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WSRC-TR-94-100-2

Savannah River Technology Center

Monthly Report

February 1994

Westinghouse Savannah River Company
Savannah River Site
Aiken, SC 29808

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Savannah River Technology Center

Monthly Report

February 1994

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Executive Summary

Tritium

- An unclassified version of the database for materials failures in the SRS Tritium Facilities was created. The database contains information on approximately 110 failures, however, further sources of information must be reviewed before it is complete. The database will be set up on the tritium area server to enable the widest possible distribution. (page 9)

- A new palladium and nickel alloy is under investigation as part of the Tritium Exposure Program in the Materials Test Facility. Tritium desorption isotherms were measured at 30°C and 50°C and revealed that the rate of tritium evolution from the metal tritide was much slower at lower temperatures. Tritium isotherm acquisition continues at 65°C. (page 9)

- CHTS personnel are developing Thermal Cycling Absorption Process (TCAP) operating procedures for the Replacement Tritium Facility (RTF). These procedures include TCAP Interim Automatic Operation, gas transfer to and from TCAP storage beds, and TCAP Product Bed Tritium Flush. (page 10)

- The Analytical Development Section (ADS) measured chloride on several wash solutions used to clean protective caps in the Tritium Facilities. They determined that less than 10 ppm chloride remained on the caps after rinsing. (page 11)

- The Existing Tritium Facility (ETF) Safety Analysis Report (SAR) Task Plan (formerly called the Technical Approach) was submitted to the Nuclear Materials Processing Division, who delivered it to DOE-SR on February 15, 1994. (page 11)

- Reserve RTF kieselghur (Pd/k) acceptable for use in a TCAP unit was prepared from Pd/k Lot 99058, procured for SRTC research and development in the Advanced Hydride Laboratory. This work was done in support of a Level 3 milestone to quality reserve Pd/k for RTF use. (page 11)

- Function tests of some systems were viewed. Specification documents and procedures were acquired and the design laboratories reviewed proposed RSO function testing activities at WSRC. (page 12)

Separations

- Ion exchange, oxalate precipitation, filtration, and calcination are being studied for recovery of a mixture of americium-curium from F-Canyon Tank 17.1 for shipment to Oak Ridge National Laboratory. A nitrate ion exchange process is

being evaluated to eliminate the need for thiocyanates in the canyon. Simplified precipitation hardware was also tested. (page 15)

- Draft comments on the F Canyon Basis for Interim Operation were received from DOE-HQ. The most significant comments were related to the perceived need for a new Process Hazards Analysis (PHA). A detailed schedule was developed. (page 15)

- A DOE (DP-62) team visited SRS to perform Preliminary Hazards Assessments for inclusion in the F Canyon and FB-Line Basis for Interim Operations. (page 15)

- Alpha emitting materials produce hydrogen, oxygen, and traces of other gases in nitric acid solutions through radiolysis. A study showed that under plant conditions, the maximum hydrogen concentration was 3.5%. The second part of the test was designed for the worst case scenario and is in progress. (page 15)

- Fault Trees are being developed to evaluate the additional risk of criticality posed by a hydrogen reaction that deforms the geometry of FB-Line process vessels. (page 16)

- Plutonium solids from the Tank 8.2 solution was characterized and a dissolution technique was identified. (page 16)

- The solution from the neptunium-237 Storage Tank 9.6 was characterized to determine whether significant corrosion or formation of unwanted solids occurred. (page 16)

- The solids in samples from Tanks 12.1 and 18.3 were dissolved in boiling nitric acid-fluoride solutions. (page 16)

- ADS is assisting the Analytical Laboratories Department (ALD) in trouble-shooting an analytical method for measuring the trace impurities in the plutonium-238 oxide. (page 17)

- Silica is one of the most troublesome impurities. An ion exchange run was performed and found that silica is approximately half passed through the column. The presence of solids is a suspected cause and, in fact, all recent samples from H-Canyon have visible solids. (page 17)

- With the termination of the Uranium Solidification Facility (USF) project, the Separations section is investigating the feasibility of shipping enriched uranyl nitrate in its liquid form to Oak Ridge National Laboratory. The Packaging and Transportation Group supports this evaluation through identification of appropriate shipping containers. (page 17)

- In April 1993, a radionuclide separation facility in Tomsk, Russia experienced an explosion in a processing tank, which severely damaged the facility. A DOE task team investigated the event and experimental work at SRTC is part of the effort to understand the conditions leading to the explosion.

Reactions with butanol (a degradation product of TBP) and nitric acid are being studied as a contributor to tank heating, leading to the explosion at Tomsk. (page 18)

Environmental

- The code AXAIR has been modified to allow the user to select the option to determine dose with a 95% meteorological exceedance probability. (page 19)
- The Radiological Assessment Program (RAP) document, Assessment of Strontium in the Savannah River Site Environment (WSRC-RP-92-8984), has been issued. (page 19)
- The MAXINE spreadsheet and its supporting documentation have been completed ahead of schedule. MAXINE is an EXCEL® spreadsheet designed to calculate radiological dose to an individual at a user-specified distance from an atmospheric emissions source. (page 19)
- Following a literature review and facility walkdown of the in-tank precipitation (ITP) tanks, team members developed analysis plans for evaluating the exposure consequences of postulated surface and subsurface H-Area liquid radioactive waste releases from the tanks due to an earthquake. Transient, one-dimensional hydraulic models of the drainage systems will be developed to determine capacity and waste transit times. (page 19)
- A meeting was held with Westinghouse Hanford Company (WHC) to compare groundwater modeling activities. (page 19)
- A steady-state finite element model simulating the Savannah River hydraulics from the New Savannah Bluff Lock and Dam to the Interstate Highway 95 bridge has been completed. (page 20)
- A report, "A Comparison of Four Aerial Radiological Surveys of Par Pond and the Surrounding Area, Savannah River Site, Aiken, South Carolina, Dates of Surveys: 1989-1992, EGG 11264-1009, September 1993", was received. The comparisons revealed that significant change occurred as the Par Pond water level was lowered and that activity in Lower Three Runs Creek varied slightly as the flow rate changed during pumping. The only man-made gamma emitter that was detected during the four surveys was ^{137}cesium. (page 20)
- Representatives from SCDHEC visited SRS on January 5, 1994 to discuss groundwater monitoring of the Saltstone Facility and to take a tour of it and the Defense Waste Processing Facility (DWPF). R. A. Hiergesell made a presentation on an alternative groundwater monitoring system. This alternative system proposes that any decision regarding the number and location of well be delayed until after a study of optimum closure cap configuration is completed. (page 20)

- A meeting of the Ecological Risk Assessments Task Group of the EH-231-sponsored Risk Based Standards Working Group was held at the Rocky Flats Plant. (page 21)

- A study to determine the dose-based concentration guidelines for the contaminated soil beneath the site of the old F-Area Retention Basin has been completed. Calculations included soil guidelines as functions of contaminated area and the determination of hot spot concentration guidelines. (page 21)

- Savannah River Technology Center (SRTC) provided PCB analysis of air extracted from the M-Area vacuum extraction wells and the two monitoring wells where a dense nonaqueous phase liquid (DNAPL) was collected. Results from the first well sampled (MSB22) showed nondetectable PCBs in the air (at concentrations < 0.001 mg/m^3). The analytical work required fabrication of a specialized sample cart for extracting the sample and loading any PCBs in the air on glass tubes packed with Chromosorb C. Additionally, a sensitive analytical method for analyzing the loaded tubes was required. Both of these development activities are complete and sampling of the wells is underway. (page 21)

- The Environmental Science Section (ESS) Groundwater Group prepared a position statement in support of the Metallurgical Laboratory Basin Part B Permit that helped Environmental Restoration Department (ERD) to successfully argue that the Crouch Branch Aquifer (formerly Black Creek) should not be included in the uppermost regulatory aquifer near the MetLab Basin. (page 21)

- The ESS Biotechnical Group personnel completed the treatability study of the sanitary landfill and sent the data to CDM-Denver. Data to date show methane stimulated microbes are capable of degrading concentrations of TCE and VC over 100,000 ppb to less than 10 in 14 days. (page 22)

- The Integrated Demonstration mid-year review was held on February 2-3, 1994, in Augusta, GA. Presentations by principal investigators summarized the technical work already completed under the demonstration, and detailed many activities and issues dealing with successful phase-out of the integrated demonstration. (page 22)

- A videotape titled, "New Technologies for Clean Up of Solvents - The SRS Integrated Demonstrations", was completed. This video tape summarizes general activities completed during the *in situ* air stripping and bioremediation demonstrations. Three dimensional modeling and visualization software were adapted and used to model changes in contaminant distribution during the subsurface *in situ* air stripping/*in situ* bioremediation and for pump and treat remedial systems. The overview report on characterization and monitoring technologies was approved for release by DOE-SR. The report summarizes the results of field demonstrations of innovative characterization and monitoring technologies funded as part of the Integrated Demonstration. (page 22)

- The collection of post-test characterization cores at the ohmic heating demonstration site was completed. Analysis of post-test sediment samples is underway and a letter report summarizing results will be provided to Pacific National Laboratory (PNL). (page 22)

- The draft of a report on the use of the ion trap mass spectrometer (IT-MS) for analysis of ground water from well characterized wells has been approved for release by DOE-SR. The goal of this task is to validate the use of IT-MS as a screening device for groundwater samples from well characterized wells. A presentation was made in January to DOE-SR, South Carolina Department of Health and Environmental Control (SCDHEC), and the Environmental Protection Agency (EPA), Region 4, by J. Rossabi. The presentation was well received and discussions focused on use of the IT-MS for sample minimization as well as use in future remedial investigations. (page 23)

- A patent disclosure for a new valve (Baroball) used to control barometric pumping was filed. These valves require little maintenance and are extremely inexpensive to produce, which makes the Baroball ideal for the barometric pumping process. (page 23)

- A team from SRTC and ERD has initiated the demonstration and testing program for technologies related to residual solvent contamination in soil and groundwater. Such contamination by dense nonaqueous phase liquids is an important segment of the M-Area soil and groundwater plume. (page 23)

- A meeting of the advisory team for the Environmental Technology Development Test Platform was held in Columbia, SC, to select the technologies that will be tested in the first field test activity scheduled for the end of August. The team consists of members of the SCDHEC, EPA (Region 4), public representatives, University professors, and Savannah River Site (SRS) personnel. (page 24)

