WSRC-TR-93-100-5

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Savannah River Technology Center

Monthly Report

May 1993

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Executive Summary

Reactors

- A report was written to describe the development of a power-dependent JASON physics library for irradiation of Mark 22 assemblies in the first stage of a Mark 22 charge. The library was required and used for the final physics analysis of the K-15.1 charge. (page 5)

- Nuclear Engineering Section representatives visited Oak Ridge National Laboratory (ORNL) on May 11, 1993 and presented proposals for experiments at the Heat Transfer Laboratory (HTL) in support of the Advanced Neutron Source Reactor to be built at ORNL. (page 5)

- The Receiving Basin for Offsite Fuels (RBOF) provides long-term storage for nuclear fuels from research and experimental reactors around the world. A recent inspection of aluminum clad fuels, storage tubes, and aluminum storage racks in water storage from 10.5 - 30 years revealed no signs of visible corrosion on aluminum components. Successful long-term storage is attributed to the low conductivity and low impurity concentration of the deionized water in the basin. (page 5)

- Two Technical Specification Change Requests (TSCRs) are pending. They address minimum staffing requirements and a new set of Technical Specifications for K Reactor in the standby condition. The other proposed TSCRs transmitted to DOE were placed on hold. (page 6)

- Documents that calculate basin water conductivity from ionic concentrations and water quality limits for the prospective lower conductivity of 10 microSiemens/cm were issued. (page 6)

Tritium

- Replacement Tritium Facility (RTF) Technical Management requested that the Hydrogen Technology Section provide test acceptance criteria for the Thermal Cycling Absorption Process (TCAP) system. The initial issue of the TCAP Cold Sequence Integrated System Test Acceptance Criteria, RTF-TC-59, was approved on May 13, 1993. The corresponding "hot" TCAP test acceptance criteria is being developed. (page 7)

- Nuclear Processes Safety Research/TMLA is providing support for safe startup of the Replacement Tritium Facility. The effort included development of certain limiting conditions of operation and support for the review of the DOE Office of Nuclear Safety and the Defense Nuclear Facilities Safety Board safety documentation. (page 7)

- Monte Carlo simulations that directly simulate the palladium hydride isotherm are underway. Isotherms for 300, 400, 500 and 700°K are nearing completion. Preliminary data analysis agrees with experimental data. (page 8)

- SRTC is working to obtain the test weld evaluation program for the Tritium Facility. Equipment necessary to accomplish the mission is available and training is being developed. Evaluation of welds for War Reserve reservoirs will begin in June 1993. (page 8)

- SRTC was integrally involved in the Storage Science Meeting at Sandia National Laboratories in Livermore, California. Eight employees represented SRTC and presented 25% of the papers. (page 8)

- Rapid heating tensile testing of tritium charged and aged NITRONIC 40 stainless steel specimens showed that as little as 0.26 appm of internal helium causes a change from ductile to brittle failure at about 800°C. (page 9)

- An unusual occurrence in the Life Storage Program was identified in April 1993. As a result, a schedule for unloading certain units was developed. In addition, a plan for administrative control for the Life Storage Program was outlined. (page 9)

Separations

- The FB-Line Justification for Continued operation was sent to DOE with comments integrated into the document. During preparation of the Calc-note, minor inconsistencies were discovered in the summation of building inventory. These changes will be incorporated when the DOE comments are closed. (page 11)

- The Separations Department is analyzing solids in two F-Canyon tanks. The latest results show that no plutonium exists in one of the tank solids and a trace amount exists in the other tank solids, which is an indication that addition of the nitric acid/boron and agitation redissolved most of the plutonium found earlier. (page 11)

- Organic material was found in samples of the H-Canyon tanks that feed Pu-238 to HB-Line. Analyses showed that the material was tributyl phosphate (TBP). Because of this unexplained occurrence, SRTC developed a method to analyze Pu-238 solutions for less than 1 ppm of phosphate. The results showed that the product produced before the problem was within specifications. Analyses were also performed on other tanks and the cold chemical feeds without discovering the TBP source. (page 11)

- SRS is participating in an investigation of the TOMSK-7 explosion to aid in evaluation of DOE facilities for similar potential accidents. The Defense Nuclear Facilities Safety Board (DNFSB) received information on red oil and other significant explosions at SRS. Copies of the Purex Chemistry Course were supplied to the DNFSB to heighten understanding of the processes involved in plutonium/uranium separations facilities. (page 12)

Environmental

- EG&G Mound Laboratories conducted the FY93 aerial multi-spectral scanner (MSS) overflights of SRS. Areas from which MSS data and vertical photography were collected included the Pen Branch corridor and delta and the SRS portion of the Savannah River swamp; Par Pond; M-Area clay cap; Lost Lake; A and M Areas; Tims Branch watershed, including Steed Pond; and F- and H-Area clay caps and seepage areas along Four Mile Branch. (page 13)

- The radiological impacts of 1992 SRS operations were documented in WSRC-RP-93-580. Radiological releases resulted in a dose to the offsite maximum individual of approximately 0.09 mrem from atmospheric releases and 0.13 mrem from liquid releases. As in the past, tritium is responsible for more than 90% of the offsite dose. (page 13)

- The Volatile Organic Analysis Lab was reconfigured for Contract Laboratory Program (CLP) operation. The CLP was originated under the Environmental Protection Agency Superfund legislation to provide an analytical protocol for assessing and ranking national waste site cleanup priorities. This program will enhance the comparability and defensibility of the work performed. (page 13)

- The SRTC pilot project Comprehensive Environmental Response Compensation, and Liability Act baseline risk assessment for the contaminated groundwater plume beneath TNX was completed. The second draft of the report was delivered to Environmental Restoration for review. The final report will be used to support decisions regarding TNX groundwater remediation. (page 13)

- The injection and extraction system using methane stimulation for the *In Situ* Bioremediation Demonstration was shut off. The demonstration spanned 14 months of continuous operation involving four injection strategies for stimulating indigenous, methane-oxidizing bacteria capable of degrading chlorinated solvents in the subsurface. Twenty laboratories from across the country participated in the demonstration. Test monitoring and interim sediment analyses indicated excellent stimulation of methanotrophs and biodegradation of contaminants. (page 14)

- The heating stage for the *In Situ* Radiofrequency Heating Demonstration ended after 24 days of continuous heating. Interim characterization activities were initiated at the site. (page 14)

- Two presentations were made to the Scientific Advisory Board for SERDP for technologies associated with volatile organic compounds in non-arid soils integrated demonstration. A proposal to fund bioreactor demonstrations for cleanup of groundwater contaminated with solvents was accepted for funding under this Department of Defense/Department of Energy program. (page 14)

