

I.D. SYSTEMS LTD.
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xc: D. Edger
DLW/Oct. 8/91*el



7 October 1991

Mr. D.L. Wotton
Director, Winnipeg Region
Environmental Operations
Building 2
139 Tuxedo Avenue
Winnipeg, Manitoba
R3N 0H6

Dear Mr. Wotton:

RE: Manitoba Department of Environment Order #0457

Please find enclosed a table summarizing the dissolved lead concentrations of seven groundwater samples taken on 9 September 1991. This table should be appended to our original report "INVESTIGATION INTO LEAD CONTAMINATION AT NORTH WEST SMELTING & REFINING LTD., 2185 LOGAN AVENUE, WINNIPEG, MANITOBA". These seven testholes were resampled because of an anomalously high lead concentration for TH10 revealed during the original laboratory analysis.

Please consider these results when reviewing the report and do not hesitate to call me if you have any questions or concerns.

Yours Truly,

I.D. SYSTEMS LTD.

G.B. Murray, P. Eng.
Manager, Engineering Services

cc: C.L. Chappell - Aikens, MacAuley & Thorvaldson
attach.





**Supplementary Laboratory Groundwater Analysis
of Northwest Smelting & Refining
Department of Environment Order #0457**

SAMPLE DESCRIPTION	LEAD CONCENTRATIONS (mg/L)	
	June 1991	September 1991
TH1	0.085	0.035
TH3	0.035	0.011
TH5	0.150	0.105
TH8	0.055	0.093
TH10	3.000	0.087
TH12	0.055	**
TH14	0.075	0.110
TH15	0.060	**
TH16	0.110	0.190

** not sampled in September 1991.



TABLE 1: NWSR - Laboratory Soil Analysis

Sample Description	Depth (M)	Depth (ft)	Leachate (mg/L)	Total Lead (ug/g)
1R1	0 - 0.2	0 - 0.5	0.15	37
1R2	0.3 - 0.5	1.0 - 1.5	0.06	30
1R3	0.6 - 0.8	2.0 - 2.5	424	115000
1R7	2.3 - 2.4	7.5 - 8.0	59.1	65800
1R8	2.9 - 3.2	9.5 - 10.5	57.6	13100
1R9	3.8 - 4.1	12.5 - 13.5	0.14	503
1R10	4.9 - 5.2	16.0 - 17.0	<0.04	68
2R1	0 - 0.2	0 - 0.5	0.45	235
2R2	0.6 - 0.9	2.0 - 3.0	152	5700
3R1	0 - 0.2	0 - 0.5	44.6	5820
3R2	0.3 - 0.5	1.0 - 1.5	37.7	725
3R3	0.9 - 1.1	3.0 - 3.5	55.8	2370
3R6	2.3 - 2.4	7.5 - 8.0	15.6	20200
3R7	2.7 - 2.9	9.0 - 9.5	1.0	244
3R8	3.5 - 3.7	11.5 - 12	2.21	629
4R1	0 - 0.2	0 - 0.5	0.76	138
4R3	0.9	3.0	101	18800
5R1	0 - 0.2	0 - 0.5	15.1	1440
5R2	0.3 - 0.5	1.0 - 1.5	27.2	6620
5R3	0.9 - 1.1	3.0 - 3.5	60.0	17500
5R6	2.1 - 2.7	7.0 - 9.0	82.0	39800
6R1	0 - 0.2	0 - 0.5	1.03	286
6R2	0.6 - 1.1	2.0 - 3.5	56.0	158000
7R1	0 - 0.2	0 - 0.5	40.0	2950
7R3	1.2 - 1.5	4.0 - 5.0	110	57100
8R1	0 - 0.2	0 - 0.5	142	85500
8R2	0.3 - 0.5	1.0 - 1.5	65.6	51900
8R4	1.4 - 1.5	4.5 - 5.0	166	197000
8R6	2.3 - 2.4	7.5 - 8.0	58.8	40900
8R7	2.7 - 2.9	9.0 - 9.5	7.45	2970

