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Final

Meeting Minutes Transmittal/Approval
Unit Manager's Meeting: 1100-EM-1 Area
450 Hills St., Richland, Washington
September 24, 1992

FROM/APPROVAL: Robert K Stewart Date 10/22/92
Robert K. Stewart, 1100-EM-1 Operable Unit Manager, RL

APPROVAL: David R. Einan Date 22 Oct 92
David R. Einan, 1100-EM-1 Unit Manager, EPA

APPROVAL: Richard B. Hibbard Date 10/22/92
Richard B. Hibbard, 1100-EM-1 Unit Manager, WA Department of Ecology

Meeting Minutes are attached. Minutes are comprised of the following:

- Attachment #1 - Meeting Summary/Summary of Commitments and Agreements
- Attachment #2 - Attendance List
- Attachment #3 - Agenda For 1100-EM-1 Meeting
- Attachment #4 - Action Items Status List
- Attachment #5 - 1100-EM-1 Operable Unit RI/FS Progress
- Attachment #6 - 1100-EM-1 Project Status
- Attachment #7 - Supercritical Fluid Extraction (SFE) Remediation of Hanford Contaminated Soils
- Attachment #8 - Ecological Risk Assessment for the 1100-EM-1 Operable Unit

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PREPARED BY: Suzanne Clarke Date 10/22/92
Suzanne Clarke, Kay Kimmel, GSSC (A4-35)

CONCURRENCE BY: John T. Stewart Date Oct 22, 1992
John T. Stewart, USACE 1100-EM-1 Project Manager (A5-20)

Attachment #1

Meeting Summary and Summary of Commitments and Agreements
Unit Manager's Meeting: 1100-EM-1 Area
September 24, 1992

1 SIGNING OF THE AUGUST 1100-EM-1 MEETING MINUTES - The August minutes were signed with no changes.

2 ACTION ITEM UPDATE: No existing Action Items (See Attachment #4).

3 NEW ACTION ITEMS (INITIATED September 24, 1992):

11EM1.103 USACE will provide EPA with a comparison of organic contaminant concentrations
K. Jones found below background to risk based benchmark concentrations from the RAGS
cheatsheet or from calculations, where baselines are not available.

4 INFORMATION ITEMS:

- Project Status and Status of Combined RI/FS Report - John Stewart presented the 1100-EM-1 project status (see attachments #5 and #6).
- Supercritical Fluid Extraction - Tim Moody presented possible applications of Supercritical Fluid Extraction (SFE) to the remediation of Hanford Contaminated Soils (see attachment #7).
- Risk Assessments - Karen Jones presented an overview of ecological risk assessment in preparation for inclusion in the 1100-EM-1 RI/FS final report (see attachment #8). Alden Foote facilitated a working session to discuss concerns with the human health risk assessments handed out at the last UMM. In general there were no serious concerns. EPA and Ecology did have several comments they will forward to USACE informally.
- Probabilistic Baseline Risk Assessment - A demonstration will be offered on October 6, 1992 at 9:00 am at the FFTF Visitor's Center.
- Siemens Power Corp. RI/FS Status - Susan Keith (G&M) updated the project status.

5 AGREEMENTS:

EPA provided informal comments concerning the draft human health risk assessment to be included in the Final RI/FS report. Several issues/questions were discussed. A general consensus was reached that, although EPA did not concur with certain technical aspects of the document, recalculation of these parameters would have no significant effect on the report conclusions. An exception involves the screening of organic contaminants below background in the industrial scenario. It was agreed that the document would be altered to satisfy EPA's concerns before the document is released to the public. It was also agreed that the draft document would include an acknowledgement indicating that this document deviates from the accepted human health risk assessment protocol and should not be used as a boiler plate for similar risk assessments in the future.

Attachment #2

1100-EM-1 Operable Unit Managers Meeting
 Official Attendance Record
 September 24, 1992

Please print clearly and use black ink

PRINTED NAME	SIGNATURE	ORGANIZATION	O.U. ROLE	TELEPHONE
Alden Fouts	<i>[Signature]</i>	USACE	Env Eng	(510) 522-6870
Karen Jones	<i>[Signature]</i>	USACE	Env Chem	(509) 376-1111
Staver W. Clark	<i>[Signature]</i>	WAC	former Tech Coord	509 376 1111
Tim Masdy	<i>[Signature]</i>	WAC	Information	6 1111
Kay Kimmel	<i>[Signature]</i>	SWEC	BSSC	509-376-0610
Neil Morten	<i>[Signature]</i>	PRC	SPM Support	206 621 1111
Dave Einan	<i>[Signature]</i>	EPA	Unit Mgr	509 376 3883
JOHN STEWART	<i>[Signature]</i>	USACE	PM	509-376 1111
Bill Kane	<i>[Signature]</i>	WAC	Ecology Support	206 221 1111
LORON MARR	<i>[Signature]</i>	SPC		509-375 8557
Suman Katta	<i>[Signature]</i>	GM for SPC		206 869 6321
DORIS MINOR	<i>[Signature]</i>	for SPC		206 781 7830
Stendross	<i>[Signature]</i>	Ecology	Unit Mgr	206 494 6111
Jon Sprockel	<i>[Signature]</i>	Biological Resources	Ecology Support	(509) 244 2009
Bob Stewart	<i>[Signature]</i>	DCE-RL	DCE Unit Mgr	509-376-6192
Rich Hubbard	<i>[Signature]</i>	Ecology	Unit Mgr	(206) 433 9811
Audree Dettinger	<i>[Signature]</i>	PRC	Ecology Support	206 621 1111

AGENDA FOR 1100-EM-1 UNIT MANAGERS MEETING

September 24, 1992
8:00 to 10:00 am
450 Hills St./Rm. 47

- 8:00 - 8:05 Introduction / Minutes Signing
- 8:05 - 8:08 Overall Project Status
- 8:08 - 9:45 Status of Combined RI/FS Report Activities
- Remedial Alternatives - Supercritical Fluid Extraction
 - Risk Assessments
 - Probabilistic Baseline Risk Assessment Demonstration
 - ARARs
- 9:50 - 9:55 Siemens Power Corp. Update
- 9:55 - 10:00 Action Item Status

