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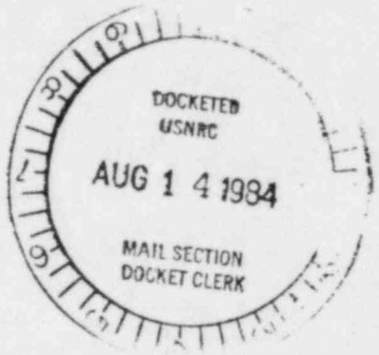
40-1341

TENNESSEE VALLEY AUTHORITY

CHATTANOOGA, TENNESSEE 37401
400 Chestnut Street Tower II

RETURN TO URFO – DENVER

August 7, 1984



Mr. R. Dale Smith
U.S. Nuclear Regulatory Commission
Uranium Recovery Field Office
P. O. Box 25325
Denver, Colorado 80225

Dear Mr. Smith:

The enclosed information regarding the perched watertable situation at the Edgemont Decommissioning disposal site is provided to clarify the associated discussion presented in my April 13, 1984 submittal to you. We believe the enclosed information shows that by following our current design and operational plans the possibility for concern over perched water at the disposal site is removed.

This information has been discussed in a meeting and in telephone conversations between our respective staffs. If you have any questions regarding this information, please get in touch with David Dunn of my staff at FTS 858-2699.

Very truly yours,

TENNESSEE VALLEY AUTHORITY

L. M. Mills, Manager
Nuclear Licensing Staff

Enclosure
cc (Enclosure):
Mr. Richard McClean
Oak Ridge National Laboratory
Energy Division
P. O. Box X
Oak Ridge, TN 37831

