CytoCulture
INTERNATIONAL INC. ENVIRONMENTAL BIOTECHNOLOGY

May 5, 1989

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
Second monthly report of treatment and discharge operations for APRIL 1989

CytoCulture/Sybron Chemicals are herein reporting on the results for the second 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.

SUMMARY OF EVENTS AND OPERATIONS IN APRIL

Operating Conditions at Beginning of Month

At the end of March, the south bioreactor system had been in continuous operation for one month processing diesel-contaminated groundwater at a rate of 1 to 1.5 gpm (1,400 to 2,000 gpd). As a result, approximately 25,000 gallons of contaminated groundwater were processed during the start-up phase and first three weeks of pilot scale operation of our treatment system.

Influent total petroleum hydrocarbon levels had been in the range of 2.9 to 4 ppm; BTXE levels were variable, ranging from zero to 450 ppb for benzene, zero to 13 ppb for toluene, zero to 4 ppb for ethyl benzene and zero to 11 ppb for xylenes. All treated water effluent discharges registered as non-detectable for all of these constituents; a healthy bacterial floc settled out in about one hour to leave a clear, transparent and odorless supernatant. Samples at this treated water are available for inspection.

On April 1, the south extraction trench flow rate was running consistently at 1.5 gpm through the south bioreactor system until the system was shut down for a day of routine compressor maintenance servicing. Our compressor supplies pressurized air (125 psi) to power our pneumatically operated well pumps (two in the south trench and two in the north trench not in use yet).

On April 4, the south trench flow rate was increased to 2.0 gpm through the south bioreactor system (no flow in the north yet).

Batch Inoculation Experiments During Start-Up of North System

As part of the start-up procedure to go full scale with the north bioreactor system, two inoculation experiments were conducted in series with the twin ("NE"/"NW") bioreactors in late March to compare the following culture conditions using a standard dose of 100 ppm diesel substrate:

* Aeration alone vs. aeration with nutrient (NH4/PO4) to compare air-stripping of volatile organics vs. biodegradation by indigenous organisms in the water

* Sybron diesel-blend bacterial cultures inoculated as a 50 gallon dose of floc from the south bioreactor vs. addition of two 5 lb dry culture "Biosocks"

The experiment began on March 25 when both bioreactors in the north system were filled with contaminated water from the north trench and spiked with 440 ml of diesel fuel per 1,000 gallon bioreactor (final hydrocarbon level of 100 ppm diesel / 300 ppm COD). The contents of the two bioreactors were mixed with a 50 gallon pump to ensure uniform starting material (sample N-1 is background before diesel dose; sample N-2 15 minutes after adding diesel to 100 ppm).

The NE bioreactor was set up with continuous aeration without adding any nutrients or bacteria (although the system is obviously open to inoculation from aerosols in the atmosphere and the tanks were not sterile to begin with). For the NW bioreactor, ammonium nitrogen and ortho-phosphate levels were adjusted to 50-60 ppm (well beyond the stoichiometric amount required to enhance biodegradation of 100 ppm diesel fuel). After 48 hours of continuous mixing and aeration, the experiment was concluded and the culture medium of each bioreactor was analyzed for TPH and BTXE (samples NE-3 and NW-4).

For the second phase of the experiment, the contents of the NE and NW bioreactors were mixed on March 27 with 50 gpm recirculation pumps to set up identical starting conditions for both tanks again. The ammonium nitrogen and ortho-phosphate levels were re-adjusted to 60 ppm prior to inoculation. The NE bioreactor was inoculated with a log phase culture of Sybron bacteria obtained from the south bioreactor system. This liquid culture inoculation was achieved by exchanging 50 gallons of culture medium from the south system for 50 gallons of water from the NE bioreactor. In contrast, the NW bioreactor was inoculated with two 5 lb Biosocks (Sybron dry diesel blend culture). Both bioreactors were then spiked with 440 ml diesel each (100 ppm). After 48 hours, the experiment was concluded and the culture medium of each bioreactor analyzed for TPH and BTXE (samples NE-5 and NW-6). A few days later, on April 4, the culture medium of these tanks were mixed together and primed with another dose of 100 ppm diesel to start-up the system for processing groundwater. Culture temperatures range from 15 to 18 Deg. Celsius.

On April 4 the effluent discharge of the continuous flow (2.5 gpm flow from the south trench) treatment in the south system was analyzed (S17B) while the north system was primed again for start-up. 48 hours later, the northwest bioreactor (#2) was analyzed (sample NW-19) prior to starting flow of contaminated water from the north trench (influent sample N-20). Flow through to the 2,000 gallon tank was adjusted later that day to 1.5 gpm for the north system and 2.5 gpm for the south system. This combined flow of 4 gpm was then maintained as long as the north trench was pumping water. Groundwater processing was at this point now flowing at about 5,600 gallons a day with a combined retention time of approximately 24 hours.

However it soon became apparent that our pumping rate exceeded the recharge capacity of the north trench, causing the north wells to operate intermittently rather than continuously. We observed that the north trench pumps, which are designed to shut off automatically when they run out of water, would shut down for hours at a time. No obvious correlation has been established with tidal levels. Flow rates through the net system must then vary between 2,300 and 5,600 gallons per day.

On April 12, with the north system off from lack of water, the south trench provided water to both the north and south bioreactor systems (a redundancy design feature of our system). An influent sample from the south trench (S-21) and an effluent sample of the combined north/south treatment discharge (E-NS-22) were analyzed for TPH and BTXE. Approximately 500 gallons of effluent water were used for inoculating the landfarmed contaminated soil on site. This practice of discharging 500 gallons of cleaned water with nutrients and cultures was to be repeated every week provided the system was operating normally.

System Interruption: Power Failure

On the afternoon of Thursday, April 13 a major power failure resulted from an accidental short back at the main meter box during the hook-up of power for a new clothing store in the shopping center. The short caused an explosion and minor fire which destroyed the CytoCulture meter panel in the same box. It took the contractor and PGE 7 days to get new replacement parts and restore power to our job site. In spite of our request to get temporary power from another panel, the City of Emeryville building inspector and PGE would not permit a power transfer.

During the power outage, the bacterial cultures settled to the bottom of the bioreactor tanks and became anaerobic. Although some viable cultures undoubtedly remained after a week without aeration, there was considerable foul smelling dead sludge to be pumped out when the power did come back on. The sludge was mixed in with the landfarm soil on site and the aerators cleaned for renewed service. The holding tank was fully discharged in preparation for a re-start of the both bioreactor systems.

On the morning of April 20 power was restored. All four bioreactors (SE,SW,NE,NW) were spiked with 100 ppm diesel and inoculated with one 5 lb Biosock each.

