ATTACHMENT C

COST ESTIMATES

FOR

RECLAMATION

OF

WHITE MESA FACILITIES

BLANDING, UTAH

PREPARED BY

INTERNATIONAL URANIUM (USA) CORP.

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International Uranium (USA) Corp.

Cost Estimates for Reclamation

Of

White Mesa Mill

Blanding, Utah

JULY 2000

Source Material License No. SUA-1358
Docket No. 40-8681

International Uranium (USA) Corp.

Cost Estimates for Reclamation of White Mesa Mill

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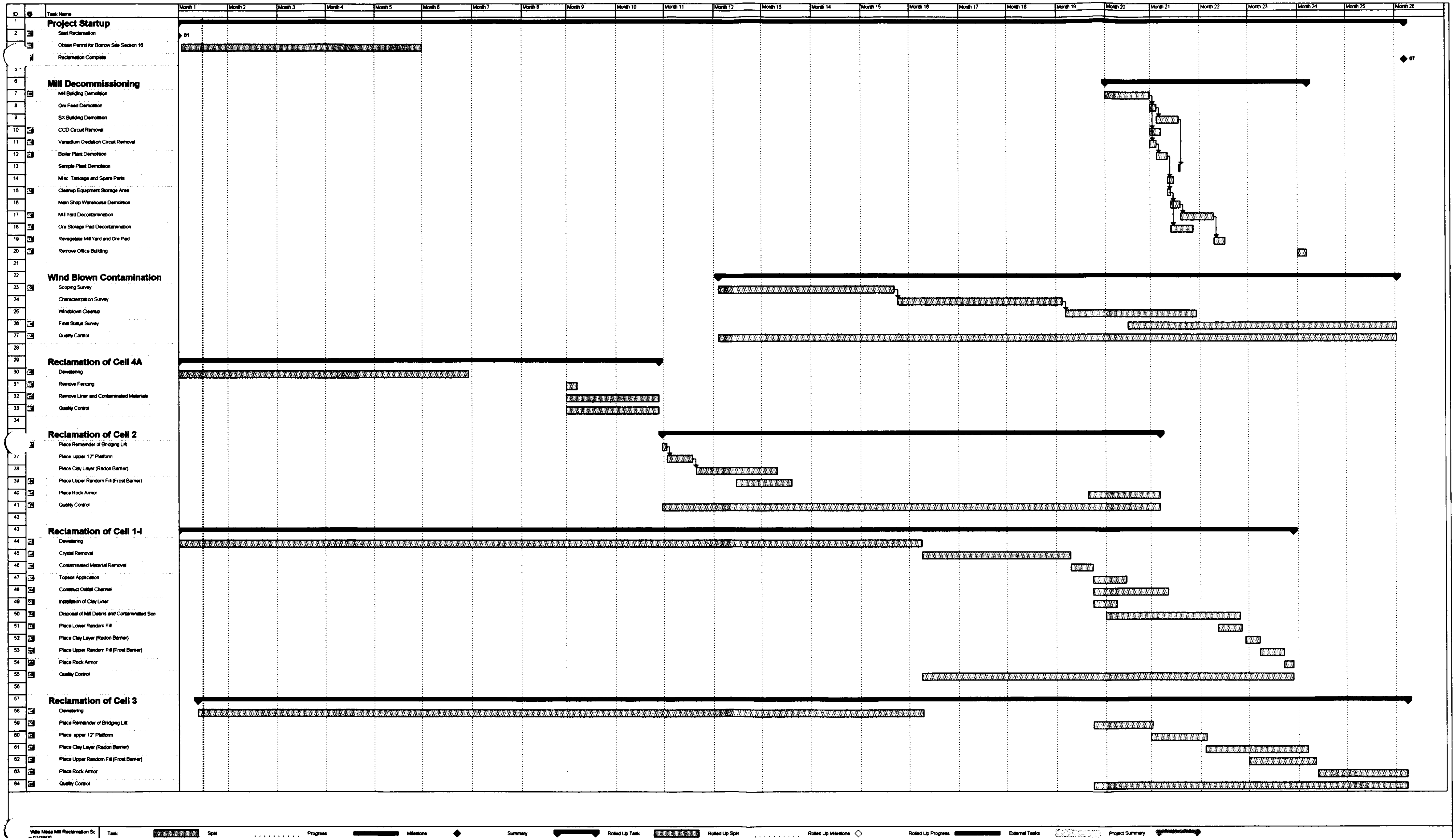


International Uranium (USA) Corporation
White Mesa Mill Reclamation
Revision 3.0 - July 2000

WHITE MESA MILL RECLAMATION COST ESTIMATE
July 2000

		July 2000 Estimate
Mill Decommissioning		$1,505,167
Cell 2		$1,082,870
Cell 3		$1,565,444
Cell 4A		$120,128
Cell 1		$1,234,212
Miscellaneous		$1,939,480
Subtotal Direct Costs		$7,447,302
Profit Allowance	10.00%	$744,730
Contingency	15.00%	$1,117,095
Licensing & Bonding	2.00%	$148,946
Long Term Care Fund		$606,721
Total Reclamation		$10,064,794
Revised Bond Amount		$10,064,794

MILL DECOMMISIONING

Mill Building Demolition

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	720	$12,757
Mechanics	hrs	$13.80	640	$8,829
Laborers	hrs	$10.35	320	$3,311
Small Tools	hrs	$1.25	960	$1,200
Cat 769 Haul Truck	hrs	$60.52	640	$38,735
Truck Drivers	hrs	$12.74	640	$8,154
Cat 988 Loader	hrs	$95.68	160	$15,308
Cat 375 Excavator	hrs	$123.76	160	$19,802
PC-400 with Shears	hrs	$159.84	160	$25,574
65 Ton Crane	hrs	$55.91	160	$8,946
30 Ton Crane	hrs	$40.80	80	$3,264
Equipment Maintenance (Butler)	hrs	$10.01	1,360	$13,617
Concrete Removal	sf	$3.30	37,500	$123,750

Total Mill Building Demolition **$283,247**

Ore Feed Demolition

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	48	$850
Mechanics	hrs	$13.80	64	$883
Laborers	hrs	$10.35	32	$331
Small Tools	hrs	$1.25	96	$120
Cat 769 Haul Truck	hrs	$60.52	64	$3,873
Truck Drivers	hrs	$12.74	64	$815
Cat 988 Loader	hrs	$95.68	16	$1,531
Cat 375 Excavator	hrs	$123.76	16	$1,980
PC-400 with Shears	hrs	$159.84	16	$2,557
30 Ton Crane	hrs	$40.80		$0
Equipment Maintenance (Butler)	hrs	$10.01	112	$1,121

Total Ore Feed Demolition **$14,063**

SX Building Demolition

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	240	$4,252
Mechanics	hrs	$13.80	320	$4,415
Laborers	hrs	$10.35	160	$1,655
Small Tools	hrs	$1.25	480	$600
Cat 769 Haul Truck	hrs	$60.52	320	$19,367
Truck Drivers	hrs	$12.74	320	$4,077
Cat 988 Loader	hrs	$95.68	80	$7,654
Cat 375 Excavator	hrs	$123.76	80	$9,901
PC-400 with Shears	hrs	$159.84	80	$12,787
65 Ton Crane	hrs	$55.91		$0
30 Ton Crane	hrs	$40.80		$0
Equipment Maintenance (Butler)	hrs	$10.01	560	$5,607
Concrete Removal	sf	$3.30	55,970	$184,701

Total SX Building Demolition **$255,017**

CCD Circuit Removal

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	195	$3,455
Mechanics	hrs	$13.80	120	$1,655
Laborers	hrs	$10.35	60	$621
Small Tools	hrs	$1.25	180	$225
Cat 769 Haul Truck	hrs	$60.52	120	$7,263
Truck Drivers	hrs	$12.74	120	$1,529
Cat 988 Loader	hrs	$95.68	30	$2,870
Cat 375 Excavator	hrs	$123.76	30	$3,713
PC-400 with Shears	hrs	$159.84	30	$4,795
65 Ton Crane	hrs	$55.91	30	$1,677
30 Ton Crane	hrs	$40.80	15	$612
Equipment Maintenance (Butler)	hrs	$10.01	315	$3,154
Concrete Removal	sf	$3.30	15,000	$49,500

Total CCD Circuit Removal **$81,070**

MILL DECOMMISIONING

Sample Plant Removal

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	24	$425
Mechanics	hrs	$13.80	32	$441
Laborers	hrs	$10.35	16	$166
Small Tools	hrs	$1.25	48	$60
Cat 769 Haul Truck	hrs	$60.52	32	$1,937
Truck Drivers	hrs	$12.74	32	$408
Cat 988 Loader	hrs	$95.68	8	$765
Cat 375 Excavator	hrs	$123.76	8	$990
PC-400 with Shears	hrs	$159.84	8	$1,279
30 Ton Crane	hrs	$40.80		$0
Equipment Maintenance (Butler)	hrs	$10.01	56	$561
Concrete Removal	sf	$3.30	4,200	$13,860

Total Sample Plant Removal **$20,892**

Boiler Demolition

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	120	$2,126
Mechanics	hrs	$13.80	160	$2,207
Laborers	hrs	$10.35	80	$828
Small Tools	hrs	$1.25	240	$300
Cat 769 Haul Truck	hrs	$60.52	160	$9,684
Truck Drivers	hrs	$12.74	160	$2,038
Cat 988 Loader	hrs	$95.68	40	$3,827
Cat 375 Excavator	hrs	$123.76	40	$4,951
PC-400 with Shears	hrs	$159.84	40	$6,394
65 Ton Crane	hrs	$55.91		$0
30 Ton Crane	hrs	$40.80		$0
Equipment Maintenance (Butler)	hrs	$10.01	280	$2,804
Concrete Removal	sf	$3.30	2,900	$9,570

Total Boiler Demolition **$44,728**

Vanadium Oxidation Circuit Removal

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	48	$850
Mechanics	hrs	$13.80	64	$883
Laborers	hrs	$10.35	32	$331
Small Tools	hrs	$1.25	96	$120
Cat 769 Haul Truck	hrs	$60.52	64	$3,873
Truck Drivers	hrs	$12.74	64	$815
Cat 988 Loader	hrs	$95.68	16	$1,531
Cat 375 Excavator	hrs	$123.76	16	$1,980
PC-400 with Shears	hrs	$159.84	16	$2,557
65 Ton Crane	hrs	$55.91		$0
30 Ton Crane	hrs	$40.80		$0
Equipment Maintenance (Butler)	hrs	$10.01	112	$1,121
Concrete Removal	sf	$3.30	1,200	$3,960

Total Vanadium Oxidation Circuit Removal **$18,023**

Main Shop/Warehouse Demolition

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	96	$1,701
Mechanics	hrs	$13.80	128	$1,766
Laborers	hrs	$10.35	64	$662
Small Tools	hrs	$1.25	192	$240
Cat 769 Haul Truck	hrs	$60.52	128	$7,747
Truck Drivers	hrs	$12.74	128	$1,631
Cat 988 Loader	hrs	$95.68	32	$3,062
Cat 375 Excavator	hrs	$123.76	32	$3,960
PC-400 with Shears	hrs	$159.84	32	$5,115
Equipment Maintenance (Butler)	hrs	$10.01	224	$2,243
Concrete Removal	sf	$3.30	19,300	$63,690

Total Main Shop/Warehouse Demolition **$91,816**

MILL DECOMMISIONING

Office Building Demolition

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	72	$1,276
Mechanics	hrs	$13.80	96	$1,324
Laborers	hrs	$10.35	48	$497
Small Tools	hrs	$1.25	144	$180
Cat 769 Haul Truck	hrs	$60.52	96	$5,810
Truck Drivers	hrs	$12.74	96	$1,223
Cat 988 Loader	hrs	$95.68	24	$2,296
Cat 375 Excavator	hrs	$123.76	24	$2,970
PC-400 with Shears	hrs	$159.84	24	$3,836
Equipment Maintenance (Butler)	hrs	$10.00	168	$1,680
Concrete Removal	sf	$3.30	12,100	$39,930

Total Office Building Demolition **$61,023**

Misc. Tankage & Spare Parts Removal

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	24	$425
Mechanics	hrs	$13.80	32	$441
Laborers	hrs	$10.35	16	$166
Small Tools	hrs	$1.25	48	$60
Cat 769 Haul Truck	hrs	$60.52	32	$1,937
Truck Drivers	hrs	$12.74	32	$408
Cat 988 Loader	hrs	$95.68	8	$765
Cat 375 Excavator	hrs	$123.76	8	$990
PC-400 with Shears	hrs	$159.84	8	$1,279
Equipment Maintenance (Butler)	hrs	$10.00	56	$560
Concrete Removal	sf	$3.20		$0

Total Misc. Tankage & Spare Parts Removal **$7,031**

Mill Yard Decontamination

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	582	$10,312
Cat 637 Scraper	hrs	$140.50	257	$36,110
Cat 988 Loader	hrs	$95.68	65	$6,219
Cat D8N Dozer With Ripper	hrs	$68.67	65	$4,463
Cat D7 Dozer	hrs	$57.90	65	$3,764
Cat 651 Waterwagon	hrs	$72.12	65	$4,688
Cat 14G Motorgrader	hrs	$48.93	65	$3,180
Equipment Maintenance (Butler)	hrs	$10.01	582	$5,827

Total Mill Yard Decontamination **$74,563**

Ore Storage Pad Decontamination

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	429	$7,601
Cat 637 Scraper	hrs	$140.50	189	$26,555
Cat 988 Loader	hrs	$95.68	48	$4,593
Cat D8N Dozer With Ripper	hrs	$68.67	48	$3,296
Cat D7 Dozer	hrs	$57.90	48	$2,779
Cat 651 Waterwagon	hrs	$72.12	48	$3,462
Cat 14G Motorgrader	hrs	$48.93	48	$2,348
Equipment Maintenance (Butler)	hrs	$10.01	429	$4,295

Total Ore Storage Pad Decontamination **$54,930**

Equipment Storage Area Cleanup

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	154	$2,729
Cat 637 Scraper	hrs	$140.50	69	$9,695
Cat 988 Loader	hrs	$95.68	17	$1,627
Cat D8N Dozer With Ripper	hrs	$68.67	17	$1,167
Cat D7 Dozer	hrs	$57.90	17	$984
Cat 651 Waterwagon	hrs	$72.12	17	$1,226
Cat 14G Motorgrader	hrs	$48.93	17	$832
Equipment Maintenance (Butler)	hrs	$10.01	154	$1,542

Total Equipment Storage Area Cleanup **$19,801**

MILL DECOMMISIONING

Revegetate Mill Yard & Ore Pad

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	231	$4,093
Cat 637 Scraper	hrs	$140.50	132	$18,547
Cat 988 Loader	hrs	$95.68	0	$0
Cat D8N Dozer With Ripper	hrs	$68.67	33	$2,266
Cat D7 Dozer	hrs	$57.90	33	$1,911
Cat 651 Waterwagon	hrs	$72.12		$0
Cat 14G Motorgrader	hrs	$48.93	33	$1,615
Equipment Maintenance (Butler)	hrs	$10.01	231	$2,313

Total Revegetate Mill Yard & Ore Pad **$30,744**

Total Demolition and Decontamination **$1,056,948**

CLEANUP OF WINDBLOWN CONTAMINATION

Scoping Survey

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Soil Samples	each	$50.00	100	$5,000
Survey Crew	hrs	$13.19	752	$9,917
Sample Crew	hrs	$13.19	1,312	$17,301

Total Scoping Survey **$32,218**

Characterization Survey

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Soil Samples	each	$50.00	472	$23,600
Sample Crew	hrs	$13.19	1,136	$14,980

Total Characterization Survey **$38,580**

Final Status Survey

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Soil Samples	each	$50.00	300	$15,000
Sample Crew	hrs	$13.19	3,552	$46,840

Total Final Status Survey **$61,840**

Windblown Cleanup

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	1,190	$21,084
Cat 637 Scraper	hrs	$140.50	680	$95,543
Cat D8N Dozer With Ripper	hrs	$68.67	170	$11,674
Cat D7 Dozer	hrs	$57.90	170	$9,844
Cat 14H Motorgrader	hrs	$48.93	170	$8,317
Soil Samples	each	$50.00	500	$25,000
Survey Crew	hrs	$13.19	163	$2,149
Sample Crew	hrs	$13.19	83	$1,095
Equipment Maintenance (Butler)	hrs	$10.01	1,190	$11,915

Total Windblown Cleanup **$186,621**

Quality Control

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Quality Control Contractor	hrs	$62.00	2,080	**$128,960**

Total Quality Control **$128,960**

Total Cleanup Windblown Contamination **$448,219**

TOTAL MILL DECOMMISIONING **$1,505,167**

INTERNATIONAL URANIUM (USA) CORP.
COST ESTIMATE

NAME/PROJECT .... Date .... Calc by .... Sheet ...... of ......

MILL DECOMMISSIONING

1) REMOVAL OF CONTAMINATED MATERIALS FROM MILL YARD.

ASSUME:

- 18" (1.5 feet) WILL HAVE TO BE REMOVED
- AREA (FROM CAD) = 1,643,453 ft² = 37.8 ACRES

Therefore VOLUME MOVED = [1,643,453 × 1.5] ÷ 27 = 91,302 yd³

SAY **91,300 yd³**

91,300 yd / 355 yd/hr = **257 hours**

HAUL ROUTE # 2

2) REMOVAL OF CONTAMINATED MATERIALS FROM ORE PAD

ASSUME:

- 18" WILL HAVE TO BE REMOVED
- AREA (from CAD) = 976,780 ft² = 22.4 ACRES.

Therefore VOLUME MOVED = [976,780 × 1.5] ÷ 27 = 54,265 yd³

SAY **54,300 yd³**

54,300 yd / 287 yd/hr = **189 hours**

HAUL ROUTE # 3

INTERNATIONAL URANIUM (USA) CORP.
COST ESTIMATE

NE/PROJECT .... Date .... Calc by .... Sheet ...... of ......

MILL DECOMMISSIONING

3) DEMOLITION EQUIPMENT
- KAMATSU PC400 (OR CAT EQUIVALENT) WITH La Bounty Shears (hydraulic)
- CAT 375L BACK HOE W/ GRAPPLES.
- 769C ROCK TRUCKS (4 ea)
- 988 LOADER (1 ea)

4) DEMOLITION CREW.
- HEAVY EQUIPMENT OPERATORS - PC400, 375, 988
- DUST CONTROL - 2 - LABORERS
- MECHANICS - CUTTING UP OF DEBRIS TO REMOVE VOIDS 4
- TRUCK DRIVERS - 4 ea - 769D TRUCKS

5) TOOL & EXPENDABLE ALLOWANCE, COVERING THE FOLLOWING:
- SAFETY GEAR
- HAND TOOLS
- BOTTLED GASES & TORCHES.
- ALLOW 1.25 / MAN HOUR FOR ALL BUT H.E. OPERATORS + TRUCK DRIVERS

MILL DECOMMISSIONING

6) DEMOLITION TIME ESTIMATES. (SHEAR & GRAPPLE)

• MILL BUILDING	20 days
• COARSE ORE	2 days
• SX BUILDING	10 days
• CCD, PLT, CLARIFIER	5 days
• SAMPLE PLANT	1 day
• BOILER	5 days
• Vanadium Oxidation	2 days
• SHOP / WAREHOUSE	4 days
• OFFICE BUILDING	3 days
• MISC TANKAGE & "NORTH FORTY"	4 days

7) FOUNDATION DEMOLITION

- ASSUME THAT MEANS 020-750-0440 OVER ENTIRE AREA OF STRUCTURE WILL SUFFICE @ $3.30/ft²
- AREAS ARE AS FOLLOWS. (FROM CAD)

	AREA, ft²	EST $
MILL BUILDING	37,500	120,000
SX BUILDING	55,970	179,100
SHOP / WAREHOUSE	19,280	61,700
OFFICE	12,100	38,700
SAMPLE PLANT	4,200	13,400
DIESEL SHOP	2050	6,600
BOILER	2900	9,300

- LABOR $2.75, EQUIP $.55

MILL DECOMMISSIONING

8) REVEGETATION

ASSUME . . .

- MILL YARD AREA = 1,643,453 ft^2
- ORE PAD AREA = 976,780 ft^2
- PLACE 6"
- 637 ROUTE #4 APPROXIMATES HAUL

therefore $[[1{,}643{,}453 + 976{,}780]\ ft^2 \times \tfrac{1}{2}\ ft] \div 27\ ft^3/yd = 48{,}522\ yd^3$

say **48,600 yd^3**

$\therefore \dfrac{48{,}600\ yd^3}{368\ yd^3/hr} =$ **132 "637" hours**

MILL DECOMMISIONING

WIND BLOWN CONTAMINATION

1) Scoping Survey

- Initial survey will be conducted on a area to be determined but for this estimate it is defined as an area approximated by a perimeter 1000 feet outside of the Restricted Area Boundries. This is conservative since wind blown contamination would most likely be found down wind of the site, which is on the East side of the restricted area

- Area determined by Cad. = 38,728,000 ft^2

Area Requiring wind blown survey is

Total Area –	38,728,000 ft^2
Cell 4A	1,909,000 ft^2
Cell 3	3,234,000 ft^2
Cell 2	2,987,000 ft^2
Cell 1	2,576,000 ft^2
Mill Yard	1,643,000 ft^2
Ore Storage Pad	977,000 ft^2
	25,402,000 ft^2

- Assume placement of standard NRC/EPA 10 x 10 meter grid (1076 ft^2)
- Assume scoping survey completed by scanning with MR meter held close to ground while traveling at ± 0.5 m/sec as per guidance in NUREG 5849.

- Survey crew of 2 capable of setting 500 grid points per day

$$\frac{25,402,000\ ft^2}{1076\ ft^2} = 23,600 \text{ Grid points}$$

$$\frac{23600 \text{ points}}{500 \text{ points/day}} \cong 47 \text{ days}$$

2 men x 8hrs x 47 Days = **752 man hrs** – Survey

- Scanning Crew consists of 2 men –

- Coverage 0.5 m/sec x 60 sec/min x 8hrs/day = 14,400 m/day

Assume .8 eff. factor

14,400 m/day x .8 = 11,520 m/day

Wind blown Contamination - Scoping Survey

- Assume 30 meter Path for each 10 x 10 grid to Cover 10% of Surface area (Per NUREG 5849)

Crew Can Scan $\frac{11,520 \text{ m/day}}{30 \text{ m/grid}}$ = 384 Grids/day

∴ $\frac{23,600 \text{ Grids}}{384 \text{ Grids/day}}$ ≅ 62 Day To Complete Initial Scan

62 Days x 2 man x 8 hrs/Day = **992 man hrs**

- Assume map Production + Data Reduction take Scanning Crew an additional 20 Days To Complete

20 Days x 2 man x 8 hrs/Day = **320 man Hrs**

Total Scanning Man hrs = **1312**

- Scoping Survey will require 100 Confirmatory Soil Samples at a Cost of $50.00/Each (Unat + Ra 226)
- Samples Can be taken at Same time as Scanning takes place.

2) Characterization Survey -

Survey of areas identified as affected areas by Scoping Survey

- Assume:
  - 20% of Area will require additional Sampling
  - Probing will be used, 4 probe sites/grid (Beta, Gamma)
  - Soil Samples will be required on 10% of Grid Samples
    - Samples will be for Unat + Ra 226
    - Cost/Sample = $50 (Lab)

$\frac{25,402,000 \text{ ft}^2}{1076 \text{ ft}^2/\text{grid}}$ = 23,608 Grids x .2 = 4722 Grids

- Crew can cover 100 Grids/day probing
- Crew Can take 25 Soil Samples/day

Probing takes $\frac{4722 \text{ Grids}}{100 \text{ Grids/day}}$ ≅ **47 Days**

47 x 2 x 8 = **752 hrs**

WINDBLOWN CONTAMINATION – CHARACTERIZATION SURVEY

Soil Sample are 10% of Probe grids

4721 x .10 = 472 Soil Sample.

$\frac{472 \text{ Samples}}{25 \text{ Sample/day}} \cong$ [19 days] x 8hrs x 2 = [304 M hrs]

Map Preparation + Data Reduction take about 5 days

$5 \times 2^{\text{man}}_{\text{Day}} \times 8^{hr} =$ [80 man hrs]

Total Hrs = [1136 man hrs]

3) Remediation Control Survey

- Provided by QA/QC Contractor

4) Final Status Survey

- In order to gain final release, will require 4 Gamma Estimates per each 100 m² grid square in the affected area (20% of area)
- 200 random soil samples will be gathered from the unaffected areas (80% of area)
- Will require 100 confirmatory samples for the affected area

Therefore

$25{,}402 \div 1076\ ft^2/100m^2$ = 23,607 Grids Total

$23{,}607 \times 0.20$ = 4,721 Grids Affected

$4{,}721 \times 4$ = 18,886 Gamma Estimates.

- Crew can take 100 probe samples/day
  ∴ 18886 ÷ 100 = 188.8 days say 190 days
- Crew can take 25 soil samples/day
  ∴ [200 + 100] ÷ 25 = 12 days.
- Assume 20 additional days for data reduction & report generation

INTERNATIONAL URANIUM (USA) CORP.
COST ESTIMATE

...E/PROJECT .... Date .... Calc by .... Sheet ..... of .....

MILL DECOMISSIONING
WIND BLOWN CONTAMINATION (CONT)

5) CLEAN-UP.

- ASSUME 20% OF AREA SURVEYED REQUIRES CORRECTIVE ACTION
- 6" OF SOIL WILL BE STRIPPED

Therefore 25,402 M^2 ft² x 0.20 x 0.5 ft = 2,540,000 ft³

or 94,080 yd³

say **94,100 yd³**

- AS IT IS NOT KNOWN WHAT AREAS MAY BE CONTAMINATED, ASSUME THE USE OF 637 HAUL ROUTE #6 TO BE CONSERVATIVE
- BECAUSE OF THE POTENTIAL FOR IRREGULAR & DISCONNECTED AREAS, EFFICIENCY WILL BE ONLY 50% OF REGULAR 637 EFFICIENCY.

Therefore 277 yd³/hr x 0.50 = 138.5 yd³/hr

say **138 yd³/hr**

Therefore 94,100 yd³ ÷ 138 yd³/hr = 681 scraper hours

say **680 hours**

RECLAMATION OF CELL 2

Obtain Permits for Clay Borrow Site - Section 16

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Permits & Licenses	ea	$10,000.00	5	**$50,000**

Total Obtain Permits for Clay Borrow Site - Section 16 **$50,000**

Place Remainder of Bridging Lift

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	178	$3,154
Cat 627F Scraper	hrs	$140.50	78	$10,959
Cat 815C Compactor	hrs	$66.15	20	$1,323
Cat D8N Dozer With Ripper	hrs	$68.67	20	$1,373
Cat D7 Dozer	hrs	$57.90	20	$1,158
Cat 651 Waterwagon	hrs	$72.12	20	$1,442
Cat 14G Motorgrader	hrs	$48.93	20	$979
Equipment Maintenance (Butler)	hrs	$10.01	178	$1,782

Total Place Remainder of Bridging Lift **$22,171**

Place Lower Random Fill (12")

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	902	$15,981
Cat 637 Scraper	hrs	$140.50	402	$56,483
Cat 825 Compactor	hrs	$66.15	100	$6,615
Cat D8N Dozer With Ripper	hrs	$68.67	100	$6,867
Cat D7 Dozer	hrs	$57.90	100	$5,790
Cat 651 Waterwagon	hrs	$72.12	100	$7,212
Cat 14G Motorgrader	hrs	$48.93	100	$4,893
Equipment Maintenance (Butler)	hrs	$10.01	902	$9,032

Total Place Lower Random Fill (12") **$112,872**

Clay Layer

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	1,690	$29,943
Cat 825 Compactor	hrs	$66.15	320	$21,167
Cat D8N Dozer With Ripper	hrs	$68.67	300	$20,601
Cat D7 Dozer	hrs	$57.90	0	$0
Cat 651 Waterwagon	hrs	$72.12	300	$21,635
Cat 14G Motorgrader	hrs	$48.93	320	$15,656
Cat 980 Loader	hrs	$64.99	300	$19,496
5000 Gallon Water Truck	hrs	$40.64	150	$6,095
Highway Trucks	hrs	$40.00	2,400	$96,000
Truck Drivers	hrs	$12.74	2,400	$30,577
Equipment Maintenance (Butler)	hrs	$10.01	4,090	$40,952

Total Place Clay Layer **$302,123**

RECLAMATION OF CELL 2

Upper Random Fill

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	1,990	$35,258
Cat 637 Scraper	hrs	$140.50	796	$111,842
Cat 825 Compactor	hrs	$66.15	199	$13,163
Cat D8N Dozer With Ripper	hrs	$68.67	199	$13,665
Cat D7 Dozer	hrs	$57.90	199	$11,523
Cat 651 Waterwagon	hrs	$72.12	199	$14,352
Cat 14G Motorgrader	hrs	$48.93	199	$9,736
5000 Gallon Water Truck	hrs	$40.64	199	$8,087
Equipment Maintenance (Butler)	hrs	$10.01	1,990	$19,925

Total Place Upper Random Fill **$237,551**

Rock Armor

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	825	$14,617
Cat D7 Dozer	hrs	$57.90	275	$15,924
Cat 651 Waterwagon	hrs	$72.12	275	$19,833
Cat 14G Motorgrader	hrs	$48.93	275	$13,454
Rock Cost Delivered	CY	$3.34	66,200	$220,965
Equipment Maintenance (Butler)	hrs	$10.01	825	$8,261

Total Place Rock Armor **$293,053**

Quality Control

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Quality Control Contractor	hrs	$62.00	1,050	**$65,100**

Total Quality Control **$65,100**

TOTAL RECLAMATION OF CELL 2 **$1,082,870**

INTERNATIONAL URANIUM (USA) CORP.
COST ESTIMATE

No. 5505 Engineer's Computation Pad

Volume Calculations
Cell 2

2/10/99

1) Area of Cell 2 - 2986,660 ft^2 = **68.56 Acres**

2) Area of Cell 2 still open 2/10/99 (see Figure A)

1000 × 200 Approximate Area ≈ 200000 sf (4.6 acres)

3) Assumptions:

- Bridging layer is placed using random fill from piles west of Cell 2
- Cell will be graded to Design elevation utilizing finer materials in random fill stockpiles and from "Clay" stockpiles.
- Clay will be mined, blended & hauled from borrow site located in Section 16 - 4 miles South of the mill - using Belly dump Trucks - Clay Layer on top of Cell only, except on South Slope Common to Cell 3
- The upper 2 feet of random fill will be placed utilizing the fine random fill and clay stockpiles
- Rock for side Armor, Top Armor and Toe aprons will come from an offsite gravel source 1 mile North of Blanding, Rock will be produced through screening, stockpiled and Trucked to the site at the time of use. Belly dump Trucks will Dump gravel in windrows on the top and sides of the Cell.

4) Bridging Layer (Random Fill) left to place

$$\frac{200{,}000\ ft^2 \times 3\ ft}{27\ ft^3/cy} = 22{,}222\ cy \rightarrow \boxed{23{,}000\ cy}$$

5) Bring Lower random fill up to Design Elevations

Assume Full Area of Cell × 1 foot thick

$$\frac{2{,}986{,}660\ ft^2 \times 1\ ft}{27\ ft^3/cy} = 110{,}617\ cy \rightarrow \boxed{110{,}700\ cy}$$

No. 5505 Engineer's Computation Pad

Volume Calculation Cell 2
(cont)

6) Placement of Clay Layer (1 foot Thick on Top of cell ONLY)

Full Area of Cell × 1ft thick

$$\frac{2986,660 ft^2 \times 1ft}{27 ft^3/cy} = 110,617 cy \rightarrow \boxed{110,700 cy}$$

7) Upper Random Fill Volume – Top of Pile

Full Area of Cell × 2 ft Thick

$$\frac{2986,660 ft^2 \times 2ft}{27 ft^3/cy} = 221,234 cy \rightarrow \boxed{221,300 cy}$$

8) Armor Protection – Top of Cell

Full Area of Cell × .5ft

$$\frac{2986,660 ft^2 \times .5 ft}{27 ft^3/cy} = 55,309 cy - \boxed{55,400 cy}$$

9) Cell 2 North Slope (Slope #1) Common with Cell 1

- Average height = 12 feet
- Length ≅ 2600 ft

a) Random Fill to Reduce Slope From 3:1 To 5:1

First Wedge
$$\left[\frac{12 \times 12 \times 5}{2} - \frac{12 \times 12 \times 3}{2}\right] \times 2600$$

$$= \frac{374,400 ft^3}{27 ft^3/cy} = 13,867 cy$$

$$= \boxed{13,900 cy}$$

Remaining Random Fill

$$\left[\frac{15 \times 15 \times 5}{2} - \frac{12 \times 12 \times 5}{2}\right] \times 2600$$

$$\frac{526,500 ft^3}{27 ft^3/cy} = \boxed{19,500 cy}$$

Volume Calculations Cell 2
(cont)

Total Random Fill N slope = 33,400 cy

b) Rock Armour 8" thick - (.67 ft)

$$\left[\frac{15.67 \times 15.67 \times 5}{2} - \frac{15 \times 15 \times 5}{2}\right] \times 2600 ft$$

$$\frac{132,957 ft^3}{27 ft^3/cy} = 4925 cy \rightarrow 5000 cy$$

c) Toe Apron $\frac{2 \times 7 \times 2600}{27} = 1348 cy \rightarrow 1400 cy$ — 6400 cy

10) North slope common with mill yard

- Average height 1 ft
- Average length 900 ft

a) Random Fill — Wedge — $\left[\frac{1 \times 1 \times 5}{2} - \frac{1 \times 1 \times 3}{2}\right] \times 900 ft$

$$\frac{900 ft^3}{27 ft^3/cy} = 33 cy \rightarrow 100 cy$$

Remaining Fill → Random $\left[\frac{4 \times 4 \times 5}{2} - \frac{1 \times 1 \times 5}{2}\right] \times 900 ft$

$$\frac{33,750 ft^3}{27 ft^3/cy} = 1250 cy$$

→ 1300 cy

Total Random Fill 1,400 cy

b) Rock Armour. 8" thick

$$\left[\frac{4.67 \times 4.67 \times 5}{2} - \frac{4 \times 4 \times 5}{2}\right] \times 900$$

$$\frac{13,070 ft^3}{27 ft^3} = 484 cy$$

500 cy

No Toe Apron No Fill

Volume Calculation Cell 2
(Cont)

11) Cell 2 West Dike Slope # 3

- Average Height 2 ft
- Length 500 ft.

a) Random Fill

Wedge $\left[\frac{2 \times 2 \times 5}{2} - \frac{2 \times 2 \times 3}{2}\right] \times 500 = 2000\ ft^3$

$= 74\ cy \rightarrow$ **100 cy**

Remaining Random fill $\left[\frac{5 \times 5 \times 5}{2} - \frac{2 \times 2 \times 5}{2}\right] \times 500$

$= \frac{26{,}250\ ft^3}{27\ ft^3/cy} = 972\ cy \Rightarrow$ **1,000 cy**

Total **1100 cy**

b) Rock Armor $\left[\frac{5.67 \times 5.67 \times 5}{2} - \frac{5 \times 5 \times 5}{2}\right] \times 500$

$= \frac{8936\ ft^3}{27\ ft^3} \cong 331\ cy \rightarrow$ **400 cy**

Toe Apron (?) → not required for slope 10' long – Drainage from Cell goes south to Cell 3 and then off of South slope of Cell 3

12) Cell 2 East Dike (Slope # 4)

- Average height 1 ft
- Length = 1,250 ft

a) Random Fill Wedge From # 10 $1\ ft^3/LF$

$1\ ft^3/LF \times 1250' = 1250\ ft^3$

$= 46\ cy \rightarrow$ **100 cy**

Remaining Random Fill – From #10 $37.5\ ft^3/LF$

$\frac{37.5\ ft^3/LF \times 1250\ LF}{27\ ft^3/cy} = 1736\ cy \rightarrow$ **1800 cy**

Total – Random Fill **1900 cy**

No. 5505 Engineer's Computation Pad

Volume Calculation Cell 2 (CONT)

12 (CONT) Rock Armor 8" (.67') THICK

USING #10 14.52 ft³/LF DICE

$14.52 \frac{cf}{lf} \times 1250\ LF = 18,153\ ft^3$

$\frac{18,153\ ft^3}{27\ ft^3/cy} \Rightarrow 672\ cy \rightarrow$ **700 cy**

NO TOE APRON →

13) SOUTH SLOPE CELL 2 COMMON WITH CELL 3

- Average Height 3 ft
- Length 3500 ft

a) Random Fill — Wedge → $\left[\frac{3 \times 3 \times 5}{2} + \frac{3 \times 3 \times 3}{2}\right] \times 3,500$

$= \frac{31500\ ft^3}{27} = 1167\ cy$

→ **1200 cy**

b) Clay Layer $\left[\frac{4 \times 4 \times 5}{2} - \frac{3 \times 3 \times 5}{2}\right] \times 3500$

$\frac{61250\ ft^3}{27} = 2268\ cy \rightarrow$ **2300 cy**

c) Random Fill (upper) $\left(\frac{6 \times 6 \times 5}{2} - \frac{4 \times 4 \times 5}{2}\right) \times 3500$

$\frac{175,000\ ft^3}{27} = 6481\ cy \rightarrow$ **6500 cy**

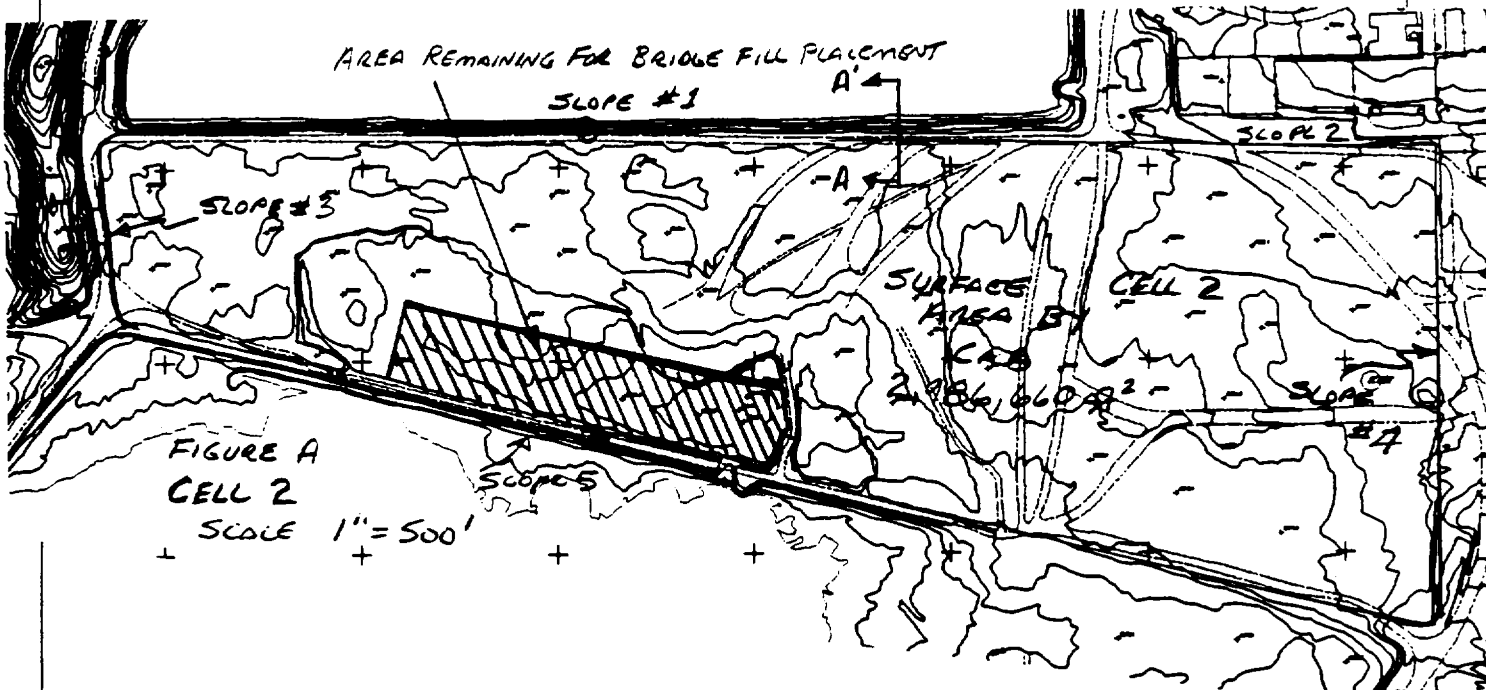
D.) Rock Armor -

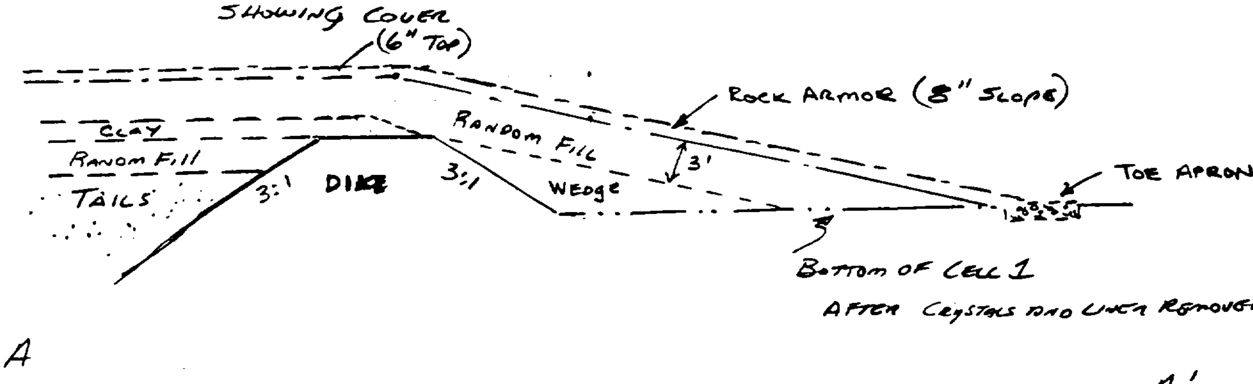
$\left(\frac{6.67 \times 6.67 \times 5}{2} - \frac{6 \times 6 \times 5}{2}\right) \times 3500$

$\frac{74,278\ ft^3}{27} = 2751\ cy \rightarrow$ **2800 cy**

NO TOE Apron -

CELL 2 VOLUME CALCULATIONS





Volume Calculations
Cell 2

Volume Summary.

	Bridge Layer	Lower Random	Clay	Upper Radon	Armour
Top of Cell	23,000	110,700	110,700	221,300	55,400
North (Slope #1)		13,900	—	19,500	6,400
North (Slope #2)		100	—	1,300	500
West (Slope #3)		100	—	1,000	400
East (Slope 4)		100	—	1,800	700
South (Slope 5)		1200	2,300	6,500	2800
Totals	23,000	126,100	113,000	251,400	66,200

PROJECT QUANTITIES

Cell Slopes

0.6667

Slope No.		Height feet	Length feet	EXISTING DIKE "A" AREA	EXISTING DIKE "A" VOL (CY)	WEDGE "B" AREA	WEDGE "B" VOL (CY)	RANDOM FILL "C" AREA	RANDOM FILL "C" VOL (CY)	RANDOM FILL "D" AREA	RANDOM FILL "D" VOL (CY)	RIPRAP "E" AREA	RIPRAP "E" VOL (CY)
1	**Cell 2 North dike**	12	2,600	216.0	20,800	144.0	13,867	62.5	6,019	140.0	13,481	51.7	4,976
2	**Cell 2 North Dike**	1	900	1.5	50	1.0	33	7.5	250	30.0	1,000	15.0	500
3	**Cell 2 West Dike**	2	500	6.0	111	4.0	74	12.5	231	40.0	741	18.3	340
4	**Cell 2 East Dike**	1	1,250	1.5	69	1.0	46	7.5	347	30.0	1,389	15.0	694
5	**Cell 2 South Dike**	3	3,500	0.0	0	9.0	1,167	17.5	2,269	50.0	6,481	30.7	3,976
	Cell 2 Slope Totals		6,150		21,031		15,187		9,116		23,093		10,485
6	**Cell 3 West Dike**	2	1,100	6.0	244	4.0	163	12.5	509	40.0	1,630	18.3	747
7	**Cell 3 South Dike**	16	1,750	384.0	24,889	256.0	16,593	82.5	5,347	180.0	11,667	65.0	4,213
8	**Cell 3 South Dike**	39	1,700	2,281.5	143,650	1,521.0	95,767	197.5	12,435	410.0	25,815	141.7	8,920
9	**Cell 3 East Dike**	6	800	54.0	1,600	36.0	1,067	32.5	963	80.0	2,370	31.7	938
	Cell 3 Slope Totals		5,350		170,383		113,589		19,255		41,481		14,819
	Total Material Requirements (CY)				191,414		128,776		28,370		64,574		25,304

NOTE:
Values shown in the "Area" column are the CROSS SECTIONAL AREA for the component in SQUARE FEET.
Values shown in the "Volume" column are the component's area x length converted to CUBIC YARDS.

CELL 2 RECLAMATION

CAT 637 RESOURCE REQUIREMENTS

	Volume	Route	Yds/Hr	%	Equip hrs
Cell 2 Bridging Lift					
Tailings Surface	23,000	5	296	100%	77.7
				TOTAL	**77.7**
Cell 2 Lower Random fill					
Tailings surface	110,700	5	296	67%	250.6
Tailings Surface	110,700	4	368	33%	99.3
Slope 1	13,900	5	296	100%	47.0
Slope 2	100	4	368	100%	0.3
Slope 3	100	5	296	100%	0.3
Slope 4	100	4	368	100%	0.3
Slope 5	1,200	5	296	100%	4.1
				TOTAL	**401.7**
Cell 2 Upper Random Fill					
Tailings surface	221,300	5	296	67%	500.9
Tailings Surface	221,300	4	368	33%	198.4
Slope 1	19,520	5	296	100%	65.9
Slope 2	1,300	4	368	100%	3.5
Slope 3	100	5	296	100%	0.3
Slope 4	1,800	4	368	100%	4.9
Slope 5	6,500	5	296	100%	22.0
				TOTAL	**796.0**
Cell 2 Rock Armour use Highway Trucks					

Clay Production

Haulage From Section 16

Haul Profile From Section 16 — Loaded

#	Segment Length	Grade		Loaded	Empty
1	2000'	4%	600 m.	1 min	.65
2	1800'	11%	540 M	1.8 min	1 min
3	4200'	1.8%	1260 m	1.4 min	1.2 min
4	5600'	0.5%	1600m	1.6 min	1.5 min
5	5700'	1.4%	1710 m	1.75 min	1.6[illegible] min
6	5200'	0.8%	1560m	1.5 min	1.48 min
	24,500'			9.05 min	7.43 min
					16.48 min

4.6 mile Trip Loaded
9.2 mile Round Trip

Clay = 2300#/cy Loose

Fixed Times — Loading —
980 7 cy Bucket 3 passes to Load
.5 min/cycle = 1.5 minutes Load
Dump → using belly Dumps → Continuous.

1.5 minutes to Load x 8 Trucks = 12 minutes
Cycle is 18 minutes → 6 minutes to spare

OFF Road Application 22 cy/Load

Cycle time = 18 minutes/Truck
50 minute hr = 2.7 cycles/hr

22 cy/cycle x 2.7 cycles/hr x 8 trucks
= ~~475~~ cy/hr.

Cell 2 = 118,000 cy Clay / .8 = ~~?~~ hrs Loader + haulage + Dozer
(Dozer Rips ~~500~~ cy/hr / say =)

= 141,250 Lcy = 297 hrs (8 Trucks) Spreading + Compacting take place as material hauled.
use 300 hrs

Using 8 Load fours.

Trucks	~~237~~ x ~~8~~ =	1896 hrs	— 2376 hrs
Dozer	300 x 1 =	300 hrs	Excess hrs to Strip 08 + Prep Site
Loader	~~237~~ x 1 =	~~237~~ hrs	297 - 300
Grader	237 x 1 =	237 hrs	297 300 + 20
WW	238 x 1 =	237 h	297 300
Compactor			300 + 20

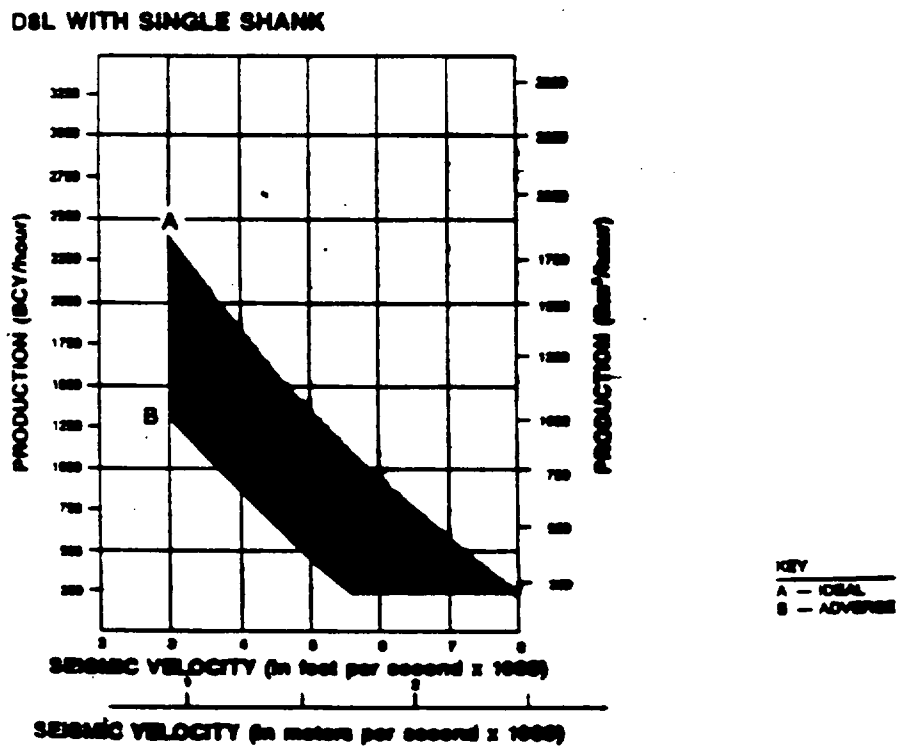
INTERNATIONAL URANIUM (USA) CORP.
COST ESTIMATE

NE/PROJECT WHITE MESA RECL. Date .... Calc by .... Sheet .... of ....

CLAY PRODUCTION COSTS
— SECTION 16 SOURCE —

1). CLAY PRODUCTION

- CLAYS WILL BE RIPPED FROM SOURCE @ SECTION 16
- APPROX 400 VERTICAL FEET OF BRUSHY BASIN EXPOSURE
- FROM CAT HANDBOOK ...
  MAX SEISMIC VELOCITY OF CLAY ≥ 6000 ft/sec



- BASED ON THE ABOVE, D8 CAT SHOULD BE ABLE TO PRODUCE AT LEAST 250 BCY / HOUR WITH AN AVERAGE OF -

  500 BCY/HR

- WE WILL ASSUME THAT THE CAT IS UTILIZED EVERY DAY OF CLAY PRODUCTION FOR RIPPING AND OR DOZING/BLENDING/PREPARATION.

RECLAMATION OF CELL 3

Dewatering of Cell 3

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Dewatering of Cell 3	hrs	$0.48	62,400	**$30,000**

Total Dewatering of Cell 3 **$30,000**

Place Remainder of Bridging Lift

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	1,945	$34,465
Cat 637 Scraper	hrs	$140.50	865	$121,536
Cat 825 Compactor	hrs	$66.15	216	$14,304
Cat D8N Dozer With Ripper	hrs	$68.67	216	$14,832
Cat D7 Dozer	hrs	$57.90	216	$12,507
Cat 651 Waterwagon	hrs	$72.12	216	$15,578
Cat 14G Motorgrader	hrs	$48.93	216	$10,568
Equipment Maintenance (Butler)	hrs	$10.01	1,945	$19,477

Total Place Remainder of Bridging Lift **$243,268**

Place Lower Random Fill (12")

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	1,745	$30,913
Cat 637 Scraper	hrs	$140.50	775	$108,891
Cat 825 Compactor	hrs	$66.15	194	$12,816
Cat D8N Dozer With Ripper	hrs	$68.67	194	$13,322
Cat D7 Dozer	hrs	$57.90	194	$11,233
Cat 651 Waterwagon	hrs	$72.12	194	$13,991
Cat 14G Motorgrader	hrs	$48.93	194	$9,491
Equipment Maintenance (Butler)	hrs	$10.01	1,745	$17,470

Total Place Lower Random Fill (12") **$218,127**

Clay Layer

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	1,975	$34,993
Cat 637 Scraper	hrs	$140.50	0	$0
Cat 825 Compactor	hrs	$66.15	375	$24,805
Cat D8N Dozer With Ripper	hrs	$68.67	350	$24,034
Cat D7 Dozer	hrs	$57.90	0	$0
Cat 651 Waterwagon	hrs	$72.12	350	$25,241
Cat 14G Motorgrader	hrs	$48.93	375	$18,347
Cat 980 Loader	hrs	$64.99	350	$22,746
5000 Gallon Water Truck	hrs	$40.64	175	$7,111
Highway Trucks	hrs	$40.00	2,800	$112,000
Truck Drivers	hrs	$12.74	2,800	$35,674
Equipment Maintenance (Butler)	hrs	$10.01	4,775	$47,811

Total Place Clay Layer **$352,761**

RECLAMATION OF CELL3

Upper Random Fill

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	2,490	$44,117
Cat 637 Scraper	hrs	$140.50	996	$139,943
Cat 825 Compactor	hrs	$66.15	249	$16,470
Cat D8N Dozer With Ripper	hrs	$68.67	249	$17,098
Cat D7 Dozer	hrs	$57.90	249	$14,418
Cat 651 Waterwagon	hrs	$72.12	249	$17,957
Cat 14G Motorgrader	hrs	$48.93	249	$12,182
5000 Gallon Water Truck	hrs	$40.64	249	$10,118
Equipment Maintenance (Butler)	hrs	$10.01	2,490	$24,932

Total Place Upper Random Fill **$297,237**

Rock Armor

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	948	$16,796
Cat D7 Dozer	hrs	$57.90	316	$18,298
Cat 651 Waterwagon	hrs	$72.12	316	$22,789
Cat 14G Motorgrader	hrs	$48.93	316	$15,460
Rock Cost Delivered	CY	$3.34	76,110	$254,043
Equipment Maintenance (Butler)	hrs	$10.01	948	$9,492

Total Place Rock Armor **$336,879**

Quality Control

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Quality Control Contractor	hrs	$62.00	1,406	**$87,172**

Total Quality Control **$87,172**

TOTAL RECLAMATION OF CELL 3 **$1,565,444**

No. 5505 Engineer's Computation Pad

2/16/99

Volume Calculations Cell 3

1) Area of Top of cell by CAD – 3,234,252 ft^2

74.25 ACRES

2) Area of Bridging layer (lower Random) placed
1,080,000 ft^2

25 ACRES

3) ASSUMPTIONS:

- Bridging Layer (Random Fill) comes from random Fill stockpiles west of Cells – using haul Route #6.
- Stockpiles designated as "Clay" will be used for top 12" of lower random Fill
- Clay for the radon barrier will be mined, blended, and hauled from Section 16 four miles South of the mill. 8" on slopes, 6" on top + 2'x7' apron at bottom of South slopes
- 2 foot layer of upper random fill will come from finer material in random fill stockpiles and "Clay" stockpiles
- Rock Armor for top, side slopes, and toe aprons will come from same source as Cell 2 Rock Armor. → Gravel pit North of Blanding.
- Clay Layer extends over only the top of Cell NOT ON SLOPES.

4) Bridging layer left to place

$$\frac{(3{,}234{,}252\,ft^2 - 1{,}080{,}000\,ft^2) \times 3\,ft}{27\,ft^3/cy} = CY$$

$$\frac{2154254 \times 3}{27} = 239{,}361\ CY$$

↓

239,400 CY

5) Bring lower random fill up to design elevations (Assume over total area for estimate, in reality parts of east end of pond is up to elevation already.)

$$\frac{3{,}234{,}252\,ft^2 \times 1\,ft}{27\,ft^3/cy} = 119{,}787\,cy \longrightarrow 119{,}800\ cy$$

2/17/99

Volume Calculations Cell 3

6) Placement of Clay Layer (1 foot thick) over full area Top of Cell

$$\frac{3,234,252\ ft^2 \times 1ft}{27\ ft^3/cy} = 119,773\ cy \rightarrow \boxed{119,800\ cy}$$

[.8 load factor]

7) upper random fill volume over full area of Cell

$$\frac{3234,252\ ft^2 \times 2ft}{27\ ft^3/cy} = 239,574\ cy \rightarrow \boxed{239,600\ cy}$$

8) Armor protection - Top of Cell 6" (.5ft)

$$\frac{3,234,252\ ft^2 \times .5\ ft}{27\ ft^3/cy} = 59,894\ cy \rightarrow \boxed{59,900\ cy}$$

9) Cell 3 West Slope (Slope #6) 2 foot high, 1100 feet long

- No Clay on slopes
- Toe Apron only at Base of long slopes or where drainage off of the Cells is directed
- Random fill wedge → No Existing Dike → so Transition from top Cover

$$\left(\frac{2 \times 2 \times 5}{2} \times 1100\ ft\right)/27 = 407\ cy \rightarrow \boxed{410\ cy}$$

- Random Fill

$$\left(\frac{5 \times 5 \times 5}{2} - \frac{2 \times 2 \times 5}{2}\right) \times 1100\ ft \rightarrow 57,750\ ft^3$$

$$\frac{57,750\ ft^3}{27\ ft^3/cy} = 2138\ cy \rightarrow \boxed{2,200\ cy}$$

- Rock Armor

$$\left(\frac{5.67 \times 5.67 \times 5}{2} - \frac{5 \times 5 \times 5}{2}\right) \times 1100 \rightarrow 19659\ ft^3$$

$$\frac{19,659\ ft^3}{27\ ft^3/cy} = 728\ cy \rightarrow \boxed{730\ cy}$$

62.5

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No. 5505 Engineer's Computation Pad

Volume Calculation Cell 3

10) Cell 3 South Dike (West End) Slope #7

- 16 ft average height
- 1750 foot long

Random Fill Wedge → 3:1-5:1 Covered →

$$\left[\frac{16 \times 16 \times 5}{2} - \frac{16 \times 16 \times 3}{2}\right] \times 1750 ft \rightarrow 448,000 ft^3$$

$$\frac{448,000 ft^3}{27 ft^3/cy} = 16,592 cy \rightarrow \boxed{16,600 cy}$$

Random fill - 1

$$\left[\frac{19 \times 19 \times 5}{2} - \frac{16 \times 16 \times 5}{2}\right] \times 1750 = 459,375 ft^3$$

$$\frac{459,375 ft^3}{27 ft^3/cy} = 17,013 cy \rightarrow \boxed{17,100 cy}$$

Rock Armor — slope - 8" thick

$$\left[\frac{19.67 \times 19.67 \times 5}{2} - \frac{19 \times 19 \times 5}{2}\right] \times 1750 \rightarrow$$

$$\frac{113,351 ft^3}{27 ft^3/cy} = 4198 cy \rightarrow \boxed{4200 cy}$$

Rock Apron at toe of slope

$$\frac{2' \text{ thick} \times 7' \text{ wide} \times 1750' \text{ long}}{27 ft^3/cy} = 907 cy \rightarrow \boxed{1000 cy}$$

---

11) Cell 3 South Dike (East End Common with Cell 4A) Slope #8

- 39 ft average height
- 1700 ft long
- Toe Apron full length

Random Fill Wedge $\left[\frac{39 \times 39 \times 5}{2} - \frac{39 \times 39 \times 3}{2}\right] \times 1700 ft \rightarrow 2,585,700 ft^3$

$$\frac{2585,700 ft^3}{27 ft^3/cy} = 95,766 cy \rightarrow \boxed{95,800 cy}$$

1521

Volume Calculations Cell 3 2/16/99

11) Cont

Upper Random Fill

$$\left[\frac{42 \times 42 \times 5}{2} - \frac{39 \times 39 \times 5}{2}\right] \times 1700 \rightarrow 1{,}032{,}750\ ft^3$$

$$\frac{1{,}032{,}750\ ft^3}{27\ ft^3/cy} \rightarrow 38{,}250\ cy \rightarrow \boxed{38{,}300\ cy}$$

Rock Armor

$$\left[\frac{42.67 \times 42.67 \times 5}{2} - \frac{42 \times 42 \times 5}{2}\right] \times 1700 \rightarrow 241{,}098\ ft^3$$

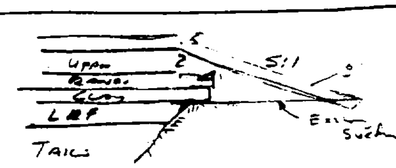
$$\frac{241{,}098\ ft^3}{27\ ft^3/cy} - 8930\ cy \longrightarrow \boxed{8950\ cy}$$

Rock Toe Apron

$$\frac{2' \times 7' \times 1700\ ft}{27\ ft^3/cy} = 881\ cy \longrightarrow \boxed{900\ cy}$$

Total Rock $\boxed{9850\ cy}$

12) Cell 3 East Slope



- Average height 4 feet
- 800 feet long

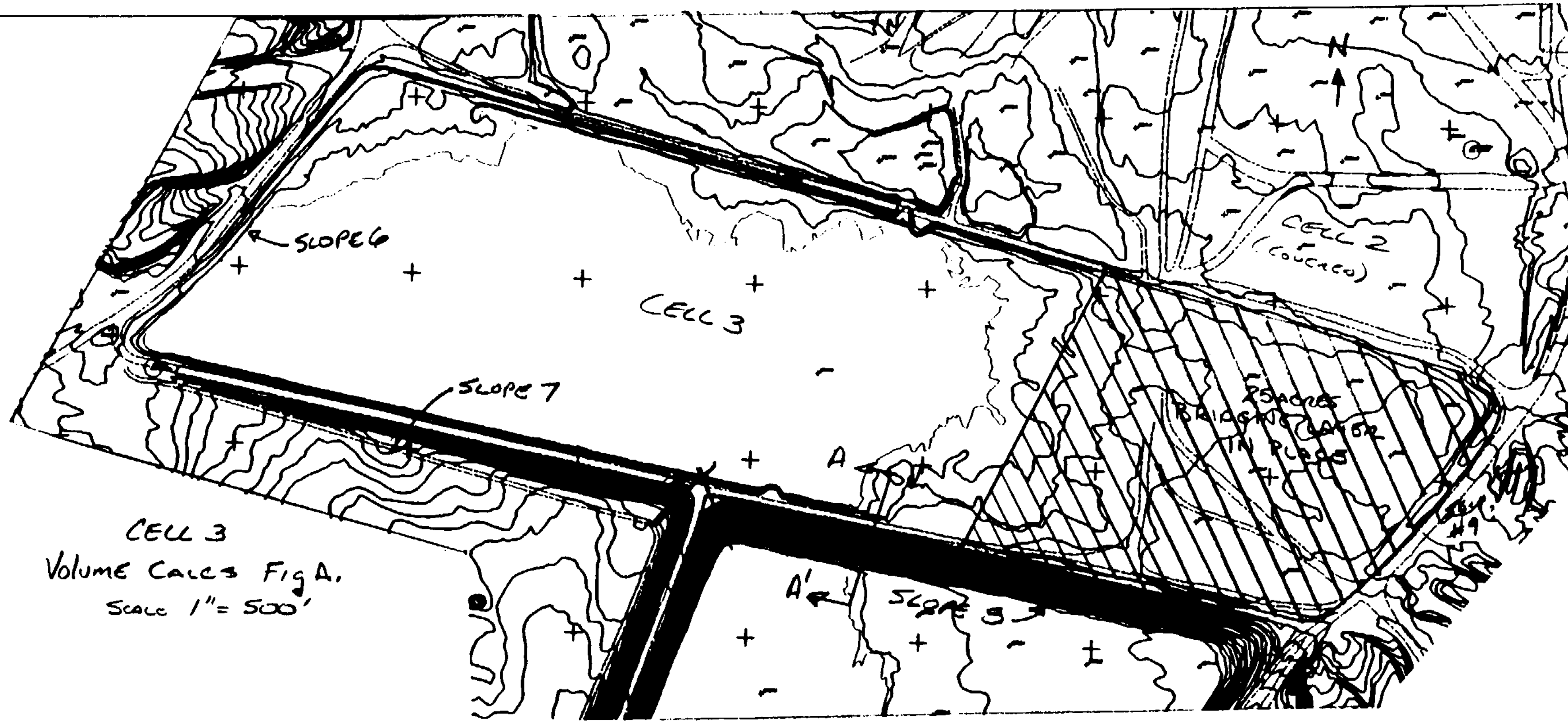
Random Fill (No existing dike) $- \frac{4 \times 4 \times 5}{2} \times 800 = 32{,}000\ ft^3$

$$\frac{32{,}000\ ft^3}{27\ ft^3/cy} = 1185\ cy \Rightarrow \boxed{1200\ cy}$$

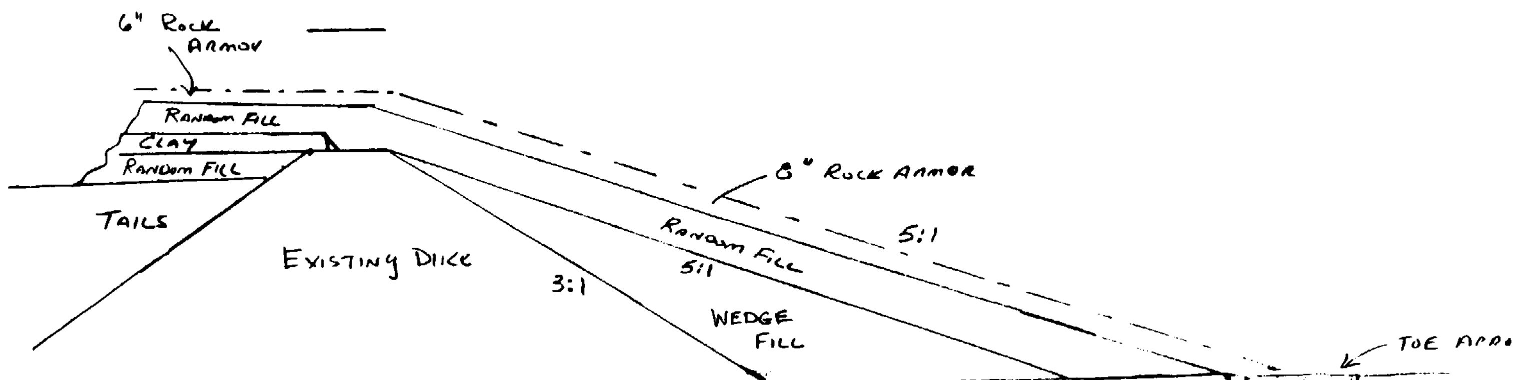
Rock Armor $- \left(\frac{4.67 \times 4.67 \times 5}{27} - \frac{4 \times 4 \times 5}{2}\right) \times 800 = 11{,}618\ ft^3$

$$\frac{11{,}618\ ft^3}{27\ ft^3/cy} \Rightarrow \boxed{430\ cy} \rightarrow$$

No Toe Apron



CELL 3
Volume Calcs Fig A.
Scale 1" = 500'



SECTION A - A' Not to Scale

Volume Calculation Cell 3

Volume Summary

	Bridge Layer	Lower Rand	Clay	Uppr Random	Armor
Top of Cell	239,400	119,800	119,800	239,400	59,900
West Slope (#6)	—	410	—	2,200	730
South Dike (#7)	—	16,600	—	17,100	5,200
South Dike (#8)	—	95,800	—	38,300	9850
East Slope (9)	—	—	—	1,200	430
Totals (cy)	239,400	232,610	119,800	298,200	76,110

CELL 3 PRODUCTION
(USE SAME ASSUMPTION AS CELL 2)

CLAY

Clay Volume = 119,800 BCY / .8 Swell factor = 149,750 LCY

TRUCKING 475 LCY/hr — 8 TRUCKS + 1 LOADER

149,750 LCY / 475 LCY/hr ≅ 316 hr + 10% ⇒ use 350 hrs

350 × 8 TRUCKS = 2800 hrs

980 LOADER — 350 hrs
D8N DOZER w/RIPPER — 350 hrs
CAT 651 WW 350 hrs
CAT 825 COMPACTOR 375 hrs
CAT 14G GRADER 395 hrs
5000 GALLON WATER TRK 175 hrs

ROCK ARMOR

Rock Armor Volume = 76,110 CY — 38 cy/TRUCK × 8 TRUCKS

304 cy/hr — DELIVERED
SAY 25% EXTRA TIME TO FINISH SPREADING —
241 cy/hr → 316 hrs

CELL 3 RECLAMATION

CAT 637 RESOURCE REQUIREMENTS

	Volume	Route	Yds/Hr	%	Equip hrs
Cell 3 Bridging Lift					
Tailings Surface	239,400	6	277	100%	864.3
				TOTAL	**864.3**
Cell 3 Lower Random Fill					
Tailings surface	119,800	6	296	100%	404.7
Slope 6	410	6	296	100%	1.4
Slope 7	16,600	6	368	100%	45.1
Slope 8	95,800	6	296	100%	323.6
Slope 9	0	6	368	100%	0.0
				TOTAL	**774.9**
Cell 3 Upper Random fill					
Tailings surface	239,400	6	296	100%	808.8
Slope 6	2,200	6	296	100%	7.4
Slope 7	17,100	6	368	100%	46.5
Slope 8	38,300	6	296	100%	129.4
Slope 9	1,200	6	368	100%	3.3
				TOTAL	**995.3**
Cell 3 Rock Armour use Highway Trucks					

CELL 4A CLEANUP

CELL 4A CLEANUP

Dewatering of Cell 4A

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Dewatering of Cell 4A	hrs	$0.48	11,500	**$5,529**

Total Dewatering of Cell 4A **$5,529**

Remove Fencing

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Cat 988 Loader	hrs	$95.68	40	$3,827
Equipment Operators	hrs	$17.72	40	$709
Equipment Maintenance (Butler)	hrs	$10.01	40	$401
Laborers	hrs	$10.35	160	$1,655

Total Remove Fencing **$6,592**

Remove Liner & Contaminated Material to Cell 3

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	303	$5,368
Cat 769 Truck	hrs	$60.52	606	$36,677
Truck Driver	hrs	$12.74	606	$7,721
Cat 988 Loader	hrs	$95.68	303	$28,990
Equipment Maintenance (Butler)	hrs	$10.01	909	$9,102

Total Remove Liner & Contaminated Material to Cell 3 **$87,858**

Quality Control

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Quality Control Contractor	hrs	$62.00	325	$20,150

Total Quality Control **$20,150**

TOTAL CELL 4A CLEANUP **$120,128**

INTERNATIONAL URANIUM (USA) CORP.
COST ESTIMATE

NE/PROJECT.................. Date.................. Calc by.................. Sheet...... of..........

