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REPORT OF INVESTIGATION
THICKENING OF ACID LEACHED URANIUM ORE
ANDERSON RANCH, ARIZONA

FOR

MINERALS EXPLORATION COMPANY
TUCSON, ARIZONA

BY

JESSE J. BRODIE
SALES AND SERVICES APPLICATIONS
ENVIROTECH CORPORATION
DENVER, COLORADO

DECEMBER, 1978

SUMMARY

Sedimentation tests simulating a proposed uranium acid leach CCD Thickener circuit utilizing both Eimco Hi-Capacity Thickener Mechanisms and Conventional Thickener Mechanisms were carried out at Hazen Research Company, Inc., Golden, Colorado to treat uranium ore from Anderson Ranch, Arizona. The solids were found to flocculate very slowly with a liquid non-ionic polymer, Nalco 7871. This confirms difficult flocculation reported in previous testwork. The resultant flocs were relatively fragile, which will necessitate polymer addition for each stage of the CCD circuit.

The slurries tested were prepared from core samples. Underflow concentrations in the range of 38% plus or minus 2% suspended solids should be obtained using either Eimco Hi-Capacity Thickener Mechanisms or Eimco Conventional Thickener Mechanisms. It is suggested that recovery economics be based on an underflow concentration of 38% suspended solids for either type of thickener mechanism. All thickener sizing reported in this report is based on 38% solids by weight underflow.

Our recommendation is as follows:

Eimco Hi-Capacity Thickener Mechanism

Design Unit Area	1.97 ft^2/STPD
Feed Solids	10% solids by weight
Underflow Concentration	38% solids by weight design
Overflow Clarity	Clear (estimated at average of 0.1 g/l suspended solids)
Flocculant Dosage - lbs. Nalco 7871/short ton dry solids	
First Stage CCD	0.60 - 0.65
Second Stage CCD	0.26 - 0.28
Third Stage CCD	0.15 - 0.16
Mill Design Capacity	2200 STPD
Thickener Size	Two (2) - 16 meter (52'-6") diameter per stage of thickening
Number of Stages	Eight (8) - Based only upon percent of available uranium recovered.

The following is given for reference if conventional thickening mechanisms are chosen:

Eimco Conventional, Type "CXX" Mechanism

Design Unit Area	7.0 ft^2/STPD
Feed Solids	10% solids by weight
Underflow Concentration	38% solids by weight design
Overflow Clarity	Clear (estimated at average of 0.1 g/l suspended solids)
Flocculant Dosage - lbs. Nalco 7871/short ton dry solids	
First Stage CCD	0.60 - 0.65
Second Stage	0.26 - 0.28
Third Stage	0.15 - 0.17
Mill Design Capacity	2200 STPD
Thickener Size	One (1) - 140'-0" diameter per stage of thickening
Number of Stages	Seven (7) - Based only upon percent of available uranium recovered.

INTRODUCTION

A series of acid leach samples were prepared by Hazen Research, Inc., Golden, Colorado on uranium ore from Anderson Ranch deposit in Arizona for Minerals Exploration Company. These leaches and the present sedimentation test were carried out on a core sample.

It is anticipated that leaching will be carried out at a pH of approximately 1.0 and that the ratio of ore to leach liquor will be adjusted to give a final solids by weight content of approximately 43%. The leach slurry and residue will be washed in a multi-stage CCD system using a pregnant liquor quantity equivalent to 4.25 tons/short ton of ore. It is expected that strong liquor from the first stage CCD thickener will go to clarifiication and then to solvent extraction. The raffinate from solvent extraction circuit will then be recycled for its use as both wash water in the final stage of the CCD circuit and leach liquor. Fresh water make-up to replace that lost in the final stage underflow will be added as wash in the final stage of the CCD circuit.

This report will cover the results of the sedimentation tests carried out at Hazen Research, Inc., to determine design size criteria and operating conditions for an acid CCD thickener circuit. The proposed mill will have a design capacity of 2,200 STPD.

TEST PROCEDURE

Leach slurries to be used in the sedimentation tests were prepared by Hazen Research, Inc., Golden, Colorado. These slurries were prepared by leaching solids obtained from Anderson Ranch, Arizona for approximately six hours at 75°C at approximately 43% solids by weight. Agitation was by means of a small propeller and was sufficient to give suspension in a beaker without baffles. Sedimentation tests were run during the week of November 14, 1978. A synthetic diluent was prepared having a pH of 1.0 with sulfuric acid and sufficient dissolved solids to yield a specific gravity of the liquor of 1.06. This synthetic diluent was used to dilute the test slurries to the desired feed percent solids by weight.

All settling tests were run in 2 liter graduates fitted with slow turning (10 mpr) rake mechanism. Flocculants, liquid Nalco 7871 was prepared fresh each day for these tests. The desired amount of 2.0% concentration flocculant was diluted with approximately 100 mls of decanted leach liquor taken from the test cylinder. Flocculants were introduced to the graduated cylinders by means of a syringe fitted to glass tubing that was also fitted with a No. 12 rubber stopper. Flocculants were introduced throughout the thoroughly mixed slurry while simultaneously agitating slurry. Each cylinder was agitated approximately 30 seconds before the flocculant was introduced. A standardized time of 30 seconds was used for flocculant addition during which time the agitation with just sufficient energy to maintain suspension of the coarse particles continued. One additional down and up motion was made at the completion of the flocculant addition.

Liquid Nalco 7871 was used as the polymer for all tests. This was used at the request of Minerals Exploration Company. All sedimentation tests were run at 40°C in hot water bath.

At the completion of Stage 1 testing, the settled slurries contained within the cylinders were thoroughly mixed using mechanical agitation and a three bladed propeller for 60 seconds. This was done in an effort to break up the flocculated particles as would be anticipated in pumping from one stage to the other. The glass tubing fitted with the No. 12 rubber stopper was then used and strongly agitated for an additional 60 seconds before flocculants were introduced for succeeding stages. Flocculants for Stages 2 and 3 were added as described for Stage 1.

DISCUSSION OF RESULTS

As indicated in the test procedure, samples for sedimentation tests were prepared by taking the previously prepared leach slurries and distributing them between four (4) cylinders. The leached slurries were prepared for the first stage CCD thickener at 75°C. However, since these samples were diluted approximately 60% with room temperature synthetic clarified liquor which would reduce the leach temperature, these tests were run at a constant 40°C in a hot water bath.

The results of these tests are indicated in our recommendation given earlier in this report.

Table 1 records the thickener sizing data for Eimco Hi-Capacity Thickener Mechanisms at various percent solids by weight in the underflow. You will readily note that there is a very significant difference in the results obtained after diluting the feed solids to approximately 10% solids by weight from that of diluting the feed solids to approximately 20% solids by weight. It is understood that the slurry from leach will contain approximately 43% solids by weight. As a result of this, it will be necessary to recycle clarified liquor within each stage of thickening to achieve a 10% solids by weight thickener feed without significantly increasing the wash water to ore ratio. This will necessitate careful design of the overflow launders of each thickener tank to assure adequate hydraulics to allow for the additional recycled liquor.

THICKENER SIZING DATA

TABLE 1

EIMCO HI-CAPACITY THICKENER MECHANISMS

Feed Solids % By Weight	Polymer Addition lbs/Ton Dry Solids	Underflow Density, % By Weight		
		35	38	40
10	0.40 - 0.60	1 - 17 Meter (55'-9-1/4"ø)	2 - 16 Meter (52'-6"ø)	2 - 19 Meter (72'-6"ø)
20	0.40 - 0.60	2 - 18 Meter (59'-0-5/8"ø)	4 - 17 Meter (55'-9-1/4"ø)	--- ---

Table 2 shows the various size thickener mechanisms required using Eimco Conventional Thickeners. Again, a significant difference in sizing is determined between 10% solids by weight in the feed and 20% solids by weight in the feed. If conventional thickener mechanisms are chosen, we would recommend consideration of a clarified liquor recycle to again achieve 10% solids by weight in the feed to the thickener mechanisms.

THICKENER SIZING DATA

TABLE 2

EIMCO CONVENTIONAL THICKENER MECHANISMS

Feed Solids % By Weight	Polymer Addition lbs/Ton Dry Solids	Underflow Density, % By Weight		
		35	38	40
10	0.40 - 0.60	125'ø	140'ø	150'ø
20	0.40 - 0.60	150'ø	170'ø	-----

We have calculated our prediction of stage efficiency resulting in recoveries of uranium from the CCD Circuit varing the number of stages. This data is recorded in Table 3. No attempt has been made to select the number of stages based upon economic considerations but only on percent recovery of the available uranium. The selection of seven (7) stages of thickening was based upon anticipated recoveries of approximately 99.5% of the available uranium. As previously discussed, we would recommend an additional stage of thickening if Eimco Hi-Capacity units are selected. This additional stage would compensate for surges and upsets that occur that would not be detected in the conventional units.

THICKENER MECHANISMS
STAGE EFFICIENCY
URANIUM % RECOVERED

TABLE 3

Underflow Density, %	Number Stages			
	5	6	7	8
35%	97.99%	98.72%	99.11%	99.34%
38%	98.61%	99.17%	99.46%	99.62%
40%	98.92%	99.38%	99.61%	99.74%

We wish to express our appreciation to Hazen Research, Inc., Golden, Colorado, specifically Mr. E. L. Coltrinari and Mr. Carroll Marvel for their warm reception, cordiality and overall helpfulness in this testing program.

We appreciate this opportunity for offering our services. We assure you of our continued interest in this project. Should there be questions, please be at liberty to call.

Respectfully submitted by,

ENVIROTECH PROCESS EQUIPMENT
ENVIROTECH CORPORATION

Jesse J. Brodie

Jesse J. Brodie
Sales and Services Applications

JJB/vm

Wet/Dry Screen Analysis

By _____

Date 11/17/78

Project 4407

HRI _____

Size (Inch, Mesh, μ)		A-1 Thick. Test 20% Solids											
		Direct	Direct	Cum Weight (%)		Direct	Direct	Cum Weight (%)		Direct	Direct	Cum Weight (%)	
Pass	Ret	Wt	Wt (%)	Ret	Pass	Wt	Wt (%)	Ret	Pass	Wt	Wt (%)	Ret	Pass
	+28M	1.6	0.3	0.3	99.7								
28M	35M	13.2	2.8	3.1	96.9								
35M	48M	39.3	8.4	11.5	88.5								
48M	65M	40.4	8.6	20.1	79.9								
65M	100M	37.7	8.1	28.2	71.8								
100M	150M	25.7	5.5	33.7	66.3								
150M	200M	29.0	6.2	39.9	60.1								
200M	270M	31.6	6.8	46.7	53.3								
270M	325M	12.7	2.7	49.4	50.6								
325M	400M	10.4	2.2	51.6	48.4								
	-400M	225.6	48.4	100.0	0.0								
	Total	467.2	100.0										

hri 50-19(a)

Wet/Dry Screen Analysis

By _____

Date 11/20/78

Project 4407

HRI _____

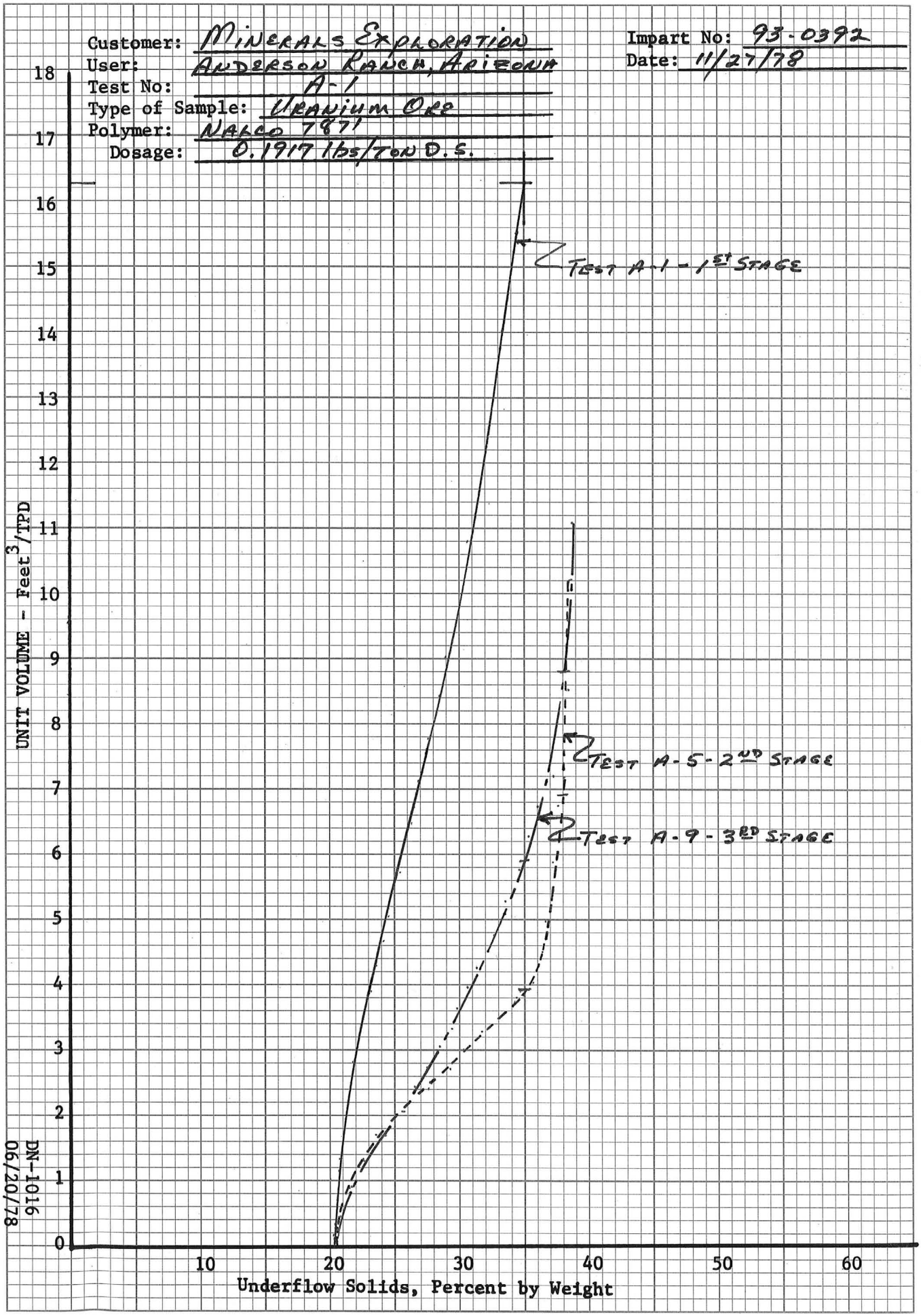
Size (Inch, Mesh, μ)		B-2											
		Direct	Direct	Cum Weight (%)		Direct	Direct	Cum Weight (%)		Direct	Direct	Cum Weight (%)	
Pass	Ret	Wt	Wt (%)	Ret	Pass	Wt	Wt (%)	Ret	Pass	Wt	Wt (%)	Ret	Pass
	+ 28M	0.0	0.0	0.0	100.0								
28M	35M	4.7	2.2	2.2	97.8								
35M	48M	16.1	7.7	9.9	90.1								
48M	65M	21.2	10.1	20.0	80.0								
65M	100M	20.5	9.8	29.8	70.2								
100M	150M	12.9	6.2	36.0	64.0								
150M	200M	16.6	7.9	43.9	56.1								
200M	270M	14.4	6.9	50.8	49.2								
270M	325M	10.2	4.9	55.7	44.3								
325M	400M	11.6	5.5	61.2	38.8								
	-400M	81.2	38.8	100.0	0.0								
	Total	209.4	100.0										

hri 50-19(a)

ENVIROTECH PROCESS EQUIPMENT, ENVIROTECH CORPORATION
WESTERN REGION, DENVER OFFICE #0775

Customer: MINERALS EXPLORATION
User: ANDERSON RANCH, ARIZONA
Test No: A-1
Type of Sample: URANIUM ORE
Polymer: NALCO 7871
Dosage: 0.1917 lbs/TON D.S.

Impart No: 93-0392
Date: 11/27/78



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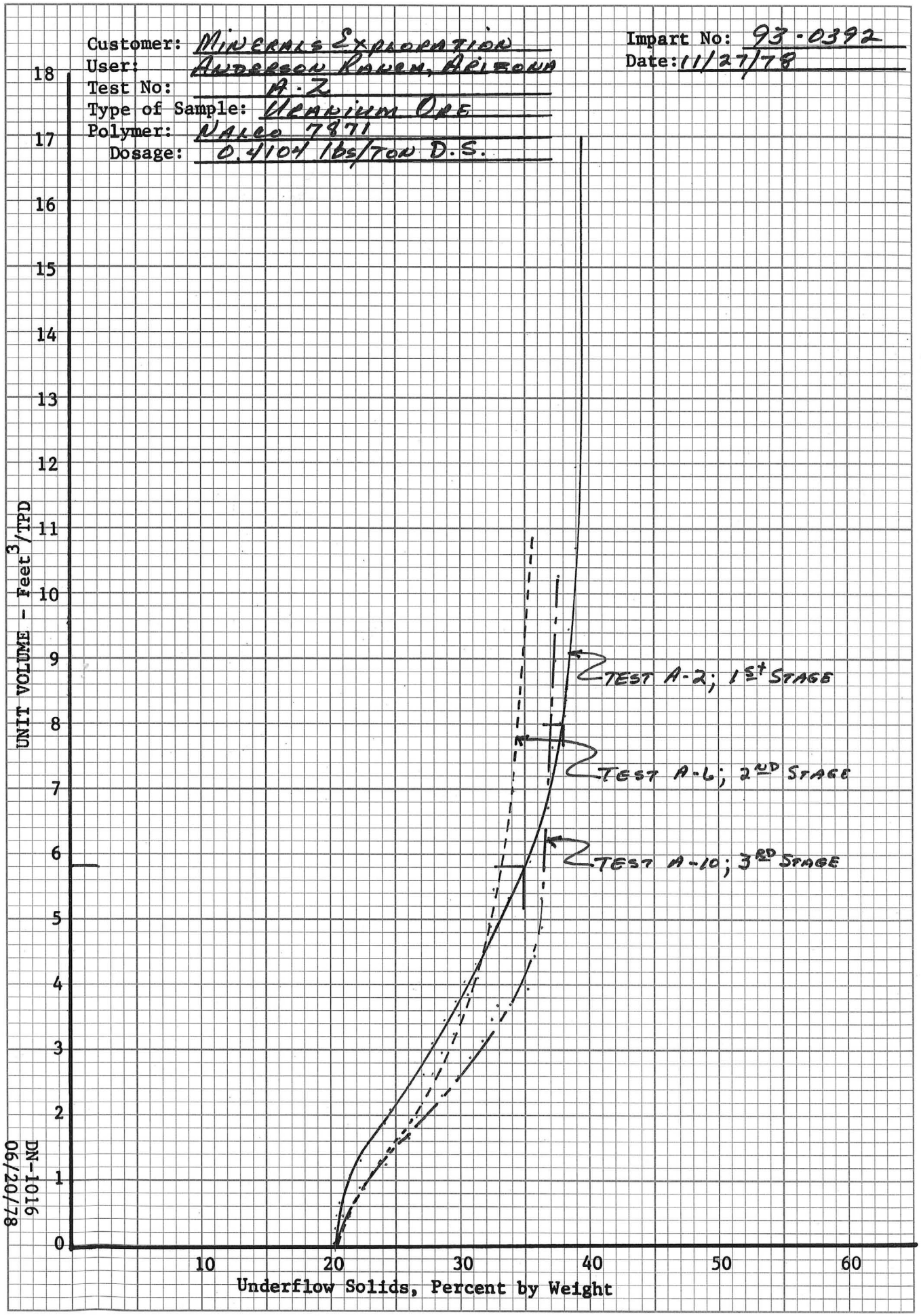
WESTERN REGION, DENVER OFFICE #0775

Customer: Minerals Exploration
User: Anderson Raven, Arizona
Test No: A-2
Type of Sample: Uranium Ore
Polymer: Nalco 7871
Dosage: 0.4104 lbs/Ton D.S.

Impart No: 93-0392
Date: 11/27/78



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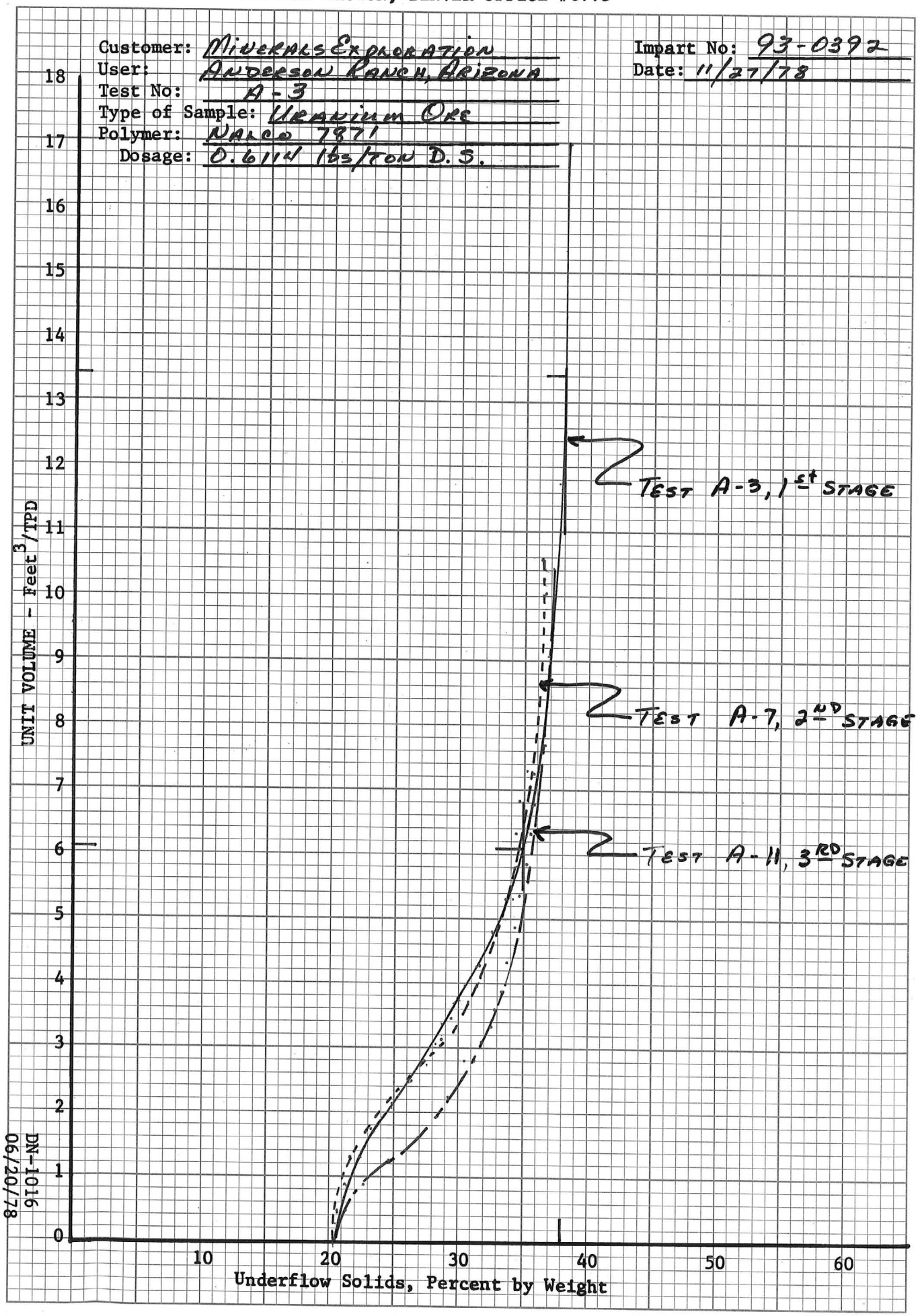

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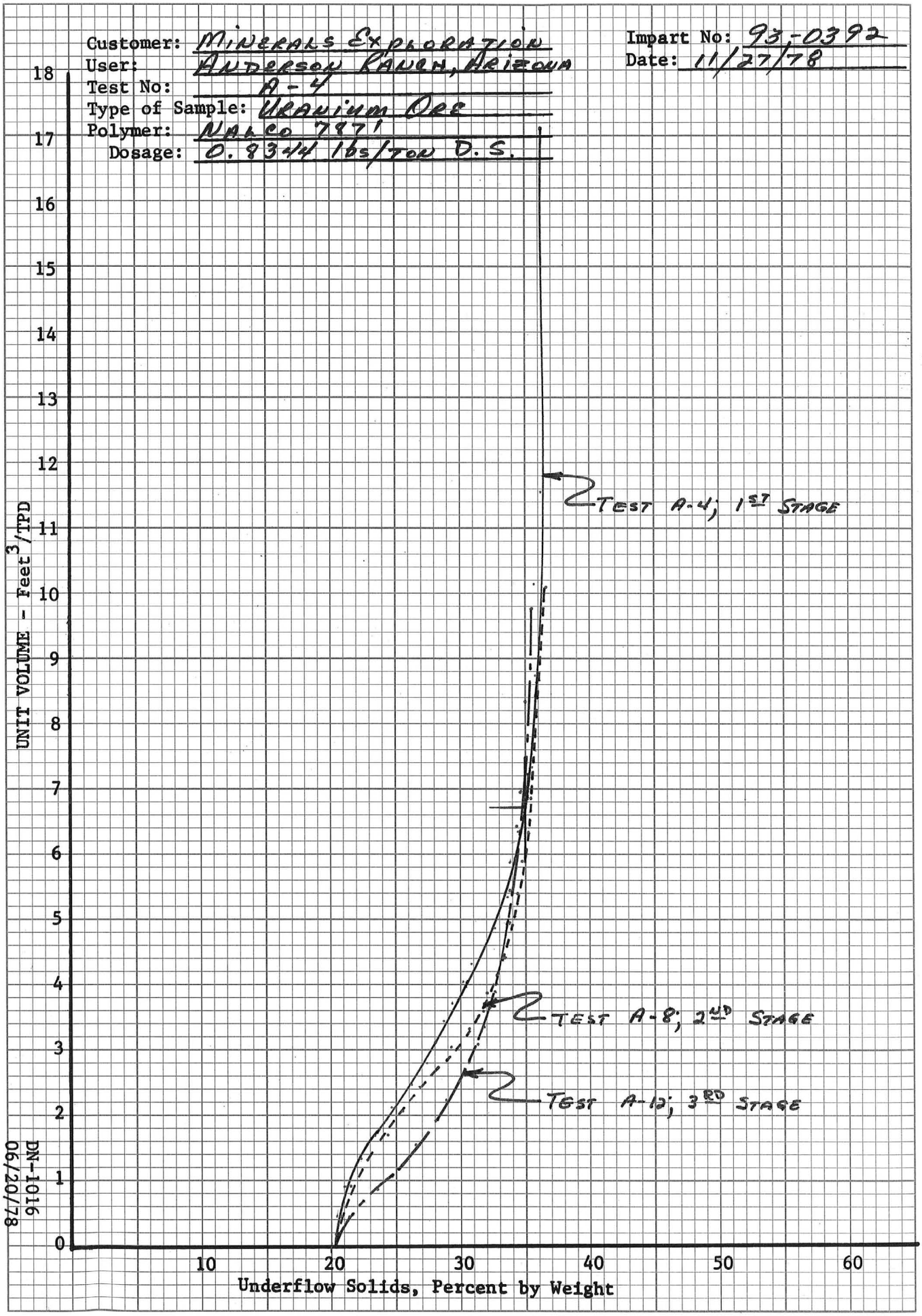
Customer: MINERALS EXPLORATION
User: ANDERSON RANCH, ARIZONA
Test No: A-4
Type of Sample: URANIUM ORE
Polymer: NALCO 7871
Dosage: 0.8344 lbs/TON D.S.

Impart No: 93-0392
Date: 11/27/78



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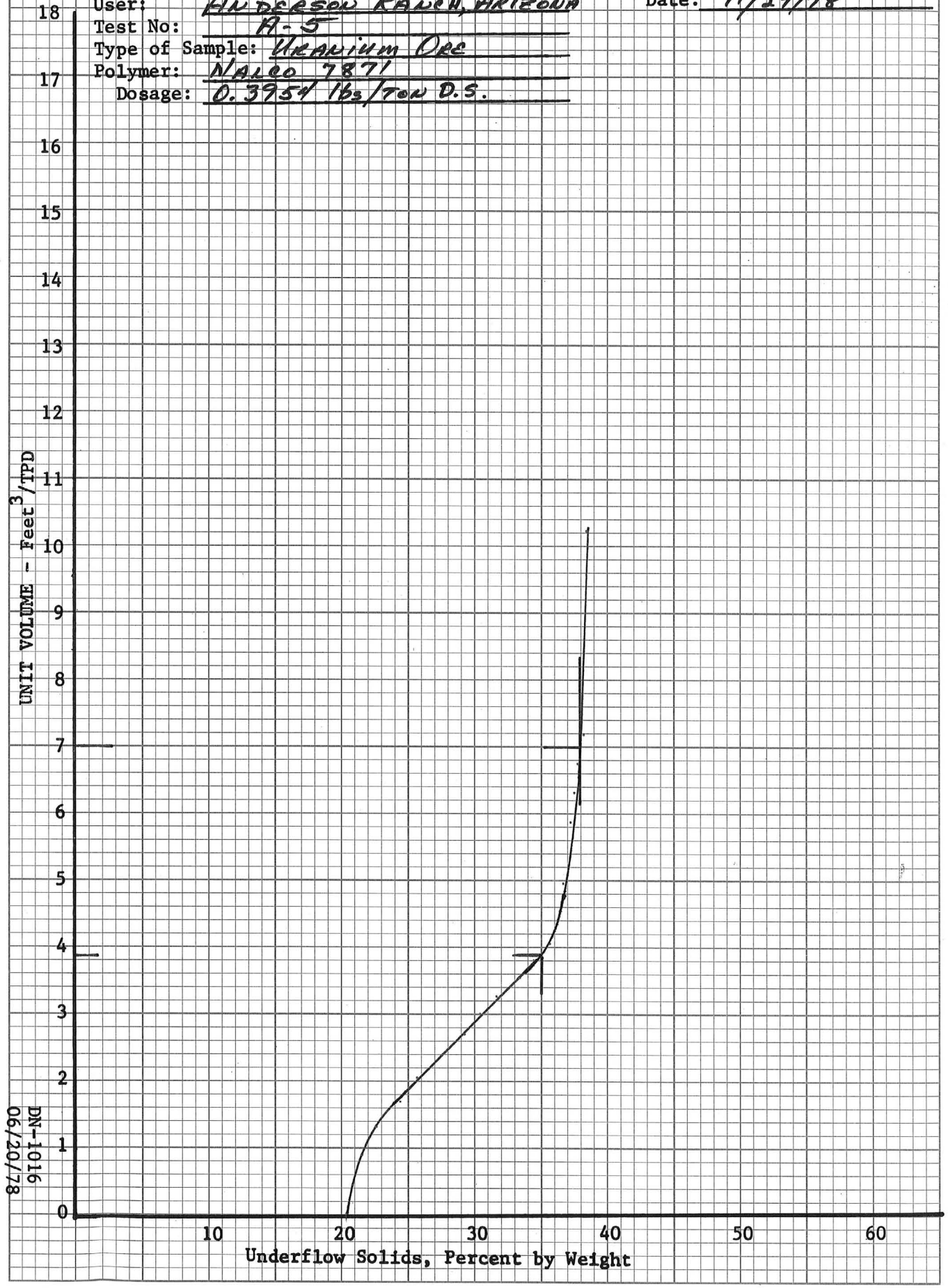
WESTERN REGION, DENVER OFFICE #0775

Customer: MINERALS EXPLORATION
User: ANDERSON RANCH, ARIZONA
Test No: A-5
Type of Sample: URANIUM ORE
Polymer: NALCO 7871
Dosage: 0.3954 lbs/TON D.S.

Impart No: 93-0392
Date: 11/27/78



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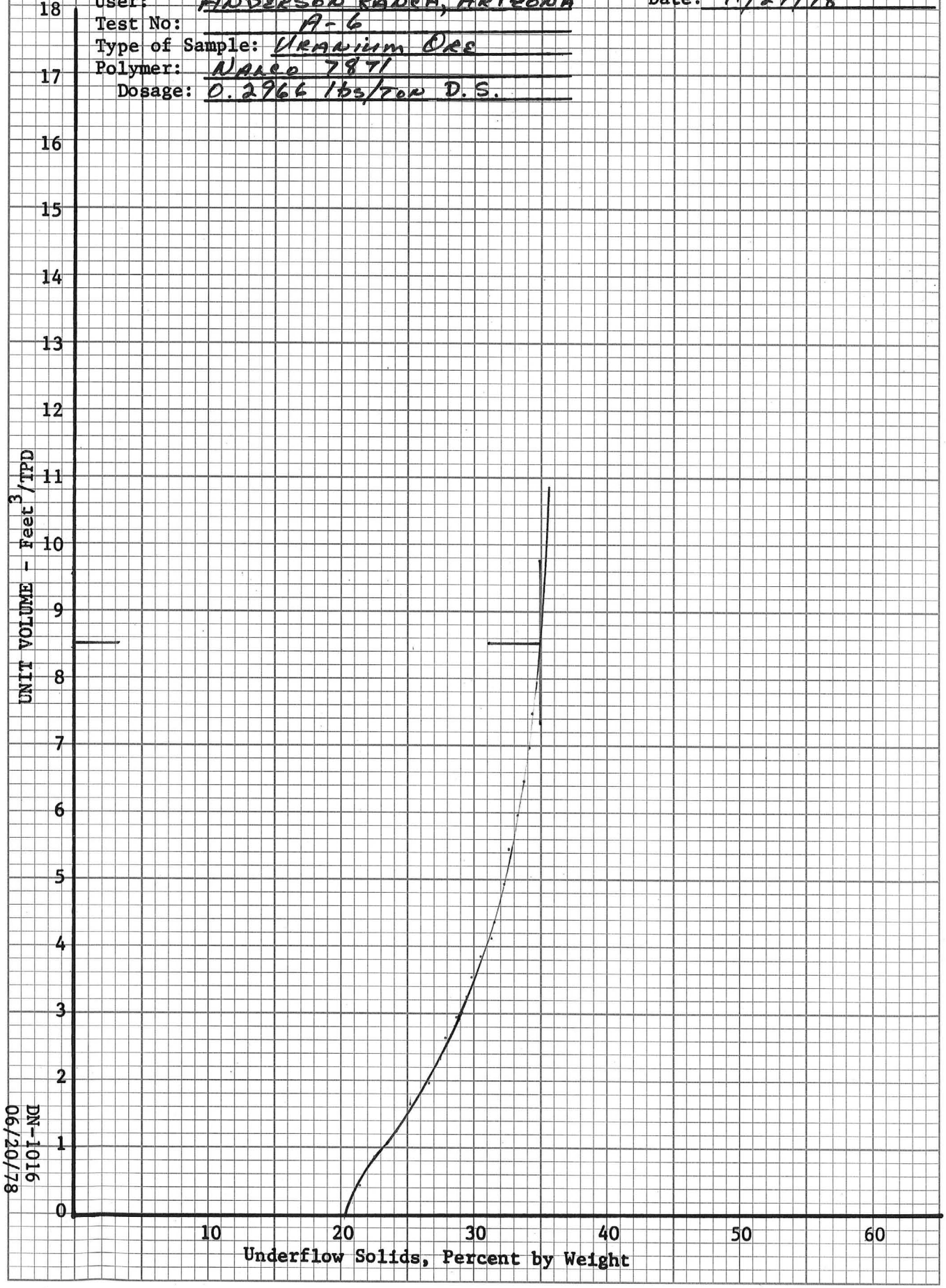
Customer: Minerals Exploration
User: Anderson Ranch, Arizona
Test No: A-6
Type of Sample: Uranium Ore
Polymer: Nalco 7871
Dosage: 0.2966 lbs/ton D.S.

