ENVIRONMENTAL ASSESSMENT

UPGRADE AND STORAGE OF BERYLLIUM

November 2014

Defense Logistics Agency
Strategic Materials
Fort Belvoir, Virginia

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SUMMARY

The Defense Logistics Agency–Strategic Materials (DLA–Strategic Materials) has prepared this environmental assessment (EA) to address the potential environmental impacts of the proposed upgrade and conversion of a portion of the existing U.S. National Defense Stockpile (NDS) of beryllium, as well as the long-term storage of the converted material. DLA–Strategic Materials is a field activity of the Defense Logistics Agency and is responsible for providing safe, secure, and environmentally sound stewardship of the beryllium stockpile and other critical materials that are part of the NDS.

Beryllium is a naturally occurring, but somewhat rare, metallic element found in the earth's crust. Its strength and low density make it desirable for use in structural applications for the military, avionics, optics, aerospace, and nuclear industries. The NDS beryllium is currently stored as individual solid cylindrical billets at the Hammond Depot in Indiana. The Hammond Depot is located in Lake County, Indiana, less than 0.1 mile (0.2 km) east of the border with Cook County, Illinois, which also serves as the southeastern boundary of the city of Chicago. The NDS beryllium was acquired in the 1980s under contract according to government specifications that existed at that time. The NDS beryllium stockpile currently consists of solid metal billets. However, DLA–Strategic Materials has determined that a portion of the metal billets currently in storage must be upgraded and converted into forms more readily useable by the U.S. Department of Defense (DOD) or its subcontractors in time of national emergency. The proposed beryllium upgrade and conversion would result in the creation of forms of beryllium that are highly compatible with the inputs required for current manufacturing processes.

Under the Proposed Action evaluated in this EA, DLA–Strategic Materials proposes to have up to 20 tons (18,140 kg) of the existing NDS beryllium billets upgraded and converted at one or more off-site commercial facilities and to then return the converted beryllium to the Hammond Depot for continued safe and environmentally sound long-term storage. This EA assesses the potential environmental impacts of the Proposed Action at the Hammond Depot, as well as along the potential transportation routes. Cumulative impacts of the Proposed Action are included. The environmental impacts of the No-Action alternative (i.e., not upgrading the beryllium and leaving it in storage in its existing billet form) are also presented.

Because the beryllium upgrade and conversion activities at off-site commercial facilities would be conducted in compliance with all applicable Federal, state, and local laws, regulations, requirements and permits, the potential environmental impacts of the activities at those commercial facilities are beyond the scope of this environmental analysis and are not addressed in detail in this EA.

The areas of assessment in this EA include the potential impacts from routine operations on human health and safety; transportation; land use; water resources; ecological resources, including threatened and endangered species; socioeconomics; environmental justice; cultural resources; noise; aesthetics; air quality; and waste management. The potential impacts from accidental releases of beryllium are also assessed.

Beryllium is a known carcinogen. The primary health effect of concern from exposure to beryllium is the development of either acute beryllium disease or chronic beryllium disease. The effects of the former are temporary and would be resolved within a few months after exposure, but the long-term effects of the latter are very serious and can lead to an overall deterioration of an exposed individual's health, including death. However, development of chronic beryllium disease only occurs among individuals that have become sensitized to beryllium, and this is estimated to affect only about 6 to 8 percent of those individuals who have become sensitized.

Traffic accidents during the off-site transport of the beryllium could result in injuries or fatalities. Accident analyses are framed in probabilistic terms, in that the accident analysis can only estimate the likelihood that a particular event might occur. The results of the accident analysis in this EA show that, statistically, far less than one non-fatal injury—and much, much less than one fatality—would be expected to result from traffic accidents during the transport of the beryllium to the off-site conversion facilities and back again to the Hammond Depot. Because beryllium is a solid, it should be possible to contain and quickly clean up any accidental spills that were to occur. Therefore, traffic accidents during transportation of the beryllium stockpile would be expected to produce no significant adverse impacts on human health or the environment as a result of exposure to any spilled or released beryllium.

Based on the analysis of the Proposed Action's potential impacts to the human environment from routine operations—including impacts to human health and safety; transportation; land use; water resources; ecological resources, including threatened and endangered species; socioeconomics; environmental justice; cultural resources; noise; aesthetics; air quality; and waste management—this EA concludes that the Proposed Action would produce no significant adverse impacts. Additionally, indirect (cumulative) impacts would also produce no significant adverse impacts.

Based on the results of the analyses documented in this EA and the finding that no significant adverse impacts would be expected to occur as a result of the Proposed Action, it can be concluded that an environmental impact statement is not needed, and a finding of no significant impact is recommended.

CONTENTS

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LIST OF FIGURES

LIST OF TABLES

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ACRONYMS AND ABBREVIATIONS

μg	microgram = 1 millionth of a gram
μm	micrometer = 1 millionth of a meter
ACGIH	American Conference of Governmental Industrial Hygienists
AEDL	Army Engineer District, Louisville
AMS	Aerospace Material Specification
ASTM	American Society for Testing and Materials
ATSDR	U.S. Agency for Toxic Substances and Disease Registry
BeLPT	beryllium lymphocyte proliferation test
°C	degrees Celsius
CAS	Chemical Abstract Service
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	*Code of Federal Regulations*
cm	centimeter = 1 hundredth of a meter
CO_2	carbon dioxide
COPD	chronic obstructive pulmonary disease
DLA	Defense Logistics Agency
DOD	U.S. Department of Defense
DOT	U.S. Department of Transportation
EA	environmental assessment
EPA	U.S. Environmental Protection Agency
°F	degrees Fahrenheit
FARS	Fatality Analysis and Reporting System
FMCSA	Federal Motor Carrier Safety Administration
FONSI	finding of no significant impact
ft	feet
ft^2	square feet
ft^3	cubic feet
g	gram
gal	gallon
ha	hectare
HIP	hot isostatic pressable
HPP	hot pressed powder

I-	U.S. Interstate highway
IARC	International Agency for Research on Cancer
IDEM	Indiana Department of Environmental Management
IDNR	Indiana Department of Natural Resources
in.	inch
kg	kilogram = 1 thousand grams
km	kilometer = 1 thousand meters
lb	pound
m	meter
m^2	square meters
m^3	cubic meters
MCDC	Missouri Census Data Center
MMAD	mass median aerodynamic diameter
mph	miles per hour
N/A	not available or not applicable
NAAQS	National Ambient Air Quality Standards
NDS	National Defense Stockpile
NEPA	National Environmental Policy Act
NIOSH	National Institute for Occupational Safety and Health
NPDES	National Pollutant Discharge Elimination System
NRC	National Research Council
NSSL	National Severe Storms Laboratory
NTP	National Toxicology Program
NWS	National Weather Service
ORNL	Oak Ridge National Laboratory
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PPE	personal protective equipment
RCRA	Resource Conservation and Recovery Act
REL	recommended exposure limit
RfC	reference concentration
RFP	request for proposal
RISC	Risk Integrated System of Closure
SPDES	State Pollutant Discharge Elimination System
SPLP	Synthetic Precipitation Leaching Procedure
SWPPP	Stormwater Pollution Prevention Plan

TCLP	Toxicity Characteristic Leaching Procedure
TLV	threshold limit value
TWA	time-weighted average
U.S.	United States
U.S.C.	*United States Code*
USCB	U.S. Census Bureau
VMT	vehicle miles traveled
yd	yard
yd^3	cubic yards

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1. PURPOSE AND NEED FOR THE PROPOSED ACTION

The Defense Logistics Agency–Strategic Materials (DLA–Strategic Materials) is responsible for the safe, secure, and environmentally sound stewardship of the National Defense Stockpile (NDS) of beryllium, which is currently stored at a depot in Indiana. DLA–Strategic Materials proposes to continue its stewardship of this material by having a portion of the beryllium upgraded and converted into more useable forms and placing the converted beryllium back into long-term storage. DLA–Strategic Materials needs to perform the proposed action because the solid beryllium billets currently in storage are not in forms readily useable by the U.S. Department of Defense (DOD) or its subcontractors in time of national emergency. The proposed upgrade and conversion would result in the creation of more useable forms of beryllium.

Chapter 1 of this environmental assessment (EA) provides essential background information and describes the purpose and need of the Proposed Action, as well as the scope of the environmental review and analysis. Chapter 2 defines and describes the Proposed Action in detail. Chapter 3 describes the No-Action alternative and other alternatives to the Proposed Action. Chapter 4 describes the existing baseline environmental conditions for each relevant resource area and evaluates the potential environmental impacts that would occur thereto under the Proposed Action or the No-Action alternative. The conclusions are presented in Chapter 5.

1.1 INTRODUCTION AND BACKGROUND

This EA has been prepared by DLA–Strategic Materials to address the potential environmental impacts of the proposed upgrade and conversion of approximately 20 tons (18,140 kg) of the existing NDS stockpile of beryllium, as well as the long-term storage of that material following its conversion. The NDS was established by Congress through the Strategic and Critical Materials Stock Piling Act of 1939 to minimize U.S. dependence on foreign sources of essential materials during times of national emergency. Between 1949 and 1988, the General Services Administration managed the program. In 1988, the responsibility for the NDS was transferred to the Secretary of Defense, who assigned the program to the Defense Logistics Agency (DLA). DLA–Strategic Materials is a field activity of DLA and is responsible for providing safe, secure, and environmentally sound stewardship of the beryllium stockpile and other critical materials as part of the NDS.

1.2 THE HAMMOND DEPOT

DLA–Strategic Materials currently manages the NDS stockpile of beryllium which is stored as individual solid, cylindrical billets at the Hammond Depot in Indiana. The Hammond Depot is located in Lake County, Indiana, less than 0.1 mile (0.2 km) east of the border with Cook County, Illinois, which also serves as the southeastern boundary of the city of Chicago. The street address for the Hammond Depot is 3200 Sheffield Avenue, Hammond, Indiana.

Wolf Lake borders the Hammond Depot on the west, and Lake Michigan is about 2.5 miles (4.0 km) to the north (Fig. 1). The Hammond Depot encompasses approximately 60 acres (24 ha) that are situated in a previously disturbed industrial setting. The area around and including the Hammond Depot property was a wetland in the mid-1940s and was filled long ago with a substantial amount of blast-furnace slag to give the site a stable and level foundation (Cash 1998). All areas immediately surrounding the depot, other than bodies of water, are current developed or have been extensively disturbed.

The structure in which the beryllium billets are currently stored (and where the upgraded and converted beryllium would be stored) is constructed of concrete block walls with firewalls on a concrete slab. This structure has no climate controls, such as heating or air conditioning.

The items currently located inside the beryllium storage structure include materials and/or their associated storage packaging with the following characteristics, as categorized by the codes developed by the National Fire Protection Association:

- **Flammability**: Materials that require considerable preheating, under all ambient temperature conditions, before ignition and combustion can occur; flash point at or above 200 °F (93 °C).
- **Health**: Intense or continued, but not chronic, exposure could cause temporary incapacitation or possible residual injury.
- **Reactivity**: Undergoes violent chemical change at elevated temperatures and pressures, reacts violently with water, or may form explosive mixtures with water.

Sodium-chloride type fire extinguishers are available at the Hammond Depot for use in suppressing any fires that might occur inside the beryllium storage structure.

The residents located nearest to the Hammond Depot installation boundary are over 600 ft (180 m) from the property boundary; however, the nearest residence is over 1500 ft (460 m) from the location where the beryllium billets are currently stored (and where the upgraded and converted beryllium would be stored).

