September 30, 2011

Mr. E. Kurt Hackmann
Director, Hematite Decommissioning Project
Westinghouse Electric Company
3300 State Road P
Festus, MO 63028

SUBJECT: ENVIRONMENTAL ASSESSMENT, HEMATITE DECOMMISSIONING PLAN, WESTINGHOUSE ELECTRIC COMPANY, LLC, HEMATITE, MISSOURI (LICENSE NO. SNM-33)

Dear Mr. Hackmann:

By letter dated August 12, 2009, Westinghouse Electric Company, LLC (WEC) submitted to U.S. Nuclear Regulatory Commission (NRC) a request to amend the Hematite License (SNM-33). Specifically, WEC requested approval of the Hematite Decommissioning Plan (DP) and a revision to the Hematite License Application.

To support this licensing action, NRC staff prepared a draft environmental assessment (EA) and provided a copy of the draft document to the Missouri Department of Natural Resources (MDNR) for comment on April 15, 2011. NRC received comments from MDNR on May 13, 2011, and revised the EA to address these comments.

NRC is issuing the enclosed final EA and Finding of No Significant Impact (FONSI) for the proposed action. The FONSI was published in the *Federal Register* on September 29, 2011 (76 FR 60557) but with the incorrect NRC's Agencywide Documents Access and Management System (ADAMS) number. The correct ADAMS number is ML112101726. The license amendment and safety evaluation report for the proposed action can now be issued following publication of this Notice.

In accordance with 10 CFR 2.390 of the NRC's "Rules of Practice for Domestic Licensing Proceedings and Issuance of Orders," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of ADAMS. ADAMS is accessible from the NRC Web site at http://www.nrc.gov/reading-rm/adams.html.

If you have any questions regarding this letter or its accompanying SER, please contact me at (301) 415-5928 or via email at john.hayes@nrc.gov.

Sincerely,

/RA/

John J. Hayes, Senior Project Manager
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Decommissioning and Uranium Recovery
Licensing Directorate
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

License No.: SNM-33
Docket No.: 070-0036

Enclosure: Environmental Assessment

cc w/o enclosure:
Westinghouse-Hematite Service List

If you have any questions regarding this letter or its accompanying SER, please contact me at (301) 415-5928 or via email at john.hayes@nrc.gov.

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DISTRIBUTION:
J. Tapp, RIII

ML112101726

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U.S. NUCLEAR REGULATORY COMMISSION

OFFICE OF FEDERAL AND STATE MATERIALS AND ENVIRONMENTAL MANAGEMENT PROGRAMS

DIVISION OF WASTE MANAGEMENT AND ENVIRONMENTAL PROTECTION

ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT RELATED TO ISSUANCE OF AMENDMENT NO. 57 TO MATERIALS LICENSE NO. SNM-33, WESTINGHOUSE ELECTRIC COMPANY, LLC HEMATITE DECOMMISSIONING PROJECT LOCATED IN HEMATITE, MISSOURI

DOCKET NO. 70-36

SEPTEMBER 2011

Table of Contents

LIST OF ACRONYMS

ABB	Asea Brown Bovier
ADAMS	Agency Wide Documents Access and Management System
AEA	Atomic Energy Act of 1954, as amended
AEC	Atomic Energy Commission
ALARA	As Low As Reasonably Achievable
Am-241	Americium-241
BNFL	British Nuclear Fuels Limited
CE	Combustion Engineering
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act or Superfund Act
CFR	Code of Federal Regulations
DCGL	Derived Concentration Guideline Level
DOE	Department of Energy
DP	Decommissioning Plan
EA	Environmental Assessment
EPA	Environmental Protection Agency
ER	Environmental Report
FONSI	Finding of No Significant Impact
FR	Federal Register
FS	Feasibility Study
GAC	General Atomics Company
GOC	Gulf Oil Corporation
HAER	Historic American Engineering Record
HHRA	Human Health Risk Assessment
LLRW	Low Level Radioactive Waste
MCW	Mallinckrodt Chemical Works
MDNR	Missouri Department of Natural Resources
NCP	National Contingency Plan
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act of 1969, as amended
Np-237	Neptunium-237
NPL	National Priorities List
NRC	Nuclear Regulatory Commission
Pu-238	Plutonium-238
Pu-239/240	Plutonium-239/240
Ra-226	Radium-226
RI	Remedial Investigation
ROD	Record of Decision
SARA	Superfund Amendments and Reauthorization Act
SER	Safety Evaluation Report
SLERA	Screening Level Ecological Risk Assessment
Tc-99	Technetium-99
TEDE	Total Effective Dose Equivalent
Th-232	Thorium-232
TRU	Transuranics

U-234	Uranium-234
U-235	Uranium-235
U-236	Uranium-236
U-238	Uranium-238
UF6	Uranium Hexafluoride
UNC	United Nuclear Corporation
USEI	U. S. Ecology, Idaho
USFWS	U. S. Fish and Wildlife Service
VOC	Volatile Organic Compound
WEC	Westinghouse Electric Company

ENVIRONMENTAL ASSESSMENT AND FINDING OF NO SIGNIFICANT IMPACT RELATED TO ISSUANCE OF AMENDMENT NO. 57 TO MATERIALS LICENSE NO. SNM-33, WESTINGHOUSE ELECTRIC COMPANY, LLC HEMATITE DECOMMISSIONING PROJECT LOCATED IN HEMATITE, MISSOURI

1.0 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 the Westinghouse Electric Company, LLC (WEC) for the former Hematite Fuel Cycle Facility in Hematite Missouri. All facility operations associated with the production of nuclear fuel ceased and the facility was placed in a standby mode prior to decommissioning pursuant to License amendment No. 42, which was approved on April 11, 2002.

The original special nuclear material license for the Hematite facility was issued to Mallinckrodt Chemical Works (MCW) on June 18, 1956, by the Atomic Energy Commission (AEC), a predecessor to the NRC. From 1956 through 1974 the facility primarily produced highly enriched uranium for the Federal government under a number of contracts. During the government contract phase, the facility was, at various times, owned by MCW (1956 – 1961), United Nuclear Corporation (UNC) (1961 – 1970), Gulf United Nuclear Fuels Corporation (1970 – 1973), the General Atomics Company (GAC) (1974), and Combustion Engineering Inc. (CE) (1974). From 1975 until the present, the facility has been licensed by the NRC to produce commercial nuclear fuel with low enrichment (< 5%). CE was the initial NRC commercial nuclear fuel licensee. The facility was subsequently acquired by Asea Brown Boveri (ABB) in 1989 prior to the facility being purchased by the WEC in 2000.

Radiological contamination has occurred at the site as the result of operations. The primary radiological contaminants identified include the isotopes Uranium-234 (U-234), Uranium-235 (U-235), Uranium-238 (U-238) and the radionuclide Technetium-99 (Tc-99). Additional radionuclide contaminants identified include trace quantities of Uranium-236 (U-236) and the transuranics (TRU) Plutonium-238 (Pu-238), Plutonium-239/240 (Pu-239/240), Americium-241 (Am-241) and Neptunium (Np-237). The source of the TRU contaminants is believed to have come from the processing of Uranium Hexaflouride (UF6) that had been produced by the U.S. Department of Energy (DOE) from reprocessed spent nuclear fuel. Thorium-232 (Th-232) has been identified in samples collected from the approved onsite burial pit. It is believed that the Th-232 contamination was the result of limited operations associated with the production of thorium fuel. Radium-226 (Ra-226) contamination has also been identified in samples collected from within the burial pit. It is believed that the source of this contamination may be associated with Ra-226 contaminated equipment that was transferred from a Mallinckrodt facility in St. Louis to the Hematite facility.

There has also been non-radiological contamination at the site, primarily volatile organic compounds (VOCs). The non-radiological contamination is regulated by the Missouri Department of Natural Resources (MDNR) under the authority granted to them by the U.S. Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) commonly referred to as the Superfund Act. The site

is identified in the national CERCLA Liability Information System identification data base as No. MOD 985770767. The data base is used to rank sites and to include the most severely impacted sites on a list called the National Priorities List (NPL). The facility and the associated environment impacted by operations have not been included on the NPL nor is it proposed for listing. However, remedial action to clean up the contamination is required. The approved CERCLA action, Record of Decision (ROD) Operable Unit 1 Buried Waste, Impacted Soils, and Sediment was approved on May 18, 2009. The area identified as Operable Unit 1 corresponds to the same areas that have been identified by the WEC as having radioactive contamination requiring remediation.

