipment. These HDPE liners or spill containment dikes are made of 40-mil HDPE material, and are re-usable. If a spill would occur (with a petroleum product) a vacuum truck would be used to remove the spill or containment. If liners are damaged beyond repair, manage appropriately for disposal.

[f] If activated carbon is selected for mercury removal.

[g] No sludge is generated. Oil is recovered from the CPI unit.

4.2 PIPELINE

4.2.1 Construction

A preliminary estimate of wastes anticipated to be generated during construction of the pipeline facilities is shown in Table 4.

Table 4: Estimated Waste Quantities from Construction of the Pipeline Facilities

Waste Stream	Quantity per Extent of Project
Sludge	808.5 tons
Wastewater – black and grey	5,750 gallons to 74,750 gallons/day
Cardboard/Paper	591 tons
DEF Fluid 55 Gallon Drums	1,495 tons
Food Waste, Containers, Wood, Plastics	44.5 tons
Engine Air Filters	144.5 tons
Antifreeze	184,470 gallons
Engine Oil Filters	394 tons
Fuel Filters	27 tons
Batteries	544 tons
Farr Gold Cone Air Filters	10.5 tons
General Camp Garbage	95,818 tons
Hydraulic Oil	69,000 gallons
Ash	493 tons
Metal Grinding Disks	49.5 tons
Mineral Lube Oil	22,000 gallons
Mixed Hydrocarbons	1,805.5 – 29,909 gallons
Used Oil	7,164,500 gallons
Rags - Oily	270.5 tons
Plastic Pails	26.5 tons
Metal	720.5 tons
Synthetic Lube Oil	13,000 – 13,800 gallons
Used Tires	3,611 tons
Vehicle Washer Fluid Containers	11.5 tons
Welding Rod Ends	174 tons
Wood	14,260 tons
42-inch Coated Pipe Wastage	4,830 tons

4.2.2 Operations

To be provided in the Federal Energy Regulatory Commission (FERC) application.

4.3 GAS TREATMENT PLANT (GTP)

A preliminary estimate of wastes anticipated to be generated during construction and operations of the GTP is provided below.

4.3.1 Construction

A summary of wastes and estimated quantities during construction is provided in Table 5.

Table 5: Estimated Waste Quantities from Construction of the GTP

Waste Stream	Estimated Quantity
Dirt – Non-Hazardous (e.g., floor Sweepings, sump cleanouts)	1 ton per year
Electronic Equipment	1 ton per year
Empty Drums/Barrels – RCRA Empty	2 tons per year
Food Waste	1,000 tons per year
General waste	1,300 tons per year
Glycol	4.5 tons per year
Kitchen Grease	85 tons per year
Medical Waste – Non-hazardous	TBD
Medical Waste – Hazardous	TBD
Office Machine Supplies – Toners, etc. from printer, copier, fax	5 tons per year
Paint Sludge/Solvents	2 tons per year
Pile Spoils	TBD
Rags/Sorbents with Oil/Fuel	0.5 ton per year
Scrap Metal	5,100 tons per year
Sewage Sludge	240 tons per year
Smoke Detectors	0.5 ton per year
Soap	0.5 ton per year
Solvent/Degreaser Solvent	0.5 ton per year
Universal Waste – Mercury containing equipment, batteries, lamp bulbs	16 tons per year
Used Oil, Engine Fluids	50 tons per year
Waste Water – Black Water/Gray Water	58,250,000 gallons per year
Wastewater – Hydro test	40,000 gallons per year
Waste Water – Industrial Water	1,550,000 gallons per year
Waste Water – Truck Wash Water	1,825,000 gallons per year
Waste Water – Other Water	440,000 gallons per year

4.3.2 Operations

A summary of wastes and estimated quantities during operation of the GTP is provided in Table 6.