Actions Items Status List

1100-EM-1 Operable Unit
September 24, 1992

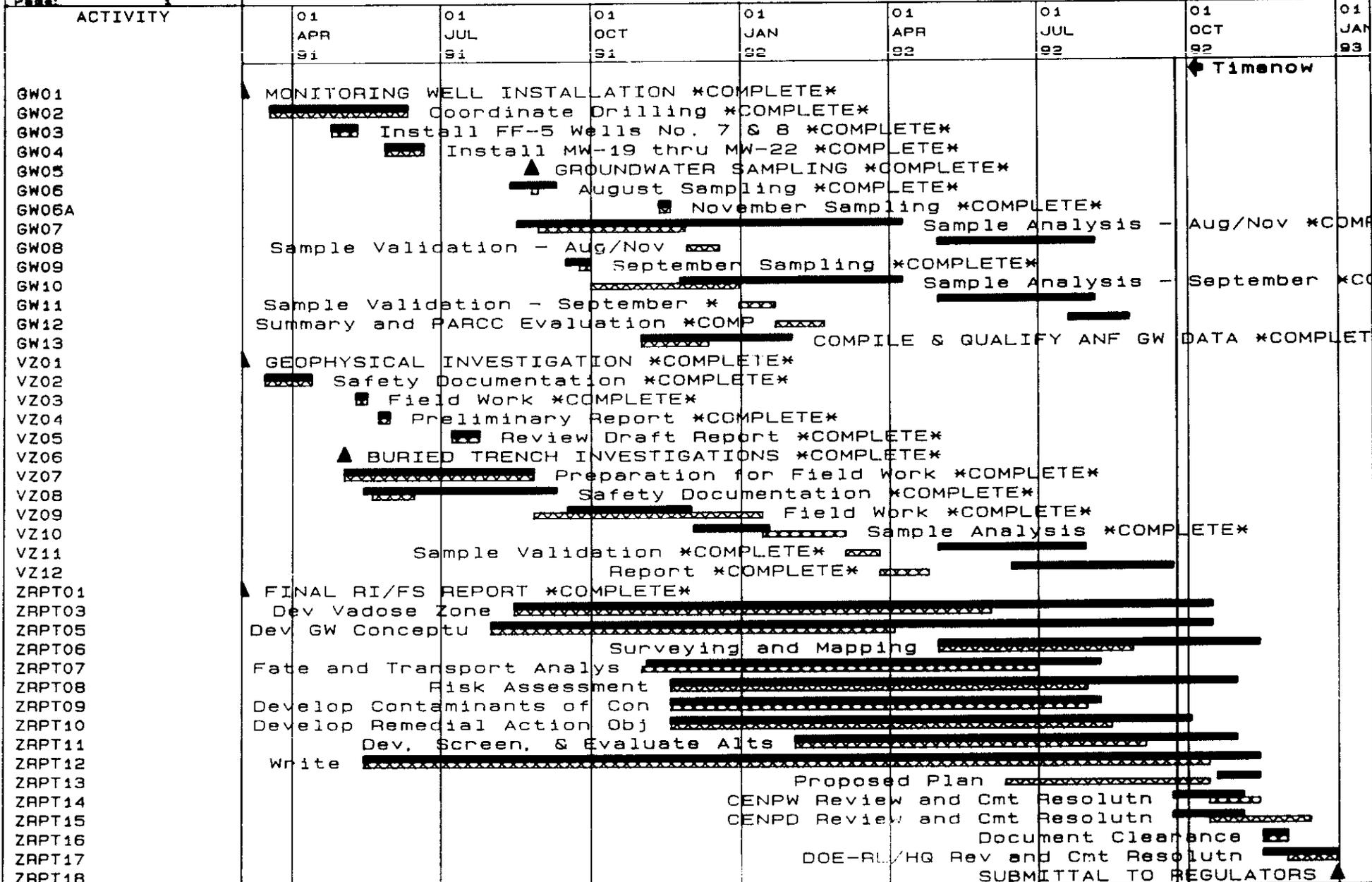
Item No.	Action/Source of Action	Status
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NO ACTION ITEMS

Report: GRAFBAR1
 Project: 1100EM1B
 Time Now: 24SEP92
 Date: 23SEP92
 Time: 10:15:45
 Page: 1

1100-EM-1 Operable Unit RI/FS Progress

Walla Walla District,
 Corps of Engineers



Legend
 [Pattern] - In progress
 [Pattern] - Planned
 [Pattern] - Critical
 [Pattern] - Baseline

Bar Chart Key: Early Dates against Baseline

Signatures
 Prep: _____
 Apprv: _____

1100-EM-1 PROJECT STATUS

Final Remedial Investigation/Feasibility Study Report for the 1100-EM-1 Operable Unit, Hanford: A draft of the report is currently being reviewed by Corps of Engineers environmental specialists and managers from Missouri River Division, Huntsville Division, North Pacific Division and Seattle District.

Remedial Alternatives: Supercritical Fluid Extraction is being considered as an innovative technology for remediation at the UN-1100-6 and the Ephemeral Pool. This technology could potentially have high removal efficiencies and moderate unit costs (not including development and construction costs). Because of the small volume of the waste sites, development of this technology is not warranted unless the regulators promote its use because of innovative technology status and because it may have wider application at other operable units.

Probabilistic Baseline Risk Assessment Demonstration: The initial meeting to discuss the probabilistic methodology, parameter sensitivity and parameter distributions is scheduled for October 6, 1992. The meeting will be in the Fast Flux Test Facility visitor conference room and begin at 9:00 am. The meeting is open to all Ecology and EPA persons and their support contractors.

ARARs: The proposed ARARs for the final RI/FS report were provided informally to the Regulators at the July Unit Managers Meeting. ~~Some~~ General comments were verbally provided to USACE at the August Unit Managers Meeting. ~~Detailed comments have not been provided.~~ Siemens Power Corp. was provided with the proposed ARARs on July 29, 1992 provided comments to USACE on August 25, 1992. All comments received to date have been incorporated.

