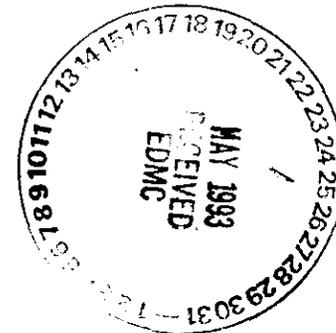


TUESDAY: AUG 5, 1991 9:00AM PAUL STASCH:

PROPOSED RD&D

RD & D Permit Meeting July 2, 1991 AGENDA

- o Introduction Dave Turner
- o Pilot Plant Testing Program Don Flyckt
- o Documentation Don Flyckt
- o Facility Description Don Flyckt
- o Permit Application Steve Skurla/Lee Bostic
- o Discussion All
- o Agreements/Action Items



START

10125071

Pilot Plant Testing Program

Introduction

- o **Pilot Plant on the Hanford Site is needed to support:**
 - **Groundwater Remediation**
 - **Design of Effluent Treatment Systems**
 - **Permitting of Effluent Treatment Systems**

- o **Immediate Concern is the Evaporator/PUREX Condensate Treatment Facility (Project C-018H)**
 - **Project Design Reviews**
 - **RCRA Delisting**
 - **WAC 173-216 or NPDES Permitting**
 - **Operator Training**

Specific Pilot Plant Data Needs (Examples)

- o Removal Efficiencies of Individual Unit Operations
- o Removal Efficiencies of Combined Unit Operations
- o Impact of Variable Feeds *2BDSC: VARIABLE FEEDS -*
- o Establish Treatment Envelope
- o Secondary Waste Volume and Composition
- o Process Control Data
- o Process Optimization Data
 - Oxidant Dosage
 - pH Range
 - Reaction Chamber Design
 - Operating Pressure
- o Ion Exchange Resin Selection
- o Long-Term Fouling Potential *LELF: PROCESS COND (TO BE USED FOR IXC) ? EFFLUENT*
 - Maintenance and Cleaning Procedures
- o Pre-Treatment Requirements

Testing Scope (Project C-018H)

o Waste Types

- **Synthetic Wastes** (Evap. Process Condensate):
- **Actual Evaporator Process Condensate**
- **Spiked Process Condensate**

o Bench-Scale

o Pilot Scale

- **5 gpm** (150 gpm Full Scale).
- **Smallest Units Available which are Representative of Full-Scale Equipment**

DELIVERING PETITION: ? SR FEEDS:

USE OF VERIFICATION TUNING.

Testing Approach

- o Performed on Individual and Combined Unit Operations**
- o Pilot Plant will not be Integrated (i.e., Mock-up of C-018H System)**
- o Initial Tests performed on Synthetic Wastes**
 - Start-up Training and Development of Procedures**
 - Establish Operating Envelope**
- o Actual Wastes for Permitting and Delisting Data**
 - Demonstrate Capabilities of Equipment with Actual Waste Matrix**

Waste Description - Project C-018H

- o 242-A Evaporator Process Condensate**
 - **Condensed Overheads from the Concentration of Double-Shell Tank Wastes**
 - **RCRA Listed Waste (F003, F005)**
 - **State Dangerous Waste (Ammonia)**

- o PUREX Ammonia Scrubber Distillate and PUREX Process Condensate**
 - **Condensed Overheads from the Concentration of Liquid Wastes Produced during the Reprocessing of Spent Nuclear Fuels**

- o Stored 242-A Evaporator Process Condensate**
 - **Liquid Effluent Retention Facility (LERF)**
 - **13 million gallons maximum**

Categories of Contaminants

- o **Suspended Solids (Particulates)**
 - **Inorganic**
 - **Organic**

- o **Organics**
 - **Miscible**
 - **Immiscible**

- o **Dissolved Ammonia**

- o **Dissolved Solids (Ions)**
 - **Radioactive**
 - **Non-radioactive**
 - **Heavy Metals**

Waste Description Summary

o Dilute Wastewater with Low-levels of Contamination

<u>Constituent</u>	<u>Maximum</u>
TOC	4900 ppm
Ammonia	9400 ppm
TDS	3.0 ppm
Conductivity	1500 US
pH	11.3
Total Beta	200,000 pCi/L

o Waste is not Ignitable; Corrosive; Reactive

Table 3-2. Chemical Constituents of Concern in C-018H Waste Water.

