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ORNL Solid Waste Storage Area 6 Trench Photos and Geologic Descriptions: July 1984 Through September 1985

E. C. Davis
D. S. Marshall
R. G. Stansfield
R. B. Dreier

Environmental Sciences Division
Publication No. 2636

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ENVIRONMENTAL SCIENCES DIVISION

ORNL SOLID WASTE STORAGE AREA 6 TRENCH PHOTOS AND GEOLOGIC DESCRIPTIONS: JULY 1984 THROUGH SEPTEMBER 1985

E. C. Davis, D. S. Marshall, R. G. Stansfield, and R. B. Dreier

Environmental Sciences Division
Publication No. 2636

NUCLEAR AND CHEMICAL WASTE PROGRAMS
(Activity No. AR 05 10 05 K; ONL-WN04)

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ABSTRACT

DAVIS, E. C., D. S. MARSHALL, R. G. STANSFIELD, and R. B. DREIER. 1985. ORNL solid waste storage area 6 trench photos and geologic descriptions: July 1984 through September 1985. ORNL/TM-9874. Oak Ridge National Laboratory, Oak Ridge, Tennessee. 80 pp.

The Environmental Sciences Division of the Oak Ridge National Laboratory has initiated a photographic and descriptive geologic study of low-level waste trenches opened in Solid Waste Storage Area 6 (SWSA-6). From July 1984 through September 1985, trenches were excavated, geologically described, and photographed before being filled and closed. Only three trenches (Nos. 438, 448, and 465) were excavated and closed before photography could be scheduled. It is recommended that the systematic trench characterization procedure outlined in this report be continued under the direction of ORNL's Operations Division with support from both Environmental Sciences and the Engineering divisions. Publication of such a compilation of trench photos on a yearly basis will serve not only as a part of Department of Energy trench documentation requirements but also as a component of a SWSA-6 geologic data base being developed for current research and development activities.

INTRODUCTION

Low-level radioactive wastes have been disposed of by shallow land burial (SLB) at the Oak Ridge National Laboratory (ORNL) for the past 40 years. During this time, six disposal sites have been opened with current operations taking place in SWSA-6 (Fig. 1). Chapter 3 of DOE Order 5820.2 (DOE 1984) establishes the policies and guidelines for managing such waste disposal areas, and requires that an accurate documentation system be established which addresses both trench location and contents. As part of this documentation system, ORNL has initiated an individual trench photographic and geologic description program covering both low-activity (less then 200 mR/h activity at the package surface) and high-activity (greater then 200 mR/h activity at the package surface) waste trenches. This report summarizes these trench documentation activities for the period July 1984 through September 1985.

In the past, a number of SLB trenches at ORNL have been documented through photography. The usual intent was to document typical SLB practices, highlight some specific geologic feature present in a particular trench, or to locate a specific waste item within a trench. These photos often remained unpublished and are therefore of little or no use to ongoing or future low-level radioactive waste research. In addition, not enough trenches have been photographed to consider the practice to be a standard operational procedure. This report describes the first year of an effort being carried out by the Environmental Sciences Division to systematically photograph and describe the shallow

geologic structures of trenches as they are opened for use. Such an effort will not only help to satisfy DOE documentation requirements, but will also be useful in collecting shallow geologic data relative to SWSA-6.

A total of 19 waste trenches are covered in this report including 18 that were used for low-activity waste and one that was used for high-activity waste. The locations of the trenches within SWSA-6 are highlighted in Fig. 1. Numbering of the trenches was not consecutive because ORNL Operations Division includes all trenches (low-activity, high-activity, biological waste, and special trenches) in their numbering system, and this report includes only the low- and high-activity waste trenches. Each trench is briefly described using a standardized data sheet followed by photographs of the trench walls. In some cases, additional photographs showing the contents of the trench are included. For two trenches (trenches 438 and 448), excavation, filling, and covering occurred before trench photography could be scheduled, therefore, no photos or geologic description are available. In addition, trench 465 was closed immediately after the geologic description was completed, but before photos were taken. Table 1 summarizes the excavation dates and photo numbers of the 19 trenches included in this report.