On April 21, 24 hours after the diesel addition and inoculation, the #2 bioreactors of each system were analyzed for TPH and BTXE (samples NW-23 and SW-24) with a 24 hour turn-around time. Groundwater flow was restarted at 1 gpm per bioreactor system (net of 2 gpm) and the treated water collected in the aerated 2,000 gallon holding tank. A newly purchased oil skimming device (water inlet sleeve for the well pumps) was installed in the southeast well (south trench) where free-product has been seen.

Treatment water effluent began to discharge into the interceptor on April 22 (sample E-26) as the cultures reached high densities of bacteria (good floc, foam). The north trench continued to pump irregularly as the depression zone dropped the water table below the pumps in the trench. A third effluent sample (E-27) was taken on April 23, 48 hours after flow-through had started. Without the north trench in full operation, the overall flow rate for the system was only around 2 gpm (4,500 gallons per day). A 72 hour flow-through effluent discharge sample was taken on April 24 (E-28) and a 96 hour effluent sample taken on April 25 (E-29), during which time the overall flow rate maintained at 2 gpm. On April 26, a 120 hour flow-through sample was taken from the effluent discharge (E-30).

On April 27, the overall flow rate for the combined bioreactor systems was increased to 2.5 to 3.0 gpm, depending on the availability of groundwater in the north trench (the entire treatment system is clearly water-limited by the shortage of trenches). On April 28, samples were taken of the south trench influent (IS-31), the north trench influent (IN-32) and the overall system effluent discharge at the interceptor (E-33). Flow rates were maintained in the range of 2.5 to 3.0 gpm, processing about 3,000 to 4,000 gallons of groundwater per day.

The East Bay Municipal Utility District field technician, Roy Luna, took samples of the effluent discharge on April 28.

Net groundwater treatment in April is estimated as follows:

Dates	Average Flow	Volume
April 1 - 6:	2 gpm	17,000 gal
April 6 - 13:	3 gpm	30,000 gal
April 21 - 30:	2 gpm	28,000 gal
	Est. treated grdwtr April:	75,000 gal
	Plus est. treated grdwtr March:	25,000 gal
	Total groundwater treated to date:	100,000 gal

LABORATORY ANALYSIS OF GROUNDWATER TREATMENT SAMPLES

Tests run by Curtis & Tompkins, Ltd. on fresh or ice-preserved 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)			mg/L (ppm)
No.	Date	Description / Comment	Benz.	Tol.	Xyl.	TPH/TEH
NORTH SYSTEM BATCH START-UP EXPERIMENTS:						
N1	3/25	North trench INFLUENT starting material	ND	ND	ND	ND
N2	3/25	Same, spiked with diesel after 15 min mixing time	ND	ND	2	240
NE-3	3/27	No nutrient, no bacteria control bioreactor, 48 hr	ND	ND	ND	860
NW-4	3/27	+ nutrients, no bacteria control bioreactor, 48 hr	ND	ND	ND	53
NE-5	3/27	Starting material T=0 Liquid inoculum experiment	ND	ND	ND	110
NW-6	3/27	Starting material T=0 Biosock inoculum expermt.	ND	2	3	129
NE-7	3/29	Liquid inoculum experiment after 48 hours	ND	ND	ND	7.4
NW-8	3/29	Biosock inoculum expermt. after 48 hours	ND	ND	ND	trace
NE-9	3/30	Liquid inoculum, 72 hr	ND	ND	ND	-
NW-10	3/30	Biosock inoculum, 72 hr	ND	ND	ND	-

NORMAL GROUNDWATER TREATMENT PROGRAM

			ug/L			mg/L
No.	Date	Description / Comment	Benz.	Tol.	Xyl.	TPH/TEH
S-17A	3/29	South System Effluent	ND	ND	ND	ND
S-17B	4/4	South System Effluent	ND	ND	ND	ND
S-18	3/31	South System Effluent	ND	ND	ND	ND
NW-19	4/6	NW Bioreactor, 48 hr after start, No Flow	ND	ND	ND	24
N-20	4/6	North trench **Influent**	630	4	ND	ND
S-21	4/12	South trench **Influent**	310	16	12	2.2
E-22	4/12	Combined N/S Effluent	ND	ND	ND	ND
NW-23	4/21	NW Bioreactor, 24 hr after 100 ppm diesel (Power loss re-start)	ND	ND	ND	42
SW-24	4/21	SW Bioreactor, 24 hr after 100 ppm diesel (Power loss re-start)	ND	ND	ND	1.0
E-26	4/22	Combined Effluent at 24 hours after Flow	ND	ND	ND	ND
E-27	4/23	Combined Effluent at 48 hours after Flow	ND	ND	ND	ND
E-28	4/24	Combined Effluent at 72 hours after Flow	ND	ND	ND	ND
E-29	4/25	Combined Effluent at 96 hours after Flow	ND	ND	ND	ND
E-30	4/26	Combined Effluent at at 120 hrs after Flow	ND	ND	ND	ND
I-S31	4/28	South trench **Influent**	ND	ND	ND	1.2
I-N32	4/28	North trench Influent	ND	ND	ND	trace
E-33	4/28	Combined Effluent	ND	ND	ND	ND

Conclusions: Influent levels of BTXE are highly variable, but the bioreactors consistently discharge treated waters with non-detectable or trace levels of aromatics and heavier hydrocarbons.

Effluent treated water now being discharged into the EBMUD interceptor is at or near non-detectable levels of BTXE and total extractable petroleum hydrocarbons. Upon standing 20 minutes to allow the bacterial floc to settle, this treated water appears clear and odorless except when free product appears in the bioreactor (some sheen seen, darker foam often has product

Except for the power interruption, aeration and mixing was found to be consistent, 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.

Near daily observations of the turbidity, color and foam accumulation confirmed that the bioreactors were maintaining healthy bacterial cultures. Continual diammonium phosphate addition kept ammonium nitrogen levels at 60 ppm or greater, and ortho phosphate levels at 30 ppm or greater, to ensure adequate nutrients for full degradation of the diesel COD. Laboratory studies suggest a ratio of 100:10:1 for ppm levels of diesel COD:NH4:PO4 is required for optimal biological activity (100 ppm diesel is roughly 300 ppm COD).

On the occasions when there is adequate water available in the north trench, overall flow rates can achieve greater than 4 gpm. This flow rate maintains a long retention rate in the bioreactors of at least 16 hours. As summer temperatures increase, the flow rates may be pushed higher. At 23 Deg. C., the hydraulic retention rate need not exceed 8 hours for full biodegradation of the diesel influent (assuming no free product in the bioreactor).

All discharges of treated water leaving either bioreactor system are directed first to the 2,000 gallon aerated holding tank. This tank is effectively serving 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 the 2,000 gallon aerated holding tank which is now being discharged into the EBMUD interceptor.

Progress in Obtaining Permission to Reinfiltrate Treated Water

A meeting was held with Dr. Ken Snarkel and John Wesnouski in the Office of Alternative Technology, DHS, Sacramento on Tuesday, April 18 to review our results and plans for reinfiltration. The phased approach to reinfiltration is a means by which CytoCulture can begin diverting increasing amounts of treated water from the sanitary sewer discharge to the infiltration galleries in soil.