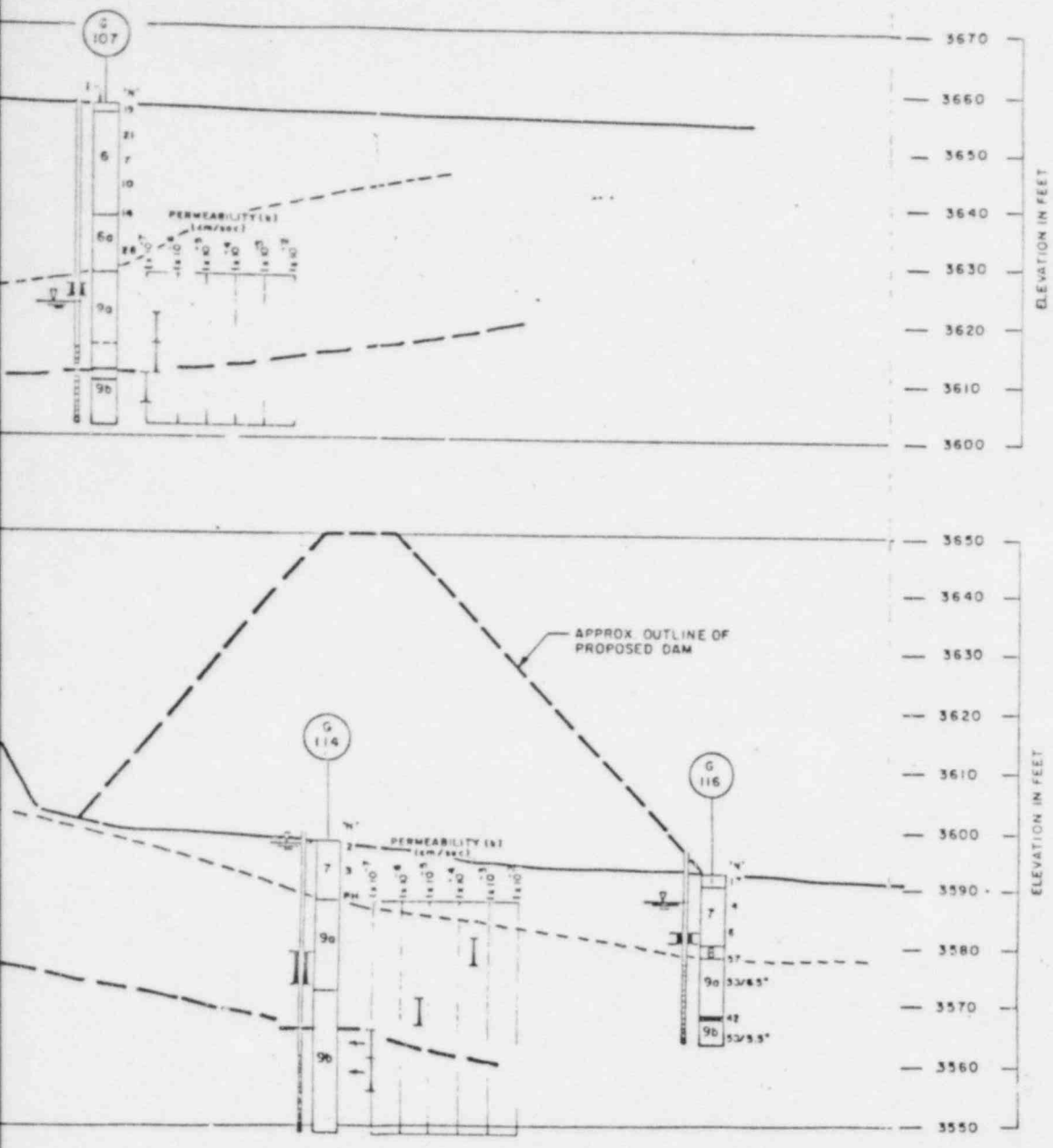
DESIGNATED ORIGINAL

Certified By Mary C. Hood

FEE EXEMPT
Add'l Info
01340

DISPOSAL SITE SECTIONS B-B AND C-C

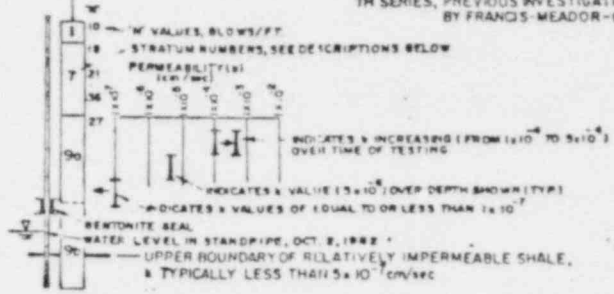
FIGURE 1



LEGEND

G 115 — BOREHOLE IN ELEVATION; G SERIES, PRESENT INVESTIGATION BY GOLDER ASSOCIATES

TH SERIES, PREVIOUS INVESTIGATION (JUNE 1980) BY FRANCIS-MEADOR-GELL HAUS, INC.



G 201 — TEST PIT IN ELEVATION; PRESENT INVESTIGATION BY GOLDER ASSOCIATES

STRATUM NUMBER, SEE DESCRIPTIONS BELOW

DRY — TEST PIT DRY DURING EXCAVATION

SIMPLIFIED STRATIGRAPHY (FOR DETAILS REFER TO RECORD OF BOREHOLE AND TEST PIT SHEETS)

1	STIFF DARK BROWN SILTY CLAY, SANDY, ROOTS, TOPSOIL (CL)
6	LOOSE TO COMPACT LIGHT TAN BROWN SANDY SILT TO SILT (ML)
6a	COMPACT LIGHT TAN FINE TO COARSE SILTY SAND (SM)
7, 7a	SOFT TO VERY STIFF DARK BROWN SILTY CLAY, $CaCO_3$ STRINGERS (CL)
8	LOOSE TAN BROWN FINE TO COARSE SAND, SILTY, CLAYEY (SM) OR (SC)
9a	STIFF TO HARD GREY WEATHERED SHALE, IRON AND SULFUR STAINS, SOME GYPSUM IN FRACTURES (MH), LOWER GREENHORN FORMATION
	BENTONITE SEAMS
9b	HARD BLACK COMPETENT SHALE, OCCASIONAL FRACTURES AND BENTONITE SEAMS, LOWER GREENHORN FORMATION

SPECIAL NOTE

THIS DRAWING IS TO BE READ IN CONJUNCTION WITH ACCOMPANYING REPORT.

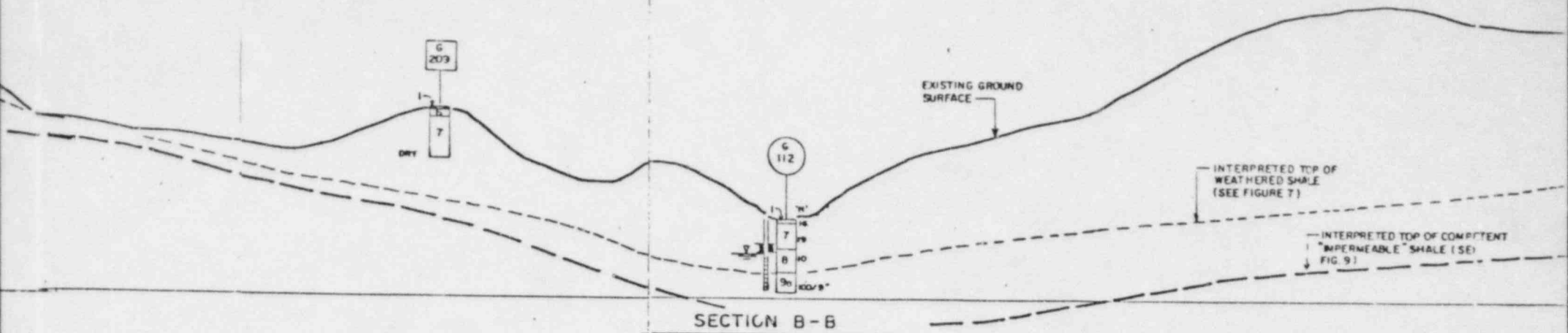
NOTE: FOR LOCATION OF SECTIONS, REFER TO FIGURE 2-1

