CONTACT INFORMATION
Mining Records Curator
Arizona Geological Survey
1520 West Adams St.
Phoenix, AZ 85007
602-771-1601
http://www.azgs.az.gov
inquiries@azgs.az.gov

The following file is part of the

Arizona Department of Mines and Mineral Resources Mining Collection

ACCESS STATEMENT

These digitized collections are accessible for purposes of education and research. We have indicated what we know about copyright and rights of privacy, publicity, or trademark. Due to the nature of archival collections, we are not always able to identify this information. We are eager to hear from any rights owners, so that we may obtain accurate information. Upon request, we will remove material from public view while we address a rights issue.

CONSTRAINTS STATEMENT

The Arizona Geological Survey does not claim to control all rights for all materials in its collection. These rights include, but are not limited to: copyright, privacy rights, and cultural protection rights. The User hereby assumes all responsibility for obtaining any rights to use the material in excess of "fair use."

The Survey makes no intellectual property claims to the products created by individual authors in the manuscript collections, except when the author deeded those rights to the Survey or when those authors were employed by the State of Arizona and created intellectual products as a function of their official duties. The Survey does maintain property rights to the physical and digital representations of the works.

QUALITY STATEMENT

The Arizona Geological Survey is not responsible for the accuracy of the records, information, or opinions that may be contained in the files. The Survey collects, catalogs, and archives data on mineral properties regardless of its views of the veracity or accuracy of those data.

01/27/92

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES FILE DATA

PRIMARY NAME: SELF BENTONITE

ALTERNATE NAMES:

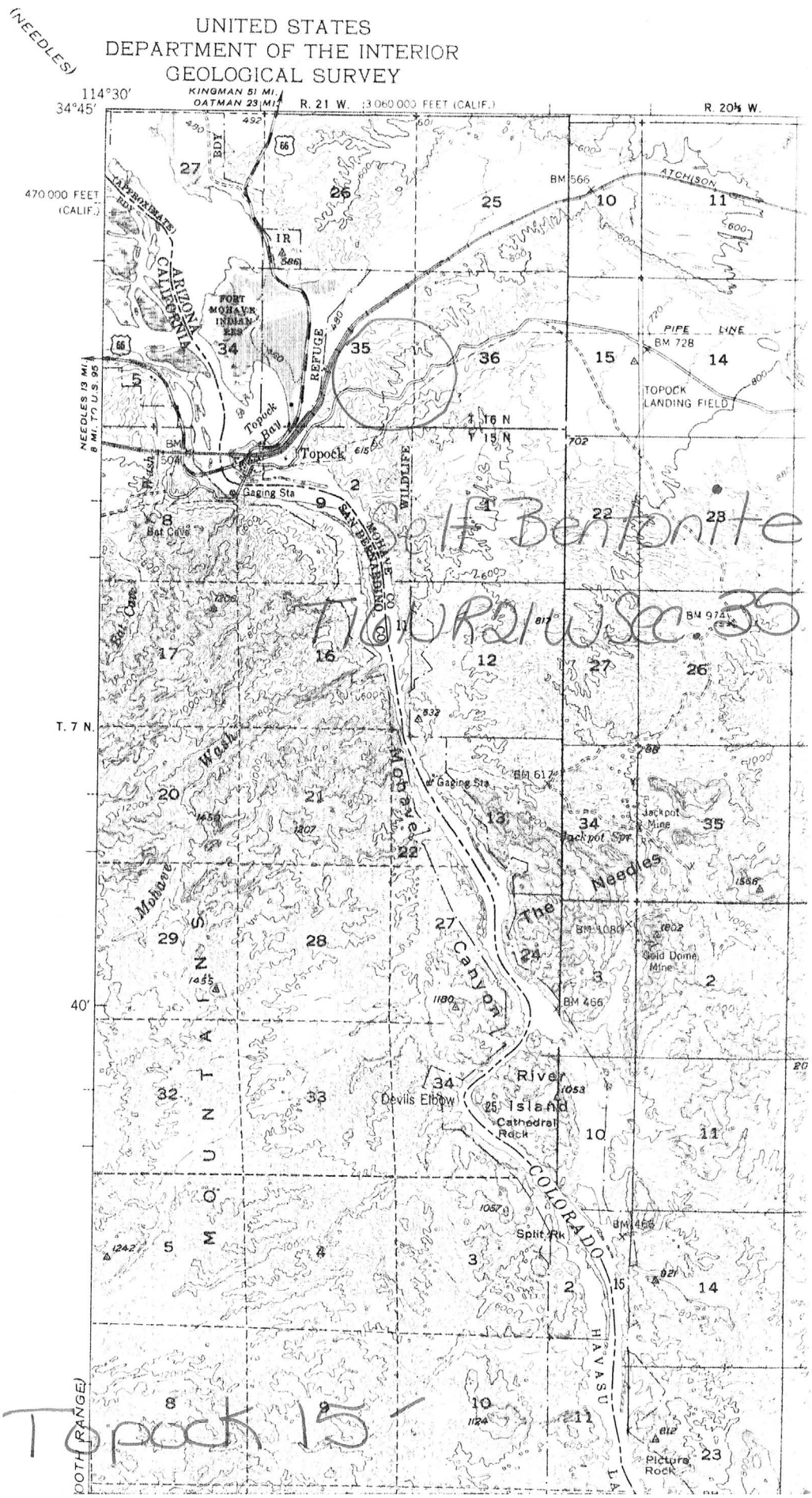
MOHAVE COUNTY MILS NUMBER: 311A

LOCATION: TOWNSHIP 16 N RANGE 21 W SECTION 35 QUARTER --
LATITUDE: N 34DEG 44MIN 35SEC LONGITUDE: W 114DEG 28MIN 03SEC
TOPO MAP NAME: TOPOCK - 7.5 MIN

CURRENT STATUS: EXP PROSPECT

COMMODITY:
CLAY BENTONITE

BIBLIOGRAPHY:
ADMMR SELF BENTONITE FILE
ALSO IN SEC. 36


UNITED STATES
DEPARTMENT OF THE INTERIOR
GEOLOGICAL SURVEY
(NEEDLES)
114°30'
34°45'
KINGMAN 51 MI.
OATMAN 23 MI.
R. 21 W.
3 060 000 FEET (CALIF.)
R. 20½ W.
470 000 FEET (CALIF.)
ARIZONA
CALIFORNIA
FORT MOHAVE INDIAN RES
REFUGE
IR
BDY
ATCHISON
PIPE LINE
BM 728
TOPOCK LANDING FIELD
T 16 N
T 15 N
NEEDLES 13 MI.
8 MI. TO U.S. 95
Topock Bay
Topock
Gaging Sta
Bat Cave
Wash
WILDLIFE
SAN BERNARDINO
MOHAVE
Mohave
Wash
Gaging Sta
Jackpot Mine
Jackpot Spr.
Needles
Gold Dome Mine
BM 466
Canyon
The
River
Island
Devils Elbow
Cathedral Rock
COLORADO
Split Rk
HAVASU
Picture Rock
T. 7 N.
40'
SAN BERNARDINO MERIDIAN)
Soft Bentonite
T16NR21WSec. 35
Topock 15'

Date Printed: 05/25/94

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

VERBAL INFORMATION SUMMARY

Information from: **Vern Eaton**

Company:

Address:
City, State ZIP: Kingman
Phone:

MINE: **Self Bentonite**

ADMMR Mine File: Self Bentonite
County: **Mohave**
AzMILS Number: **311A**

SUMMARY

Vern Eaton called to report that they and Superior Companies have suspended negotiations for an operating contract on the Self Bentonite deposit. He explained that Superior's best offer was to split the profit after all expenses were deducted from sales. The Eaton's feared that there would never be any profits under such an agreement.

Ken A. Phillips, Chief Engineer Date: May 25, 1994

Date Printed: 01/10/94

ARIZONA DEPARTMENT OF MINES AND MINERAL RESOURCES

VERBAL INFORMATION SUMMARY

Information from: **Vernon Eaton**

Company:

Address: 2731 Louise Avenue
City, State ZIP: Kingman, Arizona 86401
Phone: 602-753-6899

MINE: **Self Bentonite**

ADMMR Mine File: Self Bentonite
County: **Mohave**
AzMILS Number: **311A**

SUMMARY

Vernon Eaton, 2731 Louise Avenue, Kingman, Arizona 86401, Home phone (602) 753-6899, Work phone (602) 757-7959, called to report that his family has prospected, sampled, drilled, and tested a bentonite deposit, and begun development on the deposit near Topock.

He believes they are now in position to supply lining material for environmental mitigation uses. He went on to explain that with the help of BFI, the deposit had been tested and approved to meet ASTM Standards.

Further the Eatons report they do not have sufficient capital to start production and would like to contact some possible joint venture partners.

Ken A. Phillips, Chief Engineer Date: August 15, 1993

BLM - Yuma District - Current Projects (January 1995)

HAVASU RESOURCE AREA (AZ054)

FISCAL YEAR 94

Document Number	Project Name	Project Type	Project Location	Decision Date	Project Lead
EA-10	Beaver Mine POO	Minerals	T11N, R16W	9/95	Taylor
Remarks: On hold pending COE permits, currently operating under Notice pending COE					
CX-12	La Paz County FUPs	Minerals	T9N, R19W	2/4/94*	Taylor
Remarks:					
EA-17	Eaton Bentonite Sale	Minerals	T7N, R19W	7/95	Taylor
Remarks: On hold per applicant's request, project size now less than 5 acres.					
EA-21	Barlow Lease	Lands	T11N, R18W	9/7/94*	Montgomery
Remarks: Trespass resolution of portion of residence; AZA-24423					
CX-56	AZ Salome Pink Marble Sale	Minerals	T4N, R17W	8/95	Taylor
Remarks: Small material sale near Brenda; on hold per applicant request, will need tortoise mitigation.					
EA-58	Topock School R&PP	Lands	T16N, R21W	5/95	Montgomery
Remarks:					
EA-62	E.Cactus Plain WMP	Wilderness	T8N, R16W	9/21/94*	Bobinski
Remarks:					
CX-66	Goad Commercial Lease	Lands	T21, R21W	6/9/94*	Montgomery
Remarks: Conversion of old Reclamation lease to FLPMA AZA-28630					
EA-70	Havasu Heights Water Project	Lands	T14N, R19W	4/95	Montgomery
Remarks: Awaiting clearances for realignment of original application					
EA-73	Bullhead Post Office Withdrawal	Lands	T20N, R22W	12/29/94*	Montgomery
Remarks:					

United States Department of the Interior
BUREAU OF LAND MANAGEMENT
YUMA DISTRICT OFFICE
3150 WINSOR AVENUE
YUMA, ARIZONA 85365

TAKE PRIDE IN AMERICA

IN REPLY REFER TO:
1792 (050)

January 25, 1995

Dear Public Land User:

To help keep the public informed of activities occurring on public land in southwestern Arizona and southeastern California, the Bureau of Land Management's Yuma District is mailing a quarterly list of current projects. It is our hope that this mailing will encourage public involvement.

For more information regarding projects in the Havasu Resource Area, contact Joe Liebhauser at (602) 855-8017. For information on projects in the Yuma Resource Area or District-wide, contact Dave Curtis at (602) 726-6300.

We look forward to hearing from you.

Sincerely,

for Judith I. Reed
Yuma District Manager

I believe this legal is wrong. The Eaton Bentonite Deposit is the Self Bentonite Deposit.

Ken A. Phillips
6/12/1995

Self Bentonite (File)

KEN,

INCLOSED IS A COPY OF OUR AMC NO's OF FRANNY CLAIMS, ALSO FIRST TESTS FROM S.H.B. AGRA, INC. & FINAL REPORT & TESTS FROM S.C.S. ENGINEER'S.

THE TESTS FROM S.C.S. ALSO SHOW ADD MIXTURES WITH ON SITE LANDFILL SOILS. FOR WASTE MANAGEMENT, INC.

ANY QUESTIONS PLEASE CALL ME..

VERNON EATON
2731 LOUISE AVE
KINGMAN AZ
86401

PH 602 7536899
OR WORK 757 7959

THANKS FOR ANY HELP

Vern Eaton

8-31-93

BUREAU OF LAND MANAGEMENT

RECEIPT AND ACCOUNTING ADV

NO. 1417727 02

Subject: MINING CLAIMS (4)

MC/AZ FEB 8 98 0 12 2000

Applicant: VERNON EATON ET AL
2731 LOUISE AVE
KINGMAN AZ 86401

Remitter: MD-BAME

Assignor:

SERIAL NO.
AMC 280027 THRU 280030, XXXXXXXXX FRANNY #1 THRU #4;

REFER TO THE ABOVE CASE SERIAL NUMBER IN ALL CORRESPONDENCE. PLEASE INFORM THIS OFFICE OF ANY CHANGE IN ADDRESS.

NOTE: This notice is a receipt for monies paid the United States. If these monies are for required fees in connection with your application to lease, purchase, enter, or otherwise acquire an interest in public lands or resources, this receipt is not an authorization to utilize the land applied for and it does not convey any right, title, or interest in the land for which application is made.

RECEIPT

86401
PH. 602
753-6804

Vernon Eaton Agent

SHB AGRA, INC.
Engineering & Environmental Services
(FORMERLY SERGENT, HAUSKINS & BECKWITH)

3232 West Virginia Avenue
Phoenix, Arizona 85009
Phone: 602-272-6848
Fax: 602-272-7239

TRANSMITTAL

TO: Mr. Vernon Eaton
2731 Louise Avenue
Kingman, AZ 86401
602-753-6899 OR 757-7959

ATTN: Vernon Eaton

Date: 11-25-92
Project: Eaton Clay Deposit
Job/Proposal #: SHB Job No. LT92-3888
Transmittal #: 1
Reference: Pit Sampling

We are:	For your:	The following:
[X] transmitting	[ ] review & comment	[ ] boring logs
[ ] returning	[X] information/files	[ ] calculations
[ ] separately	[ ] approval	[ ] design charts
	[ ] signature	[ ] progress reports
	[ ] as requested	[X] laboratory results
		[ ] plans
		[ ] specifications
		[ ] other:

Copies	Date	Description

Delivery by:

[ ] Hand Delivery	[ ] Express Mail	[ ] Return Receipt Requested
[X] First Class Mail	[ ] Courier Service	
[ ] Registered Mail	[ ] Other:	

Remarks:

Copy to: Addressee (1)
File

By: James E. Weaver, P.E.

