CytoCulture
ENVIRONMENTAL
BIOTECHNOLOGY
A DIVISION OF CYTOCULTURE INTERNATIONAL INC.

January 15, 1990

Mr. William Meckel
Source Control Division
EAST BAY MUNICIPAL UTILITY DISTRICT
Mail Stop 59 P.O. Box 24055
Oakland, CA 94623

RE: Wastewater Discharge Permit (Groundwater Treatment)
EBMUD Account No. 001-00002
TENTH monthly report of treatment and discharge operations for **December 1989**

CytoCulture/Sybron Chemicals are herein reporting on the results for the tenth month of continuous biological treatment of diesel-contaminated groundwater and discharge of the treated water into an EBMUD interceptor at the former P.I.E. Nationwide truck terminal in Emeryville. Laboratory analytical results are enclosed along with our Daily Facility Log Sheets.

At the end of November, the north and south bioreactor systems were in continuous operation processing diesel-contaminated groundwater at a rate of 3 gpm (4,000 gpd) after the first winter storm over the Thanksgiving weekend. This moderate flow rate fluctuated some and lasted into the first week of December as the water table dropped again.

Operating Conditions in December

In the first week of the month the groundwater extraction flow rate from the combined N & S trenches maintained at 3-4 gpm. Some free product was recovered. By December 12 the flow rate was observed to slow down to 2 gpm (2,700 gpd) and remained at the rate of 2 - 2.5 gpm (2,900 - 3,400 gpd) for the balance of the month on account of no substantial rainfall in the period.

Free product "aged diesel" had been collected from both trenches intermittently and was skimmed off the oil/water separators on December 1, 6, 14 and 22. The total was about 30 gallons. The previous total oil stored on site was 180 gallons, so the net oil recovery since last September is about 210 gallons.

Both bioreactor systems appeared to be operating normally except that the south system was observed to have a much lower biomass density. This observation was unexplainable in light of the fact that there were adequate nutrient, aeration and carbon levels to sustain a normal density of bacteria. The north system appeared normal, leading us to suspect some toxic contamination which was inhibiting the growth of bacteria in the south bioreactors.

124 WASHINGTON AVENUE POINT RICHMOND CA 94801
415 233 6660 FAX 415 233 3

The total amount of water treated in the month of December was estimated from the averaged flow rate (2.6 gpm; 3,700 gpd) to be 116,000 gallons. The total groundwater treated since March 2nd through the end of November had been 803,000 gallons, so the year end (1989) total treatment volume is 919,000 gallons.

For virtually the entire 10 months of groundwater treatment, the treated effluent discharges registered as non-detectable for benzene, toluene, xylene and ethyl benzene as well as for total petroleum hydrocarbons (this month's data summarized below). Effluent treated water almost invariably has contained a healthy bacterial floc which settled out in about a half an hour to leave a clear, transparent and odorless supernatant.

Sample Analysis

Since there have been at least 6 months of normal operation, the treated effluent and the groundwater influent is monitored twice a month. At the beginning of the month (December 1), an effluent sample (E-93) and a corresponding south trench influent (I-94) sample were taken for routine analysis. EBMUD presumably took a sample on or about the same day for confirmation of our results. Both data indicated that the system was operating normally and that the treated effluent discharge attained non-detectable levels of BTXE and total petroleum hydrocarbons (TPH).

The south trench groundwater influent level of diesel was reported to be 4,900 mg/L (ppm) TPH indicating traces of free product were in the sample. The corresponding benzene level in this sample was 340 ug/L (ppb), but there were no detectable levels of toluene or xylene in the sample.

Four weeks later, on December 28, another influent/effluent pair of samples were taken for analysis. The influent (I-95) level of diesel from the north trench was 200 mg/L (ppm) TPH as diesel. The BTXE levels in the influent were 299 ug/L benzene, 1.9 ug/L toluene, 2.9 ug/L xylene and 3.1 ug/L ethyl benzene.

The corresponding effluent sample (E-96) was reported with non-detectable levels of TPH as diesel and N.D. levels of benzene, toluene and ethyl benzene. However, for the first time in over 10 months of operation the level of xylene in the effluent was reported to be 6.0 ug/L (ppb).

