MERCURY REFLASKING ENVIRONMENTAL ASSESSMENT

October 2000

Defense Logistics Agency
Defense National Stockpile Center
Fort Belvoir, Virginia

Copies of this document are available (while supplies last) upon written request to:

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LIST OF ACRONYMS AND TERMS

ACGIH	American Conference of Government Industrial Hygienists
AIHA	American Industrial Hygiene Association
BLM	Bureau of Land Management
CFR	Code of Federal Regulations
COPEC	contaminant of potential ecological concern
dBA	decibel A-weighted
DLA	Defense Logistics Agency
DNSC	Defense National Stockpile Center
DOE	Department of Energy
EA	environmental assessment
EIS	environmental impact statement
EPA	U.S. Environmental Protection Agency
ERPG	Emergency Response Planning Guideline
ERPG-2	Emergency Response Planning Guideline, Level 2
f	annual frequency of occurrence
FONSI	Finding of No Significant Impact
g	gravitational acceleration
gal	gallons
HQ	Hazard Quotient
IAC	Indiana Administrative Code
IDLH	Immediately Dangerous to Life and Health
km^2	square kilometers
kph	kilometers per hour
l	liters
lb	pounds
mi	miles
mi^2	square miles
m/sec	meters per second
mph	miles per hour
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NIOSH	National Institute for Occupational Safety and Health
NRHP	National Register of Historic Places
OAC	Ohio Administrative Code
OEPA	Ohio Environmental Protection Agency
PM_{10}	particulate matter less than or equal to 10 μm in diameter
ton	short ton
t	metric ton
TRV	Toxicity Reference Value
VRM	Visual Resources Management

METRIC CONVERSION CHART

To Convert Into Metric			To Convert Out of Metric		
If You Know	**Multiply By**	**To Get**	**If You Know**	**Multiply By**	**To Get**
Length					
inches	2.54	centimeters	centimeters	0.3937	inches
feet	30.48	centimeters	centimeters	0.0328	feet
feet	0.3048	meters	meters	3.281	feet
yards	0.9144	meters	meters	1.0936	yards
miles	1.60934	kilometers	kilometers	0.6214	miles
Area					
sq. inches	6.4516	sq. centimeters	sq. centimeters	0.155	sq. inches
sq. feet	0.092903	sq. meters	sq. meters	10.7639	sq. feet
sq. yards	0.8361	sq. meters	sq. meters	1.196	sq. yards
acres	0.40469	hectares	hectares	2.471	acres
sq. miles	2.58999	sq. kilometers	sq. kilometers	0.3861	sq. miles
Volume					
fluid ounces	29.574	milliliters	milliliters	0.0338	fluid ounces
gallons	3.7854	liters	liters	0.26417	gallons
cubic feet	0.028317	cubic meters	cubic meters	35.315	cubic feet
cubic yards	0.76455	cubic meters	cubic meters	1.308	cubic yards
Weight					
ounces	28.3495	grams	grams	0.03527	ounces
pounds	0.45360	kilograms	kilograms	2.2046	pounds
short tons	0.90718	metric tons	metric tons	1.1023	short tons
Temperature					
Fahrenheit	Subtract 32 then multiply by 5/9ths	Celsius	Celsius	Multiply by 9/5ths, then add 32	Fahrenheit

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}
hecto-	h	100 = 10^{2}
deka-	da	10 = 10^{1}
deci-	d	0.1 = 10^{-1}
centi-	c	0.01 = 10^{-2}
milli-	m	0.001 = 10^{-3}
micro-	F	0.000 001 = 10^{-6}
nano-	n	0.000 000 001 = 10^{-9}
pico-	p	0.000 000 000 001= 10^{-12}
femto-	f	0.000 000 000 000 001 = 10^{-15}
atto-	a	0.000 000 000 000 000 001= 10^{-18}

GLOSSARY

acute Occurring over a short time, usually a few minutes or hours. An *acute* exposure can result in short-term or long-term health effects. An *acute* effect happens a short time (up to one year) after exposure.

Air Quality Control Region An area designated by a State or the U.S. Environmental Protection Agency for the attainment and maintenance of National Ambient Air Quality Standards.

ambient Surrounding. For example, *ambient* air is usually outdoor air (as opposed to indoor air).

aquifer A saturated geologic unit through which significant quantities of water can migrate under natural hydraulic gradients.

aquitard A less permeable geologic unit in a stratigraphic sequence. Aquitards separate aquifers.

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.

background level A typical or average level of a chemical in the environment. *Backgound* often refers to naturally occurring or uncontaminated levels.

chronic Occurring over a long period of time (more than 1 year).

concentration The amount of one substance dissolved or contained in a given amount of another.

contaminant Any substance or material that enters a system (the environment, human body, food, etc.) where it is not normally found.

credible accident An accident that has a probability of occurrence greater than or equal to one in a million years.

critical habitat As defined in the Endangered Species Act of 1973, "specific areas within the geographical area occupied by [an endangered or threatened] species. . . , essential to the conservation of the species and which may require special management considerations or protection; and specific areas outside the geographical area occupied by the species . . . that are essential for the conservation of the species."

Criteria Pollutants Six air pollutants for which national ambient air quality standards are established by EPA: sulfur dioxide, nitrogen dioxide, carbon monoxide, ozone, particulate matter less than or equal to 10 microns in diameter, and lead.

cultural resources Archaeological sites, architectural features, traditional-use areas, and Native American sacred sites.

cumulative impacts The incremental impact on the environment of an action in combination with other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non Federal), private industry, or individual undertakes such other actions. Cumulative impacts can result from individually minor but collectively undertakes actions taking place over a period of time (40 CFR 1508.7.)

day-night average sound level The 24-hour, A-weighted equivalent sound level expressed in decibels. A 10 decibel penalty is added to sound levels between 10:00 p.m. and 7:00 a.m. to account for increased annoyance due to noise during night hours.

decibel A logarithmic unit of sound measurement that describes the magnitude or particular quantity of sound pressure or power with respect to a standard reference value. In general, a sound doubles in loudness with every increase of 10 decibels.

dermal Referring to the skin. *Dermal* absorption means absorption through the skin.

drainage basin An aboveground area of the Earth's surface that supplies the water to a particular stream.

emission One or more substances released to the water, air or soil in the natural environment.

environmental impact Any change to the environment, whether adverse or beneficial, wholly or partially resulting from an organization's activities, products or services.

exposure Contact with a chemical by swallowing, by breathing, or by direct contact (such as through the skin or eyes). *Exposure* may be short term (acute) or long term (chronic).

floodplain The lowlands adjoining inland and coastal waters and relatively flat areas, including, at a minimum, that area inundated by a 1 percent or greater-chance flood in any given year.

formation In geology, the primary unit of formal stratigraphic mapping or description. Most formations possess certain distinctive features.

hazardous waste According to the Resource Conservation and Recovery Act, a solid waste that because of its characteristics may (1) cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness, or (2) pose a substantial hazard to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed. Hazardous wastes appear on special U.S. Environmental Protection Agency lists and possess at least one of the following characteristics: (1) ignitability, (2) corrosivity, (3) reactivity, or (4) toxicity.

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 installations needed to support a plant or site, such as transportation and communication systems.

ingestion Swallowing (such as eating or drinking). After *ingestion*, chemicals can be absorbed into the blood and distributed throughout the body.

inhalation Breathing. Exposure may occur from inhaling contaminants because they can be deposited in the lungs, taken into the blood, or both.

Lowest-observed-adverse-effect level (LOAEL) The lowest exposure level at which there are statistically or biologically significant increases in frequency or severity of adverse effects between the exposed population and its appropriate control group.

media Soil, water, air, plants, animals, or any other parts of the environment that can contain contaminants.

National Environmental Policy Act of 1969 An act constituting the basic national charter for protection of the environment. The act calls for the preparation of an environmental impact statement for every major Federal action that may significantly affect the quality of the human or natural environment. Its main purpose is to provide environmental information to decisionmakers so that their actions are based on an understanding of the potential environmental consequences of a proposed action and the reasonable alternatives.

noise Any sound that is undesirable because it interferes with speech and hearing, is intense enough to damage hearing, or is otherwise annoying (unwanted sound).

outfall The discharge point of a drain, sewer, or pipe as it empties into a body of water.

pathways The paths or routes by which contaminants are transferred from a source to a receptor.

plume An area of chemicals in a particular medium, such as air or groundwater, moving away from its source in a long band or column. A *plume* can be a column of smoke from a chimney or chemicals moving with groundwater.

prehistoric Predating written history.

regional economic area A geographic area consisting of an economic node and the surrounding, economically related counties, including the places of work and residences of the labor force. Regional economic areas are defined by the Bureau of Economic Analysis.

recycling The process of re-using material for the production of new goods or services on the same quality level.

risk The risk assessment, the probability that something will cause injury, combined with the potential severity of that injury. In quantitative terms, risk is expressed in values ranging from zero (representing the certainty that harm will not occur) to one (representing the certainty that harm will occur).

risk assessment The determination of the kind and degree of hazard posed by an agent, the extent to which a particular group of people has been or may be exposed to the agent, and the present or potential health risk that exists due to the agent.

route of exposure The way in which a person a may contact a chemical substance. For example, drinking (ingestion) and bathing (skin contact) are two different *routes of exposure* to contaminants that may be found in water.

runoff The portion of rainfall, melted snow, or irrigation water that flows across the ground surface and eventually enters streams.

Threshold Limit Values (TLVs) Recommended guidelines for occupational exposure to airborne contaminants published by the American Conference of Governmental Industrial Hygienists. The TLVs represent the average concentration (in mg/cu.m) for an 8-hour workday and 40-hour work week to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

threatened species As defined in the Endangered Species Act of 1973, Any species which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

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 Class Any of the classifications of visual resources established through application of the Visual Resource Management process of the Bureau of Land Management. Four classifications are employed to describe different degrees of modification to landscape elements: Class I, areas where the natural landscape is preserved, including national wilderness areas and the wild sections of national wild and scenic rivers; Class II, areas with very limited land development activity, resulting in visual contrasts that are seen but do not attract attention; Class III, areas in which development may attract attention, but the natural landscape still dominates; Class IV, areas in which development activities may dominate the view and may be the major focus in the landscape.

visual resources Natural and cultural features by which the appearance of a particular landscape is defined.

waste An output with no marketable value that is discharged to the environment. Normally the term "waste" refers to solid or liquid materials.

wastewater Water originating from human sanitary water use (domestic wastewater) and from a variety of industrial processes (industrial wastewater).

water table The boundary between the unsaturated zone and the deeper, saturated zone. The upper surface of an unconfined aquifer.

wetland Land areas exhibiting hydric soil conditions, saturated or inundated soil during some portion of the year, and plant species tolerant of such conditions.

SUMMARY AND CONCLUSIONS

Under authority delegated by the Secretary of Defense under the Strategic and Critical Materials Stock Piling Act of 1939, as amended (50 USC 98 et seq.), the Defense National Stockpile Center (DNSC), a subordinate command of the Defense Logistics Agency (DLA), is responsible for all activities necessary to provide safe, secure and environmentally sound stewardship for all commodities in the National Defense Stockpile.

Specific to this particular environmental assessment (EA), DNSC is responsible for the management of stocks of certain strategic and critical materials as determined by Congress. Mercury is one of these materials. Mercury is stored in 76-lb (34-kg) steel flasks at four depots located in Binghamton, New York; New Haven, Indiana; Somerville, New Jersey; and Warren, Ohio; and in the Department of Energy's (DOE's) Y–12 plant located in Oak Ridge, Tennessee. A small number of leaking flasks have been identified at the New Haven and Warren depots. Therefore, DNSC needs to consider whether the mercury at these two depots should be transferred into new containers.

The New Haven Depot consists of approximately 268 acres (108 ha) of land with 12 permanent and 2 temporary employees. The entrance to the depot is located on the north side of Dawkins Road (State Route 14), approximately 3 mi (4.8 km) east of New Haven, Indiana. There are approximately 557 t (614 tons) of mercury stored in 16,151 steel flasks. One confirmed leaking flask and five suspected leaking flasks have been found. In addition, 140 flasks have been identified as having droplets either on the flask itself or in the plastic bag surrounding it. The Warren Depot consists of approximately 160 acres (65 ha) of land with 13 permanent duty employees. The entrance to the depot is located on the west side of Niles-Warren River Road, approximately 950 ft (290 m) north of DeForest Road. There are approximately 563 t (621 tons) of mercury stored in 16,355 steel flasks. Two confirmed leaking flasks and three suspected leaking flasks have been found. These five flasks have been placed in plastic bags to prevent any further mercury migration. Leaking mercury from these incidents at the New Haven and Warren depots has been promptly cleaned up with no mercury released to the environment outside the warehouses.

The National Environmental Policy Act (NEPA) of 1969, as amended (42 USC 4321 et seq.), requires all Federal agencies, including DNSC, to consider the environmental consequences of proposed actions before decisions are made. This EA provides sufficient information so that DNSC may determine whether a Finding of No Significant Impact (FONSI) is warranted or whether an environmental impact statement (EIS) must be prepared for the proposed action, which is to transfer the mercury at the New Haven and Warren depots into new containers. Alternatives include transferring the mercury into new 76-lb (34-kg) steel flasks or transferring into new 1-t (1.1-ton) steel containers. A No Action Alternative has also been assessed as required by NEPA and to provide a baseline for comparison of potential impacts of the reflasking alternatives.

DNSC and its predecessors have stored mercury for over 50 years with minimal, if any, impact on the environment. Under the No Action Alternative, the mercury would remain generally undisturbed, in sealed flasks inside locked warehouses. The condition of the stockpile would be monitored once a week in accordance with the DNSC mercury storage area inspection procedure. If any leaks were detected, or if there was an abnormally high concentration of mercury in the air as measured by a mercury vapor analyzer, cleanup and personal protective equipment is available nearby. Although leaking flasks would be anticipated under this alternative, releases of mercury to the environment are unlikely. Therefore, no impacts to the environment, and low to negligible risks to workers and the general public, including minority and low-income populations, are expected.

