Uriah Inc.

An Environmental Services Company

Shp 3603

REPORT OF BIOREMEDIATION
OF
HYDROCARBON CONTAMINATED SOILS
AT

U.S. WINDPOWER, INC.
17350 PATTERSON PASS ROAD
LIVERMORE, CA 94550

JULY 18, 1991

91 AUG 12 PM 2:16

464 Lindbergh Avenue • Livermore, California 94550 • (415) 455-4991

Uriah Inc.

An Environmental Services Company

July 18, 1991

Mr. Gilbert Morales, Manager
Facilities and Vehicle Maintenance
U.S. Windpower, Inc.
6952 Preston Avenue
Livermore, CA 94550

RE: Bioremediation of Hydrocarbon Contaminated Soil Now Completed at 17350 Patterson Pass Road, Livermore, CA

Dear Mr. Morales:

As you are aware, during the first week in August, 1990, Uriah staff erected a thin-spread treatment bed for the purpose of biologically detoxifying approximately 15 cubic yards of soil excavated attendant to the removal of one 550 gallon underground transmission fluid storage tank. Certified analyses of this soil had indicated the presence of Total Petroleum Hydrocarbons as Diesel (TPH-D) to 14 parts per million (ppm) and Total Oil and Grease (TOG) to 700 ppm (as well as 8.7 parts per billion [ppb] toluene and 10 ppb total xylenes).

During September and November, 1990, small volumes of fuel oil were inadvertently introduced into the treatment bed on two occasions. The introduction of additional contaminants and the unusually low ambient temperatures of December and January extended the life of the project, however, subsequent monitoring for soil chemistry, levels of nutrients and biological activity, as well residual hydrocarbons indicated that the degradation process was proceeding at a rate consistent with our projections.

During May of 1991, discrete soil samples were obtained for certified analyses. Each sample was acquired by a driving a clean brass tube 1.9 inches in diameter by 6.0 inches in length into the treatment bed until it was completely filled with a consolidated volume of material. Upon being withdrawn from the soil, the ends of each tube were covered with teflon pads, fitted with plastic caps, and wrapped with black electrical/duct tape. Each tube was then marked and placed on blue ice pending transportation to a certified hazardous waste analytical

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laboratory under chain of custody. The results of the certified analyses were as follows:

Table I

Sample Identification	TPH-D	Total Oil and Grease
USWP-1/5-8-91*	N.D (<10 ppm)	77 ppm

TPH-D...Total Petroleum Hydrocarbons as Diesel
ppm...Parts per million
* As indicated within the 20th May 1991 letter authored by Dr. R. Srna of Superior Analytical Laboratories, Inc., the sample submitted was also free of heavy hydrocarbons in the motor oil range.
** Uriah was advised during prior contacts with the Alameda County Health Services Agency that they did not require a representative of their office to be present during final sampling for certified analysis.

In consideration of the information provided by Superior Analytical Laboratories, Inc. (SAL) and Uriah's own observations and analyses, it was concluded that interference by non-regulated organic compounds were responsible for the detectable levels of TOGs reported. The most likely sources of these organic compounds were bits of asphalt paving and the fecal material deposited by the cattle which graze freely over the many acres in which the unsecured treatment site was located. To confirm this, Uriah sent a sample of the treatment bed soil to Friedman & Bruya, Inc. (F&B) of Seattle, Washington- a firm recognized nationally for its work in environmental chemistry. F&B confirmed in their analytical report that "There was no indication of the presence of saturated hydrocarbons that are major components of petroleum products" and that "There might possibly be very low levels of asphalt present in this sample". Copes of the analytical data provided by SAL and F&B are attached hereto as Appendix "A".

It is our understanding that U.S. Windpower, Inc. wishes to spread the remediated soils thinly over the area adjacent to the service building located near the treatment site. In our experience, this activity would be consistent with current policies and standards set forth by the County of Alameda and the San Francisco Bay Region Water Quality Control Board.