- C. Berry performed an onsite inspection and technical verification of the offgas bioreactor unit in Seattle. The system will treat 5-10 SCFM TCE, PCE, and TCA contaminated air obtained from the A-14 outfall. (page 24)

- A draft report from Los Alamos National Laboratory (LANL) of their modeling work was received. Basically, they have shown using a history-matching model that bioremediation removes 43% more than *in situ* air stripping alone. In addition, *In Situ* Bioremediation (ISB) allows you to remove 95% in four years or less versus more than 10 years for *In Situ* Air Stripping (ISAS). (page 24)

Waste Management

- The Materials Technology Section is preparing a report that will list the material properties of the SRS waste tank components, review the inspection data on tank degradation, and assess the potential for further degradation during current or future service by corrosion or mechanically induced mechanisms. The data will be useful for performing structural analyses of the tanks, which may experience waste removal or seismic conditions, and for determining if additional in-service inspections are necessary to assess the tank integrity. (page 25)

- WSRC is joining Westinghouse Hanford Company (WHC) to develop an improved slurry pump for use in Tank Farm operations. This effort will benefit both sites by sharing technical expertise and resources, improve cost-effectiveness, and prevent duplication of effort. (page 25)

- A report detailing the chemical analyses of a set of salt cake samples from Tank 41H in July 1993 was issued. The data, when combined with earlier analyses, indicate a radial homogeneity of the salt cake. However, the actinide content of the salt cake appears to vary with the vertical location within the first foot from the top surface. The data is also discussed relative to projected in-tank precipitation processing of the material. (page 25)

- Construction activities associated with the installation of an ion exchange testing facility at TNX began. The estimate for the initial phase of the work resulted in a cost savings of $35,000, via a design simplification. (page 26)

- The Defense Waste Processing Facility (DWPF) Materials Committee recommends that the existing Viton-A O-rings used in Cajon VCO fittings for the DWPF melter electrode cooling water lines be accepted for use. Based on an expected cumulative radiation dose of 2×10^7 rads, performance data and site experience indicate that the Viton-A O-rings will be acceptable. The committee recommends that DWPF determine the feasibility of replacing the Viton-A O-rings with an EPDM compound or equivalent O-rings for future use. (page 26)

- Actions were taken after the preliminary EAV Performance Assessments (PA) review to reduce conservatism in the PA analysis, which raised PA limits for uranium-234, uranium-236, uranium-238, plutonium-239, hydrogen-3, strontium-90, nickel-59, and neptunium-237. (page 27)

- Procurement of a Transportable Vitrification System was initiated. SCUREF placed a contract for advanced control system development with Clemson University. (page 27)

- Component checking of the Consolidated Incineration Facility Offgas Components Test Facility (OCTF) is progressing. Minor repairs to leaking pipes, flanges, etc. will be complete in early March 1994. System checking will immediately follow and continue into April 1994. (page 27)

General

- Storage in Horizontal Storage racks in the Disassembly Basin can be increased by 50% with the addition of a grating over the racks. (page 29)

- Comments were resolved on the procedure and example of how to perform a double contingency analysis using the Columbia UNH Bulk Solution Storage Tanks. An example was prepared and transmitted on how to use the XSDRNPM 1-d Sn code (PC-SCALE 4.1) for dimensional searches. (page 29)

- MCNP-4A and SCALE 4.2 were installed on the Applied Physics RISC 550. Certification of these codes is in progress and an interim configuration control plan was drafted. In addition, the PC-SCALE 4.1 and MCNP-4A codes were tested on personal computers. (page 29)

- Review of the RED evaluation (WSRC-TR-93-613) of the criticality potential associated with sludge removal activities in the K-Disassembly Basin continues. (page 29)

- Review meetings were held on February 18, 1994 with P. Rice, the facility custodian, and DOE-SR to review the SED trap removal/assay plan. A meeting was held on February 24, 1994 with the Defense Nuclear Facility Safety Board (H. Massie) to review the readiness of DOE-SR to authorize SED facility trap removal and to explain the safety risk of the SED facility versus the safety risk of the SRTC technical area. (page 30)

- The Task Technical Plan and the Task Quality Assurance Plan for preparation of the 5480.23 Safety Analysis Report (SAR) and 5480.22 Technical Safety Reports for the SRTC technical area are complete. (page 30)

- Three SRTC technical area "Potential Issues" were closed by the Potential Issue Committee (see SRT-TML-940021). (page 30)

- A "Potential Issue" concerning how visitors from the general public are treated in the SRTC SAR/Basis for Interim Operation (BIO) bounding radiological accident analysis was identified (SRT-TML-940008). (page 30)

- At the request of DOE, reconfiguration of SRTC to allow a more open access for uncleared visitors is being evaluated. The reconfiguration plan, recommended by the committee, is a reduced limited-access area with visitors having abbreviated emergency preparedness training and no escort. (page 30)

- A program to determine the natural phenomena hazards and structural qualification of SRTC facility structures, systems, and components was initiated. (page 31)

- Work continues with SRTC Laboratory Services representatives on a program to update SRTC to be more consistent with SRTC SAR/BIO requirements. Draft Operating Safety Requirements revisions were prepared and reviewed with the facility custodian. (page 31)

Progress and Accomplishments

Tritium

SRS Tritium Materials Failures Database

E. A. Clark and C. L. Shelor

An unclassified version of the database of information about materials failures in the SRS Tritium Facilities was created using the Macintosh version of FileMaker® Pro. Approximately 110 reports of component failures in the process identified using the Tritium Area Fault Tree Data bank (on the SRS classified mainframe computer) and the PINT document information database were reviewed and entered. The database was reviewed and changed to unclassified controlled nuclear information for use on the Local Area Network to be accessed by SRS personnel. Additional documentation of failures will be added to the database as they are found in the archives of the Tritium Department. The monthly Tritium Separations and Packaging reports will be reviewed and additional failure information will be added to the database. When complete, the Tritium Materials Failures database will aid in selecting and specifying materials and components, defining preventative inspection, and maintenance and replacement schedules.

New Palladium Alloy Entered into the Tritium Exposure Program

J. S. Hölder and D. E. Moseley

As part of the Tritium Exposure Program in the Materials Test Facility (MTF), a series of palladium (Pd) alloys are under investigation to determine their applicability to tritium processing. Pd metal readily absorbs and desorbs tritium and may be employed in several tritium applications (e.g., storage, purification, and isotopic separation). Alloying Pd with another element changes the tritium behavior and allows a material to be tailored to a specific application. For example, the pressure of tritium gas in equilibrium with a metal tritide may be raised or lowered by the addition of another metal to form an alloy. This is analogous to the substitution of aluminum (Al) for nickel (Ni) in $LaNi^5$ to form the Replacement Tritium Facility storage material, $LaNi^{4.25}Al^{0.75}$.

For this investigation, tritium desorption isotherms will be measured at several temperatures for each Pd alloy to determine the thermodynamics of the tritide; the alloys will then be loaded with tritium and aged for many months; tritium desorption isotherms will be measured after the tritium aging period to determine the effects of tritium exposure. This effort was initiated on the Experimental Tritium Manifold (ETM) in the MTF with a palladium nickel (PdNi-1) alloy.

Figure 1 illustrates the first two tritium desorption isotherms for PdNi-1, where the tritium gas pressure is plotted as a function of sample composition (the ratio of the number of tritium atoms to metal atoms in the solid). Two sets of data are shown: the upper set (square symbols) were measured with the sample maintained at 50°C and the lower set (round symbols) were measured with the sample at 30°C. The large symbols represent equilibrium conditions achieved at the end of an extended wait time, whereas, the small symbols show the approach to equilibrium during the wait period. For a desorption, the composition decreases in a stepwise fashion so that consecutive points go from right

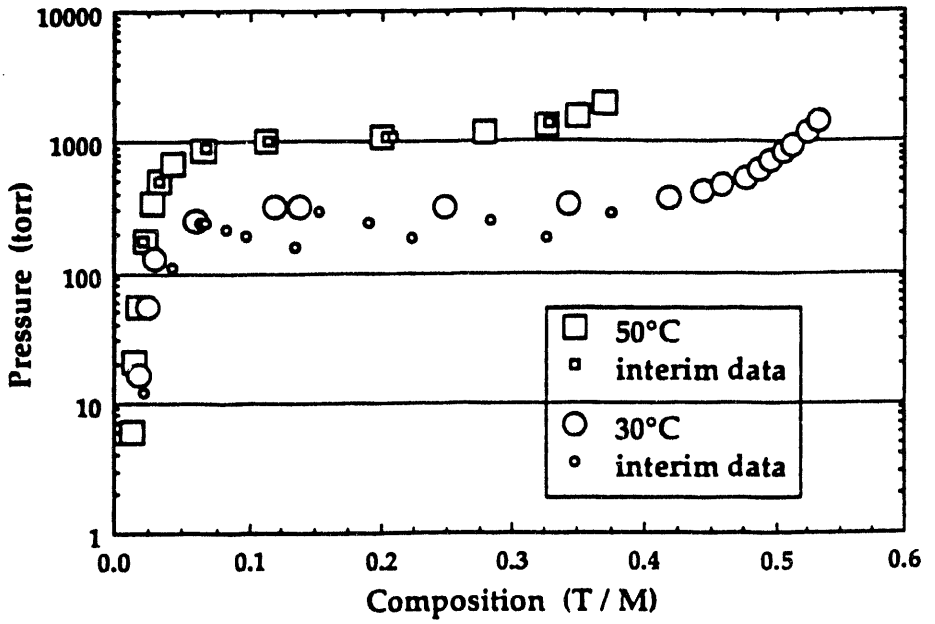

Figure 1. Tritium Desorption Isotherms for PdNi-1

to left. The isotherms show that this sample is well behaved, exhibiting typical metal tritide characteristics. The interim data illustrates one effect temperature has on a metal tritide: the rate of tritium desorption from or absorption into a tritide may be a strong function of temperature. At 30°C, equilibration on the plateau (the flat portion of the isotherm) required a wait of up to three days, whereas, at 50°C, equilibrium was achieved in hours. Understanding this kinetic effect helps to determine the operating conditions for an application.

A second effect of temperature on metal tritides is exhibited in plateau pressure. At 30°C, the plateau occurs around 350 torr, whereas, at 50°C the plateau pressure is around 1050 torr. Thus, a small increase in absolute temperature from 303 K (30°C) to 323 K (50°C) gave rise to a three-fold increase in pressure. These results allow the plateau pressure to be predicted as a function of temperature by determining the change in the thermodynamic parameters of enthalpy and entropy for the tritiding reaction. A third tritium isotherm for the PdNi-1 sample is being acquired at 65°C to more precisely define the thermodynamic parameters. A second Pd alloy, PdNi-2, is also being prepared for isothermal measurements.

