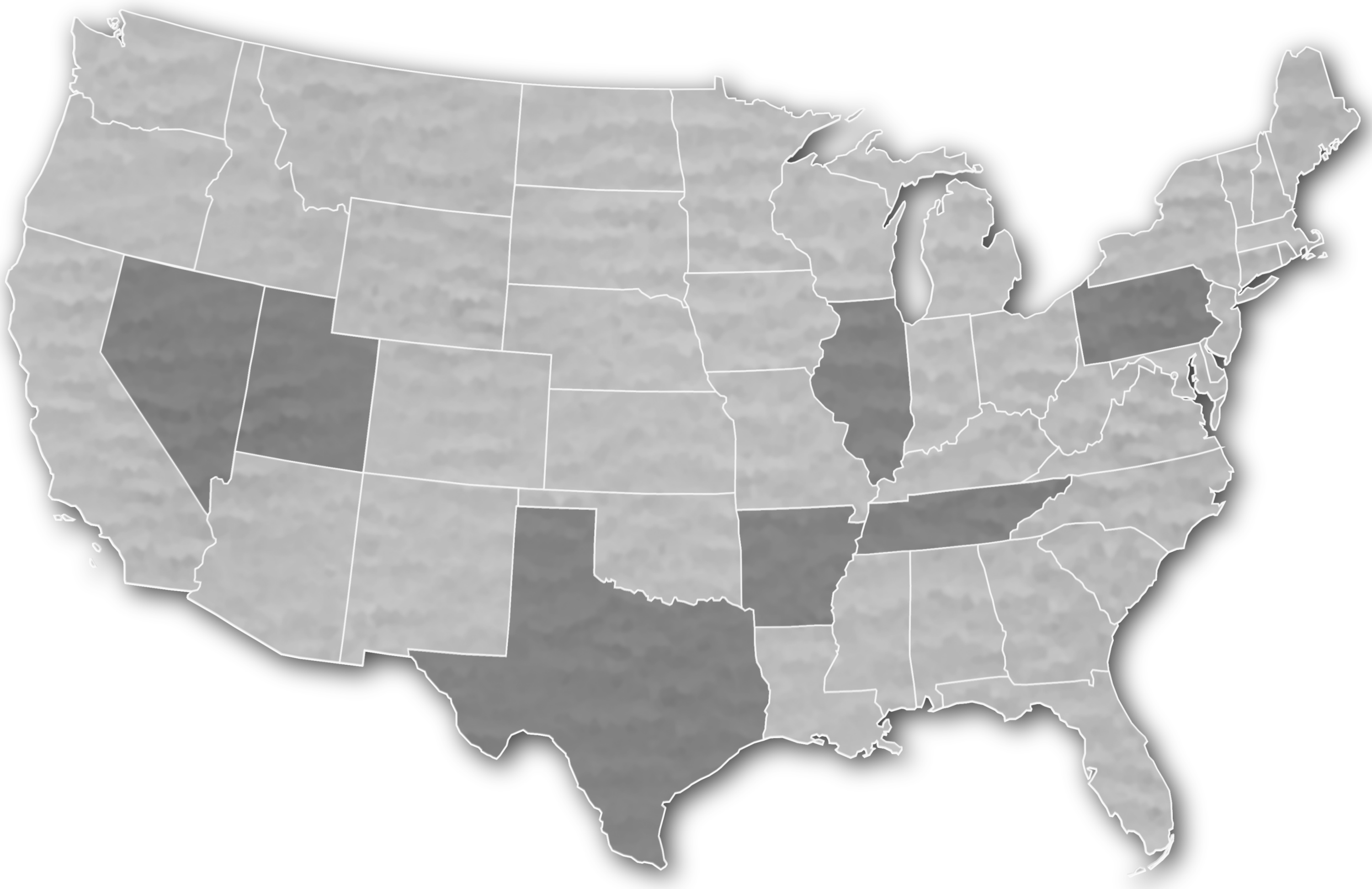
DOE/EIS-0423-S2D
June 2022

DRAFT

Long-Term Management and Storage of Elemental Mercury

Supplemental Environmental Impact Statement



Volume 1

Chapters

U.S. Department of Energy
Office of Environmental Management
Washington, DC

METRIC TO ENGLISH			ENGLISH TO METRIC		
Multiply	**by**	**To get**	**Multiply**	**by**	**To get**
Area					
Square meters	10.764	Square feet	Square feet	0.092903	Square meters
Square kilometers	247.1	Acres	Acres	0.0040469	Square kilometers
Square kilometers	0.3861	Square miles	Square miles	2.59	Square kilometers
Hectares	2.471	Acres	Acres	0.40469	Hectares
Concentration					
Kilograms/square meter	0.16667	Tons/acre	Tons/acre	0.5999	Kilograms/square meter
Milligrams/liter	1 [a]	Parts/million	Parts/million	1 [a]	Milligrams/liter
Micrograms/liter	1 [a]	Parts/billion	Parts/billion	1 [a]	Micrograms/liter
Micrograms/cubic meter	1 [a]	Parts/trillion	Parts/trillion	1 [a]	Micrograms/cubic meter
Density					
Grams/cubic centimeter	62.428	Pounds/cubic feet	Pounds/cubic feet	0.016018	Grams/cubic centimeter
Grams/cubic meter	0.0000624	Pounds/cubic feet	Pounds/cubic feet	16,018.5	Grams/cubic meter
Length					
Centimeters	0.3937	Inches	Inches	2.54	Centimeters
Meters	3.2808	Feet	Feet	0.3048	Meters
Kilometers	0.62137	Miles	Miles	1.6093	Kilometers
Radiation					
Sieverts	100	Rem	Rem	0.01	Sieverts
Temperature					
Absolute					
Degrees C + 17.78	1.8	Degrees F	Degrees F - 32	0.55556	Degrees C
Relative					
Degrees C	1.8	Degrees F	Degrees F	0.55556	Degrees C
Velocity/Rate					
Cubic meters/second	2118.9	Cubic feet/minute	Cubic feet/minute	0.00047195	Cubic meters/second
Grams/second	7.9366	Pounds/hour	Pounds/hour	0.126	Grams/second
Meters/second	2.237	Miles/hour	Miles/hour	0.44704	Meters/second
Volume					
Liters	0.26418	Gallons	Gallons	3.7854	Liters
Liters	0.035316	Cubic feet	Cubic feet	28.316	Liters
Liters	0.001308	Cubic yards	Cubic yards	764.54	Liters
Cubic meters	264.17	Gallons	Gallons	0.0037854	Cubic meters
Cubic meters	35.314	Cubic feet	Cubic feet	0.028317	Cubic meters
Cubic meters	1.3079	Cubic yards	Cubic yards	0.76456	Cubic meters
Cubic meters	0.0008107	Acre-feet	Acre-feet	1233.49	Cubic meters
Weight/Mass					
Grams	0.035274	Ounces	Ounces	28.35	Grams
Kilograms	2.2046	Pounds	Pounds	0.45359	Kilograms
Kilograms	0.0011023	Tons (short)	Tons (short)	907.18	Kilograms
Metric tons	1.1023	Tons (short)	Tons (short)	0.90718	Metric tons
ENGLISH TO ENGLISH					
Acre-feet	325,850.7	Gallons	Gallons	0.000003046	Acre-feet
Acres	43,560	Square feet	Square feet	0.000022957	Acres
Square miles	640	Acres	Acres	0.0015625	Square miles

a. This conversion is only valid for concentrations of contaminants (or other materials) in water.

METRIC PREFIXES

Prefix	Symbol	Multiplication factor
exa-	E	1,000,000,000,000,000,000 = 10^{18}
peta-	P	1,000,000,000,000,000 = 10^{15}
tera-	T	1,000,000,000,000 = 10^{12}
giga-	G	1,000,000,000 = 10^{9}
mega-	M	1,000,000 = 10^{6}
kilo-	k	1,000 = 10^{3}
deca-	D	10 = 10^{1}
deci-	d	0.1 = 10^{-1}
centi-	c	0.01 = 10^{-2}
milli-	m	0.001 = 10^{-3}
micro-	µ	0.000 001 = 10^{-6}
nano-	n	0.000 000 001 = 10^{-9}
pico-	p	0.000 000 000 001 = 10^{-12}

COVER SHEET

***Responsible Federal Agency*:** U.S. Department of Energy (DOE)

***Title*:** Draft Long-Term Management and Storage of Elemental Mercury Supplemental Environmental Impact Statement (DOE/EIS-0423-S2D) (Mercury Storage SEIS-II)

***Candidate Locations for Storage Facilities*:** Arkansas, Illinois, Nevada, Pennsylvania, Tennessee, Texas, and Utah.

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This document is available for viewing and downloading on the DOE NEPA website (http://energy.gov/nepa/).

Abstract: Pursuant to the *Mercury Export Ban Act of 2008* (Public Law [P.L.] 110-414), and the *Frank R. Lautenberg Chemical Safety for the 21st Century Act* (P.L. 114-182) (together referred herein as MEBA), DOE has been directed to designate a facility or facilities for the long-term management and storage of elemental mercury generated within the United States. DOE issued the *Final Long-Term Management and Storage of Elemental Mercury Environmental Impact Statement* (Mercury Storage EIS) (DOE/EIS-0423) in January 2011 and the *Final Long-Term Management and Storage of Elemental Mercury Supplemental Environmental Impact Statement* (Mercury Storage SEIS) (DOE/EIS-0423-S1) in September 2013. DOE is analyzing the storage of up to 7,000 metric tons (7,700 tons) of elemental mercury in an existing facility or facilities operated in accordance with the *Solid Waste Disposal Act*, as amended by the Resource Conservation and Recovery Act. DOE has prepared this Mercury Storage SEIS-II in accordance with the *National Environmental Policy Act of 1969*, as amended (NEPA; Title 42 of the *United States Code* [U.S.C.] § 4321 et seq.), the Council on Environmental Quality (CEQ) implementing regulations (Title 40 of the Code of Federal Regulations [CFR] Parts 1500–1508), and DOE's NEPA implementing procedures (10 CFR Part 1021) to evaluate the reasonable alternatives for a facility or facilities for the long-term management and storage of elemental mercury. This Mercury Storage SEIS-II analyzes the potential environmental, human health, and socioeconomic impacts of elemental mercury storage at existing facilities in eight candidate locations: Hawthorne Army Depot near Hawthorne, Nevada; Waste Control Specialists LLC, near Andrews, Texas; Bethlehem Apparatus in Bethlehem, Pennsylvania; Perma-Fix Environmental Services in Kingston, Tennessee; Veolia Environmental Services in Gum Springs, Arkansas; and Clean

Harbors Environmental Services, with three potential locations in Tooele, Utah; Greenbrier, Tennessee; and Pecatonica, Illinois. As required by CEQ NEPA regulations, the No-Action Alternative is also analyzed. DOE's Preferred Alternative is to designate one or more of the existing commercial facilities evaluated in this Draft SEIS-II.

Public Comments: On May 24, 2021, DOE issued a Notice of Intent in the *Federal Register* (86 FR 27838) notifying the public of DOE's intent to prepare this Draft SEIS-II. (In accordance with 10 CFR § 1021.311(f), a public scoping process is not required for a DOE-issued SEIS.) Comments on this Draft SEIS-II may be submitted during the 45-day comment period, which will begin upon publication of the U.S. Environmental Protection Agency's Notice of Availability in the *Federal Register*. A virtual, online public hearing on this Draft SEIS-II will be held during this 45-day comment period. The dates, times, and locations of the public hearing will be published in a DOE *Federal Register* notice, posted online at www.energy.gov/nepa, and announced through other media. DOE will consider any comments received after the comment period ends to the extent practicable.

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ACRONYMS AND ABBREVIATIONS

2011 Mercury Storage EIS	*Final Long-Term Management and Storage of Elemental Mercury Environmental Impact Statement*
2013 Mercury Storage SEIS	*Final Long-Term Management and Storage of Elemental Mercury Supplemental Environmental Impact Statement*
ACGIH	American Conference of Governmental Industrial Hygienists
AEGL	Acute Exposure Guideline Level
ASHRAE	American Society of Heating, Refrigerating, and Air-Conditioning Engineers
BGEPA	*Bald and Golden Eagle Protection Act*
BP	Before Present
CEQ	Council on Environmental Quality
CFR	*Code of Federal Regulations*
CH_3Hg	methyl mercury
CO_2e	carbon dioxide equivalent
CSB	Container Storage Building
CSBU	Container Storage Building Unit
dBA	A-weighted decibel
D.D.C.	District Court for the District of Columbia
DFBWO	Drain and Flush Building Warehouse One
DLA	Defense Logistics Agency
DNSC	Defense National Stockpile Center
DoD	U.S. Department of Defense
DOE	U.S. Department of Energy
EPA	U.S. Environmental Protection Agency
°F	degree Fahrenheit
FL	frequency level
FR	*Federal Register*
GHG	greenhouse gas
Hg^0	elemental mercury
$HgCl_2$	mercury chloride
HgS	mercury sulfide
HEPA	high-efficiency particulate air
HWAD	Hawthorne Army Depot
I-80	Interstate 80
IBC	International Building Code
Interim Guidance	*U.S. Department of Energy Interim Guidance on Packaging, Transportation, Receipt, Management, and Long-Term Storage of Elemental Mercury*
ISP	Interim Storage Partners
kVA	kilovolt-ampere
L	liter
LLW	low-level radioactive waste
MBTA	*Migratory Bird Treaty Act*
MEBA	*Mercury Export Ban Act of 2008*, as amended by the *Frank R. Lautenberg Chemical Safety for the 21st Century Act*

mg/kg	milligram per kilogram
mph	miles per hour
MT	metric ton
MTU	metric ton of uranium
NAAQS	National Ambient Air Quality Standards
NDEP	Nevada Division of Environmental Protection
NEPA	*National Environmental Policy Act*
NFPA	National Fire Protection Association
NGM	Nevada Gold Mines
NHPA	*National Historic Preservation Act*
NNSA	National Nuclear Security Administration
NPDES	National Pollutant Discharge Elimination System
NPS	National Park Service
NRC	U.S. Nuclear Regulatory Commission
NRHP	National Register of Historic Places
ORR	Oak Ridge Reservation
OSHA	Occupational Safety and Health Administration
PEMB	pre-engineered metal building
Perma-Fix DSSI	Perma-Fix Diversified Scientific Services, Inc
P.L.	public law
PAC	Protective Action Criteria
PGA	peak ground acceleration
PM_n	particulate matter with a mean aerodynamic diameter of *n* micrometer or less
PPE	personal protective equipment
ppm	parts per million
PSD	prevention of significant deterioration
RCRA	*Resource Conservation and Recovery Act*
RfC	chronic-inhalation-exposure reference concentration
ROD	Record of Decision
ROI	region of influence
RTP	Request for Task Order Proposals
SA	supplement analysis
SEIS	supplemental environmental impact statement
SHPO	State Historic Preservation Office
SL	severity level
TCP	Traditional Cultural Property
TLV	threshold limit values
TRAGIS	Transportation Routing Analysis Geographic Information System
TSCA	*Toxic Substances Control Act*
UDEQ	Utah Department of Environmental Quality
U.S.C.	*United States Code*
USCB	U.S. Census Bureau
USGS	U.S. Geological Survey
Veolia	Veolia Environmental Services
VGS	Veolia Gum Springs

WCS	Waste Control Specialists LLC
WIPP	Waste Isolation Pilot Plant
Y-12	Y-12 National Security Complex
Y-12 SWEIS	*Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex*

1 INTRODUCTION AND PURPOSE AND NEED FOR AGENCY ACTION

1.1 INTRODUCTION

Elemental mercury is a dense, naturally occurring metal that is liquid at room temperature. Mercury is found in the environment as elemental mercury (Hg^0) (e.g., elemental mercury vapor), inorganic mercury compounds (e.g., mercuric chloride [$HgCl_2$] and mercuric sulfide [HgS]), and organic mercury compounds (e.g., methylmercury [CH_3Hg]).

Mercury enters the environment through natural processes such as volcanoes and wildfires and through human activities. Sometimes informally called "quicksilver," liquid mercury has been used in manufacturing processes because it conducts electricity, reacts to temperature changes, and combines with many other metals. Examples of products that historically contained or currently contain mercury include batteries, paint, thermometers, thermostats, blood pressure monitors, automobile lighting switches, fluorescent lights, and dental fillings. Human activities that release mercury to the environment include fuel burning, incineration, metal smelting, use of mercury in industrial processes, mining, waste disposal, and production of commercial products containing mercury.

Mercury is a globally deposited pollutant, affecting waterbodies near industrial sources (e.g., the Great Lakes) and remote areas (e.g., the Arctic Circle). The mercury emitted from human activities is primarily in its elemental or inorganic form. The inorganic form of mercury, when bound to airborne particles or in its gaseous form, is readily removed from the atmosphere by dry deposition (settling) onto land surfaces and wet deposition (precipitation), including deposition in waterbodies. Most of the mercury in water, soil, sediment, plants, and animals is in the form of inorganic mercury salts (e.g., mercuric chloride) and organic mercury (e.g., methylmercury) (EPA 1997a).

Mercury and its compounds are persistent, bioaccumulative, and toxic. The toxic effects of mercury depend on its chemical form and the route of exposure. Methylmercury, a mercury compound that is generally not used commercially or stored, is the most toxic form. It can affect the immune system; alter genetic systems; and damage the nervous system, including coordination and the senses of touch, taste, and sight. Methylmercury can be particularly damaging to developing embryos. Exposure to methylmercury is usually by ingestion; it is absorbed more readily than other forms of mercury. Less toxic than methylmercury, elemental mercury vapors can cause tremors, gingivitis, and excitability when inhaled over a long period of time. If elemental mercury is ingested, it is absorbed relatively slowly and can pass through the digestive system without causing damage (USGS 2000).

It is estimated that since the 19th century, the total amount of mercury available in the environment has increased by a factor of two to five above pre-industrial levels. As the quantity of available mercury in the environment has increased, so have the risks of neurological and reproductive problems for humans and wildlife. These increases in risk make mercury a pollutant of environmental concern in the United States and throughout the world (EPA 2000).

1.2 PURPOSE AND NEED FOR AGENCY ACTION

The *Mercury Export Ban Act of 2008* (Public Law [P.L.] 110-414) and the *Frank R. Lautenberg Chemical Safety for the 21st Century Act* (Chemical Safety Act of 2016; P.L. 114-182) (together referred herein as MEBA, copies of which are presented in Appendix A), amended the *Toxic Substances Control Act* (15 United States Code [U.S.C.] § 2601 et seq.) (TSCA) and the *Resource Conservation and Recovery Act* (RCRA) at 42 U.S.C. § 6939f to address, among other things, the export and long-term management and storage of elemental mercury. MEBA prohibits the sale, distribution, or transfer by Federal agencies to any other Federal agency, any state or local government agency, or any private individual or entity, of any elemental mercury under the control or jurisdiction of a Federal agency (with certain limited exceptions) (15 U.S.C. §§ 2605(f)(1)–(2)). MEBA also amended Section 2611(c) of TSCA to prohibit the export of elemental mercury from the United States (with certain limited exceptions). MEBA directs DOE to designate a facility (or facilities) of DOE for the long-term management and storage of elemental mercury generated within the United States (42 U.S.C. § 6939f(a)(1)). MEBA further provides the Secretary of Energy with the authority to establish such terms, conditions, and procedures as are necessary to carry out this long-term management and storage function (42 U.S.C. § 6939f(f)). Although the phrase "facility or facilities of [DOE]" is not defined in MEBA, DOE has a longstanding practice in various other contexts of leasing facilities to accomplish the Department's core mission. Consistent with that practice, DOE construes the term facility of DOE to include a facility leased from a commercial entity or another Federal agency, over which DOE provides an appropriate level of oversight and guidance. Accordingly, if DOE were to designate a facility that currently is owned by a commercial entity or by another Federal agency, DOE would obtain a leasehold interest in that facility. DOE would ensure that any such facility currently owned by a commercial entity or by another Federal agency would afford DOE an appropriate level of responsibility and control over the facility. Actions DOE has undertaken to date, related to the designation of a storage facility are described in Section 1.3 of this document.

MEBA also authorizes DOE to assess and collect a fee at the time of delivery of mercury to the DOE storage facility to cover certain costs of long-term management and storage (42 U.S.C. § 6939f(b)).[1] Much of the costs of mercury storage will be covered by the generators of the mercury. These costs include operations and maintenance, security, monitoring, reporting, personnel, administration, inspections, training, fire suppression, closure, and other costs required for compliance with applicable laws; such costs shall not include costs associated with land acquisition or permitting. In addition, the generators of the mercury will be responsible for the costs of shipping mercury to the DOE storage facility (or facilities). The incentive for generators to send

[1] DOE would undertake a fee rulemaking, including any required NEPA analysis, at a later time, following completion of the present NEPA analysis and Record of Decision regarding designation of a storage facility. Among the allowable costs to be collected under MEBA are costs associated with management and "other costs required for compliance with applicable law," which DOE interprets to include potential costs associated with treatment and disposal of elemental mercury (42 U.S.C. § 6939f(b)(2)). "Management," as it appears in RCRA and implementing regulations, includes treatment and disposal (42 U.S.C. § 6903(7), (33) and 40 CFR § 260.10). While there is currently no disposal standard for elemental mercury, it is possible that the U.S. Environmental Protection Agency will, in the future, approve a standard, which would require additional treatment and allow for disposal. DOE acknowledges the potential for this eventual treatment and disposal standard, but does not analyze such treatment and disposal in this SEIS-II because the specifics of it are too speculative at this time. Undertaking additional treatment and disposal likely would require additional NEPA review, which the Department will evaluate and undertake, as appropriate, if such an option becomes viable. This issue is discussed in more detail in Section 2.6 of this SEIS-II.

their mercury to the DOE facility is that DOE will indemnify the generator from future liability (42 U.S.C. § 6939f(e)).

MEBA established January 1, 2019, as the date by which a DOE facility for the long-term management and storage of elemental mercury generated within the United States must be operational (42 U.S.C. § 6939f(a)(2)). MEBA requires that DOE adjust fees for generators temporarily accumulating elemental mercury if the DOE facility is not operational by January 1, 2019 (42 U.S.C. § 6939f(b)(1)(B)(iv)). If the DOE facility is not operational by January 1, 2020, DOE must: (1) immediately accept the conveyance of title to all elemental mercury that has accumulated on site prior to January 1, 2020,[2] (2) pay any applicable Federal permitting costs, and (3) store, or pay the cost of storage of, until the time at which a facility is operational, accumulated mercury to which the Secretary has title in a facility that has been issued a permit (42 U.S.C. § 6939f(b)(1)(C)). DOE issued a Record of Decision (ROD) on December 6, 2019, that designated the Waste Control Specialists LLC (WCS) site near Andrews, Texas, as a DOE facility for management and storage of up to 6,800 metric tons (MT) (7,480 tons) of elemental mercury (Volume 84 of the *Federal Register* page 66890 (84 FR 66890)). On December 23, 2019, DOE issued a rule to establish the fee for long-term management and storage of elemental mercury (84 FR 70402). However, both of these actions were challenged in two separate lawsuits. Consistent with the terms of a settlement agreement resolving one of the lawsuits, the fee rule was vacated and remanded to DOE, and DOE withdrew the designation in an amended ROD (85 FR 63105, October 6, 2020) (More information related to these lawsuits is provided in Section 1.3). Because statutory milestone dates have now passed, DOE needs to designate a facility and begin accepting elemental mercury as soon as practicable.

DOE prepared this *Draft Long-Term Management and Storage of Elemental Mercury Supplemental Environmental Impact Statement* (DOE/EIS-0423-S2D) (Mercury Storage SEIS-II) in accordance with the *National Environmental Policy Act of 1969*, as amended (42 U.S.C. § 4321 et seq.) (NEPA), the Council on Environmental Quality (CEQ) implementing regulations (Title 40 of the *Code of Federal Regulations* [CFR] Parts 1500–1508), and DOE's NEPA implementing procedures (10 CFR Part 1021) to evaluate reasonable alternatives for a facility (or facilities) for the long-term management and storage of elemental mercury.

1.3 RELEVANT NEPA DOCUMENTS AND PREVIOUS DOE ACTIONS RELATED TO THE LONG-TERM MANAGEMENT AND STORAGE OF MERCURY

The Federal government has prepared several NEPA evaluations related to long-term management and storage of elemental mercury that are relevant to this Mercury Storage SEIS-II. The following paragraphs discuss the documents and actions and their relevance:

Mercury Management Environmental Impact Statement: The Defense Logistics Agency (DLA) prepared the *Final Mercury Management Environmental Impact Statement* (2004 Mercury Management EIS) (DLA 2004) to help determine how to manage the Defense National Stockpile Center's (DNSC's)[3] 4,436 MT (4,890 tons) of surplus mercury because it was no longer needed

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[2] Conveyance of title pertains to mercury accumulated in accordance with 42 U.S.C. § 6939f(g)(2)(D).

[3] DNSC was subsequently renamed DLA Strategic Materials. This Mercury Storage SEIS-II uses DNSC to be consistent with the 2004 Mercury Management EIS.

for national defense. The 2004 Mercury Management EIS evaluated three alternatives to manage DNSC mercury over the long term: (1) No-Action, in which mercury would continue to be stored at then current locations, (2) consolidation and storage of mercury at one site, and (3) sale of the mercury. The alternatives included storage at DNSC depots in New Haven, Indiana; Somerville, New Jersey; and Warren, Ohio; storage at the DOE Y-12 National Security Complex on the Oak Ridge Reservation (Y-12); and storage at the Hawthorne Army Depot (HWAD) in Hawthorne, Nevada; the PEZ Lake Development in Romulus, New York; and the Utah Industrial Depot in Tooele, Utah.

The 2004 Mercury Management EIS concluded that most of the environmental and socioeconomic impacts of alternatives for mercury management would be small (referred to as “negligible” to “minor” in the analysis) under each of the three alternatives and that differences among the alternatives would not be sufficient in themselves to support selection of one alternative over the others. In the ROD (69 FR 23733; April 30, 2004), DNSC selected consolidation and storage of mercury at one site. Later, DNSC announced that mercury would be consolidated for storage at the HWAD in Hawthorne, Nevada. Consolidating the 4,436 MT (4,890 tons) of excess DNSC mercury at one site was not predicted to result in significant environmental impacts at that site. The DNSC mercury was subsequently shipped to the HWAD and is now in storage at that facility. The 2004 Mercury Management EIS is relevant because it examines mercury storage at seven locations throughout the United States; including one of the locations considered in this Mercury Storage SEIS-II.

Long-Term Management and Storage of Elemental Mercury Environmental Impact Statement: Pursuant to MEBA, DOE prepared the *Final Long-Term Management and Storage of Elemental Mercury Environmental Impact Statement* (2011 Mercury Storage EIS) (DOE 2011) to analyze the storage of up to 10,000 MT (11,000 tons) of elemental mercury generated over a 40-year period. The purpose of the 2011 Mercury Storage EIS was to evaluate the potential impacts of the proposed action of establishing a facility for the long-term management and storage of elemental mercury.

The 2011 Mercury Storage EIS analyzed the potential environmental, human health, and socioeconomic impacts of elemental mercury storage at seven candidate locations for either new construction or use of an existing facility: Grand Junction Disposal Site near Grand Junction, Colorado (new construction); Hanford Site near Richland, Washington (new construction); HWAD near Hawthorne, Nevada (existing facility); Idaho National Laboratory near Idaho Falls, Idaho (new construction and an existing facility); Kansas City Plant in Kansas City, Missouri (existing facility); Savannah River Site near Aiken, South Carolina (new construction); and the WCS site near Andrews, Texas (new construction and an existing facility). In the 2011 Mercury Storage EIS, DOE identified the WCS site near Andrews, Texas, as the Preferred Alternative for the long-term management and storage of elemental mercury. The 2011 Mercury Storage EIS is relevant because it examines mercury storage at seven locations throughout the United States, including two of the alternatives considered in this Mercury Storage SEIS-II.

Long-Term Management and Storage of Elemental Mercury Supplemental Environmental Impact Statement: DOE subsequently reconsidered the range of reasonable alternatives evaluated in the 2011 Mercury Storage EIS. Accordingly, DOE prepared the *Final Long-Term Management and Storage of Elemental Mercury Supplemental Environmental Impact Statement* (2013 Mercury

Storage SEIS) (DOE 2013) to evaluate three additional locations for an elemental mercury storage facility, all three of which were proposed as new construction in the vicinity of the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico. The 2013 Mercury Storage SEIS is relevant because it updated some of the relevant analyses for alternatives from the 2011 Mercury Storage EIS.

Supplement Analysis of the Final Long-Term Management and Storage of Elemental Mercury Environmental Impact Statement: In June 2019, DOE evaluated a potential decision to manage and store elemental mercury at the WCS facility near Andrews, Texas, in the *Supplement Analysis of the Final Long-Term Management and Storage of Elemental Mercury Environmental Impact Statement* (2019 Mercury SA) (DOE 2019). The 2019 Mercury SA evaluated changes in environmental conditions that had occurred since the initial analyses were completed in 2011 and updated in 2013, in accordance with 10 CFR § 1021.314(c). The SA also presented some additional changes that had occurred since 2011, which included:

- The total inventory of elemental mercury that was projected for the next 40 years in the 2011 Mercury Storage EIS (and subsequently evaluated in the 2013 Mercury Storage SEIS) was 10,000 MT. The 40-year projection evaluated in the 2019 Mercury SA was reduced to 6,800 MT. The derivation of this projection was presented in Appendix B of the 2019 Mercury SA and is updated in Section 2.1.2 of this Mercury Storage SEIS-II.

- The 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS evaluated the use of the existing Container Storage Building (CSB) at the WCS facility near Andrews, Texas, which had capacity to store up to 2,000 MT of elemental mercury. The 2011 EIS and 2013 SEIS also evaluated the construction of a new facility at WCS that could accommodate up to 10,000 MT of elemental mercury. In 2019, WCS identified a combination of two existing facilities (the CSB and the Bin Storage Unit 1) that could accommodate the analyzed inventory of 6,800 MT. Therefore, no new construction would be required to manage and store the full projected inventory.

The 2019 Mercury SA determined that the long-term management and storage of up to 6,800 MT of elemental mercury in existing buildings at the WCS facility near Andrews, Texas, would not constitute a substantial change from the proposal evaluated in the 2011 Mercury Storage EIS and updated in the 2013 Mercury Storage SEIS.

Record of Decision and Fee Rule. Supported by the analysis in the 2011 Mercury Storage EIS, 2013 Mercury Storage SEIS, and the 2019 Mercury SA, DOE published its ROD (84 FR 66890; December 6, 2019) to designate the WCS site near Andrews, Texas, for the management and storage of up to 6,800 MT (7,480 tons) of elemental mercury and to manage and store the elemental mercury in leased portions of existing buildings—the CSB and Bin Storage Unit 1—on the same WCS site. On December 23, 2019, DOE published its rule to establish the fee for long-term management and storage of elemental mercury (84 FR 70402, the "Fee Rule").

Subsequently, two domestic generators of elemental mercury, Coeur Rochester, Inc. and Nevada Gold Mines, LLC (NGM), filed complaints in United States District Court challenging, among other things, the validity of the Fee Rule and the designation (*Coeur Rochester, Inc. v. Brouillette et al.*, Case No. 1:19-cv-03860-RJL [D.D.C. filed December 31, 2019] and *Nevada Gold Mines*

LLC v. Brouillette et al., Case No. 1:20-cv-00141-RJL [D.D.C. filed January 17, 2020]). On August 21, 2020, DOE and NGM executed a settlement agreement that resolved NGM's lawsuit. Under the settlement agreement with NGM, DOE agreed to withdraw the designation of WCS as a facility of DOE for the purpose of long-term management and storage of elemental mercury and agreed to accept title to and store 112 MT of elemental mercury that was in temporary storage at NGM facilities as of December 31, 2019. Consistent with the settlement agreement, on September 3, 2020, DOE filed a motion in the District Court asking the Court to vacate and remand the Fee Rule. The District Court granted the motion to vacate and remand the Fee Rule on September 5, 2020. In an amended ROD, DOE subsequently withdrew the designation of WCS as the DOE facility for long-term management and storage, but also decided to store elemental mercury to which DOE accepts the conveyance of title pursuant to a legal settlement or proceeding at WCS, pursuant to MEBA (85 FR 63105, October 6, 2020). On April 25, 2021, the District Court signed a joint stipulation dismissing Coeur Rochester, Inc.'s lawsuit.

On March 7, 2022, DOE published another amended ROD (87 FR 12680) to withdraw the decision to store at WCS certain elemental mercury to which DOE accepts conveyance of title pursuant to a legal settlement or proceeding. The lease agreement between DOE and WCS for management and storage of elemental mercury expired on June 4, 2021, and DOE did not store mercury at WCS as a result of the previous December 6, 2019, ROD.

DOE's procurement process for a leased facility and services for long-term management and storage of elemental mercury. On October 14, 2020, DOE issued a Sources Sought Synopsis/Request for Information to identify companies capable of potentially providing (1) leased space for the long-term management and storage of elemental mercury generated in the United States and (2) the associated services necessary for the long-term management and storage of elemental mercury. Section 2.2.2 of this Mercury Storage SEIS-II identifies how information received in response to this Sources Sought/Request for Information has informed the alternatives evaluated in this SEIS-II. DOE will continue to obtain additional information in a procurement process that will be ongoing in parallel with the development of this Mercury Storage SEIS-II.[4] Information gained during the procurement process will inform the analysis and potential selection of a preferred alternative in this SEIS-II.

On December 3, 2020, DOE issued basic ordering agreements to five companies to conduct nationwide waste management services, including ancillary services such as the long-term management and storage of elemental mercury.[5] Section 2.2.3 of this Mercury Storage SEIS-II identifies how outreach efforts to these contract awardees also informed the alternatives evaluated in this SEIS-II. On February 4, 2022, DOE issued a Request for Task Order Proposals (RTP) to these five contract holders, seeking proposals to provide interim management and storage of the 112 MT of elemental mercury subject to the settlement agreement between DOE and NGM.

[4] On March 24, 2022, DOE issued a Request for Proposals for Elemental Mercury Long-Term Management and Storage (https://www.energy.gov/em/articles/doe-issues-request-proposals-elemental-mercury-long-term-management-and-storage). The initial capacity requirement in the procurement is 1,280 MT, which would not include mercury currently stored as a commodity at Y-12, As identified in Section 2.1.2 of this SEIS-II, the Y-12 mercury could be identified as a waste in the future. DOE could modify the capacity requirement as needs dictate.

[5] https://www.energy.gov/em/articles/doe-awards-basic-ordering-agreements-nationwide-low-level-mixed-low-level-waste

On March 17, 2022, DOE signed an Interim Action Determination that evaluates DOE's proposal to accept title to the 112 MT of elemental mercury from the NGM facilities and to provide interim management and storage of up to 120 MT, to allow for margin, of elemental mercury in a permitted facility selected by DOE based on responses to the RTP. The CEQ regulations at 40 CFR § 1506.1(a) state that "until an agency issues a finding of no significant impact, as provided in § 1501.6 of this chapter, or record of decision as provided in § 1505.2 of this chapter, no action concerning the proposal may be taken that would: (1) [h]ave an adverse environmental impact, or (2) [l]imit the choice of reasonable alternatives." DOE's implementing procedures refer to an "interim action" as "an action concerning a proposal that is the subject of an ongoing EIS and that DOE proposes to take before the ROD is issued, and that is permissible under 40 CFR 1506.1" (10 CFR § 1021.104(b)). As detailed in the Interim Action Determination, DOE determined that the proposed treatment, transportation, and interim management and storage of up to 120 MT of elemental mercury would not (1) have an adverse environmental impact; or (2) limit the choice of reasonable alternatives.[6] If DOE awards a task order as a result of the RTP and implements this interim action prior to issuance of the Final Mercury Storage SEIS-II, DOE will update the associated analyses in the Final SEIS-II to reflect the location and status of the elemental mercury subject to this interim action.

1.4 PROPOSED ACTION

DOE proposes to designate one or more facilities for the long-term management and storage of elemental mercury in accordance with MEBA. Facilities must comply with applicable requirements of Section 5(d) in MEBA, "Management Standards for a Facility," including the requirements of the *Solid Waste Disposal Act of 1965*, as amended by RCRA, and other state-specific permitting requirements (42 U.S.C. § 6939f(d)).

After completion of DOE's Proposed Action, DOE would establish the fee for long-term management and storage of elemental mercury through a rulemaking conducted pursuant to the *Administrative Procedure Act* (5 U.S.C. § 551 et seq.). DOE would evaluate the potential environmental impacts of the rulemaking in accordance with NEPA implementing procedures at 10 CFR Part 1021 at that time.

1.5 ORGANIZATION OF THIS SEIS

This Mercury Storage SEIS-II evaluates DOE's Proposed Action to designate one or more facilities for the long-term management and storage of elemental mercury.

This Mercury Storage SEIS-II consists of the following chapters:

- **Chapter 1, Introduction and Purpose and Need for Agency Action—**Provides background information on MEBA, describes the purpose and need and the Proposed Action, and summarizes other relevant NEPA documents and agency actions.
- **Chapter 2, Analytical Framework and the Identification Description, and Comparison of Alternatives—**Frames the analyses included in this SEIS-II and identifies

[6] The Interim Action Determination is available at: https://www.energy.gov/nepa/doeeis-0423-s2-supplemental-environmental-impact-statement-long-term-management-and-storage

and describes the government and commercial facilities that DOE considers reasonable alternatives. The chapter also provides a comparison of the potential environmental impacts of each of the alternatives, including the No-Action Alternative.

- **Chapter 3, Affected Environment—**Describes the potentially affected environments within the region of influence (ROI) for each of the reasonable alternatives.
- **Chapter 4, Environmental Consequences—**Describes the potential impacts on the affected environment from the Proposed Action for each of the alternatives, including the No-Action Alternative.
- **Chapter 5, References—**Lists the references cited in this Mercury Storage SEIS-II.
- **Chapter 6, List of Preparers—**Provides information about the DOE and contractor personnel that prepared this Mercury Storage SEIS-II.
- **Chapter 7, Glossary—**Provides definitions for key terms used in this Mercury Storage SEIS-II.
- **Chapter 8, Index—**Provides locations of key terms in this Mercury Storage SEIS-II.

2 ANALYTICAL FRAMEWORK AND THE IDENTIFICATION, DESCRIPTION, AND COMPARISON OF ALTERNATIVES

2.1 ANALYTICAL FRAMEWORK FOR THE MERCURY STORAGE SEIS-II

As stated in Section 1.4, DOE proposes to designate one or more facilities for the long-term management and storage of elemental mercury,[1] in accordance with MEBA's requirements at 42 U.S.C. § 6939f(a). The analysis of the Proposed Action requires the identification of several key parameters to establish a framework for the NEPA analysis. These key parameters include the following, which are addressed in more detail below:

- Duration of the Proposed Action assumed for analysis;
- Estimated mercury inventory used for analysis;
- Transportation of mercury to the DOE-designated storage facility; and
- Features of a mercury storage facility.

2.1.1 Duration of Proposed Action

The 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS assumed a mercury storage period of 40 years for the analysis of potential environmental impacts. The 40-year timeframe was consistent with the timeframe used in previous analyses (e.g., DLA 2004). A degree of uncertainty in this timeframe was acknowledged because there was no Environmental Protection Agency (EPA)-approved method of treating nonradioactive mercury for eventual land disposal, and it was unknown when such a treatment method would be available. Because the eventual treatment and disposal of mercury was highly speculative, the 2011 EIS and 2013 SEIS did not consider or evaluate its treatment or disposal; therefore, the previous evaluations only evaluated the 40-year storage timeframe.

As of the publication of this Draft Mercury Storage SEIS-II, there still is no EPA-approved treatment method for nonradioactive mercury for eventual disposal in the United States; however, US Ecology has petitioned the EPA for a site-specific Determination of Equivalent Treatment for its permitted disposal facility. The EPA has posted a notice on its website that acknowledges its review of US Ecology's request for a site-specific variance for a new Land Disposal Restriction treatment technology that stabilizes elemental mercury extracted from high-level mercury-containing wastes through a process of conversion to mercuric sulfide followed by double encapsulation and monofil disposal. According to the notice, upon completion of its review, EPA will post a public notice in the *Federal Register* of its intent to approve or deny the petition and to solicit public comment. If approved, EPA would propose revisions to the regulations. The treatment technology described in US Ecology's variance request could offer a permanent disposal solution for elemental mercury in the United States. The EPA estimates that its draft Notice of Proposed Rulemaking to revise the regulations could be issued by November 2022.[2]

[1] Throughout the balance of this Mercury Storage SEIS-II, DOE's use of the term "mercury" is synonymous with "elemental mercury," unless specifically stated otherwise.

[2] The status of EPA's review of the petition can be found at: https://www.reginfo.gov/public/do/eAgendaViewRule?pubId=202104&RIN=2050-AH21.

Section 2.6 of this Mercury Storage SEIS-II provides an overview of the Federal and state regulatory processes that would be required before an approved treatment method and disposal location could become a reality. As such, this Mercury Storage SEIS-II continues to consider the analysis and presentation of potential environmental impacts associated with treatment and disposal of mercury as speculative and assumes a 40-year mercury storage timeframe to be consistent with previous analyses. However, this SEIS-II includes a sensitivity study (Section 2.10) to provide a perspective of how the estimated environmental impacts might change if the duration required for DOE storage of MEBA mercury were shorter than 40 years. If a treatment method for mercury is approved and potential location(s) for land disposal are identified, DOE would evaluate, as appropriate, treatment and disposal actions related to elemental mercury stored in the DOE-designated facility under a separate NEPA review.

2.1.2 Estimated Elemental Mercury Inventory

The information in Tables 2-1 and 2-2 is compiled from information that was presented in the 2019 Mercury SA (DOE 2019). Table 2-1 provides the estimate of accumulated mercury inventory as of February 1, 2018 (consistent with the information in the 2019 Mercury SA) and includes an estimate of additional accumulation (primarily from ore processors) as of the date that DOE was required to accept mercury at a DOE-designated storage facility under MEBA (January 1, 2019; see Section 1.2 of this SEIS-II). Table 2-2 provides projected inventories of mercury subject to MEBA based on updated annual generation rates from those used in the 2011 Mercury Storage EIS. The information in these tables provides a basis for the estimate of storage capacity needed for the 40-year period used for analysis in this Mercury Storage SEIS-II.

Table 2-1 U.S. Inventories of Elemental Mercury in Storage as of January 1, 2019

Source	Quantity as of 2/1/2018 (MT)	Quantity as of 1/1/2019 (MT)	Notes
Nevada ore processors	38	148[a]	Estimated based on average monthly generation rates.
Other U.S. ore processors	11	12	Estimated based on assumed annual generation of 6 MT (5 percent of Nevada ore processors) accumulated since passage of the Chemical Safety Act of 2016.
Commercial storage	301	301	Based on inventory information provided by commercial storage entities in early February 2018.
NNSA	1,206	1,206	Currently stored at Y-12 in Oak Ridge, Tennessee. For analysis purposes, this inventory is assumed eventually to be managed as waste. Some or all could remain a commodity depending on NNSA mission needs.
Total	**1,600**	**1,700**	**Estimated inventory assumed subject to MEBA requirements. Rounded to two significant figures.**

MEBA=*2008 Mercury Export Ban Act*; MT=metric tons; NNSA=National Nuclear Security Administration
Note: To convert metric tons to tons, multiply by 1.1023.
a. Per the settlement agreement with NGM (as discussed in Section 1.3 of this Mercury Storage SEIS-II), the quantity of mercury that was in onsite storage in NGM's facilities was 112 MT as of December 31, 2019.
Source: Roach 2018

Table 2-2 also includes the generation estimates and sources used in the 2011 Mercury Storage EIS and the 2013 Mercury Storage SEIS for comparison. The 2011 Mercury Storage EIS and the

2013 Mercury Storage SEIS assumed a total accumulation during a 40-year period of 10,000 MT (11,000 tons) of elemental mercury, which was rounded up from an actual estimated maximum total of 9,700 MT (10,700 tons).

Table 2-2 Projections of Annual Generation of Mercury Subject to MEBA

Source	SEIS-II Estimate	2011 EIS Estimate[a]	Notes
Nevada ore processors	120 MT/yr	127 MT/yr	The actual maximum estimated rate in the 2011 Mercury Storage EIS was 122.5 MT per year, or 4,900 MT total, which is consistent with the current estimate. The additional 5 MT per year is due to rounding used in the 2011 EIS.
Other U.S. ore processors	6 MT/yr	1 MT/yr	Non-Nevada mining is conservatively assumed to represent an amount equivalent to about 5 percent of the elemental mercury generation.
Chlor-alkali plants	0 MT/yr	27 MT/yr	The 2011 Mercury Storage EIS assumed that a total of about 1,200 MT would be shipped to the DOE storage facility. Current information indicates that the chlor-alkali plants are dispositioning excess elemental mercury using Canadian facilities and, therefore, would not be stored at a DOE facility.[c]
Recycling and reclamation	5 MT/yr	63 MT/yr	The 2011 Mercury Storage EIS estimated a 40-year total of 2,500 MT. Based on current data, no excess mercury is being generated as a result of these activities; however, a small quantity is included to account for uncertainty.
Total annual generation	130 MT/yr	220 MT/yr	Reported to only two significant digits due to uncertainty in the estimates.
Total accumulated as of 1/1/2019	1,700 MT[b]	1,200 MT	The SEIS-II estimate is from Table 2-1 and includes all stored mercury as of January 1, 2019. The 2011 Mercury Storage EIS only accounted for the NNSA inventory in storage.
40-year total	6,900 MT (rounded to 7,000)	10,000 MT	The SEIS-II estimate is considered conservative based on the available information. Nevertheless, it represents about a 30-percent reduction from the 2011 Mercury Storage EIS.

MEBA=Mercury Export Ban Act; MT=metric tons; NNSA=National Nuclear Security Administration; yr=year

a. The values in this column were derived in the 2011 EIS but were also used for the analysis in the 2013 SEIS.

b. The SEIS-II estimate is from Table 2-1.

c. In accordance with MEBA, elemental mercury is first converted to a mercury compound prior to shipping to Canada.

Note: To convert metric tons to tons, multiply by 1.1023.

Source: Roach 2018

As demonstrated in Table 2-2, the annual generation rates assumed for this SEIS-II have decreased for some generators (as compared to 2011) and now total approximately 130 MT per year. Adding the projected MEBA mercury generated over the next 40 years to the estimated 1,700 MT already accumulated as of January 1, 2019 (from Table 2-1) yields about 7,000 MT, a reduction of about 30 percent from the 2011 EIS and 2013 SEIS.

As identified in Section 2.1.1, there is the possibility that a treatment and disposal approach for elemental mercury could be approved by regulatory authorities and available much earlier than 40 years. If a treatment and disposal approach becomes available and DOE completes the required steps to utilize that approach, DOE could begin the process of sending elemental mercury for treatment and ultimate disposal and eliminate the need for storage. This possibility introduces an uncertainty in the necessary capacity of a DOE-designated storage facility. For instance, if a treatment and disposal approach were available within five years, the total estimated amount of elemental mercury to be accumulated and need storage by that time would be about 2,500 MT.

2.1.3 Transportation of Mercury

Transportation of the mercury from source locations to the designated storage facility(ies) is analyzed as an element of the Proposed Action. To ensure a conservative analysis of potential transportation impacts, this Mercury Storage SEIS-II also considers the potential additional transportation for shipment of mercury from ore processors to a RCRA-permitted treatment facility to ensure that the mercury meets the waste acceptance criteria prior to shipment to the DOE-designated storage facility(ies). The 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS evaluated potential impacts of transportation by truck and rail. After further evaluation, it was determined that rail transportation is an unlikely transportation mode. Rail transportation requires truck transportation at the source location and at the storage facilities to move the mercury to and from the rail facility. This introduces additional handling (i.e., loading and unloading) of the mercury containers. Because mercury shipments would come from multiple source locations, the size of individual mercury shipments likely would be small relative to the capacity of railcars, making rail transportation less economical or efficient. Truck transportation can handle the size of mercury shipments and move the mercury containers directly from the generator to the storage facilities, eliminating additional handling of the mercury storage containers. Therefore, this Mercury Storage SEIS-II does not reevaluate rail transportation (see additional discussion in Section 2.8).

2.1.4 Features of a Mercury Storage Facility

As required by MEBA (42 U.S.C. § 6939f(d)), DOE developed guidance,[3] entitled *U.S. Department of Energy Interim Guidance on Packaging, Transportation, Receipt, Management, and Long-Term Storage of Elemental Mercury* (Interim Guidance) (DOE 2009), identifying the basic standards and procedures for the receipt, management, and long-term storage of mercury at a DOE facility. The Interim Guidance, which was prepared in 2009, is primarily based on laws, regulations, and DOE Orders and Standards, but also includes best management practices and other desired conditions and features.[4] The specific requirements for a DOE mercury storage facility are based on RCRA requirements and will be included in the procurement and contractual

[3] The Interim Guidance was prepared after consultation with EPA and all appropriate state agencies in affected states.

[4] The 2011 Mercury Storage EIS and 2013 SEIS included an assumption of 99.5% elemental mercury by volume, which was an assumption in DOE's 2009 Interim Guidance. This SEIS-II does not include this assumption; however, the analysis does assume that only RCRA hazardous waste with codes D009 and/or U151 would be in the containers, ensuring that no other hazardous materials need to be considered. Additionally, RCRA regulations require that the containers not include contaminants that would be corrosive or other incompatible materials (e.g., acid solutions, chloride salt solutions, water) that would compromise the integrity of the containers during storage, per 40 CFR 264/265.172.

documents associated with the designated facility(ies). Similarly, the waste acceptance criteria for a facility designated for long-term management and storage of elemental mercury would be specific to the facility designated and would be determined by the state regulator. As stated in Section 1.2 of the Interim Guidance, "In the future, this interim guidance may be supplemented and, as appropriate replaced (superseded) by the storage facility's site-specific standards and procedures after the DOE site designation is made." Development of the Interim Guidance demonstrated that existing regulations and national consensus codes and standards are adequate to determine the necessary capabilities and characteristics of a long-term mercury storage facility.[5] DOE is considering updates to the 2009 Interim Guidance.

In addition to shipping, handling, storage, and administrative areas, examples of the expected technical characteristics of a long-term mercury storage facility include:

- RCRA-regulated/permitted with proper spill containment features and emergency-response procedures,
- Fully enclosed[6] weather-protected building(s),
- Reinforced-concrete floors able to withstand structural loads of mercury storage,
- Ventilated storage and handling area(s),
- Fire suppression systems, and
- Security and access control.

These expectations are based on existing requirements prescribed in applicable RCRA regulations (e.g., 40 CFR Parts 264 and 265), Occupational Safety and Health Administration (OSHA) regulations (e.g., 29 CFR Part 1910, Subpart H, "Hazardous Materials, Subpart L Fire Protection," and Subpart Z, "Toxic and Hazardous Substances"), National Fire Protection Association (NFPA) standards (e.g., NFPA 101, "Life Safety Code"), and the International Building Code (IBC) (e.g., IBC Chapter 3, "Occupancy Classification and Use"), as well as state-specific requirements that may be imposed.

The mercury storage facility is assumed to accept two types of mercury containers: 3-liter (3-L) (76-pound) flasks and 1-MT (1.1-ton) containers. Figure 2-1 shows the typical 3-L flask and 1-MT container that are used to store mercury. These two types of containers are commercially available and routinely used in industry for storage and transport of elemental mercury. They are typically made of carbon steel and also satisfy the U.S. Department of Transportation hazardous materials regulations for mercury transport (49 CFR § 172.101).

[5] A national consensus code or standard is one that has been adopted and promulgated by a nationally recognized code- or standard-producing organization (e.g., Occupation Safety and Health Administration, National Fire Protection Association).

[6] This requirement is implied by 40 CFR § 264/265.173(b), which states that a hazardous waste container must not be *"…stored in a manner which may rupture the container or cause it to leak."* For long-term storage, extending potentially for several decades, exposure of carbon steel containers to weather elements could result in container failures and not be compliant with this regulation.

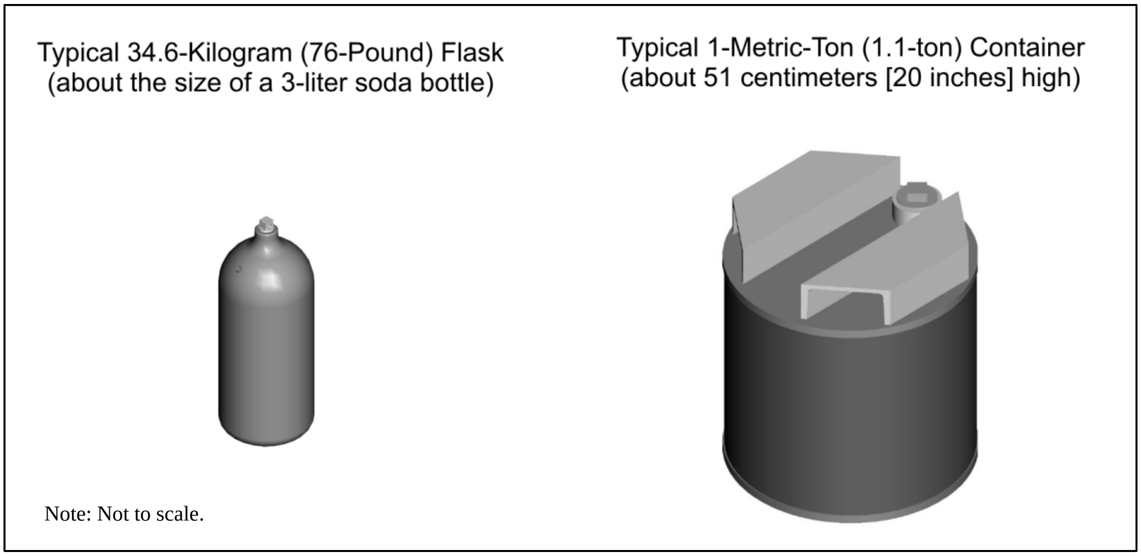


Figure 2-1 Typical Elemental Mercury Storage Containers

Based on the facility structural capabilities, the storage containers may be single- or double-stacked, depending on seismic and safety considerations and lifting equipment limitations, as well as the requirements of the RCRA permit. If stacking were implemented, its configuration would have to provide for compliance with RCRA inspection and containment requirements (e.g., 40 CFR § 264/265.174 and 40 CFR § 264/264.175).

The facility would have a reinforced-concrete floor, strong enough to withstand the heavy loads from mercury storage. The facility would utilize spill containment trays or have floors treated with an epoxy or other acceptable sealant to add strength and make them impervious to mercury leaks and spills and water from the fire suppression system. The facility would include a receiving and shipping area. The facility would be RCRA-regulated and -permitted, and thus would require, among other things, secondary containment (e.g., curbing), regular inspection of stored materials, strict recordkeeping, and periodic reporting. The building would have ventilation, fire suppression, and security monitoring systems appropriate for a RCRA-permitted mercury storage facility and as determined by NFPA and IBC requirements. Security provided for the facility would reduce the threat of inadvertent or deliberate unauthorized access to the facility. Security measures might include fences, barriers, locks, video monitoring, alarms, and guards.

Operations personnel would include management and administrative staff, facility technicians, facility maintenance staff, and security staff. Worker activity levels at the storage facility would increase during periods of receipt of mercury shipments. Facility technicians would be responsible for inspections and leak and small-spill response. Facility maintenance staff would be responsible for maintaining the operability of the building(s).

2.2 IDENTIFICATION OF POTENTIAL STORAGE FACILITIES AS ALTERNATIVES IN THIS MERCURY STORAGE SEIS-II

The alternatives considered in the 2011 Mercury Storage EIS and the 2013 Mercury Storage SEIS included construction of new facilities and the use of existing facilities for the long-term management and storage of mercury. These alternatives are identified in Table 2-3. In this

Mercury Storage SEIS-II, DOE's range of reasonable alternatives includes existing facilities that could be designated with only minor modifications to meet the permitting requirements for mercury storage. Construction of a new facility generally would not meet the purpose and need for agency action, as identified in Section 1.2 of this SEIS-II, since schedule delays associated with new construction would further exacerbate the MEBA requirement that a DOE-designated storage facility be operational by January 1, 2019. New construction would add at least three years, when compared to using existing facilities, negatively impacting the statutorily imposed schedule for DOE's receipt of elemental mercury. Additionally, new construction would result in construction-related environmental impacts that would not otherwise be realized if existing facilities were used. Additional details related to the schedule requirements are described in Section 1.2 of this SEIS-II.

Table 2-3 Alternatives Evaluated in the 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS

Facility Alternative	Location	New Construction/Existing
2011 Mercury Storage EIS		
DOE Grand Junction Disposal Site	Grand Junction, Colorado	New Construction
DOE Hanford Site	Near Richland, Washington	New Construction
Hawthorne Army Depot	Hawthorne, Nevada	Existing Facility
DOE Idaho National Laboratory	Near Idaho Falls, Idaho	Existing Facility and New Construction
Bannister Federal Complex	Kansas City, Missouri	Existing Facility
DOE Savannah River Site	Near Aiken, South Carolina	New Construction
Waste Control Specialists LLC Site	Near Andrews, Texas	Existing Facility and New Construction
2013 Mercury Storage SEIS		
Waste Isolation Pilot Plant (three separate locations)	Near Carlsbad, New Mexico	New Construction

Sources: DOE 2011, 2013

Of the four existing facilities evaluated in the 2011 Mercury Storage EIS, two remain as reasonable alternatives: HWAD and the WCS site. Since 2011, portions of the Bannister Federal Complex have been transferred from DOE to a private entity and rezoned as an urban redevelopment district. Therefore, this facility is no longer considered a reasonable alternative for mercury storage. The planning basis and the availability of the existing facilities at the Idaho National Laboratory Radioactive Waste Management Complex has changed, and those facilities are no longer considered a reasonable alternative for mercury storage. DOE is planning to demolish these facilities and close the Complex once its current radioactive waste mission is completed, which is not expected for several years. Therefore, this Mercury Storage SEIS-II updates the analysis for the HWAD and the WCS site alternatives (existing facility only).

This Mercury Storage SEIS-II also evaluates other alternative facilities that maintain or would be capable of maintaining a RCRA Part B permit for the long-term management and storage of mercury. DOE used four methods to identify these additional alternatives: (1) DOE contacted commercial facilities that had previously certified to DOE that they meet the requirements to accept and store elemental mercury at least until the DOE-designated facility is operational and accepting shipments of mercury;[7] (2) DOE issued a Sources Sought Synopsis/Request for Information to identify companies to potentially provide leased space and/or associated services for the management and storage of mercury; (3) DOE issued basic ordering agreements to companies to conduct nationwide waste management services, including ancillary services such as management and storage of mercury; and (4) DOE reevaluated existing facilities on DOE property that could be repurposed for the management and storage of mercury. Past and ongoing procurement actions were used only to assist in the identification of potential reasonable alternatives for consideration in this SEIS-II. Evaluation of an alternative in this SEIS-II does not prejudice any future procurement actions DOE would take to contract services related to long-term management and storage of mercury. Each of the four methods is addressed below.

2.2.1 Method #1 – Certifying Facilities

As provided for and authorized under MEBA, elemental mercury may be stored at a permitted facility until DOE designates a mercury storage facility if the owner or operator of the facility certifies in writing to the Secretary of Energy that: (1) it will ship the mercury to the DOE facility when the facility is available, and (2) it will not sell or otherwise place the elemental mercury into commerce. Nine permitted private facilities (seven commercial entities) around the United States previously submitted notification/certification letters to DOE stating that they meet the requirements to accept and store elemental mercury until a DOE-designated storage facility opens. These companies, listed below, certified that they would ship the elemental mercury to a DOE-designated facility when such a facility is operational and ready to accept the mercury under MEBA.

- Bethlehem Apparatus Company, Inc.
- Clean Harbors Environmental Services, Inc. (three facilities)[8]
- Heritage Environmental Services
- Lamp Environmental Industries, Inc.
- The Environmental Quality Company (US Ecology)[9]
- Veolia Environmental Services (Veolia)
- Waste Management Mercury Waste, Inc./Chemical Waste Management, Inc.[10]

From July 2016 through November 2016, DOE consulted with MEBA permittees[11] and other stakeholders affected by MEBA. The purpose of the consultation outreach was to obtain updated input from Federal and private stakeholders on the manner in which mercury was being processed, managed, and stored; information on the amount of mercury in storage and a projection of annual amounts of mercury that could be generated; and identification and estimation of major cost elements associated with mercury management and storage. As a result of the outreach, two of

[7] The permitted mercury storage facility notifications can be found at the following link: https://www.energy.gov/em/downloads/permitted-mercury-storage-facility-notifications

[8] Clean Harbors Environmental Services, Inc., (hereafter Clean Harbors) owns three certifying, permitted facilities. Effectively, there are nine permitted facilities with seven entities certifying capability to accept elemental mercury under MEBA.

[9] After the certification was received, The Environmental Quality Company was acquired by US Ecology.

[10] Hereafter, referred to as “Waste Management.”

[11] The companies listed above that certified under MEBA are referred to in this SEIS-II as MEBA permittees.

the MEBA permittees, Bethlehem Apparatus Company and Waste Management, responded and indicated that they were interested and capable of providing commercial services to manage or store elemental mercury in a DOE-designated facility.

In 2017 and 2018, DOE conducted additional outreach to refine and expand the information gathered through the initial MEBA permittee and stakeholder consultation from 2016. DOE invited the seven MEBA permittees to participate in the meetings. Three MEBA permittees, Bethlehem Apparatus Company, Waste Management, and US Ecology, accepted the opportunity to meet and share information with DOE. As a result of these meetings, DOE again determined that two of the MEBA permittees, Bethlehem Apparatus Company and Waste Management, were interested and capable of providing commercial services to manage or store elemental mercury in a DOE-designated facility.[12]

In early 2021, DOE again contacted the same seven MEBA permittees to identify whether any of their permitted facilities could be considered as reasonable alternatives for the long-term management and storage of mercury, to inform this Mercury Storage SEIS-II. Of the permittees that responded, DOE determined that Bethlehem Apparatus Company, Clean Harbors, and Veolia are currently engaged in commercial services to manage and store elemental mercury, had one or more facilities that had sufficient capacity to be considered a reasonable alternative for the Proposed Action, and were interested in potentially providing these services to DOE. The Bethlehem Apparatus facility is located in Bethlehem, Pennsylvania. Clean Harbors has proposed three potential facilities located in Pecatonica, Illinois; Greenbrier, Tennessee; and Tooele, Utah (referred to as Clean Harbors Grassy Mountain). The Veolia facility is located in Gum Springs, Arkansas. Waste Management notified DOE that it had made a business decision and was not interested in offering a Waste Management facility as a potential candidate leased site for long-term mercury storage.

2.2.2 Method #2 – Sources Sought Synopsis/Request for Information

As identified in Section 1.3 of this Mercury Storage SEIS-II, on October 14, 2020, DOE issued a Sources Sought Synopsis/Request for Information to identify companies capable of potentially providing (1) leased space for the long-term management and storage of elemental mercury generated in the United States and (2) the associated services necessary for the long-term management and storage of elemental mercury. The Sources Sought Synopsis/Request for Information solicited "input via capability statements from potential offerors that have specialized facilities and capabilities necessary to accomplish these goals in a manner that would provide the best value to the U.S. taxpayer."[13]

In response to the October 14, 2020, request, WCS and Perma-Fix Environmental Services submitted information regarding their facilities near Andrews, Texas, and Kingston, Tennessee, respectively. DOE determined that these facilities were reasonable alternatives and should be evaluated in this SEIS-II.

[12] US Ecology does not provide elemental mercury storage services. It manages the disposal of mercury compounds for a hazardous waste disposal site in Canada. US Ecology has petitioned the EPA for a Determination of Equivalent Treatment for its permitted disposal facility. See Section 2.1.1 for details.

[13] https://www.emcbc.doe.gov/seb/mercurystorage/RFI.php

2.2.3 Method #3 – Basic Ordering Agreements

On December 3, 2020, DOE issued basic ordering agreements to five companies to conduct nationwide waste management services, including ancillary services such as the long-term management and storage of elemental mercury.[14]

As part of this outreach effort, in early 2021, DOE contacted the awardees to determine their interest and capabilities related to the Proposed Action. As a result, DOE determined that WCS, Perma-Fix, and Veolia have existing facilities that could be considered within the range of reasonable alternatives considered in this Mercury Storage SEIS-II. The other awardees did not respond or identify existing facilities that could potentially meet the Department's needs for management and storage of mercury.

As identified in Section 1.3 of this Mercury Storage SEIS-II, on February 4, 2022, DOE issued an RTP to these five contract holders, seeking proposals to provide interim management and storage of the 112 MT of elemental mercury subject to the settlement agreement between DOE and NGM.

On March 17, 2022, DOE signed an Interim Action Determination that evaluates DOE's proposal to accept title to the 112 MT of mercury from the NGM facilities and to provide interim management and storage of up to 120 MT, to allow for margin, of elemental mercury in a permitted facility selected by DOE based on responses to the RTP.[15] If DOE awards a task order as a result of the RTP and implements this interim action prior to issuance of the Final Mercury Storage SEIS-II, DOE will update the associated analyses in the Final SEIS-II to reflect the location and status of the elemental mercury subject to this interim action.

2.2.4 Method #4 – Existing DOE Facilities

As identified in Section 1.5.1 of the 2011 Mercury Storage EIS, DOE previously evaluated sites within the DOE complex that met its objective criteria for consideration as a reasonable alternative. Those criteria, listed below, are still applicable today:

- The facility(ies) would not create significant conflict with any existing DOE site mission and would not interfere with future mission compatibility.
- The candidate host location has an existing facility(ies) suitable for mercury storage with the capability and flexibility for operational expansion, if necessary.
- The facility(ies) is (are), or would be, capable of complying with RCRA permitting requirements, including siting requirements.
- The facility(ies) has (have) supporting infrastructure and a capability or potential capability for flooring that would support mercury loadings.

[14] https://www.energy.gov/em/articles/doe-awards-basic-ordering-agreements-nationwide-low-level-mixed-low-level-waste

[15] The Interim Action Determination is available at: https://www.energy.gov/nepa/doeeis-0423-s2-supplemental-environmental-impact-statement-long-term-management-and-storage

- Storage of mercury at the facility(ies) is compatible with local and regional land use plans, and new construction would be feasible, as may be required.
- The facility(ies) is (are) accessible to major transportation routes.
- The candidate location has sufficient information on hand to adequately characterize the site.

On May 3, 2021, the Acting Assistant Secretary for DOE's Office of Environmental Management sent a letter to the other DOE offices and programs for assistance in the identification of any existing DOE facilities that could meet the above criteria and be considered as reasonable alternatives in this Mercury Storage SEIS-II (White 2021). No additional facility alternatives were identified from this effort.

2.2.5 Summary of Identified Reasonable Alternatives

Through an evaluation of the alternatives analyzed in previous NEPA documents and the outreach efforts described above, DOE has identified the following reasonable alternative sites for evaluation in this Mercury Storage SEIS-II:

- HWAD in Hawthorne, Nevada;
- WCS site near Andrews, Texas;
- Bethlehem Apparatus Company in Bethlehem, Pennsylvania;
- Perma-Fix Diversified Scientific Services, Inc. (Perma-Fix DSSI), in Kingston, Tennessee;
- Veolia in Gum Springs, Arkansas; and
- Clean Harbors (facilities in Pecatonica, Illinois; Greenbrier, Tennessee; and Tooele, Utah).

Sections 2.3.1 through 2.3.6 describe the characteristics and processes associated with each identified potential mercury storage facility.

2.3 DESCRIPTION OF REASONABLE ALTERNATIVE SITES

Based on the methods described in Section 2.2, DOE identified six reasonable alternatives with eight site locations (Figure 2-2). One alternative (Clean Harbors) has three site locations, including one with multiple co-located buildings. Most of the other alternatives include multiple co-located buildings that could be used for mercury storage. This Mercury Storage SEIS-II evaluates all eight sites for the potential long-term management and storage of mercury. Table 2-4 compares key physical characteristics of the eight site locations.

Figure 2-2 Locations of Alternative Sites being Evaluated for Long-Term Management and Storage of Mercury

Table 2-4 Comparison of the Physical Characteristics of Potential Mercury Storage Locations

Location Characteristic	Hawthorne Army Depot[a]	WCS Site[b]	Bethlehem Apparatus[c,d]	Perma-Fix DSSI[e]	Veolia Gum Springs[f]	Clean Harbors Grassy Mountain[g]	Clean Harbors Greenbrier[h]	Clean Harbors Pecatonica[i]
Location	Hawthorne, NV	Andrews County, TX	Bethlehem, PA	Kingston, TN	Gum Springs, AR	Tooele, UT	Greenbrier, TN	Pecatonica, IL
Site Property Size	147,000 acres	13,500 acres	10 acres	80 acres	1,400 acres	640 acres	12 acres	10 acres
Developed Area Footprint[j]	175 acres	1,338 acres	10 acres	12 acres	75 acres	0.4 acres	5.3 acres	4 acres
Number of Buildings w/in Proposed Facility	Up to 29	1	2	2	1	1	1	2
Building(s) size (length by width)	Three storehouse types 200×50 ft 160×50 ft 100×50 ft	190×166 ft	Bldg 945 192×160 ft Bldg 1055 120×120 ft	CSBU 140×60 ft CSBU Expansion 140×60 ft	Rectifier Area 368×47 ft Sand and Lime Area 378×67 ft Second Cut Area 210×66 ft	80×73 ft	100×60 ft	CSB-1 100×60 ft CSB-2 274×168 ft
Building(s) Height	14.8 ft	25 ft	Bldg 945 20 ft Bldg 1055 24 ft	18.5 ft	44.9 ft	30 ft	20 ft	CSB-1 12 ft CSB-2 16–20 ft
Building Construction	Concrete floor, walls, and support columns with steel roof trusses and transite roofing	Steel frame, metal building on concrete with 24-in-diameter piers	Steel frame, insulated metal walls, and concrete slab-on-grade floor	Steel frame, insulated metal walls, pier/footing, and foundation concrete slab-on-grade floor	Concrete and steel	Steel frame, insulated metal walls, and concrete slab floor	Pre-engineered steel frame with insulated metal walls	Steel frame, insulated metal walls, and concrete slab floor

Location Characteristic	Hawthorne Army Depot[a]	WCS Site[b]	Bethlehem Apparatus[c,d]	Perma-Fix DSSI[e]	Veolia Gum Springs[f]	Clean Harbors Grassy Mountain[g]	Clean Harbors Greenbrier[h]	Clean Harbors Pecatonica[i]
Available Storage Space	220,000 ft^2	24,874 ft^2	Bldg 945 30,110 ft^2 Bldg 1055 14,400 ft^2	CSBU 6,450 ft^2 CSBU Expansion 8,400 ft^2	Rectifier Area 17,296 ft^2 Sand and Lime Area 25,326 ft^2 Second Cut Area 13,860 ft^2	5,840 ft^2	2,430 ft^2	CSB-1 4,360 ft^2 CSB-2 29,232 ft^2
Estimated Mercury Storage Capacity (metric tons)	7,000	3,000	Bldg 945 3,000 Bldg 1055 3,000	CSBU 1,200 CSBU Expansion 1,800	6,352 to 12,704	900	1,875	CSB-1 2,465 CSB-2 12,330
RCRA Permitted for Hazardous Waste	Yes, not specific to these buildings for mercury storage	Yes, permitted for mercury storage	Bldg 945 – Yes Bldg 1055 – No	Yes, modification to increase storage capacity	Yes, modification may be required	Yes, expect a Class 2 permit mod from Utah for mercury.	Yes, permitted to store mercury	Yes, permitted to store mercury
Secondary Containment	No	Yes	Yes	Yes	No	Yes	Yes	Yes
Floor Sealant	No	Yes	Yes	Yes	No	In Progress	Yes	Yes

Location Characteristic	Hawthorne Army Depot[a]	WCS Site[b]	Bethlehem Apparatus[c,d]	Perma-Fix DSSI[e]	Veolia Gum Springs[f]	Clean Harbors Grassy Mountain[g]	Clean Harbors Greenbrier[h]	Clean Harbors Pecatonica[i]
Access/ Security	Military Base Manned control point 24/7 security patrols	Facility located within a larger hazardous waste storage complex with perimeter fence and gated access.	Work area fenced and gated. Facility secured with locks and access codes, motion sensor detectors, and third-party 24/7 monitoring service.	Facility enclosed by a 6-ft-high chain-link fence. Access controlled through manned security gate.	Facility enclosed by a 6-ft-high chain-link fence with three strands of barbed wire. Access controlled through security gate.	Facility enclosed by a 6-ft-high chain-link fence with three strands of barbed wire. Access controlled through security gate.	Facility enclosed by a 6-ft-high chain-link fence with three strands of barbed wire. Access controlled through security gate. Facility secured with alarm system and third-party 24/7 monitoring service.	Facility enclosed by a 6-ft-high chain-link fence with three strands of barbed wire. Access controlled through security gate.
Fire Suppression	No	Yes	Bldg 945 – Yes Bldg 1055 – Yes	Yes	Yes	Yes	Yes	Yes
Ventilation System	No	Mechanical	Mechanical	Mechanical	Passive	Mechanical/ passive	Passive	Passive

Bldg=building; CSB=Container Storage Building; CSBU=Container Storage Building Unit; ft=foot/feet; WCS=Waste Control Specialists LLC

a HWAD 2021
b WCS 2021a
c Bethlehem Apparatus 2021
d Bethlehem Apparatus buildings are located on two separate land parcels.
e Perma-Fix DSSI 2021
f Veolia 2021
g Clean Harbors Grassy Mountain 2021
h. Clean Harbors Greenbrier 2021
i Clean Harbors Pecatonica 2021
j Developed area footprint is the developed area within each site location (in some cases may include maintained landscape areas). Proposed facilities could include multiple buildings.

As applied to existing facilities evaluated in this Mercury Storage SEIS-II, DOE expects that some of the buildings being considered may require minor modifications to meet the applicable regulatory (i.e., NFPA, OSHA, IBC) and RCRA permit requirements for storing mercury. Additionally, for Federal Government-owned facilities, compliance with applicable DOE standards may also be required. Characteristics of the building systems, such as fire protection, ventilation, secondary containment, and security, and permitted uses vary among the site locations based on current use, building size, and current permit conditions. For example, mercury vapor monitors may need to be added to mercury storage and handling areas. Because it is not possible to identify each modification that may be required for each building, for the purposes of this SEIS-II, these are considered minor modifications that occur internal to the building and do not affect the analysis of potential impacts. In addition, RCRA permit modifications required prior to mercury storage, including updates to Emergency Response Plans, would address various building systems. DOE assumes that the designated building(s) for mercury storage would meet Federal and/or state permit requirements prior to acceptance, receipt, and storage of mercury and provide the appropriate safeguards and protections to workers and the general public. Depending on the regulator, the applicable RCRA permit may be modified to include the DOE as a co-permittee.

2.3.1 Alternative 1: Hawthorne Army Depot

The HWAD is located just outside Hawthorne, Nevada. The 147,000-acre site is owned and managed by the U.S. Department of Defense (DoD). The HWAD contains 2,427 magazines (storage buildings for military ammunition, explosives, or provisions) and 488 buildings with a combined storage footprint of 7,685,000 square feet (DOE 2011).

