



Environmental Assessment

Transfer of Normal and Low-Enriched Uranium Billets to the
United Kingdom, Hanford Site, Richland, Washington

U.S. Department of Energy
Richland, Washington

November 1995

DOE/EA - 1123

ENVIRONMENTAL ASSESSMENT

**TRANSFER OF NORMAL AND LOW-ENRICHED URANIUM BILLETS
TO THE UNITED KINGDOM**

HANFORD SITE, RICHLAND, WASHINGTON

U.S. DEPARTMENT OF ENERGY

NOVEMBER 1995

Glossary

Acronyms and Initialisms

| | |
|-------|---|
| ALARA | As Low As Reasonably Achievable |
| BNFL | British Nuclear Fuels Limited, Inc. |
| CERL | Construction Engineering Resources Laboratory |
| CFR | <i>Code of Federal Regulations</i> |
| CY | Calendar Year |
| DOE | U.S. Department of Energy |
| DOH | State of Washington Department of Health |
| DOT | U.S. Department of Transportation |
| EA | Environmental Assessment |
| FR | <i>Federal Register</i> |
| IAEA | International Atomic Energy Agency |
| IMO | International Maritime Organization |
| ISO | International Standards Organizations |
| LCF | Latent cancer fatality |
| LEU | Low-enriched uranium |
| LSA | Low specific activity |
| NAC | Nuclear Assurance Corporation |
| NCRP | National Council on Radiation Protection and Measurements |
| NEA | Nuclear Energy Agency |
| NEPA | <i>National Environmental Policy Act of 1969</i> |
| PNL | Pacific Northwest Laboratory |
| rem | roentgen equivalent man |
| WAC | Washington Administrative Code |
| WHC | Westinghouse Hanford Company |

Definition of Terms

As Low As Reasonably Achievable. An approach to radiation protection to control or manage exposures (both individual and collective to the workforce and general public) as low as social, technical, economic, practical, and public policy considerations permit.

Background radiation. That level of radioactivity from naturally occurring sources; principally radiation from cosmogenic and primordial radionuclides.

Decay, radioactive. A spontaneous nuclear transformation of one nuclide into a different nuclide or into a different energy state of the same nuclide by emission of particles and/or photons.

Effective Dose Equivalent. A value used for estimating the total risk of potential health effects from radiation exposure. This estimate is the sum of the committed effective dose equivalent from internal deposition of radionuclides in the body and the effective dose equivalent from external radiation received during a year.

Enrichment. The isotopic content, by weight, of uranium-235 in the total mass of uranium.

Fissile. Material capable of undergoing fission by slow neutrons.

Latent cancer fatality. The excess cancer fatalities in a population due to exposure to a carcinogen.

Low Specific Activity. A shipping category designation based on U.S. Department of Transportation (DOT) specifications. The specific requirements are found in 49 *Code of Federal Regulations* 173, "Shippers-General Requirements for Shipments and Packaging."

Maximally exposed individual. A hypothetical member of the public who, by virtue of location and living habits, could receive the highest possible radiation dose from radioactive and/or toxicological effluents released from either the Hanford Site or some location during a transportation accident.

Normal Uranium. Uranium having 0.711 as the percentage by weight of uranium-235 as occurring in nature.

Package. For radioactive materials, the packaging together with its radioactive contents as presented for transport. The specific requirements are found in 49 *Code of Federal Regulations* 173, "Shippers-General Requirements for Shipments and Packaging."

Packaging. For radioactive materials, the assembly of components necessary to ensure compliance with the packaging requirements of this subpart. It may consist of one or more receptacles, absorbent materials, spacing structures, thermal insulation, radiation shielding, and devices for cooling or absorbing mechanical shocks. The conveyance, tie-down system, and auxiliary equipment may sometimes be designated as part of the packaging. The specific requirements are found in 49 *Code of Federal Regulations* 173, "Shippers-General Requirements for Shipments and Packaging."

Person-rem. A population dose based on the number of persons multiplied by the radiation dose.

rem. Acronym for roentgen equivalent man; the special unit of dose equivalent that indicates the potential for impact on human cells.

Risk. The product of the probability of occurrence of an accident and the consequences of an accident.

Metric Conversion Chart

| If you know | Multiply by | To get |
|----------------------|-------------|----------------|
| Length | | |
| centimeters | 0.39 | inches |
| meters | 3.28 | feet |
| kilometers | 0.54 | nautical miles |
| kilometers | 0.62 | statute miles |
| Area | | |
| square kilometers | 0.39 | square miles |
| Mass (weight) | | |
| grams | 0.035 | ounces |
| kilograms | 2.2 | pounds |
| Volume | | |
| liters | 0.264 | gallons |
| cubic meters | 35.32 | cubic feet |

Source: *CRC Handbook of Chemistry and Physics*, Robert C. Weast, Ph.D., 70th Ed., 1989-1990, CRC Press, Inc., Boca Raton, Florida.

Scientific Notation Conversion Chart

| Multiplier | Equivalent |
|------------|------------|
| 10^{-1} | 0.1 |
| 10^{-2} | .01 |
| 10^{-3} | .001 |
| 10^{-4} | .0001 |
| 10^{-5} | .00001 |
| 10^{-6} | .000001 |
| 10^{-7} | .0000001 |
| 10^{-8} | .00000001 |

Summary

Under the auspices of an agreement between the U.S. and the United Kingdom, the U.S. Department of Energy (DOE) has an opportunity to transfer approximately 710,000 kilograms (1,562,000 pounds) of unneeded normal and low-enriched uranium (LEU) to the United Kingdom; thus, reducing long-term surveillance and maintenance burdens at the Hanford Site. The material, in the form of billets, is controlled by DOE's Defense Programs, and is presently stored as surplus material in the 300 Area of the Hanford Site. The United Kingdom has expressed a need for the billets.

The surplus uranium billets are currently stored in wooden shipping containers in secured facilities in the 300 Area at the Hanford Site (the 303-B and 303-G storage facilities). There are 482 billets at an enrichment level (based on uranium-235 content) of 0.71 weight-percent. This enrichment level is normal uranium; that is, uranium having 0.711 as the percentage by weight of uranium-235 as occurring in nature. There are 3,242 billets at an enrichment level of 0.95 weight-percent (i.e., low-enriched uranium). This inventory represents a total of approximately 532 curies. The facilities are routinely monitored. The dose rate on contact of a uranium billet is approximately 8 millirem per hour. The dose rate on contact of a wooden shipping container containing 4 billets is approximately 4 millirem per hour. The dose rate at the exterior of the storage facilities is indistinguishable from background levels.

The uranium billets would be repackaged, as necessary, and placed into appropriate Department of Transportation shipping containers. British Nuclear Fuels Limited, Inc., as an agent for the United Kingdom, would take title of the material at the Hanford Site and transport the uranium billets overland (via commercial truck transport) to the west coast port of Seattle, Washington. Approximately 45 truck shipments are anticipated. Once at the port, the shipping

containers would be transferred to a commercial cargo vessel and transported to the United Kingdom.

Alternatives to the proposed action include the No-Action Alternative, alternative uses, alternative U.S. ports, and alternative transportation modes.

The potential for significant individual and cumulative environmental impacts due to the conduct of the proposed action has been analyzed. No substantial increase in Hanford Site, corridor states, or international environmental impacts would be expected from the proposed action. Environmental impacts from postulated accident scenarios also were evaluated, and indicated that the risks associated with the proposed action would be small.

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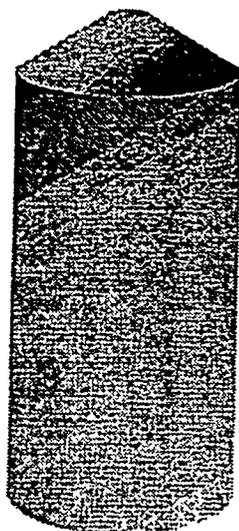
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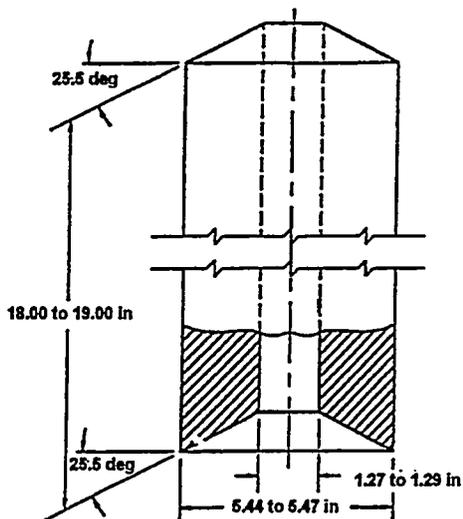
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1.0 Purpose and Need for Agency Action

Under the auspices of an agreement between the U.S. and the United Kingdom, the U.S. Department of Energy (DOE) has an opportunity to transfer approximately 710,000 kilograms (1,562,000 pounds) of unneeded normal and low-enriched uranium (LEU) to the United Kingdom; thus, reducing long-term surveillance and maintenance burdens at the Hanford Site. The material, in the form of billets (Figure 1), is controlled by DOE's Defense Programs, and is presently stored as surplus material in the 300 Area of the Hanford Site. The United Kingdom has expressed a need for the billets.



Billet, typical



Dimensions shown are for Inner Billet

Figure 1. TYPICAL URANIUM BILLET

2.0 Background

Uranium billets were fabricated into fuel for use in the Hanford Site's production reactors. Two sizes of billets, "inner" and "outer" were fabricated. The difference in the sizes is associated with the diameter of the billets. The "inner" billets have a nominal diameter of 14 centimeters (5.5 inches). The "outer" billets have a larger diameter (nominally about 20 centimeters (eight inches) and have more mass (Figure 1). The uranium billets presently stored on the Hanford Site are surplus materials due to the discontinued DOE defense reactor operations.

The surplus uranium billets are currently stored in wooden shipping containers in secured facilities in the 300 Area at the Hanford Site (the 303-B and 303-G storage facilities). There are 482 billets at an enrichment level (based on uranium-235 content) of 0.71 weight-percent. This enrichment level is normal uranium. There are 3,242 billets at an enrichment level of 0.95 weight-percent (i.e., low-enriched uranium). This inventory represents a total of approximately 532 curies. The facilities are routinely monitored. The dose rate on contact of a uranium billet is approximately 8 millirem per hour. The dose rate on contact of a wooden shipping container containing 4 billets is approximately 4 millirem per hour. The dose rate at the exterior of the storage facilities is indistinguishable from background levels.

The proposed action is similar to activities conducted earlier (without significant environmental impacts) at the Hanford Site. Recent shipments of Hanford Site excess materials to the United Kingdom (i.e., uranium billets and low-specific activity [LSA] nitric acid) have been the subject of Environmental Assessments (EA). The EAs, each of which resulted in a Finding Of No Significant Impact, are incorporated by reference in this document:

- o *Environmental Assessment for the Shipment of Low Enriched Uranium Billets to the United Kingdom from the Hanford Site, Richland, Washington (DOE 1992).*
- o *Environmental Assessment, Disposition and Transportation of Surplus Radioactive Low Specific Activity Nitric Acid, Hanford Site, Richland, Washington (DOE 1995).*

In 1992, approximately 326 metric tons (326,000 kilograms [717,200 pounds]) of LEU billets were shipped from the 300 Area to the United Kingdom under the same inter-government agreement. The potential impacts associated with the shipments were analyzed in DOE 1992. The shipments were conducted without incident. The proposed action would pose similar potential hazards. Presently, there is an ongoing campaign to ship LSA nitric acid to the United Kingdom (DOE 1995). To date, over 90 percent of the material has been shipped without incident.