All of the accident scenarios considered for the No Action Alternative have low or negligible predicted risk to workers and the general public. Likewise, the ecological risk assessment concluded that the risk is low or negligible for all of the accident scenarios. In addition, no serious truck accidents or accident fatalities are anticipated to result from transporting materials to, and removing waste from, the depots.

Under the alternatives that would transfer the mercury into 76-lb (34-kg) flasks or 1-t (1.1-ton) containers, activities would be carried out using procedures and personal protective equipment designed to protect workers and minimize any emissions of mercury to the environment. Therefore, these alternatives would pose a low to negligible risk to workers and the general public, including minority and low-income populations.

All of the accident scenarios considered for these alternatives have low or negligible predicted risk to workers and the general public. The ecological risk assessment concluded that the risk is low or negligible for all of the accident scenarios. In addition, no serious truck accidents or accident fatalities are anticipated to result from transporting materials to, and removing waste from, the depots.

Transferring the mercury into new containers would generate small quantities of hazardous waste and would generate waste pallets and flasks that may be contaminated with small amounts of mercury. Because the waste would be packaged and sent to licensed offsite commercial facilities for recycling, treatment or disposal, it is unlikely that major impacts would occur.

Transferring the mercury into new containers would not change employment at the depots; would not substantially increase air emissions and noise levels; would not involve construction or changes to existing land use; would not use any appreciable quantities of electricity, fuel oil, natural gas, or water; would take place inside warehouses in areas in which any spills would be contained; and would only marginally increase the traffic flow to and from the depots. Therefore, no major impacts to the environment are anticipated.

Cumulative effects on the environment result from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Because the contributions to adverse effects from the alternatives would be extremely small and most would be temporary, it is expected that activities associated with the alternatives would not exacerbate cumulative effects.

None of the three alternatives appear to be substantially more or less risky or to have greater or lesser environmental or human health impacts than the others. Low impacts could result for a number of resources during the process of transferring the mercury into new containers and disposing of flasks, pallets, and hazardous waste. Once the mercury is in the new containers, impacts of continued storage would be expected to be less than those of the No Action Alternative. Therefore, over the long term, it is expected that conditions would be improved by transferring the mercury into the new storage containers.

1.0 NEED FOR PROPOSED ACTION

This section provides background on DNSC's New Haven and Warren depots, discusses the purpose and need for the proposed action, briefly lists the alternatives evaluated, and describes the relationship to other agency actions.

1.1 PURPOSE AND NEED

Under authority delegated by the Secretary of Defense under the Strategic and Critical Materials Stock Piling Act of 1939, as amended (50 USC 98 et seq.), DNSC, a subordinate command of DLA, is responsible for all activities necessary to provide safe, secure, and environmentally sound stewardship for all commodities in the National Defense Stockpile. DNSC is also responsible for the disposition of stockpiled items declared excess to national defense needs and authorized for sale.

Specific to this particular EA, DNSC is responsible for the management of stocks of certain critical and strategic materials as determined by Congress. Mercury is one of these materials. Mercury is stored in 76-lb (34-kg) flasks at four DLA/DNSC depots located in Binghamton, New York; New Haven, Indiana; Somerville, New Jersey; and Warren, Ohio; and in DOE's Y–12 plant located in Oak Ridge, Tennessee. Mercury is stored in accordance with DNSC requirements (DNSC undated), and is inspected weekly as required by the DNSC mercury storage area inspection procedure (DNSC 1988). The DNSC health and safety guidelines for mercury (DNSC 1997) ensure that worker exposure is limited. Leaking flasks have been identified at the New Haven and Warren depots (TVA 2000a:4-1, 4-3). Therefore, DNSC needs to consider whether the mercury at these two depots should be transferred into new containers to ensure continued safe storage.

What is Mercury?

Mercury (Hg) is a heavy, silver-white metal, sometimes called "quicksilver" that is liquid at room temperature. It is a naturally occurring metallic element derived from the mercury ores cinnabar and calomel. Because of its unusual properties, mercury has been a useful commodity throughout history. It expands and contracts evenly with changes in temperature; alloys with other metals; and conducts electricity efficiently. Therefore, it has been used in many industrial, agricultural, medical, and defense applications.

New Haven Depot. There are six warehouses at the New Haven Depot in two rows of three as shown in Figure 1–1. Each warehouse is 960 ft (293 m) long by 180 ft (55 m) wide and is divided into four sections. Mercury is in the easternmost section of warehouse T214. The warehouse has poured concrete perimeter walls, a wood frame structural system, a wood roof deck, and a bitumen roof. Interior walls are wood and drywall. The building is protected from fire by a sprinkler system (Brooks 2000a). Other materials stored in the same section and adjacent sections of the warehouse are not flammable.

The mercury is in the center of its section of the warehouse, to which there is controlled access. There are approximately 557 t (614 tons) of mercury stored in 16,151 76-lb (34-kg) steel flasks. The mercury is composed of 30 lots with a minimum purity of 99.5 percent, and 15 lots with a minimum purity of 99.9 percent (Olmsted 2000b:4). The flasks (which are from several different sources and are not all of the same construction) are stored in wooden pallets that have provision for the insertion of the tines of a forklift. Each pallet contains approximately 50 flasks.

Information obtained from semi-weekly inspection reports from June 1993 through July 2000 indicates that free mercury was first reported in December 1997. In 1998, it was determined that 137 of the 267 pallets (51 percent) were contaminated, although no flasks were identified as leakers. It is assumed that this is from residual contamination that may have occurred before the mercury was shipped to New

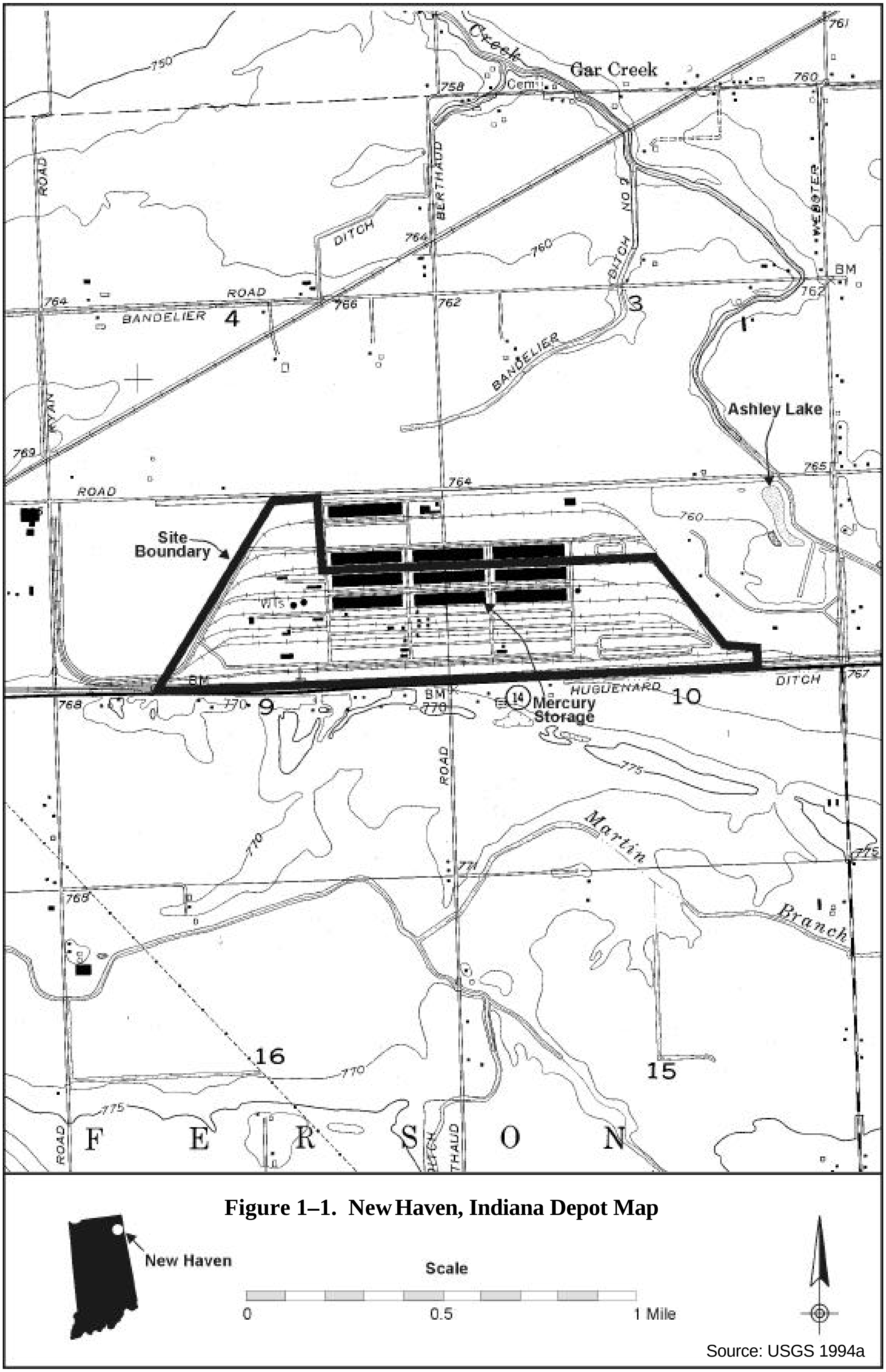

Figure 1–1. New Haven, Indiana Depot Map

Source: USGS 1994a

Haven in 1964. In 1998, all of the flasks were put into 6-mil plastic bags and placed in new pallets. In 1999, one confirmed leaking flask, and five suspected leaking flasks were found. The confirmed leaking flask was found to have a pinhole leak resulting from corrosion, which apparently penetrated along a weld defect (TVA 2000a:4-3, 4-6, 4-7; Lynch 2000e). Although 36-lb (16-kg) of mercury leaked from the flask, the mercury was not a reportable quantity since it collected in the containment tray located at the base of the pallets and was not released into the environment. The mercury was recovered and the area was cleaned, however free mercury, ranging in size from drops to pinheads, was found on flasks in seven different pallets since January 2000. One hundred and forty flasks have been identified as having droplets either on the flask itself or in the plastic bag surrounding it (Lynch 2000e). The mercury from these incidents has been promptly cleaned up with no mercury released to the environment.

The warehouse is monitored once a week for mercury vapors with a Jerome 431X Mercury Vapor Analyzer. Review of mercury inspection reports showed that between September 1999 and the end of November 1999, many readings exceeded the American Conference of Governmental Industrial Hygienists Threshold Limit Value of 0.025 mg/m^3 and some exceeded the Occupational Safety and Health Administration's Permissible Exposure Limit of 0.1 mg/m^3, with the highest reading being 0.364 mg/m^3. However, these readings were associated with the leaking flasks and cleanup activities described previously. Since the beginning of 2000, mercury vapor readings have either been below the limits of detection of the instrument or below the Threshold Limit Value, except for one reading in March which registered 0.028 mg/m^3.

Warren Depot. There are seven warehouses at the Warren Depot as shown in Figure 1–2. Each warehouse is 1,000 ft (305 m) by 200 ft (61 m) and is divided into 200-ft (61-m) by 200-ft (61-m) sections. The external walls are of concrete masonry construction, the floor is a concrete pad, and the roof is gypsum covered with a modified bitumen roofing material. Two-hour firewalls separate the sections, and the sections are protected from fire by a sprinkler system. Materials stored in adjacent sections of the warehouse are not flammable.

Approximately 563 t (621 tons) of mercury are stored in 16,355 76-lb (34-kg) steel flasks in the northernmost section of warehouse #2 in a storage cage. The cage is in the northeastern corner of the section, the rest of which is empty. The mercury is composed of 131 lots of material with a minimum purity of 99.9 percent (Olmsted 2000b:4). The flasks (which are from several different sources and are not all of the same construction) are stored in wooden pallets that have provision for the insertion of the tines of a forklift. Each pallet contains approximately 50 flasks. Most of the pallets are stacked three high.

Information obtained from semi-weekly inspection reports from January 1969 through July 2000, indicates there have been two confirmed leaking flasks, discovered in 1970 and 1976, and suspected leaking flasks, found in 1979, 1986, and 1998. In 1998, these five suspected leaking flasks in three pallets were placed in plastic bags to prevent any further migration. A suspected leaking flask analyzed in 1998 indicates that the plug weld on the bottom center of the flask may have failed. Free mercury has been observed on pallets and drip pans but has not been linked with any leakers. It is therefore assumed that it is residual contamination possibly arising before the mercury was shipped to Warren in 1968. It is estimated that 30 percent of the pallets are contaminated (TVA 2000a:4-1-4-3; Lynch 2000e). Leaking mercury from these incidents has been promptly cleaned up with no mercury released to the environment.

The warehouse is monitored once a week for mercury vapors with a Jerome 431X Mercury Vapor Analyzer. Review of the mercury inspection reports since December 1999 showed that all mercury vapor readings have been below the limit of detection of the instrument.