The NRC and the MDNR have coordinated their efforts in arriving at the remediation of the site to ensure that the final cleanup requirements for both entities are met.

2.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

WEC, in accordance with the requirements found in 10 CFR 70.38, "*Expiration and Termination of Licenses and Decommissioning of Sites and Separate Building or Outdoor Areas,*" has requested that the NRC terminate its license, SNM-33. WEC stated in its request that it will decommission or clean up the site such that, upon license termination, there will be no restrictions placed on the site in regards to future land use. The requirements for license termination and unrestricted land use are found in NRC regulations in 10 CFR Part 20, Subpart E, "*Radiological Criteria for License Termination*," and 10 CFR 20.1402, "*Radiological Criteria for Unrestricted Use*." The NRC must be assured that the proposed WEC actions will meet the established criteria for unrestricted release before the license can be terminated. Detailed information on how the WEC will meet these requirements is found in the WEC Decommissioning Plan (DP) (found in the NRC maintained Agency Wide Documents Access and Management System (ADAMS) under the accession Nos. ML092330123, ML092330125, ML092330127, ML092330129, ML092330131, and ML092330132), various other documents filed in support of the DP which are listed in Chapter 1 of the Hematite DP SER (ML112101630), the Hematite Decommissioning Project Environmental Report (ER) (ML092870403 and ML092870405), the WEC responses to the NRC staff's Requests for Additional Information (RAIs) listed in Chapter 1 of ML112101630 and the July 5, 2011, WEC submittal (ML111880293).

3.0 PROPOSED ACTION

The decommissioning will involve the characterization and removal of low activity and/or low-level radioactive waste (LLRW) that contains the previously identified radiological contaminants. The LLRW will be removed from 40 unlined disposal pits, each of which is about 12 feet deep by 40 feet long by 20 feet wide for which documentation exists. Additional sources of LLRW for disposal included an estimated 20-25 burial pits for which there are no records, contaminated soils above release limits underneath the concrete floor slabs and foundations of the process buildings including underground waste lines, and any surface contaminated soils that are above the unrestricted release limits.

The current volumetric estimate for LLRW removal is 23,000 m^3 (30,000 yd^3); however, it is recognized that this volume may increase based on analytical results generated during the excavation and waste characterization phase of the decommissioning. This volume does not

include the concrete floor slabs of the process buildings, which will be used as a staging area for impacted soils and material during the early stages of the decommissioning. The LLRW will be removed, treated as necessary, and shipped off site for disposal outside the State at an NRC Agreement State licensed facility or other State regulated facility.

NRC staff is presently evaluating WEC's proposal for alternate disposal (i.e., disposal in a facility not currently licensed by the NRC) of impacted site soil and associated debris containing radiological contaminants. Specifically, WEC requests NRC approval for impacted site material that meets the regulatory requirements found in 10 CFR 20.2002, "*Method for Obtaining Approval of Proposed Disposal Procedures,*" to be shipped by gondola rail car for disposal at the U. S. Ecology Idaho, Inc. (USEI) facility near Grand View, Idaho. LLRW that does not meet these criteria will be shipped to either an NRC or an NRC Agreement State LLRW licensed facility for disposal. In addition, if necessary, disposal of radioactive waste material generated during these decommissioning activities can occur at the NRC-licensed Energy Solutions facility in Clive, Utah.

Separate, and occurring before the site remediation described in the WEC DP, is the demolition of specified buildings, the characterization, and removal of rubble and truck transport of the rubble to an approved offsite disposal facility. The approval for the disposal of this material was the subject of the NRC EA and FONSI Related to Issuance of Amendment No. 52 to Materials License No. SNM-33, Westinghouse Electric Company, LLC Hematite Former Fuel Fabrication Facility Located in Festus, Missouri Site published in the *Federal Register* (FR) on June 29, 2006 (71 FR 37124). This approval was reaffirmed in the NRC staff's Safety Evaluation Report (SER) dated December 10, 2010 (ML102990346 and ML102990298).

4.0 ALTERNATIVES TO THE PROPOSED ACTION

4.1 Alternative – No Action

The no action alternative involves leaving known areas of LLRW on site. This approach is not acceptable because the Hematite burial pit and other on-site areas contain residual contamination exceeding NRC's release criteria. This action would be inconsistent with the requirements found in 10 CFR 70.38, "*Expiration and Termination of Licenses and Decommissioning of Sites and Separate Buildings or Outdoor Areas*."

As discussed in Section 2.0, the known areas of LLRW site contamination coincide with the same areas identified as Operable Unit 1. The MDNR CERCLA ROD for Operable Unit 1 requires that buried waste, impacted soils and sediments be removed from the site and disposed of at a permitted site. The CERCLA ROD concluded that leaving the buried waste, impacted soils and sediments in place would potentially allow future site users to be exposed to regulated chemicals above acceptable limits and presented an ecological risk to the environment. The acceptance of the ROD has been formalized between the MDNR and WEC by the signing of a Memorandum of Understanding on May 18, 2009. The no action alternative, leaving the LLRW contamination onsite, would conflict with the State and WEC agreement. Consequently, the no action alternative would conflict with the MDNR CERCLA ROD for Operable Unit 1. Additionally, the MDNR found under the no action alternative residual contamination would remain on site at levels exceeding the applicable or relevant and appropriate requirements of CERCLA. See MDNR CERCLA ROD § 2.11.1.

5.0 AFFECTED ENVIRONMENT

5.1 Site History

The site was originally farmland and was purchased by MCW. On June 18, 1956, the facility was issued an operating license by the AEC, a predecessor agency to the NRC and DOE. In May of 1961, ownership and the license was transferred to the UNC. In 1971 a joint venture was formed between UNC and the Gulf Oil Corporation (GOC) and was renamed the Gulf United Nuclear Fuels Corporation. The facility was operated under this joint venture until November of 1973, at which time GOC purchased UNC's interest in the joint venture and renamed it the Gulf Nuclear Fuels Corporation . In January of 1974, the ownership of the facility was transferred to GAC, a partnership between the GOC and Scallop Nuclear, Inc.

From 1956 to 1974, operations were focused on the production of reactor fuels for research and the production of enriched uranium fuel for the United States Navy and Army reactor programs. Operations involved the conversion of a highly corrosive gas, uranium hexafluoride (UF6), into a variety of solid compounds including the production of nuclear fuel for the Navy's nuclear powered ships and the Army's power reactors. Feed material for the operations came from the AEC regulated or DOE controlled facilities and included spent nuclear fuel that had been recycled through DOE facilities. All recycled fuel feed material used at the facility contained fission byproducts such asTc-99 and transuranics such as Np-237.

In 1974, the site was purchased by CE. In 1989, the company ABB acquired the stock of CE. In April 2000, the site was purchased by British Nuclear Fuels Limited (BNFL). At the time of the purchase, BNFL was the parent corporation to WEC and the Hematite operations were consolidated into the WEC nuclear operations. On October 16, 2006, the WEC was purchased by the Toshiba Corporation. From 1974 until 2001, operations were primarily focused on the production of low enriched (<5% enrichment) uranium fuel for NRC commercially licensed reactors, the fabrication of the fuel assemblies that went into the reactors and the recovery of uranium from scrap material. None of these operations involved recycled fuel containing fission products and transuranics. Production operations at the facility were permanently ceased in June 2001.

5.2 Site Description

The Hematite operational area totals approximately 18 acres (Figure 1, Chapter 14) and is located within property owned by the WEC that totals approximately 228 acres (Figure 2, Chapter 14). The site is located in Jefferson County, Missouri approximately 35 miles south of St. Louis, Missouri. It is approximately ¾ miles north northeast of the unincorporated town of Hematite and 4 ¼ miles west of Festus, Missouri on State Road P. The approximate center of this facility area is N38.20871 latitude and W90.47581 longitude.

Land near the WEC facility is primarily rural agricultural in nature with scattered residences, forested lands in upland areas and hay production or pasture land on the gently sloped terraces between the upland areas and low lying areas along Joachim Creek. There is a small, approximately two acre, limestone quarry located about one mile southwest of the WEC property. There are two private residences located on the site property with the closest being

about 1,000 feet from the central processing area. Other residences are located in the town of Hematite to the west of the property and to the south of Joachim Creek. The Union Pacific railroad effectively bounds the south side of the operations area and State Road P bounds the north side. The production area is bounded to the east by the Northeast Site Creek and to the west by the Site Pond and associated Site Creek whose source of water is an intermittent spring and surface runoff.