ORNL--DWG 85--11207

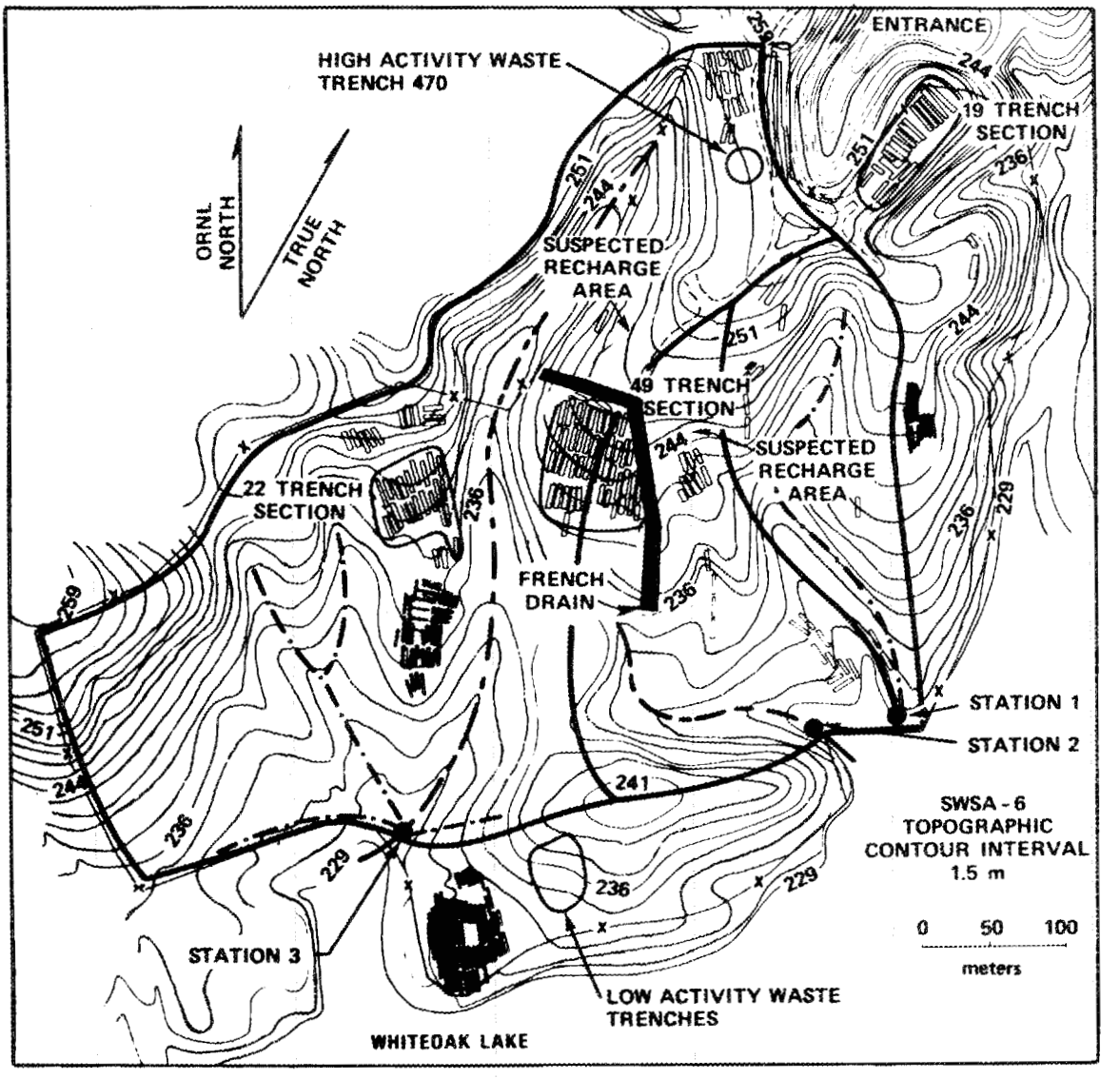


Fig. 1. Topographic map of SWSA-6 showing locations of trenches covered in this report.

TRENCH DESCRIPTIONS AND PHOTOGRAPHS

Shallow geologic data were collected for each open trench and are reported on the following standardized data sheets. Each sheet includes a description of the location of the trench, the dimensions of the trench, the trench corner coordinates, and a brief geologic description. Perhaps the most important geologic data obtained were the photographs of the walls of the trenches. Much of the geologic structure, including fracturing, is visually recorded in the walls. This is true even though some of the structure, in the softer portions of the highly weathered bedrock, is lost to view by the smearing action of the power shovel. As a result of folding, the strata are tilted from the horizontal over a wide range of angles. These folds result in varying directions of geologic strike (the compass direction of intersection of the beds with any horizontal plane).

The angle of the bedding, as seen in the vertical walls, is not the true dip of the strata, as the trenches are not excavated normal to the direction of strike. However, the strike and true dip of the strata can be calculated if two apparent dips can be measured on walls having different compass azimuths. The strike and true dip of beds were thus determined for specific corners of seven of the trenches by a graphic method using two apparent dips estimated with a pocket transit (Table 2). An example of the graphic method employed (Billings 1965) is illustrated for trench 456 in Fig. 2.

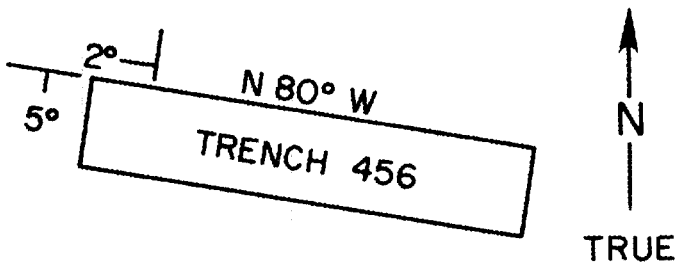
Because of the error introduced by measuring the angles from the surface (safety considerations), the calculated structural parameters

ORNL-DWG 85-17015

SWSA 6 TRENCH NO. 456
DETERMINATION OF TRUE DIP & STRIKE

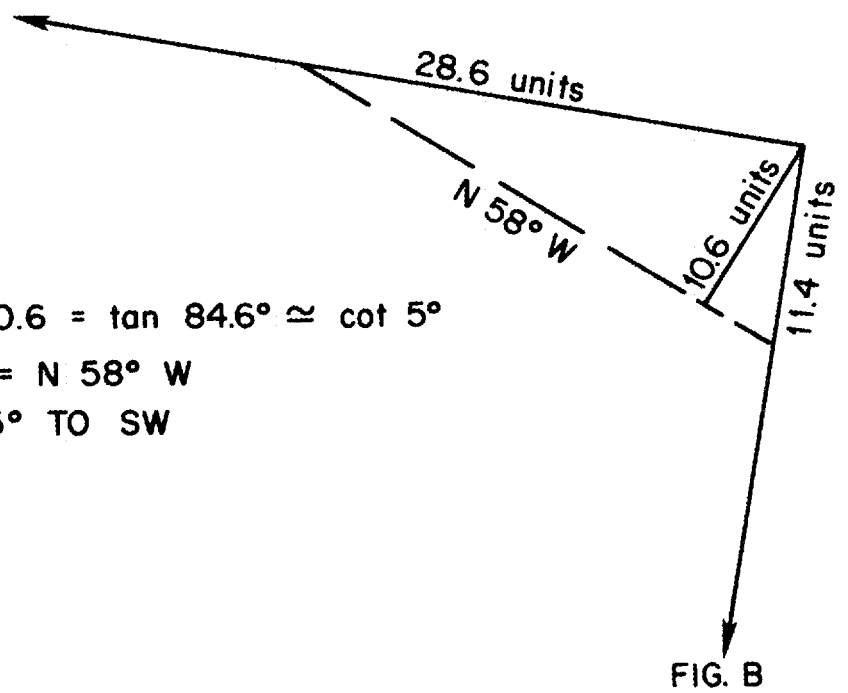
DATA:

- APPARENT DIPS MEASURED IN NW (TRUE) CORNER OF TRENCH
- LONG WALL DIRECTION = N 80° W



GRAPHIC SOLUTION:

- COTANGENT 2° = tan 88° = 28.63
- COTANGENT 5° = tan 85° = 11.43



FROM FIG. B: 10.6 = tan 84.6° ≃ cot 5°

∴ STRIKE = N 58° W

DIP = 5° TO SW

Fig. 2. Graphical determination of true dip and strike of trench 456.

