U.S. Department of Energy
Grand Junction Office
2597 B¾ Road
Grand Junction, CO 81503

NOV 30 2000

Mr. Phillip Ting, Chief
Fuel Cycle Licensing Branch
Division of Fuel Cycle Safety and Safeguards
U.S. Nuclear Regulatory Commission
Washington, DC 20555-0001

Subject: Disposal of Grand Junction Office Remedial Action Project Radioactive Wastes into the Cheney Disposal Cell

Dear Mr. Ting:

The Department of Energy-Grand Junction Office (DOE-GJO) is currently in the process of remediating radioactive-contaminated facilities at the DOE-GJO. The goal of the project is to transfer the site to the U.S. Army Reserve and the Riverview Technology Corporation, a quasi-public entity. The last phase of the remediation involves cleanup of the analytical laboratory's onsite sample preparation plant housed in Building 7A.

Over 200,000 cubic yards of previous remediation wastes from the Grand Junction Office Remedial Action Project (GJORAP) have been transported and disposed at the Uranium Mill Tailings Remedial Action (UMTRA) Cheney disposal cell. The co-location of GJORAP and UMTRA wastes in the Cheney cell was endorsed by the NRC, DOE, State of Colorado, and Mesa County in the Final Environmental Impact Statement for the Climax Uranium Mill Site (DOE, December 1986), and the Remedial Investigation/Feasibility Study and Finding Of No Significant Impact covering the remedial action at the GJO facility (DOE, February 1995). The waste streams described by these documents were categorized as uranium mill tailings and tailings-related contamination, and the current proposed waste stream (Building 7A-demolition debris) falls into these categories.

Congress also authorized DOE in the last amendment to the Uranium Mill Tailings Radiation Control Act to take radioactive materials remediated from the Monticello Superfund site to Cheney. Neither the co-location of the GJORAP wastes or Monticello wastes are expected to effect licensing of the Cheney disposal cell, although neither material is classified as residual radioactive material (RRM).

The Cheney disposal cell, falling under Title I of UMTRCA, does not have an active license; however, it will fall under the general license issued by the NRC to DOE for the long term care of the cell built for the storage of RRM remediated under the authority of Title I of UMTRCA. GJORAP contaminated materials were hauled to Cheney because the cleanup of the DOE-GJO facility was performed to meet the standards promulgated under 40 CFR 192. The material is similar in characteristics to RRM, and the overall cost to the government was much less than the alternative of shipping it to another site out-of-state. No specific waste acceptance criteria were set on what could be shipped from GJORAP to Cheney.

NMSS08
WM-54

Building 7A at DOE-GJO has been used to process/prepare sample media for subsequent analysis in the GJO analytical laboratory. Numerous pieces of equipment were used to process sample media by crushing and grinding the materials. A ventilation system connected to several vent hoods is utilized to protect the lab workers and capture emissions generated while processing samples. The majority of the samples processed in the sample plant contained uranium mill tailings and ores or consisted of soil samples that came from the UMTRA and Monticello remedial action programs.

To assess the impact that these samples may have had on the radiological conditions within the sample plant, radiological surveys were performed and samples were taken from potentially affected areas. Isotopes of uranium, radium, thorium, etc., as expected, were found in the majority of samples where radioactivity was detected, necessitating the remediation of these systems and surfaces as radioactive materials which requires disposal at the Cheney cell. These samples were also analyzed for plutonium, americium, and a host of gamma emitting isotopes. Isotopes of plutonium, americium, and cesium were found in very small (marginally detectable) quantities in some of the samples, mostly from within the ventilation system. The analytical results from this survey and sampling effort are evaluated and summarized in Attachment A, *Characterization Results Summary for Building 7A*.

We have reviewed the pertinent regulations to determine if they preclude the disposal of the Building 7A wastes in the Cheney cell. Attachment B, *Licensing and Disposal of Small Quantities of Transuranic Isotopes from Building 7A*, details this regulatory review. Since the residual surface radioactivity associated with non-uranium series isotopes measured in Building 7A are below the concentrations provided in both DOE and NRC guidance documents (as well as non-regulatory consensus standards) for unrestricted release, the presence of these radionuclides in these concentrations would not by themselves constitute regulated radioactive material. It is our conclusion that the disposal of the demolition debris from Building 7A in the Cheney cell is not contrary to either DOE or NRC regulations or guidance.

The Memorandum of Understanding between DOE and Mesa County on the operations of the Cheney disposal cell requires DOE to seek approval from the NRC for all radioactive materials disposed at Cheney. Therefore, we seek NRC concurrence on placing the GJORAP Building 7A radioactive wastes into the Cheney disposal cell. If we do not hear from your office within 45 days, DOE-GJO will assume that the NRC concurs with DOE-GJO that disposal at Cheney is in the best interest of the Government.

