REMEDIATION SERVICE, INT'L.

P.O. BOX 1601, OXNARD, CALIFORNIA 93032
(805) 644-5892 • FAX (805) 654-0720

January 2, 1990

Mr. Ray Kahler
California Regional Water
Quality Control Board
San Francisco Bay Region
1800 Harrison, Suite 700
Oakland, CA 94612

RE: Emergency Temporary Discharge Permit Request
for Desert Petroleum Station 793
dba Beacon, 4035 Park Blvd., Oakland

Dear Mr. Kahler:

This letter will confirm our conversation on December 29, 1989 regarding the various requirements of the proposed emergency permit to discharge treated ground water into the storm drain on Brighton Street.

Effluent water tests were taken on Friday, December 29, 1989, and verification samples were taken on Saturday, December 30. Samples were taken at the water outlet, both before and after the carbon canister. The purpose of this testing was to demonstrate the effectiveness of the S.A.V.E. System, prior to carbon treatment, and to document the removal efficiency of the carbon. The emergency discharge limits established by the Board are TPH 50 ppb and 0.5 ppb for BTXE individually. Verification samples are to be taken at least 6 hours, but no more than 24 hours after the initial sample. The test methods to be used are identified in the Fuel Leak Guidelines: EPA methods 8020 and 8015. As you know, the detection limits of 8020 is normally 100 ppb, and for 8015, the limit is 0.5 ppb. The lab we use in the Bay area is able to provide a lower detection limit: 50 ppb for 8020 and 0.3 ppb for 8015. You will note that the detection limits of the tests are very close to the discharge limit requirements of the Board.

We anticipate providing the Board with the test results this morning. Provided that the test results are within the limits, we understand that we will receive a verbal authorization to begin discharge, which will be followed by an executive letter providing the written authorization. We understand that the discharge permit is temporary, and will be available while we apply for the sewer discharge permit and make the necessary alterations to the sewer lines

required by the Sanitary District. Testing will continue on a daily basis, with tests taken at 24 hour intervals and analyzed within twenty-four hours of the test. This information will be provided to the Board weekly with a written status report. If a violation occurs, we understand that we must contact you and stop treatment immediately.

We would like to discuss the testing requirements, once we have some data to demonstrate the effectiveness of the system and the carbon. These initial tests will allow us to calculate the carbon breakthrough, and thus allow us to justify a reduction in the frequency of the effluent testing.

Thank you for you quick and professional response to our request for this emergency discharge. We appreciate your assistance, and look forward to the resolution of the problem.

Sincerely,

Rebecca Coleman-Roush

Rebecca Coleman-Roush
Director of Marketing

cc: John Rutherford
Desert Petroleum

REMEDIATION SERVICE, INT'L.

P.O. BOX 1601, OXNARD, CALIFORNIA 93032
(805) 644-5892 • FAX (805) 654-0720

January 3, 1900

Mr. Ray Kahler
California Regional Water
Quality Control Board
San Francisco Bay Region
1800 Harrison, Suite 700
Oakland, CA 94612

RE: Emergency Temporary Discharge Permit Request
for Desert Petroleum Station 793
dba Beacon, 4035 Park Blvd., Oakland

Dear Mr. Kahler:

I want to correct an error I made in my letter to you dated January 2, 1990. The test methods performed to determine the TPH and BTXE concentrations in the treated water were EPA 8015 and EPA 8020. Method 8015 is used to determine TPH and the normal detection limit of the test is 100 ppb. Superior Analytical Laboratory, Inc. is able to detect gasoline in water at 0.05 ppm (50 ppb.) Method 8020 provides information on BTXE and the standard detection limit is 0.5 ppb. The lab is able to detect the compounds at 0.3 ppb. The margin of error on these tests is + or - 10%. I have enclosed the copies of the test results and look forward to your comments. You will note that test samples 5 (verification sample) and 6 (duplicate sample) meet the discharge limits.

If you have any questions, please give me a call. We look forward to your comments.

Sincerely,

Rebecca Coleman-Roush

Rebecca Coleman-Roush
Director of Marketing

cc: Desert Petroleum

REMEDIATION SERVICE, INT'L.

P.O. BOX 1601, OXNARD, CALIFORNIA 93032
(805) 644-5892 • FAX (805) 654-0720

March 21, 1990

Mr. Joseph G. Damas, Jr.
Manager of Source Control
East Bay Municipal Utility District
P.O. Box 24055
Mail Slot 159
Oakland, CA 94623

Attn: Karen Folks

RE: Discharge Application for
Desert Petroleum 793
dba Beacon
4035 Park Blvd., Oakland

The purpose of this letter is to provide you with the information you require to issue a temporary sewer discharge permit for treated water at the above mentioned location.

I have provided you the following information for your review:

- EBMUD application form
- Site history
- Effluent water analyses for TPH and BTXE
- Plot plan and area plan
- Treatment process
- Maximum discharge rate

Thank you in advance for your assistance.

Sincerely,

Rebecca Coleman-Roush

Rebecca Coleman-Roush
Director of Marketing

RCR:jc

enclosures

EBMUD

Wastewater Discharge Permit Application

PERMIT NUMBER

APPLICANT BUSINESS NAME

Desert Petroleum #793 (dba Beacon)

ADDRESS OF PREMISE DISCHARGING WASTEWATER	BUSINESS MAILING ADDRESS
4035 Park Blvd.	P.O. Box 1601
STREET ADDRESS	STREET ADDRESS
Oakland, CA 94602	Oxnard, CA 93032
CITY ZIP CODE	CITY ZIP CODE

CHIEF EXECUTIVE OFFICER

Dean Jensen	Vice President
NAME	TITLE
P.O. Box 1601	Oxnard, CA 93032
STREET ADDRESS	CITY ZIP CODE

PERSON TO BE CONTACTED ABOUT THIS APPLICATION	PERSON TO BE CONTACTED IN EVENT OF EMERGENCY
John Rutherford	John Rutherford
NAME	NAME
Environmental Manager 805-644-5892	805-644-5892 805-647-0872
TITLE PHONE	DAY PHONE NIGHT PHONE

DOCUMENTATION TO BE RETURNED WITH THE PERMIT APPLICATION:

- ☐ PROCESS DESCRIPTION
- ☐ WATER BALANCE CALCULATIONS
- ☐ WASTEWATER STRENGTH DATA BASE
- ☐ SCHEMATIC FLOW DIAGRAM
- ☐ BUILDING LAYOUT DIAGRAM
- ☐ DESCRIPTION OF PRETREATMENT SYSTEM
- ☐ SELF-MONITORING METHOD
- ☐ SPILL PREVENTION AND CONTAINMENT PLAN
- ☐ A LIST OF ALL ENVIRONMENTAL PERMITS (e.g. Air, Hazardous Waste)
- ☐ OTHER _____ SPECIFY

PROVISIONS

Applicant will comply with the District Wastewater Control Ordinance and all applicable rules and regulations.

Applicant will report to EBMUD, Wastewater Department any changes, permanent or temporary, to the premise or operations that significantly change the quality or volume of the wastewater discharge or deviation from the terms and conditions under which this permit is granted.

CERTIFICATION

I have personally examined and am familiar with the information submitted in this document and attachments. To the best of my knowledge the submitted information is true, accurate and complete.

TYPE OR PRINT

Name Dean Jensen

Title Vice President

Dean E. Jensen
SIGNATURE

12-29-89
DATE

Application to EBMUD

for

Temporary Sewer Discharge Permit

for

Desert Petroleum, Inc.
Station 793
dba Beacon
4035 Park Blvd.
Oakland, CA

RSI - REMEDIATION SERVICE, INT'L
P.O. BOX 1601
OXNARD CA 93032
805-644-3493

March 1990

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Site History

Desert Petroleum, Inc. Station 793 (dba Beacon) is located at 4035 Park Blvd., Oakland, CA. It is a retail gasoline station which has been leased to Mr. Jason Golpad who operates the station under the name of J & M's Beacon Service Station. On November 30, 1989, Desert Petroleum was notified by the Alameda County Health Department (ACHD) that gasoline was leaking into the sewer on Brighton Avenue, near the station.

Desert Petroleum has retained RSI-Remediation Service, Int'l to install remediation equipment to remove the contamination. The station has been shut down during the initial clean up period. RSI proposes to treat the contaminated water and soil at the station, and to discharge the treated water into the sewer. The sewer inlet is located at the station. Water has been pumped and treated at the site. Treated water has been stored in a tank on site pending receipt of a discharge permit.

Effluent Water Analyses

Effluent samples were taken at the site, before and after the carbon. Samples identified as AC were taken after the carbon, samples identified as BC were taken after treatment, but before the carbon. Other analyses samples are identified on the chain of custody. Inlet concentrations are indicated on the 12/14/89 analysis. The analyses follow.

SUPERIOR ANALYTICAL LABORATORY, INC.
1385 FAIRFAX ST., STE. D. • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 51544
CLIENT: REMEDIATION SERVICE, INT'L
CLIENT JOB NO.: 793

DATE RECEIVED: 01/06/90
DATE REPORTED: 01/10/90

ANALYSIS FOR BENZENE, TOLUENE, ETHYL BENZENE & XYLENES
by EPA SW-846 Methods 5030 and 8020

LAB #	Sample Identification	Concentration(ug/L) Benzene	Toluene	Ethyl Benzene	Xylenes
1	AC#1 AM; 1/5/90	0.6	2	ND<0.3	1
2	AC#2 AM; 1/5/90	ND<0.3	ND<0.3	ND<0.3	ND<0.3
3	BC#3 AM; 1/5/90	47000	460000	220000	1400000
4	BC#4 AM; 1/5/90	56000	830000	350000	2000000
5	AC#5 PM; 1/5/90	ND<0.3	1	1	6
6	AC#6 PM; 1/5/90	ND<0.3	0.6	ND<0.3	0.5
7	BC#7 PM; 1/5/90	15000	27000	7800	52000
8	BC#8 PM; 1/5/90	15000	240000	190000	1200000

ug/L - parts per billion (ppb)

Minimum Detection Limit in Water:0.3ug/L

QAQC Summary:

Daily Standard run at 20ug/L: RPD = <15%
MS/MSD Average Recovery = 76% : Duplicate RPD = 8%

Richard Srna, Ph.D.

(FOR)
Laboratory Director

SUPERIOR ANALYTICAL LABORATORY, INC.
1385 FAIRFAX ST., STE. D. • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

C E R T I F I C A T E O F A N A L Y S I S

LABORATORY NO.: 51544
CLIENT: REMEDIATION SERVICE, INT'L
CLIENT JOB NO.: 793

DATE RECEIVED: 01/06/90
DATE REPORTED: 01/10/90

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS
by Modified EPA SW-846 Method 5030 and 8015

LAB #	Sample Identification	Concentration (mg/L) Gasoline Range
1	AC#1 AM; 1/5/90	ND<0.1
2	AC#2 AM; 1/5/90	ND<0.1
3	BC#3 AM; 1/5/90	22000
4	BC#4 AM; 1/5/90	24000
5	AC#5 PM; 1/5/90	0.2
6	AC#6 PM; 1/5/90	ND<0.1
7	BC#7 PM; 1/5/90	1800
8	BC#8 PM; 1/5/90	14000

mg/L - parts per million (ppm)

Minimum Detection Limit for Gasoline in Water:0.1mg/L

QAQC Summary:

Daily Standard run at 2mg/L: RPD Gasoline = <15%
MS/MSD Average Recovery = 101%: Duplicate RPD = 7%

Richard Srna, Ph.D.