Replacement Tritium Facility Thermal Cycling Absorption Process Operating Procedures

A. S. Horen

CHTS personnel are developing Thermal Cycling Absorption Process (TCAP) interim operating procedures. TCAP will begin operating after the TCAP Tritium Separation Integrated Demonstration Test (SOP-AP-233-00395) to produce large quantities of high purity tritium for in-bed accountability hydride storage bed tritium calibrations. These TCAP operating procedures are being written for interim operations using the TCAP automatic control sequence and limits operation to TCAP Column A and Storage Beds A (Feed and Product).

The following operating procedures are being developed:

- TCAP Interim Automatic Operation (SOP-AP-233-52052) Gas Transfer to/from TCAP Storage Beds (SOP-AP-233-52056)
- TCAP Product Bed Tritium Flush (SOP-AP-233-52062)

The Interim Automatic Operation procedure will describe REFLUX and ONLINE operations. The Gas Transfer and Tritium Flush procedures will be referenced, as needed, from the "master procedure" TCAP Automatic Operations.

At a later date, the following procedures will be developed for normal TCAP operation

- TCAP and PFR Manual Startup
- TCAP Normal Shutdown
- TCAP Emergency Shutdown

Chloride Analyses of Wash Solution Used to Decontaminate Reservoir Protective Caps

R. A. Malstrom, P. F. Cloessner, G. T. Fulmer, A. R. Jurgensen, M. A. Polochko, R. A. Sigg, and M. B. Thompson

The Tritium Department requested chloride analysis of several wash solutions used to clean protective caps in the tritium facilities. This information was critical to determine if possible chloride contamination on protective caps posed corrosion problems for stainless steel components. The Analytical Development Section analyzed ten samples using Neutron Activation and X-ray Fluorescence. These analyses that were performed on a rush basis and showed that less than 10 ppm chloride was left on the caps after rinsing. SRS's corrosion experts determined this concentration to be inconsequential.

Graded Approach DOE Order 5480.23 Safety Analysis Report

A. J. Cappucci and M. E. Bowman

The Existing Tritium Facility (ETF) Safety Analysis Report (SAR) Task Plan (formerly called the Technical Approach) was submitted to the Tritium Facility on February 11, 1994. Nuclear Materials Processing Division (NMPD) delivered the Task Plan to DOE by February 15, 1994.

The Task Plan describes the proposed content and level of detail of the ETF SAR to meet the requirements of DOE Order 5480.23 per guidance given in DOE-STD-3009 (proposed). The purpose of the Task Plan is to provide a detailed description of the SAR to allow the Nuclear Materials Processing Division and its customer, DOE-SR, to make informed decisions as to whether the completed SAR will adequately address the safety of the facility.

Reserve Replacement Tritium Facility Kieselguhr for a Thermal Cycling Absorption Process Unit

W. C. Mosley

Forty liters of palladium deposited on kieselguhr (Pd/k) Lot 910923 was procured from Ionex Research Corporation as Reserve Pd/k for the Replacement Tritium Facility (RTF). However, because of excessive granule breakdown during preparation by the palladium chloride deposition and reduction process, the Pd/k Lot 910923 had a palladium density of 0.30 g/cc, which is 75% of the 0.40 g/cc design value for a Thermal Cycling Absorption Process (TCAP) unit. Preliminary tests indicated that Pd/k with a palladium density close to 0.40 g/cc could be made from Pd/k Lot 99058 procured for SRTC research and

development in the Advanced Hydride Laboratory. Two options considered for providing acceptable Reserve RTF TCAP Pd/k include:

- upgrading Pd/k Lot 910923 by two repetitions of a chlorine-free process involving deposition of tetraammine palladium (II) nitrate followed by thermal decomposition of the nitrate to metallic palladium in a rotary calciner
- heating SRTC Pd/k Lot 99058 at 1095°C to remove chlorine and strengthen granules followed by sieving to produce 30-50 mesh Pd/k

SRTC recommended that reserve RTF Pd/k intended for use in a TCAP unit be made from SRTC Pd/k Lot 99058.

SRTC Pd/k Lot 99058 was heated for three hours at 1095°C in air and the loosely sintered cake was pulverized on a 30-mesh sieve. Pd/k granules smaller than 50 mesh were removed by sieving. This Pd/k contains 46.0% palladium, has no detectable chlorine, has 97.9 wt% of the granules within the 30-50 mesh range, is free-flowing, and has a tap density of 0.76 g/cc. The palladium density of 0.35 g/cc is 87.5% of the design value. The 30-50 mesh, 1095°C-heated Pd/k Lot 99058, is acceptable for use as reserve RTF TCAP Pd/k.

SRTC recommends that Pd/k procured for future RTF and Tritium Facility applications should be produced by the chlorine-free process to avoid problems of high chlorine content and low weight percentage of particles within the 30-50 mesh range. This improved form of Pd/k should be tested in an SRTC small-scale TCAP unit to provide a data base for future use.

Additional details can be found in WSRC-TR-94-061.

Reservoir Surveillance Operations Technical Information Exchanges

Y. Lutz

Since the signing of FONSI, which validated the Non-Nuclear Consolidation scope and allowed for its implementation, several information exchanges to transfer the Reservoir Surveillance technology from EG&G Mound Laboratory to WSRC took place. WSRC personnel were involved in document transfer meetings and technical specification discussions. Since the information exchange began, the following activities were accomplished for Reservoir Surveillance Operations function testing:

- viewed function tests of B83 and W76 systems
- acquired EG&G Mound Laboratory function test procedures for the W88, W87, B83, W80, W76, W78, B61, and W62
- acquired EG&G Mound Laboratory drawings of the W88 and W87 fixturing for their bell jars
- acquired Design Laboratory specification documents on the W88, W87, B83, W76, B61 (some models), and the W62
- discussed information acquired from EG&G Mound Laboratory to verify long-term operations with Design Laboratories
- reviewed proposed operations for their concurrence with Design Laboratories

This review involved meetings at the Design Laboratories and WSRC. The meetings covered PVT measurements, mass spectrometry sampling methods, transfer gas short-term archiving, current schedules for EG&G Mound Laboratory testing, proposed schedules for WSRC testing, and interim capability until long-term facilities are available in the Replacement Tritium Facility. Action items for the Design Laboratories and WSRC were developed to resolve technical concerns. A proposal based on verbal agreements were forwarded to the Design Laboratories. Written confirmation is expected soon.

Originally, information exchange followed a steady pace with the schedule of EG&G Mound Laboratory closing at the end of FY 95. With the announced closing of EG&G Mound Laboratory at the end of FY 94 and the cessation of function testing on April 30, 1994, the pace of efforts must be rapidly increased to transfer adequate information. Unfortunately, due to this new schedule, some systems will not be function tested this year, which will prevent WSRC personnel from viewing the system tests before they are tested at SRS. This may cause delays in implementation of the systems because small details will be missed.

Separations

Curium-Americium Ion Exchange Studies—Nitrate-Based Ion Exchange

R. A. Pierce and M. O. McKenzie

Ion exchange is one method to separate curium (Cm) and americium (Am) from lanthanides (as part of a program to ship the F-Canyon Tank 17.1 Cm-Am to Oak Ridge National Laboratory). These tests are part of a program to assess options for removing Cm-Am from F-Canyon. The proposed process involves adjusting the solution to 2M KSCN before the ion exchange. To avoid issues associated with introducing SCN- into the Canyon, consideration for removing most of the lanthanides using a nitrate-based ion exchange is being made. Data in the literature shows that chromatographic separations of lanthanides from a solution of $LiNO_3$ occurs on DOWEX$_{-1}$® resin. Experiments were run using 3M, 6M, and 8M $LiNO_3$ to determine how it elutes a group of lanthanides (cerium, lanthanum, praseodymium, neodymium, samarium, europium, and gadolinium) loaded onto a DOWEX$_{-1}$® resin. Precipitations of the liquid eluting from the column show preliminary agreement with the literature.

F-Canyon Basis for Interim Operation and Restart Issues

P. L. Fisk, J. H. Starling, T. L. Slaven, and J. S. McKinney

Eighty-three draft comments from DOE-HQ were received on the Basis for Interim Operation. The most significant comments were related to the perceived need for a new Process Hazards Analysis (PHA). Personnel from DOE-HQ Defense Programs were at SRS performing the PHA and Regulatory Programs and SRTC personnel are reviewing the draft report. DOE-SR condensed the comments to 22 and SRTC assembled a task team to address them. Several comments are tied to the resolution of specific technical issues (e.g., red oil explosions). A detailed schedule was developed to provide for resolution of the existing comments by the end of March 1994.

F-Canyon, FB-Line Preliminary Hazards Assessments

V. F. Serrano

During the week of February 7, 1994, a DOE (DP-62) team visited SRS to perform Preliminary Hazards Assessments (PHA) on the F-Canyon and FB-Line facilities for inclusion in the respective Basis for Interim Operations (BIO). The PHA team consisted of DP-62 and DOE subcontractors, SAIC, and EG&G Mound Laboratory. WSRC personnel assisted in the PHA process. The DOE-guided team defined the scope and level of detail expected in a PHA for future BIOs produced at WSRC. The team's objective was to complete the PHAs within the first week of their visit, but this intent emerged as an unrealistic expectation. The first draft of a PHA for F-Canyon is complete, but a significant level of effort is required to produce a final product in compliance with current guidance.

Hydrogen Generation in FB-Line Process Hold Tanks

J. R. Smith, K. J. Kalbaugh, E. A. Kyser, and J. B. Schaade

Alpha particle emitting radioactive materials produce hydrogen, oxygen, and traces of other gases in nitric acid solutions through radiolysis. The production rate of these gases depends on the dose rate from the emitted alpha particles and the nitric acid concentration of the solution. Calculations show that radiolysis can potentially cause hydrogen buildup in unvented tanks.

A study is proceeding as expected. Two parts of the study are performed concurrently. Part 1 was designed to determine an upper limit for the hydrogen concentration of the offgas. Gas chromatogram measurements give a value of 3.5% hydrogen, the same seen in the scoping study. The concentration of oxygen in the offgas increased from 35% to 48% in one week. The

balance of the gas is nitrogen. No hydroxylamine-nitrate (HAN), which forms nitrous oxide, was used in Part 1. The offgas production rate was constant for the duration of the experiment, which means that an increase in the oxygen production must be balanced by a corresponding decrease in the nitrogen production. A mechanism to support this data has not been developed.

