2.2 0001

TREATABILITY STUDY REPORT FOR PRAIRIE METALS SITE

PROJECT NUMBER 0990-241

10409

PRESENTED TO:

WESTINGHOUSE/HAZTECH
5280 PANOLA IND. BLVD.
DECATUR, GEORGIA 30035

PRESENTED BY:

KIBER ASSOCIATES, INC.
4000 DEKALB TECHNOLOGY PARKWAY, N.E.
SUITE 200
ATLANTA, GEORGIA 30340
(404) 455-3944

NOVEMBER 23, 1990

NWK6:PRAIRCVR

KIBER ASSOCIATES, INC
Environmental Specialists

Mr. Tim Morrow
Westinghouse/HAZTECH
5280 Panola Ind. Blvd.
Decatur, GA 30035

November 23, 1990

SUBJECT: Treatability Study For The Prairie Metals Site

Dear Tim:

The following letter report summarizes the analytical data and observations derived from the solidification / stabilization (s/s) treatability study performed on contaminated soils from the Prairie Metals site. It is Kiber's understanding that the samples collected represent a cross section of soils collected from different areas around the site.

In October 1990, Westinghouse HAZTECH shipped twelve, one quart samples of site soils to EcoTek, LSI (EcoTek) for hexavalent chromium analysis. After experiencing some difficulty in analysis due to interferences from ferrous ammonium sulfate, a more stringent extraction process was implemented and EcoTek was eventually able to identify that no hexavalent chromium was present in any of the twelve samples. On October 11, 1990, EcoTek shipped the twelve samples to Kiber Associates, Inc. (Kiber). Identification numbers for each of the samples have been presented in Table 1.

Upon receipt of the individual samples, Kiber mixed the samples until visually homogenous in order to produce one five gallon composite sample on which to perform treatability testing. A portion of this composite sample was separated and analyzed for the parameters presented in Table 2.

The primary objective of this treatability study was to ensure that the nature of the waste and the results of previous testing are consistent with current conditions.

4000 Dekalb Technology Parkway, N.E. ▪ Suite 200 ▪ Atlanta, Georgia 30340
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Since Portland cement was effective in contaminant reduction in previous tests, it was used again for the purposes of this study. Table 3 presents the mixes developed during this study.

On October 15, 1990, 5 mixtures were developed using Type 1 Portland cement. The samples were developed by mixing known quantities of the cement and known quantities of water together to form a slurry and adding this to the contaminated waste. This mixture was blended with a paddle type mixer at 25-30 rpm's for about 1-2 minutes. The samples were then placed into 2x4 inch molds, compacted and allowed to cure at room temperature and at 90%-95% humidity. During the mixing process, it was observed that ammonia gas was released due to the adjustment of the pH. This gas is strong initially but dissipates quickly. It may be advisable for the mixing crew to wear level B protection during all mixing operations.

The leachate generated through the TCLP testing (EPA SW-846 Method 1311) from each mixture was analyzed for chromium after sample cure times of 1, 3, 5, 10, and 17 days. The analytical results are provided in Table 4. As is apparent from these results, the chromium concentrations in the leachate were well below the regulated TCLP concentrations.

Further testing of the leachate included hexavalent chromium (hex chrome) analysis. As shown on Table 4, hex chrome was present in the leachate, while it was not detected in the untreated samples. The presence of hex chrome can be explained through an reduction/oxidation (redox) principle. For the purposes of this report however, no further explanation can be provided without additional testing.

Pocket penetrometer readings were recorded during the study after days 1, 2, and 3. The data derived from this testing is provided in Table 5. As is demonstrated in the data, the material is very hard, even after only one day of curing. The material begins to set-up within 30-40 minutes of mixing.

After several meetings with Westinghouse-HAZTECH and the EPA, it was determined that the 20% cement mixture was the optimum blend for this project. The 20% mixture was therefore subjected to the TCLP test and the Multiple Extraction Procedure (EPA SW-846 method 1320) (MEP). The leachate

generated from the TCLP was then analyzed for the eight RCRA metals. The leachate for the MEP test was tested for chromium only. The results of the TCLP and MEP tests are shown in Tables 6 and 7 respectively. The results of the TCLP test show that the 20% cement mixture is efficient in reducing the metals concentrations to specified levels.

The data from the MEP test showed excess leaching of chromium during the third and fourth extraction. This test is very stringent as the results indicate. The MEP testing is still currently in progress.

Copies of all laboratory data have been included in Appendix A.

Should you have questions regarding the study procedures or the analytical data generated through the treatability study, please feel free to contact me at your convenience at (404) 455-3944.

Sincerely,
Kiber Associates, Inc.