5.3 Release Criteria

An NRC licensed site will be considered acceptable for unrestricted release if the calculated dose from any residual radioactive contamination that is above background concentrations is less than or equal to 25 mrem/year measured as the Total Effective Dose Equivalent (TEDE). This limit is found in 10 CFR 20.1402. "*Radiological Criteria for Unrestricted Use*," and is applied to an average member of the group designated as the critical group. In the case of the Hematite DP, the designated critical group is the resident farmer. In addition, WEC is also required to demonstrate that the residual radioactivity has been reduced to a level that is as low as reasonably achievable (ALARA).

5.4 Site Characterization

The Hematite facility and property has been extensively characterized for both radiological and non-radiological contaminants. The primary WEC documents submitted to the NRC include:

(1) Hematite Decommissioning Project Environmental Report (ML092870403 and ML092870405).
(2) Hematite Decommissioning Plan (ML092330123, ML092330125, ML092330127, ML092330129, ML092330131, and ML092330132).
(3) Hematite Supplemental Characterization Report - Books 1 and 2 (ML092870496 and ML092870506).

The primary WEC documents submitted to the MDNR include:

(1) Record of Decision Operable Unit 1 Buried Wasted, Impacted Soils, and Sediment, May 18, 2009.
(2) Proposed Plan – Operable Unit 1 Buried Waste, Impacted Soils, and Sediment, June 25, 2008.
(3) Buried Waste Evaluation Report, March 2007.
(4) Remedial Investigation Report for the Westinghouse Hematite Site, Volumes 1 and 2, January 2007.
(5) Screening Level Ecological Risk Assessment, January 2007, and
(6) Baseline Human Health Risk Assessment, January 2007.

These, and additional Hematite related documents, can be found at the following link: http://www.dnr.mo.gov/env/hwp/fedfac/hematite.htm.

5.4.1 Building Slabs, Burial Sites, Surface and Subsurface Contamination

On-site burial was historically used as a disposal method for contaminated materials and wastes at the Hematite site. Facility records (burial pit logbook records) indicate that the waste burials occurred between July 1965 and November 1970. In addition, interviews with former employees indicate that undocumented on-site burials may have occurred as early as 1958 or 1959. The on-site burial pits were excavated in the clay overburden in the northeast portion of the site (northeast of Building 265). The nominal dimensions of the documented burial pits were 20 feet wide by 40 feet long by 12 feet deep and were reportedly topped with an approximate 4 feet of cover. The historical disposal records indicate that a wide range of wastes were buried in the pits. In addition to the typical solid waste (e.g., drums, pails, bottles, rags, etc.), the buried waste included uranium process metals of various enrichments, metal wastes, liquid and solid chemical wastes, and HEPA filters. Since the facility utilized enriched uranium material (Special Nuclear Material – SNM) in its fuel fabrication processes, there is a potential for SNM to be present in the burial pits. Facility records indicate that on-site burial of radioactive waste materials was terminated in November 1970 as a result of an Atomic Energy Commission (AEC) violation issued to the Hematite facility for failure to adhere to revised AEC regulations (circa June 1970) concerning the quantity of material which could be buried onsite.

The floor slabs from the process and support facilities will not be removed during the demolition and removal of above ground structures. Initially the floor slabs will be sealed (to provide an impermeable base), then used to stage remediation equipment and excavated contaminated material as it is characterized sorted and shipped offsite for disposal. Upon completion of this phase of the decommissioning, the slabs will be broken up and removed and contaminated soil removed from beneath the floor slabs. Contaminated soil removal will also include any underground drain lines found. The radionuclides of concern, or potential for concern, include: U-234, U-235, U-238, Tc-99, and to a less significant extent, Ra-226, Th-232, Am-241, Np-237, Pu-238, and Pu-239/240.

During the early operational period limestone was used as part of a dry scrubber system that was used to remove hydrogen fluoride off gases from the UF6 conversion to fuel processing operations. The spent limestone material became contaminated with low concentrations of Tc-99 during the time period when recycled fuel was being used as feed material. After use, the limestone material was approved for disposal onsite in burial pits and also as a base material for supporting concrete floor slabs when additional facilities were constructed. In addition there is a pile of limestone stored above ground. Another source of contamination is two small evaporation ponds that collectively total approximately 0.5 acres and are located between the railroad and the southwest corner of the process building complex.

5.4.2 Surface Water

The Site Pond to the west of the facility is approximately 0.5 acres in size and is fed by a small spring with an estimated flow of 1-10 gallons per minute (gpm) (0.002-0.02 ft^3/second). Flow from this spring can be intermittent. Surface water runoff also provides water to the pond. Water from the pond enters the Site Creek where it combines with treated effluent from the facility's sanitary water treatment system. The width of the creek is approximately 10 feet and the water depth is 6-8 inches. The stream passes beneath the railroad and joins the Virginia tributary prior to discharging into Joachim Creek.

The Northeast Site Creek originates north of State Road P and passes underneath the road through a culvert. The stream passes approximately 100 feet to the east of the burial pit areas. In the wooded area to the east of the burial pits the stream becomes braided and is approximately 50 feet wide and 1-2 inches deep. After combining with the East Lake tributary the stream passes under the railroad through a forested area for approximately 0.5 miles and discharges into Joachim Creek. The stream is approximately 10 feet wide and six inches deep within the 0.5 mile area.

Joachim Creek flows from west to east and is approximately parallel to the railroad and southern operations boundary of the Hematite facility. The annual mean flow is 132 cubic feet per second and the stream exhibits a seasonal flow pattern with the lowest flow occurring in the July through September time period and the highest flow occurring in the October to June time period. The stream is also characterized by periodic flooding and is considered to be a gaining stream and receives input from shallow groundwater discharge.

Two evaporation ponds were located on the southeast portion of the site, south of the process buildings. The ponds were formally used for the disposal of water suspected of containing VOC and Tc-99 contamination. One of the ponds has been backfilled and the other pond has been modified into a sump for a French drain. Both areas will undergo further remediation. With the exception of the Site Pond/Creek and the site evaporation ponds all radiological sample results from the surface waters and streams sediments were at background levels. VOCs were detected in low concentrations (<1 microgram per liter) below MDNR reporting limits.

There is no known use of surface water as a drinking water source within a four mile radius of the facility and there is no public water supply intakes located on Joachim Creek.

The facility currently discharges water to six outfalls that are regulated under the National Pollutant Discharge Elimination System Permit (NPDES) Number MO-0000761. Non-radiological limits include biochemical oxygen demand, total suspended solids, pH, fecal coliform, total chlorine, flow, ammonia as N, and temperature. Radioactive measurements include gross alpha and gross beta measurements for all radionuclides. The outfall associated with the sewage treatment plant exhibits the maximum radiological contamination. Radiological concentrations have ranged from 5.3 to 28% of the allowable limit for gross alpha and 0.7 to 2.6% of the allowable limit for gross beta. Changes to the NPDES may occur during site remediation.

5.4.3 Ground Water

Hydogeology

The hydrogeologic system at the Hematite facility consists of an overburden zone underlain by the Jefferson City – Cotter Formation, the Jefferson City – Roubidoux contact zone and the Roubidoux Formation.

Based on well completion logs, the overburden consists of clay that varies in depth from about 15-30 feet below the ground surface. At the bottom of the clay layer is a layer of fine grained sand underlain by coarse grain sand and fine to coarse grain gravel. The sand/gravel layer can range in thickness from 0-4 feet under the facility (up to eight feet near Well PL06) and is

generally 15 feet thick adjacent to Joachim Creek. The sand/gravel zone is a source of recharge to Joachim Creek.

Based on the yield rate of the overburden clay and sand/gravel layer with limited thickness, the ground water volume is too low to provide a source of drinking water. A typical value for the overburden clay that is partially completed in the sand/gravel layer is approximately 0.05 gallons per minute or less. A typical value for the sand/gravel layer is approximately 0.5 gallons per minute. By way of comparison, Federal Housing Administration requires that, for a new well construction, the system must be capable of delivering a flow of five gallons per minute over at least a 4 hour period. None of the clay overburden wells are capable of providing this type of yield rate. Further confirmation that these low yield wells are not used for a private water system is provided in a WEC survey of all wells completed within a five mile radius of the site. Results indicated that there were no wells completed in the overburden layer. In addition, the MDNR will not issue a well permit unless, at a minimum, the first 20 feet of the well is cased off to prevent near surface leachate from septic systems from contaminating a potential drinking water source. Additional guidance for groundwater yield to be usable is given in EPA 570/9-91-004 (Homeowner 50-75 gallons per day (gpd)/resident, Campgrounds 15 gpd/camper, Seasonal Cottages 50 gpd/cottage and restaurants 7-10 gpd/patron).

