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Ms. W. F. Perrin, Technical Information Officer
U. S. Department of Energy
Savannah River Operations Office
Aiken, SC 29801

Dear Ms. Perrin:

REQUEST FOR APPROVAL TO RELEASE SCIENTIFIC/TECHNICAL INFORMATION

The attached document is submitted for classification and technical approvals for the purpose of external release. Please complete Part II of this letter and return the letter to the undersigned by 01/13/95. Patent clearance, if necessary, is requested and received via direct communications between this office and the DOE-SR Patent Counsel. The document has been reviewed for classification by a WSRC classification staff member and has been determined to be Unclassified.

Jeanne Sellers, WSRC Technical Information Manager

I. DETAILS OF REQUEST FOR RELEASE

Document Number: WSRC-TR-94-100-8 Pub Deadline:
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Department: Savannah River Technology Center

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2 Title SRTC Monthly Reports--August 1994

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C. Contact *(Person knowledgeable of content)*

Name J. M. Ferrell
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Organization Savannah River Technology Center

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WSRC-TR-94-100-S

Savannah River Technology Center

Monthly Report

August 1994

Westinghouse Savannah River Company
Savannah River Site
Aiken, SC 29808

Prepared for the U.S. Department of Energy under contract no. DE-AC09-89SR18035

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Savannah River Technology Center

Monthly Report

August 1994

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Executive Summary

Tritium

- The Functional Performance Requirements (FPR) document for adding a Mini-Manifold to a loading line in the Replacement Tritium Facility was drafted and reviewed by Tritium Projects, Nuclear Materials Processing Department, Tritium Engineering, and Bechtel Design Engineering. The FPR will be issued as an addendum to the Gas Transfer System Facilities of the Tritium Consolidation Program. (page 7)

- A function test was performed with an Acorn unit meeting a milestone to test the manifold by July 31, 1994. All expected hydrogen isotopes were easily detected, which proves that laser Raman can be used for fast gas analyses. (page 7)

- In 1993, the Westinghouse Science and Technology Center was awarded a contract to develop an electrolysis unit to crack tritiated water generated during zeolite bed regeneration. The preliminary development phase is complete. A meeting was held in early August 1994 to determine a path forward for the project. Design of a tritium test unit will be complete in FY 95. (page 7)

- The Equipment Engineering Section is responsible for designing, fabricating, and checking-out secondary containers, UC609 carriers, and internal fixtures. The containers will transport tritium-loaded units from EG&G Mound Laboratory in Ohio to SRS. The secondary containers will be shipped in UC609 shipping containers. (page 8)

Separations

- An explosion in a Separations Facility in Tomsk, Russia led to studies at several DOE sites into the chemistry and conditions causing such an accident. Calorimeter studies and computer modeling of SRS solutions are near completion. The results of this study were presented at a DOE-sponsored meeting in Atlanta on August 17, 1994. The information was well received and a final report is being prepared. (page 9)

- SRTC completed testing of a deformed plutonium oxide storage can from the FB-Line vault. Tests determined that the deformation was the result of internal gas generation from PVC bag radiolysis, not a mechanical malfunction. Calculations estimated the internal can pressure at 15.0 + 1.5 psig. This completes all studies to be conducted on the storage can and its contents. The report was revised (issue date August 2, 1994) to reflect data collected since the initial report. (page 9)

- HB-Line filled, capped, and seal-welded shipping containers for transporting plutonium-238 . A concern was raised over the use of Type 316 versus Type 316L stainless steel for this application. Testing of a welded shipping container did not show any sensitization or evidence of inter-granular attack. (page 9)

Environmental

- A toxicity identification and evaluation (TIE) study was initiated for the A-001 outfall to determine the source of toxicity that was observed. (This is the first TIE initiated at a National Pollutant Discharge Elimination System outfall.) (page 11)

- In 1991, elevated levels of tritium were detected in groundwater monitoring wells near the K-Reactor seepage basin. Since then, two characterization and monitoring studies were completed to assist in determining the source of the tritium. The data are being reviewed and initial results indicate that a moderator distillation column is a potential source. (page 11)

- The article entitled, "Radiocesium in the Savannah River Site Environment", was published in the Health Physics Journal (*Health Phys.* 67(3):233–244; 1994). This article is an abbreviated version of WSRC-RP-92-250 and discusses the history and environmental significance of radioactive cesium released to the SRS environment. (page 11)

- A recent excavation uncovered extensive petroleum contamination associated with heating oil pipelines near a building in Central Shops. SRTC is working with EPD, BSRI, CSWE, and ERD to provide technical support for this problem. Feasibility studies conducted by ESS, on the leaking underground storage tanks demonstrated the strong bioremediation potential of the soil microbes in the area. (page 11)

- The HOPS team developed and demonstrated a customized HOPS application for modeling process operations at the high-level waste tanks. The application supports data import, export, manipulation, and graphical output from a chemical model of the tanks. (page 11)

- Final analyses, documentation, and technical review of the Justification for Continued Operation for in-tank precipitation are complete. (page 12)

- ESS attended a meeting at NASA's Stennis Space Center, MS to discuss the planning of an experimental hyperspectral small satellite. This joint NASA and TRW program is designed to test the feasibility of and the need for a hyperspectral satellite system. (page 12)

- Representatives from WSRC/SRTC, Oak Ridge National Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratory, and Lawrence Berkeley Laboratory were invited to participate on a peer review panel for a Land Reuse initiative for the City of Antioch, CA. The City owns a former cannery site along the Sacramento River that shows elevated concentrations of soil gases.

Additionally, small areas show elevated levels of petroleum hydrocarbons from leaking underground tanks. The SRTC team developed a proposal for bioremediation of the site using land farming and wetland remediation techniques that may sufficiently reduce costs to make the land reuse initiative feasible. (page 12)

- A Cooperative Research and Development Agreement (CRADA) between ETS and Met One Instruments to develop a fiber optic measurement-based wind vane is being completed. This will be the second CRADA between these organizations. (page 12)

- The Ecological Characterization Report for the Burial Ground Complex was delivered to Environmental Restoration. This report summarizes results from biological surveys of animals, land-cover analysis, and toxicity testing. (page 13)

- Preliminary conclusions (SRT-ESS-94-690) regarding the oxidation of Fe(II) and Mn(II) following release from Par Pond into Lower Three Runs were received. The conclusions are that oxidation rates of these metals are too slow to allow significant oxidation prior to their entering Lower Three Runs. (page 13)

- The third round of sampling of the wetland downgradient from the 643-E (the Old Burial Ground) facility was completed in August 1994. (page 13)

- Soil from the tree-kill area downgradient from the F- and H-Area seepage basins were tested for toxicity using the lettuce seed protocol. Preliminary results indicate that toxicity may be slightly reduced from previous years. (page 13)

- The December 1993 and March 1994 reports summarizing the results of tritium sampling at the F- and H-Area seeplines are complete and were distributed. ESS recommended that the frequency of these surveys be reduced in FY 95 and Environmental Restoration (ER) concurred. (page 13)

- ER provided funding to test the mobile bioreactor at TNX. Well water from TNX contaminated with TCE will be treated with the system under various treatment scenarios. (page 14)

- To support groundwater remediation efforts in the "southern sector" of M-Area, ER requested that ESS conduct an aquifer test of well MSB 88C. The test is scheduled to begin during the week of September 19, 1994. The Aquifer Test Plan and the Erosion and Sediment Control Plan are complete and approved. (page 14)

- Five newly installed recovery wells in the northern sector of the A and M Areas were tested to determine well pumping capacities and to obtain preliminary estimates of hydraulic parameters. This system will become part of the larger remediation system in A and M Areas and contribute to the long-term remediation of the trichloroethylene groundwater contaminant plume. (page 14)

