Roy F. Weston, Inc.
Suite 400
3 Hawthorn Parkway
Vernon Hills, Illinois 60061-1450
847-918-4000 • Fax 847-918-4055

31 December 1997

Mr. Jim Innes
Project Manager
Michigan Department of Environmental Quality
10650 Bennett Drive
Morrice, Michigan 48857-9792

Work Order No. 01138-079-002-0025

Re: Soil Management Plan
Linden Road Site Remedial Action
Flint Township, Michigan

Dear Mr. Innes:

Roy F. Weston, Inc. (WESTON®), on behalf of General Motors Corporation (GM), is completing the engineering design for the Linden Road Site Remedial Action in Flint Township, Michigan. As requested during our meeting with the Michigan Department of Environmental Quality (MDEQ) on 29 September 1997, WESTON prepared a summary of the construction activities planned at the above site, including a soil management plan. The following information describes the current plan for soil management activities relating to the types and volumes of material needed during each phase of construction. GM intends to provide the contractor with certain types of material which are available from other GM properties within the area.

Construction activities will be conducted in two phases. Phase 1 construction will consist of waste consolidation activities in the frontage area and clearing of trees and vegetation from the remainder of the site. Phase 2 construction will consist of the remainder of waste consolidation activities along the western border of the site, as necessary, and construction of the final cover system, to include the access roads and stormwater management facilities.

Phase 1 Construction Activities

Phase 1 construction will include excavation and consolidation of materials which exceed MDEQ criteria from the area under the new access roadway and specific areas within the limits of the

400-foot deep area fronting Linden Road. The specific areas proposed for removal action are shown on the drawings included in the report entitled, "Findings of the Subsurface Soil Sampling Investigation for Frontage Development, Linden Road Site, Genesee County, Michigan (WESTON, July 1997). Materials excavated from these areas will be relocated to the western portion of the site for placement under the final cover system. The excavations in the frontage area will be backfilled as necessary to create a smooth transition from the existing grade around the area, and to promote positive drainage from the area. Filling is expected to be in the range of 2 to 3 feet across the frontage. Topsoil, stockpiled at the site, will be placed over those areas that have been backfilled in the frontage and will not be impacted by filling or roadway construction during Phase 2 construction.

The material used for backfilling the area, except under the roadways, will be general fill material obtained from off-site locations. This material will be from virgin soils removed from off-site areas located by the contractor during the bidding process. The contractor will be required to provide GM with borrow area test results confirming the geotechnical quality of the material. Testing such as grain size analysis, USCS soil classification, and moisture/density relationships will be required. The specific geotechnical testing requirements will be outlined in the construction specifications.

In addition, the contractor will obtain a representative sample from each borrow source and conduct independent chemical testing to confirm the nature and quality of the material. The chemical testing will be consistent with testing performed at other GM sites and may include the following:

- Target Analyte List Compounds.
- Target Compound List Compounds.

Documentation of chemical testing completed will be included in the construction completion report to be submitted to MDEQ following Phase 2 construction activities.

Areas under roadways or parking areas will be backfilled with a material consistent with the Michigan Department of Transportation (MDOT) specification for aggregate backfill. This material will be a granular fill which will provide sufficient bearing capacity and will exhibit minimal settlement following placement. The granular fill material may also be tested for chemical characteristics based on the location of the material and the type of borrow source (i.e., aggregate from established quarry operations may not require testing).

Phase 2 Construction Activities

Phase 2 construction activities will consist of conducting general grading of the site as necessary to construct the required grades as shown in the design plans. A limited volume of waste may be removed along the western boundary of the site to better establish a buffer zone around the site. The grading plan has been prepared such that only a limited amount of general fill will be necessary to meet the intended grades. This additional fill material will primarily be used to backfill the waste excavation areas along the western boundary.

The 2.5-foot final cover system for the site will consist of a minimum of 2 feet of general fill and 6 inches of topsoil. GM intends to provide foundry sand from another GM facility for the first foot of cover soil material and the second foot of virgin soil will consist of material from off-site. Topsoil materials used for the vegetative layer will meet the specifications for topsoil as dictated in the specifications.

Soil Materials Provided By GM

GM has identified certain materials which will be provided to the contractor for use during construction operations. Topsoil is being obtained from another GM construction project and is currently being stockpiled at the site. The volume of topsoil expected on-site is approximately 17,320 cubic yards. This material will be sampled during the beginning of the project to verify its chemical nature. General fill material from a GM environmental remediation site will also be relocated to the site. The volume of soil from this thermal treatment project is approximately 5,450 cubic yards. Foundry sand from an area GM facility has also been identified for use at the site, but will not be brought to the site until the material is needed during construction.

Table 1 provides a summary of the soil materials and estimated volumes (in-place cubic yards) required to complete this project. The table presents the quantities of material identified as being provided by GM either on-site or from off-site locations during the project, the quantities of each type of material required during each phase of construction, and the required quantities of material needed from the contractor to complete construction in accordance with the approved design plans.

Provided with this document (Attachment A) are representative sampling results from the topsoil, remediation soil, and foundry sand materials. Any additional materials that the selected contractor will need during completion of this project will be tested using a consistent list of target parameters.

If you should have any questions relating to this submittal, please contact either of the undersigned at (847) 918-4000.

Very truly yours,

ROY F. WESTON, INC.

John J. Ososkie, P.E.
Project Engineer

S. Babusukumar, P.G.
Senior Project Manager

JJO:SB/sr
Attachment

cc: R. Metcalf, GM

Table 1

Soil Management Plan
Summary of Soil/Fill Material for On-site Use
Linden Road Site
(Soil Volumes are In-Place Cubic Yards)

Soil Type/Location	On-Site Topsoil	On-Site Rem Soil	Off-Site General Fill	Off-Site Gravel Fill	Off-Site Foundry Sand	TOTAL
Total Volume Available	17,320	5,450	As required	As required	As required	N/A
Total Soil Required - Phase 1 Construction	1,720	0	13,390	2,770	0	17,880
Balance of Soil Remaining - After Phase 1	15,600	5,450	0	0	0	N/A
Total Soil Required - Phase 2 Construction	20,400	5,450	54,350	3,700	40,750	124,650
Total Soils Used	22,120	5,450	67,740	6,470	40,750	142,530

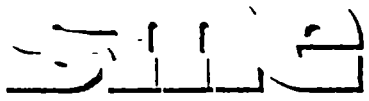
N/A - Not applicable.

Attachment A

Analytical Results of Representative Samples

EVALUATION OF FOUNDRY SAND

SAGINAW METALS CASTING OPERATIONS
SAGINAW, MICHIGAN
SME PROJECT NO. BE-23686



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- *Geophysical Surveys*
- *Geotextiles*
- *Ground Modification*
- *In-situ Testing*
- *Slope Stability*
- *Building Restoration*
- *Coatings*
- *Concrete*
- *Construction Quality Control*
- *Facility Management*
- *Masonry/Stone*
- *Metals*
- *Pavements*
- *Roofs*
- *Sealants*
- *Structural Steel*
- *Waterproofing*
- *Air Quality*
- *Asbestos/Lead Abatement*
- *Compliance Audits*
- *Contamination-Remediation*
- *Environmental Site Assessments*
- *Hydrogeologic Studies*
- *RCRA Compliance*
- *Risk Assessment*
- *Storm Water Discharge*
- *Underground Storage Tanks*
- *Waste Minimization*
- *Wetlands*

soil and materials engineers, inc.
43980 Plymouth Oaks Blvd. Plymouth, MI 48170-2584 (313) 454-9900 FAX (313) 454-0629

August 7, 1995

Mr. Raymond Ilkka
GM Powertrain Group
General Motors Corporation
1629 North Washington Avenue
Saginaw, Michigan 48605-5073

RE: Evaluation of Foundry Sand
Saginaw Metals Casting Operations
Saginaw, Michigan
SME Project No. BE-23686

Dear Mr. Ilkka:

We have completed the evaluation of the Classified, Core Butts and Metals Reclaim Sand. The purpose of the study was to evaluate the potential of these materials for reuse at the Fons/Old Wayne Landfill sites. This letter presents the results of the laboratory testing, review of the project and the applicable environmental regulations and our recommendations for the potential use of this material for the Fons/Old Wayne Landfill project.

PROJECT DESCRIPTION

We understand that GM would like to identify productive uses for the foundry sand which is currently stockpiled at their facilities in Saginaw, Michigan. Figure 1 indicates the locations of the stockpiles and the foundries which produced the sand. Currently, GM is evaluating using the sands for the Fons/Old Wayne Landfills which are in the process of being capped. These landfills are located in Ypsilanti Township, Michigan.

SCOPE OF SERVICES

As part of this study SME visited and sampled the stockpiles of materials. SME also met with Conestoga-Rovers Associates (CRA), engineers for the design of the landfill, and was accompanied by a representative of CRA during the site visit and sampling. SME performed physical laboratory testing on the materials to evaluate the engineering characteristics of the materials and to qualify the materials for use at these landfills.

SME reviewed the applicable environmental regulations and communicated with MDNR to evaluate the feasibility of site specific reuse of these materials. In addition, SME met with GM, and assisted in the preparation of letters to MDNR including preparing summary tables for the 1994 environmental data. Presented in the following sections is a summary of the information obtained during this study. This study was performed in general accordance with our proposal dated June 19, 1995.

SITE VISITS

On June 26, 1995, Mr. Mark Kramer (SME) Mr. Doug Gatrell (Conestoga-Rovers Associates) visited both the Fons/Old Wayne Landfill sites and the stockpile locations in Saginaw. The use of the foundry sands was discussed and both parties agreed that there is potential for use of these sands at this site. Based on the meeting and our understanding of the project, these materials could be used for grading fill, drainage sand, and common fill.

SAMPLING

Samples were obtained from the three stockpiles including two bulk samples from each stockpile. Although the stockpiles appeared to be composed of uniform material, due to the size of the Classified Sand stockpile, 5 additional grab samples were obtained at the approximate locations shown in Figure 2. The samples from the Metals Reclaim sand were taken from the processed material stockpile. Samples of the Core Butt sand were taken from the east and west end of the stockpile respectively.

LABORATORY TESTING

Procedures

All the soil samples were classified in general accordance with the Unified Soil Classification System. The bulk samples were subjected to the following tests:

- grain size analysis (ASTM D-422)
- Modified Proctor (ASTM D-1557)

A grain size analysis was also performed on the each of the grab samples from the Classified Sand stockpile. In addition permeability testing was performed on the classified sand. Due to the relatively higher percent fines (percentage of materials passing the No. 200 sieve), permeability testing was not performed on the Core Butts or Metal Reclaim sands. Permeability testing in accordance with ASTM D- 2434 was performed on recompacted samples.

Results

Classified Sand: The grain size analysis on the two bulk samples and five grab samples indicated 0.8 to 3.3 percent of the material passing the No 200 sieve. The fines by wash loss method also indicated 0.8 to 3.3 percent. The average percent fines for the seven samples is 1.6 percent. The grain size analysis also indicates the samples generally fall between the No. 40 to No 100 sieve which results in a classification as a fine sand with trace silt and a corresponding USCS classification of SP.

The compaction testing indicated maximum dry densities of 102.7 pounds per cubic foot (pcf) at optimum moisture contents of 10.3 and 10.9 percent based on ASTM D-1557 (Modified Proctor).

Permeability testing indicated coefficients of permeabilities of 1.1 and 1.4 x 10-2 cm/sec at 96 and 92 percent of the maximum dry density according to ASTM D-1557.

Core Butts: The grain size analysis of the two bulk samples indicated 1.2 and 2.7 percent of the material passing the No 200 sieve. The percent fines by wash loss method was 1.1 and 2.6 percent. Similar to the Classified Sand, the samples fall between the No. 40 to No 100 sieve resulting in a classification as a fine sand with trace silt. The corresponding USCS classification is SP.

The compaction testing indicated maximum dry densities of 103.3 and 104.3 pounds per cubic foot (pcf) at corresponding optimum moisture contents of 11.2 and 13.1 percent based on ASTM D-1557 (Modified Proctor).

Metals Reclaim Sand: The grain size analysis of the two bulk samples and one grab sample indicated 4.2 to 5.8 percent fines. The percent fines by wash loss method was 3.6 to 5.8 percent. Similar to the Classified Sand, the samples fall between the No. 40 to No 100 sieve resulting in a classification as a fine sand with trace to some silt. The corresponding USCS classification is SP-SM.

The compaction testing indicated maximum dry densities of 112.3 and 112.9 pounds per cubic foot (pcf) at corresponding optimum moisture contents of 13.4 and 13.8 percent based on ASTM D-1557 (Modified Proctor).

ENVIRONMENTAL REGULATIONS

Recently the MDNR has issued residential and industrial standards which replace the type A-B-C System. However, based on discussion with MDNR - Waste Management Division, MDNR is continuing to use the previous regulations for classification of the inert materials. Therefore, the materials to be classified as inert would have to meet the Type B criteria for soil in accordance with MERA Operational Memorandum #8, Revision 3 dated February 4, 1994.

Based on Act 641 the foundry sand is considered an industrial waste. However, under R299.4122(2)(b) the sand can be designated as a low hazard industrial waste. All three sands meet the criteria outlined in the regulations for this classification. In addition, the Wash Classified Sand and the Core Butts meet the requirements for classifying the material as inert in accordance with R299.4114(2)(g). The Metals Reclaim sand was also evaluated according to inert criteria. Although the levels of iron from the SPLP test do not meet Aesthetic Drinking Water Standards, but since iron is not included in criteria listed in R299.4122(2)(6), the Metals Reclaim sand could be considered inert. This interpretation has been discussed between GM and MDNR.

GENERAL DISCUSSION

Based on the laboratory testing the three sands would be classified as fine sand with a trace to some silt. The amount of silt varies with the Classified Sand having the least amount and the Metals Reclaim sand having the most. Presented below is a discussion of each material and potential reuse of the material for the Fons/Old Wayne Landfill project.

Classified Sand

Based on the laboratory testing, the Classified Sand can be used for grading fill, common fill and/or drainage sand. If this sand is used for drainage material, another type of sand or a mixture of this sand and other soil may be required for the common fill layer, otherwise, the common fill and drainage layer would act as one layer.

Core Butts

Based on the laboratory testing, this sand would be suitable for use as grading fill and common fill. However, due to the remaining structure of the sand castings, this material would likely have to be processed or crushed to use. This material could be used in deeper portions of the grading fill. The amount of processing would depend on the limitations of particle size presented in the project specifications. Typically, we recommend particle sizes of less than 6 inches in deeper fills and particle sizes less than 1 1/2 inches within three feet of the clay cap, and less than 3/4 inches within 1 foot of the clay cap.

Metals Reclaim Sand

Based on the laboratory testing, this sand would be suitable for use as grading fill and common fill. However, due to the potential debris in the sand, we would not recommend it be used within one foot of the clay cap. This material would be well suited for the common fill due to the percentage of fines and the presence of organics in the sand.

We appreciate the opportunity to serve you during this phase of the project. If there are any questions concerning this report, please contact us.

Very truly yours,

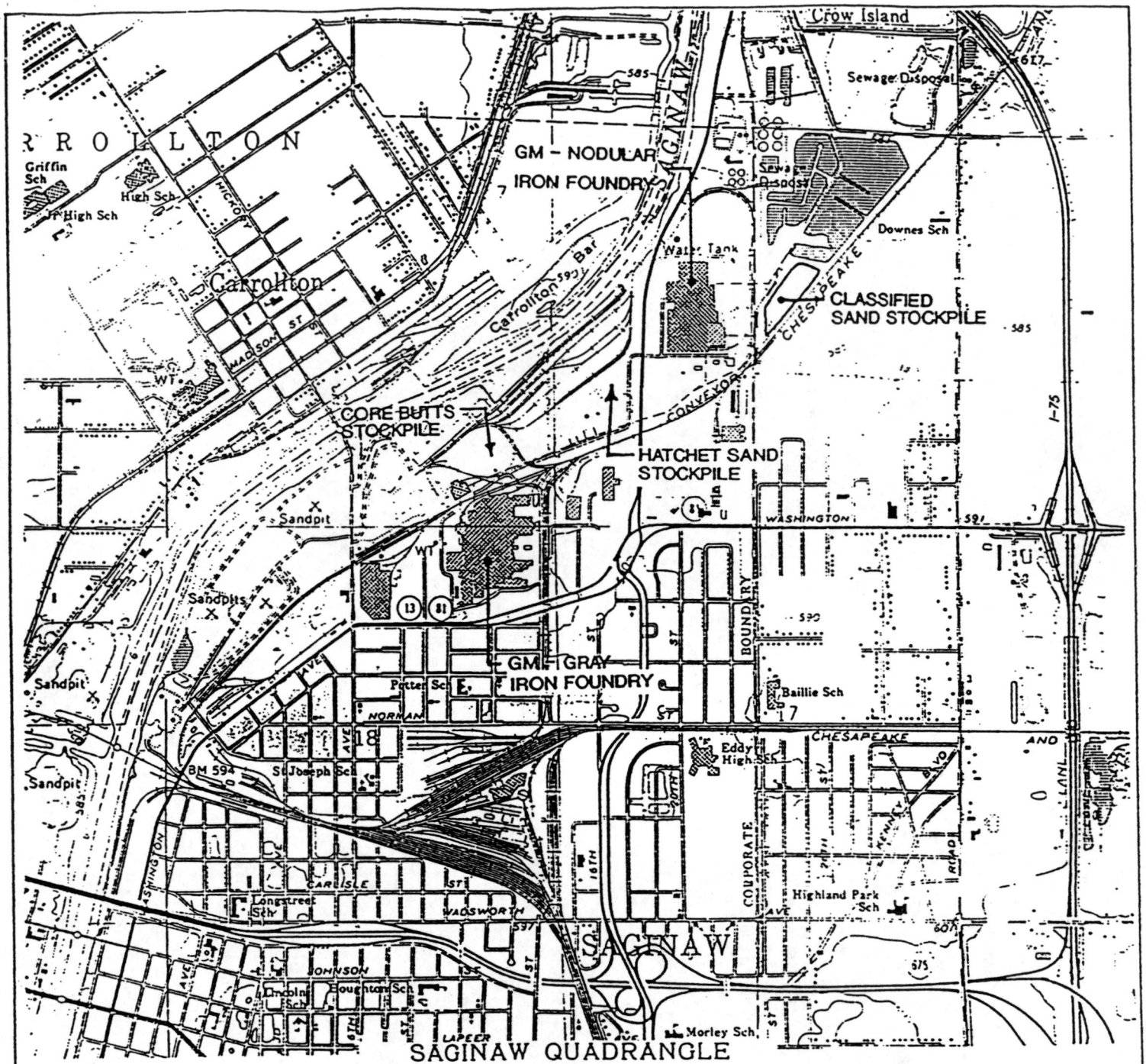
SOIL AND MATERIALS ENGINEERS, INC.

Mark K. Kramer, P.E.
Project Engineer

Garrett H. Evans, P.E.
Principal Engineer

Enclosures: Figure 1 - Stockpile Location Plan
Figure 2 - Sampling Location Plan - Classified Sand
Summary of Laboratory Test Results
Laboratory Compaction Curves (6)
Grain Size Analysis (12)
Grain Size Distribution Curves (3)

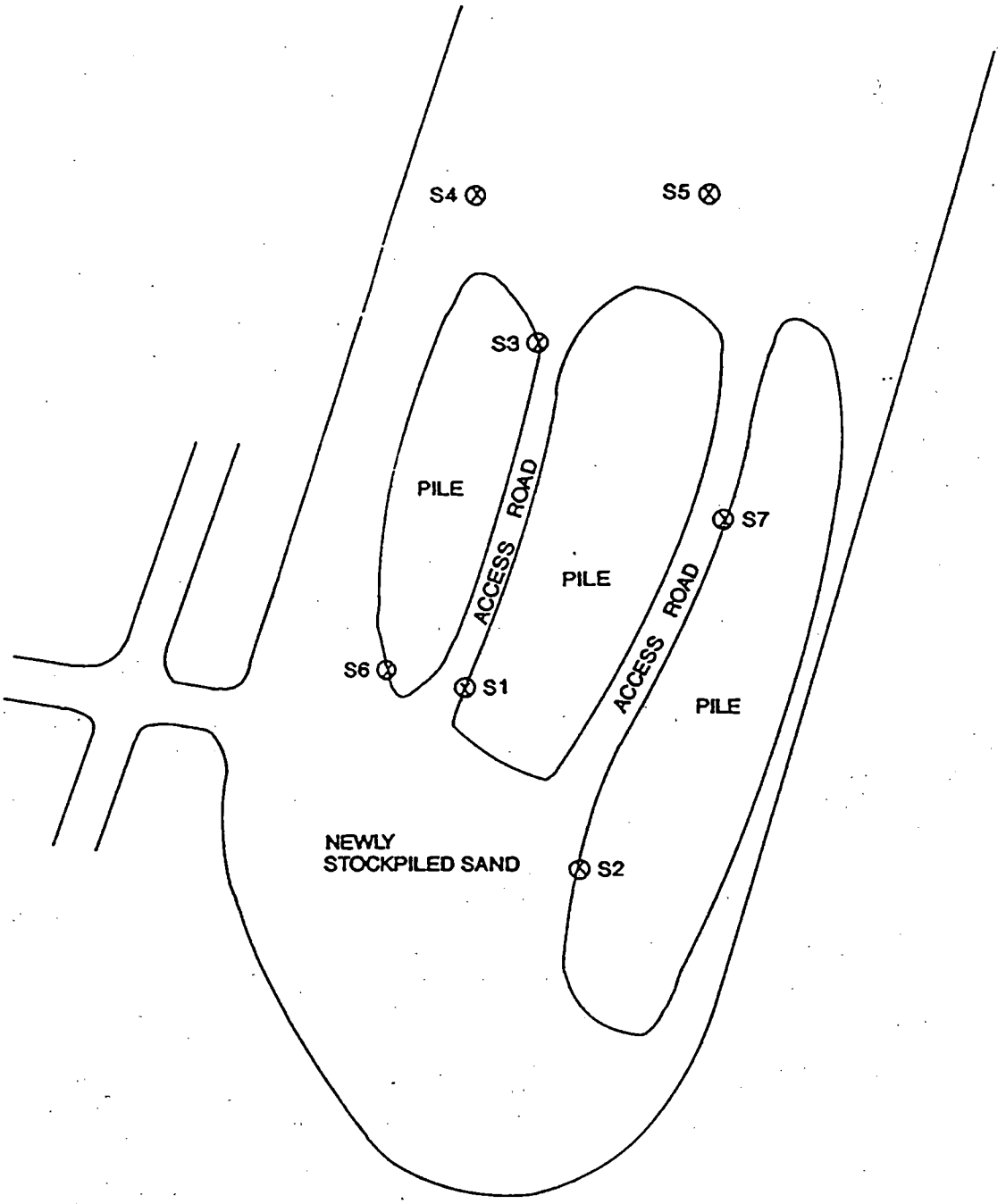
2pc: Enclosed



Date 7-12-95	BAY CITY KALAMAZOO LANSING PLYMOUTH TOLEDO	soil and materials engineers, inc.	STOCKPILE LOCATION PLAN GENERAL MOTORS FOUNDRY SAND SAGINAW, MICHIGAN
Drawn By TAC			
Scale AS SHOWN			
Job BE 23686			

DWG NO 23686-01

Figure No.