The proposed action involves the transfer of both inner (normal) and outer (normal and LEU) billets while the 1992 campaign had only inner billets. The 1992 campaign used truck transportation to Seattle, Washington. At that point, those billets were transferred to ocean vessels which transported the material through the Panama Canal, to Germany, and then to the United Kingdom. The proposed action, similarly, would transport the uranium billets (via truck transport) to Seattle, Washington, with subsequent ocean transport to the United Kingdom.

This *National Environmental Policy Act of 1969* (NEPA) review is proceeding concurrently with contractual negotiations for the transfer of the uranium billets. Transfer of the material to the United Kingdom is contingent upon completion of the NEPA process for the proposed action and a decision to proceed.

3.0 Alternatives Including the Proposed Action

3.1 Proposed Action

The DOE is proposing to transport approximately 710 metric tons (710,000 kilograms, 1,562,000 pounds) of normal and LEU billets currently stored at the Hanford Site in Richland, Washington, to the United Kingdom.

The shipments of the uranium billets would be categorized as LSA, per U.S. Department of Transportation (DOT) specifications. The LSA designation arises because the radioactivity is uniformly distributed in the billets and its estimated average concentration is low. Approximately 45 containers would be shipped from the Hanford Site to the United Kingdom. A shipping container of the uranium billets would have a dose rate of less than 0.5 millirem per hour at one meter (three feet). British Nuclear Fuels Limited, Inc. (BNFL), as the authorized agent for the United Kingdom, would take title of the uranium billets at the Hanford Site.

A typical sequence of activities for packaging and transportation includes several steps. Initially, the billets, currently stored in wooden shipping containers, would be transferred from the existing storage facilities in the 300 Area (303-B and 303-G) to a nearby facility for appropriate repackaging. Currently, facilities under consideration include the 3712 Building and the 333 Building (facilities in the 300 Area less than 1,000 meters [3,330 feet] away). Relative locations of the facilities are shown in Figures 2, 3 and 4.

Minor modifications to the 3712 or 333 Buildings would be required. Modifications would include some form of temporary heating for operator comfort, as necessary, during the campaign. Temporary, portable hoisting and rigging equipment would be provided, including A-frame(s) and chain hoist(s), as well as any special billet handling tools. It is expected that the necessary equipment, most of which is of commercial design, is presently at the Hanford Site. Some handling equipment, which was used during the 1992 campaign (DOE 1992), may be modified to interface with the current uranium billet inventories' outer- and inside-diameter dimensions and weight, and A-frame/chain hoist(s).

The billets would be transferred, as necessary to appropriate DOT containers. It is expected that the 0.95-enriched uranium billets would require repackaging in DOT Spec 7A drums. The DOT Spec 7A drum is an approximately 61-liter (16-gallon) drum, of welded construction fabricated from carbon steel, which would hold one uranium billet. A more detailed description may be found in DOE 1992. The normal uranium billets may be shipped in their current configuration (i.e., wooden shipping containers), or may be repackaged to the extent required by DOT regulations.

The drums and/or wooden shipping containers would be transferred to International Standards Organizations containers (ISOs). An ISO container (Figure 5) is a large metal box roughly the size and shape of the trailer of an 18-wheeler truck that can be lifted onto and off of the ship with their cargo inside. Approximately 90 drums or 20 wooden shipping containers could be placed into an ISO. Approximately 45 ISOs would be loaded in the 300 Area of the Hanford Site.