Access to the Hammond Depot exists by both road and rail. There is easy access to Interstate-90 and U.S. Highway 41 near the eastern boundary of the depot, as well as to U.S. Highways 12 and 20 further to the east, I-80 to the south of the depot, and I-94 to the west of the depot. The receipt and shipment of almost all commodities at the depot

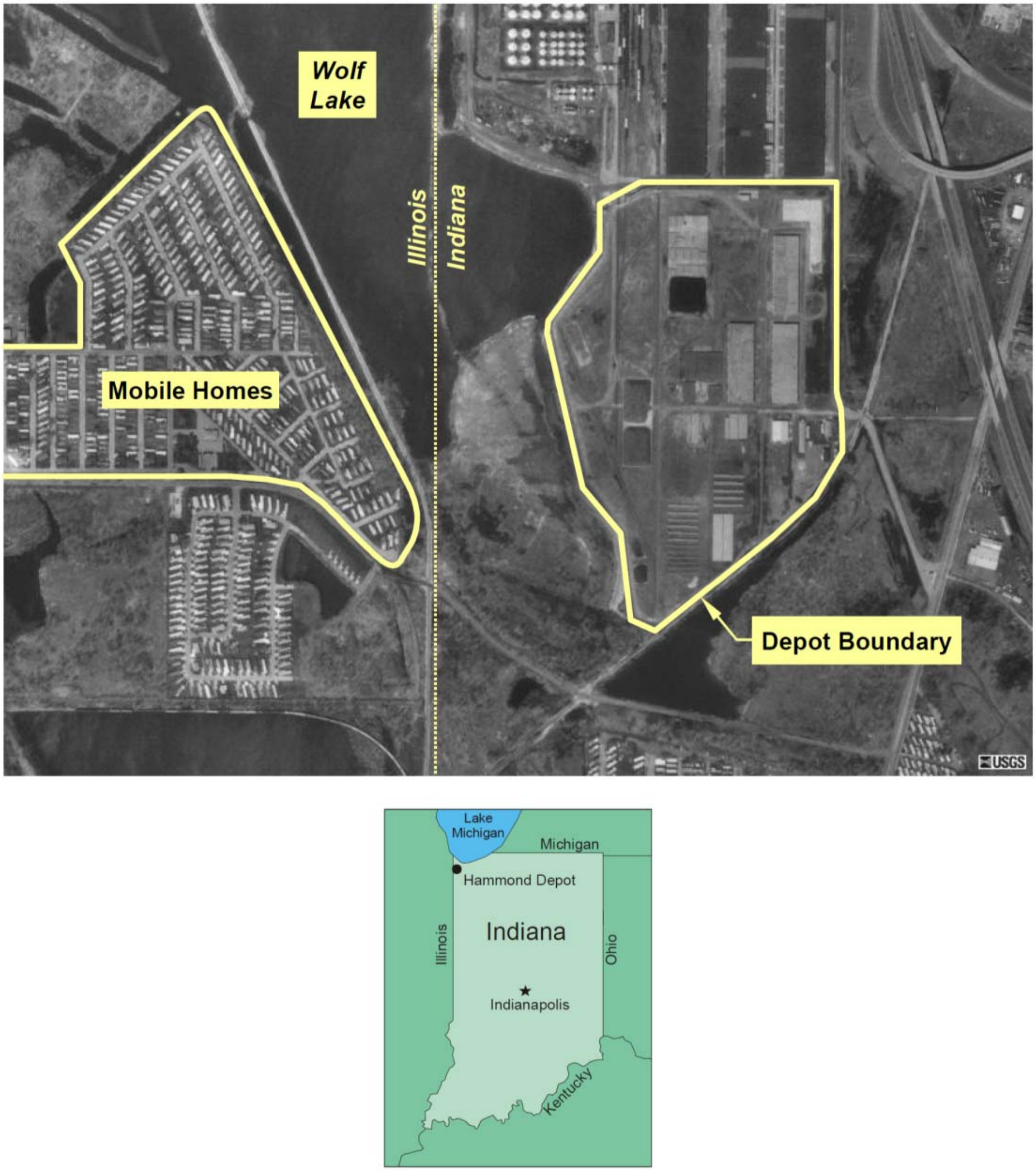

Fig. 1. Aerial photograph of the Hammond Depot and its environs.

occur by truck. The rail access is seldom used at the depot; however, at least once each day the nearby railways are used for delivery and pick-up of railcars at the commercial facilities just north of the depot.

1.3 CHARACTERISTICS OF BERYLLIUM

The characteristics of beryllium are summarized in Table 1. Beryllium is a naturally occurring, but somewhat rare, metallic element found in the earth's crust. Its strength and low density make it desirable for use in structural applications for the military, avionics, optics, aerospace, and nuclear industries. Beryllium occurs naturally only in combination with other elements in minerals. The extraction of beryllium from its compounds is accomplished by thermal processing; however, the United States, China, and Kazakhstan are the only three countries involved in the industrial scale extraction of beryllium (Materion 2014).

1.4 SCOPE OF THE ENVIRONMENTAL ANALYSIS

This EA assesses and documents the potential environmental effects of the Proposed Action and its alternatives (as defined in greater detail in Chapters 2 and 3 of this EA). The Proposed Action is to have a portion of the existing NDS beryllium billets—up to 20 tons (18,140 kg)—upgraded and converted into more useable forms.

To accomplish the Proposed Action, DLA–Strategic Materials proposes to ship the beryllium billets to one or more off-site commercial facilities where the upgrade and conversion of the beryllium would occur. The upgraded and converted beryllium would then be returned to the Hammond Depot for continued safe and environmentally sound long-term storage.

Any beryllium billets not upgraded and converted under the Proposed Action would remain in storage at the Hammond Depot.

For the purpose of making a conservative estimate of potential impacts, the transportation analysis in Section 4.2 assumes a larger number of beryllium billets would be transported to an off-site conversion facility than the 20 tons (18,140 kg) being contemplated for conversion under the Proposed Action. This assumption results in a significant overestimation of the amount of off-site transportation required, thereby establishing an upper bound on the potential environmental impacts that might occur during the transportation of 20 tons (18,140 kg) of beryllium under the Proposed Action.

One anticipated form of the upgraded and converted beryllium would be a powdered form. Beryllium powder is characterized as both a "flammable solid" and a "poison inhalation hazard" as specified in the U.S. Department of Transportation's (DOT's) Hazardous

Table 1. Characteristics of beryllium

Chemical formula	Be
CAS number[1]	7440-41-7
Atomic number	4
Atomic mass	9.01
Specific gravity	1.848
Density	115.3 lb/ft^3 (1480.7 kg/m^3)
Melting point	2349°F (1287°C)
Flash point	None for solid form. Ignition can occur between about 1000 and 1290°F (540 and 700°C) in the powdered form consisting of 1 to 5 μm particles. Beryllium powder at a dust concentration of 3 kg/m^3 (0.19 lb/ft^3) was found to be weakly explosive.
Fire suppression	Avoid the use of water, carbon dioxide, and halides/halogen gases. Appropriate extinguishing media include dolomite, dry powder, dry sand, graphite, soda ash, and/or sodium chloride. Appropriate to use a portable fire extinguisher with Class D rating (for metals fires).
Physical properties	Light gray, brittle metallic solid. Not soluble in water.
Principal hazards	None for solid form. Powdered form or particulate/dust can create a combustion hazard (i.e., rapid oxidation) and can also cause irritation to nose, throat, lungs and mucous membranes. Inhalation of powdered form or particulate/dust may cause serious, chronic lung disease in some individuals. Human carcinogen according to IARC and NTP[2].
Uses	Strong, lightweight metal with high rigidity and/or thermal stability in applications for structures for the military, avionics, optics, aerospace and nuclear industries.

Notes:
[1] CAS = Chemical Abstract Service
[2] IARC = International Agency for Research on Cancer; NTP = National Toxicology Program

Materials Table (49 CFR 172.101). Because the U.S. Environmental Protection Agency's (EPA's) criterion for the ignitability characteristic (40 CFR 261.21) defers to the DOT definition, beryllium powder would be considered a hazardous waste under the Resource Conservation and Recovery Act (RCRA).

For the purpose of analysis in this EA, the upgrade and conversion process is assumed to produce only beryllium powder, even though other forms of converted beryllium are being contemplated under the Proposed Action. Because the potential human health effects from exposure to beryllium powder, as described in Section 4.1 of this EA, are the most serious among all forms of converted beryllium, this assumption provides an upper bound estimate of the potential human health effects that are associated with the Proposed Action.

Because the beryllium upgrade and conversion activities at the off-site facilities would be conducted in compliance with all applicable Federal, state, and local laws, regulations, requirements and permits, the potential environmental impacts of the activities at those facilities are beyond the scope of this environmental analysis and are not addressed further in this EA.

This EA has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 [42 *United States Code* (U.S.C) 4321, et seq.], the Council on Environmental Quality Regulations implementing NEPA [40 *Code of Federal Regulations* (CFR) Parts 1500-1508], and with DLA Regulation 1000.22, “Environmental Considerations in DLA Actions in the United States.” As required under these regulations, a No-Action alternative is also considered in this EA (see Section 3.1).

The potential for environmental impacts is assessed at the Hammond storage depot and along the potential transportation corridors to and from the hypothetical location of the off-site facility where the beryllium upgrade and conversion activities will occur. Cumulative impacts of the Proposed Action are included.

The areas of assessment in this EA include potential impacts from routine operations to land use; air quality; water resources; human health and safety; ecological resources, including threatened and endangered species; socioeconomics; environmental justice; cultural resources; noise; aesthetics; waste management; and transportation. Potential impacts to human health from accidents are also assessed.

1.5 PUBLIC INVOLVEMENT

DLA–Strategic Materials invites public participation in this NEPA process. Consideration of the views and information of all interested persons promotes open communication and enables more informed decision making. Agencies, organizations, and members of the public having a potential interest in the Proposed Action, including minority, low-income, disadvantaged, and Native American groups, are invited to participate in the decision-making process.

2. DESCRIPTION OF THE PROPOSED ACTION

The NDS beryllium stockpile at the Hammond Depot was acquired in the 1980s under contract according to government specifications that existed at that time. The NDS beryllium stockpile consists of metal billets, with a purity of over 99 percent, manufactured by a hot pressed powder (HPP) process. These HPP beryllium billets are cylindrical in shape, each having a diameter between 30 and 36 in. (76 and 91 cm) and a length between 38 and 46 in. (97 and 117 cm). Each billet can thus weigh between about 1800 and 3120 pounds (815 to 1415 kg), with the typical weight being around 2400 pounds (1100 kg). Each billet is wrapped in sealed polyethylene and is individually packed inside a wooden crate.

DLA–Strategic Materials has determined that the existing HPP beryllium billets do not meet current specifications for many modern DOD applications. DLA–Strategic Materials therefore proposes to upgrade a portion of the NDS beryllium stockpile into forms better aligned with current and future DOD needs. The proposed upgrade would convert the existing HPP beryllium billets into one or more final products that would be of the same types used as a feedstock in current state-of-the art manufacturing processes. The upgraded and converted beryllium is also expected to be applicable to these same manufacturing processes for the foreseeable future. The upgrade and conversion activities would be conducted under contracts between DLA–Strategic Materials and one or more off-site commercial facilities.

Under the Proposed Action, up to 20 tons (18,140 kg) of beryllium billets would be upgraded and converted into other, more useable forms. However, for the purpose of analyzing and bounding the potential environmental impacts in this EA, it is assumed that 85 tons (77,100 kg) of NDS inventory beryllium billets would be transported to a hypothetical off-site conversion facility. Furthermore, it is assumed that the distance from the Hammond Depot to that hypothetical conversion facility is 1000 miles (1600 km), even though the probable facilities are much closer. These assumptions regarding quantities and distances would result in an overestimation of any resulting transportation impacts and would thus bound the magnitude and extent of any such impacts associated with the Proposed Action.

Under the Proposed Action, each crate containing a single beryllium billet would be removed from its storage location at the Hammond Depot by forklift and loaded onto a truck located adjacent to the storage structure. The load would be appropriately secured inside the truck, and the truck would then transport the crate/billet to an off-site commercial facility where the upgrade and conversion process would occur. All such upgrade and conversion activities would be conducted at the off-site facilities in compliance with all applicable state, local and federal laws, regulations, requirements, and permits.

