ENVIRONMENTAL RADIATION PROTECTION PROGRAM

Fluor Federal Services, Inc.,
Paducah Deactivation Project
Paducah, Kentucky

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Prepared by
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Paducah Deactivation Project
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APPROVAL PAGE

Environmental Monitoring Manager — Date: 9-22-14

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ACRONYMS

ACL	administrative control level
AEA	Atomic Energy Act
ALARA	as low as reasonably achievable
ASER	Annual Site Environmental Report
BAT	best available technology
CAP-88	Clean Air Act Assessment Package-1988
CFR	*Code of Federal Regulations*
DAC	derived air concentration
DCS	Derived Concentration Standard
DOE	U.S. Department of Energy
dpm	disintegrations per minute
EM	environmental monitoring
EMP	Environmental Monitoring Plan
EMS	Environmental Management System
EPA	U.S. Environmental Protection Agency
ERPP	Environmental Radiation Protection Program
KPDES	Kentucky Pollutant Discharge Elimination System
LATA Kentucky	LATA Environmental Services of Kentucky, LLC
NESHAP	National Emissions Standards for Hazardous Air Pollutants
PGDP	Paducah Gaseous Diffusion Plant
RC	regulatory compliance
RGA	Regional Gravel Aquifer
RP	radiation protection
TED	total effective dose
TEDE	total effective dose equivalent
UCRS	Upper Continental Recharge System

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DEFINITIONS

Terminology used in this Environmental Radiation Protection Program is consistent with the definitions provided in U.S. Department of Energy (DOE) Order (O) 458.1, *Radiation Protection of the Public and the Environment*.

Absorbed Dose—The average energy imparted by ionizing radiation to the matter in a volume element per unit mass of irradiated material. The absorbed dose is expressed in units of rad (or gray) (1 rad = 0.01 gray).

Actual or Likely Use Scenarios—The reasonably anticipated future uses of land or property considering the history of use and implementable use restrictions, designations, or controls; affected populations; or ecosystems, natural resources, or historic or cultural significance. For real property considerations also include Federal and State use designations; local zoning and future land use plans; and proximity to residences, commercial, industrial, or unique cultural or historic areas.

Airborne Discharges—Material released to the atmosphere in the form of dusts, fumes, particulates, mists, vapors, or gases.

ALARA (As Low As Reasonably Achievable)—An approach to radiation protection to manage and control releases of radioactive material to the environment and exposure to the workforce and to members of the public so that the levels are ALARA, taking into account societal, environmental, technical, economic, and public policy considerations. As used in this Order, ALARA is not a specific release or dose limit, but a process that has the goal of optimizing control and management of releases of radioactive material to the environment and doses so that they are as far below the applicable limits of the Order as reasonably achievable.

ALARA Process—A graded process for evaluating alternative operations, processes, and other measures for optimizing releases of radioactive material to the environment and exposure to the workforce and to members of the public taking into account societal, environmental, technical, economic, and public policy considerations to make a decision concerning the optimum level of public health and environmental protection. A graded approach provides the flexibility to perform qualitative or quantitative ALARA analyses. For low doses, qualitative evaluations normally will suffice.

Authorized Limit—A limit on the concentration or quantity of residual radioactive material on the surfaces or within property that has been derived consistent with DOE directives, including the ALARA process requirements. An authorized limit also may include conditions or measures that limit or control the disposition of property.

Background Radiation—Radiation from (1) naturally occurring radioactive materials that have not been technologically enhanced (e.g., background radiation does not include technologically enhanced naturally occurring radioactive material); (2) cosmic sources; (3) global fallout as it exists in the environment (such as from the testing of nuclear explosive devices); (4) radon and its decay products in concentrations or levels existing in buildings or the environment that have not been elevated as a result of current or prior activities; and (5) consumer products containing nominal amounts of radioactive material or producing nominal amounts of radiation.

Best Available Technology (BAT)—The preferred technology for a particular activity, selected from among others after taking into account factors related to technology, economics, public policy, and other

parameters. As used in DOE O 458.1, the BAT is not a specific level of treatment, but is the conclusion of a selection process in which several alternatives are evaluated.

BAT Selection Process—The evaluation of candidate alternative technologies in order to select the BAT after considering; technology; economics; the age of equipment and facilities involved; the process employed; the engineering aspects of applying various types of control techniques; process changes; other environmental impacts (including energy requirements); safety considerations; and policy considerations.

Clearance of Property—The removal of property that contains residual radioactive material from DOE radiological control under 10 *CFR* § 835 and DOE O 458.1.

Collective Dose—The sum of the total effective dose to all persons in a specified population received in a specified period of time. For clearance of property the collective dose refers to the population potentially exposed to the cleared property. Collective dose is expressed in units of person-roentgen equivalent man (rem) (or person-sievert).

Committed Effective Dose (E_{50})—The sum of the committed equivalent doses to various tissues or organs in the body ($H_{T,50}$), each multiplied by the appropriate tissue weighting factor (w_T)—that is, $E_{50} = \Sigma_{wT}H_{T,50} + w_{Remainder}H_{Remainder,50}$, where $w_{Remainder}$ is the tissue weighting factor assigned to the remainder organs and tissues and $H_{Remainder,50}$ is the committed equivalent dose to the remainder organs and tissues. Committed effective dose is expressed in units of rems (or sieverts).

Committed Equivalent Dose ($H_{T,50}$)—The equivalent dose calculated to be received by a tissue or organ over a 50-year period after the intake of a radionuclide into the body. It does not include contributions from radiation sources external to the body. Committed equivalent dose is expressed in units of rems (or sieverts).

Controlled Area—Any area to which access is managed by or for DOE to protect individuals from exposure to radiation and/or radioactive material as defined by 10 *CFR* § 835.

Derived Concentration Technical Standard (DCS)—A DOE Technical Standard that documents the derived concentration value for a radionuclide in water that would result in a dose of 100 mrem in a year to a gender- and age-weighted reference person using DOE approved dose conversion factors and assuming continuous exposure.

Dose—A general term for absorbed dose, equivalent dose, effective dose, committed equivalent dose, committed effective dose, or total effective dose (TED), as defined in DOE O 458.1.

Effective Dose (E)—The summation of the products of the equivalent dose received by specified tissues or organs of the body (H_T) and the appropriate tissue weighting factor (w_T)—that is, $E = \Sigma_{wT}H_T$. It includes the dose from radiation sources internal and/or external to the body. For purposes of compliance with DOE O 458.1, equivalent dose to the whole body may be used as effective dose for external exposures. The effective dose is expressed in units of rems (or sieverts).