Facility Characteristics and Storage

Under this alternative, DOE would designate a maximum of 29 buildings in the Central Magazine Area (Group 110 design storehouses). The buildings include three sizes of storehouses: 50 by 100, 50 by 160, and 50 by 200 feet (HWAD 2021). Assuming each sized building comprises about one-third of the 29 buildings, the buildings would provide up to approximately 220,000 square feet of space for DOE storage of mercury (Figure 2-3). Many of these buildings are currently used for storage (HWAD 2021). HWAD would remove and re-warehouse these materials prior to use for mercury storage. Modifications to the proposed buildings would be required prior to DOE storage of mercury and would include modifying some space to create a handling area; reinforcing and appropriately sealing the floors; and installing spill-control berms or curbing, fire protection systems, ventilation systems, and necessary utilities. These 29 buildings are similar to the 14 buildings designated for DNSC storage of mercury before they were modified.[16] HWAD operates under an existing RCRA permit. However, the RCRA permit would have to be modified for DOE mercury, or a new RCRA permit may be required. Figure 2-4 shows the location of the 29 storage buildings in relation to the DNSC mercury storage buildings and other buildings within the HWAD. Truck access is available to each building in the Central Magazine Area. The buildings

[16] The DoD currently stores 4,436 metric tons (4,890 tons) of DNSC elemental mercury in fourteen buildings (Group 110 design storehouses) in the Central Magazine Area. The design of the buildings consists of reinforced-concrete walls, floors, and foundations. The roof materials are steel truss systems covered with asbestos concrete (transite) roofing material. This mercury is separate from the elemental mercury analyzed in this Mercury Storage SEIS-II.

are located within a restricted area behind a manned control point and round-the-clock security patrols.

Figure 2-3 Existing Storage Buildings at the HWAD in Nevada

Under 10 U.S.C. § 2692, DoD is prohibited from the use of a DoD installation for the storage, treatment, or disposal of any material that is a toxic or hazardous material and that is not owned either by DoD or by a branch of the armed forces.

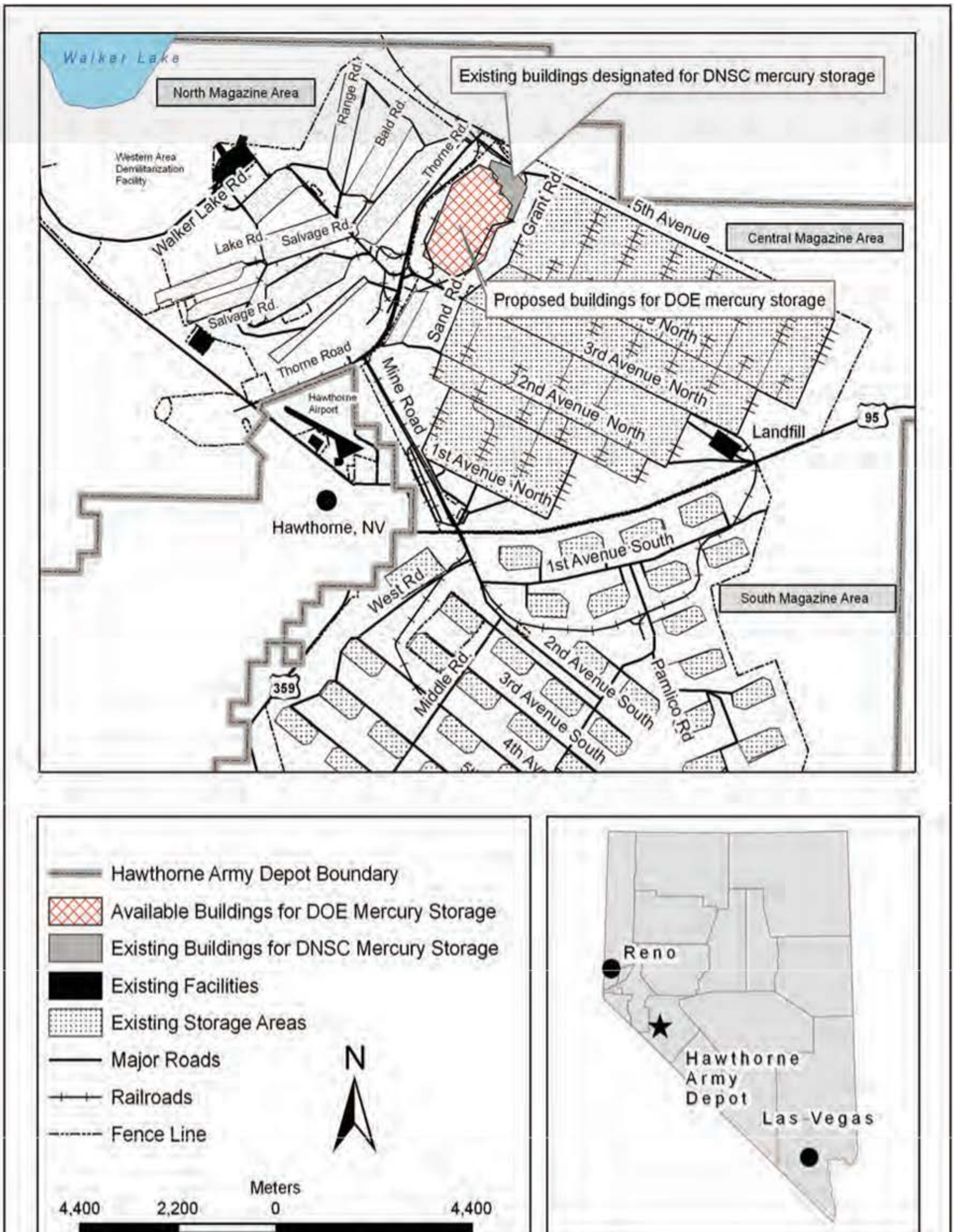
Under certain limited circumstances, the Secretary of Defense may grant exceptions. DOE may not store elemental mercury, a toxic or hazardous material, at HWAD unless and until DoD grants DOE a specific exception to do so, or DoD leases or transfers an appropriate portion of the HWAD site to DOE or the General Services Administration (and the General Services Administration subsequently transfers or leases that property to DOE). DOE has discussed with DoD the possibility of using a portion of the HWAD site as a mercury storage location and considers HWAD to be a reasonable alternative.

If selected, DOE would initiate communication with DoD and the General Services Administration concerning transfer and lease of select, excess HWAD facilities to DOE. The activities that must be completed prior to acceptance of mercury at HWAD would include the following:

- Transfer of select buildings from the DoD to the General Services Administration through coordination with the Army Corps of Engineers. The completion of the reviews and coordination of these activities is estimated to require at least 18 months from any ROD.

- Permitting of select buildings under RCRA and the Chemical Accident Prevention Program by the Nevada Department of Environmental Protection. Prior to receipt of mercury for long-term management and storage at HWAD, the State of Nevada would need to approve a permit for the modified buildings. The completion of this permitting process is estimated to require from 9 to 12 months from the time an application was submitted, which could not occur until a near-final design was developed.

- Any additional consultations (e.g., Nevada State Historic Preservation Office [SHPO]).



Note: To convert meters to feet, multiply by 3.281.

Key: DNSC=Defense National Stockpile Center, DOE=U.S. Department of Energy.

Figure 2-4 Location of Proposed Buildings for Storage of DOE Mercury in Central Magazine Area at HWAD

2.3.2 Alternative 2: Waste Control Specialists Site

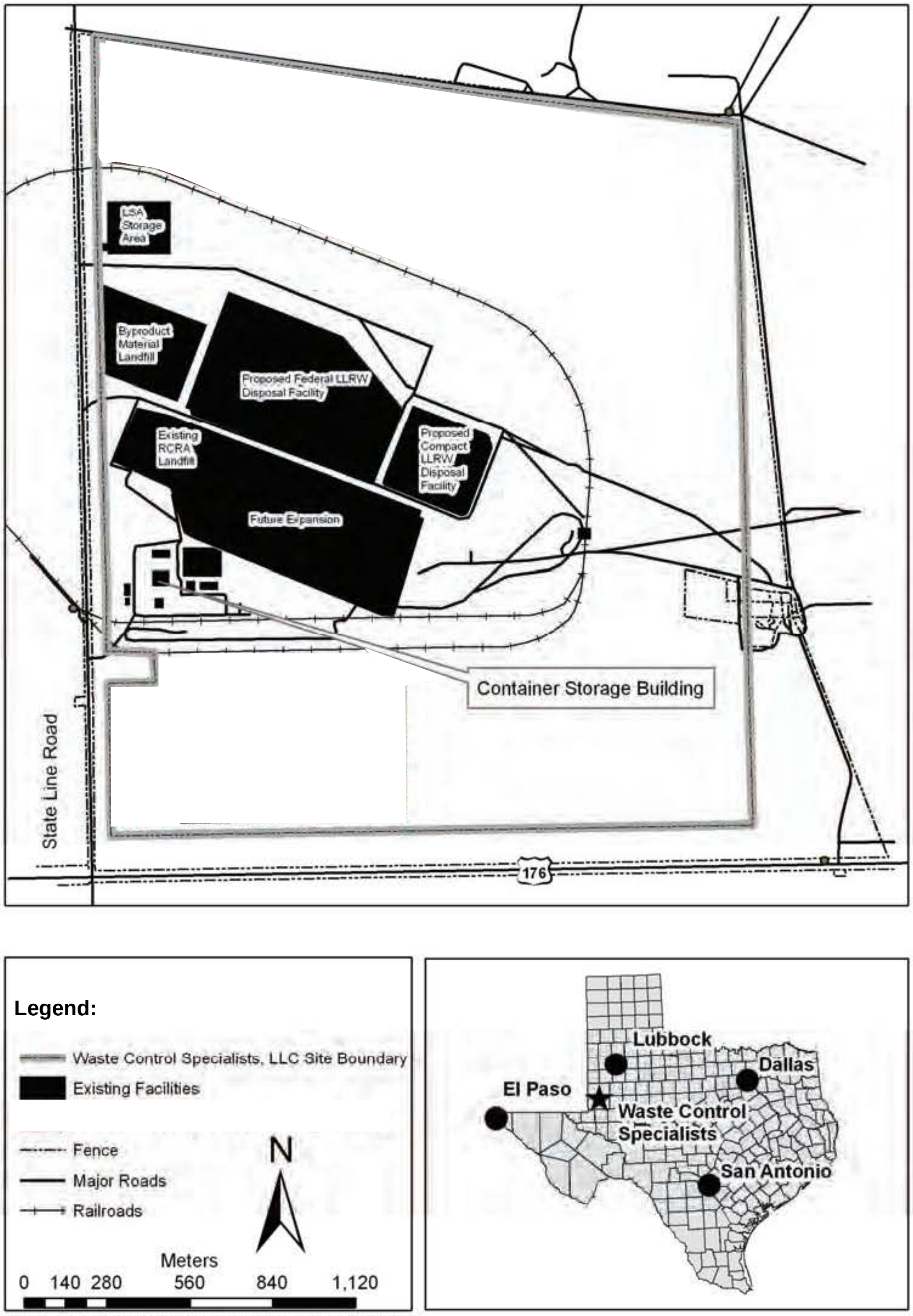
WCS owns a 13,500-acre site located approximately 31 miles west of Andrews, Texas, and six miles east of Eunice, New Mexico. Within this site, WCS operates a 1,338-acre facility for the treatment, storage, and landfill disposal of various hazardous and radioactive wastes. This facility is licensed by the Texas Commission on Environmental Quality and consists of the Texas Compact Waste Facility, Federal Waste Facility, the Byproduct Facility, a landfill for disposal of hazardous waste, and an area for the treatment and storage of various waste streams.

Facility Characteristics and Storage

Within the developed area designated for treatment and storage of hazard waste, the CSB is configured to store hazardous waste and has been modified to store elemental mercury (Figure 2-5). The CSB is a commercial-grade metal building sitting on a reinforced concrete foundation with 24-in-diameter piers. The CSB is 190 by 166 feet and is currently permitted to store mercury to which DOE has accepted title. The CSB has 10 bermed container storage areas and two separate drum staging areas. These areas are designed to provide protection from the external environment and isolation from other storage areas in the event of a leaking source. Four of the bermed container storage areas are currently permitted for the long-term storage of mercury under MEBA. The current permitted storage capacity is 1,206 MT (1,330 tons) of mercury, assuming a container mixture of 948 1-MT containers and 129 pallets of 3-L flasks (WCS 2021a). With additional permit modifications, the total available mercury storage capacity could be approximately 3,000 MT (3,307 tons). Potential additional storage capacity could be available in a second existing facility with permit authorizations if needed in the future.

Figure 2-5 Container Storage Building at Waste Control Specialists Site

As shown in Figure 2-6, the CSB is located within a larger hazardous waste disposal and storage area that is secured with a perimeter fence and gated access. The CSB is equipped with a fire suppression system. The 10-compartment storage area in the CSB is ventilated by two exhaust fans (WCS 2021a). The mercury storage area is equipped with a mercury vapor monitor. WCS also has available several mercury spill kits, vapor suppressant, drum overpacks, and a mercury vacuum with filtration.



Note: To convert meters to feet, multiply by 3.281.

Key: LLRW=Low-Level Radioactive Waste, LSA=Liquid Storage Area, RCRA=Resource Conservation and Recovery Act.

Figure 2-6 Location of Proposed CSB for Storage of DOE Mercury at the WCS Site

2.3.3 Alternative 3: Bethlehem Apparatus Site

Bethlehem Apparatus Company operates two sites in Northampton County in eastern Pennsylvania that use various methods for the treatment of mercury. The original "Hellertown Site" is located at 890 Front Street, Hellertown, Pennsylvania. The newer "Bethlehem Site" is located at 935 and 945 Bethlehem Drive, Bethlehem, Pennsylvania, and consists of two buildings on a 7.2-acre parcel in a mixed commercial/industrial area. These buildings are operated as one RCRA-permitted facility through site access control. A third building at the Bethlehem Facility is located at 1055 Win Drive, approximately 460 feet south of 935 Bethlehem Drive, on a 1.24-acre parcel. The Bethlehem Drive facility has two primary processes: (1) reclamation of mercury from mercury-bearing hazardous waste for sale to commercial and industrial users and (2) mercury retirement in which elemental mercury is converted to mercury sulfide for potential landfill disposal.[17] The 935 Bethlehem Drive building is approximately 38,400 square feet and includes an office area, a paved receiving lot, a material sorting and preparation area with various safety and handling equipment, an enclosed and covered container storage area, six high-vacuum mercury retorts and associated equipment, a high-vacuum auto-feed retort system, a calomel (mercurous chloride) process area, a research and development laboratory, and a mercury amalgamation area (for mercury retirement). The 945 Bethlehem Drive building is primarily used for storage of incoming waste materials to be processed and materials that have been processed and are awaiting disposition. A mercury decanting operation in Building 945 purifies mercury product prior to shipping off site. The 1055 Win Drive building is used as general warehouse storage. Adjacent sites are commercial/light industrial properties. Beyond the adjacent commercial/light industrial properties are some scattered enclaves of residential houses.

The existing storage buildings at 945 Bethlehem Drive and 1055 Win Drive are being considered for the DOE mercury storage facility(ies) and can provide for up to approximately 6,000 MT (6,600 tons) of mercury storage capacity.

<u>Facility Characteristics and Storage</u>

<u>Building 945</u>

The Bethlehem Apparatus primary candidate mercury storage facility is the operational, RCRA-permitted facility located at 945 Bethlehem Drive, Bethlehem, Pennsylvania (FigureFigure 2-7). Building 945 is a standard industrial structure constructed of a steel frame with insulated metal walls and a concrete slab-on-grade floor. The building measures 192 by 180 feet and is 20 feet high, providing a total of 30,110 square feet of floor space. Due to co-located storage of other waste materials, this building has a mercury storage capacity of up to approximately 3,000 MT (3,300 tons).

[17] At present, landfill disposal is not allowed in the United States; however, Bethlehem Apparatus prepares mercury sulfide for clients proposing to dispose of mercury in Canada.

Figure 2-7 Bethlehem Apparatus Building 945 (foreground) and Building 935 (rear left)

The floor in Building 945 has been sealed with a polymer coating, in accordance with permit requirements, to ensure that no waterborne contaminants can escape the facility. Building 945 also includes 4-inch-high sealed concrete containment curbing around the interior perimeter. All expansion joints have been sealed to ensure complete containment of all materials accepted.

Facility operations (i.e., container handling and management) are conducted inside the enclosed, covered building, such that exterior containment is not necessary.

Building 945 includes exhaust fans that are nominally located near the roof line; however, they are not credited as an environmental control system intended to maintain mercury vapors below healthy breathing levels in the event of a spill. Rather, operation of Building 945 leverages existing Bethlehem Apparatus operational expertise and infrastructure (i.e., from ongoing activities related to mercury treatment) to minimize airborne releases from the facility. Specifically, mercury spill kits and portable mercury vacuums are used for cleaning any spilled mercury. Various models of dust collection/mercury vapor filtration mobile units are also available to manage fugitive emissions from spills. To provide the ability to quickly identify and respond to off-normal conditions (e.g., leaking containers, spills), staff members inspect all containers weekly and record mercury vapor readings daily, in accordance with permit requirements.

Building 945 includes security features to prevent unauthorized entry. The receiving area is fenced. Door keys and security codes are required for access. Entry sensors and motion detectors are installed in the building to further enhance the facility security. Finally, a third-party contractor provides 24-hour intrusion-monitoring services.

Fire protection in Building 945 is provided by a conventional sprinkler system that is compliant with the National Fire Protection Association regulations and local codes. Additionally, similar to security measures, 24-hour, third-party monitoring service is provided for both normal working hours and after hours. The building also includes fire extinguishers strategically located throughout the facility in accordance with National Fire Protection Association requirements and local fire codes. To confirm this compliance, the local fire department periodically conducts inspections of Building 945.

Building 1055

The second structure, located at 1055 Win Drive, Bethlehem, Pennsylvania (Building 1055), is currently used as a general storage warehouse (Figure 2-8). The building measures 120 by 120 feet and is 24 feet high, providing a potential additional 14,400 square feet of floor space, with a total mercury storage capacity of approximately 3,000 MT (3,300 tons). Currently, Building 1055 is not included in the RCRA permit but could be added through a permit modification. The floor in Building 1055 has been sealed with a polymer coating to ensure that no waterborne contaminants can escape the facility. Building 1055 also includes 4-inch-high sealed concrete containment curbing around the interior perimeter. All expansion joints have been sealed to ensure complete containment of all materials accepted.

Figure 2-8 Bethlehem Apparatus Building 1055

Although Building 1055 is an operational storage facility, as mentioned above, it is not a RCRA-permitted hazardous waste storage facility, and the staff does not work full time in the facility, nor do workers routinely inspect the contents and their condition. Certain operations activities would have to be implemented for the facility to be acceptable for long-term management and storage of elemental mercury. However, Building 1055 does include security features to prevent unauthorized entry. Specifically, the building is locked and alarmed after hours. Door keys and security codes are required for both normal and after-hour access. Entry sensors are installed in the building to further enhance the facility security. Finally, a third-party contractor provides 24-hour intrusion-monitoring services.

The fire-protection system in Building 1055 is a dry-pipe sprinkler system, which is compliant with all applicable National Fire Protection Association requirements and local codes for the service conditions.

2.3.4 Alternative 4: Perma-Fix Diversified Scientific Services Inc. Site

Perma-Fix DSSI operates a RCRA-permitted hazardous waste treatment facility in Roane County, Tennessee, that accepts and treats low-level radioactive and mixed (hazardous and radioactive) wastes from offsite government (e.g., DOE) and commercial generators that are mandated for regulated treatment and disposal with unique consideration of radiological properties (Perma-Fix DSSI 2021). The Perma-Fix DSSI site is located approximately 4.5 miles east of Kingston and 10 miles southwest of Oak Ridge, Tennessee, and encompasses approximately 80 acres, of which about 12 acres have been developed (i.e., cleared of natural vegetation) and 7.2 acres have been fenced and permitted as a hazardous waste facility. Perma-Fix DSSI has constructed a new 8,400-square-foot container storage building (referred to as the Container Storage Building Unit [CSBU]) to support waste and material storage (Perma-Fix DSSI 2021). This building could be used for the long-term management and storage of mercury. Independent of the Proposed Action, Perma-Fix DSSI is also planning to build an additional building (referred to as the CSBU expansion) immediately adjacent to the CSBU as part of their corporate planning. This CSBU expansion could also be used for the long-term management and storage of mercury.

Facility Characteristics and Storage

The Perma-Fix DSSI CSBU proposed for mercury storage is located on the north side of the site (Figure 2-9). The CSBU is approximately 140 by 60 feet and 18.5 feet at peak height. Approximately 6,450 square feet of the building is storage area with secondary containment by perimeter curbing and epoxy sealant coating on the floor. The remaining 1,950 square feet of the building is laboratory space. On the southwest side, the roof extends about 14 feet beyond the wall to create a covered unloading bay (Figure 2-10). On the northwest end of the building, the roof extends about 20 feet beyond the laboratory space to create a covered area. The storage area floor design allows up to triple stacking of 1-MT containers, configured as four containers on 4 by 4-foot steel pallets. Assuming 36-inch aisles, the storage area can accommodate up to 1,200 MT (1,323 tons) of elemental mercury (Perma-Fix DSSI 2021).

Perma-Fix DSSI plans to construct the CSBU expansion immediately adjacent to the CSBU and the new building would be the same type of construction as the CSBU but with all 8,400 square feet of space available for mercury storage. The mercury storage capacity of the CSBU expansion would be approximately 1,800 MT, bringing the total Perma-Fix storage capacity to about 3,000 MT at the facility.

The proposed mercury storage area has a fire suppression system (Perma-Fix DSSI 2021). The facility also has onsite fire hydrants supplied by utility service water. The Kingston Fire Department operates a fire station across the road from the Perma-Fix DSSI site. The ventilation system in the CSBU could require minor upgrades, such as replacing carbon filters with sulfur-impregnated filters and installing mercury vapor monitors.

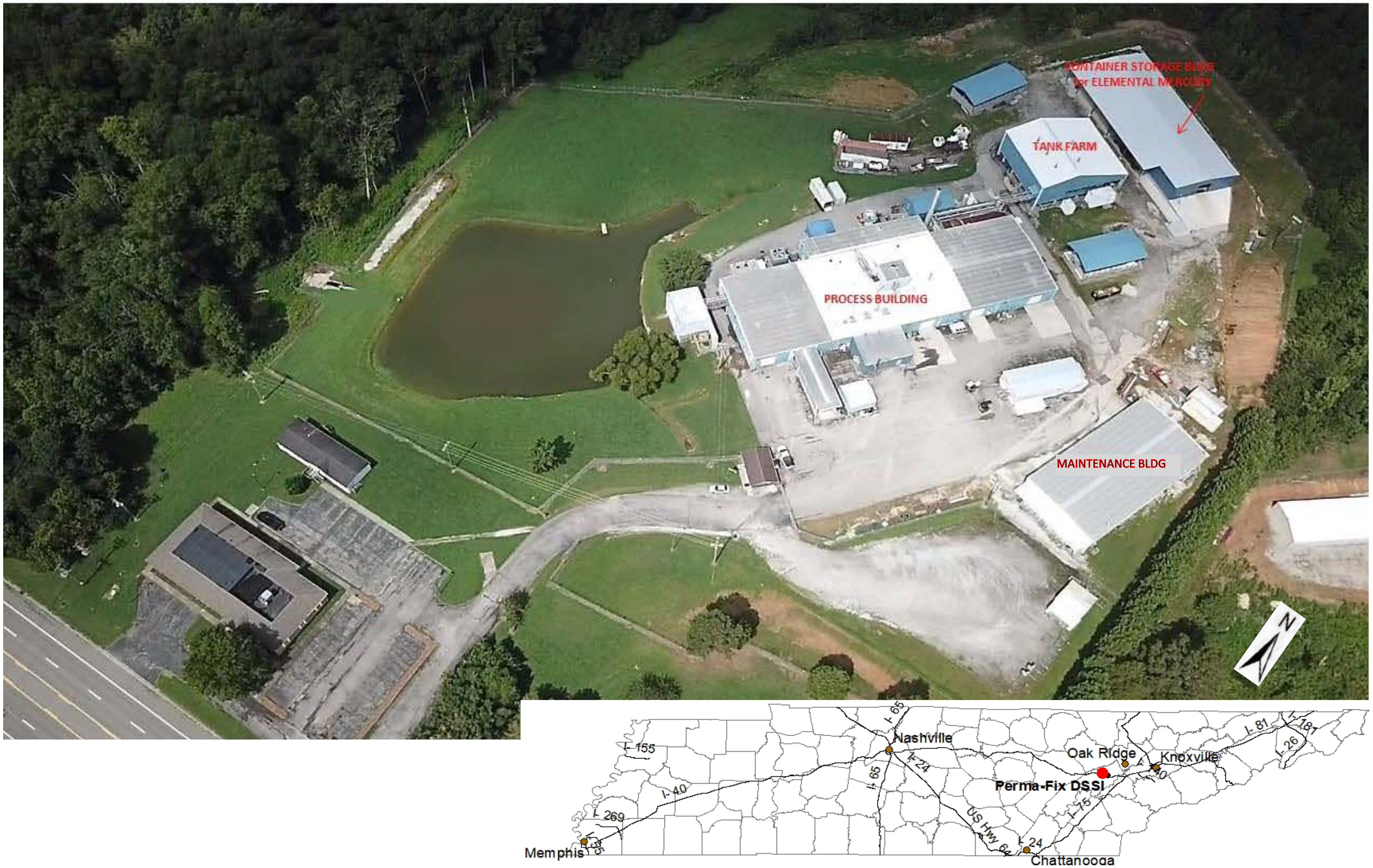


Figure 2-9 Perma-Fix DSSI Facility in Kingston, Tennessee

Figure 2-10 Perma-Fix DSSI CSBU

Security measures of the Perma-Fix DSSI site comply with requirements under 40 CFR 264.14 for controlling access to treatment, storage, and disposal facilities that handle hazardous waste. Primary access to the active operational area is controlled by a gate/guardhouse monitored by security personnel 24 hours a day. A 6-foot-high chain-link fence surrounds the RCRA-permitted area of the facility. All non-employees, contractors, and waste transporters must sign in and sign out to account for all personnel on site.

2.3.5 Alternative 5: Veolia Gum Springs Site

Veolia operates a waste treatment complex and Subtitle C hazardous waste landfill in Clark County in southwestern Arkansas near the community of Gum Springs (referred to as Veolia Gum Springs, [VGS]). The nearest population center is Arkadelphia, Arkansas, about five miles north of VGS. Veolia owns approximately 1,500 acres east of the Gum Springs community. The hazardous waste treatment facility occupies about 75 acres. A landfill occupies about 90 acres to the east of the treatment facilities (VGS 2021). The remaining land owned by Veolia surrounds the operational facilities and is used for agriculture or is mixed pine-hardwood forest.

VGS operates two rotary kilns for thermal treatment and incineration of hazardous and nonhazardous liquids, sludge, solids, and debris. VGS also operates a large stabilization unit for the treatment of liquids, sludge, and solids requiring RCRA-regulated metals stabilization prior to being landfilled. The indoor process has dust suppression and dust collection and can handle high volumes of materials for metals stabilization.

Facility Characteristics and Storage

The hazardous waste treatment facility at VGS has approximately 10 acres under roof (Figure 2-11) (VGS 2021). Buildings are concrete and steel construction with floors ranging in depth from 8 to 12 inches of high-strength concrete that previously supported aluminum smelting operations. VGS has identified three potential locations within the larger facility as potential mercury storage locations (VGS 2021). The Rectifier Area is located on the west end of the facility and is approximately 368 by 47 feet; the Sand and Lime Area is about 378 by 67 feet; and the Second Cut Area is about 210 by 66 feet. Total potential storage space is 56,500 square feet. Building height is 45 feet. These spaces are part of the overall RCRA permit for the building but are not currently used for hazardous waste storage, and secondary containment curbing and appropriate floor sealant would need to be added to any areas designated for mercury storage. Estimated mercury storage capacity is 6,352–12,704 MT (7,002–14,004 tons) depending on whether containers are stacked.

Figure 2-11 Veolia Gum Springs Facility in Clark County, Arkansas

Twenty-five fire hydrants are located throughout the facility (VGS 2021). VGS maintains and follows a site security plan. The treatment facility and landfill are surrounded by a 6-foot-high chain-link fence topped with barbed wire. The main gate is only accessible to VGS employees with proper identification. The security system monitors and records all VGS personnel that enter and exit the facility. A high-definition camera system is used throughout the facility and is live monitored from the control room and security building.

2.3.6 Alternative 6: Clean Harbors

Clean Harbors has a total of three potential facilities at three different site locations that could be used for mercury storage (see Figure 2-2). The Clean Harbors Grassy Mountain site is a RCRA-permitted hazardous waste treatment, storage, and disposal facility located in Tooele County, Utah, on the eastern edge of the northern Great Salt Lake Desert, seven miles north of Interstate 80 (I-80). Clean Harbors Grassy Mountain site is approximately 2,560 acres, of which 640 acres are fenced and permitted for waste management activities. Most of the permitted area sits on salt or saline clay flats.

The Clean Harbors Greenbrier site is a RCRA-permitted hazardous waste storage facility located on the north end of the community of Greenbrier, Tennessee, in Robertson County. The site encompasses 12 acres. The facilities include an office building, storage warehouse, supply warehouse, loading dock, trailer containment building, asphalt parking lot, and gravel work areas.

The Clean Harbors Pecatonica site is located in Winnebago County in north-central Illinois. The site is located in a rural agricultural area two miles north of the community of Pecatonica, Illinois, and four miles north of State Highway 20. Approximately 10 acres are enclosed within the security fence. The facility consists of four buildings, two of which are RCRA-permitted for the storage of hazardous waste and are currently permitted to store mercury.

2.3.6.1 Grassy Mountain Site – Facility Characteristics and Storage

Clean Harbors has identified the Drain and Flush Building Warehouse One (DFBWO) as a potential mercury storage building (Figure 2-12) (Grassy Mountain 2021). The enclosed portion of DFBWO (including the office and laboratory) that would be used for mercury storage activities is approximately 80 by 75 feet; the height is approximately 30 feet. The DFBWO contains five rooms, one of which is an office and laboratory. Three of the other four rooms (A1, A2, and A3) could be used for mercury storage and handling, and processing (Grassy Mountain 2021). Each of the rooms is equipped with one or more sumps. Room A3 has more precise temperature control through a heating, ventilation and air conditioning system. A covered outdoor area on the north side would be used for loading and unloading. The DFBWO would need to be upgraded to include secondary containment and epoxy floor sealant for expanded RCRA storage and consolidation of mercury. Clean Harbors is currently updating the building's RCRA permit (Class 2 permit modification) with the State of Utah to allow expanded storage for mercury. The estimated mercury storage capacity of the DFBWO is approximately 900 MT (992 tons) (Grassy Mountain 2021).

The DFBWO has fire suppression equipment throughout the building for fire protection. The site is enclosed by a 6-foot-high chain-link fence topped with barbed wire. Secured gates are used to control access into and out of the facility. Gates are closed and locked when not being monitored. The proposed mercury storage building is located about one mile from the main access gate.

2.3.6.2 Greenbrier Site – Facility Characteristics and Storage

Clean Harbors has identified the storage warehouse building at the Greenbrier site, adjacent to the office building, for mercury storage (Figure 2-13). The active work area of the facility is fenced and encloses approximately 5.3 acres and contains all buildings except the office building and parking lot. The storage warehouse building is 60 by 100 feet and is divided into eight separately contained areas (Greenbrier 2021). The structure is a pre-engineered steel frame with insulated metal walls for container storage. Storage areas have concrete secondary containment curbs and epoxy-sealed floors. The building is RCRA-permitted for the storage of mercury. The total estimated storage space is about 2,430 square feet. The estimated mercury storage capacity is 1,875 MT (2,067 tons) (Greenbrier 2021).

Figure 2-12 The DFBWO at the Clean Harbors Grassy Mountain Site

Figure 2-13 Storage Warehouse Building at the Clean Harbors Greenbrier Site

The building is equipped with heat and smoke detectors and fire suppression equipment. The building has a passive ventilation system. The active portion of the Greenbrier site is secured by a 6-foot-high chain-link fence topped with barbed wire. The storage warehouse building has an alarm system and is monitored around the clock by a security company. There are two overhead and two pedestrian doors in the warehouse that are locked when staff are not present.

2.3.6.3 Pecatonica Site – Facility Characteristics and Storage

Clean Harbors has identified the two RCRA-permitted container storage buildings at the Pecatonica site for mercury storage: CSB-1 and CSB-2 (Figure 2-14) (Pecatonica 2021). The two buildings share a common wall. The CSBs are steel-frame structures with insulated metal walls and concrete slab floors. The smaller CSB-1 is 100 by 60 feet. The container storage area in CSB-1 is about three-fourths of the building, or approximately 4,360 square feet. The building height is 12 feet. CSB-2 is 274 by 168 feet. A portion of this space in CSB-2 is a fully covered truck unloading and dock area accessible through rollup doors on the west side of the building. The container storage portion of CSB-2 is approximately 174 by 168 feet. The height of CSB-2 ranges from approximately 17 to 20 feet. The storage area in CSB-2 is approximately 29,232 square feet. The estimated mercury storage capacity in CSB-1 is 2,465 MT (2,717 tons) and in CSB-2 is 12,330 MT (13,591 tons) (Pecatonica 2021).

The floor has an integrated sump system and curbing for spill control and containment. The unloading and container storage areas have a fire suppression system. The buildings are naturally ventilated through doors. The site is surrounded by a 6-foot-high chain-link fence with barbed wire. Both access driveways are gated. The main gate has a roll-away gate.

Figure 2-14 CSB-2 (foreground) and CSB-1 (rear left) at the Clean Harbors Pecatonica Site

2.4 TRANSPORTATION AND HANDLING

Transport of mercury is conducted almost exclusively by truck due to the relatively small quantities involved. Persons that desire to have their elemental mercury managed and stored at the DOE storage facility would be responsible for shipping the mercury to the DOE storage facility. In some instances (e.g., gold mining in Alaska), mercury could be transported to a U.S. port (i.e., Oakland, California) before being transported to the long-term management and storage facility. This Mercury Storage SEIS-II assumes that mercury being received from ore processors would be shipped to a RCRA-permitted treatment facility prior to receipt at the DOE storage facility. The details related to these assumptions are described in Appendix B, Section B.4 of this SEIS-II. Transportation and handling of elemental mercury from generators or owners, or a U.S. port, is analyzed as an element of the Proposed Action in Chapter 4 of this SEIS-II.

Three-liter flasks would be transported in box pallets, each assumed to contain an array of up to 49 flasks, based on standard, commercially available pallet sizes for waste drums and typical forklift capacities for use in waste storage facilities (e.g., 48 inches by 48 inches and 5,000-pound capacity). The total weight of a fully loaded pallet would be approximately 4,400 pounds, or 2 MT (2.2 tons). A 1-MT container would be transported within a spill tray capable of containing the full volume of the mercury. The assembly of a full 1-MT container, spill tray, and pallet is assumed to weigh about 3,080 pounds.

Consistent with the analysis in the 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS, the mercury currently at Y-12 is stored (and would be shipped) in 3-L flasks. DOE anticipates that the majority of the mercury generated from mining would be shipped in one MT containers.

The analysis in this Mercury Storage SEIS-II assumed that the capacity of a truck is 40,000 pounds (DLA 2004). Therefore, one truck could ship either 9 pallets (of up to 49, 3-L flasks) or 13, 1-MT containers. The number of pallets of 3-L flasks or the number of 1-MT containers that the truck could accommodate is limited by weight and would be determined during the actual loading.

Table 2-5 summarizes the amounts of mercury that are assumed (for analytical purposes) to be transported from each of the locations listed in Table 2-2 to the potential alternative site locations (with the corresponding total expected numbers of pallets and 1-MT containers transported over 40 years). The values in Table 2-5 are representative values based on the accumulated amounts for each location and the estimated annual generation rates from Table 2-2.

Table 2-5 Transportation Characteristics Used for Analysis

Site	Years of Shipments[a]	Total Mass (MT)[b]	Number of Pallets	Number of 1-MT Containers	Number of Trucks[c]
Y-12 National Security Complex	1st – 2nd	1,200	713	0	80
Ore Processors (assumed to be shipped from Carlin, Nevada)	1st – 40th	5,100	0	5,100	393
Other Ore Processors (via Port of Oakland)	1st – 40th	300	0	300	24
Commercial Storage					
WM, Union Grove, Wisconsin	1st – 2nd	100	0	100	8
WM, Emelle, Alabama	1st – 2nd	300	1	298	23
Total Inventory Assumed for Analysis		**7,000**	**714**	**5,798**	**528**

MT=metric ton; WM=Waste Management Mercury Waste, Incorporated & Chemical Waste Management, Incorporated

a For purposes of analysis, the 2011 Mercury Storage EIS assumed a 40-year operational period. A revised operational start date is not known at this time; however, the period of analysis remains 40 years for this Mercury Storage SEIS-II.

b Total mass transported would be approximately 7,000 MT. Average mass transported per year during the 40-year period of analysis is 175 MT. The individual entries of this column are conservatively high, include any estimated accumulation since 2018, and are used for analytical purposes only.

c Total number of trucks: 528. Average number of trucks per year during the 40-year period of analysis: approximately 13. This assumes trucks are full. If half or partially full, the estimated number of shipments could increase by up to a factor of two. The highest number of annual truck shipments could occur in the first two years.

Note: To convert metric tons to tons, multiply by 1.1023.

2.5 NO-ACTION ALTERNATIVE

As required by CEQ NEPA regulations (40 CFR Parts 1500–1508) and the DOE NEPA implementing procedures (10 CFR Part 1021), this Mercury Storage SEIS-II also analyzes a No-Action Alternative as a basis for comparison to the Proposed Action. Under the No-Action Alternative evaluated in this SEIS-II, DOE would not designate a facility (or facilities) for the long-term management and storage of mercury. Elemental mercury would continue to be generated from other sources, primarily the gold-mining industry and, to a lesser extent, waste reclamation and recycling facilities. As a result of Chemical Safety Act of 2016, mercury generators have additional options that were not available when the 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS were prepared.

The Chemical Safety Act of 2016 amended RCRA and TSCA and includes the following key elements that could have a bearing on the No-Action Alternative:

1. Ore processors that generate mercury may accumulate mercury onsite without storage prohibition (i.e., more than 90 days) if:
    a. DOE has not designated a facility,
    b. The generator certifies that it will ship the mercury once the facility is available, and
    c. The generator certifies that the mercury would not be sold or otherwise placed back into commerce.
2. If DOE does not designate an elemental mercury storage facility by January 1, 2020, DOE will accept title to all elemental mercury accumulated at ore processor sites as of that date, and store (or pay the cost of storage for) this mercury in a RCRA-permitted facility until DOE designates a long-term storage facility.
3. Export of certain mercury compounds is prohibited, except for those exported to Organization of Economic Cooperation and Development countries for environmentally sound disposal (e.g., Canada). Note that export of the identified mercury compounds to these countries for disposal, or other potential purposes, was already acceptable under MEBA prior to 2016.

Therefore, the current options available to a mercury generator under the No-Action Alternative currently include:

- **Accumulate On site** – Ore processors can accumulate elemental mercury on site in accordance with the Chemical Safety Act of 2016 until DOE designates a facility (which theoretically would not occur under the No-Action Alternative) or Congress passes new legislation.[18] The Act requires that generators comply with requirements in 40 CFR Part 262 for managing their hazardous waste.

[18] Under the Chemical Safety Act of 2016, ore processors may store mercury in non-permitted facilities with no time constraints and RCRA-permitted facilities beyond their normal 365-day limit.

- **Store at a Permitted Facility –** Existing storage facilities can continue to store elemental mercury at their RCRA-permitted facility or generators can transport their mercury from onsite storage to a permitted, commercial storage facility. MEBA provides that storage of elemental mercury at a RCRA-permitted facility is not subject to time constraints.[19]

- **Transport for Treatment and Disposal in Canada –** Generators can opt to transport their mercury to a permitted treatment facility as a precursor to sending the mercury compound to Canada for disposal (e.g., Bethlehem Apparatus, Stablex).[20] Historically, ore processors have not used this option on a large scale.

The options that the generators could take under the No-Action Alternative are clear under the current laws and regulations; however, which option generators may choose and to what extent is still speculative and would be driven by the generators' case-by-case financial considerations.

Under the No-Action Alternative, the approximately 1,200 MT (1,330 tons) of DOE mercury currently stored at Y-12 would continue to be managed and stored in this location and no new construction would be required.

The No-Action Alternative would not comply with the MEBA legislative requirements.

2.6 REGULATORY PROCESS RELATED TO TREATMENT AND DISPOSAL OF ELEMENTAL MERCURY

As identified in Section 2.1.1, this Mercury Storage SEIS-II does not evaluate the eventual treatment and disposal of nonradioactive elemental mercury after DOE's designation of a facility for long-term management and storage. Currently, there is no EPA-approved treatment method for elemental mercury for eventual disposal in the United States; however, a petition has been filed with the EPA for a site-specific Determination of Equivalent Treatment from a commercial permittee (US Ecology) that would convert the elemental mercury to mercury sulfide for land disposal at the identified permitted disposal facility. The following are the primary steps that would require completion prior to treatment and disposal:

- EPA approval of a Determination of Equivalent Treatment petition,
- RCRA permit for implementation of this treatment method at a specific facility in the United States, and
- RCRA permit (new or modification) for land disposal of the treated mercury waste form.

[19] Section 5 of MEBA states that, "Elemental mercury may be stored at a facility with respect to which any permit has been issued under section 3005(c) of the Solid Waste Disposal Act (42 U.S.C. § 6925(c)), and shall not be subject to the storage prohibition of section 3004(j) of the Solid Waste Disposal Act (42 U.S.C. § 6924(j)) if— (i) the Secretary is unable to accept the mercury at a facility designated by the Secretary under subsection (a) for reasons beyond the control of the owner or operator of the permitted facility; (ii) the owner or operator of the permitted facility certifies in writing to the Secretary that it will ship the mercury to the designated facility when the Secretary is able to accept the mercury; and (iii) the owner or operator of the permitted facility certifies in writing to the Secretary that it will not sell, or otherwise place into commerce, the mercury."

[20] Bethlehem Apparatus is an example of a RCRA-permitted facility that currently treats mercury for eventual disposal in Canada. Stablex is a US Ecology company in Canada that accepts mercury compounds for land disposal. See Sections 2.1.1 and 2.6 of this SEIS-II for a discussion of treatment and land disposal in the United States.

Once these steps are complete, which could take several years, DOE could then consider transporting the mercury stored at the designated facility(ies) (i.e., the subject of this Mercury Storage SEIS-II) for treatment and ultimate disposal. Prior to taking these actions, DOE would perform an appropriate NEPA review. As identified in Section 2.1.2, the uncertainty of the timing and outcome of this process affects the needed duration and capacity of the DOE-designated facility for long-term management and storage of mercury.

2.7 PREFERRED ALTERNATIVE

In the 2011 Mercury Storage EIS and the 2013 Mercury Storage SEIS, DOE identified the WCS alternative as the preferred alternative. Considering that this SEIS-II evaluates seven existing commercial sites and one federal site, DOE no longer has a specific preferred alternative as of the publication of this Draft SEIS-II. However, DOE does prefer one or more of the existing commercial facilities evaluated in this Draft SEIS-II because selection of one or more of these commercial facilities would facilitate schedule urgency established by MEBA. Prior to being able to receive mercury at HWAD, DOE would need to execute real estate actions in addition to lease agreements with the General Services Administration and Departments of the Army and Defense. Designation and modification of the available storehouses at HWAD would also require further consultation with the Nevada SHPO because the proposed facilities are eligible for listing on the National Register of Historic Places. Additionally, these buildings are not currently permitted as RCRA Hazardous Waste Storage facilities, which would also be required prior to receipt of elemental mercury. Overall, these activities, which would be more complex and time-consuming than those of the other alternatives, could add significant time (i.e., three years or more) to the schedule for meeting DOE’s statutory obligation under MEBA. Such a delay would result in accumulation of additional quantities of elemental mercury at ore processing facilities.

In parallel with the ongoing NEPA process, DOE is executing a procurement process to identify potential vendors for long-term management and storage of elemental mercury. Based on analysis from this Draft SEIS-II, public comment on the Draft SEIS-II, and input gained from the procurement process, DOE will identify its Preferred Alternative in the Final SEIS-II, as required by 40 CFR 1502.14(d). DOE will then publish a ROD no sooner than 30 days after publication of the EPA Notice of Availability for the Final Mercury Storage SEIS-II in the *Federal Register*. The selection of any facility(ies) would be based on the 2011 Mercury Storage EIS, the 2013 Mercury Storage SEIS, this Mercury Storage SEIS-II, and other appropriate factors and would be described in a ROD published in the *Federal Register*.

2.8 ALTERNATIVES CONSIDERED BUT DISMISSED FROM FURTHER ANALYSIS

Reasonable alternatives, as defined in 40 CFR § 1508.1(z), are technically and economically feasible and meet the purpose and need for the Proposed Action. Alternatives that do not meet these criteria are considered but dismissed from further analysis. As required by CEQ regulations (40 CFR § 1502.9(a)), Chapter 2, Section 2.6, of the 2011 Mercury Storage EIS discussed the reasons for elimination of some alternatives from detailed study. Eliminated alternatives included storage-related alternatives and certain transportation methods. The information in the 2011 Mercury Storage EIS is incorporated by reference and is not repeated in this Mercury Storage SEIS-II.

DOE did not consider treatment and disposal options for detailed evaluation in the 2011 Mercury Storage EIS or 2013 Mercury Storage SEIS. Chapter 2, Section 2.6, of the 2011 Mercury Storage EIS discussed the reasons for elimination of treatment alternatives. Currently, EPA does not allow treatment and disposal of high-concentration mercury and elemental mercury wastes in the United States, and it is not known when treatment standards may become available. Therefore, treatment and disposal is not currently a technically feasible option and is not evaluated in this Mercury Storage SEIS-II.

Alternative locations considered but dismissed from further analysis in this Mercury Storage SEIS-II include the commercial facilities described in Section 2.2 of this Mercury Storage SEIS-II (e.g., commercial facilities that were evaluated, but not selected, as part of the process to identify the range of reasonable alternatives). See Section 2.2 for a description of the methods used to identify potential alternatives.[21] In the 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS, DOE evaluated the potential construction of a new facility at several alternative locations. As described in Sections 1.2 and 2.2 of this Mercury Storage SEIS-II, construction of a new facility would not support the purpose and need for agency action since schedule delays associated with new construction would further exacerbate the MEBA requirement that a DOE-designated storage facility be operational by January 1, 2019. New construction would add at least three years, when compared to using existing facilities, negatively impacting the statutorily imposed schedule for DOE's receipt of elemental mercury and potentially subjecting DOE to additional liabilities under 42 U.S.C. § 6939f(b)(1)(B). Because these would be contrary to the purpose and need for this action, alternatives that required the construction of new facilities were thus dismissed from further analysis in this SEIS-II.

Additional details related to the schedule requirements are described in Section 1.2 of this SEIS-II. In addition, although evaluated in the 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS, this Mercury Storage SEIS-II does not re-evaluate rail transport of mercury to a designated storage facility. The generators or owners of the mercury would be responsible for shipping mercury to the DOE storage facility. During DOE outreach to the mercury generators and MEBA permittees in 2016, DOE learned that transport of mercury is exclusively by truck. This is largely because of the generally small quantities of mercury transported and the more complex logistics involved in rail transport (i.e., mercury would often need to be loaded on trucks for shipment to the rail yard). Therefore, because the generators or owners would be responsible for shipping the mercury to the DOE storage facility and they likely would choose to ship by truck (as more technically and economically feasible), this Mercury Storage SEIS-II does not re-evaluate rail transport. Additionally, as demonstrated in the 2011 Mercury Storage EIS, because of the larger number of shipments that would be required for truck as opposed to rail, the potential transportation impacts from truck transportation bound the potential impacts if rail transportation were used.[22]

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[21] Although eliminated from detailed consideration in this Mercury Storage SEIS-II, other locations (Federal or commercial) could be considered in future NEPA documents.

[22] It is possible that initial transfer of mercury from Y-12 or other current storage locations could choose to use rail transportation.

2.9 COMPARISON OF ALTERNATIVES

This section presents a comparison of alternatives analyzed in this Mercury Storage SEIS-II, including the No-Action Alternative. Table 2-4, in Section 2.3, presents a comparison of the key physical characteristics of the eight action alternative sites; focusing primarily on the proposed, permitted buildings and their capacity and capability for storage of elemental mercury. Table 2-6 presents a comparison of key physical setting and location factors, i.e., those factors that provide some means of discerning the differences among action alternative sites regarding their surroundings, operational experience, or land use compatibility. These factors, among others, are discussed in more detail in Chapter 3.

Because of the various sites and circumstances in which mercury could potentially be stored, transported, or treated for disposal outside of the United States under the No-Action Alternative, quantitative evaluation of potential environmental consequences would be highly speculative. This SEIS-II qualitatively evaluates the potential environmental consequences of the various options that are available to entities under the No-Action Alternative (as discussed in Section 2.5). Because the No-Action Alternative could involve expansion and/or modification of non-DOE storage capacities at multiple locations, it is possible that some land, or land with more- or less-sensitive resources than those analyzed under the action alternatives, could be affected. Environmental consequences to land use and ownership, visual, geology, soils, ecological, and cultural and paleontological resource areas are dependent on the affected environment disturbed and amount of land disturbance that might occur. Potential environmental consequences to water resources would depend on the specific location and proximity to surface-water bodies and groundwater aquifers and the current use of these water resources. Therefore, the environmental consequences to water resources could be more or less than under the action alternatives. If mercury were transported to a RCRA-permitted storage facility or to a treatment facility, the potential transportation-related consequences would not be markedly different than those predicted for the action alternatives.

Impacts on infrastructure and waste management would depend on the specific infrastructure and waste management capabilities available to support the mercury storage facility(ies). Impacts on socioeconomics and environmental justice primarily would be related to the changes in employment due to changes in mercury storage and the minority and low-income composition of the communities near the mercury storage facility(ies). Because impacts on infrastructure, waste management, socioeconomics, and environmental justice are indeterminate for the No-Action Alternative, impacts could be more or less than under the action alternatives.

Table 2-6 Comparison of Action Alternatives – Physical Setting and Location Factors

Site/Resource Factor	Hawthorne Army Depot	WCS Site	Bethlehem Apparatus	Perma-Fix DSSI	Veolia Gum Springs	Clean Harbors Grassy Mountain	Clean Harbors Greenbrier	Clean Harbors Pecatonica
Location	Hawthorne, NV	Andrews County, TX	Bethlehem, PA	Kingston, TN	Gum Springs, AR	Tooele, UT	Greenbrier, TN	Pecatonica, IL
Site Property Size	147,000 acres	13,500 acres	10 acres	80 acres	1,400 acres	640 acres	12 acres	10 acres
Developed Area Footprint	175 acres	1,338 acres	10 acres	12 acres	75 acres	0.4 acre	5.3 acres	4 acres
Existing RCRA permit[a]	Yes[b]	Yes	Yes[c]	Yes	Yes	Yes	Yes	Yes
Estimated mercury storage capacity (MT)	7,000	3,000	Bldg 945 3,000 Bldg 1055 3,000	CSBU 1,200 CSBU Expansion 1,800	6,352–7,000	900	1,875	CSB-1 2,465 CSB-2 7,000
Seismic risk; peak ground acceleration (*g*)	0.62	0.08	0.10	0.33	0.10	0.16	0.14	0.05
Nearest surface-water feature	Walker Lake (5 miles)	No natural perennial features within 10 miles	Lehigh River (0.45 mile)	Stormwater detention basin (0.1 mile)	Deceiper Creek (0.4 mile)	No natural perennial features within 10 miles	Several ponds within 1 mile	Small creek (0.25 mile) Pecatonica River (1 mile)
Site in 100-year floodplain	No	No	No	No	No	No	No	No
Distance to nearest public access	2.3 miles	0.62 mile	115 feet	820 feet	984 feet	6.6 miles	130 feet	417 feet
Distance to nearest business or residence	>2.3 miles	3.4 miles	120 feet (business) 354 feet (residence)	950 feet	0.53 mile	40 miles	460 feet	607 feet
Consultation with State Historic Preservation Office required?	Yes	No	No	No	No	No	No	No

Site/Resource Factor	Hawthorne Army Depot	WCS Site	Bethlehem Apparatus	Perma-Fix DSSI	Veolia Gum Springs	Clean Harbors Grassy Mountain	Clean Harbors Greenbrier	Clean Harbors Pecatonica
Approx. time to establish lease agreement	3–5 years	<6 months	<6 months	<6 months	<6 months	<6 months	<6 months	<6 months

MT=metric ton; *g*=gravitational constant

a Any RCRA permit associated with the site designated by DOE for long-term management and storage of elemental mercury may be modified to add DOE as a co-permittee.

b HWAD is permitted for mercury storage; however, the specific modified building would need to be added to the permit.

c Building 945 is currently permitted. Building 1055 would need to be added to the permit.

Under the No-Action Alternative, the management and storage of mercury may or may not be conducted in accordance with RCRA regulations. For example, long-term accumulation at ore processor sites would be of higher concern because these sites have not necessarily been permitted for long-term storage. As such, it would be reasonable to conclude that there could be a heightened risk associated with facility accidents and the inconsistent management and storage of mercury containers. This could lead to potentially greater environmental consequences associated with air quality, occupational and public health and safety, and ecological resources. In contrast, if much of the excess mercury remained at the generating facilities and was not transferred to a DOE long-term storage facility, it is reasonable to expect that environmental consequences associated with transportation would be somewhat less than those predicted to occur under the action alternatives. Although, these transportation consequences would eventually be realized when the accumulated mercury was eventually shipped offsite for storage, treatment, or disposal. As stated in Section 2.5, one of the options that generators could take would be to ship the mercury to a RCRA-permitted treatment facility and then on to Canada for land disposal. In this scenario, transportation impacts would be similar to those predicted under the action alternatives. There would be no environmental consequences under the No-Action Alternative at any of the candidate sites because a DOE mercury storage facility(ies) would not be operated. Conversely, under any of the action alternatives, there would be beneficial environmental consequences at the various locations where excess mercury is currently stored, including Y-12, because the mercury could be transferred to a DOE facility(ies) for long-term storage and no longer be available for potential release to the environment at the current storage site.

The approximately 1,200 metric tons (1,300 tons) of DOE mercury currently stored in 35,000, 3-L flasks at Y-12 would continue to be managed and stored in this location. No new construction would be required at Y-12, nor would any incremental increase in impacts on resource areas occur because storage operations at Y-12 would not change. Continued storage at Y-12 would have potential operational impacts since these facilities would not be available for other, planned uses including storage of mission-related materials. Additional discussion on environmental consequences under the No-Action Alternative is provided in Chapter 4, Section 4.2.

The following subsections summarize the potential impacts on resources under the Mercury Storage SEIS-II action alternatives. Detailed descriptions and in-depth discussions of impacts on resources are provided in Chapter 4.

2.9.1 Land Use and Ownership, and Visual Resources

No impacts on land use or visual resources would be expected for any of the alternative sites because no new construction or substantial external modifications to the buildings would be required. The storage of mercury would be consistent with current land use and site operations at each site. If DOE were to designate a commercial facility for the Proposed Action, DOE would obtain an appropriate leasehold interest in that facility to comply with MEBA. DOE would ensure that any long-term lease agreement would afford DOE an appropriate level of responsibility and control over the facility.

As reported in Chapter 4, Section 4.3.1.1, there would be additional time constraints to completing the permitting, real estate actions, and lease agreements for the HWAD alternative. Section 2.3.1 describes some of the additional activities that would be required to implement the DOE lease agreement at HWAD that would not be required for existing commercial facilities. DOE estimates the time required to complete the activities to allow receipt of mercury at HWAD for long-term storage and management would be between three and five years from the date that DOE selected HWAD in a ROD. DOE estimates that a lease agreement for an existing commercial facility could be completed within about six months.

2.9.2 Geology, Soils, and Geologic Hazards

Except for the HWAD site, no additional impacts to geology and soils are expected because no new construction or soil disturbance would be required. At HWAD, minimal external modifications would require trenching for installation of needed utilities and other systems and services, resulting in negligible-to-minor impacts to previously disturbed, surrounding soils. All alternative sites would adhere to standard best management practices for necessary maintenance and management of soils.

Geologic hazards from potential earthquakes at any of the alternative site locations would be minimized because storage and management of elemental mercury would occur in existing structures that were engineered and built to structural and/or seismic design standards for each site location. In addition, mercury storage locations within the facilities would include robust storage containers and spill containment features.

2.9.3 Water Resources

Storage of mercury at any of the alternative sites would increase water use for sanitary purposes by up to 16,000 gallons per year. The increased water use would directly correlate to the number of additional personnel required during operations. All alternative sites are permitted for hazardous waste storage and would have engineered barriers such as berms and sealed floors in storage building(s) to prevent releases of mercury from the storage area. No impacts to groundwater or surface water would be expected. None of the alternative sites is located within a designated 100-year regulated floodplain.

2.9.4 Air Quality and Noise

Mercury storage operations at any of the alternative sites would not involve any activity that would increase air emissions. Impacts to air quality at each site would be negligible. The transportation of mercury from existing storage sites and generators over a 40-year period would release relatively small quantities of air pollutants and greenhouse gases (GHGs) compared to existing emissions from truck transportation in the United States. An average of 13 truck trips per year would be required to transport the 7,000 MT of mercury to a storage location(s). Additionally, because none of the proposed facilities is in a floodplain and all are constructed to meet building code requirements, they are mostly resilient to potential increases in severe weather related to global climate change.

Noise created by mercury storage operations, including transportation, would be undiscernible from existing noise levels. Most mercury storage activity at each site would occur indoors and be inaudible to the public.

2.9.5 Ecological Resources

No impacts on terrestrial resources, aquatic resources, wetlands, and threatened or endangered and other protected species would be expected for any of the alternative sites because of the use of existing buildings, which would require minimal to no external modifications. Therefore, none of the alternative sites analyzed would be expected to adversely affect any ecological resource. Potential ecological risk associated with transportation accident scenarios is addressed in Section 2.9.10.

2.9.6 Cultural and Paleontological Resources

Except for HWAD, there are no known prehistoric or historic cultural resources at any of the alternative site locations, and any potential unknown sites would not be impacted since mercury storage would occur within existing structures with no new construction or surface disturbance planned. At HWAD, the Group 110 design storehouses that are proposed for mercury storage are historic architectural properties that are part of a larger historic district like many of the structures at HWAD. None of the Group 110 structures would be impacted under the Proposed Action other than by proposed building modifications, which would be coordinated with the Nevada SHPO. If the HWAD became a preferred alternative for operation of a mercury storage facility, DOE would further consult with the SHPO on the proposed storage building modifications to determine the potential impacts on NRHP-eligible structures and potential mitigation measures, as appropriate. The Section 106 consultation process would need to be completed prior to completion of a ROD selecting HWAD.[23] Therefore, the key activities that would need to be completed prior to a ROD would include: (1) detailed design of all modifications to specific HWAD buildings, (2) identification of HWAD as a preferred alternative, and (3) closure of the Section 106 consultation process with the Nevada SHPO.

Because the Proposed Action at facilities other than HWAD would occur within an existing building permitted for the storage of mercury, DOE has determined that this undertaking does not have the potential to cause effects on historic properties, and DOE is not required to enter into consultation under Section 106 of the *National Historic Preservation Act* (NHPA) (36 CFR § 800.3(a)(1)).

Since no new construction would be required, no impact on American Indian resources or traditional religious practices in the immediate areas surrounding any of the alternative sites would be expected.

There are no known paleontological resources at any of the alternative site locations; because no new construction would be required under the Proposed Action, there would be no impact to paleontological resources.

2.9.7 Site Infrastructure

The frequency of mercury shipments is projected to be small (13 per year) compared with baseline truck traffic; therefore, existing road systems would be adequate for supporting the transfer of

[23] The consultation process under Section 106 of the *National Historic Preservation Act* can be found at: https://www.ecfr.gov/current/title-36/chapter-VIII/part-800/subpart-B

mercury. All of the alternative sites have sufficient utility capacity to support mercury storage. Because most of the sites are existing operating facilities, the incremental increase in utility requirements would be small. At HWAD, additional utility services would have to be extended to the designated storage buildings as needed including electricity, heating, water, and communications even though the service capacity onsite is sufficient.

2.9.8 Waste Management

The operation of a mercury storage facility would be expected to generate hazardous waste that is commensurate with the amount of mercury stored at the facility. The estimate of hazardous waste generation was based on the analysis in the 2011 Mercury Storage EIS, which assumed some degree of repackaging of potential leaking containers. This is a conservative estimate and likely bounding for any of the alternative sites. For storage facilities that have the capacity to store the full 7,000 MT of mercury, up to 637, 55-gallon drums of hazardous waste could be generated over the 40-year analytical period (about 16, 55-gallon drums per year). The amount of waste that would be expected to be generated at the alternative sites ranges from 82 to 637, 55-gallon drums over the 40-year analytical period (or 2 to 16, 55-gallon drums per year). Approximately 16,000 gallons of sanitary wastewater would be expected to be generated per year from mercury storage operations.

2.9.9 Occupational and Public Health and Safety

This section summarizes the potential human health consequences and associated risks to workers and members of the public. The analyses in Chapter 4 of this SEIS-II evaluated four scenarios: (1) normal operations, (2) facility accidents, (3) transportation, and (4) intentional destructive acts. The respective sections of Chapter 4 discuss human health consequences and associated risk analysis in detail under each alternative, and Appendix B discusses the development of the analyses and the comparison of the analyses for the alternatives evaluated in this SEIS-II and those alternatives evaluated previously in the 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS. This summary presents the most conservative (i.e., maximum) consequence, and thus risk, to a human receptor that could be expected to occur under each scenario. Consequences are presented in terms of severity levels (SLs), with SL-I representing negligible-to-very low consequences and SL-IV representing the most severe consequences. SLs are defined for various receptor scenarios in Appendix B, Section B.5. Overall risk is a function of the frequency at which an event might occur and the probable severity of the event.

Normal Operations

Normal operations would involve the receipt and storage of mercury for extended periods of time (assumed to be up to 40 years for purpose of analysis). Exposures could arise during normal operating conditions from small amounts of mercury vapor accumulating in the storage areas. This release scenario can best be described as a chronic, slow release of mercury vapor within the storage building resulting from an undetected leaking container or external contamination of a container. Under all alternatives, the consequences to involved workers, noninvolved workers, or members of the public are expected to be negligible (i.e., SL-I), with negligible associated risks.

Facility Accidents

Accidents could include mercury spills inside or outside the storage building. Of the various accident scenarios considered, those with the highest probability of occurring would be (1) a container or pallet drop during transfer from the transport vehicle to long-term storage (e.g., by forklift), (2) a collapse of storage racks, or (3) an earthquake event.

The consequences and associated risks to human health receptors would be nearly identical under all action alternatives evaluated and are summarized in Table 2-7. In all cases, potential risks to human receptors would be negligible to low. The highest potential consequences would be associated with the beyond-design-basis earthquake that, theoretically, could cause a total building collapse. In this extremely unlikely event, members of the public around the Bethlehem Apparatus and Clean Harbors Greenbrier sites could be within 330 feet of the storage buildings and could be exposed to SL-IV concentrations. However, the probability of a strong earthquake in these areas is unlikely, as the peak ground acceleration (*g*) for Bethlehem, Pennsylvania, and Greenbrier, Tennessee, is only 0.10 and 0.14, respectively, indicating areas of relatively low seismic activity. Additionally, these members of the public likely would evacuate from the area immediately, resulting in a reduction to the potential severity level to the SL-II range.

Table 2-7 Summary of Consequences and Risks from All Onsite Mercury Spill Scenarios

Scenario	Consequence (Risk)
Spills Inside Building	
Involved worker	SL-I to SL-II (Negligible to low)
Noninvolved worker[a]	SL-I (Negligible)
Member of the public	SL-I (Negligible)
Spills Outside Building	
Involved worker	SL-I to SL-II (Negligible to low)
Noninvolved worker[a]	SL-I to SL-II (Negligible to low)
Member of the public	SL-I to SL-II[b] (Negligible to low)

SL=severity level

a A noninvolved worker is nearby (outside the building) but still on site.

b A noninvolved worker is assumed to evacuate the area after an extremely unlikely earthquake scenario with building collapse.

c Bethlehem Apparatus and Clean Harbors Greenbrier are the only locations where offsite human receptors could be within 100 meters during an extremely unlikely earthquake scenario with building collapse. The potential concentrations at these locations could fall in the SL-IV range. However, the seismicity of the region at these locations is low and if members of the public were to evacuate immediately following the earthquake event, consequence levels would likely be in the SL-II range.

It should be noted that the proposed capacity of elemental mercury for each of the sites identified in this SEIS-II would be within the permitted capacity for hazardous materials established by the respective state during the permitting process. That is, DOE is not proposing to increase the capacity of hazardous materials beyond that which is permitted by the state.

Transportation

Transportation risks under all alternatives are a function of the number of miles driven and the nature of the accident (fire or no fire). Table 2-8 summarizes the consequences and associated risk to human health receptors under transportation accident scenarios with mercury spills. These scenarios apply to all alternative sites.

Table 2-8 Summary of Transportation Consequences and Risks to Human Receptors

Scenario	Consequence (Risk)
Spill onto ground	SL-I to SL-IV (Negligible)
Spill into water[a]	SL-I to SL-II (Negligible to low)
Spill with fire – inhalation	SL-III SL-II (Negligible) or (Low)
Spill with fire – dry deposition onto soil	SL-I (Negligible)
Spill with fire – wet deposition onto soil	SL-I (Negligible)
Consumption of methylmercury in fish – dry deposition onto water	Potentially above SL-I/SL-II (Negligible)
Consumption of methylmercury in fish – wet deposition onto water	Potentially above SL-I/SL-II (Negligible)

SL=severity level
a Due to a large range of uncertainty, estimating the consequences of this scenario is difficult.

Intentional Destructive Acts

The scenario for an intentional destructive act is a deliberate crash of a gasoline tanker into a truck carrying mercury with a subsequent fire. Other scenarios involving an attack on a storage facility are judged to be less likely because of the distribution of mercury within the facility, security measures, and facility design features that would mitigate the impacts of mercury releases into the environment. Therefore, the intentional destructive act analysis applies to all the alternative sites and evaluated impacts from the atmospheric pathway, from inorganic mercury deposited on the ground, and from consumption of mercury-contaminated fish.

Human exposure pathways from an intentional destructive act include atmospheric inhalation and dry or wet deposition. The most severe case for atmospheric exposure pathways would be at the SL-III level and could occur between approximately 330 feet and 3.5 miles downwind of the intentional destructive act location. SL-IV consequence levels would only be reached within 0.55 mile under low wind speeds and stable atmospheric conditions (Class F). The deposition benchmark of 180 milligrams per kilogram in soil would not be exceeded anywhere.[24] However,

[24] For inorganic mercury deposited on the ground, the threshold between SL-I (negligible) and SL-II (low) is 180 milligrams per kilogram.

sufficient mercury could be deposited on lakes such that, in the event of rain, methylmercury might accumulate to potentially hazardous levels in fish up to approximately six miles downwind for national average consumption rates, 12 miles for the average subsistence fisherman, and 25 miles for the 95th percentile subsistence fisherman.

2.9.10 Ecological Risk

Consequences and, hence, risks to ecological receptors would be negligible to all ecological receptors except if there is a fire. Without fire, the primary risk is inhalation of mercury vapor, which is an insignificant pathway for exposure to ecological receptors. The frequency of onsite fires sufficient to cause a release of mercury at any of the storage sites is predicted to be negligible; consequently, the ecological risk also would be negligible. Ecological risk would be evident only in the event of a transportation accident with fire; thus, the ecological risk would be similar under all action alternatives. Under dry deposition with fire, three ecological receptors (sediment-dwelling biota, soil invertebrates, and plants) would have low risk, while all other receptors would have negligible risk. Under wet deposition, sediment-dwelling biota would have a moderate risk, and soil invertebrates, plants, American robin, and river otter would have a low ecological risk. The other receptors would all have negligible risk.

2.9.11 Socioeconomics

There would be negligible impacts on socioeconomic conditions, including overall employment population trends, available housing, and other community services in the regions of influence associated with all alternative sites. Any additions to staff would be minor and easily accommodated by the existing labor forces in each of the alternative site locations and surrounding counties.

2.9.12 Environmental Justice

While there may be individual minority or low-income families living relatively near each of the alternative site locations, the sites are (or would be) permitted by their respective state under RCRA for the storage and treatment of hazardous materials. The Proposed Action would not increase the human health risk beyond that approved as part of the RCRA permitting process. As discussed in Sections 2.9.9 and 2.9.10, implementing the Proposed Action would result in negligible offsite human health and ecological risks from mercury emissions during normal operations and most accidents. Potentially high mercury concentrations could occur in the event of an extremely unlikely beyond-design-basis earthquake for some sites (Bethlehem Apparatus and Clean Harbors Greenbrier), as described in Section 2.9.9. Considering the probability of such an event, the potential risks associated with this extremely unlikely scenario are considered low. Therefore, there would be no disproportionately high and adverse effects on minority or low-income populations under the Proposed Action at any of the alternative site locations.

2.9.13 Reasonably Foreseeable Environmental Trends and Planned Actions

Chapter 4 of this SEIS-II evaluates reasonably foreseeable environmental trends and planned actions within the regions of influence for each of the alternative sites. Considering the negligible-to-low potential impacts of the Proposed Action, the potential contribution of the Proposed Action to the cumulative impacts to the region were shown to be negligible.

2.9.14 Resource Adverse Impacts and Commitments

This section describes any unavoidable adverse environmental impacts that could result from implementation of the alternatives; irreversible and irretrievable commitments of resources; and the relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity. Unavoidable, adverse environmental impacts are impacts that would occur after implementation of all feasible mitigation measures and best management practices. A resource commitment is considered irreversible when direct and indirect impacts from its use limit future use options. Irreversible commitments apply primarily to nonrenewable resources, such as cultural resources, and also to those resources that are renewable only over long periods of time, such as soil productivity. A resource commitment is considered irretrievable when the use or consumption of the resource is neither renewable nor recoverable for future use. Irretrievable commitment applies to the loss of production, harvest, or natural resources. The relationship between short-term uses of the environment and the maintenance and enhancement of long-term productivity addresses issues associated with the condition and maintenance of existing environmental resources used to support the Proposed Action and the function of these resources after their use.

2.9.14.1 Unavoidable Adverse Impacts

Implementing any of the action alternatives considered in this Mercury Storage SEIS-II would result in unavoidable adverse impacts to the human environment. These impacts are expected to be negligible and would occur from normal operations at existing mercury storage facilities at any of the eight alternative sites.

Operations at any of the eight alternative sites would have negligible unavoidable adverse impacts to air quality from emissions from employee vehicles and a relatively small number of truck trips per year (13) for transporting elemental mercury to the facility. These air emissions would not measurably degrade ambient air quality or affect compliance with air quality standards near any of the alternative sites.

Small amounts of hazardous and industrial waste would be generated during normal mercury storage operations and would be a negligible unavoidable adverse impact. The amount of waste produced would depend on the amount of mercury stored at the facility. Waste generated during operations would be collected, packaged, and removed for suitable recycling or disposal in accordance with applicable EPA and/or state regulations. Sanitary wastewater also would be generated and disposed of through onsite sewage disposal systems or municipal sanitary sewer systems, as appropriate for each site.

Under the No-Action Alternative, mercury would continue to be stored at Y-12, mercury generator sites, and possibly commercial waste management companies. These storage operations also would result in some negligible unavoidable adverse impacts in terms of air emissions, consumption of utility resources, and waste generation.

Future closure of mercury storage facilities would result in the one-time generation of waste material. This waste would be collected, packaged as appropriate, and shipped for suitable recycling or disposal in accordance with applicable EPA and/or state regulations.

2.9.14.2 Irreversible and Irretrievable Commitment of Resources

This section summarizes the irreversible and irretrievable commitments of resources identified under each alternative considered in this SEIS-II, including the No-Action Alternative. Long-term management and storage of elemental mercury at any of the alternative sites would include the commitment of existing facility storage space, energy (e.g., electricity and fossil fuels), water, human labor, and capital. The commitments of storage space, energy, water, labor, and capital would be irreversible and, once committed, these resources would be unavailable for other purposes. Capital would be committed permanently. Waste generation from mercury storage operations would cause an irreversible and irretrievable commitment of hazardous or solid waste landfill space.

The No-Action Alternative would also involve the commitment of land, and energy resources. The existing mercury stored at Y-12 and several other locations would continue to be stored and would include a commitment of land, energy, and water resources. In addition, similar resources would be committed for storage of mercury at generator sites and other commercial waste storage facilities if mercury generators choose to ship mercury off site. Some amount of solid waste and possible hazardous waste may be generated at sites storing mercury under the No-Action Alternative.

Land Use and Ownership, and Visual Resources

Operation of existing facilities for mercury storage would require the commitment of facility storage space for the 40-year period of analysis considered in this SEIS-II. Thus, the commitment of storage space is irreversible in the short term, but not necessarily irreversible over the long term (i.e., after treatment and disposal of the mercury; assumed to occur within 40 years). Under the No-Action Alternative, continued storage of mercury at Y-12 would involve a storage space commitment that could conflict with mission needs in the future.

Energy and Water

Energy expended directly or indirectly to support long-term management and storage of mercury would be in the form of electricity to operate equipment and facilities and fossil fuels to operate equipment and vehicles. Electricity and fuels would be purchased from commercial sources. Except for HWAD, energy has been previously committed to these existing operating facilities, and there would be only a small additional irreversible commitment of energy attributable to mercury management and storage related to operation of equipment for handling mercury storage containers. Consumption of electricity at HWAD would be an additional irretrievable commitment of nonrenewable resources because these storage buildings do not currently use electricity. Fossil fuels consumed in equipment for loading, unloading, and moving mercury storage containers and fossil fuels consumed in the transportation of mercury to any of the alternative sites would be an irretrievable commitment of nonrenewable resources. Water consumed for operations would constitute an irreversible commitment and would not be available for other uses. Water would be obtained via each site's existing water supply system, as described in Chapters 3 and 4 of this SEIS-II. However, these resources are readily available, and the amounts projected to be required are not expected to deplete available supplies.

Waste

Mercury management and storage operations at any of the alternative sites would generate nonrecyclable waste streams, such as solid waste, sanitary wastewater, and potentially hazardous (mercury-contaminated) waste. The treatment and disposal of any solid waste would cause irreversible and irretrievable commitments of landfill space, energy, and materials. Hazardous waste disposal would require an irreversible and irretrievable commitment of land. This space would be unavailable for wastes from other sources. Sanitary wastewater generated and discharged to treatment systems and/or to the land eventually would be recycled through the ecosphere and would not entail a permanent commitment or impairment of resources.

2.9.14.3 Relationship Between Short-Term Uses of the Environment and Maintenance and Enhancement of Long-Term Productivity

Under each action alternative, adverse impacts from short-term use of resources would be balanced by long-term benefits and enhancement of long-term productivity associated with the reduction of elemental mercury in the environment. Each of the action alternatives would entail similar relationships between local, short-term uses of the environment and the maintenance and enhancement of long-term productivity. However, there would be differences in the relative magnitude of the short-term uses based on differences in location, including use of existing storage facilities, availability of utility and transportation infrastructure, and availability and utilization of labor. Regardless, upon completion of mercury storage activities at any of the alternative site locations, facilities could be returned to other uses, including long-term productive uses.

