JBM MANTZUD

central foundry

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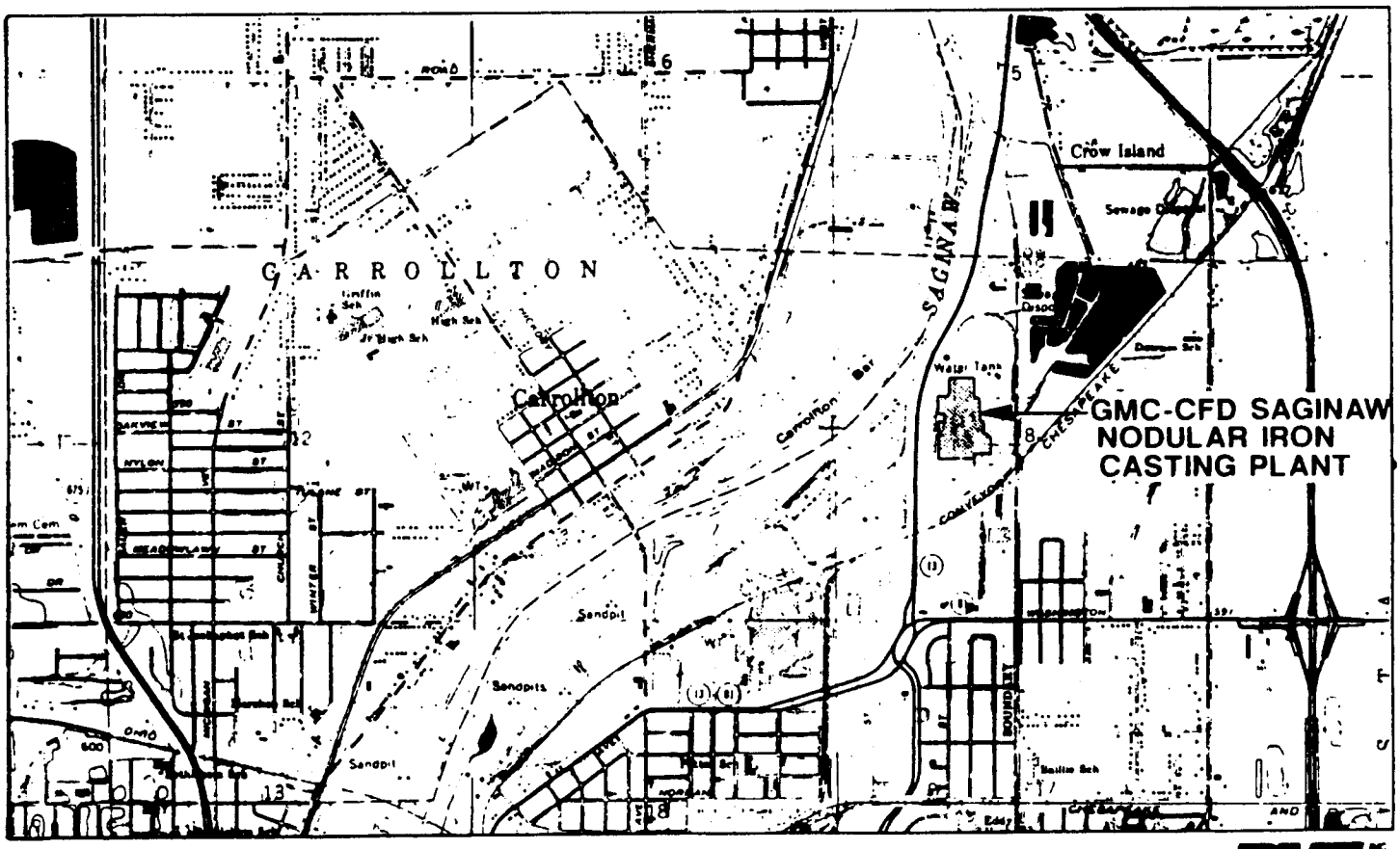
SAGINAW NODULAR IRON CASTING PLANT
SAGINAW, MICHIGAN

DOCUMENTATION REPORT FOR RCRA CLOSURE OF AN EXISTING CALCIUM CARBIDE DESULFURIZATION SLAG TREATMENT BUNKER



RMT INC

Central Foundry Division
General Motors Corporation
[illegible] Division
77 W. Center St.
Saginaw, Michigan 48605-5073

October 30, 1991

Certified Mail #P434108287
Return Receipt Requested

Ms. Cheryl Howe
Senior Environmental Planner
Waste Management Division
Michigan Department of Natural Resources
P.O. Box 30028
Lansing, Michigan 48909

Re: Documentation Report for RCRA Closure of an Existing Calcium Carbide Desulfurization Bunker Saginaw Nodular Iron Plant MID 041 793 340.

Dear Ms. Howe:

Attached are four (4) copies of the Documentation Report for RCRA Closure of an Existing Calcium Carbide Desulfurization Bunker for the Central Foundry Division, GMC Saginaw Nodular Iron Plant MID 041 793 340. As I described in my August 26, 1991 letter to you, additional static water levels were taken and the wells were resurveyed in an attempt to determine site ground water flow patterns. The results of this additional work is included in the Documentation Report.

Based upon the information contained in the Documentation report Central Foundry Division is in the process of retaining the services of a soil chemist/hydrogeologist to review the data and the Documentation Reports to determine future actions required.

If you have any questions please contact Wendy Barrott at 517-757-0414 or myself at 517-757-0423.

JB Medved, P.E.

Joseph B. Medved, P.E.
Senior Administrator -
Environmental Activities

RMT INC.

Great Lakes Office
325 S. Clinton Street
P.O. Box 447
Grand Ledge, MI 48837
Phone: 517-627-4044
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DOCUMENTATION REPORT FOR RCRA CLOSURE OF EXISTING CALCIUM CARBIDE DESULFURIZATION SLAG TREATMENT BUNKER

PREPARED FOR
GENERAL MOTORS CORPORATION
CENTRAL FOUNDRY DIVISION
SAGINAW NODULAR IRON PLANT
SAGINAW, MICHIGAN

OCTOBER 1991

Craig B. Campbell
Hydrogeologist

James R. Burns, P.E.
Group Leader
Engineering & Technical Services

Thomas J. Jancek
Project Manager

1125.23 sni1018

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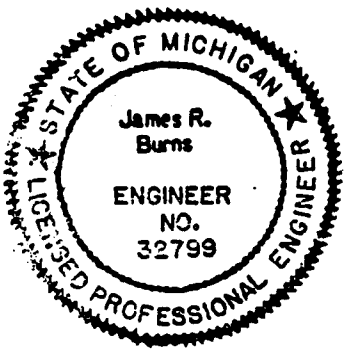
Appendix D - Ground Water Monitoring Well Locations, Well Logs and Boring Logs
Appendix E - Ground Water Analytical Results
Appendix F - Ground Water Flow Direction Contour Map
Appendix G - Statistical Analysis of Ground Water Monitoring Data

CERTIFICATION OF CLOSURE

The information submitted in this report is to the best of my knowledge and belief, true, accurate, and complete, and the closure activities for these units have been conducted in conformance with the approved closure plan.



James R. Burns, P.E.
Group Leader
Engineering and Technical Services

Gerald A. Collins
General Manager
Central Foundry Division

1125.23 sni1018

1. INTRODUCTION

1.1 Background

The General Motors Corporation Central Foundry Division, Saginaw Nodular Iron (GMC-CFD-SNI) plant manufactured nodular iron castings. During the manufacturing process, GMC-CFD-SNI added calcium carbide to reduce the sulfur content in the molten iron. This step was necessary to produce ductile iron with appropriate metallurgical properties. The slag generated by this process was known as calcium carbide desulfurization slag, and contained small quantities (one to three percent) of unreacted calcium carbide. When unreacted calcium carbide in the slag came into contact with water, a combustible gas (acetylene) was formed as a reaction product. Therefore, calcium carbide desulfurization slag was a potential hazardous waste by the characteristic of reactivity (D003).

The treatment technique used to render the slag non hazardous involved eliminating the ability of the slag to generate acetylene gas. This was accomplished by placing the waste in a waste pile, spraying the waste with a mixture of water, potassium permanganate, and a surfactant.

The GMC-CFD-SNI plant began preparing a closure plan for the existing calcium carbide desulfurization slag treatment bunker in mid-1987 and submitted the closure plans to the Michigan Department of Natural Resources (MDNR) in December 1987. The closure plan described the activities, tests, and closure performance standards used to document the closure of the bunker in accordance with Michigan Public Act 64. The following documents relate to the submittal, modification, and approval of the closure plan for the existing calcium carbide desulfurization slag treatment bunker:

- Interim Status Closure Plan for Existing Calcium Carbide Desulfurization Slag Treatment Bunker, December 1987.
- Addenda for RCRA Closure Plans, May 1988.
- Closure of Four RCRA Units March 1989 Meeting with the MDNR, March 1989.

- Ground Water Monitoring Program for RCRA Closure of Two Calcium Carbide Desulfurization Slag Waste Management Units, November 1990.

Appendix A contains MDNR correspondence related to these documents.

1.2 Purpose and Scope

The purpose of this report is to describe the MDNR-approved closure activities performed by GMC-CFD-SNI to document that soils at depths of 0-4 feet below ground surface containing "above background" concentrations of the constituents of concern have been removed from the unit. These closure activities were proposed to MDNR in the previously listed reports, and were subsequently approved by MDNR.

This report also includes a summary of the ground water monitoring aspects of the approved closure activities.

The scope of this report includes the following:

- A description of the closure performance standard and specifications.
- A description of the previous treatment, removal and disposal of the calcium carbide desulfurization slag waste.
- A description of the impacts of the calcium carbide desulfurization slag treatment on the underlying soils by means of establishing background concentrations, sampling and analyzing soils within and adjacent to the hazardous waste management unit and the evaluation of those results.
- A description of the removal of concrete.
- A description of the excavation of the impacted soils, depth determinations and methods to prevent track-out.
- A description of equipment decontamination between sites.
- A description of final decontamination of equipment.
- A description of the backfill and final cover procedures.
- A description of the post-excavation sampling activities and analytical results.
- A discussion of ground water monitoring results.

The scope of RMT's involvement in the closure process has included the following:

- Assist GMC-CFD-SNI in the development of a closure plan for the existing calcium carbide desulfurization slag treatment bunker.
- Collect and analyze soil samples from background locations for the parameters defined in the approved closure plan.
- Observe the removal of existing concrete and decontamination of excavation equipment.
- Observe the removal and disposal of the impacted soils.
- Collect and analyze soil samples from the excavation sidewalls for the parameters defined in the approved closure plan.
- Observe the backfill and final cover operation.
- Review ground water data provided by GMC-CFD-SNI and interpret the data in accordance with the November 1990 ground water plan.

2. CLOSURE PERFORMANCE STANDARD AND SPECIFICATIONS

The closure performance standard specified in the MDNR approved closure plan is detailed below:

1. Minimization of further maintenance.

2. Control, minimize, or eliminate to the extent necessary to protect human health and the environment, post-closure escape of hazardous waste, hazardous waste constituents, leachate, contaminated rainfall, or waste decomposition products to ground or surface waters or to the atmosphere.

The closure of the existing calcium carbide desulfurization slag treatment bunker consisted of the following elements:

1. Evaluation of underlying soils
2. Removal of concrete
3. Excavation of impacted soils
4. Evaluation of the remaining sidewall soils
5. Decontamination of equipment
6. Backfill and compaction of excavation

This closure documentation report details how closure activities were conducted at the site to achieve the above referenced closure performance standard for the "non groundwater-related" aspects of the approved closure activities. The ground water monitoring program has been evaluated and is also discussed in this document.

3. DOCUMENTATION OF CLOSURE ACTIVITIES

3.1 Treatment and Removal of the Hazardous Waste

The slag generated during the manufacturing process of nodular iron is known as calcium carbide desulfurization slag, which contains small quantities of unreacted calcium carbide. The calcium carbide becomes reactive with water and forms acetylene as a reaction product. Therefore, the slag was a hazardous waste by the characteristic of reactivity (D003).

The treatment technique used to render the slag nonhazardous involved eliminating the ability of the slag to generate acetylene gas. This was accomplished by placing the waste in a waste pile, spraying the waste with a mixture of water, potassium permanganate, and a surfactant.

During the active life of the Existing Calcium Carbide Desulfurization Treatment Bunker, the reacted slag, which is classified as non hazardous, was removed from the treatment area and disposed of in the Crow Island Landfill. The active life of the bunker ended in December 1987, when GMC-CFD-SNI stopped generating calcium carbide desulfurization slag.

3.2 Evaluation of Impacts of the Existing Calcium Carbide Desulfurization Slag Treatment Bunker on the Underlying Soils

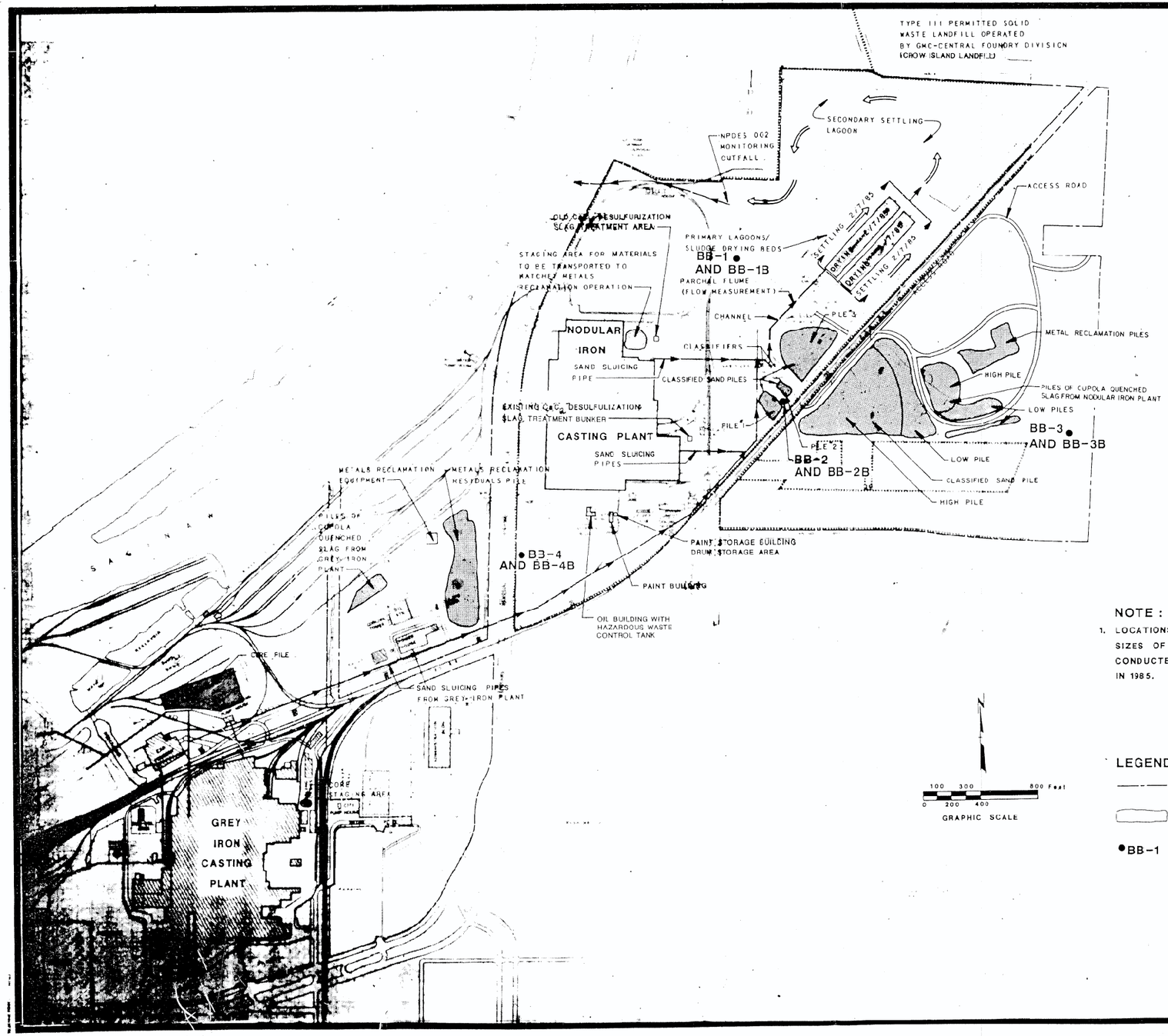
To determine the impacts of the existing calcium carbide desulfurization slag treatment bunker on the underlying soils, a soil sampling plan was developed (Interim Status Closure Plan For Existing Calcium Carbide Desulfurization Slag Treatment Bunker). The background sampling and analysis plan was conducted between September 1987 and July 1988 and is summarized in section 3.2.1. The bunker soil sampling and analysis plan was also conducted between September 1987 and July 1988, and is summarized in section 3.2.2. The specific methods and procedures are described in the reports listed in Section 1.1.

3.2.1 Establishment of Background Conditions

Prior to beginning on-site closure activities, soil samples were collected from four background soil borings located in areas believed to be unaffected by calcium carbide desulfurization slag handling, treatment, storage and disposal. The locations of the four background borings are detailed in Figure 3-1. The analytical results of the soil samples from these background borings were used to establish the upper 99% prediction limit for background concentrations of arsenic, barium, cadmium, chromium, copper, fluoride, lead, mercury, phenols, selenium, silver and zinc. This data is summarized in Table 3-1.

3.2.2 Sampling of Underlying Soils Near Treatment Bunker

As described in the approved closure plan, a sampling and analysis plan was implemented to determine potential impacts of the existing calcium carbide desulfurization slag treatment bunker on underlying soils. The sampling procedures were completed in accordance with the MDNR-approved closure plan. Soil sample locations are identified in Figure 3-2. (Figure 3-2 also identifies the post-excavation sample locations described in section 4 of this report.) The results from the underlying soil samples were statistically compared with the upper 99% prediction limit for background soil samples. Underlying soil samples with parameter concentrations in excess of the upper 99% prediction limit for the background soils were considered impacted from the existing calcium carbide desulfurization slag treatment bunker. Table 3-2 summarizes the results of the soil sampling program.



NOTE :

1. LOCATIONS, DESCRIPTIONS AND APPROXIMATE SIZES OF PILES ARE BASED ON AN INVENTORY CONDUCTED BY RMT AND CFD STAFF MEMBERS IN 1985.

