

October 19, 2005

MEMORANDUM TO: John T. Larkins, Executive Director, ACRS/ACNW

FROM: Michael T. Ryan, Chairman, ACNW /RA/
Allen Croff, Vice Chairman, ACNW /RA/
Latif Hamdan, Senior Staff Scientist, ACNW /RA/

SUBJECT: ACNW'S SITE VISITS TO DOE'S SAVANNAH RIVER PROCESSING WASTE FACILITY AND THE BARNWELL LOW-LEVEL WASTE SITE IN SOUTH CAROLINA

Three ACNW members and four ACNW staff members visited the U.S. Department of Energy's Savannah River Site (SRS) on August 10, 2005, and the Barnwell low-level waste site on August 11. The ACNW team was accompanied by the Director of the Division of Waste Management and Environmental Protection in NRC's Office of Nuclear Materials Safety and Safeguards (NMSS) and a representative of Clark County, Nevada. The trip participants are listed in Attachment 1. The site visits were quite informative and useful and gave the Committee members a first-hand perspective on the issues associated with these sites.

SRS Visit

Purpose

The purpose of this site visit was to obtain information on the SRS facilities and operations and prepare advice to the Commission on a standard review plan (SRP) for waste determinations currently under development by the NRC's NMSS staff. Information from the SRS visit may also be used to identify the waste determination activities to be included in the ACNW action plan for FY 2006.

Scope of the SRS Visit

The SRS site visit included a tour of the SRS facilities and onsite briefings on SRS operations (see the agenda in Attachments 2).

The tour included the following SRS facilities:

- F and H tank farms
- the Saltstone production facility and disposal vaults (Z Area)
- the Defense Waste Processing Facility (DWPF) (S Area)

- the nonradioactive facility for testing waste retrieval equipment (TNX Area)
- a drive-by of the site for the Mixed-Oxide Fuel Fabrication Plant (MFFP).

The onsite briefings included overviews of tank waste management and the MFFP facility, waste retrieval technology, the TNX tank mockup, waste processing, sludge washing, waste disposal in saltstone, tank closure by filling with grout, separation of cesium, actinides, and strontium, and the status of the MFFP.

The SRS visit was graciously supported by SRS staff representing the U.S. Department of Energy's Office of Savannah River Operations (DOE-SR) and Office of Fissile Materials Disposition, National Nuclear Security Administration (NNSA-SRS), and the Westinghouse Savannah River Company (WSRC) (Attachment 3 provides a complete list of SRS staff who supported the site visit).

Notes and Observations from the SRS Visit

1. Waste Determinations:

- Two of the 51 large underground tanks at SRS were closed under earlier regulations and 49 remain to be closed under current regulations. Bundling waste determinations for several tanks is efficient but has some disadvantages: if there is a problem with one tank, the entire determination could be rejected. The site staff indicated that a final decision on bundling had not been reached, and that waste determinations would likely be submitted for one or two tanks at a time based on programmatic risk considerations.
- Tank farm space currently available for salt waste processing is diminishing and, based on current practice, is projected to run out by 2008.
- Waste compatibility is an issue because it affects the waste transfer to tanks with available space.
- The timing of waste determination is an issue. Submitting a waste determination before cleanup is obviously efficient, but presupposes the extent of and may compromise the determination if adequate retrieval is not achieved.
- The current DOE thinking is to have a generic waste determination for piping and valves.
- The current DOE thinking is to have separate waste determinations for small facilities such as facilities for interim processing of tank waste, evaporators, and DWPF.
- Filling the DWPF with grout is the baseline closure option.