Copies of this report are enclosed for your convenience. It is recommended that one be forwarded to each of the following agencies for review and comment:

San Francisco Bay Region Water Quality Control Board

2101 Webster Street, Suite 500
Oakland, CA 94612

Alameda County Health Services Agency
Hazardous Materials Division
80 Swan Way, Suite 200
Oakland, CA 94621

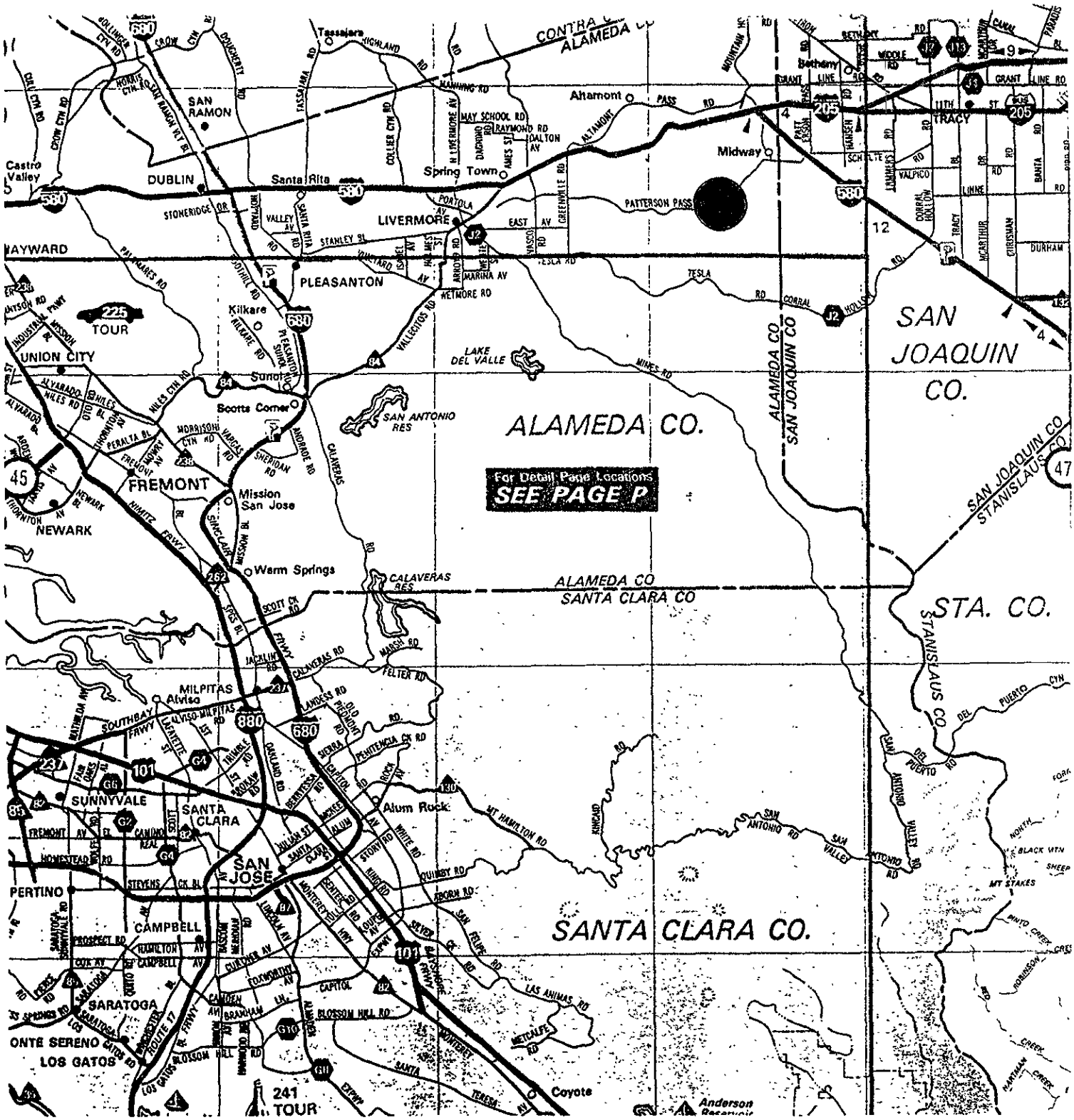
If you have any questions, or if we may otherwise be of assistance, please contact either of the undersigned at (415) 455-4991.