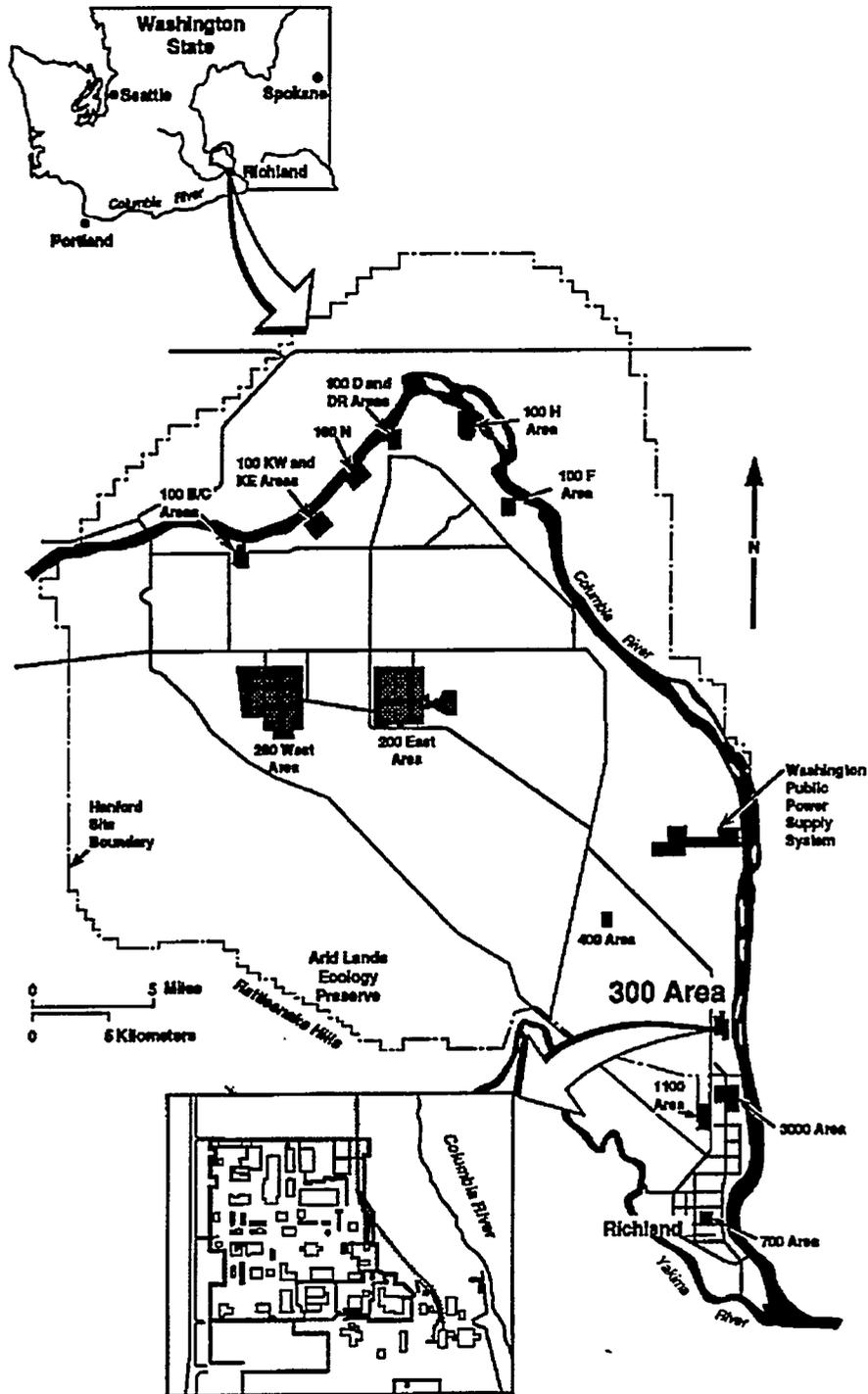


Figure 2. HANFORD SITE

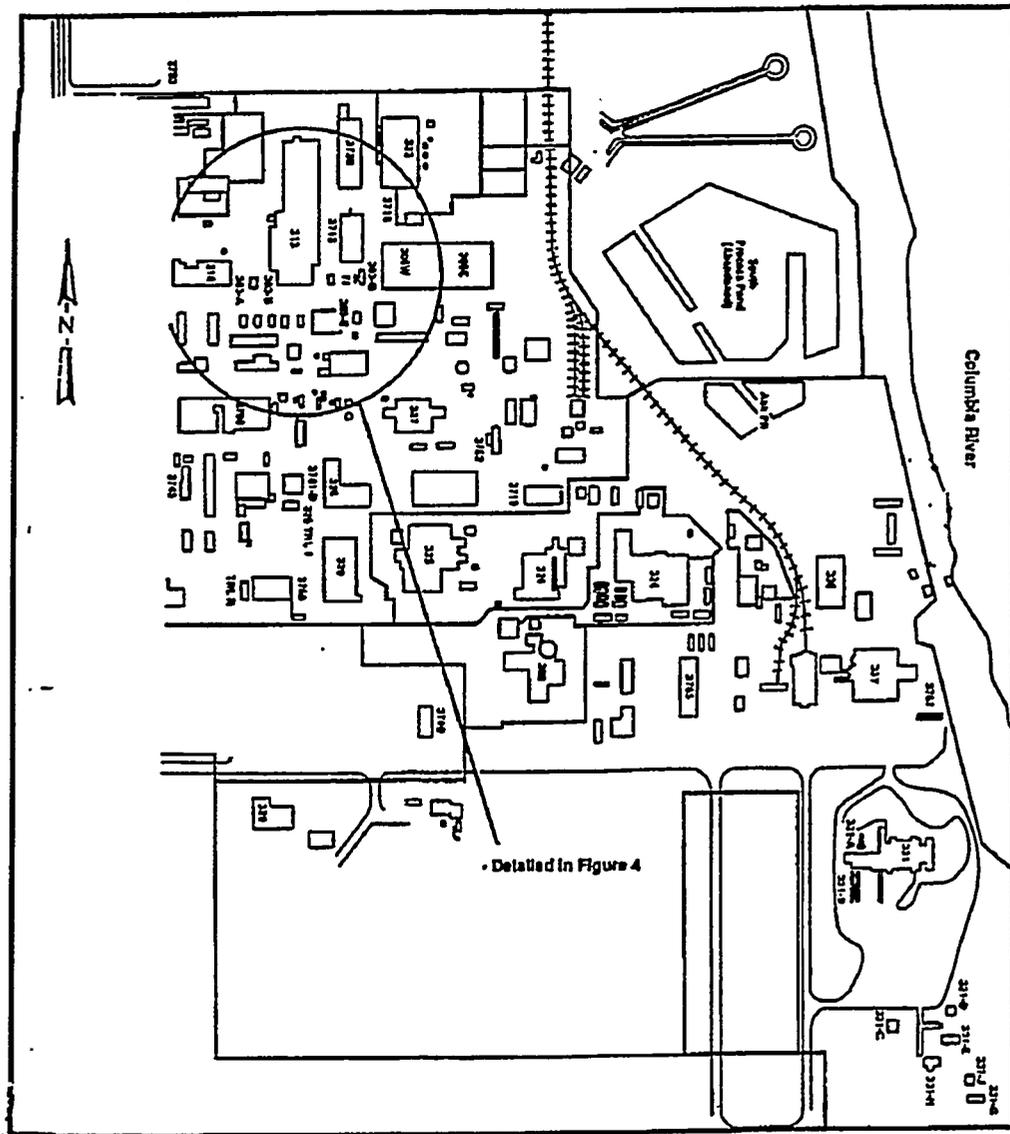


Figure 3. 300 AREA OF THE HANFORD SITE

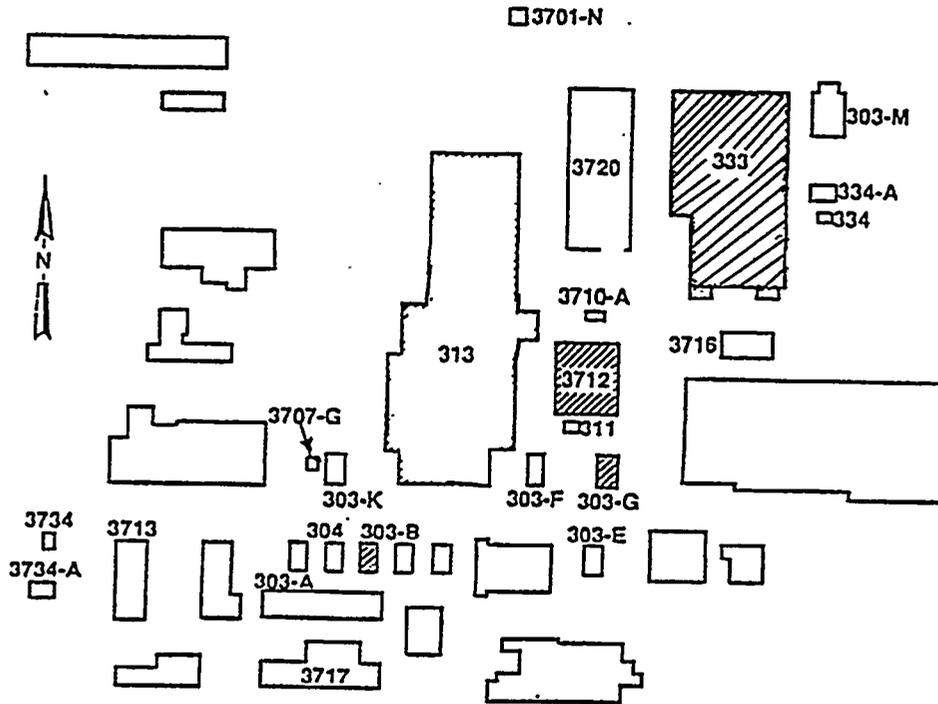
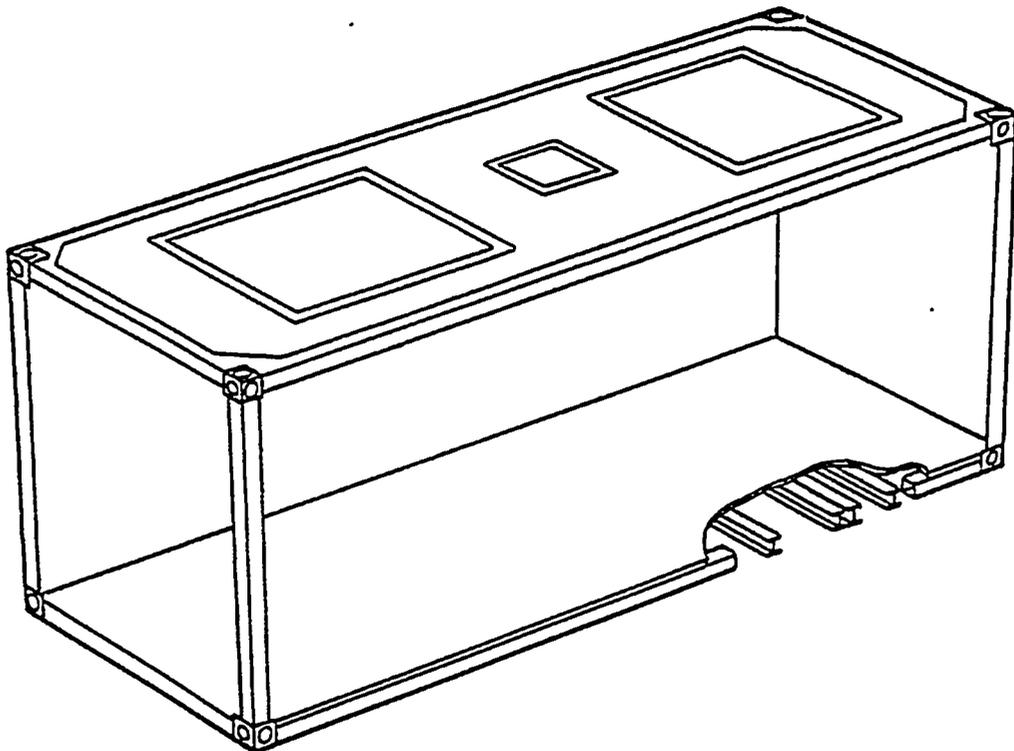


Figure 4. LOCATION OF FACILITIES, 300 AREA



Note: Typical dimensions are nominally 8 feet wide, 8 feet tall, and 20 to 40 feet long

Figure 5. ISO CONTAINER

The ISOs would be appropriately secured on a truck trailer and radiologically measured by trained personnel using prescribed equipment and procedures prior to release. The procedures include provisions for carrier compliance with federal and state regulations for transport of LSA materials. The procedures would ensure appropriate standards, specifications, and regulations, including DOT guidelines, and carrier security demands were met. BNFL would contract for the appropriate, licensed commercial carrier.

A transportation plan, delineating organizational responsibilities, shipment schedule, communications, emergency considerations, and transportation would be finalized prior to transport. Approximately 45 overland truck shipments from the Hanford Site would be required. BNFL (taking ownership of the material at the Hanford Site and using a commercial carrier) would be responsible for the routing.

Initially, BNFL considered utilizing an east coast port as the point of egress from the U.S. to the United Kingdom. After further consideration, BNFL has determined that the shipment of these billets will mirror the 1992 campaign; i.e., departure from Seattle, Washington.

The proposed route for the transport of the uranium billets from the Hanford Site to Seattle, Washington, will be similar to the route projected for the 1992 campaign (Figure 6). The actual route from the Hanford Site to Seattle, Washington, for the uranium billets may be slightly different than the route analyzed in DOE 1992.

The transport of the uranium billets would fall under DOT regulations for LSA materials and be under the control of BNFL. Transport time from the Hanford Site to Seattle, Washington, is less than 8 hours. It may be necessary to amend the uranium billets' transportation route to secure an alternate route to address logistical or other reasonable concerns. Such circumstances which could effect the selected route, including road closures, detours, and unanticipated inclement weather, are not expected to result in increased risk to the worker or public during transportation of the uranium billets.

Once at Seattle, Washington, the containers would be unloaded to a dock holding station, pending transfer to an ocean carrier. As in the continental U.S., the ocean routing would be under the control of BNFL. The base-case itinerary would be from Seattle, Washington, through the Panama Canal, to the appropriate port of entry in the United Kingdom. Once at the United Kingdom, the cargo would be off-loaded to an awaiting overland carrier for transport to the United Kingdom facility. No transport containers would be returned to the Hanford Site for reuse.

After removal of the entire inventory of uranium billets from the existing storage facilities, electrical services to those facilities would be reduced to minimize maintenance costs while maintaining appropriate safety margins. The facilities would remain locked until they are decommissioned or transferred to a new owner. The 3712 or 333 Buildings would be restored to their current configuration. The temporary equipment would be decontaminated, if necessary, and reused or excessed, as appropriate.

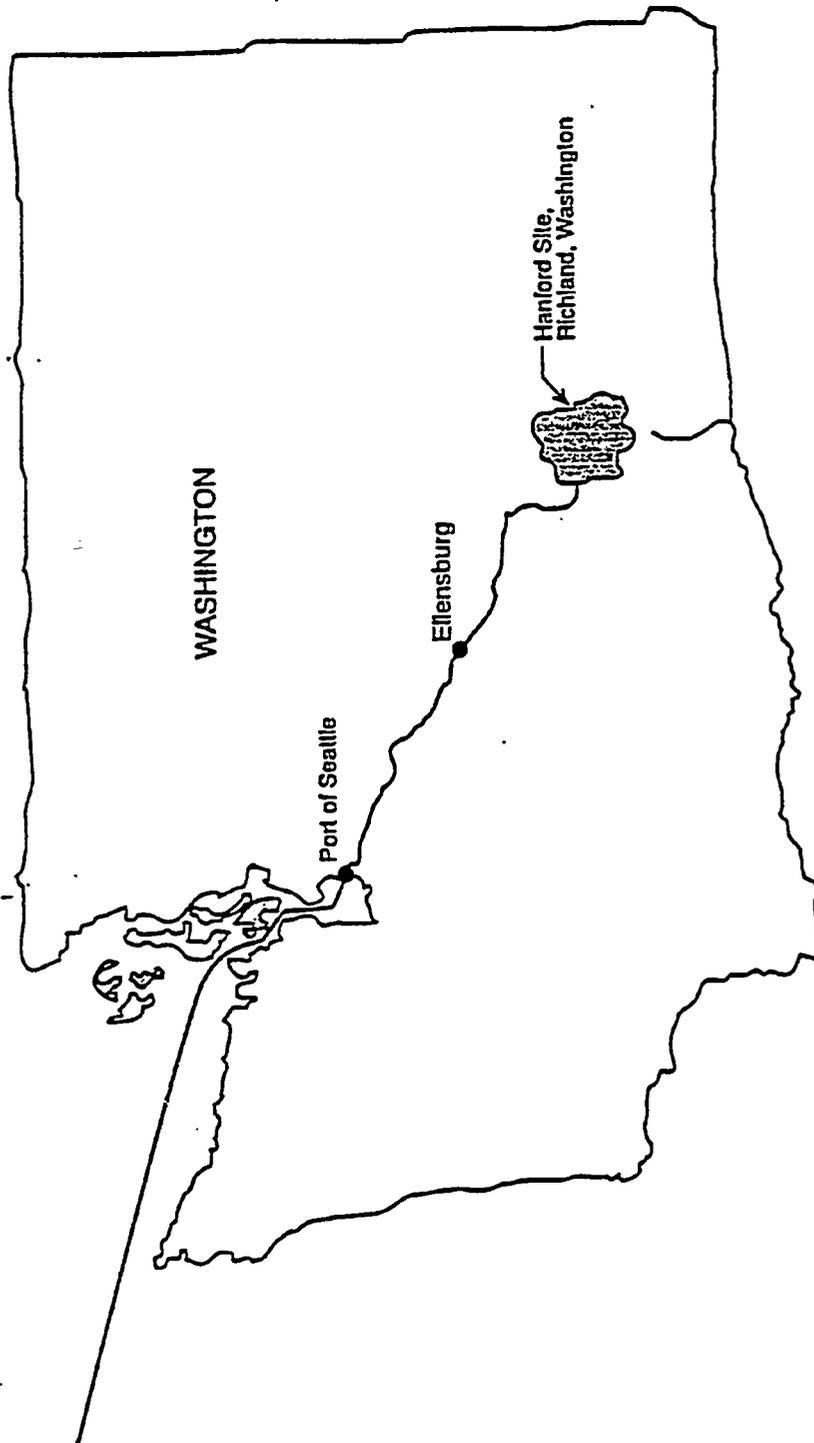


Figure 6. Proposed Shipment Route from Hanford to Seattle, Washington

3.2 Alternatives to the Proposed Action

3.2.1 No-Action Alternative

Under the No-Action Alternative, the uranium billets would remain in the existing 303-B and 303-G storage facilities. This alternative does not address the actual disposition of the material, and would result in continued surveillance and maintenance costs. The No-Action Alternative does not accommodate the opportunity to transfer the material to the United Kingdom.