Part 2 was designed for the worst case scenario with respect to "hold" time, the time before the reducing agents sulfamic acid (HSA) and HAN are exhausted. The total offgas production rate should have been even greater due to nitrite formation from the oxidation of Pu^{+3} to Pu^{+4}, resulting in an even lower hydrogen concentration. Instead, the initial offgas rate is lower, possibly due to the instability of HAN at >3.0 M HNO_3. A second column run produced a solution 3.0 M in "free" acid since the FB-Line solution should stay less than 3.0 M HNO_3 at this point in the process. The addition of ascorbic acid to the solution from the first column run showed no effect in offgas production rate.

Criticality Risk Due to Hydrogen in FB-Line Vessels

H. S. Smiley

Fault Trees are being developed to evaluate the additional risk of criticality posed by hydrogen in FB-Line process vessels. Postulations conclude that hydrogen could accumulate to a high enough concentration to be ignited and cause a vessel to be deformed from its safe geometry, resulting in an accidental criticality. The purpose of the Fault Trees is to determine if the risk of criticality by this mechanism is within acceptable limits. Preliminary results indicate a frequency of approximately 1E-05/yr as compared to the facility's overall risk of criticality of 1.4E-04/yr.

H-Canyon Tank 8.2 Solids

J. H. Gray and K. J. Kalbaugh

A second batch of plutonium (Pu) solids centrifuged from a Tank 8.2 solution sample was characterized. Heating at 50°C and 70°C in 8 M of nitric acid for six hours resulted in dissolution of two-thirds of Pu. The remaining plutonium dissolved during a 41-hour sitting period where the solution was at ambient temperatures.

Analysis of the dissolved solids solution found zinc as the major impurity with significant quantities of aluminum (Al), nickel, copper, boron, iron, silicon, and calcium. No manganese was present, indicating that the solids did not contain MnO_2. Without fluoride ions, difficulty in dissolving the Al and silicon particles is expected.

Characterization of H-Canyon Tank 9.6 Solids

J. H. Gray and K. J. Kalbaugh

The solution from the neptunium-237 Storage Tank 9.6 was characterized to determine whether significant corrosion or formation of unwanted solids occurred or could occur in the future. This effort is part of a program to monitor product tanks in F- and H-Areas to maintain safe conditions during interim storage.

Corrosion products in Tank 9.6 are about a factor of 20 higher than those previously reported for Tanks 12.1 and 18.3. Since the ratios of chromium-to-nickel and iron-to-chromium are similar to those expected for corrosion of stainless steel, direct addition of other iron compounds do not appear to have taken place.

The phosphorus content in solution is about 100 ppm. To find out if neptunium-phosphorus compounds could form at this phosphorus concentration level will require an alternate study. Sodium is the major impurity in the solution, followed by iron, aluminum, silicon, and chromium.

Solids in Tanks 12.1 and 18.3 Solutions

J. H. Gray, K. J. Kalbaugh, and the Analytical Development Section

The solids in the February 1994 solution samples from Tanks 12.1 and 18.3 were dissolved in boiling nitric acid-fluoride solutions. Alpha

counting of the acid solution from dissolved Tank 12.1 solids detected an 82-microgram trace of plutonium (Pu). Previous solids from Tank 12.1 contained similar trace levels of Pu. No Pu was found in the Tank 18.3 solids.

Since the scanning electron microscope was unavailable, x-ray fluorescence (XRF) identified the compounds. Insufficient solids were available in the Tank 12.1 sample to yield meaningful results. The XRF scan of Tank 18.3 solids identified calcium carbonate, silicon oxide, and potassium aluminum silicate hydroxide (muscovite) as major compounds.

Plutonium-238 Impurities

E. A. Kyser and M. E. Summer

The ion exchange run was completed and found that silica is approximately half passed through the column, however, some is held up and comes out in the fluoride wash (80% recovery). None came out in the elution step. This resulted from using sodium silicate as the silica spike, allowing more silica to be dissolved (suspended) than with the previous material (hydrofluoro-silicic acid).

Work with the Analytical Development Section is being done to find the source of some non-reproducible results from the Laboratories Department. The presence of solids is the suspected cause and, in fact, recent samples from H-Canyon have visible solids. This includes the elution acid, which is not filtered prior to the ion-exchange column. Since the ion exchange bed is not deep, these fines may end up in the product feed tank (which has solids). Preliminary results show significant silica in these solids. Work continues to determine the exact composition.

Analysis of Trace Impurities in Plutonium-238 Oxide Sample from HB-Line

C. J. Coleman, M. F. Bryant, and W. A. Spencer

The Analytical Development Section (ADS) is assisting the Analytical Laboratories Department (ALD) in trouble-shooting an analytical method for measuring the trace impurities in the plutonium-238 (Pu-238) oxide. The Pu-238 oxide was produced in HB-Line and sent to Los Alamos National Laboratory (LANL). The possibility of a problem with the ALD method was discovered when LANL measured significantly higher levels of a few trace impurities than measured by ALD. ADS was asked to investigate alternative dissolution methods and recommend a method that could be implemented in the HB-Line.

Our approach is to dissolve 0.25 g of plutonium (Pu) oxide with 3 ml of nitric and hydrofluoric acids in a microwave oven. After the Pu oxide dissolution, boric acid is added to complex fluoride to keep insoluble fluorides from forming. The method yields 5 ml of clear solution containing no visible solids.

Since the solution contains alpha radioactivity much greater than hood alpha radioactivity limits, the Pu is extracted with tributyl phosphate in dodecane. After the Pu-238 is extracted, the aqueous solution is analyzed for elemental impurities with Inductively Coupled Plasma (ICP)-AES techniques. The extraction technique will not be practical for use in HB-Line, therefore, our next goal is to show that the dissolution procedure is compatible with the ion exchange technique that ALD uses to separate Pu from impurities. An extensive program to validate our method is also planned. This validation program will likely include several national laboratories.

Packaging Evaluation for Separations

R. S. Maurer and D. S. Hoang

WSRC Separations has 198,000 liters of enriched Uranyl Nitrate Hexahydrate (UNH) awaiting transfer to Oak Ridge National Laboratory. The Separations department planned to operate the newly constructed Uranium Solidification Facility (USF) to convert the UNH to uranium oxide for shipment. They are investigating the feasibility of shipping UNH in its present form. The Packaging and Transportation Group (P&TG) is supporting this evaluation through identifying appropriate shipping containers.

P&TG determined the requirements for shipping UNH and performed a database search for available packagings. They submitted a report to

the Separations department that identified packaging requirements for transporting diluted mixtures of UNH.

Tomsk Explosion Parameter Studies—Butanol Behavior

W. S. Cavin, J. R. Smith, and M. C. Thompson

In April 1993, a radionuclide separation facility in Tomsk, Russia experienced an explosion in a processing tank and severely damaged the facility. The event was investigated by a DOE task team. As an outgrowth of that investigation, work is being done at several DOE sites to model the chemistry and understand the conditions leading to the explosion. Experimental work at SRTC is part of that effort.

Butanol [a degradation product of tributyl phosphate (TBP)] reacts exothermically with nitric acid at relatively low temperatures. This reaction is believed to be a contributor to the tank heating, leading to the explosion. This reaction was also examined as potential risk factor related to the evaporation and subsequent storage of SRS separation process waste solutions.

To understand the potential of a butanol reaction in waste solutions, experiments were conducted to determine the rate of butanol evaporation relative to its reaction rate. If the butanol is removed from the system by evaporation before a significant amount can react with nitric acid, this heating mechanism is eliminated.

The experiments involved heating a mixture of TBP saturated with concentrated nitric acid in an oil bath at 110°C. In the first phase, butanol was added to the TBP/nitric mixture and the offgas was fed through a condenser and an apparatus to measure the CO and CO_2 produced. The reaction was initially vigorous, with the evolution of a large amount of brown NO_x fumes. The reaction proceeded for about two hours until no appreciable gas evolution was present.

The second phase of the experiment involved the reaction of the TBP/nitric mixture (no butanol added) at 110°C and the offgas was handled in the same manner as in the first phase. This reaction was much slower and the generation of NO_x, CO, and CO_2 continued for about four hours until the run was suspended at the end of the day.

Preliminary results indicate that most of the butanol in the reaction vessel was volatilized instead of destroyed by reaction with the nitric acid. This result is based on the relative volumes condensed from the offgas. Quantitative results will be developed.

Environmental

AXAIR Dose Determination

A. A. Simpkins

The AXAIR code was modified to allow the user to select the option to determine dose with a 95% meteorological exceedance probability. Previously, AXAIR only determined doses for 99.5% and 50% meteorological conditions. The Process Safety Technology and Emergency Management Group requested these changes. The new version of AXAIR is expected to be released in February 1994. At which time training course will be offered for all users.

Radiological Assessment Program for Strontium Issued

W. H. Carlton, A. G. Evans, C. E. Murphy, Jr., R. N. Strom, and L. A. Geary

The Radiological Assessment Program (RAP) document," Assessment of Strontium in the Savannah River Site Environment" (WSRC-RP-92-984), was issued. It is the eighth in a series of ten documents on individual radionuclides and heavy metals released from SRS. Documents on tritium, cesium, iodine, uranium, technetium, carbon, and plutonium have been issued previously and documents on noble gases and mercury are being prepared.

Improvements to Individual Dose Assessment Methodology

D. M. Hamby

The MAXINE spreadsheet and its supporting documentation were completed ahead of schedule. MAXINE is an EXCEL® spreadsheet designed to calculate radiological dose to an individual at a user-specified distance from an atmospheric emissions source. The dosimetry models contained in the spreadsheet are similar to those of MAXIGASP and the NCRC Reg. Guide 1.109. User input includes dispersion factors (obtained from a PC version of XOQDOQ), consumption rates, transport times, etc. The spreadsheet methodology is an improvement to current practices in that all input values and tabular data sets are displayed in the time-stamped output. Quality assurance of MAXINE is ensured by password protection and a rigorous benchmarking exercise prior to release.

