Technical Discussion Document

Regulatory Requirements for Treatment Longevity of Treated TCLP Metals Commingled With RRM on UMTRA Vicinity Properties

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1.0 PURPOSE

This document is written to:

1. briefly provide the background of how Toxicity Characteristic Leaching Procedure (TCLP) identified metals commingled (mixed) with residual radioactive material (RRM) will be managed on certain UMTRA program vicinity properties in Grand Junction, Colorado,

2. make a regulatory comparison of the long term monitoring requirements for a RCRA land disposal cell verses the Cheney Disposal Cell, and

3. discuss the expected groundwater compliance scenario if the solidification/stabilization (s/s) treatment fails after land disposal of treated TCLP metals at the Cheney Disposal Cell.

This document applies only to situations where analytical laboratory analysis has been used to determine that a RCRA characteristically hazardous waste (TCLP metals only), hereafter referred to as TC waste, is present in residual radioactive material (RRM) on an UMTRA vicinity property.

The information discussed herein is based upon regulatory review only and not upon conversations with the Colorado Department of Health (CDH) or the U. S. Environmental Protection Agency (EPA).

This document was prepared to assist in clarifying the difference between two EPA-established standards for the long-term monitoring of land disposed radiological hazards [residual radioactive material and/or uranium byproduct material] as compared to non-radiological hazardous such as hazardous waste which has been properly disposed of at a permitted land disposal facility, and how existing EPA guidelines for the application of a treatment technology do not define an effective or expected longevity requirement for the successfully applied treatment process.

2.0 BACKGROUND

In Grand Junction, Colorado a number of Uranium Mill Tailings Remedial Action (UMTRA) Program vicinity properties have been found to contain TC waste which has become commingled (mixed) with residual radioactive material [RRM, as defined by the Uranium Mill Tailings Radiation Control Act, Title I, Section 101 (7)(A)]. This situation poses a unique regulatory problem with regard to remediation of the RRM. Cleanup standards for remediation of RRM are codified under 40 CFR Part 192 Subpart B. However, when RRM is commingled with TC waste a second regulatory requirement is imposed upon the management of the commingled materials. These additional regulatory requirements are codified at 40 CFR Parts 260 through 268, *et seq.*

In order for the U. S. Department of Energy (DOE) to remediate and subsequently dispose of the commingled materials the TC waste must first be treated to a non-hazardous condition, or to a condition where the material no longer exhibits the characteristic which caused it to be classified as a hazardous waste. The TC waste which is the subject of this Discussion Document has been identified through analytical laboratory analysis to be exclusively TCLP metals such as lead or arsenic [to date the identified TCLP metals on UMTRA vicinity properties have EPA hazardous waste codes of D004, D005, D006, D007, and D008].

The EPA has not promulgated treatment technologies for non waste water TCLP metals, but instead has identified that the s/s technology can be applied to certain non waste water TCLP metals and the resulting treatment residue (treated product) can meet TCLP regulatory thresholds [or Extraction Procedure regulatory thresholds for certain "D" waste code metals (Land Disposal Restrictions for Third-Third Scheduled Waste, 55 FR 22520 *et seq*)] with some adjustment to the treatment process. The DOE will apply the solidification/stabilization (s/s) treatment technology by following existing EPA guidance such as the "*Handbook for Stabilization/solidification of Hazardous Wastes*", as documented in EPA/540/2-88/001.

3.0 DISCUSSION OF TERMINOLOGY, and REGULATORY AUTHORITY

3.1 Terminology

When used in this discussion document, the term "treatment" as it is applied to the treatment of TC Waste is defined as:

> "...any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character or composition of any hazardous waste so as to neutralize such waste, or so as to recover energy or material resources from the waste, or so as to [render such waste non-hazardous, or less hazardous]; safer to transport, store, or dispose of..."