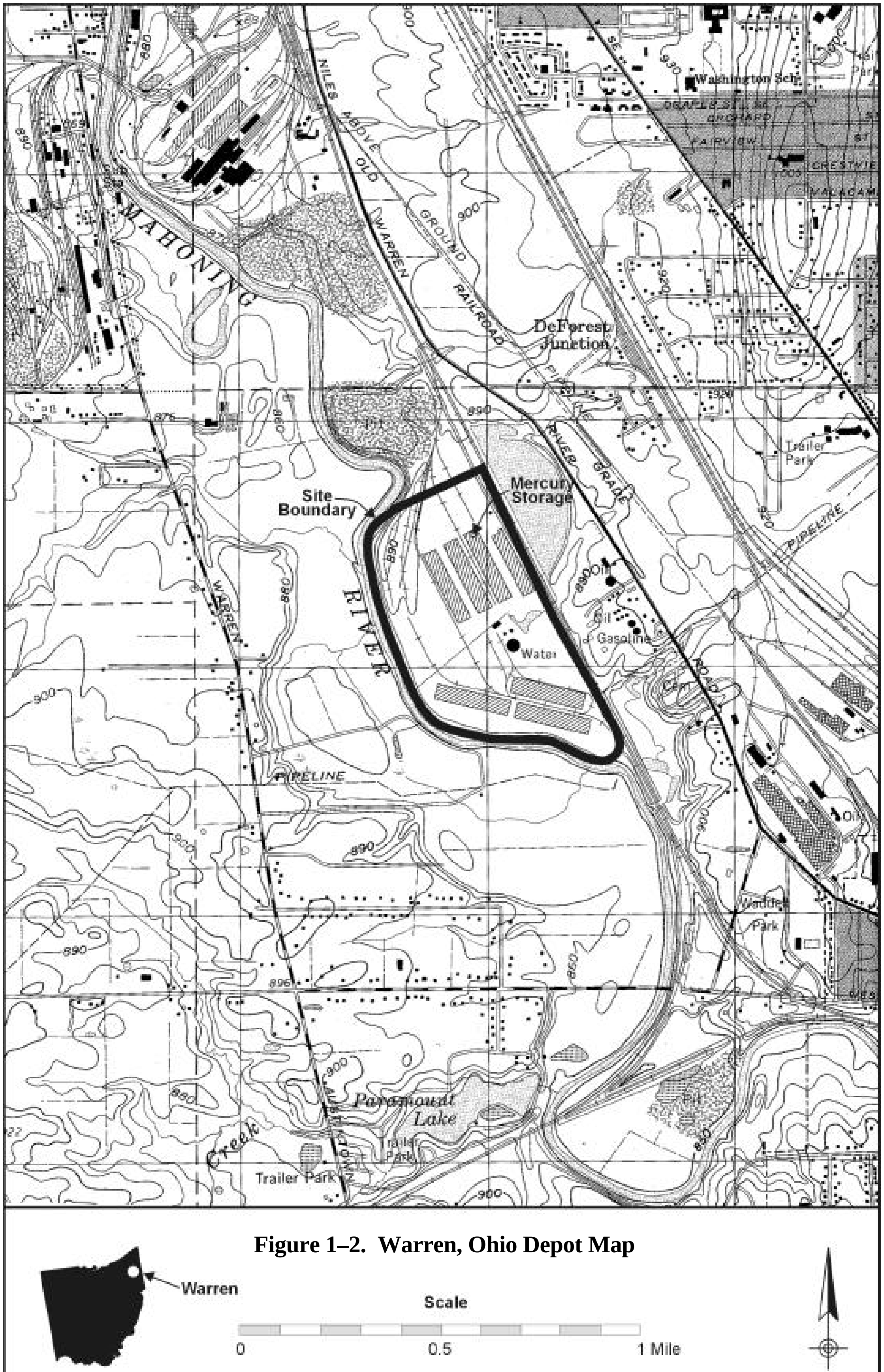

Figure 1–2. Warren, Ohio Depot Map

Source: USGS 1994b

NEPA regulations (42 USC 4321 et seq.) require all Federal agencies, including DNSC, to consider the environmental consequences of proposed actions before decisions are made. Because leaking flasks have been detected at the New Haven and Warren depots, DNSC is considering whether to transfer the mercury at those depots into new containers to ensure the continued safe storage of the mercury. This EA has been prepared to provide sufficient information so that DNSC may determine whether a FONSI is warranted for the proposed action or whether an EIS must be prepared.

1.2 PROPOSED ACTION

The proposed action is to transfer the mercury stored at the New Haven and Warren depots into new containers. Alternatives include transferring into new 76-lb (34-kg) steel flasks or transferring into new 1-t (1.1-ton) steel containers. A No Action Alternative has also been assessed pursuant to the requirements of NEPA and to provide a baseline for comparison of potential impacts.

1.3 RELATIONSHIP TO OTHER ACTIONS

DNSC voluntarily discontinued mercury sales in 1994 due to concerns raised by the U.S. Environmental Protection Agency (EPA). In 1997, DNSC initiated an EA to support its considerations of the options for the future management of the stockpiled mercury. DNSC later determined that an EIS was more appropriate under NEPA and cancelled that EA. However, because of evidence that some flasks are leaking and concerns about the integrity of the remaining flasks, an earlier decision is needed on whether to transfer the mercury stored at New Haven, Indiana and Warren, Ohio into new containers. Reflasking at the New Haven and Warren depots would be an interim action and would not prejudice the outcome of the EIS. The EIS will evaluate alternatives for management of the entire DNSC mercury stockpile including whether the mercury should continue to be stored; transferred into new containers; stored at fewer locations; treated and stored; treated and disposed; or sold.

2.0 ALTERNATIVES CONSIDERED

As described in Section 1.3, the proposed action is to transfer the mercury stored at the New Haven and Warren depots into new containers. Alternatives considered include No Action (Section 2.1), reflasking into new 76-lb (34-kg) steel flasks (Section 2.2), and reflasking into new 1-t (1.1-ton) stainless steel containers (Section 2.3). Section 2.4 summarizes information regarding the engineering characteristics of the alternatives.

2.1 NO ACTION

Under the No Action Alternative, the mercury would continue to be stored in existing flasks at the New Haven and Warren depots. Some leaking flasks would be anticipated and would be cleaned up using current procedures. This alternative assumes that 0.1 percent of the flasks will leak each year. This conservative assumption would result in approximately 16 leaking flasks per year at each depot. As described in Section 1.1, there have been one confirmed and five suspected leaking flasks at the New Haven Depot, and two confirmed and three suspected leaking flasks at the Warren Depot.

2.2 REFLASK INTO 76-LB STEEL FLASKS

Under this alternative, mercury would be transferred from the existing flasks into new 76-lb (34-kg) steel flasks. The design of these new flasks is described in Table 2–1. Most mercury storage containers are currently fabricated of carbon steel. Flasks are produced by cold cupping and drawing to produce a seamless shell, the open end of which is necked by hot forming (Norris Industries 1976:1). The entire inventory of mercury at the Y–12 Plant in Oak Ridge, Tennessee was reflasked in the mid-1980s into flasks of this construction. Fifteen years later, these flasks still look new, with no leaking flasks reported. The old flasks that leaked at the New Haven Depot have been in storage for at least 30 years and were fabricated in a manner that included welded seams rather than a seamless body (TVA 2000a:vi-vii).

Table 2–1. Description of New Mercury Storage Containers and Box Pallets

Container	Construction Material	Approximate Dimensions (in) Width	Height	Empty Weight (lb)	Capacity
76-lb flask[a, b]	Carbon steel	5.1	13	10	76 lb
1-t container[c]	Carbon steel	20	21	210	2,200 lb
Box pallets[b]	Treated hardwood	48	29	~200	50 flasks

[a] Source: Harris 1984.
[b] Source: Norris Industries 1976; TVA 2000b:4-2; Brooks 2000c.
[c] Source: Lawrence 1998.

Other materials, such as stainless steel, could be used to fabricate the containers, but would be considerably more expensive (Lawrence 1998). Still, stainless steel would not rust and would not need to be painted and therefore may be a lower maintenance material for long-term storage of mercury. This *Mercury Reflasking EA* is considering transferring the mercury into containers to address an urgent situation at the New Haven and Warren depots, and therefore does not evaluate long-term storage of the mercury. Ultimate disposition of the mercury stockpile, including long-term storage, will be evaluated in a future EIS.

At this time, the specific process that would be used for the reflasking operation has not yet been determined. The following is a summary of activities that would be part of the reflasking process:

- Replacement flasks and where required, box pallets, would be purchased from a commercial vendor and transported to the depot by truck.

- A reflasking area would be set up in the warehouse in which the mercury is stored.
- Reflasking equipment would be set up in the area; this would include mechanical devices to assist in lifting and pouring and containment in case there is a spill.
- A forklift truck would bring a pallet of mercury flasks from the storage area to the reflasking area.
- Old flasks would be emptied into the reflasking equipment and new flasks would be filled.
- Newly filled replacement flasks would be placed in a new box pallet or a clean previously used pallet.
- When the pallet is full, the forklift truck would take it to the storage area and retrieve another pallet of old flasks. Pallets would be stored in a single stack configuration.

Figure 2–1 shows a typical mercury reflasking process. Mercury from the old flasks is poured down the loading funnel into a 3,500-gal (13,249-l) main storage tank. From there, mercury is pumped up into a 30-gal (114-l) head tank. An overflow line is provided to return suspended solids back to the storage tank.

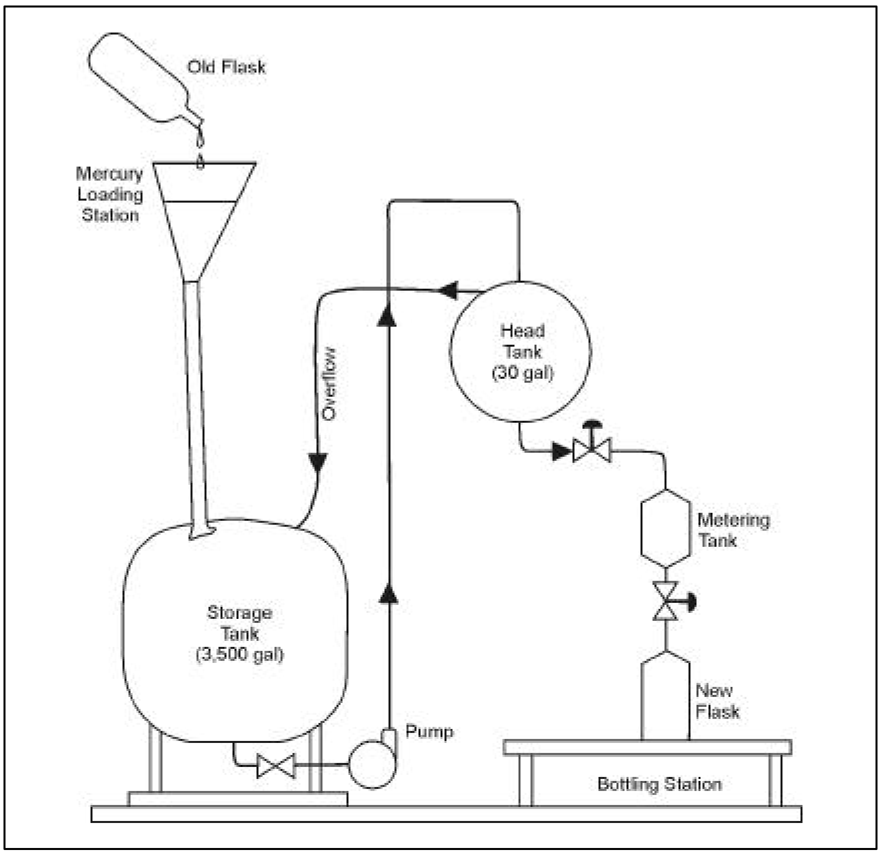

Figure 2–1. Typical Mercury Reflasking Process

By opening a series of valves, mercury can flow by gravity from the head tank into the metering tank and then into a new container (Olmsted 2000a). The new container can be filled on a scale to ensure that the proper quantity of mercury is placed in each container. Lot integrity can be maintained by processing each lot as a batch, and cleaning the tanks and process lines between lots.

Some waste would be generated (e.g., the empty flasks, old box pallets, workers' protective clothing, wipes, and so forth). The waste would be packaged and sent to a permitted offsite commercial facility for recycling, treatment or disposal. It is expected that the waste flasks and old box pallets would be trucked to an offsite treatment facility to remove any mercury contamination. The cleaned flasks would then be sent to a scrap metal recycling facility, with the old box pallets disposed of in accordance with applicable state and Federal regulations.

2.3 REFLASK INTO 1-T STEEL CONTAINERS

In this alternative, mercury from existing flasks would be transferred into new 1-t (1.1-ton) containers, which is equivalent to the contents of about 29 flasks. If lot integrity must be maintained, 1,218 metric ton containers (586 at New Haven; 632 at Warren) would be needed to contain the 176 separate lots of mercury at both depots. Approximately 195 of these containers would not be completely filled and therefore, would not contain 1-t (1.1-ton) of mercury. If lot integrity could be ignored, 1,121 new metric ton containers (557 at New Haven and 564 at Warren) would be needed, and all but two of these containers would be completely filled.

The design of the 1-t (1.1-ton) containers is described in Table 2–1. The process of reflasking is expected to be similar to that described for reflasking into the new 76-lb (34-kg) flasks. The principal difference is that, once full, the 1-t (1.1-ton) containers would be handled individually by the forklift truck. In addition, the wooden box pallets that were used to store the 76-lb (34-kg) flasks would no longer be needed and would need to be disposed of.

2.4 ENGINEERING INFORMATION

Information about the engineering characteristics of the alternatives for mercury reflasking at the New Haven and Warren Depots are presented in Tables 2–2 and 2–3. This information is used in Chapter 4 to determine the environmental consequences of the alternatives. Because DNSC is preparing an EIS to determine the ultimate disposition of the DNSC mercury stockpile, the *Mercury Reflasking EA* considers the impacts of reflasking and storage activities over a limited time span (5 years).

As shown in these tables none of the alternatives would require any construction, land disturbance, or additional permanent employees. The No Action Alternative would require some new flasks to replace leaking flasks and would generate hazardous waste during cleanup of the mercury. This alternative would also require truck trips to deliver new flasks and to pick up the hazardous waste generated during cleanup.