CELL 4A WORK

1) ASSUMPTIONS

- ANY XTALS ARE PICKED UP WITH LINER
- AVERAGE OF 1 FOOT UNDER LINER WILL GO TO CELL 3
- ALL DIKE MATERIAL IS UNCONTAMINATED & CAN BE UTILIZED FOR CELL 3 COVER, THEREFORE, NO COST IS PLACED AGAINST ITS REMOVAL
- AREA OF CELL FOR VOLUME ESTIMATES IS 1,909 M ft^2
- CRYSTALS ESTIMATED TO BE 6" THICK OVER ENTIRE AREA

Therefore

QUANTITY OF CONTAMINATED MATERIAL =

$$\left[1{,}909{,}000 \times \left[6/12 + 12/12\right]\right] \div 27\ ft^3/yd^3 = 106{,}055$$

say **106,100 yd^3**

and

BASED ON HAUL ROUTE & PROFILE, EFFICIENCY = 175 yd^3/truck hour.

$106100\ yd^3 \div 175\ yd^3 =$ 606 TRUCK HOURS

= 303 FLEET HOURS (2 TRUCKS)

RECLAMATION OF CELL 1

Dewatering of Cell 1

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Dewatering of Cell 1	hrs	$0.48	62,400	**$30,000**

Total Dewatering of Cell 1 **$30,000**

Crystal Removal

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	2,695	$47,749
Cat 769 Truck	hrs	$60.52	2,157	$130,548
Truck Drivers	hrs	$12.74	2,157	$27,481
Cat 988 Loader	hrs	$95.68	539	$51,570
Cat D8N Dozer With Ripper	hrs	$68.67	539	$37,012
Cat 375 Excavator	hrs	$123.76	539	$66,709
Cat 651 Waterwagon	hrs	$72.12	539	$38,872
Cat 14G Motorgrader	hrs	$48.93	539	$26,371
Equipment Maintenance (Butler)	hrs	$10.01	4,852	$48,582

Total Crystal Removal **$474,893**

Contaminated Materials Removal

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	616	$10,914
Cat 637 Scraper	hrs	$140.50	308	$43,275
Cat D8N Dozer With Ripper	hrs	$68.67	77	$5,287
Cat 825C Compactor	hrs	$66.15	77	$5,093
Cat 651 Waterwagon	hrs	$72.12	77	$5,553
Cat 14G Motorgrader	hrs	$48.93	77	$3,767
Equipment Maintenance (Butler)	hrs	$10.01	616	$6,168

Total Contaminated Materials Removal **$80,058**

Topsoil Application

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	240	$4,252
Cat 637 Scraper	hrs	$140.50	120	$16,861
Cat D8N Dozer With Ripper	hrs	$68.67	40	$2,747
Cat 651 Waterwagon	hrs	$72.12	40	$2,885
Cat 14G Motorgrader	hrs	$48.93	40	$1,957
Equipment Maintenance (Butler)	hrs	$10.01	240	$2,403

Total Topsoil Application **$31,104**

RECLAMATION OF CELL1

Construct Channel

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	858	$15,202
Cat 637 Scraper	hrs	$140.50	272	$38,217
Cat 769 Truck	hrs	$60.52	450	$27,235
Truck Drivers	hrs	$12.74	450	$5,733
Cat 988 Loader	hrs	$95.68	150	$14,352
Drilling & Blasting Contractor	BCY	$1.50	89,100	$133,650
Cat 14G Motorgrader	hrs	$48.93	218	$10,666
Cat D8N Dozer With Ripper	hrs	$68.67	218	$14,970
Equipment Maintenance (Butler)	hrs	$10.01	1,308	$13,097

Total Construct Channel **$273,121**

Place Clay Liner

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	355	$6,290
Cat 637 Scraper	hrs	$140.50	0	$0
Cat 825 Compactor	hrs	$66.15	60	$3,969
Cat D8N Dozer With Ripper	hrs	$68.67	60	$4,120
Cat D7 Dozer	hrs	$57.90	0	$0
Cat 651 Waterwagon	hrs	$72.12	60	$4,327
Cat 980 Loader	hrs	$64.99	60	$3,899
5000 Gallon Water Truck	hrs	$40.64	30	$1,219
Highway Trucks	hrs	$40.00	435	$17,400
Truck Drivers	hrs	$12.74	435	$5,542
Cat 14G Motorgrader	hrs	$48.93	85	$4,159
Equipment Maintenance (Butler)	hrs	$10.01	1,580	$15,820

Total Place Clay Liner **$66,745**

Place Lower Random Fill

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	602	$10,666
Cat 637 Scraper	hrs	$140.50	172	$24,167
Cat 825 Compactor	hrs	$66.15	86	$5,689
Cat D8N Dozer With Ripper	hrs	$68.67	86	$5,906
Cat D7 Dozer	hrs	$57.90	86	$4,980
Cat 651 Waterwagon	hrs	$72.12	86	$6,202
Cat 14G Motorgrader	hrs	$48.93	86	$4,208
Equipment Maintenance (Butler)	hrs	$10.01	602	$6,028

Total Place Lower Random Fill **$67,844**

RECLAMATION OF CELL1

Clay Cap

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	305	$5,404
Cat 637 Scraper	hrs	$140.50	0	$0
Cat 825 Compactor	hrs	$66.15	55	$3,638
Cat D8N Dozer With Ripper	hrs	$68.67	55	$3,777
Cat D7 Dozer	hrs	$57.90	0	$0
Cat 651 Waterwagon	hrs	$72.12	55	$3,967
Cat 14G Motorgrader	hrs	$48.93	55	$2,691
Cat 980 Loader	hrs	$64.99	55	$3,574
5000 Gallon Water Truck	hrs	$40.64	30	$1,219
Highway Trucks	hrs	$40.00	440	$17,600
Truck Drivers	hrs	$12.74	440	$5,606
Equipment Maintenance (Butler)	hrs	$10.01	305	$3,054

Total Place Clay Cap **$50,529**

Upper Random Fill

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	688	$12,190
Cat 637 Scraper	hrs	$140.50	172	$24,167
Cat 825 Compactor	hrs	$66.15	86	$5,689
Cat D8N Dozer With Ripper	hrs	$68.67	86	$5,906
Cat D7 Dozer	hrs	$57.90	86	$4,980
Cat 651 Waterwagon	hrs	$72.12	86	$6,202
Cat 14G Motorgrader	hrs	$48.93	86	$4,208
5000 Gallon Water Truck	hrs	$40.64	86	$3,495
Equipment Maintenance (Butler)	hrs	$10.01	688	$6,889

Total Place Upper Random Fill **$73,724**

RECLAMATION OF CELL1

Rock Armor

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	90	$1,595
Cat D7 Dozer	hrs	$57.90	30	$1,737
Cat 651 Waterwagon	hrs	$72.12	30	$2,164
Cat 14G Motorgrader	hrs	$48.93	30	$1,468
Rock Cost Delivered	CY	$3.34	8,607	$28,729
Equipment Maintenance (Butler)	hrs	$10.01	90	$901

Total Place Rock Armor **$36,593**

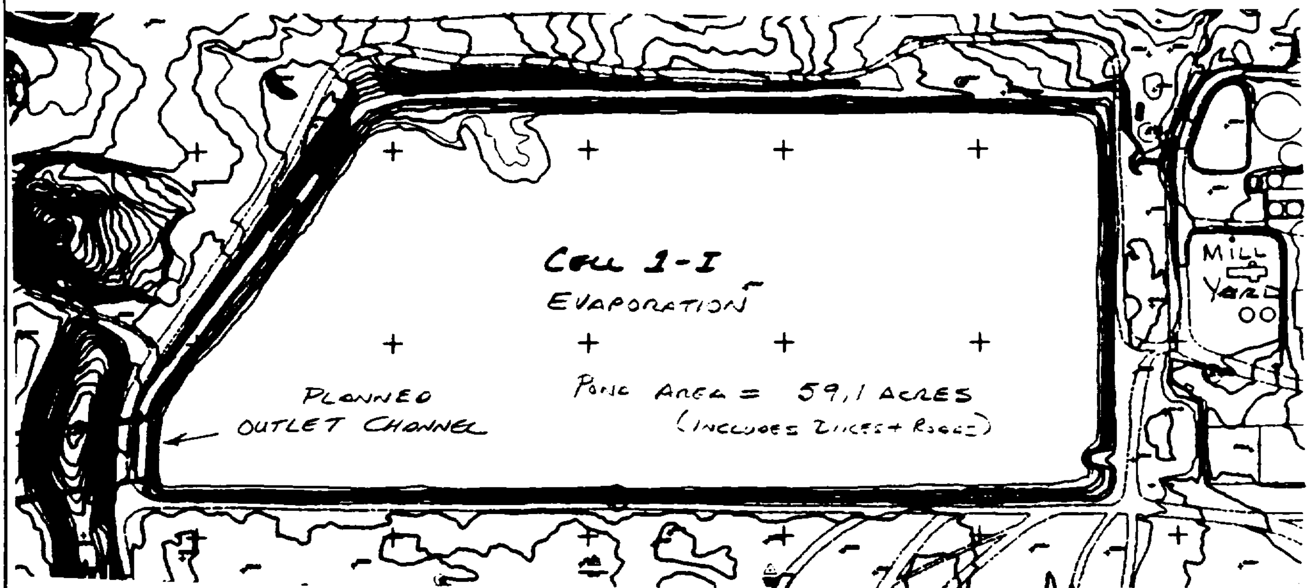
Quality Control

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Quality Control Contractor	hrs	$62.00	800	**$49,600**

Total Quality Control **$49,600**

TOTAL RECLAMATION OF CELL 1 **$1,234,212**

Cell 1 Volume Calcula



Cell 1 – Scale 1" = 500'

1) Crystal Volume + Liner Cover

- Crystal thickness based on historical elevation of top of Crystal Layer and Areal mapping → Assume 3 ft thick
- Soil Cover over PVC. Liner 1½' by design and as builts
- Liner Crystals and Soil Cover all picked up at same time.

Area of Pond $\frac{2,575,703\ ft^2 \times (3 ft + 1.5 ft)}{27\ ft^3/cy} = 429,283\ cy$

→ **429,300 cy**

2) Volume of Contaminated material under Liner

- Assume for purposes of this estimate that 1 ft of Contaminated material must be removed from under liner for whole cell

$\frac{2{,}575{,}703\ ft^2 \times 1\ ft}{27\ ft^3/cy} = 95,396\ cy$ → **95,400 cy**

3) Time Required to haul Xyls + Liner Cover Assuming the use of 4-769 Trucks, a 275L Trackhoe, 988 Loader. Assume haul Route # 1 for production (199 cy/hr/truck/hr)

$\frac{429,300\ cy}{199\ cy/hr} = 2157$ truck hrs – 539 hrs/truck

Cell 1 Volume Calculations

4) Time Required to remove material from under liner in place in Cell #3 – use Haul Route #1 – 4 scrapers

$\frac{95,500 \text{ cy}}{310 \text{ cy/hr/scraper}}$ = 308 scraper hours 4 scrapers = 77 hrs/unit.

5) Top Soil Volumes → place 6" of Top Soil over Area of

Cell 1 – $\frac{2,575,703 \text{ ft}^2 \times .5 \text{ ft}}{27 \text{ ft}^3/\text{cy}} \cong 47,698$ cy

→ 48,000 cy

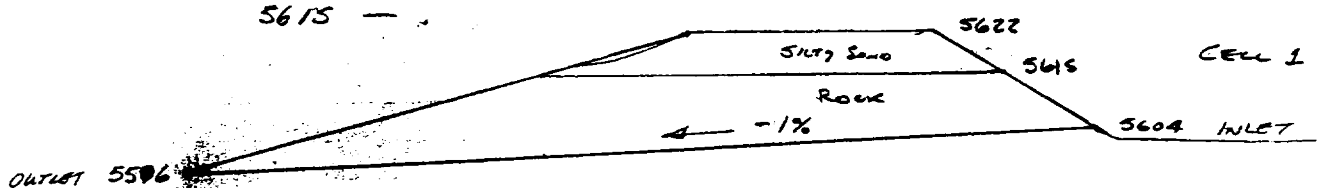
Use scraper fleet assume Route 1 → 310 cy/hr/scraper

$\frac{48000 \text{ cy}}{310 \text{ cy/hr/scraper}} \Rightarrow$ ~ 155 hrs using one scraper

If use 4 scrapers ≅ 40 hr/unit.

6) Discharge Channel Volume →

- Channel will have base width of 150 ft – side slope 3:1
- Channel flow line will drop at .01 ft/ft (1%)
- Rock elevation based on Drill holes + Construction Report is at 5615 –.



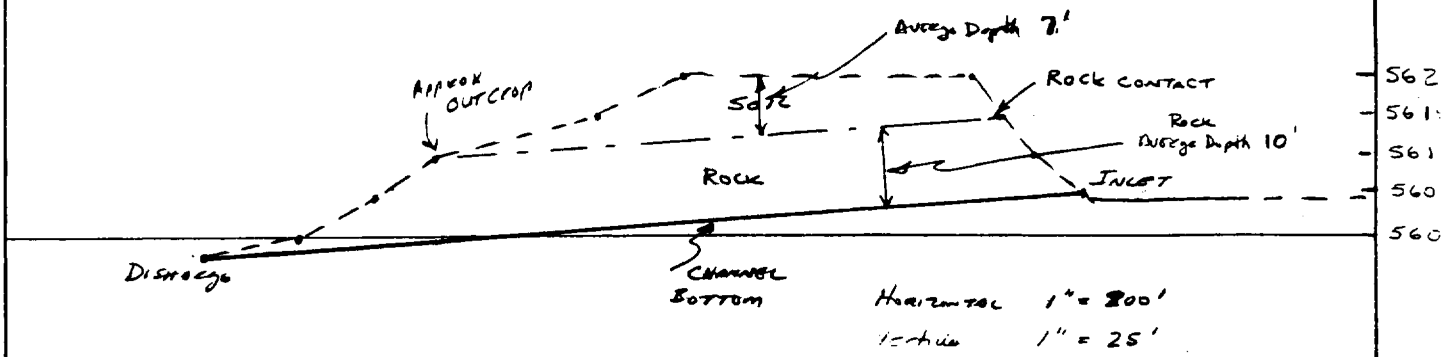
- Random Fill and Top Soil stockpiles will be used in the reclamation of Cells 2 + 3 and the mill yard before discharge channel is built.

INTERNATIONAL URANIUM (USA) CORP.
COST ESTIMATE

Cell 1 Volume Calculations

OUTLET CHANNEL SECTIONS

SECTION A-A'



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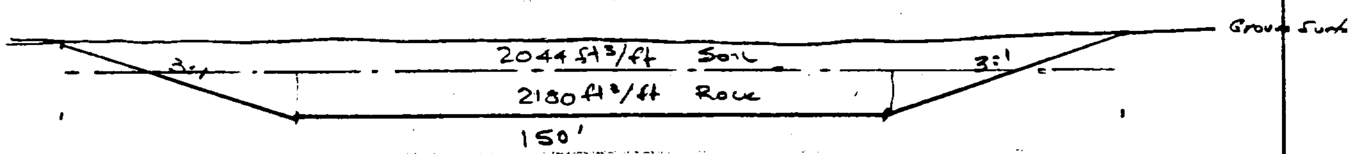


B-B' 1" = 50'

- Assume

  Rock = 81 cy/ft channel length
  Soil = 76 cy/ft channel length.

  800 ft channel = 64,800 cy Rock
  60,800 cy Soil

- Use Scrapers on Soil Removal

- Drill and Blast Rock Use Trucks to Haul away
  Based on EFN's Experience during Construction – Rock does not Rip
  Blasting is required.

- Assume Route 1 for Trucks + Scrapers.

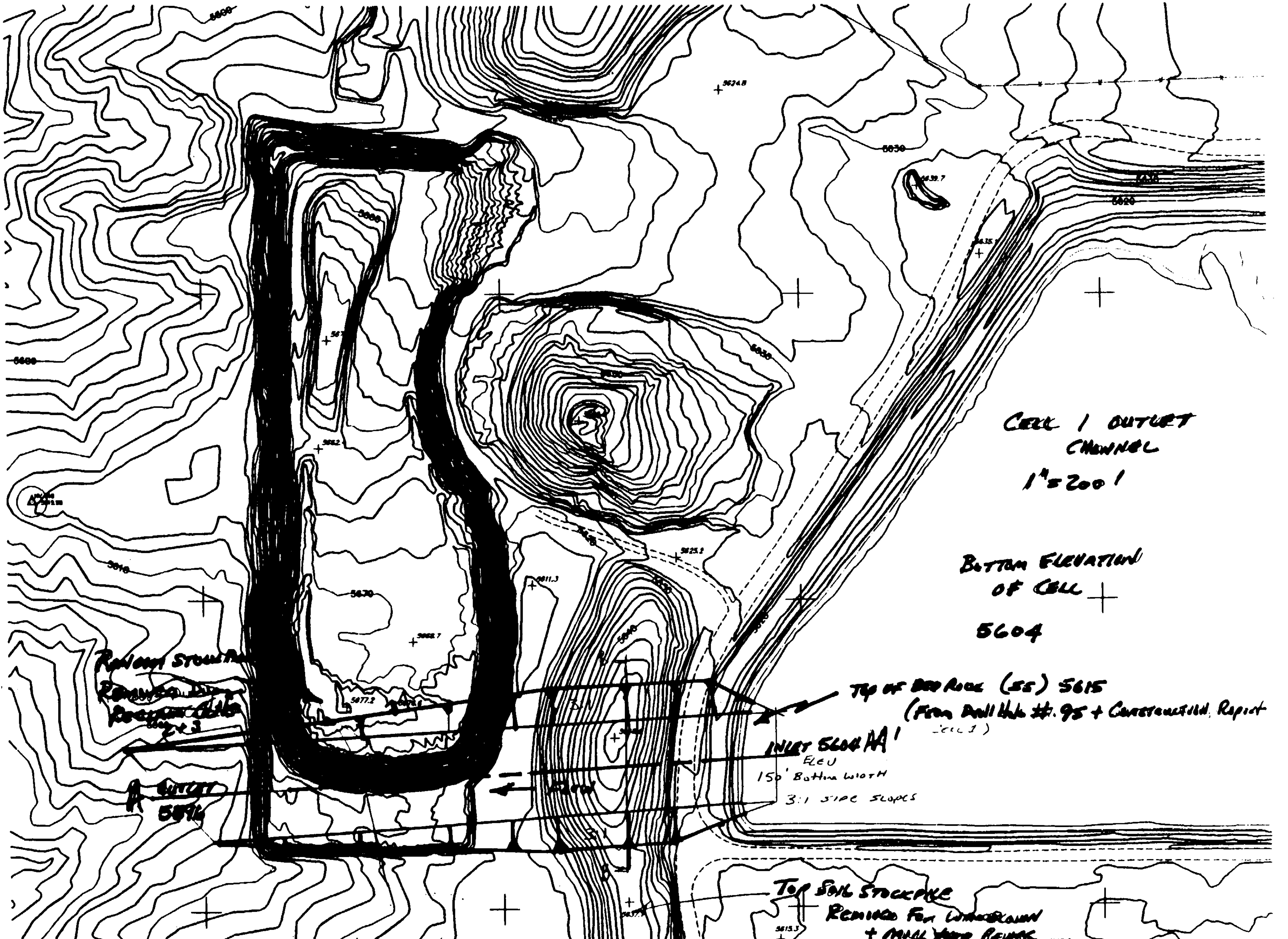
  Trucks – 199 cy/truck/hr
  Scrapers – 310 cy/hr

Channel Excavation (Continued)

Soil → $\frac{60,800 \text{ cy}}{310 \text{ cy/hr}}$ = 196 scraper hrs $\tilde{\Rightarrow}$ 50 hr/individual scraper
4 scrapers

Rock → $\frac{64,800 \text{ cy}}{199 \text{ cy/hr}}$ = 325 Truck hrs → 2 trucks = 163 hrs/ea

Drilling + Blasting Rock → 10 ft average Depth → \$1.50/cy
Based on Recent Contractor Quote



CELL 1 OUTLET
CHANNEL
1" = 200'
BOTTOM ELEVATION
OF CELL
5604
TOP OF BED ROCK (SS) 5615
(From Drill Hole #.95 + Construction Report
Cell 1)
INLET 5604 AA'
ELEV
150' Bottom width
3:1 side slopes
TOP SOIL STOCKPILE
Removed for windblown
+ Mill yard removal

BOB HEMBREE
(303) 389-4125

AMERICAN MINE SER

August 13, 1998

Via Fax:

Attn: Mark Kerr, KLG Associates, Inc.

Re: Drilling and Blasting Limestone, Mill Creek, Oklahoma

We are please to submit the following proposal to provide all equipment, labor and materials for the above referenced project as follows:

Description	Unit Price	Est. Quantity
Mobilization	$8,000.00	1
Drill and Blast Cuts >20' Deep	$ 1.35/CY	30,000 CY
Seismic Monitoring	$300.00/EA	2

General Clarifications:
> Layout and grade control by others
> Excavation by others
> Explosives storage on site
> Pricing assumes two 10 hour drilling shifts per day for 6 days per week
> If bonding is required add 1%
> Night working lights by others
> Pricing assumes dry hole conditions, add $.15 per CY if wet hole conditions are encountered
> Pricing is based on a minimum of 30,000 CY shot during a 10 day period

If you have any questions or need additional information, please feel free to contact me at 303.499.4770.

Sincerely,

C. B. Slattery, Project Manager

RECENT QUOTE FOR DRILL + BLAST USE $1.50/CY

11808 Highway 93 • BOULDER, COLORADO 80303-9849 • USA
TELEPHONE: (303) 499-4770 • FAX: (303) 499-4774

Calculation / Work Sheet

Page ____ of ______

Project: Rec. Plan Revision 3.0 by: ______ Date 07-06-00

Revision to Topsoil Cost - Cell 1-I

5) Place 6" of Topsoil over open area of Cell 1-I

Total area of Cell 1 - w/ side slopes = 60 AC.

Area consumed by new disposal area =

$(175' + 100') \times 2,600 = 715,000 \text{ ft}^2 = 16.41$ AC.

use 16.-

Total area to be topsoiled = 60 - 16 = 44 acres

Total volume = $\frac{44 \times 43,560 \times 0.5 \text{ ft}}{27} = 35,493 \text{ yd}^3$

Use scraper fleet - assume Route No. 1

$310 \text{ yd}^3 / \text{hr} / \text{machine}$

$\frac{35,493 \text{ yd}^3}{310} = 114.5 \text{ hr}$ use 3 machines

38.17 hr. —

use 40 hr. × 3

120 hr. Total

Calculation / Work Sheet

Page ____ of ______

Project: Rec. Plan Revision 3.0 by: ______ Date 07-06-00

Revision to Channel construction cost.

New channel width - 1,200 ft (was 800 ft)

- Assume Rock 81 cy / ft of channel length
  Soil 76 " " " " "

1100 ft 89,100 cy rock

83,600 cy soil

- use scrapers on soil removal
- Drill + Blast rock - use trucks to haul

  Based on EFN's experience during construction - rock is not easily ripped - Blasting is required

- Assume Route 2 for Trucks and Scrapers.

  Trucks 199 yd³ / truck / hr
  Scrapers 310 " scraper / "

Rock - $\frac{89{,}100 \text{ yd}^3}{199}$ = 448 hr - 3 trucks - 150 hr. ea.
450 hr

Soil $\frac{83{,}600 \text{ yd}^3}{310}$ = 270 - 4 units - 67.5 = 68 hr ea
272 hr.

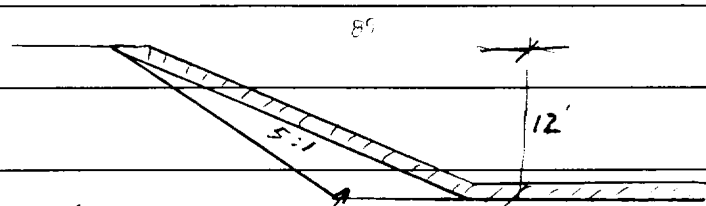
Support equipment - 150 hr. + 68 hr. = 218 hr.

Calculation / Work Sheet

Project: Rec. Plan Revision 3.0 by: ______ Page ____ of ____ Date 07-06-00

Installation of Clay Liner in Cell 1-I

Clay liner - Average depth of Tailings - 18'



Slope reduction cost included w/ Cell 2

Slope length = (5)(18) = 90'

Horizontal length - 176

175 + 90 = 265 Total length = 266

265 - 89 = 176 266 ft

266 ft × 12" × 2600 ft = 691,600 ft^3

25,615 yd^3 liner

Clay production cost - from Cell 2 estimate

22 yd^3 per cycle × 2.7 cycles / hr = 59.4 yd^3 per hour / truck

Use 8 trucks = 475 yd^3/hr.

$\frac{25,615 \text{ yd}^3}{475}$ = 54 hr. - use 60 hr

Calculation / Work Sheet

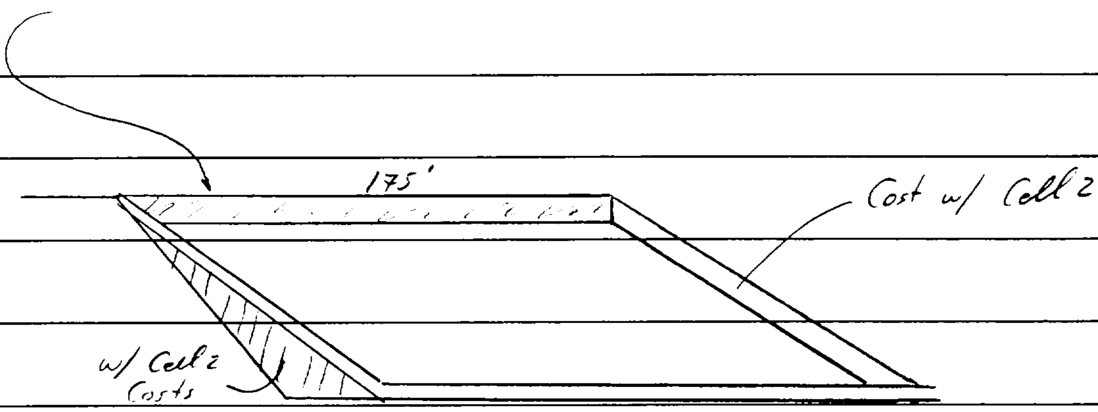
Page ____ of ______

Project: Rec. Plan Revision 3.0 by: ______ Date 07-06-00

Installation of lower Random fill

North Slope lower Random Fill included with Cell 2 Cost (19,500 yd^3)

lower Random Fill on extention Area.



3' thick - 175' wide × 2600 ft

50,556 yd^3

Use Route 5 haulage - scrapers ⇒ 296 yd^3/hr. = 171 hr.

use 174

use 2 scrapers - 87 hr. each

Calculation / Work Sheet

Project: Rec. Plan Revision 3.0 by: ______ Page ____ of ____

Date 07-06-00

Clay Cap - top and side slope

top - 175 ft

slope - 90 ft

265 ft × 1.0 ft thick × 2,600 ft

25,518 yd³

Use same haulage factor for clay liner

22 yd³ per truck cycle - × 2.7 cycles/hr ·

59.4 yd³ per hour/truck

8 trucks = 475 yd³/hr = 53.7 hr - use 55

440 truck hr

55 other

Calculation / Work Sheet

Project: Rec. Plan Revision 3.0 by: [signature]

Page ____ of ____

Date 07-06-00

Place Upper Random Fill

2'-0" lay over top and slope

Total width - 175' + 90' = 265 ft

265 × 2600 × 2'-0" = 1,378,000 ft³

= 51,037 yd³

Use Route 5 haulage - scrapers 296 yd³/hr = 172 hr.

use 2 scrapers = 86 hr.

Calculation / Work Sheet

Page ____ of ____

Project: Rec. Plan Revision 3.0 by: [signature]

Date 07-06-00

Installation of Rock Armor

Top of new area = 175' x 2600 ft

6" Thick 175 x 2600 x 0.5 = 227,500 ft^3

8,426 yd^3

Toe Apron on East and West sections

(175' x 7' x 2' Thick) x 2 = 4900 ft^3 = 182 yd^3

Upstream slope and toe apron running east-west included in Cell 2 Reclamation Costs

Total 8,607 yd^3

8,607 yd^3 - 38 yd^3 / truck 226.5 hr - use 227

use 8 trucks 28.31 hr - use 30

MISCELLANEOUS ITEMS

Equipment Mobilization

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Butler Machinery Mobilization	LS	$148,200.00	1	$148,200
Other Equipment Mobilization	LS	$2,500.00	1	$2,500

Total Equipment Mobilization **$150,700**

Office Facilities

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Run New Powerline	LS	$15,000.00	1	$15,000
Utilities for Offices	months	$1,000.00	36	$36,000

Total Temporary Office Facilities **$51,000**

Wheel Wash Facility

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Laborers	hrs	$10.35	8,320	$86,084
Construct Wheel Wash Facility	LS	$50,000.00	1	$50,000

Total Wheel Wash Facility **$136,084**

MANAGEMENT/SUPPORT

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Manager/Engineer	hrs	$48.69	6,240	$303,826
Radiation Safety Officer	hrs	$37.87	6,240	$236,309
Secretary	hrs	$15.01	6,240	$93,680
Clerk	hrs	$12.51	4,866	$60,877
Environmental Technician	hrs	$20.02	4,866	$97,403
Maintenance Foreman	hrs	$27.51	6,240	$171,661
Chemist	hrs	$22.52	2,080	$46,840
Security	hrs	$7.78	18,720	$145,583
Safety Engineer	hrs	$20.02	4,160	$83,271
Misc. Materials & Supplies	hrs	$36.45	6,240	$227,448
Health Physics Costs	hrs	$64.81	2,080	$134,800

Total Management/Support **$1,601,696**

TOTAL MISCELLANEOUS ITEMS **$1,939,480**

ROCK PRODUCTION COST

Assumptions:
Rock is obtained from gravel source north of Blanding, UT that is a BLM Public pit
Rock is processed by screening only, no crushing is required 1.25 CY of feed for 1 CY of product
Rock is produced and stockpiled at the site
Site is 7 road miles from the mill, 6 miles of which is paved public highway
Rock will be hauled in 22 CY bellydump trucks, contract haulers ($45.00/hr)
Rock will be dumped in windrows on Cells by trucks, spread by grader, and compacted by D7 Dozer
Trucks can average 30 MPH (1.75 rounds/hr)

	Product Required (CY)	Reject Factor	Material Feed to Plant (CY)	Plant Throughput (CY/hr)	Plant Operating Hours
Material fed to plant	146,000	25.0%	182,500	122	1,500

PRODUCTION OF RIPRAP

Resource Description	Units	Cost/Unit	Task Units	Task Cost
Equipment Operators	hrs	$17.72	2,340	$41,460
Laborer	hrs	$10.35	1,500	$15,520
Cat D8N Dozer With Ripper	hrs	$68.67	365	$25,064
Cat 980 Loader	hrs	$64.99	1,975	$128,353
Screening Plant w/conveyors	hrs	$55.00	1,500	$82,500
Contract Highway Trucks - Bellydumps	hrs	$45.00	3,800	$171,000
Equipment Maintenance (Butler)	hrs	$10.01	2,340	$23,430

Total Production of RipRap **$487,326**

RIPRAP COST PER CUBIC YARD DELIVERED $3.34

WHITE MESA MILL RECLAMATION COST
HOURLY EQUIPMENT COSTS 1999 DOLLARS

Actual equipment rates quoted from Butler machinery 6 month rental period
November 3, 1998

		RATE		MTCE	FUEL	FUEL @	TOTAL	Mob/Demob	Mob/Demob	Operating Hrs
	Units	MONTHLY	HOURLY	EXPENDABLES	USAGE	$0.75	COST	per machine	Totals	per Month
637E Scraper	4	21,200	120.45	2.05	24.0	18.00	$140.50	$10,800.00	$43,200.00	704
D8N Dozer	1	10,800	61.36	0.93	8.5	6.38	$68.67	$7,400.00	$7,400.00	176
D7H Dozer	1	9,100	51.70	0.95	7.0	5.25	$57.90	$6,400.00	$6,400.00	176
825C Compactor	1	9,600	54.55	1.10	14.0	10.50	$66.15	$7,300.00	$7,300.00	176
980 F Loader	1	10,000	56.82	1.42	9.0	6.75	$64.99	$7,300.00	$7,300.00	176
988 F Loader	1	15,000	85.23	1.45	12.0	9.00	$95.68	$8,600.00	$8,600.00	176
769C Haul Truck	4	9,200	52.27	1.50	9.0	6.75	$60.52	$7,400.00	$29,600.00	704
375 Excavator	1	19,600	111.36	1.90	14.0	10.50	$123.76	$15,000.00	$15,000.00	176
651 Water Wagon	1	10,000	56.82	1.80	18.0	13.50	$72.12	$8,000.00	$8,000.00	176
5000 gal Water Truck	1	5,700	32.39	0.75	10.0	7.50	$40.64	$3,000.00	$3,000.00	176
14G Motor Grader	1	7,700	43.75	1.05	5.5	4.13	$48.93	$5,600.00	$5,600.00	176
16G Motor Grader	1	11,000	62.50	1.20	8.5	6.38	$70.08	$6,800.00	$6,800.00	176
									$148,200.00	3,168

Equipment Rental Rate Quoted by Power Motive, Denver, Colorado (2/2/99) for PC400 Kamatsu Excavator with LaBounty MSD 70R Shear

PC-400 w Shear	22,950.00	130.40	18.94	14.0	10.50	$159.84	$2,500.00
Small tools allocation - Demolition - $1.25/mechanic labor hour for oxygen/acetalene, expendables						$1.25	
Total Equipment Mobilization							$150,700.00

	Monthly Maintenance Flat Rate	Planned Operating Hours/month	Availabiltiy Factor	Maintenance Cost per Operating Hour
Butler Equipment Maintenance Cost	$29,500.00	3,168	0.93	$10.01

	RATE		MTCE	FUEL	FUEL @	TOTAL
Crane Rental Rates	MONTHLY	HOURLY	EXPENDABLES	USAGE	$0.75	COST
30 ton Hydraulic Crane	7,500	42.61	2.05	15.0	11.25	$55.91
65 ton Hydraulic Crane	5,500	31.25	2.05	10.0	7.50	$40.80

Butler **CAT**

Butler Machinery Co.

Butler Machinery Co.
1351 Page Dr.
PO Box 9559
Fargo, ND 58106

(701) 232-0033
FAX (701) 298-1717

DATE: 11-3-98

TO: Bob Hembree

COMPANY: International Uranium Corp.

FROM: Oscar Swenson

DIRECT DIAL (AUDIX): 701-298-1733

ACKNOWLEDGE RECEIPT OF THIS FAX ☐ YES ☐ NO

NUMBER OF PAGES:
(INCLUDING THIS COVER SHEET) 5

NOTES:

Locations: Bismarck, Fargo, Grand Forks, Minot, Aberdeen, Rapid City, Sioux Falls

Butler

Butler Machinery Company • (701) 232-0033 • FAX (701) 298-1717 • 1351 Page Dr. • Box 9558 • Fargo, ND 58106

NOVEMBER 3, 1998

INTERNATIONAL URANIUM CORPORATION
ATTN: BOB HEMBREE
1050 SEVENTEENTH ST. SUITE 950
DENVER CO 80265

DEAR BOB:

THANK YOU FOR THE INVITATION TO QUOTE INTERNATIONAL URANIUM CORPORATION (IRC) THE EQUIPMENT NEEDED FOR THEIR MINING PROJECT IN BLANDING, UTAH. BUTLER MACHINERY COMPANY (BUTLER) RESPECTFULLY SUBMITS OUR PROPOSAL FOR A MAINTAINED FLEET OF CATERPILLAR MACHINES.

LISTED ON ATTACHMENT A, YOU WILL FIND THE MODELS, QUANTITIES, MONTHLY RENTAL RATES, HOURS ALLOWED PER MONTH, EXCESS HOUR CHARGE, GUARANTEED NUMBER OF MONTHS RATES ARE BASED UPON, TOTAL FREIGHT CHARGES AND THE MAINTENANCE RATE PER HOUR FOR MATERIALS ONLY.

ALL RATES SHOWN ON ATTACHMENT A DO NOT INCLUDE ANY STATE, LOCAL, PROPERTY OR ANY OTHER TAXES THAT MAY BE APPLICABLE.

RATES ARE BASED UPON ELECTRIC HOUR METER READINGS WHICH ARE ATTACHED TO THE DASH OF EACH MACHINE. RATES ARE BASED ON 176 HOURS OF USE EACH MONTH. EXCESS HOUR CHARGES, IF ANY, WILL BE CALCULATED AND INVOICED AT THE END OF THE PROJECT. THERE WOULD BE NO CREDIT ISSUED FOR ANY HOURS UNDER THE ALLOWED DURING THE TERM OF THIS PROPOSAL. IF IRC ELECTS TO DOUBLE SHIFT MACHINES, THEN BUTLER WOULD INVOICE THOSE HOURS AT THE END OF EACH MONTH. (TO FIGURE THE DOUBLE SHIFT RATES, TAKE THE EXCESS HOUR RATE SHOWN ON ATTACHMENT A TIMES THE NUMBER OF HOURS).

RATES ARE BASED UPON A MINIMUM GUARANTEE OF 6 MONTHS AND A PACKAGE DEAL.

MAINTENANCE:
THE MAINTENANCE RATES PER HOUR LISTED ON ATTACHMENT A INCLUDES THE MATERIAL PART ITEMS ONLY, SUCH AS AIR, OIL, AND FUEL FILTERS, LUBRICANT OILS, GREASE, ANTI-FREEZE, BATTERIES, FAN BELTS, LIGHTS AND MAKE-UP OILS. BUTLER WOULD INVOICE IRC ACTUAL HOURS USED ON MACHINES AT THE END OF EACH MONTH.

OUR MONTHLY MAINTENANCE CHARGE WOULD BE $29,500.00, WHICH INCLUDES OUR LABOR, SPECIALIZED LUBE TRUCKS, SUPPORT VEHICLES AND EQUIPMENT, SPECIALIZED TOOLING, SCHEDULED OIL SAMPLING, PARTS TRAILERS AND INVENTORIES, MILEAGE AND TRAVEL EXPENSE. BUTLER WILL PROVIDE TWO (2) FULL-TIME MAINTENANCE TECHNICIANS ON SITE FIFTY (50) HOURS PER WEEK ON A SCHEDULE TO BE DETERMINED, MONDAY THROUGH FRIDAY. IRC WOULD HAVE TO SCHEDULE THE MACHINES AVAILABLE FOR A TIME FRAME YET TO BE DETERMINED ADEQUATE FOR BUTLER MAINTENANCE PERSONNEL TO PERFORM THE REQUIRED MAINTENANCE. BUTLER WOULD INVOICE IRC FOR THE MONTHLY MAINTENANCE CHARGE AT THE BEGINNING OF EACH MONTH.

REPAIRS:

BUTLER WOULD BE RESPONSIBLE FOR ALL REPAIRS INCLUDING PARTS AND LABOR ON OUR MACHINES OTHER THAN FAILURES CAUSED BY DAMAGES OR MIS-USE. REPAIRS INCLUDE ITEMS AS MINOR AS STARTERS, ALTERNATORS, WATER PUMPS, HYDRAULIC HOSES, ETC. TO THE MAJOR ITEMS SUCH AS ENGINES, TRANSMISSIONS, DIFFERENTIALS, BRAKES, HYDRAULIC PUMPS AND CYLINDERS, ETC. IF TIME PERMITS AND IRC REQUESTS BUTLER'S TECHNICIAN TO PERFORM REPAIRS OR MAINTENANCE ON THEIR MACHINES, OUR HOURLY CHARGE WOULD BE $47.00 PER HOUR PLUS MATERIALS.

FREIGHT:

FREIGHT CHARGES INCLUDE BOTH DELIVERY AND RETURN, ASSEMBLY, AND DISASSEMBLY OF EQUIPMENT.

IRC'S RESPONSIBILITIES INCLUDE:

OPERATORS. PROVIDE THE OPERATORS AS NEEDED TO OPERATE MACHINES AS STATED IN CATERPILLAR'S OPERATING GUIDE. BUTLER WILL PROVIDE, AT NO EXPENSE TO IRC, QUALIFIED TRAINING INSTRUCTORS FOR THE PURPOSES OF TRAINING OPERATORS. THIS TRAINING WOULD TAKE PLACE ON THE JOBSITE AT THE INITIAL START UP OF THE JOB AND WOULD INCLUDE CLASSROOM, WALK AROUND, AND IN IRON DEMONSTRATIONS.

FUEL. SUPPLY AND FILL ALL FUEL FOR EQUIPMENT INCLUDING BUTLER'S SERVICE VEHICLES.

DAMAGES. THIS INCLUDES GLASS BREAKAGE, BENT HANDRAILS, STEP LADDERS, FENDERS, ETC. BUTLER'S NORMAL POLICY FOR REPAIRING DAMAGES TO RENTAL MACHINES IS TO REPAIR THEM WHEN THE RENTAL PERIOD IS COMPLETED, HOWEVER, IF THE DAMAGED ITEM IS OF A SAFETY CONCERN, WE WOULD REPAIR THE DAMAGES AS SOON AS POSSIBLE AFTER THEY OCCURRED. AN ITEMIZED LIST OF THE PARTS AND LABOR REQUIRED WOULD BE PROVIDED TO IRC PRIOR TO STARTING THE REPAIR, AND INVOICED AT CURRENT LIST PRICES PLUS FREIGHT UPON COMPLETION.

UNDERCARRIAGE AND TIRES: IRC WOULD BE RESPONSIBLE FOR ALL TIRE WEAR INCLUDING TIRE DAMAGES ON THE MACHINES WITH AN ASTERISK LISTED ON ATTACHMENT A. EQUIPMENT WOULD HAVE TO BE RETURNED WITH SAME BRAND AND MODEL TIRES AS WHEN DELIVERED, OR PRORATED ACCORDINGLY BY PERCENTAGE OF TIRE WEAR AND CONDITION AT TERMINATION OF RENTAL PERIOD.

UPON DELIVERY OF MACHINES, A REPRESENTATIVE OF BUTLER, A REPRESENTATIVE OF IRC AND A REPRESENTATIVE FROM AN INDEPENDENT TIRE DEALER OR MANUFACTURER WOULD JOINTLY VERIFY IN WRITING THE CONDITION, PERCENTAGE OF WEAR, AND TIRE VALUE. UPON TERMINATION OF RENTAL, WE WOULD AGAIN HAVE THE REPRESENTATIVES MENTIONED ABOVE DETERMINE THE CONDITION, PERCENTAGE OF WEAR, AND TIRE VALUES. ANY DIFFERENCES NOTED, WOULD THEN BE CHARGED OR CREDITED TO IRC INCLUDING BOTH MATERIALS AND LABOR.

UNDERCARRIAGE WEAR ON ALL TRACK TYPE MACHINES WOULD BE BUTLER'S EXPENSE.

GROUND ENGAGING TOOLS:

IRC WOULD BE RESPONSIBLE FOR ALL PARTS RELATING TO GROUND ENGAGING TOOLS (G.E.T.), I.E. CUTTING EDGES, RIPPER TIPS AND PROTECTORS, BUCKET TIPS AND ADAPTERS, EDGES BETWEEN ADAPTERS, WEAR PLATES ON BOTTOM OF BUCKETS AND ALL MOUNTING HARDWARE. BUTLER WOULD INSTALL THESE ITEMS ON AN AS NEEDED BASIS AT THE CURRENT CATERPILLAR LIST PRICE PLUS FREIGHT AT NO ADDITIONAL LABOR COSTS. ALL MACHINES WOULD BE DELIVERED WITH NEW G.E.T. ITEMS AND ARE TO BE RETURNED WITH NEW.

WE WISH TO THANK IRC AND YOU FOR GIVING US THE OPPORTUNITY TO PRESENT OUR PROPOSAL AND FOR ALL THE CONSIDERATION WE RECEIVE.

SINCERELY YOURS,

BUTLER MACHINERY COMPANY

Oscar D. Swenson

OSCAR D. SWENSON
RENTAL FLEET MARKETING MANAGER

ODS/del
cc: JOEL NIKLE, RENTAL FLEET MANAGER

ATTACHMENT A
INTERNATIONAL URANIUM CORPORATION
EQUIPMENT NEEDED FOR JOB IN BLANDING, UTAH
NOVEMBER 3, 1998

MODEL	QTY	MONTHLY RENTAL RATE	HOURS ALLOWED PER MONTH	EXCESS HOUR CHARGE	MINIMUM GUARANTEED NUMBER OF MONTHS RATE BASED UPON	TOTAL** FREIGHT CHARGES TO & FROM	MAINTENANCE RATE PER HOUR
*637E	4	$21,200 EA.	176 EA.	$66 EA.	6 EA.	$10,800 EA.	$2.05 EA.
D9N/RIPPER	1	13,300	176	42	6	8,600	1.40
D8N/RIPPER	1	10,800	176	34	6	7,400	1.15
D7H/RIPPER	1	9,100	176	28	6	6,400	.95
825C	1	9,600	176	30	6	7,300	1.10
980F	1	10,000	176	32	6	7,300	1.15
*988F	1	15,000	176	48	6	8,600	1.45
*769C	4	9,200 EA.	176 EA.	28 EA.	6 EA.	7,400 EA.	1.50 EA.
375L	1	19,600	176	56	6	15,000	1.90
10,000 GALLON WATER WAGON	1	10,000	176	30	6	8,000	1.80
5,000 GALLON WATER WAGON	1	5,700	176	18	6	3,000	.75
14G/RIPPER	1	7,700	176	24	6	5,600	1.05
16G/RIPPER	1	11,000	176	34	6	6,800	1.20

* PLUS TIRE WEAR
** INCLUDES ASSEMBLY AND DISASSEMBLY

Date: Feb 22, 1999

INTERNATIONAL URANIUM
BLANDING UTAH
ATTN: WALLY BRICE
CONFIDENTAIL PRICE INFORMATION FAX # 1 435 678 2224
TERMS: NET 15 DAYS ON TRANSPORT LOADS

Red dyed diesel for off road use delivered in transport quanities to various sites

	Blanding	Sunday Mines	La Sal Mine	Dove Creek
Rack dsl #2	$0.4250	$0.3825	$0.3825	$0.4465
Freight	$0.0450	$0.0500	$0.0550	$0.0400
Taxes	$0.0000	$0.0063	$0.0000	$0.0063
Margin	$0.0200	$0.0200	$0.0200	$0.0200
Sales Tax	$0.0000	$0.0000	$0.0000	$0.0000
Total Price	$0.4900	$0.4588	$0.4575	$0.5128

Utah charges sales tax on dyed diesel fuel .06%

Red dyed diesel for off road use delivered in bobtail load (500-2000) to various sites

	Blanding	Sunday Mines	La Sal Mine	Dove Creek
Rack dsl # 2	$0.4275	$0.3825	$0.3825	$0.4465
Frt & Margin	$0.1500	$0.1500	$0.1500	$0.1500
Taxes	$0.0000	$0.0063	$0.0000	$0.0063
Sales Tax	$0.0000	$0.0000	$0.0000	$0.0000
Total Price	$0.5775	$0.5388	$0.5325	$0.6028

Utah Charges sales tax on dyed diesel 06%

No Lead Gasoline 86 octane gasoline delivered in transport loads to various sites

	Blanding	Sunday Mines	La Sal Mine	Dove Creek
Rack	$0.4300	$0.3900	$0.3900	$0.4450
Freight	$0.0450	$0.0500	$0.0550	$0.0400
Taxes	$0.4290	$0.4103	$0.4290	$0.4103
Margin	$0.0200	$0.0200	$0.0200	$0.0200
Total Price	$0.9240	$0.8703	$0.8940	$0.9153

No Lead Gasoline 86 octane delivered in bobtail deliveries(500-2000)to various site

	Blanding	Sunday Mines	La Sal Mine	Dove Creek
Rack	$0.4300	$0.3900	$0.3900	$0.4450
Frt & Margin	$0.1500	$0.1500	$0.1500	$0.1500
Taxes	$0.4290	$0.4103	$0.4290	$0.4103
Total Price	$1.0090	$0.9503	$0.8690	$1.0053

Propane Delivered Transport Loads Blanding Utah

	Blanding	
Rack	$0.2700	
Freight	$0.0450	
Margin	$0.0100	
Taxes	$0.0000	
Total Price	$0.3250	+.06 % Utah Sales Tax exempt

Propane bobtail loads deliverd to various sites

	Blanding	Sunday Mine	La Sal Mine	Dove Creek
Rack	$0.2700	$0.2700	$0.2700	$0.2700
Frt & Margin	$0.1500	$0.1500	$0.1500	$0.1500
Taxes	$0.0000	$0.0000	$0.0000	$0.0000
Total Price	$0.4200	$0.4200	$0.4200	$0.4200

Utah charges .06% sales tax on propane
Colorado charges .03% sales tax

FROM: FRALEY & CO. INC CORTEZ COLORADO NEIL JONES 1 800 392 6939

(801) 201-7418

Webb Crane

100 Ton Hydraulic

#4800 Mob. & Demob. w/operator (Blanding, UT)

200/hr. on site

#100/Per Diem Not available 10/9/98

75 Ton Conventional w/operator

#3900 Mob. & Demob.

#180/hr. on site 200 hr/mo.

#100 Per Diem Not available 10/9/98

40 Ton Rough Terrain (Our Operator)

#6600/month

2200/week Not available 10/9/98

#1632 mob & Demob

Hewlett Packard

LaVeryle & Dan

Crane Service 70,122.00

~~60~~ 65 Ton

#7,500.00/month

#3600.00 mob. & Demob.

50 Ton #7000.00/month

#3,600.00 mob & Demob.

POWER MOTIVE CORP

FAX Transmission

To: Bob Embree
Company: I.U.C.
From: TERRY BERG

Date: 2/25/99
C.C.
FAX #: 303.389.4163

FOLLOWING PAGES SHOW CONFIGURATION OF THE LEC SCREEN-ITS

THE 4 x 10 SIZE RENTS @ 8,800.-/MO.

THE 5 x 12 SIZE RENTS @ 10,600.-/MO.

3" ON TOP DECK & ½" ON BOTTOM DECK IS A COMFORTABLE SET-UP FOR EITHER PLANT.

THANKS

T. Berg

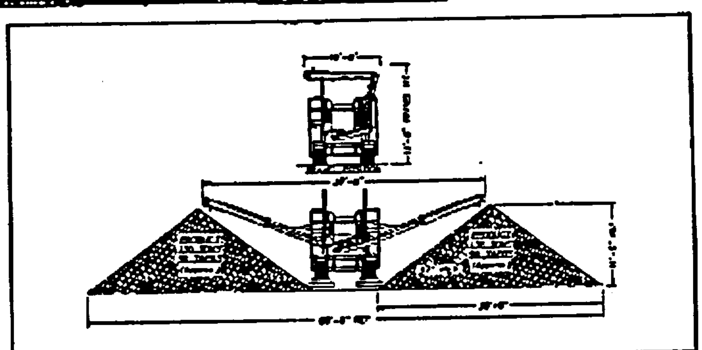
VOICE: 303-355-5900 FAX: 303-388-9328

5000 VASQUEZ BLVD, DENVER, CO 80216

Construction Equipment Co.

SCREEN-IT 4 X 10

2 of 7



TRANSPORT

Height: 13'6" Fifth Wheel Pull
Width: 10'0" Spring Suspension, air brakes
Length: 39' Lights, oil filled hubs

ENGINE

4 cylinder Deutz; 46 HP - Air Cooled
65 gallon fuel tank

OPTIONS

4 individual jacking legs
Shredder
Grizzly dump
Stacking Conveyors
Ball decks

HOPPER

5.5 cu. yard charging hopper
Height to load 12'3"
Side Loading width 12'0"

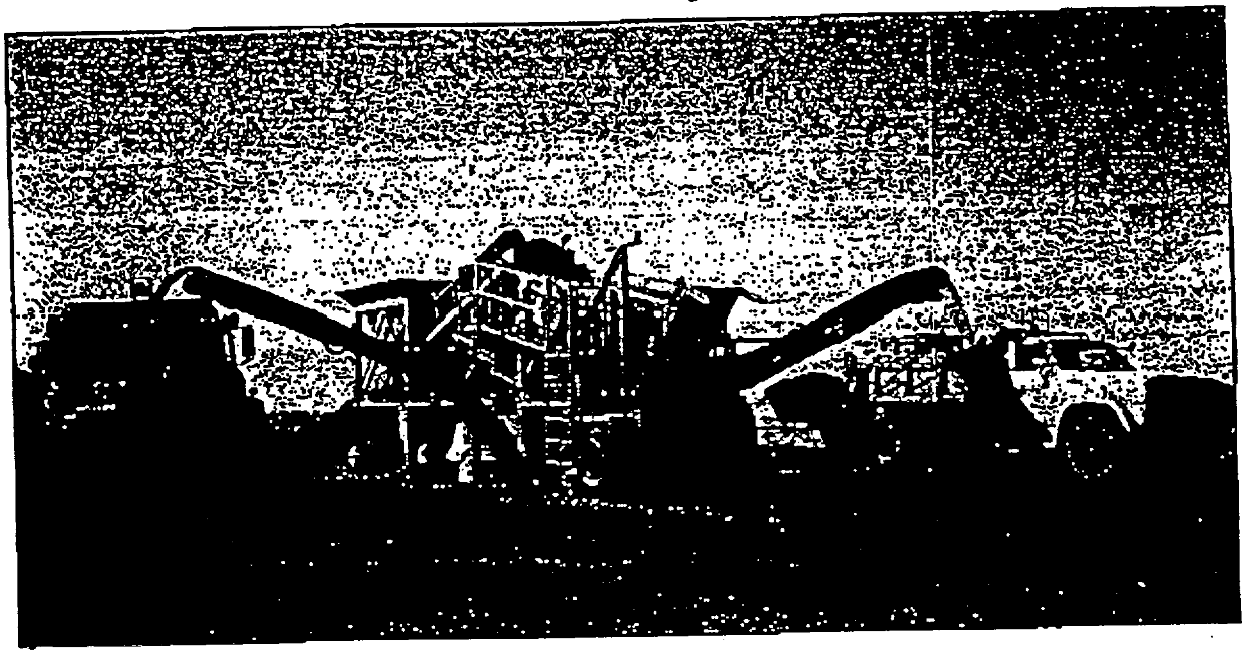
SCREEN

4 x 10; 2 Deck Screen
Hydraulic drive 5/8" Throw
Rubber Spring Suspension

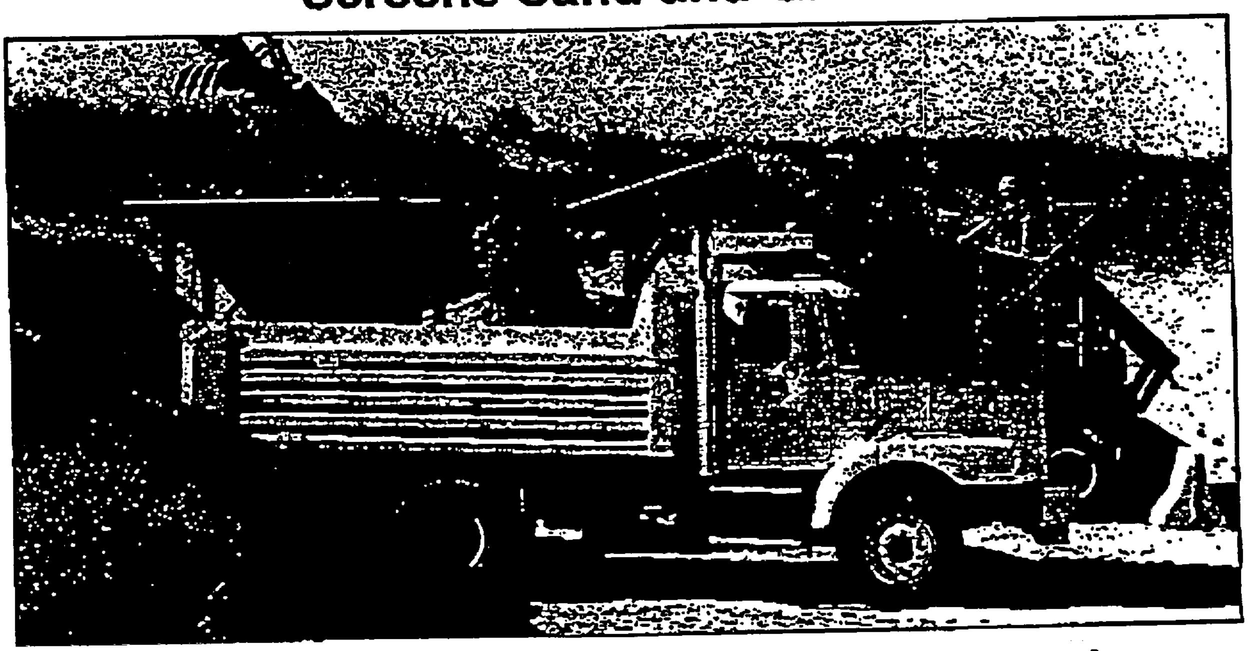
CONVEYORS

36" wide feed conveyor
36" wide under screen conveyor
24" side discharge conveyor
24" rear discharge conveyor

Diesel Hydraulic-Self Contained
Portable and Easy to Set Up



High Production
Screens Sand and Gravel



Conveyors Can Load Directly Into Truck

Construction Equipment Co.
18650 S.W. Pacific Hwy
Tualatin, OR 97062
503-692-9000
Fax 503-692-6220

Area Dealer

POWER MOTIVE
5000 VASQUEZ BLVD.
DENVER, CO 80216
PHONE: (303) 355-5900
FAX: (303) 388-9325

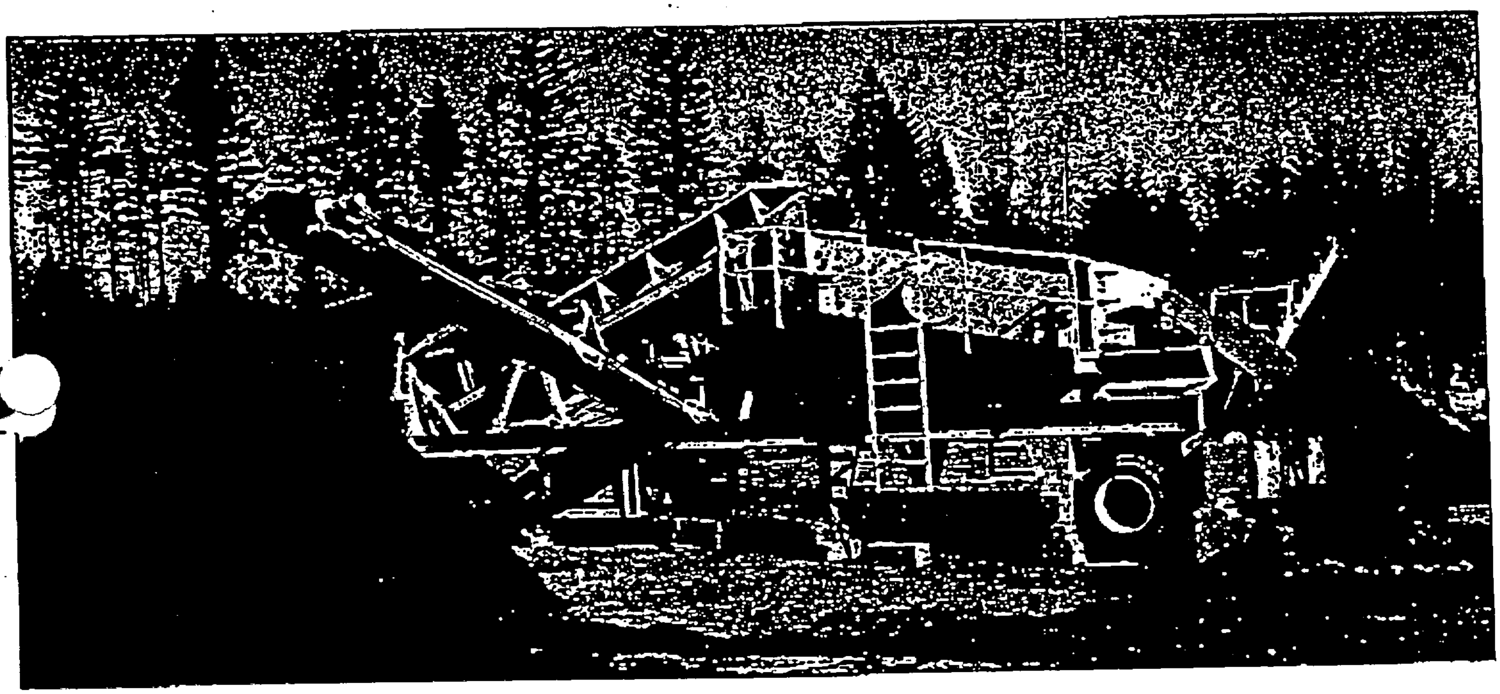
CEC

Construction Equipment Co.