TABLE 1: NWSR - Laboratory Soil Analysis Con't

Sample Description	Depth (M)	Depth (ft)	Leachate (mg/L)	Total Lead (ug/g)
9R1	0 - 0.2	0 - 0.5	113	12100
9R3	0.8 - 1.1	2.5 - 3.5	2.00	510
10R1	0 - 0.2	0 - 0.5	76.0	77000
10R2	0.2 - 0.5	0.5 - 1.5	74.0	62500
10R3	0.9 - 1.1	3.0 - 3.5	61.8	45700
10R4	1.4 - 1.7	4.5 - 5.5	7.2	2590
10R5	1.8 - 2.1	6.0 - 7.0	1.51	84
10R6	2.3 - 2.4	7.5 - 8.0	0.16	92
11R1	0 - 0.2	0 - 0.5	62.2	69800
11R2	0.9 - 1.1	3.0 - 3.5	0.59	754
12R1	0 - 0.2	0 - 0.5	62.8	75100
12R2	0.3 - 0.6	1.0 - 2.0	104	31200
12R3	0.9 - 1.2	3.0 - 4.0	0.14	54
12R4	1.4 - 1.5	4.5 - 5.0	1.85	96
13R1	0 - 0.2	0 - 0.5	92.6	95700
13R2	0.9 - 1.1	3.0 - 3.5	23.0	701
14R1	0 - 0.2	0 - 0.5	99.6	93800
14R2	0.2 - 0.5	0.5 - 1.5	98.0	78900
14R3	0.9 - 1.1	3.0 - 3.5	92.0	10100
14R4	1.4 - 1.5	4.5 - 5.0	20.0	8280
14R5	1.8 - 2.0	6.0 - 6.5	1.42	1010
14R6	2.3 - 2.4	7.5 - 8.0	0.04	2170
15R1	0 - 0.2	0 - 0.5	53.2	107000
15R2	0.3 - 0.5	1.0 - 1.5	32.4	90700
15R3	0.9 - 1.1	3.0 - 3.5	97.6	10900
15R5	1.8 - 2.0	6.0 - 6.5	97.8	20000
15R6	2.3 - 2.4	7.5 - 8.0	2.77	1660
15R7	2.7 - 2.9	9.0 - 9.5	.052	188

TABLE 1: NWSR - Laboratory Soil Analysis Con't

Sample Description	Depth (M)	Depth (ft)	Leachate (mg/L)	Total Lead (ug/g)
16R1	0 - 0.2	0 - 0.5	85.5	45400
16R2	0.3 - 0.5	1.0 - 1.5	51.2	105000
16R3	0.9 - 1.1	3.0 - 3.5	130	40900
16R5	1.8 - 2.0	6.0 - 6.5	0.15	203
16R6	2.3 - 2.4	7.5 - 8.0	0.14	395
16R7	2.7 - 2.9	9.0 - 9.5	0.31	111
17R1	0 - 0.2	0 - 0.5	27.5	5870
17R2	0.7 - 1.1	2.5 - 3.5	0.79	293

At a depth of 2.0 - 2.5 M (6.5-8.2 ft) the total lead and leachate contamination is concentrated in the northern third of the property, the area of landfilled refinery and battery recycling debris and an area of total lead contamination is centred around TH14 and 15, as shown on FIGURE 4. At a depth of 2.5 - 3.5 M (8.2-11.5 ft) total lead and leachate contamination exists in the north west third of the property, a small plume of total lead contamination is centred around TH14, as shown on FIGURE 5.

The vertical extent of contamination was not delineated in TH1, TH5, TH8 and TH14. To minimize the further migration of contamination into the undisturbed overburden the test holes were extended into the water table or into the undisturbed till. It was originally expected that the contamination had not migrated into the undisturbed overburden.

3.3.2 GROUND WATER ANALYSIS

Nine ground water samples collected from the piezometers were submitted for analysis of dissolved lead concentration. The laboratory report is attached as APPENDIX C. The results of the analysis are presented as TABLE 2. All water samples were revealed to be contaminated, they contained dissolved lead concentrations in excess of the Guidelines for Canadian Drinking Water Quality of 0.01 mg/L. The dissolved lead concentration ranged from 0.055 for TH8 and TH12 to 3.0 mg/L for TH10.

TABLE 2: NWSR - Laboratory Ground Water Analysis

SAMPLE DESCRIPTION	LEAD (mg/L)
TH1	0.085
TH3	0.035
TH5	0.150
TH8	0.055
TH10	3.00
TH12	0.055
TH14	0.075
TH15	0.060
TH16	0.110

The dissolved lead concentration of 3.0 mg/L revealed for TH10 during the laboratory analysis is surprisingly high, as the subsurface total lead concentration, 77,000 ug/g and leachate concentration, 76.0 mg/L were high but not the highest found on the property. With this in mind it has been decided to resample and analyze the groundwater. The results will confirm/dispel the relatively high reading obtained from TH10. Results of this resampling will be forwarded upon their availability.