Impart No: 93-0392
Date: 11/27/78



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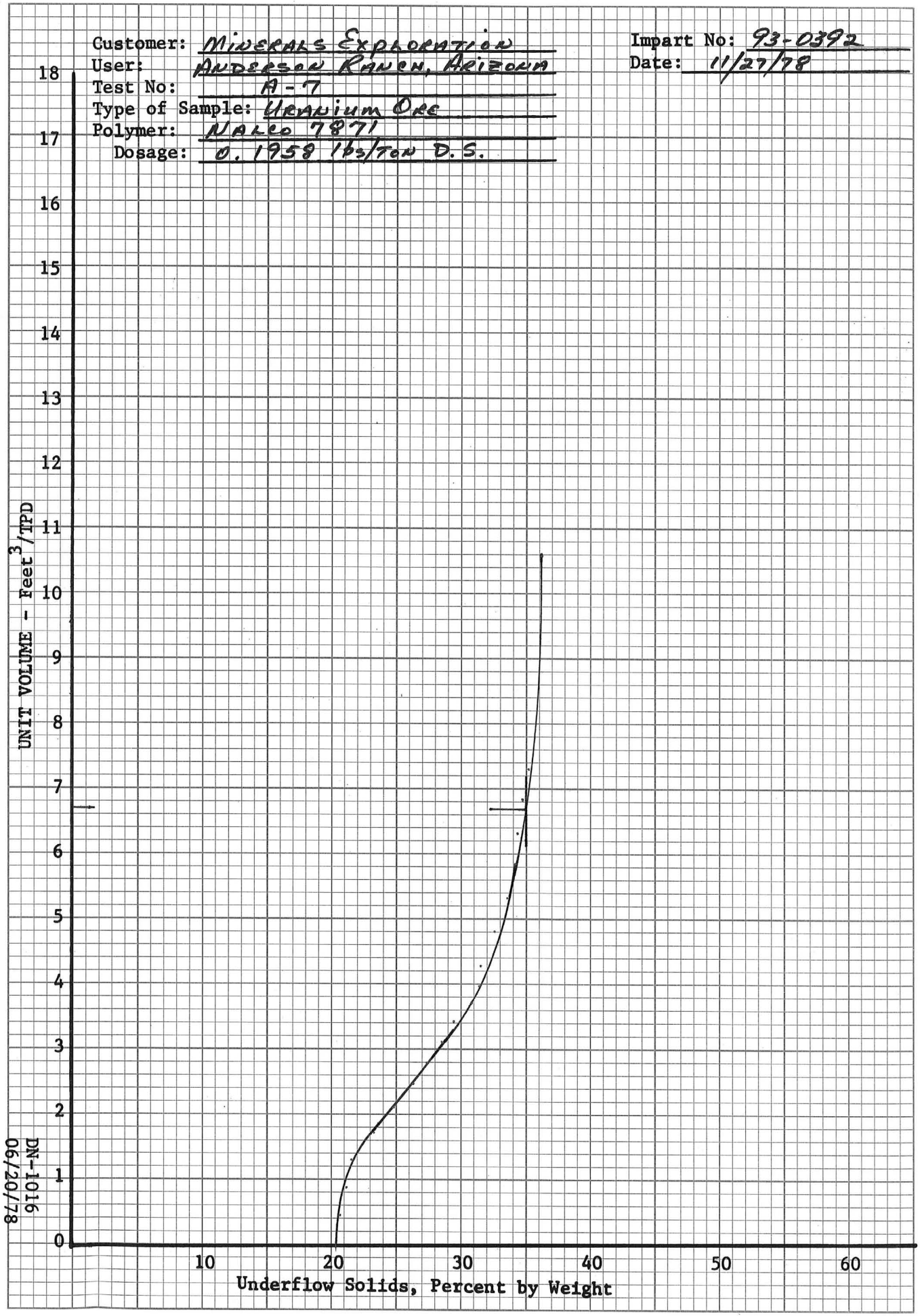
WESTERN REGION, DENVER OFFICE #0775

Customer: Minerals Exploration
User: Anderson Ranch, Arizona
Test No: A-7
Type of Sample: Uranium Ore
Polymer: Nalco 7871
Dosage: 0.1958 lbs/Ton D.S.

Impart No: 93-0392
Date: 11/27/78



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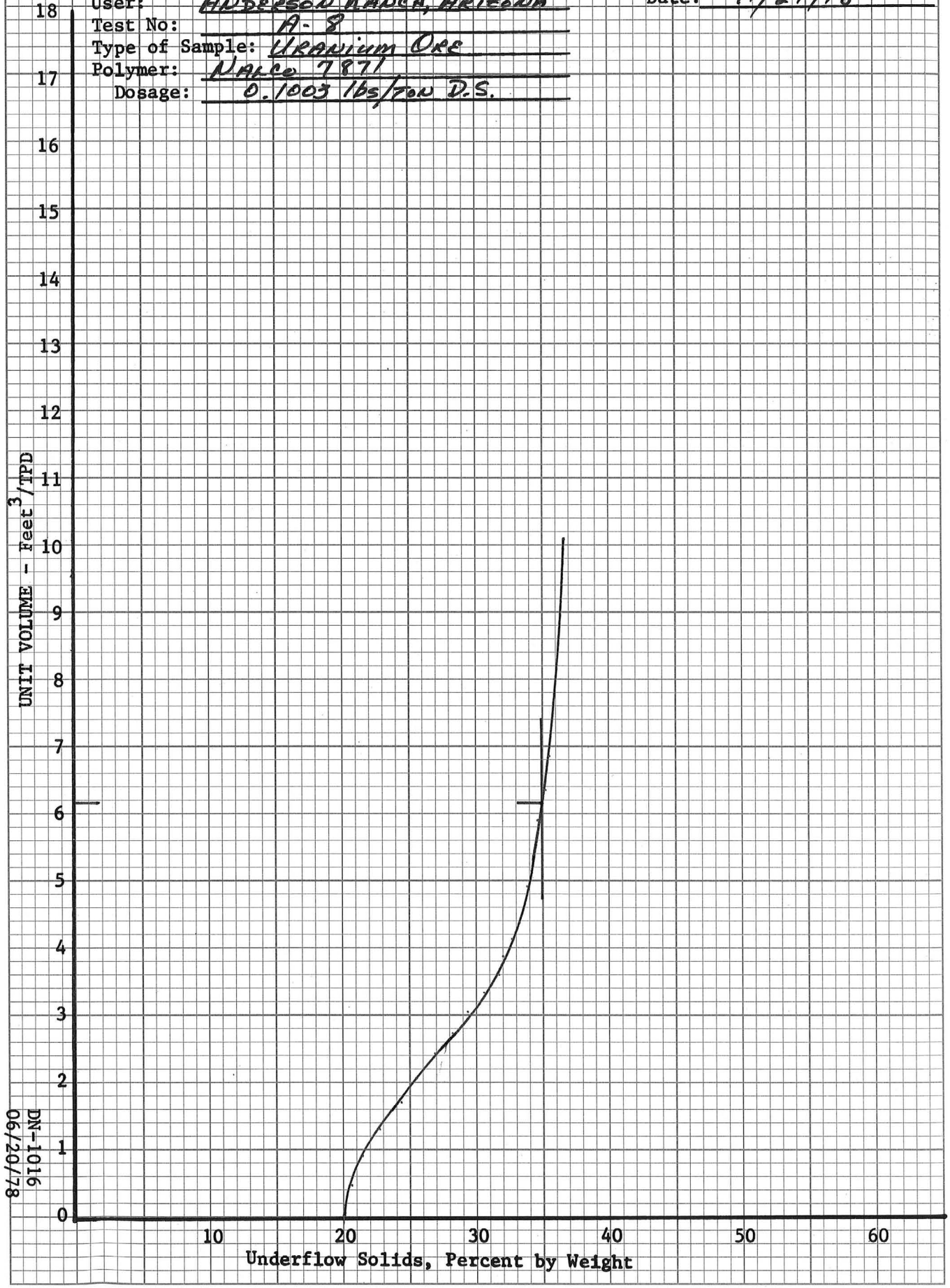
Customer: Minerals Exploration
User: Anderson Ranch, Arizona
Test No: A-8
Type of Sample: Uranium Ore
Polymer: Nalco 7871
Dosage: 0.1003 lbs/ton D.S.

Impart No: 93-0392
Date: 11/27/78



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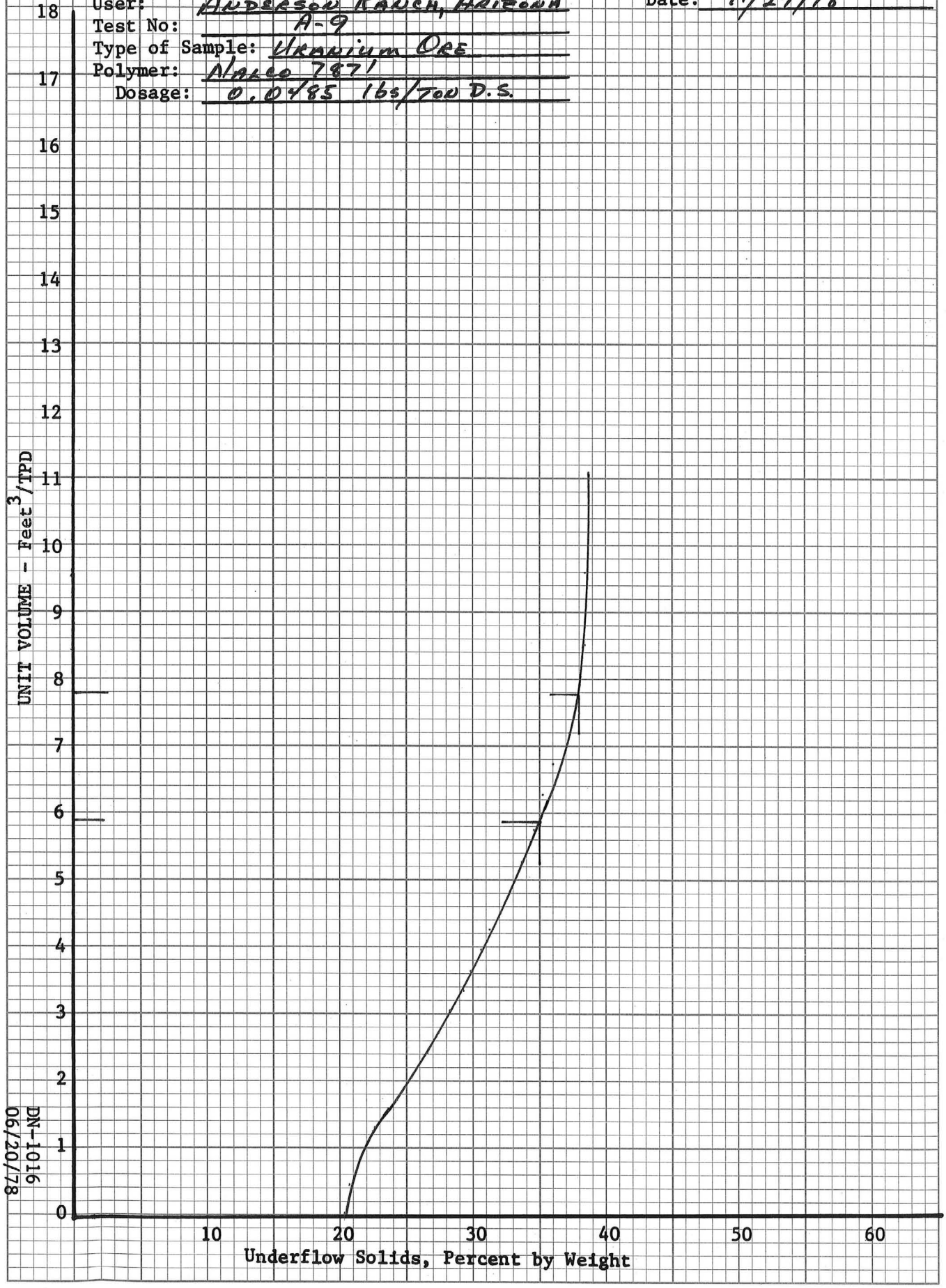
Customer: Minerals Exploration
User: Anderson Ranch, Arizona
Test No: A-9
Type of Sample: Uranium Ore
Polymer: Nalco 7871
Dosage: 0.0485 lbs/ton D.S.

Impart No: 93-0392
Date: 11/27/78



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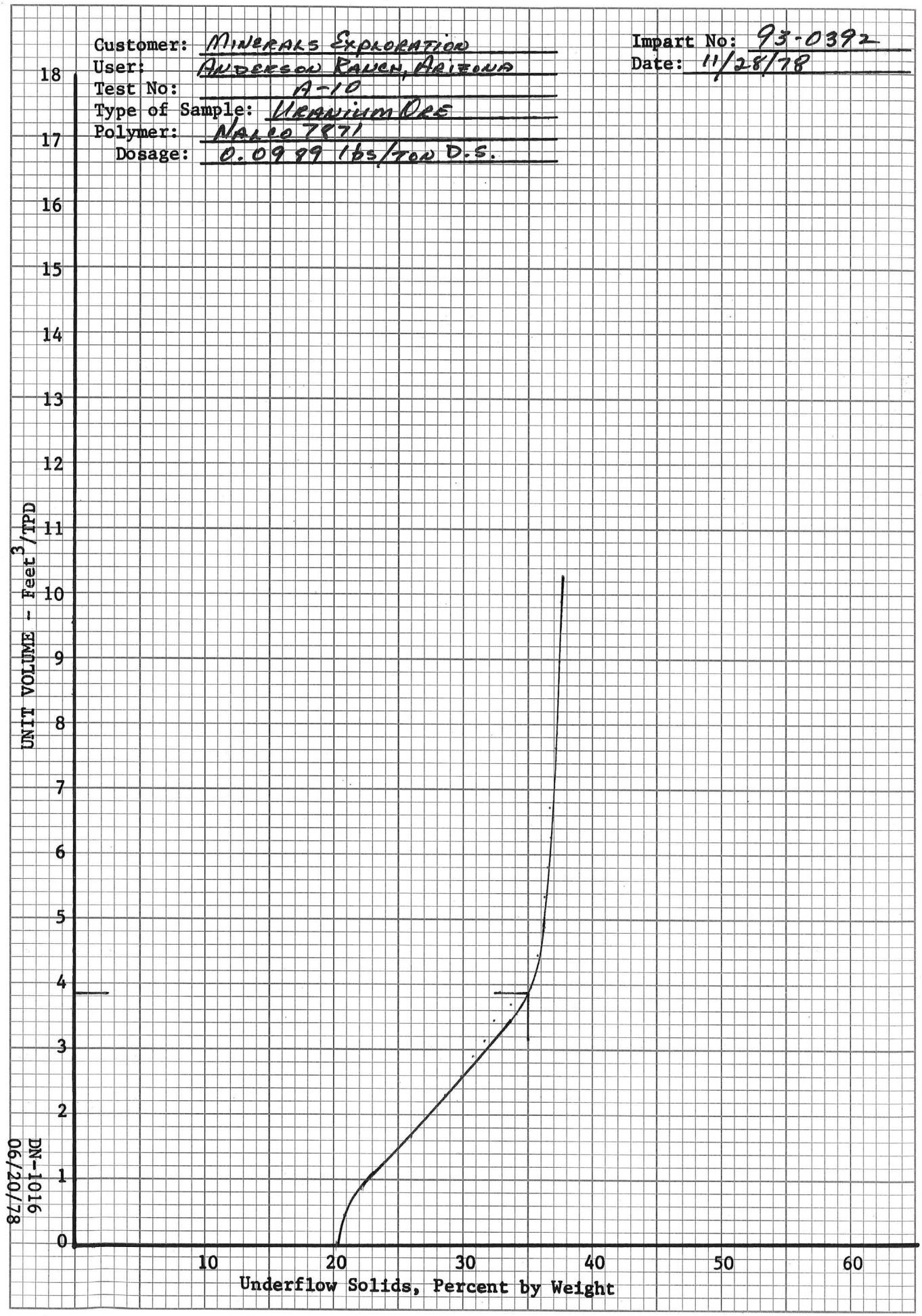
Customer: MINERALS EXPLORATION
User: ANDERSON RANCH, ARIZONA
Test No: A-10
Type of Sample: URANIUM ORE
Polymer: NALCO 7871
Dosage: 0.0999 lbs/TON D.S.

Impart No: 93-0392
Date: 11/28/78



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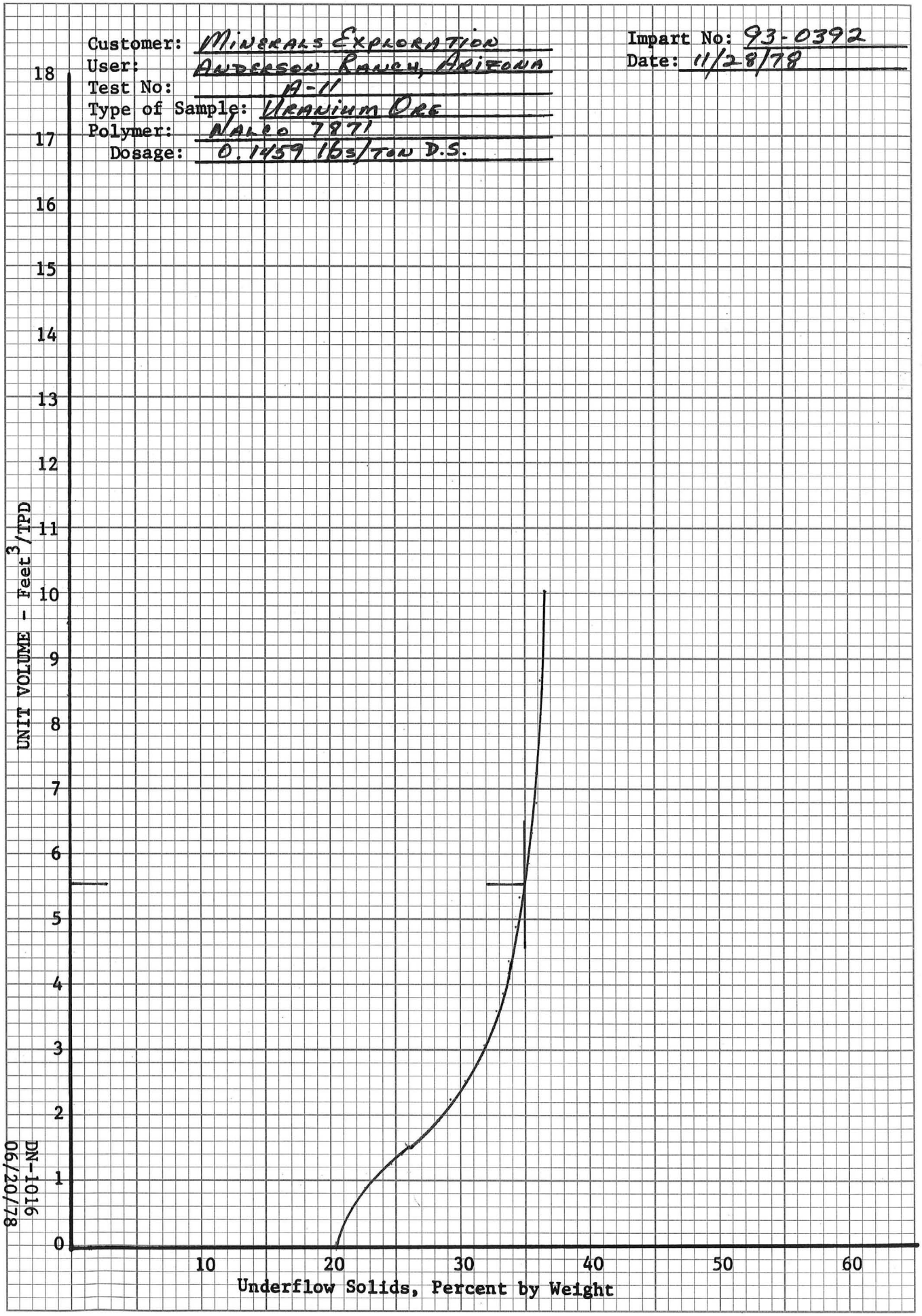
Customer: Minerals Exploration
User: Anderson Ranch, Arizona
Test No: A-11
Type of Sample: Uranium Ore
Polymer: Nalco 7871
Dosage: 0.1459 lbs/ton D.S.

Impart No: 93-0392
Date: 11/28/78



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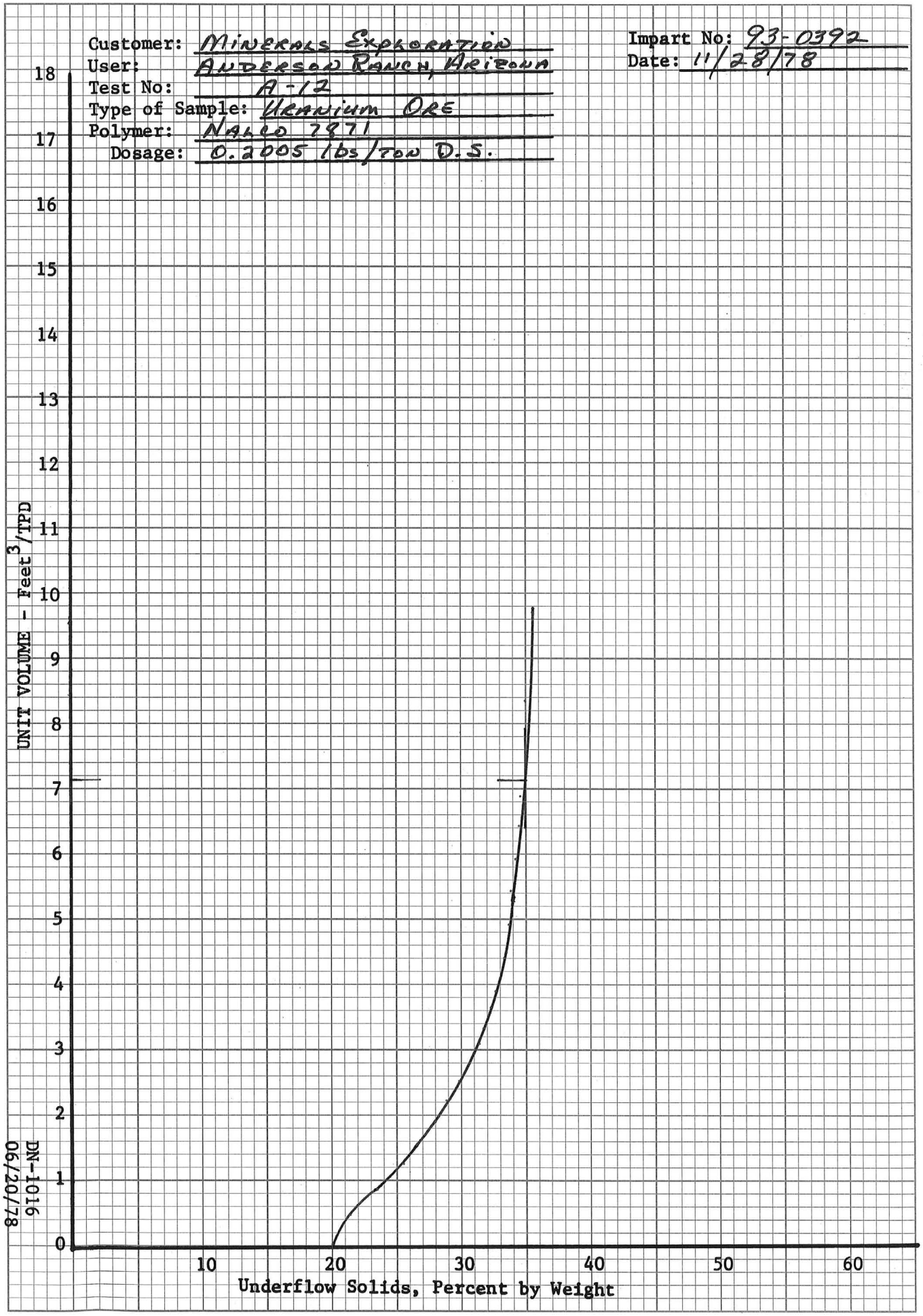
Customer: MINERALS EXPLORATION
User: ANDERSON RANCH, ARIZONA
Test No: A-12
Type of Sample: URANIUM ORE
Polymer: NALCO 7871
Dosage: 0.2005 lbs/TON D.S.

Impart No: 93-0392
Date: 11/28/78



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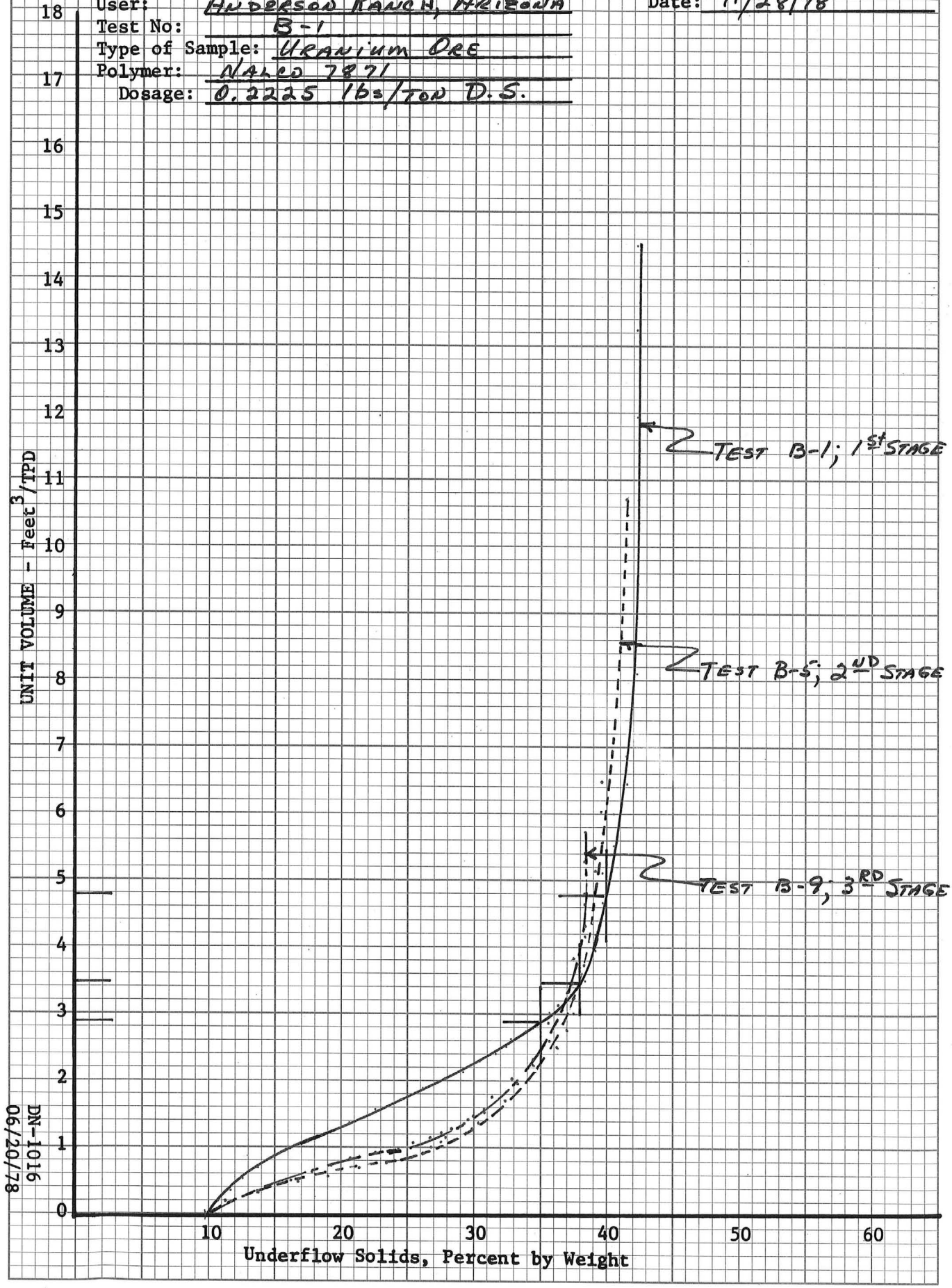
Customer: MINERALS EXPLORATION
User: ANDERSON RANCH, ARIZONA
Test No: B-1
Type of Sample: URANIUM ORE
Polymer: NALCO 7871
Dosage: 0.2225 lbs/TON D.S.

Impart No: 73-0392
Date: 11/28/78



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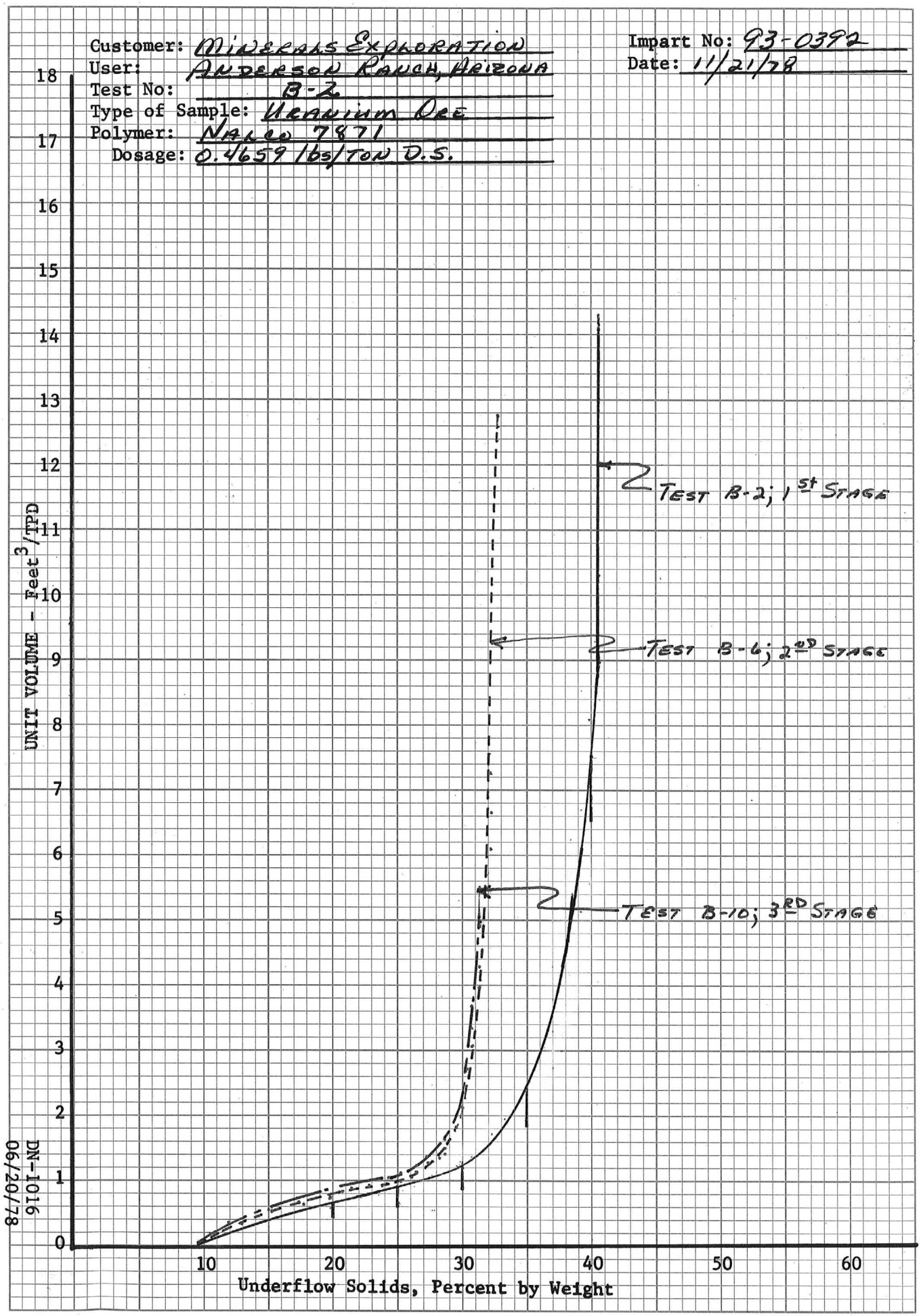

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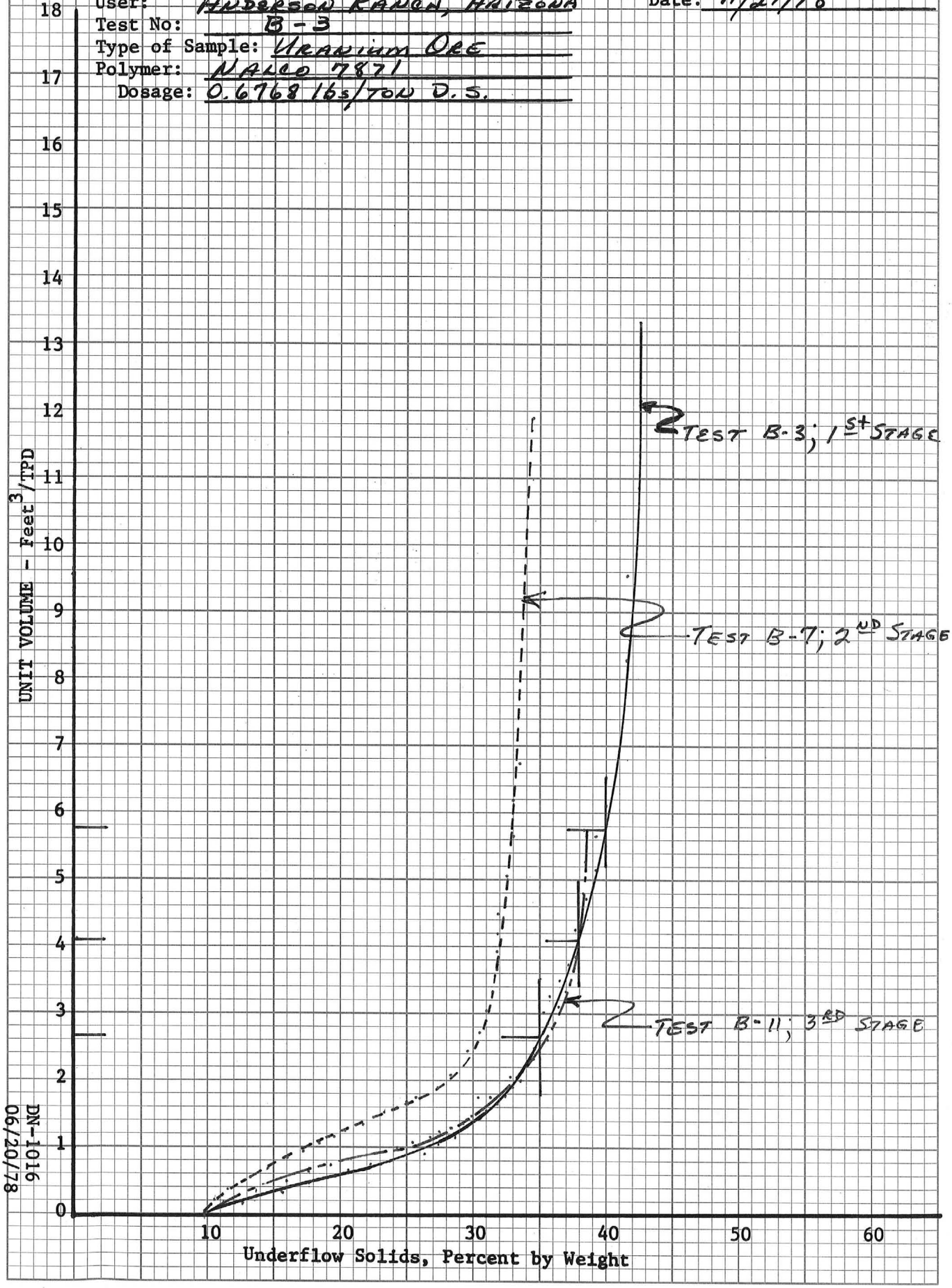
WESTERN REGION, DENVER OFFICE #0775

Customer: MINERALS EXPLORATION
User: ANDERSON RANCH, ARIZONA
Test No: B-3
Type of Sample: URANIUM ORE
Polymer: NALCO 7871
Dosage: 0.6768 lbs/TON D.S.

Impart No: 93-0392
Date: 11/21/78



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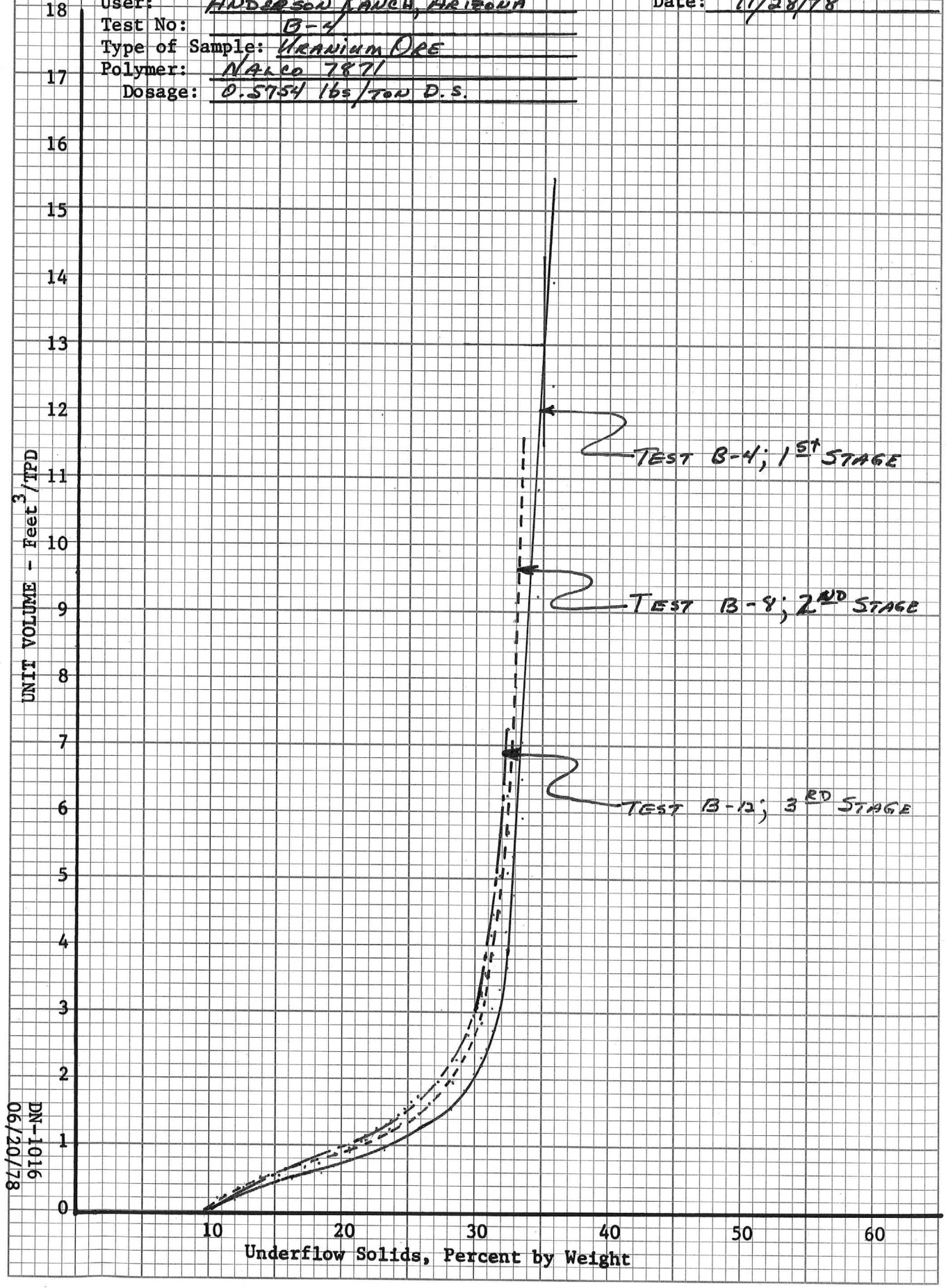
WESTERN REGION, DENVER OFFICE #0775

Customer: MINERALS EXPLORATION
User: ANDERSON RANCH, ARIZONA
Test No: B-4
Type of Sample: URANIUM ORE
Polymer: NALCO 7871
Dosage: 0.5754 lbs/TON D.S.