SCREEN IT - Series II

Highly Portable - All Hydraulic Setup

Produces Three Different Products



SCREENS COMPOST 120-140 YARDS PER HOUR
SCREENS GRAVEL UP TO 600 TONS PER HOUR

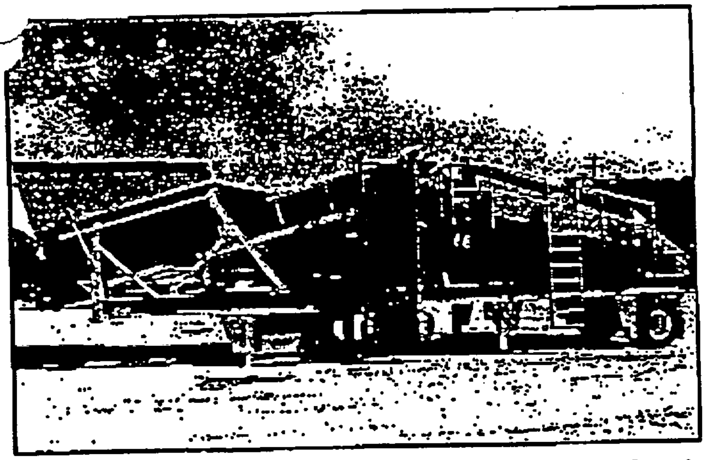
SCREENS: **LOG YARD WASTE, COMPOST, BARK, TOP SOIL, SAND & GRAVEL, TRASH, C & D, STUMPS, CONCRETE, ROCK AND MANY RECYCLE MATERIALS**

Patent #5234564

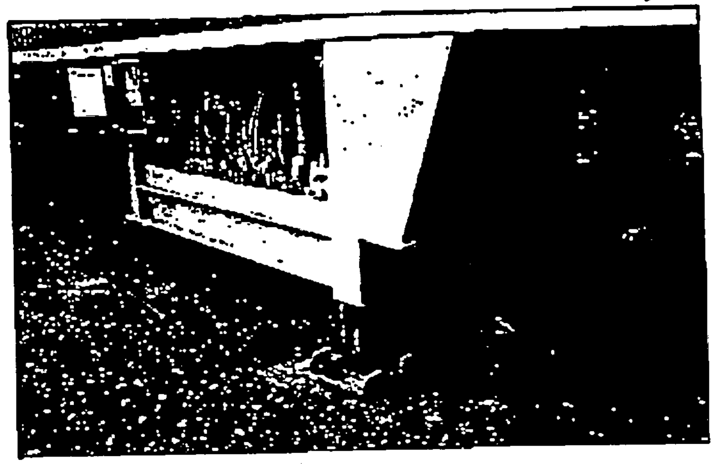
Construction Equipment Co.
P.O. Box 1271
Lake Grove, Oregon 97035
503-635-4427
Fax 503-635-7819

Area Dealer

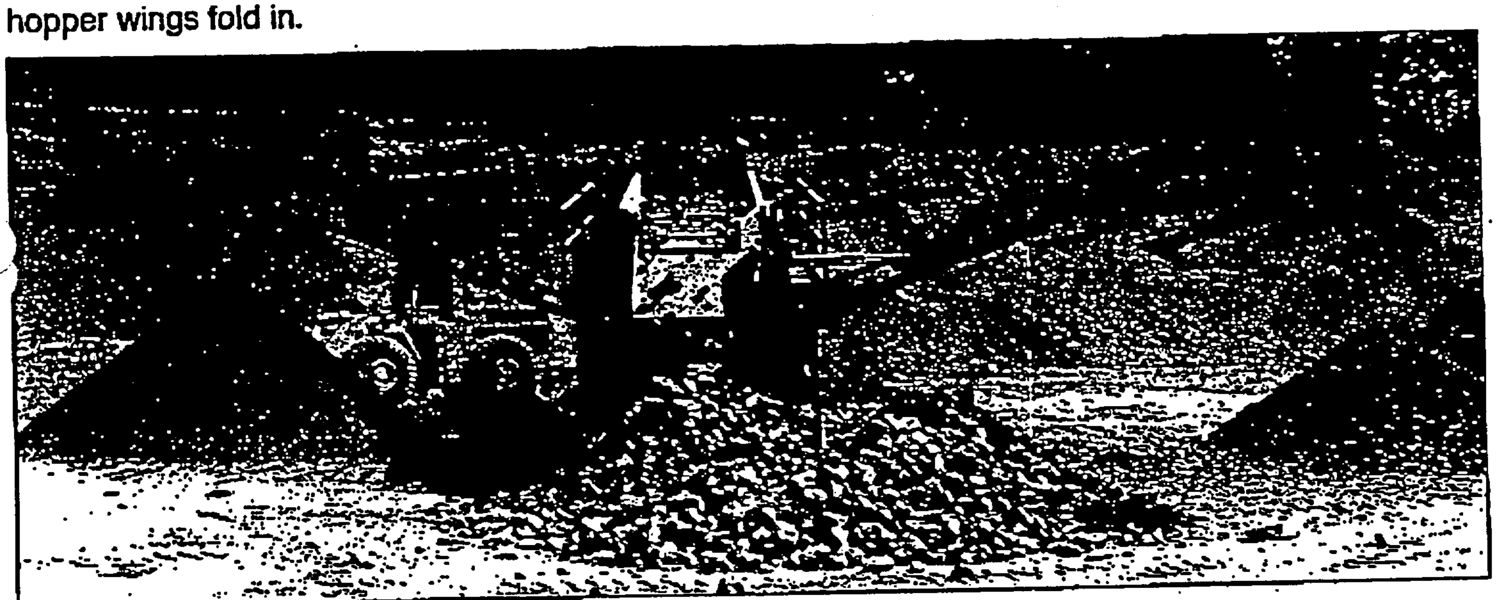
ALL HYDRAULIC FOLD AND SETUP



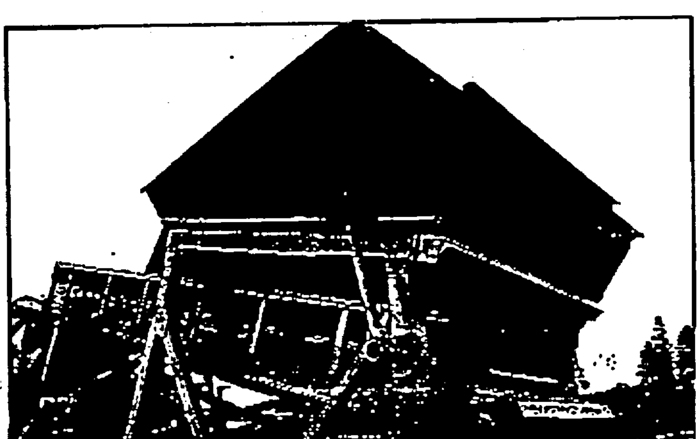
Travel position of the SCREEN IT in which feed conveyor and hopper hydraulically slide back and lower down to transportation height, while hopper wings fold in.



Hydraulic jacking legs are standard for cantelever style blocking, but four (4) individual jacking legs can be an option.



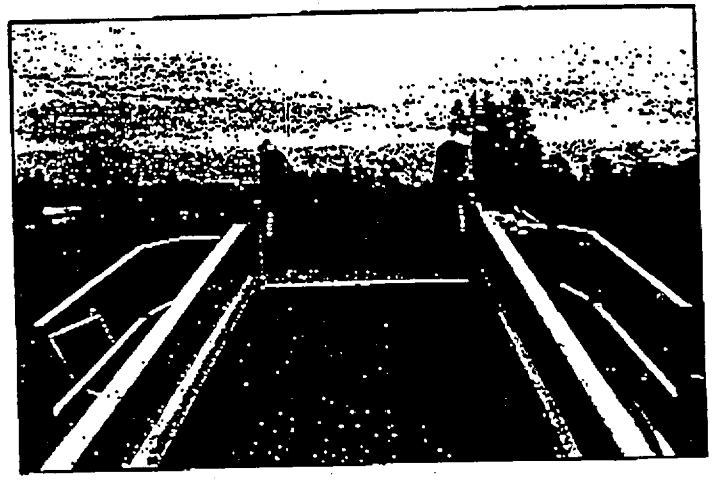
Side and rear discharge conveyors hydraulically fold out to the height of 14'.



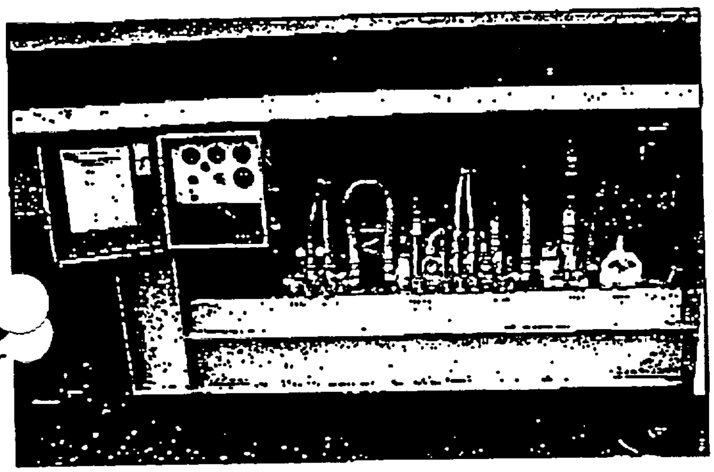
Feed conveyor moves up and forward hydraulically, while the hopper wing walls extend for operation.

Feed conveyor hydraulically moves back and down for transport.

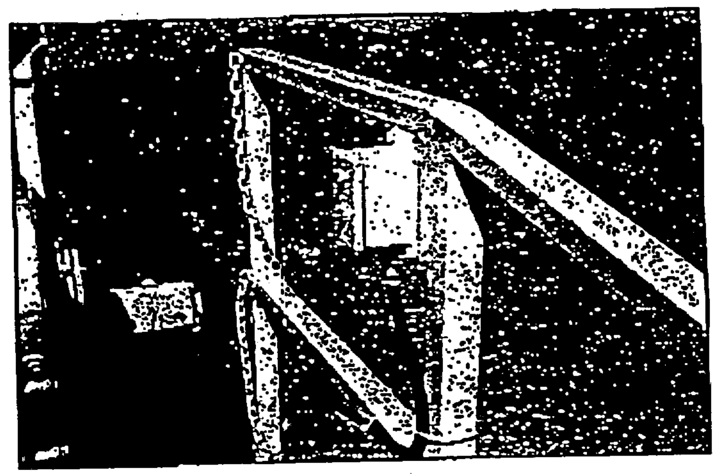
The charging hopper folds out to the width of 14' while in its working position.



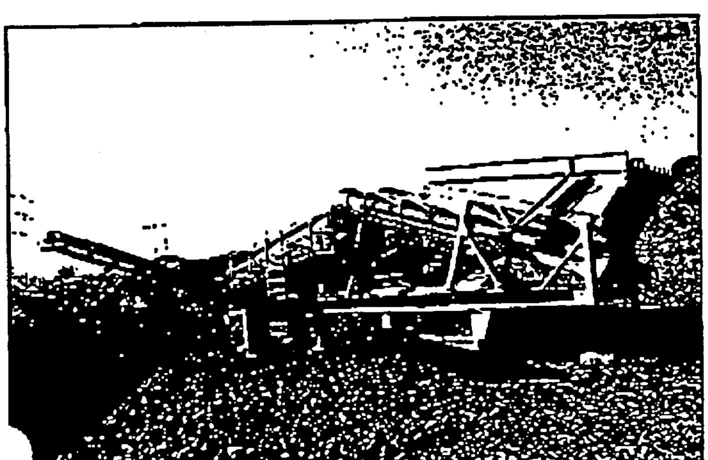
A 48" wide variable feed conveyor with 20" rubber lagged head pulley feeds a 5 x 12 2 Deck screen.



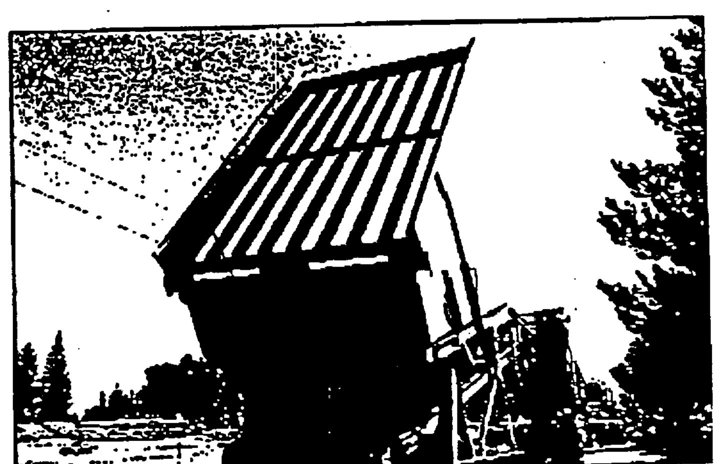
Control panel and hydraulic controls are all located in turnkey area. Powered by a Deutz 4 cylinder, 70 HP diesel engine.



Actuator switch to control speed of feed conveyor is located on the catwalk platform along with kill switch. Actuator switch also located at control panel.



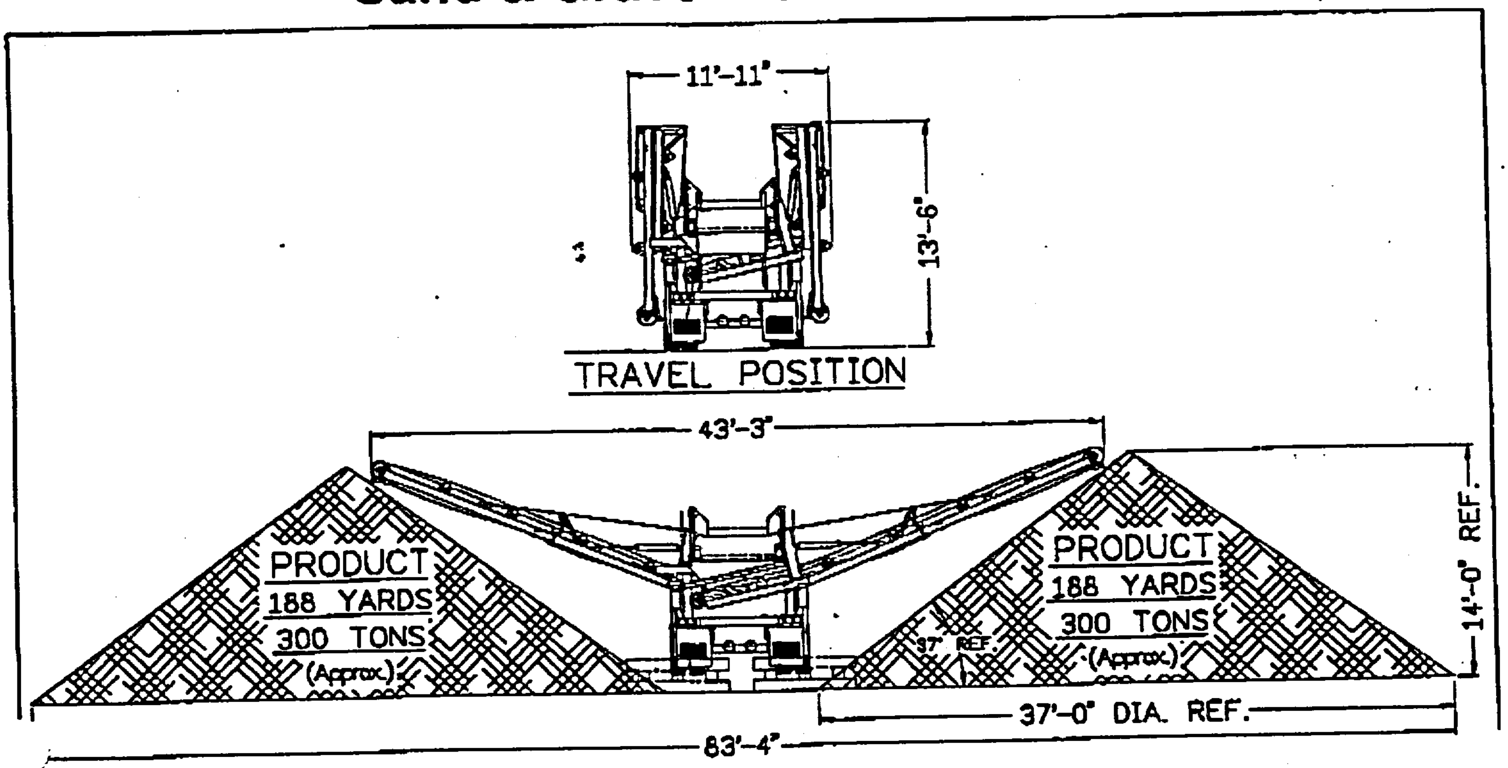
. ne SCREEN IT has an optional 14 foot long by 8 foot wide hydraulic dumping grizzly. An operator controlled remote dumping system is also available.



The optional grizzly dumps to the rear of the plant.

SCREENING,

Topsoil To 250 yds./hr.
Sand & Gravel To 600 Tons/hr.



HYDRAULIC DRIVE

TRANSPORT

Height:	13' 6"	Fifth wheel pull
Width:	11' 11"	Spring suspension, air brakes
Length:	43' 0"	Lights, oil filled hubs
Weight:	38,600	Transport speed 65 mph

HOPPER

14.5 cu. yard charging hopper
Height to load 13' 6"
Width at rear 14' - Working position
Width at rear 8' - Travel position

ENGINE

4 cylinder Deutz
70 HP • Air Cooled
65 gallon fuel tank
110 gallon hydraulic tank

SCREEN

5 x 12, 2 Deck with step deck
Hydraulic drive with 3/8" to 5/8" throw
Rubber spring suspension

OPTIONS

4 individual jacking legs
Shredder
Grizzly Dump
Stacking conveyors
79 HP Turbo Diesel (Water Cooled)
98 HP Turbo Diesel (Air Cooled)

CONVEYORS

48" wide feed conveyor 23' 10" long
42" wide under screen conveyor
30" side discharge conveyor 18' 4" long
30" rear discharge conveyor 18' 4" long

637 SCRAPER EFFICIENCY

NOMINAL CAPACITY 31

HAUL ROUTE	TRAVEL TIME	FIXED TIME	EFFICIENCY	MINUTES PER TRIP	TRIPS/ HOUR	YARDS/ HOUR
1	3.90	1.20	85%	6.0	10.0	310
2	3.25	1.20	85%	5.2	11.5	355
3	4.30	1.20	85%	6.5	9.3	287
4	3.10	1.20	85%	5.1	11.9	368
5	4.15	1.20	85%	6.3	9.5	296
6	4.50	1.20	85%	6.7	8.9	277
7	3.75	1.20	85%	5.8	10.3	319

CAT 637 SCRAPER

TRAVEL TIMES FOR CAT 637 SCRAPERS

BASED ON PROJECTED HAUL ROUTES

Haul Segment	Distance Feet	Distance Meters	Rolling Risistance	Grade %	Ave Speed MPH	Time Min
1a	200	67	7.5	0.0	9.1	0.25
1b	500	167	5.0	0.0	12.6	0.45
1c	200	67	3.0	2.5	9.1	0.25
1d	1400	467	3.0	0.0	18.7	0.85
1e	250	83	3.0	0.0	9.5	0.30
1f	250	83	3.0	0.0	11.4	0.25
1g	1400	467	3.0	0.0	21.2	0.75
1h	200	67	3.0	(2.5)	11.4	0.20
1i	400	133	5.0	0.0	13.0	0.35
1j	200	67	7.5	0.0	9.1	0.25
						3.90
2a	200	67	7.5	0.0	9.1	0.25
2b	2150	717	3.0	(0.5)	22.2	1.10
2c	250	83	5.0	0.0	9.5	0.30
2d	250	83	5.0	0.0	11.4	0.25
2e	2250	750	3.0	+0.5	23.2	1.10
2f	200	67	7.5	0.0	9.1	0.25
						3.25
3a	250	83	7.5	0.0	8.1	0.35
3b	3300	1100	3.0	-0.5	23.4	1.60
3c	250	83	5.0	0.0	9.5	0.30
3d	250	83	5.0	0.0	11.4	0.25
3e	3300	1100	3.0	+0.5	25.0	1.50
3f	250	83	7.5	0.0	9.5	0.30
						4.30
4a	350	117	7.5	-3.5	11.4	0.35
4b	1450	483	3.0	0.0	19.4	0.85
4c	250	83	5.0	0.0	9.5	0.30
4d	250	83	5.0	0.0	11.4	0.25
4e	1700	567	3.0	0.0	22.7	0.85
4f	500	167	7.5	+3.5	11.4	0.50
						3.10

CAT 637 SCRAPER

Haul Segment	Distance Feet	Distance Meters	Rolling Risistance	Grade %	Ave Speed MPH	Time Min
5a	1400	467	7.5	-2.75	15.9	1.00
5b	1350	450	3.0	0.0	19.2	0.80
5c	250	83	5.0	0.0	9.5	0.30
5d	250	83	5.0	0.0	11.4	0.25
5e	2250	750	3.0	0.0	23.2	1.10
5f	700	233	7.5	-5.5	11.4	0.70
						4.15
6a	600	200	7.5	0.0	11.4	0.60
6b	900	300	3.0	-3.3	20.5	0.50
6c	1450	483	3.0	0.0	19.4	0.85
6d	400	133	5.0	0.0	11.4	0.40
6e	400	133	5.0	0.0	11.4	0.40
6f	1450	483	3.0	0.0	22.0	0.75
6g	900	300	3.0	+3.3	17.0	0.60
6h	450	150	7.5	0.0	12.8	0.40
						4.50
7a	750	250	7.5	-1.5	12.2	0.70
7b	1600	533	3.0	0.0	20.2	0.90
7c	350	117	5.0	0.0	11.4	0.35
7d	350	117	5.0	0.0	11.4	0.35
7e	1600	533	3.0	0.0	22.7	0.80
7f	750	250	7.5	+1.5	13.1	0.65
						3.75

769C TRUCK EFFICIENCY

NOMINAL CAPACITY 25

HAUL ROUTE	TRAVEL TIME	FIXED TIME	EFFICIENCY	MINUTES PER TRIP	TRIPS/ HOUR	YARDS/ HOUR
1	3.90	2.50	85%	7.5	8.0	199
2	3.05	2.50	85%	6.5	9.2	230
3	4.00	2.50	85%	7.6	7.8	196

CAT 769 TRUCKS

TRAVEL TIMES FOR CAT 769C TRUCKS
BASED ON PROJECTED HAUL ROUTES

Haul Segment	Distance Feet	Distance Meters	Rolling Risistance	Grade %	Ave Speed MPH	Time Min
1a	200	67	7.5	0.0	7.6	0.30
1b	500	167	5.0	0.0	12.6	0.45
1c	200	67	3.0	2.5	9.1	0.25
1d	1400	467	3.0	0.0	18.7	0.85
1e	250	83	3.0	0.0	9.5	0.30
1f	250	83	3.0	0.0	11.4	0.25
1g	1400	467	3.0	0.0	22.7	0.70
1h	200	67	3.0	(2.5)	11.4	0.20
1i	400	133	5.0	0.0	13.0	0.35
1j	200	67	7.5	0.0	9.1	0.25
						3.90
2a	200	67	7.5	0.0	7.6	0.30
2b	2150	717	3.0	(0.5)	24.4	1.00
2c	250	83	5.0	0.0	9.5	0.30
2d	250	83	5.0	0.0	11.4	0.25
2e	2250	750	3.0	+0.5	26.9	0.95
2f	200	67	7.5	0.0	9.1	0.25
						3.05
3a	250	83	7.5	0.0	8.1	0.35
3b	3300	1100	3.0	-0.5	25.0	1.50
3c	250	83	5.0	0.0	9.5	0.30
3d	250	83	5.0	0.0	11.4	0.25
3e	3300	1100	3.0	+0.5	28.8	1.30
3f	250	83	7.5	0.0	9.5	0.30
						4.00
4a	350	117	7.5	-3.5	11.4	0.35
4b	1450	483	3.0	0.0	19.4	0.85
4c	250	83	5.0	0.0	9.5	0.30
4d	250	83	5.0	0.0	11.4	0.25
4e	1700	567	3.0	0.0	22.7	0.85
4f	500	167	7.5	+3.5	11.4	0.50
						3.10

CAT 769 TRUCKS

Haul Segment	Distance Feet	Distance Meters	Rolling Risistance	Grade %	Ave Speed MPH	Time Min
5a	1400	467	7.5	-2.75	15.9	1.00
5b	1350	450	3.0	0.0	19.2	0.80
5c	250	83	5.0	0.0	9.5	0.30
5d	250	83	5.0	0.0	11.4	0.25
5e	2250	750	3.0	0.0	23.2	1.10
5f	700	233	7.5	+5.5	11.4	0.70
						4.15

6a	600	200	7.5	0.0	11.4	0.60
6b	900	300	3.0	-3.3	20.5	0.50
6c	1450	483	3.0	0.0	19.4	0.85
6d	400	133	5.0	0.0	11.4	0.40
6e	400	133	5.0	0.0	11.4	0.40
6f	1450	483	3.0	0.0	22.0	0.75
6g	900	300	3.0	+3.3	17.0	0.60
6h	450	150	7.5	0.0	12.8	0.40
						4.50

7a	750	250	7.5	-1.5	12.2	0.70
7b	1600	533	3.0	0.0	20.2	0.90
7c	350	117	5.0	0.0	11.4	0.35
7d	350	117	5.0	0.0	11.4	0.35
7e	1600	533	3.0	0.0	22.7	0.80
7f	750	250	7.5	+1.5	13.1	0.65
						3.75

LABOR COSTS

Specified Wages

Heavy Construction — **1998 Estimate Labor Rates****

Labor Classification	Base Rate	Mandated Fringe	Labor Burden (FICA, SUI, FUI, etc.	Company Benefits (medical, life insure, etc)	Fringe Costs	Labor Cost/HR
			0.1397	0.2128		
Boiler Makers	$19.60	$8.76	$2.74	no added cost	$11.50	$31.10
Millwrights	$19.83	$3.25	$2.77	$0.97	$6.99	$26.82
Ironworkers	$19.92	$6.66	$2.78	no added cost	$9.44	$29.36
Carpenters	$10.81		$1.51	$2.30	$3.81	$14.62
Cement Masons	$11.52		$1.61	$2.45	$4.06	$15.58
Electricians	$14.52	$2.71	$2.03	$0.38	$5.12	$19.64
Ironworkers - Reinforcing	$11.00		$1.54	$2.34	$3.88	$14.88
Laborers (including pipelayers)	$7.65	$1.60	$1.07	$0.03	$2.70	$10.35
Pipefitters	$12.60		$1.76	$2.68	$4.44	$17.04
POWER EQUIPMENT OPERATORS						
Backhoes	$10.00		$1.40	$2.13	$3.53	$13.53
Cranes	$10.43		$1.46	$2.22	$3.68	$14.11
Dozers++	$13.10		$1.83	$2.79	$4.62	$17.72
Graders	$12.67		$1.77	$2.70	$4.47	$17.14
Loaders	$11.26		$1.57	$2.40	$3.97	$15.23
Scrapers+	$10.00		$1.40	$2.13	$3.53	$13.53
Trackhoes	$10.00		$1.40	$2.13	$3.53	$13.53
Tractors	$9.42		$1.32	$2.00	$3.32	$12.74
TRUCK DRIVERS	$9.42		$1.32	$2.00	$3.32	$12.74

Note: base rates do not include FICA, worker comp, unemployment, or company benefits which increase the cost per hour

** General Decision UT980009 - Modification 0 - 2/13/98

++ Operator Rate used in 1999 estimate

LABOR COSTS

Nonspecified Wages	Base Rate	Mandated Fringe	Labor Burden (FICA, SUI, FUI, etc.	Company Benefits (medical, life insure, etc)	Fringe Costs	Labor Cost/HR
Survey Crew Member	$9.75	$0.00	$1.36	$2.07	$3.44	$13.19
Sample Crew Member	$9.75	$0.00	$1.36	$2.07	$3.44	$13.19
Mechanic (Demolition)	$10.20	$0.00	$1.42	$2.17	$3.60	$13.80
Manager/Engineer	$36.00	$0.00	$5.03	$7.66	$12.69	$48.69
Radiation Safety Officer	$28.00	$0.00	$3.91	$5.96	$9.87	$37.87
Secretary	$11.10	$0.00	$1.55	$2.36	$3.91	$15.01
Clerk	$9.25	$0.00	$1.29	$1.97	$3.26	$12.51
Engineer	$28.00	$0.00	$3.91	$5.96	$9.87	$37.87
Environmental Technician	$14.80	$0.00	$2.07	$3.15	$5.22	$20.02
Safety Engineer	$14.80	$0.00	$2.07	$3.15	$5.22	$20.02
Maintenance Foreman	$20.34	$0.00	$2.84	$4.33	$7.17	$27.51
Security Personnel	$5.75	$0.00	$0.80	$1.22	$2.03	$7.78
Chemist	$16.65	$0.00	$2.33	$3.54	$5.87	$22.52

INTERNATIONAL URANIUM (USA) CORPORATION

6425 S. Highway 191 ♦ P.O. Box 809 ♦ Blanding, UT 84511 ♦ 435 678-2221 ♦ 435 678 2224 (fax)

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Harold Roberts

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PAGE 1 OF:

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BO

GENERAL DECISION UT980009 02/13/98 UT9
General Decision Number UT980009

Superseded General Decision No. UT970009

State: Utah

Construction Type:
HEAVY

County(ies):

BEAVER	IRON	SEVIER
CARBON	JUAB	UINTAH
DAGGETT	KANE	WASHINGTON
EMERY	PIUTE	WAYNE
GARFIELD	SAN JUAN	
GRAND	SAN PETE	

HEAVY CONSTRUCTION PROJECTS

Modification Number	Publication Date
0	02/13/1998

COUNTY(ies):

BEAVER	IRON	SEVIER
CARBON	JUAB	UINTAH
DAGGETT	KANE	WASHINGTON
EMERY	PIUTE	WAYNE
GARFIELD	SAN JUAN	
GRAND	SAN PETE	

BOIL0192B 04/01/1996

	Rates	Fringes
BOILERMAKERS	19.60	8.76

CARP0722B 10/29/1995

	Rates	Fringes
MILLWRIGHTS	19.83	3.25

IRON0027G 07/01/1997

	Rates	Fringes
IRONWORKERS:		
~~Structural~~	~~18.02~~	~~6.66~~

SUUT1000A 03/01/1900

	Rates	Fringes
CARPENTERS	10.81	
CEMENT MASONS	11.52	
ELECTRICIANS	14.52	2.71
IRONWORKERS:		
Reinforcing	11.00	
LABORERS (including pipelayers)	7.65	1.60 - 9.25
PIPEFITTERS	12.60	
POWER EQUIPMENT OPERATORS:		
Backhoes	10.00	
Cranes	10.43	
Dozers	13.10	
Graders	12.67	
Loaders	11.26	
Scrapers	10.00	
Trackhoes	10.00	
Tractors	9.42	
TRUCK DRIVERS	5.62	

From: Shauna Vigil
To: w.deal@cisna.com
Date: Fri, Nov 13, 1998 11:21 AM
Subject: Heavy Construction Davis-Bacon wages

Heavy Construction Projects

Modification Number	Publication Date
0	02/13/1998

County (ies)

Beaver	Iron	Sevier
Carbon	Juab	Uintah
Daggett	Kane	Washington
Emery	Piute	Wayne
Garfield	San Juan	
Grand	San Pete	

	Rates	Fringes
Boilermakers	19.60	8.76

	Rates	Fringes
Millwrights	19.83	3.25

	Rates	Fringes
Ironworkers:Structural	18.92	8.66

	Rates	Fringes
Carpenters	10.81	
Cement Masons	11.52	
Electricians	14.52	2.71
Ironworkers:Reinforcing	11.00	
Laborers (including pipelayers)	7.65	1.60
Pipefitters	12.60	
Power Equipment Operators:		
Backhoes	10.00	
Cranes	10.43	
Dozers	13.10	
Graders	12.67	
Loaders	11.26	
Scrapers	10.00	
Trackhoes	10.00	
Tractors	9.42	
Truck Drivers	9.42	

Let me know if this works out o.k.
Shauna :)

PREPARED: 03:14 PM 03-Feb-99
ALP036

INTERNATIONAL URANIUM (USA) CORP
SALARY ALLOCATION-JOURNAL ENTRY SUPPORT
JAN 31, 1999
(FINAL)

		SALARY	PENSN	BONUS	TAXES	INSUR	VACAT	HOLIDY	SICK	OTHER	DENOHD	TOTAL	PRPTY	VACAT	HOLIDY	SICK	OTHER
249	3H [redacted]	1,280.00	12.50		168.38	234.00	32.57	65.23	13.01			1,805.69	1,727.45		78.24		
294	3H [redacted]	1,296.00			212.26	234.00	33.57	67.03	13.47			1,856.33	1,775.93		80.40		
307	3H [redacted]	1,576.00			238.17	234.00	39.36	78.84				2,166.37	2,071.81		94.56		
214	3H [redacted]	1,612.00			243.51	234.00	40.13	80.37	16.03			2,226.04	2,129.64		96.40		
306	3H [redacted]	1,649.09			247.45	234.00	40.93	81.97	18.44			2,271.88	2,173.56		98.32		
OPERATIONS - HOURLY		201,681.02	602.15	0.00	28,185.40	24,948.00	5,682.11	9,781.64	1,900.32	0.00	0.00	272,780.64	240,341.32	10,466.12	12,032.88	324.00	616.32

1.353 overall burden # 28,185.40

.1397 Taxes → FUSS

Benefits # 42,914.22

.21288

LONG TERM CARE CALCULATION

Long Term Care Calculation

Base Amount (Starting in Dec. 1978)	$250,000
CPI-U December, 1978	67.7
CPI-U January, 1999	164.3

Adjusted Long Term Care = $250,000 x (CPI-U most recent / CPI-U Dec., 1978)

Adjusted Long Term Care	$606,721

Consumer Price Indexes

Table 1. Consumer Price Index for All Urban Consumers (CPI-U): U. S. City Average, by expenditure category and commodity and service group

Table 1. Consumer Price Index for All Urban Consumers (CPI-U): U.S. city average, b
and service group

(1982-84=100, unless otherwise noted)

CPI-U	Relative importance, December 1998	Unadjusted indexes Dec. 1998	Unadjusted indexes Jan. 1999	U perce Jan. Jan 199
Expenditure category				
All items	100.000	163.9	164.3	1
All items (1967=100)	-	491.0	492.3	
Food and beverages	16.408	162.7	163.9	2
Food	15.422	162.3	163.6	2
Food at home	9.691	162.6	164.3	2
Cereals and bakery products	1.544	182.3	184.2	2
Meats, poultry, fish, and eggs	2.569	147.3	146.4	-1
Dairy and related products (1)	1.088	157.6	161.2	8
Fruits and vegetables	1.440	200.7	208.6	3
Nonalcoholic beverages and beverage materials	1.049	131.7	133.5	-0
Other food at home	2.002	152.4	153.0	2
Sugar and sweets	.377	150.1	151.7	0
Fats and oils	.309	151.9	150.5	7
Other foods	1.316	166.9	167.7	2
Other miscellaneous foods (1) (2)	.320	104.9	104.1	3
Food away from home (1)	5.730	163.0	163.5	2
Other food away from home (1) (2)	.175	103.3	103.5	3
Alcoholic beverages	.986	167.2	167.6	1
Housing	39.828	161.3	161.8	2
Shelter	30.283	184.0	184.7	3
Rent of primary residence (3)	7.007	174.9	175.3	3
Lodging away from home (2) (3)	2.376	103.8	107.1	1
Owners' equivalent rent of primary residence (3) (4)	20.529	190.7	191.0	3
Tenants' and household insurance (1) (2)	.371	99.9	99.7	-0
Fuels and utilities	4.735	126.6	126.2	-2
Fuels	3.801	111.4	110.9	-3
Fuel oil and other fuels	.227	86.1	86.6	-10
Gas (piped) and electricity (3)	3.574	118.9	118.3	-2
Household furnishings and operations	4.810	126.6	126.8	1

Apparel	4.831	130.7	127.9	-1
Men's and boys' apparel	1.358	130.3	128.1	-1
Women's and girls' apparel	1.939	122.4	117.7	-2
Infants' and toddlers' apparel (1)	.272	129.6	130.0	4
Footwear	.876	127.5	125.6	-1
Transportation	16.999	140.7	140.4	-1
Private transportation	15.653	137.2	136.7	-1
New and used motor vehicles (2)	7.843	100.9	100.6	0
New vehicles	4.983	144.1	144.4	0
Used cars and trucks (1)	1.914	153.1	150.6	1
Motor fuel	2.493	86.2	85.0	-13
Gasoline (all types)	2.476	85.7	84.5	-13
Motor vehicle parts and equipment	.549	101.2	101.2	-0
Motor vehicle maintenance and repair	1.624	169.6	169.8	2
Public transportation (1)	1.346	188.4	190.4	1
Medical care	5.713	245.2	246.6	3
Medical care commodities	1.252	225.6	225.9	3
Medical care services	4.461	249.6	251.3	3
Professional services (3)	2.854	224.6	225.8	3
Hospital and related services (3)	1.354	291.4	294.4	3
Recreation (2)	6.120	101.2	101.7	1
Video and audio (1) (2)	1.748	100.7	101.4	0
Education and communication (2)	5.478	100.7	100.9	1
Education (2)	2.694	104.7	105.0	4
Educational books and supplies	.203	257.3	258.4	5
Tuition, other school fees, and childcare	2.492	301.7	302.4	4
Communication (1) (2)	2.783	97.1	97.3	-2
Information and information processing (1) (2)	2.580	96.9	96.9	-2
Telephone services (1) (2)	2.327	100.3	100.7	0
Information and information processing other than telephone services (1) (5)	.253	34.8	33.8	-26
Personal computers and peripheral equipment (1) (2)	.148	64.2	61.4	-36
Other goods and services	4.624	250.3	255.4	10
Tobacco and smoking products	1.159	331.2	354.2	39
Personal care (1)	3.465	158.3	158.9	2
Personal care products (1)	.742	148.7	149.9	2
Personal care services (1)	.973	168.3	168.8	2
Miscellaneous personal services	1.491	237.8	238.9	3
Commodity and service group				
Commodities	42.109	142.2	142.5	0
Food and beverages	16.408	162.7	163.9	2
Commodities less food and beverages	25.702	130.2	129.9	-0
Nondurables less food and beverages	14.345	132.1	131.8	-0
Apparel	4.831	130.7	127.9	-1
Nondurables less food, beverages, and apparel	9.514	137.8	138.8	0
Durables	11.356	127.4	127.1	-0
Services	57.891	185.7	186.3	2
Rent of shelter (4)	29.912	191.5	192.3	3
Transportation services	6.963	188.4	188.8	0
Other services	10.768	219.5	220.5	3
Special indexes				
All items less food	84.578	164.2	164.5	1
All items less shelter	69.717	157.8	158.1	1

All items less medical care	94.287	159.4	159.8	1
Commodities less food	26.688	131.7	131.4	-0
Nondurables less food	15.331	134.2	133.9	0
Nondurables less food and apparel	10.500	139.7	140.7	0
Nondurables	30.753	147.5	147.9	1
Services less rent of shelter (4)	27.979	192.8	193.3	1
Services less medical care services	53.429	179.8	180.3	2
Energy	6.294	98.9	98.1	-7
All items less energy	93.706	172.3	172.9	2
All items less food and energy	78.284	174.8	175.3	2
Commodities less food and energy commodities	23.967	143.9	143.7	1
Energy commodities	2.720	86.3	85.2	-12
Services less energy services	54.316	192.5	193.2	2
Purchasing power of the consumer dollar	-	$ .610	$ .608	
Purchasing power of the consumer dollar - old base	-	$ .204	$ .203	

1 Not seasonally adjusted.
2 Indexes on a December 1997=100 base.
3 This index series was calculated using a Laspeyres estimator. All other item s geometric means estimator in January, 1999.
4 Indexes on a December 1982=100 base.
5 Indexes on a December 1988=100 base.
- Data not available.

NOTE: Index applies to a month as a whole, not to any specific date.

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Bureau of Labor Statistics
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Bureau of Labor Statistics Washington, D.C. 20212

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Bureau of Labor Statistics
Washington, D.C. 20212

Consumer Price Index

All Urban Consumers - (CPI-U)

U.S. city average

All items

1982-84=100

YEAR	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.	SEP.	OCT.	NOV.
1913	9.8	9.8	9.8	9.8	9.7	9.8	9.9	9.9	10.0	10.0	10.1
1914	10.0	9.9	9.9	9.8	9.9	9.9	10.0	10.2	10.2	10.1	10.2
1915	10.1	10.0	9.9	10.0	10.1	10.1	10.1	10.1	10.1	10.2	10.3
1916	10.4	10.4	10.5	10.6	10.7	10.8	10.8	10.9	11.1	11.3	11.5
1917	11.7	12.0	12.0	12.6	12.8	13.0	12.8	13.0	13.3	13.5	13.5
1918	14.0	14.1	14.0	14.2	14.5	14.7	15.1	15.4	15.7	16.0	16.3
1919	16.5	16.2	16.4	16.7	16.9	16.9	17.4	17.7	17.8	18.1	18.5
1920	19.3	19.5	19.7	20.3	20.6	20.9	20.8	20.3	20.0	19.9	19.8
1921	19.0	18.4	18.3	18.1	17.7	17.6	17.7	17.7	17.5	17.5	17.4
1922	16.9	16.9	16.7	16.7	16.7	16.7	16.8	16.6	16.6	16.7	16.8
1923	16.8	16.8	16.8	16.9	16.9	17.0	17.2	17.1	17.2	17.3	17.3
1924	17.3	17.2	17.1	17.0	17.0	17.0	17.1	17.0	17.1	17.2	17.2
1925	17.3	17.2	17.3	17.2	17.3	17.5	17.7	17.7	17.7	17.7	18.0
1926	17.9	17.9	17.8	17.9	17.8	17.7	17.5	17.4	17.5	17.6	17.7
1927	17.5	17.4	17.3	17.3	17.4	17.6	17.3	17.2	17.3	17.4	17.3
1928	17.3	17.1	17.1	17.1	17.2	17.1	17.1	17.1	17.3	17.2	17.2
1929	17.1	17.1	17.0	16.9	17.0	17.1	17.3	17.3	17.3	17.3	17.3
1930	17.1	17.0	16.9	17.0	16.9	16.8	16.6	16.5	16.6	16.5	16.4
1931	15.9	15.7	15.6	15.5	15.3	15.1	15.1	15.1	15.0	14.9	14.7
1932	14.3	14.1	14.0	13.9	13.7	13.6	13.6	13.5	13.4	13.3	13.2
1933	12.9	12.7	12.6	12.6	12.6	12.7	13.1	13.2	13.2	13.2	13.2
1934	13.2	13.3	13.3	13.3	13.3	13.4	13.4	13.4	13.6	13.5	13.5
1935	13.6	13.7	13.7	13.8	13.8	13.7	13.7	13.7	13.7	13.7	13.8
1936	13.8	13.8	13.7	13.7	13.7	13.8	13.9	14.0	14.0	14.0	14.0
1937	14.1	14.1	14.2	14.3	14.4	14.4	14.5	14.5	14.6	14.6	14.5
1938	14.2	14.1	14.1	14.2	14.1	14.1	14.1	14.1	14.1	14.0	14.0
1939	14.0	13.9	13.9	13.8	13.8	13.8	13.8	13.8	14.1	14.0	14.0
1940	13.9	14.0	14.0	14.0	14.0	14.1	14.0	14.0	14.0	14.0	14.0
1941	14.1	14.1	14.2	14.3	14.4	14.7	14.7	14.9	15.1	15.3	15.4
1942	15.7	15.8	16.0	16.1	16.3	16.3	16.4	16.5	16.5	16.7	16.8
1943	16.9	16.9	17.2	17.4	17.5	17.5	17.4	17.3	17.4	17.4	17.4
1944	17.4	17.4	17.4	17.5	17.5	17.6	17.7	17.7	17.7	17.7	17.7
1945	17.8	17.8	17.8	17.8	17.9	18.1	18.1	18.1	18.1	18.1	18.1
1946	18.2	18.1	18.3	18.4	18.5	18.7	19.8	20.2	20.4	20.8	21.3

1947	21.5	21.5	21.9	21.9	21.9	22.0	22.2	22.5	23.0	23.0	23.1
1948	23.7	23.5	23.4	23.8	23.9	24.1	24.4	24.5	24.5	24.4	24.2
1949	24.0	23.8	23.8	23.9	23.8	23.9	23.7	23.8	23.9	23.7	23.8
1950	23.5	23.5	23.6	23.6	23.7	23.8	24.1	24.3	24.4	24.6	24.7
1951	25.4	25.7	25.8	25.8	25.9	25.9	25.9	25.9	26.1	26.2	26.4
1952	26.5	26.3	26.3	26.4	26.4	26.5	26.7	26.7	26.7	26.7	26.7
1953	26.6	26.5	26.6	26.6	26.7	26.8	26.8	26.9	26.9	27.0	26.9
1954	26.9	26.9	26.9	26.8	26.9	26.9	26.9	26.9	26.8	26.8	26.8
1955	26.7	26.7	26.7	26.7	26.7	26.7	26.8	26.8	26.9	26.9	26.9
1956	26.8	26.8	26.8	26.9	27.0	27.2	27.4	27.3	27.4	27.5	27.5
1957	27.6	27.7	27.8	27.9	28.0	28.1	28.3	28.3	28.3	28.3	28.4
1958	28.6	28.6	28.8	28.9	28.9	28.9	29.0	28.9	28.9	28.9	29.0
1959	29.0	28.9	28.9	29.0	29.0	29.1	29.2	29.2	29.3	29.4	29.4
1960	29.3	29.4	29.4	29.5	29.5	29.6	29.6	29.6	29.6	29.8	29.8
1961	29.8	29.8	29.8	29.8	29.8	29.8	30.0	29.9	30.0	30.0	30.0
1962	30.0	30.1	30.1	30.2	30.2	30.2	30.3	30.3	30.4	30.4	30.4
1963	30.4	30.4	30.5	30.5	30.5	30.6	30.7	30.7	30.7	30.8	30.8
1964	30.9	30.9	30.9	30.9	30.9	31.0	31.1	31.0	31.1	31.1	31.2
1965	31.2	31.2	31.3	31.4	31.4	31.6	31.6	31.6	31.6	31.7	31.7
1966	31.8	32.0	32.1	32.3	32.3	32.4	32.5	32.7	32.7	32.9	32.9
1967	32.9	32.9	33.0	33.1	33.2	33.3	33.4	33.5	33.6	33.7	33.8
1968	34.1	34.2	34.3	34.4	34.5	34.7	34.9	35.0	35.1	35.3	35.4
1969	35.6	35.8	36.1	36.3	36.4	36.6	36.8	37.0	37.1	37.3	37.5
1970	37.8	38.0	38.2	38.5	38.6	38.8	39.0	39.0	39.2	39.4	39.6
1971	39.8	39.9	40.0	40.1	40.3	40.6	40.7	40.8	40.8	40.9	40.9
1972	41.1	41.3	41.4	41.5	41.6	41.7	41.9	42.0	42.1	42.3	42.4
1973	42.6	42.9	43.3	43.6	43.9	44.2	44.3	45.1	45.2	45.6	45.9
1974	46.6	47.2	47.8	48.0	48.6	49.0	49.4	50.0	50.6	51.1	51.5
1975	52.1	52.5	52.7	52.9	53.2	53.6	54.2	54.3	54.6	54.9	55.3
1976	55.6	55.8	55.9	56.1	56.5	56.8	57.1	57.4	57.6	57.9	58.0
1977	58.5	59.1	59.5	60.0	60.3	60.7	61.0	61.2	61.4	61.6	61.9
1978	62.5	62.9	63.4	63.9	64.5	65.2	65.7	66.0	66.5	67.1	67.4
1979	68.3	69.1	69.8	70.6	71.5	72.3	73.1	73.8	74.6	75.2	75.9
1980	77.8	78.9	80.1	81.0	81.8	82.7	82.7	83.3	84.0	84.8	85.5
1981	87.0	87.9	88.5	89.1	89.8	90.6	91.6	92.3	93.2	93.4	93.7
1982	94.3	94.6	94.5	94.9	95.8	97.0	97.5	97.7	97.9	98.2	98.0
1983	97.8	97.9	97.9	98.6	99.2	99.5	99.9	100.2	100.7	101.0	101.2
1984	101.9	102.4	102.6	103.1	103.4	103.7	104.1	104.5	105.0	105.3	105.3
1985	105.5	106.0	106.4	106.9	107.3	107.6	107.8	108.0	108.3	108.7	109.0
1986	109.6	109.3	108.8	108.6	108.9	109.5	109.5	109.7	110.2	110.3	110.4
1987	111.2	111.6	112.1	112.7	113.1	113.5	113.8	114.4	115.0	115.3	115.4
1988	115.7	116.0	116.5	117.1	117.5	118.0	118.5	119.0	119.8	120.2	120.3
1989	121.1	121.6	122.3	123.1	123.8	124.1	124.4	124.6	125.0	125.6	125.9
1990	127.4	128.0	128.7	128.9	129.2	129.9	130.4	131.6	132.7	133.5	133.8
1991	134.6	134.8	135.0	135.2	135.6	136.0	136.2	136.6	137.2	137.4	137.8
1992	138.1	138.6	139.3	139.5	139.7	140.2	140.5	140.9	141.3	141.8	142.0
1993	142.6	143.1	143.6	144.0	144.2	144.4	144.4	144.8	145.1	145.7	145.8
1994	146.2	146.7	147.2	147.4	147.5	148.0	148.4	149.0	149.4	149.5	149.7
1995	150.3	150.9	151.4	151.9	152.2	152.5	152.5	152.9	153.2	153.7	153.6
1996	154.4	154.9	155.7	156.3	156.6	156.7	157.0	157.3	157.8	158.3	158.6
1997	159.1	159.6	160.0	160.2	160.1	160.3	160.5	160.8	161.2	161.6	161.5
1998	161.6	161.9	162.2	162.5	162.8	163.0	163.2	163.4	163.6	164.0	164.0
1999	164.3										

LONG TERM CARE CALCULATION

Long Term Care Calculation

Base Amount (Starting in Dec. 1978)	$250,000
CPI-U December, 1978	67.7
CPI-U January, 1999	164.3

Adjusted Long Term Care = $250,000 x (CPI-U most recent / CPI-U Dec., 1978)

Adjusted Long Term Care	$606,721

ATTACHMENT D

RECLAMATION MATERIAL CHARACTERISTICS

PREPARED BY

INTERNATIONAL URANIUM (USA) CORP.

INDEPENDENCE PLAZA

1050 17TH STREET, SUITE 950

DENVER, CO 80265

Attachment D - Reclamation Material Characteristics

Material proposed for use in the reclamation of the White Mesa Mill tailings cells is available from stockpiles on the site, which were generated from construction of the existing cells. In the case of clay material for radon barrier, it is available to supplement the onsite material from the Section 16 borrow site located approximately 3 miles to the south of the exiting cells.

The characteristics of the materials are generally described in the text of the Reclamation Plan. In addition, test work was completed on the clay borrow material as well as the onsite stockpiles.

The Section 16 clay material was originally tested in 1982 by D'Appolonia Consulting Engineers, Inc. This test work included:

-- Classification
  - Grain size, sieve and hydrometer
  - Atterberg limits
  - Specific gravity

-- X-ray diffraction

-- Cation Exchange Capacity

-- Exchangeable Cations

-- Modified Proctor

-- Permeability

A copy of the full D'Appolonia Report is included in this Attachment

The onsite random fill and clay stockpiles were sampled in characterized in a program detailed in the April 15, 1999, submittal to the NRC, "Additional Clarifications to the White Mesa Mill Reclamation Plan". A copy of this sampling and testing program are included in this Attachment as well as the results of the characterization work. The samples wee characterized for:

-- Classification
  - Grain size and sieve
  - Atterberg limits

-- Standard Proctor

The results of these tests for the onsite stockpiled material are included in this Attachment.

D'APPOLONIA

CONSULTING ENGINEERS, INC.

March 8, 1982

Project No. RM78-682B

Mr. H. R. Roberts
Energy Fuels Nuclear, Inc.
1515 Arapahoe Street
Three Park Central, Suite 900
Denver, Colorado 80202

<u>Letter Report</u>
<u>Section 16 Clay Material Test Data</u>
<u>White Mesa Uranium Project</u>
<u>Blanding, Utah</u>

Dear Harold:

This report presents the results of field investigations and laboratory tests performed on Section 16 clay material. The material tested was obtained from borings and test pits made in April 1979. The laboratory tests were performed and the data retained in our files until your recent request for the data.

Field Investigations

The area of investigation is a canyon located in Section 16, about three miles south of the mill site. Seven borings were drilled as part of the field investigations. These borings, 100 through 106, are located approximately as shown on Figure 1.

The borings were drilled with a rig provided by Energy Fuels using the rotary method with air pressure to flush out the cuttings. Samples were obtained by sampling the cuttings on five foot intervals. Only qualitative information on the subsurface materials is available because of the method of drilling and sampling utilized. However, the qualitative information and samples obtained are suitable to provide preliminary data on the character of the subsurface materials present.

Three test pits (1-3) were excavated to obtain bulk samples for laboratory testing. The location of the test pits is shown on Figure 1.

Samples from Boring 2-16 drilled by Energy Fuels in November 1978 were also provided to D'Appolonia for testing. The location of Boring 2-16 is shown on Figure 1.

Subsurface Conditions

The subsurface conditions in the canyon, based on the boring data, are shown on Cross Sections A-A' and B-B' presented on Figures 2 and 3, respectively. The plan locations of these cross sections is shown on Figure 1. As shown on the cross sections, the subsurface consists of a surficial layer of red clayey and silty sand about five feet thick. The underlying material is mostly a red or gray silty clay. The consistency of the silty clay layer varies from stiff to hard, based on observations of the drillers and rig during drilling. A lense or layer of very hard silt was noted in Boring 105. This layer appears to be a well cemented unit from the cutting samples obtained. In Boring 106, the surficial sand layer was about 20 feet thick and a clayey sand layer was also encountered at a depth of about 30 feet.

The laboratory soil classifications for the tested samples are also shown on Cross Sections A-A' and B-B'. The testing program is discussed in detail in the following section, however, the testing results indicate that the silty clay layer is mostly a CL or CH material with one sample being a SM and two a ML. These test results show the material is basically a fine grained soil with a varying amount of silt and clay size particles. The plasticity characteristics of the material vary from low to high. Further discussion of the test results and material characteristics is given below.

Water in the borings was not noted except for Boring 104 for which a depth of about 43 feet was measured. This depth is not considered completely reliable since it was measured only one day after drilling and the water level may not have had time to stabilize.

Laboratory Test Results

The laboratory testing program conducted on samples from the borings and test pits included the following types of tests:

- o Classification
  - Grain size, sieve and hydrometer
  - Atterberg limits
  - Specific gravity
- o X-Ray Diffraction
- o Cation Exchange Capacity
- o Exchangeable Cations
- o Modified Proctor Compaction Density
- o Permeability

The results of the classification tests are given on Table 1. The soil classifications given are shown on Cross Sections A-A' and B-B' (Figures 2 and 3) and were discussed above.

The cation exchange capacity (CEC) and exchangeable ions were conducted to evaluate the type of clays present and the chemical effects resulting from contact with the tailings liquid. Tests were run on samples from Test Pits 2 and 3 samples and Boring 103 (15-20 foot depth). Soil from each sample was treated by soaking in simulated tailings liquid for 48 hours before testing. Both treated and untreated (as received) samples were tested and the results are presented on Table 2. Results of the testing are summarized as follows:

- o The untreated samples indicate pH (1:1) values between 7.40 and 8.35 with CEC values in the 45-56 meq/100g range. The predominate exchangeable ions are calcium and sodium for Test Pits 2 and 3 and calcium and magnesium for Boring 103 (15-20 ft).
- o The treated samples indicate pH (1:1) values between 1.70 and 2.35 with CEC values in the 90-100 meq/100g range. The predominate exchangeable ions are hydrogen, calcium, and magnesium for all the samples.

These results indicate that exposure to the tailings water causes:

- the pH (1:1) of the material to decrease.
- the exchangeable hydrogen and magnesium to increase.
- the exchangeable calcium and sodium to decrease.
- the CEC to increase by a factor of about two due primarily to the large increase in exchangeable hydrogen.

The effects of these changes on clay material properties, particularly permeability, is discussed in the following paragraphs.

The X-ray diffraction tests were run on material from the same three samples as tested for CEC and exchangeable ions. The x-ray diffraction testing was conducted to evaluate the type of clay minerals occurring in the material. The results of the testing are given on Table 3. As shown, about 50 percent of the material is quartz, 25 percent montmorillonite, 25 percent illite, and minor percentages of other minerals. Montmorillonite is an active clay mineral which typically has a low coefficient of permeability. Illite is also a clay mineral, but it is typically relatively inactive with a somewhat higher coefficient of permeability.

Modified Proctor compaction tests were conducted on four different samples. Test Pits 1, 2 and 3 samples were tested and a composite sample from Boring 2-16 (85 to 210 feet depth). The results of the modified Proctor tests are given on Table 1. The average maximum dry density measured is 107 pounds per cubic foot and the average optimum water content is 17.5 percent.

Permeability tests were conducted on compacted samples of material from Boring 2-16 (composite 85-120 feet), Boring 101 (composite 0-25 feet), Boring 103 (composite 0-25 feet) and Test Pit 2. The tests were conducted in permeability cells with a confining pressure applied around the sample which is encased in a rubber membrane. A differential pressure was applied across the sample and flow of fluid through the sample measured. Both distilled water and simulated tailings liquid were used in the tests. The tests on Borings 101 and 103, and Test Pit 2 were conducted over a period of about five months to assess the effects of tailings liquid on the permeability of the material. The tests were conducted with distilled water for about two months to establish saturation and steady state flow. Tailings liquid was then introduced to the sample and the test continued for three more months. The results of the permeability tests are presented on Table 4 along with other pertinent sample data. The material has an average coefficient of permeability with water of 3.3×10^{-10} centimeters per second and 5.1×10^{-10} centimeters per second with simulated tailings liquid. The test results indicate that the permeability of the material was essentially the same with distilled water and tailings liquid and no degradation of the material was indicated.

Conclusions and Recommendations

Based on the field and laboratory investigations discussed above, conclusions which can be made regarding the materials in Section 16 are:

- The material is mostly a silty clay (CL to CH) with slight variation in properties. The clay minerals are mostly montmorillonite with some illite.
- The material varies laterally with some layers or lenses of sand and silt. The consistency of the material also varies from stiff to hard or very hard.
- The permeability values of the material are very low and long-term permeability tests conducted with simulated tailings liquid indicate little change in permeability with time. This result is in good agreement with the results of the CEC, exchangeable ion tests and x-ray diffraction test results.
- The clay material is suitable for use as borrow for use as a clay liner or in situ as a natural liner layer.

Recommendations for further assessment of the clay for use as a borrow area or in situ clay liner source are:

- Geotechnical borings with split spoon samples to assess the material characteristics more specifically, including consistency, natural water content, and classification.

- o Field permeability tests (falling or rising head) in the borings to measure the in situ permeability.
- o Installation of piezometers to determine the ground water level.

Additional discussion of the above recommendations can be provided as necessary depending on your needs.