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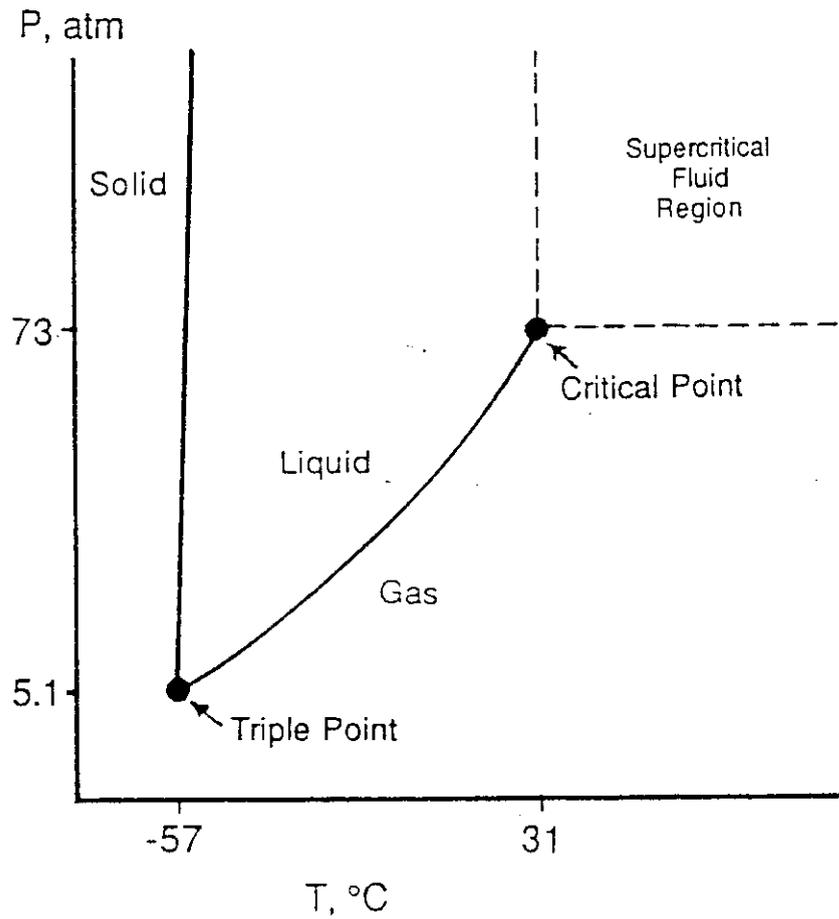
Supercritical Fluid Extraction(SFE) Remediation of Hanford Contaminated Soils

Environmental Restoration Engineering

T. E. Moody

September 22, 1992

CO₂ Phase Diagram



Supercritical Fluid Extraction

- Gas at temperature and pressures resulting in a density which approximates that of a liquid. *(diffusion K like gas)*
- Solvent is very compressed and condensed around the solute
- Short intermolecular distances increases solvation.
- Viscosity and diffusion coefficients are intermediate between those of liquids and gases
- Rapid mass transfer of solute into solvent

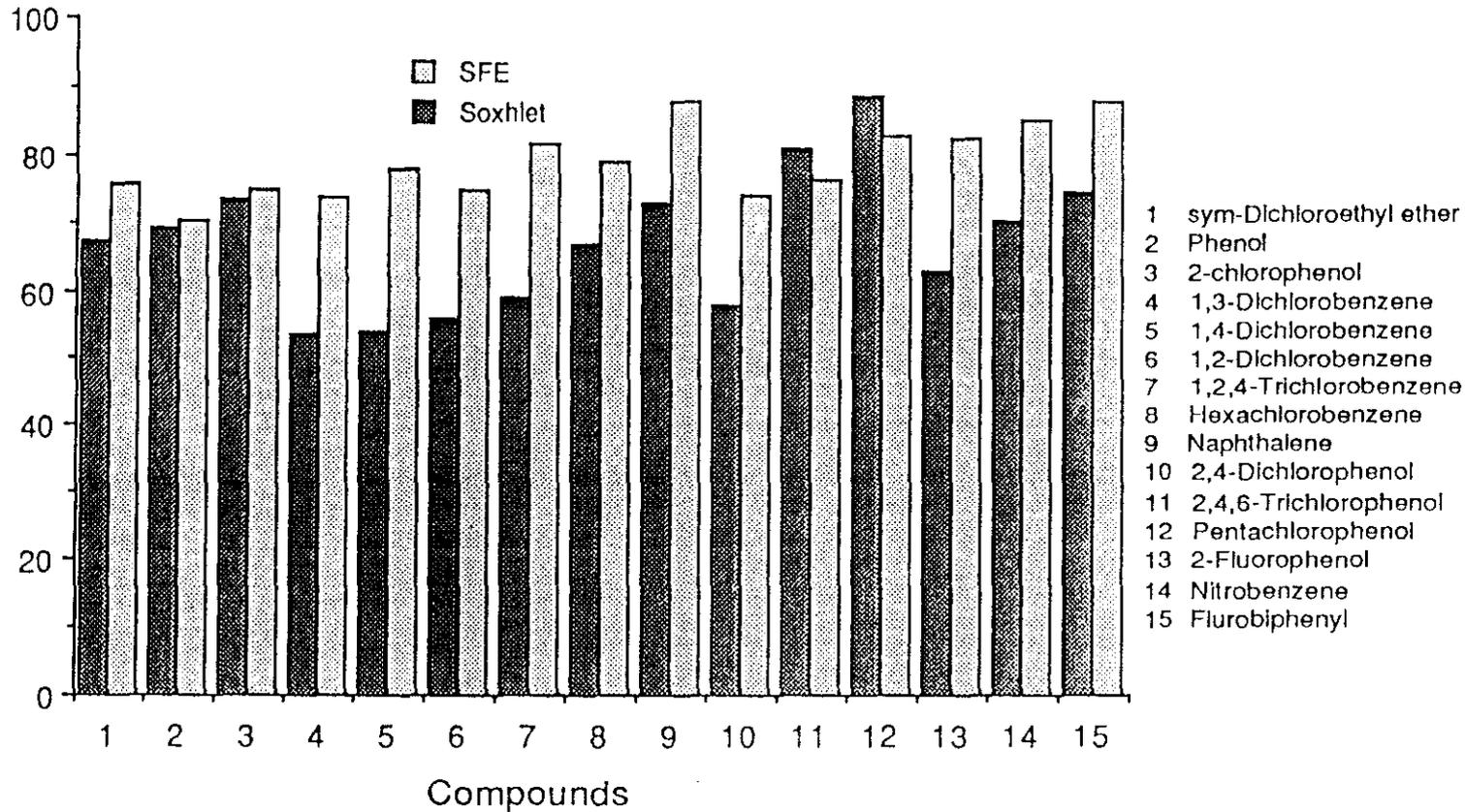
Description

- Extraction implements CO₂ at 31 °C and 73 atm pressure
- Analytical extraction procedure for semi-volatile, and non-volatile organics
- Replaces the Soxhlet analytical extraction procedure (CH₂Cl₂, C₆H₁₄)
- Inexpensive and expedient *30 min vs 18-24 hrs*
- Excellent correlation to approved analytical extraction methodologies
- EPA presently developing analytical procedures *— approved*

Technology Innovations

Percent Recovery of Semi-volatile Organics
Using SFE and Soxhlet Extraction

Recovery (%)



