REF 02-RF-00799, JLB-018-02

QUARTERLY REPORT FOR THE ROCKY FLATS GROUNDWATER PLUME TREATMENT SYSTEMS

January through March 2002

March 26, 2001

TABLE OF CONTENTS

1.0 INTRODUCTION 1
1 1 Site Events 1

2.0 SOLAR PONDS PLUME TREATMENT SYSTEM 1
2 1 Project Status 3
2 2 Treatment Effectiveness 3
2 2 1 Treatment System Monitoring 4
2 2 2 Downgradient Water Quality 4
2 3 Conclusions and Planned Changes 7

3.0 PU&D YARD PLUME TREATABILITY STUDY 7
3 1 Project Events 7
3 2 Preliminary Results 9
3 3 Conclusions and Work Planned 13

4.0 REFERENCES 13

TABLES

Table 1 Solar Ponds Plume Treatment System Analytical Results 4
Table 2 Downgradient Water Quality 5
Table 3 Recent Uranium Activities at the Pond A-4 Point-of-Compliance 6
Table 4 Preliminary Treatability Study Results 9

FIGURES

Figure 1 Solar Ponds Plume Treatment System Locations 2
Figure 2 PU&D Yard Groundwater VOC Plume Project Area 8
Figure 3 PU&D Yard Groundwater VOC Plume Material Insertion Point Configuration 10

GRAPHS

Graph 1 Solar Ponds Plume Treatment System Flow Rates, January through March 2001 3
Graph 2 Nitrate Concentrations at the Solar Ponds Plume Treatment System 6
Graph 3 Tetrachloroethene and Degradation Products Concentration versus Time in 30900 11
Graph 4 Tetrachloroethene and Degradation Products Concentration versus Time in 31001 11
Graph 5 Mole Fraction of Tetrachloroethene Relative to its Degradation Products as a Function of Time 13

2

ACRONYM LIST

DOE	Department of Energy
ITS	Interceptor Trench System
HRC®	Hydrogen Release Compound®
MIP	Material Insertion Point
mg/l	milligrams per liter
OU	Operable Unit
PCE	Tetrachloroethene
pCi/l	picoCuries per liter
PU&D	Property Utilization and Disposal
RFCA	Rocky Flats Cleanup Agreement
RFETS	Rocky Flats Environmental Technology Site
SCFA	DOE Subsurface Contaminant Focus Area
TCE	Trichloroethene
ug/l	micrograms per liter
VOC	volatile organic compound

1.0 INTRODUCTION

This quarterly report briefly describes the activities and performance monitoring data for the Solar Ponds Plume groundwater collection and treatment system and the Property Utilization and Disposal Yard (PU&D Yard) Plume Treatability Study at the Rocky Flats Environmental Technology Site (RFETS) As required by the respective decision documents, the remaining groundwater collection and treatment systems are now sampled semi-annually

This is the final Quarterly Report for the groundwater plume treatment systems In the future, the results will be compiled in the Annual Report prepared for each calendar year that includes available data for all five groundwater collection and treatment systems The Annual Report includes available data for the reactive barriers for the Mound Site Plume, the East Trenches Plume and the Solar Ponds Plume, Operable Unit (OU) 1 – 881 Hillside system, and OU7 – Present Landfill Seep collection system The PU&D Yard Plume Treatability Study results will also be summarized in the Annual Report

1.1 Site Events

No events impacting the plume treatment systems occurred this quarter However, little precipitation was received this quarter resulting in low flow rates for the plume treatment systems

2.0 SOLAR PONDS PLUME TREATMENT SYSTEM

The Solar Ponds groundwater plume contains low levels of nitrate and uranium generally attributed to storage and evaporation of radioactive and hazardous liquid wastes in the Solar Evaporation Ponds from 1953 to 1986 These ponds were drained and the sludge removed by 1995 Six interceptor trenches were installed in 1971 to de-water the hillside north and downgradient of the ponds The original six trenches were abandoned in place, and the Interceptor Trench System (ITS) was installed in 1981 The ITS was replaced with a 1,100-foot long collection system and passive treatment cell containing iron and wood chips in September 1999 The system components are shown on Figure 1 This system intercepts the water previously collected by the now defunct ITS

The original system design placed the treatment cell adjacent to North Walnut Creek With this design, water intercepted by the collection trench would flow by gravity to the treatment cell without detention in the collection trench Because Preble's Meadow Jumping Mouse (a Federally Listed Threatened Species) is present at this optimal location for a flow-through treatment cell, the location of the treatment cell was moved 400 feet upgradient to a location immediately adjacent to the collection trench As a result, the collection trench for this system must hold approximately 11 feet of groundwater to develop sufficient hydraulic head for the groundwater to flow into the treatment cell This has reduced the amount of water treated

Maintenance requirements consist of water level monitoring and sample collection Based on information from other similar systems, the media does not require raking or other maintenance It is expected that media replacement will be required 10 years after installation