Presently there is only one prototype infiltration trench on the site, around 65 feet long, parallel to and about 25 feet upfield from the current south extraction trench. The trench is gravel lined and lies about five feet under the pavement of the parking lot in engineered fill just above a heavily contaminated area of old fill left over from the truck terminal facility (see soil sample data from the Alton Geoscience hydrogeological study of this site, especially data for Monitoring Well # 3 which is just 23 feet to the east of this infiltration trench).

CytoCulture is hopeful of obtaining permission to proceed with pilot studies using treated water effluent from the holding tank directed to the model infiltration trench by the end of June. Thereafter, the company 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.

The Regional Water Quality Control Board (SF Bay Region) is giving consideration to CytoCulture's request to reinfiltrate the treated water with bacteria and nutrients. Meetings with this group are anticipated for early July.

WHO CONTACTED?

Meanwhile, CytoCulture is getting bids on the excavation work required to install infiltration galleries parallel to Building D (Such a Business).

Randall J. von Wedel

Randall J. von Wedel, Ph.D.

Project Director

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

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

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

Chain of Custody Form

Curtis & Tompkins, Ltd
2323 Fifth Street
Berkeley, CA 94710
Phone 415-486-0900
FAX 415-486-0532

Samplers: R. von Wedel

Job Description: PIE

Job Number:

Client Contact: R. von Wedel

Recorder: RvW

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	
X									X			N1	89	03	25	1005	Average background Before Expt.

ANALYSIS REQUESTED														
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	CAM 17 Metals	EPA PP Metals (#)	TPH Method- TEH	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pest's&PCB's					
						X	X							

Laboratory Notes :

lwk

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
R. von Wedel	
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) 1430 3/27

Chain of Custody Form

Curtis & Tompkins, Ltd
2323 Fifth Street
Berkeley, CA 94710
Phone 415-486-0900
FAX 415-486-0532

Samplers: R van Wesel

Job Description: PIE

Job Number:

Client Contact: R. van Wesel

Recorder: R vW

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		
X									X			N2	89	03	25	10:25		Aver. Starting concent. diesel T=0

ANALYSIS REQUESTED														
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	CAM 17 Metals	EPA PP Metals (#)	TPH Method- TEH	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pest's&PCB's					
						X	X							

Laboratory Notes :

lwk

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
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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) 1450 2/27/89

Chain of Custody Form

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Phone 415-486-0900
FAX 415-486-0532

Samplers R. von Wedel

Job Description PIE

Job Number

Client Contact R. von Wedel

Recorder RvW

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		
X									X			NE3	89	03	27	10	30	No Nutrient Control T = 48 hr

EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	CAM 17 Metals	EPA PP Metals (#)	TPH Method- TEH	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pest's&PCB's
						X	X		

Laboratory Notes :

1 wk

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
R. von Wedel	
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) 3/27/89

1430

Chain of Custody Form

Curtis & Tompkins, Ltd
2323 Fifth Street
Berkeley, CA 94710
Phone 415-486-0900
FAX 415-486-0532

Samplers R. vonWedel

Job Description PIE

Job Number

Client Contact R. vonWedel

Recorder R. vW.

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	
X									X			NW4	89	03	27	10:30	NW PLUS Nutrient Negative Control T=48hr

ANALYSIS REQUESTED																		
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	CAM 17 Metals	EPA PP Metals (#)	TPH Method- TEH	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pest's&PCB's								
						X	X										

Laboratory Notes :

Chain of Custody Record	
Relinquished by: (signature) Date/Hr	Received by (signature)
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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) 3-7-89

1430

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17082
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE

DATE RECEIVED: 03-27-89
DATE ANALYZED: 03-29-89
DATE REPORTED: 04-03-89

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

LAB ID	CLIENT ID	KEROSINE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
17082-1	N 1	ND(0.5)	ND(0.5)	ND(0.5)
17082-2	N 2	ND(0.5)	240	ND(0.5)
17082-3	NE 3	ND(0.5)	860	ND(0.5)
17082-4	NW 4	ND(0.5)	53	ND(0.5)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	11
Spike: % Recovery	97

LABORATORY DIRECTOR

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17082-1
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: N 1

DATE RECEIVED: 03-27-89
DATE ANALYZED: 03-30-89
DATE REPORTED: 04-03-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	2
SPIKE RECOVERY %	99

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17082-2
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: N 2

DATE RECEIVED: 03-27-89
DATE ANALYZED: 03-30-89
DATE REPORTED: 04-03-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	2	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	2
SPIKE RECOVERY %	99

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17082-3
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: NE 3

DATE RECEIVED: 03-27-89
DATE ANALYZED: 03-30-89
DATE REPORTED: 04-03-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	2
SPIKE RECOVERY %	99

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17082-4
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: NW 4

DATE RECEIVED: 03-27-89
DATE ANALYZED: 03-30-89
DATE REPORTED: 04-03-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	2
SPIKE RECOVERY %	99

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17085
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE

DATE RECEIVED: 03-27-89
DATE ANALYZED: 03-29-89
DATE REPORTED: 04-03-89

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

LAB ID	CLIENT ID	KEROSINE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
17085-1	NE 5	ND(0.5)	110	ND(0.5)
17085-2	NW 6	ND(0.5)	129	ND(0.5)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	11
Spike: % Recovery	97

LABORATORY DIRECTOR

Chain of Custody Form

Curtis & Tompkins, Ltd
2323 Fifth Street
Berkeley, CA 94710
Phone 415-486-0900
FAX 415-486-0532

Samplers: R vonWedel

Job Description: PLE

Job Number:

Client Contact: R vonWedel

Recorder: R vW

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	
X									X			NE5	89	03	27	1600	50gal inoculum T=0
X									X			NW5	89	03	27	1610	Biopack T=0

ANALYSIS REQUESTED																
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	CAM 17 Metals	EPA PP Metals (#)	TPH Method- TEH	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pest's&PCB's							
						X	X									
						X	X									

Laboratory Notes : lwk

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
R vonWedel	
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) 3/27/89 1610

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17085-1
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: NE 5

DATE RECEIVED: 03-27-89
DATE ANALYZED: 03-30-89
DATE REPORTED: 04-03-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	11
SPIKE RECOVERY %	97

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17085-2
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: NW 6

DATE RECEIVED: 03-27-89
DATE ANALYZED: 03-30-89
DATE REPORTED: 04-03-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	2	1
Ethyl Benzene	ND	1
Total Xylenes	3	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	11
SPIKE RECOVERY %	97

Chain of Custody Form

Curtis & Tompkins, Ltd
2323 Fifth Street
Berkeley, CA 94710
Phone 415-486-0900
FAX 415-486-0532