Impart No: 93-0392
Date: 11/28/78



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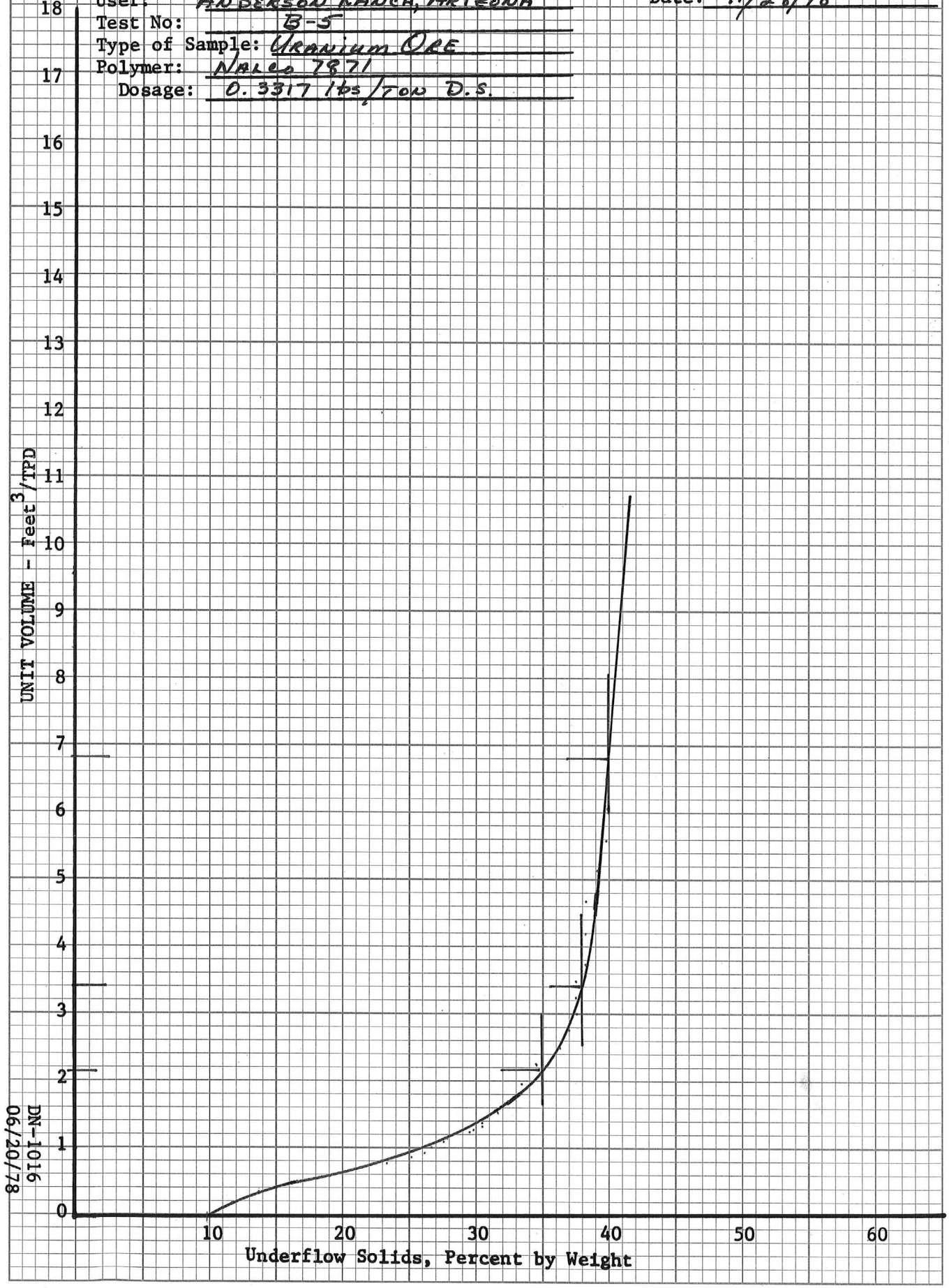
WESTERN REGION, DENVER OFFICE #0775

Customer: Minerals Exploration
User: Anderson Ranch, Arizona
Test No: B-5
Type of Sample: Uranium Ore
Polymer: Nalco 7871
Dosage: 0.3317 lbs/ton D.S.

Impart No: 93-0392
Date: 11/28/78



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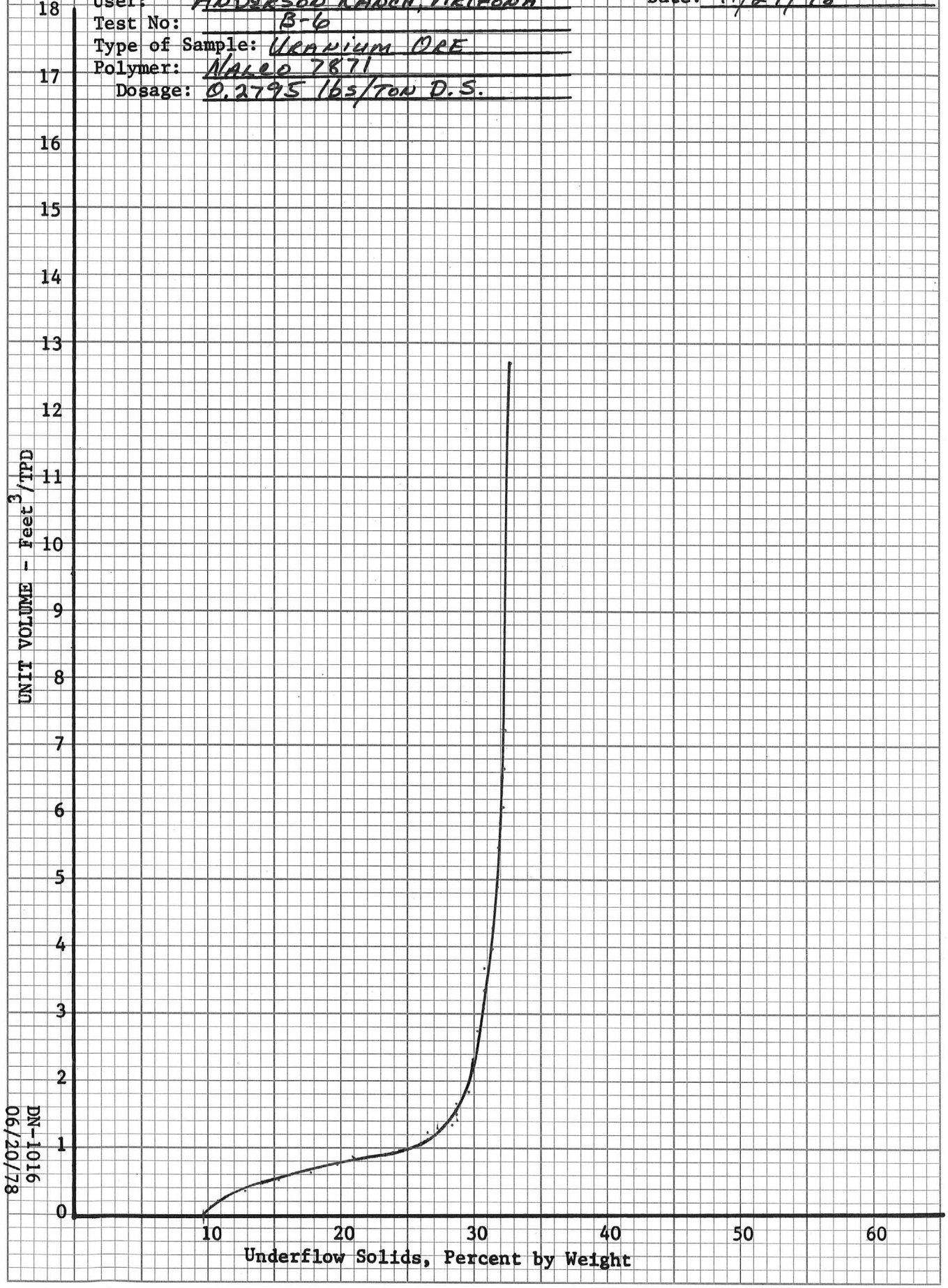
WESTERN REGION, DENVER OFFICE #0775

Customer: Minerals Exploration
User: Anderson Ranch, Arizona
Test No: B-6
Type of Sample: Uranium Ore
Polymer: Nalco 7871
Dosage: 0.2795 lbs/Ton D.S.

Impart No: 93-0392
Date: 11/29/78



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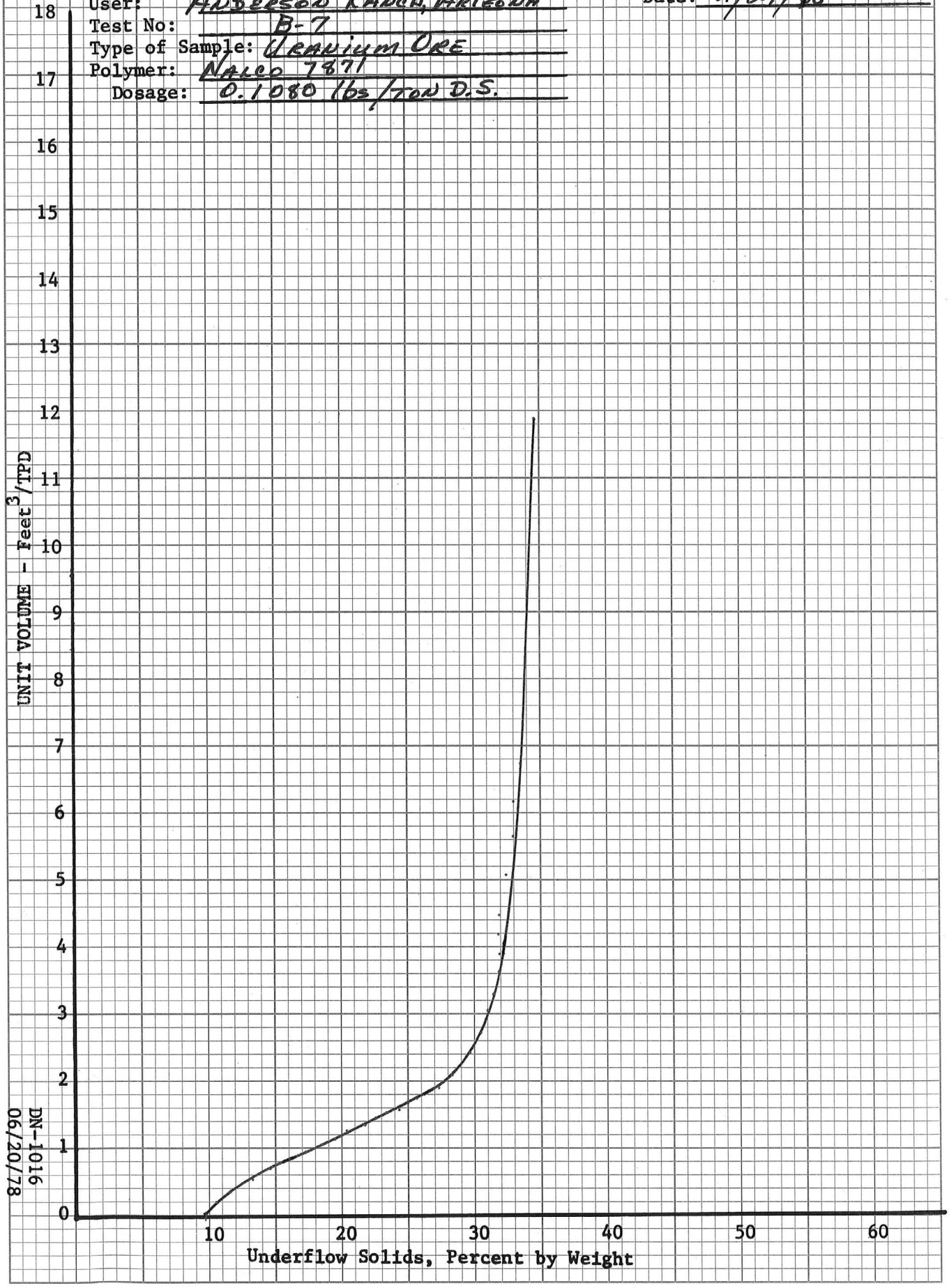
WESTERN REGION, DENVER OFFICE #0775

Customer: Minerals Exploration
User: Anderson Ranch, Arizona
Test No: B-7
Type of Sample: Uranium Ore
Polymer: Nalco 7871
Dosage: 0.1080 lbs/ton D.S.

Impart No: 93-0392
Date: 11/29/88



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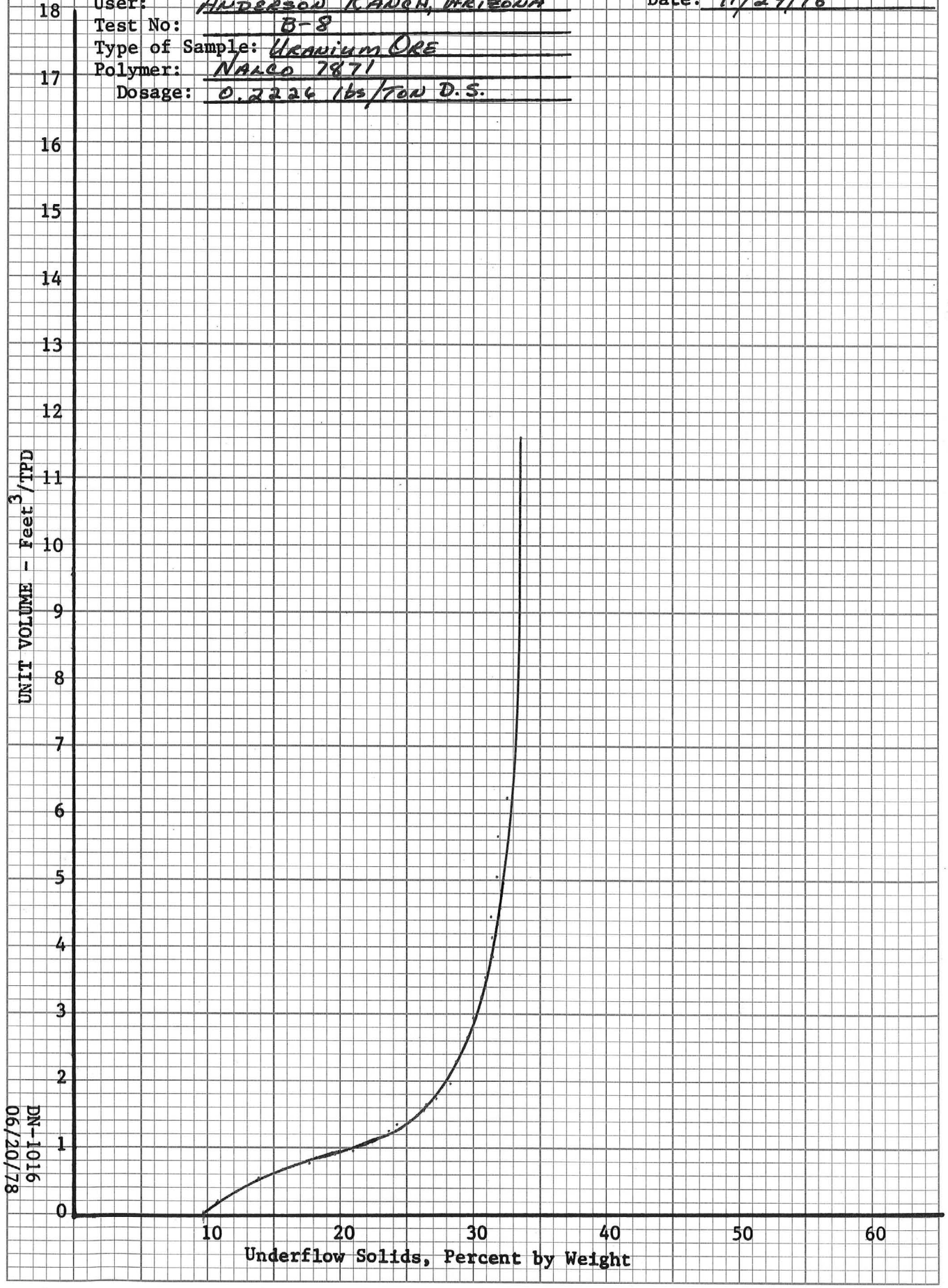
WESTERN REGION, DENVER OFFICE #0775

Customer: Minerals Exploration
User: Anderson Ranch, Arizona
Test No: B-8
Type of Sample: Uranium Ore
Polymer: Nalco 7871
Dosage: 0.2226 lbs/Ton D.S.

Impart No: 93-0392
Date: 11/29/78



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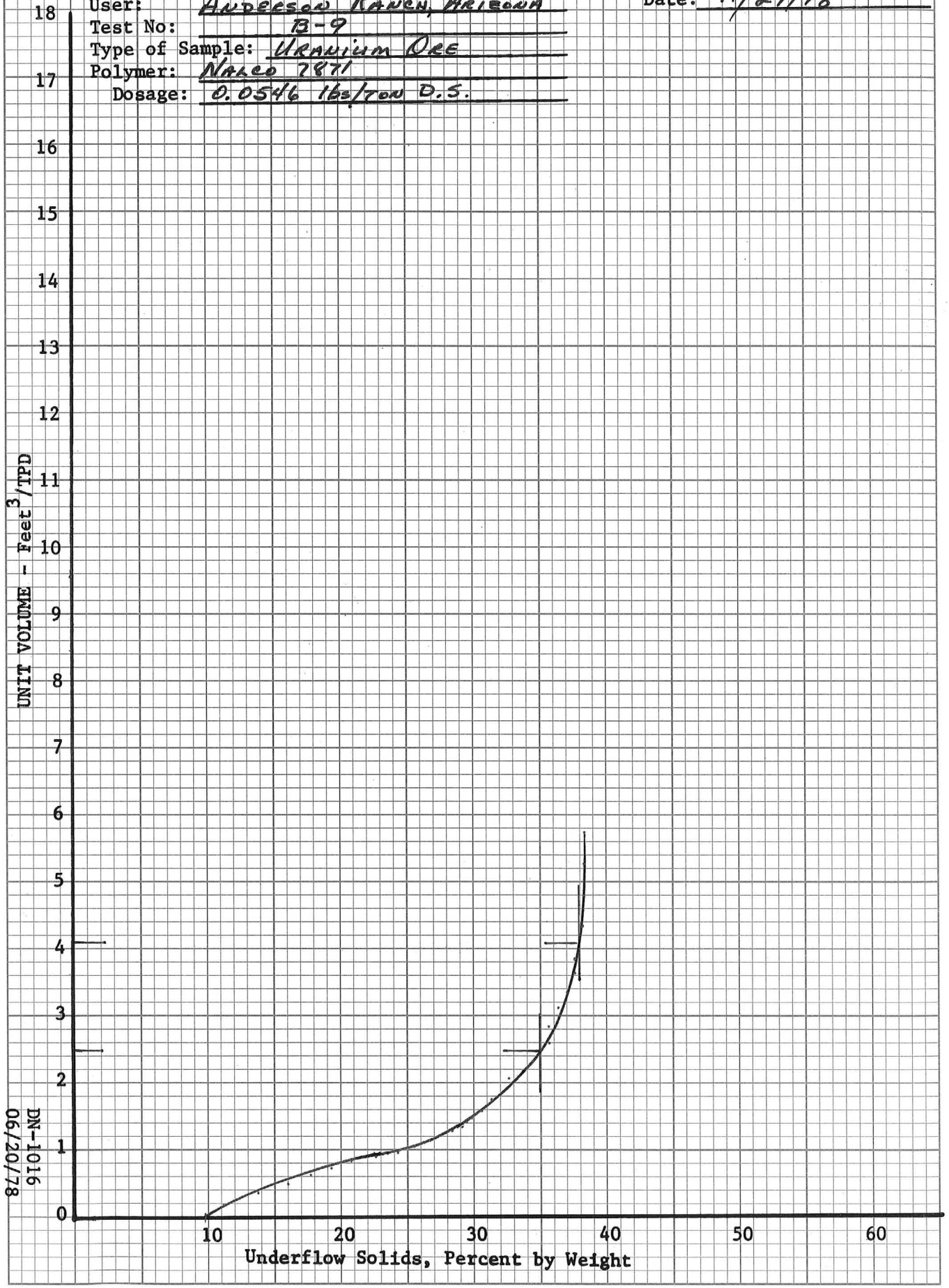
WESTERN REGION, DENVER OFFICE #0775

Customer: Minerals Exploration
User: Anderson Ranch, Arizona
Test No: B-9
Type of Sample: Uranium Ore
Polymer: Nalco 7871
Dosage: 0.0546 lbs/ton D.S.

Impart No: 93-0392
Date: 11/29/78



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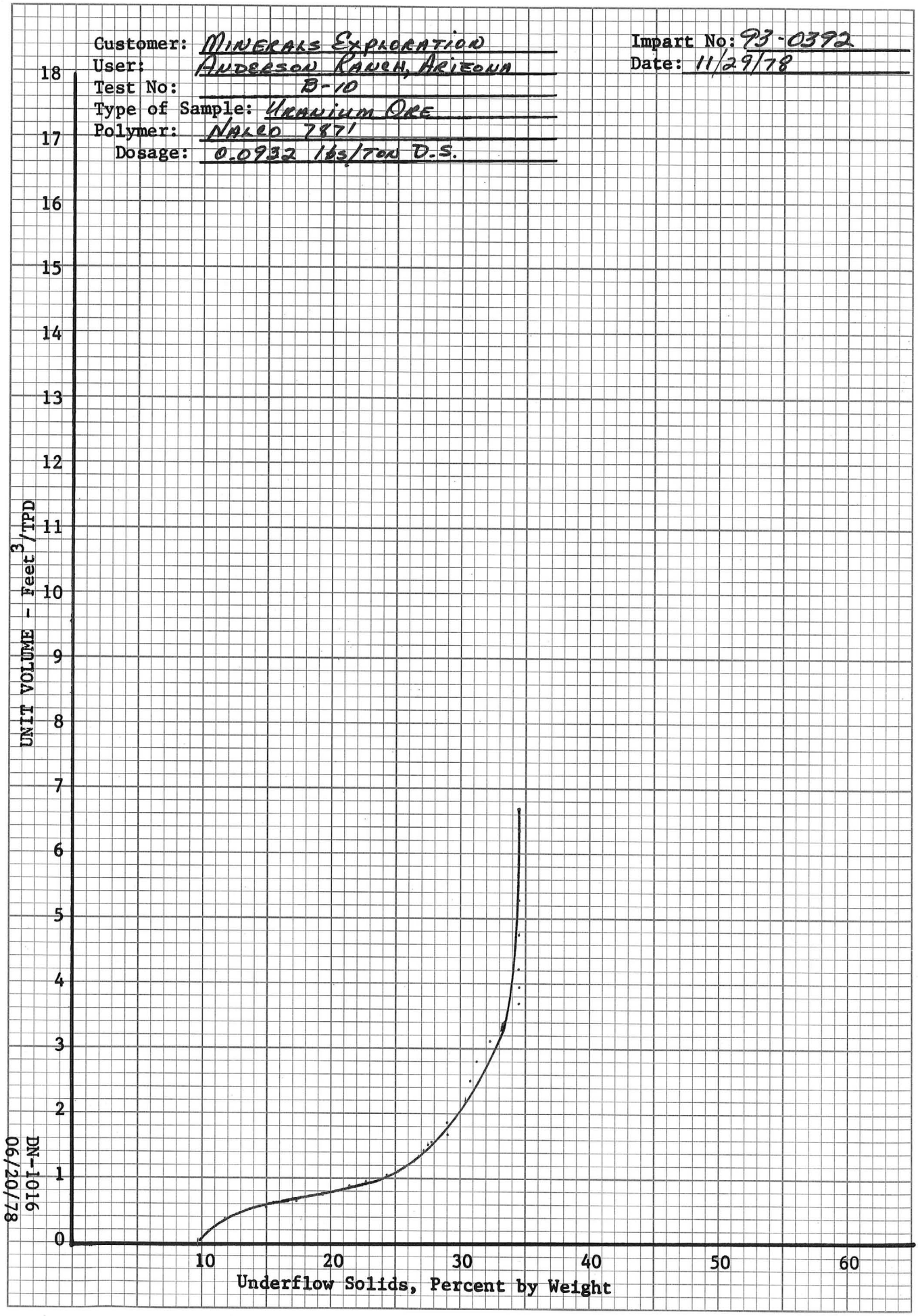
WESTERN REGION, DENVER OFFICE #0775

Customer: MINERALS EXPLORATION
User: ANDERSON RANCH, ARIZONA
Test No: B-10
Type of Sample: URANIUM ORE
Polymer: NALCO 7871
Dosage: 0.0932 lbs/TON D.S.

Impart No: 93-0392
Date: 11/29/78



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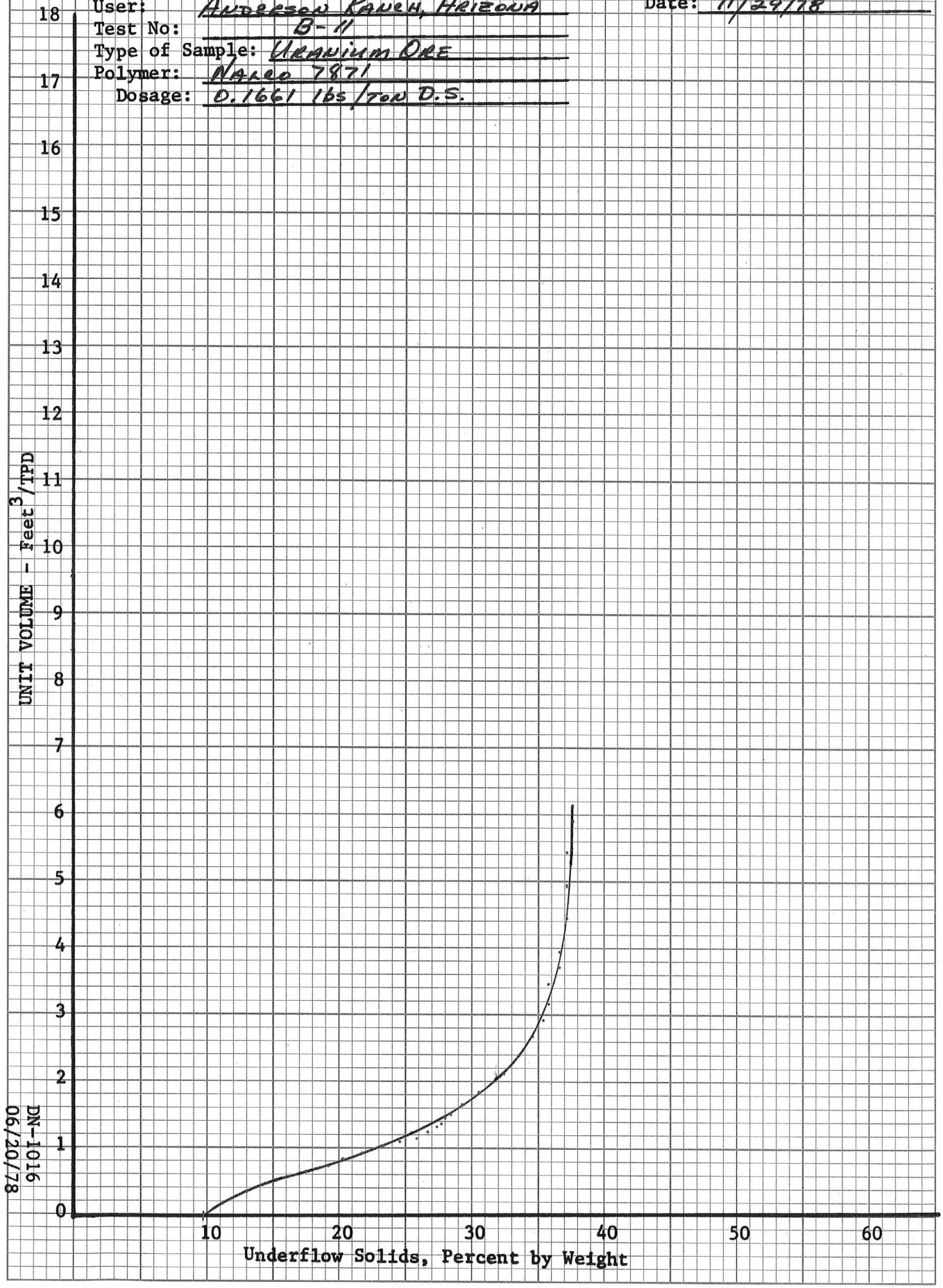
WESTERN REGION, DENVER OFFICE #0775

Customer: MINERALS EXPLORATION
User: ANDERSON RANCH, ARIZONA
Test No: B-11
Type of Sample: URANIUM ORE
Polymer: NALCO 7871
Dosage: 0.1661 lbs/TON D.S.

Impart No: 93-0392
Date: 11/29/78



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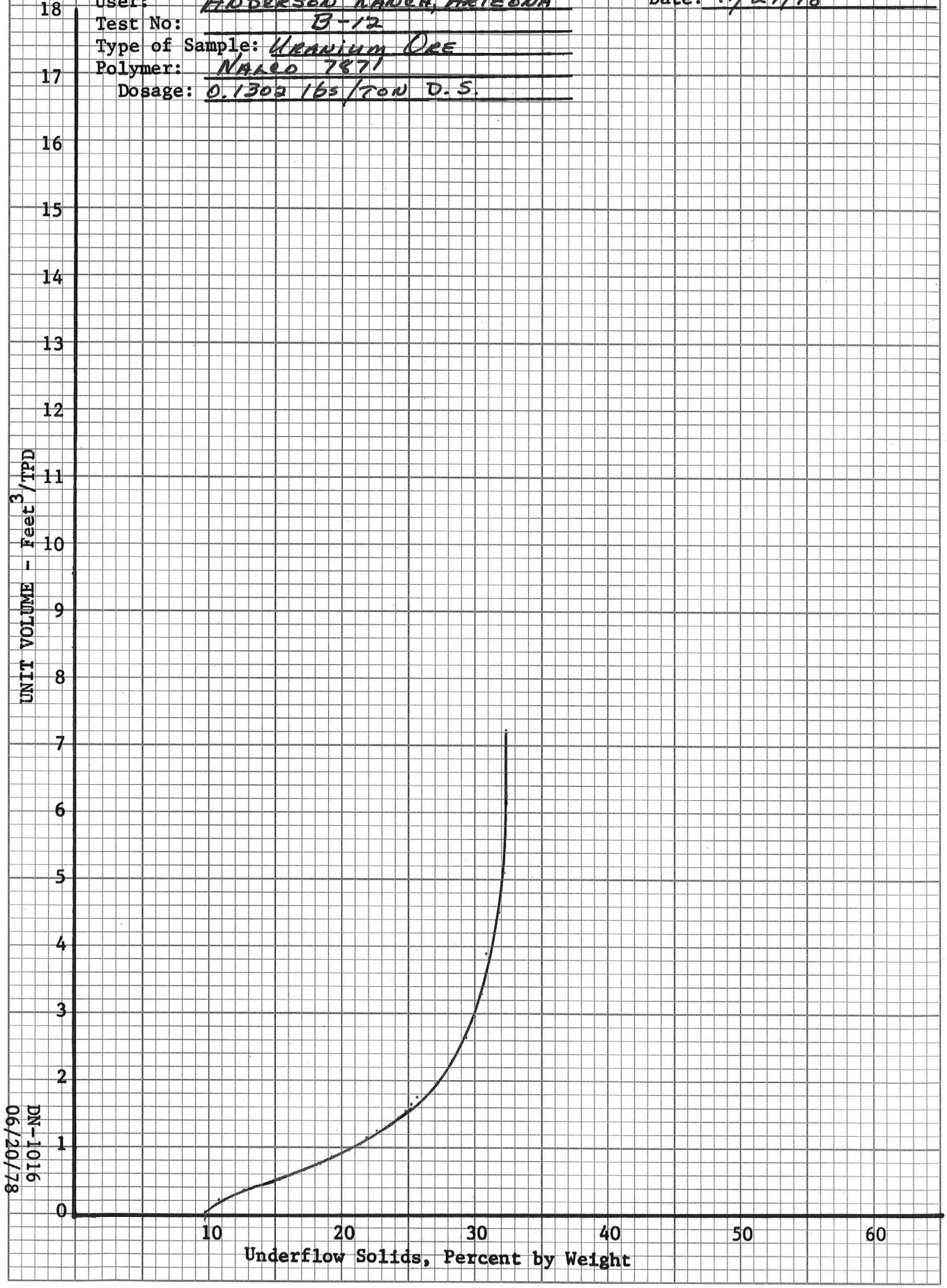
WESTERN REGION, DENVER OFFICE #0775

Customer: MINERALS EXPLORATION
User: ANDERSON RANCH, ARIZONA
Test No: B-12
Type of Sample: URANIUM ORE
Polymer: NALCO 7871
Dosage: 0.1302 lbs/TON D.S.