Waste Management

- Gas pressures resulting from hydrogen-benzene mixture deflagrations in Tanks 48 and 49 were calculated using the Deflagration Pressure Analysis Code

(DPAC), which was written as part of this task. The calculated peak gas pressures are below the pressure required to rupture the primary line (~26 psig). Reports documenting DPAC and the models employed in the code are undergoing technical review. A draft report documenting the results of the ITP waste tank deflagration pressure analysis was completed. (page 15)

- Progress is reported for efforts to define the radiation stability, glass compatibility, and performance behavior of resorcinol/formaldehyde resin. Additional funding was defined to purchase replacement resin for various DOE participants in the testing program. (page 15)

- The Accident Analysis for the *In-Tank Precipitation Process Nitrogen Process System (U)* (WSRC-TR-93-169) was issued. The report documents the basis for declaring deflagration in Tank 48 or 49 an incredible event. (page 15)

- Seven defoaming reagents were tested for use in the ITP stripper columns. SRTC recommended that the defoaming agent remain tributylphosphate. (page 15)

- In a demonstration, the particulate decontamination factor for the in-tank precipitation (ITP) filers was more than 40,000 using a new concentration technique and direct counting of naturally occurring K-40 isotope in the Environmental Technology underground gamma spectroscopy facility. This qualified the ITP filers for hot cesium decontamination. (page 16)

- A program was established to evaluate the glass canister welds, labels, and solid state closure welds for sensitization or embrittlement and evaluate its corrosion behavior. The results will be used to estimate the service life of critical regions of the canisters in the Glass Waste Storage building. Work will begin when canisters are filled during Defense Waste Processing Facility cold runs. (page 17)

General

- An eight week tutorial of the Los Alamos National Laboratory developed Monte Carlo Neutron Photon (MCNP) code will begin in May 1993. The primary focus of the tutorial will be instruction for the SOLCET participants on usage of MCNP for criticality analyses. General discussion of the code's capabilities for application to criticality problems and examples of its advanced features for modeling three-dimensional repeated lattices/arrays will be discussed. (page 19)

- The Materials Technology Section (MTS) is developing materials and fabrication technologies for the spallation and tritium targets for the Accelerator Production of Tritium. Several materials and process options for these target are being evaluated. The MTS program is also being integrated into the long-term plans for technology developed by Brookhaven National Laboratory. (page 19)

- Evaluation of overlay welds on irradiated material is nearing completion as part of the program to develop welding methods to repair stainless steel containing helium. This program, originally initiated to assure a repair method for SRS reactor tank walls, may have significant application for fusion reactor maintenance and existing commercial or naval reactors. (page 19)

Progress and Accomplishments

Reactors

Mark 22 Power Dependent JASON Physics Library

K. A. Niemer

Documentation for the power dependent Mark 22 JASON physics library was written. The report documents the background, design, development, and user instructions for the library, which was required and used for the K-15.1 charge final physics analysis.

The library was created for irradiation of Mark 22 assemblies in the first stage of a standard Mark 22 charge at reactor power levels ranging from 300 to 1500 MW. Fifty-four dependent variables (macroscopic cross sections, diffusion coefficients, and isotopic concentrations) were correlated as a function of the following independent variables:

- U-235 loading of the Mark 22 assembly at the start-of-cycle
- average stage power level in the Mark 22 assemblies
- lithium content of the Mark 22 inner target at the start-of-cycle
- lithium content of the Mark 22 outer target at the start-of-cycle
- stage fission exposure of the Mark 22 assembly

The dependent variables were correlated with 31- and 36-term polynomials. Comparisons and checks of the correlations indicated that the standard relative deviations were less than 1% for most of the dependent variables. The cross sections produced good results in material buckling calculations with the majority of the states having fitting errors of less than 10 micro bucks.

Advanced Neutron Source Reactor

Z. H. Qureshi and J. L. Steimke

Nuclear Engineering Section representatives visited Oak Ridge National Laboratory (ORNL) on May 11, 1993 to present proposals for experiments at the Heat Transfer Laboratory (HTL) in support of the Advanced Neutron Source Reactor to be built at ORNL. Presentations included a description of the capabilities of HTL, a proposal for an experiment to measure heat transfer coefficients and critical heat flux in the narrow, nearly rectangular channels of the reactor, and a proposal to build and test a scale model of the reactor, including coolant loops to determine natural convection characteristics.

Inspection of Aluminum Clad Fuel in the Receiving Basin of Offsite Fuels Storage Basin

J. P. Howell

The Receiving Basin of Offsite Fuels (RBOF) provides long-term storage for nuclear fuels from research and experimental reactors around the world. Large numbers of high and low enrichment uranium alloys clad with various materials such as zircaloy-2, hastelloy X, stainless steel, and aluminum alloys stored in the basin. The aluminum alloys are scheduled for processing at SRS, however, active equipment is not available in the canyons for processing other clad materials.

The RBOF basin water is maintained as high-quality, deionized water. The chemistry is maintained with impurities in the parts per billion range and conductivity at about 1 mmho/cm. Under these conditions, successful long-term storage of fuels was experienced throughout the facility history. Much of the current inventory has been in the basin for more than 10 years. The zirconium clad alloys from the HWCT Reactor have been in the water storage for 30 years.

Aluminum alloys are susceptible to pitting corrosion in poor quality water. To verify that aluminum alloy fuels in RBOF were not experiencing pitting corrosion, an inspection was done on April 23, 1993. Nereide Reactor fuel, clad with 1100 aluminum stored in the basin for 10.5 years, was removed from its 6061 aluminum storage tube and visually inspected for corrosion. In addition, Mark 31A slugs, of similar vintage to the slugs stored in L-Disassembly Basin, were inspected. The slugs were stored in RBOF for 4.5 years. No signs of visible corrosion products were seen on the aluminum clad fuels or canning alloy. In addition, the 6061 aluminum storage racks, which have been in the basin water environment for 30 years, show no signs of corrosion.

There is no evidence that the zirconium and stainless type alloys experienced clad penetrating corrosion over the periods of long-term storage. The Canadians and others around the world reported long-term storage for times approaching 30 years without degradation of fuel.

Successful storage of fuels in RBOF can be attributed to the high quality, deionized water conditions that are maintained by continuous operation of mixed-bed deionizers. Under these conditions, some continued storage life is possible. However, the ultimate solution is to use the canyons to stabilize the fuel.

Technical Specifications and Technical Specification Change Requests

J. S. Lietzow

Per the revised FY93 Program Execution Guidance, DOE requested that the K-Reactor and L-Reactor Technical Specifications (TS) be modified to be consistent with a planned shutdown condition by August 1, 1993. A presentation to DOE was completed and the new TS will be submitted to DOE by June 1, 1993.