Under the No-Action Alternative, environmental resources have already been committed to activities at Y-12 and at some existing mercury source locations. There could be environmental impacts at mercury generator sites and possibly commercial waste management sites in the short term associated with the need to provide for new or increased storage requirements. Such activities could adversely affect the long-term productivity of the environment.

2.10 SENSITIVITY ANALYSES

This section provides the results of sensitivity analyses to provide perspective on how potential environmental impacts might change as analytical parameters change. For this Draft Mercury Storage SEIS-II, DOE has identified two areas that could benefit from a sensitivity analysis:

1. Variation in the duration of the Proposed Action from 40 years to 5 years (Section 2.10.1)

2. How potential impacts would change if DOE were to designate more than one long-term storage facility (Section 2.10.2).

2.10.1 Variation in the Proposed Action Duration

As identified in Section 2.1.1 of this Mercury Storage SEIS-II, the potential duration of management and storage of mercury in a DOE-designated facility(ies) is somewhat uncertain. This primarily is due to the timing of potential EPA approval of a treatment technology that could allow permitted disposal of mercury in the United States. The impacts summarized in Section 2.9 are based on a potential 40-year period of storage. Section 2.1.2 provides an estimate of the potential quantities of mercury that could require management and storage within that 40-year duration.

As stated in Section 2.1.2, if a treatment and disposal approach for elemental mercury were to be approved by the EPA and state permitting authorities within the next five years, the estimated quantity of mercury that would require management and storage could be about 2,500 MT. This sensitivity analysis provides a perspective of how potential environmental impacts might change with this shorter duration of storage and reduced quantity of mercury.

2.10.1.1 Land Use and Ownership, and Visual Resources

Section 2.9.1 provides a summary of the potential impacts to land use and ownership, and visual resources. The only variability associated with the shorter storage duration would be that the facility would be encumbered for a shorter period and could be available to manage other materials. Because there would be no visual impacts from the Proposed Action, there would be no change as a result of a shorter storage duration.

2.10.1.2 Geology, Soils, and Geologic Hazards

Section 2.9.2 provides a summary of the potential impacts to geology, soils, and geologic hazards. Because modification of multiple buildings at HWAD would be required to facilitate storage of the 7,000 MT of mercury, it is possible that fewer buildings could be modified if the field work were performed on a phased basis (i.e., a few buildings at a time to keep up with forecasted storage needs). However, because it would likely be more efficient to complete all of the planned modifications at one time, a shorter duration and smaller inventory would be unlikely to further reduce potential impacts to geology and soils.

2.10.1.3 Water Resources

Section 2.9.3 provides a summary of the potential impacts to water resources. Impacts to water use are provided on an annual basis and are dependent on the number of workers. The magnitude of these impacts is unlikely to change; however, the duration of the potential impacts would be shorter. Removal of the mercury from the storage facility in less than 40 years would further minimize the relatively low risk of potentially contaminating surface- or groundwater resources from potential spills of mercury.

2.10.1.4 Air Quality and Noise

Section 2.9.4 provides a summary of the potential impacts to air quality and noise. Impacts to air quality are primarily driven by vehicle emissions from truck transportation of mercury. The vehicle emissions are a function of the number of truck miles, which are directly related to the number of shipments. If the quantity of mercury managed and stored at a DOE-designated storage facility were to decrease from 7,000 MT to 2,500 MT (64 percent), vehicle emissions would be expected to likewise decrease, although the actual reduction would be dependent on the location of the particular alternative. For instance, over the 40-year period of analysis, the majority of the mercury would come from Nevada, while the largest source of mercury for storage over the first five years could come from Y-12, if NNSA declared the mercury stored there to be waste.

For noise, the potential impacts of the Proposed Action would be minimal. For the sensitivity analysis, the magnitude of these impacts would not change; however, the duration of the potential impacts would be shorter.

2.10.1.5 Ecological Resources

Section 2.9.5 indicates that there would be no impacts on terrestrial resources, aquatic resources, wetlands, and threatened or endangered and other protected species for any of the alternative sites because of the use of existing buildings, which would require minimal to no external modifications. Therefore, a shorter duration or smaller quantity of mercury would not meaningfully change the impacts as presented under the Proposed Action.

2.10.1.6 Cultural and Paleontological Resources

Section 2.9.6 provides a summary of the potential impacts to cultural and paleontological resources. Impacts to cultural resources are primarily driven by the actions associated with modifying existing facilities to meet the requirements for mercury storage. Similar to potential impacts to geology and soils, because modification of multiple buildings at HWAD would be required to facilitate storage of the 7,000 MT of mercury, it is possible that fewer buildings could be modified if buildings were modified on a phased basis (i.e., a few buildings at a time to keep up with forecasted storage needs). However, because it would likely be more efficient to complete all of the planned modifications at one time, a shorter duration and smaller inventory would be unlikely to further reduce potential impacts to historic properties at HWAD.

2.10.1.7 Site Infrastructure

Section 2.9.7 provides a summary of the potential impacts to site infrastructure. Impacts related to the need for services such as water and electricity would be small and would be required for as long as storage continued. Similarly, area traffic would be impacted based on a small number of trucks that would arrive or depart annually. The magnitude of these impacts is unlikely to change; however, the duration of the potential impacts would be shorter.

2.10.1.8 Waste Management

Section 2.9.8 provides a summary of the potential waste management impacts. Impacts associated with waste management are related to the amounts of hazardous and sanitary wastes that would be generated on an annual basis. The annual magnitude of these impacts is unlikely to change; however, the duration of the potential impacts would be shorter.

2.10.1.9 Occupational and Public Health and Safety

<u>**Normal Operations**</u>

Section 2.9.9 indicates that exposures could arise during normal operating conditions from small amounts of mercury vapor accumulating in the storage areas. The analysis of these potential impacts is not sensitive to the total amount of mercury in the facility or the duration of the storage. Under a scenario with a shorter storage duration, the consequences to involved workers, noninvolved workers, or members of the public would still be expected to be

negligible (i.e., SL-I), with negligible associated risks. Even with negligible risks, a shorter duration of storage would further minimize risks from normal operations.

Facility Accidents

Section 2.9.9 indicates that potential accidents at a mercury storage facility could include mercury spills inside or outside the storage building. In all accident scenarios, the potential risks have been determined to range from negligible to low. The material at risk in most of the accident scenarios is one or multiple mercury containers. This accident condition would not be affected by a shorter storage duration or a smaller total quantity of mercury. Evaluation of a beyond-design basis earthquake conservatively assumes that mercury from the containers is released and spreads across the entire floor area of the building and is released in open air. Because the analysis in this SEIS-II uses the specific building floor area and not the amount of mercury stored in the building, the results of the analysis would not be affected by a reduced amount of mercury in storage. Even with negligible-to-low accident risks, a shorter duration of storage would further minimize risks from accidents.

Transportation

Section 2.9.9 indicates that risks associated with transportation accidents are a function of the number of miles driven and the nature of the accident (fire or no fire). Potential transportation risks have been determined in this SEIS-II to range from negligible to low. With a shorter duration of management and storage and a smaller quantity of mercury to be shipped to the storage facility, the number of miles driven would decrease from that analyzed under the Proposed Action. The potential consequences of an accident assume a full truckload of mercury containers. Therefore, the consequences of an accident would remain the same as presented for the Proposed Action. The number of miles traveled affects the probability of an accident. The probability (and therefore the risk) would decrease as the number of truck miles decrease. As noted in Section 2.10.4, the actual reduction in total truck miles would be dependent on the alternative site(s) DOE selects.

2.10.1.10 Ecological Risk

The ecological risk presented in Section 2.9.10 is directly related to the risks of an accident involving a fire. Impacts from the Proposed Action would be negligible to low. As described in Section 2.10.9.3, the potential ecological risks would decrease as a function of the lower probability of an accident involving a fire because of the expected decrease in truck miles required to transport a smaller quantity of mercury.

2.10.1.11 Socioeconomics

Section 2.9.11 indicates that impacts on socioeconomic conditions, including overall employment population trends, available housing, and other community services in the regions of influence for all alternative sites would be negligible. A shorter duration of storage would not change the magnitude of these impacts; however, the duration of the potential impacts would be shorter.

2.10.1.12 Environmental Justice

Section 2.9.12 indicates that there would be no disproportionately high and adverse effects on minority or low-income populations under the Proposed Action, regardless of the alternative site(s) DOE selects. A shorter storage duration and smaller quantity of mercury to be stored would further reduce the potential for adverse impacts to minority or low-income populations.

2.10.2 Designation of Multiple Facilities

As stated in Section 1.4, DOE's Proposed Action is to designate one or more facilities for the long-term management and storage of elemental mercury in accordance with MEBA. The potential environmental impacts presented in Chapter 4 and summarized in Section 2.9 are representative of potential impacts that could result if DOE were to designate one of the eight alternative sites for long-term management and storage of mercury. This sensitivity analysis provides a perspective of if, and how, those impacts might change if DOE were to implement the Proposed Action through the designation of more than one alternative site. DOE could implement this approach under a variety of situations, including but not limited to: (1) a preference for a single contract with an entity that controls three alternative sites in different geographic regions; (2) the need to enter into a second (or third) contract due to reaching capacity of the first facility (this could be the case if a treatment and disposal option is not approved by EPA in a timely manner); and (3) a preference for establishing additional designated storage sites in different geographic regions.

2.10.2.1 Land Use and Ownership, and Visual Resources

Since there would be no new construction at any of the alternative sites and they are (or would be in the case of HWAD) permitted for hazardous waste storage, there would be no changes in land use and ownership for an individual site. Additionally, there would be no impact to visual resources at any of the alternatives. Therefore, if multiple sites were used, there would still be no changes in land use or ownership or impacts to visual resources associated with the Proposed Action.

2.10.2.2 Geology, Soils, and Geologic Hazards

Since there would be no new construction at any of the alternative sites, there would be no impacts to geology or soils for an individual site. Therefore, if multiple sites were used, there would still be no impacts to geology or soils associated with the Proposed Action.

2.10.2.3 Water Resources

As reported in Section 2.9.3, impacts to water use are provided on an annual basis and are dependent on the estimated number of workers. The number of workers would not vary greatly between a facility that stored 900 MT of mercury from one capable of storing 7,000 MT of mercury (this SEIS-II assumes eight personnel, regardless of storage capacity). While the number of required workers would likely decrease when there is reduced receipt and handling activities (i.e., when a facility has reached its capacity or is no longer receiving mercury for storage, the activities are limited to monitoring the stored mercury), the amount of water used is small in comparison to capacity for each alternative. Multiple operating facilities would increase the aggregate amount of water used for the Proposed Action; however, these uses would occur in locations that are not within the same municipal water district or water supply system (the facilities that are the closest are the two alternatives in Tennessee; approximately 135 miles apart). As such, there would not be any cumulative impacts from an approach that utilized multiple site alternatives.

2.10.2.4 Air Quality and Noise

Potential environmental impacts to air quality and noise from the Proposed Action would primarily be related to transportation of the mercury to the treatment and storage locations (i.e., air emissions and traffic noise). The impacts presented in Chapter 4 and summarized in Section 2.9.4 would bound potential impacts if the up to 7,000 MT of mercury were managed and stored in multiple facilities. The analysis assumes that all 7,000 MT of mercury would be shipped to each of the alternative sites, including those that are the farthest from the treatment and storage locations (see Appendix B, Table B-3). From a noise perspective, the number of shipments received or dispatched from any of the facilities would be no greater than that assumed if the facility was the only one designated.

2.10.2.5 Ecological Resources

As described in Section 2.9.5, there would be no impacts on ecological resources for any of the alternative sites. Therefore, the potential designation of multiple sites would not increase the potential for impacts to this resource.

2.10.2.6 Cultural and Paleontological Resources

There would be no new construction at any of the alternative sites; however, building modifications at HWAD would require consultation with the Nevada SHPO prior to implementation since the buildings are eligible for listing on the NRHP. If multiple sites were used, there would be no cumulative cultural resources impacts beyond those stated for each specific alternative.

2.10.2.7 Site Infrastructure

The potential for impacts to site infrastructure at one facility to be cumulative with impacts at another designated site are negligible. As summarized in Section 2.9.7, each site has adequate capacity for utilities, and annual transportation requirements would be small. Since none of the sites is closer than 135 miles to another alternative site, designation of multiple sites would not increase potential impacts to site infrastructure.

2.10.2.8 Waste Management

As reported in Section 2.9.8, the operation of a mercury storage facility would be expected to generate hazardous waste that is commensurate with the amount of mercury stored at the facility. Therefore, if the up to 7,000 MT of mercury managed and stored under the Proposed Action were distributed into multiple facilities, the total estimated amount of hazardous waste generated would be consistent with that reported for a single facility capable of handling the full inventory. As a result, there would be no difference in impacts from that reported in Section 2.9.8.

2.10.2.9 Occupational and Public Health and Safety

Normal Operations

Section 2.9.9 indicates that exposures could arise during normal operating conditions from small amounts of mercury vapor accumulating in the storage areas. The analysis of these potential impacts is not sensitive to the total amount of mercury in the facility or the duration of the storage. Therefore, if multiple sites were used for mercury management and storage, there could be an increased number of operations personnel that could be subject to these exposures; however, the estimated consequences to involved workers, noninvolved workers, or members of the public are expected to be negligible (i.e., SL-I), with negligible associated risks.

Facility Accidents

Section 2.9.9 indicates that potential accidents at a mercury storage facility could include mercury spills inside or outside the storage building. In all accident scenarios, the potential risks have been determined to range from negligible to low. The material at risk in most of the accident scenarios is one or multiple mercury containers. This accident condition would not be affected by the total quantity of mercury stored at a single site. Evaluation of a beyond-design-basis earthquake conservatively assumes that mercury from the containers is released and spreads across the entire floor area of the building and is released in open air. Because the analysis in this SEIS-II uses the specific building floor area and not the amount of mercury stored in the building, the results of the analysis would not be affected by the total amount of mercury in storage.

If multiple alternative sites were designated, the potential impacts presented above could occur at multiple locations. Considering that the alternative sites are at least 135 miles apart from each other, there is no potential for a single accident to increase the estimated consequences or risks at multiple sites or affect the same surrounding population.

Transportation

As reported in Appendix B, Table B-3, this SEIS-II assumes that 7,000 MT of mercury is transported to each of the alternative sites, regardless of the site's physical capacity to store that amount. This conservative assumption ensures that potential transportation impacts are not underestimated. Therefore, if multiple sites were designated for management and storage, the total truck miles associated with the transportation of the mercury would be no more than the highest estimated truck miles in Table B-3.

2.10.2.10 Ecological Risk

The ecological risk presented in Section 2.9.10 is directly related to the risks of an accident involving a fire. Impacts from the Proposed Action would be negligible to low. The potential ecological risks would decrease as the total truck miles decreased (as a result of a lower probability of an accident). As described in Section 2.10.2.9, the total miles estimated for the Proposed Action would bound potential mileage if multiple site alternatives were designated. Therefore, the risks presented in Section 2.9.10 would bound those potential risks.

2.10.2.11 Socioeconomics

Potential impacts to socioeconomics are dependent on the estimated number of workers, but have been described in Section 2.9.11 as negligible. The number of workers would not vary greatly between a facility that stores 900 MT of mercury from one capable of storing 7,000 MT of mercury (this SEIS-II assumes eight personnel, regardless of storage capacity). The number of required workers would likely decrease when there is reduced receipt and handling activities (i.e., when a facility has reached its capacity or is no longer receiving mercury for storage, the activities are limited to monitoring the stored mercury). Multiple operating facilities would increase the overall employment associated with the Proposed Action; however, these workers would be in different regions of influence (the facilities that are the closest are the two alternatives in Tennessee; approximately 135 miles apart). As such, there would not be any cumulative impacts from an approach that utilized multiple site alternatives.

2.10.2.12 Environmental Justice

Section 2.9.12 indicates that there would be no disproportionately high and adverse effects on minority or low-income populations under the Proposed Action, regardless of the alternative site(s) DOE selects. Designation of multiple sites for management and storage of mercury could result in a smaller quantity of mercury to be stored at any given facility and could further reduce the potential for adverse impacts to minority or low-income populations. As discussed in Section 2.10.2.11, the populations affected at multiple sites would be in different regions of influence and any impacts at one site would not be cumulative with impacts at another site.

3 AFFECTED ENVIRONMENT

3.1 APPROACH TO DEFINING THE AFFECTED ENVIRONMENT

This chapter describes the environment at the eight sites that could be affected by implementing the action alternatives described in Chapter 2, Section 2.3. The affected environment descriptions provide the context for evaluating the potential environmental consequences presented in Chapter 4 for the action alternatives. The affected environment is the baseline from which any environmental change caused by implementing the Proposed Action can be identified and evaluated. This chapter also includes a discussion of any reasonably foreseeable environmental trends or planned actions for each of the eight sites in accordance with revised CEQ guidance in 40 CFR § 1502.15. This SEIS-II considers the same resource areas evaluated in previous NEPA reviews for mercury storage (see Section 1.3) and includes land use and ownership, and visual resources; geology, soils, and geology hazards; water resources; air quality, meteorology, and noise; ecological resources; cultural and paleontological resources; site infrastructure; waste management; occupational and public health and safety; socioeconomics; and environmental justice. In accordance with 40 CFR § 1502.15, the succinct descriptions of the affected environment, as well as data and analyses, are commensurate with the importance of the impact. The descriptions provide the detail necessary to understand the potential impacts of the alternatives.

The 2011 Mercury Storage EIS (DOE 2011) provided information about the affected environment at Y-12 to support the analysis of the No-Action Alternative. Section 3.10 of this SEIS-II updates the affected environment at the Oak Ridge Reservation (ORR) for select resource areas to establish the No-Action Alternative baseline (see Section 2.5 of this SEIS-II). For most resource areas, the affected environment for ORR is unchanged or so minor that such changes do not affect the analysis. As discussed in Section 2.5, potential actions at other sites that could continue to accumulate mercury if DOE did not designate a facility are speculative and are addressed generally in Chapter 4, Section 4.2.

The analyses in the 2011 Mercury Storage EIS for action alternatives with existing storage facilities indicated that potential environmental impacts were expected to be negligible or less for most of the resource areas evaluated. The action alternatives in this SEIS-II include two facilities previously evaluated in the 2011 Mercury Storage EIS and six facilities not previously evaluated. Because potential environmental impacts are expected to be similar to those identified in the 2011 and 2013 NEPA analyses (i.e., negligible or less), this SEIS-II limits the descriptions of the affected environment for resource areas that are unlikely to be affected. Consistent with previous NEPA analyses, the ROIs for potential environmental impacts for most resource areas were defined as the actual proposed storage facility(s) and the surrounding site. For several resource areas, the ROI may extend beyond the site because (1) the potential impacts could occur over a larger area, (2) a description of a larger area is needed to support the analysis of other resource area(s), or (3) the available data to describe a particular resource is at a scale larger than the site itself. Table 3-1 provides brief descriptions of the ROIs for each resource area.

Appendix B of the 2011 Mercury Storage EIS (DOE 2011) provides descriptions of the methods used to assess potential impacts in each of the environmental resource areas. That appendix also includes information relevant to preparing the descriptions of affected resources addressed in this chapter. For most resource areas, the methods used to assess potential impacts in this SEIS-II are consistent with the methods used in 2011. The applicable sections in Chapters 3 and 4 of this SEIS-II identify where these methods may differ. For more information on terminology and approaches used to describe the affected environment, see Appendix B of the Mercury Storage EIS (DOE 2011), which is hereby incorporated by reference into this SEIS-II.

Table 3-1 General Regions of Influence for the Affected Environment

Environmental Resource Area	Region of Influence
Land use and visual resources	The storage building(s), site, and nearby offsite areas
Geology, soils, and geologic hazards	The storage building(s), site, and nearby offsite areas
Water Resources	The storage building(s), site, and nearby offsite water bodies
Air quality, meteorology, and noise	The storage building(s), site, and nearby offsite areas Vehicle emissions from transportation of mercury are evaluated nationally
Ecological resources	Site and nearby offsite areas
Cultural and paleontological resources	Site and nearby offsite areas
Site Infrastructure	The storage building(s), site, and regional access roads
Waste Management	The waste management capabilities of the site
Occupational and public health and safety	The storage building(s), site, nearby offsite areas, and associated transportation corridors
Socioeconomics	City or county level depending on available data
Environmental justice	County level based on U.S. Census Bureau low-income and minority population data

In accordance with revised CEQ regulations (40 CFR § 1502.15), this chapter also includes a description of reasonably foreseeable environmental trends and planned actions in the ROI for each site. This information is used in Chapter 4 of this SEIS-II to identify any potential cumulative impacts (or effects) that could occur as a result of the Proposed Action. In accordance with 40 CFR § 1508.1(g), "Impacts (or effects) means changes to the human environment from the proposed action or alternatives that are reasonably foreseeable and have a reasonably close causal relationship to the proposed action or alternatives, including those effects that occur at the same time and place as the proposed action or alternatives and may include effects that are later in time or farther removed in distance from the proposed action or alternatives."

3.2 HAWTHORNE ARMY DEPOT

3.2.1 Land Use and Ownership, and Visual Resources

3.2.1.1 Land Use and Ownership

The 147,000-acre HWAD site is owned and managed by the DoD and located in Mineral County, Nevada (Tetra Tech 2018) (see Figure 2-4 in Chapter 2). Public access is restricted. HWAD has no agricultural or grazing leases as both activities are incompatible with the installation's mission activity. The primary land use is ammunition storage in approximately 3,500 buildings including 2,094 munitions structures distributed throughout three large areas (the North, Central, and South magazine areas). The majority of the land area on the site is covered with Great Basin desert shrub vegetation. The series of buildings being considered for potential mercury storage are located in the Central Magazine Area (Group 110 design storehouses) (HWAD 2021). The buildings are arranged in parallel rows, spaced approximately 460–560 feet between and within rows. This series of buildings is approximately 2.5 to 3 miles from the nearest nongovernment industrial and residential areas in Hawthorne, Nevada. The location of the Group 110 design storehouses relative to Hawthorne, Nevada is shown in Figure 3-1.

Figure 3-1 Aerial View of HWAD, Group 110 Storehouses

The HWAD is surrounded by mountains on the west, east, and south and Walker Lake on the north (Tetra Tech 2018). Much of this surrounding land is undeveloped and owned and managed by other Federal agencies such as the U.S. Department of Agriculture Forest Service and U.S. Bureau of Land Management and the Walker Lake Indian Reservation (Tetra Tech 2018, Figure 3).

3.2.1.2 Visual Resources

The viewshed surrounding the HWAD consists mainly of open Great Basin desert range within the Walker Lake Valley, containing mostly low-profile military storage, residential, and light industrial areas dominated by mountain views of the Wassuk Range to the west and the Gillis Range to the east (DOE 2011). The tallest structures located at the depot are two 280-foot water storage tanks located in the Central Magazine Area.

3.2.2 Geology, Soils, and Geologic Hazards

3.2.2.1 Geology and Soils

The general geologic information describing the HWAD is included in the 2011 Mercury Storage EIS (DOE 2011, Section 3.4.2.1) and has not changed. This information is incorporated by reference into this SEIS-II.

Descriptions of the soil types and potential or existing environmental contamination are included in the 2011 Mercury Storage EIS (DOE 2011, Section 3.4.2.2) and are incorporated by reference into this SEIS-II. Over the life of the HWAD mission, some of the soils and sediments on the depot have been contaminated with unexploded ordnance, explosives residue, metals, hydrocarbons, and volatile organic compounds. Every five years, the HWAD updates the Installation Action Plan, which outlines a multiyear cleanup program for the site and identifies locations of contamination, primary contaminants of concern, and affected environmental resources (HWAD 2017). In the general vicinity of the Group 110 design storehouses, soil contamination from an open pit burning site that operated in the 1950s was identified and remediated in 2014 (HWAD 2017, page 57).

None of the soils in the immediate vicinity of the Central Magazine Area is characterized as prime farmland as delineated by the Natural Resources Conservation Service (NRCS 2021).

3.2.2.2 Geologic Hazards

Nevada is one of the most seismically active states in the United States and has experienced the effects of several major earthquakes within the past 100 years. Among these, the October 15, 1915, Pleasant Valley earthquake occurred in a relatively uninhabited area of the state about 150 miles northeast of Hawthorne. Attributed to a fault on the east side of the Pleasant Valley, it had an estimated magnitude of 7.75 on the Richter scale. The earthquake destroyed many adobe homes in Pleasant Valley and was felt from beyond Salt Lake City, Utah, to western Oregon and south to San Diego, California. A magnitude 7.3 earthquake occurred on December 20, 1932. This earthquake was located about 34 miles northeast of Hawthorne near the Mineral-Nye County line (DOE 2011). Since the early 1900s, within a radius of approximately 62 miles of the central portion of the site, more than 5,000 earthquakes (larger than magnitude 2.5) have been recorded (USGS 2021a). One of the larger and closest events was a magnitude 5.4 earthquake on September 18, 1988, located about 15 miles southeast of the depot. In May 2020, the largest recorded earthquake in the Hawthorne region was a magnitude 6.5 event centered approximately 50 miles to the southeast in the Monte Cristo Range (USGS 2021a).

Seismically induced ground motion is expressed as a ratio of the acceleration due to Earth's gravity (g). This SEIS-II uses the latest probabilistic peak ground acceleration (PGA) data from the U.S. Geological Survey (USGS) to assess seismic hazard among the various mercury storage alternative sites. The PGA values cited are based on a 2-percent probability of exceedance in 50 years. This corresponds to an annual probability (chance) of occurrence of about 1 in 2,500. For a HWAD central location, the calculated PGA is approximately 0.62 g (USGS 2021b).

HWAD lies approximately 60 miles north of the Mono-Inyo Craters volcanic chain. This active volcanic complex extends southward for about 30 miles from Mono Lake in east-central California. Over the past 5,000 years, an eruption has occurred somewhere along the chain every 250–750 years, with the last eruption on the northern end of the lake at Paoha Island about 250 years ago (DOE 2011).

3.2.3 Water Resources

3.2.3.1 Surface Water and Floodplains

Surface water occurs on about seven percent of the HWAD site (Tetra Tech 2018). The southern one third of Walker Lake is within the boundaries of the depot but approximately five miles northwest of the Central Magazine Area. The lake is the terminal point of ephemeral stream channels that drain the Walker Lake Valley. The level of Walker Lake has declined by about 160 feet over the past 100 years because of upstream water use, diversions for irrigation water, and decreases in surface runoff reaching the lake because of diversions and evaporation. The Mount Grant watershed located in the Wassuk Range west of Hawthorne, Nevada, is within the boundaries of the HWAD site (Tetra Tech 2018). This watershed supplies much of the potable water for the HWAD. Water is captured in a series of basins and reservoirs from major creeks on Mount Grant. Black Beauty Reservoir, the nearest reservoir, is located 3.8 miles west of Hawthorne and approximately 6.2 miles from the Central Magazine Area (DOE 2011; Tetra Tech 2018, Figure 8).

Flood zones on the HWAD site have been delineated (Tetra Tech 2018, Figure 10). Several ephemeral channels crossing the Central Magazine Area have been delineated as areas subject to flooding by the 1-percent annual chance flood (100-year) event. Some portions of the depot are subject to periodic flash flooding from thunderstorms. Therefore, dikes (levees) have been constructed along principal drainages and diversion ditches throughout the depot to protect facilities from flash flooding (DOE 2011). A principal drainage feature (Pamlico Ditch) bisects the southern half of the Central Magazine Area and terminates at a diversion dike approximately 0.4 mile south of the Group 110 design storehouses. Additional details about surface water and floodplains at the site can be found in the 2011 Mercury Storage EIS and *Integrated Natural Resources Management* Plan (DOE 2011; Tetra Tech 2018, Section 5.6).

3.2.3.2 Groundwater

The principal source of groundwater in the HWAD area is the basin-fill aquifer system beneath the Walker Lake Valley (Tetra Tech 2018). Because the Walker Lake Valley is a closed hydrogeologic basin with no flow between adjacent basins, groundwater losses are mainly due to evapotranspiration, small springs, and groundwater pumping (Tetra Tech 2018). Precipitation and runoff, including snowmelt from the Wassuk Range, are the primary sources of recharge to the basin-fill aquifer system. Depth to groundwater beneath the site ranges from about five feet below land surface on the north side of the site to about 200 feet in the southern portion of the site (DOE 2011). Walker Lake is the terminal point for all groundwater flow within the Walker Lake Valley. Groundwater is used to augment potable water from the Wassuk Range as needed. Additional details about groundwater at the site is in the *Integrated Natural Resources Management Plan* (Tetra Tech 2018, Section 5.4.2).

3.2.4 Air Quality, Meteorology, and Noise

3.2.4.1 Air Quality and Meteorology

The climate of the HWAD area is arid (Tetra Tech 2018). The average annual rainfall is 4.04 inches (WRCC 2021a). Maximum rainfall occurs in late spring and during the fall. Minimum rainfall months are July and August. The average annual snowfall at Hawthorne is 2.3 inches. Average summer temperatures range from 63 degrees Fahrenheit (°F) to 96°F. Average winter temperatures range from 24 to 47°F (WRCC 2021a).

One tornado has been reported in Mineral County since January 1950 (NOAA 2021). An F1 tornado (wind speeds from 73 to 112 miles per hour [mph] per the Fujita scale) caused damage in Hawthorne on June 6, 2015. However, the region is considered very low risk for tornadoes. Several occurrences of high winds typically occur every year (DOE 2011). The average annual wind speed is six miles per hour at Reno (NOAA 2021). Predominate wind direction varies by season with south and west winds being more frequent in during the colder months and north and west winds more common during the warmer months.

Mineral County is in attainment[1] for National Ambient Air Quality Standards (NAAQS) criteria air pollutants[2] (EPA 2021a). The primary sources of criteria pollutants at the HWAD are fuel oil-fired boilers; material-recovery processes; propane furnaces; rock crushing, screening, and stacking operations; portable generators; surface coating operations; and ordinance disposal operations (DOE 2011; Tetra Tech 2018). HWAD maintains an air quality operating permit. The region is susceptible to windblown dust particulate matter because of the arid climate, sparse vegetation cover, and dry-lake beds (DOE 2011).

3.2.4.2 Noise

The State of Nevada and Mineral County have not established community noise standards, which specify acceptable noise levels applicable to the site (DOE 2011). Noise emission sources within the HWAD include various equipment and machines—heating, ventilating, and air conditioning equipment; material-handling equipment (i.e., forklifts and loaders); and vehicles. Some impulsive noise is generated from test firing and demolition of military munitions, weapons, and small arms. Most munitions detonations are conducted at the New Bomb Area located 21 miles south of Hawthorne, Nevada. An environmental noise study for the depot concluded that incompatible and normally incompatible noise zones from onsite activities do not extend beyond the installation boundary. The nearest noise-sensitive receptors are in the city of Hawthorne (DOE 2011). The closest residence is approximately three miles from the proposed mercury storage location.

3.2.5 Ecological Resources

3.2.5.1 Terrestrial Resources

The HWAD is located in the Central Basin and Range Ecoregion typical of the central Great Basin region and provides habitat for a diversity of native plants and animals (Tetra Tech 2018). Vegetation in the Central Magazine Area is classified as Intermountain Basins Greasewood Flat, which covers over 40 percent of the HWAD (Tetra Tech 2018, Figure 12, Table 11). Vegetation is dominated by sagebrush (*Artemisia* spp.), saltbush (*Atriplex* spp.), greasewood (*Sarcobatus*

[1] Attainment means measures of all criteria pollutants in the air are below the NAAQS and air quality is considered good.

[2] NAAQS criteria air pollutants include carbon monoxide, nitrogen dioxide, sulfur dioxide, lead, ozone, and particulate matter (PM), both $PM_{2.5}$ and PM_{10}.

vermiculatus), and joint fir (*Ephedra* spp.). Vegetation on the HWAD has been fragmented by roads, ammunition storage structures, and other support infrastructure.

A wide variety of mammals (70), reptiles (45), amphibians (10), and birds (218) occur throughout the depot. The abundance of animals is affected by the amount of habitat, size of undisturbed vegetation patches, and the frequency of human activity (Tetra Tech 2018).

3.2.5.2 Aquatic Resources and Wetlands

Wetlands at the HWAD are primarily located adjacent to streams and springs on Mount Grant, at the edge of Walker Lake, and in intermittent streambeds in the South Magazine Area (Tetra Tech 2018). No natural wetlands or other perennial surface water occur around the Group 110 design storehouses in the Central Magazine Area. A small wetland area has been delineated northwest of this area (Tetra Tech 2018, Figure 9). Aquatic plants and animals do not occur in the Central Magazine Area because of the absence of suitable habitat.

3.2.5.3 Threatened or Endangered and Other Protected Species

Two federally threatened or endangered species potentially occur in Mineral County: the Lahontan cutthroat trout (in Walker Lake) and yellow-billed cuckoo (USFWS 2021a; Tetra Tech 2018). Yellow-billed cuckoos use wooded habitat with dense cover and water nearby, including woodlands with low, scrubby vegetation, overgrown orchards, abandoned farmland, and dense thickets along streams and marshes. Habitat for neither species occurs in the Central Magazine Storage Area or the immediate surrounding area. Though not endangered or threatened, the sand cholla (*Grusonia pulchella*), a cactus found on the HWAD, is protected under the State of Nevada's cactus, yucca, or Christmas tree list (DOE 2011; NDNH 2021). Bald and golden eagles protected under the *Bald and Golden Eagle Protection Act* (BGEPA) occur seasonally in the area or migrate through in the spring and fall. Wintering bald eagles have been observed near Walker Lake and golden eagles have been observed nesting on Mount Grant (Tetra Tech 2018). No roosting or nesting habitat for either species occurs in the Central Magazine Storage Area. Populations of migratory birds, protected under the *Migratory Bird Treaty Act* (MBTA), occur throughout the site.

3.2.6 Cultural and Paleontological Resources

The general information describing the HWAD's archaeological, cultural, and paleontological resources is included in the 2011 Mercury Storage EIS (DOE 2011, Section 3.4.6) and is still accurate. This information is incorporated by reference into this SEIS-II.

3.2.6.1 Prehistoric and Historic Resources

The *Integrated Cultural Resources Management Plan* for HWAD is updated every five years with the latest report covering the 2019–2024 timeframe. As presented in the 2011 Mercury Storage EIS (DOE 2011), 15 archaeological sites remain eligible for listing in the National Park Service's (NPS's) *National Register of Historic Places* (NRHP). Ninety-one sites are ineligible and 10 have not been evaluated. The identified cultural resources represent every period of human occupation from the Paleoindian stage to the present and include petroglyphs, lithic scatters, open camps, quarries, hunting blinds, and a mining complex (HWAD 2019).

There are 2,646 historic architectural resources at HWAD that are considered contributing elements to the historical significance of Hawthorne Naval Ammunition Depot Eligible Historic District (the Group 110 design storehouses are included in these contributing elements). Contributing resources include 539 buildings, 2,072 structures, 28 sites, and 7 objects. HWAD is treated as a historic district, although formal designation of the HWAD Historic District has not been determined (HWAD 2019).

3.2.6.2 American Indian Resources

The state of Nevada is home to 25 federally recognized American Indian tribes and colonies, including the Walker River Indian Reservation, which is located in Mineral County near the HWAD (NCSL 2020). The Walker Lake Basin area has been home to American Indians for nearly 11,000 years. The Walker River Paiute Tribe is under Federal Government jurisdiction but is self-governing and associated with the Northern Paiute ethnic group (DOI 2010, page 9-7).

The Walker River Paiute Tribe refers to itself as *Agai-Dicutta* (Trout Eaters) Band of Northern Paiute Nation. The Walker River Indian Reservation sits on 325,000 acres between the northeastern end of Mason Valley and Walker Lake and has a population of approximately 1,200 residents. The reservation was set aside by Federal action on November 29, 1859, and later affirmed by Executive Order in 1874. Over time, the boundaries of the reservation were greatly altered by Government policy changes. The reservation's main community is in Schurz, Nevada, located along the Walker River. Most of the land is held in trust by the United States (DOI 2010, page 9-8). In addition to the Walker River Paiute Tribe, HWAD maintains an interactive relationship with six other tribes for cultural resource management input: the Fallon Paiute-Shoshone Tribe, Pyramid Lake Paiute Tribe, Yerington Paiute Tribe, Fort McDermitt Paiute and Shoshone Tribe, Yombo Shoshone Tribe, and Reno-Sparks Indian Colony. To date, there have not been any Traditional Cultural Properties (TCPs) of traditional religious and cultural importance identified at the HWAD site (HWAD 2019).

3.2.6.3 Paleontological Resources

Consistent with the 2011 Mercury Storage EIS (DOE 2011), the *Integrated Cultural Resources Management Plan* (HWAD 2019) stated that no paleontological resources have been identified on the HWAD.

3.2.7 Site Infrastructure

3.2.7.1 Ground Transportation

The primary transportation routes near HWAD are U.S. Route 95 and State Route 359. The HWAD site is accessible from U.S. Route 95 and by rail. U.S. Highway 95 crosses the site between the Central and South magazine areas. U.S. Highway 95 is the main north-south highway and connects to I-80 in central Nevada east of Reno. The average annual daily traffic count on this segment of U.S. Route 95 in 2020 was 3,350 vehicles per day: a 33-percent reduction from the 5,000 vehicles per day in 2008 (DOE 2011; NVDOT 2021).

3.2.7.2 Utilities

Although the Sierra Pacific Power Company provides electricity, the U.S. Army owns the electrical system infrastructure (DOE 2011). The depot is served by four substations. There is no transmission line electrical power to the Group 110 design storehouses (DOE 2011). Portable generators supply the necessary electrical power in the magazine area.

Fuel use at HWAD consists of fuel oil to fire the boilers for heating (HWAD 2021) and propane in some buildings for heat, hot water, and miscellaneous uses. Fuel oil and propane are both stored at the HWAD site in above- and belowground storage tanks.

The primary source of water for the HWAD comes from the Wassuk Mountain watershed on the western site boundary (HWAD 2021). Surface-water runoff is diverted into three holding reservoirs: Rose Creek, Cat Creek, and Black Beauty. All surface water flows through Black Beauty Reservoir and is treated with chlorine before being sent to the depot distribution system. Water in Black Beauty Reservoir is supplemented by well water when surface flow reaches a predetermined minimum level. Over 250 miles of pipe transport water from this distribution system throughout the depot (DLA 2004, page 3-86, as cited in DOE 2011).

There is no communications (telephone or network) capability in the current Group 110 design storehouses (HWAD 2021).

3.2.8 Waste Management

Nonhazardous and hazardous wastes are generated at the HWAD as a result of routine site operations, environmental restoration activities, and construction activities. All HWAD wastes are managed on site using appropriate treatment, storage, and disposal technologies, in compliance with applicable Federal and state statutes (HWAD 2021).

In February 2006, the HWAD was formally identified as the mercury consolidation location for the Defense Logistics Agency, Defense National Stockpile Center (DOE 2011). In 2010 and 2011, more than 300 truckloads containing 4,436 metric tons of elemental mercury in 128,736, 3-L flasks were consolidated from three sites, over-packed in epoxy-coated steel drums with air- and liquid-tight locking rings, shipped to HWAD, and stored in 14 warehouses in the Central Magazine Area (HWAD 2015). As a condition of continued long-term mercury storage, the Nevada Division of Environmental Protection (NDEP) required that all mercury be transferred to larger 1-metric-ton storage containers. In 2014, HWAD installed a mobile mercury transfer system to transfer mercury stored in the 128,736, 3-L flasks to 1-metric-ton storage containers.

Potential waste generated from the mercury transfer and storage operation includes steel drums in which the 3-L flasks were shipped and the empty 3-L flasks. The empty steel drums are either reused or crushed and recycled (HWAD 2015). Some of the repurposed drums are used to store empty flasks, used personal protective equipment (PPE), and contaminated equipment until they are disposed of as hazardous waste.

HWAD operates an onsite Class III landfill for nonhazardous waste. The landfill is permitted by NDEP. HWAD also operates an onsite permitted hazardous waste treatment facility. Explosive hazardous waste is treated at the New Bomb Disposal Facility, located south of the main depot.

The remaining regulated waste (including large quantities of petroleum, oil, and lubricants in addition to other hazardous materials, such as solvents, pesticides, and compressed gases) is shipped off site for treatment and disposal at commercial facilities.

Sanitary wastewater is managed by the town of Hawthorne's wastewater treatment plant.

3.2.9 Occupational and Public Health and Safety

HWAD conducts a wide variety of operations related to its primary mission of critical munitions storage, demilitarization activities, and munitions readiness. Additional background information about occupational and public health and safety of normal operations, facility accidents, and transportation on HWAD is discussed in the 2011 Mercury Storage EIS (DOE 2011). As discussed in Section 3.2.8 of this SEIS-II, the HWAD is the long-term storage location of the Defense National Stockpile Center mercury inventory. The discussion of occupational and public health and safety in this SEIS-II focuses on the existing Defense Logistics Agency mercury storage operation at HWAD.

3.2.9.1 Normal Operations

HWAD is currently operating a mercury transfer system to transfer mercury stored in the 128,736 3-L flasks to 1-metric-ton storage containers. The operations are performed in a temporary building in the Central Magazine Area. The elemental mercury is stored in modified Group 110 buildings in the Central Magazine Area. Mercury transfer and storage is performed under air quality and the Chemical Accident Prevention Program operating permits from the NDEP. All buildings that store or transfer mercury use air sampling and monitoring. Ventilation and filtration equipment have been installed as part of the modifications to protect workers and nonworkers from any releases of mercury vapors. Controlled access, security, and fire detection and suppression systems provide additional protection. Spill containment structures and sealed floors prevent uncontrolled releases of mercury. The operations are expected to continue until approximately 2036.

3.2.9.2 Facility Accidents

HWAD stores a large amount of elemental mercury as part of its mission. The installation's mission operations also require the use and storage of hazardous materials such as compressed gases, fuels, lubricants, oils, pesticides, and solvents. HWAD also generates hazardous waste during renovation, recovery, and disposal of unserviceable ammunition and explosives and during general depot support activities. Hazardous explosive material at HWAD that cannot be recycled or reused is demilitarized at the New Bomb Area disposal facility. Hazardous waste generated at HWAD is transported off site by licensed transporters and disposed of at permitted treatment, storage, and disposal facilities. In accordance with the RCRA permit, HWAD operations include emergency response procedures, training, and facilities. Emergency actions in response to wildland fires are addressed in HWAD's Emergency Operations Plan (Tetra Tech 2018).

HWAD mercury transfer and storage operations are conducted in accordance with a Chemical Accident Prevention Program operating permit. In the 6–7 years of operation, there have been no reported accidents involving shipping, receiving, or re-containerizing mercury (HWAD 2021).

3.2.9.3 Transportation

No incidences (accidents or releases of mercury) occurred during the transportation of the 128,736 3-L flasks via truck to the HWAD. No incidences have occurred on site during the movement of 3-L flasks to the temporary transfer building or the movement of filled 1-MT containers to the storage buildings.

3.2.10 Socioeconomics

Based on the local employment dynamics compiled by the U.S. Census Bureau (USCB), approximately 90 percent of people employed in the Hawthorne area are assumed to reside in three Nevada counties: Mineral, Lyon, and Churchill (DOE 2011). Therefore, these three counties have been identified as the ROI in this socioeconomics analysis. In 2020, the HWAD employed approximately 650 people (HWAD 2021).

3.2.10.1 Regional Employment Characteristics

From 2010 to 2019, the labor force in the ROI increased by approximately 1.2 percent, from 36,383 to 36,806 workers. By December 2019, the average unemployment rate in the ROI was 4.1 percent, which was slightly higher than the unemployment rate for Nevada (3.7 percent) (BLS 2021a, 2021b, 2021c).

3.2.10.2 Demographic and Housing Characteristics

In 2019, the estimated population of the three-county ROI was 86,924. From 2010 to 2019, the ROI population grew by 6.5 percent. There were 37,907 housing units in the ROI in 2019; 69 percent of the housing units were owner-occupied (USCB 2021a).

3.2.11 Environmental Justice

The ROI surrounding the HWAD encompasses parts of Mineral, Lyon, and Churchill counties in Nevada. The population living within 10 miles of the Central Magazine Area on HWAD is concentrated in the town of Hawthorne. In 2019, the total population of the ROI was 86,924; the minority population was 23,677 (27.2 percent); and the low-income[3] population was 9,496 (10.9 percent). Preliminary 2019 demographic data from the 2020 Census show that the top three minority groups within the ROI are (in order of population size) Hispanic or Latino, American Indian and Alaska Native, and Asian (USCB 2021a). The Walker River Indian Reservation is located approximately eight miles north of the HWAD site boundary; more than 10 miles from the Central Magazine Area.

By comparison, the state of Nevada consists of a 52-percent minority and 13-percent low-income population. The top three minority groups in the state are (in order of population size) Hispanic or Latino, Black or African American, and Asian.

[3] The definition of low-income population as used in this Draft SEIS II is determined using the U.S. Census Bureau definition of "persons in poverty," which uses a set of money income thresholds that vary by family size and composition to determine who is in poverty.

There are no residents within two miles of the Central Magazine Area.

3.2.12 Reasonably Foreseeable Environmental Trends or Planned Actions

Other than the continued operation of the HWAD, there are no other reasonably foreseeable environmental trends or planned actions within the ROI that would have the potential for cumulative impacts with the Proposed Action.

3.3 WASTE CONTROL SPECIALISTS LLC

3.3.1 Land Use and Ownership, and Visual Resources

3.3.1.1 Land Use and Ownership

The WCS site is in Andrews County, Texas. Land use on the 1,338-acre WCS waste disposal site is considered industrial and has been developed into multiple landfill disposal areas that can store hazardous waste (see Figure 2-6 in Chapter 2). Figure 3-2 shows an aerial view of the CSB at WCS. The U.S. Nuclear Regulatory Commission (NRC) is reviewing a license application to operate an interim storage facility for commercial spent nuclear fuel on the north side of the existing waste disposal facilities (NRC 2021). The WCS site also contains stormwater retention

Figure 3-2 Aerial View of WCS Container Storage Building

and evaporation ponds, excavated material storage piles, multiple access and service roads, and buildings to support workers and operations. A 13,500-acre tract of land owned by WCS surrounds the waste disposal site and consists of shrub and grass rangeland. Livestock grazing is not allowed on the WCS property, but livestock ranching occurs on rangeland near the WCS property (NRC 2021). Land use immediately surrounding the WCS site is largely rural industrial including a uranium enrichment facility, oil and gas production, sanitary landfill, and a sand and gravel quarry (DOE 2018). The city of Eunice, New Mexico, approximately six miles to the west, is the nearest population center.

3.3.1.2 Visual Resources

WCS is in the High Plains region of the central Great Plains (DOE 2011). The WCS site is characterized by relatively flat topography with views of open rangeland with shrubs and grass and few trees. Modifications to the landscape surrounding the WCS site include oil and gas production infrastructure, industrial buildings, electrical transmission infrastructure, and roads (NRC 2021).

3.3.2 Geology, Soils, and Geologic Hazards

3.3.2.1 Geology and Soils

The general geologic information describing the WCS site is included in the 2011 Mercury Storage EIS (DOE 2011, Section 3.8.2.1) and has not changed.

Descriptions of the soil types on the WCS site are included in the 2011 Mercury Storage EIS (DOE 2011, Section 3.8.2.2). None of the soils in the immediate vicinity of the CSB on the WCS site is characterized as prime farmland as delineated by the Natural Resources Conservation Service (NRCS 2021).

3.3.2.2 Geologic Hazards

The WCS site is situated over the north-central portion of the prominent structural feature in the Permian Basin known as the Central Basin Platform. The Central Basin Platform is an area of moderate, low-intensity seismic activity. A review of earthquake data collected for the site and vicinity indicates that most earthquakes that have occurred in the area were likely induced by gas/oil recovery methods and were not tectonic in origin (DOE 2011). The largest earthquake in the vicinity of WCS, referred to as the Rattlesnake Canyon earthquake, had a magnitude of 4.6 and occurred in January 1992 approximately 10 miles southwest of the site (USGS 2021c). A total of 87 earthquakes (larger than magnitude 2.5) within a 62-mile radius around the WCS site have been recorded since 1966. This includes the Rattlesnake Canyon earthquake of January 1992, which remains the closest earthquake epicenter of record (USGS 2021c).

As previously cited, this SEIS-II uses the latest probabilistic PGA data from the USGS to assess seismic hazard among the various mercury storage candidate sites. The PGA values cited are based on a 2-percent probability of exceedance in 50 years. This corresponds to an annual probability (chance) of occurrence of about 1 in 2,500. For WCS, the calculated PGA is approximately 0.08 *g* (USGS 2021b). In addition, a site-specific probabilistic seismic hazard analysis of the WCS site was completed in 2004 to estimate the levels of ground motions that could be exceeded at a specified annual frequency (or return period) at the site, incorporate the site-specific effects of the near-surface geology on ground motions, and develop seismic design parameters for the site (WCS 2007a). The seismic hazard at the WCS site was estimated to be low, with a 2,500-year return period peak horizontal acceleration on soft rock of only 0.04 *g*. The analysis stated that the absence of late-Quaternary faulting and the low-to-moderate rate of background seismicity, even that associated with petroleum recovery activities, results in low seismic hazard at the WCS site (DOE 2018).

No subsidence features related to salt dissolution have been identified within the facilities area or the immediate vicinity of WCS. The nearest active subsidence features to WCS are the San Simon Swale, the San Simon Sink, the Wink Sinks, and a sink northwest of Jal, New Mexico (DOE 2011).

3.3.3 Water Resources

3.3.3.1 Surface Water and Floodplains

The WCS region has a semiarid climate, with low precipitation rates and minimal surface water. There are only ephemeral and no permanent sources of surface water on or in the vicinity of the site. Ephemeral surface water includes several natural depression basins (sometimes referred to as playas) located to the northeast and east of the existing facilities that hold surface water following heavy or sustained rainfall events (NRC 2021, Figure 3.5-3). In general, the depression basins retain surface water for less than two weeks, with retention time depending on magnitude of the rainfall event, size of the depression basin, and the infiltration potential of the basin soil materials (NRC 2021, Section 3.5). The manmade surface-water features identified within five miles of the site include Baker Spring, various stock tanks, and stormwater retention and evaporation ponds. The principal surface-water drainage feature on the WCS site is a draw, referred to as “ranch house draw,” which crosses the southern portion of the site between Highway 176 and the WCS facilities. Most water caught by this drainage is lost to infiltration.

The WCS site is not located within a FEMA jurisdictional floodplain. A hydraulic study to delineate the 100- and 500-year floodplains found that the floodplains associated with the ranch house draw do not encroach on the facility complex (NRC 2021, Figure 3.5-2) or potential mercury storage area.

3.3.3.2 Groundwater

Groundwater occurs in two principal aquifer systems in the vicinity of WCS: the High Plains Aquifer and the Dockum Aquifer. On WCS, the formations that comprise the High Plains Aquifer are saturated to the north of the facilities area. This is because the dry line, the southern limit of saturated conditions in the High Plains Aquifer, is located just on the northern border of the current WCS facilities and designated landfill areas (DOE 2011). Groundwater at the WCS site is monitored in several transmissive zones: the Ogallala-Antlers-Gatuna unit, the 125-foot zone (dry), the 180-foot zone, and the 225-foot zone (DOE 2018). The 225-foot zone of the Dockum Group is considered the uppermost regulated groundwater zone at WCS.

3.3.4 Air Quality, Meteorology, and Noise

3.3.4.1 Air Quality and Meteorology

The climate of the region is semiarid with an annual average precipitation of 17 inches (NRC 2021, Table 3.7-1). Most precipitation occurs from May through September. Average summer temperatures range from 67 to 95°F. Average winter temperatures range from 29.5 to 57°F. Average wind speed ranges from 6.98 to 12.1 mph, and the predominant wind direction is from the southeast (NRC 2021). Andrews County, Texas, and adjacent Lea County in New Mexico experience a variety of severe weather events including flash flooding, hail, heavy rains, high winds, and tornadoes (NRC 2021, Table 3.7-2). During the 70-year period from 1950 through 2020, 25 tornadoes were reported in Andrews County (NOAA 2021). Only two tornadoes were classified as F2 (winds 113–157 mph) on the Fujita scale. All other tornadoes were F0, EF0, F1, or EF1.[4] In adjacent Lea County, New Mexico, 66 tornadoes were reported for the same time period with eight F2 and one F3 tornadoes.

Both Andrews County, Texas, and Lea County, New Mexico, are in attainment for all NAAQS criteria pollutants. Operations at WCS generate small amounts of particulate matter (fugitive dust from vehicles and landfill excavations) and criteria pollutants from fuel combustion (vehicles, heavy equipment, and boilers) (DOE 2018).

3.3.4.2 Noise

Previous environmental analyses have described noise sources and levels at WCS (NRC 2021). Point noise sources in and surrounding the WCS site primarily include trucks, heavy equipment, rail, and tractor-trailers associated with operations of WCS and adjacent industrial facilities (e.g., quarry, sanitary landfill, and nuclear enrichment facility). Measured background noise levels ranged from 36.3 A-weighted decibels (dBA) to 43.8 dBA, the primary contributor being roadway traffic on nearby State Highway 178 (NRC 2021). The nearest residential noise receptor is located approximately 3.8 miles west of WCS on the east side of Eunice, New Mexico.

3.3.5 Ecological Resources

3.3.5.1 Terrestrial Resources

The terrain in west Texas and adjacent areas of New Mexico surrounding the WCS site is gently rolling with shallow washes. The regional semiarid climate with low annual seasonal rainfall, hot summer temperatures, and cold winter temperatures supports vegetation of predominately grasses with scattered shrubs. The most abundant grasses are black grama (*Bouteloua eriopoda*), blue grama (*Bouteloua gracilis*), slim tridens (*Tridens muti*cus), purple threeawn (*Aristida purpurea*), and sand dropseed (*Sporobolus cryptandrus*) (Ortega et al. 1997, as cited in WCS 2007b). The most common shrubs are sand shinnery oak (*Quercus harvardii*), some soapweed (*Yucca* spp.), and honey mesquite (*Prosopis glandulosa*). Much of the vegetation within the WCS waste disposal site has been removed to construct waste disposal areas, buildings, access roads, railroad tracks, and stormwater retention and evaporation ponds. Vegetation on the 13,500 acres of surrounding WCS site is relatively undisturbed. Vegetation on lands immediately adjacent to the WCS disposal facilities has also been disturbed by industrial development (see Section 3.3.1 of this SEIS-II).

A variety of wildlife was observed or positively identified from signs on land surrounding the WCS waste disposal site during three ecological surveys (DOE 2018; WCS 2007b). Wildlife

[4] The Enhanced Fujita scale replaced the Fujita scale in 2007. Only three tornadoes have occurred in Andrews County under the Enhanced Fujita scale.

within the site is limited by previous removal of vegetation and fragmentation of vegetation by roads, cleared areas, and soil stockpiles.

3.3.5.2 Aquatic Resources and Wetlands

There are no permanent natural surface waters within the WCS site. Occasional ephemeral water sources form in depressions (e.g., playas) or roadside ditches following heavy precipitation events. Although these may be considered ephemeral wetlands, the U.S. Army Corps of Engineers determined that there are no jurisdictional wetlands on the WCS site (NRC 2021, Section 3.5.1.3). These ephemeral water sources occasionally support breeding populations of amphibians such as the Texas toad (*Bufo speciosus*) and spadefoot toad (*Scaphiopus multiplicatus*) and invertebrates adapted to ephemeral water sources (WCS 2007b).

3.3.5.3 Threatened or Endangered and Other Protected Species

The WCS site is within the southern range of the lesser prairie-chicken (*Tympanuchus pallidicinctus*), a Federal candidate species. Surveys conducted in 2004 and 2019 at the WCS site detected no individuals (WCS 2007b, Appendix 2.9.1; NRC 2021, Section 3.6.4). The WCS site also is within the northern edge of the historical range of the northern aplomado falcon, a federally listed species, although outside the current range (USFWS 2014). No northern aplomado falcons were observed during ecological surveys at the WCS site in 2018 and 2019 (NRC 2021, Section 3.6.4). The Texas horned lizard (*Phrynosoma cornutum*) is a State-listed threatened species and was observed on the WCS site during the ecological surveys in 1996 and 2006 (WCS 2007c) but not during the 2018 and 2019 surveys, although suitable habitat was documented (NRC 2021, Section 4.6.1.1). Habitat for these species does not occur within the existing WCS waste disposal site because vegetation and other habitat were removed during site construction.

3.3.6 Cultural and Paleontological Resources

As stated in the 2011 Mercury Storage EIS (DOE 2011), southeast New Mexico and west Texas are rich in prehistoric and historic American Indian and European-American history. The cultural sequence in the region extends back approximately 11,000 years and several chronological prehistoric and historic periods. These periods include the Paleo-Indian Period (9000–7000 Before Present[5] [BP]); the Archaic Period (5000–6000 BP to 900–1000); the Ceramic Period (900–1500); the Protohistoric Native American and Spanish Colonial Period (1541–1800); and the Historic Hispanic, American Indian, and American Period (1800–present). However, the environmental setting in the immediate vicinity of the WCS waste storage site has greatly affected both prehistoric and historic occupation and use of the area. This local setting is a flat, treeless plain lacking nearby permanent or semipermanent surface water and therefore not conducive to extensive human use over the centuries.

[5] Before Present years is a time scale used mainly in archaeology, geology, and other scientific disciplines to specify when events occurred before the origin of practical radiocarbon dating in the 1950s. Because the "present" time changes, standard practice is to use January 1, 1950, as the commencement date (epoch) of the age scale.

3.3.6.1 Prehistoric and Historic Resources

A 150-acre archaeological survey was conducted at the WCS site in 1994 prior to the expansion of the WCS footprint (WCS 2007d). The survey found no archaeological resources and concluded that the location was not well suited for the presence and preservation of archaeological resources. In 2006, a review was conducted of site records for archaeological projects within 6.2 miles of the WCS site. Eighteen known archaeological sites, including seven sites that are eligible for listing in the NPS's NRHP, were found during the review. The closest sites were between 1.8 and 2.5 miles from the site (DOE 2018; WCS 2007d). Currently, there is one historic property in Andrews County, Texas, listed on the NPS's NRHP, which is located in the town of Andrews (NPS 2022). There are no known prehistoric or historic cultural resources in the immediate vicinity of the WCS site.

3.3.6.2 American Indian Resources

The state of Texas is home to three federally recognized American Indian tribes: the Alabama-Coushatta Tribe, Kickapoo Traditional Tribe, and the Ysleta Del Sur Pueblo (NCSL 2020); however, none of these tribes is located near the WCS site. As stated in the 2011 Mercury Storage EIS (DOE 2011), the area near the WCS site was historically occupied or used by present-day tribes known as the Plains Apache, Comanche, and Kiowa; all now occupy reservation lands in Oklahoma.

Although the state of New Mexico has 23 federally recognized tribes (NCSL 2020), none of them is located within Lea County.

Literature reviews have not identified any known individual tribal or TCPs of significance within or near the WCS site (DOE 2011).

3.3.6.3 Paleontological Resources

As identified in the 2011 Mercury Storage EIS (DOE 2011), no paleontological resources have been identified on the WCS waste disposal site. WCS (2021a) does not identify any paleontological resources on the site.

3.3.7 Site Infrastructure

3.3.7.1 Ground Transportation

WCS is located approximately 31 miles west of Andrews, Texas, just east of the Texas-New Mexico state line (DOE 2011). The site is six miles east of the city of Eunice, New Mexico. Road access to the site is via State Highway 176, one mile south of the site. A railroad spur is located on site with a 110-railcar capacity. The rail spur connects to rail lines from the cities of Eunice and Hobbs, New Mexico (DOE 2011).

3.3.7.2 Utilities

WCS site electricity is provided from a nearby substation by Reliant Energy (WCS 2021a). Transformers support individual buildings or equipment. Fuel use at WCS consists of propane (for heating), diesel fuel, and gasoline (DOE 2011). Fuel is delivered by truck and refilled as needed. The facility has multiple diesel storage tanks, a gasoline tank, and two propane tanks. The primary source of potable water for WCS is via pipeline from the city of Eunice, New Mexico. WCS uses water from its central well for fire water and dust suppression (DOE 2011). The central well is located east of the CSB and is completed in the Santa Rosa sandstone; a backup well, the southeast well, extracts water from the Trujillo Formation. Production capacity from the central well is at a rate of 25–30 gallons per minute, or 13–16 million gallons per year.

3.3.8 Waste Management

The existing WCS waste disposal facilities are permitted and capable of managing transuranic waste, mixed transuranic waste, low-level radioactive waste (LLW), mixed LLW, hazardous waste (including mercury), and nonhazardous waste.

The existing WCS waste disposal operations generate sanitary waste and potential radioactive and nonradioactive solid waste. Sanitary wastes generated at the WCS site include the effluents from facility drinking water fountains, water closets, lavatories, mop sinks, and other similar fixtures. Solid radioactive wastes may be generated at the WCS site from cask contamination surveillance and decontamination activities. These wastes generally consist of paper or cloth wipes, paper towels, protective clothing, and other job-control wastes contaminated with low levels of radioactivity. Expended high-efficiency particulate air (HEPA) filters from the facility ventilation system, along with job-control waste associated with filter change-out, also may contribute to the generation of solid radioactive waste. Solid radioactive wastes generated are small relative to the waste received and are disposed of in onsite facilities in the applicable WCS permitted disposal area. Nonradioactive solid wastes are generated from routine maintenance, operations, and administrative support functions. These wastes are surveyed for radioactivity prior to disposal at a solid waste municipal landfill.

WCS has an active Waste Minimization and Pollution Prevention Program to reduce the total amount of waste generated and disposed of at WCS (DOE 2011). This is accomplished by eliminating waste through source reduction or material substitution; by recycling potential waste materials that cannot be minimized or eliminated; and by treating all waste that is generated to reduce its volume, toxicity, or mobility prior to storage or disposal.

3.3.9 Occupational and Public Health and Safety

3.3.9.1 Normal Operations

The WCS site contains storage facilities for radioactive and toxic wastes and land disposal facilities for radioactive, hazardous, and toxic wastes. The radiological environment including background radiation levels, radiation levels, and exposure levels have been described in several regulatory and NEPA documents (WCS 2007c, Section 8.1.4; DOE 2011, 2018). WCS also has an ongoing radiation monitoring program and prepares an annual dose monitoring report. The Radiological Environmental Monitoring Program report (WCS 2021b) is part of its licensing commitment to the Texas Commission on Environmental Quality and provides a calculated estimate of dose based on a general member of the public who is assumed to spend time at the site boundary and at a location inside the WCS owner-controlled area. WCS estimates the dose to this general member of the public by adding the doses from the measured maximum average airborne dose and direct radiation result at the highest environmental dosimeter station. This is a conservative approach since the highest airborne dose and dosimeter monitoring station are not at the same locations and are not accessible to the general public. The sum of these doses for 2020 after a correction for the standard background dose is 0.74 millirem per year.

WCS also prepares annual reports that include occupational injuries/illnesses related to its current operations. Table 3-2 provides the last five years of reporting statistics.

Table 3-2 WCS Reported Injury/Illness Statistics (2015–2019)

Safety Statistics	2015	2016	2017	2018	2019
Hours worked	398,108	412,054	358,787	335,160	274,778
Average number of employees	245	228	179	173	144
Restriction cases	0	0	1	0	0
Days away cases	0	1	1	0	0
Medical treatment cases	0	2	0	0	0
Other recordables	0	0	1	0	0
Total recordable cases	0	3	3	0	0

Source: WCS 2021a

3.3.9.2 Facility Accidents

WCS has had no spills, fires, explosions, leaks, or other such incidents that have resulted in offsite impacts. Spills and leaks from waste containers and equipment have occurred in the operational area of the site with only localized spread of released material (DOE 2011). During licensing and permitting processes with the NRC and Texas Commission on Environmental Quality, several hypothetical accident and natural event scenarios or performance assessments have been evaluated (DOE 2011, 2018). WCS has a full emergency response organization that includes capabilities for radiological, hazardous materials, fire, and medical incidents. Onsite equipment includes a fully equipped mobile response trailer and fire truck. Emergency personnel include State of Texas-certified emergency medical technicians and two fully trained and qualified firefighters (DOE 2011).

3.3.9.3 Transportation

Radiological and hazardous materials are transported to the WCS disposal site by truck and rail. These shipments represent a potential hazard from potential accidents between the point of origination and WCS. The 2011 Mercury Storage EIS (DOE 2011, Section 3.8.9.3) provides a summary of the risks related to nonradioactive transportation to WCS and the incident-free transportation of LLW to WCS. This information is incorporated by reference into this Mercury Storage SEIS-II. Over the past three years, WCS has averaged about 2,500 shipments of hazardous or radioactive materials into or out of the site. During that time, there were no transportation accidents that resulted in a release of these materials.

3.3.10 Socioeconomics

Based on the local employment dynamics, the majority of people employed in the area of the WCS site are assumed to reside in two counties: Andrews County in west Texas and Lea County in southeast New Mexico. Therefore, these two counties have been identified as the ROI in this socioeconomics analysis. In 2020, WCS employed approximately 100 people (WCS 2021a).

3.3.10.1 Regional Employment Characteristics

From 2010 to 2019, the labor force in the ROI increased by approximately 24 percent, from 33,231 to 41,344 workers. By December 2019, the average unemployment rate in the ROI was 3.2 percent, which was close to the unemployment rate for Texas (3.5 percent) but below the rate for New Mexico (5.0 percent) (BLS 2021a, 2021b, 2021c).

3.3.10.2 Demographic and Housing Characteristics

In 2019, the estimated population of the two-county ROI was 89,775. From 2010 to 2019, the ROI population grew by 13 percent. There were 33,382 housing units in the ROI in 2019; 85 percent of the housing units were owner-occupied (USCB 2021b).

3.3.11 Environmental Justice

The ROI surrounding the WCS waste storage site encompasses Andrews County, Texas, and Lea County, New Mexico. In 2019, the total population of the ROI was 89,775; the minority population was 57,933 (64.5 percent); and the low-income population was 12,638 (14.1 percent). Preliminary 2019 demographic data from the 2020 Census show that the top three minority groups within the ROI are (in order of population size) Hispanic or Latino, Black or African American, and American Indian and Alaska Native (USCB 2021b).

By comparison, the state of Texas consists of a 59-percent minority and 14-percent low-income population. The top three minority groups in Texas are (in order of populations size) Hispanic or Latino, Black or African American, and Asian. The state of New Mexico consists of a 63-percent minority and 18-percent low-income population. The top three minority groups in New Mexico are (in order of population size) Hispanic or Latino, American Indian and Alaska Native, and Black or African American. There are no Native American Reservation lands within the two-county ROI.

3.3.12 Reasonably Foreseeable Environmental Trends or Planned Actions

Interim Storage Partners (ISP), which includes WCS as a partner, has applied to the NRC for a license to provide interim storage services for commercial spent nuclear fuel. The license application is under review. The NRC published a Draft EIS for public review on May 8, 2020 (85 FR 27447) and published the Final EIS in July 2021 (NUREG-2239). The NRC has not issued a license as a result of the application.

The NRC license would authorize a consolidated interim storage facility to store up to 5,000 metric tons of uranium (MTUs) for a license period of 40 years. ISP plans to subsequently request amendments to the license, which, if approved, would authorize ISP to store an additional 5,000

MTUs for each of seven planned expansion phases of the proposed facility (a total of eight phases) to be completed over the course of 20 years, to expand the facility to eventually store up to 40,000 MTUs of commercial spent nuclear fuel.

3.4 BETHLEHEM APPARATUS

3.4.1 Land Use and Ownership, and Visual Resources

3.4.1.1 Land Use and Ownership

The two buildings proposed for mercury storage by Bethlehem Apparatus are located at 945 Bethlehem Drive and 1055 Win Drive in the city of Bethlehem, Pennsylvania (Figure 3-3). As described in Section 2.3.1 of this SEIS-II, the facilities on Bethlehem Drive consist of two buildings, one at 935 Bethlehem Drive and the second building at 945 Bethlehem Drive that are operated as one facility from a site access perspective. Both the Bethlehem Drive and Win Drive facilities are located in an area zoned as light industrial (City of Bethlehem 2021). The Bethlehem Apparatus site is surrounded by other industrial or commercial businesses. Residential houses occur along Jennings Street within the industrial zone approximately 400–550 feet west of the Bethlehem Apparatus buildings. Approximately 400 feet north of the 945 Bethlehem Drive building is an area zoned as residential on the north side of Pembroke Road.

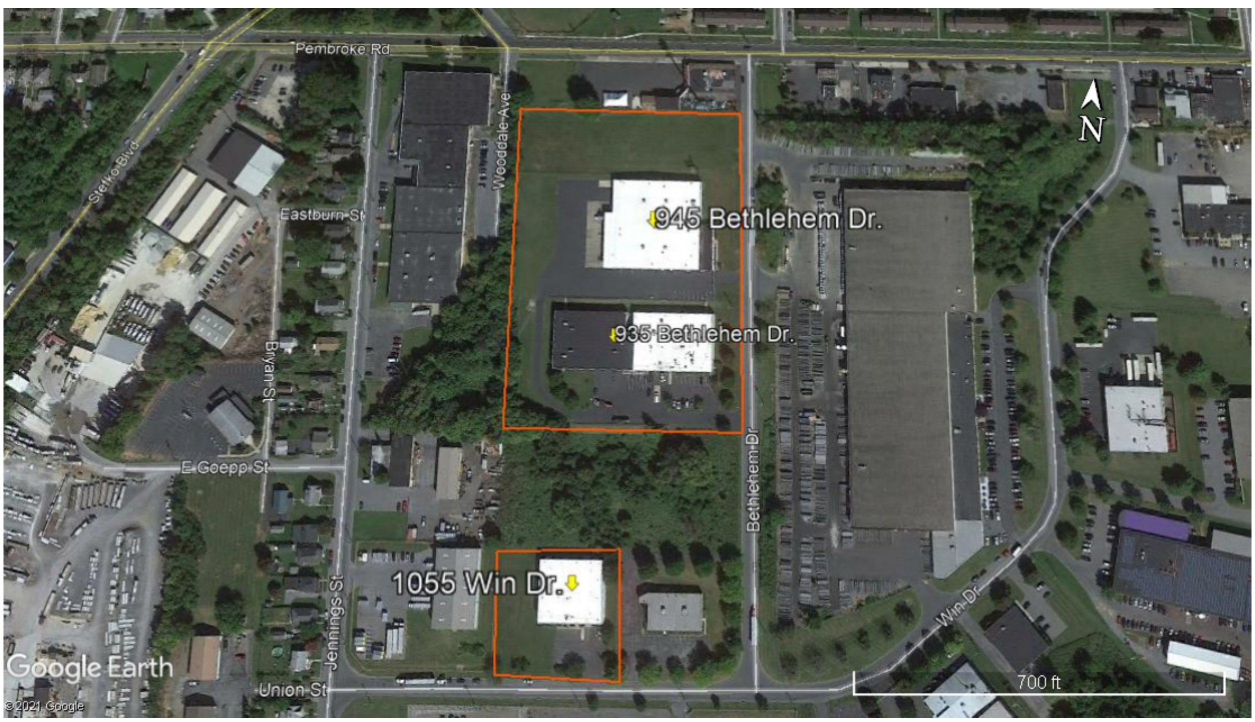

Figure 3-3 Aerial View of Bethlehem Apparatus Site

3.4.1.2 Visual Resources

The viewshed surrounding the facility is an urban light industrial landscape with industrial warehouse buildings, electrical power poles and overhead wires, communication towers, and commercial landscapes with grass lawns and deciduous trees.

3.4.2 Geology, Soils, and Geologic Hazards

3.4.2.1 Geology and Soils

The geology of Pennsylvania consists of six distinct physiographic provinces, three of which are subdivided into different sections. The metropolitan area encompassing the Bethlehem Apparatus site is located within the Great Valley section of the Ridge and Valley Province, which is characterized by crystalline metamorphic and igneous rocks including limestone, shale, dolomite, slate, sandstone, siltstone, and some scattered volcanic basalts. Almost all of the rock formations in the Great Valley are Ordovician (450–500 million years) in age (PADCNR 2021).

The soils in the immediate vicinity of the Bethlehem Apparatus site consist of developed urban lands with 0–8 percent slopes with surrounding, undeveloped soil units consisting of silty clay loam with 0–25 percent slopes. None of the soils in the immediate vicinity of the Bethlehem Apparatus facility is characterized as prime farmland as delineated by the Natural Resources Conservation Service (NRCS 2021).

3.4.2.2 Geologic Hazards

Compared to other states, Pennsylvania is relatively free of earthquake activity. However, seismic activity does occur in the state, but may be caused by earthquakes with epicenters located elsewhere. Earthquakes with magnitudes greater than five can occur in Pennsylvania, as demonstrated by the 5.2 magnitude Pymatuning earthquake in September 1998. Southeastern Pennsylvania is the state's most seismically active region but is not known to have experienced an earthquake with a magnitude greater than 4.7 (Scharnberger 2003). Those relatively active areas are within Lancaster County and are more than 62 miles from the Bethlehem Apparatus site. A small cluster of five low-magnitude earthquakes (2.4–3.3) occurred between the late- 1800s and the mid-1900s in the Allentown, Pennsylvania area, approximately 5–10 miles from the Bethlehem Apparatus site (Scharnberger 2003). A total of 27 earthquakes (larger than magnitude 2.5) within a 62-mile radius around the Bethlehem Apparatus site have been recorded since 1957 (USGS 2021d).

This SEIS-II uses the latest probabilistic PGA data from the USGS to assess seismic hazard among the various mercury storage candidate sites. The PGA values cited are based on a 2-percent probability of exceedance in 50 years. This corresponds to an annual probability (chance) of occurrence of about 1 in 2,500. For the Bethlehem Apparatus site, the calculated PGA is approximately 0.10 *g* (USGS 2021b).

Subsidence, or sinkhole, features are fairly common across Pennsylvania. Subsidence is the downward movement of surface material with little or no horizontal movement. Water introduced into an environment containing carbonate rocks can result in dissolution, weakening, and collapse of the substrate. Sinkhole occurrences are found in areas underlain by carbonate bedrock, which is prevalent in central and eastern Pennsylvania, including the general vicinity of the Bethlehem Apparatus site (Kochanov 2015).

3.4.3 Water Resources

3.4.3.1 Surface Water and Floodplains

There is no surface water on the Bethlehem Apparatus site at either 945 Bethlehem Drive or 1055 Win Drive. The nearest perennial surface water is the Lehigh River located approximately 0.45 mile from 1055 Win Drive.

Neither of the buildings identified as potential mercury storage facilities is located within a floodplain (City of Bethlehem 2019; FEMA 2021). The nearest floodplain is located along the Lehigh River, approximately 100 feet lower in elevation. The Bethlehem Apparatus site is classified as an area of minimal flood hazard on the city of Bethlehem zoning map (City of Bethlehem 2021).

3.4.3.2 Groundwater

The site is not located within one mile of a public water supply dependent on groundwater sources (City of Bethlehem 2019). Groundwater in the vicinity of the Bethlehem Apparatus site is from either carbonate rock or crystalline rock aquifers with depth to water table ranging from about 75 to 250 feet (Swistock 1986). Bethlehem Apparatus is not required to monitor groundwater under its hazardous waste recycling permit (Bethlehem Apparatus 2021).