If you have any questions, please call Larry Arnold of my staff at 970/248-6073.

Sincerely,

Donna Bergman-Tabbert

Donna Bergman-Tabbert
Manager

Enclosure

cc w/enclosure:
J. Deckler, CDPHE
L. Arnold, DOE-GJO
A. Dutcher, *WASTREN, Inc.*
LGRJ9.4 (A. Garcia)

cc w/o enclosure:
J. Elmer, MACTEC-ERS
C. Jacobson, MACTEC-ERS

larnald/NRC_LE~1.doc

Attachment A

Characterization Results Summary for Building 7A

Author: Steven D. Rima, CHP
September 29, 2000

Introduction

Building 7A (the "Sample Plant") is slated for demolition in early FY01. In order to characterize the waste stream, and to determine health and safety requirements for the project, a thorough characterization was recently undertaken. An Intra-GJO Work Order was issued to have this characterization and related tasks performed by the TAR contractor, even though the facility is on the DOE-GJO compound and is therefore the FOS contractor's responsibility. As the sample plant is slated for demolition and disposal as radioactive waste, a MARSSIM-based characterization plan was not deemed to be necessary nor warranted due to the cost of such a survey. So long as the data is representative of the waste stream and sufficient to characterize and control the hazards, it is sufficient for the intended purposes. This summary, along with the appropriate laboratory data and survey forms, will serve as the complete characterization report.

The sample plant has been used to process sample media for analysis in the GJO analytical lab (Building 20.) Numerous pieces of equipment, used to process sample media by crushing, grinding, etc. are present in the building, as is a ventilation system connected to much of the equipment, as well as on several vent hoods. In order to sufficiently characterize the waste stream, it was important to ensure that enough samples were taken such that each piece of equipment, as well as the ventilation system downstream of all equipment, was sampled and surveyed.

Fifteen sample points were designated, and are recorded on a detailed map of the building. Radiological surveys were performed at each point, and a media sample was obtained. Most of these samples involved smears, however at some locations there was sufficient material to allow collection of a soil-like media sample. These samples were then submitted to the GJO analytical laboratory following established protocol. Gamma spectroscopy and alpha spectroscopy analyses were performed on all fifteen samples, and tritium counting was performed on thirteen of the samples. Detailed analysis results are contained in the analytical reports for requisitions 17051, 16894 and 16891. In addition to these 15 samples, lab analysis data from four additional samples have also been examined. Two of these are from previous baghouse sampling events, with the other two being air samples taken during work on the ducting.

Summary of Results

Uranium, Decay Products and Transuranics

The majority of the samples contained isotopes of uranium, thorium, radium, lead, etc., which is to be expected as the result of processing uranium ores and tailings samples. All

ratios of the uranium isotopes are in the proportions expected of naturally occurring uranium, indicating that no enriched uranium is present.

Two samples contained Cs^{137}, which is not an isotope commonly found with uranium bearing materials. The highest concentration of Cs^{137} was found in a sample from a cabinet surface on the ground floor, and contained less than 27 pCi/g.

In addition to Cs^{137}, several samples indicated that trace amounts of Plutonium and Americium, specifically $Pu^{239/240}$ and Am^{241}, may be present. If plutonium were indeed present, one would also expect to find americium. Contrary to this, three of the samples indicating plutonium did not indicate that americium was present, and two other samples indicated that americium was present without any plutonium. These results are not considered to be significant since both isotopes were not present. Additionally, one must compare the amount indicated, including the error term, in relation to the minimum detectable amount (MDA), in order to make a determination of whether these isotopes are actually present.

In the case of plutonium, seven samples indicated that it was present, however, four of those results had error terms that overlapped the MDA, which does not provide a strong case for the presence of plutonium. Of the three results in which the error term did not overlap the MDA, the highest reported activity was 7.67 ± 2.65 pCi/g. Converted to dpm/100 cm^2, this amounts to approximately 17 dpm/100 cm^2, which is below the levels in both DOE (Order 5400.5) and NRC (Regulatory Guide 1.86) guidance for unrestricted release.

In the case of americium, six samples indicated that it was present, however, four of those results had error terms that overlapped the MDA, which does not provide a strong case for the presence of americium. Of the two where the error term did not overlap the MDA, the highest reported activity was 1.31 ± 0.77 pCi/g. This amounts to approximately 3 dpm/100 cm^2, which is also well below the DOE's and NRC's recommended levels for unrestricted release.