4

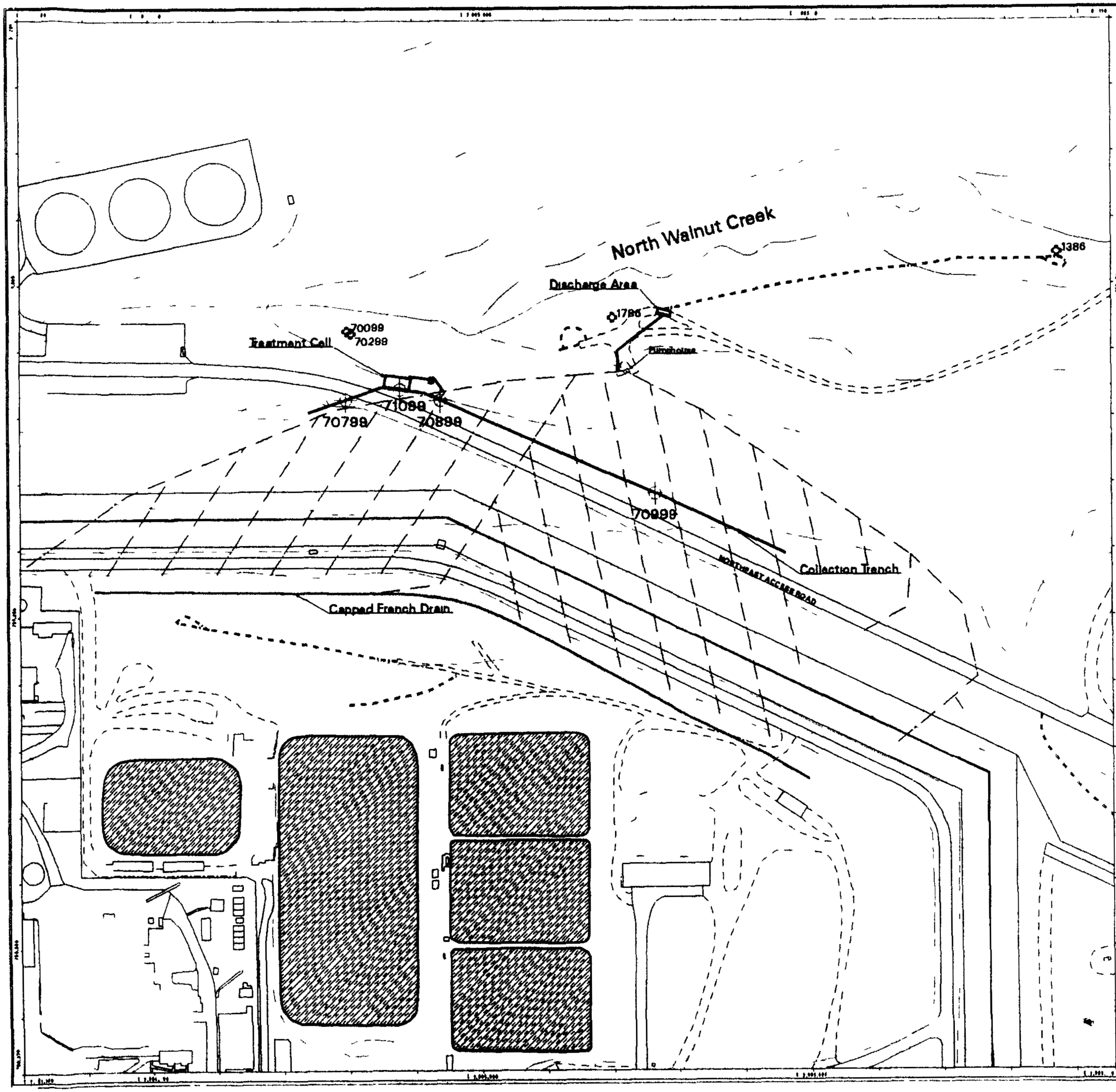


Figure 1
Solar Ponds Plume Treatment System Locations

EXPLANATION

- ITs
- In Trench Piezometer Location
- Monitoring Well

Standard Map Features

- Buildings and other structures
- Solar Evaporation Ponds (SEP)
- Lakes and ponds
- Streams ditches or other drainage features
- Fences and other barriers
- Contour (5-Foot)
- Paved roads
- Dirt roads

Scale = 1 : 3080
1 inch represents approximately 257 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD27

U S Department of Energy
Rocky Flats Environmental Technology Site

GIS Dept. 303-966-7707

Prepared by: DynCorp THE ART OF TECHNOLOGY

Prepared for: KAISER-HILL

MAP ID: 01-0345/solar_pond_ver1.aml

June 07, 2001

NT_Srv w /projects/fy2001/01 0345/solar pond ver1 aml

5

Best Available Copy

2.1 Project Status

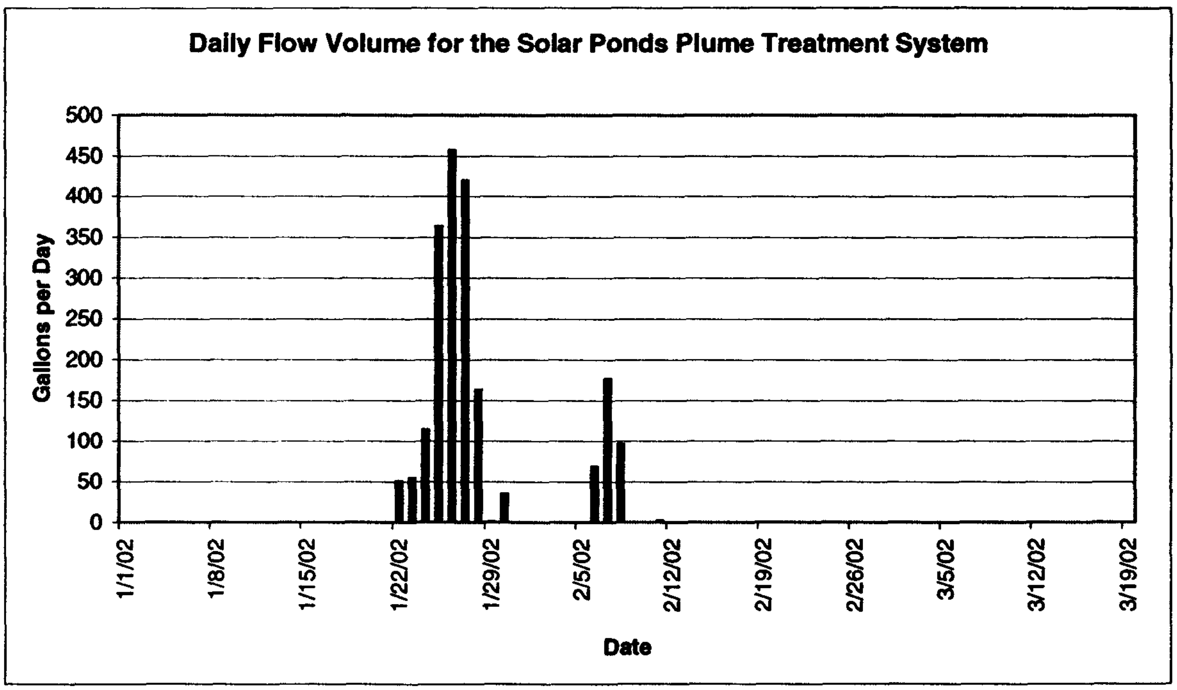
The Solar Ponds Plume system is currently collecting groundwater containing nitrate and uranium from the Solar Ponds Plume However, some untreated groundwater is also reaching surface water at the discharge gallery This results in higher nitrate levels in North Walnut Creek than were observed prior to system installation

