

Geology of the 241-U Tank Farm

April 1976



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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

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Richland, Washington 99352



GEOLOGY OF THE 241-U TANK FARM

by

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GEOLOGY OF THE 241-U 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-U 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-U TANK FARM GEOLOGY MAPS

<u>Title</u>	<u>Drawing Number</u>
241-U Tank Farm Geologic Map Legend and Plot Plan	H-2-38990
241-U Tank Farm Geologic Characterization Cross Section A-A'	H-2-38959
241-U Tank Farm Geologic Characterization Cross Section B-B'	H-2-38960
241-U Tank Farm Geologic Characterization Cross Section C-C'	H-2-38961
241-U Tank Farm Geologic Characterization Cross Section D-D'	H-2-38962
241-U Tank Farm Geologic Characterization Cross Section E-E'	H-2-38963
241-U Tank Farm Geologic Characterization Cross Section F-F'	H-2-38964
241-U Tank Farm Geologic Characterization Cross Section G-G'	H-2-38965
241-U Tank Farm Geologic Characterization Cross Section H-H'	H-2-38966
241-U Tank Farm Geologic Characterization Cross Section I-I'	H-2-38967
241-U Tank Farm Geologic Characterization Base of Backfill	H-2-38957
241-U Tank Farm Geologic Characterization Paleotopography of Silt Horizon	H-2-38958

PROCEDURES

During the drilling of 40 dry wells and 2 water wells in and around the 241-U 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 1300.

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-2-38990). 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-2-38990). 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-2-36948 (Wells in 241-U 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-U Tank Farm. The stratigraphic descriptions included, along with the Glossary (see page 11), 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-U Tank Farm, the reader is referred to articles listed in the Selected References (see page 13).

The 241-U Tank Farm is underlain by four 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; (3) unconsolidated eolian silt; and