LEGEND

——— APPROXIMATE CFD PROPERTY LINE

STOCKPILE

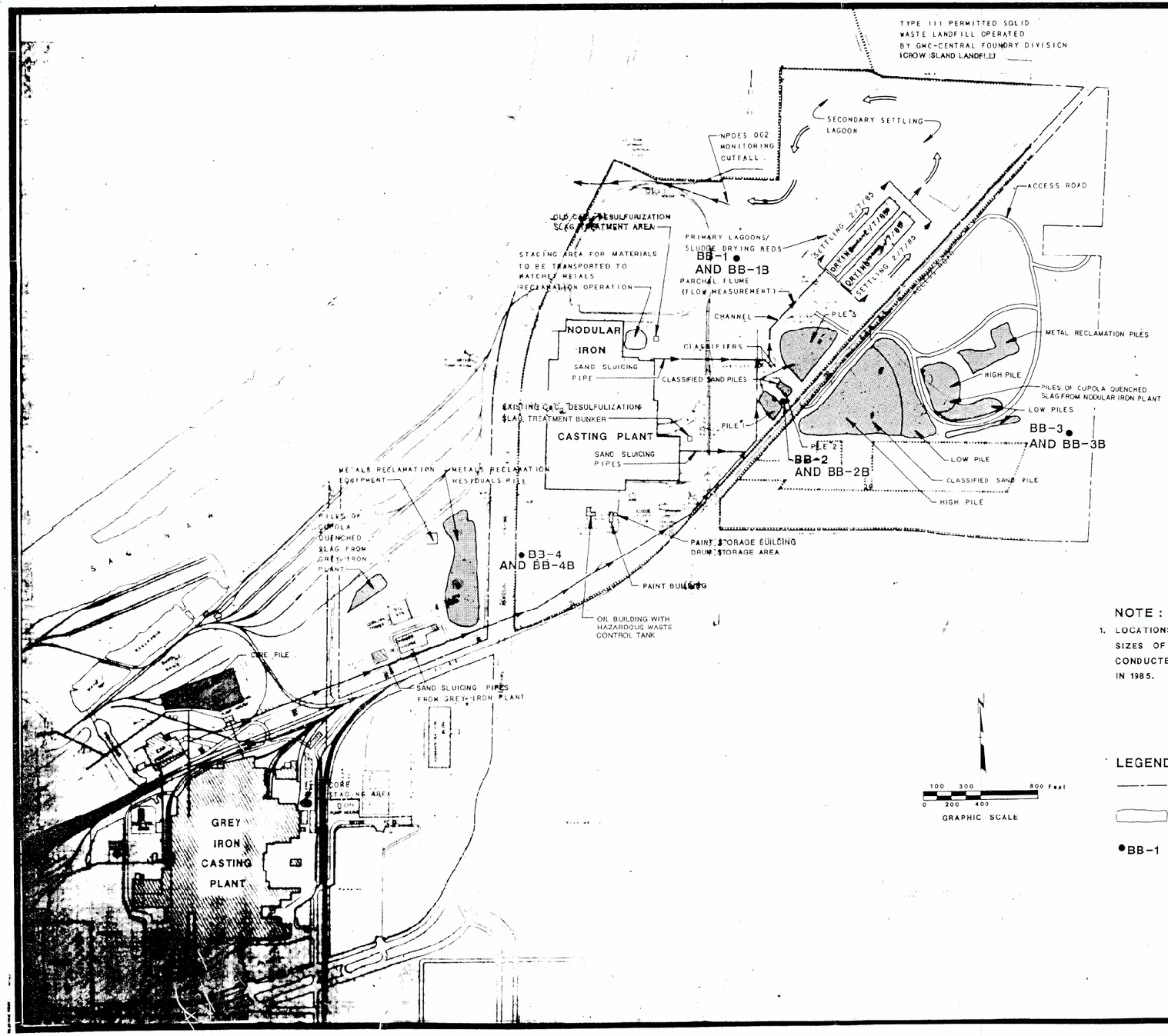
●BB-1 BACKGROUND BORING LOCATION AND NUMBER

PROJECT: CLOSURE DOCUMENTATION REPORT FOR EXISTING CaC2 DESULFURIZATION SLAG TREATMENT BUNKER GM-CFD SAGINAW, MICHIGAN

SHEET TITLE: BACKGROUND SAMPLE LOCATIONS

DRAWN: DRB	SCALE: AS SHOWN	JOB NO: 125.22
CHECKED:	DATE PLOTTED:	SHEET: FIGURE 3-1
DATE: AUGUST, 1989		

RMT
744 Heartland Trail
P.O. Box 8083
Madison WI 53708
Phone: 608-831-4444



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CHECKED:	DATE PLOTTED:	SHEET: FIGURE 3-1
DATE: AUGUST, 1989		

RMT
744 Heartland Trail
P.O. Box 8083
Madison WI 53708
Phone: 608-831-4444

TABLE 3-1

GMC – CFD – SAGINAW NODULAR IRON PLANT
BACKGROUND SOIL SAMPLE RESULTS

PARAMETER / SAMPLE LOCATION / SAMPLE DEPTH (feet)	Background 99% Prediction Limit	BB-1B (0-2)	BB-1 (1-3)	BB-1 (5-6)	B-1B (8-10)	BB-2B (0-2)	BB-2 (1-2.5)	BB-2B (4-6)	BB-2 (5.5-6.5)	BB-3B (0-2)	BB-3 (0.5-1.5)	BB-3 (4-5)	BB-3B (10-10)	BB-4B (0-2)	BB-4 (1-2)	BB-4 (3-4)	BB-4B (4-6)	SAMPLE MEAN*
Arsenic	16	3.6	10	8.6	2.6	1.3	8.4	4.7	4.8	3.7	14	12	2.5	2.3	4.5	1.8	4.6	5.6
Barium	250	63	NS	NS	NS	110	NS	NS	NS	81	NS	NS	NS	25.00	NS	NS	NS	70.00
Cadmium	1.6	<0.52	1.2	<1.0	<0.62	<0.49	<1.0	<1.2	<1.0	<0.53	<1.0	<1.0	<0.57	<0.50	<1.0	<1.0	<0.64	0.43
Chromium	178	63	NS	NS	15	140	NS	32*	NS	38	NS	NS	13	22	NS	NS	43	48
Copper	137	58	NS	NS	NS	25	NS	NS	NS	21	NS	NS	NS	7.0	NS	NS	NS	28.00
Fluoride	10,300	930	NS	NS	1000	61	NS	240	NS	860	NS	NS	329	200	NS	NS	6300	1490
Lead	136	140	120	18	18	15	32	<12	<10	26	15	<10	14	17	<10	<10	14	28
Mercury	0.261	<0.093	NS	NS	NS	<0.073	NS	NS	NS	<0.083	NS	NS	NS	<0.079	NS	NS	NS	0.036
Phenols	3.3	<1.4	NS	NS	<1.5	<1.3	NS	<1.5	NS	<1.3	NS	NS	<1.4	<1.3	NS	NS	<1.6	0.75
Selenium	1.5	<0.88	0.78	<0.60	<0.99	<0.81	<0.60	<0.96	<0.60	<0.86	<0.60	<0.60	<0.91	<0.83	<0.60	<0.60	<1.0	0.36
Silver	3.4	<1.1	NS	NS	NS	<1	NS	NS	NS	<1	NS	NS	NS	<1	NS	NS	NS	0.50
Zinc	1050	650	NS	NS	22	600*	NS	140	NS	40	NS	NS	32	43	NS	NS	24	194

Concentrations in mg/kg dry weight.

* – Indicates sample matrix interferences.

** – For concentrations below the detection limits, "o" and the detection value were alternately used in the statistical calculations.
Prediction limit – X+(t α,v)(1 + 1/n)0.5(σ); where X= mean, number of samples, σ = standard deviation, α and v are the level of significance and degrees of freedom for the critical value (t) from a. t = distribution

NS– Soil in these locations were not analyzed for this parameter.

GMC - CFD - SNI EXISTING CALCIUM CARBIDE DESULFURIZATION SLAG TREATMENT BUNKER CLOSURE DOCUMENTATION SAMPLE LOCATIONS

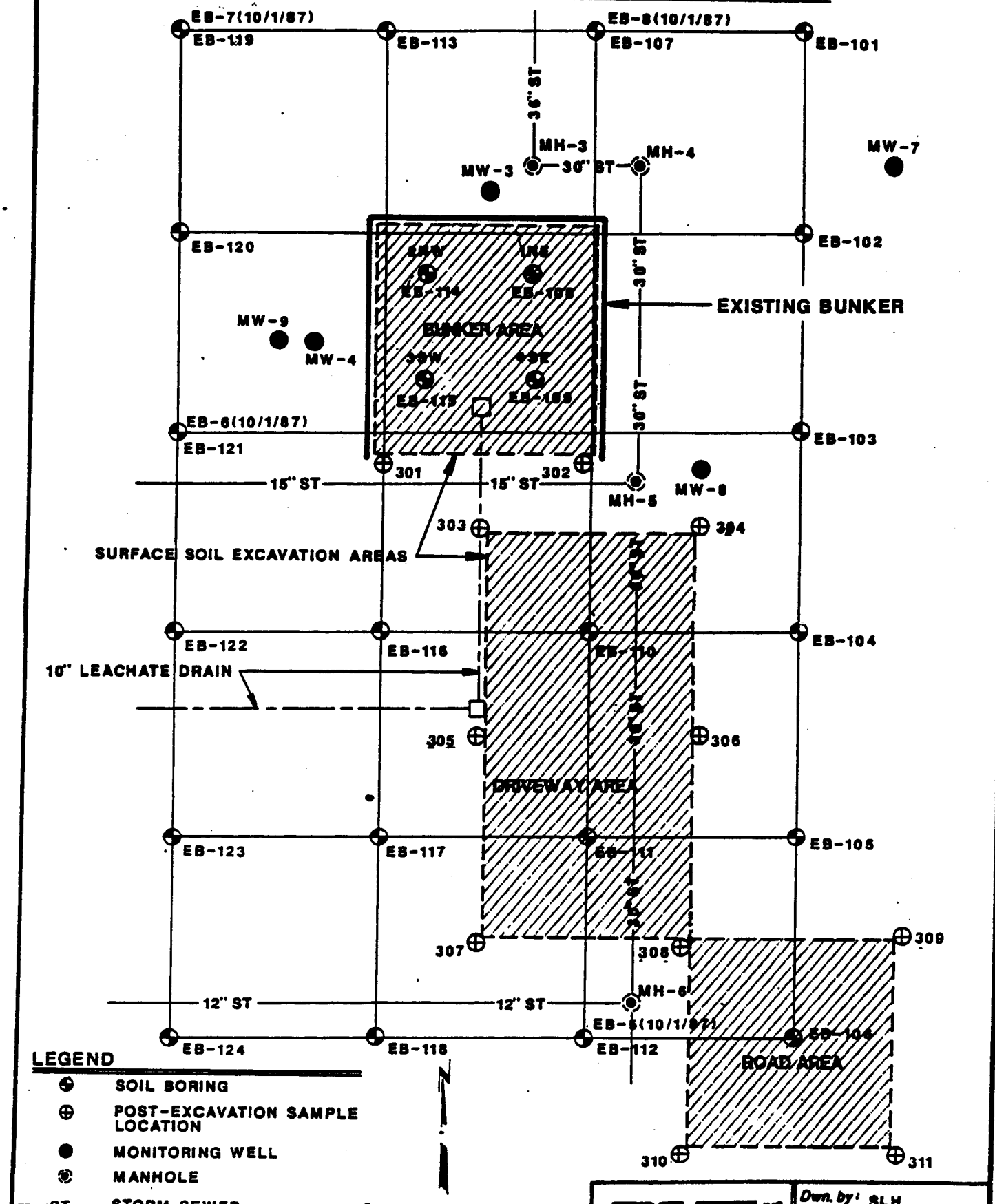


FIGURE 3-2

TABLE 3-2

GMC – CFD – SAGINAW NODULAR IRON PLANT
Compositional Analytical Results for Soil Samples of
Existing Calcium Carbide Desulfurization Slag Treatment Bunker

CHEMICAL PARAMETER	UNITS	Background 99% Prediction Limit	Sampling Location and Depth (feet)											
			EB-101 0-2	EB-101 4-6	EB-101 10-12	EB-102 0-2	EB-102 8-10	EB-102 12-14	EB-103 0-2	EB-103 4-6	EB-103 10-12	EB-104 0-2	EB-104 4-6	EB-104 10-12
Arsenic	mg/kg	16	4.7*	1.6*	5.5	2.7	0.8	10	2.0	1.9	0.9	2.3	3.8	1.8
Cadmium	mg/kg	1.8	<0.6	<0.6	1.1	<0.6	<0.6	<1.1	<0.5	<0.6	<0.6	<0.5	<0.7	<0.7
Chromium	mg/kg	178	110*	14*	12	64*	85	14.0	<1	<1	7.9	32	29	12
Fluoride	mg/kg	10,300	1200	475	150	510	370	150	640	76	190	370	530	180
Lead	mg/kg	138	<11	57*	<19	<11	<12	<12	<11	<12	<13	<11	<13	<14
Phenols	mg/kg	3.3	<1.4	<1.6	<2.4	<1.4	<1.5	<2.8	<1.3	<1.5	<1.6	<1.4	<1.7	<1.7
Selenium	mg/kg	1.5	<0.6	<0.7	<1.1	<0.6	<0.7	<1.3	<0.64	<0.71	<0.77	<0.7	<0.8	<0.8
Zinc	mg/kg	1050	250*	36*	36	170*	170	48	<2	<2	18	130	23	26
Calcium Carbide** Reactivity	mg/kg													

NOTES: * Indicates sample matrix inteferences.
** Per March 10, 1989 agreement with MDNR, it was agreed that this parameter did not need to be analyzed.

TABLE 3-2 (cont'd)

GMC – CFD – SAGINAW NODULAR IRON PLANT
Compositional Analytical Results for Soil Samples of
Existing Calcium Carbide Desulfurization Slag Treatment Bunker

CHEMICAL PARAMETER	UNITS	Background 99% Prediction Limit	Sampling Location and Depth (feet)											
			EB-105 0-2	EB-105 6-8	EB-105 8-10	EB-106 0-2	EB-106 2-4	EB-106 12-14	EB-107(a) 0-2	EB-107 4-6	EB-107 10-12	EB-108(b) 0-2	EB-108(b) 4-6	EB-108 8.5-11
Arsenic	mg/kg	16	1.8	4.6	<0.8	2.7	3.3	2.7	9.0	11	5.6	16	11	4.5
Cadmium	mg/kg	1.8	<0.6	<0.7	<0.6	<0.6	<0.6	<0.7	<1.0	<0.7	<0.9	<0.58	<0.77	<0.81
Chromium	mg/kg	178	36	23*	9	40	22	12.0	52	100	11	28	40	24
Fluoride	mg/kg	10,300	2000	200	150	1400	660	190	1800	3700	230	280	290	2800
Lead	mg/kg	138	24	<14	<13	<12	<12	<15	12	<14	<19	11	19	32
Phenols	mg/kg	3.3	<1.5	<1.8	<1.6	5.1	<1.5	<1.8	<1.4	<1.8	<2.4	<1.5	<1.9	<2.0
Selenium	mg/kg	1.5	<0.7	<0.8	<0.8	<0.70	<0.73	<0.88	<0.60	<0.8	<1.1	6.0	2.2	<1.3
Zinc	mg/kg	1050	150	39	22	76	23	29	120	78*	35	32	29	46
Calcium Carbide** Reactivity	mg/kg													

NOTES: * Indicates sample matrix inteferences.
** Per March 10, 1989 agreement with MDNR, it was agreed that this parameter did not need to be analyzed.

TABLE 3-2 (cont'd)

GMC – CFD – SAGINAW NODULAR IRON PLANT
Compositional Analytical Results for Soil Samples of
Existing Calcium Carbide Desulfurization Slag Treatment Bunker

CHEMICAL PARAMETER	UNITS	Background 90% Prediction Limit	Sampling Location and Depth (feet)											
			EB-109(b) 0-2	EB-109(b) 3.5-5.5	EB-109 9-10.5	EB-110 0-2	EB-110 4-6	EB-110 12-14	EB-111 0-2	EB-111 4-6	EB-111 10-12	EB-112(a) 0-2	EB-112 4-6	EB-112 12-14
Arsenic	mg/kg	16	12	16*	3.2	2.2	9.8	3.3	1.4	5.9	1.3	11	2.8	1.5
Cadmium	mg/kg	1.8	<0.57	<0.74	<0.85	<0.5	<0.7	<0.7	<0.6	<0.6	<0.7	<1.0	<0.7	<0.6
Chromium	mg/kg	178	27	10	150*	49	51	14.0	42	44	8.3*	38	30	12
Fluoride	mg/kg	10,300	210	190	170	1800	140	130	4400	170	71	8800	260	140
Lead	mg/kg	138	23	<9	39	<11	<14	<14	<12	<12	<13	18	<13	<13
Phenols	mg/kg	3.3	<1.4	<1.8	<2.1	6.0	<1.8	<1.8	6.5	<1.5	<1.6	<1.5	<1.6	<1.6
Selenium	mg/kg	1.5	3.9	3.3	<1.4	<0.66	<0.85	<0.85	<0.71	<0.75	<0.79	<0.60	<0.79	<0.78
Zinc	mg/kg	1050	43	11	45	160	33	19	270	20	15	380	23	23
Calcium Carbide** Reactivity	mg/kg													

NOTES: * Indicates sample matrix inteferences.
** Per March 10, 1989 agreement with MDNR, it was agreed that this paramater did not need to be analyzed.

TABLE 3-2 (cont'd)

GMC – CFD – SAGINAW NODULAR IRON PLANT
Compositional Analytical Results for Soil Samples of
Existing Calcium Carbide Desulfurization Slag Treatment Bunker

CHEMICAL PARAMETER	UNITS	Background 99% Prediction Limit	Sampling Location and Depth (feet)											
			EB-113 0-2	EB-113 4-6	EB-113 6-8	EB-114(b) 0-2	EB-114(b) 4-5.5	EB-114 9-11	EB-115(b) 0-2	EB-115(b) 4-6	EB-115 9.5-11.5	EB-116 0-2	EB-116 6-8	EB-116 10-12
Arsenic	mg/kg	16	7.2*	3.8	6.1	11	81	6.4	10	21*	8.3	2.1	2.4	2.1
Cadmium	mg/kg	1.8	<0.5*	<0.6	<0.8	<0.54	<0.75	<0.85	<0.54	<0.67	<0.93	<0.5	<0.6	<0.6
Chromium	mg/kg	178	21	25	50	32	52	9.7	22	26	10	67	44	13
Fluoride	mg/kg	10,300	430	110	63	260	250	280	120	260	270	260	200	<26
Lead	mg/kg	138	<11	<12	16	10	24	19	13	<8	20	<11	<12	<13
Phenols	mg/kg	3.3	<1.3	<1.5	<2.0	1.6	4.5	<2.1	2.6	<1.7	<2.3	<1.4	6.5	<1.6
Selenium	mg/kg	1.5	<0.6	<0.7	<0.9	4.3	4.8	<1.4	4.4	3.6	<1.5	<0.66	<0.73	<0.77
Zinc	mg/kg	1050	73	26	64	200	44	28	40	15	32	210	110	27
Calcium Carbide** Reactivity	mg/kg													

NOTES: * Indicates sample matrix inteferences.
** Per March 10, 1989 agreement with MDNR, it was agreed that this parameter did not need to be analyzed.

TABLE 3-2 (cont'd)

GMC – CFD – SAGINAW NODULAR IRON PLANT
Compositional Analytical Results for Soil Samples of
Existing Calcium Carbide Desulfurization Slag Treatment Bunker

CHEMICAL PARAMETER	UNITS	Background 99% Prediction Limit	Sampling Location and Depth (feet)											
			EB-117 0-2	EB-117 4-6	EB-117 12-14	EB-118 0-2	EB-118 6-8	EB-118 12-14	EB-119(a) 0-2	EB-119 4-6	EB-119 8-10	EB-120 0-2	EB-120 4-6	EB-120 10-12
Arsenic	mg/kg	16	2.3	3.7	2.6	2.5	6.1	2.5	3.1	5.7	2.5	2.6	3.4*	5.3*
Cadmium	mg/kg	1.8	<0.5	<0.6	<0.7	<0.5	<0.6	<0.6	<1.0	<0.6	<0.7	<0.5	<0.6	<0.8
Chromium	mg/kg	178	120	28	12	60	23	12	23*	110	19	42	25	8
Fluoride	mg/kg	10,300	520	200	150	370	400	120	1100	110	210	1300	230	1700
Lead	mg/kg	138	<11	<12	<13	<11	14	<13	<10	110	<15	<11	<12	<17
Phenols	mg/kg	3.3	<1.4	<1.5	<1.7	<1.4	<1.6	<1.6	<1.4	<1.5	<1.8	<1.4	<1.4	2.1
Selenium	mg/kg	1.5	<0.65	<0.74	<0.80	<1.3	<1.5	<1.5	<0.80	<0.7	1.2	<0.6	<0.7	<0.9
Zinc	mg/kg	1050	230	16	24	170	23	22	26	78	21	210*	20	24
Calcium Carbide** Reactivity	mg/kg													

NOTES: * Indicates sample matrix inteferences.
** Per March 10, 1989 agreement with MDNR, it was agreed that this paramater did not need to analyzed.

TABLE 3-2 (cont'd)

GMC – CFD – SAGINAW NODULAR IRON PLANT
Compositional Analytical Results for Soil Samples of
Existing Calcium Carbide Desulfurization Slag Treatment Bunker

CHEMICAL PARAMETER	UNITS	Background 99% Prediction Limit	Sampling Location and Depth (feet)											
			EB-121(a) 0-2	EB-121 6-8	EB-121 12-14	EB-122 0-2	EB-122 6-8	EB-122 18-20	EB-123 0-2	EB-123 6-8	EB-123 18-20	EB-124 0-2	EB-124 6-8	EB-124 18-20
Arsenic	mg/kg	16	5.2	2.1	4.5	1.9	3.7	2.3	2.4	3.2	2.1	2.1	1.8	8.0
Cadmium	mg/kg	1.8	<1.0	<0.6	<0.7	<0.5	<0.6	<0.6	<0.5	<0.6	<0.6	<0.5	<0.6	<0.8
Chromium	mg/kg	178	81	64	22	78	59	13	86	100	19	65	69	33
Fluoride	mg/kg	10,300	360	120	180	67	340	400	480	340	440	90	130	250
Lead	mg/kg	138	<10	67.0	<15	<11	<12	<11	<11	<12	<12	<11	<12	<17
Phenols	mg/kg	3.3	<1.3	<1.5	<1.9	<1.3	<1.5	<1.4	<1.4	<1.5	<1.4	<1.3	1.8	<2.1
Selenium	mg/kg	1.5	<0.60	<0.72	<0.90	<0.65	0.72	<1.3	<1.3	<1.4	<0.70	<0.64	<0.74	<1.0
Zinc	mg/kg	1050	270	120	35	380*	140	25	370	180	29	130	150	51
Calcium Carbide** Reactivity	mg/kg													

NOTES: * Indicates sample matrix inteferences.

** Per March 10, 1989 agreement with MDNR, it was agreed that this parameter did not need to be analyzed.

3.2.3 Statistical Comparison

The analytical results detailed in Table 3-2 were statistically compared with the background upper 99% prediction limit. None of the underlying soil samples exceeded the background upper 99% prediction limit for cadmium, chromium, fluoride, lead or zinc.

Four of the samples exceeded the background upper 99% prediction limit for arsenic. Those samples were located in the following areas:

Boring Location	Sample Depth (feet)
EB-108	(0-2)
EB-109	(3.5 - 5.5)
EB-114	(4-5.5)
EB-115	(4-6)

Five of the samples exceeded the background soil upper 99% prediction limit for phenols. Those samples were located in the following areas:

Boring Location	Sample Depth (feet)
EB-106	(0-2)
EB-110	(0-2)
EB-111	(0-2)
EB-114	(4-5.5)
EB-116	(6-8)

Eight of the samples exceeded the background soil upper 99% prediction limit for selenium. Those samples were located in the following areas:

Boring Location	Sample Depth (feet)
EB-108	(0-2), (4-6)
EB-109	(0-2), (3.5-5.5)
EB-114	(0-2), (4-5.5)
EB-115	(0-2), (4-6)

3.2.4 Identification of Impacted Soils

The results of the soil sampling program indicated that soils underlying and adjacent to the existing calcium carbide desulfurization slag treatment bunker were impacted by the use of the bunker. The MDNR approved closure plan for this area specified removal of impacted soils to the saturated zone.