NOTE: 1) ALL DIMENSIONS ARE APPROXIMATE.

2) ALL SAMPLES WERE COLLECTED ON JUNE 26, 1995. SAMPLES S1 AND S2 WERE BULK SAMPLES. SAMPLES S3 THROUGH S7 WERE GRAB SAMPLES. SAMPLE S6 WAS FROM FRESH SAND RECENTLY DELIVERED TO STOCKPILE.

LEGEND

⊗ SAMPLING LOCATION

NORTH

Date 7-12-95 Drawn By TAC Scale N.T.S. Job BE 23686	BAY CITY KALAMAZOO LANSING PLYMOUTH TOLEDO	soil and materials engineers, inc.	SAMPLING LOCATION PLAN CLASSIFIED SAND STOCKPILE GENERAL MOTORS FOUNDRY SAGINAW, MICHIGAN

DWG. NO. 23686-02

Figure No.

TABLE 1

SUMMARY OF LABORATORY TEST DATA
FOUNDRY SAND – SAGINAW METAL CASINGS OPERATION

Sample		Max Dry Density	Optimum Moisture Content	% Passing #200	Loss by Washing %	Permeability Testing		Coefficient of Permeability (cm/sec)
						Dry Unit Weight (pcf)	% Compaction	
Classified Sand								
S–1	Bulk	102.7	10.9	1.3	1.1	94.4	92%	1.4×10^{-2}
S–2	Bulk	102.7	10.3	1.8	1.5	98.3	95.7%	1.1×10^{-2}
S–3	Grab	–	–	1.1	1.1	–	–	–
S–4	Grab	–	–	1.7	1.7	–	–	–
S–5	Grab	–	–	3.3	3.3	–	–	–
S–6	Grab	–	–	0.8	0.8	–	–	–
S–7	Grab	–	–	1.4	1.4	–	–	–
Core Butts								
S–1	Bulk	103.3	13.1	1.2	1.1	–	–	–
S–2	Bulk	104.3	11.2	2.7	2.6	–	–	–
Metals Reclaim								
S–1	Bulk	112.9	11.8	4.2	3.6	–	–	–
S–2	Bulk	112.3	13.4	4.3	3.7	–	–	–
S–3	Grab	–	–	5.8	5.8	–	–	–

Soil and Materials Engineers, Inc

Detroit – Bay City – Kalamazoo – Lansing – Toledo

Laboratory Compaction Curve

PROJECT: GM FOUNDRY SAND
LOCATION:
ARCHITECT/ENGINEER:
CONTRACTOR:

SME JOB NO: BE23686
REPORT NO:
REPORT DATE: 6/28/95

DESCRIPTION OF SOIL: CLASSIFIED SAND–S1

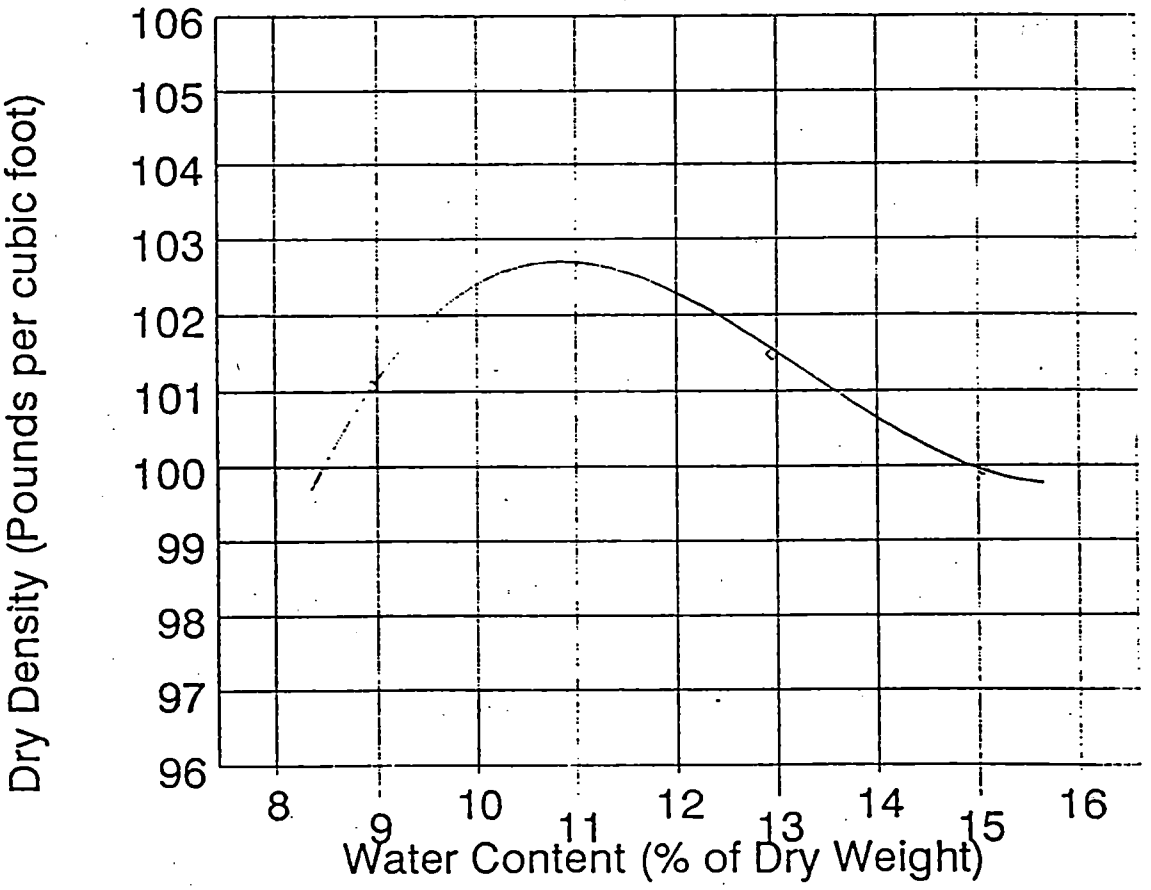
MATERIAL SOURCE:
INTENDED USE:
UNIFIED SOIL CLASSIFICATION:
MOLD DIAMETER: 4.0 In
TEST PROCEDURE USED: [ ] ASTM D–698–'Standard' [x] ASTM D–1557–'Modified' [ ] Other
RAMMER (MANUAL/MECHANICAL): Mech.

SAMPLE DATE: 6/26/95
SAMPLED BY: MKK

REMARKS

TEST RESULTS:
MAX DRY DENSITY: 102.7 PCF
OPT WATER CONT: 10.9 %

TESTED BY: MM
REVIEWED BY: GD



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PLYMOUTH, MICHIGAN
(313) 454-9900

LABORATORY PROCTOR – 4 POINTS

MOLD DIAMETER (4 OR 6):	4	MOLD FACTOR:			
DO YOU WANT CURVE (Y OR N):	y				
POINT NO:	1	2	3	4	
VOL OF WATER ADDED:					
WT OF CYL + SOIL (g):	5925.3	5984.9	5994.8	5999	
WT OF CYLINDER (g):	4258.9	4258.9	4258.9	4258.9	
WT OF SOIL (g):	1666.4	1726	1735.9	1740.1	
WET DENSITY (lb/cu ft):	110.1	114.1	114.7	115.0	
TARE + WET SOIL (g):	450	450	450	450	
TARE + DRY SOIL (g):	424.7	419.3	414.5	409.7	
TARE WT (g):	142.1	142.1	142.1	142.1	
WT OF WATER (g):	25.3	30.7	35.5	40.3	
WT OF DRY SOIL (g):	282.6	277.2	272.4	267.6	
WATER CONTENT (%):	9.0	11.1	13.0	15.1	
DRY DENSITY (lb/cu ft):	101.1	102.7	101.5	99.9	

SME JOB NO: BE23686
REPORT NO:
PROJECT: GM FOUNDRY SAND
LOCATION:
ARCHITECT/ENGINEER:
CONTRACTOR:
REPORT DATE: 6/28/95
RAMMER (MANUAL/MECHANICAL): Mech.
DESCRIPTION OF SOIL: CLASSIFIED SAND–S1

MATERIAL SOURCE:
INTENDED USE:
UNIFIED SOIL CLASSIFICATION:
TEST PROCEDURE USED (PUT A "X") x
ASTM D–698–'STANDARD'
ASTM D–1557–'MODIFIED'
OTHER

TESTED BY: MM
REVIEWED BY: GD
REMARKS:

SAMPLED BY: MKK
SAMPLE DATE: 6/26/95

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER

soil and materials engineers, inc.

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LANSING
PLYMOUTH
TOLEDO

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Analysis Of Aggregate Report

Project:	GM – Foundry Sand	Report Date	6/29/95
Material:	Class Sand	Report No.	
Sample No.:	S – 1	Log No.	467
Supplier:		SME Job No.	BE23686

Date Sampled 6/26/95 Submitted By MK

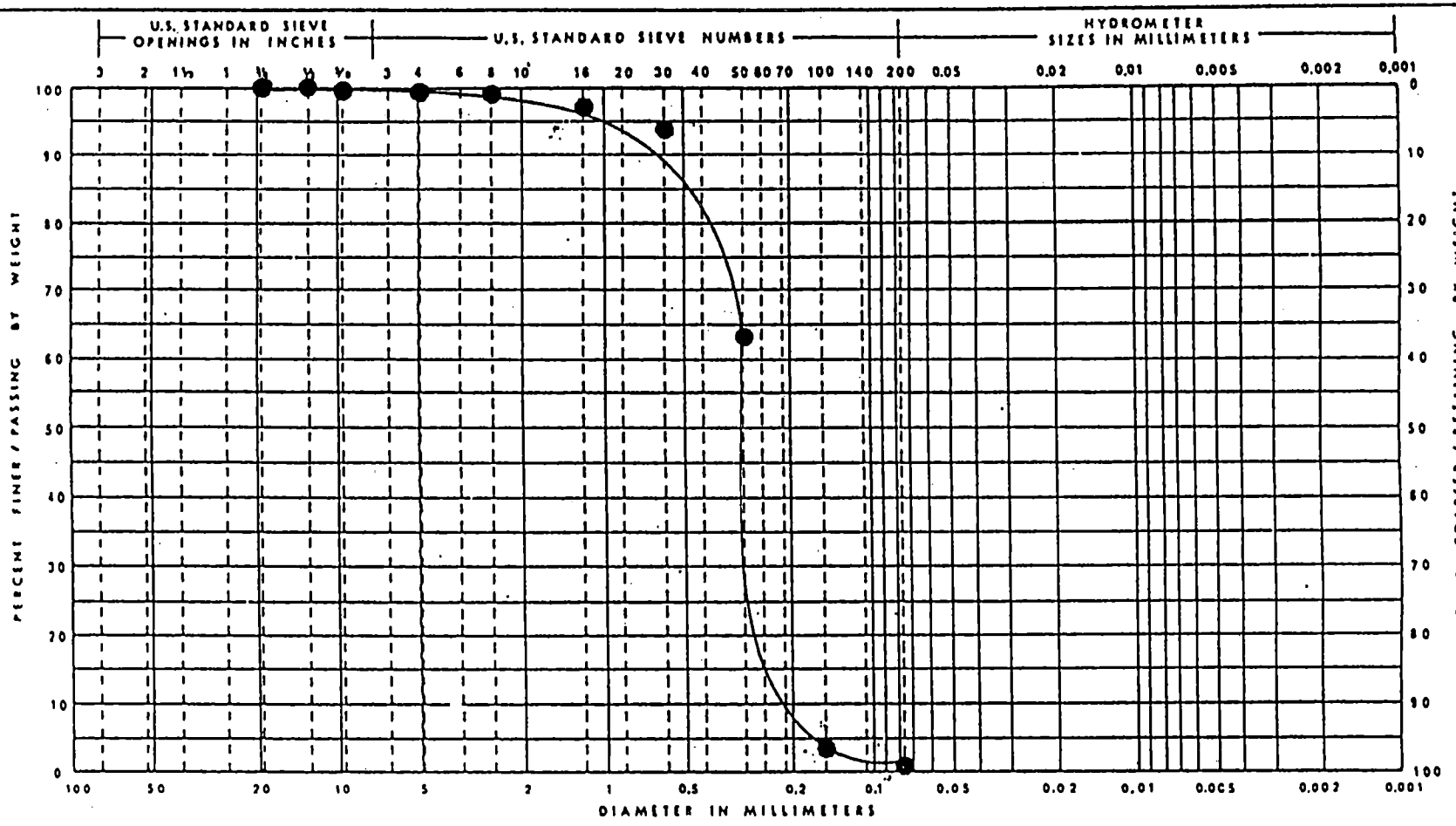
Sieve Size	Weight Retained gms	Percent Retained	Percent Passing	Spec Percent Passing	Comments
3	0	0	100.0		
2	0	0	100.0		
1 1/2	0	0	100.0		
1	0	0.0	100.0		
3/4	0.0	0.0	100.0		
1/2	0.0	0.0	100.0		
3/8	0.9	0.1	99.9		
4	2.3	0.2	99.7		
8	2.1	0.2	99.5		
16	23.6	2.4	97.0		
30	29.6	3.0	94.0		
50	302.0	30.9	63.1		
100	577.4	59.2	3.9		
200	25.4	2.6	1.3		
Pan	12.6	1.3			

Weight Of Sample	976.1
Weight After Wash	965.1
Loss By Washing %	1.1
Crush Content, %	0.0

Comment Legend:
* Low limit is out of range
** Upper limit is out of range

Remarks:

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER



	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL		COARSE SAND		FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
1		S-1		Classified Sand		

GM Foundry Sand

DRAWN MSC

APP'D

DATE 7/31/95

JOB BE-23686

soil and materials engineers, inc

Soil and Materials Engineers, Inc

Detroit – Bay City – Kalamazoo – Lansing – Toledo

Laboratory Compaction Curve

PROJECT: GM FOUNDRY SAND
LOCATION:
ARCHITECT/ENGINEER:
CONTRACTOR:

SME JOB NO: BE23686
REPORT NO:
REPORT DATE: 6/28/95

DESCRIPTION OF SOIL: CLASSIFIED SAND–S2

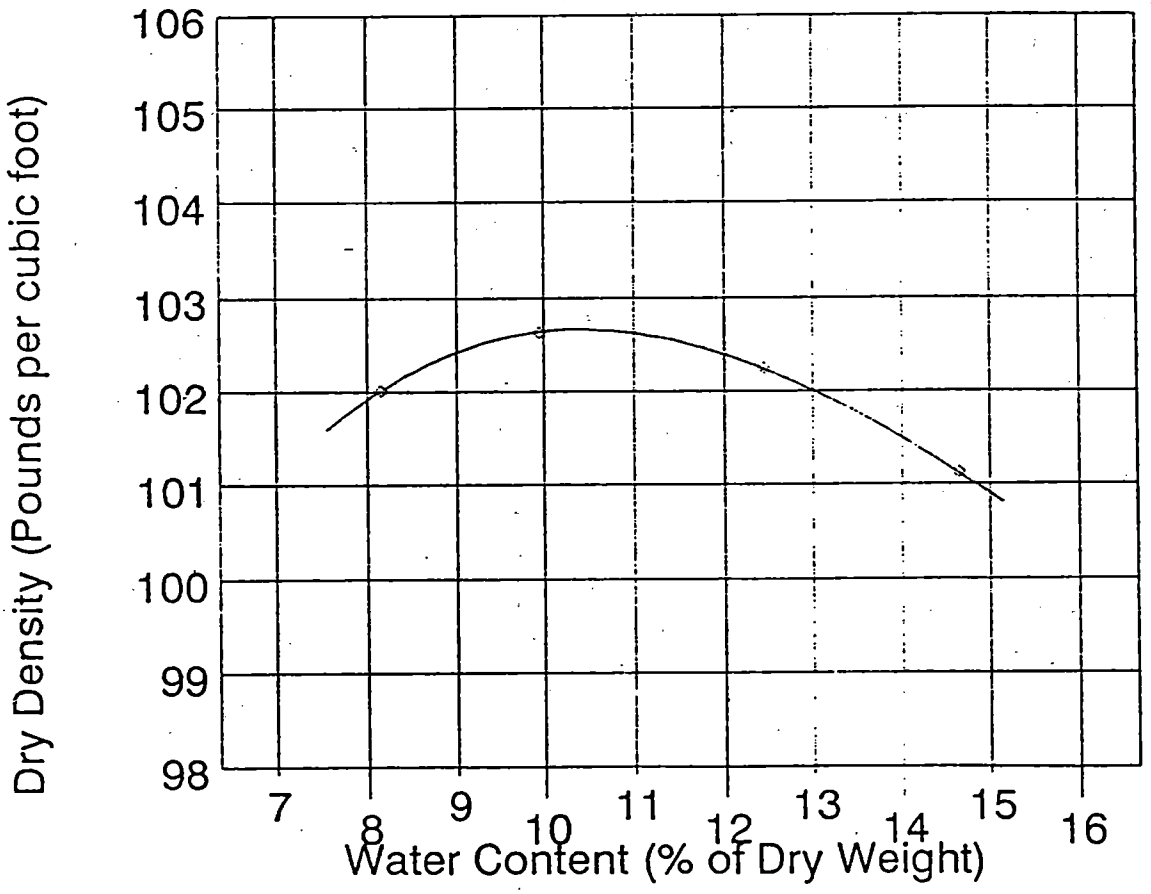
MATERIAL SOURCE:
INTENDED USE:
UNIFIED SOIL CLASSIFICATION:
MOLD DIAMETER: 4.0 In
TEST PROCEDURE USED: [ ] ASTM D–698–'Standard' [x] ASTM D–1557–'Modified' [ ] Other
RAMMER (MANUAL/MECHANICAL): Mech.

SAMPLE DATE: 6/26/95
SAMPLED BY: MKK

REMARKS

TEST RESULTS:
MAX DRY DENSITY: 102.7 PCF
OPT WATER CONT: 10.3 %

TESTED BY: MM
REVIEWED BY: GD



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sme

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PLYMOUTH, MICHIGAN
(313) 454-9900

LABORATORY PROCTOR – 4 POINTS

MOLD DIAMETER (4" OR 6): 4 MOLD FACTOR:

DO YOU WANT CURVE (Y OR N): y

POINT NO:	1	2	3	4
VOL OF WATER ADDED:				
WT OF CYL + SOIL (g):	5928.5	5965.6	5998.4	6013.2
WT OF CYLINDER (g):	4258.9	4258.9	4258.9	4258.9
WT OF SOIL (g):	1669.6	1706.7	1739.5	1754.3
WET DENSITY (lb/cu ft):	110.3	112.8	114.9	115.9
TARE + WET SOIL (g):	450	450	450	450
TARE + DRY SOIL (g):	426.8	422.3	416	410.7
TARE WT (g):	142.1	142.1	142.1	142.1
WT OF WATER (g):	23.2	27.7	34	39.3
WT OF DRY SOIL (g):	284.7	280.2	273.9	268.6
WATER CONTENT (%):	8.1	9.9	12.4	14.6
DRY DENSITY (lb/cu ft):	102.0	102.6	102.3	101.1

SME JOB NO: BE23686
REPORT NO:
PROJECT: GM FOUNDRY SAND
LOCATION:
ARCHITECT/ENGINEER:
CONTRACTOR:
REPORT DATE: 6/28/95
RAMMER (MANUAL/MECHANICAL): Mech.
DESCRIPTION OF SOIL: CLASSIFIED SAND – S2

MATERIAL SOURCE:
INTENDED USE:
UNIFIED SOIL CLASSIFICATION:
TEST PROCEDURE USED (PUT A "X") x
ASTM D-698-'STANDARD'
ASTM D-1557-'MODIFIED'
OTHER

TESTED BY: MM
REVIEWED BY: GD
REMARKS:

SAMPLED BY: MKK
SAMPLE DATE: 6/26/95

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER

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Analysis Of Aggregate Report

Project:	GM – Foundry Sand	Report Date	6/29/95
Material:	Class Sand	Report No.	
Sample No.:	S – 2	Log No.	460
Supplier:		SME Job No.	BE23686

Date Sampled 6/26/95 Submitted By MK

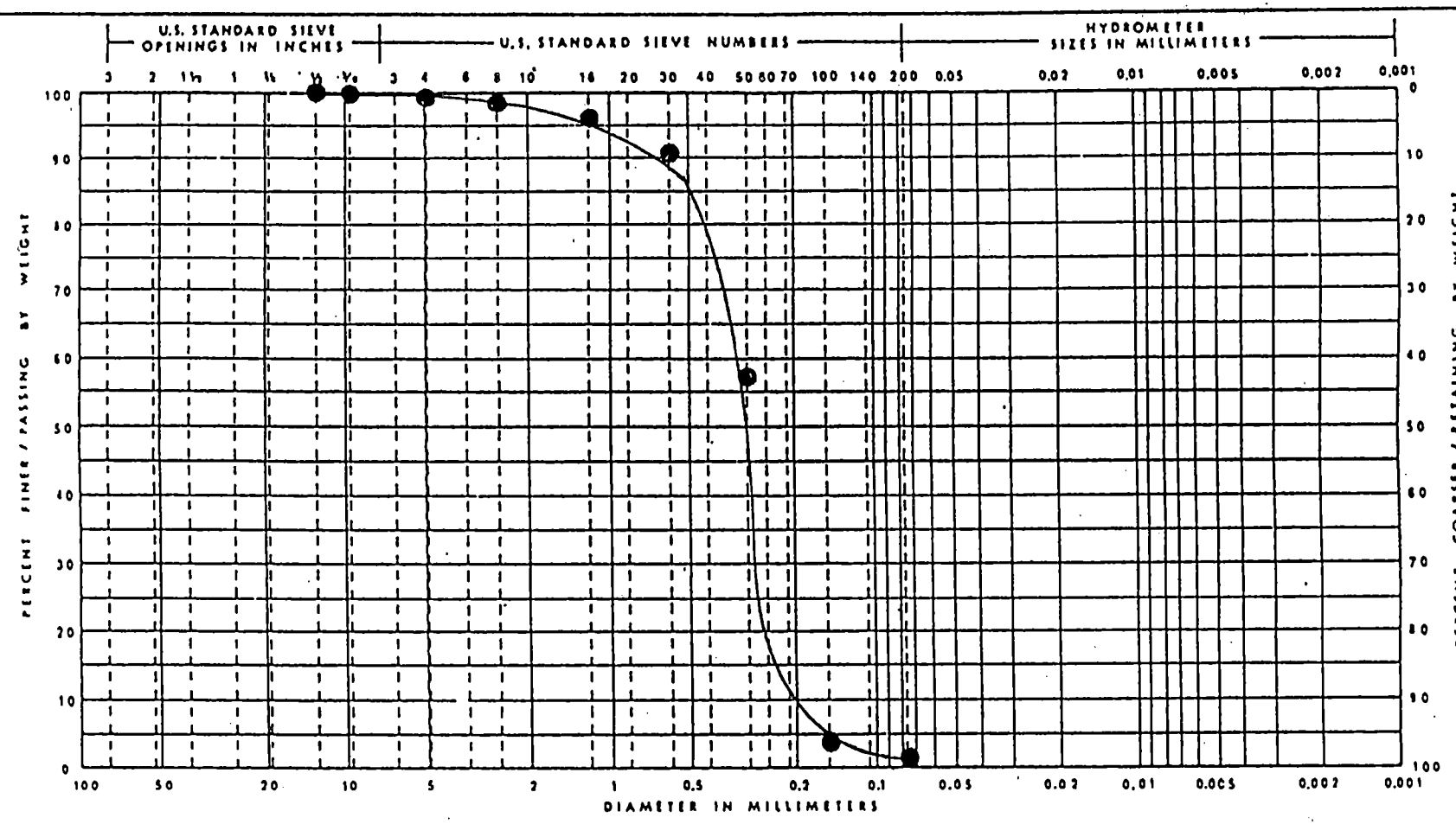
Sieve Size	Weight Retained gms	Percent Retained	Percent Passing	Spec Percent Passing	Comments
3	0	0	100.0		
2	0	0	100.0		
1 1/2	0	0	100.0		
1	0	0.0	100.0		
3/4	0.0	0.0	100.0		
1/2	0.0	0.0	100.0		
3/8	0.0	0.0	100.0		
4	4.6	0.3	99.7		
8	12.7	0.9	98.8		
16	42.7	3.0	95.8		
30	70.6	5.0	90.8		
50	475.0	33.5	57.4		
100	755.3	53.2	4.2		
200	33.8	2.4	1.8		
Pan	25.3	1.8			