% Recovery is an average of 5 Soxhlet extractions and 9 supercritical fluid extractions
 Sample size = 2 grams
 98% CO₂ and 2% methanol

Contaminants Removed by SFE

- PAH's (benzene, naphthalene)
- Dioxins and furans
- PCB's (arochlor series)
- Pesticides (DDT, aldrin, lindane, organophosphorous, carbamates)
- Explosives (TNT, DNP)
- Neutral/acidic compounds (phenols, chlorophenols)
- Coal and petroleum gasification tar waste (pyrene, chrysene)

Current Large Scale SFE Applications

- Decaffeinate coffee beans
- Oil from hops
- Defatting soybeans
- Extraction of fats from cereal grains
- Cocoa bean extraction (cocoa butter)
- Cholesterol from butter
- Extracts from spices
- Nicotine from tobacco
- Extraction of oils and turpentine from coniferous woods
- Pyrethrin insecticide from chrysanthemum

- 15 U.S. Patents;
 Porous media extractions
 Separations

Application to Hanford

- ER Needs: Soil treatment method, organic destruction methods, Separation/segregation of mixed waste
- DOE identified SFE as a possible treatment technology in processing low-level mixed wastes at Rocky Flats
- Arid, sandy soils, small % clay materials and organic matter = perfect medium for SFE extraction
- Consistent sand and silt particle size
- Conveyor feed to SFE before soil washing makes the Volume Reduction System (VRS) doubly effective in removing both organics and radionuclides complexed with soil fines
- Removal of metals, radionuclides using CO₂ + chelate (University of Idaho)

Benefits

- Permitting easier than incineration or thermal stripping
- CO₂ is inexpensive solvent, energy input < incineration or thermal separation
- Contaminants and CO₂ can be collected and recycled
- CO₂ is friendly to the environment
- SFE parameters are less destructive to soil than thermal separation or incineration.
- No secondary waste stream
- No residue left after extraction
- Pretreatment minimal < 1" diameter

Statement of Work

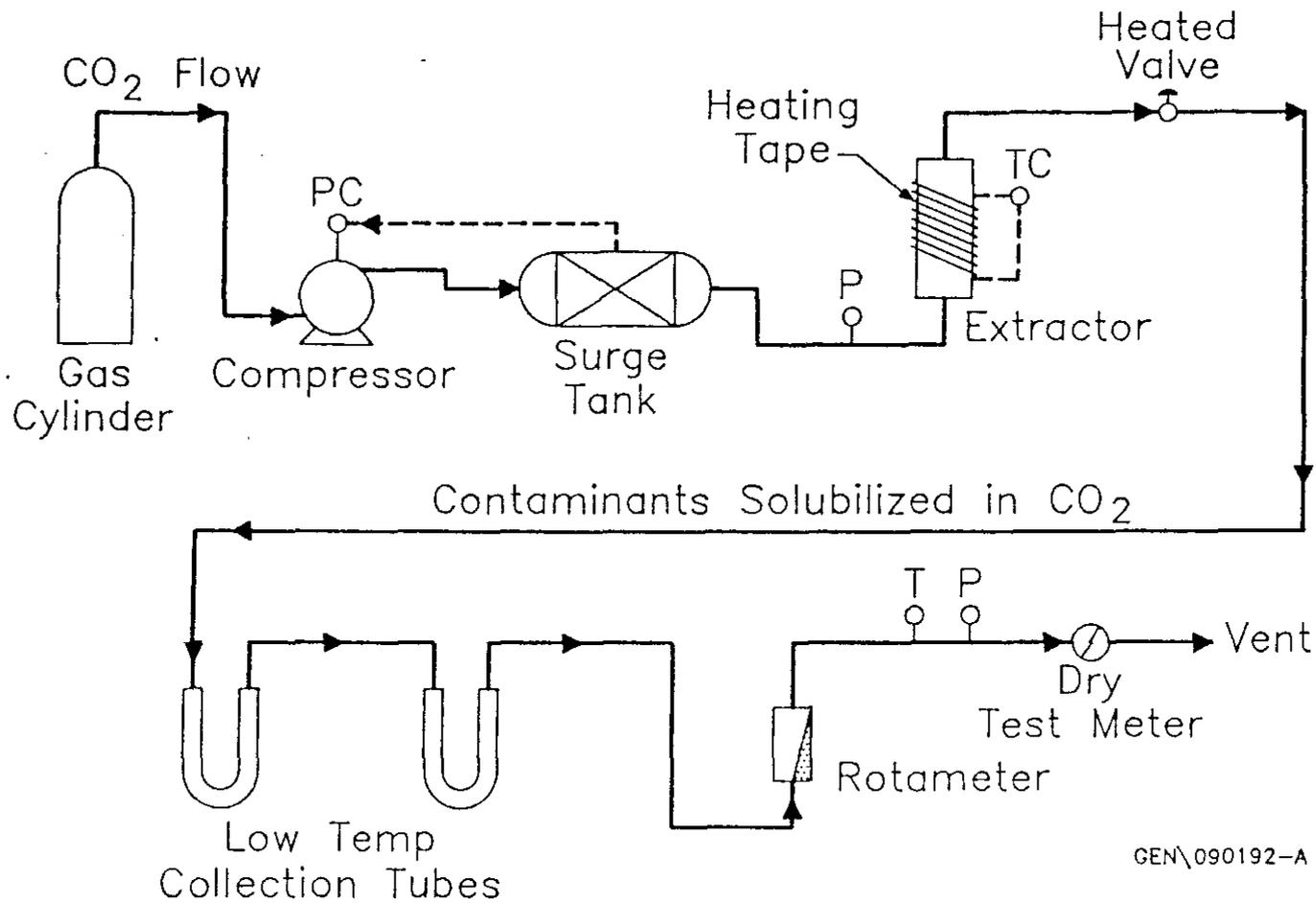
- Phasex - bench and pilot scale extractions
Virginia Polytechnic - analytical analyses of extractants
- Hanford soil contaminated with diesel, PCB's & bis(2-ethyl hexel) phthalate
- Bench scale tests at the 50g and 500g level
CO₂ pressures of 1000-6000 psi
temperatures of 25-65 °C
Vessel geometry
Flow rate
Equilibrium
Contaminant solubility
Solvent/feed
- Pilot scale tests at the 5kg level (7 Liter extractor)
Distribution of flow within soil cross section

Status

- January 10. Technical presentation given to the WHC Development Steering Board.
- January 17. 155K awarded
- March 5. The SOW, Purchase Requisition, and non-competitive justification were turned into Procurement.
- March 27. RFP mailed to the Phasex Corporation.
- May 18. The contract was award to the Phasex Corporation.
- May 29. 65 Kg of diesel contaminated soil shipped to the Phasex Corporation
- June 18. 75 Kg of 25,000 ppm bis(2-ethyl hexel) phthalate contaminated soil shipped to the Phasex Corporation
- June 29. 75 Kg of 100,000 ppb PCB contaminated soil shipped to the Phasex Corporation.