AGRA
Earth & Environmental Group

SERGENT, HAUSKINS & BECKWITH

TABULATION OF TEST RESULTS

Job No. LT2-3888

HOLE NO	DEPTH	UNIFIED CLASS	L.L.	P.I.	SIEVE ANALYSIS-ACCUM % PASSING												LAB NO
					#200	#100	#50	#40	#30	#16	#10	#8	#4	.25"	.375"	.5"	
					.75"	1"	1.5"	2"	2.5"	3"	3.5"	4"	6"	8"	10"	12"	
PIT SAMPLE	-	CH	88	69	100												2-3888-1

SERGENT, HAUSKINS & BECKWITH
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT:	EATON CLAY DEPOSIT	**JOB NO.**	LT92-3888
SAMPLE:	PIT SAMPLE	**W.O. NO.**	1
		LAB NO.	1
		DATE	11/20/92

PERMEABILITY TEST (EM1110-2-1906/SW846-9100-1986)
FLEXIBLE WALL PERMEABILITY (ASTM D5084-90)

WET DENSITY	113.7	pcf
DRY DENSITY	83.2	pcf
VOLUME	332.908	cc
INITAL MOISTURE	34.5%	
MOISTURE @ SATURATION	36.7%	

HEAD inches	PSI	Q cc	TIME sec.	K cm/sec	K ft/yr
20.00	30	0	88200	0.00E+00	0.00E+00
20.00	30	0	170100	0.00E+00	0.00E+00
20.00	48	0	79200	3.02E-11	3.13E-05
19.99	30	1	82800	1.10E-09	1.14E-03

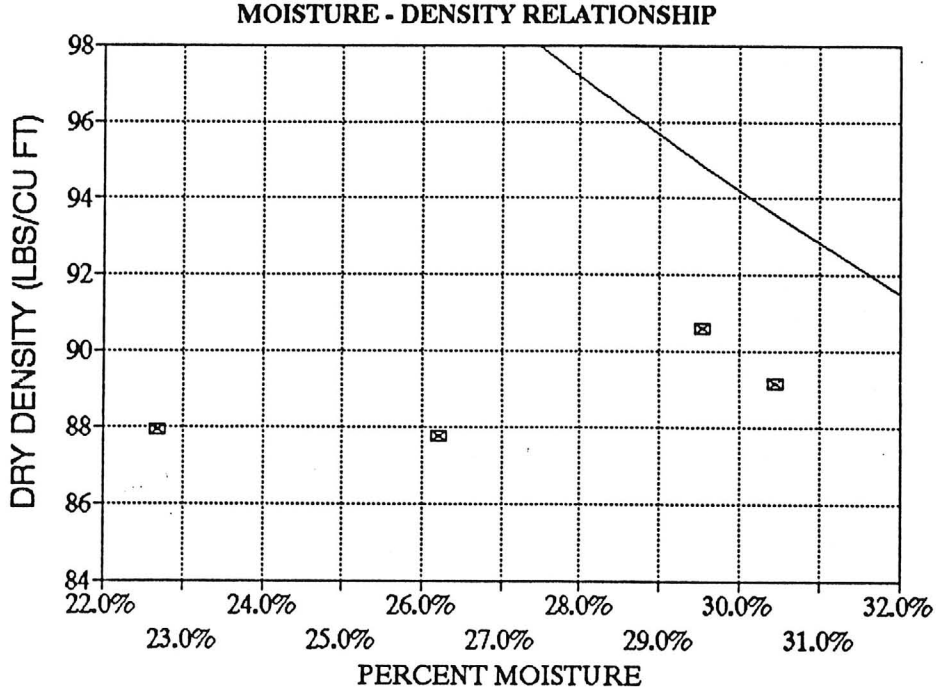
SERGENT, HAUSKINS & BECKWITH
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT:	EATON CLAY DEPOSIT	**DATE**	11/6/92
LOCATION:	SAMPLE PIT	**JOB NO.**	LT92-3888
		W.O.NO.	1
		LAB NO.	1

ASTM D698

MAXIMUM DRY DENSITY	90.8 PCF	METHOD	A
OPTIMUM MOISTURE CONTENT	29.2%	CURVE	A

MOISTURE - DENSITY RELATIONSHIP



SERGENT, HAUSKINS & BECKWITH
CONSULTING GEOTECHNICAL ENGINEERS

PROJECT	EATON CLAY DEPOSIT	**JOB No**	LT92-3888
SAMPLE	PIT SAMPLE	**W. O. No**	1
		LAB NO.	1
		DATE	11/9/92

HYDROMETER TEST REPORT (ASTM D-422)

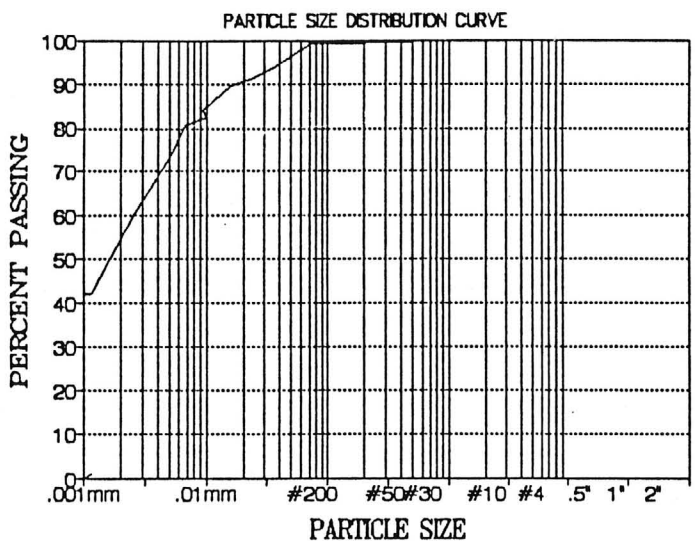
WEIGHT OF SAMPLE DISPERSED	51.62	**SPECIFIC GRAVITY OF SOLIDS**	2.908
PERCENT PASSING #10 SIEVE	100.00		

CALCULATED RESULTS

PARTICAL SIZE (DIA. mm)	0.0348	0.0248	0.0159	0.0094	0.0068	0.0050	0.0026	0.0012
PERCENT SAMPLE TESTED	93.6	91.7	89.9	84.4	80.7	73.2	60.4	42.0
PERCENT TOTAL SAMPLE	93.6	91.7	89.9	84.4	80.7	73.2	60.4	42.0

SIEVE ANALYSIS AFTER HYDROMETER ACCUMULATED % PASSING

#200	#100	#50	#40	#30	#16	#10
100	100	100	100	100	100	100



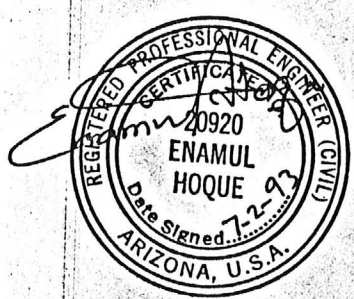
FINAL REPORT
PRE-CONSTRUCTION
BORROW SOURCE EVALUATION
SOIL LINER CONSTRUCTION
FRANCONIA TECHNOLOGIES PROJECT

Prepared for:

Waste Management of Arizona, Inc
2425 South 40th Street
Phoenix, Arizona 85034

Prepared by:

SCS ENGINEERS
2702 N. 44th Street
Suite 105B
Phoenix, Arizona 85008



July 2, 1993
File No. 10.93007

Phoenix, AZ 85008

SCS ENGINEERS

July 2, 1993
File No. 10.93007

Mr. Stephen B. Smith, P.E.
Project Manager
Waste Management of Arizona, Inc
2425 South 40th Street
Phoenix, Arizona 85034

Subject: Final Report
Pre-Construction Borrow Source Evaluation
Soil Liner Construction
Franconia Technologies Project
Franconia, Arizona

Dear Steve:

SCS Engineers (SCS) is pleased to submit four (4) copies of the final report of our evaluation of a borrow source for construction of soil liner for the subject project. This report presents background information, site surface conditions of the borrow area, a description of SCS's field work, a description of subsurface conditions encountered during the field exploration within the borrow area, the results of laboratory testings of soil samples, and our conclusions.

SCS appreciates the opportunity provided to us to work on this phase of your projects. If you have any questions, please call Enamul Hoque at (602) 840-2596.

Sincerely,

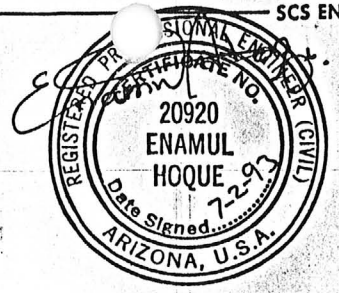
REGISTERED PROFESSIONAL ENGINEER (CIVIL) CERTIFICATE NO. 20920 ENAMUL HOQUE Date Signed 7-2-93 ARIZONA, U.S.A.

Enamul Hoque, P.E.
Senior Project Engineer

Mark Krieski, P.E.
Senior Project Manager
SCS ENGINEERS

cc: Vernon Eaton

EH/TDW:pkb
proj-2.lf\93007fin.rpt



CONTENTS

SECTION 1
INTRODUCTION

The proposed Franconia Technologies Project (FTP) will be located at Section 8 of Township 16 North and Range 19 West in Mohave County, Arizona. The FTP will consist of a landfill, a soil regeneration facility, and a recycling facility. Other ancillary features will include railroad spurs, an access roadway bridge, a paved access road from Interstate Highway I-40, an internal access road, perimeter drainage channels, and screening berms. A brief description of the Franconia Landfill (FLF) and Soil Regeneration Site (SRS) are provided below.

FRANCONIA LANDFILL

The proposed FLF will consist of approximately 111 acres of land divided into 22 cells, with a disposal capacity of 120 to 300 tons per day. The landfill bottom will be approximately 40 to 45 feet below the existing site grade; the side slopes are anticipated to be three horizontal to one vertical (3:1). The landfill containment system is proposed to consist of a double liner system, including a 24 inch thick compacted low permeability (permeability less than 1×10^{-7} cm/sec) soil liner overlain by a 60 mil thick high-density polyethylene (HDPE) geomembrane liner. At the base of the landfill, the HDPE and soil liners will be separated by a leak detection system consisting of a 12 inch thick drainage layer separated by a 12 ounce per square yard (oz/yd^2) geotextile fabric below the HDPE liner and an 8 oz/yd^2 geotextile fabric above the soil liner. Above the 60 mil HDPE liner, there will be a 12 oz/yd^2 geotextile fabric, a 12 inch thick drainage layer above the 60 mil HDPE liner, an 8 oz/yd^2 geotextile, and a 12 inch thick protective cover. The sidewall liner system will not have the 12 inch thick drainage layer as part of the leak detection and leachate collection system.

The leachate collection system will consist of 12-inch diameter HDPE sump riser pipes hydraulically connected to the leak detection layer and upper drainage layer. The leachate collection sump will be 10 feet by 10 feet with a depth of 2 feet. The landfill will have a leachate evaporation pond constructed of a composite liner system

consisting of 24 inch low permeability soil liner and a 60 mil thick HDPE geomembrane, with a leak detection system.

SOIL REGENERATION SITE

The proposed Soil Regeneration Site (SRS) will be constructed on approximately 49 acres of land divided into 12 cells, and is anticipated to be capable of processing 165 to 5,000 tons/day of solid and special wastes. The SRS will accept tree trimmings, grass clippings, food waste, and garden waste to be blended and processed with soil to produce top soil or daily, intermediate, or final cover. The containment system for the SRS will consist of a 24 inch thick compacted low permeability soil liner overlain by an 8 oz/yd^2 geotextile, a 12 inch thick drainage layer, an 8 oz/yd^2 geotextile, and a 24 inch protective cover. The drainage layer will be sloped towards a leachate collection sump lined with a 30 inch thick compacted soil liner.

SOIL LINER SOURCE

According to the results from previous site exploration, the on-site material within the proposed excavation areas consists predominantly of non-plastic, cohesionless, sandy materials. According to limited laboratory permeability tests and based on classification of this material, it is SCS's opinion that the on-site sandy material may not meet the permeability and other physical properties requirements of the proposed FLF and SRS soil liners. However, within an area close to the FTP, a portion of land (80 acres) located in Section 22 of Township 16 North and Range 20 West has been identified which may contain suitable material to construct the soil liner. The location of this site is shown in Figure 1. The 80-acre parcel of land is owned by the United States Government and administered by the Bureau of Land Management. The Eaton family has the mining claim for this land, which has been divided into four (4) segments (numbered and designated as Franny I, Franny II, Franny III, Franny IV - starting at the northeast corner in a counterclockwise direction), each segment consisting of 20 acres. One of the Eaton family members, Mr. Vernon Eaton, supplied a copy of laboratory test results indicating that the material is medium to highly plastic silty clay (CH) soil, which should meet the permeability and gradation requirements of the proposed soil liner.

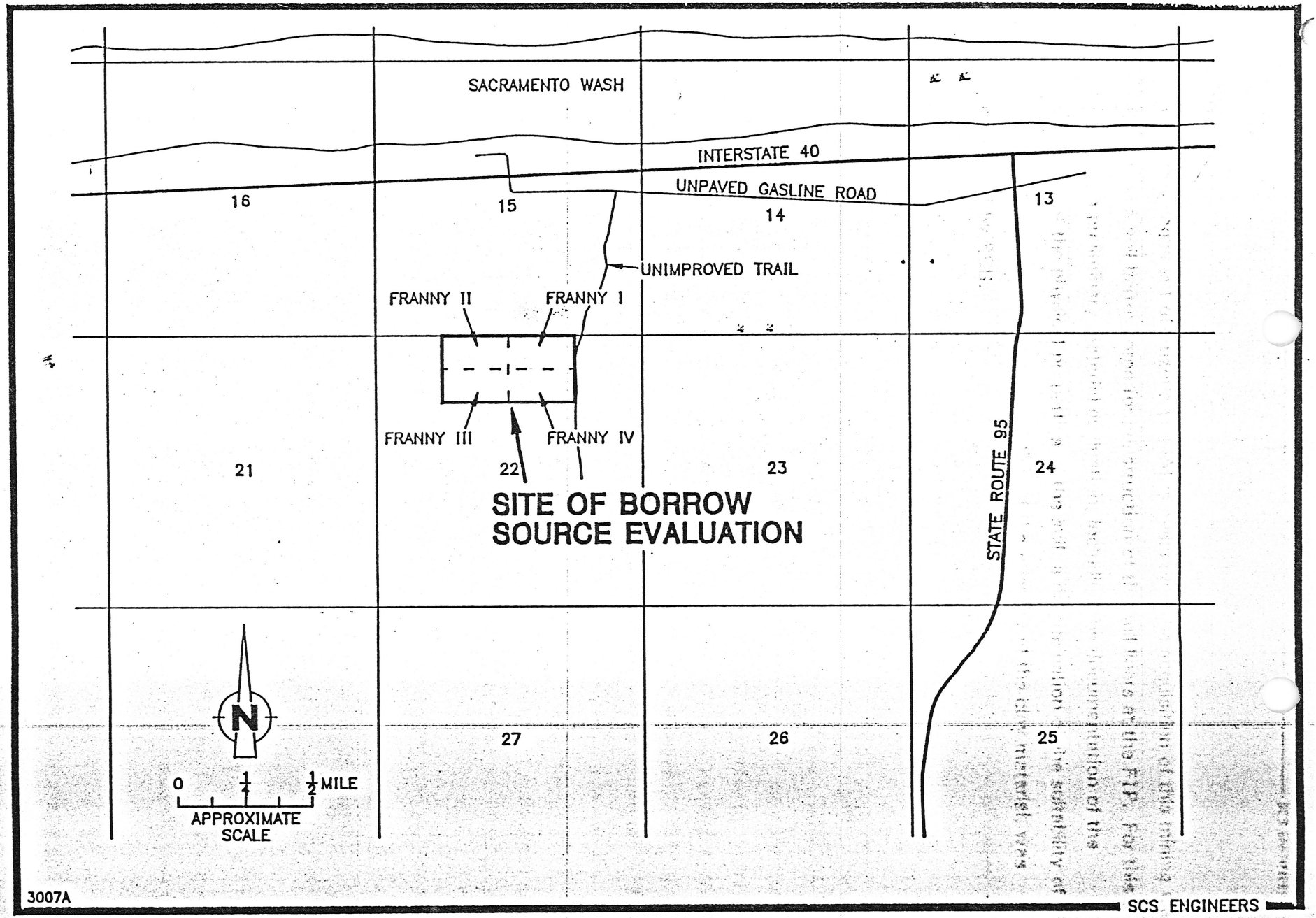


FIGURE 1. SITE LOCATION MAP

Waste Management of Arizona (WMA) is evaluating the acquisition of this mining claim for use as a soil borrow area for construction of the soil liners at the FTP. For this purpose, a preliminary material evaluation, including the documentation of the variability of the physical properties of the soil, a determination of the suitability of the soil as liner material, and an estimation of the quantity of the clay material, was performed by SCS.

SECTION 2
FIELD EXPLORATION PROGRAM

Based on the project description provided above, and our discussions with Mr. Stephen B. Smith, P.E., Project Manger WMA, SCS has completed a field exploration program in Franny II which consisted of the drilling of nine (9) test borings to maximum depths of 60 feet. Drilling was accomplished with a truck-mounted drill rig using continuous flight hollow stem augers.

Drilling was monitored and documented by a registered geotechnical engineer from SCS, who also logged the borings and supervised the collection of soil samples at approximately 5 to 10 feet vertical intervals. Sampling was limited to the collection of representative bulk samples from auger cuttings and split spoon samples by driving an 18 inch long two-inch outside diameter split barrel with a 140 pound hammer falling 30 inches. The field personnel of SCS classified the subsurface soil using the Unified Soil Classification System and recorded the number of blows (SPT blow count) required to penetrate the last 12 inches of the two-inch diameter split spoon sampler into the borehole. The purpose of split spoon sampling is to verify the type of material collected from the auger cuttings, and to obtain material properties of subsurface soils. At the end of the drilling operation, soil samples were transported to our Phoenix office where they were assigned laboratory testings. Laboratory testings included particle size analysis, Atterberg limits, Proctor compaction tests, and flexible wall permeability tests. All the drill holes were backfilled with auger cuttings after completion of the drilling operations. Drilling and field exploration at the Eaton claim site were accomplished between April 26 through 28, 1993.

On June 10, 1993, a registered engineer from SCS's Phoenix office went to the FTP site to collect surficial sandy soil samples from the FLF and SRS sites to be mixed with clay soils from the Eaton claim site for evaluation as proposed liner material. Two (2) soil samples were collected from the proposed FLF site and one (1) sample was collected from SRS site. The samples were collected by excavating a small pit using a shovel. The soil samples collected were identified as brown sand with gravel and some

fines. The samples were brought to the laboratory for performing particle size analysis, Atterberg limits tests, and to develop an optimum mix design with Eaton claim site clay in order to achieve the required physical properties of proposed soil liner material.

SECTION 3
SURFACE CONDITIONS

The surface conditions of the Eaton claim site were observed on two occasions. On April 26 through 28, during the time of the field exploration, the SCS geotechnical engineer observed the site conditions and also took photographs of the site. On June 10, 1993, the engineer visited the site with a representative of Waste Management of Arizona (WMA). Several of the site photographs taken during the field exploration are presented in Appendix A of this report.