Weight Of Sample	1420.0
Weight After Wash	1398.2
Loss By Washing %	1.5
Crush Content, %	0.0

Comment Legend:
* Low limit is out of range
** Upper limit is out of range

Remarks:

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER



ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL			COARSE SAND	FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
1		S-2		Classified Sand		

GM Foundry Sand

DRAWN MSC

APP'D

DATE 7/31/95

JOB BE-23686

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Laboratory Compaction Curve

PROJECT: GM – Foundry Sand
LOCATION:
ARCHITECT/ENGINEER:
CONTRACTOR:

SME JOB NO: BE23686
REPORT NO:
REPORT DATE: 6/29/95

DESCRIPTION OF SOIL: Core Butts S – 1

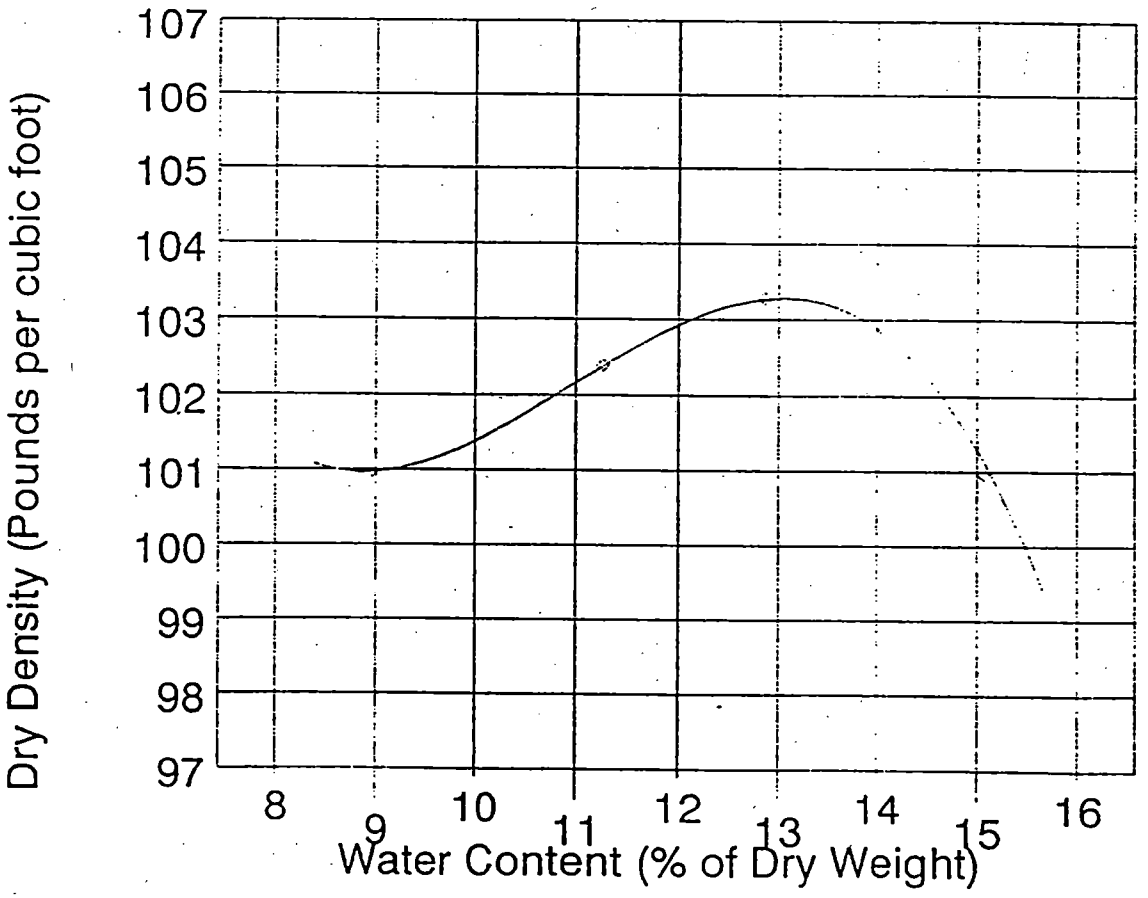
MATERIAL SOURCE:
INTENDED USE:
UNIFIED SOIL CLASSIFICATION:
MOLD DIAMETER: 4.0 In
TEST PROCEDURE USED: [ ] ASTM D–698–'Standard' [X] ASTM D–1557–'Modified' [ ] Other
RAMMER (MANUAL/MECHANICAL): Mech.

SAMPLE DATE: 6/26/95
SAMPLED BY: MK

REMARKS

TEST RESULTS:
MAX DRY DENSITY: 103.3 PCF
OPT WATER CONT: 13.1 %

TESTED BY: MM
REVIEWED BY: GD



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LABORATORY PROCTOR – 4 POINTS

MOLD DIAMETER (4 OR 6): 4
DO YOU WANT CURVE (Y OR N): y

POINT NO:	1	2	3	4
VOL OF WATER ADDED:				
WT OF CYL + SOIL (g):	5923.7	5983	6024.1	6017.9
WT OF CYLINDER (g):	4258.7	4258.7	4258.7	4258.7
WT OF SOIL (g):	1665	1724.3	1765.4	1759.2
WET DENSITY (lb/cu ft):	110.0	113.9	116.7	116.2
TARE + WET SOIL (g):	450	450	450	450
TARE + DRY SOIL (g):	424.6	418.7	414.6	409.4
TARE WT (g):	141.2	141.2	141.2	141.2
WT OF WATER (g):	25.4	31.3	35.4	40.6
WT OF DRY SOIL (g):	283.4	277.5	273.4	268.2
WATER CONTENT (%):	9.0	11.3	12.9	15.1
DRY DENSITY (lb/cu ft):	101.0	102.4	103.3	101.0

SME JOB NO: BE23686
REPORT NO:
PROJECT: GM – Foundry Sand
LOCATION:
ARCHITECT/ENGINEER:
CONTRACTOR:
REPORT DATE: 6/29/95
RAMMER (MANUAL/MECHANICAL): Mech.
DESCRIPTION OF SOIL: Core Butts S – 1

MATERIAL SOURCE:
INTENDED USE:
UNIFIED SOIL CLASSIFICATION:
TEST PROCEDURE USED (PUT A "X") X
ASTM D-698-'STANDARD'
ASTM D-1557-'MODIFIED'
OTHER

TESTED BY: MM
REVIEWED BY: GD
REMARKS:

SAMPLED BY: MK
SAMPLE DATE: 6/26/95

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER

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Analysis Of Aggregate Report

Project:	GM – Foundry Sand	Report Date	6/29/95
Material:	Core Butts	Report No.	
Sample No.:	S – 1	Log No.	465
Supplier:		SME Job No.	BE23686

Date Sampled 6/26/95 Submitted By MK

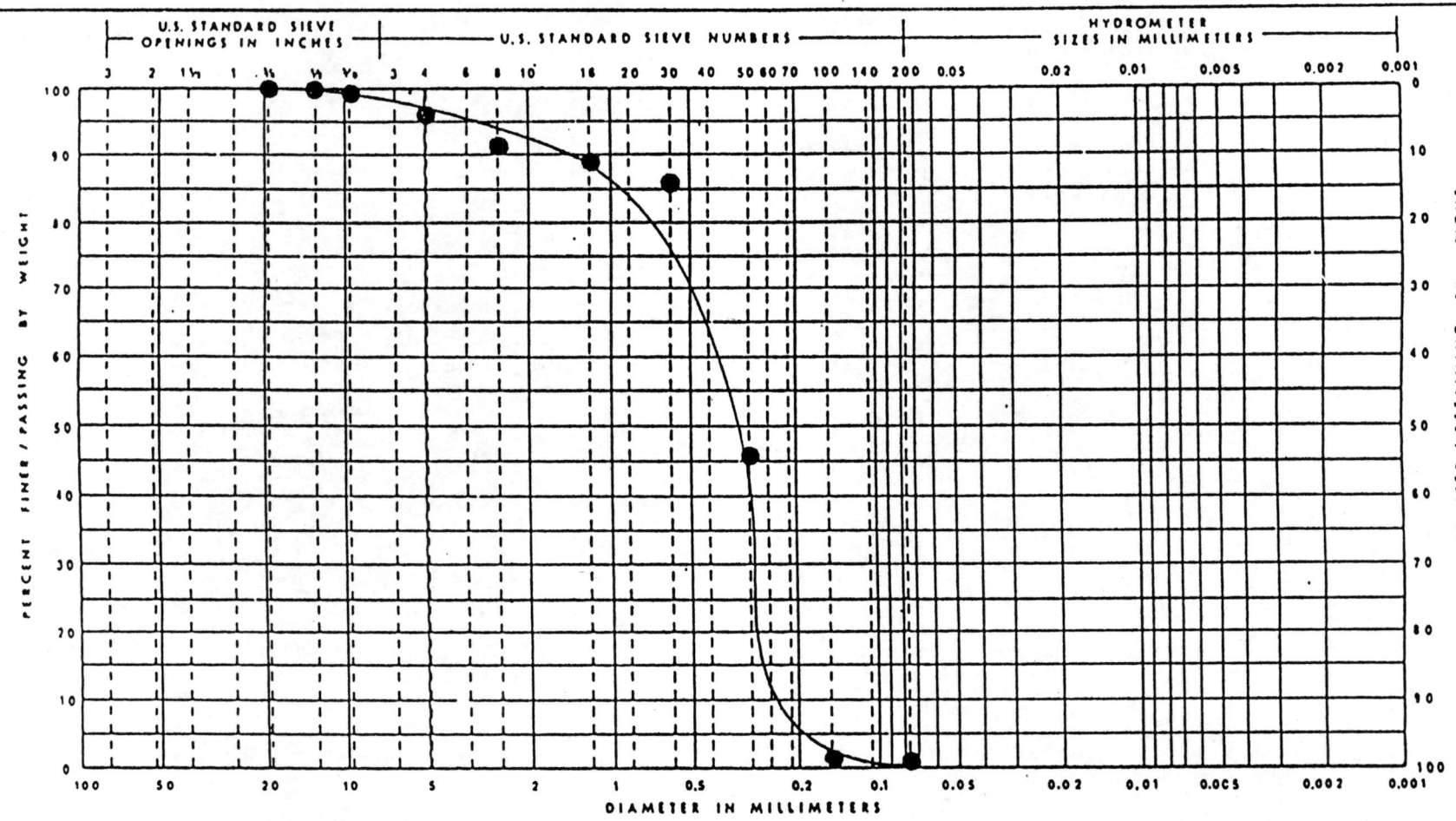
Sieve Size	Weight Retained gms	Percent Retained	Percent Passing	Spec Percent Passing	Comments
3	0	0	100.0		
2	0	0	100.0		
1 1/2	0	0	100.0		
1	0	0.0	100.0		
3/4	0.0	0.0	100.0		
1/2	0.0	0.0	100.0		
3/8	6.8	0.5	99.5		
4	54.8	3.7	95.8		
8	59.9	4.1	91.7		
16	35.7	2.4	89.3		
30	40.7	2.8	86.5		
50	597.0	40.8	45.7		
100	642.6	43.9	1.9		
200	9.7	0.7	1.2		
Pan	16.5	1.1			

Weight Of Sample	1464.6
Weight After Wash	1448.3
Loss By Washing %	1.1
Crush Content, %	0.0

Comment Legend:
* Low limit is out of range
** Upper limit is out of range

Remarks:

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER



ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL		COARSE SAND		FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
1		S-1		Core Butts		

GM Foundry Sand

DRAWN MCS

APP'D

DATE 7/31/95

JOB BE-23686

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Laboratory Compaction Curve

PROJECT: GM – Foundry Sand
LOCATION:
ARCHITECT/ENGINEER:
CONTRACTOR:

SME JOB NO: BE23686
REPORT NO:
REPORT DATE: 6/29/95

DESCRIPTION OF SOIL: Core Butts S – 2

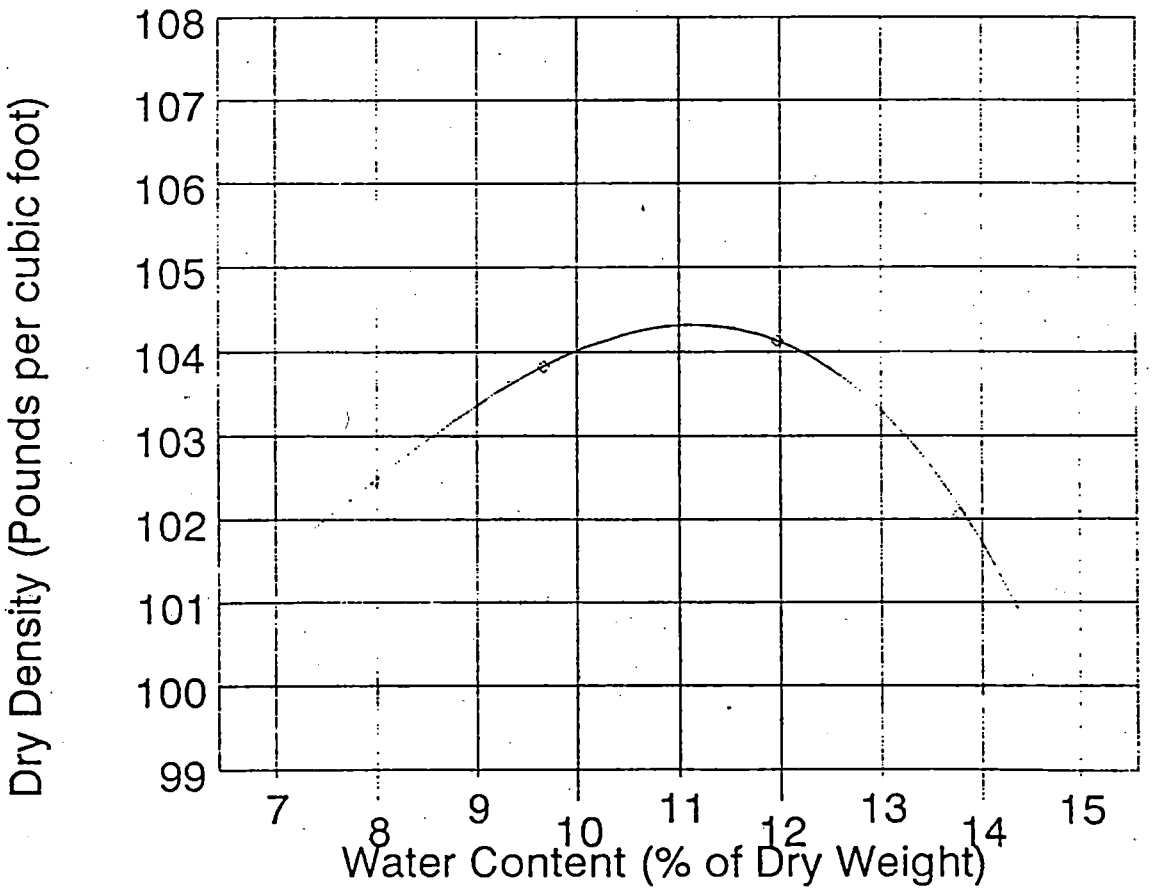
MATERIAL SOURCE:
INTENDED USE:
UNIFIED SOIL CLASSIFICATION:
MOLD DIAMETER: 4.0 In
TEST PROCEDURE USED: [ ] ASTM D–698–'Standard' [X] ASTM D–1557–'Modified' [ ] Other
RAMMER (MANUAL/MECHANICAL): Mech.

SAMPLE DATE: 6/26/95
SAMPLED BY: MKK

REMARKS

TEST RESULTS:
MAX DRY DENSITY: 104.3 PCF
OPT WATER CONT: 11.2 %

TESTED BY: MM
REVIEWED BY: GD



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...RATORY PROCTOR – 4 POINTS

...OR DIAMETER (4 OR 6): 4 MOLD FACTOR: 1/30

DO YOU WANT CURVE (Y OR N): y

POINT NO:	1	2	3	4
VOL OF WATER ADDED:				
WT OF CYL + SOIL (g):	5932.9	5981.7	6023.2	6016.7
WT OF CYLINDER (g):	4258.7	4258.7	4258.7	4258.7
WT OF SOIL (g):	1674.2	1723	1764.5	1758
WET DENSITY (lb/cu ft):	110.6	113.9	116.6	116.2
TARE + WET SOIL (g):	450	450	450	450
TARE + DRY SOIL (g):	427.2	422.8	417	412.5
TARE WT (g):	141.2	141.2	141.2	141.2
WT OF WATER (g):	22.8	27.2	33	37.5
WT OF DRY SOIL (g):	286	281.6	275.8	271.3
WATER CONTENT (%):	8.0	9.7	12.0	13.8
DRY DENSITY (lb/cu ft):	102.5	103.8	104.1	102.1

SME JOB NO: PE23686
REPORT NO:
PROJECT: GM – Foundry Sand
LOCATION:
ARCHITECT/ENGINEER:
CONTRACTOR:
REPORT DATE: 6/29/95
RAMMER (MANUAL/MECHANICAL): Mech.
DESCRIPTION OF SOIL: Core Butts S – 2

MATERIAL SOURCE:
INTENDED USE:
UNIFIED SOIL CLASSIFICATION:
TEST PROCEDURE USED (PUT A "X") X
ASTM D-698-'STANDARD'
ASTM D-1557-'MODIFIED'
OTHER

TESTED BY: MM
REVIEWED BY: GD
REMARKS:

SAMPLED BY: MKK
SAMPLE DATE: 6/26/95

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER

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Analysis Of Aggregate Report

Project:	GM – Foundry Sand	Report Date	6/29/95
Material:	Core Butts	Report No.	
Sample No.:	S – 2	Log No.	461
Supplier:		SME Job No.	BE23686

Date Sampled 6/26/95 Submitted By MK

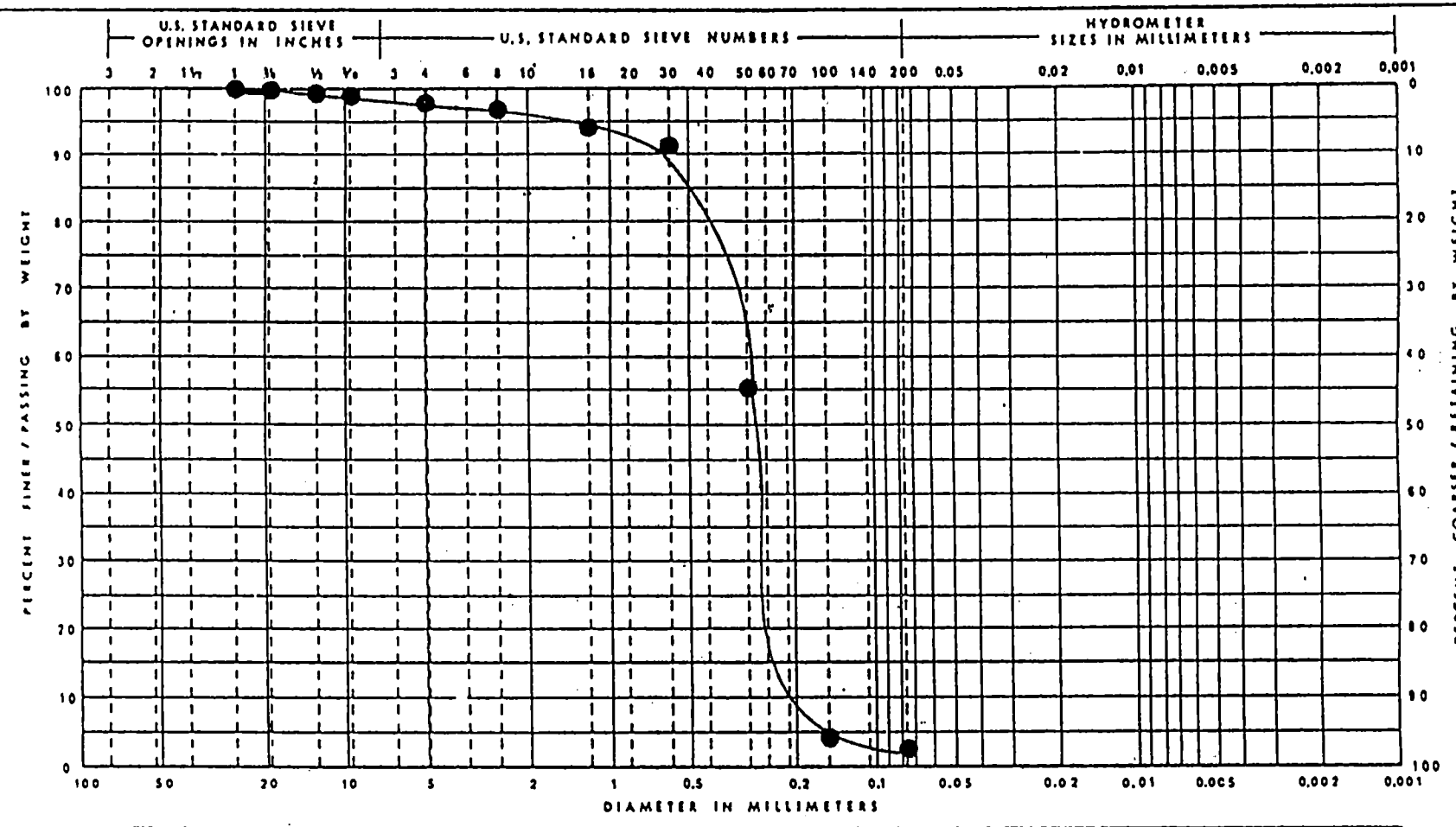
Sieve Size	Weight Retained gms	Percent Retained	Percent Passing	Spec Percent Passing	Comments
3	0	0	100.0		
2	0	0	100.0		
1 1/2	0	0	100.0		
1	0	0.0	100.0		
3/4	0.0	0.0	100.0		
1/2	8.3	0.6	99.4		
3/8	2.9	0.2	99.2		
4	12.7	0.9	98.3		
8	17.5	1.2	97.1		
16	32.4	2.3	94.8		
30	54.4	3.8	91.0		
50	507.4	35.6	55.4		
100	725.8	50.9	4.5		
200	25.7	1.8	2.7		
Pan	37.7	2.6			

