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Geology of the 241-AX Tank Farm

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Environmental Engineering Section
Research Department
Research and Engineering Division

Prepared for the U.S. Energy Research
and Development Administration
Under Contract E(45-1)-2130

Atlantic Richfield Hanford Company
Richland, Washington 99352



GEOLOGY OF THE 241-AX TANK FARM

by

W. H. Price
K. R. Fecht

Environmental Engineering Section
Research Department
Research and Engineering Division

April 1976

ATLANTIC RICHFIELD HANFORD COMPANY
RICHLAND, WASHINGTON 99352

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GEOLOGY OF THE 241-AX TANK FARM

INTRODUCTION

A series of maps have been compiled to document the structure and stratigraphy of the sediments underlying the high-level radioactive waste storage tank farms located within the Energy Research and Development Administration Hanford Reservation. The primary purpose of these maps is to provide basic geologic information to be utilized to evaluate the impact of suspected and confirmed tank leaks. For convenience of usage map sets for each tank farm have been published in separate document packets (see Table I). The contents of this packet (see Table II) contain maps compiled only for the 241-AX Tank Farm.

TABLE I

TANK FARM GEOLOGY DOCUMENTS AVAILABLE
AS OF APRIL, 1976*

<u>Title</u>	<u>Document Number</u>
Geology of the 241-A Tank Farm	ARH-LD-127
Geology of the 241-AX Tank Farm	ARH-LD-128
Geology of the 241-B Tank Farm	ARH-LD-129
Geology of the 241-BX Tank Farm	ARH-LD-130
Geology of the 241-BY Tank Farm	ARH-LD-131
Geology of the 241-C Tank Farm	ARH-LD-132
Geology of the 241-S Tank Farm	ARH-LD-133
Geology of the 241-SX Tank Farm	ARH-LD-134
Geology of the 241-T Tank Farm	ARH-LD-135
Geology of the 241-TX Tank Farm	ARH-LD-136
Geology of the 241-TY Tank Farm	ARH-LD-137
Geology of the 241-U Tank Farm	ARH-LD-138
Generalized Geology of the 241-SY Tank Farm	ARH-LD-139

*Additional documents will be completed as new tank farms are built and well monitoring networks installed.

TABLE II

241-AX TANK FARM GEOLOGY MAPS

Title	Drawing Number
241-AX Tank Farm Geologic Map Legend and Plot Plan	H-2-38979
241-AX Tank Farm Geologic Characterization Cross Section A-A'	H-2-64953
241-AX Tank Farm Geologic Characterization Cross Section B-B'	H-2-64954
241-AX Tank Farm Geologic Characterization Cross Section C-C'	H-2-64955
241-AX Tank Farm Geologic Characterization Cross Section D-D'	H-2-64956
241-AX Tank Farm Geologic Characterization Cross Section E-E'	H-2-64957
241-AX Tank Farm Geologic Characterization Cross Section F-F'	H-2-64958
241-AX Tank Farm Geologic Characterization Base of Backfill	H-2-64952

PROCEDURES

During the drilling of 23 dry wells and 4 water wells in and around the 241-AX Tank Farm, sediment samples were collected from one to 5-foot depth intervals. Information utilized to prepare this series of maps was obtained by the analysis of these samples, numbering approximately 600.

Each sediment sample was quantitatively analyzed according to grain size and CaCO_3 content. Size analysis was carried out utilizing a nest of 9 sieves selected for coincidence with the Wentworth (1922) grain size nomenclature (see H-2-38979). The CaCO_3 content of each sample was determined utilizing a semiquantitative CO_2 displacement method (Horwitz, 1970). Size and CaCO_3 data was input into the Rocksax Computer Program (Parr, 1974)

which categorized each sediment sample into 1 of 19 classes (classification scheme modified after Folk, 1968; see H-2-38979). After analysis, each sample was visually examined to aid in further characterization. Each sample was subsequently stored in the Hanford Well Library for future reference.

For convenience of usage, the geologic maps were prepared at the same scale (1" = 16') as drawing H-2-36935 (Wells in 241-AX Farm As-built). Steps outlining the preparation of the maps are listed in Figure 1.

GENERALIZED GEOLOGY

Included within this section is a brief discussion of the geology underlying the 241-AX Tank Farm. The stratigraphic descriptions included, along with the Glossary (see page), are designed only to provide sufficient information to permit a general understanding of the Tank Farm maps presented. For a more detailed discussion of the regional geologic setting of the 241-AX Tank Farm, the reader is referred to articles listed in the Selected References (see page).

The 241-AX Tank Farm is underlain by three major stratigraphic units (see Figure 2); (1) basalt of the Columbia River Group which forms the bedrock beneath the area; (2) semiconsolidated sediments of the Ringold Formation which directly overlie the bedrock; and (3) unconsolidated sand, silt, and gravel, collectively termed glaciofluvial sediments. A more detailed description of the character of these units underlying the Tank Farm follows.

COLUMBIA RIVER BASALT GROUP

About 20 million years ago a series of fissures opened around the periphery of the subsiding Pasco Basin and large volumes of basaltic lava poured out over the land surface. The highly fluid lava was extruded intermittently from these fissures until approximately 8 million years ago. At the cessation of Columbia River Basalt volcanism, the basin had been filled with more than 12,000 feet of basalt.

