



SRS Citizens Advisory Board

Environmental Remediation & Waste Management Subcommittee

**Meeting Record
February 20, 1996
Augusta, Ga.**

The ER&WM subcommittee of the SRS CAB met at 5:00 p.m. on Tuesday, February 20, 1996 at the Sheraton Augusta Hotel, Bobby Jones Expressway and Wheeler Road, Augusta, Georgia.

Subcommittee members present included Bill Lawless and Kathryn May, subcommittee co-chairs, and P.K. Smith. Roddie Burris attended from the Aiken Standard (see attached article). DOE-SR representatives included John Geiger, Charlie Anderson, Larry Ling, Karen Poore, Dale Ormond and de'Lisa Bratcher. Bratcher attended as the Associate Deputy Designated Federal Official (ADDFO). WSRC representatives included Mary Flora, Kelly Way, Bill Boettinger, Marilyn Garcia, Cliff Thomas, Anne Roe, Joe D'Amelio, Mark Barlow, Pat Nakagawa, Kevin Reed and Vlad Cleat. Members of the public attending included Bob Newman, Gloria Gentry, Lincoln Mitchell, Warren Hills Sr., Lee Poe and Walt Joseph, CAB facilitator. Monika Fraley and Paul Krumrine attended from the Waste Policy Institute. Ervin Fenyves, Tom Carleson and Leo Baetsle attended as panelists on the Blue Ribbon Review board.

Kathryn May opened the meeting, welcomed everyone and attendees introduced themselves. May reviewed CAB Recommendation #4 dated 3-28-95 and pointed out that item #4 of Recommendation #4 (ISPR review of DOE TRU waste repackaging plan) was already executed. Item #2 of Recommendation #4 (Blue Ribbon panel of experts to review TRU treatment and waste form options) would be dealt with at this meeting.

Charlie Anderson, DOE-SR, in response to a previous subcommittee request to look at Independent Scientific Peer Review (ISPR) work in High Level Waste (HLW), opened the topic of ISPRs for HLW initiatives. DOE submitted additional materials at this meeting that illustrate what has been done in the way of ISPRs for HLW. Anderson referenced a Fiori letter asking the subcommittee for clarification of the desired ISPR criteria and asking if what has already been done in the way of ISPRs for HLW is sufficient to satisfy the subcommittee. Bill Lawless responded that the ISPR criteria is simply a guideline, not a formal motion or criteria. Lawless acknowledged receipt of the materials, provided by Karen Poore, DOE-SR, on ISPRs for HLW and stated that since some new information was just received at this meeting from Poore, time would be needed for the entire subcommittee to properly review all of the information and participate in a response. Bob Newman, a concerned citizen, asked who paid for the ISPRs and challenged the "independence" of such reviews if DOE was paying the bill. He also indicated that this discussion could have taken place between DOE and the CAB in a teleconference. He

stated that the agenda and a letter received in the mail misled him, since they indicated the DWPF ISPRs would be discussed.

Lawless pointed out that the agenda item had been planned to initiate an informal review of the question posed by Mario Fiori, which was what was being done. Nothing further had been planned. Discussion concluded with the agreement that DOE will (1) provide to the subcommittee a map or synopsis of HLW ISPR recommendations made in the recent past, (2) identify specific actions taken in response to those recommendations, (3) identify any holes that may need to be checked and (4) present future plans. A copy of the HLW ISPR information provided at this meeting by DOE was requested by and is being sent to P.K. Smith, Lee Poe and Bob Newman. (Sent out 2-23-96)

John Geiger, DOE-SR, opened the next topic, Evaluation of Organic Treatment and Stabilization Options for Transuranic Wastes at SRS Draft Report prepared by an independent Blue Ribbon Panel (BRP), introduced members of the BRP, Dr. Ervin J. Fenyves, Dr. Thomas Carleson and Dr. Leo Baetsle, and reviewed the credentials of each member panelist. The chairman of the BRP, Dr. William Seeker, could not attend this meeting but will be present for the Panel's presentation to the entire CAB. Geiger noted that a Thermal Treatment Systems Study Peer Review on TRU waste was held in Dallas prior to the BRP review and pointed out that three-fourths of the BRP members participated in both ISPR groups.

Dr. Ervin J. Fenyves, Professor of Physics, University of Texas, Dallas, Texas began the presentation of the Evaluation of Organic Treatment and Stabilization Options for Transuranic Wastes at SRS (see slide presentation attachment). Fenyves began by noting that the question of treatment options for SRS TRU waste is not a new one -- in 1977, a report, "Development of an Integrated Facility for Processing TRU Elements Solid Waste at Savannah River Plant" was authored by Savannah River Laboratory personnel.