Table 1. Summary of excavation dates and photo numbers of SWSA-6 waste trenches opened from July 1984 through September 1985

Trench	Excavation date	Photo number
433	7-13-84	5063-84, 5064-84
436	7-27-84	5061-84, 5062-84
437	8-17-84	5066-84, 5065-84
		6109-84, 6110-84
438	8-27-84	no photos
441	9-19-84	6107-84, 6108-84
442	10-09-84	6307-84, 6306-84
443	10-16-84	6304-84, 6305-84
445	11-06-84	8487-84, 8486-84
		8830-84, 8833-84
446	12-04-84	8831-84, 8832-84
448	1-24-85	no photos
449	2-15-85	1416-85, 1417-85
456	2-28-85	1415-85, 1414-85
458	3-07-85	2170-85, 2169-85
459	3-18-85	2171-85, 2172-85
462	4-10-85	2173-85, 2174-85
470	4-26 85	2779-85, 2776-85
463	5-17-85	3350-85, 3351-85
465	5-24-85	no photos
468	8-09-85	5186-85, 5187-85

Table 2. Measured azimuths and apparent dips for specific corners of seven of the SWSA-6 trenches

Trench 456:	Measured azimuths of vertical walls and apparent dips in the NW corner: N80°W, dip 2°NW; S10°W, dip 5°SW
Trench 458:	Measured azimuths of vertical walls and apparent dips in the SE corner: N66°W, dip 38°SW; N24°E, dip 14°SW
Trench 459:	Measured azimuths of vertical walls and apparent dips in the SE corner: N70°W, dip 33°SE; N20°E, dip 17°SW
Trench 462:	Measured azimuths of vertical walls and apparent dips in the north corner: N65°W, dip 23°SE; N25°E, dip 5°SW
Trench 463:	Measured azimuths of vertical walls and apparent dips in the north corner: N75°W, dip 22°SE; N15°E, dip 22°SW
Trench 465:	Measured azimuths of vertical walls and apparent dips in the south corner: N76°W, dip 24°SE; N14°E, dip 25°SW
Trench 470:	Measured azimuths of vertical walls and apparent dips in the west corner: N35°W, dip 35°SE; N55°E, dip 17°SW. Measured azimuths in the south corner: N35°W, dip 45°SE; N55°E, dip 5°SW

are, at best, approximate. However, they do provide an idea of the range of variation that exists. As shown in the geologic descriptions that follow, calculated strikes for the strata ranged from N58°W, to N79°E, with the angle of dip varying from 5 to 40° from the horizontal.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill southwest of equipment storage building (7842)
Trench Number:	433
Approximate Date of Construction:	07-13-84
Approximate Length:	15 m
Approximate Width:	3 m
Approximate Depth:	4.3 m
Photo of North Wall:	Photo No.: 5063-84
Photo of South Wall:	Photo No.: 5064-84
Photo of East Wall:	Photo No.: 5063-84
Photo of West Wall:	Photo No.: 5064-84
Trench Corner Coordinates:	N15975.5, E24306.8 N16021.5, E24284.7
	N15982.6, E24316.1 N16013.6, E24276.1

Geologic Description:

Trench closed before geologic description was completed

NAME: E. C. Davis

ADDRESS: 1505

DATE: 08-22-84

ORNL PHOTO 5063-84

Fig. 3. Trench 433 looking north.

ORNL PHOTO 5064-84

Fig. 4. Trench 433 looking south.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill southwest of equipment storage building (7842)
Trench Number:	436
Approximate Date of Construction:	07-27-84
Approximate Length:	15 m
Approximate Width:	3 m
Approximate Depth:	4.3 m
Photo of North Wall:	Photo No.: Could not photograph because of fill
Photo of South Wall:	Photo No.: 5062-84
Photo of East Wall:	Photo No.: 5062-84
Photo of West Wall:	Photo No.: 5061-84

Trench Corner Coordinates: N16056.7, E24285.2 N16101.3, E24258.4
N16064.9, E24292.4 N16093.8, E24250.3

Geologic Description:

Trench closed before geologic description was completed

NAME: E. C. Davis

ADDRESS: 1505

DATE: 08-22-84

ORNL PHOTO 5061-84

Fig. 5. Trench 436 looking south: West wall in picture center.