Transferring the mercury into new 76-lb (34-kg) flasks would require more storage space in the warehouse since the pallets would not be stacked for storage as had been done previously. This alternative would require all new flasks, and would generate a like amount of waste flasks (nonhazardous waste under the Resource Conservation and Recovery Act [RCRA] empty container rule). In addition, reflasking at the Warren Depot would require all new box pallets because the existing pallets are old and some may be contaminated with mercury. These waste pallets would be tested to determine their level of mercury contamination. If contaminated, they would be sent to a RCRA-permitted facility for treatment and disposal. If uncontaminated, the wood could be recycled or disposed of in a local landfill as solid waste. The pallets at the New Haven Depot were replaced in 1998-1999, therefore, most are uncontaminated and should be able to be reused (TVA 2000a:4-7). This alternative would also require truck trips to deliver new flasks and pallets, to pick-up nonhazardous waste flasks and pallets, and to pick up hazardous waste generated during reflasking.

Transferring the mercury into new 1-t (1.1-ton) containers would require all new 1-t (1.1-ton) containers, and would generate large amounts of waste flasks and box pallets at both depots. This alternative would also require truck trips to deliver new 1-t (1.1-ton) containers, to pick up nonhazardous waste flasks and pallets, and to pick-up hazardous waste generated during transfer of the mercury.

Table 2–2. Engineering Information for Reflasking Alternatives at the New Haven Depot[a]

Information	Alternative: No Action	Alternative: Transfer to 76-lb Flasks	Alternative: Transfer to 1-t Containers
Land disturbed (acres)	0	0	0
Construction (ft^2)	0	0	0
Resources needed			
Additional employees	0	0	0
Storage space (ft^2)	2,400[b]	7,200[b]	3,400[b]
New 76-lb flasks	81[c]	16,151[d]	0
New 1-t containers	0	0	586[e]
New box pallets	0	33[f]	0
Wastes generated			
76-lb flasks	81[c]	16,151[d]	16,151[d]
Box pallets	0	33[f]	325[g]
Hazardous waste (55-gal drums)	10[h]	2[i]	2[i]
Additional truck trips			
Deliver new 76-lb flasks	1	5[j]	0
Deliver new box pallets	1	1[k]	0
Deliver new 1-t containers	0	0	4[l]
Remove waste 76-lb flasks	0	5[j]	5[j]
Remove waste box pallets	0	1[k]	5[k]
Remove hazardous waste	10[m]	1	1
Total truck trips	12	13	15

[a] Period of analysis is 5 years.

[b] Assumes 22 ft^2 (2.0 m^2) for each pallet and 5.8 ft^2 (0.5 m^2) for 1-t (1.1-ton) containers.

[c] Flasks would be needed on a continual basis to replace flasks found to be leaking. Assumes that 0.1 percent of flasks (16) are found to be leaking each year for 5 years.

[d] Source: Lynch 2000a.

[e] Source: Lynch 2000d. Assumes that lot integrity would be maintained.

[f] Assumes that 10 percent of the existing box pallets would be unusable for storage of the new flasks due to contamination, and broken wood or fasteners.

[g] Source: Lynch 2000b.

[h] Assumes that two 55-gal (208-l) drums of hazardous waste (e.g., contaminated clothing, rages, wipes, filters) would be generated each year from cleanup and inspection operations.

[i] Assumes that two 55-gal (208-l) drums of hazardous waste (e.g., contaminated clothing, rages, wipes, filters) would be generated during the reflasking operations.

[j] Assumes each truck trailer can accommodate 40,000 lb (18,144 kg); each flask weighs 10 lb (4.5 kg); and packaging adds 20 percent to weight of flasks.

[k] Assumes each 48-ft (15-m) truck trailer can accommodate seventy-two 48×48×29 in (122×122×74 cm) box pallets.

[l] Assumes each truck trailer can accommodate 40,000 lb (18,144 kg); each 1-t (1.1-ton) container weighs 210 lb (95 kg); and packaging adds 10 percent to weight of containers.

[m] Due to Resource Conservation and Recovery Act regulations that prohibit long-term storage of hazardous waste, it is assumed that 2 truck trips per year for 5 years would be required.

Table 2–3. Engineering Information for Reflasking Alternatives at the Warren Depot[a]

Information	Alternative		
	No Action	Transfer to 76-lb Flasks	Transfer to 1-t Containers
Land disturbed (acres)	0	0	0
Construction (ft^2)	0	0	0
Resources needed			
Additional employees	0	0	0
Storage space (ft^2)	2,400[b]	7,300[b]	3,700[b]
New 76-lb flasks	82[c]	16,355[d]	0
New 1-t containers	0	0	632[e]
New box pallets	0	333[f]	0
Wastes generated			
76-lb flasks	82[c]	16,355[d]	16,355[d]
Box pallets	0	333[f]	333[f]
Hazardous waste (55-gal drums)	10[g]	2[h]	2[h]
Additional truck trips			
Deliver new 76-lb flasks	1	5[i]	0
Deliver new box pallets	1	5[j]	0
Deliver new 1-t containers	0	0	4[k]
Remove waste 76-lb flasks	0	5[i]	5[i]
Remove waste box pallets	0	5[j]	5[j]
Remove hazardous waste	10[l]	1	1
Total truck trips	12	21	15

[a] Period of analysis is 5 years.

[b] Assumes 22 ft^2 (2.0 m^2) for each pallet and 5.8 ft^2 (0.5 m^2) for 1-t (1.1-ton) containers.

[c] Flasks would be needed on a continual basis to replace flasks found to be leaking. Assumes that 0.1 percent of flasks (16) are found to be leaking each year for 5 years.

[d] Source: Lynch 2000a.

[e] Source: Lynch 2000d. Assumes that lot integrity would be maintained.

[f] Source: Lynch 2000b. Assumed that all of the existing box pallets would not be usable for storage of the new flasks due to age and/or contamination.

[g] Assumes that two 55-gal (208-l) drums of hazardous waste (e.g., contaminated clothing, rages, wipes, filters) would be generated each year from cleanup and inspection operations.

[h] Assumes that two 55-gal (208-l) drums of hazardous waste (e.g., contaminated clothing, rages, wipes, filters) would be generated during the reflasking operations.

[i] Assumes each truck trailer can accommodate 40,000 lbs (18,144 kg); each flask weighs 10-lbs (4.5-kg); and packaging adds 20 percent to weight of flasks.

[j] Assumes each 48-ft (15-m) truck trailer can accommodate seventy-two 48×48×29 in (122×122×74 cm) box pallets.

[k] Assumes each truck trailer can accommodate 40,000 lb (18,144 kg); each 1-t (1.1-ton) ton container weighs 210 lbs (95 kg); and packaging adds 10 percent to weight of containers.

[l] Due to Resource Conservation and Recovery Act regulations that prohibit long-term storage of hazardous waste, it is assumed that 2 truck trips per year for 5 years would be required.

3.0 AFFECTED ENVIRONMENT

This section describes the New Haven and Warren depots and neighboring areas. It describes the natural and human environment that could be affected by either the proposed action or the No Action Alternative and provides the context for understanding the environmental consequences described in Section 4.0.

3.1 NEW HAVEN, INDIANA

The New Haven (Casad) Depot consists of approximately 268 acres (108 ha) of land owned by the Federal Government. Figure 1–1 shows the layout of warehouses at the depot, its relationship to its surroundings, and where the mercury is stored. The entrance to the depot is located on the north side of Dawkins Road (State Route 14), approximately 3 mi (4.8 km) east of New Haven, Indiana (Olmsted 2000b:5; USACE 2000a:2-1). The depot is bordered to the south by the Norfolk Southern Railroad and State Route 14, and to the north by Edgerton Road and a small industrial park. The Superior Alloys factory borders the western portion of the depot, and property owned by Jefferson Township borders the eastern side (Olmsted 2000b:5; USACE 2000a:2-1, 2-2). Entrance to the depot is controlled by an 8-ft (2.4-m) high barbed-wire fence topped with three-stranded barbed wire and by security guards (Cash 1998a:2; USACE 2000a:2-2). There are 12 permanent and 2 temporary employees at the depot (Lynch 2000c; Olmsted 2000b:5).

3.1.1 Meteorology, Air Quality, and Noise

3.1.1.1 Background

Air Quality. Air quality at a given location or in a given area is described by the concentration of various pollutants in the atmosphere. Air quality is determined by the type and amount of pollutants emitted into the atmosphere, the size and topography of the air basin, and the prevailing meteorological conditions. EPA has established National Ambient Air Quality Standards (NAAQS) that set safe concentrations for six pollutants—particulate matter with aerodynamic diameter less than or equal to 10 microns (PM_{10}), sulfur dioxide, carbon monoxide, nitrogen dioxide, ozone, and lead. These are referred to as criteria air pollutants. Most States have adopted the NAAQS and some have adopted more stringent ambient air quality standards for these and other pollutants. The ambient air quality is described in terms of the current attainment status designations for the area for the criteria pollutants. Note that areas designated as "unclassifiable" with respect to a criteria pollutant means that no monitor is located within the county or region to demonstrate attainment.

In addition to the criteria pollutants, air quality can be affected by hazardous air pollutants. These are chemicals that might not be as widespread as the criteria pollutants but are potentially more toxic. EPA is developing standards for various industrial sources that emit these pollutants. Many States have adopted their own rules or guidelines on emissions of hazardous air pollutants and have been delegated authority to enforce the EPA standards. The number of regulated pollutants, as well as the applicable acceptable ambient limits, can vary from State to State.

Noise. Noise is unwanted sound usually caused by human activity. It is further defined as sound that disrupts normal activities or that diminishes the quality of the environment. Community response to noise is generally not based on a single event, but on a series of events over time. Factors that have been found to affect the subjective assessment of the daily noise environment include the noise levels of individual events, the number of events per day, and the times of the day at which the events occur.

Sound is usually measured using the decibel (dB). A commonly used descriptor of the noise environment is the day-night average sound level, which is an average measure of sound, taking into account the loudness of a sound-producing event, the number of times the event occurs, and the time of day. Nighttime noise is weighted more heavily because it is assumed to be more annoying to the community. The day-night average sound level descriptor is accepted by Federal agencies for estimating noise impact and establishing guidelines for compatible land uses.

The high-frequency component of sound that generally corresponds to nonimpulsive noise sources such as vehicles is measured using the A-weighted scale. The A-weighted scale is oriented toward the frequencies heard by the human ear. The EPA guidelines for environmental noise protection recommend an A-weighted day-night average sound level of 55 dBA as sufficient to protect the public from the effects of broadband environmental noise in typically quiet outdoor and residential areas (EPA 1974:29).

3.1.1.2 Meteorology, Air Quality, and Noise

Meteorology. The climate of the New Haven area (based on data and climate discussions for Fort Wayne International Airport) is typical of northeastern Indiana and is influenced to some extent by the Great Lakes. Average annual temperature is 50.0 °F (10.0 °C). The maximum recorded temperature is 106 degrees F (41 degrees C). Average maximum summer temperature is 82.6 degrees F (28.1 degrees C) and average minimum summer temperature is 61.1 degrees F (16.2 degrees C). The highest monthly average maximum temperature is 84.6 degrees F (29.2 degrees F) in July. Average maximum winter temperature is 33.3 degrees F (0.7 degrees C) and average minimum winter temperature is 18.2 degrees F (-7.7 degrees C). The average annual rainfall, 34.75 in (88.27 cm), is fairly well distributed over the year with somewhat larger monthly amounts in the late spring and early summer. Damaging hailstorms occur about twice a year. Snow usually covers the ground for about 30 days during the winter months, but heavy snowstorms are not frequent. Average annual snowfall is 35.3 in (89.7 cm) with the highest annual snowfall of 61.6 in (156.5 cm) occurring in 1982 (NCDC 2000a; MCC 2000a).

Four tornadoes were reported in Allen County in the period of January 1993 to May 2000. Several occurrences of high winds usually associated with thunderstorm activity typically occur every year (MCC 2000a). The average annual wind speed is 9.9 mph (4.4 m/sec). The maximum wind speed (based on the minimum for one mile of wind to pass) is 65 mph (29 m/sec) (NOAA 2000).

Air Quality. The New Haven Depot is located in Allen County in an area that is designated better than national standards for sulfur dioxide and better than national standards or unclassifiable for nitric oxide. The area is unclassifiable regarding attainment of the standard for carbon monoxide. Under EPA's proposed rule change reinstating the 1-hr ozone standard, the area is unclassifiable regarding attainment of the standard for ozone (EPA 1999a). EPA has not assigned attainment status designation for lead and attainment status for PM_{10} is unclassifiable (EPA 1999b).

There are no active air emissions sources at the depot regulated under the Federal Clean Air Act or companion State of Indiana regulations (USACE 2000a:2-5). In addition, little fugitive particulate emissions are generated during stockpile loading or unloading activities (USACE 1999a:3-7).

Noise. Noise associated with day–to-day activities around the depot is confined to automobile and truck traffic and occasional forklift and loader operation. These noise sources are limited to normal working hours. It is expected that for residences near the depot, the day-night average sound level due to activities at the depot is less than 55 dBA and is compatible with residential land use.

3.1.2 Land Use and Visual Resources

Land Use. Land use at the New Haven Depot is predominantly light industrial. Six warehouses, each covering about 172,800 ft^2 (16,054 m^2), are located in the north-central portion of the depot. One warehouse is currently operated by the General Services Administration and is not considered part of the depot. Various other smaller structures are located throughout the depot including two pumping stations, two pump houses, an office building, a guardhouse, and a maintenance building. South of the warehouses, within the central and eastern portions of the depot, are a number of storage areas. Other storage areas are located along the rail spur lines in the western portion of the depot.

Land use surrounding the area is predominantly agricultural. There are seven farmsteads located to the south of the depot, immediately opposite Dawkins Road (State Route 14). The closest farmstead is approximately 250 ft (76 m) south of the south property fence. A small industrial park is situated immediately adjacent to the north central portion of the depot, and the Superior Alloys factory is located to the west. A park, a model airplane flying field, and an antique railroad club occupy the land immediately to the east of the depot. Ashley Lake, a small recreational lake used for sport fishing, is also located in the area east of the depot (Olmsted 2000b:5; USACE 2000a:2-3).