Neville W. Kingham
Technical Director

nwk5:hazprairie

DISCLAIMER

When performing treatability studies, Kiber Associates is typically provided with samples from a given site. These samples usually have been collected by site personnel and are intended to be representative of the site materials. The accuracy of the treatability study; however, is only as accurate as the accuracy of the sample taken in the field. Since Kiber has no control over the sample collection, the results of the study are assumed to be only estimations of the anticipated results.

Kiber Associates has applied their best technical and scientific knowledge to the performance of the work under the economic parameters of this study. The information contained in the report in no way guarantees the same results in full scale adaptation and is only meant to be used as a guideline for operational procedures.

Furthermore, the study period defined by the client, limits the evaluation of technologies to a specified, limited time frame. Kiber can evaluate the technologies based on this time frame; however, we cannot comment on the long term effects.

TABLES ONE THROUGH SEVEN

KIBER ASSOCIATES, INC.

PRAIRIE METALS TREATABILITY STUDY

INDIVIDUAL SAMPLES - COMPOSITED

TABLE 1

DATE	STATION #	OBSERVATION
10-1-90	PMNES	DRY SOIL
10-1-90	PMNPP	DRY SOIL
10-1-90	PMD3/4	MUDDY SOIL
10-1-90	PMD2	MUDDY WET SOIL
10-1-90	PMSEB (1 OF 2)	MUDDY SOIL
10-1-90	PMSEB (2 OF 2)	MUDDY SOIL
10-1-90	PMNPP	DRY SOIL
10-1-90	PMESS	DRY SOIL
10-1-90	PMD1	MUDDY WET SOIL
10-1-90	PMD2	MUDDY WET SOIL
10-1-90	PMD3/4	MUDDY WET SOIL
10-1-90	PMNSS	DRY SOIL

NWK6:PM1

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PRAIRIE METALS TREATABILITY STUDY

UNTREATED RESULTS

TABLE 2

TOTAL CHROMIUM	11,100 ppm
TCLP CHROMIUM	10.1 ppm
PERCENT MOISTURE	30.6%
SPECIFIC GRAVITY	1.453
DENSITY	91.11 lb/cu ft
HEX CHROMIUM	<0.05 ppm
pH	6.43

NWK6:pmun

KIBER ASSOCIATES, INC.
PRAIRIE METALS TREATABILITY STUDY

AGENT MIXTURES

TABLE 3

PERCENT - TYPE 1 PORTLAND CEMENT*	PERCENT WATER*
15%	7.5%
20%	10.0%
25%	12.5%
30%	12.0%
35%	14.0%

* - PERCENTAGES BASED ON THE WEIGHT OF THE SAMPLE. i.e. IN A MIXTURE WITH 15% ADDITION OF AGENT AND 7.5% ADDITION OF WATER, 15 GRAMS OF AGENT & 7.5 GRAMS OF WATER ARE ADDED TO 100 GRAMS OF SAMPLE.

NWK6:PM3

KIBER ASSOCIATES, INC.
PRAIRIE METALS TREATABILITY STUDY

TREATED SAMPLES

TABLE 4

PERCENT CEMENT	PERCENT WATER	TCLP CHROMIUM (ppm)					DAY 17 LEACHATE pH
		DAY 1	DAY 3	DAY 5	DAY 10	DAY 17	
15%	7.5%	0.36	0.52	0.78	0.75	0.71	11.41
20%	10.0%	0.47	0.68	1.1	1.1	0.87	11.28
25%	12.5%	0.49	0.86	1.1	1.325	1.1	11.43
30%	12.0%	0.56	0.82	1.1	1.277	0.93	11.77
35%	14.0%	0.45	0.66	1.1	1.267	1.1	11.82

PERCENT CEMENT	PERCENT WATER	TCLP HEX CHROMIUM (ppm)				
		DAY 1	DAY 3	DAY 5	DAY 10	DAY 17
15%	7.5%	---	---	---	---	---
20%	10.0%	---	---	---	---	---
25%	12.5%	---	---	0.479	---	1.02
30%	12.0%	---	---	---	0.766	---
35%	14.0%	---	---	---	---	---

KIBER ASSOCIATES, INC.
PRAIRIE METALS TREATABILITY STUDY

POCKET PENETROMETER READINGS
TONS PER SQUARE FOOT

TABLE 5

PORTLAND CEMENT	PERCENT WATER	DAY 1	DAY 2	DAY 3
15%	7.5%	> 4.5	> 4.5	> 4.5
20%	10.0%	> 4.5	> 4.5	> 4.5
25%	12.5%	> 4.5	> 4.5	> 4.5
30%	12.0%	> 4.5	> 4.5	> 4.5
35%	14.0%	> 4.5	> 4.5	> 4.5