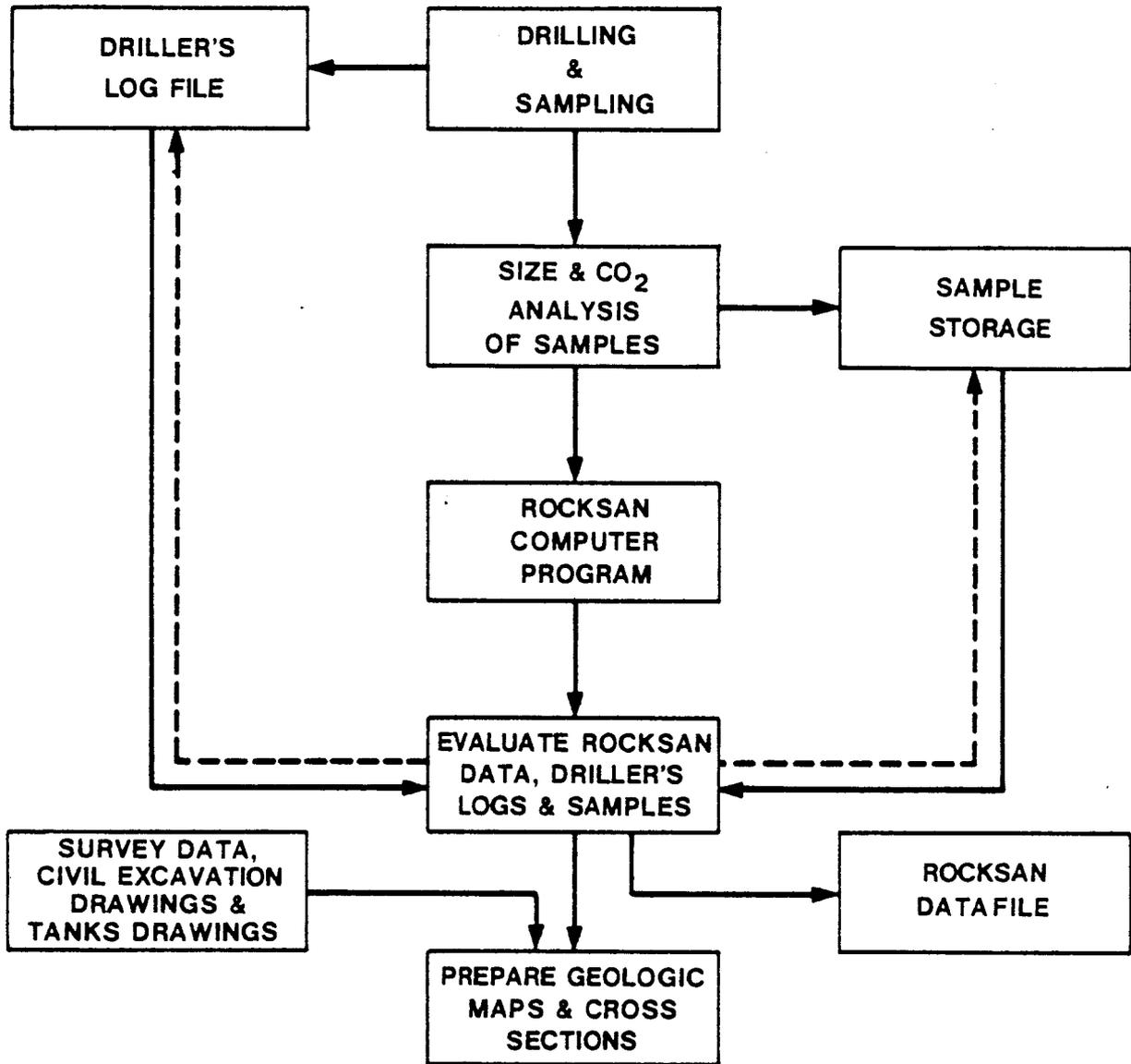


FIGURE 1

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		GLACIOFLUVIAL SEDIMENTS	FAIRLY WELL SORTED FLUVIAL SAND & SILT WITH SOME GRAVEL	
				EOLIAN SILT	FINE SAND & SILT DERIVED FROM THE UPPER RINGOLD	
	TERTIARY	PLIOCENE	1,000,000	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	
				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	
		MIOCENE		11,000,000		

WHP/KRF 1976

FIGURE 2

GENERALIZED STRATIGRAPHIC COLUMN FOR
THE 200 AREA TANK FARMS

(4) unconsolidated sand, silt, and gravel, collectively termed glaciofluvial sediments, which directly overlie the eolian silt. 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.

The surface of the Columbia River Basalt lies beneath 241-U Tank Farm at an elevation of 127 feet (all elevations based on feet above mean sea level measured at approximate center of Tank Farm). On the 241-U Tank Farm maps, this surface occurs approximately 233 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-U Tank Farm, the lower and upper Ringold units are missing. The total thickness of the Ringold Formation present is approximately 399 feet.

Middle Ringold

Beneath the 241-U Tank Farm, the 399-foot thick middle Ringold unit lies unconformably on the Columbia River Basalt and dips to the southeast about 50 feet per mile. The unit consists predominantly of well-rounded pebbles and cobbles with the interstitial spaces filled with medium to fine sand and silt cemented in places with SiO_2 or CaCO_3 . Table III summarizes the grain size and CaCO_3 values of the middle Ringold sediments.

TABLE III
TYPICAL GRAIN SIZE AND CALCIUM CARBONATE VALUES
FOR MAJOR MIDDLE RINGOLD LITHOLOGIES
BENEATH 241-U TANK FARM

Lithology	%Pebbles & Cobbles	% Sand					%Silt & Clay	%CaCO ₃
		Very Coarse	Coarse	Medium	Fine	Very Fine		
Sandy Gravel	77	2	3	4	9	5	1	0.3
Cemented Calcareous to Siliceous Slightly Silty Sandy Gravel	70	4	6	6	8	5	1	0-12.0
Coarse to Medium Sand	2	11	25	29	15	11	7	1.0
Slightly Cemented Calcareous to Siliceous Slightly Silty Sand Gravel	72	4	5	6	7	5	1	0-12.0
Coarse to Medium Sand	1	9	26	36	15	10	4	1.0
Cemented Calcareous to Siliceous Slightly Silty Sandy Gravel	67	8	7	6	6	5	1	0-12.0

The lower portion of the middle Ringold unit (elevation 127-233 feet) is blue-gray in color suggesting that the sediments have not undergone oxidation and have continuously been below the water table since their deposition.