- A relatively fine-scale three-dimensional flow model of the Old Burial Ground was constructed and calibrated. Initial particle traces suggest preferential pathways for contaminant transport consistent with field observations. (page 14)

- SRTC is assisting ER Engineering in vendor and site acceptance testing of four commercial soil vapor extraction (SVE) thermal catalytic offgas treatment units to be used as part of the A and M-Area vadose zone remediation project. Work will include inlet and stack gas sampling for chlorinated organics to determine the catalyst's conversion efficiencies. In addition, assistance will be given on evaluating and operating of new online monitoring equipment. (page 14)

- MAXIGASP output was modified to allow the display of maximum individual dose for all sixteen sectors. Previously, the dose was displayed for the worst sector. (page 15)

- The project to develop a field deployable tritium analysis system funded under the EM–50 special vendor solicitation began at the Center for Applied Isotope Studies at the University of Georgia. (page 15)

- Support was provided to Idaho National Engineering Laboratory (INEL) and Hill Air Force Base in Utah for barometric pumping remediation studies. Continuous concentration measurements of carbon tetrachloride, chloroform, trichloroethylene, and carbon dioxide were made on one well at INEL for a 24-hour period. The barometric pumping systems, developed by INEL, were installed on these wells and consisted of one-way check valve and pressure and flow measurement instrumentation. The results from the study indicate that barometric pumping is a viable remediation technique for both sites. (page 15)

- The D-Area Coal Pile Runoff Basin will be the location for a demonstration test area for the remediation of metals in groundwater. This demonstration test area will include a demonstration of the magnetic separation technology for remediating metals contaminated groundwater and the EnviroWall barrier technology. The Site Use Permit was granted, a draft Sediment and Erosion Control Plan was issued for review and comment, NEPA documentation is complete, the Hydrogeologic and Geotechnical Projects Program Plan was approved, and an evaluation of the groundwater and soil was conducted to determine the classification of the groundwater and soil versus RCRA regulations. (page 15)

- Site selection for Phase III activities for the Coleman Research Company Data Fusion project was completed in August 1994. B. Van Pelt from ER (EM-40) assisted in selecting of three sites for future work. (page 16)

General

- SRTC prepared 46 Baseline Change Control Packages during FY 94. (page 17)

- Defense Waste Processing Facility canisters use resistance upset welding to seal-weld the plugs in the canister nozzle. Structural analyses were performed to qualify the burst test in place of the shear test called out in ASME B&PV Code, Section IX, to qualify resistance welds. (page 17)

- Guidance for designing and developing sampling plans for non-radioactive hazardous waste before offsite disposal was developed based on Environmental Protection Agency requirements and recommendations as given in US EPA, SW-846, "Test Method for the Evaluation of Solid Waste, Physical/Chemical Methods", and the *SRS Waste Acceptance Criteria Manual*, WAC 3.08, rev. 2. The memo was in support of an award fee item to lift the moratorium for offsite disposal of non-radioactive hazardous waste. (page 17)

- The first of four mixing experts, Dr. A. Etchells (of Du Pont) who was involved in the initial design studies for the mixing tanks, visited SRS in August 1994. Dr. Etchells recommended experiments to better understand mixing mechanisms during low tank levels, better characterize sampling techniques, and find a way to better baffle the tanks to mitigate the vortexing now present. (18)

- A replica of part of the Glass Melter Feed System is being tested in the Thermal Fluids Laboratory. The flow loop was characterized and tests duplicated the frit depletion observed at the Defense Waste Processing Facility Melter Feed Tank. Hardware changes that would reduce or eliminate frit depletion will be tested. (page 18)

- Effluent Tritium Facility personnel are working on a technical program to obtain critical data to benchmark computer codes for establishing the technical basis for dry storing aluminum clad spent nuclear fuel and to determine the heat transfer performance of a dry vault storage system. (page 19)

- DOE Order 1540.2 is among those of special interest to the Defense Nuclear Facilities Safety Board. Sitewide assessment of WSRC compliance with the order and associated Directive of Implementation Instruction from DOE-SR are complete. (page 20)

- Parsons Main, Inc. completed a Fire Hazards Analysis (FHA) draft for Building 773-A (the main SRTC Technical Area Laboratory) and WSRC [Enginerring and Constriction Services Division (E&CSD)-SSS, E&CSD-FPA, and Site Services-LOS), reviewed it with major comments. All E&PD-SSS comments were satisfactorily resolved, and there are no major discrepancies between the new FHA and the original SRTC Safety Analysis Report (SAR) FHA. A final draft, which will incorporate all applicable comments, will be completed in mid-September 1994. (page 20)

- Work on FHAs for Buildings 776-A and 778-A to support the 5480.23 SRTC SAR was initiated and should be completed by late September 1994. (page 20)

- FHA drafts for Buildings 779-A and 777-10A were completed by Parsons Main, Inc. and were reviewed by E&PD-SSS with minor comments. (page 20)

- The preliminary draft of the TNX Area Hazards Assessment Document (HAD), per DOE-STD-1027-92, is complete. The TNX Area is classified as a "Radiological" facility (due to depleted uranium inventories). However, the chemical

analysis provides the bounding analysis. The HAD shows that if the formic acid inventory in TNX can be reduced, the facility hazard classification can be reduced from a "Non-Nuclear, Moderate Hazard" to a "Non-Nuclear, Low Hazard". (page 21)

- Work on the Building 305-A Hazards Assessment Document (HAD) to support the 5480.23 SRTC SAR was initiated per DOE-STD-1027-92. The radionuclide and chemical inventories to be used in the HAD analysis were prepared and validated by the custodian (Site Services-LOS). Preliminary findings indicate that the facility will be classified as a "General Use" facility, provided radioactive calibration sources stored in the building can be considered sealed sources. (page 21)

- Work continues on the new Preliminary Hazard Analysis for the DOE Order 5480.23 SRTC SAR. All walkdowns should be complete in September 1994. (page 21)

- The DOE-HQ Plutonium Vulnerability team issued a draft report of the "SRS Site Assessment Team Report Evaluation", (detailing findings from their July 1994 site visit) for review by the SRS Plutonium Vulnerability task teams. No open issues or findings (opposite SRTC) were identified. The DOE-HQ team determined that five of the six identified SRTC vulnerabilities (from the SRTC Site Plutonium Vulnerability Task Team) should be treated as "issues" (rather than plutonium vulnerabilities) in their report and one vulnerability (SRTC-5, "SED Facility Inventory and Form") should remain a plutonium vulnerability. (page 22)

Progress and Accomplishments

Tritium

W-76 Acorn—Status of "Mini-Manifold" Addition to the Replacement Tritium Facility

W. N. Posey, D. L. Fish, and T. J. Warren

The Functional Performance Requirements (FPR) document for adding a "Mini-Manifold" to a the Loading Line in the Replacement Tritium Facility (RTF) was drafted and reviewed by Tritium Projects, Nuclear Materials Processing Department, Tritium Engineering, and Bechtel Design Engineering for input and recommendations for the manifold design and modifications of the loading line. The FPR will be issued as an addendum to the Gas Transfer System Facilities of the Tritium Reconfiguration Program. Bechtel Design Engineering (of Bechtel Savannah River, Inc.) will have overall responsibility for the Mini-Manifold design, loading line design changes resulting from the manifold addition, and additional connections to the DCS of Building 233-H. The current recommendation by SRTC and Tritium Projects is that Bechtel Engineering subcontract the design, fabrication, and testing of the "Mini-Manifold" to the Equipment Engineering Section of SRTC because of the manifold's small size and EES's capabilities. Installation of the "Mini-Manifold" in the RTF Loading Line, and modifications of the loading line are proposed for completion and operational readiness in June 1995.

