

90030 0904

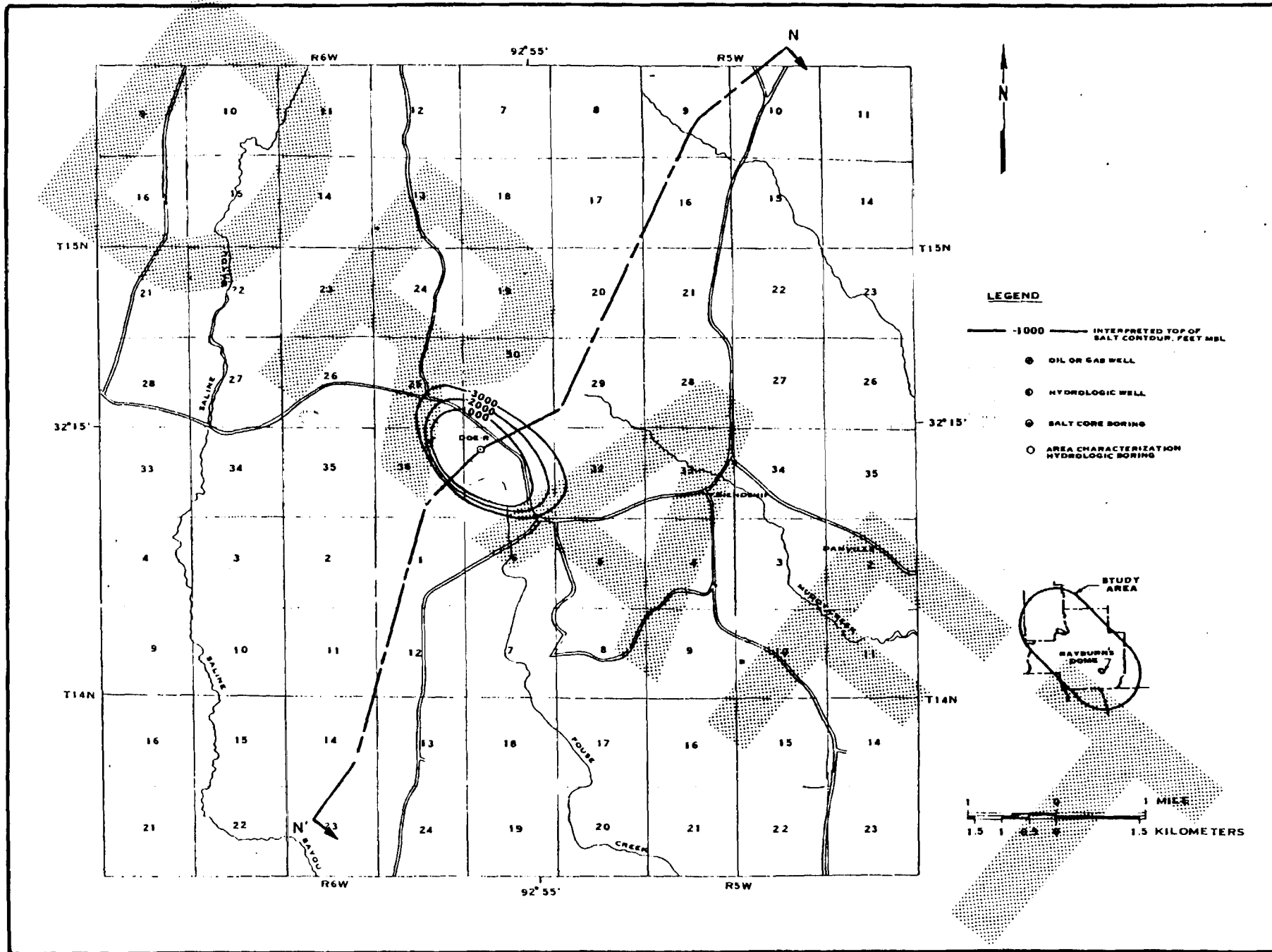
