CytoCulture
INTERNATIONAL INC. ENVIRONMENTAL BIOTECHNOLOGY

April 5, 1989

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

JUN 0 2 1989 MTC

RE: Wastewater Discharge Permit (Groundwater Treatment)
EBMUD Account No. 001-00002
First monthly report of treatment and discharge operations

Dear Mr. Meckel:

CytoCulture/Sybron Chemicals are herein reporting on the results of the first month of 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.

Summary of Events and Operations

Start-up of the treatment operation on a 50% pilot scale was re-initiated on March 1, 1989. Only the "south" bioreactor system was used for this month. Liquid bacterial culture from Sybron Chemicals was used to inoculate a 55 gallon drum of diesel-containing groundwater titrated with the proper doses of diammonium phosphate, sodium phosphate buffer and trace minerals. On March 2, the 50 gallon high-density culture of bacteria was used to inoculate two 1,000 gallon aerated bioreactors containing groundwater extracted earlier from the french drain trench along the south edge of the site. The bioreactors had been previously spiked with diesel fuel and nutrients from two previous start-up attempts which were cancelled due to unusually cold weather.

Samples of bioreactor water collected in the holding tank were taken over a period of 3 days prior to discharge. Dissolved oxygen uptake rates were monitored by Sybron during this time, but the DO meter given to CytoCulture by Sybron proved to be faulty, so DO measurements were not taken after day 4.

Each bioreactor was supplied with a Sybron "Biosock" bag of dry culture to provide a continuous time-release seed of the diesel-selective bacteria. On day 2 (March 3), groundwater flow into bioreactor #1 was initiated via the 250 gallon clarifier/oil-water separator at the low rate of 1/2 gallon per minute (gpm). Effluent from the second 1,000 gallon bioreactor was then collected in the 2,000 gallon holding tank while samples were analyzed for remaining diesel contamination.

Upon receiving confirmation of acceptable clean-up levels for the "spiked" groundwater treated during the first three days, discharge from the 2,000 gallon holding tank into the EBMUD interceptor started on March 7.

During the first few days of discharge, EBMUD inspector Ray Luna took a sample of effluent from the 2,000 gallon holding tank for in-house analysis (results not disclosed yet to CytoCulture). The low flow rate of 1/2 gpm was maintained for the first two weeks of continuous flow operation. Ammonium nitrogen and ortho phosphate levels are maintained above 60 ppm and 30 ppm, respectively, in the bioreactors with a metering pump which drips in concentrated nutrients from a reservoir.

On day 7 (March 8), adjustment problems with the well pumps caused excess air to be introduced into the influent groundwater which decreased flow rate. On March 10, groundwater was extracted from the north trench until the problem was corrected a week later without incident. The system continues to run only on the groundwater extracted from the south trench.

On day 12, (March 13), the level sensor for the clarifier diaphragm pump caused water levels in the clarifier to vary beyond the normal high/low levels. On several occasions, the pump would not turn off at the appropriate level, causing air to get into the system as the water level dropped below the intake port. Adjustments were attempted with little success. On day 13 (March 14), the groundwater flow was shut-off as a precautionary measure and resumed on March 16 when the defective sensor could be replaced. Hence, groundwater flow was interrupted for about 36 hours and then re-started at 1/2 gpm from the south trench.

On day 16 (March 17), the groundwater was plumbed directly to the first bioreactor, bypassing the clarifier/oil-water separator which had proven unnecessary and a potential liability on account of the problems with the diaphragm pump level sensor system. No oil layer was ever observed during the entire time the separator was in operation. Fine sediments have been minimal and easily handled directly by the bioreactor. The clarifier/oil-water separator is on stand-by, ready to put back into service should more sediments or free product be detected in the influent.

On March 20 (day 19), the flow rate was increased to 1 gpm following reports of acceptable effluent contamination levels in samples taken the week before. On March 21 (day 20), the influent groundwater was sampled to compare it directly to the treated water discharged from the 2,000 gallon holding tank. EBMUD took a second effluent discharge sample on March 28. On March 31, groundwater flow from the south trench to the bioreactors was increased to 2 gpm and will be maintained at this satisfactory flow rate indefinitely.

Bacterial "Biosocks" are introduced to the bioreactors about every 10 days to continually re-inoculate the system.

Summary of 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)
3) Total Lead (discontinued after consecutive negative findings and the lack of detectable lead in the groundwater influent)

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	Lead
A	1/09	South extraction wells groundwater **influent**	290	10	9	4.2	2.3
1	3/02	Diesel-spiked grdwater bioreactor #1 at **start** (after repeated diesel additions)	17	6	6	**7,400**	ND
2	3/03	Holding tank treated water at 600 gal mark	6	16	7	3.4	ND
4	3/06	Holding tank treated water at 2,000 gals (PRE-discharge)	ND	ND	ND	14	ND
5	3/07	Holding tank contents prior to discharge	ND	ND	ND	27	ND
6	3/08	Holding tank discharge day 2 at 0.5 gpm flow	ND	ND	ND	15	-
7	3/09	Holding tank discharge day 3 at 0.5 gpm flow	ND	ND	ND	2.7	-
9	3/10	Holding tank discharge day 4 at 0.5 gpm flow	ND	ND	ND	0.8	-
10	3/13	Holding tank discharge day 7 at 0.5 gpm flow	ND	ND	ND	1.5	-
11	3/14	Holding tank discharge day 8 at 0.5 gpm flow	ND	ND	ND	trace	-
12	3/17	Holding tank discharge day 11 at 0.5 gpm	ND	ND	ND	0.6	-

			ug/L (ppb)			mg/L (ppm)	
No.	Date	Description / Comment	Benz.	Tol.	Xyl.	TPH/TEH	Lead
	3/20	[Increased flow rate to 1 gpm]					
13	3/21	south trench **influent**	450	13	4	2.9	ND
14	3/21	corresponding effluent	ND	ND	ND	ND	ND
15	3/28	south trench **influent**	ND	ND	ND	4.0	-
16	3/28	corresponding effluent	ND	ND	ND	ND	-

(EBMUD also sampled treatment effluent for analysis on 3/28/89)

3/31 [Increased flow rate to 2 gpm; additional sample taken]

Dissolved Oxygen Uptake Rates During Start-Up

Dissolved oxygen uptake rates were monitored initially by Sybron during the start-up phase (log sheet for field results included). The results of these tests are summarized below::

Day	Time	Sample Description	DOUR mg/L/hr	Comment
1	1030	bioreactor at start 1,000 gallon tank	8.5	Bacterial activity from prev. starts
1	1030	50 gal high density bacterial inoculum	>30	Bacteria grown for inoculating tank
1	1430	1,000 gal bioreactor after inoculation	12	Seeded bioreactor at 12.5 Deg. C.
1	2100	1,000 gal bioreactor	18	Warmed to 25 Deg.C
2	0930	1,000 gal bioreactor	8.5	Temp = 10.5 Deg.C
2	1330	1,000 gal bioreactor	8.5	Temp = 11 Deg.C
2	1800	1,000 gal bioreactor	10	Temp = 11 Deg.C
3	0430	1,000 gal bioreactor	8.5	Temp = 10.5 Deg.C
3	1900	1,000 gal bioreactor	8.5	Temp = 10.5 Deg.C
4	0500	1,000 gal bioreactor	15	Warmed to 20 Deg.C

On account of a faulty DO meter loaned by Sybron, CytoCulture was not able to monitor dissolved oxygen uptake rates after the start-up phase: Sybron is expected to replace the meter.