As a pilot test of the process for upgrading and converting the beryllium billets, DLA–Strategic Materials has executed a request for proposal (RFP) with industry to have two billets shipped to an off-site facility, converted into hot isostatic pressable (HIP) beryllium powder[1], and returned to the Hammond Depot. A return shipment for the first processed billet (as described in the following paragraph) has been received at the Hammond Depot. In August 2014, DLA–Strategic Materials issued a second RFP to industry for another pilot test to convert an additional two billets into beryllium powder.

The beryllium powder produced from the first billet was purged with an inert gas (i.e., argon) and then vacuum packed and sealed in leak-proof bags/liners which were then placed inside five sealed 55-gal (0.2 m^3) steel drums at the off-site conversion facility. Each drum was braced and blocked onto a standard wooden pallet for shipment; however, the future storage configuration would use flame-retardant polymer pallets for storage of all future shipments, as well as for storage of the drums already received. Following shipment by truck, the drums were placed back into storage at the Hammond Depot in the as-received condition. The receiving process involves moving the transport vehicle adjacent to the storage structure and then moving the pallets with the drums by forklift to the storage location inside the storage structure.

DLA–Strategic Materials is in the process of procuring storage enclosures in the form of metal cabinets, lockers, or vaults that will hold the pallets of converted-beryllium drums. Each storage enclosure would be installed inside the existing beryllium storage structure at the Hammond Depot and would hold up to 24 pallets (with four drums per pallet). Each storage enclosure would have walls designed for a 4-hr fire rating. Access to the storage enclosure would be from the side through a closable, fire-proof door. Each storage enclosure would be anchored to the existing concrete floor slab to prevent movement of the enclosure and to protect the contents during tornadoes, other high-wind events, or earthquakes.

Under the Proposed Action, work at the Hammond Depot would be performed one billet at a time; however, multiple billets might be loaded onto a single truck for transport to the off-site conversion facility. In a similar manner, multiple shipments of upgraded and converted beryllium might be received at the same time at the Hammond Depot.

The shipping/loading activities and the receiving/unloading activities at the Hammond Depot would be conducted by depot personnel; however, personnel under contract to the off-site conversion facility would be responsible for securing the load inside the truck prior to shipment, as well as the transport of beryllium to and from the conversion facility. The upgrade and conversion activities at the off-site facility would be conducted by the employees of that facility.

[1] The final product specified in the RFP is structural-grade, high-purity beryllium powder. The specifications call for the production of HIP beryllium powder with an average grain size of 20μm or less.

All workers would be trained in the potential hazards associated with the Proposed Action and would be subject to health, safety and environmental requirements, including the Environmental Safety and Occupational Health Policy of DLA–Strategic Materials. Operating procedures, as well as those in the existing *Hammond Depot Emergency Response Plan* (DLA 2014), have been developed to reduce the risk of spreading contamination in the event a drum of converted beryllium (including beryllium powder) were to spill its contents. Additionally, personnel protective equipment (such as respirators) appropriate to the airborne beryllium hazard that may be encountered during the Proposed Action is available onsite.

Procedures have been developed to mitigate potential hazards to workers associated with the Proposed Action, including the following items:

- a dropped converted-beryllium pallet or drum inside the storage structure or during truck unloading operations resulting in a spill of the contents,
- penetration of a converted-beryllium drum by a forklift tine,
- exposure (individual and collective) to converted forms of beryllium, including beryllium powder, and
- periodic beryllium lymphocyte proliferation test (BeLPT) screenings—as described in Section 4.1.2.2 of this EA—for depot workers to check for sensitization to beryllium.

Required training for workers at the Hammond Depot would minimize the potential risks to workers. This would include beryllium safety training that is specific to the Proposed Action, as well as existing training programs in the following general categories:

- Occupational Safety and Health Administration (OSHA) safety training,
- OSHA certification of all forklift operators,
- DOT training for off-site shipment personnel, and
- respirator training as dictated by hazardous waste operations requirements, including medical approval for the wearing of a respirator.

No revisions or changes to either the existing shipping/receiving facilities or the storage buildings at the Hammond Depot are envisioned as part of this Proposed Action; however, studies are in progress to identify any additional storage conditions that would be favorable for the long-term storage of the upgraded and converted beryllium.

DLA–Strategic Materials expects to complete the beryllium upgrade and conversion portion of the Proposed Action within a five-year period and before the end of calendar year 2020. Under the Proposed Action, long-term storage of the upgraded and converted forms of beryllium at the Hammond Depot would then continue after that date. A minimally intrusive inspection methodology would be employed by DLA–Strategic Materials for the periodic, on-going quality surveillance of the upgraded and converted beryllium and to verify the continued integrity of the storage containers, the internal inert atmosphere status, and the product quality for the duration of the long-term storage period.

3. ALTERNATIVES TO THE PROPOSED ACTION

3.1 THE NO-ACTION ALTERNATIVE

Under the No-Action alternative, the NDS beryllium stockpile would continue to be stored in billet form at the Hammond Depot for the foreseeable future. Routine inspections and maintenance of this stockpile would continue. No changes, other than maintenance and repairs needed to ensure continued safe storage, would be made to the present beryllium storage structure or related facilities at the Hammond Depot.

In the event the beryllium was needed to satisfy future critical U.S. security, military or aerospace uses, it would not be available in the forms required as input to current manufacturing processes, and the billets would likely require conversion at that time. DLA–Strategic Materials has obtained estimates that it takes about 10 weeks to turn beryllium billets into powder. Hence, the usefulness of the beryllium in billet form would be questionable for any such future U.S. critical needs.

3.2 OTHER ALTERNATIVES TO THE PROPOSED ACTION

DLA–Strategic Materials has made a determination that the upgrade and conversion of up to 20 tons (18,140 kg) of beryllium billets into other forms is essential to the continued usefulness of this material as part of the NDS. Furthermore, the conversion and upgrade of the NDS beryllium billets would result in forms of beryllium that are compatible with existing manufacturing processes, as well as the manufacturing processes that might be available in the foreseeable future.

In addition to the Proposed Action as described in detail in Section 2, other alternatives and options have been identified: (1) store the upgraded and converted beryllium at some location other than the Hammond Depot, and (2) delay the upgrade and conversion until some undetermined time in the future. The following paragraphs discuss each of these alternatives/options.

Alternative/Option 1: Other depots within the DLA system could be used to store the upgraded and converted beryllium, but DLA–Strategic Materials has identified the Hammond Depot as presenting an optimum solution. Because the converted beryllium would be stored in the same space now occupied by the original beryllium billets that are to be converted, the Hammond Depot would have adequate space available for the long-term storage of the converted beryllium. Because workers at the Hammond Depot already have the training and experience with handling and working around beryllium, the use of the Hammond Depot for the long-term storage of the converted beryllium would minimize the need for additional worker training. Also, fire protection equipment specific to beryllium (e.g., sodium-chloride type fire extinguishers) is also already in place at the Hammond Depot and would therefore not need to be replicated at another depot. In addition, local emergency response personnel near the Hammond Depot are equipped with, and trained in the use of, self-contained breathing apparatus that would be used in the event of a fire involving the beryllium at the depot. This capability would also not need to be reproduced or provided at another depot.

Alternative/Option 2: If the upgrade and conversion of the beryllium billets were to be delayed (for example, until such time as a different conversion technology became available), the resulting impacts would be the same as those evaluated for the No-Action alternative. That is, the beryllium billets would continue to be stored at the Hammond Depot.

There are no practicable alternatives to the Proposed Action that would accomplish the upgrade, conversion, and long-term storage of the existing NDS beryllium stockpile with less impact and cost. Accordingly, the Proposed Action is preferred alternative of DLA–Strategic Materials.

4. THE AFFECTED ENVIRONMENT AND CONSEQUENCES

Among the environmental impacts of concern for the upgrade of beryllium billets into more useable forms of beryllium and the subsequent long-term storage of that material are the potential human health impacts of exposure to beryllium and the impacts of transporting the beryllium between the Hammond Depot and the off-site conversion facilities. These two topics are discussed in Sections 4.1 and 4.2, respectively. The remainder of Section 4 discusses the potential environmental impacts related to land use (Section 4.3), water resources (Section 4.4), ecological resources (Section 4.5), socioeconomics (Section 4.6), environmental justice (Section 4.7), cultural resources (Section 4.8), noise (Section 4.9), aesthetics (Section 4.10), air quality (Section 4.11), and waste management (Section 4.12). Section 4.13 discusses the cumulative impacts of the Proposed Action.

4.1 HUMAN HEALTH AND SAFETY

4.1.1 Existing Environment

Currently, workers at the Hammond Depot conduct periodic surveillance and maintenance activities on the beryllium stockpile to ensure that it remains in an acceptable storage condition. These inspections are conducted at least annually. Because the crates containing the beryllium billets are not routinely repositioned or handled, the potential for any industrial-type accidents to adversely impact human health is extremely small. However, the introduction of other forms of beryllium—especially beryllium powder—into storage at the Hammond Depot would create new human-health hazards, as discussed in the following subsection.

4.1.2 Potential Impacts of the Proposed Action

4.1.2.1 Beryllium exposure pathways

Exposure to beryllium may occur through a variety of routes, including breathing air (i.e., inhalation), eating food or drinking water (i.e., oral), and contact with the skin (i.e., dermal). The inhalation route is of greatest concern for systemic health effects, because less than 1 percent of beryllium on the skin or in the gastrointestinal tract is absorbed; however, exposure to skin that is already damaged from scrapes or cuts may result in the absorption of greater than 1 percent. Dermal exposure may also result in beryllium sensitization which is an allergic-type response that may subsequently lead to chronic beryllium disease. Oral exposure may result in gastrointestinal lesions such as necrosis (ATSDR 2002, NRC 2007).

The dose received by an individual inhaling beryllium dust or powder would depend on the exposure concentration, the aerosol particle size distribution, and the breathing pattern. Aerosol particle size [measured as mass median aerodynamic diameter (MMAD)] is perhaps the most important parameter when considering adverse health effects, because the deposition of particles in various portions of the respiratory tract is dependent on particle size. For example, particles with an MMAD larger than 10 µm may be deposited in the nose and throat area, but typically would not enter the lower portions of the respiratory tract because they would be removed from the body via mucocillary clearance. However, particles smaller than 10 µm may be deposited within the deep lung. Because beryllium powder is insoluble in water, these small particles may reside in the lungs for years. The upgrade and conversion of beryllium billets into powdered form is expected to yield an average particle size of 20 µm or less. Current beryllium machining processes produce fine respirable particles with more than 50 percent being smaller than 10 µm and more than 30 percent being smaller than 0.6 µm; the MMAD from various machining processes ranges from 5.0 to 9.5 µm (NRC 2007). Particles less than 0.6 µm are of greatest health concern, because they will deposit deepest in the lung. Therefore, it is expected that the majority of the beryllium particles resulting from the proposed upgrade and conversion of billets into powdered form would be respirable particles that have the potential for being deposited in the lungs.

4.1.2.2 Toxicity of beryllium

Table 2 shows the current standards and guidelines that are designed to protect humans from exposure to beryllium. It should be noted that OSHA is considering issuing a *Notice of Proposed Rulemaking* for changes to the current beryllium standard for general industry (29 CFR 1910.1000) and for construction (29 CFR 1926.55) (OSHA 2014).

Non-Cancer Dermal-Exposure Effects. Dermal contact with beryllium can result in two types of dermal effects: an inflammatory reaction and an allergic reaction. Beryllium exposure may also cause a delayed hypersensitivity (allergic) reaction in the skin, resulting in granulomas which may be necrotizing and ulcerative (ATSDR 2002). Data show that very small beryllium particles—with sizes around 0.5 to 1.0 µm—in conjunction with motion, such as occurs at the wrist, may penetrate the outermost layer of human skin, reaching the epidermis and occasionally the dermis (Tinkle et al. 2003). Dermal exposure may also be sufficient to induce the beryllium sensitization necessary for development of chronic beryllium disease.

Non-Cancer Inhalation-Exposure Effects. The respiratory tract is the primary target of beryllium toxicity following inhalation exposure. Exposure to high concentrations (i.e., greater than 0.5 $\mu g/m^3$) of soluble beryllium compounds such as beryllium salts can result in acute beryllium disease. Chronic beryllium disease can result from exposure to relatively low concentrations (0.5 $\mu g/m^3$) of soluble or insoluble (such as pure beryllium powder) beryllium compounds (ATSDR 2002).