The overburden is underlain by the Jefferson City – Cotter formation, a dolomite with interbedded sandstone and cherty intervals. Beneath the Jefferson City – Cotter formation is the Roubidoux formation, also a dolomite/sandy dolomite with some sandstone interbeds and cherty intervals. The Jefferson City – Roubidoux contact zone is an area of varying thickness that exhibits a lower transmissivity than the formations above and below it.

The hydraulic conductivity, the ease with which water can move through pore spaces or fractures, has been measured for each formation. The transmissivity, a measure of how much water can be transmitted horizontally, has also been measured. The two parameters vary within each formation, but follow the trend of increased hydraulic conductivity and transmissivity as one moves from the overburden to the Roubidoux Formation.

Radiological Contamination

Tc-99 is the only radiological contaminant in groundwater that is detected above the EPA drinking water standard of 900 pCi/liter. The maximally Tc-99 contaminated wells are overburden wells BD-02, and BD-04, which are located beneath Buildings 240 and 253. Both wells are “hybrid” wells screened within the clay and sand/gravel layers. Well BD-04 is located approximately 40 feet down gradient from Well BD-02. From the second quarter of 2008 to the fourth quarter of 2010, the Tc-99 concentration in Well BD-02 has ranged from a low of 21.9 pCi/liter (June 2008) to a high of 6,970 pCi/liter (March 2009). The Tc-99 concentration appears to be declining since it peaked in March 2009 with the most recent (December 2010) result of 3,590 pCi/liter. The Tc-99 concentration in the down gradient Well BD-04 has ranged from a low 1,940 pCi/liter (December 2010) to a high of 6,420 pCi/liter (December 2009) over the same time period (June 2008 to December 2010). As with Well BD-02 the Tc-99 concentration in Well BD-04 appears to be declining over time from its peak concentration in December 2009. Tc-99, when detected in wells screened within the sand/gravel zone found beneath the clay overburden, is typically slightly above the minimum detectable concentration of around 5 pCi/liter. The Hematite DP contains plans for extensive excavations in the immediate area of

wells BD-02 and BD-04 which is expected to remove the source of radiological contamination detected in the wells.

The Jefferson City – Cotter Formation is used, to a limited degree, as a drinking water source for individual residences. The Roubidoux Formation provides a higher yield and is used for private residences and for small municipal supplies. The public water supply well for the town of Hematite (Public Water Supply District # 5), about 2 miles south southeast of the site, is located in the Roubidoux Formation. A second public water supply well is located in Hematite and is maintained for emergency use.

In 2005, the WEC facility was connected to the Public Water Supply District #5 system and was part of the same water supply system that local residents were connected to due to VOC contamination from historic site operations. No groundwater contamination from facility operations have been detected in the public water supply system located in the Roubidoux Formation. Moreover, the facility had drilled a water supply system well on site to a depth of approximately 600 feet in the Roubidoux Formation and this water supply well was continually used from 1956 until 2005. Water from the well was used onsite as a drinking water supply as well as for production needs. All applicable drinking water standards, including those for radionuclides, were met during the period of use for the onsite well and is an indicator that site operations have not radiologically impacted groundwater in the Roubidoux Formation.

5.4.4 Ecological Resources

No unique ecological resources have been identified on the WEC's 228 acre site or the industrialized processing area. The nearby environs are reflective of light residential development and rural agriculture. The four habitat types identified on the property are: (1) bottomland forest, (2) upland forest, (3) grassland and (4) grassland/woodland. The estimated age of the trees in the forested areas is around 40 years. The habitat types listed are ubiquitous to this area.

There have been several consultations with the US Fish and Wildlife Service (USFWS) with the most recent dated December 22, 2009, in which USFWS stated, in part, that there are "no Federally listed, proposed or candidate species or critical habitat on or near the project site" (ADAMS No. ML100070569). The Missouri Department of Conservation notified the NRC on March 25, 2010 (ADAMS No. ML101040849), that "Heritage records identify no wildlife preserves, no designated wilderness areas or critical habitats, no State or Federal endangered list species within two miles of the plant, or downstream until the confluence with the Mississippi River."

In January 2007, a screening level ecological risk assessment (SLERA) for the site was conducted in accordance with EPA and State of Missouri guidance. The assessment evaluated whether sensitive ecological receptors were adequately protected and included both chemical and radiological parameters. The SLERA can produce one of three outcomes: (1) information is adequate to determine that ecological risks are negligible; (2) information is inadequate to make a decision; or (3) information indicates that potential adverse ecological effects exist. The January 2007, assessment concluded, for the radiological portion of the assessment, that the ecological risks are negligible for surface water, groundwater, surface and subsoils and no

further assessments were warranted. The entire document is available at the following web link: http://www.dnr.mo.gov/env/hwp/fedfac/hematite.htm.

5.4.5 Air Quality

The site is located within the Metropolitan St. Louis Interstate Air Quality Region. This region is considered a non-attainment area for ozone under the National Ambient Air Quality Standards (NAAQS).

The WEC is required (10 CFR 70.59, "*Effluent Monitoring Report Requirements*") to provide semiannual air monitoring report to the NRC. Gross alpha radioactive measurements are collected at five locations around the site. The gross alpha concentrations have ranged from 1.6 percent to 6.2 percent of the allowable discharge limit.

5.4.6 Noise

Currently, the ambient noise level at the plant is dominated by vehicular traffic on State Road P to the north of the site and by the Union Pacific rail line to the south of the site. Variations in the ambient noise level will change based on changing weather conditions, seasonal effects of vegetative cover as well as local traffic and rail conditions.

5.4.7 Transportation

In the Hematite, Missouri area, the Union Pacific railroad operates an active rail line that crosses the Westinghouse property from the southwest to the northeast. The rail line borders the southeastern edge of the facility. Reportedly, trains pass every few hours. WEC has constructed a rail spur system for future transportation of waste material at a location approximately 300 feet east of the areas to be remediated.

Truck traffic from the Hematite facility will enter State Route P, proceed east and connect with State Route A approximately two miles east of the site. From this intersection it is approximately two miles to Interstate 55. The average annual daily traffic flow for State Route P is approximately 2,570 vehicles per day and for Interstate 55 it is approximately 35,347 vehicles per day. Three trucks per day represent approximately 0.1 percent of the daily road traffic on State Route P and 1 percent of the total daily traffic if the truck traffic is increased by a factor of ten. All truck traffic associated with the building demolition phase of the site decommissioning has been completed with minimal impact. The principal mode of transport from the proposed remediation will be by rail and will have an even less impact than from the building demolition phase of the operation.

5.4.8 Historic and Cultural Resources

Historic and cultural resources are protected under the National Historic Preservation Act of 1996 (16 U.S.C. 470 et seq.), Executive Order 11593 – Protection and Enhancement of the Cultural Environment (36 FR 8921; May 15, 1971), the Archeological and Historic Preservation Act of 1974 (16 U.S.C. 469 et seq.), and the Historic Sites Act of 1935 (16 U.S.C. 461 et seq.). Due to the potential historic nature of the structures relative to the Cold War era the National Park Service and the State Historic Preservation Officer required that a Historic American

Engineering Record (HAER) be made for the site as part of the NRC previously approved building demolition phase. The HAER was completed and no further action is required by the WEC to meet the requirements of Section 106 of the National Historic Preservation Act.

5.4.9 Visual and Scenic Resources

The view shed around the site is limited by low lying hills to the north and the south of the site. Most of the people passing by the site on State Road P will view the facility itself and a patchwork pattern of early stage bottomland forest, pastures, transition zones where pastures are returning to shrub/forest land, stream bottoms and individual rural residences.

5.4.10 Socioeconomics

The population of Jefferson County rose 15.6 percent from 1990 to the year 2000. The population has increased an estimated 10.6 percent from 2000 to 2009. Unemployment over the same period dropped from 7.7 percent in 1990 to 3.2 percent in 2000. The unemployment rate in 2011 is currently around 10.0 percent. 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 to the northeast of the site. The combined population in these cities was 13,900 in 2000. The site is approximately 40 miles from St. Louis. The population of St. Louis has been fairly flat over the past decade and was approximately 354,000 in July of 2008. The unemployment rate in St. Louis as of December 2010 was 11.6 percent of the work force.