Pertinent Comments and Observations

This bioremediation project has initially involved treatment of diesel contaminated groundwater extracted primarily from a single 65 foot trench which intercepts groundwater water flow along the south edge of the site (analyzed as sample A taken on 1/09/89).

Effluent treated water now being discharged into the EBMUD interceptor is at or near non-detectable levels of BTXE, lead and total extractable petroleum hydrocarbons. Upon standing 10 minutes to allow the bacterial floc to settle, this treated water appears clear and odorless.

Throughout the month, 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).

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).

By the end of this first month, the pilot scale system was running at around 50% of the intended full scale groundwater treatment capacity. That is, the south bioreactor units were operating (as of 3/31) at 2 gpm flow rate, although they should be able to function effectively at up to 4 gpm in warm weather. Assuming that comparable flow rates can also be obtained from the north extraction trench to feed the north bioreactor system, the overall full-scale process should achieve at least 4 gpm flow rates once the north system is on line. 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.

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

Since the primary goal of this bioremediation project is to treat both the contaminated soil and groundwater, it is imperative that the treated water now discharged into the EBMUD interceptor be directed to infiltration galleries to seed contaminated soil with the bacterial cultures as soon as possible.

Both the Regional Water Quality Control Board and the Department of Health Services (Office of Alternative Technology) will be involved in the surveillance of the reinfiltration program. Now that CytoCulture has demonstrated a full month of continuous satisfactory groundwater treatment as a "pump and treat" operation (Phase II), the company should be in a good position to request permission to proceed with Phase III soil treatment.

A meeting has been scheduled with Dr. Ken Snarkel and John Wesnouski in the Office of Alternative Technology, DHS, Sacramento for 10 AM on Friday, April 14 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 underground. 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 conducting preliminary pilot studies for reinfiltration using this single trench as a model for introducing batch quantities of tap water mixed with diammonium phosphate nutrients (not diverted treated water or bacterial cultures). The purpose of these experiments (55 gallon batches) is to monitor the infiltration rates and appearance of ammonium and phosphate ions in the extraction trench water downfield. Reports of these experiments and any pertinent correspondence with the DHS or RWQCB will be sent to EBMUD as the study is completed.

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 April. 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.

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

Laboratory Analytical Results for March 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

QUOTED PROJECTS

PAGE 1 OF 1

DATE Jan 5, 1989 CLIENT Cytoculture

PROBABILITY 100 %

CONTACT Rachel Von Wedel

ADDRESS :

PHONE # ( ) 564-1511

REQUESTED ANALYSES

ANALYTES	EPA METHOD	MATRIX S=SOIL W=WATER X=WASTE	# OF SAMPLES	COST PER ANALYSIS	Rush Surcharge Rate	TOTAL COST ($)
* 524.2			1	*		
610			↓	175		
Title 22 Metals				200		
pH				10		

COMMENTS : * Sub Out 524.2 to ES or OTC?
Groundwater Influent Sample "A" for EBMUD

TOTAL THIS PAGE $

PROJECT TOTAL $

FOLLOW UP REQUIRED
- ☐ LETTER ☐ NONE
- ☐ VISIT
- ☐ PHONE CALL

RUSH TAT ☐ 5 DAY ☐ 24 hr

REGULAR TURN AROUND TIME ☒

Expected Incept Date _____

- ☐ FREE SAMPLE PICK UP
- ☒ FREE SAMPLE CONTAINERS
- ☐ PROVIDE FIELD BLANKS
- ☐ OTHER : _____

Give him 2 1-liter amber bottles
+ 5 volatile organics vials (VOA's)

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

LABORATORY NUMBER: 16545
CLIENT: CYTO CULTURE INTERNATIONAL
SAMPLE ID: P.I.E. PROJECT/
SOUTH EXTRACTION TRENCH
sample "A"

DATE RECEIVED: 01/09/89
DATE ANALYZED: 01/18/89
DATE REPORTED: 01/23/89

EPA METHOD 610
POLYNUCLEAR AROMATIC HYDROCARBONS IN WATER

COMPOUND	Results ug/L	LOD ug/L
Naphthalene	ND	5
Acenaphthylene	ND	5
Acenaphthene	ND	5
Fluorene	23	5
Phenanthrene	ND	5
Anthracene	ND	5
Pyrene	ND	5
Benzo(a)anthracene	ND	5
Chrysene	ND	5
Benzo(b)flouranthene	ND	5
Benzo(k)flouranthene	ND	5
Fluoranthene	ND	5
Benzo(a)pyrene	ND	5
Indeno(1,2,3-cd)pyrene	ND	25
Dibenzo(a,h)anthracene	ND	25
Benzo(ghi)perylene	ND	25

ND = None Detected, Limit of detection appears in far right column.

QA/QC:

Duplicate, Relative % Difference	11
Average Spike Recovery %	102

LABORATORY DIRECTOR

VOLATILE ORGANIC COMPOUNDS
METHOD 524.2

Sample I.D.: "A"	16545-1	Client:	Curtis & Tompkins
Sample Received:	01/10/89	Client Ref. No.:	16545
Sample Analyzed:	01/12 & 01/13/89	Lab Client No.:	0585
Sample Matrix:	Water	Lab No.:	8901034-01

Compound	Concentration µg/L (ppb)	Limit of Detection µg/L (ppb)
Benzene	290	20
Bromobenzene	ND	3
Bromochloromethane	ND	3
Bromodichloromethane	ND	2
Bromoform	ND	3
Bromomethane	ND	3
n-Butylbenzene	ND	3
sec-Butylbenzene	ND	3
tert-Butylbenzene	ND	3
Carbon tetrachloride	ND	3
Chlorobenzene	ND	3
Chloroethane	ND	4
Chloroform	ND	3
Chloromethane	ND	10
2-Chlorotoluene	ND	3
4-Chlorotoluene	4	3
Dibromochloromethane	ND	2
1,2-Dibromo-3-chloropropane	ND	3
1,2-Dibromoethane	ND	3
Dibromomethane	ND	3
1,2-Dichlorobenzene	ND	3
1,3-Dichlorobenzene	ND	3
1,4-Dichlorobenzene	ND	3
Dichlorodifluoromethane	ND	3
1,1-Dichloroethane	ND	3
1,2-Dichloroethane	ND	3
1,1-Dichloroethene	ND	3
cis-1,2-Dichloroethene	ND	3
trans-1,2-Dichloroethene	ND	3
1,2-Dichloropropane	ND	3
1,3-Dichloropropane	ND	3
2,2-Dichloropropane	ND	3
1,1-Dichloropropene	ND	3
Ethylbenzene	ND	3
C-1,3-Dichloropropene	ND	3
t-1,3-Dichloropropene	ND	5