Samplers R vW

Job Description PIE Emeryville

Job Number

Client Contact R von Wodel

Recorder R. vonWodel

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					
X										X		S174	89	03	29	16	00			2000gal effluent
X										X		NE7]	89	03	29	16	00			50gal inoculum T=48 hr
X										X		NWB]	89	03	29	16	00			Biosock T=48 hr

ANALYSIS REQUESTED																	
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	CAM 17 Metals	EPA PP Metals (#)	TPH Method- TEH	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pest's&PCB's								
						X	X										
						X	X										
						X	X										

Laboratory Notes : by Tues April 4

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
R vonWodel	
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) 3/29/89

1:50

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17103✓
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE

DATE RECEIVED: 03-29-89
DATE ANALYZED: 03-31-89
DATE REPORTED: 04-05-89

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

LAB ID	CLIENT ID	KEROSINE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
17103-1B	S 17 A	ND(0.5)	ND(0.5)	TRACE *
17103-2B	NE 7	ND(0.5)	ND(0.5)	7.4 *
17103-3B	NW 8	ND(0.5)	ND(0.5)	TRACE *

* Fingerprint pattern does not match Hydrocarbon standard. Quantitation based on largest peaks withing C12-C24 boiling range.

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	7
Spike: % Recovery	100

LABORATORY DIRECTOR

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17103-1B
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: S 17

DATE RECEIVED: 03-29-89
DATE ANALYZED: 03-31-89
DATE REPORTED: 04-05-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	7
SPIKE RECOVERY %	99

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17103-2B
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: NE 7

DATE RECEIVED: 03-29-89
DATE ANALYZED: 03-31-89
DATE REPORTED: 04-05-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	7
SPIKE RECOVERY %	99

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17103-3B
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: NW 8

DATE RECEIVED: 03-29-89
DATE ANALYZED: 03-31-89
DATE REPORTED: 04-05-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	7
SPIKE RECOVERY %	99

Chain of Custody Form

Curtis & Tompkins, Ltd
2323 Fifth Street
Berkeley, CA 94710
Phone 415-486-0900
FAX 415-486-0532

Samplers R. VanWadel

Job Description PIE Emeryville

Job Number Cyto

Client Contact R. VanWadel

Recorder R. VanWadel

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	
X										X		S-17B	89	04	04	0930	2,000 gallon effluent at 2gpm - South system only

ANALYSIS REQUESTED														
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	CAM 17 Metals	EPA PP Metals (#)	TPH Method- TEH	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pest's&PCB's					
						X	X							

Laboratory Notes :

1 wk

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
R. VanWadel	
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) Nancy Wilson

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17136
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE

DATE RECEIVED: 04/04/89
DATE ANALYZED: 04/05/89
DATE REPORTED: 04/12/89

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

LAB ID	CLIENT ID	GASOLINE (mg/L)	KEROSINE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
17136-1	S-17	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

RPD, %	3
Spike: % Recovery	98

for CBG
LABORATORY DIRECTOR

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17136
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE
SAMPLE ID: S-17

DATE RECEIVED: 04/04/89
DATE ANALYZED: 04/04/89
DATE REPORTED: 04/13/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	5
SPIKE RECOVERY %	95

Chain of Custody Form

Curtis & Tompkins, Ltd
2323 Fifth Street
Berkeley, CA 94710
Phone 415-486-0900
FAX 415-486-0532

Samplers R. von Wedel

Job Description PE

Job Number Cyto Culture

Client Contact R. von Wedel

Recorder R. von Wedel

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	
✓									X			S-18	89	03	31	1030	Used first application of South system 2000gal effluent landfarm water
X									X			NE9	89	03	30	1500	50gal inoculum T=72hr
X									X			NW10	89	03	30	1500	Biosack Supt T=72hr

ANALYSIS REQUESTED															
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	CAM 17 Metals	EPA PP Metals (#)	TPH Method- TEK	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pest's&PCB's						
						X	X								
							X								
							X								

Laboratory Notes :

1 wk

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
R. von Wedel	
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)

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17118-2
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: NE 9

DATE RECEIVED: 03-31-89
DATE ANALYZED: 04-03-89
DATE REPORTED: 04-06-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	4
SPIKE RECOVERY %	95

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17118-3
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: NW 10

DATE RECEIVED: 03-31-89
DATE ANALYZED: 04-03-89
DATE REPORTED: 04-06-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	4
SPIKE RECOVERY %	95

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17118
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: S - 18

DATE RECEIVED: 03-31-89
DATE ANALYZED: 04-04-89
DATE REPORTED: 04-06-89

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

LAB ID	CLIENT ID	KEROSINE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
17118-1	S - 18	ND(0.5)	ND(0.5)	ND(0.5)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	4
Spike: % Recovery	109

LABORATORY DIRECTOR

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17118-1
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: S - 18

DATE RECEIVED: 03-31-89
DATE ANALYZED: 04-03-89
DATE REPORTED: 04-06-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	4
SPIKE RECOVERY %	95

Chain of Custody Form

Curtis & Tompkins, Ltd
2323 Fifth Street
Berkeley, CA 94710
Phone: 415-486-0900
FAX 415-486-0532

Samplers: R. vanWedel

Job Description: PIE Emeryville

Job Number: Cyto

Client Contact: R. vanWedel

Recorder: RvW

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	
X										X		NW-19	89	04	06	1315	NW Bioreactor #2 48hr after start-up prior to beginning flow-through.

ANALYSIS REQUESTED														
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	CAM 17 Metals	EPA PP Metals (#)	TPH Method- TEH	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pest's&PCB's					
						X	X							

Laboratory Notes :

1 wk

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
R. vanWedel 4/6 1345	
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)
	4/6/89

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17156
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE

DATE RECEIVED: 04/06/89
DATE ANALYZED: 04/11/89
DATE REPORTED: 04/13/89

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

LAB ID	CLIENT ID	GASOLINE (mg/L)	KEROSINE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
17156-1	NW-19	ND(0.5)	ND(0.5)	24	ND(0.5)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

RPD, %	15
Spike: % Recovery	99

for CBG
LABORATORY DIRECTOR

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17156
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE
SAMPLE ID: NW-19

DATE RECEIVED: 04/06/89
DATE ANALYZED: 04/06/89
DATE REPORTED: 04/13/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	3
SPIKE RECOVERY %	103

Chain of Custody Form

Curtis & Tompkins, Ltd
2323 Fifth Street
Berkeley, CA 94710
Phone 415-486-0900
FAX 415-486-0532

Samplers R. von Wedel

Job Description PIE Emeryville

Job Number 4170

Client Contact R. von Wedel

Recorder R-W

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	
X										X		N-20	89	04	06	1300	North extraction trench INFLUENT collected at 1.5 gpm

ANALYSIS REQUESTED																
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	CAM 17 Metals	EPA PP Metals (#)	TPH Method- TEH	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pest's&PCB's							
						X	X									

