

Public Acceptance of Low-Level Waste Disposal Critical to the Nuclear Renaissance - 9009

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ABSTRACT

The disposal of various Low-Level Waste (LLW) forms projected to result from the operation of a pilot or large scale Advanced Fuel Cycle Initiative Programs' (formally known as Global Nuclear Energy Partnership (GNEP)) reprocessing and vitrification plants requires the DOE LLW program and regulatory structure to be utilized in its present form due to the limited availability of Nuclear Regulatory Commission licensed commercial LLW disposal facilities to handle wastes with radionuclide concentrations that are greater than Nuclear Regulatory Commission (NRC) Class A limits. This paper will describe the LLW forms and the regulatory structures and facilities available to dispose of this waste.

Then the paper discusses the necessity of an excellent public involvement program to ensure the success of an effective technical solution. All of the decisions associated with the management of these wastes are of interest to the public and successful program implementation would be impossible without including the public up-front in the program formulation. Serious problems can result if program decisions are made without public involvement, and if the public is informed after key decisions are made.

This paper will describe the regulatory and public involvement program and their effects on the decisions concerning the disposal of Low-Level Radioactive Waste (LLW) at the Savannah River Site (SRS). An extensive public communications effort resulted in endorsement of changes in disposal practices by the SRS Citizens Advisory Board that was critical to the success of the program.

A recommendation will be made to install a public involvement program that is similar to the SRS Citizens Advisory Board in order to ensure the success of the AFCI programs in view of the limited availability to handle the wastes from the program and the public acceptance of change that will be required.

THE NUCLEAR RENAISSANCE: THE ADVANCED FUEL CYCLE INITIATIVE (AFCI) RESEARCH AND DEMONSTRATION FACILITIES

The Advanced Fuel Cycle Initiative (AFCI) program working with the Department of Energy is planning to design and build large demonstration reactors, reprocessing, and vitrification facilities to show the world that nuclear energy is the way forward for the United States and the world to reduce its dependence on oil for its energy needs. The Advanced Fuel Cycle Initiative Program was formally known as Global Nuclear Energy Partnership (GNEP). To be able to plan and communicate to the public how these facilities will manage their wastes is indeed critical to AFCI's success. And AFCI's success or failure is one of the keys to a successful Nuclear Renaissance. Not only are there serious problems in the availability of treatment and disposal facilities for the various waste forms expected from AFCI facilities, but the public communication of the technical and regulatory challenges and plans to find solutions to these waste problems will be a key to the success of AFCI. A discussion of the various waste forms and the challenges to find a disposal path follows. A suggested method to involve the public and achieve public acceptability of the waste challenges is recommended.

AFCI ENVIRONMENTAL AND WASTE MANAGEMENT STRATEGY

Summary Discussion

Each solid radioactive waste form will be discussed as to its point of generation, characterization, storage, packaging, transportation, treatment, and disposal. The basic assumption is that the AFCI facilities will be licensed by the United States Nuclear Regulatory Commission (NRC) and more importantly, the waste generated from the facilities will be sent to NRC licensed facilities for disposal. This assumption will limit the available facilities dramatically compared to allowing the waste to be disposed in United States Department of Energy (DOE) disposal facilities. The NRC has not licensed a facility that can receive waste outside of the “State Compact” for that facility for disposal of NRC 10 CFR 61 Class B, C, or Greater than Class C low-level radioactive waste (LLW). Much of the waste to be generated from the AFCI facilities is expected to be in these categories as will be seen in the following discussion. Allowing existing LLW disposal facilities or development by private industry of newly licensed LLW disposal facilities to accept these categories of LLW is critical to the success of AFCI Facilities. In addition, the Nation’s repository for High-Level Nuclear Waste (HLW) must be constructed, licensed, and operated for the disposal of HLW as well. Currently the Yucca Mountain project at the Nevada Test Site near Las Vegas, Nevada, is the HLW disposal site selected for this task. The Yucca Mountain project documentation (technical studies including the performance assessment, Environmental Impact Statement (EIS), and NRC License application at a minimum) must include the HLW from AFCI Facilities. The LLW and HLW issues may require legislative action by the United States Congress to ensure that nuclear waste facilities are available for disposal of the AFCI Facilities’ wastes forms.

As a result of the concerns about using NRC licensed facilities for the disposal of AFCI radioactive wastes listed above, consideration of DOE disposal facilities and issues will be included.