Status (cont'd)

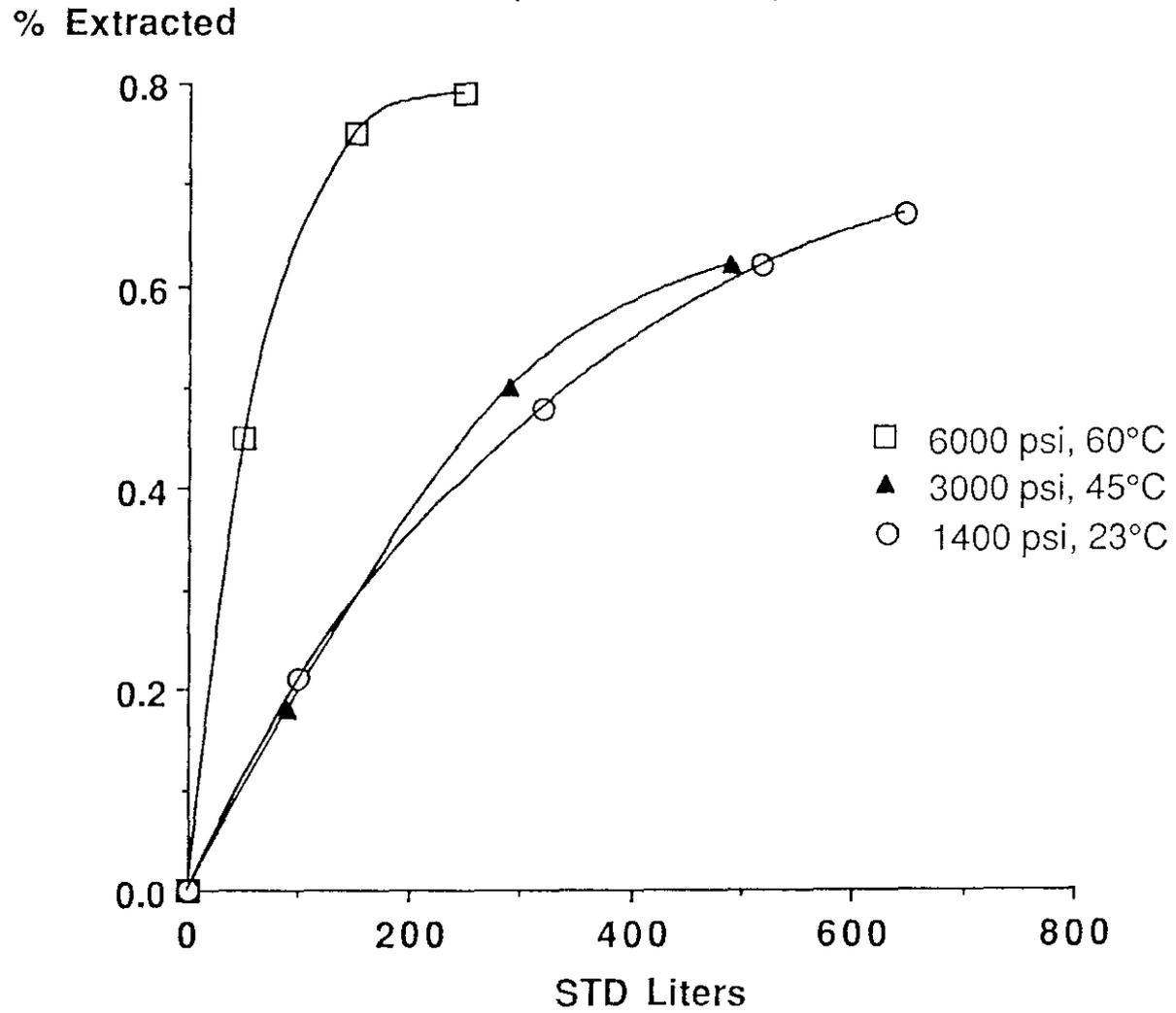
- 50g Bench scale tests completed by PhaseX
- 500g Bench scale tests completed PhaseX
- Extracts and fractions sent to VPI
(awaiting the analytical results)

