

**U.S. NUCLEAR REGULATORY COMMISSION  
DOCKET NO. 70-0036**

**ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT RELATED  
TO ISSUANCE OF AMENDMENT NO. 58 TO MATERIALS LICENSE NO. SNM-33,  
WESTINGHOUSE ELECTRIC COMPANY, LLC HEMATITE DECOMMISSIONING PROJECT  
LOCATED IN FESTUS, MISSOURI (TAC NO. J00357)**

## **1. Introduction**

The U.S. Nuclear Regulatory Commission (NRC) is considering the issuance of a license amendment to special nuclear material license number SNM-33. This license was issued to Westinghouse Electric Company, LLC (WEC or Westinghouse) for the former Hematite Fuel Cycle Facility in Hematite, Missouri. Since the fuel cycle facility operations have ceased, the Hematite site is undergoing preparations for decommissioning. The facility is now referred to as the Hematite Decommissioning Project (HDP). The NRC is considering authorizing the disposal of approximately 23,000 m<sup>3</sup> (30,000 yd<sup>3</sup>) of soil and debris containing low concentrations of byproduct material and special nuclear material (SNM) at the US Ecology Idaho, Inc. (USEI) hazardous waste disposal facility near Grand View, Idaho. WEC has requested authority for this action pursuant to Section 20.2002 of Title 10 of the Code of Federal Regulations (10 CFR 20.2002), "Method of Obtaining Approval of Proposed Disposal Procedures." This action, if approved, would also exempt USEI from further Atomic Energy Act and NRC licensing requirements to possess and dispose of byproduct material and SNM identified in WEC's license amendment request.

On July 6, 2009, NRC issued a Notice of Opportunity for Hearing (ADAMS No. ML091740733) on the May 21, 2009, WEC license amendment request (ADAMS No. ML091480071). The original notice of opportunity for hearing was extended to October 5, 2009 by Order dated September 4, 2009 (ADAMS No. ML092470425). On September 3, 2009, Citizens for a Clean Idaho, Inc. requested a hearing (ML101740493); however, on December 3, 2009, the Atomic Safety Licensing Board denied the request due to lack of standing (ADAMS No. ML093370210). On July 28, 2009, NRC held a public meeting in the community of Grand View, Idaho, to inform the public about the requested action and to give the public an opportunity to provide comments and ask questions of the NRC staff. On August 12, 2009, WEC submitted a Decommissioning Plan (DP) [ADAMS Nos. ML092330123, ML092330125, ML092330127, ML092330129, ML092330131, and ML092330132] and supporting documents. This DP superseded all previous DPs for the HDP. An Environmental Report (ADAMS Nos. ML092870403 and ML092870405) was included among the supporting documents for the DP. The NRC relied upon the information provided in the May 21, 2009, license amendment request, the July 28, 2009, public meeting, the July 2009 WEC Environmental Report, and other sources as noted in the References, in preparing this Environmental Assessment (EA).

## **2. Need for the Proposed Action**

The WEC HDP is a decommissioning and environmental restoration project that will generate, among other types of waste, approximately 23,000 m<sup>3</sup> (30,000 yd<sup>3</sup>) of low-level waste (LLW) in the form of soil and debris containing low concentrations of byproduct and special nuclear

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material. About 5% of the LLW will contain hazardous chemicals. The need for the proposed action is the safe and permanent disposal of HDP LLW.

### **3. The Proposed Action**

Under 10 CFR 20.2002, WEC proposes to dispose of about 23,000 m<sup>3</sup> (30,000 yd<sup>3</sup>) of LLW from the HDP that contains byproduct and special nuclear material at the USEI hazardous waste disposal facility near Grand View, Idaho. The LLW will be generated as part of decommissioning activities, which will include exhumation of existing burial pits, as described in the Hematite DP. There are 40 unlined pits, each of which is approximately 12 meters (40 feet) long, 6 meters (20 feet) wide, and 3.6 meters (12 feet) deep. The pits were used to dispose of waste generated by the former owners of the facility from 1965 to 1971. In addition, there are an estimated 20-25 burials for which there are no records. These burials are believed to be in the area between the documented Burial Pits and the site buildings, under roadways in the eastern portion of the central tract area of the HDP site. Additionally impacted material may come from underneath the site buildings.

In 2002, Westinghouse and the Missouri Department of Natural Resources (MDNR) entered into a Letter Agreement, which, among other things, provided for MDNR oversight of certain studies and response actions in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) under the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601 et seq. Subsequently, Missouri and Westinghouse entered into a Consent Decree, and the Letter Agreement was terminated. The Consent Decree provides for MDNR oversight of those portions of the investigation and selection of the remedy for Operable Units at the site that are not preempted by the Atomic Energy Act of 1954, as amended. The Selected Remedy for Operable Unit 1 at the HDP is Alternative 4: Removal, Treatment of Volatile Organic Compound Waste, and Off-site Disposal of Low-Level Radioactive Waste and Non-Hazardous Treatment Residues (WEC, 2009a).

### **4. Alternatives to the Proposed Action**

#### **4.1 Alternative One - No-Action**

The no-action alternative involves discontinuing ongoing decommissioning activities at the HDP and leaving decommissioning waste, including waste buried in over 40 documented and undocumented onsite trenches, at the HDP site. This action would require an exemption from the requirement in 10 CFR 70.38(d) that decommissioning of facilities specifically licensed for possession and use of special nuclear material be completed and approved by the NRC after licensed activities cease. The no action alternative is also not in accord with the July 2009, Record of Decision for Operable Unit 1, as described in Section 3 above. The no action alternative would cause WEC to continue environmental monitoring and surveillance, and to maintain administrative and engineered controls that are required to ensure facility safety and security. Environmental impacts of the no-action alternative would be bounded by impacts associated with normal operation of the facility prior to decommissioning.

## 4.2 Alternative Two - Disposal or Storage of LLW at a Licensed Facility

An alternative to the proposed action for disposal of LLW generated by decommissioning activities at the HDP is disposal of LLW in facilities specifically licensed by NRC Agreement States for storage and/or disposal of LLW. For this EA, the NRC evaluated an alternative licensed facility available to HDP -- the EnergySolutions, LLC (EnergySolutions) hazardous and radioactive waste disposal facility near Clive, Utah.