ND = Not detected at or above limit of detection

VOLATILE ORGANIC COMPOUNDS
METHOD 524.2
(CONTINUED)

Sample I.D.: "A"	16545-1	Client:	Curtis & Tompkins
Sample Received:	01/10/89	Client Ref. No.:	16545
Sample Analyzed:	01/12 & 01/13/89	Lab Client No.:	0589
Sample Matrix:	Water	Lab No.:	8901034-01

Compound	Concentration µg/L (ppb)	Limit of Detection µg/L (ppb)
Hexachlorobutadiene	ND	3
Isopropylbenzene	4	3
p-Isopropyltoluene	ND	3
Methylene chloride	ND	10
Naphthalene	ND	3
n-Propylbenzene	4	3
Styrene	ND	5
1,1,2,2-Tetrachloroethane	ND	4
1,1,1,2-Tetrachloroethane	ND	3
Tetrachloroethene	ND	4
Toluene	6	2
1,2,3-Trichlorobenzene	ND	3
1,2,4-Trichlorobenzene	ND	3
1,1,1-Trichloroethane	ND	3
1,1,2-Trichloroethane	ND	6
Trichloroethene	ND	4
Trichlorofluoromethane	ND	3
1,2,3-Trichloropropane	ND	3
1,2,4-Trimethylbenzene	ND	3
1,3,5-Trimethylbenzene	ND	3
Vinyl chloride	ND	4
o-Xylene	ND	3
m-Xylene/p-Xylene	9	3

ND = Not detected at or above limit of detection

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 16545
CLIENT: CYTO CULTURE INTERNATIONAL
SAMPLE ID: P.I.E. PROJECT/
SOUTH EXTRACTION TRENCH
"A"

DATE RECEIVED: 01/09/89
DATE ANALYZED: 01/09/89
DATE REPORTED: 01/23/89

pH	7.3
EPA 150.1	

Curtis & Tompkins, Ltd.

LABORATORY NUMBER: 16545
CLIENT: CYTO CULTURE INTERNATIONAL
SAMPLE ID: P.I.E. PROJECT/
SOUTH EXTRACTION TRENCH
"A"

DATE RECEIVED: 01/09/89
DATE ANALYZED: 01/09/89
DATE REPORTED: 01/23/89

Title 22 Metals in Aqueous Solutions

METAL	RESULT mg/L	DETECTION LIMIT mg/L	METHOD
Antimony	ND	0.05	EPA 6010
Arsenic	ND	0.05	EPA 6010
Barium	1.1	0.01	EPA 6010
Beryllium	ND	0.01	EPA 6010
Cadmium	ND	0.01	EPA 6010
Chromium (total)	ND	0.01	EPA 6010
Cobalt	ND	0.01	EPA 6010
Copper	ND	0.01	EPA 6010
Lead	2.3	0.05	EPA 6010
Mercury	ND	0.001	EPA 7470
Molybdenum	0.02	0.01	EPA 6010
Nickel	0.02	0.01	EPA 6010
Selenium	ND	0.05	EPA 6010
Silver	ND	0.02	EPA 6010
Thallium	ND	0.05	EPA 6010
Vanadium	ND	0.02	EPA 6010
Zinc	0.07	0.01	EPA 6010

ND = None Detected

QA/QC SUMMARY

	%RPD	%SPIKE		%RPD	%SPIKE
Antimony	<1	80	Mercury	<1	86
Arsenic	2	103	Molybdenum	4	102
Barium	<1	105	Nickel	2	101
Beryllium	<1	116	Selenium	<1	96
Cadmium	1	95	Silver	<1	101
Chromium	<1	99	Thallium	1	95
Cobalt	<1	97	Vanadium	1	102
Copper	1	104	Zinc	<1	92
Lead	1	89			

Chain of Custody Form

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

Job Description: PIE Emeryville

Job Number:

Client Contact: Randall von Wedel, PhD

Samplers: Peter Ingmire
Randall von Wedel

Recorder:

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			1	89	03	02	1200	Start-up

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	Total Lead				
						X	X			X				

Laboratory Notes:

~~[illegible]~~ - RUSH
by Monday - Noon
50% M-Up'

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) [signature]

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

LABORATORY NUMBER: 16912✓
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 1

DATE RECEIVED: 03-02-89
DATE ANALYZED: 03-02-89
DATE REPORTED: 03-09-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	17	1
Toluene	6	1
Ethyl Benzene	2	1
Total Xylenes	6	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 %	9
SPIKE RECOVERY %	91

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

LABORATORY NUMBER: 16912
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 1

DATE RECEIVED: 03-02-89
DATE ANALYZED: 03-05-89
DATE REPORTED: 03-09-89

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)
16912-1	#1	ND(0.5)	7,400	ND(0.5)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	1
Spike: % Recovery	97

LABORATORY DIRECTOR

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

LABORATORY NUMBER: 16912
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 1

DATE RECIEVED: 03-02-89
DATE ANALYZED: 03-03-89
DATE REPORTED: 03-09-89

TOTAL LEAD ANALYSIS IN AQUEOUS SOLUTION, EPA 7420

LAB ID	CLIENT ID	LEAD (mg/L)
16912-1	#1	ND(0.05)

ND = None Detected; Limit of detection is indicated in parentheses.

QA/QC SUMMARY

%RPD	<1
%RECOVERY	103

16922

Chain of Custody Form

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

Samplers R. vonWedel

Job Description PIE Emeryville

Job Number 16922

Client Contact Randall vonWedel · CytoCulture Recorder R. vonWedel

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			2	8	0	3	0	600 gal effluent
													8	0	3	0	3 1 2 0 0

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

Laboratory Notes :

24 hr Rush

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)

March 3, 1989
12:37

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

LABORATORY NUMBER: 16922
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 2

DATE RECEIVED: 03-03-89
DATE ANALYZED: 03-06-89
DATE REPORTED: 03-10-89

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)
16922-1	#2	ND(0.5)	3.4	ND(0.5)

ND = Not Detected; Limit of detection in parentheses.