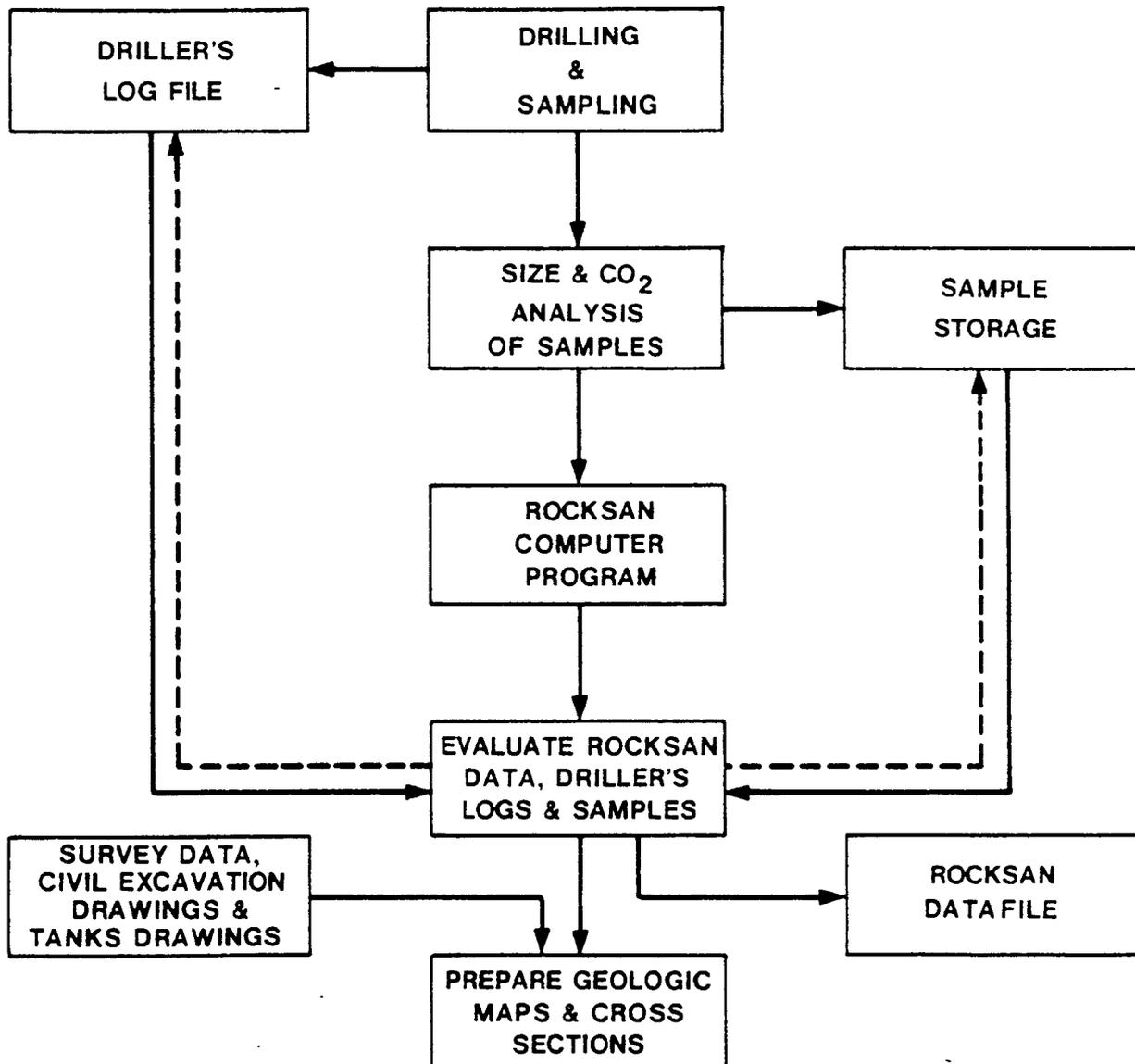


FIGURE 1

STEPS OUTLINING THE PREPARATION OF
TANK FARM GEOLOGY MAPS

ERA	PERIOD	EPOCH	YEARS B. P.	STRATIGRAPHIC NAME AND/OR UNIT	LITHOLOGY DESCRIPTION	
CENOZOIC	QUATERNARY	MODERN	30	BACKFILL	VERY POORLY SORTED GRAVEL, SAND & SILT	
		PLEISTOCENE	1,000,000	GLACIOFLUVIAL SEDIMENTS	FAIRLY WELL SORTED FLUVIAL SAND & SILT WITH SOME GRAVEL	
				EOLIAN SILT	FINE SAND & SILT DERIVED FROM THE UPPER RINGOLD	
	TERTIARY	PLIOCENE	11,000,000	RINGOLD FORMATION	UPPER RINGOLD	WELL SORTED FLUVIAL OR LACUSTRINE SILT & SAND WITH SOME CALCAREOUS LAYERS
				MIDDLE RINGOLD	FLUVIAL GRAVEL & SAND VARIABLY CEMENTED WITH CALCIUM CARBONATE & SILICA	
		MIOCENE	11,000,000	COLUMBIA RIVER BASALT GROUP	ELEPHANT MOUNTAIN MEMBER	DENSE BLACK EXTRUSIVE IGNEOUS ROCK, MICRO VESICULAR, BRICK BAT ENTABLATURE & NO COLUMNADE
				RATTLESNAKE RIDGE MEMBER	TUFFACEOUS SANDSTONE	
				POMONA MEMBER	DENSE BLACK EXTRUSIVE IGNEOUS ROCK, SCATTERED OLIVINE PHENOCRYSTS, UPPER & SOMETIMES BASAL ENTABLATURE WELL DEVELOPED, FAN JOINTING IN COLUMNADE	

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FIGURE 2

GENERALIZED STRATIGRAPHIC COLUMN FOR
THE 200 AREA TANK FARMS

The surface of the Columbia River Basalt lies beneath 241-AX Tank Farm at an elevation of 300 feet (all elevations based on feet above mean sea level measured at approximate center of Tank Farm). On the 241-AX Tank Farm maps, this surface occurs approximately 60 feet below the bottom border of the prepared cross sections.

RINGOLD FORMATION

Following the cessation of Columbia River Basalt volcanism the ancestral Columbia River transported sediments from the surrounding highlands into the Pasco Basin where they accumulated to form the Ringold Formation. Beneath the Hanford Reservation, this formation is up to 1200 feet thick and can generally be divided into three units on the basis of lithology; the clays and silts of the lower Ringold unit; the pebbles and cobbles of the middle Ringold unit; and the silts and fine sands of the upper Ringold unit.

Within the region beneath 241-AX Tank Farm, the lower and upper Ringold unit are missing. The total thickness of the Ringold unit present is approximately 108 feet.

Middle Ringold

Beneath the 241-AX Tank Farm, the middle Ringold unit lies unconformably on the Columbia River Basalt and dips about 5° to the west. The unit consists predominantly of well-rounded pebbles and cobbles with the interstitial spaces filled with very coarse to coarse sand. Table III summarizes the grain size and CaCO₃ values of the middle Ringold sediments.

TABLE III

TYPICAL GRAIN SIZE AND CALCIUM CARBONATE VALUES
FOR MAJOR MIDDLE RINGOLD LITHOLOGY
BENEATH 241-AX TANK FARM

<u>Lithology</u>	<u>%Pebbles & Cobbles</u>	<u>% Sand</u>					<u>%Silt & Clay</u>	<u>%CaCO₃</u>
		<u>Very Coarse</u>	<u>Coarse</u>	<u>Medium</u>	<u>Fine</u>	<u>Very Fine</u>		
Sandy Medium to Fine Pebble to Pebbly Very Coarse to Coarse Sand	30	25	20	11	5	3	6	0.8

GLACIOFLUVIAL DEPOSITS

During the close of the Ice Age, approximately 20,000 years ago, a continental ice sheet covered much of northern Washington. As the ice sheet retreated northward, the breakup of ice dams resulted in catastrophic floods in which large volumes of glacial meltwater were released. During one of these floods, over 500 cubic miles of water is estimated to have poured into the Pasco Basin at a rate of more than 9 cubic miles of water per hour. Sediments deposited within the basin by such flooding now comprise the glaciofluvial unit. The characteristic variability of sediment size and degree of sorting within this unit can be attributed to changes in water velocity and water level which occurred during the flooding process.

Glaciofluvial deposits are found beneath the 241-AX Tank Farm between elevations 408 and 626 feet. The 218-foot thick section of these deposits consists predominantly of very coarse to medium sand and pebbles with some silt. Table IV summarizes the grain size and CaCO₃ values of the glaciofluvial sediments.

TABLE IV

TYPICAL GRAIN SIZE AND CALCIUM CARBONATE VALUES
FOR MAJOR GLACIOFLUVIAL LITHOLOGIES
BENEATH 241-AX TANK FARM

Lithology	%Pebbles & Cobbles	% Sand					%Silt & Clay	%CaCO ₃
		Very Coarse	Coarse	Medium	Fine	Very Fine		
Sandy Fine to Very Fine Pebble to Pebbly Very Coarse Sand	30	23	21	10	7	4	5	1.7
Slightly Silty Pebbly Very Coarse to Coarse Sand	14	21	23	15	10	7	10	1.8
Slightly Silty Very Coarse to Medium Sand to Very Coarse to Medium Sand	2	17	22	21	10	9	19	1.7
Slightly Pebbly Very Coarse to Medium Sand	7	25	37	20	6	2	3	1.2
Slightly Pebbly Silty Fine Sand	5	7	11	14	23	14	28	2.6

CLASTIC DIKES

Throughout the Pasco Basin, clastic dikes are found cross-cutting the Ringold Formation and glaciofluvial sediments. These dikes, which range from a few inches to several feet in width, are known to exist to depths of more than 100 feet below the ground surface. Generally, the dikes are composed of fine silts to coarse sands. The origin of the clastic dikes is still in refute and will not be discussed here (see Selected References). Identification of clastic dikes by drilling is difficult and although some dikes were detected in the 241-AX Tank Farm, they could not be mapped.

BACKFILL MATERIAL

In preparation for tank construction, glaciofluvial material was excavated at the 241-AX Tank Farm site. This material, consisting predominantly of pebbles, and coarse to medium sands with some silt, was subsequently used as backfill from the base of the completed tanks (626 feet) to the ground surface (681 feet). An inherent characteristic of the backfill is its poor sorting. Grain size and CaCO_3 values for the backfill are found in Table V.

TABLE V

TYPICAL GRAIN SIZE AND CALCIUM CARBONATE VALUES
FOR THE 241-AX TANK FARM BACKFILL

<u>Lithology</u>	<u>%Pebbles & Cobbles</u>	<u>% Sand</u>					<u>%Silt & Clay</u>	<u>%CaCO₃</u>
		<u>Very Coarse</u>	<u>Coarse</u>	<u>Medium</u>	<u>Fine</u>	<u>Very Fine</u>		
Slightly Pebbly Slightly Silty Coarse to Fine Sand	7	17	19	19	16	9	13	2.0

WATER TABLE

The water table beneath the 241-AX Tank Farm is located within the middle Ringold unit at an elevation of 403 feet, 223 feet below the base of the tanks. For further information concerning contours on the water table beneath 200 East Area the reader is referred to drawings H-2-38398 (200 East Area Water Table Map) and H-2-38399 (200 East Area Depth to Water Map).

GLOSSARY

- Basalt. Fine-grained, dark-colored, extrusive igneous rock.
- Calcareous. Containing calcium carbonate.
- Caliche. Gravel, sand, or silt cemented by calcium carbonate.
- Cement. Chemically precipitated material occurring in the interstices between particles of gravel, sand, or silt.
- Clastic. A textural term applied to rocks composed of fragmental material derived from pre-existing rocks.
- Clastic dike. A tabular body of clastic material transecting the bedding of a sedimentary formation, representing extraneous material that has invaded the containing formation along a crack.
- Dip. The angle at which a stratum or any planar feature is inclined from the horizontal.
- Eolian. A formation formed by, or deposited from, the wind or currents of air.
- Fluvial. Produced by the action of a river or stream.
- Formation. The ordinary unit of geologic mapping consisting of a large and persistent stratum of some one kind of rock.
- Glaciofluvial. Pertaining to streams flowing from glaciers or to the deposits made by such streams.
- Grain. The particles or discrete crystals which comprise a rock or sediment.
- Group. A local or provincial subdivision of a series, based on lithologic features and contains two or more formations.
- Lacustrine. A formation deposited in a lake environment.
- Lava. Fluid rock such as that which issues from a volcano or a fissure in the earth's surface and the same material solidified by cooling.
- Lithology. The description of rocks or sediments on the basis of such characteristics as color, mineralogic composition and grain size.
- Sediment. Descriptive term for gravel, sand, and silt transported from their sources and deposited by air, water, or ice.
- Sieve. A utensil having many small perforated openings, used to separate fine particles from coarser ones.

Siliceous. Containing silica.

Silt. Fine grained material between sand and clay in size.

Sorting. The grain size range of the sediments.

Stratigraphy. The part of descriptive geology of an area that pertains to the discrimination, character, thickness, sequence, age and correlation of the sediments and rocks of the area.

Subaerial. Formed, existing, or taking place on the land surface.

Unconformity. A surface of erosion or nondeposition that separates younger strata from older strata.

Water table. The upper surface of a zone of saturation except where that surface is formed by an impermeable body.

Winnowing. Separation of fine particles from coarser ones by wind action.