The EnergySolutions LLW facility routinely manages amounts of LLW above ground that contain low concentrations of SNM, but in total quantities in excess of the critical mass limits in 10 CFR Part 150. Part 150 provides that Agreement States may only license possession of quantities of SNM up to the critical mass limits (e.g., 350 g U-235, 200 g Pu-239). Above these limits, persons need a license from NRC, in addition to the Agreement State license. EnergySolutions has an NRC exemption from the requirements for an NRC license, provided certain conditions, as specified by an NRC Order, are met. At Clive, NRC has specified SNM concentration limits, in lieu of mass limits, to ensure criticality safety.

The EnergySolutions LLW disposal facility at Clive, Utah is located 128 kilometers (80 miles) west of Salt Lake City, Utah. The site is arid and receives about 20 centimeters (8 inches) of precipitation annually. A description of the site and its history are available in the Utah Division of Radiation Control safety evaluation report for the EnergySolutions license renewal (Utah DRC, 2007). In addition to disposal of LLW, EnergySolutions holds an 11e.(2) byproduct materials license (UT2300478) and State-issued Part B RCRA solid waste permit.

## 5. Affected Environment

### 5.1 Land Use

In general, the environmental impacts on land use of the decommissioning of fuel manufacturing facilities such as the HDP have historically been limited to impacts onsite and within the immediate vicinity of the decommissioning project and waste disposal facility boundaries. For this reason, this EA is focused on potential affected areas within about a one mile radius of the HDP and USEI disposal facility.

#### 5.1.1 Land Use at the HDP

The 92-hectare (228-acre) HDP is located approximately 1.2 kilometers (0.75 mile) northeast of the unincorporated town of Hematite and approximately 56 kilometers (35 miles) south of the City of St. Louis, Missouri. Licensed activities are restricted to a central tract of land of about 4 hectares (10 acres). Land near the HDP site is primarily forest, farms and residences.

Two private residences are located on the site property. The nearest resident is approximately 300 meters (1,000 feet) from the site central tract. Other residences are located within 0.4 kilometers (0.25 mile) of the site. At the HDP, there are several transportation corridors in the immediate vicinity of the site. The Union Pacific railroad crosses the property from the southwest to the northeast. State Road P also crosses the site from the southwest to the northeast.

There are no public lands in the immediate vicinity. Primary natural resources at or near the site include farms, ponds, streams and groundwater. Water resources are described in more detail in Section 5.4. Wooded areas on and surrounding the site produce low quality timber that is not likely suitable for harvesting.

A limestone quarry of less than two acres in size is operated approximately 1 mile southwest of the HDP.

As of July 2009, there are no definite plans for use of the HDP following decommissioning. (WEC, 2009a) However, WEC's decommissioning objective is to reduce residual radioactivity to a level that permits termination of the Hematite license in accordance with 10 CFR 70.38(d) and release the site for unrestricted use in accordance with 10 CFR 20, Subpart E, "Radiological Criteria for License Termination."

### 5.1.2 Land Use at USEI

The USEI site is located in the Owyhee Desert of southwestern Idaho. It is at the end of Lemley Road, approximately 17 kilometers (10.5 miles) east of Grand View, Owyhee County, Idaho. Grand View has a population of approximately 500. Owyhee County is a ranching and agricultural area of approximately 19,900 square kilometers (7,678 square miles). The county is sparsely populated, with an average population of 0.5 people per square kilometers (1.4 people per square mile) (American Geotechnics, 2006).

This region has an arid climate. The USEI site is located on a 1.6 kilometers (1 mile) wide plateau. Maximum surface relief on the facility is 27 m (90 feet) and the mean surface elevation is 790 m (2,600 feet) above sea level. The nearest residence is 1.6 kilometers (1 mile) southwest of the site. There are no other land uses in the immediate vicinity of the site.

### 5.2 Transportation

The HDP plans to transport LLW generated by the proposed action to the USEI facility in Grand View, Idaho by gondola railcar. Railcars will be entirely enclosed in form-fitting, sift-proof, and closable wrappers meeting U.S. Department of Transportation (DOT) Industrial Type-1 Package (IP-1) requirements. The rail line that passes through the site is owned by Union Pacific. WEC plans to load waste from the HDP site using a new onsite rail spur. The spur will be located about 90 meters (300 feet) east of the impacted area between the onsite gas pipeline and rail line.

Trains traverse the site every few hours. Class I Union Pacific rail lines are available from the St. Louis area to the Boise, Idaho area. The nearest point of access is a terminal at Dupou, Illinois, located approximately 58 kilometers (36 miles) away. USEI receives wastes transported by rail at a rail transfer facility located off Simco Road, about 8 kilometers (5 miles) south of Exit 74 of U.S. Interstate 84. Bulk wastes are then transferred to transport trucks, which travel Simco Road about 26 kilometers (16 miles) south to Highway 67.

The trucks travel Highway 67 for 16 kilometers (10 miles) through Grand View. Trucks continue west on State Road 78 for about 14 kilometers (9 miles) before turning right on Lemley Road. The USEI site is about 2.4 kilometers (1.5 miles) north on Lemley Road.

### 5.3 Geology and soils

The geology and soil characteristics at both the HDP and USEI sites are understood in sufficient detail to understand the environmental impacts of exhuming waste at HDP for disposal at USEI.

#### 5.3.1. Geology and soils at the HDP

WEC describes the local and regional geology and soils at the HDP site in its Environmental Report (WEC, 2009c). Given the surficial nature of likely impacts from removal of buried waste at the HDP, NRC focused on near-surface geology and soil features which are most likely to be impacted.

As noted by Westinghouse (2009c), the HDP site contains seven soil types, including silt loams and sandy loams. At the HDP, two major areas are known to be contaminated as a result of past operations at the site: the burial pits; and the central tract area. Within the central tract area are many areas in which surface and subsurface contamination has been identified: evaporation pond; site pond/site creek area; former leach field; soil around and underneath the process buildings; limestone storage and fill areas; red room roof burial area; cistern burn pit; former Duel's Mountain; gas pipeline; and outdoor and shallow surface areas.

