

REFERENCE MATERIALS

BACKGROUND INFORMATION III



III-1 THE DRAFT PROPOSAL BY THE MINISTRY OF MINES

III-1-1 LETTER ON ELA CENTRAL METALLURGICAL LABORATORY
PROJECT (24TH JULY 1978)

MINISTRY OF MINES

ELA CENTRAL METALLURGICAL
LABORATORY PROJECT

DATED 24TH JULY 1978

EIA CENTRAL METALLURGICAL LABORATORY PROJECT

1. Description of the Project

Ministry of Mines is planning to establish a metallurgical complex at Ela, in central Burma.

To begin with, a zinc smelter of about 4800 tons capacity with a possible expansion to 20800 tons/year, will be constructed in the very near future.

Next comes the copper smelter of about 19,400 tons capacity with possible expansion to 38,800 tons/years capacity. Copper smelter will then be followed by a tin smelter of about 2000 tons/year capacity.

With the construction of zinc, copper and tin smelters, various other plants such as sulphuric acid plant, fertilizer plants, etc., will follow-suit, establishing thereby, a metallurgical complex at Ela.

In view of the abovementioned projects being envisaged the Government of the Union of Burma is of opinion that a modern metallurgical Laboratory be established at Ela. The Laboratory will be the most important and major central Laboratory of the Ministry of Mines and will not only form a control Laboratory of the metallurgical complex but also operates as the advance laboratory for various future geological, mining and metallurgical projects of the Ministry of Mines.

2. Detailed Cost Estimation

Estimated costs, with the detailed list of equipments, required for the project is given in the annexure (i) attached.

The foreign exchange portion of the cost is the F.O.B. cost of the project. Freight, insurance, transportation and

2/-

installation costs are included in the local currency costs of the project. Included in the local currency costs are also the cost of local purchases such as cement, timbers, etc.

The above costs are estimated as near as possible to present day prices.

The summary of the costs is given below :-

- | | | |
|-------|--|-----------------|
| 1. a. | Total cost of project | K 10,140,560.00 |
| | b Total grant requested | K 6,048,000.00 |
| 2. a | Local currency portion of project | K 4,092,560.00 |
| | b Foreign currency portion of project | K 6,048,000.00 |
| | c It can be seen from above that grant is being requested to cover the foreign currency portion of the project | |

3. Location of the Project

The project will be located at Ela, Lewai Township, 14 miles north of Pyinmana is in Central Burma, about 230 miles north of Rangoon and about 240 miles south of Mandalay. (see map) Ela is a small railway station on the Rangoon Mandalay railway line.

IV. Name of Implementing Agency

No.1 Mining Corporation, under Ministry of Mines, will be responsible for implementing the project. Construction Corporation will however carry out the civil engineering works on behalf of the No.1 Mining Corporation.

3/-

5. Implementation Period

Time schedule for implementing the project is attached herewith as annexure (ii). The project could be completed and the laboratory will be in operation after 3 years of construction period.

6. Technical Cooperation

Technical cooperation in the form of experts from Japan is essential. The Japanese experts will help design the Laboratory and make recommendation on procurement of the Laboratory equipments. They will also supervise in the construction and installation of the equipments and train local personnel in the proper operation of the Laboratory. Fellowship award is also requested to enable prospective local personnel to study in Japan the modern technique and operation of the Laboratory. The proposed number of experts and fellowship and the duration is given below :-

<u>Sr. No.</u>	<u>Field of Works/ Study</u>	<u>No. of Experts</u>	<u>Fellowship</u>	<u>Duration</u>
1.	Chemists/Laboratory Technicians	3	-	36 man-month
2.	Fellowship	-	5	60 man-month

ELA CENTRAL METALLURGICAL LABORATORY PROJECT
DETAILED COST ESTIMATION

SUMMARY

Sr.No.	Description	(Kyats in thousands)		
		F.E.	Local	Total
1.	<u>Laboratory Building.</u> Two storey pucca brick building of 60'x45'x24' dimensions approx. Electricity and water systems installed according to Laboratory standard. Centralised air-conditioning and wastage disposal systems attached: Lab. furniture, office equipment storage godown included.	1000.00	1300.00	2300.00
2.	Chemicals.	40.00	26.80	66.80
3.	Consumable stores, Glasswares, filter papers, crucibles, etc.	50.00	33.50	83.50
4.	Miscellaneous Lab. Appliances.	25.00	16.75	41.75
5.	Equipment and Instruments. (i) Sample preparations. (details attached) (ii) Balances (details attached) (iii) Furnaces (details attached) (iv) General Lab. equipment (details attached) (v) Instrumental Lab. section (details attached)	234.69 102.00 302.50 216.00 3197.81	157.24 68.34 202.68 144.72 2142.53	391.93 170.34 505.18 360.72 5540.34
6.	Experts, fellowship literature & reference books.	880.00	-	880.00
		6048.00	4092.56	10140.56



GOVERNMENT OF THE
SOCIALIST REPUBLIC OF THE UNION OF BURMA
MINISTRY OF MINES

.No.15-Planning 78

Rangoon, Dated 23rd October 1978

MEMORANDUM

Subject:- Ja Central Metallurgical Laboratory Project.

