CHAPTER 2

Radioactive and Mixed Waste Project Requirements

2-1. Introduction.

a. Radioactive materials have been used by the DOD and civilians for nearly 100 years. Radioactive commodities and radioactive wastes have been found on all types of projects. On BRAC (Base Realignment and Closure) and IRP (Installation Restoration Program) projects, radioactive commodities are the most common type of radioactive waste. These commodities may include:

- Dials and gauges on vehicles and equipment illuminated with radium paint.
- Electron tubes and diodes containing small quantities of radioactive materials used extensively in radar and fire control equipment.
- Radioactive tritium illuminators used in exit signs and fire control devices.
- Thorium used in radiation detection equipment and as an alloy.
- Magnesium-thorium, used in the manufacture of aircraft and missile parts.

b. Depleted uranium (DU-natural uranium with the fissionable component reduced or removed) is used in armor piercing penetrators, high-density armor, radiation shielding, and aircraft counterweights. A website containing information on all the commodities used in DOD is available from the Wright–Patterson Air Force Base site. Hospitals and laboratories use a very extensive list of radioactive materials, sometimes in liquid scintillation vials, and often combined with human or animal tissue or fluids. Nuclear reactors have a defined mix of source materials, activation products, and fission products. Nuclear weapons assembly and maintenance facilities may have uranium, plutonium, and tritium contamination, and the Formerly Used Sites Remedial Action Program (FUSRAP) sites may have uranium or thorium ores and mill tailings and their associated decay progeny. Superfund sites have encountered the widest variety of radionuclides, ranging from radium processing tailings to transuranics used in sealed source manufacturing.

c. The USACE approach for all projects is to follow the guidance and methodology outlined in Project Management Business Process (PMBP). Hazardous Toxic and Radioactive Waste (HTRW) projects follow EM 200-1-2, and when addressing a release of a hazardous substance to the environment, follow the Comprehensive Environmental, Response, Compensation, and Liability Act of 1980 (CERCLA) approach. On radioactive materials sites USACE applies guidance found in the Multi-Agency Radiation Site Survey and Investigation Manual (MARSSIM).

d. PMBP provides a means of ensuring that the right people, with the right skills and the right tools, work effectively to complete a project to the satisfaction of the customer, the

regulators, and stakeholders. TPP (Technical Project Planning) outlines an iterative four-phased approach for ensuring that the project objectives are identified, data collection is efficient, and the project progresses towards site closeout. CERCLA provides a process for ensuring authority to conduct projects with public input, and regulatory oversight. MARSSIM provides guidance on meeting the final status survey and closing out a site. Projects involving radioactive material can be approached in the same way as other hazardous materials projects, but with some of the following additions to the team and modifications of the plan.

2-2. Health Physicist Involvement.

a. Health Physicists (HPs) are technical experts in radioactive materials and radiation. They can provide expert advice on identifying, sampling, handling, transporting, and disposing of radioactive materials, measurement of radiation levels and doses, the ecological and biological effects of exposure to radiation, and the applicable laws, regulations, and guidance concerning radiation and radioactive materials. A USACE project HP should be assigned very early in the project planning process, and may need to be involved in both the decision-making processes and execution throughout the project. Contractors will often be required to have HP staff and HP technicians.

b. ER 385-1-92 requires the use of Qualified Health Physics personnel for Remedial Design activities at HTRW sites. Qualified personnel must meet education and experience requirements listed in EM 385-1-80. The addition of certified health physicists (CHPs), HPs, and HP techs to a project can significantly increase project costs.

2-3. Chemist Involvement. The project chemist will need to be acquainted with the different methodologies used for identifying and quantifying radioactive materials. Approved methods, limits of detection, radionuclide emissions, and appropriate wet chemistry can be significantly different when radionuclides are involved. Analytical laboratories should be USACE validated and must be notified in advance that potentially radioactive samples are to be submitted. The lab will need to ensure appropriate contamination control measures are used for the radioactive samples. This is in addition to the chemical analyses that may be required. ER 1110-1-263 sets laboratory data quality requirements. These factors may increase lab turn around times and analytical costs.

2-4. On-site Radiochemistry Labs. A number of projects have found it economical to have an on-site radiochemistry lab instead of contracting an off-site lab for routine radiochemistry analyses. An on-site lab will provide a more rapid turn around for sample analyses.

2-5. Risk Assessor Involvement. To address the complexities of a risk-informed approach to site clean-up, a risk assessor will need to assist on-site remediation decisions. The data needs of risk assessors are often different from other team members and may require additional

sampling and analyses. Where appropriate, a risk-informed regulatory approach can also be used to reduce unnecessary conservatism in purely deterministic approaches, or can be used to identify areas with insufficient conservatism in deterministic analyses and provide the bases for additional requirements or actions. Risk-informed approaches lie between the risk-based and purely deterministic approaches.