Surface water quality continues to be well below applicable standards of 10 picoCuries per liter (pCi/l) uranium and 100 milligrams per liter (mg/l) nitrate specified in the Solar Ponds Plume Decision Document (DOE 1999) The 100 mg/l nitrate standard is a temporary modification of the underlying stream standard of 10 mg/l nitrate in North Walnut Creek (DOE 1999)

2.2 Treatment Effectiveness

Treatment system flow and volume of water are measured and recorded automatically The daily flow volume treated for the period January through March 19, 2002 are shown in Graph 1 The flow rate this quarter ranged from 0 to 0 9 gallons per minute As of March 19, 2002 approximately 454,780 gallons of water have been treated since system installation Of this volume, 1,999 gallons were treated this quarter During this quarter, most of the flow was water from the Solar Ponds Plume that was stored in the Modular Storage Tanks Water transfer began in mid January and continued sporadically through early February As noted previously, flow is closely associated with precipitation This quarter continues the lower than normal precipitation trend since system installation

Graph 1 Solar Ponds Plume Treatment System Flow Volume, January through March 2002



Water levels within the collection trench and downgradient wells are monitored monthly at locations shown on Figure 1 and the water level information will be provided in the Groundwater Plume Treatment Systems 2002 Annual Report

6

2.2.1 Treatment System Monitoring

Monthly samples are collected from the treatment system influent, effluent and discharge gallery (Figure 1) Data for this quarter and 2001 are provided in Table 1 Influent and discharge gallery nitrate concentrations remain above average, most likely because of continued drier conditions Uranium activities are also elevated, with the highest activity observed to date in January 2002 Low flow rates during this quarter did not allow for collection of effluent samples

Table 1 Solar Ponds Plume Treatment System Analytical Results

	SPP Influent		SPP Effluent		SPP Discharge Gallery	
Collection date	Nitrate in mg/l	Total Uranium in pCi/l	Nitrate in mg/l	Total Uranium in pCi/l	Nitrate in mg/l	Total Uranium in pCi/l
30-Jan-01	140	25 06	-	-	130	25 66
26-Feb-01	150	26 44	-	-	140	24 51
19-Mar-01	120	25 58	0 07	0 15	110	28 84
13-Apr-01	140	24 43	<0 05	0 003	120	20 2
25-Apr-01	130	24 58	<0 05	0 05	130	28 55
3-May-01	110	24 82	0 13	0 091	150	24 79
8-May-01	150	23 66	5 3	0 11	140	26 6
23-May-01	130	27 97	<0 05	0 002	180	31 16
21-Jun-01	120	25 49	<0 05	0 168	220	50 38
16-Jul-01	150	21 3	0 11	0	130	55 4
10-Aug-01	140	24 51	<0 05	0 1	150	28
26-Sep-01	109	26 22	-	-	202	41 64
31-Oct-01	168	22 64	-	-	257	37 15
30-Nov-01	212	25.67	-	-	268	32 48
28-Dec-01	156	24.07	-	-	211	35 8
29-Jan-02	162	25.19	-	-	209	68
28-Feb-02	198	nr	-	-	236	nr

\- not sampled
nr – not received

It appears that the discharge gallery is discharging both groundwater that is bypassing the treatment cell and groundwater derived from the pre-existing downgradient part of the plume that has nitrate concentrations consistently above 500 mg/l The average activity for uranium at this downgradient plume location is 65 pCi/l with a maximum activity of 80 pCi/l The contribution from the downgradient part of the plume results in higher nitrate and uranium concentrations at the discharge gallery than are observed at the treatment system influent

2.2.2 Downgradient Water Quality

Surface water and groundwater are monitored at several locations downgradient of the collection and treatment system Groundwater quality will be reported in the Groundwater Plume Treatment Systems 2002 Annual Report

2 2 2 1 Surface Water Qualıty

Surface water monıtorıng statıons at GS13 and Pond A-3 are monıtored monthly to verıfy that exıstıng stream standards contınue to be met Monıtorıng data for 2001 and the avaılable data for the first quarter of 2002 are provıded ın Table 2 below Results from the March samplıng event have not been receıved

Nıtrate concentratıons are well below the temporary stream standard of 100 mg/l and uranıum actıvıtıes at GS13 are below the surface water standard of 10 pCı/l Nıtrate concentratıons and uranıum actıvıtıes are elevated thıs quarter, but are sımılar to values observed durıng other dry perıods