Additionally if DOE disposal facilities are used, DOE Order 435.1 *Radioactive Waste Management* is the primary regulation that must be followed. In general it is very similar to the NRC regulations 10 CFR 60 and 10 CFR 61; however this paper points out the differences for each waste stream. DOE Order 435.1 does add a requirement for those wastes that are considered to be High-Level Wastes by definition. The definition of High-Level Waste is as follows:

DOE G 435.1-1, II.A., P II-1 “High-Level Waste is the highly radioactive waste material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentrations; and other highly radioactive material that is determined, consistent with existing law, to require permanent isolation.”

As noted below in the section titled “Compacted Waste Canisters”, the Spent Fuel and Canisters are not considered to be High-Level Waste by DOE Order 435.1. The source of the waste, not the concentration of fission products, is the primary parameter for making High-Level Waste determinations. That said the High-Level Waste is created after separation of the fission products from the dissolved fuel during reprocessing and the fission product stream has been rejected to waste to a waste storage tank. At the point of storage in the waste storage tank, the waste is then considered High-Level Waste. Therefore, all the processes downstream of the High-Level Waste storage tanks through the vitrification facilities have the potential to be contaminated with High-Level Waste. In accordance with DOE Order 435.1, the wastes from the High-Level Waste system then must be evaluated to determine if they can be managed as Low-Level or Transuranic Wastes. Components, Equipment, and other wastes contaminated with High-Level Waste are not considered High-Level Waste by definition in Section II.A of the Order 435.1 provided they meet the condition of either the Waste Incidental to Reprocessing Citation or Evaluation Process.

This process is discussed in DOE Order 435.1, DOE G 435.1-1, II.B. Waste Incidental to Reprocessing, P. II-13. This report will point out those waste streams below that would require a Waste Incidental to Reprocessing Citation or Evaluation.

AFCI FACILITES JOB CONTROL WASTE INCLUDING EQUIPMENT

AFCI Facilities are expected to generate job control waste such as protective clothing, tools, packaging materials, and other types of routine wastes that will be relatively lightly contaminated with radionuclides. In addition failed equipment (tanks, pipes, and pumps) are expected to become waste. This type of job control waste is expected to be characterized as NRC Class A waste and will be packaged in steel boxes commonly known in the industry as B-25's that contain 90 cubic feet of waste volume each. These B-25 steel boxes are the storage and shipping containers and will be able to be shipped to an NRC licensed disposal facility. Failed equipment should be flushed and placed in B-25's or larger containers such as sealands.

Potential NRC Licensed Disposal Facilities for AFCI Job Control Waste including equipment

Currently there are only three NRC Licensed disposal facilities for this Class A LLW in the USA. Today only two NRC licensed commercial LLW disposal facilities are available for disposal of Class A, B, and C waste as set forth in 10 CFR 61.55. One is the Chem Nuclear facility operated by Energy Solutions located in Barnwell, SC. The Chem Nuclear facility near Barnwell is permitted by the State of South Carolina as an NRC agreement state. This facility is scheduled to close to most States in the nation soon and is very actively debated in the South Carolina legislature. The other LLW disposal facility for Class A, B, and C waste is the US Ecology Washington Low-Level Radioactive Waste site located near Richland, Washington. This facility disposes of Class A, B, and C LLW only from the Northwest and Rocky Mountain Compact States. The only commercial NRC licensed LLW disposal facility generally available nationally is the Energy Solutions facility located near Clive Utah. This Utah facility is also permitted by the State of Utah as an NRC agreement state. This facility, however, can only accept Class A (the lowest level of radioactive contamination) for disposal. This facility can accept mixed LLW, but again only at Class A levels. The Waste Control Specialists LLW Disposal Facilities located in Texas have applied for a license to dispose of Class A, B, and C LLW. Once granted by the State of Texas, this facility should be able to accept LLW from the AFCI Facilities.

Potential DOE Disposal Facilities for AFCI Facilities Job Control Waste including equipment

The job control waste characterized as LLW can be disposed in a DOE LLW disposal facility that is operated and authorized by DOE Order 435.1 Chapter IV, Low-Level Waste Requirements in accordance with DOE's authority granted by the Atomic Energy Act of 1954, as amended. The Nevada Test Site (NTS) LLW Disposal Facility (or several others in the DOE complex) could accept the LLW assuming it meets the facility's Waste Acceptance Criteria. Disposal at a DOE LLW Facility would meet regulatory requirements, be protective of human health and the environment, and it may be the more cost effective compared to disposal at an NRC licensed facility.