The locations of impacted soils to be excavated were defined from the statistical comparison previously described. The limits of the areas to be excavated were identified as midway between the impacted soil sample and the nearest unimpacted sample. Figure 3-2 defines the area of impacted soils which would be excavated. As approved by MDNR, the soils below the ground water table which had parameter levels higher than the background upper 99% prediction limit were not excavated due to the difficulties associated with removing soils below the ground water table.

3.3 Removal of Structures

3.3.1 Concrete Removal

Impacted soil removal for the three areas was designated as shown by the diagonal lines on Figure 3-2; existing bunker area, driveway area and road area. Concrete covered approximately 95% of the area where impacted soils were designated for removal. The

concrete in the area was initially cut to create a fracture line. A backhoe with a jack hammer attachment then broke the concrete into removable sized pieces in the existing calcium carbide desulfurization slag treatment bunker.

A bucket was placed on the backhoe. The concrete was excavated using the backhoe, loaded into trucks, weighed on GMC-CFD-SNI truck scale, and transported to GMC's Crow Island Landfill for disposal. The concrete was removed in stages so that the trucks were on pavement when loaded with broken concrete and soil. The total amount of concrete disposed was approximately 380 tons.

A catch basin with a 10-inch steel pipe was located in the existing calcium carbide desulfurization slag treatment bunker area as detailed in Figure 3-2. The catch basin was removed but the 10-inch steel pipe was left in place.

A 30-inch storm sewer traversed the driveway excavation area at a depth of approximately 4-feet below grade. The storm sewer is identified in Figure 3-2. The excavation depth did not exceed the bottom of the storm sewer, therefore, the main was not removed.

In the driveway excavation area, steel debris was found. The steel debris was removed from the excavation and was combined with GMC-CFD-SNI scrap iron.

3.3.2 Monitoring Well Removal

The monitoring wells were protected whenever possible. No monitoring wells were abandoned.

3.4 Excavation of Impacted Soil

3.4.1 Impacted Soil Removal

After the concrete was removed, the excavation of the impacted soil began. The soil was excavated using a backhoe and loaded into trucks for transportation to GMC's Crow Island Landfill for disposal.

The soil in the driveway area and road area of the excavation was removed and disposed of in the same manner as the soils removed from the existing calcium carbide desulfurization treatment bunker.

Prior to disposal in the landfill the excavated material was weighed using the GMC-CFD-SNI truck scale. The weigh tickets were then collected and the quantities tallied at the completion of each workday. The total amount of soil excavated and disposed was approximately 1510 tons.

3.4.2 Depth of Excavation

As approved by MDNR, soils were not removed below the ground water table because of the difficulties associated with the removal of saturated soils. It was previously determined through ground water elevation monitoring that soils would be excavated to a depth of 5 feet below grade or until ground water was reached. In general, the ground water depth was approximately 4 feet below grade.

3.4.3 Methods to Prevent Track-Out of Soils

The trucks remained on pavement to prevent track-out of soils. Soils spilled while loading were brushed off the truck and onto the pavement before leaving the site. The concrete was then swept, and the soils were returned to the excavation.

3.5 Decontamination

3.5.1 Decontamination of Equipment

After the excavation was completed at the existing calcium carbide desulfurization slag treatment bunker, the equipment was decontaminated. This was accomplished by driving the trucks and the backhoe onto a plastic decontamination pad. The equipment was then cleaned by using stiff bristle brushes to remove soils from the equipment. After each piece of equipment was cleaned, the soil was swept up and disposed at the Crow Island Landfill. When excavation was completed the equipment was steam cleaned before leaving the facility.

3.6 Backfill and Final Cover

After the post excavation soil analyses were evaluated (Table 4-2), GMC-CFD-SNI met with MDNR on August 8, 1989 to review the data. It was concluded at this meeting that since none of these samples were above the upper 99% prediction limit that no further excavation was necessary. The area was filled with approximately 1470 tons of sand which was compacted with a bulldozer. Stone-crete was placed over the areas to a depth of 8 to 10 inches to replace the concrete areas. The stone-crete was also compacted with the bulldozer.

3.7 Photographic Documentation of Closure Activities

The closure activities are pictorially documented in Appendix B.

4. POST-EXCAVATION SOIL SAMPLING

4.1 Sampling Locations

After excavation of the impacted soils was completed, eleven samples were collected and analyzed to document that soils which remained on the outside wall of the excavation did not contain "above background" concentrations of the constituents of concern. The samples were collected on a 38-foot grid interval approved in the closure plan. The MDNR approved sample locations are shown on Figure 3-2.

4.2 Sampling Methods

The soil samples were collected using a plastic hand trowel for selenium and a metal hand trowel for phenols to scrape the unexcavated side wall throughout its entire depth at each sampling location. For each location, an individual sample was mixed in a plastic container for selenium and a glass container for phenols to generate a composite sample for laboratory analysis, and shipped overnight to the RMT laboratory in Madison, Wisconsin. Analytical methods used are summarized in Table 4-1.

4.3 Sampling Analysis

The samples from each sampling location were tested for the parameter(s) (phenol, or selenium) at that particular location that were in excess of the background upper 99% prediction limit. For example, because sample EB-111 contained an "above background" concentration of total phenols, the surrounding soil was excavated and sample EB-305, 306, 307, and 308 were tested for total phenols. Analytical results from these samples are reported in Table 4-2 and the laboratory data sheets are presented in Appendix C. None of the samples exceeded the background upper 99% prediction limit for the parameters analyzed. Therefore, no further excavation was necessary at the existing calcium carbide desulfurization slag treatment bunker.

TABLE 4-1

ANALYTICAL METHODS FOR SOIL COMPOSITIONAL ANALYSES

Parameter	Analytical Methods[1]	Practical Quantitation Limit
Selenium	7740	0.6 mg/kg
Total Phenols (4AAP)	9066	2.5 mg/kg

1 3rd Edition of USEPA document SW 846 "Test Methods for Evaluating Solid Wastes, November 1986.

TABLE 4-2

GMC - CFD - SAGINAW NODULAR IRON
SOIL SAMPLE RESULTS FOR THE RCRA CLOSURE
OF EXISTING CALCIUM CARBIDE DESULFURIZATION SLAG TREATMENT BUNKER

CHEMICAL PARAMETER	BACKGROUND 99% PREDICTION LIMIT	SAMPLING LOCATIONS										
		301	302	303	304	305	306	307	308	309	310	311
PHENOLS	3.3 mg/kg	NS	NS	<1.4	1.4	1.9	1.4	<1.4	<1.4	<1.5	2.0	<1.4
SELENIUM	1.5 mg/kg	<0.6	<0.7	NS	NS	NS	NS	NS	NS	NS	NS	NS
ARSENIC	16 mg/kg	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS	NS

NOTE: Concentrations in mg/kg dry weight
Samples composited from a depth of 0-5 feet
NS = Soil was not analyzed for this parameter based upon previous agreement with MDNR letter dated April 3, 1989.

5. POST EXCAVATION GROUND WATER MONITORING

5.1 Ground Water Monitoring Program

Analysis of soil samples collected from the Existing Calcium Carbide Desulfurization Slag Treatment Bunker showed that constituents of concern (COC) were still present in the soils indicating the necessity of instituting a ground water monitoring program. RMT prepared a ground water monitoring plan entitled "Ground Water Monitoring Program For RCRA Closure of Two Calcium Carbide Desulfurization Slag Waste Management Units"; this plan was presented to GMC-CFD-SNI in November, 1990 who in turn had it submitted to MDNR.

The scope of the ground water monitoring program included the following:

- Installation of ground water monitoring wells around the previous calcium carbide desulfurization location.
- Collection of four distinct rounds of ground water samples and water level data.
- Analysis of the ground water samples for COCs detected in the soils at the site.
- Statistical analysis of the ground water analytical data to determine if statistically significant impacts to the ground water had occurred.
- Compilation of a report documenting the actions at the site.

GMC-CFD-SNI, having substantially completed the monitoring well installation (Appendix D) and ground water sampling, provided the data to RMT for interpretation. The monitoring wells were installed at the locations indicated on the map in Appendix D. The analytical results from the ground water sampling and analysis are included in Appendix E. Table 5-1 is a tabulated summary of the water level data collected over the four rounds of sampling. A ground water contour map which appears to be representative of the conditions at the site is included in Appendix F.

TABLE 5-1

DATA FROM WELLS AT EXISTING CALCIUM CARBIDE DESULFURIZATION SLAG TREATMENT BUNKER
CALCULATION OF GROUND WATER ELEVATIONS FROM DATA SUPPLIED BY GMC-CFD-SNI

WELL ID.	REFERENCE ELEVATION	11/19 DEPTH TO WATER	11/19 WATER TBL ELEVATION	12/17 DEPTH TO WATER	12/17 WATER TBL ELEVATION	1/28 DEPTH TO WATER	1/28 WATER TBL ELEVATION	2/13 DEPTH TO WATER	2/13 WATER TBL ELEVATION	8/7 DEPTH TO WATER	8/7 WATER TBL ELEVATION	8/19 DEPTH TO WATER	8/19 WATER TBL ELEVATION
MW-3	593.36	6.18	587.18	5.98	587.38	6.64	586.72	6.35	587.01	6.50	586.69	6.88	586.48
MW-4	593.19	7.04	586.15	6.91	586.28	7.46	585.73	7.42	585.77	7.39	585.80	7.55	585.64
MW-7	592.54	5.72	586.82	5.54	587.00	6.01	586.53	5.88	586.66	6.39	586.15	6.49	586.05
MW-8	591.72	5.36	586.36	5.16	586.56	5.77	585.95	5.56	586.16	5.74	585.98	5.80	585.92
MW-17	593.96	7.78	586.18	7.64	586.32	8.19	585.77	8.11	585.85	8.42	585.54	8.25	585.71
MW-18	594.16	8.14	586.02	8.01	586.15	8.56	585.60	8.53	585.63	8.46	585.70	8.61	585.55

5.2 Statistical Analysis

Water level data provided by GMC-CFD-SNI was used to construct ground water contour maps for the area (Appendix F). Up- and downgradient wells were interpreted from these maps and the ground water chemistry data from the wells was analyzed using a variety of statistical methods. The methods used are from the guidance document Statistical Analysis of Ground Water Monitoring Data at RCRA Facilities-Interim Final Guidance. A Test of Proportions was selected as the most appropriate method of analysis, because of the high proportion of non-detects in the data . No statistical analysis was conducted for parameters where all results were below detection limits. It was felt that this represented *prima facia* evidence that no statistically significant impacts to the ground water had occurred for that parameter.

Statistical analyses were performed on the arsenic data from the Existing Calcium Carbide Desulfurization Slag Treatment Bunker. A tabulated summary of the data is included in Table 5-2 and the statistical analyses are contained in Appendix G. A Prediction Interval and Analysis of Variance (ANOVA) methods were selected to analyze the data. Both methods were deemed appropriate for the data and it was felt that the corroboration offered by using two methods of analysis would be a good quality assurance check.

The statistical analyses for arsenic indicates that statistically significant impacts to the ground water have occurred at the Existing Calcium Carbide Desulfurization Slag Treatment Bunker. Both of the methods used indicate the same result.

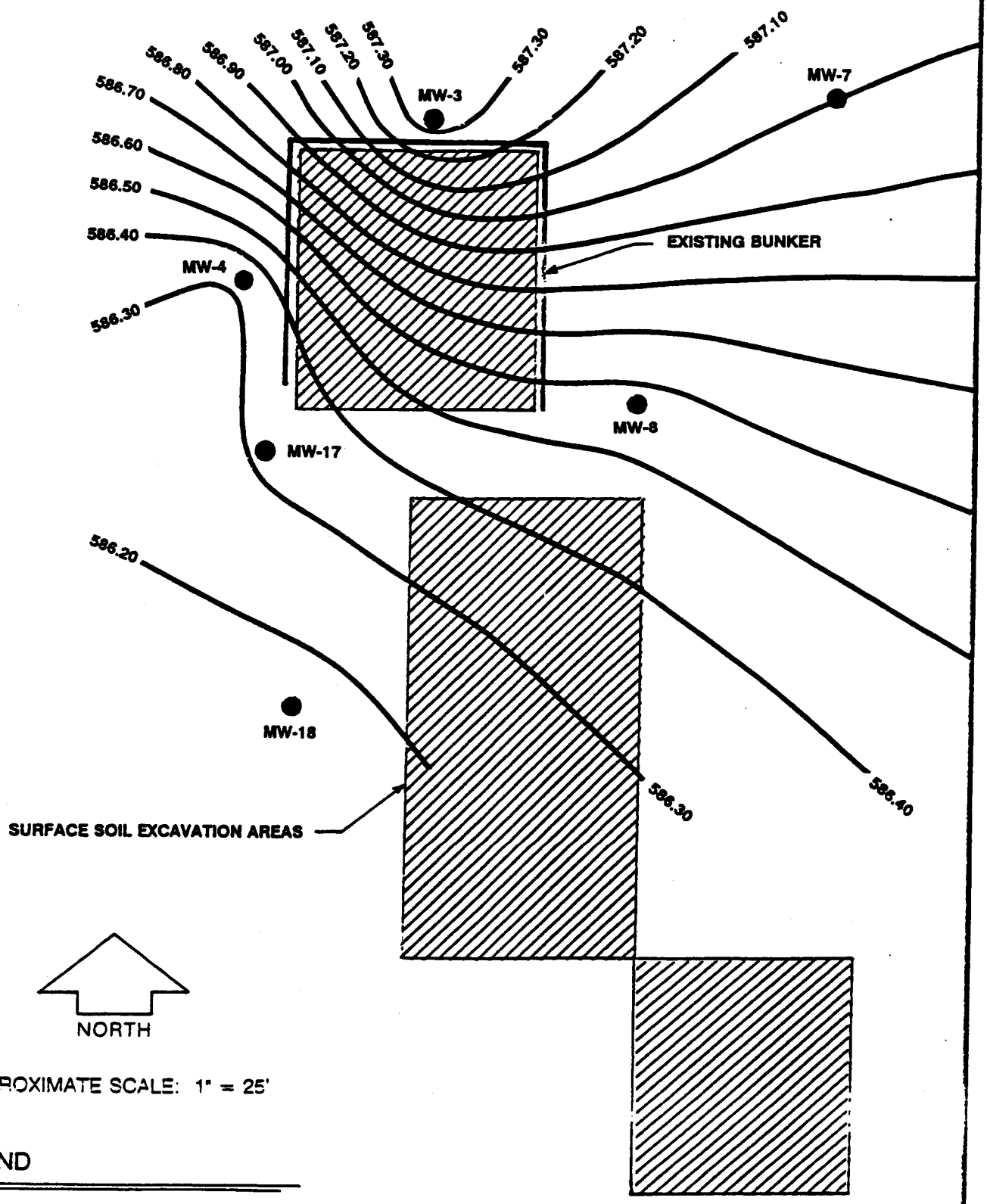
TABLE 5-2

EXISTING CALCIUM CARBIDE DESULFURIZATION SLAG TREATMENT BUNKER
GROUND WATER QUALITY DATA

	DATE	UNITS	ARSENIC	CADMIUM	CHROMIUM	LEAD	SELENIUM
UPGRADIENT WELLS	MW-7						
	20-Nov-90	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
	18-Dec-90	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
	29-Jan-91	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
	14-Feb-91	mg/l	<0.010	<0.010	<0.010	<0.010	<0.010
	MW-8						
	19-Nov-90	mg/l	0.027	<0.010	<0.010	<0.010	<0.010
	17-Dec-90	mg/l	0.031	<0.010	<0.010	<0.010	<0.010
	28-Jan-91	mg/l	0.026	<0.010	<0.010	<0.010	<0.010
	14-Feb-91	mg/l	0.027	<0.010	<0.010	<0.010	<0.010
	MW-3						
	19-Nov-90	mg/l	0.031	<0.010	<0.010	<0.010	<0.010
	17-Dec-90	mg/l	0.017	<0.010	<0.010	<0.010	<0.010
	28-Jan-91	mg/l	0.013	<0.010	<0.010	<0.010	<0.010
	14-Feb-91	mg/l	0.015	<0.010	<0.010	<0.010	<0.010
DOWNGRADIENT WELLS	MW-4						
	19-Nov-90	mg/l	0.056	<0.010	<0.010	<0.010	<0.010
	17-Dec-90	mg/l	0.042	<0.010	<0.010	<0.010	<0.010
	28-Jan-91	mg/l	0.056	<0.010	<0.010	<0.010	<0.010
	14-Feb-91	mg/l	0.049	<0.010	<0.010	<0.010	<0.010
	MW-17						
	19-Nov-90	mg/l	0.267	<0.010	<0.010	<0.010	<0.010
	17-Dec-90	mg/l	0.178	<0.010	<0.010	<0.010	<0.010
	28-Jan-91	mg/l	0.190	<0.010	<0.010	<0.010	<0.010
	14-Feb-91	mg/l	0.171	<0.010	<0.010	<0.010	<0.010
	MW-18						
	19-Nov-90	mg/l	0.071	<0.010	<0.010	<0.010	<0.010
	17-Dec-90	mg/l	0.089	<0.010	<0.010	<0.010	<0.010
	28-Jan-91	mg/l	0.136	<0.010	<0.010	<0.010	<0.010
	14-Feb-91	mg/l	0.090	<0.010	<0.010	<0.010	<0.010

Note: Metals analyses represent dissolved metals.

GMC-CFD-SNI EXISTING CALCIUM CARBIDE DESULFURIZATION TREATMENT BUNKER GROUND WATER MONITORING WELL LOCATIONS AND GROUND WATER CONTOUR MAP



APPROXIMATE SCALE: 1" = 25'

LEGEND

- MONITORING WELLS FOR RCRA CLOSURE
- GROUND WATER CONTOUR (12/17/90)

RMT INC

Dwn. by:	CMS
Date:	10/91
Proj.#	1125.23

APPENDIX A

MDNR CORRESPONDENCE

STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING
BOX 30028
LANSING, MI 48909

GORDON E. GUYER, Director

April 28, 1988

Mr. William Hudson
Environmental Coordinator
GMC-Saginaw Nodular Iron Plant
2100 Veterans Memorial Parkway
Saginaw, Michigan 48605-5073

Dear Mr. Hudson:

SUBJECT: GMC - Saginaw Nodular Iron
Closure Plan Review
MID 041 793 340

We have completed the reviews of your December 23, 1987, closure plans for your old and existing calcium carbide treatment units and container and tank storage areas.

Based on our review, we have determined that the plans are not approvable, and must be revised to meet the closure and post-closure requirements of 1979 Public Act 64. Our review comments are provided in the enclosure to this letter. You should submit the revised closure plans as soon as possible, but not later than May 20, 1988.

Closure of RCRA interim status units does not release the facility from its responsibilities under the Hazardous and Solid Waste Amendments of 1984 (HSWA). All interim status facilities are subject to the corrective action requirements.

If you have any questions, please contact me.

Sincerely,

Andrea R. Schoenrock
Waste Management Division
517-373-3988

cc: Ms. Marilyn Sabadaszka, U.S. EPA
Mr. Rich Traub, U.S. EPA
Mr. Ken Burda/C&E File
Ms. Liz Browne, MDNR
Mr. Jim Sygo, MDNR

Paint Storage Building Drum Storage Area

1. Concrete samples should be at the entrance of the area and at the crack in the concrete. Also samples should be taken from around the outer perimeter of the storage area if unpaved.

2. The closure plan must include a schedule for closure of each hazardous waste management unit and for final closure of the facility. The schedule must include, at a minimum, the total time required to close each hazardous waste management unit and the time required for intervening closure activities which will allow tracking of the progress of partial and final closure.

3. The health and safety plan outline on page 19 appears very thorough, however, the actual plan should be submitted prior to the start of closure activities.

4. The expected analytical detection limits should be included.

5. A statistical comparison for clean-up of potential organic contamination is inappropriate. Solvents are not naturally occurring, and should be removed to non-detectable levels not 1.5 times the background concentration.

6. The EP Toxic list metals should be run as a "total" analysis due to the presence of the pigments and dyes in the specialty lacquers.

7. The closure plan must discuss soil removal procedures to be used if contamination is found. This should also include resampling techniques to verify all contamination has been removed.

8. There is some question on if the designated background areas have been unaffected by plant operations.

Hazardous Waste Control Tank

1. The closure plan must include a schedule for closure of each hazardous waste management unit and for final closure of the facility. The schedule must include, at a minimum, the total time required to close each hazardous waste management unit and the time required for intervening closure activities which will allow tracking of the progress of partial and final closure.

2. The health and safety plan outline on page 20 appears very thorough, the actual plan should be submitted prior to the start of closure activities.

3. The expected analytical detection limits should be included.

4. A statistical comparison for clean-up of potential organic contamination is inappropriate. Solvents are not naturally occurring, and

should be removed to non-detectable levels, not 1.5 times the background concentration.

5. 1,1,1-Trichloroethane breakdown products such as 1,1-Dichloroethane, 1,1 and 1,2-Dichloroethene, Chloroethane and Vinyl Chloride should also be addressed for this closure.

6. What is going to be done with the tank after closure is complete?

7. There is some question on if the designated background areas have been unaffected by plant operations.

Old Calcium Carbide Desulfurization Slag Treatment Unit

1. Soil samples must not be composited.

2. If contamination is found, what is to be done with the contaminated soil or groundwater? Remediation procedures must be included in the closure plan.