NWK6:PM5

KIBER ASSOCIATES, INC.
PRAIRIE METALS TREATABILITY STUDY

TCLP TESTING ON 20% CEMENT MIX

TABLE 6

PARAMETER	RESULT (ppm)
Arsenic	<0.010
Barium	<10
Cadium	<0.05
Chromium	0.78
Lead	<0.10
Mercury	<0.010
Selenium	<0.010
Silver	<0.10

NWK6:PM6

KIBER ASSOCIATES, INC.
PRAIRIE METALS TREATABILITY STUDY

MEP TESTING ON 20% CEMENT MIX

TABLE 7

PARAMETER	EXTRACTION SEQUENCE	PARAMETER CONCENTRATION (ppm)
CHROMIUM	EP TOX	1.2
CHROMIUM	EP TOX -DUPLICATE	1.1
CHROMIUM	1	3.7
CHROMIUM	1 -DUPLICATE	3.71
CHROMIUM	2	30.1
CHROMIUM	3	360
CHROMIUM	3 -DUPLICATE	385
CHROMIUM	4	305
CHROMIUM	5	34.0
CHROMIUM	6	19.8
CHROMIUM	7	14.0
CHROMIUM	8	4.01
CHROMIUM	9	1.98

NWK6:PM7

APPENDIX A

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ES ENGINEERING-SCIENCE

2585 CHANTILLY DRIVE, N.E. • ATLANTA, GEORGIA 30324 • 404/325-5923 • FAX 404/982-9159

October 19, 1990

Mr. Neville W. Kingham,
Technical Director
4000 Dekalb Technology Parkway, N.E.
Suite 200
Atlanta, GA 30340

Dear Mr. Kingham:

Please find enclosed the analytical results summary for the water samples received at our laboratory on October 18, 1990. If you have any questions, please contact our laboratory at your convenience.

Thank you for your continued confidence in Engineering-Science laboratory services.

Sincerely,

ENGINEERING-SCIENCE, INC.

David M. Jones,
Laboratory Manager

Enclosure

ANALYTICAL RESULTS SUMMARY

ES Job No. ZA071
Client MR. NEVILLE, KINGHAM, KIBER ASSOC.
Project PRAIRIE METALS
Date Collected 10/18/90
Date Received 10/18/90

Sample Matrix:
/ X / Water
/ / Soil
/ / Other

FIELD SAMPLE NO.	LABORATORY SAMPLE NO.	CHROMIUM mg/L
1-1	90101281	0.36
2-1	90101282	0.47
3-1	90101283	0.49
4-1	90101284	0.56
5-1	90101285	0.45
1-3	90101286	0.52
2-3	90101287	0.68
3-3	90101288	0.86
4-3	90101289	0.82
5-3	90101290	0.66
1-5	90101291	0.78
EPA METHOD NO.		7190
DATE OF ANALYSIS		10/18

ANALYTICAL RESULTS SUMMARY

ES Job No. ZA071
Client MR. NEVILLE, KINGHAM, KIBER ASSOC.
Project PRAIRIE METALS
Date Collected 10/18/90
Date Received 10/18/90

Sample Matrix:
/ X / Water
/ / Soil
/ / Other

Laboratory Supervisor Approval:

FIELD SAMPLE NO.	LABORATORY SAMPLE NO.	CHROMIUM mg/L
2-5	90101292	1.1
3-5	90101293	1.1
4-5	90101294	1.1
5-5	90101295	1.1
EPA METHOD NO.		7190
DATE OF ANALYSIS		10/18

PRMO!
Engineering-Science

ANALYTICAL RESULTS SUMMARY

ES Job No. ZA071
Client MR. NEVILLE KINGHAM, KIBER ASSOC.
Project PRAIRIE METALS
Date Collected 10/18/90
Date Received 10/18/90

Sample Matrix:
/ X / Water
/ / Soil
/ / Other

Laboratory Supervisor Approval:

FIELD SAMPLE NUMBER	LABORATORY SAMPLE NUMBER	HEXAVALENT CHROMIUM mg/L
COMPOSIT OF 5 SERIES	90101292-1295	0.559
EPA METHOD NO.		SM 312 B
DATE OF ANALYSIS		10/19

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2585 CHANTILLY DRIVE, N.E. • ATLANTA, GEORGIA 30324 • 404/325-5923 • FAX 404/982-9159

October 26, 1990

Mr. Neville W. Kingham,
Technical Director
4000 Dekalb Technology Parkway, N.E.
Suite 200
Atlanta, GA 30340

Dear Mr. Kingham:

Please find enclosed the analytical results summary for the water samples received at our laboratory on October 23, 1990. If you have any questions, please contact our laboratory at your convenience.