#### 5.3.2 Geology and Soils at USEI

At USEI, there are five major geologic units which are relevant to potential environmental impacts from disposal of LLW from the HDP. These are the Bruneau Formation (0 to 30 meters (0 to 100 feet)); Glens Ferry Formation (80 to 240 meters (260 feet to 800 feet)); Chalk Hills Formation (240 to 700 meters (800 feet to 2300 feet)); Banbury Basalt (700 to 760 meters (2300 to 2500 feet)); and the Poison Creek Formation (760 meters (2500 feet)). Soils in the vicinity of the site are composed primarily of layers of silty sands, sandy silts, silts, and massive clays. The top 9 to 12 meters (30 to 40 feet) are composed primarily of silty and gravelly sands, which are underlain by silty sands and clays to a depth of 45 meters (150 feet). Below 45 meters (150 feet), thick beds of inorganic silts and clays are encountered.

### 5.4 Water Resources

A primary consideration for exhumation of waste at the HDP and disposal at USEI is the protection of both surface and groundwater resources at both sites.

Potentially affected water resources at the HDP include several surface water features and local groundwater. Surface water resources at or near the HDP include Joachim Creek and several of its tributaries. The HDP site also has several ponds and a lake (WEC, 2009c). A single wetland of less than approximately 400 square meters (4,000 square feet) has been identified southeast of the facility process buildings, between the railroad berm and gravel road on the opposite side of the railroad tracks from the buildings.

The HDP currently discharges water to three outfalls permitted under the National Pollutant Discharge Elimination System (NPDES) permit number MO-0000761. The effluent parameters monitored under this permit include: biochemical oxygen demand (BOD); total suspended solids; pH; fecal coliform; total chlorine; oil & grease; fluoride; radioactive material; and temperature. Radiological parameters are monitored at the Site Dam and sewage treatment outfall. Concentrations of gross alpha-emitting radionuclides in the sewage treatment outfall,

which are higher than effluent concentrations at the Site Dam, during the recent 5 year period from July 2004 through June 2009 have ranged from 1.6E-08  $\mu\text{Ci}/\text{mL}$  to 8.5E-08  $\mu\text{Ci}/\text{mL}$ , or 5.3% to 28% of the effluent discharge limit. Concentrations of gross beta-emitting radionuclides in these effluents during the same period have ranged from 3.4E-08  $\mu\text{Ci}/\text{mL}$  to 1.3E-07  $\mu\text{Ci}/\text{mL}$ , or 0.7% to 2.6% of the effluent discharge limit.

Groundwater at the HDP is associated with four major zones: the overburden; the Jefferson City-Cotter Formation; a Jefferson City-Roubidoux contact zone; and the Roubidoux Formation. At the HDP, groundwater flow within the overburden migrates from the vicinity of the former plant structures toward Joachim Creek, where it discharges. Westinghouse (2005) has also drawn conclusions regarding the remaining subsurface features. For example, Westinghouse concludes that there is an upper transmissive zone within the Jefferson City-Cotter hydrostratigraphic unit that appears to be closely associated with boreholes completed within about 15 meters (50 feet) of the interface between the overburden and the Jefferson City-Cotter formation. Westinghouse also notes that the Jefferson City-Roubidoux contact zone typically exhibits low transmissivity. Below the Jefferson City-Roubidoux contact zone, the Roubidoux hydrostratigraphic unit is a zone of high transmissivity. Since 2003, when the city of Festus (6 kilometers (4 miles) east of the HDP) stopped pumping water from the Roubidoux Formation, the vertical gradients in the Jefferson City-Cotter HSU and deeper HSUs has been upward. Vertical hydraulic gradients are downward within the overburden. Between the deep overburden and Jefferson City-Cotter HSU, gradients are downward near the HDP, but upward near Joachim Creek.

In December 2001, volatile organic compounds (VOCs), (primarily perchloroethylene (PCE), trichloroethylene (TCE), and their degradation by-products), were found in a private domestic well located on Westinghouse property northeast of the site. Subsequent testing found an additional seven wells to be affected, all of which were at residences located in the affected area located southeast of the site. The affected wells are reportedly open to both the Jefferson City Formation and the underlying Roubidoux Formation. PCE, TCE and their degradation by-products are "hazardous substances" as defined by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), State law and applicable regulations. In June 2002, Westinghouse implemented a time critical removal action pursuant to which public health concerns were addressed through installation of activated carbon filter units and the provision of bottled water, as needed. In May 2003, WEC and Missouri DNR signed a non-time critical removal action in which WEC agreed to provide: an extension to the local public water supply system to the twenty-four homes located in areas where private wells have been affected (i.e., affected area and well #3); abandonment of all existing residential drinking water wells at affected homes; and long-term monitoring of the contaminant plume through periodic monitoring of sentry wells and approximately three select private wells in the area.

#### 5.4.1 Water Resources at USEI

The USEI site is underlain by two water-bearing units, the Upper and Lower Aquifers. The Upper Aquifer (depth to water of 40 meters (135 feet) to 60 meters (190 feet) below ground surface) is a perched saturated zone (i.e., an unconfined to semi-confined condition) with low well yield and poor water quality. The Upper Aquifer is monitored with 33 wells and piezometers. Water flows in the Upper Aquifer from the northwest to the eastern boundary of the USEI site. In the Upper Aquifer, well production rates range from 20 liters per minute (5 gallons per minute) in the northwest corner of the site to less than 2 liters per minute (one-

half gallon per minute) across the eastern and southern extent of the Upper Aquifer. The Lower Aquifer is separated from the Upper Aquifer by a 6-9 meters (20-30 feet) thick clay confining unit. The Lower Aquifer (depth to water of 56 meter (185 feet) to 65 meter (215 feet) below ground surface) is a confined saturated zone (i.e., an unconfined to semi-confined condition) with low well yield and poor water quality. The Lower Aquifer is monitored with 22 wells and piezometers. Water flows in the Lower Aquifer from the southwest to the northeast, exiting the USEI site under the eastern boundary. Lower Aquifer well yields are all less than 2 liters per minute (0.5 gallons per minute).

The total dissolved solids in both aquifers are above 900 mg/L, indicating poor water quality. Given the low yields and water quality, neither aquifer is considered a viable or economically significant resource.