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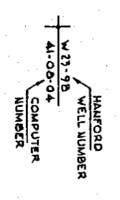
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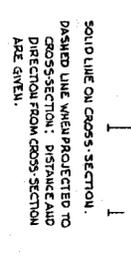
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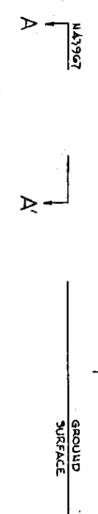
1 - WELL DESIGNATION
WELL NUMBERS PREFIXED BY 299-
PLOT PLAN VIEW



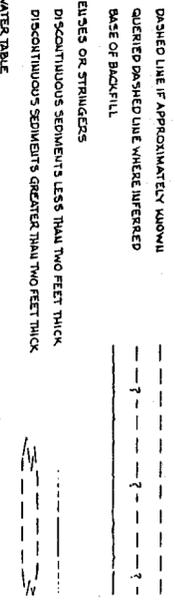
CROSS-SECTION VIEW
COMPUTER NUMBER -
HAYFORD WELL # 2
HAYFORD WELL # 4
W 23-99 (1 SOUTH)
W 23-99 (2 SOUTH)



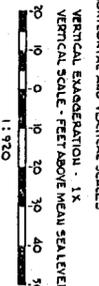
2 - COORDINATES
BASED ON HAYFORD COORDINATE SYSTEM.
3 - PLANE OF CROSS-SECTION
PLOT PLAN VIEW



4 - TANK DESIGNATION
TANKS PREFIXED BY 24-
5 - CONTACT BETWEEN LITHOLOGIES
SOLID LINE WHERE ACCURATELY KNOWN
DASHED LINE IF APPROXIMATELY KNOWN
DOTTED DASHED LINE WHERE INFERRED
BASE OF BACKFILL



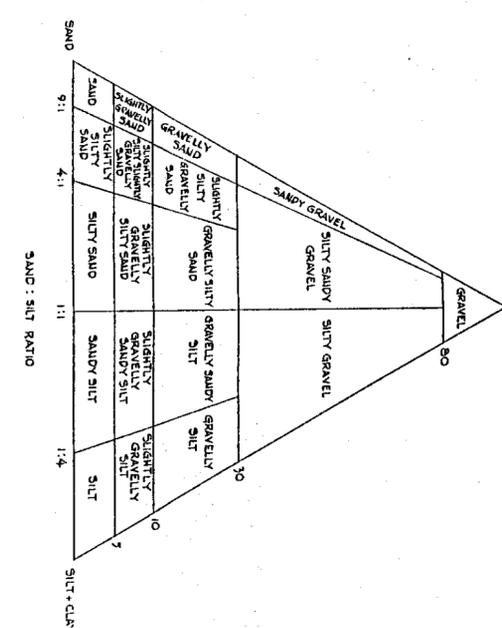
6 - LEAKERS OR STRUNGERS
DISCONTINUOUS SEDIMENTS LESS THAN TWO FEET THICK
7 - WATER TABLE
CROSS-SECTION VIEW
DATE WATER LEVEL
MEASUREMENTS TAKEN



8 - HORIZONTAL AND VERTICAL SCALES
VERTICAL EXAGGERATION - 1X
VERTICAL SCALE - FEET ABOVE MEAN SEALEVEL
HORIZONTAL SCALE - FEET
1 : 920

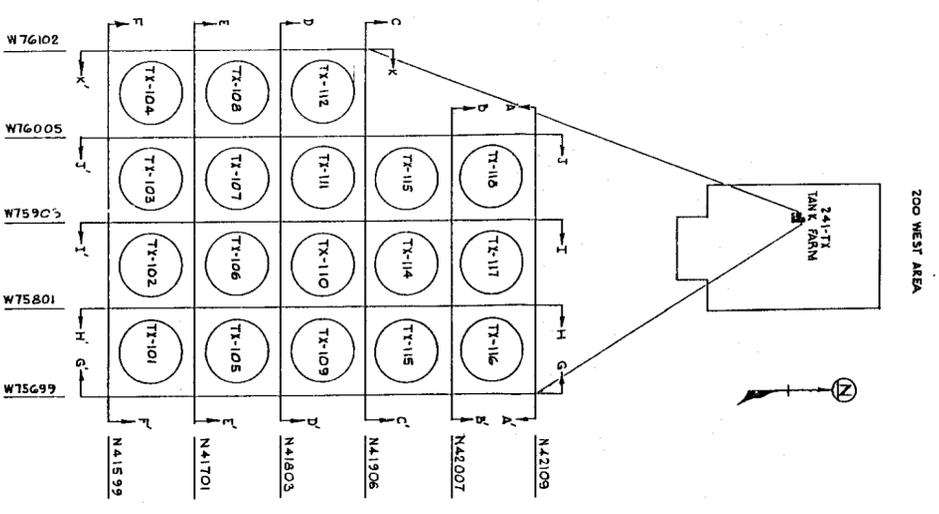
9 - SEDIMENT DESCRIPTION
SEDIMENTS BELIEVED THE TANK FARMS ARE CLASSIFIED ON THE BASIS OF ONE OF
SIX LETTERS (S, G, M, F, C, S) WHICH INDICATE THE SEDIMENT TYPE (SEDIMENT CLASSIFICATION). FURTHER DETAIL IS
GIVEN USING MODIFIERS FROM THE GRAIN SIZE NOMENCLATURE. SEDIMENTS
WITH CHEMICALLY PRECIPITATED MATERIALS OCCURRING IN THE INTERSTICES
BETWEEN GRAINS ARE PREFIXED BY THE TERM 'CEMENTED'. SEDIMENTS WITH
GRAINER THAN 10% CALCIUM CARBONATE ARE PREFIXED BY THE MODIFIER
'CALCAREOUS'. SEDIMENTS CONTAINING SILICA IN THE INTERSTICES BETWEEN
GRAINS ARE MODIFIED BY THE TERM 'SILICEOUS'.

SEDIMENT CLASSIFICATION (MODIFIED AFTER R.L. FOLK, 1968)

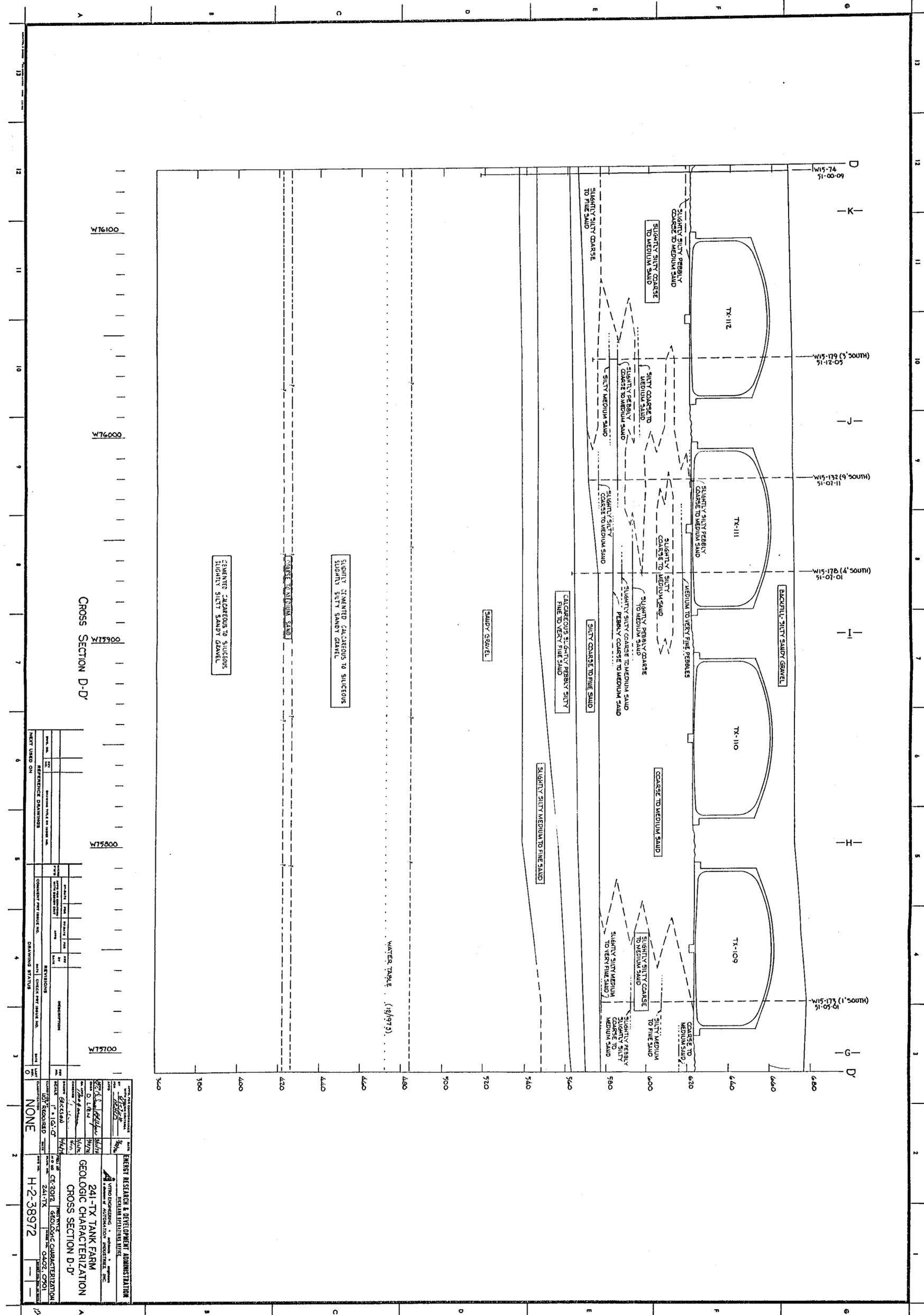


GRAIN SIZE NOMENCLATURE (MODIFIED AFTER C.A. WENTWORTH, 1922)