Table 6: Estimated Waste Quantities from GTP Operations

Waste Stream	Quantity during Operation
Batteries	TBD
Dirt – Non-Hazardous (e.g., Floor Sweepings, sump cleanouts)	5 tons per year
Electronic Equipment	1 ton per year
Empty Drums/Barrels – RCRA Empty	1.8 tons per year
Food Waste	315 tons per year
General Debris	40 tons per year
Glycol	0.5 ton per year
Kitchen Grease	26 tons per year
Medical Waste – Non-hazardous	TBD
Medical Waste – Hazardous	TBD
Office Machine Supplies – Toners, etc., from printer, copier, fax	5 tons per year
Paint Sludge/Solvents	1.6 tons per year
Pile Spoils	TBD
Process Waste – Compressors and Turbines (Filters: Nonhazardous)	TBD
Process Waste – Compressors and Turbines (Lube Oil: Nonhazardous)	183,300 gallons per year
Process Waste – Liquid (Expected E&P exempt)	TBD
Process Waste – Solid Filter Media (Expected E&P exempt)	100 tons per year
Process Waste – Solid Filters (Expected E&P exempt)	TBD
Rags/Sorbents with Oil/Fuel	0.5 ton per year
Scrap Metal	12 tons per year
Sewage Sludge	69 tons per year
Smoke Detectors	0.5 ton per year
Solvent/Degreaser Solvent	0.5 ton per year
Soap	0.5 ton per year
Universal Waste – Mercury containing equipment, batteries, lamp bulbs	1 ton per year
Used Oil, Engine Fluids	50 tons per year
Waste Water – Black Water/Gray Water	18,204,375 gallons per year
Hydrotest Discharge (essentially filtered source water)	TBD
Waste Water – Industrial Water	1,550,155 gallons per year
Waste Water – Truck Wash Water	1,825,000 gallons per year
Waste Water – Other Water	437,270 gallons per year

5.0 WASTE MANAGEMENT PROCEDURES

Many waste streams must be collected, categorized, containerized, labeled, and stored at the facility. Some waste streams, such as wastewater, would flow into engineered disposal systems; but most solid waste must be handled and transported. Planning and maintaining proper indoor and outdoor areas for waste management is imperative.

The general waste management scheme consists of the following sequential steps:

- Waste identification and classification.
- Waste segregation based on waste type and management method.
- Waste collection, consolidation, and storage.
- Volume reduction options by recycling, shredding, crushing, baling, or incinerating.
- Transfer to Approved Facilities for recycling or disposal (with certain exceptions).

5.1 WASTE IDENTIFICATION AND CLASSIFICATION

Wastes generated by the Project would be classified in accordance with the waste types identified in Section 3. Materials of unknown type, composition, or source would be presumed to be and managed as hazardous waste pending further assessment.

5.2 WASTE SEGREGATION

All hazardous wastes, universal wastes, used oil, medical wastes, lead-acid batteries, untreated domestic sewage, contaminated soils, vegetation from clearing, and commissioning and startup wastes would be segregated from non-hazardous solid waste at the Project site. Non-hazardous solid waste would be further segregated into specific reuse, recycling and disposal waste streams to the extent practicable or at least before reuse on site or shipping off site. Whenever possible, the Project entity would recycle or reuse wastes. Final disposition into landfills would be the least-preferred option.

5.3 WASTE COLLECTION, CONSOLIDATION, AND STORAGE

Hazardous and non-hazardous wastes would be stored in separate, designated, storage areas, and incompatible wastes would be segregated so as to prevent inadvertent contact in the event of leakage from a container. Waste storage areas would be shown on preconstruction facility site plans. Wastes would be stored in a manner to prevent:

- Damage due to contact with rain or storm water, such as covered storage areas, as needed.
- Accidental spillage or leakage.
- Impact from accidental spillage or leakage, such as contamination of soils or groundwater.
- Loss of container integrity from collision, corrosion, freezing temperatures, or weathering.
- Theft, such as by provision of fencing and other security measures.
- Scavenging by animal pests.
- Spread of infectious diseases, such as from medical waste.