LABORATORY DIRECTOR

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

LABORATORY NUMBER: 16922
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 2

DATE RECIEVED: 03-03-89
DATE ANALYZED: 03-04-89
DATE REPORTED: 03-09-89

TOTAL LEAD ANALYSIS IN AQUEOUS SOLUTION, EPA 7420

LAB ID	CLIENT ID	LEAD (mg/L)
16922-1	#2	ND(0.05)

ND = None Detected; Limit of detection is indicated in parentheses.

QA/QC SUMMARY

%RPD	<1
%RECOVERY	99

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

LABORATORY NUMBER: 16922
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 2

DATE RECEIVED: 03-03-89
DATE ANALYZED: 03-03-89
DATE REPORTED: 03-09-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	6	1
Toluene	16	1
Ethyl Benzene	2	1
Total Xylenes	7	1
Chlorobenzene	ND	1
1,4-Dichlorobenzene	ND	1
1,3-Dichlorobenzene	ND	1
1,2-Dichlorobenzene	ND	1

ND = None Detected

Chain of Custody Form

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

Samplers: P Ingmire

Job Description: PIE Emeryville

Job Number: 16922

Client Contact: Randall vanWechel • Cytoculture Recorder: P Ingmire

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				4				X		4	8	03	06	1340	2,000 gal. Effluent - pre discharge

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	Total lead
							X	X			X

Laboratory Notes :

24hr.

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)

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

LABORATORY NUMBER: 16934
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
JOB #: 16922
SAMPLE #: 4
(no sample #3)

DATE RECEIVED: 03-06-89
DATE ANALYZED: 03-07-89
DATE REPORTED: 03-09-89

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)
16934-1	#4	ND(0.5)	ND(0.5)	14 *

* 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.

LABORATORY DIRECTOR

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

LABORATORY NUMBER: 16934
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
JOB #: 16922
SAMPLE #: 4

DATE RECIEVED: 03-06-89
DATE ANALYZED: 03-07-89
DATE REPORTED: 03-09-89

TOTAL LEAD ANALYSIS IN AQUEOUS SOLUTION, EPA 7420

LAB ID	CLIENT ID	LEAD (mg/L)
16934-1	#4 (no sample #3)	ND(0.05)

ND = None Detected; Limit of detection is indicated in parentheses.

QA/QC SUMMARY

%RPD	<1
%RECOVERY	101

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

LABORATORY NUMBER: 16934
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
JOB #: 16922
SAMPLE #: 4

DATE RECEIVED: 03-06-89
DATE ANALYZED: 03-06-89
DATE REPORTED: 03-09-89

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 %	104

Chain of Custody Form

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

Samplers: P Engmir

Job Description: PIE Emeryville

Job Number: 16922

Client Contact: Randall von Wedel - CytoCulture

Recorder: P Engmir

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				5				X			89	03	07	1325	2,000 gal. effluent - pre discharge (No release yet)

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	Total lead
						X	X			X

Laboratory Notes :

24 hr.

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) 3/7/89 1:45 p.m.

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

LABORATORY NUMBER: 16943
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 5 (3-7-89)

DATE RECIEVED: 03-07-89
DATE ANALYZED: 03-08-89
DATE REPORTED: 03-10-89

TOTAL LEAD ANALYSIS IN AQUEOUS SOLUTION, EPA 7420

LAB ID	CLIENT ID	LEAD (mg/L)
16943	#5 (3-7-89)	ND(0.05)

ND = None Detected; Limit of detection is indicated in parentheses.

QA/QC SUMMARY

%RPD	4
%RECOVERY	100

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

LABORATORY NUMBER: 16943
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 5 (3-7-89)

DATE RECEIVED: 03-07-89
DATE ANALYZED: 03-08-89
DATE REPORTED: 03-10-89

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)
16943	#5 (3-7-89)	ND(0.5)	ND(0.5)	27 *

PRE-Discharge
(No Release)

* 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.

LABORATORY DIRECTOR

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

LABORATORY NUMBER: 16943
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 5 (3-7-89)

DATE RECEIVED: 03-07-89
DATE ANALYZED: 03-07-89
DATE REPORTED: 03-10-89

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

Chain of Custody Form

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

Samplers: P Ingram

Job Description: PLE Emeryville

Job Number: 6122

Client Contact: Randall VanWebel - Cytoculture

Recorder: P Ingram

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		6	89	05	18	1100	2,000 gal effluent

ANALYSIS REQUESTED

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

Laboratory Notes :

Nancy Ji Wilson

24hr TAT

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) Nancy Ji Wilson

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

LABORATORY NUMBER: 16950
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 6

DATE RECEIVED: 03-07-89
DATE ANALYZED: 03-09-89
DATE REPORTED: 03-17-89

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)
16950-1	#6	ND(0.5)	ND(0.5)	15 *

* 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	3
Spike: % Recovery	81

LABORATORY DIRECTOR

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

LABORATORY NUMBER: 16950
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 6

DATE RECEIVED: 03-07-89
DATE ANALYZED: 03-09-89
DATE REPORTED: 03-17-89

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 %	98

Chain of Custody Form

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

Samplers: P Ingmire

Job Description: PIE Emeryville

Job Number: 1622

Client Contact: Randall Van Wetel · Geoculture

Recorder: P Ingmire

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		7-THUR	89	03	09	1335	2,000 gal. effluent

ANALYSIS REQUESTED

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

Laboratory Notes :

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
[signature]	
Dispatched by: (signature) Date/Hr	Received for Lab by (signature) [signature] 3/9/89 1420

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

LABORATORY NUMBER: 16963
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 7 - THUR

DATE RECEIVED: 03-09-89
DATE ANALYZED: 03-10-89
DATE REPORTED: 03-17-89

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)
16963-1	7 - THUR	ND(0.5)	ND(0.5)	2.7 *

* 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	4
Spike: % Recovery	121

LABORATORY DIRECTOR

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

LABORATORY NUMBER: 16963
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 7 - THUR

DATE RECEIVED: 03-09-89
DATE ANALYZED: 03-09-89
DATE REPORTED: 03-17-89

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 %	98

Chain of Custody Form

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

Samplers: P Ingmire

Job Description: PIE Emeryville

Job Number: 16922

Client Contact: Randal von Wedel - Cyto Culture

Recorder: P Ingmire

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		09-FR1	89	05	10	1100	2,000 gal effluent non-discharge

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

Laboratory Notes :

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) 3/14/89 1130

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

LABORATORY NUMBER: 16973 ✓
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 09 - FRI

DATE RECEIVED: 03-10-89
DATE ANALYZED: 03-13-89
DATE REPORTED: 03-17-89

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)
16973-1	09 - FRI	ND(0.5)	ND(0.5)	0.8 *

* 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.

