TABLES

TABLES

TABLE 2.1

SUMMARY OF RECLAMATION PLAN ALTERNATIVES AND ADDITIONAL COSTS

	Pipeline Arroyo	Sacrifical Area	Embankment Sideslopes	Tailings Soil Cover	Total Additions Cost
United Nuclear Original Design Submittal	Incise nickpoint, reconfigured arroyo, add riprap at selected locations.	Regrade to eliminate depressions.	Construct and rip-rap runoff control ditch. Install interception ditches.	Regrade tailings to shed water. Install 4-foot soil cover vegetation.	
Additional Cost	$0	$0	$0	$0	$0
NRC Proposed Changes	Install riprap on entire length of reconfigured channel.	Provide a 6-inch-thick rock mulch layer.	Provide a 6-inch-thick Rock mulch layer.	Provide a 6-inch-thick rock mulch layer.	
	$7,100,000	$501,000	$251,000	$2,417,500	$10,269,500
				OR	OR
				Regrade top to stable slopes (benches). Install riprap swales, no vegetation.	
				$4,020,000	$11,872,000
United Nuclear Proposed Design Modifications	Do not incise nick-point; install a low-flow channel, buried jetty.	Regrade to eliminate depressions.	Provide 3-inch-thick rock mulch layer and protective bench.	Provide soil/rock matrix over soil cover, riprap swales, no vegetation.	
Additional Cost	($492,000)	$0	$95,000	$1,380,000	$983,000

TABLE 2.2

IMPOUNDMENT TOP DRAINAGE SWALE CHARACTERISTICS

Swale Designation	Length (ft)	Slope (ft/ft)	Bottom Width (ft)	Peak Discharge (cfs)	Depth of Flow (ft)	Minimum Swale Depth (ft)	Riprap D 50 (in)
A	2,600	0.0038	10	40	0.98	2.0	1.5
B	3,600	0.0083	20	97	0.97	2.0	1.5
C	3,400	0.0050	10	75	1.38	2.0	1.5
D	3,200	0.0028	10	68	1.43	2.0	1.5
E	1,350	0.0037	10	85	1.53	2.5	1.5
F	1,600	0.0031	10	126	2.00	2.5	1.5
G	1,400	0.0021	10	99	1.88	2.5	1.5
H	2,550	0.0085	20	284	1.90	2.5	3.0
I	550	0.0040	20	385	2.65	3.5	3.0
J	1,900	0.0047	10	101	1.66	2.5	1.5

Note: See Figures 2-2 and 2-3 for swale locations.

TABLE 2.3

RIPRAP AND FILTER MATERIAL GRADATION REQUIREMENTS (a)

Location	D_{50} (b)	Sieve Size:	Percent Passing by Weight									
			30 Inch	25 Inch	20 Inch	15 Inch	10 Inch	5 Inch	4 Inch	3 Inch	1 Inch	No. 4
Upper Section South Cell Drainage Channel	23 Inches (c)		100		35-45		12-32	5-22		0-17		
Upper Section North Cell Drainage Channel	14 Inches (c)			100		40-50		10-33		0-27		
Lower Section North Cell Drainage Channel	11 Inches (c)					100		17-30		10-24	0-12	
North Diversion Ditch, Buried Jetty	6.0 Inches						100		30-40		7-20	0-3
Swales H and I, Lower Reach of Runoff Control Ditch	3.0 Inches							100		40-47	15-32	0-16
Soil/Rock Matrix, Swales, Upper Reach of Runoff Control Ditch	1.5 Inches									100	25-37	0-17
		Sieve Size:	No. 200	No. 40	No. 10	No. 4	3/4 Inch	3 Inch	+3 Inch			
	Filter Layer		0-30	23-70	47-94	65-100	85-100	100	--			

(a) The rock quality will be determined in accordance with Appendix D of the NRC's Staff Technical Position (STP) on "Design of Erosion Protection Covers" dated August 1990. Rock used for channels, swales, and the tailings cover soil/rock matrix shall be considered "noncritical" and have a minimum rock quality rating of 50.

(b) Rock sizes shown will be oversized based on their rock quality rating by the methods provided in Appendix D of the NRC's STP.

(c) Rock sizes have been based on Maynord's 1987 method. United Nuclear reserves the right to modify the above gradations using Maynord's 1978 method as an alternative method if justifiable.

TABLE 2.4

SUMMARY OF RADON MODEL INPUT PARAMETERS

General Description	Specific Gravity	Dry Bulk Density (pcf)	Porosity	Moisture Content (percent)	Radium Content (pCi/g)	Diffusion Coefficient (cm2/sec)	Emanation Coefficient
Radon Source Parameters:							
Fine Tailings							
Average	2.78	86	0.53	38.7	547	0.00176	0.26
95 Percent Confidence Interval	2.73 to 2.83 *		0.50 to 0.56 *	29.7 * to 47.7	296 to 798 *	0.00022 to 0.0053 *	0.20 to 0.32 *
Coarse Tailings							
Average	2.81	97.5	0.45	10.4 *	154	0.029	0.26
95 Percent Confidence Interval	2.77 to 2.84 *		0.43 to 0.47 *		125.0 to 183.0 *	0.018 to 0.047 *	0.25 to 0.27 *
Radon Attenuation Parameters:							
Soil Cover	2.6 *	108.3 *	0.33 *	13.4 *	--	0.0029 *	--

Notes:

1. * indicates parameters that were used in the RADON model.

2. Radon attenuation parameters for the soil cover materials were calculated from measured geotechnical parameters.

TABLE 2.5

COARSE TAILINGS LABORATORY TEST DATA

General Description	Boring Number	Depth (feet)	Specific Gravity	Dry Bulk Density (pcf)	Porosity	Moisture (a) Content (percent)	Radium Content (pCi/g)	Diffusion (b) Coefficient (cm2/sec)	Emanation Coefficient
Tailings Sands	658	15	NT	105	0.40	NT	NT	NT	NT
	658	20	2.83	104	0.41	23.5	160	0.0000053	0.32
	658	30	2.81	98	0.44	23.4	141	0.000019	0.27
	658	40	2.89	92	0.49	31.2	212	0.000002	0.25
	659	10	2.84	95	0.46	6.1	125	0.037	0.18
	659	20	2.83	94	0.47	10.5	227	0.023	0.21
	659	30	2.74	97	0.43	13.1	132	0.016	0.20
	659	32.5	NT	106	0.47	8.1	115	0.042	0.27
	662	20	NT	97	0.49	34.1	NT	NT	NT
	662	25	2.78	96	0.36	25.1	108	0.0000025	0.33
	662	30	2.79	94	0.46	29.6	177	0.0000013	0.28
Supplemental (c)							143.1		
Average			2.81	97.5	0.45	20.47	154	NA	0.26
95 Percent Confidence Interval			2.77 to 2.84	NA	0.43 to 0.47	NA	125.0 to 183.0	NA	0.25 to 0.27

NT = Not tested

(a) Moisture contents are not indicative of long-term values, which will typically be lower; therefore, soils test data have been averaged and a value of 10.4 percent obtained.