We enclose herewith (5) copies of Revised List of Equipment, for the abovementioned project. The above list will also be forwarded to the Japanese Embassy through our Foreign Office.

Soeh
23/10/78

for Deputy Minister
Ministry of Mines
(U Soe Mra, Head of Office)

Team Leader
Japanese Survey Team for
Central Metallurgical Laboratory
Project.

Ministry of Mines

No. 1 Mining Corporation

ELA CENTRAL METALLURGICAL LABORATORY PROJECT

Revised List of Equipments

Rangoon, 20th October 1978

EIA CENTRAL METALLURGICAL LABORATORY PROJECT

REVISED LIST OF EQUIPMENTS

SUMMARY

(Kyats in thousand)

<u>Sr. No.</u>	<u>Descriptions</u>	<u>F. O. B.</u>
A	Sample Preparation Equipment	600.0
B	Analytical Laboratory	8,750.0
C	Mineral Processing Laboratory	1,100.0
D	Flotation Pilot Unit	1,090.0
E	Gravity Concentration and Other Equipments	3,170.0
F	Pyrometallurgical Laboratory	6,550.0
G	Pyrometallurgical Pilot Plant	10,240.0
H	Miscellaneous	1,500.0
I	Building and Accessories	25,000.0
	GRAND TOTAL	<u>58,000.0</u>

ELA CENTRAL METALLURGICAL LABORATORY PROJECT
REVISED LIST OF EQUIPMENTS

(Kyats in thousand)

Sr. No.	Description	Qty. Reqd.	F.O.B. Kyats
	<u>(A) Sample Preparation Equipment</u>	<u>1 Lot</u>	<u>600.0</u>
1.	Jaw Crusher Laboratory Type Mouth measurement 200 x 250 mm	1 Set	
2.	Jaw Crusher 100 x 125 mm	1 "	
3.	Laboratory Type Crushing Rolls Diameters 250 mm, Width 150 mm.	1 "	
4.	Pulvariser (Eccentric motion type) for fine grinding	2 Sets	
5.	Roller type agitator and Jar Mill	1 Set	
6.	Laboratory type Ball Mill (Wet grinding closed) Batch type for fine grinding	1 "	
7.	Laboratory type, Ball/Rod/Tube Mill Dia. 16" x 48" drum length	2 Sets	
8.	Vibrating Screen (Portable) Laboratory Screen 1 ft x 3 ft, Single Deck	1 Set	
9.	Sieve shaker for both wet and dry screening. Complete with timer	1 "	
10.	Laboratory Sieves. A standard set of Tyler Sieves, to suit the above Sieve Shaker	2 Sets	
11.	Laboratory pH indicators, electric type	2 "	
12.	Cyclosizer	1 Set	
13.	Sample Balances	3 Sets	
14.	Other accessories	1 Lot	

(Kyats in thousand)

Sr. No.	Description	Qty. Reqd.	F.O.B. Kyats
	<u>(B) Analytical Laboratory</u>	<u>1 Lot</u>	<u>8,750.0</u>
1.	Atomic Absorption Spectrophotometer	2 Sets	
2.	Cathode Lamps	25 Nos.	
3.	Emission Spectrometer and accessories	1 Set	
4.	Power Supply Source and Comparator	1 "	
5.	X-ray Fluorescence Spectrometer (Full automatic)	1 "	
6.	Muffle Furnace with temperature controller	1 No.	
7.	X-ray Diffractometer	1 "	
8.	X-ray Microanalyzer	1 "	
9.	Quantitative Analyzer for Oxygen and Nitrogen in Metal	1 No.	
10.	Fire Assay Equipments	1 Set	
11.	Double Beam Spectrophotometer	1 "	
12.	Size Analyzer	1 No.	
13.	Distilled Water Unit	1 Set	
14.	Laboratory Water Deionizer	2 Nos.	
15.	Magnetic Stirrer/hot plate combined	2 "	
16.	Centrifuge (Automatic)	2 "	
17.	Electric Hot Plates	3 "	
18.	analytical Balances	3 Sets	
19.	Instruments for Wet Analysis	1 Lot	
20.	Chemical Reagents	1 "	
21.	Other Materials and Accessories	1 "	

(Kyats in thousand)