Fast Gas Analyzer Development

R. A. Malstrom, J. E. McCarty, M. A. Sanders, E. F. Dyer, W. J. Rogier, and T. J. Warren

The ability to measure gas concentrations in realtime are needed throughout the DOE complex; however, the technology is not commercially available. As part of the DOE reconfiguration efforts at SRS, a laser Raman function test gas analysis system was developed. This system can analyze non-radioactive components and will be used as a prototype for possible installation in the Tritium Facilities.

The system was tested with an Acorn unit, meeting a milestone for testing the manifold by July 31, 1994. During the test, pressure and temperatures were measured 100 times per second; gas concentrations were measured 10 times per second. All expected hydrogen isotopes were easily detected, which proves that laser Raman can be used for fast gas analyses.

Solid Oxide Electrolysis Development

J. H. Scogin

In 1993, the Westinghouse Science and Technology Center (WSTC) was awarded a contract to develop an electrolysis unit to crack tritiated water. Current high temperature fuel cell design forms the technology base used for designing this unit. The technology will reduce the waste

uranium beds generated during zeolite bed regeneration. The contract is divided into three phases:

1. design and fabrication of a single cell
2. single cell testing and tritium test unit design
3. test unit fabrication

Phase 1 is complete. A single cell unit was designed and has entered Phase 2 testing. The final Phase 1 issue was resolved; the ceramic to metal joint using a glass seal will be made using alloy 48.

A meeting was held in early August 1994 to determine the path forward for the project. Representatives from the Westinghouse Science and Technology Center (WSTC) presented the status of the project and proposed options for the test unit design. Senior members of tritium technical management attended, as well as representatives from SRTC, Tritium, Purchasing, and DOE-SR. WSTC agreed to provide additional information prior to selecting a test unit design.

Transfer/Storage Secondary Container

K. Rehberger

The Equipment Engineering Section is responsible for designing, fabricating, and checking-out secondary containers and UC609 fixtures. The containers will be used to transport tritium loaded units from EG&G Mound Laboratories in Ohio to SRS. The secondary containers will be shipped in UC609 shipping containers.

Twelve secondary containers with additional modifications requested by EG&G Mound Laboratory were shipped after cleaning, proofing, and leak testing. Sixty new secondary containers from the vendor were received and delivered to Construction for cleaning.

A modified UC609 carrier was hand delivered to EG&G Mound Laboratory. The carrier size was reduced from 31.0 "to 30.5", based on measurements made on the available UC609 shipping containers. The carrier holds two secondary containers. The carrier is then lowered into a UC609 shipping container. The same modification will be made to five other carriers.

Eleven 3U fixtures with the modifications requested by EG&G Mound Laboratory were shipped. The 3U units are the first to be shipped from EG&G Mound Laboratory to SRS. The 3U fixture supports the 3U unit inside of the secondary container.

Separations

TBP/HNO_3 Heat Measurements by Calorimetry

J. R. Smith and J. E. Laurinat

An explosion in a Separations Facility in Tomsk, Russia led to studies at several DOE sites into the chemistry and conditions causing such an accident. Calorimeter studies are being developed to support computer modeling of the heat produced in process tanks and evaporators containing organic layers of tributyl phosphate saturated with nitric acid.

The experimental portion of the work is complete. The results of the calorimeter experiments show that when there is sufficient water in the organic phase, the organic phase is self-cooled by forced evaporation of the volatile liquids (mostly water) during oxidation. This forced evaporation causes a net cooling of the reaction solution, resulting in both phases (organic and aqueous) cooling down. Experiments and calculations determined the rate at which water and butanol are transferred between the two phases. This transfer is most rapid when oxidation in the aqueous phase produces bubbles that mix the interface between the two layers. The balance between the water loss in the organic phase due to forced evaporation and the transfer rate between the two layers is used to determine the maximum height of organic phase that can be kept cool by a known height of aqueous phase.

The results of this study were presented at a DOE-sponsored meeting in Atlanta, GA on August 17, 1994. The information was well received. A draft report will be issued for technical peer review in September 1994.

FB-Line Storage Issues

R. A. Pierce and J. D. Clark

SRTC completed testing of a deformed plutonium oxide storage can from the FB-Line vault. Tests determined that the deformation was the result of internal gas generation, not a mechanical malfunction. Analyses are attempting to assess the gas-generation mechanism.

These tests clearly demonstrated that gas generation from PVC bag radiolysis and degradation caused the can deformation. Calculations estimated the internal can pressure at 15.0 ± 1.5 psig with a gas volume of 730 ± 10 mL. Gas analyses indicated that the gas contains PVC decomposition products of H_2, CO_2, CO, and H_2O. No HCl or other organics were detected.

Additional results from some dissolved PVC bag samples were received from R. Sigg (ADS). Various pieces of the bag were submitted to quantify variations in chloride content between heavily discolored and slightly discolored regions. The samples were first dissolved in nitric acid using microwave dissolution, and then analyzed using neutron activation. Results from these tests reflect earlier data obtained using an ion selective electrode on the same dissolved solutions and are inconclusive. These tests show little chloride present (0–30 ppm observed vs. 4000–10000 ppm expected), indicating that oxidation of the plastic and loss of the chloride during dissolution probably occurred. The only thing that can be surmised from the data is that the degraded samples were more difficult to digest.

This completes the studies to be conducted on the storage can and its contents. The report issued on June 29, 1994 (WSRC-RP-94-0629) was revised (issue date August 2, 1994) to reflect data collected since the initial report.

Sensitization Studies of Type 316 Stainless Steel EP-61 Shipping Container Welds

J. I. Mickalonis, D. Z. Nelson, and S. L. West

The Materials Technology Section (MTS) assisted the Applied Technology and Special Processes Sections with evaluating plutonium-238 oxide shipping container weld heat-affected zones for susceptibility to intergranular attack. The Electrochemical Potentiokinetic Reactivation test was used to determine the degree of sensitization (DOS). Very low DOS numbers were obtained for all welds tested, indicating little or no sensitization. Based on these test results and conditions

for storage and postulated accidents, intergranular attack in the weld heat-affected zones is of little concern.

Austenitic stainless steel containers are used to transport plutonium-238 oxide powder from SRS to other DOE sites for subsequent processing. These EP-61 shipping containers, fabricated from Type 316 stainless steel and welded with Type 316L filler metal, are designed and qualified to withstand storage conditions and potential accident conditions during transport. These containers are filled, capped, and seal-welded by HB-Line. A test specimen is welded prior to each production run; this test specimen is subjected to destructive metallographic examination.

A concern was raised over the use of Type 316 versus Type 316L stainless steel for this application. The higher carbon grade is more susceptible to sensitization in the weld heat-affected zones, i.e., chromium depletion at grain boundaries due to chromium carbide precipitation. This sensitized microstructure could lead to intergranular stress corrosion cracking under the right conditions of temperature and environment, either from storage or an accident.

MTS was asked to assist the Special Processes Section, Weld Engineering Group with evaluating the shipping containers for sensitization. Samples with large, high heat input welds were selected for sensitization tests from the remains of the destructively examined test specimens. The Electrochemical Potentiokinectic Reactivation (EPR) test was primarily used to examine the weld heat-affected zones. During the test, a potential is applied to a sample in an aggressive aqueous solution to passivate the sample surface by forming a protective chromium oxide layer, the potential is then reversed to break down the oxide layer. The presence of sensitization is based on a characteristic current density and a metallographic analysis of the test sample. A sensitized microstructure exhibits intergranular attack, evidenced by ditching of the grain boundaries. Results are quantitative in that a number can be calculated for the DOS.