This report, 20 years ago, basically reached the same conclusions that the BRP arrived at, with some technical differences and some differences in the fixation of the waste. Fenyves also stated that in 1977, there were approximately 300,000 curies at SRS and today, there are 550,000 or more curies at SRS. The current charge to the BRP was to evaluate the organic treatment and near term suitability options (non thermal and thermal) for TRU mixed wastes; evaluate the stabilization and near term suitability options for TRU wastes; and recommend the optimal treatment method for SRS TRU mixed wastes.

Evaluation data for the BRP recommendations and draft report included the integrated Thermal Treatment Systems Study Review, the Vitrification Peer Review, meetings with DOE, WSRC and CAB, tours of waste storage areas, the integrated Non Thermal Treatment Systems Study Review, selection of technologies for further evaluation, development of technology criteria, evaluations of technologies in each criteria and evaluation of integrated systems. Criteria used by the committee to evaluate technologies, in order of priority, were applicability/maturity, environmental impact, worker health and safety, process performance and cost.

The advantages, disadvantages, potential flaws and major concerns for each waste treatment system were identified with respect to these criteria. Other considerations included the uncertain

status of WIPP and stakeholder concerns. SRS is currently managing 9194 cu-m as TRU waste on concrete pads and 4911 cu-m of the waste is expected to be TRU or mixed TRU waste. This waste is contaminated with Pu238 and Pu239 isotopes. A significant amount of this is contaminated with the very active Pu238 isotope and there is a need to treat the SRS high activity mixed TRU waste. Fenyves challenged DOE to expeditiously address the TRU waste issue before potential drum leakage or acts of nature lead to serious consequences.

Dr. Thomas Carleson, Professor of Chemical Engineering, University of Idaho, Moscow, Idaho, presented next and listed the non thermal and thermal pre-treatment processes that were evaluated.

Non thermal processes evaluated included:

- Catalytic wet oxidation - low temperature chemical oxidation in solutions using acids and catalysis (A demonstration of this process at SRS and at Weldon Springs, Mo. is being funded by the Office of Technical Development-DOE, over the next few years.)
- Mediated electrochemical oxidation - moderate temperature oxidation in water solutions using acids and catalysis with electrical recovery of catalysts
- Bulk metal decontamination - high pressure water or steam or detergent cleaning of large open metal parts
- Washing - agitation in washing machine to remove surface organics
- Acid digestion - moderate temperature oxidation using powerful acids (There is an active research program at SRS on the acid digestion process.)

Decontamination is recommended for bulk metals. Carleson stressed all of the non thermal processes are pre-treatment and will not, by themselves, solve the TRU waste problem. They will not produce a product that can be put at WIPP or put into the ground.

Thermal processes evaluated included:

- Incineration - pre-treatment - high temperature combustion of organic wastes
- Joule melter vitrification - ash from incineration - passing electricity through non-conductive waste to melt it
- Plasma torch melters - total process - generating very high temperature gas to burn and melt the waste
- DC arc melters - total process - melting the waste by creating an electrical arc across graphite electrodes
- Hybrid plasma/induction melter - total process - combining plasma and induction melting in a single system (There is an active program at SRS on this process and it appears SRS will purchase a melter from the Russians.)

To illustrate a non thermal process, Carleson reviewed the catalytic wet oxidation process with conclusions being that this pre-treatment process is still in laboratory development, is 10-15 years from commercialization, is not sufficiently mature to allow design and construction of a plant to address the problem of stored mixed TRU wastes at SRS and research in this area should

continue as a potential pre-treatment method prior to melting stabilization or as an alternative technology if permitting does not allow incineration or plasma processes.

Carleson opened the floor for questions. P.K. Smith questioned the thoroughness of the draft report's technology reviews. Carleson responded that over 200 technology treatments were reviewed, extensive studies were evaluated and that the Panel looked beyond what SRS may have looked at. Smith suggested that the Panel's report should more accurately reflect the extent and thoroughness of the Panel's review. Bill Lawless asked what the comparative releases are between incineration vs. non thermal. Carleson responded that it is a trade-off; catalytic wet oxidation doesn't achieve volume reduction (it produces more solid waste than it starts with) and there is the potential of water pollution. Incineration has some release.

Lee Poe pointed out that the type of organics being referred to were not defined i.e. soft debris such as job control waste as opposed to liquid organics. Carleson clarified the referenced organics as soft debris or job control waste. Poe then questioned the benefit of destroying organics compared to removing them. Carleson acknowledged that removal of transuranics did not necessarily solve a problem but converts it from one form to another form. A discussion ensued concerning the viability of the Waste Isolation Pilot Project (WIPP), WIPP waste acceptance and treatment criteria, separation of organics from inorganics, TRU transportation and packaging logistics and certain problems that Pu238 and Pu239 present. Poe suggested, and all agreed, that the emerging technical-specific conversation be continued separately between the interested individuals.

