NORTHERN NEW MEXICO CITIZENS' ADVISORY BOARD (NNMCAB)
Waste Management Committee

Recommendation to the Department of Energy No. 2010-01 Recommendation for Disposition of Remote-handled Waste Buried in 33 Shafts at Technical Area 54 (TA-54)

Background

The Consent Order between the State of New Mexico, the Department of Energy/National Nuclear Safety Administration (DOE/NNSA) and Los Alamos National Security (LANS) requires that TA-54 Material Disposal Area G (MDA-G) corrective actions be completed by October, 2015. This means that the Remote-Handled Transuranic (RH-TRU) waste must be retrieved from MDA-G, preferably by the summer of 2011, to provide adequate time for retrieval, processing, characterizing, certifying, and packaging for shipment to the Waste Isolation Pilot Plant (WIPP) that is designed to handle and dispose of RH-waste. The RH-TRU Waste Retrieval and Disposition program is part of the TA-54 Closure Project scheduled to complete remaining Area G corrective actions before October 2015. The RH-TRU Waste Retrieval and Disposition Project is a major part of the overall LANL Legacy Waste Disposition Program, which is to result in closure of TA-54 and is one of the highest priorities within the DOE Environmental Management (EM) program and is consistent with the DOE Strategic Plan to accelerate cleanup of weapons sites.

The cleanup of MDA-G has been previously considered as one of the three top priority remediation sites by the NNMCAB in Draft Recommendation 2009-05.

Typical waste materials and waste material parameters are summarized below.

1. There are 193 packages of waste (~27 m^3) in 1-2 ft. diam. metal pipes buried in 33 shafts (#200-232) that are 13 to 20 ft. length. The wastes in the metal pipes were generated and emplaced at different times (1970 to 1995) and in different configurations. RH wastes are defined as having surface doses >200 milliroentgen/hr (mR/hr) @ contact. (Wastes <200 mR/hr are considered to be Contact Handled waste.)
2. Nineteen of 33 shafts has waste that is >1000 R/hr contact but only 10 shafts have radiation levels > 100 R/hr @ 1 meter.
3. The principal beta-gamma activities are from Mixed Fission Products (MFP):
   Cs-137 30.1 yr half-life 662 kev gamma-ray
   Sr-90 28.2 yr half-life Pure beta-emitter
   Eu fission product activity is low level
   Combined MFP radioactivity is ~2000 Ci (corrected to 2009)
4. There is ~1.54 Kg of Pu with ~128 Ci of alpha-activity with Am-241.
5. According to the current governing document CCP-TP-500 Revision 8 (7-24-08), the waste must be examined item-by-item for prohibited items and for characterization of Waste Material Parameters. (There may be negotiation or exception to this requirement but it may take an unacceptable length of time)
6. Shaft #212 contains the core of the Los Alamos Molten Pu Reactor Experiment (LAMPRE I) that reportedly contains 200 gm of Pu and weighs over 7200 Kg. There may be residual Na coolant in the concreted core.

7. There is a final radiation limit of 1000 R/hr per packaged drum prepared for shipment to the WIPP.
8. Typical waste items in the 33 shafts are highly radioactive materials contaminated with irradiated fuel claddings, grindings, metallurgical fuel sample mounts, stainless steel and fuel cut remains. There are no gross fuel pin samples in the waste.

Discussion

Disposition of the wastes from the 33 shafts is very complex and requires a diversity of facilities, technical expertise, regulatory protocols, administrative policies, environmental concerns, industrial and radiation safety practices, and collaborative approaches that must come together to achieve success. There are a large number of disciplines that are necessary to provide solutions to the challenges of this undertaking, particularly, personnel capable of making shielding calculations, exposure calculations, trained hot cell operators, trained radio-chemists, experienced EM and mechanical engineers, safety-based scientists and technicians, radiation protection and control workers trained to handle highly radioactive materials, etc. If expertise in these areas is lacking, DOE/NNSA, and LANL must recognize that they must provide appropriate technical training for key personnel to address these type of challenging initiatives. Without adequately trained personnel, working in a collaborative manner, the cost of this and other challenging EM projects will be ineffective and inefficient and cost the taxpayer an unreasonable amount of money while yielding unsatisfactory results. This project could be handled as a model that could be implemented on a national basis.

Comment

To comply with the 2015 time limit established by the Consent Order, at least six methodologies have been considered and are briefly summarized below. In order to select the most appropriate methodology, the NNMCAB recommends that DOE/LANL complete and implement the Sampling and Analyses Plan that was previously drafted before any of the listed methodologies are initiated.
(Note that the methodologies are categorized as "ideal" or "non-ideal" depending on how extensive deviations, exceptions, or modifications to already approved agreements and standard practices must be made. Also, in how readily the methodologies are accepted by the Pueblo Tribes, environmental, and citizen groups.)

No. 1—(Ideal Method) Retrieve the 3 types of waste pipes in order from the 33 shafts and conduct item-by-item characterization (or whatever is currently acceptable) in the Chemical and Metallurgical Research (CMR) hot cells according to CCP-TP-500 and package and send to the WIPP. There are no deviations, exclusions, or modifications.