Table 2. Beryllium standards and guidelines

Standard/Guideline (Source)	Value	Health Effect/Target Organ/Basis for Value
WORKPLACE STANDARDS:		
Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) (NIOSH 1999)	0.002 mg/m^3 PEL-TWA[a] 0.005 mg/m^3 Ceiling[b] 0.025 mg/m^3 Peak[c]	Chronic beryllium disease (berylliosis); Pneumonitis; Beryllium skin granuloma; contact dermatitis
National Institute for Occupational Safety and Health (NIOSH) Recommended Exposure Limit (REL)[d] (NIOSH 1999)	0.0005 mg/m^3 Ceiling[b]	Lung cancer; Kidney stones; enlargement of the liver, spleen, and heart; multiple granulomas of the lung, spleen, liver, and lymph nodes; heart failure leading to death; tracheobronchitis; pneumonitis; pulmonary edema leading to death; eye, upper respiratory, and skin irritation; contact dermatitis
American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Value (TLV) (ACGIH 2013)	0.00005 mg/m^3 TLV-TWA[e] (inhalable particulate matter) Skin; SEN[f]	Beryllium sensitization; Chronic beryllium disease
GENERAL POPULATION STANDARDS:		
Oral Reference Dose (RfD)[g] (EPA 1998)	0.002 mg/kg/day	Intestinal lesions (dog study)
Inhalation Reference Concentration (RfC)[h] (EPA 1998)	0.000002 mg/m^3	Beryllium sensitization; Chronic beryllium disease
ENVIRONMENTAL STANDARD:		
Air: National Emission Standard from stationary sources (40 CFR 61.32)	≤10 g (0.022 lb) of beryllium over a 24-hour period[i]	N/A

Notes:

[a] PEL-TWA: Highest level of beryllium in air to which a worker may be exposed, averaged over an 8-hour workday.

[b] Concentration that should not be exceeded during any part of the working exposure.

[c] 30 minute Peak concentration.

[d] Defined as analogous to the ACGIH-TLV.

[e] The airborne concentration for a conventional 8-hour workday and 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, over a working lifetime, without adverse health effects.

[f] Danger of cutaneous absorption. Sensitization.

[g] An estimate (with uncertainty spanning perhaps an order of magnitude) of a daily oral exposure to the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

[h] An estimate (with uncertainty spanning perhaps an order of magnitude) of a daily inhalation exposure of the human population (including sensitive subgroups) that is likely to be without an appreciable risk of deleterious effects during a lifetime.

[i] Rather than meet the requirement, an owner or operator may request approval from the Administrator to meet an ambient concentration limit on beryllium in the vicinity of the stationary source of 0.01 µg/m^3, averaged over a 30-day period.

Acute Beryllium Disease

Acute beryllium disease is characterized by inflammation of the entire respiratory tract, and may involve the nose, pharynx, tracheobronchial airways, and alveoli. Symptoms may include nasopharyngitis, shortness of breath, labored breathing, and chemical pneumonitis (ATSDR 2002). The effects are usually resolved within several months of exposure, but acute beryllium disease can progress to chronic beryllium disease if sensitization also occurs. Acute beryllium disease usually results from exposure to soluble beryllium compounds. However, because beryllium powder is not soluble, acute beryllium disease is not likely to be a concern for the upgraded and converted inventory of NDS beryllium.

Chronic Beryllium Disease

Chronic beryllium disease (also called berylliosis or chronic granulomatous disease) is an immune response to inhaled beryllium deposited in air spaces within the lung; it is observed only in individuals who are sensitized to beryllium. Chronic beryllium disease can be classified into three stages: (1) beryllium sensitization; (2) subclinical chronic beryllium disease; and (3) clinical chronic beryllium disease (ATSDR 2002). Several studies have attempted to establish associations between beryllium sensitization and/or chronic beryllium disease and mean, cumulative, and peak exposure levels and duration of exposure and/or employment. In general, no consistent associations were found; however, repeated exposure to particles smaller than 1 μm was associated with the prevalence of beryllium sensitization or chronic beryllium disease (NRC 2007).

Beryllium sensitization occurs in up to 16 percent of exposed workers and may be diagnosed by a blood test called the beryllium lymphocyte proliferation test (BeLPT); this blood test can be used for medical surveillance programs. An individual must first be sensitized before beryllium in the lungs can cause the lung damage (granulomas) associated with chronic beryllium disease. Beryllium sensitization can progress to chronic beryllium disease, but not all sensitized individuals develop chronic beryllium disease (ATSDR 2002, NRC 2007). The proportion of sensitized individuals who will eventually develop chronic beryllium disease is unknown; however, Newman et al. (2005) estimated that 6 to 8 percent of sensitized individuals may eventually develop chronic beryllium disease.

Individuals with subclinical chronic beryllium disease are sensitized to beryllium and have histological evidence of lung granulomas, but no clinical signs. Although no clinical signs are observed, evidence suggests that there may be some impairment of lung function. Slight alterations in lung function during exercise were observed in approximately 60 percent of individuals with subclinical chronic beryllium disease; however, no other consistent alterations in lung function were found (ATSDR 2002).

Individuals with clinical chronic beryllium disease are beryllium sensitized and have histological evidence of lung granulomas and respiratory symptoms (such as difficulty breathing, coughing, chest pain, general weakness), changes on chest X-rays, and/or altered lung function (ATSDR 2002). Other systemic effects that have been observed in individuals with severe cases of chronic beryllium disease include damage to the right heart ventricle, liver necrosis, kidney stones, and weight loss; however, these effects are probably secondary to chronic beryllium disease rather than a direct effect on the tissues. The course of chronic beryllium disease varies, with some individuals having few or no symptoms for many years followed by eventual symptom development, including deterioration of health and potentially death. Possible risk factors for progression from beryllium sensitization to chronic beryllium disease include smoking status, genetic factors, concurrent exposures, and stressors such as pregnancy and lactation, combat, and surgery. Almost all patients with chronic beryllium disease have a positive BeLPT test (NRC 2007).

Non-Cancer Oral-Exposure Effects. Unlike the inhalation exposure route, the primary effect observed after oral exposure is site-of-contact ulcerative gastrointestinal lesions, rather than an immune response to beryllium (ATSDR 2002).

Cancer. A number of epidemiology studies have been conducted to assess the carcinogenic potential of beryllium. Schubauer-Berigan et al. (2011) analyzed cause-specific mortality data for almost 10,000 workers from seven beryllium processing plants. Workers were followed for mortality from the years 1940 through 2005. Standardized mortality ratios were estimated based on U.S. population comparisons for lung, nervous system and urinary tract cancers, chronic obstructive pulmonary disease (COPD), chronic kidney disease, and categories containing chronic beryllium disease and cor pulmonale (failure of the right side of the heart). Associations with maximum and cumulative exposure were calculated. Overall mortality in the workers, compared with the U.S. population as a whole, was increased for lung cancer, COPD, and the categories containing chronic beryllium disease and cor pulmonale. Mortality rates for most diseases of interest increased with time-since-hire. For the category including chronic beryllium disease, rates were significantly increased compared to the U.S. population. Workers whose maximum beryllium exposure was greater than or equal to 10 mg/m^3 had higher rates of lung cancer, urinary tract cancer, COPD and the category containing cor pulmonale than workers with lower exposure. Significant positive trends with cumulative exposure were observed for nervous system cancers and—when short-term workers were excluded—lung cancer, urinary tract cancer, and COPD. This study reaffirms that lung cancer and chronic beryllium disease may be related to beryllium exposure, and it suggests that COPD and nervous system and urinary tract cancers may also be related to beryllium exposure. The authors of the study concluded that cigarette smoking and exposure to other lung carcinogens are unlikely to explain these increases.

Studies such as the one described in the preceding paragraph are used as the basis of cancer classification by organizations such as the National Toxicology Program (NTP), International

Agency for Research on Cancer (IARC), American Conference of Governmental and Industrial Hygienists (ACGIH), and the U.S. Environmental Protection Agency (EPA).

The NTP classifies beryllium in Group 1, a known human carcinogen (NTP 2011). Based on sufficient evidence for carcinogenicity in humans and animals, the IARC has classified beryllium in Group 1, carcinogenic to humans (IARC 2010). Based on the weight-of-evidence from human epidemiological studies, the ACGIH classifies beryllium in Group A1, a confirmed human carcinogen (ACGIH 2013). The U.S. EPA classifies beryllium in Group B1, a probable human carcinogen. This classification is based on the limited evidence of carcinogenicity in humans exposed to airborne beryllium (lung cancer) and sufficient evidence of carcinogenicity in animals (lung cancer in rats and monkeys inhaling beryllium, lung tumors in rats exposed to beryllium via intratracheal instillation, and osteosarcomas in rabbits and possibly mice receiving intravenous or intramedullary injection) (EPA 1998).

Other Effects. The available data on the potential of beryllium to induce reproductive and/or developmental effects are inconclusive. In animal studies, reproductive and developmental effects, as well as other extra-pulmonary effects, have generally been observed only at doses higher than the lowest doses that induce chronic beryllium disease or cancer (NRC 2007).

4.1.2.3 Measures to prevent exposure and adverse health effects

Minimizing the Health Risks to Workers. Beryllium sensitization, chronic beryllium disease, and lung cancer are the principal health concerns related to beryllium exposure. Because of a lack of quantitative risk information on low exposure and uncertainties associated with factors that contribute to the development of chronic beryllium disease, it is difficult to identify a chronic inhalation exposure level that is unlikely to lead to beryllium sensitization or chronic beryllium disease. Therefore, managing exposure may be appropriate to minimize health risks.

The National Research Council has recommended measures that should be taken to prevent skin and respiratory exposure to beryllium to the greatest extent possible (NRC 2008). These measures—as applicable to the Proposed Action contemplated in this EA—include the following:

- Know the beryllium content of all materials in the workplace;
- Keep airborne concentrations of beryllium as low as possible;
- Minimize the number of workers exposed to beryllium dusts, fumes, and contaminated surfaces;
- Install, use, and maintain effective engineering controls for processes that create beryllium dusts and fumes;

- Monitor airborne beryllium concentrations to document the effectiveness of efforts to reduce airborne exposure;
- Inform workers about the risks of beryllium sensitization, chronic beryllium disease, and lung cancer and the proper procedures for working with beryllium;
- Keep beryllium dusts and fumes confined to the immediate work area;
- Avoid the use of cleaning methods that may cause dust to become resuspended in air (for example, dry sweeping, use of compressed air, and other dust-generating methods);
- Prevent beryllium dusts and other contamination from leaving beryllium work areas on equipment or workers' skin, clothing, shoes, and tools;
- Establish and maintain an appropriate respiratory-protection program; and
- Establish and maintain a skin-protection program to protect workers' skin from contamination with beryllium dusts and solutions by keeping work surfaces and work areas clean; providing work gloves, long-sleeved shirts, long pants, and shoes that remain at the workplace; and providing showering and changing facilities.

In addition to the project-specific health and safety measures included in the Proposed Action, compliance with all OSHA regulations for the type of work associated with the beryllium stockpile will be required. All workers would be trained in the potential hazards associated with the Proposed Action. Additionally, each worker would be issued and required to wear personal protective equipment appropriate to the hazards that may be encountered during the Proposed Action. Some of the potential hazards to workers associated with the Proposed Action are listed in Section 2.0. Required training for workers would minimize the potential risks to workers, and that training includes the general categories listed in Section 2.0.

The potential beryllium hazards listed above would pose risks to on-site workers at the Hammond Depot, including those workers involved in moving the upgraded and converted beryllium from the receiving area and placing it back into storage, as well as those workers involved in subsequent inspections of the beryllium stockpile while it is in long-term storage. Periodic examinations of these depot workers via BeLPT blood testing would provide early indication of any sensitization to beryllium that the worker might be developing. If a positive BeLPT test result is obtained, an alternate work assignment would be identified for this worker in order to eliminate any subsequent exposure to beryllium.