3.4.4 Air Quality, Meteorology, and Noise

3.4.4.1 Air Quality and Meteorology

Northampton County has a humid continental climate, characterized by warm and humid summer months and cool conditions during the winter. Meteorological data collected in Allentown, about four miles west of Bethlehem, are used to describe the climate of the region (NWS 2021). Average summer temperatures range from 62 to 84°F. Average winter temperatures range from 24 to 41°F. The average annual precipitation for the Bethlehem region is 47 inches. Annual precipitation is relatively evenly distributed throughout the year, with the highest precipitation in the summer. The peak average monthly precipitation of 5.3 inches occurs in July. Winter is the driest season, and the lowest average monthly precipitation of 2.8 inches occurs in February. The region averages about 33 inches of snow per year.

Wind data collected in the Allentown area are used to describe the wind climate of the Bethlehem Apparatus site. The annual average wind speed at the site is eight mph. The windiest period is from February through April, when wind speeds average 10 mph. However, the strongest instantaneous winds generally occur during the warmer months of the year in association with thunderstorms. Winds prevail from the southwest to west during the warmer months of the year and west during the winter months. Since 1950, nine tornadoes were observed in Northampton County, where Bethlehem Apparatus is located, or an average of about one tornado every eight years (NOAA 2021). Only three of the nine tornado events were rated F2 or stronger.

Northampton County is in attainment for all NAAQS criteria pollutants except for the 8-hour (2008) ozone standard, which is classified as marginal (EPA 2021b). The marginal classification means ozone levels exceed the standard by a small amount. The Pennsylvania Department of

Environmental Protection Air Quality Program has issued the Bethlehem Apparatus facility a "Letter of Minor Significance" (i.e., minor source of air emissions) for air quality permitting (Bethlehem Apparatus 2021).

3.4.4.2 Noise

Existing daytime noise sources are those typical of urban/light industrial areas and include car and commercial truck traffic, commercial equipment such as forklifts, building heating and cooling compressors and fans, and landscape maintenance. Potential sensitive noise receptors within 0.5 mile include four community parks, five churches, and one school (Bethlehem Apparatus 2021).

3.4.5 Ecological Resources

3.4.5.1 Terrestrial Resources

The landscape at the Bethlehem Apparatus site consists of industrial buildings, paved parking lots and driveways, and grass lawns with a few deciduous landscape trees. No native vegetation occurs on the site. An undeveloped private land parcel exists between the 1055 Win Drive property and the facilities along Bethlehem Drive. This 2-acre lot contains semi-natural stands of deciduous trees, shrubs, grasses, and forbs. A 1-acre stand of deciduous trees is located on adjacent property on the southwest side of the Bethlehem Apparatus site. The Bethlehem Apparatus site contains minimal habitat for terrestrial wildlife species. The small area of undeveloped adjacent property likely provides seasonal habitat for a small number of urban-adapted species, such as rabbits, squirrels, songbirds, and bats.

3.4.5.2 Aquatic Resources and Wetlands

The Bethlehem Apparatus site contains no wetlands or other aquatic habitat (Bethlehem Apparatus 2021).

3.4.5.3 Threatened or Endangered and Other Protected Species

The endangered Indiana bat (*Myotis sodalis*) and threatened northern long-eared bat (*Myotis septentrionalis*) potentially occur in Northampton County (USFWS 2021d). However, habitat does not exist on the Bethlehem Apparatus site for either species. Habitat for migratory birds or eagles, protected under the MBTA and BGEPA, respectively, also does not occur on the site.

3.4.6 Cultural and Paleontological Resources

As of 2017, more than 25,000 cultural sites have been recorded related to 16,000 years of human activity in Pennsylvania. The sites range from pre-contact to the historic period and are located in every county (PSHPO 2018).

3.4.6.1 Prehistoric and Historic Resources

There are 23 historic properties in Bethlehem listed on the NRHP (NPS 2022). There are no known prehistoric or historic cultural resources in the immediate vicinity of the Bethlehem Apparatus site.

3.4.6.2 American Indian Resources

There are no federally recognized tribes or reservation lands in Pennsylvania, although the southeast portion of the state in the general vicinity of the Bethlehem Apparatus site was historically inhabited by the Susquehannock, Lenape Delaware, and Munsee Delaware ethnic groups (PSHPO 2018). There are no known tribal resources or TCPs in the immediate vicinity of the Bethlehem Apparatus site.

3.4.6.3 Paleontological Resources

The Bethlehem Apparatus site is in an urban or industrial area where land has already been disturbed for development. Paleontological resources are not expected to be present at the Bethlehem Apparatus site.

3.4.7 Site Infrastructure

3.4.7.1 Ground Transportation

Primary access to the Bethlehem Apparatus site is from I-78 in Hellertown, Pennsylvania. The travel distance from I-78 to the Bethlehem Apparatus site is approximately 3.1 miles (Bethlehem Apparatus 2021). The primary truck route uses State Route 412 North (East 4th Street) from I-78 to Stefko Boulevard and then city streets—East Market Street, Jennings Street, Win Drive, and Bethlehem Drive. A secondary truck route uses Stefko Boulevard, turns left on Pembroke Road, and then right on Bethlehem Drive. The primary truck route passes through 19 residential type units (some of which are used for business purposes), and the secondary truck route passes through 28 residential type units (some of which are also used for business purposes).

3.4.7.2 Utilities

The City of Bethlehem provides municipal water service to the Bethlehem Apparatus site. Water use is approximately 27 thousand gallons per month (Bethlehem Apparatus 2021). PPL Electric Utilities provides electrical service and UGI Utilities provides gas service.

3.4.8 Waste Management

Bethlehem Apparatus is a RCRA-permitted facility that primarily accepts mercury-bearing materials for mercury reclamation and recycling. Bethlehem Apparatus recovers elemental mercury from mercury-bearing materials through retort processing. A mercury distillation operation in Building 935 is used to treat the mercury product prior to selling the high-purity mercury back to U.S. industrial customers. Recovered mercury is handled as a commodity and not a waste product. In addition to recovered mercury, the retort process creates residual materials that are classified by seven process codes (Bethlehem Apparatus 2021). These materials are segregated, containerized, and placed in the drum storage area until processed and disposed of offsite in accordance with the type of material (e.g., hazardous, nonhazardous, or nonwaste). Container storage areas are inspected weekly as required by a Preparedness, Prevention, and Contingency Plan.

In addition to recovering elemental mercury, Bethlehem Apparatus receives shipments of mercury from industrial customers whose intent is to retire or dispose of the mercury through the mercury sulfide processing operation. This treatment process mixes mercury with elemental sulfur in a retort to form red mercury sulfide, a solid suitable for landfill disposable.[6]

Through its mercury treatment processes, Bethlehem Apparatus segregates waste materials and containers according to the type of material and condition of containers. Recyclable materials are separated and containers in good condition are reused.

Sanitary wastewater is managed by the City of Bethlehem's municipal wastewater treatment plant.

3.4.9 Occupational and Public Health and Safety

3.4.9.1 Normal Operations

The Bethlehem Apparatus facility conducts operations in Buildings 935 and 945. Operations in Building 935 primarily involve mercury recycling and treatment using retort and chemical processing. The retort process separates mercury from mercury-bearing material such as glass or metal products. This process produces a nonhazardous solid material suitable for recycling or disposal and elemental mercury which is purified and sold. Building 935 also contains a chemical processing operation that forms red mercury sulfide from elemental mercury and sulfur for offsite disposal in Canada. Building 945 is used primarily for storage of incoming waste materials to be processed and materials that have been processed and are waiting disposition. A mercury distillation operation is also performed in Building 935 to treat the mercury product for either subsequent stabilization as mercury sulfide or recycling as high-purity commodity elemental mercury. All facility operations take place within the buildings and in the secondary containment areas.

The facilities are equipped with dust collection and mercury filtration units including HEPA filtration and activated carbon filters for mercury adsorption. Mercury monitors are used to detect mercury vapors.

Bethlehem Apparatus prepares annual reports that include occupational injuries/illnesses related to its current operations. Table 3-3 provides the last five years of reporting statistics.

Table 3-3 Bethlehem Apparatus Reported Injury/Illness Statistics (2016–2020)

Safety Statistics	2016	2017	2018	2019	2020
Hours worked	2,600	2,600	2,600	2,600	2,600
Average number of employees	21	21	21	21	21
Restriction cases	0	0	0	0	0
Days away cases	1	0	0	0	0
Medical treatment cases	0	0	0	0	0
Other recordables	1	0	0	0	0
Total recordable cases	0	0	0	0	0

Source: Bethlehem Apparatus 2021

[6] Mercury sulfide is shipped to Canada. Landfill disposal of mercury sulfide is not approved in the United States.

3.4.9.2 Facility Accidents

The Preparedness, Prevention, and Contingency Plan specifies actions to minimize and abate hazards to human health and safety and the environment from fire, explosion, or emission or discharge of hazardous or nonhazardous waste constituents into air, soil, surface water, or groundwater. The most likely incident associated with current operations would be a spill of liquid mercury from a process vessel or container. Concrete floors, sealed expansion joints, and concrete curbs around building exits ensure that spills would be contained within the facility. Spill response and cleanup supplies are stationed in the facilities for quick access.

Depending on the type of potential accident, emergency response departments are notified, operations are stopped, released material is collected or contained, if safe to do so, and the facility is evacuated as necessary.

3.4.9.3 Transportation

The transportation of waste materials to Bethlehem Apparatus and the shipment off site of produced products (e.g., elemental mercury, mercury sulfide, hazardous waste, and nonhazardous waste) represent a potential hazard from vehicle accidents and release of material. In 2020, Bethlehem Apparatus received or dispatched 557 shipments of hazardous materials into or out of the site (Bethlehem Apparatus 2021). Over the past five years, there have been no transportation accidents that resulted in a release of hazardous materials.

3.4.10 Socioeconomics

Bethlehem, Pennsylvania, lies in both Northampton and Lehigh counties. Employees at the Bethlehem Apparatus site reside in either these counties or nearby Bucks County. Therefore, these three counties have been identified as the ROI in this socioeconomics analysis. In 2020, Bethlehem Apparatus employed approximately 22 people (Bethlehem Apparatus 2021).

3.4.10.1 Regional Employment Characteristics

From 2010 to 2019, the labor force in the ROI increased by approximately 1.0 percent, from 664,118 to 671,003 workers. By December 2019, the average unemployment rate in the ROI was 4.4 percent, which matches the unemployment rate for Pennsylvania (BLS 2021a, 2021b, 2021c).

3.4.10.2 Demographic and Housing Characteristics

In 2019, the estimated population of the three-county ROI was 1,302,873. From 2010 to 2019, the ROI population grew by 2.4 percent. There were 523,265 housing units in the ROI in 2019; 71 percent of the housing units were owner-occupied (USCB 2021c).

3.4.11 Environmental Justice

The ROI surrounding the Bethlehem Apparatus site encompasses Northampton, Lehigh, and Bucks counties, Pennsylvania. In 2019, the total population of the ROI was 1,302,873; the minority population was 318,515 (24.4 percent); and the low-income population was 102,399 (7.9 percent). Preliminary 2019 demographic data from the 2020 Census show that the top three minority groups within the ROI are (in order of population size) Hispanic or Latino, Black or African American, and Asian (USCB 2021c).

By comparison, the state of Pennsylvania consists of a 24-percent minority and 12-percent low-income population. The top three minority groups in the state are (in order of population size) Hispanic or Latino, Black or African American, and Asian.

3.4.12 Reasonably Foreseeable Environmental Trends or Planned Actions

Other than the continued operation of the Bethlehem Apparatus facilities under the current RCRA permit, there are no other reasonably foreseeable environmental trends or planned actions within the ROI that would have the potential for cumulative impacts with the Proposed Action.

3.5 PERMA-FIX DIVERSIFIED SCIENTIFIC SERVICES, INC.

3.5.1 Land Use and Ownership, and Visual Resources

3.5.1.1 Land Use and Ownership

The Perma-Fix DSSI site encompasses approximately 80 acres of which about 12 acres have been developed for facility operations (Perma-Fix DSSI 2021) (see Figure 3-4). The facilities consist of industrial buildings, an administration office building, mowed lawns, and a stormwater detention basin. Of the 12 acres, 7.2 acres are fenced and permitted for industrial operations. The remaining 68 acres of undeveloped land consists of eastern deciduous hardwood forest. The Perma-Fix DSSI facilities are located in a mixed-use rural environment located in Roane County,

Figure 3-4 Aerial View of Perma-Fix DSSI Site

approximately five miles from Kingston, Tennessee. The adjacent properties and land uses along Gallaher Road (State Route 58) consist of similar industrial or commercial businesses with undeveloped forested areas extending up the hillsides to the ridgelines on either side of the road. A few rural residential homes occur along Gallaher Road. Gallaher Road intersects I-40 about 0.5 mile to the southwest.

3.5.1.2 Visual Resources

The primary viewshed along Gallaher Road in the valley bottom is of forest vegetation interspersed with cleared areas containing industrial and commercial businesses. Hillsides, approximately 200–300 feet high, parallel the road on both sides and are largely covered with deciduous hardwood forest above the developed areas.

3.5.2 Geology, Soils, and Geologic Hazards

3.5.2.1 Geology and Soils

The Perma-Fix DSSI facility lies in the Valley and Ridge Physiographic Province of eastern Tennessee. The topography consists of alternating valleys and ridges that have a northeast-southwest trend, with most industrial facilities in the area occupying the valleys. In general, the ridges consist of resistant siltstone, sandstone, and dolomite units, and the valleys, which resulted from stream erosion along fault traces, consist of less-resistant shales and shale-rich carbonates (NNSA 2011). Several northeast-southwest trending low-angle and other faults traverse the area, consistent with the like-trending valleys and ridges. The site is also located within the East Tennessee Seismic Zone in the southern Appalachians, which is a region of seismicity that extends from northeast Alabama and northwest Georgia to northeast of Knoxville, Tennessee.

The soils underlying the Perma-Fix DSSI site consist of silt loam with 5–12 percent slopes with soil units of silt loam to the north on heavily wooded, steeper slopes (20–35 percent). Neither of these soils is characterized as prime farmland as delineated by the Natural Resources Conservation Service. However, a soil unit named the Capshaw silt loam with gentler, 2–5 percent slopes located immediately south of the Perma-Fix DSSI site is characterized as prime farmland in all areas (NRCS 2021). This productive soil unit surrounds a small tributary named Young Creek.

3.5.2.2 Geologic Hazards

The East Tennessee Seismic Zone is the second most active seismic zone east of the Rocky Mountains. Although the East Tennessee Seismic Zone has not recorded historical earthquakes of magnitudes greater than 5, researchers have used hypothetical and theoretical relationships to suggest that it may be capable of generating an “infrequent” magnitude 7.5 earthquake (Hatcher et al. 2013). The area is cut by many inactive faults, and there is no evidence of capable faults in the immediate area. The nearest capable faults are approximately 300 miles west in the New Madrid Fault Zone (NNSA 2011). A total of 143 earthquakes (larger than magnitude 2.5) within a 62-mile radius around the Perma-Fix DSSI site have been recorded since 1913 (USGS 2021e).

This SEIS-II uses the latest probabilistic PGA data from the USGS to assess seismic hazard among the various mercury storage candidate sites. The PGA values cited are based on a 2-percent probability of exceedance in 50 years. This corresponds to an annual probability (chance) of occurrence of about 1 in 2,500. For the Perma-Fix DSSI site, the calculated PGA is approximately 0.33 g (USGS 2021b).

Subsidence, or sinkhole, features are common across much of middle and eastern Tennessee. Much of the bedrock of the valley and ridge landscape of east Tennessee consists of carbonate rocks that form complex erosion drainage patterns that can cause dissolution underground, resulting in sinkholes at the surface (Moore and Drumm 2018). These occurrences are common in the vicinity of the Perma-Fix DSSI site.

3.5.3 Water Resources

3.5.3.1 Surface Water and Floodplains

The Perma-Fix DSSI site does not contain any natural surface waters. An onsite 34,060-square-foot manmade stormwater detention pond holds about 2.5 million gallons and collects runoff from the industrial facilities and paved areas (Perma-Fix DSSI 2021). The pond is designed to accommodate rainfall events without overflow and allow sedimentation of runoff prior to discharge. The pond has an outfall equipped with a shutoff that drains into an unnamed wet weather tributary to Young Creek. Perma-Fix operates under a general National Pollutant Discharge Elimination System (NPDES) permit for stormwater discharge and follows a Stormwater Pollution Prevention Plan and Spill Prevention, Control, and Countermeasure Plan. The Perma-Fix DSSI site is not in a FEMA-designated floodplain (FEMA 2021).

3.5.3.2 Groundwater

The groundwater in the vicinity of the Perma-Fix DSSI site is part of the Valley and Ridge Province of the East Tennessee aquifer system. Recharge is primarily through percolation of rainfall. The quality of water is generally very good, and the aquifer is commonly used for drinking water (Brahana et al. 1986).

3.5.4 Air Quality, Meteorology, and Noise

3.5.4.1 Air Quality and Meteorology

The climate in the Kingston, Tennessee, area may be broadly classified as humid subtropical with cool to cold winters and warm to hot summers (Parr and Hughes 2006). Average summer temperatures range from 66 to 87°F (NWS 2021). Average winter temperatures range from 30 to 49°F. Average precipitation is about 59 inches, almost all coming as rainfall. Average annual snowfall is only about two inches. Precipitation occurs throughout the year. Winds in the region are greatly influenced by the complex topography associated with the ridge and valley terrain oriented southwest to northeast. Surface winds typically follow the axes of the valleys but winds above ridgelines (altitudes of about 330 feet) can flow from significantly different directions (Parr and Hughes 2006). Wind direction is primarily from the west-southwest (WRCC 2021b). Average monthly wind speeds from nearby Oak Ridge, Tennessee (12 miles), range from a high of 6 miles per hour in April to 3.7 miles per hour in August (Weather Atlas 2021a). Tornadoes are uncommon in the region with only four reported from 1950 to present (NOAA 2021).

As of May 2021, Roane County is listed as being in attainment for all NAAQS criteria pollutants (EPA 2021c). Perma-Fix DSSI operates under a Title V Operating Permit issued under the *Clean Air Act* (Perma-Fix DSSI 2021).

3.5.4.2 Noise

Primary noise sources in the vicinity include the highway traffic on Gallaher Road and occasional emergency sirens from the fire station across Gallaher Road from the Perma-Fix DSSI facility. Noise sources on the Perma-Fix DSSI site include delivery trucks, forklifts, and various fans, motors, and generators associated with facility operation. Most of the industrial operations are contained within buildings. The industrial operations are located about 600 feet from Gallaher Road. One potential sensitive noise receptor, a church, is approximately 0.25 mile from the site.

3.5.5 Ecological Resources

3.5.5.1 Terrestrial Resources

The land cover within the 12 acres of developed property consists of mowed lawn, several landscape trees, buildings, paved parking and work lots, driveways, and a stormwater retention pond. The developed property is surrounded by eastern deciduous hardwood forest on the north and west sides, developed land on the east, and Gallaher Road on the south. The Perma-Fix DSSI site lacks habitat for most wildlife species except those tolerant of human activities. Undeveloped areas adjacent to the site support wildlife common to the eastern deciduous forest, including squirrels, chipmunks, raccoons, bats, white-tailed deer, and a variety of bird species.

3.5.5.2 Aquatic Resources and Wetlands

No natural wetlands exist on the Perma-Fix DSSI site. The stormwater detention basin may support some aquatic species, but the pond is not managed as an aquatic habitat. Stormwater sampling shows that water quality in the detention pond is below the benchmark concentration levels for all measured parameters except magnesium, which has been attributed to the magnesium content of native soils (Perma-Fix DSSI 2021).

3.5.5.3 Threatened or Endangered and Other Protected Species

There is a potential for bat species (3), fish species (2), clam species (15), a snail species, and flowering plants (2) listed as federally threatened or endangered to occur in Roane County, Tennessee (USFWS 2021e). Habitat for none of these species occurs on the Perma-Fix DSSI site. Indiana and northern long-eared bats may occur in forested habitats in the vicinity of the Perma-Fix DSSI site during the summer when individuals roost singly or in colonies underneath bark, in cavities, or in crevices of both live and dead trees.

Both bald and golden eagles occur in Tennessee and are protected by BGEPA. Bald eagles occur as both year-round residents and winter migrants and are associated with larger rivers and reservoirs (TWRA 2021a). Golden eagles are a rare, but regular migrant and winter resident in Tennessee, and very rare in summer (TWRA 2021b). The Perma-Fix DSSI site does not contain suitable habitat for either species. Populations of migratory birds occur throughout the area, particularly in undisturbed forest and open meadow/shrub habitats. Habitat is very limited within the developed property of the Perma-Fix DSSI site because most of the area is either mowed lawn or covered with buildings or paved lots.

3.5.6 Cultural and Paleontological Resources

Human occupation and use of the east Tennessee valley between the Cumberland Mountains and the southern Appalachians is believed to date back to the Late Pleistocene, at least 14,000 years ago. During the Mississippian cultural periods (from the year 900 to historic times), larger scale, permanent communities developed, first along the alluvial terraces, and later on the second river terraces in rich bottomlands suitable for intensive agriculture. The first Euro-Americans to visit the region were French and English traders and trappers, soon followed by permanent settlers. After 1942, the military developed ORR approximately 10 miles east of Kingston, Tennessee (NNSA 2011).

3.5.6.1 Prehistoric and Historic Resources

There are 21 historic properties in Roane County, Tennessee, listed on the NPS's NRHP, four of which are located in the town of Kingston (NPS 2022). There are no known prehistoric or historic cultural resources in the immediate vicinity of the Perma-Fix DSSI site.

3.5.6.2 American Indian Resources

There are no federally recognized tribes or reservation lands in Tennessee. The tribal identities of the 16^{th} and 17^{th} century Native American occupants are disputed; however, by the 18^{th} century, the only native people in the area were the Cherokee prior to their relocation to the Oklahoma territory (Roth 2020). There are no known tribal resources or TCPs in the immediate vicinity of the Perma-Fix DSSI site.

3.5.6.3 Paleontological Resources

The carbonate bedrock formations in eastern Tennessee are conducive for preserving paleontological materials. Where there are surface exposures of these formations, fossil resources may be present; however, these materials consist of common invertebrate remains, which are unlikely to be unique from those available throughout the east Tennessee region (NNSA 2011). The Perma-Fix DSSI developed area is a previously disturbed industrial area. Because the site is previously disturbed and the Proposed Action would be a continuation of the same type of actions currently undertaken at the site, the Proposed Action would not be expected to have any additional impacts to paleontological resources.

3.5.7 Site Infrastructure

3.5.7.1 Ground Transportation

The Perma-Fix DSSI site is accessible by I-40 from the west and east. The site is located about 0.3 mile northeast of the intersection of I-40 on Gallaher Road or State Route 58 (Perma-Fix DSSI 2021). State Route 58 provides access from Oak Ridge, Tennessee, to the northeast.

3.5.7.2 Utilities

The Tennessee Valley Authority provides electrical power to the Perma-Fix DSSI site through a local public utility (Perma-Fix DSSI 2021). Service capacity is 2,000 kilovolt-ampere (kVA). Emergency power is supplied by a 250 kVA generator. The City of Kingston provides municipal water service via 8-inch water pipes to fire hydrants and 2- and 3-inch distribution lines for potable water. All Perma-Fix DSSI buildings have utility-supplied and underground natural gas distribution (Perma-Fix DSSI 2021). Fuel oil and other combustible liquids used in thermal treatment of waste fuels are stored in aboveground tanks. Perma-Fix also uses a variety of compressed gases for laboratory equipment, process operations (e.g., argon), emission monitoring, welding, and industrial equipment (e.g., propane).

3.5.8 Waste Management

The Perma-Fix DSSI site accepts, stores, and treats LLW and mixed (hazardous and radioactive) wastes and operates under a radioactive materials license and two RCRA permits granted by the Tennessee Department of Environment and Conservation. One permit covers the combustion boiler system used for treatment of liquid waste fuels and recovery of the thermal energy (i.e., heat of combustion), and the second permit covers all other waste storage and treatment facilities. Perma-Fix DSSI accepts waste from offsite government (e.g., DOE) and commercial generators that are mandated for regulated treatment and disposal with specific consideration of radiological properties. Perma-Fix maintains and operates in accordance with a Spill Prevention, Control, and Countermeasure Plan that identifies potential waste discharge volumes, direction of flow, and discharge prevention measures. The plan includes facility inspection and personnel training programs. Examples of waste that may be generated include PPE and mercury vacuums from leaks or spills and PPE from container consolidation (Perma-Fix DSSI 2021). Sanitary wastewater is managed by the City of Kingston's municipal wastewater treatment plant.

3.5.9 Occupational and Public Health and Safety

3.5.9.1 Normal Operations

Perma-Fix DSSI site facilities are constructed and maintained in accordance with National Fire Protection Association requirements and operate under a Spill Prevention, Control, and Countermeasures Plan. Table 3-4 provides the Perma-Fix DSSI injury/illness statistics as reported for the period 2018–2020.

Table 3-4 Perma-Fix Injury/Illness Statistics (2018–2020)

Safety Statistics	2018	2019	2020
Hours worked	79,761	89,071	83,059
Average number of employees	40	45	45
Restriction cases	1	3	0
Days Away cases	0	0	0
Medical treatment cases	1	4	0
Other recordables	0	0	0
Total recordable cases	1	1	0

Source: Perma-Fix DSSI 2021

3.5.9.2 Facility Accidents

In accordance with their radioactive materials license and hazardous waste permit, Perma-Fix maintains emergency response equipment, procedures, and personnel training to respond to accidents involving hazardous materials. Other than the industrial safety injury/illnesses reported in Section 3.5.9.1, there were no facility accidents at the Perma-Fix DSSI site that caused releases of hazardous or radiological material.

3.5.9.3 Transportation

Perma-Fix maintains its own transportation division with USDOT authority to transport Class 7 materials including nonhazardous, hazardous, LLW, and mixed LLW. Currently, Perma-Fix utilizes its transportation fleet for industrial waste shipments and intra-company movement of waste for treatment at any of its facilities. Perma-Fix is expected to complete the process of obtaining DOE Motor Carrier Evaluation Program approval to transport materials and/or packages from DOE sites in 2022. In addition, Perma-Fix's Environmental Waste Operations Center, located approximately five miles from DSSI, has rail access and is a registered transload facility with the ability to transfer and deliver packages to the DSSI facility. Perma-Fix utilizes approved, third-party vendors for some transportation activities from generator sites. Over the past five years, Perma-Fix DSSI received or dispatched an average of 178 shipments of radiological or hazardous materials annually into or out of the DSSI site. Over this same period, there were no transportation accidents that resulted in a release of these materials.

3.5.10 Socioeconomics

The Perma-Fix DSSI site in Kingston, Tennessee, is located in Roane County. Kingston serves as the county seat and is centrally located within the county. Therefore, it is assumed that the majority of people employed in the area of the Perma-Fix DSSI site reside in Roane County, which is identified as the ROI in this socioeconomics analysis. In 2020, Perma-Fix DSSI employed approximately 46 people (Perma-Fix DSSI 2021).

3.5.10.1 Regional Employment Characteristics

From 2010 to 2019, the labor force of the ROI decreased by approximately 3.9 percent from 24,340 to 23,402 workers. By December 2019, the unemployment rate of Roane County was 4 percent, which was slightly higher than the unemployment rate for Tennessee (3.4 percent) (BLS 2021a, 2021b, 2021c).

3.5.10.2 Demographic and Housing Characteristics

In 2019, the estimated population of Roane County was 53,382. From 2010 to 2019, the ROI population declined by 1.5 percent. There were 25,694 housing units in the ROI in 2019; 77 percent of the housing units were owner-occupied (USCB 2021d).

3.5.11 Environmental Justice

The ROI surrounding the Perma-Fix DSSI site encompasses Roane County, Tennessee. In 2019, the total population of the ROI was 53,382; the minority population was 4,003 (7.5 percent); and the low-income population was 7,793 (14.6 percent). Preliminary 2019 demographic data from the 2020 Census show that the top three minority groups within the ROI are (in order of population size) Black or African American, Hispanic or Latino, and Asian (USCB 2021d).

By comparison, the state of Tennessee consists of a 27-percent minority and 14-percent low-income population. The top three minority groups in the state are (in order of population size) Black or African American, Hispanic or Latino, and Asian.

3.5.12 Reasonably Foreseeable Environmental Trends or Planned Actions

The Tennessee Department of Environment and Conservation is currently considering the Perma-Fix DSSI hazardous waste management permit for renewal. As identified in Section 2.3.4, Perma-Fix DSSI is also planning to build an additional building (referred to as the CSBU expansion) immediately adjacent to the CSBU as part of its corporate planning. This CSBU expansion could also be used for the long-term management and storage of mercury. Other than the continued operation of the Perma-Fix DSSI site under its current radioactive materials license and hazardous waste permit, there are no other reasonably foreseeable environmental trends or planned actions within the ROI that would have the potential for cumulative impacts with the Proposed Action.

3.6 VEOLIA GUM SPRINGS

3.6.1 Land Use and Ownership, and Visual Resources

3.6.1.1 Land Use and Ownership

Veolia owns approximately 1,500 acres adjacent to the small community of Gum Springs in Clark County, Arkansas (VGS 2021). The area is rural and used primarily for agriculture with forested areas (VGS 2021). The VGS industrial facilities occupy approximately 75 acres in the center of VGS and contain buildings and equipment for the treatment and storage of hazardous waste. These facilities also contain administration buildings, parking lots, access roads, paved work lots, and a rail yard. Figure 3-5 provides an aerial view of VGS. A RCRA-permitted landfill facility occupies about 90 acres immediately to the east and contains waste disposal areas and collection ponds for stormwater. Outside of the industrial facilities in the center of the VGS site, land use on the site includes forested areas, agricultural fields, and grass meadows.

3.6.1.2 Visual Resources

Topography in the region is relatively flat. The nearest primary public travel route is U.S. Highway 67, which passes north to south through the community of Gum Springs. The viewsheds along this highway consist of open agricultural fields with forested borders, areas of forest vegetation, and several industrial or commercial facilities south of Gum Springs. The VGS facilities are approximately 0.75 mile from the highway and are not visible from U.S. Highway 67 or the Gum Springs community because of trees throughout the region.

3.6.2 Geology, Soils, and Geologic Hazards

3.6.2.1 Geology and Soils

Present-day Clark County, Arkansas, is bisected by two of the six natural or ecoregion divisions of Arkansas. The northern portion of the county is within the Ouachita Mountains and the southern portion is in the Coastal Plain (Jeffers 2019). The VGS site is within the Coastal Plain natural division relatively close to the border with the Ouachita Mountains. The majority of the regional geology near the VGS site consists of upper Cretaceous age deposits, specifically the Arkadelphia marl[7] and Nacatosh sand. However, near the floodplain of Deceiper Creek/Ouachita River north of the VGS site, these deposits are eroded away and overlain by alluvial deposits (VGS 2021).

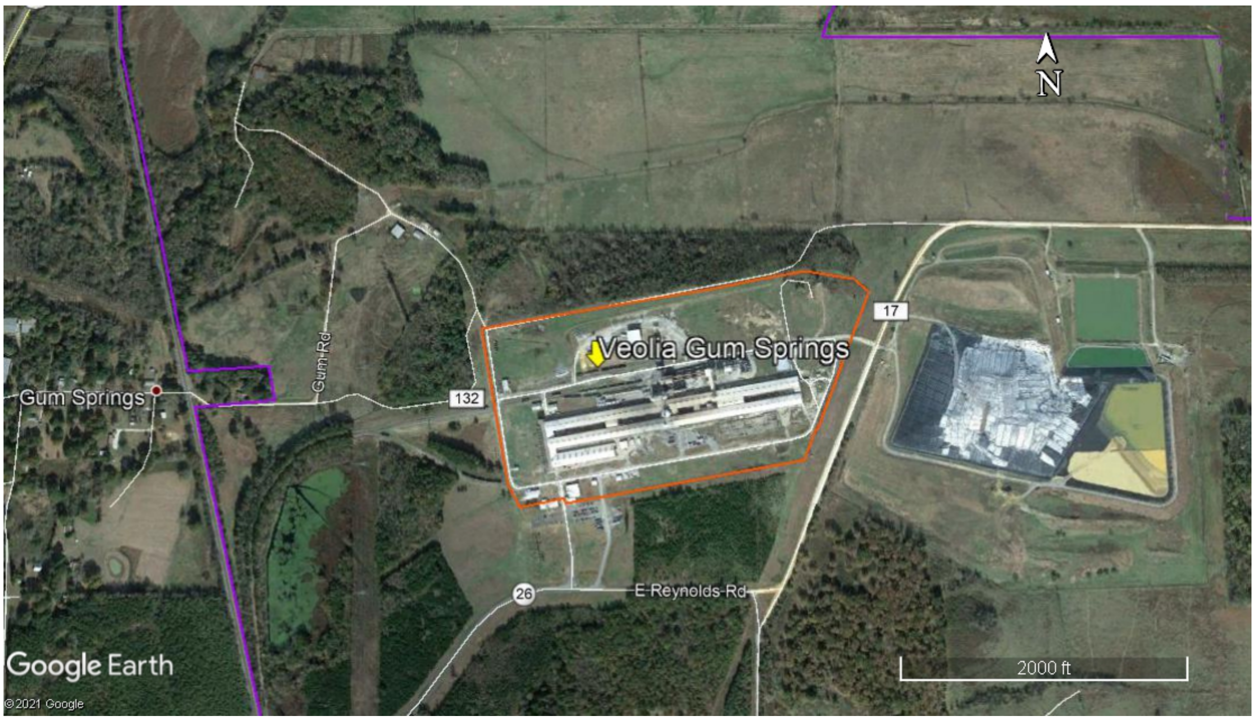

Figure 3-5 Aerial View of Veolia Gum Springs Site

The soils underlying the operational area of the VGS site consist of fine sandy loam with 3–8 percent slopes with some adjacent soil units consisting of silty clay loam with 2–5 percent slopes. The fine sandy loam underlying the site is not characterized as prime farmland as delineated by the Natural Resources Conservation Service. However, some of the adjacent silty clay loams are characterized as prime farmland in all areas (NRCS 2021).

3.6.2.2 Geologic Hazards

The VGS site is located approximately 180 miles southwest of the New Madrid Seismic Zone and 90 miles southwest of the Enola Earthquake Swarm area. The New Madrid Seismic Zone in northeastern Arkansas is the most seismically active area in central and eastern North America. In

[7] Marl consists of a mixture of clay and calcium carbonate, usually containing shell fragments.

the early 1800s, at least three major earthquakes over magnitude 7.5 occurred within this zone. They were among the largest historical earthquakes to occur in North America. The Enola Earthquake Swarm began with a small event in 1982 near the town of Enola in Faulkner County, Arkansas. Between 1982 and 2011, more than 40,000 seismic events were recorded in that area, with none exceeding magnitude 4.5. Most of these earthquakes were small-magnitude events that were not felt. The swarm's seismic activity is ongoing with periods of increased activity at times. (USGS 2011). Since 2011, seismic activity in the vicinity of the swarm area has not exceeded magnitude 4.0. A total of 16 earthquakes (larger than magnitude 2.5) within a 62-mile radius around the VGS site have been recorded since 1974 (USGS 2021f). The closest seismic event was a magnitude 3.6 earthquake in February 1974 located approximately 2.5 miles west-southwest of Gum Springs.

This SEIS-II uses the latest probabilistic PGA data from the USGS to assess seismic hazard among the various mercury storage candidate sites. The PGA values cited are based on a 2-percent probability of exceedance in 50 years. This corresponds to an annual probability (chance) of occurrence of about 1 in 2,500. For the VGS site, the calculated PGA is approximately 0.10 *g* (USGS 2021b).

Subsidence, or sinkhole, features are present in the northernmost parts of Arkansas and generally do not occur further south in Clark County.

3.6.3 Water Resources

3.6.3.1 Surface Water and Floodplains

No naturally occurring surface water exists within the 165 acres of developed land (industrial facilities and landfill area) on the VGS site. Several constructed stormwater collection ponds occur on the east side of the landfill area. Much of the 1,400 acres of the VGS site is either agricultural land or forest vegetation. The site topography has several small hills but is relatively flat with small channels draining the surrounding land. Deceiper Creek and its associated channels drain the site north and east of the industrial facilities. On the west side of the site and on adjacent property are several small streams with wetland areas surrounded by forest. Several low areas on the property collect and retain water based on the amount of precipitation. The Ouachita River and associated riverine ponds and wetlands occur approximately 2–3 miles east of the VGS site. VGS maintains an NPDES permit for stormwater discharges from the facilities to the Ouachita River (VGS 2021).

The industrial facilities on the VGS site are not in a FEMA-designated floodplain (VGS 2021). Parts of the north and east side of the undeveloped VGS site are in the 100-year floodplain associated with the Ouachita River (FEMA 2021). The industrial facilities are on a relatively topographic high point and are approximately 65–70 feet above the edge of the nearest mapped floodplain.

3.6.3.2 Groundwater

The hydrogeologic setting has been investigated extensively as part of the development of the hazardous waste landfill east of the facilities proposed for mercury storage (VGS 2021). The Nacatoch Sand is the upper most aquifer with a maximum thickness of 250 feet. Recharge is primarily through percolation of rainfall. Several lower, water-yielding formations exist between the Nacatoch Sand and the Toklo Formation, the next major aquifer. VGS conducts a groundwater monitoring program of the upper aquifer as part of the landfill operation.

3.6.4 Air Quality, Meteorology, and Noise

3.6.4.1 Air Quality and Meteorology

The climate of Arkansas is classified as humid subtropical with abundant precipitation and cool winters and warm to hot summers. Average summer temperatures in Arkadelphia, Arkansas, range from 70 to 93°F (NWS 2021). Average winter temperatures range from 33 to 57°F. Average annual precipitation is approximately 55 inches, primarily in the form of rain. Average wind speeds are highest (6.5 mph) during winter through spring and the lowest during summer, with average speed of about 5 mph (Weather Atlas 2021b). The predominate wind direction is from the south for most of the year with winds switching more from the north in winter and from the east in fall (Weather Spark 2021). Twenty-nine tornadoes have been reported in Clark County, Arkansas, since 1950 (NOAA 2021). Although most tornadoes were rated F0 or F1 on the Fujita scale, one F4, two F3, and seven F2 tornadoes have occurred in Clark County.

Clark County, Arkansas, is in attainment for all NAAQS criteria air pollutants (EPA 2021d). VGS operates under a Title V air quality permit (1016-AOP-R14) that specifies emission rates for regulated pollutants.

3.6.4.2 Noise

The VGS site is in a rural agricultural setting, intermixed with pine-hardwood forest. There are no noise restrictions (VGS 2021). A commercial rail line runs north to south between the Gum Springs community and the VGS site and is a periodic source of noise. Noise emissions from the VGS facilities include various equipment and machines including material-handling equipment, two rotary kilns, and vehicles. Many of the operations at VGS occur within the facility buildings and do not emit external noise. There are no sensitive noise receptors near the VGS site. The community of Gum Springs is about 0.5 mile from the closest VGS operating facility but stands of pine-hardwood trees help attenuate any noise emissions.

3.6.5 Ecological Resources

3.6.5.1 Terrestrial Resources

The VGS site is in the western part of the Gulf Coastal Plain physiographic region just east of the Ouachita Mountains. The typical vegetation of this area is mixed pine-hardwood forest. Common pines include loblolly (*Pinus taeda*) and short-leaf (*Pinus echinata*). Hardwoods include oaks (*Quercus* spp.) and hickory (*Carya* spp.). In the vicinity of the VGS site, much of the forest vegetation has been converted to agricultural cropland. The 75-acre developed portion of the VGS site is occupied by buildings and equipment, paved parking lots and work areas, and access roads, and surrounded by a perimeter of mowed grass meadow vegetation. The balance of the VGS site is mostly agricultural cropland or pine-hardwood forest.

Within the developed portion of VGS, wildlife habitat is limited to the perimeter area of mowed grass meadows. Although a few species may inhabit the grass meadows, wildlife is limited around the industrial facilities.

3.6.5.2 Aquatic Resources and Wetlands

No aquatic habitat or wetlands occur on the 75-acre developed portion of VGS.

3.6.5.3 Threatened or Endangered and Other Protected Species

The northern long-eared bat, eastern black rail (*Laterallus jamaicensis ssp. jamaicensis*), piping plover (*Charadrius melodus*), red knot (*Calidris canutus rufa*), and red-cockaded woodpecker (*Picoides borealis*) are species listed as either threatened or endangered and potentially could occur in Clark County, Arkansas (USFWS 2021f). There is no suitable habitat for any of these species within the developed areas of VGS.

Bald and golden eagles are protected under the BGEPA. Golden eagles are uncommon in Arkansas and unlikely to occur on or near VGS. Bald eagles occur throughout Arkansas both as winter migrants and resident nesting pairs. However, their preferred aquatic habitats (rivers, lakes, and reservoirs) do not exist on or in the immediate area surrounding VGS.

Migratory birds protected by the MBTA occur throughout the area surrounding VGS. The lack of habitat and presence of human activity in the developed area on VGS minimizes the number of species and abundance on the site.

3.6.6 Cultural and Paleontological Resources

The pre-European history of Arkansas began 13,500 years ago in the Pleistocene Epoch. Archaeologists divide human occupation in Arkansas, like that of all of eastern North America, into five periods, the Paleoindian, Dalton, Archaic, Woodland, and Mississippian. Each of the periods has distinctive lifestyles, cultural practices, and artifacts that are indicative of cultural resources across Arkansas. One of the more significant cultural practices in the area included mound building during the Archaic period, which are thought to be centers for political and ritual activity for a dispersed foraging population (Early 2017).

3.6.6.1 Prehistoric and Historic Resources

The Arkansas Historic Preservation Program has surveyed more than 40,700 historic resources since 1969, while the Arkansas Archeological Survey has more than 48,000 archaeological sites listed in its files (AHPP 2018). These cultural resources are located throughout all counties in the state and consist of such properties as residential and commercial historic districts, African American heritage sites, cemeteries, and mid-century modern buildings.

There are 40 historic properties listed on the NPS's NRHP in Clark County, Arkansas; 23 of which are located in the city of Arkadelphia, approximately four miles north of VGS (NPS 2022). There are no known prehistoric or historic cultural resources in the immediate vicinity of VGS.

3.6.6.2 American Indian Resources

There are no federally recognized tribes or reservation lands in Arkansas, although historically, there were up to a dozen tribal ethnic groups living throughout Arkansas (Sabo 2019). The southern Arkansas area, including Clark County, was historically inhabited predominantly by the Caddo Nation and Tunica Tribe prior to their relocation to the Oklahoma Territory. There are no known tribal resources or TCPs in the immediate vicinity of VGS.

3.6.6.3 Paleontological Resources

The western Coastal Plain was a biologically productive, shallow sea. Small amounts of limestone and sea animal fossils are not uncommon. Shellfish fossils are found lying in pastures in Clark County a few miles west of Arkadelphia with other fossil finds abundant. The Arkadelphia marl rock formation found in the vicinity of VGS is known for abundant fossil fauna including corals, bivalves, gastropods, cephalopods, shark teeth, and various microfossils. No dinosaur fossils have been found in Clark County (Jeffers 2019).

3.6.7 Site Infrastructure

3.6.7.1 Ground Transportation

The Veolia site is accessible via I-30 from the cities of Texarkana to the southwest and Little Rock to the northeast. From I-30 VGS can be accessed by State Route 26 near Gum Springs, which becomes Reynolds Road after crossing State Highway 67. Reynolds Road is the primary access road to the Veolia Site.

3.6.7.2 Utilities

The Southwest Arkansas Electric Cooperative provides electrical power to VGS (VGS 2021). The City of Arkadelphia provides municipal water service via a 12-inch service line. This water line is connected to the fire hydrants surrounding the facility for emergency fire suppression. Fuel is stored in three aboveground diesel fuel tanks (2,000, 3,000, and 4,000 gallons) and one aboveground 1,000-gallon gasoline tank. All tanks have containment barriers. The Veolia site also contains two tanks for liquid nitrogen, one tank located at the Tank Farm, and one tank located at the Alternate Feed Area.

3.6.8 Waste Management

The Veolia site is a hazardous waste treatment and landfill disposal facility (VGS 2021). Veolia operates two RCRA Part B permitted rotary kiln incinerators for treatment of bulk waste liquids, sludges, solids, and debris. A bulk solids stabilization operation treats bulk solids that require stabilization of toxic metals prior to landfill disposal. Veolia also operates a Subtitle C hazardous waste disposal landfill adjacent to the waste treatment facility (VGS 2021). In addition to receiving waste from generators requiring landfill disposal, Veolia uses the landfill to dispose of waste generated in its waste treatment facility.

As part of its waste reduction program, Veolia reuses several waste streams as raw material substitutes (VGS 2021). City water is mixed with incinerator ash to aid in cooling and dust suppression. Veolia is permitted to reuse certain specific nonhazardous water instead of city water. Veolia also adds virgin sand to the spent potliner process and uses nonhazardous granular material intended for landfill disposal as a sand replacement in its kilns as a carrier agent. Virgin lime is added to the spent potliner process to allow other waste materials containing lime or with alkaline properties to be used as a lime substitute in its rotary kilns.

3.6.9 Occupational and Public Health and Safety

3.6.9.1 Normal Operations

As part of a RCRA Part B permit, hazardous waste treatment, storage, and disposal facilities are required to be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous constituents to the environment, or that may create a threat to human health. Veolia implements precautionary measures as part of its permit to prevent potential hazards from occurring in its permitted facilities. These measures are achieved through strict security control of the area, implementation of hazard prevention procedures, assessment of potential hazards, and an inspection program (VGS 2021).

Veolia is also required by its permit to ensure that its employees are properly trained in hazardous materials safety and emergency procedures. Facility personnel must successfully complete a program of classroom instruction and/or on-the-job training that teaches them to perform their duties in a way that ensures the facility's compliance with the requirements. Veolia has developed, implemented, and maintained a comprehensive training plan designed to familiarize employees with emergency procedures, hazardous waste safety and job-specific requirements.

Table 3-5 provides the OSHA-reported statistics for VGS for the period 2019–2020.

Table 3-5 Veolia Injury/Illness Statistics (2019–2020)

Safety Statistics	2019	2020
Hours worked	145,484	147,841
Average number of employees	70	75
Restriction cases	0	1
Days away cases	0	0
Medical treatment cases	2	3
Other recordables	0	0
Total recordable cases	2	2

Source: VGS 2021

3.6.9.2 Facility Accidents

In accordance with their hazardous waste permit, VGS maintains emergency response equipment, procedures, and personnel training to respond to accidents involving hazardous materials. Other than the industrial safety injury/illnesses reported in Section 3.6.9.1, there were no facility accidents at the Veolia facilities that caused releases of hazardous material (VGS 2021).

3.6.9.3 Transportation

Veolia utilizes approved, third-party vendors for transportation activities. In 2020, Veolia received more than 3,500 shipments of hazardous waste at VGS. Over the past five years, there have been no transportation accidents that resulted in a release of hazardous materials.

3.6.10 Socioeconomics

The Veolia site in Gum Springs, Arkansas, is located in Clark County. It is assumed that most people employed in the area of VGS reside in Clark County, which is identified as the ROI in this socioeconomics analysis. In 2021, Veolia employed approximately 90 people (VGS 2021).

3.6.10.1 Regional Employment Characteristics

From 2010 to 2019, the labor force of the ROI decreased by approximately 6.4 percent from 10,366 to 9,700 workers. By December 2019, the unemployment rate of Clark County was 3.8 percent, which was slightly higher than the unemployment rate for Arkansas (3.5 percent) (BLS 2021a, 2021b, 2021c).

3.6.10.2 Demographic and Housing Characteristics

In 2019, the estimated population of Clark County was 22,320. From 2010 to 2019, the ROI population declined by 2.9 percent. There were 10,600 housing units in the ROI in 2019; 58 percent of the housing units were owner-occupied (USCB 2021e).

3.6.11 Environmental Justice

The ROI surrounding VGS encompasses Clark County, Arkansas. In 2019, the total population of the ROI was 22,320; the minority population was 7,075 (31.7 percent); and the low-income population was 4,597 (20.6 percent). Preliminary 2019 demographic data from the 2020 Census show that the top two minority groups within the ROI are (in order of population size) Black or African American and Hispanic or Latino. American Indian and Alaska Native and Asian groups represent a very small percentage of minority populations in the ROI (USCB 2021e).

By comparison, the state of Arkansas consists of a 28-percent minority and 16-percent low-income population. The top two minority groups in the state are (in order of population size) Black or African American and Hispanic or Latino.

3.6.12 Reasonably Foreseeable Environmental Trends or Planned Actions

Other than the continued operation of the Veolia facilities under the current hazardous waste permits, there are no other reasonably foreseeable environmental trends or planned actions within the ROI that would have the potential for cumulative impacts with the Proposed Action. Veolia operates two rotary kiln incinerators and a landfill that are covered under the existing permits.

3.7 CLEAN HARBORS GRASSY MOUNTAIN

3.7.1 Land Use and Ownership, and Visual Resources

3.7.1.1 Land Use and Ownership

The Clean Harbors Grassy Mountain site is located on the eastern edge of the northern Great Salt Lake Desert and includes approximately 2,560 acres, of which 640 acres are fenced and permitted for hazardous waste management (Tooele County 2021; Grassy Mountain 2021). Within the 640-acre site, much of the land is used for waste disposal in constructed landfills or waste disposal cells (see Figure 3-6). The larger area surrounding the Grassy Mountain site is owned by the Federal Government and managed by the Bureau of Land Management with inclusions of State Trust Lands. Other uses of the surrounding land include U.S. Department of Defense bombing ranges and desert warfare training. The site is within a 100-square-mile zone set aside by the Tooele County Commission for hazardous waste activities. The nearest residential area is approximately 40 miles west in Wendover, Utah.

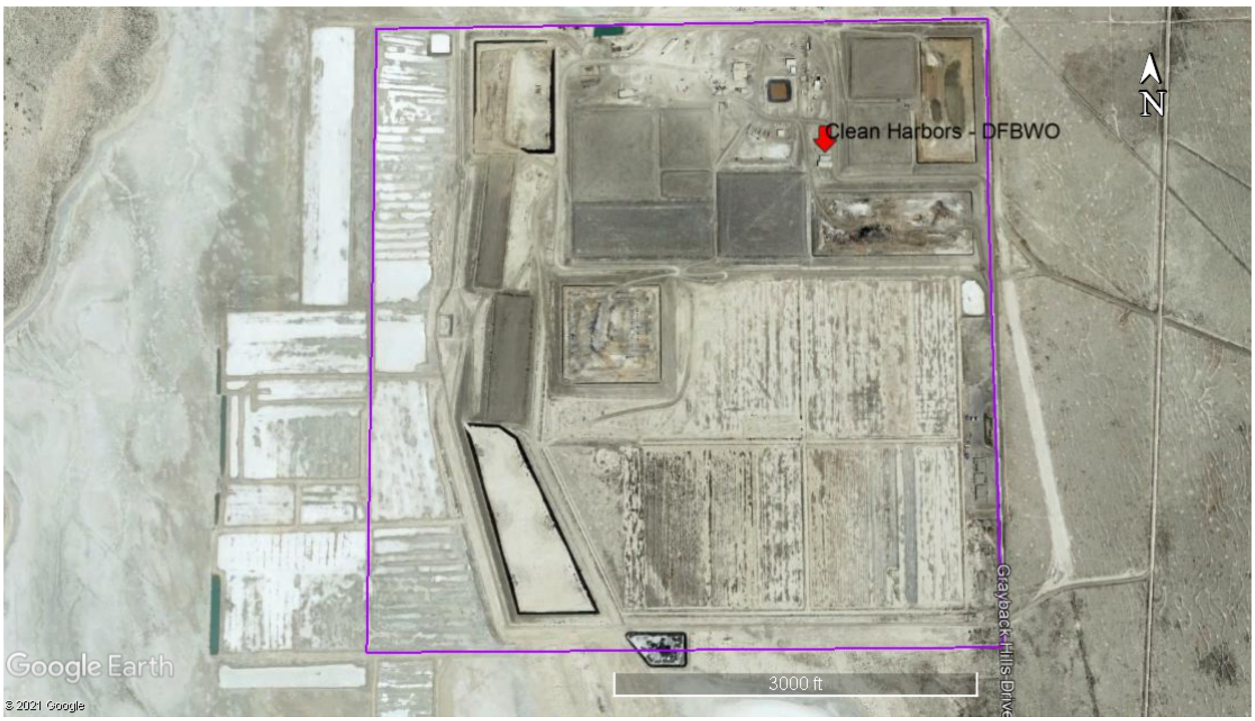

Figure 3-6 Aerial View of Clean Harbors Grassy Mountain Site

3.7.1.2 Visual Resources

The Clean Harbors Grassy Mountain site is located approximately seven miles north of I-80, the nearest public highway, and is not visible from the highway. The topography is flat and views consist of open range with either low desert shrub vegetation or barren salt and saline clay flats.

3.7.2 Geology, Soils, and Geologic Hazards

3.7.2.1 Geology and Soils

The Great Salt Lake Desert is a prominent and vast dry lake feature in northwestern Utah noted for white evaporite Lake Bonneville salt deposits including the Bonneville Salt Flats near the border of Nevada. Several small mountain ranges are located on the eastern edge of the desert including the Grayback Hills, the Grassy Mountains, and the Cedar Mountains near the Clean Harbors Grassy Mountain site. The Grayback Hills, approximately two miles east of the Grassy Mountain site, consist of latite lava flows that form prominent ridges 200–300 feet above the elevation of the Grassy Mountain site (Clark and Oviatt 2018). Natural deposits adjacent to the Grassy Mountain site consist of eolian silt loam over lacustrine, fine-grained deposits with 0–2 percent slopes. None of the soil deposits in the vicinity of the Grassy Mountain site is designated as prime farmland as delineated by the Natural Resources Conservation Service (NRCS 2021).

3.7.2.2 Geologic Hazards

Utah has experienced 17 earthquakes greater than magnitude 5.5 since pioneer settlement in 1847, and geologic investigations of the region's faults indicate a long history of repeated large earthquakes of magnitude 6.5 and greater prior to settlement (UGS 2021). The Oquirrh Fault Zone in the mountains just east of the community of Tooele has produced significant earthquakes in the past. No significant fault zones have been mapped in the immediate vicinity of the Grassy Mountain site, although an inferred, low-angle, northwest-to-southeast trending thrust fault may be present in the valley between the Grassy Mountain site and the Grayback Hills (Clark and Oviatt 2018). A total of 164 earthquakes (larger than magnitude 2.5) within a 62-mile radius around the Grassy Mountain site, have been recorded since 1934. A cluster of approximately 30 magnitude 2.5–4.0 earthquakes occurred in the late 1980s approximately 30 miles north of the Grassy Mountain site (USGS 2021g).

This SEIS-II uses the latest probabilistic PGA data from the USGS to assess seismic hazard among the various mercury storage candidate sites. The PGA values cited are based on a 2-percent probability of exceedance in 50 years. This corresponds to an annual probability (chance) of occurrence of about 1 in 2,500. For the Grassy Mountain site location, the calculated PGA is approximately 0.16 *g* (USGS 2021b).

3.7.3 Water Resources

3.7.3.1 Surface Water and Floodplains

No perennial surface water exists in the vicinity of the Clean Harbors Grassy Mountain site. Surface runoff from the surrounding mountains is low and seldom reaches the desert salt flats. The largest inputs of surface water occur from summer thunderstorms or brief periods of rapid snowmelt, which forms thin sheets across the salt flats and evaporates or is briefly stored as soil moisture. Overland runoff in small stream or drainage channels is ephemeral and is lost rapidly by infiltration and by evapotranspiration.

The Clean Harbors Grassy Mountain site is not located in a FEMA-designated 100-year floodplain (FEMA 2021).

3.7.3.2 Groundwater

Groundwater occurs in both consolidated and unconsolidated rocks in the northern Great Salt Lake Desert. The major groundwater reservoir is the unconsolidated-to-partly-consolidated valley fill, which has a maximum thickness of at least 1,644 feet and likely is at least 1,000 feet thick throughout most of the area (Stephens 1974). The surficial lakebed deposits and crystalline salt comprise an aquifer that yields brines. The valley fill that underlies the lakebed deposits and crystalline salt makes up an aquifer that also yields brine.

3.7.4 Air Quality, Meteorology, and Noise

3.7.4.1 Air Quality and Meteorology

The climate of the region that includes the Clean Harbors Grassy Mountain site is Great Basin desert with hot summers and cold winters. Climate information is based on Wendover, Utah, located approximately 40 miles west of the Grassy Mountain site (NWS 2021). Average summer temperatures range from 64 to 89°F. Average winter temperatures range from 22 to 38°F. Annual precipitation averages 3.6 inches. Average monthly wind speed ranges from 4.3 mph in January to 8.1 mph in April. Winds blow predominately from the wester during most of the year. Tornadoes are relatively rare in Tooele County, Utah. Only five tornadoes have been reported since 1950 (NOAA 2021).

Parts of Tooele County are considered in nonattainment for ozone, $PM_{2.5}$, and sulfur dioxide, primarily near the Salt Lake City area in eastern Tooele County (EPA 2021e). The Clean Harbors Grassy Mountain site is located in an isolated area of Tooele County on the eastern edge of the Great Salt Lake desert. Because the area is arid and windy, dust (i.e., particulate matter) can be a concern. Clean Harbors operates under an air Approval Order issued by Utah Department of Environmental Quality, Division of Air Quality.[8] Emissions are minor and typically limited to dust from regular site activities as well as from stabilization and solidification treatment of waste (Grassy Mountain 2021).

3.7.4.2 Noise

The Clean Harbors Grassy Mountain site is in an isolated location. Primary noise sources at the site would be trucks and other large equipment for dust control and landfill operations. There are no sensitive noise receptors in the region. Wendover, Utah, approximately 40 miles west of the site, is the nearest residential area (Grassy Mountain 2021).

3.7.5 Ecological Resources

3.7.5.1 Terrestrial Resources

The Clean Harbors Grassy Mountain site is on the edge of the salt flats of the Great Salt Lake desert. Most of the site was likely devoid of vegetation prior to development as a hazardous waste landfill. The DFBWO building proposed for the long-term storage of mercury occurs within the landfill area and the site is devoid of vegetation. The building is surrounded by hazardous waste

[8] https://deq.utah.gov/air-quality/air-quality-permitting

landfills. Vegetation on adjacent land approximately 0.25 mile to the east consists of salt-desert shrubs. Common species include greasewood (*Sarcobatus vermiculatus*), saltbush (*Atriplex* spp.), rabbitbrush (*Chrysothamnus* spp. and *Ericameria* spp.), and winterfat (*Krascheninnikovia lanata*). Disturbed areas may contain Russian thistle (*Salsola* spp.) and halogeton (*Halogeton glomeratus*). Land on the north, south, and west of the Grassy Mountain site are salt flats or saline clay flats largely devoid of vegetation.

Wildlife is mostly absent from the Clean Harbors Grassy Mountain site and specifically the DWBFO building location because of the absence of vegetation and other suitable habitat. Species such as jackrabbits (*Lepus californica*), cottontails (*Sylvilagus auduboni*), and desert rodents likely inhabit salt desert shrub communities on the east side of the site, along with a variety of bird species.

3.7.5.2 Aquatic Resources and Wetlands

The Clean Harbors Grassy Mountain site contains no aquatic habitat, species, or wetlands.

3.7.5.3 Threatened or Endangered and Other Protected Species

No threatened or endangered species are known to occur at the Clean Harbors Grassy Mountain site (USFWS 2021f). The area contains no habitat for bald eagles. Golden eagles likely occur in the region but to the east, where sufficient desert vegetation exists to support prey species such as jackrabbits and cottontails. Migratory birds are not abundant because of the absence of habitat on the site.

3.7.6 Cultural and Paleontological Resources

Utah is known for its rich cultural heritage with human occupation dating back about 12,000 years. The early known habitants were members of what is termed the Desert Archaic Culture, consisting of nomadic hunter-gatherers. From the earliest Paleoindian groups to the Fremont Culture in northern and eastern Utah with their masonry structures, basketry, pottery, and clay figurines to waves of Mormon emigrants and mining prospectors, Utah contains numerous layers of cultural and historical sites (Utah SHPO 2016).

3.7.6.1 Prehistoric and Historic Resources

Stone tools dominate the prehistoric artifact assemblages in the Great Salt Lake Desert area; ceramics are also present to a lesser extent. Obsidian and basalt are the predominant lithic materials in the area with a high number of Western Stemmed Tradition lithic scatters associated with the ancient shorelines of Lake Bonneville.

There are 29 historic properties listed on the NPS's NRHP in Tooele County, Utah. One of the listed properties is a military supersonic missile launch site from the 1940s located just under a mile north of the Clean Harbors Grassy Mountain site at the northern edge of the industrial complex surrounding the area (NPS 2022). The remaining NRHP properties are located much farther away in communities within the county.

3.7.6.2 American Indian Resources

There are seven federally recognized tribes or reservation lands in Utah, including tribes of the Shoshone Nation, Goshute, Ute, Paiutes, and Navajo (NCSL 2020). The closest tribal land is the Skull Valley Goshute Reservation approximately 35 miles southeast of the Grassy Mountain site. There are no known tribal resources or TCPs in the immediate vicinity of the Grassy Mountain site.

3.7.6.3 Paleontological Resources

There are no known paleontological resources in the immediate vicinity of the Clean Harbors Grassy Mountain site.

3.7.7 Site Infrastructure

3.7.7.1 Ground Transportation

Primary access to the region is I-80 between Salt Lake City and the Utah-Nevada state line. Access from I-80 is via Exit 41 and a frontage road and a paved road north for seven miles (Grassy Mountain 2021).

3.7.7.2 Utilities

Rocky Mountain Power supplies the onsite electrical service to the Clean Harbors Grassy Mountain site. Non-potable process water is shipped in from Grantsville, Utah. Water used for onsite dust suppression is sourced from a well approximately three miles from the site boundary or from nonhazardous recycled water sources. A natural gas system is installed at the site. Oil storage tanks are located in three areas and include gasoline, diesel fuel, oils, and grease (Grassy Mountain 2021). All oil products are stored with secondary containment.

3.7.8 Waste Management

The Clean Harbor Grassy Mountain site includes a hazardous waste treatment, storage, and landfill disposal facility. Operations include consolidation of non-acceptable waste and transfer to other facilities and storage of containers meeting RCRA and Toxic Substances Control Act polychlorinated biphenyl requirements. The Grassy Mountain site treats waste using a variety of methods to meet landfill disposal requirement standards prior to land disposal (Grassy Mountain 2021). Clean Harbors Grassy Mountain constructs and operates hazardous waste disposal cells using clay and multiple liners with leachate detection/collection systems and protective soil caps when cells are filled and closed.

3.7.9 Occupational and Public Health and Safety

3.7.9.1 Normal Operations

As part of a RCRA Part B permit, hazardous waste treatment, storage, and disposal facilities are required to be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous constituents to the environment, or create a threat to human health. Clean Harbors Grassy Mountain implements precautionary measures as part of its permit to prevent potential hazards from occurring in its permitted facilities. These measures are achieved through strict security control of the area, implementation of hazard prevention procedures, assessment of potential hazards, and an inspection program. Grassy Mountain's Preparedness and Prevention Plan is contained in its permit and addresses emergency communications, fire response, and spill prevention (Clean Harbors Grassy Mountain RCRA Permit, Attachment II-5).

Clean Harbors Grassy Mountain is also required by its permit to ensure that its employees are properly trained in hazardous materials safety and emergency procedures. Facility personnel must successfully complete a program of classroom instruction and/or on-the-job training that teaches them to perform their duties in a way that ensures the facility's compliance with the requirements. Clean Harbors Grassy Mountain has developed, implemented, and maintained a comprehensive training plan designed to familiarize employees with emergency procedures, hazardous waste safety, and job-specific requirements.

Table 3-6 provides the OSHA-reported statistics for the Clean Harbors Grassy Mountain site for the period 2016–2020.

Table 3-6 Clean Harbors Grassy Mountain Reported Injury/Illness Statistics (2016–2020)

Safety Statistics	2016	2017	2018	2019	2020
Hours worked	57,747	61,990	63,295	63,505	65,636
Average number of employees	25	28	24	24	29
Restriction cases	0	0	0	0	0
Days away cases	0	0	0	0	1
Medical treatment cases	0	0	2	0	2
Other recordables	0	0	2	0	0
Total recordable cases	0	0	4	0	3

Source: Grassy Mountain 2021

3.7.9.2 Facility Accidents

In accordance with their hazardous waste permit, Clean Harbors maintains emergency response equipment, procedures, and personnel training to respond to accidents involving hazardous materials. Other than the industrial safety injury/illnesses reported in Section 3.7.9.1, there were no facility accidents at the Clean Harbors Grassy Mountain site that caused releases of hazardous material (Grassy Mountain 2021).

3.7.9.3 Transportation

Clean Harbors Grassy Mountain utilizes approved, third-party vendors for transportation activities. In 2020, Clean Harbors Grassy Mountain received and dispatched more than 7,200 shipments of hazardous materials at the Grassy Mountain site. Over the past five years, there have been no transportation accidents that resulted in a release of hazardous materials.

3.7.10 Socioeconomics

The Clean Harbors Grassy Mountain site is in Tooele County, Utah. Due to the somewhat remote location of the facility, it is assumed that most people employed in the area reside in Salt Lake or Tooele counties in Utah, or Elko County in Nevada. All three counties are identified as the ROI in this socioeconomics analysis. In 2021, Grassy Mountain employed approximately 28 people (Grassy Mountain 2021).

3.7.10.1 Regional Employment Characteristics

From 2010 to 2019, the labor force in the ROI increased by approximately 16 percent, from 599,896 to 696,291 workers. By December 2019, the average unemployment rate in the ROI was 2.8 percent, which was slightly higher than the unemployment rate for Utah (2.5 percent) and lower than the unemployment rate for Nevada (3.9 percent) (BLS 2021a, 2021b, 2021c).

3.7.10.2 Demographic and Housing Characteristics

In 2019, the estimated population of the three-county ROI was 1,285,474. From 2010 to 2019, the ROI population increased by 13 percent, driven largely from the metropolitan growth of Salt Lake City within Salt Lake County. There were 456,601 housing units in the ROI in 2019; 68 percent of the housing units were owner-occupied (USCB 2021f).

3.7.11 Environmental Justice

The ROI surrounding the candidate storage locations at Grassy Mountain encompasses Tooele and Salt Lake counties in Utah and Elko County in Nevada. In 2019, the total population of the ROI was 1,285,474; the minority population was 375,271 (29 percent); and the low-income population was 114,073 (8.9 percent). Preliminary 2019 demographic data from the 2020 Census show that the top three minority groups within the ROI are (in order of population size) Hispanic or Latino, Asian, and Black or African American (USCB 2021f).

By comparison, the state of Utah consists of a 22-percent minority and 9-percent low-income population. The top three minority groups in Utah are (in order of population size) Hispanic or Latino, Asian, and Black or African American. The state of Nevada consists of a 52-percent minority and 13-percent low-income population. The top three minority groups in Nevada are (in order of population size) Hispanic or Latino, Black or African American, and Asian.

3.7.12 Reasonably Foreseeable Environmental Trends or Planned Actions

The primary reasonably foreseeable environmental trend and planned action is the continued operation of the Clean Harbors Grassy Mountain site under the current hazardous waste permit. Energy*Solutions* owns and operates a disposal facility for radioactive (Class A) and hazardous waste approximately 9 miles south of the Clean Harbors Grassy Mountain site. The Energy*Solutions* facility has a radioactive material license and hazardous waste permit granted by the Utah Department of Environmental Quality (UDEQ). Recently, Energy*Solutions* applied to UDEQ for a license amendment for the potential development of a Federal Cell Facility at this facility. In April 2021, Energy*Solutions* submitted a license application to UDEQ to allow permanent disposal of DOE concentrated depleted uranium (UDEQ 2021).

3.8 CLEAN HARBORS GREENBRIER

3.8.1 Land Use Ownership, and Visual Resources

3.8.1.1 Land Use and Ownership

The Clean Harbors Greenbrier site is a 12-acre site located in a light industrial/commercial use area on the north side of the community of Greenbrier, Tennessee, in Robertson County. The site includes multiple storage buildings, an office, and parking areas, surrounded by pasture and grassy areas as shown in Figure 3-7. Surrounding land uses include agricultural cropland and pastureland, light industrial, commercial, residential, and wooded lots (Greenbrier 2021). U.S. Highway 41 and a railroad are on the southwest side of the site.

Figure 3-7 Aerial View of Clean Harbors Greenbrier Site

3.8.1.2 Visual Resources

The viewshed along U.S. Highway 41 consists of commercial and industrial businesses, open agricultural cropland or pasture, and rural residential homes interspersed among forested lots. Topography in the area is relatively flat and distant views are blocked by forested property boundaries and wooded lots.

3.8.2 Geology, Soils, and Geologic Hazards

3.8.2.1 Geology and Soils

The Clean Harbors Greenbrier site lies in the Western Highland Rim Physiographic Province of north-central Tennessee. The topography consists of an elevated plain with hilly terrain that is bisected by the Tennessee River and Cumberland River valleys. In general, the bedrock geology consists of limestone, chert, shale, siltstone, and dolomite.

The soils underlying the Clean Harbors Greenbrier site consist of silt loam with 0–2 percent slopes grading outward to 5–12 percent slopes and cherty silty clay loam with 5–12 percent slopes. The silt loams with 0–2 percent slopes are characterized as prime farmland in all areas as delineated by the Natural Resources Conservation Service (NRCS 2021). Tilled land characterized as prime farmland is located across Logan Road approximately 350 feet east of the Greenbrier site.

3.8.2.2 Geologic Hazards

The Clean Harbors Greenbrier site is in a relatively quiet seismic area, approximately 200 miles east of the New Madrid Seismic Zone just over the border with Arkansas, and 200 miles west of the East Tennessee Seismic Zone. Each of the seismic zones has the capability of producing moderate to large earthquakes (Hatcher et al. 2013). The nearest capable faults to the Greenbrier site are located within these seismic zones. A total of five earthquakes (larger than magnitude 2.5) within a 62-mile radius around the Greenbrier site have been recorded since 1980 (USGS 2021h).

This SEIS-II uses the latest probabilistic PGA data from the USGS to assess seismic hazard among the various mercury storage candidate sites. The PGA values cited are based on a 2-percent probability of exceedance in 50 years. This corresponds to an annual probability (chance) of occurrence of about 1 in 2,500. For the Greenbrier site location, the calculated PGA is approximately 0.14 *g* (USGS 2021b).

Subsidence, sinkhole, or karst features are common across much of north-central Tennessee. Much of the bedrock of the Western Highland Rim Physiographic Province consists of carbonate rocks that form complex erosion drainage patterns that can cause dissolution underground, resulting in sinkholes at the surface (Moore and Drumm 2018). These occurrences are common in the general vicinity of the Clean Harbors Greenbrier site.

3.8.3 Water Resources

3.8.3.1 Surface Water and Floodplains

The 12-acre Clean Harbors Greenbrier site does not contain any surface water. Stormwater drains to the southeast and is permitted under a NPDES stormwater permit. Several small ponds occur on surrounding properties, and other low areas may temporarily collect surface runoff following significant precipitation events.

The Clean Harbors Greenbrier site is not in a designated FEMA 100-year floodplain (FEMA 2021; Greenbrier 2021).

3.8.3.2 Groundwater

Groundwater in Robertson County, Tennessee, is part of the Central Basin aquifer system and is composed of carbonate and shale rocks. The Central Basin aquifer is an important source of drinking water. Groundwater in the aquifer occurs primarily in solution openings and fractures and the flow system is generally limited to 300 feet or less below ground surface (Brahana and Bradley 1986).

3.8.4 Air Quality, Meteorology, and Noise

3.8.4.1 Air Quality and Meteorology

The regional climate is considered humid subtropical with hot and humid summers and cool to cold winters. Meteorological data is from Springfield, Tennessee, about five miles northwest of the Clean Harbors Greenbrier site (NWS 2021). Average summer temperatures range from 66 to 87°F. Average winter temperatures range from 28 to 47°F. Annual precipitation averages approximately 53 inches. Snowfall averages about eight inches each year.

Winter through spring is the windiest period, with average wind speed of eight mph (Weather Atlas 2021c). Twenty-three tornadoes have occurred in Robertson County, Tennessee, since 1950 (NOAA 2021). Of these tornadoes, 21 have been less than F2, with eleven being rated as F1 tornadoes.

Robertson County is in attainment for all NAAQS criteria pollutants (EPA 2021c). Clean Harbors Greenbrier has an air permit for bulk operations at the facility (Greenbrier 2021).

3.8.4.2 Noise

Primary noise sources in the vicinity of the Clean Harbors Greenbrier site are vehicle traffic on adjacent roadways and trains on the railroad adjacent to the site. Onsite noise sources include commercial trucks and equipment, such as forklifts for loading and unloading waste shipments. There are two potential sensitive noise receptors: a church, approximately 0.25 mile from the site and an elementary school approximately 0.7 mile from the site.

3.8.5 Ecological Resources

3.8.5.1 Terrestrial Resources

Approximately 5–6 acres of the 12-acre site have been cleared of vegetation and are occupied by an office and several industrial buildings, parking lots, paved or gravel work areas, and equipment storage areas. The remaining acreage is maintained lawn or grass areas with several landscape trees. A small stand of deciduous trees occupies the northeast corner of the site. The immediate surrounding properties contain agricultural cropland or pasture, small stands of deciduous trees interspersed with lawns on rural residential lots, small wooded lots, and other light industrial/commercial sites largely devoid of vegetation except for landscape lawns.

The Clean Harbors Greenbrier site does not contain vegetation or habitats to support populations of wildlife.

3.8.5.2 Aquatic Resources and Wetlands

The Clean Harbors Greenbrier site does not contain wetlands, other aquatic habitats, or species that use those habitats.

3.8.5.3 Threatened or Endangered and Other Protected Species

Three bat species listed as threatened or endangered potentially occur in Robertson County, Tennessee (USFWS 2021g). The gray bat depends on caves year-round and therefore is unlikely to occur near the Clean Harbors Greenbrier site. The Indiana bat and northern long-eared bat both occupy roost sites under the exfoliating bark of dead trees or cavities and crevices in live trees during the summer. Foraging habitat ranges from the understory of forested areas for the northern long-eared bat to forest gaps, wooded edges, riparian zones, and forested habitats for the Indiana bat. Although both species could likely occur in the landscape matrix surrounding the Clean Harbors Greenbrier site, habitat for neither species exists on the site.

Both bald and golden eagles occur in Tennessee and are protected under the BGEPA. Bald eagles occur as both year-round residents and winter migrants and are associated with larger rivers and reservoirs (TWRA 2021a). Golden eagles are a rare, but regular migrant and winter resident in Tennessee, and very rare in summer (TWRA 2021b). The Clean Harbors Greenbrier site does not contain suitable habitat for either species. Populations of migratory birds occur throughout the surrounding landscape matrix of agriculture, residential, commercial, and wooded areas. Habitat is very limited on the Clean Harbors Greenbrier site because most of the area is either mowed lawn or covered with buildings or paved lots.

3.8.6 Cultural and Paleontological Resources

The Tennessee regional cultural resources and historical description for the Perma-Fix DSSI site near Kingston, Tennessee, is applicable to the Clean Harbors Greenbrier site (see Section 3.5.6).

