SAVANNAH RIVER SITE PUBLIC INVOLVEMENT IN THE TRANSURANIC (TRU) PROGRAM AND THEIR EFFECT ON DECISIONS CONCERNING Pu-238 SPACE GRADE TRU WASTE

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ABSTRACT

This paper describes the public involvement program and its effect on the decisions concerning the disposition of heat source Pu-238 transuranic (TRU) waste. Also described in the paper are discussions, educational sessions, and negotiations including resolution of equity issues, which moved forward to an understanding of the difficulties including risk management faced by the Ship-to-the Waste Isolation Pilot Plant (WIPP) program. Once the program was better understood, the real negotiations concerning equity, safety, and risk to workers from handling Pu-238 waste could begin.

This paper discusses the fact that SRS remains focused on the shipment of all legacy TRU waste to WIPP. Also it discusses the public involvement aspects of the plans to ship the legacy TRU and the challenges facing the program. The program and the challenges that face the program must be properly communicated if the program is to be successful. The Risk Based End State Vision Report for the Savannah River Site includes a potential variance that poses the idea of near surface disposal of a small amount of waste from the program to produce Pu-238 heat sources for deep space probes. Near surface disposal could greatly reduce the risk to workers by eliminating the need to repackage the waste in order to characterize it and ship it to the Waste Isolation Pilot Plant. Significant cost savings can also be realized. A preliminary technical analysis was completed to demonstrate that near surface disposal of this waste can be done while meeting the Department of Energy performance objectives and other criteria that might be required to authorize this action. This preliminary analysis provides a means of demonstrating the technical basis for this alternative to management and stakeholders. The technical analysis details will be presented in another paper while this paper will deal with the public involvement aspects.

INTRODUCTION

During the 1960's and 1970's the Savannah River Site performed several Pu-238 production campaigns to provide fuel for nuclear batteries called Radioisotopic Thermoelectric Generators (RTG's). These RTG's provided electric power for many missions including NASA's deep space probes such as Voyager, Viking, and Galileo. As a result of these campaigns, radioactive waste was created contaminated with space grade Pu-238 (around 83% Pu-238).

The Technical Staff of the Savannah River National Laboratory (SRNL) through their work associated with the disposal of plutonium isotopes as low-level waste under DOE Order 435.1,

"Radioactive Waste Management" found that plutonium isotopes could be disposed safely and within low-level waste disposal performance objectives at much higher concentrations that the transuranic (TRU) limits of 100 nanocuries per gram. The DOE Order 435.1 and the Waste Isolation Pilot Plant (WIPP) Land Withdrawal Act specifies that radioactive waste contaminated with TRU isotopes above 100 nanocures per gram can be characterized, packaged and shipped to the WIPP in New Mexico for disposal. These same requirements, however, allow for non-WIPP disposal of TRU waste if certain requirements can be met and if certain approvals are obtained.

Armed with this information the technical work began to perform the detailed calculations to demonstrate that certain space grade Pu-238 contaminated waste at the Savannah River Site could be dispositioned within the required performance objectives to ensure that the environment and the public would be protected for thousands of years. A very vigorous Public Involvement Program associated with TRU waste disposition already existed at the Savannah River Site in support of the work being done to ship as much TRU waste as possible to WIPP. Since about half of the TRU waste (by volume) was space grade Pu-238 contaminated the issues surrounding handling of Pu-238 waste were discussed in several Citizens Advisory Board (CAB) meetings. As Savannah River Site began to better characterize the Pu-238 waste stored in 55-gallon drums and in large containers discussions were held to educate the public as to the plans for preparation of this waste for shipment to WIPP and to better educate the public about the different hazards that are brought to bear by handling Pu-238 waste verses the weapons grade Pu-239 waste that makes up the major proportion of the DOE-Complex's TRU waste.

PUBLIC INVOLVEMENT IN WASTE MANAGEMENT AT THE SAVANNAH RIVER SITE

The SRS Public Involvement Program became centered on the SRS Citizens Advisory Board (CAB) and through its public meetings other interested members of the public. The SRS TRU Program now works primarily with the Waste Management Committee (WMC) of the SRS CAB as well as with members of the public to address SRS's TRU waste management operations.

The CAB is comprised of 25 individuals from South Carolina and Georgia who are chosen by an independent panel of citizens from approximately 250 applicants. The board members reflect the cultural diversity of the population affected by SRS. The members, who serve two- or three-year terms, represent all walks of life, including the business world, academia, local government, environmental and special interest groups, and the general public. Two of the members specifically represent economically disadvantaged persons.

The methodology for public input has been provided through the CAB and the CAB's agreed bylaws that requires a response from DOE along with reports of progress to resolve issues associated with a recommendation. A review of the References in this paper can point out the record of extensive public involvement with the CAB that was conducted to educate and request input on the SRS TRU waste activities.