Laboratory Director

51544

SAMPLE CHAIN OF CUSTODY

SUBMITTED BY:

COMPANY: REMEDIATION SERVICE INT'L

CONTACT NAME: REBECCA ROUSH

ADDRESS: P.O. BOX 1601 - OXNARD, CA 93032

PHONE: (805) 644-5892

PROJECT #: 793

PROJECT NAME: DESERT - OAKLAND

SAMPLER (Print & Sign Name): ABRAHAM I ALEJANDO

CCAS LAB #	SAMPLE IDENTIFICATION (ID #, location, matrix)	DATE/TIME COLLECTED	# of ITEMS	PRESERVE	ANALYSIS REQUESTED: TPH 8015 Mod	BTXE 8020
	AC #1 AM	1-5-90 12:00 N	1	NO	X	X
	AC #2 AM	1-5-90 12:00 N	1	NO	X	X
	BC #3 AM	1-5-90 12:00 N	1	NO	X	X
	BC #4 AM	1-5-90 12:00 N	1	NO	X	X
	AC #5 PM	1-5-90 6:00 PM	1	NO	X	X
	AC #6 PM	1-5-90 6:00 PM	1	NO	X	X
	BC #7 PM	1-5-90 6 PM	1	NO	X	X
	BC #8 PM	1-5-90 6 PM	1	NO	X	X

REMARKS:

TPH 8015 TEST TO 50 PPB - BTXE 8020 5 PPB

24 HOUR TURN

SAMPLE RELINQUISHED BY:	DATE/TIME	RECEIVED BY:	DATE/TIME
James C Myers	1-6-90 945		1-6 945

COC1.WR1/8806

SUPERIOR ANALYTICAL LABORATORY, INC.
1385 FAIRFAX ST., STE. D. • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 51541
CLIENT: Remediation Services

DATE RECEIVED: 12/30/89
DATE REPORTED: 01/02/89
JOB NO.: DP793

ANALYSIS FOR VOLATILE PETROLEUM HYDROCARBONS
by Modified EPA SW-846 Method 8015

#	Sample Identification	Concentration (mg/l) Lab Gasoline Range
1	01	0.5
2	02	0.08
3	03	0.8
4	04	0.6
5	05	0.06
6	06	ND<0.05
7	99	**

mg/l = part per million (ppm)
Minimum Detection Limit for Gasoline in water = 0.05 mg/l

** sample was outside calibration range as is being rerun. data will be reported as soon as it becomes available

Richard [illegible], Ph.D.
Laboratory Director

OUTSTANDING QUALITY AND SERVICE

SUPERIOR ANALYTICAL LABORATORY, INC.
1385 FAIRFAX ST., STE. D. • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 51541
CLIENT: Remediation Service
JOB NO.: DF793

DATE SAMPLED: 12/30/89
DATE ANALYZED: 01/01/90
DATE REPORTED: 01/02/90

ANALYSIS FOR BENZENE, TOLUENE, ETHYL BENZENE & XYLENES
by EPA SW-846 Methods 5030 and 8020

		Concentration (ug/l)			
LAB#	CLIENT ID	Benzene	Toluene	Ethyl Benzene	Xylenes
1	01	59	64	4	21
2	02	2	1	1	4
3	03	110	120	7	38
4	04	100	110	6	30
5	05	0.3	0.4	ND<0.3	0.7
6	06	ND<0.3	ND<0.3	ND<0.3	0.3
7	99	**	**	**	**

ug/l = part per billion (ppb)
Minimum Detection Limit for BTXE in water = 0.3 ug/l
QA/QC Summary:
Daily standards run at 20 ug/L; RPD = <15%
MS/MSD: Average Recovery = **; Duplicate RPD = **

** data not available at this time. It will be added to the final report as soon as it becomes available.

Richard Srna, Ph.D.
Laboratory Director

RSI PO BOX 1041 [illegible]

CHAIN OF CUSTODY RECORD

PROJ. NO.	PROJECT NAME	P.O.#
	DP 793	

SAMPLERS. *(Signature)* mike Sulka

Superior Analytical Inc.
1385 Fairfax, Suite D
San Francisco, CA 94124
(415) 647-2081

SAMPLE I.D.	DATE	TIME	COMP.	GRAB	SAMPLE LOCATION	MEDIA	TPH (gasoline)	BTXE	DETECTION LIMIT	TURN-AROUND TIME	SUSPECTED CONTAMINANT
01	12-29	1615		X	SAVE OUTLET	H_2O LIQ	X	X		~~LAST WEEK~~ 24 hr	GASOLINE
02	12-29	1647		X	CARBON OUTLET	H_2O LIQ	X	X		↓	↓
03	12-30	0917		X	SAVE OUT	H_2O LIQ	X	X		↓	↓
04	12-30	0918		X	SAVE OUT DUPLICATE	H_2O LIQ	X	X		↓	↓
05	12-30	09:28		X	CARBON OUT	H_2O LIQ	X	X		↓	↓
06	12-30	0930		X	CARBON OUT DUPLICATE	H_2O LIQ	X	X		↓	↓
99	12-29	16:24		X	WELL WATER		X	X	—	NORMAL	—

Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*	Relinquished by: *(Signature)*	Date / Time	Received by: *(Signature)*
mike Sulka	12/30/89 11:07	Received for Laboratory by: *(Signature)* Dalzely 12/30/89	Date / Time: 12/30/89 11:07	Remarks: ice chest	

-6-

SUPERIOR ANALYTICAL LABORATORY, INC.

1385 FAIRFAX ST., STE. D. • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 51478
CLIENT: REMEDIATION SERVICE, INT'L
CLIENT JOB NO.: N/A

DATE RECEIVED: 12/14/89
DATE REPORTED: 12/22/89

ANALYSIS FOR TOTAL PERTROLEUM HYDROCARBONS
by Modified EPA SW-846 Method 8015

LAB #	Sample Identification	Concentration (mg/kg) Gasoline Range
1	RS-1; 5' 12/11/89	16
2	RS-1;10' 12/11/89	33
3	RS-1;15' 12/11/89	ND<1
7	RS-2; 5' 12/11/89	ND<1
8	RS-2;10' 12/11/89	11
9	RS-2;15' 12/11/89	ND<1
15	RS-5; 5' 12/12/89	ND<1
16	RS-5;10' 12/12/89	ND<1
17	RS-5;15' 12/12/89	ND<1
20	RS-5;30' 12/13/89	1600
21	RS-5;35' 12/13/89	ND<1
23	RS-6; 5' 12/13/89	ND<1
24	RS-6;10' 12/13/89	ND<1
25	RS-6;15' 12/13/89	ND<1
28	RS-6;30' 12/13/89	ND<1

mg/kg - parts per million (ppm)

Minimum Detection Limit for Gasoline in Soil: 1mg/kg
Minimum Detection Limit for Gasoline in Water: 0.1mg/L

QAQC Summary:

Daily Standard run at 2mg/L: RPD Gasoline =2%
MS/MSD Average Recovery =106%: Duplicate RPD =0%

Richard Srna, Ph.D.

FOR
Laboratory Director

SUPERIOR ANALYTICAL LABORATORY, INC.

1385 FAIRFAX ST., STE. D. • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 51478
CLIENT: REMEDIATION SERVICE, INT'L
CLIENT JOB NO.: N/A

DATE RECEIVED: 12/14/89
DATE REPORTED: 12/22/89

ANALYSIS FOR TOTAL PETROLEUM HYDROCARBONS
by Modified EPA SW-846 Method 5030 and 8015

LAB #	Sample Identification	Concentration (mg/kg) Gasoline Range
4	RS-1;20' 12/11/89	ND<1
5	RS-1;25' 12/12/89	10
6	RS-1;30' 12/12/89	ND<1
10	RS-2;20' 12/11/89	ND<1
11	RS-3; 5' 12/11/89	ND<1
12	RS-3;10' 12/11/89	ND<1
13	RS-4; 5' 12/12/89	50
14	RS-4;10' 12/12/89	8
18	RS-5;20' 12/13/89	530
19	RS-5;25' 12/13/89	4
22	RS-5;40' 12/13/89	1
26	RS-6;20' 12/13/89	ND<1
27	RS-6;25' 12/13/89	ND<1
29	RS-6;35' 12/13/89	ND<1
30	SB-1; 12/14/89	130
31	SB-2; 12/14/89	370
32	RS-1; 12/14/89	19 WATER
33	RS-5; 12/14/89	57
34	RS-6; 12/14/89	11

(mg/L) / (mg/kg) - parts per million (ppm)

Minimum Detection Limit for Gasoline in Soil: 1mg/kg
Minimum Detection Limit for Gasoline in Water:0.1mg/L

QAQC Summary:

Daily Standard run at 2mg/L: RPD Gasoline = <15%
MS/MSD Average Recovery = 95%: Duplicate RPD = 5%

Richard Srna, Ph.D.

Laboratory Director

SUPERIOR ANALYTICAL LABORATORY, INC.

1385 FAIRFAX ST., STE. D. • SAN FRANCISCO, CA 94124 • PHONE (415) 647-2081

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 51478
CLIENT: REMEDIATION SERVICE, INT'L
CLIENT JOB NO.: N/A

DATE RECEIVED: 12/14/89
DATE REPORTED: 12/22/89

ANALYSIS FOR BENZENE, TOLUENE, ETHYL BENZENE & XYLENES
by EPA SW-846 Methods 5030 and 8020

LAB #	Sample Identification	Concentration(ug/kg) Benzene	Toluene	Ethyl Benzene	Xylenes
4	RS-1;20' 12/11/89	ND<3	8	ND<3	ND<3
5	RS-1;25' 12/12/89	56	120	41	130
6	RS-1;30' 12/12/89	ND<3	12	ND<3	ND<3
10	RS-2;20' 12/11/89	ND<3	17	ND<3	ND<3
11	RS-3; 5' 12/11/89	ND<3	43	ND<3	8
12	RS-3;10' 12/11/89	ND<3	20	ND<3	ND<3
13	RS-4; 5' 12/12/89	780	3400	740	4100
14	RS-4;10' 12/12/89	250	940	170	920
18	RS-5;20' 12/13/89	1500	8400	3900	22000
19	RS-5;25' 12/13/89	700	420	58	260
22	RS-5;40' 12/13/89	36	69	9	43
26	RS-6;20' 12/13/89	17	7	ND<3	15
27	RS-6;25' 12/13/89	9	11	ND<3	ND<3
29	RS-6;35' 12/13/89	5	7	ND<3	6
30	SB-1; 12/14/89	460	3600	1000	7600
31	SB-2; 12/14/89	1100	13000	4400	29000
32	RS-1; 12/14/89	2600	2700	200	1200
33	RS-5; 12/14/89	3100	4300	670	3400
34	RS-6; 12/14/89	1400	1700	160	860

WATER

(ug/L) / (ug/kg) - parts per billion (ppb)

Minimum Detection Limit in Soil: 3.0ug/kg
Minimum Detection Limit in Water:0.3ug/L

QAQC Summary:

Daily Standard run at 20ug/L: RPD = <15%
MS/MSD Average Recovery = 92% : Duplicate RPD = 3%