5.4.11 Public and Occupational Health

There is no known public health effects associated with the facility in its current status. Public and occupational health and safety at the facility is regulated by multiple local, State and Federal agencies under numerous laws, licenses and permits. During the period of 2007 through the first quarter of 2009 there have been no Occupational Health and Safety Administration reportable injuries.

6.0 ENVIRONMENTAL IMPACTS

The NRC evaluated whether there are significant environment impacts related to the proposed action and considered whether the impacts were adverse or positive and evaluated the cumulative impacts. The proposed action is to excavate and remove an estimated 23,000 m^3 (30,000 yd^3) of contaminated waste and soil from known and suspected burial sites as well as contamination beneath building floor slabs and the site's evaporation pond. The waste will be shipped out of the state by train for disposal at an approved facility.

6.1 Surface Water

6.1.1 Adverse Impacts

Requirements to maintain surface water quality through surface water discharge limits would continue to apply throughout the decommissioning process. If the Site Creek and Site Pond

sediments require remediation then water will be diverted, as necessary, to complete the remediation of contaminated sediments. The Site Pond is a man made structure and the Site Creek is a low volume stream and the Site Spring is intermittent. Adverse impacts would be of short duration. The No Action Alternative would not result in a disturbance to the surface water; however, a potential radiological source term would remain onsite.

6.1.2 Cumulative Impacts

The cumulative impact would be positive in that a potential source term would be removed with the proposed action.

6.1.3 Evaluation of Significance

Due to the low radiological contamination of the sediments, the site creek/site pond area may not require remediation. If remediation is required, then a potential source term would be removed so that the site's use would remain unrestricted. The significance would be small (neutral) to possibly moderate (positive) if contamination is required to be removed.

6.2 Groundwater

6.2.1 Adverse Impacts

Radiologically impacted subsurface water has been identified in the silty clay overburden and in the underlying sand/gravel hydrogeologic unit at the Hematite facility. This data is primarily from "hybrid wells" which have well screens that extend from the silty clay overburden to the sand/gravel hydrogeologic unit. The well screens in the hybrid wells hydraulically connect these two units and as a result, it is not clear whether one or both of these hydrogeologic units are actually radiologically impacted.

In response to this problem, WEC constructed a number of sand/gravel unit wells adjacent to the hybrid wells (so called well couplets). These couplet wells were placed primarily in locations downgradient of the process buildings. Monitoring data from these well couplets (e.g., GW-T/DM-02; GW-U/EP-20, GW-V/NB-31) indicate that the sand/gravel unit is not significantly impacted with radionuclides (i.e., low levels of radiological constituents with respect to the levels in the hybrid wells). The Tc-99 concentrations vary on the order of between 50 to over 200 pCi/L in hybrid well NB-31, while Tc-99 is almost constant just above 0 pCi/L in sand/gravel well GW-V during the same time of period from the 3rd Quarter 2009 to the 3rd Quarter 2010. In addition, groundwater flow in the sand/gravel unit is predominantly horizontal and moves toward the Joachim Creek. The wells screened in the sand/gravel unit downgradient of the impacted hybrid wells at the process buildings do not show elevated levels of radionuclides (i.e., much lower than levels detected in hybrid wells). Based on above, it is concluded that source of radionuclides in hybrid wells appears to be in silty clay overburden.

The proposed decommissioning plan contains ample excavation and subsurface verification in the area of the impacted hybrid wells (e.g., BD-02, BD-04) in the area of process buildings to delineate radiological constituents in the clay overburden (down to the top of the sand/gravel unit, approximately 30-33 ft below land surface) above their calculated DCGLs.

With respect to radiologically impacted water in the bedrock system, the present groundwater quality data set from the Hematite site does not indicate elevated levels of radionuclides in the Jefferson City – Cotter or Roubidoux bedrock units. Analysis of hydraulic data indicates that vertical downward flow from the silty clay overburden, a known source of radiological contamination, is impeded because the sand/gravel unit is a confined system (i.e., the piezometric surface is above the top of the sand/gravel unit, and is located within the clay overburden). In addition, flow in the sand/gravel unit is predominantly horizontal due to the high hydraulic conductivity in the unit. The flow direction is toward the Joachim Creek, located southeast of the facility. Consequently, there does not appear to be a pathway for the radionuclides to enter the bedrock system. This is supported by the lack of significant radiological contamination in the overlying sand/gravel unit. This is in contrast to the chlorinated hydrocarbon contamination in the bedrock system. Those solvents are dense nonaqueous phase liquids (DNAPLs) and are not influenced by either the confined sand/gravel unit condition or the predominately horizontal flow.

6.2.2 Cumulative Impacts

The cumulative long term impact would be considered positive as a potential source term will have been removed from the environment whereas the No Action alternative would leave this source term in place.

6.2.3 Evaluation of Significance

The implementation of the proposed license amendment would remove a known subsurface radiological source term that has impacted subsurface water in the silty clay overburden immediately underlying the Hematite facility. Due to the fact that the contaminated groundwater in the silty clay overburden is of insufficient quantity to be of practicable use (i.e., estimated to be less than 0.05 gpm), the significance of removing the source term verses leaving it in place under the No Action alternative would be considered small. However, removal of the source term would be considered to be a good practice that would eliminate the potential for future contamination of groundwater. As a result, any impacts associated with the removal of contaminated overburden would be considered to be positive.

6.3 Ecological Resources

6.3.1 Adverse Impacts

The January 2007 screening level ecological risk assessment indicated that the facility had minimal environmental habitat. However, the assessment did identify a variety of aquatic (water) and terrestrial (land) habitats of value over the entire 228 acre site. The assessment evaluated onsite and offsite surface water features, land habitats such as bottomland and upland forests, grasslands, wetlands and rare, threatened and endangered species that may occur on the 228 acre property as a whole.

Results from the radiological screening concluded that there was no potential for risk to sensitive ecological receptors from radionuclides observed in surface water and sediments on the 228 acre property and that any risk from groundwater could also be rejected as highly unlikely. Sensitive environmental receptors included animals and plants at the top of the food

chain where chemicals and radionuclides would concentrate as well as environmentally sensitive rare, threatened and endangered species.

The proposed action would have little discernable impact on ecological resources as the remediation activities would occur on an industrial site that has already been disturbed. Surface water runoff would occur at permitted discharge points and continue to be protective. There have been no unique wildlife habitats identified at the site and any impacts to wildlife due to noise would be minimal. Remediation activities would be similar in scope to those described in the EA FONSI for the building demolition that concluded that there would be no significant impacts to ecological resources.

6.3.2 Cumulative Impacts

Any cumulative impacts would be considered positive as a potential radiological source term would be removed.

6.3.3 Evaluation of Significance

The screening level ecological risk assessment performed in January 2007 concluded that no further action was required and that the ecological risk to the site was minimal even if the existing source terms were not removed. Consequently, any removal of source terms would be considered to be a positive impact, but of small significance.

6.4 Air Quality

6.4.1 Adverse Impacts

The EA FONSI for the building demolition concluded that there would be little impact to air quality from the proposed action and that any impact would be mitigated by applying best management practices to minimize the generation of dust. The excavation of primarily saturated or partially saturated soil and soil like material from the burial pits and underneath the former process buildings should have a lower potential for the generation of dust and would have a lower impact. The levels of attainment and non-attainment under the NAAQS within the air region that the Hematite facility is found would not change as a result of this proposed action. Similarly, the No Action alternative would not impact the attainment or non-attainment status.

Current radiological emissions are well below permitted limits. The building demolition EA FONSI concluded that there would be no adverse impacts from the actions associated with the building demolition. Similarly, any radiological emissions from the proposed action will be well below established limits.

6.4.2 Cumulative Impacts

Any discernable air quality impacts will be of short duration during the actual construction remediation phase and would have the same impact as the No Action alternative after the remediation is completed.

6.4.3 Evaluation of Significance

Any impact to air quality would be of short duration and well within established limits. Consequently, any impact would be considered to be insignificant.

6.5 Noise

6.5.1 Adverse Impacts

Site remediation will temporarily increase noise levels in the immediate vicinity of the site. However, the noise levels will not be significantly louder than the levels experienced during operations and it should be considerably lower than that experienced during the building demolition phase of decommissioning. The latter will involve heavy equipment using shears and/or similar equipment to reduce the size and volume of the building rubble. Noise levels associated with staging and loading the building rubble will be similar to that for excavating the contaminated soil.