PARTICLE DESIGNATION	PARTICLE DIAMETER (MM)
BOULDER	> 256
COBBLE	25.4 - 128
GRAVEL	4.75 - 25.4
LARGE	12.5 - 25.4
SMALL	4.75 - 12.5
PEBBLE	2.0 - 6.4
VERY COARSE	4.0 - 6.4
COARSE	2.0 - 4.0
MEDIUM	0.85 - 2.0
FINE	0.425 - 0.85
VERY FINE	0.25 - 0.425
SAND	0.075 - 0.425
VERY COARSE	0.425 - 0.6
COARSE	0.25 - 0.425
MEDIUM	0.15 - 0.25
FINE	0.075 - 0.15
VERY FINE	0.0425 - 0.075
SILT + CLAY	< 0.0425



DATE	2/1/73	BY	W. J. ...						
SCALE	AS SHOWN	CHECKED BY	...						
PROJECT	24-TX TANK FARM	APPROVED BY	...						
DRAWING STATUS	...	DATE	...						
REVISIONS	<table border="1"> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> </tr> <tr> <td>1</td> <td>...</td> <td>...</td> </tr> </table>			NO.	DATE	DESCRIPTION	1
NO.	DATE	DESCRIPTION							
1							
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PROJECT NO.	H-2-38988	DATE	...						



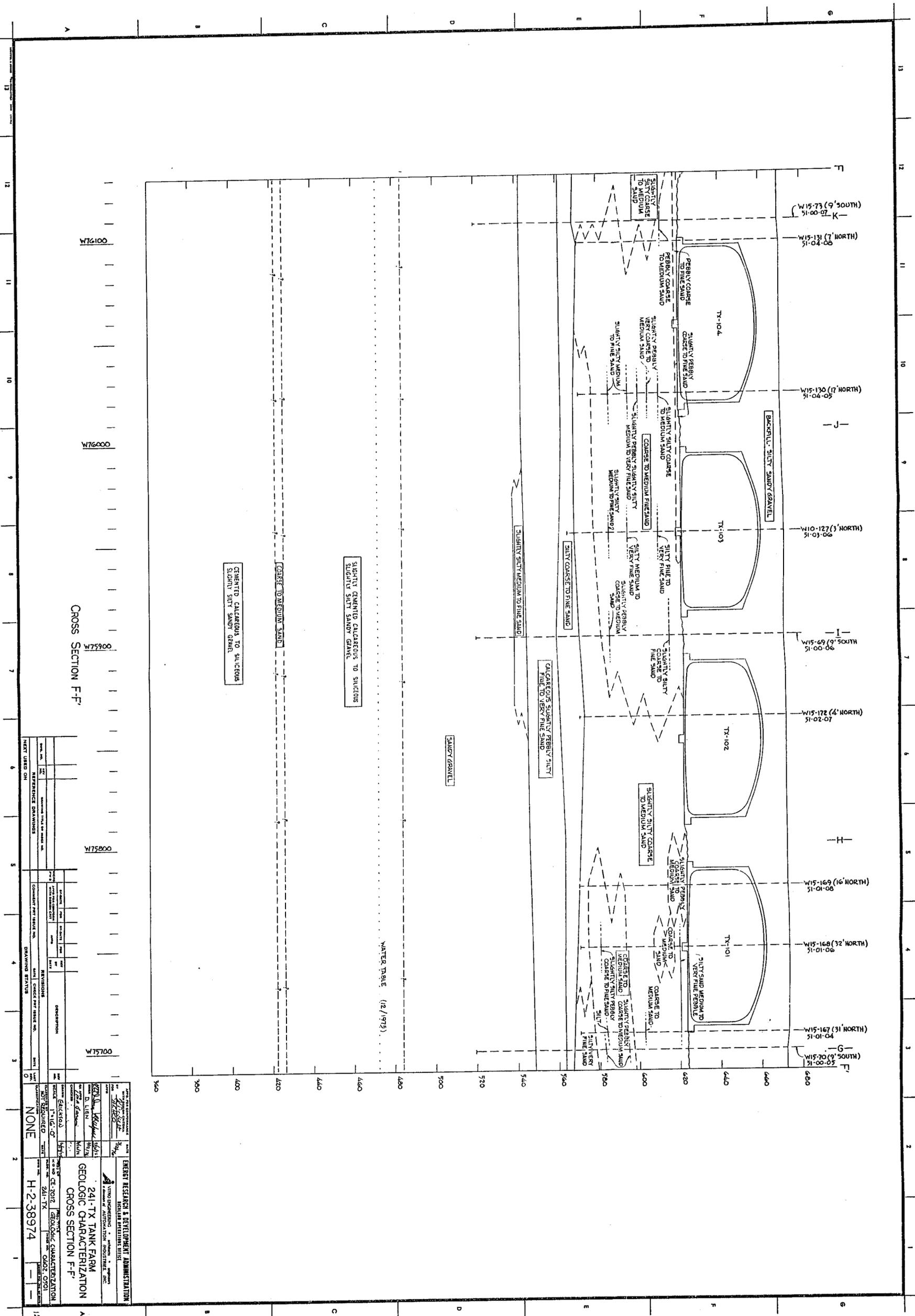
CROSS SECTION D-D'

NO.	DATE	BY	REVISIONS
1			AS SHOWN

DATE	BY	REVISIONS

PROJECT NO.	241-TX
DATE	12/1/72
SCALE	AS SHOWN
DRAWN BY	WJL
CHECKED BY	WJL
APPROVED BY	WJL

PROJECT TITLE	241-TX TANK FARM
CLIENT	ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION
LOCATION	241-TX TANK FARM, GEORGIA
DRAWING NO.	H-2-38972
DATE	12/1/72
SCALE	AS SHOWN
DRAWN BY	WJL
CHECKED BY	WJL
APPROVED BY	WJL



CROSS SECTION F-F'

NO.	DATE	REVISIONS	DESCRIPTION
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NO.	DATE	REVISIONS	DESCRIPTION
1	12/1973	AS SHOWN	AS SHOWN

NO.	DATE	REVISIONS	DESCRIPTION
1	12/1973	AS SHOWN	AS SHOWN

NO.	DATE	REVISIONS	DESCRIPTION
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NO.	DATE	REVISIONS	DESCRIPTION
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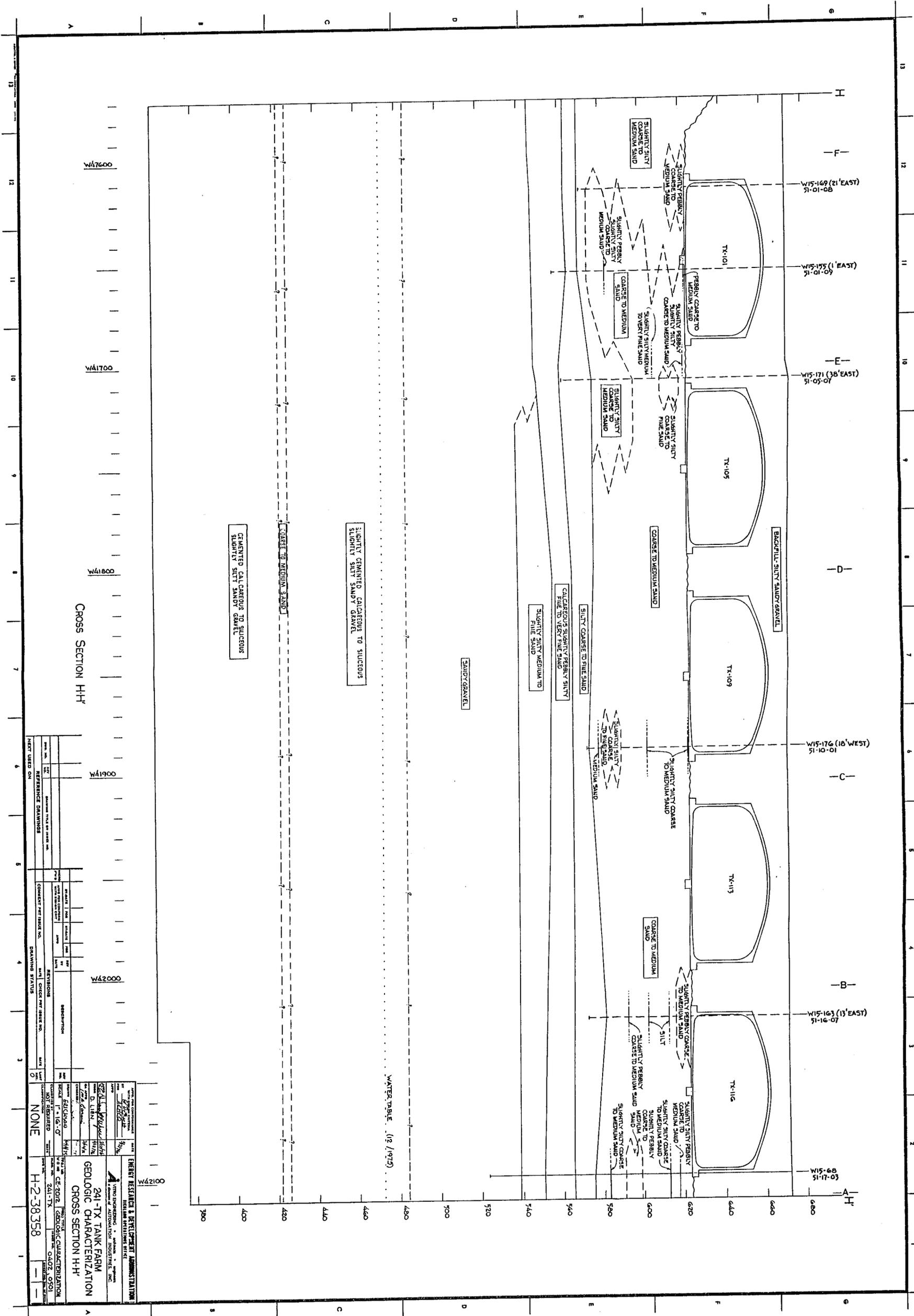
NO.	DATE	REVISIONS	DESCRIPTION
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NO.	DATE	REVISIONS	DESCRIPTION
1	12/1973	AS SHOWN	AS SHOWN

241-TX TANK FARM
GEOLOGIC CHARACTERIZATION
CROSS SECTION F-F'

ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION
VINHO ENGINEERING & CONSULTANTS, INC.

