Comments on DOE Advanced Mixed Waste Treatment Project Draft EIS

Comments of the Institute for Energy and Environmental Research on: US Department of Energy Idaho National Engineering and Environmental Laboratory Advanced Mixed Waste Treatment Project Draft Environmental Impact Statement (July 1998)(DOE/EIS-0290-D)

Idaho Falls, ID Hearing August 18, 1998
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Background

The legacy of waste from the United States nuclear weapons complex is a serious threat to the environment, to the workers at sites complex-wide, and to the health of people living near these sites. The management of this deadly legacy should be one of the top priorities of the United States Department of Energy.

The Department of Energy (DOE) and its contractor, British Nuclear Fuels Limited (BNFL), propose to treat 65,000 cubic meters of waste at the Idaho National Engineering and Environmental Laboratory (INEEL). It is estimated that 95% of the waste is mixed waste – that is, contains both radioactive elements and contaminants considered hazardous under the Resource and Conservation Recovery Act (RCRA). The waste under consideration is classified as “retrievably-stored transuranic waste” since it is located at an above-ground storage area (as opposed to transuranic waste that has been buried or transuranic contaminated soils).

According to the Draft Environmental Impact Statement (DEIS) the waste needs to be treated in order to be disposed of in the Waste Isolation Pilot Plant (WIPP), a federal repository to be opened in New Mexico for retrievably-stored transuranic (TRU) and TRU mixed waste. The Department of Energy’s definition of transuranic waste is waste with long-lived (half-life greater than 20 years) isotopes of elements with an atomic number greater than uranium and above a certain radioactivity level (greater than 100 nanocuries per gram). This includes elements such as plutonium, neptunium, and americium. There are a number of problems with DOE’s TRU waste definition, not the least of which is DOE’s redefinition of TRU waste in 1984 (from 10 nanocuries to 100 nanocuries per gram). This meant that all of sudden waste which had been handled as TRU waste became a mixture of both TRU waste (the portion meeting the higher radioactivity limit) and “low-level waste” (the portion between 10 and 100 nanocuries per gram).

The waste to be treated by the Advanced Mixed Waste Treatment Project (AMWTP) contains three different waste types: transuranic mixed waste, alpha-Low Level Mixed Waste (LLMW), and LLMW. Approximately 25,000 cubic meters of the waste to be treated does not meet the minimum radioactivity threshold of TRU waste and thus could not ordinarily be disposed of in WIPP.

Proposed Treatment

The AMWTP facility would super-compact (crush) and macro-encapsulate (surround with cement) the majority of the waste with most of the rest being incinerated (with subsequent encapsulation of the ashes). The goal of both treatments is to meet the WIPP Waste Acceptance Criteria (WIPP-WAC). Thus, ignitable wastes which ordinarily could not be disposed of in WIPP would become acceptable after incineration. Additionally, alpha-LLMW which does not have a high enough radioactivity concentration to qualify under the current TRU waste definition would be compacted together with waste meeting the 100 nanocurie per gram level. This compacted waste would be considered TRU waste and be acceptable at WIPP under WIPP-WAC, according to DOE.

There are a number of concerns with both treatment methods and with DOE's TRU waste management priorities.

Compaction

Fundamentally, the AMWTP-DEIS does not provide a clear compelling reason for super-compaction. The only rationale DOE provides for super-compaction is to essentially mix the TRU and alpha-LLMW so that it meets the 100 nanocurie per gram WIPP-WAC criteria. It will not change the nature of the waste, except to reduce the volume. In fact, the waste may be able to be placed in RCRA-compliant storage without any treatment other than repackaging (along the lines of the "No Action Alternative"). By processing drums that may not need any treatment for compliance with RCRA the project may unnecessarily increase worker hazards and environmental risks.

The DEIS has failed to analyze all the potential risks of super-compaction. For example, there is no discussion of potential nuclear criticality problems and the results of a potential criticality. As the primary process would result in waste with a higher concentration of plutonium, this would seem to be a necessary component of a thorough analysis.

The DEIS has also excluded decontamination and decommissioning impacts which could result in a large volume of transuranic waste being created. It is therefore difficult to determine how much TRU waste would remain after the facility ceases operations.