To ensure the potential hazards of beryllium are adequately addressed, the contractor(s) performing work at the Hammond Depot—including the transportation of the beryllium to and from the off-site beryllium conversion facilities—would be required to have health and safety plans for addressing these potential hazards. The aforementioned beryllium hazards would also pose risks to the workers at the off-site facilities where the beryllium upgrade and conversion activities would occur. However, the off-site facilities would be expected to have previous expertise in beryllium processing and already have health and safety plans in place to protect those workers. Therefore, the introduction of the NDS beryllium from the

Hammond Depot into the off-site upgrade and conversion facilities would not be creating any additional hazards that do not already exist in those places.

As discussed in the above paragraphs, it should be possible to avoid serious human health impacts among workers due to the Proposed Action.

Preventing Impacts to Members of the Public. Members of the public would not be exposed to beryllium as a result of normal operations during the implementation of the Proposed Action or during the long-term storage of beryllium at the Hammond Depot. However, as described in the following paragraphs, in the event of a fire or an accident inside the storage structure at the Hammond Depot, beryllium might be released into the environment, thereby potentially subjecting nearby members of the public to beryllium exposure.

While a fire in the storage structure would not be expected to result in the release of beryllium from the stored billets, a fire could result in the airborne suspension and downwind distribution of any converted beryllium—such as beryllium powder—that was released from its storage container. However, the release of converted beryllium from the storage drums would not be a likely consequence of a fire inside the storage structure, since the drums and pallets of converted beryllium would be stored inside a protective metal storage enclosure with a 4-hr fire rating. That is, a fire would be unlikely to cause a rupture of the converted-beryllium storage containers. Therefore, the release of converted beryllium from the storage drums and a fire inside the storage structure would have to occur as separate, but highly unlikely, events before the beryllium presented any hazard to the nearby population.

DLA–Strategic Materials has conducted an assessment of the potential human health consequences of an accident involving a fire and the converted beryllium. The results of the accident analysis indicate that potentially adverse human health effects could occur as a result of exposure to accidentally released beryllium; however, such an accident would be highly unlikely to occur and its effects could be mitigated by the actions described in the following paragraph.

Fire extinguishing equipment (including sodium-chloride type fire extinguishers and personnel protective equipment) specific to potential fires involving beryllium are available at the Hammond Depot for use in suppressing any fires that might occur inside the beryllium storage structure. In addition, local emergency response personnel near the Hammond Depot are equipped with, and trained in the use of, self-contained breathing apparatus that would be used in the event of a fire involving the beryllium at the depot. The use of such equipment would be expected to rapidly extinguish any fire and reduce or eliminate any potential for off-site human health consequences.

In the absence of a fire, the off-site release of a significant quantity of beryllium due to a spill or the rupture of a storage container would be extremely unlikely due to the lack of a physical mechanism to get the beryllium airborne. In addition, due to the absence of explosive materials near the converted beryllium storage containers, the release of beryllium by explosive mechanisms is also extremely unlikely; hence, these scenarios are not analyzed further in this EA.

The consequences of a possible accidental release of beryllium powder are described in Section 4.2.2.2. As discussed in the above paragraphs and in Section 4.2.2.2, no adverse human health impacts among members of the public would be expected during to the Proposed Action.

4.1.3 Potential Impacts of the No-Action Alternative

Under the No-Action alternative, workers at the Hammond Depot would continue to conduct periodic surveillance and maintenance activities for the existing inventory of beryllium billets. Due to the packaging and the physical state of this beryllium, exposure to beryllium would not be likely to occur during such activities. Hence, impacts to human health would be unlikely to occur during the No-Action alternative.

4.2 TRANSPORTATION

4.2.1 Existing Environment

As discussed in Section 1.2, the Hammond Depot is served by roads that provide ready access to the interstate highway system. The roads immediately surrounding the depot are in general good condition and are adequately maintained, as is the interstate system of highways. Normal highway traffic volumes in the vicinity are many times greater than the volume of traffic entering and exiting the depot.

4.2.2 Accident Analysis

For the Proposed Action, accidents during off-site transportation would produce a potential source of adverse impacts. The analysis in this section addresses only potential impacts to individuals because all credible accidents are sufficiently small that they would not produce large or permanent impacts on a greater scale in the human environment. Because the anticipated method of transportation between the Hammond Depot and the off-site beryllium conversion facility is by truck, the analysis is this section focuses on highway accidents.

4.2.2.1 The risk of a transportation accident

The U.S. Department of Transportation (DOT) has established regulations at 49 CFR Part 177 regarding the transportation of hazardous materials on public highways. These regulations include provisions that provide an appropriate level of safety and that protect the public during such transportation activities. While the DOT regulations do not require that a transportation risk assessment be conducted for the shipment of hazardous materials, transportation risk assessments are sometimes prepared to identify and assess the potential risks to members of the public due to accidents during such shipments.

This subsection provides a numerical calculation of risk based on the most recent information available about national accident statistics for the types of large trucks that would be used to transport the NDS beryllium. The calculations in this subsection focus on an analysis of transportation risk using truck crash statistics based upon the number of miles traveled. Therefore, the number of potential accidents during the off-site transport of the NDS beryllium was evaluated against statistics available from the DOT in regard to the transportation of hazardous materials. As described below, hazardous materials transporters have a better-than-average safety record.

Crash statistics for large trucks are maintained in the DOT's Fatality Analysis and Reporting System (FARS). This system compiles all types of data from accidents as collected from police reports. The latest version of the FARS report for large trucks (FMCSA 2014a) was used as the basis for the accident analysis presented in this subsection. Large trucks are defined as trucks with a gross vehicle weight more than 10,000 pounds. The types of vehicles to be used in the transportation of the NDS beryllium fall into this category.

The following data are given in the FARS trends report for large-truck crashes that occurred in 2012, the latest year for which such data are available (FMCSA 2014a, 2014b):

- In 2012, large trucks accounted for 9 percent of all vehicle miles traveled and 4 percent of all registered vehicles in the United States.
- Of the approximately 317,000 police-reported crashes involving large trucks in 2012, only 1 percent (3,464) resulted in fatalities, and 23 percent (73,000) resulted in non-fatal injuries.
- Almost two-thirds (63 percent) of all fatal crashes involving large trucks occurred on rural roads.
- Of the 33,077 people killed in motor vehicle crashes in the United States in 2012, 12 percent (3,921) died in crashes involving a large truck.
- Only 4 percent of the large trucks involved in fatal crashes—and 2 percent of the large trucks involved in non-fatal crashes—were carrying hazardous materials.

- Approximately 0.6 percent of the large trucks involved in fatal crashes—and 0.3 percent of the large trucks involved in non-fatal crashes—released hazardous material from the cargo compartment during those events.
- Rollover was the first harmful event (the first event during a crash that caused injury or property damage) in only 5 percent of all fatal crashes involving large trucks and in only 3 percent of all non-fatal crashes involving large trucks.

The sets of FARS data from the ten-year period 2003 to 2012 are summarized in Table 3. These data show the number of accidents involving large trucks, as well as the consequences of those accidents (as measured by three categories: fatalities, injuries, and property-damage-only). The data on the numbers of accidents in Table 3 have been expressed on a "per vehicle mile traveled (VMT)" basis so that the resulting rates can be applied to the potential distances to be traveled by the beryllium shipments.

Under the Proposed Action, up to 20 tons (18,140 kg) of beryllium billets would be upgraded and converted into other, more useable forms. However, for the purpose of conservatively analyzing hypothetical transportation accidents in this EA, it is assumed that 85 tons (77,100 kg) of NDS inventory beryllium billets would be transported to an off-site conversion facility. Furthermore, it is assumed that the distance from the Hammond Depot to the hypothetical off-site conversion facility is 1000 miles (1600 km), even though the probable facilities are much closer. These assumptions regarding quantities and distances would result in an overestimation of any resulting transportation impacts and would thus bound the magnitude and extent of any such impacts associated with the Proposed Action.

Because the typical weight of each beryllium billet is just over 1 ton (910 kg), the maximum number of trips required to move the NDS beryllium inventory from the Hammond Depot to the hypothetical beryllium conversion facility would be about 85 trips. For the assumed one-way transportation distance of 1000 miles (1600 km), the total amount of round-trip transportation by truck for the duration of the Proposed Action would not exceed 170,000 vehicle miles (273,500 km).

Table 4 shows the results of the statistical accident calculations for the Proposed Action, based upon the accident rates for year 2012 as shown in Table 3. For the assumed 170,000 vehicle miles (273,500 km) associated with the Proposed Action, Table 4 shows that the number of statistically anticipated accidents of all types would be very small (i.e., 0.20) during the shipment of the beryllium from the Hammond Depot to the hypothetical beryllium conversion facility and back again. Statistically, less than one of these accidents (i.e., 0.05) would be expected to result in injuries, and also far less than one of these accidents (i.e., 0.002) would be expected to result in fatalities.

Table 3. Accident statistics for crashes over the past ten years that have involved large trucks

Part A. Large truck crashes of all types and crashes with only property damage

		All types of accidents		Accidents with property damage only	
Year	**Vehicle miles traveled (VMT), in millions**	**Number of crashes**	**Accident rate (crashes/VMT)**	**Number of crashes**	**Accident rate (crashes/VMT)**
2003	217,876	436,000	2.0×10^{-6}	347,000	1.6×10^{-6}
2004	220,811	399,000	1.8×10^{-6}	312,000	1.4×10^{-6}
2005	222,523	424,000	1.9×10^{-6}	341,000	1.5×10^{-6}
2006	222,513	368,000	1.6×10^{-6}	287,000	1.3×10^{-6}
2007	304,178	393,000	1.3×10^{-6}	317,000	1.0×10^{-6}
2008	310,680	365,000	1.2×10^{-6}	297,000	9.6×10^{-7}
2009	288,306	286,000	9.9×10^{-7}	232,000	8.1×10^{-7}
2010	286,527	266,000	9.3×10^{-7}	207,000	7.2×10^{-7}
2011	267,594	273,000	1.0×10^{-6}	210,000	7.9×10^{-7}
2012	268,318	317,000	1.2×10^{-6}	241,000	9.0×10^{-7}

***Note*:** A large truck is one with a gross vehicle weight over 10,000 pounds.
***Source*:** Data taken from Tables 4, 7 and 10 in Federal Motor Carrier Safety Administration (FMCSA), *Large Truck and Bus Crash Facts 2012*, FMCSA-RRA-14-004, Analysis Division, FMCSA, U.S. Department of Transportation, Washington, D.C., June 2014; Available on-line at http://ntl.bts.gov/lib/35000/35500/35578/LTCF2012-1.pdf

Table 3. (continued)

Part B. Large truck crashes with fatalities or injuries

		Fatal crashes				Crashes with injuries			
Year	**Vehicle miles traveled (VMT), in millions**	**Number of fatal crashes**	**Accident rate (fatal crashes/ VMT)**	**Number of fatalities**	**Fatality rate (fatalities/ VMT)**	**Number of crashes with injuries**	**Accident rate (injurious crashes/ VMT)**	**Number of injuries**	**Injury rate (injuries/ VMT)**
2003	217,876	4,335	2.0×10^{-8}	5,036	2.3×10^{-8}	85,000	3.9×10^{-7}	122,000	5.6×10^{-7}
2004	220,811	4,478	2.0×10^{-8}	5,235	2.4×10^{-8}	83,000	3.8×10^{-7}	116,000	5.3×10^{-7}
2005	222,523	4,551	2.1×10^{-8}	5,240	2.4×10^{-8}	78,000	3.5×10^{-7}	114,000	5.1×10^{-7}
2006	222,513	4,350	2.0×10^{-8}	5,027	2.3×10^{-8}	77,000	3.4×10^{-7}	106,000	4.8×10^{-7}
2007	304,178	4,204	1.4×10^{-8}	4,822	1.6×10^{-8}	72,000	2.4×10^{-7}	101,000	3.3×10^{-7}
2008	310,680	3,754	1.2×10^{-8}	4,245	1.4×10^{-8}	64,000	2.1×10^{-7}	90,000	2.9×10^{-7}
2009	288,306	2,983	1.0×10^{-8}	3,380	1.2×10^{-8}	51,000	1.8×10^{-7}	74,000	2.6×10^{-7}
2010	286,527	3,271	1.1×10^{-8}	3,686	1.3×10^{-8}	56,000	2.0×10^{-7}	80,000	2.8×10^{-7}
2011	267,594	3,365	1.3×10^{-8}	3,781	1.4×10^{-8}	60,000	2.3×10^{-7}	88,000	3.3×10^{-7}
2012	268,318	3,464	1.4×10^{-8}	3.921	1.5×10^{-8}	73,000	2.7×10^{-7}	104,000	3.9×10^{-7}

***Note*:** A large truck is one with a gross vehicle weight over 10,000 pounds.
***Source*:** Data taken from Tables 4 and 7 in Federal Motor Carrier Safety Administration (FMCSA), *Large Truck and Bus Crash Facts 2012*, FMCSA-RRA-14-004, Analysis Division, FMCSA, U.S. Department of Transportation, Washington, D.C., June 2014; Available on-line at http://ntl.bts.gov/lib/35000/35500/35578/LTCF2012-1.pdf

Table 4. Statistically anticipated accidents during proposed beryllium shipments and their consequences

		Predicted numbers of accidents				Accident consequences	
Number of one-way trips	Assumed one-way distance (miles)	Total accidents of all types	Accidents with property damage only	Accidents with injuries	Accidents with fatalities	Expected number of injuries	Expected number of fatalities
85	1000	0.20	0.15	0.05	0.002	0.07	0.003

Note: The accident rates used for the calculations in the above table were taken from the data for 2012 as shown in Table 3. The calculations in the above table account for the round-trip distance.