Visual Resources. The developed areas of the depot are consistent with the Bureau of Land Management's (BLM's) Visual Resources Management (VRM) Class III or IV. Class III includes areas in which there have been moderate changes in the landscape that could attract attention, but do not dominate the view of the casual observer. Class IV includes areas in which major modifications to the character of the landscape have occurred. These changes may be dominant features of the view and the major focus of viewer attention (DOI 1986:App. 2). The viewshed around the depot consists mainly of rural land that is used for farming, residences, and light industry, and is generally consistent with VRM Class II or III (DiMarzio 2000a).

3.1.3 Geology and Soils

Surficial soils in the vicinity of the New Haven Depot are described as deep, somewhat poorly drained to very poorly drained, nearly level, medium-textured to finely-textured soils on uplands (USACE 1999a:3-1). These soils overlay glacial till, which is composed of massive, firm, pale brown to light gray clay loam and silty clay loam. Local lenses of sand and plastic clay may also exist. To the south and west of the depot are thin sand and gravel deposits overlying the till. The unconsolidated deposits at the depot reach to 70 ft (21 m) below ground surface. The bedrock underlying the till comprises deposits of Devonian limestone and dolomite of the Traverse and Detroit Rivers formations (USACE 1999a:3-1).

As part of a 1999 site investigation, a total of 21 surface soil samples and three duplicate samples were collected at the depth interval of 0 to 6 in (0 to 15 cm) and 1.5 to 2 ft (0.46 to 0.61 m) below ground surface. Two additional samples were taken along the depot's west fence line in order to obtain samples representative of background soil conditions (USACE 2000a:3-2). Soil sample concentrations were also compared to State of Indiana soil standards for residential land use (USACE 2000a:3-5). No elevated levels of mercury were found in any of the soil samples.

The tectonic setting of Indiana has remained fairly stable over the last 650 million years (Rupp 1997:1). The closest fault to Allen County, Indiana, where the New Haven Depot is located, is the Fortville Fault; however, no faults are located directly within the county (Rupp 1997:3).

In the period from 1568 to present, only seven significant earthquakes with a magnitude greater than 4.5 were centered within a 100-mi (160-km) radius of Allen County; only the 1937 earthquake registered a magnitude higher than 5.0 (USGS 2000a, 2000b). Historically, the most detrimental earthquake originating within Indiana occurred in 1909, near the Illinois border between Vincennes and Terre Haute. This earthquake was felt over an area of 30,000 mi^2 (77,700 km^2). Another damaging Indiana earthquake, felt over an area of 40,000 mi^2 (103,600 km^2), occurred in 1899 at an intensity of VI to VII on the Modified Mercalli Scale. Indiana has also experienced effects of earthquakes originating in neighboring States. In 1968, an earthquake centered near Dale in southern Illinois was felt over 580,000 mi^2

(1,502,194 km^2) and 23 States, at a magnitude of 5.3 on the Richter Scale (USGS 1972:1). The Great New Madrid earthquakes of 1811 and 1812 are thought to have had a strong effect on the State, particularly in the southwest, but there is little information from the frontier times (USGS 1972:1). The scientific community, in recognition of Indiana's vulnerability to New Madrid earthquakes, has begun mapping and collecting engineering data on earthquake-induced soil liquefaction features in southern and central Indiana. These studies have indicated the occurrence of major prehistoric earthquakes in the Wabash Valley and southeastern Indiana (Eggert, et al. 1995).

Measures of peak (ground) acceleration are indicative of what an object on the ground would experience during an earthquake. This motion is generally expressed in units of gravitational acceleration (g). The U.S. Geological Survey (USGS) has developed seismic hazard maps that are based on response spectral acceleration. Such maps account for the natural period of vibration of structures. These maps have been adapted for use in the new International Building Code and depict maximum considered earthquake ground motion of 0.2 and 1.0 second spectral response acceleration, respectively, based on a 2 percent probability of exceedance in 50 years. This corresponds to an annual recurrence interval of about 1 in 2,500. The New Haven Depot lies within the 0.16 to 0.17 g mapping contours for a 0.2-second spectral response acceleration and the 0.06 to 0.07 g contours for a 1.0-second spectral response acceleration (USGS 2000e).

3.1.4 Water Resources

Surface Water. Four stormwater outfalls drain surface water from the majority of the New Haven Depot. These outfalls discharge into the Lomont Ditch, which is a man-made drainage ditch that ultimately empties into the Maumee River. The cities of New Haven and Fort Wayne obtain their water supply from the St. Joseph River, which branches off from the Maumee River (USACE 1999a:3-4). Surface water also drains to Ashley Lake, a small recreational lake located northeast of the depot. During flood conditions, an overland surficial hydrological connection between Ashley Lake and the Lomont Ditch can occur (USACE 1999a:3-4). Three man-made ponds are also located near the eastern perimeter of the depot (Cash 1998a:7). The National Flood Insurance Program Flood Insurance Rate Map for Allen County, Indiana and incorporated areas indicates that the New Haven Depot is not located in a flood plain (FEMA 1990).

The U.S. Army Center for Health Promotion and Preventative Medicine conducted a stormwater management study in April 1996 that sampled stormwater runoff at the depot outfalls. As part of the 1999 site investigation, two sediment and five surface water samples were collected and compared to Indiana Administrative Code (IAC) 327, Article 2, Rule 2 water quality standards, developed by the Water Pollution Control Board. Rule 2 water quality standards apply to the Great Lakes System, to which the Maumee River belongs (USACE 2000a:3-13). None of these samples contained elevated levels of mercury.

Groundwater. Groundwater occurs predominantly in the till/bedrock or the upper bedrock units, and occurs between 50 to 70 ft (15 to 21 m) below ground surface. The aquifer or aquifers underlying the depot are believed to be under confining conditions, and they likely flow in a northwesterly direction (USACE 1999a:3-2).

There are a number of bedrock and unconsolidated wells onsite. The wells are used primarily for groundwater sampling (USACE 2000a:3-8). Two water wells on the depot are used to supply potable water. The primary onsite well, installed in 1992, was drilled to a depth of 396 ft (121 m) below ground surface (USACE 1999a:2-2). The shallow, water-bearing zones within the upper portion of the till are not used as a water resource (USACE 1999a:3-3). The City of New Haven obtains its water supply from the St. Joseph River. The surrounding farms and small businesses likely use private groundwater wells for potable water supply (USACE 1999a:3-3).

3.1.5 Ecological Resources

Ecological resources are defined as terrestrial (predominantly land) and aquatic (predominantly water) ecosystems characterized by the presence of native and naturalized plants and animals. For the purposes of this EA, those ecosystems are differentiated in terms of habitat support of threatened, endangered, and other special-status species—that is, "sensitive" versus "nonsensitive" habitat.

Sensitive Habitats and Species. The U.S. Department of Interior, Fish and Wildlife Service identified wetland areas adjacent to and on the New Haven Depot. A number of small wetland areas (approximately 14) were identified in the eastern portion of the depot. Three small scattered wetlands were also identified in the far western portion of the depot and a larger wetlands is located in a wooded area to the west (USACE 2000a:3-11, 3-12). However, no endangered, threatened, or rare species have been reported onsite or in the vicinity of the depot nor is there suitable habitat to support such species (Cash 1998a:12; USACE 2000a:3-12).

Nonsensitive Habitats and Species. The depot predominately consists of mowed lawn, gravel, paved areas, and planted prairie grasses and wildflowers. Several ornamental trees (i.e., cottonwood and maples) are located throughout the depot. In 1995, native wildflowers including the compass plant and rattlesnake master plant were planted on the northern side of the main office. At the same time, prairie grasses including Indian grass, bluestem, side oats grama, switch grass, along with 42 forbs were used to establish prairie areas at the northwest and southwest sections of the depot, although the southwest portion was unsuccessful at germinating (Cash 1998a:9-11).

As a result of the restored prairie area and intermittent water sources, many common wildlife species such as blue heron, ducks, ground hogs, hawks, kestrels, killdeer, red fox, skunks, snapping turtles, various songbirds, and other wildlife are frequently observed on the depot. It is important to note that the wildlife community associated with the prairie area may change over time by attracting new varieties of small animals like rabbits and game birds, but large animals, such as deer, will be kept out by the depot's fence. The remainder of the depot does not contain suitable habitat for wildlife (Cash 1998a:8, 9).

3.1.6 Cultural Resources

The New Haven Depot is a heavily built-up landscape that experienced intensive preparation for its mission to process troop supplies during World War II, and later, to stockpile strategic materials. A pedestrian survey was completed for the entire depot in 1997 and all exposed soils were inspected for cultural resources. No historic or prehistoric archeological sites were discovered (DeLeon and Whetsell 1999a:17).

The architectural survey conducted during the cultural resources assessment found no structures, buildings, or objects that appear eligible for listing, pending State Historic Preservation Officer concurrence, on the National Register of Historic Places (NRHP). The depot is not eligible as a historic district because fragmentation of the property precludes its historic district eligibility. The existing buildings were not found to be unique or exceptionally significant examples of World War II building design or use (DeLeon and Whetsell 1999a:18-19).

An offsite survey conducted in 1991 identified 22 structures that fall within a 1-mi (1.6-km) radius of the depot and meet the minimum age requirement for consideration to the NRHP. To date, no determination of NRHP eligibility has been made for these structures (DeLeon and Whetsell 1999a:5).

Historic American Indian tribes occupied, and inspired, the State's name—Indiana, the land of the Indians. However, the United States acquired Native American land through treaties and by the 1840s most of the Native Americans had been forcibly removed (IHB 2000). At the time of the 1990 census, there were 12,453 Native Americans residing in Indiana, of which 880 were residing in Allen County (DOC 2000). While there are currently no federally recognized tribes, three are pending such a distinction with the closest, the Indiana Miami Council, residing in the adjacent county of Huntington (AIHF 2000).

3.1.7 Infrastructure

Utilities. Water is supplied to the New Haven Depot by onsite wells. Electricity is purchased from the American Electric Power Company and is transported to the depot above ground. The depot is responsible for repairs to electric lines within its fenceline. Fuel oil is supplied by various contractors and is used for heating and equipment operation; gasoline is also used to operate depot equipment (Brooks 2000b).

Transportation. Access to the New Haven Depot is obtained via the major 4-lane U.S. Highway 30 and the smaller, 2-lane Dawkins Road. The depot is served by the Norfolk and Southern Railroad (Brooks 2000b).

3.1.8 Waste Management

Sanitary wastewater, nonhazardous solid waste, and small quantities of hazardous waste are generated during routine maintenance and materials handling activities at the New Haven Depot. Sanitary wastewater is discharged to sewers leading to the City of New Haven sanitary wastewater treatment facility. Nonhazardous solid wastes consisting of typical office garbage and maintenance wastes, are picked up by a commercial refuse collection company and disposed of at the National Serveall Landfill in Fort Wayne (Brooks 2000b).

The depot is a conditionally-exempt small quantity hazardous waste generator (USACE 2000a:2-4). Therefore, only small quantities of hazardous waste such as spent paints, cleaners, solvents, and contaminated materials from mercury cleanup activities, are routinely generated during the depot operations (USACE 2000a:2-12). Approximately 200 lb (91 kg) of hazardous waste are generated each year (Brooks 2000b). Hazardous wastes are accumulated in 55-gal (208-l) drums until trucked offsite by a commercial waste management company for recycling, or treatment and disposal (USACE 2000a:2-12).

3.2 WARREN, OHIO

The Warren Depot consists of approximately 160 acres (65 ha) of land leased from the Conrail Railroad Company (USACE 2000b:2-1, 2-2). Figure 1–2 shows the layout of warehouses on the depot, its relationship to its surroundings, and where the mercury is stored. The entrance to the depot is located on the west side of Niles-Warren River Road, approximately 950 ft (290 m) north of DeForest Road. The depot is bordered on the east by the Penn Central Railroad, on the northeast by WCI Steel, and on the northwest, west and south by the Mahoning River. Entrance to the depot is controlled by an 8-ft (2.4-m) high barbed wire fence and security guards (USACE 2000b:2-1). There are 13 permanent duty employees at the depot (Lynch 2000c).

3.2.1 Meteorology, Air Quality, and Noise

Meteorology. The climate of the Warren area (based on data and climate discussions for Youngstown Regional Airport) is influenced to some extent by the Great Lakes. Average annual temperature is 48.3 °F (9.1 °C). The maximum recorded temperature is 103 degrees F (39 degrees C). Average maximum summer temperature is 79.4 degrees F (26.3 degrees C) and average minimum summer temperature is 57.3 degrees F (14.1 degrees C). The highest monthly average maximum temperature is 81.3 degrees F (27.4 degrees F) in July. Average maximum winter temperature is 33.5 degrees F (0.8 degrees C) and average minimum winter temperature is 19.1 degrees F (-7.2 degrees C). The average annual rainfall, 37.32 in (94.79 cm), is fairly well distributed over the year with somewhat larger monthly amounts in the late spring and summer. Winter months are characterized by persistent cloudiness and intermittent snow flurries. Severe snowstorms typically occur several times a year, but the bulk of the snow falls as occurrences of 2 in (5 cm) or less. Average annual snowfall is 58.1 in (147.6 cm) with the highest annual snowfall of 91.3 in (231.9 cm) occurring in 1987 (NCDC 2000b; MCC 2000b).

At the Warren Depot, there was a tornado in 1986 that demolished or damaged several buildings (DeLeon and Whetsell 1999b). Five tornadoes were reported in Trumbull County in the period of January 1993 to May 2000. Several occurrences of high winds typically occur every year (MCC 2000b). The average annual wind speed is 9.7 mph (4.3 m/sec). The maximum wind speed (highest one minute average) is 58 mph (26 m/sec) (NOAA 2000).