Laboratory Notes :

lwk

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
R von Wedel 4/6 1345	
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)
	4/6/89

12-15

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17157
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE

DATE RECEIVED: 04/06/89
DATE ANALYZED: 04/11/89
DATE REPORTED: 04/13/89

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

LAB ID	CLIENT ID	GASOLINE (mg/L)	KEROSINE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
17157-1	N-20	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

RPD, %	15
Spike: % Recovery	99

for CBG
LABORATORY DIRECTOR

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17157
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE
SAMPLE ID: N-20

DATE RECEIVED: 04/06/89
DATE ANALYZED: 04/06/89
DATE REPORTED: 04/13/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	630	1
Toluene	4	1
Ethyl Benzene	3	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	3
SPIKE RECOVERY %	103

Chain of Custody Form

Curtis & Tompkins, Ltd
2323 Fifth Street
Berkeley, CA 94710
Phone 415-486-0900
FAX 415-486-0532

Samplers RvW

Job Description PIE

Job Number Cyto

Client Contact R. van Wedel

Recorder RvW

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	
X										X		S 21	89	04	12	1315	South trench effluent
X										X		NS22	89	04	12	1315	Combined north/south trench effluent at 3gpm

ANALYSIS REQUESTED														
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	CAM 17 Metals	EPA PP Metals (#)	TPH Method- TEH	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pest's&PCB's					
						X	X							
						X	X							

Laboratory Notes :

lwk

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
R. van Wedel	
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) 4/12/89 0935

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710. Phone (415) 486-0900

LABORATORY NUMBER: 17186
CLIENT: CYTO CULTURE INTERNATION
JOB ID: PIE EMERYVILLE

DATE RECEIVED: 04/12/89
DATE ANALYZED: 04/14/89
DATE REPORTED: 04/21/89

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

LAB ID	CLIENT ID	GASOLINE (mg/L)	KEROSINE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
17186-1	S-21	2.2	ND(0.5)	ND(0.5)	ND(0.5)
17186-2	NS-22	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

RPD, %	5
Spike: % Recovery	101

LABORATORY DIRECTOR

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17186-1
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE
SAMPLE ID: S-21

DATE RECEIVED: 04/12/89
DATE ANALYZED: 04/13/89
DATE REPORTED: 04/21/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	310	1
Toluene	16	1
Ethyl Benzene	ND	1
Total Xylenes	12	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	8
SPIKE RECOVERY %	98

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17186-2
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE
SAMPLE ID: NS-22

DATE RECEIVED: 04/12/89
DATE ANALYZED: 04/13/89
DATE REPORTED: 04/21/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	8
SPIKE RECOVERY %	98

Chain of Custody Form

Curtis & Tompkins, Ltd
2323 Fifth Street
Berkeley, CA 94710
Phone. 415-486-0900
FAX. 415-486-0532

Samplers RvW

Job Description RE

Job Number

Client Contact Ryan 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	
X										X		MW-23	89	04	21	1130	24 after (approx)
X										X		MW-24	89	04	21	1131	" "
																	Start up on 4/20 (System down 4/13 - 4/20)

ANALYSIS REQUESTED														
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	CAM 17 Metals	EPA PP Metals (#)	TPH Method- TEH	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pest's&PCB's					
						X	X							
						X	X							

Laboratory Notes :

24 hr TAT

by Mon 4/24

NO sample 25

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) 13:30 4/21/89

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17241 ✓
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE

DATE RECEIVED: 04/21/89
DATE ANALYZED: 04/21/89
DATE REPORTED: 05/08/89

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

LAB ID	CLIENT ID	GASOLINE (mg/L)	KEROSINE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
17241-1A	NW-23	ND(0.5)	ND(0.5)	42*	ND(0.5)
17241-2A	SW-24	ND(0.5)	ND(0.5)	1.0*	ND(0.5)

4/24 verbal

* Fingerprint pattern does not match Hydrocarbon Standards. Quantitation based on largest peaks within C11 to C22 diesel range.

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	<1
Spike: % Recovery	99

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17241
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE
SAMPLE ID: NW-23

DATE RECEIVED: 04/21/89
DATE ANALYZED: 04/21/89
DATE REPORTED: 05/08/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	4
SPIKE RECOVERY %	100

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17241
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE
SAMPLE ID: SW-24

DATE RECEIVED: 04/21/89
DATE ANALYZED: 04/21/89
DATE REPORTED: 05/08/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	4
SPIKE RECOVERY %	100

Chain of Custody Form

Curtis & Tompkins, Ltd
2323 Fifth Street
Berkeley, CA 94710
Phone 415-486-0900
FAX 415-486-0532

Samplers Ryan Wedel

Job Description PIE Emeryville

Job Number CYTO

Client Contact RvW

Recorder RvW

Matrix							Method Preserved						Sample Number	Sampling Date					SAMPLE NOTES
Water	Soil	Waste	Oil				#Containers	H_2SO_4	HNO_3	Ice	None	Other		Yr	Mo	Dy	Time		
X										X			E-26	89	04	22	17	30	Effluent at 24hr
X										X			E-27	89		42	13	00	" " 48hr
X											X		E-28	89		42	11	00	" " 72hr after flow-through initiated

3 Separate days

ANALYSIS REQUESTED																	
EPA 601/8010	EPA 602/8020	EPA 624/8240	EPA 625/8270	CAM 17 Metals	EPA PP Metals (#)	TPH Method- TEH	Benzene-Toluene-Xylene(s)	Oil and Grease	EPA 608/8080 Pest's&PCB's								
						X	X										
						X	X										
						X	X										

Laboratory Notes : 24hr please

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) Donna Williams 4/24

Curtis & Tompkins, Ltd., Analytical Laboratories, Since 1878
2323 Fifth Street, Berkeley, CA 94710, Phone (415) 486-0900

LABORATORY NUMBER: 17251 ✓
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE

DATE RECEIVED: 04/24/89
DATE ANALYZED: 04/24/89
DATE REPORTED: 04/25/89

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

LAB ID	CLIENT ID	KEROSINE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
17251-1	E-26	ND(0.5)	ND(0.5)	ND(0.5)
17251-2	E-27	ND(0.5)	ND(0.5)	ND(0.5)
17251-3	E-28	ND(0.5)	ND(0.5)	ND(0.5)

ND = Not Detected; Limit of detection in parentheses.

QA/QC:	
Duplicate: Relative % Difference	<1
Spike: % Recovery	89

LABORATORY DIRECTOR

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17251-1
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: E-26

DATE RECEIVED: 04/24/89
DATE ANALYZED: 04/24/89
DATE REPORTED: 04/25/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	4
SPIKE RECOVERY %	95

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17251-2
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: E-27

DATE RECEIVED: 04/24/89
DATE ANALYZED: 04/24/89
DATE REPORTED: 04/25/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	4
SPIKE RECOVERY %	95

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17251-3
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: E-28

DATE RECEIVED: 04/24/89
DATE ANALYZED: 04/24/89
DATE REPORTED: 04/25/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	4
SPIKE RECOVERY %	95

Chain of Custody Form

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

Samplers _____

Job Description PIE

Job Number _____

Client Contact _____ 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	
X						3			X			E-29	89	04	25		eff @ 97 hrs
X						3			X			E-30	89	04	26		eff @ 120 hrs.