Thank you for your continued confidence in Engineering-Science laboratory services.

Sincerely,

ENGINEERING-SCIENCE, INC.

David M. Jones,
Laboratory Manager

Enclosure

PM01
Engineering-Science

ANALYTICAL RESULTS SUMMARY

ES Job No. ZA071
Client NEVILLE W. KINGHAM
Project KIBER ASSOCIATES, INC.
Date Collected 10/23/90
Date Received 10/23/90

Sample Matrix:
/ X / Water
/ / Soil
/ / Other

Laboratory Supervisor Approval:

FIELD SAMPLE NUMBER	LABORATORY SAMPLE NUMBER	CHROMIUM mg/L	HEXAVALENT CHROMIUM mg/L
1-10	90101386	0.75	---
2-10	90101387	1.1	---
3-10	90101388	1.3	---
4-10	90101389	1.3	0.766
5-10	90101390	1.3	---
EPA METHOD NO.		7190	SM312B
DATE OF ANALYSIS		10/23	10/23

2/2

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ES ENGINEERING-SCIENCE

2585 CHANTILLY DRIVE, N.E. • ATLANTA, GEORGIA 30324 • 404/325-5923 • FAX 404/982-9159

November 1, 1990

Mr. Neville W. Kingham,
Technical Director
4000 Dekalb Technology Parkway, N.E.
Suite 200
Atlanta, GA 30340

Dear Mr. Kingham:

Please find enclosed the analytical results summary for the water samples received at our laboratory on October 30, 1990. If you have any questions, please contact our laboratory at your convenience.

Thank you for your continued confidence in Engineering-Science laboratory services.

Sincerely,

ENGINEERING-SCIENCE, INC.

David M. Jones,
Laboratory Manager

Enclosure

PRAIRIE
Engineering-Science

ANALYTICAL RESULTS SUMMARY

ES Job No. ZA071
Client MR. NEVILLE KINGHAM, KIBER ASSOCIATES, INC.
Project PRAIRIE METALS
Date Collected 10/30/90
Date Received 10/30/90

Sample Matrix:
/ X / Water
/ / Soil
/ / Other

Laboratory Supervisor Approval:

FIELD SAMPLE NO.	LABORATORY SAMPLE NO.	CHROMIUM mg/L	HEXAVALENT CHROMIUM mg/L
1-15	90101472	0.71	---
2-15	90101473	0.87	---
3-15	90101474	1.1	1.02
4-15	90101475	0.93	---
5-15	90101476	1.1	---
EPA METHOD NO.		7190	SM312B
DATE OF ANALYSIS		10/30	10/30

ES ENGINEERING-SCIENCE

2585 CHANTILLY DRIVE, N.E. • ATLANTA, GEORGIA 30324 • 404/325-5923 • FAX 404/982-9159

November 9, 1990

Mr. Neville W. Kingham,
Technical Director
4000 Dekalb Technology Parkway, N.E.
Suite 200
Atlanta, GA 30340

Dear Mr. Kingham:

Please find enclosed the analytical results summary for the samples received at our laboratory on November 1, 1990. If you have any questions, please contact our laboratory at your convenience.

Thank you for your continued confidence in Engineering-Science laboratory services.

Sincerely,

ENGINEERING-SCIENCE, INC.

David M. Jones,
Laboratory Manager

Enclosure

PMII
Engineering-Science

ANALYTICAL RESULTS SUMMARY

ES Job No. ZA071
Client MR. NEVILLE KINGHAM, KIBER ASSOCIATES, INC.
Project PRAIRIE METALS
Date Collected 11/1/90
Date Received 11/1/90

Sample Matrix:
/ / Water
/ / Soil
/ X / Other

Laboratory Supervisor Approval:

Parameter	Field Sample No. Laboratory Sample No.	SAMPLE NO.2 90111001	% RECOVERY OF MATRIX SPIKE	EPA Method No.	Date of Analysis
ARSENIC, mg/L *		<0.010	100	7061	11/8
BARIUM, mg/L *		<10	100	7080	11/7
CADMIUM, mg/L *		<0.05	98.1	7130	11/6
CHROMIUM, mg/L *		0.78	120	7190	11/6
LEAD, mg/L *		<0.10	95.7	7420	11/6
MERCURY, mg/L *		<0.010	107	7470	11/9
SELENIUM, mg/L *		<0.010	120	7741	11/8
SILVER, mg/L *		<0.10	103	7760	11/7

* CONCENTRATION IN TCLP LEACHATE PER EPA METHOD 1311.