Air Quality. The Warren Depot is located in Trumbull County in an area that is designated better than national standards for sulfur dioxide and better than national standards or unclassifiable for nitric oxide. The area is unclassifiable regarding attainment of the standard for carbon monoxide. Under EPA's proposed rule change reinstating the 1-hr ozone standard, the area is in attainment for ozone (EPA 1999a). EPA has not assigned attainment status designation for lead and attainment status for PM_{10} is unclassifiable (EPA 1999b).

There are no active air emission point sources on the depot (USACE 2000b:3-10). Fugitive particulate emissions from truck traffic along dirt roads are possible as well as during the loading and unloading of the various materials to and from outdoor stockpiles. However, a water truck is employed on the depot during dry periods to control fugitive dust (USACE 1999b:3-4).

Noise. Noise associated with day-to-day activities around the depot is confined to automobile and truck traffic and occasional forklift and loader operation. These noise sources are limited to normal working hours. It is expected that for residences near the depot, the day-night average sound level due to activities at the depot is less than 55 dBA and is compatible with residential land use.

3.2.2 Land Use and Visual Resources

Land Use. Land use at the Warren Depot is considered to be light industrial. The depot contains 14 buildings, seven of which are warehouses, in addition to the outdoor stockpile areas (Cash 1998b:2; USACE 2000b:2-1).

The depot is bounded by the Penn Central (Conrail) railroad on the east, by WCI Steel industrial complex on the northeast, and by the open space of the Mahoning River on the northwest, west, and south. This river is used for fishing and swimming. A man-made lake, used by a private fishing club, is located along the northeast property boundary (USACE 2000b:2-1, 3-8).

Visual Resources. The developed areas of the depot are consistent with BLM's VRM Class III or IV. Class III includes areas in which there have been moderate changes in the landscape that could attract attention, but do not dominate the view of the casual observer. Class IV includes areas in which major modifications to the character of the landscape have occurred. These changes may be dominant features of the view and the major focus of viewer attention (DOI 1986:App. 2). The viewshed around the depot consists mainly of wooded lands, some residences, and industrial areas and is generally consistent with VRM Class II to IV (DiMarzio 2000b).

3.2.3 Geology and Soils

The Warren Depot is situated on 15 ft (4.6 m) or more of fill, consisting of slag, cinders and other steel mill solid wastes. Beneath the fill are deposits of stratified, well-sorted sand and gravel layers. These deposits represent a mixture of repeated depositional and erosional environments along the river valley. Underlying bedrock is undifferentiated Mississippian Period limestones and shales (USACE 1999b:3-1).

As part of a 1999 site investigation, 21 soil samples were collected. Samples were collected at depth intervals of 0 to 6 in (0 to 15 cm) and 1.5 to 2 ft (0.46 to 0.61 m) below ground surface. Samples were analyzed for antimony, arsenic, barium, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc (USACE 2000b:3-2). Elevated concentrations of all 14 elements were found in one or more soil samples. Elevated concentrations of all of the metals, except antimony and nickel, were found in one or more of the deep samples (USACE 2000b:3-4). Results were also compared to generic direct-contact soil standards presented in Ohio Administrative Code (OAC) rule of the Ohio Environmental Protection Agency (OEPA). Exceedances of the OAC generic soil residential land use standards were detected for five of the metals. Concentrations of one or more of these metals were found in all but seven of the soil samples analyzed (USACE 2000b:3-4). Because the depot is built on fill composed of slag, cinders, and other steel mill solid waste, elevated concentrations of some or all of the metals is not unexpected.

There is no evidence of active faults in the Trumbull County area, where the Warren Depot is located (ODNR 2000:2). The State of Ohio has experienced over 120 earthquakes since 1776. Fourteen of these events have caused minor to moderate damage. Three areas of the State appear to be particularly susceptible to seismic activity. These areas include Shelby County and surrounding counties in western, northeastern, and southeastern Ohio. The area of northeastern Ohio, east of Cleveland, is the second most active area of Ohio. At least 20 earthquakes have occurred in this area since 1836. While most of these earthquakes were small and resulted in little or no damage, an earthquake occurred in the area in 1986 with a Richter magnitude of 5.0. This earthquake shook Ohio and was felt in 10 other States and southern Canada. It caused minor to moderate damage (OGS 2000:1). In the period from 1568 to present, only three significant earthquakes with a magnitude greater than 4.5 were centered within a 100-mi (160-km) radius of Trumbull County; only the 1998 earthquake registered a magnitude higher than 5.0 (USGS 2000c, 2000d).

Measures of peak (ground) acceleration are indicative of what an object on the ground would experience during an earthquake. This motion is generally expressed in units of gravitational acceleration (g). USGS has developed seismic hazard maps that are based on response spectral acceleration. Such maps account for the natural period of vibration of structures. These maps have been adapted for use in the new International Building Code and depict maximum considered earthquake ground motion of 0.2 and 1.0 second spectral response acceleration, respectively, based on a 2 percent probability of exceedance in 50 years. This corresponds to an annual recurrence interval of about 1 in 2,500. The Warren Depot lies within the 0.17 to 0.18 g mapping contours for a 0.2-second spectral response acceleration and the 0.05 to 0.06 g contours for a 1.0-second spectral response acceleration (USGS 2000e).

3.2.4 Water Resources

Surface Water. While the Mahoning River defines the northwest, west, and southwest boundaries of the Warren Depot, a pond and wetland mark the southeast boundary. The southern one-third of the property is separated in a northeast-southwest direction from the remainder of the property by a drainage ditch (USACE 1999b:3-2). In 1998, the southwest end of this ditch was sealed and a berm was constructed along the edge of the depot to prevent surface water discharge from the depot (USACE 2000b:3-8). The depot has never been flooded (USACE 1999b:3-2). The National Flood Insurance Program Flood

Insurance Rate Map for Trumbull County, Ohio indicates that the Warren Depot is not located in a flood plain (HUD 1978).

Before 1998, two sewer outfalls discharge surface runoff from the depot to the Mahoning River (USACE 2000b:3-8). In October 1996, a U.S. Army assessment team examined stormwater runoff samples from the two sewer outfall points (Cash 1998b:7). Sample results indicated that mercury was not present at concentrations exceeding EPA benchmark levels (USACE 1999b:3-2). All of the public water supplies used by the surrounding communities are obtained from surface water (USACE 1999b:3-1), the majority of which is obtained from the Meander Creek Reservoir, located on a tributary of the Mahoning River (USACE 1999b:3-3).

As part of the 1999 site investigation, sediment samples were collected from the three former depot outfalls. Due to a dry spell in the area, the outfalls did not contain water at the time the samples were collected (USACE 2000b:3-9). Mercury was detected in one of the three samples (USACE 2000b:3-9). While detected in the samples, mercury was not present in elevated concentrations.

Groundwater. As noted, the depot is situated on porous fill composed of slag, cinders, and other steel mill solid wastes on land that was previously a floodplain. Therefore, the presence of groundwater at the depot is determined primarily by the water level in the river (USACE 2000b:3-5). The shallow groundwater most likely flows in a south-southwest direction on the depot. There are 3,669 water wells within a 4-mi (6.4-km) radius of the depot; however, the nearby communities of Warren, Niles, Lordstown, and Girard all obtain their public water supplies from surface water (USACE 1999b:3-1).

The 1999 site investigation included the comparison of soil samples to determine the potential of downward migration of metals and impacts on groundwater at the depot (USACE 2000b:3-6). Mercury was detected in one or more samples at concentrations exceeding OEPA leach-based values (USACE 2000b:3-7). However, observed concentrations of mercury in groundwater are suspected of originating from the steel mill slag on which the depot is built.

3.2.5 Ecological Resources

Sensitive Habitats and Species. The U.S. Department of Interior, Fish and Wildlife Service has identified wetland areas immediately adjacent to the east-central perimeter of the Warren Depot (USACE 1999b:3-3). However, there are no known wetland areas present at the depot (Cash 1998b:11). Furthermore, no endangered, threatened, or rare species have been reported to be located on or in the vicinity of the depot (Cash 1998b:12; USACE 1999b:3-4).

Nonsensitive Habitats and Species. Woodlands border the western perimeter of the depot. The dominant forest types in this region include white oak-northern red oak-hickory hardwood forests and American beech-sugar maple forests. There are no woodlands within the perimeter of the depot, which contains mowed lawn, gravel, and pavement (Cash 1998b:11).

The frequent sighting of raccoons, skunks, squirrels, and various birds and waterfowl passing through the depot is attributable to the proximity of the Mahoning River. Canadian geese have been observed within and around the onsite man-made reservoir. However, no known habitat exists to support these animal species, despite incidental use by some wildlife (Cash 1998b:11).

3.2.6 Cultural Resources

No historic or prehistoric archeological resources were discovered during a survey of the Warren Depot. If archeological resources exist within the boundaries, they are deeply buried and most likely are protected from disturbance by the thick layer of slag on which the depot was built (DeLeon and Whetsell 1999b:13-15).

The architectural survey concluded that of the fifteen buildings and one structure identified in preliminary investigations, none are eligible for individual or district nomination to the NRHP. The depot is not eligible as a historic district due to damage inflicted during a 1986 tornado and no individual structure is eligible because no building on the depot represents an exceptional architectural design or construction method (DeLeon and Whetsell 1999b:14-15).

An offsite survey indicated that two prehistoric sites are recorded within a 1-mi (1.6-km) radius of the depot. The Morgan site lies across the Mahoning River from the depot and was at one time an apparently rich site. The second site, a small remnant of an Early Woodland village, is also situated on the other side of the Mahoning River from the depot, approximately 1.5 mi (2.4 km) upstream from the Morgan site (DeLeon and Whetsell 1999b:5).

When Ohio became a State in 1803, American Indian tribes claimed parts of northern and northwestern Ohio. Although they fought hard to retain this land, by 1843 the United States had sent away the remaining Indian tribes (OHS 2000). At the time of the 1990 census, there were 19,859 Native Americans residing in Ohio, of which 333 were residing in Trumbull County (DOC 2000). However, there are no federally recognized tribes currently in Ohio (AIHF 2000).

3.2.7 Infrastructure

Utilities. Water is supplied to the Warren Depot by Niles City via underground water mains. Electricity is purchased from Ohio Edison Electric and is transported to the depot via telephone poles. The depot is responsible for repairs to electric lines within its fenceline. Fuel oil is provided by North West Fuel and is used for heating and forklifts (Pittano 2000).

Transportation. Access to the Warren Depot is obtained via the major 2- and 4-lane State highways of Ohio Route 422 and Ohio Route 46, which connect with Pine Street Extension, a smaller, 2-lane commercial road. The depot is served by the Norfolk and Southern Railroad (Pittano 2000).

3.2.8 Waste Management

Sanitary wastewater, nonhazardous solid waste, and small quantities of hazardous waste are generated during routine maintenance and materials handling activities at the Warren Depot. Sanitary wastewater is discharged to an onsite sanitary leach field (USACE 2000b:2-6). Nonhazardous solid wastes, consisting of typical office garbage and maintenance wastes, are picked up by a commercial refuse collection company and disposed of at the BFI Landfill in Poland, Ohio (Leach 2000).

The depot is a conditionally-exempt small quantity hazardous waste generator. Therefore, only small quantities of hazardous waste such as spent paints, cleaners, solvents, and contaminated materials from mercury cleanup activities, are routinely generated during the depot operations (USACE 2000b:2-6). Approximately 70-gal (265-l) of hazardous waste are generated each year. Hazardous wastes are accumulated onsite in 55-gal (208-l) drums until trucked offsite by a commercial waste management company for recycling, or treatment and disposal (Leach 2000).

4.0 ENVIRONMENTAL CONSEQUENCES

The following sections describe the potential human health and environmental consequences of the three alternatives. Environmental consequences are evaluated for all resources described in Section 3.0.

4.1 NO ACTION

The following subsections describe the environmental consequences of the No Action Alternative. Under no action, mercury would continue to be stored in existing flasks at the New Haven and Warren depots.

4.1.1 Waste Management

As the existing flasks age, greater numbers may begin to leak. As shown in Section 2.4, it is estimated that 0.1 percent of the flasks would leak each year for a total of 16 per year at each depot. Cleanup of the leaking flasks could generate additional hazardous waste similar to that generated during past cleanup actions. The quantities of waste generated are expected to be small (two 55-gal [208-l] drums per year at each depot) and would not result in major impacts at either depot.

4.1.2 Human Health Risk

This section describes the human health risks for the No Action Alternative. Risks to human health are evaluated for normal operations, facility accidents, and transportation. This information is summarized from the detailed description presented in Appendix A.

4.1.2.1 Normal Operations

During normal operations, the mercury remains generally undisturbed in sealed flasks inside locked warehouses. The condition of the stockpile is monitored once a week in accordance with the DNSC mercury storage area inspection procedure (DNSC 1988). If any leaks are detected, or if there is abnormally high concentration of mercury in the air, cleanup equipment and personal protective equipment is available nearby. Therefore, there would be low to negligible risk to the worker and the general public at either depot.

4.1.2.2 Facility Accidents

As described in Appendix A, a number of hypothetical accident scenarios were identified and a frequency, consequence, and risk analysis was performed. The risk associated with each scenario was assigned to one of four categories—negligible, low, moderate, or high. These categories were defined with reference to well-established risk assessment practices (DOE 1994a, 1994b; CCPS 1989). A high risk consists of combinations of frequency and consequence magnitude that identify situations of major concern. A medium risk consists of situations of some concern. Situations of low or negligible risk would generally be considered as acceptable or tolerable. All of the accident scenarios considered for the No Action Alternative have low or negligible predicted risk to workers and the general public. The following is a discussion of the various accident scenarios and their risks.

