

ANALYSIS OF THE IMPACT OF THE BYPRODUCT RULE ON THE U.S. DEPARTMENT OF ENERGY'S GRAND JUNCTION REMEDIAL ACTION PROGRAMS

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ABSTRACT

The byproduct rule resolved numerous issues with regard to the management of U.S. Department of Energy (DOE) radioactive waste which is also hazardous under the Resource Conservation and Recovery Act (RCRA). It did so by clarifying that radioactive waste that is hazardous under RCRA is subject to regulation under both RCRA and the Atomic Energy Act (AEA), with the exception of materials that are defined as byproduct under Section 11(e)(2) of the AEA, specifically uranium and thorium mill tailings. However, when remedial actions at sites involving uranium or thorium mill tailings are conducted, it is still necessary to examine each remedial project in its entirety in order to determine the applicability of EPA requirements. In this paper the background, regulatory status, and compliance approach of three DOE Remedial Action Projects involving mill tailings are examined.

PURPOSE

Over the past three years much attention has been given to determining the regulatory status of waste which is both radioactive and hazardous - "mixed waste." This waste is of interest because hazardous and radioactive wastes are governed by different regulatory authorities and regulations. Most radioactive waste is subject to regulation by the Nuclear Regulatory Commission (NRC) or Department of Energy (DOE) under the Atomic Energy Act of 1954 (AEA); hazardous waste is regulated by the Environmental Protection Agency (EPA) under the Resource Conservation and Recovery Act of 1976 (RCRA). Because many radioactive wastes are byproduct materials, much of the discussion has focused on an exemption in RCRA for source, special nuclear, and byproduct materials as defined by the AEA. In an effort to avoid dual regulation, DOE initially proposed to regulate virtually all mixed waste as byproduct material under the AEA. However, DOE withdrew this proposal when, on May 1, 1987, it issued the "byproduct rule" (10 CFR Part 962) which mandated that all DOE radioactive waste which is hazardous under RCRA is subject to regulation under both RCRA and the AEA.

The rule, however, specified that it did not affect radioactive material that is defined as byproduct material under Section 11e(2) of the AEA. Section 11(e)(2) identifies byproduct material as "the tailings or waste produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content." Nor did the rule affect the status of these materials as hazardous substances under the Comprehensive Environmental Response Compensation and Liability Act of 1989 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA). This is significant to DOE because much of the Department's current remedial action activity deals with uranium or thorium mill tailings. The purpose of this paper is to focus on those remedial ac-

tion programs being performed through the DOE's Grand Junction Project Office and examine their regulatory status and compliance approach with respect to RCRA and CERCLA/SARA, given the byproduct rule.

INTRODUCTION

The DOE has been conducting remedial action at its facilities for a number of years. Remedial action has been performed primarily under three programs: the Uranium Mill Tailings Remedial Action Program (UMTRAP), the Surplus Facilities Management Program (SFMP), and the Formally Utilized Site Remedial Action Program (FUSRAP). UMTRAP deals with remedial actions at selected non-government-owned uranium millsites as specified by Congress. SFMP covers remedial activities at DOE-owned surplus facilities. FUSRAP covers remedial action at privately owned facilities that were used by the government as part of the Manhattan Project.

The DOE's Grand Junction Projects Office (GJPO) in Grand Junction, Colorado, is responsible for several remedial action projects in UMTRAP and SFMP. Under UMTRAP, the GJPO is involved in the Vicinity Properties Program for Grand Junction and Edgemont, South Dakota. Under SFMP, GJPO is responsible for remedial action at the Monticello Millsite and the Monticello Vicinity Properties in Utah. The GJPO is also responsible under SFMP for remedial activity at the GJPO property itself.

Although all of these GJPO projects involve uranium or thorium mill tailings, each represents a unique set of regulatory challenges. Described in this paper are the background, regulatory status, and compliance approach for each project.

URANIUM MILL TAILINGS REMEDIAL ACTION PROJECT-VICINITY PROPERTY PROGRAM

Background

In November 1978, Congress enacted the Uranium Mill Tailings Radiation Control Act, Public Law 95-604 (UMTRCA), to stabilize and control tailings at selected mill tailings sites. The Act designated 24 millsites nationwide where, prior to 1971, uranium mill tailings were accumulated in large piles as part of an effort to produce uranium for the Manhattan Project and the Atomic Energy Commission. It authorized the DOE to enter into cooperative agreements with the affected States and Indian Tribes to conduct any necessary remedial action. The Act also required the EPA to promulgate general standards to be applied to cleanup work conducted by the DOE under the auspices of the UMTRAP.