Samples of effluent have been taken weekly ever since to monitor for possible indications of system problems in the discharged treated water. In the first week of January, the effluent was found to be at the usual non-detectable levels again for both TPH and BTXE components. EBMUD tests on the early January monthly sample may confirm this reported result.

The aberrant appearance of trace xylene in the discharge cannot be attributed to irregular process control. The only unusual observation that may explain the transient passage of xylene

through the system was that the bacterial culture density in the south bioreactor system appeared substantially lower than normal. It was noted that the south system was much less dense than the north system, which continued to produce a healthy bacterial floc. Since the levels of nutrients, aeration and hydrocarbon substrate would plentiful for growing high densities of bacteria, the only conclusion we can reach is that some toxic material was entering the system through the south trench. Discussions with Mr. Chris Falbo at Blymyer & Sons Engineers revealed that the adjacent property to the south, from which some of the groundwater enters the south bioreactor system, apparently has significant contaminations of lead and arsenic. These metals can be toxic to the bacteria in our system and could easily account for the transient failure of the biological treatment system. CytoCulture has therefore requested that the first January influent sample (from the south trench) be tested for both lead and arsenic. Results of the toxic metal analysis will be published in the January 1990 EBMUD report of operations.

SUMMARY OF GROUNDWATER TREATMENT RATES

Dates	Average Flow	Net Volume
December 1-31	2.6 gpm (3,700 gpd)	116,000 gal
Estimated volume treated water, March-November:		803,000 gal
Total groundwater treated for 1989:		919,000 gal

LABORATORY ANALYSIS OF GROUNDWATER TREATMENT SAMPLES

Tests run by Curtis & Tompkins, Ltd. on samples collected by CytoCulture field technicians:

1) EPA 602 - Volatile Aromatic Hydrocarbons in Water
2) EPA 8015 (modified) - Total Extractable Petroleum Hydrocarbons in Aqueous Solutions (TPH/TEH)

ND = Not Detectable; Detection limits for BTXE, ND = 1 ug/L; for TPH, ND = 0.5 mg/L

			ug/L (ppb)			Diesel mg/L(ppm)
No.	Date	Description / Comment	Benz.	Tol.	Xyl.	TPH/TEH
E-93	12/01	Combined N/S Effluent at 3 gpm	ND	ND	ND	ND
I-94	12/01	South trench **INFLUENT** at 2 gpm	340	ND	ND	4,900
I-95	12/28	North trench **INFLUENT** 1.5 gpm	299	1.9	2.9	200
E-96	12/28	Combined N/S Effluent 2.5 gpm	ND	ND	6	ND

Effluent treated water discharged into the EBMUD interceptor, with only two exceptions all year, has been at non-detectable levels of BTXE and total extractable petroleum hydrocarbons. Upon standing 30 minutes to allow the bacterial floc to settle, this treated water has appeared clear and odorless. Independent monthly sampling and testing for hydrocarbons and priority pollutants by EBMUD confirm these results.

GENERAL OPERATION NOTES

Aeration and mixing are continuous, providing saturated oxygen levels in the water and little accumulation of sediment on the bottom of the tanks. The aeration blower and air compressor for powering the pneumatic well pumps in the extraction trenches performed very well in the field. After proper adjustment, the well pumps themselves now easily deliver 2 gpm apiece (there are two wells per trench), although the tidally influenced north well works intermittently.

Daily observations of the turbidity, color and foam accumulation confirmed that the bioreactors were maintaining healthy bacterial cultures. Continual diammonium phosphate addition is supposed to keep ammonium nitrogen levels at 10 ppm or greater, and ortho phosphate levels at 5 ppm or greater, to ensure adequate nutrients for full degradation of the diesel COD. When the bioreactors were overwhelmed with free-product, the nutrient addition rate is increased to support the greater biomass.
All discharges of treated water leaving either bioreactor system are directed first to the 2,000 gallon aerated holding tank. This tank continues to serve as a final "polishing" step in the biological treatment process by extending the actual retention rate of contaminated water within the system.