***Slow Leak*.** The potential exists for an aging flask to develop a slow leak due to corrosion, resulting in a release of liquid mercury to the catch pan located underneath each stack of pallets. This is considered to be a high frequency event, one that is expected to occur a number of times each year. The consequences are based on a spill of the entire contents of a single flask to the catch pan and are determined to be negligible. A negligible airborne concentration of mercury is defined with respect to the American Industrial Hygiene Association's (AIHA's) Emergency Response Planning Guidelines (ERPGs) for the public (AIHA 1999) and the National Institute for Occupational Safety and Health's Immediately Dangerous to Life and Health (IDLH) airborne concentration. The IDLH for mercury is 10 mg/m^3 and a concentration affecting a worker is considered to be negligible if it is less than one tenth of the IDLH (DOE 1994a, 1994b). For the public (including children and the elderly), the concentration is considered to be negligible if it is less than one tenth of the ERPG-2 (Level 2), where the ERPG-2 is essentially that concentration which can be tolerated for up to an hour without irreversible adverse health effects or impairment of the ability to take emergency actions. AIHA does not have an official ERPG-2 for mercury: in its absence, it is taken to be one tenth of the IDLH (i.e., 1mg/m^3) based on precedents established by EPA (EPA 1998). Because the concentration for this category of releases has been determined to be negligible, the risk is also negligible at both depots. The explanation for this way of using the ERPG-2 and IDLH is given in Section A.1.2 of Appendix A.

***Single Flask Drop*.** The potential exists for a single flask to be dropped during handling resulting in the breach of the flask. This postulated accident scenario is considered to be a high frequency event but, because the predicted concentration affecting both workers and the public is negligible, the predicted risk is also negligible at both depots.

***Single Pallet Drop/Puncture*.** The potential exists for a single pallet to be dropped during handling conservatively resulting in the breach of all flasks in the pallet. The flasks in a single pallet could also be punctured with the forklift tines. These postulated accident scenarios pose negligible risk because the predicted concentrations involving both workers and the public are negligible.

Pallets Collapse. The potential exists for the wood pallets to fail, resulting in the collapse of three pallets in a stack and a release of liquid mercury to the floor. The consequences are conservatively based on spilling the entire contents of three pallets from a single stack to the floor (i.e., the catch pan is not sufficient to contain the spill). This accident has also been determined to lead to negligible risk to the workers and the public. Spilled mercury has a low vapor pressure and evaporates very slowly.

Review of the mercury inspection reports for the Warren Depot from December 1999 through June 2000 showed that the highest temperature recorded inside the warehouse was 74^{o}F (23^{o}C). A more limited set of readings from the New Haven Depot showed the highest recorded temperature of 76^{o}F (24.5^{o}C) during the period from September 1999 through March 2000. The temperature assumed for the mercury evaporation model is 68^{o}F (20^{o}C), which is slightly lower than these readings. Because the mercury possesses a very large heat capacity, its temperature will lag behind that of the warehouse. Based on the calculations performed and reported in Appendix A, the temperature in the warehouse would have to exceed 100^{o}F (38^{o}C) for an extended period for an evaporating pool of mercury to cause airborne concentrations to exceed one tenth the concentration considered immediately dangerous to life and health (10 mg/m^3). The frequency of such a scenario is considered to be negligible.

Forklift Fire. A fire initiated by the fuel contained on a forklift and subsequently involving a pallet being moved is not expected to spread beyond the immediate vicinity of the forklift due to activation of the fire suppression system. It is assumed that 5 percent of the flasks in the pallet that is being carried by the forklift are engulfed in the central position of the fire resulting in complete evaporation of the mercury. As is shown in Appendix A, the calculations identify a combination of frequency and consequence magnitude that is of low risk to the public and of negligible risk to the workers.

Building Fires. Combustible materials associated with mercury storage operations include the wood storage pallets and miscellaneous materials such as plastic sheeting, paper, and cardboard. Potential ignition sources include electrical control panels, distribution circuits, and fixtures. These components are ignition sources only if sparking occurs. No refueling or maintenance of the forklifts is performed in the warehouses. No forklift fuel is present in the buildings except for the fuel in an individual forklift fuel tank. The amount of combustible material in the storage areas is maintained at as low a level as feasible.

DNSC storage procedures (DNSCM 4145.1) require that mercury be stored in different sections of the warehouse than highly combustible commodities such as rubber.

Observations at the Warren Depot indicated low combustible loading (other than wooden pallets), and limited ignition sources. There is no wood in the structure of the warehouse itself. In addition, the installed fire suppression system reduces the likelihood of building fires resulting in the breach of the flasks. Building fires are therefore assigned to the negligible frequency category, which means less than one chance in a million per year (10^{-6}/yr) and are associated with negligible risk.

At the New Haven Depot, the wood frame structural system of the warehouse and wood roof deck provides additional combustible material. However, limited ignition sources and the installed fire suppression system also reduce the likelihood of building fires to negligible and reduce the predicted risk to the negligible category.

Earthquake. There is no documentation to determine what earthquake the buildings at the New Haven or Warren depots can withstand. Seismic-induced failure of a portion of the building walls and failure of overhead services (fire sprinkler system, etc.) and breach of some flasks is considered to be the bounding scenario for an earthquake with a peak horizontal ground acceleration of 0.15 g and hazard exceedance frequency of once in a thousand years (10^{-3}/yr). This hazard exceedance frequency is consistent with the earthquake information presented in Sections 3.1.3 and 3.2.3. This failure behavior is typical of similarly constructed warehouse facilities (DOE 1994c).

A certain percentage of the flasks are expected to be breached by the fall from their storage positions and the possible collapsing exterior masonry block/poured concrete walls and overhead building structure. For buildings in which drums are stored (e.g., 55-gal [208-l] drums), the fraction of drums damaged by the type of earthquake described has been estimated (Hand 1998) to be 0.05 for a bottom layer, 0.10 for a middle layer, and 0.15 for a top layer for metal drums stacked three high. Visual inspection of the flasks suggests that they are at least as robust as 55-gal (208-l) storage drums, so these estimates should be conservative for flasks. It is further assumed that, if a flask is damaged, it is 100 percent certain to be breached, with 100 percent of the contents being spilled. This translates into an overall failure rate of 10 percent. The frequency and consequence calculations described in Appendix A identify these accidents involving the breaching of mercury flasks due to earthquakes as being of low risk to the facility worker and of negligible risk to the collocated worker and the public.

High Winds/Tornadoes. Similarly-constructed facilities can withstand a fastest mile wind speed of 73 mph (117 kph) (DOE 1994c). The high wind exceedance probability for such a wind is once in a hundred years (10^{-2}/yr). This assumption is likely conservative for the New Haven Depot, where the highest one-minute averaged wind-speed is 65-mph (29-m/sec), and for the Warren Depot where the highest one-minute averaged wind-speed is 58-mph (26-m/sec) (NOAA 2000). Although not explicitly evaluated, the concrete block/poured concrete wall construction of the buildings most likely will survive a 73-mph (117-kph) wind without adversely impacting the stored mercury. It is therefore concluded that the consequences due to high winds are negligible. Because the consequences are negligible, the risk is also negligible.

At the Warren Depot, there was a tornado in 1986 that demolished or partially demolished several buildings (DeLeon and Whetsell 1999b). The probability that such a tornado would occur again and impact the specific area of mercury storage area is less than the probability of occurrence of the high wind described—it is about once in ten thousand years (10^{-4}/yr). It is assumed that the effect of the roof and walls falling on the mercury storage area would be similar to that of an earthquake, thus leading to a situation of low risk.

Lightning. Severe weather could result in the buildings being struck by lightning. However, a single lightning strike is not expected to result in a fire of sufficient magnitude to involve the stored mercury flasks. The frequency of this scenario is therefore considered to be negligible and the risk is negligible at either depot.

Snow Loads. Severe winter weather could result in a large accumulation of snow on the roof of the buildings. This can potentially cause the roof to collapse and subsequent breach of a small number of mercury flasks. This postulated accident scenario is considered to be a low risk event, primarily due to the design of the buildings. The buildings are assumed to have been designed in accordance with requirements that specify snow loads be taken into account in the design of the roof support structure. If a roof collapse were to occur, results would be expected to be similar to a collapse caused by an earthquake.

Aircraft Crash. An aircraft crash resulting in a breach of mercury flasks stored in the buildings is considered to be an event of negligible frequency. The area of the buildings where the mercury is stored represents a very limited target area given the size of the buildings, the type of aircraft in the airspace, and associated flight vectors. Therefore, the associated risk is negligible.

Vehicle Crash. The mercury storage areas are located in an area with little vehicular traffic. An out-of-control vehicle could strike an exterior door or wall. There is also a rail spur that runs parallel to the length of the building. However, significant damage to the building exterior and interior masonry-block/poured concrete walls, and subsequently the mercury flasks, due to surface transportation accidents is considered to be an event of negligible frequency and the risk is negligible at either depot.

Nearby Facility Fire/Explosion. The only buildings located near the mercury storage area are other warehouse buildings. There are no explosive hazards associated with storage at other buildings. Since these buildings are primarily constructed of concrete and masonry block (Warren Depot) or poured concrete (New Haven Depot), they do not pose a fire or explosion risk to the mercury storage area and are not analyzed further. No hazards associated with adjacent facilities/operations were found that could have an impact on the mercury storage areas. Therefore, the risk associated with fires and explosions at nearby facilities are negligible.

4.1.2.3 Transportation

In this alternative, small quantities of new flasks would be transported onto the depot, and old flasks and pallets, and small amounts of hazardous waste would be transported offsite. In these cases, it is expected that the normal risks associated with truck transportation—injuries or fatalities due to collisions—would be a larger contribution to risk than the transportation of residual amounts of mercury.

As described in Section 2.4, and summarized in Table 4–1, the number of truck trips required for the New Haven and Warren depots is estimated to be the same. At each depot, one truck trip would be required to deliver new flasks, one truck trip would be required to deliver new pallets, one truck trip would be required to remove waste pallets, and 10 truck trips would be required to remove hazardous waste. These 13 truck trips would occur over the 5-year period of analysis, and therefore, would average approximately 2 to 3 truck trips per year at each depot.

Assuming the trucks delivering the new flasks and pallets and removing the waste flasks and pallets would have to travel 2,000 mi (3,219 km) round trip (1,000 miles each way), 26,000 mi (41,843 km) of truck travel would be required to ship the materials in and out of each depot for a total of 52,000 mi (83,686 km) for both depots.

Table 4–1. Truck Transport of Materials and Wastes for No Action Alternative

Container	Total Truck Trips Needed[a]	
	New Haven	Warren
New flasks	1	1
New pallets	1	1
Waste pallets	1	1
Hazardous waste	10	10
TOTAL	13	13

a Data from Tables 2–2 and 2–3.

Based on 1998 data, the expected truck accident rate is 2.4×10^{-7} per mile (DOT 2000). This rate is the threshold assumed for a property-damage accident, and discounts truck accidents with little or no damage. The probability of a fatality associated with a truck accident is 3.7×10^{-8} per mile, or a factor of six times less.

As shown in Table 4–2, no serious truck accidents or accident fatalities are anticipated to result from the No Action Alternative. Even if twice as many trucks were needed, no serious truck accidents or fatalities would be expected.

Table 4–2. Potential for Truck Accidents and Fatalities from No Action Alternative

Depot	Total Truck Mileage	Expected Serious Truck Accidents	Expected Fatalities
New Haven	26,000	0.0062	0.00096
Warren	26,000	0.0062	0.00096
TOTAL	52,000	0.012	0.0019

4.1.3 Ecological Risk from Potential Accidents

If mercury becomes airborne as a result of the accident scenarios described in Appendix A, it may deposit on the ground or on surface waters. This mercury could be present at concentrations that are toxic to plants and animals living or foraging in the area. Section A.2 of Appendix A describes the ecological risk assessment that evaluated the potential impacts of these accidents on various plants and animals. This risk assessment concluded that the ecological risk is low or negligible for all of the accident scenarios applicable to this alternative.

4.1.4 Other Resources (Air Quality and Noise, Geology and Soils, Water Resources, Ecological Resources, Cultural and Paleontological Resources, Land Use and Visual Resources, Environmental Justice, Infrastructure, and Waste Management)

As described in Section 3.0, DNSC has stored mercury for over 50 years with minimal impact to the environment. As described in Section 1.1, leaking flasks were found at the New Haven and Warren depots and would likely continue to be found under the No Action Alternative. Although flasks would continue to leak under this alternative, mercury would not escape the warehouses to the environment. Therefore, little or no impacts are anticipated.

4.2 REFLASK INTO 76-LB STEEL FLASKS

The following subsections describe the potential environmental impacts of transferring the entire mercury inventory at the New Haven and Warren depots from existing flasks into new 76-lb (34-kg) steel flasks.

4.2.1 Waste Management

As shown in Section 2.4, reflasking the mercury into new 76-lb (34-kg) flasks at the New Haven and Warren depots would generate small quantities of hazardous waste, and waste pallets and flasks that may be contaminated with small amounts of mercury. These would be managed in accordance with applicable Federal and State regulations. Because a limited amount of hazardous waste is expected to be generated (two 55-gal [208-l] drums at each depot), and the waste is expected to be packaged and sent to a permitted offsite commercial facility for recycling, treatment or disposal, there would be no major impacts on the waste management infrastructures at the depots. In addition, because the 33 waste pallets and 16,151 waste flasks generated at New Haven and the 333 waste pallets and 16,355 waste flasks produced at Warren would be transported offsite to permitted commercial facilities for mercury recovery, recycling, and/or disposal, no major impacts would be expected at either depot.

4.2.2 Human Health Risk

The following subsections describe the predicted impact on human health from reflasking the mercury into 76-lb (34-kg) flasks. Risks to human health are evaluated for normal operations, facility accidents, and transportation. This information is summarized from the detailed description presented in Appendix A.

4.2.2.1 Normal Operations

Normal operation refers to the reflasking of mercury into new 76-lb (34-kg) flasks, followed by continued storage of the new flasks. As described in Section 2.2, the reflasking operation would be carried out using procedures and personal protective equipment designed to protect workers and minimize any emissions of mercury to the environment. The storage would continue as described for the No Action Alternative. Therefore, normal operations pose low to negligible risk to the workers and the general public.