SCALE: HORIZONTAL 1 INCH TO 100 FEET
VERTICAL 1 INCH TO 20 FEET

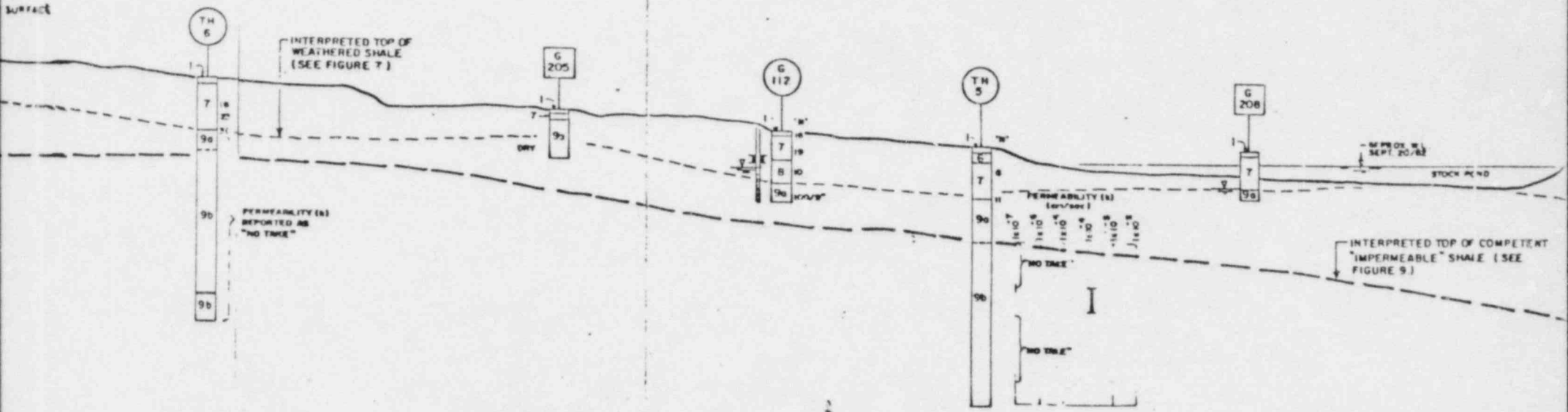
Date: DEC 13, 1982
Project: 821-1169

Golder Associates

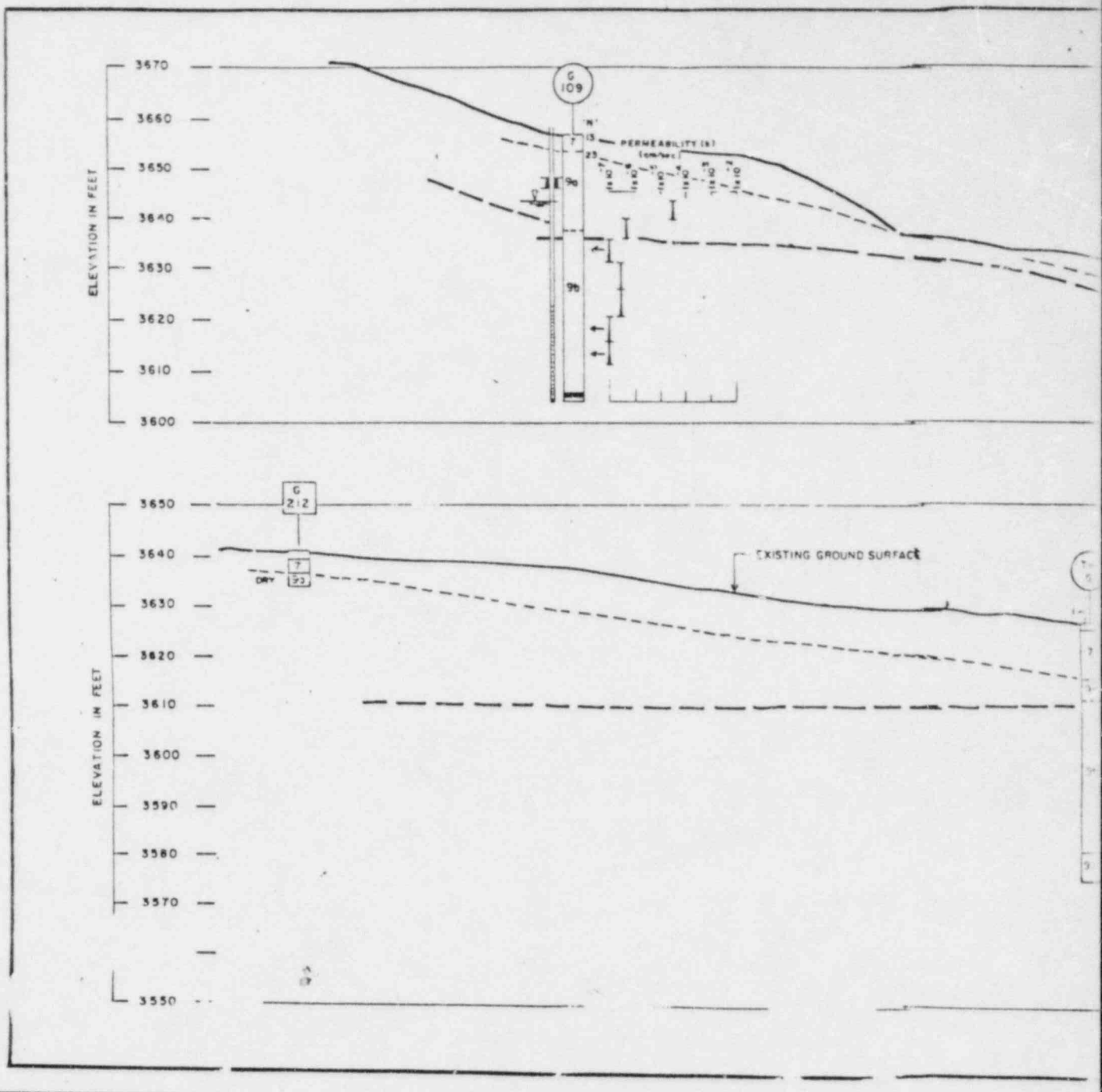
Drawn: MHM
Chkd: [illegible]