Sincerely,

John E. Rapp
Microbiologist

Jeff Schafer
Project Engineer

JER:JS
enc.



0 5
Scale (miles) N

URIAH ENVIRONMENTAL SERVICES, INC.
AT:
U.S. WINDPOWER
17350 PATTERSON PASS ROAD, LIVERMORE, CA

Figure #1

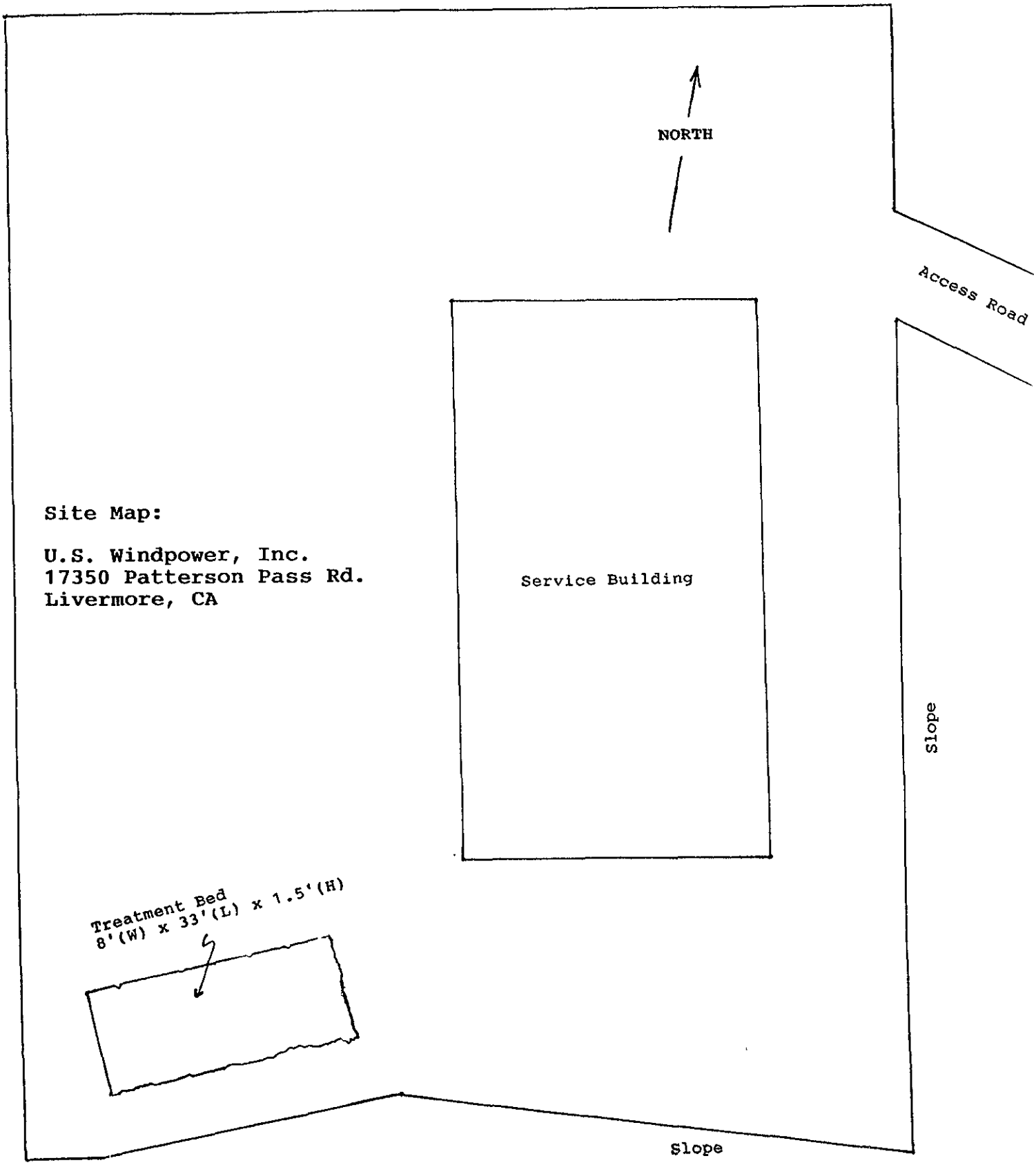

NORTH
Access Road
Site Map:
U.S. Windpower, Inc.
17350 Patterson Pass Rd.
Livermore, CA
Service Building
Slope
Treatment Bed
8'(W) x 33'(L) x 1.5'(H)
Slope

Figure #2

Appendix "A"

FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Andrew John Friedman
James E. Bruya, Ph.D.
(206) 285-8282

3008-B 16th Avenue West
Seattle, WA 98119
FAX: (206) 283-5044

June 28, 1991

Jeff Schafer, Project Leader
Uriah, Inc.
464 Lindbergh Avenue
Livermore, CA 94550

Dear Mr. Schafer:

This letter is to summarize the data that was reported on June 25, 1991 regarding the analyses of the sample submitted on June 21, 1991 from Project U.S. Windpower.

This sample was analyzed for volatile, semi-volatile and non-volatile organic compounds by gas chromatography (GC) and thin-layer liquid chromatography (TLC.) No volatile nor semi-volatile compounds were seen using the GC. We would have expected to have seen some indication of motor oil had it been there. The TLC analysis showed a general absence of petroleum-like compounds.

We appreciate this opportunity to be of service to you on this project. If you have any questions regarding this material, or if you just want to discuss any aspect of your projects, please do not hesitate to contact me.