(b) Diffusion coefficients are typically low due to the high moisture content values; therefore, calculated values will be used.

(c) Value for radium content from Environmental Report on Uranium Mill Tailings Backfill presented in April 8, 1981 letter from United Nuclear to the New Mexico Environmental Improvement Division.

TABLE 2.6

FINE TAILINGS LABORATORY TEST DATA

General Description	Boring Number	Depth (feet)	Specific Gravity	Dry Bulk Density (pcf)	Porosity	Moisture Content (percent)	Radium Content (pCi/g)	Diffusion Coefficient (cm2/sec)	Emanation Coefficient
Fine-Grained Tailings Slimes	659	37.5	2.72	78	0.54	29.6	602	0.0056	0.16
	660	8.0	2.81	74	0.58	44.27	341	0.0000011	0.37
	660	15.0	2.84	94	0.47	60.0	1099	0.0000016	0.31
	660	27.5	2.75	89	0.48	32.2	285	0.0000016	0.26
	660	37.5	2.84	79	0.56	41.4	526	0.0000027	0.28
	662	40.0	2.72	84	0.51	36.4	574	0.0000062	0.21
	662	42.5	NT	89	0.55	43.8	NT	NT	NT
	658	10.0	2.81	88	0.50	17.4	402	0.0067	0.22
	658	32.5	NT	97	0.55	43.6	NT	NT	NT
Average			2.78	86	0.53	38.7	547	0.00076	0.26
95 Percent Confidence Interval			2.73 to 2.83	NA	0.50 to 0.56	29.7 to 47.7	296 to 798	0.00022 to 0.0053	0.20 to 0.32

NT = Not tested

TABLE 2.7

SUMMARY OF MEANDER PATTERNS

PIPELINE ARROYO

Elevation Contour	Channel Distance (ft)	Slope (ft/ft)	Valley Distance (ft)	Sinuosity (ft/ft)	Average Meander Amplitude (ft)	Average Meander Wave Length (ft)
6840						
6880	3800	0.011	3375	1.126	200	1150
6920	5200	0.008	5025	1.035	150	1250
6960	7000	0.006	6500	1.077	100	2275
7000	2000	0.020	1675	1.194	100	2000
7040	7200	0.006	6025	1.195	100	1750
7080	3600	0.011	3225	1.116	200	750

Watershed Area = 20.12 square miles
Maximum Amplitude = 570 feet

HARD GROUND CANYON

Elevation Contour	Channel Distance (ft)	Slope (ft/ft)	Valley Distance (ft)	Sinuosity (ft/ft)	Average Meander Amplitude (ft)	Average Meander Wave Length (ft)
6800	0					
6840	5600	0.007	5300	1.057	150	1050
6880	3400	0.012	3300	1.030	150	675
6920	7000	0.006	6800	1.029	200	1800
6960	3300	0.012	2500	1.320	350	1000
7000	7900	0.005	7500	1.053	150	1780
7040	2800	0.014	2600	1.077	100	1400
7080	2300	0.017	2150	1.070	75	2000

Watershed Area = 14.11 square miles
Maximum Amplitude = 350 feet

TABLE 2.8

TOTAL HEAD COMPARISONS AT CONFLUENCES

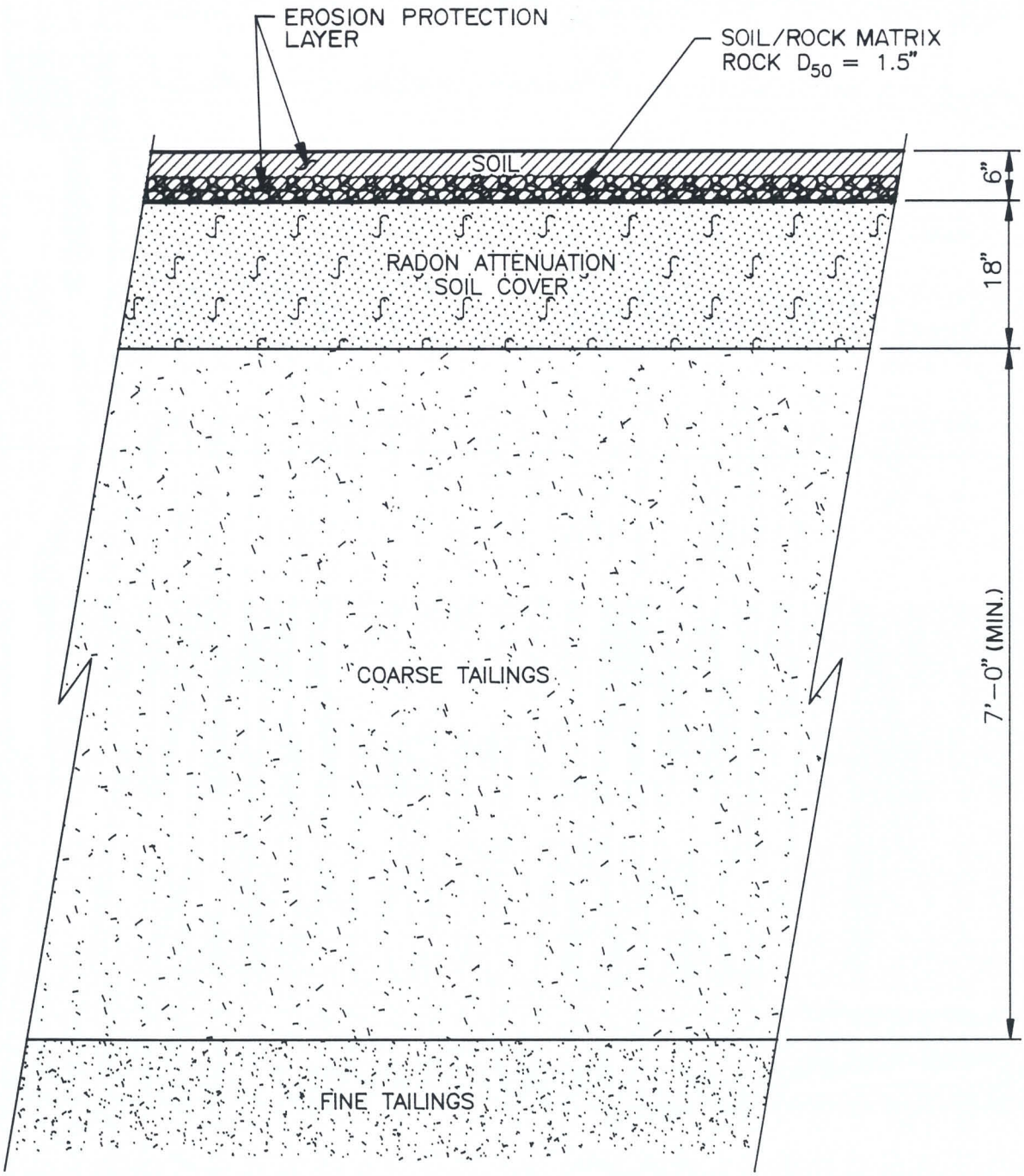
Cross Section Location	Peak Discharge (cfs)	Channel Slope (ft/ft)	Depth of Flow (ft)	Flow Velocity (fps)	Velocity Head (ft)	Total Head (ft)
K	1081	0.0054	4.22	9.0	1.26	5.48
A1	383	0.044	0.88	11.2	1.95	2.93
L	2265	0.0071	5.69	12.5	2.43	8.12
A2	765	0.020	1.81	10.8	1.82	3.63
M	2265	0.0074	4.34	9.8	1.49	5.83
B	2046	0.019	2.48	13.2	2.17	5.19
N	5850	0.0074	8.02	15.1	3.54	11.56

Note: Figure 2-8 provides the cross section locations.