Table 2 Downgradıent Surface Water Qualıty

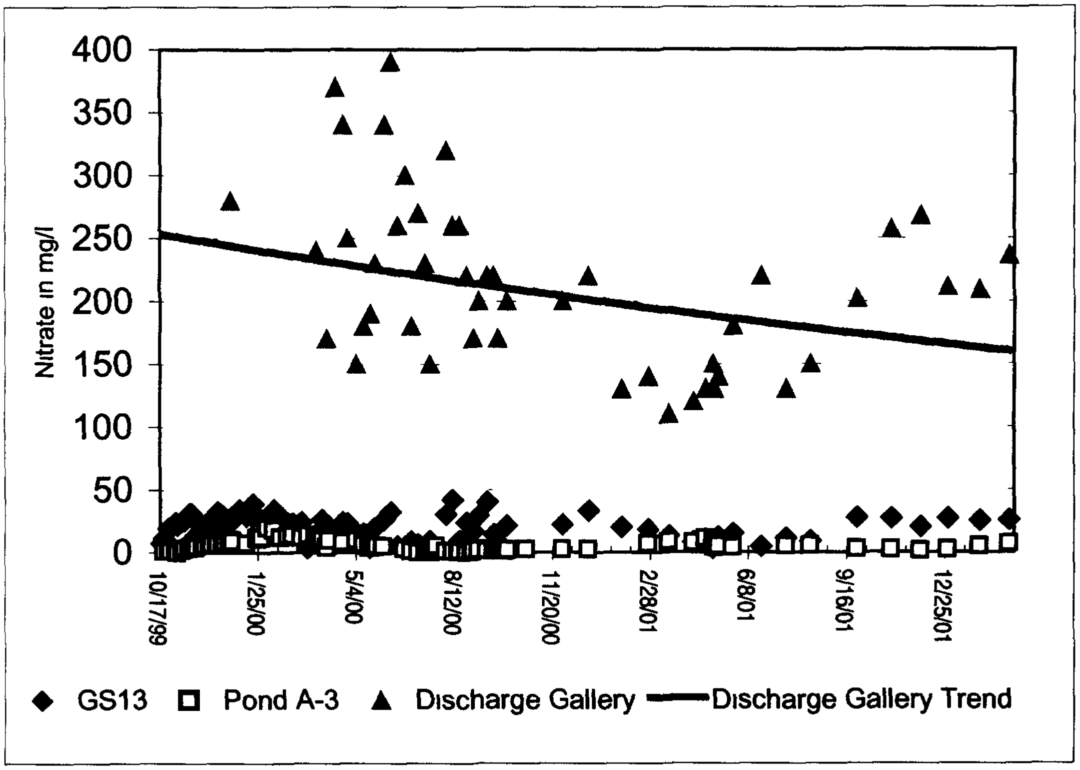
	GS13		Pond A-3
Collection date	Nıtrate ın mg/l	Total Uranıum ın pCı/l	Nıtrate ın mg/l
30-Jan-01	20	9 15	7 9
26-Feb-01	18	8 85	11
19-Mar-01	13	5 89	8 2
13-Apr-01	7 8	2 999	4 1
25-Apr-01	10	2 936	5 4
3-May-01	2 9	1 328	4 5
8-May-01	12	4 08	5 3
23-May-01	15	5 53	5 6
21-Jun-01	4 3	2 33	2 9
16-Jul-01	11	3 71	2 2
10-Aug-01	8 9	4 4	1 5
26-Sep-01	27 4	9 18	1 9
31-Oct-01	26 5	8 02	4 9
30-Nov-01	20 2	7 89	7
28-Dec-01	26 5	9 9	7 7
29-Jan-02	24 9	12 18	7
28-Feb-02	25 3	nr	9 6
85th Percentile	**26.02**	**9.2**	**8.08**
Standards	**100**	**10**	**100**

nr – not receıved

Graph 2 below dısplays the surface water nıtrate data sınce ınstallatıon of the Solar Ponds Plume system along wıth concentratıons observed at the dıscharge gallery The graph also shows that even wıth the recent elevated concentratıons, there ıs an overall stable trend at GS-13 and Pond A-3 Although there ıs a wıder range ın the concentratıons observed at the dıscharge gallery, an overall decreasıng trend ın dıscharge gallery nıtrate concentratıons ıs evıdent

8

Graph 2 Nitrate Concentrations at the Solar Ponds Plume Treatment System



GS13 is the performance monitoring location for the Solar Ponds Plume System (DOE 1999) and is located in North Walnut Creek immediately downgradient of the Solar Ponds Plume Since September 2001, the nitrate concentrations have generally been around 25 mg/l but fluctuate depending upon precipitation and other factors For the last 3 months where data are available, the nitrate concentration ranged from 25 3 to 26 5 mg/l, slightly lower than the last quarter's data

At Pond A-3, located downstream of GS13, nitrate concentrations over the past year were consistently below 10 mg/l Nitrate concentrations this reporting period ranged from 7 to 9 6 mg/l nitrate

The Pond A-4 Outfall (GS-11) is a Rocky Flats Cleanup Agreement (RFCA) Point of Compliance for uranium Samples are collected during the Pond A-4 discharge events and usually contain 3 to 4 pCi/l total uranium, well below the stream standard of 10 pCi/l No Pond A-4 discharges occurred this quarter The most recent Pond A-4 discharge was August 16 to 24, 2001, uranium data from the pre-discharge sample and discharge samples are shown in Table 3 and are well below the 10 pCi/l stream standard These data were also reported last quarter

Table 3 Recent Uranium Activities at the Pond A-4 Point-of-Compliance (pCi/l)

Dates	U-233, 234	U-235	U-238	Total Uranium
7/30/01	1 07	0 03	0 66	1 76
8/16/01 to 8/19/01	0 93	0 05	0 90	1 88
8/19/01 to 8/22/01	0 95	0 03	0 92	1 9
8/22/01 to 8/24/01	0 79	0 05	0 85	1 69

2 2 2 2 Groundwater Quality
Analytical samples are collected quarterly from the two downgradient wells These data will be provided in the Groundwater Plume Treatment Systems 2002 Annual Report

2.3 Conclusions and Planned Changes

The treatment cell is performing as designed However, water levels in the collection trench fluctuate rather than maintaining constant head at 11 feet suggesting that water is bypassing the treatment system Water quality in North Walnut Creek continues to be well below applicable standards for nitrate and uranium despite apparent bypass of the treatment system

Water levels within the collection trench and nearby wells will continue to be monitored on a monthly basis Based on the results from over 2 years of monitoring data, water quality sampling will now be conducted quarterly at groundwater wells, GS13, Pond A-3, the treatment system influent, effluent and discharge gallery to measure system performance and the impact to surface water

3.0 PU&D YARD PLUME TREATABILITY STUDY

A plume of volatile organic compound (VOC) contaminated groundwater is derived from a contaminant source located in the PU&D Yard at RFETS Investigation results indicate that subsurface VOC contamination is present in only a few locations and that the primary contaminant is tetrachloroethene (Kaiser-Hill 2001)

A treatability study is in progress to evaluate the effectiveness of Hydrogen Release Compound® (HRC®) for enhancing natural attenuation of the VOCs in the groundwater and soil at the PU&D Yard Plume HRC® is a proprietary, environmentally safe, food quality, polylactate ester formulated for slow release of lactic acid upon hydration The HRC® is expected to stimulate rapid degradation of chlorinated VOCs found in groundwater and soil at this location by making low concentrations of hydrogen available to the resident microbes to use for dechlorination The HRC® is expected to be a one-time application According to the manufacturer (Regenesis), the material is expected to stimulate contaminant degradation at the project site for approximately one year and a half

The product has been used at other sites to stimulate rapid degradation of chlorinated VOC contaminants in groundwater and soil This study is evaluating the effectiveness of HRC® in the low-flow groundwater regimes common at RFETS (Kaiser-Hill 2001) This project is a cooperative effort between RFETS and the Department of Energy (DOE) Subsurface Contaminant Focus Area (SCFA) and funding is provided by DOE SCFA