Sincerely,

James E. Bruya, Ph.D.

JEB

Enclosures

FRIEDMAN & BRUYA, INC.
ENVIRONMENTAL CHEMISTS

Date of Report: June 25, 1991
Date Submitted: June 21, 1991
Project: U.S. Windpower

RESULTS OF ANALYSES OF THE SOIL SAMPLE FOR CONTAMINANT CHARACTERIZATION BY THIN LAYER CHROMATOGRAPHY

Sample #	TLC Characterization
USWP A(1-4)	The thin layer chromatographic trace showed the presence of low levels of moderately polar and highly polar organic compounds, such as those found in a mixture of biogenic compounds. This characterization is based on the presence of a band of material at Rf (hexane) 0.8, visible under both short wave UV light, as well as with iodine staining and is indicative of elemental sulfur, a possible by product of biological degradation. There was a small amount of material showing an Rf (hexane) 0.0 and Rf (methylene chloride) 1.0 that was visible under both short and long wave UV light, as well as with iodine staining. This type of character is seen by high boiling aromatic hydrocarbons, as well as by highly polar unsaturated oxidized hydrocarbons. There was no indication of the presence of saturated hydrocarbons that are major components of petroleum products. There might possibly be very low levels of asphalt present in this sample. There does not appear to be motor oil present due to the absence of saturated hydrocarbons.