Also of interest with regard to the treatment of commingled waste is the fact that RRM is excluded from the RCRA definition of a solid waste. This exclusion can be found at 40 CFR Part 261.4(a)(4), "Exclusions." The exclusion of RRM from the RCRA definition of a solid waste impacts the manner in which the treated TC waste will be managed. This impact will be discussed in detail in section 5.0 of this Discussion Document.

The EPA defined under RCRA the term "land disposal" to include, but not be limited to:

> "...any placement of hazardous waste in a landfill, surface impoundment, waste pile, injection well, land treatment facility, salt dome formation, salt bed formation, or underground mine or cave...[RCRA section 3004(k)]."

3.2 Regulatory Authority

The regulatory authority for characteristically hazardous wastes within the state of Colorado is the Colorado Department of Health (CDH). For situations involving the treatment of a waste stream such as the TC waste identified on certain UMTRA vicinity properties, the CDH prefers to utilize Consent Agreements in lieu of RCRA Part B Permits.

The DOE currently in the process of entering into a Consent Agreement with the CDH for the treatment of commingled TC waste on the UMTRA vicinity properties in Grand Junction, Colorado. As a part of the Consent Agreement the DOE proposes that treated TC waste be disposed of at the Cheney Disposal Cell along with all other RRM which has been remediated in Grand Junction. This disposal option will be recommended by the DOE because the Cheney Disposal Cell has already been accepted by the DOE, CDH, and Nuclear Regulatory Commission (NRC) as the most appropriate disposal site for RRM remediated under the UMTRA program. The CDH will make a regulatory ruling with regard to the final disposal site for any treated TC waste.

Additional discussion of the proposed disposal option can be found in Section 4.0 of this Discussion Document.

4.0 MONITORING REQUIREMENTS FOR LAND DISPOSAL FACILITIES

The EPA has established long term monitoring standards for the owners or operators of hazardous waste treatment, storage, and disposal facilities. These standards are codified at 40 CFR Part 264. The standards address post-closure care and use of any identified land disposal unit, and state in part at 40 CFR Part 264.117(a)(1):

> "...Post-closure care for each hazardous waste management unit subject to the requirements of Part 264.117 through 264.120 must begin after completion of closure of the [land disposal] unit and continue for [30 years after that date] emphasis added..."

In effect, the EPA has determined that the land disposal facility post-closure monitoring requirements must continue for 30 years after the date that the land disposal unit has been closed.

In the promulgated standards for treated hazardous waste, the EPA has not defined (avoided having to define) the expected life for a successfully applied treatment technology, or how long the applied treatment technology must remain effective. Instead the EPA identified post-closure monitoring requirements for any properly permitted land disposal facility which receives and disposes of successfully treated hazardous waste. It is of course a regulatory requirement that successful treatment must be demonstrated through the use of analytical laboratory analysis of the treated materials. When treating TC waste commingled with RRM the DOE will utilize analytical laboratory analysis following EPA protocols (defined in SW-846, "Test Methods for Evaluating Solid Waste," Physical/Chemical Methods, EPA Office of Solid Waste and Emergency Response) to demonstrate successful treatment was achieved.

There are similar post-closure monitoring standards for uranium disposal sites which have been licensed by the NRC. All uranium disposal sites must comply the post-closure control and monitoring requirements promulgated by the EPA and codified at 40 CFR Part 264 *et seq*. However, there are additional more stringent standards for the control and post-closure monitoring of radiological materials at these licensed uranium disposal sites. These standards are codified at 40 CFR Part 192 Subpart D. The regulations state in part at 40 CFR Part 192.32(b)(1)(i):

> "...to [provide reasonable assurance of control of radiological hazards] be effective for one thousand years, to the extent reasonably achievable, and, in any case, for at least 200 years, emphasis added..."

It is clear from this comparison of the regulatory citations for post-closure monitoring, that the EPA has imposed standards upon the long term monitoring of radiological hazards [residual radioactive material and/or uranium byproduct material] which are significantly more stringent in duration than those standards imposed upon non-radiological hazardous such as treated hazardous waste which has been properly disposed of at a permitted land disposal facility.