Test results did not show any sensitization (low DOS numbers) or evidence of intergranular attack after testing. For comparative purposes, a sample of this shipping container material was intentionally furnace sensitized at 675°C for four hours. The EPR test showed a large DOS and significant attack was seen at grain boundaries. Container fabrication welds were also screened for sensitization using the Oxalic Acid etch test, and no sensitization was apparent. The promising low DOS results of actual welds, coupled with dry storage and relatively low postulated accident temperatures at short times, indicate little concern for intergranular attack in the weld heat-affected zones.

Environmental

Toxicity Identification and Evaluation for A-1 Outfall

W. L. Specht and A. L. Corbly

A toxicity identification and evaluation (TIE) was initiated for the A-001 outfall to determine the source of toxicity that has been observed. (This is the first TIE initiated at an NPDES outfall.) Preliminary results from the Phase I tests suggest that metals are the likely source of the toxicity.

K-Area Groundwater Support

J. Haselow and C. Bennett

In 1991, elevated levels of tritium were detected in groundwater monitoring wells near the K-Reactor seepage basin. Since that time, two characterization and monitoring studies were completed to assist in determining the source of the tritium. The data are being reviewed and initial results indicate that one potential source is a moderator distillation column. A report will be issued by the end of the fiscal year.

Radiocesium in the Savannah River Site Environment

W. H. Carlton, A. G. Evans, and C. E. Murphy, Jr.

The article entitled, "Radiocesium in the Savannah River Site Environment", was published in the Health Physics Journal (*Health Phys.* 67(3):233–244; 1994). This article is an abbreviated version of WSRC-RP-92-250 and discusses the history and environmental significance of radioactive cesium released to the SRS environment. It will serve as a significant reference for those interested in the effect of SRS operations on the environment.

Heating Oil Line Leaks at Central Shops

T. C. Hazen

Heating oil is brought to various Central Shops buildings via underground pipe lines installed in the early 1950's. These lines are fed from a 10,000 gallon underground tank at the Central Shops Diesel Storage Facility. Due to the home heating oil exemption, these lines have not been leak tested. A recent excavation uncovered extensive contamination associated with one of these lines near a building in Central Shops. Given past findings of leaking tanks in the area installed at the same time, it is likely that much of this pipeline may have leaks. SRTC is working with EPD, BSRI, CSWE, and ERD to provide technical support for this problem. This type of petroleum contamination is amenable to bioventing and intrinsic bioremediation. Feasibility studies by ESS on the leaking underground storage tanks demonstrated the strong bioremediation potential of the soil microbes in the area. B. B. Looney showed that reducing petroleum contaminants by soil microbes created soil gas concentrations as high as 75% in some areas above the underground plume. ESS will continue to work with responsible entities to characterize and actively or passively bioremediate, if necessary, the petroleum contaminants in the area.

HOPS Application for Waste Tank Model

J. A. Bowers

The HOPS team developed and demonstrated a customized HOPS application for modeling process operations at the high-level waste tanks. The application supports data import, export, manipulation, and graphical output from a chemical model of the tanks. Using the HOPS compression algorithm, a data file from the modeling algorithm that required 72 megabytes of space in the current configuration required only 2.4 megabytes in HOPS. Total development time for the application was 3.5 person-days.

Subsurface Contaminant Transport Analyses to Support In-Tank Precipitation—H-Area Safety Basis

G. Flach

Final analyses, documentation, and technical review of the Justification for Continued Operation for in-tank precipitation (ITP) are complete. Conclusions from the work are as follows:

- Liquid waste will not seep from the side of the berm, provided the berm remains intact.
- The best-estimate groundwater travel time from an ITP tank to the stream discharge point is about 85 years.
- The long travel time, coupled with contaminant retardation due to strong sorption onto immobile soil particles, means that most radionuclides will decay to an insignificant activity.
- For a postulated 540,000 gallon precipitate leak from Tank 49, the best-estimate 50-year Committed Effective Dose Equivalent (CEDE) to a hypothetical individual living on the Savannah River is about 0.9 rem.
- Practically the entire dose is due to colloidal transport of cesium-137 at the groundwater velocity.
- For a postulated leak of the entire contents of Extended Sludge Processing Tank 51, the 50-year CEDE to an individual is no more than 0.07 rem.
- Most of the dose is from plutonium-239 because of its long half-life.

SRTC Participates in NASA's Small Satellite Program

J. B. Gladden

ESS attended a meeting at NASA's Stennis Space Center, MS to discuss the planning of an experimental hyperspectral small satellite. This joint NASA/TRW program is designed to test the feasibility of and the need for a hyperspectral satellite system. The planning meeting was intended to identify projects for which the satellite data could be used. A variety of governmental, educational, and private sector organizations were represented. The first phase of the project will involve an airborne mission in the Fall of 1994. A second airborne mission will be flown in 1995, with the satellite scheduled for launch in early 1996.

Land Reuse Initiative

B. B. Looney, C. B. Fliermans, E. A. Nelson, V. A. Rogers, and J. B. Gladden

Representatives from WSRC/SRTC, Oak Ridge National Laboratory, Lawrence Livermore National Laboratory, Sandia National Laboratory and Lawrence Berkeley Laboratory were invited to participate in a peer review panel for a Land Reuse initiative for the City of Antioch, CA. The City owns a former cannery site along the Sacramento River that shows elevated concentrations of soil gases (e.g., methane, hydrogen cyanide, and hydrogen sulfide) as a result of disposal and decomposition of cannery wastes. Additionally, small areas show elevated levels of petroleum hydrocarbons from leaking underground tanks. The City has a strong interest in developing this property, but conventional remediation technologies may be cost prohibitive. The SRTC team developed a proposal for bioremediation of the site using land farming and wetland remediation techniques that may reduce costs sufficiently to make the land reuse initiative feasible.

Potential CRADA for Fiber Optic Based Wind Vane

M. J. Parker

A Cooperative Research and Development Agreement (CRADA) between the Environmental Technology Section (ETS) and Met One Instruments to develop a fiber optic measurement based wind vane is in the process of being completed. This is the second CRADA between ETS and Met One currently being approved by DOE. During the discussions for the first CRADA, which will involve improving the aerodynamic performance of the Model 1585 Bivane, Met One and ETS indicated that both parties were interested in developing a fiber-optic based wind vane. ETS is interested in developing fiber

optic-based meteorological devices to combat radio frequency interference and lightning surges, which commonly cause sensor failures. Fiber optic technology would ideally improve several other aspects of meteorological sensors such as:

- increased precision, linearity, and resolution
- fewer moving parts and greater longevity
- low starting threshold
- high signal to noise ratio
- possible application in explosive environments.

Met One will develop a prototype, and ETS will conduct wind tunnel and field tests.

Burial Ground Ecological Characterization Report

G. P. Friday

The Ecological Characterization report for the Burial Ground Complex was delivered to Environmental Restoration on September 12, 1994. This report summarized results from biological surveys of animals, land-cover analysis, and toxicity testing in areas adjacent to the burial ground.

Par Pond

M. E. Denham

Preliminary conclusions (SRT-ESS-94-690) regarding the oxidation of Fe(II) and Mn(II) following release from Par Pond into Lower Three Runs were received.

The conclusions are that oxidation rates of these metals are too slow to allow significant oxidation prior to their entering Lower Three Runs. Thus, it is important to estimate the concentrations of Fe(II) and Mn(II) in Par Pond bottom water to be certain they are below toxicity levels to fish. Methods of estimating these concentrations were discussed.

Sampling of 643-E Wetland Completed

K. L. Dixon

The third round of sampling of the wetland downgradient from the 643-E (the Old Burial Ground) facility was completed in August 1994. Shallow groundwater sampling is being conducted to define the tritium plume in this area and test for the presence of volatile organic compounds in the groundwater.