In contrast, sediments of the middle Ringold unit above the 233-foot elevation level have undergone oxidation as evidenced by their gray-brown color and their well developed weathering rinds.

Although the middle Ringold unit consists predominantly of pebbles and cobbles, a few sand units up to 17 feet in thickness occur beneath 200 West Area. Such units represent either lacustrine or fluvial deposits layed down during periods of decreased velocity of the ancestral Columbia River. Two such units are found beneath the 241-U Tank Farm at elevations of 378 feet and 398 feet.

EOLIAN SILT DEPOSIT

After deposition of the Ringold Formation, the surface of the land was subjected to subaerial erosion. Wind action winnowed, reworked, and redeposited the fine grained sands and silts of the nearby upper Ringold unit. These wind-deposited sediments, termed Early Palouse soil or eolian silt, occur beneath the 241-U Tank Farm between elevations 526 and 546 feet. After deposition of the eolian silt, the climate was arid as indicated by CaCO_3 (caliche) found within the unit. Table IV summarizes the grain size and CaCO_3 content of the eolian silt.

TABLE IV
TYPICAL SIEVE AND CALCIUM CARBONATE VALUES
FOR 241-U TANK FARM EOLIAN SILT

<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>		
Calcareous Sandy Silt to Silty Very Fine Sand	0	0	1	9	19	33	38	11.0

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-U Tank Farm between elevations 546 and 626 feet. The 80-foot thick section of these deposits consists predominantly of coarse to fine sand with some silt and pebbles. Table V summarizes the grain size and CaCO_3 values of the glaciofluvial sediments.

TABLE V
TYPICAL SIEVE AND CALCIUM CARBONATE VALUES
FOR MAJOR GLACIOFLUVIAL LITHOLOGIES
BENEATH 241-U TANK FARM

Lithology	%Pebbles & Cobbles	% Sand					%Silt & Clay	%CaCO ₃
		Very Coarse	Coarse	Medium	Fine	Very Fine		
Silty Sandy Medium to Very Fine Pebble to Pebbly Very Coarse to Coarse Sand	35	15	13	9	7	5	11	2.0
Slightly Silty Coarse to Fine Sand to Coarse to Fine Sand	3	8	19	20	23	15	12	1.9
Slightly Silty Medium to Very Fine Sand to Silty Medium to Very Fine Sand	0	5	15	21	25	19	15	1.7

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-U Tank Farm, they could not be mapped.

BACKFILL MATERIAL

In preparation for tank construction, glaciofluvial material was excavated at the 241-U Tank Farm site. This material, consisting predominantly of cobbles, pebbles, and coarse to medium sands to silts, was subsequently used as backfill from the base of the completed tanks (626 feet) to the ground surface (665 feet). An inherent characteristic of the backfill is its poor sorting. Grain size and CaCO₃ values for the backfill are found in Table VI.

TABLE VI

TYPICAL SIEVE AND CALCIUM CARBONATE VALUES FOR
THE 241-U 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>		
Silty Sandy Medium to Very Fine Pebble	35	10	11	12	12	10	10	2.1

WATER TABLE

The water table beneath the 241-U Tank Farm is located within the middle Ringold unit at an elevation of 483 feet, 143 feet below the base of the tanks. For further information concerning contours on the water table beneath 200 West Area the reader is referred to drawings H-2-38397 (200 West Area Water Table Map) and H-2-38877 (200 West 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.