Very truly yours,

Corwin E. Oldweiler
Project Engineer

CEO:par

TABLE 1

LABORATORY TEST RESULTS

BORING/ TEST PIT	SAMPLE DEPTH (FEET)	GRAIN SIZE ANALYSIS SAND (PERCENT)	SILT (PERCENT)	CLAY (PERCENT)	ATTERBERG LIMITS LIQUID (PERCENT)	PLASTIC (PERCENT)	PLASTICITY (PERCENT)	USCS CLASSIFICATION	SPECIFIC GRAVITY	OPTIMUM PROCTOR VALUES DRY DENSITY (PCF)	WATER CONTENT (PERCENT)
101	0-5	61	22	17	24.0	18.5	5.5	SC-SM	-	-	-
	5-10	26	48	26	58.9	24.1	34.8	CH	-	-	-
	10-15	10	50	40	73.0	28.2	44.8	CH	-	-	-
	15-20	7	54	39	103.0	31.2	71.8	CH	2.59	-	-
102	5-10	-	-	-	-	-	NP	ML	-	-	-
	10-15	-	-	-	-	-	NP	ML	-	-	-
	15-20	-	-	-	20.3	10.2	10.1	CL	-	-	-
103	0-5	70	18	12	17.0	14.9	2.1	SM	2.71	-	-
	5-10	15	38	47	73.8	24.9	48.9	CH	-	-	-
	10-15	13	49	38	59.8	26.6	33.2	CH	-	-	-
	15-20	13	50	37	71.0	21.6	49.4	CH	-	-	-
104	0-5	55	30	15	18.4	16.2	2.2	SM	-	-	-
	5-10	30	43	27	31.2	16.5	14.7	CL	-	-	-
	10-15	66	17	17	-	-	-	-	-	-	-
	15-20	37	31	32	35.7	11.8	23.9	CL	-	-	-
105	0-5	58	22	20	-	-	NP	SM	-	-	-
	5-10	65	17	18	-	-	NP	SM	-	-	-
	10-15	62	17	21	24.0	12.0	12.0	SC	-	-	-
	15-20	17	36	47	71.0	18.9	52.1	CH	-	-	-
1(1)	-	17	40	43	108.0	25.0	83.0	CH	-	99.9	19.9
2(1)	-	17	50	33	141.2	18.4	122.8	CH	-	111.5	15.0
3(1)	-	3	42	55	115.0	23.0	92.0	CH	2.60	101.0	20.5
2-16	65	-	-	-	32.0	15.8	16.2	CL	-	-	-
	125	7	43	50	57.5	25.9	31.6	CH	-	-	-
	180	-	-	-	148.5	25.3	123.0	CH	-	-	
	COMPOSITE 85-210(2)	95	5	0	-	-	-	SW-SC	-	-	-
	COMPOSITE 85-210(3)	18	47	35	-	-	-	cl-ml	2.72	115.8	14.7

(1) These samples are Test Pits
(2) Sample tested before soaking.
(3) Sample tested after soaking 16 hours.

TABLE 2

CATION EXCHANGE CAPACITY AND EXCHANGEABLE CATION TEST RESULTS

PARAMETER	UNITS	UNTREATED SAMPLES TEST PIT 2	UNTREATED SAMPLES TEST PIT 3	UNTREATED SAMPLES BORING 103	TREATED SAMPLES[1] TEST PIT 2[2]	TREATED SAMPLES[1] TEST PIT 3	TREATED SAMPLES[1] BORING 103
pH (1:1)	-	8.35	7.40	7.60	2.30	2.35	1.70
Buffer pH	-	NA	NA	NA	2.28	2.20	2.15
Exchangeable:							
H	meq/100g	0	0	0	56.6	57.6	58.2
Ca	meq/100g	19.5	21.1	25.8	12.3	13.5	18.7
Mg	meq/100g	4.3	4.9	15.4	17.0	20.3	17.8
Na	meq/100g	20.0	28.0	6.5	3.7	6.5	2.6
K	meq/100g	1.2	2.5	0.6	0.8	1.6	0.5
Cation Exchange Capacity (CEC)	meq/100g	45	56	48	90	100	98

[1] Samples soaked in simulated tailings liquid for 48 hours before testing.
[2] Represents triplicate results.

TABLE 3

X-RAY DIFFRACTION SEMI-QUANTITATIVE RESULTS

SAMPLE	QUARTZ	ANDESINE	MONTMORILLONITE	ILLITE	MIXED LAYER
Test Pit 2	50%+	-5%	10-25%	10-25%	5-10%
Test Pit 3	50%+	5-10%	10-25%	10-25%	5-10%
Boring 101 (15'-20' Depth)	50%+	5-10%	25-50%	Trace	-5%

TABLE 4

PERMEABILITY TEST RESULTS

BORING/ TEST PIT	SAMPLE DEPTH (FEET)	INITIAL CONDITIONS		COEFFICIENTS OF PERMEABILITY	
		DRY DENSITY (PCF)	WATER CONTENT (PERCENT)	WITH DISTILLED WATER (CM/SEC)	WITH TAILINGS LIQUID (CM/SEC)
103	0-25	116.7	13.3	1.2×10^{-9}	9.4×10^{-10}
101	0-25	117.5	14.6	5.2×10^{-10}	7.5×10^{-10}
2	-	110.7	14.7	4.7×10^{-10}	2.3×10^{-10}
2-16	85-210	101	15	-	1.0×10^{-10}
2-16	85-210	110	15	-	5.5×10^{-10}

Soil Sampling and Testing Program – White Mesa Mill

The purpose of this Soil Sampling and Testing Program is to verify the soil classification, gradation and compaction characteristics (standard proctor) of the stockpiled random fill and clay materials that will be used for cover materials on the tailings cells at the White Mesa Mill. Additionally this program will verify the compaction characteristics and gradation of the random fill materials utilized in the platform fill previously placed on Cells 2 and 3.

Sampling

Sampling will take place on each of six stockpiles of random fill (designated RF-1 through RF-6 on Exhibit A), two clay material stockpiles (C-1 and C-2 on Exhibit A), and on platform fill areas in Cells 2 & 3. A total of 9 samples will be taken from the random fill stockpiles. Two (2) samples will be taken from the clay stockpiles and three (3) samples will be taken from the covered areas of the cells. Samples will be taken from test pits excavated by a backhoe. Samples will be taken from a depth of 8 feet in stockpiles and from 2 foot depth in cells. One backhoe bucket full of material will be taken from the test pit at the specified depth and dumped separately. This sample will be quartered and one quarter will be screened to minus 2" (rocks over 8" will be removed prior to screening). Two five gallon sample buckets will be filled with sample randomly selected from the screened fraction. Oversized material remaining after the screening of the sample will be visually classified and then weighed. Sample locations will be indicated on a site map and sample descriptions will recorded and maintained in the facility's records. A total of fourteen samples will be submitted for testing during this program.

Testing

Samples will be packaged and shipped to a certified commercial testing laboratory for testing. Tests will be run on each sample for standard proctor (ASTM D698), particle size analysis (ASTM C117 and ASTM C136), soil classification (ASTM D2487) and plasticity index (Atterberg limits ASTM D4318).

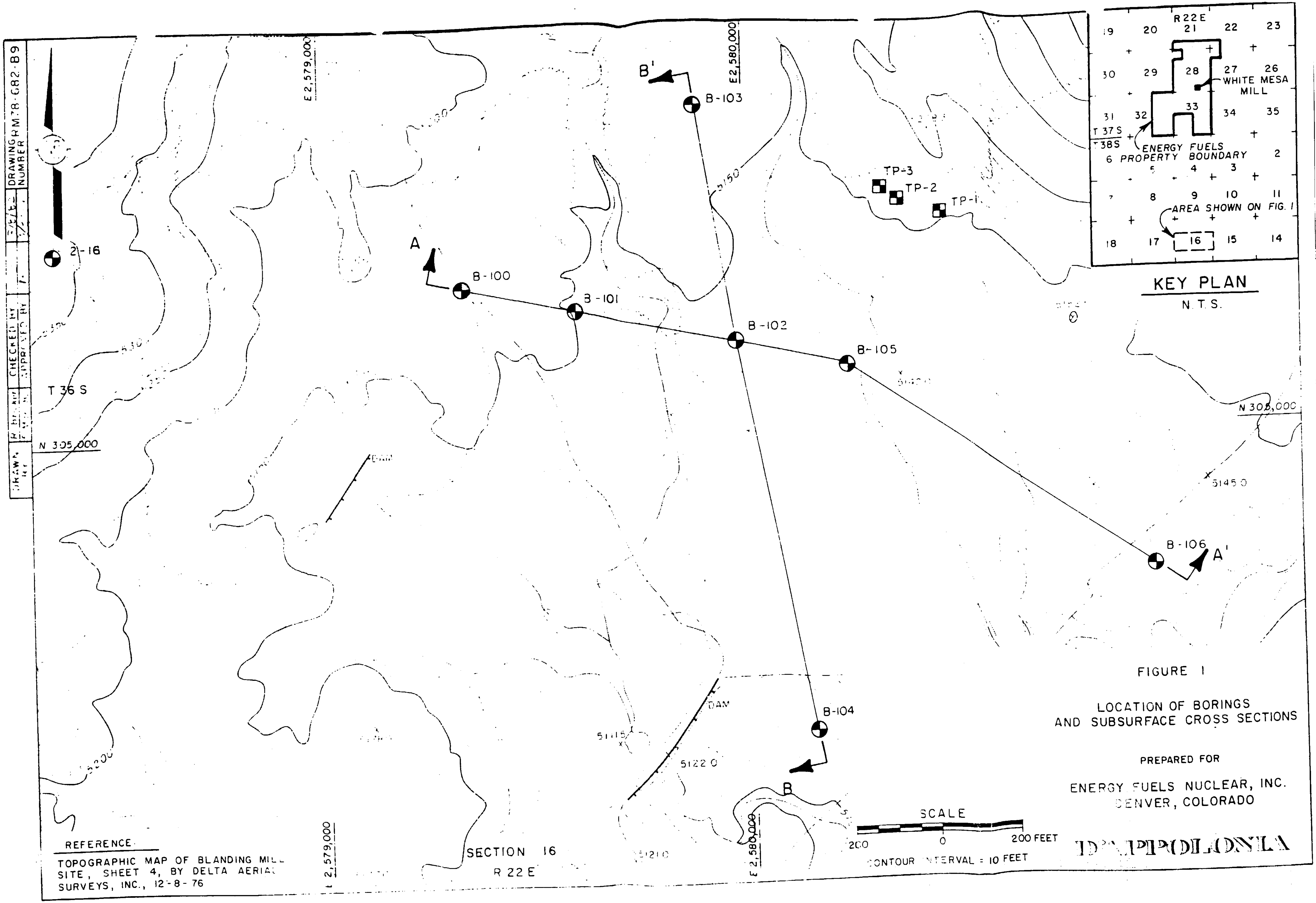


FIGURE 1

LOCATION OF BORINGS AND SUBSURFACE CROSS SECTIONS

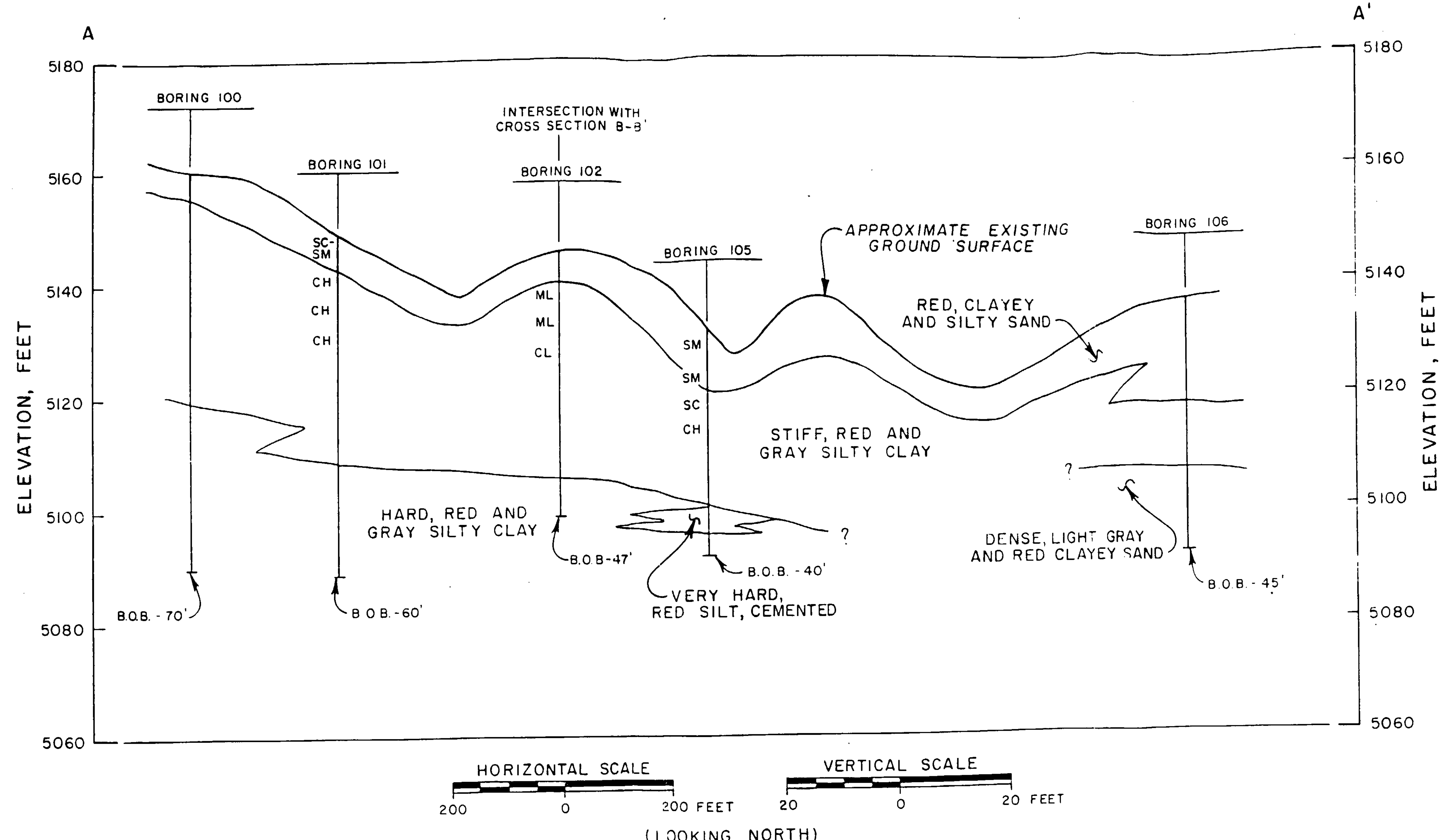


FIGURE 2

SUBSURFACE CROSS SECTION A-A'

THE DEPTH AND THICKNESS OF THE SUBSURFACE STRATA INDICATED ON THE SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN THE TEST BORINGS INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT THE LOCATION OF THE TEST BORINGS AND IT IS POSSIBLE THAT SUBSURFACE CONDITIONS BETWEEN THE TEST BORINGS MAY VARY FROM THOSE INDICATED

LEGEND:

CH - LABORATORY SOIL CLASSIFICATION

(UNIFIED SOIL CLASSIFICATION SYSTEM)

NOTES:

1. FOR PLAN LOCATION OF CROSS SECTION, SEE FIGURE 1.
2. VERTICAL EXAGGERATION EQUALS 10X.

PREPARED FOR

ENERGY FUELS NUCLEAR, INC.
DENVER, COLORADO

D'APPOLONIA

DRAWN BY R. Bricker 4 Mar. 82 | CHECKED BY | APPROVED BY | DRAWING NUMBER RM78-682-B7

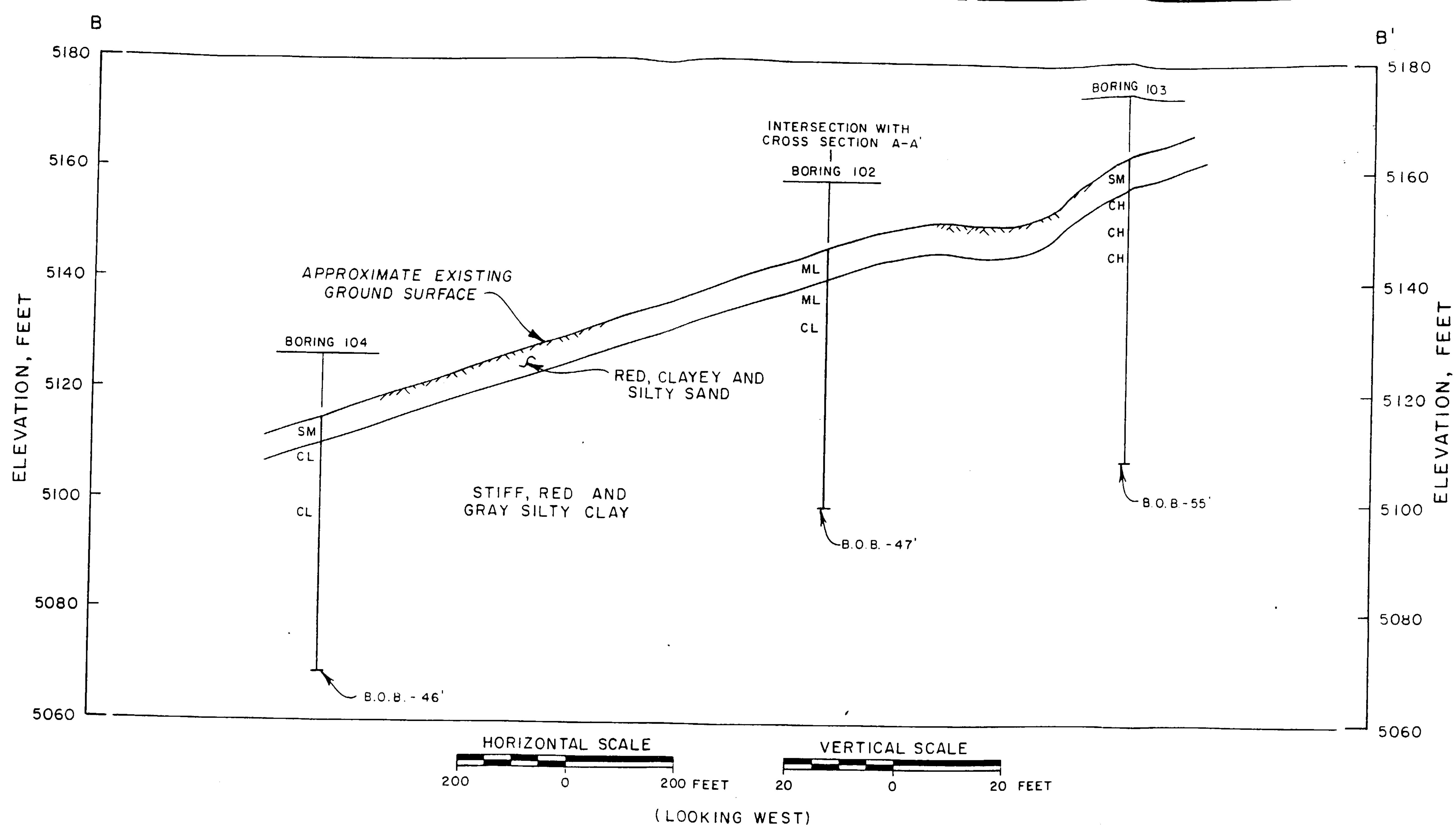


FIGURE 3

SUBSURFACE CROSS SECTION B-B'

PREPARED FOR

ENERGY FUELS NUCLEAR, INC.
DENVER, COLORADO

DAPPOLONIA

THE DEPTH AND THICKNESS OF THE SUBSURFACE STRATA INDICATED ON THE SECTIONS WERE GENERALIZED FROM AND INTERPOLATED BETWEEN THE TEST BORINGS INFORMATION ON ACTUAL SUBSURFACE CONDITIONS EXISTS ONLY AT THE LOCATION OF THE TEST BORINGS AND IT IS POSSIBLE THAT SUBSURFACE CONDITIONS BETWEEN THE TEST BORINGS MAY VARY FROM THOSE INDICATED

LEGEND:

CH - LABORATORY SOIL CLASSIFICATION (UNIFIED SOIL CLASSIFICATION SYSTEM)

NOTES:

1. FOR PLAN LOCATION OF CROSS SECTION, SEE FIGURE 1.
2. VERTICAL EXAGGERATION EQUALS 10 X.

DRAWN BY	R. Bricker 4 Mar. 82	CHECKED BY APPROVED BY	DRAWING NUMBER RM78-682-B8

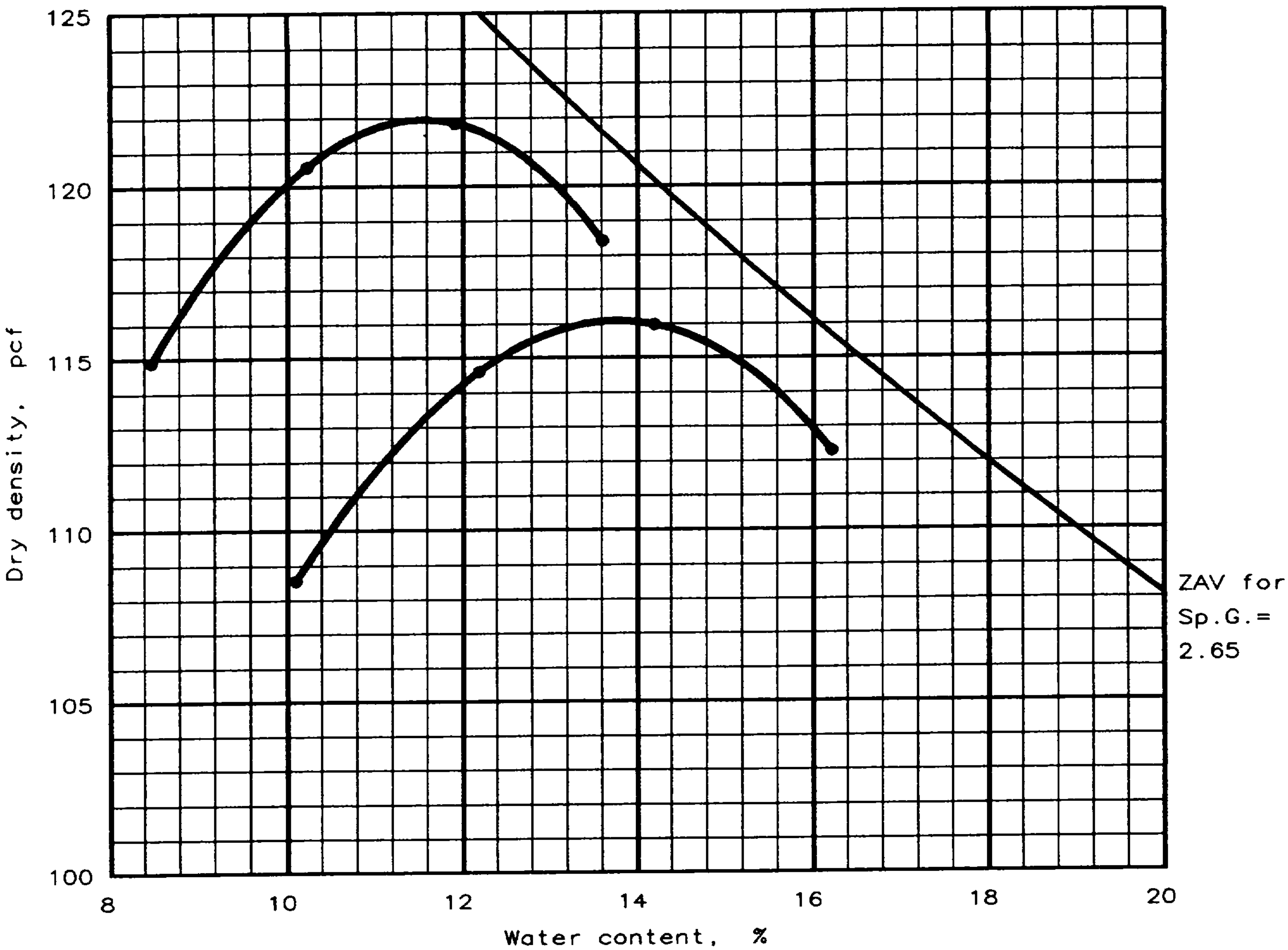
THIS PAGE IS AN OVERSIZED DRAWING OR FIGURE,

THAT CAN BE VIEWED AT THE RECORD TITLED: EXHIBIT A: SOIL SAMPLING AND TESTING PROGRAM SAMPLE AND STOCKPILE LOCATIONS

WITHIN THIS PACKAGE...OR, BY SEARCHING USING THE DRAWING NUMBER: EXHIBIT A

NOTE: Because of this page's large file size, it may be more convenient to copy the file to a local drive and use the Imaging (Wang) viewer, which can be accessed from the Programs/Accessories menu.

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure B, Standard

Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in	% < No.200
	USCS	AASHTO						
			N/A %	2.65			16.1 %	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 122.0 pcf Optimum moisture = 11.6 %	116.1 pcf 13.8 %	2-1-W Sand, clayey, grvly, brn

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 5/3/99

Remarks:

SUBMITTED BY: Client

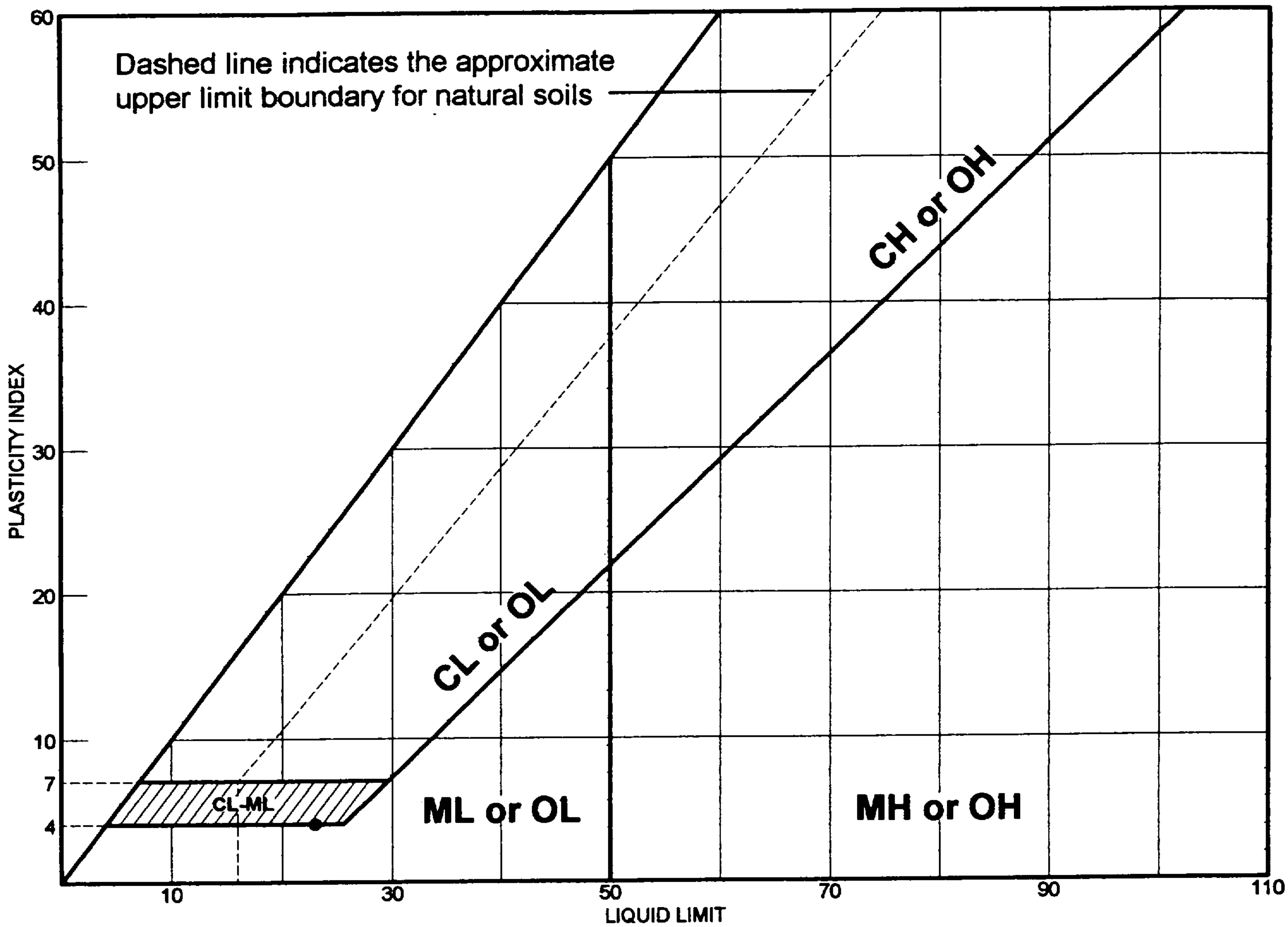
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 7

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sand, very clayey, sl silty, red	23	19	4	56.9	25.1	SM

Project No. 804899 **Client:** International Uranium Corporation

Project: Soil Sample Testing

● **Source:** **Sample No.:** 2-1-W

Remarks:

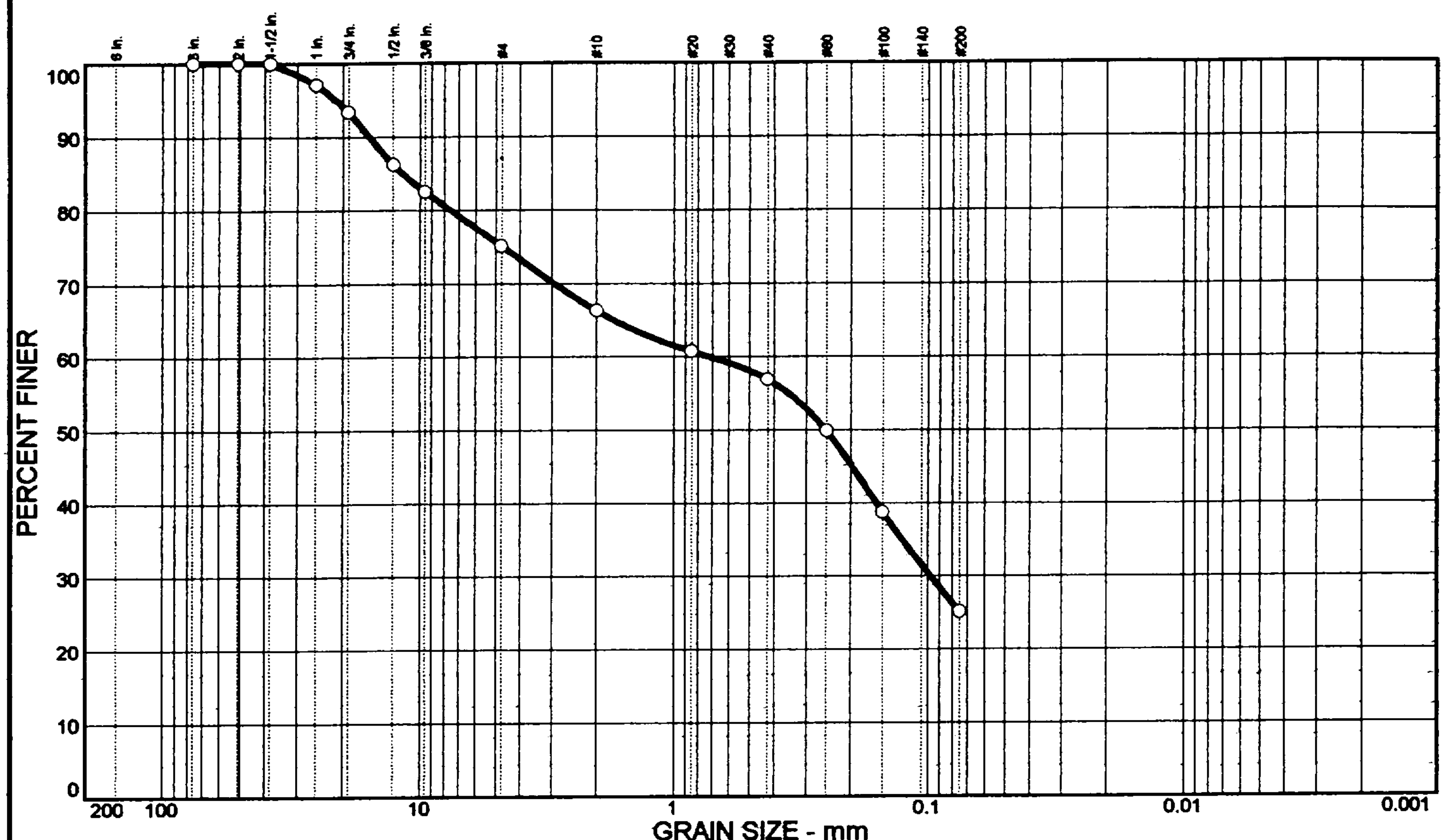
● Tested By: JH

LIQUID AND PLASTIC LIMITS TEST REPORT

WESTERN COLORADO TESTING, INC.

Figure 22

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		24.8	50.1			SM	A-2-4(0)	19	23

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	97.1		
3/4	93.4		
1/2	86.3		
3/8	82.6		
	GRAIN SIZE		
D_{60}	0.726		
D_{30}	0.0973		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	75.2		
#10	66.3		
#20	60.7		
#40	56.9		
#60	49.9		
#100	38.8		
#200	25.1		

SOIL DESCRIPTION

○ Sand, very clayey, sl silty, red

REMARKS:

○ Tested By: JH

○ Source:

Sample No.: 2-1-W

WESTERN COLORADO TESTING, INC.

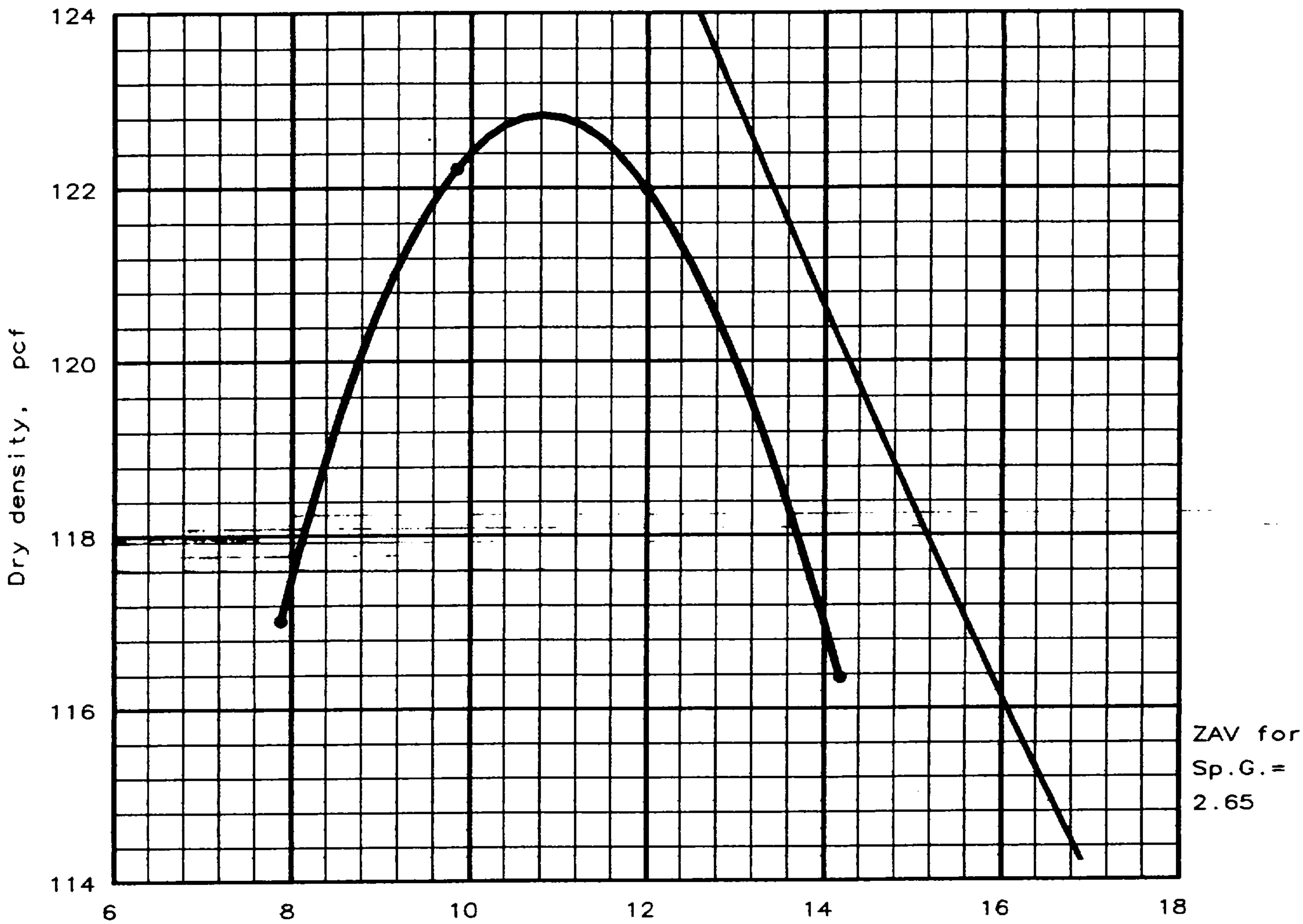
Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 38

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure B, Standard
Oversize correction applied to each point

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in	% < No.200
			N/A %	2.65			13.4 %	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 122.8 pcf Optimum moisture = 10.8 %	122.8 pcf 10.8 %	2W-7C Sand, silty, gravely, br

Project No.: 804899
Project: International Uranium Corporation
Location: Soil Sample Testing

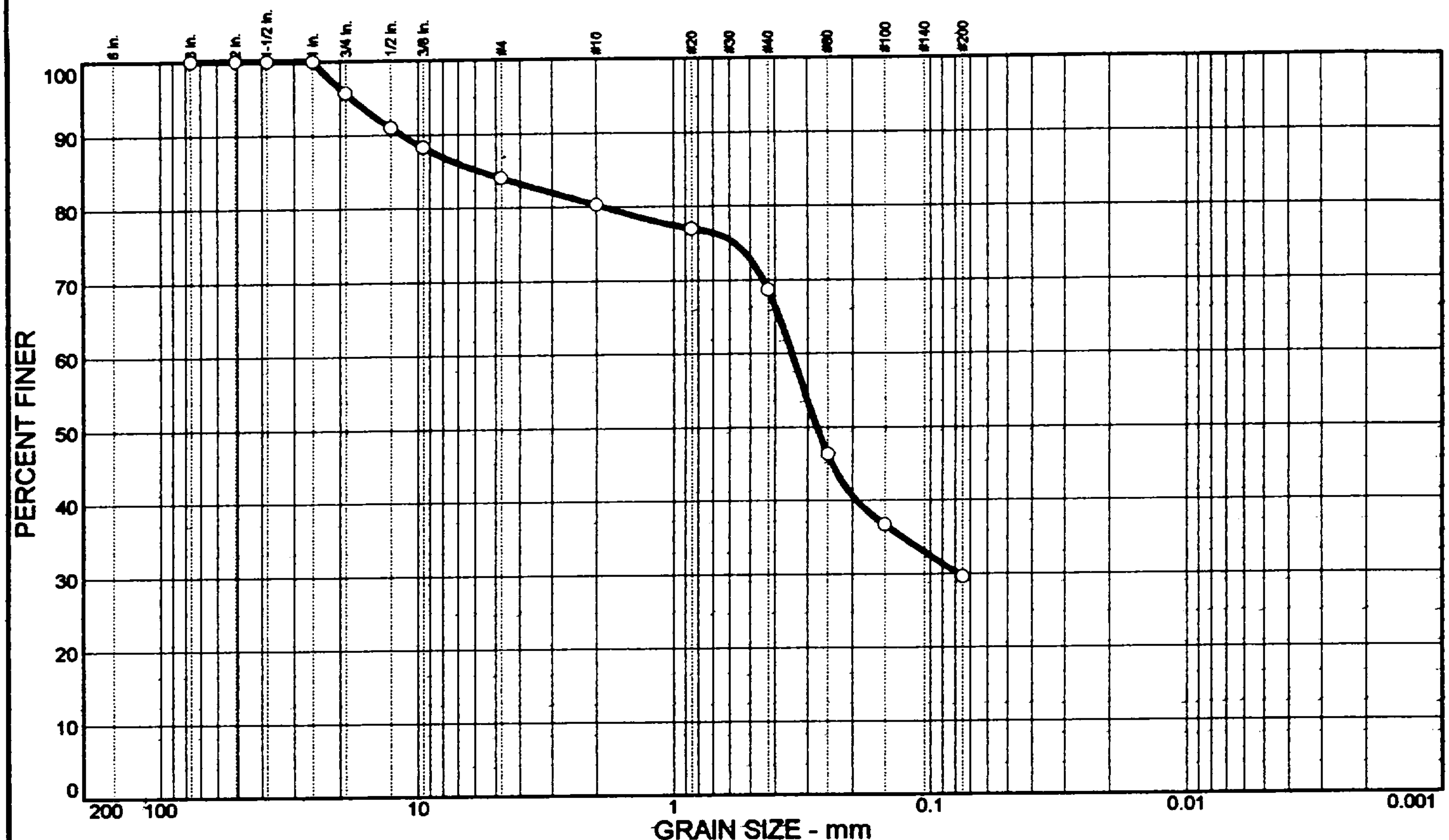
Date: 5/3/99

Remarks:
SUBMITTED BY: Client
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST
WESTERN COLORADO TESTING, INC.

Fig. No. 8

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		15.9	54.5			SM	A-2-4(0)	NP	

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
3/4	95.7		
1/2	91.0		
3/8	88.3		
	GRAIN SIZE		
D_{60}	0.344		
D_{30}	0.0781		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	84.1		
#10	80.3		
#20	77.0		
#40	68.6		
#60	46.4		
#100	36.7		
#200	29.6		

SOIL DESCRIPTION

○ Sand, silty, gravely, brown

REMARKS:

○ Tested By: JH

○ Source:

Sample No.: 2W-7C

WESTERN COLORADO TESTING, INC.

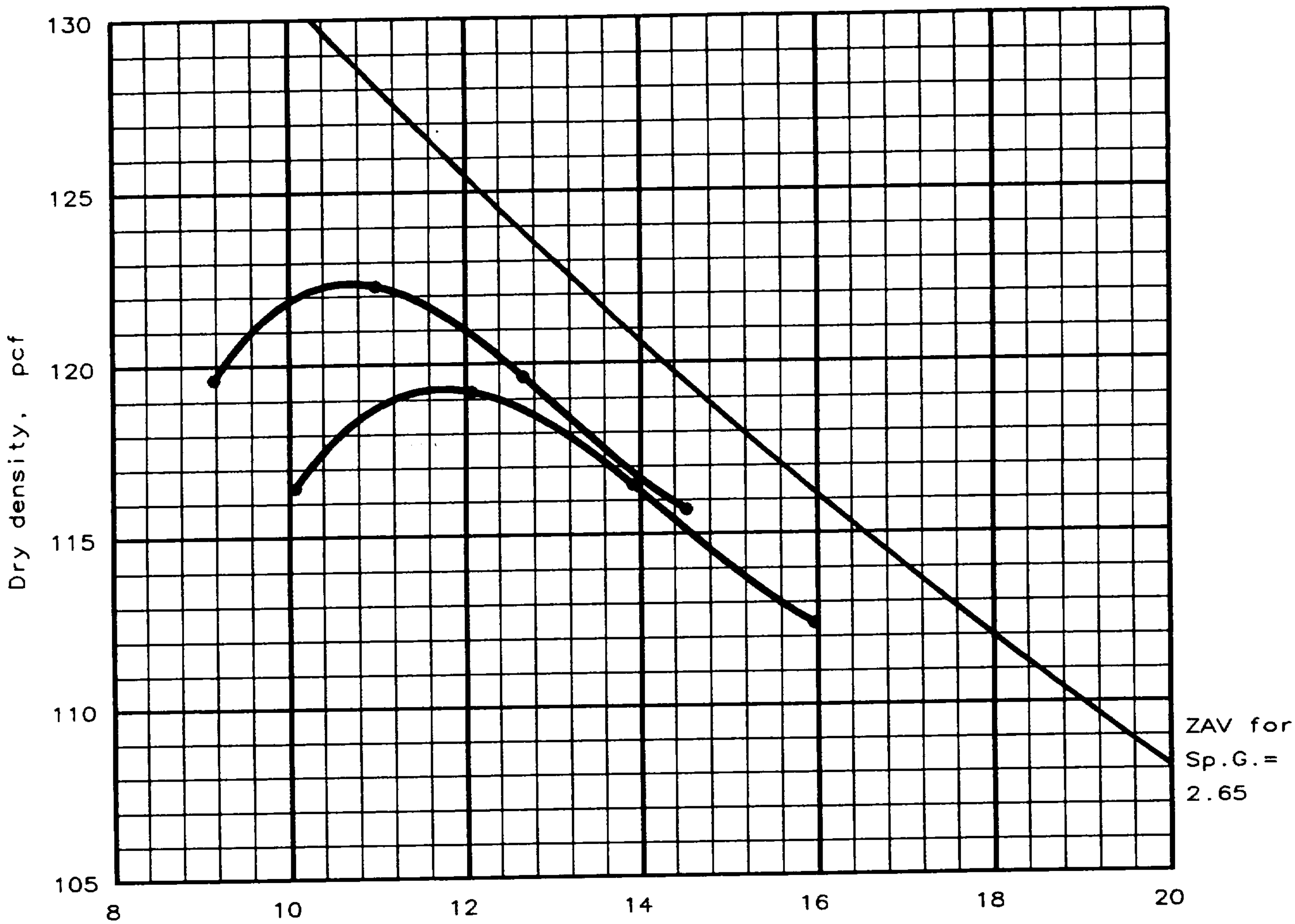
Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 39

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure C, Standard
Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in	% < No.200
	USCS	AASHTO						
			N/A %	2.65			9.0 %	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 122.4 pcf Optimum moisture = 10.7 %	119.3 pcf 11.8 %	3-1C Sand, clayey, grvly, brn

Project No.: 804899
Project: International Uranium Corporation
Location: Soil Sample Testing

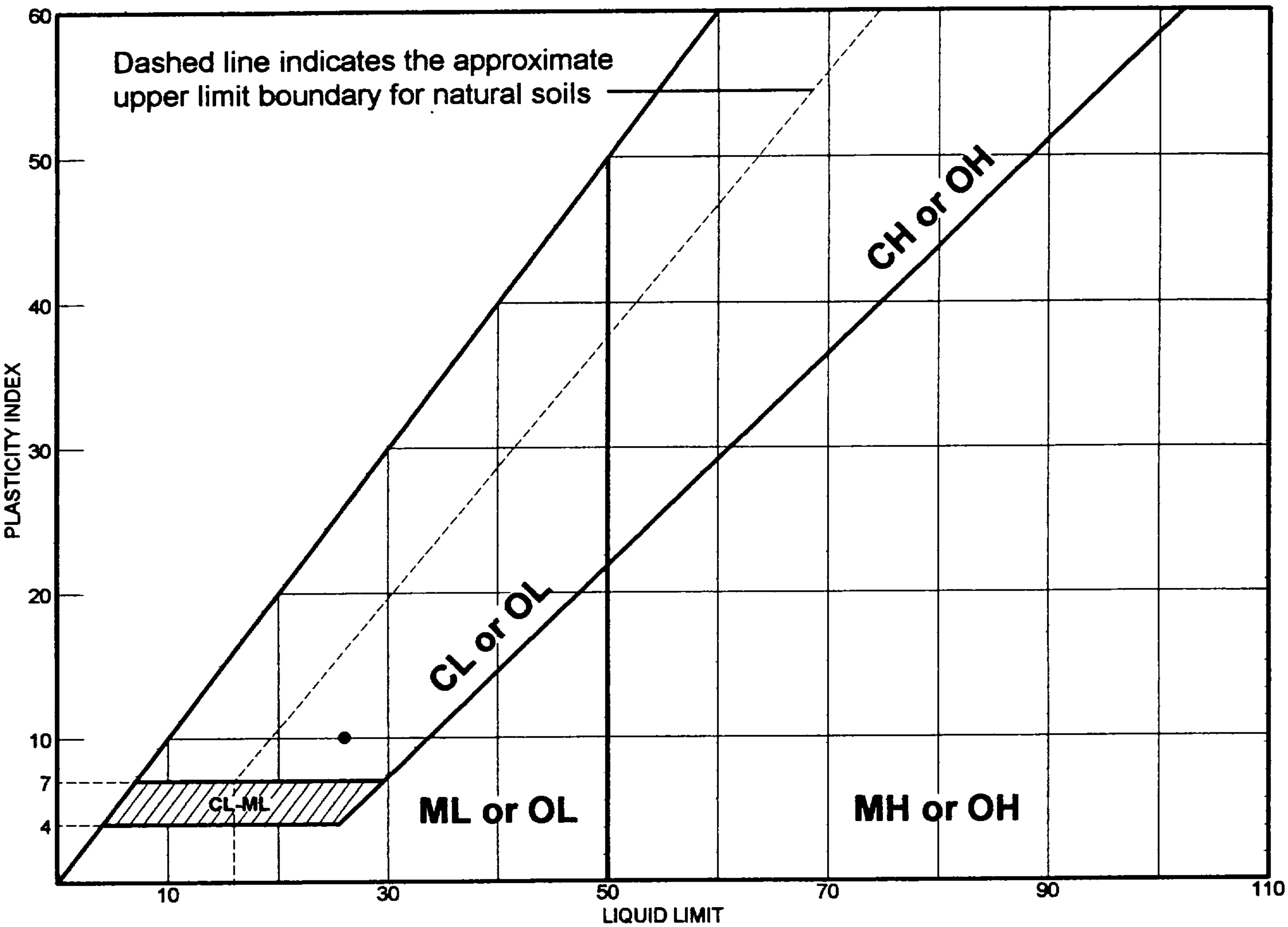
Date: 5/3/99

Remarks:
SUBMITTED BY: Client
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST
WESTERN COLORADO TESTING, INC.

Fig. No. 9

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sand, clayey, gravely, brown	26	16	10	69.5	36.9	SM

Project No. 804899 **Client:** International Uranium Corporation

Project: Soil Sample Testing

● **Source:** **Sample No.:** 3-1C

Remarks:

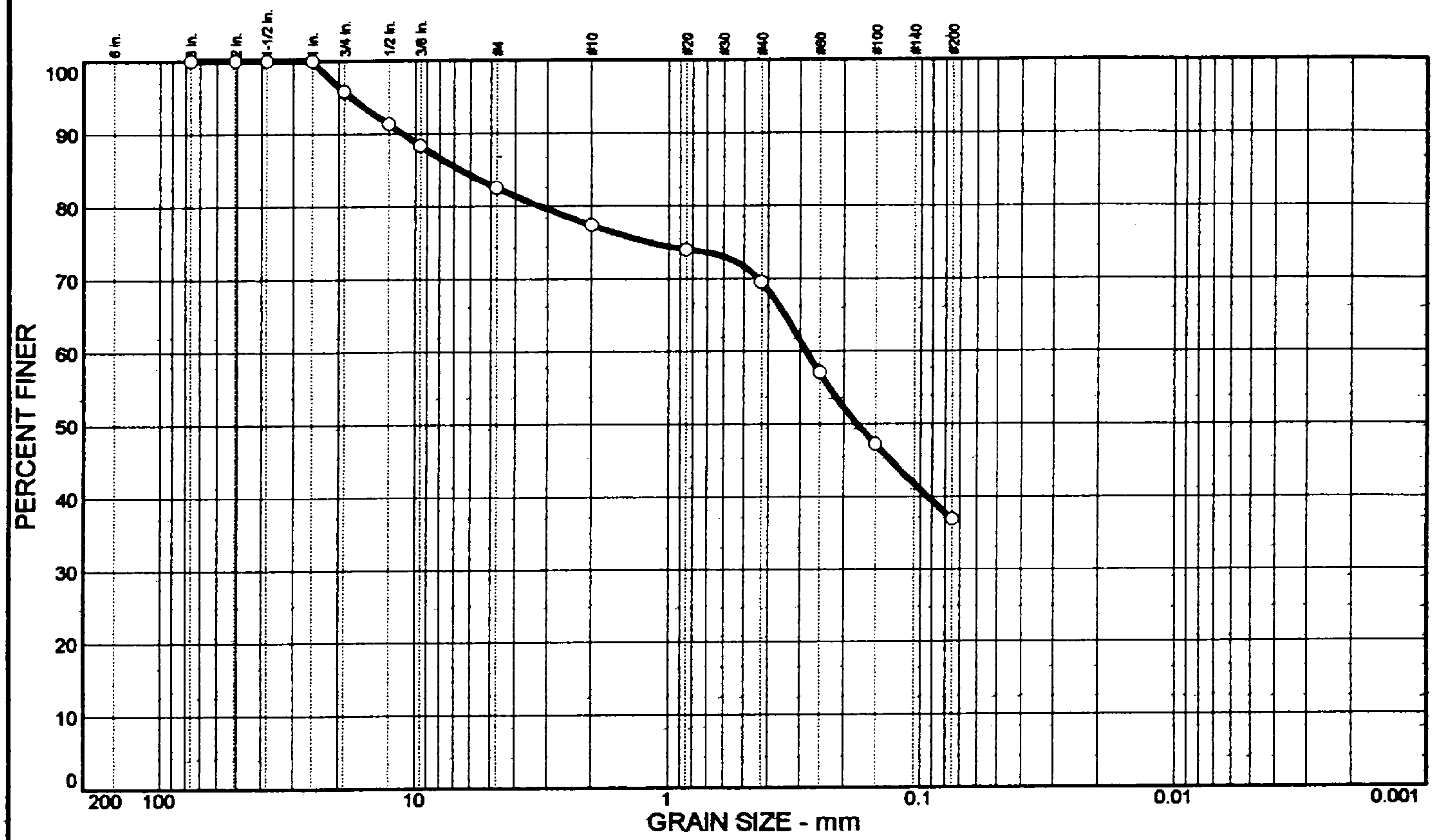
● Tested By: JH

LIQUID AND PLASTIC LIMITS TEST REPORT

WESTERN COLORADO TESTING, INC.

Figure 23

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		17.4	45.7			SM	A-4(0)	16	26

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
3/4	95.8		
1/2	91.3		
3/8	88.3		
	GRAIN SIZE		
D_{60}	0.282		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	82.6		
#10	77.4		
#20	74.0		
#40	69.5		
#60	57.0		
#100	47.2		
#200	36.9		

SOIL DESCRIPTION
○ Sand, clayey, gravely, brown

REMARKS:
○ Tested By: JH

○ Source:

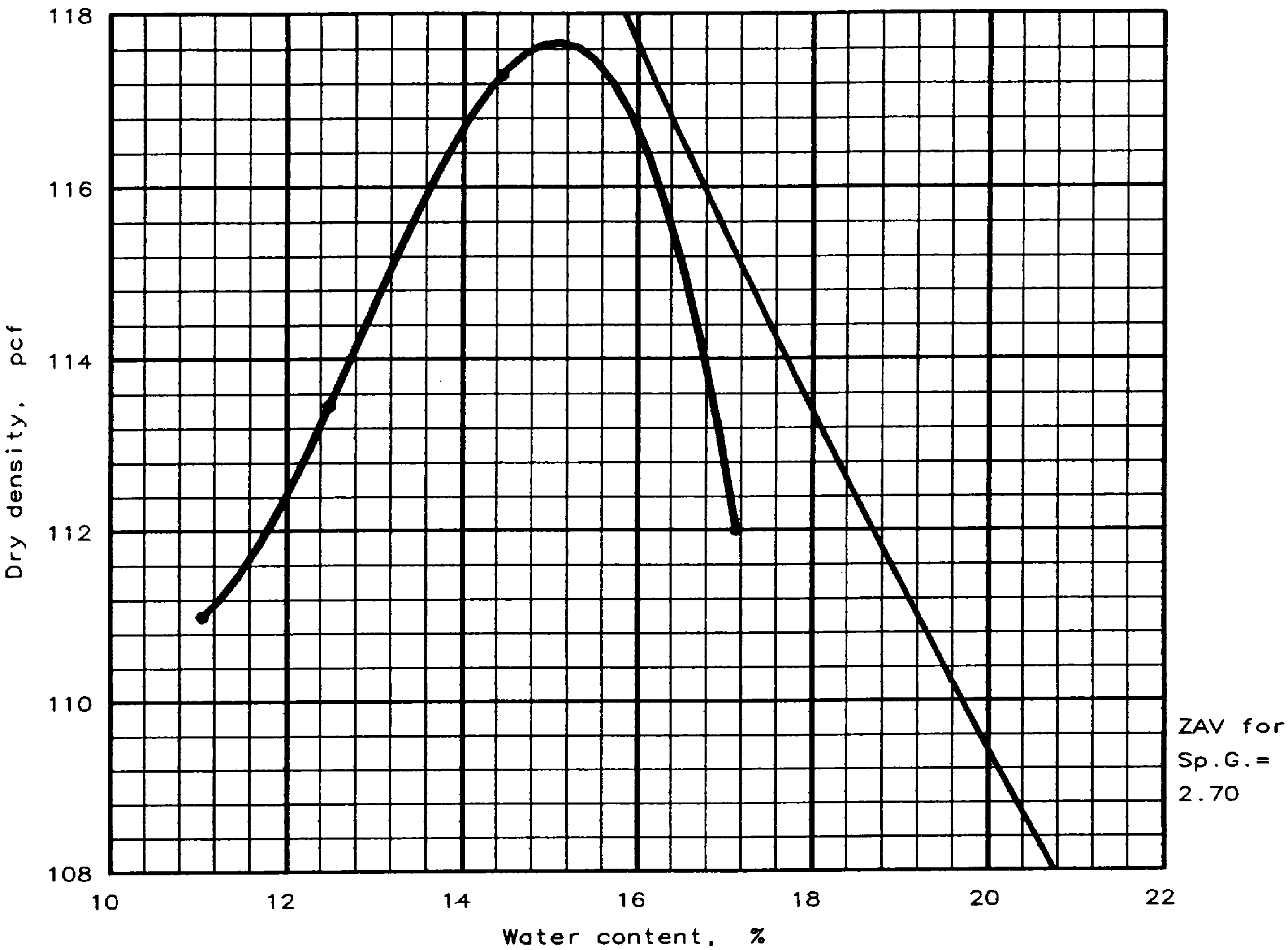
Sample No.: 3-1C

WESTERN COLORADO TESTING, INC.

Client: International Uranium Corporation
Project: Soil Sample Testing
Project No.: 804899

Figure 40

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure A, Standard

Oversize correction applied to each point

Elev/ Depth	Classification USCS	AASHTO	Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
			N/A %	2.70				

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 117.7 pcf Optimum moisture = 15.1 %	117.7 pcf 15.1 %	C1-S1 Clay, v sandy, silty, rd

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 5/3/99

Remarks:

SUBMITTED BY: Client

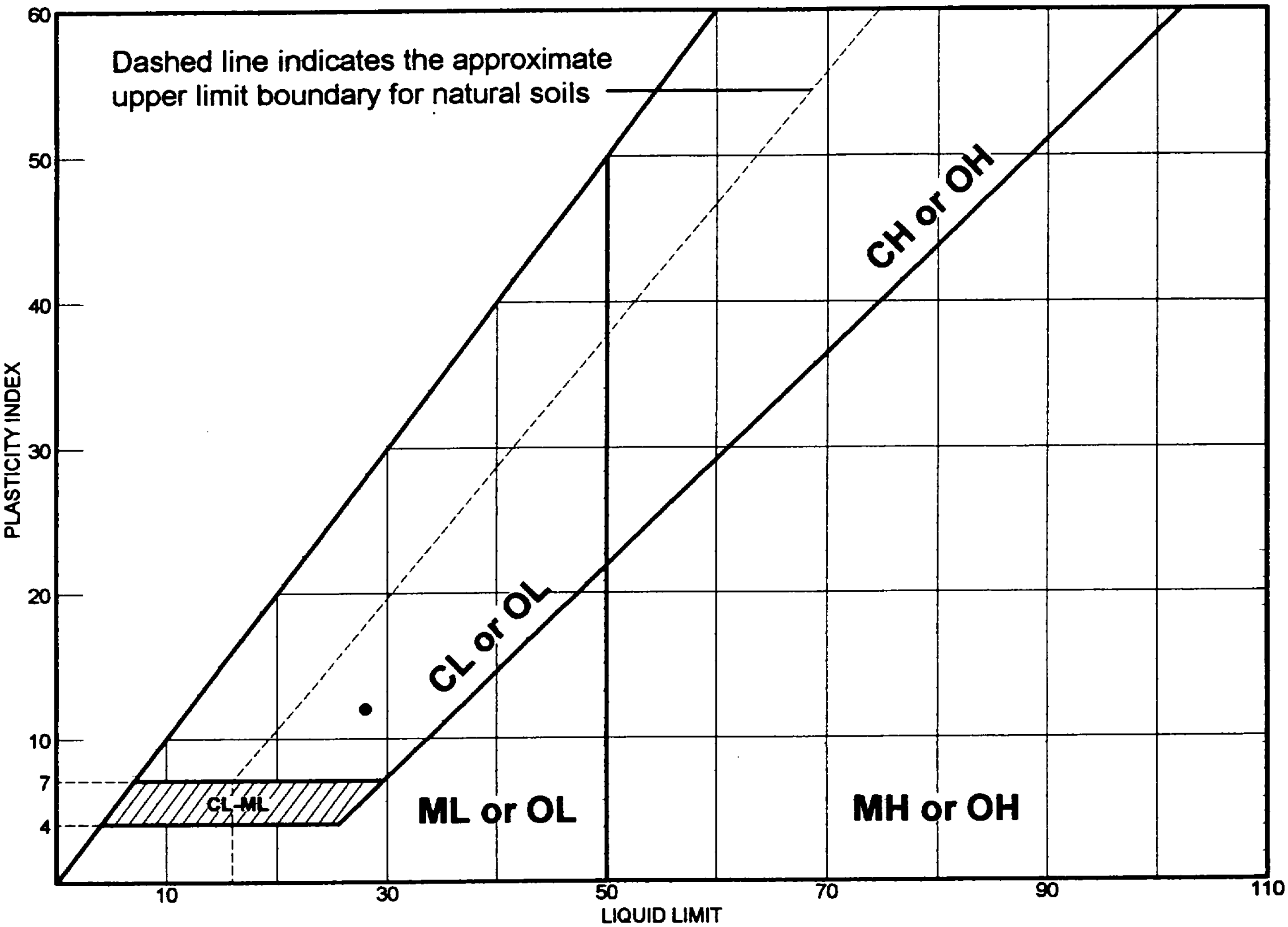
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 10

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clay, very sandy, silty, red	28	16	12	98.3	64.8	CL

Project No. 804899 **Client:** International Uranium Corporation

Project: Soil Sample Testing

● **Source:** **Sample No.:** C1-S1

Remarks:

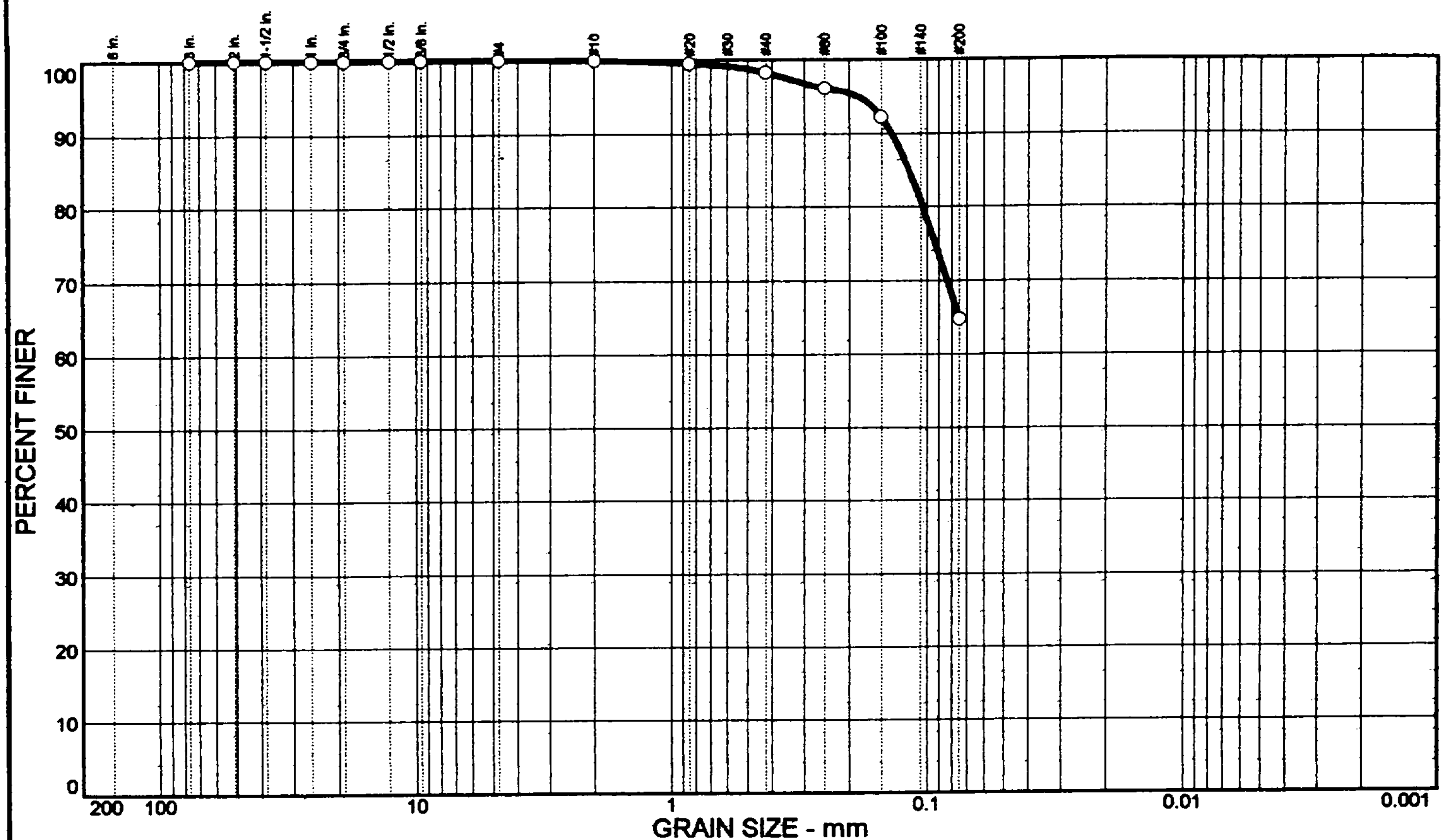
● Tested By: JH

LIQUID AND PLASTIC LIMITS TEST REPORT

WESTERN COLORADO TESTING, INC.