Containers used for storing wastes would be compatible with their contents and appropriate in terms of volume and shape. Only containers in good condition would be used.

Where required, container lids would be securely fastened or other forms of covering provided to secure contents and prevent damage from exposure to the elements. Waste storage containers

would also be clearly labeled, and where required indicate the characteristics of the contents, date of filling, and data on toxicity and other potential hazards.

Debris and wastes generated from construction would be incinerated or disposed of at an approved disposal site.

5.3.1 Wildlife Management

Wildlife-proof containers would be available at all sites, with each container designated to receive particular wastes. Fencing or other means of isolating the wastes would be considered on a site-by-site basis.

5.3.2 Waste Collection

Waste collection stations would be located near waste generation points, such as workshops, office sites, food preparation facilities, and so forth, where waste can be placed into designated containers. The design of these areas would reflect actual need of the waste sources and location including criteria such as waste type, quantity, manpower, etc. Each station would be clearly indicated by signs and its limits demarcated by barricades or fencing.

Hazardous waste would be stored only within secondary containment or structures that are engineered, constructed, and operated at a standard of technology commensurate with the risk posed by the wastes.

All work areas would be regularly policed in accordance with good housekeeping practice. No wastes would be allowed to migrate outside the approved work area. Wastes would never be allowed to enter wetlands or waterbodies. Refuse collection containers, of sufficient capacity to accommodate the quantities of daily wastes generated, would be onsite. Separate receptacles would be provided for disposing recyclable materials.

All wastes would be picked up daily and transferred to temporary holding facilities. Open disposal of food scraps would not be permitted.

5.3.3 Waste Storage

Wastes from collection stations would be conveyed to main waste accumulation areas, which are temporary holding and storage facilities located on site. The main waste accumulation areas would be developed for all waste storage and handling in preparation for offsite transport. Dedicated areas would be developed for and assigned to each waste type (i.e., hazardous wastes, universal wastes, used oil, used tires, and the various types of non-hazardous wastes). General requirements of the area include:

- Storage area would be secured from unauthorized entry.
- Containers of flammables would be grounded.
- Incompatible wastes would be separated by a berm, distance, or secondary containment.
- Where secondary containment is required, the volume would be at least 10 percent of the total volume of all containers or 110 percent of the volume of the largest container, whichever is larger.
- Dedicated spill kits, funnels, and spark proof bung wrenches would be provided.
- Schedule for waste removal for final disposal.
- Security measures that would be implemented at waste storage sites, including measures for animal exclusion.

5.3.4 Volume Reduction

Material collected would be evaluated for opportunities for volume reduction through recycling, shredding, crushing, baling, or incinerating prior to disposal. Whenever practical, recycling can be used to reduce waste streams, and costs associated with disposal (e.g., scrap metal, used oil).

Incineration is highly regulated, but is also an effective volume reduction method for some waste streams. Combustion greatly reduces the volume of waste by breaking waste streams down to their elemental forms, releasing water, and carbon strings.

5.3.5 Transport

Wastes would be transferred from accumulation areas only to appropriately permitted or licensed facilities with capacity to accept the waste, and only by appropriately trained and licensed transporters.

All delivery drivers would be informed of procedures and restrictions regarding vehicle traffic within the site and locations of material offloading. All loads that could cause contamination of the air or ground shall have appropriate coverage to prevent spillage from the vehicle during transit.

Collections would be scheduled as frequently as necessary to prevent the waste from exceeding storage capacity or regulatory limits in the case of hazardous waste.

Each waste container leaving the Project area would be:

- Clearly and appropriately labeled in accordance with U.S. Department of Transportation (USDOT) and EPA requirements.
- Appropriately sealed with a lid or bung to avoid emitting any harmful gases or generating heat.
- In good condition and not leaking.
- Appropriate for the waste it contains.

All waste transport vehicles would be:

- Appropriately designed for the type of waste and containers to be transported.
- Carrying the necessary emergency equipment, such as spill containment kits.
- Placarded in accordance with USDOT requirements.
- Roadworthy and legally compliant, such as tires in good condition and lights functioning.