Effluent Monitoring—The collection and analysis of samples of liquid and gaseous effluents or measurements of liquid and gaseous effluents performed to characterize and quantify radiological contaminants and process stream characteristics, assess radiation exposures of members of the public, and demonstrate compliance with applicable standards.

Environmental Surveillance—The collection and analysis of samples of air, water, soil, foodstuffs, biota, and other media at the DOE Site and surrounding environs and the measurement of external

radiation to demonstrate compliance with applicable standards, assess radiation exposure of members of the public, and assess effects, if any, on the environment.

Equivalent Dose (H_T)—The product of average absorbed dose ($D_{T,R}$) in rad (or gray) in a tissue or organ (T) and a radiation (R) weighting factor (w_R). For external dose, the equivalent dose to the whole body is assessed at a depth of 1 cm in tissue; the equivalent dose to the lens of the eye is assessed at a depth of 0.3 cm in tissue, and the equivalent dose to the extremity and skin is assessed at a depth of 0.007 cm in tissue. Equivalent dose is expressed in units of rems (or sieverts).

External Dose or Exposure—That portion of the dose received from radiation sources outside the body (e.g., external sources).

Facility—Something that is built, installed, or established to serve a particular DOE radiological activity.

General Employee—An individual who is either a DOE or DOE contractor employee, an employee of a subcontractor, or an individual who performs work for or in conjunction with DOE or utilizes DOE facilities.

Internal Dose or Exposure—That portion of the dose received from radioactive material taken into the body (e.g., internal sources).

Liquid Discharge—The release to the environment of radioactive material in a liquid medium. The discharge generally occurs at a point, such as the end of a pipe, where it is released to any of several receptors in the environment, such as a waterway, land, sewer system, etc.

Maximally Exposed Individual—A hypothetical individual who—because of realistically assumed proximity, activities, and living habits—would receive the highest radiation dose, taking into account all pathways, from a given event, process, or facility.

Measurement Quality Objectives—A statement of a performance objective or requirement for a particular method performance characteristic.

Member of the Public—An individual who is not a general employee. An individual is not a member of the public during any period in which the individual receives an occupational dose.

Monitoring—The measurement of radiation levels, discharges or environmental releases, residual radioactive levels, quantities of radioactive material, or exposure to members of the public and the use of the results of these measurements to evaluate radiological discharges or releases or potential and actual dose resulting from exposures to radioactive material or radiation.

Personal Property—Property of any kind, except for real property.

Potential Dose—A calculated dose based on a postulated set of exposure conditions that have a reasonable probability of occurrence.

Public Dose—The dose received by members of the public from exposure to radiation and to radioactive material released by a DOE radiological activity whether the exposure is within a DOE site boundary or off-site.

Radiation—Ionizing radiation: alpha particles, beta particles, gamma rays, X-rays, neutrons, high-speed electrons, high-speed protons, and other particles capable of producing ions. Radiation, as used in

DOE O 458.1, does not include nonionizing radiation, such as radio waves or microwaves, or visible, infrared, or ultraviolet light.

Radiation Weighting Factor (w_R)—The modifying factor used to calculate the equivalent dose from the average tissue or organ absorbed dose; the absorbed dose (expressed in rad or gray) is multiplied by the appropriate radiation weighting factor.

Radioactivity—The property or characteristic of radioactive material to undergo spontaneous transformations (disintegrations or decay) with the emission of energy in the form of radiation. It is measured by the rate of spontaneous transformations of a radionuclide. The unit of radioactivity is the curie, Ci (or becquerel, Bq) ($1\ Ci = 3.7 \times 10^{10}$ Bq).

Radiological Activity—Any activity taken for or by DOE that has the potential to result in releases of radioactive material to the environment or exposures of members of the public, to include all doses both present and future, from clearance activities and radiation generating devices. The activity may involve a single DOE facility, or combination of facilities and operations, possibly including an entire site or no fixed site at all.

Real Property—Land and anything permanently affixed to the land such as buildings, fences, and those things attached to the buildings, such as light fixtures, plumbing and heating fixtures, or other such items, that would be personal property if not attached.

Reference Person—A hypothetical aggregation of human (male and female) physical and physiological characteristics arrived at by international consensus for the purpose of standardizing radiation dose calculations.

Remedial Actions—Those actions, consistent with permanent remedy, taken to control or remove radiological contaminants to prevent or to minimize doses to members of the public.

Representative Person—An individual receiving a dose that is representative of the more highly exposed individuals in the population. This term is the equivalent of, and replaces, "average member of the critical group." (Source: ICRP Publication 103, page 32)

Representativeness—The extent to which a set of measurements taken in a space-time domain reflects the actual conditions in the same or different space-time domain taken on a scale appropriate for a specific application.

Residual Radioactive Material—Any radioactive material that is in or on soil, air, water, equipment, or structures as a consequence of past operations or activities of the Department or its predecessors.

Sanitary Sewerage—A system of public sewers for carrying off waste water and refuse, but excluding sewage treatment facilities, septic tanks, and leach fields owned or operated by or for DOE.

Settleable Solids—(i) that matter in waste water which will not stay in suspension during a preselected settling period, such as one hour, but settles to the bottom; (ii) in the Imhoff cone test, the volume of matter that settles to the bottom of the cone in one hour; or (iii) suspended solids that can be removed by conventional sedimentation processes.

Sewer—An artificial conduit, usually underground, for carrying off waste water and refuse.

Site—Land or property upon which DOE facilities or activities are located and access to which is subject to DOE or DOE contractor control.

Site Boundary—The perimeter of a DOE Site, within which DOE or a DOE contractor normally can control access or restrict activities.

Soil Column—An *in situ* volume of soil through which liquid waste streams percolate from ponds, cribs, trenches, drain fields, or other areas or facilities used for the primary purpose of removing or retaining the suspended or dissolved radionuclides contained within the liquid process waste stream.

Technologically Enhanced Naturally Occurring Radioactive Material—Any naturally occurring radioactive materials whose radionuclide concentrations or potential for human exposure have been increased above levels encountered in the natural state by human activities.

Tissue Weighting Factor (w_T)—The fraction of the overall health risk, resulting from uniform, whole body irradiation, attributable to specific tissue (T). The equivalent dose to tissue, (H_T), is multiplied by the appropriate tissue weighting factor to obtain the effective dose (E) contribution from that tissue.