3.2.2 Alternative Uses

At the present time, no domestic uses for the uranium billets have been identified. Previous attempts to market these materials in cooperation with the U.S. Enrichment Corporation have been unsuccessful.

3.2.3 Alternative U.S. Ports

Alternative U.S. ports were considered. However, the uranium billets would become the property of BNFL at the Hanford Site. Currently, BNFL prefers to transport the material from the Hanford Site (via overland truck carrier) to Seattle, Washington. However, shipment via an east coast port could be used in the event that the Port of Seattle becomes unavailable. Potential east coast ports include those considered for shipment of LSA nitric acid; i.e., Portsmouth, Virginia; Baltimore, Maryland; and Newark, New Jersey (DOE 1995). The 1992 campaign (DOE 1992) transported uranium billets through the Port of Seattle, with no measurable environmental impacts. It is expected that the environmental impacts of transport through other U.S. ports would be bounded by those analyzed in previous EAs (DOE 1992, DOE 1995).

3.2.4 Alternative Continental U.S. Transportation Modes

Other modes of transportation, such as rail, air transport, or barge, were considered. The potential hazards and risks associated with such transport would be similar to those experienced with ground truck transport. The mode preferred by BNFL is overland transport by truck. The following discussion of alternative modes is provided for completeness.

Rail transport of the uranium billets would be possible, although it would be more expensive than overland truck transport. Logistically, it would be more difficult to coordinate shipments with other goods and commodities transported daily by rail throughout the State of Washington.

Air transportation of the uranium billets would be possible, although it would be more expensive than other forms of transportation. Radiation doses to persons not involved in the transportation essentially would be zero under normal conditions. As stated in the *National Transportation Statistics, Annual Report for 1992* (DOT 1992), probability of an air accident is about 20 times less than the probability of a truck accident, on a per-mile basis. Therefore, the risk from an air crash is low.

Barge transportation is generally slow. No barge route has been identified which would not require transportation by truck and/or multiple loading and unloading of the containers between the involved origins and destination.

4.0 Affected Environment

The affected environment includes the transportation route (generally interstate highways as projected for the 1992 campaign to Seattle, Washington [DOE 1992]), as well as Seattle, Washington, in addition to the Hanford Site. The general environmental description of the routes was considered in the route-specific aggregate data used to analyze transportation impacts. Details regarding the Hanford Site may be found in the *Hanford Site Environmental Report for Calendar Year 1994* (PNL 1995) and *Hanford Site National Environmental Policy Act (NEPA) Characterization* (Cushing 1995).

4.1 Hanford Site 300 Area

The 303-B, 303-G, 3712 and 333 Buildings are located in the 300 Area of the approximately 1,450-square-kilometer (560-square-mile) semiarid Hanford Site in the southeastern portion of the State of Washington (Figures 3, 4 and 5). Portions of the 300 Area are approximately 1 kilometer (0.6 miles) west of the Columbia River, the nearest natural watercourse. The nearest population center is the City of Richland, approximately 8 kilometers (4.2 miles) to the south. The City of Richland has a population of 32,315, while the population within an 80-kilometer (50-mile) radius of the 300 Area is approximately 375,860.

The Hanford Site has a mild climate with 15 to 18 centimeters (6 to 7 inches) of annual precipitation, and infrequent periods of high winds of up to 128-kilometers (80-miles) per hour. Tornadoes are extremely rare; no destructive tornadoes have occurred in the region surrounding the Hanford Site. The probability of a tornado hitting any given waste management unit on the Hanford Site is estimated at 1 chance in 100,000 during any given year. The region is categorized as one of low to moderate seismicity.

The 300 Area facilities are not located within a wetland or in a 100- or 500-year floodplain. No plants or animals on the federal list of "Endangered and Threatened Wildlife and Plants," (50 CFR 17) are found in the immediate vicinity of the facilities associated with the proposed action.

No sensitive cultural resources in the area of the 303-B, 303-G, 3712, or 333 Buildings have been identified, or are anticipated. No Cultural Resources Review was conducted for the proposed action since no ground disturbance or facility modifications are planned as part of the proposed action. Additional information regarding the cultural resources on the Hanford Site may be found in the *Hanford Cultural Resources Laboratory Annual Report for 1992* (PNL 1993).

4.2. Seattle, Washington

Seattle, Washington is the largest city in Washington State, with an area of approximately 375 square kilometers (145 square miles), and a population of 516,259 (1990 census). The metropolitan area population (1990 census), including Seattle, is 1,973,000. Seattle is situated on a series of hills in a lowland area of eastern Washington. The city is located on Puget Sound's eastern shore between the Olympic Mountains to the west and the Cascade Mountains to the east. Puget Sound opens to the Pacific Ocean. There is roadway access via major arteries connecting the area with interstates, as well as air, bus and rail service.

Seattle, Washington, is a frequent destination for container cargo ships traveling from ports throughout the world, and has a great deal of experience handling containerized cargo of all kinds. The Port of Seattle is the fifth-largest container port in the U.S. (DOE 1992). The Port of Seattle, located within the city limits of Seattle, Washington, is in Elliot Bay which connects the city to Puget Sound. In addition to container cargo, the port also handles other forms of goods; e.g., grain, automobiles, and steel. The port provides berthing space, cranes, pier storage, dry storage, and open-yard storage, and can accommodate ships up to 427 meters (1,400 feet) in length. There are 25 commercial terminals located on approximately 345 acres. The Port of Seattle was the point of egress from the U.S. to the United Kingdom for the 1992 uranium billets shipping campaign. In 1992, approximately 2×10^{10} kilograms (4.4×10^{10} pounds) of materials were handled through the Port of Seattle.

4.3. Ocean Transport

The proposed action would include ocean transport on the Pacific and Atlantic Oceans. Descriptive information of the North Atlantic, much of which is applicable to the entire ocean transport route, may be found in U.S. Army Corps of Engineers documentation (CERL 1990).

5.0 Environmental Impacts

The following sections present quantitative information on those potential environmental impacts that have been identified as a result of activities being proposed for the packaging of uranium billets at the Hanford Site's 300 Area, and subsequent transport of the material to the United Kingdom. Both routine operations (incident-free packaging and transportation) and accident scenarios are analyzed in Sections 5.1 and 5.2, respectively.

This Section of the EA provides quantitative analyses of potential risks and environmental impacts associated with the transport of uranium billets in the continental U.S. and on international waters. No quantitative analysis is provided for activities on English soil. However, a qualitative discussion of the latter activities is included for continuity and completeness.

The proposed action is not expected to result in radiological or hazardous material releases to the environment. All activities would comply with current DOE orders, and state and federal regulations.

The low level of radioactivity associated with the uranium billets makes the risks associated with the handling and transportation of the uranium billets small. There would be low radiation exposure associated with packaging the uranium billets. A toxicological hazard exists due to the potential for an accidental release of the material in particulate form to the environment. However, the uranium billets are large, solid metal masses (Figure 1), which do not release particulates readily.

It is expected that potential personnel exposure to both radiation and hazardous materials during routine handling operations at Seattle, Washington, during ocean transport, offloading in England, and subsequent operations would be no greater than existing conditions at those locations. Appropriate procedures would be in place to ensure minimum exposure to radiation and hazardous materials (in keeping with As Low As Reasonably Achievable [ALARA] principles) and to ensure maximum employee and public safety. Potential impacts associated with both routine operations and accidents outside the continental U.S. would be expected to be bounded by those described in the following sections for activities at the Hanford Site's 300 Area and U.S. transportation.

Qualitatively, potential impacts associated with both routine operations and accidents outside the continental U.S. would not be expected to be substantially different than those described in the following sections for activities at the 300 Area and U.S. transportation.

It is noted that commercial liners (i.e., commercial container ships) are common carriers operating on scheduled sailings over established trade routes. Most international maritime trade goods are transported via such ships. The cargo on container ships is loaded into individual ISO containers (i.e., large metal boxes roughly the size and shape of the trailer of an 18-wheeler truck) that can be lifted onto and off-of the ship with their cargo inside. The containers are used to minimize the need to handle the cargo since the cargo is loaded into the container at the cargo's point of origin and not touched again until the cargo is unloaded at its final destination.

Use of the containers also facilitates and speeds loading and unloading of the ship and the transfer of the cargo to and from truck transport in the ports. Ports which serve container ships are equipped with specially built cranes designed to automate as much of the loading/unloading operation as possible.

5.1 Proposed Action: Impacts from Routine Operations

5.1.1 Uranium Billets Packaging and Loading at the Hanford Site's 300 Area

The potential for release of radioactive and hazardous uranium during packaging and loading exists. However, appropriate controls would be in place in order to maintain radioactive personnel exposure well below DOE guidelines of 5,000 millirem per year, in keeping with ALARA principles. Additionally, appropriate procedures and administrative controls (e.g., personnel training and a Radiation Work Permit) would be in place prior to any proposed activities. Also, radiation and hazardous chemical worker exposure levels would be monitored during the proposed action (i.e., personal dosimeters and constant air monitors).

Most of the potential radiological exposure would be expected for the workers involved in the proposed packaging, due to the handling of the slightly radioactive uranium billets in the 300 Area facilities. The maximum expected whole body total dose for an estimated workforce of 5 workers would be a small fraction of the average annual exposure to radiation by Hanford Site 300 Area personnel from ongoing activities. Average occupational external whole-body exposure to personnel in the 300 Area due to routine operations in CY 1993 was immeasurable above background. This is substantially less than the maximum allowable exposure of 5,000 millirem per year. Based on a dose-to-risk conversion factor of 4.0×10^{-4} (onsite) latent cancer fatalities (LCF) per person-rem (56 FR 23363), no LCFs would be expected.

No public exposure to radiation above that currently experienced from Hanford Site operations is anticipated as a result of these actions. As reported in PNL 1995, the potential dose to the hypothetical offsite maximally exposed individual during CY 1994 from Hanford Site operations was 0.05 millirem. The 1994 average dose to the population was 0.002 millirem per person. Collectively, the potential dose to the local population of 380,000 persons from 1993 operations was 0.6 person-rem. The current DOE radiation limit for an individual member of the public is 100 millirem per year, and the national average dose from natural sources is 300 millirem per year. The low doses associated with the total inventory of uranium billets at the 300 Area would not contribute to offsite public exposure. With no additional offsite exposure involved with the packaging and loading of the uranium billets, no adverse health effects to the public are expected.