Soil infiltration with treated water and bacterial cultures will utilize the effluent from an aerated holding tank which is now being discharged into the EBMUD interceptor.

UPDATE ON REINFILTRATION PLANS

CytoCulture plans to construct a series of infiltration galleries under the parking lot pavement along both sides of building D (upfield of both the north and south extraction trenches in an attempt to achieve some "hydraulic control" of infiltrated water). Please refer to CytoCulture's Phase II Report and Operational Plan for details on the proposed infiltration program for seeding contaminated soil with bacteria.

A detailed proposal was submitted to the client (P.I.E.) for the construction of an additional 400 feet of groundwater extraction trenches along the west and south boundaries of the property to further capture migrating product and contaminated water. See the attached site plan. The trenches would employ an additional 8 groundwater pumps delivering an estimated 8-12 gpm of contaminated water to the existing bioreactor treatment system.

The Phase IV remedial action proposal also calls for the construction of 200 feet of reinfiltration trenches north and east of Building D at the shopping center. This reinfiltration gallery would receive nutrients and bacteria-laden treated water back into the water table upfield of the heavily contaminated zones under the building.

This remedial action proposal (Phase IV) will be presented to regulatory agencies (Alameda County, RWQCB, DHS and the DHS Office of Alternative Technology) once approval from the client has been received. Construction could start within 3 weeks, once the plans for expanded extraction trenches, installation of the reinfiltration trenches and the hydrogeological study have been approved.

The Phase IV proposal also calls for a thorough groundwater and hydrogeological study to monitor the current gradient, determine to what extent the local water table is tidally influenced and to ascertain that our extraction trenches are indeed creating the expected zone of depression in the water table to have an impact on the contaminated soils beneath the shopping center. A second important consideration will be the evaluation of the hydraulic control over the immediate area in anticipation of reinfiltration activities. It is still presumed that some percentage of the treated groundwater will directed back into the contaminated zones covered by all the buildings and asphalt.

The reinfiltration process is a gradual one, with a phased approach to redirecting treated water from the EBMUD interceptor to the infiltration galleries beneath the parking lot pavement in the shopping center.

CytoCulture has planned for meetings in early February with DHS (Berkeley office), DHS (Sacramento) Office of Alternative Technologies (John Wesnouski and Dr. Ken Smarkel) and the Alameda Environmental Health Department (Dennis Byrne) to discuss the reinfiltration program in detail.

CytoCulture Bioremediation Project
for P.I.E. Nationwide former Truck Terminal Site
Emeryville, CA

Laboratory Analytical Results for **December** 1989
including BTXE and TPH/TEH Data
provided by Curtis & Tompkins, Ltd.

Each sample data set is preceded by the
corresponding Chain of Custody sheet

1003

Chain of Custody Form

Curtis & Tompkins, Ltd
2323 Fifth Street
Berkeley, California 94710
(415) 486-0900

Samplers D Virus

Job Description PIF

Job Number C4TO

Client Contact RJ Von Wedel

Recorder

Matrix						#Containers	Method Preserved					Sample Number	Sampling Date				SAMPLE NOTES
Water	Soil	Waste	Oil				H_2SO_4	HNO_3	Ice	None	Other		Yr	Mo	Dy	Time	
✓									✓			E93	89	12	01	1700	Effluent at 2.5
✓									✓			E94	89	12	01	1700	Influent South

ANALYSIS REQUESTED														
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	Title 22 Metals	EPA PP Metals (#)	TPH Method- 1E M	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pesticides & PCB's					
						✓	✓							
						✓	✓							

Laboratory Notes :

Normal

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
Relinquished by: (signature) Date/Hr	Received by (signature)
Relinquished by: (signature) Date/Hr	Received by (signature)
Relinquished by: (signature) Date/Hr	Received by (signature)
Dispatched by: (signature) Date/Hr	Received for Lab by (signature) 1705

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 18858
CLIENT: CYTO CULTURE INTERNATIONAL
JOB LOCATION: PIE EMERYVILLE

DATE RECEIVED: 12/05/89
DATE ANALYZED: 12/07/89
DATE REPORTED: 12/11/89

Benzene, Toluene, Ethyl Benzene, Xylenes by EPA 8020
Extraction by EPA 5030 Purge and Trap

LAB ID	CLIENT ID	BENZENE (ug/L)	TOLUENE (ug/L)	TOTAL XYLENES (ug/L)	ETHYL BENZENE (ug/L)	REPORTING LIMIT * (ug/L)
18858-1	E 93	ND	ND	ND	ND	1.0
18858-2	I 94	340	ND	ND	ND	10.0

ND = Not Detected.