Constituents	Maximum Influent Concentration (ppb)	Most Restrictive Discharge Limit (ppb)	Constituents	Maximum Influent Concentration (ppb)	Most Restrictive Discharge Limit (ppb)
<u>Inorganics</u>			<u>Organics</u>		
Aluminum	4,992	50	1,1,1-Trichloroethane	5	7
Ammonia	1,360,000	1,300	1-Butanol	88,000	5,000
Barium	8	1,000	2-Butanone (methylethylketone)	120	10
Chloride	3,220	250,000	Acetone	5,100	50
Chromium	156	50	Benzyl Alcohol	18	20
Copper	127	1,000	Chloroform (Trichloromethane)	27	6
Cyanide	47	5.2	Dimethylnitrosamine	57	0.002
Fluoride	12,273	2,000	Methylenechloride	180	5
Iron	503	300	MIBK (Hexone)	17	5
Manganese	5	50	Phenol	33	39
Mercury	1.9	2	Pyridine	550	14
Nickel	17	100			
Nitrate	217,000	10,000*			
Sulfate	13,000	250,000			
Sulfide	66,000	14,000			
Uranium	1.03	59			
Vanadium	7	40			
Zinc	77	5,000			

*As equivalent nitrogen

- FW CUMULATIVE TOXICITY CRITERIA: NPDES PERMITS -
 - MTCR:

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Table 3-3. Radionuclides and Radioactivity of Concern in C-018H Waste Water.

Radionuclides	Maximum Influent Level (pCi/L)	Most Restrictive Limit (pCi/L)
Total Alpha	100,000	1.2
Total Beta	200,000	40
* Tritium	60,000,000	80,000
90-Strontium	81,000	40
103-Ruthenium	48,000	2,000
106-Ruthenium	240,000	240
113-Tin	28,000	2,000
129-Iodine	560	20
134-Cesium	0.0088	80
137-Cesium	45,000	120
147-Promethium	32,000	4,000
155-Europium	1,400	4,000
238-Plutonium	1,200	1.6
239- & 240-Plutonium	120,000	1.2
241-Plutonium	12,000	80
241-Americum	6,500	1.2
Uranium(gross)	140	24

Planned Testing

- o Filtration**
- o UV Oxidation**
- o Granulated Activated Carbon**
- o Reverse Osmosis**
- o Ion Exchange**

Filtration

- o **Conducted near LERF**
 - **Transport of Waste will alter Characteristics**
 - **Skid Unit with up to Three Filtration Technologies (e.g., Backwashable Filter, Tubular Ultrafilter, Centifical Ultrafilter)**
- o **Long-term Test to Evaluate Performance and Fouling Potential**
- o **Patterned after Savannah River Plant Testing**

UV Oxidation

- o **Vendor Tests** : PEROXIDE -
- o **Synthetic Process Condensate**
 - **Shakedown and Familiarization**
 - **Determine Organic Destruction Efficiency**
 - **Evaluate Effect of Feed Variability**
 - **Establish Operability Parameters**
- o **Actual or Spiked Process Condensate**
 - **Determine Organic Destruction Efficiency**
 - **Optimization of Operability Parameters (pH, Oxidant Dose, Reaction Time)**
 - **Determine Cleaning Method and Frequency**

UV Oxidation Pilot Plant Equipment Selection

- o **Based on Initial Feasibility Testing**
- o **Preferred a System without Ozone for Safety Reasons**
- o **Preferred a Compacted System due to Space Considerations**
- o **5 gpm Peroxidation Systems, Inc. Selected**
 - **Most Consistent Performance in Meeting Feasibility Criteria**
 - **Hydrogen Peroxide as Oxidant**
 - **Compact System using High Energy UV Lamps**

- Air Emission Limits: Air Permit 5 (ORGANICS)

Granulated Activated Carbon

- o Potential Replacement or Enhancement of UV Oxidation**
- o Synthetic Process Condensate**
 - Capacity for Low Molecular Weight Organics**
 - Secondary Waste Volume**
- o Actual Wastes**
 - No Test Currently Planned**

Reverse Osmosis

- o Synthetic Process Condensate**
 - **Required Number of Stages**
 - **Shakedown and Familiarization**
 - **Determine Removal Efficiencies**
 - **Determine Water Recovery**
 - **Composition and Volume of Reject**

- o Actual Process or Spiked Condensate**
 - **Confirm Number of Stages Required**
 - **Optimization Removal Efficiencies**
 - **Procedures to Reduce Effect of Fouling**
 - **Evaluate Cleaning Methods**