Figure 24

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		0.0	35.2			CL	A-6(5)	16	28

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
3/4	100.0		
1/2	100.0		
3/8	100.0		
	GRAIN SIZE		
D_{60}			
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	100.0		
#10	99.9		
#20	99.5		
#40	98.3		
#60	96.2		
#100	92.3		
#200	64.8		

SOIL DESCRIPTION

○ Clay, very sandy, silty, red

REMARKS:

○ Tested By: JH

○ Source:

Sample No.: C1-S1

WESTERN COLORADO TESTING, INC.

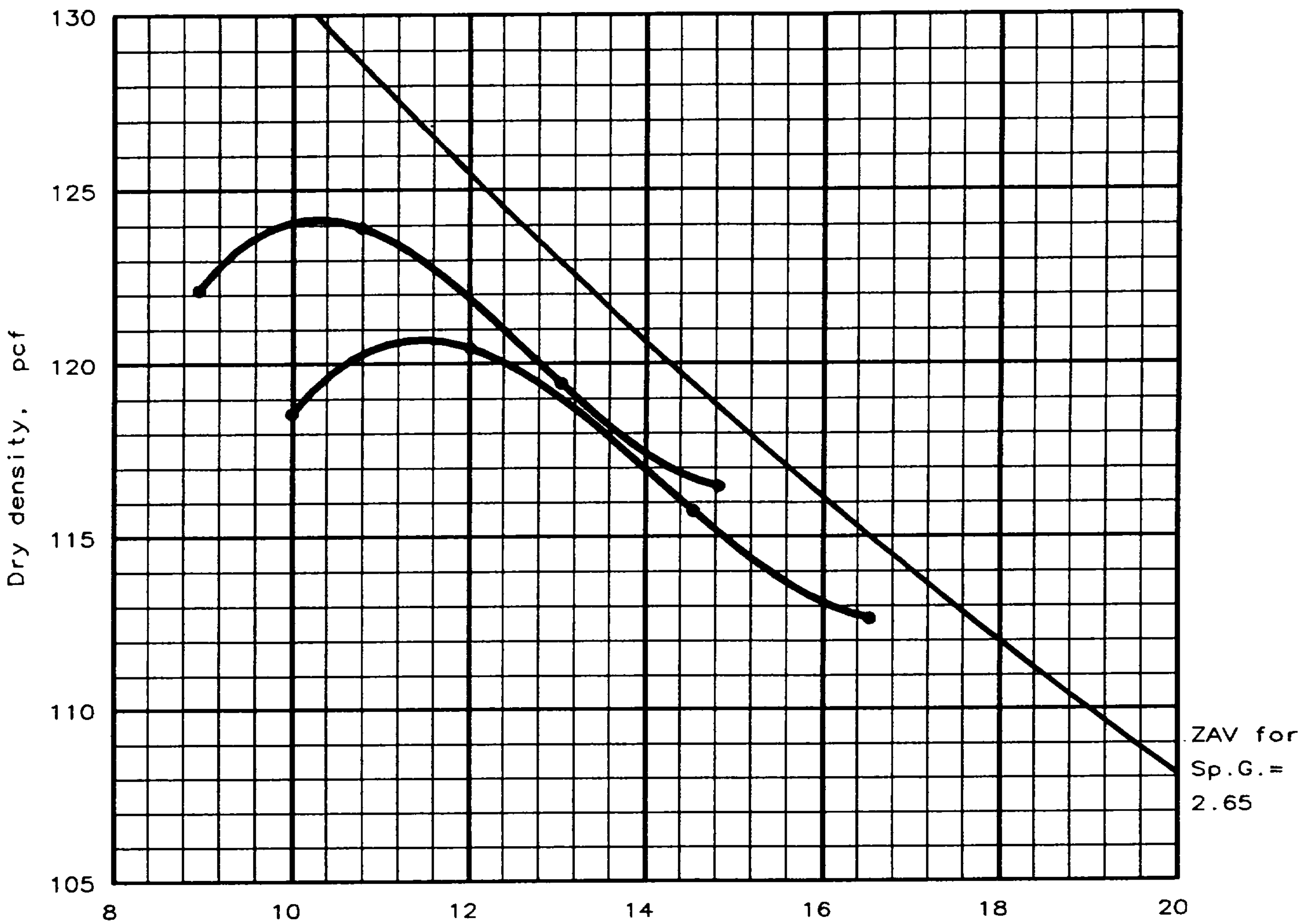
Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 41

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure C, Standard
Oversize correction applied to each point

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in	% < No.200
			N/A %	2.65			10.3 %	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 124.2 pcf Optimum moisture = 10.3 %	120.7 pcf 11.5 %	C2-S1 Sand, clayey, grvly, brn

Project No.: 804899
Project: International Uranium Corporation
Location: Soil Sample Testing

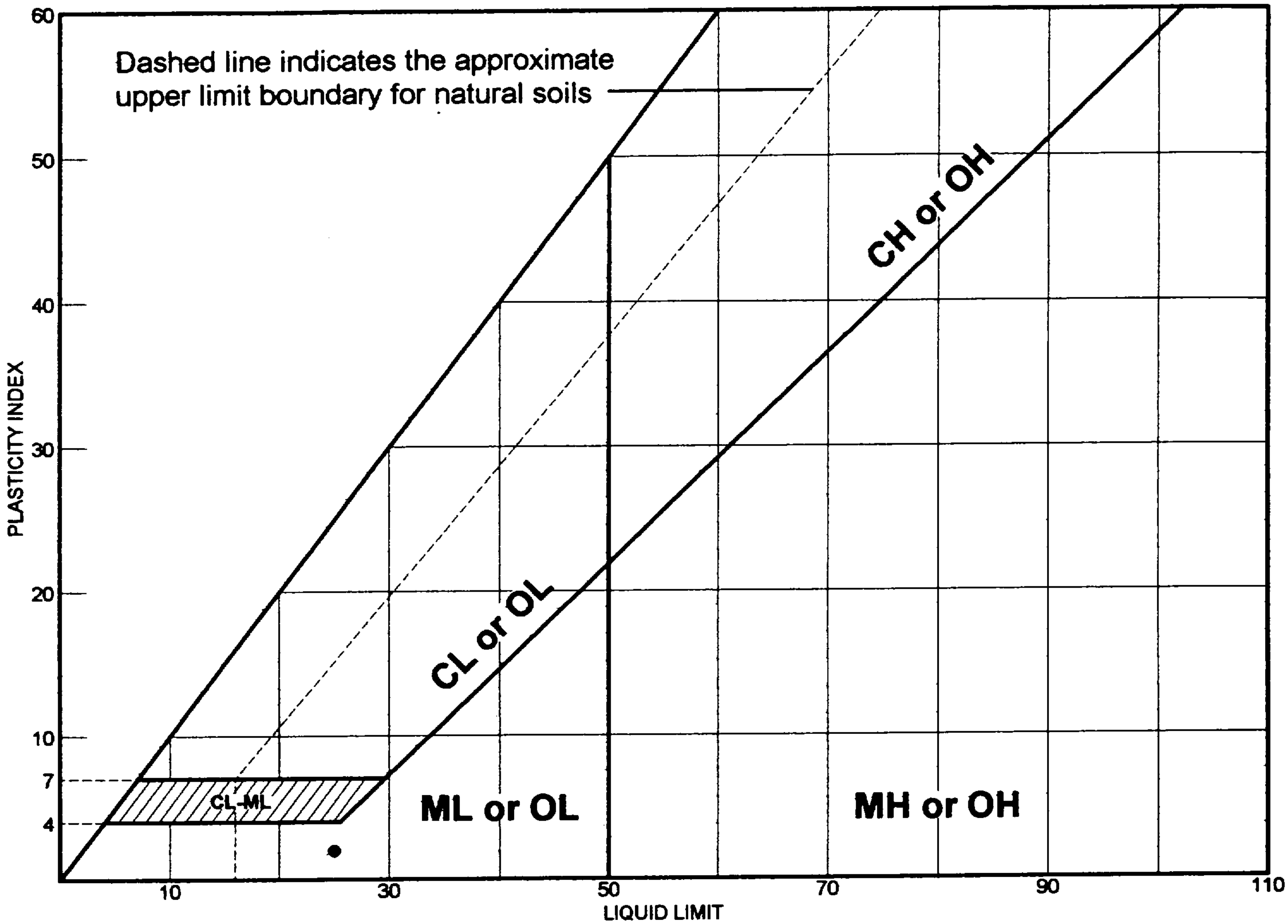
Date: 5/3/99

Remarks:
SUBMITTED BY: Client
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST
WESTERN COLORADO TESTING, INC.

Fig. No. 11

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sand, clayey, gravely, brown	25	23	2	48.2	26.7	SM

Project No. 804899 **Client:** International Uranium Corporation

Project: Soil Sample Testing

● **Source:** **Sample No.:** C2-S1

Remarks:

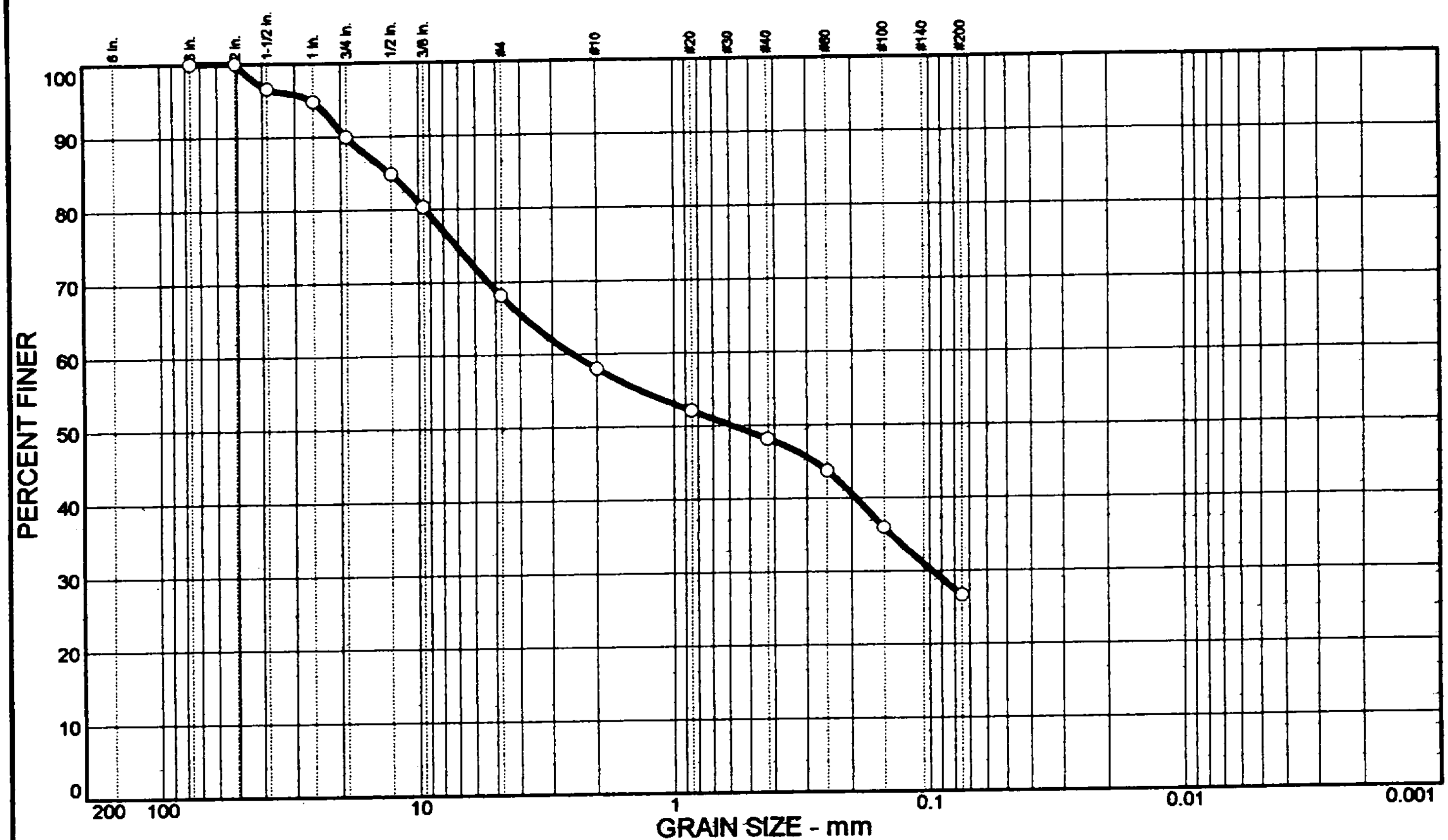
● Tested By: JH

LIQUID AND PLASTIC LIMITS TEST REPORT

WESTERN COLORADO TESTING, INC.

Figure 25

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
O		31.9	41.4			SM	A-2-4(0)	23	25

SIEVE inches size	PERCENT FINER O		
3	100.0		
2	100.0		
1.5	96.6		
1	94.8		
3/4	90.0		
1/2	84.9		
3/8	80.3		
	GRAIN SIZE		
D_{60}	2.48		
D_{30}	0.0977		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER O		
#4	68.1		
#10	58.0		
#20	52.1		
#40	48.2		
#60	43.8		
#100	36.0		
#200	26.7		

SOIL DESCRIPTION

O Sand, clayey, gravely, brown

REMARKS:

O Tested By: JH

O Source:

Sample No.: C2-S1

WESTERN COLORADO TESTING, INC.

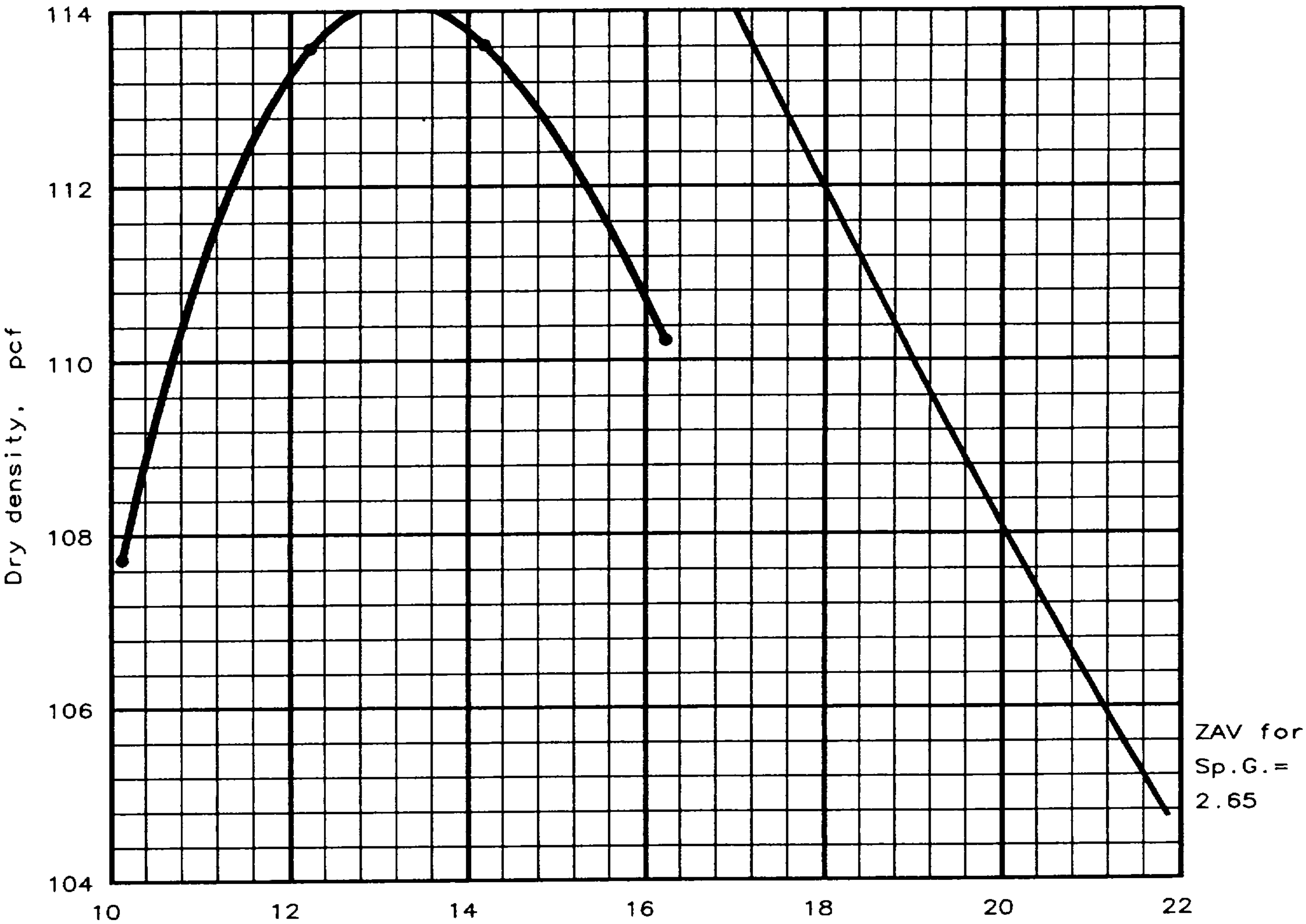
Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 42

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure A, Standard

Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
			N/A %	2.65				

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 114.1 pcf Optimum moisture = 13.2 %	114.1 pcf 13.2 %	RF1-S1 Clay, silty, sandy, red

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 5/3/99

Remarks:

SUBMITTED BY: Client

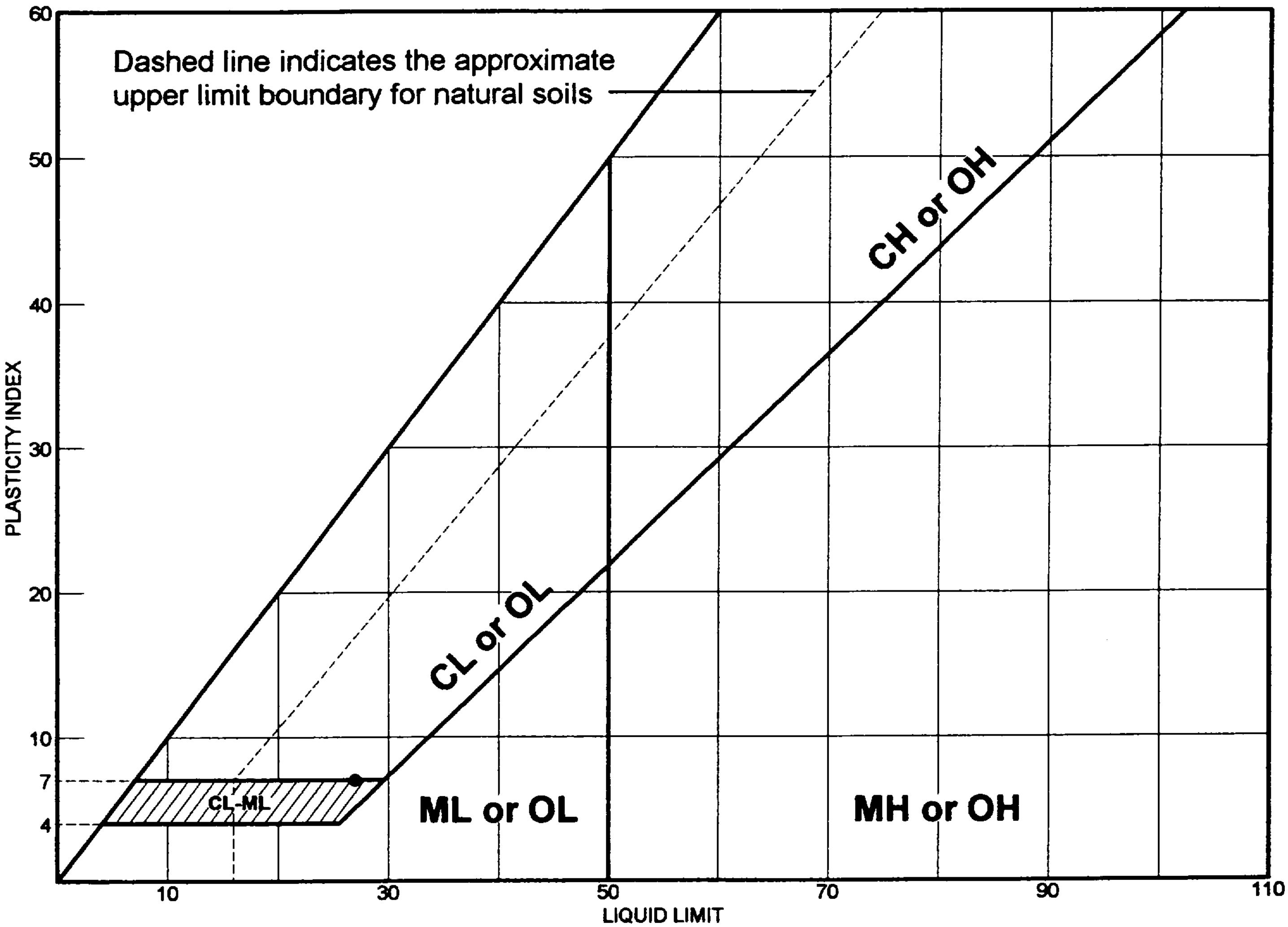
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 12

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clay, silty, sandy, red	27	20	7	99.1	63.1	ML

Project No. 804899 **Client:** International Uranium Corporation

Project: Soil Sample Testing

● **Source:** **Sample No.:** RF1-S1

Remarks:

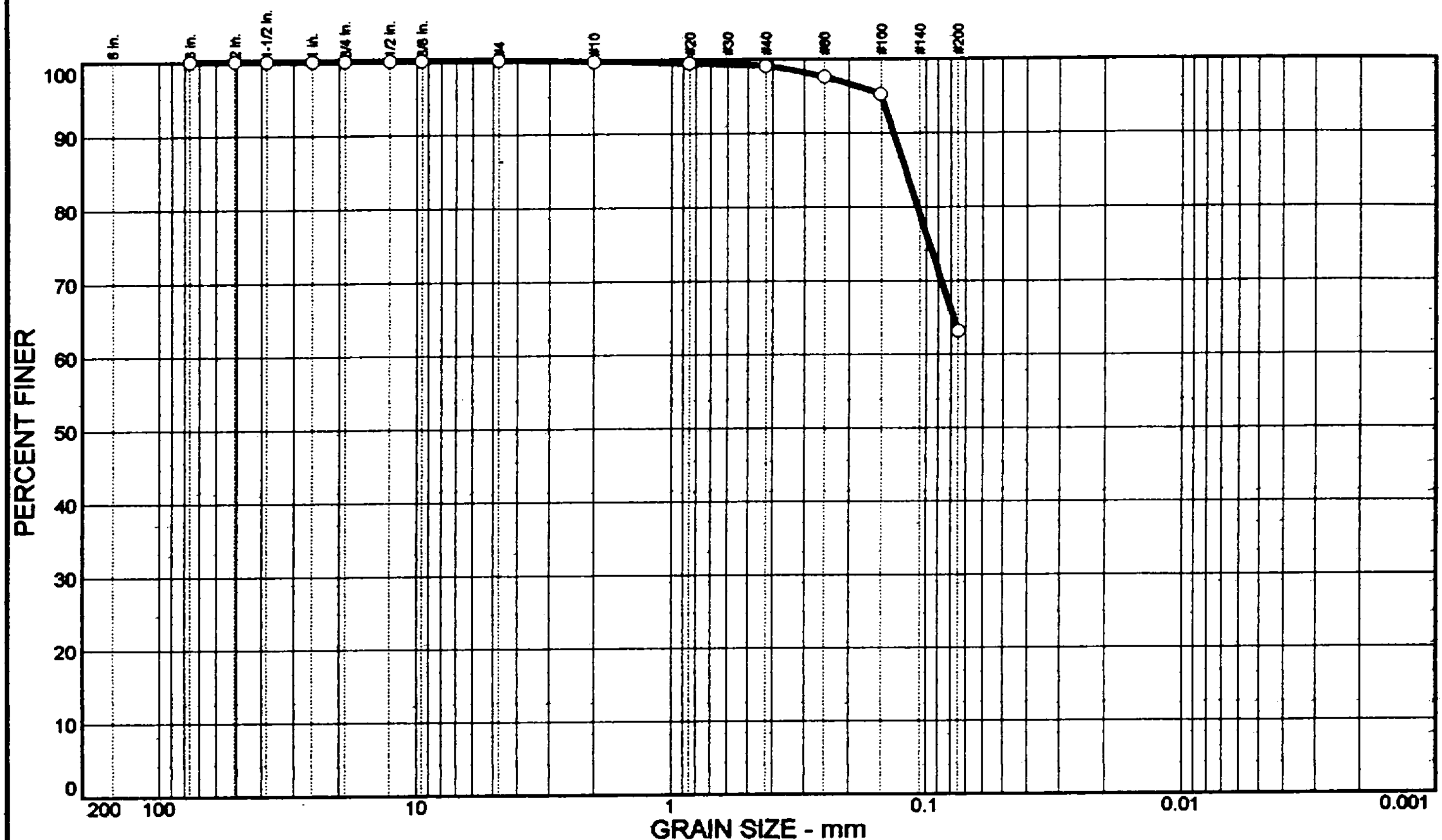
● Tested By: JH

LIQUID AND PLASTIC LIMITS TEST REPORT

WESTERN COLORADO TESTING, INC.

Figure 26

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
O		0.0	36.9			ML	A-4(0)		

SIEVE inches size	PERCENT FINER O		
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
3/4	100.0		
1/2	100.0		
3/8	100.0		
	GRAIN SIZE		
D_{60}			
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER O		
#4	100.0		
#10	99.8		
#20	99.5		
#40	99.1		
#60	97.6		
#100	95.2		
#200	63.1		

SOIL DESCRIPTION
O Clay, silty, sandy, red

REMARKS:
O Tested By: JH

O Source:

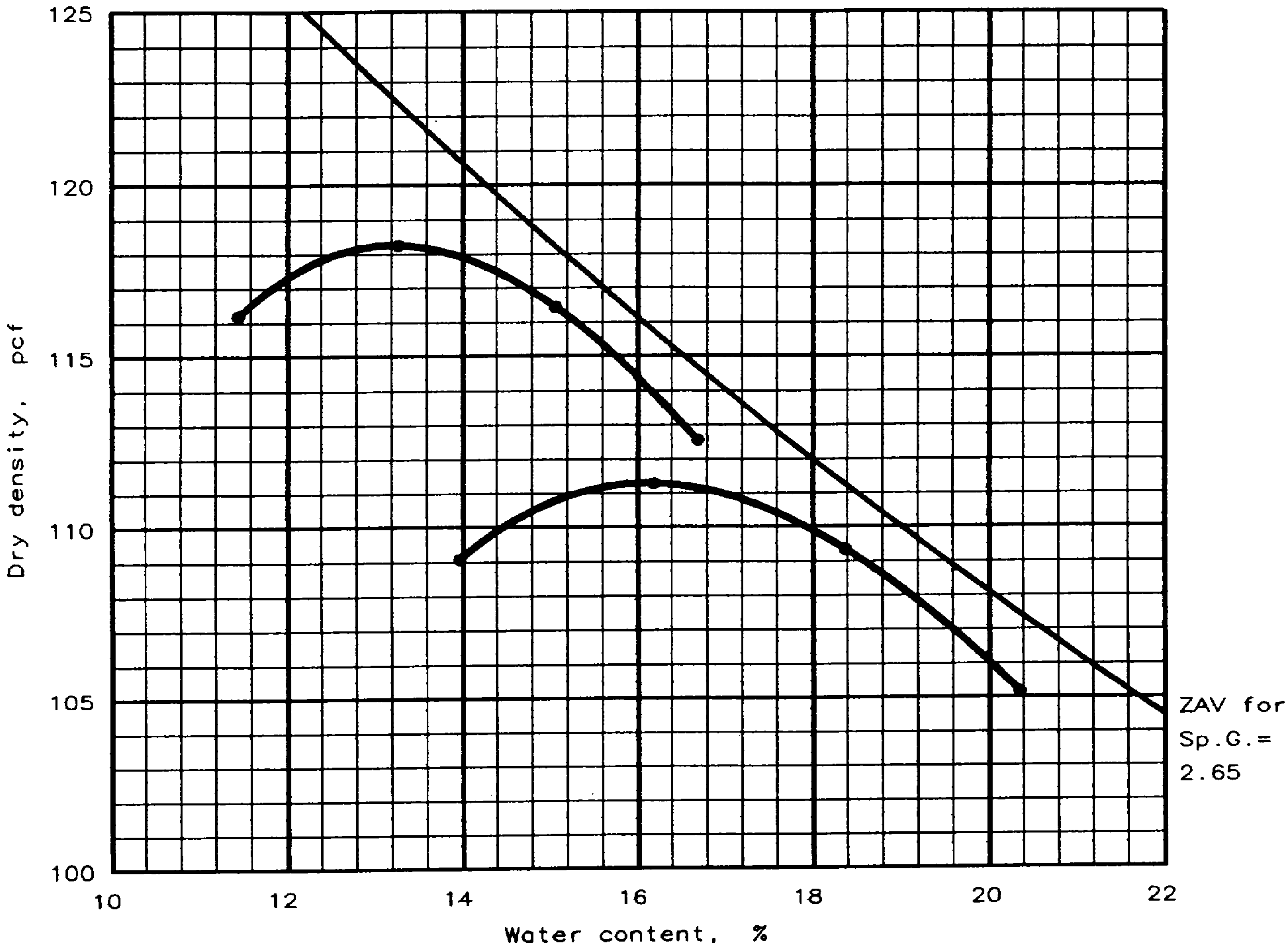
Sample No.: RF1-S1

WESTERN COLORADO TESTING, INC.

Client: International Uranium Corporation
Project: Soil Sample Testing
Project No.: 804899

Figure 43

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure B, Standard

Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in	% < No.200
	USCS	AASHTO						
			N/A %	2.65			18.0 %	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 118.3 pcf Optimum moisture = 13.2 %	111.3 pcf 16.1 %	RF2-S1 Sand, clayey, grvly, brn

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 5/3/99

Remarks:

SUBMITTED BY: Client

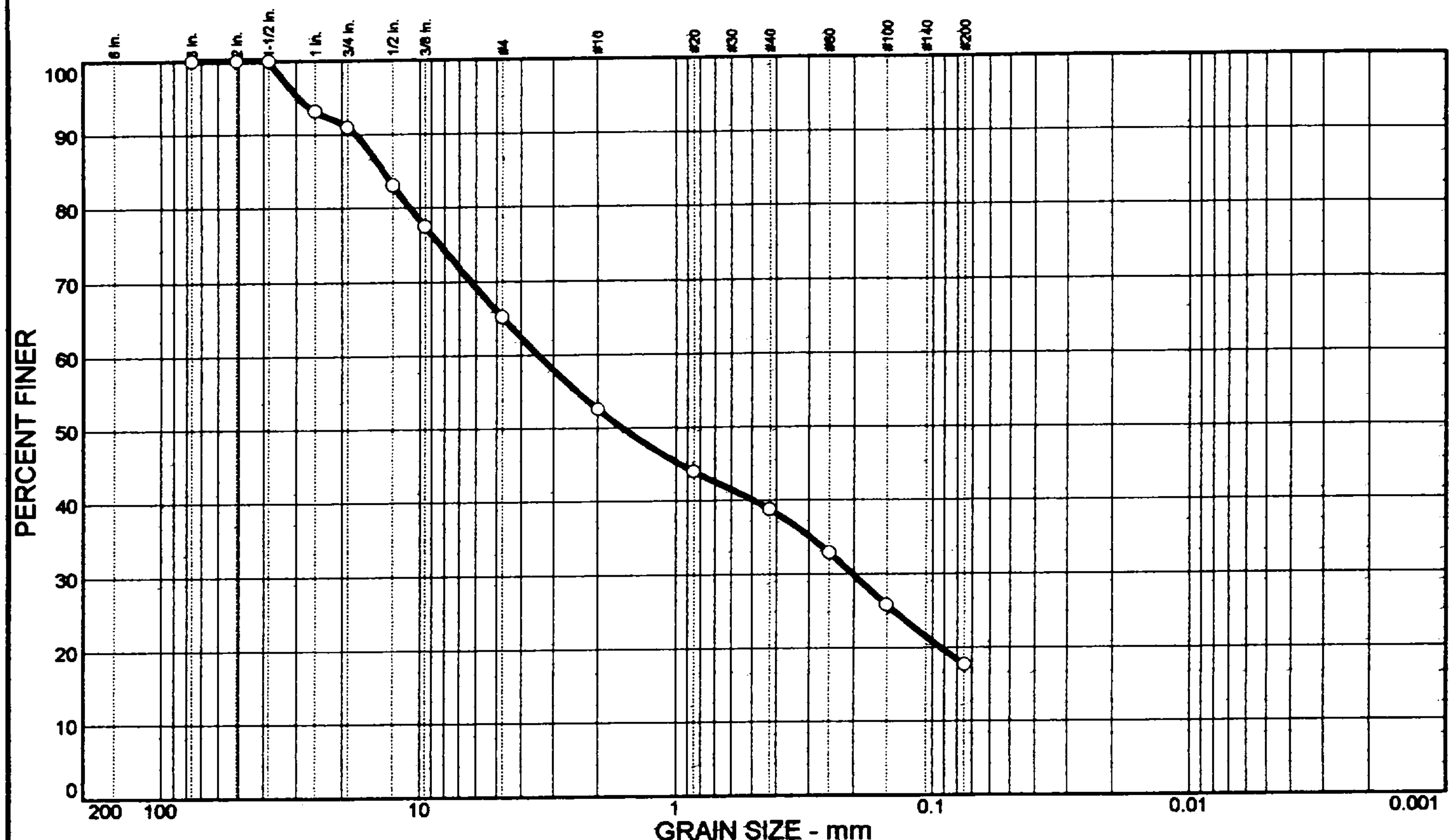
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 13

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		34.8	47.5			SM	A-1-b	NP	NP

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	93.2		
3/4	91.0		
1/2	83.1		
3/8	77.5		
	GRAIN SIZE		
D_{60}	3.42		
D_{30}	0.203		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	65.2		
#10	52.6		
#20	44.0		
#40	38.8		
#60	32.9		
#100	25.8		
#200	17.7		

SOIL DESCRIPTION

○ Sand, sl clayey, gravely, brown

REMARKS:

○ Tested By: JH

○ Source:

Sample No.: RF2-S1

WESTERN COLORADO TESTING, INC.

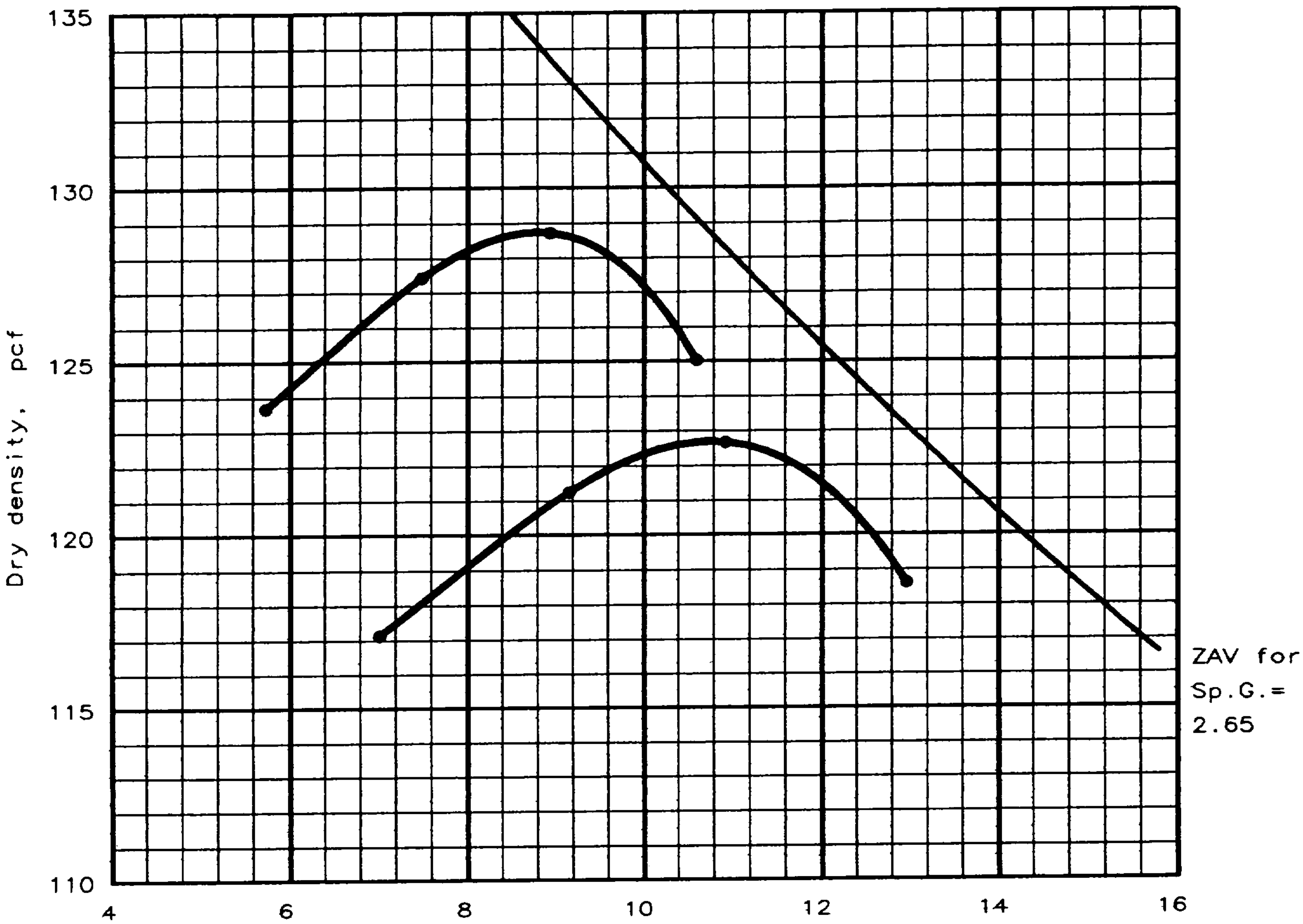
Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 44

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure C, Standard
Oversize correction applied to each point

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in	% < No.200
			N/A %	2.65			18.2 %	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 128.7 pcf Optimum moisture = 8.8 %	122.7 pcf 10.8 %	RF2-S2 Sand, gravely, brown

Project No.: 804899
Project: International Uranium Corporation
Location: Soil Sample Testing

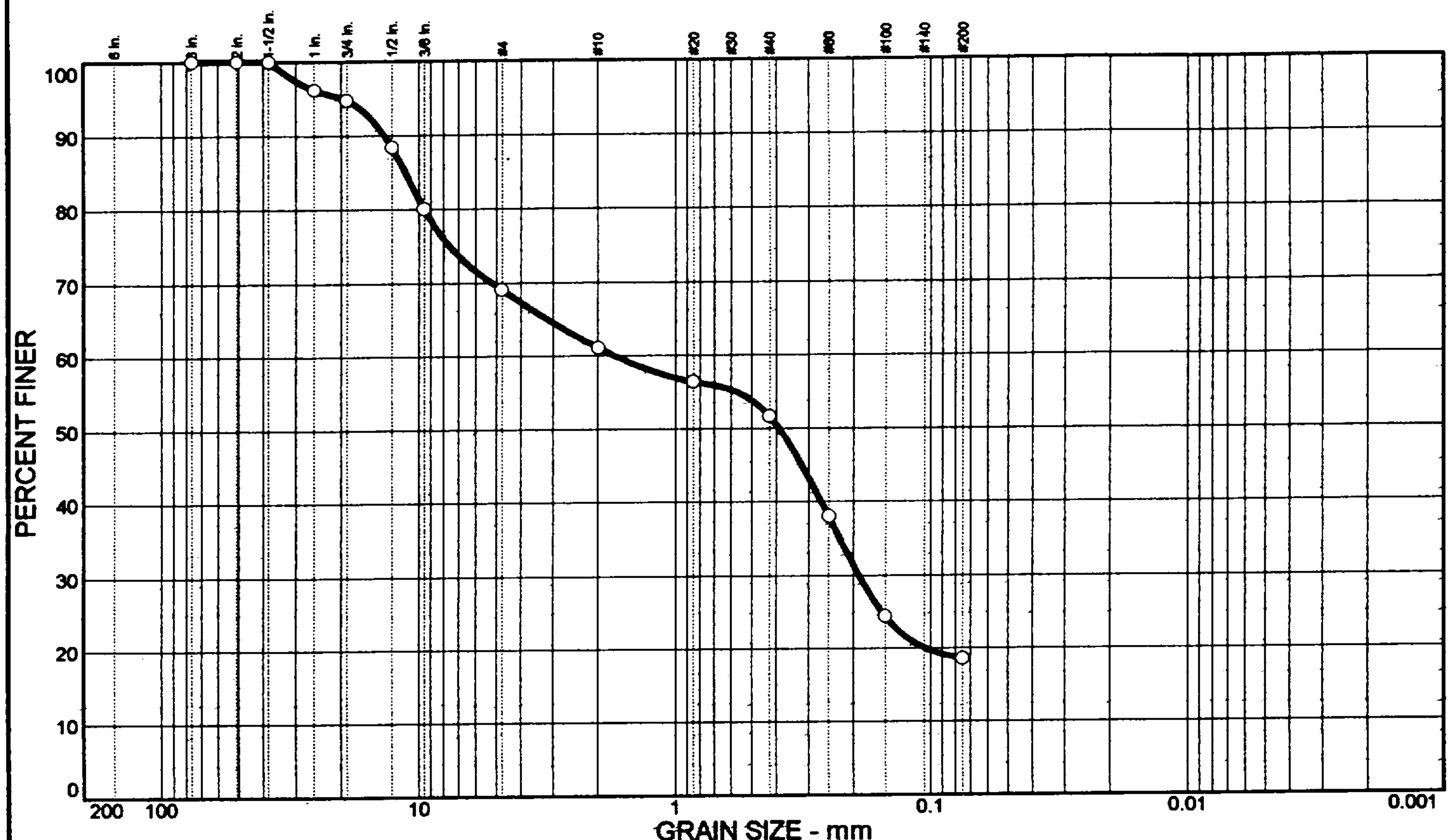
Date: 5/3/99

Remarks:
SUBMITTED BY: Client
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST
WESTERN COLORADO TESTING, INC.

Fig. No. 14

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		30.9	50.5			SM	A-2-4(0)	NP	NP

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	96.2		
3/4	94.8		
1/2	88.4		
3/8	80.1		
	GRAIN SIZE		
D_{60}	1.73		
D_{30}	0.190		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	69.1		
#10	61.1		
#20	56.4		
#40	51.7		
#60	38.0		
#100	24.4		
#200	18.6		

SOIL DESCRIPTION

○ Sand, gravely, brown

REMARKS:

○ Tested By: JH

○ Source:

Sample No.: RF2-S2

WESTERN COLORADO TESTING, INC.

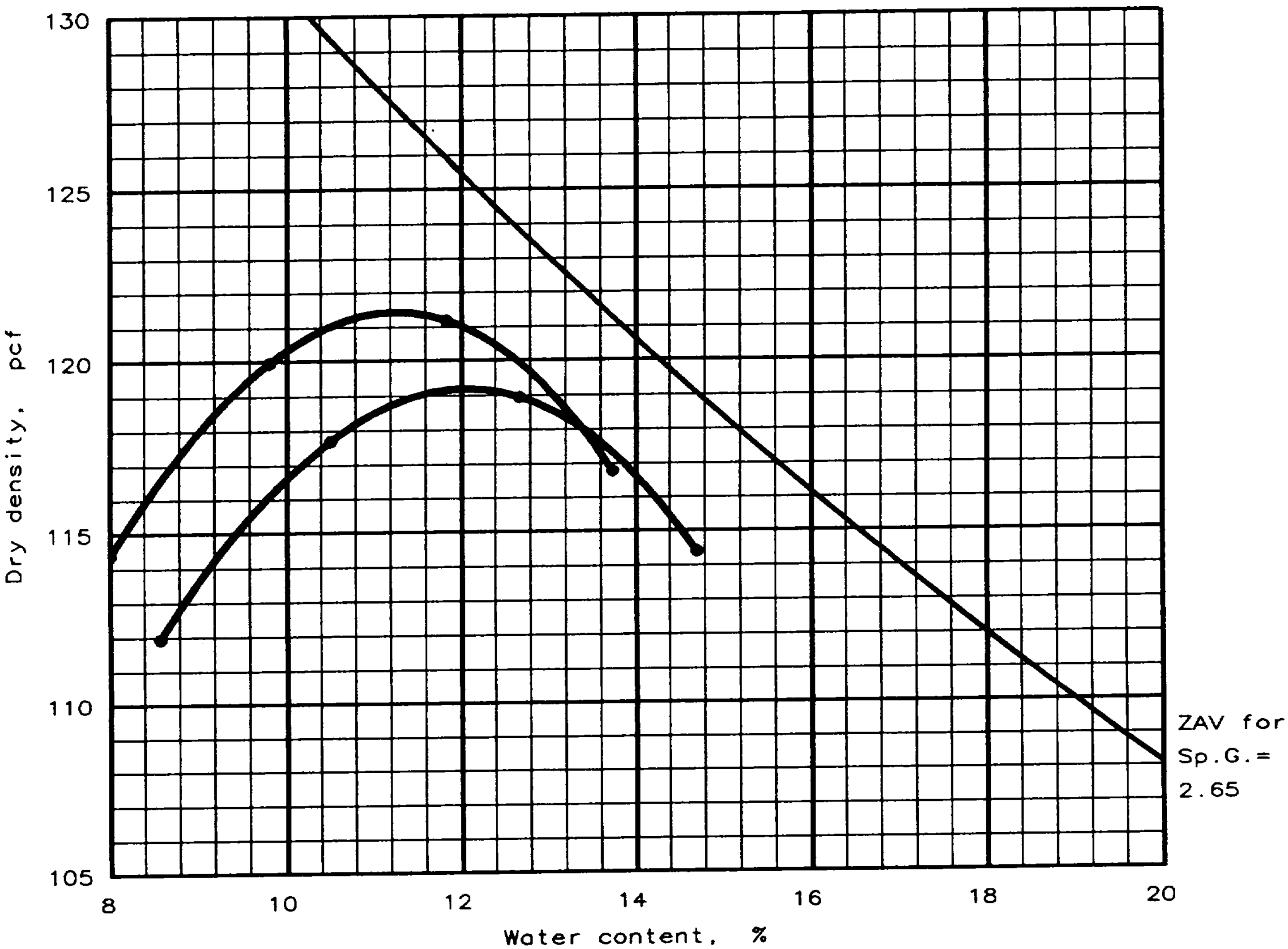
Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 45

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure C, Standard

Oversize correction applied to each point

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in	% < No.200
			N/A %	2.65			6.6 %	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 121.4 pcf Optimum moisture = 11.3 %	119.2 pcf 12.1 %	RF3-S1 Sand, clayey, grvly, brn

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 5/3/99

Remarks:

SUBMITTED BY: Client

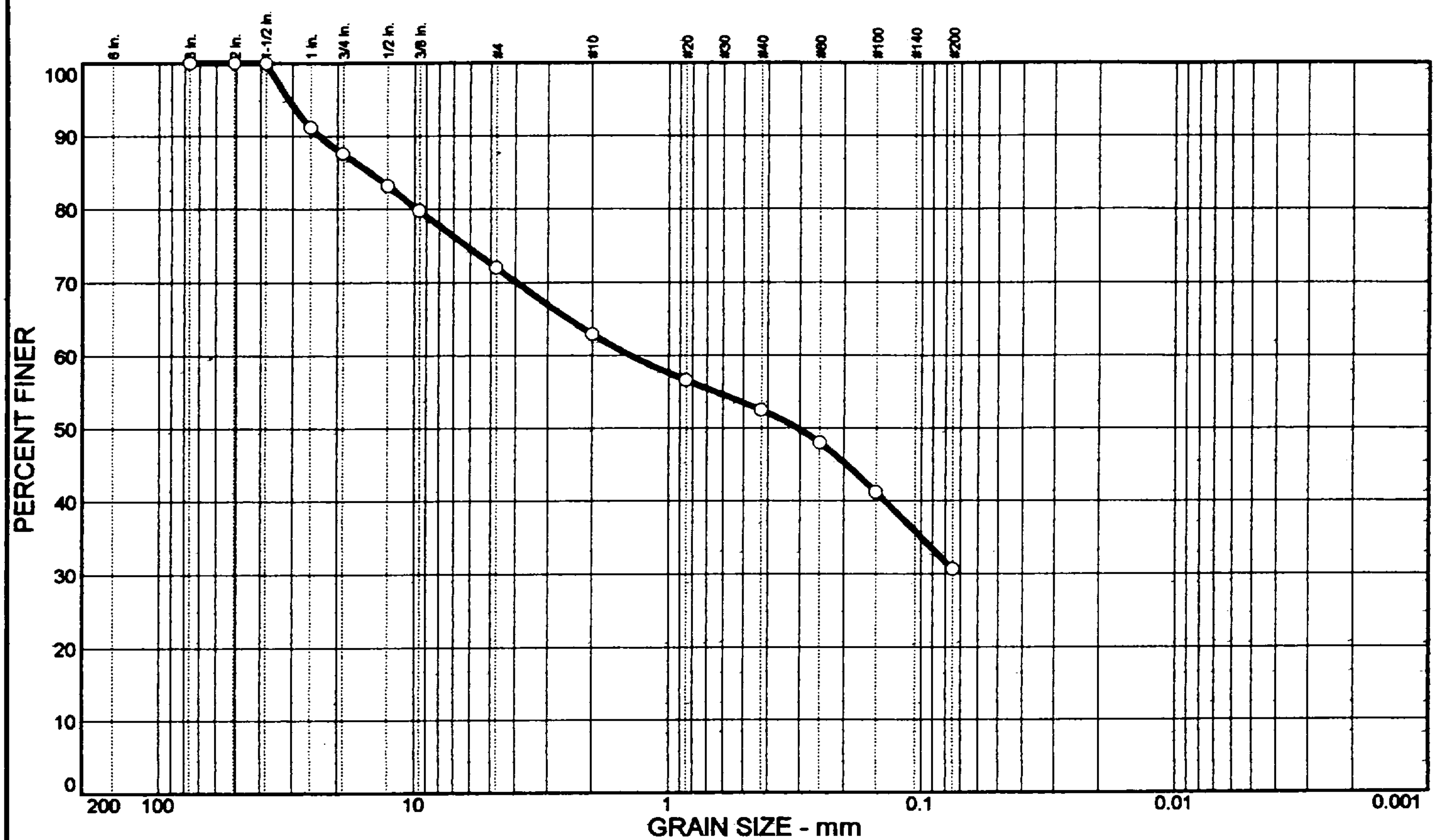
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 15

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		28.0	41.4			SM	A-2-4(0)	NP	

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	91.2		
3/4	87.6		
1/2	83.2		
3/8	79.8		
	GRAIN SIZE		
D_{60}	1.41		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	72.0		
#10	62.9		
#20	56.6		
#40	52.5		
#60	48.0		
#100	41.2		
#200	30.6		

SOIL DESCRIPTION

○ Sand, sl clayey, gravely, brown

REMARKS:

○ Tested By: JH

○ Source:

Sample No.: RF3-S1

WESTERN COLORADO TESTING, INC.

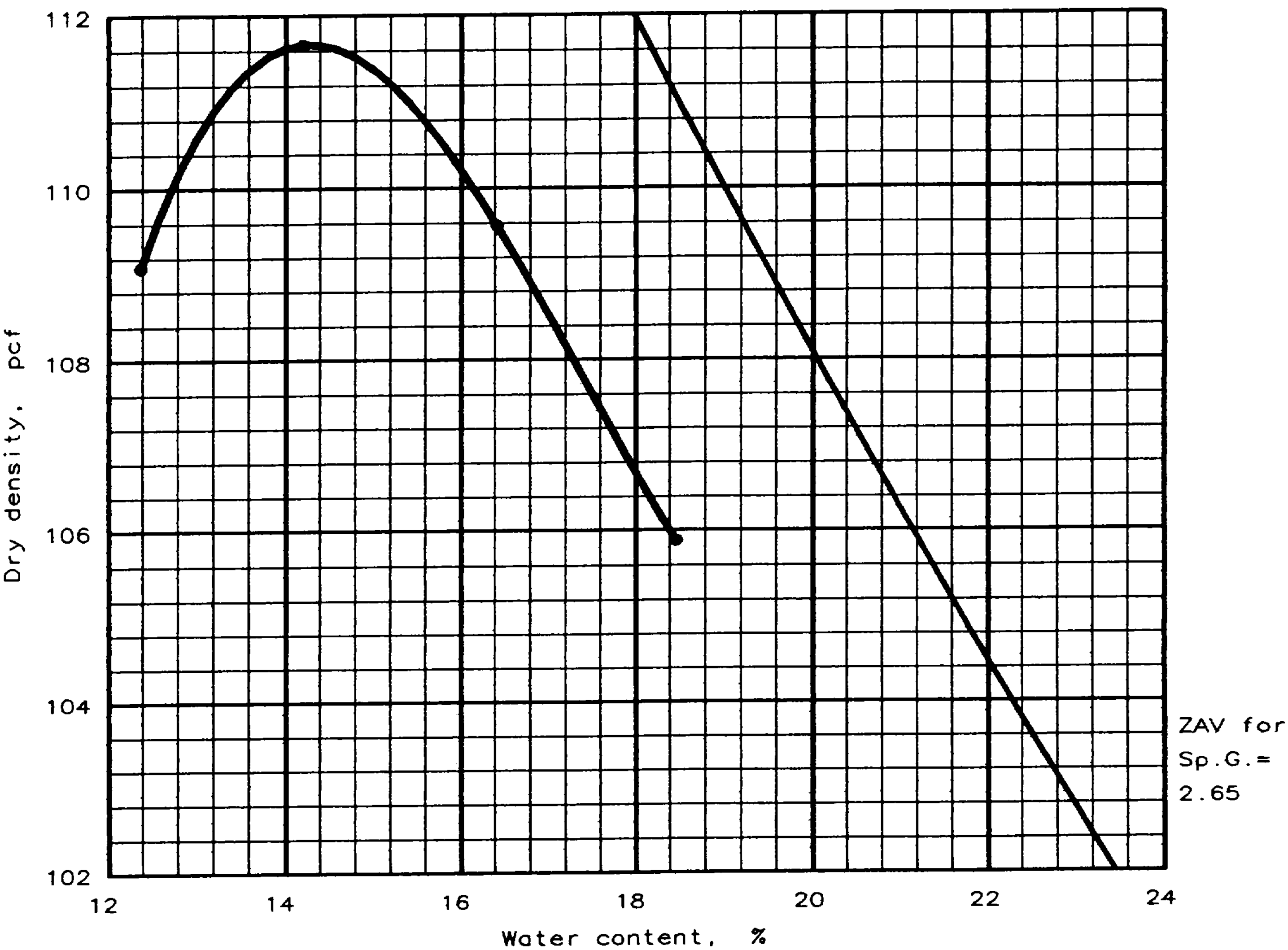
Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 46

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure A, Standard

Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
			N/A %	2.65				

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 111.7 pcf Optimum moisture = 14.3 %	111.7 pcf 14.3 %	RF3-S2 Clay, v sandy, red

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 5/3/99

Remarks:

SUBMITTED BY: Client

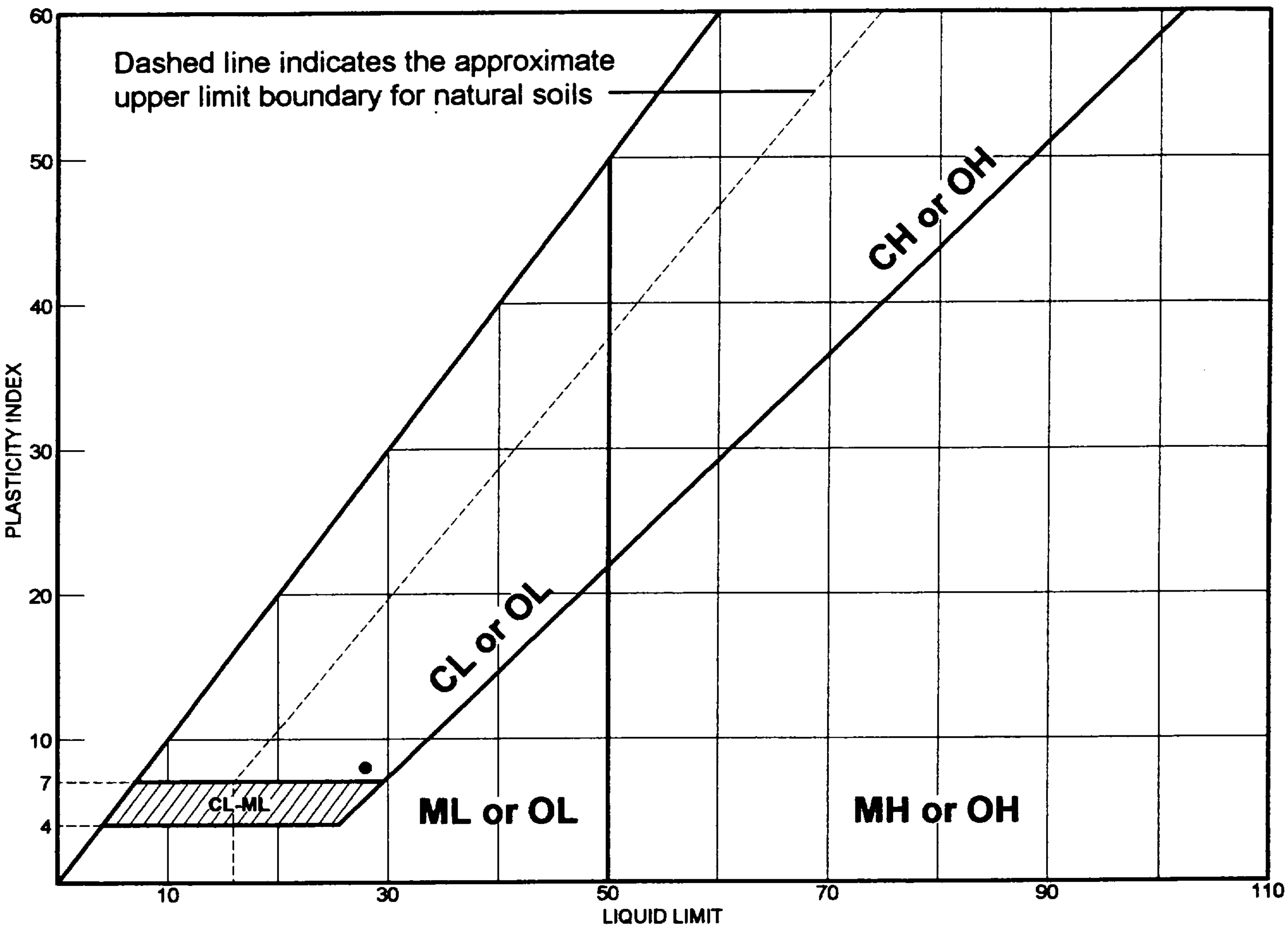
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 16

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clay, very sandy, red	28	20	8	69.0	39.0	SM

Project No. 804899 **Client:** International Uranium Corporation

Project: Soil Sample Testing

● **Source:** **Sample No.:** RF3-S2

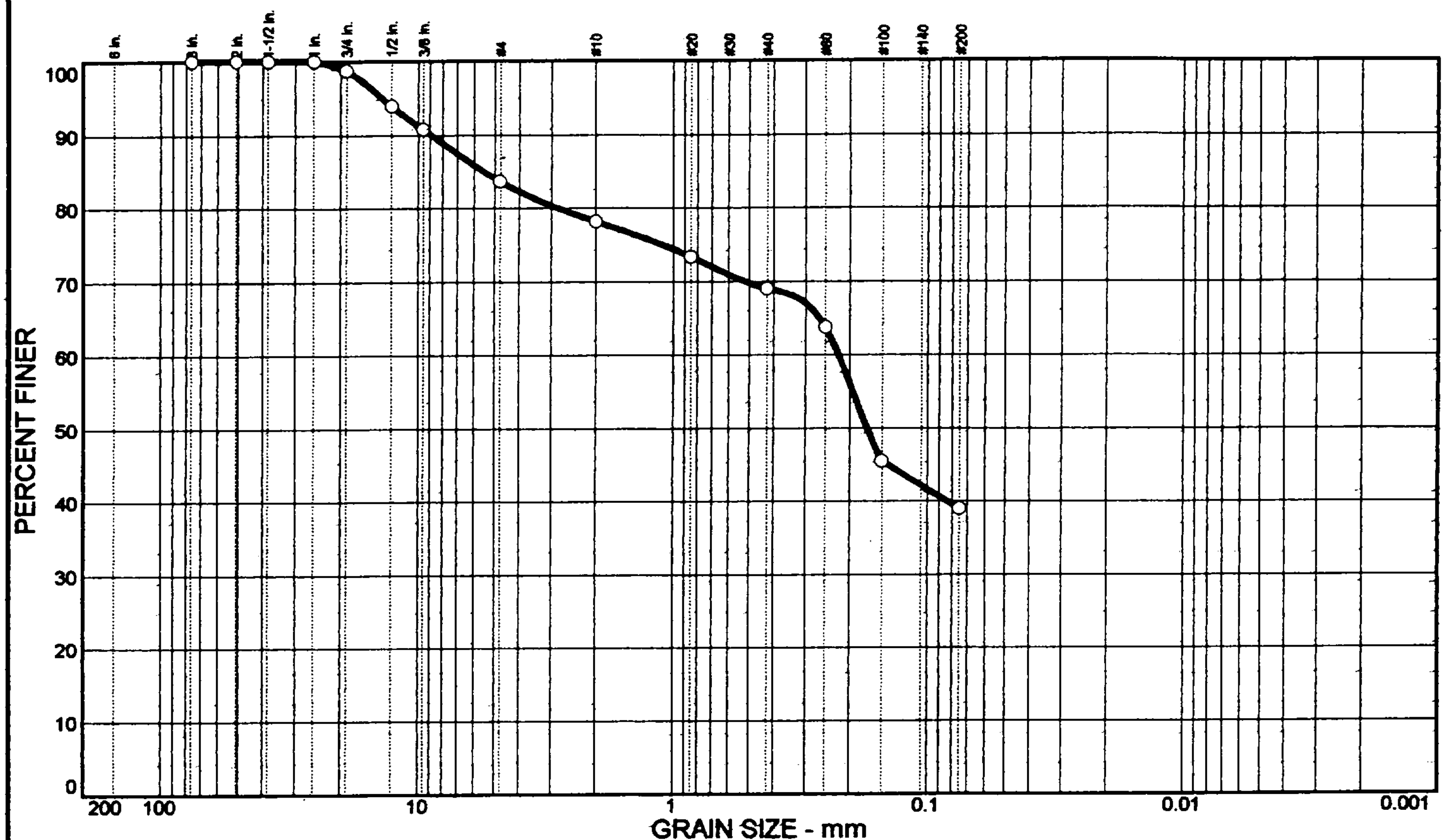
Remarks:
● Tested By: JH

LIQUID AND PLASTIC LIMITS TEST REPORT

WESTERN COLORADO TESTING, INC.