6.5.2 Cumulative Impacts

Any discernable noise impacts will be of short duration and will occur only during daylight, working hours. After the site remediation has been completed, there will be no noise impacts, the same as for the No Action alternative.

6.5.3 Evaluation of Significance

Any noise impacts will be minimal and of short duration and less than that for the building demolitions for which the EA FONSI concluded that there was no significant impact.

6.6 Transportation

6.6.1 Adverse Impacts

Actual waste shipments for the remediation will be by rail and will have minimal impact to the road traffic (i.e., primarily temporary rail crossings closures). It is estimated that approximately 23,000 m^3 (30,000 yd^3) of contaminated soil/material will be shipped offsite requiring a total of about 400 to 600 rail cars (i.e., depending on the size of the gondola car). Each shipment will consist of between 6 to 7 railcars requiring about 65 to 100 shipments over an estimated 2 year period. Given the rail loading configuration at the Hematite site, it is estimated that no more than one shipment will leave the site daily. Consequently, with the relatively small amount of railcars in the train and the infrequent shipments (one daily), the impact of these shipments to road traffic is minimal. Even doubling the currently estimated amount of rail shipments (a very conservative assumption), does not result in a significant increase in impact to local road traffic.

As discussed above, virtually all waste transportation is to occur by rail. However, as in any construction project, there is a potential for some material to be moved by truck. Local traffic estimates for the site include 2,570 vehicles per day on State Route P, with an average traffic count of 35,347 vehicles per day for nearby Interstate 55. Conservatively estimating between

10 to 20 trucks leaving the site daily, the resulting impact on local traffic patterns would be nominal (i.e., less than 1 percent).

Traffic count will increase somewhat due to construction workers coming onto and leaving the site during the remediation activities. It is estimated that there will be an additional 35 construction workers onsite during the soil removal phase of the operation. Assuming that each construction worker arrived in a separate vehicle and that there were 20 trucks loaded with debris leaving daily would result in an increase of 55 vehicles per day arriving/leaving from the site. The total increase in traffic would be approximately 2% based on a daily traffic use of 2,570 vehicles per day on State Route P.

6.6.2 Cumulative Impacts

Any observable impacts to transportation would be small (worst case about a 2 percent increase in local traffic) and of short duration.

6.6.3 Evaluation of Significance

Any impact to transportation will be of short duration and a small fraction 0.1 percent to 2 percent of the estimated daily road traffic on State Route P and would be considered to be insignificant.

6.7 Historic and Cultural Resources

6.7.1 Adverse Impacts

The only potential adverse impact to historic resources has been the potential historic value of the role that the facility played during the Cold War era. The WEC completed, as part of the building demolition EA FONSI, a HAER, which provided for an unclassified documentation of the strategic role the facility played during the Cold War. The Federal and State historical agencies have concluded that there are no other historical and cultural resources at the site.

6.7.2 Cumulative Impacts

The cumulative impacts are considered to be insignificant as no historical and cultural resources have been identified at the site by regulatory agencies above and beyond that identified in the building demolition EA FONSI.

6.7.3 Evaluation of Significance

The removal of contaminated soil from the site under the proposed action will have insignificant impacts to the historic and cultural resources at the site and region.

6.8 Visual and Scenic Resources

6.8.1 Adverse Impacts

Before the facility was built, the area was considered to be rural agriculture. The building demolition EA FONSI concluded that there would be no significant impact to the visual and scenic resources. There would be a slightly positive impact as most of the production and ancillary facilities will be removed from the site and there will be less of a visual impact that currently exists as compared to the original rural agricultural setting. Any visual impacts from removal actions will be comparable to that seen during building demolition and temporary. After removal actions have been completed the impacted areas will be backfilled with soils below the derived concentration guideline levels (DCGLs) or clean material, and graded and reseeded to more closely resemble nearby grasslands or pastures in a rural agricultural setting.

6.8.2 Cumulative Impacts

Cumulative impacts will be slightly positive as old production and ancillary buildings will be removed from the site and excavations related to this proposed actions will be backfilled, graded to a contour consistent with the existing alluvial terrace landscape and seeded to grass consistent with the pastoral setting of the alluvial terrace surfaces.

6.8.3 Evaluation of Significance

The removal of contaminated soils and restoration of the site will have minimal significance to the overall visual and scenic resources of the site and area and what impacts there will be will more consistent with the original land use, rural agriculture and are considered to be insignificant.

6.9 Socioeconomics

6.9.1 Adverse Impacts

The population of Jefferson County has shown a steady growth from 1990 to 2009 and until recently showed a declining unemployment rate to a low of approximately 3.2 percent. Beginning with the recent economic downturn the unemployment rate increased to approximately 10 percent in 2011. The unemployment rate in St. Louis, approximately 40 miles away, was 11.6 percent of the work force as of December 2010. The remediation work that will occur under the proposed alternative will provide a relatively small number of, primarily, construction type jobs drawn from the Jefferson County and/or metropolitan area of St. Louis. It is estimated that the building demolition phase of the decommissioning will employ approximately 30 to 50 workers including truck drivers over a 2 to 3 month period and the soil removal action approximately 35 construction workers over an estimated two year period. Any discernable impact from the proposed action would be considered to be positive given the large available existing work pool and the high unemployment rate.

6.9.2 Cumulative Impacts

The cumulative impact from the site remediation will be of short duration and slightly positive to the local economy. After the remediation is completed the long term impact will essentially be the same as for the No Action alternative, which will be negligible.

6.9.3 Evaluation of Significance

Over the short term there will be no discernable impact on the unemployment rate or overall socioeconomic status of the greater metropolitan area of St. Louis and a very limited positive impact to Jefferson County. The overall impact would be considered to be insignificant.

6.10 Public and Occupational Health

6.10.1 Adverse Impacts

Based on the nature of decommissioning activities, and past industry experience in nuclear facility decommissioning, there is a very low likelihood of significant public and occupational health impacts. For worker exposure, there will be a short term increase in occupational exposure as radioactive material is handled during excavation and loading activities; however, this exposure will be well below acceptable limits found in 10 CFR Part 20, Appendix B Table 1.

To address radiological soil contamination, WEC has proposed four sets of derived concentration guideline levels (DCGLs) in their July 5, 2011 transmittal (ML111880290); each based on a separate conceptual site model. These DCGL values related to two different source term geometries, a three stratum geometry, and a uniform geometry. In the three stratum geometry, different DCGL values were generated for different layers of the subsurface soil. In the uniform geometry, the same DCGL value is used for the entire thickness of the contaminated zone. Compliance with the 25 mrem dose criteria will be demonstrated for different areas of the site using either the three stratum approach or the uniform approach. A description of the four categories of DCGL values generated by WEC is listed below.

Three stratum geometry approach:

- Surface - surface soil to a depth of 15 cm below the ground surface;
- Root - subsurface soil starting at 15 cm and extending to 1.5 m below the ground surface to include the entire root stratum; and
- Excavation - subsurface soil located below 1.5 m (i.e., below the root stratum), and extending to the bottom of the Contaminated Zone which was conservatively estimated to be 6.7 m below the ground surface.

Uniform geometry approach:

- Uniform - uniform soil contamination from the ground surface to the bottom of the Contaminated Zone (6.7 m).

The Surface, Root, and Excavation DCGL values presented in the following table (Table 1) correspond to a dose of 25 mrem assuming that the other two layers do not contain any contamination. If contamination exists in more than one layer, the sum of fractions approach will be used to demonstrate compliance and the maximum allowable remaining contamination would be less than listed in the table. The Excavation DCGL values were generated based on a scenario in which the soil is excavated to construct the basement for a house

The method in which the WEC will meet the required cleanup criteria will be detailed in a NRC approved Final Status Survey Plan. The plan will consist of surface scanning, stationary dose measurements and material sample measurements. As part of the plan, the WEC will document that appropriate field instruments and/or laboratory analytical techniques will be used in documenting that the required quantitative limits have been met.