Richard Srna, Ph.D.
Laboratory Director

BRIAN MOSSMAN
RSI
P.O. BOX 1601
OXNARD, CA 93032

FOR DESERT PET. #793
OAKLAND, CA

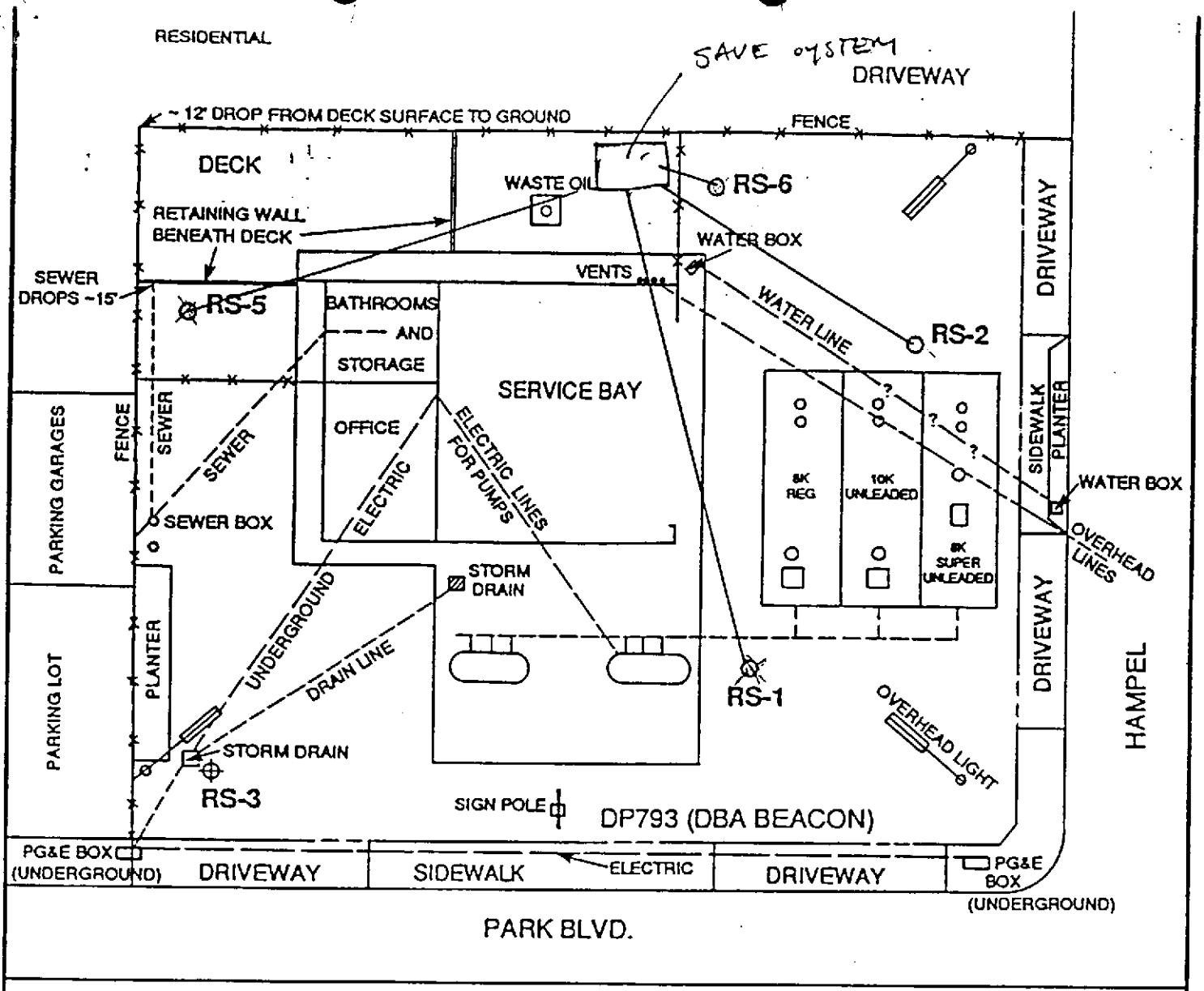
CHAIN OF CUSTODY

SAMPLE	DATE/TIME	SOIL	WATER	# OF CONTAINERS	ANALYSIS TPH (GAS)	ANALYSIS BTXE
RS-1 5'	12-11-89	X		1	X	
RS-1 10'	12-11-89	X		1	X	
RS-1 15'	12-11-89	X		1	X	
RS-1 20'	12-11-89	X		1	X	X
RS-1 25'	12-12-89	X		1	X	X
RS-1 30'	12-12-89	X		1	X	X
RS-2 5'	12-11-89	X		1	X	
RS-2 10'	12-11-89	X		1	X	
RS-2 15'	12-11-89	X		1	X	
RS-2 20'	12-11-89	X		1	X	X
RS-3 5'	12-11-89	X		1	X	X
RS-3 10'	12-11-89	X		1	X	X
RS-4 5'	12-12-89	X		1	X	X
RS-4 10'	12-12-89	X		1	X	X
RS-5 5'	12-12-89	X		1	X	
RS-5 10'	12-12-89	X		1	X	
RS-5 15'	12-12-89	X		1	X	
RS-5 20'	12-13-89	X		1	X	X
RS-5 25'	12-13-89	X		1	X	X
RS-5 30'	12-13-89	X		1	X	
RS-5 35'	12-13-89	X		1	X	
RS-5 40'	12-13-89	X		1	X	X
RS-6 5'	12-13-89	X		1	X	
RS-6 10'	12-13-89	X		1	X	
RS-6 15'	12-13-89	X		1	X	
RS-6 20'	12-13-89	X		1	X	X
RS-6 25'	12-13-89	X		1	X	X
RS-6 30'	12-13-89	X		1	X	
RS-6 35'	12-13-89	X		1	X	X
SP-1	12-14-89	X		1	X	X
SP-2	12-14-89	X		1	X	X
RS-1	12-14-89 10:20		X	2	X	X
RS-5	12-14-89 10:45		X	2	X	X
RS-6	12-14-89 10:20		X	2	X	X

RELEASED BY BRIAN MOSSMAN TO PAULA STEWART OF EXPRESS-IT COURIERS FOR TRANSPORT TO SUBURBAN LAB ON 12-14-89 AT 12:45

Plot Plan

The site plot plan shows the equipment location. A vicinity map is also enclosed for review. The only sewer connection will be at the station. We do not propose a connection to the Brighton Sewer.



PLOT PLAN
DESERT PETROLEUM STATION NO. 793
OAKLAND, CALIFORNIA

Prepared for

DESERT PETROLEUM
VENTURA, CALIFORNIA

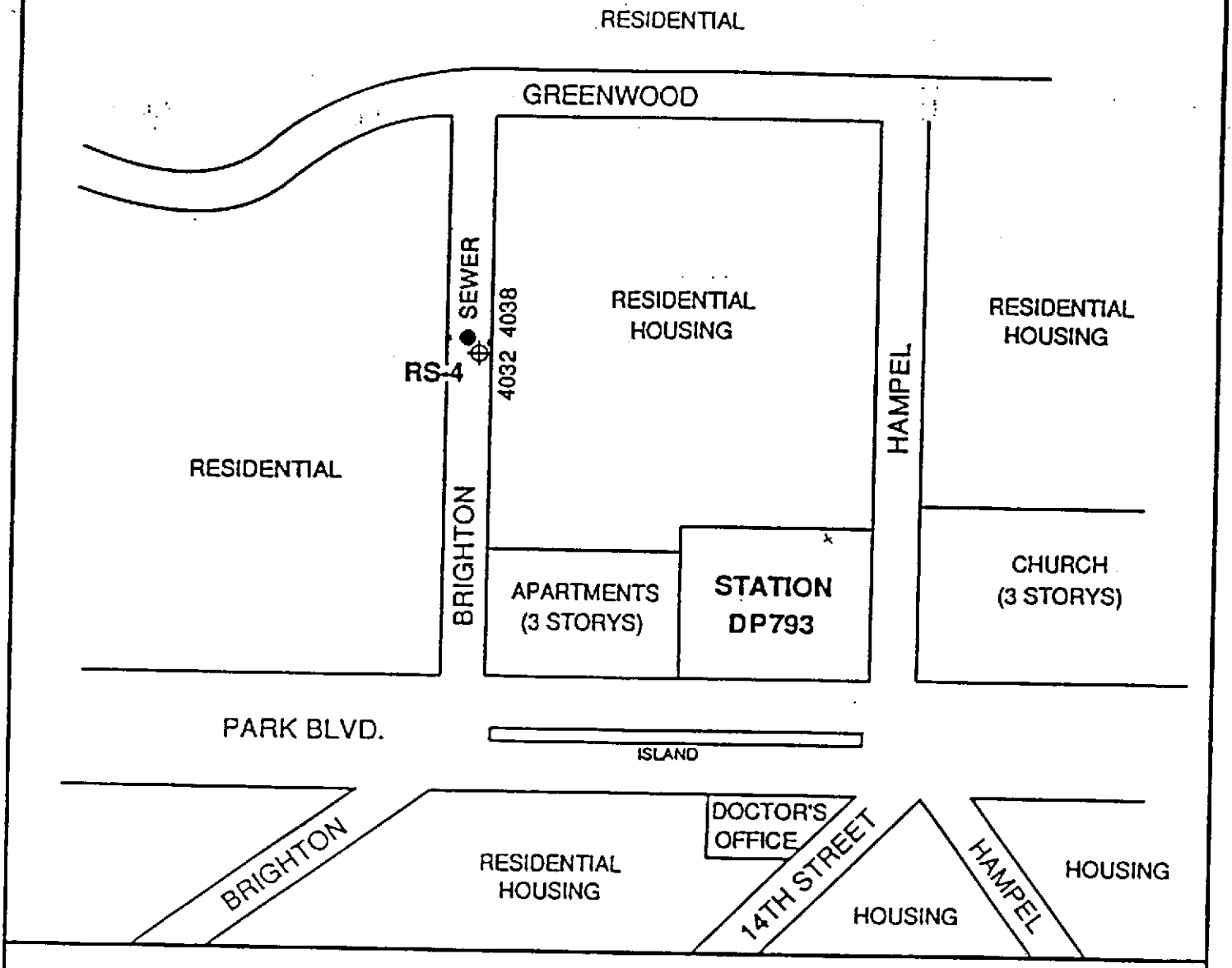
EXPLANATION

RS-4 ⊕ RSI Boring (12/89)

RS-6 ○ RSI Monitoring Well (12/89)

0 20 40

SCALE IN FEET



VICINITY MAP

DESERT PETROLEUM STATION NO. 793
OAKLAND, CALIFORNIA

Prepared for

DESERT PETROLEUM
VENTURA, CALIFORNIA

EXPLANATION

RS-4 ⊕ RSI Boring (12/12/89)

SCALE UNKNOWN

Treatment Process

An equipment operation description follows. A system schematic and flow chart are also included for review.

RSI S.A.V.E. SYSTEM
Equipment Operation and Process Description

Soil and Water Remediation

The RSI S.A.V.E. (Spray Aeration Vacuum Extraction) System has been designed to solve the problem of gasoline contamination in soil and ground water. The system utilities several remediation technologies that remove petroleum hydrocarbons from the contaminated subsurface and uses the reclaimed gasoline as fuel for the remediation process. The process includes a four cylinder internal combustion engine which operates on the gasoline vapors and an auxiliary fuel, either natural gas or propane.

The system use three remediation technologies. Each will be discussed in this process description. The technologies are:

- Vacuum extraction to remove gasoline vapors from the soil
- Spray aeration to separate the gasoline from the water
- Combustion in the internal combustion engine and catalytic converter to destroy the gasoline vapors.

Vacuum Extraction

Vacuum extraction is used primarily to extract the gasoline vapors from the soil. A recovery well or similar structure is installed in the contaminated area. A vacuum powered by a vacuum pump is placed on the recovery well, which causes the gasoline hydrocarbons to volatilize and flow with the air into the engine, where combustion occurs.

Spray Aeration

The contaminated water is pumped into the spray aerator water tank at a maximum rate of 10 gpm, where it is sprayed through one pair of nozzles into the tank chamber. This process promotes vaporization of the gasoline. Volatilization of the gasoline occurs; then the water falls to the bottom of the tank and the gasoline vapors travel to the engine where they are burned. Water is recirculated at a rate of 130 gpm. First this water is heated, then reintroduced into the tank through another pair of spray nozzles. Contamination reduction is 80% to 90% per cycle.

As the water level rises from the influx of well water, a float triggers the discharge of the treated water. To determine the level of reduction of the contaminates, the water is sampled prior to treatment and at the system discharge point. Treated water is passed through activated granular carbon before final discharge.

Combustion

Gasoline vapors from the soil and treated ground water enter the internal combustion engine, where they are burned during combustion. They represent a portion of the fuel required to operate the engine. An auxiliary fuel source is required, either natural gas or propane, to make up the difference between the engine fuel requirements and the available gasoline vapors from the remediation process. A three way automotive catalytic converter is used to complete combustion and control hydrocarbon emissions to the atmosphere.