SECTION B-B



SECTION C-C


ELEVATION IN FEET
3670
3660
3650
3640
3630
3620
3610
3600
G
109
PERMEABILITY (k)
(cm/sec)
ELEVATION IN FEET
3650
3640
3630
3620
3610
3600
3590
3580
3570
3550
G
212
DRY
EXISTING GROUND SURFACE

ENCLOSURE

Edgemont Mill Decommissioning

Disposal Site Perched Watertable

TVA's April 13, 1984 submittal regarding the relationship of EPA's 40 CFR 192 regulations to the Edgemont decommissioning project included a discussion of the groundwater situation at the disposal site (items 5 and 6 of the enclosure). This discussion erroneously referred to the perched unconfined groundwater in the disposal site area as an aquifer. The following information is intended to resolve this discrepancy and to clarify our plans for dealing with this perched water.

The perched water situation at the Edgemont decommissioning disposal site has been previously discussed in Enclosure 2, Report No. 10, Disposal Site Design.* This submittal also presented the operational and design plan for dealing with this water during disposal site excavation and material implacement. In addition, plans were presented for isolating the final disposal basin to preclude reformation of this perched water situation and thereby eliminate the possibility for concern over perched water at the disposal site. The applicable information is summarized here with reference to the appropriate previously provided discussions.

A. Present Disposal Site Perched Water Regime

An aquifer, as defined in 40 CFR 260 Part B, "Definitions," paragraph 260.10 means a geologic formation, group of formations, or part of a formation capable of yielding a significant amount of groundwater to wells or springs." As shown below, because of the limited extent of this water formation and because of the extensive separation of it from the main water bearing formation (Fall River) by an unsaturated zone, the perched water is not considered an aquifer nor to be connected to one. No yield of economically significant quantities of water is available.

Measured water levels in standpipes (Enclosure 3, Report No. 7, Results of Geotechnical Investigation Proposed Disposal Site,)* installed in the perimeter boreholes indicate that a perched water condition exists within the lower portion of the relatively pervious weathered shale in the disposal site area, Figure 1. This perched flow system is largely controlled by the topography of the underlying relatively impervious competent shale, Figure 2. Based on the stabilized water levels in the standpipes and considering the surface topography of the "impervious" shale, the groundwater surface (or upper phreatic surface) contours shown on Figure 3 were developed.

This phreatic zone is typically about 5- to 10-feet thick, although it is thicker within the southeast quadrant of the site. Within this zone, seepage is occurring from the topographic highs toward the valley floor of the disposal basin area.

Within the buried disposal basin floor area, the groundwater appears to be ponded to about elevation 3610 (Figures 1 and 2), probably as a result of a "damming" effect at the outlet of the valley (i.e., the proposed containment dam area). This ponded groundwater probably recharges the existing stockpond during periods of high evaporation and is, in turn, recharged by the stockpond during periods of precipitation and surface runoff.

The perched water "pond" in the disposal basin floor area discharges to the southeast; generally following the present surface drainage. In this area, the multiple standpipe installations in Boreholes G-114 (Figure 1), 114a and 114b indicate that a slight downward hydraulic gradient exists within the shale bedrock.

Overall, the perched water and existing stockpond are recharged by meteoric waters falling within the confines of the existing drainage with a major contribution being made from the western side of the drainage. (Watershed boundary for the disposal basin area is shown in Figure 4.)