Table 1 – Hematite DCGL Values

	Three Layer Approach DCGL Values (pCi/g)			Uniform DCGL Values (pCi/g)
	0 to 0.15 m layer	0.15 to 1.5 m layer	> 1.5 m layer	
Americium-241	220.7	118.5	229.2	79.3
Neptunium-237+D	17.4	5.0	0.3*	0.3
Plutonium-239/ Plutonium-240	239.6	85.1	246.6	83.1
Radium-226+C	5.4	2.3	5.8	2.0
Technetium-99	162	32.3	79.4	26.9
Thorium-232+C	5.0	2.1	5.6	2.1
Uranium-234	545.4	252.7	935.6	209.6
Uranium-235+D	109.7	68.7	223.2	55.3
Uranium-238+D	319.2	196.6	591	181.0
Total Uranium**	1001 mg/kg	617 mg/kg	1862 mg/kg	564 mg/kg

* Neptunium-237 DCGL for >1.5 m is determined using the DEEP CSM, while all other radionuclides are determined using the Excavation CSM.

** The total uranium concentration was calculated by the NRC based on the DCGLs provided by Westinghouse.

WEC will perform all decommissioning activities in accordance with a site specific environmental, health and safety plan that will include, at a minimum, a radiation protection program plan, an environmental safety program and an industrial safety program. The minimum requirements are described in the DP and implementation of the program will be evaluated during the decommissioning by NRC site inspections.

The radiation protection program will include detailed procedures designed to protect workers and the public from ionizing radiation to allowable limits. The radiation protection program also includes a description of the types of radiation monitoring equipment, their calibration and use; the use of air samplers, monitoring policy methods, frequency and procedures; measures to control external exposures; measures to control the potential for airborne releases and monitoring, and how radiation exposure will be maintained ALARA.

The requirement to maintain ALARA is above and beyond that required to meet regulatory limits specified in 10 CFR Part 20 and further discussion on ALARA is included under Section 8.0, Mitigation Measures.

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," Vols. 1 and 2, dated December 1977 (ML022590355 and ML022590511). 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 0.01 millisievert per year (mSV/yr) (1 mrem/yr), well below the 10 CFR 20.1301 limit of 1 mSV/yr (100 mrem/yr) for a member of the public. The contribution of the Hematite waste shipments to the average annual individual dose of 0.01 mSV/yr (1 mrem/yr) for all radioactive waste shipments in the U.S. would be extremely small based on the radionuclides of concern, the short duration of the project,the self shielding effects of the soil, the shielding effects of the rail cars and the distance individuals remain away from the rail line.

6.10.2 Cumulative Impacts

The cumulative impacts from the site removal of buried waste, impacted soils and sediments should be small and any impacts would be of short duration.

6.10.3 Evaluation of Significance

Over the short term there may be some small impacts to onsite workers and barely discernable, if any, measurable impacts to members of the public from the site removal of buried waste, impacted soils and sediments.

7.0 MITIGATION MEASURES

The WEC has identified a number mitigation measures associated with its decommissioning activities. Many of the same measures identified in the building demolition EA FONSI are applicable to the site remediation identified in the proposed action. These include, but are not limited to, the use of best management practices to manage surface water run on and runoff from contaminated areas that are being excavated and site specific radiological works plans that ensure that contamination controls are in place and that the potential for airborne contamination is minimized through the application of water and/or other dust suppression techniques. Other examples include storm water controls such as the construction of dikes and berms and the use of sediment and silt control fencing to minimize and control the movement of contaminants.

The primary mechanism that the WEC will use to maintain exposures to onsite workers and to the members of the public ALARA is through the use of site specific work permits. For each discrete work area identified, the WEC or its designated contractor will be required to develop and implement a work plan. Only those workers whose training qualifies them to work in the specified work area will be allowed to perform assigned tasks. Training will address such areas as industrial, chemical and radiation safety. The work permit will specify the types of personal protective equipment that the workers will be required to use as well as personal radiation monitoring devices such as thermoluminescent dosimeters. The work permits will specify the types and frequencies of monitoring samples that will occur around the work area and how the waste encountered will be processed, characterized, treated, packaged and shipped for offsite disposal or used as approved backfill.

The ALARA program will also address the potential for exposures to members of the public through the implementation of monitoring programs for air and water effluents. Examples include the implementation of a program to control the run on and run off of water from precipitation events from contaminated areas to uncontaminated areas, the collection of the water and the measurement of the contamination to ensure that any releases that may occur are within allowable limits. Similarly, the ALARA program will address how contaminated liquids recovered during excavation activities will be processed and treated to meet 10 CFR Part 20 (i.e., NRC regulatory) criteria prior to discharge. Other examples include the collection of air samples and direct radiation readings taken from strategic locations around the plant site boundary to ensure that the radiation exposures to the public are being maintained ALARA.

Any potential groundwater impacts from radioactive contamination will be mitigated by the removal of the radioactive source term contained in the clay overburden. During the MDNR CERCLA process, the potable water from privately owned wells that had become contaminated with VOCs, was replaced with uncontaminated water from a public water supply system. In addition to replacing the water supply for the individual residences, the public water line was extended the length of State Road P to the site where it now serves as the potable water supply for the facility.

8.0 MONITORING

During the building demolition phase of the decommissioning process as well as the soil remediation phase, the WEC will continue to implement an Effluent and Environmental Monitoring Program. This will include, in part, continued surface water, groundwater and air quality monitoring. An environmental health and safety plan will be developed that will be implemented using site specific procedures and job specific work plans. All activities will be overseen by a qualified radiation safety officer in accordance with applicable NRC requirements. Perimeter air monitors will be established to measure airborne radiation levels as close to the excavation activities as possible, around the work areas as well as designated facility perimeter locations. In addition, individual workers may, upon a determination made by the radiation safety officer, wear air sampling devices to measure potential exposures directly at the site where work is being performed.

9.0 AGENCIES AND PERSONS CONSULTED AND SOURCES USED

The USFWS stated, in its response letter to the NRC (ML100070569) 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 received a response to its letter from the Missouri Department of Conservation (ML101040849) that stated “Heritage records identify no wildlife preserves, no designated wilderness areas or critical habitats, no State or Federal endangered-list species records with two miles of the plant, or down steam until the confluence with the Mississippi River.”

The USFWS had previously been consulted, and in a December 10, 2004, letter to the NRC they stated that no Federally listed, proposed or candidate species or critical habitat is present

on or near the project site (United States Department of the Interior, Fish and Wildlife Services, letter to Amir Kouhestani from Charles M. Scott, dated December 10, 2004 (ML043520384).

The NRC also provided a draft copy of this EA to the MDNR, for their comments (letter to Ms. Sara Parker Pauley, Director MDNR from John J. Hayes, Senior Project Manager, Materials Decommissioning Branch dated April 15, 2011, ML111020574). MDNR's subsequent comments on the EA, dated May 13, 2011 (ML111580572), focused on the effectiveness of the derived DCGL values, radiological contamination in site ground water, and a number of typographical errors. NRC staff addressed MDNR's comments in a letter to Ms. Sara Parker Pauley, dated August 30, 2011 (ML112160406). In the present document, derivation of DCGL values is addressed in Section 7.10 Public and Occupational Health, while ground water impacts is addressed in Section 7.2.

10.0 CONCLUSION

In July 1997, the NRC published NUREG-1496, "*Generic Environmental Impact Statement in support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities*," Vols. 1, 2, and 3 (ML042310492, ML042320379, and ML042330385). The scope of this Generic Environmental Impact Statement (GEIS) included a hypothetical fuel fabrication facility as one of its four reference facilities for analysis. The GEIS considered both radiological and non-radiological impacts on human health and safety, including radiation exposure resulting from occupancy of site buildings and residence on site lands following decommissioning and license termination, and radiation exposure during decommissioning and waste transport for disposal. Non-radiological impacts on humans, such as those resulting from conventional workplace accidents and from traffic accidents during transport of decommissioning wastes for disposal, were also considered. Waste disposal impacts, as well as impacts on biota, economic impacts, societal impacts, and land use impacts were considered.

In NUREG-1496's generic evaluation of radiological impacts, it was concluded that a 25 mrem/year dose criterion (sum of sources, distinguished from background) for soil and structure decommissioning with unrestricted site use should be established. This finding bounds the site specific decommissioning analysis of the Hematite DP and supporting SER developed by the NRC staff where a 25 mrem/year dose criterion for unrestricted release was also applied. As such, the NUREG-1496 GEIS serves as a bounding estimate for the unrestricted release of the site. Additionally, NRC staff has also found that the non-radiological impacts associated with the proposed amendment are not significant.

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The NRC staff has concluded that the proposed action to grant a license amendment under 10 CFR 70.38 is authorized by law and will not endanger life or property or the common defense and security and is otherwise in the public interest.