ORNL PHOTO 5062-84

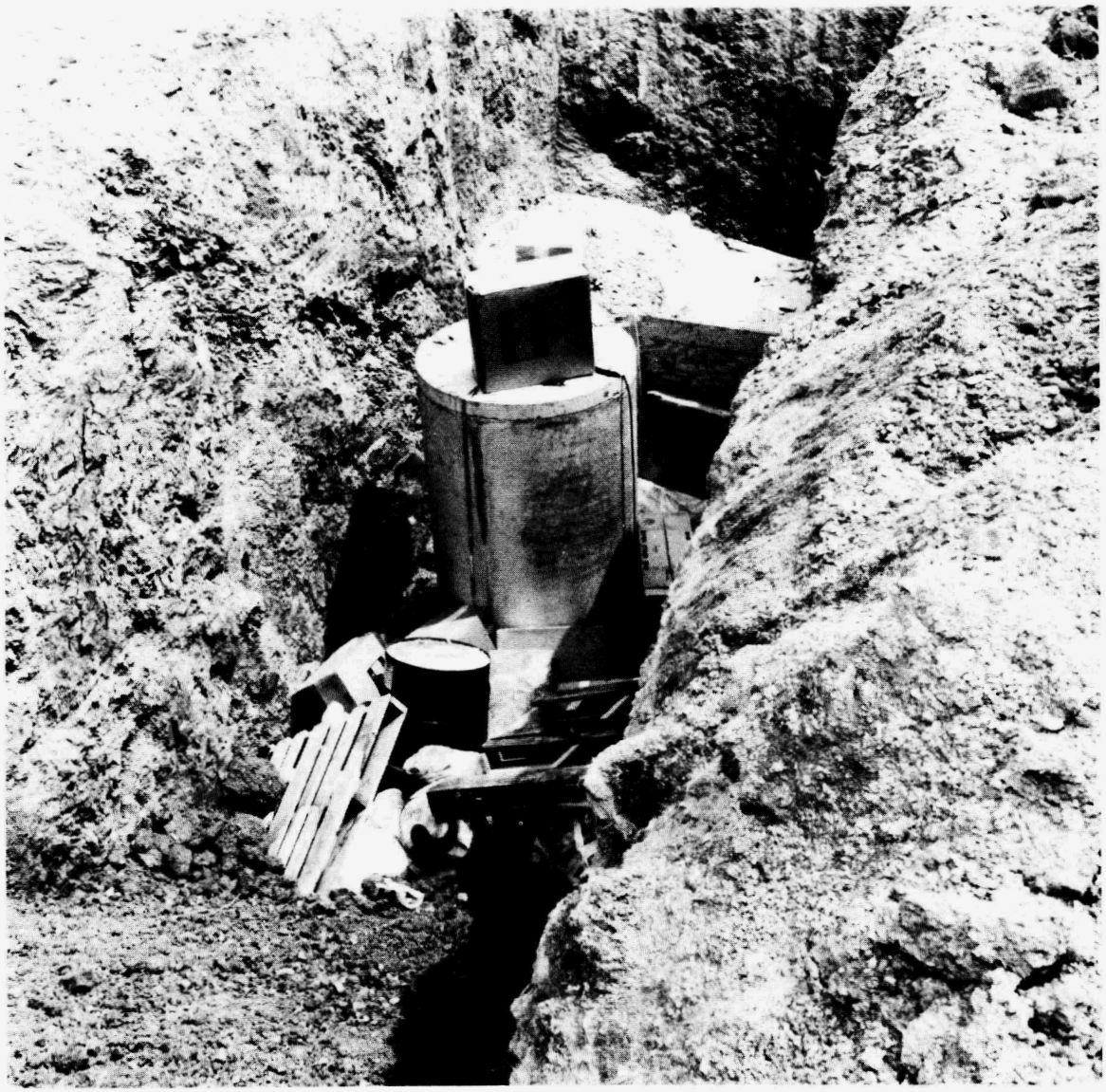


Fig. 6. Trench 436 looking south: East wall in picture center.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill southwest of equipment storage building (7842)
Trench Number:	437
Approximate Date of Construction:	08-17-84
Approximate Length:	5.4 m
Approximate Width:	3.2 m
Approximate Depth:	4.0 m
Photo of North Wall:	Photo No.: 5065-84
Photo of South Wall:	Photo No.: 5066-84
Photo of East Wall:	Photo No.: 5065-84
Photo of West Wall:	Photo No.: 5066-84
Trench Corner Coordinates:	N15915.5, E24352.2 N15963.1, E24329.4
	N15922.2, E24361.6 N15955.7, E24320.8

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	1.5 m of soil and 20 cm crushed stone
Compass direction of long axis of trench	N70°W
Average geologic strike of strata	N55°E
Estimated range of geologic dip of strata	Apparent dip along long wall is from 35 to 20°
Is nonweathered rock visible in trench?	No
Is water visible in trench?	No

NAME:	E. C. Davis	R. G. Stansfield
ADDRESS:	1505	3504
DATE:	08-22-84	08-22-84

ORNL PHOTO 5066-84

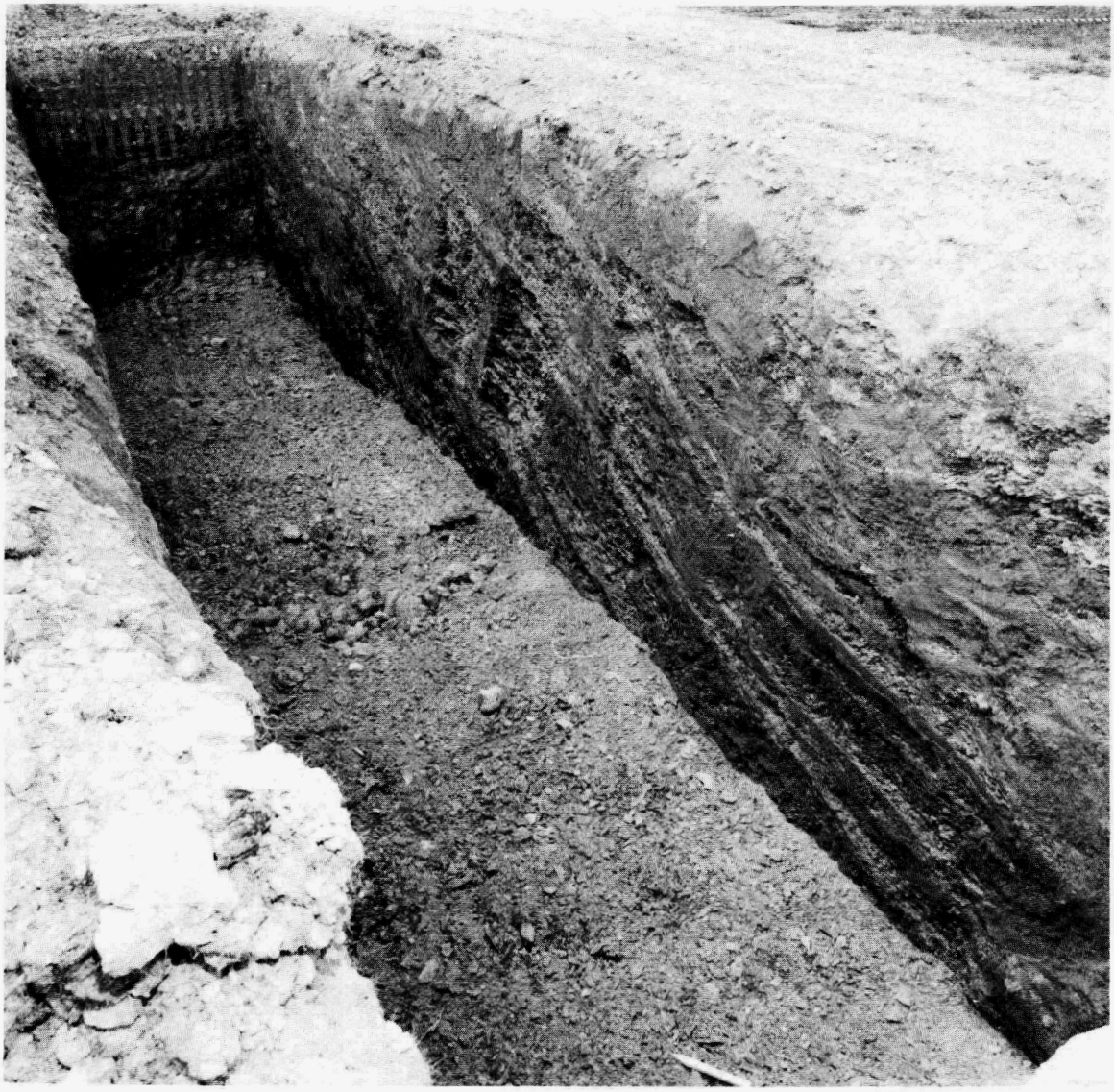


Fig. 7. Trench 437 looking south.