ANALYSIS REQUESTED														
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	X							
						X	X							

Laboratory Notes :

1-wk

results by 5/2

Chain of Custody Record

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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) 4/26/19 0315

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17272✓ 1A,2A
CLIENT: CYTO CULTURE INTERNATIONAL
PROJECT : PIE EMERYVILLE

DATE RECEIVED: 04/26/89
DATE ANALYZED: 04/27/89
DATE REPORTED: 05/01/89

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

LAB ID	CLIENT ID	GASOLINE (mg/L)	KEROSINE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
17272-1A	E-29	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)
17272-2A	E-30	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

RPD, %	3
Spike: % Recovery	97

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17272-1B
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: E-29

DATE RECEIVED: 04/26/89
DATE ANALYZED: 04/27/89
DATE REPORTED: 05/01/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	10
SPIKE RECOVERY %	102

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17272-2B
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: E-30

DATE RECEIVED: 04/26/89
DATE ANALYZED: 04/27/89
DATE REPORTED: 05/01/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	10
SPIKE RECOVERY %	102

Chain of Custody Form

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

Samplers: Ruco

Job Description: PIE

Job Number: Cytoculture

Client Contact: R von Wedel

Recorder: Ruco

Matrix: Water	Soil	Waste	Oil			#Containers	Method Preserved: H_2SO_4	HNO_3	Ice	None	Other	Sample Number	Sampling Date: Yr	Mo	Dy	Time	SAMPLE NOTES
X										X		I-S31	89	04	28	1130	Influent - south trench
X										X		I-N32		04	28	1130	" - north trench
X										X		E-33		04	28	1200	Effluent -

ANALYSIS REQUESTED

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	X		
						X	X		
						X	X		

Laboratory Notes: 1 week by Friday May 5 Noon

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
R von Wedel	
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) Nancy Wilson 4/28

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17290
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE

DATE RECEIVED: 04/28/89
DATE ANALYZED: 04/29/89
DATE REPORTED: 05/08/89

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

LAB ID	CLIENT ID	GASOLINE (mg/L)	KEROSINE (mg/L)	DIESEL (mg/L)	OTHER (mg/L)
17290-1	I-S31	ND(0.5)	1.2*	ND(0.5)	ND(0.5)
17290-2	I-N32	ND(0.5)	TRACE	ND(0.5)	ND(0.5)
17290-3	E-33	ND(0.5)	ND(0.5)	ND(0.5)	ND(0.5)

* Fingerprint pattern does not match Hydrocarbon Standards. Quantitation based on largest peaks within C9 to C12 boiling range.

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

RPD, %	4
Spike: % Recovery	102

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17290
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE
SAMPLE ID: I-S31

DATE RECEIVED: 04/28/89
DATE ANALYZED: 05/01/89
DATE REPORTED: 05/08/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	4
SPIKE RECOVERY %	100

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17290
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE
SAMPLE ID: I-N32

DATE RECEIVED: 04/28/89
DATE ANALYZED: 05/01/89
DATE REPORTED: 05/08/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	4
SPIKE RECOVERY %	100

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 17290
CLIENT: CYTO CULTURE
JOB ID: PIE EMERYVILLE
SAMPLE ID: E-33

DATE RECEIVED: 04/28/89
DATE ANALYZED: 05/01/89
DATE REPORTED: 05/08/89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	ND	1
Toluene	ND	1
Ethyl Benzene	ND	1
Total Xylenes	ND	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

QA/QC SUMMARY

RPD %	4
SPIKE RECOVERY %	100

Daily Facility Log Sheets for April 1989

CytoCulture - PIE Bioremediation Project, Emeryville

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: RWW | D Urua

DATE: 4/1 TIME: 11AM HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill ϕ Discharge ϕ 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 (622) → OFF overnight → turned on ~3pm Temperature ✓ Oil —

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

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

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: ϕ Temp. GPM South Trench: ϕ Temporary GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: ϕ Temp GPM → 1.5gpm-2.0 end of day

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 1 _____ % South: 30/30 20 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 3/31 South Units: 3/31 2,000 Gal. Unit 3/20

CULTURE OBSERVATIONS:

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

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

Sample No.____ TPH TLH:___ BTXE:___ Comment:_____

OPERATIONAL CHANGES TODAY:

Routine service of compressor 3/31 - 4/1
to change oil, filters + clean unit
Flow interrupted Noon 3/31 - 3pm 4/1 - then started up 1.5gpm

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: Russ / D.V.

DATE: 4/4 TIME: 9 AM HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill A Discharge A-½ Pressure 60/5

East well flow setting: Full West well flow setting: Full

NORTH TRENCH: Refill — Discharge — Pressure —

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

COMPRESSOR CHECKS: Hours 686 Temperature 100° 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: — GPM South Trench: 2.0 GPM (both EW)

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 2.0 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: / % South: 30 / 30 25 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 4/4 South Units: 4/1 2,000 Gal. Unit 3/20

CULTURE OBSERVATIONS:

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS TO BE RUN FOR ANALYSIS:

Sample No. 5178 TPH "G": ✓ BTX: — Comment: 2000 gal holding tank effluent

Sample No. _____ TPH "G": _____ BTX: _____ Comment: before starting up North Bioreactor system

OPERATIONAL CHANGES TODAY:

5 New Brooms NE, NW SE, SW, NE

Add 100 ppm diesel to both contaminated water in each of the north bioreactors; start up

440 ml diesel → 1,000 gal → Run for 2 days

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: RyanSedel

DATE: 4/6 TIME: Noon-2pm HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill A Discharge A-½ Pressure 60/5

East well flow setting: Full West well flow setting: full

START NORTH TRENCH: Refill A Discharge A½ Pressure 60/4.5

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

COMPRESSOR CHECKS: Hours 718 Temperature 110° 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: 1.5 GPM South Trench: 2.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 4.0 GPM → First time we reached this level

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 10/10 100 % South: 30/30 20 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 4/2 South Units: 4/1 2,000 Gal. Unit 3/20

CULTURE OBSERVATIONS:

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. NW19 TPH/TEH: ✓ BTXE: ✓ Comment: Northwest Bioreactor prior to Flow ← 48hr after start up

Sample No. N20 TPH/TEH: ✓ BTXE: ✓ Comment: North trench INFLUENT at 1.5gpm instead of Flow

OPERATIONAL CHANGES TODAY:

Started Flow of North Bioreactor system 48 hr after startup @ 1.5gpm (plus South system flow rate @ 2.5gpm)