## 5.5 Ecological Resources

NRC consulted the Missouri Office of the U.S. Fish & Wildlife Service in 2004 (ADAMS No. ML043140063) and again in 2009 (ADAMS No. ML092680602). In a letter dated December 22, 2009 (ADAMS No. ML100070569), the U.S. Fish & Wildlife Service states that there are “no federally listed, proposed or candidate species or critical habitat on or near the project site.” However, the U.S. Fish & Wildlife Service also suggested that the NRC contact the Missouri Department of Conservation for information concerning Missouri Species of Conservation Concern. The NRC contacted the Department of Conservation (ADAMS No. ML100760452) and received a response dated March 25, 2010 (ADAMS No. ML101040849). The Department of Conservation’s response stated, “[h]eritage records identify no wildlife preserves, no designated wilderness areas or critical habitats, no state or federal endangered-list species records within two mile of the plant, or downstream until the confluence with the Mississippi River.” Westinghouse (2005) has also noted that no significant ecological resources have been identified within the 10-acre project site.

USEI has also completed a consultation with the U.S. Fish & Wildlife Service, which described several protected species in the general area. However, the Idaho Fish and Game Department has since concluded that no federally listed endangered or threatened species were located on, or near, the USEI site (American Geotechnics, 2006). To the west, north, and east of the USEI site is the Morley Nelson Snake River Birds of Prey National Conservation Area (SRBPNCA), established in 1993 by Public Law 103-65. It contains 196,000 hectares (485,000 acres) of public lands set aside by the Bureau of Land Management (BLM) as part of its National Landscape Conservation System. The SRBPNCA hosts about 800 pairs of falcons, eagles, hawks and owls that arrive each spring to mate and raise their young (BLM, 2008).

## 5.6 Air Quality

### 5.6.1 Air Quality at the HDP

The HDP lies within the Metropolitan St. Louis Interstate Air Quality Control Region. This region is an ozone non-attainment area under the National Ambient Air Quality Standards (NAAQS). In addition a portion of Jefferson County (the city of Herculaneum) is a lead non-attainment area.

Pursuant to 10 CFR 70.59, "Effluent Monitoring Reporting Requirements," WEC provides NRC a semiannual report of air monitoring for radionuclides at five locations around the HDP site. Concentrations of gross alpha-emitting radionuclides, during the period January 2006 through June 2009, have ranged from  $8\text{E-}16$   $\mu\text{Ci/mL}$  to  $3.1\text{E-}15$   $\mu\text{Ci/mL}$ , or 1.6% to 6.2% of the effluent discharge limit.

### 5.6.2 Air Quality at USEI

The USEI site is located in an attainment area for NAAQS. Air emissions from USEI are permitted under a June 2006 permit issued by IDEQ (Permit No. 073-00004).

USEI performs radiological air sampling at five locations at the site. Observed concentrations of alpha-emitting uranium-238 in air at the site between September 2007 and July 2009 range from a low of  $1.2\text{E-}17$   $\mu\text{Ci/mL}$  up to  $5.5\text{E-}14$   $\mu\text{Ci/mL}$ . These values range from 0.00006% to 0.3% of the 10 CFR Part 20, Appendix B, Derived Air Concentration (DAC) for class Y uranium-238 compounds (e.g.,  $\text{UO}_2$ ,  $\text{U}_3\text{O}_8$ ) in air (WEC, 2009).

### 5.7 Noise

The ambient noise baseline at the HDP is dominated by vehicular traffic on State Road P and trains on the Union Pacific rail line. As is common in rural areas, variations in noise levels result from changing weather conditions, local traffic conditions, rail traffic, and seasonal effects of vegetative cover.

Current noise at the USEI site results from use of heavy vehicles and earth-moving equipment used to construct disposal cells and manage and transport wastes. However, the USEI site is located in the Owyhee Desert nearly 1.6 kilometers (1 mile) from the nearest residence, 16 kilometers (10 miles) from the nearest school, 29 kilometers (18 miles) from the nearest airport, and nearly 48 kilometers (30 miles) from the nearest hospital. Therefore, noise levels are significantly attenuated in populated areas outside the USEI site.

### 5.8 Historic and Cultural Resources

#### 5.8.1 Historic and Cultural Resources at the HDP

Affects on historic and cultural resources from decommissioning activities at the HDP will be limited to the site. Historic and cultural resources are protected under the National Historic Preservation Act of 1996 (16 U.S.C. §§ 470a-470w), Executive Order 11593 – Protection and Enhancement of the Cultural Environment (36 FR 8921; May 15, 1971), the Archaeological and Historic Preservation Act of 1974 (16 U.S.C. §§ 469-469c), and the Historic Sites Act of 1935 (16 U.S.C. §§ 461-467). Due to the potential historical significance of the site, the National Park Service and State Historic Preservation Officer required that a Historic American Engineering Record (HAER) be compiled for the builds on the site, including photographic documentation of both the process equipment and buildings. The completion of the HAER (WEC, 2003) adequately documents the historical resources and satisfies the requirements of §106 of the National Historic Preservation Act.



## 5.8.2 Historic and Cultural Resources at USEI

At the USEI site, one small potentially significant historic site has been identified at the southern boundary. The Bureau of Land Management has inspected and inventoried the site, declared that no further cultural work was necessary, and granted full cultural resource clearance. According to the State Historical Preservation Office (SHPO), the site contains no property eligible for the National Register of Historic Places (American Geotechnics, 2006)

## 5.9 Visual/Scenic Resources

### 5.9.1 Visual/Scenic Resource at the HDP

The viewshed surrounding the Hematite site is limited. Since a majority of people passing through the site do so on State Road P, the viewshed is limited to bottomland forest, pasture fields, East Lake, and plant facilities located south of State Road P and the forested bluffs and stream valleys located north of State Road P.

### 5.9.2 Visual/Scenic Resource at USEI

The USEI site complies with IDAPA 58.01.06-013.G, which specifies that the boundaries of the active portions of the facility “shall not be located closer than one thousand (1,000) feet from the boundary of any state or national park, or land reserved or withdrawn for scenic or natural use including, but not limited to, wild and scenic areas, national monuments, wilderness areas, historic sites, recreation areas, preserves and scenic trails.”

Bruneau Dunes State Park is located approximately 48 kilometers (30 miles) southeast. The Snake River Birds of Prey National Conservation Area (SRBPNCA) occupies several miles of the Snake River and adjacent lands to the northwest, but the boundaries of the area are greater than 300 meters (1,000 feet) from any portion of the facility. The site also maintains a 150 meter (500 foot) inactive buffer zone between active facilities on USEI property, and adjacent BLM-owned land to ensure that monitoring wells and associated access roads would not be required on BLM-owned land adjacent to the site.