ORNL PHOTO 5065-84

Fig. 8. Trench 437 looking north: Note structure in east wall.

ORNL PHOTO 6109-84

Fig. 9. Trench 437 looking north after filling with waste.

ORNL PHOTO 6110-84

Fig. 10. Trench 437 looking south after filling with waste.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill southwest of equipment storage building (7842)
Trench Number:	441
Approximate Date of Construction:	09-19-84
Approximate Length:	5.4 m
Approximate Width:	3.2 m
Approximate Depth:	4.2 m
Photo of North Wall:	Photo No.: 6107-84
Photo of South Wall:	Photo No.: 6108-84
Photo of East Wall:	Photo No.: 6107-84
Photo of West Wall:	Photo No.: 6108-84

Trench Corner Coordinates: N16016.7, E24321.9 N16061.4, E24295.5
N16023.7, E24329.4 N16053.1, E24288.5

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	0 soil, 20 cm crushed stone
Compass direction of long axis of trench	N73°W
Average geologic strike of strata	N55°E
Estimated range of geologic dip of strata	30 to 40° - apparent dip along long axis of trench
Is nonweathered rock visible in trench?	No
Is water visible in trench?	No

NAME: R. G. Stansfield

ADDRESS: 3504

DATE: 10-03-84

ORNL PHOTO 6107-84

Fig. 11. Trench 441 looking north.

ORNL PHOTO 6108-84

Fig. 12. Trench 441 looking south.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill southwest of equipment storage building (7842)
Trench Number:	442
Approximate Date of Construction:	10-09-84
Approximate Length:	15 m
Approximate Width:	3 m
Approximate Depth:	4 m
Photo of North Wall:	Photo No.: 6306-84
Photo of South Wall:	Photo No.: 6307-84
Photo of East Wall:	Photo No.: 6307-84
Photo of West Wall:	Photo No.: 6306-84
Trench Corner Coordinates:	N15953.4, E24344.4 N16001.4, E24324.5
	N15960.2, E24354.7 N15994.4, E24315.4

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	15 to 30 cm
Compass direction of long axis of trench	N65°W
Average geologic strike of strata	Not determined
Estimated range of geologic dip of strata	9° reverse dip to 45° (long axis)
Is nonweathered rock visible in trench?	No
Is water visible in trench?	No

NAME: R. G. Stansfield

ADDRESS: 3504

DATE: 10-25-84

ORNL PHOTO 6307-84

Fig. 13. Trench 442 looking south.

ORNL PHOTO 6306-84

Fig. 14. Trench 442 looking north.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill southwest of equipment storage building (7842)
Trench Number:	443
Approximate Date of Construction:	10-16-84
Approximate Length:	15 m
Approximate Width:	3 m
Approximate Depth:	4 m
Photo of North Wall:	Photo No.: 6305-84
Photo of South Wall:	Photo No.: 6304-84
Photo of East Wall:	Photo No.: 6304-84
Photo of West Wall:	Photo No.: 6305-84
Trench Corner Coordinates:	N15911.5, E24378.9 N15956.8, E24357.8
	N15918.6, E24388.2 N15950.9, E24348.4

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	30 to 60 cm
Compass direction of long axis of trench	N65°W
Average geologic strike of strata	Not determined
Estimated range of geologic dip of strata	In long axis reverse (50) dip to 33°
Is nonweathered rock visible in trench?	No
Is water visible in trench?	No

NAME: R. G. Stansfield

ADDRESS: 3504

DATE: 10-25-84

ORNL PHOTO 6304-84

Fig. 15. Trench 443 looking south.

ORNL PHOTO 6305-84

Fig. 16. Trench 443 looking north.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill southwest of equipment storage building (7842)
Trench Number:	445
Approximate Date of Construction:	11-06-84
Approximate Length:	15 m
Approximate Width:	3 m
Approximate Depth:	4 m
Photo of North Wall:	Photo No.: 8487-84
Photo of South Wall:	Photo No.: 8486-84
Photo of East Wall:	Photo No.: 8486-84
Photo of West Wall:	Photo No.: 8487-84
Trench Corner Coordinates:	N16068.8, E24297.3 N16112.7, E24270.9
	N16076.9, E24305.1 N16104.8, E24263.2

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	15 to 30 cm
Compass direction of long axis of trench	N70°W
Average geologic strike of strata	N70°W wall at SE corner has apparent dip of 26°; and the N20°E wall dips 28°; True strike = N68°E; True dip = 36°SE
Estimated range of geologic dip of strata	From 26 to 90° along long wall at SE corner - long wall N70°W dip 26°; N20°E wall dips 28°
Is nonweathered rock visible in trench?	No
Is water visible in trench?	No

NAME: R. G. Stansfield

ADDRESS: 3504

DATE: 12-13-84

ORNL PHOTO 8487-84

Fig. 17. Trench 445 looking north.

ORNL PHOTO 8486-84

Fig. 18. Trench 445 looking south.

ORNL PHOTO 8830-84

Fig. 19. Trench 445 looking north after filling with waste.

ORNL PHOTO 8833-84

Fig. 20. Trench 445 looking south after filling with waste.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill southwest of equipment storage building (7842)
Trench Number:	446
Approximate Date of Construction:	12-04-84
Approximate Length:	15 m
Approximate Width:	3 m
Approximate Depth:	4 m
Photo of North Wall:	Photo No.: 8832-84
Photo of South Wall:	Photo No.: 8831-84
Photo of East Wall:	Photo No.: 8831-84
Photo of West Wall:	Photo No.: 8832-84
Trench Corner Coordinates:	N15966.1, E24360.4 N16011.9, E24338.1
	N15973.0, E24368.5 N16005.1, E24330.1

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	0.0 to 30 cm
Compass direction of long axis of trench	N65°W
Average geologic strike of strata	N65°W wall at SE end has apparent 28° dip; and the N25°E wall has apparent dip of 5°; true strike = N35°E, true dip = 29°
Estimated range of geologic dip of strata	Along N65°W wall, strata dips from horizontal to 55°
Is nonweathered rock visible in trench?	No
Is water visible in trench?	No

NAME: R. G. Stansfield

ADDRESS: 3504

DATE: 12-13-84

ORNL PHOTO 8831-84

Fig. 21. Trench 446 looking south.