Liquid Pathways Contaminant Transport Analyses to Support In-Tank Precipitation/ H-Area Safety Basis

G. P. Flach and K. F. Chen

After a literature review and facility walk-down of the in-tank precipitation (ITP) tanks, team members developed analysis plans for evaluating the exposure consequences of postulated surface and subsurface H-Area liquid radioactive waste releases from the tanks due to an earthquake. Program cost and schedule constraints dictated relatively simple models. For subsurface leaks, the groundwater flow field and stratigraphy will be deduced from field data. Contaminant transport will be simulated using a three-dimensional analytical model. The geochemistry is complicated by the extremely high pH of the waste (about 14). Therefore, analyses will be performed assuming best-estimate contaminant retardation factors and no retardation as a bounding estimate. For most surface leaks, the waste will flow immediately to an engineered drainage systems and nearly all of the liquid will be discharged to the H-Area effluent ditch, unless diverted to the stormwater retention basin. Transient, one-dimensional hydraulic models of the drainage systems will be developed to determine capacity and waste transit times. This information will be used to determine the feasibility of operator action and perhaps to drive modifications to the plant or normal operations.

Groundwater Modeling

J. Haselow, G. Flach, and L. Hamm

A meeting was held with Westinghouse Hanford Company (WHC) to compare groundwater modeling activities. WHC and the Environmental Sciences Section are working on

similar problems and will be cooperating on code development activities so that work can be accomplished more cost effectively.

Finite Element Model of Savannah River Flow

K. Chen

A steady-state finite element model simulating the Savannah River hydraulics from the New Savannah Bluff Lock and Dam to the Interstate Highway 95 bridge was completed. Model calculations were performed using the Finite Element Surface-Water Modeling System for two-dimensional flow in a horizontal plain. This model was developed by the U. S. Geologic Survey, Water Resources Division, for the Federal Highway Administration.

This model was evaluated using dye tracer studies conducted by the Environmental Protection Agency (EPA) in 1990 and 1991. The calculated average flow velocities between the sampling stations along the Savannah River agree with the measured data within 7% except for data measured at the City of Savannah pump station. The discrepancy at that location is 41.1%. The flow in that section is strongly affected by tides, which the present steady-state model does not simulate. This discrepancy should be reduced when a transient model is used. In the transient model, the time-dependent water elevation at the downstream end of the model will be simulated. This work is documented in the SRT-ETS940287.

Par Pond Aerial Gamma Survey Report

H. E. Mackey

The Environmental Technology Section received a report entitled, "A Comparison of Four Aerial Radio logical Surveys of Par Pond and the Surrounding Area, Savannah River Site, Aiken, SC, Dates of Surveys: 1989-1992, EGG 11264 1009, September 1993". This report summarizes a series of aerial gamma radiation surveys conducted over Par Pond in 1991 and 1992 as its water level was lowered. An April 1989 aerial gamma survey was used as baseline data for comparing the report surveys, which were conducted in August and October 1991 and August 1992. The comparisons revealed that significant changes occurred as the Par Pond water level was lowered and that activity in Lower Three Runs Creek varied slightly as the flow rate changed during pumping. These changes were directly related to the moisture variations (Par Pond water level lowering, rain fall, and stream flow) between the survey periods. The only man-made gamma emitter that was detected during the four surveys was ^{137}cesium.

Saltstone Facility Groundwater Monitoring

R A. Hiergesell

Representatives from the South Carolina Department of Health and Environmental Control (SCDHEC) visited SRS on January 5, 1994 to discuss groundwater monitoring of the Saltstone Facility and to tour it and the DWPF. SCDHEC proposed a ground monitoring system for the Saltstone Facility in a draft industrial waste permit, which calls for installing an individual monitoring well within 25 feet of each vault and bi-annual sample collection and analysis. Presentations were made to familiarize the visitors with the facility and the performance assessment process. R. A. Hiergesell made a presentation on an alternative groundwater monitoring system. This alternative system proposes that any decision regarding the number and location of wells be delayed until after a study of optimum closure cap configurations is completed. It is expected that optimal long-term performance of the facility will be realized with a continuous clay cap over all of the individual vaults. If this is shown to be the case, close-in monitoring at each vault will not be possible. SCDHEC representatives were receptive to the concerns, but wanted to review the performance assessment document before responding to the SRS alternative groundwater monitoring proposal.

Ecological Risk Assessments

J. B. Gladden

A meeting of the Ecological Risk Assessments Task Group of the EH-231-sponsored Risk Based Standards Working Group was held at the Rocky Flats Plant the week of January 31, 1994. Representatives from most DOE sites were in attendance. The group reviewed two guidance documents being prepared, received a demonstration of the draft Oak Ridge National Laboratory toxicity database and began work on a new charter to bring the task group mission into better alignment with anticipated changes in responsibilities at DOE-HQ. The group discussed issues relating to ongoing and completed risk assessments and received a tour of areas of the Rocky Flats Plant ecological concern.

RESRAD Study of the Old F-Area Retention Basin

D. M. Hamby

A study to determine the dose-based concentration guidelines for the contaminated soil beneath the site of the old F-Area Retention Basin was completed. A report on the findings of the study is under review. The computer package RESRAD was utilized for the soil guideline estimates. Site-specific data were used where available for determining parameters of the groundwater transport and dosimetry models of RESRAD. Sensitive parameters and dominant pathways were determined for potential exposures of a hypothetical resident farmer to strontium-90, cesium-137, and plutonium-238. Calculations included soil guidelines as functions of contaminated area and the determination of hot spot concentration guidelines.

M-Area Vadose Zone Sampling Extracted Air PCB Concentrations

T. Jarosch, S. Burdick, and B. Looney

Over the last two years, Environmental Restoration (ER) and SRTC collected and characterized a residual chlorinated solvent phase from the sumps of wells MSB3D and MSB22. This solvent, a dense nonaqueous phase liquid (DNAPL), contains primarily tetrachloroethylene and trichloroethylene. Recent analysis indicates that low levels of polychlorinated biphenyls (PCB) are also associated with this material. At the same time, a large ER project is progressing to implement full-scale vacuum extraction in M Area. SRTC provided PCB analysis of air extracted from the M-Area vacuum extraction wells and the two monitoring wells where DNAPL was collected. Results from the first well sampled (MSB22) showed nondetectable PCBs in the air (at concentrations < 0.001 mg/m^3). The analytical work required fabrication of a specialized sample cart for extracting the sample and loading any PCBs in the air on glass tubes packed with Chromosorb C. Additionally, a sensitive analytical method for analyzing the loaded tubes was required. Both of these development activities are complete and sampling of the wells is underway. The sample cart consists of a high volume pump for drawing down the well, a smaller pump for loading sample tubes, a mass flow meter for measuring the amount of air sampled, alternative sample ports, and necessary valves. All of the lines are heat traced to minimize potential loss of PCBs. The cart, mounted on pneumatic tires for ease of transport to the various sample locations, was constructed with available and excessed equipment. The analytical method utilizes a desorber attached to the Viking gas chromatograph-mass spectrometer. The analysis utilizes selective ion monitoring and provides stable operation and low and defensible detection limits (well below regulatory limits or any levels impacting the treatment process).

A/M Area Groundwater Support

J. Haselow

The Environmental Sciences Section (ESS) Groundwater Group prepared a position statement in support of the Metallurgical Laboratory Basin Part B Permit that helped Environmental Restoration to successfully argue that the Crouch Branch Aquifer (formerly Black Creek) should not be included in the uppermost regulatory aquifer near the MetLab Basin. This position was taken in response to Notice of Deficiencies (NODs) given to DOE-SR by SCDHEC for the MetLab Part B.

Sanitary Landfill Bioremediation Treatability

T. Hazen, C. Fliermans, K. Lombard, D. Jackson, C. Bemy, and M. Franck

The Environmental Sciences Section's Biotechnical Group personnel completed the treatability study of the sanitary landfill and sent the data to CDM-Denver. Currently, the CDM's final report is under review. Data to date show methane stimulated microbes are capable of degrading concentrations of TCE and VC over 100,000 ppb to less than 10 in 14 days.

Integrated Demonstration Program Review

Environmental Sciences Section and Environmental Restoration Section

The Integrated Demonstration mid-year review was held on February 2-3, 1994, in Augusta, GA. Presentations by principal investigators summarized the technical work completed under the demonstration and detailed many activities and issues dealing with successful phase out of the integrated demonstration. During the meeting, interviews with the principal investigators were videotaped. The video footage will be used to prepare a demonstration summary videotape that will be submitted as part of the phase-out documentation.

Characterization and Monitoring

R L. Nichols and C. A. Eddy-Dilek

Comprehensive data evaluation and presentation is an essential component of cost-effective environmental characterization and remediation. Throughout the characterization and monitoring activities completed as part of the Integrated Demonstration Project, new computational techniques were used and developed for digital imaging and video animation of environmental data. This work resulted in a new ability to communicate complex environmental issues and concepts in a format easily under stood by individuals with a diverse range of technical abilities. A videotape titled, "New Technologies for Clean Up of Solvents—The SRS Integrated Demonstration", was completed. This videotape summarizes general activities completed during the *in situ* air stripping and bioremediation demonstrations. Three-dimensional modeling and visualization software were adapted and used to model changes in contaminant distribution during the subsurface *in situ* air stripping/*in situ* bioremedciation and for pump and treat remedial systems.

DOE-SR approved the overview report on characterization and monitoring technologies for release. The report summarizes the results of field demonstrations of innovative characterization and monitoring technologies funded as part of the Integrated Demonstration. Technologies for measurement of physical parameters include the *in situ* permeable flow sensors and the colloidal borescope for measurement of groundwater flow and seismic, electrical, and electromagnetic tomography for three-dimensional imaging of physical changes induced by the remedial process. New technologies for depth-discrete sampling include the passive multilayer groundwater sampler and the arrayed vadose zone sampler. Innovative technologies for chemical analysis include the fiber optic trichloroethylene (TCE) sensor for remote detection of TCE and chloroform, the photoacoustic arrayed wave sensor (PAWS) and the HaloSnif for continuous, online measurement of total chlorinated compounds over a wide dynamic range, and the direct sampling ion trap mass spectrometer for compound specific determination of organic analytes at concentrations down to parts per billion levels. The report is being printed for distribution.

Ohmic Heating Demonstration

T. Jorosch and C. A. Eddy-Dilek

The collection of post-test characterization cores at the ohmic heating demonstration site was completed during the third week of January 1994. Collection of cores for the post-test characterization was initiated in December 1993. Five continuous cores were collected while the ground was still heated (approximately 80°C) to collect samples that were representative as possible of post-heating conditions. An additional two

borings were collected in January 1994 after the ground cooled to 50°C. Analysis of post-test sediment samples is underway and a letter report summarizing results will be provided to Pacific Northwest Laboratory (PNL) by March 7, 1994. A report summarizing pre-test characterization activities done at the ohmic heating demonstration site was provided to PNL on December 23, 1993. The data included a general description of the site geology, sample and analysis procedures for sediment samples collected at the site, and tabulations of grain size distributions, pretest moisture content, and the volatile organic compound content of the sediments. The final characterization report will be completed on schedule (June 30, 1994).