PUBLIC INVOLVEMENT ON Pu-238 WASTES

In several public meetings with the CAB the properties associated with Space Grade Pu-238 were explained to ensure that the public properly understood the hazards associated with opening containers to repackage the waste material in order to meet the requirements to ship the waste and the WIPP waste acceptance requirements for disposal in the repository. It was explained that Pu-238 has very different properties from those of Pu-239 and in fact, Pu-238 is about 280 times more radioactive, exists as highly dispersible sub-micron sized particles and generates thermal heat at about 0.5 watts per gram. As a result of these properties it is greatly preferred not to open containers of Pu-238 waste rather it would be best to place containers directly in the shipping containers for shipment to WIPP. Unfortunately, also due to Pu-238's relatively high specific radioactivity and thermal heat generation properties, only relative low quantities of Pu-238 can be shipped in the current shipping packages that are licensed for shipment to WIPP. The radiation emanated from the Pu-238 waste attacks the plastic materials that were used to package the waste or were a part of the protective clothing that make up the waste causing the generation of hydrogen gas. There are very strict requirements for the amount of Pu-238 that can be shipped due to the heat load and the hydrogen gas generation, thus many of the packages now stored at Savannah River Site would require that the waste be removed from the current storage containers and repackaged in several containers to reduce the amount of Pu-238 in each container. In addition the WIPP will not accept waste that has certain prohibited item in the package, such as aerosol cans and polybottles with a small amount of liquids. Any containers that have higher loadings of Pu-238 than allowed or with prohibited items would require opening of the containers and direct handling of the waste to either expand the waste into several other containers or remove the prohibited items. To make matters even more complicated, the larger containers contain large waste items such as ventilation ducts, gloveboxes, and equipment that will not fit into the current WIPP shipping container or even in the proposed larger WIPP shipping containers. In this case, the large container would need to be opened, the waste removed and size reduced, then repackaged in WIPP compliant shipping containers. Again the Pu-238 contaminated waste would be removed from the container. Without the proper facilities to protect Savannah River Site workers these operations would be extremely hazardous to perform. The Savannah River Site program to conduct these operations are planned to rely on existing facilities to open these containers if required.

As we discussed the Pu-238 challenges with the CAB in our public meetings, the CAB became concerned that there may be significant risk to the SRS workers to repackage containers of Pu-238 waste with relative high gram loadings. As a part of the public review of the DOE Top-to-Bottom Review program and its associated Program Management Plans (PMP), Savannah River Site began proposing ways to accelerate risk reduction and cleanup by (in the case of TRU waste) accelerating the shipment of the TRU waste to WIPP. The CAB noted in Recommendation 155 that DOE should make a technical risk evaluation of the DOE Order requirements with a view to reduce the waste that would require shipment to WIPP so as to reduce the amount that would require Savannah River Site workers to open highly loaded Pu-238 waste containers, thus reducing the risk to the workers. In addition to recommending that the Department of Energy at the Savannah River Site ensure that the risk of opening containers of Pu-238 waste was appropriately understood and mitigated by engineered and administrative controls, the CAB also recommended in Recommendation number 155, that other disposal paths

be investigated besides WIPP that are environmentally acceptable that would pose no increased risks to Savannah River Site workers or the public.

This was an important first step in educating the public that shipping Pu-238 waste to WIPP was not necessarily the least hazardous method of dispositioning this type of waste. The predominate view of the public before the educational process began, of course, was that any nuclear waste that can be removed from the state of South Carolina, the better. It required very patient educationally oriented meetings to allow understanding of the real risks so that the path with the least risk could be explored with public acceptance.

As a result of CAB Recommendation 155, DOE-SR provided a request to the DOE Top-to Bottom Review team to explore the possibility of disposal of TRU waste at locations other than WIPP that would pose no significant increase in risk and could be more cost effective. As this team continued its work, Savannah River Site continued to hold public meetings through the CAB to educate and update the CAB on the status of deliberations surrounding the progress toward disposition of all of the legacy TRU waste.