DOE LLW disposal facilities operate in accordance with DOE Order 435.1 and, as such, bases its LLW disposal waste acceptance criteria on the long term Performance Assessment derived limits for disposal of each radionuclide in the disposal facility. The limits are developed based on their performance of the waste form, the disposal configuration, and the sites hydrogeologic characteristics; not on a predetermined set of limit tables such as the NRC regulations. Therefore, the NRC designations of Class A, B, C, or Greater Than Class C are not used by DOE to determine the amount or concentration of

radionuclides that can be disposed in a DOE LLW disposal facility. This allows DOE LLW disposal sites to generally dispose of relatively high levels of radioactivity if the disposal site and its disposal engineered facilities perform to meet environmental standards. In fact DOE owned LLW is required to be disposed of at the DOE site where the waste is generated, if practical; or at another DOE facility. Use of non-DOE facilities for radioactive waste storage, treatment, and in the case of LLW, disposal must be specifically exempted under the requirement of DOE Order 435.1, Chapter I. 2. F. (4), “Approval of Exemptions for Use of Non-DOE Facilities”.

DOE managed Job Control Wastes from the HLW storage and vitrification facility would need to be included in a Waste Incidental to Reprocessing Citation. The failed equipment from the HLW storage and vitrification facility would require a Waste Incidental to Reprocessing Citation or Evaluation.

Disposal Facility Recommendation for AFCI Job Control Waste including equipment

It is recommended that AFCI Facilities Job Control Class A LLW be disposed at the Energy Solutions facility located near Clive Utah. The basis for this recommendation is that the disposal facility is assumed to be an NRC Licensed LLW Disposal Facility. If, however, the radioactive waste is determined to be DOE’s responsibility, then the waste should be disposed at a DOE LLW disposal facility such as the at the Nevada Test Site.

COMPACTED WASTE CANISTERS FROM DISSOLUTION OF THE SPENT FUEL AND THE TRU WASTE GENERATED IN AFCI FACILITES

AFCI Facilities may use fuel processing that result in Compacted Waste Canisters; these compacted canisters contain hulls and end pieces, fines, and technological wastes (worn out pieces of equipment). Compacted Waste Canisters and Glass Canisters should have the same geometry. However, the Glass Canisters are filled with vitrified HLW. The Compacted Waste Canisters are not considered to be HLW by NRC or DOE regulations, rather they are considered to be LLW or TRU wastes. The basis for the rationale that the Compacted Waste Canisters are not considered to be HLW is provided below.

Additionally TRU waste may be generated from compactable organic and metallic residues containing Pu02. These TRU waste are included in the evaluation below.

Potential NRC Licensed Disposal Facilities for Compacted Waste Canisters and other TRU wastes:

Disposal of the Compacted Waste Canisters at Yucca Mountain as HLW is not allowed by Law and regulation.

Since the compacted waste radioactivity and heat load is very low, compared to HLW, compacted canisters could be disposed in Yucca Mountain in specific drifts; these specific drifts could be much closer, allowing an enhanced capacity. Different specific compacted waste storage can be imagined in order to increase the repository capacity.

However, the compacted waste canisters do not need to be disposed at Yucca Mountain, in fact, under current United States Department of Energy (DOE) and United States Nuclear Regulatory Commission (NRC) Orders and Regulations, the compacted waste canisters are not allowed to be disposed at Yucca Mountain. The Law would need to be changed to allow for disposal of the compacted waste canisters at Yucca Mountain, however, disposal at Yucca Mountain is not the most cost effective alternative that would also be protective of human health and the environment. Therefore, if the compacted waste

canisters were removed from the Yucca Mountain inventory and it would have no impact on the Yucca Mountain capacity.

Since the compacted waste canisters and other TRU wastes are expected to be classified as transuranic (TRU) waste due to the fact that they are expected to contain greater than 3700 becquerels (Bq) (100 nanocuries) of alpha-emitting transuranic isotopes per gram of waste (see the complete definition of TRU waste later in this document), they should be disposed at a suitably permitted TRU waste disposal facility under DOE requirements (or a Low-Level Waste (LLW) facility if the waste was low enough in TRU isotopic concentration). Since the waste is assumed to be disposed at an NRC Licensed Disposal Facility and is determined to meet the DOE definition of TRU waste, then the Nuclear Regulatory Commission (NRC) regulations would require that the waste be disposed in a Greater than Class C LLW disposal facility. Today, a LLW disposal facility licensed by NRC to dispose of Greater Than Class C waste does not exist. DOE has published the intent to prepare an Environmental Impact Statement to study the alternatives concerned with building such a Greater Than Class C LLW disposal facility built by DOE and licensed by NRC.