It was observed during our field visit that the entire site of the Eaton claim consists of undisturbed desert land. The topography of the site is dominated by a series of high terraces, which are suspected to have been deposited as debris flows and fan deposits from the mountains to the south. The terraces result from downcutting by desert ephemeral washes flowing to the north. The surficial soil on the top of these terraces consists of sand and gravel with occasional varnished desert pavement. Soils within the floodplain of the washes consist predominantly of sandy soil, with occasional gravel. At several locations, especially along the northern portion and at the near vertical slopes of the terraces, the channel downcutting and erosion has exposed clay soils.

Site vegetation consists of local desert bushes of creosote, palo verde, and other native grasses and bushes. The top surfaces of the terraces have midstatured local bushes; the palo verde, creosote and other desert trees are concentrate along the washes. The density of the vegetation can be described as sparse to medium dense. The site has a general slope to the north-northwest.

SECTION 4
SUBSURFACE CONDITIONS

Subsurface conditions were explored with nine (9) test borings drilled at the site on April 26 through 28, 1993. The borings were drilled with a truck mounted CME drill rig utilizing continuous flight hollow stem augers. The borings were drilled at locations shown in the attached Boring Location Diagram (Figure 2). The locations of these borings at the site were staked by measuring distances, and estimating right angles, with respect to site features such as the quarter section marks and other permanent features. Therefore, the accuracy of these borings should be considered to the degree implied by the methods used.

The details of subsurface conditions are presented in the boring logs in Appendix B of this report. As presented in boring logs, the subsurface condition in borings B-1 and B-2 consisted of brown gravelly sand, with varying amount of fines at the ground surface, extending to depths of 10 to 13 feet. Below this sandy layer, and extending to the full depth of exploration, the soil was brown silty clay (CH) of high plasticity and hard in consistency. The clay samples were mottled brown, orange, red brown, and pale olive at depths of 20 feet and below. In Boring B-3, brown gravelly sand with varying percentage of fines which extended to the depth of terminus. Coarse-grained overburden with similar descriptions as in B-3 was encountered in boring B-5 to a depth of 9 feet, in boring B-6 to a depth of 11 feet, and in boring B-7 to a depth of 12 feet. Below the overburden in these borings, and extending to the full depth of exploration, the soil was highly plastic silty clay (CH) with very stiff to hard consistency and occasional mottling.

In Boring B-8, sandy overburden was not encountered, and the clay soil (CH) appeared at the surface and extended to the depth of terminus. At around 20 feet below ground, the material was very hard and shale-like, as evidenced by the behavior of the drilling machine. In Boring B-9, the subsurface conditions consisted of stratified soils with coarse brown sand (SP-SM) at the surface extending to a depth of 8 feet. The sand soil was underlain by a 3 feet thick silty clay (CL) layer, which was followed by a clayey sand (SC) layer of low plasticity. The clayey sand layer extended to the full depth of exploration. Ground water was not encountered in any of the borings.

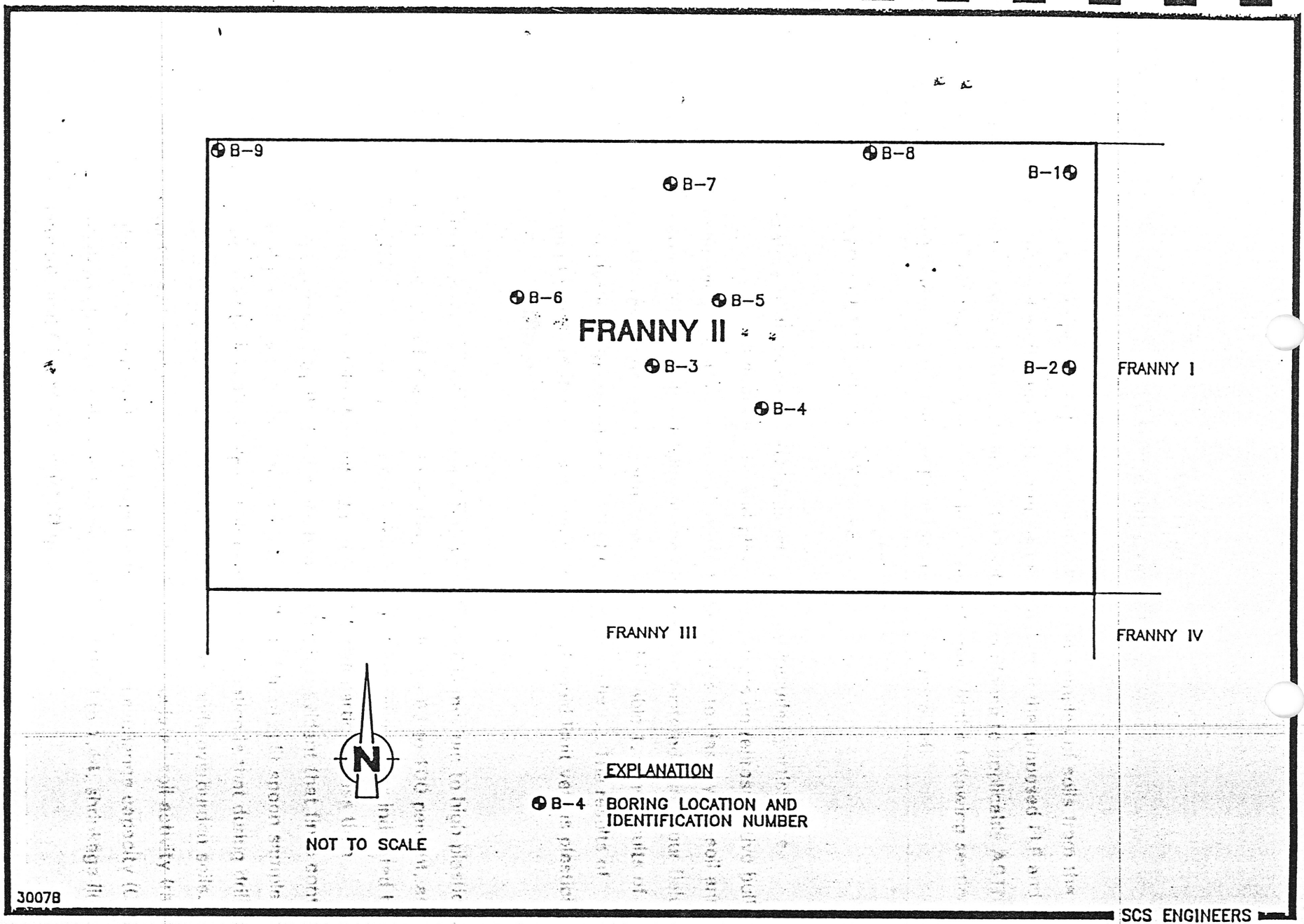


FIGURE 2. BORING LOCATION MAP (FRANNY II)

SECTION 5
LABORATORY TESTINGS

Laboratory tests were performed on bulk and split spoon samples of soils from the Eaton claim site, and on the bulk soil samples collected from the proposed FLF and SRS sites. All the laboratory testings were performed in accordance to applicable ASTM standards. The testings were performed in several phases. In the following sections, descriptions of laboratory testings and the test results are provided.

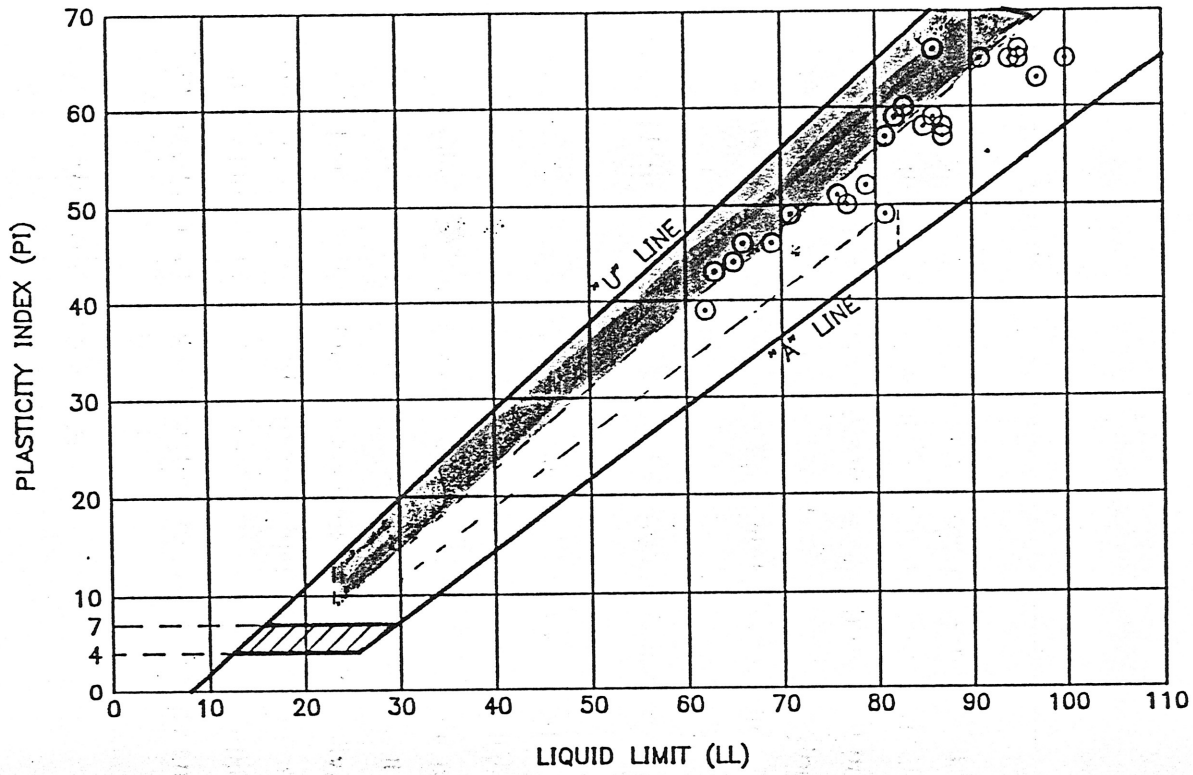
PHASE I - EATON CLAIMS SITE CLAY SOILS

Phase I laboratory testings on Eaton claims site clay soil included particle size distribution and Atterberg limits (liquid and plastic limit) tests on representative bulk and split spoon samples. The purpose of these testings was to classify the soil and record the vertical and lateral variability of the clay soil encountered during our field explorations. The results of these testings are provided in Table 1. The results of particle size analysis (hydrometer) is attached to the Appendix C. The results of Atterberg limits tests plotted on a plasticity chart (plot of liquid limit versus plasticity index) is shown in Figure 3.

As provided in the tables and on Figure 3, the on-site soil is medium to high plasticity silty clay (CH) soil. The fines content of the soil varied from 63 to 100 percent, and plasticity indices varied from 43 to 65 percent. One of the samples, as indicated by one hydrometer test, contained about 50 percent clay size particles (less than 0.002mm). As indicated by the laboratory test results, it is evident that fines content, liquid limit, and plasticity indices of soil samples collected from split spoon samples are higher than those of bulk soil samples. The possible explanation is that during drilling and sampling, the clay soil may have been mixed with the sandy overburden soils. Based on the Phase I laboratory testing results, SCS has calculated soil activity (ratio of plasticity index to clay content), shrinkage limits, and cation exchange capacity (CEC). These calculations show that the soil has an activity of 0.96 to 1.44, shrinkage limit of 11 to 18 percent, and CEC of 65 meq/100 gm.

TABLE 1 - PHASE I TEST RESULTS

Boring No.	Depth of Samples (feet)	Fines Content (%)	Atterberg Limits (%)		Unified Soil Classification Symbol
			Liquid Limit	Plasticity Index	
B1	15-25	69	62	39	CH
B1	25-35	92	76	51	CH
B1	15-16.5	93	83	60	CH
B2	10-20	87	81	57	CH
B2	18.5-20	96	81	49	CH
B4	30-40	83	63	43	CH
B4	38.5-40	97	89	59	CH
B5	12-20	83	66	46	CH
B5	20-30	92	82	59	CH
B5	30-40	89	71	49	CH
B5	40-41.5	84	87	57	CH
B5	50-51.5	89	100	65	CH
B5	58.5-60	93	85	58	CH
B6	13-20	81	69	46	CH
B6	20-30	93	91	65	CH
B6	30-40	86	86	59	CH
B6	30-31.5	90	95	66	CH
B6	50-51.5	96	95	65	CH
B7	13-20	79	86	66	CH
B7	18.5-20	93	94	65	CH
B8	5-15	84	77	50	CH
B8	30-45	89	79	52	CH
B8	45-60	94	87	58	CH
B8	40-41.5	92	65	44	CH
B8	58.5-60	92	97	63	CH



3007C

SCS ENGINEERS

FIGURE 3. PLASTICITY CHART

SCS did not perform any mineralogical analysis. However, indirect correlation of soils index properties such as specific gravity, Atterberg limits, activity of the clay fraction, and cation exchange capacity indicate that the predominant minerals of the Eaton claims site clay is montmorillonite. If required to confirm the mineral type, SCS recommends that a mineralogical analysis using X-ray diffraction or differential thermal analysis (DTA) should be performed.

PHASE II - EATON CLAIMS SITE CLAY SOILS

Fines content, Atterberg limits, standard Proctor compaction tests, and flexible wall hydraulic conductivity tests were included in the Phase II testings. Each of these testings were performed on five soil samples (A through E) prepared by mixing equal amounts (by weight) of clay soil sampled from different borings at different depths. Table 2 contains the results of these tests and the constituents of the samples. The hydraulic conductivity tests were performed on remolded soil samples compacted to the density and molding water content shown in Table 2.

As presented in Table 2, the clayey soil meets the permeability requirements of the project soil liner specifications. The liquid limit and plasticity indices of this clay exceed the requirement of the specifications. Based on our previous experience, it is SCS's opinion that the high plasticity of the clay material will cause some difficulty in processing and compaction during construction. Additionally, the high shrink-swell characteristics of these soils make them vulnerable to desiccation cracks and swell-related increases in void ratio, and hence affect the performance adversely. Therefore, the clay soil may be used as an admixture to on-site sandy soil.

PHASE III - FLF AND SRS SITE SOILS

Phase III laboratory soil testings included particle size analysis, Atterberg limits, and sand equivalent tests on sandy soil collected from the FLF and SRS sites, and on composite soil samples prepared by mixing equal proportions of the samples collected from the FLF and SRS sites. The purpose of these testings was to classify the soils, and record the variability of soil properties. The results are summarized in Table 3.

TABLE 2 - PHASE II LABORATORY TEST RESULTS

Sample No.	Fines Content	Atterberg Limits		Unified Soil Classification	Proctor Compaction Test Results		Initial Dry Density (pcf)	Initial Moisture Content (%)	Coefficient of Permeability 1×10^{-8} cm/sec
		Liquid Limit	Plasticity Index		Maximum Dry Density (pcf)	Optimum Moisture Content (%)			
A	80	73	49	CH	102.4	21.5	94.2	25.5	0.[illegible]
							97.3	19.5	2.1
B	88	80	51	CH	98.9	20.7	98.9	18.7	1.7
							93.9	22.7	1.5
C	81	73	46	CH	100.5	21.7	95.5	24.7	0.24
D	-	81	51	CH	97.7	24.7	97.7	21.7	0.32
E	-	83	57	CH	95.5	25.7	97.4	23.7	0.32

NOTE: Sample A consisted of soil samples from borings B-1 (15^1-25^1), B-2 (10^1-20^1) and B-5 (13^1-20^1)
Sample B consisted of soil samples from borings B-1 (25-35), B-4 (20-30) and B-5 (20-30)
Sample C consisted of soil samples from borings B-6 (12^1-20^1), B-8 (5^1-15^1) and B-7 (12^1-20^1)
Sample D consisted of soil samples from borings B-6 (20^1-30^1), B-8 (15^1-30^1)
Sample E consisted of soil samples from borings B-6 (40^1-50^1), B-8 (30^1-45^1)

TABLE 3 - PHASE III LABORATORY TEST RESULTS

Sample No.	Sample Location	USCS Classification	Fines Content (%)	Atterberg Limits		
				Liquid Limit	Plasticity Indices	Sand Equivalent
1	Franconia Landfill	SP-SM	6.6	NP	NP	-
2	Franconia Landfill	SP-SM	5.6	-	NP	-
3	SRS Site	SP-SM	9.4	-	MP	-
4	Combination of sample 1, 2, and 3	SP-SM	6.8	-	NP	65

TABLE 4 - RESULTS OF LABORATORY TESTINGS ON TRIAL MIX DESIGN (PHASE IV)

Sample No.	Fines Content (%)	Atterberg Limits		Sand Equivalent (SE)	Compaction Test Results		Initial		Permeability ($x10^{-8}$ x cm/sec)
		Liquid Limit	Plasticity Indices		Maximum Dry Density (pcf)	Optimum Moisture Content (%)	Dry Density (pcf)	Moisture Content (%)	
MD-1	64	63	45	8	109	17.6	103	15.6	1.2
MD-2	47	55	38	12	114	15.6	108	13.5	12.0
MD-3	37	43	29	13	115	14.8	109	12.8	17.0
MD-4	30	33	17	14	118	13.7	112	11.7	800

PHASE IV - BORROW SOURCE AND DEVELOPMENT SITE SOIL MIXES

Phase IV laboratory testing consisted of preparing trial mixes of Eaton claims site clay with FTP site sandy soils to obtain an optimum mix which meets the requirements of landfill and SRS soil liner specifications. Before the mix, all the samples of Eaton claim site clay were mixed together and tested. Following are the tests and results of the Eaton claim site clay mix:

- Fines content 86%
- Liquid limit 71%
- Plasticity index 49%

Four trial mixes were then fabricated as described below.