2. The Class C boundary is still important at SRS:
 - It is a self imposed (DOE-imposed) limit in the saltstone waste determination.
 - It is embodied in the compliance agreement with the State: no Greater Than Class C (GTCC) waste.
 - The disposal method for GTCC waste requires consultation with the NRC. DOE is unsure about the implications and concerned that it is tantamount to a license application for a new LLW disposal facility. DOE is against this outcome. The SRP should provide guidance on how consultation with NRC on GTCC disposal will be implemented.
3. There is an emphasis on technologies to reduce source terms (materials remaining in tanks and adjacent spaces). New pumps, cleaning tools, and material removal strategies have been tried and matched to details of tank construction and arrangements. These technologies seem to have performed well so far, but more challenging tanks have a “forest” of vertical cooling coils.
4. Monitoring and performance assessment models were being coordinated. The SRS staff has studied records and environmental data as a guide to future waste management strategies and has mined site-specific data to support predictions of future behavior.
5. The cleanup of SRS tanks might appear to be relatively straightforward because the tanks have relatively good leak integrity, but significant challenges remain: vertical cooling coils in many tanks, the cleanup of waste leaked to the annulus surrounding many tanks, and the apparent complications of using conventional chemical cleaning techniques.
6. Glass manufacturing: production of HLW glass at the DWPF appears to be proceeding well and to be prepared for current and future waste streams. Though rebaselining of schedules has occurred, there are clear and detailed plans for future activities. The facility itself clearly exhibits careful maintenance. The staff seemed all to have extensive experience with HLW glass manufacturing. The work seemed well coordinated and planned. Such experience is relevant to the NRC's evaluation of planned waste glass production at other DOE sites.
7. Saltstone: SRS is changing from a rectangular array of vaults to independent circular vaults. Circular vaults will be 150 ft in diameter (the same width as rectangular vaults) and have the same height as existing vaults. The rationale is that the licensees can get modular factory construction of modular vaults and reduce cost. The 0.2 Ci/gal limit for the Saltstone facility is based on the dose limits for aereally scattered/dispersed gamma radiation (“skyshine” from the disposal vaults to the employees in the parking lot).
8. Waste Retrieval: Cleanup of Tank 5 is now underway with installation of bulk retrieval pumps. Traditionally bulk retrieval has relied on dissolution and sluicing with mixing pump (aka slurry sluicing pumps) that had motors atop the tanks with long (40 ft) shafts into the tanks. The slurry resulting from mixing was removed with waste transfer (sump)

pumps. The new practice is to use submersible mixing pumps with the motor inserted into the tank. This avoids shaft vibration and bearing problems. Submersible pumps (305 hp) are based on Navy technology and have been tested at TNX. One pump is installed in Tank 5, the other will be installed shortly. Traditional mixer pumps require the construction of supports over the tanks to bear the weight. Submersible pumps do not. SRS estimates that traditional technology would cost \$20M for each tank but that submersible pumps would lower the cost to \$7M amortized over multiple tanks.

9. Cleanup of Tank 16 with coils: This tank contained soluble salt wastes. It is very clean now as a result of using conventional retrieval followed by cleaning with oxalic acid. The retrieval was done in 1979, and the SRS staff has no institutional memory of the extent of retrieval with conventional retrieval (mixer pumps and dissolution) vs. oxalic acid.
10. Oxalic acid issues: Oxalic acid seems to clean residual waste in tanks very well. SRS plans to use oxalic acid in selected tanks. The site staff did not explain how many tanks or how the selection decision will be made. There are three disadvantages of using oxalic acid for cleaning SRS tanks:
 - Selective precipitation of highly enriched uranium.
 - Foaming in evaporator.
 - DWPF has limits on flammable organics in the off-gas stream, and Oxalic acid is claimed by the site staff to contribute to the flammability.
11. Salt-waste-processing facility (SWPF): The facility is presently in the final design phase. Delays are possible because of DOE-wide concerns about radionuclide containment requirements for a seismic event. DOE stated that there are interim processes that can be used to alleviate tank space problems if SWPF were delayed, but that the State would not allow that.

Barnwell Site Visit

Purpose

The purpose of the ACNW visit to the Barnwell low-level waste site was to obtain information on what low-level waste activities should be included in the Committee's action plan for FY 2006 and the priorities. The site visit also updated Committee members and ACNW staff on current low-level disposal technology and practice.

Scope of the Barnwell Site Visit

The Barnwell site visit included a tour of Chem-Nuclear Systems/Duratek low-level waste facilities and a briefing on their operations. The site tour included closed disposal units and operating units, the Chem-Nuclear Systems/Duratek onsite environmental laboratory, adjacent Duratek Consolidation and Services Facility (DCSF), and a "windshield" tour of the Allied General Nuclear Services' (AGNS) nuclear reprocessing plant site (see agenda in

Attachment 4). The onsite briefing provided an overview of the Chem-Nuclear/Duratek operations at the Barnwell site.