Safety

The following safety elements have been designed into the system:

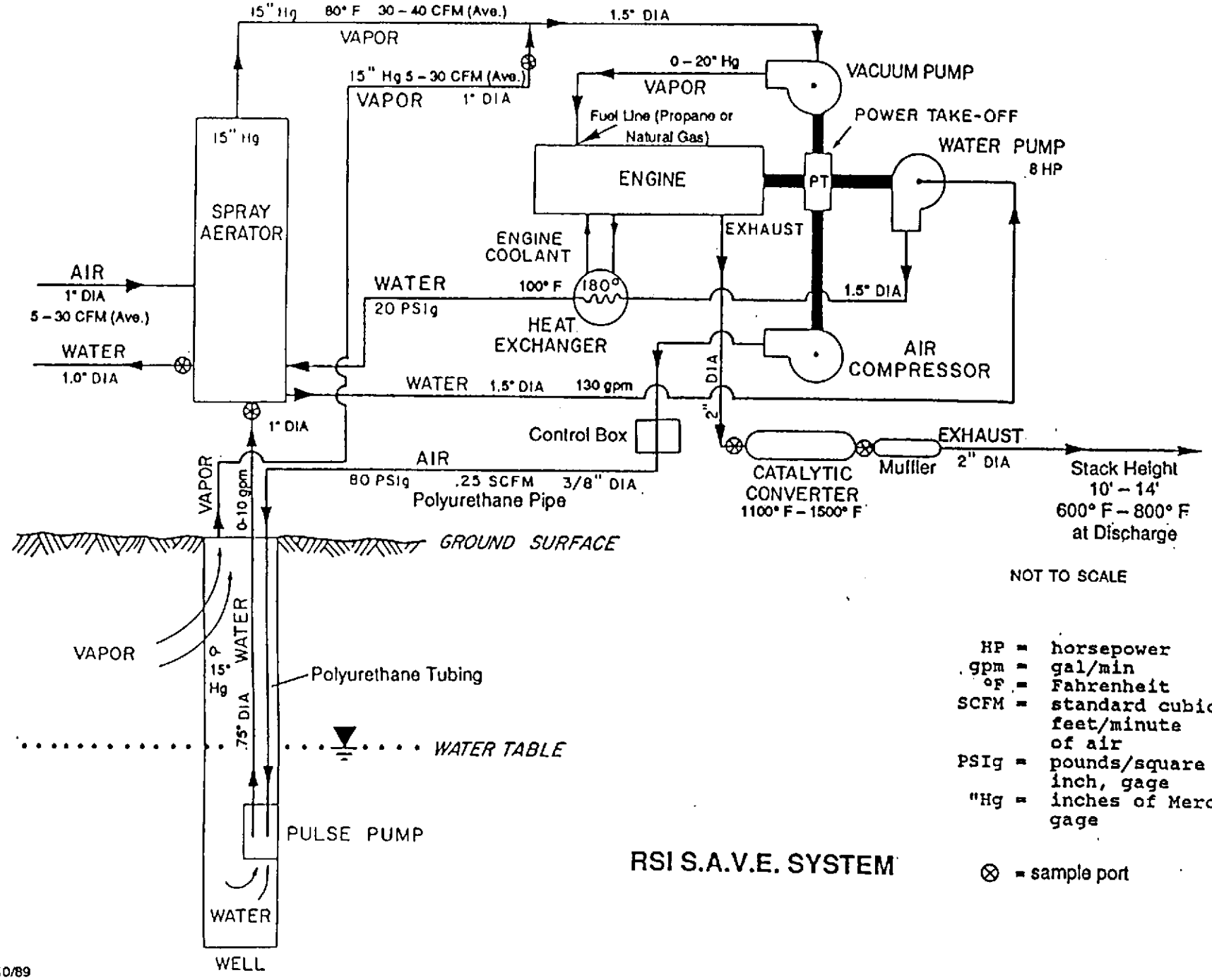
Leaks: The entire system operates under a vacuum until the gasoline vapors enter the cylinders of the engine for combustion. As a result of this arrangement, any leaks of seals or connections are into the system. No hydrocarbons escape to the atmosphere.

Automatic Shut Off: The engine provides the power for all other system equipment, the entire system will stop if the engine stops, thus preventing any uncontrolled releases. In addition, the engine has shut off devices which are triggered by low oil pressure, loss of vacuum or engine overheating.

Well connections: The hoses connecting the wells to the equipment are installed within underground conduit.

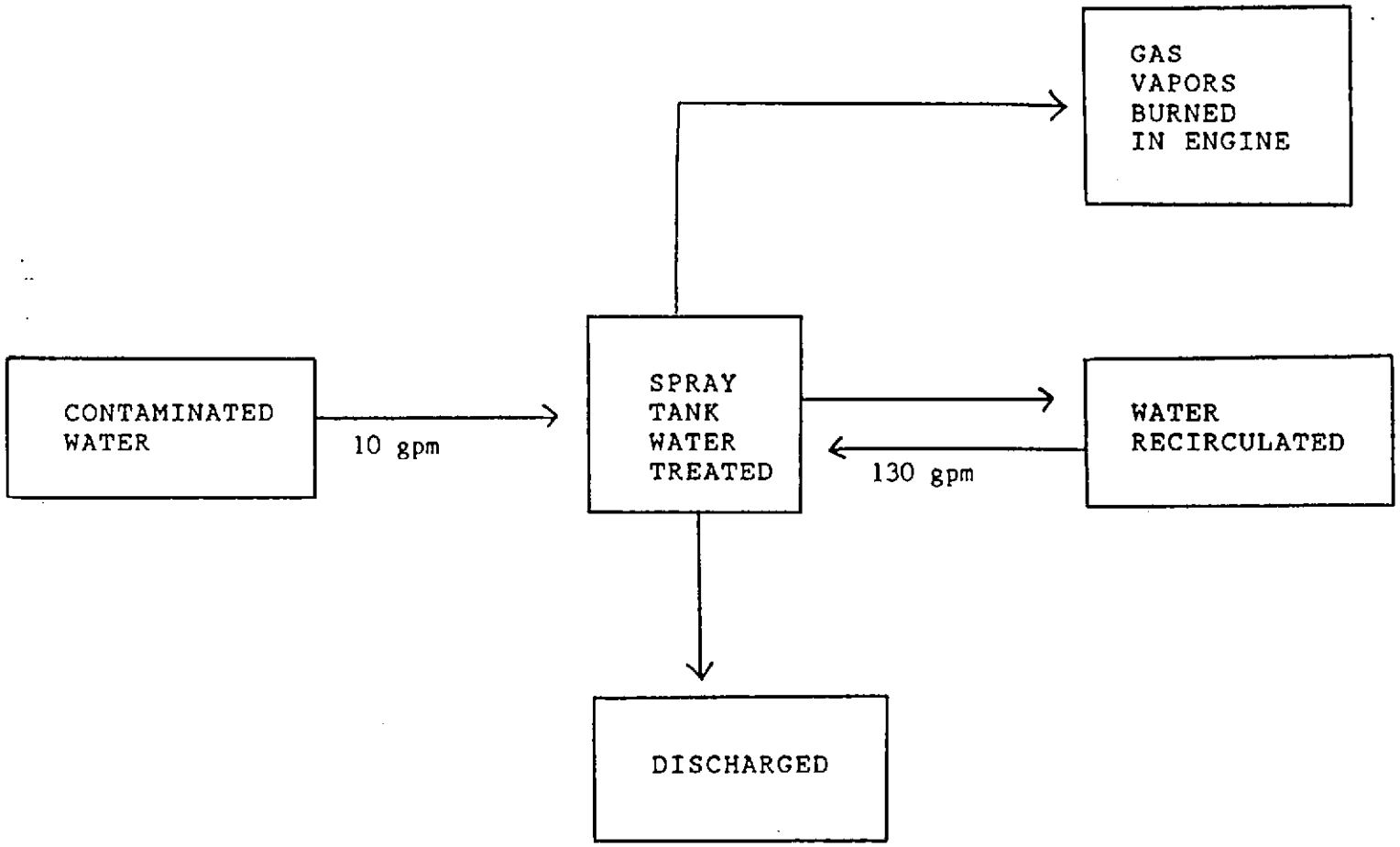
Safety enclosure: All equipment will be enclosed in a fenced, covered compound, to prevent tampering with the equipment.

03/90



RSI S.A.V.E. SYSTEM

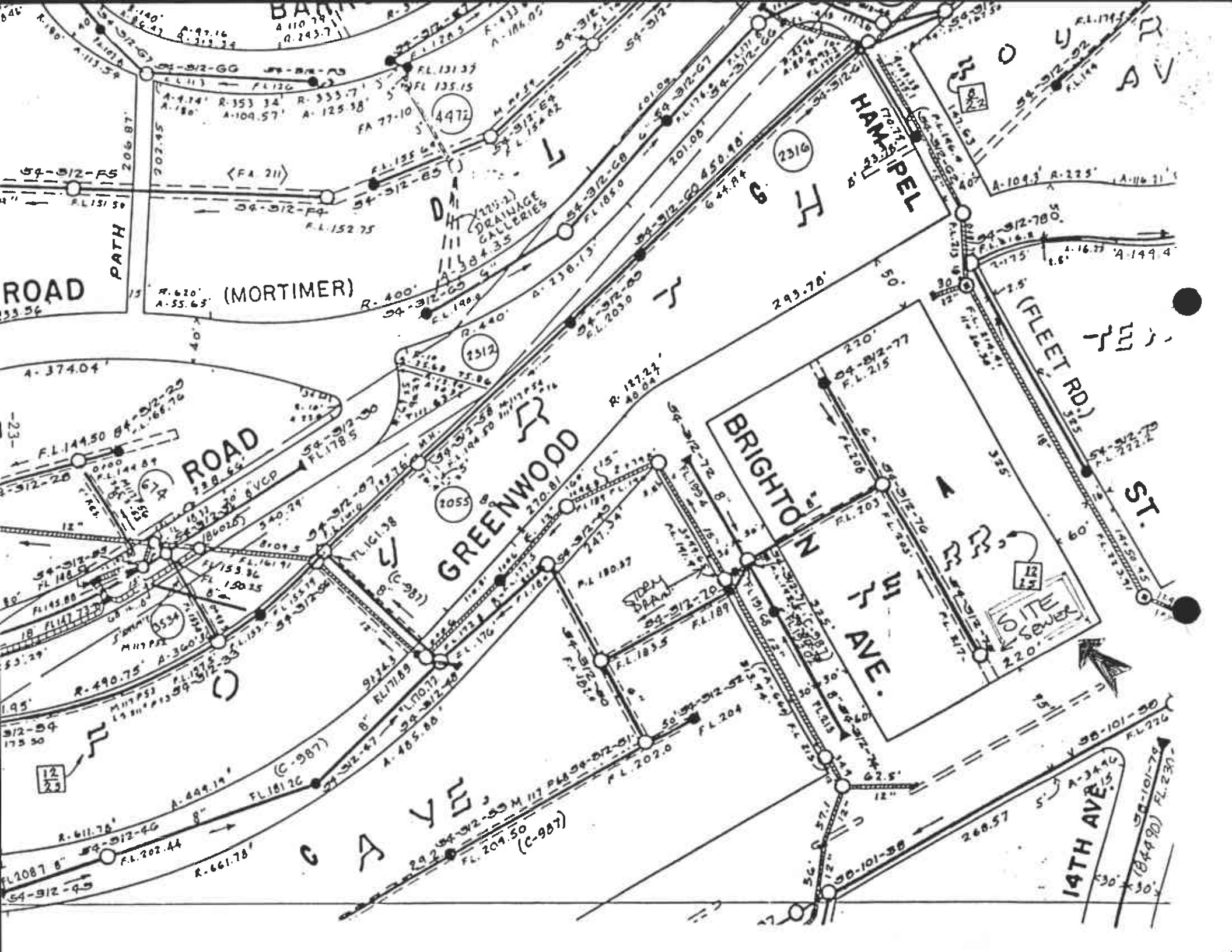
10/89


GAS
VAPORS
BURNED
IN ENGINE
CONTAMINATED
WATER
10 gpm
SPRAY
TANK
WATER
TREATED
130 gpm
WATER
RECIRCULATED
DISCHARGED

Maximum Discharge Rate

The maximum amount of treated water is 14,400 gallons per day. The system can exhaust a maximum of 10 gpm, and discharge at the same rate.