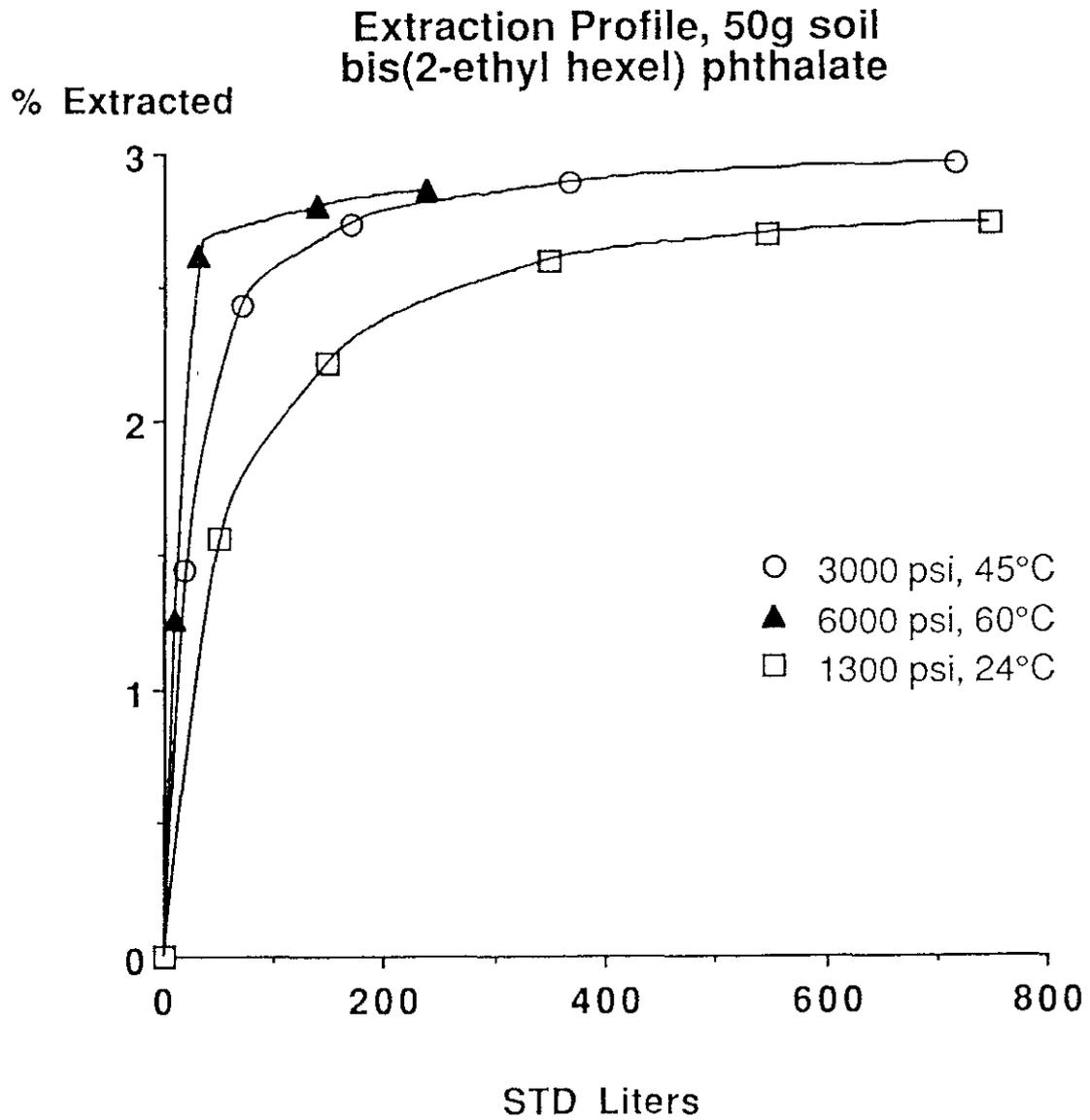


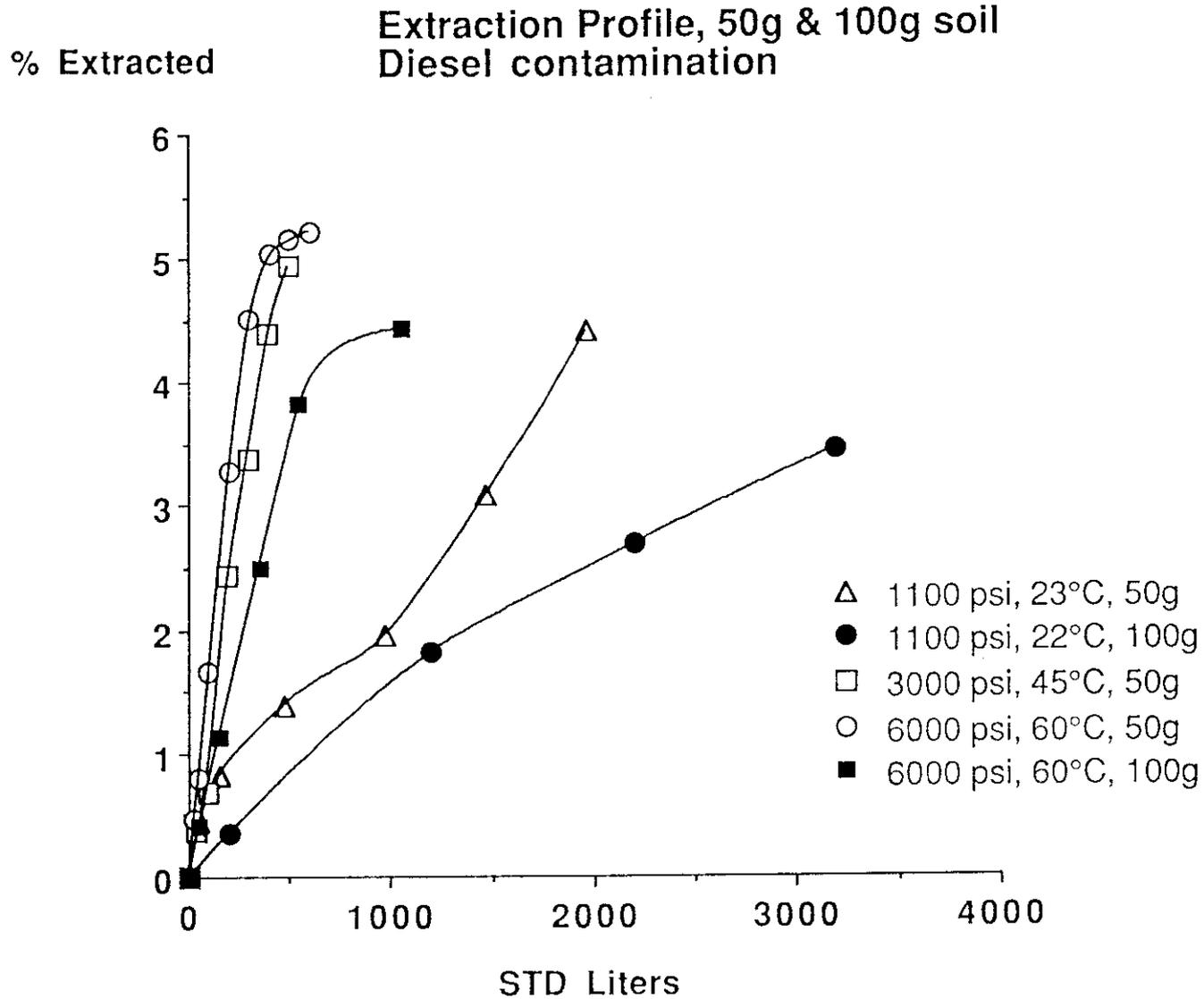
TC: Temperature Controller
 T: Thermocouple