Sr. No.	Description	Qty. Reqd.	F.O.B. Kyats
	<u>(C) Mineral Processing Laboratory</u>	<u>1 Lot</u>	<u>1,100.0</u>
1.	Batch Type Flotation Machine with variable speed motor and 'Sub A' interchangeable cells. Stainless steel cells capacity 250 g; 500 g; 2000 g; and Transparent Cell 1000 g.		
2.	Vibrating Mill for Fine grinding	1 No.	
3.	Sample Grinder, Gyrotory Type Dia. 150 mm	1 "	
4.	Dry Type Drum Magnetic Separator	1 "	
5.	High Intensity Belt Type Magnetio Separator. 3 Desk, Rapid Type	1 "	
6.	Mineralite	1 "	
7.	High Tension Separator Carpcu Type	1 "	
8.	Pulp Density Balances Marcy Type	3 Nos.	
9.	Heavy Liquid Separator	1 No.	
10.	Vertical Dryer with Burner set	1 Set	
11.	Sample Blending and Splitting Preparation apparatus	1 Set	
12.	Tube Type Electric Furnace with ontroller	1 No.	
13.	Binocular Microscope Zoom type	1 "	
14.	Polarizing Microscope	1 "	
15.	Reagents and other materials	1 Set	
16.	Other Instruments and Spare Parts	1 Lot	

(Kyats in thousand)

Sr. No.	Description	Qty. Reqd.	F.C.B. Kyats
	(D) <u>Flotation Pilot Unit (200 lbs/hr)</u>	<u>1 Unit</u>	<u>1,090.0</u>
1.	Crude Ore receiving hopper. Capacity - 2 tons		
2.	Belt feeder, with variable speed reducer and motor.	1 No.	
3.	Forced Feed Jaw Crusher Capacity 500-2000 lbs/hr. Crusher size 5"x6", Complete with motor	1 "	
4.	Vibrating Screen 1 ft x 3 ft Complete with motor	2 Nos.	
5.	Cone Crusher Complete with motor. Capacity 500-2000 lbs/hr.	1 No.	
6.	Fine Ore Bin, Capacity 5 tons	1 "	
7.	Belt feeder, With variable speed reducer and motor	1 "	
8.	Rod Mill With drum feeder, Complete with motor, welded steel base, 16" dia x 32" drum length. Capacity 300 lb/hr.	1 "	
9.	Ball Mill. Similar to above, 16" dia. x 48" drum length Capacity 450 lbs/hr.	1 "	
10.	Spiral Classifier 9" dia. Simplex, 6 ft length	1 "	
11.	Hydrocyclone 4" dia.	1 "	
12.	Thickener with spiral rake and motor dia. 48" tank depth 3 ft.	4 Nos.	
13.	Conditioner With motor, 18" dia x 24", 3.28 cu.ft.	4 "	
14.	Flotation Machines (Sub.A Type) 6-cell machine, cell to cell type Effective volume 24-26 liters/cell Capacity 200 lbs/hr. Complete with motors	3 Sets	
15.	Slurry Pumps With motor, discharge size 1" dia.	6 Nos.	
16.	Diaphragm Pumps With motor, suction-pressure type Discharge size - 1" dia.	3 "	
17.	Dry reagent feeder With motor 6" dia. Vol 1 cu.ft. Maximum feed 14 lbs/hr.	2 "	
18.	Wet reagent feeder With motor, Tank Capacity 2 gallons 12" dia. disc.	4 Nos.	
19.	Other Equipments and Accessories	1 Lot	
20.	Reagents and other Materials	1 Lot	

(Kyats in thousand)

Sr. No.	Description	Qty. Reqd.	F.O.B. Kyats
	<u>(E) Gravity Concentration and Other Equipments</u>	1 Lot	3,170.0
1.	Laboratory Jig (Harz type) Removeable screen compartment with glass side (or transparent side). Capacity 18 - 24 lbs/hr. Adjustable speed and length of plunger stroke.	1 No.	
2.	Placer Jig 610 x 610 mm	1 "	
3.	Wilfley Table Deck size, 50" length x 25" width Capacity $\frac{1}{2}$ - 3 tons/24 hr. Complete with motor.	1 "	
4.	James Table	1 "	
5.	Laboratory Vacuum Pressure, Equipment (Piston-Type) 40 lbs. pressure, Vacuum 1" HZ Piston Displacement 20 C.F.M. Inlet pipe 1" size, Discharge pipe 1" size.	1 Set	
6.	Laboratory Pressure Filter Machine size 12" dia. Filter area 113 sq.in. Volume 6 gallons	1 No.	
7.	Laboratory Vacuum Filter Machine size 12" x 3" Area 72 sq.in., Volume 1 gallon	1 "	
8.	Drum type filter, complete with motor, Machine size 18" dia x 12" length Area 4.6 sq.ft. Capacity 50-84 lbs/hr.	1 "	
9.	Disc type filter, complete with motor Machine size 2'. 2 Nos. discs. Total area 9 sq.ft. Capacity 100-160 lbs/hr.	1 "	
10.	Laboratory Dryer (Oven type) With thermostat control, air-circulating damper and an accurate stem thermometer	2 Nos.	
11.	Bench Type Cutting Machine with sample rock cutting wheel.	1 No.	
12.	Thin Section Grinder Complete with grinding media	1 Set	
13.	Polishing Machine Complete with motor and accessories	2 Sets	
14.	Epidioscope Complete with lamp and accessories	1 Set	
15.	Super Panner	1 No.	
16.	Dust Collector	1 Set	
17.	Exhaust Collector	1 "	