Toxicity Testing of F/H Area Seepline Soils Completed

E. A. Nelson and H. M. Westbury

Soils from the tree-kill area downgradient from the F- and H-Area seepage basins were tested for toxicity using the lettuce seed protocol. Soils were extracted with water and lettuce seeds were germinated and grown in this water. Preliminary results indicate that toxicity may be slightly reduced from previous years.

F/H Seepline Tritium Reports Completed

V. A. Rogers, K. L. Dixon, and C. L. Cummins

The December 1993 and March 1994 reports summarizing the results of tritium sampling at the F- and H-Area seeplines are complete and were distributed. The June 1994 report is complete and will be printed and distributed in September 1994. The results confirm earlier findings that tritium concentrations continue to decline at the seepline. ESS recommended that the frequency of these surveys be reduced in FY 95 and Environmental Restoration concurred with this recommendation.

TNX Bioreactor Test

C. J. Berry and R. Brigmon

Environmental Restoration provided funding to test the mobile bioreactor at TNX. The test consists of developing a biofilm capable of utilizing methane as their sole carbon energy sources in the trickle filter columns of the two vessels in the system. Well water from TNX contaminated with trichloroethylene will be treated with the system under various treatment scenarios. The efficiency of this system will be compared with a more conventional pump and treat system. An active biofilm was developed on both columns within two weeks of inoculation.

A- and M-Area Southern Sector Aquifer Tests

M. A. Phifer, R. A. Hiergesell, B. W. Pemberton, C. P. May, R. S. Van Pelt, and J. J. Kupar

To support groundwater remediation efforts in the "southern sector" of M Area, Environmental Restoration requested Environmental Sciences Section conduct an aquifer test of Well MSB 88C. The test is scheduled to be conducted the week of September 19, 1994. The Aquifer Test Plan and Erosion and Sediment Control Plan are complete and approved. The site-specific Health and Safety Plan (HASP) is complete and routing for approval.

Testing of New Recovery Wells in Northern A and M Areas

R. Hiergesell, R. Nichols, R. Ridgway, C. May, B. Pemberton, J. Haselow, and R. Van Pelt

Five newly installed recovery wells in the northern sector of the A and M Areas were tested to determine well pumping capacities and to obtain preliminary estimates of hydraulic parameters. These wells, RWM-13B, -13C, -14B, -14C, and -15B, were installed from July through December 1993 and will eventually be connected to the A-2 air stripper. This system will become part of the larger remediation system in the A and M Areas and contribute to the long-term remediation of the trichloroethylene (TCE) groundwater contaminant plume. Well testing was conducted from April through July 1994. Four of the five wells had TCE contaminant concentrations sufficiently high to force containerization of pumped water. Only 2000 gallons, the capacity of the tanker truck that hauled the pumped water to an air stripper, could be pumped during well testing. Additional monitoring of hydraulic responses to pumping will be conducted when they are brought online and pumping continues for much longer periods of time. With the longer pumping periods, better estimates of hydraulic parameters can be made. A draft report of the preliminary testing of these wells is complete and will be issued by the end of September 1994.

Detailed Three-Dimensional Flow and Contaminant Transport Modeling of the Old Burial Ground

M. Harris, P. Thayer, A. Smits, G. Flach, W. Jones, J. Haselow, and L. Hamm

A relatively fine-scale three-dimensional flow model of the Old Burial Ground was constructed and calibrated. The model was developed from a detailed, three-dimensional representation of soil mud fraction interpolated from foot-by-foot core descriptions from over 100 area wells. Recharge to the subsurface from rainfall is varied spatially in the model depending on the exposed soil type. Predicted hydraulic heads match measured heads within a root-mean-square difference of three feet. Initial particle traces suggest preferential pathways for contaminant transport consistent with field observations.

Environmental Restoration Support for Vadose Zone Remediation

T. R. Jarosch, S. A. Burdick, B. Riha, B. Pemberton, C. May, and R. Raymond

SRTC is assisting Environmental Restoration (ER) Engineering in the vendor and site acceptance testing of four commercial soil vapor extraction (SVE–thermal catalytic offgas treatment units to be used as part of the A- and M-Areas vadose zone remediation project. Work will include inlet and stack gas sampling for chlorinated organics to determine the catalyst's conversion efficiencies. In addition, assistance

will be given on the evaluation and operation of new online monitoring equipment. Work on the gas sampling is scheduled to begin in late August 1994 through October 1994.

Two multi-port monitoring well arrays were installed for ER. These wells will monitor soil vapor concentrations and zone of influence from an M-Area vapor extraction system. The well arrays use the sampling port developed by Environmental Sciences Section personnel which has a 1 inch screen connected to the surface by high density poly tubing. The ports are connected with standard 1 inch PVC pipe that provides exact placement of the ports and protection for the tubing. The multi-port array provides depth discrete samples at a lower cost than installing individual piezometers.

Concentration support was provided to ER for functional testing of the catox unit 782-4M near the M-Area seepage basin. The Bruel and Kjaer Model 1302 gas analyzer was used to continuously measure trichloroethylene and tetrachloroethylene concentrations entering the catox unit. The realtime results allowed for the immediate adjustment of the proper air dilution into the unit to prevent exceeding the HCl emissions. The results were also used to determine when system equilibrium was reached for sampling for gas chromatography analysis. The realtime analysis provided rapid system evaluation and increased accuracy of the samples analyzed by gas chromatography.

MAXIGASP Output Modified

A. A. Simpkins and D. M. Hamby

MAXIGASP output was modified to allow the display of maximum individual dose for all sixteen sectors. Previously, the dose was only displayed for the worst sector. The offsite doses and corresponding relative air concentrations are included for the adult only. The changes were verified by inspection with doses that were printed and compared with relative air concentrations from the expanded table. Prior to releasing the new version, test cases were run to ensure correctness.

Remotely Operated and Field Deployable Tritium Analysis System

K. J. Hofstetter and J. E. Noakes

The project to develop a field deployable tritium analysis system (TAS) funded under the EM-50 special vendor solicitation began at the Center for Applied Isotope Studies (CAIS) at the University of Georgia. A task technical plan (TTP) was written for this project for approval by WSRC and DOE management. Equipment (liquid scintillation counter and radiation flow sensor) was ordered by CAIS and the design of an automated sampling and analysis system began. The TAS will integrate well into projects developing realtime tritium detection in aqueous effluents.

Integrated Demonstration Technology Transfer

B. D. Riha and J. Rossabi

Support was provided to Idaho National Engineering Laboratory and Hill Air Force Base in Utah for barometric pumping remediation studies. Continuous concentration measurements of carbon tetrachloride, chloroform, trichloroethylene, and carbon dioxide were made on one well at INEL for a 24-hour period. Four days of continuous Freon 113 and carbon dioxide concentration measurements were made at Hill Air Force Base in Utah. Concentrations were measured using the Bruel and Kjaer Model 1302 gas analyzer. The barometric pumping systems developed by INEL were installed on these wells and consisted of a one-way check valve and pressure and flow measurement instrumentation. The results from the study indicate that barometric pumping is a viable remediation technique for both sites.

Magnetic Separation Demonstration

R. L. Nichols, M. A. Phifer, F. C. Sappington, M. E. Denham, and J. M. Jerome

The D-Area Coal Pile Runoff Basin will be the location for a demonstration test area for the remediation of metals in groundwater. This

demonstration test area will include a demonstration of the magnetic separation technology for the remediation of metals contaminated groundwater and the EnviroWall barrier technology. The magnetic separation technology uses iron particles coated with ion exchange resin to remove contaminants for the groundwater. Then the resin is removed from the water using an electromagnet. The EnviroWall barrier technology will be used to install a 30-foot deep by 300-foot long interceptor well for the extraction of contaminated groundwater.