- sample MD-1 consisted of 30 percent (by weight) of FTP site sandy soil and 70 percent (by weight) of Eaton claim site clay,
- sample MD-2 consisted of 45 percent (by weight) of FTP site sandy soil and 55 percent (by weight) of Eaton claim site day,
- sample MD-3 consisted of 60 percent (by weight) of FTP site sandy material and 40 percent of Eaton claim site clay, and
- Sample MD-4 consisted of 70 percent (by weight) of FTP site sandy material and 30 percent (by weight) of Eaton claims site clay.

After thorough mixing, samples MD-1, MD-2, MD-3, and M-D were subjected to fines content, Atterberg limits, sand equivalent, standard Proctor compaction, and flexible wall permeability tests. The hydraulic conductivity tests were performed on remolded soil samples compacted to a density corresponding to 95 percent of its standard Proctor dry density with a molding moisture content two points below optimum moisture content. Table 4 presents the results of these tests.

The correlations between sand content versus liquid limit, sand content versus plasticity index, sand content versus sand equivalents, and sand content versus permeability, are presented graphically in Figures 4 through 7, respectively. The purpose of these plots is obtain an optimum trial mix which will meet the design requirements of the soil liner; to use the index properties such as fines content, liquid limit, plasticity index, and sand equivalent to verify the consistency of field mixing; and to use these as indicator tests during the construction of the soil liner.

The results of the laboratory testings on trial mixes of FTP site sandy soil and Eaton claim site clay soil slightly below optimum indicate conformance to the hydraulic conductivity and other physical property requirements of the proposed soil liner, as indicated by Eaton claim site clay mixed with 35 to 45 percent of FTP site sandy soil compacted to about 95% of its standard Proctor maximum density.

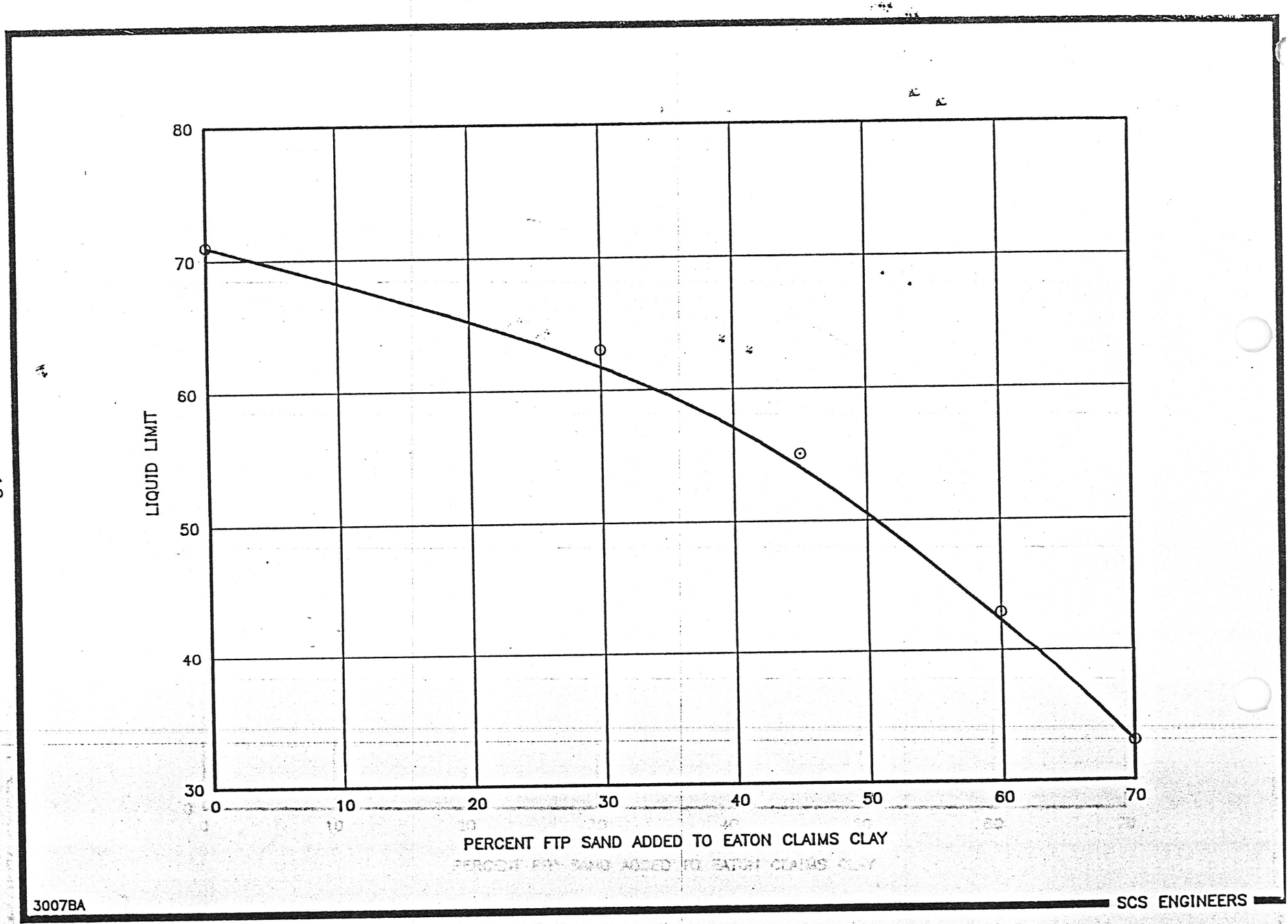


FIGURE 4. LIQUID LIMIT VERSUS PERCENT MIX OF FTP SITE SAND WITH EATON CLAIMS CLAY

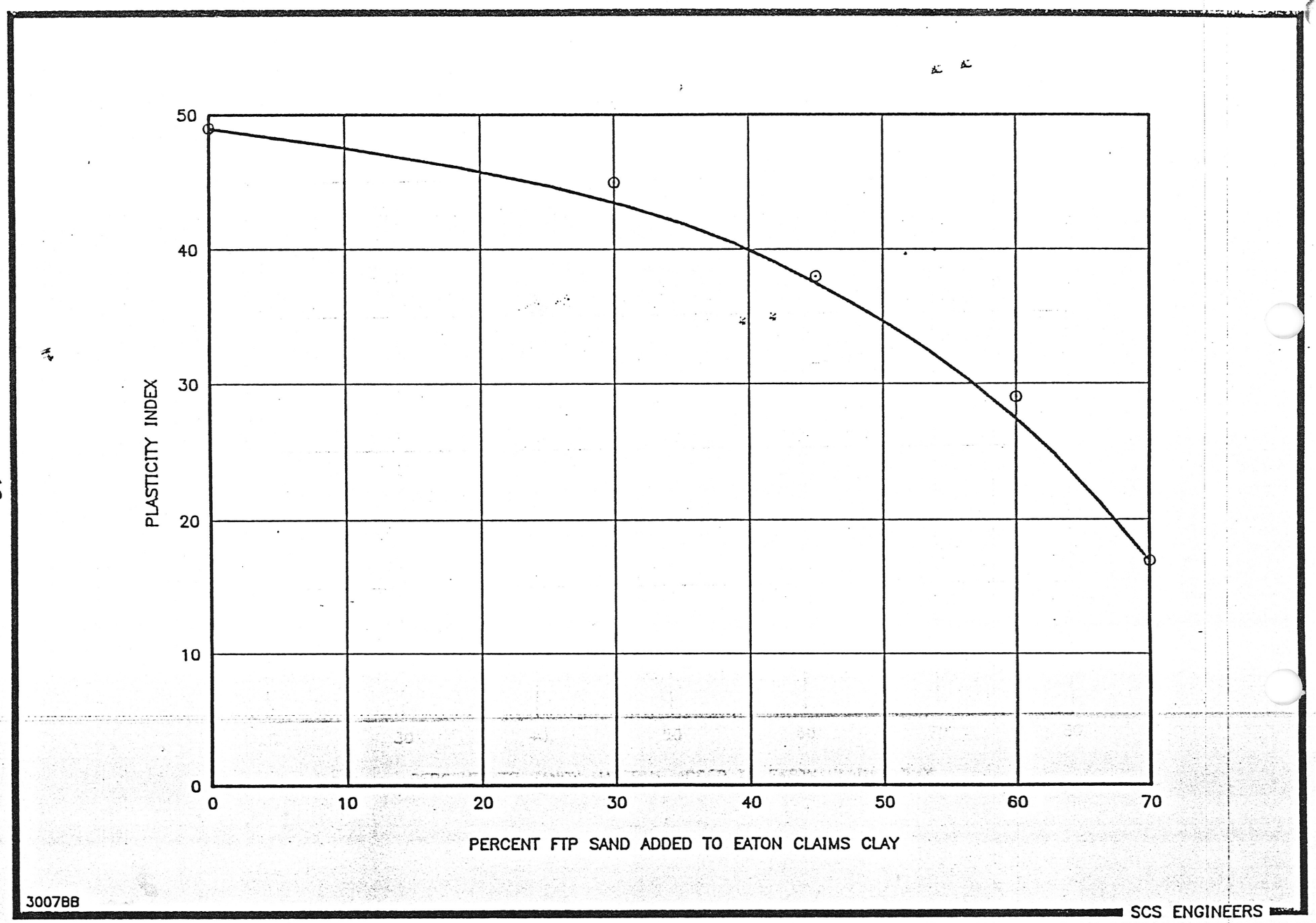
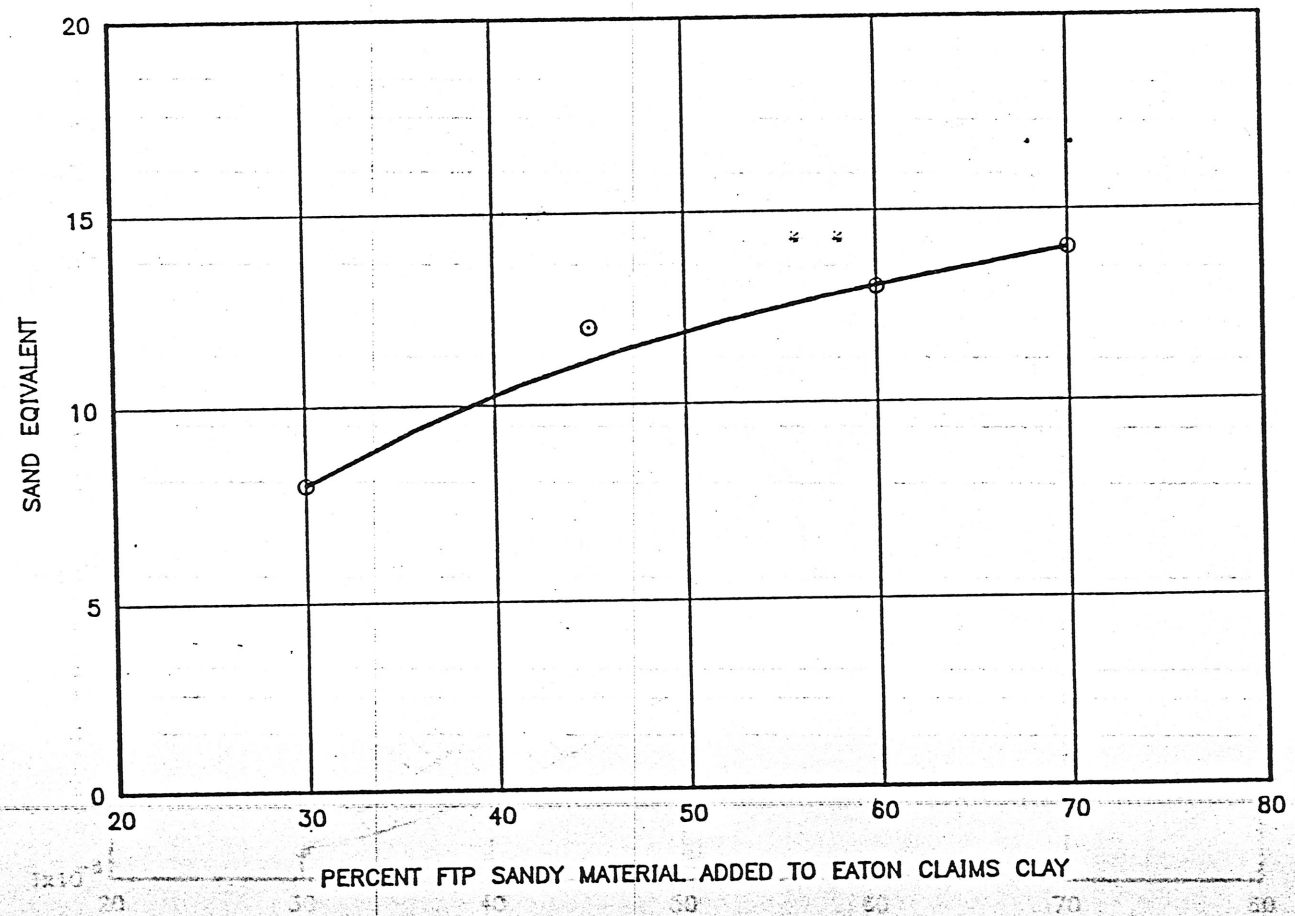


FIGURE 5. PLASTICITY INDEX VERSUS PERCENT MIX OF FTP SITE SAND WITH EATON CLAIMS CLAY



3007BC

SCS ENGINEERS

FIGURE 6. SAND EQUIVALENT VERSUS PERCENT MIX OF FTP SITE SAND WITH EATON CLAIMS CLAY

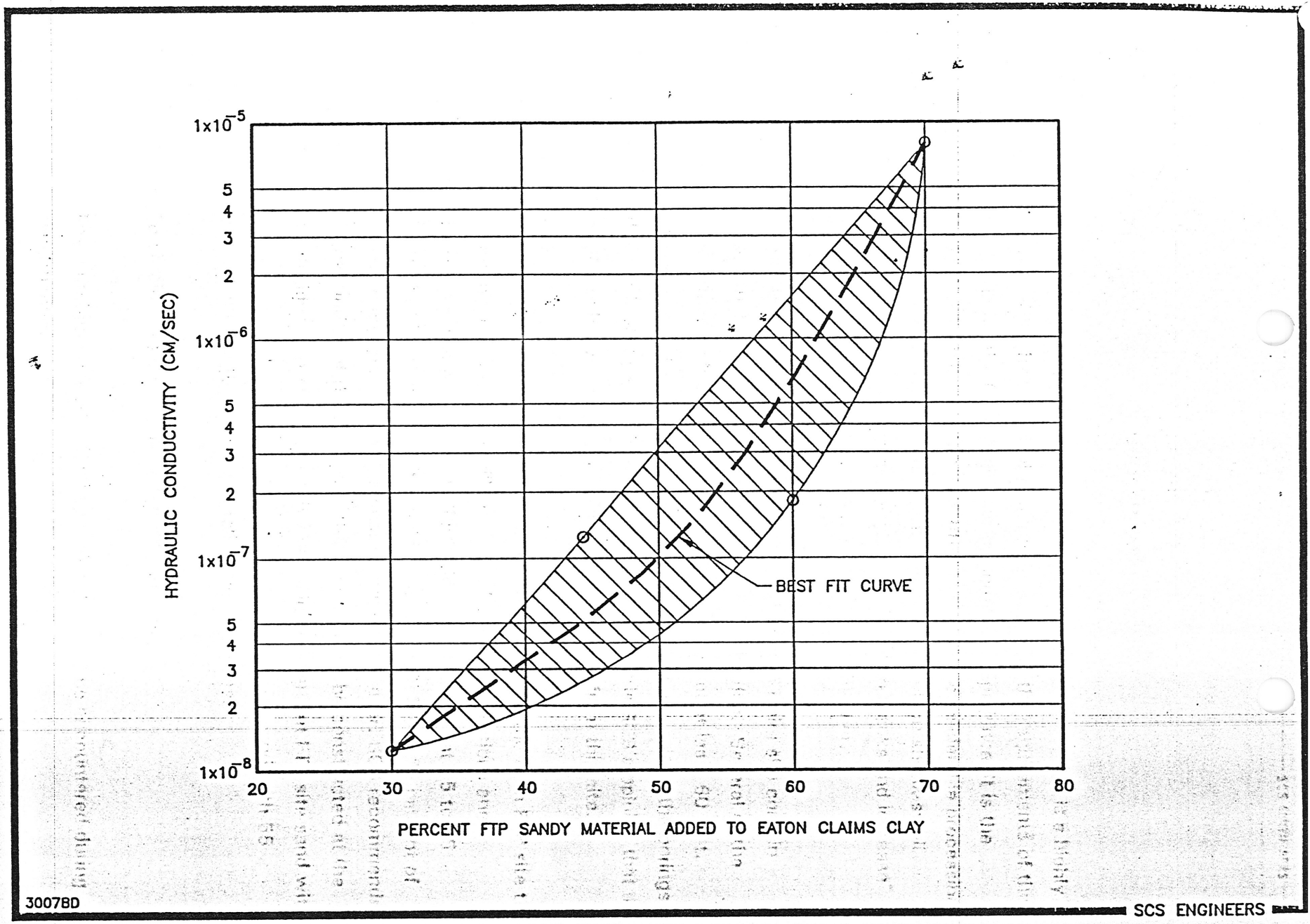


FIGURE 7. HYDRAULIC CONDUCTIVITY VERSUS PERCENT MIX OF FTP SITE SAND WITH EATON CLAIMS CLAY

SECTION 6
CONCLUSION

The field and laboratory testings indicate that the Eaton claim site clay soil is a highly plastic silty clay (CH) which has physical properties exceeding the requirements of the soil liners specifications for the FTP. Based on our previous experience, it is the opinion of SCS that during the construction with this material, considerable processing and compaction difficulties will be encountered. Moreover, the high shrink-swell properties of this material also make it vulnerable to desiccation cracks and increase adversely in void ratio, which may affect the performance of the liner.