LABORATORY DIRECTOR

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

LABORATORY NUMBER: 16973
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 09 - FRI

DATE RECEIVED: 03-10-89
DATE ANALYZED: 03-10-89
DATE REPORTED: 03-17-89

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: P Ingmire

Job Description: PIE · Emeryville

Job Number: 16922

Client Contact: Randall von Wedel - Cytoculture

Recorder: P Ingmire

Matrix: Water	Soil	Waste	Oil			#Containers	Method Preserved: H₂SO₄	HNO3	Ice	None	Other	Sample Number	Sampling Date: Yr	Mo	Dy	Time	SAMPLE NOTES
X										X		10-MON	89	03	13	1100	2000 gal. effluent (no discharge) Let off for weekend

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		

Laboratory Notes :

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
[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) [signature] 3/13/89 11:15

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

LABORATORY NUMBER: 17024
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 10 - MON

DATE RECEIVED: 03-13-89
DATE ANALYZED: 03-13-89
DATE REPORTED: 03-17-89

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)
17024-1	10 - MON	ND(0.5)	ND(0.5)	1.5 *

* 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.

LABORATORY DIRECTOR

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

LABORATORY NUMBER: 17024
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 10 - MON

DATE RECEIVED: 03-13-89
DATE ANALYZED: 03-13-89
DATE REPORTED: 03-17-89

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 %	109

Chain of Custody Form

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

Samplers: [signature]

Job Description: PIE - Emeryville

Job Number: 16922

Client Contact: Randall von Wedel - Cytoculture

Recorder: [signature]

Matrix: Water	Soil	Waste	Oil			#Containers	Method Preserved: H_2SO_4	HNO_3	Ice	None	Other	Sample Number	Yr	Mo	Dy	Time	SAMPLE NOTES
X										X		11-TVES	89	03	14	1500	2,000 gal 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		

Laboratory Notes :

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
[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 3/14/89 4PM	Received for Lab by (signature) [signature]

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

LABORATORY NUMBER: 16997
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 11 - TVES

DATE RECEIVED: 03-14-89
DATE ANALYZED: 03-15-89
DATE REPORTED: 03-17-89

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)
16997	11 - TVES	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.

LABORATORY DIRECTOR

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

LABORATORY NUMBER: 16997
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 11 - TVES

DATE RECEIVED: 03-14-89
DATE ANALYZED: 03-14-89
DATE REPORTED: 03-17-89

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 %	102

Chain of Custody Form

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

Job Description: PIS - Emeryville

Job Number: 16922

Client Contact: R. von Wedel - Cytoculture

Samplers: [signature]

Recorder: [signature]

Water	Soil	Waste	Oil	#Containers	H_2SO_4	HNO_3	Ice	None	Other	Sample Number	Yr	Mo	Dy	Time	SAMPLE NOTES
X								X		1[illegible]-FR1	89	03	17	1200	2,000 gal effluent Non-discharge

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		

Laboratory Notes :

24 hr TAT

Chain of Custody Record

Relinquished by: (signature) Date/Hr	Received by (signature)
[signature] 3.17.89 1230	
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) [signature]

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

LABORATORY NUMBER: 17022
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
JOB #: 16922
SAMPLE #: 12 - FRI

DATE RECEIVED: 03-17-89
DATE ANALYZED: 03-20-89
DATE REPORTED: 03-21-89

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)
17022-1	12 - FRI	ND(0.5)	ND(0.5)	0.6 *

* 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.

LABORATORY DIRECTOR

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

LABORATORY NUMBER: 17022
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
JOB #: 16922
SAMPLE #: 12 - FRI

DATE RECEIVED: 03-17-89
DATE ANALYZED: 03-17-89
DATE REPORTED: 03-21-89

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 %	9
SPIKE RECOVERY %	91

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

LABORATORY NUMBER: 17022
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
JOB #: 16922
SAMPLE #: 12 - FRI

DATE RECEIVED: 03-17-89
DATE ANALYZED: 03-20-89
DATE REPORTED: 03-21-89
PAGE 1 OF 2

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)
17022-1	12 - FRI	ND(0.5)	ND(0.5)	0.6 *

* 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.

LABORATORY DIRECTOR

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

LABORATORY NUMBER: 17022
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
JOB #: 16922
SAMPLE #: 12 - FRI

DATE RECEIVED: 03-17-89
DATE ANALYZED: 03-17-89
DATE REPORTED: 03-21-89
PAGE 2 OF 2

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 %	9
SPIKE RECOVERY %	91

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

Client Contact R. von Wedel

Recorder R. von Wedel

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		13	89	03	21	1500	South trench inflow at clarifier after 3 wks flow

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	Total lead				
						X	X			X				

Laboratory Notes : Regular 1wk turnaround time.

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) 3/21/89

13:30

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

LABORATORY NUMBER: 17040
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 13

DATE RECEIVED: 03-21-89
DATE ANALYZED: 03-22-89
DATE REPORTED: 03-30-89

EPA 602: Volatile Aromatic Hydrocarbons in Water

COMPOUND	RESULT ug/L	DETECTION LIMIT ug/L
Benzene	450	1
Toluene	13	1
Ethyl Benzene	4	1
Total Xylenes	11	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 %	102

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

LABORATORY NUMBER: 17040
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 13

DATE RECEIVED: 03-21-89
DATE ANALYZED: 03-28-89
DATE REPORTED: 03-30-89
PAGE 1 OF 3

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)
17040	#13	ND(0.5)	ND(0.5)	2.9 *

* Fingerprint pattern does not match Hydrocarbon standard. Quantitation based on largest peaks withing C9-C12 boiling range.

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	4
Spike: % Recovery	79

LABORATORY DIRECTOR

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

LABORATORY NUMBER: 17040
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 13

DATE RECIEVED: 03-21-89
DATE ANALYZED: 03-23-89
DATE REPORTED: 03-30-89

TOTAL LEAD ANALYSIS IN AQUEOUS SOLUTION, EPA 7420

LAB ID	CLIENT ID	LEAD (mg/L)
17040	#13	ND(0.05)

ND = None Detected; Limit of detection is indicated in parentheses.

QA/QC SUMMARY

%RPD	2
%RECOVERY	98

Chain of Custody Form

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

Samplers: R. von Wedel

Job Description: PIE Emeryville

Job Number:

Client Contact: Randall 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										X		14	89	03	21	1500	Holding tank effluent at 3wks continuous flow (South system only)

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	Total Lead					
						X	X			X					

Laboratory Notes: ~~Regular~~ 1wk turn around time.