In summary of the non thermal processes, with the exception of bulk metal decontamination, Carleson stated that these processes are not far enough along to result in implementation within a 10-15 year time frame, there is significant research and development required, these are only pre-treatment processes and preliminary cost information indicates that these processes are two to three times the cost of thermal processes.

Dr. Leo Baetsle, Counselor to the General Management, Nuclear Research Center, Belgium presented an overview of the thermal processes. Incineration, a process not looked at in peer review meetings held recently in Dallas (thermal methods) and Phoenix (non thermal methods), was introduced into the SRS study in order to evaluate a mature technology that could treat Pu238 within five to ten years. After a thorough review of incineration as stated against evaluation criteria, Baetsle offered the conclusion that incineration, followed by vitrification, is the best system to treat SRS TRU waste in the most expeditious manner; that ashes can be kept safely in controlled circumstances with little threat to the environment while awaiting final disposition at WIPP; that environmental and worker safety issues have been addressed and resolved at other installations; and that it may be possible to adapt and use existing incineration and vitrification facilities at SRS. Incineration, followed by vitrification, is the Panel's first choice technology for TRU waste treatment at SRS.

Following this recommendation, Baetsle briefly reviewed other thermal technologies as stated against evaluation criteria. Highlights include:

- Vitrification - organics must be pre-treated prior to vitrification; used mostly for high level waste; a homogeneous feed is necessary; experimental data and specific cost factors are not available for mixed TRU waste
- Hybrid Plasma Induction Melter - combination of a plasma torch and an induction heating furnace; solves in one step incineration and vitrification; potentially good but it is at bench scale; SRS will purchase a laboratory pilot installation melter from the Institute of Chemical Technology in Moscow; research and development should be pursued to have an alternative for the very highly contaminated wastes that form only a fraction in volume of the total mixed waste SRS inventory; differences in Russian and United States safety cultures call for a very cautious approach
- Plasma Torch Melter - premature technology for solving SRS problem; now in bench scale
- Arc Melter - used extensively in the metallurgical industry; premature technology in nuclear industry; continue research and development because this process can melt almost everything and offers very promising results in pilot scale units with surrogate materials

Baetsle presented a summation of treatment system components. The components which must comprise the treatment system include characterization, segregation, size reduction and homogenization, organic separation and destruction, residue stabilization, air pollution control, water pollution control and monitoring, and control systems.

Baetsle presented a summation of the Panel's recommendations for treatment of SRS TRU waste:

1. Characterization of the situation in and around the TRU waste drums to assess degree of confinement and integrity
2. Start with selective removal of drums with highest Pu238 contamination and transfer drums to dry storage area
3. Use process knowledge, waste management records and additional non-intrusive characterization to characterize physical, chemical and radiological properties of drums and segregate waste into treatment classes (bulk metals, combustibles, non combustibles, etc.)
4. Use decontamination techniques for treatment of bulk metals
5. Start a project for incineration of drums with organic waste content (80 percent) of inventory
6. Alternatively, a calcination process could be used for organic removal for materials that do not have high levels of organic content
7. After constructing incinerator or calciner, a treatment campaign of excavated drums could start
8. Ashes could be safely stored on site at SRS until the WIPP facility becomes operational
9. If WIPP does not become available, a Joule melting project should be set up leading to design and construction of an industrial melter
10. Vitrification of ashes could lead to a waste form that is compatible with on site storage and perhaps disposal if only Pu238 waste is taken into account
11. Hybrid vitrification is one technology, which after further development, will be capable of treating the highest Pu238 contaminated waste at SRS

This concluded the Blue Ribbon Panel's presentation on the Evaluation of Organic Treatment and Stabilization Options for TRU wastes at SRS. General questions and discussion followed.

Lee Poe called for a differentiation between incineration and calcination technologies. Poe said each technology i.e. incineration vs. calcination and the specifics of each technology should be

detailed to eliminate confusion. Poe stated this was an important point to go beyond number five and number six of the Panel's recommendations. Poe also pointed out that treating SRS TRU waste successfully could result in the waste being kept at SRS, and he did not want TRU waste kept at SRS. Poe noted that successful treatment of TRU and glass waste forms of TRU through vitrification do not force DOE to dispose of TRU at the WIPP facility.

Baetsle responded that incineration is only a first step that solves an immediate problem and is not intended as a solution. Likewise, vitrification is not a final solution.