5.3.5.1 Hazardous Waste

All hazardous waste would be shipped off site for treatment, storage or disposal, and a manifest would be prepared for and accompany all shipments. A Uniform Hazardous Waste Manifest form would be used. The manifest allows all parties involved in hazardous waste management, such as generators; transporters; Treatment, Storage, and Disposal Facilities (TSDFs), EPA, and state agencies to track the movement of hazardous waste from the point of generation to the point of ultimate treatment, storage, or disposal.

In Alaska, there are no hazardous waste disposal facilities and such wastes are shipped to facilities in the Lower 48 for disposal. The closest TSDFs to Alaska are located in Washington and Oregon.

6.0 WASTE DISPOSAL

The Project entity would dispose of waste material as required by federal, state, and local environmental regulations. Each construction Contractor and Facilities Operations Plan would identify the final approved disposal location for each waste stream. Table 6 lists existing, regulated, non-hazardous waste disposal facilities in Alaska near the Project footprint; while landfill expansions are not planned at this time, future waste management plans would identify if new landfill options including landfill expansion would be required to accommodate Project waste. In addition, other approved facilities exist for specialized wastes (e.g., medical waste disposal at Entech Alaska LLC in Anchorage). The construction Contractor would provide the Project entity with evidence of agreements that are in place to use these services before construction may begin.

As noted above, since there are no hazardous waste disposal facilities in Alaska, all hazardous waste materials would be stored at collection sites until they can be transported to the Lower 48 for disposal.

Table 7: Non-hazardous Waste Disposal Facilities in Alaska Potentially Available for Project Use

Disposal Facility	Location	Remarks
Central Peninsula Landfill	47140 East Poppy Lane Soldotna, Alaska 99669	The Central Peninsula Landfill is a Class I Landfill. Large and other types of waste accepted daily at the landfill include animal carcasses, appliances, Construction Demolition (C/D), junk vehicles, Landscaping and Wood (L/W), metals, etc. The recyclables are baled and placed in a staging location for transport to market.
Anchorage Regional Landfill (ARL)	15500 E Eagle River Loop Rd. Eagle River, AK 99577	The ARL receives commercial refuse collection vehicles, residential refuse collection vehicles, and household vehicles (cars and pickups) from throughout the Anchorage and Eagle River area. The ARL also provides a location for the collection of CFC-containing appliances (refrigerators and freezers), used oil, batteries, and household hazardous waste. The ARL is open for commercial loads of municipal construction and demolition solid wastes.
Fairbanks Landfill	455 Sanduri St. Fairbanks, AK 99701	The Fairbanks Landfill accepts municipal solid waste, industrial solid waste, and construction and demolition wastes.
Oxbow Landfill	Prudhoe Bay, AK	Service Area Ten provides utilities and waste management services, which are focused on safety and environment compliance, to industrial clients in the Prudhoe Bay area. Operational assets include a Water Plant, Wastewater Plant, Hotel and the Oxbow Landfill.

Management of vegetative waste is a potential exception to the general strategy of offsite waste disposal. Open burning of vegetative waste from land clearing and the salvage of timber would be in accordance with the Project-specific *Open Burning Plan*.

6.1 LIQUEFACTION FACILITY

The Liquefaction Facility would have permitted outfalls to Cook Inlet for the removal of some liquid wastes, including:

- Stormwater runoff following treatment by sedimentation pond (for operational areas there would also be treatment by oily water separator, as needed).
- Firewater testing runoff following treatment by oily water separator and sedimentation pond as needed.

- Domestic sewage following secondary treatment on site.
- Boiler blowdown water (non-hazardous).
- Reverse osmosis reject water.

Other material would be disposed of offsite, but to a recycling/reuse facility as practicable, including:

- Paper.
- Cardboard.
- Metals.
- Plastics.
- Concrete rubble.
- Grease and oil.
- Batteries.
- Lamps.
- Antifreeze.
- Electronics.