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) 3/21/89

15:30

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

LABORATORY NUMBER: 17041
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 14

DATE RECEIVED: 03-21-89
DATE ANALYZED: 03-22-89
DATE REPORTED: 03-30-89

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 %	102

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

LABORATORY NUMBER: 17041
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 14

DATE RECEIVED: 03-21-89
DATE ANALYZED: 03-22-89
DATE REPORTED: 03-30-89

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)
17041	#14	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	79

LABORATORY DIRECTOR

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

LABORATORY NUMBER: 17041
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 14

DATE RECIEVED: 03-21-89
DATE ANALYZED: 03-23-89
DATE REPORTED: 03-30-89

TOTAL LEAD ANALYSIS IN AQUEOUS SOLUTION, EPA 7420

LAB ID	CLIENT ID	LEAD (mg/L)
17041	#14	ND(0.05)

ND = None Detected; Limit of detection is indicated in parentheses.

QA/QC SUMMARY

%RPD	2
%RECOVERY	98

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 Emergency

Job Number

Client Contact R vonWedel

Recorder Russ

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		15	89	03	28	1300	INFLUENT - South System
X										X		16	89	03	28	1200	Effluent 2000 gal Tank

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 :

1 wk

Chain of Custody Record

R vonWedel

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) 3/28/89 1355

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

LABORATORY NUMBER: 17090
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE

DATE RECEIVED: 03-28-89
DATE ANALYZED: 03-30-89
DATE REPORTED: 04-04-89

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)
17090-1	# 15	ND(0.5)	4.0	ND(0.5)
17090-2	# 16	ND(0.5)	ND(0.5)	ND(0.5)

ND = Not Detected; Limit of detection in parentheses.

QA/QC SUMMARY

Duplicate: Relative % Difference	7
Spike: % Recovery	85

LABORATORY DIRECTOR

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

LABORATORY NUMBER: 17090-1
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 15

DATE RECEIVED: 03-28-89
DATE ANALYZED: 04-03-89
DATE REPORTED: 04-04-89

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: 17090-2
CLIENT: CYTO-CULTURE INTERNATIONAL
PROJECT: PIE EMERYVILLE
SAMPLE #: 16

DATE RECEIVED: 03-28-89
DATE ANALYZED: 04-03-89
DATE REPORTED: 04-04-89

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

Daily Facility Log Sheets for March 1989

CytoCulture - PIE Bioremediation Project, Emeryville

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: R. van Dobel

DATE: 3/1 TIME: 9 am HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill off Discharge off 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 stdby Temperature _____ Oil _____

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: — in. South system: 78 in. Blower: 83 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: — GPM South Trench: temporarily off GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: zero GPM until start-up completed

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: —/— —% South: Manually added 25 lbs dry DAP / —% —%

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

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

CULTURE OBSERVATIONS:

DOURs: (Sykron) [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

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

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

OPERATIONAL CHANGES TODAY:

Seeded bioreactor: inoculation 55 gal drum aerated w/ sump pump with 230 ml liquid culture sent to us by Sykron
plus nutrients, trace elements; added 250 ml diesel - formed white
* Spiked both reactors (third time x 2 wks) with (wet) diesel emulsion

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: R von Wedel, Gary Hater, Buck Cox (Sybron)

DATE: 3/2 TIME: 8:30 am HIGH TIDE: ______

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill off Discharge off Pressure —

East well flow setting: off West well flow setting: off

NORTH TRENCH: Refill — Discharge — Pressure —

South well flow setting: ______ North well flow setting: ______

COMPRESSOR CHECKS: Hours — Temperature — Oil —

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: — in. South system: 78 in. Blower: 83 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: off GPM South Trench: (Standby) GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: zero GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: / ______ % South: ⇗ 40 40 (setting to start with) 100 % — >500 ppm both

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: ~ South Units: today 2,000 Gal. Unit —

CULTURE OBSERVATIONS:
10:30 - Buck Cox - Sybron

DOURs: bioreactor ~ 8.5 mg/L/hr T=12.5% [NH4]: > 500 ppm [PO4]: > 500 ppm

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 1 TPH TEH: ✓ BTXE: ✓ Comment: 4 heads - South trench INFLUENT

Sample No. ______ TPH TEH: ______ BTXE: ______ Comment: Starting water bioreactor #1 spiked 3x w/diesel

OPERATIONAL CHANGES TODAY: Inoculator drum very active, foam.
@ 10:30 transferred entire contents of 50 gal inoculum to both bioreactors of south system. Mixing good; Added 2 biosocks to ea. tank
@ 5 pm Turned on south extraction trench well pumps (very low flowrate) < 0.5 gpm

CYTOCULTURE - EMERYVILLE
DOUR READINGS
TAKEN BY: HWR

DATE	TIME	DOUR mg/l/h	LOCATION	COMMENTS
3/2	~10:30 A.M.	8.5	TREATMT. TANK	TANK @ 12.5°C
3/2	~10:30 A.M.	>30.0	55 gal. DRUM INNOCULUM	
3/2	~2:30 p.m.	12.0	TREATMT. TANK [redacted]	AFTER INNOC
3/2	~9:00 P.M.	18.0	SAMPLE CONTAINER	IN MOTEL ROOM AFTER WARMING TO 25°C
3/3	~9:30 A.M.	8.5	TREATMT. TANK	TANK @ 10.5°C
3/3	~1:30 PM	8.5	TREATMT. TANK	TEMP @ 11°C
3/3	~6:00 P.M	10.0	TREATMT. TANK	TEMP @ 11°C
3/4	~4:30 A.M.	8.5	TREATMT. TANK	TEMP @ 10.5°C
	~7:00 P.M	8.5	TREATMT. TANK	TEMP @ 10.5°C
3/5	~5:00 A.M.	~15.0	SAMPLE CONTAINER FROM SAMPLE PUMP-TE BEFORE	20°C WENT TO >SRC OVERNITE

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: R. Wedel

DATE: 3/3 Sat. TIME: 10 Am HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill B Discharge A&2 Pressure 60 psi

East well flow setting: V. low West well flow setting: V. low

NORTH TRENCH: Refill — Discharge — Pressure —

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

COMPRESSOR CHECKS: Hours 437 Temperature 120° Oil Normal

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: — in. South system: 78 in. Blower: 83 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: —— GPM South Trench: < 0.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: < 0.5 GPM during initial startup

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: — / _____ % South: 40 / 40 95 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

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

CULTURE OBSERVATIONS:

Bioclor. 930 Am: 8.5 mg/l/hr

HOURS: 1330; 8.5 mg/l/hr [NH4]: > 100 ppm [PO4]: > 100 ppm

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 2 TPH TEH: ✓ BTXE: ✓ Comments: Head - Holding tank now

Sample No. ___ TPH TEH: ___ BTXE: ___ Comments: filled to 600 gal mark of treated water

OPERATIONAL CHANGES TODAY:

- Step up flow to ~ 0.5 gpm, so can proceed to fill holding tank slowly over weekend.