Weight Of Sample	1425.1
Weight After Wash	1390.2
Loss By Washing %	2.4
Crush Content, %	0.0

Comment Legend:
* Low limit is out of range
** Upper limit is out of range

Remarks:

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER



	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL		COARSE SAND		FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
1		S-2		Core Butts		

GM Foundry Sand

DRAWN MCS

APP'D

DATE 7/31/95

JOB BE-23686

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Detroit – Bay City – Kalamazoo – Lansing – Toledo

Laboratory Compaction Curve

PROJECT: GM – Foundry Sand
LOCATION:
ARCHITECT/ENGINEER:
CONTRACTOR:

SME JOB NO: BE23686
REPORT NO:
REPORT DATE: 6/29/95

DESCRIPTION OF SOIL: Hatchet Sand S – 1

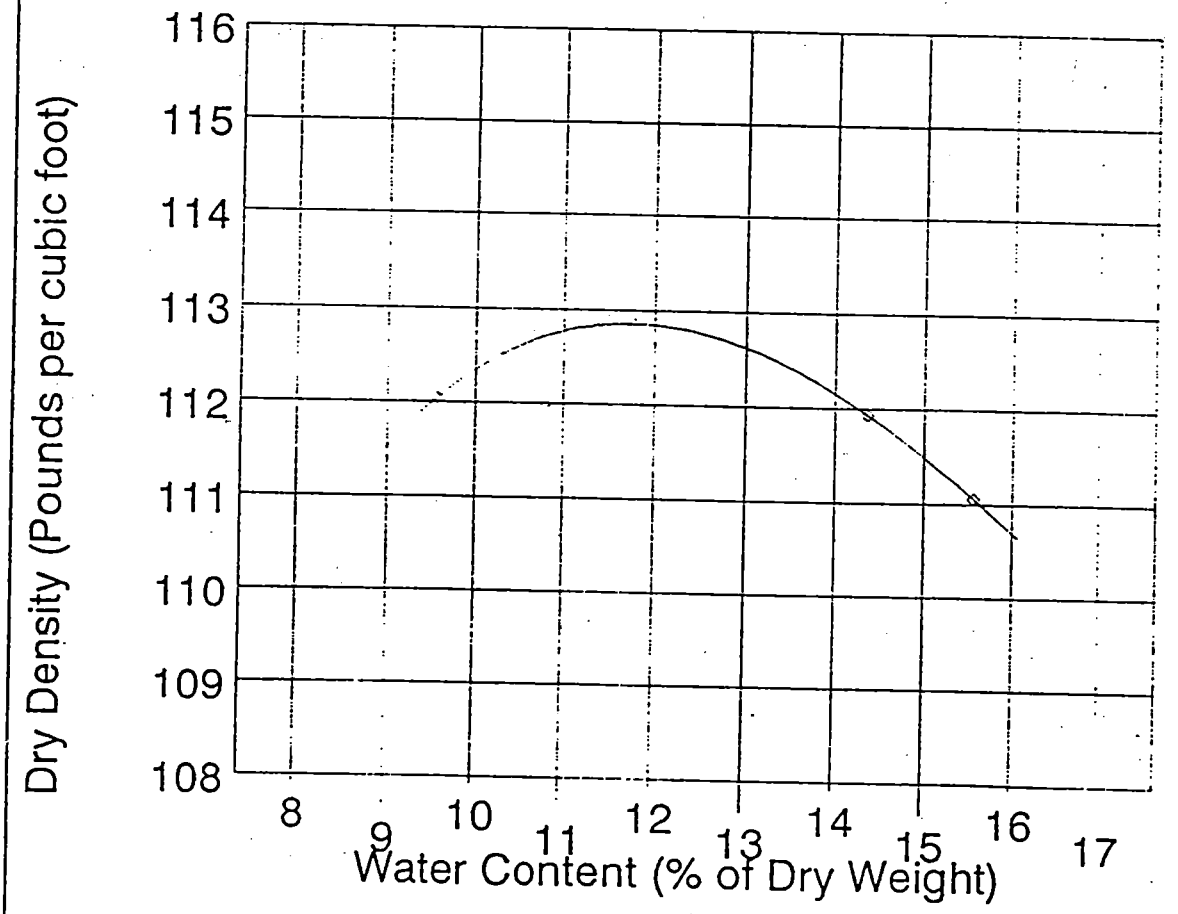
MATERIAL SOURCE:
INTENDED USE:
UNIFIED SOIL CLASSIFICATION:
MOLD DIAMETER: 4.0 In
TEST PROCEDURE USED: [ ] ASTM D–698–"Standard" [X] ASTM D–1557–"Modified" [ ] Other
RAMMER (MANUAL/MECHANICAL): Mech.

SAMPLE DATE: 6/26/95
SAMPLED BY: MK

REMARKS

TEST RESULTS:
MAX DRY DENSITY: 112.9 PCF
OPT WATER CONT: 11.8 %

TESTED BY: MM
REVIEWED BY: GD



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LABORATORY PROCTOR – 4 POINTS

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PROCTOR DIAMETER (4 OR 6): 4 MOLD FACTOR: 30.0
DO YOU WANT CURVE (Y OR N): y

POINT NO:	1	2	3	4
VOL OF WATER ADDED:				
WT OF CYL + SOIL (g):	6121.1	6172.6	6200.6	6205.7
WT OF CYLINDER (g):	4263.4	4263.4	4263.4	4263.4
WT OF SOIL (g):	1857.7	1909.2	1937.2	1942.3
WET DENSITY (lb/cu ft):	122.8	126.2	128.0	128.3
TARE + WET SOIL (g):	450	450	450	450
TARE + DRY SOIL (g):	423.1	417.5	411.3	408.5
TARE WT (g):	141.8	141.8	141.8	141.8
WT OF WATER (g):	26.9	32.5	38.7	41.5
WT OF DRY SOIL (g):	281.3	275.7	269.5	266.7
WATER CONTENT (%):	9.6	11.8	14.4	15.6
DRY DENSITY (lb/cu ft):	112.0	112.9	111.9	111.1

SME JOB NO: BE23686
REPORT NO:
PROJECT: GM – Foundry Sand
LOCATION:
ARCHITECT/ENGINEER:
CONTRACTOR:
REPORT DATE: 6/29/95
RAMMER (MANUAL/MECHANICAL): Mech.
DESCRIPTION OF SOIL: Hatchet Sand S – 1

MATERIAL SOURCE:
INTENDED USE:
UNIFIED SOIL CLASSIFICATION:
TEST PROCEDURE USED (PUT A "X") X
ASTM D-698-'STANDARD'
ASTM D-1557-'MODIFIED'
OTHER

TESTED BY: MM
REVIEWED BY: GD
REMARKS:

SAMPLED BY: MK
SAMPLE DATE: 6/26/95

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER

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Analysis Of Aggregate Report

Project:	GM – Foundry Sand	Report Date	6/29/95
Material:	Hatchet Sand	Report No.	
Sample No.:	S – 1	Log No.	459
Supplier:		SME Job No.	BE23686

Date Sampled 6/26/95 Submitted By MK

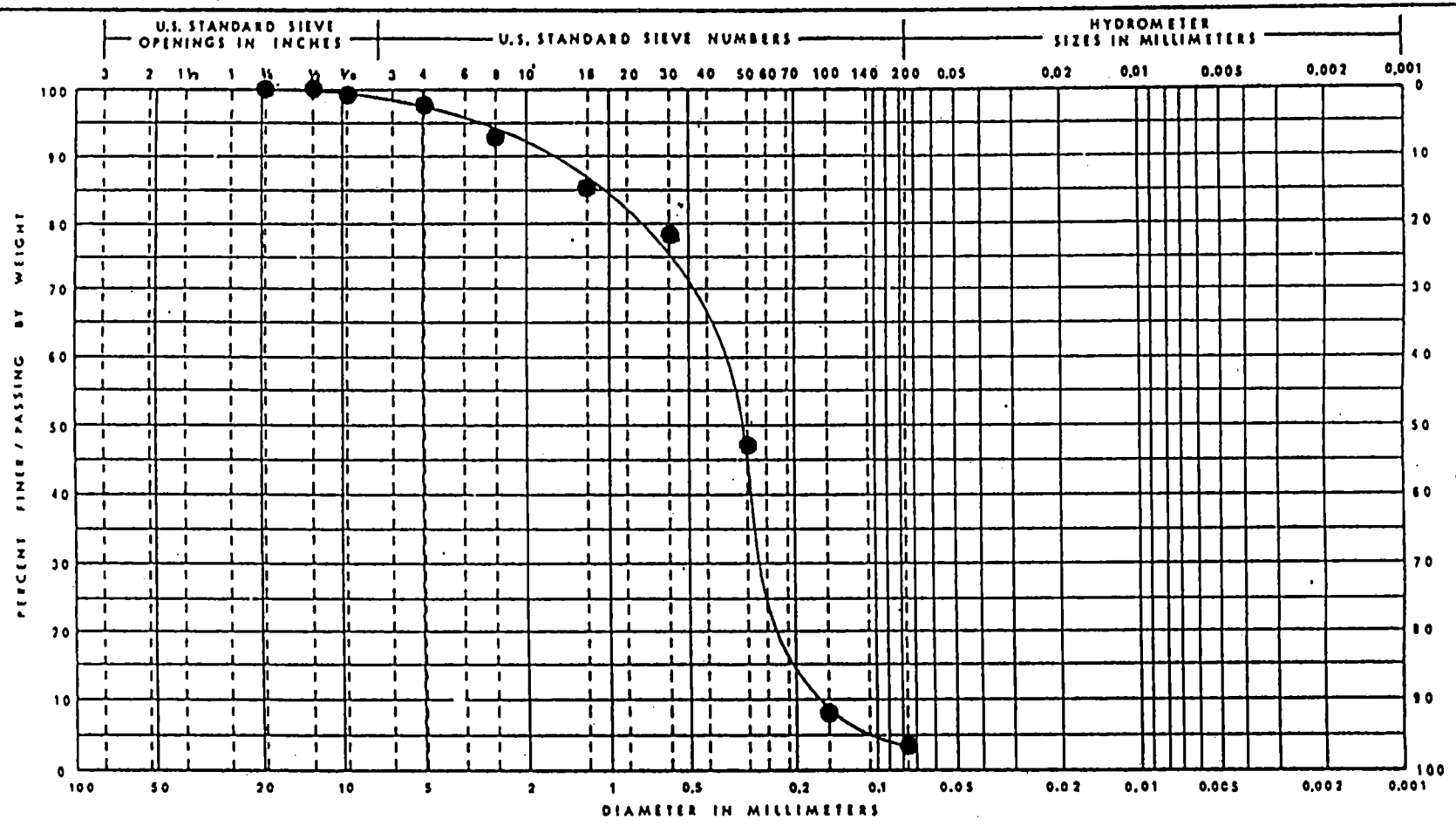
Sieve Size	Weight Retained gms	Percent Retained	Percent Passing	Spec Percent Passing	Comments
3	0	0	100.0		
2	0	0	100.0		
1 1/2	0	0	100.0		
1	0	0.0	100.0		
3/4	0.0	0.0	100.0		
1/2	0.0	0.0	100.0		
3/8	5.4	0.4	99.6		
4	23.4	1.9	97.7		
8	58.0	4.6	93.1		
16	97.3	7.8	85.3		
30	89.9	7.2	78.1		
50	388.4	31.0	47.1		
100	489.3	39.1	8.1		
200	48.7	3.9	4.2		
Pan	51.7	4.1			

Weight Of Sample	1252.8
Weight After Wash	1207.1
Loss By Washing %	3.6
Crush Content, %	0.0

Comment Legend:
* Low limit is out of range
** Upper limit is out of range

Remarks:

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER



ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL		COARSE SAND		FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
1		S-1		Hatchet Sand		

GM Foundry Sand

DRAWN MCS

APP'D

DATE 7/31/95

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ORIGINAL MOISTURE CONTENT 2.2%

Permeability Test on Granular Soil

Project:	GM Foundry Sand	Report Date	7/6/95
Location:	Saginaw, MI	Report No.	
Sample No.	Classified Sand S-1	SME Job No.	BE23686
Date Sampled	6/26/95 (MKK)	Tested By:	MCS

MCS

Material Description: Classified Sand S-1
Moisture Content as Tested: 11.7%
Dry Density as Tested (pcf): 94.4

Wt. of Sample,g:	6994.00	Coefficient of Permeability:	
Ht. of Sample,in:	8.94	$1.44 * 10^{-2}$ cm/sec	
Area, sq. in:	28.27		
Time, sec	30.00	Wet Density (pcf)	
Diameter,in:	6.00	105.45	

manometer		Head	Volume	Flow	Hydraulic
Right,cm	Left,cm	(cm)	(ml)	(ml/sec)	Gradient
29.2	47.0	17.8	92.0	3.1	1.2
29.2	47.0	17.8	92.0	3.1	1.2
29.2	47.0	17.8	92.0	3.1	1.2
		0.0		0.0	0.0
		0.0		0.0	0.0
		0.0		0.0	0.0

Sample was tested in accordance to ASTM D 2434.

REVIEWED BY: GARY DOCRING, LABORATORY MANAGER

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ORIGINAL MOISTURE CONTENT 5.5%

Permeability Test on Granular Soil

Project:	GM Foundry Sand	Report Date	7/6/95
Location:	Saginaw, MI	Report No.	
Sample No.	Classified Sand S-2	SME Job No.	BE23686
Date Sampled	6/26/95 (MKK)	Tested By:	MCS

MCS

Material Description: Classified Sand S-2
Moisture Content as Tested: 10.8 %
Dry Density as Tested (pcf): 98.3

Wt. of Sample,g:	7174.00
Ht. of Sample,in:	8.88
Area, sq. in:	28.27
Time, sec	30.00
Diameter,in:	6.00

Coefficient of Permeability:
$1.07 * 10^{-2}$ cm/sec

Wet Density (pcf)
108.93

manometer		Head	Volume	Flow	Hydraulic
Right,cm	Left,cm	(cm)	(ml)	(ml/sec)	Gradient
29.8	46.7	16.9	65.0	2.2	1.1
29.8	46.7	16.9	63.0	2.1	1.1
29.8	46.7	16.9	64.0	2.1	1.1
		0.0		0.0	0.0
		0.0		0.0	0.0
		0.0		0.0	0.0

Sample was tested in accordance to ASTM D 2434.

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER

Soil and Materials Engineers, Inc

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Laboratory Compaction Curve

PROJECT: GM FOUNDRY SAND
LOCATION:
ARCHITECT/ENGINEER:
CONTRACTOR:

SME JOB NO: BE23686
REPORT NO:
REPORT DATE: 6/28/95

DESCRIPTION OF SOIL: HATCHET SAND–S2

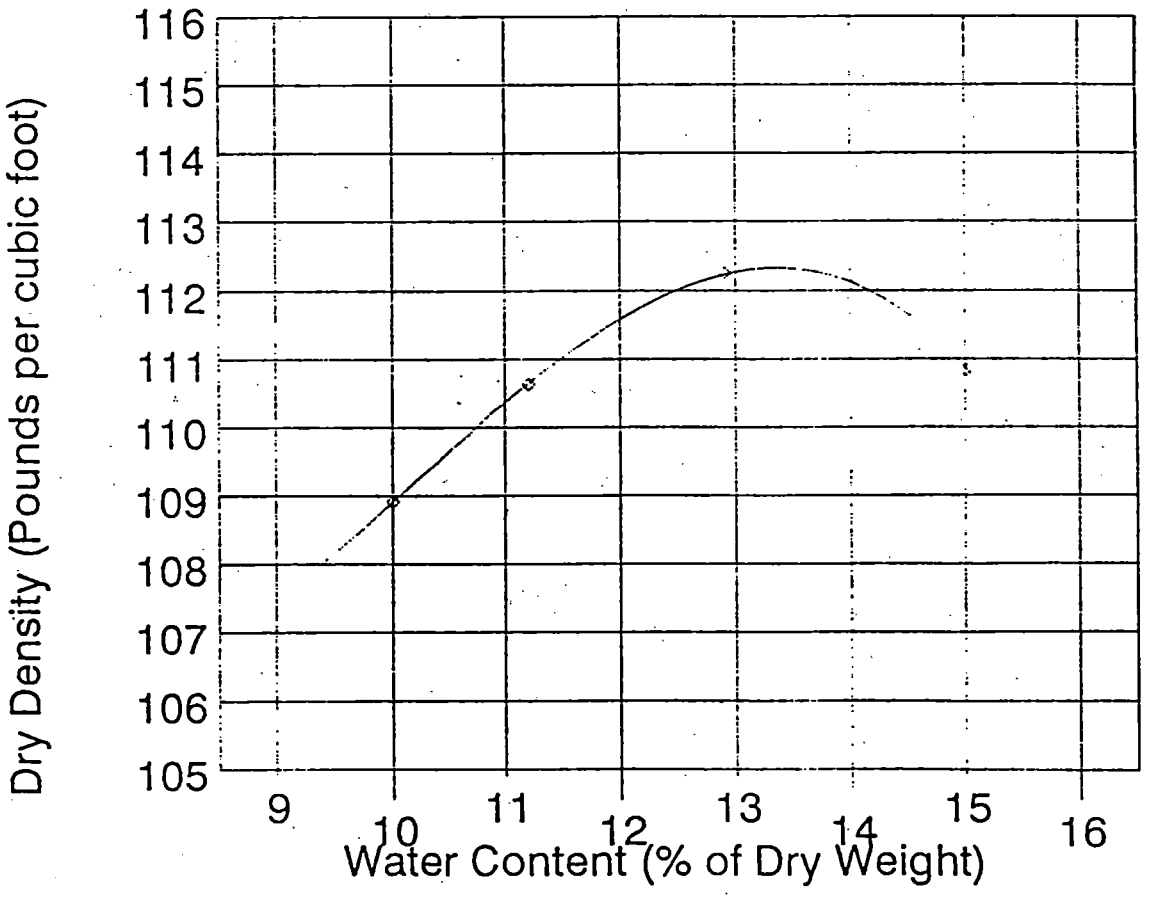
MATERIAL SOURCE:
INTENDED USE:
UNIFIED SOIL CLASSIFICATION:
MOLD DIAMETER: 4.0 In
TEST PROCEDURE USED: ☐ ASTM D–698–'Standard' ☒ ASTM D–1557–'Modified' ☐ Other
RAMMER (MANUAL/MECHANICAL): Mech.

SAMPLE DATE: 6/26/95
SAMPLED BY: MKK

REMARKS

TEST RESULTS:
MAX DRY DENSITY: 112.3 PCF
OPT WATER CONT: 13.4 %

TESTED BY: MM
REVIEWED BY: GD



Consultants in the geosciences, materials, and the environment

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43980 PLYMOUTH OAKS BLVD.
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(313) 454-9900

LABORATORY PROCTOR – 4 POINTS

MOLD DIAMETER (4 OR 6): 4 MOLD FACTOR:

DO YOU WANT CURVE (Y OR N): y

POINT NO:	1	2	3	4
VOL OF WATER ADDED:				
WT OF CYL + SOIL (g):	6120.6	6177.6	6188.1	6072
WT OF CYLINDER (g):	4258.9	4258.9	4258.9	4258.9
WT OF SOIL (g):	1861.7	1918.7	1929.2	1813.1
WET DENSITY (lb/cu ft):	123.0	126.8	127.5	119.8
TARE + WET SOIL (g):	450	450	450	450
TARE + DRY SOIL (g):	419	414.7	409.8	422
TARE WT (g):	142.1	142.1	142.1	142.1
WT OF WATER (g):	31	35.3	40.2	28
WT OF DRY SOIL (g):	276.9	272.6	267.7	279.9
WATER CONTENT (%):	11.2	12.9	15.0	10.0
DRY DENSITY (lb/cu ft):	110.6	112.3	110.8	108.9

SME JOB NO: BE23686
REPORT NO:
PROJECT: GM FOUNDRY SAND
LOCATION:
ARCHITECT/ENGINEER:
CONTRACTOR:
REPORT DATE: 6/28/95
RAMMER (MANUAL/MECHANICAL): Mech.
DESCRIPTION OF SOIL: HATCHET SAND – S2

MATERIAL SOURCE:
INTENDED USE:
UNIFIED SOIL CLASSIFICATION:
TEST PROCEDURE USED ASTM D – 698 – 'STANDARD'
(PUT A "X") x ASTM D – 1557 – 'MODIFIED'

OTHER

TESTED BY: MM
REVIEWED BY: GD
REMARKS:

SAMPLED BY: MKK
SAMPLE DATE: 6/26/95

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER

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Analysis Of Aggregate Report

Project:	GM – Foundry Sand	Report Date	6/29/95
Material:	Hatchet Sand	Report No.	
Sample No.:	S – 2	Log No.	462
Supplier:		SME Job No.	BE23686