FIGURES

FIGURES

DRAWING NUMBER 86-060-A426



NOTE:

1. THIS DRAWING IS NOT TO SCALE.

SOIL COVER PROFILE

PREPARED FOR

UNC MINING AND MILLING
GALLUP, NEW MEXICO

Canonie Environmental

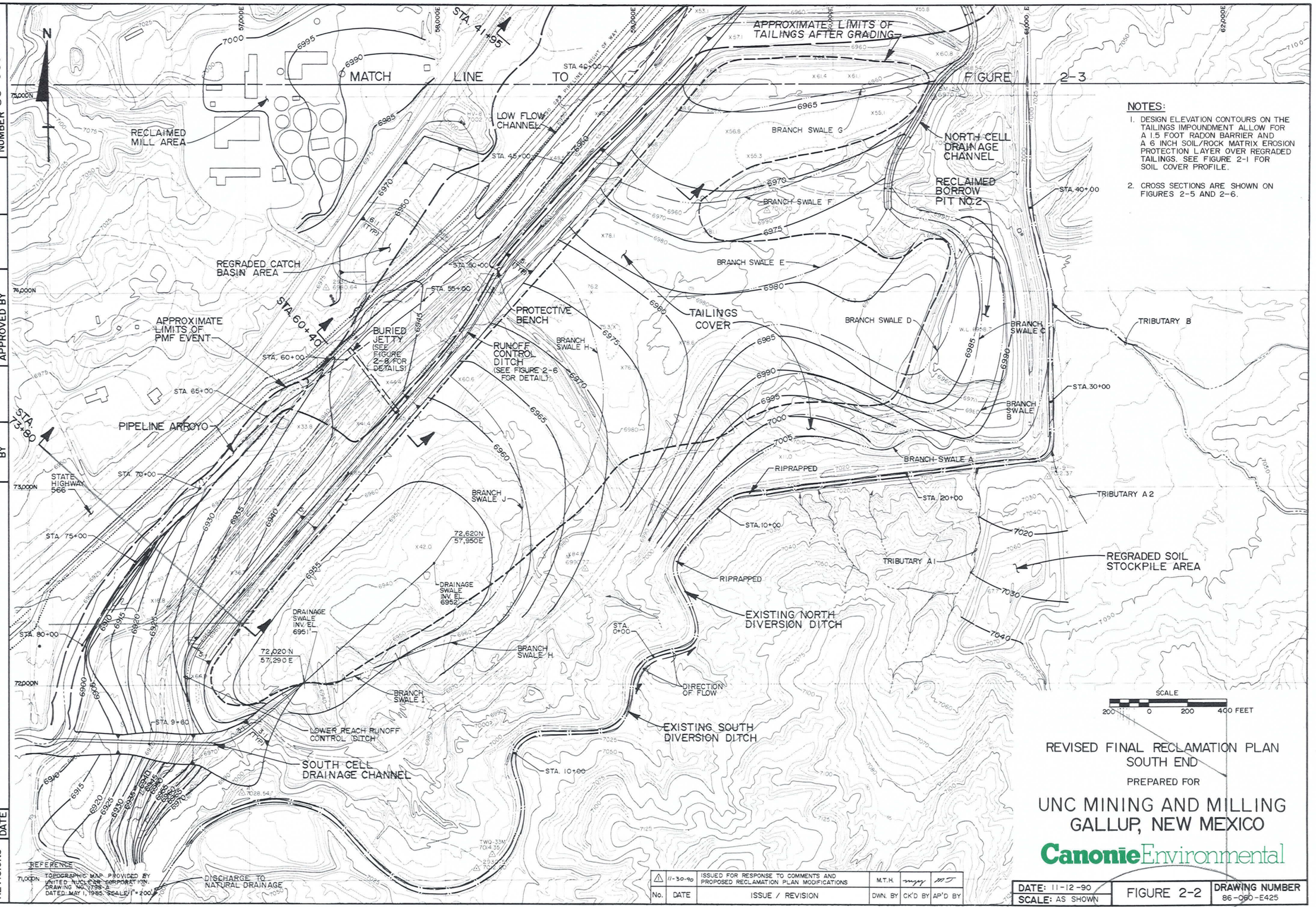
No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
1	12-4-90	ISSUED FOR RESPONSE TO COMMENTS AND PROPOSED RECLAMATION PLAN MODIFICATIONS	P.M.W.	mjj	DHG

DATE: 11-12-90
SCALE: N.T.S.

FIGURE 2-1

DRAWING NUMBER 86-060-A426

1



NOTES:

1. DESIGN ELEVATION CONTOURS ON THE TAILINGS IMPOUNDMENT ALLOW FOR A 1.5 FOOT RADON BARRIER AND A 6 INCH SOIL/ROCK MATRIX EROSION PROTECTION LAYER OVER REGRADED TAILINGS. SEE FIGURE 2-1 FOR SOIL COVER PROFILE.
2. CROSS SECTIONS ARE SHOWN ON FIGURES 2-5 AND 2-6.

REVISED FINAL RECLAMATION PLAN
SOUTH END

PREPARED FOR

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GALLUP, NEW MEXICO

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1	11-30-90	ISSUED FOR RESPONSE TO COMMENTS AND PROPOSED RECLAMATION PLAN MODIFICATIONS	M.T.H.		