Total Effective Dose—Sum of the effective dose (for external exposures) and the committed effective dose. At the Paducah Site, TED is equivalent to the historically utilized term total effective dose equivalent.

Whole Body—For the purposes of external exposure, head, trunk (including male gonads), arms above and including the elbow, or legs above and including the knee.

Working Level—The potential alpha energy concentration of radon decay products in 1 liter of air, without regard to the degree of equilibrium, that will result in the emission of 1.3×10^5 MeV of alpha particle energy.

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CONVERSION TABLES

Prefix	Symbol	Exponential Value	E Notation	Numeric Value
pico	p	10^{-12}	1E-12	0.000000000001
micro	µ	10^{-6}	1E-6	0.000001
milli	m	10^{-3}	1E-3	0.001
kilo	k	10^{3}	1E3	1,000
mega	M	10^{6}	1E6	1,000,000
giga	G	10^{9}	1E9	1,000,000,000
tera	T	10^{12}	1E12	1,000,000,000,000

Examples of use:	
pCi =	picocurie
mrem =	millirem

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1. PROGRAM ORGANIZATION AND ADMINISTRATION

1.1 ENVIRONMENTAL RADIATION PROTECTION PROGRAM

1.1.1 Purpose and Scope

The Deactivation Contractor has a task order with the U.S. Department of Energy (DOE) to perform facility modification, stabilization, and deactivation; decontamination and demolition; and environmental services at the Paducah Gaseous Diffusion Plant (PGDP). The purpose of this Environmental Radiation Protection Program (ERPP) is to set forth the approach for the deactivation work scope in a manner that meets the requirements of DOE Order (O) 458.1, *Radiation Protection of the Public and the Environment*. This ERPP provides an overview of the measures implemented by the Deactivation Contractor to ensure compliance with the requirements of DOE O 458.1 for PGDP. The Deactivation Contractor has implemented an appropriate structure of management and administrative measures, as necessary, to ensure the authorized activities are conducted in accordance with this ERPP.

The goals of this ERPP are as follows:

1. To conduct radiological activities so that exposure to members of the public is maintained within the dose limits established by the Order;

2. To control the radiological clearance of real and personal property;

3. To ensure that potential radiation exposures to members of the public are ALARA;

4. To monitor routine and nonroutine radiological releases and to assess the radiation dose to members of the public; and

5. To provide protection of the environment from the effects of radiation and radioactive material.

This ERPP incorporates ALARA policies using a graded approach to the application of environmental ALARA reviews, environmental monitoring (EM), and environmental radiological performance metrics to assure accomplishment of annually established environmental performance goals and objectives.

This ERPP has been prepared consistent with the requirements of DOE O 458.1, Attachment 1, "Contractor Requirements Document." This ERPP describes the general requirements for ensuring that members of the public and the environment are protected from the effects of radiation and radioactive material during the execution of remediation and decommissioning activities within the scope of the DOE contract.

This ERPP applies to all work activities associated with the completion of the scope of work defined under the contract and conducted on behalf of DOE by Deactivation Contractor and all respective subcontractors and suppliers that involve radioactive materials. The upper level requirements described in this ERPP are implemented through a variety of mechanisms, including written procedures, plans, instructions, and employee training and qualifications. Additionally, the scope of the ERPP applies to all operations at locations, facilities, activities, and sites that are within the contract scope of work where the Deactivation Contractor performs work for DOE. These locations, facilities, and sites may extend beyond the boundaries of the DOE Reservation in some instances. Consequently, the Deactivation Contractor employees, subcontractors, and subtier subcontractor personnel are obligated to comply with the applicable environmental RP procedures that implement this ERPP. Implementing guidance and

requirements contained in this ERPP are intended to help itemize and clarify environmental RP responsibilities and performance expectations.

This ERPP is intended to address all of the requirements of paragraph 2 of Attachment 1 to DOE O 458.1 that are applicable to the Deactivation Contractor. The responsible DOE Field Element Manager performs oversight of the Deactivation Contractor ERPP Program. The responsible DOE Field Element Manager for DOE activities at PGDP currently is the Portsmouth/Paducah Project Office Manager (or designee). Any change in the responsible DOE Field Element Manager for PGDP will be provided to the contractor by DOE. The Cognizant DOE Secretarial Officer for the PGDP site currently is the DOE Assistant Secretary of Environmental Management (or designee). This position can be changed, as determined by the DOE Chief, Health, Safety, and Security Officer.

This ERPP does not encompass the activities of the Depleted Uranium Hexafluoride (DUF_6) Contractor, the Infrastructure Contractor, or the Remediation Contractor, with the exception of the current monitoring data shared for reporting purposes [e.g., National Emissions Standards for Hazardous Air Pollutants (NESHAP) data]. Detectable results are shared promptly with other site contractors and DOE to ensure actions to achieve ALARA are implemented in a timely manner to minimize potential exposure.

1.1.2 Plans, Schedules, and Other Measures for Achieving Compliance

Should any conditions constituting noncompliance be discovered during the course of program implementation, the Deactivation Contractor will take prompt action to assess the condition, ensure the safety of the public and the environment, and restore the conditions to be in compliance with the Order.

1.1.3 ERPP Approval and Changes

DOE line management must approve this ERPP in accordance with paragraph 1.d of Attachment 1 to DOE O 458.1. Changes to this ERPP will be instituted, as necessary, to reflect changes in the scope of the covered activities, changes in the environmental radiological controls instituted for those activities, or changes to DOE O 458.1. Any change that does not reduce the effectiveness of the ERPP and that continues to meet the requirements of DOE O 458.1 will be made, as necessary, without prior DOE approval. Any proposed change that may reduce the effectiveness of the ERPP will be approved by DOE prior to implementation.

1.1.4 Performance Documents and Other Administrative Controls

The ERPP is not intended to be a working-level document. The provisions of the ERPP are implemented through lower level administrative controls, including performance documents and other guidance documents. The Deactivation Contractor develops and implements performance documents and other administrative controls, as needed, to ensure compliance with the requirements of DOE O 458.1. Consequently, employees and subcontractor personnel are obligated to comply with the performance documents and other administrative controls that implement this ERPP.

1.1.5 Other Site Tenants

DUF_6 Activities. The DOE DUF_6 Contractor operates a conversion facility (DUF_6 Project) to convert UF_6 stored in cylinders, which were depleted of uranium-235 (U-235) in the enrichment process, to hydrogen fluoride and triuranium octoxide to render the material in a form safer for storage, transportation, and disposal. Activities performed by the DUF_6 contractor are not addressed specifically under this ERPP.