Date Sampled 6/26/95 Submitted By MK

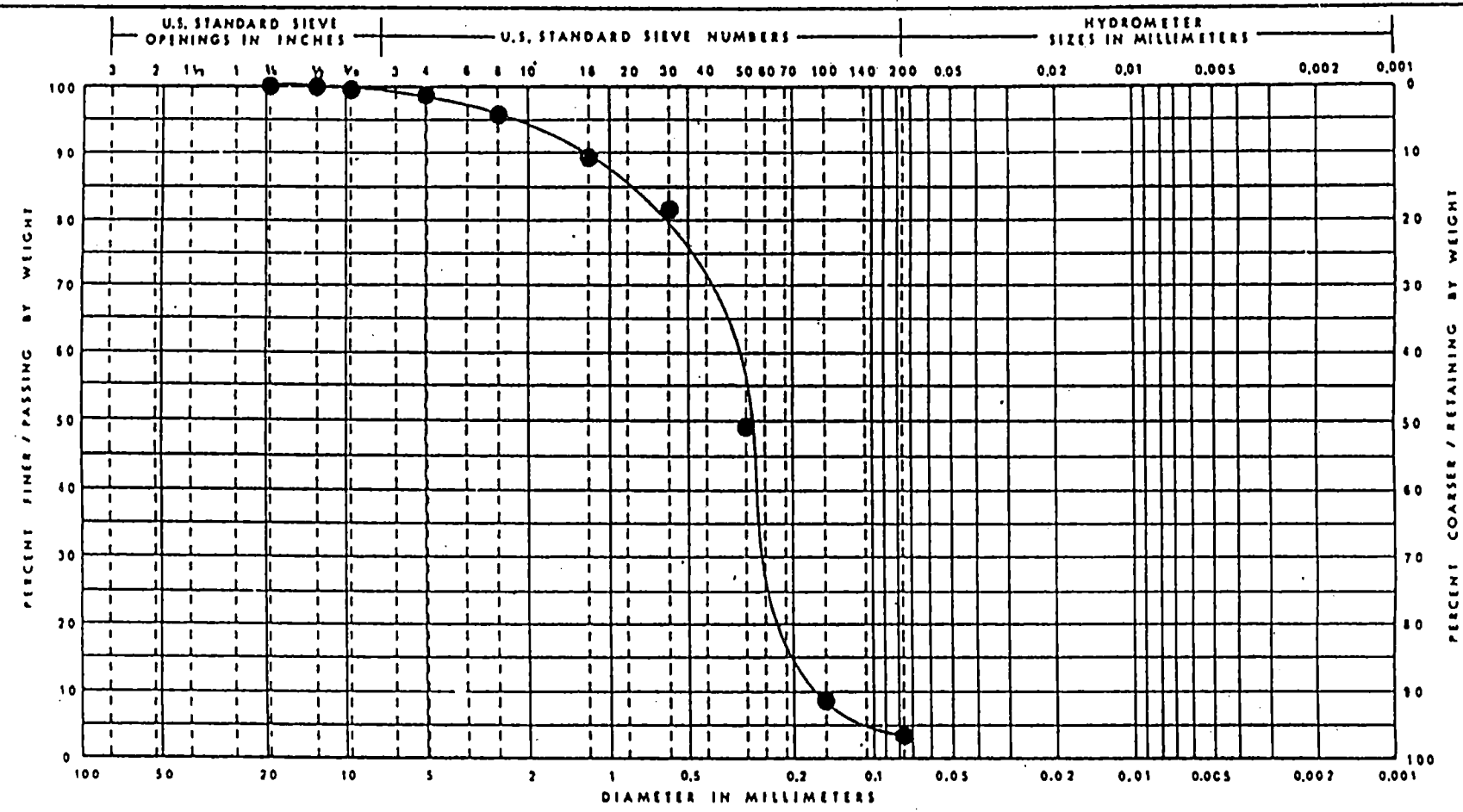
Sieve Size	Weight Retained gms	Percent Retained	Percent Passing	Spec Percent Passing	Comments
3	0	0	100.0		
2	0	0	100.0		
1 1/2	0	0	100.0		
1	0	0.0	100.0		
3/4	0.0	0.0	100.0		
1/2	0.0	0.0	100.0		
3/8	4.7	0.3	99.7		
4	13.0	0.9	98.8		
8	45.7	3.2	95.6		
16	91.0	6.3	89.3		
30	103.9	7.2	82.1		
50	472.6	32.7	49.4		
100	590.7	40.9	8.6		
200	61.3	4.2	4.3		
Pan	62.3	4.3			

Weight Of Sample	1445.7
Weight After Wash	1391.9
Loss By Washing %	3.7
Crush Content, %	0.0

Comment Legend:
* Low limit is out of range
** Upper limit is out of range

Remarks:

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER



	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL		COARSE SAND		FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
1		S-2		Hatchet Sand		

GM Foundry Sand

DRAWN MCS

APP'D

DATE 7/31/95

JOB BE-23686

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Analysis Of Aggregate Report

Project: GM Foundry Sand
Material: Classified Sand S-3
Contractor:
Supplier:

Report Date 7/5/95
Report No.
Log No.
SME Job No. BE23686

Date Sampled 6/26/95

Submitted By MKK

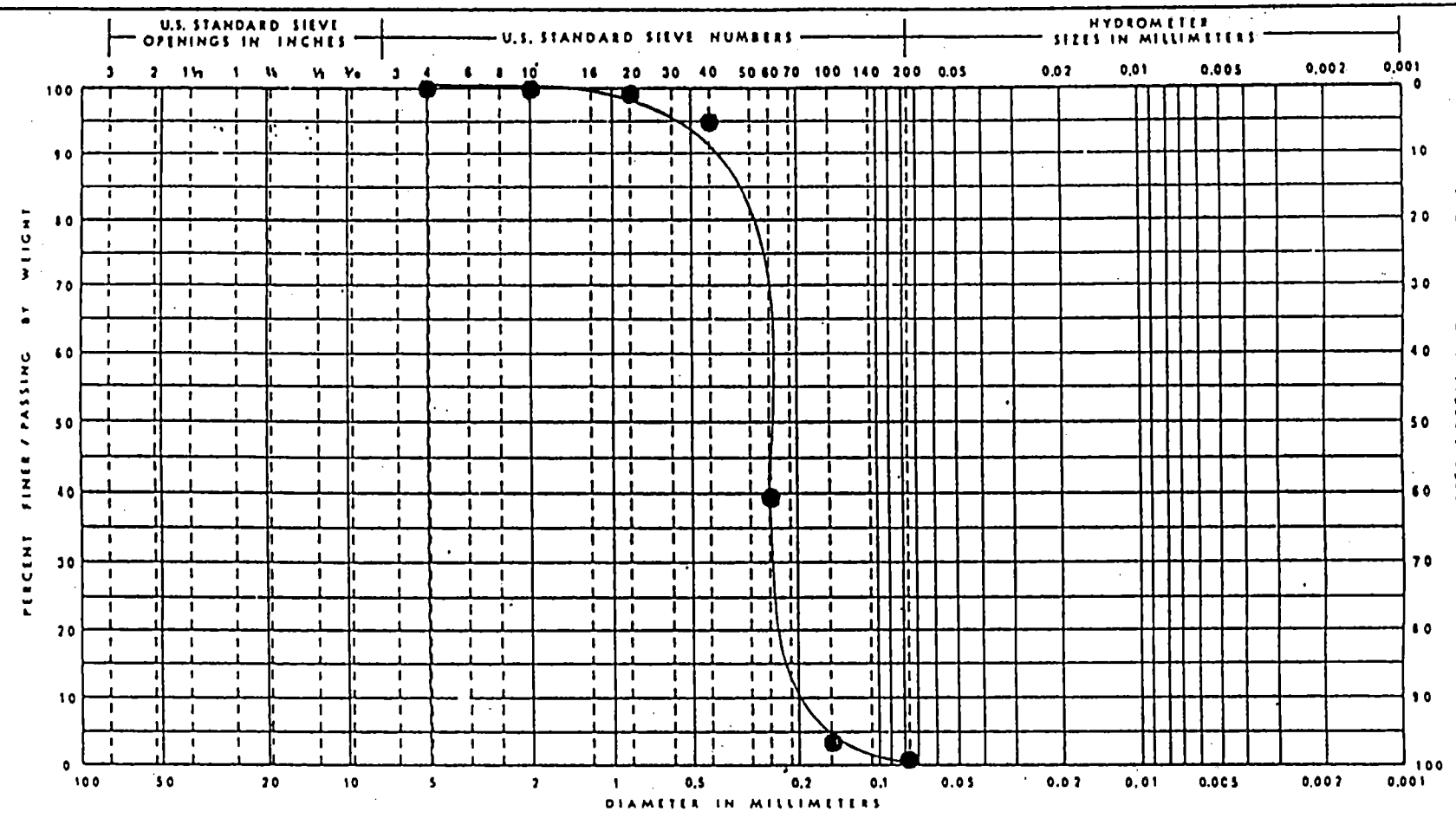
Sieve Size	Weight Retained gms	Percent Retained	Percent Passing	Spec Percent Passing	Comments
3	0	0	100.0		
2	0	0	100.0		
1 1/2	0	0	100.0		
1	0	0.0	100.0		
3/4	0.0	0.0	100.0		
1/2	0.0	0.0	100.0		
3/8	0.0	0.0	100.0		
4	0.0	0.0	100.0		
10	0.1	0.0	100.0		
20	1.1	0.8	99.2		
40	6.0	4.2	94.9		
60	79.1	55.8	39.2		
100	50.1	35.3	3.9		
200	3.9	2.7	1.1		
Pan	1.6	1.1			

Weight Of Sample 142.0
Weight After Wash 140.4
Loss By Washing % 1.1
Crush Content, %

Comment Legend:
* Low limit is out of range
** Upper limit is out of range

Remarks:

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER



	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL		COARSE SAND		FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
1		S-3		Classified Sand		

GM Foundry Sand

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Analysis Of Aggregate Report

Project:	GM Foundry Sand	Report Date	7/5/95
Material:	Classified Sand S-4	Report No.	
Contractor:		Log No.	
Supplier:		SME Job No.	BE23686

Date Sampled 6/26/95 Submitted By MKK

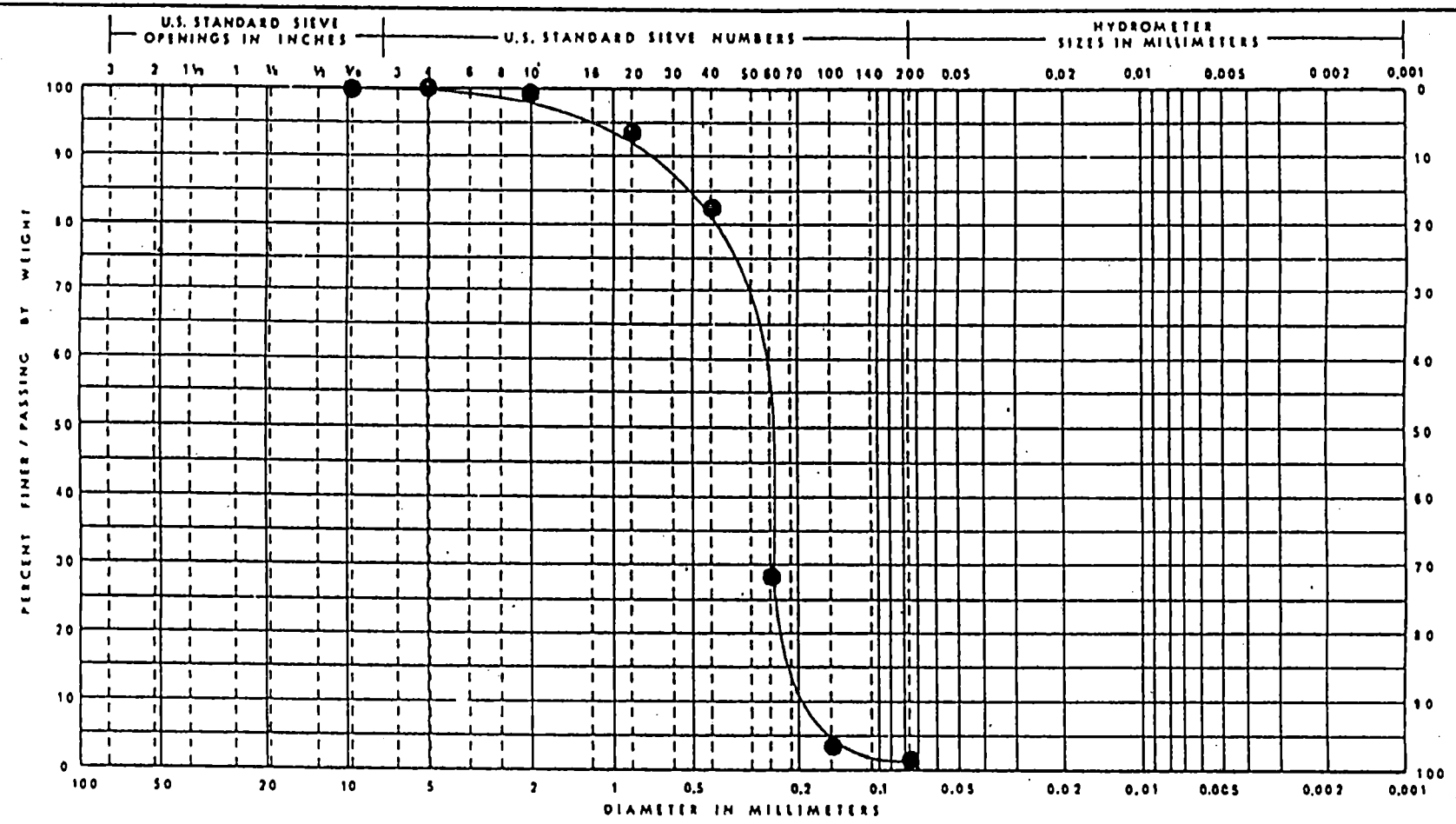
Sieve Size	Weight Retained gms	Percent Retained	Percent Passing	Spec Percent Passing	Comments
3	0	0	100.0		
2	0	0	100.0		
1 1/2	0	0	100.0		
1	0	0.0	100.0		
3/4	0.0	0.0	100.0		
1/2	0.0	0.0	100.0		
3/8	0.0	0.0	100.0		
4	0.0	0.0	100.0		
10	0.8	0.7	99.3		
20	6.3	6.0	93.3		
40	11.5	10.9	82.3		
60	57.1	54.1	28.3		
100	26.5	25.1	3.2		
200	1.5	1.4	1.7		
Pan	1.8	1.7			

Weight Of Sample	105.5
Weight After Wash	103.7
Loss By Washing %	1.7
Crush Content, %	

Comment Legend:
* Low limit is out of range
** Upper limit is out of range

Remarks:

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER



ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL		COARSE SAND		FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
1		S-4		Classified Sand		

GM Foundry Sand

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Analysis Of Aggregate Report

Project: GM Foundry Sand
Material: Classified Sand S-5
Contractor:
Supplier:

Report Date 7/5/95
Report No.
Log No.
SME Job No. BE23686

Date Sampled 6/26/95

Submitted By MKK

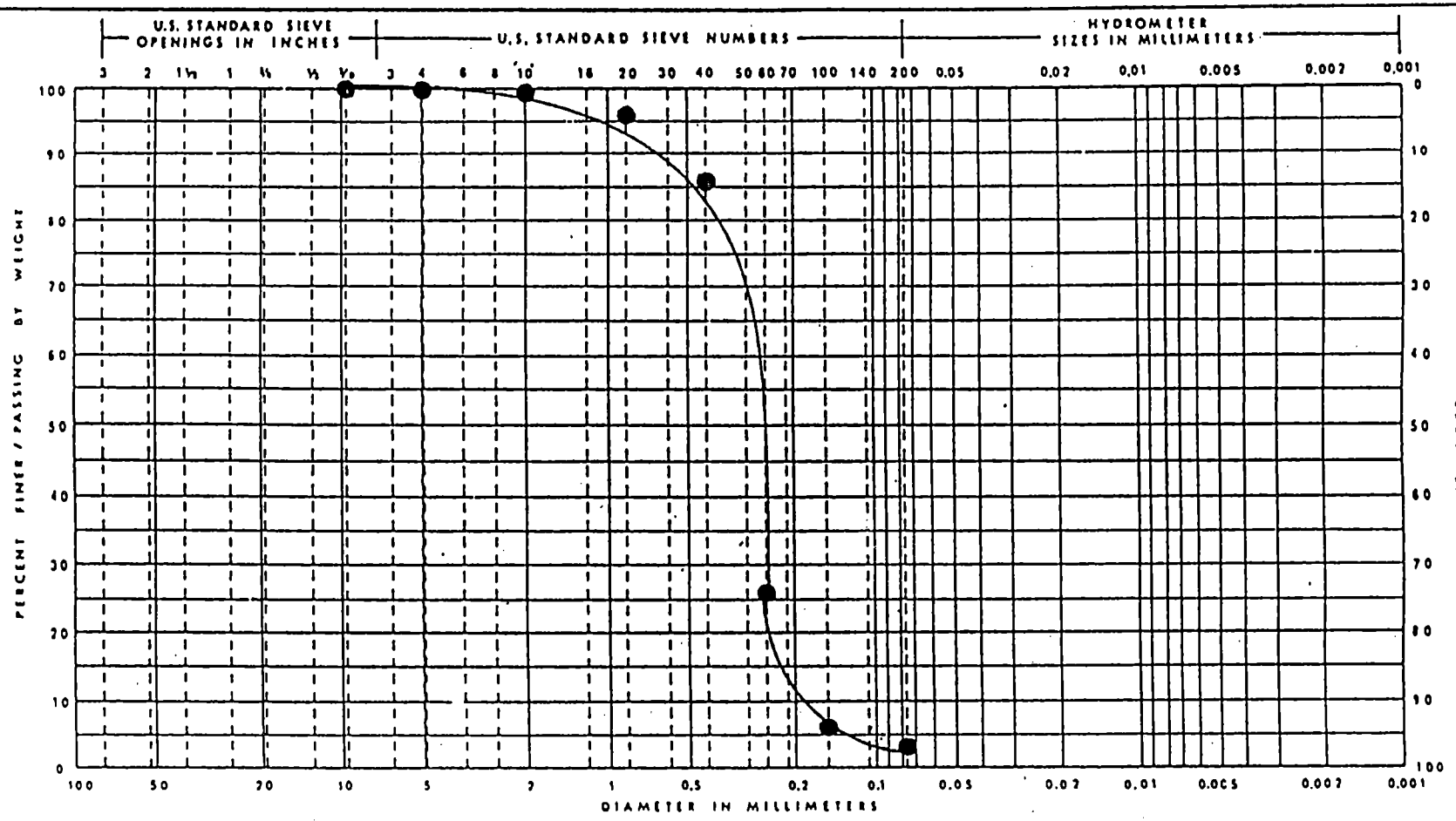
Sieve Size	Weight Retained gms	Percent Retained	Percent Passing	Spec Percent Passing	Comments
3	0	0	100.0		
2	0	0	100.0		
1 1/2	0	0	100.0		
1	0	0.0	100.0		
3/4	0.0	0.0	100.0		
1/2	0.0	0.0	100.0		
3/8	0.0	0.0	100.0		
4	0.0	0.0	100.0		
10	0.5	0.5	99.5		
20	3.6	3.6	95.9		
40	10.3	10.4	85.5		
60	59.3	59.5	26.0		
100	20.4	20.4	5.6		
200	2.4	2.4	3.3		
Pan	3.2	3.3			

Weight Of Sample	99.7
Weight After Wash	96.5
Loss By Washing %	3.2
Crush Content, %	

Comment Legend:
* Low limit is out of range
** Upper limit is out of range

Remarks:

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER



	GRAVEL		SAND			SILT & CLAY	
ASTM	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL		COARSE SAND		FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
1		S-5		Classified Sand		

GM Foundry Sand

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Analysis Of Aggregate Report

Project: GM Foundry Sand
Material: Classified Sand S-6
Contractor:
Supplier:

Report Date 7/5/95
Report No.
Log No.
SME Job No. BE23686

Date Sampled 6/26/95

Submitted By MKK

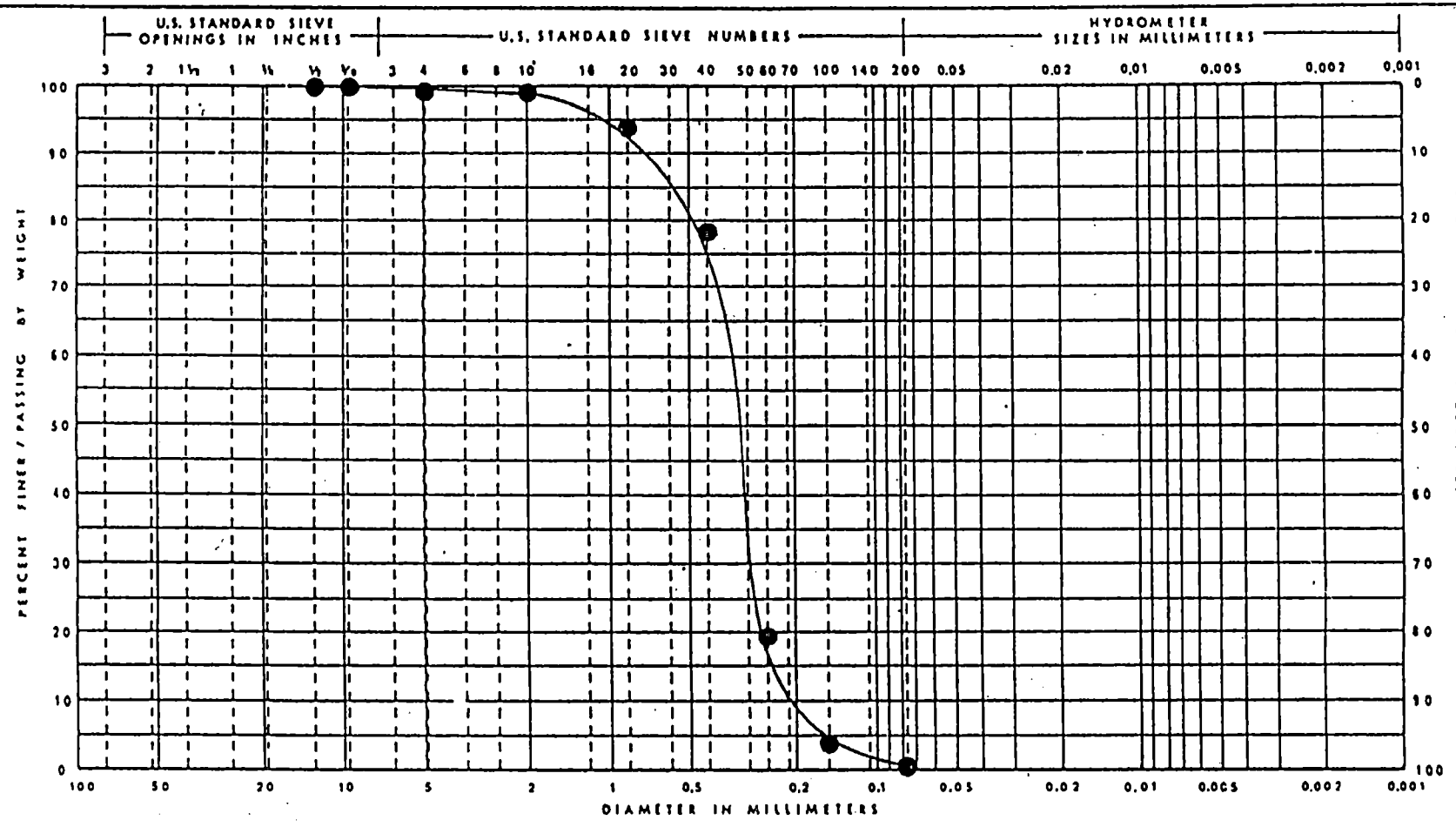
Sieve Size	Weight Retained gms	Percent Retained	Percent Passing	Spec Percent Passing	Comments
3	0	0	100.0		
2	0	0	100.0		
1 1/2	0	0	100.0		
1	0	0.0	100.0		
3/4	0.0	0.0	100.0		
1/2	0.0	0.0	100.0		
3/8	0.0	0.0	100.0		
4	0.1	0.1	99.9		
10	0.7	0.7	99.3		
20	5.9	5.6	93.7		
40	16.3	15.4	78.3		
60	62.3	58.7	19.6		
100	16.4	15.4	4.2		
200	3.6	3.4	0.8		
Pan	0.8	0.8			

Weight Of Sample	106.1
Weight After Wash	105.3
Loss By Washing %	0.7
Crush Content, %	