* Reporting Limit applies to all analytes.

QA/QC SUMMARY

%RPD	12
%RECOVERY	108

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 18858
CLIENT: CYTO CULTURE INTERNATIONAL
LOCATION: PIE EMERYVILLE

DATE RECEIVED: 12/05/89
DATE ANALYZED: 12/07/89
DATE REPORTED: 12/11/89

Extractable Petroleum Hydrocarbons in Aqueous Solutions
EPA 8015 (Modified)
Extraction Method: EPA 3510

LAB ID	CLIENT ID	KEROSENE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
18858-1	E 93	ND(0.5)	ND(0.5)	ND(0.5)
18858-2	I 94	ND(0.5)	4,900*	ND(0.5)

*Fingerprint pattern does not match Hydrocarbon standards. Quantitation based on area sum within C12-C26 boiling range.

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

RPD, %	4
Spike: % Recovery	101

Chain of Custody Form

Curtis & Tompkins, Ltd
2323 Fifth Street
Berkeley, California 94710
(415) 486-0900

Samplers: RvW

Job Description: ____________

Job Number: PIE Emeryville

Client Contact: R. von Wedel

Recorder: RvW

Water	Soil	Waste	Oil	#Containers	H_2SO_4	HNO_3	Ice	None	Other	Sample Number	Yr	Mo	Dy	Time	SAMPLE NOTES	EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	Title 22 Metals	EPA PP Metals (#)	TPH Method- TEH	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pesticides & PCB's
X										I-95	89	12	28	1400	North INFLUENT							X	X		
X										E-96	89	12	28	1400	Combined EFFLUENT @ 0.5-1.0 gpm (low water)							X	X		

Laboratory Notes :

1 wk normal turn-around

Note turbidity in North influent + "slivers" of growth → torn-away biofilm slime?

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
R. von Wedel	
Dispatched by: (signature) Date/Hr	**Received for Lab by (signature)**
	[signature] 12/28

INVOICE [illegible]

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 19070
CLIENT: CYTO CULTURE INTERNATIONAL
PROJECT #: PIE
LOCATION: EMERYVILLE

DATE RECEIVED: 12/28/89
DATE ANALYZED: 01/04/90
DATE REPORTED: 01/08/90

Extractable Petroleum Hydrocarbons in Aqueous Solutions
EPA 8015 (Modified)
Extraction Method: EPA 3510

LAB ID	CLIENT ID	KEROSENE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
19070-1	I - 95	ND(0.5)	200*	ND(0.5)
19070-2	E - 96	ND(0.5)	ND(0.5)	ND(0.5)

ND = Not Detected; Limit of detection in parentheses.

* = Fingerprint Pattern does not match Hydrocarbon Standards.
Quantitation based on area sum within C12 to C26 boiling range.

QA/QC SUMMARY

RPD, %	10
Spike: % Recovery	90

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 19070
CLIENT: CYTO CULTURE INTERNATIONAL
JOB NAME: PIE
JOB LOCATION: EMERYVILLE

DATE RECEIVED: 12/28/89
DATE ANALYZED: 01/03/90
DATE REPORTED: 01/08/90

Benzene, Toluene, Ethyl Benzene, Xylenes by EPA 8020
Extraction by EPA 5030 Purge and Trap

LAB ID	CLIENT ID	BENZENE (ug/L)	TOLUENE (ug/L)	TOTAL XYLENES (ug/L)	ETHYL BENZENE (ug/L)	REPORTING LIMIT * (ug/L)
18070-1	I95	299	1.9	2.9	3.1	1.0
18070-2	E96	ND	ND	6.0	ND	1.0

ND = Not Detected.