Remediation Activities. The DOE Remediation Contractor is responsible for environmental restoration,

environmental monitoring, facility decommissioning, and waste management activities at the PGDP. The contractor also performs a wide variety of activities in support of their awarded work scope. Upon completion of the Remediation Contract in July 2015, these services will be transitioned to the Deactivation Contractor through the remaining term of the Deactivation Task Order.

Infrastructure Activities. The DOE Infrastructure Contractor is responsible for surveillance and maintenance of nonleased land and facilities, as assigned. The Infrastructure Contractor also provides property management, including Facility Information Management System Program and records management, and performs security program administration.

1.2 ENVIRONMENTAL RADIOLOGICAL HAZARD ASSESSMENT

The potential environmental radiological hazards found at PGDP are related to the following categories:

- Direct gamma and beta radiation exposure from controlled and inadvertent releases of radioactive material;
- Inhalation or ingestion of controlled and inadvertent releases of airborne radioactivity; and
- Ingestion of loose surface contamination, contaminated liquids, contaminated soil, and other environmental media contaminated as the result of a controlled and inadvertent release of radioactive material.

The level of radiological hazard on-site varies by location and is attributed to chemically processed uranium (including enriched, natural, and depleted) and associated daughter products; consequently, the level of environmental hazard and the potential exposure to the public varies, as well. Due to the legacy processing of reprocessed uranium from the Hanford and Savannah River sites, mixed fission products and, to a lesser degree, tritium and transuranic elements—notably plutonium, americium, and neptunium—also are found at the Paducah Site.

2. ORGANIZATIONAL ROLES AND RESPONSIBILITIES

2.1 ENVIRONMENTAL MONITORING

The EM Project Manager is responsible for all aspects of project execution, including implementation of environmental protection measures, as required by this ERPP, written environmental procedures, and other documents. The EM project manager is a senior line manager who is fully empowered to control project resources and has cradle-to-grave responsibility for project planning and execution. The EM organization is supported by the Regulatory Compliance (RC) organization, the radiological protection organization, and other personnel. Work activities for the project include waste management, environmental restoration, and facility operation.

2.2 REGULATORY COMPLIANCE

RC is managed within the Regulatory Affairs organization. RC is responsible for aspects of the ERPP, as defined in lower-level performance documents. RC provides guidance and oversight with regard to the

implementation of DOE O 458.1 and its supporting guidance, as it applies to the project. To ensure there are no conflicts with production goals, RC reports to upper management through a chain that is independent of the EM project organization.

2.3 RADIATION PROTECTION ORGANIZATION

Radiation Protection (RP) is managed within the Safety, Health, and Quality Assurance organization. RP is responsible for aspects of the ERPP, as defined in lower-level performance documents. RP also provides support to the EM organization in complying with program requirements. To ensure there are no conflicts with production goals, the radiological control organization reports to upper management through a chain that is independent of the EM project organization.

3. ENVIRONMENTAL ALARA PROGRAM

The Deactivation Contractor ALARA Program has been developed in a manner consistent with DOE O 458.1. The Environmental ALARA Program has been developed and implemented using a combination of physical design features, environmental monitoring, and administrative controls. During routine operations, these controls ensure that the radiation doses to the public and the environment are ALARA. The Environmental ALARA Program process is applied to activities that could present potential exposures to the public and potential environmental releases.

The Environmental ALARA Program incorporates a graded approach. The method of implementing the Environmental ALARA Program depends on the complexity and magnitude of potential radiological consequences. Complex activities with greater potential for exposure involve more engineering, monitoring, and administrative control measures to control exposures. Environmental air monitoring, area dosimetry, personnel monitoring, etc., play key roles in ensuring that releases of radioactive contamination is prevented/mitigated in accordance with site ALARA goals.

3.1 ALARA POLICY

The Environmental ALARA Policy is as follows:

> The Deactivation Contractor conducts radiological operations in a manner that ensures that potential radiation exposures to members of the public are as low as is reasonably achievable and to provide protection of the environment from the effects of radiation and radioactive material. Efforts are taken to reduce exposures and releases in accordance with a process to make exposures or releases ALARA.

The ALARA philosophy is predicated upon the theory that any radiation exposure, however small, carries with it some risk that should be balanced by an offsetting benefit. The Deactivation Contractor ensures that any activity that involves exposure to radiation or radioactive materials is assessed to determine the most appropriate exposure controls for those activities having a net beneficial outcome. It is understood that ALARA criteria are considered successfully implemented when exposures to a maximally exposed member of the public are less than 1 mrem/yr as a result of site releases.

The Deactivation Contractor's policy requires the performance of activities in a safe/environmentally protective manner that meets or exceeds the applicable requirements of DOE O 458.1. Flour Federal Services Paducah Deactivation Project management affirms the following:

1. Excellent performance is evident when site missions are completed and public and environmental radiation exposures are maintained well below limits, radioactivity is well controlled, radiological releases are reviewed and evaluated, and radiological spills or uncontrolled releases are prevented.

2. Continuing improvement is essential to excellence in environmental radiological control.

3. It is the responsibility of management and each worker to comply with this ERPP and to practice ALARA during all work activities.

4. Cooperate with other site contracts to meet DOE goals for radiological effluents, including but not limited to, sharing information, identifying causes of anomalies, and reporting effluent release concentrations.

3.2 ENVIRONMENTAL ALARA

The Deactivation Contractor will use the ALARA process to evaluate the environmental program. Performance tracking mechanisms will be used to identify and, as appropriate, to correct adverse trends. The ALARA reviews of the environmental program may be performed, as necessary, to accommodate changes in the scope, unanticipated tasks, or radiological conditions.

The ALARA process (CP3-RP-1114) generally will follow the proposed methods and techniques described in "Optimizing Radiation of the Public and the Environment for Use with DOE O 458.1, ALARA Requirements" (a draft/pre-decisional DOE document) and DOE-STD-ALARA draft, *Applying the ALARA process for Radiation Protection of the Public and Environmental Compliance with 10 CFR Part 834 and DOE 5400.5 ALARA Program Requirements* (DOE 1997), or another appropriate ALARA process. The level of formality associated with these analyses depends on a number of factors, including the expected radiation doses, the complexity of the hazards and controls, and the types of work to be performed. As the project progresses, the types of physical design controls and administrative controls used to implement the environmental ALARA process and the balance between design features and administrative controls may change due to changes in the types of work being performed and the radiological hazards associated with that work. In all cases, the combination of physical design features and administrative controls will be adequate to ensure that public and environmental radiation exposures are within the limits established per the requirements of DOE O 458.1.