No. 2—(Alternative-ideal Method) Retrieve the wastes from the 33 shafts according to method of emplacement so that those pipes that can be directly inserted into the CMR Hot Cells for an item-by-item characterization. The pipes from the remaining shafts could be retrieved into a mobile or portable hot cell system built at TA-54 for handling the larger diameter concreted pipes. A modified characterization can be conducted that is less extensive within the portable hot cells at TA-54 if this approval is achievable. This will require a deviation or exclusion from

CCP-TP-500 and new agreement with the Environmental Protection Agency (EPA), New Mexico Environmental Department (NMED), and other pertinent agencies. (Alternatively, the concrete from the pipes could be cut away or otherwise removed from within transportable hot cells at TA-54. The cleaned pipes could then be transferred to the CMR Hot Cells for total characterization of the wastes. Treatment and characterization of a specific waste form such as the LAMPRE I in Shaft 212 could be completed in the CMR Hot Cells. Recognize that greater reliance on the portable hot cells will necessarily call for greater compliance with regulations for non-reactor nuclear facilities as stipulated in DOE Order 420.1, Facility Safety.

No. 3—(Non-ideal Method) Conduct In-Vitro Solidification on each of the 33 shafts and allow molten material to cool for 2 years and monitor the effectiveness of this methodology for an agreed time frame into the future. This will require new reviews and agreements with all pertinent parties.

No. 4—(Non-ideal Method) Leave the wastes in place and monitor the entire waste field in accordance with a long term legacy waste management program. Future actions will be as determined by new agreements with all pertinent agencies including the affected Pueblos.

No. 5—(Limited ideal Method) Retrieve the wastes from the 33 shafts and move to another location or site for storage and characterization at a later date.

No. 6—(Combined Form) A modified or combined form of Method 1 through 5 or some other innovative methodology depending on availability of hot cells, technologies, RH-waste capabilities and time frame to implement. This form will require extensive new agreements.

Observations and Descriptive Comments

- The selection of a means to comply with the Consent Order without modification can be accomplished with budget estimates that can range from $50M to $200M for the first two Methods outlined above.
- Conducting the work with a modified Consent Order and/or modified characterization plan might be less costly and can still result in the removal of wastes from TA-54 and transferal to the WIPP.
- What may seem like a quick fix (Methodology No. 4) may outwardly seem attractive but would require consideration of input and consequences from a variety of agencies and the most affected Tribes and could result in endless mistrust from environmental and citizen groups in northern New Mexico. These negotiations could extend beyond the year 2015. Also, should a future monitoring system indicate a radioactive leak, the cost of remediation could be unacceptable.
- The San Ildefonso Tribe considers the land around TA-54 to be sacred and they have said that “ideally” they would prefer to have the waste removed rather than pass this unwanted waste on to future generations. However, they are cognizant of certain cost/risk/benefit analyses and limitations that have to be considered.
- In time, DOE/NNSA and/or LANL may maintain that they no longer have the technical capability to effectively comply with the Consent Order.

- Although this is considered to be a DOE-EM problem, the NNSA must recognize that the 33 Shafts waste is NNSA derived waste and they too have a responsibility to help reduce the risks inherent in these type wastes and cooperate with available RH waste facilities, technologies, and expertise and in sharing the expense associated with this special, indeed unique, waste problem.

Recommendations

Note: The 33 Shafts project is highly complex and requires cooperation between many agencies, organizations, and disciplines. EM must establish a needs breakdown structure and assign responsibilities and roles required to accomplish this project in a unified manner.

No. 1—Complete and implement the Sampling and Analysis Plan to determine the integrity of the inner and outer pipe wall by sampling the inner-outer annulus fill material.

No. 2—Assure sufficient funding is available for completion of the project within time limitations and all safety requirements.

No. 3—Assure the necessary technology, trained expertise, and infrastructure is available to implement any selected methodology.

No. 4—Based on the results of implementation of Recommendations No. l, 2, and 3, select an "ideal" or "non-ideal" methodology for disposition of the waste.

No. 5—Determine the non-acceptability/acceptability of time delays required for seeking and obtaining deviations, exceptions, and/or modifications from pertinent agencies for less extensive and more reasonable characterization and handling methodologies for highly radioactive RH-mixed wastes that have been "stable" for 20 to 30 years. Acceptance of more reasonable methodologies will result in great reductions in time, effort, expense, and radiation exposure to workers.

Intent

The intent of this recommendation is to remove the highly radioactive RH-TRU wastes from TA-54 in a safe manner with a minimum of radiation exposure to workers at all levels. Accomplishing this will result in a successful closure of the site. If the "ideal" methodology is not feasible, then a secondary or "non-ideal" methodology should be considered. Equally important, this recommendation is to discourage inaction to result in a final "no action" decision/non-decision for the disposition of the 33 shafts.

Effect

The effect of implementing this recommendation is to help maintain public confidence in the ability of DOE/NNSA/LANS in collaboration with the EPA, State of New Mexico, and associated Pueblos to effect a complex but dynamic approach to disposition the RH waste in the 33 shafts at TA-54 leading to eventual closure of MDA-G.