Impart No: 93-0392
Date: 11/29/78



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Impart No. 93-0392
Date: 11/20/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. A-1
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.1917 lbs/TON D.S.
Calculations: Basis 38.0 % solids in underflow

$tx = \frac{212}{1440} = 0.1472$ DAYS

$Co = \frac{486.4}{2389} \div 32 = 0.0064$ TONS/ft^3

$Ho = 1.4277$

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.1472}{(0.0064)(1.42)} = 16.20$ ft^2/TPD

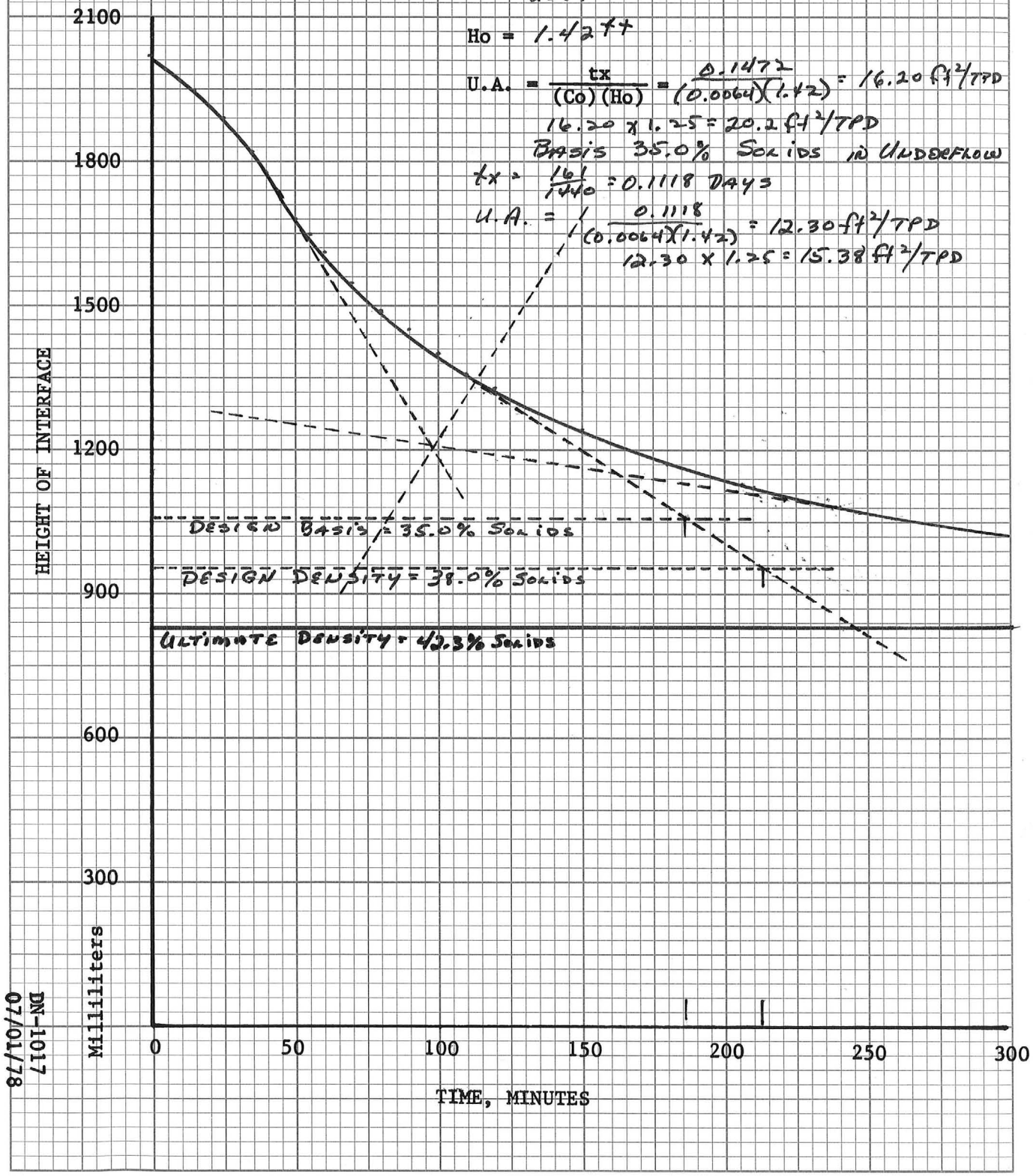
$16.20 \times 1.25 = 20.2$ ft^2/TPD

BASIS 35.0% SOLIDS IN UNDERFLOW

$tx = \frac{161}{1440} = 0.1118$ DAYS

$U.A. = \frac{0.1118}{(0.0064)(1.42)} = 12.30$ ft^2/TPD

$12.30 \times 1.25 = 15.38$ ft^2/TPD



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ENVIROTECH PROCESS EQUIPMENT
WESTERN REGION, DENVER OFFICE #0775

Impart No. 93-0392
Date: 11/14/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. A-2
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.4104 lbs/TON D.S.
Calculations: Basis 38.0 % solids in underflow

$tx = \frac{111}{1440} = 0.0771$ DAYS

$Co = \frac{486.3}{2391} \div 32 = 0.0064$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0771}{(0.0064)(1.42)} = 8.48$ ft^2/TPD

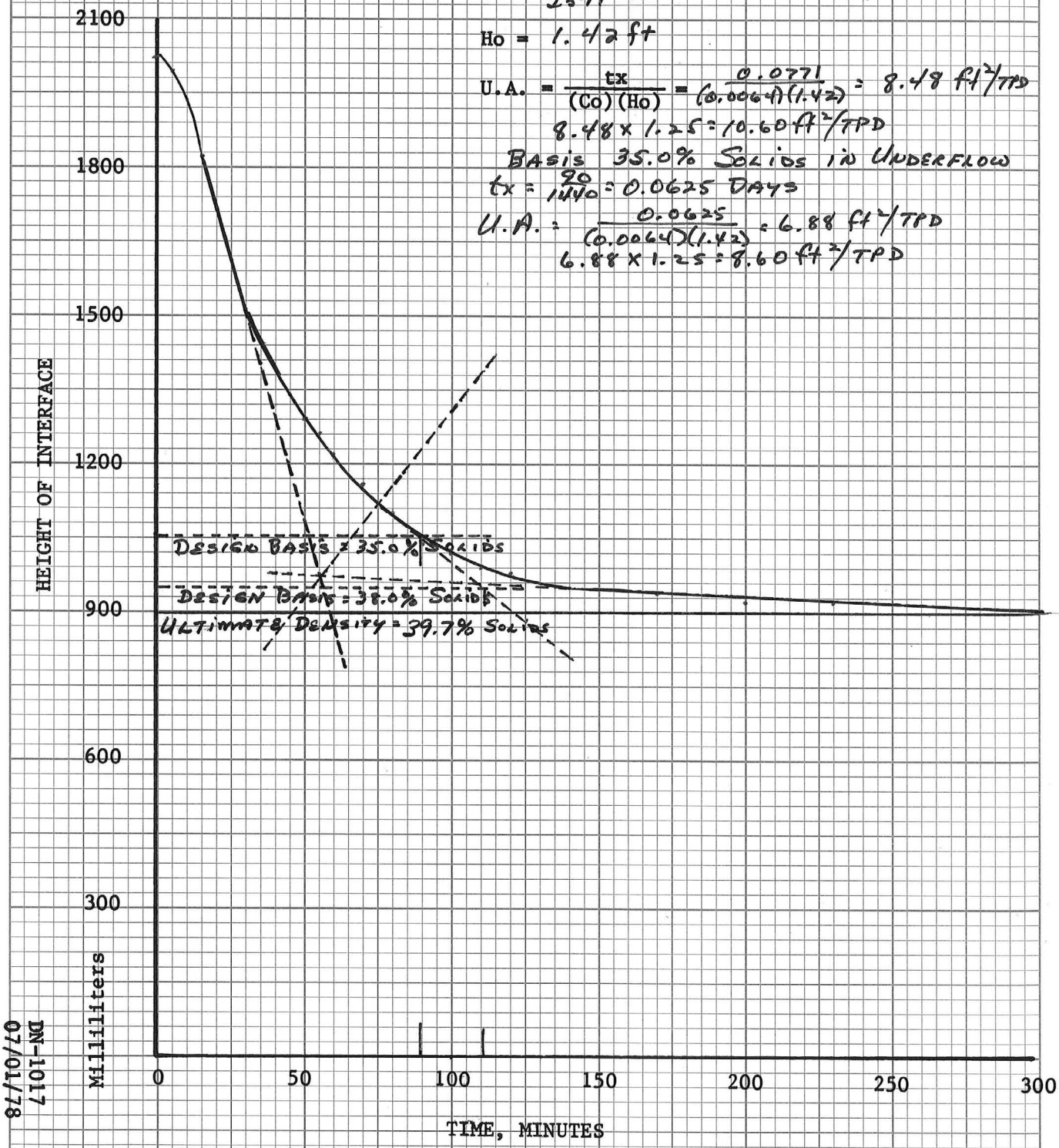
$8.48 \times 1.25 = 10.60$ ft^2/TPD

BASIS 35.0% SOLIDS IN UNDERFLOW

$tx = \frac{90}{1440} = 0.0625$ DAYS

$U.A. = \frac{0.0625}{(0.0064)(1.42)} = 6.88$ ft^2/TPD

$6.88 \times 1.25 = 8.60$ ft^2/TPD



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Impart No. 93-0392
Date: 11/14/78

Customer Minerals Exploration
User Anderson Ranch, Arizona
Test No. A3
Type of Sample Uranium Ore
Polymer Nalco 7871
Dosage 0.6114 lbs/Ton D.S.
Calculations: Basis 38.0 % solids in underflow

$tx = \frac{109}{1440} = 0.0757$ Days

$Co = \frac{491.1}{2396} \div 32 = 0.0064$ Tons/ft^3

$Ho = 1.42$ ft^2

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0757}{(0.0064)(1.42)} = 8.33$ ft^2/TPD

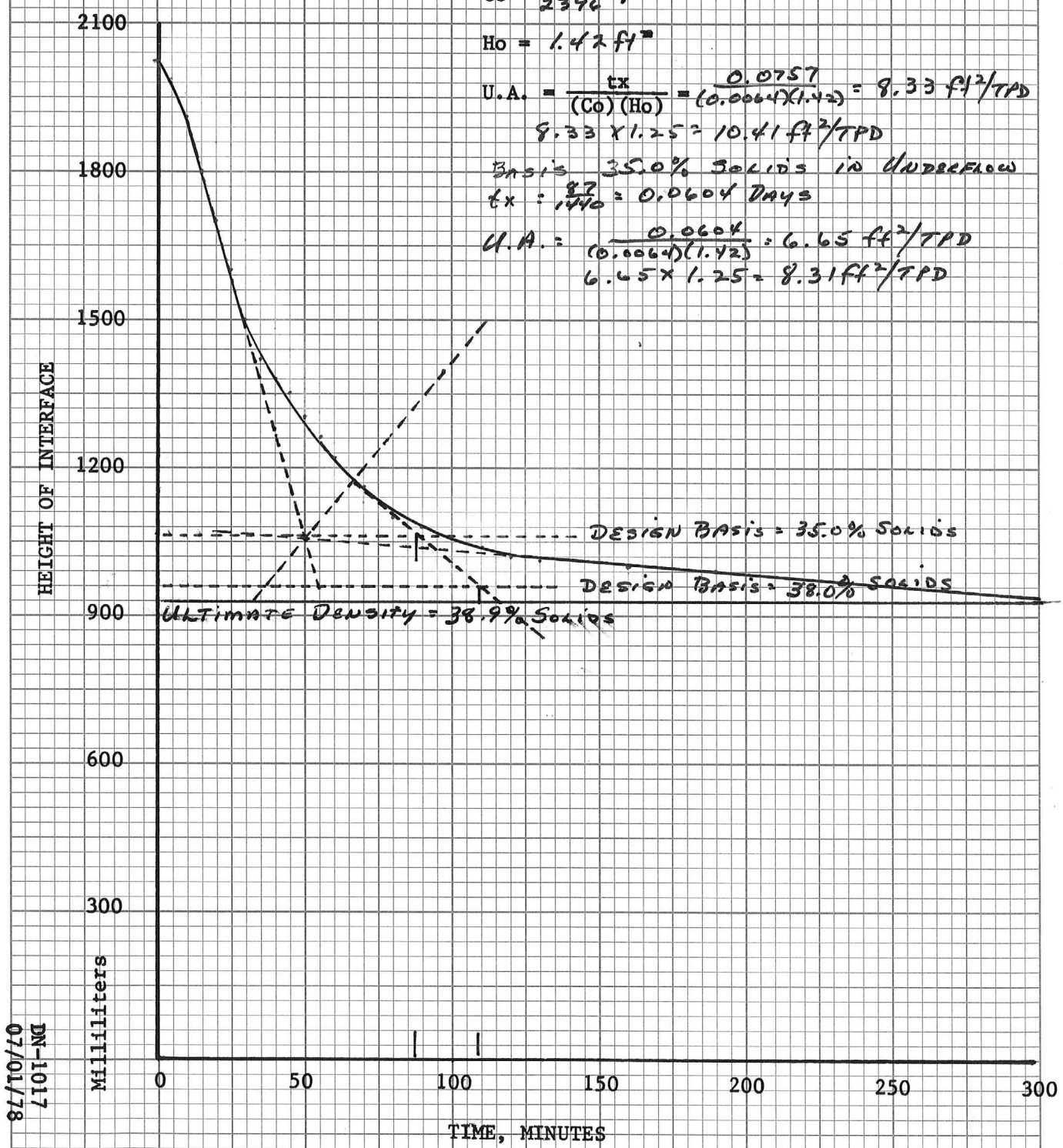
$8.33 \times 1.25 = 10.41$ ft^2/TPD

Basis 35.0% Solids in Underflow

$tx = \frac{87}{1440} = 0.0604$ Days

$U.A. = \frac{0.0604}{(0.0064)(1.42)} = 6.65$ ft^2/TPD

$6.65 \times 1.25 = 8.31$ ft^2/TPD



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WESTERN REGION, DENVER OFFICE #0775

Impart No. 93-0392
Date: 11/14/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. A-4
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.8344 lbs./TON D.S.
Calculations: Basis 35.0 % solids in underflow

$tx = \frac{97}{1440} = 0.0639$ DAYS

$Co = \frac{479.5}{2389} \div 32 = 0.0063$ TONS/ft³

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0639}{(0.0063)(1.42)} = 7.14$ ft²/TPD

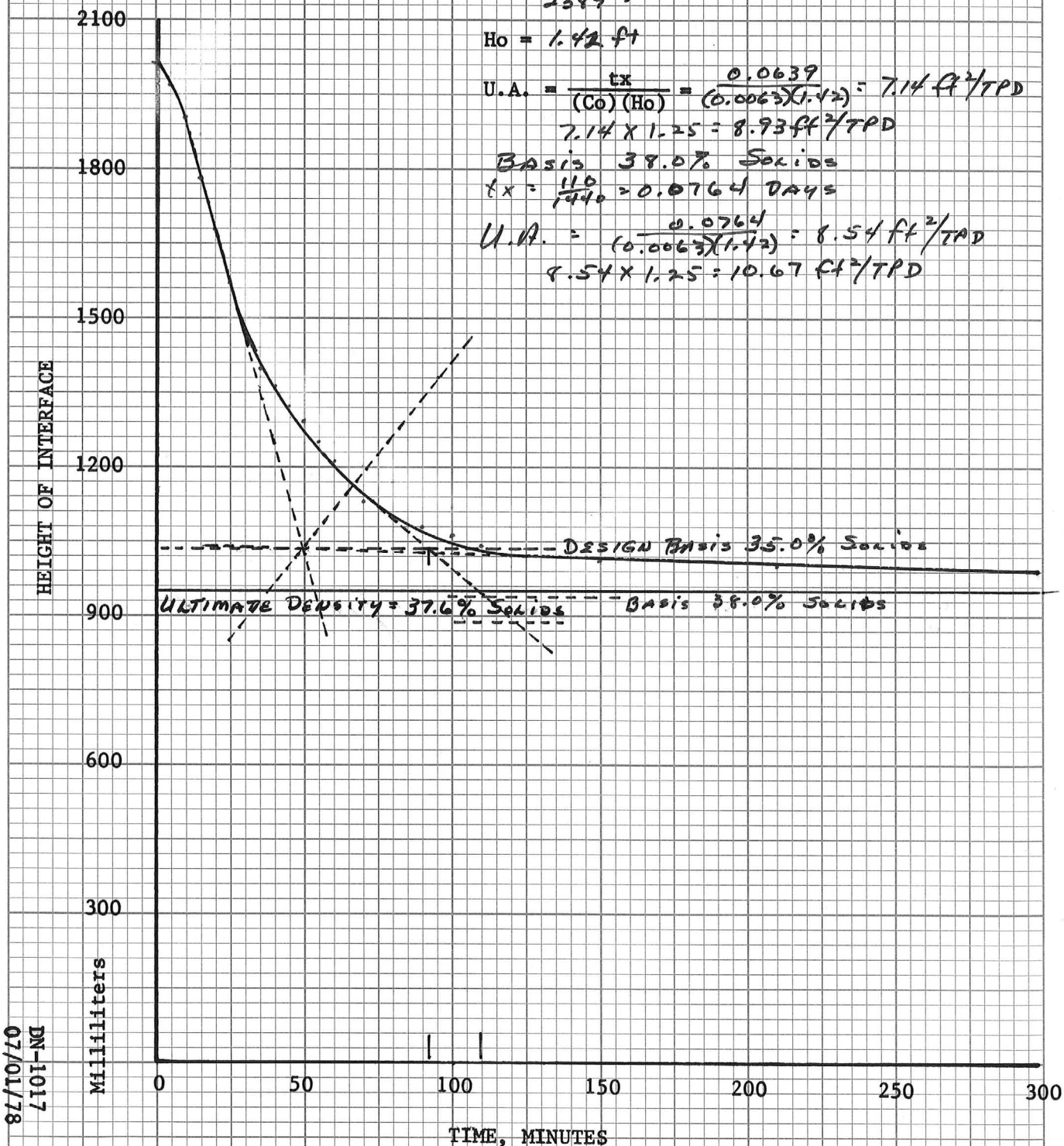
$7.14 \times 1.25 = 8.93$ ft²/TPD

Basis 38.0% Solids

$tx = \frac{110}{1440} = 0.0764$ DAYS

$U.A. = \frac{0.0764}{(0.0063)(1.42)} = 8.54$ ft²/TPD

$8.54 \times 1.25 = 10.67$ ft²/TPD



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WESTERN REGION, DENVER OFFICE #0775

Impart No. 93-0392
Date: 4/27/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. A-5
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.3954 lbs/TON D.S.
Calculations: Basis 38.0 % solids in underflow

$tx = \frac{78}{1440} = 0.0542$ DAYS

$Co = \frac{486.4}{2389} \div 32 = 0.0064$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0542}{(0.0064)(1.42)} = 5.96$ ft^2/TPD

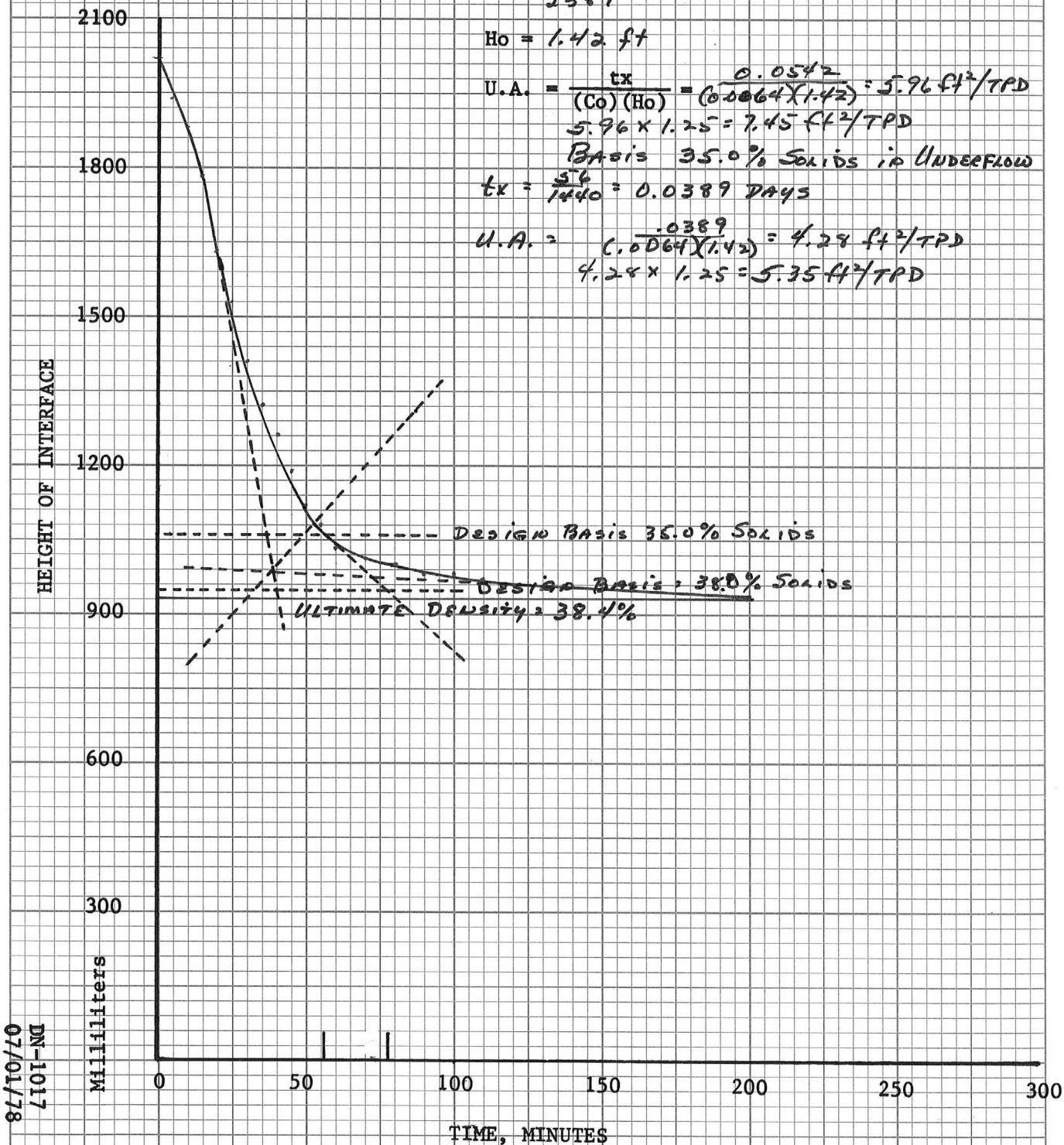
$5.96 \times 1.25 = 7.45$ ft^2/TPD

BASIS 35.0% SOLIDS IN UNDERFLOW

$tx = \frac{56}{1440} = 0.0389$ DAYS

$U.A. = \frac{.0389}{(.0064)(1.42)} = 4.28$ ft^2/TPD

$4.28 \times 1.25 = 5.35$ ft^2/TPD



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Impart No. 93-0392
Date: 11/27/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. A-6
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.2986 lbs/TON D.S.
Calculations: Basis 35.0 % solids in underflow

$tx = \frac{87}{1440} = 0.0604$ DAYS

$Co = \frac{486.3}{2391} \div 32 = 0.0064$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0604}{(0.0064)(1.42)} = 6.65$ ft^2/TPD

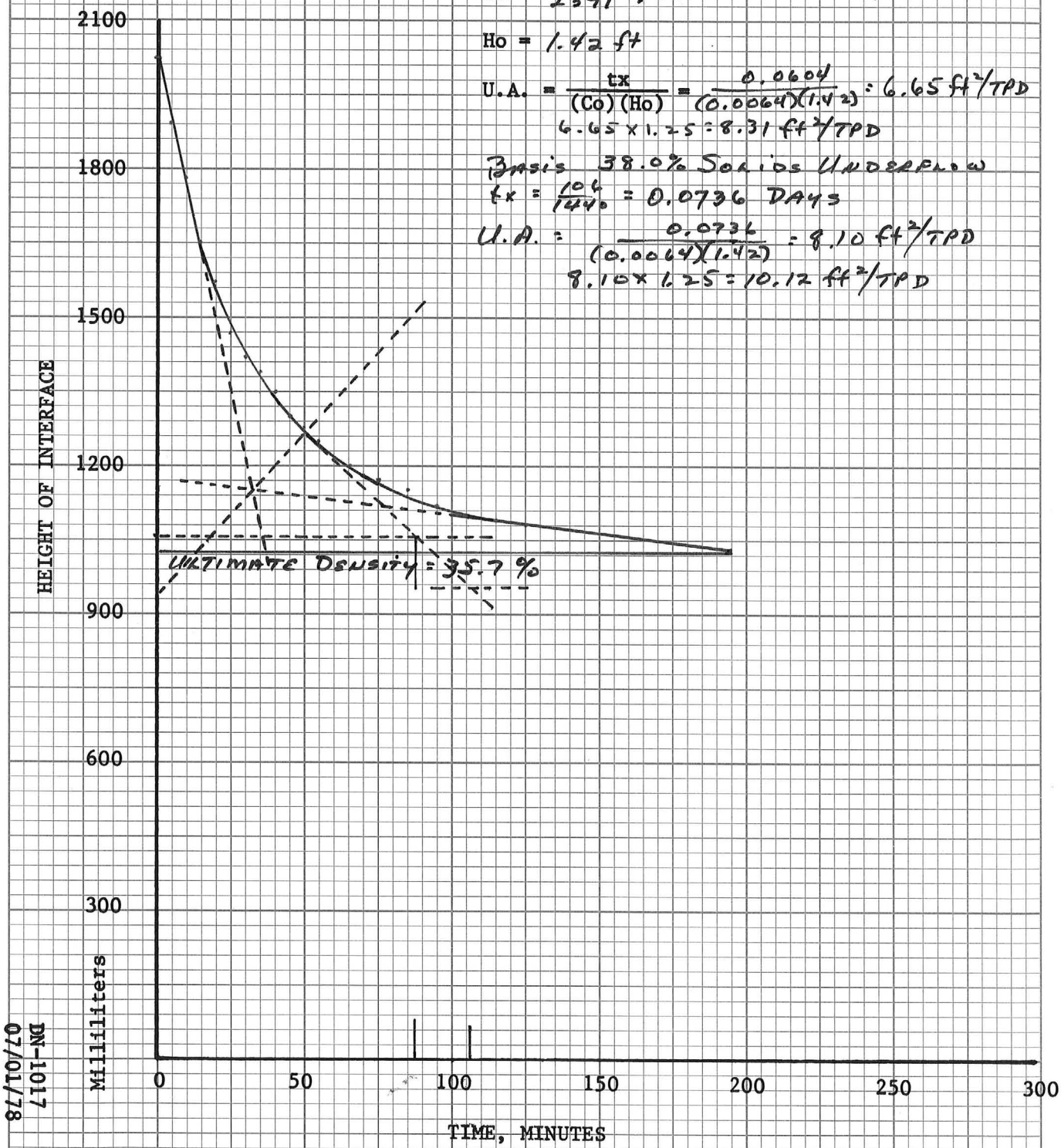
$6.65 \times 1.25 = 8.31$ ft^2/TPD

Basis 38.0% SOLIDS UNDERFLOW

$tx = \frac{104}{1440} = 0.0736$ DAYS

$U.A. = \frac{0.0736}{(0.0064)(1.42)} = 8.10$ ft^2/TPD

$8.10 \times 1.25 = 10.12$ ft^2/TPD



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Impart No. 93-0392
Date: 11/27/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. A-7
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.1958 lbs/TON D.S.
Calculations: Basis 35.0 % solids in underflow

$tx = \frac{87}{1440} = 0.0604$ DAYS

$Co = \frac{491.1}{2396} \div 32 = 0.0064$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0604}{(0.0064)(1.42)} = 6.65\ ft^2/TPD$

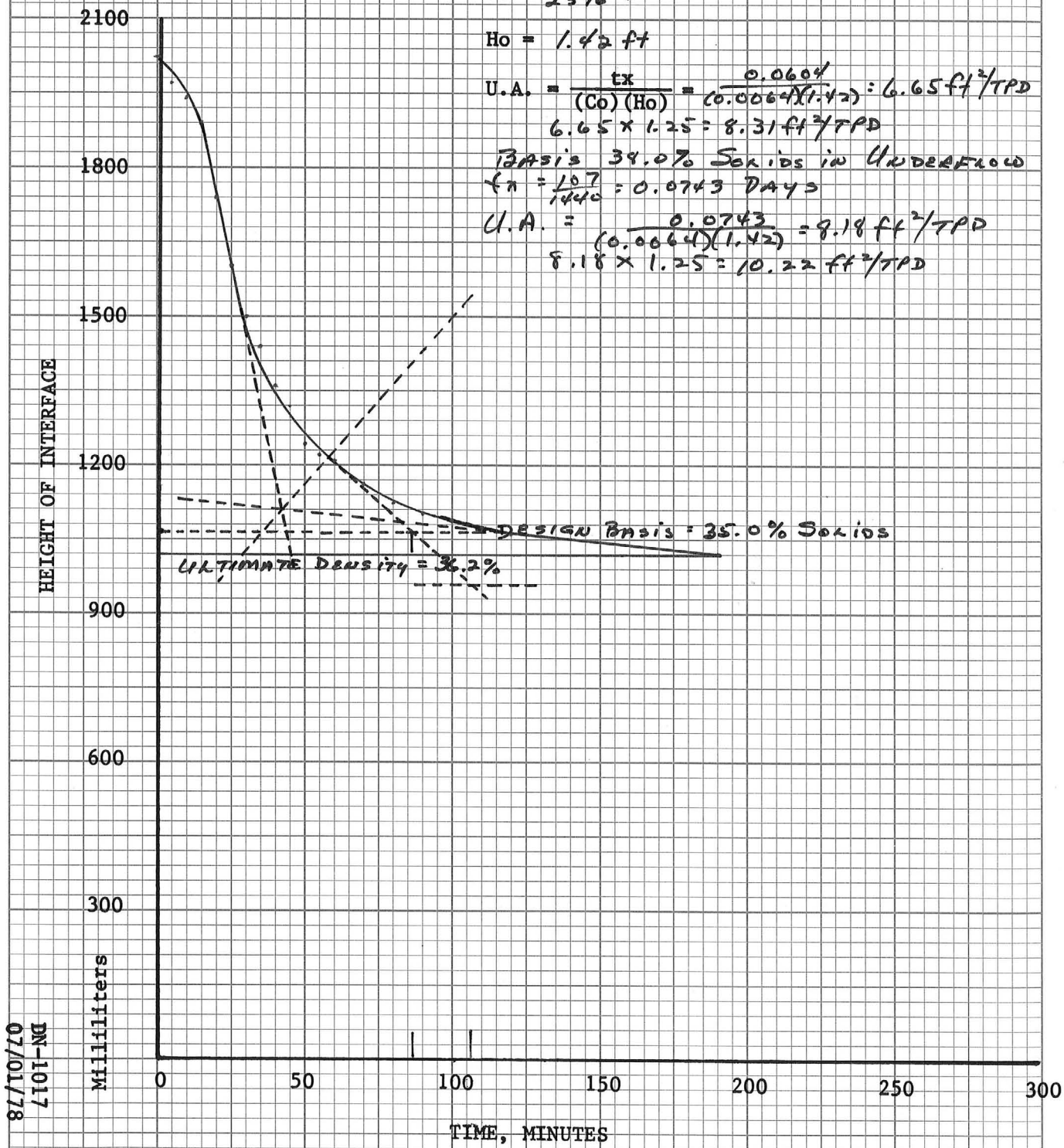
$6.65 \times 1.25 = 8.31\ ft^2/TPD$

BASIS 34.0% SOLIDS IN UNDERFLOW

$tx = \frac{107}{1440} = 0.0743$ DAYS

$U.A. = \frac{0.0743}{(0.0064)(1.42)} = 8.18\ ft^2/TPD$

$8.18 \times 1.25 = 10.22\ ft^2/TPD$



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Impart No. 93-0392
Date: 11/27/78

Customer: Minerals Exploration
User: Anderson Ranch, Arizona
Test No. A-8
Type of Sample: Uranium Ore
Polymer: Nalco 7871
Dosage: 0.1003 lbs/ton D.S.
Calculations: Basis 35.0 % solids in underflow

$tx = \frac{76}{1440} = 0.0528$ Days

$Co = \frac{479.5}{2389} \div 32 = 0.0063$ Tons/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0528}{(0.0063)(1.42)} = 5.90$ ft^2/TPD

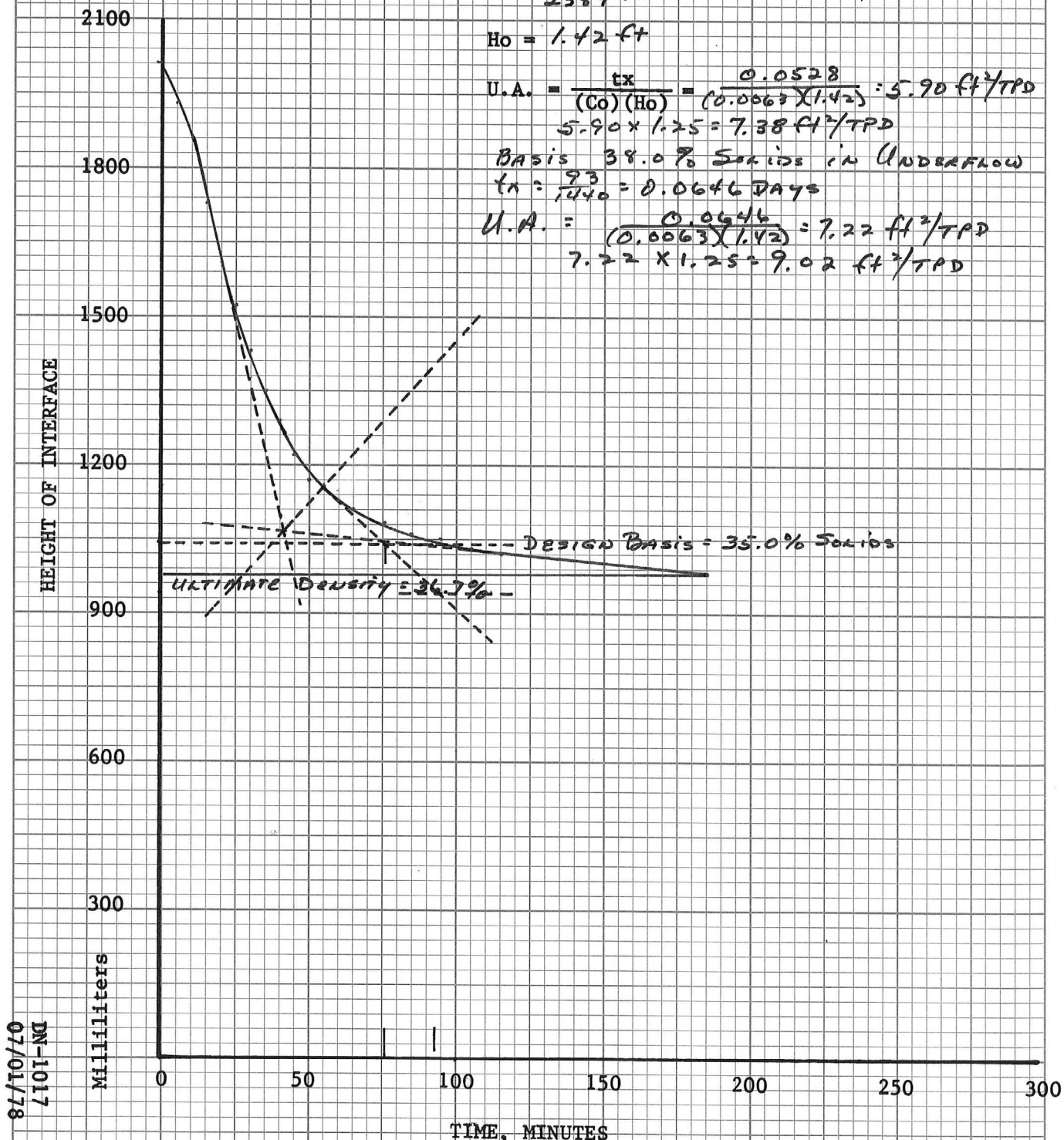
$5.90 \times 1.25 = 7.38$ ft^2/TPD

Basis 38.0% Solids in Underflow

$tx = \frac{93}{1440} = 0.0646$ Days

$U.A. = \frac{0.0646}{(0.0063)(1.42)} = 7.22$ ft^2/TPD

$7.22 \times 1.25 = 9.02$ ft^2/TPD



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Impart No. 93-0392
Date: 11/28/78

Customer Minerals Exploration
User Anderson Ranch, Arizona
Test No. A-9
Type of Sample Uranium Ore
Polymer Nalco 7871
Dosage 0.0485 lbs/ton D.S.

Calculations: Basis 38.0 % solids in underflow

$tx = \frac{111}{1440} = 0.0771$ Days

$Co = \frac{486.4}{2389} \div 32 = 0.0064$ Tons/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0771}{(0.0064)(1.42)} = 8.48$ ft^3/TPD

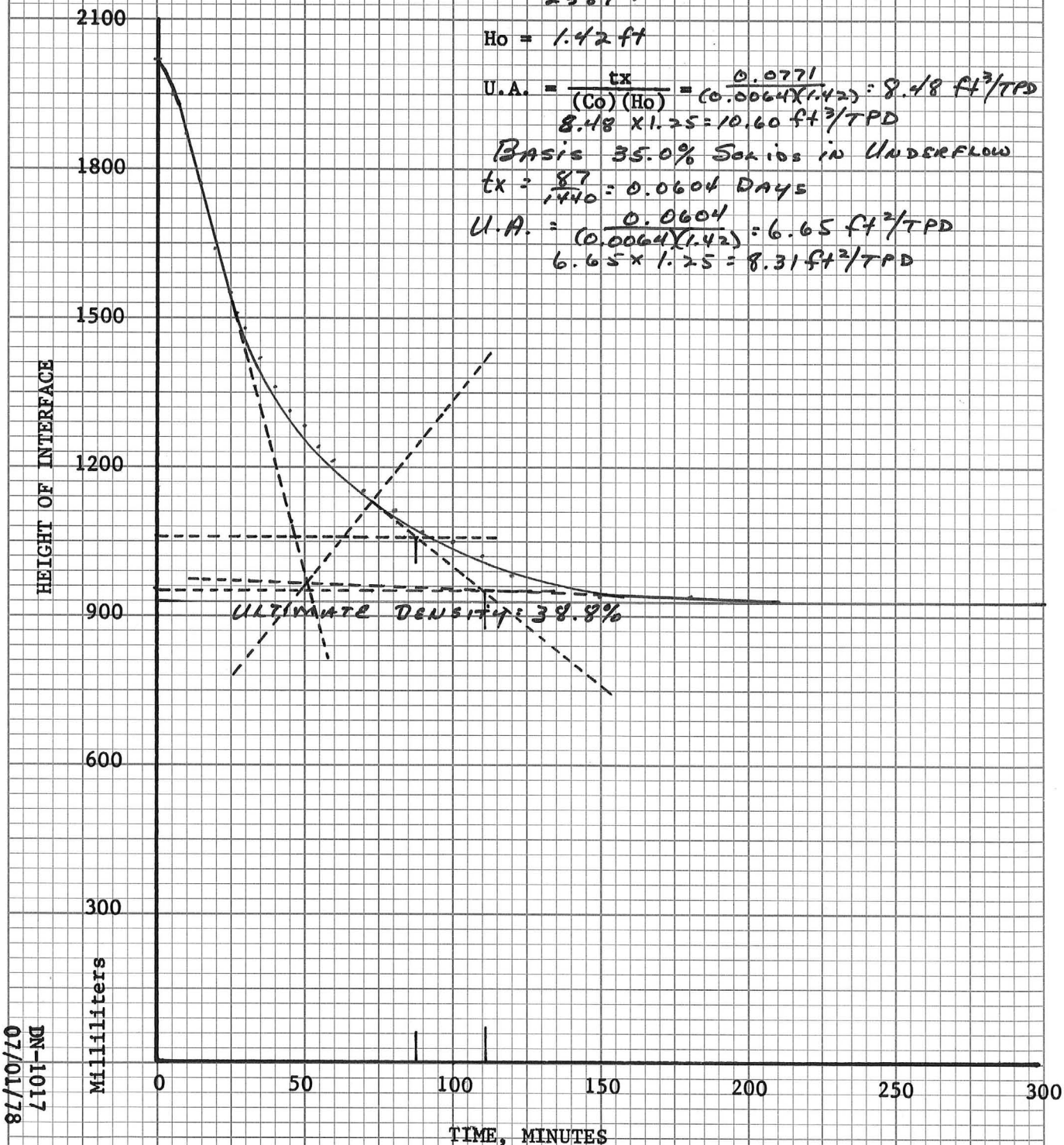
$8.48 \times 1.25 = 10.60$ ft^3/TPD

Basis 35.0% Solids in Underflow

$tx = \frac{87}{1440} = 0.0604$ Days

$U.A. = \frac{0.0604}{(0.0064)(1.42)} = 6.65$ ft^2/TPD

$6.65 \times 1.25 = 8.31$ ft^2/TPD



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ENVIROTECH PROCESS EQUIPMENT
WESTERN REGION, DENVER OFFICE #0775

Impart No. 93-0392
Date: 11/28/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. A-10
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.0999 lbs/TON D.S.