As presented super-compaction has many important disadvantages and no significant advantages. The problem is complicated by a lack of a plan to adequately characterize the waste prior to super-compaction. Possibly a better alternative would be storage with repackaging as necessary and declaration of waste greater than ten nanocuries per gram as transuranic waste destined for repository disposal.

Incineration

The DEIS also has deficiencies in its analysis of incineration. The DEIS states that approximately 25% of the waste is destined to be thermally treated (approximately 16,250 cubic meters). The three types of waste which would be incinerated are those containing PCBs, some excess liquids, and ignitable wastes. Only PCBs have thermal treatment as the Best Demonstrated Control Technology. The others require incineration in order to meet the WIPP-WAC which prohibits ignitables and "free liquids."

It is not clear how the 25% estimate for incineration was made. The potential range of waste slated for incineration is huge. In Table F-1-9 only one waste stream, totaling 26 cubic meters (0.04%), is listed as definitely having PCBs (and therefore requiring incineration). However, according to Table F-1-6 if all the waste suspected of containing PCBs over the limit, all ignitable waste, and all waste with excess liquids were incinerated, then the total volume of waste incinerated would be 26, 572 cubic meters or 41% of the waste. This wide range in the amount of waste which may be incinerated raises three questions:

- How accurate is the estimate that 25% of the waste would be incinerated and what is the most probable range of waste volume to be incinerated?
- Have the environmental impacts from the full range of potential waste volume incinerated been addressed in the DEIS?
- What is the relative cost/benefit in sizing the facility first as DOE has done versus determining the composition of the waste first and then sizing the thermal treatment facility appropriately? Waste characterization would provide the time and knowledge necessary to choose the appropriate technology, incineration or otherwise.

There is also no statement of how much waste would require thermal treatment if the WIPP-WAC were not a criteria (though presumably it would only be the PCB waste). As WIPP is not assured of opening, DOE should present an estimate of how much and what type of waste would still require thermal treatment if the goal were RCRA-compliant storage (and requirements under the Toxic Substances Control Act or TSCA). In other words, RCRA compliance assessment should be separated from WIPP related issues.

Another issue is whether BNFL's incinerator would be able to handle the highly variable waste stream (the waste will contain debris of varying composition). Since highly variable waste streams have caused problems at other incinerators, DOE should show how it plans to address this issue. The DEIS analysis regarding incineration is seriously deficient in that it does not address this issue.

Radiolytic Degradation Issues

The DEIS also ignores a basic fact when dealing with radioactive materials which could have significant impacts for both super-compaction and incineration. Irradiation of materials such as plastics and rubber results in the production and/or release of numerous hazardous substances which can change the characteristic of the waste over time. Production of substances such as hydrochloric acid, benzene, and acetone, among others, can result in waste meeting the criteria of ignitability, corrosivity, reactivity, or toxicity – even if the waste was previously considered non-hazardous.

On p. E-5-10 of the DEIS there is a discussion of production of some decomposition products due to thermal effects, however, there is no discussion of radiolytic production of hazardous products. This could have three very significant effects on the AMWTP.

First, it is not clear that the characterization and pre-treatment process proposed for the facilities would be designed to detect dangerous levels of these substances. In particular, drums slated to pass directly to the super-compactor without pre-treatment could pose risks. The DEIS does not discuss what effect either

puncturing the drums or actually compacting the drums would have, particularly if reactive or ignitable substances are present. As this waste has been in storage for a significant periods of time and these radiolytic decay products would be expected to increase over time, this could become a significant issue for facility operations and safety. The explosive and other hazards posed by radiolytic decay products has not been included in DOE's analysis.

Second, the AMWTP-DEIS does not provide even a basic overview of a Quality Assurance (QA) program which would demonstrate that final waste drums do not contain ignitable, corrosive, or reactive wastes. These wastes are not allowed to be disposed of in WIPP. Instead of a QA program, the AMWTP relies on the characterization and pre-treatment steps to handle and segregate these wastes for either thermal treatment, neutralization, or segregation. However, as discussed above, it is not clear that the process would detect these types of wastes if they were the result of radiolytic degradation. Thus, the failure to account for radiolysis means that the AMWTP may not achieve its basic goal of treating the waste to meet WIPP-WAC.

Third, the AMWTP-DEIS does not provide an analysis showing that even if it were determined that the waste meets the WIPP-WAC after treatment, the waste would continue to meet the WIPP-WAC over time as radiolytic degradation continued.