3.8.6.1 Prehistoric and Historic Resources

There are 29 historic properties listed on the NPS' NRHP in Robertson County, Tennessee, two of which are located approximately 1.5 miles from the Clean Harbors Greenbrier site in the community of Greenbrier (NPS 2022). One of the properties is a distillery site from the late 1800s and the other is a historic home. There are no known prehistoric or historic cultural resources in the immediate vicinity of the Clean Harbors Greenbrier site.

3.8.6.2 American Indian Resources

There are no federally recognized tribes or reservation lands in Tennessee. The tribal identities of the 16th and 17th century Native American occupants are disputed; however, by the 18th century the only native people in the area were the Cherokee prior to their relocation to the Oklahoma territory (Roth 2020). There are no known tribal resources or TCPs in the immediate vicinity of the Clean Harbors Greenbrier site.

3.8.6.3 Paleontological Resources

The carbonate bedrock formations in north-central Tennessee are conducive for preserving paleontological materials. Where there are surface exposures of these formations, fossil remains may be present; however, these materials consist of common invertebrate remains, which are unlikely to be unique from those widely available throughout the north-central Tennessee region.

The Clean Harbors Greenbrier site is in a previously disturbed area; therefore, it is not expected that paleontological resources are present at the site.

3.8.7 Site Infrastructure

3.8.7.1 Ground Transportation

Transportation access to the Clean Harbors Greenbrier site is by Interstate and State highways and secondary roads. A number of Interstate highways (e.g., I-40 and I-65) converge in the Nashville area located approximately 20 miles south of Greenbrier and provide access from all parts of the United States (Greenbrier 2021). State Highway 41 is adjacent to the Greenbrier site and connects to the Interstate highway system in the Nashville area. The Greenbrier site is accessed from Old Greenbrier Pike adjacent to State Highway 41. There are no restrictions for large vehicle traffic.

3.8.7.2 Utilities

Cumberland Electric Membership Corporation provides electrical service on the Clean Harbors Greenbrier site (Greenbrier 2021). The White House Utility District provides water and wastewater treatment. Springfield Gas provides natural gas only to the office area. Propane canisters are used to power forklifts.

3.8.8 Waste Management

The Clean Harbors Greenbrier site is a RCRA-permitted hazardous waste storage facility with an overall permitted capacity of 200,000 gallons. The facility is currently permitted under RCRA for the storage of mercury; however, none is currently stored on site. An application for a renewal of the existing RCRA permit was submitted in May 2020 to the Tennessee Department of Environmental Control.[9] No waste treatment is conducted at the Greenbrier facility. Sanitary wastewater is managed by the White House Utility District's wastewater treatment plant.

3.8.9 Occupational and Public Health and Safety

3.8.9.1 Normal Operations

As part of a RCRA Part B permit, hazardous waste storage facilities are required to be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous constituents to the environment, or create a threat to human health. Clean Harbors Greenbrier implements precautionary measures as part of its permit to prevent potential hazards from occurring in its permitted facilities. These measures are achieved through strict security control of the area, implementation of hazard prevention procedures, assessment of potential hazards, and an inspection program (Clean Harbors Greenbrier RCRA Permit).

[9] The RCRA permit renewal application is available at https://www.tn.gov/content/dam/tn/environment/solid-waste/documents/public-notices/permit-documents/ppo_sw_hw_clean-harbors.pdf

Clean Harbors Greenbrier is also required by its permit to ensure that its employees are properly trained in hazardous materials safety and emergency procedures. Facility personnel must successfully complete a program of classroom instruction and/or on-the-job training that teaches them to perform their duties in a way that ensures the facility's compliance with the requirements. Clean Harbors Greenbrier has developed, implemented, and maintained a comprehensive training plan designed to familiarize employees with emergency procedures, hazardous waste safety, and job-specific requirements.

Over the past three years, there have been no reportable cases of occupational illnesses or injuries at the Clean Harbors Greenbrier facility.

3.8.9.2 Facility Accidents

In accordance with their hazardous waste permit, Clean Harbors maintains emergency response equipment, procedures, and personnel training to respond to accidents involving hazardous materials. There have been no facility accidents at the Clean Harbors Greenbrier facilities that caused releases of hazardous material (Greenbrier 2021).

3.8.9.3 Transportation

Although Clean Harbors Greenbrier is a permitted RCRA storage facility, its primary operations over the last 10 years have been as a 10-day transfer facility. This included receipt or dispatch of approximately 700 shipments annually. For the first seven months of 2021, the Clean Harbors Greenbrier site received or dispatched 23 shipments of hazardous materials. Over the past five years, there have been no transportation accidents that resulted in a release of hazardous materials.

3.8.10 Socioeconomics

The Clean Harbors Greenbrier site is in Robertson County, Tennessee. The city of Nashville is in adjacent Davidson County, approximately 25 miles south of Greenbrier. The Nashville area is the closest metropolitan area to the site and it is assumed that the majority of people employed in the area reside in Davidson County and Robertson County. Both counties are identified as the ROI in this socioeconomics analysis. In 2020, Greenbrier employed approximately 25 people (Greenbrier 2021).

3.8.10.1 Regional Employment Characteristics

From 2010 to 2019, the labor force in the ROI increased by approximately 17 percent, from 376,357 to 440,963 workers. By December 2019, the average unemployment rate in the ROI was 2.7 percent, which was slightly lower than the unemployment rate for Tennessee (3.4 percent) (BLS 2021a, 2021b, 2021c).

3.8.10.2 Demographic and Housing Characteristics

In 2019, the estimated population of the two-county ROI was 766,957, over 90 percent of which reside in Davidson County. From 2010 to 2019, the ROI population increased by 11 percent. There were 353,488 housing units in the ROI in 2019; 56 percent of the housing units were owner-occupied (USCB 2021g).

3.8.11 Environmental Justice

The ROI for the Clean Harbors Greenbrier site encompasses Robertson and Davidson counties in Tennessee. In 2019, the total population of the ROI was 765,957; the minority population was 315,835 (41.2 percent); and the low-income population was 95,077 (12.4 percent). Preliminary 2019 demographic data from the 2020 Census show that the top three minority groups within the ROI are (in order of population size) Black or African American, Hispanic or Latino, and Asian (USCB 2021g).

By comparison, the state of Tennessee consists of a 27 percent minority and 14 percent low-income population. The top three minority groups in Tennessee are (in order of population size) Black or African American, Hispanic or Latino, and Asian.

3.8.12 Reasonably Foreseeable Environmental Trends or Planned Actions

Other than the continued operation of the Clean Harbors Greenbrier RCRA storage facilities under the current hazardous waste permit, there are no other reasonably foreseeable environmental trends or planned actions within the ROI that would have the potential for cumulative impacts with the Proposed Action.

3.9 CLEAN HARBORS PECATONICA

3.9.1 Land Use and Ownership, and Visual Resources

3.9.1.1 Land Use and Ownership

The Clean Harbors Pecatonica site is 10 acres in size and located in a rural agricultural area in northern Illinois in Winnebago County (Pecatonica 2021). The site includes multiple container storage buildings, offices, and parking areas as shown in Figure 3-8. The surrounding land is primarily used for growing corn, hayfields, and pastureland for livestock grazing. Rural residences occur throughout the area. The nearest community is Pecatonica, approximately two miles south of the site, with a population of about 2,000 people.

3.9.1.2 Visual Resources

The topography is relatively flat with views primarily of cornfields, pastureland, and rural residences. The area is typical of the Midwest agriculture landscapes.

3.9.2 Geology, Soils, and Geologic Hazards

3.9.2.1 Geology and Soils

The Clean Harbors Pecatonica site lies in the Rock River Hill Country of the Central Lowland Province in north-central Illinois. The topography is characterized by gently rolling terrain with glacial moraine deposits of miscellaneous rocks, gravel, sand, and soil left behind by retreating ice sheets. After the glaciers retreated, the area was blanketed with surficial, wind-blown till deposits (Kron et al. 2011). In general, the bedrock geology beneath the surficial deposits consists of coarse-grained, brown-gray dolomites.

Figure 3-8 Aerial View of Clean Harbors Pecatonica Site

The soils underlying the Clean Harbors Pecatonica site consist of glaciated silt loam with 5–10 percent slopes with adjacent units of eroded silt loam with 5–10 percent slopes and glaciated silt loams with 2–5 percent slopes. The silt loams with 5–10 percent slopes are characterized as farmland of statewide importance, as delineated by the Natural Resources Conservation Service, and the remaining silt loams with 2–5 percent slopes are characterized as prime farmlands in all areas (NRCS 2021).

3.9.2.2 Geologic Hazards

Earthquakes occur in Illinois about once per year; damaging earthquakes are much less frequent. The southern one third of the state is more seismically active than the remainder, likely due to the proximity to the New Madrid Fault Zone south of Illinois and the Wabash Valley Seismic Zone along the southern Illinois-Indiana border (ISGS 2021a). The Clean Harbors Pecatonica site lies in the relatively quiet seismic area of northern Illinois. The nearest capable faults to the Clean Harbors Pecatonica site are located within the above-mentioned seismic zones; however, smaller, less-active fault zones occur in the counties south of Winnebago (ISGS 2021b). A total of five earthquakes (larger than magnitude 2.5) within a 62-mile radius around the Pecatonica site have been recorded since 1972 (USGS 2021i).

This SEIS-II uses the latest probabilistic PGA data from the USGS to assess seismic hazard among the various mercury storage candidate sites. The PGA values cited are based on a 2-percent probability of exceedance in 50 years. This corresponds to an annual probability (chance) of occurrence of about 1 in 2,500. For the Clean Harbors Pecatonica site, the calculated PGA is approximately 0.05 *g* (USGS 2021b).

Subsidence, sinkhole, or karst features are present along the length of the western border of Illinois. In the northern one-third of the state, the karst features formed by carbonate rocks (dolomite) tend to be comparatively small, with potential sinkholes measuring a few tens of feet in diameter. Karst features are present in the southern part of Winnebago County (ISGS 2021c).

3.9.3 Water Resources

3.9.3.1 Surface Water and Floodplains

The Clean Harbors Pecatonica site is in the Rock River Basin in northern Illinois. The surface water resources in the Rock River Basin are described in documents prepared by the Illinois State Water Survey (e.g., Sinclair 1996). There is no surface water on the Clean Harbors Pecatonica site. The facility discharges only stormwater under an NPDES permit. A small stream approximately 0.25 mile west of the facility on the opposite side of Pecatonica Road drains agricultural land and several farm ponds farther north. The Pecatonica River is located one mile east and south of the Clean Harbors Pecatonica site.

The Clean Harbors Pecatonica site is not in a FEMA-designated 100-year floodplain (FEMA 2021). The nearest floodplain is along the small stream 0.25 mile west of the facility and about 60 feet lower in elevation. The floodplain associated with the Pecatonica River is approximately one mile from the site and is characterized by a floodplain approximately 0.5–1 mile wide filled with oxbow lakes and wetlands created by changes in the historical flow channel.

3.9.3.2 Groundwater

Groundwater is a plentiful resource in the Rock River Basin (Sinclair 1996). Groundwater is withdrawn from sand and gravel aquifers in glacial drift deposits and from shallow dolomite and deeper sandstone bedrock aquifers. The sand and gravel and shallow dolomite aquifers are generally less than 500 feet in depth, while sandstone aquifers exceed 500 feet in depth. Recharge is primarily through percolation of rainfall. The Rock River, approximately 15 miles east-southeast of the Clean Harbors Pecatonica site, serves as the discharge zone for the regional groundwater.

3.9.4 Air Quality, Meteorology, and Noise

3.9.4.1 Air Quality and Meteorology

The climate of northern Illinois is humid continental with warm, humid summers and cold winters. Average summer temperatures range from 62 to 82°F (NOAA 2021). Average winter temperatures range from 17 to 32°F. Average annual precipitation is about 37 inches with average snowfall of 37 inches. The wettest months are April through September.

The windiest period is October–May, when winds average more than 10 mph (Weather Spark 2021). The least windy month is August, when winds still average more than 7 mph. Since 1950, 18 tornadoes have been reported in Winnebago County, Illinois. The strongest of these were three F2 tornadoes (NOAA 2021).

Winnebago County is in attainment for all NAAQS criteria pollutants (EPA 2021f). Clean Harbors Pecatonica operates under a Registration of Smaller Sources program through the Illinois Environmental Protection Agency (Pecatonica 2021; IL DCEO 2021). The Registration of Smaller Sources program covers small emission sources with limits specified in tons per year for combined pollutants, combined hazardous air pollutants, mercury, and lead. The program requires registration with the program rather than acquisition and maintenance of an air permit (Illinois EPA 2012).

3.9.4.2 Noise

The Clean Harbors Pecatonica site is in a rural, agricultural environment with few noise sources. Commercial trucks are the only primary external noise source. Equipment, such as forklifts for loading and unloading waste shipments and moving waste containers, is used primarily within the storage buildings and does not generate external noise. There are no sensitive noise receptors in the immediate facility of the site.

3.9.5 Ecological Resources

3.9.5.1 Terrestrial Resources

No natural vegetation occurs on the Clean Harbors Pecatonica site. Areas not occupied by buildings or paved lots and driveways are mowed grass fields. The vegetation on surrounding land is a mixture of cornfields, hayfields, pastureland, and wooded lots or wooded areas along streams. Wildlife on the Clean Harbors Pecatonica site is limited because of the lack of suitable habitat. Typical farmland wildlife that occurs in the surrounding landscape include ring-neck pheasant, cottontail rabbits, white-tailed jackrabbits, mourning doves, white-tailed deer, red fox, skunks, squirrels, and raccoons.

3.9.5.2 Aquatic Resources and Wetlands

The Clean Harbors Pecatonica site contains no surface water and therefore no wetlands or aquatic resources.

3.9.5.3 Threatened or Endangered and Other Protected Species

The Indiana bat, northern long-eared bat, eastern prairie fringed orchid (*Platanthera leucophaea*), and prairie bush clover (*Lespedeza leptostachya*) are four species listed as either threatened or endangered that could potentially occur in Winnebago County, Illinois (USFWS 2021h). The Indiana bat and northern long-eared bat both occupy roost sites under the exfoliating bark of dead trees or cavities and crevices in live trees during the summer. Foraging habitat ranges from the understory of forested areas for the northern long-eared bat to forest gaps, wooded edges, riparian zones, and forested habitats for the Indiana bat. The eastern prairie fringed orchid occurs in mesic to wet prairies. The prairie bush clover occurs in dry to mesic prairies with gravelly soil. There are no suitable habitats for these species on the Clean Harbors Pecatonica site. Habitat for the two bats species potentially could exist along the Pecatonica River, which is one mile from the site.

Both bald and golden eagles occur in Illinois and are protected under the BGEPA The bald eagle is common in the state of Illinois, particularly during winter when winter migrants occur along the

Mississippi River and other Illinois rivers. The golden eagle is a rare migrant and winter resident in the state (Illinois DNR 2020). There are no suitable habitats for either species on the Clean Harbors Pecatonica site. Habitat for migratory birds is limited on the site although populations exist in the surrounding farmland landscape.

3.9.6 Cultural and Paleontological Resources

People have inhabited what is today Illinois for over 12,000 years. By the year 700, native people had begun to establish settlements that included earthen mounds used for burial ceremonies and other rituals (Illinois DNR 2021). The Illinois territory is historically well known for the people of the Illinois Confederation, who were made up of 12–13 tribes living in the Mississippi River Valley. After the arrival of European explorers in the late 1600s, a succession of other settlers arrived in the territory leaving behind historic artifacts.

3.9.6.1 Prehistoric and Historic Resources

There are 40 historic properties listed on the NPS's NRHP in Winnebago County, Illinois, one of which is a historic home located approximately two miles south of the Clean Harbors Pecatonica site in the community of Pecatonica (NPS 2022).

3.9.6.2 American Indian Resources

There are no federally recognized tribes or reservation lands in Illinois. The northern Illinois area, including Winnebago County, was historically inhabited predominantly by the Ioway and Ho-Chunk people prior to their relocation to the Oklahoma Territory. There are no known tribal resources or TCPs in the immediate vicinity of the Clean Harbors Pecatonica site.

3.9.6.3 Paleontological Resources

The Clean Harbors Pecatonica site is located in a rural agricultural area where land has already been disturbed for the operating facility and nearby crops. It is not expected that paleontological resources are present at the Clean Harbors Pecatonica site.

3.9.7 Site Infrastructure

3.9.7.1 Ground Transportation

Transportation access to the Clean Harbors Pecatonica facility is by Interstate and State highways and State secondary roads. A number of Interstate highways converge in the Chicago area located to the southeast of the site and provide access from all parts of the United States. State Highway 20 is four miles south of the Clean Harbors Pecatonica site, and the site is accessible by North Pecatonica Road. All access roads are designed for maximum vehicle weights (Pecatonica 2021).

3.9.7.2 Utilities

Electrical service is provided by Commonwealth Edison, the local electrical utility. Water for industrial use is supplied by two onsite wells, each yielding 20 gallons per minute (Pecatonica

2021). There is no natural gas system; however, the Clean Harbors Pecatonica site has a 250-gallon diesel fuel tank. Compressed gas is stored on site.

3.9.8 Waste Management

The Clean Harbor Pecatonica site is a RCRA-permitted waste storage facility. The facility has two RCRA-permitted buildings (Pecatonica 2021). The smaller building (CSB-1) has a permitted storage capacity of 48,125 gallons. The larger building (CSB-2) has a permitted capacity of 240,680 gallons. The facility accepts all EPA hazardous waste codes. The facility is permitted to store mercury. Approximately 9,900 gallons of mercury waste were stored in the facility in 2020 (Pecatonica 2021). Sanitary wastewater is handled by the Village of Pecatonica's municipal wastewater treatment facility.

3.9.9 Occupational and Public Health and Safety

3.9.9.1 Normal Operations

As part of a RCRA Part B permit, hazardous waste facilities are required to be designed, constructed, maintained, and operated to minimize the possibility of a fire, explosion, or any unplanned sudden or non-sudden release of hazardous constituents to the environment, or create a threat to human health. Clean Harbors Pecatonica implements precautionary measures as part of its permit to prevent potential hazards from occurring in its permitted facilities. These measures are achieved through strict security control of the area, implementation of hazard prevention procedures, assessment of potential hazards, and an inspection program (Clean Harbors Pecatonica RCRA Permit).

Clean Harbors Pecatonica is also required by its permit to ensure that its employees are properly trained in hazardous materials safety and emergency procedures. Facility personnel must successfully complete a program of classroom instruction and/or on-the-job training that teaches them to perform their duties in a way that ensures the facility's compliance with the requirements. Clean Harbors Pecatonica has developed, implemented, and maintains a comprehensive training plan designed to familiarize employees with emergency procedures, hazardous waste safety and job-specific requirements.

Over the past three years, there have been no reportable cases of occupational illnesses or injuries at the Clean Harbors Pecatonica site.

3.9.9.2 Facility Accidents

In accordance with their hazardous waste permit, Clean Harbors maintains emergency response equipment, procedures, and personnel training to respond to accidents involving hazardous materials. Other than the industrial safety injury/illnesses reported in Section 3.9.9.1, there were no facility accidents at the Clean Harbors Pecatonica site that caused releases of hazardous material (Pecatonica 2021).

3.9.9.3 Transportation

Clean Harbors Pecatonica utilizes approved, third-party vendors for transportation activities. There have been an average of 400 annual shipments of hazardous waste received into or dispatched from the Clean Harbors Pecatonica site. Over the past five years, there have been no transportation accidents that resulted in a release of hazardous materials (Pecatonica 2021).

3.9.10 Socioeconomics

The Clean Harbors Pecatonica site is located near the western edge of Winnebago County, Illinois. The community of Pecatonica lies about midway between the Illinois metropolitan areas of Rockford, 16 miles to the east within Winnebago County, and Freeport, 16 miles to the west within Stephenson County. It is assumed that most people employed in the area reside in one of these two counties, which are therefore identified as the ROI in this socioeconomics analysis. In 2021, Clean Harbors Pecatonica employed one person (Pecatonica 2021).

3.9.10.1 Regional Employment Characteristics

From 2010 to 2019, the labor force in the ROI decreased by approximately 7.2 percent, from 174,225 to 161,611 workers. By December 2019, the average unemployment rate in the ROI was 4.8 percent, which was slightly higher than the unemployment rate for Illinois (4.0 percent) (BLS 2021a, 2021b, 2021c).

3.9.10.2 Demographic and Housing Characteristics

In 2019, the estimated population of the two-county ROI was 327,070. From 2010 to 2019, the ROI population decreased by 4.6 percent. There were 147,587 housing units in the ROI in 2019; 67 percent of the housing units were owner-occupied (USCB 2021h).

3.9.11 Environmental Justice

The ROI surrounding the Clean Harbors Pecatonica site encompasses Winnebago and Stephenson counties in Illinois. In 2019, the total population of the ROI was 327,070; the minority population was 99,368 (30.4 percent); and the low-income population was 50,596 (15.5 percent). Preliminary 2019 demographic data from the 2020 Census show that the top three minority groups within the ROI are (in order of population size) Black or African American, Hispanic or Latino, and Asian (USCB 2021h).

By comparison, the state of Illinois consists of a 39-percent minority and 12-percent low-income population. The top three minority groups in Illinois are (in order of population size) Hispanic or Latino, Black or African American, and Asian.

3.9.12 Reasonably Foreseeable Environmental Trends or Planned Actions

Other than the continued operation of the Clean Harbors Pecatonica RCRA storage facilities under the current hazardous waste permit, there are no other reasonably foreseeable environmental trends or planned actions within the ROI that would have the potential for cumulative impacts with the Proposed Action.

3.10 NO-ACTION ALTERNATIVE

As described in Section 2.5 of this Mercury Storage SEIS-II, and as a result of the *Chemical Safety Act of 2016*, mercury generators have additional options that were not available when the 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS were prepared. Under the No-Action Alternative, a mercury generator would have the following options: (1) continue to accumulate mercury at ore processor facilities; (2) transport mercury from generators to a permitted, commercial storage facility; or (3) transport mercury to a permitted treatment facility as a precursor to sending the mercury compound to Canada for disposal (e.g., Bethlehem Apparatus, Stablex).

At ore processors (primarily in Nevada), mercury is packaged and stored in RCRA-approved, 1-MT containers. Generators also have the option to send mercury to RCRA-permitted commercial storage facilities. These facilities could be existing or future construction. Two examples of existing, commercial storage facilities include those identified in Table 2-5, which are the Waste Management facilities in Emelle, Alabama, and Union Grove, Wisconsin. These RCRA-permitted facilities currently store mercury derived from ore processing. As mentioned above, the third option could include treatment at a permitted facility such as Bethlehem Apparatus (affected environment is described in Section 3.4) and disposal of the mercury compound at the permitted facility in Quebec, Canada.

As discussed in Section 3.1, the 2011 Mercury Storage EIS (DOE 2011) provided information on the affected environment at Y-12 to support the analysis of the No-Action Alternative. Under the No-Action Alternative, the 1,206 MT of mercury stored at Y-12 would remain in place. This section updates information for the affected environment for resource areas described for Y-12 in the 2011 Mercury Storage EIS.

In August 2018, the NNSA prepared a Supplement Analysis (SA) (NNSA 2018) to the *Final Site-Wide Environmental Impact Statement for the Y-12 National Security Complex* (Y-12 SWEIS) (NNSA 2011) to evaluate the environmental impacts of continuing site operations of the Y-12 complex to determine if significant changes or new information warranted a supplemental EIS or new SWEIS.[10] In the 2018 Y-12 SA, NNSA determined that Y-12 continuing operations were not significantly different than those evaluated in the 2011 SWEIS. In July 2020, NNSA prepared an SA (NNSA 2020) of the Y-12 SWEIS to evaluate the potential impacts of an earthquake accident at Y-12 based on updated seismic hazard information. NNSA concluded that earthquake consequences and risks based on updated seismic hazard information do not constitute a substantial change. This Mercury Storage SEIS-II uses the updated information and evaluation in the Y-12 2018 and 2020 SAs and other recent information sources (DOE 2020) to describe new or changed information for the affected environment at Y-12. Unless discussed, the affected environment has remained the same as 2011.

3.10.1 Land Use and Ownership, and Visual Resources

The land use at Y-12 remains industrial. The only potential change in the classification or management of land resources at Y-12 since 2011 is the establishment of the Manhattan Project

[10] While the 2018 Y-12 SA was set aside and remanded for further NEPA analysis in *OREPA v. Perry*, 412 F. Supp. 786 (E.D. Tenn. 2019), all required agency action has been taken with the issuance of the 2020 SA (NNSA 2020) and other NEPA documentation as related to certain categorical exclusions, not relevant to this document.

National Historical Park, which was created by Federal legislation signed into law on December 19, 2014. The NPS is establishing visitor centers at three sites (Oak Ridge, Tennessee; Hanford, Washington; and Los Alamos, New Mexico) to provide a hub of information about the Manhattan Project on a national scale. Two facilities located at Y-12 are listed as part of the Park: Buildings 9731 and 9204-3. Both buildings have been nominated for National Historic Landmark status consideration by the NPS (NNSA 2018).

Y-12 remains an industrial complex and any changes in facilities (both new construction and demolition) have not changed the Class IV visual resource rating for highly developed areas.

3.10.2 Geology, Soils, and Geologic Hazards

The description of the geology and soils at and surrounding Y-12 remains the same as described in 2011 with the surrounding ridges consisting of resistant siltstone, sandstone, and dolomites. The valleys consist of less-resistant shales and shale-rich carbonates resulting from stream erosion along fault traces. The Y-12 site in Bear Creek Valley lies on well- to moderately well-drained soils underlain by shale, siltstone, and limestones. Soil erosion ranges from slight to severe with the highest potential in previously eroded locations with slopes greater than 25 percent. The flatter-lying areas contain permeable soils that have a loamy texture (NNSA 2018).

Although soil resources at Y-12 have not changed since the 2011 SWEIS was issued, during excavation of an underpass for the Site Readiness Haul Road, various types of debris (concrete, wood, metal) were encountered; some radiologically contaminated, and some contaminated with mercury. Given the industrial nature of the site, contaminated debris could potentially be discovered over portions of the site where cleanup has not occurred (NNSA 2018).

The Y-12 SWEIS (NNSA 2011) discussion of the seismic conditions in the region and at the Y-12 site remains valid and relevant. The Y-12 SA (NNSA 2020) presents more recent information regarding seismicity that is consistent with the latest USGS seismic hazard tools for identifying PGA for specific sites in the United States. The USGS online tool calculated that the PGA at the surface, with two percent probability of exceedance in 50 years, changed from approximately 0.22 *g* in 2008 to approximately 0.34 *g* in 2014 (NNSA 2020). The change represents an increase in predicted ground motion of approximately 56 percent. Year 2021 verification of PGA using the USGS seismic hazard tool remains at 0.34 *g* (USGS 2021b). Such an increase, in and of itself, does not mean that the earthquake risk at Y-12 has increased significantly or constitutes significant new circumstances or information relevant to environmental concerns. In addition, a seismic risk assessment and hazard analysis was prepared for the Y-12 site utilizing the latest USGS seismic hazard tools (NNSA 2020).

3.10.3 Water Resources

Water resources, including surface and groundwater, in the vicinity of the Y-12 site continue to be affected by site activities. Groundwater monitoring indicates that contaminant concentrations are generally declining year to year or are stable after remedial actions (NNSA 2018). A wetland assessment was prepared for Y-12 in 2011. Since 2011, approximately three acres of wetlands were expanded or created in the Bear Creek watershed to mitigate the potential loss of one acre of wetland from construction of the Uranium Processing Facility (NNSA 2018; DOE 2020).

The Outfall 200 Mercury Treatment Facility is a vital piece of infrastructure that will open the door for demolition of Y-12's large, deteriorated, mercury-contaminated facilities and subsequent soil remediation by providing a mechanism to limit potential mercury releases into Upper East Fork Poplar Creek. When operational, the facility will be able to treat 3,000 gallons of water per minute and help Oak Ridge meet regulatory limits in compliance with EPA and state of Tennessee requirements. In 2020, contractors began excavations for the facility. Additionally, crews poured the concrete pads and began installing rebar for the walls of the treatment plant. The Mercury Treatment Facility is slated to be operational in the mid-2020s (DOE 2020).

3.10.4 Air Quality, Meteorology, and Noise

In 2011, Anderson County, Tennessee, in which the Y-12 site is located, was in nonattainment for ozone and $PM_{2.5}$. Anderson County is currently classified as a maintenance area for ozone and $PM_{2.5}$ after re-designation to attainment in 2017. Replacement of the coal-fired steam plant with a gas-fired steam plant has reduced total GHG emissions by 50 percent (NNSA 2018; DOE 2020, Table 4.9).

3.10.5 Ecological Resources

The 2011 Y-12 SWEIS noted only one federally listed threatened or endangered species on or near ORR: the gray bat (*Myotis grisescens*), which is still endangered. The 2011 SWEIS also identified the Indiana bat as endangered, but that bat was not known to occur on ORR. Ecological resources have not changed in any significant ways at Y-12 since issuance of the 2011 SWEIS with the following exceptions: (1) since publication of the 2011 SWEIS, the USFWS has listed the northern long-eared bat as threatened, and Y-12 falls within the range for this species; and (2) acoustic analyses and mist net trapping conducted from 2013 to 2015 confirm that the Indiana bat, northern long-eared bat, and gray bat are found across the ORR, which includes Y-12 (NNSA 2018).

3.10.6 Cultural and Paleontological Resources

A site-wide Programmatic Agreement among DOE Oak Ridge Office, NNSA, the Tennessee State Historic Preservation Office (TN SHPO), and the Advisory Council on Historic Preservation concerning management of historical and cultural properties at Y-12 has been in effect since it was approved on August 25, 2003. No prehistoric sites have been found within or immediately adjacent to the Y-12 site (NNSA 2011, 2018).

As discussed in Section 3.10.1 of this SEIS-II, the Manhattan Project National Historical Park was established in 2015 consistent with existing historic preservation plans. In addition, over 50 proposed projects were evaluated to determine whether any historic properties eligible for inclusion in the NRHP would be adversely impacted. It was determined that several of the proposed projects were part of an infrastructure disposition program and would have an adverse effect on 16 historic properties eligible for listing in the NRHP. In accordance with the Programmatic Agreement, the required NHPA Section 106 recordation, interpretation, and documentation information was submitted to the SHPO for the demolition of several buildings. The Tennessee SHPO concurred that documentation adequately mitigated project effects upon eligible properties (DOE 2020).

There currently are no federally recognized tribes or reservation lands in Tennessee, although the east Tennessee area was historically inhabited predominantly by the Cherokee ethnic group. No Native American sacred sites or TCPs have been found within or immediately adjacent to Y-12.

The carbonate bedrock formations in eastern Tennessee are conducive for preserving paleontological materials. Where there are surface exposures of these formations, fossil resources may be present; however, these materials consist of common invertebrate remains, which are unlikely to be unique from those widely available throughout the east Tennessee region (NNSA 2011).

3.10.7 Site Infrastructure

Changes to the Y-12 infrastructure include the completion of the Site Readiness Haul Road extension and construction of the Bear Creek Road bypass (NNSA 2018). In addition, new potable water lines have been installed and are delivering water to the Y-12 site. Through a variety of modernization/transformation activities (by reducing the number and size of operating facilities), Y-12 has realized significant reductions in peak monthly electricity and water usage (NNSA 2018, Table 2.7; DOE 2020).

3.10.8 Waste Management

Waste management is performed at multiple locations on ORR for both solid and liquid wastes, including landfills and water treatment facilities. Most of the waste generated during FY 2020 cleanup activities in Oak Ridge went to disposal facilities on ORR. The Environmental Management Waste Management Facility received 12,271 waste shipments, totaling 129,038 cubic yards, from cleanup projects on ORR. This engineered landfill consists of six disposal cells that only accept LLW and hazardous waste meeting specific criteria. These wastes include soil, dried sludge and sediment, building debris, and personal protective equipment.

For solid waste disposal, DOE operates and maintains solid waste disposal facilities called the ORR Landfills. In FY 2020, these three active landfills received 6,334 waste shipments, totaling 79,675 cubic yards of waste.

NNSA at Y-12 treats wastewater generated from both production and environmental cleanup activities. Safe and compliant treatment of more than 121 million gallons of wastewater and groundwater was provided at various facilities during 2020 (DOE 2020).

3.10.9 Occupational and Public Health and Safety

Activities at ORR have the potential to release hazardous chemicals and radionuclides to the environment. These releases could result in members of the public being exposed to low concentrations of chemicals or radionuclides. Monitoring and surveillance are used to show that doses from chemicals and radionuclides are in compliance with regulations. Recent estimates of doses from chemical and radionuclide releases are reported in the *Oak Ridge Reservation Annual Site Environmental Report for 2019* (DOE 2020). Radiation doses to the public and to workers have been estimated and compared with the applicable criteria in the most recent Annual Site Environment Report (DOE 2020).

Reported ambient mercury concentrations at the two air monitoring sites in 2019 were comparable to the reference site background level of 0.006 microgram per cubic meter and were well below the American Conference of Governmental Industrial Hygienists' threshold limit value of 25 micrograms per cubic meter and the EPA reference concentration of 0.3 microgram per cubic meter for chronic-inhalation exposure (DOE 2020).

Concentrations of mercury in fish tissue collected near Y-12historically have been elevated in East Fork Poplar Creek compared with concentrations in reference samples and samples taken from other streams near ORR. In 2008, the average mercury concentration in fish tissue from East Fork Poplar Creek was about 0.52 parts per million (ppm), which is above the Tennessee precautionary advisory level of 0.3 ppm for mercury, within the EPA-recommended consumption limit of one fish meal per month (greater than 0.47 through 0.94 ppm for methylmercury), and above the EPA water quality criterion of 0.3 ppm (DOE 2020, page 4-63).

DOE at Oak Ridge has implemented a Biological Monitoring and Abatement Program, which consists of two tasks designed to evaluate the effects of legacy operations at the East Tennessee Technology Park on the local environment, identify areas where abatement measures would be most effective, and test the efficacy of the measures. The results from this program will support future cleanup actions, including previous mercury contamination. These tasks are: (1) bioaccumulation studies and (2) instream monitoring of biological communities. More information about this program can be found in DOE (2020).

3.10.10 Socioeconomics

The Y-12 SWEIS and SAs (NNSA 2011, 2018, 2020) used the same ROI for socioeconomic characteristics. The ROI was a four-county area in Tennessee that consists of Anderson, Knox, Loudon, and Roane counties, where 90 percent of the workforce for Y-12 resides. This SEIS-II updates socioeconomic parameters for the same four counties consistent with those identified for the eight site alternatives discussed in Socioeconomic Sections 3.2.10–3.9.10.

From 2010 to 2019, the labor force in the four-county ROI increased by approximately 5.1 percent, from 311,557 to 327,396 workers. By December 2019, the average unemployment rate in the ROI was 3.5 percent, which is essentially the same as the unemployment rate for Tennessee (3.4 percent) (BLS 2021a, 2021b, 2021c).

In 2019, the estimated population in the ROI was 654,741. From 2010 to 2019, the ROI population increased by 7.3 percent, with the majority of that increase coming from Knox County. There were 294,661 housing units in the ROI in 2019; 67 percent of the housing units were owner-occupied (USCB 2021i).

3.10.11 Environmental Justice

The Y-12 SWEIS and SAs (NNSA 2011, 2018, 2020) used data from the formal 2000 Census and 2016 resident population estimates, respectively, to address the environmental justice affected environment within a 50-mile radius around Y-12. However, this SEIS-II updates the data using the four-county ROI, consistent with the socioeconomic affected environment discussed in the previous section.

In 2019, the total population of the four-county ROI was 654,741; the minority population was 104,177 (15.9 percent); and the low-income population was 87,835 (13.4 percent). Preliminary 2019 demographic data from the 2020 Census show that the top three minority groups within the ROI are (in order of population size) Black or African American, Hispanic or Latino, and Asian (USCB 2021i).

4 ENVIRONMENTAL CONSEQUENCES

Appendix B of the 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS describe the methods used to assess the potential impacts of previously considered alternative site locations for the long-term management and storage of elemental mercury, which are incorporated herein by reference. These same methods are used to assess alternative site locations identified for the first time in this SEIS-II. Unlike the previous impact analyses and for reasons explained in Section 2.2 of this Mercury SEIS-II, this SEIS-II does not consider alternatives that would involve construction of new facilities for mercury storage. This Mercury SEIS-II assumes that minor modifications to existing facilities may be required. With the exception of facilities at HWAD, these modifications are expected to be part of the existing structure(s) and most likely would be internal to or within the existing footprint of the building(s).

Appendix D of the 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS provides detailed descriptions of the methods for the evaluation of occupational and public health and safety as well as ecological risk from normal mercury operations, facility accidents, and mercury transportation which are incorporated herein by reference. This chapter discusses how those methods are adopted and applied to the alternative sites evaluated in this Mercury SEIS-II.

4.1 APPROACH TO ANALYSIS OF ENVIRONMENTAL IMPACTS

This Mercury SEIS-II considers and assesses the potential impacts to the same resource areas evaluated in the 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS and described in Chapter 3 of this SEIS-II for the action alternatives described in Chapter 2. The impacts of a No-Action Alternative are also presented in Section 4.2.

Methods for assessing environmental impacts vary for each resource area (DOE 2011, 2013). Resource areas are analyzed in a manner commensurate with their importance and the expected level of impact on and/or to them under a specific alternative; i.e., the sliding-scale assessment approach (DOE 2004). This approach recognizes that potential impacts may vary in significance and importance for different resource areas and that the analysis should discuss impact identification and quantification in proportion to their significance. The impact analyses in this Mercury SEIS-II are consistent with the impact analyses in the 2011 Mercury Storage EIS for alternative sites with existing facilities. The alternative sites considered in this SEIS-II are existing facilities that operate under RCRA Part B permits for the treatment and/or storage of hazardous waste. Except as they may contribute to cumulative impacts, this SEIS-II does not evaluate or consider the impacts of these existing permitted operations but only the potential incremental impacts associated with receiving, treating, handling, transporting, storing, and managing elemental mercury at each of these sites.

Chapter 2, Section 2.1, of this SEIS-II describes the analytical framework used to consistently analyze and present potential impacts of long-term management and storage of elemental mercury at the alternative facilities. The framework includes the following key parameters:

- Assumed 40-year analytical period of generation, management, and storage of mercury;

- Up to 7,000 MT of mercury that could require management and storage at a DOE-designated facility; and

- Transport of the mercury by legal-weight truck from the generator or current storage location to the DOE-designated storage facility. Per the discussion in Section 2.4, the analysis in this Mercury Storage SEIS-II assumes that mercury being received from ore processors would be shipped to a RCRA-permitted treatment facility prior to receipt at the DOE storage facility.

4.2 NO-ACTION ALTERNATIVE

Under the No-Action Alternative evaluated in this SEIS-II, DOE would not designate and operate a facility for the long-term management and storage of elemental mercury generated within the United States, as described in Chapter 2, Section 2.5. Elemental mercury would continue to be generated from other sources, primarily the gold-mining industry and, to a lesser extent, waste reclamation and recycling facilities. As stated in Section 2.5, the current options available to a mercury generator under the No-Action Alternative currently include:

- **Accumulate On site –** Ore processors can accumulate elemental mercury on site in accordance with the Chemical Safety Act of 2016 until DOE designates a facility (which theoretically would not occur under the No-Action Alternative) or Congress passes new legislation.[11] The Act requires that generators comply with the requirements in 40 CFR Part 262 for managing their hazardous waste. The removal of the limit on storage times at ore-processing facilities could have the largest potential impact on analysis of the No-Action Alternative. Theoretically, if DOE does not implement the Proposed Action, mercury could continue to accumulate at the ore-processor sites unless there are future legislative or regulatory changes.

- **Store at a Permitted Facility –** Existing storage facilities can continue to store elemental mercury at their RCRA-permitted facility or generators can transport their mercury from onsite storage to a permitted, commercial storage facility. MEBA provides that storage of elemental mercury at a RCRA-permitted facility is not subject to time constraints.

- **Transport for Treatment and Disposal in Canada –** Generators can opt to transport their mercury to a permitted treatment facility as a precursor to sending the mercury compound to Canada for disposal (e.g., Bethlehem Apparatus, Stablex).[12] Historically, generators have not used this option on a large scale. Considering that the costs to generators for this option would not be reimbursed by DOE, implementation of this option on a large scale is not likely and would be driven by economic considerations by the generators.

In addition to the commercially generated mercury addressed in this SEIS-II, under the No-Action Alternative, the approximately 1,200 MT (1,330 tons) of DOE mercury currently stored at Y-12

[11] Under the Chemical Safety Act of 2016, ore processors may store mercury in non-permitted facilities with no time constraints and RCRA-permitted facilities beyond their normal 365-day limit.

[12] Bethlehem Apparatus is an example of a RCRA-permitted facility that currently treats mercury for eventual disposal in Canada. Stablex is a US Ecology company in Canada that accepts mercury compounds for land disposal. See Sections 2.1.1 and 2.6 of this SEIS-II for a discussion of treatment and land disposal in the United States.

would continue to be managed and stored in this location. No new construction would be required. Continued storage at Y-12 would have potential operational impacts since these facilities would not be available for other, planned uses including storage of mission-related materials. If the unavailability of the current storage facility at Y-12 were to result in new construction for other programs, that new construction would require NEPA review by NNSA at Oak Ridge.

The following sections qualitatively discuss the potential impacts associated with the various options that generators could take under the No-Action Alternative and provide a semi-quantitative assessment of the potential impacts of continued mercury storage at Y-12.

4.2.1 Land Use and Ownership, and Visual Resources

Potential continued onsite storage at ore-processor facilities has the potential to cause the generators to consider construction of additional storage facilities. Should any new construction be considered, generators would be expected to follow state regulatory requirements during the siting and construction of storage facilities. Therefore, construction of new storage facilities under the No-Action Alternative likely would result in environmental impacts similar to those identified in DOE's analyses of new facility construction in the 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS. As discussed in Section 4.2, there is significant uncertainty as to the specific actions the generators would take under the No-Action Alternative; therefore, DOE acknowledges that there could be land use impacts, but a specific evaluation of those impacts would be speculative.

As indicated in Section 4.2.1 of the 2011 Mercury Storage EIS, non-DOE storage facilities may be constructed, and some non-DOE storage sites may need to modify their storage capacity, resulting in land disturbance and related visual impacts. Construction of RCRA-compliant hazardous waste storage facilities could trigger additional land use and zoning requirements at existing sites, depending on what would be allowable under local land use plans and zoning ordinances. As discussed above, any analysis of impacts on land use and ownership and visual resources at non-DOE storage sites would be speculative at this time since specific locations would not be known.

If a generator opted to transport mercury for treatment and ultimate disposal in Canada, that action would not result in any land use or ownership impacts at the generator site. Additionally, because the treatment facility and disposal facility are already permitted for such activities, this option would not result in any change to existing land uses or ownership.

Land use at Y-12 remains industrial as stated in the 2011 Mercury Storage EIS. However, as described in Section 3.10.1 of this SEIS-II, on December 19, 2014, Federal legislation created the Manhattan Project National Historical Park, managed by the National Park Service. One of the park's visitor centers is at Y-12; however, the park would be unaffected by continued storage of mercury at Y-12. Under the No-Action Alternative, existing mercury storage at Y-12 would remain the same. There would be no changes or impacts to land use or ownership, or visual resources.

4.2.2 Geology, Soils, and Geologic Hazards

Potential continued onsite storage at ore-processor facilities in existing facilities would have no impacts to geology and soils; however, this continued storage has the potential to cause the generators to consider construction of additional storage facilities.

For new construction at generator facilities or storage at non-DOE sites, it is assumed that such storage facilities would be compliant with modern building codes that specify criteria for seismic design in accordance with the assessed hazard for the affected locality. At some locations, construction of new storage space, such as a typical single-story warehouse structure on a concrete foundation, would have negligible-to-minor incremental impacts on geology and soils and geologic resource demands. Mercury storage space constructed to be compliant with RCRA permit requirements or existing, commercial RCRA-permitted facilities where excess elemental mercury could be sent would have to meet applicable location, design, construction, and performance standards under 40 CFR Part 264 to safeguard the stored material from release, including threats from natural hazards such as earthquakes.

If a generator opted to transport mercury for treatment and ultimate disposal in Canada, that action would not result in any impacts to geology and soils at the generator site. Because the treatment facility and disposal facility are already permitted for such activities and would not require new construction, this option would not result in any impacts to geology and soils.

Continued mercury storage at Y-12 would have no impact on geologic or soil resources, including erosion and slope and drainage characteristics, as there would be no new construction. Y-12 would follow standard best management practices for necessary maintenance and management of soils and the engineered landscape at the site.

The Y-12 site is located in the fairly active East Tennessee Seismic Zone, although the zone has not recorded historical earthquakes with magnitudes greater than 5, and the nearest capable faults are located approximately 300 miles west. As reported in Section 3.10.2 of this SEIS-II, the calculated PGA for Y-12 is approximately 0.34 *g*. While ground motion in this range could cause considerable damage to ordinary structures, damage to properly designed and constructed facilities such as Y-12 is not expected. DOE applies the seismic engineering provisions from the latest building codes as the minimum standard for the design, construction, and upgrade of its facilities. In addition, mercury storage locations within the facility include robust storage containers and spill containment features to minimize impacts if an earthquake were to result in a spill. Facility accidents from earthquakes are discussed in Section 4.2.9.

4.2.3 Water Resources

Potential continued onsite storage at ore-processor locations in existing facilities would be unlikely to increase potential impacts to local water resources or to require an increase in water use; however, this continued storage has the potential to cause the generators to consider construction of additional storage facilities.

If new construction were required at an ore-processor facility or non-DOE storage sites, new facility construction would expose soils and sediments to possible erosion by heavy rainfall or by wind and could convey other pollutants in stormwater runoff. Nevertheless, appropriate soil erosion and sediment control measures and spill prevention and waste management practices would serve to minimize suspended sediment, the transport of other deleterious materials, and potential water quality impacts. It is assumed that all construction would be conducted in accordance with applicable State- or EPA-issued NPDES general permits for stormwater discharges associated with construction activities. Specific impacts would be dependent on the local characteristics of the site of the new construction.

Potential impacts on water resources would be limited to the potential for spills and other unforeseen releases that might occur during mercury storage and/or during shipment, such as for transport to a RCRA-permitted storage or treatment facility. DOE assumes that non-DOE storage facility operators would adhere to their established procedures and safeguards for proper management and handling of elemental mercury, facility maintenance, and spill prevention and response.

If a generator opted to transport mercury for treatment and ultimate disposal in Canada, that action would not result in any impacts to water resources at the generator site. Because the treatment facility and disposal facility are already permitted for such activities and would not require new construction, this option would not result in any impacts to water resources. The potential impacts of transportation of mercury and the potential risks to waterbodies and ecological receptors would be similar to that described for the Proposed Action in Sections 4.2.9 and 4.2.10 of this SEIS-II.

At Y-12 no change in operation of the mercury storage building is expected under the No-Action Alternative. Mercury would remain stored in an existing warehouse with epoxy-sealed and curbed floors to prevent any spills from migrating outdoors. Appropriate best management practices for material storage and handling, including inspections of mercury storage locations (including the adequacy of epoxy sealant) and mercury vapor monitoring, would continue. All activities would be conducted in accordance with applicable DOE policies and procedures that address spill prevention, response, and cleanup. DOE maintains a stormwater pollution prevention plan for Y-12 to minimize the discharge of pollutants in stormwater runoff (DOE 2011, Section 4.2.3).

4.2.4 Air Quality, Meteorology, and Noise

Potential continued onsite storage at ore-processor locations in existing facilities would be unlikely to increase potential impacts to air quality or noise; however, this continued storage has the potential to cause the generators to consider construction of additional storage facilities.

If new construction were required at an ore-processor facility or non-DOE storage sites, the construction activities could result in short-term increases in emissions of criteria pollutants and GHGs from construction equipment. Also, additional short-term air quality impacts would result from truck shipments of elemental mercury between storage facilities. The existing primary sources of criteria air pollutants at any existing storage sites could include heating systems, boilers, and material-handling equipment such as forklifts.

If a generator opted to transport mercury for treatment and ultimate disposal in Canada, that action would not result in any impacts to air quality or noise at the generator site. Because the treatment facility and disposal facility are already permitted for such activities and would not require new construction, this option would not result in any additional air quality or noise impacts at those facilities. There would be additional air quality impacts associated with the vehicle emissions from transportation to the treatment facility and disposal facility, and those air quality impacts would be similar to the minor impacts identified for transportation activities under the Proposed Action.

No impact on air quality is expected from continued mercury storage at Y-12. There would be no associated transportation and minimal-to-no handling of storage flasks inside the storage warehouse. Ambient air concentrations of mercury have been measured downwind of the Y-12 storage warehouse since 1986 and have averaged 3.6×10^{-6} mg/m^3, which is well below EPA's chronic-inhalation-exposure reference concentration (RfC) of 3×10^{-4} (DOE 2011, Section D.4.1.2). The Y-12 storage facility would be expected to be resilient to potential increases in severe weather associated with global climate change based on its construction to DOE standards.

Potential new construction of additional storage space at non-DOE storage sites could result in short-term increases of noise immediately adjacent to the construction site. Most activities related to storage, such as inspections, would be performed inside the new or existing storage facilities and would result in negligible or no noise impacts on nearby noise-sensitive areas. Regular maintenance of the storage facilities is expected to continue and is not expected to result in any offsite noise impacts. At non-DOE storage facilities, activities associated with readying elemental mercury for shipment, such as for transport to a RCRA-permitted storage or treatment facility, could result in short-term increases in offsite noise, including noise associated with increased truck traffic. No increase in noise would be expected at Y-12.

4.2.5 Ecological Resources

Potential continued onsite storage at ore-processor locations in existing facilities would have no impacts to ecological resources; however, this continued storage has the potential to cause the generators to consider construction of additional storage facilities.

If new construction were required at an ore-processor facility or non-DOE storage sites, construction activities would result in land disturbance, with the potential to disturb terrestrial resources and other ecological resources. However, these impacts likely would be minor, as the buildings would be similar in size to buildings analyzed in the 2011 Mercury Storage EIS but would be dependent on the specific location and the existence of protected species or habitat.

If a generator opted to transport mercury for treatment and ultimate disposal in Canada, that action would not result in any impacts to ecological resources either at the generator site, treatment facility, or disposal facility. The potential ecological risks from transportation for this option would be similar to those identified for the Proposed Action.

Since publication of the 2011 Mercury Storage EIS and as discussed in Section 3.10.5 of this SEIS-II, biologists have documented three species of bats federally listed as either threatened or endangered on the greater ORR. However, continued storage of the 1,200 MT of mercury at Y-12 would not include any activity that could potentially affect these three species. No impacts to any other ecological resource on Y-12 would occur because mercury storage would continue in the existing warehouse within an industrial area where the species are not likely to occur.

4.2.6 Cultural and Paleontological Resources

Potential continued onsite storage at ore-processor locations in existing facilities would have no impacts to cultural and paleontological resources; however, this continued storage has the potential to cause the generators to consider construction of additional storage facilities.

If new construction were required at an ore-processor facility or non-DOE storage sites, there would be a potential for impacts to cultural or paleontological resources; however, these potential impacts would be dependent on the existence of these resources at the specific site.

If a generator opted to transport mercury for treatment and ultimate disposal in Canada, that action would not result in any impacts to cultural or paleontological resources either at the generator site, treatment facility, or disposal facility.

Because the No-Action Alternative would not involve new construction or surface disturbance at Y-12, no impacts to cultural or paleontological resources would occur from continued mercury storage at the Y-12 complex.

4.2.7 Site Infrastructure

Potential continued onsite storage at ore-processor locations in existing facilities would have no impacts to site infrastructure beyond continued reduction of existing storage space within these operating facilities. This continued storage has the potential to cause the generators to consider construction of additional storage facilities.

If new construction were required at an ore-processor facility or non-DOE storage sites, additional increases in utility resource consumption could be required. However, utility demands for warehouse operations, including lighting and ventilation, are not particularly resource intensive. These facilities could also require additional onsite roads to connect storage and operating facilities.

If a generator opted to transport mercury for treatment and ultimate disposal in Canada, that action would not result in any impacts to site infrastructure either at the generator site, treatment facility, or disposal facility. The generator site would regain previously used storage space and potentially reduce utility consumption while the treatment and disposal facilities would be managing mercury treatment and disposal within their expected permit conditions and expected operating parameters.

Under the No-Action Alternative, there would be no change in utility infrastructure demands associated with continued storage of elemental mercury at Y-12. Operation of the storage warehouse is expected to continue to require up to about 0.2 megawatt-hours of electricity and 261 gallons of water annually, while used exclusively for storage of elemental mercury (DLA 2004, page 4-28). Since 2011, DOE has installed new potable water lines at Y-12 (NNSA 2018).

4.2.8 Waste Management

Potential continued storage at ore-processor locations has the potential to cause the generators to consider construction of additional storage facilities to manage the additional accumulation or to ship the accumulated mercury to a commercial, permitted storage facility. Any increase of mercury-contaminated wastes at ore-processor facilities would be managed in accordance with the facilities' RCRA permits.

Mercury storage operations at non-DOE storage sites and at Y-12 under the No-Action Alternative would generate small volumes of mercury-contaminated waste. The waste would primarily consist of cleaning rags used during facility maintenance activities, PPE, and any materials used to remediate unplanned events such as material spills. Existing site waste management practices are assumed to continue at all non-DOE sites, with mercury-contaminated wastes shipped off site to a commercial waste management company.

In the event that mercury is shipped to a permitted treatment facility for treatment prior to being shipped to Canada for disposal, such treatment would be performed in accordance with the RCRA permit for treatment and would be unlikely to result in environmental impacts beyond those evaluated as part of the permitting process by the state regulator. Disposal in Canada would require that the waste meet the waste acceptance criteria for the permitted disposal facility.

It is estimated that 109, 55-gallon (208-liter) drums of mercury-contaminated waste would be generated based on a 40-year period of analysis of continued mercury storage at Y-12 (DOE 2011, Section 4.2.8). This volume (equivalent to three 55-gallon drums annually) is significantly less than the total amount of routine hazardous waste generated each year at Y-12 (DOE 2011, Section 3.9.8). Hazardous waste generated during routine Y-12 operations is shipped off site for treatment and disposal at RCRA-permitted commercial facilities.

4.2.9 Occupational and Public Health and Safety

There are three primary safety-related risks of the No-Action Alternative:

- Risks associated with the operation of non-DOE storage facilities. These risks are very hard to describe quantitatively because to do so would be speculative based on the available data. Storage of mercury at non-DOE commercial storage facilities would be expected to be performed in accordance with the RCRA permit for the facility; therefore, risk, while not quantifiable, would not be expected to be high. Continued long-term storage at ore-processor sites would be of slightly higher concern because these sites have not necessarily been permitted for long-term storage. However, states may identify additional requirements to minimize potential risks in the face of DOE's lack of action. The accident risks associated with continued storage at ore-processor facilities, which would be based on potential consequences associated with scenarios involving mercury containers (e.g., drops of flasks, pallets, or 1-MT containers, or earthquakes), would be expected to be similar to those identified for the Proposed Action.

- Risks associated with transportation of the mercury to a permitted treatment facility in the United States for conversion to a mercury compound suitable for disposal in Canada. It would be speculative to determine what percentage of mercury generators would choose to ship their mercury to a treatment facility and ultimately pay for disposal in Canada. Although DOE expects that this percentage would be very low based on past usage of this option. The relative risks of the transportation actions would be similar (i.e., negligible to low) to those risks identified in this SEIS-II for the transportation of elemental mercury to a DOE-designated facility. Additionally, if a generator chose this option, the treatment would be performed in a RCRA-permitted facility; the potential environmental impacts would have been considered during the state permitting of the facility.

- Risks associated with the storage of mercury at Y-12. These risks can be analyzed and characterized to the same level of detail as those for the alternative sites evaluated in this SEIS-II.

Before discussing the human health risks associated with specific alternative sites, the analysis describes assumptions, background data, and methods of analysis common to all alternative sites evaluated in this SEIS-II (Section 4.2.9.1). This is applicable to the evaluation of potential impacts associated with the No-Action Alternative and the management and storage of mercury at the specific alternative sites. Section 4.2.9.2 then discusses normal operations risks, followed by facility accident risks (Section 4.2.9.3), transportation risks (Section 4.2.9.4), and intentional destructive acts (Section 4.2.9.5). In addition, there are a few site-specific considerations for occupational and public health and safety that are discussed in the appropriate subsections.

4.2.9.1 Conditions Common to All Alternatives

This section contains a human health assessment that applies to the No-Action Alternative, all alternative sites, and transportation routes evaluated in this SEIS-II. The risk assessment is essentially the same as the human health assessment conducted for the 2011 Mercury Storage EIS and has been updated as appropriate.

Appendix D of the 2011 Mercury Storage EIS contains a detailed description of the analyses that were performed to assess the human health risks to workers and members of the public. Much of this information has been summarized in Appendix B to this SEIS-II and updated for the specific alternative site analyzed. Many of the analytical considerations and results are the same under each alternative site. Therefore, the reader is frequently referred to these appendices to avoid excessive repetition.

This SEIS-II considers three forms of mercury: (a) elemental mercury, which is the form in which mercury would be stored and transported; (b) inorganic/divalent mercury,[13] which is the form into which elemental mercury can be converted if it is involved in a fire;[14] and (c) methylmercury, which can potentially be formed if elemental mercury or inorganic mercury becomes mixed with soil or sediment or in an aquatic system by the microbes that are present. The EPA's Mercury Study Report to Congress (EPA 1997b, 1997c, 1997d) provides exhaustive descriptions of the

[13] Mercury can exist in three oxidation states (EPA 1997a): elemental (Hg^0), mercurous (Hg_2^{2+}), and mercuric (Hg^{2+}). Mercurous compounds are unstable in the environment. In this SEIS-II, Hg^{2+} is referred to interchangeably as "inorganic" or "divalent" mercury; both terms are shorthand for inorganic mercury compounds. See DOE 2011, Appendix D, Section D.1.1.2, for further discussion.

[14] The potential formation of divalent mercury in a fire is extremely important for the assessment of risk in this SEIS-II. Elemental mercury (i.e., the form in which the mercury would be stored) has a very small dry deposition velocity and is only slightly affected by precipitation scavenging (i.e., washout by rain or snow). However, divalent mercury has a significant dry deposition velocity and is quite effectively removed by precipitation. Therefore, the only scenarios in this SEIS-II that lead to deposition on the ground from a vapor cloud are the fire scenarios. See Appendix B, Section B.4, and DOE 2011, Appendix D, Section D.7.3.3, for further discussion.

potential effects of these forms of mercury on humans. DOE (2011, Appendix D, Sections D.3.1–D.3.3) provides a summary of that information; a condensed version is presented briefly below.

> The principal route of exposure to elemental mercury is by inhalation. Once absorbed through the lungs, it is readily distributed throughout the body and causes a range of adverse neurological effects at low exposure levels, such as (a) tremors; (b) emotional liability; (c) insomnia; (d) muscle weakness, twitching, and atrophy; (e) headaches; and (f) impairment of cognitive function. Elemental mercury may also result in adverse renal effects and pulmonary dysfunction.
>
> In contrast to elemental mercury, ingestion of inorganic mercury salts with subsequent absorption through the gastrointestinal tract is an important route of exposure. Adverse effects of exposure to inorganic mercury include kidney disease, peripheral and motor neurotoxicity, and renal impairment.
>
> Methylmercury is a highly toxic substance that is readily absorbed through the gastrointestinal tract. As is well known, the principal concern is ingestion of methylmercury in fish. Once in the body, it readily passes into the adult and fetal brain, where it accumulates and is subsequently converted to inorganic mercury. Consequently, the nervous system is considered to be the critical target organ system for methylmercury toxicity. The nervous system of developing organisms is considered of special concern.

Human Receptors

The purpose of the human health analysis in this SEIS-II is to assess the risk of exposure of various human receptors to levels of mercury in its various forms that could cause health effects, as described in the foregoing paragraphs. Three human receptors are considered:

- Involved workers – those inside the storage building or working on unloading mercury trucks, re-containerizing mercury, or participating in spill response;
- Noninvolved workers – those nearby but still on site; and
- Members of the public/public receptors.

Assessment of Risk

Risk under any specific accident scenario is generally expressed as a function of two quantities: the predicted frequency of occurrence of the scenario and the predicted severity of the consequences. This analysis used the matrix shown in Figure 4-1 to assess the magnitude of the risk.

The discussion of the frequencies (*f*) of the scenarios that were considered for this risk assessment is provided in Appendix B, Sections A.3 and A.4. The predicted frequencies are then assigned to one of four bands:

- Frequency Level (FL)-IV (high) – more than or equal to once in 100 years ($f \geq 10^{-2}$ per year)

- FL-III (moderate) – less than once in 100 years to once in 10,000 years (10^{-2} per year > $f \geq 10^{-4}$ per year)
- FL-II (low) – less than once in 10,000 years to once in 1 million years (10^{-4} per year > $f \geq 10^{-6}$ per year)
- FL-I (negligible) – less than once in 1 million years ($f < 10^{-6}$ per year)

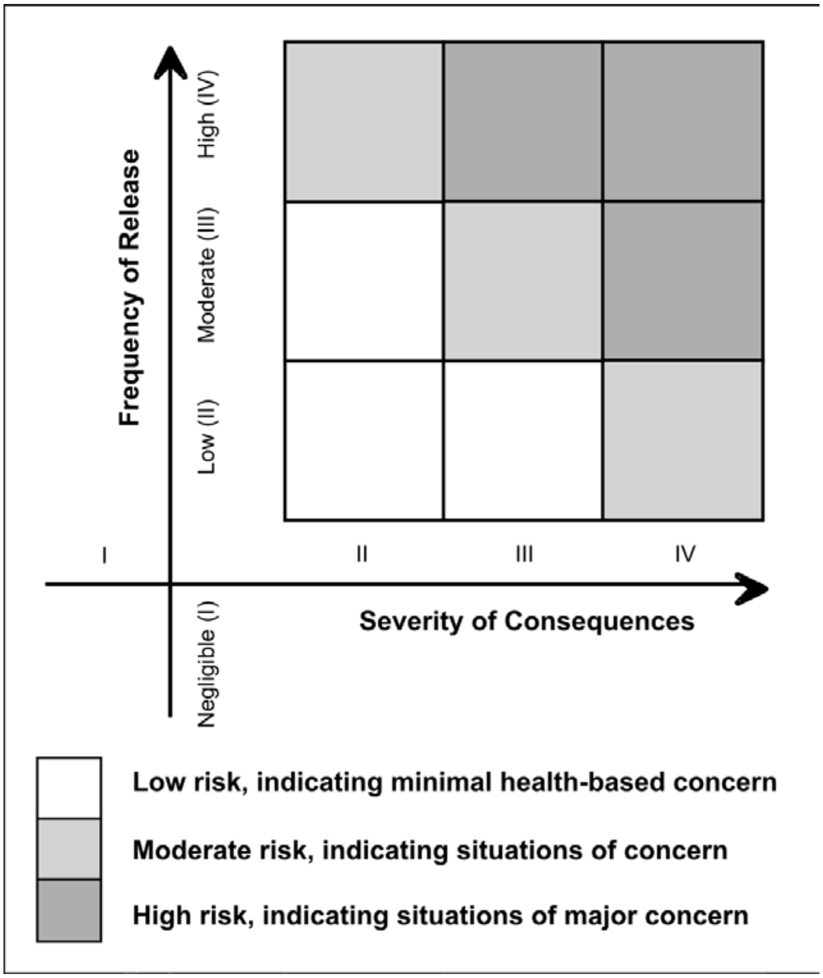

Figure 4-1 Risk (Frequency and Consequence) Ranking Matrix

The definition and derivation of SLs I through IV for human receptors are described in Appendix B, Section B.5.1. It is necessary to assign these levels for several cases: (a) acute-inhalation exposures to the public, (b) acute-inhalation exposures to workers, (c) chronic-inhalation exposures to the public and workers, (d) exposures to mercury deposited on the ground, and (e) consumption of methylmercury in fish. The SLs are related to EPA's Acute Exposure Guideline Levels (AEGLs), the American Conference of Governmental Industrial Hygienists (ACGIH) threshold limit values (TLVs), and DOE's Protective Action Criteria (PACs) as summarized in Table 4-1.

Table 4-1 Definition of Consequence Severity Bands for Acute Inhalation of Elemental Mercury and Inorganic Mercury – Public Receptors[a]

Acute-Inhalation Consequence Severity Level	Corresponding Airborne Concentrations of Elemental Mercury	Expected Health Effects
Inhalation SL-IV	≥ AEGL-3 (see Table 4-2)	Potential for lethality as concentration increases above AEGL-3
Inhalation SL-III	< AEGL-3 and ≥ AEGL-2 (see Table 4-2)	Potential for severe, sublethal, irreversible health effects
Inhalation SL-II	< AEGL-2 and (a) ≥ PAC-1b (t_d ≤ 1 hour) (b) ≥ ACGIH TLV 8-hour TWA (t_d > 1 hour)	Potential for transient health effects, reversible on cessation of exposure
Inhalation SL-I	(a) < PAC-1 (t_d ≤ 1 hour) (b) < ACGIH TLV 8-hour TWA (t_d > 1 hour)	Negligible-to-very-low consequences

≥ =greater than or equal to; <=less than; ACGIH=American Conference of Governmental Industrial Hygienists; AEGL=Acute Exposure Guideline Level; mg/m3=milligrams per cubic meter; PAC=Protective Action Criterion; t_d=duration of exposure; TLV=threshold limit value; TWA=time-weighted average

a Exposure period up to 8 hours.

b PAC-1=0.15 mg/m3 (DOE 2012); ACGIH-0=0.025 mg/m3 (OSHA 2019)

Source: DOE 2013, Table D-5

As described below, there are three AEGLs. They represent threshold exposure limits for the general public and are applicable to emergency exposure periods ranging from 10 minutes to 8 hours. It is believed that the recommended exposure levels protect the general population, including infants and children and other individuals who may be susceptible. However, although the AEGL values represent threshold levels for the general public, it is recognized that individuals subject to unique or idiosyncratic responses could experience the effects described at concentrations below the corresponding AEGL. The EPA has defined the three AEGLs as follows (EPA 2010):

> **AEGL-1** is the airborne concentration above which it is predicted that the general population, including susceptible individuals, could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects are not disabling and are transient and reversible upon cessation of exposure.
>
> **AEGL-2** is the airborne concentration above which it is predicted that the general population, including susceptible individuals, could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
>
> **AEGL-3** is the airborne concentration above which it is predicted that the general population, including susceptible individuals, could experience life-threatening health effects or death.

Airborne concentrations below AEGL-1 represent exposure levels that can produce mild and progressively increasing but transient and nondisabling odor, taste, and sensory irritation or certain asymptomatic, nonsensory effects. EPA's interim AEGLs[15] for elemental mercury are shown in Table 4-2.

Table 4-2 Interim EPA Values for Mercury Vapor AEGLs

Exposure	10 minutes	30 minutes	60 minutes	4 hours	8 hours
Guideline					
AEGL-1[a]	NR	NR	NR	NR	NR
AEGL-2	3.1 mg/m^3	2.1 mg/m^3	1.7 mg/m^3	0.67 mg/m^3	0.33 mg/m^3
AEGL-3	16 mg/m^3	11 mg/m^3	8.9 mg/m^3	2.2 mg/m^3	2.2 mg/m^3

AEGL=Acute Exposure Guideline Level; EPA=U.S. Environmental Protection Agency; mg/m^3=milligrams per cubic meter; NR=not recommended

a Table 4-1 uses PAC-1 and the ACGIH TLV for 8-hour time-weighted average as a surrogate AEGL-1. The reasons for doing so are described in Appendix B, Section B.2, of the 2013 Mercury Storage SEIS. In short, EPA has not published values for the AEGL-1 for elemental mercury.

Note: Reported values are in milligrams per cubic meter, not parts per million. AEGLs for durations of exposure other than those explicitly listed in this table are obtained by linear interpolation.

Source: EPA 2010

Additional details concerning the derivation of the SLs and factors that strongly influence the risks associated with exposure to mercury are in the 2011 Mercury Storage EIS (DOE 2011, Section 4.2.9.1 and Appendix D).

Normal Operations

Normal operations are discussed in Appendix B, Section B.6.1. The considerations are common to all of the alternative sites evaluated in this SEIS-II and to the No-Action Alternative. As noted above, consequences to the involved worker are predicted to be negligible (SL-I) because involved workers would not be exposed to airborne concentrations of mercury vapor above the ACGIH's 8-hour TWA/TLV of 0.025 milligram per cubic meter of mercury vapor due to an assumed combination of ventilation, inspection, monitoring, and use of PPE. The design, installation, and operation of the ventilation system would be in accordance with the applicable OSHA and NFPA standards, as well as appropriate guidance of the American Society of Heating, Refrigerating, and Air-Conditioning Engineers (ASHRAE). Therefore, the risks to involved workers would be negligible.

For people outside the building during normal operations (noninvolved workers and members of the public), a chronic, long-term release is bounded by consideration of a full spill tray under a pallet of 3-L flasks that remains undetected indefinitely (a highly conservative assumption given the expected inspection and monitoring activities within the storage building). The steady-state release from this source of mercury vapor is assumed to leak from the building and to be mixed into its turbulent building wake.[16] Appendix B, Table B-9, shows that, conservatively, the

[15] From EPA's website (https://www.epa.gov/aegl/access-acute-exposure-guideline-levels-aegls-values), "Interim AEGLs are established following review and consideration by the National Advisory Committee for AEGLs of public comments on Proposed AEGLs. Interim AEGLs are available for use by organizations while awaiting National Research Council, National Academy of Sciences peer review and publication of Final AEGLs. Changes to Interim values and Technical Support Documents may occur prior to publication of Final AEGL values."

[16] *Building wake* refers to a volume of air downwind of a building that typically has increased turbulence caused by the displacement of the air as it passes by and over the building

predicted long-term average concentration in the building wake for any of the eight alternative storage sites and Y-12 is in the range from 3.5×10^{-5} milligram per cubic meter (WCS) to 2.0×10^{-4} milligram per cubic meter (HWAD and Clean Harbors Pecatonica). These values are below EPA's RfC of 3.0×10^{-4} milligram per cubic meter, that is, below which long-term concentrations are considered to be negligible (DOE 2011, Section D.4.1.2). Hence, consequences would be in the SL-I range, and the risk to both noninvolved workers and members of the public would be negligible.

Facility Accidents

Appendix B, Section B.4, contains considerations of the likelihood of occurrence of alternative facility (onsite) accident scenarios initiated by failures of engineered systems, human errors, and external events based on the analysis presented in the 2011 Mercury Storage EIS (DOE 2011, Appendix D, Section D.2.4). Table 4-3 summarizes the results of this analysis. These results are the same for all potential storage sites and do not provide a means of discriminating among the alternatives. They are slightly different under the No-Action Alternative, which is discussed further below.

Table 4-4 lists the accident scenarios that could result in an onsite spill of elemental mercury. These accident scenarios are the same for all alternative sites evaluated in this SEIS-II and are slightly different under the No-Action Alternative.

Table 4-3 Summary of Onsite and Offsite Accident Scenarios and Their Estimated Frequency

Hazard	Activity	Postulated Scenario	Frequency of Release[a]	Comments[a]
Toxic	Onsite storage	Slow leak/release of liquid mercury	High (FL-IV)	Requires undetected failure of multiple containers.
Kinetic	Onsite material handling	Single flask dropped during handling, resulting in breach	Moderate (FL-III)	Consolidation of partially filled pallets could lead to a relatively large number of handling events per year. Could only occur inside building.
Kinetic	Onsite material handling	Single pallet dropped during transfer to storage racks, resulting in breach	Moderate (FL-III)	Assumes pallet dropped from 12 feet and all 49 flasks breached. Conservatively assumed that it could occur outside the building as well as inside.
Kinetic	Onsite material handling	Triple-pallet collapse	Moderate (FL-III)	Requires failure of storage rack. DOE (2011) conservatively assumed triple stacking was utilized in the building. Proposed facilities in this SEIS-II only utilize single or double stacking. Could only occur inside building.
Kinetic	Onsite material handling	Single 1-MT container drop	Moderate (FL-III)	Could occur inside or outside building. Assumes container dropped from a height of less than 5 feet.

Hazard	Activity	Postulated Scenario	Frequency of Release[a]	Comments[a]
Earthquake	All activities	Earthquake causes building damage and pallets and/or flasks to fall and spill	Moderate[b] (FL-III)	Requires an earthquake and failure of flasks or 1-MT containers. Two alternatives considered: building remains recognizably intact or building collapses completely.
Surface transportation	Offsite transport	Truck crash during transportation of mercury; fire breaks out	Moderate (FL-III)	Impact breaches flasks or 1-MT containers; spill and fire occur after crash.
Surface transportation	Offsite transport	Truck crashes during transportation of mercury; fire breaks out in wet weather	Low (FL-II)	Impact breaches flasks or 1-MT containers; spill and fire occur after crash.
Surface transportation	Offsite transport	Truck crashes and mercury spills (no fire)	Moderate (FL-III)	Impact breaches flasks or 1-MT containers; subsequently evaporates.
Surface transportation	Offsite transport	Truck crashes with mechanically induced fatality	Moderate (FL-III)	Impact causes fatality.
Intentional destructive act	Transport	Full gasoline tanker driven into truck; fire breakout.	Not Assessed	Gasoline fire causes release of mercury.

FL=frequency level; MT=metric-ton

a For justification of frequency assignments and comments, see DOE (2011, Appendix D, Sections D.2.4 and D.2.5).

b No effort is made to split the moderate frequency between earthquake with building collapse and earthquake without building collapse (i.e., conservatively, the frequency of occurrence of both scenarios is moderate).

Source: DOE 2011, Appendix D, Table D-18

Table 4-4 Summary of Types of Accidents Considered in Onsite Spill Analysis

Accident Scenario	Could Occur Indoors?	Could Occur Outdoors?
Single-flask spill	Yes	No[a]
Single-pallet spill	Yes	Yes
Triple-pallet spill	Yes	No[b]
1-metric-ton container spill	Yes	Yes
Earthquake spill[c]	Yes[d]	Yes[e]

a DOE (2011) assumed that mercury flasks are transported and stored in pallets in a 7- by 7-flask configuration. Flasks may be removed from a pallet prior to transport if they are leaking or if flasks from partially filled or smaller pallets are consolidated.

b Triple-pallet collapse could only occur when the pallets are inside on the storage racks. DOE (2011) conservatively assumed triple stacking was utilized in the building. Proposed facilities in this SEIS-II only utilize single or double stacking.

c This scenario also encompasses the risk from tornadoes, high winds, and floods.

d Earthquake leaves building relatively intact.

e Beyond-design-basis earthquake causes building collapse.

Per Table 4-3 the frequencies of all scenarios in Table 4-4 are low (FL-II) or moderate (FL-III). Combining this with a consequence in the SL-I to SL-II range gives a risk in the negligible-to-low range for the involved worker in the storage building at all sites.

Under all of the scenarios in Table 4-4, both indoors and outdoors (except the beyond-design-basis earthquake with building collapse), the evaporating mercury would mix into the building wake. Appendix B, Table B-9, shows that the predicted concentrations in the wake are all in the SL-I range. Therefore, the risks to the noninvolved worker and the public from all of these scenarios would be negligible.