ORNL PHOTO 8832-84

Fig. 22. Trench 446 looking north.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill southwest of equipment storage building (7842)
Trench Number:	449
Approximate Date of Construction:	02-15-85
Approximate Length:	15 m
Approximate Width:	3.2 m
Approximate Depth:	Not measured, trench full of low level waste
Photo of North Wall:	Photo No.: Could not photograph because of fill
Photo of South Wall:	Photo No.: 1417-85
Photo of East Wall:	Photo No.: 1417-85
Photo of West Wall:	Photo No.: 1416-85
Trench Corner Coordinates:	N15981.6, E24373.3 N16026.5, E24351.0
	N15988.6, E24382.9 N16018.9, E24342.3

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	0.0 to 30 cm
Compass direction of long axis of trench	N69°W
Average geologic strike of strata	Not measurable - trench full
Estimated range of geologic dip of strata	Not measurable - trench full
Is nonweathered rock visible in trench?	Not determinable - trench full
Is water visible in trench?	Not determinable - trench full

NAME: R. G. Stansfield

ADDRESS: 3504

DATE: 03-29-85

ORNL PHOTO 1416-85

Fig. 23. Trench 449 looking north.

ORNL PHOTO 1417-85

Fig. 24. Trench 449 looking south.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill southwest of equipment storage building (7842)
Trench Number:	456
Approximate Date of Construction:	02-28-85
Approximate Length:	15 m
Approximate Width:	3.2 m
Approximate Depth:	Not measured - too full
Photo of North Wall:	Photo No.: 1414-85
Photo of South Wall:	Photo No.: 1415-85
Photo of East Wall:	Photo No.: 1415-85
Photo of West Wall:	Photo No.: 1414-85
Trench Corner Coordinates:	N16079.1, E24310.5 N16122.2, E24283.9
	N16086.4, E24318.6 N16114.0, E24277.3

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	30 to 60 cm
Compass direction of long axis of trench	N80°W
Geologic strike of strata	In NW corner = N58°W
True dip in NW corner	5°SW
Estimated range of apparent geologic dip of strata on long wall	2 to 45°
Is nonweathered rock visible in trench?	No
Is water visible in trench?	No

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ADDRESS: 3504

DATE: 03-27-85

ORNL PHOTO 1415-85

Fig. 25. Trench 456 looking south: Note structure in east wall.

ORNL PHOTO 1414-85

Fig. 26. Trench 456 looking north.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill southwest of equipment storage building (7842)
Trench Number:	458
Approximate Date of Construction:	03-07-85
Approximate Length:	15 m
Approximate Width:	3.2 m
Approximate Depth:	4 m
Photo of North Wall:	Photo No.: 2169-85
Photo of South Wall:	Photo No.: 2170-85
Photo of East Wall:	Photo No.: 2169-85
Photo of West Wall:	Photo No.: 2170-85
Trench Corner Coordinates:	N15933.5, E24408.4 N15982.1, E24386.3
	N15940.7, E24416.9 N15975.4, E24379.0

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	30 to 60 cm
Compass direction of long axis of trench	N66°W
Geologic strike of strata	In SE corner = N42°E
True dip in SE corner	40°SE
Estimated range of apparent geologic dip of strata on long wall	12 to 38°
Is nonweathered rock visible in trench?	No
Is water visible in trench?	No

NAME: R. G. Stansfield

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DATE: 03-29-85

ORNL PHOTO 2170-85

Fig. 27. Trench 458 looking south.

ORNL PHOTO 2169-85

Fig. 28. Trench 458 looking north.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill southwest of equipment storage building (7842)
Trench Number:	459
Approximate Date of Construction:	03-18-85
Approximate Length:	15 m
Approximate Width:	3 m
Approximate Depth:	4 m
Photo of North Wall:	Photo No.: 2172-85
Photo of South Wall:	Photo No.: 2171-85
Photo of East Wall:	Photo No.: 2171-85
Photo of West Wall:	Photo No.: 2172-85
Trench Corner Coordinates:	N16039.4, E24349.5 N16083.7, E24323.1
	N16047.3, E24357.9 N16076.3, E24316.1

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	0.0 to 30 cm
Compass direction of long axis of trench	N70°W
Geologic strike of strata	In SE corner = N45°E
True dip in SE corner	34°SE
Estimated range of apparent geologic dip of strata on long wall	25 to 35°
Is nonweathered rock visible in trench?	No
Is water visible in trench?	No