The northern and northeastern portion of Franny II of the Eaton claim site contain significant clay deposits beneath 0 to 12 feet of sandy overburden. Several of the borings indicate that the clay is expected to extend to a depth of at least 60 feet. Based on our interpretation of the subsurface lithology encountered within the borings, and assuming the depth of the clay deposits exceed 60 feet, it is SCS's opinion that a minimum of 500,000 cubic yards of clay soils can be obtained from this site.

The Eaton claim site clay soil should be mixed with sandy material the from FTP site to achieve an optimum mix design which will meet the design specifications and regulatory requirements. The preliminary trial mix design indicates that 35 to 45 percent (by weight) of FTP site sandy soil should be mixed with 55 to 65 percent of Eaton claim site clay to achieve the desired liner material. However, SCS recommends that before the construction of the liner, two test liners should be constructed at the site with two mix designs (preferably one mix containing 40 percent FTP site sand with 60 percent Eaton claim site clay and one with 45 percent FTP site sand with 55 percent Eaton claim site clay) to achieve the following objectives:

- To obtain data on actual field mix conditions,
- To control and correlate field variables that may be encountered during construction,

- To correlate construction factors such as type of equipment, energy imparted during compaction, and moisture conditioning requirements,
- Perform field percolation tests (using double ring, Boutwell two-stage borehole device or any other suitable method) and correlate the field permeability with laboratory permeability,
- Observe the affect of environmental exposure to the soil liner,
- Observe the affect of presence of oversize particle (2 inches or larger) on permeability and develop protocol to remove these oversized particles,
- Correlate the field density testings using sand-cone device and nuclear gauge, and
- To familiarize the field personnel with the consistency of the mix design and the use of index tests as indicators of clay content and other physical properties.

SCS would like to mention that conclusions in this report are based on our interpretation of the lithologic conditions encountered within the sparsely spaced borings. The materials encountered within these borings are from an area which is insignificant or negligible compared to the area for which this interpretation was made. Therefore, there is a possibility that the material in between the borings may be significantly different than those which were encountered at the boring locations. SCS does not provide any warranty for such unanticipated conditions.

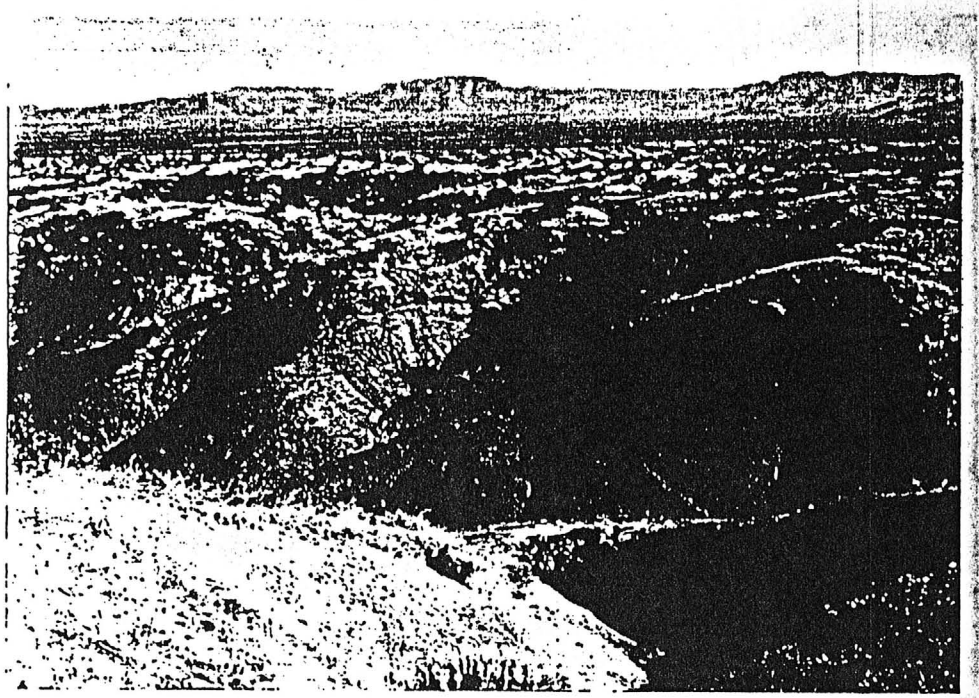
Moreover, during the progress of this project work, such as at the time of field exploration, laboratory testing, and preparation of this report, SCS has used ordinary care and standard procedures as normally used by any other reputable consultant working in this general area. Therefore, the warranties should only be considered to the extent to standards that are accepted by the profession within the area of practice. No other warranties are assumed by SCS nor by its legal representatives.

APPENDICES

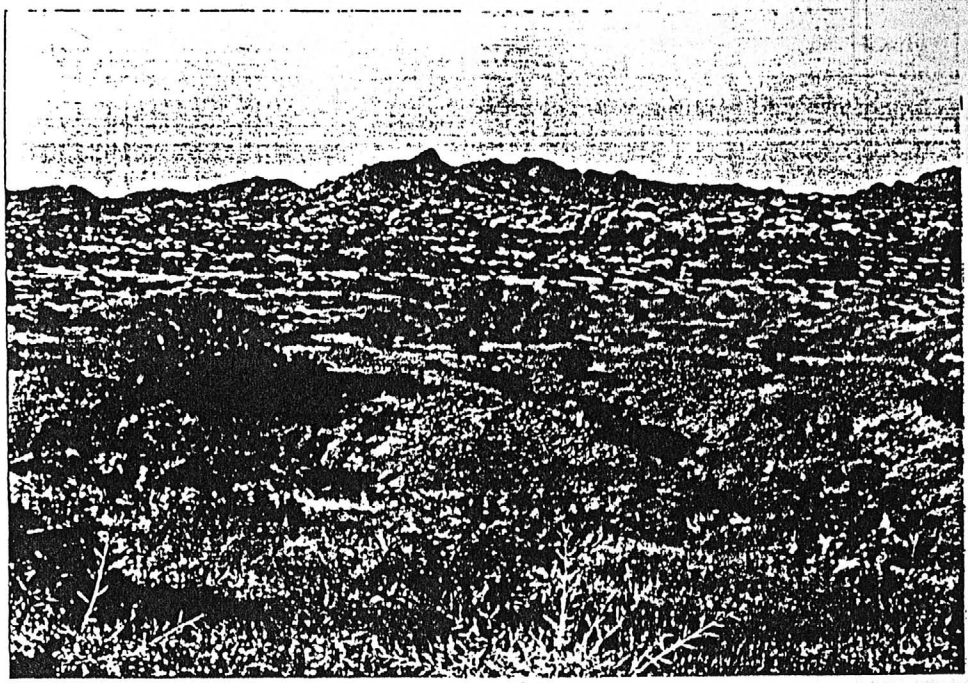
APPENDIX A

SITE PHOTOGRAPHS

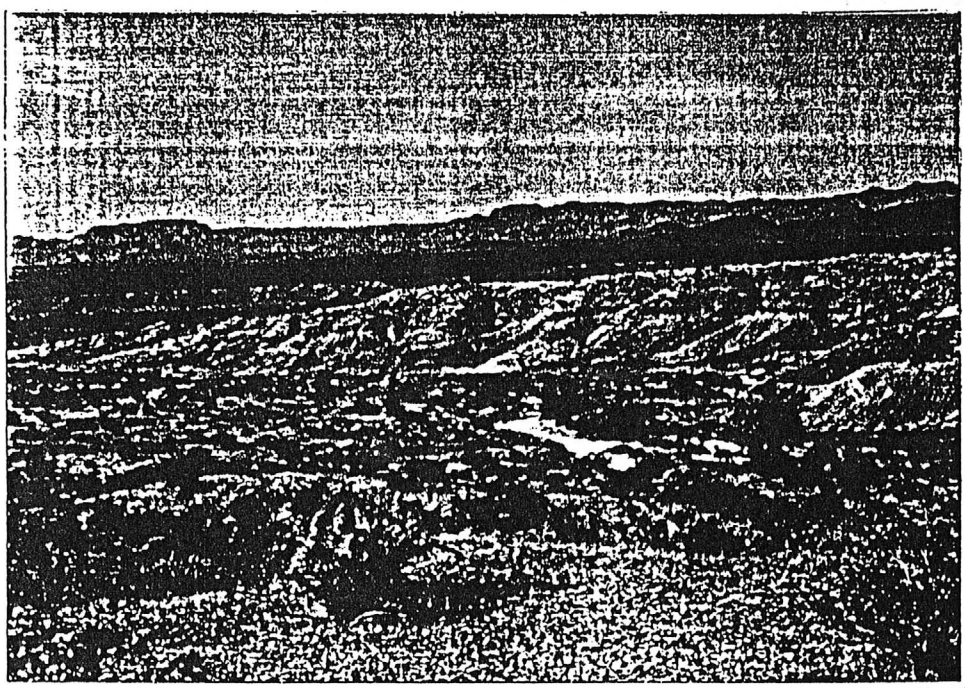
Looking east along the northern portion of Franny II.



Looking north-northeast on exposed clay surface at Franny II.



Looking south from the center of Franny II.



Looking east-northeast along the northern portion of Franny II.

APPENDIX B

BORING LOGS

Project Name: Francania Technologies Project		Log of Boring No: B-1	Page 1 of 1
Logged/Checked by: EH		WL Datum: None	
Date: 04/27/93		Datum Elev:	
Depth of Boring Below GS: 35'		WL Below Datum	
Drilling Equipment: CME 55		ATD/Time:	
Surface Elevation (MSL):		Static/Date:	

Depth (Ft)	Geologic Log	Blow Count	Interval	Sample Number	PID/OVA	USCS Symbol	Material Description	Comments
5						SC	Brown gravelly Sand, with clay, damp	
10		65	SS				increasing clay	
15		78	SS			CH	Brown silty Clay, hard, highly plastic, moist	
20				Bulk				
25								
30				Bulk				
35		84/11"	SS				Stopped at 35' No ground-water encountered Borehole backfilled with auger cuttings	
40								
45								
50								

Note: SS stands for split spoon sample

3007AA

SCS ENGINEERS

Project Name: Franconia Technologie ...oject	Log of Boring No: B-2	Page 1 of 1
Logged/Checked by: EH	WL Datum: None	
Date: 04/27/93	Datum Elev:	
Depth of Boring Below GS: 20'	WL Below Datum	
Drilling Equipment: CME 55	ATD/Time:	
Surface Elevation (MSL):	Static/Date:	

Depth (Ft)	Geologic Log	Blow Count	Interval	Sample Number	PID/OVA	USCS Symbol	Material Description	Comments
						SM	Brown Sand with gravel, some fines, damp	
						SP	Brown Sand, some gravel, trace fines	
5							gravelly	
10		42	SS	Bulk		CH	Brown silty Clay, hard, medium to high plasticity, moist	
15								
20		42	SS				Mottled orange, red, brown, and pale olive	
							Stopped at 20' No ground-water encountered Borehole backfilled with auger cuttings	
25								
30								
35								
40								
45								
50								

Note: SS stands for split spoon sample

SCS ENGINEERS

3007A8

Project Name: Franconia Technolo... Project	Log of Boring No: B-3	Page 1 of 1
Logged/Checked by: EH	WL Datum: None	
Date: 04/27/93	Datum Elev:	
Depth of Boring Below GS: 16.5'	WL Below Datum	
Drilling Equipment: CME 55	ATD/Time:	
Surface Elevation (MSL):	Static/Date:	

Depth (Ft)	Geologic Log	Blow Count	Interval	Sample Number	PID/OVA	USCS Symbol	Material Description	Comments
0						SP-SM	Brown gravelly Sand, some fines, damp	
5							decreasing gravel, increasing fines, damp	
10		42	SS			SM	Brown Sand, some fines, moist	
15		63	SS					
20							Stopped at 16.5' No ground-water encountered Borehole backfilled with auger cuttings	
25								
30								
35								
40								
45								
50								

Note: SS stands for split spoon sample

3007AC

SCS ENGINEERS

Project Name: Franconia Technologies Pr[illegible]t	Log of Boring No: B-4	Page 1 of 1
Logged/Checked by: EH	WL Datum: None	
Date: 04/27/93	Datum Elev:	
Depth of Boring Below GS: 40'	WL Below Datum	
Drilling Equipment: CME 55	ATD/Time:	
Surface Elevation (MSL):	Static/Date:	

Depth (Ft)	Geologic Log	Blow Count	Interval	Sample Number	PID/OVA	USCS Symbol	Material Description	Comments
						SP	Brown Sand with gravel, trace fines, damp	
							decreasing gravel, damp	
5						SM	Yellow brown silty Sand, some fines, moist	
10								
15						SP	Brown gravelly Sand, trace fines	
20						CH	Brown silty Clay, hard, high plasticity, moist	
25			SS	Bulk				
30		60	SS				mottled brown, red, orange, and pale olive, moist	Slow drilling
35				Bulk				
40		57	SS				Stopped at 40' No ground-water encountered Borehole backfilled with auger cuttings	
45								
50								

Note: SS stands for split spoon sample

SCS ENGINEERS

SCS ENGINEERS

3007A0

Project Name: Franconia Technologies Pro.	Log of Boring No: B-5	Page 1 of 2
Logged/Checked by: EH	WL Datum: None	
Date: 04/27/93	Datum Elev:	
Depth of Boring Below GS: 60'	WL Below Datum	
Drilling Equipment: CME 55	ATD/Time:	
Surface Elevation (MSL):	Static/Date:	

Depth (Ft)	Geologic Log	Blow Count	Interval	Sample Number	PID/OVA	USCS Symbol	Material Description	Comments
						SP	Brown gravelly Sand, trace fines, damp	
							decreasing gravel	
5						SC-SM	Yellowish brown Sand, some silt and clay, moist	
10		24	SS			CL-CH	Brown, sandy Clay, some gravel	
				Bulk		CH	Brown silty Clay, hard, highly plastic, moist	
15								
20		52	SS				mottled orange, yellow, and pale olive	
				Bulk				
25								
30		64	SS				mottled orange, yellow, pale olive, and brown	Slow drilling
				Bulk				
35								
40		78	SS					
				Bulk				
45								
50								
55								
60								

Note: SS stands for split spoon sample

Project Name: Franconia Technologies Project	Log of Boring No: B-5	Page 2 of 2
Logged/Checked by: EH	WL Datum: None	
Date: 04/27/93	Datum Elev:	
Depth of Boring Below GS: 60'	WL Below Datum	
Drilling Equipment: CME 55	ATD/Time:	
Surface Elevation (MSL):	Static/Date:	

Depth (Ft)	Geologic Log	Blow Count	Interval	Sample Number	PID/OVA	USCS Symbol	Material Description	Comments
55		60 / 11"	SS	Bulk			mottled brown, orange, yellow, and pale olive	
60		33	SS				Stopped at 60' No ground-water encountered Borehole backfilled with auger cuttings	
65								
70								
75								
80								
85								
90								
95								
100								