SELECTED REFERENCES

1. J. A. Alwin, Clastic Dikes of Touchet Beds, Southeastern Washington, Washington State University Masters Thesis (1970).
2. V. R. Baker, Paleohydrology and Sedimentology of Lake Missoula Flooding in Eastern Washington, Geological Society of America Special Paper 144, (1973).
3. J. H. Bretz, Washington's Channeled Scabland, Washington Division of Mines and Geology, Bull. 45, (1959).
4. D. J. Brown, Subsurface Geology of the Hanford Separations Areas, HW-61780 (1959).
5. D. J. Brown, An Eolian Deposit Beneath 200 West Area, HW-67549 (1960).
6. D. J. Brown, and R. E. Brown, Touchet Clastic Dikes in the Ringold Formation, HW-SA-2851 (1962).
7. D. J. Brown, G. T. Lobdell, and G. E. Neff, Hydrology and Engineering Geology of the Columbia Basin, Geological Society of America, Cordilleran Section, 72nd Annual Meeting, Field Guide No. 3 (1976).
8. R. L. Folk, "Petrology of Sedimentary Rocks," University of Texas Press (1968).
9. R. Fryxell, and E. F. Cook, A Field Guide to the Loess Deposits and Channeled Scablands of the Palouse Area, Eastern Washington, Laboratory of Anthropology Report 27, Pullman, Washington (1964).
10. E. H. Gilmour, and D. Stradling, Proceedings of the Second Columbia River Basalt Symposium, EWSC Press, Cheney, Washington (1969).
11. E. Gustafson, A Revised Chronology for Vertebrate Fossil Faunas of Eastern Washington, Geological Society of America, Cordilleran Section, 72nd Annual Meeting (1976).
12. W. Horwitz, Official Methods of Analysis of the Association of Official Analytical Chemists, 11th Edition, Association of Official Analytical Chemists, p. 139, (1970).
13. R. K. Ledgerwood, D. J. Brown, C. W. Meyers, and A. C. Waters, Identification of Yakima Basalt Flows in the Pasco Basin, ARH-27-68 (1973).
14. R. L. Lupper, Clastic Dikes of the Columbia Basin Region, Washington and Idaho, Geological Society of America Bull., V55, 1431-1462 (1944).

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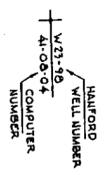
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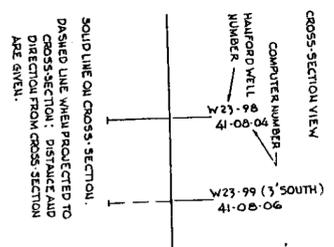
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1. WELL DESIGNATION
WELL NUMBERS PREFIXED BY 249 -
PLOT PLAN VIEW



CROSS-SECTION VIEW

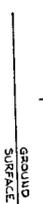


2. COORDINATES
BASED ON HAIFORD COORDINATE SYSTEM.

3. PLANE OF CROSS-SECTION
PLOT PLAN VIEW

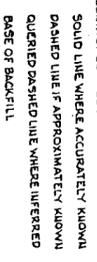


CROSS-SECTION VIEW



4. TANK DESIGNATION
TANKS PREFIXED BY 241 -

5. CONTACT BETWEEN LITHOLOGIES

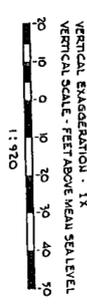


6. LEISES OR STRIBERS
DISCONTINUOUS SEDIMENTS LESS THAN TWO FEET THICK
DISCONTINUOUS SEDIMENTS GREATER THAN TWO FEET THICK