For the specific case of an earthquake with building collapse (beyond-design-basis earthquake), the quantity of spilled mercury is assumed to be sufficient to spread across and cover the full floor area of the building and evaporate as if in open air. The evaporation rate is therefore also dependent on the floor area of the building. In the immediate vicinity of the collapsed building, the concentration of mercury vapor would be in the SL-IV range, meaning potentially lethal concentrations could be present. The range of building wake factors and storage building floor areas for the alternative sites evaluated in this SEIS-II are within the range of wake factors and floor areas evaluated in the 2011 Mercury Storage EIS. Appendix E, Table E-2 of the 2013 Mercury Storage SEIS provides the updated maximum predicted distances to consequence SL-II, SL-III, and SL-IV concentrations of mercury vapor. For all alternatives, the distance to a SL-IV concentration was less than 100 meters. This means that potential mercury concentrations would not be as high as SL-IV at distances of 100 meters or more from the collapsed building. Predicted distances to SL-III concentrations ranged from less than 100 meters to 250 meters at HWAD. Most sites had a predicted distance near 200 meters. The predicted distance to a SL-II (low consequence) level ranged from 200 to 1,010 meters. Based on the similar physical characteristics of the existing storage buildings evaluated in this SEIS-II it is reasonable to assume that the range of distances to SL-II, SL-III, and SL-IV concentrations would be similar. To evaluate the potential consequences to an individual or public receptors, the distance to the nearest site boundary or public receptor was estimated (see Appendix B, Table B-11).

Consequences to the public would not be above SL-I for HWAD, WCS, or Clean Harbors Grassy Mountain because the nearest public receptor (public highway or residence) is more than one km away (assuming the maximum predicted distance for SL-II). Other than Bethlehem Apparatus and Clean Harbors Greenbrier, no site has public access for potential receptors (e.g., residences or businesses) within 100 meters that could potentially be exposed to a SL-IV concentration. In these scenarios, as reported in the 2011 Mercury Storage EIS, if affected individuals (workers and members of the public) were to evacuate the area immediately following the earthquake event, consequence levels likely would be in the SL-II range. Under the No-Action Alternative, unknown non-DOE sites, including continued storage at ore-processor facilities, could also have public receptors as close as 100 meters from the storage location and would therefore also be subject to potentially lethal concentrations in the event of a total building collapse in a beyond-design-basis earthquake.

As noted in Section 2.1.4 of this Mercury Storage SEIS-II, the DOE-designated facility would be RCRA-permitted. Most of the buildings evaluated in this SEIS-II already have RCRA permits that would allow the storage of the necessary volume of elemental mercury. The Proposed Action would not introduce volumes of hazardous materials or potential accident scenarios that have not previously been considered as part of the RCRA permitting process.

Transportation

In summary, the analysis of potential transportation impacts in this Mercury Storage SEIS-II determined that the FLs and SLs associated with mercury shipments to the specific alternative sites would be similar to those FLs and SLs previously identified in the 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS, which were all determined to result in negligible risks to the human and ecological receptors. Appendix D, Section D.2.7, of the 2011 EIS describes the assumptions regarding the transportation of a total of up to 10,000 MT (11,000 tons) of elemental mercury. Similar assumptions are used in the analysis of the transportation of approximately 7,000 MT (7,700 tons) of mercury to the alternative sites evaluated in this SEIS-II over the 40-year period of analysis. As reported in Appendix B, Section B.4, of this SEIS-II, the probabilities associated with a potential offsite transportation accident are based on the estimated route miles from the mercury generator or temporary storage site to the long-term storage site. As explained in Appendix B, it was assumed that a portion of the mercury inventory would be shipped to Bethlehem, Pennsylvania, for treatment prior to shipment to the storage location. This information is site-specific and therefore is different than values used in the 2011 Mercury Storage EIS. The truck route lengths were multiplied by the estimated number of truck trips required to transport mercury over the 40-year accumulation period (Chapter 2, Table 2-5) to estimate total number of truck miles to transport all mercury to a specific storage site (see Appendix B, Table B-3).[17]

As identified in Appendix B, Table B-3, the total truck shipment miles to the alternative sites evaluated in this SEIS-II range from 1,083,231 to 2,344,273 miles. These estimates are higher than mileage estimates in the 2011 EIS because they include additional miles for the potential shipment of the mercury inventory from ore processors to a treatment facility prior to storage in the DOE-designated facility. These additional shipments were not included in the 2011 analysis (see Appendix B, Section B.4). In the 2011 Mercury Storage EIS the highest probability of a truck accident with a spill (2.5×10^{-3}) was associated with the highest number of truck shipment miles of 1,251,164. The highest number of truck shipment miles in this SEIS-II is 87 percent higher. Increasing the mileage by 87 percent only increases the probability of an accident for the highest truck shipment miles to about 4.7×10^{-3}, a value that is still within a moderate frequency level (FL-III) for risk of the accident. Therefore, the increase in truck miles traveled with mercury to account for treatment prior to storage at the DOE-designated facility does not increase the frequency level of potential accidents for any of the alternative sites when compared to the 2011 analysis. Therefore, the potential risks from a transportation accident with a mercury spill remain the same as those presented in the 2011 Mercury Storage EIS.

The 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS analyzed several transportation accident scenarios:

[17] For the purpose of analyses and to be conservative, the total number of truck miles assumes that 7,000 MT of elemental mercury is shipped to each facility, even though several of the facilities do not have the capacity to store this amount. Any amount less than 7,000 MT shipped to any facility would result in impacts less than estimated in this SEIS-II.

- Crash with spill of elemental mercury onto the ground without fire
- Crash with spill of elemental mercury into water
- Crash with fire in dry weather conditions (without rain) (to analyze the effects of dry deposition)
- Crash with fire in wet weather conditions (with rain) (to analyze the effects of wet deposition)
- Crash with death caused by mechanical impact

This SEIS-II evaluates similar transportation scenarios. The estimated frequency of an accident involving a truck transporting mercury is a function of the expected cumulative miles from the point of mercury generation to the particular storage facility (including any additional transportation to provide potential pre-storage treatment) and the historical accident rate for large trucks. As discussed above, even with the additional potential transportation for pre-storage treatment, the estimated frequency ranges remain comfortably in the moderate range. Section B.4 also justifies the continued use of accident rate data (large truck accident rates per 100 million miles) from the 2011 EIS. Most of the accident scenarios have moderate (FL-III) frequencies with several low frequencies (FL-II) for the alternative sites that have fewer cumulative transportation miles. These frequencies are no more than the accident frequencies for the alternative sites analyzed in the 2011 Mercury Storage EIS, Table D-13.

The potential exposure of a human receptor to mercury from an offsite truck transportation accident is a function of the crash characteristics (with or without fire), weather conditions (dry or wet), and the probability that a human receptor would be in close enough proximity of the accident to be exposed. These factors are independent of the location or characteristics of the alternative sites. Therefore, the analysis of consequences (i.e., severity level) of offsite truck accidents conducted in 2011 and updated in 2013 is applicable to the risk assessment in this SEIS-II when combined with the site-specific accident frequencies for transportation to each site. Appendix D, Sections D.4.3–D.4.5, in the 2011 Mercury Storage EIS and updated in Appendix E, Section E.2, in the 2013 Mercury Storage SEIS provides a full description and discussion of the consequence analyses for transportation accidents. The applicability of those results combined with the estimated site-specific transportation accident frequencies for alternative sites analyzed in this SEIS-II are described in Appendix B, Section B.6.3.

The analyses of transportation accidents in the 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS evaluated impacts from the atmospheric pathway, from inorganic mercury deposited on the ground, and from consumption of mercury-contaminated fish. The results of the atmospheric analyses are provided in terms of the distances to predicted locations of acute inhalation exposures, which are summarized in Table 4-5 for the range of atmospheric stability classes and windspeeds.

For inorganic mercury deposited on the ground, the analysis predicted that the threshold for SL-II (180 milligrams per kilogram) would not be exceeded anywhere (DOE 2011, Section 4.2.9.1.5).

Table 4-5 Predicted Range of Distances Downwind to Which Acute Airborne Severity Levels are Exceeded – Crashes with Fires, All Sites

Atmospheric Stability Class/Windspeed	ACGIH TLV8-hour TWA (SL-II) (meters)	AEGL-2 (SL-III) (meters)	AEGL-3 (SL-IV) (meters)
A/1.5 m/sec	<100–3,500	<100–130	Nowhere
D/4.5 m/sec	<100–>25,000	Nowhere	Nowhere
F/1.5 m/sec	<100–>40,000[a]	500–1,200	Nowhere

ACGIH=American Conference of Governmental Industrial Hygienists; AEGL=acute exposure guideline level; TLV=threshold limit value; TWA; time-weighted average; SL=severity level

a The limit of the validity of the dispersion model is 40,000 meters (approximately 25 miles).

Note: To convert meters to feet, multiply by 3.281.

Source: DOE 2013, Appendix E, Table E-3

The 2011 Mercury Storage EIS evaluated the potential impacts associated with accumulation of methylmercury in fish as a result of an accidental truck crash and fire. The analysis considered the following pathway: (1) transportation accident with fire leads to 20-percent airborne fraction of inorganic/divalent mercury; (2) inorganic mercury deposits on the surface of waterbodies used for fishing; (3) most of the inorganic mercury enters the sediment at the bottom of the lake; (4) 15 percent of the inorganic mercury is converted to methylmercury; (5) methylmercury equilibrates between the sediment and the water column above it; and (6) fish bioaccumulate methylmercury. Details of the analytical parameters are discussed in the 2011 Mercury Storage EIS (DOE 2011, Section 4.2.9.1.5).

Table 4-6 shows the results from the 2011 Mercury Storage EIS (DOE 2011, Table 4-7) of the dispersion/bioaccumulation model; specifically, the ranges of distances downwind to which lakes could potentially be contaminated with methylmercury above levels safe for human consumption of fish caught there.

Table 4-6 Predicted Range of Distances Downwind to Which Lakes Could be Contaminated Above Levels Safe for Consumption of Fish – Accidental Truck Crashes with Fires

Type of Accident	Atmospheric Stability Class/Windspeed	Consumption of Fish		
		National Average (meters)	Subsistence Fisherman	
			Average (meters)	95th Percentile (meters)
Truck Crash with Fire, Dry Deposition	A/1.5 m/sec	Nowhere	Nowhere	500–700
	D/4.5 m/sec	Nowhere	Nowhere	Nowhere
	F/1.5 m/sec	Nowhere	Nowhere	Nowhere
Truck Crash with Fire, Wet Deposition	A/1.5 m/sec	<100	500–700	2,000–3,000
	D/4.5 m/sec	100–200	700–1,000	3,000–5,000
	F/1.5 m/sec	Nowhere	1,000-–2,000	5,000–7,000

<=less than; m/sec=meters per second

Note: To convert meters to feet, multiply by 3.281.

Source: DOE 2011, Appendix D, Section D.4.5

Intentional Destructive Acts

The analysis of intentional destructive acts applies to all sites and all transportation routes and is described in the 2011 Mercury Storage EIS, Section 4.2.9.1.6. These analyses and results are directly applicable to the sites evaluated in this SEIS-II. A wide range of intentional destructive act scenarios involving a release of mercury were postulated for the sites and transportation routes considered for mercury storage. Each involved an action by intruders or insiders that affected mercury inventories either at the storage facility or during transportation to the storage facility. The human health impacts of an intentional destructive act are directly related to the amount of mercury available for dispersion, as well as the means of dispersing it to the environment. Other factors that affect impacts include population density, distance to the population, and meteorology.

Intentional destructive act scenarios were selected based on the amount of mercury at the storage facility or in a transport vehicle. Other factors considered include the nature of the intentional destructive act event that would result in the highest dispersion of mercury to the environment. The likelihood or frequency of the intentional destructive act scenarios cannot be quantified because of the dependence on unpredictable intruder actions and security measures that the DOE or hazardous material transporters would employ. Each intentional destructive act scenario assumed multiple actions by intruders with no successful mitigation or protection measures. Conservative analytical assumptions were also imposed on the calculations. The results are presented in terms of consequences, but not annual risks because of the lack of an annual probability or frequency for these intentional destructive act events.

The accident analyses in Appendix D of the 2011 Mercury Storage EIS show that the largest airborne and ground mercury concentrations would result from scenarios in which a quantity of mercury in containers is exposed to a fire. The intentional destructive act scenario postulated that a group of individuals hijack a fully loaded 9,000-gallon gasoline tank truck, which the group then drives into either a truck or railcar loaded with mercury being carried in either 3-L flasks or 1-MT containers. Another postulated scenario would involve two groups of armed intruders: one hijacking the loaded tanker truck and the other disabling the train or truck carrying mercury.

Appendix D, Section D.2.6, of the 2011 Mercury Storage EIS describes a fire caused by an intentional destructive act. The analyses evaluated impacts from the atmospheric pathway, from inorganic mercury deposited on the ground, and from consumption of mercury-contaminated fish. The results of the atmospheric analyses are provided in terms of the distances to predicted locations of acute inhalation exposures, which are summarized in Table 4-7 for the range of atmospheric stability classes and windspeeds.

For inorganic mercury deposited on the ground, the analysis predicted that the threshold for SL-II (180 milligrams per kilogram) would not be exceeded anywhere.

Table 4-8 shows the predicted ranges of distances downwind to which waterbodies could be contaminated with methylmercury at levels that would be unsafe for human consumption of fish caught there (DOE 2011, Table 4-9).

As can be seen, lakes located up to thousands of meters (tens of miles) downwind could be contaminated to levels unacceptable for subsistence fishermen; lakes up to 10,000 meters (approximately 6 miles) downwind could be unacceptable for people who consume fish at the national average rate. However, as noted previously, it is not possible to associate risks with these predictions.

Table 4-7 Predicted Range of Distances Downwind to Which Acute Airborne Severity Levels are Exceeded – Intentional Destructive Act Fires

Atmospheric Stability Class/Windspeed	ACGIH TLV8-hour TWA (SL-II) (meters)	AEGL-2 (SL-III) (meters)	AEGL-3 (SL-IV) (meters)
A/1.5 m/sec	<100–9,000	370–780	Nowhere
D/4.5 m/sec	<100–>40,000[a]	Nowhere	Nowhere
F/1.5 m/sec	<100–>40,000[a]	100–5,700	680–870

ACGIH=American Conference of Governmental Industrial Hygienists; AEGL=acute exposure guideline level; TLV=threshold limit value; TWA; time-weighted average; SL=severity level

a The limit of the validity of the dispersion model is 40,000 meters (approximately 25 miles).

Note: To convert meters to feet, multiply by 3.281.

Table 4-8 Predicted Range of Distances Downwind to Which Lakes Could be Contaminated Above Levels Safe for Consumption of Fish – Intentional Destructive Acts

Type of Accident	Atmospheric Stability Class/Windspeed	Consumption of Fish		
		National Average (meters)	Subsistence Fisherman	
			Average (meters)	95th Percentile (meters)
Intentional destructive act fire, dry deposition	A/1.5 m/sec	Nowhere	1,000–2,000	2,000–3,000
	D/4.5 m/sec	Nowhere	Nowhere	10,000–20,000
	F/1.5 m/sec	Nowhere	Nowhere	1,000–2,000
Intentional destructive act fire, wet deposition	A/1.5 m/sec	2,000–3,000	7,000–10,000	10,000–20,000
	D/4.5 m/sec	5,000–7,000	10,000–20,000	30,000–40,000
	F/1.5 m/sec	7,000–10,000	10,000–20,000	20,000–30,000

m/sec=meters per second

Note: To convert meters to feet, multiply by 3.281

Source: DOE 2011, Appendix D

4.2.9.2 Normal Operations Risks – No-Action Alternative

The generic discussion of normal operations is provided in Section 4.2.9.1. For storage of elemental mercury in non-DOE storage facilities (including continued storage at ore processors) under the No-Action Alternative, it is assumed that normal operations would be carried out in accordance with state permitting and would comply with standards sufficient to protect involved workers, noninvolved workers, and members of the public so that their associated risks are negligible.

If a generator opted to transport mercury for treatment and ultimate disposal in Canada, that action would be unlikely to increase potential health and safety impacts from normal operations beyond those already expected at the generator site (e.g., negligible risk from potential slow leaks of containers). Additionally, the activities at the RCRA—permitted treatment facility and the disposal facility in Canada would have been evaluated during their respective permitting processes for the facilities. As long as the mercury and the mercury compounds sent to Canada met the waste acceptance criteria, treatment and disposal of the mercury under the No-Action Alternative would not be expected to increase potential health and safety impacts at those facilities beyond the impacts evaluated as part of the permitting process.

For continued storage at Y-12, the generic analysis applies and the risk there from normal operations is also predicted to be negligible.

4.2.9.3 Facility Accident Risks – No-Action Alternative

Many of the potential accident scenarios associated with the storage and movement of elemental mercury under the No-Action Alternative would be the same as for transportation to and storage at one of the alternative sites evaluated in this SEIS-II. Therefore, accidents involving the dropping of these containers, or the dropping of pallets, would be possible, both indoors and outdoors. Buildings would be vulnerable to natural phenomenon events, such as earthquakes and high winds, as well as aircraft crashes. It is not known whether all new storage buildings or buildings in which mercury is currently stored or handled are designed to the same standards as required for the alternative sites (for example, in their ability to resist earthquakes or high winds). The consequences of accidents involving severe damage to a building would depend on how much mercury is actually present in the building and on where it is located relative to nearby populations; for example, it is conceivable that the distance to the fence line could be short and that there could be houses backing up to that fence line, in which case the risks could be higher than those predicted for most of the alternative site facilities as discussed under Assessment of Risk in Section 4.2.9.1.

If a generator opted to transport mercury for treatment and ultimate disposal in Canada, that action would be unlikely to increase potential accident risks beyond those already expected at the generator site (e.g., increased handling of mercury containers could result in similar accidents as discussed above). Additionally, the activities and potential accident scenarios at the RCRA—permitted treatment facility and the disposal facility in Canada would have been evaluated during their respective permitting processes for the facilities. As long as the mercury and the mercury compounds sent to Canada meet the waste acceptance criteria, treatment and disposal of the mercury under the No-Action Alternative would not be expected to increase potential accident consequences or introduce unique accident scenarios beyond the accidents evaluated as part of the permitting process.

For continued storage at Y-12, the analysis of onsite spills is the same as for the generic analysis and leads to the same conclusions:

- For the involved and noninvolved workers, frequencies would be in the low (FL-II) or moderate (FL-III) range.
- Consequences would be in the SL-I to SL-II range.
- Risks would be in the negligible-to-low range.
- For the public, risks would be negligible.

4.2.9.4 Transportation Risks – No-Action Alternative

Under the No-Action Alternative, elemental mercury could be transported among various facilities. This could include transport to a non-DOE commercial storage facility or a permitted treatment facility. The total amount transported could be about the same as that used for analysis purposes in this SEIS-II (up to 7,000 MT), although the amount transported could be less if some storage occurs at generation locations. What is not known is how much would be transported as a full truck or as a partial load (e.g., one pallet or one 1-MT container on a truck, or fewer flasks than a full pallet), or the distances that mercury might be transported. (Section 2.4 of this SEIS-II discusses assumptions for a full truck shipment.) It would appear that the various transportation spills with fires that were analyzed for the alternative storage facilities would also be possible under the No-Action Alternative, with concomitant, but currently unquantifiable, risks to human health (see Section 4.2.9.1). However, since the generic predicted consequences of crashes with fires were performed for full trucks, the results presented in Table 4-5 likely would bound the magnitude of the consequences. Similarly, since it would be unlikely that total truck shipment miles associated with the No-Action Alternative would be greater than that analyzed for the Proposed Action, the overall transportation risk of the No-Action Alternative would be no more than that of the Proposed Action.

For transportation under the No-Action Alternative, the types of spills directly onto the ground or into waterbodies likely would be similar to those discussed in Section 4.2.9.1; therefore, those types of risks also would exist for transportation to new and existing non-DOE mercury storage facilities or to permitted treatment and disposal facilities.

Since there would be no transportation to or from Y-12 under the No-Action Alternative, there would be no transportation risks for that site.

4.2.9.5 Intentional Destructive Acts – No-Action Alternative

The generic discussion of intentional destructive act fires is in Section 4.2.9.1. The same types of intentional destructive act scenarios would appear to be possible for transportation of elemental mercury under the No-Action Alternative. Therefore, the analysis of intentional destructive act consequences in Section 4.2.9.1 likely would bound those for such transport. At Y-12, the mercury storage warehouse is located within a high-security area protected by the Perimeter Intrusion Detection and Assessment System, which includes a range of physical and personnel security provisions designed to protect nuclear materials at DOE sites. This would appear to make intentional destructive act directly on the storage facility highly unlikely. In addition, under the No-Action Alternative, there would be no transportation of mercury to or from Y-12; thus, no transportation intentional destructive act could occur.

4.2.10 Ecological Risk

This section contains an ecological risk assessment that applies to the No-Action Alternative, all alternative sites, and transportation routes evaluated in this SEIS-II. As mentioned in Section 4.2.9.1 for transportation risks to human receptors, the potential ecological exposure to mercury from an offsite truck transportation accident is a function of the crash characteristics (with or without fire), weather conditions (dry or wet), and the probability that a particular ecological receptor would be in close enough proximity of the accident to be exposed. These factors are independent of the location or characteristics of the alternative sites. Therefore, the analysis of consequences (i.e., severity level) of offsite truck accidents conducted in 2011 and updated in 2013 is applicable to the risk assessment in this SEIS-II when combined with the site-specific accident frequencies for transportation to each site. The ecological risk assessment is presented consistently with, and summarized from, the ecological risk assessment conducted for the 2011 Mercury Storage EIS (DOE 2011, Section D.5).

4.2.10.1 Ecological Risk – Generic Discussion

The ecological risk assessment conducted in the 2011 Mercury Storage EIS assessed the potential effects of mercury releases to representative species or communities across a range of ecosystems present at alternative mercury storage sites and along transportation routes to those sites (DOE 2011, Appendix D, Section D.5). The ecological risk assessment used the same mercury release scenarios that were modeled for the human health risk assessment. The ecological receptors chosen were representative of trophic levels within a food chain that exhibit different sensitivity to mercury present in soil, sediment, surface water, or the food that they eat (DOE 2011, Appendix D, Section D.5). The 2011 EIS evaluated the following ecological receptors:

- Sediment-dwelling biota
- Soil invertebrates
- Plants
- American robin
- River otter
- Aquatic biota
- Short-tailed shrew
- Great blue heron
- Red-tailed hawk

The concern for ecological receptors is the potential bioaccumulation of mercury through the food chain such as methylmercury that may be formed by aquatic system-dwelling microbes or biota that are then consumed by other aquatic biota, such as fish, which are subsequently eaten by an aquatic top predator such as a great blue heron or river otter.

The ecotoxicity of mercury is discussed in Appendix D, Section D.5.1, of the 2011 Mercury Storage EIS. Sections D.5.2 and D.5.3 discuss how toxicity reference values were used to establish the receptor-specific screening benchmarks for mercury in environmental media such as soil, surface water, and sediment. The toxicity reference values represent the level of mercury at which an ecological receptor would experience adverse effects. The screening benchmarks represent the necessary level of mercury in environmental media to achieve a toxicity reference value for a specific ecological receptor based on accumulation through a food chain.

As discussed in the 2011 Mercury Storage EIS (Appendix D, Section D.1.1.2), the consequences of exposure to mercury depend on the form of mercury. Mercury can exist in three oxidation states (EPA 1997b, page 2-2): elemental (Hg^0), mercurous (Hg_2^{2+}), and mercuric (Hg^{2+}). Mercurous compounds are unstable in the environment. Hg^{2+} is referred to interchangeably as “inorganic” or “divalent” mercury; both terms are shorthand for inorganic mercury compounds. See Appendix D, Section D.1.1.2, of the 2011 Mercury Storage EIS for further discussion. The potential formation of divalent mercury in a fire is important for the assessment of risk. Elemental mercury (i.e., the form in which the mercury would be stored) vapor has a very small dry deposition velocity and is only slightly affected by precipitation scavenging (i.e., washout by rain or snow). However, divalent mercury has a significant dry deposition velocity and is quite effectively removed by precipitation. Therefore, the only scenario that leads to deposition on the ground from a mercury vapor cloud is with fire. This has important implications for the assessment of ecological risk. As discussed in Appendix D, Section D.7.3.3, of the 2011 Mercury Storage EIS, deposition of airborne inorganic mercury (Hg^{2+}) is the primary mechanism of soil or water contamination and entry into ecological food chains. Three mercury release scenarios were considered for ecological risk: (1) slow leaks, accidental spills at storage sites, and spills without fires during transportation; (2) spill of mercury into waterbodies; and (3) transportation spills with fire.

Slow Leaks, Accidental Spills at Storage Sites, and Spills without Fires during Transportation

The release of mercury liquid during slow leaks during normal operations, accidental spills at mercury storage sites, and transportation spills without fire results in the volatilization into the atmosphere of elemental mercury (Hg^0) vapor. Mercury vapor is not subject to significant atmospheric deposition, and the primary pathway to ecological receptors would be inhalation. The inhalation exposure route is insignificant relative to the major exposure pathway of ingestion for ecological receptors (DOE 2011, Appendix D, Section D.5.4.1). Therefore, it was concluded that given the dispersion of mercury upon leaving a storage facility or truck spill, the risk to ecological receptors from slow leaks, accidental spills at storage sites, and spills without fire during transportation (other than spills directly into a waterbody) are considered to be negligible at all alternative sites analyzed in this SEIS-II and along all transportation routes.

Spill of Mercury into Waterbodies

This scenario is a special case of a transportation spill without fire where the mercury is spilled directly into a body of water, such as a lake or river. As explained in Appendix D, Section D.2.8, of the 2011 Mercury Storage EIS, this could conceivably occur if a truck crashes on a bridge over water or if the transportation route is immediately adjacent to a river or lake. As stated in the 2011 Mercury Storage EIS, it is difficult to estimate the potential frequency of such crashes and it would vary by route based on the number and length of bridges and proportion of the route that is immediately adjacent to a waterbody. Because bridges would likely comprise a small percentage of each route, the frequency of crashes on bridges is likely to be in the low-to-negligible (FL-II to FL-I) range (DOE 2011, Appendix D, Section D.2.8). Even though Interstate routes occasionally follow rivers, in many cases accidents would not occur in the river because the route is near but not immediately adjacent to the river. The frequency of such accidents would certainly be less than the overall frequency of crashes with spills because waterbodies would be adjacent to the route for a small proportion of the route. The severity of the consequences of a mercury spill in a waterbody depends on how much and how fast the elemental mercury is converted into inorganic or methylmercury. The 2011 Mercury Storage EIS made the following conclusions regarding the consequences of a mercury spill in a waterbody (for additional background, see DOE (2011, Appendix D, Section D.5.4.2):

- The available understanding of the behavior of elemental mercury spilled into a river or other waterbody is subject to great uncertainty so that an estimate of the consequences to ecological receptors is not possible.
- Should such a spillage occur, the processes that convert elemental mercury into forms that are potentially hazardous to ecological receptors (inorganic compounds of mercury and methylmercury) are slow and would generally allow ample time for cleanup.
- If the spillage occurs onto the banks of a river or waterbody, but not directly into it, conversion to methylmercury and/or transport to the waterbody would be slow, again allowing ample time for cleanup.

The same reasoning was used in the 2013 Mercury Storage SEIS regarding potential spills of mercury into waterbodies. The conclusion was that given the slow conversion of elemental mercury and sufficient time for cleanup, consequences to ecological receptors would likely be in the negligible-to-low range. However, both the 2011 and 2013 NEPA analyses noted that in the case of a fast-flowing river, sufficient cleanup time might not be available and would be of concern. Because the transportation routes in this SEIS-II are similar to those evaluated in 2011 and 2013 (i.e., length and crossing similar regions of the United States), a similar conclusion is appropriate for transportation to the alternative sites evaluated in this SEIS-II. Further, the probability of an accident with a spill into a waterbody compared to the 2011 or 2013 analyses is likely lower because approximately 30-percent less mercury would be transported (7,000 vs. 10,000 MT).

Transportation Spills with Fires

In a transportation mercury spill with a fire, some elemental mercury would be converted into inorganic or divalent mercury, which is more prone to dry or wet deposition than elemental mercury vapor. For ecological receptors, ingestion is the primary exposure pathway. A transportation spill with ensuing fire is the primary scenario in which deposition to the ground, wetland sediment, or waterbody of inorganic mercury would occur and make mercury (inorganic or methylmercury) available for ingestion by ecological receptors. The 2011 Mercury Storage EIS conservatively estimated that 20 percent of the elemental mercury in a truck crash with fire would be converted to inorganic mercury (DOE 2011, Appendix D; Section D.7.3.3).

The transportation routes in this SEIS-II, like those evaluated in the 2011 Mercury Storage EIS, are independent of the characteristics of the facilities at each alternative site. The ecological risk analysis conducted for truck crashes with fire in 2011, and also used in the 2013 Mercury Storage SEIS, are applicable to transportation accidents with fire for all alternative sites in this SEIS-II. The details of the 2011 analysis are described in Appendix D, Section D.5.4.3, of the 2011 Mercury Storage EIS. The analysis considered both dry and wet (i.e., raining at the time of the crash) deposition, atmospheric stability class, and windspeed. The results of the 2011 ecological risk analysis are summarized and presented in Tables 4-9–4-12.

Dry Deposition

For dry deposition (no rain) only three ecological receptors (sediment-dwelling biota, soil invertebrates, and plants) would be exposed to a maximum SL-II consequence level (DOE 2011,

Appendix D, Table D-42). These results are shown in Table 4-9. The risk to these three receptors would be low when considering the frequency of crashes with fire is low to moderate (FL-II or FL-III) (see Appendix B of this SEIS-II, Table B-6 and DOE 2011, Appendix D, Table D-43). Risk to all other ecological receptors under dry deposition would be negligible. See Table 4-10 for a depiction of the expected risks to these receptors.

Table 4-9 Summary of Potential Exposure of Receptors to Deposited Mercury at Severity Levels II, III, and IV – Truck Spills with Pallet Fire, No Rain (dry deposition)

Ecological Receptor	Distance (meters) to Which Benchmark is Exceeded (A[a], 1.5 m/s[b])			Distance (meters) to Which Benchmark is Exceeded (D[a], 4.5 m/s[b])			Distance (meters) to Which Benchmark is Exceeded (F[a], 1.5 m/s[b])		
	SL-II	SL-III	SL-IV	SL-II	SL-III	SL-IV	SL-II	SL-III	SL-IV
Sediment-dwelling biota	1,000–2,000			3,000–5,000					
Soil invertebrates	700–1,000			2,000–3,000					
Plants	300–500								
American robin									
River otter									
Aquatic biota									
Short-tailed shrew									
Great blue heron									
Red-tailed hawk									

m/s=meters per second; SL=severity level

a Atmospheric stability class.

b Wind speed measured at an elevation of 10 meters.

Note: Shaded cells denote no exceedance of the appropriate benchmark. The ranges in this table indicate that there is uncertainty in the predicted distances to which the various benchmarks are exceeded. The distances downwind at which the various concentrations are first encountered can conservatively be set to 0. To convert meters to feet, multiply by 3.281.

Source: DOE 2011, Appendix D, Section D.5.4.3.1, Table D-42

Table 4-10 Frequencies, Consequences, and Risks to Ecological Receptors from Truck Accidents with Pallet Fires and No Rain (dry deposition)[a]

Ecological Receptor	Frequency Level of Crash with Fire[b]	Consequence Level[c]	Risk
Sediment-dwelling biota	III (moderate)	II	Low
Soil invertebrates	III (moderate)	II	Low
Plants	III (moderate)	II	Low
American robin	III (moderate)	I	Negligible
River otter	III (moderate)	I	Negligible
Aquatic biota	III (moderate)	I	Negligible
Short-tailed shrew	III (moderate)	I	Negligible

Ecological Receptor	Frequency Level of Crash with Fire[b]	Consequence Level[c]	Risk
Great blue heron	III (moderate)	I	Negligible
Red-tailed hawk	III (moderate)	I	Negligible

a. Applies equally to all alternative sites.
b Frequencies of truck crashes with spills from DOE 2011, Appendix D, Tables D-13 and D-14.
c The highest consequence in any weather condition, from DOE 2011, Appendix D, Table D-42.
Source: DOE 2011, Appendix D, Section D.5.4.3.1, Table D-43

Wet Deposition

Deposition of inorganic mercury is enhanced under precipitation (wet deposition). The 2011 Mercury Storage EIS evaluated a scenario involving a transportation spill with fire and rainfall. The probability (frequency) of this scenario is lower (low vs. moderate) than for dry deposition because the probability of rainfall at the time of the accident has to be taken into account (i.e., dry periods are more frequent than rainfall events). The consequence severity levels for this scenario are shown in Table 4-11. Potential exposure of ecological receptors to SL-IV (high) consequences occurred only to sediment-dwelling biota out to 100–500 meters from the accident site. Soil invertebrates were potentially exposed to a maximum SL-III (moderate) consequence level out to about 200–1,000 meters depending on the atmospheric stability conditions. Plants, the American robin, and the river otter were exposed to a maximum SL-II (low) consequence level at 1,000–5,000 meters, 500–3,000 meters, and 100–500 meters, respectively (DOE 2011, Appendix D, Table D-45). The American robin and river otter represent predators on soil invertebrates and sediment-dwelling biota, respectively. The range in distances from a truck crash to which a particular severity level would be reached reflects both uncertainty in prediction and differences among the atmospheric stability classes analyzed. When combined with the low frequency of truck crashes with fire and rainfall, there is a moderate risk to sediment-dwelling biota, and a low risk to soil invertebrates, plants, the American robin, and river otter (DOE 2011, Appendix D, Section D.5.4.3.1, Table D-46). These risks are shown in Table 4-12. All other ecological receptors are at negligible risk to exposure to mercury from a transportation spill with fire and rainfall.

Table 4-11 Summary of Potential Exposure of Receptors to Deposited Mercury at Severity Levels II, III, and IV – Truck Spills with Pallet Fire and Rain (wet deposition)

Ecological Receptor	Distance (meters) to Which Benchmark is Exceeded (A[a], 1.5 m/s[b])			Distance (meters) to Which Benchmark is Exceeded (D[a], 4.5 m/s[b])			Distance (meters) to Which Benchmark is Exceeded (F[a], 1.5 m/s[b])		
	SL-II	SL-III	SL-IV	SL-II	SL-III	SL-IV	SL-II	SL-III	SL-IV
Sediment-dwelling biota	3,000–5,000	300–500	100–200	3,000–5,000	500–700	100–200	10,000–20,000	1,000–2,000	300–500
Soil invertebrates	3,000–5,000	200–300		2,000–3,000	300–500		7,000–10,000	700–1,000	
Plants	1,000–2,000			1,000–2,000			3,000–5,000		
American robin	500–700			700–1,000			2,000–3,000		

Ecological Receptor	Distance (meters) to Which Benchmark is Exceeded (A[a], 1.5 m/s[b])			Distance (meters) to Which Benchmark is Exceeded (D[a], 4.5 m/s[b])			Distance (meters) to Which Benchmark is Exceeded (F[a], 1.5 m/s[b])		
	SL-II	SL-III	SL-IV	SL-II	SL-III	SL-IV	SL-II	SL-III	SL-IV
River otter	100–200						300–500		
Aquatic biota									
Short-tailed shrew									
Great blue heron									
Red-tailed hawk									

m/s=meters per second; SL=severity level
a Atmospheric stability class.
b Wind speed measured at an elevation of 10 meters.
Note: Shaded cells denote no exceedance of the appropriate benchmark. The ranges in this table indicate that there is uncertainty in the predicted distances to which the various benchmarks are exceeded. The distances downwind at which the various concentrations are first encountered can conservatively be set to 0. To convert meters to feet, multiply by 3.281.
Source: DOE 2011, Appendix D, Section D.5.4.3.1, Table D-45

Table 4-12 Frequencies, Consequences, and Risks to Ecological Receptors from Truck Accidents with Pallet Fires and Rain (wet deposition)[a]

Ecological Receptor	Frequency Level of Crash with Fire[b]	Consequence Level[c]	Risk
Sediment-dwelling biota	II (low)	IV	Moderate
Soil invertebrates	II (low)	III	Low
Plants	II (low)	II	Low
American robin	II (low)	II	Low
River otter	II (low)	II	Low
Aquatic biota	II (low)	I	Negligible
Short-tailed shrew	II (low)	I	Negligible
Great blue heron	II (low)	I	Negligible
Red-tailed hawk	II (low)	I	Negligible

a Applies equally to all alternative sites.
b Frequencies of truck accidents with spills from DOE 2011, Appendix D, Table D-17.
c The highest consequence in any weather condition, from DOE 2011, Appendix D, Table D-45.
Source: DOE 2011, Appendix D, Section D.5.4.3.1, Table D-46

4.2.10.2 Ecological Risk – No-Action Alternative

As discussed in Section 4.2.10.1, potential releases of elemental mercury vapor at storage sites, either Y-12 or non-DOE sites (including continued onsite storage at ore processors), would represent only an inhalation exposure, which is insignificant to potential ecological receptors. Therefore, the risks to ecological receptors under the No-Action Alternative at Y-12 or non-DOE sites would be negligible.

Transportation of mercury by road would continue under the No-Action Alternative. What is not known is the average, maximum, and minimum loads per truck. However, accidental or deliberately initiated truck fires could occur, and the generic analysis provides a picture of what kinds of scenarios and risks there might be. This previous analysis would also be appliable to ecological risks of transportation of mercury to treatment and disposal facilities if the generators opted for that approach. There would be no transportation to or from Y-12 under the No-Action Alternative. The frequency of onsite fires sufficient to cause a release of mercury at Y-12 likely would be negligible, just as it is for all of the alternative sites evaluated in this SEIS-II.

4.2.11 Socioeconomics

Potential continued onsite storage at ore-processor locations in existing facilities would have no impacts to socioeconomics; however, this continued storage has the potential to cause the generators to consider construction of additional storage facilities.

If new construction were required at an ore-processor facility or non-DOE storage sites, based on analyses of DOE's proposed action in 2011, construction, modification, or operation of storage facilities would require a relatively small number of additional staff and be unlikely to result in notable socioeconomic impacts to the affected region.

If a generator opted to transport mercury for treatment and ultimate disposal in Canada, that action would not result in any impacts to socioeconomics at the generator site, treatment facility, or disposal facility. It would be unlikely that this action under the No-Action Alternative would require any additional staffing.

Under the No-Action Alternative, elemental mercury would remain in storage at Y-12. No additions to staff for purposes of continuing mercury management and storage at Y-12 would be necessary. No impacts on socioeconomic conditions, including overall employment, population trends, available housing, and other community services in the ROI, would result under the No-Action Alternative.

4.2.12 Environmental Justice

Potential continued onsite storage at ore-processor locations in existing facilities would likely have no additional impacts to minority or low-income populations since the continued storage would be within existing buildings and be unlikely to result in offsite impacts. As noted earlier, this continued storage has the potential to cause the generators to consider construction of additional storage facilities.

If new construction were required at an ore-processor facility or non-DOE storage sites, the specific evaluation of impacts to minority or low-income populations would be dependent on the proximity of these populations to the proposed construction locations.

As indicated in the 2011 Mercury Storage EIS, Section 4.2.12, minority and low-income populations are present within 10 miles of the Y-12 site. Relative to the 2019 total population within the four-county ROI for Y-12, the minority and low-income populations are 15.9 percent and 13.4 percent, respectively. As discussed in Sections 4.2.9 and 4.2.10, implementing the No-Action Alternative would result in negligible offsite human health and ecological risks from mercury emissions during normal operations and accidents. Therefore, there would be no disproportionately high and adverse effects on minority or low-income populations surrounding the Y-12 site under the No-Action Alternative.

4.3 HAWTHORNE ARMY DEPOT

4.3.1 Land Use and Ownership, and Visual Resources

4.3.1.1 Land Use and Ownership

As discussed in the 2011 Mercury Storage EIS, DOE would expect no impacts on land use and visual resources. Storage and management of elemental mercury in the existing Group 110 design storehouses in the Central Magazine Area would be consistent with current land use. This group of buildings is adjacent to where the DoD is currently storing and re-containerizing 4,436 MT (4,890 tons) of DNSC elemental mercury in 14 buildings (see Chapter 2, Section 2.3.1, of this SEIS-II). Many of these buildings are currently in use for material storage (HWAD 2021). This would require a re-warehousing of materials by HWAD prior to modification for mercury storage and affect the current use of these buildings. The storage of DOE mercury in the newly modified buildings would not affect any offsite land uses within the ROI. As discussed in Chapter 2, Section 2.1.1, of this SEIS-II, storage of mercury in these buildings would prevent the use of these buildings for other purposes for potentially 40 years.

As described in Chapter 1, Section 1.2, of this SEIS-II, DOE has interpreted MEBA to authorize DOE to designate a storage facility or facilities at a DOE-owned or -leased property. Accordingly, if DOE were to designate the Group 110 design storehouses as its preferred alternative, DOE would need to obtain a leasehold interest in those buildings. DOE would ensure that this lease agreement would afford DOE an appropriate level of responsibility and control over the facility. However, as explained in Section 2.3.2 of this SEIS-II, DoD (i.e., HWAD) is prohibited under 10 U.S.C. § 2692, "Storage, Treatment, and Disposal of Nondefense Toxic and Hazardous Materials," from using a DoD installation for the storage, treatment, or disposal of any material that is a toxic or hazardous material and that is not owned either by DoD or by a member of the armed forces.

The Secretary of Defense may grant exceptions under certain limited circumstances. DOE may not store elemental mercury, a toxic or hazardous material, at HWAD unless and until DoD grants DOE a specific exception to do so, or DoD leases or transfers an appropriate portion of the HWAD site to DOE or the General Services Administration (and the General Services Administration subsequently transfers or leases that property to DOE). Section 2.3.1 describes some of the activities that would be required to realize the DOE lease agreement. A conservative estimate of the time required to complete the lease agreement, the final design of the modifications, permitting, and consultation with the Nevada SHPO (see Section 4.3.6) would be between three and five years from the date that DOE selected HWAD in an ROD.

4.3.1.2 Visual Resources

Under the Proposed Action, elemental mercury would be stored and managed inside the existing Group 110 design storehouses; visual context or view sheds in the surrounding area would not be affected.

4.3.2 Geology, Soils, and Geologic Hazards

4.3.2.1 Geology and Soils

As stated in the 2011 Mercury Storage EIS, upgrades and internal modifications of the 29 structures in the Central Magazine Area at HWAD would have a very small impact on geology and soils. Under the Proposed Action, direct, small-scale land disturbance impacts would be limited to trenching between structures and storage buildings to install needed utilities and other systems and services. Soils in between existing structures have been previously disturbed and consist of graded fill materials used during original construction at HWAD. Under the Proposed Action, the depths of excavations would be approximately two feet wide by four feet deep.

As discussed in HWAD's latest installation action plan (HWAD 2017), cleanup of historical spills of hazardous materials and wastes is ongoing, and DOE does not expect any contamination among and immediately surrounding the Group 110 design storehouses. Adherence to standard best management practices for soil erosion and sediment control would serve to minimize any soil erosion and loss from any small-scale trenching in between structures. There would be no additional impact on geology and soils under the Proposed Action.

4.3.2.2 Geologic Hazards

Hazards from large-scale geologic conditions, such as earthquakes, are summarized in Section 3.2.2.2 of this SEIS-II. The area surrounding HWAD is one of high seismic activity. As discussed in the 2011 Mercury Storage EIS, while the Hawthorne, Nevada, area has historically experienced numerous earthquakes and significant ground shaking, no depot facilities have suffered damage due to earthquakes over the 60-plus years of operations. The 2011 EIS presented the predicted PGA at the site from an earthquake with an annual probability of occurrence of 1 in 2,500 as 0.57 *g*. Updated USGS earthquake hazard data recharacterize the PGA at HWAD as 0.62 *g* (USGS 2021b). This is the upper end of the range for the sites evaluated in this SEIS-II (0.05–0.62 *g*). Ground motion even at the lower number could cause considerable damage to ordinary substantial buildings but would only cause slight damage to specially designed structures. The original construction of the Group 110 structures is particularly unique, in that the buildings were designed to contain accidental detonation of ammunition and are unlikely to collapse or be destroyed from predicted ground motion at the site (DOE 2011). Nevertheless, under the Proposed Action, upgrades and modifications of existing structures would include retrofits to flooring to contain any potential spills. This, combined with specially designed storage racks, would serve to minimize the potential for spills or the loss of containment should a spill occur from an earthquake.

An analysis of potential environmental consequences resulting from an earthquake-induced accident is discussed in Section 4.3.9.2.

4.3.3 Water Resources

4.3.3.1 Surface Water and Floodplains

Walker Lake is the nearest perennial surface water and is approximately five miles north of the Group 110 design storehouses. Building upgrades and modifications in the Central Magazine Area and subsequent use of those buildings for mercury storage would not alter or affect any surface water feature or ephemeral wash that drains to Walker Lake. Potential contamination of surface water with mercury is considered negligible because containment berms and floor sealant, which would need to be installed within storage buildings, would prevent any potential release of mercury, and surface runoff is infrequent in the arid climate and unlikely to reach any ephemeral wash on HWAD.

Surface water from the Mount Grant watershed is a primary source of water for HWAD. Any increase in water use to support mercury storage operations would be small and limited to that required to serve the potable and sanitary needs of a mercury storage operation staff. This volume of water would be extremely small compared to the total water use at HWAD.

Based on floodplain delineation, several ephemeral washes crossing the Group 110 design storehouses may be subject to a 1-percent annual chance (100-year) flood event (Tetra Tech 2018, Figure 10). The mapped flood-prone washes are relatively narrow, and buildings are widely spaced (460–560 feet apart). None of the Group 110 storehouses is within the delineated boundaries of the ephemeral washes or floodplains. The risk of flood damage to an individual building is considered minor.

4.3.3.2 Groundwater

Storage building modifications would not occur at a depth that could affect groundwater hydrology (DOE 2011). Building modifications (e.g., containment berms and floor sealants) and operational procedures for spill containment and container inspections would prevent any spills from reaching groundwater. No impacts to groundwater are expected under the Proposed Action.

4.3.4 Air Quality and Noise

4.3.4.1 Air Quality

Negligible-to-very-minor short-term air quality impacts with little or no measurable effect on air quality would result from modification of the existing Group 110 design storehouses in the Central Magazine Area for mercury storage. Criteria air pollutant emissions from construction equipment would be limited to those from construction employee vehicles and work trucks; little or no heavy equipment is expected to be used.

Emissions from operation of the proposed storage facilities in the Central Magazine Area would be very small, consisting of emissions from employee vehicles, trucks, semiannual testing of emergency generators, and possibly mercury vapor from any spills or from mercury containers. No localized emissions from space heating are expected from operations under the Proposed Action, as electric heating is anticipated for areas requiring climate control.

As discussed in Appendix B, Section B.6.1.1, of this SEIS-II and Appendix D, Section D.4.1.1, of the 2011 Mercury Storage EIS, exposures to mercury vapor could arise during normal operating conditions from small amounts of mercury vapor escaping from storage containers or residual contamination. These conservative analyses demonstrate that for a long-term, undetected slow leak, the predicted long-term average concentration in the wake of a building would be less than 2.0×10^{-4} mg/m^3 (Table B-9), which is below the EPA's RfC of 3.0×10^{-4}, that is, below which health effects are considered negligible. HWAD is a controlled, secured-access facility, and the likelihood that a noninvolved worker or member of the public would be near the HWAD storage buildings is extremely low. Potential health impacts of mercury vapors from normal operations and accident scenarios are discussed in Appendix B and in Sections 4.3.9.1 and 4.3.9.2, respectively.

Under the Proposed Action, the transportation of mercury to HWAD, as well as the other alternative sites, would generate vehicle emissions including GHGs. To estimate vehicle emissions for total hydrocarbons, carbon monoxide, nitrogen oxides, 2.5 micron or smaller particulate matter ($PM_{2.5}$), and total GHGs (expressed as carbon dioxide equivalent [CO_2e]), total truck transportation miles were multiplied by emission rates for each pollutant (Table 4-13). Quiros et al. (2017, Table 2) estimated GHG emission rates from conventional diesel on-road trucks for six driving conditions. For this analysis, it was assumed that each truck trip was composed of four driving conditions: near-dock, local, hill climbs, and Interstate highway. Near-dock and local driving conditions would occur at the start and end of each trip and are assumed to be a total of 5 and 40 miles per trip, respectively. The remainder of each truck trip was composed of Interstate highway (70 percent) and hill climb (30 percent). The emission rate for each driving condition was multiplied by the number of miles in each driving condition and then summed across the driving conditions to estimate the total emissions of GHG (CO_2e). Final values were converted from grams to tons.

Table 4-13 Emission Rates for Heavy-Duty Diesel Vehicles Used to Estimate Emissions for Transportation of Mercury

Emission Pollutant	Emission Rate (grams/mile)[a]				
		Driving Condition[d]			
		Near-Dock	Local	Interstate Highway	Hill Climb
Total hydrocarbons[b]	0.269				
Exhaust carbon monoxide[b]	2.000				
Exhaust nitrogen oxides[b]	4.169				
Total particulate matter less than 2.5 microns[b]	0.119				
Total GHG (CO_2e)[c]	-	2,671	2,220	1,516	1,988

CO_2e=carbon dioxide equivalent; GHG=greenhouse gas

a Emission rate for GHG is dependent on driving conditions. Emission rates for total hydrocarbons, carbon monoxide, nitrogen oxides and PM2.5 are provided on a grams/mile basis.

b Source: EPA 2021g.

c Source: Quiros et al. 2017, Table 2.

d Near-Dock=Characterized by container pickup at ports; Local=Surface streets, acceleration onto highways, and congested highway driving; Interstate Highway80% of driving greater than 40 miles per hour with no extended grade; Hill Climb-up- and downhill grades with average 2.3% positive grade.

Table 4-14 provides the truck emissions for transporting mercury to all the alternative sites being evaluated in this SEIS-II over the 40-year analysis period. Total GHG emissions in CO_2e for transportation of mercury to HWAD for the 40-year analysis period is 4,312 tons, or approximately 107.5 tons per year. To put this in perspective, the national GHG emissions from heavy-duty trucks in 2019 were estimated to be 444 million MT (EPA 2021h). Therefore, under the Proposed Action, the annual average contribution from transportation of mercury to HWAD would incrementally add about 0.000024 percent, which would be unlikely to measurably add to potential global climate change impacts. Additionally, because the HWAD Central Magazine Area is not in a floodplain and the buildings are constructed of concrete blocks, they are mostly resilient to potential increases in severe weather related to global climate change.

Table 4-14 Estimates of Truck Emissions (tons) for Transportation of Mercury over the 40-Year Analysis Period by Alternative Site

Site	Total Truck Miles[a]	Truck Emissions over 40-year Period (tons)				
		Total HC	Exhaust CO	Exhaust NO_x	Total $PM_{2.5}$	Total GHG (CO_2e)
Hawthorne Army Depot	2,344,270	0.71	5.17	10.77	0.31	4,312.14
Waste Control Specialists	1,887,330	0.56	4.16	8.67	0.25	3,477.22
Bethlehem Apparatus Company	1,081,265	0.32	2.38	4.97	0.14	2,004.39
Perma-Fix DSSI	1,289,695	0.38	2.84	5.93	0.17	2,385.23
Veolia Gum Springs	1,571,380	0.47	3.46	7.22	0.21	2,899.92
CH-Grassy Mountain	2,101,570	0.62	4.63	9.66	0.28	3,868.68
CH-Greenbrier	1,369,330	0.41	3.02	6.29	0.18	2,530.73
CH-Pecatonica	1,419,880	0.42	3.13	6.53	0.19	2,623.10

CH=Clean Harbors; CO=carbon monoxide; CO_2e=carbon dioxide equivalent; HC=hydrocarbon; NO_x=nitrogen oxides; $PM_{2.5}$=particulate matter less than 2.5 microns

a Total truck miles as presented in Appendix B, Table B-3.

4.3.4.2 Noise

Noise impacts are expected to be negligible (DOE 2011). Short-term localized noise would be generated during building modifications. Under the Proposed Action, noise would be limited to employee vehicles and occasional truck deliveries of mercury containers, which would not be discernable from other similar existing activities on HWAD.

4.3.5 Ecological Resources

Potential impacts to terrestrial resources, aquatic resources and wetlands, and threatened or endangered and other protected species are discussed in Sections 4.3.5.1, 4.3.5.2, and 4.3.5.3, respectively. The risk to ecological receptors from potential releases of mercury from normal operations and accident scenarios at each alternative site, and the risk associated with accidental releases of mercury during transportation to each respective storage site is evaluated and discussed in Section 4.2.10.1.

4.3.5.1 Terrestrial Resources

Little native vegetation remains within the area of the buildings in the Central Magazine Area designated for potential storage of mercury (DOE 2011). Because existing buildings and access roads would be used, no new land or vegetation would be disturbed. During operations, some minor, additional human activity may occur (e.g., employee vehicles) but most activity would occur inside buildings. There would also be little or no emissions of pollutants to water and air (see Sections 4.3.3 and 4.3.4.1) and little additional noise (see Section 4.3.4.2). As a result, impacts to terrestrial resources are expected to be negligible under the Proposed Action.

4.3.5.2 Aquatic Resources and Wetlands

No wetlands or aquatic resources exist within the area of the proposed mercury storage facility within the Central Magazine Area (DOE 2011). Therefore, no impacts on wetlands or aquatic habitats are expected under the Proposed Action.

4.3.5.3 Threatened or Endangered and Other Protected Species

As identified in Chapter 3, Section 3.2.5.3, no threatened or endangered species or their critical habitats are known or are expected to exist within the area of the proposed mercury storage facility within the Central Magazine Area. Thus, no impacts on threatened or endangered and other protected species are expected under the Proposed Action.

4.3.6 Cultural and Paleontological Resources

4.3.6.1 Prehistoric and Historic Resources

Since the structures that may be used for mercury storage are located on property that has been previously disturbed by construction, it is highly unlikely that any prehistoric or historic resources on the property would be impacted. The *HWAD Integrated Cultural Resources Management Plan* outlines the planned and ongoing cultural resources management activities related to NRHP-eligible properties at the Depot (HWAD 2019). The Group 110 design storehouses are contributing elements of the NRHP-eligible HWAD Historic District (DOE 2011). Many of the numerous architectural resources at HWAD are still being used for various operations at the Depot (e.g., some of the Group 110 design storehouses are currently storing various materials). The existing and potential historic architectural properties located on the Depot, as well as the NRHP-eligible historic district associated with the Depot, would not be impacted under the Proposed Action. However, as was documented in the 2011 Mercury Storage EIS, because modification of existing structures would be required to implement the Proposed Action, DOE initiated consultation under NHPA Section 106 with the Nevada SHPO to support the 2011 EIS. The Nevada SHPO noted that a determination of whether proposed storage building modifications could affect historic properties would require that DOE provide a more-thorough description of the structural modifications (DOE 2011, Appendix H, p. H-41). Therefore, if the HWAD became a preferred alternative for operation of a mercury storage facility, DOE would further consult with the SHPO on the proposed storage building modifications to determine the potential impacts on NRHP-eligible structures and potential mitigation measures, as appropriate. The Section 106 consultation process would need to be completed prior to completion of a ROD selecting HWAD. Therefore, the key activities that would need to be completed prior to a ROD would include: (1) detailed design of all modifications to specific HWAD buildings, (2) identification of HWAD as a preferred alternative, and (3) closure of the Section 106 consultation process with the Nevada SHPO. DOE estimates that these activities could be completed in 12 to 18 months after DOE elected to consider HWAD as a preferred alternative.

4.3.6.2 American Indian Resources

The Walker River Indian Reservation is located approximately eight miles north of HWAD. Since no new construction would be required, no impact on American Indian resources or traditional religious practices in the area is expected. The ongoing tribal interaction program with the Walker River Paiute Tribe and other tribes in the vicinity would continue under the Proposed Action.

4.3.6.3 Paleontological Resources

No unique paleontological resources have been identified at HWAD (HWAD 2019); therefore, no related impacts would occur under the Proposed Action.

4.3.7 Site Infrastructure

4.3.7.1 Ground Transportation

Road traffic, either on or off the HWAD, would not appreciably increase during either modification of the Group 110 design storehouses for mercury storage or operation of a mercury storage facility. The number and frequency of truck deliveries under the Proposed Action, about 13 per year, would be small relative to existing traffic.

4.3.7.2 Utilities

Under the Proposed Action, utility services, such as electricity, water, and communications, would have to be extended into the Group 110 design storehouses as part of the building modifications. The specific utility services to individual buildings would be determined during operational planning and building upgrades. HWAD uses only a small portion of its sitewide electrical capacity, and projected increases in electrical use from operation of a mercury storage facility would be less than four percent of current electrical usage (DOE 2011). Water requirements for facility modifications and mercury storage operations under the Proposed Action would be negligible compared with HWAD’s sitewide water usage and capacity.

4.3.8 Waste Management

The 2011 Mercury Storage EIS described the potential waste generated for modifications of up to 29 buildings and the operation of buildings for mercury storage (DOE 2011, Section 4.5.8). It was concluded that the amount of waste generated during building modifications would be negligible to minor compared to existing operations on HWAD. Considering that fewer buildings would be required to store a smaller volume of mercury (7,000 MT versus 10,000 MT), this conclusion remains valid.

In the 2011 Mercury Storage EIS, DOE estimated that operations to store 10,000 MT of mercury would generate 910, 55-gallon drums of hazardous waste over the 40-year period of analysis (DOE 2011, Appendix C, Table C-4). As discussed in Chapter 2, Section 2.1.2, of this SEIS-II, the amount of mercury to be stored has decreased by approximately 30 percent since the 2011 estimate. Therefore, the amount of waste generated is expected to be about 70 percent of the 2011 estimate, or 637, 55-gallon drums of hazardous waste. This volume equates to an average annual generation rate of 16, 55-gallon drums, or approximately 4.5 cubic yards of hazardous waste. This waste would primarily consist of cleaning rags used during facility maintenance activities, PPE used during monitoring activities, materials used during spill response activities, and mercury vapor filters used in the Handling Area. Mercury-contaminated waste would be disposed of in a RCRA-permitted hazardous waste disposal facility. In the event of spills, some mercury-contaminated waste could require additional treatment (i.e., retort) prior to disposal if the concentrations are above 260 milligrams per kilogram (mg/kg).[18] Under the Proposed Action, this hazardous waste would be integrated into the existing, permitted waste streams managed at HWAD and would be a small addition to those existing waste streams.

In the 2011 Mercury Storage EIS, DOE estimated that operations over a 40-year storage period would produce approximately 623,000 gallons of sanitary wastewater, or 15,575 gallons per year (DOE 2011, Appendix C, Table C-4). DOE expects that a similar amount of sanitary wastewater would be generated at HWAD under the Proposed Action, which would be a negligible addition to the HWAD discharge of sanitary wastewater to the Town of Hawthorne sewage treatment facility.

4.3.9 Occupational and Public Health and Safety

The analysis of risk at HWAD is similar to that presented in Section 4.2.9.1. Under the Proposed Action, mercury at HWAD would not be stored in a single, large building, but in multiple buildings with dimensions of approximately 200 feet long, 50 feet wide, and 15 feet high (see Appendix B, Table B-8). However, this difference in dimensions does not change the generic conclusions about human health risks.

4.3.9.1 Normal Operations

Section 4.2.9.1 provides a discussion of the risks of normal operations that apply to all alternative sites evaluated in this SEIS-II. Consequences to the involved worker are predicted to be negligible because involved workers would not be exposed to airborne concentrations of mercury vapor above the ACGIH's 8-hour TWA/TLV of 0.025 milligram per cubic meter of mercury vapor. This corresponds to keeping exposures to the involved worker in the SL-I (negligible) range. This would be achieved by adherence to good operating practices, in particular attention to ventilation, inspection, monitoring, and use of PPE as required by the applicable national consensus codes and standards. The design, installation, and operation of ventilation systems would be in accordance with applicable OSHA and NFPA standards and compliant with ASHRAE guidance. Therefore, under the Proposed Action, the risks to involved workers would be negligible during normal operations.

For people outside the building during normal operations (noninvolved workers and members of the public), a chronic, long-term release is bounded by consideration of a full spill tray under a pallet of 3-L flasks that remains undetected indefinitely (a highly conservative assumption given the expected inspection and monitoring activities within the storage building). The steady-state release from this source of mercury vapor is assumed to leak from the building and to be mixed into its turbulent building wake. Appendix B, Table B-9, shows that the predicted long-term average concentration in the building wake for existing buildings at HWAD is about 2.0×10^{-4} milligram per cubic meter. This is below EPA's chronic-inhalation-exposure RfC of 3.0×10^{-4} milligram per cubic meter. Hence, consequences would be in the SL-I range, and the risk to both noninvolved workers and the public would be negligible under the Proposed Action.

[18] EPA defines "high mercury wastes" as those wastes containing greater than 260 mg/kg of mercury (40 CFR Part 268).

4.3.9.2 Facility Accidents

Section 4.2.9.1 provides a discussion of facility accident risks that apply to all alternative sites evaluated in this SEIS-II. Table 4-3 contains a summary of the evaluated facility accident scenarios. Appendix B, Section B.1, discusses the frequency of each of the accident scenarios. The estimated risks to workers and members of the public from onsite spill scenarios (inside or outside) are negligible to low (see Table B-12 in Appendix B of this SEIS-II). The results vary from site to site depending on the size of the building and the building wake concentrations; however, the slight differences do not affect the SLs for each scenario; they are the same for each alternative. In the case of a beyond-design-basis earthquake that causes total building collapse, mercury concentrations in the immediate vicinity of the collapsed building could be in the SL-IV severity range, potentially affecting involved and noninvolved workers. However, as reported in the 2011 Mercury Storage EIS, if workers were to evacuate the area immediately following the earthquake event, consequence levels likely would be in the SL-II range. Because the distance to the closest site boundary from the HWAD Central Magazine Area is 2.3 miles, the potential consequences and hence risks to members of the public would be negligible under the Proposed Action.

4.3.9.3 Transportation

Section 4.2.9.1 describes the analysis of potential impacts of the transportation of up to 7,000 MT (7,700 tons) of elemental mercury over a 40-year period of analysis to HWAD based on the analysis in the 2011 Mercury Storage EIS. As reported in Table B-3 in Appendix B of this SEIS-II, the total shipment distance (assuming all 7,000 MT were shipped to HWAD) is 2,344,270 miles. As reported in Section 4.2.9.1, the estimated frequencies of accidents are similar to those presented in the 2011 EIS and 2013 SEIS. The potential consequences of the accident scenarios are the same as presented in these previous analyses. As a result, the potential transportation risks are no greater than those presented in the previous analyses. As reported in Section 4.2.9.1, this SEIS-II considers the following transportation accident scenarios:

- Crash with spill of elemental mercury onto the ground without fire;
- Crash with spill of elemental mercury into water;
- Crash with fire in dry weather conditions (without rain) (to analyze the effects of dry deposition); and
- Crash with fire in wet weather conditions (with rain) (to analyze the effects of wet deposition).

In summary, based on the 2011 EIS analysis and described in Section 4.2.9.1 of this SEIS-II:

- The risk to a member of the public from transportation spills onto the ground without fire en route to HWAD would be negligible.
- Direct spillage of mercury into a body of water could be of concern if it is not cleaned up, but there is generally adequate time for such cleanup. Hence, the consequences to humans

could be managed so that they are negligible or low. Given this assumption and the fact that the frequency of crashes with spills on any of the transportation routes is no more than moderate (and this is an upper bound on the frequency of spills directly into water), the risk would be negligible or low for all transportation routes. However, because of the uncertainty about an accident that could occur near fast-flowing rivers, this observation should be tempered by noting that the uncertainty regarding this prediction of risk is very large.

- The analyses performed for the 2011 EIS showed that, under all fire scenarios, with and without rain, mercury deposited on the ground would never cause the benchmark of 180 milligrams per kilogram to be exceeded. Therefore, the corresponding risks would be negligible.

4.3.10 Socioeconomics

Modifications necessary to bring the existing Group 110 buildings at HWAD up to specifications to support mercury storage would require fewer than 20 temporary workers for several months. Since mercury is already being stored at HWAD for other programs, operational expertise is readily available. Under the Proposed Action, peak operation of the storage facility is estimated to require eight individuals for routine maintenance and support activities (DOE 2011), which would result in a minor increase to HWAD's workforce of approximately 638 people. Neither modification nor operation of the storage facility is expected to generate substantial, new direct or indirect employment. There would be negligible impacts on socioeconomic conditions, including overall employment, population trends, available housing, and other community services in the three-county ROI (Mineral, Lyon, and Churchill), under the Proposed Action.

4.3.11 Environmental Justice

Relative to the 2019 total population within the three-county ROI, the minority and low-income populations are 27.2 percent and 10.9 percent, respectively. Seventeen percent of the minority population consists of American Indian and Native Alaskan people, the majority of which are likely members of the Walker River Paiute Tribe located approximately eight miles north of HWAD. As discussed in Sections 4.3.9 and 4.2.10, implementing the Proposed Action at HWAD would result in negligible offsite human health and ecological risks to both individuals and communities from mercury emissions during normal operations and accidents. Therefore, there would be no disproportionately high and adverse effects on minority or low-income populations under the Proposed Action at HWAD.

4.3.12 Reasonably Foreseeable Environmental Trends or Planned Actions

As identified in Chapter 3, Section 3.2.12, of this SEIS-II, there are no other reasonably foreseeable environmental trends or planned actions within the ROI that would have the potential for cumulative impacts with the Proposed Action other than the continued operation of the HWAD. As part of HWAD's current operations, the DoD is currently storing 4,436 MT (4,890 tons) of elemental mercury for the DNSC (see Chapter 2, Section 2.3.1 of this SEIS-II). The additional storage of up to 7,000 MT of MEBA mercury would incrementally increase impacts already being realized at HWAD. Considering the negligible-to-low potential impacts of the Proposed Action, cumulative impacts within the HWAD ROI would be represented by those associated with ongoing operations of the Depot.

4.4 WASTE CONTROL SPECIALISTS LLC

4.4.1 Land Use and Ownership, and Visual Resources

4.4.1.1 Land Use and Ownership

As described in Section 1.2 of this SEIS-II, DOE has interpreted MEBA to authorize DOE to designate a storage facility or facilities at DOE-owned or -leased property. Accordingly, if DOE were to designate the WCS facility as its preferred alternative, DOE would acquire a leasehold interest in that facility. DOE would ensure that any long-term lease agreement would afford DOE an appropriate level of responsibility and control over the facility. As discussed in Section 2.1.1 of this SEIS-II, storage of mercury in the CSB could require the use of the CSB storage space for potentially 40 years.

The CSB is already permitted by the State of Texas for hazardous waste storage including mercury. Under the Proposed Action, there would be no new construction or changes in the designated uses of the CSB. Therefore, there would be no impacts to land use either within the WCS site or in the surrounding ROI.

4.4.1.2 Visual Resources

Under the Proposed Action, there would be no new construction at the WCS site and mercury operational activities would occur primarily within an existing building; there would be no impacts to visual resources.

4.4.2 Geology, Soils, and Geologic Hazards

4.4.2.1 Geology and Soils

Under the Proposed Action, there would be no new construction at the WCS site; there would be no additional impacts to geology and soils. WCS would follow standard best management practices for necessary maintenance and management of soils and the engineered landscape at the site.

4.4.2.2 Geologic Hazards

The Central Basin Platform in Texas is an area of moderate, low-intensity seismic activity with crustal properties that indicate minimum risk due to faulting and seismicity (DOE 2011). As reported in Chapter 3, Section 3.3.2.2, of this SEIS-II, the calculated PGA for the WCS site is approximately 0.08 *g*, which is a relatively low value in terms of seismicity and on the lower end of the range for the sites evaluated in this SEIS-II (0.05–0.62 *g*). Under the Proposed Action, storage and management of elemental mercury would occur in an existing structure that was engineered and built to seismic design standards for the location. In addition, mercury storage locations within the facility would include robust storage containers and spill containment features to minimize impacts if an improbable earthquake were to result in a spill. Facility accidents as a result of an earthquake are discussed in Section 4.4.9.2.

4.4.3 Water Resources

4.4.3.1 Surface Water and Floodplains

The CSB is located in a developed area on the WCS site, and no ephemeral or permanent surface water occurs in the vicinity. Under the Proposed Action, use of structural controls, such as concrete sealed floors and containment berms inside the CSB, would prevent release of mercury to outside surfaces where stormwater could convey the mercury to ephemeral surface water features in undeveloped areas. The CSB is not located in a designated floodplain and impacts from flooding are not expected.

4.4.3.2 Groundwater

The structural controls that would prevent impacts to ephemeral surface water features under the Proposed Action would also prevent impacts to groundwater. Groundwater would not be affected by normal operations of the permitted facility. The storage and management of elemental mercury would be integrated into existing operations and any incremental increase in water use to support additional staff for mercury management would be negligible. The City of Eunice provides municipal water service to WCS. Groundwater from onsite wells is used for fire water and dust suppression, but those uses would not increase as a result of mercury storage operations.

4.4.4 Air Quality and Noise

4.4.4.1 Air Quality

Under the Proposed Action, the management and storage of mercury in the CSB would be integrated into an existing, permitted, operating facility. Under normal mercury storage operations, there would be no activity that would create a measurable increase in non-mercury air emissions. As discussed in Appendix B, Section B.6.1.1, of this SEIS-II and Appendix D, Section D.4.1.1, of the 2011 Mercury Storage EIS, exposures to mercury vapor could arise during normal operating conditions from small amounts of mercury vapor escaping from storage containers or residual contamination. These conservative analyses demonstrate that for a long-term, undetected slow leak, the predicted long-term average concentration in the wake of the CSB would be less than 3.5×10^{-5} mg/m^3 (Table B-9), which is below the EPA's RfC of 3.0×10^{-4} mg/m^3, that is, below which health effects are considered negligible. WCS is a controlled-access facility and the likelihood that a member of the public would be near the CSB is extremely low. Potential health impacts of mercury vapors from normal operations and accident scenarios are discussed in Appendix B and in Sections 4.4.9.1 and 4.4.9.2, respectively

Under the Proposed Action, the transportation of mercury to WCS would generate vehicle emissions, including GHG. Vehicle and GHG emissions estimates are described in Section 4.3.4. Vehicle emissions of hydrocarbons, carbon monoxide, nitrogen oxides, and $PM_{2.5}$ over the 40-year analysis period from transportation of mercury to WCS are 0.56, 4.16, 8.67, and 0.25 tons, respectively (see Table 4-14). Total GHG emissions in CO_2e for the 40-year analysis period are 3,477 tons, or approximately 87 tons per year. To put this in perspective, the national GHG emissions from heavy-duty trucks in 2019 were estimated to be 444 million MT (EPA 2021h). Therefore, under the Proposed Action, the annual average contribution from transportation of mercury to WCS would incrementally add about 0.00078 percent, which would be unlikely to measurably add to potential global climate change impacts. Additionally, because the CSB is not in a floodplain and is constructed to meet building code requirements, it is mostly resilient to potential increases in severe weather related to global climate change.

4.4.4.2 Noise

Noise impacts are expected to be negligible. Under the Proposed Action, noise would be limited to employee vehicles and occasional truck deliveries of mercury containers, which would not be discernable from other similar existing activities on WCS. The nearest residential noise receptor is approximately 3.8 miles west of WCS and would not be affected.

4.4.5 Ecological Resources

Potential impacts to terrestrial resources, aquatic resources and wetlands, and threatened or endangered and other protected species are discussed in Sections 4.4.5.1, 4.4.5.2, and 4.4.5.3, respectively. The risk to ecological receptors from potential releases of mercury from normal operations and accident scenarios at each alternative site, and the risk associated with accidental releases of mercury during transportation to each respective storage site is evaluated and discussed in Section 4.2.10.1.

4.4.5.1 Terrestrial Resources

The CSB is within a developed area of the WCS site that contains no vegetation (see Chapter 3, Figure 3-2). Mercury storage would not cause any new land disturbances, and terrestrial resources would not be affected under the Proposed Action.

4.4.5.2 Aquatic Resources and Wetlands

No aquatic resources or wetlands occur within the vicinity of the CSB. No impacts to these resources would occur under the Proposed Action.

4.4.5.3 Threatened or Endangered and Other Protected Species

As discussed in Chapter 3, Section 3.3.5.3, no habitat for any threatened, endangered, and other protected species exists within the WCS waste disposal site including the area containing the CSB. No impacts to any threatened, endangered, and other protected species are expected under the Proposed Action.

4.4.6 Cultural and Paleontological Resources

4.4.6.1 Prehistoric and Historic Resources

No impacts on cultural resources are expected under the Proposed Action. As discussed in Chapter 3, Section 3.3.6.1, there are no known prehistoric or historic cultural resources at the WCS site, and any potential unknown sites would not be impacted since mercury storage would occur within an existing structure with no planned new construction or surface disturbance under the Proposed Action. Similarly, because the Proposed Action at WCS would occur within an existing building permitted for the storage of mercury, DOE has determined that this undertaking does not have the potential to cause effects on historic properties and DOE is not required to enter into consultation under Section 106 of the NHPA (36 CFR 800.3(a)(1)).

4.4.6.2 American Indian Resources

As discussed in Chapter 3, Section 3.3.6.2, none of the three federally recognized tribes in Texas is located near the WCS site and none of the 23 federally recognized tribes in New Mexico is located in the adjacent Lea County. There are known tribal resources or TCPs in the immediate vicinity of the WCS site, and any potential unknown resources or TCPs would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action.

4.4.6.3 Paleontological Resources

As discussed in Chapter 3, Section 3.3.6.3, there are no known paleontological resources at the WCS site and since no new construction would be required under the Proposed Action, there would be no impact to paleontological resources under the Proposed Action.

4.4.7 Site Infrastructure

4.4.7.1 Ground Transportation

WCS has averaged about 2,500 truck and rail shipments of hazardous or radioactive materials annually into and out of the site over the past three years (Chapter 3, Section 3.3.9.3). Under the Proposed Action, approximately 528 truck shipments, or about 13 shipments per year, are estimated to ship the 7,000 MT of mercury over the 40-year analysis period. Compared with existing ground transportation in the region, the truck shipment of mercury would have negligible impacts to ground transportation infrastructure and local traffic under the Proposed Action.

4.4.7.2 Utilities

WCS is an existing operating facility that receives water, electricity, and natural gas through local utility providers. Under the Proposed Action, mercury storage would be integrated into the existing CSB; there would be no appreciable increase in demand for any utility service.

4.4.8 Waste Management

In the 2011 Mercury Storage EIS, DOE estimated that operations to store 10,000 MT of mercury would generate 910, 55-gallon drums of hazardous waste over the 40-year period of analysis (DOE 2011, Appendix C, Table C-4). The amount of mercury that could be stored at WCS is only 3,000 MT, or 70-percent less than the 2011 estimate. Therefore, the amount of waste generated is expected to be about 30 percent of the 2011 estimate, or 273, 55-gallon drums of hazardous waste. This volume equates to an average annual generation rate of about seven 55-gallon drums, or approximately two cubic yards of hazardous waste. This waste would primarily consist of cleaning rags used during facility maintenance activities, PPE used during monitoring activities, materials used during spill response activities, and mercury vapor filters used in the handling area. Mercury-contaminated waste would be disposed of in a RCRA-permitted hazardous waste disposal facility. In the event of spills, some mercury-contaminated waste could require additional treatment (i.e., retort) prior to disposal if the concentrations are above 260 mg/kg. Under the Proposed Action, this hazardous waste would be integrated into the existing, permitted waste streams managed at WCS and would be a small addition to those existing waste streams.