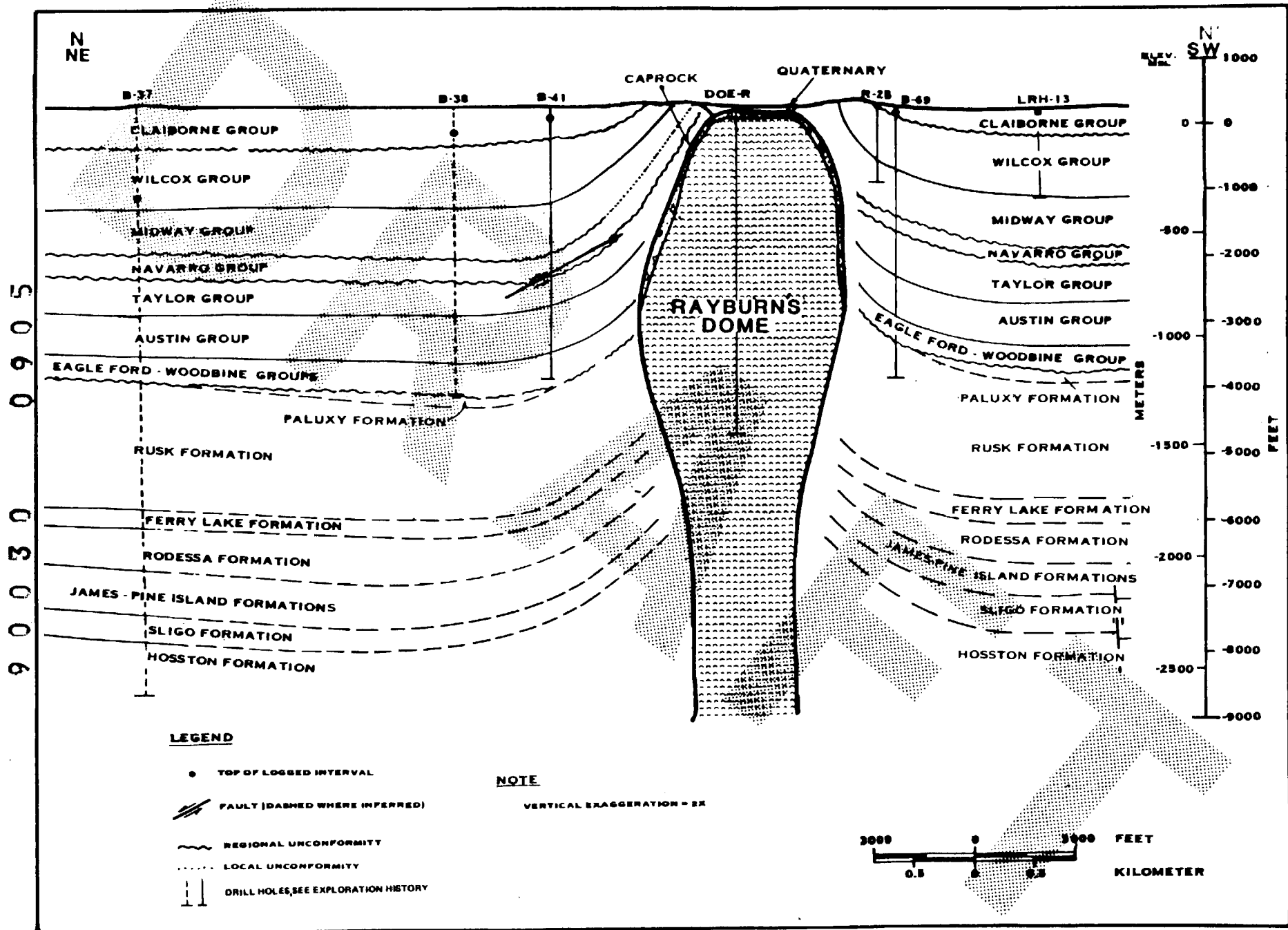