The Kenai Peninsula Borough's (KPB's) recycling programs handle approximately 300 tons per year of metals and 600 tons per year in paper and cardboard. They also accept waste lumber and construction and demolition debris. Other local recycling companies working on the Kenai Peninsula are Rock-Tenn Recycling of Anchorage, Metalizing Inc. of north Kenai, Peninsula Scrap and Salvage, on contract to the KPB at Central Peninsula Landfill. Recycling facilities under contract would be audited regularly to assure their compliance with commitments of the FERC Order and with applicable federal and state law.

The remaining materials that are not reused on site would go to an approved landfill facility. The KPB maintains the Central Peninsula Landfill, an ADEC-permitted landfill just south of Soldotna, 22 miles from the Liquefaction Facility site. About 98 percent of the KPB's population of 55,000 is served by this landfill. For the last decade the KPB has disposed of 53,000 tons per year of solid waste, about 5.3 pounds per person per day. During peak construction of the Liquefaction Facility, approximately 4,100 tons per year of solid waste would be generated from camp operations, less than 8 percent of current landfill use. The Central Peninsula Landfill is also authorized to accept contaminated soil, and industrial process wastes, so long as they are properly tested and meet the requirements of the Special Waste Disposal Policy (December 15, 2014) and the approval of the KPB Solid Waste Department.

6.2 PIPELINE

Pipeline camps would incinerate burnable solid waste on site, where permitted. All other waste would be temporarily stored on site and then trucked to a licensed solid waste disposal facility.

Using the most technically advanced diesel fired incinerators, a considerable amount of waste produced in the construction camps would be incinerated on site, if allowed. These incinerators would be designed and perform in accordance with federal and State of Alaska environment regulations for emissions. Ash produced from the incineration process would be approximately 7 pounds per 100 pounds of burned waste and would be transported to a certified landfill once documented as non-hazardous.

Camp generated wastes would include bio-hazardous waste, food waste, spent batteries, spent lamps, recyclables and sewage sludge, and small quantities of hazardous waste (mainly aerosol cans).

Sewage sludge can be pressed, dried and disposed of by incineration, if allowed. The bio-hazardous waste and recyclables would be transported to proper disposal facilities.

Regarding sewage, considerable improvement and innovation has been seen over the last several decades in the wastewater treatment processing for remote site locations. These improved systems are extremely robust, arctic designed and consist of electrical and mechanical interfaces enabling quick set up and removal. Typical performance of these systems would enable treated effluent to be directly discharged in compliance with regulatory requirements.

6.3 GAS TREATMENT PLANT (GTP)

A large variety of wastes would be disposed of using disposal wells. The GTP would include two wells consistent with Class I wells under the UIC program, providing a safe disposal option with minimal transportation off site. During GTP operations, process liquid wastes would be generated from the dehydration of the treated gas and Byproduct streams. This liquid would be combined with reject water from the Process Water Treatment system and treated wastewater and injected into a Class I Industrial (non-hazardous) injection well. The rate of generation of this liquid waste from the process is expected to be approximately 185 gallons per minute. Additional liquid waste from intermittent waste streams could bring the flow rate into the disposal wells to maximum of 225 gallons per minute, which is the design flow rate of the injection pumps. It has also been assumed that all wastewater (e.g., industrial, truck), except for black and gray water, would be injected untreated down the disposal well. The black and gray water would be treated at a wastewater treatment plant, as applicable, and/or disposed down a disposal well.

Recycling programs would be implemented as practical (e.g., metals, glycol, used oil). For materials that cannot be used or recycled, the North Slope Borough operates a landfill (Oxbow Landfill) in proximity to the GTP that is expected to be the primary management method for solid waste. Oily waste and kitchen grease are also expected to go to energy recovery units at the Oxbow Landfill.

An incinerator was considered for use of the GTP but is not included in the facilities' current design due to the proximity of the Oxbow Landfill. Not having an onsite incinerator would minimize the footprint required for the GTP pad.