EPA promulgated final standards for the disposal and cleanup of the inactive mill tailings sites under UMTRCA on January 5, 1983 (48 CFR 590). These standards were challenged in the Tenth Circuit Court of Appeals by several parties (Case Nos. 83-1014, 83-1041, 83-1206 and 83-1300). On September 3, 1985, the court dismissed all challenges except one: it remanded the ground-water provisions of the regulation at 40 CFR 192.20(a) (2)-(3) to EPA "...to treat these toxic chemicals that pose ground-water risk as it did in the active mill site regulations." EPA proposed additional standards that considered the ground-water risk at UMTRCA millsites on September 24, 1987. These standards are based in part on the 40 CFR Part 264 RCRA regulations for hazardous waste facilities.

When inappropriately managed, uranium mill tailings may pose risks to the public in the form of elevated indoor radon levels, gamma radiation, and elevated levels of the radioactive and toxic elements (uranium, radium, arsenic, molybdenum, and selenium) in food or water. However, when the tailings piles were being formed, these potential threats were not recognized and there were no restrictions on the use of the tailings. The sand-like tailings were widely used in areas where natural sand was not available; varying amounts of tailings were taken from many of the millsites by residents and builders for use as fill material, as a base for concrete foundations, and for soil conditioning. Locations away from inactive millsites where tailings were used or where wind and water erosion have caused tailings contamination are called "vicinity properties."

The DOE's GJPO and its contractor UNC Geotech are responsible for over 80 percent of the UMTRAP Vicinity Properties Program. The GJPO program consists of conducting remedial action at vicinity properties in both Grand Junction, Colorado, and Edgemont, South Dakota. Tailings in the Grand Junction area were derived from the Climax Uranium Millsite. Climax Uranium processed uranium and vanadium ore at the Grand Junction millsite from June 1951

to March 1970. During that period the mill produced 2.2 million tons of tailings of which approximately 300,000 tons were removed and used as construction material and for landfill around Mesa County (1).

Approximately 8,000 designated vicinity properties in the Grand Junction area have been identified on a master listing to receive inclusion surveys. An inclusion survey is used to determine if a property should be included in the UMTRA Project. The UMTRAP Vicinity Property "process" consists of obtaining owner access agreements, performing an inclusion survey, preparing a remedial action design, conducting the remedial action, and certifying that the remedial action has been completed. Tailings-contaminated materials are taken back to a temporary storage area adjacent to the Climax Millsite where they will be remediated as part of the UMTRA millsite program. Current plans are to move the tailings to a new site approximately 30 miles from Grand Junction. This disposal site will be designed and operated to meet requirements of 40 CFR Part 192. It is estimated that approximately 50 to 60 percent of the vicinity properties to be surveyed contain uranium mill tailings in excess of EPA standards and will be included for remediation under the UMTRA Project. These property projects vary greatly in complexity and range from simple residential properties to complex commercial facilities.

Regulatory Status

When congress enacted the UMTRCA in 1978, two years after the passage of RCRA, it did so in full recognition of the hazards presented to the public health and the environment by both the radioactive and toxic constituents of uranium mill tailings. EPA was entrusted to issue specific standards (40 CFR Part 192) with regard to disposal and cleanup of inactive mill tailings sites under UMTRCA that were consistent, to the maximum extent practicable, with the requirements of the RCRA. The decision to maintain the RCRA exemption for these byproduct materials in the May 1, 1987, byproduct ruling was clearly consistent with Congress' intent to regulate UMTRCA sites separately. This intent was again made clear when Congress enacted the CERCLA and excluded in Section 101(22), "uranium mill tailings which enter the environment from any of the mill sites designated in UMTRCA."

However, none of the exclusions mentioned above cover tailings that are commingled with RCRA waste or hazardous substance releases. RCRA waste or hazardous substance releases found on UMTRAP sites independent of tailings or milling activities are also not exempt from RCRA or CERCLA/SARA requirements. Commingled tailings, RCRA wastes, and hazardous substance releases are suspected to exist at a number of the vicinity properties in Grand Junction. These materials are believed to be a particular problem at many of the complex commercial sites.