Technical Specification Change Request 93-0007 (M. Layton and J. Lietzow) will modify minimum shift crew composition to specify that one qualified control room operator is required during reactor standby. A new definition for reactor standby is also proposed.

Disassembly Basin Water Chemistry

E. W. Baumann

Cleanup of the reactor disassembly basins to a prospective lower conductivity of 10 microSiemens/cm is in progress to mitigate corrosion of fuel and target assemblies stored in the basins. Two documents concerning chemical characteristics of the disassembly basin water were issued. One document (SRT-ADS-93-0211) presents the formalism for calculation of conductivity from ionic concentrations. The other document (SRT-ADS-93-0267) uses physicochemical relationships to calculate limiting values of pH and chloride concentration in basin water after cleanup to 10 microSiemens/cm.

Tritium

Replacement Tritium Facility Thermal Cycling Absorption Process Test Acceptance Criteria

A. S. Horen

Replacement Tritium Facility (RTF) Technical Management requested that the Hydrogen Technology Section provide test acceptance criteria for the Thermal Cycling Absorption Process (TCAP) system. The initial issue of the TCAP Cold Sequence Integrated System Test Acceptance Criteria, RTF-TC-59, was approved on May 13, 1993 (ahead of schedule).

The TCAP Cold Sequence Integrated System Test Acceptance Criteria provides criteria that will be used to evaluate the acceptability of tests performed in the TCAP system. The tests will confirm the system's operational readiness to perform within the designed safety envelope and assure effective operation of the TCAP system within the RTF. The test acceptance criteria meets the requirements for RTF project closure with respect to TCAP. A "hot" TCAP sequence integrated system test will be performed before TCAP production operation to determine appropriate operating parameters and target values and to evaluate performance under various operating conditions with tritium.

The TCAP Cold Sequence Integrated System Test Acceptance Criteria also verifies the mechanical functionality of the TCAP process and ensures that interfaces to other design areas are functional. Low concentration tritium testing determines the capability of the TCAP process to produce "stackable" deuterium. Additional low concentration tritium testing completes the requirements for Phase I leak testing of the TCAP column and plug flow reverser. The test acceptance criteria verifies the distributed control system (DCS) process control logic for the TCAP process. The TCAP process cannot be tested in a manual mode, therefore, the test acceptance criteria is written to demonstrate the TCAP process capabilities and DCS functionality.

The TCAP Cold Sequence Integrated Test Acceptance Criteria consists of:

- DCS verification of states
- TCAP reflux testing (system test)
- TCAP production mode testing (integrated system test)
- low concentration tritium TCAP testing
- TCAP column/plug flow reverser tritium leak checking, phase I

The corresponding "hot" TCAP integrated sequence test acceptance criteria is being developed and will be approved by the end of May 1993. The TCAP "hot" integrated sequence test will verify TCAP operability and isotope separation in a production-type environment.

Safety Support for Replacement Tritium Facility Startup

M. L Moore and R. H. Voss

This month's accomplishments include:

- approval of the interim inventory limiting condition of operation (LCO) and issuance as a revision to the existing technical safety requirements
- DOE-HQ approval of the request to delete the Seismic Tritium Confinement Systems (STCS) LCO until the new system is installed and the page revisions are issued
- support from TMLA personnel for Defense Programs in discussions with the Office of Nuclear Safety (ONS) regarding approval of the DOE Order 6430.1A deviation request on STCS
- TMLA personnel's support of the Replacement Tritium Facility in a Defense Nuclear Facility Safety Board site visit in which an overview on the analysis of operations was presented

At the request of DOE-HQ, M. L. Moore, M. J. Montini, and D. M. Hamby participated in a meeting with Mr. Stello to resolve issues and concerns raised by ONS regarding the source term and consequence analysis design basis events releases. The meeting succeeded in resolving the ONS issues. However, ONS requested additional information on AXAIR89Q to perform independent dose calculations.

A response to a request for information from ONSB was prepared, relative to the source-terms used in a single-failure deviation request for the STCS. The response included information about the dispersion models for consequence analysis used at SRS. The response was issued to NMPD for transmittal to ONS via DOE.

Simulation of the Palladium Hydride Isotherm

R. J. Wolf and R. C. Davis

The simulation of the palladium hydride isotherm provides a direct link to engineering applications in the Replacement Tritium Facility. The simulations are performed in a new statistical thermodynamic ensemble in collaboration with Professor J. R. Ray (via SCUREF Task #17).

The isotherms are being simulated at 300, 400, 500 and 700°K, which should map most of the alpha to beta phase transition envelope in palladium hydride. The preliminary data analysis agrees with experimental isotherm plateau pressures, critical behavior, and the changes in enthalpy and entropy for the alpha to beta phase transition. A simulation modeling the change in chemical potential with adsorption of hydrogen on Pd(100) agrees with experimental data. These simulations are computationally demanding. Isotherm sensitivity to the hydrogen isotopes is being pursued.

Test Weld Metallography

J. R. Dollar, W. C. Barnard, and C. L. Shelor

The Hydrogen Technology Section operates a metallography laboratory as part of the reservoir life storage mission. These facilities are a part of the Material Test Facility (MTF). RMQA performs the reservoir pinch and reclamation weld evaluations in the 300 Area. At the request of Tritium Operations, pinch and reclamation weld metallography work will be transferred to the MTF. This proposal offers many advantages to the tritium facility, including a cost savings of approximately $200,000 per year, faster turn around for weld results, and increased technical oversight of the pinch weld process. The equipment to perform the work is available. A performance based training course is being developed for the test weld evaluation process. The classroom training will be given in early June 1993, followed by an on-the-job training program. Concurrent pinch weld analysis is underway with complete transfer of responsibility for pinch weld evaluation scheduled for late June 1993.

1993 Storage Science Meeting

D. L. Fish, et al.

Eight SRTC employees representing the Hydrogen Technology, Analytical Development and Equipment Engineering Sections and three Tritium employees from SRS attended the 1993 Storage Science Meeting at Sandia National Laboratory Livermore from May 18-20, 1993. SRTC personnel presented ten discussions, which represents 25% of the discussions given at the conference.