3. It is stated that the liquids used for cleaning will be discharged directly on to the ground. The plan also states that hexane, methanol or other organic solvents may be used during decontamination. These solvents should be handled very carefully, containerized, and disposed of in an environmentally safe manner, not on the ground.

4. If contaminated soil removal is necessary, decontamination procedures for equipment used must be outlined, and also steps to ensure trackout will not occur.

5. The health and safety plan outline on page 39 appears very thorough, however, the actual plan should be submitted prior to the start of closure activities.

6. The expected analytical detection limits should be included.

7. Iron, total chromium and total phenols should be included as soil monitoring parameters.

8 There is some question on if the designated background areas have been unaffected by plant operations.

9. Four samples taken 20 feet away from the unit may not adequately identify potential contamination. The effectiveness of the two monitor wells in identifying any groundwater contamination is also questionable.

Calcium Carbide Desulfurization Slag Treatment Bunker-Existing

1. Soil samples must not be composited.

2. If contamination is found, what is to be done with contaminated soil or groundwater? Remediation procedures must be included in the closure plan.

3. It is stated that the liquids used for cleaning will be discharged directly onto the ground. The plan also states that hexane, methanol or other organic solvents may be used during decontamination. These solvents should be handled very carefully, containerized, and disposed of in an environmentally safe manner, not on the ground.

4. If contaminated soil removal is necessary, decontamination procedures for equipment used must be outlined, and also steps to ensure trackout will not occur.

5. The health and safety plan outline on page 41 appears very thorough, however, the actual plan should be submitted prior to the start of closure activities.

6. The expected analytical detection limits should be included.

7. Iron, total chromium and total phenols should be included as soil monitoring parameters.

8. Six samples, taken up to 110 feet away from the bunker may not adequately identify potential contamination. The effectiveness of the two monitor wells in identifying any groundwater contamination is also questionable.

9. There is some question on if the designated background areas have been unaffected by plant operations.

STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T MASON BUILDING
BOX 30028
LANSING, MI 48909

XXXXXXX XXXX XXXX
David F. Hales, Director

June 10, 1988

Mr. William Hudson
Environmental Coordinator
GMC-Saginaw Nodular Iron Plant
2100 Veterans Memorial Parkway
Saginaw, Michigan 48605-5073

Dear Mr. Hudson:

SUBJECT: GMC - Saginaw Nodular Iron
Closure Plans
MID 041 793 340

The Michigan Department of Natural Resources (MDNR) has completed a review of your revised closure plans dated May 27, 1988, for your old and existing calcium carbide treatment units and container and tank storage areas, pursuant to the requirements of 40 CFR, Part 265, which are adopted by reference in MAC 299.11003 of the Act 64 administrative rules. Based on this review, and the fact that no significant comments were received during the 30-day public comment period, the MDNR hereby approves your closure plans.

Closure of RCRA interim status units does not release the facility from its responsibilities under the Hazardous and Solid Waste Amendments of 1984 (HSWA). All interim status facilities are subject to the corrective action requirements of these amendments.

If you have any questions, please contact Ms. Andrea Schoenrock, of my staff, at 517-373-3988.

Sincerely,

Alan J. Howard, Chief
Waste Management Division
517-373-2730

cc: Ms. Marilyn Sabadaszka, USEPA
Mr. Rich Traub, USEPA
Ms. Andrea Schoenrock, MDNR
Ms. Liz Browne, MDNR
Mr. Ken Burda/C& E File
Mr. Jim Sygo, MDNR

REMOVE & DO NOT REPLACE

May 13, 1988

Ms. Andrea R. Schoenrock
Department of Natural Resources
Waste Management Division
P.O. 30028
Lansing, Michigan 48909

Re: GMC Saginaw Nodular Iron
Closure Plan Review
MID 041 793 340

Dear Ms. Schoenrock:

Confirming the telephone conversation with Mr. Thomas Jancek of RMT and yourself on May 13, 1988, GM-Saginaw Nodular requests that they be granted a one week extension to complete the four RCRA closure plans. This date will be May 27, 1988.

These closure plans are for our old and existing calcium carbide treatment units and container and tank storage areas.

As discussed, your April 28, 1988, review comments will be addressed in individual addendums rather than revising each individual closure plan.

If you have any questions, please contact me.

Sincerely,

jab

cc: Jim Sygo - MDNR
Thomas Jancek - RMT

1125.16 gmsni-45

FINAL DRAFT 07/15

July xx, 1988

REMOVE & REPLACE

Ms. Andrea Schoenrock
MDNR, Waste Management Division
Ottawa Street Building, South Tower
P.O. Box 30028
Lansing, MI 48909

Re: GMC - Saginaw Nodular Iron MID 041 793 340
Closure Plans for the Old and Existing Calcium Carbide Desulfurization Slag Treatment Units

Dear Ms. Schoenrock:

General Motors - Saginaw Nodular Iron (SNI) has received the letter of June 10, 1988 from the MDNR which indicates that its revised closure plans for four hazardous waste management units dated May 26, 1988 have been approved.

Two of the approved plans pertain to the closure of the Old and Existing Calcium Carbide Desulfurization Slag Treatment units. The Closure Performance Standard for these plans (Section 5 of each plan) states that the regulatory closure requirements will be satisfied by documenting the following:

- o treatment and removal of all waste and waste residues;
- o decontamination of concrete surfaces in the treatment areas;
- o determination of whether any release of hazardous constituents from the desulfurization slag has adversely affected surrounding soils.

SNI intends to carry out all closure activities that are necessary for generating this documentation. However, a recent review of the two closure plans revealed that there are a number of items in these plans which SNI believes are beyond the scope of such activities. Specifically:

1. The analysis of the hazardous constituents in Table 6-1 of each plan is sufficient for determining whether any release of hazardous constitutents from the desulfurization slag has adversely affected surrounding soil; the analysis of the nonhazardous constituents in these tables is beyond the scope of RCRA closure requirements.

   If an evaluation of whether hazardous constituents from the treatment units have adversely impacted groundwater is necessary, the analysis of the hazardous constituents in Table 7-1 of each

plan is sufficient for making this determination; the analysis of the nonhazardous constituents in these tables is beyond the scope of RCRA closure requirments.

2. The statistical analysis of the soil compositional data as described in the Sampling and Analysis Plan (Section 6.5 of each plan) is sufficient for determining whether any release of hazardous constituents from the desulfurization slag has adversely affected surrounding soil. The statistical analysis of soil leachate data as described in Section 6.5 of each plan is beyond the scope of RCRA closure requirements and is unnecessary if the compositional analysis indicates that no adverse impact has occurred. Consequently, soil samples do not need to be subjected to the ASTM water leachate test (ASTM Method D3987) unless it is determined, based on the results of the statistical analysis on soil compositional data, that a statistical analysis of soil leachate data is desirable.

3. Soil sampling from within the actual boundaries of the treatment units, in conjunction with the sampling of surrounding soils conducted for the preliminary site investigation (described in Section 4 of each plan), is sufficient for determining whether treatment operations at the units have adversely impacted the surrounding soils.

   Inasmuch as the closure plans are intended to address the treatment units rather than extended portions of the facility, the sampling grid shown in Figure 2 of each plan is unnecessarily broad and, in the case of the grid for the old treatment unit, inadequate. The grid for the old treatment unit currently specifies 25 boring locations on a square grid of 100 feet by 100 feet. However, there is only one boring location within the 20 feet by 20 feet boundary of the actual treatment unit. SNI believes that three borings (in a triangular configuration) within the boundaries of the old treatment unit is sufficient to satisfy RCRA closure requirements for this unit when considered in conjunction with the soil borings already taken during the preliminary site investigation. The proposed soil boring locations are detailed in the attached closure plan amendments.

   Similarly, SNI believes that the four borings that are within the actual boundaries of the Existing Treatment Bunker as specified in Figure 2 of the approved plan is also sufficient when considered in conjunction with the soil borings already taken during the preliminary site investigation of this unit.

4. Continuous soil samples (cores) will be collected from each borehole (located as described in the proposed amendments) to a depth below the foundry-sand/native soil interface. However, only the near-ground-surface section and the water-table sections of the samples will be analyzed; the remaining sections will be retained for any further analyses that may later be deemed necessary.

5. Groundwater monitoring for the purposes of this closure will be performed if it is determined that statistically significant soil contamination in the saturated zone has resulted from the treatment units (as determined by analyses of the water table soil samples).

6. If groundwater monitoring is necessary, then groundwater samples will be collected and analyzed for the hazardous constituents in Table 7-1 of each plan from the monitoring wells described in Figures 2 of the proposed amendments once a month for four consecutive months. The data will be statistically compared against concentrations of the constituents in background groundwater. The locations where background groundwater quality will be assessed is also indicated on Figures 2 of the proposed amendments.

   If the four months of data do not indicate contamination of the groundwater, then monitoring will terminate. If the four months of data indicate that the treatment units have contaminated groundwater, SNI will amend the closure plan to address the investigation of the extent of contamination and possible impact on closure activities.

SNI trusts that you will concur with our findings and requests to amend the two plans, per 40 CFR 265.112(c), with respect to the six items above. Attached for your approval are the amended sections of the closure plans.

While we await your approval, we are proceeding with closure activities that are not dependent on the amendments. However, we anticipate that the approval process may impact the original closure schedule and therefore, request, per 40 CFR 265.113(b), that the 180-day time limit allowed for the completion of closure activities be extended for the number of days from the date of this submittal to the date of resolution of this request.

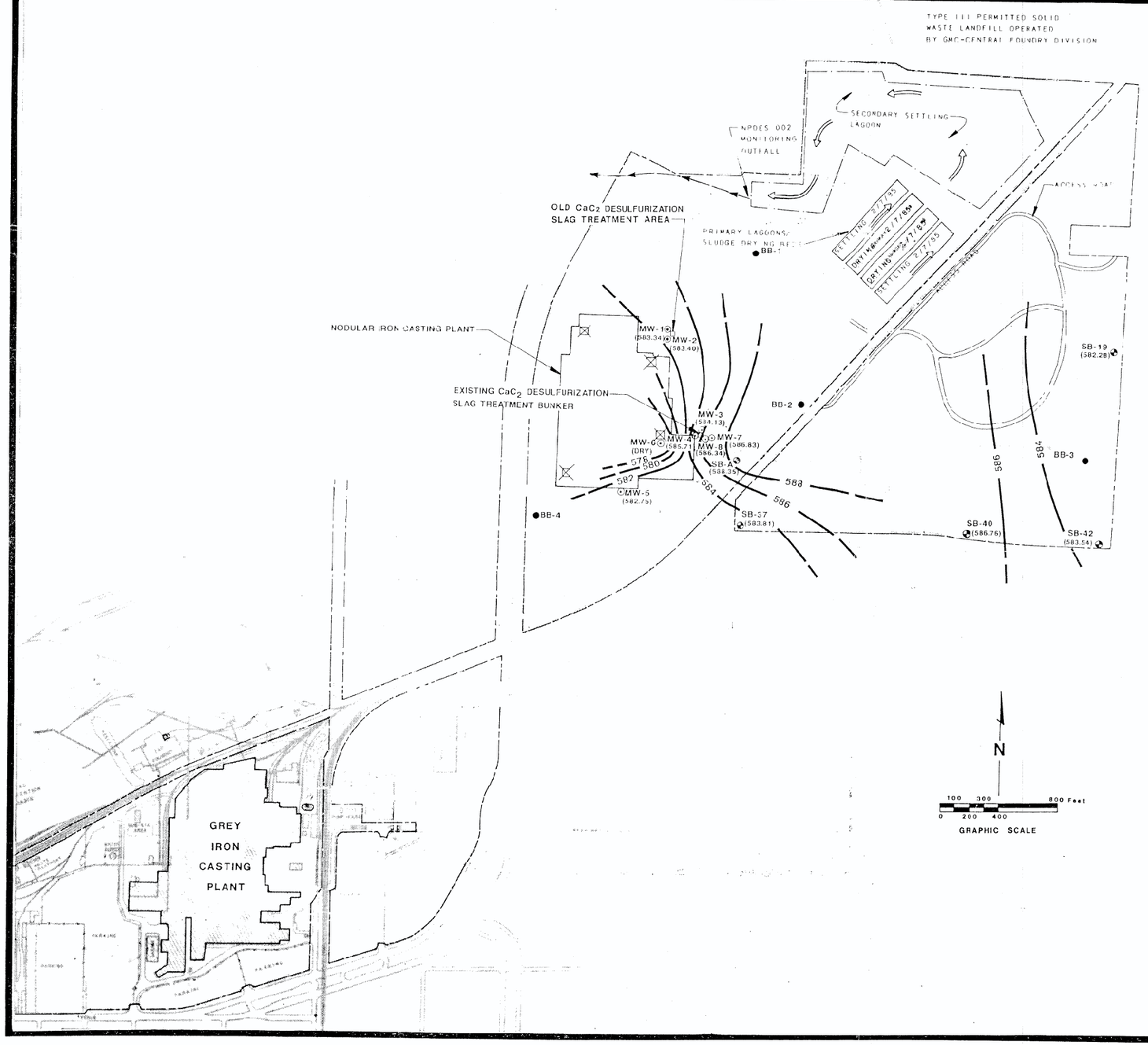
Along with the proposed amended closure plans for the Old and Existing Calcium Carbide Desulfurization Slag Treatment units is a copy of a Health and Safety Plan for the closure activities that are currently underway.

If you have any questions or would like to meet with SNI and our consultants to discuss this matter, please contact me at (517) xxx-xxxx. 757-0223

Sincerely,

William Hudson
Environmental Co-Ordinator

Attachment



LEGEND

- APPROXIMATE CFD PROPERTY LINE
- STOCKPILE
- ●BB-1 BACKGROUND BORING LOCATION AND NUMBER
- ⊙MW-1 MONITORING WELL LOCATION (APPROXIMATE) AND NUMBER (INSTALLED BY RMT, INC.)
- ⊙SB-19 MONITORING WELL LOCATION (APPROXIMATE) AND NUMBER (INSTALLED PREVIOUSLY)
- (583.54) WATER TABLE ELEVATION (FT. MSL.)
- ⊠ SUMP PUMP LOCATION
- 588 WATER TABLE ELEVATION CONTOUR LINE (FT. MSL) DASHED WHERE INFERRED, CONTOUR INTERVAL = 2 FT.

TOF SA2.

NOTE :

1. LOCATIONS, DESCRIPTIONS AND APPROXIMATE SIZES OF PILES ARE BASED ON AN INVENTORY CONDUCTED BY RMT AND CFD STAFF MEMBERS IN 1985.
2. CONTRACTOR SHALL FIELD LOCATE AND VERIFY EXISTING UTILITIES PRIOR TO BORING INSTALLATION.
3. GROUND WATER ELEVATION DATA COLLECTED 4-13-88.
4. MONITORING WELL MW-6 WAS DRY ON 4-13-88, THE SCREEN BASE HAS AN ELEVATION OF 576.88 FT. MSL.

DRAFT

NO.	BY	DATE	REVISION	APPD

PROJECT: PRELIMINARY SITE EVALUATION FOR CaC_2 DESULFURIZATION SLAG TREATMENT AREAS
GM - CFD SAGINAW, MICHIGAN

SHEET TITLE: WATER TABLE MAP

DRAWN: CDD	SCALE:	PROJ. NO. 1125.14
DESIGNED:		DWG. NO.
APPROVED:	DATE PRINTED: APR 20 1988	SHEET OF
DATE: 4-88		FIGURE 2

RMT

Central Foundry Division
General Motors Corporation
Saginaw Nodular Iron Plant
2100 Veterans Memorial Parkway
Saginaw, Michigan 48605-5073

July 21, 1988

Ms. Andrea Schoenrock
MDNR, Waste Management Division
Ottawa Street Building, South Tower
P.O. Box 30028
Lansing, MI 48909

Re: GMC - Saginaw Nodular Iron MID 0141 793 340
Closure Plans for the Old and Existing Calcium Carbide Desulfurization Slag Treatment Units

Dear Ms. Schoenrock:

General Motors - Saginaw Nodular Iron (SNI) has received the letter of June 10, 1988 from the MDNR which indicates that its revised closure plans for four hazardous waste management units dated May 26, 1988 have been approved.

Two of the approved plans pertain to the closure of the Old and Existing Calcium Carbide Desulfurization Slag Treatment units. The Closure Performance Standard for these plans (Section 5 of each plan) states that the regulatory closure requirements will be satisfied by documenting the following:

- treatment and removal of all waste and waste residues;
- decontamination of concrete surfaces in the treatment areas;
- determination of whether any release of hazardous constituents from the desulfurization slag has adversely affected surrounding soils.

SNI intends to carry out all closure activities that are necessary for generating this documentation. However, a recent review of the two closure plans revealed that there are a number of items in these plans which SNI believes are beyond the scope of such activities. Specifically:

1. The analysis of the hazardous constituents in Table 6-1 of each plan is sufficient for determining whether any release of hazardous constituents from the desulfurization slag has adversely affected surrounding soil; the analysis of the nonhazardous constituents in these tables is beyond the scope of RCRA closure requirements.

   If an evaluation of whether hazardous constituents from the treatment units have adversely impacted groundwater is necessary,

the analysis of the hazardous constituents in Table 7-1 of each plan is sufficient for making this determination; the analysis of the nonhazardous constituents in these tables is beyond the scope of RCRA closure requirements.

2. The statistical analysis of the soil compositional data as described in the Sampling and Analysis Plan (Section 6.5 of each plan) is sufficient for determining whether any release of hazardous constituents from the desulfurization slag has adversely affected surrounding soil. The statistical analysis of soil leachate data as described in Section 6.5 of each plan is beyond the scope of RCRA closure requirements and is unnecessary if the compositional analysis indicates that no adverse impact has occurred. Consequently, soil samples do not need to be subjected to the ASTM water leachate test (ASTM Method D3987) unless it is determined, based on the results of the statistical analysis on soil compositional data, that a statistical analysis of soil leachate data is desirable.

3. Soil sampling from within the actual boundaries of the treatment units, in conjunction with the sampling of surrounding soils conducted for the preliminary site investigation (described in Section 4 of each plan), is sufficient for determining whether treatment operations at the units have adversely impacted the surrounding soils.

   Inasmuch as the closure plans are intended to address the treatment units rather than extended portions of the facility, the sampling grid shown in Figure 2 of each plan is unnecessarily broad and, in the case of the grid for the old treatment unit, inadequate. The grid for the old treatment unit currently specifies 25 boring locations on a square grid of 100 feet by 100 feet. However, there is only one boring location within the 20 feet by 20 feet boundary of the actual treatment unit. SNI believes that three borings (in a triangular configuration) within the boundaries of the old treatment unit is sufficient to satisfy RCRA closure requirements for this unit when considered in conjunction with the soil borings already taken during the preliminary site investigation. The proposed soil boring locations are detailed in the attached closure plan amendments.

   Similarly, SNI believes that the four borings that are within the actual boundaries of the Existing Treatment Bunker as specified in Figure 2 of the approved plan is also sufficient when considered in conjunction with the soil borings already taken during the preliminary site investigation of this unit.

4. Continuous soil samples (cores) will be collected from each borehole (located as described in the proposed amendments) to a depth below the foundry-sand/native soil interface. However, only the near-ground-surface section and the water-table sections of the samples will be analyzed; the remaining sections will be retained for any further analyses that may later be deemed necessary.

5. Groundwater monitoring for the purposes of this closure will be performed if it is determined that statistically significant soil contamination in the saturated zone has resulted from the treatment units (as determined by analyses of the water table soil samples).

6. If groundwater monitoring is necessary, then groundwater samples will be collected and analyzed for the hazardous constituents in Table 7-1 of each plan from the monitoring wells described in Figures 2 of the proposed amendments once a month for four consecutive months. The data will be statistically compared against concentrations of the constituents in background groundwater. The locations where background groundwater quality will be assessed is also indicated on Figure 2 of the proposed amendments.

   If the four months of data do not indicate contamination of the groundwater, then monitoring will terminate. If the four months of data indicate that the treatment units have contaminated groundwater, SNI will amend the closure plan to address the investigation of the extent of contamination and possible impact on closure activities.

SNI trusts that you will concur with our findings and requests to amend the two plans, per 40 CFR 265.112(c), with respect to the six items above. Attached for your approval are the amended sections of the closure plans.

While we await your approval, we are proceeding with closure activities that are not dependent on the amendments. However, we anticipate that the approval process may impact the original closure schedule and therefore, request, per 40 CFR 265.113(b), that the 180-day time limit allowed for the completion of closure activities be extended for the number of days from the date of this submittal to the date of resolution of this request.

Along with the proposed amended closure plans for the Old and Existing Calcium Carbide Desulfurization Slag Treatment units is a copy of a Health and Safety Plan for the closure activities that are currently underway.

If you have any questions or would like to meet with SNI and our consultants to discuss this matter, please contact me at (517) 757-0223.

Sincerely,

William Hudson
Environmental Coordinator

Attachment

cc: Ms. M. Sabadaszka, USEPA
Mr. R. Traub, USEPA
Mr. A. Howard, MDNR
Ms. L. Browne, MDNR
Mr. K. Burda/C&E File
Mr. J. Sygo, MDNR

WFH72188.DOC

STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING
BOX 30028
LANSING, MI 48909

XXXXXXXXXXXXXXX
David F. Hales, Director

September 26, 1988

Mr. William Hudson
Environmental Coordinator
GMC - Saginaw Nodular Iron Plant
2100 Veterans Memorial Parkway
Saginaw, Michigan 48605-5073

Dear Mr. Hudson:

Subject: Saginaw Nodular Iron
Calcium Carbide Slag Units
MID 041 793 340

In response to our meeting on August 15, 1988, with Steve Song of your staff, and your letter of July 21, 1988, we are summarizing the six issues discussed in the letter and at the meeting. The issues are summarized in the order corresponding to the numbered items in your letter. The following points were agreed upon:

1. The analysis of all the calcium carbide constituents and indicator parameters listed in Tables 6-1 and 7-1 will be performed. If non-hazardous constituents are detected, the company may resample for confirmation purposes.