- o Pilot Plant Equipment based on Feasibility Testing**
 - **5 gpm Applied Membrane Unit Selected**
 - **Filmtech Poly Amide Membrane**

Ion Exchange

- o Performed on Bench-Scale**
- o Synthetic Process Condensate**
 - Determine Removal Efficiencies**
 - Select Preferred Resin**
 - Determine Sizing Requirements**
 - Determine Secondary Waste Volume and Composition**
- o Actual Process Condensate**
 - Confirm Removal Efficiencies of Selected Resin**
 - Verify Sizing Requirements**
 - Verify Secondary Waste Volume and Composition**

Pilot Plant Facility Description

Pilot Plant Siting

o Construct New Facility

- Did not Support C-018H Schedule
- Expensive

i 2103 Facility - Temporary Location:
Clean Energy Lab.

PH 11 - (4-6) + Project 20 (99% Rebuilt up
Annex).

o Renovate Existing Facility at 1706-KE

- Supported C-018H Schedule
- Less Expensive than New Facility
- Access to Ancillary Laboratory Equipment
- Facility can be Reconfigured to Accommodate Other Flowsheets (i.e., Projects)

1706-KE

o Past Use

- Water Chemistry Studies and Treatment Development for 100 Area Reactors

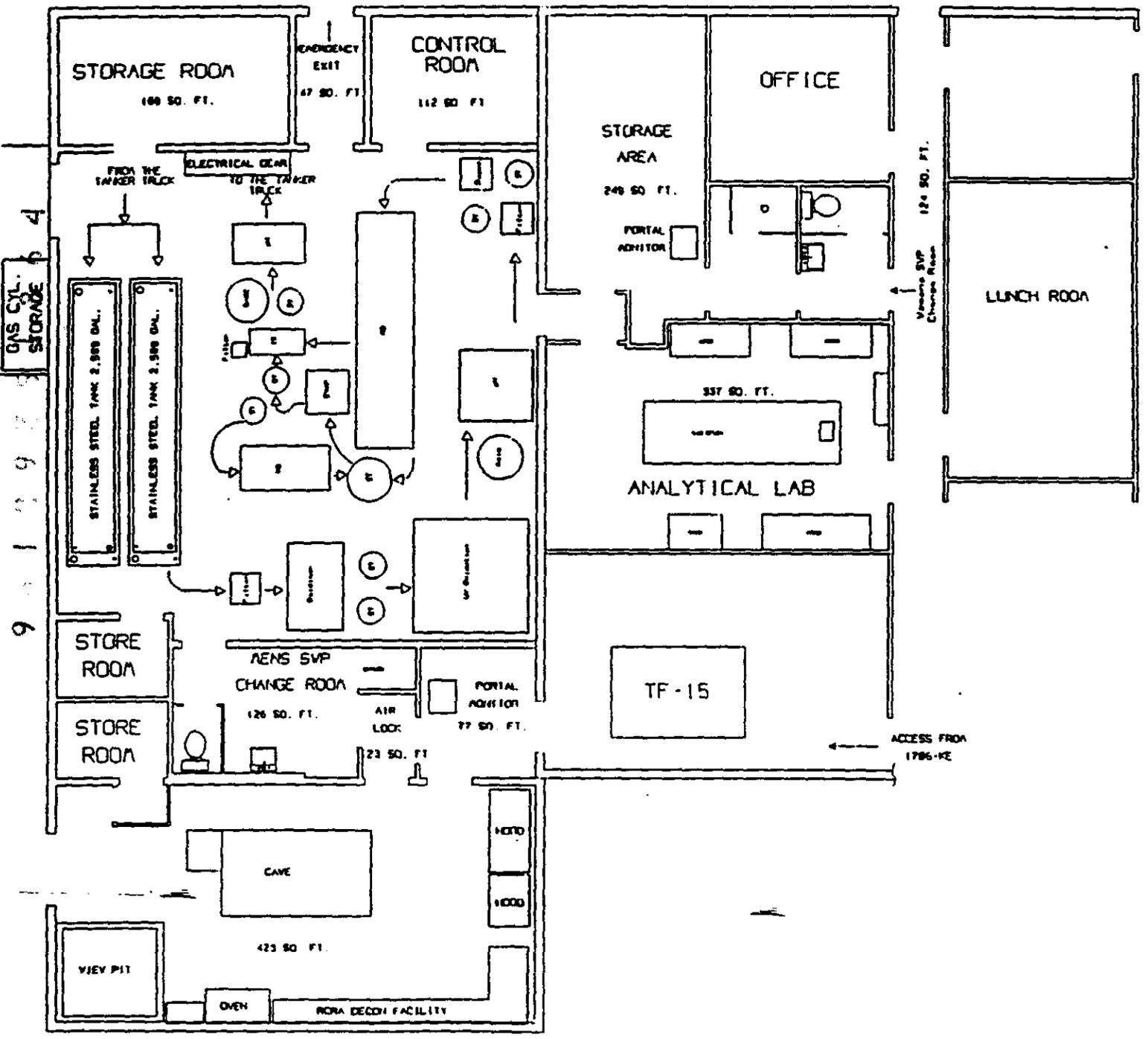
o Current Use

- RCRA Sample Equipment Preparation and Certification

o 242-A Process Condensate must be Transported to 1706-KE (approximately 6 miles)

- Purchase Two (2) 5000 gallon Tankers *(Temp Storage)*
- DOT Certified

PROPOSED PILOT PLANT FACILITY IN 1706-KE



Building Upgrades

- o Remove Old Equipment/Piping
- o Upgrade Restroom/Changeroom Facilities
- o Ventilation :HVAC
- o Seal Floor Drains
- o Painting

- NEPA Documentation.

Feed System

- o **Tanker Truck Unloading and Loading Area**
 - **Feed Tanker (5,000 gallon)**
 - **Effluent Tanker**

- o **Intermediate Storage Tanks**
 - **Approximately 500 Gallon Tanks between Unit Operations**

- o **Piping**
 - **Leak Tested**
 - **Catch Pans - below flanged joints**
 - **Some Flexible Piping may be Utilized**

- o **Catch Pans below Unit Operations**

Analytical Upgrades

- o **Provide Quick Turn-around Process Testing :**
 - **Gas Chromatography**
 - **Ion Chromatography**
 - **Total Organic Carbon**
 - **Basic Wet Chemistry**

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Documentation

Documentation

- o **Treatability Test Program Plan**