The conference began with a presentation by A. E. Whiteman, Director of Weapons Quality, DOE/AL entitled "Support of the Enduring Stockpile". This was followed by a series of overviews from Sandia, Los Alamos, Mound, and SRS. Ten technical sessions with 36 additional discussions were presented during the remaining days. SRTC employees addressed the following subjects:

- SRS Metal Hydride Tritium Exposure Program
- Aging Studies of Tritides
- Los Alamos Reservoir Function Test Results
- Proposed Los Alamos Reclamation Program
- Cleaning Study Overview and Recent Near Full-Scale Test Results
- Cleaning Study Electrobalance Tests
- Computer Study of the AFR Cleaning Process
- Atomistic Calculation of Hydrogen and Helium Effect in Metals
- Advances in Real-Time Laser Raman Analysis for Hydrogen Isotopes
- Long-Term Storage Beds: Radiography, Film Digitization, and Density Correlation

Table 1. Tensile Properties of NITRONIC 40 Stainless Steel Specimens

Temp °C	He-3 appm	OYS MPa	UTS MPa	TE %	UE %	NE %	RA %
25	0.0	17 ± 7	732 ± 7	50.6 ± 0.2	38.9 ± 0.1	11.6 ± 0.4	81.9
817 ± 8	0.26	136 ± 14	196 ± 37	9.3 ± 1.5	6.7 ± 1.8	2.6 ± 0.4	31.7 ± 8.4
817*	0.0	138	225	25.3	9.6	15.8	92.0
842 ± 2	2.6	127 ± 5	154 ± 16	3.4 ± 0.6	2.8 ± 0.6	0.5 ± 0.0	24.0 ± 2.6
842*	0.0	128	180	24.4	6.8	17.7	95.9
* Interpolated values							

Effects of Internal Helium on Tensile Properties of NITRONIC™ 40 Stainless Steel

W. C. Mosley

Austenitic stainless steels are used to construct equipment that is exposed to tritium. Rapid heating tensile testing of tritium charged and aged specimens determines how tensile properties of these stainless steels, at temperatures up to 1100°C, are affected by internal helium-3. Recent tests on several austenitic stainless steels were directed at determining helium concentration thresholds for reduction of ductility at about 800°C. This report describes results of tests on NITRONIC 40 stainless steel (see Table 1).

Three specimens containing 0.26 appm of helium-3 were tested at 809, 816 and 825°C. Two specimens containing 2.6 appm of helium-3 were tested at 840 and 843°C. Specimens containing helium-3 failed by brittle, intergranular fractures, in contrast to ductile, transgranular fractures exhibited by uncharged specimens. Average values of tensile parameters for specimens containing internal helium are tabulated below, along with values for uncharged specimens measured at 25°C and interpolated for 817 and 842°C. Low concentrations of 0.26 and 2.6 appm of internal helium had no effect on offset yield strength (OYS). The decrease in ultimate tensile strength was the same (14%) for specimens containing 0.26 and 2.6 appm of internal helium and is attributed to the change from ductile to brittle fracture. This change inhibits the necking process. Nonuniform elongation (NE), which is influenced by necking, is the ductility parameter most sensitive to the presence of internal helium. At 817 and 842°C, NE was decreased to 16.4% and 2.8% of its normal value by 0.26 and 2.6 appm of helium-3, respectively. Uniform elongation is least sensitive to internal helium with corresponding decreases of 69.8% and 41.1%. Reduction-in-area, which is influenced by uniform elongation and necking, exhibits intermediate sensitivity with decreases of 34.4% and 25.0% for 0.26 and 2.6 appm of helium-3, respectively. These results indicate that the helium concentration threshold for reduction of ductility at about 800°C is probably much less than 0.26 appm.

Life Storage Program Unusual Occurrence Update

K. A. Dunn, H. D. Brown, G. D. Creech, J. R. Dollar, and J. R. Knight

An unusual occurrence in the life storage program was found when plans were being made to unload units in the program. As a result, an increased effort to unload life storage units was established.

The administrative control of the life storage program is also undergoing a revision. Past practices required that a test authorization (TA) be written for the test requested by the design agency. Each TA described the test criteria for the reservoirs and materials studies. Current requirements specify that an overall life storage TA be written to provide the pressure limits nec-

essary to maintain the safe storage of reservoirs in the life storage program. In addition, task technical plans (TTP) will be written with a thorough description of each test. These TTP's will provide better tracking of the life storage information. Also, a revision to the Tritium Facility, justification for continued operation (JCO) will be submitted to provide a more complete description of the Materials Test Facility (MTF) activities. Process requirements (PR) will be developed from the JCO. These PR's will provide a clear definition of the safety limits for the MTF.

Additional information was added to the life storage database. This information includes the pressure of each unit in storage, the pressure in the secondary if all the contents released into the secondary, the date when the unit will reach its proof pressure, and the date when the pressure in a secondary would exceed the maximum allowable working pressure (MAWP) if the contents of the units released into that secondary. This information allows us to identify potential safety problems, such as proof pressure exceeded or MAWP of the secondary exceeded. At least one year prior to a safety concern, Tritium Technology and Tritium Operations will be informed of the issue at the monthly life storage meeting. The issue will be discussed at each meeting thereafter until it is resolved.

Separations

Pu-239 Processing

FB-Line Justification for Continued Operation

P. L. Fisk and H. S. Smiley

Comments received from DOE-SR in December 1992 on the FB-Line Justification for Continued Operation (JCO) were integrated into the document and a draft copy was sent to DOE on April 6, 1993 for final resolution. During preparation of the Calc-note, minor inconsistencies were discovered in the summation of building inventory, based on Nuclear Criticality Safety Supplements. The Separations Analysis Group requested clarification and documentation of some assumptions from Separations Engineering. Upon delivery of this information, final revisions will be made to the JCO and the Calc-note. These revisions are minor in their impact on the consequence analysis, but are needed to reflect an accurate model of the facility.

In addition, DOE-SR indicated that further discussion is required on at least one comment response. When final agreement is reached on these issues, Nuclear Processes Safety Research will reroute the document for WSRC approval.

Solids in Tank Solutions

J. H. Gray, R. W. Wainwright, and the Analytical Development Section

Liquid samples taken from two tanks contained trace quantities of solids. These samples were taken after the addition of nitric and solutions containing the soluble poison boron and start-up of the tank agitators. Solids were collected and analyzed using X-Ray Diffraction (XRD).

The XRD scans identified quartz (silicon dioxide), mica (a potassium aluminum silicate hydroxide), and stainless steel, in one of the tank solids.

A trace of plutonium is associated with the other tank solids. The XRD scan identified quartz, another form of mica, and a large titanium oxide, or anatase component. The scanning electron microscopy scans confirmed the presence of titanium, silicon, and aluminum, and found most of the plutonium as small specs of PuO_2 imbedded in small pieces of stainless steel.

This is one of the indicators that plutonium compounds identified in the solids have or are in the process of redissolving as a result of agitation of the adjusted solutions.

Organic Material in Frames Waste Recovery Tanks

E. A. Kyser, R. R. Livingston, K. J. Kalbaugh, R. W. Wainwright, G. E. Whittle, and J. H. Gray

Dissolved phosphate compounds were identified in frames waste recovery (FWR) processing tanks with a range of 20 to 40 ppm phosphate.

The tributyl phosphate (TBP) visibly detected in samples from FWR processing tanks does not contain n-paraffin. An additional analysis of the organic phase, using gas chromatography, found no trace of n-paraffin.