3.1 Project Events

The treatability study is located within the source area and that portion of the PU&D Yard Plume exhibiting the highest groundwater contaminant concentrations (Figure 2) Monitoring well 30900 was installed in this area immediately adjacent to borehole 17497 where the highest concentrations of VOCs in soils were detected An additional monitoring well (31001) was installed slightly downgradient of the source area in January 2001 as part of this study Baseline samples were collected from these two monitoring wells prior to insertion of the HRC®

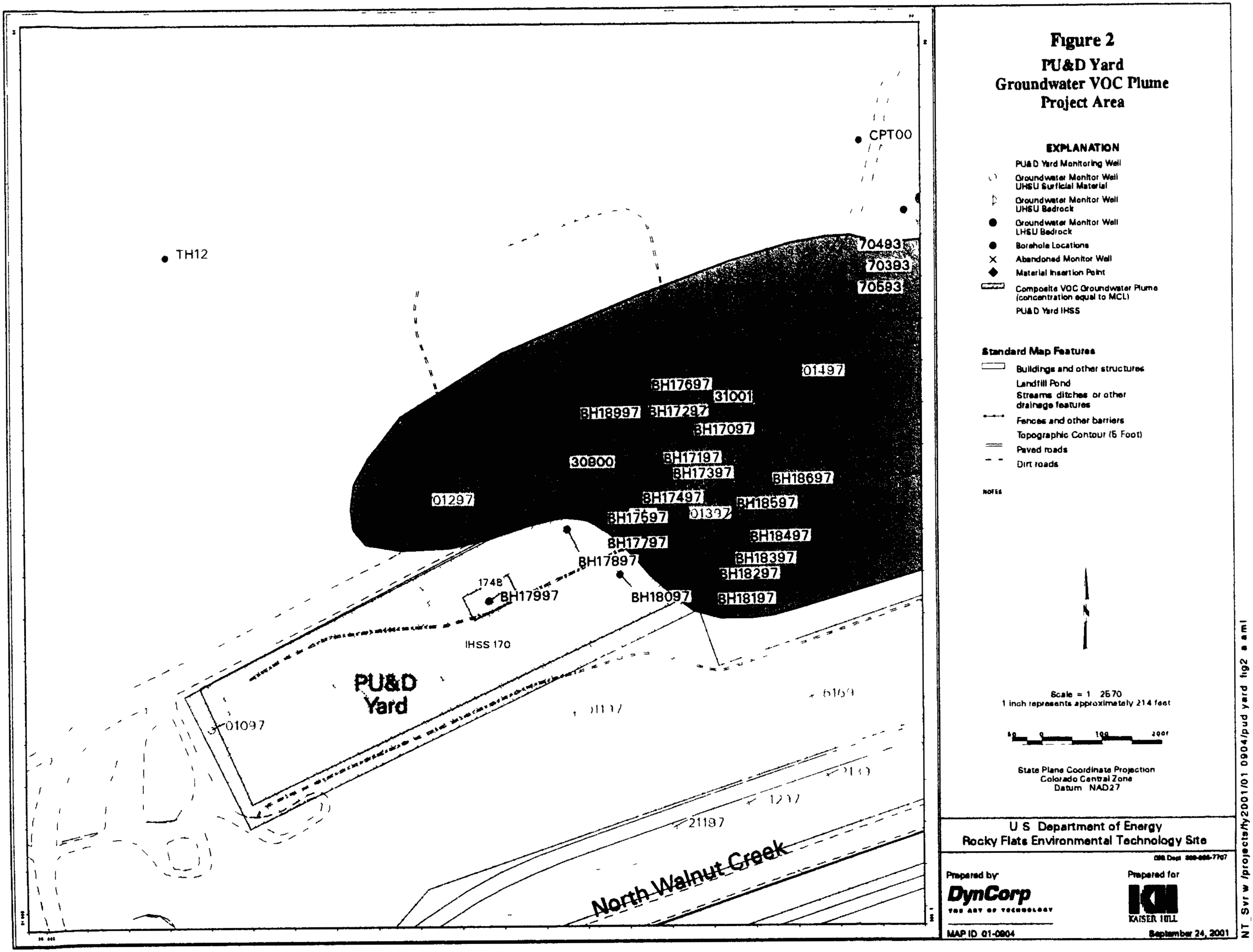


Figure 2
PU&D Yard
Groundwater VOC Plume
Project Area
EXPLANATION
PU&D Yard Monitoring Well
Groundwater Monitor Well UHSU Surficial Material
Groundwater Monitor Well UHSU Bedrock
Groundwater Monitor Well LHSU Bedrock
Borehole Locations
Abandoned Monitor Well
Material Insertion Point
Composite VOC Groundwater Plume (concentration equal to MCL)
PU&D Yard IHSS
Standard Map Features
Buildings and other structures
Landfill Pond
Streams ditches or other drainage features
Fences and other barriers
Topographic Contour (5 Foot)
Paved roads
Dirt roads
Scale = 1 2570
1 inch represents approximately 214 feet
State Plane Coordinate Projection
Colorado Central Zone
Datum NAD27
U S Department of Energy
Rocky Flats Environmental Technology Site
Prepared by
DynCorp
Prepared for
KAISER HILL
MAP ID 01-0904
September 24, 2001
NT_Svr w /projects/fy2001/01 0904/pud yard fig2 a aml
CPT00
TH12
70493
70393
70593
01497
BH17697
31001
BH18997
BH17297
BH17097
30800
BH17197
BH17397
BH18697
01297
BH17497
BH18597
BH17597
01397
BH18497
BH17797
BH18397
BH17897
BH18297
1748
BH17997
BH18097
BH18197
IHSS 170
PU&D
Yard
01097
21197
North Walnut Creek

Beginning in February 2001, 16 material insertion points (MIPs) were used to place over 800 pounds of HRC® into the subsurface A 10 feet by 6 feet grid was used for material insertion and was located within the source area of the plume immediately surrounding borehole 17497 (Figure 3) The initial grid consisted of nine points, additional geoprobe boreholes used as material insertion points were spaced between these initial locations biased to the upgradient part of the source area HRC® insertion was completed on March 1, 2001 Subsurface conditions were allowed to stabilize for two months, then monthly sampling was initiated April 30, 2001