Calculations: Basis 35.0 % solids in underflow

$tx = \frac{58}{1440} = 0.0403$ DAYS

$Co = \frac{486.3}{2391} \div 32 = 0.0064$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0403}{(0.0064)(1.42)} = 4.43\ ft^2/TPD$

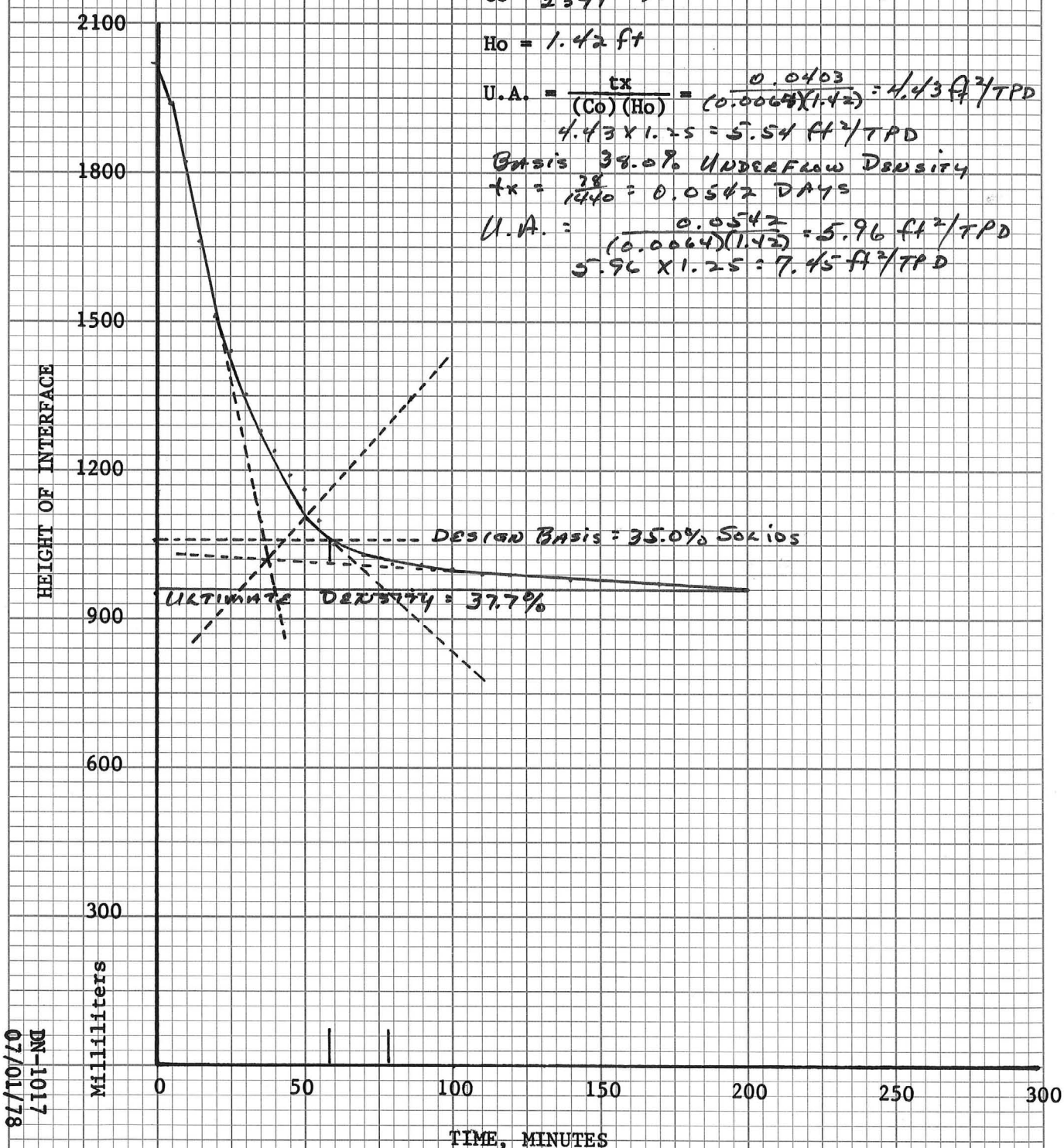
$4.43 \times 1.25 = 5.54\ ft^2/TPD$

Basis 38.0% UNDERFLOW DENSITY

$tx = \frac{78}{1440} = 0.0542$ DAYS

$U.A. = \frac{0.0542}{(0.0064)(1.42)} = 5.96\ ft^2/TPD$

$5.96 \times 1.25 = 7.45\ ft^2/TPD$



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Impart No. 93-0392
Date: 11/28/78

Customer Minerals Exploration
User Anderson Ranch, Arizona
Test No. A-11
Type of Sample Uranium Ore
Polymer Nalco 7871
Dosage 0.1459 lbs/ton D.S.

Calculations: Basis 35.0% solids in underflow

$tx = \frac{20}{1440} = 0.0468$ Days

$Co = \frac{491.1}{2396} \div 32 = 0.0064$ Tons/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0468}{(0.0064)(1.42)} = 5.15$ ft^2/TPD

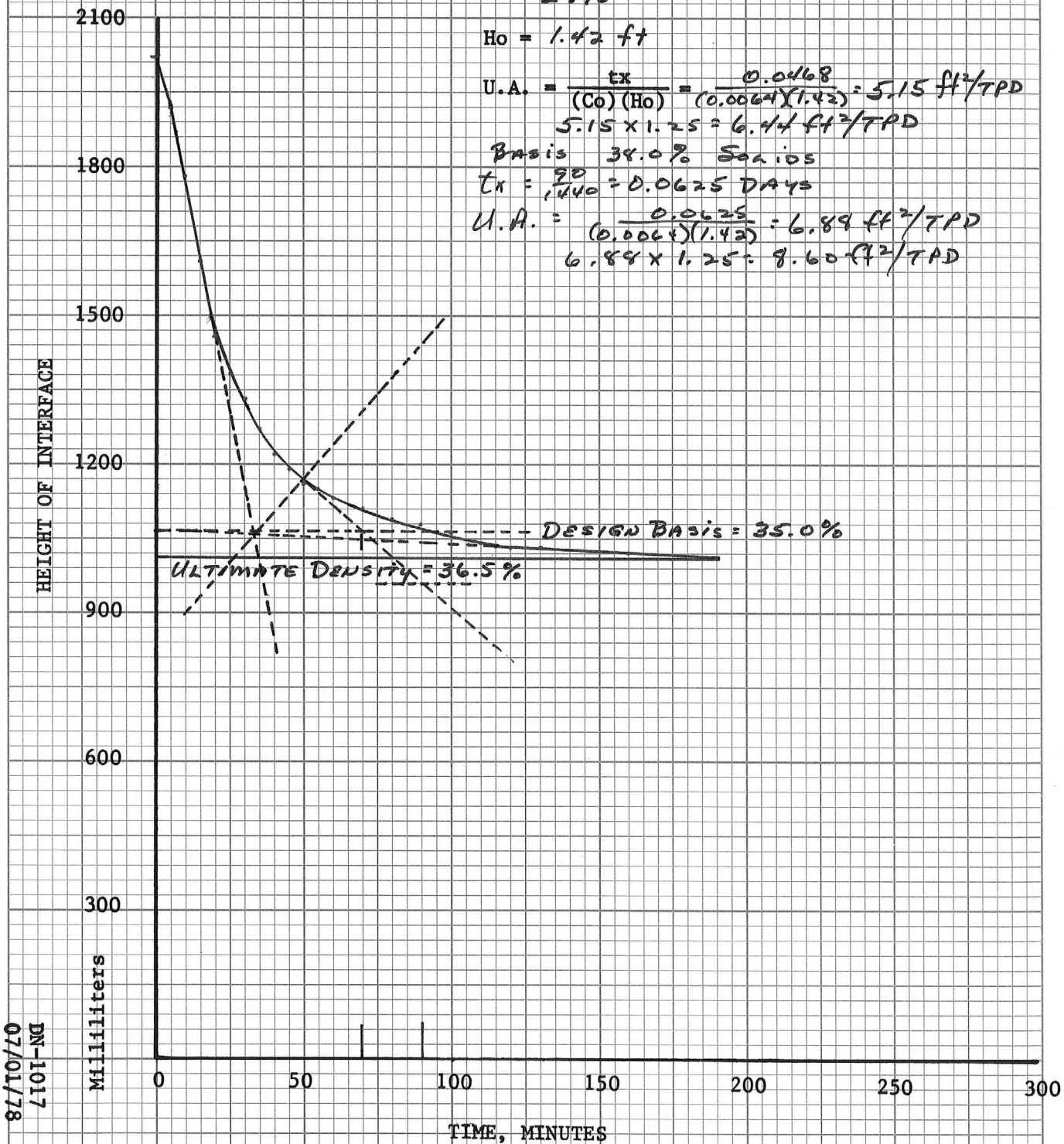
$5.15 \times 1.25 = 6.44$ ft^2/TPD

Basis 38.0% Solids

$tx = \frac{90}{1440} = 0.0625$ Days

$U.A. = \frac{0.0625}{(0.0064)(1.42)} = 6.88$ ft^2/TPD

$6.88 \times 1.25 = 8.60$ ft^2/TPD



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ENVIROTECH PROCESS EQUIPMENT
WESTERN REGION, DENVER OFFICE #0775

Impart No. 93-0392
Date: 11/28/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. A-12
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.2005 lbs/TON D.S.
Calculations: Basis 35.0 % solids in underflow

$tx = \frac{71}{1440} = 0.0493$ DAYS

$Co = \frac{479.5}{2389} \div 32 = 0.0063$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0493}{(0.0063)(1.42)} = 5.51$ ft^2/TPD

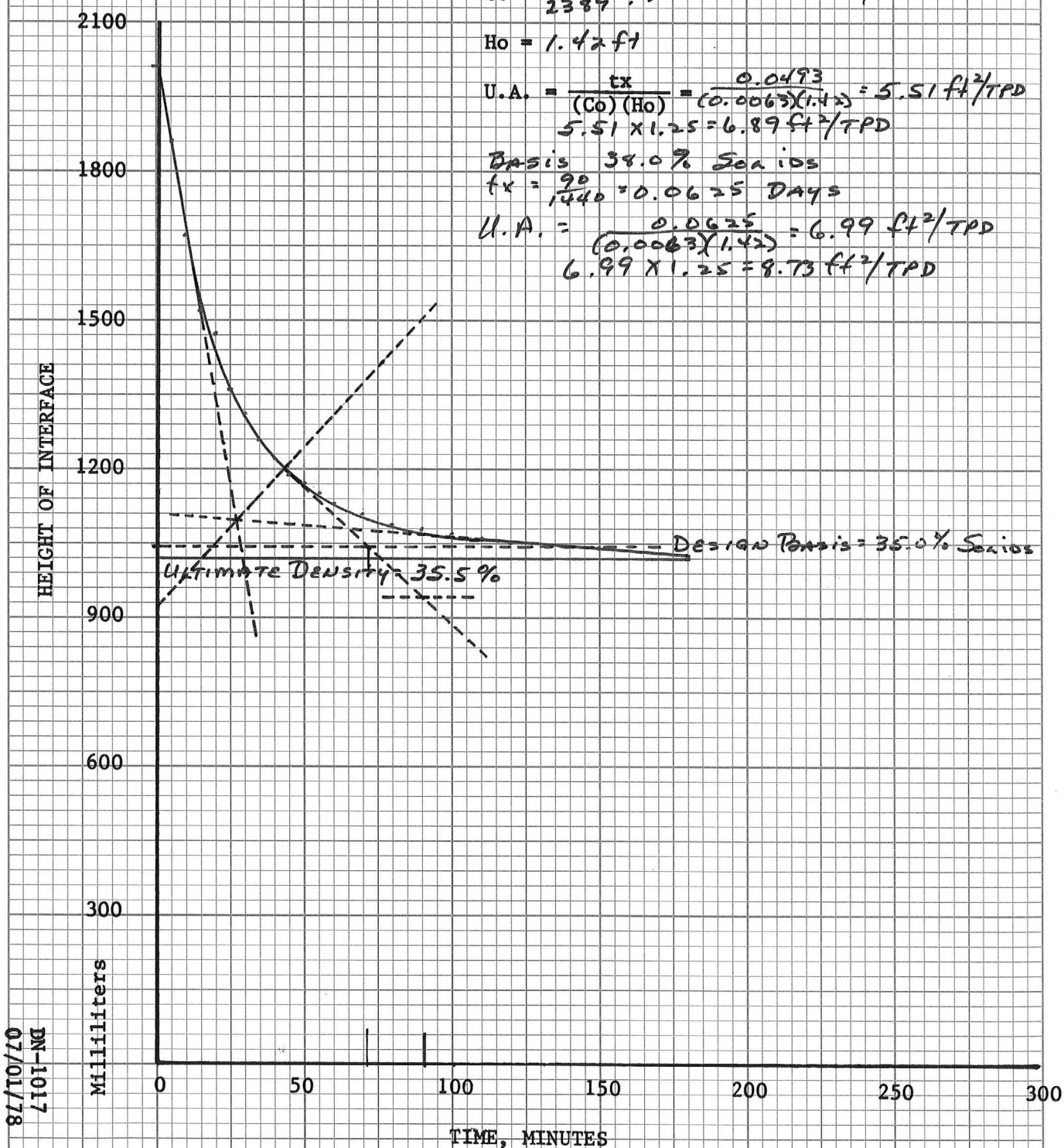
$5.51 \times 1.25 = 6.89$ ft^2/TPD

Basis 38.0% Solids

$tx = \frac{90}{1440} = 0.0625$ DAYS

$U.A. = \frac{0.0625}{(0.0063)(1.42)} = 6.99$ ft^2/TPD

$6.99 \times 1.25 = 8.73$ ft^2/TPD



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Impart No. 93-0392
Date: 11/28/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. B-1
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.2225 lbs/TON D.S.
Calculations: Basis 35.0 % solids in underflow

$tx = \frac{38}{1440} = 0.0264$ DAYS

$Co = \frac{216.1}{2196} \div 32 = 0.0031$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0264}{(0.0031)(1.42)} = 6.00$ ft^2/TPD

$6.00 \times 1.25 = 7.50$ ft^2/TPD

BASIS 38.0% SOLIDS IN UNDERFLOW

$tx = \frac{43}{1440} = 0.0299$ DAYS

$U.A. = \frac{0.0299}{(0.0031)(1.42)} = 6.79$ ft^2/TPD

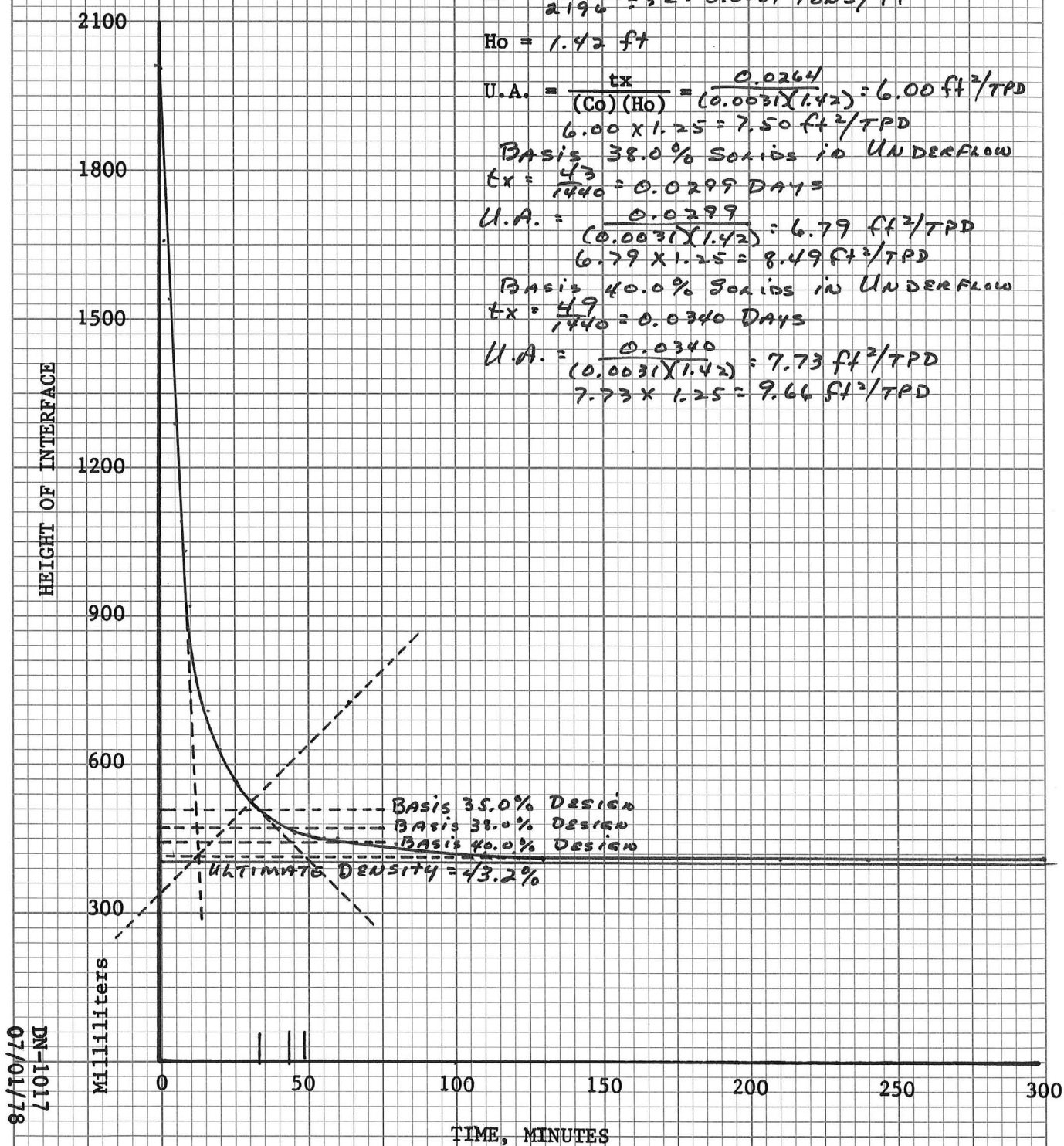
$6.79 \times 1.25 = 8.49$ ft^2/TPD

BASIS 40.0% SOLIDS IN UNDERFLOW

$tx = \frac{49}{1440} = 0.0340$ DAYS

$U.A. = \frac{0.0340}{(0.0031)(1.42)} = 7.73$ ft^2/TPD

$7.73 \times 1.25 = 9.66$ ft^2/TPD



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Impart No. 93-0392
Date: 11/28/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. B-2
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.4659 lbs/TON D.S.

Calculations: Basis 35.0 % solids in underflow

$tx = \frac{27}{1440} = 0.0188$ DAYS

$Co = \frac{214.2}{2190} \div 32 = 0.0031$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0188}{(0.0031)(1.42)} = 4.27$ ft^2/TPD

$4.27 \times 1.25 = 5.34$ ft^2/TPD

BASIS 38.0% SOLIDS IN UNDERFLOW

$tx = \frac{33}{1440} = 0.0229$ DAYS

$U.A. = \frac{0.0229}{(0.0031)(1.42)} = 5.21$ ft^2/TPD

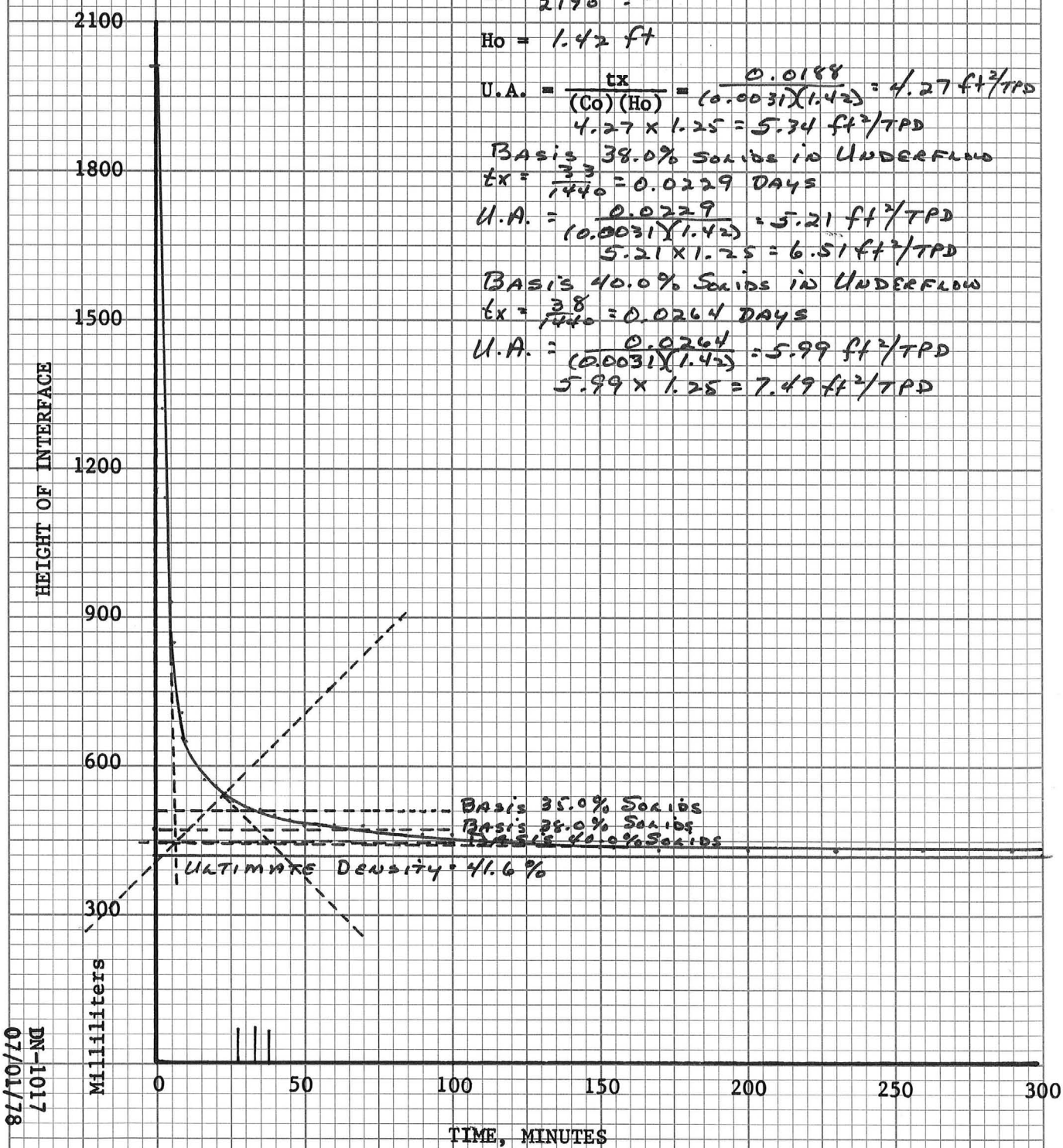
$5.21 \times 1.25 = 6.51$ ft^2/TPD

BASIS 40.0% SOLIDS IN UNDERFLOW

$tx = \frac{38}{1440} = 0.0264$ DAYS

$U.A. = \frac{0.0264}{(0.0031)(1.42)} = 5.99$ ft^2/TPD

$5.99 \times 1.25 = 7.49$ ft^2/TPD



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Impart No. 93-0392
Date: 11/28/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. B-3
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.6768 lbs/TON D.S.

Calculations: Basis 35.0 % solids in underflow

$tx = \frac{30}{1440} = 0.0208$ DAYS

$Co = \frac{218.5}{2200} \div 32 = 0.0031$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0208}{(0.0031)(1.42)} = 4.73\ ft^2/TPD$

$4.73 \times 1.25 = 5.91\ ft^2/TPD$

Basis 38.0% Solids in Underflow

$tx = \frac{37}{1440} = 0.0257$ DAYS

$U.A. = \frac{0.0257}{(0.0031)(1.42)} = 5.84\ ft^2/TPD$

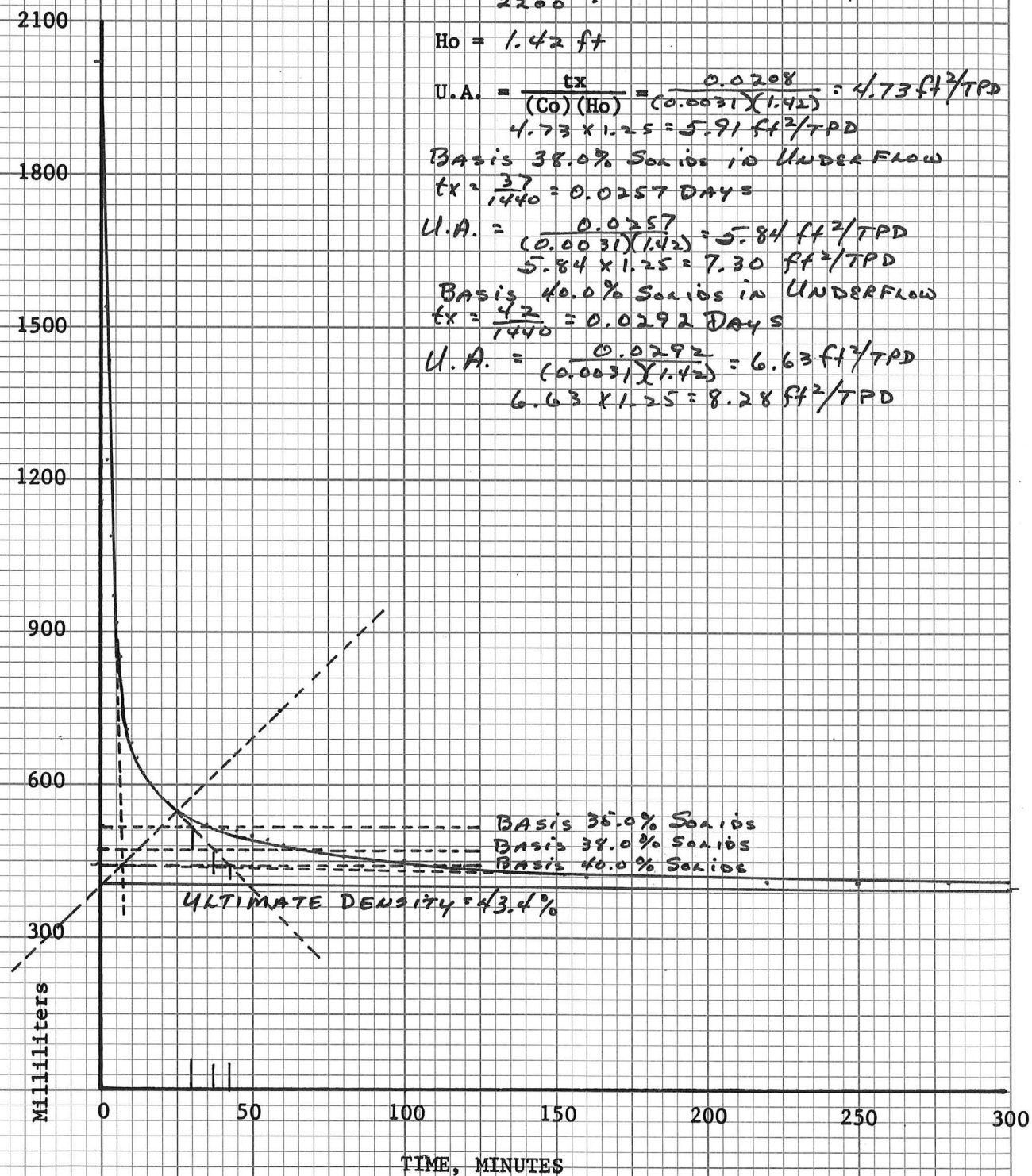
$5.84 \times 1.25 = 7.30\ ft^2/TPD$

Basis 40.0% Solids in Underflow

$tx = \frac{42}{1440} = 0.0292$ DAYS

$U.A. = \frac{0.0292}{(0.0031)(1.42)} = 6.63\ ft^2/TPD$

$6.63 \times 1.25 = 8.28\ ft^2/TPD$



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Impart No. 93-0392
Date: 11/28/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. B-4
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.5754 lbs/TON D.S.
Calculations: Basis 35.0 % solids in underflow

$tx = \frac{38}{1440} = 0.0264$ DAYS

$Co = \frac{216.0}{2193} \div 32 = 0.0031$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0264}{(0.0031)(1.42)} = 6.00$ ft^2/TPD

$6.00 \times 1.25 = 7.50$ ft^2/TPD

Basis 38.0% Solids

$tx = \frac{46}{1440} = 0.0319$ DAYS

$U.A. = \frac{0.0319}{(0.0031)(1.42)} = 7.26$ ft^2/TPD

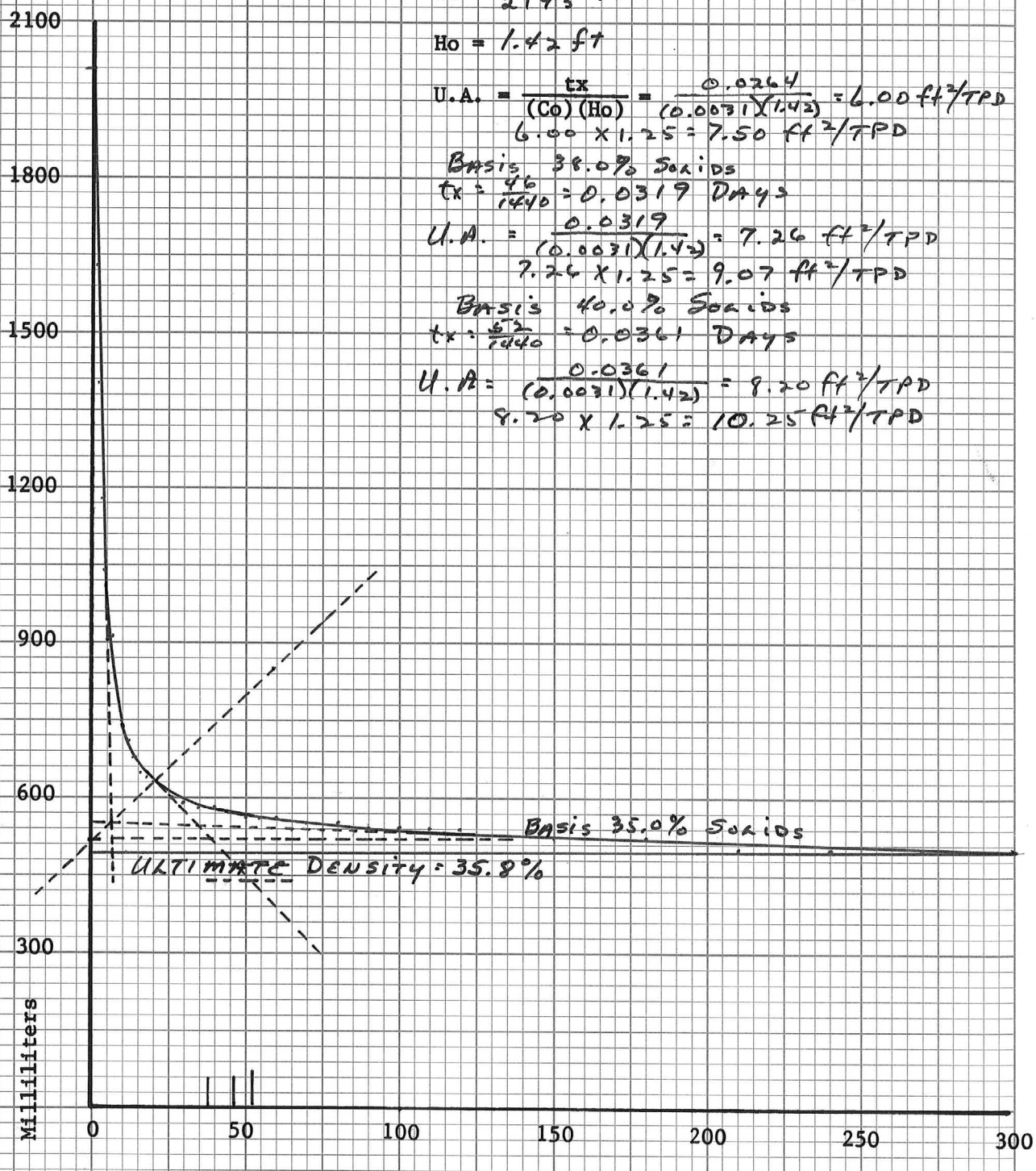
$7.26 \times 1.25 = 9.07$ ft^2/TPD

Basis 40.0% Solids

$tx = \frac{52}{1440} = 0.0361$ DAYS

$U.A. = \frac{0.0361}{(0.0031)(1.42)} = 8.20$ ft^2/TPD

$8.20 \times 1.25 = 10.25$ ft^2/TPD



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Impart No. 93-0392
Date: 11/28/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. B-5
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.3317 lbs/TON D.S.
Calculations: Basis 35.0 % solids in underflow

$tx = \frac{27}{1440} = 0.0188$ DAYS

$Co = \frac{216.1}{2196} \div 32 = 0.0031$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0188}{(0.0031)(1.42)} = 4.27$ ft^2/TPD

$4.27 \times 1.25 = 5.34$ ft^2/TPD

BASIS 38.0% SOLIDS IN UNDERFLOW

$tx = \frac{34}{1440} = 0.0236$ DAYS

$U.A. = \frac{0.0236}{(0.0031)(1.42)} = 5.36$ ft^2/TPD

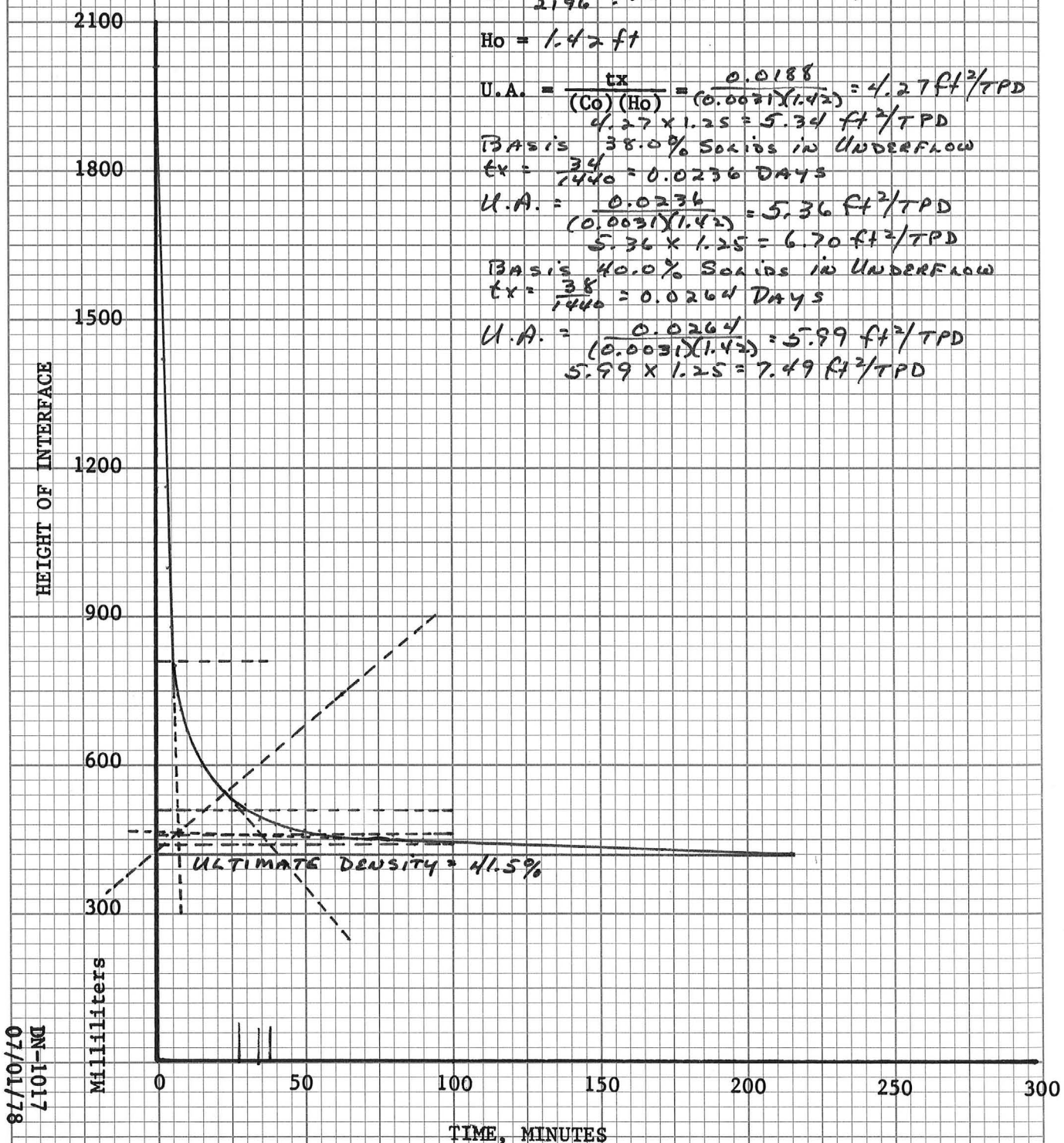
$5.36 \times 1.25 = 6.70$ ft^2/TPD

BASIS 40.0% SOLIDS IN UNDERFLOW

$tx = \frac{38}{1440} = 0.0264$ DAYS

$U.A. = \frac{0.0264}{(0.0031)(1.42)} = 5.99$ ft^2/TPD

$5.99 \times 1.25 = 7.49$ ft^2/TPD



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Impart No. 93-0392
Date: 11/29/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. B-6
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.2795 lbs/TON D.S.