Comment Legend:
* Low limit is out of range
** Upper limit is out of range

Remarks:

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER



ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL		COARSE SAND		FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
1			S-6	Classified Sand		

GM Foundry Sand

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Analysis Of Aggregate Report

Project: GM Foundry Sand
Material: Classified Sand S-7
Contractor:
Supplier:

Report Date 7/5/95
Report No.
Log No.
SME Job No. BE23686

Date Sampled 6/26/95

Submitted By MKK

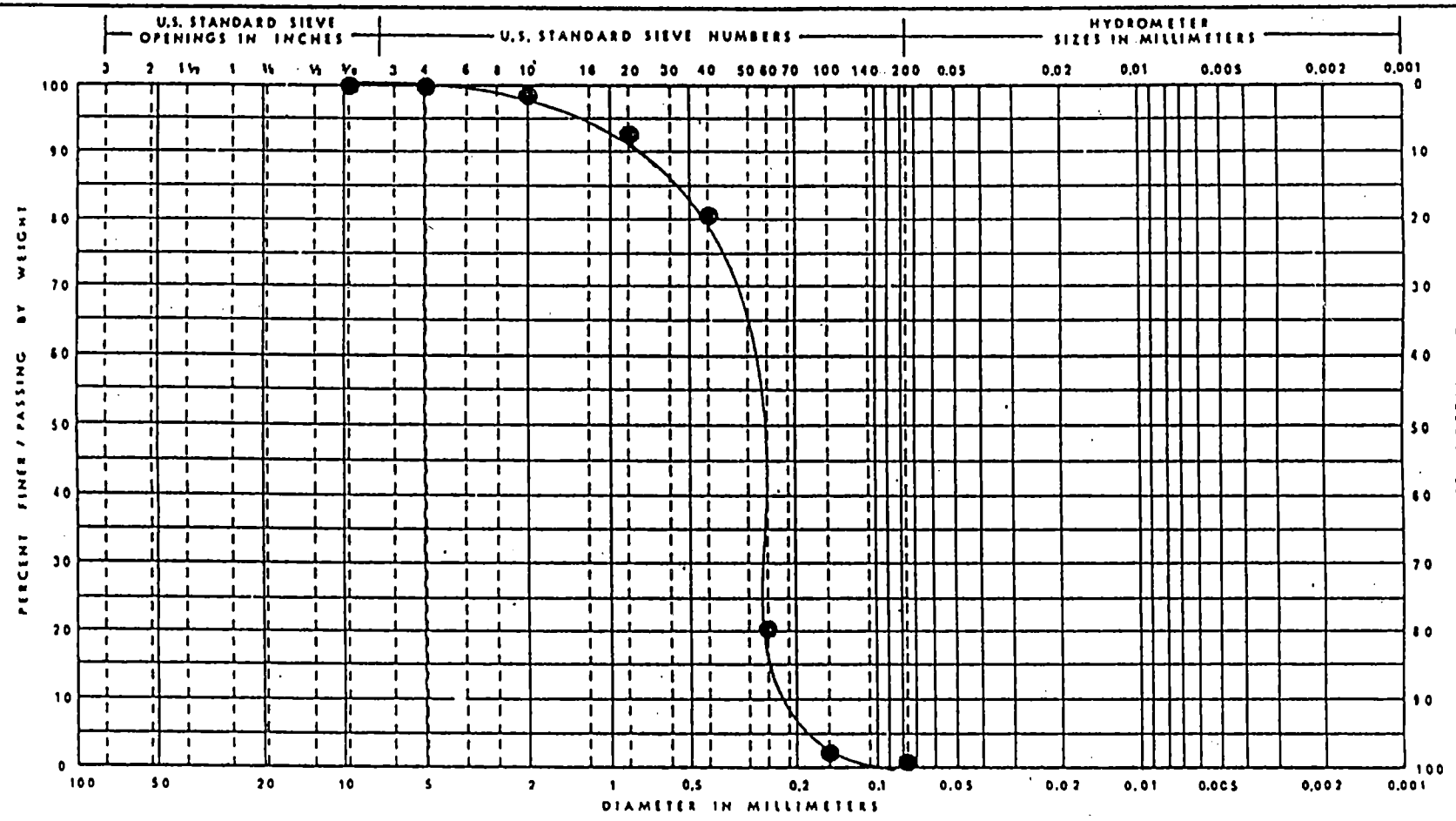
Sieve Size	Weight Retained gms	Percent Retained	Percent Passing	Spec Percent Passing	Comments
3	0	0	100.0		
2	0	0	100.0		
1 1/2	0	0	100.0		
1	0	0.0	100.0		
3/4	0.0	0.0	100.0		
1/2	0.0	0.0	100.0		
3/8	0.0	0.0	100.0		
4	0.0	0.0	100.0		
10	2.1	1.7	98.3		
20	7.2	5.8	92.5		
40	15.2	12.2	80.3		
60	74.6	60.2	20.1		
100	22.3	18.0	2.1		
200	0.8	0.7	1.4		
Pan	1.8	1.4			

Weight Of Sample	124.0
Weight After Wash	122.2
Loss By Washing %	1.4
Crush Content, %	

Comment Legend:
* Low limit is out of range
** Upper limit is out of range

Remarks:

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER



ASTM	GRAVEL		SAND			SILT & CLAY	
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY
AASHTO	GRAVEL		COARSE SAND		FINE SAND	SILT & CLAYS	

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
1		S-7		Classified Sand		

GM Foundry Sand

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Analysis Of Aggregate Report

Project: GM Foundry Sand
Material: Hatchet Sand S-1
Contractor:
Supplier:

Report Date 7/5/95
Report No.
Log No.
SME Job No. BE23686

Date Sampled 6/26/95

Submitted By MKK

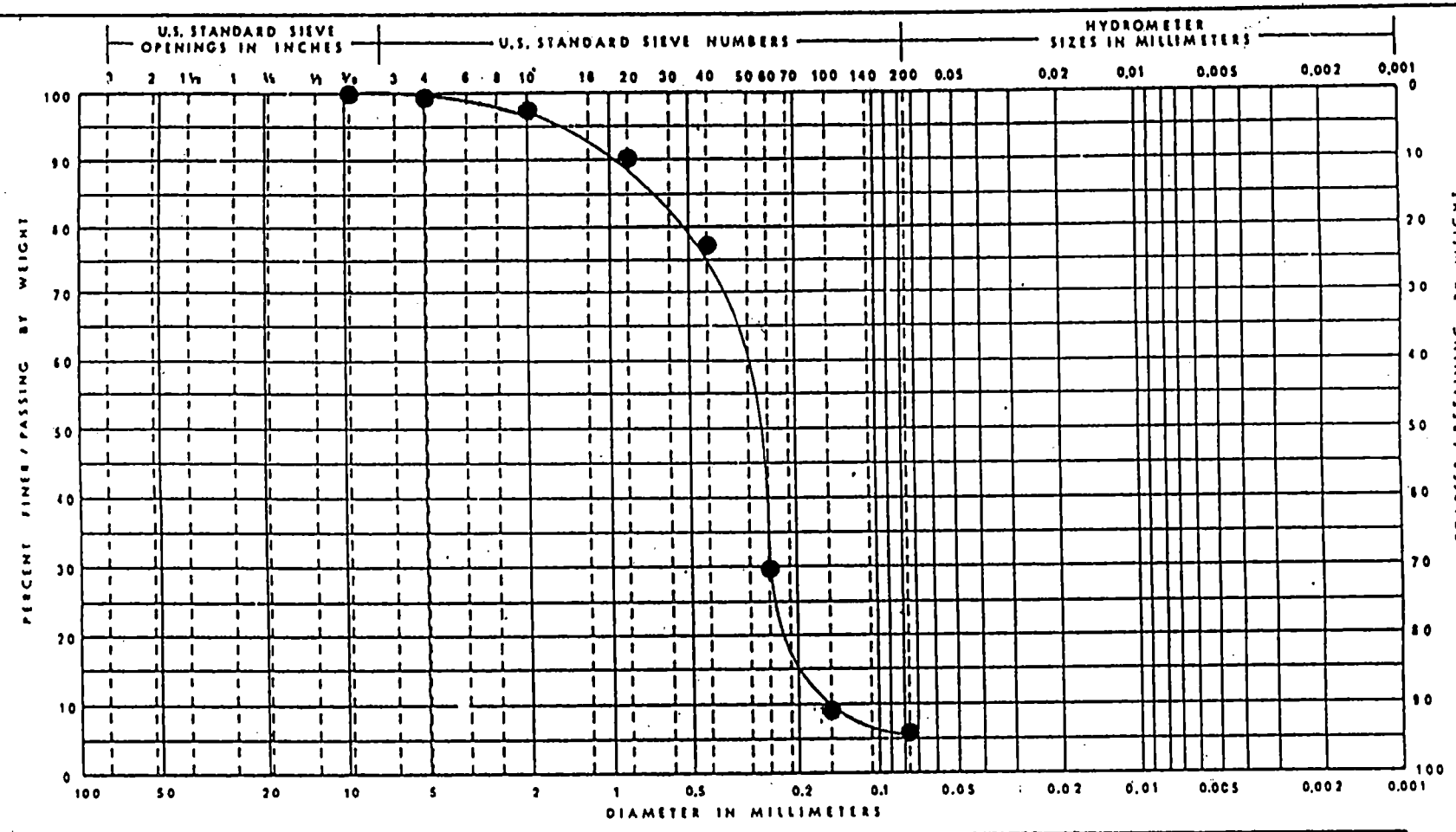
Sieve Size	Weight Retained gms	Percent Retained	Percent Passing	Spec Percent Passing	Comments
3	0	0	100.0		
2	0	0	100.0		
1 1/2	0	0	100.0		
1	0	0.0	100.0		
3/4	0.0	0.0	100.0		
1/2	0.0	0.0	100.0		
3/8	0.0	0.0	100.0		
4	0.8	0.7	99.3		
10	2.4	2.1	97.3		
20	7.8	6.7	90.6		
40	16.0	13.7	76.9		
60	55.3	47.3	29.6		
100	23.9	20.4	9.2		
200	3.9	3.3	5.8		
Pan	6.8	5.8			

Weight Of Sample	116.9
Weight After Wash	110.2
Loss By Washing %	5.8
Crush Content, %	0.0

Comment Legend:
* Low limit is out of range
** Upper limit is out of range

Remarks:

REVIEWED BY: GARY DOCKING, LABORATORY MANAGER



ASTM	GRAVEL		SAND			SILT & CLAY		
	COARSE	FINE	COARSE	MEDIUM	FINE	SILT	CLAY	
AASHTO	GRAVEL		COARSE SAND		FINE SAND	SILT & CLAYS		

CURVE NO.	BORING NO.	SAMPLE NO.	DEPTH (FT)	SAMPLE CLASSIFICATION	% < 0.074 mm	
1		S-1		Hatchet Sand		

GM Foundry Sand

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APP'D

DATE. 7/31/95

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Washed Classified Sand (1)

		Limit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
Al	Total	6,900												2,200	1,500	1,100	1,000	2,400	3,400	2,200	2,600
	SPLP	0.05	0	0.3	0.3	0.3	0	0.4	0	0.3	0.5	0.3	0.3								
As	Total	6												0.8	0	0	0.7	1.1	0.9	1.2	5.1
	SPLP	0.001	0	0	0	0	0.003	0	0	0	0	0	0								
Ba	Total	75												84	20	13	12	41	69	47	50
	SPLP	2	0.093	0.13	0.099	0.15	0.15	0.1	0.073	0	0	0	0	0.12							
Cd	Total	1.2												0	1.5	0.94	0.86	0.06	0.06	0	0.05
	SPLP	0.0035	0	0	0	0	0	0.0006	0	0	0	0	0		0						
Cr	Total	18												72	18	18	20	50	70	47	220
	SPLP	0.12	0	0	0.017	0	0	0.021	0	0	0	0	0	0			0.08	0	0		0.0008
Cu	Total	32												12	21	10	15	11	44	11	
	SPLP	1	0		0	0													0		
Fe	Total	12,000					8,700	11,000	8,800	10,000	11,000	10,000	8,600	9,000	5,800	4,900	7,100	7,900	7,800	9,100	84,300
	SPLP	0.3	1.5	1.5	0.62	0.17	0.21	1.3	0.89	0.8	2.7	1.7	0.3								1.8
Mn	Total	440												1,600	570	320	150	1,200	1,900	880	2,500
	SPLP	0.05	0.022	0.029	0.019	0.003	0.084	0.054	0.012	0.02	0.09	0.06	0	0.064	0	0.08	0.004	0.21	0.045	0.11	0.094
Ni	Total	20												0	2	3	5	0	0	8	73
	SPLP	0.53		0			0	0	0	0	0	0	0								0
Pb	Total	21												12	7	3	8	19	24	11	17
	SPLP	0.004	0	0	0	0	0	0.005	0.002	0	0.007	0	0.005						0.005		
Se	Total	0.41												0	0	0	0	0	0	0	0
	SPLP	0.035	0	0	0	0	0.007	0	0	0	0	0	0								
Ag	Total	1												0	0	0	0	0	0	0	0.09
	SPLP	0.033	0	0	0	0	0	0.0004	0	0	0	0	0								
Zn	Total	47												380	74	67	81	620	430	430	420
	SPLP	2.3	0.04	0.049	0.035	0.012	0.062	0.11	0.02	0.04	0.28	0.1	0	0.2	0	0.15	0.04	0.7	0.14	0.28	0.15
Fe	Total	12,000					8,700	11,000	8,800	10,000	11,000	10,000	8,600	9,000	5,800	4,900	7,100	7,900	7,800	9,100	
	SPLP	0.3	1.5	1.5	0.62	0.17	0.21	1.3	0.89	0.8	2.7	1.7	0.3								
Mn	Total	440												1,600	570	320	150	1,200	1,900	880	
	SPLP	0.05	0.022	0.029	0.019	0.003	0.084	0.054	0.012	0.02	0.09	0.06	0	0.064	0	0.08	0.004	0.21	0.045	0.11	

Note: 0's are non-detectable results below the regulatory limit

% Moisture			97.2%	96.5%	94.0%	86.4%	96.0%	95.0%	96.3%	96.5%	95.0%	95.4%	92.6%	95.0%	84.3%	89.0%	94.0%	96.4%	95.4%	80.0%
Mn	Total	440	0	0	0	0	0	0	0	0	0	0	0	1,520	312	285	141	1,133	1,813	704	
	SPLP	0.05	0.021	0.028	0.018	0.003	0.081	0.051	0.012	0.019	0.086	0.057	0.000	0.061	0.000	0.071	0.004	0.198	0.043	0.088	

sand96sh 92-3 24-Jul-97

WASHED CLASSIFIED SAND
PROPOSED FOR USE AT LINDEN ROAD SITE

Washed Classified Sand (2)

		Limit	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35	36	37	38
Al	Total	6,900	4,300	5,400	3,600	3,500	2,000	2,800		4,600	4,400	3,200	2,500	3,200	2,300	540	4,900	4,400	970	2,300	900
	SPLP	0.05																			
As	Total	6	0	2.2	1.5	1.3	0.9	1.1		0.9	1.6	0.6	1	0.9	0.7	0.3	0.8	0.7	0	0.6	1.3
	SPLP	0.001																			
Ba	Total	75	70	120	63	54	33	58		100	72	66	56	63	47	4	92	72	6	56	9
	SPLP	2		0						0.12							0				
Cd	Total	1.2	0	0.06	0.07	0.06	0.07	0.05		0.06	0.09	0.08	0.09	0.07	0.05	0	0.09	0.08	0.06	0.05	0
	SPLP	0.0035																			
Cr	Total	18	60	88	85	65	42	95		100	100	55	240	64	54	13	78	120	14	57	28
	SPLP	0.12	0	0	0	0	0	0		0	0	0	0	0.013	0		0	0		0	
Cu	Total	32	11	18	22	15	13	22		15	13	18	150	16	34	26	20	14	11	15	25
	SPLP	1											0		0.1						
Fe	Total	12,000	11,500	12,000	16,000	14,000		88 16,000		9,200	8,500	8,800	10,000	11,000	7,800	5,700	6,500	7,900	5,100	9,900	12,000
	SPLP	0.3			2.1	2		0.58													
Mn	Total	640	1,100	1,500	1,900	1,200	850	1500		2,400	2,200	1,500	1,400	1,600	1,400	74	2,400	2,400	94	1,200	150
	SPLP	0.05	0.04	0.06	0.05	0.05	0.07	0		0.073	0.064	0.05	0.03	0.04	0.04	0	0.11	0.04	0	0.035	0
Ni	Total	20	0	0	6	11	0	16		7	7	5	18	10	7	5	6	4	6	9	10
	SPLP	0.57																			
Pb	Total	21	0	5	10	7	13	7		7	6	2	8	17	15	3	8	6	3	7.6	4
	SPLP	0.004																			
Se	Total	0.41	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0
	SPLP	0.035																			
Ag	Total	1	0	0	0	0	0	0		0	0	0	0	0	0	0	0	0	0	0	0
	SPLP	0.033																			
Zn	Total	47	310	260	450	400	340	430		410	380	289	690	370	440	87	230	380	140	400	94
	SPLP	2.3	0.071	0.13	0.18	0.16	0.23	0.053		0.27	0.19	0.11	0.1	0.09	0	0.03	0.19	0.09	0.08	0.12	
Fe	Total	12,000	11,500	12,000	16,000	14,000		88 16,000		9,200	8,500	8,800	10,000	11,000	7,800	5,700	6,500	7,900	5,100	9,900	12,000
	SPLP	0.3			2.1	2		0.58													
Mn	Total	640	1,100	1,500	1,900	1,200	850	1,500		2,400	2,200	1,500	1,400	1,600	1,400	74	2,400	2,400	94	1,200	150
	SPLP	0.05	0.04	0.06	0.05	0.05	0.07	0		0.073	0.064	0.05	0.03	0.04	0.04	0	0.11	0.04	0	0.035	0
	Note:	D's ar																			
% Moisture			95.0%	95.4%	83.4%	93.0%	94.7%	88.9%		97.4%	92.8%	92.0%	95.3%	96.0%	95.2%	93.0%	93.7%	96.0%	95.4%	94.2%	95.3%
Mn	Total	640	1,045	1,431	1,585	1,116	786	1,336		2,338	2,024	1,380	1,334	1,536	1,333	70	2,249	2,304	90	1,130	143
	SPLP	0.05	0.038	0.057	0.062	0.047	0.066	0.000		0.071	0.059	0.046	0.029	0.038	0.038	0.000	0.105	0.038	0.000	0.033	0.000

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Washed Classified Sand (3)

		Limit	39	35b	36b	37b	38b	39b	40	41	42	43	44	45	46	47	48	49	50	51	52
Al	Total	6,900	2,600	1,100	4,500	6,000	4,900	2,500	940	5,000	1,500	810	5,400	3,800		2,700	4,200	2,900	770	860	
	SPLP	0.05																			
As	Total	6	1.9	1	1.2	2.3	2	1.9	0.9	1.8	1.3	0.9	1.1	1.7		1.3	2	1.8	0.6	1	
	SPLP	0.001																			
Ba	Total	75	41	14	84	99	92	48	9	88	24	8	140	63		53	82	54	6.8	6	
	SPLP	2				0.15	0.12			0.12			0.17				0				
Cd	Total	1.2	0	0.15	0.09	0	0.12	0.11	0	0.07	0.1	0	0.1	0.06		0.13	0.1	0.07	0	0.27	
	SPLP	0.0035																			
Cr	Total	18	49	21	85	110	130	38	0.8	160	43	32	100	75		54	93	67	14	11	
	SPLP	0.12		0.15		0	0	0		0	0	0	0	0.007	0	0	0				
Cu	Total	32	9	17	14	120	28	10	12	18	18	26	17	14		13	17	24	18	10	
	SPLP	1				0.009															
Fe	Total	12,000	5,700	6,400	7,200	5,900	11,000	5,200	6,000	8,800	9,600	13,000	9,400	8,800		8,000	7,800	8,700	5,000	4100	
	SPLP	0.5										0.47									
Mn	Total	440	1,200	290	2,400	3,100	3,200	1,100	180	3,800	720	170	3,500	210		1,600	2,600	1,700	73	74	
	SPLP	0.05	0.073	0.21	0.068	0.08	0.07	0.034	0	0.14	0.026	0	0.088	0.11	0.056	0.16	0.12	0.008	0.039	0.07	
Mi	Total	20	4	4	5	3.6	8	6	10	5	74	10	7	5.1		10	5	7	8	4	
	SPLP	0.53				0					0					0					
Pb	Total	21	15	6	5	3.6	13	6	3	12	3.8	4	8	7		11	7	7	2	3	
	SPLP	0.004																			
Se	Total	0.41	0	0	0	2.6	0	0.6	0	2.1	0	0.6	0.7	0		0	0	0	0	0.7	
	SPLP	0.035				0	0	0		0		0	0		0	0				0	
Ag	Total	1	0	0	0	0	0	0.03	0	0	0	0	0	0		0	0	0	0	0	
	SPLP	0.033																			
Zn	Total	47	280	120	120	210	450	200	74	360	170	130	290	470		380	320	420	40	35	
	SPLP	2.3		0.15		0.16	0.11	0.046	0	0.32	0.053	0.009	0.15	0.31	0.18	0.4	0.18				
Fe	Total	12,000	5,700	6,400	7,200	5,900	11,000	5,200	6,000	8,800	9,600	13,000	9,400	8,800		8,000	7,800	8,700	5,000	4,100	
	SPLP	0.3										0.47									
Mn	Total	440	1,200	290	2,400	3,100	3,200	1,100	180	3,800	720	170	3,500	210		1,600	2,600	1,700	73	74	
	SPLP	0.05	0.073	0.21	0.068	0.08	0.07	0.034	0	0.14	0.026	0	0.088	0.11	0.056	0.16	0.12	0.008	0.039	0.07	
	Note:	D's ar																			
% Moisture			96.0%	95.6%	95.4%	96.3%	94.7%	95.8%	94.8%	93.9%	92.5%	95.0%	93.7%	96.3%	96.0%	93.4%	93.4%	96.0%	95.9%	96.8%	
Mn	Total	440	1,152	277	2,290	2,923	3,050	1,054	171	3,568	666	162	3,280	202	0	1,494	2,428	1,632	70	72	
	SPLP	0.05	0.070	0.200	0.065	0.075	0.066	0.033	0.000	0.131	0.024	0.000	0.082	0.106	0.054	0.149	0.112	0.008	0.037	0.068	

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[redacted] (4)