The MDAs for the various samples for plutonium and americium varied significantly from sample to sample. Plutonium MDAs varied from as low as 0.02 pCi/g up to 12.19 pCi/g. Americium MDAs varied from as low as 0.02 pCi/g up to 7.74 pCi/g. Thus, the highest reported $Pu^{239/240}$ and Am^{241} activities are less than some of the other samples' MDA values.

All of the samples were analyzed using gamma spectroscopy and radiochemical analysis techniques. $Pu^{239/240}$ can not be detected by gamma spectroscopy, while Am^{241} can be. The MDAs for gamma spectroscopy and radiochemical analysis for Am^{241} are similar, yet none of the gamma spectroscopy analysis results indicated the presence of Am^{241}.

Tritium

In January of 2000, 13 smears were taken in various parts of the building with the intent of sampling for tritium. While it is possible that small amounts of tritium have been handled in the past, it is extremely unlikely that any smearable tritium would be present on equipment surfaces due to the behavioral characteristics of tritium. The 13 smears were collected according to current procedure. Lab analysis results indicated the presence of smearable tritium up to a maximum amount of approximately 1500 dpm/smear. However, in reviewing this data, including a discussion with Ron Chessmore of the lab, this data is suspect at best, and most likely wrong.

In analyzing for tritium, one must ensure that tritium is the only potential isotope present prior to the use of liquid scintillation counting techniques being used to quantify the tritium. In the case of the 13 smears, this was not done. The smears were taken in areas with known uranium contamination, which was also indicated during the analysis. With the presence of uranium and its decay progeny, one cannot quantify tritium with liquid scintillation techniques. Therefore, for purposes of this characterization, these laboratory results have been discounted. As there is no reasonable expectation of smearable tritium being a concern, no further tritium surveys were undertaken.

Conclusions

Isotopes of uranium and its decay progeny expected to be present were indicated on the majority of samples. Ratios of uranium isotopes indicate that no enriched uranium is present. While the presence of extremely minute quantities of $Pu^{239/240}$ cannot be positively excluded or confirmed, the sample data does not present a strong argument for the presence of transuranic isotopes. If such isotopes are present, they are present in quantities below unrestricted release levels provided by the DOE and NRC.

Tritium samples were obtained, however, due to the collection technique employed and the presence of uranium decay isotopes, this data is not considered to be accurate and has not been used in the characterization. There is no credible scenario in which removable tritium would still be present in the equipment and ducting, and therefore no further sampling for tritium is justified.

Based on the samples obtained, surveys performed, and discussions with lab personnel regarding past sample content, there is no reason to suspect that tritium or other radioactive isotopes other than those already analyzed for are present in the building or ducting.

The results of the characterization indicate that the radioactive contamination present in the building, equipment and ducting is consistent with isotopes encountered in the UMTRA program and that no extraordinary waste handling/disposal or radiation safety considerations are warranted.

It must be noted, however, that the maximum amount of plutonium measured, 17 dpm/100 cm^2, is only slightly below the recommended DOE and NRC unrestricted release criteria of 20 dpm/100 cm^2. Due to this, and since the laboratory is still in operation, further sampling is strongly recommended. This additional sampling should be undertaken after the cessation of laboratory operations and prior to the start of demolition work. The sample locations that indicated plutonium in this survey should be the same locations used for the additional sampling.

References

GJO Analytical Laboratory Results:

Requisition No. 14492, February 28, 1996
Requisition No.15581, August 26, 1997
Requisition No.16891, January 27, 2000
Requisition No.17023, June 2, 2000
Requisition No.16894, April 3, 2000
Requisition No.16907, April 4, 2000
Requisition No.17051, June 21, 2000

DOE Order 5400.5, *Radiation Protection of the Public and Environment*, U.S. Department of Energy

NRC Regulatory Guide 1.86, *Termination of Operating Licenses for Nuclear Reactors*, U.S. Nuclear Regulatory Commission

Attachment B

Licensing and Disposal of Small Quantities of Transuranic Isotopes from Building 7A

Author: Steven D. Rima, CHP, CSP
September 29, 2000

Background

Building 7A (the "Sample Plant") is slated for demolition in FY01. Characterization surveys and sampling have revealed the probable presence of minute quantities of transuranic isotopes, i.e., $Pu^{239/240}$ and Am^{241}. Plutonium in particular is classified as Special Nuclear Material (SNM) in the regulations.

Questions have arisen as to whether SNM can be disposed of at the Cheney disposal cell. This paper addresses the regulatory aspects of that question.