As discussed in Enclosure 3, Report No. 7, Appendix C,* only the three boreholes drilled in the bottom of the disposal basin's current drainage course (discharge to the southeast) were initially, and for the first few days after drilling, found to contain water within the standpipes. Eventually all the boreholes had water present in them. The borehole water levels became constant over time and were shown by standpipe response testing to be representative of actual water levels across the site. This information indicates that while some perched water does exist at the site it is not a formation capable of yielding significant quantities of water to wells and therefore is not considered an aquifer.

Also, there is no evidence that the near-surface, perched water discussed here has any direct hydraulic communication with the confined bedrock aquifer (i.e., the Fall River and Lakota Formations) which the results of the Komes Test Hole 1 indicate underlie the site at depths in excess of 500-feet.

(Reference: Section 2.4, Report No. 10, Disposal Site Design, Enclosure 2)*

B. Excavation and Operational Plans

Engineering plans for disposal site preparation have taken into account the presence of the perched water and provide for its drainage. The centerline ditch has as its single purpose the drainage of the perched water within the disposal site. (Section 6.5.1 of Report 10, Disposal Site Design, Enclosure 2).* The perched water is generally located 5- to 10-feet above the top of the competent shale base of the disposal basin and the centerline drainage ditch will be placed along the disposal basin floor so as to draw down the perched water. As can be noted from Drawing 3, Disposal Basin Development - 1984 (Enclosure 2, Report 10, Disposal Site Design),* the upper elevation for the centerline ditch is 3602 which is below the perched water elevation level of 3610-feet previously mentioned and into the competent shale (Figure 2 and reference Drawing 3). The centerline

ditch which will be in place throughout the period when wastes are being placed will follow the floor contour of the disposal site in a generally southeast direction and will go down to approximately elevation 3580-feet at the lower end of the disposal site, thus providing a drainage system to remove the "pond" water at elevation 3610-feet. Also, the cut-off trench (Drawing 2, Disposal Design Containment Dam, Enclosure 2, Report 10)* which will be cut into the competent shale at the upstream toe of the containment dam will provide additional drainage.

C. Disposal Site Containment Plan And Recharge Prevention

After disposal site excavation, perched water drainage and cell construction complete encapsulation of the overall disposal site is accomplished by utilization of a curtain liner (Section 5.4, Report No. 10, Enclosure 2)*; a clay cap (Section 5.6, Report No. 10, Enclosure 2)*; and the competent shale bedrock (Section 2.3, Report No. 10, Enclosure 2)*; of the disposal basin. (See Drawing 7, Disposal Basin Design - Sections and Details, Report No. 10, Enclosure 2, for engineering details.)*

In addition, perimeter ditches (Section 5.7.1, Report No. 10, Enclosure 2)*, around the disposal site will prevent overland flow recharge into the disposal site (Figure 5). Together these disposal site internal design details and external drainage methods ensure that material encapsulation is complete and that the disposal site is effectively isolated.

As discussed above and detailed in the subject references, we believe that (1) the perched water as it presently exists does not constitute an aquifer; (2) the planned disposal site excavation will modify the geologic formation in which this perched water formed; (3) site construction and operation will drain the water; and, (4) the disposal site features which encapsulate the tailings and ensure their confinement will isolate the area and minimize any recharge and reformation of a similar perched water formation. In addition, appropriate land use restrictions imposed for the disposal site should provide further control of water usage concerns. Therefore, we believe that, by following our current design and operational plans, the possibility for concern over perched water at the disposal site is removed.

*TVA's September 19, 1983 submittal of L. M. Mills to R. Dale Smith.