		Limit	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70
Al	Total	6,900	760	580	860	3,100	610	5,000	5,700	650	3,300	4,900	2,800	3,400	1,300	2,700	3,200	3,500	4,000	
	SPLP	0.05																		
As	Total	6	1	0.7	0.7	1.4	0.6	1.4	1.5	0.9	1.5	3.3	0	2.8	0	0	0	0	0	
	SPLP	0.001																		
Ba	Total	75	7	4	6	55	5	85	92	6	68	100	51	66	17	65	61	70	76	
	SPLP	2						0.12	0			0.051							0.11	
Cd	Total	1.2	0	0	0	0.07	0	0	0.07	0	0	0.08	0	0.08	0	0.16	0.53	0	0	
	SPLP	0.0035																		
Cr	Total	18	14	14	15	57	11	75	90	16	62	96	48	46	21	53	66	80	73	
	SPLP	0.12				0		0	0		0.007	0.099	0	0.01	0.004	0	0		0.01	
Cu	Total	32	12	10	13	12	31	16	20	12	16	18	13	17	11	14	14	14	23	
	SPLP	1																		
Fe	Total	12,000	5,400	5,400	5,300	7,800	4,600	7,000	8,500	5,400	7,300	8,300	7,400	8,000	5,700	7,000	8,500	8,600	7,700	
	SPLP	0.3																		
Mn	Total	440	100	79	98	1,800	89	1,900	2,500	70	1,800	3,000	1,300	1,600	400	1,700	2,000	2,500	2,200	
	SPLP	0.05	0	0.16	0.03	0.062	0.026	0.06	0.13	0.05	0.074	0	0.07	0.084	0.074	0.041	0.073	0.058	0.087	
Ni	Total	20	5	5	0	0	7	15	6.4	4	5	6	5.6	5.7	5.7	5.6	8.1	6.6	6.2	
	SPLP	0.53																		
Pb	Total	21	5	3	2	9	3.6	9	9.1	3	7	10	6.9	16	5.5	14	7.2	9.5	8.7	
	SPLP	0.006																		
Se	Total	0.41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	SPLP	0.035									0									
Ag	Total	1	0	0	0	5.3	0	0	0	1	0	0.6	0.6	0.7	0.3	0.71	0.78	0.66	0.64	
	SPLP	0.033				0.018														
Zn	Total	47	76	16	32	290	21	240	340	38	280	320	340	290	210	270	310	480	310	
	SPLP	2.3	0					0.1	0.19		0.14	0.28	0.17	0.2	0.16	0.044	0.15		0.33	
Fe	Total	12,000	5,400	5,400	5,300	7,800	4,600	7,000	8,500	5,400	7,300	8,300	7,400	8,000	5,700	7,000	8,500	8,600	7,700	
	SPLP	0.3						0	0	0	0	0	0	0	0					
Mn	Total	440	100	79	98	1800	89	1,900	2,500	70	1,800	3,000	1,300	1,600	400	1,700	2,000	2,500	2,200	
	SPLP	0.05	0	0.16	0.03	0.062	0.026	0.06	0.13	0.05	0.074	0	0.07	0.084	0.074	0.041	0.073	0.058	0.087	
	Note:	0's ar				0.75														
% Moisture			91.9%	95.3%	90.1%	94.9%	83.9%	95.0%	95.0%	96.0%	96.0%	95.3%	95.7%	96.0%	99.9%	95.0%	95.2%	97.5%	95.1%	
Mn	Total	440	92	75	88	1,708	75	1,805	2,375	67	1,728	2,859	1,244	1,504	400	1,615	1,904	2,438	2,092	
	SPLP	0.05	0.080	0.152	0.027	0.059	0.022	0.057	0.124	0.048	0.071	0.080	0.067	0.079	0.074	0.039	0.069	0.057	0.083	

[redacted]

		Limit	Average
Al	Total	6,900	2,683
	SPLP	0.05	0.208
As	Total	6	1.11
	SPLP	0.001	0.000
Ba	Total	75	52
	SPLP	2	0.08
Cd	Total	1.2	0.114
	SPLP	0.0055	0.00
Cr	Total	16	63
	SPLP	0.12	0.008
Cu	Total	32	21
	SPLP	1	0.02
Fe	Total	12,000	9,321
	SPLP	0.3	1.2
Mn	Total	440	1,388
	SPLP	0.05	0.058
Ni	Total	20	8
	SPLP	0.53	0.00
Pb	Total	21	8
	SPLP	0.006	0.00
Se	Total	0.41	0.12
	SPLP	0.035	0.00
Ag	Total	1	0.17
	SPLP	0.033	0.00
Zn	Total	47	268
	SPLP	2.3	0.15

Fe	Total	12,000	8,185
	SPLP	0.3	0.73
Mn	Total	440	1,361
	SPLP	0.05	0.058
	Note:	D's are w/o #19	

% Moisture

Mn	Total	440	1,056
	SPLP	0.05	0.054

Metals Reclamation Sand (5)

		Limit	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17
Al	Total	6,900	1900	2600	2600	2300	6500	2200	2,100	2,500	2,400	1,500	2,200	2,600	1,700	1,900	1,600	1,400	1,700
	SPLP	0.05																	
As	Total	5.8	2.5	2.3	1.3	1.8	32	3.6	6.9	2.1	2.8	4.1	2.4	2.5	7.3	4.6	2.3	2.3	4.5
	SPLP	0.001					0		0						0				0
Ba	Total	75	27	60	47	31	250	24	27	37	55	34	36	40	32	41	41	26	24
	SPLP	2					0.22												
Cd	Total	1.2	0.08	0.11	0.11	0.1	1.8	0.1	2	0.13	0.1	0.09	0.16	0.11	0.12	0.13	0.12	0.12	0
	SPLP	0.0035					0												
Cr	Total	18	220	240	85	150	26	65	120	240	250	190	210	240	220	240	250	180	270
	SPLP	0.12	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0	0
Cu	Total	32	150	200	45	80	110	44	120	200	150	130	170	180	250	180	190	140	220
	SPLP	1	0	0	0	0	0	0	0	0	0	0	0		0	0	0	0.006	0
Fe	Total	12,000	64,000	94,000	37,000	53,000	17,000	28,000	81,000	110,000	100,000	77,000	100,000	100,000	120,000	110,000	150,000	86,000	120,000
	SPLP	0.3	0.6	0.5	0	0	0	0.1	0	0	0	0	0.05	0.08	0.17	0.06	0	0.02	0
Mn	Total	440	910	1,300	1,200	850	230	470	910	1,400	16	1,100	1,200	1,500	1,200	1,100	1,500	780	1,100
	SPLP	0.05	0	0	0	0.01		0	0	0		0	0	0	0	0	0	0	0
Ni	Total	20	45	39	0	32	30	12	39	84	69	47	70	84	49	46	62	52	70
	SPLP	0.53	0	0	0	0	0		0	0	0	0	0	0		0	0	0	0
Pb	Total	21	12	56	8	13	63	7	64	4	52	29	50	70	14	7	49	7.7	7
	SPLP	0.004		0			0		0		0	0	0	0			0		
Se	Total	0.41	0.8	0	0	1.3	5.2	0	0	4.6	0.7	0	6.6	5.4	2	0	0	1.5	0
	SPLP	0.035				0	0			0	0		0	0	0			0	
Ag	Total	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SPLP	0.033																	
Zn	Total	47	240	250	200	260	150	230	590	300	180	240	430	250	200	160	210	220	110
	SPLP	2.3	0	0.03	0	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0

Note: 0's are non-detectable results below the regulatory limit

6/2/97

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METALS RECLAMATION SAND
- NOT FOR USE AT LINDEN ROAD SITE.

Grade Reclamation Sand (6)

		Limit	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35
Al	Total	6,900	1,200	1,600	1,400	4,300	990	900	1,000	1,100	1,300	1,300	910	1,700	1,500	920	1,100	1,300	1,200	5,600
	SPLP	0.05											0							
As	Total	5.8	8.8	1.8	1.7	3.8	40	16	6.4	3.1	3.4	3.4	7.5	7	2.8	7	2.6	6	2	23
	SPLP	0.001	0				0	0	0					0		0		0		0.003
Ba	Total	75	20	28	15	80	13	11	13	14	12	17	10	29	23	13	30	34	19	39
	SPLP	2				0.14														
Cd	Total	1.2	0	0.05	0.09	0.2	0.11	0.17	0.12	0.06	0	0.07	0	0.08	0.1	0.05	0.26	0.07	0.1	0.09
	SPLP	0.0035																		
Cr	Total	18	310	260	61	160	290	400	190	130	210	260	230	200	99	370	120	230	52	190
	SPLP	0.12	0	0	0	0	0	0.033	0	0	0	0	0	0	0	0	0	0	0	0
Cu	Total	32	270	220	56	97	380	350	180	120	170	170	210	130	120	230	110	160	48	70
	SPLP	1	0	0	0	0	0	0.022	0.005	0	0	0	0	0.19	0	0	0	0	0	0
Fe	Total	12,000	240,000	110,000	25,000	66,000	136,000	220,000	86,000	51,000	9,600	37,000	15,000	68,000	34,000	150,000	95,000	81,000	19,000	72,000
	SPLP	0.3	0.1	0	0.2	0.06	0.02	0.75	0.2	0.2		0.03	0.05	0	0	0.2	0	0.1	0	0
Mn	Total	440	1,200	1,100	280	2,100	1,300	19	910	440	750	860	1,200	710	540	1,200	680	890	350	2,500
	SPLP	0.05	0	0		0	0.007		0.031	0	0	0	0	0.02	0	0	0	0		0
Ni	Total	20	80	87	18	53	130	150	73	39	77	46	89	45	27	85	37	70	18	120
	SPLP	0.53	0	0		0	0	0.13	0	0		0	0	0	0	0	0	0		0
Pb	Total	21	6	9	6	17	7	36	18	5	2.5	7	4	14	6	4	28	6	11	6
	SPLP	0.004						0									0			
Se	Total	0.41	0	0	0	0.9	0	0	0	6.6	1.2	3.7	0	1	0	0	0	0	0	5.1
	SPLP	0.035				0	0			0	0	0		0		0				0
Ag	Total	1	0	0	0	0	0	0.19	0	0	0	0	0.13	0	0	0	0	0	0	0
	SPLP	0.033																		
Zn	Total	67	120	70	150	190	76	91	110	70	24	180	31	110	84	200	140	79	63	130
	SPLP	2.3	0	0	0.03	0	0	0.093	0.033	0.005		0.006		1.6	0	0	0	0	0	0

Note: D's ar

Metals Reclamation Sand (7)

		Limit	36	37	38	39	40	41	42	43	44	45	46	47	48	49	50	51	52	53	54
Al	Total	6,900	3,600	4,200	4,100	5,400	4,300	2,400	2,800	2,600	3,600	2,500	5,700	5,400	6,700	2,400	3,300	5,300	4,700	5,300	6,400
	SPLP	0.05																			
As	Total	5.8	4	4	4	3.2	3.4	3	4.1	3.8	4.5	2.1	6	6	6	3.5	1.7	12	4	8	7
	SPLP	0.001																0		0.008	0.005
Ba	Total	75	68	38	76	110	71	34	55	36	30	35	50	66	34	30	56	64	29	49	49
	SPLP	2			0	0.13															
Cd	Total	1.2	0.27	0.11	0.15	0.17	0.17	0.19	0.12	0.07	0.09	0.15	0.08	0.11	0.06	0.09	0.1	4.2	0.32	2	1
	SPLP	0.0035																0.0013		0	
Cr	Total	18	130	71	230	160	170	65	180	67	39	30	95	150	36	57	70	160	20	92	75
	SPLP	0.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	Total	32	55	25	81	43	75	25	130	32	25	15	37	110	16	31	27	120	16	57	31
	SPLP	1	0		0	0	0		0	0			0	0				0		0	
Fe	Total	12,000	37,000	21,000	57,000	33,000	62,000	20,000	92,000	17,000	15,000	10,900	37,400	47,400	26,100	17,000	18,000	130,000	11,000	42,000	28,000
	SPLP	0.3	1.5	1.3	1.1	0.49	1.2	0.035	0	0.23	0.1		0	0	0	0.2	0.4	0.4		0	0.3
Mn	Total	440	1,900	860	2,500	3,200	2,000	630	1,500	630	460	330	1,000	1,400	700	390	840	1,700	470	1,100	1,100
	SPLP	0.05	0.04	0.03	0.03	0.027	0.026	0.012	0.005	0.011	0		0	0	0		0	0	0	0	0.03
Ni	Total	20	24	15	55	26	42	20	51	11	14	9	19	41	12	13	11	41	7	31	47
	SPLP	0.53	0		0	0	0	0	0					0				0		0	0
Pb	Total	21	27	12	14	15	14	12	16	10	10	20	11	14	8	14	25	29	7	11	11
	SPLP	0.004	0														0	0			
Se	Total	0.41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.5	0	0	0	0
	SPLP	0.035				0	0						0	0	0.007		0				
Ag	Total	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2.1	0	1.3	0
	SPLP	0.033																0		0	
Zn	Total	47	590	190	580	570	470	180	310	140	200	220	300	150	210	130	270	340	150	690	250
	SPLP	2.3	0.05	0.04	0.03	0.068	0.048	0.015	0.026	0.056	0	0.02	0	0	0	0.02	0.02	0	0	0	0.21

Note: 0's ar

Metals Reclamation Sand (8)

		Limit	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73
Al	Total	6,900	5,200	2,900	6,100	3,800	6,600	3,100	3,300	2,200	5,700	780	3,800	4,300	2,400	3,000	2,700	2,900	2,200	3,200	3,300
	SPLP	0.05																			
As	Total	5.8	6	2.8	13	2.6	6.7	5.6	2.6	1.5	2.3	3.2	5	6	3	3.3	3.8	4.8	2.4	3.3	3.5
	SPLP	0.001	0		0.008		0.009							0							
Ba	Total	75	47	42	63	38	51	33	46	24	98	12	58	62	39	39	54	63	36	41	27
	SPLP	2			0						0										
Cd	Total	1.2	0.55	0.27	0.07	0.07	0.09	0.51	0.07	0.05	0.12	0	0.48	0.48	0.28	0.1	0.57	0.78	0.19	0.11	0.07
	SPLP	0.0035																			
Cr	Total	18	97	52	120	57	48	58	90	37	130	210	87	70	52	40	120	160	61	62	29
	SPLP	0.12	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cu	Total	32	30	21	44	9.7	15	23	55	17	36	170	24	29	25	14	52	67	24	18	15
	SPLP	1			0				0		0	0					0	0			
Fe	Total	12,000	17,000	15,000	63,000	6,700	14,000	29,000	26,000	11,000	26,000	86,000	25,000	20,000	16,000	11,000	31,000	64,000	16,000	13,000	9,500
	SPLP	0.3	0	0.1	0		0	0.6	0		0.5	0	0	0	0.8		1.3	0.24	0.12	0	
Mn	Total	440	13,000	680	1,200	730	1,000	580	1,200	280	2,700	880	1,100	950	560	520	1,100	1,500	700	1,000	1,500
	SPLP	0.05	0	0	0	0	0	0	0	0	0.02	0	0	0	0	0.06	0	0	0	0.18	0.007
Hi	Total	20	17	59	38	5	13	15	20	10	19	67	28	18	12	7	24	36	12	9	7
	SPLP	0.53		0	0				0			0	0				0	0			
Pb	Total	21	10	12	25	9	7	17	9	10	15	10	12	18	13	13	18	16	11	14	10
	SPLP	0.004																			
Se	Total	0.41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	SPLP	0.035			0	0	0	0	0	0	0	0					0	0			
Ag	Total	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0.9	0.6
	SPLP	0.033																	0		
Zn	Total	47	190	110	170	130	420	220	110	96	330	71	220	200	260	210	330	360	180	200	120
	SPLP	2.3	0	0.02	0	0	0	0.03	0	0.02	0.04	0	0	0	0.3	0.11	0.026	0	0	0	0

Note: 0's ar

Metals Reclamation Sand (9)

		Limit	74	75	76	77	78	79	80	81	82	83	84	85	86	87	88	89	90	91	92
Al	Total	6,900	2,600	3,500	3,100	2,800	2,900	2,600	3,500	4,900	3,700	3,500	2,400	3,800	7,300	4,000	2,500	4,400	4,100	4,200	4,000
	SPLP	0.05													0.2						
As	Total	5.8	2.5	3.7	0	0	0	0	0	6	4.8	5.7	2.8	0	4	0	5	0	0	5.6	0
	SPLP	0.001								0		0									
Ba	Total	75	43	48	160	43	69	31	66	36	530	40	29	79	370	69	60	99	97	39	78
	SPLP	2			0.15						0.18			0.13	0.14			0.14	0.016		0.15
Cd	Total	1.2	0.07	0.14	0.7	0.7	0.7	0	1.3	0.1	0.2	0.09	0.06	1.6	0	0	1	0.85	0.53	0.68	1.3
	SPLP	0.0035							0					0							0
Cr	Total	18	30	76	92	97	98	29	150	53	190	260	43	160	190	110	280	130	100	50	160
	SPLP	0.12	0	0	0	0	0	0	0	0	0	0	0	0.004	0.004	0.003	0.003	0.021	0.01	0	0
Cu	Total	32	11	26	75	33	34	19	75	42	79	84	17	47	43	34	160	44	30	22	66
	SPLP	1			0	0.004	0		0	0	0	0		0	0	0	0	0.014			0.016
Fe	Total	12,000	8,500	19,000	30,000	29,000	30,000	9,600	43,000	20,000	70,000	64,000	11,000	36,000	38,000	26,000	11	28,000	21,000	25,000	45,000
	SPLP	0.3		0.25	0.33	0.53	0.41		0.63	0	2	0		0.43	0.47	0.59		0.3	0.59	0	0.23
Mn	Total	640	410	790	940	990	980	340	1,600	560	1,800	1,000	400	1,700	1,600	1,400	1,900	2,600	1,600	730	2,100
	SPLP	0.05		0.008	0.01	0.01	0.012		0.016	0	0.039	0		0.016	0.016	0.015	0.015	0.014	0.025	0	0.007
Ni	Total	20	7	13	21	33	24	8.1	36	17	51	120	8	25	28	17	78	22	19	19	34
	SPLP	0.55				0	0		0		0	0		0	0		0	0.05			0
Pb	Total	21	11	69	13	12	12	14	19	15	18	16	11	21	21	16	28	21	13	12	0
	SPLP	0.004		0														0			
Se	Total	0.41	0	0	0	0	0	0	0	0	0	0	0	1.3	1.7	0	1.1	0	0	0	0
	SPLP	0.035								0	0	0		0	0		0				
Ag	Total	1	0.5	1.2	2.1	2.1	2.2	0.7	3.2	1.5	4.3	6	0.8	2.7	2.8	2	6.7	2.3	1.8	1.8	3.5
	SPLP	0.033		0	0	0	0		0	0	0	0		0	0	0	0	0	0	0	0
Zn	Total	47	120	200	250	200	180	230	370	330	500	220	130	500	540	330	440	450	460	240	660
	SPLP	2.3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.017	0.024	0.013	0.014

Note: 0's ar

[redacted]

		Limit	93	94	95	96	97	98	99	100	101	102	103	104	105	106	Average
Al	Total	6,900	2,900	3,300	3,800	3,000	3,700	3,700	2,700	2,800	6,300	3,400	1,600	2,000	1,500	3,200	3,122
	SPLP	0.05															0.07
As	Total	5.8	6.6	0	0	0	0	0	5	0	0	0	0	0	0	0	4.3
	SPLP	0.001	0	0													0.0014
Ba	Total	75	81	82	80	52	62	94	62	75	170	93	24	30	21	68	57
	SPLP	2	0.11	0.16	0.16			0.16		0.14	0.16	0.16					0.12
Cd	Total	1.2	2.6	0.14	0.2	0.18	0	0.22	0.16	0.15	0.18	0.14	0	0	0	0	0.331
	SPLP	0.0035	0														0.000
Cr	Total	18	330	140	130	170	100	190	210	170	160	200	59	26	110	170	140
	SPLP	0.12	0	0	0	0	0	0	0	0.004	0.004	0.005	0	0.004			0.001
Cu	Total	32	150	62	68	99	68	88	180	110	53	98	62	12	75	87	89
	SPLP	1	0	0.03	0	0	0.006	0	0	0	0	0.003	0.002				0.00
Fe	Total	12,000	120,000	37,000	36,000	54,000	34,000	56,000	87,000	66,000	33,000	68,000	22,000	6,000	39,000	46,000	51,120
	SPLP	0.3	0.24	1	1.5	0.31	0.52	0.68	1.1	0.47	0.56	0.96	0.08				0.51
Mn	Total	640	1,400	1,900	2,100	1,400	1,200	1,700	1,500	1,100	3,300	1,500	510	360	580	1,800	1,259
	SPLP	0.05	0.008	0.035	0.047	0.006	0.019	0.017	0.026	0	0.019	0.033	0.025	0.014			0.011
Ni	Total	20	72	28	28	40	27	40	78	37	25	47	17	4.6	31	36	38
	SPLP	0.53	0	0.006	0.008	0.006	0	0	0.005	0	0	0					0.00
Pb	Total	21	45	63	18	25	19	26	33	23	27	24	13	7.1	15	19	18
	SPLP	0.004	0	0		0		0	0	0	0	0					0.00
Se	Total	0.41	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.68
	SPLP	0.035										0	0				0.000
Ag	Total	1	6.9	23	1.9	2.7	1.7	2.5	3.6	2.5	1.5	3.4	1.2	0.36	2.5	3	1.05
	SPLP	0.035	0	0	0	0	0	0	0	0	0	0	0				0.000
Zn	Total	47	890	420	320	540	260	720	480	470	980	640	150	140	210	450	272
	SPLP	2.3	0.015	0.035	0.035	0.008	0.01	0.018	0.028	0.01	0.011	0.025	0	0.022			0.052

Note: 0's ar

NET NATIONAL ENVIRONMENTAL TESTING, INC.®

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ANALYTICAL REPORT

Tom McComb
GRANGER CONSTRUCTION
6090 Grand Point Drive
Grand Blanc, MI 48439

11/25/1996

NET Job Number: 96.06032

cc: Bob Venegoni

Waste Characterization
SPO Site

Enclosed is the Analytical Report for the following samples submitted to the Auburn Hills Division of NET, Inc. for analysis:

Sample Number	Sample Description		Date Taken	Date Received
210508	Top Soil	10/28	10/28/1996	10/28/1996

TCLP= TESTING AS IF USED in LAND fill

PER RANDY RUBIN TOP SOIL IS FINE to BE SOLD OR USED AS LANDFILL 12/9/96

National Environmental Testing, Inc. certifies that the analytical results contained herein apply only to the specific samples analyzed. Reproduction of this analytical report is permitted only in its entirety.

Susan K. Schafer
Project Manager

ACCREDITED

NATIONAL ENVIRONMENTAL TESTING, INC.