The basis for the discussion that the compacted waste canisters would not be allowed to be disposed at Yucca Mountain as HLW under current regulations and would indeed be better suited for a DOE TRU waste disposal facility or a LLW disposal facility is as follows:

DOE Order 435.1 places its requirement in a Manual and provides a Guidance document as well. DOE G 435.1-1 contains the following:

“II.A. Definition of High-Level Waste. P. II-1

High-level waste (HLW) is the highly radioactive waste material resulting from the reprocessing of spent nuclear fuel, including liquid waste produced directly in reprocessing and any solid material derived from such liquid waste that contains fission products in sufficient concentration; and other highly radioactive material that is determined, consistent with existing law, to require permanent isolation.”

II.A. P. II-6 states: “DOE M 435.1-1 supports the implementation of part (2) of the 10 CFR Part 60 definition to mean that high-level wastes are wastes that are generated as a product of reprocessing of spent nuclear fuel downstream of, and including, the first step in a separations process, and the consistent waste stream from subsequent extraction cycles or steps. ...Wastes that are produced upstream of these separation processes, from such processes as chemical or mechanical decladding, fuel dissolution, cladding separations, conditioning, or accountability measuring, are not high-level waste. Such wastes are considered processing wastes and should be managed in accordance with the appropriate Chapter of DOE M 435.1-1, as either transuranic, mixed low-level, or low-level wastes.”

Potential NRC Licensed Disposal for AFCI Compacted Waste

If the Facility waste is managed under current NRC regulations, then the waste would not be allowed (without changes to regulations and probably law), to dispose of its waste at DOE TRU or LLW disposal facilities such as at WIPP, Savannah River Site (SRS) or at Nevada Test Site (NTS). The compacted waste canisters are likely to be highly radioactive and under the NRC regulation 10 CFR 60.55 “Waste Classification”, would likely be determined to be Class C waste or Greater Than Class C (a designation of the amount and concentration of radionuclides in the waste form). Today only two NRC licensed commercial LLW disposal facilities are available for disposal of Class A, B, and C waste as set forth in 10 CFR 61.55. One is the Chem Nuclear facility operated by Energy Solutions located in Barnwell, SC. The Chem Nuclear near Barnwell is permitted by the State of SC as an NRC agreement state. This facility is scheduled to close to most States in the nation soon and is very actively debated in the South Carolina

legislature. The other LLW disposal facility for Class A, B, and C waste is the US Ecology Washington Low-Level Radioactive Waste site located near Richland, Washington. This facility disposes of Class A, B, and C LLW only from the Northwest and Rocky Mountain Compact States. The only commercial LLW disposal facility generally available nationally is the Energy Solutions facility located near Clive Utah. This Utah facility is also permitted by the State of Utah as an NRC agreement state. This facility, however, can only accept Class A (the lowest level of radioactive contamination) for disposal. This facility can accept mixed LLW, but again only at Class A levels. The Waste Control Specialists LLW Disposal Facilities located in Texas have applied for a license to dispose of Class A, B, and C LLW. Once granted by the State of Texas, this facility should be able to accept LLW from the AFCI Facilities.

Also, today, there is no LLW disposal facility licensed by NRC to dispose of Greater Than Class C waste. DOE has published the intent to prepare an Environmental Impact Statement to study the alternates of building such a LLW Greater Than Class C disposal facility built by DOE and licensed by NRC.

Therefore, the NRC licensed commercially available radioactive disposal facilities are very limited today and unless the LLW program on a national level changes dramatically in the next decade, the limited availability to dispose of NRC licensed radioactive LLW is not likely to improve.

Potential DOE Disposal Facilities for Compacted Waste Canisters and other TRU Wastes:

The Compacted Waste Canisters and other TRU wastes are TRU waste under DOE's waste classification program.

If the AFCI reprocessing facility waste is to be dispositioned under DOE programs, then the radioactive waste generated from the facility must be managed in accordance with DOE Order 435.1, "Radioactive Waste Management". Therefore, the Compacted Waste Canisters are not considered Spent Fuel or High Level Waste under the DOE programs and DOE Order 435.1. Allowing the waste to be dispositioned under DOE programs provides for more regulatory suitable and cost effective options for all of the wastes from AFCI Facilities including the compacted waste canisters.

Yucca Mountain is only expected to be authorized to accept Spent Fuel and DOE Defense HLW glass. (The "Nuclear Waste Policy Act of 1982", as amended) Since the Compacted Waste Canisters are not considered Spent Fuel or High Level Waste, they must be characterized to determine if they are transuranic (TRU) waste or low-level waste (LLW). They will most likely be TRU waste. However, if they meet the definition of LLW, a discussion of that situation is included below. They will also need to be characterized to ensure that they are not mixed wastes. (Mixed LLW is waste that contains both radioactive isotopes subject to the Atomic energy Act of 1954, as amended, and a chemically hazardous component subject to the Resource Conservation and Recovery Act (RCRA).)