* Reporting Limit applies to all analytes.

QA/QC SUMMARY

%RPD	2
%RECOVERY	99

Daily Facility Log Sheets for December 1989

CytoCulture - PIE Bioremediation Project, Emeryville

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

P.I.E. NATIONWIDE BIOREMEDIATION SITE, EMERYVILLE, CA

OPERATOR: DJC

DATE: Dec 1 TIME: 1500 HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill 6 Discharge 0+1½ Pressure 94

East well flow setting: 1/2 West well flow setting: 1/2

NORTH TRENCH: Refill 5 Discharge 0+2 Pressure 90C

South well flow setting: 1/2 North well flow setting: 1/2

COMPRESSOR CHECKS: Hours 5225 Temperature 91 Oil N

Air Filter drain checks: 1) ✓ 2) ✓ 3) ✓

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 82 in. South system: 82 in. Blower: 82 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: 1.5 GPM South Trench: 1.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 3 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 10 / 22 45 % South: 12.5 / 20 55 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 1 Dec South Units: 1 Dec 2,000 Gal. Unit _____

CULTURE OBSERVATIONS: Water Temperature: ___ Deg.C.

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. E-93 TPH/TEH: ✓ BTXE: ✓ Comment: Effluent 2.5

Sample No. I-94 TPH/TEH: ✓ BTXE: ✓ Comment: Influent Soaps

OPERATIONAL CHANGES TODAY:

Skimmed O/

Boi&tacked N/S #1

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

P.I.E. NATIONWIDE BIOREMEDIATION SITE, EMERYVILLE, CA

OPERATOR: DFU

DATE: 3 Dec TIME: 1600 HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill 6 Discharge 01½ Pressure 94

East well flow setting: ½ West well flow setting: ½

NORTH TRENCH: Refill 6 Discharge 01½ Pressure 00

South well flow setting: ½ North well flow setting: ½

COMPRESSOR CHECKS: Hours 5273 Temperature 95 Oil N

Air Filter drain checks: 1) ✓ 2) ✓ 3) —

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 62 in. South system: 62 in. Blower: 63 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: 1.5 GPM South Trench: 1.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 3 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 125/120 43 % South: 125/120 53 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 12/1 South Units: 12/1 2,000 Gal. Unit —

CULTURE OBSERVATIONS: Water Temperature: ____ Deg.C.

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

OPERATIONAL CHANGES TODAY:

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

P.I.E. NATIONWIDE BIOREMEDIATION SITE, EMERYVILLE, CA

OPERATOR: DGd

DATE: 4 Dec 35 TIME: 1700 HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill 6 Discharge 0+1½ Pressure 95

East well flow setting: ½ West well flow setting: ½

NORTH TRENCH: Refill 6 Discharge 0+2 Pressure 900

South well flow setting: ½ North well flow setting: ½

COMPRESSOR CHECKS: Hours 5245 Temperature 135 Oil W

Air Filter drain checks: 1) ✓ 2) ✓ 3) ✓

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 62 in. South system: 62 in. Blower: 57 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: 1.5 GPM South Trench: 1.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 3 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 125/20 32 % South: 125/20 53. %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 1 Dec South Units: 1 Dec 2,000 Gal. Unit _____

CULTURE OBSERVATIONS: Water Temperature: ____ Deg.C.

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

OPERATIONAL CHANGES TODAY:

* ON Back

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

P.I.E. NATIONWIDE BIOREMEDIATION SITE, EMERYVILLE, CA

OPERATOR: DNV

DATE: 5 Dec 85 TIME: 1630 HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill 1 Discharge 0+1½ Pressure 54

East well flow setting: ½ West well flow setting: ½

NORTH TRENCH: Refill 6 Discharge 0+2 Pressure 00C

South well flow setting: ½ North well flow setting: ½

COMPRESSOR CHECKS: Hours 5220 Temperature 135 Oil W

Air Filter drain checks: 1) ✓ 2) ✓ 3) ✓

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 83 in. South system: 83 in. Blower: 83 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench; 2 GPM South Trench: 2 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 4 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 25 lbs 30 % South: 25 lbs 50 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 1 Dec South Units: 1 Dec 2,000 Gal. Unit _____

CULTURE OBSERVATIONS: Water Temperature: ____ Deg.C.