The following items were accomplished in association with this demonstration test area:

- the Site Use Permit was granted
- a draft Sediment and Erosion Control Plan was issued for review and comment
- NEPA documentation was completed
- the Hydrogeologic and Geotechnical Projects Program Plan was approved
- an evaluation of the groundwater and soil was conducted to determine the classification of the groundwater and soil versus RCRA regulations.

It was determined that the groundwater and soil are classified as non-hazardous according to RCRA.

Data Fusion Program

C. Eddy-Dilek and R. S. Van Pelt

Site selection for Phase III activities for the Coleman Research Company Data Fusion project was completed in August 1994. At the Phase II review meeting in June 1994, we requested that Phase III activities be focused on further work in the A Area in support of the Environmental Restoration (ER) Program. J. Hild from Coleman Blackhawk visited SRS to chose the location for the seismic and Time Domain ElectroMagnetic (TDEM) lines to be collected in A and M Areas during Phase III. B. Van Pelt from Environmental Restoration (EM-40) assisted in the selection of three sites for future work. The first task includes collection of seismic data along the full length of the line where TDEM data was previously collected during Phase II. The second task is collection of TDEM and seismic data along Road 1 in A Area. The target clay is thinner and sandier here due to upgradient facies changes. The third task is of primary importance to ER and includes acquisition of data east of the Savannah River Laboratory seepage basins. This area is poorly understood at this time and a good understanding of this area in important for the further refinement of the A-Area conceptual model.

General

Change Control Status

L. R. Chandler

The following outlines the current status of the Baseline Change Proposal packages developed by SRTC in FY 94:

- forty-six were prepared
- three are routing in SRTC for approval
- one is in Site Change Control
- thirteen were sent to DOE for approval
- twenty-nine were approved by DOE
- twenty-two were entered into the FY 94 Annual Operating Plan electronic database

Burst Test Qualification Analysis of Defense Waste Processing Facility Canister-Plug Weld

N. K. Gupta and C. Gong

Defense Waste Processing Facility (DWPF) canister closure system uses resistance welding for sealing the canister nozzle and plug to ensure leak tightness. The welding group at SRTC is using the burst test to qualify this seal weld in lieu of the shear test in American Society of Mechanical Engineering B&PV Code, Section IX, paragraph QW-196. The burst test is considered simpler and more appropriate than the shear test for this application. Although the geometry, loading, and boundary conditions are quite different in the two tests, structural analyses are performed in an attempt to show similarity in the failure mode of the shear test in paragraph QW-196 and the burst test on the DWPF canister nozzle.

Non-linear structural analyses are performed using finite element techniques to study the failure mode of the two tests. Actual test geometry and realistic stress-strain data for the 304L stainless steel and the weld material are used in the analyses. The finite element model are loaded until failure strains (≈40%) are reached. It is found that the failure modes in both tests are shear at the failure points. Based on these observations, it is concluded that the use of burst test, in lieu of shear test, for qualifying the canister-plug weld is acceptable.

The burst test analysis for the canister-plug weld also yields the burst pressures, which compare favorably with the actual pressures found during burst tests. Thus, the analysis also provides an estimate of the safety margins in the design of these seal welds.

Design and Development of Sampling Plans for Non-Radioactive Hazardous Waste

J. H. Weber

The Environmental Protection Agency requires certain hazardous wastes to be analyzed for physical and chemical properties. To accomplish this, each type of hazardous waste stream must be sampled to ensure that no regulatory thresholds are exceeded. SRS was under a moratorium for disposing of non-radioactive hazardous waste offsite. As part of an award fee item, procedures for developing sampling plans for non-radioactive hazardous waste containers were required. This document outlines the requirements for developing the sampling plan, including the sampling objectives, determining the appropriate sampling methodology, determining the number and size of samples, plus a number of secondary issues, such as composite sampling and sub-sampling. The sampling plan is a written document that includes three major sections: (1) objectives, (2) sampling methodology, and (3) evaluation of data collected. The sampling plan will be developed before sampling and analyzing containers of waste. An example of a sampling plan is described in the memo. Historical data from analyses on previous containers from Radioactive Control Areas (RCAs) and non-RCAs are presented and used to determine the sample size for future sampling from similar waste streams.

Mixing Consultant Visits SRS

M. R. Duignan

The first of four contracted mixing consultants visited SRS on August 30, 1994. Dr. A. W. Etchells, as mixing consultant with Du Pont, played an instrumental role in proposing, studying, and testing the designs of the Defense Waste Processing Facility (DWPF) mixing-tanks in the early 1980s. He visited SRS to obtain a better understanding of the thought process behind the original design and how current mixing problems may be resolved. Attendees obtained an overview to mixing and its theory and a summary of tests performed to develop the DWPF mixing-tank designs. After Dr. Etchells received presentations of design changes that have occurred since his last interaction with SRS in 1985, discussions were made on current mixing, sampling, and pumping problems in the mixing tanks. His verbal assessment was that experiments need to be done to better understand mixing mechanisms during low tank levels, better characterize sampling techniques, and find a way to better baffle the tanks to mitigate the vortexing now present. Dr. Etchells' written report of his visit will be used as a seed document for the next visit of three mixing consultants in September 1994. The mixing experts will be presented with the current problems in view of past and present experiences and they will be required to indicate a path forward to resolve them. The consultants are: D. Leng (Dow Chemical), M. Roco (University of Kentucky and the National Science Foundation), and P. Skelland (Georgia Tech).

Thermal Fluids Laboratory Melter Feed Test

J. L. Steimke, K. H. Rohleder and J. W. Corbett

Shakedown of the Thermal Fluids Lab (TFL) Melter Feed Loop with water in the TFL is complete. The loop was configured like Melter Feed Loop #2 for the shakedown. During shakedown, a small leak at a weld was detected and repaired. The leak allowed air to enter the highest point in the loop where the pressure is less than atmospheric. The performance of the instruments and the data acquisition system were checked, including seven pressure transducers, two magnetic flowmeters, five thermocouples, and a gamma densitometer.

At the conclusion of shakedown testing, the flow loop was drained of water and filled with slurry from TNX containing glass frit. During the first tests with slurry, a large void fraction of air was entrained in the slurry where it sprayed out of the one-inch flow restrictor. The entrained air slowly bubbled to the surface of the slurry reservoir. The entrained air made it difficult to maintain stable pump operation. Therefore, the decision was made to seal the top of the dip tube to the exit of the flow restrictor, making that part of the flow loop like Melter Feed Loop #1. The dip tube now runs full of slurry, air entrainment is greatly reduced, and unstable pump operation is not a problem.

During operation of the flow loop, samples of slurry were collected from the end of the melter feed line and the slurry reservoir. Some of the samples were sent to the TNX analytical laboratory for analysis of iron (sludge tracer) and lithium (frit tracer) as well as other elements, but not enough sample analyses exist to give statistically meaningful results. Additional samples will be sent to TNX. The densities of other samples were measured at the TFL using a 100 mL volumetric flask and a digital scale. Two trends were observed in the densities. First, the densities are increasing with time consistent with evaporating water out of the slurry in the open slurry reservoir. This trend may be compensated with appropriate dilution of the slurry with water. Second, the densities of samples collected at the end of the feed line have about 1.5% lower density than the corresponding samples collected using a grab sampler out of the slurry reservoir, which is analogous to the Melter Feed Tank. This is consistent with a depletion of frit as the feed flow is drawn off the recirculation line at the feed strainer. About the same difference in density was observed at the DWPF Melter Feed Tank. Chemical analyses of those slurry samples showed that a 2% difference in density was accompanied by a 20% difference in sludge to frit ratio.