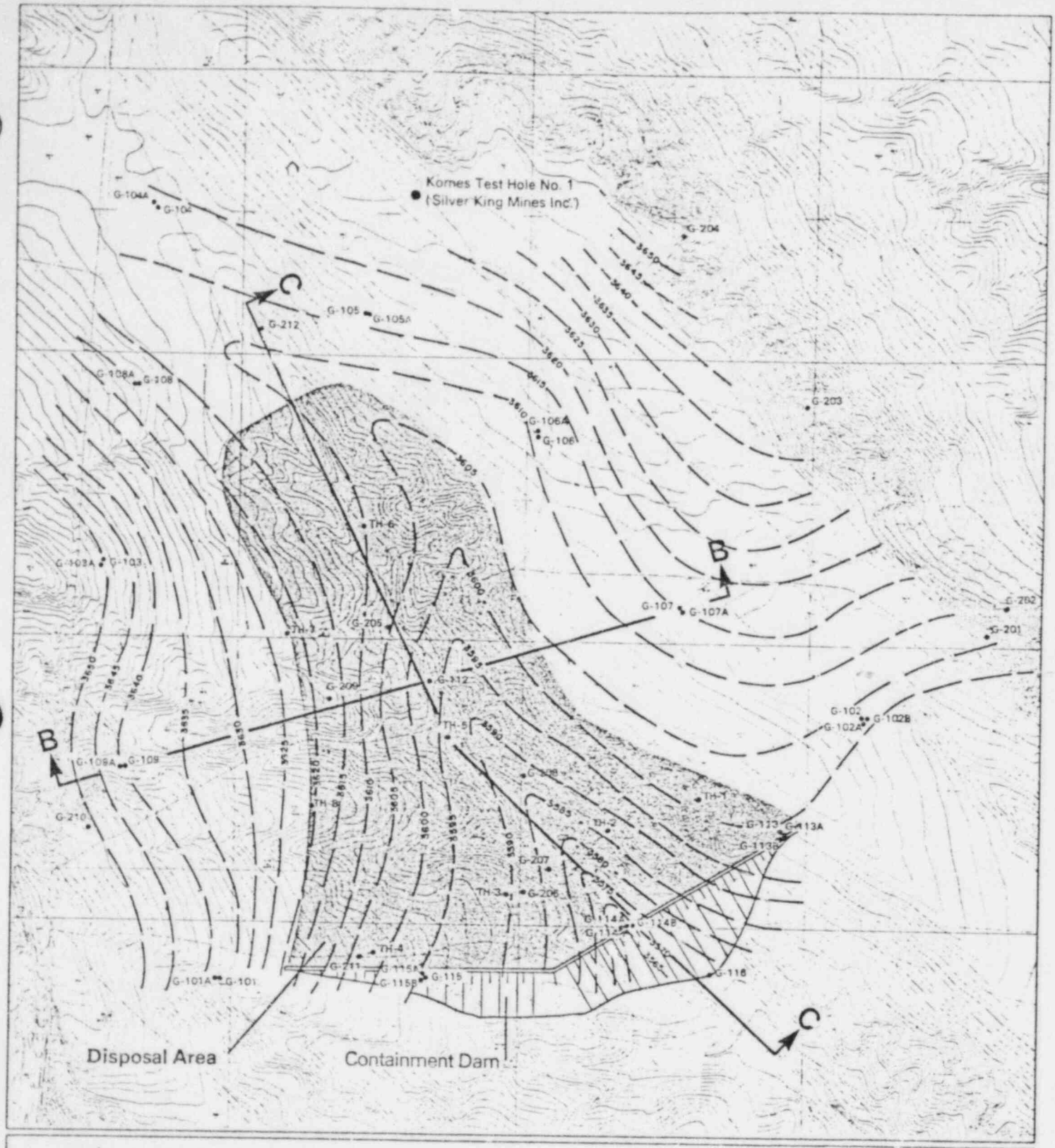


Figure 2

Top of "Impermeable" Competent Shale at Disposal Area

N

0 500 1000 Feet

0 150 300 Metres

• G-101 BOREHOLE LOCATION IN PLAN

34639-0