DATE: 11-12-90
SCALE: AS SHOWN

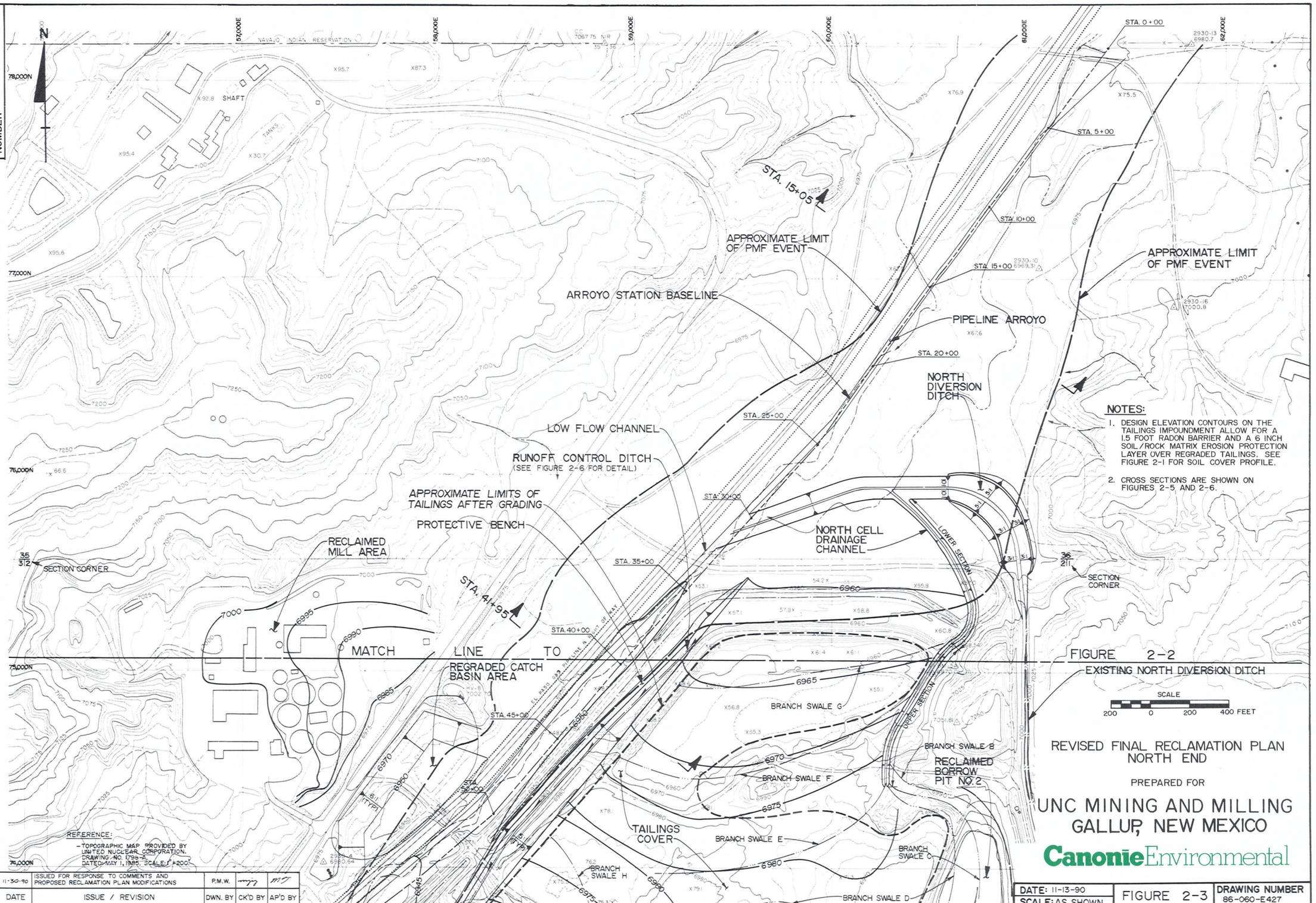
FIGURE 2-2

DRAWING NUMBER 86-060-E425

DRAWING NUMBER 86-060-E425
CHECKED BY
APPROVED BY
DRAWN BY
REVISIONS
NO. DATE

DRAWING NUMBER 86-060-E427

E391



NOTES:

1. DESIGN ELEVATION CONTOURS ON THE TAILINGS IMPOUNDMENT ALLOW FOR A 1.5 FOOT RADON BARRIER AND A 6 INCH SOIL/ROCK MATRIX EROSION PROTECTION LAYER OVER REGRADED TAILINGS. SEE FIGURE 2-1 FOR SOIL COVER PROFILE.
2. CROSS SECTIONS ARE SHOWN ON FIGURES 2-5 AND 2-6.

FIGURE 2-2

REFERENCE:
- TOPOGRAPHIC MAP PROVIDED BY UNITED NUCLEAR CORPORATION. DRAWING NO. 1795-A DATED MAY 1, 1985. SCALE: 1" = 200'

REVISED FINAL RECLAMATION PLAN
NORTH END

PREPARED FOR

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GALLUP, NEW MEXICO

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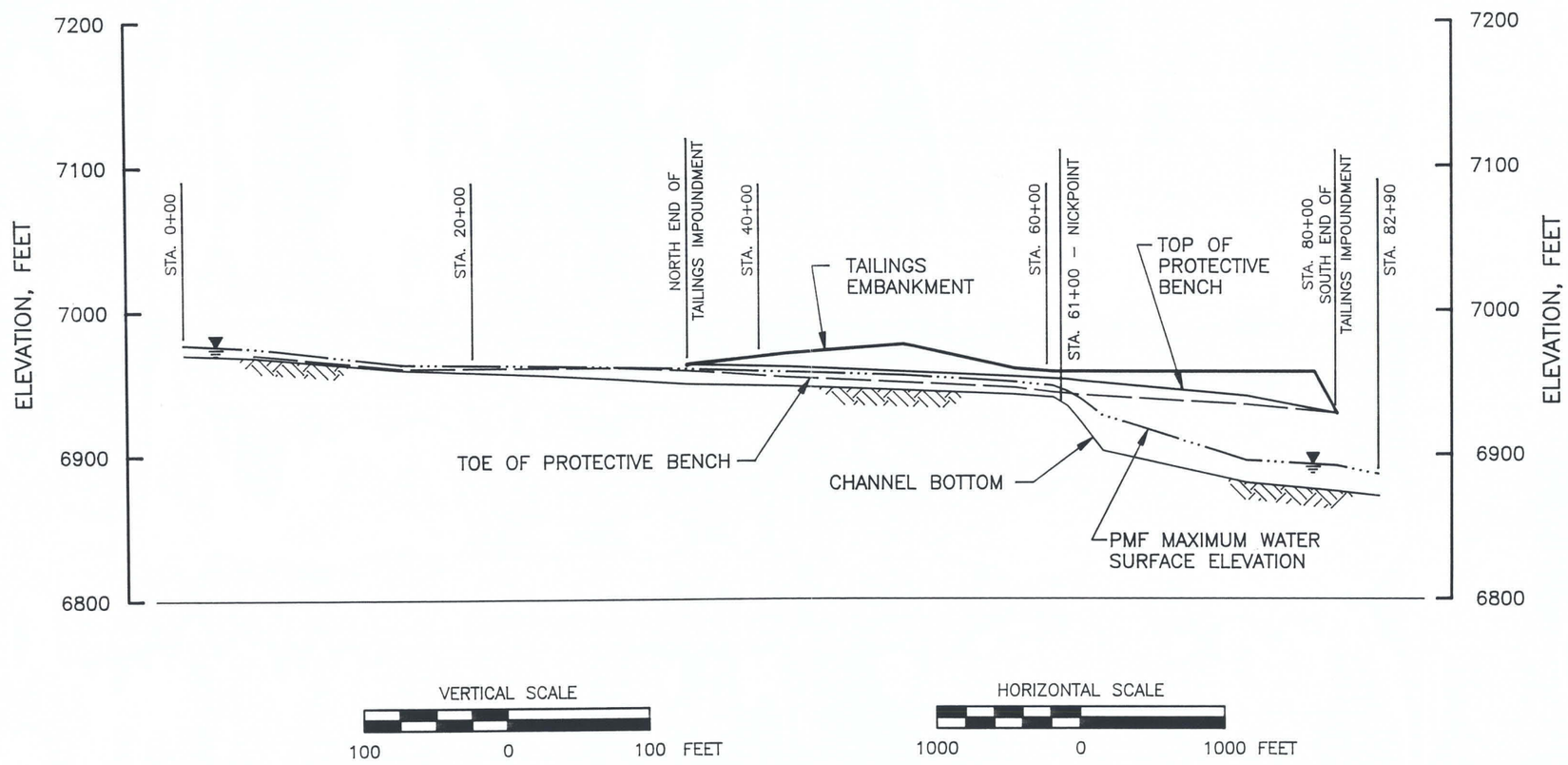
1	11-30-90	ISSUED FOR RESPONSE TO COMMENTS AND PROPOSED RECLAMATION PLAN MODIFICATIONS	P.M.W.		