Therefore, the options for disposal of the compacted waste canisters should they be determined to be characterized as TRU waste to be dispositioned by DOE are as follows:

Disposal as DOE TRU waste in the Waste Isolation Pilot Plant (WIPP) in New Mexico.

Since WIPP is only authorized to dispose of Defense related TRU, the Law would need to be changed to allow TRU waste from the AFCI project to be disposed at WIPP. The WIPP Waste Acceptance Criteria (WAC) will only allow Remote Handled TRU Waste (greater than 2,000 microsieverts/hour (200 mrem/hr) less than 10 sieverts/hour (1,000 rem/hr)) to be disposed. Shielding of the disposal containers to meet this limit is not allowed. The compacted waste canisters are expected to be 50 sieverts/hour

(5,000 rem/hr). Therefore, the WIPP WAC would need to be modified to accept the compacted waste canisters.

Disposal as DOE TRU waste at a suitable location utilizing DOE's authority as the Implementing Agency under 40 CFR 191 to dispose of TRU waste at a location other than WIPP. The decision to locate a TRU waste disposal facility at a location other than WIPP would be determined through a performance assessment to demonstrate the requirements of 40 CFR 191 were met by the TRU waste disposal system.

TRU waste disposal regulations and available facilities

Should the Compacted Waste Canisters (UC-C) and other TRU wastes be determined to be Transuranic (TRU) Waste under DOE or NRC regulations, then it is even more important for DOE to be the owner/operator of the facility because DOE can authorize disposal of TRU waste in certain circumstances as discussed in DOE Order 435.1 Chapter III.P. "Disposal". There is currently only one disposal facility for TRU Waste in the USA. It is the Waste Isolation Pilot Plant (WIPP) near Carlsbad, New Mexico and it is only authorized to dispose of TRU waste resulting from atomic energy defense activities. The recycling facility (AFCI Facilities) is not expected to be designated a atomic energy defense activity, therefore, any TRU waste generated from the AFCI Facilities will not be able to be disposed at the WIPP under current laws and regulations. The Law could be changed; however, there are methods available to dispose of TRU waste in facilities other than the WIPP. DOE has the authority and responsibility for making compliance determinations for TRU waste disposal facilities other than the WIPP.

The definition of TRU waste for DOE Order 435.1 is:

TRU waste is radioactive waste containing more than 100 nanocuries (3700 becquerels) of alpha-emitting TRU isotopes per gram of waste, with half-lives greater than 20 years, except for:

1. High-level radioactive waste;
2. Waste that the Secretary of Energy has determined, with the concurrence of the Administrator of the Environmental Protection Agency, does not need the degree of isolation required by 40 CFR 191 disposal regulations; or waste that the NRC has approved for disposal on a case by case basis in accordance with 10 CFR 61.

An NRC approved disposal exception (exception to the definition TRU waste item 3. above) gives the NRC the latitude to not apply the disposal standards of 40 CFR 191 to waste which meets the concentration limits of TRU waste if the waste is disposed of in an NRC licensed facility. Waste generated by commercial activities such as AFCI Facilities could have waste that meets the definition of TRU waste. Under NRC regulation, this waste could be as a Greater-than-Class-C (GTCC) LLW per the waste classification system in 10 CFR 61.55. In accordance with the "Low-Level Radioactive Waste Policy Act", as amended, the DOE is responsible for disposal of GTCC waste; however, disposal of GTCC waste generated by a commercial NRC licensee is to be in a facility licensed by the NRC for the disposal of GTCC wastes. Currently, there is no GTCC disposal facility available or planned. (see discussion below on GTCC)

This definition of TRU waste is the definition used in the "WIPP Land Withdrawal Act of 1992", as amended. This definition is functionally equivalent to that in 40 CFR 191, "Environmental Radiation Protection Standards for Management and Disposal of Spent Nuclear Fuel, High-Level and Transuranic Radioactive Wastes". The "WIPP Land Withdrawal Act of 1992", as amended, defines TRU waste and

limits disposal at WIPP to TRU waste resulting from atomic energy defense activities which meets the definition above of TRU waste.

DOE can authorize disposal of TRU waste in certain circumstances as discussed in DOE Order 435.1 Chapter III.P. “Disposal”. Determination of compliance with the TRU waste disposal requirements of 40 CFR 191 depends on the facility being considered. In the “WIPP Land Withdrawal Act of 1992”, as amended, Congress assigned EPA the responsibility for issuing the standards discussed above and certifying that WIPP meets the standards. However in accordance with 40 CFR 191, sites other than WIPP are “regulated” by the implementing agency, in this case, DOE. As such DOE Order 435.1 Chapter III. P. established DOE-HQ as the DOE authority for making compliance determinations for TRU waste disposal facilities other than WIPP.