Note: SS stands for split spoon sample

SCS ENGINEERS

3007AF

Project Name: Francania Technologi[illegible]roject	Log of Boring No: B-6	Page 1 of 2
Logged/Checked by: EH	WL Datum: None	
Date: 04/27/93	Datum Elev:	
Depth of Boring Below GS: 60'	WL Below Datum	
Drilling Equipment: CME 55	ATD/Time:	
Surface Elevation (MSL):	Static/Date:	

Depth (Ft)	Geologic Log	Blow Count	Interval	Sample Number	PID/OVA	USCS Symbol	Material Description	Comments
						SP	Brown Sand, gravel, some fines, damp	
							decreasing gravel, increasing fines, moist	
						SM	Brown with yellow hue Sand with fnes, trace gravel, moist	
10		70	SS					
						CH	Brown, silty Clay, hard, highly plastic, moist	
15				Bulk				
20								
25				Bulk				
30		60	SS				mottled pale olive, orange, reddish brown, dark brown	
35				Bulk				
40								
45				Bulk				
50								

Note: SS stands for split spoon sample

SCS ENGINEERS

3007AG

Project Name: Franconia Technologies Pro	Log of Boring No: B-5	Page 2 of 2
Logged/Checked by: EH	WL Datum: None	
Date: 04/27/93	Datum Elev:	
Depth of Boring Below GS: 60'	WL Below Datum	
Drilling Equipment: CME 55	ATD/Time:	
Surface Elevation (MSL):	Static/Date:	

Depth (Ft)	Geologic Log	Blow Count	Interval	Sample Number	PID/OVA	USCS Symbol	Material Description	Comments
55		50	SS	Bulk			mottled brown, orange, and pale olive	
60		30	SS				Stopped at 60' No ground-water encountered Borehole backfilled with auger cuttings	

Note: SS stands for split spoon sample

SCS ENGINEERS

3007AH

Project Name: Francania Technologies P[illegible]t	Log of Boring No: B-7	Page 1 of 1
Logged/Checked by: EH	WL Datum: None	
Date: 04/28/93	Datum Elev:	
Depth of Boring Below GS: 20'	WL Below Datum	
Drilling Equipment: CME 55	ATD/Time:	
Surface Elevation (MSL):	Static/Date:	

Depth (Ft)	Geologic Log	Blow Count	Interval	Sample Number	PID/OVA	USCS Symbol	Material Description	Comments
0						SP-SC	Gravelly Sand, some fines, decreasing gravel, damp	
5						SM	Brown Sand, some silt, moist	
10		86	SS			SP-SC	Gravelly Sand, some fine, damp	
15				Bulk		CH	Brown silty Clay, hard, highly plastic, moist	
20		67	SS				mottled orange, yellow, brown, and pale olive	
25							Stopped at 20' No ground-water encountered Borehole backfilled with auger cuttings	
30								
35								
40								
45								
50								

Note: SS stands for split spoon sample

SCS ENGINEERS

3007A1

Project Name: Franconia Technologies Pr	Log of Boring No: B-3	Page 1 of 1
Logged/Checked by: EH	WL Datum: None	
Date: 04/28/93	Datum Elev:	
Depth of Boring Below GS: 60'	WL Below Datum	
Drilling Equipment: CME 55	ATD/Time:	
Surface Elevation (MSL):	Static/Date:	

Depth (Ft)	Geologic Log	Blow Count	Interval	Sample Number	PID/OVA	USCS Symbol	Material Description	Comments
						SC	Clayey Sand, some gravel	
						CH	Brown silty Clay (decomposed shale), damp to moist	
5								
				Bulk				
10							auger cuttings contained .25" to .75" size shale fragments (consistency fell between decomposed shale and very hard clay)	
15								
20		50/5"	SS	Bulk			mottled, brown, pale olive, and orange, damp	
25								
30								
35				Bulk				
40		55	SS				mottled, pale olive, brown, and orange, moist	
45								
				Bulk				
50								

Note: SS stands for split spoon sample

SCS ENGINEERS

3007AJ

Project Name: Franconia Technologies Pr	Log of Boring No: B-8	Page 2 of 2
Logged/Checked by: EH	WL Datum: None	
Date: 04/28/93	Datum Elev:	
Depth of Boring Below GS: 60'	WL Below Datum	
Drilling Equipment: CME 55	ATD/Time:	
Surface Elevation (MSL):	Static/Date:	

Depth (Ft)	Geologic Log	Blow Count	Interval	Sample Number	PID/OVA	USCS Symbol	Material Description	Comments
55				Bulk				
		60	SS				mottled pale olive, brown, and orange, moist	
60							Stopped at 60' No ground-water encountered Borehole backfilled with auger cuttings	
65								
70								
75								
80								
85								
90								
95								
100								

Note: SS stands for split spoon sample

SCS ENGINEERS

3007AK

Project Name: Franconia Technologies Proi	Log of Boring No: B-9	Page 1 of 1
Logged/Checked by: EH	WL Datum: None	
Date: 04/28/93	Datum Elev:	
Depth of Boring Below GS: 20'	WL Below Datum	
Drilling Equipment: CME 55	ATD/Time:	
Surface Elevation (MSL):	Static/Date:	

Depth (Ft)	Geologic Log	Blow Count	Interval	Sample Number	PID/OVA	USCS Symbol	Material Description	Comments
0						SP	Coarse brown Sand, trace fines, damp	
5							gravelly, moist	
		42	SS			CL	Brown silty Clay, moist	
10								
						SC	Clayey Sand, some gravel, moist	
15				Bulk				
		51	SS					
20							Stopped at 20' No ground-water encountered Borehole backfilled with auger cuttings	
25								
30								
35								
40								
45								
50								

Note: SS stands for split spoon sample

SCS ENGINEERS

3007AL

40

APPENDIX C

LABORATORY DATA SHEETS

Project No.: 93-0582

Date: 24-Jun-93

By: E. Hoque/
SCS Engr.

PHASE I - LABORATORY TEST DATA

Plasticity Index
39
51
50
57
49
43
59
46
59
49
67
66
68
46
66
59
66
65
60
65
60
62
68
44
63

LABORATORY TEST RESULTS

Project: Franconia Technologies Project **Project No:** 93-0592

Source: As Noted Below **Date:** 24-Jun-93

Material: **Sampled By:** E. Hoque/ SCS Eng.

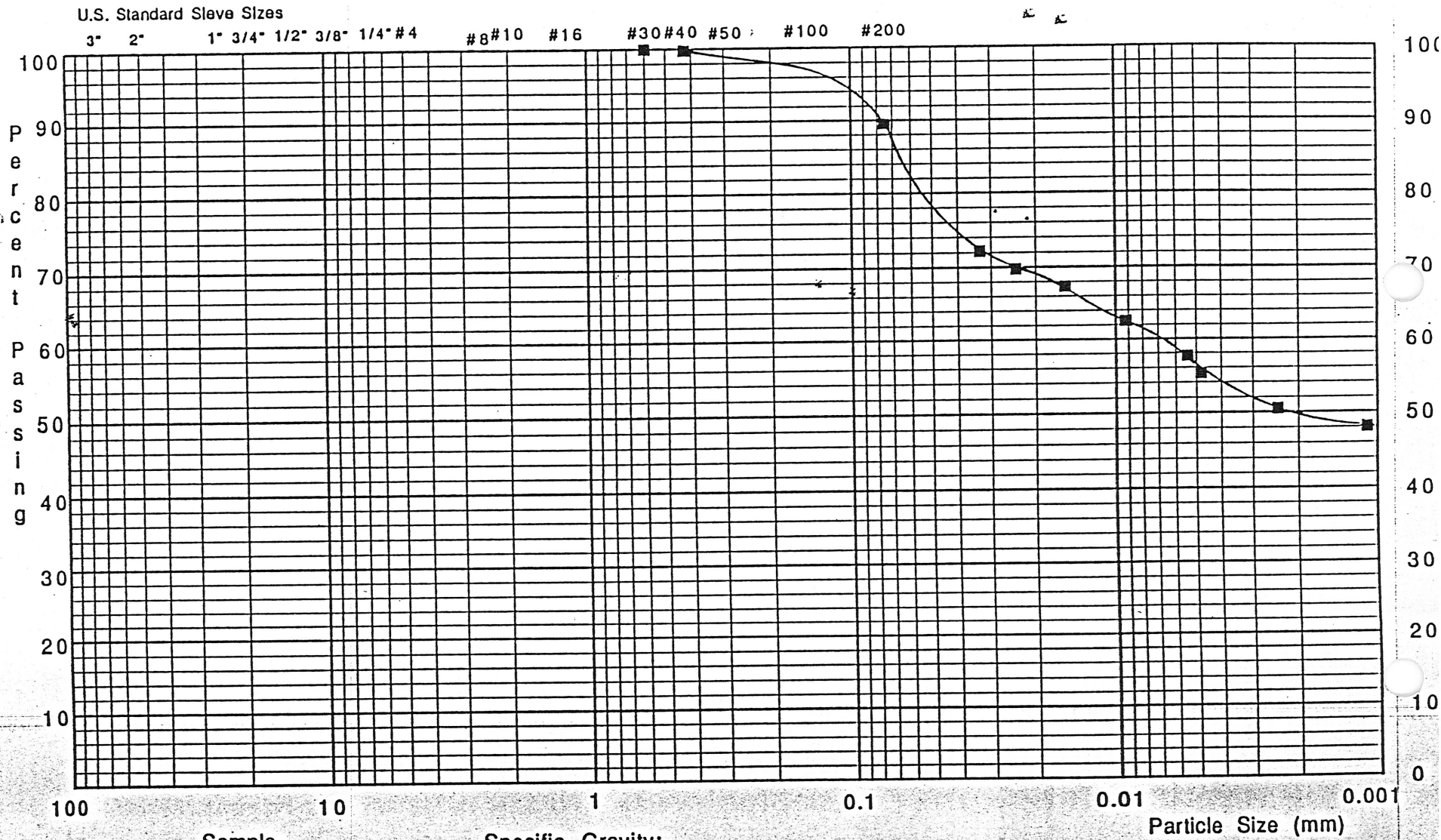
TEST METHOD: ASTM D1140, D4318

Sample Source	Percent Minus #200	Liquid Limit	Plasticity Index
B1 @ 15'-25'	69	62	39
B1 @ 25'-35'	92	76	51
B1 @ 15'-16.5'	93	83	50
B2 @ 10'-20'	87	81	57
B2 @ 18.5'-20'	96	81	49
B4 @ 30'-40'	83	63	43
B4 @ 38.5'-40'	97	89	59
B5 @ 12'-20'	83	66	46
B5 @ 20'-30'	92	82	59
B5 @ 30'-40'	89	71	49
B5 @ 40'-41.5'	84	87	57
B5 @ 50'-51.5'	89	100	65
B5 @ 58.5'-60'	93	85	58
B6 @ 13'-20'	81	69	46
B6 @ 20'-30'	93	91	65
B6 @ 30'-40'	86	86	59
B6 @ 30'-31.5'	90	95	66
B6 @ 50'-51.5'	96	95	65
B7 @ 13'-20'	79	86	66
B7 @ 18.5'-20'	93	94	65
B8 @ 5'-15'	84	77	50
B8 @ 30'-45'	89	79	52
B8 @ 45'-60'	94	87	58
B8 @ 40'-41.5'	92	65	44
B8 @ 58.5'-60'	92	97	63

Remarks:

Thomas-Hartig and Associates, Inc.

Particle Distribution Curve



Sample
B 5 @ 40'-41.5'

Specific Gravity:
2.76

Thomas-Hartig & Associates
Project No. 93-0592

Project No: 93-0592

Date: 24-Jun-93

Submitted By: E. Hoque/
SCS Eng.

PHASE II - LABORATORY TEST DATA

Plasticity Index
49
51
46
51
57

LABORATORY TEST RESULTS

Date: 17-May-93

Project: Franconia Technologies Project **Project No:** 93-0592

Source: As Noted Below **Date:** 24-Jun-93

Material: **Sampled By:** E. Hoque/ SCS Eng.

TEST METHOD: ASTM D1140, D4318

Sample Source	Percent Minus #200	Liquid Limit	Plasticity Index
Composite "A": B1 @ 15'-25', B2 @ 10'-20' & B5 @ 12'-20'	80	73	49
Composite "B": B1 @ 25'-35', B4 @ 20'-30' & B5 @ 20'-30'	88	80	51
Composite "C": B6 @ 12'-20', B7 @ 12'-20' & B8 @ 5'-15'	81	73	46
Composite "D": B6 @ 20'-30' & B8 @ 15'-30'	----	81	51
Composite "E": B6 @ 40'-50' & B8 @ 30'-45'	----	83	57

Remarks:

Thomas-Hartig and Associates, Inc.

46

MAXIMUM DENSITY-OPTIMUM MOISTURE

(ASTM D698, METHOD A)

SAMPLE:

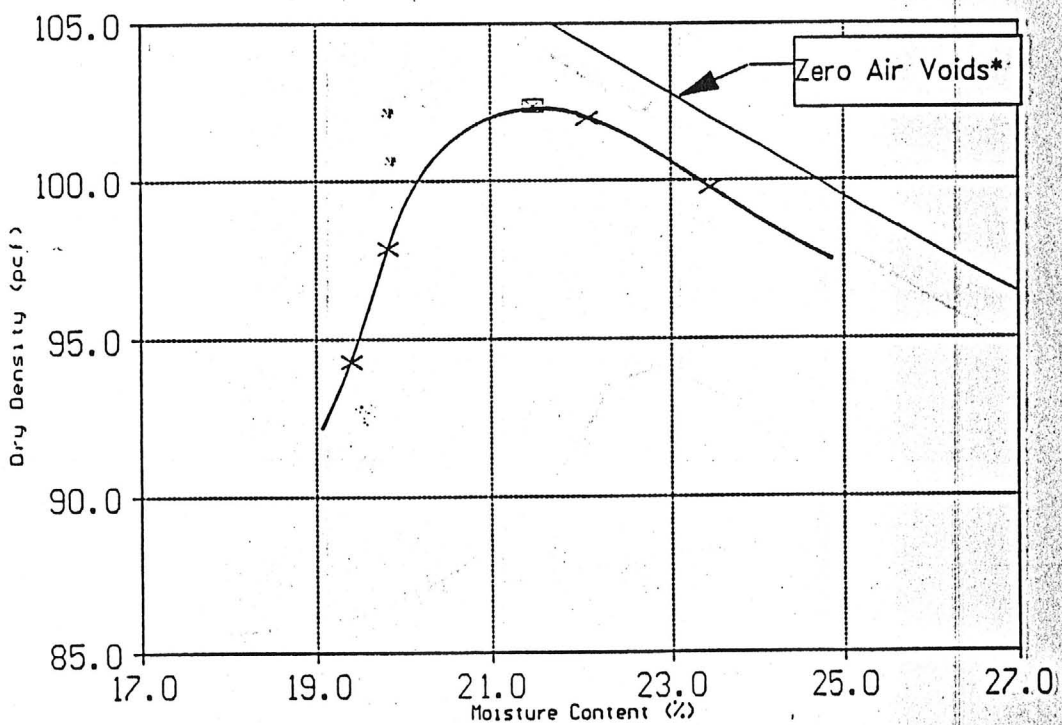
Date: 17-May-93

Source: Composite A: B1 @ 15'-25'; B2 @ 10'-20'; B5 @ 12'-20''
Type: Bulk
Material: Clay (CH)
Sampled By: SCS Engineers/ E. Hoque

RESULTS:

Maximum Dry Density (pcf) = 102.4

Optimum Moisture Content (%) = 21.5



* Assumed Gs = 2.65

Project No.: 93-0592

Thomas-Hartig and Associates, Inc.