DATE: 11-13-90
SCALE: AS SHOWN
FIGURE 2-3
DRAWING NUMBER 86-060-E427

DRAWING NUMBER 86-060-B420



NOTE:

1. ALIGNMENT OF PIPELINE ARROYO IS SHOWN ON FIGURES 2-2 AND 2-3.

PIPELINE ARROYO PROFILE

PREPARED FOR

UNC MINING AND MILLING
GALLUP, NEW MEXICO

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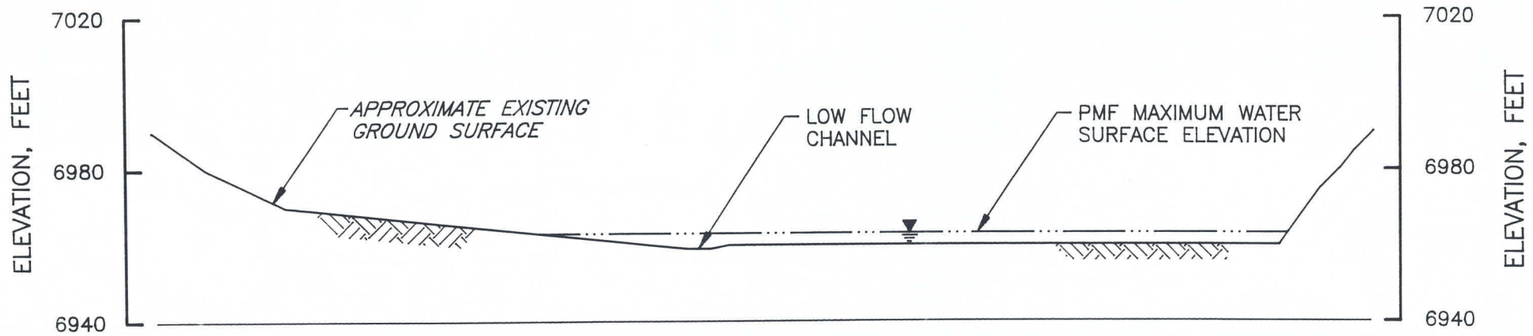
1	12-4-90	ISSUED FOR RESPONSE TO COMMENTS AND PROPOSED RECLAMATION PLAN MODIFICATIONS	R.H.	mjj	DHG

DATE: 11-9-90	FIGURE 2-4	DRAWING NUMBER 86-060-B420
SCALE: AS SHOWN		

1

DRAWING NUMBER 86-060-B424



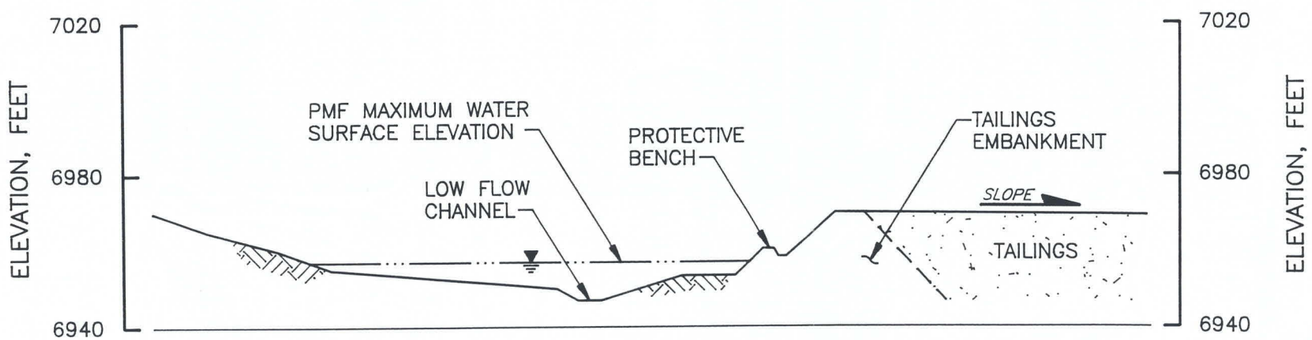
PIPELINE ARROYO CROSS SECTION

STATION 15+05

(LOOKING NORTH)

NOTE:

1. CROSS SECTION LOCATIONS ARE SHOWN ON FIGURES 2-2 AND 2-3.



PIPELINE ARROYO CROSS SECTION

STATION 41+95

(LOOKING NORTH)

VERTICAL SCALE

40 0 40 FEET

HORIZONTAL SCALE

200 0 200 FEET

VERTICAL EXAGGERATION = 5X

PIPELINE ARROYO
CROSS SECTIONS

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GALLUP, NEW MEXICO

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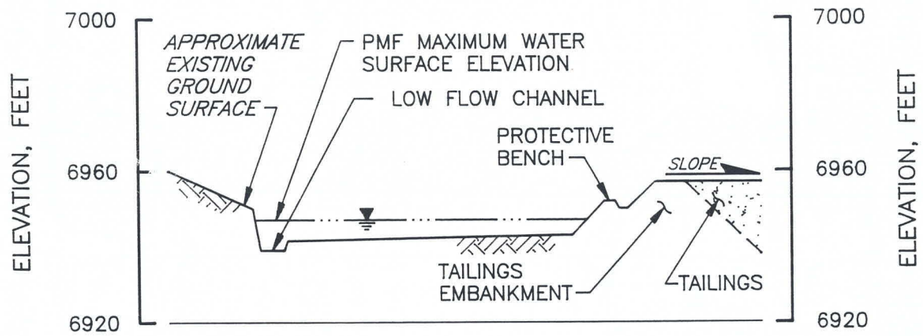
1	12-4-90	ISSUED FOR RESPONSE TO COMMENTS AND PROPOSED RECLAMATION PLAN MODIFICATIONS	R.H.	mjg	DHG