(Kyats in thousand)

Sr. No.	Description	Qty. Reqd.	F.O.B. Kyats
18.	Drill, electric, high or variable speed	1 Set	
19.	Lathe (Precision Power) Multi-purpose 3" lathe, for drilling, milling, grinding and turning operation. Complete with motor and accessories	1 "	
20.	Automatic Compressor Single stage air-cooled, max: pressure 10 atm., complete with tanks, automatic pressure switches, with belt guard, suction capacity 20.4 m ³ /hr. 2 cylinder, with single phase motor 3 h.p. 230/240V A.C. main, 50 Hz, 890 rev:/min.	1 "	
21.	Electric hot plate With thermostatically controlled, Plate 60 x 45 cm., 5 KW; 220/240V, 50 Hz, A.C. main	3 Nos.	
22.	Radioactive Survey Meter	1 No.	
23.	Compression Testing Apparatus	1 "	
24.	Schmidt Concrete Test Hammer	1 "	
25.	Sample Splitter (Jone's Type) 10" x 18" size, riffle width 1" 8" x 10" size, riffle width ½"	1 Set 2 Sets	
26.	Trinocular Zoom stereo Microscope	1 No.	
27.	Drum Washer 3' x 6'	1 "	
28.	Hoist Crane 2 ton	2 Nos.	
29.	Vibrating Feeder, Laboratory Type (10" x 24" size)	1 No.	
30.	Reagent, materials and instruments	1 Lot	
31.	Other Accessories and Spares	1 Lot	

(Kyats in thousand)			
Sr. No.	DESCRIPTION	Qty. Reqd.	F.C.B. Kyats
	<u>(F) Pyrometallurgical Laboratory</u>	1 Lot	<u>6,550.0</u>
1.	Crushing Roll with screen, 16"dia x 10"	1 Set	
2.	Rotary Drier	1 "	
3.	Flash drier	1 "	
4.	Blender	1 No.	
5.	Multihearth roaster	1 "	
6.	Fluosolid Roaster	1 "	
7.	Turbulent layer roaster	1 "	
8.	Sintering plant	1 "	
9.	Disc Pelletiser	1 "	
10.	Drum Pelletiser	1 "	
11.	Electric arc Furnace	1 "	
12.	Induction Furnace	1 "	
13.	Oil Fired Short Rotary Furnace	1 "	
14.	Oil Fired Converter	1 "	
15.	Oil Fired Reverberatory Furnace	1 "	
16.	Oil Fired Rotary Kiln	1 "	
17.	High Temperature, High pressure autoclaves	1 "	
18.	Ordinary leaching autoclaves	1 "	
19.	Optical pyrometers	3 Nos.	
20.	High temperature Thermocouples with indicators	12 "	
21.	Automatic temperature control units	6 "	
22.	Gas analyser for Metals	1 No.	
23.	Gas Chromotograph	1 "	
24.	Metallurgical Electron Microscope with Camera	1 Set	
25.	Differential Thermal Balance	1 No.	
26.	Size Analyser	1 No.	
27.	Sample Preparation Equipment	1 "	
28.	Sample Polishing Machine	2 Nos.	
29.	Registering Meter	1 Set	
30.	Power Source	1 "	

(Kyats in thousand)

Sr. No.	Description	Qty. Reqd.	F.O.B. Kyats
31.	General Electric Apparatus	1	Set
32.	Reagent, Materials, Instruments	1	"
33.	Solvent Extraction Equipment	1	"
34.	Continuous Leaching apparatus (with Filter Press, Pumps, Stirers, fitting units, motors, etc.)	1	"
35.	Tank house with controlling equipment (Rectifiers, motors, agitators, incubator, shaker, electrical measuring instruments like unmeter, voltmeters, resistance, etc)	1	"
36.	Electrolytic cells and electrolyte controlling equipments, reagent, materials and instrument	1	"
37.	Cottrell precipitators	1	"
38.	Electrostatic precipitators	1	"
39.	Bag houses and Cyclone dust catchers (Dry and Wet by the filters)	1	"
40.	Apparatus for determining fixed carbon, Volatile matter; Calorific Value etc.	1	"
41.	Briquetting Machine	1	"
42.	De-gassing equipment	1	"
43.	De-volatilisation equipment	1	"
44.	Coking equipment	1	"
45.	Suction fans with motors	1	Lot
46.	Ventilation fans with motors	1	"
47.	Exhaust fans	1	"
48.	Air conditioning sets	1	"
49.	Mini Oxygen Plant	1	No.
50.	H ₂ , N ₂ , Cl ₂ , He, Ar gas cylinders	1	Lot
51.	Other accessories	1	Lot