Calculations: Basis 35.0 % solids in underflow

$tx = \frac{36}{1440} = 0.0250$ DAYS

$Co = \frac{214.2}{2190} \div 32 = 0.0031$ TONS/ft³

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0250}{(0.0031)(1.42)} = 5.68$ ft²/TPD

$5.68 \times 1.25 = 7.10$ ft²/TPD

Basis 38.0% Solids

$tx = \frac{41}{1440} = 0.0285$ DAYS

$U.A. = \frac{0.0285}{(0.0031)(1.25)} = 6.47$ ft²/TPD

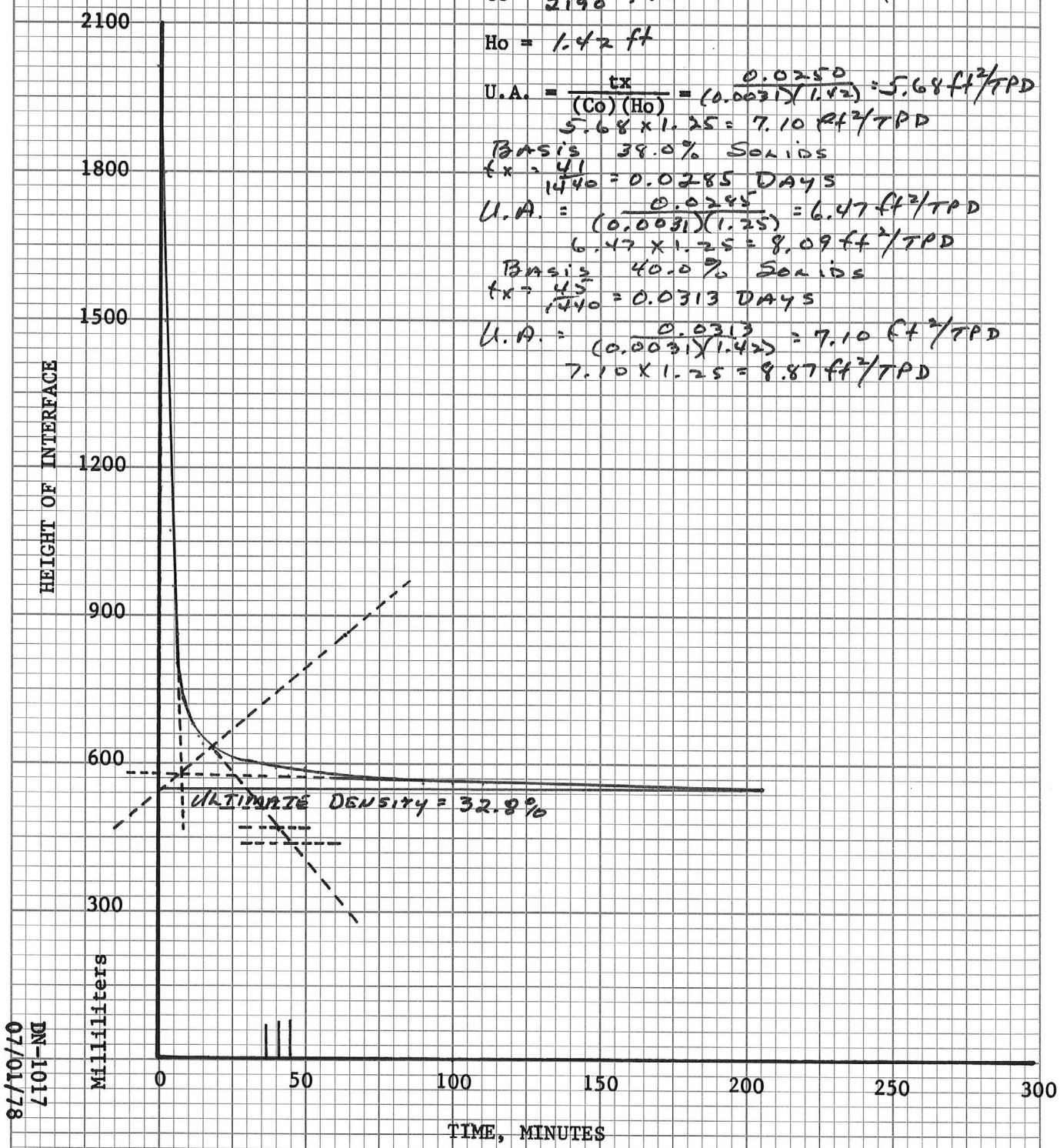
$6.47 \times 1.25 = 8.09$ ft²/TPD

Basis 40.0% Solids

$tx = \frac{45}{1440} = 0.0313$ DAYS

$U.A. = \frac{0.0313}{(0.0031)(1.42)} = 7.10$ ft²/TPD

$7.10 \times 1.25 = 8.87$ ft²/TPD



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Impart No. 93-0392
Date: 11/29/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. B-7
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.1080 lbs/TON D.S.
Calculations: Basis 35.0 % solids in underflow

$tx = \frac{46}{1440} = 0.0319$ DAYS

$Co = \frac{214.5}{2200} \div 32 = 0.0031$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0319}{(0.0031)(1.42)} = 7.25$ ft^2/TPD

$7.25 \times 1.25 = 9.06$ ft^2/TPD

Basis 38.0% Solids

$tx = \frac{49}{1440} = 0.0340$ DAYS

$U.A. = \frac{0.0340}{(0.0031)(1.42)} = 7.73$ ft^2/TPD

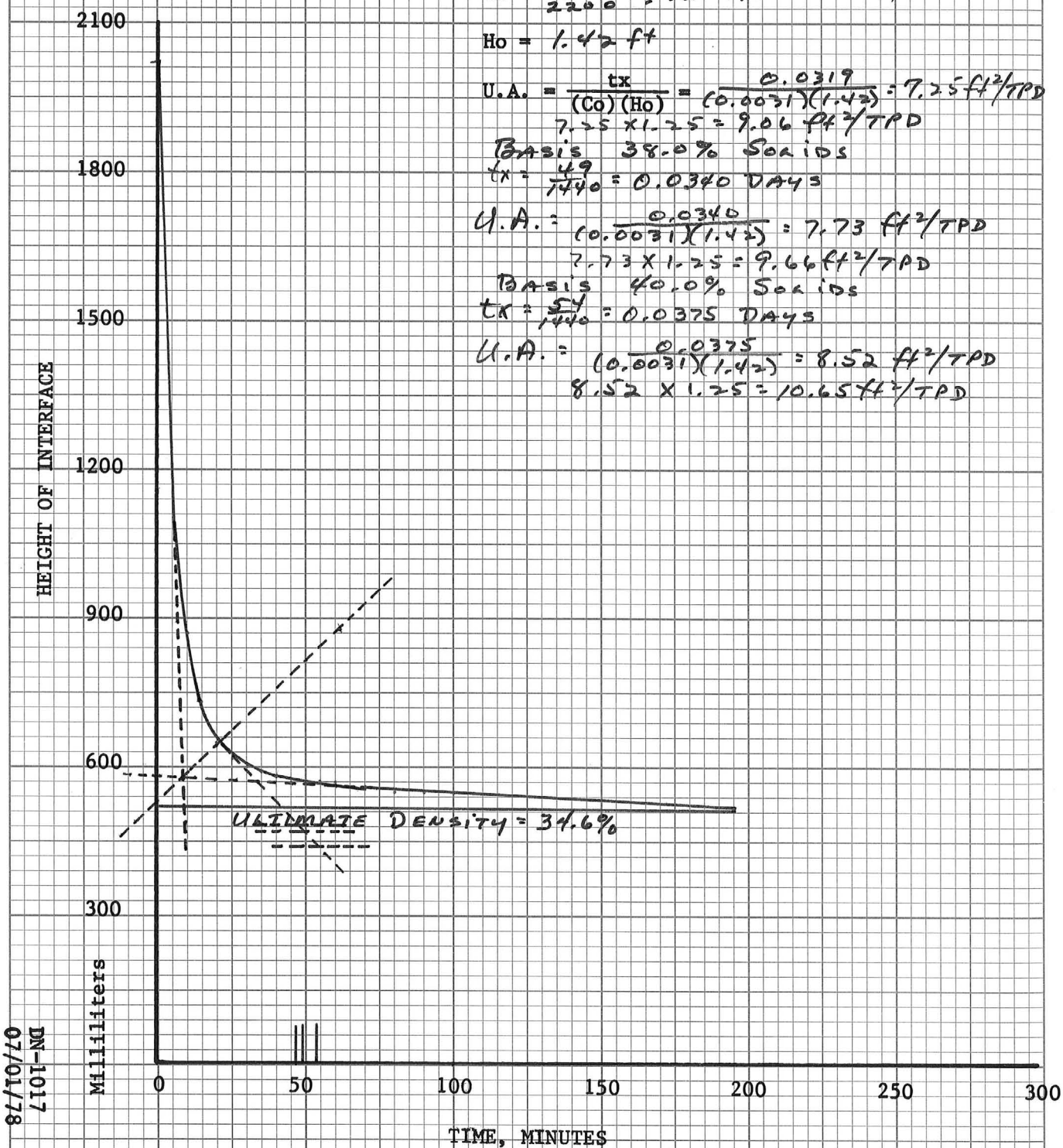
$7.73 \times 1.25 = 9.66$ ft^2/TPD

Basis 40.0% Solids

$tx = \frac{54}{1440} = 0.0375$ DAYS

$U.A. = \frac{0.0375}{(0.0031)(1.42)} = 8.52$ ft^2/TPD

$8.52 \times 1.25 = 10.65$ ft^2/TPD



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Impart No. 93-0392
Date: 11/29/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. B-8
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.2226 lbs/TON D.S.

Calculations: Basis 35.0 % solids in underflow

$tx = \frac{38}{1440} = 0.0264$ Days

$Co = \frac{216.0}{2193} \div 32 = 0.0031$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0264}{(0.0031)(1.42)} = 6.00\ ft^2/TPD$

$6.00 \times 1.25 = 7.50\ ft^2/TPD$

Basis 38.0% Solids

$tx = \frac{45}{1440} = 0.0313$ DAYS

$U.A. = \frac{0.0313}{(0.0031)(1.42)} = 7.10\ ft^2/TPD$

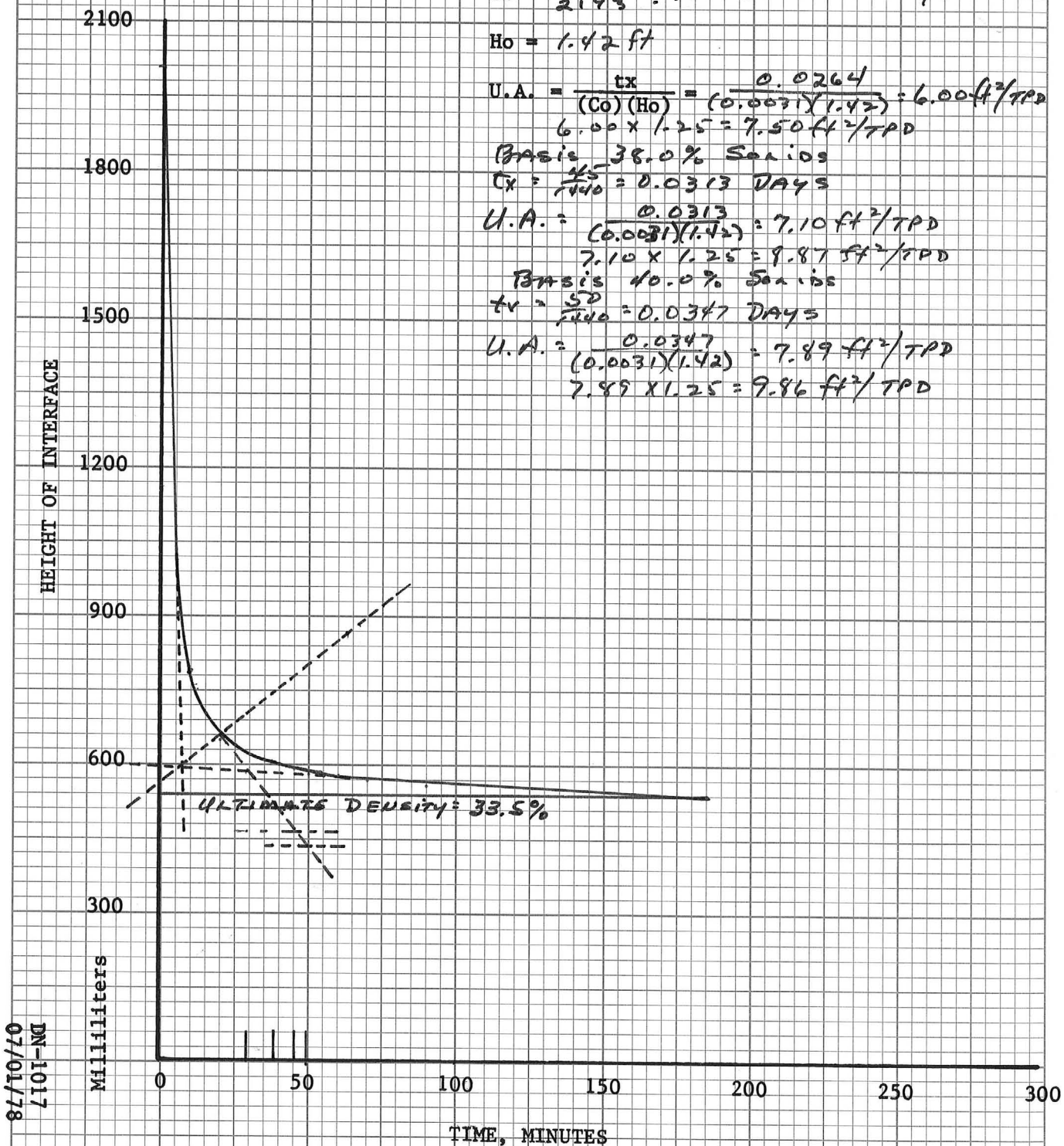
$7.10 \times 1.25 = 8.87\ ft^2/TPD$

Basis 40.0% Solids

$tx = \frac{50}{1440} = 0.0347$ DAYS

$U.A. = \frac{0.0347}{(0.0031)(1.42)} = 7.89\ ft^2/TPD$

$7.89 \times 1.25 = 9.86\ ft^2/TPD$



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Impart No. 93-0392
Date: 11/29/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. B-9
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.0546 lbs/TON D.S.

Calculations: Basis 35.0 % solids in underflow

$tx = \frac{38}{1440} = 0.0194$ DAYS

$Co = \frac{216.1}{2196} \div 32 = 0.0031$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0194}{(0.0031)(1.42)} = 4.41\ ft^2/TPD$

$4.41 \times 1.25 = 5.51\ ft^2/TPD$

Basis 38.0% Solids

$tx = \frac{35}{1440} = 0.0243$ DAYS

$U.A. = \frac{0.0243}{(0.0031)(1.42)} = 5.52\ ft^2/TPD$

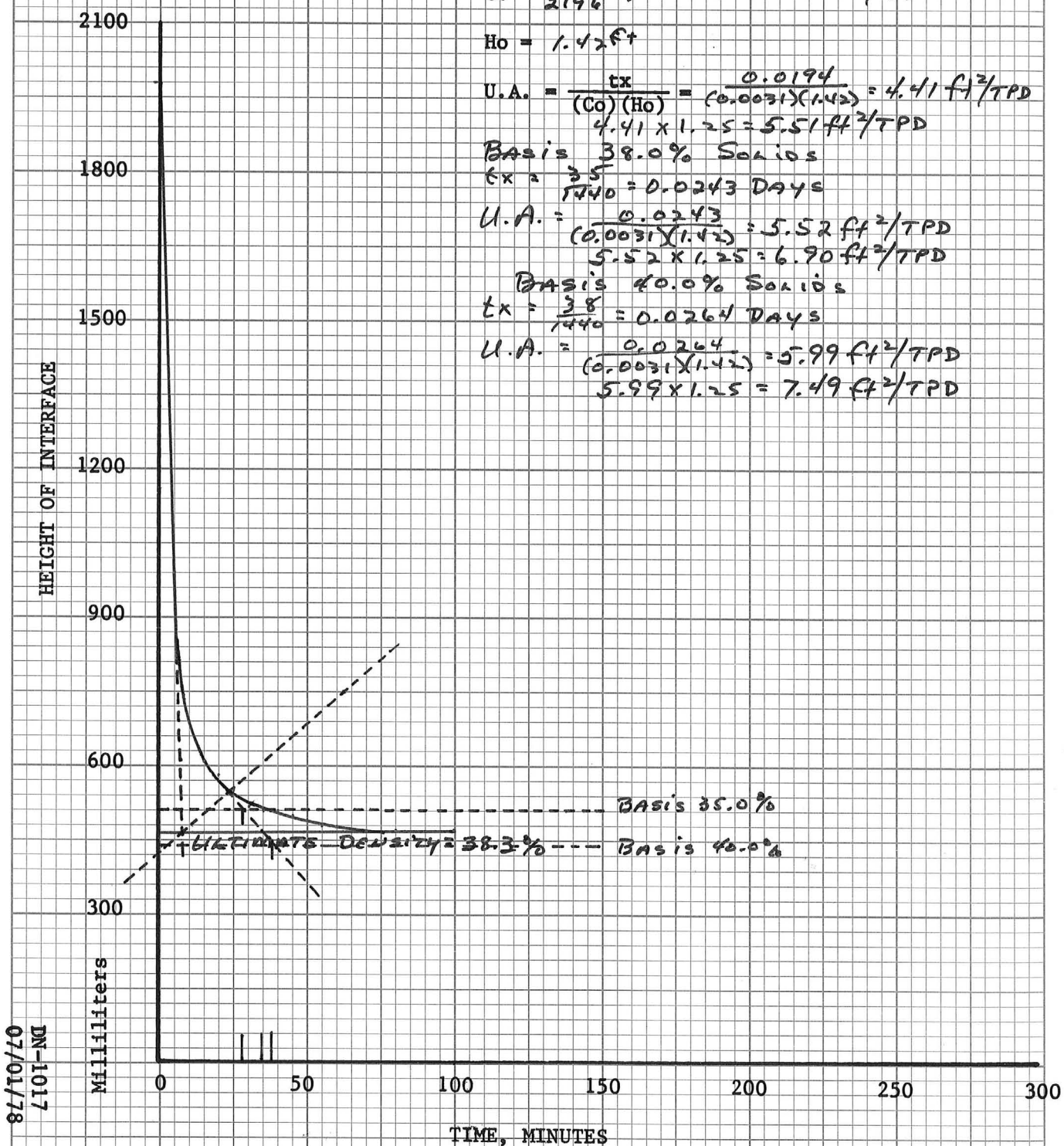
$5.52 \times 1.25 = 6.90\ ft^2/TPD$

Basis 40.0% Solids

$tx = \frac{38}{1440} = 0.0264$ DAYS

$U.A. = \frac{0.0264}{(0.0031)(1.42)} = 5.99\ ft^2/TPD$

$5.99 \times 1.25 = 7.49\ ft^2/TPD$



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WESTERN REGION, DENVER OFFICE #0775

Impart No. 93-0392
Date: 11/29/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. B-10
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.0932 lbs/TON D.S.

Calculations: Basis 35.0 % solids in underflow

$tx = \frac{35}{1440} = 0.0243$ DAYS

$Co = \frac{214.2}{2190} \div 32 = 0.0031$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0243}{(0.0031)(1.42)} = 5.52$ ft^2/TPD

$5.52 \times 1.25 = 6.90$ ft^2/TPD

Basis 38.0% Solids

$tx = \frac{42}{1440} = 0.0292$ DAYS

$U.A. = \frac{0.0292}{(0.0031)(1.42)} = 6.63$ ft^2/TPD

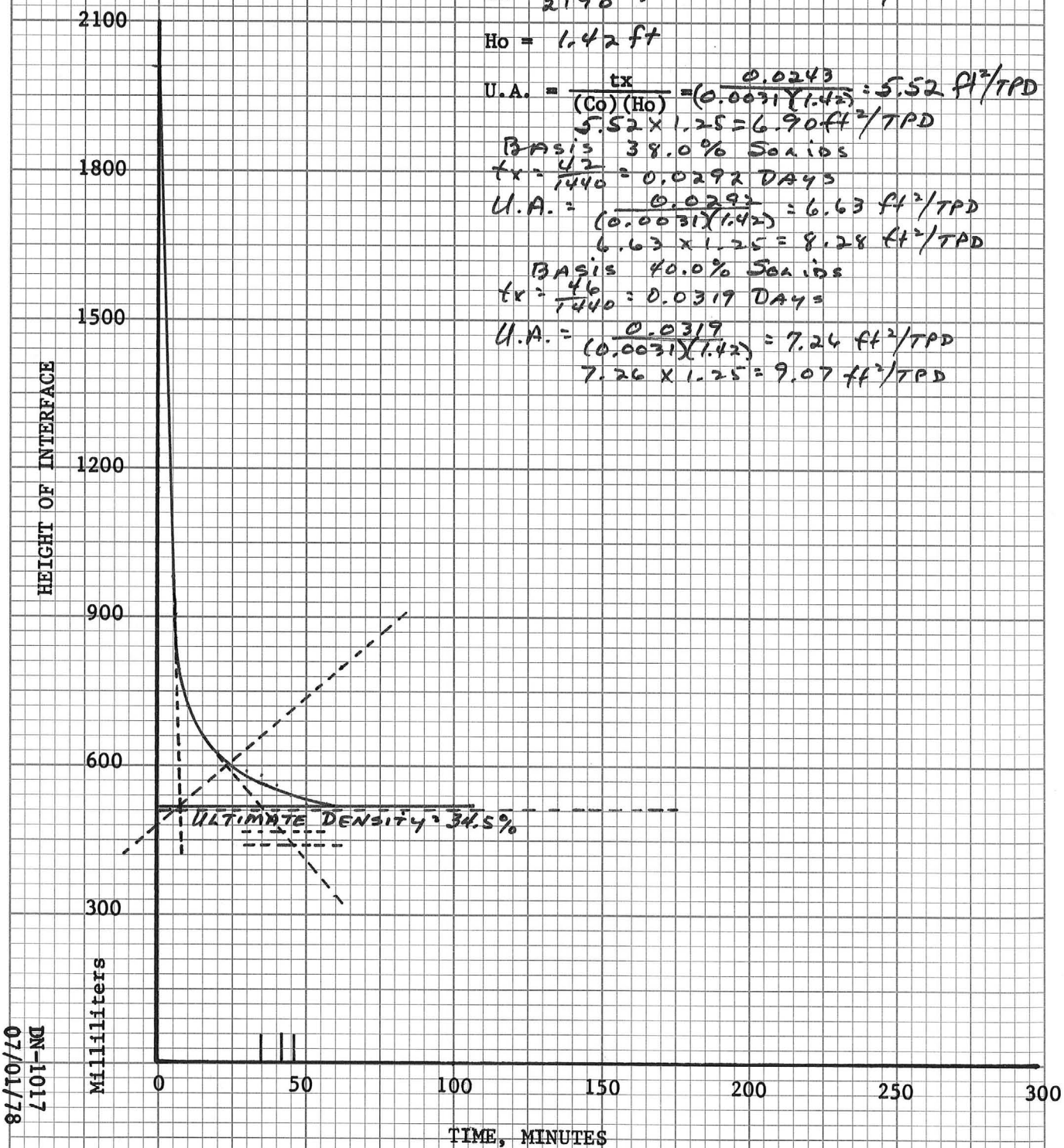
$6.63 \times 1.25 = 8.28$ ft^2/TPD

Basis 40.0% Solids

$tx = \frac{46}{1440} = 0.0319$ DAYS

$U.A. = \frac{0.0319}{(0.0031)(1.42)} = 7.24$ ft^2/TPD

$7.26 \times 1.25 = 9.07$ ft^2/TPD



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Impart No. 93-0392
Date: 11/29/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. B-11
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.1661 lbs/TON D.S.
Calculations: Basis 35.0 % solids in underflow

$tx = \frac{34}{1440} = 0.0236$ DAYS

$Co = \frac{218.5}{2200} \div 32 = 0.0031$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0236}{(0.0031)(1.42)} = 5.36$ ft^2/TPD

$5.36 \times 1.25 = 6.70$ ft^2/TPD

Basis 38.0% Solids

$tx = \frac{37}{1440} = 0.0257$ DAYS

$U.A. = \frac{0.0257}{(0.0031)(1.42)} = 5.84$ ft^2/TPD

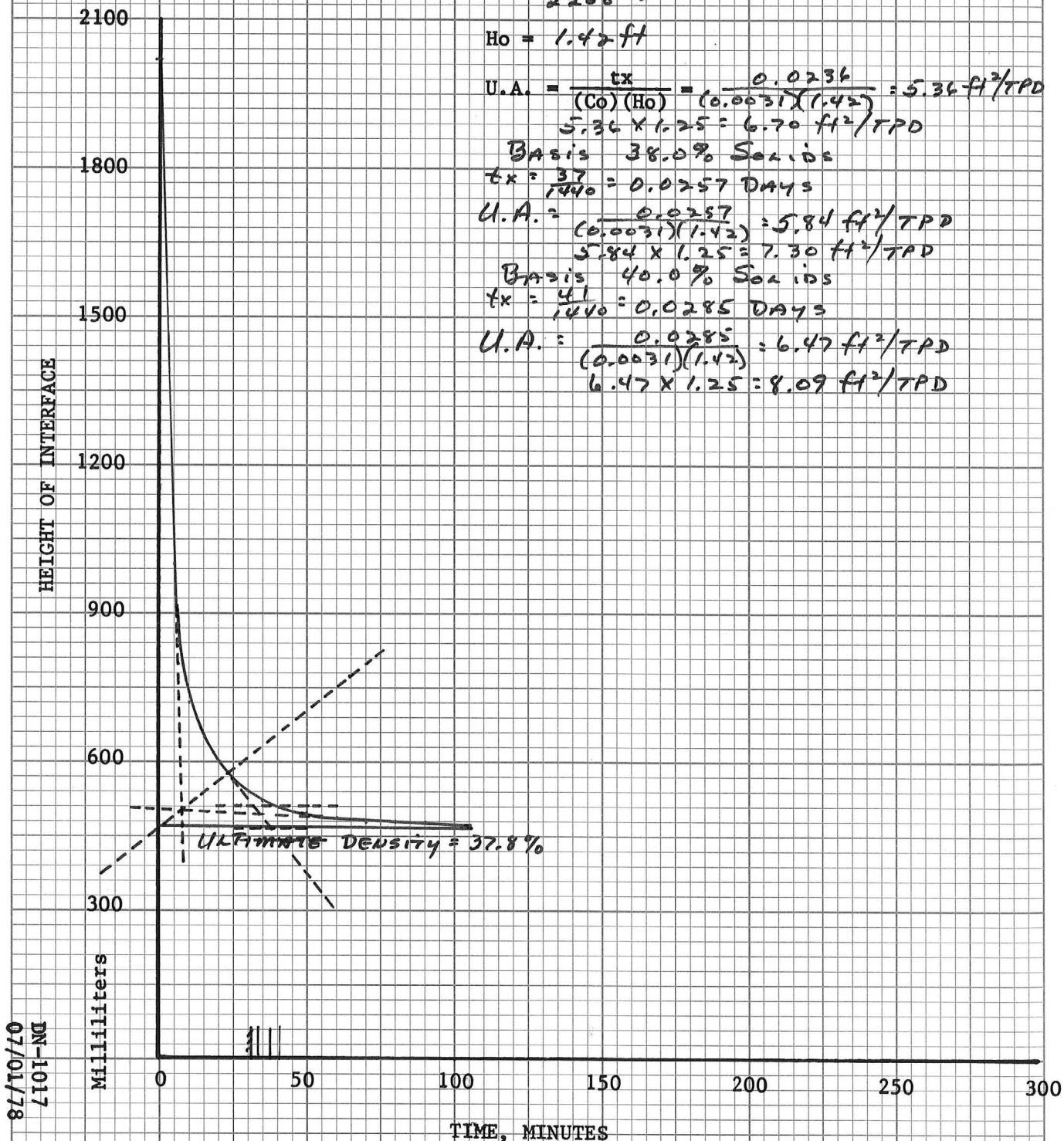
$5.84 \times 1.25 = 7.30$ ft^2/TPD

Basis 40.0% Solids

$tx = \frac{41}{1440} = 0.0285$ DAYS

$U.A. = \frac{0.0285}{(0.0031)(1.42)} = 6.47$ ft^2/TPD

$6.47 \times 1.25 = 8.09$ ft^2/TPD



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WESTERN REGION, DENVER OFFICE #0775

Impart No. 93-0392
Date: 11/29/78

Customer MINERALS EXPLORATION
User ANDERSON RANCH, ARIZONA
Test No. B-12
Type of Sample URANIUM ORE
Polymer NALCO 7871
Dosage 0.1302 lbs/TON
Calculations: Basis 35.0 % solids in underflow

$tx = \frac{50}{1440} = 0.0347$ DAYS

$Co = \frac{216.0}{2193} \div 32 = 0.0031$ TONS/ft^3

$Ho = 1.42$ ft

$U.A. = \frac{tx}{(Co)(Ho)} = \frac{0.0347}{(0.0031)(1.42)} = 7.88$ ft^2/TPD

$7.88 \times 1.25 = 9.85$

BASIS 38.0% SOLIDS

$tx = \frac{57}{1440} = 0.0396$ DAYS

$U.A. = \frac{0.0396}{(0.0031)(1.42)} = 8.99$ ft^2/TPD

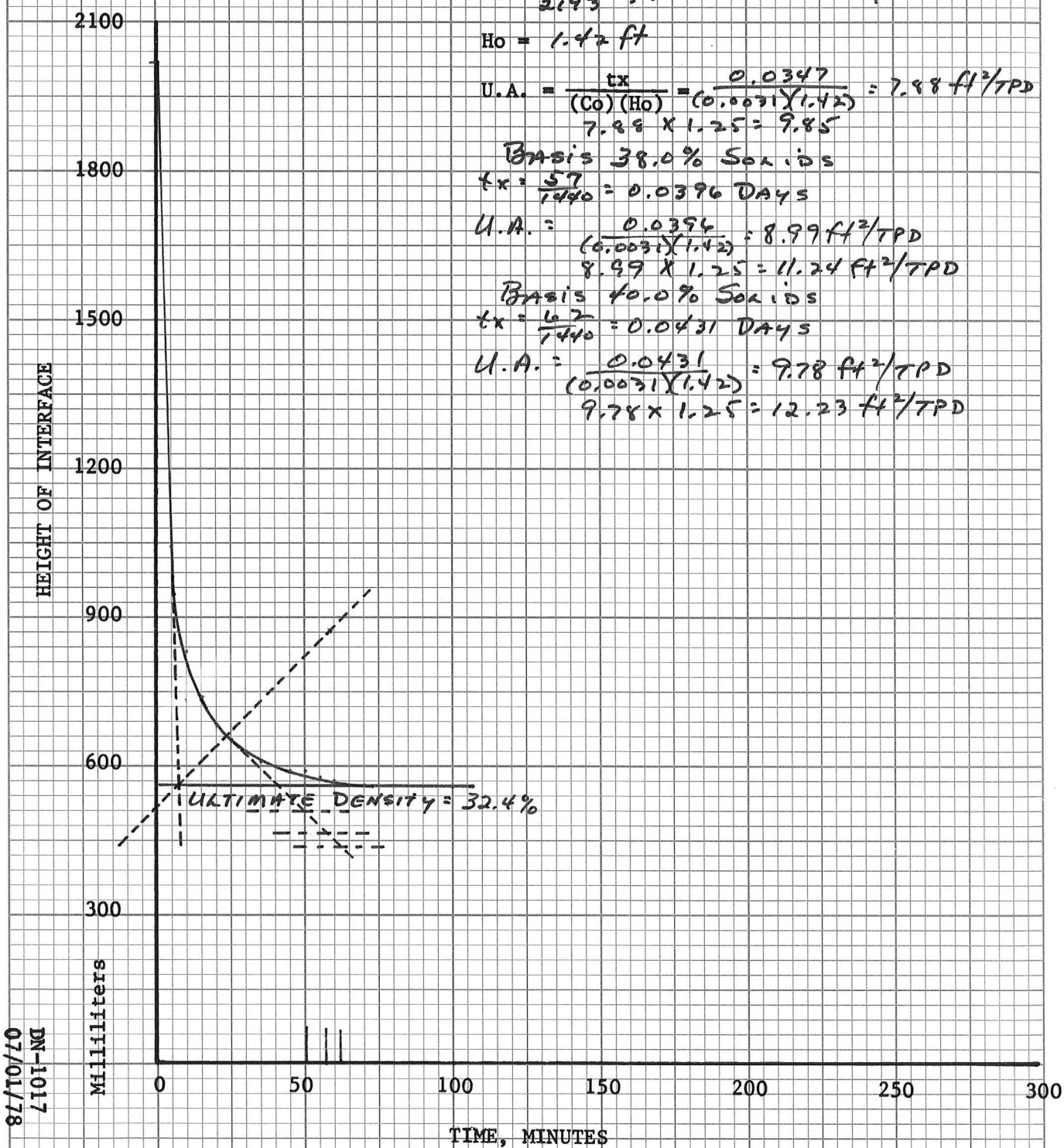
$8.99 \times 1.25 = 11.24$ ft^2/TPD

BASIS 40.0% SOLIDS

$tx = \frac{62}{1440} = 0.0431$ DAYS

$U.A. = \frac{0.0431}{(0.0031)(1.42)} = 9.78$ ft^2/TPD

$9.78 \times 1.25 = 12.23$ ft^2/TPD



DN-1017
07/01/78

46 0780
K+E 10 X 10 TO THE INCH • 7 X 10 INCHES KEUFFEL & ESSER CO. MADE IN U.S.A.

CUSTOMER NAME: Minerals Exploration Computer Run By: _____

LOCATION: Anderson Ranch, Arizona Date: 11/14/78

Test Work Done at Hazen Research

Test Work Performed by Jesse Brodie

Date of Testwork 11/14/78

Comments: 1st Stage CCD

TEST NUMBER	A-1	A-2
Given Information:		
Ws = Weight of Feed Solids	486.4	486.3
Vslo = Initial Volume of Slurry	2000	2000
de = Density of Liquor	1.06	1.06
Wslo = Weight of Initial Slurry	2389 g	2351 g
CALCULATED INFORMATION:		
ds = Density of Solids	2.372	2.394
p = Initial Pulp Solids to Slurry Weight Ratio	20.4	20.3
OPERATING CONDITIONS		
Approximate Temperature	40°C	40°C
Flocculant Added	50 mg 2.5 ml 0.2% Nalco 7871	100 mg 5.0 ml 0.2% Nalco 7871
Flocculant Dosage	0.1917 lbs/Ton D.S.	0.4104 lbs/Ton D.S.

CALCULATIONS	Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft³/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft³/TPD
	1	2020	0	20.2	0.00	2020	0	20.2	0.00
	2	2020	1	20.2	0.09	2010	3	20.2	0.28
	3	2000	2	20.2	0.18	2000	5	20.3	0.46
	4	2010	4	20.3	0.37	1960	7	20.7	0.64
A-2 clear →	5	2000	6	20.4	0.55	1890	12	21.4	1.08
	6	1990	8	20.5	0.73	1820	15	22.1	1.34
	7	1970	10	20.6	0.92	1650	22	24.1	1.89
	8	1950	13	20.7	1.19	1610	25	24.6	2.12
	9	1950	15	20.8	1.36	1510	30	26.0	2.47
	10	1930	17	21.0	1.54	1440	35	27.1	2.81

SAMPLE NUMBER	A-1				A-2			
Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
11	1910	22	21.2	1.98	1390	40	27.9	3.13
12	1890	25	21.4	2.24	1340	45	28.8	3.45
13	1850	32	21.8	2.84	1290	50	29.7	3.75
14	1820	35	22.1	3.09	1260	55	30.2	4.04
15	1780	40	22.6	3.50	1220	60	31.1	4.32
16	1730	45	23.1	3.90	1160	70	32.4	4.87
17	1680	50	23.7	4.29	1100	2:15 80	33.8	5.38
18	1650	55	24.1	4.68	1040	90	35.4	5.87
19	1610	60	24.6	5.05	1020	100	36.0	6.34
20	1550	70	25.4	5.77	990	2:45 110	36.8	6.80
21	1490	80	26.3	6.47	980	2:55 120	37.1	7.25
22	1450	3:05 90	26.9	7.14	950	3:15 140	38.1	8.14
23	1400	100	27.7	7.79	940	3:45 170	38.4	9.43
24	1360	110	28.4	8.42	920	4:15 200	39.0	10.71
25	1330	2:45 120	29.0	9.04	920	4:45 230	39.0	11.97
26	1240	3:15 150	30.7	10.80	910	6:05 350	39.4	16.99
27	1170	3:45 180	32.2	12.45	910	9:45 470	39.4	21.99
28	1120	4:15 210	33.4	14.02	900	9:45 pm 1235	39.7	53.66
29	1080	4:45 240	34.4	15.53				
30	1040	6:05 360	35.5	21.35				
31	1000	8:05 480	36.6	26.95				
32	830	9:30 am 1245	42.3	58.96				
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A1 - Cloudy →

CUSTOMER NAME: Minerals Exploration Computer Run By: _____

LOCATION: Anderson Ranch, Arizona Date: _____

Test Work Done at Hazen Research

Test Work Performed by Jesse Brodie

Date of Testwork 11/14/78

Comments: 1st Stage CCD

TEST NUMBER	A-3	A-4
Given Information:		
Ws = Weight of Feed Solids	491.1	479.5
Vslo = Initial Volume of Slurry	2000 ml/s	2000 ml/s
de = Density of Liquor	1.06	1.06
Wslo = Weight of Initial Slurry	2396 g	2389 g
CALCULATED INFORMATION:		
ds = Density of Solids	2.420	2.415
Po = Initial Pulp Solids to Slurry Weight Ratio	20.5	20.1
OPERATING CONDITIONS		
Approximate Temperature	40°C	40°C
Flocculant Added	150 mg 7.5 ml/s of 2.0% Nalco 7871	200 mg 10.0 ml/s of 2.0% Nalco 7871
Flocculant Dosage	0.6114 lbs/Ton D.S.	0.8344 lbs/Ton D.S.