The FARS statistics, as used in this analysis, indicate that no significant number of transport-vehicle accidents would be expected to occur during the off-post shipment of beryllium billets and the return shipments of upgraded and converted beryllium.

4.2.2.2 The consequences of a transportation accident

Injuries and Fatalities from Accidents. In addition to data on the frequency of crashes involving large trucks, Table 3 also presents the data for the consequences of those accidents (as measured by the categories: injuries, fatalities, and property-damage-only). These data (as expressed on a “per VMT” basis) have been applied to the transportation distances to be traveled by the hypothetical beryllium shipments. Table 4 shows the results of the accident consequence calculations based upon the injury and fatality rates for the year 2012 (as shown in Table 3). For the assumed round-trip transportation distance to be traveled by the beryllium shipments, Table 4 shows that the number of statistically anticipated injuries would be far less than one (i.e., 0.07) during the beryllium shipments. The total number of fatalities expected from accidents involving the beryllium shipments would also be statistically much, much less than one (i.e., 0.003).

The FARS statistics, as used in this analysis, indicate that no significant number of injuries or fatalities would be expected to occur during the off-site shipment of beryllium billets and the return shipments of upgraded and converted beryllium.

Impacts from Accidental Spills or Releases. The impacts of greatest concern during the return shipments of upgraded and converted beryllium from the off-site conversion facility back to the Hammond Depot would be associated with accidental spills or releases of beryllium, particularly beryllium in the form of fine powder. In the unlikely event of such an accident, beryllium powder could be released from its shipping container and escape into the environment. As discussed below, any such releases would be expected to be contained within a highly localized area in the immediate vicinity of the accident, and no significant adverse impacts would be expected to human health, soils, surface water, or groundwater along the transportation corridor.

Because beryllium is heavier than water and because beryllium is not soluble in water (see the physical characteristics in Table 1), any accidentally spilled beryllium powder that is introduced into surface water would settle onto the bottom as sediment. Due to its small particle size, some of the beryllium powder could be swept away in rapidly moving surface water; however, the mixing and dispersion motion within such surface waters would be expected to result in very low concentrations of beryllium within such waters. If such water were to be subsequently ingested by humans, any resulting health effects would be of much less concern than the exposure to beryllium through the inhalation pathway (see Sections 4.1.2.1 and 4.1.2.2).

Because a major portion of any beryllium spilled onto soil would not dissolve in water and would remain bound to the soil, it is not likely to move deeper into the ground and enter groundwater (ATSDR 2002). Cleanup of beryllium spilled onto soils and other surfaces would thus be relatively straightforward because of the localization and adsorption that would occur. While beryllium does exhibit toxicity, as described in Section 4.1.2.2, any beryllium powder accidentally spilled would not be expected to become the source of any significant airborne hazard unless the accident involved a fire or unless high winds existed at the time of the accident. Either of these two situations could possibly result in the airborne suspension of fine beryllium particles and the distribution of these particles to locations beyond the immediate vicinity of the accident. The potential impacts to human health from such wind-transported particles would depend on a variety of factors, including wind direction, the population in the area, and the specific distribution of beryllium particle sizes resulting from the processing at the off-site conversion facility. Any such exposure to airborne beryllium would be of short duration and would occur only in the unlikely event of an accident.

The potential for environmental impacts from accidental releases or spills of beryllium powder would therefore primarily be limited to localized contamination of surface soils and/or nearby surface waters or groundwater and also to the possibility of human exposure from wind-borne beryllium particles resulting from the accident. Appropriate emergency response actions, as described in the following paragraphs, would be expected to eliminate or greatly reduce the impacts of any such accidental releases or spills. In addition, emergency response measures, such as instructing the nearby public to shelter in place, would greatly reduce the potential for any adverse health effects from wind-borne beryllium.

The containers and vehicles used for the beryllium shipments would be appropriately placarded and labeled. Furthermore, each shipment would be accompanied by either a hazardous materials manifest or bill of lading. All shipping papers would conform to applicable federal, state, and local regulations in order to provide first responders with the necessary information in the event of an accidental spill or release. In such instances, emergency responders are trained to establish isolation and protective action distances for accidents involving hazardous material and to take appropriate actions to limit the impact of such accidents.

Under the provisions of DOT regulations at 49 CFR Part 172, licensed carriers and shippers are required to provide information to emergency responders about the hazardous nature of their shipments. Specifically, Subpart G of these regulations relates to "Emergency Response Information" that is to be carried by each transporter, and Subpart H relates to "Training" for hazardous materials transport personnel.

Spills involving more than 10 pounds (4.5 kg) of beryllium powder with a diameter less than 100 μm are required to be reported under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (40 CFR 302.4). Notification of such spills must be made to the National Response Center, as well as to the Local Emergency Planning Committee and the State Emergency Response Commission.

4.2.3 Potential Impacts of the Proposed Action

Because of the low number of off-post shipments of beryllium (i.e., a total of not more than 85 shipments) that would be spread over the 5-year conversion portion of the Proposed Action, there would be no significant impacts to local traffic.

The risk of transportation accidents during the off-post shipment of the beryllium billets from the Hammond Depot and the return shipments of upgraded and converted beryllium back to the depot has been evaluated and has been found not to be significant; that is, the risk of such accidents is statistically very, very small (see Section 4.2.2.1). Furthermore, the consequences of any such transportation accidents have also been statistically evaluated and found not to be significant (see Section 4.2.2.2). Because (1) nationwide, there are millions of highway shipments of hazardous materials each year, for which the states already provide capable emergency response, and (2) some of these shipments involve chemicals (such as toxic sulfuric acid or flammable gasoline) that present far greater hazards than the beryllium to be shipped from the Hammond Depot, it is concluded that the intent of DLA–Strategic Materials to ship beryllium (either in billet form or in other forms, including fine powder) does not pose any unique safety concerns or unacceptable environmental impacts relative to those associated with routine commercial and trade industry hazardous waste shipments.

Based on the transportation analyses conducted in this EA, no significant number of accidents would be expected to occur during the off-site shipment of beryllium, nor would any significant adverse consequences be expected if such accidents were to actually occur.

4.2.4 Potential Impacts of the No-Action Alternative

Operations at the Hammond Depot would continue at approximately the current levels of traffic. Because these current levels do not create any significant impacts to traffic on the local roads, no significant impacts to traffic would occur near the depot as a result of the No-Action alternative.

4.3 LAND USE

4.3.1 Existing Environment

As discussed in Section 1.2, the 60-acre (24-ha) Hammond Depot is situated in a previously disturbed industrial setting and is located on a previously disturbed site. As seen in Fig. 1, development and/or disturbed areas exist on all sides of the depot that do not border bodies of water.

The soil resources at the depot are characterized as being in an "urban land use" class (Cash 1998). According to the Remedial Investigation conducted at the Hammond Depot in 2011 (PARS Environmental 2011), the depot is underlain by approximately 7 to 10 ft (2 to 3 m) of fill. The top 0.5 to 2 ft (15 to 60 cm) of this fill consists of varying amounts of poorly sorted sand, silt, and gravel with a trace of cinders and ash. Underlying the granular fill across the majority of the site is slag. Underlying the slag is native fine sand with some organic material and trace shell fragments.

The majority of the soil samples collected at the depot for the 2011 Remedial Investigation had concentrations below the applicable Indiana Department of Environmental Management (IDEM) default Risk Integrated System of Closure (RISC) soil levels for industrial properties. The IDEM RISC soil-migration-to-groundwater-exposure-route closure level was exceeded in several arsenic and lead samples and in two thallium samples. However, Synthetic Precipitation Leaching Procedure (SPLP) and groundwater sample results indicated that this exposure route is not currently and is not expected to be a concern at the site in the future (PARS Environmental 2011).

Four relatively isolated areas at the depot were identified as having concentrations of arsenic or lead above applicable IDEM RISC industrial direct-contact levels. Based on the sample results, these areas cover a total of approximately 30,000 ft^2 (2790 m^2). Assuming a thickness of 1 ft (0.3 m), the volume of soil with a concentration above a default direct-contact standard is approximately 1,100 yd^3 (840 m^3). Toxicity Characteristic Leaching Procedure (TCLP) results for applicable metals confirm that any potentially excavated soil would not be classified as hazardous waste (PARS Environmental 2011).

4.3.2 Potential Impacts of the Proposed Action

There would be no impacts to future land use because no new structures, roads, or shipping facilities would be constructed at the Hammond Depot as part of the Proposed Action. There would be no disturbance of lands that have not already been disturbed from previous activities. Hence, the Proposed Action would be expected to have no significant adverse impacts to land use at the Hammond Depot or in the surrounding area. Likewise, there would be no effects on land use either along the transportation corridors or at the existing off-site beryllium conversion facilities.

4.3.3 Potential Impacts of the No-Action Alternative

The continued, long-term storage of the beryllium billets at the Hammond Depot would not result in any changes to existing land uses at the depot; hence, there would be no land-use impacts associated with the No-Action alternative.

4.4 WATER RESOURCES

4.4.1 Existing Environment

The Hammond Depot borders Wolf Lake (see Fig. 1), and Lake Michigan lies about 2.5 miles (4.0 km) north of the depot. The water flow within Wolf Lake empties into Lake Michigan. A large, man-made tributary borders the southeast portion of the Hammond Depot, and it empties into Wolf Lake. This man-made tributary was designed to prevent lakes and city ditches in the area from flooding (Cash 1998). Stormwater from stormwater outfalls at the depot also empty into this unnamed tributary. Current activities at the Hammond Depot do not adversely impact any of the aforementioned bodies of water.

Regional shallow groundwater around the Hammond Depot flows north-northeast, toward Lake Michigan. However, groundwater beneath Hammond Depot may flow toward and discharge into Wolf Lake, which lies adjacent to the west side of the depot (Parsons 2001).

Federal storm water regulations were first issued in 1990 by the EPA via the implementation of permits under the National Pollutant Discharge Elimination System (NPDES) and the State Pollutant Discharge Elimination System (SPDES) to address storm water runoff and the prevention of pollution therefrom. A SPDES permit has not been issued to the Hammond Depot, because State of Indiana regulations exempt the depot from coverage. Nevertheless, in accordance with DLA policy, a Storm Water Pollution Prevention Plan (SWPPP) has been developed for the Hammond Depot (AEDL 2013).