## 5.10 Socioeconomics

### 5.10.1 Socioeconomics at the HDP

The population of Jefferson County rose 15.6 percent in the period between the 1990 and 2000 census. Unemployment over the same period dropped from 7.7 percent in 1990 to 3.2 percent in 2000. The nearest populated settlement is the community of Hematite, Missouri, which had a population of 125 in 1990. The cities of Festus and Crystal City are located 3.5 miles northeast of the site. The population in these cities was 13,900 in 2000.

### 5.10.2 Socioeconomics at USEI

The USEI site has a significant effect on economic activity in Owyhee County. USEI is the largest property tax payer in the county and Bruneau-Grand View School District (approximately 15 percent of the District's total revenue). USEI is also Owyhee County's largest private

non-agricultural employer. USEI commissioned an economic impact study in 2005 (Section 6.2 of Attachment 7 of ADAMS No. ML100320540), the results of which are provided in Table 1.

Table 1. Economic Impact of USEI in Owyhee County, Idaho

Description	Economic impact
Jobs provided	250
Payroll	\$14.8 million
Direct spending	\$12.5 million
Indirect spending	\$19.1 million
Taxes paid (Elmore & Owyhee County & State of Idaho)	\$1.75 million
Fees paid	\$3.0 million

## 5.11 Public and Occupational Health

### 5.11.1 Public and Occupational Health at the HDP

There are no known public health effects associated with current operations at the HDP. Both public and occupational health and safety at the HDP site is regulated by several local, State and Federal agencies under numerous laws, licenses and permits (WEC, 2009c).

Table 2 provides baseline data for the HDP's occupational health and safety record after the completion of manufacturing operations in 2001 (Attachment 1 of ADAMS No. ML100320540).

Table 2. Work-related injuries at the HDP

Year	Work Hours	Injuries	OSHA cases	Fatalities	Injuries per 10,000 hours
2001	438,404	67	50	0	1.5
2002	115,832	11	5	0	1.0
2003	86,736	1	0	0	0.1
2004	52,208	0	0	0	----
2005	169,739	18	3	0	1.1
2006	144,480	26	1	0	1.8
2007	57,760	0	0	0	0
2008	114,000	0	0	0	0
2009(1 <sup>st</sup> Qtr)	32,811	0	0	0	0
TOTAL	1,211,970	123	59	0	1.0

### 5.11.2 USEI

Worker health at the USEI site is regulated by OSHA, EPA, and equivalent State regulations. All personnel receive 24-hour Occupational Safety and Health Administration training (so-called "HAZWOPER" training), prescribed in 29 CFR Part 1910, "Occupational Safety and Health Standards." Employees are also subject to training under the Toxic Substances Control Act (TSCA) [15 U.S.C. §§ 2601 – 2692]. All employees receive a pre-employment physical and

employees assigned to hazardous waste operations are subject to annual medical surveillance. USEI conducts two unannounced evacuation drills annually. The regulations in 29 CFR Part 1910 also address requirements for respiratory protection, lock out and tag out procedures, confined space entry procedures, fire prevention, material handling and storage procedures, hearing conservation, and others.

The USEI compliance history for the period from 2003 to 2009 (USEI, 2009) shows no violations identified by the Idaho Department of Environmental Quality (IDEQ) during annual RCRA facility inspections in 2003 to 2005. In 2006, IDEQ noted 4 minor violations of its Part B permit regarding whether USEI had adequately documented inspections. In 2008, IDEQ noted six minor violations, three of which pertained to timeliness of required reports. The other violations in 2008 pertained to: maintenance of documentation for multi-generator non-hazardous waste profiles; maintenance of container storage area surface coatings; observations of non-hazardous fugitive dust from a containment building. EPA did not find any violations of requirements of the Toxic Substances and Control Act during annual inspections from 2004 to 2008. An air quality permit inspection by IDEQ in 2008 resulted in warning letter, which has been resolved.

Table 3. Work-related injuries at USEI

<b>Year</b>	<b>Work Hours</b>	<b>Injuries</b>	<b>OSHA Cases</b>	<b>Fatalities</b>	<b>Injuries per 10,000 hours</b>
2001	87,362	9	5	0	1.0
2002	81,707	8	3	0	1.0
2003	93,490	18	2	0	1.9
2004	94,872	16	3	0	1.7
2005	121,048	20	4	0	1.6
2006	158,800	22	5	0	1.4
2007	180,683	40	7	0	2.2
2008	179,072	30	3	0	1.7
2009 thru November 1	138,005	18	3	0	1.3
<b>TOTAL</b>	<b>1,135,039</b>	<b>181</b>	<b>35</b>	<b>0</b>	<b>1.6</b>

## 5.12 Waste Management

The USEI facility is a hazardous waste, PCB, and low-activity radioactive waste disposal facility that provides treatment and disposal services to both government and private industry waste generators. The facility receives radioactive waste from the U.S. Army Corp Formerly Utilized Sites Remedial Action Program (FUSRAP), and is permitted to receive a range of naturally-occurring radioactive materials. The facility's permit allows disposal of NRC-exempted low activity fission and activation products, and special nuclear material.

The USEI facility currently operates two RCRA/TSCA landfills to dispose of containerized solids, bulk solids, and electrical equipment (small capacitors, transformer carcasses, etc.) Construction of Cell 14 was completed in 1993. Cell 15, construction of which will be completed in 2009, is designed to contain over 4.8 million cubic yards of material. Post-closure criteria specified in the USEI RCRA permit include a 15 mrem/year limit on dose to the public during a post-closure performance period of 1,000 years. The facility permit also specifies that the total concentration of source, byproduct and special nuclear material in waste must be less than 3,000 pCi/gram. USEI states that the average concentration of radioactive material in waste disposed of at the USEI facility between 2000 and 2008 is approximately 63 pCi/g (ADAMS No. ML101200047.)

## **6. Environmental Impacts**

### **6.1 Proposed Action**

The NRC evaluated whether there are significant environmental impacts related to the proposed action. The NRC considered adverse and cumulative impacts to each resource area.

#### **6.1.1 Land Use**

Excavation, characterization, packaging and transport offsite of contaminated soils within the 10-acre affected area of the HDP is not expected to result in any impacts on land use outside the WEC property. WEC plans to use interim storage and laydown areas well within its 93-hectare (228-acre) property. Also, interruptions of the use of the existing Union Pacific rail or State road that pass through the site as a result of decommissioning activities are expected to be infrequent and temporary. Likewise, the addition of 23,000 m<sup>3</sup> (30,000 yd<sup>3</sup>) of waste to a disposal facility in which existing and future planned disposal cells have a capacity for 3,670,000 m<sup>3</sup> (4,800,000 yd<sup>3</sup>) will not directly affect future land use at the USEI facility.