H-2-38974



CROSS SECTION HH'

NO.	DATE	DESCRIPTION	BY	CHECKED BY	STATUS
0		AS SHOWN			0

PROJECT NO.	241-TX
DATE	12/1972
SCALE	AS SHOWN
DRAWING STATUS	FINAL
PROJECT PERMITS NO.	
COMMITTEE NO.	
REVISIONS	
CHECK PERMITS NO.	
DATE	
BY	
DESCRIPTION	
NO. OF SHEETS	1
TOTAL SHEETS	1
DATE OF REVISION	
BY	
DESCRIPTION	
NO. OF SHEETS	
TOTAL SHEETS	

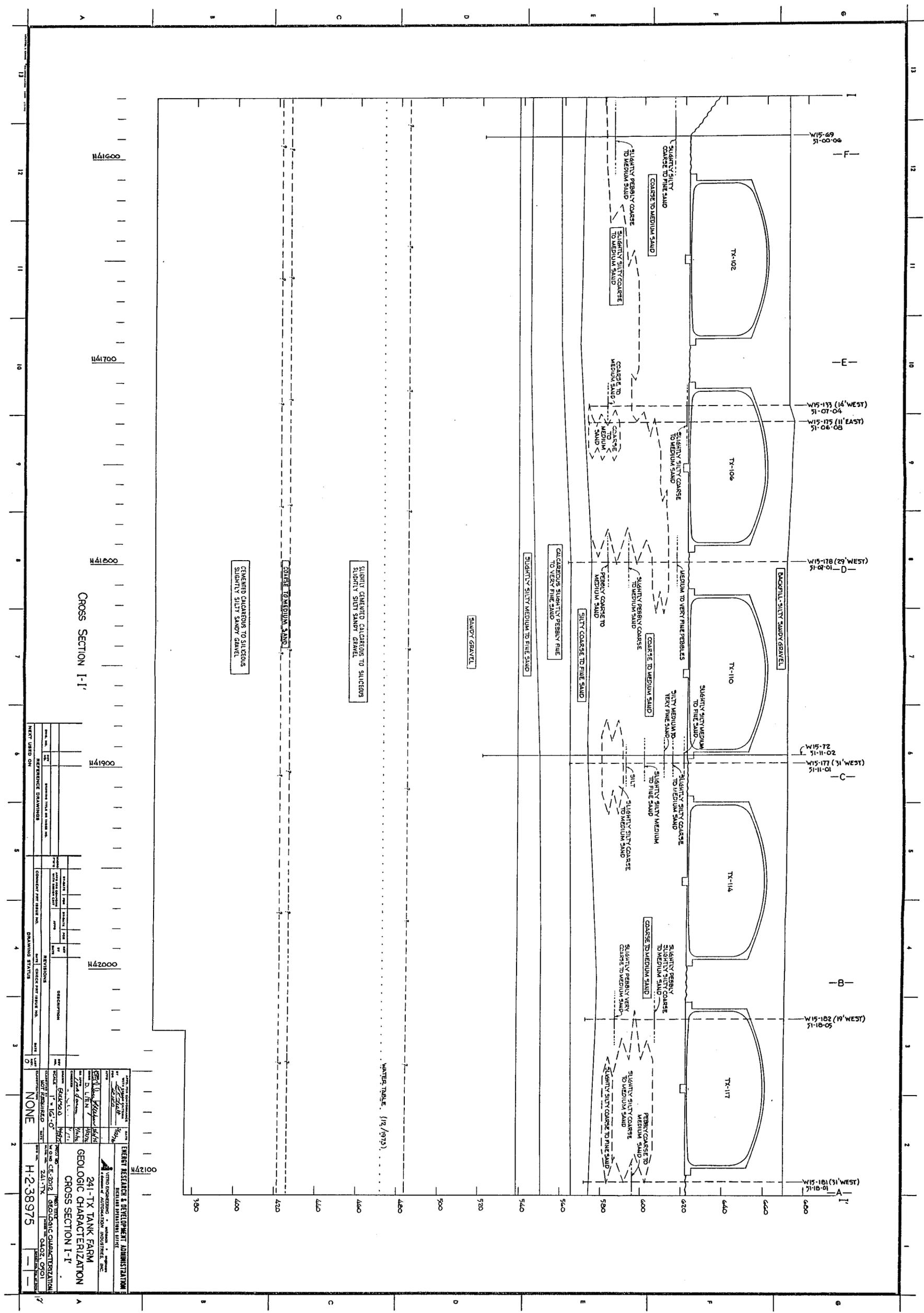
PROJECT NO.	241-TX
DATE	12/1972
SCALE	AS SHOWN
DRAWING STATUS	FINAL
PROJECT PERMITS NO.	
COMMITTEE NO.	
REVISIONS	
CHECK PERMITS NO.	
DATE	
BY	
DESCRIPTION	
NO. OF SHEETS	1
TOTAL SHEETS	1
DATE OF REVISION	
BY	
DESCRIPTION	
NO. OF SHEETS	
TOTAL SHEETS	

PROJECT NO.	241-TX
DATE	12/1972
SCALE	AS SHOWN
DRAWING STATUS	FINAL
PROJECT PERMITS NO.	
COMMITTEE NO.	
REVISIONS	
CHECK PERMITS NO.	
DATE	
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TOTAL SHEETS	1
DATE OF REVISION	
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NO. OF SHEETS	
TOTAL SHEETS	

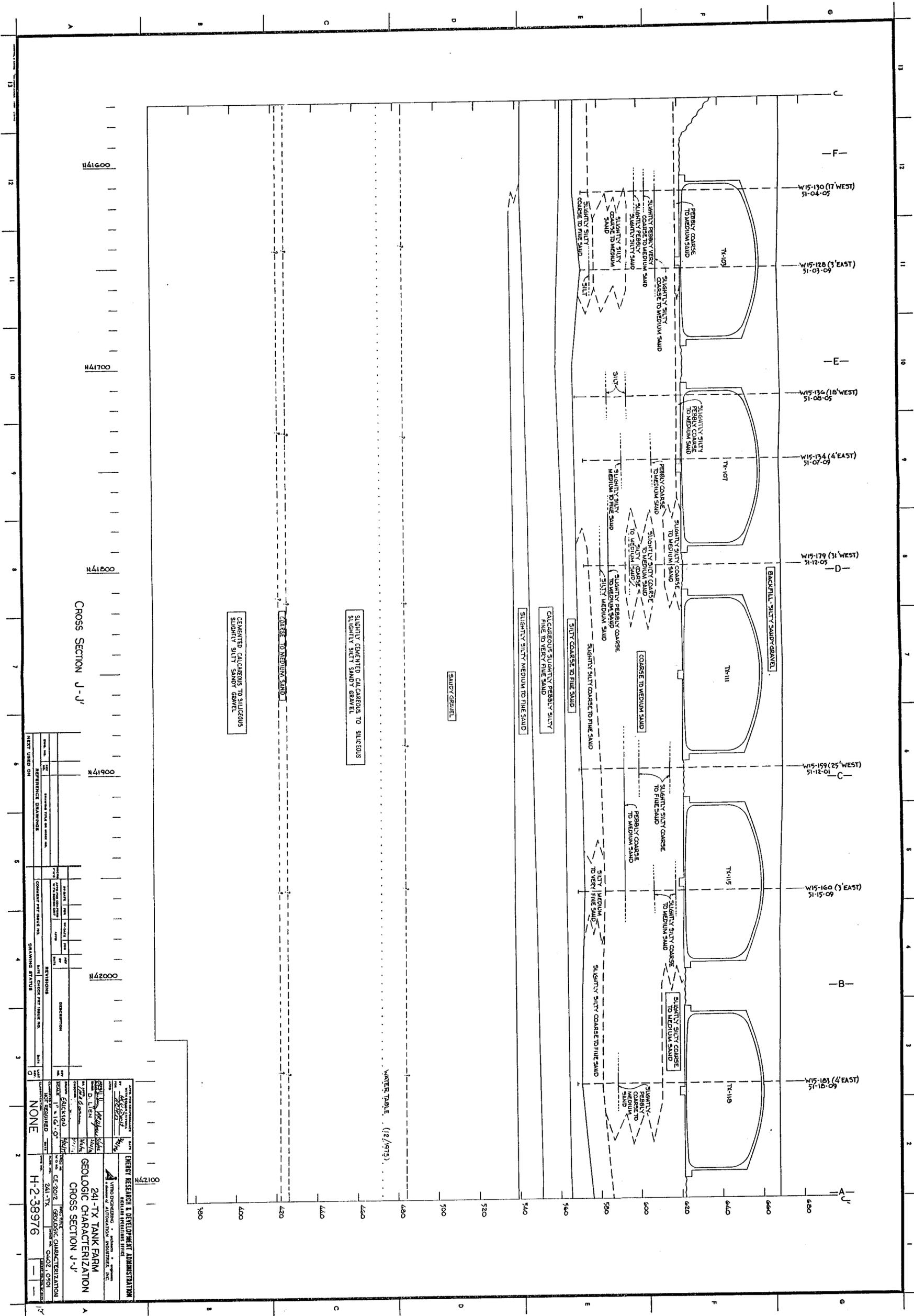
PROJECT NO.	241-TX
DATE	12/1972
SCALE	AS SHOWN
DRAWING STATUS	FINAL
PROJECT PERMITS NO.	
COMMITTEE NO.	
REVISIONS	
CHECK PERMITS NO.	
DATE	
BY	
DESCRIPTION	
NO. OF SHEETS	1
TOTAL SHEETS	1
DATE OF REVISION	
BY	
DESCRIPTION	
NO. OF SHEETS	
TOTAL SHEETS	

