

September 26, 2014

Mr. Donald R. Metzler
Moab Federal Project Director
U.S. Department of Energy
200 Grand Avenue
Grand Junction, CO 81501

SUBJECT: REVIEW OF SUPPLEMENTAL STANDARDS APPLICATIONS FOR MOAB GAS
LINE AND VICINITY PROPERTY VP018

Dear Mr. Metzler:

The U.S. Department of Energy (DOE) submittal, "Review of Supplemental Standards Application for Moab Gas Line and Vicinity Property 018," received by letter dated March 3, 2008 (ADAMS Accession # ML080840175) and revised April 2, 2010 (ML100980497), requested the U.S. Nuclear Regulatory Commission (NRC) to concur with the application of supplemental standards allowed under 40 CFR 192 for portions of vicinity property 018 (VP018) and a high pressure gas line adjacent to the northern end of the remediated portion of the Moab mill site.

Based on its review of the information provided, NRC staff concurs in the application of supplemental standards for VP018 and the area containing the high pressure gas line. Technical evaluation reports documenting the reviews are enclosed. If you have any questions concerning this letter, please contact the NRC project manager, Kim Conway, either by telephone at (301) 415-1335, or by e-mail at Kimberly.Conway@nrc.gov.

D. Metzler

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In accordance with 10 CFR 2.390 of the NRC's "Agency Rules of Practice and Procedure," a copy of this letter will be available electronically for public inspection in the NRC Public Document Room or from the Publicly Available Records component of NRC's Agencywide Documents Access and Management System (ADAMS). ADAMS is accessible from the NRC Web site at <http://www.nrc.gov/reading-rm/adams.html>.

Sincerely,

/RA/

Lydia Chang, Branch Chief
Special Projects Branch
Division of Waste Management
and Environmental Protection
Office of Federal and State Materials
and Environmental Management Programs

Docket No. WM-110

Enclosures: 1) Technical Evaluation Report for VP018
2) Technical Evaluation Report for High Pressure Gas Line

D. Metzler

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**U.S. NUCLEAR REGULATORY COMMISSION (NRC)
TECHNICAL EVALUATION REPORT
COMPLETION REPORT AND SUPPLEMENTAL STANDARD APPLICATION FOR
MOAB VICINITY PROPERTY (VP018)**

DATE: January 25, 2012
SITE: Moab Vicinity Property (VP018)
NRC Docket No. WM-110
NRC PROJECT MANAGER: Kim Conway
NRC TECHNICAL REVIEWERS: Thomas Youngblood, CHP

Introduction

The U.S. Department of Energy (DOE) submittal, "Review of Supplemental Standards Application for Moab Gas Line and Vicinity Property 018," received by letter dated March 3, 2008 (ADAMS Accession # ML080840175) and revised April 2, 2010 (ML100980497), requested the U.S. Nuclear Regulatory Commission (NRC) to concur with the application of supplemental standards allowed under 40 Code of Federal Regulations (CFR) 192 for portions of vicinity property 018 (VP018) and a high pressure gas line adjacent to the northern end of the remediated portion of the Moab mill site. The DOE proposed a "no remediation alternative" and the use of supplemental standards for these areas since it is expected that the economic impacts associated with remediating the sites would be unreasonably high relative to the long-term benefits and the residual radioactive material does not pose a clear present or future hazard.

This NRC Technical Evaluation Report (TER) provides a summary of the NRC staff's review of V018 area discussed in "Completion Report and Supplemental Standard Application for Moab Vicinity Property VP018." A separate TER (Enclosure 2) evaluated the impacts to the area containing the high pressure gas line.

Description of Vicinity Property

VP018 is bounded on the north by Utah Highway 191, on the south by the Colorado River, on the west by the Moab mill site, and on the east by privately owned property. VP018 has a utility corridor with a buried high-pressure gas line that was not remediated by the DOE and is the subject of this application of supplemental standard. The DOE has indicated that the utility corridor is a fenced area of approximately 620 square meters (m²). The DOE has remediated surface soils adjacent to the utility corridor. The radioactive contamination appears to be weathered uranium ore or windblown uranium tailing mixed with soil. The DOE has estimated the depth of the contamination to be 15 cm based on sampling of the area. The total volume of contamination in the utility corridor is estimated to be 94 cubic meters (m³).