#### **6.1.2 Transportation**

WEC plans to use existing rail lines to transport waste to USEI. Nearby St. Louis, Missouri, is the nation's third largest rail center, with over 85 Union Pacific trains passing through each day (Union Pacific, 2008). Union Pacific, one of seven national Class I rail service providers, originated an average of over 120,000 rail cars in Missouri during the period 2005 to 2008 (Union Pacific, 2008). The 400 gondola rail cars that are required to transport the HDP wastes over a period of about 2 years are a small fraction (< 0.4%) of the average number of rail cars originated in Missouri annually, and would not have a significant impact on rail transportation resources. Waste from the HDP will be shipped in compliance with NRC and DOT regulations for IP-1 packages containing LLW. The waste packages will also be fissile exempt under 10 CFR Part 71.

WEC will load waste from the HDP into gondola cars at an onsite rail spur. The risk to human health from the transportation of all radioactive material in the U.S. was evaluated in NUREG-0170, "Final Environmental Statement on the Transportation of Radioactive Materials by Air and Other Modes." The principal radiological environmental impact during normal transportation is minimal direct radiation exposure to transport workers and nearby persons from radioactive material in the package. The average annual individual dose from all radioactive material transportation in the U.S. was calculated as approximately 0.005 mSv per

year (0.5 mrem per year), well below the §20.1301 limit of 1 mSv per year (100 mrem per year) for a member of the public. (NRC, 2006b)

In Idaho, the waste will be offloaded from the railcars onto trucks. It was estimated that eight individuals would be assigned to survey the waste prior to offloading from the gondola car to the trucks and that 14 drivers would transport the waste a total of 10 miles to the USEI site. WEC estimated that 1200 of truck loads will be required to transport the entire 23,000 m<sup>3</sup> to USEI. Each trip was estimated to take 45 minutes. WEC estimated the dose to the surveyor to be 0.001 mSv per year (0.1 mrem per year), while the dose to the truck drivers was estimated at 0.005 mSv per year (0.5 mrem per year).

### 6.1.3 Geology and Soils

Environmental impacts on HDP soils and geology will be small and temporary. WEC plans to use erosion controls to restrict the transport of sediment within the project area and to protect nearby surface waters (WEC, 2009c). Additional mitigation measures are described in Section 7 of this EA. Similarly, design features and requirements at the USEI site will ensure that disposal of wastes has a minimal affect on site geology and soils.

### 6.1.4 Water Resources

At the HDP, permitted surface water discharge limits would continue to apply during decommissioning activities. WEC states (WEC, 2009c) that both Site Creek/Pond and Northwest Site Creek could require remediation to remove contamination in sediment and nearby soil. WEC will divert streams, as necessary, to complete remediation activities on contaminated streambeds. Remediation activities are not expected to result in long-term changes to stream locations, or result in any long-term degradation of water quality. As a result, the proposed action should have no permanent impact on water resources at the HDP. At the USEI site, the disposal of LLW from the HDP is assumed to result in contamination of the Upper and Lower Aquifers during the 1,000 year post-closure period of performance. However, given the poor water quality and low yields, such contamination is not expected to result in degradation of important water resources in the human environment.

### 6.1.5 Ecological Resources

There are no significant ecological resources that are likely to be affected by decommissioning and waste disposal operations at either the HDP or USEI sites, respectively. A buffer area around the USEI site ensures protection of the SRBPNCA from waste disposal operations.

### 6.1.6 Air Quality

Excavation, characterization, packaging and transport offsite of contaminated soils within the 4-hectare (10-acre) affected area of the HDP is not expected to result in the generation of significant direct or diffuse air emissions. The levels of attainment and non-attainment under the NAAQS within the HDP and USEI regions will not change as a result of this action.

Section 6.1.11 includes an evaluation of public radiation doses from fugitive air emissions resulting from decommissioning activities at the HDP. At the USEI site, fugitive air emissions will be monitored and are likely to remain comparable to emissions that occur during similar LLW disposal actions.

#### 6.1.7 Noise

Site remediation at the HDP will temporarily increase noise levels in the immediately vicinity of the site. However, noise levels will not be significantly louder than the noise levels experienced when the plant was operating. Offsite noise from USEI site operations will not increase as a result of processing and disposing of a comparatively small quantity of additional waste from the HDP.

#### 6.1.8 Historic and Cultural Resources

At the HDP, since the National Park Service and State Historic Preservation Officer has required that a Historic American Engineering Record (HAER) be compiled for the buildings on the site, including photographic documentation of both the process equipment and buildings, no impacts to potential historical resources are anticipated from soil excavation in the central site tract (WEC, 2009c).

At the USEI site, no additional impacts on historic and cultural resources are expected as a result of disposal operations involving HDP wastes.

#### 6.1.9 Visual and Scenic Resources

There will be a temporary negative impact on visual resources at the HDP as decommissioning proceeds, and building debris and excavated soils and wastes are stockpiled for segregation, characterization and packaging for shipment to an off-site disposal facility. However, at the completion of decommissioning activities, there will be a significant reduction in the number of structures on-site, and any disturbed land will be restored. Therefore, there are no long-term adverse impacts on the viewshed resulting from decommissioning at the HDP, and disposal of wastes off-site.

At the USEI site, the small additional quantity of wastes from the HDP will not noticeably alter the viewshed or scenic resources at the site. Ultimately, the active disposal cells will be closed and covered in accordance with RCRA requirements.

#### 6.1.10 Socioeconomics

The start of building demolition and soil excavation activities at the HDP will result in a temporary increase in the workforce at the HDP. This would result in a short-term beneficial impact on the local economy. However, the short-term influx of workers is not expected to result in permanent beneficial impacts on local infrastructure, including schools, hospitals, local businesses. In the long term, decommissioning the site and license termination will allow the site to be put to productive local use. With regard to USEI, the disposal of 23,000 m<sup>3</sup> (30,000 yd<sup>3</sup>) of debris and soil from the HDP, which is a small fraction of the total amount of waste which USEI is capable of receiving over the expected time period of HDP shipments, is not expected

to significantly alter the number of jobs or create significant beneficial direct or indirect economic effects.