(Kyats in thousand)

Sr. No.	Description	Qty. Reqd.	F.O.B. Kyats
	(G) <u>Pyrometallurgical Pilot Plant</u>	1 Lot	<u>10,240.0</u>
1.	Material receiving hoppers	5 Nos.	
2.	Feedometers	5 "	
3.	Weightometers	5 "	
4.	Reversible Conveyor with motor and etc.	3 "	
5.	Mixer or Blender	2 "	
6.	Hoppers (minor)	6 "	
7.	Conveyor	1 Lot	
8.	Multihearth roaster	1 No.	
9.	Fluosolid roaster	1 "	
10.	Turbulent roaster	1 "	
11.	Sintering Plant	1 "	
12.	Rotary Kiln	1 "	
13.	Lead Blast Furnace (shaft)	1 "	
14.	Hot Cyclone gas cleaning equipment	1 "	
15.	Fume collector electrostatic precipitator	1 "	
16.	Bag house	1 "	
17.	Weighing scale	3 Nos.	
18.	Suction fans	1 Lot	
19.	Air Blower	1 No.	
20.	Air Compressor	1 Lot	
21.	Electric reduction furnace	1 No.	
22.	Slag cleaning electric furnace	1 "	

(Kyats in thousand)

Sr. No.	Description	Qty. Reqd.	F.O.B. Kyats
23.	Oil fired anode furnace with moulding equipments	1 No.	
24.	Slag disposal equipment	1 Lot	
25.	Oil fired reverberatory furnace	1 No.	
26.	Rotary converter	1 "	
27.	Rotary furnace	2 Nos.	
28.	Refined anode furnace with moulding equipment	1 No.	
29.	Lead refiner furnace	1 Lot	
30.	Refining Kettles	1 "	
31.	Crude lead moulding shop	1 No.	
32.	Copper tank house 10 tons 1 day with starter sheet production section	1 "	
33.	Melting furnace	2 Nos.	
34.	Electrolytic lead refinery 10 tons 1 day	1 No.	
35.	General Electrical equipments	1 Lot	
36.	Thermocouples with indicators and recorders	1 "	
37.	Chemicals and other instruments	1 "	
38.	Electric Cyclone Furnace	1 No.	
39.	Other accessories	1 Lot	

(Kyats in thousand)

Sr. No.	Description	Qty. Reqd.	F.O.B. Kyats
	<u>(H) Miscellaneous</u>	<u>1 Lot</u>	<u>1,500.0</u>
1.	Photostat	1 Set	
2.	Copying Machine (wet)	1 "	
3.	Electric Typewriter and other instruments	1 Lot	
4.	Reference literature, etc.	1 "	
5.	Projector	1 Set	
6.	Audio-visual equipment	1 "	
7.	Slide Projector	1 "	
8.	Closed circuit television equipment	1 "	
9.	Protection equipments	1 Lot	
10.	Stop Watches and Stop Clock	12 Nos.	
11.	Furnitures and Vehicles	1 Lot	
12.	Spare parts and other instruments	1 "	
13.	Electrical fittings, etc.	1 "	
14.	Other accessories	1 "	

(Kyats in thousand)

Sr. No.	Description	Qty. Reqd.	F.O.B. Kyats
<u>(I) Buildings and Accessories</u>		<u>1 Lot</u>	<u>25,000.0</u>
<u>(a) Main Building - 890 m²</u>			
1.	Administration Office	200 m ²	
2.	Director's and Manager's Room	200 m ²	
3.	Conference Room and Classroom	200 m ²	
4.	Library	100 m ²	
5.	Other attachments	<u>190 m²</u>	
<u>(b) Attached Building - 4110 m²</u>			
6.	Assay Laboratory	850 m ²	
7.	Mineral Processing and Mineralogical Laboratory (280, 200, 80 and 80 m ²)	640 m ²	
8.	Metallurgical Laboratory (360 and 60 m ²)	420 m ²	
9.	Guest House (100 m ² x 7)	700 m ²	
10.	Dormitory (20 m ² x 10 room)	200 m ²	
11.	Pyrometallurgical Pilot Plant	1,040 m ²	
12.	Workshop and Garage (200 and 50)	<u>250 m²</u>	
Grand Total Area		5,000 m ²	



CONSTRUCTION CORPORATION
RESEARCH & SOIL TESTING LABORATORIES
KAMAKYI ROAD, THUWUNNA

Letter No.La Satha/79/ $\frac{292}{299}$ / ၆၆၁၆. 31st January'79.

Subject:- Preliminary Soil-Test Data
Mineral Smelting Plant
Mining Corporation No.1,Ela.

Reference:- Letter No.Kha Tha Na/79/Soil-Test/045
dated 3-1-79 of the Staff Officer I,
Q/S & R, Construction Corporation,
Rangoon.