Policies and Alternatives

A key overall problem is that very little is known about the composition of some of the waste to be treated. The DOE is undertaking a complex and costly project without clearly analyzing the environmental consequences or even the safety issues involved. The DOE has not demonstrated that it has done sufficient technical preparation to actually super-compact and incinerate the variety of INEEL waste that it proposes to handle.

The lack of sufficient preparation and pilot level work is characteristic of many large DOE projects and has been an important element in many failures of such projects. It is so systemic that we have even given a name to the problem – monumentalism. The super-compaction and incineration project has all the earmarks of a poorly conceived and ill-prepared project that will channel large amounts of tax dollars to corporations without even a reasonable assurance of achieving the stated objectives. Finally we also believe that the objectives (other than those directly and demonstrably related to RCRA compliance which has not been shown) are based on improper priorities.

DOE's development of the AMWTP demonstrates the fundamental problem with DOE's transuranic waste program: DOE continues to prioritize the wrong aspects of the TRU waste problem. In a 1997 study, IEER documented three key reasons why DOE's focus on WIPP and retrievably-stored transuranic waste was the wrong priority:

1. the total amount of transuranic waste in the DOE complex is more than double the capacity of WIPP
2. buried transuranic waste poses much greater near- and medium-term risks to the environment than retrievably-stored waste
3. there are serious concerns about the suitability of the WIPP site.

In response to IEER's analysis, DOE has agreed to review key aspects of its transuranic waste program, specifically flawed technical assumptions regarding buried transuranic wastes. This review is to involve a review of data quality issues relating to these wastes. DOE also agreed to prepare a summary and status of remediation activities at sites with buried transuranic wastes and transuranic-contaminated soil. There are clear repository-related programmatic issues raised by the fact that the amount of buried transuranic waste, transuranic-contaminated soil, and decontamination and decommissioning waste cannot all be accommodated in the WIPP repository. DOE should fully address such issues before proceeding with large projects, such as the AMWTP, since they are based on flawed technical and policy assumptions. The AMWTP DEIS fails to acknowledge that key parts of DOE's transuranic waste program have been shown to be based on poor data and faulty technical and scientific arguments.

While the emphasis should be on buried TRU waste and soils, there is some merit to taking limited action on retrievably-stored waste. However, the AMWTP fails to consider all the appropriate alternatives. After 25 years, WIPP has yet to open and its future remains highly uncertain. TRU waste should be placed into RCRA-compliant storage at the sites where it is now stored. During this process a more careful analysis of the waste content should be done. In particular, attention can be paid to determining the extent of radiolytic decay product contamination. A more detailed accounting of the waste would allow DOE to thermally treat only that waste which requires it for safety and environmental reasons (and not in order to meet repository criteria). If the volume of waste is determined to be small, then alternatives might be found such as chemical treatment, incineration off-site or alternative thermal treatments (e.g. plasma-arc). These approaches are not included in the Draft Environmental Impact Statement.

Conclusion and Recommendations

The Institute for Energy and Environmental Research is opposed to any program designed to treat waste mainly in order to meet the WIPP Waste Acceptance Criteria. The WIPP repository is not a solution to the TRU waste problem. There are serious concerns about the geology and hydrology of the site and it will not take and could not handle a significant portion of the TRU waste volume. Additionally, there is no assurance that, after spending the money and treating the waste, the WIPP-WAC will have been met. Instead of focusing on WIPP the AMWTP needs to be defined according to meeting the goals of safely storing the waste and meeting RCRA criteria while minimizing environmental impacts, protecting public health, and reducing the risks to workers. Finally, spending large amounts of money on WIPP-related treatment diverts scarce resources from the environmentally more pressing buried TRU waste problem.

Recommendations

1. DOE should issue a new the Draft Environmental Impact Statement that addresses radiolysis
2. An alternative that would undertake waste characterization first with treatment decided upon later should be included
3. All waste with greater than 10 nanocuries per gram should be considered TRU waste eligible for repository disposal
4. The retrievably stored waste at INEEL should be repackaged and stored in accordance with RCRA
5. Waste volumes to be treated due to RCRA requirement should be calculated more precisely and then alternatives analyzed. This would separate WIPP-WAC analysis from RCRA analysis.

Related Information

Fact Sheet: Incineration of Radioactive and Mixed Waste