#### 6.1.11 Public and Occupational Health\*\*

At the HDP, decommissioning activities will be expected to slightly increase the risk of exposure to both WEC workers and nearby members of the public to both radiological and non-radiological contaminants. Radiological contaminants associated with dust, soil and concrete debris will include uranium isotopes and small quantities of fission products and transuranic elements. Table 4 includes estimates provided by WEC (WEC, 2005) of uranium concentrations in soil excavated at the site.

Table 4. Concentration of Uranium Isotopes in Soil at the HDP

Uranium isotope	Concentration (pCi/g)
uranium-234	1,758
uranium-235	93
uranium-238	132
<b>Total</b>	<b>1,983</b>

Worker doses during decommissioning and soil excavation will be limited by specific radiological control features and procedures used by WEC during decommissioning activities, in order to meet worker radiation protection standards in 10 CFR Part 20. These measures will include specific controls to prevent a criticality accident that might result from improper handling of wastes containing high concentrations of SNM or individual items that contain SNM. Based on past experience at the HDP, NRC anticipates that worker injuries associated with decommissioning will remain lower than 2 cases per 10,000 person-hours worked (see Table 2 above), and that there will be no fatalities among site workers.

With regard to the potential for public radiological dose, WEC completed a very conservative and simple dose assessment, taking into account the maximum likely dust loading in air, human breathing rates, human dose conversion factors from Federal Guidance Report No. 11 (FGR, 1988) and Equation 1 of Regulatory Guide 1.145 (NRC, 1983). Using this methodology and associated assumptions, WEC estimated downwind doses at the nearest residence of less than 0.02 mSv per year (2 mrem per year). This estimate clearly bounds the public dose from decommissioning activities, since this simple calculation doesn't account for several mitigating factors, including, but not limited to, any efforts by WEC to reduce dust loading, the fact that residents will be indoors a significant portion of the time, and the fact that the wind does not blow continuously in any one direction. Other human dose pathways (for example, dispersion of contaminants into surface waters) are not likely to affect members of the public to any greater extent than the air pathway described above. Small non-radiological impacts to worker safety may also be associated with excavation of wastes containing hazardous chemicals, including: hydrochloric acid, hydrofluoric acid, potassium hydroxide, tetrachloroethylene, polychloroethylene, alcohols, and oils. Other hazardous substances that may be encountered include asbestos, lead pipe gaskets. Worker exposure to these substances is subject to Occupational Safety & Health Administration regulations at 29 CFR Parts 1910 and 1926, "Safety and Health Regulations for Construction." EPA regulations at 40 CFR Part 61, Subpart M, "National Emission Standard for Asbestos," governs the handling of asbestos-containing materials. Transportation of hazardous waste is subject to EPA regulations in 40 CFR Parts

260 through 272. WEC programs designed to ensure compliance with these regulations (WEC, 2009c) will ensure that impacts to worker health remain small. The general public is also protected by these programs insofar as the measures identified in the Health and Safety Plan (WEC, 2009c) prevent spills and offsite releases of hazardous chemicals.

Based on the nature of decommissioning activities, and, specifically, past industry experience in nuclear facility decommissioning, there is a very low likelihood of significant environmental impact from either accidents or malevolent acts against the HDP.

At the USEI site, NRC does not expect the small amount of additional waste received from HDP to significantly alter USEI's worker safety compliance record, as described in Section 5.11.2. Also, based on the nature of hazardous waste and LLW disposal operations, and, specifically, past industry experience, there is a very low likelihood of significant environmental impacts resulting from either accidents or malevolent acts against the USEI facility.

#### 6.1.12 Waste Management

Table 5 contains estimates provided by WEC of the expected concentrations for the target radionuclides following excavation and aggregation.

Table 5. Expected concentrations of target radionuclides in waste

Radionuclide	<sup>226</sup> Ra	<sup>232</sup> Th	<sup>99</sup> Tc	<sup>234</sup> U	<sup>235</sup> U	<sup>238</sup> U
Concentration (pCi/g)	1	1.2	27	113	5.5	18

The total activity concentration (sum of all radionuclides and progeny) for this waste is approximately 226 pCi/g, or about 8% of the 3,000 pCi/g disposal limit at USEI. WEC estimates that the peak public dose resulting from disposal of 23,000 m<sup>3</sup> (30,000 yd<sup>3</sup>) of waste with this concentration will be 0.0092 mSv per year (0.92 mrem per year), or about 6% of the 0.15 mSv per year (15 mrem per year) post-closure limit contained in the USEI RCRA permit. However, the actual estimate of projected future dose from disposal of HDP waste will be based on measurements of material actually received at the facility, and may be lower than this projection. Therefore, disposal of HDP waste at the USEI site is a moderate to low impact on remaining LLW disposal availability at USEI.

#### 6.1.13 Alternative - Disposal at EnergySolutions LLW facility.

As described in Section 4.2, beyond the no-action alternative, NRC also considered the environmental impacts associated with management of HDP wastes at the EnergySolutions facility in Clive, Utah.

Land use impacts at both the USEI and EnergySolutions waste disposal facilities are similar. The land on which each facility operates will be dedicated to waste operations and post-closure maintenance for the foreseeable future. There are no impacts on land use in the immediate vicinity of either site.



Transportation-related environmental impacts associated with transport by rail would be similar for each site. The distance to the USEI site from Hematite, MO is about 320 kilometers (200 miles) (or about 15%) further than the distance to the EnergySolutions' Clive site. As a result, the rail operator radiation doses and transportation-related air emissions would be slightly higher for the proposed action.

There is no significant difference in the impact to soils at the EnergySolutions site as compared to the USEI site. Operations at both sites involve disturbance of surface soils in order to dispose of LLW. Similarly, at both the EnergySolutions and USEI sites, surface runoff is controlled, and there are minimal effects of disposal operations on potable groundwater. Therefore, the impacts of disposal operations on water resources are minimal. Air quality impacts from waste management and disposal operations are expected to be similar at both sites, given the remote nature of both facilities from nearby ecological resources, residences or places of business. For the same reason, the environmental impacts on noise and visual and scenic resources are minimal. Historic and cultural resources within both sites have been surveyed and protected, as needed, under applicable laws.