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: D. Tine

DATE: 4/2/20 TIME: 1500 HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill A+2 Discharge O+2 Pressure 28

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

NORTH TRENCH: Refill B Discharge O+2 Pressure O

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

COMPRESSOR CHECKS: Hours 833 Temperature 140 Oil N/Clear

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 79 in. South system: 79 in. Blower: 80 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: O GPM South Trench: 2.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 2 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 20/20 100 % South: 20/20 100 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

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

CULTURE OBSERVATIONS:

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 521 TPH/TEH: ✓ BTEX: ✓ Comment: INFLUENT - South trench

Sample No. E(N-2)22 TPH TEH: ✓ BTEX: ✓ Comment: EFFLUENT - combined North/South

OPERATIONAL CHANGES TODAY:

100 [illegible]

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: RWW/DV

DATE: 4/13 TIME: Noon-4 PM HIGH TIDE: ______

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill N/A every 3 sec. Discharge A 1/2 Pressure ____

East well flow setting: full West well flow setting: full

NORTH TRENCH: Refill ____ Discharge ____ Pressure ____

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

COMPRESSOR CHECKS: Hours 853 Temperature 140° Oil ✓

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

Before power failure

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 82 in. South system: 81 in. Blower: 80 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: intermittent 1 GPM South Trench: 2.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 2.5-3.5 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 20 / 80 100 % South: 20 / 80 100 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 4/4 South Units: 4/4 2,000 Gal. Unit 4/4

CULTURE OBSERVATIONS:

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. ____ TPH/TEH: ____ BTXE: ____ Comment: [illegible]

Sample No. ____ TPH/TEH: ____ BTXE: ____ Comment: [illegible]

OPERATIONAL CHANGES TODAY: POWER FAILURE - Compressor + blower System Interruption - AC Flow @ 2 PM OFF

* "Meridian Wesvale" electrical subcontractors accidentally shorted out meter box - explosion + brief fire destroyed entire box - expect several days w/out power

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: Rus- DU

DATE: 4/20 TIME: 11:45 HIGH TIDE: ______

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill OFF Discharge OFF Pressure —

East well flow setting: Ø West well flow setting: Ø

NORTH TRENCH: Refill OFF Discharge OFF Pressure —

South well flow setting: Ø North well flow setting: Ø

COMPRESSOR CHECKS: Hours 853 at startup Temperature 120° 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: Ø GPM South Trench: Ø GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: Ø GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: — 100 % South: 10/10 100 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: ______ South Units: ______ 2,000 Gal. Unit ______

CULTURE OBSERVATIONS: All bioreactors were cleaned out, sludge landfarmed on site; and new biosocks added

DOURs: [NH4]: [PO4]: after power comes on

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

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

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

OPERATIONAL CHANGES TODAY: Restart South system - Add [illegible] (440 ml [illegible] to each 1000 gal) at 100 ppm [illegible] both [illegible] [illegible]

Wait 24 hr before starting any flow through system

POWER BACK ON 7:45 AM Today

Used pumps to clean out sludges & recirculate cultures

Very low viability, but still have some floc.

Blasted air through aerators to unclog, especially in south system

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: Russ / DV

DATE: 4/21 TIME: 11[30] Am HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill B+2 Discharge 0+2 Pressure 80

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

NORTH TRENCH: Refill ~~0+2~~ C Discharge 0+2 Pressure 80

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

COMPRESSOR CHECKS: Hours 9043 Temperature 100 Oil N/Clear

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 79 in. South system: 78 in. Blower: 80 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: 1 GPM GPM South Trench: 1 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 0 GPM 1500 Gal

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 20 / 10 _____ % South: 20 / 10 _____ %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 4-20 South Units: 4-20 2,000 Gal. Unit _____

CULTURE OBSERVATIONS: Water Temperature: ____ Deg.C.

DOSES: half fed 2000gal tank / no flow until today [NH4]: 760 [PO4]: 760

SAMPLES TAKEN AND TESTS REQUESTED FOR THIS VISIT:

Sample No. NW23 TPH/TEH: ✓ BTEX: ✓ Comment: Bior #2, 24hr after 100ppm diesel dose

Sample No. SW24 TPH/TEH: ✓ BTEX: ✓ Comment: " " "

OPERATIONAL CHANGES TODAY: Start flow at noon at 1 gpm ea system — North + south

* Oil / Free product skimmer installed in SE well today — no obvious oil seen in well.

South Influent has 1.5 PPM Phosphate

to operate at 0.5-1.0 gpm

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GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: Russ

Earth Day

DATE: 4/22 TIME: 530 PM HIGH TIDE: Noon-1

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 935 Temperature 85° Oil ok

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 80 in. South system: ___ in. Blower: 81 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: 0 to 1 ← intermittent GPM South Trench: 1.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 1-2 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 10/20 30 % South: ___/___ ___ %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 4/20 South Units: 4/20 2,000 Gal. Unit ___

CULTURE OBSERVATIONS: Water Temperature: ___ Deg.C.

DOUPs: South #1 very little foam - grey water
North #1 - lots of "

[NH4]:] see over [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 26 TPH/TEH: ✓ BTXE: ✓ Comment: Set sample 2000 gal effluent 48hr after start up

Sample No. ___ TPH/TEH: ___ BTXE: ___ Comment: ___ 24hr after begin flow through a bak

OPERATIONAL CHANGES TODAY: Added 1 biosock to 2000 gal system

North trench to ON/OFF → sometimes 10 min no flow (low tide now)

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: RVW

DATE: 4/23 SUN TIME: 12:30 pm HIGH TIDE: 3 pm

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

every 10sec intermittent

SOUTH TRENCH: Refill ____ Discharge ____ Pressure ____

East well flow setting: full West well flow setting: full

NORTH TRENCH: Refill ____ Discharge ____ Pressure ____

South well flow setting: 3/4 full North well flow setting: full

COMPRESSOR CHECKS: Hours 954 Temperature 82 Oil OK 3/8

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 80 in. South system: ____ in. Blower: 81 in. - Moderate air pressure relief

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

(high tide) North Trench: <.5 GPM - erratic - sometimes pumps once every 10sec x3, then off for couple of minutes South Trench: 1.1 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: ~1.5-1.9 GPM sometimes hits 2.0 gal/min

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 5/8 (turned down) 20 % South: 10/10 45 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 4/20 South Units: 4/20 2,000 Gal. Unit 4/22

CULTURE OBSERVATIONS: grey water in North system good foam Water Temperature: ____ Deg.C.