Feed Loops #1 and #2 and the TFL Melter Feed Loop have a one-inch flow restrictor in the two-inch recirculation line, which generates the pressure that drives slurry through the feed lines to the melter. The measured flow resistance for the restrictors in Feed Loop #2 and the TFL Melter Feed Loop are about the same. Flow Loop #1 restrictor has more than twice the resistance of the other two. The reason for this is not known and is being investigated.

The TFL Melter Feed Loop was fully characterized with the existing feed strainer oriented upward. The feed strainer will be rotated 90° and the loop retested to see if there is less frit depletion; then it will be rotated 180° from its original position. Hardware changes involving one large hole in the strainer rather than 26 0.082" holes will then be tried. The strategy for testing is to quickly scope the alternatives. Then the two most promising alternatives will be more fully characterized.

In the technical literature, some papers that should give good guidance on hardware changes were found. In one paper, the authors ran a 27 wt% mixture of sand and water through a tee. The Melter Feed Loop strainer forms a tee with the recirculation line. The main flow was always horizontal as it is for the recirculation loop in the vicinity of the feed strainer. The branch of the tee was oriented up, sideways, and then down. The weight percents of sand in the branch and main lines were measured. When the branch was up, there was sand depletion. When the branch was down, there was sand enrichment. The branch concentration most accurately reflected the main flow concentration when the branch was sideways. Therefore, they saw an effect of gravity. In another paper, the authors ran a 47 wt% mixture of sand and water through a vertical tee. They tested branches with three different diameters. The larger the diameter of the branch, the more accurately the branch concentration reflected the main flow concentration. Apparently, it is more difficult for the sand particles to make a 90° turn into a small hole than a large hole; this is an inertial effect.

FRR Spent Fuel Dry Storage Development

H. N. Guerrero, D. A. Eghbali, and M. D. Fowley

Integral Canister Test

Construction of the wind tunnel is complete, including installation of the fan. A variable speed controller for the fan was added for air speed control. Parts for the test canister were received and fit-up of sealing parts is being evaluated to determine if the vacuum pressure of 5 torr required by the test can be maintained. Also, anodized parts for three additional MTR mock-ups were received from the vendor; assembly of these components can proceed.

Additional data acquisition cards for the Apple Macintosh computer-based data acquisition system were ordered as replacements for existing cards that exceed drift and scatter specifications for the test. This deterioration in card performance appears to be due to aging. Further, signal conditioning amplifiers for the heat flux sensors were also ordered.

FIDAP Modeling

Several two-dimensional simulations of the spent fuel canister were conducted to investigate the following: the effect of constant and variable heat transfer coefficients along the canister circumference on the temperature distribution inside the canister and the effect of simplifying view factor calculations on the canister heat transfer. Simulations with the three-dimensional model will be resumed upon completion of the mesh generation.

White Paper for Dry Vault Demonstration Project

A White Paper outlining the need for a Dry Vault Demonstration Project is being drafted. The objective is to validate, in the full-scale and prototypic case, heat transfer and materials performance parameters in dry storing aluminum clad

spent fuel, as predicted by laboratory experiments. One dry vault module is adequate to validate normal operating parameters, but if safety issues must also be examined, two or three vaults are needed. The incremental cost of the additional modules can be justified if the intention is to utilize the demonstration vault facility as part of the storage capacity of the full project. Alternatively, safety testing can be performed in a smaller scale in the laboratory.

Sitewide Compliance Assessment of DOE Order 1540.2 and DII 1540.2

T. K. Houghtaling

Procedures governing hazardous materials packaging activities for offsite transport are required and guided by DOE Order 1540.2. Contractor (WSRC) compliance with the order and with the associated DII from DOE-SR is of special interest to the Defense Nuclear Facility Safety Board, along with other safety related orders.

Compliance was assessed sitewide and 20 SRS facilities were affected by the directives. Specific requirements applicable to WSRC were satisfied in large part by the site-level Transportation Safety Manual, 19Q. The manual reduced the need to reference facility-level procedures to meet directive requirements. The work is documented in a Compliance Assessment and Implementation Report in accordance with the WSRC 8B DOE Directives Administration Manual.

SRTC Building 773-A Fire Hazards Analysis

S. P. Tinnes

A Fire Hazards Analysis (FHA) draft was completed for Building 773-A (the main SRTC Technical Area Laboratory) by Parsons Main, Inc. The FHA will be a key support document for the planned DOE Order 5480.23 SRTC Safety Analysis Report (SAR). Simultaneous reviews of the draft FHA (along with confirmatory field inspections) were conducted by E&PD-SSS, E&PD-FPA, and the facility custodian (Site Services-LOS), with major review comments being generated. A subsequent comment resolution meeting was held with all parties attending, and E&PD-SSS comments were satisfactorily resolved. There are no major discrepancies between the new FHA and the original SRTC SAR FHA (WSRC-SA-2, vol. 4, Appendix E, "Safety Analysis Report, SRL Technical Area, Fire Hazards Analysis", approved for interim use, September 1993). A final FHA draft that will incorporate all applicable comments will be completed by Parsons Main, Inc. in mid-September 1994.

SRTC Buildings 776-A and 778-A Fire Hazards Analyses

S. P. Tinnes

Work on Fire Hazards Analyses (FHAs) for Buildings 776-A and 778-A to support the 5480.23 SRTC Safety Analysis Report was initiated and should be completed by late September 1994. Building 776-A, the Liquid Waste Handling Facility, is rated as a Hazard Category 2 facility (DOE-STD-1027-92 criteria). Building 778-A, the Solid Waste Storage Facility, is rated as a Hazard Category 3 facility. The FHA work is being done by the E&PD-SED-C&FA-FPA group.

SRTC Buildings 779-A and 777-10A Fire Hazards Analyses

S. P. Tinnes

Fire Hazards Analysis (FHA) drafts for Buildings 779-A and 777-10A were completed by Parsons Main, Inc. and subsequently reviewed by E&PD-SSS, with only minor comments. The FHAs will be support documents for the projected DOE Order 5480.23 SRTC Safety Analysis Report. Building 779-A was used to conduct laboratory operations supporting the Naval Fuel Program. These operations were terminated and the inventory and equipment were removed from the building. Minor spots of residual uranium contamination remain in the building and it is classified as a Radiological facility (DOE-STD-1027-92 criteria). Building 777-10A is a retired Research Reactor Facility that contained three experimental reactors. Five plutonium-beryllium (Pu-Be) encapsulated sources are still stored in the building. It is expected that the 777-10A

facility will be classified as a General Use facility, provided the Pu-Be sources can be considered sealed sources.

SRTC TNX Area Hazards Assessment Document

J. L. Kelly, S. P. Tinnes, and S. M. Patel

The preliminary draft of the TNX Area Hazards Assessment Document (HAD), per DOE-STD-1027-92, is complete. The HAD will be a support document for the projected DOE Order 5480.23 SRTC Safety Analysis Report (SAR). The TNX Area is classified as a Radiological facility (due to depleted uranium inventories). However, the chemical analysis provides the bounding analysis. The HAD shows that if the formic acid inventory in TNX can be reduced, the facility hazard classification can be reduced from a "Non-Nuclear, Moderate Hazard" to a "Non-Nuclear, Low Hazard". Ten chemicals, in Buildings 682-T, 674-T, 684-T, and 677-T, have maximum inventory levels that exceed the "Low Hazard" classification threshold. Based on these preliminary results, a SAR prepared in accordance with DOE Order 5480.23 would not be required for the TNX Area. However, safety documentation (a safety analysis) would be required in accordance with DOE Order 5481.1B.