NAME: R. G. Stansfield

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DATE: 03-29-85

ORNL PHOTO 2171-85

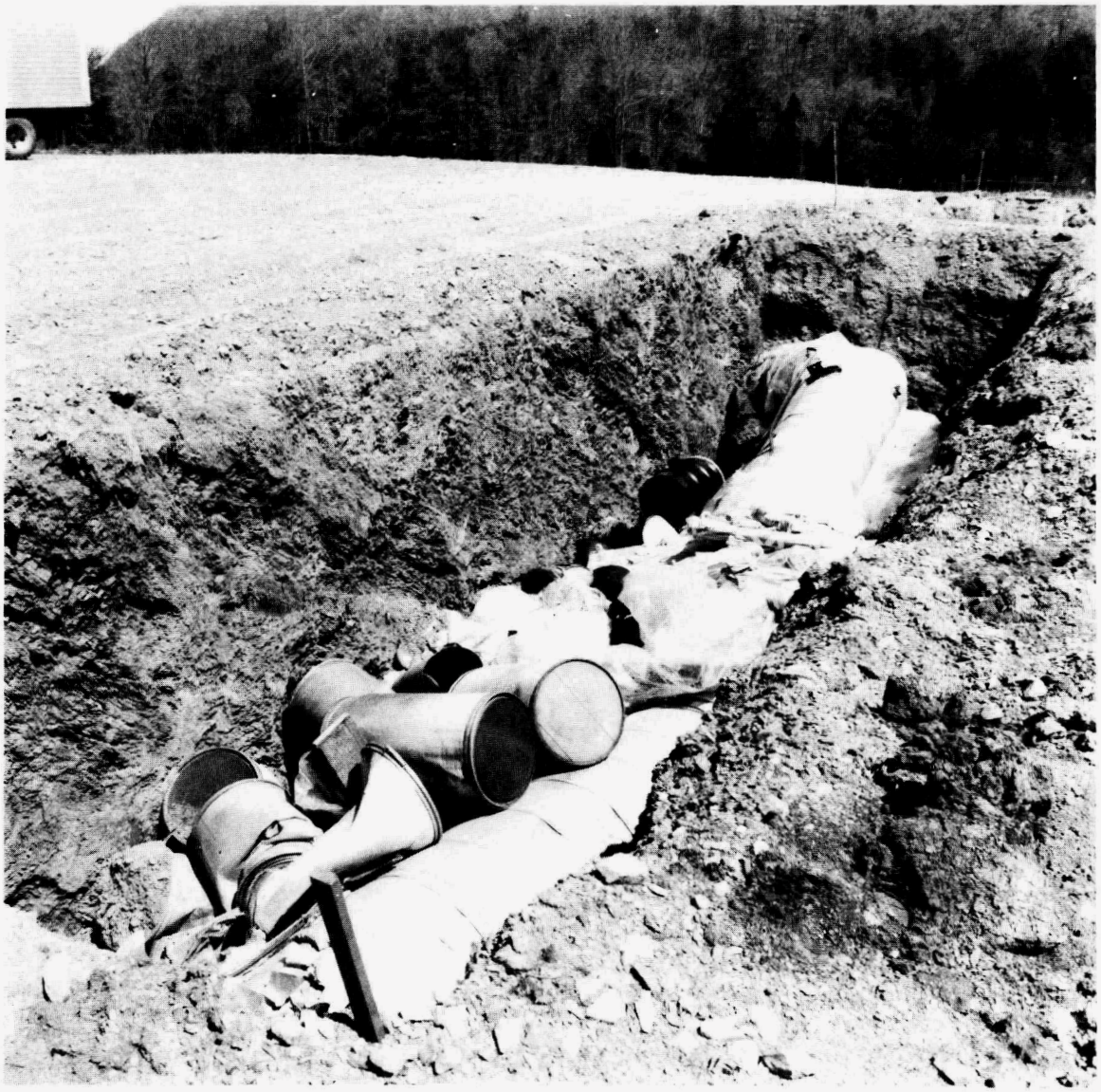

Fig. 29. Trench 459 looking south: Note structure in east wall.

ORNL PHOTO 2172-85

Fig. 30. Trench 459 looking north.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill southwest of equipment storage building (7842)
Trench Number:	462
Approximate Date of Construction:	04-10-85
Approximate Length:	15 m
Approximate Width:	3.2 m
Approximate Depth:	4 m
Photo of North Wall:	Photo No.: 2174-85
Photo of South Wall:	Photo No.: 2173-85
Photo of East Wall:	Photo No.: 2174-85
Photo of West Wall:	Photo No.: 2173-85
Trench Corner Coordinates:	N15992.6, E24389.3 N16038.2, E24365.3
	N15998.3, E24397.9 N16031.5, E24357.8

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	30 to 60 cm
Compass direction of long axis of trench	N65°W
Geologic strike of strata	In north corner N37°E
True dip in N corner	23°SE
Estimated range of apparent geologic dip of strata	7 to 25° on long wall
Is nonweathered rock visible in trench?	No
Is water visible in trench?	No

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DATE: 05-06-85

ORNL PHOTO 2173-85

Fig. 31. Trench 462 looking south.

ORNL PHOTO 2174-85

Fig. 32. Trench 462 looking north.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	Approximately 91 meters south of the north entrance gate
Trench Number:	470
Approximate Date of Construction:	04-26-85
Approximate Length:	15 m
Approximate Width:	3.2 m
Approximate Depth:	5 m
Photo of North Wall:	Photo No.: 2776-85
Photo of South Wall:	Photo No.: 2779-85
Photo of East Wall:	Photo No.: 2778-85
Photo of West Wall:	Photo No.: 2776-85
Trench Corner Coordinates:	N17536.1, E24604.4 N17486.4, E24607.1
	N17535.2, E24593.9 N17486.1, E24596.3

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	30 to 122 cm
Compass direction of long axis of trench	N35°W
Geologic strike of strata	In west corner - N79°E In south corner - N60°E
Estimated range of apparent geologic dip of strata	In long wall = 30 to 45°
Is nonweathered rock visible in trench?	No
Is water visible in trench?	No

NAME: R. G. Stansfield

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DATE: 05-06-85

ORNL PHOTO 2779-85

Fig. 33. Trench 470 looking south: Note fractures in northeast corner.