Barnwell site issues were also discussed during a lunch with representatives of Barnwell County, including the Barnwell County Administrator, and members of the county chamber of commerce, the county council, and the county Economic Development Commission.

Support for the Barnwell site visit was graciously provided by the Chem-Nuclear/Duratek management and site staff. The State of South Carolina inspector accompanied Chem-Nuclear/Duratek staff throughout the site visit. Attachment 5 lists participants, including Chem-Nuclear Systems/Duratek site staff who guided the ACNW site visit, the state inspector, and the representatives of Barnwell County who discussed Barnwell issues with the ACNW team during lunch.

Notes and Observations From the Barnwell Site Visit

1. The Barnwell site appears to be a well-managed low-level waste disposal facility.
2. Barnwell has the capacity to receive wastes for several decades at current rates of receipt.
3. The State of South Carolina now controls pricing, and the operator is paid a negotiated fee.
4. The future use of the facility is driven by nontechnical decisions (i.e., not by compliance or available space).
5. The facility has operated in a compliant fashion with State inspector approval of each waste shipment that is received for disposal.
6. Both the Chem-Nuclear/Duratek representative and the State inspector indicated that the regulator and the licensee communicate openly and honestly.
7. The community leaders are in favor of expanding the role of the facility to manage LLW. They also indicated that the Chem-Nuclear/Duratek management and staff have been open and honest with the community and is a good corporate citizens.
8. The only notable issue communicated by the site staff is related to the long-term stewardship fund. Barnwell has two stewardship funds. One covers decommissioning and is held by a third-party trustee. The other fund covers long-term institutional controls and is deposited with the State. The decommissioning fund held by a third-party is intact. The long-term stewardship fund was intact a few years ago at \$104M.

However, the impacts of the national economic downturn caused the State of South Carolina to borrow \$80M from this fund to help the State budget. Since this event a new governor has been elected and has promised that \$25M will be restored this fall. Management of long-term stewardship funds is a likely issue for low-level waste disposal sites.

Attachments:

- 1) Trip Participants
- 2) Agenda for the SR Site Visit
- 3) SRS Participant List
- 4) Agenda for the Barnwell Site Visit
- 5) Barnwell Site Participant List

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**Advisory Committee on Nuclear Waste (ACNW)
U.S. Nuclear Regulatory Commission
Washington, D.C.**

**ACNW's Site Visits
U.S. Department of Energy's Savannah River Site (SRS)
Aiken South Carolina
&
Barnwell LLW Site
Barnwell, South Carolina**