4.4.2 Potential Impacts of the Proposed Action

There are no wet processes associated with the Proposed Action at the Hammond Depot, nor would the proposed activities at the depot consume water (beyond what would be required by personnel for drinking and sanitation purposes). Potable water is provided to the depot by the City of Hammond and is withdrawn from Lake Michigan. However, due to the extremely small number of workers, the quantity of potable water consumed by depot personnel and workers during the Proposed Action would not be significant in relation to the available supply.

The depot is connected to the City of Hammond sanitary sewer system. Worker sanitary wastes would be collected in this system; however, due to the extremely small number of workers, the impacts from this small volume of liquid waste would not be significant. Therefore, the Proposed Action would have insignificant, short-term impacts on water resources at the Hammond Depot.

Actions to be taken in case of a spill or leak at the Hammond Depot are described in the depot's SWPPP (AEDL 2013). Beryllium is a solid as opposed to a liquid or gas; hence, if an accidental spill of beryllium were to occur during drum handling at the depot, the spill could be contained and cleaned up quickly.

Wolf Lake is over 800 ft (240 m) from the location where the beryllium is stored, as well as from where the activities associated with the Proposed Action would be conducted. The distance and the relatively flat terrain would limit the potential for spilled material to reach surface water; hence, no impacts to nearby bodies of water would be expected to occur as a result of any spills. A major portion of any beryllium spilled onto soil would not dissolve in water and would remain bound to the soil, so it is not likely to move deeper into the ground and enter groundwater (ATSDR 2002). Cleanup of spills onto soils and other surfaces would thus be relatively straightforward because of the localization and adsorption that would occur. Similarly, any spills of fuels or oils from materials handling equipment or transport vehicles would be contained and cleaned up quickly. Consequently, no significant adverse impacts to surface water or groundwater resources at the Hammond Depots would be expected from potential spills during the Proposed Action.

The impacts upon water resources due to potential spills of beryllium as a result of a vehicle accident along the transportation route are discussed in Section 4.2.2.2. No significant adverse impacts to water resources would be expected from such spills.

4.4.3 Potential Impacts of the No-Action Alternative

The water resources at the Hammond Depot would not be affected by the continued storage of the beryllium billets at the depot; hence, there would be no impacts to water resources as a result of the No-Action alternative.

4.5 ECOLOGICAL RESOURCES

4.5.1 Existing Environment

The area of the Hammond Depot was a wetland in the mid-1940s which has since been filled with a substantial amount of blast-furnace slag to give the site a stable and level foundation (Cash 1998). Wolf Lake borders the depot on the west, and industrial properties border the remainder. Wolf Lake serves as habitat for many aquatic species. While the western bank of Wolf Lake has a riparian buffer of mature hardwoods that serves as habitat for woodland species, the eastern bank (near the Hammond Depot) has meager amounts of vegetation, including grasses and weeds, as well as uneven bank edges that indicate some erosion is occurring. An unidentified bamboo species is dense along the southeast perimeter of the depot; the remainder of the area has been disturbed for industrial purposes, and plant communities are scarce in this area. No wetlands or other habitats suitable to support typical wildlife species are present at or immediately adjacent to the depot, despite the incidental use of the depot property by some wildlife (Cash 1998).

The Indiana Department of Natural Resources (IDNR) has identified almost 400 plant and animal species that either occur in Lake County or have the potential to occur in the county and that are listed by the State of Indiana as being endangered, threatened, rare, species of special concern, or state-significant (IDNR 2013). Of these species, only eight are federally listed. Four of these eight species are listed as endangered [the sheepnose mussel (*Plethobasus cyphyus*), the American burying beetle (*Nicrophorus americanus*), the Karner blue butterfly (*Lycaeides melissa samuelis*), and the piping plover (*Charadrius melodus*)], and four are listed as threatened [the bald eagle (*Haliaeetus leucocephalus*), Mead's milkweed (*Asclepias meadii*), the dune thistle (*Cirsium pitcheri*), and the prairie white-fringed orchid (*Platanthera leucophaea*)]. No federally-protected endangered or threatened species are known to occur on the Hammond Depot site. Although Wolf Lake may serve as habitat for many wildlife species, no habitat with the characteristics needed to support viable populations for rare, threatened, or endangered species is present at the Hammond Depot (Cash 1998).

4.5.2 Potential Impacts of the Proposed Action

Loading of the crates containing the beryllium billets onto trucks for transport to off-site conversion facilities would occur adjacent to the location where the beryllium is currently stored and would use existing, surrounding roadways. Because loading materials stored at the depot onto trucks is a common activity occurring in the surrounding area, wildlife in the vicinity are habituated to these types of routine activities.

Because of the absence of significant habitat, and because the Proposed Action would not cause any other disturbances potentially affecting ecological resources, there would be no significant adverse impacts to wildlife or vegetation at the Hammond Depot.

In the event of a release or spill of beryllium during transport from the off-site conversion facilities back to the Hammond Depot, the movement of the spilled beryllium through the environment and its accumulation in the food chain would determine the potential for significant adverse impacts. Because beryllium attaches readily to soil, any spilled beryllium would not be transported long distances in soil (ATSDR 2002). Beryllium does not concentrate in plants, and there is no evidence that plants are harmed by an uptake of beryllium. The concentration of beryllium does not increase (biomagnify) in predators when they consume contaminated prey because fish do not accumulate beryllium from water into their bodies to any great extent, and most of the beryllium ingested by wildlife is eliminated quickly in urine and feces (ATSDR 2002). Hence, there would be no expected significant adverse impacts to ecological resources from releases or spills of beryllium, including beryllium in the form powder.

4.5.3 Potential Impacts of the No-Action Alternative

Under the No-Action alternative, routine activities would continue at the Hammond Depot. Species on or near the depot have become accustomed to those routine activities and, hence, would not be expected to experience any adverse impacts. No adverse impacts would be expected to occur to other ecological resources, such as habitats, at the depot as a result of the No-Action alternative.

4.6 SOCIOECONOMICS

4.6.1 Existing Environment

The level of employment at the Hammond Depot is an extremely minor part of the total employment in Lake County, Indiana, which has a total population of nearly 500,000 people, and the Chicago metropolitan area, which has more than 9 million people. Currently, less than 10 percent of one person-year is associated with the storage of the beryllium billets at the Hammond Depot.

4.6.2 Potential Impacts of the Proposed Action

No change in the numbers of permanent staff personnel at the Hammond Depot would be required under the Proposed Action. The contractor personnel (i.e., truck drivers) who would move the beryllium to and from the off-site conversion facility would be at the Hammond Depot for extremely short periods of time.

Small increases in utility usage (including water and electricity) at the depot may result from the Proposed Action; however, because neither water nor electricity is in short supply in the area, no significant impacts would be expected to result from the increased use of utilities.

There could be a temporary, positive impact on the local economy around the Hammond Depot caused by the presence of the small number of contractor personnel during the Proposed Action, since such personnel might make local purchases of food, equipment, and fuel. Because of the short duration and intermittent nature of the loading/unloading activities at the Hammond Depot during the Proposed Action, no adverse impacts to social services would be expected to occur.

No more than 85 shipments by truck would be needed to move the beryllium billets to the off-site conversion facility and back again to the Hammond Depot. Over the 5-year duration of the Proposed Action, this small number of shipments would create an insignificant amount of additional traffic on the roads near the Hammond Depot. Therefore, the truck traffic associated with the Proposed Action would produce no significant adverse impacts to local traffic.

4.6.3 Potential Impacts of the No-Action Alternative

Under the No-Action alternative, the level of employment at the Hammond Depot would not change, and the expenditures for local services and equipment in the communities around the Hammond Depot would continue at the current levels. There would thus be no socioeconomic impacts to these surrounding communities as a result of the No-Action alternative.

4.7 ENVIRONMENTAL JUSTICE

4.7.1 Existing Environment

The residents located nearest to the Hammond Depot site boundary are over 600 ft (180 m) away; however, the nearest residence is over 1500 ft (460 m) from the location where the beryllium billets are currently stored (and where the upgraded and converted beryllium would be stored).

The Hammond Depot is located in Lake County, Indiana, and the depot is less than 0.1 mi (0.2 km) east of the boundary with Cook County, Illinois, which also serves as the southeastern boundary for the city of Chicago. Data from the 2010 census show that 83,361 residents live within 3.1 mi (5.0 km) of the depot (see Table 5). According to data from the 2010 census, minorities make up 35.6 percent of the population in Lake County and 44.6 percent of the population in Cook County (USCB 2014); however, larger percentages of minorities exist in the vicinity of the depot (see Table 5).

Table 5. Characteristics of the population around the Hammond Depot

	Distance from the center of the Hammond Depot		
Population/Attribute	**3.1 mi (5 km)**	**6.2 mi (10 km)**	**10 mi (16 km)**
Total population within specified distance	83,361	344,756	929,599
Minority Category:			
Black or African American	23,912 (28.7%)	184,270 (53.4%)	589,579 (63.4%)
American Indian or Native Alaskan	643 (0.8%)	1688 (0.5%)	3155 (0.3%)
Asian	330 (0.4%)	1624 (0.5%)	6068 (0.7%)
Native Hawaiian or Other Pacific Islander	21 (0.0%)	68 (0.0%)	224 (0.0%)
Some Other Race	13,713 (16.5%)	37,698 (10.9%)	57,544 (6.2%)
More than One Race	2293 (2.8%)	7961 (2.3%)	18,023 (1.9%)
Aggregate Minority(1)	**40,912 (49.1%)**	**233,309 (67.7%)**	**674,593 (72.6%)**
Hispanic	35,614 (42.7%)	89,528 (26.0%)	136,877 (14.7%)
White	42,449 (50.9%)	111,447 (32.3%)	255,006 (27.4%)

Note: Aggregate minority” is calculated by subtracting the percentage of reported “White” from the total population. The aggregate minority percentage in all of Lake County, Indiana, is 35.6%, and in all of Cook County, Illinois, is 44.6%.

Source: Missouri Census Data Center, *Circular Area Profiling System (CAPS), Version 10C*, Office of Social and Economic Data Analysis, University of Missouri, Columbia, Mo., 2014. Accessed April 29, 2014, at http://mcdc.missouri.edu/websas/caps10c.html.

Data for 2012 on small-area income and poverty estimates from the Census Bureau show that persons at or below the poverty level make up 19.6 percent of the total population in Lake County, Indiana, and 18.0 percent of the total population in Cook County, Illinois. The poverty rates in each state as a whole are 15.5 percent for Indiana and 14.7 percent for Illinois (USCB 2013); therefore, higher percentages of low-income populations exist near the Hammond Depot than on average for either state.

4.7.2 Potential Impacts of the Proposed Action

While minority and low-income populations do exist near the Hammond Depot, the analyses in this EA have identified no significant adverse impacts resulting from implementation of the Proposed Action. Hence, there would be no disproportionately high and adverse impacts to minority or low-income populations from the activities associated with the Proposed Action.

4.7.3 Potential Impacts of the No-Action Alternative

Under the No-Action alternative, there would continue to be no adverse impacts to the human environment. Hence, there would be no disproportionately high and adverse impacts to minority or low-income populations as a result of the No-Action alternative.

4.8 CULTURAL RESOURCES

4.8.1 Existing Environment

Because of its method of construction (i.e., slag fill in a previous wetland area), there are no recoverable archaeological artifacts at Hammond Depot. In addition, an architectural survey conducted in 1998 for the assessment of cultural resources at the depot found no structures, buildings, or objects that are eligible for listing in the National Register of Historic Places. A portion of the Hammond Depot containing Cold War era structures was previously excessed and is no longer part of the depot; furthermore, the buildings have been modified to the point where they no longer have historic integrity (DeLeon and Whetsell 1998).

4.8.2 Potential Impacts of the Proposed Action

Activities under the Proposed Action at the Hammond Depot would not adversely impact any cultural, archaeological, or historic resources since no such resources are present at the depot. Likewise, transporting the beryllium on existing highways to and from the off-site conversion facilities would not adversely impact any cultural, archaeological, or historic resources along the transportation route. Hence, no impacts would be anticipated to any cultural, archaeological, or historic resources as a result of the Proposed Action.