7. WATER TABLE
GROSS SECTION VIEW
PATIUM - MEAN SEA LEVEL



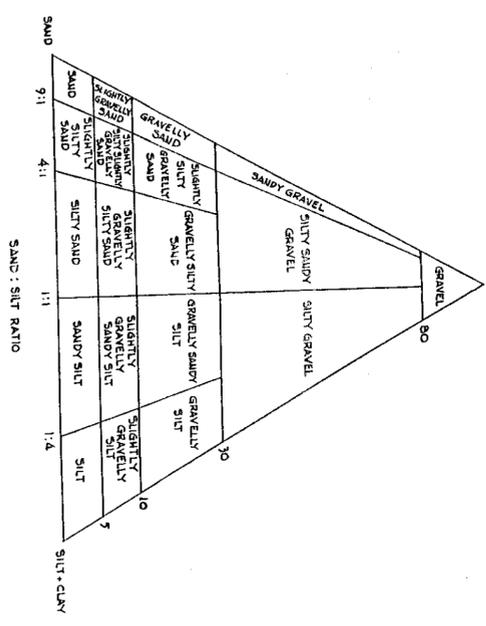
8. HORIZONTAL AND VERTICAL SCALES



9. SEDIMENT DESCRIPTION

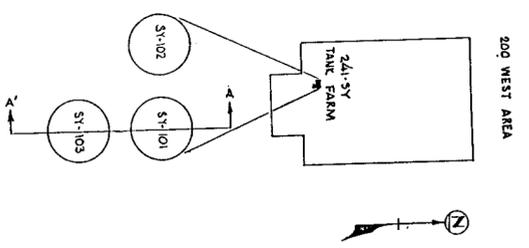
SEDIMENTS BENEATH THE TANK FARMS ARE CLASSIFIED ON THE BASIS OF ONE OF
LITERATURE SEDIMENT TYPES (SEDIMENT CLASSIFICATION). FURTHER DETAILS
GIVEN USING MODIFIERS FROM THE GRAIN SIZE NOMENCLATURE. SEDIMENTS
WITH CHEMICALLY PRECIPITATED MATERIALS OCCURRING IN THE INTERSTICES
BETWEEN GRAINS ARE PREFIXED BY THE TERM CEMENTED. SEDIMENTS WITH
GREATER THAN 10% CALCIUM CARBONATE ARE PREFIXED BY THE MODIFIER
CALCAREOUS. SEDIMENTS CONTAINING SILICA IN THE INTERSTICES BETWEEN
GRAINS ARE MODIFIED BY THE TERM SILICEOUS.

GRAIN SIZE NOMENCLATURE (MODIFIED AFTER R.L. FOLK, 1968)



GRAIN SIZE NOMENCLATURE (MODIFIED AFTER C.K. WELTJORN, 1972)

PARTICLE DESIGNATION	PARTICLE DIAMETER (MM)
BOULDER	> 256
GRAVEL	
LARGE	256 - 128
SMALL	128 - 64
VERY COARSE	64 - 32
COARSE	32 - 16
MEDIUM	16 - 8
FINE	8 - 4
VERY FINE	4 - 2
VERY COARSE SAND	2 - 1
COARSE SAND	1 - 0.75
MEDIUM SAND	0.75 - 0.425
FINE SAND	0.425 - 0.25
VERY FINE SAND	0.25 - 0.075
SILT + CLAY	< 0.075



ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION
HEILBRUNN, CALIFORNIA

241-SY TANK FARM
GEOLOGIC MAP
LEGEND AND PLOT PLAN

H-2-38986

NO.	DATE	BY	DESCRIPTION
1	1974	...	...
2	1974	...	...
3	1974	...	...
4	1974	...	...
5	1974	...	...