Reference the above letter on the subject matter forwarded herewith is the "Premiminary Soil-Test Data" for the proposed Mineral Smelting Plant at Ela.

(SHWE TUN MAUNG)
STAFF OFFICER II
RESEARCH & SOIL TESTING(LABS:)
CONSTRUCTION CORPORATION

STAFF OFFICER I,
QUANTITY SURVEY, ESTIMATES & RESEARCH,
CONSTRUCTION CORPORATION,
R A N G O O N.

- 1 Set.
- Copy to:- (1) D.E.(Roads),C.C., Rangoon. 1 Set.
- √(2) Managing Director,
Mining Corporation No.1,
Rangoon. 3 Sets.
- (3) Laboratory Unit No.2 1 Set.
- (4) Office. 4 Sets.

CONSTRUCTION CORPORATION
RESEARCH & SOIL TESTING LABORATORIES
KAMAKYI ROAD, THUWUNNA

Preliminary Soil-Test Data, Mineral Smelting Plant, Ela.

1. BORINGS:

The programme of boring consists of 5 drill holes. Out of these 5 holes 2 have been completed. They are Hole Nos: 2 and 5.

The borings were performed with a wash boring type of drilling machine. Thin walled shelby-tube samplers having 2 inches inner diameter and a wall thickness of 1/8 inch were driven into the sub-soil formations by a hammer weighing 350 pounds and falling freely from a height of ¹²~~20~~ inches. The number of hammer blows required for every 6 inches penetration of the shelby-tube sampler was recorded. The values of the penetration resistance provided in column 9 of table Nos. 1.1 and 1.2 are the averages for the penetration of the sampler for 1 foot penetration into the sub-soil. During the course of drilling operation the ground water table was struck in the vicinity of 15 feet from the existing surface.

2. LABORATORY TESTS:

At the time of writing this report the following-tests have been completed:

- (a) Visual Classification
- (b) Moisture Content (%)

(c) Wet Density (lb/cu.ft).

(d) Dry Density (lb/cu.ft).

(e) Unconfined Compression Test (lb/sq.ft).

The test results are tabulated in Table Nos:1.1 and 1.2 attached to this report. Rest of the test results shall be forwarded in due course.

(SHWE TUN MAUNG)
STAFF OFFICER II
RESEARCH & SOIL TESTING (LABS:)
CONSTRUCTION CORPORATION

AC.31/1.

TABLE 1.1. NATURAL MOISTURE CONTENT, WET & DRY DENSITIES & UNCONFINED COMPRESSIVE STRENGTH.

JOB: MINERAL SMELTING FACTORY, ELA-LAB.		DRILL HOLE NO. 2.					
SHELF NO.	DEPTH Ft.	VISUAL CLASSIFICATION	MOISTURE CONTENT %	DENSITY Lb./Cu.Ft.	U.C.S. TEST STRENGTH Lb./sq.ft.	EST. STRAIN %	No. of Hammer Blows
1	0-2	Brownish Grey Silty Sand, some Clay.	13.5	-	-	-	37
2	2-4	- do -	10.1	122.8	111.5	-	26
3	4-6	- do -	9.1	129.8	118.9	-	31
4	6-8	- do -	14.0	125.8	110.3	-	26
5	8-10	Brownish Grey Silty Sand, some Clay.	11.5	129.8	112.8	-	25
6	10-12	- do -	21.1	120.8	99.7	-	15
7	12-14	- do -	22.4	117.5	95.9	20.0	20
8	14-16	Yellowish Brown Silty Sand & SILT.	24.7	113.8	95.2	-	20
9	16-18	- do -	20.9	119.1	98.5	-	24
10	18-20	Yellowish Brown Sand & SILT, some Clay.	22.2	130.4	106.7	-	24
11	20-22	- do -	23.5	141.1	114.2	-	54
12	25-27	Yellowish Brown Silty Sand & SILT.	19.5	135.7	113.5	-	47
13	30-32	- do -	18.7	137.6	115.9	10.0	43
14	35-37	Brownish Grey Silty Sand, trace Sand.	26.6	128.1	101.1	-	63
15	40-42	- do -	24.3	127.9	102.8	-	35
16	45-47	Brownish Grey Silty Sand, some Clay.	20.2	137.8	114.6	-	67
17	50-52	Brown Silty Sand, trace Clay.	19.5	140.3	117.4	-	77
18	55-57	- do -	20.0	143.2	119.3	-	90
1	60-62	Brown to Grey Sand, some SILT.	19.3	-	-	-	101
2	65-66½	- do -	15.2	-	-	-	86

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TABLE 1.2. NATURAL MOISTURE CONTENT, WET&DRY DENSITIES&UNCONFINED COMPRESSIVE STRENGTH.

JOB: MINERAL SMELTING FACTORY, ELA.LAB.

DRILL HOLE NO. 5.