4.8.3 Potential Impacts of the No-Action Alternative

Because no cultural, archaeological, or historic resources are present at the Hammond Depot, no impacts would be anticipated to any such resources at or near the depot as a result of the No-Action alternative.

4.9 NOISE

4.9.1 Existing Environment

The Hammond Depot is located within an industrial area associated with the normal levels of noise produced by transportation and material-moving equipment. Other than vehicle traffic, no noise-generating equipment is in operation at the depot either currently or for the foreseeable future.

4.9.2 Potential Impacts of the Proposed Action

No noisy equipment would be used for the Proposed Action, other than the normal forklifts and vehicles used for loading and unloading the beryllium. The noise produced by this vehicle traffic would be intermittent and temporary, and would not generate noises loud enough to create a nuisance off-site.

4.9.3 Potential Impacts of the No-Action Alternative

Under the No-Action alternative, operations at the Hammond Depot would continue with occasional trucks and trains and their associated typical noises. Such noise would not be expected to produce any significant adverse impacts.

4.10 AESTHETICS

4.10.1 Existing Environment

The Hammond Depot is located within an industrial area, and the structures and facilities at the depot are similar to those in the surrounding area.

4.10.2 Potential Impacts of the Proposed Action

There would be no new construction associated with the Proposed Action; hence, the visual characteristics of the existing structures at the Hammond Depot would not be altered by the Proposed Action. Therefore, there would be no significant adverse impacts to the aesthetic resources at the Hammond Depot as a result of the Proposed Action.

4.10.3 Potential Impacts of the No-Action Alternative

Under the No-Action alternative, operations at the Hammond Depot would continue, including the long-term storage of the beryllium billets. There would be no new construction associated with these storage activities, nor would the visual nature of the existing storage facilities be altered. Therefore, there would be no impacts to the aesthetic resources at the Hammond Depot under the No-Action alternative.

4.11 METEOROLOGY AND AIR QUALITY

4.11.1 Existing Environment

The air quality at the Hammond Depot is characteristic of the large, surrounding industrial area. The area is classified by the EPA as being in nonattainment for ozone but is in attainment for all other criteria pollutants listed under the National Ambient Air Quality Standards (NAAQS) (40 CFR 81.315).

Extreme meteorological events may be expected infrequently in the area. The quantity of precipitation during extreme events has been estimated by the National Weather Service according to the expected frequency of occurrence (NWS 2014a). The amount of precipitation during a 24-hr period that would be expected to occur, on average, once every 10 years is 4.5 in. (11.4 cm) at the nearby Chicago Midway Airport. The quantity of 24-hr precipitation that would be expected to occur, on average, once every 100 years is 7.4 in. (18.8 cm). With regard to snowfall, the greatest total amount of seasonal snowfall recorded in Chicago was 89.7 in. (2.3 m), which occurred during 1978 and 1979 (NWS 2014b).

Tornadoes occasionally occur in the area. Based on the 20-year period of record between 1980 and 1999, the mean number of days per year with one or more tornadoes within 25 miles (40 km) of the Hammond Depot is 0.9 (NSSL 2003). Therefore, the probability of a tornado occurring within the boundaries of the Hammond Depot is approximately 4.3×10^{-5} annually. Based on the same period of record, the mean number of days per year experiencing thunderstorms with wind speeds of at least 58 mph (93 km/hr) within 25 miles (40 km) of the depot is 4.5 (NSSL 2003).

Based upon historical records, the probability of a hurricane striking the Hammond Depot is vanishingly small. However, the remnants of tropical storms have passed through the area on rare occasions.

4.11.2 Potential Impacts of the Proposed Action

Under the Proposed Action, the activities that would take place at the Hammond Depot would involve moving the beryllium billets while inside their existing packaging and the return receipt of the upgraded and converted beryllium packaged inside steel drums. Because the drums would be sealed and would not be opened at the Hammond Depot, there would be no atmospheric emissions from the drums.

Atmospheric emissions of pollutants from the small amount of truck traffic required to move the beryllium to and from the off-site conversion facilities would be inconsequential for the industrial area surrounding the Hammond Depot, as well as for the system of state roads and interstate highways.

Phenomena such as tornadoes or high-winds could occur at the Hammond Depot; however, the converted beryllium would be stored within steel drums inside a metal storage enclosure (i.e., cabinet, locker, or vault) that is bolted to the concrete floor inside the beryllium storage structure. It is therefore highly unlikely that such high-wind events would affect the contents inside the converted beryllium drums.

For the reasons described in the above paragraphs, the Proposed Action would be expected to produce no significant adverse impacts to air quality.

4.11.3 Potential Impacts of the No-Action Alternative

Under the No-Action alternative, current levels of depot activities would continue, and no impacts to air quality would be anticipated.

4.12 WASTE MANAGEMENT

4.12.1 Existing Environment

Currently, wastes generated at the Hammond Depot are managed through a facility maintenance contract and are disposed of at a local landfill in Newton County, approximately 40 miles (65 km) south of the depot. The depot generally has no hazardous waste to report on an annual basis.

4.12.2 Potential Impacts of the Proposed Action

Implementation of the Proposed Action would generate waste at the Hammond Depot, potentially including wooden crates, plastic liners, pallets, personal protective equipment, and tools. These wastes would be disposed of at the local landfill already used by the depot and/or at licensed commercial facilities. The expected quantity of such waste is expected to be extremely small and would therefore not be expected to produce any significant adverse impacts either to the waste management services in the area or to the capacity of nearby waste disposal systems, such as landfills.

4.12.3 Potential Impacts of the No-Action Alternative

Under the No-Action alternative, very small quantities of non-hazardous waste would continue to be generated as a result of maintenance activities. These wastes would continue to be disposed of at the local landfill and/or licensed commercial disposal facilities. Because the quantities of waste would be small, there would be no significant adverse impacts to waste management services or capacity in the area.

4.13 CUMULATIVE IMPACTS

Cumulative impacts may result when the environmental effects of the Proposed Action are added to or overlaid upon the effects associated with other past, present, and reasonably foreseeable future activities in the same project area. Cumulative impacts can result from individually minor, but collectively significant, actions taking place over a period of time.

4.13.1 Hammond Depot

Cumulative impacts from past and ongoing activities at the Hammond Depot are generally reflected in the “existing environment” subsections within Chapter 4 of this EA. Regarding reasonable foreseeable future actions, no publicly announced future actions or changes in the mission of the Hammond Depot were identified that could contribute to cumulative impacts.

Other projects in the area might be in competition with the Proposed Action for resources, such as potable water, transportation equipment, motor vehicle fuel, electricity, and manpower; however, none of these commodities is in short supply, and the quantities of such resources required by the Proposed Action are small in comparison to the total quantities available.

During the Proposed Action, other transportation activities on the depot unrelated to the Proposed Action may remain the same. Up to 10 tractor/trailer rigs not related to the Proposed Action may be entering and leaving the depot each day. The small increase in traffic from the Proposed Action, in conjunction with existing traffic near the depot, would be expected to create no significant cumulative impacts to the local transportation infrastructure that is already appropriately sized for an active industrial area.

Based on the information given above, no significant adverse cumulative impacts would be expected to occur at the Hammond Depot as a result of the Proposed Action.

4.13.2 Transport Routes

The total truck transport distance for the duration of the Proposed Action [i.e., up to 170,000 vehicle miles (273,500 km); see Section 4.2.2.1] would be an insignificant portion of the 267,207 million miles (429,936 million km) driven by large truck in the United States in a calendar year (see Table 3). There would be no adverse cumulative impacts from the additional traffic associated with the Proposed Action.

The emission of pollutants, including carbon dioxide (CO_2) and other greenhouse gases, from vehicles associated with the Proposed Action have not been quantified. Nevertheless, these vehicle emissions could contribute to the cumulative impacts of such emissions either regionally, nationally, or internationally. Because the Proposed Action could involve up to 85 trips between the Hammond Depot and the off-site beryllium conversion facilities, and because this number of trips is extremely small in comparison to the other vehicle traffic on U.S. highways, the emissions of pollutants from the vehicles involved in the Proposed Action would contribute insignificantly to the overall levels of pollutants in the atmosphere. The EPA has estimated that annual CO_2 emissions are 33 billion tons (30 trillion kg) globally and 6 billion tons (5.4 trillion kg) for the United States alone (EPA 2012). Because the average U.S. passenger vehicle emits approximately 5.7 tons (5200 kg) of CO_2 annually (EPA 2005), and because of the extremely small number of trips associated with the Proposed Action in comparison to other vehicle traffic—either regionally, nationally, or globally—it is concluded that the cumulative impacts of vehicle emissions during the Proposed Action would not be significant.

During the beryllium-conversion portion of the Proposed Action—an approximately 5-year period ending by the end of calendar year 2020—no extraordinary or conflicting uses would be expected for the local roads around the Hammond Depot or for those portions of the interstate highway system that connect the Hammond Depot to the off-site beryllium conversion facility.

While routine highway construction and/or maintenance activities would be expected to occur on the routes between the Hammond Depot and the off-site beryllium conversion facilities during the period of the Proposed Action, such activities would not be expected to adversely affect the Proposed Action due to the large number of alternate routes available. In addition, the transportation associated with the Proposed Action would not be expected to contribute to the need for additional highway construction and/or maintenance.

Based on the information given above, no cumulative adverse impacts would be expected along the transportation routes as a result of the Proposed Action.

5. FINDINGS AND CONCLUSIONS

5.1 FINDINGS

5.1.1 Consequences of the No-Action Alternative

Under the No-Action alternative, DLA–Strategic Materials would continue to store the NDS inventory of HPP beryllium billets, and the routine inspection and maintenance of this inventory would continue for the foreseeable future. No changes, other than repairs needed to ensure continued safe storage, would be made to the present storage buildings or facilities at the Hammond Depot. There would thus be no significant adverse environmental impacts associated with the No-Action alternative.

However, the HPP beryllium billets currently in storage are not in a form readily useable by the DOD or its subcontractors in time of national emergency. In the event the beryllium was needed to satisfy future critical U.S. security, military or aerospace uses, it would not be available in the forms required as input to current manufacturing processes, and the billets would likely require conversion at that time. DLA–Strategic Materials has obtained estimates that it takes about 10 weeks to turn beryllium billets into powder. Hence, the usefulness of the beryllium in billet form would be questionable for any such future U.S. critical needs.

5.1.2 Consequences of the Proposed Action

The Proposed Action would result in no significant adverse impacts—including cumulative impacts—related to human health and safety; land use; water resources; ecological resources, including threatened and endangered species; socioeconomics; environmental justice; cultural resources; noise; aesthetics; air quality; and waste management. Transportation accidents were also examined because they have the potential for adverse impacts during the Proposed Action; however, it was found that the risk of an accident during transportation is extremely low and the Proposed Action would not be expected to produce any significant adverse impacts resulting from such accidents.

Table 6 provides a summary of impacts by resource area for the No-Action alternative and the Proposed Action.

Table 6. Summary of the impacts of the alternatives

Resource Area	Proposed Action	No-Action Alternative
Human Health and Safety	No significant impact	No impact
Transportation	No significant impact	No significant impact
Land Use	No significant impact	No impact
Water Resources	No significant impact	No impact
Ecological Resources	No significant impact	No impact
Socioeconomics	No significant impact	No impact
Environmental Justice	No impact	No impact
Cultural Resources	No impact	No impact
Noise	No significant impact	No significant impact
Aesthetics	No impact	No impact
Meteorology and Air Quality	No significant impact	No impact
Waste Management	No significant impact	No significant impact

5.2 CONCLUSIONS

Based on the environmental impact analyses conducted for and documented in this EA, it is concluded that the implementation of the Proposed Action would have no significant adverse or cumulative impacts on the quality of the natural or human environment. The results of these evaluations and analyses indicate that preparation of an EIS is not needed; and, therefore, a Finding of No Significant Impact is recommended.

6. LIST OF PREPARERS AND PERSONS CONSULTED

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