REVISIONS

DATE

BY

DESCRIPTION

1. NONE

2. NONE

3. NONE

4. NONE

5. NONE

6. NONE

7. NONE

8. NONE

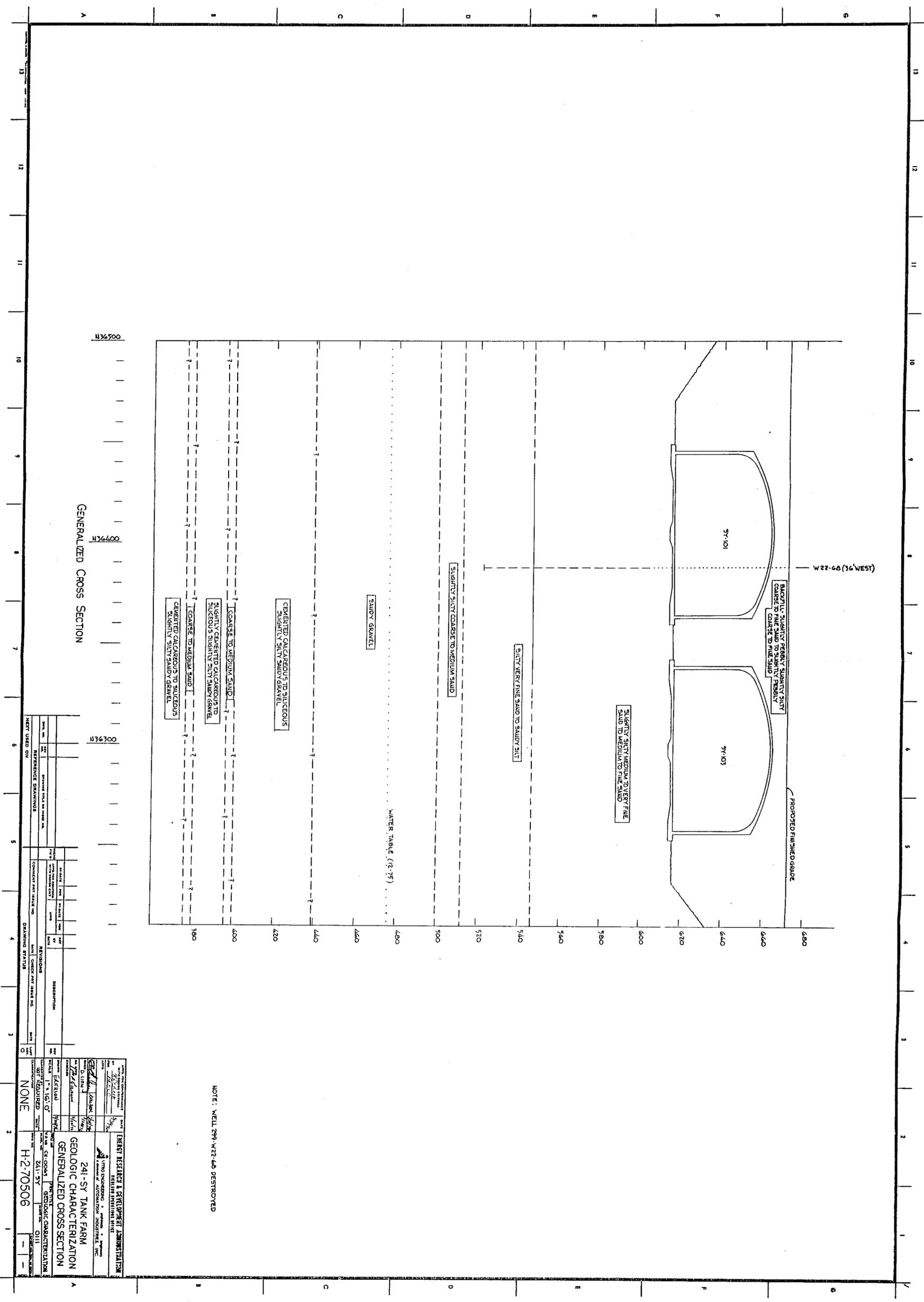
9. NONE

10. NONE

11. NONE

12. NONE

13. NONE



GENERALIZED CROSS SECTION

REV.	DATE	DESCRIPTION	BY	CHKD.
1		ISSUED FOR CONSTRUCTION		
2		REVISED TO SHOW WELL SY-103		
3		REVISED TO SHOW WELL SY-101		
4		REVISED TO SHOW PROPOSED FINISHED GRADE		
5		REVISED TO SHOW WATER TABLE		
6		REVISED TO SHOW SOIL LAYERS		
7		REVISED TO SHOW CORRECTIONS		
8		REVISED TO SHOW CORRECTIONS		
9		REVISED TO SHOW CORRECTIONS		
10		REVISED TO SHOW CORRECTIONS		
11		REVISED TO SHOW CORRECTIONS		
12		REVISED TO SHOW CORRECTIONS		
13		REVISED TO SHOW CORRECTIONS		

PROJECT NO.	241-SY TANK FARM
CLIENT	ENERGY RESEARCH & DEVELOPMENT ADMINISTRATION
DATE	2-11-57
SCALE	AS SHOWN
DRAWN BY	W. H. HARRIS
CHECKED BY	W. H. HARRIS
APPROVED BY	W. H. HARRIS
TITLE	GENERALIZED CROSS SECTION
PROJECT LOCATION	241-SY TANK FARM, HELLER INDIAN RESERVE, NEBRASKA
PROJECT TYPE	GEOLOGIC CHARACTERIZATION
PROJECT STATUS	COMPLETE
PROJECT PHASE	FINAL
PROJECT COST	NONE
PROJECT BUDGET	H-2-70506

NOTE: WELL 299-W22-68 DESTROYED