4. DOSE LIMITS

4.1 PUBLIC DOSE LIMITS

Public doses resulting from radiation exposures associated with deactivation activities will be controlled ALARA and within the DOE O 458.1 limits identified in Table 1. The public dose limits apply to members of the public located off DOE Reservation and on DOE Reservation outside of controlled areas.

Table 1. Public Dose Limits

Category	Type of Dose	Dose Limit
Member of the Public[1]	Total effective dose (TED)	100 mrem per year
	Lens of the eye equivalent dose	1,500 mrem per year
	Sum of the equivalent dose to the skin or extremities.	5,000 mrem per year
	Temporary dose limit of TED to a member of the public. This temporary dose limit is only at the request of the DOE Field Element Manager and may only be employed with the approval of a Cognizant DOE Secretarial Officer in consultation with the DOE Chief Health, Safety, and Security Officer.	100 mrem per year when averaged over any 5 contiguous years
	Radiological activities from management and storage of radioactive waste from all exposure pathways and radiation sources associated with the waste, except for transportation and radon and its decay products.	25 mrem per year
	Emissions of radionuclides to the ambient air from Deactivation Contractor activities (40 *CFR* § 61.92).	10 mrem per year
	Annual average concentration of beta particle or photons radioactivity from man-made radionuclides in drinking water (40 *CFR* § 141.66).	4 mrem per year

4.2 TEMPORARY DOSE LIMITS

If special circumstances could affect a Deactivation Contractor's radiological activity in such a manner that the potential dose to a member of the public could exceed a TED of 100 mrem in a year, then the Deactivation Contractor will submit a request for specific authorization for a temporary public dose limit higher than 100 mrem in a year to the responsible DOE Field Element Manager, per the requirements of DOE O 458.1, which includes plans for ensuring 500 mrem over a five-year period will not be exceeded and for reducing the exposure below 100 mrem per year.

4.3 DIRECT RADIATION

The only identified source of potential exposure to the public from radiation emanating from radionuclides contained in structures and other objects is gamma radiation from the uranium cylinder storage yards. It is very improbable that members of the public would be exposed to gamma radiation from these uranium cylinders found in the storage yards due to limited exposure time, distance from the access points of the public to the cylinder yards, and shielding.

The External Gamma Radiation Monitoring Program is designed to provide exposure data on direct radiation from DOE operations to members of the public. The primary factor in selecting the monitoring locations is the potential for a member of the public to be exposed to direct radiation. The highest potential radiation exposure to the public is at the plant perimeter. The monitoring program conducts area gamma radiation dose monitoring using thermoluminescent dosimeters. Devices of this type are capable

[1] Excepts dose from radon or its decay products, dose received by medical services, dose received by medical research volunteers, dose from background sources or occupational exposure under Nuclear Regulatory Commission, Agreement State License, and 10 *CFR* § 835.

of measuring exposure resulting from gamma radiation and are used throughout the industry to perform EM.

EM of direct radiation is performed by the Remediation Contactor for the Deactivation Contractor in accordance with the latest revision of the Remediation Contractor's Environmental Monitoring Plan (EMP) (LATA Kentucky 2013a). Upon completion of the Remediation Contract in July 2015, the EM of direct radiation will be transitioned to the Deactivation Contractor through the remaining term of the Deactivation Task Order.

4.4 RADIATION EXPOSURE CONTROL

4.4.1 Physical Design Features

In addition to meeting the public and environmental radiation dose limits established in Section 4.1, the Deactivation Contractor has instituted measures to control radiation doses at levels that are ALARA. To the extent practicable, the ALARA process will be implemented through the use of physical design features and BAT.

Because of the comprehensive scope associated with the project, a mix of short-term and long-term controls will be used to ensure exposures remain ALARA. The physical design features and engineered controls include, but are not limited to, portable and fixed ventilation systems, confinement and containment structures, and other BAT. Administrative controls also may be used; however, engineered controls and design features are preferred. The type and application of specific controls to be used are determined during project planning and hazard assessment activities. Additional monitoring may be required to verify the effectiveness of these controls and to determine the amount of radioactivity discharged to the environment as a result of operations.

4.4.2 Administrative Controls

Administrative controls are used to supplement the prescribed physical design features and where physical design features are demonstrated to be impractical.

Administrative controls used to implement the ALARA process may include, as appropriate for the planned activities, administrative control levels (ACLs), performance goals, written procedures, and postings to restrict access.

Through policies and procedures, the Deactivation Contractor establishes project ACLs for the release of radiological materials equal to or less than DOE requirements. If determined to be effective in controlling public and environmental exposure, the Deactivation Contractor may establish project or work-group-specific ACLs. The actual ACLs are established by the Deactivation Contractor's management.

5. AIRBORNE RADIOACTIVE EFFLUENTS

5.1 AIRBORNE EFFLUENTS MONITORING AND SURVEILLANCE

Airborne radioactive effluents are monitored in accordance with the Remediation Contractor EMP and requirements from 40 *CFR* Part 61, Subpart H. Stack emissions will be monitored consistent with the requirements of the Deactivation Contractor's Title V air permit (V-07-031). Planned activities or start-up of

new activities that have potential radionuclide emissions are evaluated against NESHAP requirements and will be evaluated prior to discharge per the requirements of DOE O 458.1 and site ALARA goals. Unplanned discharges to the environment will be evaluated following release to determine potential impacts to off-site personnel and the environment. Results from radioactive air monitoring are used to ensure ALARA is properly implemented at PGDP to track performance and to effect changes, as needed, to minimize radioactive air pollution.

Meteorological Monitoring. The Deactivation Contractor will work under the Remediation Contractor NESHAP Management Plan (LATA Kentucky 2013b) and provide input to the Remediation Contractor for the Annual NESHAP Report. Upon completion of the Remediation Contract in July 2015, responsibility for the management and implementation of the EMP and the NESHAP Management Plan will be transitioned to the Deactivation Contractor through the remaining term of the Deactivation Task Order.

Meteorological monitoring is necessary to model the dispersion of airborne radiological emissions so exposures from emissions can be estimated when direct monitoring is not used. Actual ambient air radionuclide concentrations at PGDP are continuously monitored and the levels are bounded by conservative assumptions in the calculation of the dose to the maximum exposed individual. DOE operations at the PGDP site have limited potential for atmospheric release of radiological hazardous materials.