In January 2004, the National Academy of Sciences began two reviews to assess "Risk Based Approaches for Disposition of Transuranic and High-Level Radioactive Waste" and "Opportunities for Accelerating Characterization and Treatment of Wastes at DOE Sites". Savannah River Site presented the scope of the potential risks associated with opening TRU waste containers with high loadings of Pu-238 to both of these committees. In addition Savannah River Site presented the idea that the least risk to the pubic, workers, and the environment may result from not opening these types of containers, rather disposal could prove to be the least risky alternative for disposition of this type of waste. Presented as evidence of the idea was a scoping analysis prepared using a postulated waste form that included concrete encapsulation of the Pu-238 waste that calculated doses over the required 1,000 year compliance period to be less than the prescribed performance objectives for protection of the groundwater to EPA drinking water standards and protection of the inadvertent intruder. As a part of the National Academy's public meetings, the CAB and other members of the public were invited to attend and specifically participate in the discussions. This strategy has proved to be very beneficial in that the National Academy Committee members expressed genuine interest in the idea of non-WIPP disposal that was reflected in a positive manner when the CAB members returned to their own meetings and reported to others about what they had heard.

Partially as a result of the National Academy of Science meetings, the Savannah River Site decided to include the non-WIPP disposal of Pu-238 waste idea as a variance from the baseline in the Risk Based End State Vision (RBES) and also as an alternative for identified assumptions in the Performance Management Plan (PMP). The idea that some of the Pu-238 waste may not be suitable for repackaging due to the risk, rather it may be more appropriate to dispose of this waste was included in public reviews of the drafts of both of these documents. As can be imagined, the public interest and review of these documents was considerable resulting in the CAB issuing additional Recommendations (numbers 189 for the PMP and 190 for the RBES) requesting additional details on the performance assessment modeling for Pu-238 disposal alternatives and asking that Savannah River Site continue to evaluate disposal options for Pu-238

contaminated waste so that the risks associated with handling and shipments are protective of human health and the environment.

One more thing that provided additional public understanding of the problems being faced by the TRU program was continued education of the successes of shipping relative low gram loaded Pu-239 and Pu-238 55 gallon drummed waste to WIPP along with discussions of the challenges associated with the preparations to ship the higher activity drums and large containers, primarily the Pu-238 contaminated wastes. This educational effort lead to CAB Recommendation number 163 that concerned itself with the risk and challenges facing the shipment of Pu-238 wastes in drums and large containers. The most significance to the public involvement program that Recommendation 163 had was that the public was beginning to really understand, and were becoming more and more supportive of alternatives that were environmentally acceptable and posed less risk to the Savannah River Site workers. This understanding extended to the idea of non-WIPP disposal if it could be demonstrated to be safe and environmentally acceptable. The only other alternative to disposal was explained to be longer-term storage which is not preferred from a risk based approach.

Through this avenue the idea of non-WIPP disposal of Pu-238 as a real possibility to reduce the risk to Savannah River Site workers was veted in a non-confrontational manner. At these points in the public involvement process, no formal proposals were made, only the ideas were "floated" up for review and consideration.

The CAB review of the TRU Waste program continues with considerable interest. Every month there has been a public meeting that included updates on the progress and challenges. The latest CAB Recommendation number 198 reflects the CAB's continued interest in the program as a whole, but in addition reiterates previous requests for information about the Risk Based End State alternative of possible non-WIPP disposal of Pu-238 contaminated waste.

CONCLUSIONS

The TRU waste program continues to focus on shipping all of the legacy waste to WIPP. There is, however, recognition that there may be a relatively small population of Pu-238 contaminated waste that may present an unacceptable risk to Savannah River Site workers to prepare for shipment, and thus may require the appropriate performance assessments and approvals for non-WIPP disposal or long-term storage. As a result of positive feedback from the public involvement to date and the requests to hear more about the possible alternative to the Risk Based End State for TRU wastes, in particular Pu-238 wastes, Savannah River Site is continuing to provide educational opportunities for the public to provide feedback to the program. It will remain a key to the success of the overall program to safely disposition all the legacy TRU wastes, that the public find the disposition paths to be acceptable. This is the best possible result from handing public involvement of a very sensitive set of issues. An educated public that can understand the alternatives for waste disposition and their associated risks without judging through preconceived, uninformed, notions about what should or should not happen is the only way to achieve acceptance by the public of difficult, possibly controversial decisions.

REFERENCES

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14. Citizens Advisory Board Recommendation No. 153 (adopted April 23, 2002), "TRU Waste Priority and Offsite Shipments."
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16. Citizens Advisory Board Recommendation No. 163 (adopted May 21, 2003), "High Activity TRU Waste Packaging."

17. Citizens Advisory Board Recommendation No. 164 (adopted May 21, 2003), "Waste Isolation: Pilot Plant (WIPP) Non-Compliant Item Waste Acceptance Criteria (WAC)."

18. Citizens Advisory Board Recommendation No. 189 (adopted July 26, 2004), "Performance Management Plan 2004."

19. Citizens Advisory Board Recommendation No. 190 (adopted September 14, 2004), "Risk Based End State Vision Document."

20. Citizens Advisory Board Recommendation No. 198 (adopted October 13, 2004) "SRS TRU Waste Program Challenges."