No toxicological exposure to workers or the general public is expected to occur as a result of routine handling of the uranium billets, either during packaging, loading or offloading activities. The material will be handled in a manner consistent with packaging and transportation

of LSA solid materials. 300 Area personnel and port personnel routinely handle hazardous chemicals on a daily basis. Routine procedures (e.g., use of personnel protective clothing), specific hazardous materials training, and equipment safeguards are in place, and are adequate to assure the safe packaging and handling of this material.

Small quantities of hazardous materials (e.g., solvents, cleaning agents) which may be generated during the proposed action at the 300 Area would be managed and disposed of in accordance with applicable federal and state regulations. Radioactive material, radioactively-contaminated equipment, and radioactive mixed wastes at the 300 Area would continue to be appropriately packaged, stored, and/or disposed of at existing facilities on the Hanford Site. The wooden shipping containers, if no longer needed, would be disposed of as low-level solid waste in existing Hanford Site waste disposal facilities.

The proposed action is not expected to impact the flora and fauna, air or water quality, land use, or to have socioeconomic effects. Noise levels would be comparable to existing conditions at the 300 Area. No cultural resources would be impacted since no ground disturbance or permanent facility modifications are planned as part of the proposed action. The amount of equipment and materials to be used, such as fuel for transportation, represent a minor commitment of nonrenewable resources.

5.1.2 Transportation

This section addresses the impacts of incident-free truck transport of uranium billets in the continental U.S. from the Hanford Site to Seattle, Washington. These data are based on two previous computer analyses (RADTRAN). Specifically, incident-free transportation of uranium billets from the Hanford Site to Seattle, Washington, was analyzed (DOE 1992).

For the 1992 campaign (DOE 1992), it conservatively was assumed that the dose rate at one meter (three feet) from the surface of the shipping container was one millirem per hour. Subsequent measurements of the container during the 1992 campaign indicated the actual dose rate was less than 0.5 millirem per hour at one meter (three feet). A similar dose rate (i.e., 0.5 millirem per hour at one meter [three feet]) is anticipated to be representative of the current inventory of uranium billets, per shipping container, associated with the proposed action. Therefore, it is expected that the potential radiation exposure associated with the proposed action would be bounded by the previous analysis (DOE 1992), which is incorporated by reference.

5.1.2.1 RADTRAN 4. The RADTRAN 4 computer code yields conservative estimates of radiological exposure to workers and the public (Neuhauser 1992). The conservatism comes from the assumptions which are made in selecting data in the program itself; for example, in the absence of actual measurements, the highest allowable external radiation level for a package (under transportation regulations) were used. In practice, packaging arrangements reduce this below the assumed level by a factor of 10.

5.1.2.2 Potential Impacts. The shipment characteristics necessary to calculate the radiological impacts of transport include the type of transportation packaging, the number of shipments, and the quantity of radioactive material within the package (referred to as the "inventory"). These parameters are presented in the RADTRAN Analysis for the transportation packaging considered in this EA. Some of the information also is used in the analysis of transportation accidents, which is provided in Section 5.2.

Radiological impacts during normal transport involve dose to the public from radiation emitted by radioactive material packages as the shipment passes by, and to transport workers who are in the general vicinity of a radioactive material shipment. Even though radiation shields are incorporated into packaging designs, some radiation penetrates the package and exposes the nearby population at extremely low dose rates. After the shipment has passed, no further exposure occurs. No toxicological impacts would occur during normal transport. The groups exposed to radiation while the shipments are in-transit include truck drivers, those who directly handle radioactive shipments while they are in route, and the general public (e.g., bystanders at truck stops, persons living or working along a route, and nearby travelers (moving in the same and opposite directions). The RADTRAN 4 computer code (Neuhauser 1992) was used to calculate exposures during highway transport to these population groups for the 1992 campaign (DOE 1992) and the LSA nitric acid transport (DOE 1995).

The potential impacts associated with incident-free transport of the 1992 uranium billets are provided in Table 1. The total dose to truck crews (workers) would amount to 0.11 person-rem for all of the shipments to Seattle, Washington. Total public doses were calculated to be 0.013 person-rem (predominantly from exposures received during truck stops). There were no excess LCFs predicted. Specifics such as number of workers (2), persons exposed during stops (50), and average exposure during stops (0.5 millirem per hour at 1 meter from the cask) are provided in the earlier EA (DOE 1992).

Circumstances which could effect the selected route (e.g., road closures, detours, unanticipated inclement weather) are not expected to result in increased risk to the worker or public during transportation of the uranium billets. Similarly, potential delays associated with ocean transport would be addressed based on locale and quantity of material.

Table 1. Radiological Impacts of Incident-Free Transportation.

| | Worker | Public |
|--|----------------------|----------------------|
| Hanford, Washington to Seattle, Washington (DOE 1992) | | |
| Total Dose (person-rem) | 0.11 | 0.013 |
| Latent Cancer Fatalities | 4.4×10^{-5} | 6.5×10^{-6} |

5.2 Proposed Action: Impacts from Accidents

5.2.1 Packaging of Uranium Billets at the Hanford Site's 300 Area

Postulated accidents associated with the repackaging of the uranium billets at the 300 Area of the Hanford Site have been considered, and are believed to be bounded by those potential events associated with transportation accidents (Section 5.2.2). The environmental effects of accidents related to the repackaging are limited to those associated with most routine industrial activities. There are no specific initiators related to the proposed action which would cause a criticality or a fire. The minimal dose rate (8 millirem per hour on contact) from the uranium billets would not pose an acute or chronic hazard in the event of a drop of a container of uranium billets.

Personnel injuries, such as back strains or minor abrasions, would receive appropriate medical treatment. Administrative controls, proper training and specification of detailed procedures used in handling the materials would be in place, all of which would minimize the potential of any effects of such an accident.

5.2.2 Transportation

Potential accidents associated with the transportation of uranium billets have been analyzed (DOE 1992). The severity of consequences depends on the degree to which the billets would be converted from large solid masses to airborne particulates, the extent of exposure to such a release, and the specific location of the affected individual(s). Material Safety Data Sheets provide information regarding hazards of uranium. Symptoms of exposure to uranium particulates or powder may include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting. Uranium particulates or powder are extremely destructive to tissue of the mucous membranes and upper respiratory tract, eyes and skin.

The analyses consider the affected public and the drivers. Fatalities as a result of vehicular impact are not included within the scope of this document.

In the event that an individual could not evacuate the immediate vicinity of a potential accident scene, the individual may or may not be directly exposed to material. The effects to an individual as a result of exposure to any chemical are a result of time of exposure, concentration and distance. The specific exposure to an individual who is unable to evacuate would depend upon extent of a spill (i.e., the amount of material released), their proximity to the spill and the meteorological conditions. For distances less than 100 m, it is assumed that the direct physical injuries due to the vehicular accident itself would be the principle hazard; otherwise, the individual would be able to evacuate the area and minimize their exposure. Additionally, the initial response by the drivers and/or the emergency response personnel would reduce the risk and exposure of individuals unable to evacuate the accident scene.

Should the driver(s) be unable to take protective action, such as exiting the vehicle and moving out of any irritating plume (upwind) to a distance of at least 100 meters (330 feet), it is possible that they may be exposed to concentrations of materials, including airborne uranium (in the event of a fire) and fuel vapors which could cause destruction to tissue of the mucous membranes and upper respiratory tract, eyes, and skin. However, proper emergency response (e.g., flushing affected external areas with water while removing contaminated clothing) would minimize the amount of permanent physical damage to the individual(s). As discussed below, potential accidents could result in minimal impact to worker and public health and safety.

States and tribes having jurisdiction over areas through which these shipments would pass have the primary responsibility for protecting the public and the environment, and for establishing incident command should there be an emergency involving the shipments. DOE would provide technical advice and assistance to authorities and carriers, when requested. The selected carrier for these shipments has the primary responsibility for providing emergency response assistance and recovery/restoration actions, if required.

In the event of a highway incident, where the transport container is involved, the driver would notify the 911 line, the appropriate state control, and the carrier's central dispatch facility. In the event of an accidental release of the uranium, the carrier is required to notify the National Response Center per DOT and U.S. Environmental Protection Agency regulations (49 CFR 171, *General Information, Regulations, and Definitions*, and 40 CFR 302, *Designation, Reportable Quantities, and Notification*, respectively. The National Response Center would provide appropriate response in support of recovery/restoration.

Emergency response guides accompany each shipment. These guides are attached to the bill of lading. The driver would be in control of these documents at all times during shipment. These guides address the potential toxicological and radiological hazards associated with the material. The guides also include a phone number, manned 24-hours a day, which could be called for emergency assistance. In the event that the paperwork was inaccessible (e.g., a fire in the transporter cab), a first responder could contact the chosen carrier which would provide emergency response information.

The container would be marked and placarded in accordance with DOT regulations. Placards indicating the radioactive nature of the shipment would be permanently attached to the transport containers. These visual warnings would provide information to first responders and the general public regarding the hazards and appropriate emergency response.

Specific details regarding emergency preparedness, notifications, and emergency response will be found in the transportation plan, currently being prepared for the shipment of the uranium billets. It is expected that the transportation plan will not be substantially different than that prepared for the 1992 campaign entitled *Westinghouse Hanford Company, British Nuclear Fuels Springfields Plant, U.K., Shipping/Receiving Plan* (WHC 1991).

The impacts associated with potential transportation accidents are expressed as risk. For this analysis, risk is defined as the product of the probability of occurrence of an accident involving uranium billets and the consequences of an accident (DOE 1992). Consequences are expressed in terms of the health effects from a release of uranium from the packaging.

Probability categories for accidents range from anticipated to incredible events (WHC 1988). That is, an anticipated event is one where the frequency ranges from 1 to 1×10^{-2} (one chance in one hundred). An unlikely event has a frequency range from 1×10^{-2} (one chance in one hundred) to 1×10^{-4} (one chance in ten thousand). An extremely unlikely event has a frequency range from 1×10^{-4} (one chance in ten thousand) to 1×10^{-6} (one chance in one million). Incredible events have a frequency of less than 1×10^{-6} (one chance in one million).

The Maximum Credible Accident associated with the shipping container was analyzed for the 1992 uranium billet campaign (DOE 1992). The accident consisted of a truck or ship collision which engulfs the entire shipment of billets (90 billets in one ISO container per truck collision; 720 billets in eight ISO containers per ship collision) in a fire, thus providing the maximum radiological release to the public. Should an accident involving a uranium billets shipment occur, a release of material could occur only if the transport packaging were to become breached. The RADTRAN 4 computer code was used to calculate the potential radiological impacts of such an event. Details of the 1992 campaign analysis are provided in DOE 1992.