In accordance with DOE O 458.1, the public dose from air emissions is estimated by use of the U.S. Environmental Protection Agency (EPA) Clean Air Act Assessment Package-1988 (CAP-88) computer model. In general, for use in air quality modeling applications, meteorological data should be representative of conditions affecting the transport and dispersion of pollutants in the "area of interest," as determined by the locations of the sources and receptors being modeled. A quantitative method does not exist for determining representativeness absolutely. The meteorological data set used is the five-year STAR distribution from the 60-m station on the PGDP meteorological tower for the years 1988 through 1992. (Meteorological tower operations ceased in 1993.) The data set was generated in compliance with the appropriate guidance and met the data quality requirements (EPA 2000; DOE 2004). This included meteorological conditions measured at two heights. The quality of the data set at the PGDP is commensurate with the level of site radiological activities, the site topographical characteristics, and the distance to critical receptors. While the data set uses 5 years of data to account for all seasonal variations, the data set does not account for any long-term change in wind patterns over decades. Use of the historical data set is still considered representative of the site because the on-site terrain has remained constant; the terrain is an industrial site that is flat and partially wooded; and the on-site data set includes the resultant air flow from the terrain. CAP-88 relies on the meteorological data set to estimate the dispersion of the pollutant radionuclides. The CAP-88 model assumes steady state air dispersion of emitted radionuclides results in a public dose based on multiple radionuclide uptake methods.

PGDP site operations historically have contributed little, if any, dose to the public. The ambient air concentration of radionuclides usually is below the detection ability of the ambient air stations. Since 2000, most of the ambient air monitoring stations have not detected any airborne radionuclides. The few detection results recorded have been below the 40 *CFR* § 61, Appendix E, Table 2, safe dose values. The CAP-88 model estimated dose, modeled in previous Annual Site Environmental Reports (ASERs), also has been much lower than the safe public dose standard of 10 mrem/year. Note: Doses calculated in CAP-88 are presented in the historical unit of total effective dose equivalent (TEDE). At the Paducah Site TEDE is equivalent to the more current unit of total effective dose (TED).

Choosing a different meteorological data set for CAP-88 potentially would cause a small change in the dose estimate; however, based on the above discussion and due to the very low dose resulting from site

radionuclide emissions, the model results would be well less than the safe public dose standard. Based on these conditions, the CAP-88 program continues to use the existing on-site data set.

5.2 RADON

An evaluation of radium-containing waste at PGDP was performed in the *Authorized Limits Request for Solid Waste Disposal at C-746-U Landfill at the Paducah Gaseous Diffusion Plant* (C-746-U Landfill Authorized Limits) (DOE 2011a) and support documents. Results of the evaluation demonstrate that radon emissions will not be a significant concern. Without a significant source of radon emissions to the site, radon monitoring is not performed.

PGDP has no 11e.(2) by-product material, as defined in the Atomic Energy Act (AEA) (as amended). The AEA, as amended, states that discrete sources of radium-226 must be treated like 11e (2) by-product material; therefore, the limit on radon-222 emissions of 20 pCi/m^2-sec would apply to any radium-226 sources managed by the Deactivation Contractor. After review of the United States Enrichment Corporation radioactive source inventory, no radium-226 sources were identified for transfer to the Deactivation Contractor. Therefore, this section is not applicable to its operations.

6. CONTROL AND MANAGEMENT OF RADIONUCLIDE IN LIQUID DISCHARGES

Control and management of radionuclides in liquid discharges is confirmed by monitoring of the effluent discharge through the outfalls, site environmental surveillance sampling, evaluations of planned and unplanned liquid discharges. The site EMP implemented by the Remediation Contractor documents the rationale, sampling frequency, and parameters for environmental monitoring activities at the Paducah Site[2]. Characterization is dependent for the potential for on- and off-site impacts. Assessment of radiological consequences and modeling is presented in the ASER.

Radionuclide analysis is performed on selected samples as outlined in the EMP to evaluate the compliance of site discharges in comparison with the DOE STD-1196-2011 *Derived Concentration Technical Standard* (DCS) (DOE 2011b). DOE/EH-0173T, *Environmental Regulatory Guide for Radiological Effluent Monitoring and Environmental Surveillance*, recommends that radionuclide analysis is appropriate to identify radionuclides that could contribute 10% or more of the dose (DOE 1991).

6.1 EFFLUENT DISCHARGE

DOE-permitted surface water discharges include rainfall runoff from cylinder yards, landfills, and effluent from site processes. The EMP sets forth the sampling requirements and parameters for these outfalls. The outfalls are sampled for radionuclides, as specified each year in the EMP and as required by

[2] Upon completion of the Remediation Contract in July 2015, responsibility for the management and implementation of the EMP will be transitioned to the Deactivation Contractor through the remaining term of the Deactivation Task Order.

DOE O 458.1, DCS, Kentucky Pollutant Discharge Elimination System (KPDES) permits, planned activities, and site ALARA goals. Collection of radiological parameters to assess dose per DOE O 458.1, which is not permit required, will be collected immediately downstream of the compliance sampling points at each site outfall. The ASER presents the analytical results and an assessment of any radiological consequences to demonstrate compliance with DOE O 458.1.

6.2 SETTLEABLE SOLIDS

DOE O 458.1 requires that liquid discharges containing radionuclides from DOE activities do not exceed an annual average at the point of discharge of either of the following:

- 5 pCi per gram above background of settleable solids for alpha emitting radionuclides, or
- 50 pCi per gram above background of settleable solids for beta emitting radionuclides.

Settleable solids are measured in plant effluent at the point of discharge on frequencies and locations determined annually by the EMP. The EMP defines the collection process for settleable solids. If the defined collection process does not recover a sufficient quantity of settleable solids to detect the criteria above, then the releases are in de facto compliance.

6.3 SANITARY SEWER SYSTEM

The Deactivation Contractor operates a permitted sanitary sewer system for PGDP in accordance 401 *KAR* Chapter 5, *Water Quality*. Environmental radiological protection guidelines are incorporated into site plans and procedures to minimize radiological contamination discharges. Disposal of liquids containing radionuclides into the sanitary sewer complies with the ALARA process and applicable procedures. Potential sources of radiological contamination into the sanitary sewer are from the on-site laboratory, if operating, and C-746-U Landfill leachate.