DOUPs: [NH4]: South reactors Modest foam grey water, Bioreactor # 2 more turbid & more foam [PO4]:

SAMPLES TAKEN AND TEST. REQUESTED FOR ANALYSIS:

Sample No. E27 TPH TEH: ✓ BTXE: ✓ Comment: Effluent, 2000 gal tank 48hr after flow through

Sample No.____ TPH TEH:____ BTXE:____ Comment:____

OPERATIONAL CHANGES (CAM):

opened up North wells to ↑ flow, but little increase. Nothing in N/S well but < 0.5gpm in N/N well, even at high tide. (sometimes get surge of water)

Diverted ~1/3 water from south trench (1.1gpm) to North bioreactor. Now N=0.9gpm S=0.8gpm

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GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: Russ

DATE: 4/24 TIME: 11 AM HIGH TIDE: 4 PM

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

Before today's changes

SOUTH TRENCH: Refill C Discharge ~~3 FCA~~ Pressure 80 / 4.5

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

NORTH TRENCH: Refill C Discharge 3 to A Pressure 90 / 4.5

Intermittent action every 10 sec

South well flow setting: full North well flow setting: full

COMPRESSOR CHECKS: Hours 976 Temperature 75° Oil OK - foamy

Air Filter drain checks: 1) ✓ 2) ✓ 3) ✓ all bleeding a little

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 80 in. South system: 81 in. Blower: 81 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES: - intermittent on/off

strong odor influent both N+S

North Trench: < 1.5 GPM South Trench: 1.2 GPM → direct w/ 0.4 gpm North

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 1.2 GPM 0.8 South

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING: good foam NE less NW need to get North going

turnup

North: 10/10 20 % South: 10 / 10 50 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: 4/20 South Units: 4/20 2,000 Gal. Unit 4/22

CULTURE OBSERVATIONS: Water Temperature: ____ Deg.C.

North #1 grey-green turbid + foam

DOURs: #2 H. brown, less turbid [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS: Effluent (2000 gal)

Sample No. E 28 TPH/TEH: ✓ BTXE: ✓ Comment: 72 hr after flow-through barge

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

OPERATIONAL CHANGES TODAY: Turned up NH4/PO4 flow north.

North: 1) change Refill from "C" to "B" (action goes 10 sec → 3 sec)

2) Block all flow from south to north New flow rate about 0.9 gpm North alone

North influent foams like seawater / clear w/ odor 1.0 gpm South alone

1.9 gpm total

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: RVW

DATE: 4/25 TIME: 130pm HIGH TIDE: 5

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill ____ Discharge ____ Pressure ____

East well flow setting: ____ West well flow setting: ____

NORTH TRENCH: Refill C Discharge 3/4 A Pressure 80/4.5

South well flow setting: off ~~full~~ North well flow setting: full

COMPRESSOR CHECKS: Hours 1003 Temperature 80° Oil Replaced today

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 80 in. South system: 81 in. Blower: 81 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: ~0.9 GPM South Trench: ~1.1 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 2.0 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: ___/___ ____% South: ___/___ ____%

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

— NEW TODAY —

North Units: 4/20 → 4/25 Box #1 South Units: 4/20 → 4/25 Box #1 2,000 Gal. Unit 4/22 ok

CULTURE OBSERVATIONS: Water Temperature: ____ Deg.C.

DOUR=: North - better foam still grey [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. E29 TPH/TEH: ✓ BTXE: ✓ Comment: 96hr after flow Effluent/bulkwater 2000 gal

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

OPERATIONAL CHANGES TODAY: Compressor OFF 1:30 - 3:30 for monthly oil change, filter replacement & maintenance.

* Shut down N/S well to replace cracked air tubing - New QED tubing being shipped today.

Flow resumed at N = 1 gpm S = 1 gpm

air today

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: QC'd

DATE: 4/26 TIME: 6:20 HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill 0+2 Discharge B+2 Pressure 80

East well flow setting: Full West well flow setting: Full

NORTH TRENCH: Refill 0+2 Discharge B+1 Pressure 80

South well flow setting: Off North well flow setting: 2/3

COMPRESSOR CHECKS: Hours 1030 Temperature 95 Oil N/C CLEAR

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 80 in. South system: 81 in. Blower: 81 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: .7 GPM South Trench: 1 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 1.5 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 1 _____% South: 1 _____%

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

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

CULTURE OBSERVATIONS: Water Temperature: ____ Deg.C.

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. E-30 TPH/TEH: ✓ BTXE: ✓ Comment: 2000 Effluent 120 hr after flow

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

OPERATIONAL CHANGES TODAY:

Transferred 3 55 gal Drums to North B.S.

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GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: RVW

DATE: 4/22 TIME: 3:50 HIGH TIDE: 6 pm

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

NEW SOUTH TRENCH: Refill 3/4A Discharge 3/4A Pressure 51/57

East well flow setting: full West well flow setting: full

New [illegible] NORTH TRENCH: Refill 3/4A Discharge 3/4A Pressure 79/4

South well flow setting: ∅ [illegible] North well flow setting: full

COMPRESSOR CHECKS: Hours 1032 Temperature 130° Oil clear ([illegible] 4/22)

Air Filter drain checks: 1) [illegible] 2) ✓ 3) ✓

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 81 in. South system: 80 in. Blower: 50 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: ~0.5 GPM South Trench: 1.0 GPM [illegible] ↑

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 1.8 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: 10/10 5 % South: 10/10 20 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: Today South Units: Today 2,000 Gal. Unit 4/22

CULTURE OBSERVATIONS: Water Temperature: ____ Deg.C.

DOURs: very little foam anywhere [illegible] [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS: [illegible]

Sample No. ____ TPH/TPH: ____ BTEX: ____ Comment: [illegible]

Sample No. ____ TPH/TPH: ____ BTEX: ____ Comment: ____

OPERATIONAL CHANGES TODAY:

4" [illegible] 2" trench [illegible] [illegible] 1.6 [illegible] to .59 [illegible] 25-30 [illegible]

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: DCV / Rod

DATE: 4/16 TIME: 10:15 AM-Noon HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill A+1½ Discharge 0+2 Pressure 80

East well flow setting: Full West well flow setting: Secured

NORTH TRENCH: Refill A+3½ Discharge 0+2 Pressure 80

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

COMPRESSOR CHECKS: Hours 1,270 Temperature 150 Oil N/A

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: 80 in. South system: 80 in. Blower: 30 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: .2-5 GPM South Trench: 2-2.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 2.2-3 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: ___/___ _____% South: ___/___ _____%

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

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

CULTURE OBSERVATIONS: Water Temperature: ____ Deg.C.

DO'Rs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

I-531 Sample No. I-S31 TPH TEH: ✓ BTXE: ✓ Comment: South trench INFLUENT 10:30

I-N32 Sample No. I-N32 TPH TEH: ✓ BTXE: ✓ Comment: North trench INFLUENT 10:30

E-33 E33 2000gal holding tank EFF 10:30

OPERATIONAL CHANGES TODAY: [illegible]; Site visit by Rick of Blaymyer & Sons Engineer

EBMUD (Rayline) took effluent sample today 9/10:30 AM 2000gal tank at interceptor discharge