EMERT RESEARCH & DEVELOPMENT CORPORATION
 241-TX TANK FARM
 GEOLOGIC CHARACTERIZATION
 CROSS SECTION HH'

H-2-38358



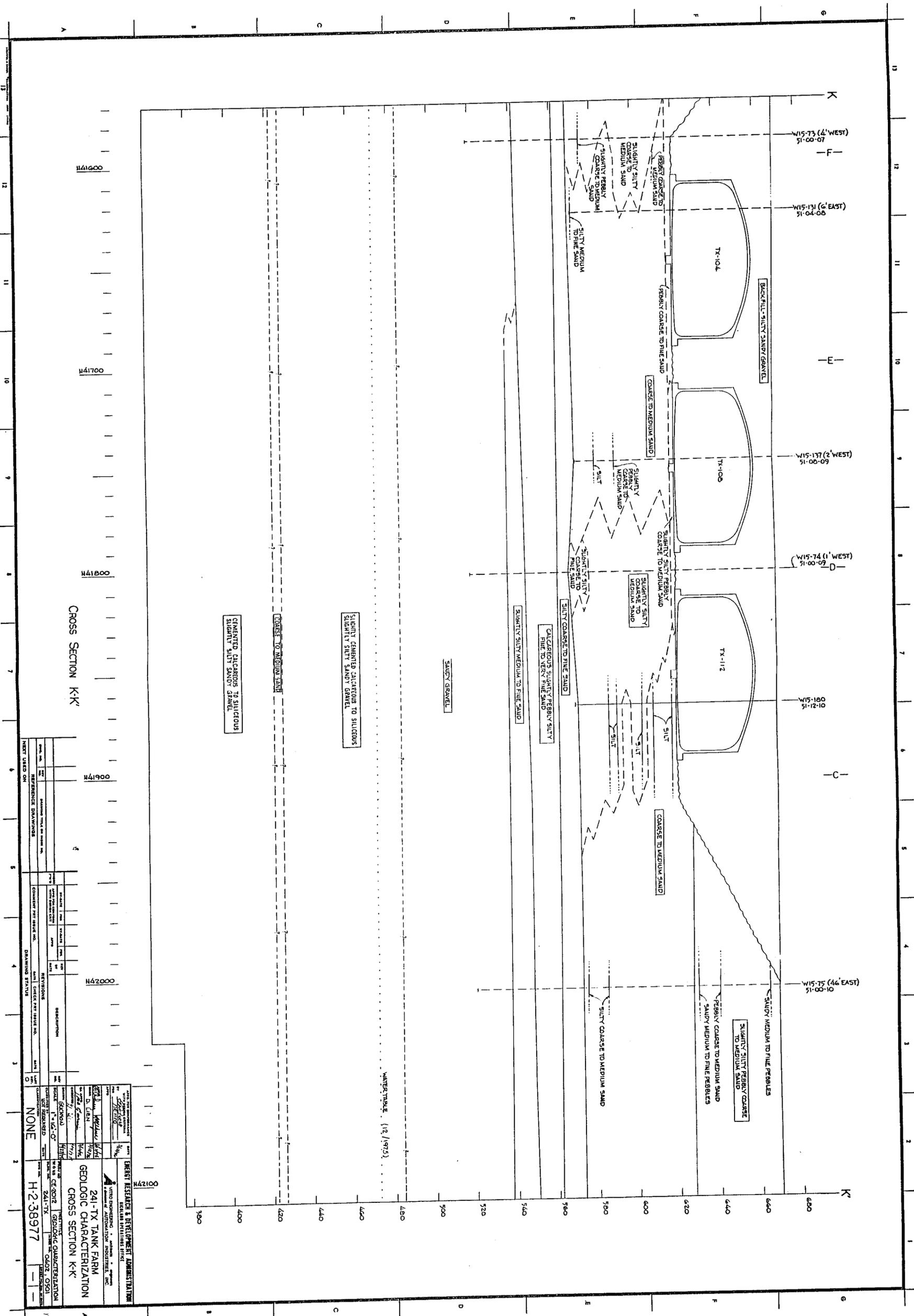
241-TX TANK FARM GEOLOGIC CHARACTERIZATION CROSS SECTION I-I'	
PROJECT NO. H-2-38975 DATE: 01/03/01 SCALE: AS SHOWN	DRAWING NO. H-2-38975 SHEET NO. 01/03
PROJECT LOCATION: 241-TX TANK FARM 241-TX	PROJECT NO. H-2-38975 DATE: 01/03/01
PROJECT OWNER: ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION 1500 SANDHILL AVENUE, SUITE 100 BERKELEY, CALIFORNIA 94708	PROJECT NO. H-2-38975 DATE: 01/03/01
PROJECT ENGINEER: VINTO ENGINEERING 1500 SANDHILL AVENUE, SUITE 100 BERKELEY, CALIFORNIA 94708	PROJECT NO. H-2-38975 DATE: 01/03/01
PROJECT GEOLOGIST: VINTO ENGINEERING 1500 SANDHILL AVENUE, SUITE 100 BERKELEY, CALIFORNIA 94708	PROJECT NO. H-2-38975 DATE: 01/03/01
PROJECT SURVEYOR: VINTO ENGINEERING 1500 SANDHILL AVENUE, SUITE 100 BERKELEY, CALIFORNIA 94708	PROJECT NO. H-2-38975 DATE: 01/03/01
PROJECT PHOTOGRAPHER: VINTO ENGINEERING 1500 SANDHILL AVENUE, SUITE 100 BERKELEY, CALIFORNIA 94708	PROJECT NO. H-2-38975 DATE: 01/03/01
PROJECT DRAFTER: VINTO ENGINEERING 1500 SANDHILL AVENUE, SUITE 100 BERKELEY, CALIFORNIA 94708	PROJECT NO. H-2-38975 DATE: 01/03/01
PROJECT CHECKER: VINTO ENGINEERING 1500 SANDHILL AVENUE, SUITE 100 BERKELEY, CALIFORNIA 94708	PROJECT NO. H-2-38975 DATE: 01/03/01
PROJECT APPROVER: VINTO ENGINEERING 1500 SANDHILL AVENUE, SUITE 100 BERKELEY, CALIFORNIA 94708	PROJECT NO. H-2-38975 DATE: 01/03/01



CROSS SECTION J-J'