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ANALYTICAL REPORT

Tom McComb
GRANGER CONSTRUCTION
6090 Grand Point Drive
Grand Blanc, MI 48439

11/25/1996

Job No.: 96.06032
Sample No.: 210508

cc: Bob Venegoni

Waste Characterization
SPO Site
Sample Description: Top Soil 10/28

Physical Description: brown soil

Date Taken: 10/28/1996

Date Received: 10/28/1996

Parameter	Result	Regulatory Limit	Unit	Date Prepared	Date Analyzed	Lab Tech.	Methodology	No
Cyanide, Total	<1		mg/kg		11/01/1996	day	9010 (1)	
Sulfide, Total	<2.0		mg/kg	10/29/1996	10/29/1996	gah	376.2 (3)	
Corrosivity (pH)	7.7	<2.0 or >=12.5	units		10/30/1996	gah	9040 (1)	
Ignitability (Flash Point)	>200	<140	degree F		10/31/1996	sks	1010 (1)	
Reactive Sulfide	<2.0	500	mg/kg		10/29/1996	gah	Sec 7.3.4.1 (1)	
Reactive Cyanide	<1	250	mg/kg		11/01/1996	day	Sec 7.3.3.1 (1)	

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11/25/1996

Job No.: 96.06032
Sample No.: 210508

cc: Bob Venegoni

Waste Characterization
SPO Site
Sample Description: Top Soil 10/28

Physical Description: brown soil

Date Taken: 10/28/1996

Date Received: 10/28/1996

Parameter	Result	Regulatory Limit	Unit	Date Prepared	Date Analyzed	Lab Tech.	Methodology	No
METALS - TCLP								
Arsenic	<0.20	5.0	mg/L	10/31/1996	11/11/1996	gls	6010 (1)	
Barium	0.41	100.0	mg/L	10/31/1996	11/11/1996	gls	6010A (1)	
Cadmium	<0.01	1.0	mg/L	10/31/1996	11/11/1996	gls	6010A(1)	
Chromium	<0.02	5.0	mg/L	10/31/1996	11/11/1996	gls	6010A (1)	
Copper	0.02	100.0	mg/L	10/31/1996	11/11/1996	gls	6010A (1)	
Lead	<0.05	5.0	mg/L	10/31/1996	11/11/1996	gls	6010A (1)	
Mercury	<0.0005	0.2	mg/L	10/30/1996	11/01/1996	bpj	7470A (1)	
Nickel	<0.10	--	mg/L	10/31/1996	11/11/1996	gls	6010A (1)	
Selenium	<0.50	1.0	mg/L	10/31/1996	11/11/1996	gls	6010A (1)	
Silver	<0.02	5.0	mg/L	10/31/1996	11/11/1996	gls	6010A (1)	
Zinc	0.03	500.0	mg/L	10/31/1996	11/11/1996	gls	6010A (1)	33

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ANALYTICAL REPORT

Tom McComb
GRANGER CONSTRUCTION
6090 Grand Point Drive
Grand Blanc, MI 48439

11/25/1996

Job No.: 96.06032
Sample No.: 210508

cc: Bob Venegoni

Waste Characterization
SPO Site
Sample Description: Top Soil 10/28

Physical Description: brown soil

Date Taken: 10/28/1996

Date Received: 10/28/1996

Parameter	Result	Detection Limit	Regulatory Limit	Unit	Date Prepared	Date Analyzed	Lab Tech.	Methodology	Note
VOLATILE COMPOUNDS - TCLP									
Benzene	ND	<0.20	0.5	mg/L		11/01/1996	pmc	8260 (1)	
Carbon tetrachloride	ND	<0.20	0.5	mg/L		11/01/1996	pmc	8260 (1)	
Chlorobenzene	ND	<0.20	100.0	mg/L		11/01/1996	pmc	8260 (1)	
Chloroform	ND	<0.20	6.0	mg/L		11/01/1996	pmc	8260 (1)	
1,4-Dichlorobenzene	ND	<0.20	7.5	mg/L		11/01/1996	pmc	8260 (1)	
1,2-Dichloroethane	ND	<0.20	0.5	mg/L		11/01/1996	pmc	8260 (1)	
1,1-Dichloroethene	ND	<0.20	0.7	mg/L		11/01/1996	pmc	8260 (1)	
Methyl ethyl ketone	ND	<0.20	200.0	mg/L		11/01/1996	pmc	8260 (1)	
Tetrachloroethene	ND	<0.20	0.7	mg/L		11/01/1996	pmc	8260 (1)	
Trichloroethene	ND	<0.20	0.5	mg/L		11/01/1996	pmc	8260 (1)	
Vinyl chloride	ND	<0.20	0.2	mg/L		11/01/1996	pmc	8260 (1)	

ND indicates the analyte was not detected at the detection limit (DL) specified for this sample.

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GRANGER CONSTRUCTION
6090 Grand Point Drive
Grand Blanc, MI 48439

11/25/1996

Job No.: 96.06032
Sample No.: 210508

cc: Bob Venegoni

Waste Characterization
SPO Site
Sample Description: Top Soil 10/28

Physical Description: brown soil

Date Taken: 10/28/1996

Date Received: 10/28/1996

Parameter	Result	Detection Limit	Regulatory Limit	Unit	Date Prepared	Date Analyzed	Lab Tech.	Methodology	Note
BASE NEUTRAL COMPOUNDS - TCLP					10/31/1996				
2,4-Dinitrotoluene	ND	<0.10	0.13	mg/L		11/01/1996	wad	8270 (1)	
Hexachlorobenzene	ND	<0.10	0.13	mg/L		11/01/1996	wad	8270 (1)	
Hexachlorobutadiene	ND	<0.10	0.5	mg/L		11/01/1996	wad	8270 (1)	
Hexachloroethane	ND	<0.10	3.0	mg/L		11/01/1996	wad	8270 (1)	
Nitrobenzene	ND	<0.10	2.0	mg/L		11/01/1996	wad	8270 (1)	
Pyridine	ND	<0.10	5.0	mg/L		11/01/1996	wad	8270 (1)	
ACID COMPOUNDS - TCLP					10/31/1996				
3-Cresol	ND	ND	200.0	mg/L		11/01/1996	wad	8270 (1)	3
2-Cresol	ND	<0.10	200.0	mg/L		11/01/1996	wad	8270 (1)	
4-Cresol	ND	<0.10	200.0	mg/L		11/01/1996	wad	8270 (1)	
Cresol	ND	<0.20	200.0	mg/L		11/01/1996	wad	8270 (1)	
Pentachlorophenol	ND	<0.10	100.0	mg/L		11/01/1996	wad	8270 (1)	
2,4,5-Trichlorophenol	ND	<0.10	400.0	mg/L		11/01/1996	wad	8270 (1)	
2,4,6-Trichlorophenol	ND	<0.10	2.0	mg/L		11/01/1996	wad	8270 (1)	

ND indicates the analyte was not detected at the detection limit (DL) specified for this sample.

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Grand Blanc, MI 48439

11/25/1996

Job No.: 96.06032
Sample No.: 210508

cc: Bob Venegoni

Waste Characterization
SPO Site
Sample Description: Top Soil 10/28

Physical Description: brown soil

Date Taken: 10/28/1996

Date Received: 10/28/1996

Parameter	Result	Detection Limit	Regulatory Limit	Unit	Date Prepared	Date Analyzed	Lab Tech.	Methodology	Note
PESTICIDES - TCLP					10/31/1996				
Chlordane	ND	<0.010	0.03	mg/L		11/06/1996	mmk	8080 (1)	29
Endrin	ND	<0.010	0.02	mg/L		11/06/1996	mmk	8080 (1)	
Heptachlor	ND	<0.0080	0.008	mg/L		11/06/1996	mmk	8080 (1)	
Heptachlor epoxide	ND	<0.0080	0.008	mg/L		11/06/1996	mmk	8080 (1)	
Toxaphene	ND	<0.10	0.5	mg/L		11/06/1996	mmk	8080 (1)	
Lindane	ND	<0.010	0.4	mg/L		11/06/1996	mmk	8080 (1)	
Methoxychlor	ND	<0.10	10.0	mg/L		11/06/1996	mmk	8080 (1)	
HERBICIDES - TCLP					11/05/1996				
2,4-D	ND	<0.025	10.0	mg/L		11/22/1996	mmk	8150 (1)	
2,4,5-TP	ND	<0.025	1.0	mg/L		11/22/1996	mmk	8150 (1)	

ND indicates the analyte was not detected at the detection limit (DL) specified for this sample.

ACCREDITED

NATIONAL ENVIRONMENTAL TESTING, INC.

Auburn Hills Division
1700 Harmon Road
Auburn Hills, MI 48326
Tel: (810) 391-2050
Fax: (810) 391-9698
(800) 526-4951

NOTES

1. The laboratory did not prepare a leachate. Sample contained less than 0.5% solids, therefore, a leachate would be inappropriate. Sample was filtered and analysis performed.

2. Sample did not flash but burned above the cup at _____ ^{o} F.

3. Data not available, isomers coelute.

5. Elevated detection levels were reported due to sample matrix interference.

6. Detection levels were elevated due to the high concentration of reported compounds in the sample.

7. A Practical Quantitation Limit has been established by NET and is reported as a "<", less than value. The value reported in parenthesis is the actual value which the client has requested and assumes full responsibility for reporting.

8. ND - Not detected via forward library search.

9. Analysis was subcontracted to another laboratory.

10 * The lowest possible detection limit has been reported based on current Method Detection Limit studies.

11. Not detected via manual ion screen.

20. No data available: Sample was spiked at an inappropriate level based on original sample concentration.

21. B: Probable laboratory artifact. Trace levels of this compound were found in the analytical batch.

22. H: Analysis was performed beyond the EPA recommended holding time.

23. J: Reported as an estimated value.

24. R: Samples were received at the laboratory beyond the EPA recommended holding time.

25. Matrix spike/matrix spike duplicate data is not available due to a required dilution.

26. The high laboratory control standard recovery did not affect the sample results as they were below detection limit.

27. Sample results released based on client history.

28. Sample results released based on other surrogate and QCI recoveries.

29. The high continuing calibration verification standard recovery did not affect the sample results as they were below detection limit.

30. Blank concentration is negligible in comparison to the sample result.

31. Internal Standards were beyond control criteria: Sample results were below detection limits.

32. Sample was originally analyzed within acceptable holding times. However, quality control criteria was not met. Data reflects second analysis performed.

33. QCI recoveries for this compound were beyond control criteria.

ACCREDITED

NEI®

FIELD NOTES AND OBSERVATIONS

210508

Account: Granger Const. Date: 10/28/96

Field Personnel: Rubin Observers:

Weather: Time on Site: 1 hour

Sample I.D.	Type and Description of Containment	Sampling Method	Sample Bottle	Sample Description
	Top Soil	Grab	32oz glass	Soil
	Clay Pite	Grab	32oz glass	Soil

Comments:

Chain of Custody: Relinquished By: [signature] Date: 10/28/96

Received By: [signature] Date: 10/28/96

ATC ASSOCIATES INC.
ENVIRONMENTAL, GEOTECHNICAL AND MATERIALS PROFESSIONALS

July 24, 1997

Mr. Robert S. Metcalf, P.E.
General Motors Corporation
Building 85
Mail Code #485-185-030
Flint, Michigan 48550

RE: Stockpiled Soil Sample Analysis
NAO - Flint Facility

Dear Mr. Metcalf:

ATC Associates Inc. (ATC) has attached the analytical results for three soil samples collected from an approximately 4,500 yard pile of soil located across from the main building (headquarters). The samples were collected with a hand auger into the side of the stockpile at representative locations.

Thank you for the opportunity to provide sampling services. Please me in our Flint, Michigan Office at (810)687-6321, if you have any questions regarding the sample collection or results.

Very truly yours,
ATC ASSOCIATES INC.

Keith A. Goodale
Flint Operations Manager

KAG/kg

Attachment

FECL
Fire & Environmental
Consulting Laboratories, Inc.
One East Complex 1451 East Lansing Drive, Suite 222 East Lansing, MI 48823
Phone (517) 332-0167 Fax (517) 332-6333

July 09, 1997

Attention: Mr. Keith Goodale

ATC Environmental Inc.
2113 W. Vienna Room C
Clio, MI 48420

Analytical Laboratory Report

FECL #(s): AA48453-AA48455

Project: 775.0003 General Motors
Samples collected by: P. DELISLE
Date/Time Submitted: 07/01/97 11:50
PO #: Verbal

FECL #: AA48453
Tag: SB-1
Date/Time Collected: 06/30/97 10:25
Matrix: Soil
Container(s): 3-4 oz Glass
Preservation: Refrigeration/None

FECL #: AA48454
Tag: SB-2
Date/Time Collected: 06/30/97 10:35
Matrix: Soil
Container(s): 3-4 oz Glass
Preservation: Refrigeration/None

FECL #: AA48455
Tag: SB-3
Date/Time Collected: 06/30/97 10:40
Matrix: Soil
Container(s): 3-4 oz Glass
Preservation: Refrigeration/None

FECL

4,500 cu yds Remediation Soils @ NAO Flint

Analytical Laboratory Report
ATC Environmental Inc.
July 09, 1997

FECL #: AA48453
Tag: SB-1
Date/Time Collected: 06/30/97 10:25
Matrix: Soil

Analysis	Results	Units	MDL	Method	Analyst	Date Rur
Inorganics						
Total Solids	93.1	%	1	160.3	JH	07/03/97
Metals						
Arsenic	4.47	mg/kg	0.50	6020	P R	07/07/97
Barium	30.2	mg/kg	1.0	6020	P R	07/07/97
Cadmium	Not detected	mg/kg	0.05	6020	P R	07/07/97
Chromium	15.7	mg/kg	1.0	6020	P R	07/07/97
Copper	12.2	mg/kg	1.0	6020	P R	07/07/97
Lead	20.2	mg/kg	1.0	6020	P R	07/07/97
Mercury	Not detected	mg/kg	0.10	7471	E B	07/08/97
Selenium	Not detected	mg/kg	0.50	6020	P R	07/07/97
Silver	Not detected	mg/kg	0.20	6020	P R	07/07/97
Zinc	37.0	mg/kg	1.0	6020	P R	07/07/97
Organics						
PNA Extraction	Completed				JKB	07/03/97
Polynuclear Aromatics						
Acenaphthene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Acenaphthylene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Anthracene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(a)anthracene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(a)pyrene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(b)fluoranthene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(k)fluoranthene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(ghi)perylene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Chrysene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Dibenzo(ah)anthracene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Fluoranthene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Fluorene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Indeno(1,2,3-cd)pyrene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Naphthalene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Phenanthrene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Pyrene	Not detected	mg/kg	0.33	8270	JB	07/03/97
2-Methylnaphthalene	Not detected	mg/kg	0.33	8270	JB	07/03/97

FECL

Analytical Laboratory Report
ATC Environmental Inc.
July 09, 1997

FECL #: AA48454
Tag: SB-2
Date/Time Collected: 06/30/97 10:35
Matrix: Soil

Analysis	Results	Units	MDL	Method	Analyst	Date Run
Inorganics						
Total Solids	91.8	%	1	160.3	JH	07/03/97
Metals						
Arsenic	4.05	mg/kg	0.50	6020	P R	07/07/97
Barium	33.8	mg/kg	1.0	6020	P R	07/07/97
Cadmium	Not detected	mg/kg	0.05	6020	P R	07/07/97
Chromium	9.3	mg/kg	1.0	6020	P R	07/07/97
Copper	13.9	mg/kg	1.0	6020	P R	07/07/97
Lead	31.9	mg/kg	1.0	6020	P R	07/07/97
Mercury	Not detected	mg/kg	0.10	7471	E B	07/08/97
Selenium	Not detected	mg/kg	0.50	6020	P R	07/07/97
Silver	Not detected	mg/kg	0.20	6020	P R	07/07/97
Zinc	39.4	mg/kg	1.0	6020	P R	07/07/97
Organics						
PNA Extraction	Completed				JKB	07/03/97
Polynuclear Aromatics						
Acenaphthene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Acenaphthylene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Anthracene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(a)anthracene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(a)pyrene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(b)fluoranthene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(k)fluoranthene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(ghi)perylene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Chrysene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Dibenzo(ah)anthracene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Fluoranthene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Fluorene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Indeno(1,2,3-cd)pyrene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Naphthalene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Phenanthrene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Pyrene	Not detected	mg/kg	0.33	8270	JB	07/03/97
2-Methylnaphthalene	Not detected	mg/kg	0.33	8270	JB	07/03/97

FECL

Analytical Laboratory Report
ATC Environmental Inc.
July 09, 1997

FECL #: AA48455
Tag: SB-3
Date/Time Collected: 06/30/97 10:40
Matrix: Soil

Analysis	Results	Units	MDL	Method	Analyst	Date Run
Inorganics						
Total Solids	90.9	%	1	160.3	JH	07/03/97
Metals						
Arsenic	Not detected	mg/L	0.005	200.8	P R	07/08/97
Barium	1.08	mg/L	0.01	200.8	P R	07/08/97
Cadmium	0.010	mg/L	0.001	200.8	P R	07/08/97
Chromium	0.02	mg/L	0.01	200.8	P R	07/08/97
Copper	0.03	mg/L	0.01	200.8	P R	07/08/97
Lead	0.185	mg/L	0.003	200.8	P R	07/08/97
Mercury	Not detected	mg/L	0.0002	245.1	E B	07/08/97
Selenium	Not detected	mg/L	0.005	200.8	P R	07/08/97
Silver	Not detected	mg/L	0.001	200.8	P R	07/08/97
Zinc	1.38	mg/L	0.01	200.8	P R	07/08/97
TCLP Extraction						
% Solids	100			1311	I M	07/08/97
Sample used g	100			1311	I M	07/08/97
Final Volume ml	2,000			1311	I M	07/08/97
Final Extract pH	5.08			1311	I M	07/08/97
Organics						
PNA Extraction	Completed				JKB	07/03/97
Polynuclear Aromatics						
Acenaphthene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Acenaphthylene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Anthracene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(a)anthracene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(a)pyrene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(b)fluoranthene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(k)fluoranthene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Benzo(ghi)perylene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Chrysene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Dibenzo(ah)anthracene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Fluoranthene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Fluorene	Not detected	mg/kg	0.33	8270	JB	07/03/97

FECL

Analytical Laboratory Report
ATC Environmental Inc.
July 09, 1997

FECL #: AA48455 (Continued)
Tag: SB-3
Date/Time Collected: 06/30/97 10:40
Matrix: Soil

Analysis	Results	Units	MDL	Method	Analyst	Date Run
Organics (Continued)						
Polynuclear Aromatics (Continued)						
Indeno(1,2,3-cd)pyrene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Naphthalene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Phenanthrene	Not detected	mg/kg	0.33	8270	JB	07/03/97
Pyrene	Not detected	mg/kg	0.33	8270	JB	07/03/97
2-Methylnaphthalene	Not detected	mg/kg	0.33	8270	JB	07/03/97

Note: Methods may be modified for improved performance.
Results reported on a dry weight basis, where applicable.
Results relate only to items tested.
Report shall not be reproduced except in full, without the written approval of FECL.

Violetta F. Murshak

Violetta F. Murshak
Laboratory Director

Fire & Environmental Consulting Laboratories, Inc.
One East Complex 1451 East Lansing Dr., Suite 222 East Lansing, MI 48823 (517) 332-0167 FAX (517) 332-6333
Indianapolis (317) 577-8087 FAX (317) 594-9406

CHAIN OF CUSTODY RECORD

INVOICE TO

NAME: ATC Asso. Attn: Keith Goodale
ADDRESS: 2113 W. Vienna RM Co.
CITY: Clio | STATE: MI | ZIP CODE: 48420
P.O. NO. | PHONE NO.: 810687-6321 | FAX NO.: 810 687 6935

REPORT TO

NAME: Same as Invoice
ADDRESS
CITY | STATE | ZIP CODE
PHONE NO. | FAX NO.

PROJECT NO.: 775.0003 | CLIENT: General Motors
SAMPLER (SIGNATURE): [signature] | SAMPLER - PLEASE PRINT NAME: Paul S. DeLisle
AFFILIATION: ATC Assc.

PRESERVATIVE CODE
REFRIGERATE (Y/N): Y
BOTTLE TYPE: 40z
SAMPLE TYPE: GW ☐ WW ☐ SW ☐ SOIL ☒ SLUDGE ☐ OTHER ____
CODE: A = NONE, B = HNO_3, C = H_2SO_4, D = NaOH, E = HCL, F = ____

FEC LAB. NO.	SAMPLE COLLECTION YEAR: DATE	TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	TOTAL NO. CONTAINERS	ANALYSES
48453	30Jun	1025	SB-1	3	X — Ph, PNAs, Michigan Metals
48454	↓	1035	SB-2	↓	↓
48455	↓	1040	SB-3	↓	↓

RELINQUISHED BY: SIGNATURE	DATE	TIME
[signature]	1 Jul 97	10:20
RECEIVED BY: SIGNATURE	DATE	TIME
[signature]	7-1-97	10:20
RELINQUISHED BY: SIGNATURE	DATE	TIME
RECEIVED BY: SIGNATURE	DATE	TIME

RELINQUISHED BY: SIGNATURE	DATE	TIME
RECEIVED AT FECL BY: SIGNATURE [signature]	DATE 7-1-97	TIME 1150

SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	NOTES: TEMP. ON ARRIVAL ____
SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS	4°C

Fire & Environmental Consulting Laboratories, Inc.

One East Complex 1451 East Lansing Dr., Suite 222 East Lansing, MI 48823 (517) 332-0167 FAX (517) 332-6333
Indianapolis (317) 577-8087 FAX (317) 594-9406

07/02/1997 10:31 8106876935 ATC ASSOCIATES PAGE 09

CHAIN OF CUSTODY RECORD

INVOICE TO

NAME: ATL Assc. Attn: Kim [illegible]
ADDRESS: [illegible] W. V[illegible] RM. C.
CITY: Cl[illegible] STATE: MI ZIP CODE: 4[illegible]420
P.O. NO.: PHONE NO.: [illegible] FAX NO.: [illegible]

REPORT TO

NAME: [illegible]
ADDRESS:
CITY: STATE: ZIP CODE:
PHONE NO.: FAX NO.:

PROJECT NO.: 775.0003 CLIENT: Giant Motors
SAMPLER (SIGNATURE): [illegible] SAMPLER - PLEASE PRINT NAME: [illegible] DeLisle
AFFILIATION: ATC Assc.

PRESERVATIVE CODE: A
REFRIGERATE (Y/N): Y
BOTTLE TYPE:

SAMPLE TYPE: GW ☐ WW ☐ SW ☐ SOIL ☒ SLUDGE ☐ OTHER ____

CODE: A = NONE, B = HNO_3, C = H_2SO_4, D = NaOH, E = HCL, F - ____

FEC LAB. NO.	DATE	TIME	SAMPLE TAG IDENTIFICATION-DESCRIPTION	TOTAL NO. CONTAINERS	ANALYSES
	30 Jun	10[illegible]	SB-1	3	X Pb, PNA's, Michigan Metals
	↓	[illegible]:3[illegible]	SB-2	↓	↓
	↓	104[illegible]	SB-3	↓	↓ TCLP

K[illegible] 7-1-97
last metals

RELINQUISHED BY: SIGNATURE	DATE	TIME	RELINQUISHED BY: SIGNATURE	DATE	TIME
[illegible]	7-3-97	[illegible]			
RECEIVED BY: SIGNATURE [illegible]	DATE	TIME	RECEIVED AT FECL BY: SIGNATURE	DATE	TIME
RELINQUISHED BY: SIGNATURE	DATE	TIME	SEAL NO.	SEAL INTACT YES ☐ NO ☐	INITIALS
	DATE	TIME	SEAL NO.	SEAL INTACT	INITIALS

NOTES: TEMP. ON ARRIVAL ____