2. It was agreed that total metals analysis is sufficient to determine the extent of contamination for closure purposes. However, if soil total metals concentrations are not EP toxic, but are above background, the soils may be disposed in your Type III Crow Island landfill if the criteria for an inert designation are met. The soils must be disposed at a Type II landfill if the criteria for an inert designation cannot be met. The water leachate (Kach) test only needs to be done if you seek an inert designation.

3. Due to past practices at the site which may have impacted areas outside the regulated waste management units, soil will be sampled at all of the locations identified in the approved closure plans, not at the locations proposed in the July amendments.

4. Soil samples (cores) for analysis will be taken at the ground surface, near the soil/water table interface, and at the foundry slag sand/clay interface.

5. If statistically significant soil contamination, as defined on pages 36 and 37 of the approved closure plans, is found in the bottom two saturated zone soil samples from the boreholes, the groundwater could be potentially impacted and groundwater monitoring must be implemented as described in Section 7 of the approved closure plans.

6. If groundwater monitoring is necessary, then groundwater samples will be collected and analyzed for the constituents listed in Table 7-1 in accordance with Section 7, Ground Water Monitoring, of the approved closure plans. Placement of the monitoring wells must be approved by a Waste Mangement Division geologist. The results of the statistical evaluation of the groundwater monitoring data must be submitted.

If you have any questions, please contact me.

Sincerely,

Andrea R. Schoenrock
Waste Management Division
(517) 373-2730

cc: Ms. Marilyn Sabadaszka, USEPA
Mr. Wayde Hartwick, USEPA
Mr. Ken Burda/C&E File
Mr. Jim Sygo, MDNR
Ms. Liz Browne, MDNR

Central Foundry Division
General Motors Corporation
[illegible]
2100 Veterans Memorial Parkway
Saginaw, Michigan 48605-5073

October 14, 1988

Ms. Andrea R. Schoenrock
Department of Natural Resources
Waste Management Division
P.O. Box 30028
Lansing, Michigan 48909

Subject: Saginaw Nodular Iron
Four RCRA Closure Plans for GM-SNI
MID 041 793 340

Dear Ms. Schoenrock:

In response to the August 15, 1988 meeting between Steve Song of the GM Environmental Activities Staff and MDNR, and your letter of September 26, 1988 this letter summarizes our understanding of the two issues listed below. The issues summarized are in the order as listed on the MDNR letter dated September 26, 1988 from Andrea Schoenrock to Bill Hudson as follows:

1. Regarding Table 6-1 the only constituents that will not be analyzed for are iron and TOC. Iron had been previously eliminated; and as agreed upon at the August 15, 1988 meeting TOC will be eliminated because it is not an appropriate indicator parameter of VOC's, particularly in soils. All the parameters on Table 7-1 will be analyzed. However, data on non-hazardous constituents in both tables will not be subject to statistical analysis and will not be used as closure performance criteria.

2. Regarding the soil analysis of the closures three options are as follows:

   a.) If the total metals analyses shows concentrations that are not significantly above background concentrations found in soils at GM-SNI, the soils will be left in place.

   b.) If the total metals analyses shows concentrations that are significantly above background concentrations found in soils at GM-SNI, the soils will be tested for EP toxicity and will be removed and disposed in a suitable landfill depending on the EP toxicity test results.

The word soils discussed in item 2 are those soils within the grid sampling boundary.

Due to delays in finalizing the parameter list; the amount of soils to be sampled, analyses and data interpretation required; and the cold winter months ahead, it is apparent that we will be unable to complete the four RCRA Closure Plans within the 180 day time period. Therefore, we are requesting an additional 180 day extension, which according to our records the new closure expiration date will be June 20, 1989. Even though we are asking for this extension, we are still pursuing the four RCRA Closures as expediently as possible. If another closure date is required for reasons now unforeseen we will inform MDNR of our intentions.

If you have any questions regarding this letter please contact me.

Sincerely,

William Hudson

William Hudson
Environmental Coordinator

cc: J. Sygo, MDNR
S. Song, GM Environmental Activities Staff
J. Medved, CFD-DO Environmental Administrator
✓T. Jancek, RMT

A:WH101488.DOC

STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor
DEPARTMENT OF NATURAL RESOURCES
STEVENS T MASON BUILDING
PO BOX 30028
LANSING, MI 48909
DAVID F HALES, Director

December 22, 1988

Mr. William Hudson, Environmental Coordinator
General Motors Corporation
Central Foundry Division
Saginaw Nodular Iron
2100 Veterans Memorial Parkway
Saginaw, Michigan 48605-5073

Dear Mr. Hudson:

Subject: Saginaw Nodular Iron--Four Approved Closure Plans
MID 041 793 340

This is in response to your October 14, 1988 letter which summarized your understanding of the issues discussed at the August 15, 1988 meeting between GM Environmental Activities staff and Waste Management Division staff. Your letter also requested a 180 day extension of the closure time period.

With respect to your summarization of issues 1 and 2 from our September 26, 1988 letter to you, Waste Management Division concurs that the Table 6-1 constituents iron and TOC do not have to be analyzed for in soils. Analytical results for Table 6-1 non-hazardous constituents must be reported in the closure certification document. In regard to issue 2, Waste Management Division concurs with your soils management plan as long as soils which contain total metals that are significantly above background concentrations are disposed of in a properly licensed (rather than suitable) landfill for disposal.

The October, 1988 Revised "Health and Safety Plan for Soil and Water Sampling Activities for Four RCRA Closure Areas at GM-Saginaw Nodular Iron Foundry" which was received by Waste Management Division on October 27, 1988 has been reviewed and is hereby approved and incorporated into the approved closure plans.

The time period for closure is hereby extended to June 20, 1989.

We apologize for the delay in responding to your letter. Ms. Cheryl Howe has replaced Ms. Andrea Schoenrock, who left the Division, as the contact person for your facility. She can be reached at 517-373-9881.

Sincerely,

Alan J. Howard, Chief
Waste Management Division
517-373-9523

cc: Mr. Rich Traub, U.S. EPA
Ms. Marilyn Sabadaszka, U.S. EPA
Mr. Ken Burda, WMD/C&E File
Mr. Jim Sygo, Saginaw District, WMD
Ms. Liz Browne, WMD

STATE OF MICHIGAN

JAMES J. BLANCHARD, Governor

DEPARTMENT OF NATURAL RESOURCES

STEVENS T. MASON BUILDING
P.O. BOX 30028
LANSING, MI 48909

DAVID F. HALES, Director

April 3, 1989

Mr. William Hudson, Environmental Coordinator
General Motors Corporation-Central Foundry Division
Saginaw Nodular Iron Plant
2100 Veterans Memorial Parkway
Saginaw, Michigan 48605-5073

Dear Mr. Hudson:

Subject: Interim Closure Document Issues
MID 041 793 340

This is in follow-up to our March 10, 1989 meeting and recent telephone conversations regarding resolution of the interim closure document issues that have been brought up by staff of General Motors (GM) and its consultant, RMT, Inc. In addition, Dave Slayton, the Waste Management Division geologist who reviewed the document, has requested further ground water monitoring information.

Closure of Existing and Old Calcium Carbide Treatment Areas

1. Closure soil excavation and resampling activities may proceed as outlined in the document and based on the background soil concentrations contained on page 1 of Section A. Based on a review of the background data, Waste Management Division (WMD) believes that some areas of the facility have been impacted in the past by foundry operations. Because of this, a copy of the closure documentation is being referred to the U.S. Environmental Protection Agency (U.S. EPA) for an evaluation of whether site-wide corrective action needs to be addressed. Michigan is not yet authorized for corrective action under the Hazardous and Solid Waste Amendments of 1984. Therefore, Mr. Rich Traub, Chief of the Michigan Permits Section, RCRA Permitting Branch, should be contacted at 312-886-6136 for further information.

   After the ground water monitoring around the units is implemented and that data has been reviewed, WMD will be in a better position to make recommendations to U.S. EPA regarding whether further corrective measures beyond the proposed excavation are needed.

2. Disposal of excavated soil and concrete from the areas designated on Figures 4 and 5 into GM's Crow Island Landfill is acceptable.

3. Calcium carbide reactivity testing of the soils is not necessary.

Closure of 1,1,1-Trichloroethane Hazardous Waste Control Tank

4. In order to confirm whether soils around the tank are contaminated, WMD requests that two additional samples be obtained near the location of Boring TST-1 at the 0 to 0.5 foot depth within a 1 to 2 feet radius. If analysis of these two samples demonstrates that 1,1,1-trichloroethane is non-detectable, no further action will be required. If it is detected, excavation and resampling must be done in accordance with the approved closure plan.

Ground Water Monitoring Program

5. On page 6 of Section F of the document, item 7 should read "Field filter sample for heavy metals analyses."

6. Clarification of the statistical comparison method to be used to evaluate the ground water monitoring data is needed by May 1, 1989.

7. For the existing wells in the existing and old calcium carbide treatment areas, the following information must be provided by May 1, 1989: well logs, well construction methods and materials, and all existing ground water data (static water level measurements and chemical analytical results).

8. For the new wells, approval must be obtained from WMD prior to installation. Information on the proposed depths and the well construction methods and materials must be provided at least two weeks before the expected date of installation.

If you have questions or comments, please contact Dave Slayton at 517-373-8012 or me.

Sincerely,

Cheryl Howe

Cheryl Howe
Senior Environmental Engineer
Hazardous Waste Permits Section
Waste Management Division
517-373-9881

cc: Mr. Rich Traub, U.S. EPA (w/Closure Documentation)
Ms. Marilyn Sabadaszka, U.S. EPA
Mr. Jim Sygo, Saginaw District, DNR
Mr. Dave Slayton, DNR
Mr. Steve Buda, DNR/C&E File

RMT INC.
Great Lakes Office
325 S. Clinton Street
P.O. Box 447
Grand Ledge, MI 48837-0447
Phone: 517-627-4044

RMT, Inc.
Suite 124
1406 East Washington Ave.
Madison, WI 53703-3009
Phone: 608-255-2134

CLOSURE OF FOUR RCRA UNITS
LOCATED AT

GMC-CFD SAGINAW NODULAR IRON
SAGINAW, MICHIGAN

MEETING WITH MDNR IN SAGINAW

ON MARCH 10, 1989

1125.23 101:RTA:sag10117

SECTION E
EXISTING CaC_2 TREATMENT BUNKER

Summary, Findings, and Conclusions

1. None of the 75 soil samples tested from this unit exceeded the background 99% prediction limit for cadmium, chromium, fluoride, lead, or zinc.

2. Four of the 75 soil samples tested from this unit exceeded the background 99% prediction limit for arsenic. These samples are located as follows:

Boring Location	Sample Depth (ft)
EB-108	0-2
EB-109	3.5-5.5
EB-114	4-5.5
EB-115	4-6

3. Five of the 75 soil samples tested from this unit exceeded the background 99% prediction limit for phenols. These samples are located as follows:

Boring Location	Sample Depth (ft)
EB-106	0-2
EB-110	0-2
EB-111	0-2
EB-114	4-5.5
EB-116	6-8

4. Eight of the 75 soil samples tested from this unit exceeded the background 99% prediction limit for selenium. These samples are located as follows:

Boring Location	Sample Depth (ft)
EB-108	0-2 and 4-6
EB-109	0-2 and 3.5-5.5
EB-114	0-2 and 4-5.5
EB-115	0-2 and 4-6

Proposed Approach

1. Although GM anticipates that materials remaining near the existing treatment bunker will not be "reactive," calcium carbide reactivity tests will be conducted prior to the activities described below.

2. Soil surrounding EB-106, 108, 109, 110, 111, 114, and 115 will be excavated and disposed as solid waste in GM's Crow Island Landfill. Due to excavation difficulties with soil below the ground water table, only unsaturated zone soil will be excavated, in the areas shown on Figure 5. The estimated depth of soil excavation will be to a 4-foot depth below ground surface.

3. After excavation, samples will be collected and analyzed to document contaminated soil does not remain. Proposed sampling locations are shown on Figure 5. As noted on the figure, samples will be collected using the 38-foot grid interval in the approved closure plan. Samples will be collected using the excavation backhoe (after decontamination) to scoop some unexcavated sidewall material from a proposed sampling location, and then using a hand trowel to take several small grab samples from the backhoe bucket. For each proposed location, individual grab samples will be combined for laboratory analysis, and compared to the 99% prediction limits shown in Section A of this document.

4. After excavation, samples from the proposed sampling locations will be tested for the parameter(s) of concern at a particular boring. The following tests will be conducted on the post-excavation perimeter samples:

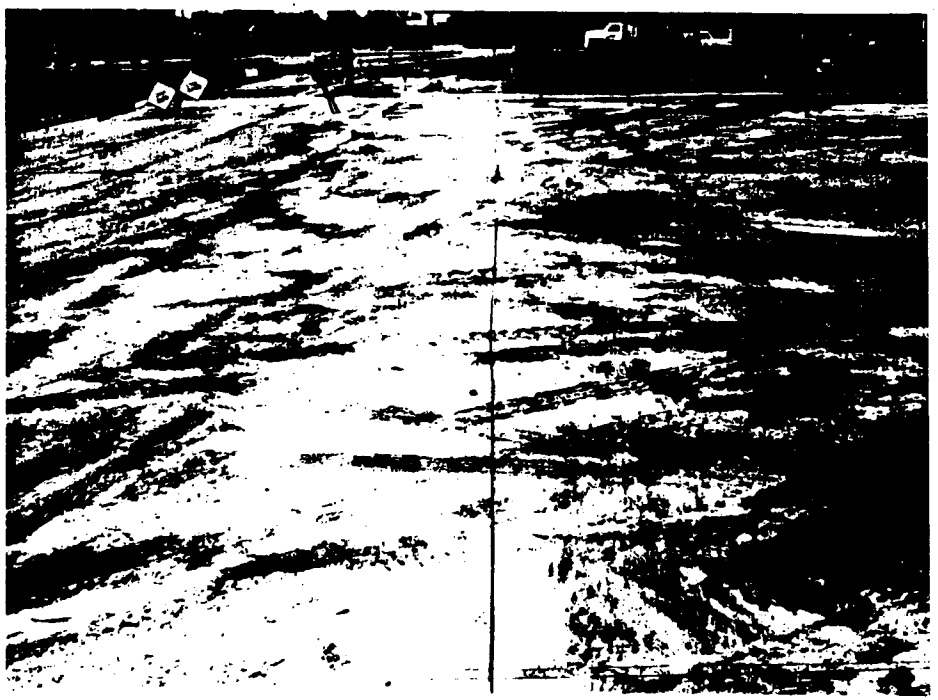
Phenols	Selenium
303	301
304	302
305	
306	
307	
308	
309	
310	
311	

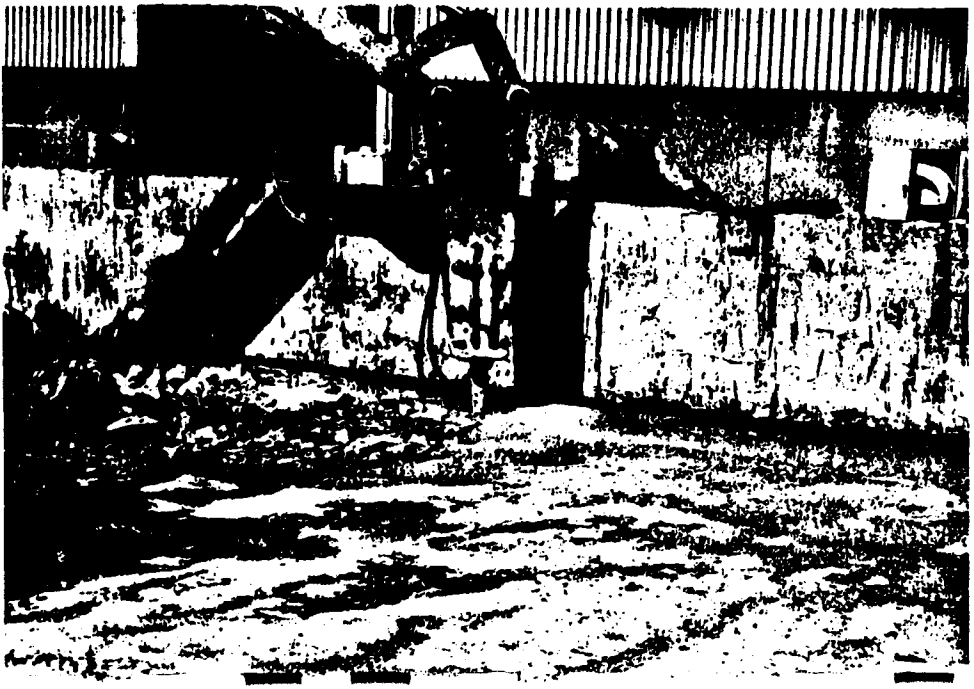
5. If the proposed post-excavation samples are below the 99% prediction limits, the excavation will be backfilled with purchased silica sand, and ground water monitoring will be conducted as described in Section F. Otherwise, additional samples will be collected to evaluate the extent of contamination.

APPENDIX B

PHOTOGRAPHIC DOCUMENTATION OF CLOSURE ACTIVITIES

C-LINE #52584
35MM PRINTS





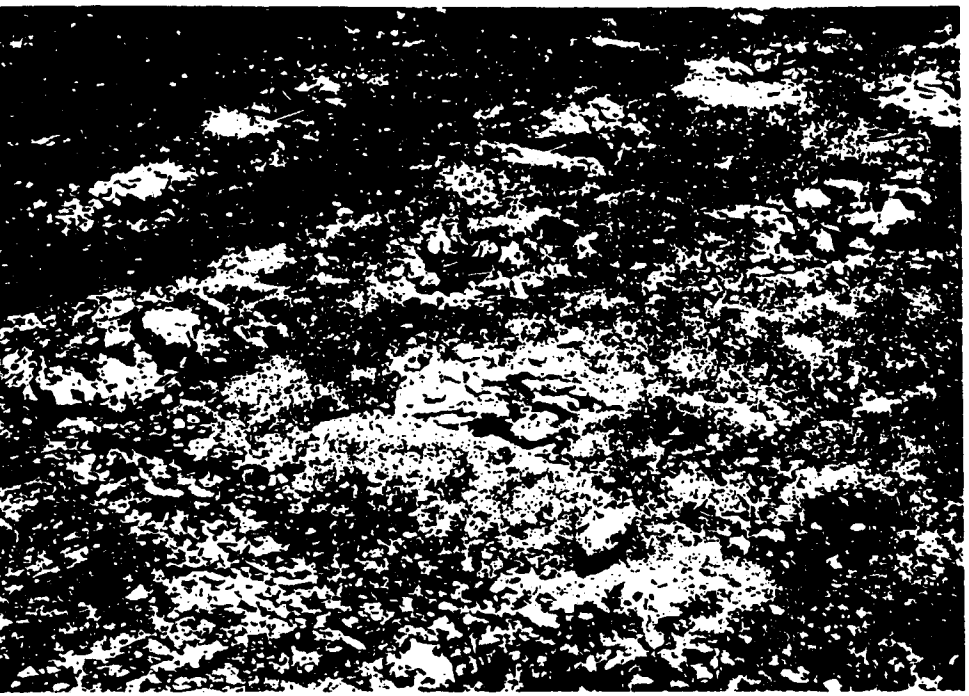
1) Holes punched in the driveway area and the road area so the trucks could continue to drive over them.

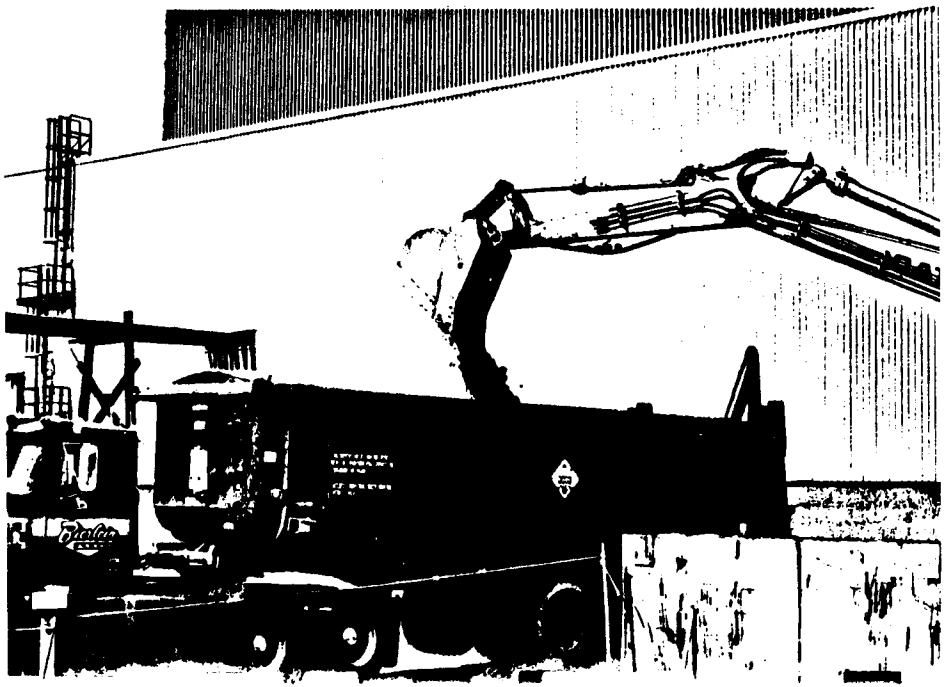
2) Cutting the rebar extending from the broken concrete.