7.0 INSPECTION AND RECORDKEEPING

Operations phase waste management programs would be further developed during later Project stages. The Project entity's construction phase waste management program would include:

- Documentation and recordkeeping.
- Training.
- Monitoring through inspections and audits.

7.1 DOCUMENTATION AND RECORDKEEPING

Records would be maintained of the wastes generated by, stored on, and transferred from the site. Hazardous and universal wastes, used oil, and other wastes as required would be tracked to ensure and document delivery to appropriate facilities using a manifest system. For other types of solid waste, the Project entity would ensure delivery through contractual means and routine inspections and periodic audits.

During construction, the Contractor would be responsible for maintaining necessary records, demonstrating full compliance with the Plan. All RCRA hazardous wastes would be tracked "cradle to grave." Copies of documentation would be provided to the Project entity including:

- Safety Data Sheets (SDSs) for materials used during construction.
- Complete inventory and waste stream classification for wastes.
- Facility inspection checklists.
- Records of personnel training.

Other documentation related to the storage, transport, and final disposal of wastes generated during construction (including manifests, chain-of-custody, waste characterization analyses, treatment/disposal facility receipts) would be maintained by the Contractor, but available for inspection by the Project entity and agencies.

7.2 PERSONNEL TRAINING

Prior to reporting to the jobsite, all Project entity personnel would receive basic waste management training covering waste generation, collection, storage, recycling, and disposal. Personnel who would handle potentially hazardous wastes would receive additional training covering personal protection, proper waste storage, waste site security, and waste documentation and manifesting.

7.3 INSPECTION AND AUDITING

All site waste accumulation and storage areas and containers would be inspected for compliance with prescribed operating procedures and regulatory requirements on a regular, scheduled basis. Hazardous waste satellite and accumulation areas would be inspected at least once per week. Waste-storage areas would be inspected weekly. In addition, containment areas would be monitored. Inspections would be conducted and results documented using checklists.

The facilities and procedures of waste subcontractors would be periodically inspected and audited to ensure wastes are being managed appropriately and in accord with contractual terms, including all applicable rules. Routine audits of waste management practices would be conducted by the Project entity.

During construction, the Project entity's Environmental Inspectors would conduct regular inspections of the Contractors' plan implementation. These inspections would place particular emphasis on the following practices:

- Waste collection and housekeeping at all Project sites.
- Proper waste classification and labeling.
- Waste stream segregation and secure storage.
- Prevention of spillage and offsite deposition.
- Reuse and recycling efforts.
- Waste transport practices.
- Corrective actions needed.
- Spillage response actions.
- Contractor documentation, including final disposal paperwork.

During construction, the Project entity would complete reports that would address the results of these inspections, along with follow-up documentation as needed.

8.0 ACRONYMS AND TERMS

Term	Definition
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
AGDC	Alaska Gasline Development Corporation
ARL	Alaska Regional Landfill
BOD	biochemical oxygen demand
CFR	Code of Federal Regulations
CPI	corrugated plate interceptor
EMALL	ExxonMobil Alaska LNG LLC
E&P	Oil and gas exploration and production
EPA	United States Environmental Protection Agency
FERC	Federal Energy Regulatory Commission
GTP	Gas Treatment Plant
HDPE	high-density polyethylene
HMR	Hazardous Material Regulations
KPB	Kenai Peninsula Borough
SDSs	Safety Data Sheets
NORM	naturally occurring radioactive material
PBTL	Prudhoe Bay Gas Transmission Line
PBU	Prudhoe Bay Unit
PCB	polychlorinated biphenyl
Plan	Project Waste Management Plan
ppm	parts per million
Project	Alaska LNG Project
PTTL	Point Thomson Gas Transmission Line
PTU	Point Thomson Unit
RCRA	Resource Conservation and Recovery Act
TSDF	Treatment, Storage, and Disposal Facility
UIC	Underground Injection Control
USDOT	United States Department of Transportation