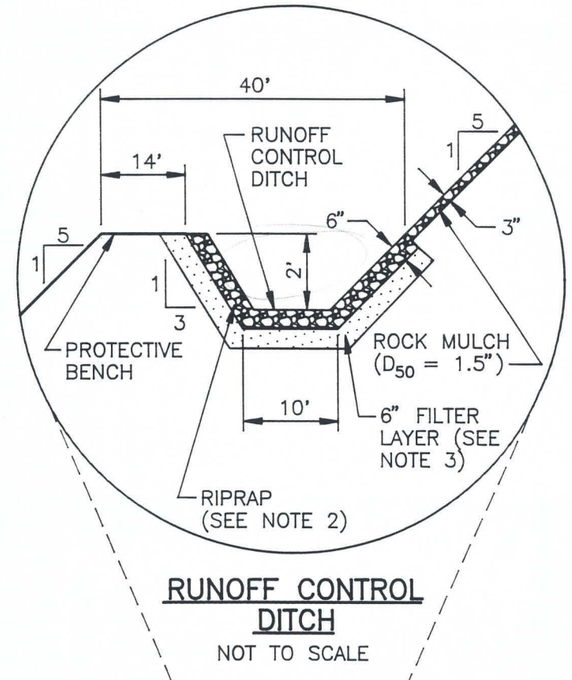
DATE: 11-12-90	FIGURE 2-5	DRAWING NUMBER 86-060-B424
SCALE: AS SHOWN		

1

DRAWING NUMBER 86-060-B421



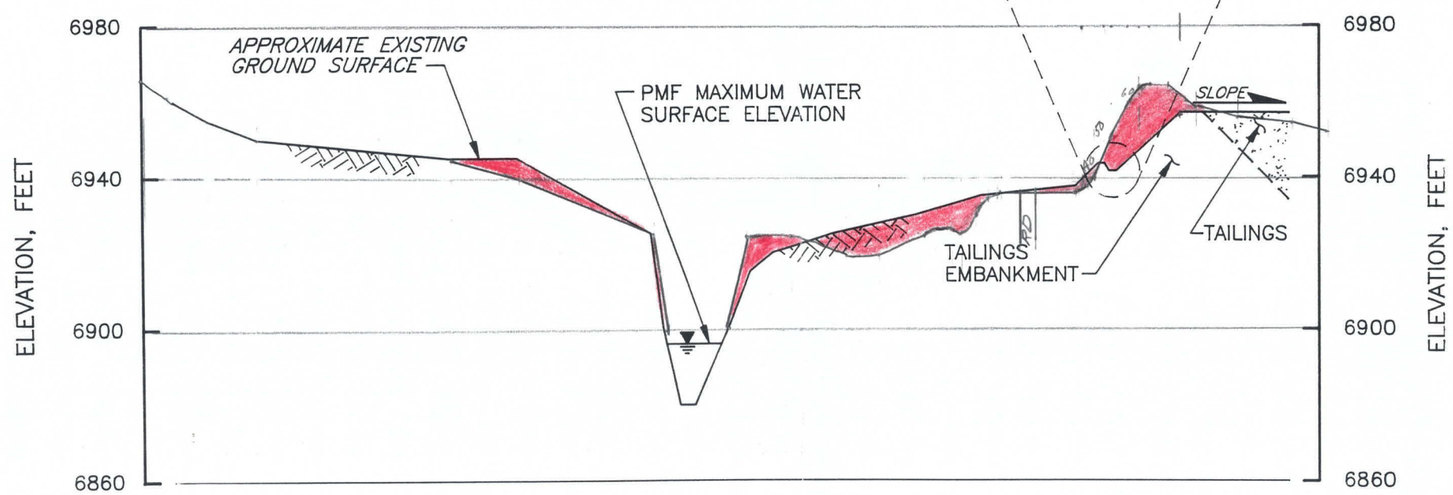
PIPELINE ARROYO CROSS SECTION
STATION 60+40
(LOOKING NORTH)



RUNOFF CONTROL DITCH
NOT TO SCALE

NOTE:

1. CROSS SECTION LOCATIONS ARE SHOWN ON FIGURES 2-2 AND 2-3.
2. RIPRAP D_{50} = 1.5" IN UPPER REACH OF RUNOFF CONTROL DITCH. D_{50} = 3.0" IN LOWER REACH OF RUNOFF CONTROL DITCH.
3. FILTER LAYER REQUIRED ONLY FOR LOWER REACH OF RUNOFF CONTROL DITCH.



PIPELINE ARROYO CROSS SECTION
STATION 73+80
(LOOKING NORTH)

VERTICAL SCALE
40 0 40 FEET

HORIZONTAL SCALE
200 0 200 FEET

VERTICAL EXAGGERATION = 5X

PIPELINE ARROYO
CROSS SECTIONS
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1	12-4-90	ISSUED FOR RESPONSE TO COMMENTS AND PROPOSED RECLAMATION PLAN MODIFICATIONS	R.H.	mjg	DHG

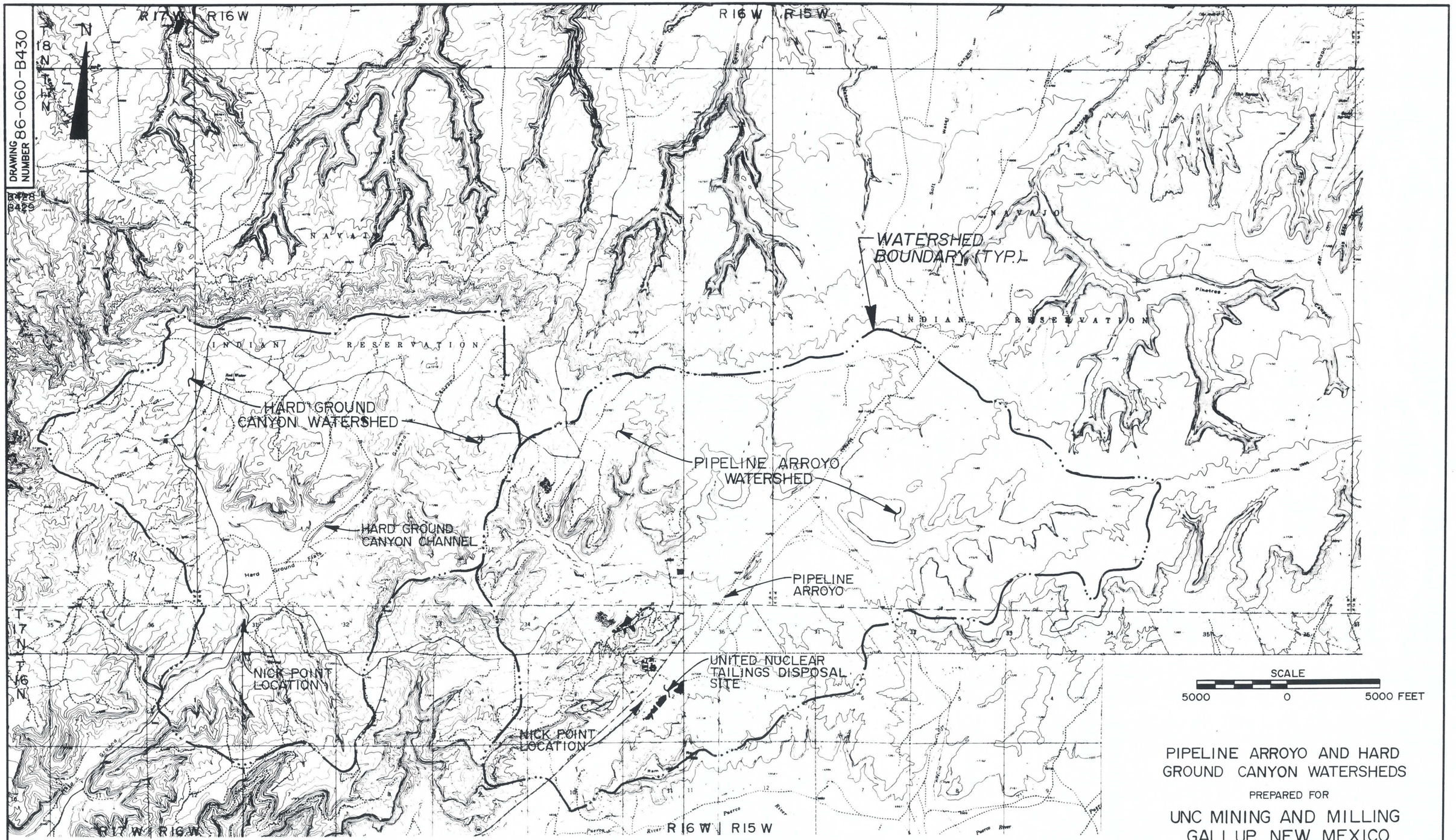
DATE: 11-12-90	FIGURE 2-6	DRAWING NUMBER 86-060-B421
SCALE: AS SHOWN		