3) Excavating soil from the existing calcium carbide desulfurization slag treatment bunker area.

4) Loading of a truck with soil from the existing calcium carbide desulfurization slag treatment bunker area.

C-LINE #52584
35MM PRINTS





1) Dumping of excavated materials at Crow Island Landfill.

2) Dumping of excavated materials at Crow Island Landfill.

3) Dike built of stone-crete to prevent run-off in case of rain.

4) Dike built of stone-crete to prevent run-off in case of rain.

C-LINE #52584
35MM PRINTS

1) Breaking of a catch basin in the driveway excavation area.

2) Breaking of a catch basin in the driveway excavation area, also notice holes punched through concrete allowing equipment to drive over it while excavating.

3) Finished excavation of existing calcium carbide desulfurization slag treatment bunker area with 10" steel pipe.

4) 30" storm sewer line in driveway excavation area. Excavation was required only to midpoint of pipe.

C-LINE #52584
35MM PRINTS

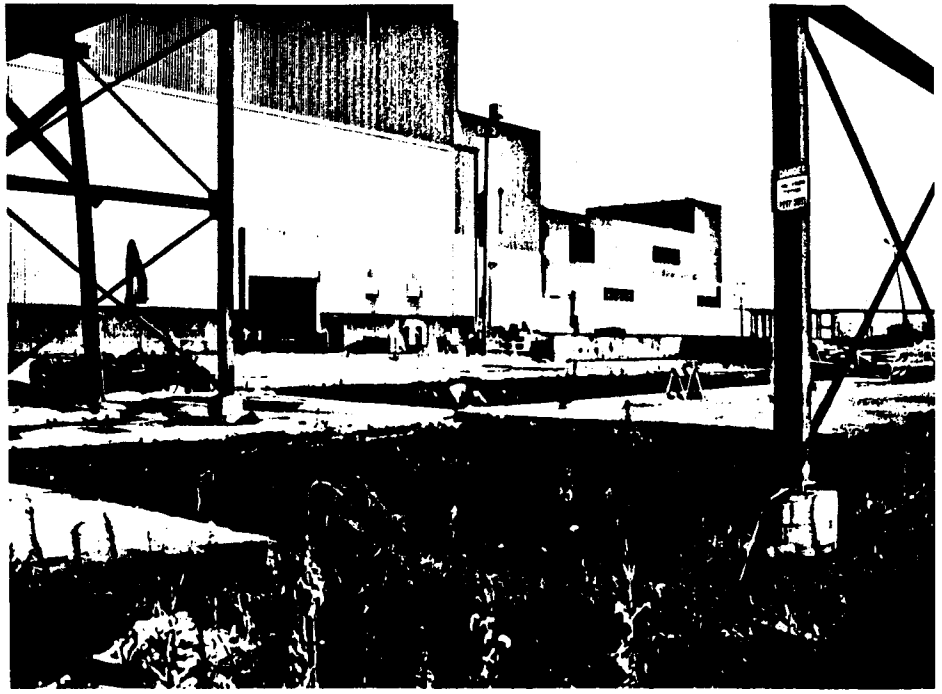
1) Finished excavation at the existing calcium carbide desulfurization slag treatment bunker showing bunker driveway and road areas.

2) Finished excavation at the existing calcium carbide desulfurization slag treatment bunker showing bunker driveway and road areas.

3) Decontamination of backhoe track before moving equipment to old calcium carbide desulfurization slag treatment area.

4) Sweeping up of the soils that were brushed off the equipment during decontamination.

C-LINE #52584
35MM PRINTS



NOTE: Photos on this sheet show decontamination of equipment after excavation at existing calcium carbide desulfurization slag treatment bunker and old calcium carbide desulfurization treatment unit.

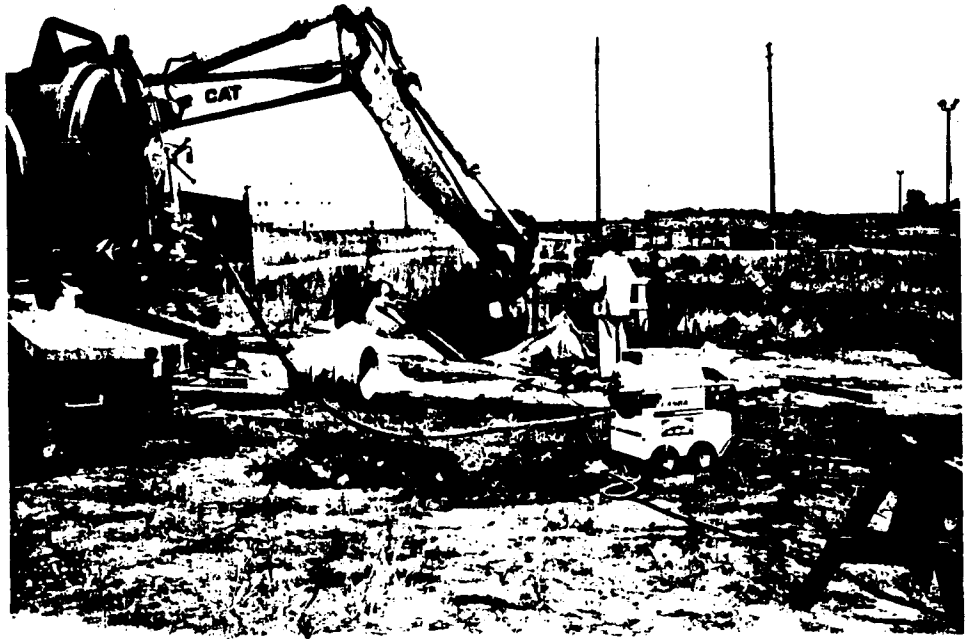
1) Decontamination of the backhoe.

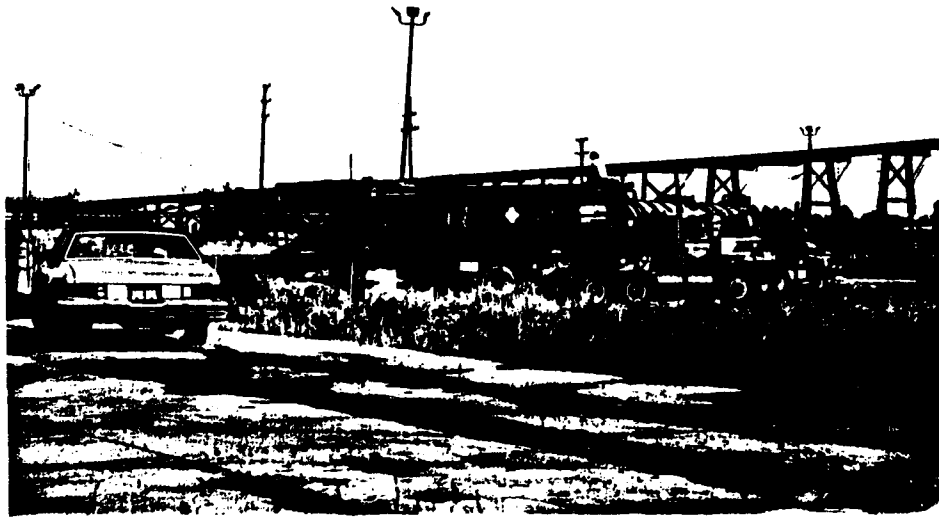
2) Decontamination of the backhoe with the tanker truck vacuuming the rinsate water.

3) Decontamination of the backhoe bucket with the tanker vacuuming the rinsate water.

4) Decontamination of a truck.

C-LINE #52584
35MM PRINTS





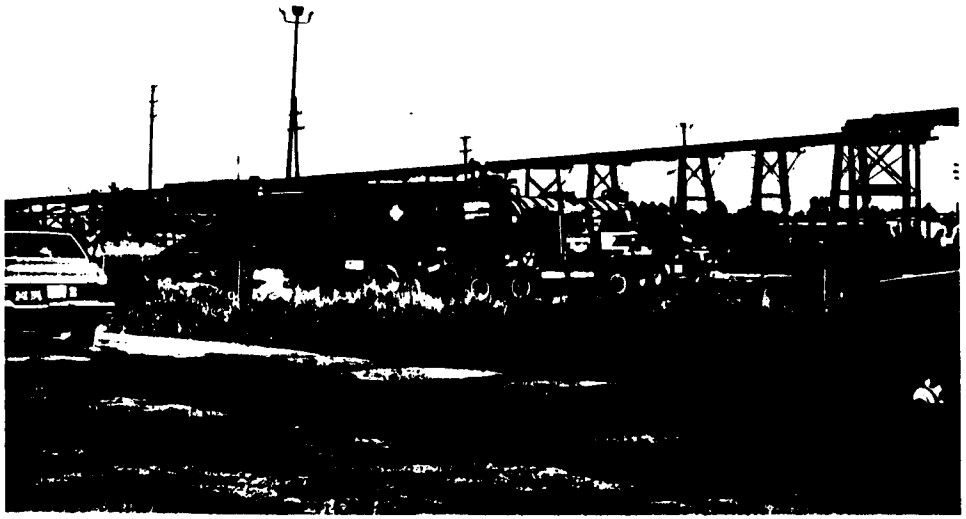
1) Decontamination of truck after the completion of excavation.

2) Decontaminated truck.

3) Completed excavation.

4) Beginning of backfill of driveway area.

C-LINE #52584
35MM PRINTS

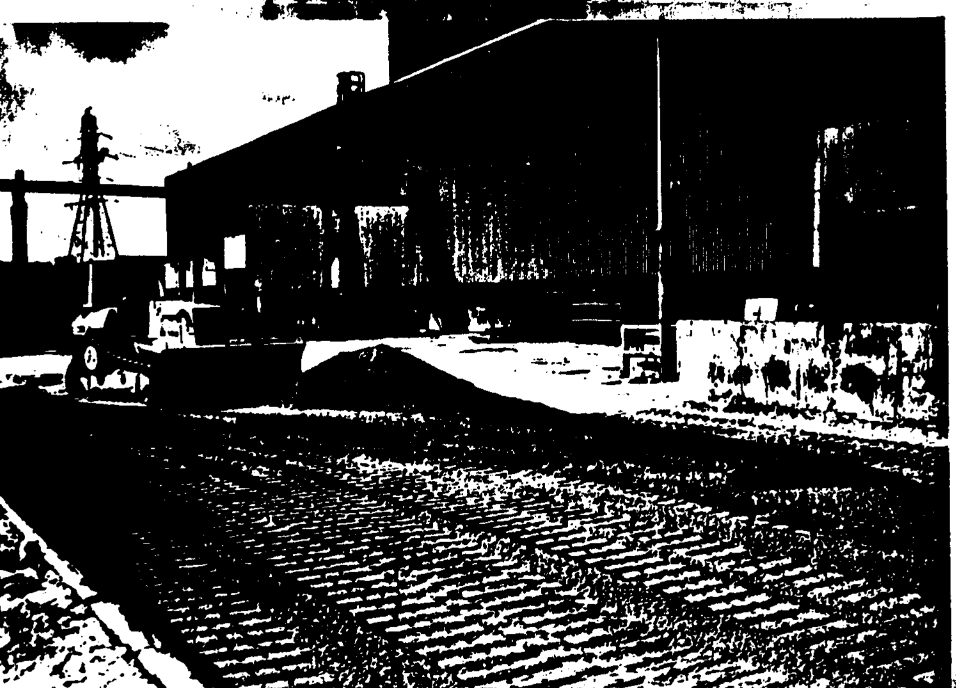


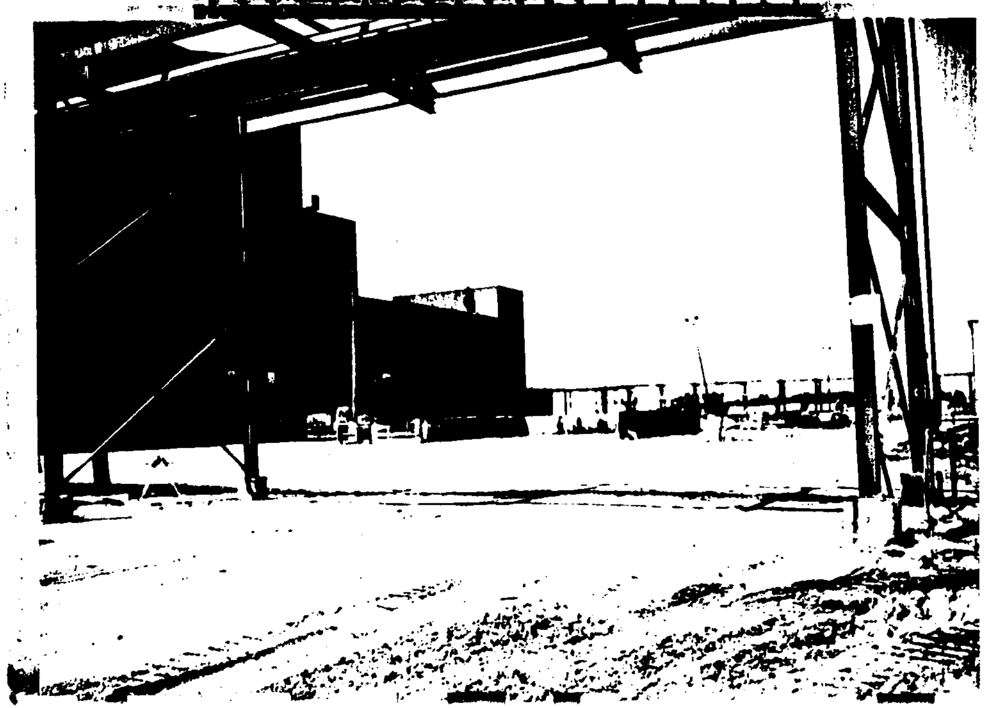
1) Backfill and compaction of driveway area.

2) Backfill and compaction of driveway area.

3) Final cover of existing calcium carbide desulfurization treatment bunker area.

4) Final cover of area with stonecrete at the existing calcium carbide desulfurization slag treatment bunker.





APPENDIX C

LABORATORY DATA SHEETS FOR POST EXCAVATION SAMPLES

RMT, INC.
LABORATORIES

CLIENT: GMC CFD SAGINAW NODULAR IRON
SAMPLE #: 40947
PROJECT #: 01125.22
WORK ORDER #: 072489-0112522
REPORT DATE: 08/01/89
COLLECTION DATE: 07/21/89
STATION ID: 301
SAMPLE COLLECTOR: MK

COMPOSITIONAL ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Solids, Total	93	%
Selenium, Total	<0.6	mg/kg dry wt.

Alan Dougney, Ph.D., Laboratory Director

RMT INC.
LABORATORIES

CLIENT: GMC CFD SAGINAW NODULAR IRON
SAMPLE #: 40948
PROJECT #: 01125.22
WORK ORDER #: 072489-0112522
REPORT DATE: 08/01/89
COLLECTION DATE: 07/21/89
STATION ID: 302
SAMPLE COLLECTOR: MK

COMPOSITIONAL ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Solids, Total	89	%
Selenium, Total	<0.7	mg/kg dry wt.

Alan Doughty, Ph.D., Laboratory Director

RMT INC
LABORATORIES

CLIENT: GMC CFD SAGINAW NODULAR IRON
SAMPLE #: 40949
PROJECT #: 01125.22
WORK ORDER #: 072489-0112522
REPORT DATE: 08/01/89
COLLECTION DATE: 07/21/89
STATION ID: 303
SAMPLE COLLECTOR: MK

COMPOSITIONAL ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Phenols	<1.4	mg/kg dry wt.
Solids, Total	87	%

Alan Dougnty, Ph.D., Laboratory Director

RMT INC.
LABORATORIES

CLIENT: GMC CFD SAGINAW NODULAR IRON
SAMPLE #: 40950
PROJECT #: 01125.22
WORK ORDER #: 072489-0112522
REPORT DATE: 08/01/89
COLLECTION DATE: 07/21/89
STATION ID: 304
SAMPLE COLLECTOR: MK

COMPOSITIONAL ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Phenols	1.4	mg/kg dry wt.
Solids, Total	88	%

Alan Doughty, Ph.D., Laboratory Director

RMT, INC.
LABORATORIES

CLIENT: GMC CFD SAGINAW NODULAR IRON
SAMPLE #: 40951
PROJECT #: 01125.22
WORK ORDER #: 072489-0112522
REPORT DATE: 08/01/89
COLLECTION DATE: 07/21/89
STATION ID: 305
SAMPLE COLLECTOR: MK

COMPOSITIONAL ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Phenols	1.9	mg/kg dry wt.
Solids, Total	92	%

Alan Doughty, Ph.D., Laboratory Director

RMT, INC.
LABORATORIES

CLIENT: GMC CFD SAGINAW NODULAR IRON
SAMPLE #: 40952
PROJECT #: 01125.22
WORK ORDER #: 072489-0112522.
REPORT DATE: 08/01/89
COLLECTION DATE: 07/21/89
STATION ID: 306
SAMPLE COLLECTOR: MK

COMPOSITIONAL ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Phenols	1.4	mg/kg dry wt.
Solids, Total	87	%

Alan Doughty, Ph.D., Laboratory Director

RMT INC.
LABORATORIES

CLIENT: GMC CFD SAGINAW NODULAR IRON
SAMPLE #: 40953
PROJECT #: 01125.22
WORK ORDER #: 072489-0112522
REPORT DATE: 08/01/89
COLLECTION DATE: 07/21/89
STATION ID: 307
SAMPLE COLLECTOR: MK

COMPOSITIONAL ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Phenols	<1.4	mg/kg dry wt.
Solids, Total	92	%

Alan Doughty, Ph.D., Laboratory Director

RMT INC.
LABORATORIES

CLIENT: GMC CFD SAGINAW NODULAR IRON
SAMPLE #: 40954
PROJECT #: 01125.22
WORK ORDER #: 072489-0112522
REPORT DATE: 08/01/89
COLLECTION DATE: 07/21/89
STATION ID: 308
SAMPLE COLLECTOR: MK

COMPOSITIONAL ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Phenols	<1.4	mg/kg dry wt.
Solids, Total	92	%

Alan Doughty, Ph.D., Laboratory Director

RMT INC.
LABORATORIES

CLIENT: GMC CFD SAGINAW NODULAR IRON
SAMPLE #: 40955
PROJECT #: 01125.22
WORK ORDER #: 072489-0112522
REPORT DATE: 08/01/89
COLLECTION DATE: 07/21/89
STATION ID: 309
SAMPLE COLLECTOR: MK

COMPOSITIONAL ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Phenols	<1.5	mg/kg dry wt.
Solids, Total	85	%

Alan Doughty, Ph.D., Laboratory Director

RMT INC.
LABORATORIES

CLIENT: GMC CFD SAGINAW NODULAR IRON
SAMPLE #: 40956
PROJECT #: 01125.22
WORK ORDER #: 072489-0112522
REPORT DATE: 08/01/89
COLLECTION DATE: 07/21/89
STATION ID: 310
SAMPLE COLLECTOR: MK

COMPOSITIONAL ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Phenols	2.0	mg/kg dry wt.
Solids, Total	89	%

Alan Doughty, Ph.D., Laboratory Director

RMT INC.
LABORATORIES

CLIENT: GMC CFD SAGINAW NODULAR IRON
SAMPLE #: 40957
PROJECT #: 01125.22
WORK ORDER #: 072489-0112522
REPORT DATE: 08/01/89
COLLECTION DATE: 07/21/89
STATION ID: 311
SAMPLE COLLECTOR: MK

COMPOSITIONAL ANALYSIS REPORT

PARAMETER	RESULT	UNITS
Phenols	<1.4	mg/kg dry wt.
Solids, Total	92	%

Alan Dougnty, Ph.D., Laboratory Director

APPENDIX D

GROUND WATER MONITORING WELL LOCATIONS, WELL LOGS AND BORING LOGS

SCHLEEDE
HAMPTON
ASSOCIATES INC
CONSULTING ENGINEERS

Central Foundry Division
Divisional Offices
77 W. Center Street
Saginaw, Michigan 48605-5073

August 23, 1991

Attn: Mr. G.K. West
Senior Engineering - Environmental Activities
Manufacturing Administration

Regarding: Monitoring Well Installation Project
Saginaw Nodular Iron Plant
Calcium Carbide Storage Areas
SHA Project Number 30240

Gentlemen:

The purpose of this letter is to document that the monitoring wells installed as part of this project (MW-2, MW-2A, MW-13, MW-14, MW-15, MW-16, MW-17, and MW-18) were constructed in accordance with instructions and specifications for the closure plan provided by CFD. I was present during construction of all of the wells, and I attest to their proper installation.

Sincerely,
Schleede-Hampton Associates, Inc.