DOE Proposed Actions

Using the applicable Environmental Protection Agency Criteria in Section 1.0 of the Supplemental Standard Application for VP018, DOE concluded that:

“the estimated cost of remedial action to satisfy 40 CFR 192.12(a) at a “vicinity” site (described under section 101 (6)(B) of the Act) is unreasonably high relative to the long-term benefits and the residual radioactive materials do not pose a clear present or future hazard.”

Consequently, DOE proposes no remedial action for the residual radioactive material in the utility corridor and has developed a dose assessment for a repair worker performing work in the utility corridor with the buried high-pressure gas line to further support this proposal.

DOE Radiological Dose and Risk Assessment

The DOE indicates that there is no public access to the fenced utility corridor, and the site has no particular attraction to an intruder. The residual radioactive material on the site is found in soil and likely originated from windblown uranium ore or uranium mill tailings associated with the former Atlas mill. The DOE indicates that the most likely exposure would be to a worker engaged in repair of the gas line. The identified pathways for worker exposure are direct exposure from external gamma radiation as well as inhalation and ingestion of residual radioactive material while the gas pipeline is uncovered. The DOE does not expect edible vegetation to be produced in the utility corridor or radon to accumulate on site. There are no water sources in the fenced utility corridor.

The process used for calculating the overall dose to the gas line repair worker is discussed in Attachment 1 to Appendix A, “Assessment of Potential Public Dose from Residual Radioactive Materials (VP018),” of the “Completion Report and Supplemental Standard Application For Moab Vicinity Property VP018.” Doses were calculated using the parameters included in Table A-1 of the Supplemental Standard Application and the International Commission on Radiological Protection (ICRP) 72 dose coefficients for inhalation and ingestion. For the purpose of calculating the dose from direct external gamma, it was assumed that a total of 40 hours in a given year would be spent performing repairs. The DOE calculations indicated that the worker dose would be 4.8×10^{-2} millisieverts/year (mSv/yr) [4.8 millirem/year (mrem/yr)] from all exposure pathways for working 40 hours in the utility corridor.

NRC Staff’s Review and Independent Analysis

This NRC TER provides a summary of the NRC staff’s review and independent analyses associated with the DOE application for supplemental standards for residual radioactive material at VP018.

The NRC staff reviewed the assumptions and parameters used for the dose assessment for workers on the unremediated portions of VP018 and performed independent analyses to further evaluate the conclusions made by the DOE. The NRC staff used the MICROSIELD software code to estimate the radionuclide concentrations based on the gamma survey levels. The MICROSIELD code results indicate that the DOE assumed radionuclide concentrations are conservative and provide an upper bound for the expected worker doses. Accordingly, NRC staff considered the assumed radiological parameters to be acceptable for the purpose of estimating worker dose.

The NRC staff reviewed the parameters and equations used by DOE to calculate the dose to the repair worker. Using the same process, NRC staff estimated the worker dose to be 5.3×10^{-2} mSv/yr (5.3 mrem/yr). The minor difference between NRC and DOE doses results from the use of different soil ingestion intakes (0.15 g/day vs. 0.10 g/day). The DOE assumed a 0.15 g/day intake value in Table A-1 but used the ICRP 72 ingestion dose coefficient of 0.10 g/day in its calculation. The NRC staff notes that, regardless of which dose is considered, the dose to a member of the public (in this case a gas line worker) is expected to be considerably less than 25 mrem/yr. This 25 mrem/yr value is the NRC radiological criterion for unrestricted release of a property subject to NRC requirements for decommissioning.