Figure 27

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
O		16.3	44.7			SM	A-4(0)		

SIEVE inches size	PERCENT FINER O		
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
3/4	98.7		
1/2	94.0		
3/8	90.8		
	GRAIN SIZE		
D_{60}	0.222		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER O		
#4	83.7		
#10	78.2		
#20	73.4		
#40	69.0		
#60	63.7		
#100	45.5		
#200	39.0		

SOIL DESCRIPTION

O Clay, very sandy, red

REMARKS:

O Tested By: JH

O Source:

Sample No.: RF3-S2

WESTERN COLORADO TESTING, INC.

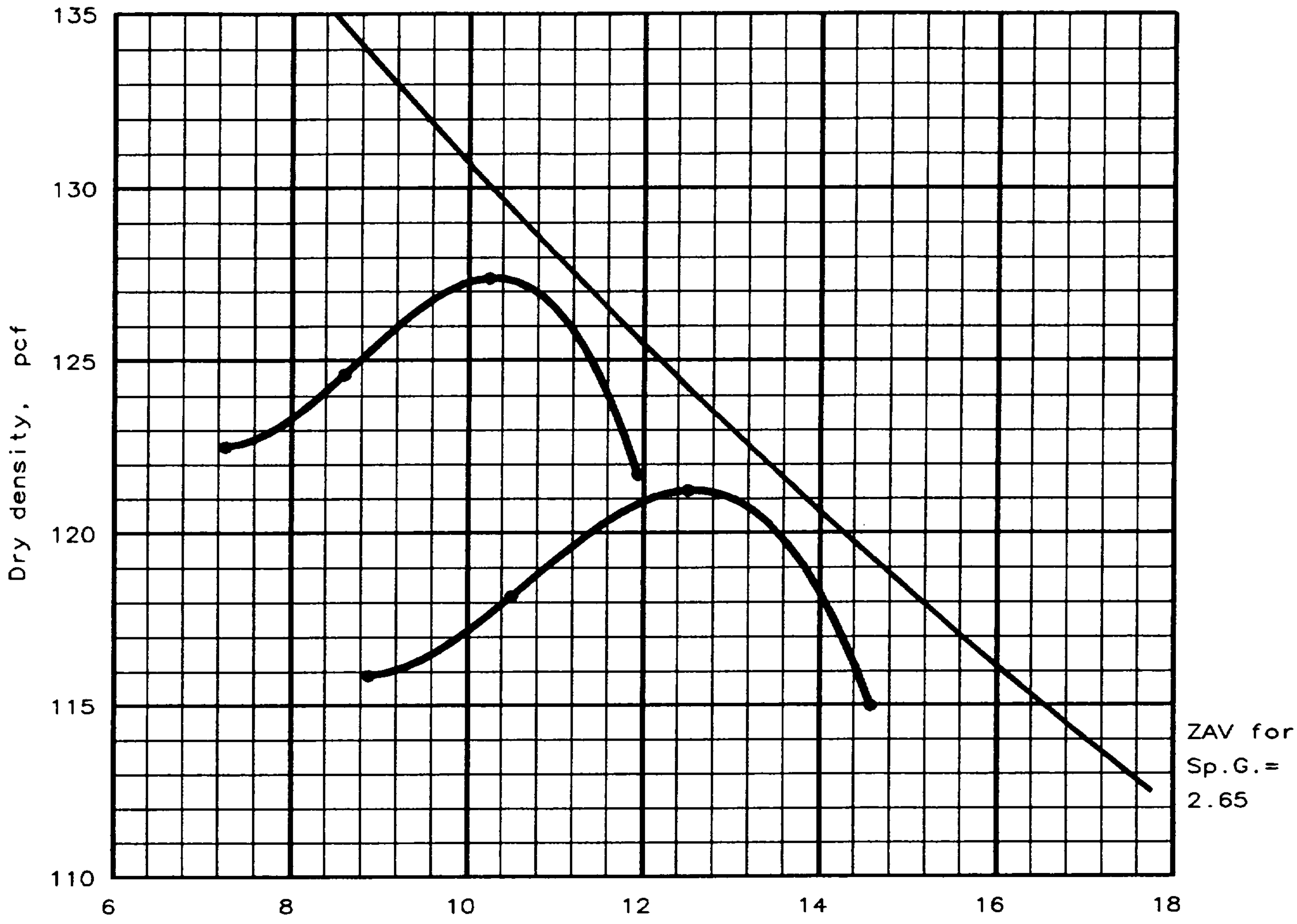
Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 47

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure C, Standard
Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in	% < No.200
	USCS	AASHTO						
			N/A %	2.65			18.1 %	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 127.4 pcf Optimum moisture = 10.3 %	121.3 pcf 12.6 %	RF3-S3 Sand, clayey, grvly, brn

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 5/3/99

Remarks:

SUBMITTED BY: Client

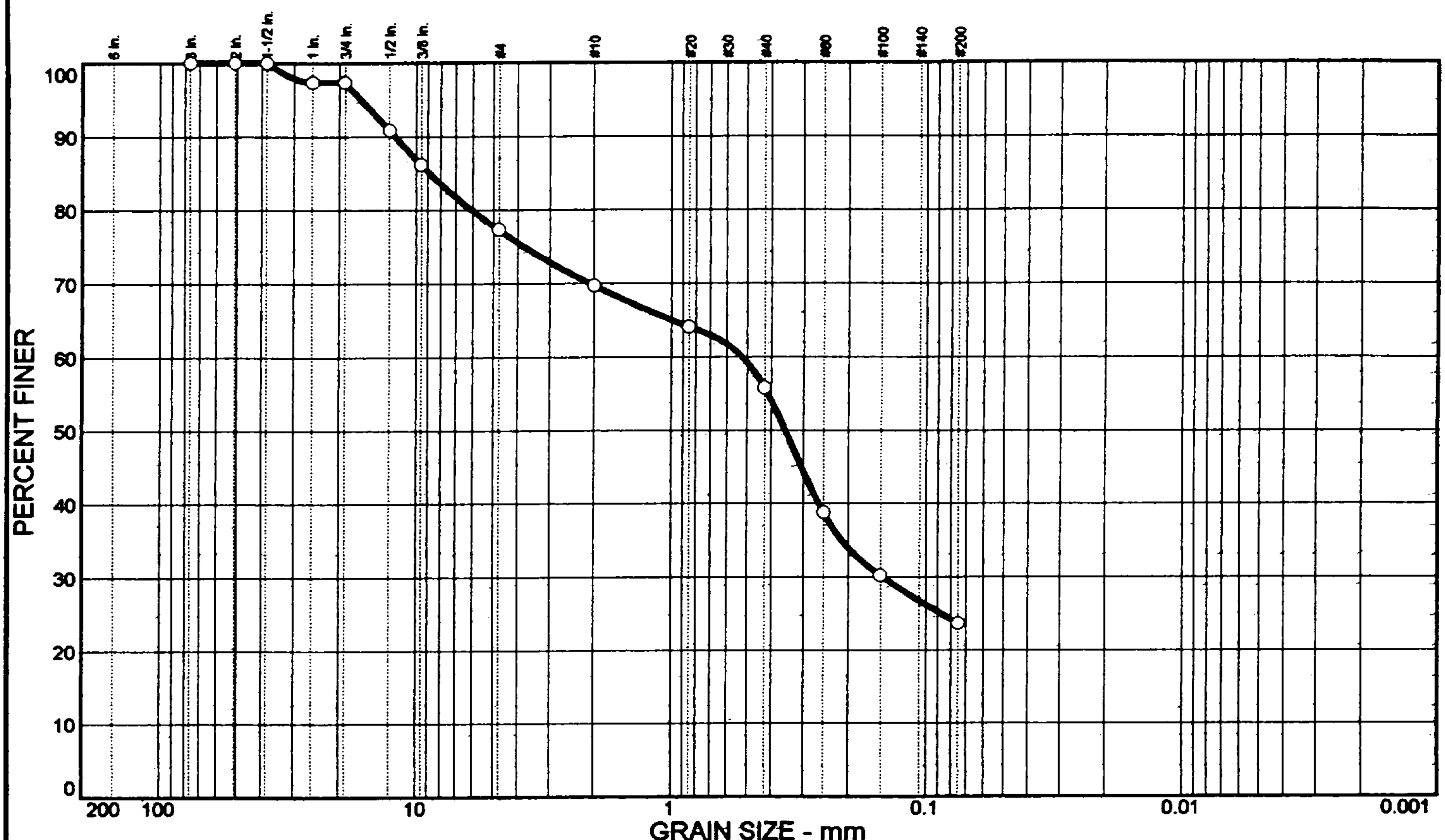
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 17

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		22.7	53.6			SM	A-2-4(0)	NP	NP

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	97.4		
3/4	97.4		
1/2	90.9		
3/8	86.2		
	GRAIN SIZE		
D_{60}	0.523		
D_{30}	0.147		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	77.3		
#10	69.7		
#20	64.1		
#40	55.8		
#60	38.8		
#100	30.2		
#200	23.7		

SOIL DESCRIPTION

○ Sand, sl clayey, gravely, brown

REMARKS:

○ Tested By: JH

○ Source:

Sample No.: RF3-S3

WESTERN COLORADO TESTING, INC.

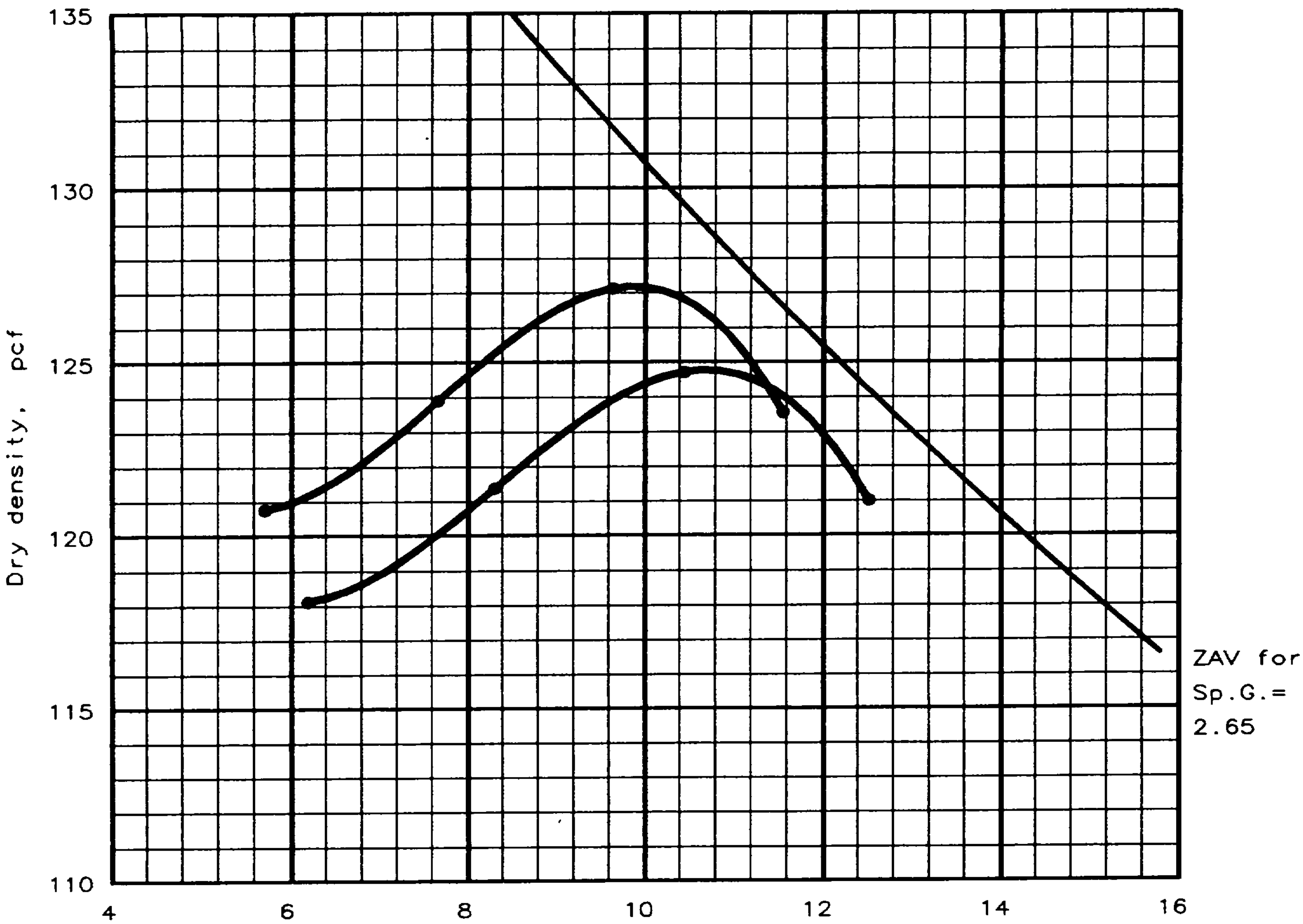
Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 48

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure C, Standard

Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in	% < No.200
	USCS	AASHTO						
			N/A %	2.65			7.7 %	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 127.2 pcf Optimum moisture = 9.9 %	124.8 pcf 10.7 %	RF4-S1 Sand, clayey, grvly, brn

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 5/3/99

Remarks:

SUBMITTED BY: Client

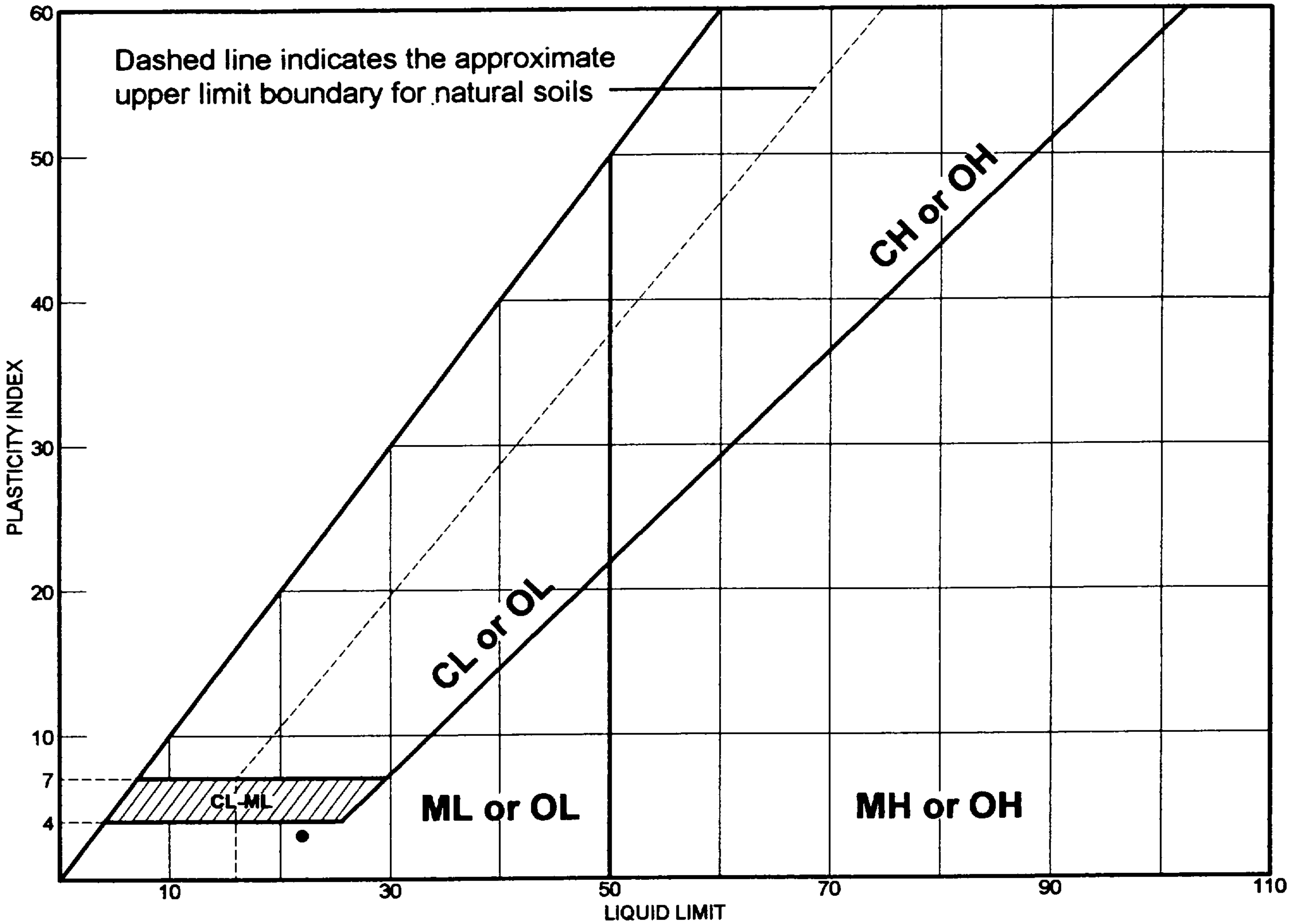
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 18

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sand, clayey, gravely, brown	22	19	3	51.1	25.5	SM

Project No. 804899 **Client:** International Uranium Corporation

Project: Soil Sample Testing

● **Source:** **Sample No.:** RF4-S1

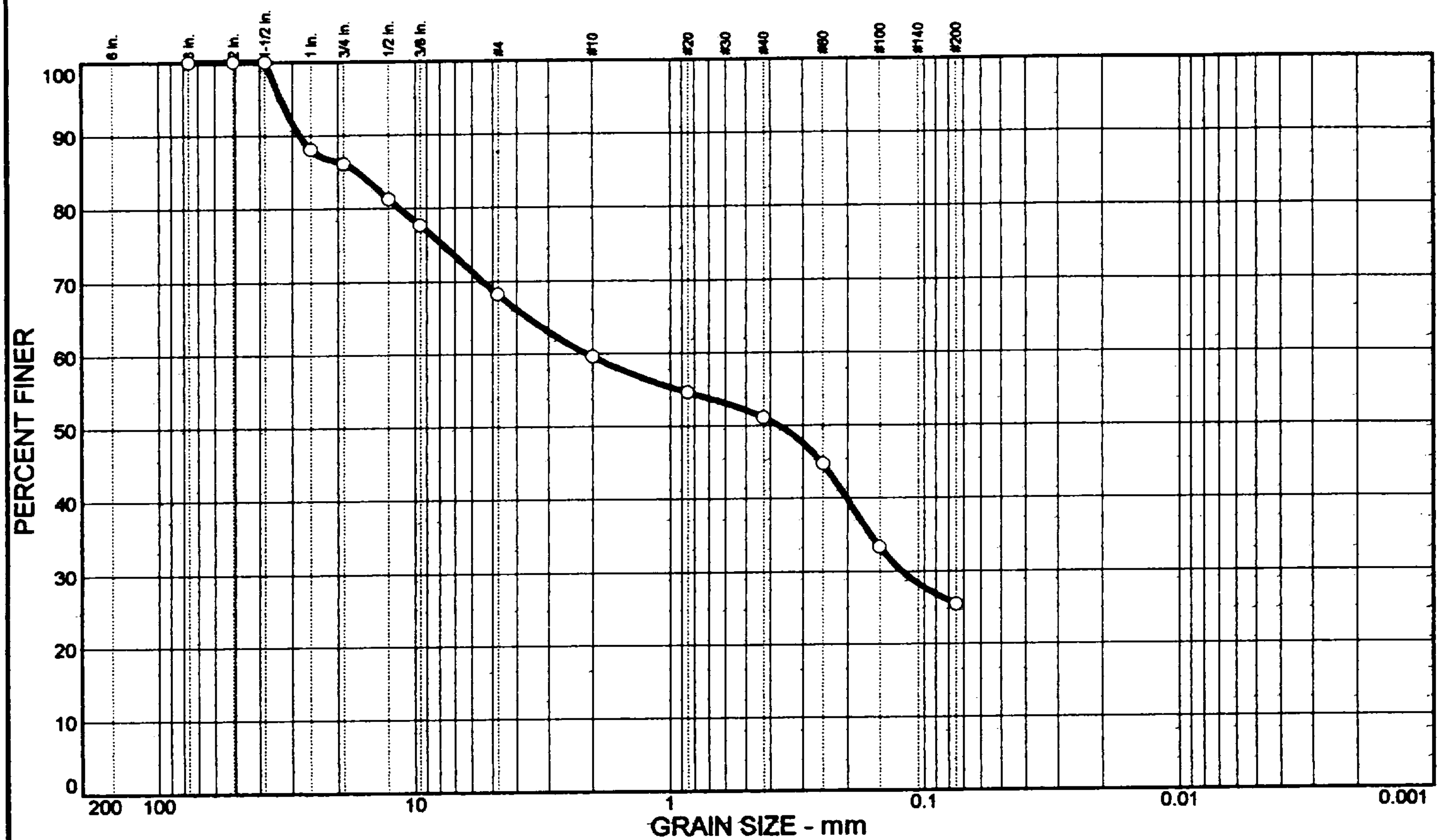
Remarks:

● Tested By: JH

LIQUID AND PLASTIC LIMITS TEST REPORT

WESTERN COLORADO TESTING, INC.

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		31.8	42.7			SM	A-2-4(0)		

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	88.1		
3/4	86.1		
1/2	81.3		
3/8	77.7		
	GRAIN SIZE		
D_{60}	2.11		
D_{30}	0.122		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	68.2		
#10	59.6		
#20	54.6		
#40	51.1		
#60	44.7		
#100	33.3		
#200	25.5		

SOIL DESCRIPTION

○ Sand, clayey, gravely, brown

REMARKS:

○ Tested By: JH

○ Source:

Sample No.: RF4-S1

WESTERN COLORADO TESTING, INC.

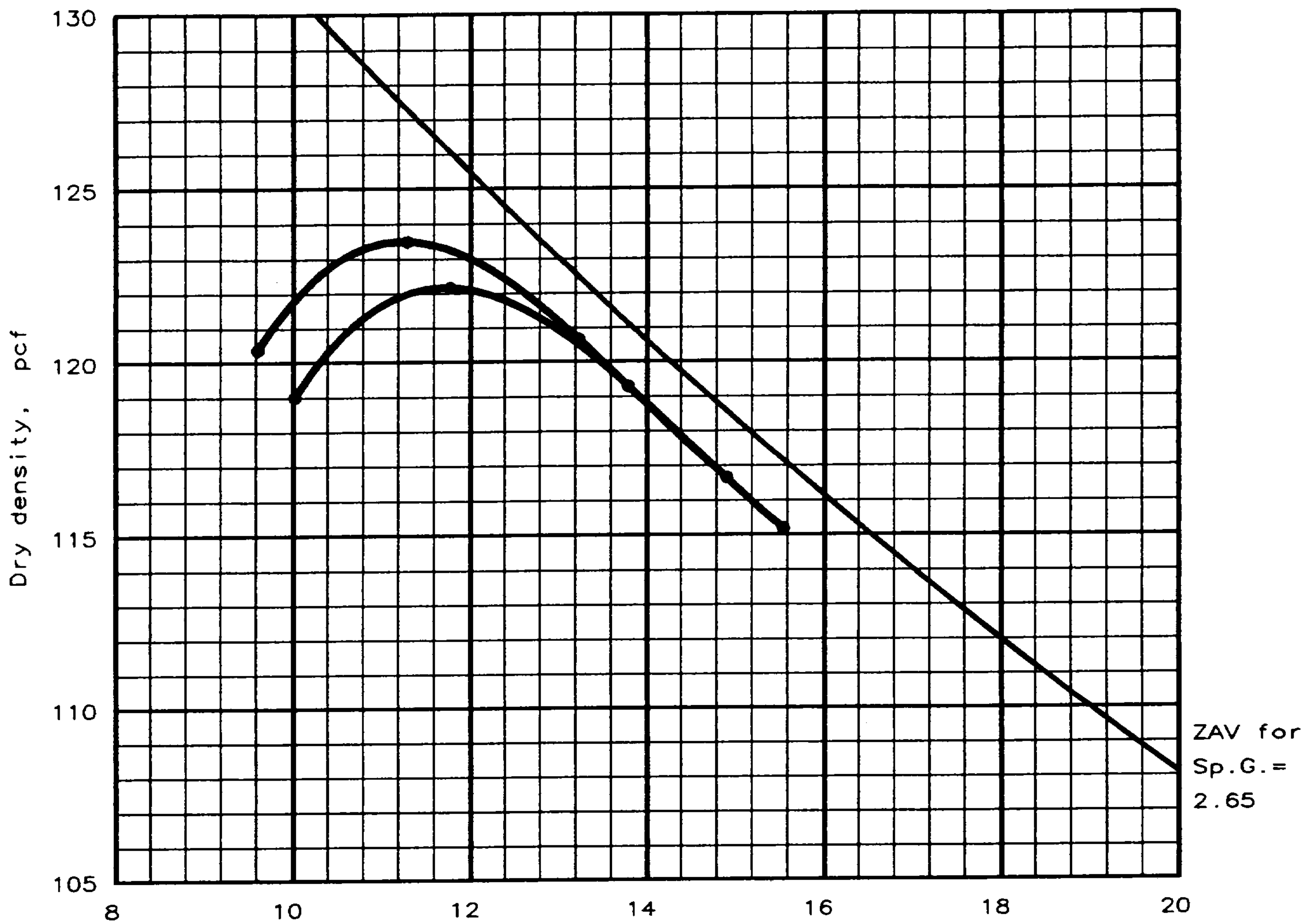
Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 49

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure B, Standard

Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > 3/8 in	% < No.200
	USCS	AASHTO						
			N/A %	2.65			4.1 %	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 123.5 pcf Optimum moisture = 11.3 %	122.2 pcf 11.7 %	RF5-S1 Sand, clayey, grvly, brn

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 5/3/99

Remarks:

SUBMITTED BY: Client

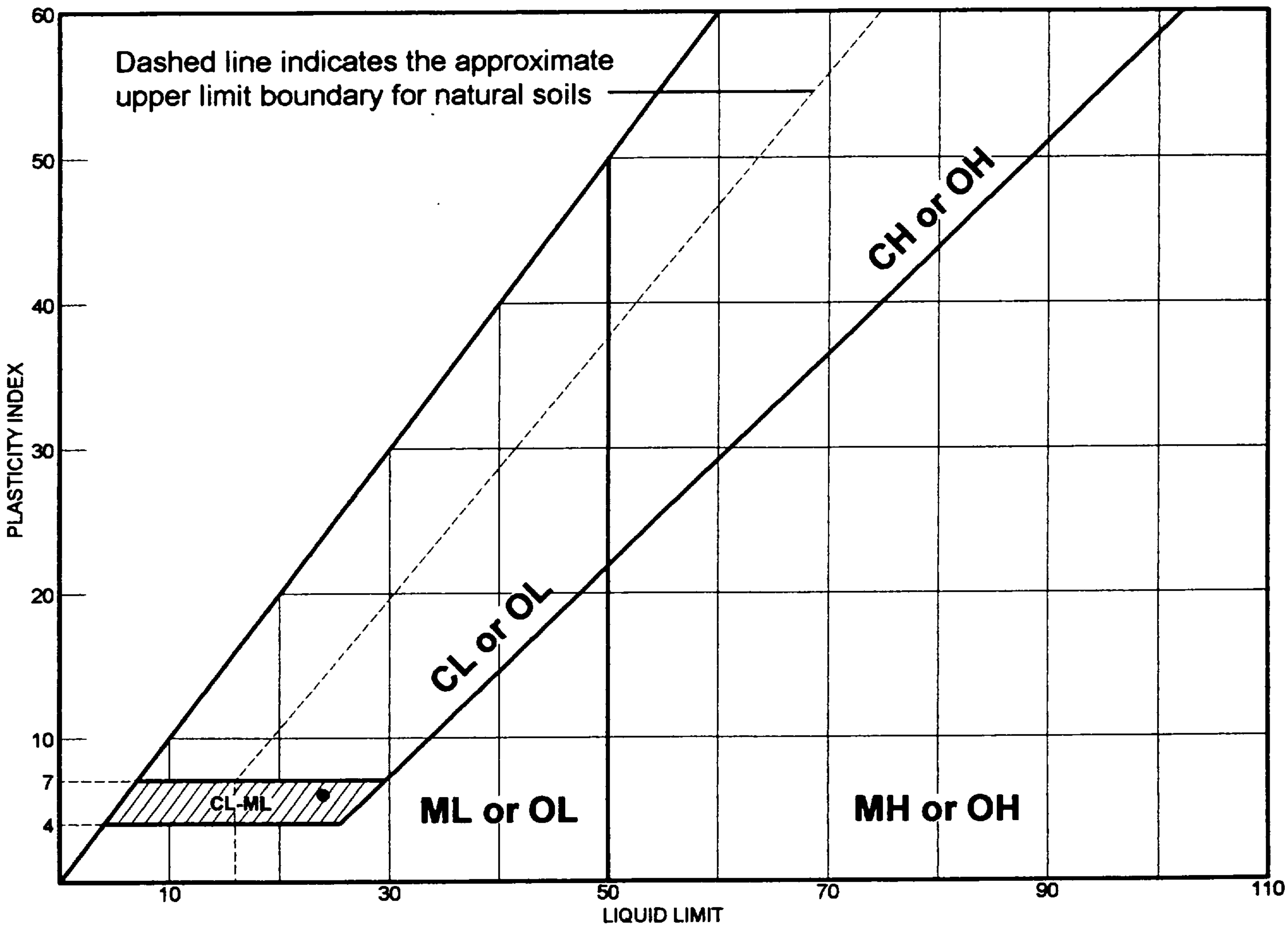
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 19

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sand, clayey, gravely, brown	24	18	6	74.3	41.6	SM

Project No. 804899 **Client:** International Uranium Corporation

Project: Soil Sample Testing

● **Source:** **Sample No.:** RF5-S1

Remarks:

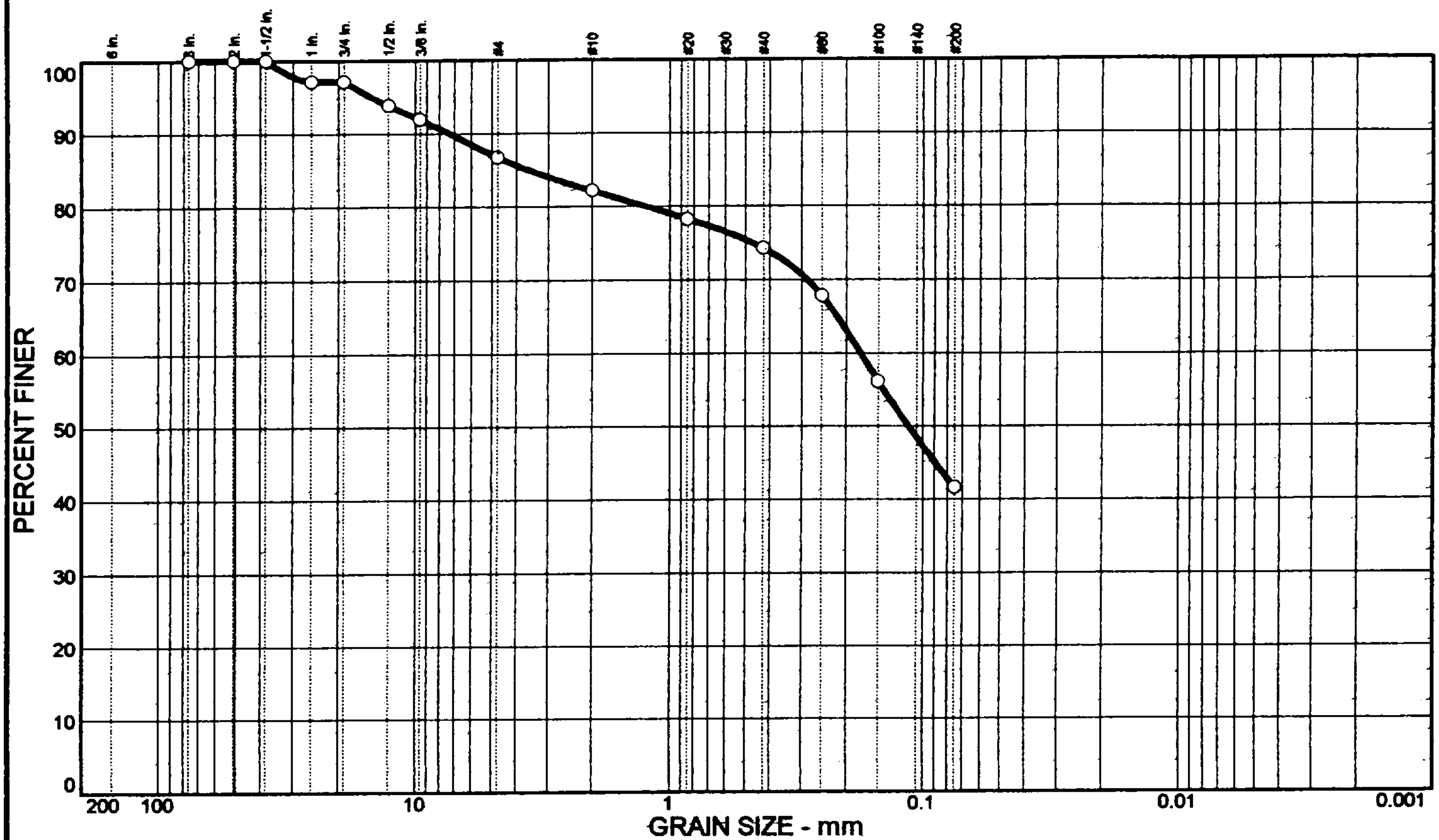
● Tested By: JH

LIQUID AND PLASTIC LIMITS TEST REPORT

WESTERN COLORADO TESTING, INC.

Figure 29

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		13.2	45.2			SM	A-4(0)		

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	97.2		
3/4	97.2		
1/2	93.9		
3/8	92.0		
	GRAIN SIZE		
D_{60}	0.176		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	86.8		
#10	82.2		
#20	78.3		
#40	74.3		
#60	67.8		
#100	56.2		
#200	41.6		

SOIL DESCRIPTION

○ Sand, clayey, gravely, brown

REMARKS:

○ Tested By: JH

○ Source:

Sample No.: RF5-S1

WESTERN COLORADO TESTING, INC.

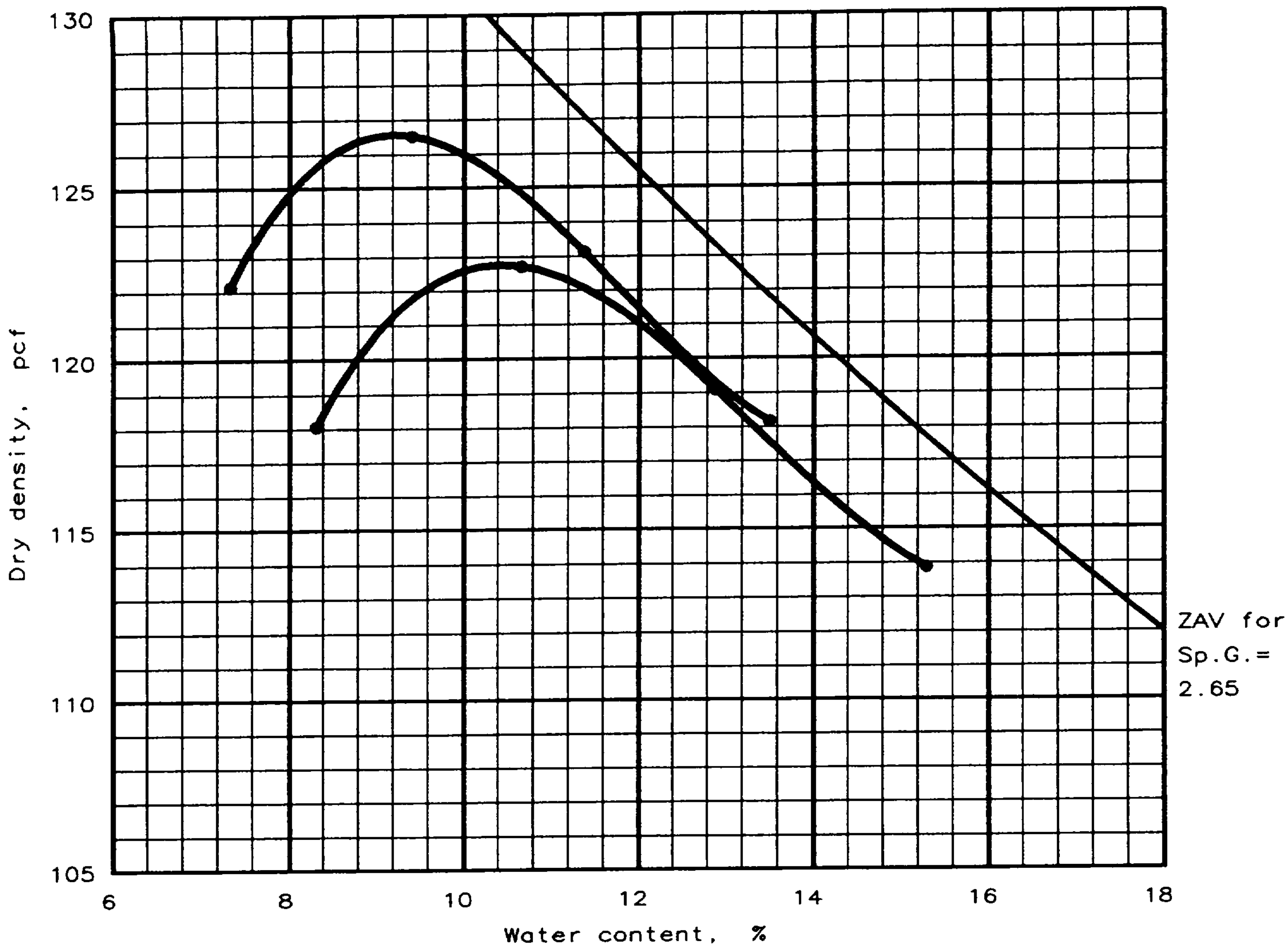
Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 50

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure C, Standard
Oversize correction applied to each point

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	Sp.G.	LL	PI	% > 3/4 in	% < No.200
			N/A %	2.65			11.7 %	

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 126.6 pcf Optimum moisture = 9.2 %	122.8 pcf 10.4 %	RF6-S1 Sand, clayey, grvly, brn

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 5/3/99

Remarks:

SUBMITTED BY: Client

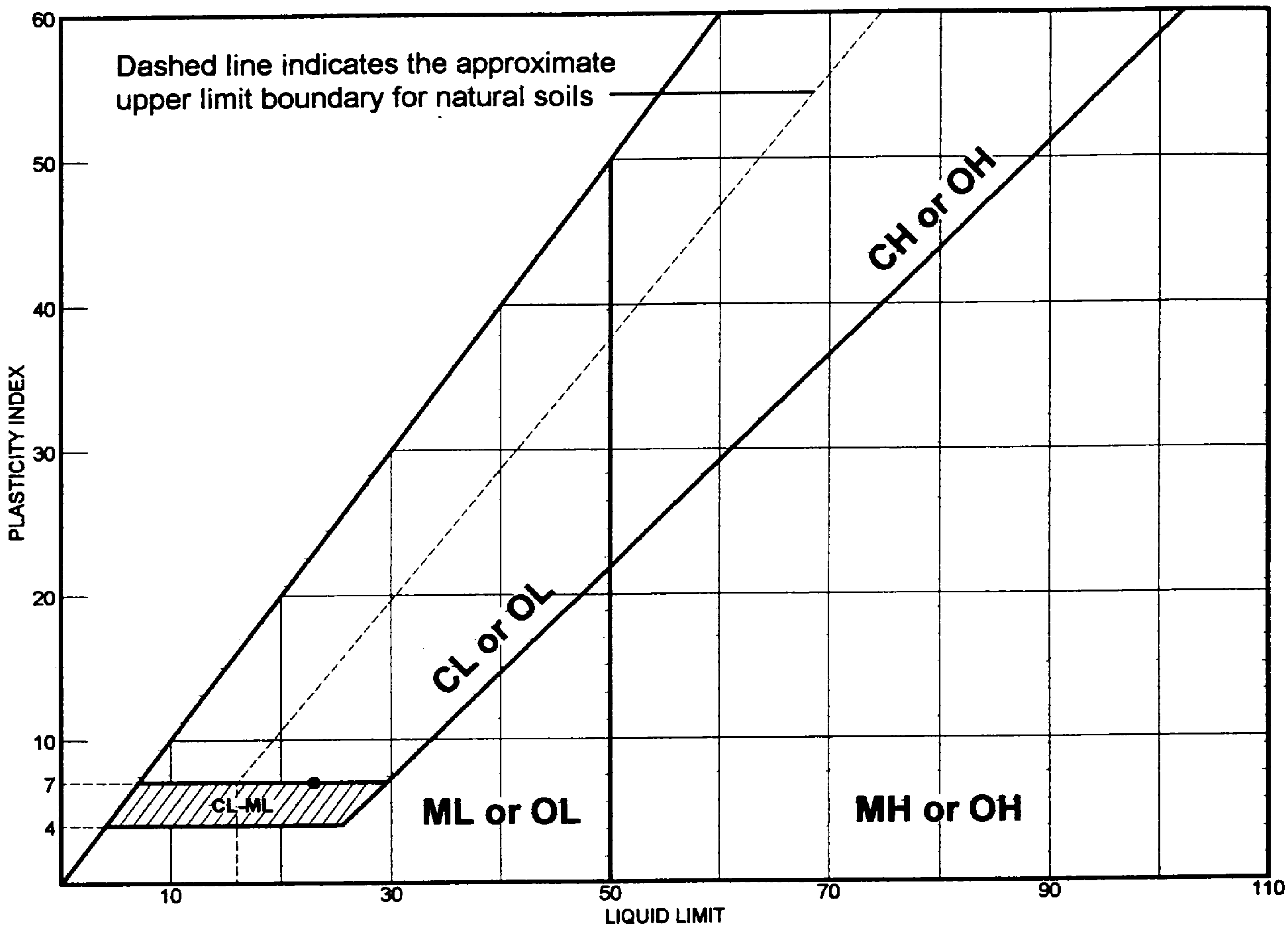
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 20

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Sand, clayey, gravely, brown	23	16	7	53.0	30.6	GC-GM

Project No. 804899 **Client:** International Uranium Corporation

Project: Soil Sample Testing

● **Source:** **Sample No.:** RF6-S1

Remarks:

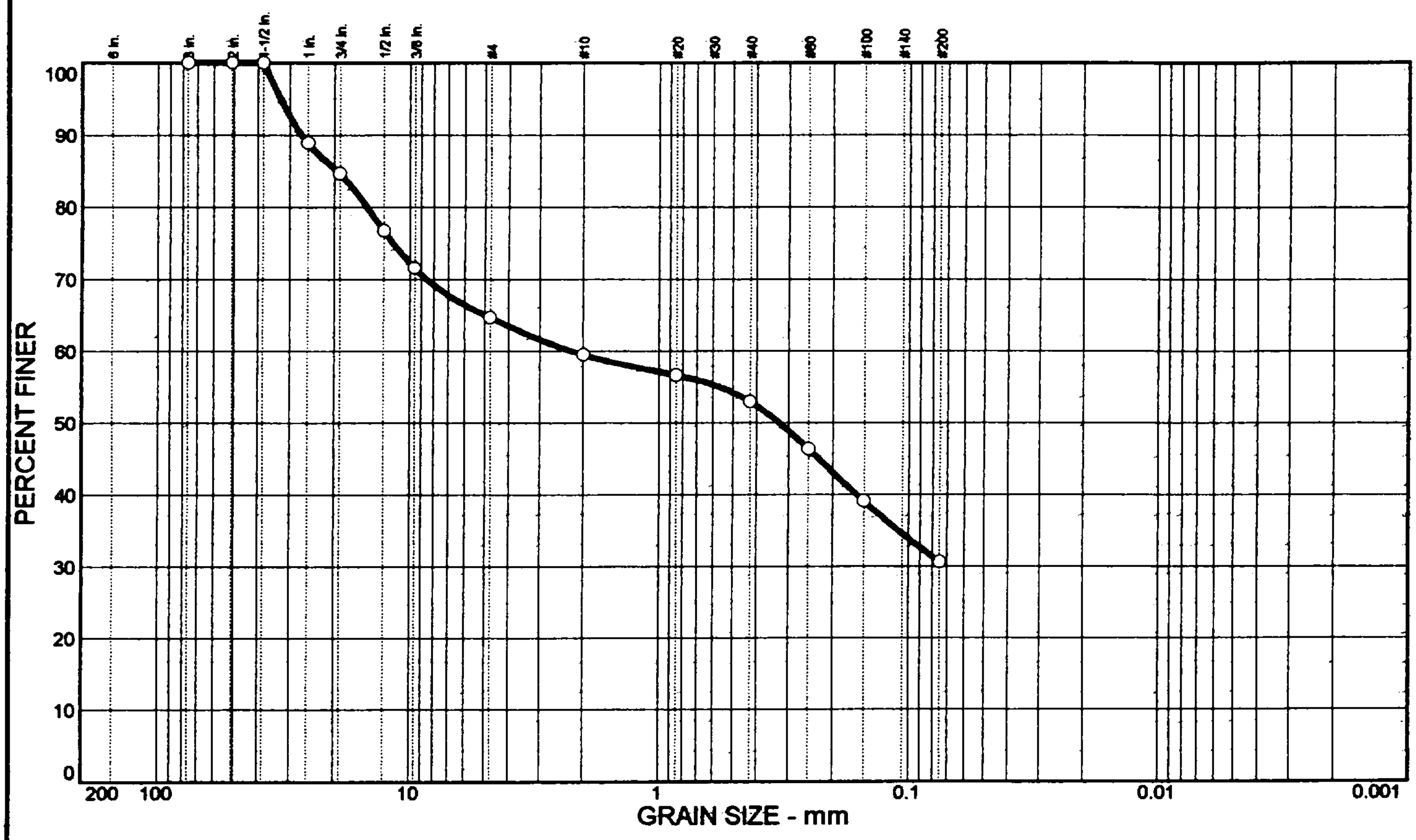
● Tested By: JH

LIQUID AND PLASTIC LIMITS TEST REPORT

WESTERN COLORADO TESTING, INC.

Figure 30

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		35.3	34.1			GC-GM	A-2-4(0)	16	23

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	88.9		
3/4	84.7		
1/2	76.8		
3/8	71.6		
	GRAIN SIZE		
D_{60}	2.23		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	64.7		
#10	59.5		
#20	56.7		
#40	53.0		
#60	46.4		
#100	39.1		
#200	30.6		

SOIL DESCRIPTION

○ Sand, clayey, gravely, brown

REMARKS:

○ Tested By: JH

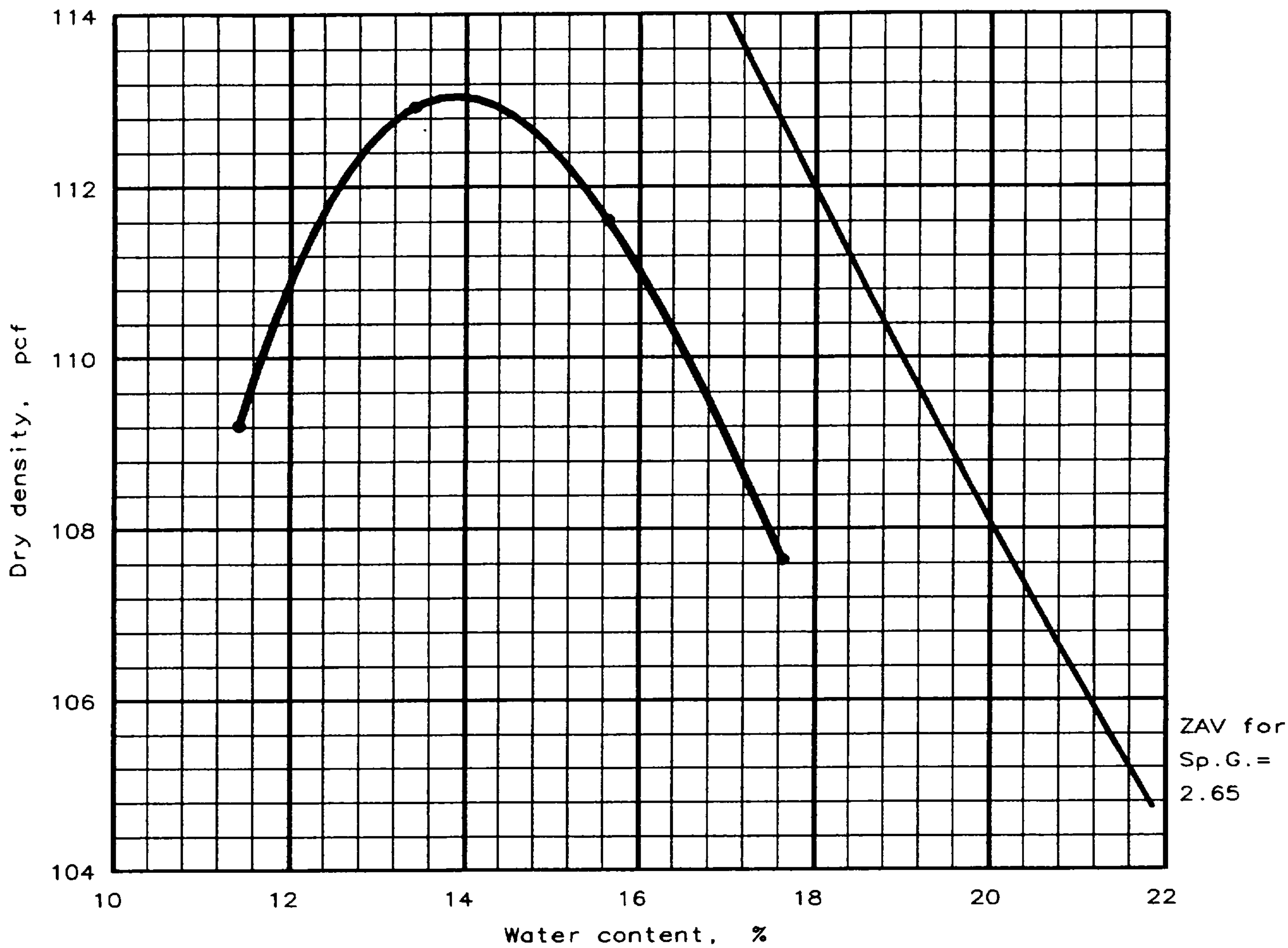
○ Source:

Sample No.: RF6-S1

WESTERN COLORADO TESTING, INC.

Client: International Uranium Corporation
Project: Soil Sample Testing
Project No.: 804899

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure A, Standard
Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
			N/A %	2.65				

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 113.1 pcf Optimum moisture = 13.9 %	113.1 pcf 13.9 %	RF7-S1 Clay, v sandy, silty, rd

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 5/3/99

Remarks:

SUBMITTED BY: Client

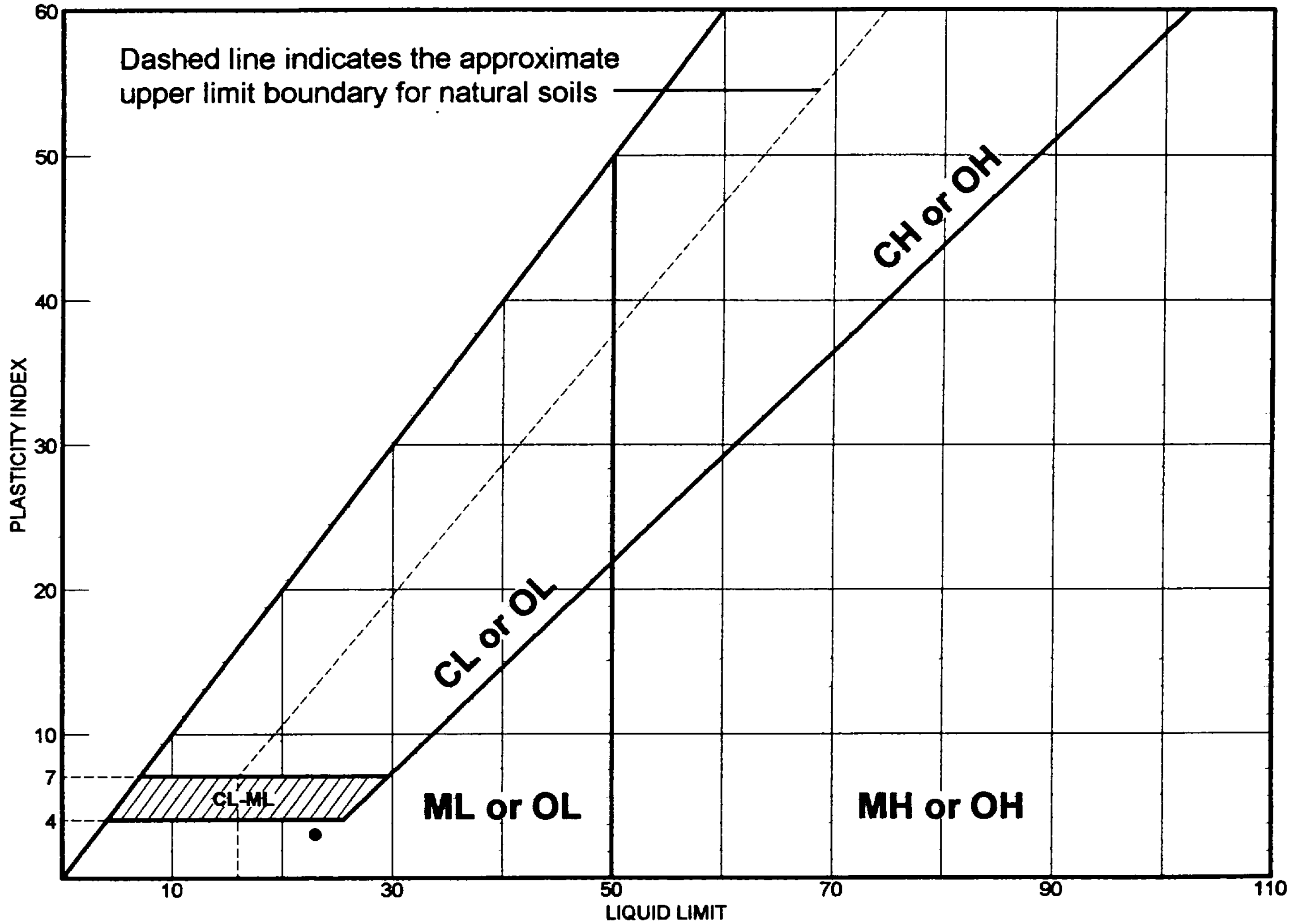
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 21

LIQUID AND PLASTIC LIMITS TEST REPORT



	MATERIAL DESCRIPTION	LL	PL	PI	%<#40	%<#200	USCS
●	Clay, very sandy, silty, red	23	20	3	88.6	56.8	ML

Project No. 804899 **Client:** International Uranium Corporation

Project: Soil Sample Testing

● **Source:** **Sample No.:** RF7-S1

Remarks:

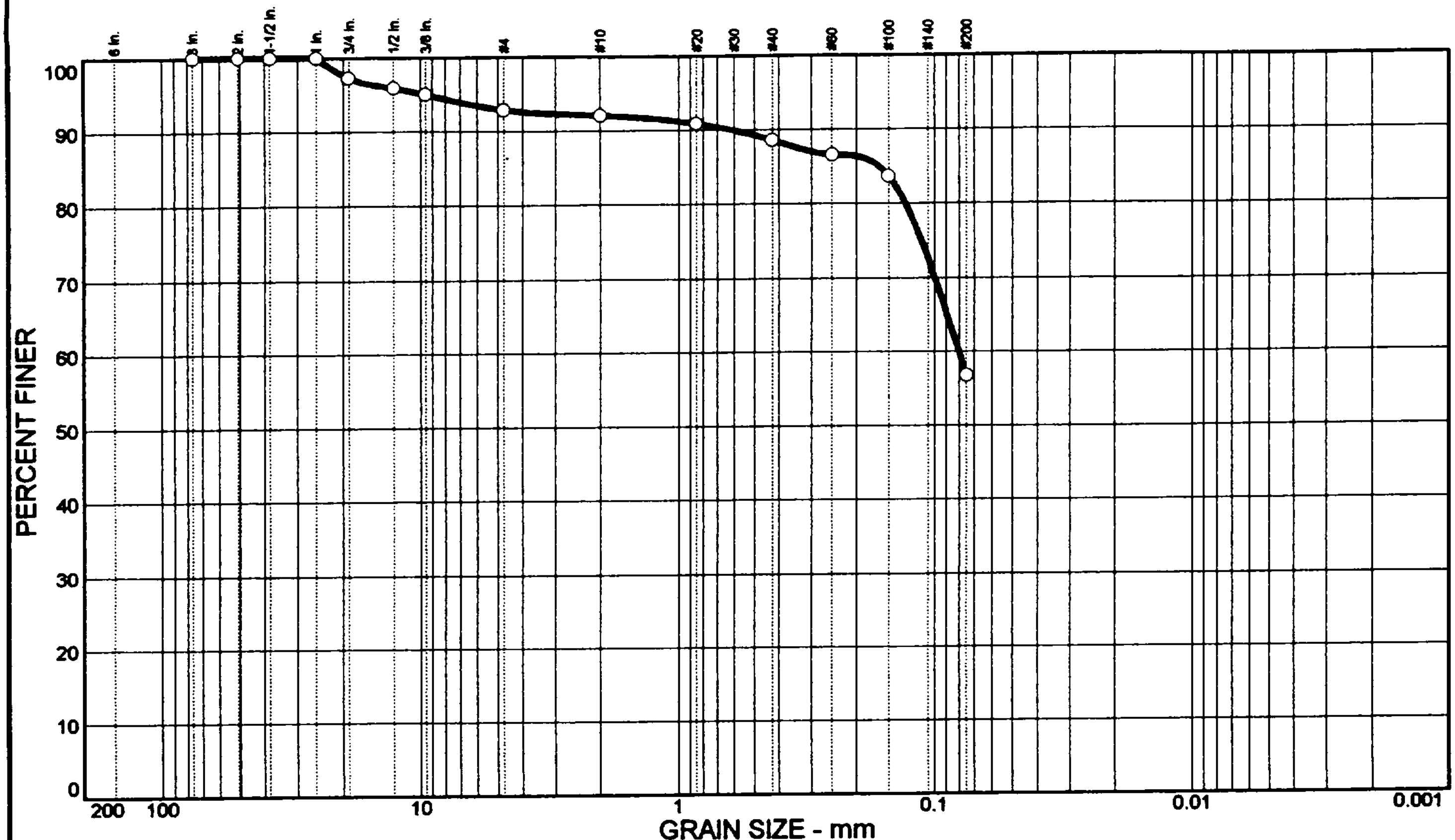
● Tested By: JH

LIQUID AND PLASTIC LIMITS TEST REPORT

WESTERN COLORADO TESTING, INC.

Figure 31

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		7.1	36.1			ML	A-4(0)	20	23

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
3/4	97.3		
1/2	95.9		
3/8	95.0		
	GRAIN SIZE		
D_{60}	0.0801		
D_{30}			
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

SIEVE number size	PERCENT FINER ○		
#4	92.9		
#10	92.1		
#20	90.9		
#40	88.6		
#60	86.6		
#100	83.7		
#200	56.8		

SOIL DESCRIPTION

○ Clay, very sandy, silty, red

REMARKS:

○ Tested By: JH

○ Source:

Sample No.: RF7-S1

WESTERN COLORADO TESTING, INC.

Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 52

ATTACHMENT E

EVALUATION OF POTENTIAL SETTLEMENT

DUE TO EARTHQUAKE-INDUCED LIQUEFACTION

AND

PROBABILISTIC SEISMIC RISK ASSESSMENT

PREPARED BY

INTERNATIONAL URANIUM (USA) CORP.

INDEPENDENCE PLAZA

1050 17TH STREET, SUITE 950

DENVER, CO 80265

EVALUATION OF POTENTIAL SETTLEMENT DUE TO EARTHQUAKE-INDUCED LIQUEFACTION
INTERNATIONAL URANIUM CORPORATION, WHITE MESA MILL
5/6/99

An evaluation of potential settlement due to earthquake-induced liquefaction of tailings at International Uranium Corporation's White Mesa mill has been performed, and the results are reported below. This analysis applies to cells #2 and #3 and uses conditions of those cells that existed before May 1999, ore sieve analyses, calculated average in-place density, seismic analyses by Knight Piesold, and typical physical property values from the literature. Two analyses were performed using methods applied to the Maybell UMTRA site by Morrison-Knudsen Engineers (per information supplied by the NRC to IUC).

Method I is the Stress Ratio method of Takimatsu and Seed, 1987[1]. This method uses the SPT blow counts (N) as input for the analysis. No N values are available for the White Mesa tailings, so N values were estimated (see page 2 of calculations) using the grain size properties determined in recent tests by Western Colorado Testing Inc. and the average in-place density determined by IUC from volumetric calculations. The N values are conservatively estimated to range from 0 at ground surface to 8 at 35 feet depth, values consistent with very loose to loose fine grained (relative density 0 to 35), non-plastic soils according to Terzaghi et al, 1996[2], and NAVFAC DM-7, 1971[3]. According to KME's UMTRA Design Procedures, Chap. 11, App. 11B, Fig 11B-2, this is conservative because under field conditions the minimum relative density should be about 36%. For additional conservatism, it was assumed that the tailings are completely saturated below ground surface. The results of this calculation, tabulated on page A2, indicate that the maximum settlement should be about one foot in 35 feet of tailings and that most of that settlement originates in the upper 15 feet. According to Borns and Mattson, 1999[4], an earthen cover of the type used on tailings impoundments should not exhibit cracking in response to rapid settlement until differential settlement exceeds about 0.75%. At White Mesa, estimated differential settlements are not significant (less than 1%) over the tailing cell with the possible exception of the inslope areas where differential settlement, expressed as vertical feet of settlement over horizontal distance, could exceed 0.01 (1%) in the upper 5 feet and between 10 and 20 feet of the inslope depth. Differential settlements would be accommodated initially by plastic deformation of the cover, then by cracking, so not all of the differential

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[1] Takimatsu, K. and H.B. Seed, 1987; "Evaluation of Settlements in Sands Due to Earthquake Shaking", Journal of Geotechnical Engineering, ASCE, Vol. 113, No. 8
[2] Terzaghi, k., R.B. Peck, and G. Mesri, 1996; *Soil Mechanics in Engineering Practice*, 3rd Edition, John Wiley & Sons
[3] Dept. Of Navy, Navy Facilities Engineering Command, 1971; Design Manual *Soil Mechanics, Foundations, and Earth Structures*, NAVFAC DM-7
[4] Borns, D. And E. Mattson, 1999, "Simulated Subsidence of the Monticello Cover", Sandia National Laboratories Draft Report, 3/10/99

settlement would be expressed by offset along fractures. However, if it is conservatively assumed that all differential settlement is expressed in fracture offset, then the largest offset would be about 0.175 feet (2.1 inches) about 30-45 feet from the top of the cell inslope. It is more likely that this differential settlement would result in some cover flexure or, at worst, several small fractures with offsets totaling not more than 2.1 inches.

The other method used for analysis, MKE's Method II, is from the Committee on Earthquake Engineering, 1985[5]. It is based on evaluating the shear strain in the tailings caused by an earthquake. It relies not on N values but on shear wave velocities and shear modulus/ maximum shear modulus ratio, both of which are estimated based on empirical data. This removes the effect of uncertainty associated with the lack of site-specific in-place tailings characterization. Using the same assumptions as in Method I, the estimated maximum settlement from liquefaction is 0.0581 feet, or 0.7 inches. The associated differential settlements are all well below the 0.75% threshold of concern for cracking of the cover.