As part of the study, two additional groundwater samples were to be collected if possible from the northwest and southwest corners of the insertion grid (Kaiser-Hill 2001) Sufficient groundwater was present at the southwest corner of the insertion grid (MIP3) to collect a groundwater sample prior to insertion of the HRC® There was insufficient water encountered at the northwest corner of the insertion grid (MIP1) to collect a groundwater sample at this location

3.2 Preliminary Results

Results from the initial baseline samples and the monthly sampling events through February 2002 are reported below in Table 4 in micrograms per liter (ug/l) For completeness, the previous samples from the pre-existing monitoring well (30900) in the source area are also included In addition, results from the one time only groundwater sample from MIP3 are also shown below

Table 4 Preliminary Treatability Study Results (ug/l)

Location	Sample Date	Tetrachloro-ethene	Trichloro-ethene	Cis 1,2 Dichloro-ethene	Trans 1,2, Dichloro-ethene	1,1-Dichloro-ethene	Vinyl Chloride
MIP3	2/20/01	4 9	ND	ND	ND	ND	ND
30900	10/21/00	96	7 4	53 1	ND	ND	ND
	2/7/01	120	7	78	0 5	0 5	ND
	4/30/01	180	11	110	0 1	0 4	ND
	5/30/01	350	23	210	ND	ND	ND
	6/27/01	240	15	140	0 2	0 5	ND
	7/31/01	93 6	10 6	91 4	0 19	0 31	0 21
	8/28/01	116	15	100	ND	0 39	ND
	10/1/01	50	5	77	ND	ND	ND
	10/31/01	34	3 1	36	ND	ND	ND
	11/29/01	30	3 6	45	ND	0 28	ND
	1/7/02	18 5	2 92	88 6	0 212J	ND	ND
	2/4/02	9 8	1 9	140	ND	0 38	ND
31001	2/7/01	18	5 5	1 2	ND	2 6	ND
	4/30/01	130	20	52	0 1	4	ND
	5/30/01	41	18	4	ND	ND	ND
	6/27/01	120	25	38	ND	1	ND
	7/31/01	105	16 3	189	0 13	1 49	0 12
	8/29/01	81	22	93	ND	ND	ND
	10/1/01	67	7 7	71	ND	0 6	ND
	11/1/01	18	4 8	30	ND	0 65	ND
	11/30/01	15	3 7	24	ND	0 47	ND
	1/7/02	12	3 78	12 1	ND	0 88	ND
	2/18/02	37	9 4	13	ND	3 3	ND
Groundwater Tier I Action Levels		500	500	700	700	700	200
Groundwater Tier II Action Levels		5	5	7	7	7	2

ND - not detected

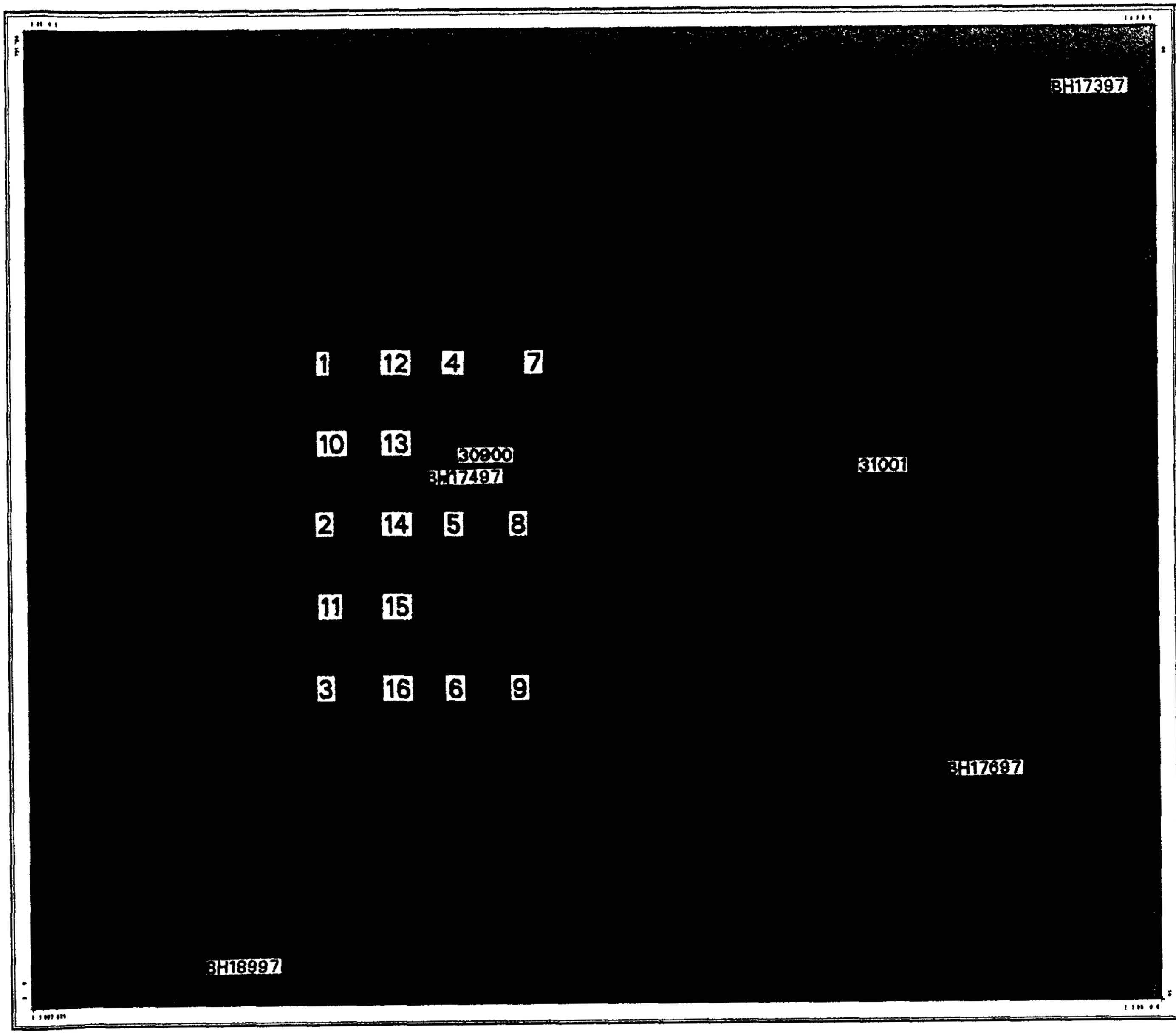


Figure 3
PU&D Yard
Groundwater VOC Plume
Material Insertion Point Configuration

EXPLANATION

PU&D Yard Monitoring Well
Groundwater Monitor Well UHSU Surficial Material
Groundwater Monitor Well UHSU Bedrock
Groundwater Monitor Well LHSU Bedrock
Borehole Location
Abandoned Monitor Well
Material Insertion Point
Composite VOC Groundwater Plume (concentration equal to MCL)
PU&D Yard IHSS