Ion Trap Mass Spectrometer

J. Rossabi

DOE-SR approved the draft of a report on the use of the ion trap mass spectrometer (IT-MS) for analysis of groundwater from well characterized wells. Analytical results obtained with the IT-MS are compared to results obtained using baseline methods. The goal of this task is to validate the use of IT-MS as a screening device for groundwater samples from well characterized wells. J. Roassabi made a presentation in January 1994 to DOE-SR, the South Carolina Department of Health and Environmental Control, and the Environmental Protection Agency, Region 4. The presentation was well received and discussions focused on use of the IT-MS for sample minimization and use in future remedial investigations. If regulatory approval is obtained, the IT-MS will be used instead of offsite laboratories for a selected suit of wells. This activity should result in a significant reduction in the number of samples sent offsite to commercial labs for analysis.

Barometric Pumping Program

B. Riha, B. Pemberton, C. May, and J. Rossabi

A patent disclosure for a new valve (Baroball) used to control barometric pumping was filed. The inexpensive valve incorporates technology originally developed for heat transfer experiments at SRTC. The valve consists of a ping pong ball and ball seat in a tube mounted vertically to allow one-way flow with low cracking pressure from vadose zone wells when the subsurface pressure is higher than the surface pressure. These valves require little maintenance and are extremely inexpensive to procure, which makes the Baroball ideal for the barometric pumping process.

Data and the conceptual test plan from the barometric pumping experiment were presented to members of the Characterization and Monitoring, and Remediation DOE technical support groups for the Integrated Demonstration Program. Preliminary flow and pressure data from a well incorporating the newly developed Baroball technology were shown indicating the viability of the system to control flows from barometrically pumped wells.

Dense Non-Aqueous Phase Liquid Characterization and Remediation Program

B. Looney, J. Rossabi, T. Jarosch, C. Eddy-Dilek, D. Tuck, S. Burdick, and J. Jordan

N. Hayden, a winner of the DOE Junior Faculty Award at the University of Vermont, presented her work on cosolvent flushing remediation to the SRS Dense Non-Aqueous Phase Liquid (DNAPL) committee. Collaborative research opportunities involving the University of Vermont and SRS were discussed and will be planned in the coming months.

A request for proposal for the purchase of the high-resolution video camera was sent to equipment vendors. This color camera will be supplied with external lighting equipment and a variable focus lens. The camera and lighting source will be remote controlled and capable of operation at depths up to 200 feet. This camera will be used to do high-resolution video surveys of wells suspected to be impacted by the presence of DNAPL.

A team from SRTC and the Environmental Restoration Department initiated the demonstration and testing program for technologies related to residual solvent contamination in soil and groundwater. Such

contamination by dense nonaqueous phase liquids is an important segment of the M-Area soil and groundwater plume. Characterization monitoring and clean up methods targeted at this portion of the plume will substantially improve the long-term effectiveness of the groundwater cleanup. By creatively and carefully determining the nature and extent of the DNAPL portion of the plume and enhancing removal of the contamination from these critical areas, the cost of contaminant removal can be greatly reduced. The following activities were completed on this program completion of interagency agreement scope of work with the United States Geological Survey for geophysical support; completion of procurement package for competitively bid subcontract studying critical interfacial tension values leading to mobilization; meetings with EPD to formulate regulatory strategy with respect to applicable regulations (e.g., the Resource Conservation and Recovery Act, the Toxic Substance Control Act, and underground injection control), meetings with Waste Management to develop the waste handling strategy and the path forward, weekly project team meetings, and approximately 50% complete on alcohol solubilization characterization test plan.

Test Platform Facility

J. Rossabi, B. Riha, and B. Pemberton

A meeting of the advisory team for the Environmental Technology Development Test Platform was held in Columbia, SC to select the technologies that will be tested in the first field test activity scheduled for the end of August 1994. The team consists of members of the South Carolina Department of Health and Environmental Control, the Environmental Protection Agency, Region 4, public representatives, university professors, and SRS personnel. The goal is to facilitate regulatory acceptance and transfer innovative technologies for environmental characterization, monitoring, and remediation.

A draft test plan for conducting work on the Environmental Technology Development Platform project was completed. The plan describes the two field deployable gas chromatographs chosen for the initial demonstration, outlines the testing parameters for instrument evaluation, and describes the sampling and analysis procedures.

Gas Phase Bioreactor

C. Berry

C. Berry performed an onsite inspection and technical verification of the offgas bioreactor unit in Seattle, WA. The system will treat ~10 SCFM trichloroethylene, PCE, and tetrachloroethylene contaminated air obtained from the A-14 outfall. The unit consists of three large plastic tanks and a 7-feet by 12-feet skid with a 24-feet scrubber unit. This project will be visible from D Road. The system should arrive on February 16 or 17, 1994. ECOVA personnel will arrive on February 22, 1994 for startup activities. The system is scheduled for start up on March 8, 1994.

Methane Injection Demonstration Modeling

T. Hazen, C. Fliermans, K. Lombard, and M. Franck

A Los Alamos National Laboratory draft report of their modeling work was received. Basically, they have shown using a history-matching model that bioremediation removes 43% more than *in situ* air stripping alone. In addition, *In Situ* Bioremediation (ISB) allows you to remove 95% in four years or less versus more than ten years for *In Situ* Air Stripping (ISAS). ISB also allows you to get to drinking water standards where as ISAS may never allow you to get to those levels (i.e., < 100 ppb). This is for the methantrophic biostimulation demonstration with trichloroethylene/tetrachloroethylene.

Waste Management

Assessment of the Material Properties and Aging Degradation Mechanisms of Savannah River Site Waste Tanks

B. J. Wiersma and R. L. Sindelar

Several Savannah River Site (SRS) groups were combined to develop a comprehensive waste tank structural integrity strategy. Initially, the groups identifying key issues that determine and/or affect the condition of the functional components (i.e., carbon steel liners, concrete vaults, cooling coils, etc.) of the waste tanks. As part of the strategy, the Materials Technology Section is providing input on the material properties of the components and the potential aging degradation mechanisms that may occur in the tanks under service conditions.

A report that will list the material properties of the tank liners, cooling coils, and concrete vaults is being prepared. The inspection data for these components will also be reviewed to determine the extent of degradation (i.e., wall thinning, cracking, and pitting) that occurred while the tanks were in service. Finally, the potential for further degradation during current or future service conditions by corrosion or mechanically induced mechanisms will be evaluated. This data will be useful for performing structural analyses of the tanks that may experience waste removal and seismic conditions and for determining if additional in-service inspections are necessary to assess the tank integrity. A rough draft of this report will be prepared by the end of March 1994.

WSRC and Westinghouse Hanford Company Joint Slurry Pump Program

M. J. Dalmaso

WSRC and the Westinghouse Hanford Company (WHC) are participating in a joint slurry pump development program. The goal of the program is to develop an advanced design slurry pump that eliminates the problems associated with the current technology at SRS and Hanford. By participating in a cooperative program, each site will benefit by sharing expertise and resources, improve cost-effectiveness, and prevent duplication of effort.

A performance-based pump specification is being used to solicit proposals. This type of specification allows the vendors to propose new and innovative technologies. The specification is complete and the Request for Proposal was issued. Vendor proposals are due in March 1994. A Source Evaluation Board (SEB) was established to evaluate the proposals. Two of the five SEB voting members are WSRC personnel. Other SRS personnel will provide technical assistance to the voting members. The SEB expects to begin evaluating the proposals in April 1994.

Analysis of Tank 41H Salt Cake Samples

D. T. Hobbs and C. J. Coleman

Three salt cake samples taken from Tank 41H on July 12 and 13, 1993 were analyzed for chemical and radiochemical content, identification of crystalline phases, and solubility in inhibited water. These results were compared to the results for the earlier sample taken in March 1993. The maximum total uranium content of the as-received samples ranged from 3.0 to 7.3 μg/g, with a maximum uranium-235 enrichment of between 15% and 16% at the 95.2% (2s) confidence level. The maximum total plutonium content ranged from 0.034 to 0.061 μg/g with a maximum plutonium-239 enrichment of between 26% and 32% at the 95.2% (2s) confidence level.

Based on the data, uranium appears to be distributed uniformly radial, but not vertically in the top 12-inch layer of the salt cake. There was approximately a factor of two difference in the uranium content between the top sample (6.0 μg/g) and the bottom sample (2.7 μg/g). The samples were comprised of a mixture of light and dark solids. The light-colored solids readily dissolved in inhibited water. Uranium and plutonium were not uniformly distributed among the white and dark solids. Less than 5% of the total plutonium, but 63-82% of the total uranium, was determined to be associated with the water-soluble solids fraction of the samples.

Based on the chemical and radiochemical analytical results, the solution that will be produced upon dissolution of the salt cake would have the following impacts on in-tank precipitation (ITP) processing:

- The salt solution in Tank 48H will exceed the current process requirement for the insoluble solids content of no more than 400 mg/L.
- The removal of strontium-90 would not be necessary to meet the recommended Saltstone feed requirements.
- The amount of potassium tetraphenyl borate precipitate that will be produced in the ITP process will be 10-25% of that based on the average flowsheet.

Complete details of the analyses can be found in "Analysis of Tank 41H Saltcake Sample #2 and Comparison to Sample #1 (U)", (WSRC-TR-93-054).

Ion Exchange

M. L. Meyer, L. L. Kilpatrick, and D. A. Boyce

The construction estimate for the first design change package (DCP) was received ($97.5 thousands) and work is anticipated to begin on February 14, 1994. This estimate includes a $35,000 savings from the design estimate. Savings were realized from an alternative construction proposal by using an existing tanker truck loading station and running additional pipeline rather than constructing a new truck unloading station. The first design change package includes civil and structural changes to the facility, such as tank movements and dike construction. Revision 0 of the second DCP was received on January 17, 1994. SRTC and Site Services Division personnel reviewed the design and forwarded comments to Ebasco (the design agency). The construction estimate for the second DCP is anticipated on February 28, 1994. This DCP covers piping, mechanical, and instrumentation and controls. The third DCP package was received on February 15, 1994 with an anticipated construction estimate completion by March 1, 1994. The final DCP includes the electrical design. All construction estimates and start dates are based on timely submission of the design documentation.