James Berry, P.E.
Project Manager

2254 COLE STREET
BIRMINGHAM, MICHIGAN 48009
313-540-3044

SCHLEEDE
HAMPTON
ASSOCIATES INC
CONSULTING ENGINEERS

December 5, 1990

Central Foundry Division
Divisional Offices
77 W. Center Street
P.O. Box 5073
Saginaw, Michigan 48605-5073

Attn: Mr. G. Keith West
Senior Engineer - Environmental Activities

Regarding: Monitoring Well Installation Project
Calcium Carbide Storage Areas
Saginaw Nodular Iron Plant
SHA Project Number 30240

Gentlemen:

We have completed the groundwater monitoring well installation project at the Saginaw Nodular Iron Plant. The project consisted of installing a total of eight monitoring wells at both of the former calcium carbide yards storage areas at the plant. This report presents a discussion the project including methods and materials, soil boring logs, and monitoring well installation logs.

The scope of this project included soil drilling, sampling, and the installation of eight groundwater monitoring wells at two sites. Six wells were installed at the old slag treatment area located southeast of the plant. These wells were designated MW-2, MW-2A, MW-13, MW-14, MW-15, MW-16. Two wells were installed at the existing slag treatment bunker located south of the plant. These wells were designated MW-17 and MW-18.

The monitoring well locations were marked in the field by representatives of Central Foundry Division before the field work started.

The wells were drilled using truck mounted rotary head drilling equipment. Standard penetration tests were performed and split barrel samples were recovered at 2 1/2 foot intervals to the full depth of each boring.

Well screens and riser casing were installed in the borehole at completion of the drilling and sampling operations. Washed, graded, sand backfill was placed around the screen, and an annular seal of bentonite pellets was installed near the surface. A locking protective steel cover was grouted into place over the top of the casing at completion.

2254 COLE STREET
BIRMINGHAM, MICHIGAN 48009
313-540-3044

The boreholes were extended to depths greater than the eventual depth of well screen placement in some cases. Washed sand backfill was used to seat the screen in the upper sand soils at these locations.

A Field Engineer from Schleede-Hampton Associates, Inc. supervised and monitored the drilling and sampling procedures at all times.

After the wells were constructed, they were purged using hand bailers. Well development continued until the water was clear and pH, temperature, and conductivity field meter readings had stabilized.

Well rim elevations were determined by conventional differential leveling. A site benchmark was selected with an assumed elevation of 100.00 feet. This benchmark consisted of the plant floor surface at the center line of the overhead door immediately north of the existing treatment bunker.

A summary of well construction data is shown in table 1. Soil boring logs and well construction details for each well are contained in the appendix of this report.

If you have any questions regarding the project, please feel free to contact us at your convenience.

Sincerely,
Schleede-Hampton Associates, Inc.

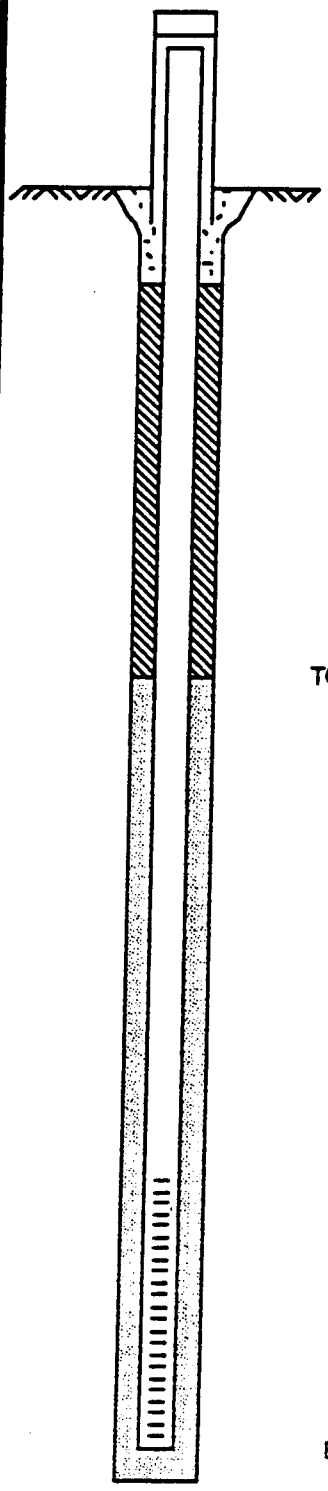
James Berry, P.E.
Senior Project Manager

TABLE I

SUMMARY OF WELL CONSTRUCTION DATA

Well Number	Construction Material	Well Diameter (IN.)	Rim Elevation	Total Length (FT.-IN.)	Stick Up Height (in.)	Well Tip Elevation	Well Screen Interval
MW-2	PVC	4	102.33	15-5	40	86.9	86.9 - 96.9
MW-2A	PVC	4	102.80	17-7	42	85.3	85.3 - 95.3
MW-13	PVC	4	102.70	15-1	43	87.6	87.6 - 97.6
MW-14	PVC	4	101.98	15-5	40	86.6	86.6 - 96.6
MW-15	PVC	4	102.60	15-5	45	87.2	87.2 - 97.2
MW-16	PVC	4	102.83	16-2	42	86.7	86.7 - 96.7
MW-17	PVC	4	102.03	17-8	43	84.4	84.4 - 94.4
MW-18	PVC	4	102.23	18-3	40	84.0	84.0 - 94.0

ELEVATION	WELL CONSTRUCTION DETAIL MW - 17	REMARKS
		DATE OF INSTALLATION 10/30/90
102.03	TOP OF CASING (RIM)	
98.4	GROUND SURFACE	ANNULAR SEAL BENTONITE TABLETS
97.6	TOP OF ANNULAR SEAL	
		TOTAL RISER LENGTH 7 FT. 8 IN.
		SCREEN LENGTH 10 FT.
96.9	TOP OF GRANULAR BACKFILL	PERVIOUS BACKFILL WASHED SAND
		TOTAL WELL LENGTH 17 FT. 8 IN.
		STICK UP HEIGHT 43 IN.
94.4	TOP OF SCREEN	LOCK ID. MASTER # 3753
84.4	BOTTOM OF PLUG (TIP)	



SCHLEEDE-HAMPTON ASSOCIATES, INC. • CONSULTING ENGINEERS

RECORD OF SUBSURFACE EXPLORATION

BORING MW-17 PAGE 1 OF 1

PROJECT NAME SNI Monitoring Well Installation Project
SHA PROJECT NO. 30240
SITE LOCATION Existing Calcium Carbide Treatment Bunker

DATE STARTED 10/30/90
DATE COMPLETED 10/30/90
DRILLER RD BORING METHOD HSA
GW ENCOUNTERED WHILE DRILLING 6'
GROUND WATER, AT COMPLETION 6'
GROUND WATER, AFTER - DAYS -
HOLE CAVED, - AT -

ELEV.	DESCRIPTION	DEPTH	SAMPLE	N	Qu	Qp	Wc	REMARKS
	10" P.C. CONCRETE							
	Black, fine SAND Trace silt		SS-1	19				
	Brown SAND Trace silt							
	Moist to wet, medium dense to loose, black, fine SAND Trace silt	5	SS-2	3				
			SS-3	9				
		10	SS-4	2				
			SS-5	2				
	Moist, variegated, brown silty CLAY	15	SS-6	2				
	End of Boring							

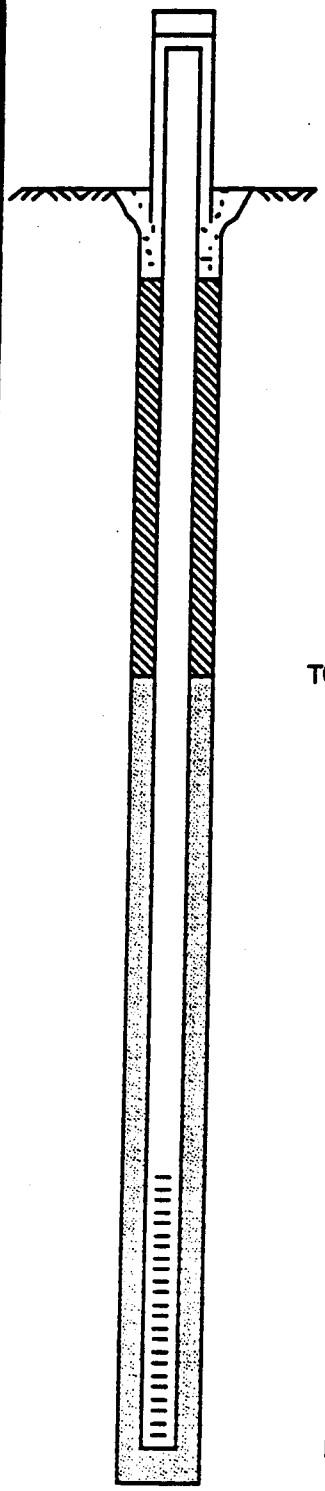
SYMBOLS
- N: STANDARD PENETRATION, BLOWS/FT.
- Qu: UNCONFINED COMPRESSIVE STRENGTH, TONS/SQ. FT.
- Wc: WATER CONTENT, %
- LL: LIQUID LIMIT, %
- PI: PLASTICITY INDEX, %
- Dd: NATURAL DRY DENSITY, LBS./CU. FT.
- Qp: HAND PENETROMETER, TONS/SQ. FT.
- GW: GROUND WATER

SAMPLE DESIGNATION
- SS— DRIVEN SPLIT SPOON 1 3/8" I.D., 2" O.D.
- ST— PRESSED SHELBY TUBE
- AU— AUGER SAMPLE
- RC— ROCK CORE - NXM

BORING METHOD
- HSA—HOLLOW STEM AUGERS
- CFA—CONTINUOUS FLIGHT AUGERS
- C— CASING
- MD— MUD DRILLING

NOTE: The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

ELEVATION	WELL CONSTRUCTION DETAIL MW - 18	REMARKS
		DATE OF INSTALLATION 10/30/90
102.23	TOP OF CASING (RIM)	
98.7	GROUND SURFACE	ANNULAR SEAL BENTONITE TABLETS
97.2	TOP OF ANNULAR SEAL	
		TOTAL RISER LENGTH 8 FT. 3 IN.
		SCREEN LENGTH 10 FT.
96.1	TOP OF GRANULAR BACKFILL	PERVIOUS BACKFILL WASHED SAND
		TOTAL WELL LENGTH 18 FT. 3 IN.
		STICK UP HEIGHT 42 IN.
94.0	TOP OF SCREEN	LOCK ID. MASTER # 3753
84.0	BOTTOM OF PLUG (TIP)	



SCHLEEDE-HAMPTON ASSOCIATES, INC. • CONSULTING ENGINEERS

RECORD OF SUBSURFACE EXPLORATION

BORING MW-18 PAGE 1 OF 1

PROJECT NAME SNI Monitoring Well Installation Project
SHA PROJECT NO. 30240
SITE LOCATION Existing Calcium Carbide Treatment Bunker

DATE STARTED 10/30/90
DATE COMPLETED 10/30/90
DRILLER RD BORING METHOD HSA
GW ENCOUNTERED WHILE DRILLING 8'
GROUND WATER, AT COMPLETION -
GROUND WATER, AFTER - DAYS -
HOLE CAVED, - AT -

ELEV.	DESCRIPTION	DEPTH	SAMPLE	N	Qu	Qp	Wc	REMARKS
	8" P.C. CONCRETE							
	Moist, medium dense, black, fine SAND Trace silt		SS-1	30				
		5	SS-2	7				
	DEBRIS Very hard drilling	10						
	Wet, loose, black, fine SAND Trace silt		SS-3	4				
	Moist, soft, variegated, silty CLAY	15	SS-4	6				
	End of Boring	20						

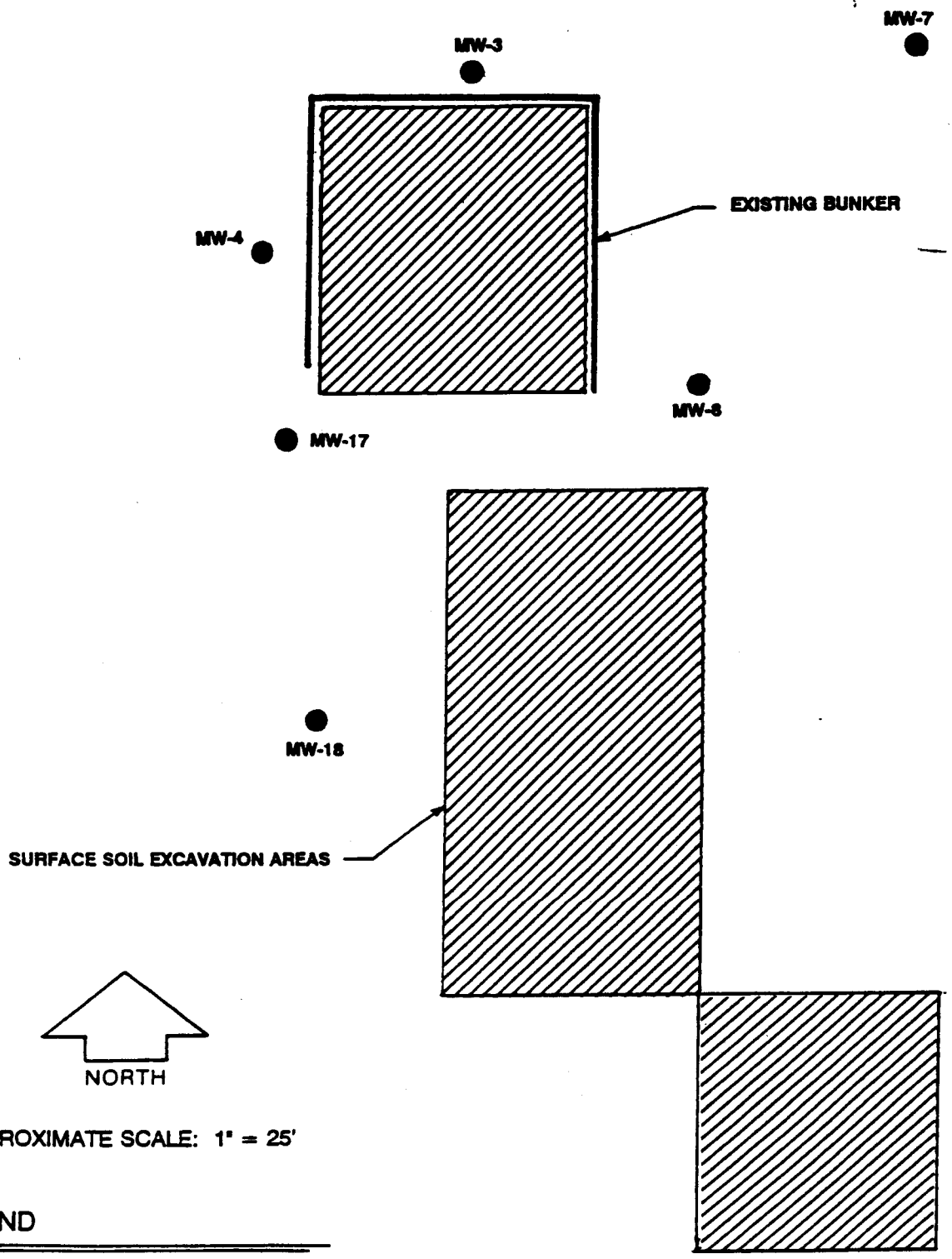
SYMBOLS
- N: STANDARD PENETRATION, BLOWS/FT.
- Qu: UNCONFINED COMPRESSIVE STRENGTH, TONS/SQ. FT.
- Wc: WATER CONTENT, %
- LL: LIQUID LIMIT, %
- PI: PLASTICITY INDEX, %
- Dd: NATURAL DRY DENSITY, LBS./CU. FT.
- Qp: HAND PENETROMETER, TONS/SQ. FT.
- GW: GROUND WATER

SAMPLE DESIGNATION
- SS— DRIVEN SPLIT SPOON 1 3/8" I.D., 2" O.D.
- ST— PRESSED SHELBY TUBE
- AU— AUGER SAMPLE
- RC— ROCK CORE - NXM

BORING METHOD
- HSA— HOLLOW STEM AUGERS
- CFA— CONTINUOUS FLIGHT AUGERS
- C— CASING
- MD— MUD DRILLING

NOTE: The stratification lines represent the approximate boundary between soil types and the transition may be gradual.

GMC-CFD-SNI EXISTING CALCIUM CARBIDE DESULFURIZATION TREATMENT BUNKER GROUND WATER MONITORING WELL LOCATION MAP



APPROXIMATE SCALE: 1" = 25'

LEGEND

- MONITORING WELLS FOR RCRA CLOSURE
- GROUND WATER CONTOUR (12/17/90)

RMT INC.

Dwn. by:	CMS
Date:	10/91
Proj.#	1125.23

APPENDIX E

GROUND WATER ANALYTICAL RESULTS

WW Engineering & Science, Inc.
5555 Glenwood Hills Parkway SE • PO Box 874 • Grand Rapids, MI 49588-0874 • (616) 942-9600. Fax (616) 942-6499

October 14, 1991

Mr. Keith West
GM Central Foundries Division
Divisional Offices
77 W. Center Street
P.O. Box 5073
Saginaw, MI 48605-5073

RE: Groundwater Monitoring

Dear Mr. West:

WW Engineering & Science (WWES) collected and analyzed groundwater samples from your Saginaw Nodular Iron Plant during the period of November 1990 through January 1991.

All work was completed in accordance with the calcium carbide closure plan for the old and existing area of the plant, outlined in Section F (Groundwater Monitoring Program) as supplied to WWES by the General Motors Corporation.

Thank you for the opportunity to be of service. Please do not hesitate to contact me if you have any questions or need additional information for your summary report.

Sincerely,

WW ENGINEERING & SCIENCE
ENVIRONMENTAL LABORATORY DIVISION

Shar Hopp
Marketing Director

Hopp/West

FEB 2 . 1991

WW Engineering & Science, Inc.
5555 Glenwood Hills Parkway SE • P.O. Box 874 • Grand Rapids, Michigan 49588-0874 • PH(616)942-9600 FX(616)942-6499

REQ'D FOR ITEM #7 OH JBH

February 26, 1991

Mr. Keith West
GM Central Foundry
Divisional Offices
77 W. Center St.
P.O. Box 5073
Saginaw, MI 48605

Dear Mr. West:

I recently had a discussion with Shar Hopp in which your concerns regarding the Saginaw closure monitoring well reports were addressed. Accordingly, I have compiled spread sheets for each individual well as well as field reports for your review. Please make note of the following:

1. Data for each well has been entered with regards to your detection limit requirements rather than our achievable limits. Therefore, values our analytical reports that were positive above our detection limit but below your required detection limit are entered as "less than" your required limit.
2. All units have been converted to mg/l for consistency.
3. MW 2A and MW 7A refer to the same well. MW 7A has been designated as the well I.D. for consistency.
4. The computer software program used to compile the spread sheets assigns a value of zero for data points entered as "less than" for purposes of calculating averages.
5. MW 14 and its duplicate from the November sampling were reanalyzed for manganese due to the difference in their originally reported values. The values obtained were 0.007 mg/l and 0.009 mg/l respectively. The data point entered on the spread sheet reflects this 0.007 value.
6. The nitrate value in our analytical report for MW 3 from the November sampling was in error. The value should have read 0.20 mg/l rather than 0.02 mg/l. The spread sheet reflects this correction.

You will also find enclosed a memorandum from Dr. Richard Rediske addressing your concerns about differences in phosphorus and chloride results for field duplicates. I hope this will clarify matters on this issue.

If you have any questions or require any further information at this time, do not hesitate to contact either Shar or myself.