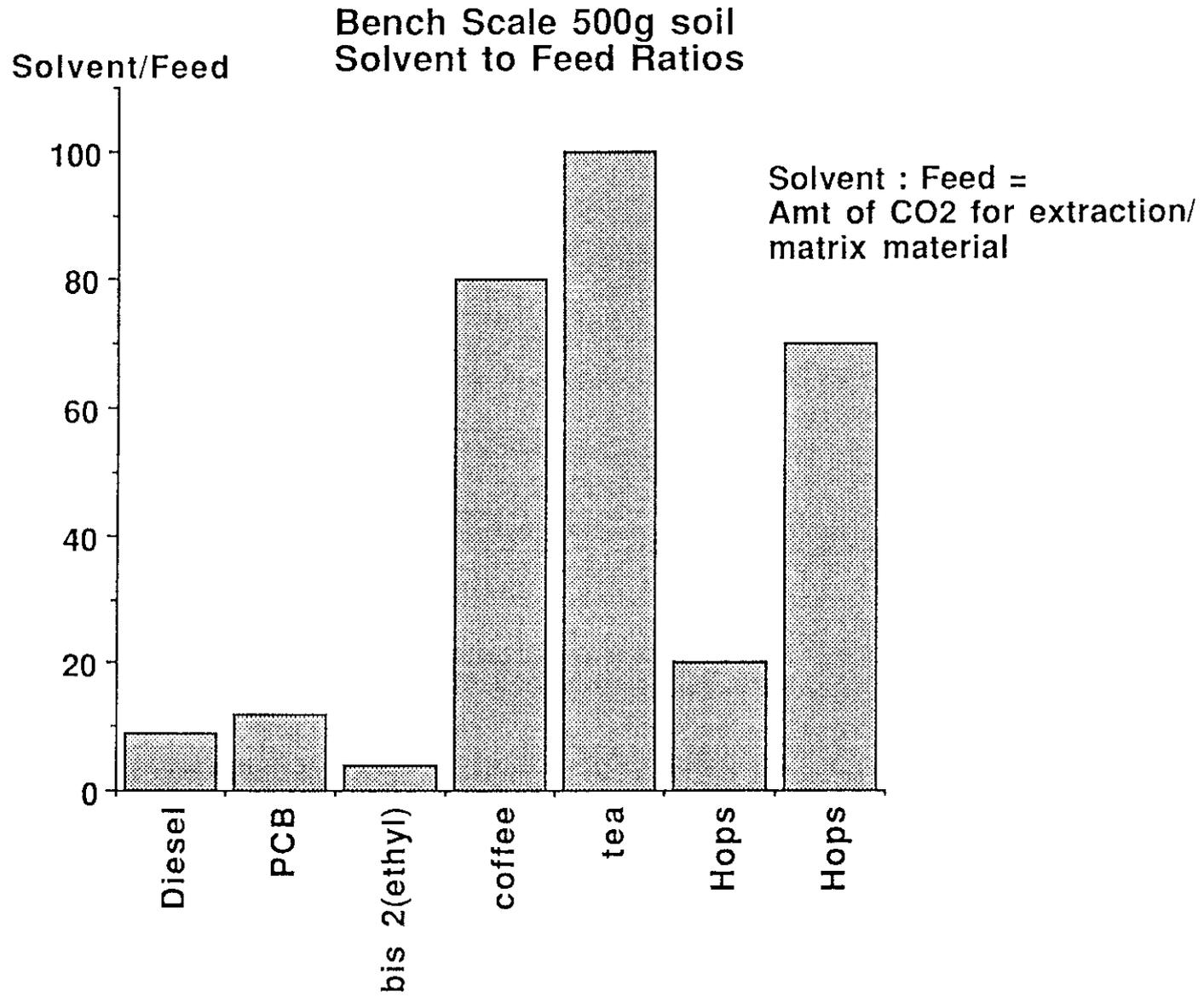
PC: Pressure Controller
 P: Pressure Gauge

Extraction Profile, 50g soil
PCB (aroclor 1248)









Liquid Propane extraction results from PCB Superfund site
CF Industries, MA
EPA Region X

Sample	[PCB] ppm	extraction %	[PCB] ppm	extraction %
Untreated	697.0	--	13,800.0	--
Stage #1	14.0	97.99	178.0	98.71
Stage #2	1.4	99.80	26.8	99.81
Stage #3	2.9	99.58	10.3	99.93
Stage #4	0.2	99.97	5.3	99.96
Stage #5	0.1	99.99	2.6	99.98
Stage #6	0.3	99.96	1.4	99.99

Summary of Needs for FY 93

- Revised Schedule
Phase I completed in FY 92
- Final Report
- EPA Evaluation Criteria for Technology Innovations
Nine criteria for technology acceptance
- Program integration 1100-EM-1 Operable Unit
Record of Decision (ROD)
Contaminants of Concern
- Marketing strategy
- Conceptual design for large scale SFE Unit
- Funds for FY 93 continuance and completion

ECOLOGICAL RISK ASSESSMENT FOR THE 1100-EM-1 OPERABLE UNIT

**PURPOSE AND SCOPE OF THE BASELINE ENVIRONMENTAL RISK
ASSESSMENT**

PROBLEM DEFINITION

Habitats of Potential Concern

Terrestrial Flora

Terrestrial Fauna

Contaminants of Potential Concern

Assessment and Measurement Endpoints

ANALYSIS

Exposure Assessment

Contaminant Transport

Uptake Rate Calculations for Assessment Endpoints

Toxicity Assessment

RISK CHARACTERIZATION

Comparison of Toxicity to Exposure

Uncertainty Analysis

Ecological Implications

POTENTIALLY SENSITIVE HABITATS AT 1100-EM-1

ENDANGERED

Peregrine falcon

THREATENED

Ferruginous hawk

MONITORED

Thompson's Sandwort
Long-billed curlew
Grasshopper mouse
Sagebrush vole

CANDIDATE

Swainson's hawk
Golden eagle
Prairie falcon
Pocket gopher
Striped whipsnake

UPTAKE CALCULATIONS FOR PLANTS, INSECTS AND SMALL MAMMALS

C_s = Contaminant concentration in soil (maximum concentration),
mg/kg
 UF_p = Plant uptake factor as dry weight (dw), unitless
 C_p = Contaminant concentration in plants, mg/kg dw
 UF_i = Insect uptake factor as dry weight, unitless
 C_i = Contaminant concentration in insects, mg/kg dw
 UF_m = Uptake factor for small mammals, unitless or d/kg as
indicated
 IR_m = Ingestion rate of vegetation for small mammals, kg/d
 C_m = Contaminant concentration in small mammals, mg/kg dw

Plants

$$C_p = C_s \times UF_p$$

Insects

$$C_i = C_p \times UF_i$$

Small Mammals

$$C_m = C_p \times UF_m$$

This equation was used where the unitless, dry weight uptake factors were available. If these values were unavailable, the following equation was used:

$$C_m = C_p \times UF_m \times IR_m$$

For this calculation UF_m has units of d/kg and IR_m was estimated from a mouse study to be 0.039 kg/d.