CALCULATIONS	Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
	1	2020	0	20.3	0.00	2010	0	20.0	0.00
	2	2000	3	20.5	0.27	1990	2	20.2	0.19
	3	1980	5	20.7	0.45	1970	5	20.3	0.46
	4	1940	7	21.1	0.63	1900	10	21.0	0.91
	5	1910	10	21.3	0.89	1780	15	22.2	1.34
	6	1800	15	22.5	1.31	1680	20	23.4	1.74
	7	1700	20	23.6	1.71	1570	25	24.8	2.12
	8	1600	25	24.9	2.08	1470	30	26.2	2.47
	9	1500	30	26.3	2.43	1400	35	27.4	2.80
	10	1420	35	27.6	2.76	1360	40	28.0	3.12

SAMPLE NUMBER	A-3				A-4			
Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
11	1380	40	28.2	3.08	1320	45	28.7	3.43
12	1350	45	28.8	3.39	1290	50	29.3	3.73
13	1300	50	29.7	3.69	1250	55	30.1	4.03
14	1260	55	30.5	3.98	1210	60	30.9	4.31
15	1220	60	31.3	4.26	1130	70	32.7	4.86
16	1160	70	32.6	4.80	1100	80	33.4	5.37
17	1100	80	34.1	5.31	1080	90	33.9	5.88
18	1080	90	34.6	5.81	1060	100	34.4	6.38
19	1060	100	35.1	6.29	1040	110	35.0	6.86
20	1040	110	35.6	6.77	1020	120	35.5	7.34
21	1020	120	36.2	7.23	1010	150	35.8	8.75
22	1010	130	36.5	7.69	1010	180	35.8	10.16
23	1000	160	36.8	9.06	1000	210	36.1	11.56
24	990	190	37.1	10.41	1000	330	36.1	17.13
25	970	220	37.7	11.74	990	450	36.4	22.66
26	950	340	38.2	16.96	950	1215	37.6	57.09
27	940	460	38.6	22.10				
28	930	1215	38.9	54.50				
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CUSTOMER NAME: Minerals Exploration Computer Run By: _____

LOCATION: Anderson Ranch, Arizona Date: _____

Test Work Done at Hazen Research

Test Work Performed by Jesse Brodie

Date of Testwork 11/15/78

Comments: 2ND STAGE CCD

TEST NUMBER	A-5	A-6
Given Information:	Repulp of Test A-1	Repulp of Test A-2
Ws = Weight of Feed Solids	486.4	486.3
Vslo = Initial Volume of Slurry	2000	2000
de = Density of Liquor	1.06	1.06
Wslo = Weight of Initial Slurry	2389 g	2391 g
CALCULATED INFORMATION:		
ds = Density of Solids	2.372	2.394
Po = Initial Pulp Solids to Slurry Weight Ratio	20.4	20.3
OPERATING CONDITIONS		
Approximate Temperature	40°C	40°C
Flocculant Added	4.8 mls of Nalco 7871	3.6 mls of Nalco 7871
Flocculant Dosage	0.3954 lbs/ton D.S.	0.2966 lbs/ton D.S.

CALCULATIONS	Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
	1	2000	0	20.2	0.00	2000	0	20.2	0.00
	2	1940	5	20.9	0.45	1890	5	21.4	0.45
	3	1880	10	21.5	0.89	1780	10	22.5	0.87
	4	1780	15	22.6	1.31	1650	15	24.1	1.26
	5	1630	20	24.4	1.70	1570	20	25.1	1.63
	6	1530	25	25.7	2.06	1470	25	26.6	1.97
	7	1410	30	27.6	2.40	1420	30	27.4	2.31
	8	1320	35	29.2	2.71	1390	35	27.9	2.63
	9	1260	40	30.3	3.00	1350	40	28.6	2.94
	10	1190	45	31.8	3.28	1300	45	29.5	3.24

CARROLL MARVEL

SAMPLE NUMBER	A-5				A-6			
Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
11	1120	50	33.4	3.55	1280	50	29.9	3.54
12	1080	55	34.4	3.80	1250	55	30.5	3.83
13	1030	60	35.7	4.04	1210	60	31.3	4.11
14	1010	70	36.3	4.51	1200	65	31.5	4.38
15	1000	80	36.6	4.97	1170	75	32.2	4.93
16	980	90	37.2	5.42	1150	85	32.6	5.46
17	980	100	37.2	5.87	1120	95	33.3	5.98
18	970	110	37.5	6.31	1100	105	33.8	6.48
19	960	120	37.8	6.75	1090	115	34.1	6.99
20	950	130	38.1	7.19	1080	125	34.3	7.48
21	940	200	38.4	10.22	1030	195	35.7	10.86
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CUSTOMER NAME: Minerals Exploration Computer Run By: _____

LOCATION: Anderson Ranch, Arizona Date: _____

Test Work Done at Hazen Research

Test Work Performed by Jesse Brodie

Date of Testwork 11/14/78

Comments: 2ND STAGE CCD

TEST NUMBER	A-7	A-8
Given Information:	Repulp of Test A-3	Repulp of Test A-4
Ws = Weight of Feed Solids	491.1	479.5
Vslo = Initial Volume of Slurry	2000	2000
de = Density of Liquor	1.06	1.06
Wslo = Weight of Initial Slurry	2396 g	2389 g
CALCULATED INFORMATION:		
ds = Density of Solids	2.420	2.415
p = Initial Pulp Solids to Slurry Weight Ratio	20.5	20.1
OPERATING CONDITIONS		
Approximate Temperature	40°C	40°C
Flocculant Added	2.4 mls of 2.0% Nalco 7871	1.2 mls of 2.0% Nalco 7871
Flocculant Dosage	0.1958 lbs/ton D.S.	0.1003 lbs/ton D.S.

CALCULATIONS	Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
	1	2020	0	20.3	0.00	2010	0	20.0	0.00
	2	1970	5	20.8	0.45	1930	5	20.7	0.46
	3	1940	10	21.1	0.89	1860	10	21.4	0.90
	4	1890	15	21.5	1.33	1730	15	22.8	1.31
	5	1740	20	23.2	1.74	1610	20	24.3	1.70
	6	1600	25	24.9	2.12	1520	25	25.5	2.06
	7	1500	30	26.3	2.47	1430	30	26.9	2.41
	8	1440	35	27.2	2.80	1350	35	28.2	2.73
	9	1360	40	28.6	3.12	1290	40	29.3	3.02
	10	1320	45	29.3	3.42	1220	45	30.7	3.33

SAMPLE NUMBER	A-7				A-8			
Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
11	1240	50	30.9	3.71	1170	50	31.8	3.60
12	1220	55	31.3	3.99	1160	55	32.0	3.87
13	1210	60	31.5	4.27	1130	60	32.7	4.14
14	1160	70	32.6	4.80	1110	65	33.2	4.40
15	1120	80	33.6	5.32	1080	75	33.9	4.91
16	1100	90	34.1	5.82	1060	85	34.4	5.40
17	1090	100	34.3	6.32	1050	95	34.7	5.89
18	1070	110	34.8	6.81	1030	105	35.2	6.37
19	1060	120	35.1	7.29	1020	115	35.5	6.85
20	1020	190	36.2	10.59	980	185	36.7	10.10
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CUSTOMER NAME: Minerals Exploration Computer Run By: _____

LOCATION: Anderson Ranch, Arizona Date: _____

Test Work Done at Hixon Research

Test Work Performed by Jesse Brooks

Date of Testwork 11/15/78

Comments: 3RD Stage CCD

TEST NUMBER	A-9	A-10
Given Information:	Repulp of Test A-5	Repulp of Test A-6
Ws = Weight of Feed Solids	486.4	486.3
Vslo = Initial Volume of Slurry	2000	2000
de = Density of Liquor	1.06	1.06
Wslo = Weight of Initial Slurry	2389 g	2391 g
CALCULATED INFORMATION:		
ds = Density of Solids	2.372	2.394
Po = Initial Pulp Solids to Slurry Weight Ratio	20.4	20.3
OPERATING CONDITIONS		
Approximate Temperature	40°C	40°C
Flocculant Added	0.6 mls of 2.0% Nalco 7871	1.2 mls of 2.0% Nalco 7871
Flocculant Dosage	0.0485 lbs/Ton D.S.	0.0989 lbs/Ton D.S.

CALCULATIONS	Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
	1	2020	0	20.2	0.00	2020	0	20.2	0.00
	2	1950	5	20.8	0.45	1940	5	20.9	0.45
	3	1870	10	21.6	0.89	1820	10	22.1	0.88
	4	1770	15	22.7	1.31	1660	15	23.9	1.28
	5	1640	20	24.2	1.70	1510	20	26.0	1.64
	6	1550	25	25.4	2.06	1440	25	27.1	1.98
	7	1480	30	26.5	2.41	1350	30	28.6	2.30
	8	1420	35	27.4	2.74	1280	35	29.9	2.60
	9	1360	40	28.4	3.06	1240	40	30.7	2.89
	10	1310	45	29.3	3.36	1190	45	31.7	3.17

SAMPLE NUMBER	A-9				A-10			
Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/ TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/ TPD
11	1280	50	29.9	3.66	1160	50	32.4	3.84
12	1240	55	30.7	3.95	1100	55	33.8	3.69
13	1210	60	31.3	4.23	1050	60	35.1	3.94
14	1150	70	32.7	4.77	1030	70	35.7	4.42
15	1110	80	33.6	5.28	1010	80	36.2	4.88
16	1070	90	34.7	5.78	1010	90	36.2	5.34
17	1050	100	35.2	6.27	1000	100	36.5	5.80
18	1020	110	36.0	6.74	990	110	36.8	6.26
19	980	120	37.2	7.20	990	120	36.8	6.71
20	940	150	38.4	8.51	980	140	37.1	7.61
21	940	180	38.4	9.60	970	170	37.4	8.95
22	930	210	38.8	11.09	960	200	37.7	10.28
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CUSTOMER NAME: Minerals Exploration Computer Run By: _____

LOCATION: Anderson Ranch Arizona Date: _____

Test Work Done at Hazen Research

Test Work Performed by Jesse Brodie

Date of Testwork 11/15/78

Comments: 3RD Stage CCD

TEST NUMBER	A-11	A-12
Given Information:	Repulp of Test A-7	Repulp of Test A-8
Ws = Weight of Feed Solids	491.1	479.5
Vslo = Initial Volume of Slurry	2000 mls	2000 mls
de = Density of Liquor	1.06	1.06
Wslo = Weight of Initial Slurry	2396 g	2389 g
CALCULATED INFORMATION:		
ds = Density of Solids	2.420	2.415
Po = Initial Pulp Solids to Slurry Weight Ratio	20.5	20.1
OPERATING CONDITIONS		
Approximate Temperature	40°C	40°C
Flocculant Added	1.8 mls of 3.0% Nalco 7871	2.4 mls of 3.0% Nalco 7871
Flocculant Dosage	0.1459 lbs/ton D.S.	0.2005 lbs/ton D.S.

CALCULATIONS	Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
	1	2020	0	20.3	0.00	2010	0	20.0	0.00
	2	1920	5	21.2	0.45	1860	5	21.4	0.45
	3	1780	10	22.7	0.87	1670	10	23.5	0.86
	4	1610	15	24.8	1.25	1520	15	25.5	1.23
	5	1460	20	26.9	1.60	1460	20	26.4	1.57
	6	1380	25	28.2	1.92	1360	25	28.0	1.90
	7	1330	30	29.1	2.23	1310	30	28.9	2.21
	8	1270	35	30.3	2.52	1260	35	29.9	2.51
	9	1220	40	31.3	2.80	1220	40	30.7	2.80
	10	1190	45	31.9	3.07	1190	45	31.3	3.08

SAMPLE NUMBER	A-11				A-12			
Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/ TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/ TPD
11	1160	50	32.6	3.34	1170	50	31.8	3.35
12	1150	55	32.8	3.60	1150	55	32.2	3.62
13	1130	60	33.3	3.86	1130	60	32.7	3.88
14	1110	70	33.8	4.37	1110	70	33.2	4.40
15	1090	80	34.3	4.87	1090	80	33.7	4.91
16	1080	90	34.6	5.36	1080	90	33.9	5.42
17	1060	100	35.1	5.84	1070	100	34.2	5.91
18	1040	110	35.4	6.32	1060	110	34.4	6.41
19	1030	120	35.9	6.79	1050	120	34.7	6.90
20	1030	130	35.9	7.25	1040	150	35.0	8.35
21	1020	160	36.2	8.65	1020	180	35.5	9.79
22	1010	190	36.5	10.03				
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U_3O_8 = .07% in Heads W.R. → Prog 4.25 Wash: 38% 5 stage 140'd 7 ft²

CUSTOMER NAME: Minerals Exploration Computer Run By:

LOCATION: Anderson Ranch, Arizona Date:

Test Work Done at Hazen Research

Test Work Performed by Jesse Brodie

Date of Testwork 11/6/78

Comments: 1st Stage CCD

TEST NUMBER	B-1	B-2
Given Information:		
Ws = Weight of Feed Solids	216.1	214.2
Vslo = Initial Volume of Slurry	2000	2000
de = Density of Liquor	1.06	1.06
Wslo = Weight of Initial Slurry	2,196g	2,190g
CALCULATED INFORMATION:		
ds = Density of Solids	1.635	1.575
Po = Initial Pulp Solids to Slurry Weight Ratio	9.8	9.8
OPERATING CONDITIONS		
Approximate Temperature	40°C	40°C
Flocculant Added	24 mg 1.2 mls of 2.0% Dreco 7871	50 mg 2.5 mls of 2% Dreco 7871
Flocculant Dosage	0.2225 lbs/ton D.S.	0.4659 lbs/ton D.S.

CALCULATIONS	Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft³/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft³/TPD
	1	2010	0	9.8	0.00	2010	0	9.7	0.00
	2	1830	1	10.7	0.20	1710	1	11.4	0.19
	3	1660	2	11.8	0.38	1320	2	14.6	0.35
	4	1540	3	12.6	0.54	1140	3	16.8	0.48
	5	1410	4	13.8	0.69	1020	4	18.6	0.59
	6	1290	5	15.0	0.83	930	5	20.3	0.69
	7	1090	7	17.5	1.08	850	6	22.1	0.78
	8	1030	8	18.5	1.19	710	8	26.0	0.95
	9	920	10	20.6	1.39	650	10	28.2	1.09
	10	830	12	22.6	1.57	610	12	29.9	1.22

SAMPLE NUMBER	B-1				B-2			
Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/ TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/ TPD
11	760	14	24.5	1.73	590	14	30.1	1.34
12	710	16	26.1	1.88	570	16	31.8	1.46
13	660	18	27.9	2.02	570	18	31.8	1.58
14	630	20	29.1	2.16	560	20	32.3	1.70
15	600	22	30.4	2.28	550	22	32.8	1.81
16	570	24	31.8	2.40	550	24	32.8	1.93
17	560	26	32.3	2.52	530	26	33.9	2.04
18	550	28	32.8	2.63	530	28	33.9	2.15
19	530	30	33.9	2.75	520	30	34.5	2.26
20	500	35	35.7	3.01	510	35	35.1	2.52
21	470	*40	37.6	3.26	500	*40	35.7	2.79
22	460	45	38.3	3.50	490	45	36.3	3.05
23	460	50	38.3	3.74	480	50	37.0	3.30
24	450	55	39.1	3.97	480	55	37.0	3.55
25	450	60	39.1	4.20	480	60	37.0	3.80
26	440	70	39.8	4.66	480	70	37.0	4.30
27	440	80	39.8	5.11	470	80	37.7	4.79
28	430	90	40.6	5.56	460	90	38.4	5.27
29	430	100	[illegible]	[illegible]	460	100	38.4	5.75
30	420	110	41.5	6.44	460	110	38.4	6.23
31	420	120	41.5	[illegible]	450	120	39.2	6.70
32	410	9:10 150	42.3	8.15	440	150	39.9	8.09
33	410	2:20 180	42.3	9.42	430	2:20 170	40.7	8.99
34	410	3:20 210	42.3	10.69	430	3:20 200	40.7	10.33
35	410	3:50 240	42.3	11.95	430	3:50 230	40.7	11.67
36	410	4:10 270	42.3	13.22	430	4:10 260	40.7	13.01
37	410	4:40 300	42.3	14.49	430	4:40 290	40.7	14.35
38	400	440	43.2	20.32	420	430	41.6	20.53
39	400	570	43.2	25.67	420	560	41.6	26.20
40	400	9:20 1,310	43.2	56.14	420	9:20 1,300	41.6	58.47

*Entire Mass Moving with Rakes

CUSTOMER NAME: Minerals Exploration Computer Run By: _____

LOCATION: Anderson Ranch, Arizona Date: _____

Test Work Done at Hazen Research

Test Work Performed by Jesse Brodie

Date of Testwork 11/16/78

Comments: 1st Stage CCD

TEST NUMBER	B-3	B-4
Given Information:		
Ws = Weight of Feed Solids	218.5	216.0
Vslo = Initial Volume of Slurry	2000	2000
de = Density of Liquor	1.06	1.06
Wslo = Weight of Initial Slurry	2,200 g	2,193
CALCULATED INFORMATION:		
ds = Density of Solids	1.672	1.601
Po = Initial Pulp Solids to Slurry Weight Ratio	9.9	9.8
OPERATING CONDITIONS		
Approximate Temperature	40°C	40°C
Flocculant Added	74 mg 2.7 ml/s of 2.0% Dalco 7871	3.162 mg ml/s of 2.0% Dalco 7871
Flocculant Dosage	0.6768 lbs/ton D.S.	0.5754 lbs/ton D.S.

CALCULATIONS	Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft³/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft³/TPD
	1	2020	0	9.8	0.00	2010	0	9.8	0.00
	2	1540	1	12.8	0.18	1630	1	12.0	0.19
	3	1240	2	15.7	0.32	1400	2	13.9	0.34
	4	1090	3	17.7	0.44	1180	3	16.3	0.48
	5	970	4	19.7	0.55	1040	4	18.4	0.59
	6	920	5	20.7	0.64	970	5	19.6	0.69
	7	850	6	22.3	0.73	910	6	20.8	0.79
	8	710	8	26.2	0.89	810	8	23.2	0.97
	9	680	10	27.3	1.03	750	10	24.9	1.13
	10	640	12	28.8	1.17	710	12	26.2	1.28

SAMPLE NUMBER	B-3				B-4			
Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
11	620	14	29.6	1.30	680	14	27.2	1.42
12	600	16	30.5	1.42	650	16	28.3	1.56
13	590	18	31.0	1.54	640	18	28.7	1.69
14	570	20	31.9	1.66	630	20	29.2	1.82
15	560	22	32.4	1.77	610	24	30.0	2.08
16	550	24	33.0	1.89	600	26	30.5	2.20
17	540	26	33.5	2.00	600	28	30.5	2.32
18	540	28	33.5	2.11	590	*30	30.9	2.45
19	530	*30	34.0	2.22	580	35	31.4	2.75
20	520	35	34.4	2.48	580	40	31.4	3.05
21	510	40	35.2	2.75	570	45	31.9	3.34
22	510	45	35.2	3.01	560	50	32.4	3.64
23	500	50	35.8	3.26	560	55	32.4	3.92
24	490	55	36.5	3.51	560	60	32.4	4.21
25	480	60	37.1	3.76	550	70	32.9	4.78
26	470	70	37.8	4.25	550	80	32.9	5.35
27	460	80	38.5	4.72	540	90	33.5	5.91
28	450	90	39.2	5.18	540	100	33.5	6.47
29	450	100	39.2	5.64	540	110	33.5	7.02
30	440	110	40.0	6.09	540	120	33.5	7.58
31	440	120	40.0	6.54	520	3 min 150	34.6	9.22
32	420	3 min 160	41.6	8.27	520	3 min 180	34.6	10.82
33	420	3 min 190	41.6	9.58	500	3 min 210	35.8	12.40
34	410	3 min 220	42.5	10.84	500	3 min 240	35.8	13.94
35	410	4 min 250	42.5	12.09	500	4 min 270	35.8	15.49
36	410	4 min 280	42.5	13.35	500	410	35.8	22.70
37	400	420	43.4	19.12	500	540	35.8	29.39
38	400	550	43.4	24.41	500	1280	35.8	67.50
39	400	1290	43.4	54.55				
40								

* Entire mass moving with rakes

CUSTOMER NAME: MINERALS EXPLORATION Computer Run By: _____

LOCATION: ANDERSON RANCH, ARIZONA Date: _____

Test Work Done at HAZEN RESEARCH

Test Work Performed by JESSE BRODIE

Date of Testwork 11/17/78

Comments: 2ND STAGE CCD

TEST NUMBER	B-5	B-6
	REPULP OF B-1	REPULP OF B-2
Given Information:		
Ws = Weight of Feed Solids	216.1	214.2
Vslo = Initial Volume of Slurry	2000 ml's	2000 ml's
de = Density of Liquor	1.06	1.06
Wslo = Weight of Initial Slurry	2,196 g	2,190 g
CALCULATED INFORMATION:		
ds = Density of Solids	1.635	1.575
Po = Initial Pulp Solids to Slurry Weight Ratio	9.8	9.8
OPERATING CONDITIONS		
Approximate Temperature	40°C	40°C
Flocculant Added	1.8 ml's OF 2.0% NALCO 7871	1.5 ml's OF 2.0% NALCO 7871
Flocculant Dosage	0.3317 lbs/TON D.S.	0.2795 lbs/TON D.S.

CALCULATIONS	Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
	1	2010	0	9.8	0.00	2010	0	9.7	0.00
	2	1670	1	11.7	0.19	1800	1	10.8	0.20
	3	1420	2	13.7	0.35	1500	2	12.9	0.37
	4	1160	3	16.6	0.48	1260	3	15.2	0.51
	5	1000	4	19.0	0.59	1070	4	17.8	0.62
	6	880	5	21.4	0.69	960	5	19.7	0.74
	7	800	6	23.4	0.78	860	6	21.8	0.83
	8	740	7	25.1	0.85	780	7	23.9	0.92
	9	710	8	26.1	0.93	740	8	25.1	1.00
	10	690	9	26.8	1.00	710	9	26.0	1.07

SAMPLE NUMBER		B-5				B-6			
	Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
	11	670	10	27.5	1.07	700	10	26.4	1.15
	12	660	11	27.9	1.14	700	11	26.4	1.22
	13	620	12	29.5	1.21	680	12	27.1	1.29
	14	610	13	29.9	1.27	650	13	28.2	1.36
	15	600	14	30.4	1.33	640	14	28.6	1.43
	16	600	15	30.4	1.39	640	15	28.6	1.49
	17	570	17	31.8	1.51	640	17	28.6	1.63
	18	560	20	32.3	1.69	620	20	29.5	1.82
* ENTIRE MASS TURNING WITH RAKES	19	540	25	33.3	1.97	610	25	29.9	2.14
	20	520	30	34.5	2.24	600	30	30.3	2.46
	21	490	35	36.3	2.50	600	*35	30.3	2.77
	22	480	40	37.0	2.75	590	40	30.8	3.08
	23	470	*45	37.6	3.00	590	45	30.8	3.38
	24	470	50	37.6	3.24	590	50	30.8	3.69
	25	470	55	37.6	3.48	580	55	31.3	3.99
	26	460	60	38.3	3.72	580	60	31.3	4.29
	27	460	70	38.3	4.19	570	70	31.8	4.89
	28	460	80	38.3	4.67	570	80	31.8	5.48
	29	450	90	39.1	5.14	560	90	32.3	6.07
	30	440	100	39.8	5.59	560	100	32.3	6.65
	31	440	110	39.8	6.05	560	1:55 110	32.3	7.23
	32	440	1:55 120	39.8	6.50	550	1:30 205	32.8	12.71
	33	420	1:30 215	41.5	10.71				
	34								
	35								
	36								
	37								
	38								
	39								
	40								

CUSTOMER NAME: MINERALS EXPLORATION Computer Run By: _____

LOCATION: ANDERSON RANCH ARIZONA Date: _____

Test Work Done at HAZEN RESEARCH

Test Work Performed by JESSE BRODIE

Date of Testwork 11/17/78

Comments: 2ND STAGE CCD

TEST NUMBER	B-7	B-8
Given Information:	REPULP OF B-3	REPULP OF B-4
Ws = Weight of Feed Solids	218.5	216.0
Vslo = Initial Volume of Slurry	2000 ml's	2000 ml's
de = Density of Liquor	1.06	1.06
Wslo = Weight of Initial Slurry	2,200 g	2,193 g
CALCULATED INFORMATION:		
ds = Density of Solids	1.672	1.601
Po = Initial Pulp Solids to Slurry Weight Ratio	9.9	9.8
OPERATING CONDITIONS		
Approximate Temperature	40°C	40°C
Flocculant Added	0.6 ml's OF 2.0% NALCO 7871	1.2 ml's OF 2.0% NALCO 7871
Flocculant Dosage	0.1080 lbs/TON D.S.	0.2226 lbs/TON D.S.

CALCULATIONS	Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
	1	2020	0	9.8	0.00	2010	0	9.8	0.00
	2	1880	1	10.5	0.20	1800	1	10.9	0.20
	3	1710	2	11.5	0.38	1620	2	12.1	0.37
	4	1490	3	13.2	0.54	1400	3	13.9	0.53
	5	1340	4	14.6	0.69	1220	4	15.8	0.66
	6	1210	5	16.0	0.82	1080	5	17.7	0.78
	7	1120	6	17.2	0.94	970	6	19.6	0.89
	8	1040	7	18.5	1.05	900	7	21.0	0.98
	9	980	8	19.5	1.15	860	8	21.9	1.07
	10	940	9	20.3	1.25	820	9	22.9	1.16

SAMPLE NUMBER	B-7				B-8			
Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
11	870	10	21.8	1.34	790	10	23.7	1.24
12	840	11	22.5	1.43	770	11	24.3	1.32
13	810	12	23.3	1.51	740	12	25.2	1.40
14	780	13	24.1	1.59	720	13	25.8	1.48
15	750	14	25.0	1.67	710	14	26.2	1.55
16	730	15	25.6	1.74	700	15	26.5	1.62
17	680	17	27.3	1.89	680	17	27.2	1.76
18	650	20	28.4	2.09	650	20	28.3	1.97
19	620	25	29.6	2.41	640	25	28.7	2.30
20	600	30	30.5	2.72	620	30	29.6	2.63
21	590	35	31.0	3.03	610	35	30.0	2.94
22	580	40	31.4	3.33	600	40	30.5	3.25
23	570	45	31.9	3.62	590	45	30.9	3.56
24	570	50	31.9	3.91	580	50	31.4	3.86
25	570	55	31.9	4.20	580	55	31.4	4.16
26	570	60	31.9	4.49	580	60	31.4	4.46
27	560	70	32.4	5.06	570	70	31.9	5.05
28	550	80	33.0	5.63	570	80	31.9	5.64
29	550	90	33.0	6.19	560	11:55 90	32.4	6.22
30	540	11:55 100	33.5	6.74	540	12:30 185	33.5	11.60
31	520	12:30 195	34.6	11.87				
32								
33								
34								
35								
36								
37								
38								
39								
40								

CUSTOMER NAME: Minerals Exploration Computer Run By: _____

LOCATION: Anderson Ranch, Arizona Date: _____

Test Work Done at Hazen Research

Test Work Performed by Jesse Brodie

Date of Testwork 11/17/78

Comments: 3RD Stage CCD

TEST NUMBER	B-9	B10
Given Information:	Repulp of Test B-5	Repulp of Test B-6
Ws = Weight of Feed Solids	216.1	214.2
Vslo = Initial Volume of Slurry	2000 ml's	2000 ml's
de = Density of Liquor	1.06	1.06
Wslo = Weight of Initial Slurry	2,196 g	2,190 g
CALCULATED INFORMATION:		
ds = Density of Solids	1.635	1.575
Po = Initial Pulp Solids to Slurry Weight Ratio	9.8	9.8
OPERATING CONDITIONS		
Approximate Temperature	40°C	40°C
Flocculant Added	0.3 ml's of 2.0% NALCO 7871	0.5 ml's of 2.0% NALCO 7871
Flocculant Dosage	0.0546 lbs/TON D.S.	0.0932 lbs/TON D.S.

CALCULATIONS	Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
	1	2010	0	9.8	0.00	2010	0	9.7	0.00
	2	1770	1	11.1	0.19	1880	1	10.4	0.20
	3	1420	2	13.7	0.36	1650	2	11.8	0.39
	4	1200	3	16.0	0.49	1280	3	15.0	0.54
	5	1080	4	17.7	0.61	1100	4	17.3	0.66
	6	990	5	19.2	0.72	980	5	19.3	0.77
	7	910	6	20.8	0.82	880	6	21.4	0.87
	8	830	7	22.6	0.90	820	7	22.8	0.95
	9	770	8	24.2	0.99	770	8	24.2	1.04
	10	730	9	25.4	1.06	740	9	25.1	1.11

SAMPLE NUMBER	B-9				B-10			
Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
11	690	10	26.8	1.14	720	10	25.7	1.19
12	670	11	27.5	1.21	700	11	26.4	1.26
13	650	12	28.2	1.28	690	12	26.7	1.34
14	630	13	29.1	1.34	680	13	27.1	1.41
15	620	14	29.5	1.41	670	14	27.5	1.48
16	610	15	29.9	1.47	660	15	27.8	1.55
17	590	17	30.8	1.59	630	17	29.0	1.68
18	580	20	31.3	1.77	630	20	29.0	1.88
19	550	25	32.8	2.06	600	25	30.3	2.20
20	520	30	34.5	2.34	590	30	30.8	2.51
21	500	35	35.7	2.60	580	35	31.3	2.81
22	500	40	35.7	2.86	560	40	32.3	3.11
23	490	45	36.3	3.11	540	45	33.3	3.39
24	480	50	37.0	3.36	520	50	34.5	3.67
25	470	55	37.6	3.61	520	55	34.5	3.94
26	470	60	37.6	3.85	520	60	34.5	4.21
27	460	70	38.3	4.33	520	70	34.5	4.75
28	460	80	38.3	4.80	520	80	34.5	5.29
29	460	90	38.3	5.28	520	90	34.5	5.83
30	460	100	38.3	5.75	520	100	34.5	6.37
31					520	106	34.5	6.69
32								
33								
34								
35								
36								
37								
38								
39								
40								

CUSTOMER NAME: Minerals Exploration Computer Run By: _____

LOCATION: Anderson Ranch, Arizona Date: _____

Test Work Done at Hazen Research

Test Work Performed by Jesse Brodie

Date of Testwork 11/17/78

Comments: 3rd Stage CCD

TEST NUMBER	B-11	B-12
Given Information:	Repulp of Test B-7	Repulp of Test B-8
Ws = Weight of Feed Solids	218.5	216.0
Vslo = Initial Volume of Slurry	2000 m/s	2000 m/s
de = Density of Liquor	1.06	1.06
Wslo = Weight of Initial Slurry	2,200 g	2,193 g
CALCULATED INFORMATION:		
ds = Density of Solids	1.672	1.601
Po = Initial Pulp Solids to Slurry Weight Ratio	9.9	9.8
OPERATING CONDITIONS		
Approximate Temperature	40°C	40°C
Flocculant Added	0.9 m/s of 2.0% Nalco 7871	0.7 m/s of Nalco 7871
Flocculant Dosage	0.1661 lbs/Ton D.S.	0.1302 lbs/Ton D.S

CALCULATIONS	Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
	1	2020	0	9.8	0.00	2010	0	9.8	0.00
	2	1780	1	11.1	0.19	1810	1	10.8	0.20
	3	1510	2	13.0	0.36	1530	2	12.7	0.37
	4	1280	3	15.2	0.50	1260	3	15.3	0.51
	5	1100	4	17.5	0.62	1120	4	17.1	0.63
	6	1000	5	19.2	0.73	1040	5	18.4	0.75
	7	940	6	20.3	0.83	980	6	19.4	0.85
	8	870	7	21.8	0.92	920	7	20.6	0.95
	9	810	8	23.3	1.01	880	8	21.5	1.04
	10	760	9	24.7	1.09	860	9	21.9	1.13

SAMPLE NUMBER	B-11				B-12			
Reading Number	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD	Pulp Level ml.	Time min.	Percent Solids under pulp level	Unit Volume ft^3/TPD
11	720	10	[illegible]	1.16	830	10	22.7	1.22
12	700	11	26.6	1.23	810	11	[illegible]	1.30
13	680	12	27.3	1.31	790	12	23.7	1.38
14	670	13	27.7	1.37	770	13	[illegible]	1.46
15	660	14	28.0	1.44	750	14	24.9	1.54
16	650	15	28.4	1.51	740	15	25.2	1.62
17	630	17	[illegible]	[illegible]	720	17	[illegible]	1.77
18	600	20	30.5	1.92	680	20	[illegible]	1.99
19	560	25	32.4	2.12	650	25	[illegible]	[illegible]
20	540	30	33.5	2.40	630	30	[illegible]	[illegible]
21	520	35	[illegible]	2.67	610	35	[illegible]	[illegible]
22	510	40	35.2	2.98	600	40	30.5	3.29
23	500	45	35.8	3.19	590	45	30.9	3.60
24	500	50	36.2	[illegible]	590	50	30.9	3.90
25	490	55	[illegible]	3.70	580	55	31.4	4.20
26	490	60	[illegible]	3.95	570	60	[illegible]	4.50
27	480	70	37.1	4.44	560	70	32.4	5.02
28	480	80	[illegible]	4.93	560	80	32.4	5.65
29	480	90	37.1	[illegible]	560	90	32.4	6.28
30	470	100	37.8	5.90	560	100	[illegible]	6.81
31	470	105	37.8	6.14	560	107	32.4	7.21
32								
33								
34								
35								
36								
37								
38								
39								
40								

CCD Calculation Sheet

Project Name MINERALS EXPLORATION — Date 12/11/78

Location ANDERSON RANCH, ARIZONA

Impart # 93-0392 — G = Number of CCD stages 5

$W = \frac{\text{Wash Water}}{\text{Feed Solids}} = \frac{S}{A_0} = 4.7818$, $L = \frac{\text{Pregnant Liquor}}{\text{Feed Solids}} = \frac{S_1}{A_0} = 4.25$, $M = \frac{\text{Preg. Liquor}}{\text{Wash Water}} = \frac{S_1}{S} = 0.8888$