In the 2011 Mercury Storage EIS, DOE estimated that operations over a 40-year storage period would produce approximately 623,000 gallons of sanitary wastewater, or 15,575 gallons per year (DOE 2011, Appendix C, Table C-4). DOE expects that a similar amount of sanitary wastewater would be generated at WCS under the Proposed Action. This sanitary wastewater would be dependent on the number of additional employees above the current baseline workforce. Considering that WCS likely would not increase staff to support this effort, there would be no, or limited, increase in sanitary wastewater impacts for the Proposed Action.

4.4.9 Occupational and Public Health and Safety

The analysis of risk at WCS is similar to that presented in Section 4.2.9.1 and summarized below.

4.4.9.1 Normal Operations

Section 4.2.9.1 provides a discussion of the risks of normal operations that apply to all alternative sites evaluated in this SEIS-II. Consequences to the involved worker are predicted to be negligible because involved workers would not be exposed to airborne concentrations of mercury vapor above the ACGIH's 8-hour TWA/TLV of 0.025 milligram per cubic meter of mercury vapor. This corresponds to keeping exposures to the involved worker in the SL-I (negligible) range. This would be achieved by adherence to good operating practices, in particular attention to ventilation, inspection, monitoring, and use of PPE, as required by the applicable national consensus codes and standards. The design, installation, and operation of ventilation systems would be in accordance with applicable OSHA and NFPA standards and compliant with ASHRAE guidance. Therefore, under the Proposed Action, the risks to involved workers would be negligible during normal operations.

For people outside the building during normal operations (noninvolved workers and members of the public), a chronic, long-term release is bounded by consideration of a full spill tray under a pallet of 3-L flasks that remains undetected indefinitely (a highly conservative assumption given the expected inspection and monitoring activities within the storage building). The steady-state release from this source of mercury vapor is assumed to leak from the building and to be mixed into its turbulent building wake. Appendix B, Table B-9, shows that the predicted long-term average concentration in the building wake for existing buildings at WCS would be about 3.5×10^{-5} milligram per cubic meter. This is below EPA's RfC of 3.0×10^{-4} milligram per cubic meter. Hence, consequences would be in the SL-I range, and the risk to both noninvolved workers and the public would be negligible under the Proposed Action.

4.4.9.2 Facility Accidents

Section 4.2.9.1 provides a discussion of facility accident risks that apply to all alternative sites evaluated in this SEIS-II. Table 4-3 contains a summary of the alternative site accident scenarios that were included in the analysis. Appendix B, Section B.1, discusses the frequency of each of the accident scenarios. The analysis of the scenarios at WCS is similar to that for the same scenarios in Section 4.2.9.1. The estimated risks to workers and members of the public from onsite spill scenarios (inside or outside) are negligible to low (see Table B-12). The results vary from site to site depending on the size of the building and the building wake concentrations; however, the slight differences do not affect the SLs for each scenario; they are the same for each alternative. In the case of a beyond-design-basis earthquake that causes total building collapse, mercury concentrations in the immediate vicinity of the collapsed building could be in the SL-IV severity range, potentially affecting involved and noninvolved workers. However, as reported in the 2011 Mercury Storage EIS, if workers were to evacuate the area immediately following the earthquake event, consequence levels likely would be in the SL-II range. Because the distance to the closest public access from the proposed mercury storage facilities is 0.62 mile, the potential consequences and hence risks to members of the public would be in the SL-II to SL-I range under the Proposed Action.

4.4.9.3 Transportation

Section 4.2.9.1 describes the analysis of potential impacts of the transportation of up to 7,000 MT (7,700 tons) of elemental mercury over a 40-year period of analysis to WCS based on the analysis in the 2011 Mercury Storage EIS. As reported in Appendix B, Table B-3, of this SEIS-II, the total shipment distance (assuming all 7,000 MT were shipped to WCS) is 1,887,330 miles. The actual shipment miles would be much less under this alternative site because the estimated capacity of the CSB at WCS is 3,000 MT (see Table 2-4). As reported in Section 4.2.9.1, the estimated frequencies of accidents are similar to those presented in the 2011 EIS and 2013 SEIS. The potential consequences of the accident scenarios are the same as presented in the previous analyses. As a result, the potential transportation risks are no greater than those presented in those analyses. As reported in Section 4.2.9.1, this SEIS-II considers the following transportation accident scenarios:

- Crash with spill of elemental mercury onto the ground without fire;
- Crash with spill of elemental mercury into water;
- Crash with fire in dry weather conditions (without rain) (to analyze the effects of dry deposition); and
- Crash with fire in wet weather conditions (with rain) (to analyze the effects of wet deposition).

In summary, based on the analysis in the 2011 Mercury Storage EIS and described in Section 4.2.9.1:

- The risk to a member of the public from transportation spills onto the ground without fire en route to WCS would be negligible.
- Direct spillage of mercury into a body of water could be of concern if it is not cleaned up, but there is generally adequate time for such cleanup. Hence, the consequences to humans

could be managed so that they are negligible or low. Given this assumption and the fact that the frequency of crashes with spills on any of the transportation routes is no more than moderate (and this is an upper bound on the frequency of spills directly into water), the risk would be negligible or low for all transportation routes. However, because of the uncertainty about an accident that could occur near fast-flowing rivers, this observation should be tempered by noting that the uncertainty regarding this prediction of risk is very large.

- The analyses performed for the 2011 EIS showed that, under all fire scenarios, with and without rain, mercury deposited on the ground would never cause the benchmark of 180 milligrams per kilogram to be exceeded. Therefore, the corresponding risks would be negligible.

4.4.10 Socioeconomics

As discussed in Chapter 3, Section 3.3.10, of this SEIS-II, WCS employed approximately 100 people in 2020. Any additions to staff would be minor and easily accommodated by the existing labor force in the area. There would be negligible impacts on socioeconomic conditions, including overall employment, population trends, available housing, and other community services in the two-county ROI (Andrews in western Texas and Lea in southwestern New Mexico), under the Proposed Action.

4.4.11 Environmental Justice

Relative to the 2019 total population within the two-county ROI, the minority and low-income populations are 64.5 percent and 14.1 percent, respectively (see Chapter 3, Section 3.3.11). A population analysis in the 2011 Mercury Storage EIS found one minority population and no low-income populations within 10 miles of the WCS site and none within two miles. As discussed in Sections 4.4.9 and 4.2.10, implementing the Proposed Action at WCS would result in negligible offsite human health and ecological risks to both individuals and communities from mercury emissions during normal operations and accidents. Therefore, there would be no disproportionately high and adverse effects on minority or low-income populations under the Proposed Action at WCS.

4.4.12 Reasonably Foreseeable Environmental Trends or Planned Actions

As identified in Chapter 3, Section 3.3.12, WCS has applied to the NRC for a license to provide interim storage of up to 40,000 MTUs of commercial spent nuclear fuel. The potential impacts of this planned action are presented in the NRC's *Environmental Impact Statement for Interim Storage Partners LLC's License Application for a Consolidated Interim Storage Facility for Spent Nuclear Fuel in Andrews County, Texas* (NUREG-2239; NRC 2021). Chapter 5 of NUREG-2239 presents a detailed cumulative impacts analysis for the WCS ROI. The past, present, and reasonably foreseeable future projects identified in NUREG-2239 involve mining and oil and gas development; nuclear facilities; co-located disposal facilities; other commercial spent nuclear fuel storage facilities; solar, wind, and other energy projects; agriculture; recreation; housing and urban development; waste disposal facilities; and other projects. Because the potential environmental impacts under the Proposed Action in this SEIS-II would be negligible to small, any cumulative impacts for the resource areas identified in NUREG-2239 would not change from those presented in NUREG-2239. These potential cumulative impacts were determined to be either small or moderate for the following resource areas: land use, geology and soils, groundwater, air quality, noise, and visual resources.

4.5 BETHLEHEM APPARATUS

4.5.1 Land Use and Ownership, and Visual Resources

4.5.1.1 Land Use and Ownership

As described in Chapter 1, Section 1.2, of this SEIS-II, DOE has interpreted MEBA to authorize DOE to designate a storage facility or facilities at DOE-owned or -leased property. Accordingly, if DOE were to designate the Bethlehem Apparatus facility as its preferred alternative, DOE would acquire a leasehold interest in that facility. DOE would ensure that this lease agreement would afford DOE an appropriate level of responsibility and control over the facility.

Because storage and management of mercury in either Building 945 or 1055 would occur within existing operating buildings and these buildings are already permitted (or would be in the case of Building 1055) by the Commonwealth of Pennsylvania for hazardous waste storage, land use on either the Bethlehem Apparatus properties or surrounding properties would not be affected under the Proposed Action.

4.5.1.2 Visual Resources

Under the Proposed Action, there would be no new construction at the Bethlehem Apparatus site and operational activities would occur within existing buildings; there would be no impacts to visual resources.

4.5.2 Geology, Soils, and Geologic Hazards

4.5.2.1 Geology and Soils

Under the Proposed Action, there would be no new construction at the Bethlehem Apparatus site; there would be no additional impacts to geology and soils. Bethlehem Apparatus would follow standard best management practices for necessary maintenance and management of soils and the engineered landscape at the site.

4.5.2.2 Geologic Hazards

Pennsylvania is relatively free of earthquake activity, although some earthquakes are known to occur. As reported in Chapter 3, Section 3.4.2.2, the calculated PGA for the Bethlehem Apparatus site is approximately 0.10 *g*, which is a relatively low value in terms of seismicity and on the lower end of the range for the sites evaluated in this SEIS-II (0.05–0.62 *g*). Under the Proposed Action, storage and management of elemental mercury would occur in existing structures that were engineered and built to seismic design standards for the location. In addition, mercury storage locations within the facility would include robust storage containers and spill containment features to minimize impacts if an improbable earthquake were to result in a spill. Facility accidents as a result of an earthquake are discussed in Section 4.5.9.2.

Although subsidence, or sinkhole, features are fairly common in Pennsylvania, including the general vicinity of the Bethlehem Apparatus site, no sinkholes are known to exist at the site location.

4.5.3 Water Resources

4.5.3.1 Surface Water and Floodplains

No surface water features exist on the Bethlehem Apparatus site. As discussed in Chapter 2, Section 2.3.1, of this SEIS-II, concrete sealed floors and containment berms inside the potential storage buildings would prevent release of elemental mercury to outside surfaces where stormwater could convey the mercury to either offsite surface water or to groundwater. The Bethlehem Apparatus site is not in a designated floodplain and impacts from flooding are not expected.

4.5.3.2 Groundwater

Structural controls (sealed floors and containment berms) and operational procedures, as required by the existing hazardous waste permit, would prevent release of mercury. Groundwater would not be affected by normal operations of the facility. Under the Proposed Action, the storage and management of elemental mercury would be integrated into existing operations and any incremental increase in water use to support additional staff for mercury management would be negligible.

4.5.4 Air Quality and Noise

4.5.4.1 Air Quality

Under the Proposed Action, the management and storage of mercury in Buildings 945 and 1055 would be integrated into an existing operating facility that is permitted by the Pennsylvania Department of Environmental Protection Air Quality Program as a minor source of air emissions. Under normal mercury storage operations, there would be no activity that would create a measurable increase in non-mercury air emissions. As discussed in Appendix B, Section B.6.1.1, of this SEIS-II, and Appendix D, Section D.4.1.1, of the 2011 Mercury Storage EIS, exposures to mercury vapor could arise during normal operating conditions from small amounts of mercury vapor escaping from storage containers or residual contamination. These conservative analyses demonstrate that for a long-term, undetected slow leak, the predicted long-term average concentration in the wake of Buildings 945 and 1055 would be less than 4.54×10^{-5} and 5.04×10^{-5} mg/m^3, respectively (Table B-9) which is below the EPA's RfC of 3.0×10^{-4} mg/m^3, that is, below which health effects are considered negligible. Potential health impacts of mercury vapors from normal operations and accident scenarios are discussed in Appendix B and in Sections 4.5.9.1 and 4.5.9.2, respectively.

Under the Proposed Action, the transportation of mercury to Bethlehem Apparatus would generate vehicle emissions, including GHGs. The estimation of vehicle and GHG emissions is described in Section 4.3.4. Vehicle emissions of hydrocarbons, carbon monoxide, nitrogen oxides, and $PM_{2.5}$ over the 40-year period from transportation of mercury to Bethlehem Apparatus are 0.32, 2.38, 4.97, and 0.14 tons, respectively (Table 4-14). Total GHG emissions in CO_2e for the 40-year analysis period is 2004 tons, or approximately 50 tons per year. To put this in perspective, the national GHG emissions from heavy-duty trucks in 2019 was estimated to be 444 million MT (EPA 2021h). Therefore, under the Proposed Action, the annual average contribution from transportation of mercury to Bethlehem Apparatus would incrementally add about 0.00001 percent, which would be unlikely to measurably add to potential global climate change impacts. Additionally, because the Bethlehem Apparatus buildings are not in a floodplain and are constructed to meet building code requirements, they are mostly resilient to potential increases in severe weather related to global climate change.

4.5.4.2 Noise

Operation of a mercury storage facility at Bethlehem Apparatus is expected to have a negligible impact on noise levels, as most activity would occur inside existing buildings. Under the Proposed Action, short-term noise impacts from truck deliveries of mercury would not be discernible from existing levels of truck activity.

4.5.5 Ecological Resources

Potential impacts to terrestrial resources, aquatic resources and wetlands, and threatened or endangered and other protected species are discussed in Sections 4.5.5.1, 4.5.5.2, and 4.5.5.3, respectively. The risk to ecological receptors from potential releases of mercury from normal operations and accident scenarios at each alternative site, and the risk associated with accidental releases of mercury during transportation to each respective storage site is evaluated and discussed in Section 4.2.10.1.

4.5.5.1 Terrestrial Resources

The Bethlehem Apparatus site is a developed property with a few landscape trees and mown lawns with no native vegetation or habitat. Mercury storage would not cause any new landscape disturbances and terrestrial resources would not be affected under the Proposed Action.

4.5.5.2 Aquatic Resources and Wetlands

No wetlands or aquatic resources exist on the Bethlehem Apparatus site. Therefore, there would be no impacts to wetlands or aquatic habitats under the Proposed Action.

4.5.5.3 Threatened or Endangered and Other Protected Species

No threatened, endangered, or other protected species occur on the Bethlehem Apparatus site. During mercury storage operations, all activities other than truck deliveries of mercury would occur inside Building 945 or 1055. No impacts to any protected species are expected under the Proposed Action.

4.5.6 Cultural and Paleontological Resources

4.5.6.1 Prehistoric and Historic Resources

None of the city of Bethlehem's 19 NRHP-listed historic properties is located in the immediate vicinity of the Bethlehem Apparatus site; therefore, no impacts to the properties would occur under the Proposed Action. There are no known prehistoric cultural resources at the Bethlehem Apparatus site, and any potential unknown sites would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action. Similarly, because the Proposed Action at Bethlehem Apparatus would occur within existing buildings permitted for the storage of mercury, DOE has determined that this undertaking does not have the potential to cause effects on historic properties and DOE is not required to enter into consultation under Section 106 of the NHPA (36 CFR 800.3(a)(1)).

4.5.6.2 American Indian Resources

As discussed in Chapter 3, Section 3.4.6.2, there are no federally recognized tribes or reservation lands in Pennsylvania and no known tribal resources or TCPs in the immediate vicinity of the Bethlehem Apparatus site, and any potential unknown resources or TCPs would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action.

4.5.6.3 Paleontological Resources

As discussed in Chapter 3, Section 3.4.6.3, there are no known paleontological resources at the Bethlehem Apparatus site, and since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action, no impacts would occur under the Proposed Action.

4.5.7 Site Infrastructure

4.5.7.1 Ground Transportation

As discussed in Chapter 3, Section 3.4.9.3, Bethlehem Apparatus received or dispatched 557 shipments of hazardous waste in 2020. Under the Proposed Action, Bethlehem Apparatus would receive an annual average of 13 trucks containing elemental mercury, although the first few years could be higher (Chapter 2, Table 2-5). Therefore, operation of a proposed mercury storage facility on the Bethlehem Apparatus site under the Proposed Action would not appreciably increase demand on roads or impact local traffic.

4.5.7.2 Utilities

Bethlehem Apparatus receives water, electricity, and gas through local utility providers. Under the Proposed Action, mercury storage would be integrated into existing operating buildings; there would be no appreciable increase in demand for any utility services.

4.5.8 Waste Management

Bethlehem Apparatus is a RCRA Part B-permitted facility that routinely handles and processes mercury and mercury-containing materials. In the 2011 Mercury Storage EIS, DOE estimated that operations to store 10,000 MT of mercury would generate 910, 55-gallon drums of hazardous waste over 40 years (DOE 2011, Appendix C, Table C-4). Bethlehem Apparatus has the potential capacity to store 6,000 MT. Based on this storage capacity, it is estimated that approximately 546, 55-gallon drums of hazardous waste would be generated during the 40-year period of analysis, or about 14, 55-gallon drums, or 4 cubic yards, per year. This waste primarily would consist of cleaning rags used during facility maintenance activities, PPE used during monitoring activities, materials used during spill response activities, and mercury vapor filters used in the Handling Area. Mercury-contaminated waste would be disposed of in a RCRA-permitted hazardous waste disposal facility. In the event of spills, some mercury-contaminated waste could require additional treatment (i.e., retort) prior to disposal if the concentrations are above 260 mg/kg. Under the Proposed Action, this waste would be integrated into the existing permitted waste streams managed at the Bethlehem Apparatus facility and would be small compared to existing waste streams. No appreciable change to waste management processes are expected under the Proposed Action.

In the 2011 Mercury Storage EIS, DOE estimated that operations over a 40-year storage period would produce approximately 623,000 gallons of sanitary wastewater, or 15,575 gallons per year (DOE 2011, Appendix C, Table C-4). DOE expects that a similar amount of sanitary wastewater would be generated at Bethlehem Apparatus under the Proposed Action. This sanitary wastewater would be dependent on the number of additional employees above the current baseline workforce. Considering that Bethlehem Apparatus would have minimal to no increase in staff to support this effort, there would be limited to no increase in sanitary wastewater impacts for the Proposed Action, which would be handled by the existing City of Bethlehem's municipal wastewater treatment plant.

4.5.9 Occupational and Public Health and Safety

The analysis of risk at the Bethlehem Apparatus site is similar to that presented in Section 4.2.9.1 and summarized below.

4.5.9.1 Normal Operations

Section 4.2.9.1 provides a discussion of the risks of normal operations that apply to all alternative sites evaluated in this SEIS-II. Consequences to the involved worker are predicted to be negligible because involved workers would not be exposed to airborne concentrations of mercury vapor above the ACGIH's 8-hour TWA/TLV of 0.025 milligram per cubic meter of mercury vapor. This corresponds to keeping exposures to the involved worker in the SL-I (negligible) range. This would be achieved by adherence to good operating practices, in particular attention to ventilation, inspection, monitoring, and use of PPE, as required by the applicable national consensus codes and standards. The design, installation, and operation of ventilation systems would be in accordance with applicable OSHA and NFPA standards and compliant with ASHRAE guidance. Therefore, under the Proposed Action, the risks to involved workers would be negligible during normal operations.

For people outside the building during normal operations (noninvolved workers and members of the public), a chronic, long-term release is bounded by consideration of a full spill tray under a pallet of 3-L flasks that remains undetected indefinitely (a highly conservative assumption given the expected inspection and monitoring activities within the storage building). The steady-state release from this source of mercury vapor is assumed to leak from the building and to be mixed into its turbulent building wake. Appendix B, Table B-9, shows that the predicted long-term average concentration in the building wake for existing buildings at Bethlehem Apparatus would be as high as 5.04×10^{-5} milligram per cubic meter. This is below EPA's RfC of 3.0×10^{-4} milligram per cubic meter. Hence, consequences would be in the SL-I range, and the risk to both noninvolved workers and the public would be negligible under the Proposed Action.

4.5.9.2 Facility Accidents

Section 4.2.9.1 provides a discussion of facility accident risks that apply to all alternative sites evaluated in this SEIS-II. Table 4-3 contains a summary of the alternative site accident scenarios that were included in the analysis. Appendix B, Section B.1, discusses the frequency of each of the accident scenarios. The analysis of the scenarios at Bethlehem Apparatus is similar to that for the same scenarios in Section 4.2.9.1. The estimated risks to workers and members of the public from onsite spill scenarios (inside or outside) are negligible to low (see Table B-12). The results vary from site to site depending on the size of the building and the building wake concentrations; however, the slight differences do not affect the SLs for each scenario; they are the same for each alternative site. In the case of an extremely unlikely beyond-design-basis earthquake that causes total building collapse, mercury concentrations in the immediate vicinity of the collapsed building could be in the SL-IV severity range, potentially affecting involved and noninvolved workers. Because the distance from the proposed mercury storage facilities to the site boundary (approximately 35 meters) and the closest business and residence is just over 100 meters, under the Proposed Action, members of the public could also be subject to potential mercury concentrations in the SL-III to SL-IV range. However, as reported in the 2011 Mercury Storage EIS and further documented in Appendix B, Section B.6.2.2, of this SEIS-II, if affected individuals (workers and members of the public) were to evacuate the area immediately following the earthquake event, consequence levels likely would be in the SL-II range. As discussed in Section 4.5.2.2, the risk of earthquake activity in this part of Pennsylvania is low. Additionally, the Bethlehem Apparatus facilities are existing buildings that are (or would be) permitted by the Commonwealth of Pennsylvania.

4.5.9.3 Transportation

Section 4.2.9.1 describes the analysis of potential impacts of the transportation of up to 7,000 MT (7,700 tons) of elemental mercury over a 40-year period of analysis to Bethlehem Apparatus based on the analysis in the 2011 Mercury Storage EIS. As reported in Table B-3, the total shipment distance (assuming all 7,000 MT were shipped to Bethlehem Apparatus) is 1,081,265 miles. The actual shipment miles would be less under this alternative site because the estimated capacity of the facilities at Bethlehem Apparatus is up to 6,000 MT (see Table 2-4). As reported in Section 4.2.9.1, the estimated frequencies of accidents are similar to those presented in the 2011 EIS and 2013 SEIS. The potential consequences of the accident scenarios are the same as presented in these previous analyses. As a result, the potential transportation risks are no greater than those presented in previous analyses. As reported in Section 4.2.9.1.3, this SEIS-II considers the following transportation accident scenarios:

- Crash with spill of elemental mercury onto the ground without fire;
- Crash with spill of elemental mercury into water;
- Crash with fire in dry weather conditions (without rain) (to analyze the effects of dry deposition); and
- Crash with fire in wet weather conditions (with rain) (to analyze the effects of wet deposition).

In summary, based on the analysis in the 2011 Mercury Storage EIS and described in Section 4.2.9.1:

- The risk to a member of the public from transportation spills onto the ground without fire en route to Bethlehem Apparatus would be negligible.
- Direct spillage of mercury into a body of water could be of concern if it is not cleaned up, but there is generally adequate time for such cleanup. Hence, the consequences to humans could be managed so that they are negligible or low. Given this assumption and the fact that the frequency of crashes with spills on any of the transportation routes is no more than moderate (and this is an upper bound on the frequency of spills directly into water), the risk would be negligible or low for all transportation routes. However, because of the uncertainty about an accident that could occur near fast-flowing rivers, this observation should be tempered by noting that the uncertainty regarding this prediction of risk is very large.
- The analyses performed for the 2011 EIS showed that, under all fire scenarios, with and without rain, mercury deposited on the ground would never cause the benchmark of 180 milligrams per kilogram to be exceeded. Therefore, the corresponding risks would be negligible.

4.5.10 Socioeconomics

As discussed in Chapter 3, Section 3.4.10, Bethlehem Apparatus employed 22 people in 2020. Under the Proposed Action, any additions to staff would be minor and easily accommodated by the existing labor force in the area. There would be negligible impacts on socioeconomic conditions, including overall employment, population trends, available housing, and other community services in the three-county ROI (Northampton, Lehigh, and Bucks), under the Proposed Action.

4.5.11 Environmental Justice

Relative to the 2019 total population within the three-county ROI for the Bethlehem Apparatus site, the minority and low-income populations are 24.4 percent and 7.9 percent, respectively. While there could be individual minority and/or low-income families living near the Bethlehem

Apparatus site, the site is currently permitted by the Commonwealth of Pennsylvania under RCRA for the storage and treatment of hazardous materials. The Proposed Action would not increase the human health risk beyond that approved as part of the RCRA permitting process. As discussed in Sections 4.5.9 and 4.2.10, implementing the Proposed Action at Bethlehem Apparatus would result in negligible offsite human health and ecological risks to both individuals and communities from mercury emissions during normal operations and most accidents. Potentially high and adverse consequences that would occur in the event of an extremely unlikely beyond-design-basis earthquake are described in Section 4.5.9.2 and Appendix B, Section B.6.2.2. Considering the probability of such an event, the potential risks associated with this extremely unlikely scenario are considered low. Therefore, there would be no disproportionately high and adverse effects on minority or low-income populations under the Proposed Action at Bethlehem Apparatus.

4.5.12 Reasonably Foreseeable Environmental Trends or Planned Actions

As identified in Chapter 3, Section 3.4.12, of this SEIS-II, there are no other reasonably foreseeable environmental trends or planned actions within the ROI that would have the potential for cumulative impacts with the Proposed Action other than the continued operation of the Bethlehem Apparatus facilities. As reported in Chapter 2, Section 2.3.3, of this SEIS-II, Bethlehem Apparatus currently operates RCRA-permitted facilities for storage and processing of mercury. The 935 Bethlehem Drive building includes a material sorting and preparation area with various safety and handling equipment, an enclosed and covered container storage area, six high-vacuum mercury retorts and associated equipment, a high-vacuum auto-feed retort system, a calomel (mercurous chloride) process area, a research and development laboratory, and a mercury amalgamation area (for mercury retirement). The 945 Bethlehem Drive building is primarily used for storage of incoming waste materials to be processed and materials that have been processed and are awaiting disposition. A mercury decanting operation in Building 945 treats mercury product prior to shipping off site.

Considering the negligible-to-low potential impacts of the Proposed Action, cumulative impacts within the Bethlehem Apparatus ROI would be represented by those associated with ongoing operations of the facility. Since Bethlehem Apparatus operates its facilities within the approved constraints of the State-issued RCRA permit, which would include any additional mercury stored under this Proposed Action, additional cumulative impacts would not be likely.

4.6 PERMA-FIX DIVERSIFIED SCIENTIFIC SERVICES, INC.

4.6.1 Land Use and Ownership, and Visual Resources

4.6.1.1 Land Use and Ownership

As described in Section 1.2, DOE has interpreted MEBA to authorize DOE to designate a storage facility or facilities at DOE-owned or -leased property. Accordingly, if DOE were to designate the Perma-Fix DSSI facility as its preferred alternative, DOE would acquire a leasehold interest in that facility. DOE would ensure that this lease agreement would afford DOE an appropriate level of responsibility and control over the facility. As identified in Chapter 2, Section 2.3.4, Perma-Fix DSSI is planning to build an additional building (referred to as the CSBU expansion) immediately adjacent to the CSBU as part of DSSI's corporate planning. Mercury storage in the Perma-Fix DSSI CSBU or CSBU expansion building could utilize that space for up to 40 years.

Because Perma-Fix DSSI is already permitted by the Tennessee Department of Environment and Conservation for hazardous waste storage, and storage and management of mercury would occur within existing or planned buildings within the confines of the site, land use on either the Perma-Fix DSSI property or surrounding properties would not be affected.

4.6.1.2 Visual Resources

The CSBU is an existing building that is not visible from Gallaher Road. The CSBU expansion, if implemented by Perma-Fix, is in an area away from the road and between the existing CSBU and the surrounding wooded area. Under the Proposed Action, there would be no impacts to visual resources.

4.6.2 Geology, Soils, and Geologic Hazards

4.6.2.1 Geology and Soils

Under the Proposed Action, there would be no new construction at the Perma-Fix DSSI site; there would be no additional impacts to geology and soils. Perma-Fix would follow standard best management practices for necessary maintenance and management of soils and the engineered landscape at the site.

4.6.2.2 Geologic Hazards

The Perma-Fix DSSI site is located in the fairly active East Tennessee Seismic Zone, although the zone has not recorded historical earthquakes with magnitude greater than five and the nearest capable faults are located 300 miles west. As reported in Chapter 3, Section 3.5.2.2, the calculated PGA for the Perma-Fix DSSI site is approximately 0.33 *g*. This is about in the middle of the range for the sites evaluated in this SEIS-II (0.05–0.62 *g*). Under the Proposed Action, storage and management of elemental mercury would occur in existing structures engineered and built to seismic design standards for the location. In addition, mercury storage locations within the facility would include robust storage containers and spill containment features to minimize impacts if an earthquake were to result in a spill. Facility accidents as a result of an earthquake are discussed in Section 4.6.9.2.

Although subsidence, or sinkhole, features are common across much of middle and eastern Tennessee, including the vicinity of the Perma-Fix DSSI site, no sinkholes are known to exist at the site location.

4.6.3 Water Resources

4.6.3.1 Surface Water and Floodplains

The Perma-Fix DSSI site does not contain natural surface waterbodies. As described in Chapter 3, Section 3.5.3.1, the site contains a 34,060-square-foot manmade stormwater detention pond that holds about 2.5 million gallons and collects runoff from the industrial facilities and paved areas.

Perma-Fix DSSI operates under a general NPDES permit for stormwater discharge and follows a stormwater pollution prevention plan and a spill prevention, control, and countermeasures plan. Structural and operational controls in the CSBU and CSBU expansion buildings would prevent mercury leaks or spills that could be carried by stormwater runoff. The detention pond also has a shutoff on the outfall as an additional control measure. Impacts to surface water are not expected under the Proposed Action. The Perma-Fix DSSI site is not located in a designated floodplain and impacts from flooding are not expected.

4.6.3.2 Groundwater

As described in the previous section, structural and operational controls would prevent mercury leaks or spills that could be carried by stormwater runoff. Because groundwater recharge occurs primarily through percolation of rainfall, impacts to groundwater are not expected under the Proposed Action.

4.6.4 Air Quality and Noise

4.6.4.1 Air Quality

Under the Proposed Action, the management and storage of mercury at Perma-Fix DSSI would be integrated into an existing operating facility that is permitted under a Title V operating permit. Under normal mercury storage operations, there would be no activity that would create a measurable increase in non-mercury air emissions. As discussed in Appendix B, Section B.6.1.1, of this SEIS-II, and Appendix D, Section D.4.1.1, of the 2011 Mercury Storage EIS, exposures to mercury vapor could arise during normal operating conditions from small amounts of mercury vapor escaping from storage containers or residual contamination. These conservative analyses demonstrate that for a long-term, undetected slow leak, the predicted long-term average concentration in the wake of the CSBU or CSBU expansion building would be approximately 1.31×10^{-4} mg/m^3 (Table B-9), which is below the EPA's RfC of 3.0×10^{-4} mg/m^3, that is, below which health effects are considered negligible. Potential health impacts of mercury vapors from normal operations and accident scenarios are discussed in Appendix B and in Sections 4.6.9.1 and 4.6.9.2, respectively.

Under the Proposed Action, the transportation of mercury to the Perma-Fix DSSI site would generate vehicle emissions, including GHG. The estimation of vehicle and GHG emissions is described in Section 4.3.4. Vehicle emissions of hydrocarbons, carbon monoxide, nitrogen oxides, and $PM_{2.5}$ over the 40-year analysis period from transportation of mercury to Perma-Fix DSSI are 0.38, 2.84, 5.93, and 0.17 tons, respectively (Table 4-14). Total estimated GHG emissions in CO_2e for the 40-year analysis period are 2,385 tons, or approximately 60 tons per year. To put this in perspective, the national GHG emissions from heavy-duty trucks in 2019 was estimated to be 444 million MT (EPA 2021h). Therefore, under the Proposed Action, the annual average contribution from transportation of mercury to Perma-Fix DSSI would incrementally add about 0.000013 percent, which would be unlikely to measurably add to potential global climate change impacts. Additionally, because the Perma-Fix DSSI facilities are not in a floodplain and are newly constructed to meet building code requirements, they are mostly resilient to potential increases in severe weather related to global climate change.

4.6.4.2 Noise

Operation of a mercury storage facility at Perma-Fix DSSI is expected to have negligible impact on noise levels, as most activity would occur inside existing buildings. Under the Proposed Action, short-term noise impacts from truck deliveries of mercury, about 13 per year, would not be discernible from daily traffic noise on Gallaher Road or from existing levels of onsite truck activity, which averages about 178 shipments per year.

4.6.5 Ecological Resources

Potential impacts to terrestrial resources, aquatic resources and wetlands, and threatened or endangered and other protected species are discussed in Sections 4.6.5.1, 4.6.5.2, and 4.6.5.3, respectively. The risk to ecological receptors from potential releases of mercury from normal operations and accident scenarios at each alternative site, and the risk associated with accidental releases of mercury during transportation to each respective storage site is evaluated and discussed in Section 4.2.10.1.

4.6.5.1 Terrestrial Resources

The mercury management and storage operation in the CSBU and CSB expansion buildings would occur within a developed area of the Perma-Fix DSSI property. No new land disturbance would occur, and therefore no terrestrial resources would be affected under the Proposed Action.

4.6.5.2 Aquatic Resources and Wetlands

No natural wetlands occur within the developed facilities. As discussed in Section 4.6.3.1, structural and operational controls would prevent release of mercury from the storage building and potential drainage to the stormwater detention basin. No impacts to aquatic resources or wetlands are expected under the Proposed Action.

4.6.5.3 Threatened or Endangered and Other Protected Species

Although several threatened or endangered species and other protected species potentially exist in the region surrounding the Perma-Fix DSSI site, habitat for none of these species exists within the site. Under the Proposed Action, all work would occur primarily within existing buildings. No impacts to either threatened or endangered species and other protected species are expected under the Proposed Action.

4.6.6 Cultural and Paleontological Resources

4.6.6.1 Prehistoric and Historic Resources

Of the 29 NRHP-listed historic properties in Roane County, four are located in Kingston, and none is located on the Perma-Fix DSSI site; therefore, no impacts to the properties would occur under the Proposed Action. There are no known prehistoric cultural resources at the Perma-Fix DSSI site, and any potential unknown sites would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action. Similarly, because the Proposed Action at Perma-Fix DSSI would occur within an existing building permitted for storage of mercury, DOE has determined that this undertaking does not have the potential to cause effects on historic properties and DOE is not required to enter into consultation under Section 106 of the NHPA (36 CFR 800.3(a)(1)).

4.6.6.2 American Indian Resources

As reported in Chapter 3, Section 3.5.6.2, there are no federally recognized tribes or reservation lands in Tennessee and no known tribal resources or TCPs in the immediate vicinity of the Perma-Fix DSSI site, and any potential unknown resources or TCPs would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action.

4.6.6.3 Paleontological Resources

As reported in Chapter 3, Section 3.5.6.3, there are no known paleontological resources at the Perma-Fix DSSI site, and any potential unknown paleontological resources would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action.

4.6.7 Site Infrastructure

4.6.7.1 Ground Transportation

As discussed in Chapter 3, Section 3.5.9.3, Perma-Fix DSSI receives or dispatches about 178 shipments per year of radiological or hazardous material. Under the Proposed Action, the DOE-designated facility would receive an annual average of 13 trucks containing elemental mercury, although the first few years could be higher (Chapter 2, Table 2-5). Therefore, operation of the mercury storage facility on the Perma-Fix DSSI site under the Proposed Action would not appreciably increase demand on roads or impact local traffic.

4.6.7.2 Utilities

Perma-Fix DSSI receives water, electricity, and natural gas through local utility providers. Under the Proposed Action, mercury storage would be integrated into existing operating buildings; there would be no appreciable increase in demand for any utility service.

4.6.8 Waste Management

Perma-Fix DSSI is a RCRA-permitted hazardous treatment facility that handles and processes hazardous materials. In the 2011 Mercury Storage EIS, DOE estimated that operations to store 10,000 MT of mercury would generate 910, 55-gallon drums of hazardous waste over the 40-year period of analysis (DOE 2011, Appendix C, Table C-4). Perma-Fix DSSI has the potential capacity to store 3,000 MT, or 70-percent less than the 2011 estimate. Therefore, the amount of waste generated is expected to be about 30 percent of the 2011 estimate, or 273, 55-gallon drums of hazardous waste. This volume equates to an average annual generation rate of about seven 55-gallon drums, or approximately two cubic yards of hazardous waste. This waste would primarily consist of cleaning rags used during facility maintenance activities, PPE used during monitoring activities, materials used during spill response activities, and mercury vapor filters used in the

Handling Area. Mercury-contaminated waste would be disposed of in a RCRA-permitted hazardous waste disposal facility. In the event of spills, some mercury-contaminated waste could require additional treatment (i.e., retort) prior to disposal if the concentrations are above 260 mg/kg. Under the Proposed Action, this hazardous waste would be integrated into the existing, permitted waste streams managed at Perma-Fix DSSI and would be a small addition to those existing waste streams.

In the 2011 Mercury Storage EIS, DOE estimated that operations over a 40-year storage period would produce approximately 623,000 gallons of sanitary wastewater, or 15,575 gallons per year (DOE 2011, Appendix C, Table C-4). DOE expects that a similar amount of sanitary wastewater would be generated at Perma-Fix DSSI under the Proposed Action. This sanitary wastewater would be dependent on the number of additional employees above the current baseline workforce. Considering that Perma-Fix DSSI would have minimal to no increase in staff to support this effort, there would be limited to no increase in sanitary wastewater impacts for the Proposed Action, which would be handled by the existing City of Kingston municipal wastewater treatment plant.

4.6.9 Occupational and Public Health and Safety

The analysis of risk at the Perma-Fix DSSI site is similar to that presented in Section 4.2.9.1 and summarized below.

4.6.9.1 Normal Operations

Section 4.2.9.1 provides a discussion of the risks of normal operations that apply to all alternative sites evaluated in this SEIS-II. Consequences to the involved worker are predicted to be negligible because involved workers would not be exposed to airborne concentrations of mercury vapor above the ACGIH’s 8-hour TWA/TLV of 0.025 milligram per cubic meter of mercury vapor. This corresponds to keeping exposures to the involved worker in the SL-I (negligible) range. This would be achieved by adherence to good operating practices, in particular attention to ventilation, inspection, monitoring, and use of PPE, as required by the applicable national consensus codes and standards. The design, installation, and operation of ventilation systems would be in accordance with applicable OSHA and NFPA standards and compliant with ASHRAE guidance. Therefore, under the Proposed Action, the risks to involved workers would be negligible during normal operations.

For people outside the building during normal operations (noninvolved workers and members of the public), a chronic, long-term release is bounded by consideration of a full spill tray under a pallet of 3-L flasks that remains undetected indefinitely (a highly conservative assumption given the expected inspection and monitoring activities within the storage building). The steady-state release from this source of mercury vapor is assumed to leak from the building and to be mixed into its turbulent building wake. Appendix B, Table B-9, shows that the predicted long-term average concentration in the building wake for existing buildings at Perma-Fix DSSI would be about 1.31×10^{-4} milligram per cubic meter. This is below EPA’s RfC of 3.0×10^{-4} milligram per cubic meter. Hence, consequences would be in the SL-I range, and the risk to both noninvolved workers and the public would be negligible under the Proposed Action.

4.6.9.2 Facility Accidents

Section 4.2.9.1 provides a discussion of facility accident risks that apply to all alternative sites evaluated in this SEIS-II. Table 4-3 contains a summary of the alternative site accident scenarios that were included in the analysis. Appendix B, Section B.1, discusses the frequency of each of the accident scenarios. The analysis of the scenarios at Perma-Fix DSSI is similar to that for the same scenarios in Section 4.2.9.1. The estimated risks to workers and members of the public from onsite spill scenarios (inside or outside) are negligible to low (see Table B-12). The results vary from site to site depending on the size of the building and the building wake concentrations; however, the slight differences do not affect the SLs for each scenario; they are the same for each alternative. In the case of a beyond-design-basis earthquake that causes total building collapse, mercury concentrations in the immediate vicinity of the collapsed building could be in the SL-IV severity range, potentially affecting involved and non-involved workers. However, as reported in the 2011 Mercury Storage EIS, if workers were to evacuate the area immediately following the earthquake event, consequence levels likely would be in the SL-II range. Because the distance from the proposed mercury storage facilities to the nearest public access is approximately 820 feet, the potential consequences and hence risks to members of the public would be in the SL-II range under the Proposed Action.

4.6.9.3 Transportation

Section 4.2.9.1 describes the analysis of potential impacts of the transportation of up to 7,000 MT (7,700 tons) of elemental mercury over a 40-year period of analysis to Perma-Fix DSSI based on the analysis in the 2011 Mercury Storage EIS. As reported in Table B-3 in Appendix B of this SEIS-II, the total shipment distance (assuming all 7,000 MT were shipped to Perma-Fix DSSI) is 1,289,695 miles. The actual shipment miles would be much less under this alternative site because the estimated capacity of the facilities at Perma-Fix DSSI is 3,000 MT (see Table 2-4). As reported in Section 4.2.9.1, the estimated frequencies of accidents are similar to those presented in the 2011 EIS and 2013 SEIS. The potential consequences of the accident scenarios are the same as presented in these previous analyses. As a result, the potential transportation risks are no greater than those presented in the previous analyses. As reported in Section 4.2.9.1, this SEIS-II considers the following transportation accident scenarios:

- Crash with spill of elemental mercury onto the ground without fire;
- Crash with spill of elemental mercury into water;
- Crash with fire in dry weather conditions (without rain) (to analyze the effects of dry deposition); and
- Crash with fire in wet weather conditions (with rain) (to analyze the effects of wet deposition).

In summary, based on the analysis in the 2011 Mercury Storage EIS and described in Section 4.2.9.1:

- The risk to a member of the public from transportation spills onto the ground without fire en route to Perma-Fix DSSI would be negligible.

- Direct spillage of mercury into a body of water could be of concern if it is not cleaned up, but there is generally adequate time for such cleanup. Hence, the consequences to humans could be managed so that they are negligible or low. Given this assumption and the fact that the frequency of crashes with spills on any of the transportation routes is no more than moderate (and this is an upper bound on the frequency of spills directly into water), the risk would be negligible or low for all transportation routes. However, because of the uncertainty about an accident that could occur near fast-flowing rivers, this observation should be tempered by noting that the uncertainty regarding this prediction of risk is very large.

- The analyses performed for the 2011 EIS showed that, under all fire scenarios, with and without rain, mercury deposited on the ground would never cause the benchmark of 180 milligrams per kilogram to be exceeded. Therefore, the corresponding risks would be negligible.

4.6.10 Socioeconomics

As reported in Chapter 3, Section 3.5.10, Perma-Fix DSSI employed 46 people in 2020. Under the Proposed Action, any additions to staff would be minor and easily accommodated by the existing labor force in the area. There would be negligible impacts on socioeconomic conditions, including overall employment, population trends, available housing, and other community services in the ROI (Roane County), under the Proposed Action.

4.6.11 Environmental Justice

Relative to the 2019 total population within the ROI for the Perma-Fix DSSI site, the minority and low-income populations are 7.5 percent and 14.6 percent, respectively. While there could be individual minority and/or low-income families living near the Perma-Fix DSSI site, as discussed in Sections 4.6.9 and 4.2.10, implementing the Proposed Action at Perma-Fix DSSI would result in negligible offsite human health and ecological risks to both individuals and communities from mercury emissions during normal operations and accidents. Therefore, there would be no disproportionately high and adverse effects on minority or low-income populations under the Proposed Action at Perma-Fix DSSI.

4.6.12 Reasonably Foreseeable Environmental Trends or Planned Actions

As identified in Chapter 3, Section 3.5.12, of this SEIS-II, Perma-Fix DSSI is planning to construct a CSBU expansion adjacent to the existing CSBU. Considering that the expansion would be constructed within the Perma-Fix DSSI fence line and would follow state guidelines for construction and permitting, construction-related environmental impacts would be expected to be minor. There are no other reasonably foreseeable environmental trends or planned actions within the ROI that would have the potential for cumulative impacts with the Proposed Action other than the continued operation of the Perma-Fix DSSI facilities (including the operation of the CSBU expansion) and the ongoing renewal of DSSI's hazardous waste permit. As reported in Chapter 2, Section 2.3.4, of this SEIS-II, Perma-Fix DSSI currently operates RCRA-permitted facilities that accept and treat low-level radioactive and mixed (hazardous and radioactive) wastes from offsite government (e.g., DOE) and commercial generators that are mandated for regulated treatment and disposal with unique consideration of radiological properties. A subset of these wastes includes radioactively contaminated mercury waste.

Considering the negligible-to-low potential impacts of the Proposed Action, cumulative impacts within the Perma-Fix DSSI ROI would be represented by those associated with ongoing operations of the facility. Since DSSI operates its facilities within the approved constraints of the State-issued RCRA permit, which would include any additional mercury stored under this Proposed Action, additional cumulative impacts would not be likely.

4.7 VEOLIA GUM SPRINGS

4.7.1 Land Use and Ownership, and Visual Resources

4.7.1.1 Land Use and Ownership

As described in Chapter 1, Section 1.2, of this SEIS-II, DOE has interpreted MEBA to authorize DOE to designate a storage facility or facilities at DOE-owned or -leased property. Accordingly, if DOE were to designate VGS as its preferred alternative, DOE would acquire a leasehold interest in that facility. DOE would ensure that this lease agreement would afford DOE an appropriate level of responsibility and control over the facility. Mercury storage in the VGS building could utilize that space for up to 40 years.

Because VGS is already permitted for hazardous waste treatment, storage, and disposal, storage and management of mercury within the existing VGS building would not affect land use on either the VGS site or surrounding properties.

4.7.1.2 Visual Resources

Under the Proposed Action, there would be no impacts to visual resources because mercury would be stored in an existing, operating building.

4.7.2 Geology, Soils, and Geologic Hazards

4.7.2.1 Geology and Soils

Under the Proposed Action, there would be no new construction at VGS; there would be no additional impacts to geology and soils. Veolia would follow standard best management practices for necessary maintenance and management of soils and the engineered landscape at the site.

4.7.2.2 Geologic Hazards

The Veolia site is located approximately 180 miles away from the seismically active New Madrid Seismic Zone, which does not pose a significant earthquake threat at VGS. Likewise, although the Enola Earthquake Swarm area is approximately 90 miles away from VGS, none of the earthquakes in that area exceeded magnitude 4.5 and characteristic future earthquakes are not likely to pose a significant threat at VGS. As reported in Chapter 3, Section 3.6.2.2, the calculated PGA for VGS is approximately 0.10 *g*, which is a relatively low value in terms of seismicity and on the lower end of the range for the sites evaluated in this SEIS-II (0.05–0.62 *g*). Under the Proposed Action, storage and management of elemental mercury would occur in existing structures that were engineered and built to seismic design standards for the location. In addition, mercury storage locations within the facility would include robust storage containers and spill containment features to minimize impacts if an earthquake were to result in a spill. Facility accidents as a result of an earthquake are discussed in Section 4.7.9.2 under occupational and public health and safety for VGS.

4.7.3 Water Resources

4.7.3.1 Surface Water and Floodplains

No naturally occurring surface water exists within the 75 acres of industrial facilities on VGS. As discussed in Chapter 2, Section 2.3.5, concrete-sealed floors and containment berms inside the potential storage buildings would prevent release of elemental mercury to outside surfaces where stormwater could convey the mercury to either offsite surface water or to groundwater. No impacts to surface water are expected under the Proposed Action. The industrial facilities within which mercury would be stored are not in a designated floodplain and impacts from flooding are not expected.

4.7.3.2 Groundwater

As described in the previous section, structural and operational controls would prevent mercury leaks or spills that could be carried by stormwater runoff. Because groundwater recharge occurs primarily through percolation of rainfall, impacts to groundwater are not expected under the Proposed Action.

4.7.4 Air Quality and Noise

4.7.4.1 Air Quality

Under the Proposed Action, the management and storage of mercury at VGS would be integrated into an existing operating facility that is permitted under a Title V air quality permit. Under normal mercury storage operations, there would be no activity that would create a measurable increase in non-mercury air emissions. As discussed in Appendix B, Section B.6.1.1, of this SEIS-II, and Appendix D, Section D.4.1.1, of the 2011 Mercury Storage EIS, exposures to mercury vapor could arise during normal operating conditions from small amounts of mercury vapor escaping from storage containers or residual contamination. These conservative analyses demonstrate that for a long-term, undetected slow leak, the predicted long-term average concentration in the wake of the VGS building would be approximately 5.39×10^{-5} mg/m^3 (Table B-9) which is below the EPA's RfC of 3.0×10^{-4} mg/m^3, that is, below which health effects are considered negligible. Because the mercury would be stored within a 75-acre controlled-access site, no public receptor would be exposed to mercury under normal operations. Potential health impacts of mercury vapors from normal operations and accident scenarios are discussed in Appendix B and in Sections 4.7.9.1 and 4.7.9.2, respectively.

Under the Proposed Action, the transportation of mercury to the VGS site would generate vehicle emissions, including GHGs. The estimation of vehicle and GHG emissions is described in Section 4.3.4. Vehicle emissions of hydrocarbons, carbon monoxide, nitrogen oxides, and $PM_{2.5}$ over the 40-year period from transportation of mercury to VGS are 0,47, 3.46, 7.22, and 0.21 tons, respectively (Table 4-14). Total estimated GHG emissions in CO_2e for the 40-year analysis period are 2,900 tons, or approximately 73 tons per year. To put this in perspective, the national GHG emissions from heavy-duty trucks in 2019 was estimated to be 444 million MT (EPA 2021h). Therefore, under the Proposed Action, the annual average contribution from transportation of mercury to VGS would incrementally add about 0.000016 percent, which would be unlikely to measurably add to potential global climate change impacts. Additionally, because the VGS facility is not in a floodplain and is constructed to meet building code requirements, it is mostly resilient to potential increases in severe weather related to global climate change.

4.7.4.2 Noise

Operation of a mercury storage facility at VGS is expected to have a negligible impact on noise levels, as most activity would occur inside existing buildings. Under the Proposed Action, short-term noise impacts from truck deliveries of mercury, about 13 per year, would not be discernible from existing levels of truck and rail deliveries, which in 2020 were about 3,500 shipments (see Section 3.6.9.3).

4.7.5 Ecological Resources

Potential impacts to terrestrial resources, aquatic resources and wetlands, and threatened or endangered and other protected species are discussed in Sections 4.7.5.1, 4.7.5.2, and 4.7.5.3, respectively. The risk to ecological receptors from potential releases of mercury from normal operations and accident scenarios at each alternative site, and the risk associated with accidental releases of mercury during transportation to each respective storage site is evaluated and discussed in Section 4.2.10.1.

4.7.5.1 Terrestrial Resources

No impacts to terrestrial resources are expected, as all mercury storage operations would occur within the existing 75-acre industrial facility site. No new land disturbances would occur under the Proposed Action.

4.7.5.2 Aquatic Resources and Wetlands

The 75-acre VGS industrial complex within which the mercury would be stored contains no aquatic resources or wetlands. Mercury storage would occur in existing buildings. No impacts to aquatic resources or wetlands are expected under the Proposed Action.

4.7.5.3 Threatened or Endangered and Other Protected Species

There is no suitable habitat within the 75-acre VGS industrial facilities for any of the threatened or endangered and other protected species that potentially occur in Clark County, Arkansas. No impacts to any protected species are expected under the Proposed Action.

4.7.6 Cultural and Paleontological Resources

4.7.6.1 Prehistoric and Historic Resources

Of the 40 NRHP-listed historic properties in Clark County, 23 are located in Arkadelphia, four miles away from the VGS site, and none is located on VGS; therefore, no impacts to the properties would occur under the Proposed Action. There are no known prehistoric cultural resources at VGS, and any potential unknown sites would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action. Similarly, because the Proposed Action at VGS would occur within an existing building permitted for storage of mercury, DOE has determined that this undertaking does not have the potential to cause effects on historic properties and DOE is not required to enter into consultation under Section 106 of the NHPA (36 CFR 800.3(a)(1)).

4.7.6.2 American Indian Resources

As reported in Chapter 3, Section 3.6.6.2, there are no federally recognized tribes or reservation lands in Arkansas and no known tribal resources or TCPs in the immediate vicinity of VGS, and any potential unknown resources or TCPs would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action.

4.7.6.3 Paleontological Resources

As reported in Chapter 3, Section 3.6.6.3, the rock formations in the vicinity of VGS are known for containing fossil remains; however, there are no known paleontological resources on VGS, and any potential unknown paleontological resources would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action.

4.7.7 Site Infrastructure

4.7.7.1 Ground Transportation

In 2020, VGS received approximately 3,500 shipments (truck and rail) of hazardous waste. The estimated average of about 13 truck shipments of mercury per year under the Proposed Action would not appreciably increase demand on roads or impact local traffic.

4.7.7.2 Utilities

Electrical power and water are provided by local utilities, and fuel is stored in aboveground tanks. Under the Proposed Action, mercury storage would be integrated into VGS' existing operations; there would be no measurable increase in demand for utility services or fuel needs.

4.7.8 Waste Management

VGS operates a RCRA Part B-permitted hazardous waste treatment and Subtitle C landfill disposal facility. In the 2011 Mercury Storage EIS, DOE estimated that operations to store 10,000 MT of mercury would generate 910, 55-gallon drums of hazardous waste over the 40-year period of analysis (DOE 2011, Appendix C, Table C-4). The amount of mercury to be stored has decreased by approximately 30 percent since the 2011 estimate. VGS has the capacity to store the 7,000 MT expected to be generated and stored. Therefore, the amount of waste generated is expected to be about 70 percent of that estimated in 2011, or 637, 55-gallon drums of hazardous waste. This volume equates to an average annual generation rate of 16, 55-gallon drums, or approximately 4.5 cubic yards of hazardous waste. This waste would primarily consist of cleaning rags used during facility maintenance activities, PPE used during monitoring activities, materials used during spill response activities, and mercury vapor filters used in the Handling Area. Mercury-contaminated waste would be disposed of in a RCRA-permitted hazardous waste disposal facility. In the event of spills, some mercury-contaminated waste could require additional treatment (i.e., retort) prior to disposal if the concentrations are above 260 mg/kg. Under the Proposed Action, this hazardous waste would be integrated into the existing, permitted waste streams managed at VGS and would be a small addition to those existing waste streams.

In the 2011 Mercury Storage EIS, DOE estimated that operations over a 40-year storage period would produce approximately 623,000 gallons of sanitary wastewater, or 15,575 gallons per year (DOE 2011, Appendix C, Table C-4). DOE expects that a similar amount of sanitary wastewater would be generated at VGS under the Proposed Action. This sanitary wastewater would be dependent on the number of additional employees above the current baseline workforce. Considering that VGS would have minimal to no increase in staff to support this effort, there would be limited to no increase in sanitary wastewater impacts for the Proposed Action.

4.7.9 Occupational and Public Health and Safety

The analysis of risk at the VGS site is similar to that presented in Section 4.2.9.1 and summarized below.

4.7.9.1 Normal Operations

Section 4.2.9.1 provides a discussion of the risks of normal operations that apply to all alternative sites evaluated in this SEIS-II. Consequences to the involved worker are predicted to be negligible because involved workers would not be exposed to airborne concentrations of mercury vapor above the ACGIH’s 8-hour TWA/TLV of 0.025 milligram per cubic meter of mercury vapor. This corresponds to keeping exposures to the involved worker in the SL-I (negligible) range. This would be achieved by adherence to good operating practices, in particular attention to ventilation, inspection, monitoring, and use of PPE, as required by the applicable national consensus codes and standards. The design, installation, and operation of ventilation systems would be in accordance with applicable OSHA and NFPA standards and compliant with ASHRAE guidance. Therefore, under the Proposed Action, the risks to involved workers would be negligible during normal operations.

For people outside the building during normal operations (noninvolved workers and members of the public), a chronic, long-term release is bounded by consideration of a full spill tray under a pallet of 3-L flasks that remains undetected indefinitely (a highly conservative assumption given the expected inspection and monitoring activities within the storage building). The steady-state release from this source of mercury vapor is assumed to leak from the building and to be mixed into its turbulent building wake. Appendix B, Table B-9, shows that the predicted long-term average concentration in the building wake for existing buildings at the VGS site would be about 5.39×10^{-5} milligram per cubic meter. This is below EPA's RfC of 3.0×10^{-4} milligram per cubic meter. Hence, consequences would be in the SL-I range, and the risk to both noninvolved workers and the public would be negligible under the Proposed Action.

4.7.9.2 Facility Accidents

Section 4.2.9.1 provides a discussion of facility accident risks that apply to all alternative sites evaluated in this SEIS-II. Table 4-3 contains a summary of the evaluated facility accident scenarios that were included in the analysis. Appendix B, Section B.1, discusses the frequency of each of the accident scenarios. The analysis of the scenarios at the VGS site is similar to that for the same scenarios in Section 4.2.9.1. The estimated risks to workers and members of the public from onsite spill scenarios (inside or outside) are negligible to low (see Table B-12). The results vary from site to site depending on the size of the building and the building wake concentrations; however, the slight differences do not affect the SLs for each scenario; they are the same for each alternative. In the case of a beyond-design-basis earthquake that causes total building collapse, mercury concentrations in the immediate vicinity of the collapsed building could be in the SL-IV severity range, potentially affecting involved and noninvolved workers. However, as reported in the 2011 Mercury Storage EIS, if workers were to evacuate the area immediately following the earthquake event, consequence levels likely would be in the SL-II range. Because the distance from the proposed mercury storage facilities on the VGS site to the nearest public access is approximately 1,000 feet, the potential consequences and hence risks to members of the public would be in the SL-II range under the Proposed Action.

4.7.9.3 Transportation

Section 4.2.9.1 describes the analysis of potential impacts of the transportation of up to 7,000 MT (7,700 tons) of elemental mercury over a 40-year period of analysis to VGS based on the analysis in the 2011 Mercury Storage EIS. As reported in Table B-3 in Appendix B of this SEIS-II, the total shipment distance (assuming all 7,000 MT were shipped to Veolia) is 1,571,380 miles. As reported in Section 4.2.9.1, the estimated frequencies of accidents are similar to those presented in the 2011 EIS and 2013 SEIS. The potential consequences of the accident scenarios are the same as presented in these previous analyses. As a result, the potential transportation risks are no greater than those presented in the previous analyses. As reported in Section 4.2.9.1, this SEIS-II considers the following transportation accident scenarios:

- Crash with spill of elemental mercury onto the ground without fire;
- Crash with spill of elemental mercury into water;
- Crash with fire in dry weather conditions (without rain) (to analyze the effects of dry deposition); and
- Crash with fire in wet weather conditions (with rain) (to analyze the effects of wet deposition).

In summary, based on the analysis in the 2011 Mercury Storage EIS and described in Section 4.2.9.1:

- The risk to a member of the public from transportation spills onto the ground without fire en route to VGS would be negligible.

- Direct spillage of mercury into a body of water could be of concern if it is not cleaned up, but there is generally adequate time for such cleanup. Hence, the consequences to humans could be managed so that they are negligible or low. Given this assumption and the fact that the frequency of crashes with spills on any of the transportation routes is no more than moderate (and this is an upper bound on the frequency of spills directly into water), the risk would be negligible or low for all transportation routes. However, because of the uncertainty about an accident that could occur near fast-flowing rivers, this observation should be tempered by noting that the uncertainty regarding this prediction of risk is very large.

- The analyses performed for the 2011 EIS showed that, under all fire scenarios, with and without rain, mercury deposited on the ground would never cause the benchmark of 180 milligrams per kilogram to be exceeded. Therefore, the corresponding risks would be negligible.

4.7.10 Socioeconomics

As reported in Chapter 3, Section 3.6.10, Veolia employed 90 people in 2020. Under the Proposed Action, any additions to staff would be minor and easily accommodated by the existing labor force in the area. There would be negligible impacts on socioeconomic conditions, including overall employment, population trends, available housing, and other community services in the ROI (Clark County), under the Proposed Action.

4.7.11 Environmental Justice

Relative to the 2019 total population within the ROI for VGS, the minority and low-income populations are 31.7 percent and 20.6 percent, respectively. While there could be individual minority and/or low-income families living near VGS, as discussed in Sections 4.7.9 and 4.2.10, implementing the Proposed Action at VGS would result in negligible offsite human health and ecological risks to both individuals and communities from mercury emissions during normal operations and accidents. Therefore, there would be no disproportionately high and adverse effects on minority or low-income populations under the Proposed Action at VGS.

4.7.12 Reasonably Foreseeable Environmental Trends or Planned Actions

As identified in Chapter 3, Section 3.6.12, of this SEIS-II, there are no other reasonably foreseeable environmental trends or planned actions within the ROI that would have the potential for cumulative impacts with the Proposed Action other than the continued operation of the VGS treatment and disposal facilities. As reported in Chapter 2, Section 2.3.5, of this SEIS-II, Veolia currently operates RCRA-permitted facilities that include two rotary kiln incinerators and a landfill.

Considering the negligible-to-low potential impacts of the Proposed Action, cumulative impacts within the VGS ROI would be represented by those associated with ongoing operations of the facilities. Since Veolia operates its facilities within the approved constraints of the State-issued RCRA permit, which would include any additional mercury stored under this Proposed Action, additional cumulative impacts would not be likely.

4.8 CLEAN HARBORS GRASSY MOUNTAIN

4.8.1 Land Use and Ownership, and Visual Resources

4.8.1.1 Land Use and Ownership

As described in Chapter 1, Section 1.2, DOE has interpreted MEBA to authorize DOE to designate a storage facility or facilities at DOE-owned or -leased property. Accordingly, if DOE were to designate Clean Harbors Grassy Mountain as its preferred alternative, DOE would acquire a leasehold interest in that facility. DOE would ensure that this lease agreement would afford DOE an appropriate level of responsibility and control over the facility. Mercury storage in the DFBWO building could utilize that space for up to 40 years.

Because Clean Harbors Grassy Mountain is already permitted for hazardous waste treatment, storage, and disposal, storage and management of mercury within the existing DFBWO building would not affect land use on either the Clean Harbors Grassy Mountain site or surrounding properties. Much of the surrounding land is owned by either the Federal or state government.

4.8.1.2 Visual Resources

The Clean Harbors Grassy Mountain site is located in an isolated area on the eastern edge of the Great Salt Lake Desert and is not visible from the nearest public highway (I-80), approximately seven miles away. No new construction would occur. Visual resources would not be affected.

4.8.2 Geology, Soils, and Geologic Hazards

4.8.2.1 Geology and Soils

Because there would be no new construction at the Clean Harbors Grassy Mountain site under the Proposed Action, there would be no additional impacts to geology and soils. Clean Harbors would follow standard best management practices for necessary maintenance and management of soils and the engineered landscape at the site.

4.8.2.2 Geologic Hazards

Although the Oquirrh Fault Zone in the mountains just east of the community of Tooele, Utah, has produced significant earthquakes in the past, no significant fault zones have been mapped in the immediate vicinity of the Clean Harbors Grassy Mountain site. As reported in Chapter 3, Section 3.7.2.2, the calculated PGA for the Grassy Mountain site is approximately 0.13 *g*, which is a relatively low value in terms of seismicity and on the lower end of the range for the sites evaluated in this SEIS-II (0.05–0.62 *g*). Under the Proposed Action, storage and management of elemental mercury would occur in existing structures that were engineered and built to seismic design standards for the location. In addition, mercury storage locations within the facility would include robust storage containers and spill containment features to minimize impacts if an earthquake were to result in a spill. Facility accidents as a result of an earthquake are discussed in Section 4.8.9.2 under occupational and public health and safety for the Grassy Mountain site.

4.8.3 Water Resources

4.8.3.1 Surface Water and Floodplains

No perennial surface water exists within or near the Clean Harbors Grassy Mountain site. The site is located on desert salt flats. As discussed in Chapter 2, Section 2.3.6.1, concrete-sealed floors and containment berms inside the potential storage building would prevent release of elemental mercury to outside surfaces. No impacts to surface water are expected under the Proposed Action. Per Section 3.7.3.1, the Grassy Mountain site is not located in a FEMA-designated 100-year floodplain and impacts from flooding are not expected.

4.8.3.2 Groundwater

As mentioned above, structural and operational controls would prevent release of mercury from the DFBWO building. Recharge to the saline aquifers is slow because annual precipitation is less than four inches. No impact to groundwater is expected under the Proposed Action.

4.8.4 Air Quality and Noise

4.8.4.1 Air Quality

Under the Proposed Action, the management and storage of mercury at Clean Harbors Grassy Mountain would be integrated into the existing DFBWO building. The Grassy Mountain site is permitted by the Utah Department of Environmental Quality, Division of Air Quality. Emissions are minor and typically limited to dust from regular site activities as well as from stabilization and solidification treatment of waste. Under normal mercury storage operations, there would be no activity that would create a measurable increase in non-mercury air emissions. Trucks delivering mercury may create a small amount of fugitive dust. As discussed in Appendix B, Section B.6.1.1, of this SEIS-II, and Appendix D, Section D.4.1.1, of the 2011 Mercury Storage EIS, exposures to mercury vapor could arise during normal operating conditions from small amounts of mercury vapor escaping from storage containers or residual contamination. These conservative analyses demonstrate that for a long-term, undetected slow leak, the predicted long-term average concentration in the wake of the DFBWO building would be approximately 6.63×10^{-5} mg/m^3 (Table B-9) which is below the EPA's RfC of 3.0×10^{-4} mg/m^3, that is, below which health effects are considered negligible. Because the Clean Harbors Grassy Mountain site is in a remote location and the storage building is within a 640-acre fenced area, there would be no public receptor for mercury releases under normal operations. Potential health impacts of mercury vapors from normal operations and accident scenarios are discussed in Appendix B and in Sections 4.8.9.1 and 4.8.9.2, respectively.

Under the Proposed Action, the transportation of mercury to the Grassy Mountain site would generate vehicle emissions, including GHGs. The estimation of vehicle and GHG emissions is described in Section 4.3.4. Vehicle emissions of hydrocarbons, carbon monoxide, nitrogen oxides, and $PM_{2.5}$ over the 40-year period from transportation of mercury to the Grassy Mountain site are 0.62, 4.63, 9.66, and 0.28 tons, respectively (Table 4-14). Total estimated GHG emissions in CO_2e for the 40-year analysis period are 3,869 tons or approximately 97 tons per year. To put this in perspective, the national GHG emissions from heavy duty trucks in 2019 was estimated to be 444 million MT (EPA 2021h). Therefore, under the Proposed Action, the annual average contribution from transportation of mercury to Clean Harbors Grassy Mountain would incrementally add about 0.000022 percent, which would be unlikely to measurably add to potential global climate change impacts. Additionally, because the Grassy Mountain facility is not in a FEMA-designated floodplain and is constructed to meet building code requirements, it is mostly resilient to potential increases in severe weather related to global climate change.

4.8.4.2 Noise

No noise impacts are expected under the Proposed Action. The Clean Harbors Grassy Mountain site is in a remote desert location with no permanent residence within 40 miles. The estimated 13 annual truck deliveries of mercury is relatively small compared to the 7,200 shipments received and dispatched in 2020.

4.8.5 Ecological Resources

Potential impacts to terrestrial resources, aquatic resources and wetlands, and threatened or endangered and other protected species are discussed in Sections 4.8.5.1, 4.8.5.2, and 4.8.5.3, respectively. The risk to ecological receptors from potential releases of mercury from normal operations and accident scenarios at each alternative site, and the risk associated with accidental releases of mercury during transportation to each respective storage site is evaluated and discussed in Section 4.2.10.1.

4.8.5.1 Terrestrial Resources

Land within the 640-acre Clean Harbors Grassy Mountain site has been completely disturbed to create landfill disposal cells for hazardous waste and support facilities (Figure 3-6). Mercury storage would occur in the existing DFBWO building that is surrounded by bare soil and hazardous waste landfill disposal cells. No terrestrial resources would be disturbed or impacted under the Proposed Action.

4.8.5.2 Aquatic Resources and Wetlands

No aquatic resources or wetlands exist on the Clean Harbors Grassy Mountain site and no impacts would occur under the Proposed Action.

4.8.5.3 Threatened or Endangered and Other Protected Species

There are no threatened or endangered species known to occur on the Clean Harbors Grassy Mountain site. The site is largely void of vegetation and contains no habitat for other protected species. There would be no impacts to threatened or endangered and other protected species under the Proposed Action.

4.8.6 Cultural and Paleontological Resources

4.8.6.1 Prehistoric and Historic Resources

Of the 29 NRHP-listed historic properties in Tooele County, one is located within one mile of the Clean Harbors Grassy Mountain site, and none is located on the Grassy Mountain site; therefore, no impacts to the properties would occur under the Proposed Action. There are no known prehistoric cultural resources at the Clean Harbors Grassy Mountain site, and any potential unknown sites would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action. Similarly, because the Proposed Action at Clean Harbors Grassy Mountain would occur within an existing building permitted for the storage of mercury, DOE has determined that this undertaking does not have the potential to cause effects on historic properties and DOE is not required to enter into consultation under Section 106 of the NHPA (36 CFR 800.3(a)(1)).

4.8.6.2 American Indian Resources

As reported in Chapter 3, Section 3.7.6.2, there are seven federally recognized tribes or reservation lands in Utah, with the closest tribe approximately 35 miles away from the Clean Harbors Grassy Mountain site. There are no known tribal resources or TCPs in the immediate vicinity of the Grassy Mountain site, and any potential unknown resources or TCPs would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action and

4.8.6.3 Paleontological Resources

As reported in Chapter 3, Section 3.7.6.3, there are no known paleontological resources at the Clean Harbors Grassy Mountain site, and any potential unknown paleontological resources would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action

4.8.7 Site Infrastructure

4.8.7.1 Ground Transportation

Access to the Clean Harbors Grassy Mountain site is from I-80. The approximately 7-mile paved road from the Interstate to the Grassy Mountain site is used primarily for site access with little local traffic. The estimated average of about 13 truck shipments of mercury per year under the Proposed Action would not appreciably increase demand on roads or impact local traffic when compared to the 7,200 shipments either received by or dispatched from the Grassy Mountain site in 2020.

4.8.7.2 Utilities

Under the Proposed Action, mercury storage would be integrated into the existing DFBWO building; there would be no measurable increase in demand for electrical power, water, or fuel.

4.8.8 Waste Management

The Clean Harbors Grassy Mountain site is a RCRA-permitted hazardous waste treatment, storage, and landfill disposal facility that handles and processes hazardous materials. In the 2011 Mercury Storage EIS, DOE estimated that operations to store 10,000 MT of mercury would generate 910, 55-gallon drums of hazardous waste over the 40-year period of analysis (DOE 2011, Appendix C, Table C-4). The Grassy Mountain site has the potential capacity to store 900 MT, or 9 percent of the 2011 estimate. Therefore, the amount of waste generated is expected to be about 91 percent less than the 2011 estimate, or 82, 55-gallon drums of hazardous waste. This volume equates to an average annual generation rate of about two 55-gallon drums, or approximately 0.6 cubic yard of hazardous waste. This waste would primarily consist of cleaning rags used during facility maintenance activities, PPE used during monitoring activities, materials used during spill response activities, and mercury vapor filters used in the Handling Area. Mercury-contaminated waste would be disposed of in a RCRA-permitted hazardous waste disposal facility. In the event of spills, some mercury-contaminated waste could require additional treatment (i.e., retort) prior to disposal if the concentrations are above 260 mg/kg. Under the Proposed Action, this hazardous waste would be integrated into the existing, permitted waste streams managed at Clean Harbors Grassy Mountain and would be a small addition to those existing waste streams.

In the 2011 Mercury Storage EIS, DOE estimated that operations over a 40-year storage period would produce approximately 623,000 gallons of sanitary wastewater, or 15,575 gallons per year (DOE 2011, Appendix C, Table C-4). DOE expects that this amount of sanitary wastewater would bound the amount generated at Clean Harbors Grassy Mountain. This sanitary wastewater would be dependent on the number of additional employees above the current baseline workforce. Considering that Grassy Mountain would have minimal to no increase in staff to support this effort, there would be limited to no increase in sanitary wastewater impacts for the Proposed Action.

4.8.9 Occupational and Public Health and Safety

The analysis of risk at the Clean Harbors Grassy Mountain site is similar to that presented in Section 4.2.9.1 and summarized below.

4.8.9.1 Normal Operations

Section 4.2.9.1 provides a discussion of the risks of normal operations that apply to all alternative sites evaluated in this SEIS-II. Consequences to the involved worker are predicted to be negligible because involved workers would not be exposed to airborne concentrations of mercury vapor above the ACGIH's 8-hour TWA/TLV of 0.025 milligram per cubic meter of mercury vapor. This corresponds to keeping exposures to the involved worker in the SL-I (negligible) range. This would be achieved by adherence to good operating practices, in particular attention to ventilation, inspection, monitoring, and use of PPE, as required by the applicable national consensus codes and standards. The design, installation, and operation of ventilation systems would be in accordance with applicable OSHA and NFPA standards and compliant with ASHRAE guidance. Therefore, under the Proposed Action, the risks to involved workers would be negligible during normal operations.

For people outside the building during normal operations (noninvolved workers and members of the public), a chronic, long-term release is bounded by consideration of a full spill tray under a pallet of 3-L flasks that remains undetected indefinitely (a highly conservative assumption given the expected inspection and monitoring activities within the storage building). The steady-state release from this source of mercury vapor is assumed to leak from the building and to be mixed into its turbulent building wake. Appendix B, Table B-9, shows that the predicted long-term average concentration in the building wake for existing buildings at the Clean Harbors Grassy Mountain site would be about 6.63×10^{-5} milligram per cubic meter. This is below EPA's RfC of 3.0×10^{-4} milligram per cubic meter. Hence, consequences would be in the SL-I range, and the risk to both noninvolved workers and the public would be negligible under the Proposed Action.

4.8.9.2 Facility Accidents

Section 4.2.9.1 provides a discussion of facility accident risks that apply to all alternative sites evaluated in this SEIS-II. Table 4-3 contains a summary of the evaluated facility accident scenarios that were included in the analysis. Appendix B, Section B.1, discusses the frequency of each of the accident scenarios. The analysis of the scenarios at Clean Harbors Grassy Mountain is similar to that for the same scenarios in Section 4.2.9.1. The estimated risks to workers and members of the public from onsite spill scenarios (inside or outside) are negligible to low (see Table B-12). The results vary from site to site depending on the size of the building and the building wake concentrations; however, the slight differences do not affect the SLs for each scenario; they are the same for each alternative. In the case of a beyond-design-basis earthquake that causes total building collapse, mercury concentrations in the immediate vicinity of the collapsed building could be in the SL-IV severity range, potentially affecting involved and noninvolved workers. However, as reported in the 2011 Mercury Storage EIS, if workers were to evacuate the area immediately following the earthquake event, consequence levels likely would be in the SL-II range. Because the distance to the closest public access from the proposed mercury storage facilities is over six miles, the potential consequences and hence risks to members of the public would be negligible under the Proposed Action.

4.8.9.3 Transportation

Section 4.2.9.1 describes the analysis of potential impacts of the transportation of up to 7,000 MT (7,700 tons) of elemental mercury over a 40-year period of analysis to Clean Harbors Grassy Mountain based on the analysis in the 2011 Mercury Storage EIS. As reported in Table B-3 in Appendix B of this SEIS-II, the total shipment distance (assuming all 7,000 MT were shipped to Grassy Mountain) is 2,101,570 miles. The actual shipment miles would be much less under this alternative site because the estimated capacity of the Grassy Mountain facility is 900 MT (see Table 2-4). As reported in Section 4.2.9.1, the estimated frequencies of accidents are similar to those presented in the 2011 EIS and 2013 SEIS. The potential consequences of the accident scenarios are the same as presented in these previous analyses. As a result, the potential transportation risks are no greater than those presented in the previous analyses. As reported in Section 4.2.9.1, this SEIS-II considers the following transportation accident scenarios:

- Crash with spill of elemental mercury onto the ground without fire;
- Crash with spill of elemental mercury into water;

- Crash with fire in dry weather conditions (without rain) (to analyze the effects of dry deposition); and
- Crash with fire in wet weather conditions (with rain) (to analyze the effects of wet deposition).