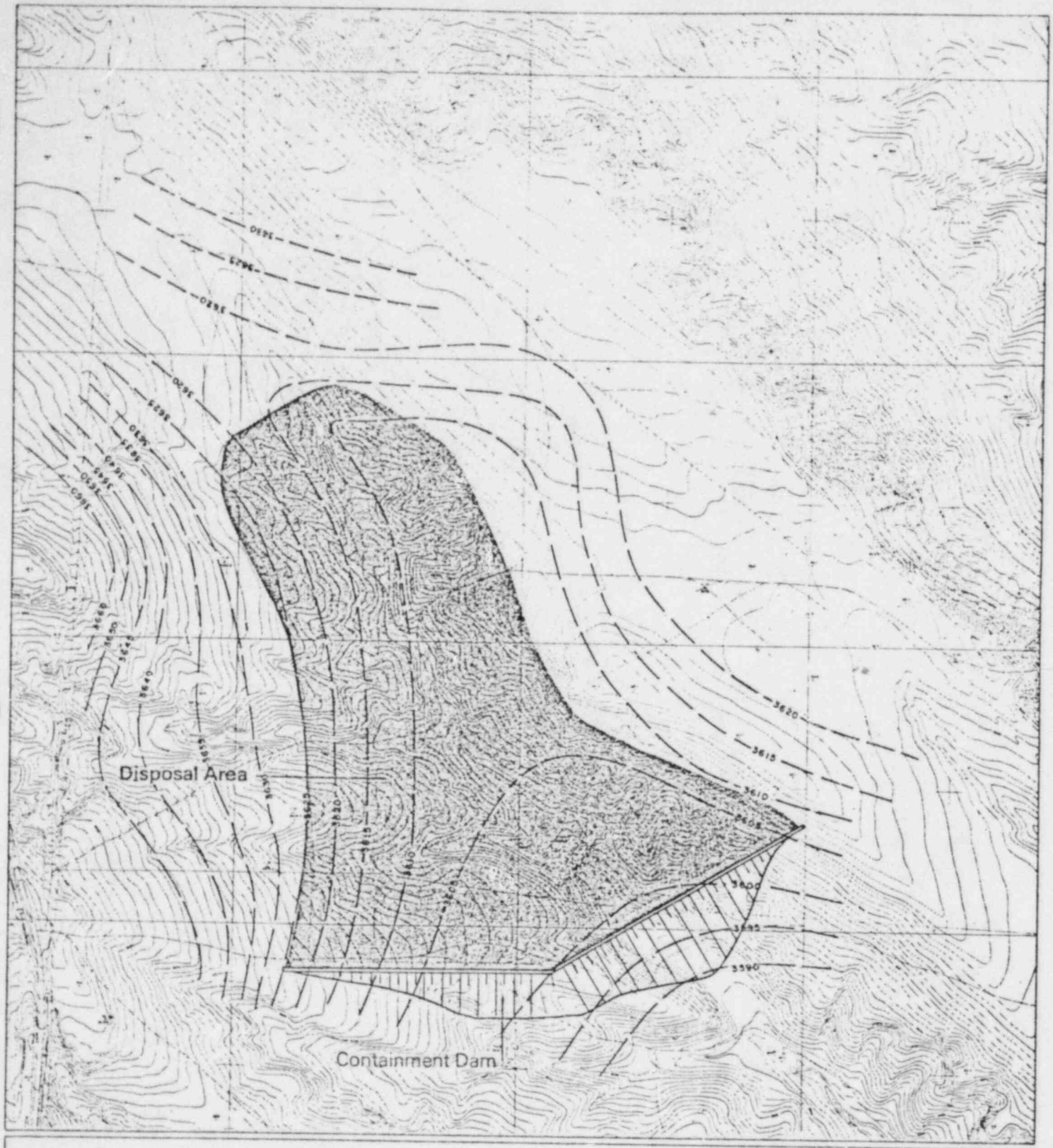


Figure 3

Inferred Groundwater Contours at Disposal Area

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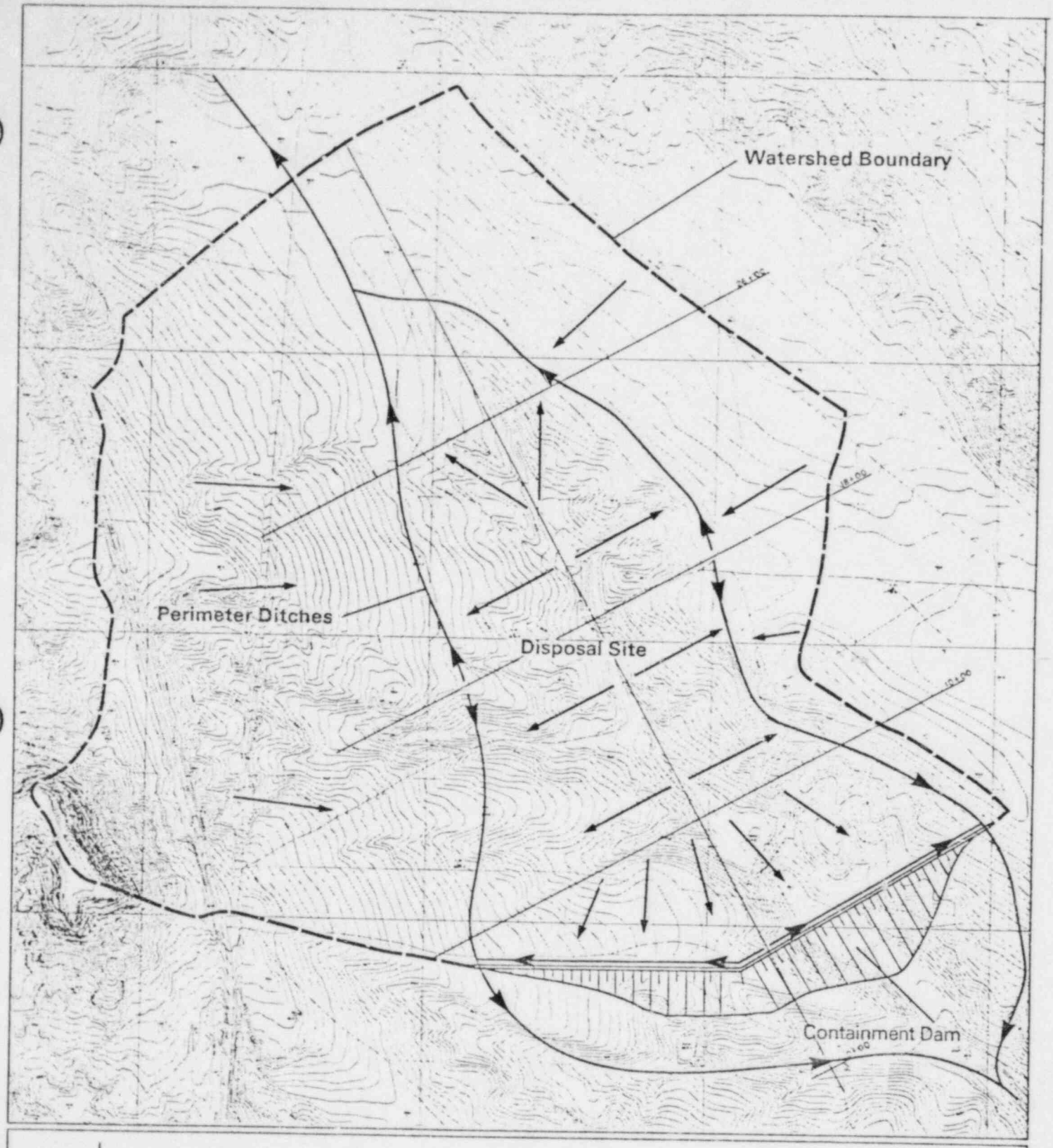