1

86-060-B429
86-060-B428

DRAWING NUMBER 86-060-B430

B428
B429



PIPELINE ARROYO AND HARD GROUND CANYON WATERSHEDS

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1	12-3-90	ISSUED FOR RESPONCE TO COMMENTS AND PROPOSED RECLAMATION PLAN MODIFICATIONS	M.T.H.	[illegible]	MT

REFERENCE:

COMPOSITE OF 7.5' USGS TOPOGRAPHIC QUADRANGLE MAPS OF HARD GROUND FLATS AND OAK SPRING, NEW MEXICO.
SCALE: 1" = 2000' DATED: 1963. PHOTOREVISED: 1979.

86-060-B428

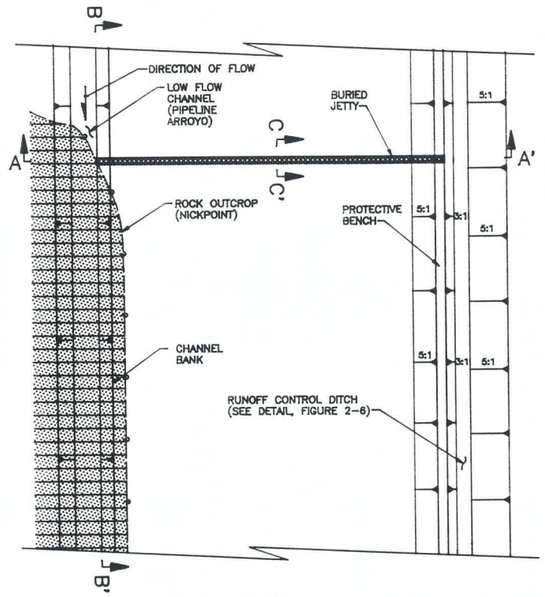
DATE: 11-14-90
SCALE: AS SHOWN

FIGURE 2-7

DRAWING NUMBER 86-060-B430

86-060-B429 1

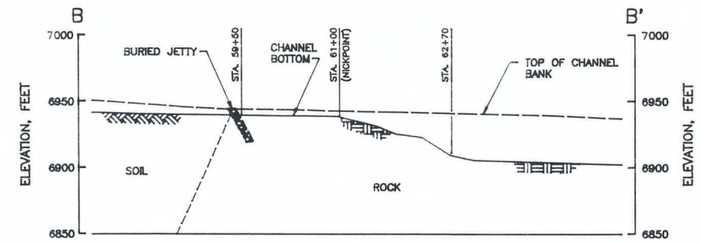
DRAWING NUMBER 86-060-E419



PLAN

SCALE

100 0 100 FEET



SECTION B-B'
NICKPOINT REINFORCEMENT

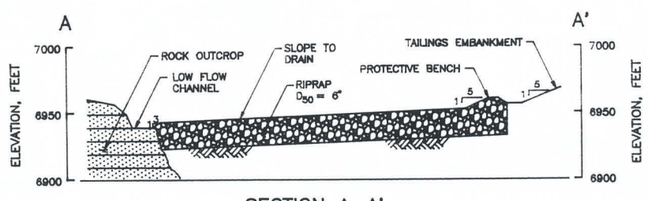
VERTICAL SCALE

50 0 50 FEET

HORIZONTAL SCALE

100 0 100 FEET

VERTICAL EXAGGERATION = 2X



SECTION A-A'

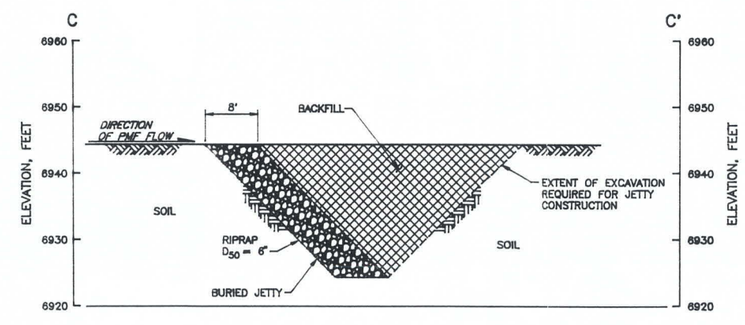
VERTICAL SCALE

50 0 50 FEET

HORIZONTAL SCALE

100 0 100 FEET

VERTICAL EXAGGERATION = 2X



SECTION C-C'