ORNL PHOTO 2776-85

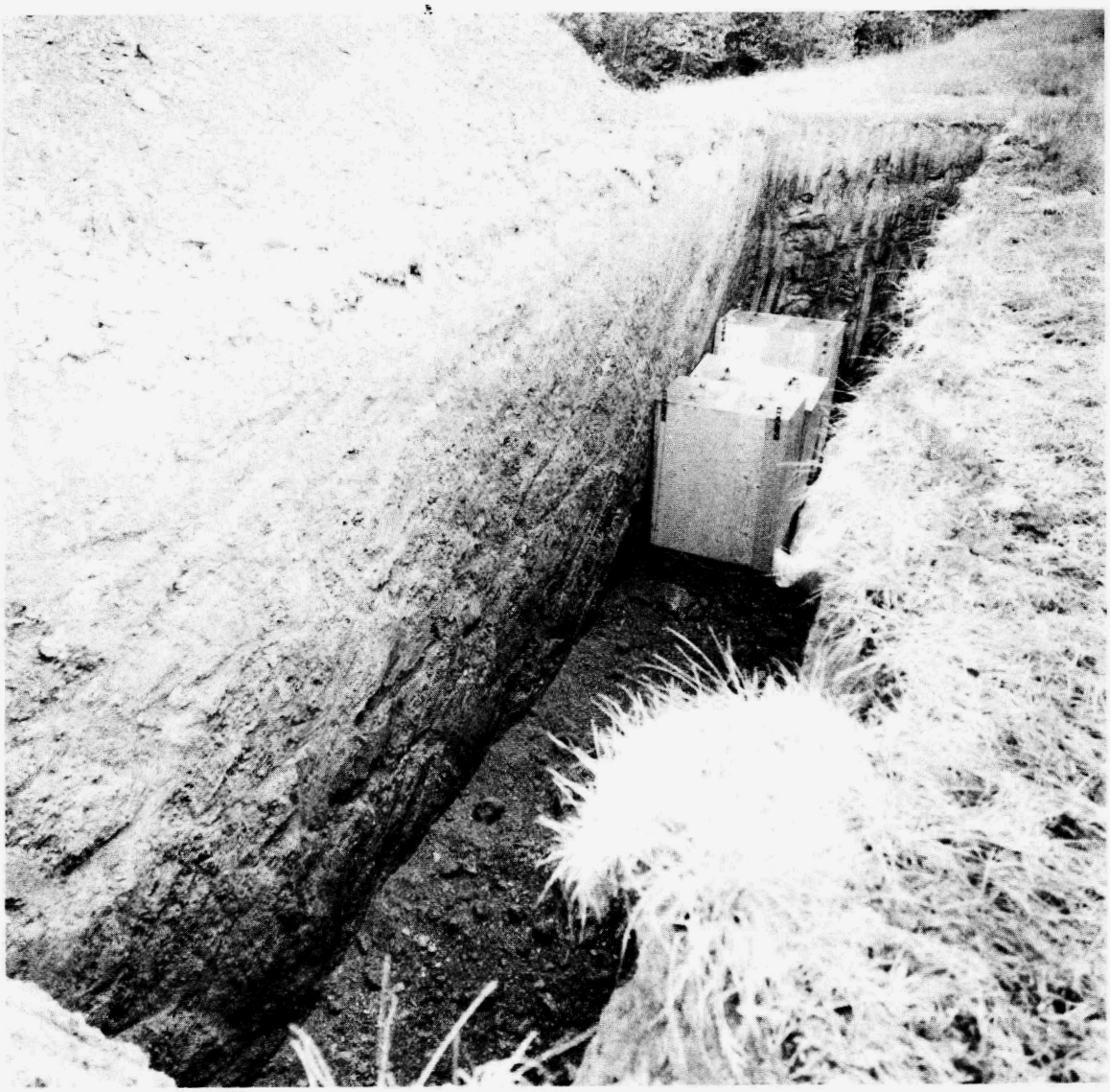

Fig. 34. Trench 470 looking north.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill SW of equipment storage building (7842)
Trench Number:	463
Approximate Date of Construction:	05-17-85
Approximate Length:	15 m
Approximate Width:	3.2 m
Approximate Depth:	4 m
Photo of North Wall:	Photo No.: None
Photo of South Wall:	Photo No.: 3353-85
Photo of East Wall:	Photo No.: 3352-85
Photo of West Wall:	Photo No.: 3353-85
Trench Corner Coordinates:	N16157.7, E24273.4 N16115.8, E24301.0
	N16122.4, E24308.9 N16151.6, E24267.1

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	30 to 60 cm
Compass direction of long axis of trench	N75°W
Geologic strike of strata	In north corner - N61°E
True dip in north corner	38°SE
Estimated range of apparent geologic dip of strata in long wall	30 to 70°
Is nonweathered rock visible in trench?	No
Is water visible in trench?	No

NAME: R. G. Stansfield

ADDRESS: 3504

DATE: 05-24-85

ORNL PHOTO 3350-85

Fig. 35. Trench 463 looking south.

ORNL PHOTO 3351-85

Fig. 36. Trench 463 looking north: Note structure in west wall.

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill south of equipment storage building (7842)
Trench Number:	465
Approximate Date of Construction:	05-24-85
Approximate Length:	15 m
Approximate Width:	3.0 m
Approximate Depth:	5.1 m
Photo of North Wall:	Photo No.:
Photo of South Wall:	Photo No.:
Photo of East Wall:	Photo No.:
Photo of West Wall:	Photo No.:

Trench Corner Coordinates: N16118.9, E24312.3 N16076.4, E24339.0
N16083.8, E24346.2 N16111.7, E24304.9

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	30 to 60 cm
Compass direction of long axis of trench	N76°W
Geologic strike of strata	In south corner - N60°E
True dip in south corner	33°SE
Estimated range of apparent geologic dip of strata	30 to 70°
Is nonweathered rock visible in trench?	Yes - 30-cm-thick limestone in east corner at bottom
Is water visible in trench?	No

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ADDRESS: 3504

DATE: 05-24-84

LOW-LEVEL RADIOACTIVE WASTE TRENCH DESCRIPTION

Disposal Site:	ORNL SWSA-6
General Location:	On hill southwest of equipment storage building (7842)
Trench Number:	468
Approximate Date of Construction:	08-09-85
Approximate Length:	15 m
Approximate Width:	3 m
Approximate Depth:	4.5 m
Photo of North Wall:	Photo No.: 5187-85
Photo of South Wall:	Photo No.: 5186-85
Photo of East Wall:	Photo No.: 5186-85
Photo of West Wall:	Photo No.: 5187-85
Trench Corner Coordinates:	N16046.0, E24345.4 N15994.0, E24335.9
	N16045.1, E24334.9 N15993.8, E24347.9

Geologic Description:

Range of depths of soil cover (material that shows no fractures)	15 to 60 cm
Compass direction of long axis of trench	N68°W
Geologic strike of strata	N20°E, 30°E
Estimated range of apparent geologic dip of strata	60 to 20°
Is nonweathered rock visible in trench?	No
Is water visible in trench?	Yes - at SE end (down dip)

NAME: R. B. Dreier

ADDRESS: 3504

DATE: 08-29-85

ORNL PHOTO 5186-85

Fig. 37. Trench 468 looking south.

ORNL PHOTO 5187-85

Fig. 38. Trench 468 looking north.

CONCLUSIONS

The first year of an effort to photograph and geologically describe waste trenches being opened in ORNL SWSA-6 has resulted in documentation covering 17 trenches. Sixteen of the trenches were filled with low-activity waste and only one, located in the northern portion of SWSA-6, was filled with high-activity waste. The photographs of the trench walls do an excellent job of highlighting the complex shallow geologic structure of the strata in which the trenches are excavated. Many folds are apparent, along with layers of impermeable clay and wet zones that transport water during precipitation events. The geologic structure includes highly fractured, dipping strata that is often tightly folded. Commonly, the structure of the weathered bedrock extends to within 0.3 m of the surface, thereby providing pathways for transporting water quickly during precipitation events.

Groundwater was not observed in any of the trench excavations included in this report; however, water was observed in the southeast corner of trench 468. This water is believed to be the result of rainfall infiltration from precipitation occurring prior to the date of the geologic description. In one trench (number 465), nonweathered bedrock approximately 30 cm thick was observed near the bottom at the east corner.

It is recommended that the trench photographic program described in this report be continued, and that annual reports containing the photos and a brief geologic description of each trench be prepared as part of a larger SWSA-6 characterization program. For such a program

to be a success, it will require direction by a single group (e.g., ORNL Operations Division) and input from several support groups including Environmental Sciences and Engineering divisions. With this arrangement, pertinent trench records (including date opened, contents, and photo numbers) will remain the responsibility of a single group and be readily available for a variety of uses.

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