Phosphate Contamination Issues in Pu-238 Processing

E. A. Kyser, R. R. Livingston, K. J. Kalbaugh, R. W. Wainwright, G. E. Whittle, and J. H. Gray

The discovery of dissolved organic phosphates in Pu-238 process solutions prompted concern that product Pu-238 oxide might exceed the 20 ppm phosphorus specification. This limit was put into place in the mid 80s because of the apparent attack of the iridium cladding. However, prior to this incident, neither SRS nor Los Alamos established the capability to analyze for phosphorus in Pu-238 at these levels. At the request of Separations, the chemical technology section extended our spectrophotometric methods for doing research and development phosphate analyses on plutonium solutions from 100 ppm levels of organic phosphate to 0.25 ppm to detect product spec levels.

Efforts were shifted from the original acid-colored complex to a molybdophosphoric acid complex. After reduction, the molybdophosphoric acid forms an intensely-colored molybdenum blue that can be extracted into an organic phase to remove interferences and achieve higher sensitivity. The blue color from this method is visible to the naked eye at 0.25 ppm.

After modifying hardware to use a 4 cm path length cell, standards were run and a model was developed to read concentrations in the 0.25 to 10 ppm range. By increasing sample size, analyses indicated that the Pu-238 oxide dissolved by HB-Line is less than 0.2-0.7 ppm phosphate the specification limit when converted to this solution concentration would be about 0.24 ppm. This indicates that the phosphorous contamination problems in product oxide do not exceed specifications.

Analyses of solutions from H-Canyon associated with operation of the RC-16 column are being run to determine the effect on phosphate. The results from those tests show that a high decontamination factor (DF) exists across the anion column for all forms of phosphate in the feed. H-Canyon personnel will use information on the tank volumes before and after processing to calculate a material balance for phosphate in the anion exchange process. It appears that the product solution has a phosphate content of about 1 ppm (compared with the equivalent product spec of about 0.24 ppm). Plans are being developed for tests to answer the level of DF attained by Pu^{+3} oxalate precipitation in HB-Line.

Red Oil Explosions at SRS

W. S. Durant

Presentations were made to the Defense Nuclear Facilities Safety Board (DNFSB) and two groups of Nuclear Materials Planning Division personnel on red oil and other significant explosions at SRS. More than 60 copies of Nuclear Processes Safety Research reports on adverse experiences with nitric acid and on the 200-Area data bank were distributed. These presentations aided in an evaluation of DOE facilities to determine if a TOMSK-7 type explosion is likely in DOE facilities and to heighten the awareness of SRS personnel in explosion prevention.

Environmental

SRS Remote Sensing Overflights

H. Mackey

EG&G Mound Laboratories conducted the FY93 aerial multi-spectral scanner (MSS) overflights of SRS. Areas from which MSS data and vertical photography (normal and false color infrared) were collected included the Pen Branch corridor and delta and the SRS portion of the Savannah River swamp; Par Pond; M-Area clay cap; Lost Lake; A and M Areas; Tim's Branch watershed including Steed's Pond; F- and H-Area clay caps and seepage areas along Four Mile Branch. These data will be used to support planning and monitoring of the wetlands restoration projects in the Pen Branch corridor and delta required under the mitigation action plan for K Reactor. It will also be used to document changes in the Par Pond shoreline environment, the Lost Lake wetlands restoration project, and potential projects associated with Tims Branch and vegetational stress areas along Four Mile Branch areas south of the former F- and H-Area seepage basins. Photographs can be expected for review in approximately one month and the MSS data tapes in approximately three months.

Timely and accurate weather forecasts provided by the Environmental Transport Group (R. P. Addis) made it possible to efficiently and safely plan for the Environmental Sciences Section/EG&G Mound Laboratories/MSS overflights of SRS by enabling them to schedule rest days for pilots and to take full advantage of low haze, cloud-free, and low humidity days as each weather system moved past SRS.

1992 Radiological Trend Report

D. M. Hamby

The radiological impacts of 1992 operations at SRS are documented in WSRC-RP-93-580. This report is being edited and DOE review and will be available for distribution in a few weeks. Radiological releases due to operations at SRS in 1992 resulted in a dose to the offsite maximum individual of approximately 0.09 mrem from atmospheric releases and 0.13 mrem from liquid releases. As in the past, tritium is responsible for more than 90% of the offsite dose. The total population dose from atmospheric and aqueous effluents was 8.9 person-rem, including the drinking water users at Beaufort-Jasper and Port Wentworth.

Reconfiguration of SRTC Volatile Organic Analysis Lab for Contract Laboratory Program Mode Operation

J. E. Young

The volatile organic analysis (VOA) lab was reconfigured for contract laboratory program (CLP) operation. The reconfiguration was required to expand the target compound list (TCL) to include additional compounds listed in the CLP and to provide the ability to perform purge and trap sample preconcentration from soil and solid samples. The target compounds were fully calibrated using a 5-point average response factor calibration method and the detection limit for each TCL compound was experimentally determined. The contract-required detection limits were met or exceeded for all compounds except the 2-hexanone.

The CLP originated under the Environmental Protection Agency (EPA) Superfund legislation to provide an analytical protocol for assessing and ranking national waste site cleanup priorities. The CLP protocol is an EPA procurement specification for work similar to the SRS Level 1 procurement process. CLP laboratory vendors that successfully enter the program are allowed to bid and obtain contract analytical work from the EPA. SRS will not be allowed to bid on EPA projects and, therefore, will not be a qualified supplier of CLP work. However, the comparability and defensibility of the work performed in this lab will be enhanced by this program.

TNX Groundwater Baseline Risk Assessment

N. D. Woody

The SRTC pilot project Comprehensive Environmental Response, Compensation, and Liability

Act Baseline Risk Assessment for the contaminated groundwater plume beneath TNX was completed. The second draft of the report was delivered to Environmental Restoration for review. The risk assessment and report were generated by an SRTC team that included Environmental Technology, Nuclear Processes Safety Research, Scientific Computations, and Environmental Sciences Section personnel. This revision included the addition of an uncertainty analysis to the human health risk assessment and incorporation of SRTC review comments. The final report will be used to support decisions regarding the TNX groundwater remediation.