- o **Quality Assurance Program Plan**
- o **Test Plans**
 - **Scope Limited to a Specific Test Objective**
 - **Results of Initial Test Plans used to Design Subsequent Tests**
- o **Test Reports**
 - **Summarize the Results of Several Test Plans**

Treatability Test Program Plan Outline

- o Introduction**
- o Approach**
- o Program Management**
- o Cost**
- o Schedule**
- o Quality Assurance Requirements**

Quality Assurance Project Plan Outline

- o **Based on QAMS-005**

- 1. Project Description**
- 2. Project Organization and Responsibilities**
- 3. Quality Assurance Objectives**
- 4. Sampling Procedures**
- 5. Sample Custody**
- 6. Calibration Procedures**
- 7. Analytical Procedures**
- 8. Data Reduction, Validation, and Reporting**
- 9. Internal Quality Control**
- 10. Performance and System Audits**
- 11. Preventive Maintenance**
- 12. Data Assessment Procedures**
- 13. Corrective Action**
- 14. Quality Assurance Reports**
- 15. References**

Table 3.2

DATA ACQUISITION PROTOCOL APPROPRIATE TO DATA USES

Data Acquisition Protocol

<u>Quality Level</u>	<u>Data Uses</u>	<u>Equipment Configuration</u>	<u>Operating Parameters</u>	<u>Analytical Measurements</u>
I	a. Familiarization b. Shakedown c. Non-process	Logbook sketch. Deviations from H-2 drawings/CVI/SOP noted in logbook.	Noted in logbook and on SOP data sheets. Documentation of equip. maintenance/instrument calibrations not required. Deviations from SOP noted in logbook.	Data to be noted in logbook/data sheets. Matrix spikes, matrix spike duplicates, surrogates, or deter- mination of precision, accuracy, representa- tiveness, compara- bility and completeness (PARCC) not required.
II	a. Optimization b. Determination of treatability range.	Same as for Quality Level I above.	Follow approved SOP. Process related equip. maintenance/instrument calibrations to be documented.	Same as for Quality Level I above except: documentation of analytical instrument calibrations required. Analyses to be per SOP
III	a. Delisting petition. b. RCRA permitting c. Design	Logbook sketch. Configuration per H-2 drawings/CVI/and SOP.	Same as for Quality Level II above.	Matrix spikes, matrix spike duplicates, surrogates, and deter- mination of PARCC required. Use SW-846 or other approved EPA protocol. Use CLP.