Compliance Approach

The Department of Energy guidance for hazardous and commingled waste on vicinity properties is that the waste should be identified before remedial action has commenced and characterized such that its final disposition can be determined. To support the identification of these wastes, a hazard assessment is made for each property whereby a historical survey is performed and an on-site inspection of the property is undertaken to determine waste sampling requirements. Any required samples are then in accordance with written sampling procedures developed under EPA sampling requirements (2). When a hazardous waste or a release of a hazardous substance is identified on a vicinity property, the property owner is notified so that all EPA requirements can be met. Plans are underway for a RCRA-permitted storage facility that will accept tailings commingled with RCRA waste. Commingled waste will be temporarily stored in this facility until its final disposition can be determined. To date, no commingled waste has been identified, although it is suspected at a number of complex commercial facilities now undergoing site characterization.

GRAND JUNCTION PROJECTS OFFICE REMEDIAL ACTION PROJECTBackground

The U.S. Atomic Energy Commission (AEC) established the Colorado Raw Materials Office in Grand Junction, Colorado, in December 1947 at the site of the present-day DOE GJPO. The office was to aid in the development of a viable domestic uranium industry. Accordingly, personnel at the Facility purchased and sampled uranium concentrate until 1970. They also conducted pilot-plant milling research, which involved testing and processing uranium ores on site. Prior to 1947, a pilot mill was operated by private companies involved in the war effort. From 1954 to 1958, the AEC operated a uranium mill pilot plant at the site. The last shipment of uranium concentrate was sent from the GJPO compound in January 1975. Since then, the site has been used to support various DOE programs such as the former National Uranium Resource Evaluation (NURE) program, the Uranium Mill Tailings Remedial Action Project, the Surplus Facilities Management Program, and the Technical Measurements Center (TMC).

As a direct result of the pilot plant operations, 18 acres of the GJPO Facility is contaminated with approximately 81,500 cubic yards of uranium mill tailings and ore, as well as buildings and other related equipment. In addition, localized surface and ground waters have been affected by the tailings (3). Remedial action site investigations formally began in 1984 when the GJPO was accepted into the DOE SFMP.

Regulatory Status

The uranium mill tailings subject to remedial action as part of the Grand Junction Projects Office Remedial Action Project (GJPORAP) fall under the Section 11e(2) AEA definition of byproduct material and are therefore exempt from RCRA. Any hazardous waste or hazardous waste commingled with exempt byproduct material falls under RCRA.

Although remedial activities at the federally owned GJPO Facility involve uranium mill tailings, the site is not one of the 24 UMTRCA millsites excluded under Section 101(22) from CERCLA/SARA. The project is therefore subject to the full requirements of CERCLA as amended by SARA.

When Congress amended CERCLA with SARA it provided for increased EPA involvement and oversight of federal facility cleanup. In addition federal

agencies were given mandatory schedules to assess their sites and to conduct remedial actions for those sites listed on the National Priority List (NPL). EPA was required to complete a comprehensive inventory of federal facility sites and, within 18 months, ensure that each agency conducts a preliminary assessment and site investigation (PA/SI) of each site on the docket. Sites are evaluated under the Hazard Ranking System (HRS) for inclusion on the NPL. For sites listed on the NPL, federal agencies are required under SARA to begin a Remedial Investigation and Feasibility Study (RI/FS) within six months. An Interagency Agreement with EPA is used as the vehicle for selecting the remedy and setting the remedial action schedule.

Although CERCLA provided no cleanup standards, Section 121 of SARA was intended to provide the methodology for choosing cleanup standards on a site-by-site basis. Section 121 calls for the use of applicable or relevant and appropriate public health and environmental requirements (ARARs). Applicable means that the standard specifically addresses a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a site; relevant and appropriate means that the standard does not apply to the situation at hand but that, because it addresses conditions sufficiently similar, its application is well-suited to the site. Table I contains a list of the potential ARARs for GJPORAP.

Compliance Approach

With the acceptance of the GJPO into the SFMP in 1984, remedial action investigations at this site formally began. Although the GJPO Facility is owned by the federal government and is not specifically regulated by the UMTRCA of 1978, the DOE recognized the intent of Congress as expressed in the Act and resolved to bring the Facility into full compliance with applicable or relevant and appropriate standards. Thus, UMTRCA guidelines were

TABLE I

Potentially Applicable or Relevant and Appropriate Requirements (ARARs) Federal, State Standards, Criteria, and Limitations DOE Grand Junction Projects Office Facility.