2-6. Considerations for Cleanup Level Development. How clean is clean? This fundamental question must be answered in all environmental remediation projects. It must be answered at the time when the decision is made as to what response is needed at a site, and it must be answered again at the end to determine if the required response has been completed and is successful in operation. The answers to this question are found in a complex analysis of technical and legal factors established in the laws governing environmental response action projects.

a. CERCLA requires that response actions be conducted in compliance with the implementing regulations promulgated by the Environmental Protection Agency, the National Oil and Hazardous Substances Pollution Contingency Plan, 40 CFR Part 300 (NCP). The NCP includes a list of hazardous substances, including radioactive elements and compounds. In addition, if other hazardous substances or pollutants and contaminants are present, then CERCLA also applies to the cleanup of these other contaminants. CERCLA authorizes the decision maker for the lead Federal agency to respond through removal or remedial actions when the release or threat of release of a hazardous substance has created or may create an imminent and substantial danger to humans or the environment. Remedial actions provide the permanent remedy necessary to prevent or minimize the release so that the hazardous substances or pollutants and contaminants do not migrate to cause substantial danger to present or future public health or welfare or the environment. Removal actions are required to contribute, to the extent practicable, to the efficient performance of any long-term remedial action in responding to a release or threatened release.

b. Chapter 9 describes the regulatory processes that authorize USACE to clean up a site. The primary environmental response authority that USACE follows when addressing a release of a hazardous substance to the environment is CERCLA.

2-7. Disposal Options.

a. Disposal options for radioactive materials will vary from readily disposable locally, to no immediate disposal options at all, depending on the type, quantity, concentration, and pedigree of the radioactive materials. Very early in the planning process and well before any execution, a disposal plan must be prepared. Kansas City District has a number of pre-placed contracts for disposal of radioactive waste that may be accessed by all of USACE. The project HP should be able to assist with initial estimates of potential disposal sites.

b. Low-Level Radioactive Waste (LLRW) is also under the control of the originating state's Low-Level Radioactive Waste Compact. The compacts were originally developed in 1985 to construct and operate radioactive waste disposal facilities within their boundaries. Currently, there are 10 approved compacts and three active LLRW disposal facilities. Only two of the three disposal facilities may accept Classes A, B, and C radioactive waste. The Hanford, Washington, facility only accepts LLRW from the Northwest and Rocky Mountain compacts, but will accept non-NRC regulated wastes from all states. The Envirocare (Utah) facility accepts Class A LLRW, 11e.(2), and non-NRC regulated wastes from all regions of the United States. The Barnwell, South Carolina, facility accepts LLRW from all generators in the United States except the Rocky Mountain and Northwest compacts. Beginning in 2008, Barnwell will only accept LLRW from the Atlantic Compact states. These compacts may control the import and export of LLRW to or from their compact, and may assess fees for import or export. In some cases, payment of these fees by the Federal Government may violate fiscal law. The appropriate Office of Counsel should be consulted for guidance on this matter. The Army Field Support Command (AFSC) of Army Materials Command (AMC) is the operating agency for the Executive Agent for radioactive waste from DOD activities. All disposal actions for DOD wastes need to be coordinated with AFSC through the USACE Hazardous, Toxic and Radioactive Waste Center of Expertise (HTRW-CX). Radioactive wastes generated by Civil Works activities, such as FUSRAP, may not be considered DOD wastes. Additional guidance on disposal is furnished in Chapter 9.

2-8. Transportation. Transportation requirements for radioactive materials, wastes, and samples are substantially different from transportation of other types of DOT hazardous materials. Department of Transportation (DOT) radioactive materials regulations are listed in 49 CFR 173.401 (Subpart I) et seq. The project HP will be familiar with transportation requirements. Certain states also charge a fee to transport radioactive waste through them. In some cases, payment of these fees by the Federal Government may violate fiscal law. The appropriate Office of Counsel should be consulted. Additional guidance on transportation is furnished in Chapter 8.

2-9. Public Perception.

a. Most projects involving radioactive materials will receive increased public interest. PMBP requires the project delivery team (PDT) to develop a communications plan. The plan requires input and assistance from the Public Affairs Office. Past experience has shown that addressing all concerns in a truthful and open manner is the simplest method of allaying public concerns. The HTRW-CX and the Radiation Safety Support Team (RSST) have developed a number of fact sheets that are available for general use by USACE, our customers, contractors, and regulators.

b. The communications plan will identify the project stakeholders' problems, concerns, and issues. It will then establish an internal and external communication strategy and

determine the information needs of all PDT members and stakeholders: who needs what information, when they will need it, how it will be given to them, and by whom.