The sanitary sewer treatment plant is operated to minimize long-term buildup of radionuclides in the sewage sludge. The sludge is dried prior to sampling and off-site disposal. Effluent from the sewage treatment plant flows through KPDES Outfall 004. Sampling for radiological parameters in the effluent and sewer sludge will performed in accordance with the current revision of the EMP.

6.4 ENVIRONMENTAL SURVEILLANCE SAMPLING

Environmental surveillance sampling at the site is conducted to verify the effectiveness of in-plant measures used for controlling the release of radioactive materials, evaluate the buildup of environmental radioactivity, capture areas not normally captured in routine plant effluents, and for public information purposes. The off-site environmental surveillance sampling is established on the basis of an evaluation of radionuclide composition of the liquid waste discharges from the facility and the environmental parameters that affect their dispersion and dilution in the environment. The EMP implemented by the Remediation Contractor defines radionuclides and frequencies of sampling events as required by DOE O 458.1, DCS, planned activities, and site ALARA goals. Locations for these sites are evaluated based on available data each time the EMP is revised. Since most radionuclide levels in the surrounding plant sediment and surface water have been historically low it is anticipated that effluents will pose minimal risk and that only a few sample locations will be necessary each year for surveillance sampling. Priority of locations are given to areas where members of the public have access and which capture the sum

discharges of all site activities present and historical, identify radionuclides, evaluate changes in the site effluent characteristics, and identify areas protective of the public and the environment. Consistent with this plan, information obtained from environmental surveillance sampling is used to effect changes in controls implemented to prevent/control releases and achieve ALARA goals. The Remediation Contractor will provide comprehensive analytical services to meet the needs of the Deactivation Contractor Task Order. Upon completion of the Remediation Contract in July 2015, these services will be transitioned to the Deactivation Contractor through the remaining term of the task order.

6.5 EVALUATIONS OF PLANNED AND UNPLANNED DISCHARGES

The DOE site routinely discharges liquids from treatment of wastewater, planned activities, or startup of new activities to the environment. Each of these events is evaluated prior to discharge per the requirements of DOE O 458.1, KPDES permits, and site ALARA goals. Unplanned discharges to the environment will be evaluated following release as soon as possible to determine contaminants of concern, number of samples and necessary protective actions.

7. RADIOACTIVE WASTE AND SPENT NUCLEAR FUEL

7.1 RADIOACTIVE WASTE

The Deactivation Contractor has implemented procedures, practices, and monitoring in accordance with Section 4.3 of this ERPP to ensure that management, storage, and disposal of radioactive waste is maintained ALARA and does not result in a TED of greater than 25 mrem/year to the public or any releases to the environment. Radioactive waste is managed to meet the requirements of DOE O 435.1.

7.2 BY-PRODUCT MATERIAL

As defined by the Section 11e.(2) of the AEA, there is no by-product material at PGDP. Material defined as Section 11e.(3) or 11e.(4) by-product material in the AEA (e.g., sealed radioactive sources) is managed under 10 *CFR* § 835.

8. PROTECTION OF DRINKING WATER AND GROUNDWATER

8.1 ON-SITE DRINKING WATER TREATMENT PLANT

The Deactivation Contractor operates a permitted drinking water system in accordance with 401 *KAR* Chapter 8, *Public Water Supply*, regulations for on-site use. Water is withdrawn from the Ohio River and treated to meet regulatory standards. Because groundwater is not used for drinking water, there is no potential from plant-derived radiological contamination within the drinking water system. No members of the public are supplied drinking water from this system.

8.2 PROTECTION OF GROUNDWATER

The potential for migration of radiological constituents present in liquid discharges to act as a source of radiological contamination to groundwater was evaluated to meet the requirements set forth in DOE O 458.1 that requires groundwater be protected from radiological contamination to ensure compliance with dose limits in DOE O 458.1 and consistent with ALARA process requirements. To this end, this program ensures the following are performed:

1. Baseline conditions of the groundwater quantity and quality are documented;
2. Possible sources of, and potential for, radiological contamination are identified and assessed;
3. Strategies to control radiological contamination are documented and implemented;
4. Monitoring methodologies are documented and implemented; and
5. Groundwater monitoring activities are integrated with other environmental monitoring activities.

Based on a previous remedial investigation conducted at the PGDP, the potential for soils to act as sources to groundwater was estimated (DOE 2012). This estimate indicated that the constituents migrating through the Upper Continental Recharge System (UCRS) are reduced in concentration by a dilution attenuation factor of at least 58 before they can affect the Regional Gravel Aquifer (RGA).

Constituents migrate vertically through the UCRS at a relatively slow rate. Once the constituents migrate to the RGA, the flow pattern changes to horizontal and is at a much higher volume that then dilutes the concentrations found in the UCRS. The net dilution/attenuation is a factor of 58.

Site sampling per the EMP evaluates if there is potential for radionuclides from the Deactivation Contractor's radiological activities contained in liquid effluents to cause private or public drinking water systems to exceed the drinking water maximum contamination limits in 40 *CFR* § 141, *National Primary Drinking Water Regulations*.

8.3 PROTECTION OF SURFACE WATER

The Deactivation Contractor evaluates processes and activities with liquid effluents prior to discharge per the requirements of DOE O 458.1, KPDES permits, and site ALARA goals. Discharges from PGDP enter Bayou Creek and Little Bayou Creek from either side of PGDP, with the on-site North-South Diversion Ditch flowing from the landfill area into Little Bayou Creek. These two creeks combine shortly before flowing into the Ohio River north of the plant. Planned or unplanned discharges typically flow into one of these two streams prior to flowing to the river. Planned discharges are evaluated prior to release into the streams and unplanned discharges are evaluated when detected to determine protective actions necessary to protect soils and groundwater. Analytical results and potential dose exposure calculations are presented in the ASER.

8.4 APPROACH APPLIED TO LIQUID DISCHARGES

Liquid surface discharges from PGDP are monitored and compared to established DCSs that are protective of human health and the environment. Surface discharges maintained at a protective level using the DCS, at a maximum, will be a factor of 25 (DCS of 100 mrem/year; 40 *CFR* § 141 of 4 mrem/year) above the contamination limits in 40 *CFR* § 141. Thus, as long as surface water protectiveness (at the maximum contaminant level MCL or risk-based level) is assured in accordance with the DCS, then the groundwater protectiveness is assured as the groundwater concentrations will be a factor of 58+ lower than the surface water concentrations.