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

OPERATIONAL CHANGES TODAY:

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

P.I.E. NATIONWIDE BIOREMEDIATION SITE, EMERYVILLE, CA

OPERATOR: DCJ

DATE: 6 Dec TIME: 1300 HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill 6 Discharge 0+1½ Pressure 100

East well flow setting: ½ West well flow setting: ½

NORTH TRENCH: Refill 6 Discharge 0+1¾ Pressure 100

South well flow setting: ½ North well flow setting: ½

COMPRESSOR CHECKS: Hours 5293 Temperature 135 Oil N

Air Filter drain checks: 1) ✓ 2) ✓ 3) ✓

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 81 in. South system: 81 in. Blower: 82 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: 1.5 GPM South Trench: 1.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 3 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 125 / 20 25 % South: 125 / 70 92 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 10 Dec South Units: 10 Dec 2,000 Gal. Unit _____

CULTURE OBSERVATIONS: Water Temperature: ____ Deg.C.

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

OPERATIONAL CHANGES TODAY:

Replaced South Nut Pump / Tested N/S shut downs
Skimmed Oil N/S / Worked On N/S Controllers

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

P.I.E. NATIONWIDE BIOREMEDIATION SITE, EMERYVILLE, CA

OPERATOR: DJO

DATE: 2 Dec TIME: 1530 HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill 1 Discharge 0+1½ Pressure 100

East well flow setting: ½ West well flow setting: ½

NORTH TRENCH: Refill 0 Discharge 0+1¾ Pressure 100

South well flow setting: ½ North well flow setting: ½

COMPRESSOR CHECKS: Hours 5316 Temperature 140 Oil —

Air Filter drain checks: 1) — 2) — 3) —

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 82 in. South system: 81 in. Blower: 82 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: ~~0.5~~ 1 GPM South Trench: 2 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 3 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 12.5 / 20 100 % South: 12.5 / 20 40 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 1 Dec South Units: 1 Dec 2,000 Gal. Unit —

CULTURE OBSERVATIONS: Water Temperature: — Deg.C.

[NH4]: [PO4]:

DOURs:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No.— TPH/TEH:— BTXE:— Comment:

Sample No.— TPH/TEH:— BTXE:— Comment:

OPERATIONAL CHANGES TODAY:

Skimmed Oil N/S

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

P.I.E. NATIONWIDE BIOREMEDIATION SITE, EMERYVILLE, CA

OPERATOR: RW

DATE: 12/12 TIME: 1030 AM HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill 6 Discharge 0+1½ Pressure 100/6

East well flow setting: ½ West well flow setting: ½

NORTH TRENCH: Refill 6 Normal 6 sec Discharge 0+1¾ Pressure 100/5

South well flow setting: ½ North well flow setting: ½

COMPRESSOR CHECKS: Hours 5432 Temperature 138° Oil ¼ OK

Air Filter drain checks: 1) ✓ 2) ✓ 3) ✓ good → just shut off cycle.

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 83 in. South system: 82 in. Blower: 81.5 in. w/ relief valve open motor normal

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: Intern 1.5 GPM when on - clear water South Trench: 1.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: Averg 2 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 10/15 80 % South: 10/10 15 % ← change tomorrow

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: today South Units: today 2,000 Gal. Unit _____

CULTURE OBSERVATIONS: Water Temperature: ____ Deg.C.