The NRC compared the socioeconomic impacts of the disposal of 23,000 m<sup>3</sup> (30,000 yd<sup>3</sup>) of LLW at the EnergySolutions facility with those impacts at the USEI facility. Based on information reported by EnergySolutions, gross revenue within its Logistics, Processing and Disposal business segment, most of which involves disposal operations at the Clive site, were \$293,025,000, \$262,801,000, and \$246,810,000 in calendar years 2006, 2007, and 2008, respectively. EnergySolutions has attributed the decrease over this period to processing of lower waste volumes and lower revenues at its Clive, Utah and Bear Creek, Tennessee facilities. (EnergySolutions, 2009). Assuming EnergySolutions' waste vendor charges to the HDP were \$1 per pound (NUREG-1307, Table A.3), and that disposal operations will span 2 years, the annualized disposal costs of \$25,000,000 would be a moderate change in gross revenues for EnergySolutions. Therefore, the socioeconomic effects in the Salt Lake City region associated with this potential waste stream are expected to be low to moderate. With regard to worker and public health impacts from disposal operations, EnergySolutions is licensed by the State of Utah to receive Class A LLW as defined in Utah Administrative Code R313-15-1008, and Class A Mixed LLW. EnergySolutions may also receive LLW containing SNM below certain concentration limits, as specified in its State of Utah license. Under the radioactive materials license for the Clive disposal facility, EnergySolutions maintains site-wide safety and environmental protection programs, including a radiological control program, worker training, and a policy for maintaining worker radiation doses as low as reasonably achievable. As a result, worker and public health impacts from receipt of HDP LLW at the Clive facility would be low.

EnergySolutions has stated that it has remaining capacity for Class A LLW that would dispose of all Class A waste from the 104 operating nuclear power plants in the United States, from both on-going operations and ultimate decommissioning of these plants, and still have approximately 50 million cubic feet of capacity remaining (EnergySolutions, 2009). Disposal of 23,000 m<sup>3</sup> (810,000 cubic feet) from the HDP would have minimal impact on EnergySolutions' remaining disposal capacity.

Based on the foregoing, the NRC staff determined that, as with the proposed action, there are no significant environmental impacts associated with this alternative.

## 6.2 Cumulative Impacts Assessment

In recent history, a number of NRC licenses have requested authorization for disposal of LLW under 10 CFR 20.2002 at the USEI facility. As noted above, USEI's RCRA permit states that USEI must ensure that public dose must be less than 15 mrem per year for a 1,000 year period of compliance post-closure. It is USEI's practice to verify compliance with this dose limit upon receipt of each waste consignment. Therefore, the cumulative radiological impacts associated with other past, present, and reasonably foreseeable future similar actions will remain low.

## 7. Mitigation Measures

WEC has identified a number of mitigation measures associated with its decommissioning activities. An onsite rail spur will facilitate rail transportation of decommissioning wastes and minimize impacts on local roads. WEC intends to grade and re-seed soils that are affected by waste exhumation and building demolition. According to WEC, the "site will be restored in a manner that blends in with the surrounding topography and provides suitable drainage patterns similar to existing surface water drainage patterns. WEC intends to use stormwater runoff controls, including dikes and berms and sediment/silt control fencing to minimize the movement of contaminants. Additional engineering controls will be used to reduce fugitive emissions of contaminants to the air.

## 8. Monitoring

WEC will continue to implement an Effluent and Environmental Monitoring Program. Groundwater monitoring will continue as decommissioning, waste treatment and characterization, and waste packaging and transportation activities proceed. Work areas will be monitored by the site Radiation Safety Officer (RSO) and Environmental, Health and Safety (EH&S) Manager, in accordance with NRC requirements and applicable NRC license conditions. Monitoring activities at the USEI site, including groundwater monitoring, worker medical surveillance, and maintenance of onsite contingency plans.

## 9. Agencies and Persons Consulted

The NRC prepared a draft EA and sent it to the U.S. Fish and Wildlife Service by letter dated January 4, 2011 (ADAMS No. ML103610359). Previously, the U.S. Fish and Wildlife Service stated, in its response letter (ML1000705691) dated December 22, 2009, there are "no federally listed, proposed or candidate species or critical habitat on or near the project site." The NRC also contacted the Missouri Department of Conservation for information concerning Missouri Species of Conservation Concern (ADAMS No. ML100760452). The NRC received a response dated March 25, 2010 (ADAMS No. ML101040849). The Department of Conservation's response stated, "Heritage records identify no wildlife preserves, no designated wilderness areas or critical habitats, no State or Federal endangered-list species records within two mile of the plant, or downstream until the confluence with the Mississippi River." The NRC also provided a draft EA to the Missouri Department of Natural Resources and the Idaho Department of Environmental Quality by letters dated December 29, 2010 (ML103570231 and ML103570126, respectively). In a letter dated January 27, 2011 the Missouri Department of Natural Resources (ML11390624) stated that they had no comment with respect to the draft EA. No comments were received from the Idaho Department of Environmental Quality.

On April 25, 2011, the NRC published in the *Federal Register* (76 FR 22926) a notice of the availability for public comment of a draft of this document and the NRC's draft finding of no significant impact. Members of the public had until May 25, 2011, to provide comments on a draft of this environmental assessment. No comments were received.

## 10. Conclusion

The NRC has concluded that the proposed action to grant a license amendment to WEC HDP, and an exemption to USEI from the requirements for a license under 10 CFR 30.3 and 70.3 with respect to HDP's disposal of approximately 23,000 m<sup>3</sup> (30,000 yd<sup>3</sup>) of soil and debris containing low concentrations of byproduct material and special nuclear material, is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest as it will allow WEC to complete decommissioning of the HDP.

The NRC has prepared this EA in support of the proposed action to issue an amendment the WEC HDP license allowing disposal of certain LLW at the USEI hazardous waste disposal facility in Grand View, Idaho. On the basis of this EA, NRC has concluded that there are no significant environmental impacts and the issuance of a license amendment does not warrant the preparation of an Environmental Impact Statement. Accordingly, it has been determined that a Finding of No Significant Impact is appropriate.

## 11. Preparer

David D. Brown is a Senior Health Physicist at the Nuclear Regulatory Commission and is certified by the American Board of Health Physics in the comprehensive practice of health physics. Mr. Brown has a Bachelor of Science degree in physics from Muhlenberg College, and a Master of Science degree in environmental engineering from Clemson University. Mr. Brown has 15 years of facility decommissioning, environmental monitoring, and regulatory experience.

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