Cliff Thomas voiced concern regarding ash and water absorption. Baetsle agreed that TRU must be kept dry and away from moisture. Discussion on the absolute necessity for SRS to treat its TRU waste before sending it to a repository, the incineration process, incineration technology and potentially very high costs associated with incineration of TRU waste ensued. Thomas expressed concern regarding incineration system cost, estimating the cost of a TRU waste shredder at \$200M, another decontamination facility at \$200M and another incinerator at \$200M -- given tightening budgets, incineration may be cost prohibitive.

Thomas stated a system that can treat 55 gallon drums, without opening TRU drums up, is needed. Baetsle agreed that a facility should be able to treat whole drums and TRU waste segregation should be administrative (not intrusive) and use digital radiography. Thomas raised criticality issues, citing potential accumulation of Pu in an incinerator. Drum geometry must prevent accumulation in order to prevent criticality and the incineration facility must be designed to consider nuclear criticality as well as everything else.

Tom Carleson mentioned the Pit 9 pilot project at the INEL site in Idaho Falls. The Remote Waste Management Complex there has been storing Rocky Flats waste. The Pit 9 project will remediate 600 lbs. of waste and 8000 lbs. of soil or 250,000 cu.ft. for approximately \$180-200M. The \$180M contract includes both the retrievable facility to excavate the waste to segregate it based upon size and, also, a plasma torch facility to melt the waste -- total treatment for about \$200M. This project is under construction and Carleson stated he thought work would begin by August, 1996.

Specific written comments responding to the Panel's draft report will be sent to the Waste Policy Institute via Mary Flora by March 1. The Panel's final report is due by the end of March. The ER&WM subcommittee will prepare and present a motion to the full CAB in March.

Lawless identified concerns and important questions for DOE:

- Cost of treatment technologies
- Construction of a centralized facility - SRS and Los Alamos would be considered
- Pilot facility vs. industrial facility - an industrial facility could process waste in five years; can any site transport to WIPP; does a central facility work; or is one required at each site
- SRS does not want to be the ultimate disposal facility for all DOE complex TRU waste; motion must clearly reflect an SRS site facility
- Status of the alpha waste incinerator; is a conversion possible, similar to conversion of the beta-gamma incinerator

- Explore Duratech melter/conversion
- Question of chemistry of the ash

- Is incineration and vitrification in one facility ideal
- Can ash go upstream from DWPF or the Canyons

Baetsle commented on the ash issue. He stated that a feed system is not available for ashes. Study and design work are needed to see how ashes can be vitrified. The first option is for the ashes to go to WIPP, and vitrification is recommended only if WIPP is not an option. Grouting the ashes is not an answer. Lawless noted that the residents of Carlsbad, N.M. may not like the ash coming to them.

Katherine May introduced a draft motion on the treatment of TRU wastes at DOE-SRS. May read a excerpt from the Blue Ribbon Panel's recommendation, presented a slide of treatments with ratings ranked against criteria as understood by the ER&WM subcommittee, requested the Panel to give an assessment of chart rankings and presented a flow diagram, prepared by the subcommittee, of the Panel's recommendations. A mistake on the flow diagram matrix was pointed out by a member of the Blue Ribbon Panel and May said the slide would be revised.

Bill Lawless presented the first draft of a formal motion (see attached, latest revision of draft) that will be distributed for feedback and then presented at the full CAB meeting in March.

Warren Hills, Sr. stated that DWPF must go on-line, TRU waste should be treated and the accelerator project is necessary. Hills pointed out that the construction trade and construction labor provide maintenance on these facilities and something needs to be done now. Hills called for DOE to loosen up funding.

With no further discussion, Lawless and May adjourned the meeting.

Attachments:

- Savannah River Site Citizens Advisory Board, Recommendation No. 4, March 28, 1995
- August 18, 1995 letter from Mario Fiori to Mildred McClain, Subject: Transuranic (TRU) Waste Management Plan of the Waste Management Environmental Impact Statement
- Waste Policy Institute Blue Ribbon Panel commission announcement
- Charge to the Blue Ribbon Panel on Savannah River TRU Waste Treatment and Waste Form
- Agenda, February 20, 1996, ER&WM subcommittee meeting
- February 20, 1996 letter from Karen Poore to William Lawless, Subject: HLW Independent Scientific Peer Reviews
- "An Independent Panel Evaluation of Organic Treatment and Stabilization Options for Transuranic Wastes at the Savannah River Site"
- Blue Ribbon Panel's Report - "Draft - An Independent Panel Evaluation of Organic Treatment and Stabilization Options for Transuranic Wastes at the Savannah River Site"
- "Wastes Called Urgent" by Roddie Burris, Aiken Standard, Friday, February 23, 1996
- Estimated cost data for CAB Recommendation #4 , ISPRs

- ER&WM subcommittee draft motion: Treatment of Transuranic Wastes at DOE-SRS

Note: Meeting attachments may be obtained by calling the SRS CAB toll free number at 1-800-249-8155.