4.7

MAXIMUM DENSITY-OPTIMUM MOISTURE
(ASTM D698, METHOD A)

SAMPLE:

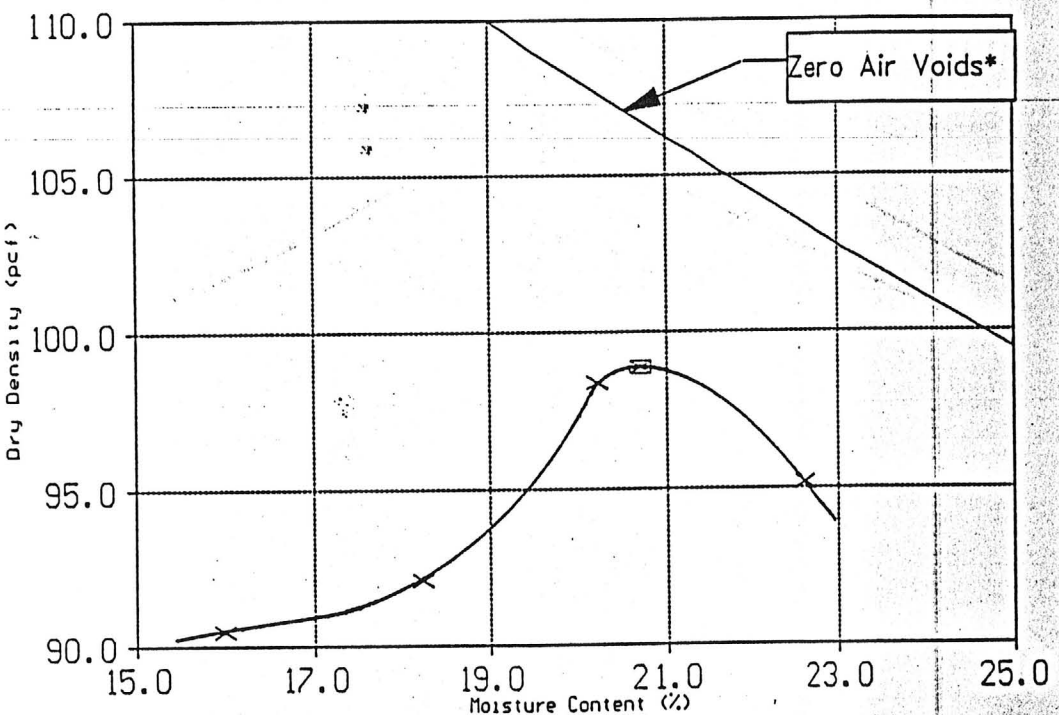
Date: 12-May-93

Source: Composite B: B1 @ 25'-35'; B4 @ 20'-30'; B5 @ 20'-30'
Type: Bulk
Material: Clay (CH)
Sampled By: SCS Engineers/ E. Hoque

RESULTS:

Maximum Dry Density (pcf) = 98.9

Optimum Moisture Content (%) = 20.7



* Assumed Gs = 2.65

Project No.: 93-0592

Thomas-Hartig and Associates, Inc.

48

MAXI M DENSITY-OPTIMUM MOISTU
(ASTM D698, METHOD A)

SAMPLE:

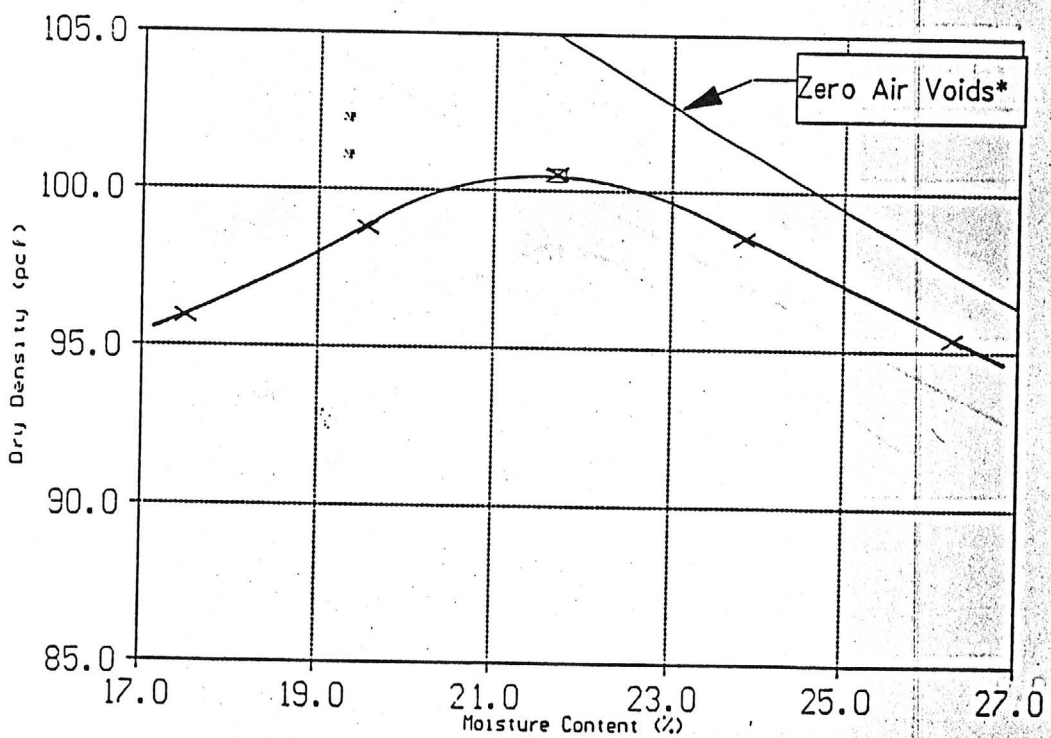
Date: 17-May-93

Source: Composite C: B6 @ 12'-20'; B7 @ 12'-20'; B8 @ 5'-15'
Type: Bulk
Material: Clay (CH)
Sampled By: SCS Engineers/ E. Hoque

RESULTS:

Maximum Dry Density (pcf) = 100.5

Optimum Moisture Content (%) = 21.7



* Assumed Gs = 2.65

Project No.: 93-0592

Thomas-Hartig and Associates, Inc.

MAXIMUM DENSITY-OPTIMUM MOISTURE
(ASTM D698, METHOD A)

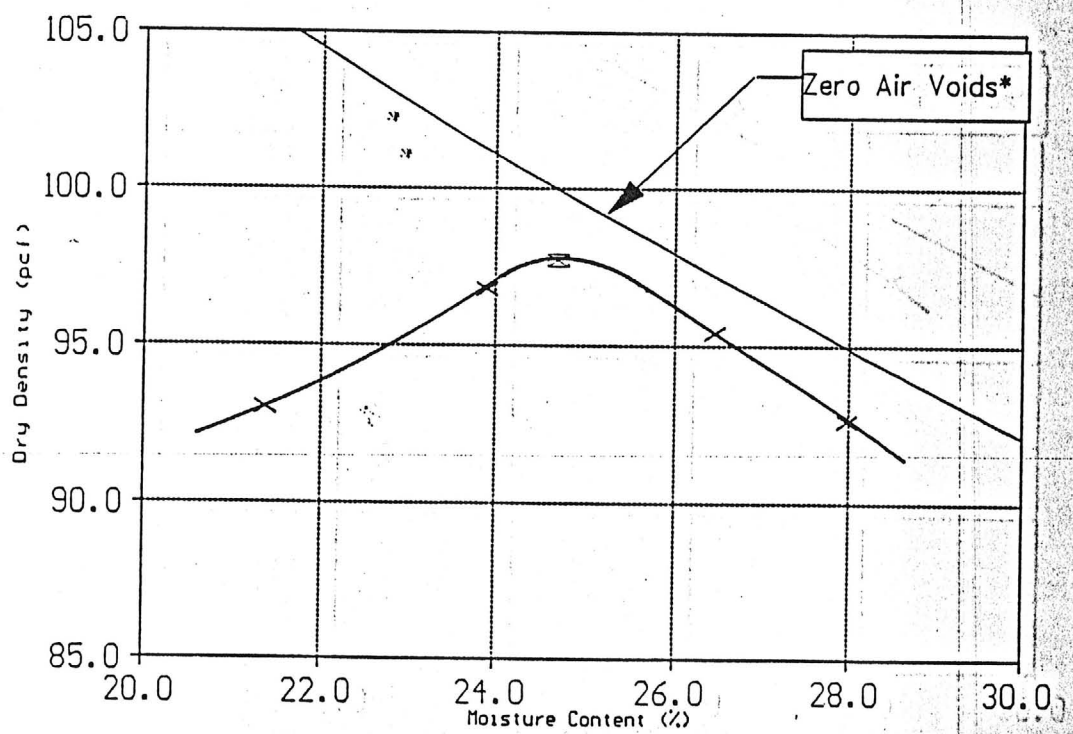
SAMPLE:

Date: 14-May-93

Source:	Composite D: B6 @ 20'-30'; B8 @ 15'-30'
Type:	Bulk
Material:	Clay (CH)
Sampled By:	SCS Engineers/ E. Hoque

RESULTS:

Maximum Dry Density (pcf) =	97.7
Optimum Moisture Content (%) =	24.7



* Assumed Gs = 2.65

Project No.: 93-0592

Thomas-Hartig and Associates, Inc.

50

MAXIMU DENSITY-OPTIMUM MOISTURE
(ASTM D698, METHOD A)

SAMPLE:

Date: 17-May-93

Source: Composite E: B6 @ 40'-50'; B8 @ 30'-45'
Type: Bulk
Material: Clay (CH)
Sampled By: SCS Engineers/ E. Hoque

Project No: 93-0592

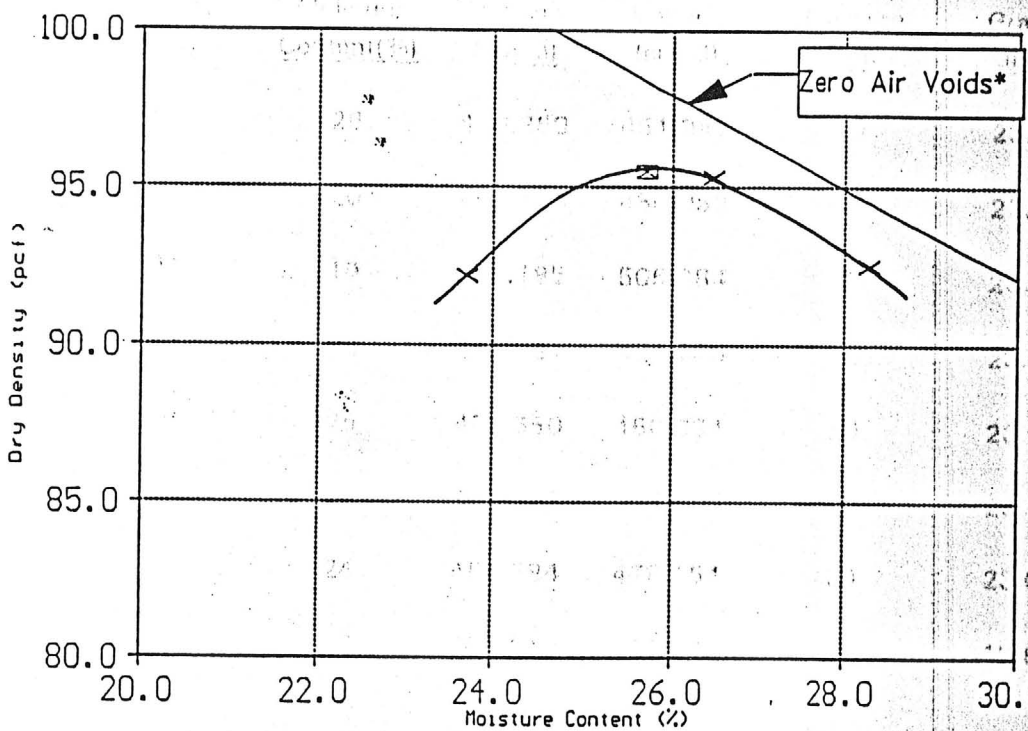
Date: 24-Jun-93

Sampled By: E. Hoque/ SCS Eng.

RESULTS:

Maximum Dry Density (pcf) = 95.5

Optimum Moisture Content (%) = 25.7



Hydraulic Gradient (in/in)	Coefficient Of Permeability (cm/sec)
.427	6.8E-09
.137	1.0E-08
.203	1.7E-08
.099	1.4E-08
.099	2.4E-09
.137	3.2E-09
.049	3.2E-09
.813	6.1E-07

* Assumed Gs = 2.65

Project No.: 93-0592

Thomas-Hartig and Associates, Inc.

51

LABOR. TORY TEST RESULTS

Project: Franconia Technologies Project

Project No: 93-0592

Source: As Noted Below

Date: 24-Jun-93

Material:

Sampled By: E. Hoque/ SCS Eng.

TEST METHOD: ASTM D5084

Sample Source	Initial Dry Density (pcf)	Initial Moisture Content(%)	Initial Sample Volume (cm^3)	Final Sample Volume (cm^3)	Sample Consolidation Pressure (psi)	Hydraulic Gradient (in/in)	Coefficient Of Permeability (cm/sec)
A1	94	26	446.360	451.947	10	23.427	6.8E-09
A2	97	20	451.823	480.053	10	23.137	1.0E-08
B1	99	19	451.185	505.384	3	23.203	1.7E-08
B2	94	23	453.051	474.240	10	23.099	1.6E-08
C1	96	25	453.550	458.034	20	23.099	2.4E-09
D1	98	22	453.167	473.458	20	23.137	3.2E-09
E1	97	24	454.584	478.154	20	23.049	3.2E-08
E2	91	28	453.613	492.525	3	13.813	6.1E-07

arks:

Thomas-Hartig and Associates, Inc.

Project No: 93-0592

Date: 13-Jun-93

Prepared By: E. Hoque/
SCS Engineers

Sample Date: 10-Jun-93

PHASE III - LABORATORY TEST DATA

LIQUID LIMIT:

PLASTIC LIMIT:

PLASTICITY INDEX: Non-Plastic

GRADATION AND PLASTICITY INDEX TEST RESULTS

Project: Franconia Technologies Project

Project No: 93-0592

Source: Franconia-Northwest Corner Landfill Site

Date: 13-Jun-93

Material: Silty Sand and Gravel

Sampled By: E. Hoque/ SCS Engineers

Supplier:

Sample Date: 10-Jun-93

Lab No:

TEST METHOD: ASTM C117, C136, D4318

SIEVE SIZE	PERCENT PASSING	SPECS. MIN	SPECS. MAX
3"	100		
2"	100		
1 1/2"	100		
1"	97		
3/4"	97		
1/2"	93		
3/8"	91		
1/4"	88		
#4	86		
#8	76		
#10	73		
#16	62		
#30	42		
#40	31		
#50	21		
#100	11		
#200	6.6		

LIQUID LIMIT:

PLASTIC LIMIT:

PLASTICITY INDEX: Non-Plastic

ks:

Thomas-Hartig and Associates, Inc.

GRADATION AND PLASTICITY INDEX TEST RESULTS

Project: Franconia Technologies Project

Project No: 93-0592

Source: Franconia-South Central Landfill Site

Date: 13-Jun-93

Material: Silty Sand and Gravel

Sampled By: E. Hoque/ SCS Engineers

Supplier:

Sample Date: 10-Jun-93

Lab No:

TEST METHOD: ASTM C117, C136, D4318

SIEVE SIZE	PERCENT PASSING	SPECS. MIN	SPECS. MAX
3"	100		
2"	100		
1 1/2"	100		
1"	100		
3/4"	97		
1/2"	95		
3/8"	93		
1/4"	90		
#4	86		
#8	77		
#10	75		
#16	66		
#30	45		
#40	32		
#50	20		
#100	9		
#200	5.6		

LIQUID LIMIT:

PLASTIC LIMIT:

PLASTICITY INDEX: Non-Plastic

narks:

Thomas-Hartig and Associates, Inc.

55

GRADATION AN PLASTICITY INDEX TEST R ULTS

Project: Franconia Technologies Project **Project No:** 93-0592

Source: SRS Site **Date:** 13-Jun-93

Material: Silty Sand and Gravel **Sampled By:** E. Hoque/ SCS Engineers

Supplier: **Sample Date:** 10-Jun-93

Lab No:

TEST METHOD: ASTM C117, C136, D4318

SIEVE SIZE	PERCENT PASSING	SPECS. MIN	SPECS. MAX
3"	100		
2"	100		
1 1/2"	100		
1"	98		
3/4"	97		
1/2"	95		
3/8"	95		
1/4"	94		
#4	93		
#8	89		
#10	87		
#16	81		
#30	65		
#40	54		
#50	41		
#100	19		
#200	9.4		

LIQUID LIMIT:

PLASTIC LIMIT:

PLASTICITY INDEX: Non-Plastic

emarks:

Thomas-Hartig and Associates, Inc.

[illegible] RESULTS

Project No: 93-0592

Date: 13-Jun-93

By: E. Hoque/ SCS Engineers

PHASE IV - LABORATORY TEST DATA

Sample Date: 10-Jun-93

Lab No:

	[illegible]	[illegible]	[illegible]
	100		
	100		
	100		
	97		
	[illegible]		
	[illegible]		
	90		
	85		
	82		
	[illegible]		
	[illegible]		
	60		
	47		
	30		
	[illegible]		
	12		
	6.3		

LIQUID LIMIT:

PLASTIC LIMIT:

PLASTICITY INDEX: Non Plastic

SAND EQUIVALENT: 65

Thomas Hardy and Associates, Inc.