The Compacted Waste Canisters may be LLW and disposal in a DOE LLW Facility may be preferred.

Assuming that compacted waste canisters are LLW, it would be appropriate to decontaminate the hulls and end pieces, fines, and technological wastes (worn out pieces of equipment) by acid wash or water spray to reduce the contamination levels to as low as possible before they are compacted and placed in the compacted waste canisters. This decontamination step would ensure that the TRU isotope concentration is as low as possible as well, to ensure that the waste is below the TRU waste concentration limit and can be managed as LLW. Additionally, in order to stabilize the waste it may be appropriate to combine the Compacted Waste Canisters with concrete or grout. This would also result in a higher weight of the waste form and, thus, a lower TRU isotopic concentration that could determine a LLW classification instead of TRU waste classification. Treatment including decontamination and stabilization would increase the possibility that the resulting waste would be LLW, thus, increasing the alternatives for acceptable disposal facilities. Disposal of a LLW is the preferred path since there are DOE and NRC regulated LLW facilities available and suited for disposal of LLW. The disposal facilities for TRU waste or Greater-than Class C (GTCC) wastes are extremely limited.

The compacted waste canisters characterized as LLW can then be disposed in a DOE LLW disposal facility that is operated and authorized by DOE Order 435.1 Chapter IV, Low-Level Waste Requirements. The Nevada Test Site (NTS) LLW Disposal Facility (or several others in the DOE complex such as SRS) could accept the LLW assuming it meets the facility’s Waste Acceptance Criteria. Disposal at a DOE LLW Facility would meet regulatory requirements, be protective of human health and the environment, and it would be the most cost effective compared to disposal at Yucca Mountain.

If the compacted waste canisters were below the applicable concentration limits for NRC Class A LLW as set out in 10 CFR 61, then a commercial NRC licensed LLW disposal facility such as Energy Solutions Utah, could dispose of this waste. It may be impractical to decontaminate the compacted waste canisters to levels low enough for Class A disposal. In that case a DOE facility as described above is the best route.

DOE LLW disposal facilities operate in accordance with DOE Order 435.1 and, as such, bases its LLW disposal waste acceptance criteria on the long term Performance Assessment derived limits for disposal of each radionuclide in the disposal facility. The limits are developed based on their performance of the waste form, the disposal configuration, and the sites hydrogeologic characteristics; not on a predetermined set of limit tables such as the NRC regulations. Therefore, the NRC designations of Class A, B, C, or Greater Than Class C are not used by DOE to determine the amount or concentration of radionuclides that can be disposed in a DOE LLW disposal facility. This allows DOE LLW disposal sites to generally dispose of relatively high levels of radioactivity if the disposal site and its disposal

engineered facilities perform to meet environmental standards. In fact DOE owned LLW is required to be disposed of at the DOE site where the waste is generated, if practical; or at another DOE facility. Use of non-DOE facilities for radioactive waste storage, treatment, and in the case of LLW, disposal must be specifically exempted under the requirement of DOE Order 435.1, Chapter I. 2. F. (4), “Approval of Exemptions for Use of Non-DOE Facilities”.

Disposal Facility Recommendation for Compacted Waste Canisters and other TRU wastes:

The Compacted Waste Canisters and other TRU wastes could be disposed in an NRC licensed Greater than Class C LLW Disposal Facility. The basis for this recommendation is that the disposal facility is assumed to be an NRC Licensed LLW Disposal Facility. However, today, there is no LLW disposal facility licensed by NRC to dispose of Greater Than Class C waste. DOE has published the intent to prepare an Environmental Impact Statement to study the alternates of building such a LLW Greater Than Class C disposal facility built by DOE and licensed by NRC. The construction, licensing and operation of this facility should be pursued by DOE and the NRC.

As an alternative, changes in the regulations concerning the HLW repository currently being studied at Yucca Mountain in Nevada could be pursued to allow the Compacted Waste Canisters to be considered HLW and disposed in the HLW repository.

A second alternative is to allow DOE to be responsible to dispose of the Compacted Waste Canisters and other TRU wastes). Under DOE regulations the Compacted Waste Canisters and other TRU wastes are TRU waste. Therefore, the law could be changed to allow AFCI Compacted Waste Canisters and other TRU wastes to be disposed at the WIPP Facility near Carlsbad, NM or DOE could exercise its authority under 40 CFR 191 and provide a TRU disposal facility at a location other than WIPP.