Values used in Uptake Calculations

Contaminant	Maximum Concentration, mg/kg	Plant Uptake Factor, unitless	Small Mammal Uptake Factor
Antimony	15.6	0.01b	0.002c
Arsenic	3.6	0.04a	0.002c
Barium	1320	0.001b	0.001c
Beryllium	1.3	0.43a	0.001c
Chromium	17.1	0.2a	0.0092c
Copper	58.6	0.3a	0.15a
Lead	482	0.008a	0.0004c
Nickel	174	0.09a	0.002c
Thallium	0.42	0.5b	0.02
Vanadium	87.3	0.04b	0.0092c
Zinc	408	0.80a	1.1a
BEHP	24000	0.38a	5.5a
Beta-HCH	0.094	0.38a	15.6a
Chlordane	1.86	0.05a	5.5a
DDT	2.0	0.11a	5.7a
Heptachlor	0.065	0.02a	14.2a
PCBs	100	0.38a	5.5a

a = Values from EPA 1986

b = Values from Kabatus-Pendias and Pendias

c = Values from Clement and Assoc, d/kg

Swainson's Hawk and Long-Billed Curlew

The average annual uptake rates for the Swainson's hawk and long-billed curlew were calculated using the following equation (EPA 1989):

$$\text{Uptake rate (mg/kg/d)} = \frac{(\text{CB})(\text{IR})(\text{FI})(\text{EF})(\text{ED})}{(\text{BW})(\text{AT})}$$

Where: CB = concentration of contaminant in the food source, Ci
or Cm (mg/kg)
IR = ingestion rate (kg/d)
FI = fraction ingested from the contaminant site
EF = exposure frequency (d/yr)
ED = exposure duration (yr)
BW = body weight (kg)
AT = averaging time (d)

Results of Uptake Calculations

Contaminant	Plant Uptake mg/kg	Insect Uptake mg/kg	Small Mammal Uptake mg/kg	Swainson's Hawk Uptake Rate mg/kg/d	Long-Billed Curlew Uptake Rate mg/kg/d
Antimony	0.16	0.16	1.2E-6	1.6E-8	8.6E-4
Arsenic	0.26	0.26	1.9E-6	2.4E-8	0.0014
Barium	1.32	1.32	5.0E-6	6.2E-8	0.0072
Beryllium	0.56	0.56	2.4E-6	2.8E-8	0.0031
Chromium	3.42	3.42	0.00062	7.6E-6	0.019
Copper	17.6	17.6	5.2	0.064	0.096
Lead	3.85	3.85	6.0E-6	7.4E-8	0.021
Nickel	15.7	15.7	1.2E-4	1.6E-6	0.086
Thallium	0.2	0.2	0.008	2.0E-4	0.0011
Vanadium	3.5	3.5	0.0002	2.4E-6	0.019
Zinc	326	326	720	8.8	1.8
BEHP	9100	9100	100000	0.24	1.0
Beta-HCH	0.035	0.035	01.1	0.014	2.0E-4
Chlordane	0.093	0.093	1.02	2.6E-6	1.0E-5
DDT	0.22	0.22	2.5	0.030	0.0012
Heptachlor	0.0013	0.0013	0.036	8.8E-8	1.4E-7
PCB	38	38	420	5.2	0.2

TOXICITY VALUES

Contaminant	Toxicity	Toxicity Parameter	Organism	Comments
Antimony	0.35 mg/kg bw/d	LOAEL	Rat	Chronic Oral
Arsenic	0.014 mg/kg/d	LOAEL	Human	Chronic Oral
Barium	0.21 mg/kg/d	NOAEL	Human	Chronic drinking
Beryllium	0.54 mg/kg bw/d	NOAEL	Rat	Chronic Oral
Chromium	2.4 mg/kg bw/d	NOAEL	Rat	1 year drinking
Copper	152 mg/kg	TDLo	Rat	Chronic Oral
Lead	4.3 mg/kg/d	LOAEL	Hawk	Subchronic Oral
Nickel	5 mg/kg/d	NOAEL	Rat	Chronic Oral
Thallium	0.7 mg/kg/d	LOAEL	Rat	Chronic Oral
Vanadium	0.89 mg/kg/d	NOAEL	Rat	Chronic Oral
Zinc	96 mg/kg/d	NOAEL	Mouse	Drinking water
BEHP	19 mg/kg bw/d	LOAEL	Guinea Pig	Chronic Oral
Beta-HCH	0.33 mg/kg/d	NOAEL	Rat	Subchronic Oral
Chlordane	0.055 mg/kg/day	NOEL	Rat	30 mo Oral
DDT	0.49 mg/kg/d	NOAEL	Hawk	Lifetime dosing
Heptachlor	0.15 mg/kg/day	NOEL	Rat	2-year Oral
PCBs	325 mg/kg	TDLo	Mammals	Subchronic Oral

Distribution

Unit Manager's Meeting: 1100-EM-1 Area
September 24, 1992

Ronald D. Izatt Director, DOE-RL, ERD (A5-15)
 June M. Hennig DOE-RL, WMD (A5-21)
 Julie K. Erickson Chief, DOE-RL, ERB (A5-19)
 Roger D. Freeberg Chief, Rstr. Br., DOE-RL, ERD (A5-19)
 Steven H. Wisness TPA Proj. Mgr., DOE-RL, EAP/TPA (A5-15)
 Bob Stewart Operable Unit Manager, DOE-RL, ERD (A5-19)
 Mike Thompson DOE-RL (A6-95)
 Diane Clark DOE-RL (A5-55)
 Mary Harmon DOE-HQ (EM-442)
 Lisa Chetnik Treichel DOE-HQ (EM-442)

John Stewart 1100-EM-1 Proj. Mgr., USACE (A5-20)
 Raimo Lias Env. Eng. Branch Chief, USACE (Walla Walla)

Dave Einan EPA (B5-01)
 Ward Staubitz USGS, Support to EPA
 Audree DeAngeles PRC, Support to EPA

Dib Goswami WDOE (Kennewick)
 Richard Hibbard WDOE (Lacey)
 Larry Goldstein WDOE (Lacey)
 Lynn Albin Washington Dept. of Health

Chris Abraham GAO (A1-80)

Lauren Maas SNP
 Clive Francis SNP
 Susan Keith Geraghty & Miller

Thomas Wintczak (L4-92) Prgm. Mgr. WHC
 DIANA SICKLE (L4-92) (WHC)

ADMINISTRATIVE RECORD: 1100-EM-1; Care of EDMC, WHC (H4-22)

This list has been updated. Please contact Suzanne E. Clarke (SWEC 372-0630) if further changes to the distribution list are needed.