Uranium Mill Tailings Radiation Control Act
Clean Air Act
· National Primary and Secondary Ambient Air Quality Standards
· National Emission Standards for Hazardous Air
Atomic Energy Act, as amended
Toxic Substances Control Act
· PCB Requirement
Occupational Safety and Health Act
Hazardous Materials Transportation Act
· Hazardous Materials Transportation Regulations
National Historic Preservation Act
Archaeological and Historic Preservation Act
Protection of Fish and Wildlife
Endangered Species Act
Clean Water Act
· Dredge or Fill Requirements (Army Corps Section 404)
Executive Order on Floodplain Management
Radiation Control Act
Rules and Regulations Pertaining to Radiation Control
Colorado Water Quality Control Act
Basic Standards for Groundwater
Effluent Limitations
Colorado Air Quality Control Act
Colorado Air Quality Control Regulations and Ambient Air Quality
Water Well and Pump Installation Contractors Act
Well Permit Regulations
Nongame, Endangered, and Threatened Species Act

followed in the site characterization and remedial action studies that were subsequently undertaken to evaluate the radiologic environmental hazards at the Facility. Preparation of an Environmental Assessment (EA), as required by the National Environmental Policy Act (NEPA), was the initial goal (3). However, with the passage of the SARA in 1986, it became necessary to evaluate the site in terms of hazardous substances as well as radioactive materials, and a decision was made to prepare an RI/FS (4,5).

To identify potentially hazardous substances at the Facility, a Level I scoping exercise was conducted. Results of the historical survey and soil, sediment, and water sampling program indicated that the only potentially hazardous substances present were those directly associated with the uranium-vanadium ore, tailings, and processing equipment, i.e., radium, uranium, vanadium, molybdenum, selenium, and arsenic. Extraction Procedure Toxicity (EP Tox) analyses performed on the tailings showed that the samples were not hazardous waste by characteristic, as defined in 40 CFR 261 under the RCRA.

Since the completion of the draft EA and RI/FS documents, an HRS score was determined for the GJPO Facility

and submitted to the Region VIII office of the EPA. It appears that EPA will arrive at a finding of "No Further Action" on GJPORAP due to the submitted score being below the cutoff point of 28.5 for inclusion on the NPL. As a result, the EPA will no longer be involved with negotiations for remediating the site. Rather, the DOE would reach agreement with the Colorado Department of Health on the eventual remediation activities, including final disposal.

MONTICELLO REMEDIAL ACTION PROJECT

Background

The Monticello Mill Tailings Site is a 78-acre tract located in south-eastern Utah in San Juan County. The millsite is adjacent to the city of Monticello, which has a population of approximately 1,900. The site lies in a gently sloped alluvial valley formed by Montezuma Creek, a small intermittent stream with headwaters in the Abajo mountains immediately west of Monticello.

The mill was operated intermittently from 1942 to 1960; it has been owned by the AEC since 1949. The mill was one of the earliest uranium mills to operate on the Colorado Plateau and was at the forefront of development in uranium-milling technology throughout its period of operation. An estimated 2 million tons of tailings and contaminated substrate exist at the millsite. The radioactive and nonradioactive properties of the tailings reflect the various processing technologies implemented during the operation of the mill.

Contamination from the millsite has been spread to the local community and properties peripheral to the site. This has been done mostly by use of the tailings for construction purposes and by wind and water dispersion of the tailings to lands adjacent to the millsite. These areas contain an estimated 400,000 tons of contaminated material.

The tailings piles, in their present location, are within the floodplain of Montezuma Creek. They are also in contact with a shallow alluvial aquifer underlying the site. Regulatory Status

The Monticello Millsite is located on federally owned property; therefore, its compliance status is more similar to that of GJPORAP than to that of the UMTRAP Vicinity Properties Program. Under the byproduct rule, the tailings material is exempt from RCRA, while any commingled or purely hazardous waste is subject to RCRA requirements. And again, not being a designated millsite under the UMTRCA, the project is subject to CERCLA/SARA requirements.

The Vicinity Properties Program at Monticello brings additional requirements to the MRAP in that it is currently listed on the NPL. Tailings from the vicinity properties are being temporarily stored at the Monticello Millsite. This action brings the selection of the remedial alternative for the millsite completely under CERCLA/SARA. Potential

TABLE II

Potentially Applicable or Relevant and Appropriate Requirements (ARARs) Federal, State Standards, Criteria, and Limitations DOE Monticello Millsite and Vicinity Properties.