Figure 4

Drainage Basin and Proposed Drainage System

34639-0

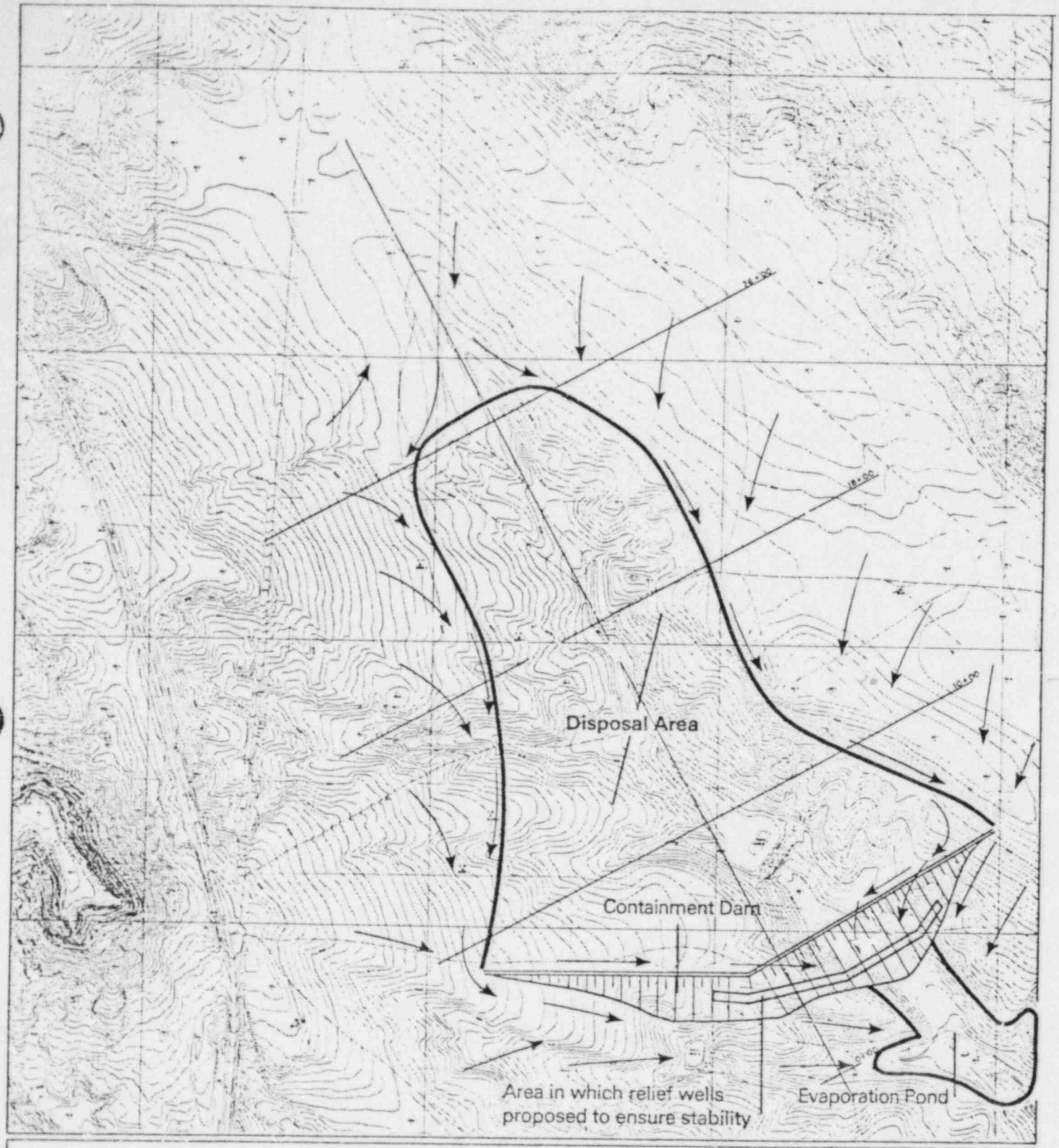

Figure 5

Modified "Perched" Groundwater Flow Pattern