The sewer map is enclosed, to identify the discharge locations.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BRIGHTON
AVE.
HAMPEL
(FLEET RD.)
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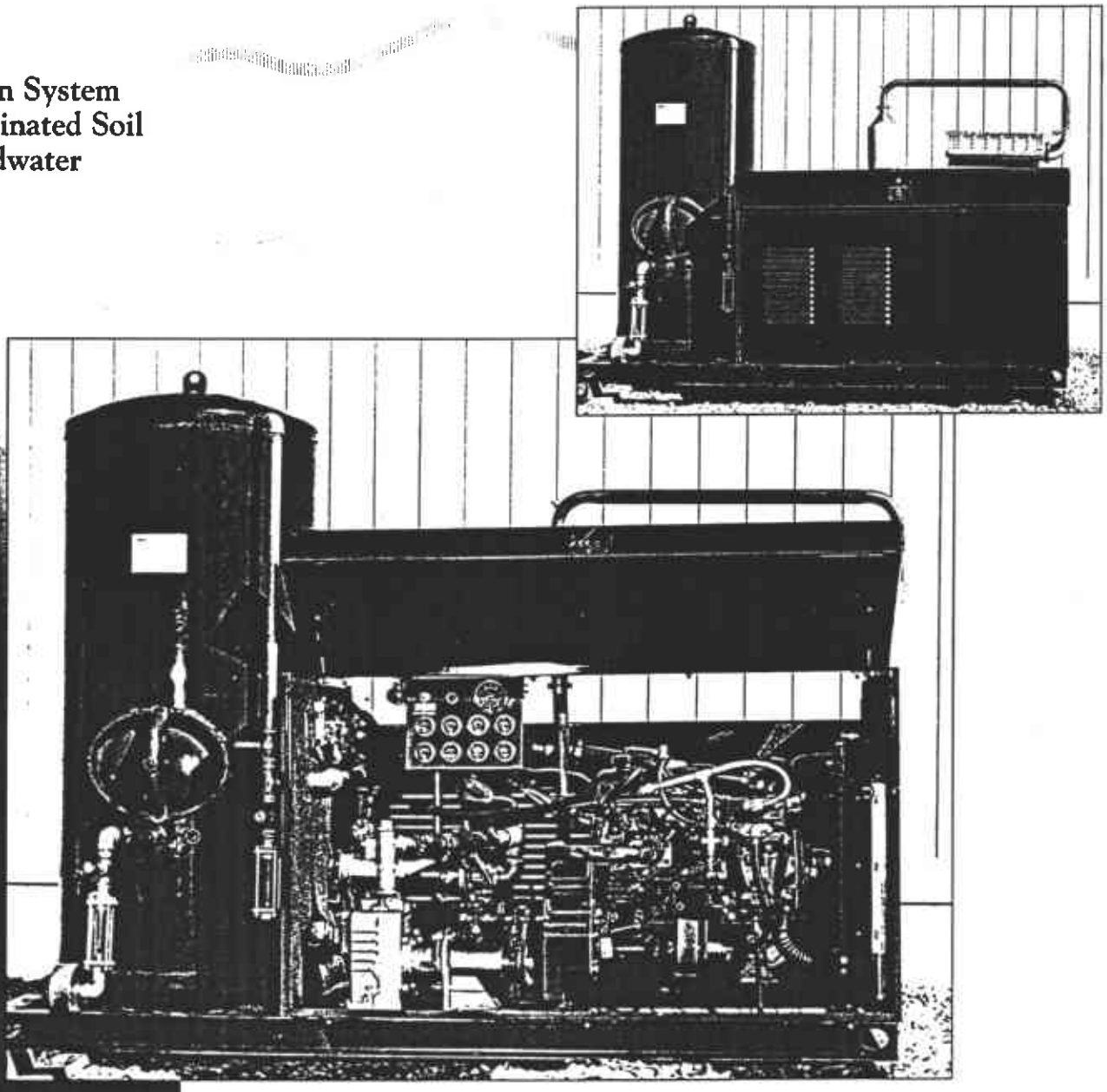
THE S.A.V.E. SYSTEM

Remediation System
for Contaminated Soil
and Groundwater



REMEDIATION SERVICE, INT'L.

Remediation Equipment • Environmental Services

BIOAUGMENTATION OF GASOLINE CONTAMINATED SOILS

Soils tested at the site show only slight contamination around the sewer lines, and the lines from the tanks. This is due to the very tight nature of the adjacent soils and the high moisture contents. With such conditions, vapor extraction is a very effective means for cleaning up very porous backfill as seen at this site. The only limits are the radius of influence around the extraction points. Our previous report documents the migration of the gasoline along the piping trenches and down the sewer runs toward Brighton Street. Removal of hydrocarbons to date have been high at both ends of our recovery setup. However, with no new source of contamination, the main vapor recovery unit at the site is showing decreasing flow rates. Gasoline migrating down the sewer pipeline has diminished, and the lower vapor system is also showing lower flow rates.

Alternative and enhance methods have been investigated for possible use. Of these, additional well points along the pipeline, and excavation of the soils have been ruled out, the reasons being lack of egress, exposure of vapors to area, elevation differentials, possible minor migration routes not detectable with excavation, and high costs.

Bioaugmentation, on the other hand, will deliver effective treatment to the complete spill site. The culture formulas are supplied in a dry form. They become fully activated when presoaked for four to twelve hours in lukewarm (80-100° F) water,

which would be provided by the S.A.V.E. System. Two gallons of water per pound of culture are mixed and added at the upstream point of contamination. Batches of solution are safe to use in this environment (see attached data) and cultures are packed in 25 pound containers for easy mixing. A sufficient quantity will be mixed based on SOLMAR's recommendation and will be repeated at 30 days. Testing, using hand augers, along the piping runs will track progress, and provide data for migration rates and effectiveness.

The attached data sheets provide information on similar uses of the SOLMAR bioaugmentation program.

SOLMAR CORP.

January 03, 1990

Mr. Rick Jirsa
2242 Santa Anita
Norco, California 91760

Dear Mr. Jirsa:

Thank you for your telephone call. Enclosed are some literature pieces which you will find of interest.

Solmar Corp. is a complete operation with Administration, Sales, Research and Development, Technical Service and Production all located at Orange, California.

Solmar's staff and associates offer more than 50 years of practical field experience. Most of all the know-how, application techniques, accepted theories of mechanisms and formulation wherewithal for bioaugmentation were developed by persons associated with our organization.

If you have any questions or need additional information, please let us know.

We would welcome the opportunity of working with you.

Very truly yours,

SOLMAR CORP.

Barry A. Molnaa
Technical Director

BAM:ls

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625 W. Katella Ave., Suite 5, Orange, California 92667 • (714) 538-0881

WHY USE BIOAUGMENTATION?

Although man has used various biological processes for centuries in making beer, cheese, and wines, it has only been during the last century that most of the microbial processes have been understood. The value of seeding with specific organisms to maintain consistent, uniform high quality, rather than relying on organisms there by happenstance, has now been accepted by the food, beverage, pharmaceutical and chemical industries. The use of bioaugmentation in pollution control has grown over the past twenty-five years.

In many biological wastewater treatment systems, ubiquitous bacteria can sufficiently degrade the wasteproducts. However, systems are frequently subjected to unusual compositions, heavy organic loadings, inconsistent loading or those beyond design capabilities. Problems develop, and bacterial supplementation can provide effective solutions.

Many facilities have found bioaugmentation invaluable to:

- Improve BOD_5 removals
- Increase settleability
- Lower sludge volumes
- Control hydrogen sulfide emissions
- Eliminate grease mats
- Give consistent, predictable performance
- Prevent blockages within lines
- Restore percolation in fields and seepage pits
- Accelerate startups and recoveries from upsets
- Breakdown organic accumulations
- Provide onsite detoxification of troublesome organic compositions
- Reduce chemical needs
- Lower defoamer costs
- Extend life expectancy of treatment facilities
- Abate offensive odors
- Eliminate costs and headaches associated with noncompliance
- Reduce energy requirements

USING ADVANCED BIO CULTURES FORMULATIONS

The culture formulations are supplied in dry form. They become fully activated when presoaked for four to twelve hours in lukewarm (80°F to 100°F) water with eight hours being ideal. Two gallons of either tap water or wastewater are used for each pound of cultures formulation. If the wastestream is cool, the slurry should be cooled to the approximate temperature of the wastestream during the presoak to avoid thermal shock. The slurry should be stirred occasionally during presoaking.

After presoaking the cultures slurry should be added as far upstream as practical. Introduction within the interceptor system has proven effective in pretreating the wastestream ahead of the treatment plant itself. Additions should in any event be ahead of primary clarification.

For lagoon applications the slurry should be applied over the surface of the entire lagoon.

Where liftstations are being treated, applications should be made through manholes upstream from the station itself.

A NATURAL MEANS OF TREATING ORGANIC WASTES

From the oceans through the energy of the sun, life began with the creation of organic chemical molecules. The first orders of life were single celled organisms. Bacteria can lay claim to being one of the most successful representatives of life on our planet. Man's existance has been short compared to their own of some $3\frac{1}{2}$ billion years.

Over these millions and millions of years, life has begun and ended time and time again. Nature has wisely chosen plans to continually renew and recycle, rather than merely accumulate organic matter through the means of microbial processes. Scientists refer to these processes as element cycles, there being a nitrogen cycle, a carbon cycle, a sulfur cycle and the like.

Fortunately to carry out this work, microbial life abounds. In fact, it has been estimated that the combined weight of microbial cells on earth is about twenty-five times that of the earth's animal life. So obviously only a minute proportion is not beneficial.

Their size is incredibly small. One cubic inch of pure typical bacteria would contain over nine trillion organisms. Yet, they have continued to effectively cleanse our planet.

In the large population areas of developed countries, wastewater treatment plants have been built to enhance the efficiency of biodegradation processes and thereby minimize the harmful effect of pollution to streams, lakes and adjacent areas. Wastewater treatment is man's largest use of biological processes.

THE STANDARD OF THE INDUSTRY

Advanced Bio Cultures formulations are based upon natural occurring bacteria, which have been specifically selected and carefully matched to give outstanding performance. Through extensive quality control methods, individual organisms are grown in pure form, preserved, and then combined. This minimizes any unwanted contaminants that would interfere with the desired organisms. This accounts for the superior organic breakdowns by the **Advanced Bio Cultures** formulations over ubiquitous organisms and competitive products.

Individual organisms have been chosen by their ability to work in concert with their counterparts in handling the complex array of compositions usually present in wastestreams, particularly phenols, oils, greases, hydrocarbons, pesticides and tars, and to reduce them to harmless end products. Formulations have been designed for use in existing facilities.

Solmar Corp. offers several different formulations. These have been tailored to effectively give better organic breakdowns in a variety of industrial wastestreams as well as domestic sewage. No single formulation can possibly deal with all wastestreams as well as domestic sewage. There are numerous, complex interrelationships between the multitude of organisms necessary to complete the task of giving acceptable cleanup. These interrelations may even change depending upon the chemical compositions present within a given system.

The organisms used in the **Advanced Bio Cultures** formulations are primarily facultative organisms which can be used under both aerobic and anaerobic conditions. None of the organisms are capable of generating hydrogen sulfide under anaerobic conditions.

SOLMAR CORP.

TREATMENT OF CONTAMINATED SOILS

The use of Solmar Advanced Bio Cultures in bioaugmentation programs has proven to be a very cost effective means of dealing with many environmental problems. Of special note is the increasing use of our cultures for on site treatment of soil contamination involving diesel fuel and other petrochemical products.

The following outlines details on typical treatment requirements for 1,000 cubic yards of diesel contaminated soil (average contamination of 2,500 ppm). Should there be a question of inhibition caused by any other contaminants present, a representative 1 lb soil sample should be sent to our lab for a toxicity test for which there is no charge.

A sufficient quantity of fertilizer has to be added and thoroughly mixed with the contaminated soil to furnish 100 pounds of nitrogen per 1,000 cubic yards of soil. This means that 650 pounds of 15-15-15 fertilizer would be required for each 1,000 cubic yards of a project. Fertilizer with higher numbers are available, but may not be water soluble. This should be checked out with the local suppliers in your area.

After the fertilizer has been added and thoroughly mixed in, necessary water should be added to bring total moisture content to at least 20, but not higher than 80 percent of saturation levels. After waiting two days, the initial inoculation dosage of 50 pounds of our L-104 cultures premixed with water at a ratio of one pound to at least two gallons of water should be soaked for at least four to six hours before application. Two weeks after the initial inoculation, another 25 pounds of presoaked cultures is to be added and mixed into the soil.

Thirty days after this, another application of 25 pounds of presoaked cultures is to be added and mixed into the soil. The foregoing dosage rates are designed for optimum degradation. Mixing and tilling is to be done at least once a week to allow the fastest degradation, since tilling not only aerates but maximizes the interface contact of the cultures with the contaminants. Mixing and moisture level maintenance will be required from here on until designated degradation levels are achieved.

- Solmar Advanced Bio Cultures are packaged in 25 pound quantities in heavy duty plastic pails. Total product required to treat 1,000 cubic yards is 100 pounds of our L-104 formulation.

As a result of the many successful projects that have used our ABC Cultures, we truly feel that bio-remediation offers the most cost effective means of dealing with soil cleanups and welcome the opportunity of working with you on them.

While this procedure outlines a typical project, most situations are site specific. Please call us to discuss variables such as type of contamination, degree of contamination, expected level to be achieved, soil types, or anything unique.

If bioremediation is of interest, but for one reason or another the "land farming technique" presents some problems, we may be able to suggest other approaches as a solution to your site.