August 10-11, 2005

ACNW Participants

Mike Ryan, ACNW Member

Allen Croff, ACNW Member

James Clarke, ACNW Member

Rich Major, ACNW Staff

Ashok Thadani, ACNW Staff

John T. Larkins, ACNW Staff

Latif Hamdan, ACNW Staff

Larry Camper, NMSS/NRC

Engelbrecht von Tiesenhausen, Clark County, State of Nevada

**Advisory Committee on Nuclear Waste (ACNW)
U.S. Nuclear Regulatory Commission
Washington, D.C.**

**ACNW Site Visit
U.S. Department of Energy's Savannah River Site (SRS)
Aiken, South Carolina
August 10, 2005**

Agenda

- 8:00 a.m. Guests Arrive SRS Badge Office, Building 703-46A
- Met by Bill Pearson, DOE-Savannah River (SR) Waste Disposition; Julie Petersen, DOE-SR Office of External Affairs; and Laurie Posey, SRS Tours Program
- Government Tour Bus Arrives 703-46A SRS Transportation Dept.
- 8-8:30 a.m. Badging and Point-of-Entry Briefing (Laurie Posey)
ACP for Visit: Julie Petersen
- Inspection of Government Vehicle (Wackenhut Services, Inc.
Inspection of hand carried Items as guests board bus
- 8:30 a.m. Depart A Area for F Tank Farm (w/WSI escort to Barricade 9)
SRS General Driveby (Laurie Posey)
- 8:45 a.m. Arrive F Tank Farm for walking tour
(Closed Tanks 17 and 20)
- 9:45 a.m. Depart F tank farm for H Area
- 9:55 a.m. Arrive H Area for Driveby of 3H Evaporator
and 512-S Actinide Removal Project
- 10:10 a.m. Depart H Area for Z Area
- 10:20 a.m. Arrive Z Area for tour of Saltstone Disposal Facility
- 11:00 a.m. Depart Z Area for S Area
- 11:05 a.m. Arrive S Area, Defense Waste Processing Facility (DWPF)
(704-S, Conference Room B)
- 11:15a.m.-
12:30 p.m. Tank Waste Management Overview Terry Spears

The topics are: waste retrieval and technology Acting Assistant Manager

TNX tank mockup waste processing, sludge washing, low-actinide waste disposal asfor Waste Disposition saltstone, tank closures, CS/actinide separation, and the actinide removal process

- 12:30-12:45 p.m. Break (lunch)
- 12:45-1:30 p.m. MOX Briefing Sterling Franks
Director, Office of Fissile Materials Disposition
- 1:30-3:00 p.m. DWPF Overview and Facility Tour Jeff Barnes
DWPF Facility Manager
- 3:00 p.m. Depart DWPF for Driveby of MOX site
- 3:15 p.m. Tour concludes at SRS Badge Office

**Advisory Committee on Nuclear Waste (ACNW)
U.S. Nuclear Regulatory Commission
Washington, D.C.**

**ACNW Site Visit
U.S. Department of Energy's Savannah River Site (SRS)
Aiken, South Carolina
August 10, 2005**

SRS Participant List

U.S. Department of Energy (DOE) Staff

Office of Savannah River Operations Office (DOE-SR):

Doug Hintze
Terry Spears
Carl Everatt
Bill Pearson
Bill Clark
Tony Polk
Julie Petersen

Office of Fissile Materials Disposition, National Nuclear Security Administration (NNSA-SRS)

Sam Glenn

Westinghouse Savannah River Company (WSRC)

Laurie Posey
Ginger Dickert
Steve Thomas
Jeff Newman
Jeff Barnes

**Advisory Committee on Nuclear Waste (ACNW)
U.S. Nuclear Regulatory Commission
Washington, D.C.**

**ACNW Site Visit
Barnwell LLW Site
Barnwell, South Carolina
August 11, 2005**

Agenda

09:30-09:45 a.m.	Arrival
09:45-10 a.m.	Introductions and introductory remarks
10-11:00 a.m.	Site tour
11-11:45 a.m.	Environmental Dosimetry Lab tour
11:45 a.m.-12:30 p.m.	Adjacent facilities tour (DCSF)
12:30-12:40 p.m.	Windshield tour to the AGNS site
12:40-2 p.m.	Working lunch with community leaders
2 p.m.	End

**Advisory Committee on Nuclear Waste (ACNW)
U.S. Nuclear Regulatory Commission
Washington, D.C.**

ACNW Site Visit

**Barnwell LLW Site
Barnwell, South Carolina
August 11, 2005**

Barnwell Site Participant List

Chem-Nuclear Systems/Duratek staff

James Latham (VP and GM)
Vernon Ichimura (Hydrogeologist)
Bill House (VP Regulatory Affairs)
Regan Voit (President)
David Lee (Laboratory)
Curtis Charlton (Security)

Barnwell County Representatives:

Jason Stapleton, Executive Director, Barnwell County Chamber of Commerce
Pickens Williams, Jr., Barnwell County Administrator
Freddie Houston, Chairman, Barnwell County Council
Keith Sloan, Councilman, Barnwell County Council
Jim Kearse, Councilman, Barnwell County Council
Flowe Trexler, Councilman, Barnwell County Council
Marshall Martin, Executive Director, Barnwell County Economic Development Commission

State of South Carolina

Mr. Michael Moore, Section Manager, Radioactive Waste Management, South Carolina Department of Health and Environmental Control