SRTC is working with Procurement and Materials Management to resolve questions from British Nuclear Fuels Limited (BNFL) regarding the SKID support scope of work. SRTC is also investigating an alternative means to have the contract funded through the Westinghouse Hanford Company.

Viton-A O-Rings in Cajon VCO Fittings

T. E. Skidmore and G. T. Chandler

The Defense Waste Processing Facility (DWPF) melter electrode cooling water lines use Cajon VCO fittings with Viton-A O-rings. The O-rings are expected to receive a maximum unshielded integrated dose of 2×10^7 rads over the two- to three- year melter life. DWPF Process Engineering requested that the DWPF Materials Committee determine if the Viton-A O-rings are acceptable for use at this dose.

Although data on specific compounds and properties is limited, generic data on the O-rings indicates an approximate 22% loss in tensile strength and a 65% loss in elongation at break after exposure to 2.3×10^7 rads. Although the 65% loss in elongation appears to be severe, these properties are secondary to seal performance. Compression set resistance is much more significant, especially for dynamic seal performance. In a static seal, greater compression set, or permanent deformation, can be tolerated. In addition, some degree of swelling will occur due to water exposure. A 10% increase in section thickness or volume is considered nominal and often compensates for compression set due to radiation-induced crosslinking.

One onsite example of successful use of Viton-A O-rings above 1×10^7 rads can be seen in the SRTC Gammacell and cobalt-60 pit sources. Viton-A O-rings are used to seal the exposure vessels during testing, offering satisfactory performance after multiple exposures to dose rates as high as 2×10^6 rads/hr.

EPDM compounds offer a higher radiation resistance than Viton-A O-rings in addition to superior compression set resistance and resistance to high-temperature water, steam, and alkaline solutions. The committee recommended that DWPF determine the feasibility of replacing the Viton-A O-rings with the EPDM compound or equivalent O-rings for future use.

Support to Low-Level Mixed Waste Vitrification Program

J. C. Whitehouse

A purchase requisition and Statement of Work were prepared to support procurement of a Transportable Vitrification System (TVS). The TVS will be the second phase of a project to treat actual mixed waste. After crucible and pilot-scale testing of the candidate waste stream, the TVS will be used to vitrify significant quantities (tons per day) of waste. Placement of the purchase order for the TVS is anticipated by mid-March 1994.

A SCUREF contract was placed with Professor R. Schalkoff of Clemson University's Electrical and Computer Engineering department to develop an advanced control system using "fuzzy logic". The project will include developing algorithms using "multi-valued logic" and applying the resulting software to one of the joule-heated melters at Clemson. Work will be completed over the next 18 months.

Offgas Components Test Facility

J. F. McGlynn, D. B. Burns, and C. B. Miller

The Offgas Components Test Facility (OCTF) will evaluate the operating performance of the CIF offgas design, including system operability, equipment performance, and start-up support.

Component checkout on the OCTF began on January 24, 1994. Operation support for the OCTF was delegated to CIF shift supervisors. The shift supervisors are responsible for carrying out all start-up activities.

A formal component checkout plan is being followed to evaluate each equipment item. Various flange leaks were located and will be corrected. After repairing a few leak corrections, the job plan will be completed in early March 1994.

The component checkout plan is required to ensure that the components are installed correctly and free of leaks. After completing this checkout, each specific system of the OCTF (air flow control, scrubber system, quench system, HCl addition, particulate feeder, etc.) will be evaluated per design specifications. System check-out will be complete in April 1994.

Comparison of Performance Assessment Limits

E. L. Wilhite and J. R. Cook

At the request of D. Shank, estimates of disposal limits from other DOE Performance Assessments (PA) were made to provide a basis for comparison with the limits developed from the EAV PA. Limits for selected radionuclides (hydrogen-3, carbon-14, cobalt-60, nickel-59, nickel-63, niobium-94, strontium-90, technetium-99, iodine-129, cesium-137, uranium-234, uranium-235, uranium-238, neptunium-237, plutonium-239, plutonium-241, and curium-242) for several PAs, including the EAV PA, were presented in tabular form. The results are documented in (SRT-WED-94-0055, Rev. February 3, 1994).

General

100-Area Fuel Consolidation Support Activities

R. L. Reed

Proposals to increase the fuel storage capability in the 105-K Assembly and the Disassembly Area are being studied. A report, SRT-CMA-93-0062, examines aspects of criticality potential for Mark 22 assemblies after damage to borated concrete fuel storage racks in the Assembly Area (see the September 1993 SRTC Monthly report).

RED proposed increasing the number of bundles stored in a slot in the Horizontal Storage racks from two to three. Under Task Plan 93-006-I-E-1, the Applied Physics Group examined the changes in the subcriticality margin from current storage configurations and a proposal for grating be placed above the Horizontal Storage racks to prevent a dropped fuel bundle from increasing the reactivity of the filled storage racks. Calculations (HRXN-KENO and MGBS-TGAL) indicate that three fuel bundles per storage slot is adequately subcritical and that a grating that will maintain a spacing of six inches or more between the storage array and a dropped fuel bundle is adequate to maintain subcriticality. A report, SRT-CMA-93-0074, documenting the calculations and evaluation was issued.

Westinghouse Nuclear Fuels Facility

J. F. Mincey

Comments on the double contingency analysis procedure and example were resolved and the final version was submitted to Columbia. This example was for UNH Bulk Solution Storage Tanks.

Columbia also requested that examples be prepared for using the XSDRNPM 1-d SN code (from the PC-SCALE 4.1 package) to do searches for specified K_{eff} values. Examples on doing outer radius and variable inner zone searches were prepared and transmitted.

New Computer Codes

K. A. Niemer, K. E. Hammer, and J. F. Mincey

MCNP-4A and SCALE 4.2 were installed on the Applied Physics RISC 550. The latest release of the TWODANT code was also requested, but has not been received. An interim configuration control plan was drafted to comply with 1Q34 and E-7 critical software requirements.

In addition, IBM compatible computer versions of MCNP-4A and the Oak Ridge National Laboratory SCALE criticality codes (PC-SCALE 4.1) were obtained and tested on 80386 and 80486 CPU machines. While useful for non-critical scoping calculations, they also appear as a promising way to learn the mainframe and workstation versions of the codes without interfering with production calculations.

Disassembly Basin Sludge Cleanup in K Area

R. L. Reed

RED analysis (WSRC-TR-93-613) of K-Disassembly Basin sludge sample results indicate that the total fissile mass sludge exceeds subcritical mass limits (American Nuclear Society standards) and concentrations of fissionable material are insufficient to support criticality. Neutron absorptive characteristics of other materials, including uranium-238, in the sludge provide additional margins of safety. The Applied Physics Group (APG) performed GLASS and KENO calculations as confirmatory calculations. Comments were provided to RED and are being resolved.

Field Procurement Engineering Activity

K. A. Friedrichsen

Savannah River Technology Center (SRTC) processed 354 requisitions in February 1994, with a rejection rate of 3.7%, compared to a site average of 5.4%. After construction, SRTC has been the largest originator of requisitions for the last two years.

The Environmental Safety, Health, and Quality Assurance department completed a "Quality Assurance Assessment" of our Field Procurement Engineering Group as part of a sitewide evaluation of program controls in place by the 22 FPE groups. The results of the evaluation are expected soon.

Subcontract Technical Representative Activity

K. A. Friedrichsen

The Procurement department's Subcontract Technical Representative (STR) Site Coordination Group performed the yearly self assessment of SRTC's STR program, reviewing approximately 10% of the subcontracts. A final report is not complete, however, comments indicate an improvement over last year's assessment.

SRTC Safety Support

S. P. Tinnes, R. C. Edwards, C. L. Smith, et al.

SED Trap Removal

Review meetings were held on February 18, 1994 with P. Rice (WSRC consultant), the facility custodian, and DOE-SR to review the SED trap removal/assay plan. The meetings included a "walkdown" of the SED facility and briefings on the SED safety documentation, the trap removal/assay procedures, the schedule, different issues and concerns, and the SED decontamination and decommissioning program.

A meeting with H. Massie of the Defense Nuclear Facility Safety Board was held on February 24, 1994 to review and provide an explanation of the safety risk of the SED facility of the SRTC technical area. A walkdown of the facility was included. M. Cowen presented talks on the "Current Status of the SED Authorization Basis" and the "Safety Risk of SED Versus SRTC". The facility custodian presented talks on the "Schedule and Plans for Trap Removal and Characterization" and the "Status of the WSRC Readiness Self-Assessment and DOE Review". B. Marcey (of National Environmental Protection Act activities) presented, "Status of the Environmental Assessment". DOE-SR reviewed the "DOE Review and Approval Process for Safety Documentation".

SRTC Safety Documentation Task Technical and Quality Assurance Plans

The Task Technical Plan and the Task Quality Assurance Plan for preparation of the 5480.23 Safety Analysis Report and 5480.22 Technical Safety Report for the SRTC Technical Area were completed. Draft copies were distributed to the STD Functional Area Technical Leads (13 Technical Leads) and the SRTC Quality Section representative for review and approval.

SRTC Technical Area Potential Issues

The following SRTC Technical Area "Potential Issues" were closed by the Potential Issue Committee (see SRT-TML-940021). The issues are being tracked by Unreviewed Safety Question Determinations and/or the SRTC Basis for Interim Operation (BIO).

- "Fire Risk from Flammable Gas and Distribution Lines" (PI93-014)
- "Proposed SRTC Radionuclide Working Inventory Levels" (PI93-008)
- "Classification of SRTC 703-A/700 Area Reconfiguration Visitors in SRTC SAR/BIO Bounding Accident Analysis" (PI94-004)

SRTC Public Access Potential Issue

A "Potential Issue" concerning how "general public" visitors to SRS are treated in the SRTC Safety Analysis Report (SAR)/Basis for Interim Operation (BIO) bounding radiological accident analysis was identified (SRT-TML-940008). "General public" visitors were always allowed free access to the 700-Area parking lots, cafeteria, the credit union, and other general facilities. Recently, unescorted visitors, that have no emergency preparedness training, were allowed unlimited access to most of Building 703-A. These "general public" visitors could result in new definitions for "offsite personnel", "co-located workers", or "facility workers" in the SRTC safety analysis. If distances defining "offsite personnel" or "co-located workers" are

reduced in the SRTC SAR/BIO, dose limits for the bounding accidents in the present and proposed SRTC authorization bases could be exceeded.