Given the reliability of these facilities, these doses can be considered overly conservative since repairs are not expected to occur on an annual basis. Furthermore, the DOE indicates that future plans for the site include constructing a bypass line outside the area being considered for supplemental standards. The bypass line would connect at two points inside the area being considered for supplemental standards but primarily reside outside the area. If this bypass line is constructed the amount of time the repair worker spends in the area considered for supplemental standards would decrease, further decreasing the doses received for each work activity.

Conclusion

Based on a review of the DOE application and independent analyses performed, NRC staff concludes that the residual radioactive materials remaining at the site do not pose present or future risks to members of the public and that the cost for remediation is unreasonably high relative to the long-term benefits. Therefore, NRC staff concludes that the criterion of 40 CFR 192.21 "Criteria for applying supplemental standards" applies and hereby concurs with the DOE application of supplemental standards for the areas specified for VP018.

**U.S. Nuclear Regulatory Commission
Technical Evaluation Report
Supplemental Standards Application for the Gas Line Adjacent to the Off-Pile
Remediation of the Moab Mill Site per 40 CFR 192**

DATE: September 24, 2014
SITE: Moab Gas Line Adjacent to the Off-Pile Remediation
NRC Docket No. WM-110
NRC PROJECT MANAGER: Kim Conway
NRC TECHNICAL REVIEWERS: Adam Schwartzman

Introduction

The U.S. Department of Energy (DOE) submittal, "Review of Supplemental Standards Application for Moab Gas Line and Vicinity Property 018," received by letter dated March 3, 2008 (ADAMS Accession # ML080840175) and revised April 2, 2010 (ML100980497), requested the U.S. Nuclear Regulatory Commission (NRC) to concur with the application of supplemental standards allowed under 40 Code of Federal Regulations 192 for portions of vicinity property 018 (VP018) and a high pressure gas line adjacent to the northern end of the remediated portion of the Moab mill site. The DOE proposed a "no remediation alternative" and the use of supplemental standards for these areas since it is expected that the economic impacts associated with remediating the sites would be unreasonably high relative to the long-term benefits and the residual radioactive material does not pose a clear present or future hazard.

This NRC Technical Evaluation Report (TER) provides a summary of the NRC staff's review of the high pressure gas line area discussed in "Supplemental Standards Application for the Gas Line Adjacent to the Off-Pile Remediation of the Moab Mill Site." A separate TER (Enclosure 1) evaluated the impacts to Vicinity Property 018.

Description of the Area Containing the High Pressure Gas Line

This area is approximately 8,112 square meters (m²) [87,320 square feet (ft²)] within the boundary of the Moab mill site and adjacent to the Off-Pile Remediation (OPR) area. This portion of the site contains a trench with a buried high pressure gas line. The property is owned by the U.S. Department of Energy (DOE) and the high pressure gas line is owned by Williams Energy Company. The area borders the northern end of the remediated portion of the site and all but small portion is surrounded by fencing. Surface soils to the south of the area have also been remediated. Although a small portion of the area is accessible from the highway right-of-way the site is not expected to be of interest to an intruder. Therefore the most likely exposure scenario would be a worker performing repairs to the gas line.

DOE Proposed Actions

Using the applicable Environmental Protection Agency Criteria provided in Section 2.0 of the "Supplemental Standards Application for the Gas Line Adjacent to the Off-Pile Remediation of the Moab Mill Site," DOE concluded that:

Enclosure 2

“the estimated cost of remedial action to satisfy 40 CFR 192.12(a) at a “vicinity” site (described under section 101 (6)(B) of the Act) is unreasonably high relative to the long-term benefits and the residual radioactive materials do not pose a clear present or future hazard.”

Consequently, DOE proposes no remedial action for the residual radioactive material in the utility corridor and has developed a dose assessment for a repair worker performing work in the utility corridor with the buried high pressure gas line to further support this proposal.

DOE Radiological Dose and Risk Assessment

As discussed in the application, the site lies within the boundary of the Moab mill site with only a small portion of unfenced area accessible to an intruder. The residual radioactive material on the site is found in the top 15 centimeters (cm) of the soil and likely a combination of windblown uranium mill tailings originating from the former Atlas mill and decomposed uranium ore. Ra-226 concentrations measured from samples collected from the top 15 cm of soil ranged from 3.1 Becquerel per gram (Bq/g) [83.4 picocuries per gram (pCi/g)] to 36.2 Bq/g (979.5 pCi/g).