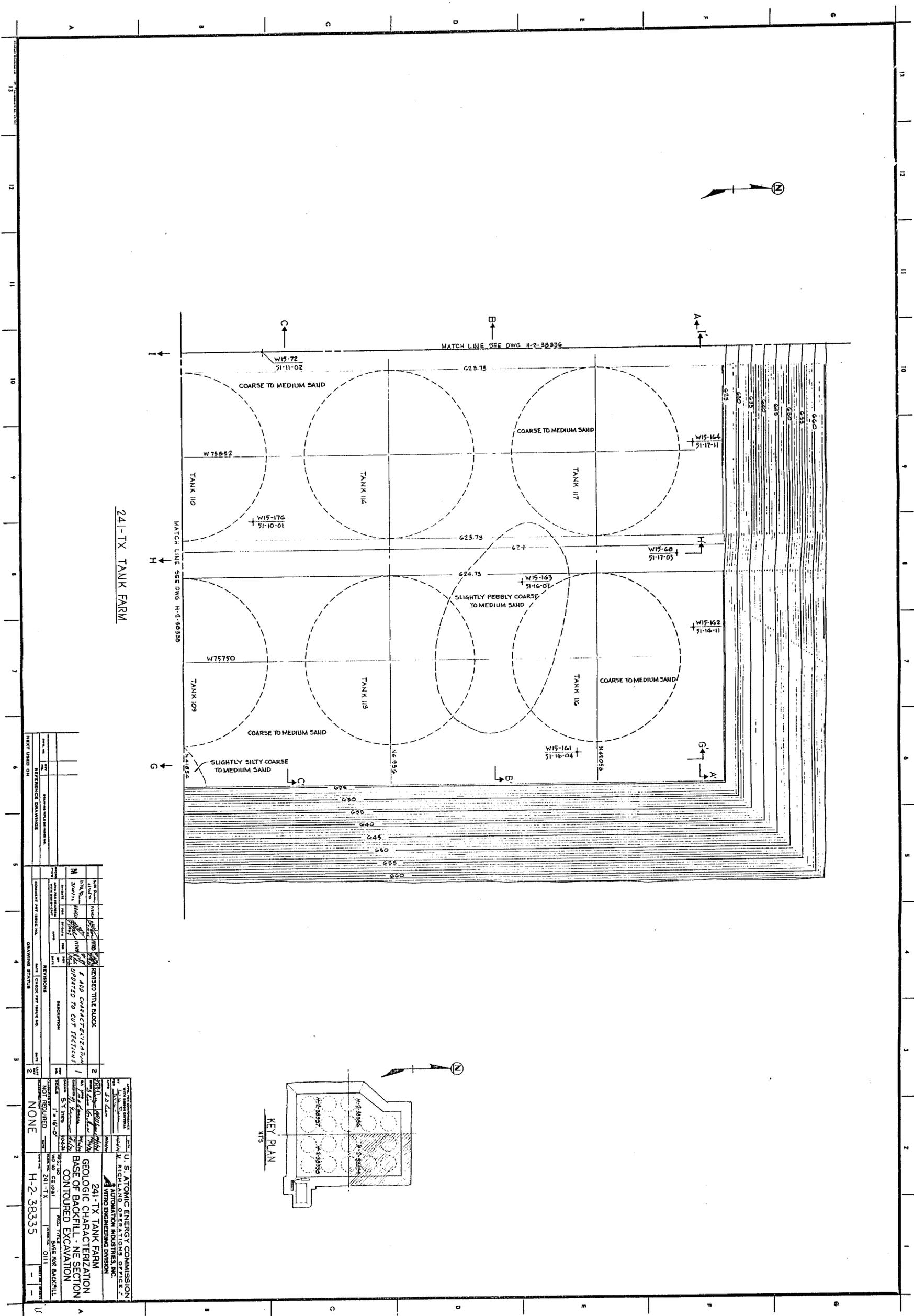
NO.	DATE	BY	REVISIONS	DESCRIPTION
1	12/1/73	W. J. L. / J. L. S.		INITIAL DRAWING
2	12/1/73	W. J. L. / J. L. S.		REVISED
3	12/1/73	W. J. L. / J. L. S.		REVISED
4	12/1/73	W. J. L. / J. L. S.		REVISED
5	12/1/73	W. J. L. / J. L. S.		REVISED
6	12/1/73	W. J. L. / J. L. S.		REVISED
7	12/1/73	W. J. L. / J. L. S.		REVISED
8	12/1/73	W. J. L. / J. L. S.		REVISED
9	12/1/73	W. J. L. / J. L. S.		REVISED
10	12/1/73	W. J. L. / J. L. S.		REVISED
11	12/1/73	W. J. L. / J. L. S.		REVISED
12	12/1/73	W. J. L. / J. L. S.		REVISED
13	12/1/73	W. J. L. / J. L. S.		REVISED

PROJECT NO.	241-TX
PROJECT NAME	241-TX TANK FARM
PROJECT LOCATION	241-TX
PROJECT OWNER	ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION
PROJECT ENGINEER	W. J. L.
PROJECT GEOLOGIST	J. L. S.
PROJECT SURVEYOR	W. J. L.
PROJECT PHOTOGRAPHER	W. J. L.
PROJECT DRAFTER	J. L. S.
PROJECT CHECKER	J. L. S.
PROJECT APPROVER	J. L. S.
PROJECT DATE	12/1/73
PROJECT SCALE	1" = 100'
PROJECT SHEET NO.	0402, 0501
PROJECT SHEET TOTAL	0402, 0501
PROJECT DRAWING STATUS	NONE
PROJECT DRAWING NO.	H-2-38976

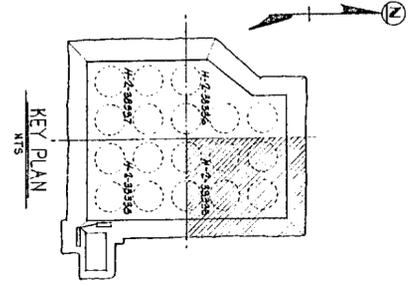


CROSS SECTION K-K'

ERNEST RESEARCH & DEVELOPMENT ADMINISTRATION 241-TX TANK FARM GEOLOGIC CHARACTERIZATION CROSS SECTION K-K'	
DRAWING STATUS: NONE H-2-38977	DATE: 12/1973 SCALE: AS SHOWN PROJECT NO: 241-TX DRAWING NO: 0402-0501
REVISIONS: NO. DATE BY DESCRIPTION	CHECKED BY: [] DRAWN BY: []
AUTHORITY: [] APPROVED: []	NEXT USED ON: []



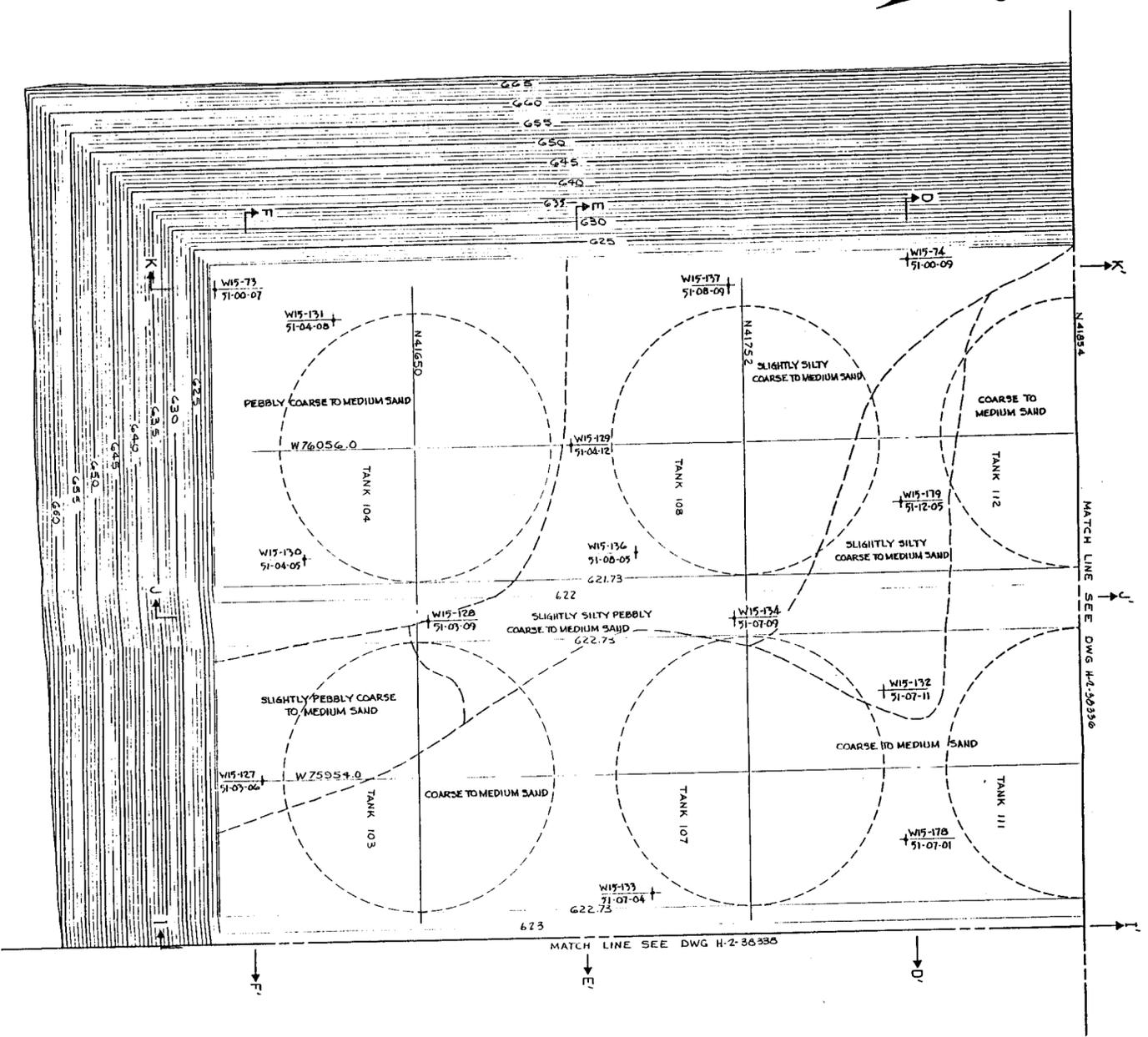
241-TX TANK FARM



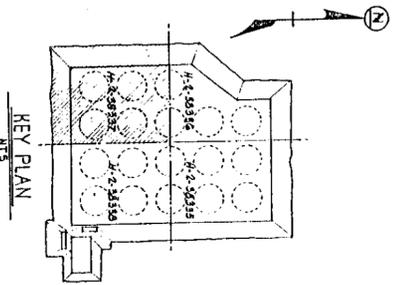
U.S. ATOMIC ENERGY COMMISSION HEALTH, SAFETY AND ENVIRONMENTAL PROTECTION DIVISION RICHLAND OPERATIONS OFFICE WYOMING ENGINEERING DIVISION	
PROJECT NO. H-2-38335 DRAWING NO. 241-TX SHEET NO. 1	TITLE GEOLOGIC CHARACTERIZATION BASE OF BACKFILL - NE SECTION CONTOURED EXCAVATION
DATE: 11-16-07 SCALE: 1" = 10'-0" DRAWN BY: [Signature] CHECKED BY: [Signature]	REVISIONS 1. REVISED TITLE BLOCK 2. REVISED TITLE BLOCK 3. ADD CHARACTERIZATION 4. UPDATE TO CUT SECTIONS
MATERIALS: NONE TESTS: NONE	COMMENTS:

13 12 11 10 9 8 7 6 5 4 3 2 1

A B C D E F



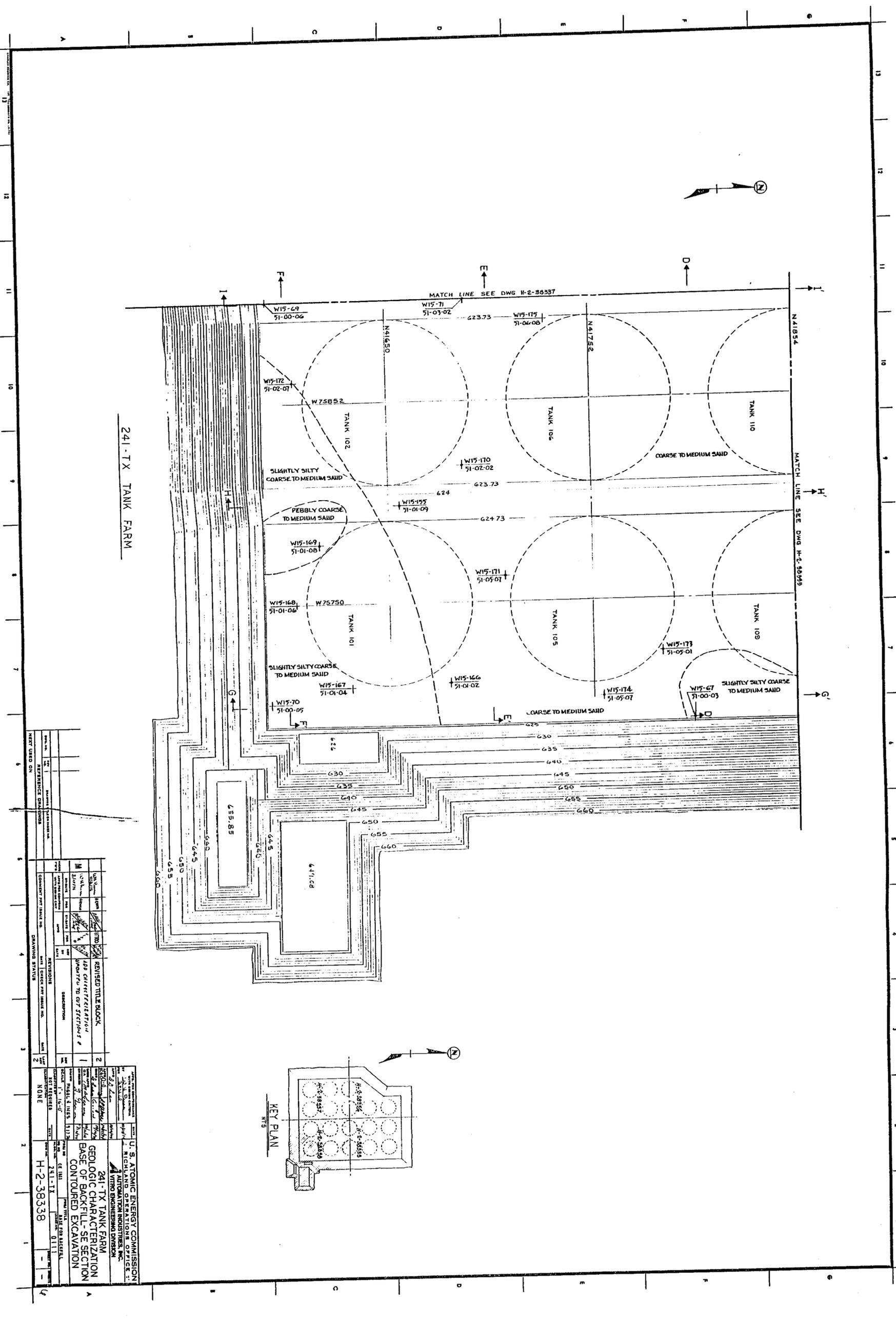
241-TX TANK FARM



NO.	DATE	BY	DESCRIPTION
1	11/11/09	J. J. [Signature]	REVISED TITLE BLOCK
2	11/11/09	J. J. [Signature]	LAND CHARACTERIZATION REPORT UPDATED TO CUT SECTIONS

U.S. ATOMIC ENERGY COMMISSION SOUTH CAROLINA Aiken, South Carolina	U.S. ATOMIC ENERGY COMMISSION SOUTH CAROLINA Aiken, South Carolina
241-TX TANK FARM GEOLOGIC CHARACTERIZATION BASE OF BACKFILL-SW SECTION CONTOURED EXCAVATION	241-TX TANK FARM GEOLOGIC CHARACTERIZATION BASE OF BACKFILL-SW SECTION CONTOURED EXCAVATION
U.S. ATOMIC ENERGY COMMISSION SOUTH CAROLINA Aiken, South Carolina	U.S. ATOMIC ENERGY COMMISSION SOUTH CAROLINA Aiken, South Carolina
U.S. ATOMIC ENERGY COMMISSION SOUTH CAROLINA Aiken, South Carolina	U.S. ATOMIC ENERGY COMMISSION SOUTH CAROLINA Aiken, South Carolina

DATE	11-11-09
TIME	01:11
SCALE	AS SHOWN
PROJECT NO.	H-2-38337
REVISIONS	NONE



241-TX TANK FARM

NO.	DATE	BY	DESCRIPTION
1	11/15/50	J. L. GIBSON	REVISED TITLE BLOCK
2	11/15/50	J. L. GIBSON	ADD CIVIL ENGINEERING
3	11/15/50	J. L. GIBSON	ADD ELECTRICAL ENGINEERING
4	11/15/50	J. L. GIBSON	ADD MECHANICAL ENGINEERING
5	11/15/50	J. L. GIBSON	ADD CHEMICAL ENGINEERING
6	11/15/50	J. L. GIBSON	ADD METALLURGICAL ENGINEERING
7	11/15/50	J. L. GIBSON	ADD INDUSTRIAL ENGINEERING
8	11/15/50	J. L. GIBSON	ADD AERONAUTICAL ENGINEERING
9	11/15/50	J. L. GIBSON	ADD AGRICULTURAL ENGINEERING
10	11/15/50	J. L. GIBSON	ADD MARINE ENGINEERING
11	11/15/50	J. L. GIBSON	ADD MINING ENGINEERING
12	11/15/50	J. L. GIBSON	ADD METALURGICAL ENGINEERING
13	11/15/50	J. L. GIBSON	ADD CHEMICAL ENGINEERING
14	11/15/50	J. L. GIBSON	ADD ELECTRICAL ENGINEERING
15	11/15/50	J. L. GIBSON	ADD MECHANICAL ENGINEERING
16	11/15/50	J. L. GIBSON	ADD CIVIL ENGINEERING
17	11/15/50	J. L. GIBSON	ADD INDUSTRIAL ENGINEERING
18	11/15/50	J. L. GIBSON	ADD AERONAUTICAL ENGINEERING
19	11/15/50	J. L. GIBSON	ADD AGRICULTURAL ENGINEERING
20	11/15/50	J. L. GIBSON	ADD MARINE ENGINEERING
21	11/15/50	J. L. GIBSON	ADD MINING ENGINEERING
22	11/15/50	J. L. GIBSON	ADD METALURGICAL ENGINEERING
23	11/15/50	J. L. GIBSON	ADD CHEMICAL ENGINEERING
24	11/15/50	J. L. GIBSON	ADD ELECTRICAL ENGINEERING
25	11/15/50	J. L. GIBSON	ADD MECHANICAL ENGINEERING
26	11/15/50	J. L. GIBSON	ADD CIVIL ENGINEERING
27	11/15/50	J. L. GIBSON	ADD INDUSTRIAL ENGINEERING
28	11/15/50	J. L. GIBSON	ADD AERONAUTICAL ENGINEERING
29	11/15/50	J. L. GIBSON	ADD AGRICULTURAL ENGINEERING
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36	11/15/50	J. L. GIBSON	ADD CIVIL ENGINEERING
37	11/15/50	J. L. GIBSON	ADD INDUSTRIAL ENGINEERING
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43	11/15/50	J. L. GIBSON	ADD CHEMICAL ENGINEERING
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45	11/15/50	J. L. GIBSON	ADD MECHANICAL ENGINEERING
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55	11/15/50	J. L. GIBSON	ADD MECHANICAL ENGINEERING
56	11/15/50	J. L. GIBSON	ADD CIVIL ENGINEERING
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99	11/15/50	J. L. GIBSON	ADD AGRICULTURAL ENGINEERING
100	11/15/50	J. L. GIBSON	ADD MARINE ENGINEERING

U. S. ATOMIC ENERGY COMMISSION
 GEOLGIC CHARACTERIZATION
 BASE OF BACKFILL - SE SECTION
 CONTURED EXCAVATION
 241-TX TANK FARM
 NICHOLSON ENGINEERING DIVISION
 H-2-38338