Sincerely,

WW ENGINEERING & SCIENCE
ENVIRONMENTAL LABORATORY DIVISION

Ron Hamilton
Project Chemist

CENTRAL FOUNDRY
PROJECT #25744
CFD-SAGINAW CLOSURE

MW: #3

PARAMETERS	11/19/90 (mg/l)	12/17/90 (mg/l)	1/28/91 (mg/l)	2/14/91 (mg/l)	REQUIRED LIMITS (mg/l)	AVERAGE (mg/l)
PH (FIELD)	9.62	9.61	9.72	10.14	---	9.77
TOC	8.2	6.7	6.4	3.2	1.0	6.1
ALKALINITY, TOTAL	226	222	209	220	20	219
CHLORIDE	108	112	98	80	1.0	100
FLUORIDE	18	17	22	18	0.1	19
NITROGEN,NITRATE	0.20	0.82	0.25	0.74	0.05	0.50
PHENOL, TOTAL	<0.10	<0.10	<0.10	<0.10	0.10	0
PHOSPHORUS, TOTAL	0.16	0.14	0.14	0.10	0.10	0.14
ARSENIC, DISSOLVED	0.031	0.017	0.013	0.015	0.010	0.019
CADMIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
CALCIUM, DISSOLVED	6.9	6.8	13	6.2	0.03	8.2
CHROMIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
IRON, DISSOLVED	0.03	0.01	0.01	0.01	0.01	0.02
LEAD, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
MAGNESIUM, DISSOLVED	2.8	2.9	2.3	3.5	0.30	2.9
MANGANESE, DISSOLVED	<0.005	<0.005	<0.005	<0.005	0.005	0
POTASSIUM, DISSOLVED	13	9.6	8.0	8.6	0.5	9.8
SELENIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
SODIUM, DISSOLVED	228	228	211	210	0.3	219
ZINC, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0

3M CENTRAL FOUNDRY
PROJECT #25744
FD-SAGINAW CLOSURE

MW: #4

PARAMETERS	11/19/90 (mg/l)	12/17/90 (mg/l)	1/28/91 (mg/l)	2/14/91 (mg/l)	REQUIRED LIMITS (mg/l)	AVERAGE (mg/l)
pH (FIELD)	9.88	9.85	9.97	10.37	---	10.02
TOC	44	30	27	23	1.0	31
ALKALINITY, TOTAL	283	261	254	248	20	262
CHLORIDE	297	256	243	243	1.0	257
FLUORIDE	17	18	22	18	0.1	19
NITROGEN,NITRATE	<0.05	<0.05	<0.05	<0.05	0.05	0
PHENOL, TOTAL	0.18	0.20	0.13	<0.10	0.10	0.13
PHOSPHORUS, TOTAL	<0.10	0.12	0.13	<0.10	0.10	0.06
ARSENIC, DISSOLVED	0.056	0.042	0.056	0.049	0.010	0.051
CADMIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
CALCIUM, DISSOLVED	37	27	39	26	0.03	32
CHROMIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
IRON, DISSOLVED	0.09	0.04	0.05	0.05	0.01	0.06
LEAD, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
MAGNESIUM, DISSOLVED	0.57	<0.30	<0.30	0.72	0.30	0.32
MANGANESE, DISSOLVED	<0.005	<0.005	<0.005	<0.005	0.005	0
POTASSIUM, DISSOLVED	14	15	12	14	0.5	14
SELENIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
SODIUM, DISSOLVED	233	214	207	198	0.3	213
ZINC, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0

GM CENTRAL FOUNDRY
PROJECT #25744
CFD-SAGINAW CLOSURE

MW: #7

PARAMETERS	11/19/90 (mg/l)	12/17/90 (mg/l)	1/29/91 (mg/l)	2/14/91 (mg/l)	REQUIRED LIMITS (mg/l)	AVERAGE (mg/l)
pH (FIELD)	7.18	7.23	7.16	7.52	---	7.27
TOC	24	22	26	24	1.0	24
ALKALINITY, TOTAL	451	461	464	420	20	449
CHLORIDE	1200	1090	826	1020	1.0	1034
FLUORIDE	4.2	5.7	6.8	7.7	0.1	6.1
NITROGEN,NITRATE	<0.05	<0.05	0.12	<0.05	0.05	0.03
PHENOL, TOTAL	<0.10	<0.10	<0.10	<0.10	0.10	0
PHOSPHORUS, TOTAL	0.19	<0.10	<0.10	0.10	0.10	0.07
ARSENIC, DISSOLVED	<0.010	<0.010	<0.010	<0.010	0.010	0
CADMIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
CALCIUM, DISSOLVED	204	237	269	232	0.03	236
CHROMIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
IRON, DISSOLVED	8.6	2.0	19	10	0.01	9.9
LEAD, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
MAGNESIUM, DISSOLVED	52	58	61	62	0.30	58
MANGANESE, DISSOLVED	1.53	1.79	1.42	1.37	0.005	1.53
POTASSIUM, DISSOLVED	16	16	15	13	0.5	15
SELENIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
SODIUM, DISSOLVED	526	539	513	463	0.3	510
ZINC, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0

GM CENTRAL FOUNDRY
PROJECT #25744
CFD-SAGINAW CLOSURE

MW: #8

PARAMETERS	11/19/90 (mg/l)	12/17/90 (mg/l)	1/28/91 (mg/l)	2/14/91 (mg/l)	REQUIRED LIMITS (mg/l)	AVERAGE (mg/l)
pH (FIELD)	10.94	11.05	10.71	11.45	---	11.04
TOC	20	16	16	<1.0	1.0	13
ALKALINITY, TOTAL	189	191	202	196	20	195
CHLORIDE	297	327	266	241	1.0	283
FLUORIDE	29	26	30	29	0.1	29
NITROGEN,NITRATE	<0.05	0.98	0.16	0.15	0.05	0.32
PHENOL, TOTAL	<0.10	<0.10	<0.10	<0.10	0.10	0
PHOSPHORUS, TOTAL	0.11	0.14	0.11	0.11	0.10	0.12
ARSENIC, DISSOLVED	0.027	0.031	0.026	0.027	0.010	0.028
CADMIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
CALCIUM, DISSOLVED	71	84	73	61	0.03	72
CHROMIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
IRON, DISSOLVED	0.02	0.05	<0.01	0.02	0.01	0.02
LEAD, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
MAGNESIUM, DISSOLVED	0.88	0.79	0.47	0.98	0.30	0.78
MANGANESE, DISSOLVED	<0.005	<0.005	<0.005	<0.005	0.005	0
POTASSIUM, DISSOLVED	41	40	34	30	0.5	36
SELENIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
SODIUM, DISSOLVED	224	221	214	209	0.3	217
ZINC, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0

GM CENTRAL FOUNDRY
PROJECT #25744
CFD-SAGINAW CLOSURE

MW: #17

PARAMETERS	11/19/90 (mg/l)	12/17/90 (mg/l)	1/28/91 (mg/l)	2/14/91 (mg/l)	REQUIRED LIMITS (mg/l)	AVERAGE (mg/l)
pH (FIELD)	10.41	10.42	10.23	10.87	---	10.48
TOC	90	30	45	93	1.0	65
ALKALINITY, TOTAL	245	545	424	616	20	458
CHLORIDE	450	81	238	402	1.0	293
FLUORIDE	7.3	6.7	7.7	7.5	0.1	7.3
NITROGEN,NITRATE	<0.05	<0.05	0.18	<0.05	0.05	0.05
PHENOL, TOTAL	0.33	0.25	<0.10	0.50	0.10	0.27
PHOSPHORUS, TOTAL	<0.10	0.18	<0.10	0.18	0.10	0.09
ARSENIC, DISSOLVED	0.261	0.176	0.190	0.171	0.010	0.200
CADMIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
CALCIUM, DISSOLVED	130	129	97	107	0.03	116
CHROMIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
IRON, DISSOLVED	1.8	0.09	0.07	0.11	0.01	0.52
LEAD, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
MAGNESIUM, DISSOLVED	0.67	0.87	0.95	1.0	0.30	0.87
MANGANESE, DISSOLVED	0.074	0.003	<0.005	<0.005	0.005	0.020
POTASSIUM, DISSOLVED	21	16	13	18	0.5	17
SELENIUM, DISSOLVED	0.018	<0.01	<0.01	<0.01	0.01	0.005
SODIUM, DISSOLVED	160	138	119	170	0.3	147
ZINC, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0

GM CENTRAL FOUNDRY
PROJECT #25744
CFD-SAGINAW CLOSURE

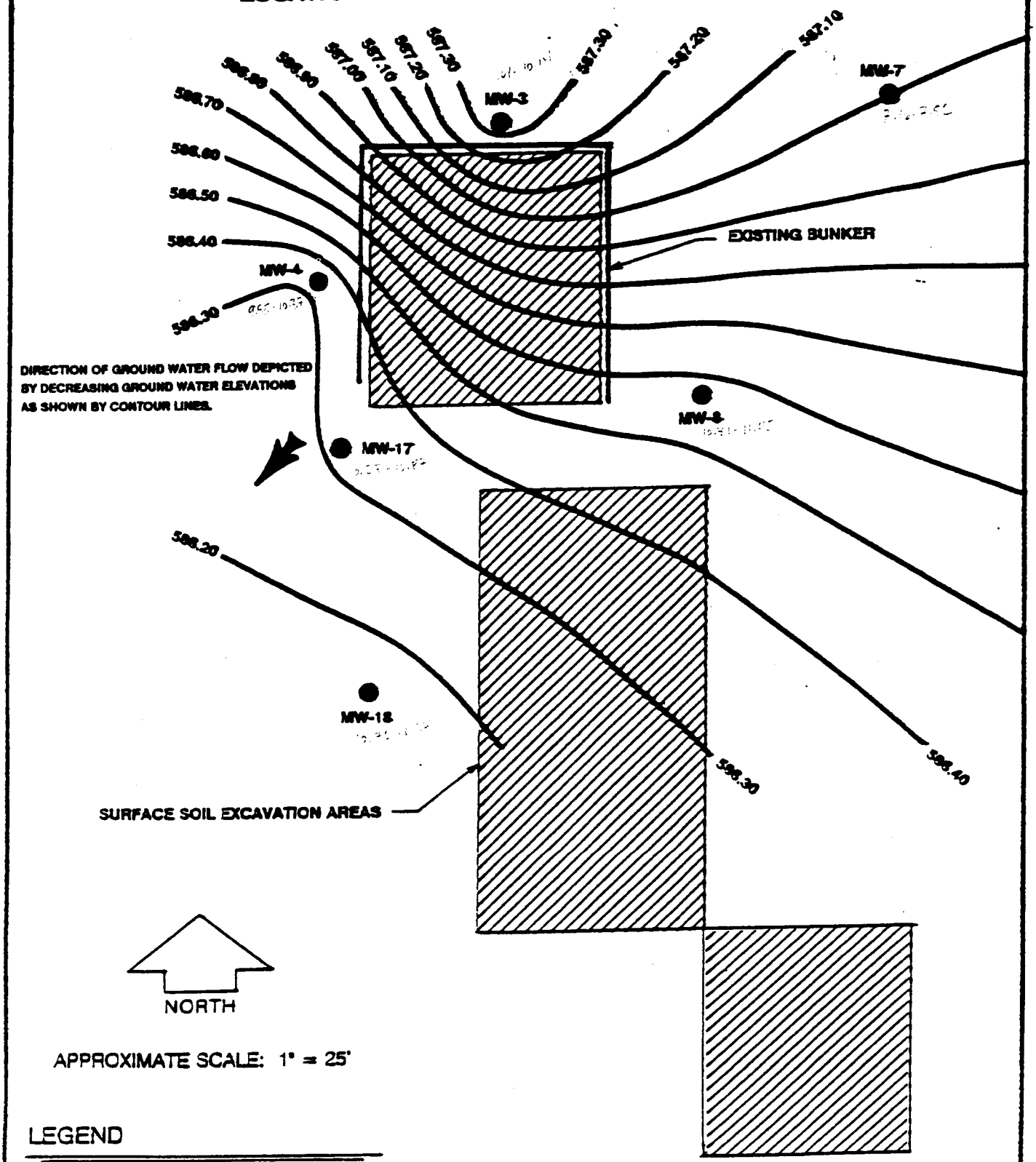
MW: #18

PARAMETERS	11/19/90 (mg/l)	12/17/90 (mg/l)	1/28/91 (mg/l)	2/14/91 (mg/l)	REQUIRED LIMITS (mg/l)	AVERAGE (mg/l)
pH (FIELD)	10.72	11.24	11.16	10.78	---	10.98
TOC	70	4.8	9.4	171	1.0	64
ALKALINITY, TOTAL	611	554	675	760	20	650
CHLORIDE	366	73	505	898	1.0	461
FLUORIDE	18	16	17	15	0.1	17
NITROGEN,NITRATE	0.15	0.36	0.84	2.7	0.05	1.0
PHENOL, TOTAL	0.39	0.40	0.76	0.66	0.10	0.55
PHOSPHORUS, TOTAL	<0.10	0.14	<0.10	0.28	0.10	0.11
ARSENIC, DISSOLVED	0.071	0.089	0.138	0.090	0.010	0.097
CADMIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
CALCIUM, DISSOLVED	127	102	132	119	0.03	120
CHROMIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
IRON, DISSOLVED	1.6	0.03	0.03	0.14	0.01	0.45
LEAD, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
MAGNESIUM, DISSOLVED	0.59	<0.30	<0.30	1.6	0.30	0.55
MANGANESE, DISSOLVED	0.050	<0.005	<0.005	<0.005	0.005	0.013
POTASSIUM, DISSOLVED	45	40	41	47	0.5	43
SELENIUM, DISSOLVED	<0.01	<0.01	<0.01	<0.01	0.01	0
SODIUM, DISSOLVED	132	138	140	168	0.3	145
ZINC, DISSOLVED	0.02	<0.01	<0.01	<0.01	0.01	0.01

APPENDIX F

GROUND WATER FLOW DIRECTION CONTOUR MAP

GMC-CFD-SNI EXISTING CALCIUM CARBIDE DESULFURIZATION TREATMENT BUNKER GROUND WATER MONITORING WELL LOCATIONS AND GROUND WATER CONTOUR MAP



APPROXIMATE SCALE: 1" = 25'

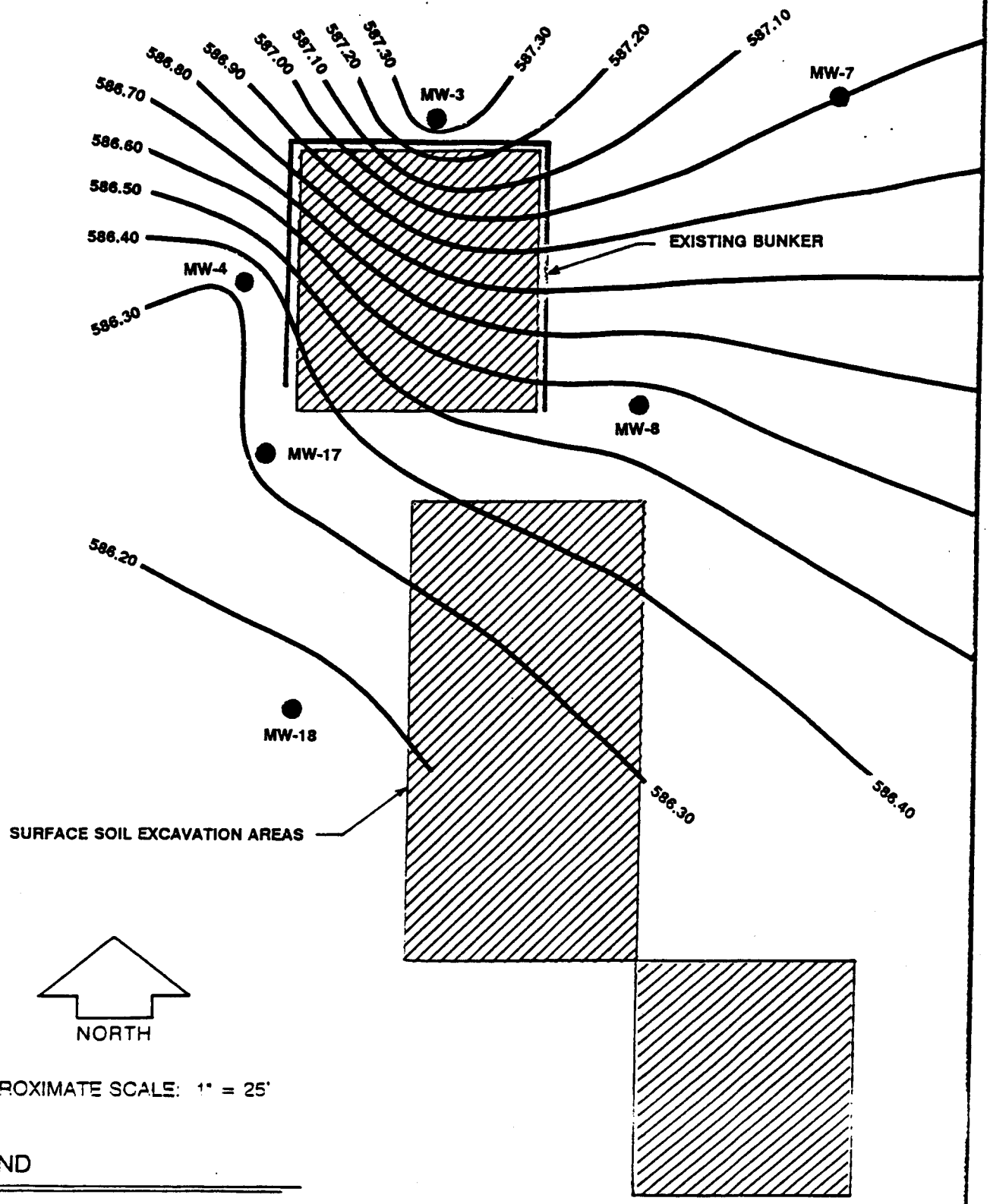
LEGEND

- MONITORING WELLS FOR RCRA CLOSURE
- GROUND WATER CONTOUR (12/17/90)

RMT INC.

Dwn. by:	CMS
Date:	10/91
Proj.#	1125.23

GMC-CFD-SNI EXISTING CALCIUM CARBIDE DESULFURIZATION TREATMENT BUNKER GROUND WATER MONITORING WELL LOCATIONS AND GROUND WATER CONTOUR MAP



APPROXIMATE SCALE: 1" = 25'

LEGEND

- MONITORING WELLS FOR RCRA CLOSURE
- GROUND WATER CONTOUR (12/17/90)

RMT INC

Dwn. by	CMS
Date	10/91
Proj #	1125.23

APPENDIX G

STATISTICAL ANALYSIS OF GROUND WATER MONITORING DATA

SNISTAT.WK1

ONE-WAY PARAMETRIC ANOVA FOR ARSENIC DATA FROM EXISTING
CALCIUM CARBIDE DESULFERIZATION SLAG TREATMENT BUNKER

TABLE CURRENT AS OF 23-Oct-91
04:21 PM EST

MW-7				
20-Nov-90 <	0.005			
18-Dec-90 <	0.005			
29-Jan-91 <	0.005	WELL MEAN	WELL TOT.	WELL STD
14-Feb-91 <	0.005	0.005	0.020	0.000
MW-8				
19-Nov-90	0.027			
17-Dec-90	0.031			
28-Jan-91	0.026	WELL MEAN	WELL TOT.	WELL STD
14-Feb-91	0.027	0.028	0.111	0.002
MW-3				
19-Nov-90	0.031			
17-Dec-90	0.017			
28-Jan-91	0.013	WELL MEAN	WELL TOT.	WELL STD
14-Feb-91	0.015	0.019	0.076	0.008
MW-4				
19-Nov-90	0.056			
17-Dec-90	0.042			
28-Jan-91	0.056	WELL MEAN	WELL TOT.	WELL STD
14-Feb-91	0.049	0.051	0.203	0.007
MW-17				
19-Nov-90	0.261			
17-Dec-90	0.176			
28-Jan-91	0.190	WELL MEAN	WELL TOT.	WELL STD
14-Feb-91	0.171	0.200	0.798	0.042
MW-18				
19-Nov-90	0.071			
17-Dec-90	0.089			
28-Jan-91	0.138	WELL MEAN	WELL TOT.	WELL STD
14-Feb-91	0.090	0.097	0.388	0.029
		GRNDMEAN	GRND TOT	
		0.0665	1.596	

SOURCE VARIATION	SUM OF SQUARES	DEGREES FREEDOM	MEAN SQUARES	F CALCULATED	F .01 TABLE 5 & 18 DEG. FREE.
SS WELLS	0.095	5	0.019	18.693	4.25
SS TOT	0.114	23			
SS ERROR	0.018	18	0.001		

F CALC. IS LARGER THAN F.01 TABULATED INDICATING HYPOTHESIS OF EQUAL WELL MEANS MUST BE REJECTED- MUST CALC. BONFERRONI-t STATISTIC

BONFERRONI-t STATISTIC

Nup =	12	SEi =	0.018	Di =	0.053
Xup =	0.017	CRIT.t =	2.878	FOR i = 4,17,18	
X4-Xup =	0.034	FREE = 18			
X17-Xup =	0.182	M = 3			
X18-Xup =	0.080	ALPHA = .01			

Xi-Xup EXCEEDS Di FOR WELLS MW-17 AND MW-18 THUS WE MUST CONCLUDE THAT THERE ARE STATISTICALLY SIGNIFICANT IMPACTS TO THE GROUND WATER AT THESE LOCATIONS

SNISTAT.WK1 CALCULATION OF PREDICTION INTERVAL FOR ARSENIC DATA FROM EXISTING CALCIUM CARBIDE DESULFERIZATION SLAG TREATMENT BUNKER

ARSENIC DATA

BACKGROUND WELLS

MW-7					
20-Nov-90	< 0.005				
18-Dec-90	< 0.005				
29-Jan-91	< 0.005				
14-Feb-91	< 0.005				
MW-8					
19-Nov-90	0.027				
17-Dec-90	0.031				
28-Jan-91	0.026				
14-Feb-91	0.027				
MW-3					
19-Nov-90	0.031	MEAN OF	SAMPLE STD.	INTERVAL UPPER	
17-Dec-90	0.017	BACKGRND	BACKGRND	ENDPOINT=	0.048
28-Jan-91	0.013	WELLS =	WELLS =		
14-Feb-91	0.015	0.01725	0.011		

COMPLIANCE WELLS

MW-4		
19-Nov-90	0.056	ALL THREE COMPLIANCE WELLS CONSISTENTLY EXCEED
17-Dec-90	0.042	THE CALCULATED UPPER LIMIT OF THE INTERVAL 0.048
28-Jan-91	0.056	THUS WE MUST CONCLUDE THAT THERE HAVE BEEN
14-Feb-91	0.049	SIGNIFICANT IMPACTS TO THE GROUND WATER
MW-17		
19-Nov-90	0.261	
17-Dec-90	0.176	
28-Jan-91	0.190	
14-Feb-91	0.171	
MW-18		
19-Nov-90	0.071	
17-Dec-90	0.089	
28-Jan-91	0.138	
14-Feb-91	0.090	

TABLE CURRENT AS OF 23-Oct-91 04:21 PM EST

t = 2.718 (FROM TABLE 6 p.B9 USEPA,1989)

WHERE: K=12,n=12,a=0.99 alpha = .01 and deg. freedom = 11

CALCULATED PREDICTION INTERVAL

[0,X + (S)SQRT(1/m + 1/n)t for(n-1,K,0.99)]

where X = mean of background readings

S = standard deviation of background readings

m = number of observation to be compared

n = number of observation in background data