SITE NO.	DEPTH Ft.	VISUAL CLASSIFICATION	MOISTURE CONTENT %		DENSITIES lb/cu.ft.	U.C.S. TEST STRENGTH lb/sq.ft.	NO. OF BLOWS
			WET	DRY			
1	0-2	Light Brown Sandy SILT, some Clay.	9.8	-	-	-	-
2	2-4	- do -	9.6	124.3	113.4	-	24
3	4-6	Brownish Grey SILT&CLAY, some Sand.	19.5	124.2	103.9	4893	23
4	6-8	- do -	14.7	137.1	119.5	-	17
5	8-10	Light Grey SILT&CLAY, some Sand.	22.1	119.7	98.0	4836	22
6	10-12	Grey to Bluish Grey Clayey SILT&SAND.	16.5	133.9	114.9	-	24
7	12-14	- do -	16.3	127.5	109.6	-	28
8	14-16	Brownish Grey Silty SAND, some Clay.	13.7	127.0	111.6	-	30
9	16-18	- do -	15.9	133.9	115.5	-	30
10	18-20	- do -	14.6	135.0	117.8	-	28
11	20-22	- do -	14.4	130.5	114.0	-	38
12	25-27	Yellowish Brown Clayey SILT, some Sand.	16.3	123.6	106.2	6534	44
13	30-32	- do -	18.7	126.9	106.9	4779	57
14	35-37	Brownish Grey Silty Coarse SAND, some Clay.	20.2	128.7	107.0	-	48
15	40-42	- do -	17.7	126.5	107.5	-	52
16	45-47	Brownish Grey SILT&CLAY, some Sand.	23.4	129.1	104.6	9135	65
17	50-52	- do -	23.1	129.3	105.0	9751	70

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RESEARCH & SOIL TESTING LABORATORIES
KAMAKYI ROAD, T' WUNNA

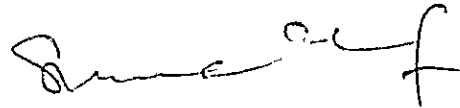
Letter No. La Satha/79/ $\frac{291}{299}$ / La-t'go-9/73

20.2.79

Subject :- 2nd Preliminary Soil-Test Data
Mineral Smelting Plant
Mining Corporation No.1, Ela.

Reference :- Letter No. Kha Tha Na/79/Soil-Test/045
dated 3-1-79 of the Staff Officer I,
Q/S & R, Construction Corporation,
Rangoon.

Reference the above letter on the subject matter forwarded herewith is the "2nd Preliminary Soil-Test Data" for the balance of 3 Holes (Hole Nos.1,3 & 4) of the proposed Mineral Smelting Plant at Ela.



(SHWE TUN MAUNG)
STAFF OFFICER II
RESEARCH & SOIL TESTING(LABS:)
CONSTRUCTION CORPORATION

STAFF OFFICER I,
QUANTITY SURVEY, ESTIMATES & RESEARCH,
CONSTRUCTION CORPORATION,
R A N G O O N.

..... 1 Set.
Copy to:-(1) D.E.(Roads), C.C., Rangoon 1 Set.
 (2) Managing Director,
 Mining Corporation No.1,
 Rangoon, 3 Sets.
 (3) Laboratory Unit No.2 1 Set.
 (4) Office. 4 Sets.

AC.19/2/79.

TABLE 1.3. NATURAL MOISTURE CONTENT, WET & DRY DENSITIES & UNCONFINED COMPRESSIVE STRENGTH.
 JOB: MINERAL SMELTING FACTORY, ELA. DRILL HOLE NO. 1.

SHELF LEVEL NO.	DEPTH Ft.	VISUAL CLASSIFICATION	M/C %	DENSITIES		U.C.S. TEST		No. of Hammer Blows Per Foot (N)
				WET Lb./Cu.Ft.	DRY Lb./Cu.Ft.	STRENGTH Lb./Sq.Ft.	STRAIN %	
1	0-2	Brownish Grey SAND & SILT, some Clay.	4.5	-	-	-	-	18
2	2-4	- do -	7.6	-	-	-	-	21
3	4-6	- do -	15.6	117.6	101.7	-	-	28
4	6-8	- do -	17.1	126.7	108.1	-	-	36
5	8-10	- do -	16.9	131.5	112.4	-	-	51
6	10-12	- do -	15.1	129.5	112.5	-	-	47
7	12-14	- do -	16.7	130.3	111.6	-	-	35
8	14-16	- do -	19.4	130.4	109.2	-	-	41
9	16-18	Brownish Grey Silty SAND, some Clay.	22.4	135.7	110.3	-	-	35
10	18-20	- do -	20.8	128.0	105.9	-	-	25
11	20-22	- do -	21.6	130.0	106.9	-	-	26
12	25-27	- do -	22.2	135.2	110.6	-	-	35
13	30-32	Yellowish Brown Clayey SILT, some Sand.	14.9	137.6	119.7	8926	15.0	57
14	35-37	- do -	13.9	136.2	119.5	7108	16.0	46
15	40-42	Yellowish Grey SAND & SILT, some Clay.	18.6	133.8	112.9	0	-	42
16	45-47	- do -	16.0	137.5	118.5	-	-	52
17	50-52	Yellowish Brown Clayey SILT, some Sand.	17.6	124.7	106.0	6205	15.0	78
18	55-57	- do -	15.8	138.1	119.2	6869	15.0	105
19	60-62	Brown medium to coarse SAND, some SILT.	15.7	131.1	113.3	-	-	107
20	65-67	- do -	13.1	135.0	119.3	-	-	128