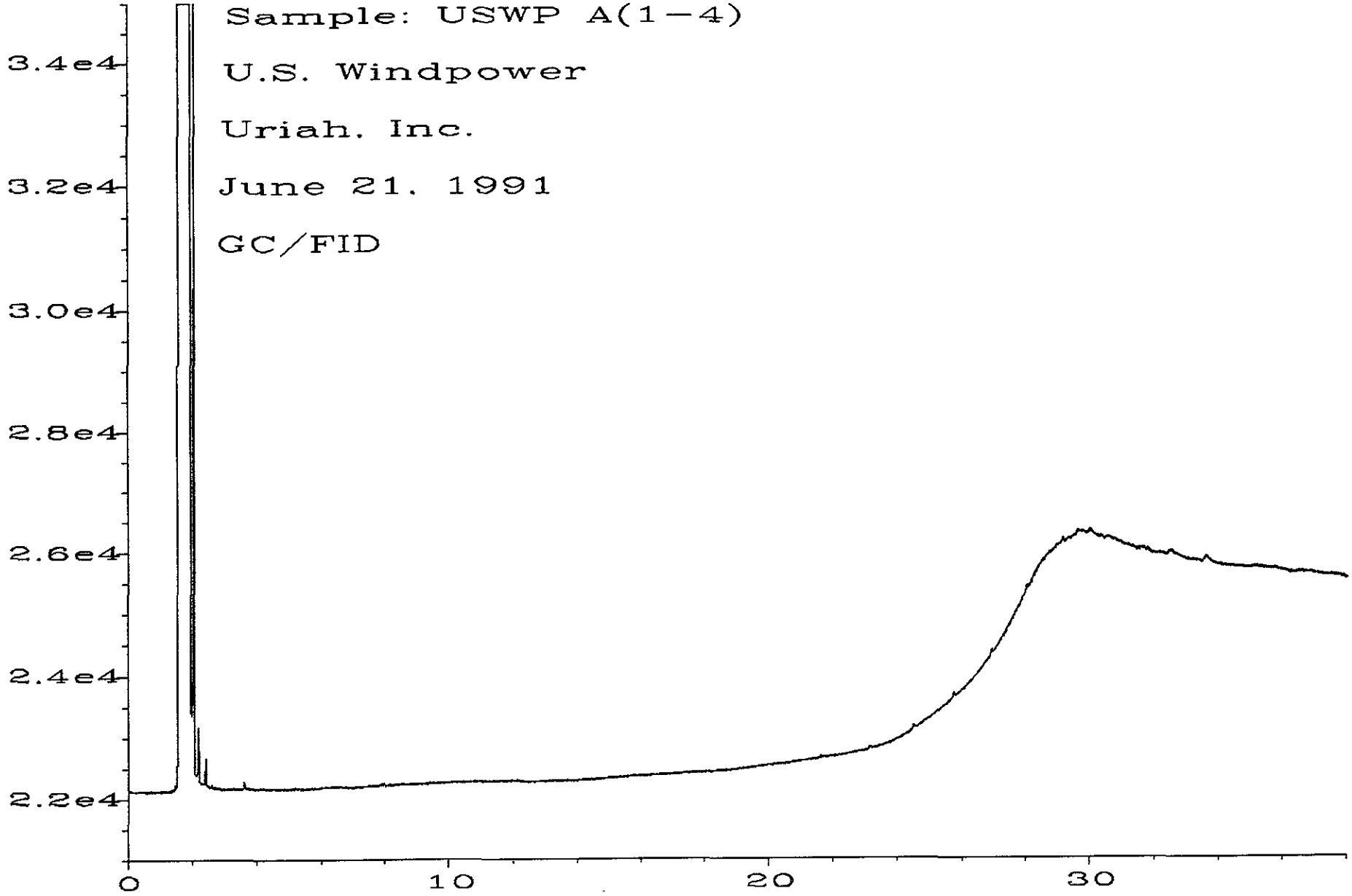
FRIEDMAN & BRUYA, INC.

ENVIRONMENTAL CHEMISTS

Date of Report: June 25, 1991
Date Submitted: June 21, 1991
Project: U.S. Windpower

RESULTS OF ANALYSES OF THE SOIL SAMPLE FOR FINGERPRINT CHARACTERIZATION BY CAPILLARY GAS CHROMATOGRAPHY

Sample #	GC Characterization
USWP A(1-4)	The gas chromatographic trace showed an absence of significant levels of volatile or semi-volatile compounds.