Standard Map Features

Buildings and other structures
Landfill Pond
Streams ditches or other drainage features
Fences and other barriers
Topographic Contour (5 Foot)
Paved roads
Dirt roads

Scale = 1 : 60
1 inch represents 5 feet

State Plane Coordinate Projection
Colorado Central Zone
Datum NAD27

U S Department of Energy
Rocky Flats Environmental Technology Site

Prepared by: DynCorp

Prepared for: KAISER HILL

MAP ID 01-0904

September 24 2001

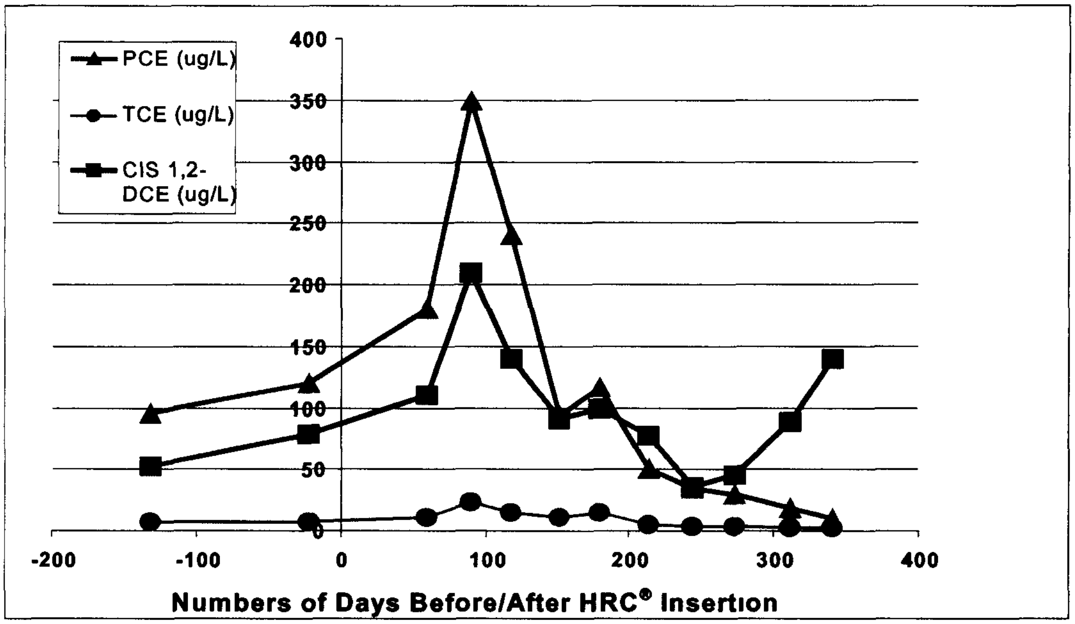
NT Svr w /projects/fy2001/01 0904/pud yard mip_fig3 a aml

13

Best Available Copy

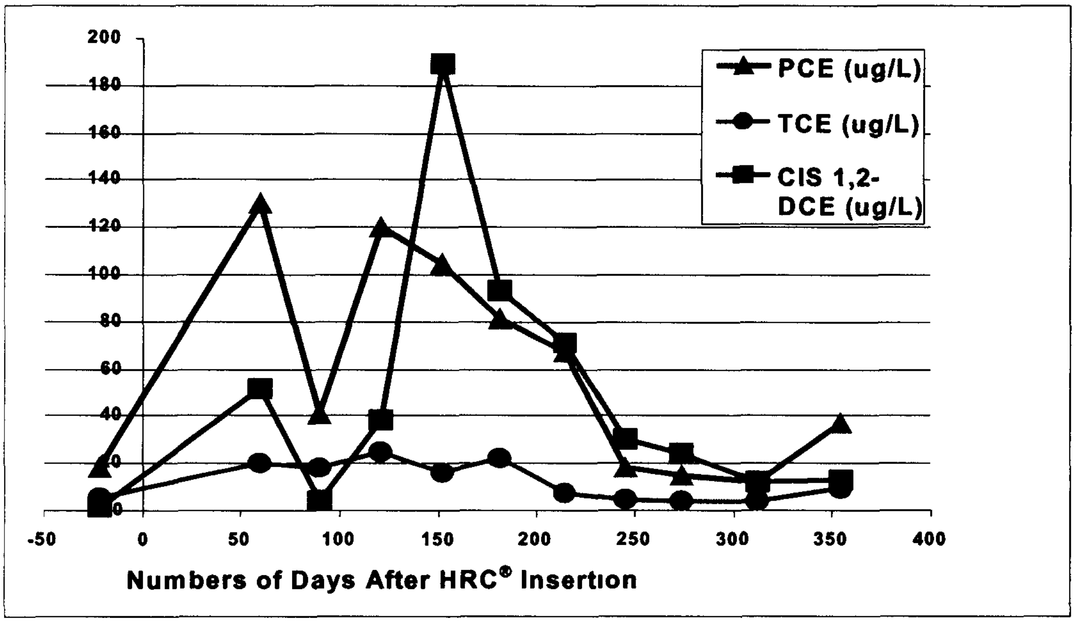
As shown in Table 4 and on Graph 3, tetrachloroethene, trichloroethene and cis-1,2 dichloroethene concentrations 30900 increased after insertion of the HRC®, then decreased Trichloroethene and cis-1,2 dichloroethene are degradation products of tetrachloroethene Cis 1,2-dichloroethene concentrations at this location have recently increased

Graph 3 Tetrachloroethene and Degradation Products Concentration versus Time in 30900



As shown on Graph 4, a similar declining trend is observed in the data from 31001 but without a concurrent increase in cis 1,2-dichloroethene There is also a slight increase in tetrachloroethene concentrations

Graph 4 Tetrachloroethene and Degradation Products Concentration versus Time in 31001