The differences in settlement estimates of the two methods are substantial, about 17.5 times. However, the two estimates probably provide bounding limits for the range of likely liquefaction-induced settlement. If the Method I results are used, then the following consequences of the design earthquake liquefaction would be conservatively predicted:

maximum settlement - 1.015 feet in the deepest part of the cell, up to 0.4 feet along the cell margins over the inslope

maximum differential settlement - 2.7% within about 15 feet horizontal distance of the top of inslope, 1.2% to 0.8 % between 30 and 60 feet from top of inslope

impacts on cover - settlement of cover in response to tailing settlement, with maximum flexure over the upper half of the inslopes, where some cracking is possible with offsets less than two inches and probably less than one inch

[5] Committee on Earthquake Engineering, Commission on Engineering and Technical Systems, National Research Council, 1985; "Liquefaction of Soils During Earthquakes", National Academy Press

EVALUATION OF LIQUEFACTION POTENTIAL
WHITE MESA MILL TAILINGS

Tailing Samples Parameters
from tests by Western Colorado Testing Inc., April 1999

Sample #	USCS	LL	PI	Max. Dry Density pcf	Optimum Moisture %	% -#200
C2-ST1	SM	NP	NP	109.2	15.2	24.1
C2-TS2	ML	29	29	103.5	20.8	82.7
C2-TS3	SM	NP	NP	110.4	16.0	32.7
C2-TS4	SM	NP	NP	107.4	16.8	32.2
C3-TS1	ML	24	23	105.7	16.0	60.8
C3-TS2	SM	NP	NP	105.4	15.3	23.0
ave. for	SM	NP	NP	108.1	15.8	28.0
ave. for	ML	26.5	26	104.6	18.4	71.75

Seismic Parameters

Design Life	1000 yrs	from Knight Piesold (Julio Valera), 4/23/99
Return Period	10000 yrs	from Knight Piesold (Julio Valera), 4/23/99
Peak Horiz Acceler.	0.18g	from Knight Piesold (Julio Valera), 4/23/99
Seismic Coeff.	0.12g	(DOE, 1989, Technical Approach Document, Revision II, Uranium Mill Tailings Remedial Action Project)

Tailing In-place Characteristics

From mill screen analyses:

	Ore Blanding #4	Anchutz #1	Hanksville #2A	Hanksville #1	Average
% -#200	27.2	30.7	37.6	23.2	29.7

Ave. Dry Unit Wt. of all tailings, in pcf = 86.31 from IUC volumetric calcs.

From this value and ave. % -#200, ave. unit wts of sand and slimes would be:

Ave. pcf = 86.31 = SDpcf * .703 + SLpcf * .297

Parameters:

Tav = ave cyclic shear stress from earthquake, psi
P_o = total overburden pressure at depth considered, psi = (86.31+ n*62.4) * depth = (86.31+ 0.478*62.4) * depth = 116.1 pcf/ft *
P_o' = effective overburden pressure at depth considered, psi = P_o - depth * 62.4
r_d = stress reduction factor (1.0 at surface to 0.89 at 35') per Kovacs and Solomne, 1984
a_{max} = peak acceleration at ground surface = .18g
N_1 = SPT N value normalized to an effective overburden pressure of 1 tsf and effective energy delivered to drill rods of 60% of theoretical free-fall energy
= C_n * N
N = SPT N value
C_n = correction factor based on effective overburden pressure at depth of SPT count

Assumptions:

1) N values are assumed to increase with depth, from 1 to 8 (see page 3)
2) Tailings are saturated to ground surface

Estimation of N Values:

No SPT tests have been performed, so N values are estimated using physical properties of samples, average in-place dry density, and standard soil mechanics references.

1) From NAVFAC DM-7, Fig. 3-7, relative density ranges from 0 to 35% for SM to ML soil with dry density of 86.31 pcf, and corresponding N values range from 1 to 8 (Fig. 4-2).

2) From MKE UMTRA Design Procedures, Chap. 11, App. 11B, Fig.11B-2, minimum relative density under field conditions is about 36%, corresponding to N_1 = 0,and maximum relative density (100%) corresponds to N_1 of about 47.

3) Based on 1 and 2 above, it is reasonable to estimate that the relative density of the SM/ ML tailings in-place is at least 35% and that the N values range from 1 at the surface to 8 at 35 feet depth.

N_1 = C_n * N

N_1 = corrected SPT value
N = recorded SPT value
C_n = correction coeff.
= 0.77 log10 (20/(P_o'/2000))

z	N	P_o'	C_n	N_1
5	1	269	1.67	1.67
10	2	537	1.44	2.88
15	3	806	1.31	3.92
20	4	1074	1.21	4.84
25	5	1343	1.14	5.68
30	6	1611	1.07	6.44
35	8	1880	1.02	8.18

Calculation of Settlement:

shear stress ratio Tav/P_o' = 0.65 * (a_{max}/g) * (P_o/P_o') * r_d

Depth, z ft	N_1	P_o psf	P_o' psf	P_o/P_o'	r_d	Tav/P_o'	Vol. strain % (1)	Thickness of Layer, ft	Settlement ft
5	1.67	581	269	2.162	1	0.2530	8	5	0.4
10	2.88	1161	537	2.162	0.98	0.2479	5	10	0.5
15	3.92	1742	806	2.162	0.96	0.2428	4.5	15	0.675
20	4.84	2322	1074	2.162	0.95	0.2403	4	20	0.8
25	5.68	2903	1343	2.162	0.93	0.2352	3.6	25	0.9
30	6.44	3483	1611	2.162	0.92	0.2327	3.2	30	0.96
35	8.18	4064	1880	2.162	0.89	0.2251	2.9	35	1.015

(1) from Fig 6, Tokimatsu and Seed, 1987

Differential Settlements over Cell Inslopes:

Slopes are 3H:1V

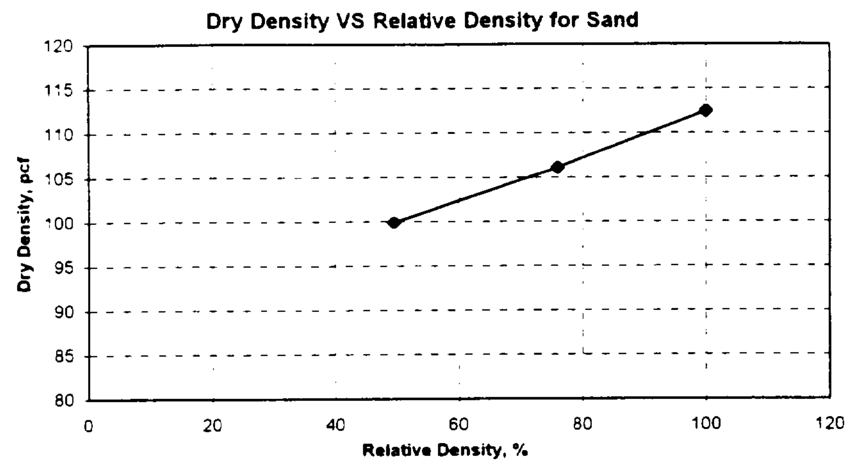
Horizontal Distance over slope ft.	Depth of Tailings over slope ft.	Settlement ft.	Differential Settlement, vertical ft./ horizontal ft.
15	5	0.4	0.027
30	10	0.5	0.007
45	15	0.675	0.012
60	20	0.8	0.008
75	25	0.9	0.007
90	30	0.96	0.004
105	35	1.015	0.004

CORRELATION BETWEEN RELATIVE DENSITY AND ABSOLUTE DRY DENSITY OF SANDS

By AKK
5/6/99

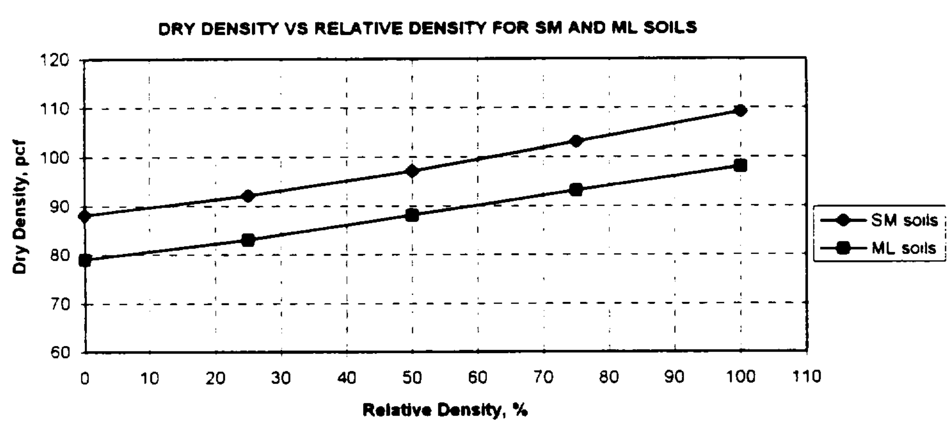
after Terzaghi et al. 1996, Fig 44.1

Relative Density	Dry Density	
	pcf	Mg/m^3
49.5	99.89	1.6
76	106.1	1.7
100	112.4	1.8



after NAVFAC DM-7, 1971, Fig. 3-7

Relative Density, %	Dry Density,pcf SM soils	Dry Density,pcf ML soils
0	88	79
25	92	83
50	97	88
75	103	93
100	109	98



Based on these relationships, the average dry density of 86.31 pcf corresponds to relative density in the 0% to 40% range, depending on the amount of silt vs sand. Therefore, N values would range from 1 at ground surface to 8 at depths of 35-40 ft.

Parameters:

T	= peak shear stress from earthquake, psi
P_o	= total overburden pressure at depth considered, psi = =w*z
r_d	= stress reduction factor (1.0 at surface to 0.9 at 30', 0.8 at 40')
S	= strain
g	= acceleration of gravity, ft/sec/sec
a	= peak acceleration at ground surface = 0.18g
w	= unit weight, pcf
z	= depth, ft.
d	= mass density
G	= shear modulus
G/G_{max}	= modulus reduction factor for strain
V_s	= shear wave velocity, fps
pr	= Poisson's ratio
E_A	= axial strain
h	= thickness of layer, ft.
dh	= settlement in layer, ft.

Assumptions:

1) Tailings are saturated to ground surface
2) G/G_{max} = 0.80
3) V_s = 3000 fps, per Committee on Earthquake Engineering, 1985
4) pr = 0.5
5) Shear wave travels path that is 45 degrees from vertical, so $E_{lateral} = pr * E_A$

Calculations:

S = T/G = $((a/g)*P_o*r_d)/G$ = $((a/g)*(w*z)*r_d)/G$ = $a*z*(w/g)*r_d/G$

$G_{max} = d*V_s^2$ $=(w/g)*V_s^2$

d = G_{max}/V_s^2 = w/g

S = $a*z*d*r_d/G$ = $a*z*(G_{max}/V_s^2)*r_d/G$ = $a*z*r_d/(V_s^2*(G/Gmax))$

= $a*z*r_d/(V_s^2*0.80)$ = $1.25*a*z*r_d/V_s^2$ = $1.25*a*z*r_d/(300)^2$

= $1.25*(0.18*32.2)*z*r_d/90000$ = $1.25*(0.18*32.2)*z*r_d/90000$

S = $0.0000805*z*r_d$

r_d = 1.0 at surface to 0.9 at 30', 0.8 at 40' (Kovacs and Solomne, 1984)

$E_A = S/(1+pr)$ = dh/h = $0.00008*z*r_d/1.5$

dh = $0.00008*z*r_d*h/1.5$

Settlements:

Depth, z ft	r_d	Thickness of Layer, h, ft	Strain S	Axial Strain E_A	Settlement dh, ft
5	1	5	0.0004	0.00027	0.0013
10	0.98	10	0.0008	0.00052	0.0052
15	0.96	15	0.0012	0.00077	0.0115
20	0.95	20	0.0015	0.00101	0.0203
25	0.93	25	0.0019	0.00124	0.0310
30	0.92	30	0.0022	0.00147	0.0442
35	0.89	35	0.0025	0.00166	0.0581

Differential Settlements over Cell Inslopes:

Slopes are 3H:1V

Horizontal Distance over slope ft.	Depth of Tailings over slope ft.	Settlement ft.	Differential Settlement, vertical ft./ horizontal ft.
15	5	0.0013	0.0001
30	10	0.0052	0.0003
45	15	0.0115	0.0004
60	20	0.0203	0.0006
75	25	0.0310	0.0007
90	30	0.0442	0.0009
105	35	0.0581	0.0009

Memorandum

Date: April 23, 1999 — International Uranium Corporation

To: Mr. Harold R. Roberts

From: Julio E. Valera

Re: **Probabilistic Seismic Risk Assessment**

As stipulated by the Nuclear Regulatory Commission (NRC) in their *"Draft Standard Review Plan for the Review of a Reclamation Plan for Mill Tailings Sites under Title II of the Uranium Mill Tailings Radiation Control Act"*, (UMTRCA) - NUREG-1620, a probabilistic seismic hazard analysis (PSHA) may be considered as an acceptable method to a deterministic maximum credible earthquake (MCE) analysis for establishing the peak horizontal acceleration (PHA) for a site.

The NRC draft standard (Section 1.4) states the following: *"An exceedance value no greater than 10^{-4} per year should be used in determining the PHA for the site. This 10^{-4} value represents a 1 in 10 chance of the site exceeding the PHA in a 1,000-year period, which is appropriate for a 1,000 -year design life"*. Based on this understanding, Knight Piésold has performed a simplified seismic risk assessment for IUC's White Horse Mesa Uranium Mill Tailings Facility to establish the probabilistic PHA for the site. The simplified PSHA has made use of probabilistic seismic hazards maps recently developed for the contiguous USA as part of a joint effort by the Federal Emergency Management Agency (FEMA), and the U. S. Geological Survey (USGS) to develop new maps for use in seismic design. A detailed description of the development of the maps is contained in the USGS Open-File Report 96-532, National Seismic Hazards Maps: Documentation. June 1996 by Frankel et al. (1996). The maps provide probabilistic ground motion design parameters with 2%, 5% and 10% probabilities of exceedance in 50 years, corresponding to recurrence intervals of 475, 975 and 2500 years, respectively. The maps were developed using a soft-rock site as the reference site condition which is reasonably representative of the conditions at White Horse Mesa mill site. A probability of exceedance of 10% for a 1,000 year design life as stipulated by the NRC corresponds to a recurrence interval of 10,000 years. A similar probability of exceedance for a 200 year design life corresponds to an earthquake recurrence interval of 2000 years.

The latitude and longitude for the White Horse Mill are $37^0 35'$ N, and $109^0 30'$ W. respectively. Using these coordinates, values of PHA were obtained from the USGS seismic hazards maps at the three recurrence intervals previously mentioned. These are plotted in the accompanying figure versus return period. A best-fit straight line and curve were fitted to the data to extrapolate to larger return periods. The following PHA values were obtained for the White Horse Mesa Mill site:

Design Life (yrs)	Return Period (yrs)	PHA (g)
200	2,000	0.11
1,000	10,000	0.18

Thus based on extrapolation of the USGS data, a PHA equal to 0.18g would correspond to the 10,000 year event for the site.

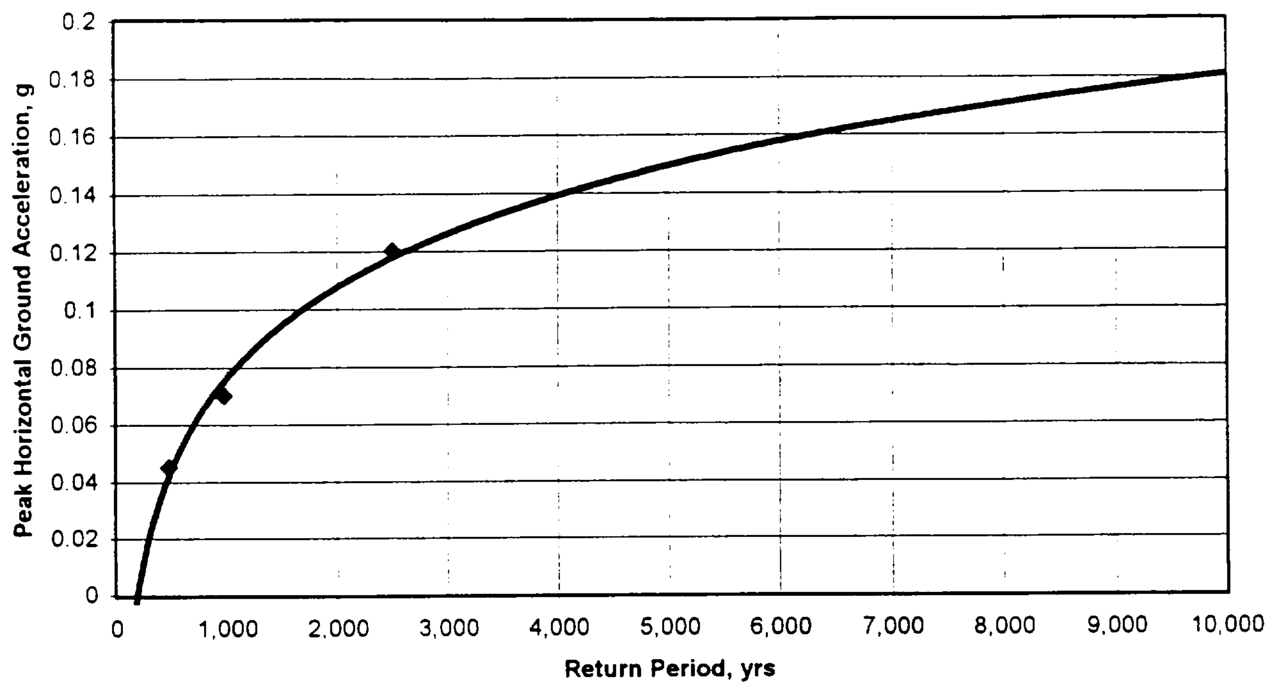
In Section 1.4.3 of NUREG-1620 the NRC states that in order "*to assess potential site ground motion from earthquakes not associated with known tectonic structures (i.e., random or floating earthquakes), the largest floating earthquake reasonably expected within the tectonic province (no smaller than magnitude 6.2) should be identified*". They also state that a site-to-source distance of 15 km should be used for floating earthquakes within the host tectonic province in a dterministic analysis.

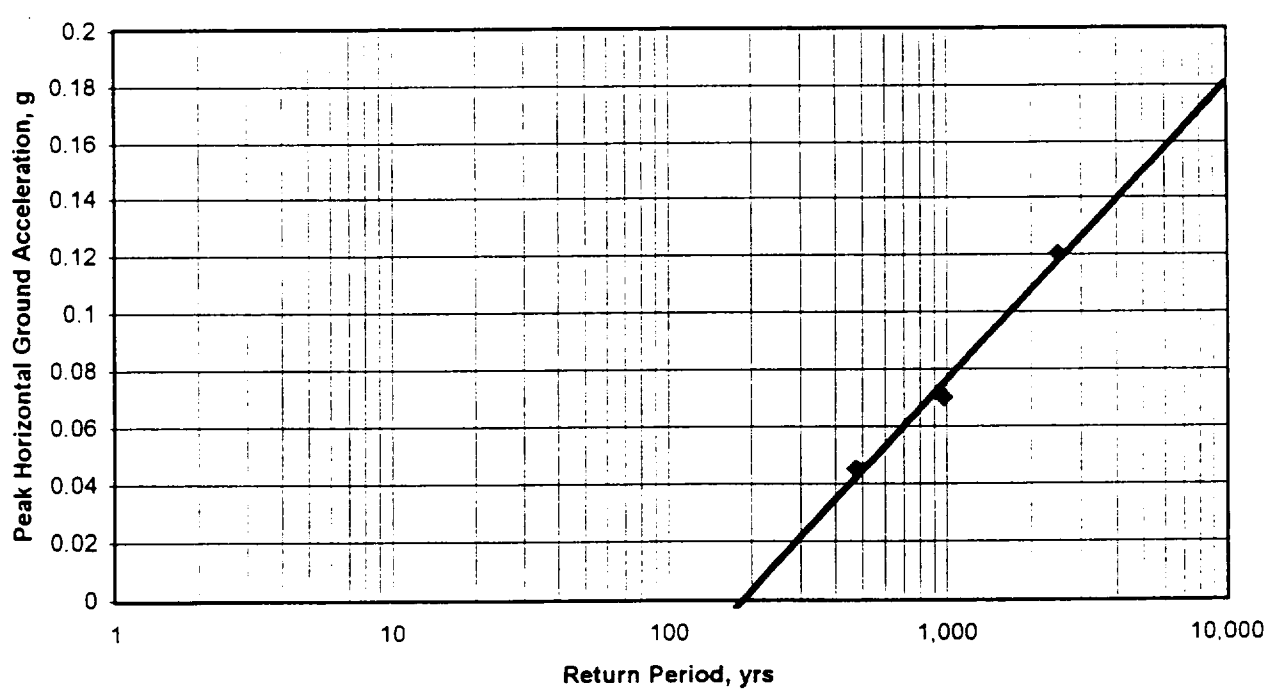
In addition to the PHA, it is necessary to establish the magnitude of the corresponding earthquake in order to conduct a liquefaction assessment of the tailings impoundment. An estimate of this magnitude was obtained using the acceleration attenuation relationship developed by Campbell and Bozorgnia (1994) which is considered by the NRC as an acceptable relationship. The attenuationship relationship used for this study assumed strike-slip faulting and soft rock site conditions. A site-to-source distance of 15 km was also used with a PHA of 0.18g to establish the corresponding magnitude. By coincidence a magnitude of 6.2 was obtained.

Thus based on this simplified seismic risk assessment, a magnitude 6.2 earthquake producing a PHA of 0.18g at the mill site represents the 10,000 year event which has a 10% probability of exceedance during a mine life of 1000 years.

White Mesa
Ground accelerations from Frankel et al. (1996)

return period, yrs	accel.
475	0.045
975	0.07
2500	0.12





White Mesa Mill - Soil Testing, tailings samples

WESTERN COLORADO TESTING, INC.
529 25 1/2 Road, Suite B-101
Grand Junction, Colorado 81505
(970) 241-7700 • Fax (970) 241-7783

May 4, 1999
WCT #804899

International Uranium USA Corporation
Independence Plaza, Suite 950
1050 17th Street
Denver, Colorado 80265

Subject: Soil Sample Testing

As requested, we have completed the soil laboratory work for International Uranium USA Corporation. The testing performed included the following:

21 Sieve Analyses
21 Atterberg Limit Tests
21 Standard Proctor Tests (ASTM D698)
6 Hydrometer Tests
6 Specific Gravity Tests

Data sheets are included for each test except for the specific gravities. The results of these are shown below:

Sample	Avg. Bulk Specific Gravity	Avg. Bulk Specific Gravity (SSD)	Apparent Specific Gravity	Absorption Percent
C2 - TS1	2.337	2.468	2.673	5.372
C2 - TS2	2.137	2.392	2.868	11.926
C2 - TS3	2.157	2.359	2.705	9.396
C2 - TS4	2.265	2.432	2.721	7.402
C3 - TS1	2.456	2.562	2.746	4.294
C3 - TS2	2.349	2.464	2.655	4.900

We have been happy to be of service. If you have any questions or we may be of further assistance, please call.

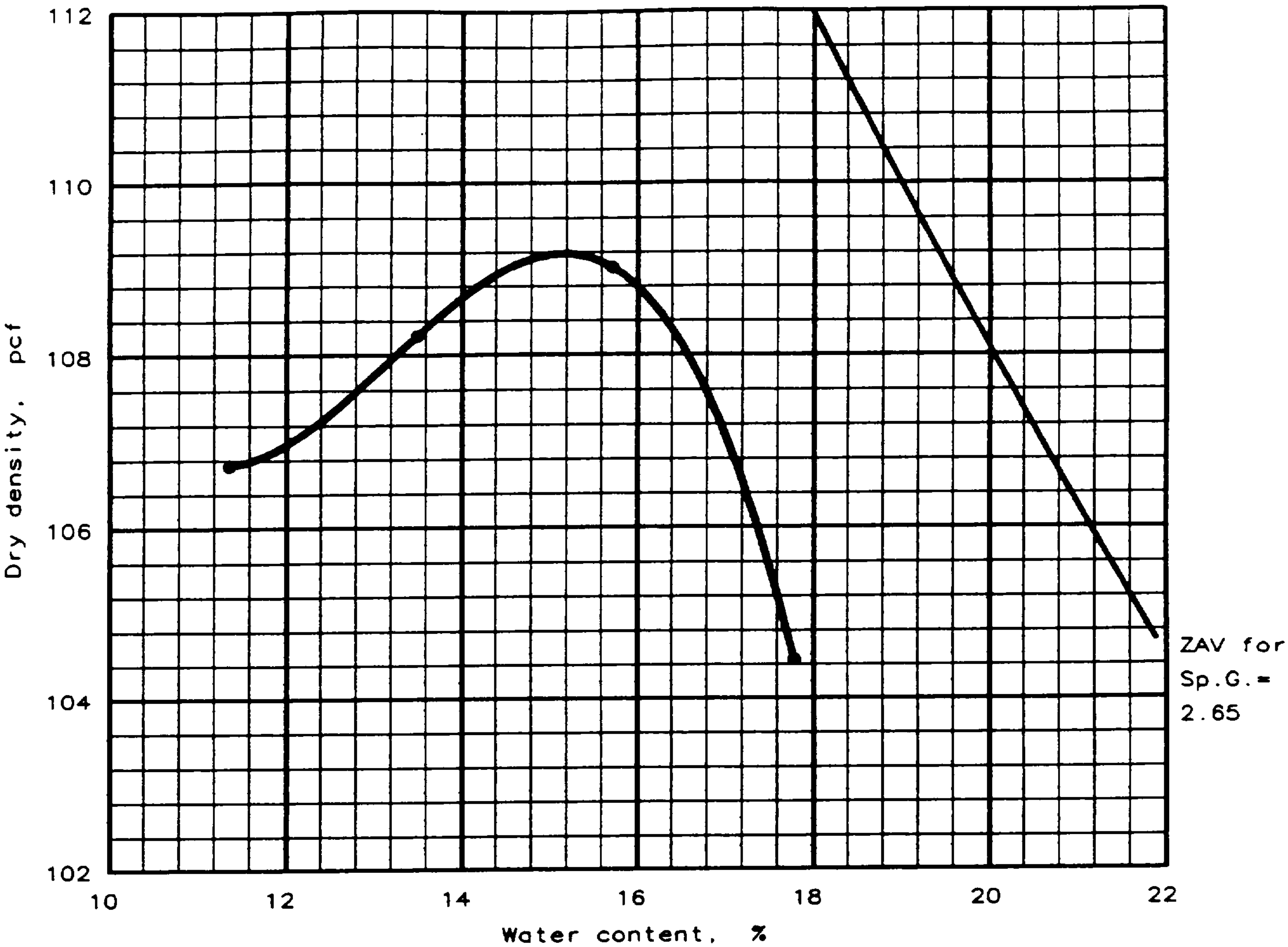
Respectfully Submitted:
WESTERN COLORADO TESTING, INC.

Wm. Daniel Smith

Wm. Daniel Smith, P.E.
Senior Geotechnical Engineer

WDS/mh
Mab:jobs\8048L0504

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure A, Standard

Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
			N/A %	2.65				

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 109.2 pcf Optimum moisture = 15.2 %	109.2 pcf 15.2 %	C2-ST1

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 4/27/99

Remarks:

SUBMITTED BY: Client

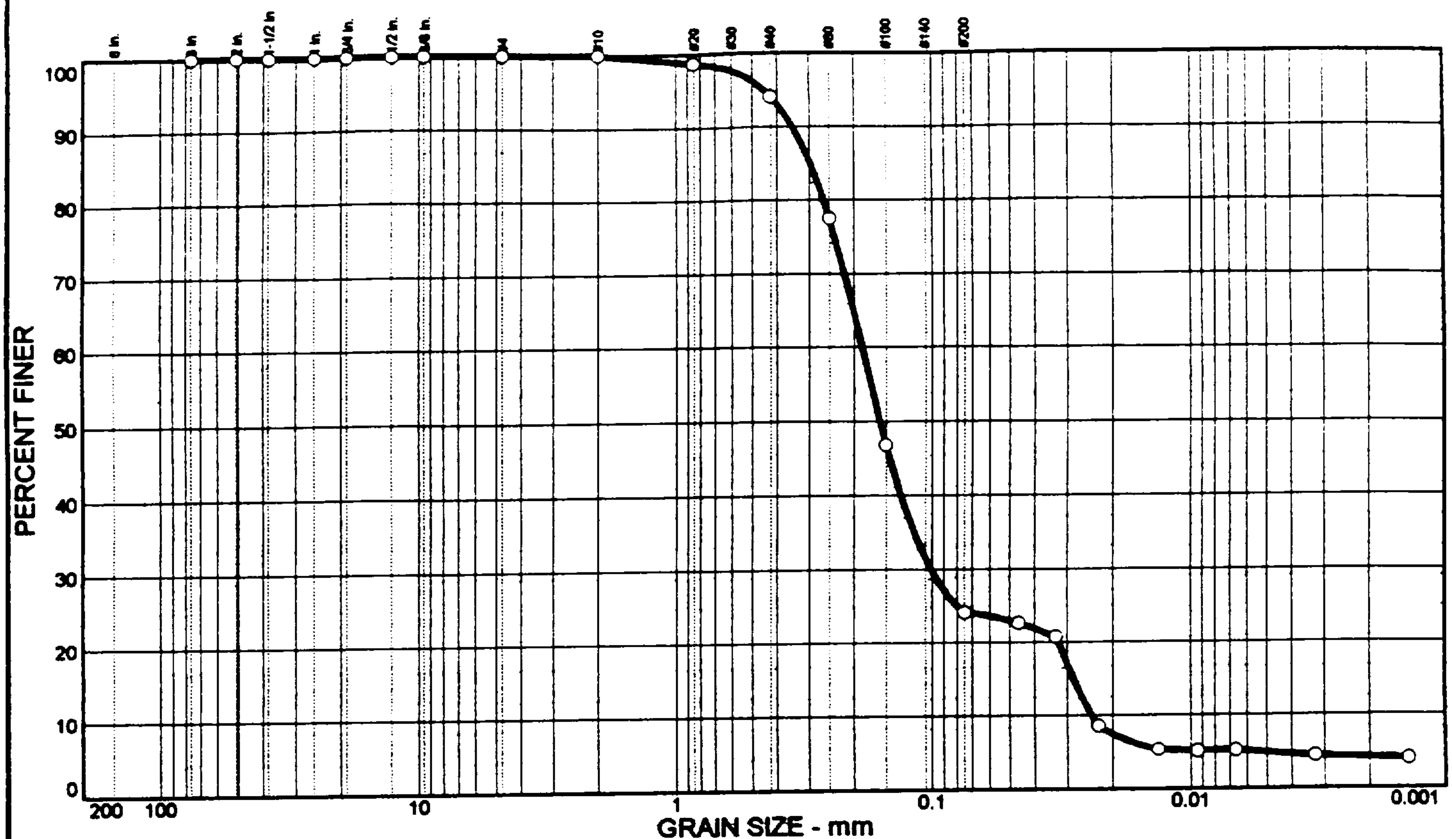
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 1

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		0.0	75.9	19.3	4.8	SM	A-2-4(0)	NP	NP

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
3/4	100.0		
1/2	100.0		
3/8	100.0		
	GRAIN SIZE		
D_{60}	0.186		
D_{30}	0.100		
D_{10}	0.0241		
	COEFFICIENTS		
C_c	2.25		
C_u	7.74		

○ Source:

SIEVE number size	PERCENT FINER ○		
#4	100.0		
#10	100.0		
#20	98.7		
#40	94.1		
#60	77.5		
#100	46.8		
#200	24.1		

Sample No.: C2-ST1

SOIL DESCRIPTION

○ Sand, silty, gray/brown

REMARKS:

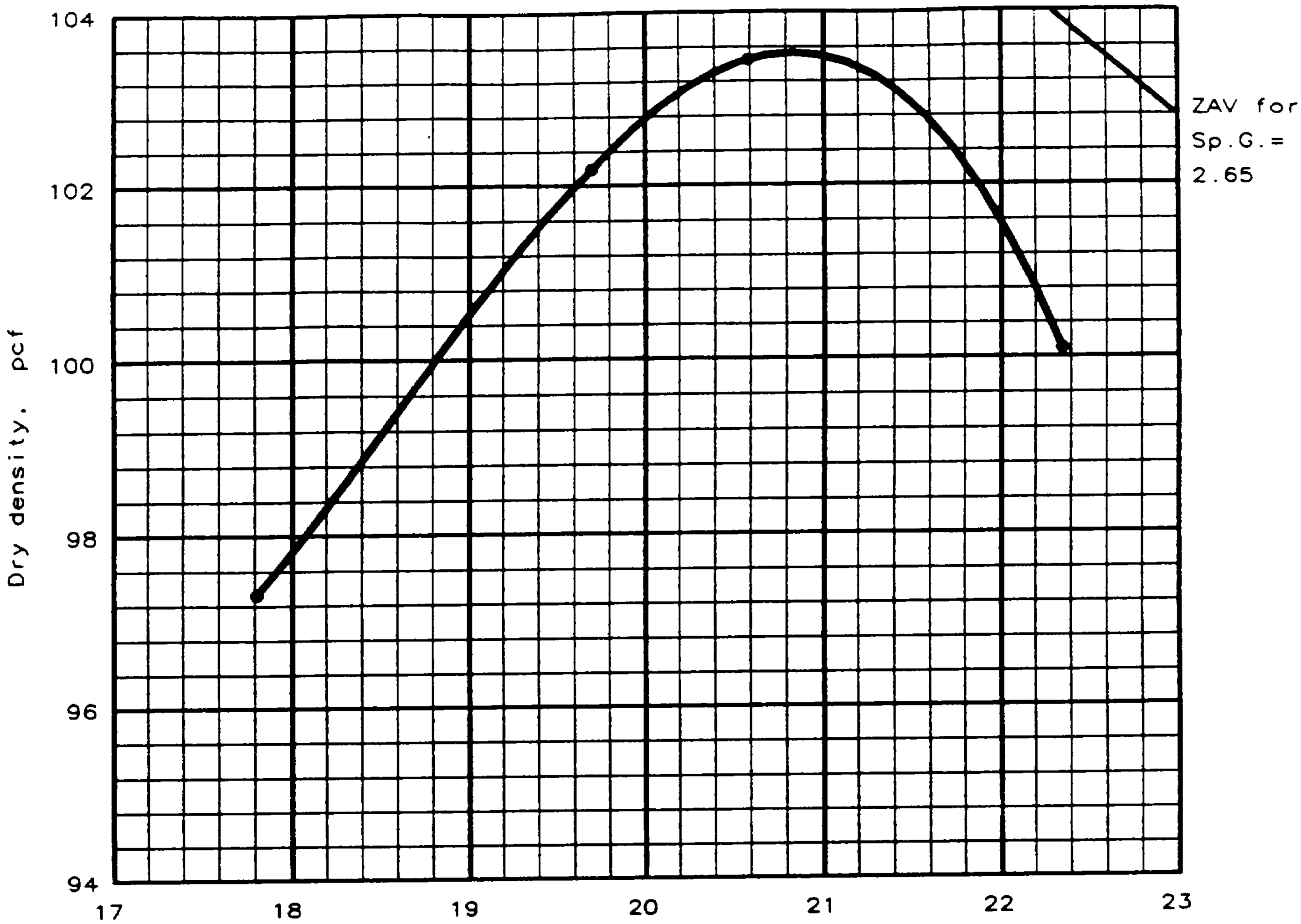
○ Tested by: JH

WESTERN COLORADO TESTING, INC.

Client: International Uranium Corporation
Project: Soil Sample Testing
Project No.: 804899

Figure 32

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure A, Standard

Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
			N/A %	2.65				

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 103.5 pcf Optimum moisture = 20.8 %	103.5 pcf 20.8 %	C2-TS2

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 4/27/99

Remarks:

SUBMITTED BY: Client

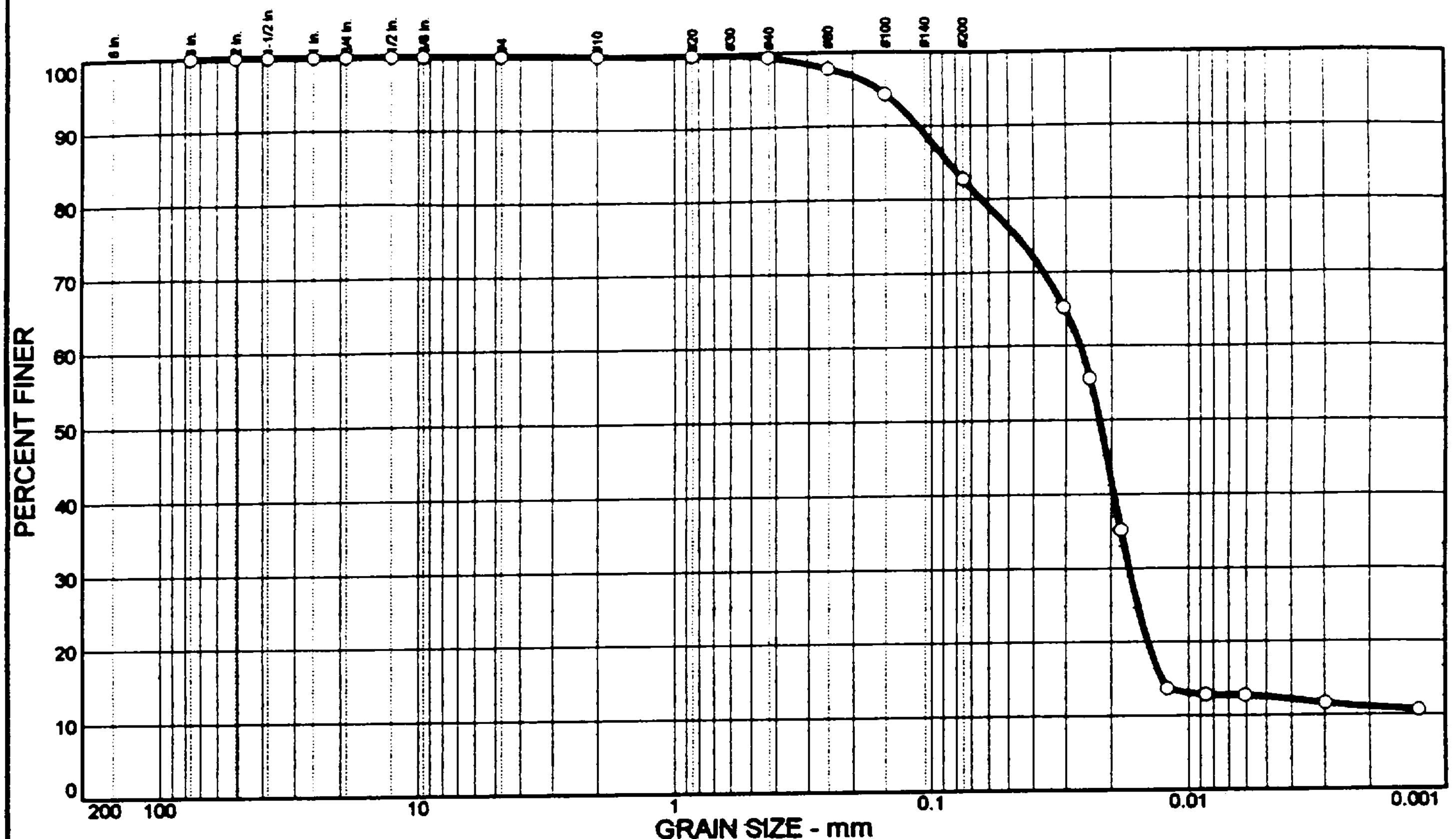
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 2

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		0.0	17.3	70.2	12.5	ML	A-4(0)	29	29

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
3/4	100.0		
1/2	100.0		
3/8	100.0		
	GRAIN SIZE		
D_{60}	0.0264		
D_{30}	0.0170		
D_{10}			
	COEFFICIENTS		
C_c			
C_u			

○ Source:

SIEVE number size	PERCENT FINER ○		
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.4		
#60	97.8		
#100	94.3		
#200	82.7		

Sample No.: C2-TS2

SOIL DESCRIPTION

○ Silt, clayey, sandy, gray

REMARKS:

○ Tested By: JH

WESTERN COLORADO TESTING, INC.

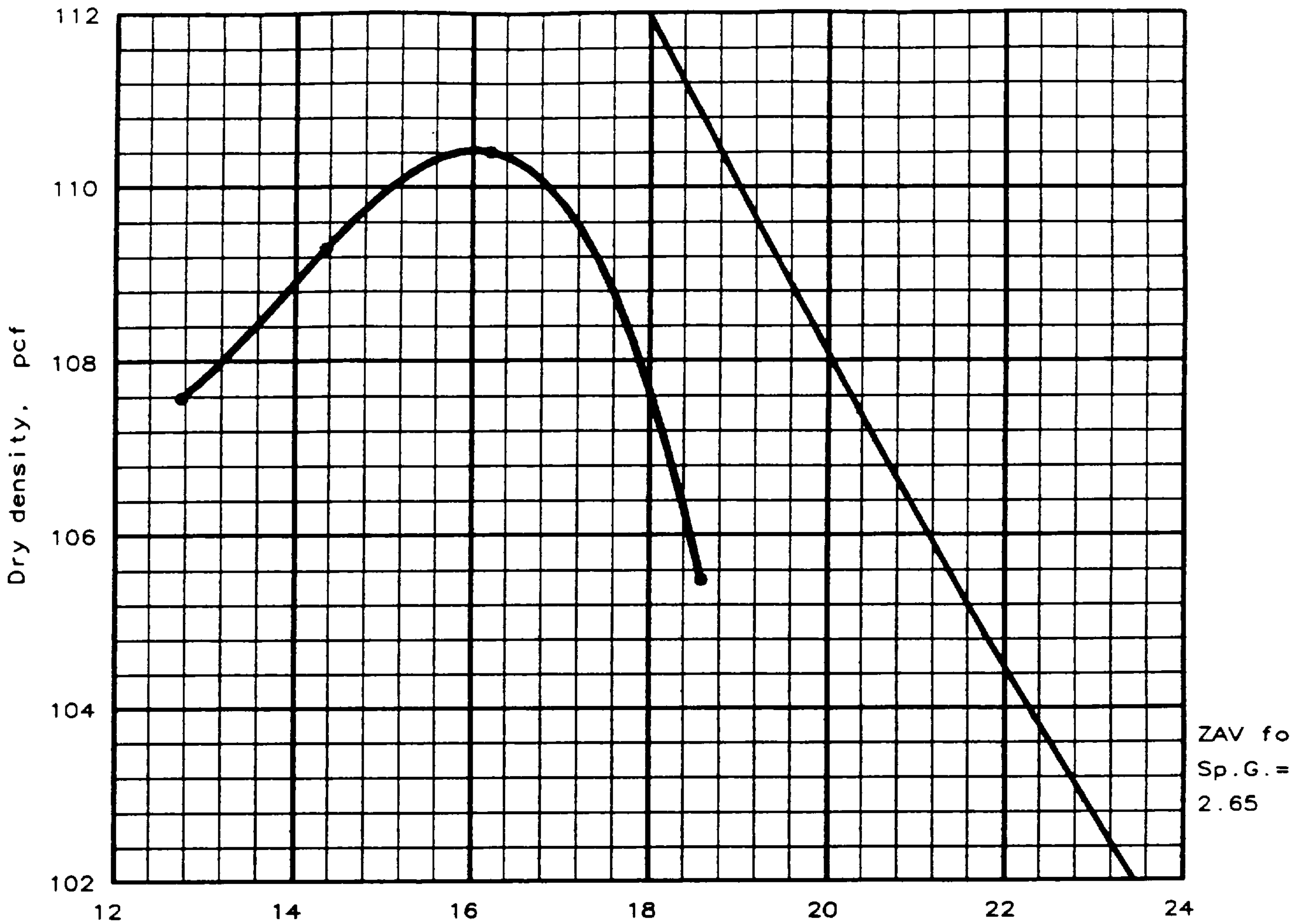
Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 33

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure A, Standard

Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
			N/A %	2.65				

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 110.4 pcf Optimum moisture = 16.0 %	110.4 pcf 16.0 %	C2-TS3

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 4/27/99

Remarks:

SUBMITTED BY: Client

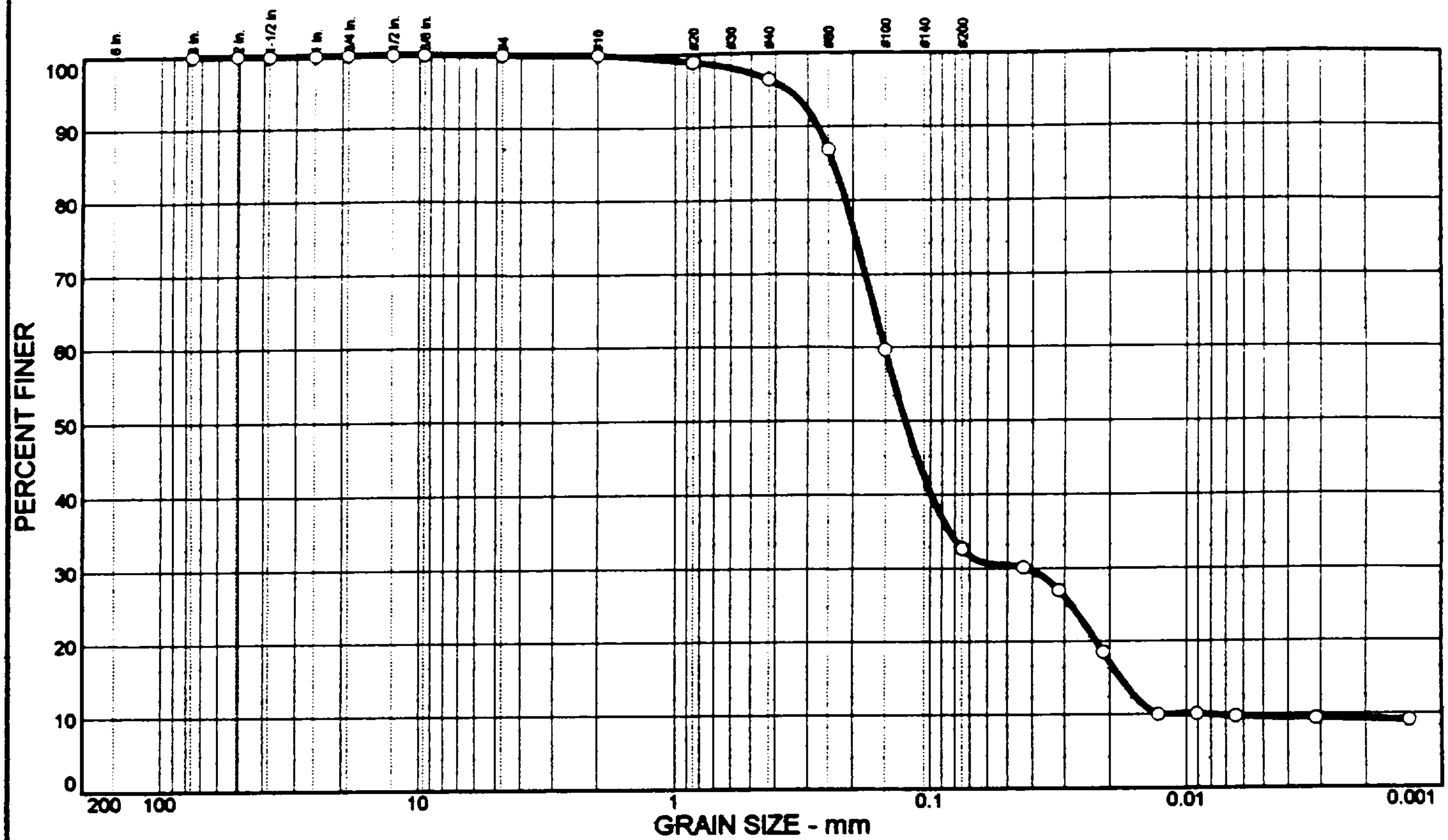
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 3

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		0.0	67.3	23.2	9.5	SM	A-2-4(0)	NP	NP

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
3/4	100.0		
1/2	100.0		
3/8	100.0		
	GRAIN SIZE		
D_{60}	0.151		
D_{30}	0.0425		
D_{10}	0.0084		
	COEFFICIENTS		
C_c	1.42		
C_u	18.03		

SIEVE number size	PERCENT FINER ○		
#4	100.0		
#10	100.0		
#20	98.9		
#40	96.4		
#60	86.9		
#100	59.6		
#200	32.7		

SOIL DESCRIPTION
○ Sand, silty, gray/brown

REMARKS:
○ Tested By: JH

○ Source:

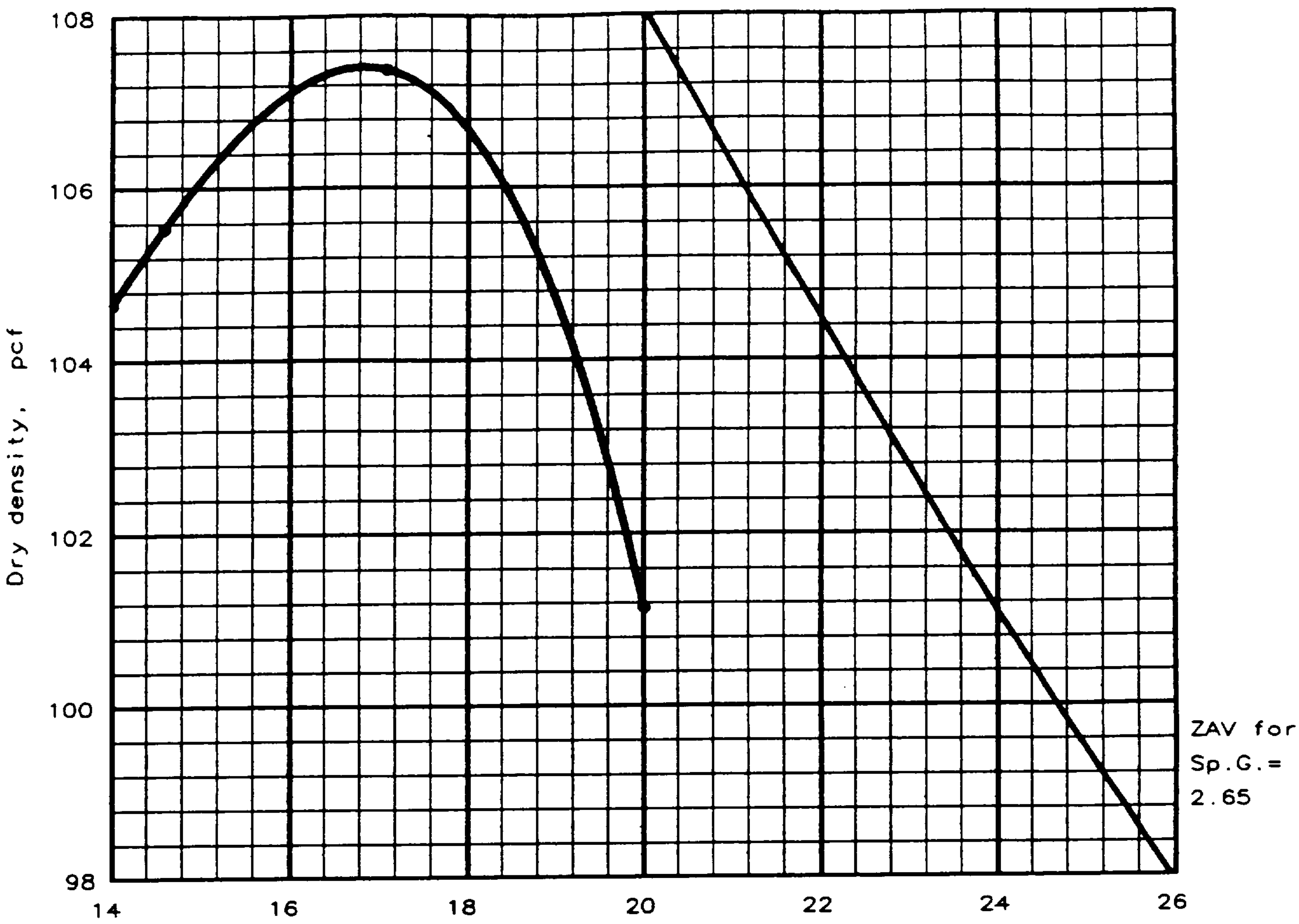
Sample No.: C2-TS3

WESTERN COLORADO TESTING, INC.

Client: International Uranium Corporation
Project: Soil Sample Testing
Project No.: 804899

Figure 34

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure A, Standard
Oversize correction applied to each point

Elev/ Depth	Classification		Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
	USCS	AASHTO						
			N/A %	2.65				

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 107.4 pcf Optimum moisture = 16.8 %	107.4 pcf 16.8 %	C2-TS4

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 4/27/99

Remarks:

SUBMITTED BY: Client

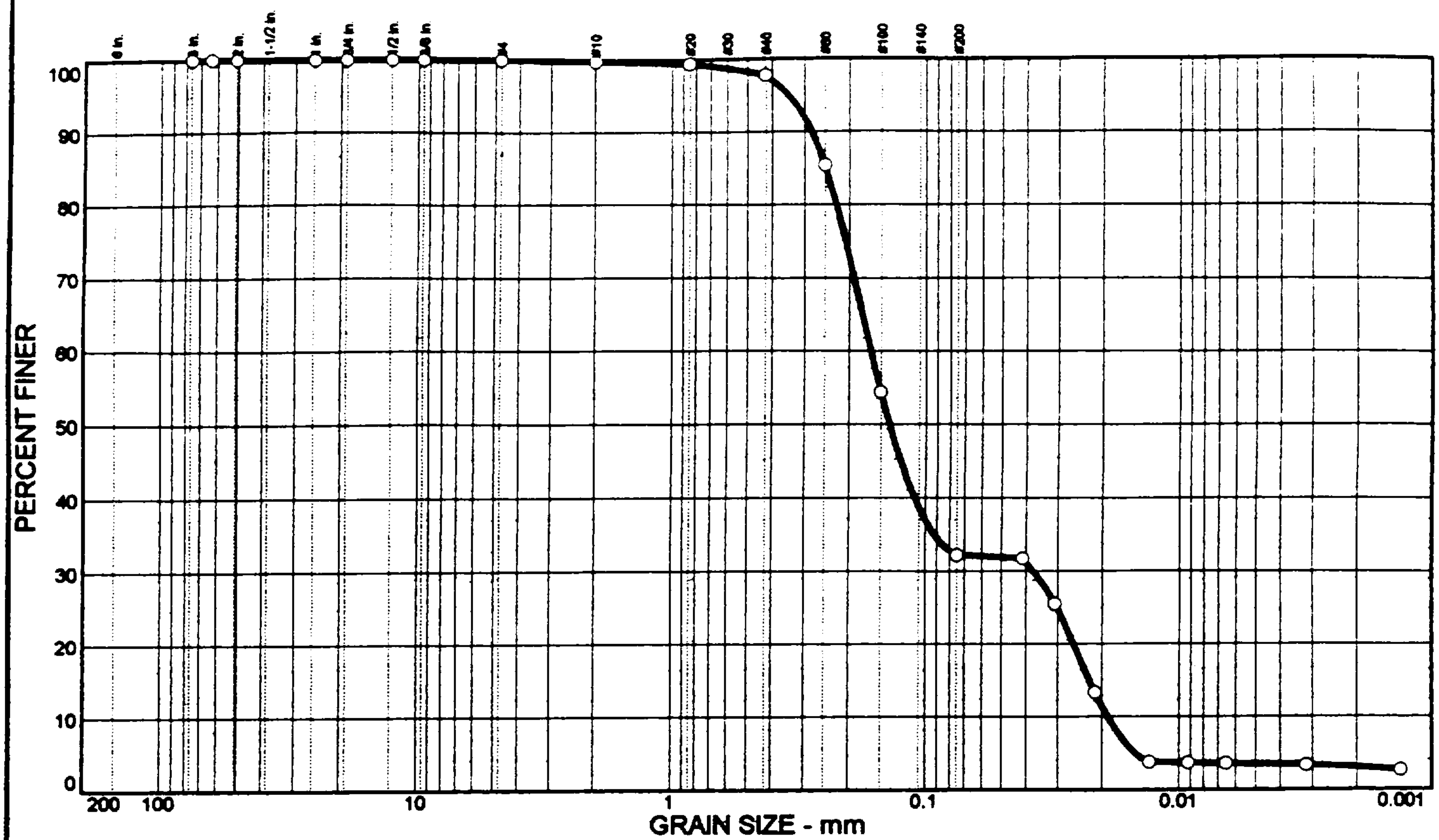
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 4

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
○		0.0	67.8	28.7	3.5	SM	A-2-4(0)	NP	NP

SIEVE inches size	PERCENT FINER ○		
3	100.0		
2.5	100.0		
2	100.0		
1	100.0		
3/4	100.0		
1/2	100.0		
3/8	100.0		
	GRAIN SIZE		
D_{60}	0.164		
D_{30}	0.0376		
D_{10}	0.0189		
	COEFFICIENTS		
C_c	0.45		
C_u	8.69		

SIEVE number size	PERCENT FINER ○		
#4	100.0		
#10	99.8		
#20	99.4		
#40	97.8		
#60	85.4		
#100	54.4		
#200	32.2		

SOIL DESCRIPTION

○ Sand, silty, gray/brown

REMARKS:

○ Tested By: JH

○ Source:

Sample No.: C2-TS4

WESTERN COLORADO TESTING, INC.

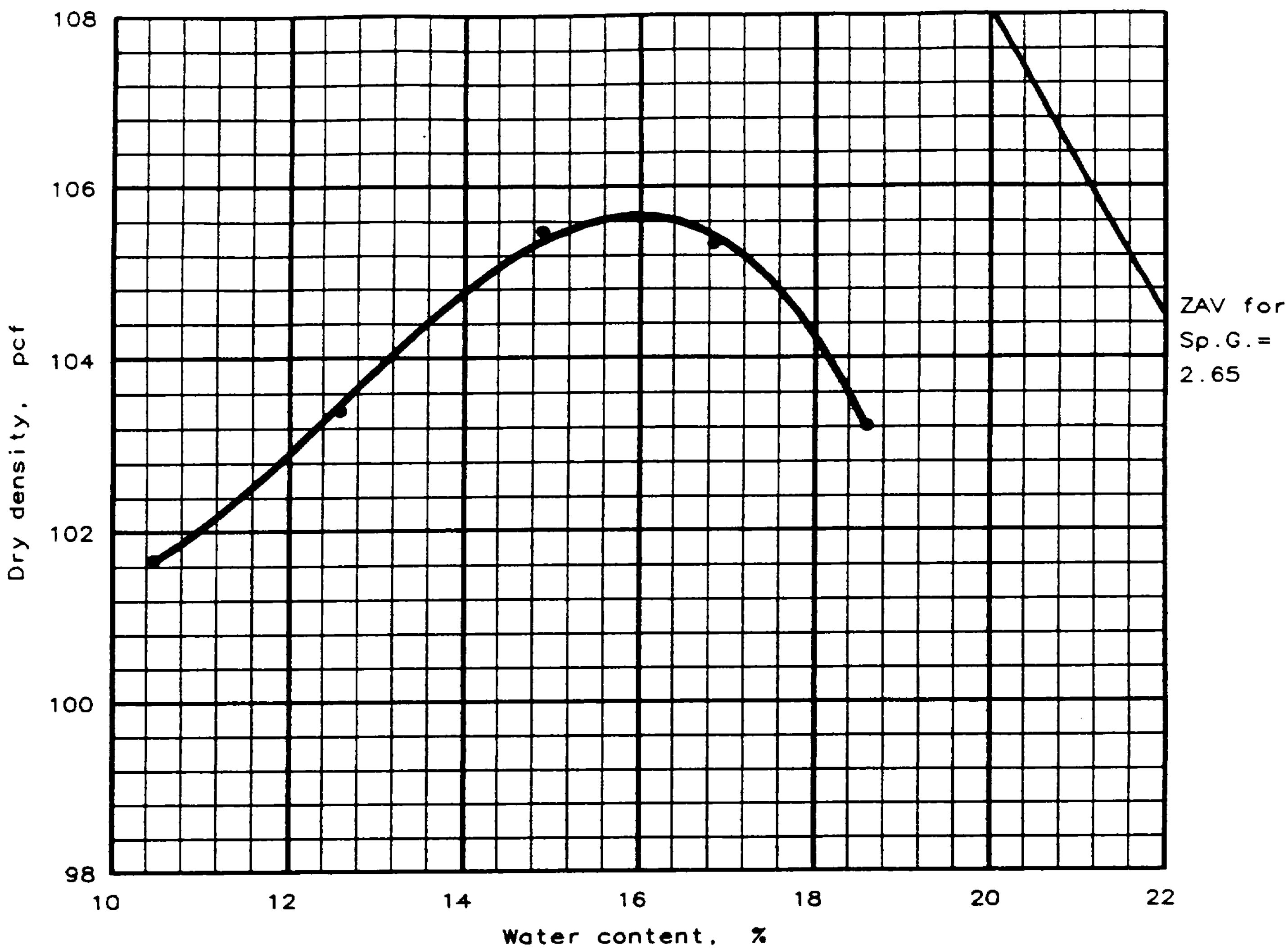
Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 35

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure A, Standard

Oversize correction applied to each point

Elev/ Depth	Classification USCS	Classification AASHTO	Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
			N/A %	2.65				

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 105.7 pcf Optimum moisture = 16.0 %	105.7 pcf 16.0 %	C3-TS1

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 4/27/99

Remarks:

SUBMITTED BY: Client

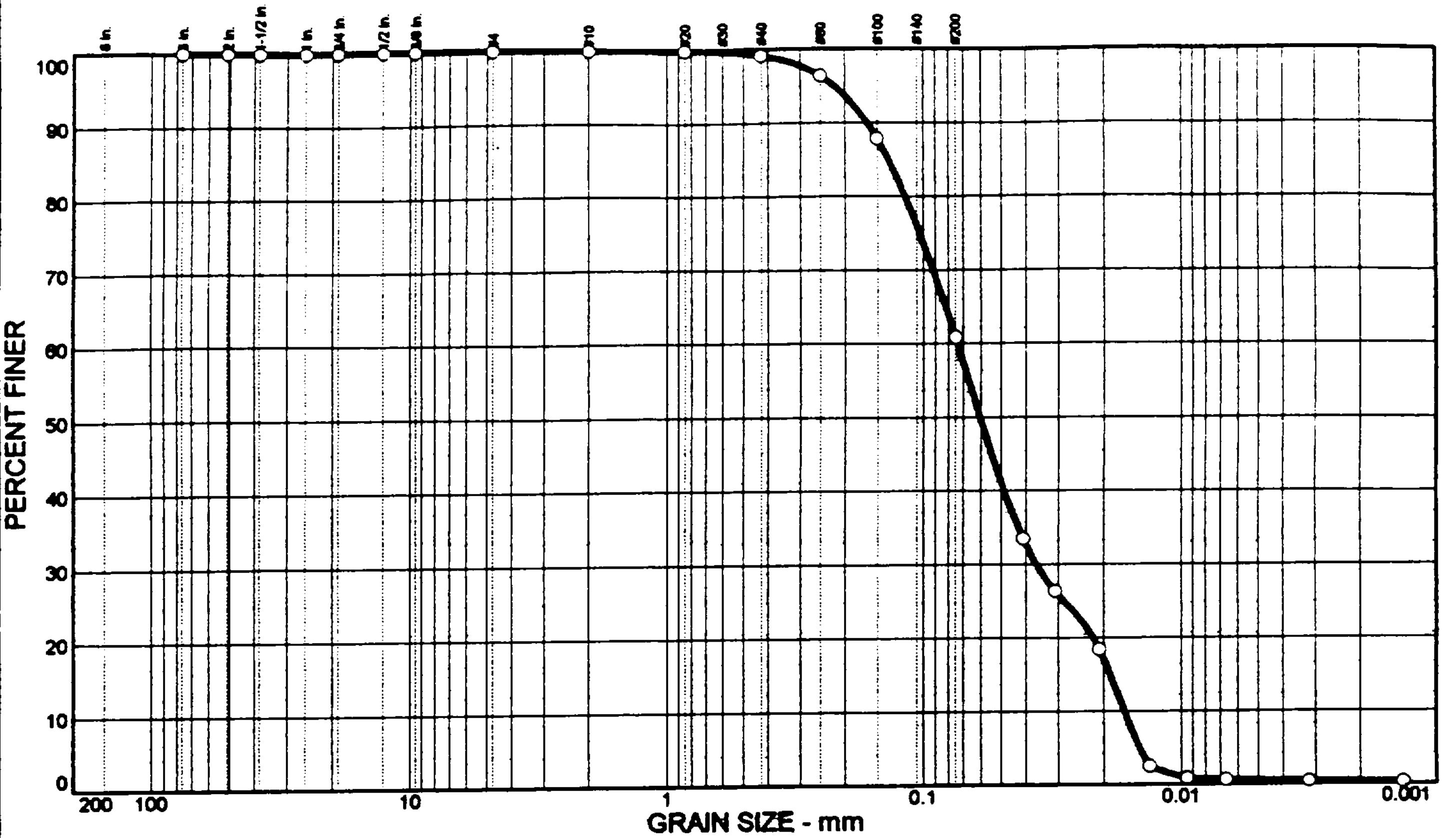
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 5

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
O		0.0	39.2	60.3	0.5	ML	A-4(0)	NP	NP

SIEVE inches size	PERCENT FINER O		
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
3/4	100.0		
1/2	100.0		
3/8	100.0		
	GRAIN SIZE		
D_{60}	0.0738		
D_{30}	0.0364		
D_{10}	0.0166		
	COEFFICIENTS		
C_c	1.08		
C_u	4.45		

SIEVE number size	PERCENT FINER O		
#4	100.0		
#10	100.0		
#20	99.9		
#40	99.1		
#60	96.3		
#100	87.8		
#200	60.8		

SOIL DESCRIPTION

O Silt, sandy, brown

REMARKS:

O Tested By: JH

O Source:

Sample No.: C3-TS1

WESTERN COLORADO TESTING, INC.