Sample: USWP A(1-4)
U.S. Windpower
Uriah. Inc.
June 21. 1991
GC/FID
3.4e4
3.2e4
3.0e4
2.8e4
2.6e4
2.4e4
2.2e4
0
10
20
30
C:\HPCHEM\1\DATA\06-21-91\017F0601.D

6-KMC-B

Uriah, Inc.
An Environmental Services Company

464 Lindbergh Avenue
Livermore, CA 94550
(415) 455-4991 Office
(415) 455-4995 FAX

Chain of Custody

DATE 6/19/91 PAGE 1 OF 1

PROJ. MGR. JEFF SCHAFER
COMPANY URIAH, INC.
ADDRESS 464 LINDBERGH AVE.
LIVERMORE, CA 94550

SAMPLERS (SIGNATURE) Jeff Schafer (PHONE NO.) (415) 455-4991

ANALYSIS REQUEST

SAMPLE ID.	DATE	TIME	MATRIX	LAB ID.	TPH - Gasoline (EPA 5030)	TPH - Gasoline (5030) w/BTEX (EPA 602, 8020)	TPH - Diesel (EPA 3510, 3550)	PURGEABLE AROMATICS BTEX (EPA 602, 8020)	PURGEABLE HALOCARBONS (EPA 601, 8010)	VOLATILE ORGANICS (EPA 624, 8240)	BASE/NEUTRALS, ACIDS (EPA 625/627, 8270)	TOTAL OIL & GREASE (EPA 5520E)	PESTICIDES/PCB (EPA 608, 8080)	PHENOLS (EPA 604, 8040)	SEE BELOW		METALS: Cd, Cr, Pb, Zn	CAM METALS (17) w/Cr VI	PRIORITY POLLUTANT METALS (13)					NUMBER OF CONTAINERS
USWP A(1-4)	6/19/91	6:30a	SOIL	20486											✓									

PLS. CALL JEFF SCHAFER TO LET HIM KNOW WHICH ANALYSES WE'LL USE. IF YOU GET THE

PROJECT INFORMATION	SAMPLE RECEIPT	
U.S. Windpower	TOTAL NO. OF CONTAINERS	1
	CHAIN OF CUSTODY SEALS	
	REC'D GOOD CONDITION/COLD	
	CONFORMS TO RECORD	
	LAB NO.	

RELINQUISHED BY 1.	RELINQUISHED BY 2.	RELINQUISHED BY 3.
Jeff Schafer		
(Signature) (Time)	(Signature) (Time)	(Signature) (Time)
JEFF SCHAFER		
(Printed Name) (Date)	(Printed Name) (Date)	(Printed Name) (Date)
URIAH, INC		
(Company)	(Company)	(Company)
RECEIVED BY 1.	**RECEIVED BY 2.**	**RECEIVED BY (LABORATORY) 2.**
(Signature) (Time)	(Signature) (Time)	(Signature) (Time)
		M.A. DAWFORD
(Printed Name) (Date)	(Printed Name) (Date)	(Printed Name) 6-21-91 (DATE)
(Company)	(Company)	(LAB)

SPECIAL INSTRUCTIONS/COMMENTS:
HOT-TREATED SOIL CONTAMINATED WITH DIESEL
D MOTOR OIL. 8015 ANALYSIS SHOWS TPH-D is ND;
D&F SHOWS OIL @ 130 ppm. THERE IS INTER-
ICE FROM ASPHALT/OGANIC MATTER.
SE DISTINGUISH THE USED MOTOR OIL FR

SUPERIOR ANALYTICAL LABORATORIES, INC.
825 ARNOLD, STE. 114 • MARTINEZ, CALIFORNIA 94553 • (415) 229-1512
DOHS #319
DOHS #220

20th May 1991

Uriah Environmental Inc.
464 Lindbergh Ave
Livermore, CA 94550

For Attention: Gene Painter

Uriah Job #: US Windpower

With reference to Superior Job#: 83066, sample #1; was analyzed for TPH as Diesel. The result of this analysis was non-detected at the 10 ppm detection limit. After further scrutiny of the chromatogram, there was no evidence of any heavy hydrocarbons in the Motor Oil range. This opinion is contingent with the fact that Superior does not have a calibration set up for Motor Oil analysis.