DOURs: NW = high aeration, low culture density
NE = low air - needs clean [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

OPERATIONAL CHANGES TODAY: North trench off, south trench on

North oil/water separator ~ 1-2" thick product - skim next time

Add biosocks N.S

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

P.I.E. NATIONWIDE BIOREMEDIATION SITE, EMERYVILLE, CA

OPERATOR: RVW

DATE: 12/14 TIME: 11 Am HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill B Discharge 04 1/2 Pressure 100/6

East well flow setting: 1/2 West well flow setting: 0 1/2

NORTH TRENCH: Refill B Discharge 04 1/3 Pressure 100/5

South well flow setting: 1/2 North well flow setting: 1/2

COMPRESSOR CHECKS: Hours 5480 Temperature 135° Oil ✓

Air Filter drain checks: 1) ✓ 2) ✓ 3) ✓

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 82 in. South system: 81 in. Blower: 82 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: ON/OFF 1.5 GPM South Trench: 1.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 1.5-2 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 1 1/2 gal 60 % South: 10 1/2 gal 5 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 12/12 South Units: 12/12 2,000 Gal. Unit _____

CULTURE OBSERVATIONS: Water Temperature: ____ Deg.C.

DOURs: OK both [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

OPERATIONAL CHANGES TODAY:

skimmed out south system

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

P.I.E. NATIONWIDE BIOREMEDIATION SITE, EMERYVILLE, CA

OPERATOR: RvW

DATE: 12/16 sat TIME: 2PM-4PM HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill B Discharge 0+1½ Pressure 100/5

East well flow setting: ½ West well flow setting: ½

NORTH TRENCH: Refill B Discharge 0+1⅓ Pressure 100/5

South well flow setting: ½ North well flow setting: ½

COMPRESSOR CHECKS: Hours 5532 Temperature 120° OFF 138° ON Oil ¼ good

Air Filter drain checks: 1) ✓ 2) ✓ 3) 2

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 82 in. South system: 81 in. Blower: 82 in.

Needs blowing out of aerators

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: 1.5 ~~off~~ GPM on only 25' South Trench: 2 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: ~~2.35~~ GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING: Filled today

North: 10 / 20 55 % South: 10 / 20 100 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 12/12 South Units: 12/12 2,000 Gal. Unit —

CULTURE OBSERVATIONS: OK Water Temperature: ___ Deg.C.

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No.____ TPH/TEH:___ BTXE:___ Comment: Skimmed about 5-10 gals N

Sample No.____ TPH/TEH:___ BTXE:___ Comment: 10-15 gals S

OPERATIONAL CHANGES TODAY:

Blew out/cleaned N & S aerators at 125psi

All OK except low groundw.

Better air flow now in N sept

No Rain for 3 weeks

Cleaned discharge line between bioreactors

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

P.I.E. NATIONWIDE BIOREMEDIATION SITE, EMERYVILLE, CA

OPERATOR: RvW

DATE: 12/18 TIME: 1130 HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill B Discharge 04 1/2 Pressure 100/6

East well flow setting: F West well flow setting: F

NORTH TRENCH: Refill B Discharge 04 1/2 Pressure 100/5

South well flow setting: F North well flow setting: F

COMPRESSOR CHECKS: Hours 5814 Temperature 140° Oil OK

Air Filter drain checks: 1) ✓ 2) ✓ 3) ✓

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 83 in. South system: 82 in. Blower: 83 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: 0-1.5 GPM South Trench: 2-2.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 2 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 20/10 45 % South: 20/10 90 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 12/12 South Units: 12/12 2,000 Gal. Unit _____

CULTURE OBSERVATIONS: OK Water Temperature: ____ Deg.C.

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

OPERATIONAL CHANGES TODAY:

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

P.I.E. NATIONWIDE BIOREMEDIATION SITE, EMERYVILLE, CA

OPERATOR: RG | RVW

DATE: 12/21 Thurs TIME: 1 PM HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill B Discharge 0+1½ Pressure 100/6

East well flow setting: f West well flow setting: f

NORTH TRENCH: Refill B Discharge 0+1½ Pressure 100/5

South well flow setting: f North well flow setting: f

COMPRESSOR CHECKS: Hours 5891 Temperature 132° Oil OK

Air Filter drain checks: 1) ✓ 2) ✓ 3) ✓

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 83-84 in. South system: 82 in. Blower: 84.5 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: intermt 0-1 GPM South Trench: est 2 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 2 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 10 4 35 % South: 20 / 10 70 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 12/12 South Units: 12/12 2,000 Gal. Unit _____

CULTURE OBSERVATIONS: OK Water Temperature: ____ Deg.C.