Test Plan Format

- o **Engineering Document Content Guidelines**
- o **Outline**
 1. **Introduction**
 2. **Objective**
 3. **Scope**
 4. **Description of Test**
 5. **Expected Results**
 6. **Test Procedure**
 7. **Safety**
 8. **Quality Assurance** → QAPP
 9. **Organization and Functional Responsibilities**
 10. **Schedule**
 11. **Reports**
 12. **References**
 13. **Data Sheets**

Test Report Format

- o **Engineering Document Content Guidelines**

- o **Outline**
 1. **Introduction**
 2. **Description of Test**
 3. **Test Results**
 4. **Conclusions and Recommendations**
 5. **References**
 6. **Appendix**

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Permit Application

RD&D Permit Application - Contents

- o Introduction
- o Research Plan
- o Facility Description
- o Waste Characteristics
- o Process Information
- o Procedures to Prevent Hazards
- o Contingency Plan
- o Personnel Training
- o Closure Plan
- o Reporting and Recordkeeping
- o Certification
- o Appendix - Example Test Plan

- FLEXIBILITY:

- TEST PLANS

- WASTE STREAMS / SPIKING OF WASTE
STREAMS

Introduction

- o Reasons for Conducting the Tests**
- o Facility Permitting Method**

Research Plan

- o Type of Testing to be Completed under the RD&D Permit
- o Structure under which Test Plans will be Performed so that Worker Health and the Environment are Protected
 - PROTECTIVE SYSTEMS DURING TESTING.
 - NO RELEASE DURING TESTING.
 - ORGANICS KUMMISSIONS.
- o Flexibility to Add or Modify Test Plans as Testing Proceeds
- o Format and Content of the Test Plans
 - LIMITATIONS OF EQUIPMENT -
 - Temp, Pressure, pH etc.
- o Test Results to be Included in Test Reports
 - PROCESS FLOW SHEETS -
 - PFD
- o Schedule for Development of Test Plans
 - Provide EPA and Ecology with an Advance Informational Copies
- o QA Program Plan under Which the Program will Operate

Facility Description

- o Locations of Test Facilities**
- o Facility Site Plans Showing Additional Details**

Waste Characteristics

- o **Waste Sources Currently Planned for Test (242-A Process Condensate, Purgewater)**
- o **Incoming Waste is of Low Toxicity, not Ignitable or Reactive, will not Contain Greater than 10 Percent Organics**
- o **Waste will be Treated in 5,000 Gallon Batches (maximum)**
 - **Waste feed rate is 5 gpm**
- o **Waste will be Lower in Dangerous Constituents after Testing and will be Returned to LERF; Solids will be Transported to the Central Waste Complex for Storage and Eventual Disposal**
- o **Permit Flexible Enough to Allow Treatment of Other Waste Sources by Specifying Maximum Contaminant Limits**

- OVERALL PROVISIONS

Process Information

- o **Equipment Description (Vendor Drawings, etc.) and Quantities of Waste Equipment can Hold**
- o **Description of Secondary Containment**
- o **Permit is Flexible Enough to Allow Other Equipment to be used if EPA is Supplied with Equipment Description Information**

- EQUIPMENT MATERIALS.
- SAFEGUARDS FOR EQUIPMENT.

Procedures to Prevent Hazards

- o Security Procedures and Structures
- o Inspection Plans for Detecting Equipment Malfunctions, Leaks, etc.

o SAFEGUARDS FOR PROCESS TO PREVENT HAZARDS TO HUMAN HEALTH & ENVIRONMENT.

Contingency Plan

- o General Hanford Site Emergency Plan
- o Facility Specific Building Emergency Plan Developed using Existing Tank Farms Plans as a Guide

- 1706 KE:

- LEEF:

- INTERNAL WASTE ACCOUNTING SYSTEM:

- TRUCK TRUCKS → TANK SEWAGE.

Personnel Training

- o Guidance from Other Part B Applications**
- o 40 hour Hazardous Waste Training used where Applicable**
- o OJT Training Program for Personnel who will use the Various Pieces of Equipment**

Closure Plan.

- o Assume Clean Closure**
- o Existing Facility Conditions (e.g., asbestos tile) will Require NEPA Documentation which may Affect the Closure Plan Content**

Reporting and Recordkeeping

- o Treatment Verification Testing**
- o Test Frequency**
- o Information Submitted to the Regulatory Agencies**