In Situ Bioremediation Demonstration

T. C. Hazen

At 7:15 p.m. on April 30, 1993, the injection and extraction system for the *In Situ* Bioremediation Demonstration, using methane stimulation, was shut off. This demonstration involved 14 months of continuous operation involving four injection strategies for stimulation of indigenous methane-oxidizing bacteria capable of degrading chlorinated solvents that contaminated the soil and groundwater. Twenty nationwide laboratories (from industry, university, and government) participated in the demonstration, including the Gas Research Institute, who supplied the natural gas for the project and research co-funding. More than 100,000,000 cubic feet of air and 1,400,000 cubic feet of methane (natural gas) were injected during the demonstration. The system operated 386 days of the 424 days possible, with nearly all of the downtime due to experiments and power outages. Test monitoring and interim sediment analyses indicated excellent stimulation of methanotrophs and biodegradation of contaminants. Post-test characterization and monitoring began immediately and will continue for the next two months.

In Situ Radiofrequency Heating Demonstration

T. R. Jarosch and B. B. Looney

On April 27, 1993, the heating stage for the *In Situ* Radio Frequency Heating Demonstration ended after 24 days of continuous heating. Interim characterization activities were initiated on April 26, 1993. Three sediment borings were continuously sampled from the surface to a depth of 60 ft. while the heated area was too hot to assess the effect of the heating on the microbial communities. Samples for volatile organic compound analysis were collected every foot from approximately 30 to 50 ft. Samples for microbiologic study were collected adjacent to locations where a depth discrete temperature sensor was available. Three borings were collected, two in the heated zone and one in the control (cold zone). The maximum temperature measured was 80°C at approximately 1 m, which compares with the maximum temperature measured *in situ* (63°C at approximately 2 m). An additional seven borings will be sampled when the subsurface temperatures are closer to the initial ambient readings.

Integrated Demonstration Presentations

T. C. Hazen and B. B. Looney

Two presentations were made to the Scientific Advisory Board for SERDP for technologies associated with the volatile organic compounds in non-arid soils integrated demonstration. The purpose of the presentations was to seek additional funds to advance innovative technologies by addressing technical issues identified through the demonstration process. A proposal to fund bioreactor demonstrations for cleanup of groundwater contaminated with solvents was accepted for funding under this Department of Defense/DOE program. One benefit of this program is the strong industry interaction with the Gas Research Institute. A second proposal to demonstrate *in situ* air sparging and *in situ* bioremediation systems at the Picatinny Arsenal was also presented. A request was made to revise the proposal for presentation at the board's next meeting.

Waste Management

Waste-Tank Deflagration Pressure Analysis

J. K. Thomas and S. J. Hensel

The purpose of this task, initiated at the request of Waste Management and Environmental Restoration (WM&ER), is to calculate the pressure resulting from a hypothetical waste-tank deflagration to support the ongoing structural analysis of the Type IIIA Waste Tanks to be employed in the in-tank precipitation (ITP) process. Gas pressures resulting from hydrogen-benzene mixture deflagrations in Tanks 48 and 49 were calculated using the deflagration pressure analysis code (DPAC), written as part of this task. Reports documenting DPAC and the models employed in the code are undergoing technical review. A draft report documenting the results of the ITP waste-tank deflagration pressure analysis was completed.

DPAC accounts for venting, radiative heat transfer, structural deformation, and gas PdV work. It can also model nonstoichiometric hydrogen-benzene mixtures containing excess inert components (nitrogen and water vapor). The total gas volume is divided into product and reactant gas control volumes; each control volume is treated as homogeneous. The energy, mass, and state equations are solved for each volume at each time step. The models employed by DPAC and the code itself were benchmarked against hand calculations and relevant experimental data.

Both best-estimate and upper-bound gas compositions were considered in this analysis. The best-estimate gas compositions account for the initial nitrogen content, air ingress into the tank via atmospheric pressure fluctuations, and the water-vapor content of the air (the best-estimate gas compositions were calculated by J. P. Morin, WM&ER, as part of a related task). The upper-bound gas compositions were calculated with the assumption that the combustible gases are mixed with dry air containing no excess nitrogen, thus, representing an upper bound with respect to deflagration pressure.

The calculated peak gas pressures for the best-estimate gas mixtures are below 16 psig. Furthermore, the calculated pressures for these mixtures are relatively insensitive to variations in flame speed; for example, increasing the input flame speed by a factor of four increased the maximum calculated peak gas pressure by only 4.3 psi. The maximum-calculated peak gas pressure for the upper-bound gas mixtures is approximately 23 psig (Tank 48 at a 10% waste-solution fill level with a stoichiometric combustible gas concentration), which is less than the pressure required to rupture the primary liner (≈ 26 psig).

Resorcinol Formaldehyde Resin for Cesium Removal from High-Level Waste

J. P. Bibler

WERP is transferring $40,000 to order new resorcinol formaldehyde resin for use throughout the DOE complex. When the transfer is complete, the purchase order will be submitted.

An Office of Technology Development milestone was completed with submission of the mid-year report (WSRC-RP-93-610) on the cesium ion exchange work being performed for Hanford.

Stripping Tests: Evaluating Causes of Foaming and/or Flooding in a Small-Scale Stripper and Correcting the Problem

M. J. Barnes and J. F. McGlynn

Filtrate foaming caused a high differential pressure across the packing in the decontaminated salt solution (DSS) stripping column at the in-tank precipitate. The Waste Management Department has a contract with Koch (the stripping column vendor) to troubleshoot the problem. Interim Waste Technology (IWT) developed a series of tests to recommend a solution to the problem and incorporate the information into the contract with Koch.

IWT evaluated defoaming agents to inhibit foaming in the column. The following series of tests were completed:

- a graduated cylinder test (Foamometer) to measure the foam height of the filtrate and

determine defoaming agents that inhibit the foaming
- a small-scale stripping-column test to determine the concentration of the defoaming agent to allow the stripping column to operate without foaming
- small-scale sparging tests to determine if the defoaming agent chosen for use in the stripping column adversely effects benzene removal

Seven defoaming agents were tested using this method (Gafac RA-600, tributyl phosphate, Pegol L-62, Triton X-100, Surfynol 104-E, Dow Antifoam 544, and Triton X-114). It was determined that tributyl phosphate worked best and should have minimum downstream concerns. Our recommendation to the Waste Management Department was to use tributyl phosphate in the amount of 150 ppm to mitigate the foaming in the DSS stripping column.