Both of the post-closure monitoring requirements discussed in the previous paragraphs are intended to demonstrate continued post-closure compliance with groundwater protection standards at the land disposal facility. Clearly, because of the more stringent post-closure monitoring requirements imposed upon NRC licensed RRM disposal sites, these sites may have the potential to be a more desirable location for final disposal of treated UMTRA TC waste. However, this potential is only more desirable if the post-closure monitoring at an RRM disposal site involves monitoring for the treated RCRA component which was

commingled with the RRM and was successfully treated to a nonhazardous condition.

Two additional points to consider is that there are no EPA mandated land disposal requirements for successfully treated TC waste. More directly stated, once it has been demonstrated that a characteristically hazardous waste has been successfully treated to a nonhazardous condition the material may be disposed of at any appropriate municipal landfill or land disposal facility. The disposal facility need not be a RCRA permitted treatment, storage, or disposal facility. Additionally, since RRM is excluded from the definition of a RCRA solid waste the only requirement for disposal of this material is a licensed NRC uranium mill tailings disposal site such as the Cheney Disposal Site. Second, as of this writing there are no permitted RCRA disposal facilities which also have an NRC license allowing the land disposal of RRM.

Through the development of a narrative supplemental standard for the Cheney Disposal Site the DOE has already demonstrated that disposal of RRM at this Site will be done in a manner which is protective of human health and the environment (Remedial Action Plan, September 1991). The basis for the supplemental standard is the limited use (Class III) designation for the groundwater in the Dakota Sandstone, which is the uppermost aquifer beneath the Cheney Disposal Site. The groundwater in this location satisfies the EPA criteria for Class III designation because the total dissolved solids (TDS) content is greater than 10,000 mg/L [codified at 40 CFR Part 192.11(e)] and the groundwater is not considered a resource, see Attachment 1 to this Discussion Document.

The technical issue which has been raised by the DOE concerns the impact to groundwater below the Cheney Disposal Site should the s/s treatment process fail, or become no longer effective, after the land disposal of treated TC waste at the Cheney Disposal Site. This concern is discussed in Section 5.0 of this Discussion Document.

5.0 THE EFFECTS OF TREATMENT TECHNOLOGY FAILURE

As part of the application of the s/s treatment technology to commingled TC waste, consideration was given to the possibility that the treatment may fail at some point in time after land disposal of the material at Cheney. Should the s/s treatment technology fail a concern has been raised as to whether groundwater compliance standards will be negatively impacted. It is therefore assumed that the Cheney Disposal Site is the location for land disposal of the treated TC waste, and that all of the treated TC waste from multiple UMTRA vicinity properties will be land disposed at one concentrated location (worst case scenario).

Using a computer modeling approach to model the unsaturated zone flow it was assumed that a simultaneous failure takes place with the s/s treated materials (i.e., that the TC waste was now leachable at the same concentrations as if it had never been treated prior to land disposal).

This was assumed to be the worst case scenario. Attachment 1 identifies the results of the modelling process, and states in part:

> "...[the worst case scenario] emphasis added, would not represent a significant source of potentially hazardous constituents that would adversely impact compliance with groundwater standards..."

Therefore, should the s/s treatment technology fail in a worst case scenario, there would not be an adverse impact to the groundwater below the Cheney Disposal Site.

6.0 CONCLUSION and RECOMMENDATION

Based upon the discussion presented above, the most appropriate land disposal option for s/s treated TC waste is the Cheney Disposal Site. This conclusion is based upon the following:

1. Once treated the TC waste can be demonstrated to no longer exhibit the hazardous characteristic (through analytical laboratory analysis) which originally caused the material to be classified as a hazardous waste.

2. RRM is excluded from the RCRA definition of a solid waste and there are no RCRA restrictions for the land disposal of this material other than those associated with post-closure monitoring of the land disposal facility (site).