Surface water is not used for drinking water in the immediate PGDP area[3]. The nearest drinking water pathway for consumption of surface water at a public drinking water system is at Cairo, Illinois, which collects surface water from the Ohio River. The EMP outlines locations and radionuclides for environmental surveillance samples in the vicinity of the PGDP. These samples are evaluated for compliance with drinking water maximum radiological contamination limits in 40 *CFR* § 141.

9. PROTECTION OF BIOTA

Sampling of aquatic organisms over previous years in the streams that directly receive plant discharges (Bayou Creek and Little Bayou Creek) has been extensive and the sampling was eliminated under direction of the KPDES permit as it could result in deleterious effects on the aquatic community. Sediment sampling is used as the predictive environmental media sampled in accordance with the EMP[4]. Sediment surveillance sampling is performed to monitor the behavior of the radionuclides in the environment. Sediment sampling concentrations and liquid discharge concentrations less than the DCS indicate levels sufficient to protect biota in the environment. Sediment sampling concentrations and liquid discharge concentrations greater than the DCS indicate further evaluation is needed in accordance with DOE O 458.1 and DOE 2002.

10. RELEASE AND CLEARANCE OF PROPERTY

10.1 AUTHORIZED LIMITS

The Deactivation Contractor will continue to use the guidelines and limits previously derived from DOE O 458.1 and associated guidance (such as the surface activity guidelines) for the clearance of residual radioactive material until such guidelines and limits are replaced or revised by Authorized Limits approved by DOE or preapproved Authorized Limits issued by DOE.

10.2 RESIDUAL RADIOACTIVE MATERIAL

The Deactivation Contactor has an established process for release of materials that potentially contain residual radioactive materials. This process is documented within the Radiological Controls organization. Property potentially containing residual radioactive material will be evaluated employing this process to determine if they can be cleared from the Deactivation Contractor control. Once the property is demonstrated not to contain residual radioactive material or is evaluated and appropriately monitored or surveyed to determine that any residual radioactive material levels are within acceptable limits, the Deactivation Contractor will work with DOE to gain concurrence prior to release.

[3] DOE established a Water Policy in 1994 that included provisions to extend a municipal water line to the entire area of the groundwater contamination originating from the Paducah Site. DOE has established agreements with the affected residents and pays their water bills.

[4] Upon completion of the remediation contract in July 2015, responsibility for the management and implementation of the EMP will be transitioned to the Deactivation Contractor through the remaining term of the Deactivation Task Order

11. RECORDS, RETENTION AND REPORTING REQUIREMENTS

11.1 ERPP RECORDS

The records of ERPP-related activities are prepared, maintained, and dispositioned in accordance with task order requirements and applicable procedures. Required records will be retained until final disposition is concurred upon by DOE. ERPP records will include, at a minimum, the following.

- Information and data necessary to identify and characterize releases of radioactive material to the environment, their fate in the environment, and their probable impact on radiation dose to members of the public, and any impacts on ecological systems.

- Documentation of individual and collective dose to members of the public due to radiological activities. This includes documentation of site-specific information on radiation source dispersion patterns, location, and demography of members of the public in the vicinity of the radiological activity and assumed default values or site-specific parameters used in calculations.

- Requests for specific authorization for temporary public dose limits, and subsequent approvals and other related actions.

- Documentation of actions taken to implement the ALARA process.

- Documentation of actions taken to demonstrate compliance with the public dose limit.

- Documentation of actions taken to implement the BAT selection process in regulating liquid discharges, including documentation of analyses and factors considered to be important, including alternative processes, for the BAT selection process.

- Effluent monitoring and environmental surveillance information and data.

- Documentation related to the long-term management of radioactive waste and residual radioactive material.

- Final documentation for clearance of property containing residual radioactive material.

- Documentation of approved Authorized Limits for routine clearance of property for unrestricted or restricted use and the scenarios evaluated in selecting the limits and approved revised Authorized Limits for clearance of property.

- Annual summaries related to clearance of property.

- Survey results documented in sufficient detail to evaluate the residual radioactivity, to calculate the critical level, and to identify the instrument(s) used in the survey.

- Results of functional checks to allow reconstruction of counts in the event an error is discovered.

11.2 RADIOLOGICAL UNITS

Unless otherwise specified, the required records will use the special radiological units, including curies, rads, roentgen, and rem and multiples and subdivisions of these units. Other radiological units that have been specified and are allowable for ERPP records include these:

- Units of disintegrations per minute per 100 cm^2 (dpm/100 cm^2) for measurements of radioactive surface contamination; and

- Multiples and subdivisions of derived air concentrations (DACs) and DAC-hours for measurements of airborne radioactivity and individual exposure to airborne radioactivity.

The International System of Units radiological units (e.g., becquerel, gray, and sievert) may be used for purposes of calculations and may be provided parenthetically in required records as an aid to unit conversion.

11.3 REPORTING

The Deactivation Contractor provides the Remediation Contractor[5] information for the DOE ASER per requirements in DOE O 458.1. Other annual reports are submitted to summarize information on particular pathways in accordance with their applicable regulations. These reports include, but are not limited to, the National Emissions Standards for Hazardous Air Pollutants Annual Reports and Annual Report on External Gamma Radiation Monitoring. Additional trending reports of site environmental radiological parameters are provided at DOE request to support comparison, trending, and decisions.

12. RESOURCE ASSESSMENT

Funding required to develop and implement a fully compliant ERPP has been factored into the Deactivation Contractor project work. Appropriate levels of funding have been assigned for management of this ERPP, development of programmatic documents, and acquisition of equipment, sampling, analysis, training, and personnel to meet all commitments fully.

13. PRIORITIZATION

The Deactivation Contractor recognizes the applicable elements of DOE O 458.1 with priority given to *CFR* requirements as applicable. Other elements of DOE O 458.1 are implemented as applicable with a lower priority than *CFR* requirements if they do not conflict. In the event of a conflict between the *CFR* and DOE Order, the *CFR* will take priority. DOE O 458.1 objectives are accomplished through integration with the Environmental Management Systems (EMS). An EMS is a continuing cycle of planning, implementing, evaluating, and improving processes and actions undertaken to achieve

[5] Upon completion of the Remediation Contract in July 2015, responsibility for the ASER will be transitioned to the Deactivation Contractor through the remaining term of the Deactivation Task Order.

environmental goals. The EMS Description (CP2-ES-0101) was developed pursuant to DOE P 450.4, *Safety Management System Policy*.

14. REFERENCES

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