IODINE TRAPS DISPOSAL

Gaseous Iodine Releases (Iodine Traps)

The Iodine Traps are expected to be in the offgas system from the recycling facility’s spent fuel dissolvers. It is not until the solvent extraction process in the reprocessing facility that the fission product solution wastes become HLW. At this point in the solvent extraction process the fission product solution wastes become HLW. Since the Iodine traps from the dissolver offgas system are in the vapor space prior to solvent extraction, they will not be considered HLW. The Iodine traps from the dissolver offgas system is in the vapor space of the offgas and when the traps are removed and ultimately discarded to waste, they will have to be characterized to ensure that they will or have been appropriately treated to meet Land Disposal Restrictions (LDR) under RCRA prior to ultimate land disposal.

If the facility is to be operated under NRC or DOE programs, then the radioactive waste generated from the facility must be managed in accordance with 10 CFR 60, 10 CFR 61, and DOE Order 435.1, “Radioactive Waste Management.” Therefore, the Iodine traps are not considered Spent Fuel or High Level Waste under the NRC or DOE programs. The basis for this conclusion is discussed below. Therefore, the Iodine Traps cannot be disposed at Yucca Mountain and will not contribute to the repository. They will be Mixed LLW. “Mixed waste” under the Resource Conservation and Recovery Act (RCRA) means waste that contains both hazardous waste and source, special nuclear or by-product material subject to the Atomic Energy Act (AEA) and is subject to both RCRA and the AEA.

Yucca Mountain is only expected to be authorized to accept Spent Fuel and DOE Defense HLW glass. Since the Iodine Traps are not considered Spent Fuel or High Level Waste, they must be characterized to

determine if they are transuranic (TRU) waste or Low Level Waste (LLW). They will most likely be mixed LLW. At the point in time when the Iodine Traps are considered for discard, they will have to be characterized to ensure that they will or have been appropriately treated to meet Land Disposal Restrictions (LDR) under RCRA prior to land disposal.

Disposal Facility Recommendation for Iodine Traps:

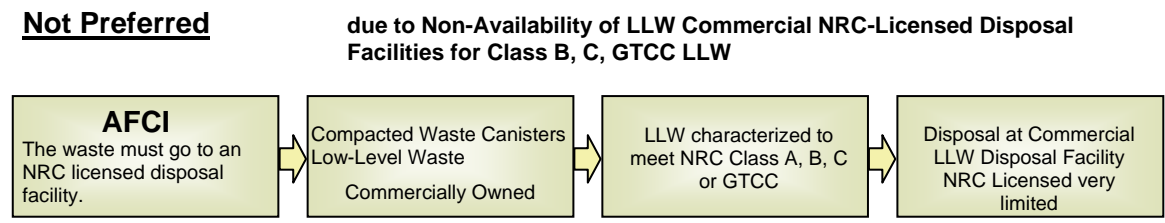
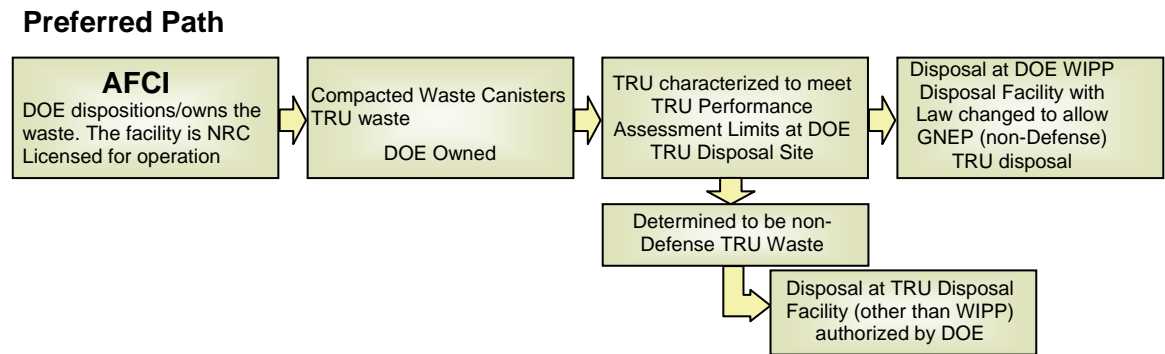
If the Iodine Traps were below the applicable concentration limits for NRC Class A LLW as set out in 10 CFR 61, then a commercial NRC licensed LLW and/or mixed LLW disposal Facility such as Energy Solutions, Utah, could dispose of this waste. Since the Iodine Traps are not expected to meet the Class A concentration limits, it is expected that a DOE LLW facility such as NTS would be required to dispose of this waste. However, the mixed waste permit for NTS for the disposal of mixed waste would need to be extended beyond 2010.