In-tank Precipitation Particulate-Filter Decontamination

L. O. Dworjanyn

The main function for in-tank precipitation (ITP) filters is the removal of fine, precipitated cesium tetraphenyl borate (CsTPB). Earlier demonstration in Tank 48 showed that the filtered salt solution can be decontaminated from cesium by a factor of 40,000. The decontamination factor (DF) is a function of CsTPB's solubility and effective removal of 0.5 micron precipitated-CsTPB. The solubility of the cesium salt in ITP sodium salt solutions is well-established:

$$CsTPB = 0.000032 \exp(-0.67[Na]) \text{ mol/liter at } 20°C$$

To achieve the goal cesium DF, we must also assure 40,000 particulate DF with the installed ITP filters. This can be simulated with potassium tetraphenyl borate (KTPB) used during cold

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In-Tank Precipitation Safety Analyses

T. E. Britt, M. K.Gupta, S. K. Norkus, K. J. Lansaw, A. Beyrer, B. Shapiro, and L. M. Olsen

Resolution of In-tank Precipitation - Extended Sludge Processing Safety Analysis Report Comments

The DOE-SR comments (Anderson to Wright, April 28, 1993) on the in-tank precipitation - extended sludge processing and operating safety requirements (OSR) page changes issued in late March 1993 (Boyer to Sjostrom, WER-OVP-930036), were addressed and responses were issued (Cowen to Satterfield, SRT-WAG-930076). These responses will require revisions to the Safety Analysis Report (SAR) and OSRs. The revisions are scheduled for the June 8, 1993 submittal for DOE approval of the SAR and OSRs.

Deflagration Analysis

The *Accident Analysis for the In-Tank Precipitation Process Nitrogen Process System (U)*, WSRC-TR- 93-169, was issued. This report documents the basis for declaring deflagration in Tank 48 or 49 an incredible event. A revision is planned for this analysis to incorporate the results of human reliability analysis (HRA) task analysis, an assessment of the seismic rigor of the ITP facility, the ignition source probabilistic risk assessment (PRA) (SRT- RST-930151), and the use of nitrogen purge as a recovery action.

Evaluation of the Extended Sludge Processing Baseline Runs

A safety evaluation for the baseline runs of the Extended Sludge Processing - Sludge Washing was completed to support the unreviewed safety question determination. The evaluation concluded that the current operating safety requirements (OSR) and test procedures provided sufficient protection to preclude the need for a new OSR.

Characterization of Defense Waste Process Facility Canister Welds and Labels and Estimates of Service Life

S. L. West, K. J. Imrich, and W. R. Kanne, Jr.

The Defense Waste Process Facility (DWPF) canisters will contain vitrified radioactive waste during interim storage at SRS and in a federal repository. These canisters are fabricated components and the construction materials are Type 304L austenitic stainless-steel and Type 308L weld filler material. Canisters are fabricated from rolled and seam-welded plate with girth welds to attach the top and bottom sections and the nozzle, requiring approximately 23 linear feet of weld (gas-tungsten arc-welding) per canister. The canisters are sealed using a resistance upset plug weld technique. Identification labels are weld metal deposited to form alpha-numeric characters.

The integrity of the canisters must be assured for up to 50 years of storage. The welds must be free of sensitization and embrittling phases that can develop during canister fabrication and glass pouring from thermal cycling. Previous experimental corrosion data must be qualified for quality assurance (QA) pedigree. The objectives of this work are to verify that the weld filler-metal and base-metal composition limits assure the proper microstructure and corrosion resistance. Metallographic characterization of canister welds and generation of corrosion data at operating and severe conditions will accomplish these objectives. The life of fabrication welds will be estimated, labels, and solid-state closure welds, while stored in the glass-waste storage building.

A detailed task technical and QA plan was written. Sections containing welds will be cut from canisters filled during DWPF qualification runs. Optical and electron microscopy will characterize weld-fusion zone and heat-affect zone microstructures. Coupon tests evaluate the potential for crevice corrosion and pitting. Four-point bend tests evaluate stress-corrosion cracking potential in a simulated high-chloride environment. The relative corrosion potential of fusion welds versus solid-state (resistance) welds will be compared. The combined results will be used to estimate the service life of welds and labels while stored at SRS.

General

Monte Carlo Neutron Photon Tutorial

J. F. Zino

The Applied Physics Group will be conducting an eight week tutorial on the Los Alamos developed Monte Carlo Neutron Photon code for application to criticality safety analyses.

The course will involve instructive discussions and class problem solving participation in the use of the code for analyzing criticality source fissioning systems. The primary objective of the course will be to teach the fundamental aspects of the code, while stressing it's application to criticality safety problems. The students will participate in several classroom lectures and several hands-on computer simulation problems as they learn the general features of the code. Test problems to qualify the students as cognizant code users (for criticality applications) will be given at the end of the course.

Target Materials and Process Technologies for Accelerator Production of Tritium

H. B. Peacock

Brookhaven National Laboratory (BNL) requested that the Materials Technology Section develop materials and process technologies for spallation induced lithium conversion (SILC) targets. Initial scoping studies are focused on developing materials concepts, target configuration, and associated manufacturability. SRTC will be the primary contractor for this phase of the program, coordinated by BNL. Targets are 1 cm diameter rods and are clad with 0.05 cm of aluminum is the preferable cladding materials because of low neutron absorption. The evaluated concepts being evaluated include casting, powder metallurgy, and coextrusion.

The Materials Technology Section's effort is also being integrated into BNL's long-term program plans for this technology.

Overlay Weld Analysis

D. Z. Nelson and W. R. Kanne

Evaluation of overlay welds on irradiated material is nearing completion as part of the program to develop welding methods for repairing stainless steel containing helium. Low-penetration overlay welds, previously made on irradiated 304 stainless steel removed from R-Reactor Tank, are being examined. The overlay technique was previously shown, using material impregnated with helium by tritium decay, to reduce helium embrittlement cracking compared to conventional welds. The current work will confirm applicability of the low-penetration overlay method to irradiated material.

This program, originally initiated to assure a repair method for SRS reactor tank walls, may have significant application for fusion reactor maintenance and for existing commercial or naval reactors. The fusion reactor community planning the International Thermonuclear Experimental Reactor and the naval reactor community expressed interest in our program.

Metallographic equipment for preparation of overlay weld samples was installed in the High Level Caves (HLC) facility of SRTC. Eight samples were cut from the two overlay welds previously made. These samples are being ground, polished, and etched for metallographic examination. Grinding was completed and polishing is in the final stages and awaiting installation of additional capability in the HLC. Metallographic samples of the overlay welds will be examined for helium embrittlement cracks caused by the welding process. Results will be compared with conventional welds previously made on irradiated material and with overlay welds made on tritium charged and aged samples. It is known from dye penetrant testing, which showed no surface cracks, that cracking is not as severe as with conventional welds.

Items of Interest

D. K. Craig attended the DOE TRADE "Advanced Workshop on Hazards Assessment".

E. Wilhite and B. Hiergesell attended the Performance Assessment Task Team meeting at Richland, Washington on April 20-22, 1993.

E. Wilhite and J. Cook attended a meeting on May 5 and 6, 1993, organized by DOE Headquarters, to revise DOE Order 5820.2A. Wilhite will work in the General Requirements Technical Working Group (TWG); Cook will work in the Mixed Waste TWG.