625 West Katella Ave., Suite 5, Orange, CA 92667 • (714) 538-0881

SOUTH BAY

Los Angeles Times

Sunday, October 11, 1987

Oil-Gobbling Bacteria Clean Soil at Site of Park in Carson

By GEORGE STEIN, *Times Staff Writer*

"Pacmen"—mobile little mouths that gobble as they go—is what Carson Mayor Kay Calas calls the billions of bacteria that are helping the city turn an oil-contaminated field into a park.

The bacteria—specially cultured strains of *Bacillus*—have been dining on the petrochemicals that are contaminating the soil at the future Veterans Park since June 16. Once the bacteria have finished their meal, all that will remain is harmless carbon dioxide and water.

Tests by Bright & Associates, the Placentia firm seeding the oil-eating bacteria into the soil at the site, show that the process is almost complete. And the city is poised to seek bids for construction of its most elaborate recreation facility, the last project in the city's 20-year master plan.

The park, on a 10-acre site near the intersection of 223rd Street and Moneta Avenue, will have an adult fitness center, five racquetball courts, two baseball diamonds, a gymnasium and children's playground for the use of residents. Construction will cost about $6 million.

Until the city exercised its redevelopment powers and condemned the property in 1981, the site was owned by Moine Salvage Co., which used it for years as a yard for petrochemical tank storage and salvage operations.

> 'We wanted to make sure there wouldn't be a contaminant there on account of children playing the park. We may be overly cautious but it is better to be cautious than to be sorry.'
>
> —Kay Calas
> Carson mayor

"It was horrible," Calas said. "It was an eyesore. We had many complaints from the people in the adjacent mobile home park. We had trouble from the kids cutting through" on the way to Caroldale Elementary School.

Moine's sand-blasting and other cleaning operations left a residue of heavy metals, mainly lead, and petrochemicals that had soaked into the earth. Rather than seal the contaminants under buildings and parking lots, the city decided to get rid of them.

"We wanted to make sure there wouldn't be a contaminant there on account of children playing the park," Calas said. "We may be overly cautious but it is better to be cautious than to be sorry."

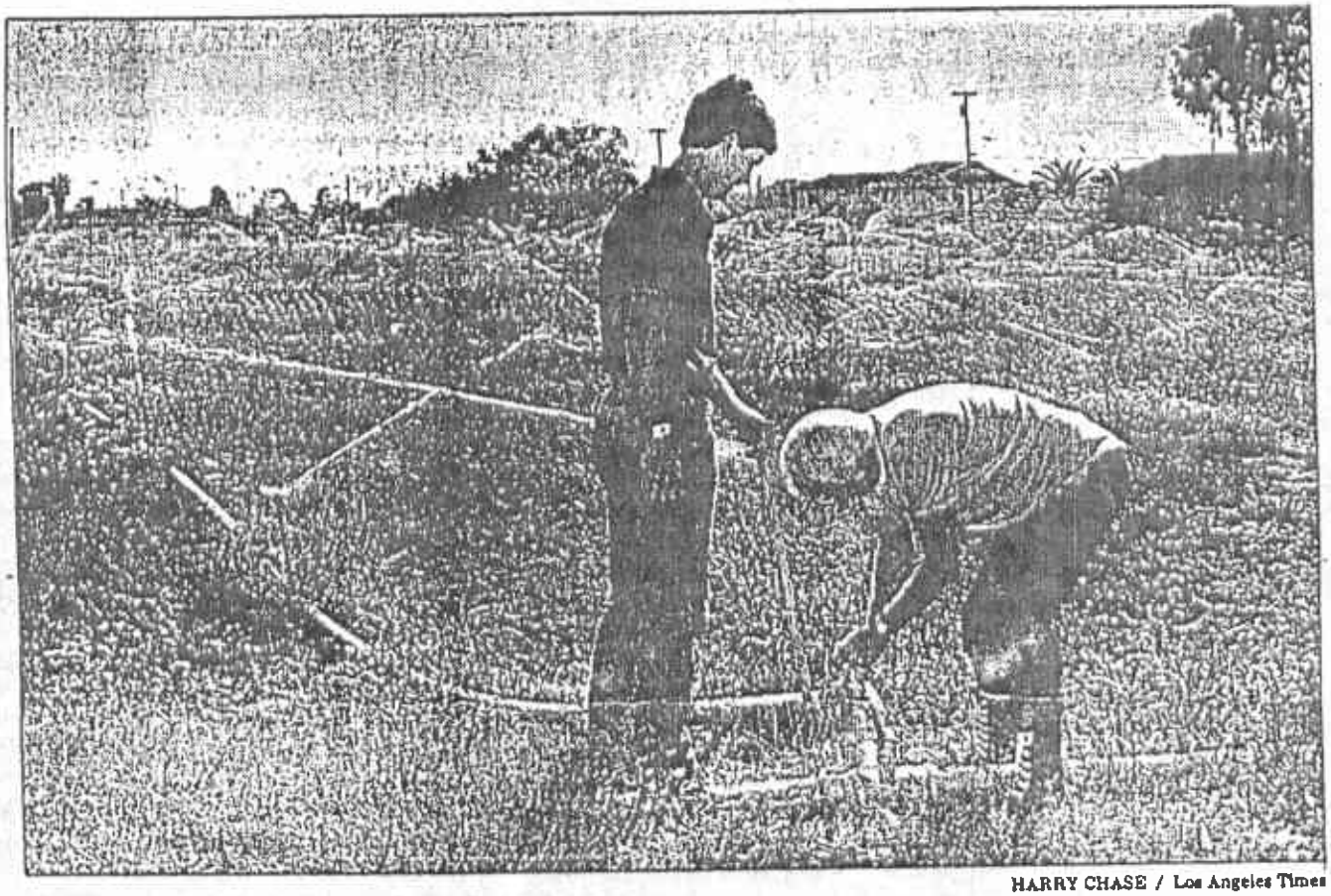
Fourteen truckloads of soil laced with lead, which cannot be treated with bacteria, have been taken to a hazardous waste dump at a cost of about $50,000.

But hauling away soil laced with petrochemicals would have cost about $2 million, city officials said. The oily wastes had soaked as deep as five feet and contaminated 10,000 cubic yards of dirt, according to Art Homrighausen, a biologist and environmental specialist with Bright & Associates.

Enter the "Pacmen" bacteria.

The bacteria occur naturally in soil and digest the

Los Angeles Times



HARRY CHASE / Los Angeles Times

Art Homrighausen, left and Dick Johnson turn on sprinkler system that feeds bacteria.

BACTERIA: Cleaning Carson Soil

Continued from Page 1

petrochemicals, turning them into harmless carbon dioxide and water, according to Homrighausen. Certain strains of the bacteria that digest the petrochemicals with particular efficiency have been commercially cultured for use in environmental cleanup. Though many bacteria eat petrochemicals, which particular strain is a trade secret, Homrighausen said.

The process, which Bright & Associates calls "bioaugmentation," takes longer than disposal at a hazardous waste dump—up to a year—but costs much less. Bacterial cleanup costs between $10 and $20 per cubic yard, compared with $200 to $225 a cubic yard for hauling, according to Homrighausen.

The cost of the biological cleanup will be less than the $132,000 budgeted for the job, he said.

The process, commonly used by oil refineries and tank farms that are recycling land, is rarely used for preparing parks, Homrighausen said, adding that his firm had never before used it to prepare a park site.

The process works like this: Bacterial concentrate is mixed with water and sprinkled on the site. To assist the growth of the bacteria, a layer of fertilizer is put on top. To make sure the bacteria can get to the contaminant, the land must be turned with disk plows.

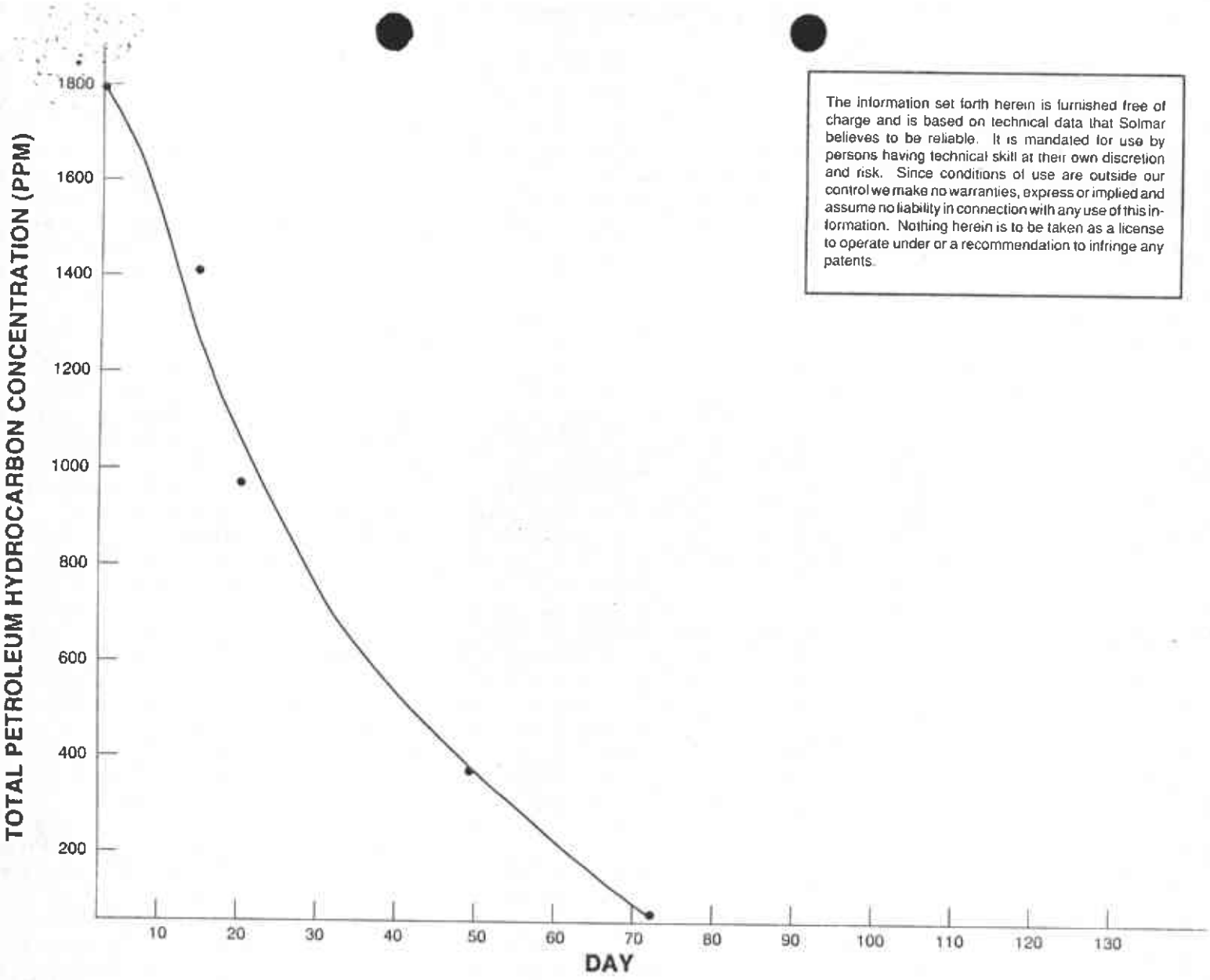
Since the process can only work through 12 inches of soil, it was necessary at the Veterans Park site first to dig up four feet of soil in the spots where the oil had sunk deepest and spread it out in a foot-deep layer.

Once the bacteria are seeded, they need water just like plants. Like a farmer, Homrighausen has been turning on the water in a vast sprinkler system two or three times a week. During last week's high temperatures, the soil needed extra soaking.

And as for the term "Pacmen," Homrighausen said: "We don't ever refer to them as that. . . . We don't like to conjure up images of little critters running around." The bacteria are not harmful to humans, Homrighausen said.

Calas, however, said she couldn't help thinking of Pacmen when Bright & Associates described its plans.

"Those little things eating up those goodies! That's what I thought," she declared.



DIESEL CONCENTRATIONS

(ppm)

Date	Treatment Day	Excavated Soil	Soil in Bottom of Excavation
08/28/87	-1	1,803	-
09/11/87	+12	1,400	2,200
09/18/87	+19	943	1,345
10/16/87	+48	317	42
11/10/87	+72	23	<10

Advanced Bio Cultures

Formulations

A new generation of bacterial supplements
for environmental use based upon
specifically selected, natural occurring organisms.