The results (Table 2) indicate that the total calculated dose from a Maximum Credible Accident during continental U.S. (overland truck) uranium billet shipments to Seattle, Washington, was conservatively estimated to be 32.1 person-rem. This equates to 0.016 LCFs. The total transportation impacts (accident consequences) are dominated by the shipments from the Hanford Site to the east coast port, primarily because of the long overland shipping distance from the Hanford Site to the east coast (about 4,200 kilometers [2,600 miles]), compared with potential overland distance on English soil.

Table 2. Potential Transportation Radiological Accident Risks.

| Hanford, Washington to Portsmouth, Virginia 1992 Uranium Billets Shipment (DOE 1992) | |
|---|----------------------|
| Total Dose (person-rem) | 32.1 |
| LCFs | 1.6×10^{-2} |

Nonradiological consequences of the transportation of uranium billets were also evaluated in the 1992 analysis (DOE 1992). It was determined that no LCFs associated with the 1992 transportation activities would occur. It is believed that there would be no substantial difference between the 1992 data and the proposed action. In any event, it is expected that potential accident consequences would be bounded by those analyzed for the transport to, and acceptance by the DOE, of spent fuel elements from eight European research reactors (DOE 1994).

Risks associated with offloading activities are similar to those associated with handling any commercially available, bulk solid uranium metal. In the event of an accidental release, potential exposures to the public would be expected to be below those levels which would cause serious health effects.

The potential for a severe port accident, after the shipping containers are loaded aboard the carrier, was considered. No more than three U.S. port calls would be expected for any particular shipment of uranium billets. Marine accident data provided by the U.S. Coast Guard were the basis for estimates of accident frequencies per port call (DOE 1986). Specifically, the probability that a collision would result in the penetration of a cargo hold containing ISO shipping containers was calculated to be 2.9×10^{-5} per port call. Additionally, the probability of a severe fire following collision was estimated at 1.1×10^{-8} per port call. The radiological consequences of a severe port accident associated with several containers of uranium billets would be bounded by a similar event involving spent nuclear fuel. The following analysis was provided in DOE 1994.

A postulated severe port accident associated with spent nuclear fuel was recently analyzed by DOE. In the event of such an accident (involving major mechanical damage, fire, oxidation of 100 percent of the fuel, and release of radioactive material from a cask containing 33 spent nuclear fuel elements), the dose to a maximally exposed individual (i.e., an individual assumed to be standing outside approximately 30 meters (100 feet) away from the event and remaining there for 24 hours, would be 25,000 millirem. At such close distance, it is highly probable that the individuals, if not evacuated, would be harmed more by the explosion and fire engulfing the cask than by the radiation dose. If the individual were inside a building approximately 30 meters (100 feet) away and remained there for 24 hours after the accident, the dose would be reduced to 220 millirem. At a more likely distance, where an individual may be located outside for a period of 24 hours after the accident, the dose at 100 meters (330 feet) would be 210 millirem. When considered in conjunction with the probability of occurrence, the accident has an extremely small risk. For example, the risk of developing a single fatal cancer for the most severe case (i.e., individual outside, 30 meters [100 feet], 24 hours receiving 25,000 millirem) is about 1 chance in 600 million.

Compared to more than 330,000 curies associated with a spent nuclear fuel cask for the postulated accident discussed in the preceding paragraph, a transport container of uranium billets would have less than 12 curies of radioactivity (the total inventory associated with the uranium billets [532 curies] divided by 45 shipping containers). The radiological risks associated with a potential port accident involving uranium billets would be even lower than the extremely small risk associated with spent nuclear fuel.

The total toxicological effects of a postulated severe port accident would depend upon the nature of the entire cargo on board. Other materials typically found on ocean-going vessels, such as petroleum products, could be present in far greater quantities and are flammable. As stated above, the maximally exposed individual approximately 30 meters (100 feet) away almost certainly would be harmed more by the explosion and fire than by exposure to the uranium. At 100 meters (330 feet), it would be expected that the effects directly attributable to the uranium billets would be similar to those evaluated during transportation. This exposure would not be expected to result in any health effects.

The potential radiological and chemical environmental impacts from ocean transport of loaded uranium billets ISO containers are expected to be negligible, and bounded by those potential impacts associated with ocean transport of spent nuclear fuel. Approximately 383 shipments of spent nuclear fuel were received in the U.S. from foreign research reactors prior to 1990 (Cashwell 1990). In the same time-frame, the Nuclear Assurance Corporation (NAC) indicated that the two largest companies in the commercial business of shipping spent nuclear fuel by sea logged over 5.6×10^6 kilometers (3.0×10^6 nautical miles) over 18 years without a significant incident (NAC 1986). Since approximately 6.2×10^4 kilometers (3.4×10^4 nautical miles) at sea are involved in shipment of the uranium billets, which is less than one percent of the NAC quoted distance, it is not anticipated that there would be a significant incident over the entire shipping campaign, or that the vessel transporting the shipping container(s) between the U.S. and the English port of entry would be involved in some incident. This conservative probability is the sum of all incident probabilities and includes minor incidents as well as major incidents. Only a small subset of these incidents would be severe enough to result in sufficient damage to the shipping container to allow a release of uranium to the environment. The recent analysis involving foreign research reactor spent nuclear fuel (DOE 1994) provides additional information regarding the potential consequences of ocean transport of nuclear materials.

The affected human population would be a long distance away from potential material/gaseous releases and thus atmospheric mixing and dilution would tend to disperse released radioactivity and chemical toxicity. However, humans would not be the principally exposed species in a deep ocean accident. The impacts of such an event would primarily affect marine life. The Nuclear Energy Agency of the Organization for Economic Cooperation and Development in Paris, France, estimated the impacts of various accident scenarios involving shipment of reprocessed commercial spent nuclear fuel. The peak doses to biota residing on the ocean floor in or near the uppermost sediment layer were evaluated for fish, crustaceans, and mollusks (NEA 1988). Uranium, the major radiological constituent of spent nuclear fuel and of the billets, has not been found to bioaccumulate in fish and bioaccumulates only slightly in crustaceans and mollusks (IAEA 1976). Natural ocean currents would promote mixing and dilution of any release of uranium. Therefore, the consequences to the public and marine life from accidental releases of radiological or toxicological contaminants associated with the uranium billets on the open sea, should they occur, would be minor.

5.3 Proposed Action: Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs Federal agencies to identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs and activities on minority and low-income populations. DOE is in the process of developing official guidance for implementation of the Executive Order. However, the analysis in this EA (Sections 5.1 and 5.2) indicates that there would be minimal impacts to both the offsite population and potential workforce during handling and transportation of the uranium

billets, under both routine and accident conditions. Additionally, transportation in the continental U.S. would involve established, existing highways, minimizing transit time and associated potential exposure. Therefore, it is not expected that there would be any disproportionately high and adverse impacts to any minority or low-income populations.

5.4 Proposed Action: Cumulative Impacts

The risks associated with routine packaging and transportation of the uranium billets are small. The transportation of the uranium billets would not be expected to substantially contribute to existing worker and public exposure from natural background radiation, or the existing toxicological background environment. As stated previously (Section 5.1.2.2), the average annual radiation dose from natural background radiation to the exposed population between the east coast and the Hanford Site was calculated to be approximately 6,000 person-rem per year. This may be compared with the calculated additional exposure of less than 0.5 person-rem associated with the proposed action. No measurable cumulative impacts would be anticipated as a result of the proposed transfer of the uranium billets.

6.0 Permits and Regulatory Requirements

6.1 Facility Compliance

It is DOE policy to carry out its operations in compliance with all applicable federal, state, and local laws and regulations. Facilities on the Hanford Site, including those in the 300 Area, operate in compliance with National Ambient Air Quality Standards (*Clean Air Act of 1977*, U.S. Environmental Protection Agency). Hanford Site radioactive stacks have been registered with the State of Washington Department of Health (DOH), Office of Radiation Protection. The DOH has issued a radioactive air emissions permit for the Hanford Site. No additional air emission permits would be required for the proposed action. All generated solid wastes would be handled in a manner compliant with applicable federal and state regulations and DOE orders. For example, requirements include Washington Administrative Code (WAC) 173-303 and DOE Order 5820.2A, *Radioactive Waste Management* (DOE 1988).

6.2 Transportation Requirements

The loading and transportation of the uranium billets to the United Kingdom will comply with the applicable regulations, orders, and guidance promulgated by agencies such as the DOE, DOT, International Atomic Energy Agency (IAEA), and the International Maritime Organization (IMO). These agencies have developed comprehensive regulations covering the performance of the shipping packaging, vehicle safety, routing of shipments, and physical protection. International regulations include those found in the United Nations' *Recommendations on the Transport of Dangerous Goods, IAEA Safety Standards; Regulations of the Safe Transport of Radioactive Material 1985 Edition (as amended 1990)*, and the IMO's *International Maritime Dangerous Goods Code*. Specific examples include:

- 10 CFR 110 "Export and Import of Nuclear Equipment and Material"
- 46 CFR 64 "Marine Portable Tanks and Cargo Handling Systems"
- 49 CFR 107 "Hazardous Materials Program Procedures"
- 49 CFR 171 "General Information, Regulations, and Definitions"
- 49 CFR 172 "Hazardous Materials Table and Hazardous Materials Communications Regulations"

- 49 CFR 173 "Shippers-General Requirements for Shipments and Packaging"
- 49 CFR 177 "Carriage by Public Highway"
- 49 CFR 178 "Shipping Container Specifications"
- 49 U.S.C. 1801 et seq, "Hazardous Materials Transportation Act"

7.0 Agencies Consulted

The Yakama Indian Nation, the Confederated Tribes of the Umatilla Indian Reservation, the Wanapum People, the Nez Perce Tribe, the States of Washington and Oregon, the Western Governor's Association, the Council of States Governments Midwestern Office, and other stakeholders were notified regarding the proposed action. Copies of the draft EA were distributed to these entities for a 30-day review period. All comments received were considered in the finalization of this EA. Comment letters and responses are provided in Appendix A.

8.0 References

- 10 CFR 110, 1993, "Export and Import of Nuclear Equipment and Material," *Code of Federal Regulations*, as amended.
- 40 CFR 302, 1993, "Designation, Reportable Quantities, and Notification," *Code of Federal Regulations*, as amended.
- 46 CFR 64, 1993, "Marine Portable Tanks and Cargo Handling Systems," *Code of Federal Regulations*, as amended.
- 49 CFR 107, 1993, "Hazardous Materials Program Procedures," *Code of Federal Regulations*, as amended.
- 49 CFR 171, 1993, "General Information, Regulations, and Definitions," *Code of Federal Regulations*, as amended.
- 49 CFR 172, 1993, "Hazardous Materials Tables and Hazardous Materials Communications Regulations," *Code of Federal Regulations*, as amended.
- 49 CFR 173, 1993, "Shippers - General Requirements for Shipments and Packagings," *Code of Federal Regulations*, as amended.
- 49 CFR 177, 1993, "Carriage by Public Highway," *Code of Federal Regulations*, as amended.
- 49 CFR 178, 1993, "Shipping Container Specification," *Code of Federal Regulations*, as amended.
- 50 CFR 17, 1992, "Endangered and Threatened Wildlife and Plants," *Code of Federal Regulations*, as amended.
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APPENDIX A

PUBLIC COMMENTS AND DOE RESPONSES

Dick Belsey, MD

September 21, 1995

Paul F. X. Dunigan, Jr., NEPA Compliance Officer
Department of Energy
Richland Operations Office
PO Box 550
Richland, WA 99352

Re: Review of EA dealing with
transfer of uranium billets to
BNFL in the United Kingdom

Dear Mr. Dunigan:

Thank you for the opportunity to comment on this environmental assessment.