W. E. = Washing Efficiency = 97.99 %

P. L. = Percent Loss = 2.01 %

= Investment Life years ____

= Interest per annum, compounded 330 days per year = ____ %

P.I.V. = Present Investment Value to eliminate CCD system losses $ ____

k = % values in heads = ____ %

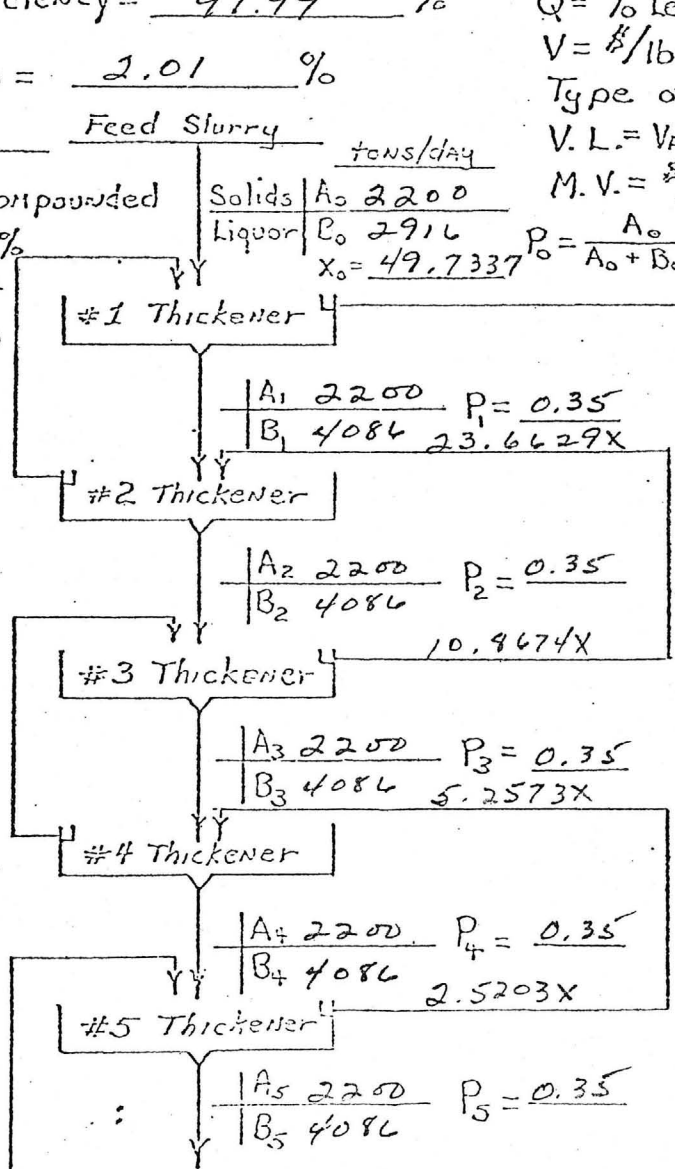
Q = % Leaching efficiency = ____

V = $/lb for values = $ ____ /

Type of Values ____

V. L. = Values/day ____ lb/d

M. V. = $/day = $ ____ /da



Pregnant Liquor

Liquor S_1 = 9350

$K_1' = \frac{S_1}{B_1}$ = 2.2883

R_1 = 0.9000

$K_1 = R_1 K_1'$ 2.0595

48.7337X

S_2 = 10520

$K_2' = \frac{S_2}{B_2}$ = 2.5746

R_2 = 0.8100

$K_2 = R_2 K_2'$ = 2.0854

22.6629X

S_3 = 10520

$K_3' = \frac{S_3}{B_3}$ = 2.5746

R_3 = 0.7290

$K_3 = R_3 K_3'$ 1.8769

9.8674X

S_4 = 10520

$K_4' = \frac{S_4}{B_4}$ = 2.5746

R_4 = 0.6561

$K_4 = R_4 K_4'$ = 1.6892

4.2573X

S_5 = 10,520

$K_5' = \frac{S_5}{B_5}$ = 2.5746

R_5 = 0.5905

$K_5 = R_5 K_5'$ 1.5203

1.5203X

Wash Water

S_6 = 10,520

y = 0

CCD Calculation Sheet

Project Name MINERALS EXPLORATION — Date 12/11/78

Location ANDERSON RANCH, ARIZONA

Impart # 93-0392 — G = Number of CCD stages 6

$W = \frac{\text{Wash Water}}{\text{Feed Solids}} = \frac{S}{A_o} = 4.7818$, $L = \frac{\text{Preg Liquor}}{\text{Feed Solids}} = \frac{S_1}{A_o} = 4.25$, $M = \frac{\text{Preg. Liquor}}{\text{Wash Water}} = \frac{S_1}{S} = 0.889$

k = % values in heads = 0.069 %

W. E. = Washing Efficiency = 98.7189 %

Q = % Leaching efficiency = 90 %

V = $/lb for values = $ 42/00

P. L. = Percent Loss = 1.2811 % *1470.00/DAY

Type of Values U_3O_8

V. L. = Values/day 2732.4 lb/day

M. V. = $/day = $ 114,761 /day

= Investment Life years ____

= Interest per ANNUM, compounded 330 days per year = ____ %

P. I. V. = Present Investment Value to eliminate CCD system losses $ ____

Feed Slurry — tons/day

Solids A_o 2200

Liquor B_o 2916

X_o = 78.0576X

$P_o = \frac{A_o}{A_o + B_o} = 0.43$

#1 Thickener

A_1 2200 — B_1 4086 — P_1 = 0.35 — 37.4157X

Pregnant Liquor

Liquor S_1 = 9350

$K_1' = \frac{S_1}{B_1} = 2.2883$

R_1 = 0.9000

$K_1 = R_1 K_1'$ 2.0595 — 77.0576X

#2 Thickener

S_2 = 10,520

$K_2' = \frac{S_2}{B_2} = 2.5746$

R_2 = 0.8100

$K_2 = R_2 K_2'$ = 2.0854 — 36.4157X

A_2 2200 — B_2 4086 — P_2 = .35 — 17.4622X

#3 Thickener

S_3 = 10520

$K_3' = \frac{S_3}{B_3} = 2.5746$

R_3 = 0.7290

$K_3 = R_3 K_3'$ 1.8769 — 16.4622X

A_3 2200 — B_3 4086 — P_3 = .35 — 8.7710X

#4 Thickener

S_4 = 10520

$K_4' = \frac{S_4}{B_4} = 2.5746$

R_4 = 0.6561

$K_4 = R_4 K_4'$ = 1.6892 — 7.7710X

A_4 2200 — B_4 4086 — P_4 = .35 — 4.6004X

#5 Thickener

S_5 = 10520

$K_5' = \frac{S_5}{B_5} = 2.5746$

R_5 = 0.5905

$K_5 = R_5 K_5'$ 1.5203 — 3.6004X

A_5 2200 — B_5 4086 — P_5 = .35 — 2.3682X

#6 Thickener

S_6 = 10520

$K_6' = \frac{S_6}{B_6} = 2.5746$

R_6 = 0.5314

$K_6 = R_6 K_6'$ = 1.3682 — 1.3682X

A_6 2200 — B_6 4086 — P_6 = .35

TAILS

X_6 = X

WASH WATER

S_7 = 10520

y = 0

CCD Calculation Sheet

Project Name: Minerals Exploration — Date: 12/11/78

Location: Anderson Ranch, Arizona

Impart #: 93-0392 — G = Number of CCD stages: 7

$W = \frac{\text{Wash Water}}{\text{Feed Solids}} = \frac{S_8}{A_0} = 4.7919$, $L = \frac{\text{Pregnant Liquor}}{\text{Feed Solids}} = \frac{S_1}{A_0} = 4.25$, $M = \frac{\text{Preg. Liquor}}{\text{Wash Water}} = \frac{S_1}{S_8}$ 0.88

W. E. = Washing Efficiency = 99.1145 %

P. L. = Percent Loss = 0.8855 %

k = % values in heads = ____ %

Q = % Leaching efficiency = ____

V = $/lb for values = $ ____ /

Type of Values ____

V. L. = Values/day ____ lb/day

M. V. = $/day = $ ____ /day

y = Investment Life years ____

i = Interest per annum, compounded 330 days per year = ____ %

P. I. V. = Present Investment Value to eliminate CCD system losses

$ ____

Feed Slurry — tons/day

Solids | A_0 2200

Liquor | B_0 2916

X_0 = 112.9335X

$P_0 = \frac{A_0}{A_0 + B_0} = 0.43$

#1 Thickener → Pregnant Liquor

Liquor S_1 = 9350

$K_1' = \frac{S_1}{B_1} = 2.2883$

R_1 = 0.90

$K_1 = R_1 K_1'$ 2.0595

111.9335X

A_1 2200 | B_1 4086 — P_1 = 0.35, 54.3499X

#2 Thickener

S_2 = 10,520

$K_2' = \frac{S_2}{B_2} = 2.5746$

R_2 = 0.8100

$K_2 = R_2 K_2'$ 2.0854

53.3499X

A_2 2200 | B_2 4086 — P_2 = 0.35, 25.5826X

#3 Thickener

S_3 = 10520

$K_3' = \frac{S_3}{B_3} = 2.5746$

R_3 = 0.7290

$K_3 = R_3 K_3'$ 1.8769

24.5826X

A_3 2200 | B_3 4086 — P_3 = 0.35, 13.0974X

#4 Thickener

S_4 = 10,520

$K_4' = \frac{S_4}{B_4} = 2.5746$

R_4 = 0.6561

$K_4 = R_4 K_4'$ 1.6892

12.0974

A_4 2200 | B_4 4086 — P_4 = 0.35, 7.1616X

#5 Thickener

S_5 = 10520

$K_5' = \frac{S_5}{B_5} = 2.5746$

R_5 = 0.5905

$K_5 = R_5 K_5'$ 1.5203

6.1616X

A_5 2200 | B_5 4086 — P_5 = 0.35, 4.0529X

#6 Thickener

S_6 = 10,520

$K_6' = \frac{S_6}{B_6} = 2.5746$

R_6 = 0.5314

$K_6 = R_6 K_6'$ 1.3682

3.0529X

A_6 2200 | B_6 4086 — P_6 = 0.35, 2.2313X

#7 Thickener

S_7 = 10520

$K_7' = \frac{S_7}{B_7} = 2.5746$

R_7 = 0.4783

$K_7 = R_7 K_7'$ 1.2313

1.2313X

A_7 2200 | B_7 4086 — P_7 = 0.35

WASH WATER

S_8 = 10,520

y = 0

TAILS

X_7 = X

CCD Calculation Sheet

Project Name MINERALS EXPLORATION Date 12/11/78

Location ANDERSON RANCH, ARIZONA

Import # 93-0396 G = Number of CCD stages 8

$W = \frac{\text{Wash Water}}{\text{Feed Solids}} = \frac{S_3}{A_0} = 4.7818$, $L = \frac{\text{Pregnant Liquor}}{\text{Feed Solids}} = \frac{S_1}{A_0} = 4.25$, $M = \frac{\text{Preg. Liquor}}{\text{Wash Water}} = \frac{S_1}{S_3} = 0.888$

k = % values in heads =

W. E. = Washing Efficiency = 99.34 %

Q = % Leaching efficiency =

V = $/lb for values = $

P. L. = Percent Loss = 0.66 %

Type of Values

V. L. = Values/day

y = Investment Life years

M. V. = $/day = $

i = Interest per annum, compounded 330 days per year = %

P. I. V. = Present Investment Value to eliminate CCD system losses $

Feed Slurry tons/day

Solids A_0 2200

Liquor B_0 2916

$X_0 = 151.5845X$

$P_0 = \frac{A_0}{A_0 + B_0} = 0.43$

#1 Thickener

Pregnant Liquor

Liquor $S_1 = 9350$

$K_1' = \frac{S_1}{B_1} = 2.2883$

$R_1 = 0.9000$

$K_1 = R_1 K_1' = 2.0595$

150.5845X

A_1 2200 B_1 4086 $P_1 = 0.35$ 73.1170X

#2 Thickener

$S_2 = 10520$

$K_2' = \frac{S_2}{B_2} = 2.5746$

$R_2 = 0.8100$

$K_2 = R_2 K_2' = 2.0854$

72.1170X

A_2 2200 B_2 4086 $P_2 = 0.35$ 34.5819X

#3 Thickener

$S_3 = 10,520$

$K_3' = \frac{S_3}{B_3} = 2.5746$

$R_3 = 0.7290$

$K_3 = R_3 K_3' = 1.8769$

33.5819X

A_3 2200 B_3 4086 $P_3 = 0.35$ 17.8922X

#4 Thickener

$S_4 = 10,520$

$K_4' = \frac{S_4}{B_4} = 2.5746$

$R_4 = 0.6561$

$K_4 = R_4 K_4' = 1.6892$

16.8922X

A_4 2200 B_4 4086 $P_4 = 0.35$ 10.0001X

#5 Thickener

$S_5 = 10,520$

$K_5' = \frac{S_5}{B_5} = 2.5746$

$R_5 = 0.5905$

$K_5 = R_5 K_5' = 1.5203$

9.0001X

A_5 2200 B_5 4086 $P_5 = 0.35$ 5.9200X

#6 Thickener

$S_6 = 10,520$

$K_6' = \frac{S_6}{B_6} = 2.5746$

$R_6 = 0.5314$

$K_6 = R_6 K_6' = 1.3682$

4.9200X

A_6 2200 B_6 4086 $P_6 = 0.35$ 3.5959X

#7 Thickener

$S_7 = 10520$

$K_7' = \frac{S_7}{B_7} = 2.5746$

$R_7 = 0.4783$

$K_7 = R_7 K_7' = 1.2313$

A_7 2200 B_7 4086 $P_7 = 0.35$ 2.1083X

CCD Calculation Sheet

Project Name: MINERALS EXPLORATION — Date: 12/11/78

Location: ANDERSON RANCH, ARIZONA

Impart #: 93-0392 — G = Number of CCD stages: 5

$W = \frac{\text{Wash Water}}{\text{Feed Solids}} = \frac{S}{A_o} = 4.5559$, $L = \frac{\text{Pregnant Liquor}}{\text{Feed Solids}} = \frac{S_1}{A_o} = 4.25$, $M = \frac{\text{Preg. Liquor}}{\text{Wash Water}} = \frac{S_1}{S} = 0.9329$

W. E. = Washing Efficiency = 98.61 %

P. L. = Percent Loss = 1.39 %

k = % values in heads =

Q = % Leaching efficiency =

V = $/lb for values = $ /

Type of Values

V. L. = Values/day lb,

M. V. = $/day = $ /c

= Investment Life years

= Interest per annum, compounded 330 days per year = %

P. I. V. = Present Investment Value to eliminate CCD system losses

$

Feed Slurry — tons/day

Solids	A_o	2200
Liquor	B_o	2916

X_o = 71.8613X

$P_o = \frac{A_o}{A_o + B_o} = 0.43$

#1 Thickener → Pregnant Liquor

A_1	2200	P_1 = 0.35
B_1	3589	30.2219X

Liquor S_1 = 9350

$K_1' = \frac{S_1}{B_1}$ = 2.6052

R_1 = 0.9000

$K_1 = R_1 K_1'$ 2.3447

70.8613X

#2 Thickener

A_2	2200	P_2 = 0.35
B_2	3589	12.9180X

S_2 = 10023

$K_2' = \frac{S_2}{B_2}$ = 2.7927

R_2 = 0.8100

$K_2 = R_2 K_2'$ = 2.2621

29.2219X

#3 Thickener

A_3	2200	P_3 = 0.35
B_3	3589	5.8539X

S_3 = 10023

$K_3' = \frac{S_3}{B_3}$ = 2.7927

R_3 = 0.7290

$K_3 = R_3 K_3'$ 2.0359

11.9180X

#4 Thickener

A_4	2200	P_4 = 0.35
B_4	3589	2.6491X

S_4 = 10023

$K_4' = \frac{S_4}{B_4}$ = 2.7927

R_4 = 0.6561

$K_4 = R_4 K_4'$ = 1.8323

4.8539X

#5 Thickener

A_5	2200	P_5 = 0.35
B_5	3589	

S_5 = 10023

$K_5' = \frac{S_5}{B_5}$ = 2.7927

R_5 = 0.5905

$K_5 = R_5 K_5'$ 1.6491

1.6491X

TAILS X_5 = X

Wash Water

S_6 = 10023

y = 0

CCD Calculation Sheet

Project Name: Minerals Exploration — Date: 12/11/78

Location: Anderson Ranch, Arizona

Impart #: 93-0392 — G = Number of CCD stages: 6

$W = \frac{\text{Wash Water}}{\text{Feed Solids}} = \frac{S}{A_o} = 4.5559$, $L = \frac{\text{Pregnant Liquor}}{\text{Feed Solids}} = \frac{S_1}{A_o} = 4.25$, $M = \frac{\text{Preg. Liquor}}{\text{Wash Water}} = \frac{S_1}{S_7}$ 0.93

k = % values in heads = ____ %

Q = % Leaching efficiency = ____

V = $/lb for values = $ ____ /

Type of Values ____

V. L. = Values/day ____ lb/da

M. V. = $/day = $ ____ /day

W. E. = Washing Efficiency = 99.17 %

P. L. = Percent Loss = 0.83 %

= Investment Life years ____

= Interest per annum, compounded 330 days per year = ____ %

P. I. V. = Present Investment Value to eliminate CCD system losses $ ____

Feed Slurry — tons/day

Solids	A_o 2200
Liquor	B_o 2916

X_o = 120.2836X

$P_o = \frac{A_o}{A_o + B_o} = 0.43$

#1 Thickener

A_1 2200	P_1 = 0.38
B_1 3589	50.8737X

Pregnant Liquor

Liquor S_1 = 9350

$K_1' = \frac{S_1}{B_1} = 2.6052$

R_1 = 0.9000

$K_1 = R_1 K_1'$ 2.3447

119.2836X

#2 Thickener

S_2 = 10023

$K_2' = \frac{S_2}{B_2} = 2.7927$

R_2 = 0.8100

$K_2 = R_2 K_2'$ = 2.2621

49.8737X

A_2 2200	P_2 = 0.38
B_2 3589	22.0475X

#3 Thickener

S_3 = 10023

$K_3' = \frac{S_3}{B_3} = 2.7927$

R_3 = 0.7290

$K_3 = R_3 K_3'$ 2.0359

21.0475X

A_3 2200	P_3 = 0.38
B_3 3589	10.3382

#4 Thickener

S_4 = 10023

$K_4' = \frac{S_4}{B_4} = 2.7927$

R_4 = 0.6561

$K_4 = R_4 K_4'$ = 1.8323

9.3382X

A_4 2200	P_4 = 0.38
B_4 3589	5.0964X

#5 Thickener

S_5 = 10023

$K_5' = \frac{S_5}{B_5} = 2.7927$

R_5 = 0.5905

$K_5 = R_5 K_5'$ 1.6491

4.0964X

A_5 2200	P_5 = 0.38
B_5 3589	2.4840

#6 Thickener

S_6 = 10023

$K_6' = \frac{S_6}{B_6} = 2.7927$

R_6 = 0.5314

$K_6 = R_6 K_6'$ = 1.4840

1.4840X

A_6 2200	P_6 = 0.38
B_6 3589	

TAILS

X_6 = X

WASH WATER

S_7 = 10023

y = 0

CCD Calculation Sheet

Project Name: Minerals Exploration — Date: 12/11/78

Location: Anderson Ranch, Arizona

Impart #: 93-0392 — G = Number of CCD stages: 7

$W = \frac{\text{Wash Water}}{\text{Feed Solids}} = \frac{S_8}{A_0} = 4.5939$, $L = \frac{\text{Pregnant Liquor}}{\text{Feed Solids}} = \frac{S_1}{A_0} = 4.25$, $M = \frac{\text{Preg. Liquor}}{\text{Wash Water}} = \frac{S_1}{S_8} = 0.9$

W. E. = Washing Efficiency = 99.4593 %

P. L. = Percent Loss = 0.5407 %

k = % values in heads = ____ %

Q = % Leaching efficiency = ____

V = $/lb for values = $ ____ /

Type of Values ____

V. L. = Values/day ____ lb/d

M. V. = $/day = $ ____ /da

y = Investment Life years ____

i = Interest per annum, compounded 330 days per year = ____ %

P. I. V. = Present Investment Value to eliminate CCD system losses $ ____

Feed Slurry — tons/day

Solids | A_0 2200

Liquor | B_0 2916

$X_0 = 184.9581X$

$P_0 = \frac{A_0}{A_0 + B_0} = 0.43$

#1 Thickener

A_1 2200 | B_1 3589 — $P_1 = 0.38$, 78.4570

#2 Thickener

A_2 2200 | B_2 3589 — $P_2 = 0.38$, 34.2412X

#3 Thickener

A_3 2200 | B_3 3589 — $P_3 = 0.38$, 16.3275X

#4 Thickener

A_4 2200 | B_4 3589 — $P_4 = 0.38$, 8.3652X

#5 Thickener

A_5 2200 | B_5 3589 — $P_5 = 0.38$, 4.4662X

#6 Thickener

A_6 2200 | B_6 3589 — $P_6 = 0.38$, 2.3357X

#7 Thickener

A_7 2200 | B_7 3589 — $P_7 = 0.38$

TAILS

$X_7 =$ X

Pregnant Liquor

Liquor $S_1 = 9350$

$K_1' = \frac{S_1}{B_1} = 2.6052$

$R_1 = 0.90$

$K_1 = R_1 K_1' = 2.3447$, 183.9581X

$S_2 = 10023$

$K_2' = \frac{S_2}{B_2} = 2.7927$

$R_2 = 0.8100$

$K_2 = R_2 K_2' = 2.2621$, 77.4570X

$S_3 = 10023$

$K_3' = \frac{S_3}{B_3} = 2.7927$

$R_3 = 0.7290$

$K_3 = R_3 K_3' = 2.0359$, 33.2412X

$S_4 = 10023$

$K_4' = \frac{S_4}{B_4} = 2.7927$

$R_4 = 0.6561$

$K_4 = R_4 K_4' = 1.8323$, 15.3275X

$S_5 = 10023$

$K_5' = \frac{S_5}{B_5} = 2.7927$

$R_5 = 0.5905$

$K_5 = R_5 K_5' = 1.6491$, 7.3652X

$S_6 = 10023$

$K_6' = \frac{S_6}{B_6} = 2.7927$

$R_6 = 0.5314$

$K_6 = R_6 K_6' = 1.4840$, 3.4662X

$S_7 = 10023$

$K_7' = \frac{S_7}{B_7} = 2.7927$

$R_7 = 0.4783$

$K_7 = R_7 K_7' = 1.3357$, 1.3357X

WASH WATER

$S_8 = 10023$

$y = 0$

CCD Calculation Sheet

Project Name: Minerals Exploration — Date: 12/11/78

Location: Anderson Ranch, Arizona

Impart #: 93-0392 — G = Number of CCD stages: 8

$W = \frac{\text{Wash Water}}{\text{Feed Solids}} = \frac{S_8}{A_0} =$ _____, $L = \frac{\text{Pregnant Liquor}}{\text{Feed Solids}} = \frac{S_1}{A_0} =$ _____, $M = \frac{\text{Preg. Liquor}}{\text{Wash Water}} = \frac{S_1}{S_8}$

W. E. = Washing Efficiency = 99.62 %

P. L. = Percent Loss = 0.38 %

k = % values in heads = _____

Q = % Leaching efficiency = _____

V = $/lb for values = $ _____

Type of Values _____

V. L. = Values/day _____

M. V. = $/day = $ _____

y = Investment Life years _____

i = Interest per annum, compounded 330 days per year = _____ %

P. I. V. = Present Investment Value to eliminate CCD system losses

$ _____

Feed Slurry — tons/day

Solids A_0 2200

Liquor B_0 2916

$X_0 = 262.7113X$

$P_0 = \frac{A_0}{A_0 + B_0} = 0.43$

#1 Thickener → Pregnant Liquor

Liquor $S_1 = 9350$

$K_1' = \frac{S_1}{B_1} = 2.6052$

$R_1 = 0.9000$

$K_1 = R_1 K_1' = 2.3447$

261.7113X

A_1 2200, B_1 3589 — $P_1 = 0.38$, 111.6183X

#2 Thickener

$S_2 = 10023$

$K_2' = \frac{S_2}{B_2} = 2.7927$

$R_2 = 0.8100$

$K_2 = R_2 K_2' = 2.2621$

110.6183X

A_2 2200, B_2 3589 — $P_2 = 0.38$, 48.9007X

#3 Thickener

$S_3 = 10,023$

$K_3' = \frac{S_3}{B_3} = 2.7927$

$R_3 = 0.7290$

$K_3 = R_3 K_3' = 2.0359$

47.9007X

A_3 2200, B_3 3589 — $P_3 = 0.38$, 23.5280X

#4 Thickener

$S_4 = 10023$

$K_4' = \frac{S_4}{B_4} = 2.7927$

$R_4 = 0.6561$

$K_4 = R_4 K_4' = 1.8323$

22.5280X

A_4 2200, B_4 3589 — $P_4 = 0.38$, 12.2949

#5 Thickener

$S_5 = 10,023$

$K_5' = \frac{S_5}{B_5} = 2.7927$

$R_5 = 0.5905$

$K_5 = R_5 K_5' = 1.6491$

11.2949X

A_5 2200, B_5 3589 — $P_5 = 0.38$, 6.8492X

#6 Thickener

$S_6 = 10,023$

$K_6' = \frac{S_6}{B_6} = 2.7927$

$R_6 = 0.5314$

$K_6 = R_6 K_6' = 1.4840$

5.8492X

A_6 2200, B_6 3589 — $P_6 = 0.38$, 3.9415X

#7 Thickener

$S_7 = 10,023$

$K_7' = \frac{S_7}{B_7} = 2.7927$

$R_7 = 0.4783$

$K_7 = R_7 K_7' = 1.3357$

A_7 2200, B_7 3589 — $P_7 = 0.38$, 2.2022X

#8 Thickener

CCD Calculation Sheet

Project Name: Minerals Exploration — Date: 12/11/78

Location: Anderson Ranch, Arizona

Impart #: 93-0392 — G = Number of CCD stages: 5

$W = \frac{\text{Wash Water}}{\text{Feed Solids}} = \frac{S}{A_o} = 4.4259$, $L = \frac{\text{Pregnant Liquor}}{\text{Feed Solids}} = \frac{S_1}{A_o} = 4.25$, $M = \frac{\text{Preg. Liquor}}{\text{Wash Water}} = \frac{S_1}{S_6} = 0.9603$

W. E. = Washing Efficiency = 98.92 %

P. L. = Percent Loss = 1.08 %

k = % values in heads = ____ %

Q = % Leaching efficiency = ____

V = $/lb for values = $ ____ /

Type of Values ____

V. L. = Values/day ____ lb/

M. V. = $/day = $ ____ /d

y = Investment Life years ____

i = Interest per annum, compounded 330 days per year = ____ %

P. I. V. = Present Investment Value to eliminate CCD system losses $ ____

Feed Slurry (tons/day): Solids A_o 2200; Liquor B_o 2916; X_o = 92.3485

$P_o = \frac{A_o}{A_o + B_o} = 0.43$

#1 Thickener → Pregnant Liquor

A_1 2200; B_1 3300; P_1 = 0.40; 35.8229X

Liquor S_1 = 9350

$K_1' = \frac{S_1}{B_1} = 2.8333$

R_1 = 0.9000

$K_1 = R_1 K_1'$ = 2.5500; 91.3485X

#2 Thickener

A_2 2200; B_2 3300; P_2 = 0.40; 14.5703X

S_2 = 9737

$K_2' = \frac{S_2}{B_2} = 2.9506$

R_2 = 0.8100

$K_2 = R_2 K_2'$ = 2.3900; 34.8229X

#3 Thickener

A_3 2200; B_3 3300; P_3 = 0.40; 6.3088X

S_3 = 9737

$K_3' = \frac{S_3}{B_3} = 2.9506$

R_3 = 0.7290

$K_3 = R_3 K_3'$ = 2.1510; 13.5703X

#4 Thickener

A_4 2200; B_4 3300; P_4 = 0.40; 2.7423X

S_4 = 9737

$K_4' = \frac{S_4}{B_4} = 2.9506$

R_4 = 0.6561

$K_4 = R_4 K_4'$ = 1.9359; 5.3088X

#5 Thickener

A_5 2200; B_5 3300; P_5 = 0.40

S_5 = 9737

$K_5' = \frac{S_5}{B_5} = 2.9506$

R_5 = 0.5905

$K_5 = R_5 K_5'$ = 1.7423; 1.7423X

TAILS X_5 = X

Wash Water

S_6 = 9737

y = 0

CCD Calculation Sheet

Project Name: Minerals Exploration — Date: 12/11/78

Location: Anderson Ranch, Arizona

Impart #: 93-0392 — G = Number of CCD stages: 6

$W = \frac{\text{Wash Water}}{\text{Feed Solids}} = \frac{S}{A_o} = 4.4259$, $L = \frac{\text{Pregnant Liquor}}{\text{Feed Solids}} = \frac{S_1}{A_o} = 4.25$, $M = \frac{\text{Preg. Liquor}}{\text{Wash Water}} = \frac{S_1}{S_7}$ 0.96

W. E. = Washing Efficiency = 99.38 %

P. L. = Percent Loss = 0.62 %

k = % values in heads = ____ %

Q = % Leaching efficiency = ____

V = $/lb for values = $ ____ /

Type of Values ____

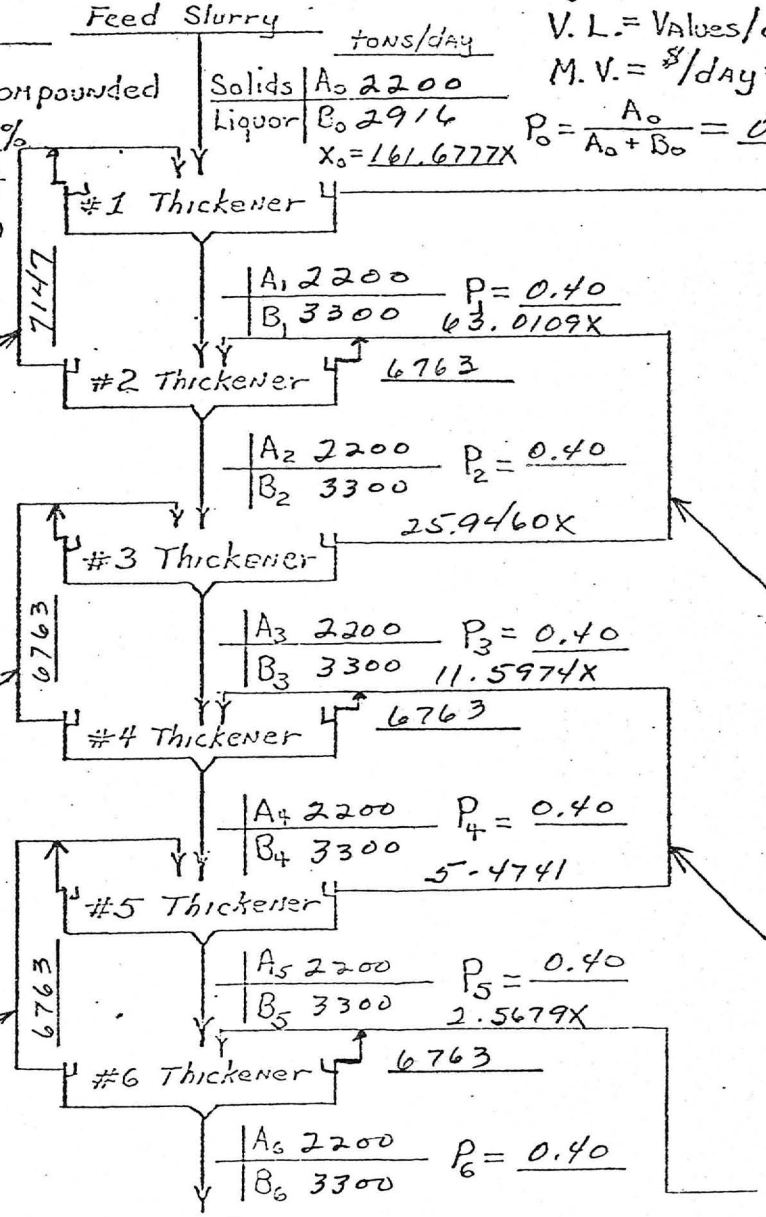
V. L. = Values/day ____ lb/d

M. V. = $/day = $ ____ /da

= Investment Life years ____

= Interest per annum, compounded 330 days per year = ____ %

P. I. V. = Present Investment Value to eliminate CCD system losses $ ____



$P_o = \frac{A_o}{A_o + B_o} = 0.43$

Pregnant Liquor

Liquor $S_1 = 9350$

$K_1' = \frac{S_1}{B_1} = 2.8333$

$R_1 = 0.9000$

$K_1 = R_1 K_1' = 2.5500$

160.6777X

$S_2 = 9737$

$K_2' = \frac{S_2}{B_2} = 2.9506$

$R_2 = 0.8100$

$K_2 = R_2 K_2' = 2.3900$

62.0109X

$S_3 = 9737$

$K_3' = \frac{S_3}{B_3} = 2.9506$

$R_3 = 0.7290$

$K_3 = R_3 K_3' = 2.1510$

24.9460X

$S_4 = 9737$

$K_4' = \frac{S_4}{B_4} = 2.9506$

$R_4 = 0.6561$

$K_4 = R_4 K_4' = 1.9359$

10.5974X

$S_5 = 9737$

$K_5' = \frac{S_5}{B_5} = 2.9506$

$R_5 = 0.5905$

$K_5 = R_5 K_5' = 1.7423$

4.4741X

$S_6 = 9737$

$K_6' = \frac{S_6}{B_6} = 2.9506$

$R_6 = 0.5314$

$K_6 = R_6 K_6' = 1.5679$

1.5679X

WASH WATER

$S_7 = 9737$

$y = 0$

CCD Calculation Sheet

Project Name: Minerals Exploration — Date: 12/11/78

Location: Anderson Ranch, Arizona

Tmpart #: 93-0382 — G = Number of CCD stages: 7

$W = \frac{\text{Wash Water}}{\text{Feed Solids}} = \frac{S_8}{A_0} = 4.4259$, $L = \frac{\text{Pregnant Liquor}}{\text{Feed Solids}} = \frac{S_1}{A_0} = 4.25$, $M = \frac{\text{Preg. Liquor}}{\text{Wash Water}} = \frac{S_1}{S_8}$ 0.9

k = % values in heads = ____ %

Q = % leaching efficiency = ____

V = $/lb for values = $ ____ /

Type of Values ____

V. L. = Values/day ____ lb/d

M. V. = $/day = $ ____ /da

W. E. = Washing Efficiency = 99.61 %

P. L. = Percent Loss = 0.39 %

y = Investment Life years ____

i = Interest per annum, compounded 330 days per year = ____ %

P. I. V. = Present Investment Value to eliminate CCD system losses $ ____

Feed Slurry — tons/day

Solids A_0 2200

Liquor B_0 2916

X_0 = 259.5067X

$P_0 = \frac{A_0}{A_0 + B_0} = 0.43$

Pregnant Liquor

Liquor S_1 = 9350

$K_1' = \frac{S_1}{B_1} = 2.8333$

R_1 = 0.900

$K_1 = R_1 K_1'$ 2.5500

258.5067

#1 Thickener

A_1 2200, B_1 3300 — P_1 = 0.40, 101.3752X

7147

#2 Thickener — 6763

S_2 = 9737

$K_2' = \frac{S_2}{B_2} = 2.9506$

R_2 = 0.8100

$K_2 = R_2 K_2'$ = 2.3900

100.3752X

A_2 2200, B_2 3300 — P_2 = 0.40, 41.9980X

#3 Thickener

S_3 = 9737

$K_3' = \frac{S_3}{B_3} = 2.9506$

R_3 = 0.7290

$K_3 = R_3 K_3'$ 2.1510

40.9980X

A_3 2200, B_3 3300 — P_3 = 0.40, 19.0600X

6763

#4 Thickener — 6763

S_4 = 9737

$K_4' = \frac{S_4}{B_4} = 2.9506$

R_4 = 0.6561

$K_4 = R_4 K_4'$ = 1.9359

18.0600X

A_4 2200, B_4 3300 — P_4 = 0.40, 9.3290X

#5 Thickener

S_5 = 9737

$K_5' = \frac{S_5}{B_5} = 2.9506$

R_5 = 0.5905

$K_5 = R_5 K_5'$ 1.7423

8.3290X

A_5 2200, B_5 3300 — P_5 = 0.40, 4.7804X

6763

#6 Thickener — 6763

S_6 = 9737

$K_6' = \frac{S_6}{B_6} = 2.9506$

R_6 = 0.5314

$K_6 = R_6 K_6'$ = 1.5679

3.7804X

A_6 2200, B_6 3300 — P_6 = 0.40, 2.4112X

#7 Thickener

S_7 = 9737

$K_7' = \frac{S_7}{B_7} = 2.9506$

R_7 = 0.4783

$K_7 = R_7 K_7'$ = 1.4112

1.4122X

A_7 2200, B_7 3300 — P_7 = 0.40

6763

WASH WATER

S_8 = 9737

y = 0

TAILS

X_7 = X

CCD Calculation Sheet

Project Name: Minerals Exploration — Date: 12/11/78

Location: Anderson Ranch, Arizona

Impart #: 93-0392 — G = Number of CCD stages: 8

$W = \frac{\text{Wash Water}}{\text{Feed Solids}} = \frac{S_3}{A_0} = 4.4259$, $L = \frac{\text{Pregnant Liquor}}{\text{Feed Solids}} = \frac{S_1}{A_0} = 4.25$, $M = \frac{\text{Preg. Liquor}}{\text{Wash Water}} = \frac{S_1}{S_3}$ 0.96

W. E. = Washing Efficiency = 99.74 %

P. L. = Percent Loss = 0.24 %

k = % values in heads =

Q = % leaching efficiency =

V = $/lb for values = $

Type of Values

V. L. = Values/day

M. V. = $/day = $

y = Investment Life years

i = Interest per annum, compounded 330 days per year = %

P. I. V. = Present Investment Value to eliminate CCD system losses $

Feed Slurry — tons/day

Solids A_0 2200

Liquor B_0 2916

$X_0 = 383.7736X$

$P_0 = \frac{A_0}{A_0 + B_0} = 0.43$

#1 Thickener

A_1 2200 — B_1 3800 — $P_1 = 0.40$ — 150.1073X

Pregnant Liquor

Liquor $S_1 = 9350$

$K_1' = \frac{S_1}{B_1} = 2.8333$

$R_1 = 0.9000$

$K_1 = R_1 K_1' = 2.5500$

382.7736X

#2 Thickener

$S_2 = 9737$

$K_2' = \frac{S_2}{B_2} = 2.9506$

$R_2 = 0.8100$

$K_2 = R_2 K_2' = 2.3900$

149.1073X

A_2 2200 — B_2 3300 — $P_2 = 0.40$ — 62.3880X

#3 Thickener

$S_3 = 9737$

$K_3' = \frac{S_3}{B_3} = 2.9506$

$R_3 = 0.7290$

$K_3 = R_3 K_3' = 2.1510$

61.3880X

A_3 2200 — B_3 3300 — $P_3 = 0.40$ — 28.5393

#4 Thickener

$S_4 = 9737$

$K_4' = \frac{S_4}{B_4} = 2.9506$

$R_4 = 0.6561$

$K_4 = R_4 K_4' = 1.9359$

27.5393X

A_4 2200 — B_4 3300 — $P_4 = 0.40$ — 14.2256X

#5 Thickener

$S_5 = 9737$

$K_5' = \frac{S_5}{B_5} = 2.9506$

$R_5 = 0.5905$

$K_5 = R_5 K_5' = 1.7423$

13.2256X

A_5 2200 — B_5 3300 — $P_5 = 0.40$ — 7.5909X

#6 Thickener

$S_6 = 9737$

$K_6' = \frac{S_6}{B_6} = 2.9506$

$R_6 = 0.5314$

$K_6 = R_6 K_6' = 1.5679$

6.5909X

A_6 2200 — B_6 3300 — $P_6 = 0.40$ — 4.2036X

#7 Thickener

$S_7 = 9737$

$K_7' = \frac{S_7}{B_7} = 2.9506$

$R_7 = 0.4783$

$K_7 = R_7 K_7' = 1.4112$

A_7 2200 — B_7 3300 — $P_7 = 0.40$ — 2.2701X

#8 Thickener