Relevant Regulations

10 CFR 40

The Cheney disposal cell is currently being managed under DOE regulations, Orders and guidance, and is being used for the disposal of uranium mill tailings and related waste. However, when the cell is filled and capped, it will come under an NRC license issued under the authority of 10 CFR 40, *Domestic Licensing of Source Material*. In 10 CFR 40.1(a), *Purpose*, it states "The regulations in this part establish procedures and criteria for the issuance of licenses to receive title to receive, possess, use, transfer, or deliver source and byproduct materials, as defined in this part." Also, "These regulations also provide for the disposal of byproduct material and for the long-term care and custody of byproduct material and residual radioactive material."

Byproduct Material is defined as "...the tailings or wastes produced by the extraction or concentration of uranium or thorium from any ore processed primarily for its source material content..."

Residual Radioactive Material is defined as "Waste...in the form of tailings resulting from the processing of ores for the extraction of uranium and other valuable constituents of the ores; and other waste at a processing site which relates to such processing..."

Source Material is defined as "Uranium or thorium, or any combination thereof, in any physical or chemical form or ores which contain by weight one-twentieth of one percent (0.05%) or more of: (i) uranium, (ii) thorium or (iii) any combination thereof. Source material does not include special nuclear material."

Special Nuclear Material is defined as "Plutonium, uranium 233, uranium enriched in the isotope 233 or in the isotope 235..."

It is clear from the above citations that plutonium is specifically excluded from licensing and regulation under 10 CFR 40. Since plutonium is classified as SNM, 10 CFR 40 is not applicable.

10 CFR 70

10 CFR 70, *Domestic Licensing of Special Nuclear Material*, governs NRC licensing of SNM. There is no "exempt" quantity specified in this regulation, and so a first glance would seem to

imply that any amount of SNM, no matter how small, is subject to licensing. In practice, this is not sensible, however, as this would subject most environmental media to NRC licensing, as there are trace amounts of plutonium almost everywhere in the environment due to past atmospheric weapons testing.

DOE 5400.5

DOE 5400.5, *Radiation Protection of the Public and Environment*, provides guidelines for allowable total residual surface activity, in dpm/100 cm^2, for the release of real property and structures. These guidelines are used to determine whether property or structures are "clean" for radiological purposes. The guidelines for transuranics are 100 dpm/100 cm^2 average total activity (fixed plus removable) averaged over an area not to exceed 1 m^2; 300 dpm/100 cm^2 maximum total activity; and 20 dpm/100 cm^2 removable activity. If transuranic activity is below these guideline values, the property or structure is considered to be "clean" for radiological purposes and can therefore be released for unrestricted use, including demolition and disposal.

In the case of Building 7A, the highest transuranic radioactivity measured was 7.67 pCi/g, sampled over an area of 100 cm^2, which equates to 17 dpm/100 cm^2. This value is below all guideline values and therefore building 7A and its contents are acceptable for unrestricted release according to current DOE guidance.

NRC Regulatory Guide 1.86

Reg. Guide 1.86, *Termination of Operating Licenses for Nuclear Reactors*, provides "acceptable surface contamination levels" that are to be used to determine if a surface is "clean" and can be released for unrestricted use, including demolition and disposal. The limits provided in this Reg. Guide for transuranics are equal to those from DOE 5400.5, provided above.

In the case of building 7A, the highest transuranic radioactivity measured was 7.67 pCi/g, sampled over an area of 100 cm^2, which equates to 17 dpm/100 cm^2. This value is below all Reg. Guide 1.86 values and therefore building 7A and its contents are acceptable for unrestricted release according to NRC guidance.

NOTE: While this Regulatory Guide is specific to nuclear reactors, it provides limits for unrestricted release of transuranics for NRC license termination, and therefore is considered to be germane to the case of building 7A. In fact, this approach was recommended in a personal communication between the author and a NRC staff member.

Conclusion

Since the residual transuranic radioactivity measured in building 7A is below the levels provided in DOE and NRC guidance documents for unrestricted use, and therefore could be released for unrestricted use, including disposal in a public, unlicensed landfill, the disposal of the demolition debris at the Cheney landfill is not contrary to either DOE or NRC regulations or guidance.

If, during the course of demolition, transuranic activity is measured that exceeds the levels provided in DOE 5400.5 and Reg. Guide 1.86, this issue should be revisited. This is not likely to occur, however, as the building and its contents have been thoroughly characterized. However, since the measured plutonium activity of 17 dpm/100 cm^2 is only slightly below the release level of 20 dpm/100 cm^2, and since the laboratory is still being used to analyze radioactive samples, further sampling should be performed prior to a final decision being made regarding waste

disposal. This sampling should be performed after the laboratory has ceased operations, and prior to the start of demolition activities. Sampling should be performed at the same locations where plutonium was identified in the characterization survey.