3.4 GROUND WATER CONDITIONS

Surface ground water was encountered in seven of the seventeen testholes. All piezometers contained water after they were allowed to sit undisturbed for two weeks. Depth to water level readings were collected on three occasions. From these readings the elevation of the ground water table was determined, the ground water table elevations are presented as TABLE 3.

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*Rec. Sept 6/91
By Courier*

September 5, 1991

Mr. D.L. Wotton
Director, Winnipeg Region
Environmental Operations
Building 2
139 Tuxedo Avenue
Winnipeg, Manitoba
R3N 0H6

Dear Mr. Wotton:

RE: Manitoba Department of Environment Order #0457

Please find enclosed a copy of the report detailing the results of Section 2 of the aforementioned order. This report is submitted on behalf of our client in accordance with the provisions of the order.

Once your staff has reviewed the report, we would appreciate a meeting to discuss the contents.

Yours truly,

I.D. SYSTEMS LTD.

A handwritten signature in blue ink, appearing to read 'G.B. Murray'.

G.B. Murray, P. Eng.

cc: C. Chappel - Aikens, MacAuley & Thorvaldson
attach.

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G.B. Murray, P. Eng.

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**INVESTIGATION INTO LEAD
CONTAMINATION AT NORTH WEST
SMELTING & REFINING LTD.
2185 LOGAN AVENUE
WINNIPEG, MANITOBA**

Prepared for:

Mr. C.L. Chappell
Aikens, MacAulay & Thorvaldson
30th Floor
Commodity Exchange Tower
360 Main Street
Winnipeg, Manitoba
R3C 4G1



August 1991

Report Distribution: Environment- 1 copy; Aikens, MacAulay
& Thorvaldson -2 copies; I.D. Systems Ltd.- 2 copies

Privileged & Confidential

Executive Summary:

On January 21, 1991 Manitoba Environment issued an order (Order #0457) to North West Smelting and Refining Ltd (NWSR) to perform an investigation to determine the degree and extent of lead contamination in the soil, the leachability of the lead in the soil and if the groundwater has been contaminated with lead.

Nine (9) piezometers and eight (8) shallow test holes were installed on the North West Smelting and Refining property.

Each piezometer is constructed of slotted 508 mm (2 in) PVC pipe covered with geosox, the upper 0.6 M (2 ft) of the piezometer is solid PVC pipe. The piezometers were installed into the water table or the undisturbed till, the piezometer depths range from 2.4 to 5.2 M (8 - 17 ft). Piezometer boreholes were not extended deeper than the upper 2 M (6 ft) of the undisturbed till interface as to minimize the migration of lead contamination deeper into the overburden.

Soil samples were collected at the following intervals:

0 - 0.2 M
0.2 - 0.5 M
0.9 - 1.1 M
1.4 - 1.5 M
1.8 - 2.0 M
2.3 - 2.4 M
2.7 - 2.9 M
3.5 - 4.1 M
4.9 - 5.2 M

A total of sixty-six (66) soil samples were analyzed for total lead and leachate (concentration in extract) concentration.

The total lead concentration varied from 197,000 ug/g to 30 ug/g and the leachate concentration varied from 166 mg/L to <0.04 mg/L. TH8 had the highest concentration of lead contamination and TH1 had the lowest lead concentration. All testholes were found to be contaminated, the lead concentration varied with depth.

From the surface to a depth of 0.2 M (0.6 ft) all testholes were contaminated except TH1, TH2 and TH6, as shown on FIGURE 2. At a depth of 0.6 - 1.5 M (2-5 ft) the contamination is limited to total lead in the area surrounding TH10 and total lead and leachate contamination in portions of the north half of the property.

At a depth of 2.0 - 2.5 M (6.5-8.2 ft) the total lead and leachate contamination is concentrated in the northern third of the property, the area of landfilled refinery and battery recycling debris and an area of total lead contamination is centred around TH14 and 15. At a depth of 2.5 - 3.5 M (8.2-11.5 ft) total lead and leachate contamination exists

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