The DOE indicates that the most likely exposure scenario would be to a worker engaged in repair of the gas line. The identified pathways for worker exposure are direct exposure from external gamma radiation as well as inadvertent inhalation and ingestion of residual radioactive material while performing repairs to the gas pipeline. The DOE does not expect edible vegetation to be produced in the utility corridor or radon to accumulate on site. The only water source, Moab Wash, flows intermittently and is not suitable for drinking.

The process used for calculating the overall dose to the gas line repair worker is discussed in Appendix 1, “Assessment of Potential Public Dose from Residual Radioactive Materials Adjacent to the Off-Pile Remediation of the Moab Mill Site (2021 North Highway 191),” of the supplemental standards application. Doses were calculated using the equations provided in Appendix 1 and the parameters included in the table “Parameter Values Used in the Estimate of Dose.” International Commission on Radiological Protection (ICRP) 72 dose coefficients for inhalation and ingestion were also used. For the purpose of calculating the dose from direct external gamma, it was assumed that a total of 40 hours in a given year would be spent performing repairs. Using these formulas and parameter values DOE determined that the worker dose would range from 1.68×10^{-2} millisieverts/year (mSv/yr) [1.68 millirem/year (mrem/yr)] to 0.141 mSv/yr (14.1 mrem/yr).

NRC Staff’s Review and Independent Analysis

The NRC staff reviewed the assumptions and parameters used for the repair worker dose assessment and performed independent analyses to further evaluate the conclusions made by the DOE. Although NRC staff was unable to reproduce the doses calculated for ingestion and inhalation included in the submittal, the NRC staff found the parameter values to be acceptable. NRC staff was able to duplicate the external gamma radiation dose values included in the submittal. Table 1 provides a comparison of the doses reported in the submittal and the doses calculated by NRC staff.

Regardless of which doses are considered the actual dose to a repair worker (i.e., member of the public) is expected to be considerably less than 25 mrem/yr. This 25 mrem/yr value is the NRC's radiological criterion for unrestricted release of a property subject to NRC requirements for decommissioning.

Table 1. Comparison of individual and NRC-calculated doses (mrem/yr)

	Minimum Ra-226 Concentration		Maximum Ra-226 Concentration	
	Reported Dose	NRC-Calculated Dose	Reported Dose	NRC-Calculated Dose
External	0.84	8.4E-01	4.2 ¹	4.2E+00
Ingestion	0.40	3.38E-01	4.70	3.99E+00
Inhalation	0.44	1.49E-01	5.18	1.76E+00
Total	1.68	1.33E+00	14.1	9.95E+00

¹ The maximum reported external dose calculated in the submittal is 4.2 mrem/year. The "Results" table in Appendix A of the submittal reports a maximum external dose value of 0.84 mrem/year.

The doses calculated for the repair worker scenario can be considered overly conservative due to the infrequent need for the repair worker to access the site. The parameters and resulting doses assume repairs occur on an annual basis. However, based on the frequency of repairs that occur at similar sites, repairs for this area would not be expected to occur on an annual basis.

Conclusion

Based on a review of the DOE supplemental standards application and independent analyses performed, NRC staff concludes that the residual radioactive materials remaining on the site containing the high pressure gas line do not pose present or future risks to members of the public and that the cost for remediation is unnecessarily high relative to the long-term benefits. Since the gas company evaluates the integrity of the gas line remotely using an internal probe and physical repairs do not occur on an annual basis, NRC staff also realizes that doses to a repair worker would be less than the annual doses provided above. Therefore, NRC staff concludes that the criterion of 40 CFR 192.21, "Criteria for applying supplemental standards" applies for this site and hereby concurs with the DOE application of supplemental standards for the portion of the Moab mill site adjacent to the OPR that contains the high pressure gas line.