Yours sincerely

R. Srna PhD, Lab Manager

OUTSTANDING QUALITY AND SERVICE

SUPERIOR ANALYTICAL LABORATORIES, INC.
825 ARNOLD, STE. 114 • MARTINEZ, CALIFORNIA 94553 • (415) 229-1512
DOHS #319
DOHS #220

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

LABORATORY NO.: 83066
CLIENT: Uriah Environmental, Inc.
CLIENT JOB NO.: USWINDPOWER

DATE RECEIVED: 05/09/91
DATE REPORTED: 05/17/91

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

LAB #	Sample Identification	Concentration (mg/Kg) Diesel Range
1	USWP-1	ND<10

Method Detection Limit for Gasoline and Diesel in Soil: 10 mg/Kg

QAQC Summary:

Daily Standard run at 200mg/L: RPD Gasoline = NA
RPD Diesel = 7
MS/MSD Average Recovery = 101%: Duplicate RPD = 1

Richard Srna, Ph.D.

Laboratory Manager

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DOHS #319
DOHS #220

CERTIFICATE OF ANALYSIS

LABORATORY NO.: 83149
CLIENT: Uriah Environmental, Inc.
CLIENT JOB NO.: U.S WINDPOWE

DATE RECEIVED:05/22/91
DATE REPORTED:05/29/91

ANALYSIS FOR TOTAL OIL AND GREASE
by Standard Method 5520F

LAB #	Sample Identification	Concentration(mg/kg) Oil & Grease
1	us wp-1	77

mg/kg - parts per million (ppm)

Method Detection Limit for Oil and Grease in Soil: 50mg/Kg

QAQC Summary: MS/MSD recovery 74% ; Duplicate RPD : 1

Richard Srna, Ph.D.
Laboratory DIrector

OUTSTANDING QUALITY AND SERVICE

Uriah, Inc.

An Environmental Services Company

(415) 455-4991 Office
(415) 455-4995 FAX

Chain of Custody

DATE May 8, 1991 PAGE 1 OF 1

PROJ. MGR.

COMPANY Uriah, Inc.

ADDRESS 464 Lindbergh Avenue
Livermore, CA 94550

SAMPLERS (SIGNATURE) Gene Painter (PHONE NO.) 455-4991

ANALYSIS REQUEST

SAMPLE ID.	DATE	TIME	MATRIX	LAB ID.	TPH - Gasoline (EPA 5030)	TPH - Gasoline (5030) w/BTEX (EPA 602, 8020)	TPH - Diesel (EPA 3510, 3550)	PURGEABLE AROMATICS BTEX (EPA 602, 8020)	PURGEABLE HALOCARBONS (EPA 601, 8010)	VOLATILE ORGANICS (EPA 624, 8240)	BASE/NEUTRALS, ACIDS, (EPA 625/625, 8270)	TOTAL OIL & GREASE (EPA 5520 E/F)	PESTICIDES/PCB (EPA 608, 8080)	PHENOLS (EPA 604, 8040)			METALS: Cd, Cr, Pb, Zn	CAM METALS (17) W/Cr VI	PRIORITY POLLUTANT METALS (13)						NUMBER OF CONTAINERS
U.S.W.P.-1	5/8/91	1:15	Soil				X																		1
Also Check for motor oil																									

PROJECT INFORMATION

U.S. Windpower

SAMPLE RECEIPT

TOTAL NO. OF CONTAINERS	1
CHAIN OF CUSTODY SEALS	
REC'D GOOD CONDITION/COLD	
CONFORMS TO RECORD	
LAB NO.	

SPECIAL INSTRUCTIONS/COMMENTS:

Check for motor oil also as per my conversation with Thomas.

	1.	2.	3.
RELINQUISHED BY	Gene Painter 3:25 PM		Ken Brown
(Signature) (Time)	Gene Painter 5/8/91	Mike Wyatt 4:20 PM	Ken Brown
(Printed Name) (Date)	Uriah	Uriah May 8, 1991	
(Company)			
RECEIVED BY	Mike Wyatt	J. Stewart	Vodermann
(Signature) (Time)	Mike Wyatt 8:25 PM	J. Stewart 16:20	5/9/91 10.50
(Printed Name) (Date)	Uriah	5-8-91	SAL MTZ
(Company)	May 8 '91		(LAB)