Reduced continue monitoring Dock tonight and Sunday

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: [illegible]

DATE: 2/6 TIME: 10³⁰ AM HIGH TIDE: ________

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill B Discharge A 1/2 Pressure 60

East well flow setting: ~1/3 West well flow setting: ~1/3

NORTH TRENCH: Refill — Discharge — Pressure —

South well flow setting: ______ North well flow setting: ______

COMPRESSOR CHECKS: Hours ______ Temperature OK Oil OK

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: — in. South system: 28 in. Blower: 83 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: — GPM South Trench: ~0.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 0.5 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: — ______ % South: 30 / 30 90 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

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

CULTURE OBSERVATIONS:

DOURs: [illegible] [NH4]: >10ppm [PO4]: >1ppm

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 4 TPH GEH: ✓ BTXE: ✓ Comment: [illegible]

Sample No. ____ TPH GEH: ___ BTXE: ___ Comment: [illegible]

OPERATIONAL CHANGES TODAY:

[illegible]

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: Peter Ingraine, SWS

DATE: 3.7.89 TIME: 13:00 HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill ___ Discharge ___ Pressure ___

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

NORTH TRENCH: Refill — Discharge — Pressure —

South well flow setting: — North well flow setting: —

COMPRESSOR CHECKS: Hours ___ Temperature Norm. Oil Norm.

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

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

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: 0 GPM South Trench: 0.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 0.5 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: —/— ___% South: 30 / 30 ___%

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: X South Units: 3.2.89 2,000 Gal. Unit X

CULTURE OBSERVATIONS:

DOURs: Faulty meter [NH4]: > 14ppm [NO3]: > 14ppm

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 5 (3 7 89) TPH/TEL: ✓ BTXE: ✓ Comment: (also lead) Pre discharge on 2,000 gal. tank Tank nearly full — discharge should begin overnight

Sample No. ___ TPH T+B: ___ EPA: ___ Comment: ___

OPERATIONAL CHANGES TODAY: * Continued

Increased flow rate from South trench by turning on East well to ½ speed.

Increased extraction trench flow rate to 0.5 GPM

Took nutrient sample from both reactor tanks — levels were good.

Bioreactor water is brown & cloudy

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: Peter Ingmire

DATE: 3.8.89 TIME: 11:00 HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill ___ Discharge ___ Pressure ___

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 ___ Temperature Norm. Oil Norm.

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

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

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: — GPM South Trench: 0.5 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 0.5 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: —/— ___% South: 30 / 30 ___%

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: none South Units: 3.2.89 2,000 Gal. Unit —

CULTURE OBSERVATIONS:

DOURs: [NH4]: — [PO4]: —

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 6 TPH/TEH: ✓ BTXE: ✓ Comment: Discharge from 2,000 gallon tank

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

OPERATIONAL CHANGES MADE:

Increased South trench well flow settings to Full for both wells because very little water flowing through the system — mainly air.

Water from discharge is brown & cloudy

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: Peter Ingmire

DATE: 3.9.89 TIME: 13:00 HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill ___ Discharge ___ Pressure ___

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 ___ Temperature Norm. Oil Norm.

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

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

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: — GPM South Trench: 0.3 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 0.3 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: —/— ___% South: 25/25 ___%

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: — South Units: 3-2-89 2,000 Gal. Unit —

CULTURE OBSERVATIONS:

DOURs: [NH4]: > 14ppm [PO4]: > 14ppm

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 7 TPH/GEN: ✓ BTXE: ✓ Comment: Discharge from 2,000 gallon tank

Sample No. ___ TPH/GEN: ___ BTXE: ___ Comment: ___

OPERATIONAL CHANGES TODAY:

Decreased Nutrient pump because NH_4 & PO_4 levels remain high.
South trench flow rate down & mainly air being pumped through system despite both well flow settings on full.
Water appears clearer, no flock on surface.
Diaphragm pump was faltering

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: Peter Ingmire

DATE: 3.10.89 TIME: 11:00 HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill ___ Discharge _____ 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: 1/2

COMPRESSOR CHECKS: Hours _____ Temperature Norm Oil Norm

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

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

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: _____ GPM South Trench: _____ GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 20.3 ____ GPM - measured at clarifier

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: — / — _____% South: 30 / 30 _____%

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: — South Units: 3.2.89 2,000 Gal. Unit —

CULTURE OBSERVATIONS:

DOURs: [NH4]: [PO4]:

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

JC ← Sample No. 9 TPH/Em: ✓ BTXE: ✓ Comment: Non-discharge from 2,000 gallon tank

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

OPERATIONAL CHANGES TODAY: Turned on North trench to increase flow into system - flow rate was so slow no discharge was occurring water in reactors & holding tank was clear

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: Peter Ingmire

DATE: 3-13-89 TIME: 11:00 HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill ____ Discharge ____ Pressure ____

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

NORTH TRENCH: Refill ____ Discharge ____ Pressure ____

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

COMPRESSOR CHECKS: Hours ____ Temperature Norm. Oil Norm.

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

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

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: _____ GPM South Trench: ___ . ___ GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: ~~0~~ GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: — / — —— % South: 30 / 30 _____ %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: — South Units: 3-13-89 2,000 Gal. Unit —

CULTURE OBSERVATIONS:

DOURs: ~2 [NH4]: — [PO4]: —

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 10 TPH/TEH: ✓ BTXE: ✓ Comments: (temporary shut down) - Non discharge

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

OPERATIONAL CHANGES TODAY: Over the weekend the blower was shut off
Water was clear, no flock on the surface of bioreactors.
2 - biosocks added to South Units
Increased North trench flow rate.

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: Peter Ingmore

DATE: 3-14-89 TIME: 14:00 HIGH TIDE: ____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill ____ Discharge ____ Pressure ____

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

NORTH TRENCH: Refill ____ Discharge ____ Pressure ____

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

COMPRESSOR CHECKS: Hours ____ Temperature Norm Oil Nor

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

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

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: ____ GPM South Trench: ____ GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: ≈ 0.5 GPM — Then shut off.

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: — / — —% South: 30 / 30 ____%

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: — South Units: 3-13-89 2,000 Gal. Unit —

CULTURE OBSERVATIONS:

DOURs: New D.O. meter — 10.6 → 9.8 over 1hr. [NH4]: > 14 ppm [PO4]: > 14 ppm

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 11 TPH FEH: ✓ BTXE: ✓ Comment: Discharge effluent

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

OPERATIONAL CHANGES (log): Nutrient pump was off but nutrient levels okay water clear & flock was developing.

Diaphragm pump not working well. F. Hater tried to fix it but didn't, so shut the compressor off — done at 17:40.

North well of North trench shut off.

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: Peter Ingmire

DATE: 3.17.89 TIME: 12:00 HIGH TIDE: ______

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill ____ Discharge _____ Pressure _____

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

NORTH TRENCH: Refill ____ Discharge _____ Pressure _____

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

COMPRESSOR CHECKS: Hours ______ Temperature Norm. Oil Norm.