Open Access Reconfiguration Plan

At the request of DOE, reconfiguration of SRTC to allow a more open access for "uncleared" visitors is being evaluated. A SRTC Reconfiguration committee is active and has representatives from all "stakeholder" groups. The committee met many times during the month and evaluated different reconfiguration options for reduced limited access areas and pocket limited access areas.

The visitors would be allowed access to the facilities with or without an escort but after watching a videotape of abbreviated emergency preparedness training, or without an escort or emergency preparedness training. A 3 x 3 matrix that shows each reconfiguration option versus each visitor escort/training option was developed. In each matrix block (nine options), safety, radiation control, emergency preparedness, SRTC mission, security, worker productivity, cost, and liability are qualitatively evaluated.

The committee recommended a reconfiguration plan that calls for a reduced limited-access area with visitors having abbreviated emergency preparedness training and no escort. A reduced limited-access area was defined and the Project Department prepared a cost estimate. The estimated cost is $1.46 million and is expected to be completed in approximately one year. The reconfiguration plan will be presented to upper management for review and approval.

SRTC Natural Phenomena Hazards

A program was initiated to determine the natural phenomena hazards (NPH) and structural qualification of SRTC facility structures, systems, and components. A scope of work was provided to the Engineering and Project Division (E&PD) Structural Mechanics for evaluation. E&PD plans to conduct a quick walkdown of the facilities to finalize the schedule and the cost estimate for the seismic evaluation.

SRTC Operational Safety Report Support

C. L. Smith, S. P. Tinnes, and R. C. Edwards

Work continues with SRTC Laboratory Services representatives on a program to update the SRTC Operational Safety Report (OSR) to be more consistent with SRTC Safety Analysis Report (SAR)/Basis for Interim Operation (BIO) requirements. The SRTC OSRs contain many requirements that are non-essential to mitigation of SAR/BIO postulated accidents. Draft OSR revisions were prepared and reviewed with the facility custodian for the following items:

- sand filter exhaust system (LCO 3.2.1)
- diversion hood exhaust system (LCO 3.2.2)
- Section F exhaust system (LCO 3.2.4)
- Section B and C central hood exhaust system high-efficiency particulate air (HEPA) filters (LCO 3.2.7)
- Section B and C shielded area exhaust system HEPA filters (LCO 3.2.8)
- 792-A 600 kW standby diesel generator (LCO 3.4.1)
- B060 400-kW standby diesel generator (LCO 3.4.2)
- Section F 125-kW standby diesel generator (LCO 3.4.3)

The OSR "Administrative Controls", Section 6.5.13, was revised to supplement and reinforce the proposed OSR changes. On February 13, 1994, a revised copy of the draft OSR Change Request Package 94-0001 was distributed for review. Comments were received by February 18, 1994 and appropriate responses were incorporated into the package.

Informal comments were also received from B. Farris of the Facility Safety Evaluation Section. These comments are being addressed and incorporated into the package, as applicable. A meeting to discuss the package was held on February 23, 1994 between Facility and TMLA&L personnel. The meeting included Facility Engineering, Technical Area Operations and Services, Maintenance, and ALARA. There

was general acceptance of the scope of the package and its approach. The final cleanup is being performed and will be ready for distribution for formal WSRC review the week of February 28, 1994, barring additional changes.

Items of Interest

E. Wilhite chaired a meeting of the DOE Performance Assessment Peer Review Panel (PRP) in Dallas, Texas on February 9 and 10, 1994. The meeting was the first in a series of meetings to review the Hanford Grout Performance Assessment (PA). The Grout PA was reviewed and rejected by the PRP earlier.

M. Hay attended a product demonstration seminar on the latest release of LabView Data Acquisition and Control software. This product is a graphical programming language that may be used to control mechanical devices and switches while acquiring data from sensors and detectors. The software is compatible with and portable between, Macintosh and Windows platforms. This software is being used in many onsite organizations. The company also sells data acquisition hardware.

The Equipment Engineering Section (EES) provided High-Level Waste Engineering (HLWE) with a preliminary Salt Core Sampling system concept and operating steps. HLWE is looking into two methods for sampling and removing the salt from the tanks, One method involves taking a sample, analyzing it, dissolving the sampled salt layer for transfer, and repeating the process. The other method involves taking continuous samples for analysis dissolving the salt and removing it from the tank. EES has preliminary concepts for both methods.

EES delivered two video push-probe type systems to Waste Management for inspection of the Tank 38 Gravity Drain Line (GDL). The probe must enter the 2" GDL via a 1" line that requires the probe to be less than 1" in diameter. A probe approximately 4/5" in diameter was delivered and inserted into the line. A 3/4" valve in the 1" line would not allow the probe to pass, which required that a second probe approximately 11/16" in diameter be fabricated. A color lipstick camera probe with a built-in light and a secondary light assembly were provided.

In-tank precipitation (ITP) personnel requested that EES write a proposal and cost estimate for replacing the cameras and associated equipment within the ITP Filter building. Since the installation of the current cameras, many advancements in the area of radiation-hardened video equipment were made. Upgrading the equipment would greatly increase the reliability, useful life, and quality of the pictures.

ITP personnel requested that EES provide equipment and technical assistance for performing a stroke-time test on two fast-acting valves installed in 241-96H. EES provided a calibrated strip chart recorder to record the time lapse between the operation of the solenoid and the valve.

EES successfully tested the Cooling Coil Pressure/Flow Inspection Technique under ideal conditions in an all-plastic, small-scale mockup. The mockup is also being used as the initial test bed for software development. Once the software is fully functional, a carbon steel section of tubing will be installed in the small-scale mockup, and a test of the technique under more realistic conditions will be performed.

High-Level Waste Engineering (HLWE) requested that EES HLWE investigate the cause of unexplained current readings for the 1H CST Recirculation and Drawoff pump motors. Each motor is three-phased and the current in two phases were high. Visual inspections of the motor wiring were performed and voltage and current measurements were taken during operation. No hard failures were found in the starter cabinets or external wiring that could be specifically be pointed to as being the cause of the unbalanced current draw of either motor.

Presentations

E. Wilhite, at the request of Defense Nuclear Facilities Safety Board (DNFSB), made a presentation on the DOE Performance Assessment Peer Review Panel to the DNFSB in Washington, DC on February 1, 1994.

J. Fast presented, "Atmospheric and Dispersion Modeling in Areas of Highly Complex Terrain Employing a Four-Dimensional Data Assimilation Technique", at the Eighth Joint Conference on Applications on Air Pollution Meteorology with Air and Waste Management Association in Nashville, TN, on January 27, 1994. The authors were J. Fast and L. O'Steen.

D. M. Hamby gave a presentation to representatives of the South Carolina Department of Health and Environmental Control and Environmental Protection Agency on the preliminary results of soil concentration guidelines calculated for the old F-Area Retention Basin.

C. A. Eddy-Dilek gave a presentation at the Characterization, Monitoring, and Sensor Technology meeting in Denver, CO.

T. C. Hazen gave seminars to the WSRC Environmental Restoration Department on the SRS Sanitary Landfill Treatability Study in January 1994 and sOILS Facility for Bioremediation of Petroleum Contaminated Soil in February 1994.

T. C. Hazen gave two presentations on the DOE Office of Technology Development Integrated *In Situ* Bioremediation Demonstration—Mid-Year Review in February 1994. One presentation was made in Augusta, GA and the other was made in Houston, TX.

J. A. Bowers presented, "HOPS: Mainframe Performance on a Desktop Computer", at the January 1994 SRTC technical session. The purpose of this presentation was to inform SRTC managers and professionals about the HOPS software system.

T. C. Hazen presented a proposal entitled, "Methantrophic Bioreactor Demonstrations", in January 1994 in Los Alamos, NM, to the Scientific Advisory Board, Strategic Environmental Research and Development Program.

Publications

D. M. Hamby wrote, "A Numerical Comparison of Sensitivity Analysis Techniques", which was submitted for publication in *Health Physics*.

T. C. Hazen prepared a guest editorial, "*In-Situ* remediation: The Hope and the Hype", *Centerpoint*, 1:15 (1993) (publication of the USEPA Hazardous Substance Research Centers).

R. W. Gorden, T. C. Hazen, and C. B. Fliermans co-authored "Rapid Screening for Bacteria Capable of Degrading Toxic Organic Compounds", in the *Journal of Microbiology Methods*, 18:339-347 (1993).

T. C. Hazen wrote, "Full-Scale Demonstration of *In Situ* Bioremediation of Chlorinated-Solvents at SRS" of the January 1994 issue of the *South Carolina Engineer*.

B. L. O'Steen wrote, "Numerical Simulation of Nocturnal Drainage Flows in Idealized Terrain", for the Sixth Conference on Mesoscale Processes. This conference is sponsored by the American Meteorological Society. The abstract is based on work done at SRTC for the OHER Atmospheric Science in Complex Terrain program (ASCOT).

Other

A. H. Weber, B. L. O'Steen, J. D. Fast, and J. Stewart gave tours of WCAL for National Engineers' Week Teachers.

K. Chen completed a GLEAMS workshop given by the University of Georgia Biological and Agricultural Engineering Department at Tifton, GA. GLEAMS is a code developed by the USDA Agricultural Research Service and the University of Georgia Biological and Agricultural Engineering Department to assess pollutant loads from field areas and to evaluate management alternatives. GLEAMS simulates edge-of-field and bottom-of-root zone losses of pesticides and plant nutrients resulting from climatic conditions and soil management practices.

C. Eddy-Dilek, T. Hazen, K. Lombard, B. Looney, and R. Nichols received George Westinghouse Bronze Awards.

C. May and J. Haselow passed the Professional Engineering License Examination in Mechanical and Chemical Engineering, respectively.

C. Fliermans was appointed to ASHRAE's Environmental Health Committee; *Legionella* Guidelines Committee and Program Committee for another three years. ASHRAE approved a technology transfer program and J. Corey and colleagues will present it at the DOE Technology to ASHRAE Industry in January 1995.

Two patent disclosure statements were prepared for tools that enhance the capability of a cone penetrometer for subsurface characterization. One tool allows for multi-level water sampling and the other is for continuous water sampling during a cone penetrometer push. The tools were constructed at SRS and will be tested during this quarter.

A Patent Disclosure (SRS-94-0023) entitled, "Use of specific algal strains for removing toxic heavy metals from waste waters", by E. Wilde, M. Whitaker, and J. Radway, was recommended for further processing by DOE and is being processed by patent attorney M. Mann and his staff in Columbia, SC.

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