SOLMAR CORP.

625 West Katella Avenue, Suite 5
Orange, California 92667
(714) 538-0881

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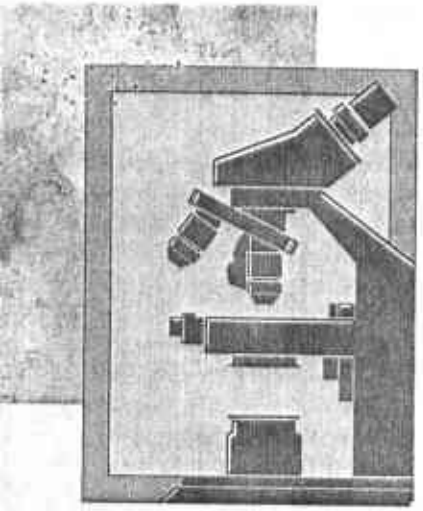


Invisible solutions to ugly problems.

The "safe and natural" alternative to incineration, fixation and off-site disposal.

Presenting Solmar's proven bioremediation solutions—microbes formulated to clean up organic wastes. Solmar starts with naturally occurring micro-organisms, selecting and combining compatible strains for specific performance. Programmed additions of Solmar's unique Advanced Bio Cultures to a system enables our microbes to become dominant and biodegrade the targeted components. Their task completed, using nature's way, they die, leaving a safe, clean environment.

Hazardous waste treatment using Solmar's Advanced Bio Cultures offers dramatic cost-savings over alternative technologies.

Treatment Method	Typical Cost
Incineration	$110-400 per ton
Off-site disposal	$180 per ton
Bioremediation using Solmar's formulations	$15-70 per ton (based on volume)

Proven in countless applications.

Whether cleaning up a waste "accident" or correcting a hazardous situation, Solmar's scientifically formulated bioremediation solutions successfully perform in a vast array of on-site operations. Fortune 500 companies, government agencies and municipalities, and numerous small and medium-sized industrial companies depend on Solmar for waste treatment solutions. Solmar also works hand-in-hand with engineering and consulting companies to solve waste problems.

Advanced Bio Cultures allow many day-to-day operations to meet or exceed discharge standards. Applications are now used in sewage treating, paper processing, wood preserving, coatings manufacturing, food processing, canning, bottling, meat packing, dairy processing, and petroleum, petrochemical and chemical processing.

While the formulations are used on a programmed basis to keep industrial processes running smoothly and cleanly, "emergency" situations also utilize Solmar's products for fast clean-up solutions. When soils and groundwaters are contaminated by accidental chemical spills, leaking underground storage tanks or other hazardous conditions, Solmar's Advanced Bio Cultures formulations are your answer.

Predictable results and success.

Solmar's unique microbial formulations are designed to optimize the degradation of many complex organic wastes—including phenols, polynuclear aromatics, oils, greases, hydrocarbons, animal fats, pesticides and coal tars. When used according to Solmar's recommended program process, they are ideal for controlling contamination of gasoline, diesel fuel, heating oil, chlorinated solvents, refinery and pulp mill wastes, wood preservation plant residues, petrochemicals, latex products and phenolics.

Solmar formulations work safely and naturally to reduce these contaminants and wastes to harmless end-products, such as carbon dioxide and water.

Because our blended formulations are matched to your specific problem, we can offer you timely, predictable results.

Risk reduction.

Solmar's unique bioremediation approach results in reduced volume, toxicity and mobility of the contaminant. We offer our users risk reduction, liability avoidance and clean-up assurance..

Full laboratory testing ensures the correct formulation for your specific application.

In your facility or in the field, Solmar offers you complete bioremediation solutions.

Our success stories range from small companies to full, extensive sanitation district operations.

PRINCIPLES OF USE

The basic concepts are not difficult. Systems are seeded with formulations of carefully matched organisms that can use the various petroleum products to increase their biomass as energy sources. Application techniques maximize the biological activity and enable the various organisms to handle the original array of compositions present as well as those formed through catabolism.

Nearly every program needs to be looked upon as a case unto itself, however, some guidelines are provided here for consideration. A Solmar Corp. representative should be consulted prior to initiating any program. In nearly all instances treatability studies should be conducted by Solmar Corp. to assure suitability of any program and to determine the product of choice.

Principles need to be borne in mind. The Advanced Bio Cultures Formulations are based upon preserved microorganisms which become activated when put in water.

Like all living organisms the various essential elements must be included in their diet, such as calcium, carbon, iron, magnesium, nitrogen, phosphorous, etc. Application techniques must take this into account.

Time requirements for completion of any program are dependent upon many different factors including the nature of the compositions present, the complexity of these compositions present, the temperature, pH, salinity, final disposal techniques, the amount of aeration and agitation available.

For example, bacteria perform most efficiently at 35°C. Their efficiency is roughly halved for every 10°C shift. Pasteurization occurs above 50°C.

Similarly a pH of 7 is best with activity being approximately halved for every shift of 1 pH unit. Variable pH's have a very deleterious effect on the bacteria.

Aeration is crucial. The initial degradation steps require oxygen. Furthermore the bacteria operate far more efficiently aerobically. Aeration also provides agitation, which increases the oil/water interface surface area dramatically. The bacteria then have a greater opportunity to degrade the oils.

Some compositions are more easily degraded than others. Straight chained compounds generally breakdown much more quickly than aromatics or cross-linked structures. It may take longer to break down a large number of different compositions than if fewer are present. The viscosity and quantity of oil to be degraded influence the time required for the program.

ANTICIPATED RESULTS

Programs vary considerably. Where emulsification is present, many systems experience demulsification as the hydrophilic-hydrophobic balance of the emulsifying agent is disrupted by biodegradation. This can facilitate phase separation techniques.

On the other hand where distinct phases exist and little degradation has occurred treatment with the Advanced Bio Cultures may produce an emulsion, thereby accelerating biodegradation.

In the treatment of lagoons or sumps degradation may seem slow initially and then appear to speed up as the system approaches a state of equilibrium. Following this, sludge from the bottom frequently is freed up, which then covers the surface. It is subsequently broken down.

PRODUCT DESCRIPTIONS

Formulations commercially available include:

Advanced Bio Cultures Formulation M-101
Designed for use in aerobic systems handling domestic sewage. It is particularly effective in handling many of the problem components of domestic sewage, including heavy grease loadings, incoming industrial wastes, cosmetics, salad oils, petroleum derivatives, etc.

Advanced Bio Cultures Formulation C-102
This product is particularly useful for high carbohydrate and starch wastes. Effective with many aliphatic chemical wastes.

Advanced Bio Cultures Formulation L-103
Tailored to handle high loadings of animal, fish and vegetable oils, particularly where protein levels are low. Usually the product of choice with light weight oils and many petrochemical products.

Advanced Bio Cultures Formulation L-104
Formulated to deal effectively with the heavy, tarry types of oils, coal tars and organic sludges. Particularly well suited for phenolic and other aromatic chemical structure wastes. Usually the product of choice for coking and wood preserving wastes.

Advanced Bio Cultures Formulation P-105
This product is well suited for industrial wastes having exceptionally high loadings of proteins, blood and fats. Develops an excellent floc for handling many setteability problems.

Advanced Bio Cultures Formulation AN-106
Particularly useful in dealing with domestic wastes being treated anaerobically. Typically enhances organic digestion and gas production in digesters. Handles many of the problems associated with operations of septic tanks, Imhoff tanks, and anaerobic lagoons.

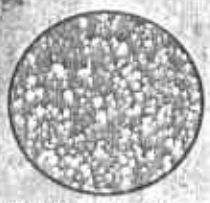
Advanced Bio Cultures Formulation I-107
This is a very versatile product for highly complex industrial wastewater streams. It is the product of choice with many petrochemical, petroleum, food, textile and paper product streams.

The product descriptions given above serve only as guidelines. Due to high variability of non-domestic wastestreams (even within a given industry) treatability studies should be conducted to determine which (if any) formulation should be used. Studies at Solmar Corp.'s laboratory will also indicate the degree of improvement which can be expected. Contact your representative for details.

With its unique in-house research and development capabilities, Solmar Corp. can customize formulations where warranted.

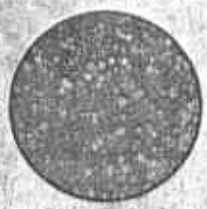
The correct Advanced Bio Culture formulation for your specific need.

Solmar's economical "off-the-shelf" bioremediation formulations are ready for immediate delivery.

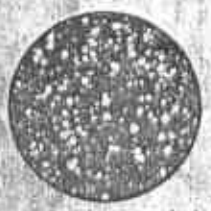


AN-106 Improves the performance of anaerobic systems.

Aids digestion to eliminate bothersome organics in septic systems, Imhoff tanks, digesters and anaerobic lagoons. Restores percolation in leach fields and seepage pits. Reduces sludge volumes and controls odors. Is particularly effective with anaerobic treatment of domestic wastes containing heavy amounts of salad oils, detergents and grease.



C-102 Treats high concentrations of carbohydrates, starch wastes and aliphatic chemical wastes such as acrylics, vinyl acetates and a variety of solvents. Beneficial to canning companies, soft-drink bottlers, manufacturers of corn products, starches, glue products, and chemicals. Particularly effective in enhancing settleability.



I-107 The most versatile of Solmar's formulations. Consumes many of the components found in industrial wastestreams.

Treats product waste containing detergents, various petroleum and petrochemical derivitives, as well as protein and lipid structures. Treats pulp, paper and forest products in wastewaters and allows users to comply with waste regulations even during winter months.

Focus on total solutions.

Solmar conducts ongoing research in many areas of environmental clean-up for the very latest, cost-effective methods.

No single solution can treat all organic waste problems—so Solmar offers a wide variety of "off-the-shelf" formulations, developed to meet your specific requirements. To ensure the best formulation for your clean-up problem, we offer testing of your samples in our laboratory to determine which formulation is right for your treatment needs.

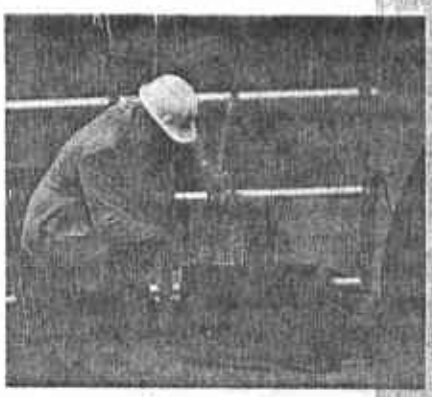
For more complex problems, the company can create customized formulations to treat unique situations.

Working with you to completion.

You can depend on Solmar for solutions to your waste problems. We pioneered the science of bioremediation, and our technical staff has the longest success record of anyone in the business. We're recognized *nationwide* as the most complete supplier of bacterial bioremediation formulations.

Solmar provides much more than advanced bioremediation formulations. We understand that being responsive means supplying you with timely answers—including problem identification, needs analysis, and recommendations which are time-efficient, cost-effective and predictable. We can provide you with the operational guidance to obtain certified "clean" results that meet EPA and other regulatory standards.

Our successful partnership begins with you. Contact the Solmar home office for the bioremediation specialist in your area. Each is highly skilled in providing you with the best solutions—fast.



Our technical specialists work with you on-site for expert clean-up.

Solmar—working with you for a cleaner world.

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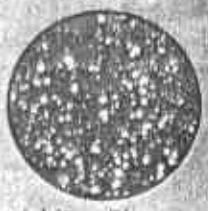
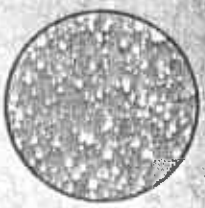


L-103 Treats wastewaters with a very high lipid content, such as animal, fish and vegetable oils.

Improves performance of wastewater-treatment systems such as lagoons, activated sludge systems, trickling filters and oxidation ditches. Degrades gasoline, lightweight mineral oils and many petrochemical products.

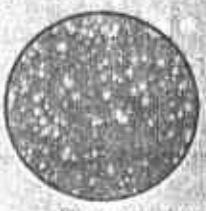


L-104 Combats heavy tar-like oils, coal tars, and organic sludges in wastestreams, tanks and land spills. Particularly effective in degrading diesel fuel, bunker oil and crude oil. Treats wastes containing phenolic and other aromatic chemical structures.