The document makes the statement that DOE needs to transfer nearly 800 tons of normal and low-enriched uranium to the UK. There is no discussion concerning the urgency of this transfer. Is this a situation where the UK can request the transfer of materials to their contractor, BNFL? Is the material being sold, given away or lent? Does the DOE have any other options? What is the ultimate destination of these materials: will it be used for fabrication of commercial fuel rods? Or for nuclear weapons components? Are there any non-proliferation considerations that need to be evaluated before this EA is finalized?

Shouldn't DOE explore other credible options that would be appropriate if this strategy was developed so DOE could move this material to another jurisdiction, thereby reducing its management cost at Hanford? Has consideration been given to transfer of this material to US Enrichment Corporation for use in the fabrication of commercial nuclear fuel in this country? If not, why not? Will people in the US have to pay more for their nuclear power because DOE is giving this fuel away to the UK?

It is obviously better to reuse surplus materials than recycle them or dispose of them. There seems to be no consideration of alternatives other than the no-action alternative and the preferred action alternative, with the major focus of the EA being on the transportation modes and transfer points. Is it possible that the real reason for transferring this material to BNFL is for disposition purposes. If this is the case, and it may be because of the paucity of substantial justification for shipment to the UK, then DOE must consider other reasonable alternatives in the EA before it can conclude that this is the best alternative.

Another issue of concern is the safe movement and transfer of these materials to US ports on the East Coast. The transfer points from truck to ship transport is one of the most vulnerable parts of the whole transfer process. It will be essential that DOE work with the municipalities and states and their appropriate emergency response and transportation services to be sure

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that citizens in the area and workers handling the materials at the transfer points are adequately trained in the handling of these hazardous materials. It is my understanding that the city of Baltimore did not have such advance notice or preparation prior to the arrival of nitric acid shipments last spring and summer.

I would like to have a hard copy of the final EA when it is completed. I would be available for consultation should questions arise concerning incorporation of a DOE's response to these comments into the pre-final draft of the EA.

Respectfully submitted,

Dick Belsay, M.D.



Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

95-SM-103

Richard Belsey, M.D.
Physicians for Social Responsibility
30 SW Oak Ridge Drive
Portland, Oregon 97219-6566

Dear Dr. Belsey:

TRANSFER OF NORMAL AND LOW ENRICHED URANIUM BILLETS TO THE UNITED KINGDOM

Thank you for reviewing the draft Environmental Assessment (EA), "Transfer of Normal and Low Enriched Uranium Billets to the United Kingdom." We would like to take this opportunity to address your concerns. For ease of understanding, each of your questions/comments is listed below followed by our response.

"The document makes the statement that DOE needs to transfer nearly 800 tons of normal and low enriched uranium to the UK. There is no discussion concerning the urgency of this transfer. Is this a situation where the UK can request the transfer of materials to their contractor, BNFL? Is the material being sold, given away or lent? Does the DOE have any other options? What is the ultimate destination of these materials: will it be used for fabrication of commercial fuel rods? Or for nuclear weapons components? Are there any non-proliferation considerations that need to be evaluated before this EA is finalized."

"Shouldn't DOE explore other credible options that would be appropriate if this strategy was developed so DOE could move this material to another jurisdiction, thereby reducing its management cost at Hanford? Has consideration been given to transfer of this material to US Enrichment Corporation for use in the fabrication of commercial nuclear fuel in this country? If not, why not? Will people in the US have to pay more for their nuclear power because DOE is giving this fuel away to the UK?"

The 706 metric tons of normal and low enriched uranium billets which are being considered for this government-to-government transfer are under the control of DOE's Assistant Secretary for Defense Programs (DP). The DOE-Richland Operations Office (RL) is the custodian of these materials until such time as DP determines their final disposition.

The U.S. Enrichment Corporation (USEC) has been consulted. Previous attempts at identifying a domestic end-user proved fruitless. The operating specifications for nuclear power plants in the U.S. do not allow for the high uranium-235 content found in these billets. Therefore, there is no domestic

Dr. Richard Belsey
95-SNM-103

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commercial use for these billets and the people of the U.S. will not pay more for nuclear power because of this trade. In addition, the low enrichment level of the billets makes their use in nuclear weapons unfeasible.

In 1958, the Mutual Defense Agreement (MDA) between the United States (U.S.) and the United Kingdom (U.K.) was established. This agreement remains in effect to this day. The MDA obliges DP to seriously consider any request made by the U.K. with regard to a request for nuclear materials for defense purposes. In keeping with the MDA, these billets will be traded for other nuclear materials of equal value. The U.K. is not required to reveal their intentions with regard to this material; however, it is noteworthy to point out that the U.K. Foreign Secretary Douglas Hurd announced at this year's Review and Extension Conference on the Non-Proliferation of Nuclear Weapons Treaty that "...the United Kingdom has ceased the production of fissile materials for explosive purposes."

There is no "urgency" to this transfer. However, there are substantial surveillance and maintenance costs associated with the billets inventory. It is RL's responsibility to move forward as expeditiously as possible in our goal to reduce the expenditures at our facilities.

"It is obviously better to reuse surplus materials than recycle them or dispose of them. There seems to be no consideration of alternatives other than the no action alternative and the preferred action alternative, with the major focus on the EA being on the transportation modes and transfer points. Is it possible that the real reason for transferring this material to BNFL is for disposition purposes? If this is the case, and it may be because of the paucity of substantial justification for shipment to the U.K., then DOE must consider other reasonable alternatives in the EA before it can conclude that this is the best alternative."

This is an evaluation of the environmental risks associated with transportation of these billets from Hanford to the U.K. At the present time, no domestic use for these materials has been identified.

"Another issue of concern is the safe movement and transfer of these materials to U.S. ports on the East Coast. The transfer points from truck to ship transport is one of the most vulnerable parts of the whole transfer process. It will be essential that DOE work with the municipalities and states and their appropriate emergency response and transportation services to be sure that citizens in the area and workers handling the materials at the transfer points are adequately trained in the handling of hazardous materials."

Dr. Richard Belsey
95-SNM-103

- 3 -

Since the draft EA was issued in September, BNFL has decided to utilize the port of Seattle as their primary point of egress from the U.S. Therefore, road transport time will be minimized. The uranium billets are solid blocks of metal and are not subject to dispersion. Radiation levels at contact with the outside of each ISO-container is not detectable against background levels. Hazards associated with potential mishaps will be equal to, or less than, that associated with the transportation of other hazardous materials. No extraordinary training for emergency response personnel is required.

Again, thank you for your efforts with regard to this review. If you have any questions regarding this EA please contact me at (509) 373-6667, or Mr. Richard X. Gonzalez of the Transition Program Division at (509) 373-9922.

Sincerely,



Paul F. X. Dunigan, Jr.
NEPA Compliance Officer

TPD:RXG



MARYLAND DEPARTMENT OF THE ENVIRONMENT
2500 Broening Highway • Baltimore, Maryland 21224
(410) 631-3000

Parris N. Glendening
Governor

Jane T. Nishida
Secretary

October 19, 1995

Mr. Richard X. Gonzalez
Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

RE: Comments on Draft Environmental Assessment (EA) of Uranium Ballets Shipments

Dear Mr. Gonzalez:

Upon the initial review of the EA, it appears that it is similar to the EA that was prepared for the Nitric Acid shipments. Again, with the preferred selection of an East Coast port for the oceanic shipments to England, all the corridor States will be concerned about these road shipments.

What most States would expect from DOE is a timetable of when the EA document becomes final, the development of an Emergency Plan, the itinerary of road shipments to include the scheduling, the tracking systems, the communications (conference calls), etc. I'm sure all of the above will follow in short order upon the completion of the final EA.

I would like to be added to the distribution list for the final EA and all future correspondence. Please continue to telefax or mail additional information as it becomes available.

Sincerely,

Carl E. Trump, Jr., Program Manager
Radiological Health Program

"Together We Can Clean Up"

Recycled Paper



Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

NOV 19 1995

95-SNM-108

Mr. Carl E. Trump
Radiological Health Program
Maryland Department of the Environment
2500 Broening Highway
Baltimore, Maryland 21224

Dear Mr. Trump:

ENVIRONMENTAL ASSESSMENT (EA): TRANSFER OF NORMAL AND LOW-ENRICHED URANIUM BILLETS TO THE UNITED KINGDOM

Thank you for your review of the subject EA. The result of this assessment was a Finding of No Significant Impact (FONSI). The FONSI was signed by John Wagoner, Manager of the Richland Operations Office on November 9, 1995.

British Nuclear Fuels, Ltd., has decided to utilize the port of Seattle, Washington. Therefore, transportation of these billets is expected to occur within the state of Washington. If unforeseen circumstances dictate that an East Coast port, we will inform your agency prior to any such shipment.

If you have any questions regarding this EA please contact me on (509) 376-6667, or Mr. Richard X. Gonzalez at (509) 373-9922.

Sincerely yours,

A handwritten signature in cursive script that reads "Paul F. X. Dunigan, Jr.".

Paul F. X. Dunigan, Jr.
NEPA Compliance Officer

TPD:RXG



PENNSYLVANIA EMERGENCY MANAGEMENT AGENCY
BOX 3321
HARRISBURG, PENNSYLVANIA 17105-3321



October 11, 1995

Mr. Paul F. X. Dunigan, Jr.
NEPA Compliance Officer
Department of Energy
Richland Operations Office
P. O. Box 550
Richland, WA 99352

Dear Mr. Dunigan:

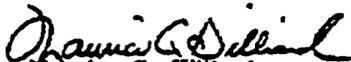
Reference is made to your letter of September 13, 1995, Environmental Assessment Review: Transfer of Normal and Low-Enriched Uranium Billets to the United Kingdom, Hanford Site.

As the Pennsylvania Emergency Management Agency Radiological Officer, I have reviewed the subject environmental assessment and have the following comments:

- We will treat these shipments as we do any LSA shipments; however, with a campaign of shipments such as these, we will ensure all Pennsylvania affected counties along the transportation routes are alerted once we receive the identified routes and time-table.
- We have a radiological protection program in all of our counties and do not anticipate any problem in responding to a radiological accident.
- Request we receive a hard copy of the final EA.

Should there be any questions transiting Pennsylvania, please contact me at 717-783-8150 (24 hour number) or FAX 717-783-7393.

Sincerely,


Maurice G. Hilliard
Chief, Radiological Operations Division

MGH:nlc



Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

NOV 15 1995

95-SNM-105

Mr. Maurice G. Hilliard, Chief
Radiological Operations Division
Pennsylvania Emergency Management Agency
P.O. Box 3321
Harrisburg, Pennsylvania 17105-3321

Dear Mr. Hilliard:

**ENVIRONMENTAL ASSESSMENT: TRANSFER OF NORMAL AND LOW-ENRICHED URANIUM
BILLETS TO THE UNITED KINGDOM**

Thank you for reviewing the subject Environmental Assessment. The result of this assessment was a Finding of No Significant Impact (FONSI). The FONSI was signed by John Wagoner, Manager, on November 9, 1995.