Program items are underway for the Design Authority (Site Services-LOS) to validate the chemical inventory used and to consider reducing maximum chemical inventory levels below the low hazard characterization threshold. Also, consideration is being given to segment different areas of TNX (facilities with the highest chemical and radionuclide inventories) into different independent facilities. With segmentation, some TNX facilities could be classified as Non-Nuclear—General Use.

SRTC Building 305-A Hazards Assessment Document

J. L. Kelly, S. P. Tinnes, and S. M. Patel

Work on the Hazards Assessment Document (HAD) for Building 305-A to support the 5480.23 SRTC Safety Analysis Report was initiated, per DOE-STD-1027-92. The building is a research and development facility. Among the current missions are medium-scale equipment prototype development, physics and robotics laboratory operations, and the storage of small calibration standard radioactive sources. The facility contains a decommissioned test reactor, which has a quarter segment mockup of a production reactor tank. The laboratories are also equipped with applied physics research devices (such as electron beams) and two calorimeters (under development) for special nuclear material measurement (the radioactive calibration sources are stored in a concrete vault). The radionuclide and chemical inventories to be used in the HAD analysis were prepared and validated by the custodian (Site Services-LOS). Preliminary findings indicate that the facility will be classified as a "General Use" facility, provided the radioactive calibration sources stored in the building can be considered sealed sources.

Hazards Assessment Document Determination for SRTC Shielded Cells Upgrade Project

S. P. Tinnes and S. M. Patel

A Hazards Assessment Document Determination (HADD) for Project S-4636, "Shielded Cells Facility Upgrade, Building 773-A" was approved and issued. The HADD determined that a Hazards Assessment Document is not required for the project.

SRTC Preliminary Hazards Analysis

S. P. Tinnes and J. L. Kelly

Work continues on the new Preliminary Hazard Analysis for the DOE Order 5480.23 SRTC Safety Analysis Report. Walkdowns are complete for Buildings 607-17A, 735-A, 735-11A, 736-A, 738-A, 749-A, 773-2A, 773-43A, 774-A, 776-A, 778-A, 786-A, and the TNX Area. Walkdowns for Building 773-A are about 85% complete. Walkdowns will begin during the week of August 29, 1994 for the remaining SRTC facilities outside the Technical Area (Buildings 723-A, 730-A, 777-10A, B-Area Environmental Laboratories, and the Par Pond Laboratories). All walkdowns should be complete in September 1994.

SRTC Plutonium Vulnerability Study

S. P. Tinnes and H. A. Ford

The DOE-HQ Plutonium Vulnerability team, which consists of 14 members from Los Alamos National Laboratory, SCIENTECH Inc., Pacific Northwest Laboratory, Idaho National Engineering Laboratory, SAIC, Inc., Battelle, and Sandia National Laboratory, is chaired by M. Zamorski (DOE Kirtland Area Office). M. Zamoriski issued a draft report of their "SRS Site Assessment Team Report Evaluation" (detailing findings from a July 1994 site visit) for review by the SRS Plutonium Vulnerability task teams. The section on SRTC (Section 4.7) was reviewed and found to be satisfactory. The section summarizes the completed questions sets and the six identified SRTC vulnerabilities from the SRTC Site Plutonium Vulnerability Task Team. The DOE-HQ team determined that five of the six identified vulnerabilities should be treated as "Issues" in the report (rather than "plutonium vulnerabilities") and one vulnerability (SRTC-5, "SED Facility Inventory and Form") should remain as a plutonium vulnerability. No open issues or findings (opposite SRTC) were identified. The DOE-HQ team requested that the site report remain essentially intact, so it can be used as a reference in their report.

Items of Interest

From August 8–11, 1994, E. K. Opperman and R. J. Gromada participated in the EM 261 Transportation Management Division (TMD) Annual Transportation and Packaging Workshop in Rockville, Maryland. The meeting brought the DOE packaging and transportation community together to review the status of FY 94 work and to identify program direction for 1995. In addition to contractors, senior program personnel from DOE, the Nuclear Regulatory Commission, and the Department of Transportation presented papers.

The Groundwater Group (GWG) received two letters of appreciation for providing services to offsite customers—one was received from a local company to whom GWG provided support as part of the industrial assistance program and the other was from the U.S. Air Force at Fairchild Air Force Base in Spokane, WA.

Presentations

From August 20–27, 1994, R. C. Tuckfield presented a paper entitled, "Quantifying Ecological Risk: Boon or Boondoggle", at the recent INTECOL meetings in Manchester, United Kingdom. The intent of this presentation was to raise the awareness of the international community of environmental statisticians and ecologists that the human health model for assessing risks from environmental contamination may be inadequate when applied to assessing the associated "health" risks to a surrounding ecosystem.

Dr. E. Poeter from Colorado School of Mines visited SRTC on August 17, 1994. She gave a presentation entitled, "Using Soft Information to Reduce Uncertainty in Assessment of Groundwater Flow and Contaminant Transport".

J. Rossabi and C. Eddy-Dilek gave presentations at Argonne National Laboratory (ANL) on characterization and monitoring activities completed at the Integrated Demonstration site. As a result of this presentation, ANL is interested in testing a continuous water sampler developed by SRS during characterization activities at the ID site. This is a mechanically simple device designed to collect groundwater samples and does not require that the cone tip be removed for each sample. Preliminary arrangements were made to have ANL demonstrate the sampler during field characterization activities in Nebraska in September 1994. SRTC will send an engineer to facilitate deployment of the sampler during the demonstration.

M. S. Hay presented, "A Laboratory Study of Washing of SRS High-Level Waste Radioactive Sludge: Evidence for Insoluble Sodium and Cesium-137", at the Spectrum '94: International Nuclear and Hazardous Waste Management Conference.

On August 5, 1994, B. Carlton presented, "Assessment of Technetium in the SRS Environment", at the CSRA Radiological Environmental Monitoring Programs meeting at Hilton Head, SC.

R. Brigmon and T. C. Hazen (of the Biotechnology Group) gave a technical talk entitled, "Immunoassay Technology for Environmental Investigations", to the SWER-ERD on August 9, 1994. The talk was a general overview of immunoassays and their applications to xenobiotic testing at SRS. A 30-minute discussion followed concerning applications of this technology to SRS. A presentation of a manufacturer of immunoassay test kits for BTEX, PCBs, and PAHs was scheduled for the next day. After our immunoassay overview, the SWER-ERD group will be more aware of the potential and challenges of immunoassays and should be able to better evaluate vendors of the technology.

Publications

An article on the sOILS Bioremediation Facility entitled, "Savannah River Opens Cleanup Facility", was published in the July 1994 issue of *DOE This Month.*

"Chemotactic Selection of Pollutant Degrading Soil Bacteria" (Patent 5,324,661) was featured in the Patents section of the *Bioremediation Report,* 3(7):11, July 1994.

R. L. Brigmon, D. P. Chynoweth. J. C. Yang, and S. G. Zam published, "An Enzyme-linked Immunosorbent Assay (Elisa) for Detection of Clostridium Aldrichii in Anaerobic Digesters" in *J. Appl. Bacteriol,* vol. 77.

R. L. Brigmon, H. W. Martin, T. L. Morris, G. Bitton, and S. G. Zam published, "Biogeochemical Ecology of *Thiothrix Spp.* in Underwater Limestone Caves", *Geomicrobiol. J.,* vol. 12.

J. C. Radway, J. C. Weissman, E. W. Wilde, and J. R. Benemann wrote, "Nutrient Removal by Thermophilic Fischerella in a Simulated Agriculture Process", which was accepted in the *Journal of Bioresource Technology.*

M. E. Denham, and K. H. Lombard published, "A Synopsis of Environmental Horizontal Wells at the Savannah River Site", in *The South Carolina Engineer.*

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