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

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

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: ________ GPM South Trench: ________ GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: ≈ 0.5 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: – / – —— % South: 25 / 25 ______ %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: — South Units: 3.13.89 2,000 Gal. Unit ——

CULTURE OBSERVATIONS:

DOURs: 9.6 → 9.2 over 1 hr. – again, have doubts about new DO meter [NH4]: > 14 ppm [PO4]: > 14 ppm

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 12 TPH TEH: ✓ BTXE: ✓ Comment: Non discharge effluent

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

OPERATIONAL CHANGES TODAY: Compressor reactivated 3.16.89 –
Water in tanks clear, good flock.
Slowed nutrient pump (G. Hunter had increased it to 70/70)

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: RW

DATE: 3/20 TIME: 11 Am HIGH TIDE: ______

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill A½ Discharge A Pressure 60 psi

East well flow setting: 2/3 full West well flow setting: 2/3 full

NORTH TRENCH: Refill — Discharge — Pressure —

South well flow setting: ______ North well flow setting: ______

COMPRESSOR CHECKS: Hours 521 Temperature 120° Oil ok

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: — in. South system: 78 in. Blower: 84 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: ______ GPM South Trench: ~1/2 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: ~1/2 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: —/— ______% South: 30 / 30 50 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

North Units: — South Units: 3/13 2,000 Gal. Unit —

CULTURE OBSERVATIONS:

DOURs: — [NH4]: >100ppm [PO4]: >100ppm

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. — TPH [illegible]: ___ BTXE: ___ Other: ______

Sample No. ______ [illegible]: ___ BTXE: ___ Other: ______

OPERATIONAL CHANGES [illegible]:

stepped up flow rate to little over 1gpm
by full throttle on well pump remote operator values

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: R. [illegible]

DATE: 3/21 TIME: Noon HIGH TIDE: ______

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill A Discharge A½ Pressure 60

East well flow setting: 2/3 full West well flow setting: 2/3 full

NORTH TRENCH: Refill — Discharge — Pressure —

South well flow setting: ______ North well flow setting: ______

COMPRESSOR CHECKS: Hours ______ Temperature OK Oil ok

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: ___ in. South system: 78 in. Blower: 83 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: ______ GPM South Trench: 1gpm GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 1gpm GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: ___ / ___ ______% South: 30 / 30 45 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

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

CULTURE OBSERVATIONS: brown, turbid, healthy foam

DOURs: — [NH4]: > 100ppm [PO4]: > 100ppm

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 13 TPH/TEH: ✓ BTXE: ✓ Comment: also lead / Grdwtr Influent

Sample No. 14 TPH/TEH: ✓ BTXE: ✓ Comment: + lead / compos. effluent from 2000 gal tank

OPERATIONAL CHANGES TODAY

compare influent / effluent

Added new biosocks (one ea) to both bioreactors "set up as polishing step" → and one to 2000 gal tank too

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: Russell

DATE: 3-28 TIME: 11Am HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill A Discharge A½ Pressure 60

East well flow setting: 2/3 full West well flow setting: 2/3 full

NORTH TRENCH: Refill — Discharge — Pressure —

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

COMPRESSOR CHECKS: Hours 604 Temperature ok Oil ok

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: — in. South system: 78 in. Blower: 73 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: _____ GPM South Trench: 6 gpm GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: 1 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: / _____% South: 20 / 20 40 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

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

CULTURE OBSERVATIONS: healthy cultures / foam

DOURs: — [NH4]: ~60ppm [PO4]: 50ppm

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 15 TPH,TEH: ✓ BTXE: ✓ Comment: INFLUENT / South System

Sample No. 16 TPH,TEH: ✓ BTXE: ✓ Comment: Effluent / 2000 gal Bioreactor tank

OPERATIONAL CHANGES TODAY:

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: RW

DATE: 3/29 TIME: 11 AM HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill A Discharge A Pressure 60

East well flow setting: 2/3 full West well flow setting: 2/3 full

NORTH TRENCH: Refill — Discharge — Pressure —

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

COMPRESSOR CHECKS: Hours 604 Temperature ok Oil ok

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

North system: — in. South system: 76 in. Blower: 83 in.

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: _____ GPM South Trench: ~1 GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: ~1 GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

North: / _____ % South: 30 / 30 25 %

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

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

CULTURE OBSERVATIONS:

DOURs: [NH4]: > 60 ppm [PO4]: > 60 ppm

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 17 TPH(D&E): ✓ BTXE: ✓ Comments: midwk sample effluent

Sample No. _____ TPH (D&E): ___ BTXE: ___ Comments: _____

OPERATIONAL CHANGES TODAY: mechanical adjustments to aerators + tune-up

* set up batch expts in north system (no flow-through)

CytoCulture International, Inc.

GROUNDWATER TREATMENT DAILY FACILITY INSPECTION LOG

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

OPERATOR: Russ / David Vivra

DATE: 3/31 TIME: 11 AM HIGH TIDE: _____

WELL PUMP CONTROLLER SETTINGS AND OBSERVATIONS:

SOUTH TRENCH: Refill A Discharge A 1/2 Pressure 60

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 621 Temperature 90° Oil OK

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

BLOWER AIR PRESSURE READINGS and TEMPERATURE CHECKS:

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

GROUNDWATER EXTRACTION TRENCH FLOW RATES:

North Trench: _____ GPM South Trench: _____ GPM

TOTAL GROUNDWATER TREATMENT DISCHARGE RATE: _____ GPM

DIAMMONIUM PHOSPHATE FLOW AND PERCENT REMAINING:

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

DATE OF LAST BIOSOCK INOCULATIONS: (# per unit)

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

CULTURE OBSERVATIONS: OK, but grey water in #1

DOURs: —— [NH4]: >100ppm [PO4]: >100 ppm

SAMPLES TAKEN AND TESTS REQUESTED FOR ANALYSIS:

Sample No. 18 TPH/TEH: ✓ BTXE: ✓ Comment: last effluent sample of month

Sample No. _____ TPH/TEH: ___ BTXE: ___ Comment: _____ Jason Kaufman (EMCON)

OPERATIONAL CHANGES TODAY: Replaced broken biosock in bioreactor #1 (water looks grey)

* adjusted wells to ≈ 2 gpm flow

> 4 hr landfarming, David sprayed ~ 600 gallons of effluent from 2000 gal holding tank (last time)

Compressor will be broken down today for replacement of fitting, oil change, expect 6 hr interruption in service / No flow

3/21 - 3/31

= 10 d at 1 gpm : 60 gph : 1440 gpd = 14,000 gal

3/6 - 3/20

= 14 d at 0.5 gpm : 30 gph : 720 gpd ≈ 10,000 gal

24,000 gal