SCALE

10 0 10 FEET

BURIED JETTY DETAILS

PREPARED FOR

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GALLUP, NEW MEXICO

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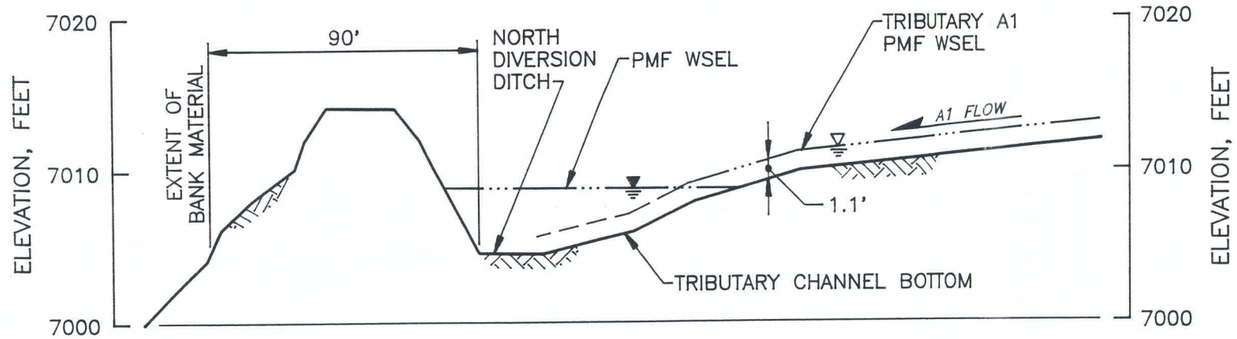
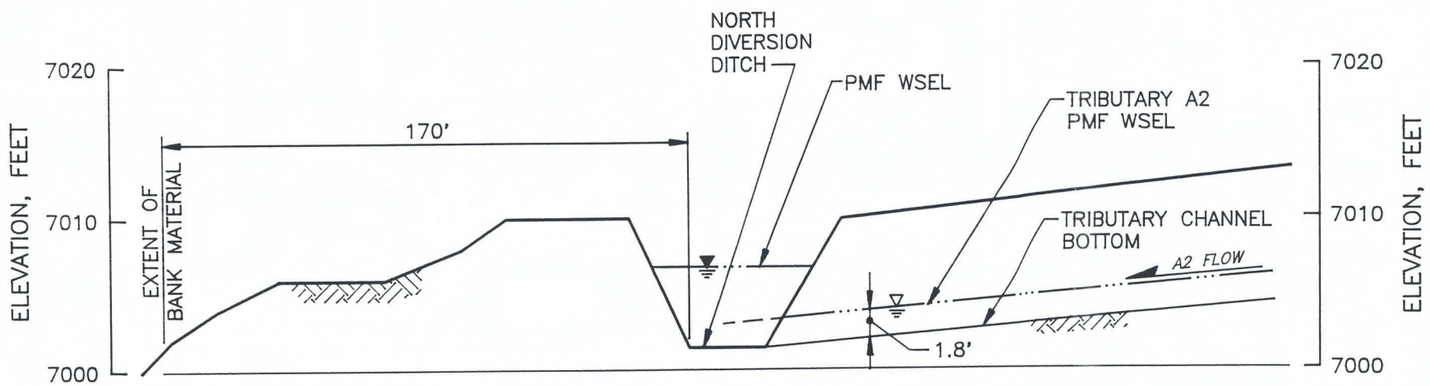
No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
1	12/3/90	ISSUED FOR RESPONSE TO COMMENTS AND PROPOSED RECLAMATION PLAN MODIFICATIONS	P.M.W.	[illegible]	[illegible]

DATE: 11-15-90	FIGURE 2-8	DRAWING NUMBER 86-060-E419	1
SCALE: AS SHOWN			

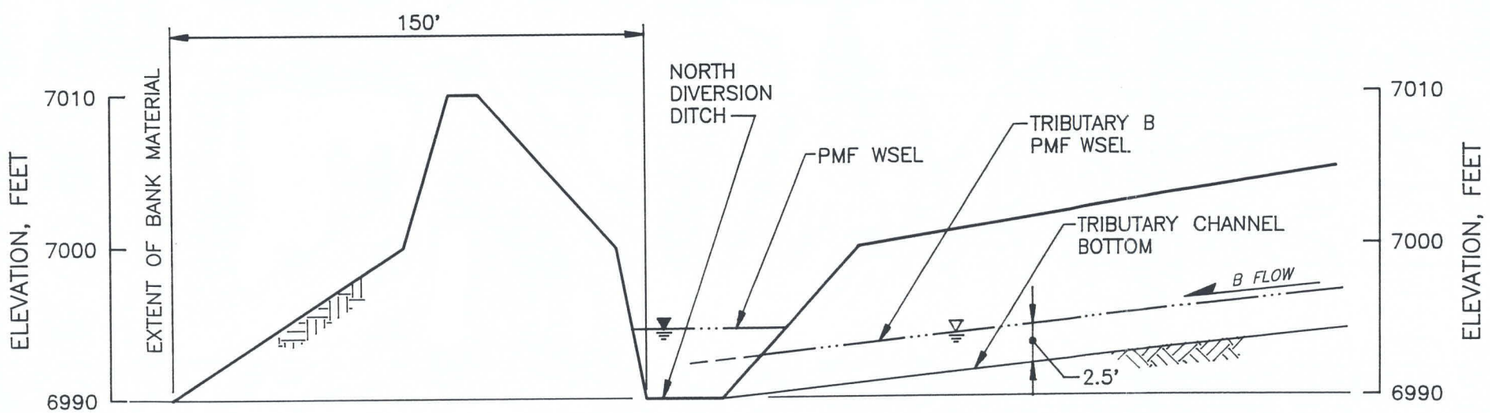
DRAWING NUMBER 86-060-B423



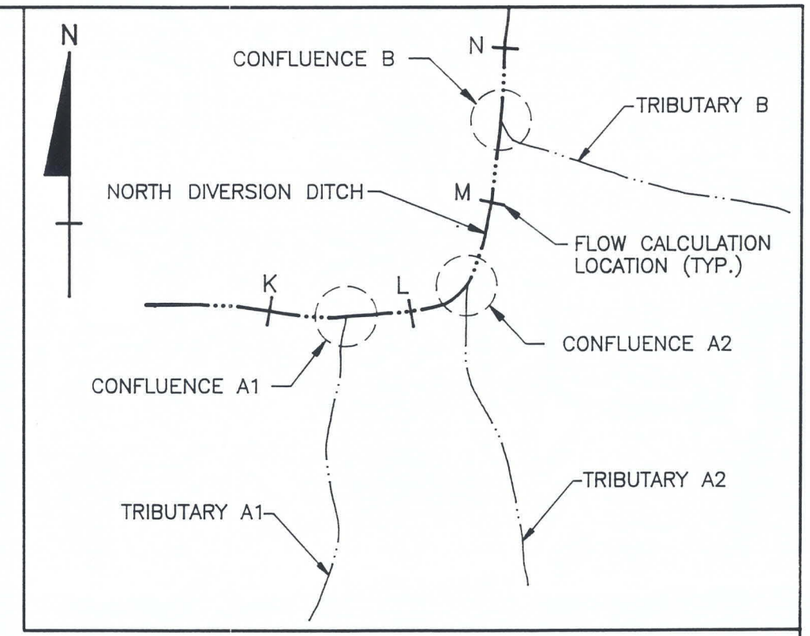
CONFLUENCE A1



CONFLUENCE A2



CONFLUENCE B



SCHEMATIC OF TRIBUTARY CONFLUENCES

(NOT TO SCALE)

LEGEND:

PMF	PROBABLE MAXIMUM FLOOD
WSEL	WATER SURFACE ELEVATION

NOTE:

1. ACTUAL TRIBUTARY LOCATIONS ARE SHOWN ON FIGURE 2-2.

VERTICAL SCALE

10 0 10 FEET

HORIZONTAL SCALE

50 0 50 FEET

VERTICAL EXAGGERATION = 5x

NORTH DIVERSION DITCH
CROSS SECTIONS

PREPARED FOR

UNC MINING AND MILLING
GALLUP, NEW MEXICO

CanonieEnvironmental

No.	DATE	ISSUE / REVISION	DWN. BY	CK'D BY	AP'D BY
1	12-4-90	ISSUED FOR RESPONSE TO COMMENTS AND PROPOSED RECLAMATION PLAN MODIFICATIONS	P.M.W.	mjy	DHG

DATE: 11-12-90	FIGURE 2-9	DRAWING NUMBER 86-060-B423
SCALE: AS SHOWN		

1