4.2.2.2 Facility Accidents

All of the accident scenarios described for the No Action Alternative could occur for the reflasking option, and have the same low or negligible risk. As described in Appendix A, the reflasking operation itself provides additional possibilities for the dropping of single flasks or pallets, or fires involving the forklift fuel system. However, none of these accidents would result in more than low or negligible risk.

4.2.2.3 Transportation

In this alternative, new pallets and 76-lb (34-kg) flasks would be transported onto the depot, and old pallets and waste flasks (possibly still contaminated with mercury) and small amounts of hazardous waste would be transported offsite. In these cases, it is expected that the normal risks associated with truck transportation—injuries or fatalities due to collisions—would be a larger contribution to risk than the transportation of residual amounts of mercury.

As described in Section 2.4, and summarized in Table 4–3, the number of truck trips required for the New Haven and Warren depots would be the same except for the delivery of new, and pick up of, waste pallets. Since all existing pallets at the Warren Depot would be replaced with new pallets, 5 truck trips would be required to remove the waste pallets, with 5 trips required to deliver the new pallets. Because only 10 percent of the pallets are expected to be replaced at the New Haven Depot, 1 truck trip would be required to remove the waste pallets, with 1 trip required to deliver the new pallets.

Table 4–3. Truck Transport of Materials and Wastes for Reflasking into 76-lb Flasks

Container	Total Truck Trips Needed[a]	
	New Haven	Warren
New 76-lb flask	5	5
Waste flasks	5	5
New pallets	1	5
Waste pallets	1	5
Hazardous waste	1	1
TOTAL	13	21

a Data from Tables 2–2 and 2–3.

Assuming the trucks delivering the new flasks and pallets and removing the waste would have to travel 2,000 mi (3,219 km) round trip (1,000 miles each way), 26,000 to 42,000 mi (41,843 to 67,592 km) of truck travel would be required to ship the materials in and out of each depot for a total of 68,000 mi (109,435 km) for both depots.

Based on 1998 data, the expected truck accident rate is 2.4×10^{-7} per mile (DOT 2000). This rate is the threshold assumed for a property-damage accident, and discounts truck accidents with little or no damage potential for the cargo. The probability of a fatality associated with a truck accident is 3.7×10^{-8} per mile, or a factor of six times less.

As shown in Table 4–4, no serious truck accidents or accident fatalities are anticipated to result from this alternative. Even if twice as many trucks were needed, no serious truck accidents or fatalities would be expected.

Table 4–4. Potential for Truck Accidents and Fatalities from Reflasking into 76-lb Flasks

Depot	Total Truck Mileage	Expected Serious Truck Accidents	Expected Fatalities
New Haven	26,000	0.0062	0.00096
Warren	42,000	0.010	0.0016
TOTAL	68,000	0.016	0.0025

4.2.3 Ecological Risks from Potential Accidents

If mercury becomes airborne as a result of the accident scenarios described in Appendix A, it may deposit on the ground or on surface waters. This mercury could be present at concentrations that are toxic to plants and animals living or foraging in the area. Section A.2 of Appendix A describes the ecological risk assessment that evaluated the potential impacts of these accidents on various plants and animals. This risk assessment concluded that the ecological risk is low or negligible for all of the accident scenarios applicable to this alternative.

4.2.4 Other Resources

Air Quality and Noise. Reflasking the mercury into new 76-lb (34-kg) flasks at the New Haven and Warren depots would have little to no impact on air quality. A small increase in mobile source emissions is expected associated with forklift operations and trucks bringing flasks to the depot or removing waste. However, this increase would be temporary. Similarly, the proposed action would not result in any permanent change in noise levels at the depots. A small increase in noise levels from the additional forklift and truck operation would be expected. However, this increase in noise would also be temporary.

***Land Use and Visual Resources*.** The reflasking operation would not involve any construction or changes to existing land use, would take place inside warehouses, and would only marginally increase the traffic flow to and from the depots. Therefore, there would be no impact on land use and visual resources.

***Geology and Soils*.** The reflasking operation would not involve any construction and would take place inside warehouses. Therefore, there would be no impact on geology and soils.

Water Resources. The reflasking operation would not involve any construction and would take place inside warehouses. Therefore, there would be no impact on water resources.

***Ecological Resources*.** The reflasking operation would not involve any construction, would take place inside warehouses, and would only marginally increase the traffic flow to and from the depots. Therefore, there would be no impact on ecological resources.

***Cultural Resources*.** Because the proposed action would not require any land disturbance for construction or modification of facilities, and the action would only marginally increase the traffic flow to and from the depots, no impacts on cultural resources are anticipated.

***Infrastructure*.** The reflasking operation would not use any appreciable quantities of electricity, fuel oil, natural gas, or water, and would not appreciably increase traffic near the depots. Therefore, there would be no major impact on the depot infrastructure, including utilities.

Environmental Justice. As discussed, the proposed action would pose no significant risk to the general population, including minority and low-income populations. Therefore, there would be no disproportionately high or adverse impacts on minority and low-income populations.

4.3 REFLASK INTO 1-T STEEL CONTAINERS

The following subsections describe the potential environmental impacts of transferring the entire mercury inventory at the New Haven and Warren depots from existing flasks into new 1-t (1.1-ton) steel containers.

4.3.1 Waste Management

As shown in Section 2.4, transferring the mercury into 1-t (1.1-ton) containers at the New Haven and Warren depots would generate small quantities of hazardous waste and waste pallets and flasks that could be contaminated with small amounts of mercury. This waste would be managed in accordance with applicable Federal and State regulations. Because a limited amount of hazardous waste is expected to be generated (two 55-gal [208-l] drums at each depot), and the waste would be packaged and sent to a permitted offsite commercial facility for recycling, treatment or disposal, there would be no major impacts to the waste management infrastructures at the depots. Because the 325 waste pallets and 16,151 waste flasks produced at New Haven and the 333 waste pallets and 16,355 waste flasks produced at Warren would be transported offsite to permitted commercial facilities for mercury recovery, recycling, and/or disposal, no major impacts would be expected at either depot.

4.3.2 Human Health Risk

The following subsections describe the human health risks associated with reflasking the mercury into 1-t (1.1-ton) containers. Risks to human health are evaluated for normal operations, facility accidents, and transportation. This information is summarized from the detailed description presented in Appendix A.

4.3.2.1 Normal Operations

Normal operation refers to the reflasking of mercury into 1-t (1.1-ton) containers, followed by continued storage of the new containers. As described in Section 2.2, the reflasking operation would be carried out using procedures and personal protective equipment designed to protect workers and minimize any emissions of mercury to the environment. The storage would continue as described for the No Action Alternative. Therefore, normal operations pose low to negligible risk to the workers and the general public.

4.3.2.2 Facility Accidents

All of the scenarios described for the No Action Alternative could occur for the reflasking option, and have the same low or negligible risk. In addition, there is the possibility of the release of the contents of a 1-t (1.1-ton) container (e.g., as a result of dropping it). As described in Appendix A, the risks associated with spillages from a 1-t (1.1-ton) container are negligible.

4.3.2.3 Transportation

In this alternative, new 1-t (1.1-ton) containers would be transported onto the depot, and old pallets and waste flasks (possibly still contaminated with mercury) and small amounts of hazardous waste would be transported offsite. In these cases, it is expected that the normal risks associated with truck transportation—injuries or fatalities due to collisions—would be a larger contribution to risk than the transportation of residual amounts of mercury.

As described in Section 2.4, and summarized in Table 4–5, the number of truck trips required for the New Haven and Warren depots would be the same. Four truck trips would be required to deliver the new 1-t (1.1-ton) containers, five truck trips would be required to remove the waste flasks, five truck trips would be required to remove the waste pallets, and 1 truck trip would be required to remove the hazardous waste.

Table 4–5. Truck Transport of Materials and Wastes for Reflasking into 1-t Containers

	Total Truck Trips Needed[a]	
Container	**New Haven**	**Warren**
New 1-t containers	4	4
Waste flasks	5	5
Waste pallets	5	5
Hazardous waste	1	1
TOTAL	15	15

a Data from Tables 2–2 and 2–3.

Assuming the trucks delivering the new flasks and pallets and removing the waste flasks and pallets would have to travel 2,000 mi (3,219 km) round trip (1,000 miles each way), 30,000 mi (48,280 km) of truck travel would be required to ship the materials in and out of each depot for a total of 60,000 mi (95,560 km) for both depots.

Based on 1998 data, the expected truck accident rate is 2.4×10^{-7} per mile (DOT 2000). This rate is the threshold assumed for a property-damage accident, and discounts truck accidents with little or no damage. The probability of a fatality associated with a truck accident is 3.7×10^{-8} per mile, or a factor of six times less.

As shown in Table 4–6, no serious truck accidents or accident fatalities are anticipated to result from this alternative. Even if twice as many trucks were needed, no serious truck accidents or fatalities would be expected.

Table 4–6. Potential for Truck Accidents and Fatalities from Reflasking into 1-t Containers

Depot	Total Truck Mileage	Expected Serious Truck Accidents	Expected Fatalities
New Haven	30,000	0.0072	0.0011
Warren	30,000	0.0072	0.0011
TOTAL	60,000	0.014	0.0022

4.3.3 Ecological Risk from Potential Accidents

If mercury becomes airborne as a result of the accident scenarios described in Appendix A, it may deposit on the ground or on surface waters. This mercury could be present at concentrations that are toxic to plants and animals living or foraging in the area. Section A.2 of Appendix A describes the ecological risk assessment that evaluated the potential impacts of these accidents on various plants and animals. This risk assessment concluded that the ecological risk is low or negligible for all of the accident scenarios applicable to this alternative.

4.3.4 Other Resources

Air Quality and Noise. Reflasking the mercury into 1-t (1.1-ton) containers at the New Haven and Warren depots would have little to no impact on air quality. A small increase in mobile source emissions is expected associated with forklift operations and trucks bringing the new containers to the depot or removing waste. However, this increase would be temporary. Similarly, the proposed action would not result in any permanent change in noise levels at the depots. A small increase in noise levels from the additional forklift and truck operation would be expected. However, this increase in noise would also be temporary.

Land Use and Visual Resources. The reflasking operation would not involve any construction or changes to existing land use, would take place inside warehouses, and would only marginally increase the traffic flow to and from the depots. Therefore, there would be no impact on land use and visual resources.

Geology and Soils. The reflasking operation would not involve any construction and would take place inside warehouses. Therefore, there would be no impact on geology and soils.

Water Resources. The reflasking operation would not involve any construction and would take place inside warehouses. Therefore, there would be no impact on water resources.

Ecological Resources. The reflasking operation would not involve any construction, would take place inside warehouses, and would only marginally increase the traffic flow to and from the depots. Therefore, there would be no impact on ecological resources.

Cultural Resources. Because the proposed action would not require any land disturbance for construction or modification of facilities, and the action would only marginally increase the traffic flow to and from the depots, no impacts on cultural resources are anticipated.

Infrastructure. The reflasking operation would not use any appreciable quantities of electricity, fuel oil, natural gas, or water, and would not appreciably increase traffic near the depots. Therefore, there would be no major impact on the depot infrastructure, including utilities.

Environmental Justice. As discussed, the proposed action would pose no significant risk to the general population, including minority and low-income populations. Therefore, there would be no disproportionately high or adverse impacts on minority and low-income populations.

4.4 CUMULATIVE IMPACTS

Cumulative effects on the environment result from the incremental effect of an action when added to other past, present, and reasonably foreseeable future actions, regardless of what agency or person undertakes such other actions. Cumulative effects can result from individually minor, but collectively significant, actions taking place over a period of time (40 CFR 1508.7). All of the scenarios discussed for the proposed action show little or no impact on the depots or the surrounding areas, and low or negligible risks associated with accidents. This is true for all three alternatives at both depots. Because the contributions to adverse effects from the proposed action would be extremely small, and most would be temporary, it is expected that activities associated with the proposed action would not exacerbate cumulative effects.

4.5 COMPARISON OF ALTERNATIVES

As shown in Table 2–2, the No Action Alternative would generate the largest volume of hazardous waste (ten 55-gal [208-l] drums) at each depot. Transferring mercury into new 76-lb (34-kg) flasks would require the largest storage area (over 7,000 ft^2 [650 m^2]) at each depot, and would require the most truck trips (33 total). Transferring mercury into new 1-t (1.1-ton) containers would generate the largest number of waste pallets (658 total).

As shown in Table 4–7, none of the three alternatives appear to be substantially more or less risky or to have greater or lesser environmental or human impacts than the others. Low impacts could result to a number of resources during the process of transferring the mercury into new containers and disposing of waste flasks, pallets, and hazardous waste. Once the mercury is in the new containers, impacts of continued storage would be expected to be less than those of the No Action Alternative. Therefore, over the long term, overall conditions would be improved by transferring the mercury into the new storage containers.

Table 4–7. Comparison of Impacts of Alternatives

	Alternative		
		Transfer into New Containers	
Resource	**No Action**	**76-lb Flasks**	**1-t Containers**
Waste Management	L	L[a]	L[a]
Human Health			
Normal Operations	L	L[a]	L[a]
Facility Accidents	L	L	L
Transportation	L	L[a]	L[a]
Ecological Risk	L	L	L
Air Quality and Noise	L	L[a]	L[a]
Land Use and Visual Resources	N	N	N
Geology and Soils	N	N	N
Water Resources	N	N	N
Ecological Resources	N	N	N
Cultural Resources	N	N	N
Socioeconomics	N	N	N
Environmental Justice	N	N	N

[a] This alternative would result in low impacts during the process of transferring the mercury into the new containers and disposing of waste flasks, pallets, and hazardous waste. Once the mercury is in the new containers, impacts would be expected to be less than those of the No Action Alternative.

Key: L, low impacts or risks; N, no or negligible impacts or risks.

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