RECOMMENDATION: THE AFCI FACILITIES’ WASTES SHOULD BE DISPOSITIONED AND OWNED BY DOE

The AFCI Facilities’ wastes should be dispositioned by the DOE. Therefore the waste will be DOE owned waste and managed in accordance with DOE Order 435.1, “Radioactive Waste Management”. AFCI could be licensed by the Nuclear Regulatory Commission (NRC) or operated by DOE, but the waste should be DOE owned waste. There are alternative ways to achieve this assumption, such as allowing the waste to be generated from an NRC Licensed facility that is owned by a commercial company, however, the responsibility for the wastes should remain DOE’s responsibility.

Diagram 1.0

AFCI Facilities Waste should be dispositioned by DOE



PUBLIC ACCEPTANCE IS CRITICAL TO SUCCESS

And so, the complexity of the problem of waste disposal is discussed in some detail above. The public acceptance of the fact that the problem can be dealt with in an environmentally friendly manner is absolutely critical to the ability of the government to complete and operate the AFCI Facilities. How should this be done? It is not likely that any overnight solution is ready to be put in place. A very carefully thought out public involvement program must be designed and put into place. This effort is just as important as the technical solutions, design, construction, and operation of the facilities. A possible way forward would be to design the public involvement program after the DOE Citizens Advisory Boards public involvement programs. In this design AFCI could set up AFCI Citizen Advisory Boards with Committees to deal with each aspect of the program including the waste disposition. Public membership could include people from all walks of life and the group could have advisors from Regulatory bodies such as State Regulatory organizations, the Environmental Protection Agency, and Universities.

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 Radioactive Waste 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 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. In addition the South Carolina Department of Health and Environmental Control (SCDHEC) and the Environmental Protection Agency Region IV (EPA) personnel are represented at the CAB meetings as Ex-Officio Members. Of course this brings the opportunity to have the regulators involved in the discussions of the various SRS issues.

The methodology for public input has been provided through the CAB and the CAB's agreed bylaws that require a response from DOE along with reports of progress to resolve issues associated with a recommendation.

The key to successful public involvement at the Savannah River Site (SRS) has been and continues to be vigorous, up-front involvement of the public, federal and state regulators with technical experts. The SRS Waste Management Program includes all forms of radioactive waste. All of the decisions associated with the management of these wastes are of interest to the public and successful program implementation would be impossible without including the public up-front in the program formulation. Serious problems can result if program decisions are made without public involvement, and if the public is informed after key decisions are made.

The regulatory and public involvement program and their effects on the decisions concerning the disposal at the Savannah River Site (SRS) of LLW have been critical to nuclear waste management success. The most cost effective disposal alternated is to use the onsite LLW disposal facility in E-Area. The E-Area LLW Facility is owned and operated by the Department of Energy (DOE) under its authority granted by the Atomic Energy Act of 1954, as amended. Since the disposal of CERCLA generated waste is also governed by the Environmental Protection Agency (EPA) CERCLA regulations, it is important that EPA, DOE, and the South Carolina Department of Health and Environmental Control (SCDHEC) work

together to resolve any conflicts in implementation of the D&D program so that all regulations are followed and the program can be continued successfully.

Low-level radioactive waste (LLW) disposal practices at SRS evolved from disposal in robust concrete vaults, without modeling long-term performance. Now, based on an assessment of long-term performance of various waste forms and methods of disposal, the LLW disposal program allows for a "smorgasbord" of various disposal techniques and waste forms, all modeled to ensure long-term performance is environmentally sound.

New disposal techniques include components-in-grout, and trench disposal of extremely low activity waste. Additionally, factoring partition coefficient (Kd) measurements based on waste forms has been factored into performance models. Approvals from the South Carolina Department of Health & Environmental Control to dispose of LLW with lead shielding and counterweights opened another avenue to cost effective, environmentally sound LLW disposal.

An extensive public communications effort resulted in endorsement of the changes by the SRS Citizens Advisory Board that was critical to the success of the program. The discussions and negotiations with the South Carolina regulators and EPA were conducted in full view of the public and as such, an informed decision as to resolution included the public interactions

THE PUBLIC INVOLVEMENT PROGRAM FOR AFCI SHOULD BE DESIGNED AFTER THE DOE CITIZENS ADVISORY BOARDS

This could be the key or certainly one of the keys to success of the AFCI efforts. And this would surely spur on the Nuclear Renaissance. If the AFCI program does not decide how to implement and carryout a successful public involvement program, it is doomed to fail no matter how excellent the technical decisions are made. The recommendation made here is to install a public involvement program designed after the DOE Citizens Advisory Boards. This program should be installed as soon as possible.