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TABLE 1.3. NATURAL MOISTURE CONTENT, WET& DRY DENSITIES& UNCONFINED COMPRESSIVE STRENGTH. DRILL HOLE NO. 3. JOB: MINERAL SMELTING FACTORY, ELA.

SHELVY NO.	DEPTH Ft.	VISUAL CLASSIFICATION	M/C %	DESNITIES		U.C.S. TEST.		No. of Hammer Blows Per Foot (N)
				Lb/Cu.Ft. WET	DRY	STRENGTH (p.s.f.)	STRAIN (%)	
1	0-2	Brownish Grey SILT, some Sand, some Clay.	8.3	-	-	-	-	46
2	2-4	- do -	10.7	131.6	118.9	-	-	59
3	4-6	- do -	11.4	129.0	115.8	-	-	42
4	6-8	Yellowish Brown to grey Sandy & Clayey SILT.	15.0	129.3	112.5	-	-	36
5	8-10	- do -	15.6	127.5	110.3	3012	12.5	20
6	10-11	- do -	20.4	122.8	102.0	2754	12.5	21
7	12-14	Brownish Grey Silty SAND, some Clay.	15.4	129.3	112.1	1672	8.5	38
8	14-16	- do -	23.2	126.0	102.3	-	-	22
9	16-18	Yellowish Brown Sandy & Clayey SILT.	20.5	124.1	103.0	4170	12.5	22
10	18-20	- do -	21.7	120.3	98.9	-	-	14
11	20-22	Yellowish Brown SILT & CLAY, some Sand.	20.9	126.4	104.6	4427	20.0	21
12	25-27	Brownish Grey Clayey SAND & SILT.	17.3	129.1	110.1	4718	12.5	36
13	30-32	Brownish Grey Silty Coarse SAND, some Clay.	15.6	129.5	112.1	-	-	36
14	35-37	Brownish Grey SILT & CLAY, some Sand.	22.6	129.0	105.3	-	-	25
15	40-42	- do -	22.2	137.1	112.2	7073	18.0	85
16	45-47	Brownish Grey Sandy & Clayey SILT.	15.2	136.5	118.5	-	-	109
17	50-52	- do -	16.9	139.8	119.6	1810	12.5	113

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TABLE 1. NATURAL MOISTURE CONTENT, WET & DRY DENSITIES & UNCONFINED COMPRESSIVE STRENGTH
 JOB: MINERAL SMELTING FACTORY, ELA. DRILL HOLE NO. 4.

SHEET NO.	DEPTH Ft.	VISUAL CLASSIFICATION	M/C %	DENSITIES		U.C.S. STRENGTH, Lb/Sq.ft.	TEST STRAIN, %	No. of Hammer Blows Per Foot (N)
				Lb/Cu.Ft. WET	DRY			
1	0-2	Brown Sandy SILT, trace Clay.	4.7	-	-	-	-	36
2	2-4	- do -	7.3	121.6	113.3	-	-	38
3	4-6	Grey Sandy SILT, some Clay.	12.6	126.1	111.9	-	-	40
4	6-8	- do -	10.1	119.9	108.9	-	-	32
5	8-10	- do -	9.1	118.1	108.2	-	-	38
6	10-12	- do -	12.1	116.0	103.4	-	-	22
7	12-14	- do -	13.1	122.7	108.3	2524	12.5	25
8	14-16	Light Grey SAND & SILT, some Clay.	11.2	123.1	110.7	-	-	40
9	16-18	- do -	13.9	126.8	111.3	-	-	55
10	18-20	- do -	10.4	127.9	115.8	-	-	57
11	20-22	- do -	10.5	129.3	117.0	-	-	63
12	25-27	Brownish Grey Silty SAND, trace Clay.	10.7	130.0	117.4	-	-	63
13	30-32	- do -	12.0	121.0	108.0	-	-	37
14	35-37	- do -	12.8	123.9	109.8	2349	8.5	45
15	40-42	Yellowish Brown to Grey Silty SAND, trace Clay.	17.5	133.4	113.5	-	-	89
16	45-47	- do -	12.6	125.0	119.8	-	-	109
17	50-52	- do -	10.1	-	-	-	-	115

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