N. Roddy and B. Steed of SRTC/IWT attended the DOE Waste Reduction/Pollution Prevention Conference in San Francisco, California, in April 1993. Roddy and Steed presented posters on the SRS Recycling Outreach Programs and the SRTC Decontamination Programs.

D. K. Craig participated in activities of the Process Safety Management Task Team, whose goal is to define the similarities and differences between the requirements for hazards assessments conducted under DOE, Environmental Protection Agency, or Occupational Safety and Health Administration regulations.

J. Bodiford attended training on "Environmental Safety Library on CD-ROM" presented by vendor.

Publications

R. J. Kurzeja's "Comparison of a Doppler Sodar with Cup Anemo-meters and Bivanes" was accepted for publication in the *Journal of Atmospheric and Oceanic Technology*.

Presentations

H. E. Mackey facilitated two sessions and wrote "Application of Low Altitude Normal Color and False Color Infrared Photography for Delineation and Monitoring Wetland Restoration of a Large Carolina Bay" for presentation at the 14th Biennial Workshop on Color Photography and Videography in Resource Monitoring at Utah State University from May 25 to 28, 1993.

E. Wilde presented "Microbial Strain Selection for Optimal Toxic Metal Bioremoval Applications" and "Physical, Chemical, and Physiological Factors Governing Heavy Metal Bioremoval". He was a co-author for "Processing Techniques to Enhance Toxic Heavy Metal Binding by Algal Biomass", which was presented at the Second International *In Situ* and

Onsite Bioreclamation Symposium on April 5–8, 1993 in San Diego, California.

B. L. O'Steen presented "Mesoscale Atmospheric Modeling for Emergency Response" at the 1993 Spring National Meeting of the American Institute of Chemical Engineers.

C. B. Fliermans co-chaired a session entitled "Bioremediation in Aquatic and Terrestrial Environments" and presented "Immunological Techniques as Tools to Characterize the Subsurface Microbial Community at a Trichloroethylene-Contaminated Site" at the 1993 Annual American Society for Microbiology Meeting in Atlanta, Georgia. J. E. Wear, M. M. Franck, P. C. McKinsey, J. M. Dougherty, and T. C. Hazen were co-authors.

T. C. Hazen presented "*In Situ* Bioremediation of Chlorinated Solvents Using Horizontal Wells to Inject Air and Methane" at the 1993 Annual American Society for Microbiology Meeting in Atlanta, Georgia. M. V. Enzien, M. M. Franck, and C. B. Fliermans were co-authors.

J. E. Wear presented "Most-Probable-Number Assay Using BIOLOG-GN Plates for the Study of Groundwater Microbial Communities" at the 1993 Annual American Society for Microbiology Meeting in Atlanta, Georgia. P. C. McKinsey, M. V. Enzien, M. M. Franck, H. G. Findlay, C. B. Fliermans, and T. C. Hazen were co-authors.

D. M. Tuck presented "Immiscible Displacement of Residual NAPL Blobs from Unsaturated Porous Media" at the 1993 Spring Meeting of the American Geophysical Union.

C. Gong presented "Response of a Type III Waste Tank to Hydrogen Deflagration" at the spring meeting of the Society for Computer Simulations at the 1993 Simulation MultiConference in Arlington, Virginia on March 28 -April 1, 1993.

J. Samuels presented CMT's work on Organizational Analysis to the Site Management Council on April 15, 1993.

M. R. Buckner presented "Excess Plutonium Disposition Using ALWR Technology," at the American Power Conference, Chicago, Illinois on April 14, 1993.

R. J. Wolf presented a seminar entitled "Atomistic Modeling of Materials" at the Molecular Science Research Center, Pacific Northwest Laboratories, Richland, Washington on April 20, 1993.

M. R. Buckner presented "Strategies for Denaturing the Weapons-Grade Plutonium Stockpile," at the DOE Compatibility Conference, Aiken, South Carolina on April 21, 1993.

S. E. Lance presented an overview of SRS Scientific and Technical Computer Training at the Computer Education Information Exchange 1993 on April 27, 1993, hosted by the Computer Education Group of Information Resource Management. Several representatives from various DOE sites attended in order to share information and resources about computer training.

R. J. Wolf presented "Molecular Modeling Approach to Finding a Novel Metal ion Sensor" to the Analytical Development Section on April 30, 1993.

At LLNL's request, M. Hart, who is on assignment to LLNL, presented "Natural Radiation" to D. Gish of the DOE Office of Weapons Complex Reconfiguration (DP-40). The presentation encompassed a general discussion of radiation, outlined the history of radiation work, and reviewed the history of radiation exposure limits. Variations of the presentation were made at local area schools.

C. Ward and M. Restivo made presentations at the DOE Tritium Focus Group Conference/Workshop on the Recycling of Radioactively Contaminated Metals and Alloys in Augusta. Ward's presentation focused on Robotics for Sizing and Decontamination and Restivo's presentation dealt with Nitric Acid Decontamination.

Other Items

N. Roddy of SRTC/IWT completed a draft of the Interim Sanitary Landfill Leachate Estimation Study. The draft is being circulated for review. Plans are to have the final report approved and issued by the end of May 1993.

E. Wilhite, at the request of DOE Headquarters, provided comments to DOE Headquarters on a procedure for Headquarters approval of performance assessments.

F. Heckendorn was selected as a robotics representative from SRTC to serve on a peer review team sponsored by Idaho National Engineering Laboratory. The team reviewed an Idaho/Hanford program for deploying a robotic arm into waste tanks for sampling and video applications.

At a recent American Nuclear Society conference in Knoxville, Tennessee, the Equipment Engineering Section's Robotics Group staged a booth illustrating examples of robotic applications at SRS for waste management and environmental restoration. A list of technical papers issued on robotics at SRS was made available at the booth. To date, 25 requests were received for additional information.

NRC Assistance

W. C. Perkins

The Nuclear Regulatory Commission's (NRC) Office of Nuclear Material Safety and Safeguards accepted a proposal by the Risk Assessment Methodology Group to provide two man-years of assistance in FY93 and 94 in the form of methods and criteria for nonreactor safety analysis by fuel cycle licensees, in their initial applications and renewals.

A task plan was drafted for this work and is under review. The principal deliverables under the task plan are a safety analysis guidance (NUREG) document and a revision to existing Regulatory Guide 3.52. In addition, a workshop will be conducted for Nuclear Regulatory Commission and licensee personnel to describe the methods and criteria in these deliverables.

General Issue: Verification and Validation of Release and Disperse Computer Codes

J. A. Tacca

A Software Development Plan (SDP) and Software Design Report for certification of the RELEASE and DISPERSE codes was completed. The SDP includes the Task Quality Assurance Plan and Software Requirements Specification. Both reports are milestones in an STS work authorization document and were delivered on schedule by J. McKinney of STS. Both reports are being reviewed.

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