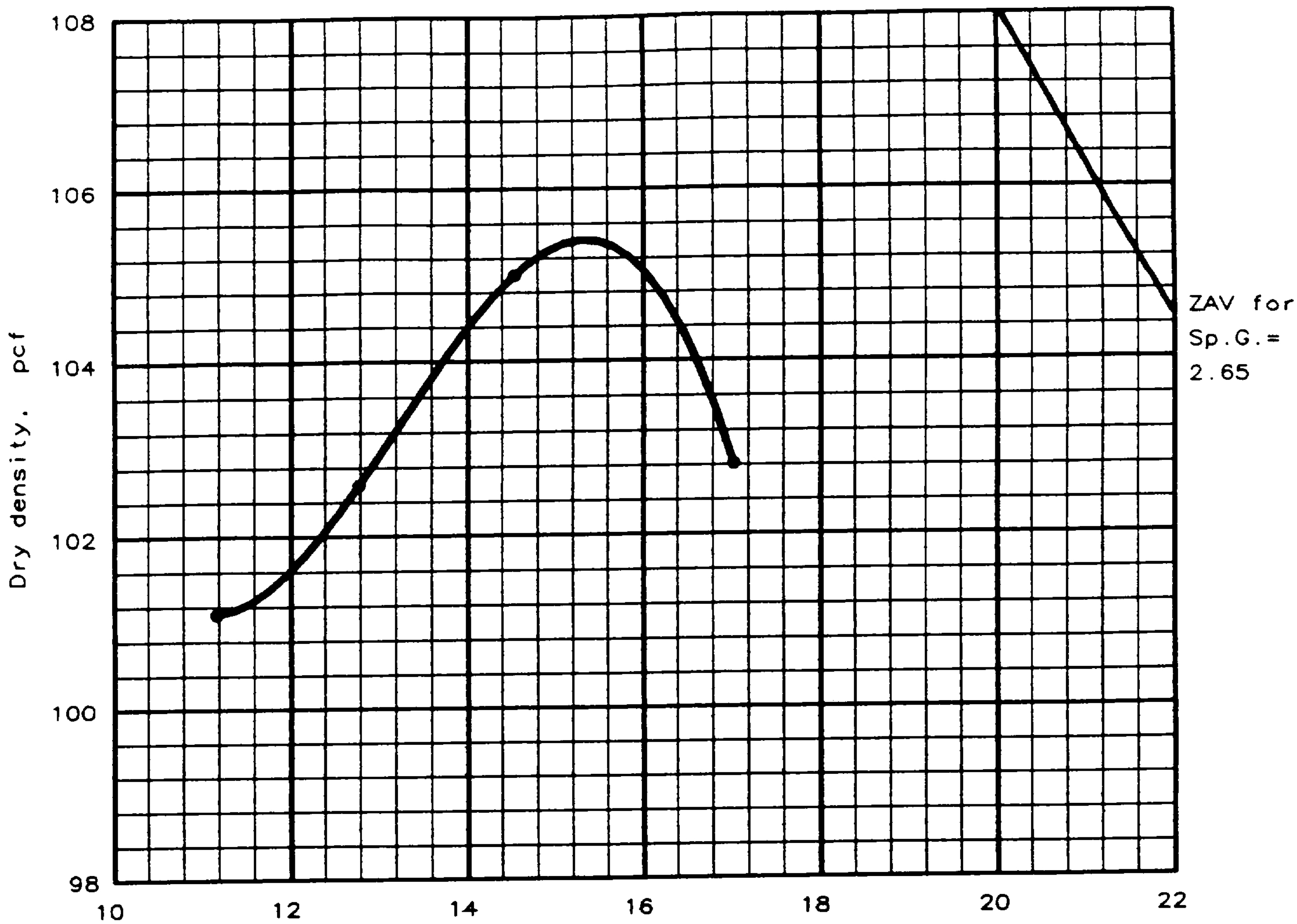
Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 36

MOISTURE-DENSITY RELATIONSHIP TEST



Test specification: ASTM D 698-91 Procedure A, Standard

Oversize correction applied to each point

Elev/ Depth	Classification USCS	AASHTO	Nat. Moist.	Sp.G.	LL	PI	% > No.4	% < No.200
			N/A %	2.65				

ROCK CORRECTED TEST RESULTS	UNCORRECTED	MATERIAL DESCRIPTION
Maximum dry density = 105.4 pcf Optimum moisture = 15.3 %	105.4 pcf 15.3 %	C3-TS2

Project No.: 804899

Project: International Uranium Corporation

Location: Soil Sample Testing

Date: 4/27/99

Remarks:

SUBMITTED BY: Client

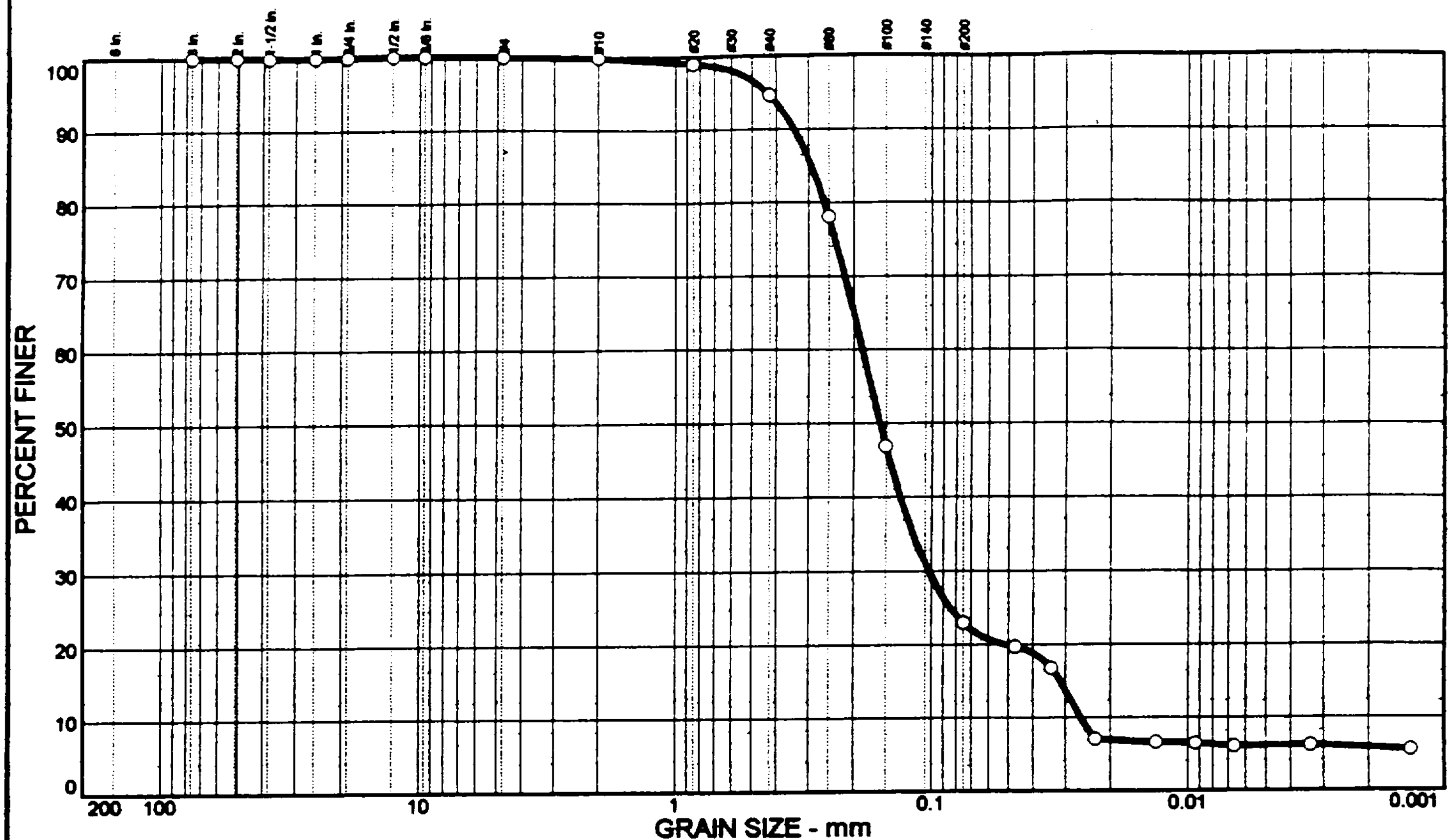
TESTED BY: JH

MOISTURE-DENSITY RELATIONSHIP TEST

WESTERN COLORADO TESTING, INC.

Fig. No. 6

PARTICLE SIZE DISTRIBUTION TEST REPORT



	% + 3"	% GRAVEL	% SAND	% SILT	% CLAY	USCS	AASHTO	PL	LL
O		0.0	77.0	16.9	6.1	SM	A-2-4(0)	NP	NP

SIEVE inches size	PERCENT FINER O		
3	100.0		
2	100.0		
1.5	100.0		
1	100.0		
3/4	100.0		
1/2	100.0		
3/8	100.0		
	GRAIN SIZE		
D_{60}	0.185		
D_{30}	0.102		
D_{10}	0.0260		
	COEFFICIENTS		
C_c	2.16		
C_u	7.12		

SIEVE number size	PERCENT FINER O		
#4	100.0		
#10	99.9		
#20	99.0		
#40	94.6		
#60	78.1		
#100	46.9		
#200	23.0		

SOIL DESCRIPTION

O Sand, silty, gray/brown

REMARKS:

O Tested By: JH

O Source:

Sample No.: C3-TS2

WESTERN COLORADO TESTING, INC.

Client: International Uranium Corporation

Project: Soil Sample Testing

Project No.: 804899

Figure 37

Tailings Cell 2 - Dry Density Calculation

Cell 2 – Original Design Volume

2,380,000 tons @ 92 dpcf	=	1,916.264 yd^3
Design change to east end - + 5%	=	95,000 yd^3
Total as built volume	=	2,011,264 yd^3
Remaining storage volume	=	<23,000> yd^3
		1,988,264 yd^3

Total Tailings to Date

As of October 23, 1989	2,299,708 tons
Cabot	12,000 tons
On-Site Waste	5,000 tons
	2,316,708 tons

$$\frac{2,316,708 \text{ tons}}{1,988,264 \text{ yd}^3} = 86.31 \text{ dpcf}$$

TO: Bill Deal

FROM: Shannon Clark

DATE: June 25, 1997

SUBJECT: Cell 3 Calculated Capacity Left

I was asked by you, to find the original capacity of Cell 3 and the capacity we have left to fill.

In the Environmental files I found where John Hamrick had listed the cells and capacities and , off the 19 C's had calculated the from inception tons deposited to each cell.

Cell 2	2,299,708	
Cell 3	1,249,000	(+600,000 tons = License Amendment)

as of October 23, 1989.

I then went to Gary Richards to find the dry tons fed to the mill to date off of the 19C report Fed to the mill, inception to-date, is 3,757,344 tons. We have produced 14,050 tons of Yellowcake and 16,200 tons of Vanadium.

3,757,344	Dry tons fed to mill
- 14,050	YC produced in tons
3,743,294	Tons to tails
- 16,200	Vanadium Produced
3,727,094	Tons to tails
-2,299,708	Tons deposited into Cell 2
1,427,386	Tons in Cell 3 at this point

2,091,717	Available tons in Cell 3 at time of construction
- 1,427,386	Tons deposited into Cell 3 as of now
664,331	**Tons of space left in Cell 3 (in theory)**
	This calculates out to be 68% full.

White Mesa Mill - Screen Analysis of Ore Feed to Leach

Table 5

Screen Analysis of Feed Ore to Leach

Grind conditions:

Rod mill	7-5/8" diam x 9-1/2", steel, ribbed, 85/90 rpm
Rod charge	8.9 kg
Ore charge	1.00 kg, minus 6-mesh
% solids	50
Time	3 min

Size Mesh (Tyler)	Weight Distribution, %			
	Blanding No. 4 HRI-11868	Anschutz No. 1 HRI-11870	Hanksville No. 1 1/ HRI-11175-1	Three-Ore Composite
+35	0.0	0.0	0.5	
35x48	2.5	0.2	1.9	1.2
48x65	16.2	7.4	15.3	12.7
65x100	25.0	25.2	26.2	28.9
100x150	18.7	21.9	19.5	20.1
150x200	10.4	14.6	13.4	13.7
200x270	4.5	7.6	6.2	6.0
270x325	1.5	2.8	1.8	2.9
-325	21.2	20.3	15.2	14.5
	100.0	100.0	100.0	100.0

1/ Data from June 15, 1977 report "Uranium Recovery from Hanksville and Blanding Station Ores."

Screen Analysis of Blanding No. 4, Anschutz No. 1, and Hanksville No. 2A Ore Feed to Leach

Grinding conditions:

Mill — Rod, steel, 7-5/8" diam x 9-1/2", ribbed, 85/90 rpm

Rod charge — Steel rods, 9" in length

Diam inch	No. of Rods	Weight kg
1/4	6	0.54
3/8	7	1.11
1/2	16	4.49
5/8	6	2.76
		8.90

Ore charge — 1.0 kg, minus 6-mesh

H_2O — 1.0 kg

Time — 3 min

Screen analysis:

Size Mesh (Tyler)	Weight Distribution, % Blanding No. 4 HRI-11868	Anschutz No. 1 HRI-11870	Hanksville No. 2A HRI-11869
+28			12.3
28x35	0.0	0.0	11.3
35x48	2.5	0.2	13.5
48x65	16.2	7.4	9.2
65x100	25.0	25.2	7.1
100x150	18.7	21.9	4.8
150x200	10.4	14.6	4.2
200x270	4.5	7.6	3.0
270x325	1.5	2.8	2.3
-325	21.2	20.3	32.3
	100.0	100.0	100.0

ATTACHMENT F

RADON EMANATION CALCULATIONS

(REVISED)

PREPARED BY

INTERNATIONAL URANIUM (USA) CORP.

INDEPENDENCE PLAZA

1050 17TH STREET, SUITE 950

DENVER, CO 80265

Knight Piésold

Memorandum

Date: April 15, 1999 1626B

To: File 1626B

From: Roman Popielak and Pete Duryea

Re: **Radon Emanation Calculations (Revised)**

At the request of International Uranium (USA) Corporation (IUC), we have completed a series of analyses of the expected levels of radon flux from the White Mesa uranium tailings facility for the tailings cover design. These analyses accounted for recent comments from the United States Nuclear Regulatory Commission (NRC).

Analysis Methodology and Input Parameters

The analyses conducted and described herein adopted the methods and approach detailed in NRC Regulatory Guide 3.64 and more specifically the computer code RADON Version 1.2. The code, which considers one-dimensional steady state gas diffusion, requires input data including: layer thickness, porosity, dry density, radium activity, emanation coefficient, gravimetric water content and radon diffusion coefficient. These input data were based exclusively on available data from previous work by others including Rogers and Associates Engineering Corporation, Advanced Terra Testing, Chen and Associates, D'Appolonia Consulting Engineers Inc. and TITAN Environmental. Key laboratory data and a summary of parameters selected for these analyses are presented in the attached Table 1.

The current cover design includes 2.0 feet of random fill (frost barrier fill) over 1.0 foot of compacted clay which in turn overlies 3.0 feet of random fill (platform fill). In the analyses, the thickness of final cover was reduced by 6.8 inches to 1.4 feet to account for the depth of frost penetration as evaluated by TITAN Environmental. The actual tailings thickness is on the order of 44 feet, which meets the NRC guidelines for an infinitely thick source, and hence it could be modeled in program RADON as a 500.0-centimeter thick layer. Available data on the in-situ density of the tailing was used. All available historical Proctor compaction results for the other materials were evaluated to select appropriate maximum dry densities for the clay and random fill.

The clay layer and frost barrier fill, which are to be placed and compacted as engineered fill materials, were modeled with 95-percent standard Proctor compaction. The platform fill material is dumped and spread directly on top of the tailing surface. Once in place, the material is compacted by selective routing of equipment traffic, and it then provides a working surface for subsequent operations such as placement and compaction of the clay layer and frost barrier fill. The compaction of material comprising the platform is expected to be higher at its top than at its contact with the tailings.

Within the platform fill, the surficial material is likely to exhibit fairly high compaction given the influence of the contact stresses exerted by equipment traffic and later by the compaction of overlying material. Such stresses diminish with depth, so lower portions of the platform fill will not have experienced as significant a compactive effort. Compaction of the platform fill is therefore likely to range from about 80-percent of standard Proctor at the base of the random fill immediately above the tailing to 90- to 95-percent of standard Proctor compaction at the top of the platform fill immediately below the equipment loads just described.

The porosity of each of the materials/sublayers was calculated from its dry density and specific gravity of soil solids. Radium activities and emanation coefficients were selected for each soil type from available lab data, and the long term water contents were selected for the analyses as follows. In the absence of other data, the tailing was modeled with a 6.0 percent by weight moisture content as the NRC recognizes that value as a practical lower bound for soils in the western United States. Long term moisture content can be conservatively modeled as the residual (or irreducible) water content from capillary moisture retention data since a lower value is more critical, that is it yields a higher radon flux. Such data was provided and used for the random fill and the clay.

The final, and one of the more critical parameters, was the radon diffusion coefficient. This parameter is dependent upon the porosity and degree of saturation of the soil, and although lab data was available, it was for conditions other than those modeled. So in the absence of diffusion coefficient data at the porosities and degrees of saturation of interest, a correlation provide by the NRC was employed to compute the diffusion coefficients adopted for the analyses. These values ranged from 0.0071 to 0.0507 cm^2/sec. It should be noted that the resultant values did seem to match well with the trends observed in the available laboratory data.

Results and Conclusions

Since there were not data available describing the degree and distribution of compaction in the platform fill, a series of analyses were conducted based on varying assumptions about the condition of that material. In each of those cases, the platform fill was divided into a series of sublayers whose thickness and degree of compaction were selected based upon engineering judgement and previous experience with similar situations.

The two cases of distribution of compaction considered to represent the conditions anticipated at White Mesa are presented in attached Figure 1 as Case I and Case II. The results of the radon flux evaluation for those two cases are attached. For the reasonably conservative input parameters listed herein and an interim cover comprising 1.0 foot each at 80-, 90 and 95-percent compaction as shown as Case I in Figure 1, a radon flux at the ground surface of 18.2 pCi/m^2/sec is expected. For Case II with 0.5 foot of 95-percent compaction material overlying 1.0 feet of 90-percent compaction material and 1.5 feet of 85-percent compaction material, the radon flux at the ground surface is 19.8 pCi/m^2/sec. Both of these results are within the 20.0 pCi/m /sec limit specified by the NRC.

Therefore, it appears that the cover design should be acceptable assuming that the conditions described herein do not vary significantly from those in the field.

In conclusion, empirical knowledge of the site conditions should be taken under consideration in evaluation of the model results. At present, approximately 80-percent of Cell No.2 is covered with the random fill (platform fill). This fill supports traffic of the heavy, 30 ton haulers. Hence the degree of compaction of the layer(s) as represented in the radon flux models (see Figure 1) may have already been achieved in certain locations within the cell. The platform fill has been very effective to date in attenuating the radon flux, which as currently recorded is 7.4 pCi/m^2/sec which is well below the standard of 20.0 pCi/m^2/sec. Based on these observations, it would appear that the performance of the tailings cover, which will ultimately include the clay layer and frost barrier fill in addition to the fill currently in place, as a barrier controlling radon flux is anticipated to meet the regulatory requirements.

Table 1
Laboratory and Model Input Data

LABORATORY DATA

Material	Specific Gravity G_s	Max. Dry Unit Wt. $\gamma_{dry,max}$ (pcf)	Max. Dry Density $\rho_{dry,max}$ (g/cm^3)	95% Max. Dry Density $\rho_{dry,95\% max}$ (g/cm^3)	Porosity[1] n	Dry Density ρ_{dry} (g/cm^3)	Radium Activity (pCi/g)	Emanation Coefficient	Water Content w (% by wt.)	Diffusion[7] Coefficient D (cm^2/sec)	Saturation[2] S	Diffusion[3] Coefficient D (cm^2/sec)
Tailings	2.85	104.0	1.67	1.58	0.491	1.45	981.0	0.19	13.2	2.00E-02	0.390	2.07E-02
	2.85	104.0	1.67	1.58	0.495	1.44	981.0	0.19	19.1	8.40E-03	0.556	1.06E-02
Rnd. Fill (Comp.)	2.67	120.2	1.93	1.83	0.307	1.85	1.9	0.19	6.5	1.60E-02	0.392	1.63E-02
	2.67	120.2	1.93	1.83	0.311	1.84	1.9	0.19	12.5	4.50E-04	0.740	1.99E-03
Clay (Site #1)	2.69	121.3	1.94	1.85	0.312	1.85	2.2	0.20	8.1	1.60E-02	0.480	1.12E-02
	2.69	121.3	1.94	1.85	0.316	1.84	2.2	0.20	12.6	1.40E-03	0.734	2.13E-03
Clay (Site #4)	2.75	108.7	1.74	1.65	0.400	1.65	2.0	0.11	15.4	1.10E-02	0.635	5.48E-03
	2.75	108.7	1.74	1.65	0.400	1.65	2.0	0.11	19.3	4.20E-04	0.796	1.34E-03
Clay (UT-1)	2.39	113.5	1.82	1.73	0.280	1.72	1.5	0.22	14.5	9.10E-03	0.890	2.84E-04

SELECTED MODEL INPUT DATA

Material	Specific[6] Gravity G_s	Max. Dry[6] Unit Wt. $\gamma_{dry,max}$ (pcf)	Max. Dry Density $\rho_{dry,max}$ (g/cm^3)	Specified Dry Density $\rho_{dry,spec}$ (g/cm^3)	Porosity[1] n	Dry[4] Density ρ_{dry} (g/cm^3)	Radium[6] Activity (pCi/g)	Emanation[6] Coefficient	Water[5] Content w (% by wt.)	Diffusion[3] Coefficient D (cm^2/sec)	Saturation[2] S
Tailings	2.85	N/A	N/A	N/A	0.583	1.19	981.0	0.19	6.0	5.07E-02	0.122
Rnd. Fill @ 80% Std.	2.67	120.2	1.93	1.54	0.423	1.54	1.9	0.19	9.8	2.12E-02	0.357
Rnd. Fill @ 85% Std.	2.67	120.2	1.93	1.64	0.387	1.64	1.9	0.19	9.8	1.62E-02	0.415
Rnd. Fill @ 90% Std.	2.67	120.2	1.93	1.73	0.351	1.73	1.9	0.19	9.8	1.15E-02	0.484
Rnd. Fill @ 95% Std.	2.67	120.2	1.93	1.83	0.315	1.83	1.9	0.19	9.8	7.05E-03	0.570
Clay @ 95% Std.	2.72	100.0	1.60	1.52	0.440	1.52	1.9	0.18	14.1	1.30E-02	0.488

(1) $n=1-(\rho_{dry}/G_s/\rho_w)$

(2) $S=w*G_s*\rho_{dry}/\rho_w/(G_s*\rho_w-\rho_{dry})$

(3) $D=0.07\exp(-4(S-Sn^2+S^5))$ per NRC correlation

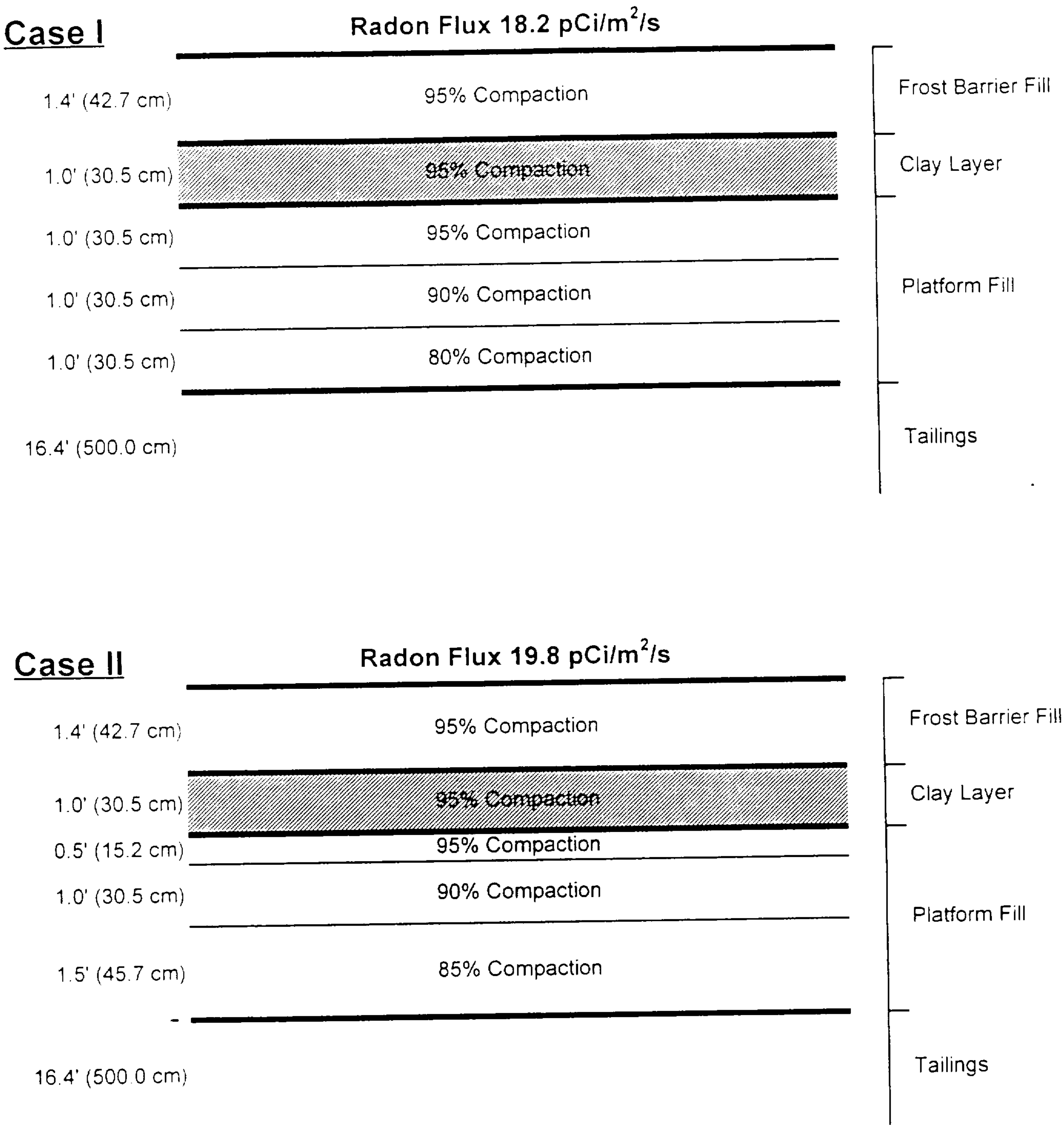
(4) Tailings based on 74.2 pcf. Rnd. Fill ranges from 80 to 95% Std. Proctor. Clay based on 95% Std. Proctor.

(5) Tailings based on w=6% per NRC. Others based on capillary moisture data. Rnd. Fill w=9.8% and Clay w=14.1% (average of two tests).

(6) Values for clay are an average of test results.

(7) Individual lab test results.

Figure 1
Cover Cross Sections for Radon Flux Models



Note: Percent compaction is based upon the maximum dry density by standard Proctor.

-----*****! RADON !*****-----

Version 1.2 - Feb. 2, 1989 - G.F. Birchard tel.# (301)492-7000
U.S. Nuclear Regulatory Commission Office of Research

RADON FLUX, CONCENTRATION AND TAILINGS COVER THICKNESS
ARE CALCULATED FOR MULTIPLE LAYERS

WHITE MESA CASE I

CONSTANTS

RADON DECAY CONSTANT	.0000021	s^-1
RADON WATER/AIR PARTITION COEFFICIENT	.26	
SPECIFIC GRAVITY OF COVER & TAILINGS	2.65	

GENERAL INPUT PARAMETERS

LAYERS OF COVER AND TAILINGS	6	
DESIRED RADON FLUX LIMIT	20	pCi m^-2 s^-1
LAYER THICKNESS NOT OPTIMIZED		
DEFAULT SURFACE RADON CONCENTRATION	0	pCi l^-1
SURFACE FLUX PRECISION	0	pCi m^-2 s^-1

LAYER INPUT PARAMETERS

LAYER 1

THICKNESS	500	cm
POROSITY	.583	
MEASURED MASS DENSITY	1.19	g cm^-3
MEASURED RADIUM ACTIVITY	981	pCi/g^-1
MEASURED EMANATION COEFFICIENT	.19	
CALCULATED SOURCE TERM CONCENTRATION	7.990D-04	pCi cm^-3 s^-1
WEIGHT % MOISTURE	6	%
MOISTURE SATURATION FRACTION	.122	
MEASURED DIFFUSION COEFFICIENT	.0507	cm^2 s^-1

LAYER 2

THICKNESS	30.5	cm
POROSITY	.423	
MEASURED MASS DENSITY	1.54	g cm^-3
MEASURED RADIUM ACTIVITY	1.9	pCi/g^-1
MEASURED EMANATION COEFFICIENT	.19	
CALCULATED SOURCE TERM CONCENTRATION	2.760D-06	pCi cm^-3 s^-1
WEIGHT % MOISTURE	9.8	%
MOISTURE SATURATION FRACTION	.357	
MEASURED DIFFUSION COEFFICIENT	.0212	cm^2 s^-1

LAYER 3

THICKNESS	30.5	cm
POROSITY	.351	
MEASURED MASS DENSITY	1.73	g cm^-3
MEASURED RADIUM ACTIVITY	1.9	pCi/g^-1
MEASURED EMANATION COEFFICIENT	.19	
CALCULATED SOURCE TERM CONCENTRATION	3.737D-06	pCi cm^-3 s^-1
WEIGHT % MOISTURE	9.8	%
MOISTURE SATURATION FRACTION	.483	
MEASURED DIFFUSION COEFFICIENT	.0115	cm^2 s^-1

LAYER 4

THICKNESS	30.5	cm
POROSITY	.315	
MEASURED MASS DENSITY	1.83	g cm^-3
MEASURED RADIUM ACTIVITY	1.9	pCi/g^-1
MEASURED EMANATION COEFFICIENT	.19	
CALCULATED SOURCE TERM CONCENTRATION	4.404D-06	pCi cm^-3 s^-1
WEIGHT % MOISTURE	9.8	%
MOISTURE SATURATION FRACTION	.569	
MEASURED DIFFUSION COEFFICIENT	.0071	cm^2 s^-1

LAYER 5

THICKNESS	30.5	cm
POROSITY	.44	
MEASURED MASS DENSITY	1.52	g cm^-3
MEASURED RADIUM ACTIVITY	1.9	pCi/g^-1
MEASURED EMANATION COEFFICIENT	.18	
CALCULATED SOURCE TERM CONCENTRATION	2.481D-06	pCi cm^-3 s^-1
WEIGHT % MOISTURE	14.1	%
MOISTURE SATURATION FRACTION	.487	
MEASURED DIFFUSION COEFFICIENT	.013	cm^2 s^-1

LAYER 6

THICKNESS	42.7	cm
POROSITY	.315	
MEASURED MASS DENSITY	1.83	g cm^-3
MEASURED RADIUM ACTIVITY	1.9	pCi/g^-1
MEASURED EMANATION COEFFICIENT	.19	
CALCULATED SOURCE TERM CONCENTRATION	4.404D-06	pCi cm^-3 s^-1
WEIGHT % MOISTURE	9.8	%
MOISTURE SATURATION FRACTION	.569	
MEASURED DIFFUSION COEFFICIENT	.0071	cm^2 s^-1

DATA SENT TO THE FILE `RNDATA' ON DRIVE A:

N	F01	CN1	ICOST	CRITJ	ACC
6	-1.000D+00	0.000D+00	0	2.000D+01	0.000D+00

LAYER	DX	D	P	Q	XMS	RHO
1	5.000D+02	5.070D-02	5.830D-01	7.990D-04	1.225D-01	1.190
2	3.050D+01	2.120D-02	4.230D-01	2.760D-06	3.568D-01	1.540
3	3.050D+01	1.150D-02	3.510D-01	3.737D-06	4.830D-01	1.730
4	3.050D+01	7.100D-03	3.150D-01	4.404D-06	5.693D-01	1.830
5	3.050D+01	1.300D-02	4.400D-01	2.481D-06	4.871D-01	1.520
6	4.270D+01	7.100D-03	3.150D-01	4.404D-06	5.693D-01	1.830

BARE SOURCE FLUX FROM LAYER 1: 6.938D+02 pCi m^-2 s^-1

RESULTS OF THE RADON DIFFUSION CALCULATIONS

LAYER	THICKNESS (cm)	EXIT FLUX (pCi m^-2 s^-1)	EXIT CONC. (pCi l^-1)
1	5.000D+02	1.417D+02	2.911D+05
2	3.050D+01	8.383D+01	1.976D+05
3	3.050D+01	5.158D+01	1.220D+05
4	3.050D+01	3.608D+01	5.146D+04
5	3.050D+01	2.274D+01	4.139D+04
6	4.270D+01	1.824D+01	0.000D+00

-----*****! RADON !*****-----

Version 1.2 - Feb. 2, 1989 - G.F. Birchard tel.# (301)492-7000
U.S. Nuclear Regulatory Commission Office of Research

RADON FLUX, CONCENTRATION AND TAILINGS COVER THICKNESS
ARE CALCULATED FOR MULTIPLE LAYERS

WHITE MESA CASE II

CONSTANTS

RADON DECAY CONSTANT	.0000021	s^-1
RADON WATER/AIR PARTITION COEFFICIENT	.26	
SPECIFIC GRAVITY OF COVER & TAILINGS	2.65	

GENERAL INPUT PARAMETERS

LAYERS OF COVER AND TAILINGS	6	
DESIRED RADON FLUX LIMIT	20	pCi m^-2 s^-1
LAYER THICKNESS NOT OPTIMIZED		
DEFAULT SURFACE RADON CONCENTRATION	0	pCi l^-1
SURFACE FLUX PRECISION	0	pCi m^-2 s^-1

LAYER INPUT PARAMETERS

'ER 1

THICKNESS	500	cm
POROSITY	.583	
MEASURED MASS DENSITY	1.19	g cm^-3
MEASURED RADIUM ACTIVITY	981	pCi/g^-1
MEASURED EMANATION COEFFICIENT	.19	
CALCULATED SOURCE TERM CONCENTRATION	7.990D-04	pCi cm^-3 s^-1
WEIGHT % MOISTURE	6	%
MOISTURE SATURATION FRACTION	.122	
MEASURED DIFFUSION COEFFICIENT	.0507	cm^2 s^-1

LAYER 2

THICKNESS	45.7	cm
POROSITY	.387	
MEASURED MASS DENSITY	1.64	g cm^-3
MEASURED RADIUM ACTIVITY	1.9	pCi/g^-1
MEASURED EMANATION COEFFICIENT	.19	
CALCULATED SOURCE TERM CONCENTRATION	3.213D-06	pCi cm^-3 s^-1
WEIGHT % MOISTURE	9.8	%
MOISTURE SATURATION FRACTION	.415	
MEASURED DIFFUSION COEFFICIENT	.0162	cm^2 s^-1

LAYER 3

THICKNESS	30.5	cm
POROSITY	.351	
MEASURED MASS DENSITY	1.73	g cm^-3
MEASURED RADIUM ACTIVITY	1.9	pCi/g^-1
MEASURED EMANATION COEFFICIENT	.19	
CALCULATED SOURCE TERM CONCENTRATION	3.737D-06	pCi cm^-3 s^-1
WEIGHT % MOISTURE	9.8	%
MOISTURE SATURATION FRACTION	.483	
MEASURED DIFFUSION COEFFICIENT	.0115	cm^2 s^-1

LAYER 4

THICKNESS	15.2	cm
POROSITY	.315	
MEASURED MASS DENSITY	1.83	g cm^-3
MEASURED RADIUM ACTIVITY	1.9	pCi/g^-1
MEASURED EMANATION COEFFICIENT	.19	
CALCULATED SOURCE TERM CONCENTRATION	4.404D-06	pCi cm^-3 s^-1
WEIGHT % MOISTURE	9.8	%
MOISTURE SATURATION FRACTION	.569	
MEASURED DIFFUSION COEFFICIENT	.0071	cm^2 s^-1

LAYER 5

THICKNESS	30.5	cm
POROSITY	.44	
MEASURED MASS DENSITY	1.52	g cm^-3
MEASURED RADIUM ACTIVITY	1.9	pCi/g^-1
MEASURED EMANATION COEFFICIENT	.18	
CALCULATED SOURCE TERM CONCENTRATION	2.481D-06	pCi cm^-3 s^-1
WEIGHT % MOISTURE	14.1	%
MOISTURE SATURATION FRACTION	.487	
MEASURED DIFFUSION COEFFICIENT	.013	cm^2 s^-1

LAYER 6

THICKNESS	42.7	cm
POROSITY	.315	
MEASURED MASS DENSITY	1.83	g cm^-3
MEASURED RADIUM ACTIVITY	1.9	pCi/g^-1
MEASURED EMANATION COEFFICIENT	.19	
CALCULATED SOURCE TERM CONCENTRATION	4.404D-06	pCi cm^-3 s^-1
WEIGHT % MOISTURE	9.8	%
MOISTURE SATURATION FRACTION	.569	
MEASURED DIFFUSION COEFFICIENT	.0071	cm^2 s^-1

DATA SENT TO THE FILE `RNDATA' ON DRIVE A:

N	F01	CN1	ICOST	CRITJ	ACC
6	-1.000D+00	0.000D+00	0	2.000D+01	0.000D+00

LAYER	DX	D	P	Q	XMS	RHO
1	5.000D+02	5.070D-02	5.830D-01	7.990D-04	1.225D-01	1.190
2	4.570D+01	1.620D-02	3.870D-01	3.213D-06	4.153D-01	1.640
3	3.050D+01	1.150D-02	3.510D-01	3.737D-06	4.830D-01	1.730
4	1.520D+01	7.100D-03	3.150D-01	4.404D-06	5.693D-01	1.830
5	3.050D+01	1.300D-02	4.400D-01	2.481D-06	4.871D-01	1.520
6	4.270D+01	7.100D-03	3.150D-01	4.404D-06	5.693D-01	1.830

BARE SOURCE FLUX FROM LAYER 1: 6.938D+02 pCi m^-2 s^-1

RESULTS OF THE RADON DIFFUSION CALCULATIONS

LAYER	THICKNESS (cm)	EXIT FLUX (pCi m^-2 s^-1)	EXIT CONC. (pCi l^-1)
1	5.000D+02	1.382D+02	2.930D+05
2	4.570D+01	7.131D+01	1.485D+05
3	3.050D+01	4.602D+01	9.400D+04
4	1.520D+01	3.921D+01	5.586D+04
5	3.050D+01	2.469D+01	4.491D+04
6	4.270D+01	1.977D+01	0.000D+00

ATTACHMENT G

CHANNEL AND TOE APRON

DESIGN CALCULATIONS

OF

WHITE MESA FACILITIES

BLANDING, UTAH

PREPARED BY

INTERNATIONAL URANIUM (USA) CORP.

INDEPENDENCE PLAZA

1050 17TH STREET, SUITE 950

DENVER, CO 80265

ATTACHMENT 7 - RESPONSE TO NRC COMMENTS 7/17/98

TABLE OF SIX-HOUR LOCAL PMP RAINFALL DEPTH VS DURATION FOR WHITE MESA MIL

6-Hour Storm Rainfall is 10 inches (ref: Hydrologic Design Report for White Mesa Mill, 1990)
6/1 Hr Ratio for WHITE MESA is 1.22 (Figure 4.7 and Table 4.4, HMR 49)
ONE-HOUR PMP IS: 8.20 inches at 5000 ft. elevation
97.0% or 7.95 inches at 5600 ft. elevation (1)

DURATION HOURS	% OF 1-HR PMP	RAINFALL DEPTH, IN INCHES, AT AVERAGE ELEVATION OF: (based on Table 6.3A, HMR 49)	
		5000 ft	5600 ft(1)
0	0	0.00	0.00
0.25	74	6.07	5.88
0.5	89	7.30	7.08
0.75	95	7.79	7.55
1	100	8.20	7.95
2	111	9.10	8.83
3	116	9.51	9.22
4	119	9.75	9.46
5	121	9.92	9.62
6	122	10.00	9.70

Plot of data is adaptation of Figure 12.10, HMR 55A, to site rainfall.
(1) Average elevation of site in vicinity of base of cell 4Aeach tanks

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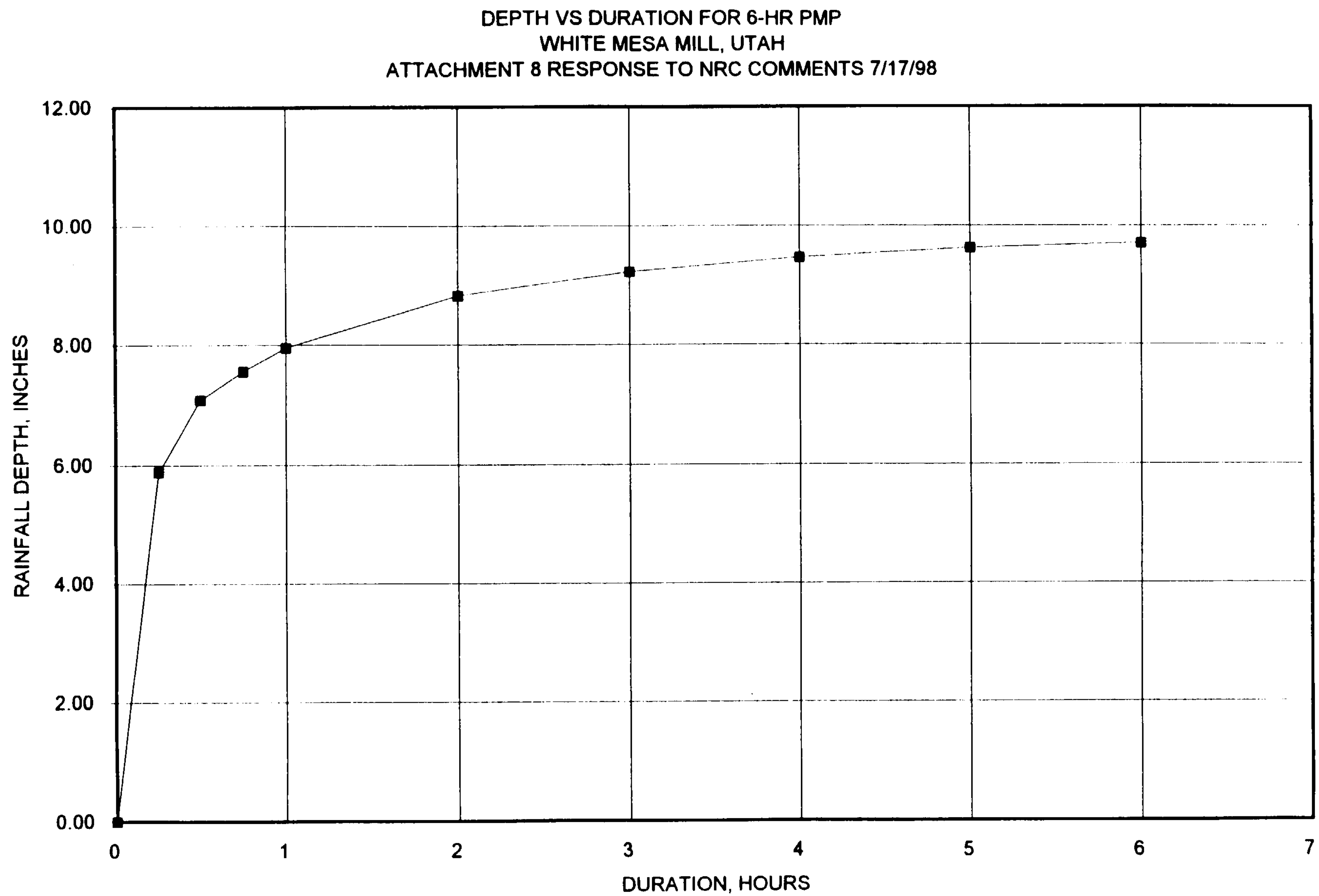
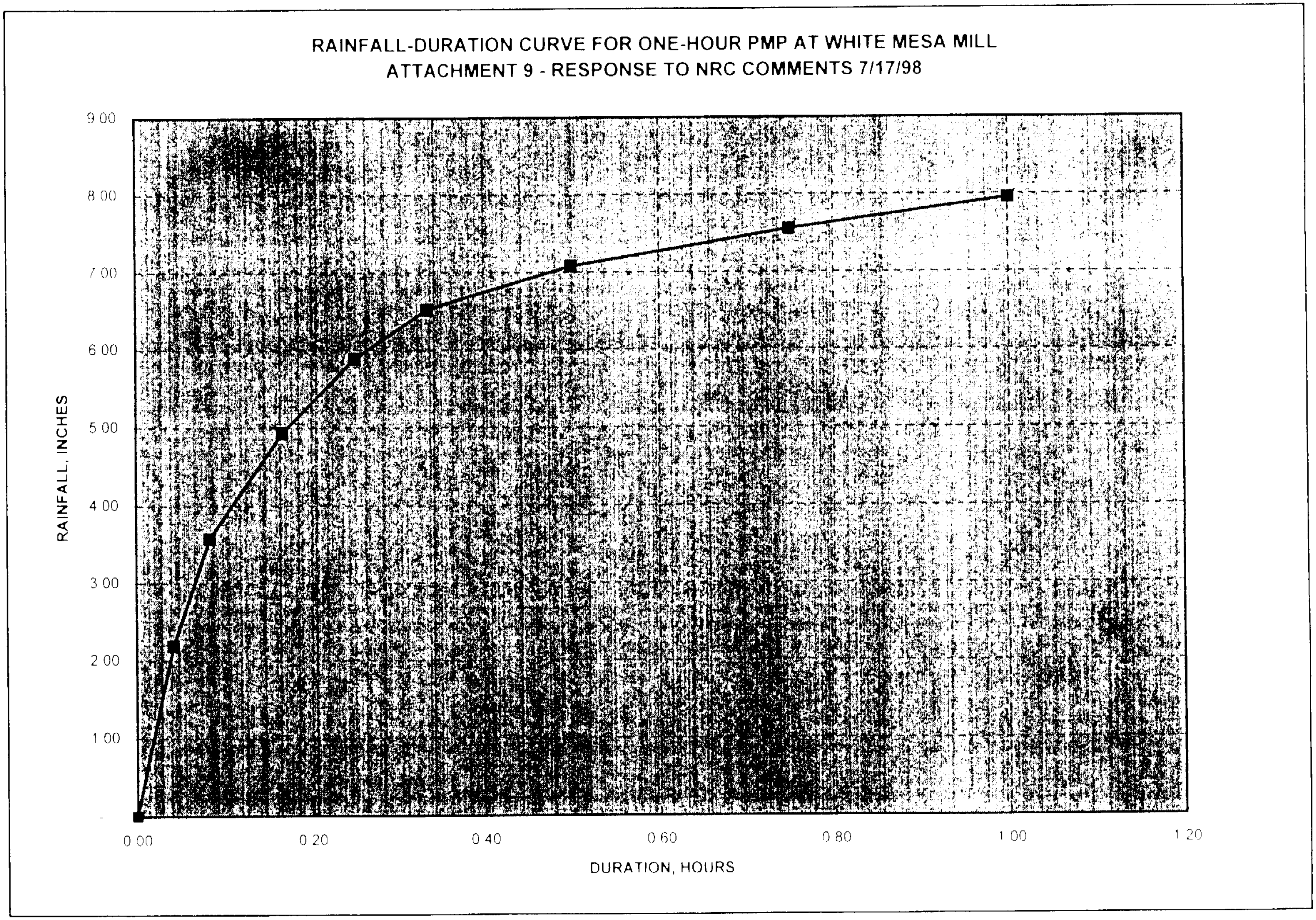
TIME DISTRIBUTION OF FIRST ONE HOUR, OR THE ONE-HOUR PMP
(after Table 2.1, NUREG CR 4620)

RAINFALL DURATION MINUTES	RAINFALL DURATION HOURS	% OF ONE-HOUR PMP	RAINFALL DEPTH IN INCHES AT ELEVATION:	
			5000 ft	5600 ft(1)
0	0	0	0	0
2.5	0.04	27.5	2.25	2.19
5	0.08	45	3.69	3.58
10	0.17	62	5.08	4.93
15	0.25	74	6.07	5.88
20	0.33	82	6.72	6.52
30	0.50	89	7.30	7.08
45	0.75	95	7.79	7.55
60	1.00	100	8.20	7.95



DEPTH VS DURATION FOR 6-HR PMP
WHITE MESA MILL, UTAH
ATTACHMENT 8 RESPONSE TO NRC COMMENTS 7/17/98
RAINFALL DEPTH, INCHES
12.00
10.00
8.00
6.00
4.00
2.00
0.00
0
1
2
3
4
5
6
7
DURATION, HOURS


RAINFALL-DURATION CURVE FOR ONE-HOUR PMP AT WHITE MESA MILL
ATTACHMENT 9 - RESPONSE TO NRC COMMENTS 7/17/98
RAINFALL, INCHES
9 00
8 00
7 00
6 00
5 00
4 00
3 00
2 00
1 00
0 00
0 20
0 40
0 60
0 80
1 00
1 20
DURATION, HOURS

ATTACHMENT 11 RESPONSES TO NRC COMMENTS 7/17/98

RATIONAL METHOD CALCULATION OF PMF PEAK DISCHARGE, VELOCITY, AND DEPTH THROUGH CELL #1 DISCHARGE CHANNEL

FLOW PATH ELEMENT	ELEMENT LENGTH L	MAX ELEV	MIN. ELEV	GRADIENT S	SLOPE ANGLE degrees	tc hours	RAINFALL WITHIN tc (1)	i in/hr	SURFACE AREA acres	PEAK DISCHARGE Q, cfs
LONGEST	4800	5655	5610	0.0094	0.54	0.54	7.20	13.43	143	1344

FLOW PARAMETERS IN CELL #1 DISCHARGE CHANNEL AT PEAK PMF DISCHARGE											
	Channel Bottom Width, b ft	Channel Side Slopes	Channel Gradient, s ft/ft	Manning Coeff., n	Qn/1.49*s^.5	Flow Depth, y ft	Cross Section Area of Flow a, ft^2	Hydraulic Radius R, ft	a(R)^.67	Velocity v fps	Allowable Peak Velocity fps (COE, 1970)
Bedrock Channel	100	3:1	0.0100	0.025	226	1.62	169.9	1.54	226.95	7.96	8-10
Bedrock Channel	120	3:1	0.0100	0.025	226	1.45	180.3	1.40	225.46	7.45	8-10

RATIONAL METHOD CALCULATION OF PMF PEAK DISCHARGE, VELOCITY, DEPTH AND SCOUR THROUGH CELL 4A BREACH
WITH BREACH WIDENED TO 200 FEET - IUC WHITE MESA

FLOW PATH ELEMENT	ELEMENT LENGTH L	MAX ELEV	MIN ELEV.	GRADIENT S	SLOPE ANGLE degrees	tc hours	RAINFALL WITHIN tc (1)	i in/hr	SURFACE AREA acres	PEAK DISCHARGE Q, cfs
CELL 2 COVER	1230	5619.5	5617	0.0020	0.12	0.34	6.53	19.29	41.30	637
CELL 2/3 BERM	10	[illegible]	5615	0.2000	11.31	0.34	6.54	19.24	1.10	654
CELL 3 COVER	900	[illegible]	5613.2	0.0020	0.11	0.61	7.30	12.01	35.12	992
CELL 3/4A BERM	180	[illegible]	5577.2	0.2000	11.31	0.62	7.40	11.92	6.40	1053
CELL 4A	1400	[illegible]	5562	0.0109	0.62	0.82	7.70	9.42	27.70	1262
CELL 4A INSLOPES	80	5599	5560	0.4875	25.99	0.04	2.00	47.62	5.68	216
CELL 4A BREACH	275	5562	5560	0.0073	0.42	0.92	7.80	8.44	0.38	1481

FLOW PARAMETERS IN CELL 4A BREACH AT PEAK PMF DISCHARGE

	Breach Bottom Width, b ft	Breach Side Slopes	Breach Channel Gradient, s ft/ft	Manning Coeff., n	Qn/1.49*s^.5	Flow Depth, y ft	Cross Section Area of Flow a, ft^2	Hydraulic Radius R, ft	a(R)^.67	Velocity v fps	Allowable Peak Velocity fps (COE, 1970)	Riprap Size d50 inches (ref. 1)
Soil (SM) Channel	200	3:1	0.0073	0.03	350	**1.39**	283.8	1.36	348.59	**5.20**	2-4	**4.00**
Rock Channel	200	3:1	0.0073	0.025	291	**1.25**	254.7	1.23	291.78	**5.82**	8-10	**N/A**

NOTE: If rounded rock (river cobbles and gravel) is used, rock size should be increased by 33%, per Fig. 4.10, NUREG /CR 4651, Vol. 2

Reference 1 - Fig 4.11, NUREG CR 4620

DEPTH OF SCOUR OF CELL 4A BREACH CHANNEL

All methods used are from Pemberton, E.L., and J.M. Lara, 1984, "Computing Degradation and Local Scour", Technical Guideline for Bureau of Reclamation

ds = depth of scour, ft.
q = unit discharge, cfs/ft

			Soil Channel 200' wide
Method 1	ds=K*q^0.24 K = constant, 2.45	q =	5.2
		ds =	**3.64**
Method 2	ds = 0.25 dm dm = mean water depth at design discharge =		1.4
		ds =	**0.34**
Method 3	ds = 0.6*dfo dfo = q^0.666/Fbo^0.333 = Fbo = zero bed factor = 1.0 ft/s^2 for fine sand		3.00
		ds =	**1.80**
Method 4	ds = 0.25 * dma dma = unit cross section of flow =		1.39
		ds =	**0.35**
Method 5	ds = dm*((Vm/Vc)-1)	Vm = mean velocity =	5.22
		Vc =	2
		ds =	**2.19**

AVERAGE SCOUR DEPTH, ft = **1.66**

ATTACHMENT 12 TABLE - RESPONSES TO NRC COMMENTS 7/17/98

ROCK APRON DESIGN TABLE - TAILING CELL EROSION PROTECTION

WHITE MESA MILL

FLOW PATH ELEMENT	ELEMENT LENGTH L ft	ELEMENT WIDTH W ft	GRADIENT S ft/ft	SLOPE ANGLE degrees	tc (minimum is 0.042) hours	RAINFALL WITHIN tc inches	INTENSITY in/hr	Peak Unit Discharge q cfs/ft	d50 inches
APRON	10	1	0.01	0.57	0.60	7.29	12.07	1.80	**7.3**

Notes:
The top cover element length is 2450 ft. This was used in the calculations for time of concentration and peak unit discharge
The outslope element length is 240 ft. This was used in the calculations for time of concentration and peak unit discharge
The d50 for the outslope was calculated per Abt, S.R. and Johnson, T.L., "Riprap Design for Overtopping Flow," ASCE Journal of Hydraulic Engineering, 1991.
The d50 for the apron was calculated per Abt, S.R., Johnson, T.L., Thornton, C.I. and Trabant, S.C., "Riprap Sizing at Toe of Embankment Slopes," ASCE Journal of Hydraulic Engineering, July 1998

DEPTH OF SCOUR AT DOWNSTREAM EDGE OF TOE APRON

All methods used are from Pemberton, E.L., and J.M. Lara, 1984, "Computing Degradation and Local Scour", Technical Guideline for Bureau of Reclamation

ds = depth of scour, ft.
q = unit discharge, cfs/ft

Method 1 **ds=K*q^0.24**
K = constant, 2.45
q = 1.81 cfs/ft

ds = **2.82 ft**

Method 2 **ds = 0.25 dm**
dm = mean water depth at design discharge

ds = **0.22 ft.**

Method 3 **ds = 0.6*dfo**
dfo = q^0.666/Fbo^0.333
Fbo = zero bed factor = 1.0 ft/s^2 for fine sand

ds = **0.09 ft**

Method 4 **ds = 0.25 * dma**
dma = unit cross section of flow = 0.87 ft

ds = **0.22 ft**

Method 5 **ds = dma*((Vm/Vc)-1)**
Vm = mean velocity = 1.81/0.78 fps
Vc = 0.5 fps

ds = **3.17 ft**

AVERAGE SCOUR DEPTH = 1.30 ft
minimum depth of downstream edge scour barrier

ATTACHMENT H

ROCK TEST RESULTS

BLANDING AREA GRAVEL PITS

PREPARED BY

INTERNATIONAL URANIUM (USA) CORP.

INDEPENDENCE PLAZA

1050 17TH STREET, SUITE 950

DENVER, CO 80265

TO: Harold R. Roberts cc: William N. Deal

FROM: Robert A. Hembree

DATE: November 20, 1998

SUBJECT: Rock Test Results – Blanding Area Gravel Pits

Attached you will find the results for lab tests that were performed on rock samples obtained from three gravel sources around the White Mesa Mill. These samples were taken from the Cow Canyon pit located just north of Bluff (15 miles south of the mill), the Brown Canyon pit located on the east side of Recapture Canyon four miles northeast of the mill, and the North Pit located one mile northeast of Blanding. A 75 pound sample of material was collected from each site, each sample was crushed and screened to a +1/2 –1 ½ inch size. Testing was performed by Western Colorado Testing in Grand Junction, Colorado. All samples were tested for specific gravity, absorption, sulfate soundness and L.A. Abrasion.

Test results indicate that all three sites score high enough to be used as rip rap sources for the reclamation cover at the mill (see attached scoring calculations). The Cow Canyon site scores high enough that there would be no over-sizing required; it is suitable for use in channels as well as on side and top slopes. The Brown Canyon site requires the most over-sizing at nineteen percent (19%). The North Pit material would require over-sizing of 9.35%. These test results prove that there are sources of rip rap material within a reasonable distance of the mill site. The average over-sizing factor for the three sites is 9.5%, which is well below the 25% number used in the 1996 reclamation cost estimate. The over-sizing factor used in the Titan Design Study was also 25%.

Based on the results of the testing IUC could use any of these three sites. The North Pit would be the most reasonable choice of material sites since it has a lower over-sizing factor than the Brown Canyon site and is closer to the mill than the Cow Canyon site. The North Pit also has the advantage of being an established public pit on BLM administered land.

RAH/rah

NRC Rip Rap Scoring Calculations

Weighting Factors for Igneous Rocks
Oversizing for side slopes, top slopes, and well drained toes and aprons
Rock Scoring less than 50% is rejected, rock scoring over 80% does not require oversizing

Cow Canyon Pit (Bluff)

Lab Test	Lab Results	Score	Weight	Score x Weight	Max. Score
Specific Gravity	2.63	7.5	9	67.5	90
Absorption, %	0.47	8.25	2	16.5	20
Sodium Sulfate Sound., %	0.2	10	11	110	110
L.A. Abrasion, %	6.4	7.5	1	7.5	10
Totals				201.5	230

Overall Score 87.61 %

Oversizing none %

Brown Canyon Site

Lab Test	Lab Results	Score	Weight	Score x Weight	Max. Score
Specific Gravity	2.525	5.5	9	49.5	90
Absorption, %	2.61	1.75	2	3.5	20
Sodium Sulfate Sound., %	5.5	7.5	11	82.5	110
L.A. Abrasion, %	10.3	4.75	1	4.75	10
Totals				140.25	230

Overall Score 60.98 %

Oversizing 19.02 %

North Pit (N. Blanding)

Lab Test	Lab Results	Score	Weight	Score x Weight	Max. Score
Specific Gravity	2.557	6.25	9	56.25	90
Absorption, %	2.84	1.25	2	2.5	20
Sodium Sulfate Sound., %	3.2	8.75	11	96.25	110
L.A. Abrasion, %	6.3	7.5	1	7.5	10
Totals				162.5	230

Overall Score 70.65 %

Oversizing 9.35 %

WESTERN COLORADO TESTING, INC.
529 25 1/2 Road, Suite B-101
Grand Junction, Colorado 81505
(970) 241-7700 • Fax (970) 241-7783

November 16, 1998
WCT #811898

International Uranium USA Corporation
Independence Plaza
1050 17th Street
Denver, Colorado 80265

Attention: Mr. Bob Hembree

Reference: Rock Durability Testing

As requested, three (3) potential sources of riprap for use in reclamation of tailings ponds in Blanding, Utah were tested for rock durability. The riprap material was obtained, crushed to testing size, and delivered to Western Colorado Testing, Inc. by the client. The three sources of material were tested for specific gravity and absorption (ASTM C127), Sodium Sulfate Soundness (ASTM C88), and Los Angeles Abrasion (ASTM C131). The results of the testing are provided below.

Material Source: Cow Canyon	
Test	**Result**
Bulk Specific Gravity, g/cc	2.630
SSD Specific Gravity, g/cc	2.642
Apparent Specific Gravity, g/cc	2.663
Water Absorption, %	0.47
Sodium Sulfate Soundness, Avg. % Loss	0.2
L.A. Abrasion, % Loss @ 100 Rev.	6.4

Material Source: Brown Canyon	
Test	**Result**
Bulk Specific Gravity, g/cc	2.460
SSD Specific Gravity, g/cc	2.525
Apparent Specific Gravity, g/cc	2.629
Water Absorption, %	2.61
Sodium Sulfate Soundness, Avg. % Loss	5.5
L.A. Abrasion, % Loss @ 100 Rev.	10.3

Material Source: North Pit	
Test	**Result**
Bulk Specific Gravity, g/cc	2.485
SSD Specific Gravity, g/cc	2.557
Apparent Specific Gravity, g/cc	2.674
Water Absorption, %	2.84
Sodium Sulfate Soundness, Avg. % Loss	3.2
L.A. Abrasion, % Loss @ 100 Rev.	6.3

If there are any questions or if additional testing is needed, please feel free to contact our office.

Respectfully Submitted:
WESTERN COLORADO TESTING, INC.

Kyle Alpha
Construction Services Manager

KA/mh
Mab:jobs\8118L1118