57

GRADATION AND PLASTICITY INDEX TEST RESULTS

Project: Franconia Technologies Project

Project No: 93-0592

Source: Sample S-1

Date: 13-Jun-93

Material: Silty Sand and Gravel

Sampled By: E. Hoque/
SCS Engineers

Supplier:

Sample Date: 10-Jun-93

Lab No:

TEST METHOD: ASTM C117, C136, D4318, D2419

SIEVE SIZE	PERCENT PASSING	SPECS. MIN	SPECS. MAX
3"	100		
2"	100		
1 1/2"	100		
1"	97		
3/4"	94		
1/2"	91		
3/8"	89		
1/4"	85		
#4	83		
#8	75		
#10	73		
#16	65		
#30	47		
#40	36		
#50	26		
#100	12		
#200	6.8		

LIQUID LIMIT:

PLASTIC LIMIT:

PLASTICITY INDEX: Non-Plastic

SAND EQUIVALENT: 65

Remarks:

Thomas-Hartig and Associates, Inc.

58

LABORATORY TEST RESULTS

Date: 24-Jun-93

Project: Franconia Technologies Project **Project No:** 93-0592

Source: Bench Scale Testing And Mix Design **Date:** 24-Jun-93

Material: **Sampled By:** E. Hoque/ SCS Eng.

TEST METHOD: ASTM D1140, D4318

Sample Source	Percent Sand Added	Percent Minus #200	Liquid Limit	Plasticity Index	Sand Equivalent
C-1		86	71	49	—
MD-1	30	64	63	45	8
MD-2	45	47	55	38	12
MD-3	60	37	43	29	13
MD-4	70	30	33	17	14

Remarks:

Thomas-Hartig and Associates, Inc.

MAXIMUM DENSITY-OPTIMUM MOISTURE

(ASTM D698, METHOD A)

AMPLE:

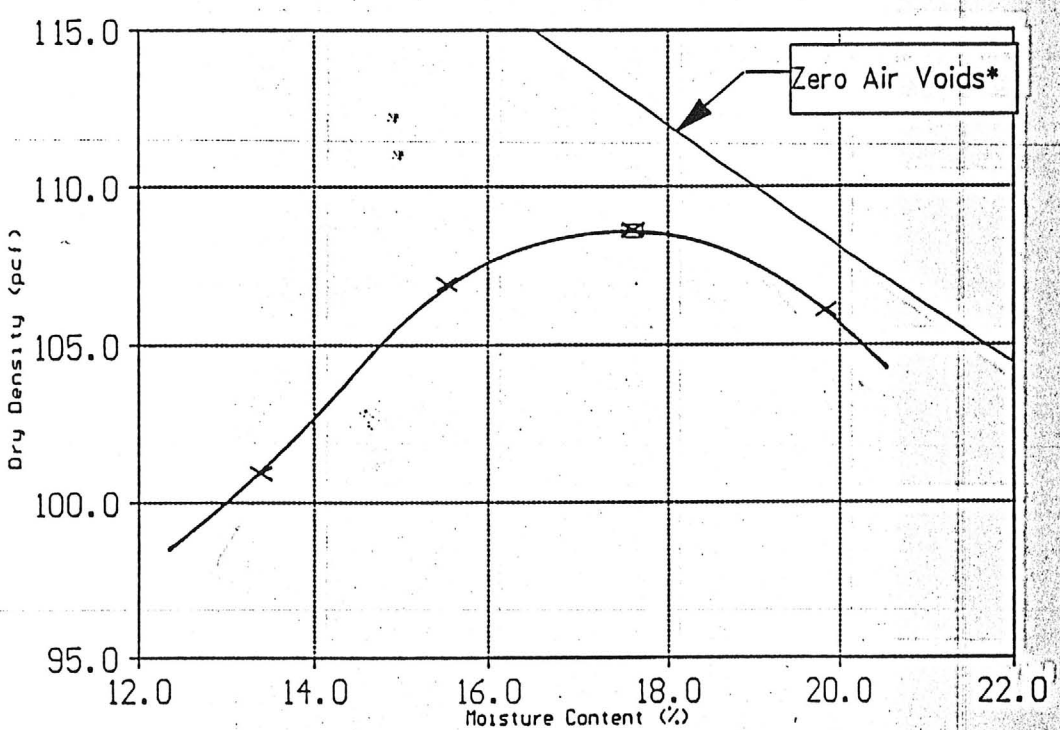
Date: 24-Jun-93

Source: MD-1
Type: Bulk
Material: Sandy Clay (CH)
Sampled By: SCS Engineers/ E. Hoque

ESULTS:

Maximum Dry Density (pcf) = 108.6

Optimum Moisture Content (%) = 17.6



* Assumed Gs = 2.65

Project No.: 93-0592

Thomas-Hartig and Associates, Inc.

60

MAXIMUM DENSITY-OPTIMUM MOISTURE

(ASTM D698, METHOD A)

SAMPLE:

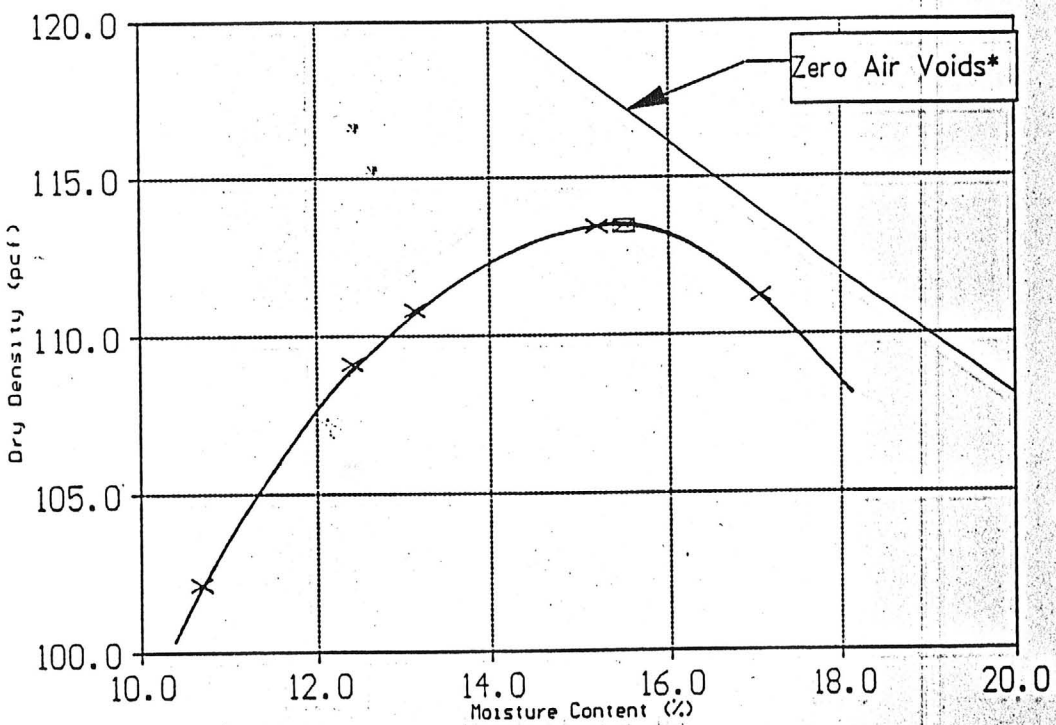
Date: 24-Jun-93

Source: MD-2
Type: Bulk
Material: Clayey Sand (SC)
Sampled By: SCS Engineers/ E. Hoque

RESULTS:

Maximum Dry Density (pcf) = 113.5

Optimum Moisture Content (%) = 15.5



* Assumed Gs = 2.65

Project No.: 93-0592

Thomas-Hartig and Associates, Inc.

61

MAXIMUM DENSITY-OPTIMUM MOISTURE
(ASTM D698, METHOD A)

PLE:

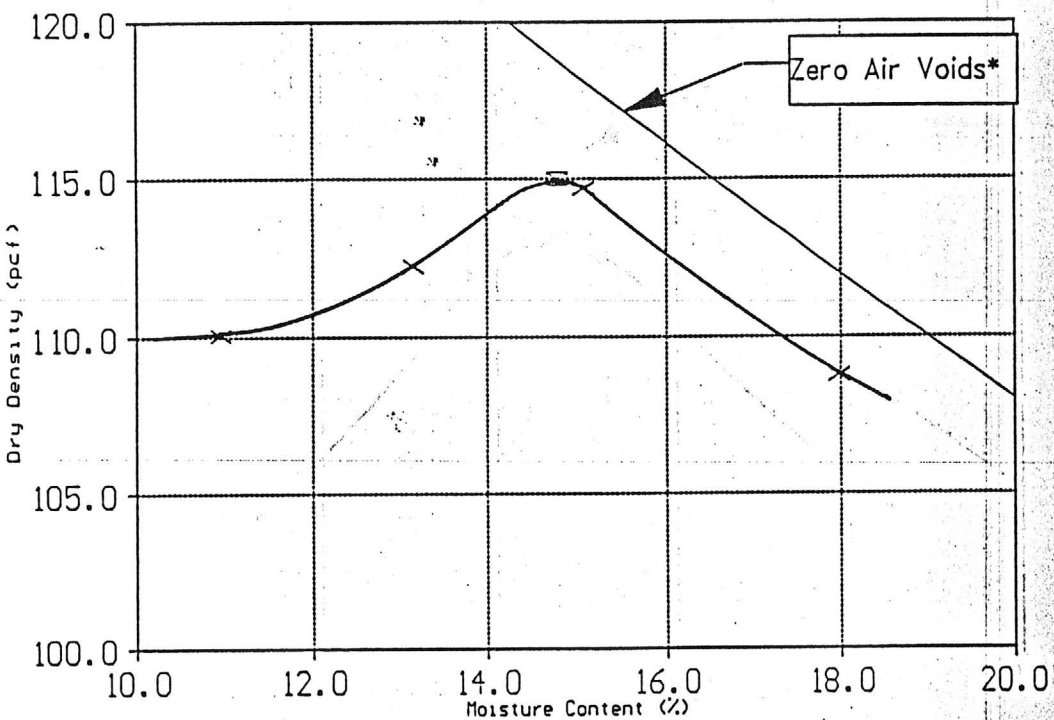
Date: 24-Jun-93

Source: MD-3
Type: Bulk
Material: Clayey Sand (SC)
Sampled By: SCS Engineers/ E. Hoque

JLTS:

Maximum Dry Density (pcf) = 115.0

Optimum Moisture Content (%) = 14.8



* Assumed Gs = 2.65

Project No.: 93-0592

Thomas-Hartig and Associates, Inc.

62

MAXIMUM DENSITY-OPTIMUM MOISTURE
(ASTM D698, METHOD A)

AMPLE:

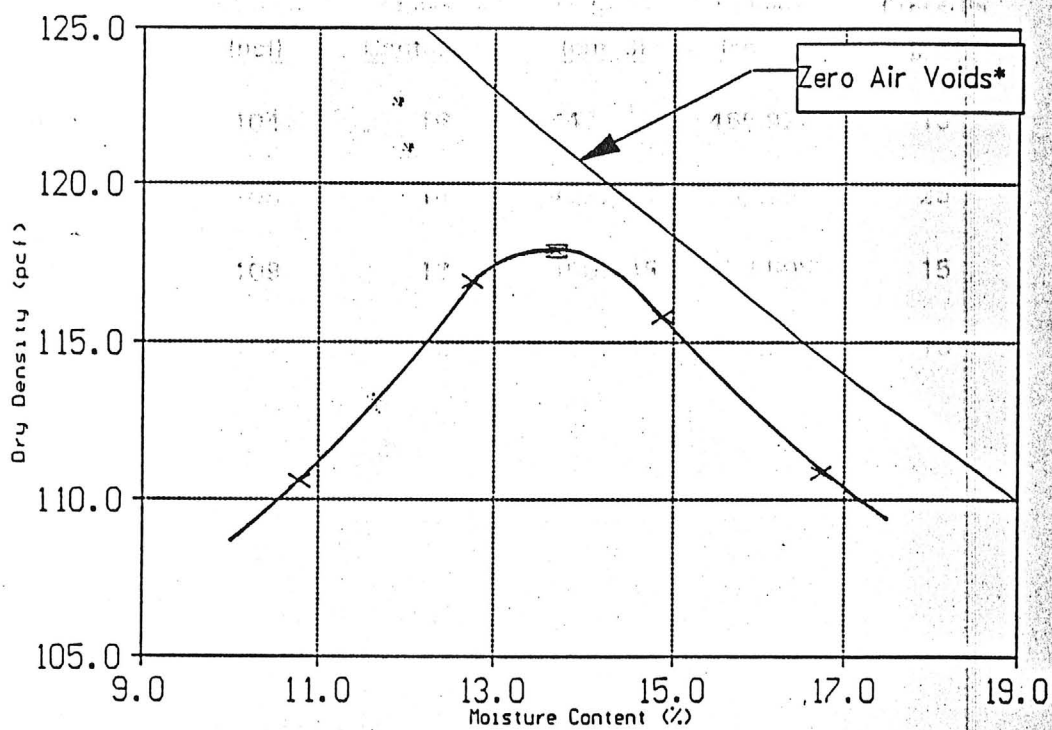
Date: 24-Jun-93

Source: MD-4
Type: Bulk
Material: Clayey Sand (SC)
Sampled By: SCS Engineers/ E. Hoque

ESULTS:

Maximum Dry Density (pcf) = 117.9

Optimum Moisture Content (%) = 13.7



* Assumed Gs = 2.65

Project No.: 93-0592

Thomas-Hartig and Associates, Inc.

63

LABORATORY TEST RESULTS

Project: Franconia Technologies Project **Project No:** 93-0592

Source: As Noted Below **Date:** 06-Jul-93

Material: **Sampled By:** E. Hoque/ SCS Eng.

TEST METHOD: ASTM D5084

Sample Source	Initial Dry Density (pcf)	Initial Moisture Content(%)	Initial Sample Volume (cm^3)	Final Sample Volume (cm^3)	Sample Consolidation Pressure (psi)	Hydraulic Gradient (in/in)	Coefficient Of Permeability (cm/sec)
MD-1	104	16	447.389	466.928	15	23.379	1.2E-08
MD-2	108	14	452.741	465.293	25	13.889	1.2E-07
MD-3	109	13	450.245	452.505	15	23.192	1.7E-07
MD-4	112	12	450.644	456.585	10	13.910	8.0E-06

Remarks:

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine THE SELF BENTONITE MINE Date September 9, 1957

District MOHAVE COUNTY Engineer Lewis A. Smith

Subject:

Location of Mine: 2 miles East of Needles, California, on the Arizona side (T16N R21W, Secs. 35-36).

Owner: J. Self, Blue Line Motel, Blythe, California.

Mr. Self stated that it had been tested and found to be satisfactory by Union Oil Company people. Some cleaning would be required.

He said that since little has been done except a few test pits he would have to give us more complete information at a later date. It is just now being located and little is known of its extent. Later he hopes to have some test drilling done on it.

KEN,

INCLOSED IS A COPY OF OUR AMC NO.'s OF FRANNY CLAIMS, ALSO FIRST TESTS FROM S.H.B. AGRA, INC. & FINAL REPORT & TESTS FROM S.C.S. ENGINEER'S.

THE TESTS FROM S.C.S. ALSO SHOW ADD MIXTURES WITH ON SITE LANDFILL SOILS. FOR WASTE MANAGEMENT, INC.

ANY QUESTIONS PLEASE CALL ME..

VERNON EATON
2731 LOUISE AVE
KINGMAN AZ
86401

PH 602 7536899
OR WORK 757 7959

THANKS FOR ANY HELP

Vern Eaton

8-31-93

RECEIPT AND ACCOUNTING ADVICE

NO. 1417727 02

Subject: MINING CLAIMS (4)

MC/AZ FEB 8 98 0 12 1 2000

Applicant:

VERNON EATON ET AL
2731 LOUISE AVE
KINGMAN AZ 86401

Remitter: MO-BAME

Assignor:

SERIAL NO.
AMC 280027 THRU 280030, XXXXXXXXX FRANNY #1 THRU #4

REFER TO THE ABOVE CASE SERIAL NUMBER IN ALL CORRESPONDENCE. PLEASE INFORM THIS OFFICE OF ANY CHANGE IN ADDRESS.

NOTE: This notice is a receipt for monies paid the United States. If these monies are for required fees in connection with your application to lease, purchase, enter, or otherwise acquire an interest in public lands or resources, this receipt is not an authorization to utilize the land applied for and it does not convey any right, title, or interest in the land for which application is made.

RECEIPT

Agent

86401
PH. 602
753-6800

DEPARTMENT OF MINERAL RESOURCES
STATE OF ARIZONA
FIELD ENGINEERS REPORT

Mine THE SELF BENTONITE MINE Date September 9, 1957

District MOHAVE COUNTY Engineer Lewis A. Smith

Subject:

Location of Mine: 2 miles East of Needles, California, on the Arizona side (T16N R21W, Secs. 35-36).

Owner: J. Self, Blue Line Motel, Blythe, California.

Mr. Self stated that it had been tested and found to be satisfactory by Union Oil Company people. Some cleaning would be required.

He said that since little has been done except a few test pits he would have to give us more complete information at a later date. It is just now being located and little is known of its extent. Later he hopes to have some test drilling done on it.