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

Sample No._____ TPH/TEH:___ BTXE:___ Comment:_____

OPERATIONAL CHANGES TODAY:

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

P.I.E. NATIONWIDE BIOREMEDIATION SITE, EMERYVILLE, CA

OPERATOR: RVW

DATE: 12/22 TIME: 8 15 Am HIGH TIDE: ______

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill B Discharge 0+1½ Pressure 100/6

East well flow setting: f West well flow setting: f

NORTH TRENCH: Refill B Discharge 0+1½ Pressure 100/5

South well flow setting: f North well flow setting: f

COMPRESSOR CHECKS: Hours 5669 Temperature 120° (goes to 140° when ON) Oil OK (foamy)

Air Filter drain checks: 1) ✓ 2) ✓ 3) ✓

(cold day AMBIENT AIR = 41° F)

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 85 in. → Needs cleaning again South system: 82 in. Blower: 88 in. ← before, 83" after

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: (ON ← rare) 0.5 Av GPM South Trench: 2-2.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 2.5 (Av = 2.0) GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 20 / 10 100 % South: 20 / 10 100 % to d

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: Needs new socks South Units: ______ 2,000 Gal. Unit ______

CULTURE OBSERVATIONS: Water Temperature: ____ Deg.C.

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No.______ TPH/TEH:___ BTXE:___ Comment:______

Sample No.______ TPH/TEH:___ BTXE:___ Comment:______

OPERATIONAL CHANGES TODAY:

Reset alarm

Opened bypass aeration N sys

Need to clean N aerator discs

Before cleaning (Bypass off) N = 91", after blowout 88" → open Bypass to 84"

Refilled nutrients

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

P.I.E. NATIONWIDE BIOREMEDIATION SITE, EMERYVILLE, CA

OPERATOR: RvW

DATE: 12/24/89 TIME: 11AM HIGH TIDE: _____ Xmas Eve

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill ____ Discharge ____ Pressure ____

East well flow setting: _____ West well flow setting: _____

NORTH TRENCH: Refill ____ Discharge ____ Pressure ____

South well flow setting: _____ North well flow setting: _____

COMPRESSOR CHECKS: Hours 5718 Temperature 130° Oil OK'd

Air Filter drain checks: 1) ✓ 2) ✓ 3) ✓

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 84 in. South system: 83 in. Blower: 84 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: Intern 0-0.5 GPM South Trench: 2-2.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 2.5 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 20/10 95 % South: 20/10 90 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: Today South Units: Today 2,000 Gal. Unit ____

CULTURE OBSERVATIONS: Water Temperature: ____ Deg.C.

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No.____ TPH/TEH:___ BTXE:___ Comment:_____

Sample No.____ TPH/TEH:___ BTXE:___ Comment:_____

OPERATIONAL CHANGES TODAY: Re-inoculated today w/ New Biosocks (1 ea N/S)

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

P.I.E. NATIONWIDE BIOREMEDIATION SITE, EMERYVILLE, CA

OPERATOR: RVW

DATE: 12/28/89 TIME: 3PM (1hr) HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill B Discharge 0415 Pressure 100/5

East well flow setting: F West well flow setting: F

NORTH TRENCH: Refill B Discharge 0415 Pressure 100/6

South well flow setting: F North well flow setting: F

COMPRESSOR CHECKS: Hours 5822 Temperature 140° Oil v. ok

Air Filter drain checks: 1) ✓ 2) ✓ 3) ✓

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 82 in. South system: 83 in. Blower: 84 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: 0-0.5 GPM South Trench: 2-2.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 2-2.5 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 20/10 75 % South: 20/10 70 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 12/24 South Units: 12/24 2,000 Gal. Unit _____

CULTURE OBSERVATIONS: OK Water Temperature: ____ Deg.C.

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. I95 TPH/TEH: ✓ BTXE: ✓ Comment: TPH/TEH and normal

Sample No. E96 TPH/TEH: ✓ BTXE: ✓ Comment: _____

OPERATIONAL CHANGES TODAY:

No rain