The area around the source well 30900 continues to have low oxidation-reduction potential levels (-54 6) indicating that HRC® is still present The continued presence of the HRC® as a food source, the reducing environment, and saturation of electron receptors such as sulfates and iron creates a favorable environment for anaerobic bacteria and favors the degradation of tetrachloroethene and trichloroethene but not the degradation of cis 1,2-dichloroethene As tetrachloroethene and trichloroethene degrade, higher concentrations of cis 1,2-dichloroethene are occurring in the center of the biological activity Away from the insertion grid, the oxygen content increases, conditions become more favorable for aerobic degradation and the cis 1,2-dichloroethene is being degraded

In the downgradient well 31001, oxidizing conditions are returning The low oxidation-reduction potential in this well has gone from low value of -15 1 in November up to their current levels of 356 6 The data as shown in Table 4 and Graph 4 show the higher tetrachloroethene levels and the lower cis 1,2-dichloroethene levels The more aerobic conditions will also return to the source area once HRC® is consumed This is an indication that the HRC® is being consumed and that the area of anaerobic biodegradation is shrinking This effect could be offset later this Spring as the water table rises and HRC® in the unsaturated soil becomes available again for continued remediation

As discussed previously, the initial increase in tetrachloroethene groundwater concentrations at both wells is most likely due to one or a combination of the following conditions

- A change in the surface tension of free phase solvents in the pores that would cause more solvent to be released from the pores

- An increase in the relative solubility of the individual VOCs due to the presence of the lactic acid in the aqueous phase that would allow more VOCs to go into solution

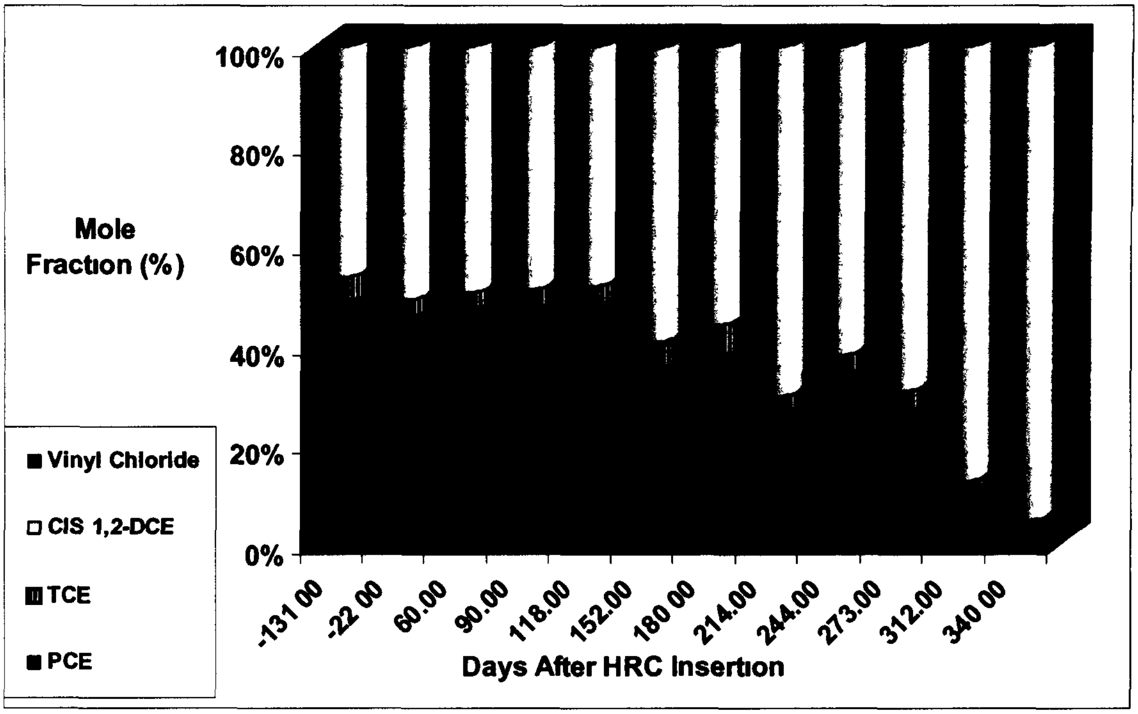
- Other changes in liquid and organic phases caused by changes in pH, temperature, oxidation-reduction potential, etc caused by addition of lactic acid or by increases in biological activity

The initial increases in concentrations indicate that VOCs were transferred from the soil to an aqueous phase, potentially accelerating both soil and water remediation Typically, the VOCs trapped in soil below the saturated zone have been the most difficult phase to remediate using traditional remediation methods and continue to act as a contaminant source If these are being mobilized and then biologically degraded along with the dissolved phase, this will be a much more robust treatment methodology than simply biologically degrading the dissolved fraction

As shown in Table 4, the presence of other degradation products such as trans 1,2-dichloroethene, 1,1-dichloroethene and vinyl chloride demonstrates that degradation is occurring since these contaminants were not associated with releases at the PU&D Yard Vinyl chloride is the last degradation product generated prior to the degradation to ethene The small quantities of ethene produced are expected to offgas and not be detected

The increase in the ratio of degradation products relative to tetrachloroethene concentrations confirms that degradation is occurring Graph 5 shows the relative changes of mole fractions of tetrachloroethene and its degradation products in 31001 This trend in combination with the overall reduction of tetrachloroethene indicates that even though there was an initial increase in tetrachloroethene that much of this has been degraded It is anticipated that over time there also will be a further decrease in these degradation products

Graph 5 Mole Fraction of Tetrachloroethene Relative to its Degradation Products over Time



3.3 Conclusions and Work Planned

The continued decrease in tetrachloroethene and appearance of its byproducts provide direct evidence that the contaminant plume is being degraded However, monthly monitoring will continue until sufficient data are collected to establish the effectiveness of the HRC® and these data will be provided in the Groundwater Plume Treatment Systems 2002 Annual Report A treatability study report was completed in October 2001 and provides additional information on the treatability study (Kaiser-Hill, 2001)

4.0 REFERENCES

DOE, 1999, *Final Solar Ponds Plume Decision Document*, RF/RMRS-98-286 UN, June

Kaiser-Hill, 2001, *Final PU&D Yard Plume Enhanced Natural Attenuation Treatability Study Report*, September

16/16