In summary, based on the analysis in the 2011 Mercury Storage EIS and described in Section 4.2.9.1:

- The risk to a member of the public from transportation spills onto the ground without fire en route to Clean Harbors Grassy Mountain would be negligible.
- Direct spillage of mercury into a body of water could be of concern if it is not cleaned up, but there is generally adequate time for such cleanup. Hence, the consequences to humans could be managed so that they are negligible or low. Given this assumption and the fact that the frequency of crashes with spills on any of the transportation routes is no more than moderate (and this is an upper bound on the frequency of spills directly into water), the risk would be negligible or low for all transportation routes. However, because of the uncertainty about an accident that could occur near fast-flowing rivers, this observation should be tempered by noting that the uncertainty regarding this prediction of risk is very large.
- The analyses performed for the 2011 EIS showed that, under all fire scenarios, with and without rain, mercury deposited on the ground would never cause the benchmark of 180 milligrams per kilogram to be exceeded. Therefore, the corresponding risks would be negligible.

4.8.10 Socioeconomics

As reported in Chapter 3, Section 3.7.10, Clean Harbors Grassy Mountain employed 28 people in 2020. Under the Proposed Action, any additions to staff would be minor and easily accommodated by the existing labor force in the area. There would be negligible impacts on socioeconomic conditions, including overall employment, population trends, available housing, and other community services in the three-county ROI (Tooele, Salt Lake, and Elko), under the Proposed Action.

4.8.11 Environmental Justice

Relative to the 2019 total population within the three-county ROI for the Clean Harbors Grassy Mountain site, the minority and low-income populations are 29.0 percent and 8.9 percent, respectively. While there could be individual minority and/or low-income families living near the Grassy Mountain site, as discussed in Sections 4.8.9 and 4.2.10, implementing the Proposed Action at Clean Harbors Grassy Mountain would result in negligible offsite human health and ecological risks to both individuals and communities from mercury emissions during normal operations and accidents. Therefore, there would be no disproportionately high and adverse effects on minority or low-income populations under the Proposed Action at Clean Harbors Grassy Mountain.

4.8.12 Reasonably Foreseeable Environmental Trends or Planned Actions

As identified in Chapter 3, Section 3.7.12, of this SEIS-II, the primary reasonably foreseeable planned actions are the continued operation of the Clean Harbors Grassy Mountain site under the current hazardous waste permit and the continued operations of the Energy*Solutions* disposal facility for radioactive (Class A) and hazardous waste. The Energy*Solutions* facility has a radioactive material license and hazardous waste permit granted by the Utah Department of Environmental Quality. Recently, Energy*Solutions* applied to the State of Utah for a license amendment for the potential development of a Federal Cell Facility at this facility. In April 2021, Energy*Solutions* submitted a license application to Utah Department of Environmental Quality to allow permanent disposal of DOE concentrated depleted uranium.

Considering the negligible-to-low potential impacts of the Proposed Action, cumulative impacts within the Clean Harbors Grassy Mountain ROI would be represented by those associated with ongoing operations of the Grassy Mountain and Energy*Solutions* facilities. Since both of these facilities operate within the approved constraints of their State-issued licenses and RCRA permits, additional cumulative impacts would be expected to remain within permit limits. If the Energy*Solutions* Federal Cell Facility were approved, traffic in the area could increase; however, because the number of shipments associated with the Proposed Action would be around thirteen shipments per year, its contribution to potential cumulative transportation impacts would be minor.

4.9 CLEAN HARBORS GREENBRIER

4.9.1 Land Use and Ownership, and Visual Resources

4.9.1.1 Land Use and Ownership

As described in Chapter 1, Section 1.2, DOE has interpreted MEBA to authorize DOE to designate a storage facility or facilities at DOE-owned or -leased property. Accordingly, if DOE were to designate Clean Harbors Greenbrier as its preferred alternative, DOE would acquire a leasehold interest in that facility. DOE would ensure that this lease agreement would afford DOE an appropriate level of responsibility and control over the facility. Mercury storage in the Greenbrier storage warehouse could utilize that space for up to 40 years.

Because Clean Harbors Greenbrier is permitted for hazardous waste storage, storage and management of mercury within the existing storage warehouse building would not affect land use on either the Greenbrier site or surrounding properties.

4.9.1.2 Visual Resources

No major modifications would be required on the Clean Harbors Greenbrier site to accept and store mercury. Therefore, no impacts to visual resources would occur under the Proposed Action.

4.9.2 Geology, Soils, and Geologic Hazards

4.9.2.1 Geology and Soils

Because there would be no new construction at the Clean Harbors Greenbrier site under the Proposed Action, there would be no additional impacts to geology and soils, including erosion, slope and drainage, and nearby prime farmland characteristics. Clean Harbors would follow standard best management practices for necessary maintenance and management of soils and the engineered landscape at the site.

4.9.2.2 Geologic Hazards

The Clean Harbors Greenbrier site is in a relatively quiet seismic area. As reported in Chapter 3, Section 3.8.2.2, the calculated PGA for the Greenbrier site is approximately 0.14 *g*, which is a relatively low value in terms of seismicity and on the lower end of the range for the sites evaluated in this SEIS-II (0.05–0.62 *g*). Under the Proposed Action, storage and management of elemental mercury would occur in existing structures that were engineered and built to seismic design standards for the location. In addition, mercury storage locations within the facility would include robust storage containers and spill containment features to minimize impacts if an earthquake were to result in a spill. Facility accidents as a result of an earthquake are discussed in Section 4.9.9.2.

Although subsidence, or sinkhole, features are common across much of north-central Tennessee, including in the vicinity of the Clean Harbors Greenbrier site, no sinkholes are known to exist at the site location.

4.9.3 Water Resources

4.9.3.1 Surface Water and Floodplains

The Clean Harbors Greenbrier site is a developed property that contains no surface water. Structural and operational controls in the storage warehouse would prevent the release of mercury to the exterior where it could mix with stormwater runoff. No impacts to surface water are expected under the Proposed Action. The Greenbrier site is not in a designated floodplain and impacts from flooding are not expected.

4.9.3.2 Groundwater

As described in the previous section, structural and operational controls would prevent mercury leaks or spills that could be carried by stormwater runoff. Because groundwater recharge occurs primarily through percolation of rainfall, impacts to groundwater are not expected under the Proposed Action.

4.9.4 Air Quality and Noise

4.9.4.1 Air Quality

Under the Proposed Action, the management and storage of mercury at Clean Harbors Greenbrier would be integrated into the existing storage warehouse building. The Greenbrier site is permitted for air emissions from bulk operations. Under normal mercury storage operations, there would be no activity that would create a measurable increase in non-mercury air emissions. As discussed in Appendix B, Section B.6.1.1, of this SEIS-II, and Appendix D, Section D.4.1.1, of the 2011 Mercury Storage EIS, exposures to mercury vapor could arise during normal operating conditions from small amounts of mercury vapor escaping from storage containers or residual contamination. These conservative analyses demonstrate that for a long-term, undetected slow leak, the predicted long-term average concentration in the wake of the storage warehouse building would be approximately 1.21×10^{-4} mg/m^3 (Table B-9) which is below the EPA's RfC of 3.0×10^{-4} mg/m^3, that is, below which health effects are considered negligible. Potential health impacts of mercury vapors from normal operating conditions and accident scenarios are discussed in Appendix B and in Sections 4.9.9.1 and 4.9.9.2, respectively.

Under the Proposed Action, the transportation of mercury to the Clean Harbors Greenbrier site would generate vehicle emissions, including GHGs. The estimation of vehicle and GHG emissions is described in Section 4.3.4. Vehicle emissions of hydrocarbons, carbon monoxide, nitrogen oxides, and $PM_{2.5}$ over the 40-year period of analysis from transportation of mercury to the Greenbrier site are 0.41, 3.02, 6.29, and 0.18 tons, respectively (see Table 4-14). Total estimated GHG emissions in CO_2e for the 40-year analysis period are 2,531 tons, or approximately 63 tons per year. To put this in perspective, the national GHG emissions from heavy-duty trucks in 2019 was estimated to be 444 million MT (EPA 2021h). Therefore, under the Proposed Action, the annual average contribution from transportation of mercury to Clean Harbors Greenbrier would incrementally add about 0.000014 percent, which would be unlikely to measurably add to potential global climate change impacts. Additionally, because the Greenbrier facility is not in a floodplain and is constructed to meet building code requirements, it is mostly resilient to potential increases in severe weather related to global climate change.

4.9.4.2 Noise

Under the Proposed Action, operations at Clean Harbors Greenbrier are expected to have a negligible impact on noise levels, as most activity would occur inside existing buildings. Short-term noise from truck deliveries of mercury, about 13 per year, would not be discernible from daily traffic or railroad noise on adjacent Old Greenbrier Pike, State Highway 41, and the Louisville & Nashville rail line or the approximately 700 annual shipments (receipts and dispatches) from the Greenbrier site.

4.9.5 Ecological Resources

Potential impacts to terrestrial resources, aquatic resources and wetlands, and threatened or endangered and other protected species are discussed in Sections 4.9.5.1, 4.9.5.2, and 4.9.5.3, respectively. The risk to ecological receptors from potential releases of mercury from normal operations and accident scenarios at each alternative site, and the risk associated with accidental releases of mercury during transportation to each respective storage site is evaluated and discussed in Section 4.2.10.1.

4.9.5.1 Terrestrial Resources

As discussed in Chapter 3, Section 3.8.5.1, approximately six acres surrounding the developed Clean Harbors Greenbrier facilities are mostly mown grass field with several landscape trees and a small stand (about one acre) of deciduous trees on the north side of the property. Under the Proposed Action, all mercury storage activities would occur within the developed portion of the Greenbrier site and no impacts to terrestrial resources would occur.

4.9.5.2 Aquatic Resources and Wetlands

No aquatic resources or wetlands occur on the Clean Harbors Greenbrier site, and no impacts to either aquatic habitats or wetlands would occur under the Proposed Action.

4.9.5.3 Threatened or Endangered and Other Protected Species

Because of the developed nature of the Clean Harbors Greenbrier site, no habitat for the three threatened or endangered bat species (gray, Indiana, and northern long-eared bat) that could occur in Robertson County exists on the site. Although a few migratory birds may use the perimeter of the Greenbrier site, none of the mercury storage activities under the Proposed Action, which would be mostly indoors, would impact any protected species. No impacts to threatened or endangered and other protected species are expected under the Proposed Action.

4.9.6 Cultural and Paleontological Resources

4.9.6.1 Prehistoric and Historic Resources

Of the 29 NRHP-listed historic properties in Robertson County, two are located within 1.5 miles of the Clean Harbors Greenbrier site, and none is located on the Greenbrier site; therefore, no impacts to the properties would occur under the Proposed Action. There are no known prehistoric cultural resources at the Greenbrier site, and any potential unknown sites would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action. Similarly, because the Proposed Action at Clean Harbors Greenbrier would occur within an existing building permitted for the storage of mercury, DOE has determined that this undertaking does not have the potential to cause effects on historic properties and DOE is not required to enter into consultation under Section 106 of the NHPA (36 CFR 800.3(a)(1).

4.9.6.2 American Indian Resources

As reported in Chapter 3, Section 3.8.6.2, there are no federally recognized tribes or reservation lands in Tennessee and no known tribal resources or TCPs in the immediate vicinity of the Clean Harbors Greenbrier site, and any potential unknown resources or TCPs would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action.

4.9.6.3 Paleontological Resources

As reported in Chapter 3, Section 3.8.6.3, the rock formations in the vicinity of the Clean Harbors Greenbrier site are known for containing fossil remains; however, there are no known paleontological resources at the Greenbrier site, and any potential unknown paleontological resources would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action.

4.9.7 Site Infrastructure

4.9.7.1 Ground Transportation

Under the Proposed Action, the estimated 13 shipments of mercury per year to the Clean Harbors Greenbrier site would have negligible impacts on roads and local traffic compared to the approximately 700 shipments that are currently received or dispatched from the site each year.

4.9.7.2 Utilities

Clean Harbors Greenbrier receives water, electricity, and natural gas through local utility providers. Under the Proposed Action, mercury storage would be integrated into existing operating buildings; there would be no appreciable increase in demand for any utility service.

4.9.8 Waste Management

Clean Harbor's Greenbrier site is a RCRA-permitted hazardous waste storage facility. In the 2011 Mercury Storage EIS, DOE estimated that operations to store 10,000 MT of mercury would generate 910, 55-gallon drums of hazardous waste over the 40-year period of analysis (DOE 2011, Appendix C, Table C-4). The Greenbrier site has the potential capacity to store 1,875 MT, or about 19 percent of the 2011 estimate. Therefore, the amount of waste generated is expected to be about 81-percent less than the 2011 estimate of 910, 55-gallon drums, or 170, 55-gallon drums of hazardous waste. This volume equates to an average annual generation rate of about 4.25, 55-gallon drums, or approximately 1.2 cubic yards of hazardous waste. This waste would primarily consist of cleaning rags used during facility maintenance activities, PPE used during monitoring activities, materials used during spill response activities, and mercury vapor filters used in the Handling Area. Mercury-contaminated waste would be disposed of in a RCRA-permitted hazardous waste disposal facility. In the event of spills, some mercury-contaminated waste could require additional treatment (i.e., retort) prior to disposal if the concentrations are above 260 mg/kg. Under the Proposed Action, this hazardous waste would be integrated into the existing, permitted waste streams managed at Clean Harbors Greenbrier and would be a small addition to those existing waste streams.

In the 2011 Mercury Storage EIS, DOE estimated that operations over a 40-year storage period would produce approximately 623,000 gallons of sanitary wastewater, or 15,575 gallons per year (DOE 2011, Appendix C, Table C-4). DOE expects that this amount of sanitary wastewater would bound the amount generated at Clean Harbors Greenbrier. This sanitary wastewater would be dependent on the number of additional employees above the current baseline workforce. Considering that Greenbrier would have minimal to no increase staff to support this effort, there would be limited to no increase in sanitary wastewater impacts for the Proposed Action, which would be handled by the existing White House Utility District's wastewater treatment plant.

4.9.9 Occupational and Public Health and Safety

The analysis of risk at the Clean Harbors Greenbrier site is similar to that presented in Section 4.2.9.1 and summarized below.

4.9.9.1 Normal Operations

Section 4.2.9.1 provides a discussion of the risks of normal operations that apply to all alternative sites evaluated in this SEIS-II. Consequences to the involved worker are predicted to be negligible because involved workers would not be exposed to airborne concentrations of mercury vapor above the ACGIH's 8-hour TWA/TLV of 0.025 milligram per cubic meter of mercury vapor. This corresponds to keeping exposures to the involved worker in the SL-I (negligible) range. This would be achieved by adherence to good operating practices, in particular attention to ventilation, inspection, monitoring, and use of PPE, as required by the applicable national consensus codes and standards. The design, installation, and operation of ventilation systems would be in accordance with applicable OSHA and NFPA standards and compliant with ASHRAE guidance. Therefore, the risks to involved workers would be negligible during normal operations.

For people outside the building during normal operations (noninvolved workers and members of the public), a chronic, long-term release is bounded by consideration of a full spill tray under a pallet of 3-L flasks that remains undetected indefinitely (a highly conservative assumption given the expected inspection and monitoring activities within the storage building). The steady-state release from this source of mercury vapor is assumed to leak from the building and to be mixed into its turbulent building wake. Appendix B, Table B-9, shows that the predicted long-term average concentration in the building wake for existing buildings at the Clean Harbors Greenbrier site would be about 1.21×10^{-5} milligram per cubic meter. This is below EPA's RfC of 3.0×10^{-4} milligrams per cubic meter. Hence, consequences would be in the SL-I range, and the risk to both noninvolved workers and the public would be negligible.

4.9.9.2 Facility Accidents

Section 4.2.9.1 provides a discussion of facility accident risks that apply to all alternative sites evaluated in this SEIS-II. Table 4-3 contains a summary of the alternative site accident scenarios that were included in the analysis. Appendix B, Section B.1, discusses the frequency of each of the accident scenarios. The analysis of the scenarios at Clean Harbors Greenbrier is similar to that for the same scenarios in Section 4.2.9.1. The estimated risks to workers and members of the public from onsite spill scenarios (inside or outside) are negligible to low (see Table B-12). The results vary from site to site depending on the size of the building and the building wake concentrations; however, the slight differences do not affect the SLs for each scenario; they are the same for each alternative. In the case of a beyond-design-basis earthquake that causes total building collapse, mercury concentrations in the immediate vicinity of the collapsed building could be in the SL-IV severity range, potentially affecting involved and noninvolved workers. Because the distance to the site boundary (40 meters) and the closest residence (140 meters) from the proposed mercury storage facilities are within the 200-meter threshold, members of the public could also be subject to potential mercury concentrations between SL-III and SL-IV (see Appendix B, Table B-11). However, as reported in the 2011 Mercury Storage EIS and further documented in Appendix B, Section B.6.2.2, of this SEIS-II, if affected individuals (workers and members of the public) were to evacuate the area immediately following the earthquake event, consequence levels likely would be in the SL-II range. As discussed in Section 4.9.2.2, the risk of earthquake activity in this part of Tennessee is low. Additionally, the Clean Harbors Greenbrier facility is an existing building that is permitted by the State of Tennessee.

4.9.9.3 Transportation

Section 4.2.9.1 describes the analysis of potential impacts of transportation of up to 7,000 MT (7,700 tons) of elemental mercury over a 40-year period of analysis to Clean Harbors Greenbrier based on the analysis in the 2011 Mercury Storage EIS. The actual shipment miles would be much less under this alternative site because the estimated capacity of the Greenbrier facility is 1,875 MT (see Table 2-4). As reported in Table B-3 in Appendix B of this SEIS-II, the total shipment distance (assuming all 7,000 MT were shipped to Greenbrier) is 1,369,330 miles. As reported in Section 4.2.9.1, the estimated frequencies of accidents are similar to those presented in the 2011 EIS and 2013 SEIS. The potential consequences of the accident scenarios are the same as presented in these previous analyses. As a result, the potential transportation risks are no greater than those presented in the previous analyses. As reported in Section 4.2.9.1, this SEIS-II considers the following transportation accident scenarios:

- Crash with spill of elemental mercury onto the ground without fire;
- Crash with spill of elemental mercury into water;
- Crash with fire in dry weather conditions (without rain) (to analyze the effects of dry deposition); and
- Crash with fire in wet weather conditions (with rain) (to analyze the effects of wet deposition).

In summary, based on the analysis in the 2011 Mercury Storage EIS and described in Section 4.2.9.1:

- The risk to a member of the public from transportation spills onto the ground without fire en route to Clean Harbors Greenbrier would be negligible.
- Direct spillage of mercury into a body of water could be of concern if it is not cleaned up, but there is generally adequate time for such cleanup. Hence, the consequences to humans could be managed so that they are negligible or low. Given this assumption and the fact that the frequency of crashes with spills on any of the transportation routes is no more than moderate (and this is an upper bound on the frequency of spills directly into water), the risk would be negligible or low for all transportation routes. However, because of the uncertainty about an accident that could occur near fast-flowing rivers, this observation should be tempered by noting that the uncertainty regarding this prediction of risk is very large.

- The analyses performed for the 2011 EIS showed that, under all fire scenarios, with and without rain, mercury deposited on the ground would never cause the benchmark of 180 milligrams per kilogram to be exceeded. Therefore, the corresponding risks would be negligible.

4.9.10 Socioeconomics

As reported in Chapter 3, Section 3.8.10, Clean Harbors Greenbrier employed 25 people in 2020. Under the Proposed Action any additions to staff would be minor and easily accommodated by the existing labor force in the area. There would be negligible impacts on socioeconomic conditions including, overall employment, population trends, available housing, and other community services in the two-county ROI (Robertson and Davidson), under the Proposed Action.

4.9.11 Environmental Justice

Relative to the 2019 total population within the two-county ROI for the Clean Harbors Greenbrier site, the minority and low-income populations are 41.2 percent and 12.4 percent, respectively. While there could be individual minority and/or low-income families living near the Greenbrier site, the site is currently permitted by the State of Tennessee under RCRA for the storage of hazardous materials. The Proposed Action would not increase the human health risk beyond that approved as part of the RCRA permitting process. As discussed in Sections 4.9.9 and 4.2.10, implementing the Proposed Action at Clean Harbors Greenbrier would result in negligible offsite human health and ecological risks to both individuals and communities from mercury emissions during normal operations and most accidents. Potentially high and adverse consequences that would occur in the event of an extremely unlikely beyond-design-basis earthquake are described in Section 4.9.9.2 and Appendix B, Section B.6.2.2. Considering the probability of such an event, the potential risks associated with this extremely unlikely scenario are considered low. Therefore, there would be no disproportionately high and adverse effects on minority or low-income populations under the Proposed Action at Clean Harbors Greenbrier.

4.9.12 Reasonably Foreseeable Environmental Trends or Planned Actions

As identified in Chapter 3, Section 3.8.12, of this SEIS-II, there are no other reasonably foreseeable environmental trends or planned actions within the ROI that would have the potential for cumulative impacts with the Proposed Action other than the continued operation of the Clean Harbors Greenbrier facility. As reported in Chapter 2, Section 2.3.6.2, of this SEIS-II, Clean Harbors currently operates the RCRA-permitted storage facility, which is currently permitted to store mercury.

Considering the negligible-to-low potential impacts of the Proposed Action, cumulative impacts within the Clean Harbors Greenbrier ROI would be represented by those associated with ongoing operations of the facility. Since Clean Harbors operates its facilities within the approved constraints of the State-issued RCRA permit, which would include any additional mercury stored under this Proposed Action, additional cumulative impacts would not be likely.

4.10 CLEAN HARBORS PECATONICA

4.10.1 Land Use and Ownership, and Visual Resources

4.10.1.1 Land Use and Ownership

As described in Chapter 1, Section 1.2, DOE has interpreted MEBA to authorize DOE to designate a storage facility or facilities at DOE-owned or -leased property. Accordingly, if DOE were to designate Clean Harbors Pecatonica as its preferred alternative, DOE would acquire a leasehold interest in that facility. DOE would ensure that this lease agreement would afford DOE an appropriate level of responsibility and control over the facility. Mercury storage at the Pecatonica site could utilize that space for up to 40 years.

Because Clean Harbors Pecatonica is permitted for hazardous waste storage, storage and management of mercury within the existing CSB1 and CSB2 buildings would not affect land use on either the Pecatonica site or surrounding properties.

4.10.1.2 Visual Resources

Mercury storage at the Clean Harbors Pecatonica site would occur in existing buildings. No change to or impacts to visual resources would occur under the Proposed Action.

4.10.2 Geology, Soils, and Geologic Hazards

4.10.2.1 Geology and Soils

Because there would be no new construction at the Clean Harbors Pecatonica site under the Proposed Action, there would be no additional impacts to geology and soils, including erosion, slope and drainage, and prime farmland and farmland of statewide importance characteristics. Clean Harbors would follow standard best management practices for necessary maintenance and management of soils and the engineered landscape at the site.

4.10.2.2 Geologic Hazards

The Clean Harbors Pecatonica site is in a relatively quiet seismic area. As discussed in Chapter 3, Section 3.9.2.2, the calculated PGA for the Pecatonica site is approximately 0.05 *g*, which is a low value in terms of seismicity and the lowest for the sites evaluated in this SEIS-II (0.05–0.62 *g*). Under the Proposed Action, storage and management of elemental mercury would occur in existing structures that were engineered and built to seismic design standards for the location. In addition, mercury storage locations within the facility would include robust storage containers and spill containment features to minimize impacts if an earthquake were to result in a spill. Facility accidents as a result of an earthquake are discussed in Section 4.10.9.2.

4.10.3 Water Resources

4.10.3.1 Surface Water and Floodplains

The Clean Harbors Pecatonica site is a developed property that contains no surface water. Structural and operational controls in the CSB1 and CSB2 buildings would prevent the release of mercury to the exterior where it could mix with stormwater runoff. No impacts to surface water are expected under the Proposed Action. The Pecatonica site is not in a designated floodplain and impacts from flooding are not expected.

4.10.3.2 Groundwater

As described in the previous section, structural and operational controls would prevent mercury leaks or spills that could be carried by stormwater runoff. Because groundwater recharge occurs primarily through percolation of rainfall, impacts to groundwater are not expected under the Proposed Action.

4.10.4 Air Quality and Noise

4.10.4.1 Air Quality

Under the Proposed Action, the management and storage of mercury at Clean Harbors Pecatonica would be integrated into the existing CSB1 and CSB2 buildings. The Pecatonica site is permitted for air emissions under the Illinois Registration of Smaller Sources program. Under normal mercury storage operations, there would be no activity that would create a measurable increase in non-mercury air emissions. As discussed in Appendix B, Section B.6.1.1, of this SEIS-II, and Appendix D, Section D.4.1.1, of the 2011 Mercury Storage EIS, exposures to mercury vapor could arise during normal operating conditions from small amounts of mercury vapor escaping from storage containers or residual contamination. These conservative analyses demonstrate that for a long-term, undetected slow leak, the predicted long-term average concentration in the wake of the CSB1 building would be approximately 2.02×10^{-4} mg/m^3 and 4.8×10^{-5} mg/m^3 for the CSB2 building (Table B-9), which are both below the EPA's RfC of 3.0×10^{-4} mg/m^3, that is, below which health effects are considered negligible. Potential health impacts of mercury vapors from normal operations and accident scenarios are discussed in Appendix B and in Sections 4.10.9.1 and 4.10.9.2, respectively.

Under the Proposed Action, the transportation of mercury to the Clean Harbors Pecatonica site would generate vehicle emissions, including GHGs. The estimation of vehicle and GHG emissions is described in Section 4.3.4. Vehicle emissions of hydrocarbons, carbon monoxide, nitrogen oxides, and $PM_{2.5}$ over the 40-year period from transportation of mercury to the Pecatonica site are 0.42 3.13, 6.53, and 0.19 tons, respectively (Table 4-14). Total estimated GHG emissions in CO_2e for the 40-year analysis period are 2,623 tons or approximately 66 tons per year. To put this in perspective, the national GHG emissions from heavy duty trucks in 2019 was estimated to be 444 million MT (EPA 2021h). Therefore, under the Proposed Action, the annual average contribution from transportation of mercury to Clean Harbors Pecatonica would incrementally add about 0.000015 percent, which would be unlikely to measurably add to potential global climate change impacts. Additionally, because the Pecatonica facilities are not in a floodplain and are constructed to meet building code requirements, they are mostly resilient to potential increases in severe weather related to global climate change.

4.10.4.2 Noise

Under the Proposed Action, operations at Clean Harbors Pecatonica is expected to have negligible impact on noise levels, as most activity would occur inside existing buildings including truck unloading in CSB2. Short-term noise from truck deliveries of mercury, about 13 per year, would not be discernible from the approximately 400 shipments (receipts and dispatches) from the Pecatonica site per year.

4.10.5 Ecological Resources

Potential impacts to terrestrial resources, aquatic resources and wetlands, and threatened or endangered and other protected species are discussed in Sections 4.10.5.1, 4.10.5.2, and 4.10.5.3, respectively. The risk to ecological receptors from potential releases of mercury from normal operations and accident scenarios at each alternative site, and the risk associated with accidental releases of mercury during transportation to each respective storage site is evaluated and discussed in Section 4.2.10.1.

4.10.5.1 Terrestrial Resources

As discussed in Chapter 3, Section 3.9.5.1, no natural vegetation remains on the Clean Harbors Pecatonica site, and areas not occupied by pavement or buildings are mown grass fields. The Pecatonica site is surrounded by agricultural cropland. All mercury storage activities would occur within the developed portion of the Pecatonica site and no impacts to terrestrial resources would occur under the Proposed Action.

4.10.5.2 Aquatic Resources and Wetlands

No aquatic resources or wetlands exist on the Clean Harbors Pecatonica site and no impacts to either aquatic habitats or wetlands would occur under the Proposed Action.

4.10.5.3 Threatened or Endangered and Other Protected Species

As discussed in Chapter 3, Section 3.9.5.3, no habitat exists on the Clean Harbors Pecatonica site for any of the four species listed as either threatened or endangered that could potentially occur in Winnebago County, Illinois. Habitat for migratory birds is limited because of the lack of habitat diversity. No impacts to threatened or endangered and other protected species are expected under the Proposed Action.

4.10.6 Cultural and Paleontological Resources

4.10.6.1 Prehistoric and Historic Resources

Of the 39 NRHP-listed historic properties in Winnebago County, one is located within two miles of the Clean Harbors Pecatonica site, none is located on the Pecatonica site; therefore, no impacts to the properties would occur under the Proposed Action. There are no known prehistoric cultural resources at the Pecatonica site, and any potential unknown sites would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action. Similarly, because the Proposed Action at Clean Harbors Pecatonica would occur within an existing building permitted for storage of mercury, DOE has determined that this undertaking does not have the potential to cause effects on historic properties and DOE is not required to enter into consultation under Section 106 of the NHPA (36 CFR 800.3(a)(1)).

4.10.6.2 American Indian Resources

As reported in Chapter 3, Section 3.9.6.2, there are no federally recognized tribes or reservation lands in Illinois and no known tribal resources or TCPs in the immediate vicinity of the Clean Harbors Pecatonica site, and any potential unknown resources or TCPs would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action.

4.10.6.3 Paleontological Resources

As reported in Chapter 3, Section 3.9.6.3, there are no known paleontological resources at the Clean Harbors Pecatonica site, and any potential unknown paleontological resources would not be impacted since mercury storage would occur within existing structures with no planned new construction or surface disturbance under the Proposed Action.

4.10.7 Site Infrastructure

4.10.7.1 Ground Transportation

The average number of annual shipments of hazardous waste from or to the Clean Harbors Pecatonica site is about 400 (Section 3.9.9.3). The addition of an average of about 13 annual shipments of mercury per year to the Pecatonica site under the Proposed Action would not appreciably impact roads or local traffic.

4.10.7.2 Utilities

Clean Harbors Pecatonica receives electricity through a local utility provider, water from onsite wells, and stores diesel fuel on site. Under the Proposed Action, mercury storage would be integrated into existing operations, and there would be no appreciable increase in demand for electricity, water, or fuel.

4.10.8 Waste Management

The Clean Harbor Pecatonica site has two RCRA-permitted waste storage buildings. In the 2011 Mercury Storage EIS, DOE estimated that operations to store 10,000 MT of mercury would generate 910, 55-gallon drums of hazardous waste over the 40-year period of analysis (DOE 2011, Appendix C, Table C-4). The Pecatonica site has the potential capacity to store all 7,000 MT of the mercury expected to be generated over the 40-year analysis period. This is 30-percent less than the 2011 estimate. Therefore, the amount of waste generated is expected to be about 70 percent of the 2011 estimate, or 637, 55-gallon drums of hazardous waste. This generation volume equates to an average annual generation rate of about 16, 55-gallon drums, or approximately 4.5 cubic yards of hazardous waste. This waste would primarily consist of cleaning rags used during facility maintenance activities, PPE used during monitoring activities, materials used during spill response activities, and mercury vapor filters used in the Handling Area. Mercury-contaminated waste would be disposed of in a RCRA-permitted hazardous waste disposal facility. In the event of spills, some mercury-contaminated waste could require additional treatment (i.e., retort) prior to disposal if the concentrations are above 260 mg/kg. Under the Proposed Action, this hazardous waste would be integrated into the existing, permitted waste streams managed at Clean Harbors Pecatonica and would be a small addition to those existing waste streams.

In the 2011 Mercury Storage EIS, DOE estimated that operations over a 40-year storage period would produce approximately 623,000 gallons of sanitary wastewater, or 15,575 gallons per year (DOE 2011, Appendix C, Table C-4). DOE expects that a similar amount of sanitary wastewater would be generated at Clean Harbors Pecatonica. This sanitary wastewater would be dependent on the number of additional employees above the current baseline workforce. Considering that Clean Harbors would add several staff to support this effort, there would be a small increase in sanitary wastewater impacts under the Proposed Action; however, these increases would be handled by the existing Village of Pecatonica's municipal wastewater treatment facility.

4.10.9 Occupational and Public Health and Safety

The analysis of risk at the Clean Harbors Pecatonica site is similar to that presented in Section 4.2.9.1 and summarized below.

4.10.9.1 Normal Operations

Section 4.2.9.1 provides a discussion of the risks of normal operations that apply to all alternative sites evaluated in this SEIS-II. Consequences to the involved worker are predicted to be negligible because involved workers would not be exposed to airborne concentrations of mercury vapor above the ACGIH's 8-hour TWA/TLV of 0.025 milligram per cubic meter of mercury vapor. This corresponds to keeping exposures to the involved worker in the SL-I (negligible) range. This would be achieved by adherence to good operating practices, in particular attention to ventilation, inspection, monitoring, and use of PPE, as required by the applicable national consensus codes and standards. The design, installation, and operation of ventilation systems would be in accordance with applicable OSHA and NFPA standards and compliant with ASHRAE guidance. Therefore, under the Proposed Action, the risks to involved workers would be negligible during normal operations.

For people outside the building during normal operations (noninvolved workers and members of the public), a chronic, long-term release is bounded by consideration of a full spill tray under a pallet of 3-L flasks that remains undetected indefinitely (a highly conservative assumption given the expected inspection and monitoring activities within the storage building). The steady-state release from this source of mercury vapor is assumed to leak from the building and to be mixed into its turbulent building wake. Appendix B, Table B-9, shows that the predicted long-term average concentration in the building wake for existing buildings at the Clean Harbors Pecatonica site would be up to 2.02×10^{-4} milligram per cubic meter. This is below EPA's RfC of 3.0×10^{-4}

milligrams per cubic meter. Hence, consequences would be in the SL-I range, and the risk to both noninvolved workers and the public would be negligible.

4.10.9.2 Facility Accidents

Section 4.2.9.1 provides a discussion of facility accident risks that apply to all alternative sites evaluated in this SEIS-II. Table 4-3 contains a summary of the alternative site accident scenarios that were included in the analysis. Appendix B, Section B.1, discusses the frequency of each of the accident scenarios. The analysis of the scenarios at Clean Harbors Pecatonica is similar to that for the same scenarios in Section 4.2.9.1. The estimated risks to workers and members of the public from onsite spill scenarios (inside or outside) are negligible to low (see Table B-12). The results vary from site to site depending on the size of the building and the building wake concentrations; however, the slight differences do not affect the SLs for each scenario; they are the same for each alternative. In the case of a beyond-design-basis earthquake that causes total building collapse, mercury concentrations in the immediate vicinity of the collapsed building could be in the SL-IV severity range, potentially affecting involved and noninvolved workers. Because the distance to the site boundary (127 meters) and the closest residence (190 meters) from the proposed mercury storage facilities are within the 200-meter threshold, members of the public could also be subject to potential mercury concentrations between SL-II and SL-III (see Appendix B, Table B-11). However, as reported in the 2011 Mercury Storage EIS and further documented in Appendix B, Section B.6.2.2, of this SEIS-II, if affected individuals (workers and members of the public) were to evacuate the area immediately following the earthquake event, consequence levels likely would be in the SL-II range. As discussed in Section 4.10.2.2, the risk of earthquake activity in this part of Illinois is low. Additionally, the Clean Harbors Pecatonica facilities are existing buildings that are permitted by the State of Illinois.

4.10.9.3 Transportation

Section 4.2.9.1 describes the analysis of potential impacts of the transportation of up to 7,000 MT (7,700 tons) of elemental mercury over a 40-year period of analysis to Clean Harbors Pecatonica based on the analysis in the 2011 Mercury Storage EIS. As reported in Table B-3 in Appendix B of this SEIS-II, the total shipment distance (assuming all 7,000 MT were shipped to Pecatonica) is 1,419,880 miles. As reported in Section 4.2.9.1, the estimated frequencies of accidents are similar to those presented in the 2011 Mercury Storage EIS and 2013 Mercury Storage SEIS. The potential consequences of the accident scenarios are the same as presented in these previous analyses. As a result, the potential transportation risks are no greater than those presented in the analyses. As reported in Section 4.2.9.1, this SEIS-II considers the following transportation accident scenarios:

- Crash with spill of elemental mercury onto the ground without fire;
- Crash with spill of elemental mercury into water;
- Crash with fire in dry weather conditions (without rain) (to analyze the effects of dry deposition); and

- Crash with fire in wet weather conditions (with rain) (to analyze the effects of wet deposition).

In summary, based on the analysis in the 2011 Mercury Storage EIS and described in Section 4.2.9.1:

- The risk to a member of the public from transportation spills onto the ground without fire en route to Clean Harbors Pecatonica would be negligible.

- Direct spillage of mercury into a body of water could be of concern if it is not cleaned up, but there is generally adequate time for such cleanup. Hence, the consequences to humans could be managed so that they are negligible or low. Given this assumption and the fact that the frequency of crashes with spills on any of the transportation routes is no more than moderate (and this is an upper bound on the frequency of spills directly into water), the risk would be negligible or low for all transportation routes. However, because of the uncertainty about an accident that could occur near fast-flowing rivers, this observation should be tempered by noting that the uncertainty regarding this prediction of risk is very large.

- The analyses performed for the 2011 EIS showed that, under all fire scenarios, with and without rain, mercury deposited on the ground would never cause the benchmark of 180 milligrams per kilogram to be exceeded. Therefore, the corresponding risks would be negligible.

4.10.10 Socioeconomics

As reported in Chapter 3, Section 3.9.10, Clean Harbors Pecatonica employed one person in 2020 due to limited operations. Under the Proposed Action, DOE expects that several staff members would be added and would easily be accommodated by the existing labor force in the area. There would be negligible impacts on socioeconomic conditions, including overall employment, population trends, available housing, and other community services in the two-county ROI (Winnebago and Stephenson), under the Proposed Action.

4.10.11 Environmental Justice

Relative to the 2019 total population within the two-county ROI for the Clean Harbors Pecatonica site, the minority and low-income populations are 30.4 percent and 15.5 percent, respectively. While there could be individual minority and/or low-income families living near the Pecatonica site, the site is currently permitted by the State of Illinois under RCRA for the storage of hazardous materials. The Proposed Action would not increase the human health risk beyond that approved as part of the RCRA permitting process. As discussed in Sections 4.10.9 and 4.2.10, implementing the Proposed Action at Clean Harbors Pecatonica would result in negligible offsite human health and ecological risks to both individuals and communities from mercury emissions during normal operations and most accidents. Potentially high and adverse consequences that would occur in the event of an extremely unlikely beyond-design-basis earthquake are described in Section 4.10.9.2 and Appendix B, Section B.6.2.2. Considering the probability of such an event, the potential risks associated with this extremely unlikely scenario are considered low. Therefore, there would be no disproportionately high and adverse effects on minority or low-income populations under the Proposed Action at Clean Harbors Pecatonica.

4.10.12 Reasonably Foreseeable Environmental Trends or Planned Actions

As identified in Chapter 3, Section 3.9.12, of this SEIS-II, there are no other reasonably foreseeable environmental trends or planned actions within the ROI that would have the potential for cumulative impacts with the Proposed Action other than the continued operation of the Clean Harbors Pecatonica facility. As reported in Chapter 2, Section 2.3.6.3, of this SEIS-II, Clean Harbors currently operates two RCRA-permitted container storage buildings at the Pecatonica site for mercury storage: CSB-1, with a permitted capacity of 48,125 gallons, and CSB-2, with a permitted capacity of 240,680 gallons.

Considering the negligible-to-low potential impacts of the Proposed Action, cumulative impacts within the Clean Harbors Pecatonica ROI would be represented by those associated with ongoing operations of the facility. Since Clean Harbors operates its facilities within the approved constraints of the State-issued RCRA permit, which would include any additional mercury stored under this Proposed Action, additional cumulative impacts would not be likely.

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Doug Tonkay	M.S., Nuclear Engineering B.S., Nuclear Engineering Over 40 years of experience	DOE-EM Office of Waste Disposal, Director

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Name	Education/Expertise	Responsibility
Joseph Rivers	B.S., Mechanical Engineering Over 39 years of experience	SEIS-II Project Manager Resource Analyst: occupational and public health and safety
Joanne Stover	B.S., Business Administration Over 25 years of experience	Technical Editor, Administrative Record coordinator
Greg Fasano	M.B.A., Business Administration B.S., Geology Over 39 years of experience	Resource Analyst: geology and soils, cultural and paleontological resources, American Indian resources, socioeconomics, environmental justice
Ron Green	Ph.D., Zoology M.S., Wildlife Biology B.S., Wildlife Biology Over 35 years of experience	Resource Analyst: land use and visual resources, air quality, water resources, ecological resources, site infrastructure, waste management, data call coordination
Larry Saraka	M.A., Geology Over 30 years of experience	Mercury program management, technical review
Jay Roach	Ph.D., Mechanical Engineering M.S., Chemical Engineering B.S., Chemical Engineering Over 44 years of experience	Elemental mercury storage facility structural and HVAC requirements, packaging/palletizing approach, waste acceptance criteria
Mark Janaskie	B.A., Biology Over 36 years of experience	Program Manager for the current EM-HQ program support contract. Experience in waste management, RCRA regulatory compliance, and long-term disposition of DOE excess contaminated facilities
Steve Loftus	M.B.A., Business Administration B.S., Geology Over 37 years of experience	Program management, life-cycle strategic planning, and financial analysis.

7 GLOSSARY

accident	An unplanned sequence of events resulting in undesirable consequences, such as the release of hazardous material to the environment.
active fault	A fault that is likely to have another earthquake sometime in the future. Faults are commonly considered to be active if they have moved one or more times in the last 10,000 years. In assessing seismic hazard as part of the U.S. Geological Survey's National Earthquake Hazard Reduction Program, faults for which there is surface evidence of tectonic activity during the Quaternary Period are considered active.
acute	Severe but of short duration; not chronic.
Acute Exposure Guideline Levels (AEGLs)	Threshold values published by the National Research Council and National Academy of Sciences for use in chemical emergency planning, prevention, and response programs. AEGLs represent threshold exposure limits for the general population, including susceptible individuals, and are developed for exposure periods of 10 minutes, 30 minutes, 1 hour, 4 hours, and 8 hours. AEGL values are defined for varying degrees of severity of toxic effects, as follows:
AEGL-1	The airborne level of concentration of a substance above which the exposed population could experience notable discomfort, irritation, or certain asymptomatic nonsensory effects. However, the effects would not be disabling and would be transient and reversible upon cessation of exposure.
AEGL-2	The airborne level of concentration of a substance above which the exposed population could experience irreversible or other serious, long-lasting adverse health effects or an impaired ability to escape.
AEGL-3	The airborne level of concentration of a substance above which the exposed population could experience life-threatening health effects or death.
air pollutant	Generally, an airborne substance that could, in high-enough concentrations, harm living things or cause damage to materials. From a regulatory perspective, an air pollutant is a substance for which emissions or atmospheric

	concentrations are regulated or for which maximum guideline levels have been established due to potential harmful effects on human health and welfare.
air quality	The cleanliness of the air as measured by the levels of pollutants relative to the standards or guideline levels established to protect human health and welfare. Air quality is often expressed in terms of the pollutant for which concentrations are the highest percentage of a standard (e.g., air quality may be unacceptable if the level of one pollutant is 150 percent of its standard, even if levels of other pollutants are well below their respective standards).
alluvium (alluvial)	Unconsolidated, poorly sorted detrital sediments, ranging from clay to gravel sizes, deposited by streams.
ambient	Surrounding.
ambient air	The atmosphere around people, plants, and structures.
ambient air quality standards	Regulations prescribing the levels of airborne pollutants that may not be exceeded during a specified time in a defined area.
aquatic	Living or growing in, on, or near water.
aquifer	An underground geologic formation, group of formations, or part of a formation capable of yielding a significant amount of water to wells or springs.
archaeological site	Any location where humans have altered the terrain or discarded artifacts during prehistoric or historic times.
artifact	An object produced or shaped by human beings and of archaeological or historic interest.
atmospheric dispersion	The distribution of pollutants from their source into the atmosphere by wind, turbulent air motion attributable to solar heating of the earth's surface, or air movement over rough terrain and variable land and water surfaces.
attainment area	An area considered to have air quality as good as or better than the National Ambient Air Quality Standards for a given pollutant. An area may be in attainment for one pollutant and nonattaining for others. (See also *nonattainment area*.)

basalt	The most common volcanic rock, dark gray to black in color, high in iron and magnesium and low in silica. It is typically found in lava flows.
baseline	A quantitative expression of conditions, costs, schedule, or technical progress that constitutes the standard against which to measure the performance of an effort. For National Environmental Policy Act evaluations, baseline is defined as the existing environmental conditions against which impacts of the proposed action and its alternatives can be compared. The environmental baseline is the site environmental conditions as they exist or are estimated to exist in the absence of the proposed action.
basin	Geologically, a circular or elliptical downwarp or depression in the earth's surface that collects sediment. Younger sedimentary beds occur in the center of basins. Topographically, a depression into which water from the surrounding area drains.
bedrock	The solid rock that lies beneath soil and other loose surface materials.
bioaccumulation	The accumulation or buildup of contaminants in living systems by biological processes. Methylmercury can bioaccumulate in animal tissue.
bound	An analysis of impacts or risks such that the result overestimates or describes a limit on (i.e., "bounds") potential impacts or risks.
building wake	A volume of air downwind of a building that typically has increased turbulence caused by the displacement of the air as it passes by and over a building.
carbon dioxide	A colorless, odorless, nonpoisonous gas that is a normal component of the ambient air and an expiration product of normal animal life.
carbon dioxide equivalent	The U.S. Environmental Protection Agency defines carbon dioxide equivalent as the number of metric tons of carbon dioxide emissions with the same global warming potential as 1 metric ton of another greenhouse gas.
carbon monoxide	A common air pollutant formed by incomplete combustion; a colorless, odorless gas that is toxic if breathed in high concentrations over an extended period; when humans are

	exposed to lower concentrations, it can result in chronic effects.
carbonate	A sedimentary rock made mainly of calcium carbonate ($CaCO_3$). Limestone and dolomite are common carbonate sedimentary rocks. (See *dolomite* and *limestone*.)
chronic	Lasting for a long period or marked by frequent recurrence.
clay	The name for a family of finely crystalline sheet silicate minerals that commonly form as a product of rock weathering. Also, any soil particle smaller than or equal to about 0.002 millimeter (0.00008 inch) in diameter.
Clean Air Act	A law mandating and providing for the enforcement of regulations to control air pollution from various sources.
Code of Federal Regulations	A publication containing all Federal regulations in force.
criteria pollutant	An air pollutant that is regulated by National Ambient Air Quality Standards. The U.S. Environmental Protection Agency must describe the characteristics and potential health and welfare effects that form the basis for setting, or revising, the standard for each regulated pollutant. Criteria pollutants include sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and two size classes of particulate matter, less than 10 micrometers (0.0004 inch) in diameter, and less than 2.5 micrometers (0.0001 inch) in diameter. New pollutants may be added to, or removed from, the list of criteria pollutants as more information becomes available. (See *National Ambient Air Quality Standards*.) Note: Sometimes pollutants regulated by state laws are also called criteria pollutants.
cultural resources	Archaeological sites, architectural features, historic resources, traditional-use areas, and American Indian sacred sites.
cumulative impacts	Impacts on the environment that result when the incremental impact of a proposed action is added to the impacts from other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes the other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time.
decontamination	The removal of chemical contamination from facilities, equipment, or soils by washing, heating, chemical or

	electrochemical action, mechanical cleaning, or other techniques.
deposition	In geology, the laying down of potential rock-forming materials; sedimentation. In atmospheric transport, the settling out on ground and building surfaces of atmospheric aerosols and particles ("dry deposition") or their removal from the air to the ground by precipitation ("wet deposition").
discharge	In surface-water hydrology, the amount of water issuing from a spring or in a stream that passes a specific point in a given period of time.
dolomite	A mineral composed of calcium magnesium-carbonate ($CaMg[CO_3]_2$) that is the chief constituent of a sedimentary rock commonly called dolomite, as well as of some kinds of marble. It is thought to form by the alteration of limestone by seawater. (See *carbonate*.)
drainage basin	The land area drained by a particular stream.
earthquake	A sudden ground motion or vibration of the earth. It can be produced by a rapid release of stored-up energy along an active fault.
ecology	A branch of science dealing with the interrelationships of living organisms with one another and with their nonliving environment.
effluent	A waste stream flowing into the atmosphere, surface water, groundwater, or soil.
endangered species	Plants or animals that are in danger of extinction through all or a significant portion of their ranges and that have been listed as endangered by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, following the procedures outlined in the Endangered Species Act and its implementing regulations (50 CFR Part 424). (See *threatened species*.) The lists of endangered species can be found in 50 CFR 17.11 (wildlife), 17.12 (plants), and 222.23(a) (marine organisms).

environmental assessment (EA)
: A concise public document that a Federal agency prepares under the National Environmental Policy Act (NEPA) to provide sufficient evidence and analysis to determine whether a proposed agency action would require preparation of an environmental impact statement (EIS) or a Finding of No Significant Impact. A Federal agency may also prepare an EA to aid its compliance with NEPA when no EIS is necessary or to facilitate preparation of an EIS when one is necessary. An EA must include brief discussions of the need for the proposal, alternatives, environmental impacts of the proposed action and alternatives, and a list of agencies and persons consulted. (See *Finding of No Significant Impact*, *environmental impact statement*, and *National Environmental Policy Act*.)

environmental impact statement
: The detailed written statement that is required by Section 102(2)(C) of the National Environmental Policy Act (NEPA) for a proposed major Federal action significantly affecting the quality of the human environment. A U.S. Department of Energy (DOE) EIS is prepared in accordance with applicable requirements of the Council on Environmental Quality NEPA regulations in 40 CFR Parts 1500–1508 and DOE NEPA regulations in 10 CFR Part 1021. The statement includes, among other information, discussions of the environmental impacts of the proposed action and all reasonable alternatives, adverse environmental effects that cannot be avoided should the proposal be implemented, the relationship between short-term uses of the human environment and enhancement of long-term productivity, and any irreversible and irretrievable commitments of resources.

environmental justice
: The fair treatment and meaningful involvement of all people regardless of race, color, national origin, or income with respect to the development, implementation, and enforcement of environmental laws, regulations, and policies. Fair treatment means that no group of people, including racial, ethnic, or socioeconomic groups, should bear a disproportionate share of the negative environmental consequences resulting from industrial, municipal, or commercial operations or the execution of Federal, state, local, or tribal programs and policies. Executive Order 12898 directs Federal agencies to make achieving environmental justice part of their missions by identifying and addressing disproportionately high and adverse effects of agency programs, policies, and activities on minority and

	low-income populations. (See *minority population* and *low-income population*.)
exposure	The condition of being subject to the effects of, or acquiring a dose of, a potential stressor such as a hazardous chemical agent; also, the process by which an organism acquires a dose of a chemical such as mercury. Exposure can be quantified as the amount of the agent available at various boundaries of the organism (e.g., skin, lungs, gut) and available for absorption.
exposure limit	The level of exposure to a hazardous chemical (set by law or a standard) at which or below which adverse human health effects are not expected to occur. (See *reference concentration* and *reference dose*.)
exposure pathway	The course a chemical or physical agent takes from the source to the exposed organism. An exposure pathway describes a mechanism by which chemicals or physical agents at or originating from a release site reach an individual or population. Each exposure pathway includes a source or release from a source, an exposure route, and an exposure point. If the exposure point differs from the source, the transport/exposure medium such as air or water is also included. (See *exposure*.)
farmland of statewide importance	As defined by the U.S. Department of Agriculture, land that is available for farming but could currently be cropland, pastureland, rangeland, forestland, or other land, but not urban built-up land or water.
fault	A fracture or a zone of fractures within a rock formation along which vertical, horizontal, or transverse slippage has occurred. A normal fault occurs when the hanging wall has been depressed in relation to the footwall. A reverse fault occurs when the hanging wall has been raised in relation to the footwall.
federally recognized tribe	An American Indian or Alaska Native tribal entity that is recognized as having a government-to-government relationship with the United States, with the responsibilities, powers, limitations, and obligations attached to that designation, and is eligible for funding and services from the Bureau of Indian Affairs.

Finding of No Significant Impact	A public document issued by a Federal agency briefly presenting the reasons why an action for which the agency has prepared an environmental assessment has no potential to have a significant effect on the human environment and, thus, will not require preparation of an environmental impact statement. (See *environmental assessment* and *environmental impact statement*.)
flask	A container used to store mercury. Mercury storage flasks, typically made of 0.5-centimeter-thick (0.2-inch-thick) low-carbon steel, can hold 34.6 kilograms (76 pounds) of mercury and are sealed with a threaded plug. A typical mercury storage flask is similar in size and dimensions to a 3-liter soda bottle.
floodplain	The lowlands and relatively flat areas adjoining inland and coastal waters and the flood-prone areas of offshore islands. Floodplains include, at a minimum, that area with at least a 1.0-percent chance of being inundated by a flood in any given year.
formation	In geology, the primary unit of formal stratigraphic mapping or description. Most formations possess certain distinctive features.
fracture	Any break in rock along which no significant movement has occurred.
frequency level	A range of probability values that describes a category of how often an event might occur.
geology	The science that deals with the earth; the materials, processes, environments, and history of the planet, including rocks and their formation and structure.
global climate change	Changes in Earth's surface temperature thought to be caused by the greenhouse effect and responsible for changes in global climate patterns. The greenhouse effect is the trapping and buildup of heat in the atmosphere (troposphere) near Earth's surface. Some of the heat flowing back toward space from Earth's surface is absorbed by water vapor, carbon dioxide, ozone, and several other gases in the atmosphere and then reradiated back toward Earth's surface.

groundwater	Water below the ground surface in a zone of saturation. It usually occurs in aquifers that may supply wells and springs, as well as baseflow, to major streams and rivers.
hazardous air pollutants	Air pollutants not covered by National Ambient Air Quality Standards but which may present a threat of adverse human health or environmental effects. Those specifically listed in 40 CFR 61.01 are asbestos, benzene, beryllium, coke oven emissions, inorganic arsenic, mercury, radionuclides, and vinyl chloride. More broadly, hazardous air pollutants are any of the 188 pollutants to be regulated or reviewed under Section 112(b) of the Clean Air Act. Very generally, hazardous air pollutants are any air pollutants that may realistically be expected to pose a threat to human health or welfare.
hazardous chemical	Under 29 CFR Part 1910, Subpart Z, hazardous chemicals are defined as "any chemical that is a physical hazard or a health hazard." Physical hazards include combustible liquids, compressed gases, explosives, flammables, organic peroxides, oxidizers, pyrophorics, and reactives. A health hazard is any chemical for which there is good evidence that acute or chronic health effects occur in exposed employees. Hazardous chemicals include carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, agents that act on the hematopoietic system, and agents that damage the lungs, skin, eyes, or mucous membranes.
hazardous material	A material, including a hazardous substance as defined by 49 CFR 171.8 that poses a risk to health, safety, and property when transported or handled.
hazardous waste	A category of waste regulated under the Resource Conservation and Recovery Act (RCRA). To be considered hazardous, a waste must be a solid waste under RCRA and must exhibit at least one of four characteristics described in 40 CFR 261.20–261.24 (i.e., ignitability, corrosivity, reactivity, or toxicity) or be specifically listed by the U.S. Environmental Protection Agency in 40 CFR 261.31–261.33.
historic resources	Archaeological sites, architectural structures, and objects dating from 1492 or later, after the arrival of the first Europeans to the Americas.

infrastructure	The basic facilities, services, and utilities needed for the functioning of an industrial facility. Transportation and electrical systems are part of the infrastructure.
Karst	Landscape underlain by limestone that has been eroded by dissolution, producing ridges, towers, fissures, sinkholes and other characteristic landforms.
labor force	All persons of a defined geographic area classified as employed or unemployed.
land use	A characterization of land surface in terms of its potential utility for various activities.
limestone	A sedimentary rock composed mostly of the mineral calcite, $CaCO_3$. (See *carbonate*.)
loam	Soil material that is composed of 7–27 percent clay particles, 28–50 percent silt particles, and less than 52 percent sand particles.
local magnitude	See *magnitude*.
low-income individuals/persons	Individuals whose income is less than the poverty threshold defined in the U.S. Bureau of the Census' annual statistical poverty levels (Current Population Reports, Series P-60 on Income and Poverty).
low-income population	As defined in terms of U.S. Census Bureau annual statistical poverty levels (Current Population Reports, Series P-60 on Income and Poverty), groups or individuals who live in geographic proximity to one another or who are geographically dispersed or transient (such as migrant workers or American Indians), where either type of group experiences common conditions of environmental exposure or effect. (See *environmental justice* and *minority population*.)
magnitude	A number that reflects the relative strength or size of an earthquake. Magnitude is based on the logarithmic measurement of the maximum motion recorded by a seismograph. An increase of one unit of magnitude (for example, from 4.6 to 5.6) represents a 10-fold increase in wave amplitude on a seismograph recording or approximately a 30-fold increase in the energy released. Several scales have been defined, but the most commonly used are (1) local magnitude, commonly referred to as "Richter magnitude," (2) surface-wave magnitude, and (3)

	body-wave magnitude. Each is valid for a particular type of seismic signal varying by such factors as frequency and distance. These magnitude scales will yield approximately the same value for any given earthquake within each scale's respective range of validity. A fourth scale (moment magnitude) is the latest to be applied that better estimates the size of very large earthquakes that the other scales underestimate by varying degrees.
mercury (elemental)	Elemental mercury is a dense, naturally occurring, silver-colored metallic element that is liquid at room temperature. Sometimes called "quicksilver," liquid mercury has been used extensively in manufacturing processes because it conducts electricity, reacts to temperature changes, and alloys with many other metals.
mercury (primary)	Unused, "virgin" mercury that has been produced as the main product of mining activities.
mercury (secondary)	Mercury recycled from the dismantling of used products or equipment.
meteorology	The science dealing with the atmosphere and its phenomena, especially as relating to weather.
metric ton	A unit of mass equal to 1,000 kilograms, or 2,200 pounds.
migration	The natural movement of a material through the air, soil, or groundwater; also, seasonal movement of animals from one area to another.
minority individuals	Individuals who identify themselves as a member of the following population groups: American Indian or Alaska Native; Asian; Black or African American; Hispanic or Latino; Native Hawaiian or other Pacific Islander; or multiracial minority (two or more races, at least one of which is a minority race under CEQ guidelines). This definition is similar to that given in CEQ's environmental justice guidance; however, it has been modified to reflect revisions to the Standards for the Classification of Federal Data on Race and Ethnicity (62 FR 58782), which is published by the Office of Management and Budget.
minority population	Minority populations exist where either: (a) the minority population of the affected area exceeds 50 percent or (b) the minority population percentage of the affected area is meaningfully greater than in the general population or other appropriate unit of geographic analysis (such as a governing

body's jurisdiction, a neighborhood, census tract, or other similar unit). Minority populations include either a single minority group or the total of all minority persons in the affected area. They may consist of groups of individuals living in geographic proximity to one another or a geographically dispersed/transient set of individuals (such as migrant workers or American Indians), where either type of group experiences common conditions of environmental exposure or effect. (See *environmental justice* and *low-income population*.)

mitigation	Actions taken to lessen the impacts of a proposed action, including (1) avoiding an impact altogether by not taking a certain action or parts of an action; (2) minimizing impacts by limiting the degree or magnitude of an action and its implementation; (3) rectifying an impact by repairing, rehabilitating, or restoring the affected environment; (4) reducing or eliminating the impact over time by preservation and maintenance operations during the life of an action; or (5) compensating for an impact by replacing or providing substitute resources or environments.
Modified Mercalli Intensity	A level on the modified Mercalli scale. A measure of the perceived intensity of earthquake ground shaking with 12 divisions, from I (not felt by people) to XII (damage nearly total). It is a unitless expression of observed effects.
National Ambient Air Quality Standards	Standards defining the highest allowable levels of certain pollutants in the ambient air (i.e., the outdoor air to which the public has access). Because the U.S. Environmental Protection Agency must establish the criteria for setting these standards, the regulated pollutants are called criteria pollutants. Criteria pollutants include sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and two size classes of particulate matter, less than 10 micrometers (0.0004 inch) in diameter, and less than 2.5 micrometers (0.0001 inch) in diameter. Primary standards are established to protect public health; secondary standards are established to protect public welfare (e.g., visibility, crops, animals, buildings). (See *criteria pollutant*.)

National Environmental Policy Act of 1969 (NEPA)	The basic national charter for protection of the environment. This law establishes policy, sets goals (in Section 101), and provides means (in Section 102) for carrying out the policy. Section 102(2) contains action-forcing provisions to ensure that Federal agencies follow the letter and spirit of the law. For major Federal actions significantly affecting the quality of the human environment, Section 102(2)(C) of NEPA requires Federal agencies to prepare a detailed statement that includes the environmental impacts of the proposed action and other specified information.
National Pollutant Discharge Elimination System (NPDES)	A provision of the Clean Water Act that prohibits discharge of pollutants into waters of the United States unless a special permit is issued by the U.S. Environmental Protection Agency, a state, or, where delegated, a tribal government on an American Indian reservation. The NPDES permit lists permissible discharges and/or the level of cleanup technology required for wastewater.
National Register of Historic Places (NRHP)	The official list of the Nation's cultural resources that are worthy of preservation. The National Park Service maintains the list under direction of the Secretary of the Interior. Buildings, structures, objects, sites, and districts are included in the NRHP for their importance in American history, architecture, archaeology, culture, or engineering. Properties included in the NRHP range from large-scale, monumentally proportioned buildings to smaller-scale, regionally distinctive buildings. The listed properties are not just of nationwide importance; most are significant primarily at the state or local level. Procedures for listing properties in the NRHP are found in 36 CFR Part 60.
natural phenomena hazard	A category of events (e.g., earthquake, wind, flood, and lightning) that must be considered in the U.S. Department of Energy (DOE) facility design, construction, and operations, as specified in DOE Order 420.1B.
nitrogen oxides	The oxides of nitrogen, primarily nitrogen oxide and nitrogen dioxide, produced in the combustion of fossil fuels. Nitrogen dioxide emissions constitute an air pollution problem, as they contribute to acid deposition and the formation of atmospheric ozone.
noise	Undesirable sound that interferes or interacts negatively with the human or natural environment. Noise may disrupt

	normal activities (e.g., hearing, sleep), damage hearing, or diminish the quality of the environment.
nonattainment area	An area that the U.S. Environmental Protection Agency has designated as not meeting (i.e., not being in attainment of) one or more of the National Ambient Air Quality Standards for sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, lead, and particulate matter. An area may be in attainment for some pollutants, but not for others.
ozone	The triatomic form of oxygen; in the stratosphere, ozone protects Earth from the sun's ultraviolet rays, but in lower levels of the atmosphere, ozone is considered an air pollutant.
pallet	A small platform on which material is stored. Pallets are often constructed of wood and serve to lift the material off the ground to keep it dry. Pallets also enable the material to be easily lifted with a forklift.
particulate matter (PM)	Any finely divided solid or liquid material, other than uncombined (i.e., pure) water. A subscript denotes the upper limit of the diameter of particles included. Thus, PM_{10} includes only those particles equal to or less than 10 micrometers (0.0004 inch) in diameter; $PM_{2.5}$ includes only those particles equal to or less than 2.5 micrometers (0.0001 inch) in diameter. Total suspended particulates were first used as the indicator of particulate concentrations.
peak ground acceleration	A measure of the maximum horizontal acceleration (as a percentage of the acceleration due to Earth's gravity) experienced by a particle on the surface of the earth during the course of earthquake motion.
percent *g*	In measuring earthquake ground motion, the acceleration (the rate of change in velocity) experienced relative to that due to Earth's gravity (i.e., 9.8 meters per square second).
physiographic province	A region having a particular pattern of relief features or landforms that differs significantly from that of adjacent regions.
$PM_{2.5}$ and PM_{10}	See *particulate matter*.
potable water	Water that is fit to drink.

prehistoric	Predating written history; in North America, also predating contact with Europeans.
prime farmland	As defined by the U.S. Department of Agriculture, land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses.
Protective Action Criteria (PACs)	These are protective criteria introduced by the U.S. Department of Energy for use in the planning of emergency response to accidental releases of chemicals. There are three levels: PAC-1, PAC-2, and PAC-3. These are equal to the 1-hour Acute Exposure Guideline Levels (AEGL-1, -2, and -3, respectively), if available; otherwise, they are equal to the Emergency Response Planning Guidelines (ERPG-1, -2, and -3, respectively). If neither AEGLs nor ERPGs are available, PACs are equal to Temporary Emergency Exposure Limits (TEEL-1, -2, and -3, respectively).
Quaternary	The second geologic period of the Cenozoic Era, dating from about 1.6 million years ago to the present. It contains two epochs: the Pleistocene and the Holocene. It is characterized by the first appearance of human beings on Earth.
Record of Decision	A document providing a concise public record of an agency's decision on a proposed action for which an environmental impact statement was prepared. Prepared in accordance with 40 CFR 1505.2, the Record of Decision identifies the alternatives considered in reaching the decision, the environmentally preferable alternative, factors balanced by the agency in making the decision, whether all practicable means to avoid or minimize environmental harm have been adopted, and if not, why they were not.
reference concentration	The chronic exposure concentration for a given hazardous chemical at which or below which adverse human noncancer health effects are not expected to occur. (See *exposure limit* and *reference dose*.)
reference dose	The chronic exposure dose for a given hazardous chemical at which or below which adverse human noncancer health effects are not expected to occur. (See *exposure limit* and *reference concentration*.)

region of influence	A site-specific geographic area. The regions of influence for different resources can vary widely in extent. For example, the region of influence for ecological resources would generally be confined to the site and nearby adjacent areas, whereas the socioeconomic region of influence would include the cities and counties surrounding each site that could be affected by the proposed action.
Resource Conservation and Recovery Act (RCRA), as amended	This law gives the U.S. Environmental Protection Agency the authority to control hazardous waste from “cradle to grave” (i.e., from the point of generation to the point of ultimate disposal), including its minimization, generation, transportation, treatment, storage, and disposal. RCRA also sets forth a framework for management of nonhazardous solid waste. (See *hazardous waste*.)
Richter magnitude	See *magnitude*.
risk	The probability of a detrimental effect from exposure to a hazard. Risk is often expressed quantitatively as the probability of an adverse event occurring multiplied by the consequence of that event (i.e., the product of these two factors). However, separate presentation of probability and consequence is often more informative.
risk assessment (chemical)	The qualitative and quantitative evaluation performed to define the risk posed to human health and/or the environment by the presence or potential presence and/or use of specific chemical materials.
runoff	The portion of rainfall, melted snow, or irrigation water that flows across the ground and which may eventually enter surface waters.
sand	Loose grains of rock or mineral sediment formed by weathering that range in size from 0.0625 to 2.0 millimeters (0.0025 to 0.08 inch) in diameter and often consist of quartz particles.
sandstone	A sedimentary rock composed mostly of sand-size particles cemented usually by calcite, silica, or iron oxide.
sanitary waste (wastewater)	Wastes generated by normal housekeeping activities, liquid or solid (includes sludge), that are not hazardous or radioactive.

sedimentary rock	Rock formed from the accumulation of sediment, which may consist of fragments and mineral grains of varying sizes from pre-existing rocks, remains or products of animals and plants, products of chemical action, or mixtures of these. Sedimentary rocks often have distinctive layering or bedding.
seismic	Pertaining to any earth vibration, especially that of an earthquake.
seismicity	The frequency and distribution of earthquakes.
severity level	A categorical classification of the potential consequences of an event (e.g., an accident or chemical exposure) to a receptor, such as a human or living organism.
shale	Sedimentary rock derived from mud, commonly finely laminated (bedded). Particles in shale are commonly clay minerals mixed with tiny grains of quartz eroded from pre-existing rocks. “Shaley” means like a shale or having some shale component, as in shaley sandstone.
silt	Loose particles of rock or mineral sediment that range in size from about 0.002 to 0.0625 millimeter (0.00008 to 0.0025 inch) in diameter. Silt is finer than sand, but coarser than clay.
siltstone	A fine-grained sedimentary rock composed mostly of silt-sized grains.
sinkhole	A cavity in the ground, especially in limestone bedrock, caused by water erosion and providing a route for surface water to disappear underground.
socioeconomics	Demographic and economic characteristics of a defined geographic area.
soils	All unconsolidated materials above bedrock. Natural earthy materials on the earth’s surface, in places modified or even made by human activity, containing living matter, and supporting or capable of supporting plants.
solid waste	In general, solid wastes are nonliquid, nonsoluble discarded materials ranging from municipal garbage to industrial wastes that contain complex and sometimes hazardous substances. Solid wastes include sewage sludge, agricultural refuse, demolition wastes, and mining residues. For purposes of regulation under the Resource Conservation

	and Recovery Act, solid waste is any garbage; refuse; sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility; and other discarded material. Solid waste includes solid, liquid, semisolid, or contained gaseous material resulting from industrial, commercial, mining, and agricultural operations and from community activities. A more-detailed regulatory definition of solid waste can be found in 40 CFR 261.2. (See *hazardous waste* and *Resource Conservation and Recovery Act*.)
spill prevention, control, and countermeasures plan	A plan prepared by a facility to minimize the likelihood of a spill and to expedite control and cleanup activities should a spill occur.
stabilize	To convert a compound, mixture, or solution to a nonreactive form.
State Historic Preservation Officer	The State officer charged with the identification and protection of prehistoric and historic resources in accordance with the National Historic Preservation Act.
stormwater	Stormwater runoff, snowmelt runoff, and surface runoff and drainage.
subsidence	Downward movement of surface rock or sediment with little or no horizontal movement.
subsistence consumption of fish and wildlife	Dependence by a minority population, low-income population, American Indian tribe, or subgroup of such populations on indigenous fish, vegetation, and/or wildlife as the principal portion of their diet.
sulfur oxides	Common air pollutants, primarily sulfur dioxide, a heavy, pungent, colorless gas (formed in the combustion of fossil fuels, considered a major air pollutant), and sulfur trioxide. Sulfur dioxide is involved in the formation of acid rain. It can also irritate the upper respiratory tract and cause lung damage.
supplemental environmental impact statement (EIS)	An EIS that considers new or additional environmental impacts based on the introduction of new options and/or changes in the natural environment or communities in a previously completed EIS.

surface water	All bodies of water on the surface of the earth and open to the atmosphere, such as rivers, lakes, reservoirs, ponds, seas, and estuaries.
tectonic	Of or relating to motion in Earth's crust and occurring on geologic faults.
Temporary Emergency Exposure Limits (TEELs)	Values developed by the U.S. Department of Energy (DOE) for use in DOE facility hazard analyses and emergency planning and response for chemicals lacking Acute Exposure Guideline Levels or Emergency Response Planning Guidelines. TEEL values are applied to the peak 15-minute time-weighted average concentration at the point of interest and are defined for varying degrees of severity of toxic effects, as follows: TEEL-1: The maximum concentration in air below which it is believed nearly all individuals could be exposed without experiencing other than mild transient adverse health effects or perceiving a clearly defined objectionable odor. TEEL-2: The maximum concentration in air below which it is believed nearly all individuals could be exposed without experiencing or developing irreversible or other serious health effects or symptoms that could impair their abilities to take protective action. TEEL-3: The maximum concentration in air below which it is believed nearly all individuals could be exposed without experiencing or developing life-threatening health effects.
threatened species	Any plants or animals that are likely to become endangered species within the foreseeable future throughout all or a significant portion of their ranges and that have been listed as threatened by the U.S. Fish and Wildlife Service or the National Marine Fisheries Service, following the procedures set out in the Endangered Species Act and its implementing regulations (50 CFR Part 424). (See *endangered species*.) The lists of threatened species can be found in 50 CFR 17.11 (wildlife), 17.12 (plants), and 227.4 (marine organisms). Note: Some states also list species as threatened. Thus, in certain cases, a state definition would also be appropriate.

threshold limit values	The recommended highest concentrations of contaminants to which workers may be exposed according to the American Conference of Governmental Industrial Hygienists.
time-weighted average	Method of calculating exposure to potential hazardous substances such as dust, fumes, chemicals, gases, or vapors when exposure concentrations may vary over time by averaging exposure for a standard time period, such as an 8-hour workday.
toxic	Poisonous (to living organisms); capable of producing disease or otherwise harmful to human health when taken into the body. Mercury is toxic.
Toxic Substances Control Act (TSCA)	This law requires that the health and environmental effects of all new chemicals be reviewed by the U.S. Environmental Protection Agency before they are manufactured for commercial purposes. This law also imposes strict limitations on the use and disposal of polychlorinated biphenyls, chlorofluorocarbons, asbestos, dioxins, certain metal-working fluids, and hexavalent chromium. In addition, the provisions of the Mercury Export Ban Act relating to the prohibition on sale, distribution, or transfer of elemental mercury by Federal agencies, and to the prohibition on the export of elemental mercury, amended Sections 6 and 12, respectively, of TSCA.
traditional cultural property	A property or place that is eligible for inclusion in the National Register of Historic Places because of its association with cultural practices and beliefs that are (1) rooted in the history of a community and (2) important to maintaining the continuity of that community's traditional beliefs and practices.
treatment	Under the Resource Conservation and Recovery Act, any method, technique, or process designed to change the physical, chemical, or biological character or composition of any hazardous waste.
unemployment rate	The number of unemployed persons as a percentage of the labor force.
viewshed	The extent of the area that may be viewed from a particular location. Viewsheds are generally bounded by topographic features such as hills or mountains.

visual resource management	A process devised by the Bureau of Land Management to assess the aesthetic quality of a landscape and to minimize a project's visual impact on the landscape. The process consists of a rating of visual quality followed by a measurement of the degree of contrast between proposed development activities and the existing landscape using four classification levels.
volatile organic compound	Any of a broad range of organic compounds, often halogenated, that vaporize at ambient or relatively low temperatures, such as benzene, chloroform, and methyl alcohol. In regard to air pollution, any organic compound that participates in atmospheric photochemical reaction, except for those determined by the U.S. Environmental Protection Agency Administrator to have negligible photochemical reactivity.
Waste Isolation Pilot Plant (WIPP)	WIPP is the Nation's only underground repository for the permanent disposal of defense-generated transuranic waste. The WIPP site is located in Eddy County in southeastern New Mexico. The site was considered as a potential site for construction and operation of a U.S. Department of Energy-designated mercury storage facility in the 2013 Mercury Storage SEIS.
wastewater	Water originating from human sanitary water use (domestic wastewater) and from a variety of industrial processes (industrial wastewater).
water quality standards and criteria	Limits on the concentrations of specific constituents or on the characteristics of water, often based on water use classifications (for example, drinking water, recreation, propagation of fish and aquatic life, agricultural and industrial use). Water quality standards are legally enforceable, whereas water quality criteria are non-enforceable recommendations based on biotic impacts.
water table	The boundary between the unsaturated zone and the deeper, saturated zone; the upper surface of an unconfined aquifer.
wetlands	Areas that are inundated or saturated by surface water or groundwater and that typically support vegetation adapted for life in saturated soils. Wetlands generally include swamps, marshes, bogs, and similar areas (e.g., sloughs, potholes, wet meadows, river overflow areas, mudflats, natural ponds).

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