The NRC has prepared this EA in support of the proposed action to issue an amendment to WEC license SNM-00033 approving the Hematite DP and associated supporting documentation leading to the termination of the Hematite license and release of the site for unrestricted use in accordance with 10 CFR 20.1402, allowing the removal of contaminated waste from the

Hematite site and to package and transport the waste for permitted or licensed disposal outside of the State of Missouri.

On the basis of this EA, NRC has concluded that that there are no significant environmental impacts and the 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.

11.0 PREPARER

Mr. Philip Brandt, project manager at the Nuclear Regulatory Commission, authored this environmental assessment. Mr. Brandt has a Bachelor of Science Degree in Wildlife Fisheries and Management, graduate course work in terrestrial ecology and has conducted scientific research in South America involving a rare, threatened and endangered species. He has over 30 years of environmental, ecological, hazardous and radioactive project management experience including site remediation resulting in their release for unrestricted release. His work experience includes work in the private sector, government and environmental consulting companies.

12.0 LIST OF REFERENCES

10 CFR Part 20, Subpart E – *Radiological Criteria for License Termination.*

10 CFR 20.1402 – *Radiological Criteria for Unrestricted Use.*

10 CFR 20.2002 – *Method for Obtaining Approval of Proposed Disposal Procedures.*

10 CFR Part 51 – *Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions.*

10 CFR Part 70 – *Domestic Licensing of Special Nuclear Material.*

10 CFR 70.59 – *Effluent Monitoring Report Requirements.*

10 CFR 70.38 – *Expiration and Termination of Licenses and Decommissioning of Sites and Separate Building or Outdoor Areas.*

40 CFR 1502.21 – *Incorporation by Reference.*

40 CFR 1508.27 – *Significantly.*

State of Missouri, Department of Natural Resources, correspondence from Aaron Schmidt, MDNR to John Hayes, NRC, May 13, 2011.

State of Missouri, Record of Decision Operable Unit 1 Buried Wasted, Impacted Soils, and Sediment, May 18, 2009.

State of Missouri, Proposed Plan – Operable Unit 1 Buried Waste, Impacted Soils, and Sediment, June 25, 2008.

State of Missouri, Buried Waste Evaluation Report, March 2007.

State of Missouri, Remedial Investigation Report for the Westinghouse Hematite Site, Volumes 1 and 2, January 2007.

State of Missouri, Screening Level Ecological Risk Assessment, January 2007.

State of Missouri, Baseline Human Health Risk Assessment, January 2007.
ROD for Operable Unit 1.

U. S. Nuclear Regulatory Commission, "*Final Environmental Statement on the Transportation of Radioactive Materials by Air and Other Modes*," NUREG-0170, December 1977.

U. S. Nuclear Regulatory Commission, "*Generic Environmental Impact Statement in support of Rulemaking on Radiological Criteria for License Termination of NRC-Licensed Nuclear Facilities*," NUREG-1496, July 1997.

U. S. Nuclear Regulatory Commission, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs – Final Report," NUREG-1748, August 2003.

U. S. Nuclear Regulatory Commission, "Consolidated Decommissioning Guidance Decommissioning Process for Materials Licensees – Final Report," NUREG-1757, Vol.1, Rev. 2, September 2003.

U. S. Nuclear Regulatory Commission, "Characterization, Survey, and Determination of Radiological Criteria – Final Report," NUREG-1757, Vol. 2, Rev. 1, September 2006.

U. S. Nuclear Regulatory Commission, "Financial Assurance, Recordkeeping, and Timeliness – Final Report," NUREG-1757, Vol. 3, September 2003.

U. S. Nuclear Regulatory Commission, "Notice of Availability of Environmental Assessment and Finding of No Significant Impact Related to Issuance of Amendment No. 52 to Materials License No. SNM-00033, Westinghouse Electric Company, LLC Hematite Former Fuel Fabrication Facility Located in Festus, MO, Site (TAC No. L52641)." *Federal Register*, Washington DC, 71 FR 37124, June 29, 2006.

U. S. Nuclear Regulatory Commission, correspondence from John Hayes, NRC to Ms Sara Parker Pauley, MDNR, April 15, 2011.

U. S. Nuclear Regulatory Commission, correspondence from John Hayes, NRC to Ms Sara Parker Pauley, MDNR, August 30, 2011.

Westinghouse Electric Company, LLL (WEC) "Hematite Decommissioning Plan", DO-08-04, Revision 0, August 2009.

Westinghouse Electric Company, LLL (WEC) “Hematite Decommissioning Project Environmental Report”, DO-08-09, Revision 0, July 2009.

13.0 FIGURES

Figure 1 Hematite Operating Area

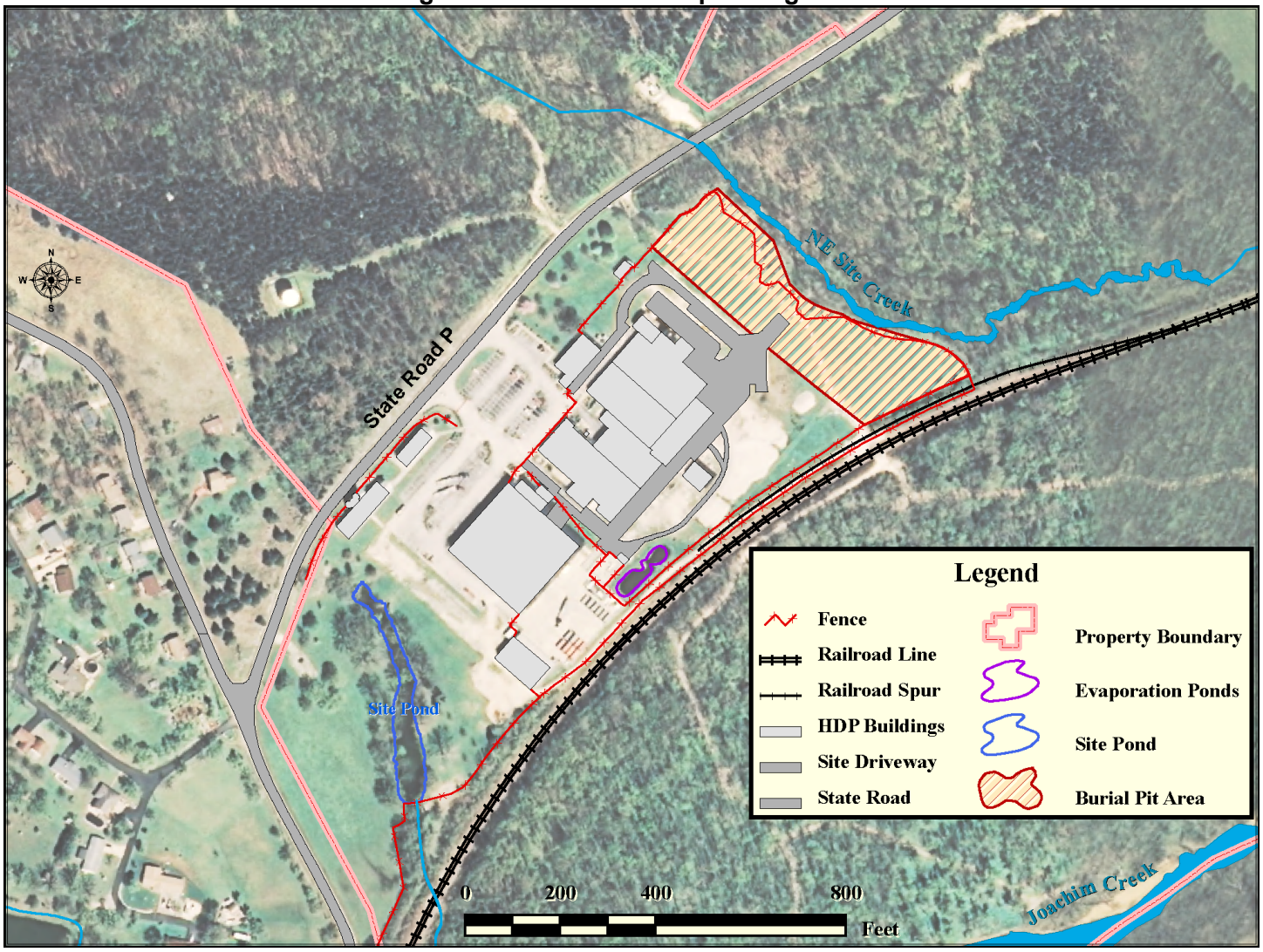

Figure 2 Hematite Site Area