Degrades diverse organics (including coke wastes) and wood preservative wastes (such as creosote and pentachlorophenol) associated with railroad tie and telephone pole facilities, refinery bottoms and asphaltics.

M-101 Designed for applications in sewage-treatment plants and collection lines. Product of choice for municipal wastewater treatment.

Has capability of handling a wide array of wastes including heavy grease loadings, cosmetics, salad oils and petroleum derivatives, and other incoming industrial wastes. Controls malodors and hydrogen sulfide emissions. Improves treatment plant overall efficiency while lowering sludge volume. Effective in pre-treatment and in-line treatment of wastes.



P-105 Treats industrial wastes with exceptionally high protein, blood and fat contents. Processes high-protein wastes generated by dairy processing and meat packing and processing companies.

Decomposes nitrogenous compounds generated by petrochemical firms. Forms excellent flocs.

Insist on Solmar. It's the natural choice.

The quantities required for treatment facilities depend upon the characteristics and size of the facilities as well as the nature and flow rates of the wastewater. Due to the many existing variables, specific programs need to be tailored to individual sites. Solmar Corp. personnel with their many, many years of successful field application experience are eminently qualified to devise appropriate, cost effective treatment programs and to assist in appropriate operational changes to maximize treatment effectiveness.

The basis of such programs is to have the supplemented organisms gain dominance over the ubiquitous organisms present. Without this dominance, benefits will not be realized. Technical backup and support in addition to product quality is critical. Solmar Corp.'s personnel continue to set the technical standards for the industry.

Packaging

The formulations are supplied in convenient 25 pound plastic pails which are easily stored and protective of the product. The pails can be used for presoaking. Each pail contains a resealable plastic liner to minimize moisture pick-up.

Safety

The formulations are based upon harmless saprophytic, soil type microorganisms. These utilize non-living organic matter as their food source.

The related chemical products present in the formulations may cause allergic skin or respiratory reactions with some persons, and it therefore is recommended that direct skin contact be avoided. Simply wash thoroughly if there is any contact. Avoid breathing the dust. Handle the dry product where there is adequate ventilation.

Storage

The Advanced Bio Cultures formulations should be stored in a cool, dry place. Moisture activates the product. Exposure above 120°F may inactivate the product.

Properties

pH levels	-For greatest effectiveness the pH of the system being treated should be 7. Formulations may usually be used in the range of 5.5 - 8.5.
Temperature	-Formulations are based upon mesophilic strains which operate in the range of 55°F to 105°F.
Form	-A free flowing powder and granules.
Color	-Individual particles vary from white to tan.
Bulk Density	-0.7 gms/ml or 5.8 lbs/gal. (22 fluid oz/lb)

The use of
Advanced **B**io **C**ultures formulations
for treating oily waste

Although biodegradation techniques have been used for environmental problems with petroleum products for many years, traditional methods have frequently taken too long to achieve desired results. Physically disposing of unwanted hydrocarbon residues, tank bottoms, spills and runoffs has become a real problem not only from a cost standpoint but from potential legal ramifications as well.

The use of specially selected culture formulations with appropriate application techniques has proven to be a very cost effective means in dealing with many such problems. Tank cleanouts, spill cleanups, land farming operations, on site detoxification programs and sump cleanups have all benefited from bioaugmentation. Many instances have occurred, wherein heavy tarry wastes have even been converted through bioaugmentation to products of economic value.

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Where heavy oils exist, they may be converted to lighter oils of economic value. If the surface oils are not to be reclaimed, it is important that they not dry out. Mixing, cascading, or spraying with recirculation are helpful.

For soil-bound oil, bioaugmentation can be very helpful. The time required depends upon the nature of the oils, its concentration, depths of penetration and soil conditions. The time required can vary from days to months.

The cultures are very helpful in reducing odor levels. Since Advanced Bio Cultures cannot themselves generate hydrogen sulfide, they can provide control of sulfide emissions.

Most of the hydrocarbons will be used as food and energy sources with the consequential end products being carbon dioxide, water, cell mass and biological waste products.

TREATMENT SCHEDULES

Advanced Bio Cultures formulations are useful in sumps, tanks or lagoons, flow through systems or land spills.

The correct formulation should be chosen on the basis of treatability studies conducted at Solmar Corp's laboratories.

Treatment rates will generally be at the levels outlined below.

STATIC LAGOONS

Volume of System in Gallons	Innoculation Doseage	Add Two Weeks Later	Monthly Treatment After Second Treatment
10,000-50,000	1 lb/5,000 gal.	1 lb/7,500 gal.	1 lb/15,000 gal.
50,000-300,000	1 lb/10,000 gal.	1 lb/15,000 gal.	1 lb/30,000 gal.
300,000-1,000,000	1 lb/20,000 gal.	1 lb/30,000 gal.	1 lb/60,000 gal.
Over 1,000,000	1 lb/25,000 gal.	1 lb/35,000 gal.	1 lb/75,000 gal.

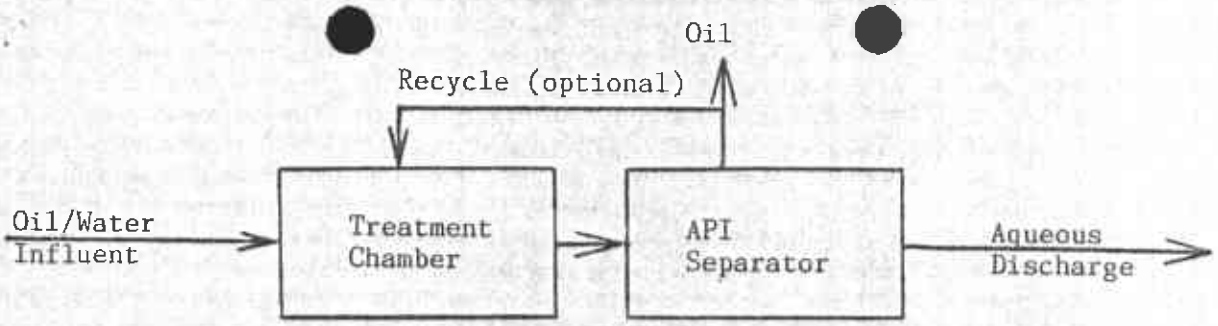
Nitrogen levels should be at least 20 ppm, and phosphorous levels at least 5 ppm before beginning any program. Levels should be monitored regularly and appropriate nutrient additions made.

The cultures should be activated by mixing with two gallons of water per pound of cultures. Extended presoaking is not necessary in static lagoons.

The bacteria slurry should be spread over the entire surface of the lagoon. Depending upon the size of the system, spray equipment, firehouse, boat or aerial application can be made. Agitation by aeration is very beneficial.

FLOW THRU SYSTEMS

Average Daily Flow	Daily Feed Rate For 5 Days	Daily Feed Rate Treatment
Up to 25,000 gpd.	1 lb/5,000 gal.	1 lb/10,000 gal.
25,000 to 100,000 gpd.	1 lb/10,000 gal.	1 lb/25,000 gal.
100,000 to 400,000 gpd.	1 lb/25,000 gal.	1 lb/50,000 gal.
400,000 to 1,000,000 gpd.	1 lb/50,000 gal.	1 lb/100,000 gal.
Over 1,000,000 gpd.	1 lb/75,000 gal.	1 lb/200,000 gal.



Nitrogen levels should be at least 20 ppm and phosphorous levels at 5 ppm.

Presoak the Advanced Bio Cultures for 4 to 12 hours and add at treatment chamber. Divide the daily treatment into 4 or 5 applications if feasible.

Treatment chambers should have good mixing and at least 2 hours detention. As much as practical is normally recommended. Recovered oil can be reclaimed, burned, or recycled for more complete degradation.

DRY LAND SPILLS

For areas having oil depths of one foot or less:

Under one acre: innoculate with 1 lb/1,000 sq. ft.
One acre or more: innoculate with 50 lbs/acre

Two weeks later reseed with 75% of the initial innoculation. Reapply a 50% doseage (of initial innoculation) one month after the second treatment. Reapply this same doseage monthly as required. Tars may require heavier seedings.

For areas having oil depths exceeding one foot, innoculation should be made at the rate of 25 to 50 pounds per 1,000 cubic yards depending on the nature of the oil and the system. Use the above reseeding schedule. Contact your local representative for the proper program for your specific site.

Nitrogen levels must be at least 20 ppm and phosphorous levels at 10 ppm.

The bacteria should be added as a slurry prepared with at least two gallons of water per pound of cultures. This should broadcast over the entire surface area. Regular aeration and mixing are necessary for degradation.

MONITORING

Regular monitoring is necessary. During warm temperatures, significant bubbling in aqueous systems indicates good microbial activity. Oil quantity monitoring is unusually impractical, particularly when it can be freed up from the bottom of a pond. Bacteria counts using standard plate counts can be useful. There should be significant numbers (30-300) x 10^6.

Where activity seems low check the following and correct as appropriate.

Moisture	- Bacteria live and carry on their life processes in water. Do not allow systems to dry out.
Nitrogen	- Must always exceed 5 ppm.
Phosphorous	- Must always exceed 1 ppm.
pH	- Maximum activity occurs at a pH of 7. This is approximately halved for each 1 pH unit shift.
Temperature	- Ideal temperature is 95°F. Activity will decrease above or below this. From a practical standpoint, most programs should be run at 55° to 105°F.

If low plate counts occur, check for the presence of inhibitory substances. If not present, reseeding will assure that all species of bacteria are made available to handle residues and metabolities previously produced.

SMUD
SACRAMENTO MUNICIPAL UTILITY DISTRICT ☐ P. O. Box 15830, Sacramento CA 95852-1830, (916) 452-3211
AN ELECTRIC SYSTEM SERVING THE HEART OF CALIFORNIA

November 24, 1987

MR R B "JONES" GRUBBS
SOLMAR CORPORATION
625 W KATELLA AVENUE
SUITE 5
ORANGE CA 92667

DATA ON DIESEL CONCENTRATIONS DURING BIOREMEDIATION

Per your request, enclosed are data showing the reduction of diesel concentrations during our bioremediation project.

If you have any questions, please contact me at (916) 732-6137.

James A. Wilson

JAMES A WILSON
PROJECT LICENSING MANAGER

Enclosure

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Additional On Site Testing

During the week of February 26 through March 2, 1990, additional investigation was done at the site concerning the underground piping and storage tanks. The fueling system was exposed by excavation and further testing of the product lines and tanks was done under the direction of Walton Engineering and Desert Petroleum personnel. The product piping was exposed and isolated from the storage tank vessels. Air pressure of 45 PSI was placed on the lines and visual inspection made over the exposed piping using a soap leak solution on line joints and other suspect areas. An air pressure gauge was also installed to observe any pressure loss during testing and also to indicate any line damage which might occur during excavation work at the site. The line tests indicated no line leakage during the testing.

The tank vessels were uncovered to tank top for visual inspection during tank testing (see attached photos). The storage tanks were precision tested by Scott Co. Mechanical Contractors, a certified tank testing firm using the petro-tite system. All product and other related piping was disconnected from the tanks for a more accurate test of the storage vessels only.

To prevent any further possible contamination, water was used for the vessel testing instead of gasoline. The water residue will be treated as a waste through the on-site S.A.V.E. water remediation equipment and discharged upon approval of a water discharge permit which is pending.

All three storage tanks were tested within NFPA criteria and were considered liquid tight at that time. We have retained the existing Red Jacket line detectors for further testing and evaluation. Upon advice from the Scott Co., who are certified to test the detectors, we are holding the detectors to be tested when the fuel system is placed back in service. The testing requires liquid and pressure and the detectors must be installed on an operating system. The test results will be incorporated in the next progress reporting.

It is the intent to upgrade the present facility by replacing all lines, vents and storage tanks, along with an approved monitoring system, in the near future prior to reopening the business.

The results of recent outlined testing indicates no other leaks were found other than reported in the initial release report which outlined the line leak found in testing the unlead line under the east dispenser island.

Representatives on site for the testing and inspection as outlined were:

1) Walton Engineering personnel
2) Desert construction and environmental personnel
3) Scott Co. personnel, testing
4) D.I. Chadbourne personnel, relining inspection
5) Johnson Maintenance personnel, retained to observe and evaluate the testing.

Pictures taken during tank tests show exposed tank top and all lines.