Safe Drinking Water Act
· National Primary Drinking Water Standards
· National Secondary Drinking Water Standards
· Maximum Contaminant Level Goals
Clean Water Act
· Water Quality Criteria
· National Pollutant Discharge Elimination
· Dredge and Fill Requirements (Army Corps Section 404)
Executive Order on Floodplains Management
Clean Air Act
· National Emission Standards for Hazardous Air
· National Primary and Secondary Ambient Air Quality Standards
Atomic Energy Act, as amended, and Energy Reorganization Act
Uranium Mill Tailings Radiation Control Act
Hazardous Materials Transportation Act
Occupational Safety and Health Act
National Historic Preservation Act
Archeological and Historic Preservation Act
Historic Sites, Building, and Antiquities Act
Protection of Fish and Wildlife
Endangered Species Act
Utah State Engineer's Office; Utah Division of Water Rights
Utah Department of Transportation
San Juan County Roads Department

ARARs for the Monticello Remedial Action Project (MRAP) are listed in Table II.

Compliance Approach

The Monticello Millsite was accepted into the SFMP in 1980; soon after, the MRAP was established to restore the federally owned site to safe levels of radioactivity, to dispose of (or contain) the tailings in an environmentally safe manner, and to perform remedial actions on tailings-contaminated vicinity properties. Remedial activities at MRAP and the vicinity properties were separated in 1983 with the establishment of the Monticello Vicinity Properties (MVP) Project. Both remedial projects are administered by the Grand Junction office of the DOE.

Surveillance activities commenced at the millsite in 1980. Initially, only water analyses were conducted, but activities were subsequently broadened to include atmospheric radon monitoring and air particulate sampling. Site characterization began in 1981 under the guidelines set forth in the UMTRCA. In compliance with provisions of the National Environmental Policy Act (NEPA), environmental studies were completed and a draft Environmental Assessment (1985/revised 1988) was prepared (6).

The passage of SARA in 1986 placed SFMP activities at Monticello under the regulatory framework of the CERCLA. Although the millsite is currently not listed on the NPL, guidance from DOE and EPA mandates that DOE and its contractors comply with the requirements of CERCLA and SARA. In October 1987, the DOE submitted its HRS score for the Monticello Millsite to the EPA Region VIII office to aid in the determination of the site's NPL eligibility. Current indications are that the site will score above the necessary value of 28.5 for inclusion on the NPL. The two agencies have since entered into negotiations for an Interagency Agreement under SARA Section 120 which will encompass the millsite and the associated vicinity properties.

MRAP was directed in January 1987 to prepare RI/FS documents for the millsite. As a result of CERCLA/SARA, potential releases of all hazardous substances must be evaluated (not only uranium, radium, radon, and a limited suite of nonradioactive elements which had been the focus of previous scrutiny), and a health risk assessment reflecting such consideration was to be prepared. The RI/FS reports were completed in January 1988 (7).

Table III lists the alternative actions being considered for the Monticello Millsite and the GJPO Facility.

CONCLUSION

All three remedial action projects at the GJPO involve uranium mill tailings, yet each is subject to a different set of regulatory requirements. Under the byproduct rule, the

TABLE III

Remedial Action Alternatives for the GJPO Facility and the Monticello Millsite.

Alternative 1 - No Action
Alternative 2 - Off-Site Disposal
Alternative 3 - Action That Attains Standards
Alternative 4 - Action That Exceeds Standards
Alternative 5 - Action That Does Not Attain Standards

UMTRAP Vicinity Properties Program is exempt from RCRA regulations for byproduct materials. It is also exempt from CERCLA/SARA as a designed program under UMTRCA. However, hazardous and commingled waste found on vicinity properties are not exempt from RCRA requirements. In addition, any identified hazardous substances are subject to the environmental response provisions of CERCLA/SARA. The GJPORAP and the MRAP again involve uranium mill tailings which are exempt from RCRA under the byproduct rule, and commingled and hazardous wastes which are not. But because they were not designated under UMTRCA, these projects are not exempt from CERCLA/SARA. Having a low HRS score, GJPORAP will not require an Interagency Agreement between EPA and DOE for the selection of the remedial alternative; MRAP, which has a high NPL score, will require such an agreement.

In summary, even with the clarification provided by the byproduct rule, it is impossible to generalize concerning regulatory requirements for remedial activity at sites involving radioactive waste. Each remedial action project needs to be assessed individually in order that remedial action can be conducted in full compliance with applicable environmental rules and requirements.

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