British Nuclear Fuels, Inc. has decided to utilize the port of Seatt Washington. Therefore, transportation of these billets is expected within the state of Washington. If unforeseen circumstances dictates of an East Coast port, we will inform your agency prior to any such

If you have any questions, please call me on (509) 376-6667, or Mr. Richard X. Gonzalez of the Transition Program Office, (509) 373-

Sincerely yours,

A handwritten signature in cursive script that reads "Paul F. X. Dunigan, Jr.".

Paul F. X. Dunigan
NEPA Compliance Officer

TPD:RXG



STATE OF WASHINGTON
WASHINGTON STATE PATROL
PO Box 42614 • Olympia WA 98504-2614

September 25, 1995

Mr. Paul F. X. Dunigan, Jr.
Department of Energy
Richland Operations Office
P.O. Box 550
Richland, WA 99352

Dear Mr. Dunigan:

This correspondence is in response to our review of the Environmental Assessment (EA) Review of the Transfer of Normal and Low-Enriched Uranium Billets to the United Kingdom, Hanford Site, (DOE/EA-1123).

The Assessment mentioned the preparation of a transportation plan for the movement of the uranium billets. Please provide us with a hard copy of this plan when completed and a hard copy of the final EA.

If you have any questions please call me at (360) 753-2754.

Sincerely,

CHIEF ANNETTE M. SANDBERG

A handwritten signature in black ink, appearing to read "Lonnie R. Brackins".

Lieutenant Lonnie R. Brackins
Emergency Mobilization Section

LRB:hdb

RECEIVED

SEP 26 1995

DOE-RL/CCC





Department of Energy
Richland Operations Office
P.O. Box 550
Richland, Washington 99352

95-SNM-104

NOV 14 1995

Lieutenant Lonnie R. Brackens
Emergency Mobilization Section
Washington State Patrol
P.O. Box 42614
Olympia, Washington 98504-2614

Dear Lieutenant Brackens:

ENVIRONMENTAL ASSESSMENT: TRANSFER OF NORMAL AND LOW-ENRICHED URANIUM
BILLETS TO THE UNITED KINGDOM

Thank you for your review of the subject Environmental Assessment. The result of this assessment was a Finding of No Significant Impact (FONSI). The FONSI was signed by John Wagoner, Manager, November 9, 1995.

A copy of the final EA is enclosed. British Nuclear Fuels, Ltd. will take possession of the billets at the Hanford Site and will be responsible for all phases of transportation. Therefore, the transportation plan prepared by Westinghouse Hanford Company was not published. Copies of this internally distributed plan are included for your convenience. The plan will be considered by BNFL prior to the shipping campaign.

If you have any questions, please contact me on (509) 376-6667 or Mr. Richard X. Gonzalez, of the Transition Program Division, on (509) 373-9922.

Sincerely,

Paul F. X. Dunigan
Paul F. X. Dunigan
NEPA Compliance Officer

TPD:RXG

Enclosures

**TRANSFER
OF NORMAL AND LOW-ENRICHED URANIUM BILLETS
TO THE UNITED KINGDOM**

HANFORD SITE, RICHLAND, WASHINGTON

U.S. DEPARTMENT OF ENERGY

FINDING OF NO SIGNIFICANT IMPACT

NOVEMBER 1995

AGENCY: U.S. Department of Energy

ACTION: Finding of No Significant Impact

SUMMARY: The U.S. Department of Energy (DOE) has prepared an Environmental Assessment (EA), DOE/EA-1123, to assess environmental impacts associated with the transfer of normal and low-enriched uranium billets, and activities to support this work at the Hanford Site, Richland, Washington. The billets were fabricated for use in the Hanford Site's nuclear production reactors. The billets are located in the 300 Area of DOE's Hanford Site near the City of Richland, Washington. Alternatives considered in the review process included: the No Action alternative; the preferred alternative to transfer the uranium billets; and alternatives addressing other uses of the billets and modes/methods for transporting the billets in the continental U.S.

Based on the analysis in the EA, and considering comments from Dr. Belsey of the Physicians for Social Responsibility, the Pennsylvania Emergency Management Agency, the Maryland Department of the Environment, and the Washington State Patrol, DOE has determined that the proposed action is not a major federal action significantly affecting the quality of the human environment within the meaning of the *National Environmental Policy Act of 1969* (NEPA), 42 U.S.C. 4321, et seq. Therefore, the preparation of an Environmental Impact Statement (EIS) is not required.

ADDRESSES AND FURTHER INFORMATION

Single copies of the EA and further information about the proposed action are available from:

Jim Mecca, Director
Transition Program Division
U.S. Department of Energy
Richland Operations Office
P. O. Box 550
Richland, Washington 99352
(509) 376-7471

For further information regarding the DOE NEPA process, contact:

Carol M. Borgstrom, Director
Office of NEPA Oversight
U.S. Department of Energy
1000 Independence Avenue, S.W.
Washington, D.C. 20585
(202) 586-4600 or (800) 472-2756

PURPOSE AND NEED: Under the auspices of an agreement between the U.S. and the United Kingdom, the U.S. Department of Energy (DOE) has an opportunity to transfer approximately 710,000 kilograms (1,562,000 pounds) of normal and low-enriched uranium to the United Kingdom, thus reducing long-term surveillance and maintenance burdens at the Hanford Site. The material, in the form of billets, is controlled by DOE's Defense Programs, and is presently stored as surplus material in the 300 Area of the Hanford Site.

BACKGROUND: Uranium billets were fabricated into fuel for use in the Hanford Site's production reactors. The uranium billets presently stored on the Hanford Site are surplus material because DOE defense reactor operations have been discontinued. The surplus uranium billets are currently stored in wooden shipping containers in secured facilities in the 300 Area of the Hanford Site. The proposed action is similar to that taken in 1992 when uranium billets were transported from the Hanford Site, through Seattle, Washington, to the United Kingdom. No significant environmental impacts were identified as a result of the 1992 campaign.

PROPOSED ACTION: The proposed action is to transfer low-enriched and normal uranium billets to the United Kingdom. British Nuclear Fuels, Inc. (BNFL), acting as an agent for the United Kingdom will be responsible for transportation of the billets. The billets would be packaged at the Hanford Site, and transferred to BNFL for transportation to the UK. The current route is overland truck from the Hanford Site to Seattle, Washington; and ocean carrier to the United Kingdom.

ALTERNATIVES CONSIDERED: The EA discussed a variety of alternatives as well as the No-Action Alternative.

No-Action Alternative. This alternative would result in the continued storage of the uranium billets in their current configuration at the Hanford Site. The facilities would be maintained with minimal surveillance as they have been for several years. Although no environmental impacts would be expected as a result of continued storage, this alternative would result in continued surveillance and maintenance costs.

Alternative Uses. At the present time, no domestic uses for these materials have been identified. Previous attempts to market these materials have been unsuccessful.

Alternative U.S. Ports. BNFL currently plans to use Seattle, Washington, as the point of egress from the U.S., although other U.S. ports were considered in the EA. It is expected that any potential environmental impacts of transport through other U.S. ports would be bounded by those analyzed for the 1995 nitric acid shipments from the Hanford Site to the United Kingdom via east coast ports (DOE/EA-1005, Environmental Assessment for the Disposition and Transportation of Surplus Radioactive Low Specific Activity Nitric Acid, Hanford Site, Richland, Washington).

Alternative Continental U.S. Transportation Modes. Rail, air, and barge transportation to Seattle, Washington, were considered. BNFL presently prefers to use truck transport to Seattle, Washington, for transfer to an ocean carrier.

ENVIRONMENTAL IMPACTS: Routine conduct of the proposed activity would not result in any significant increase in Hanford Site emissions. Before beginning the proposed activity, appropriate procedures and administrative controls would be in place to maintain exposure to workers and other onsite personnel to within requirements established by DOE Orders and as low as reasonably achievable principles. No additional radiation exposure to either onsite personnel or offsite individuals would be expected from the proposed action. The risks to workers from chemical exposures, noxious vapors, burns, and other common industrial hazards are expected to be low, and would be minimized by training and the use of appropriate personal protective equipment.

The 300 Area is a developed, highly disturbed area, and is currently under a vegetation management program which eradicates vegetation. No sensitive or critical plant or animal habitat would be affected. There are no animal species of special concern which are known to use the areas exclusively.

The proposed action would not increase noise levels or release any particulate matter, thermal releases, or gaseous discharges in significant amounts.

Socioeconomic Impacts

Existing Hanford workers will perform the bulk of the packaging and transfer activities. Therefore, no socioeconomic impacts are expected from this action.

Cumulative Impacts

The proposed action is not expected to contribute substantially to the overall cumulative impacts from operations on the Hanford Site. Standard Operating Procedures will provide sufficient personnel protection such that exposure to radiological and chemical materials will be kept below DOE and contractor guidelines. Routine uranium disposition operations will not increase the amount of radioactivity released from total Hanford operations. In 1994, the maximally exposed offsite individual was exposed to 5×10^{-2} millirem (effective dose equivalent) from total air emissions, well below allowable limits set by state and federal regulations. The wastes generated from the activities would not add substantially to waste generation rates at the Hanford Site and would be stored or disposed of in existing facilities.

Environmental Justice

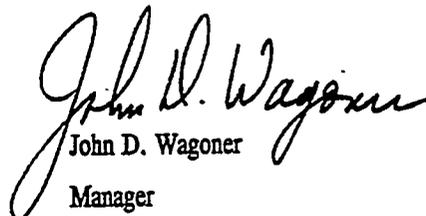
Executive Order 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires that Federal agencies identify and address, as appropriate, disproportionately high and adverse human health or environmental effects of their programs and activities on minority and low-income populations. Since no socioeconomic impacts or health effects are expected, it is not expected that there would be any disproportionate adverse effects to low-income or minority populations in the surrounding community.

Impacts From Postulated Accidents

In addition to environmental impacts that were postulated from routine operations, the EA discussed a range of reasonably foreseeable accident scenarios that could lead to environmental impacts. The maximum reasonably foreseeable accident was considered to be one in which a truck or ship collision results in an entire shipment of billets being engulfed in fire. The resulting total dose was conservatively estimated to be 32.1 person-rem, or 0.016 latent cancer fatalities.

DETERMINATION: Based on the analysis in the EA, and considering comments from Dr. Belsey of the Physicians for Social Responsibility, the Pennsylvania Emergency Management Agency, the Maryland Department of the Environment, and the Washington State Patrol, I conclude that the proposed Transfer of Normal and Low-Enriched Uranium to the United Kingdom does not constitute a major federal action significantly affecting the quality of the human environment within the meaning of NEPA. Therefore, an EIS for the proposed action is not required.

Issued at Richland, Washington, this 9th day of November, 1995.


John D. Wagoner
Manager

Richland Operations Office