3. Post-closure monitoring requirements at the Cheney Disposal Site are significantly more stringent in duration than those at an EPA permitted land disposal facility. However, this factor is only desirable if the post-closure monitoring addresses the RCRA component of the RRM which was treated to a nonhazardous condition.

4. The worse case volume of untreated TC waste disposed of at the Cheney Disposal Site has been demonstrated to be insufficient to have a negative impact to groundwater compliance standards.

5. The groundwater below the Cheney Disposal Site has been demonstrated to not be a resource because of the TDS concentration of the water (Attachment 1).

No other regulatory guidance was considered for this evaluation of the land disposal of treated TC waste at the Cheney Disposal Site.

Attachment 1

Jacobs Engineering Group Inc.
Evaluation of Groundwater Compliance Strategy
at the
Cheney Disposal Cell

February 23, 1993

JACOBS ENGINEERING GROUP INC., ALBUQUERQUE OPERATIONS

TO: Don Leske, GJPO

THROUGH: Larry Pinkel, TAC Assistant Project Manager

FROM: Chris Watson, TAC Site Manager

DATE: February 23, 1993

SUBJECT: Groundwater Compliance Strategy - Cheney Disposal Cell
Contract No. DE-AC04-91AL62350

Per your request, the TAC has reviewed the groundwater compliance strategy in light of the need to dispose of commingled waste from the VP program at the Cheney disposal cell. Based on the available information, the TAC concludes that the addition of commingled waste will not significantly affect the groundwater resources in the area or compliance with the groundwater protection standards. The attached memorandum delineates the TAC position in regard to the groundwater compliance strategy.

If you have any questions please contact me.

CDW\LWP\lm
Attachment

cc w/attachment:
JStelmach, UMT PO
RNelson, TAC
MTerpak, TAC
Document Control
SM File

cw_prj 02/23/93

JACOBS ENGINEERING GROUP INC., ALBUQUERQUE OPERATIONS

TO: CWatson

FROM: RHeydenburg

DATE: February 10, 1993

SUBJECT: Groundwater Compliance Strategy - Cheney Disposal Cell

Based on information available, the TAC concludes that the addition of commingled waste from vicinity properties (VP) to the Cheney disposal cell will not significantly affect groundwater resources in the area or compliance with groundwater protection standards.

Compliance with the proposed EPA groundwater protection standards at the Cheney disposal site is based on supplemental standards and hydrogeologic isolation. The DOE proposes a narrative supplemental standard that will demonstrate protection of human health and the environment (Attachment 4, final "Remedial Action Plan", September 1991). The basis of the supplemental standard is the limited use (Class III) designation of the groundwater in the Dakota Sandstone, which is the uppermost aquifer beneath the disposal site. The groundwater meets the EPA criteria for Class III designation because the total dissolved solids (TDS) content is greater than 10,000 mg/L (40 CFR 192.11(e)) and the groundwater is not considered a resource. Also, the uppermost aquifer lies approximately 750 feet below the existing ground surface and is hydrogeologically isolated from surface recharge by low-permeability confining sandstones and shales overlying the aquifer.

Information provided by the DOE ("Regulatory Agency Classification for Commingled Waste Properties", November 1992) was reviewed to evaluate the volume of commingled waste, and type and amount of potentially hazardous (non-RRM) constituents in the materials. The information was based on analysis of waste samples from a number of the VPs, and indicated that certain metals, volatile organics, polychlorinated biphenyls (PCBs), and pesticides were present. In general the volume of commingled waste from the VPs is small relative to the total volume of material in the cell, and would not represent a significant source of potentially hazardous constituents that would adversely impact compliance with groundwater standards. Results of unsaturated zone flow modeling indicated that transient drainage and long-term steady state seepage conditions are such that any drainage from the disposal cell would be accepted into the matrix of the Mancos Shale near the surface, and would have no impact on groundwater in the uppermost aquifer at a depth of approximately 750 feet.

RH/ll

cc: RSaar
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