FIGURE A-1. RAYBURN'S DOME OUTLINE AT DEPTH AND LOCATION OF GEOLOGIC CROSS SECTION N'-N

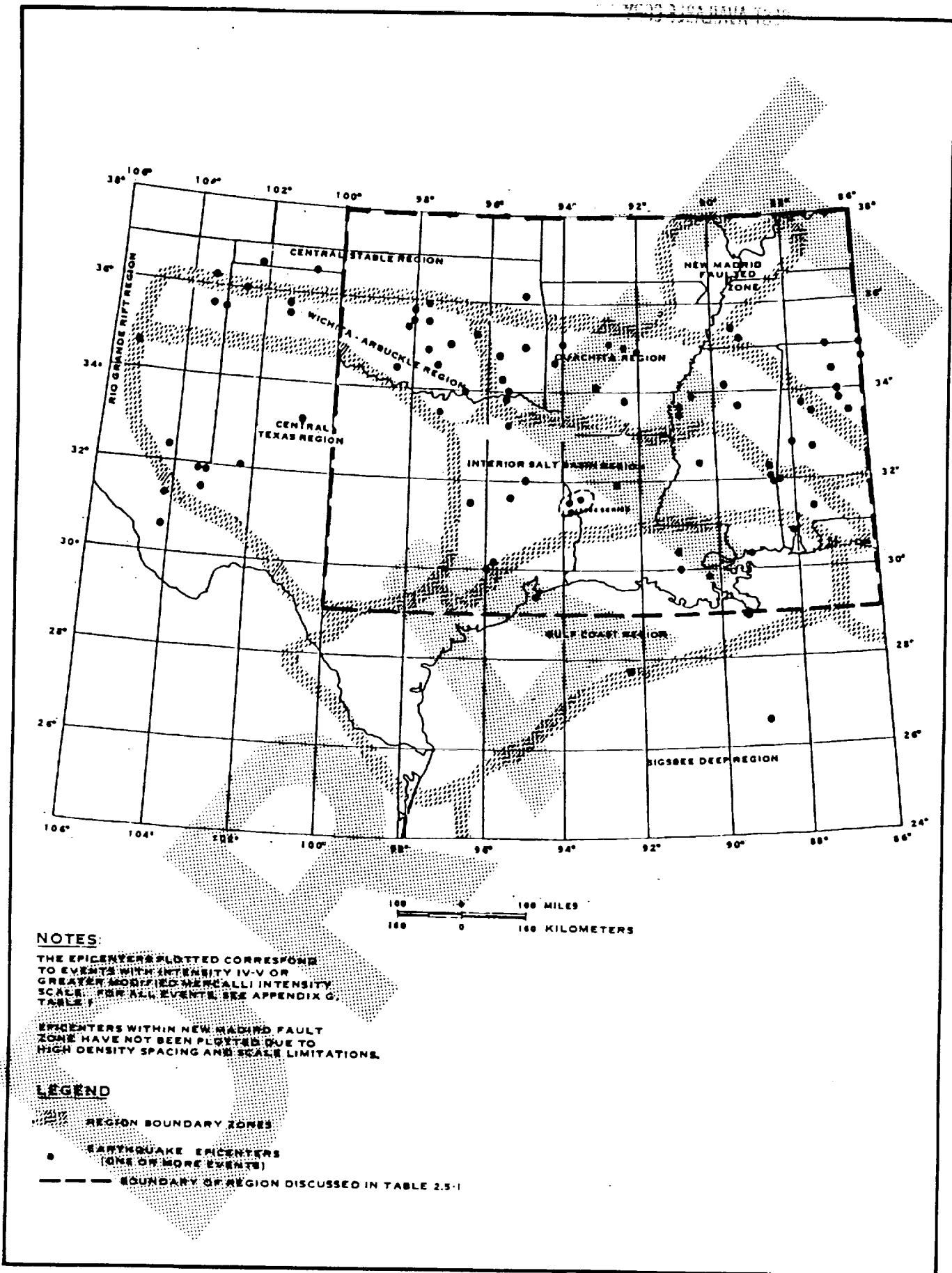
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FIGURE A-2. RAYBURN'S DOME GEOLOGIC SECTION N-N'

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NOTES:

THE EPICENTERS PLOTTED CORRESPOND TO EVENTS WITH INTENSITY IV-V OR GREATER MODIFIED MERCALLI INTENSITY SCALE. FOR ALL EVENTS SEE APPENDIX G, TABLE 1.

EPICENTERS WITHIN NEW MADRID FAULT ZONE HAVE NOT BEEN PLOTTED DUE TO HIGH DENSITY SPACING AND SCALE LIMITATIONS.

LEGEND

- REGION BOUNDARY ZONES
- EARTHQUAKE EPICENTERS (ONE OR MORE EVENTS)
- BOUNDARY OF REGION DISCUSSED IN TABLE 2.5-1

FIGURE A-3. SEISMO-TECTONIC REGIONS OF THE SOUTH CENTRAL UNITED STATES

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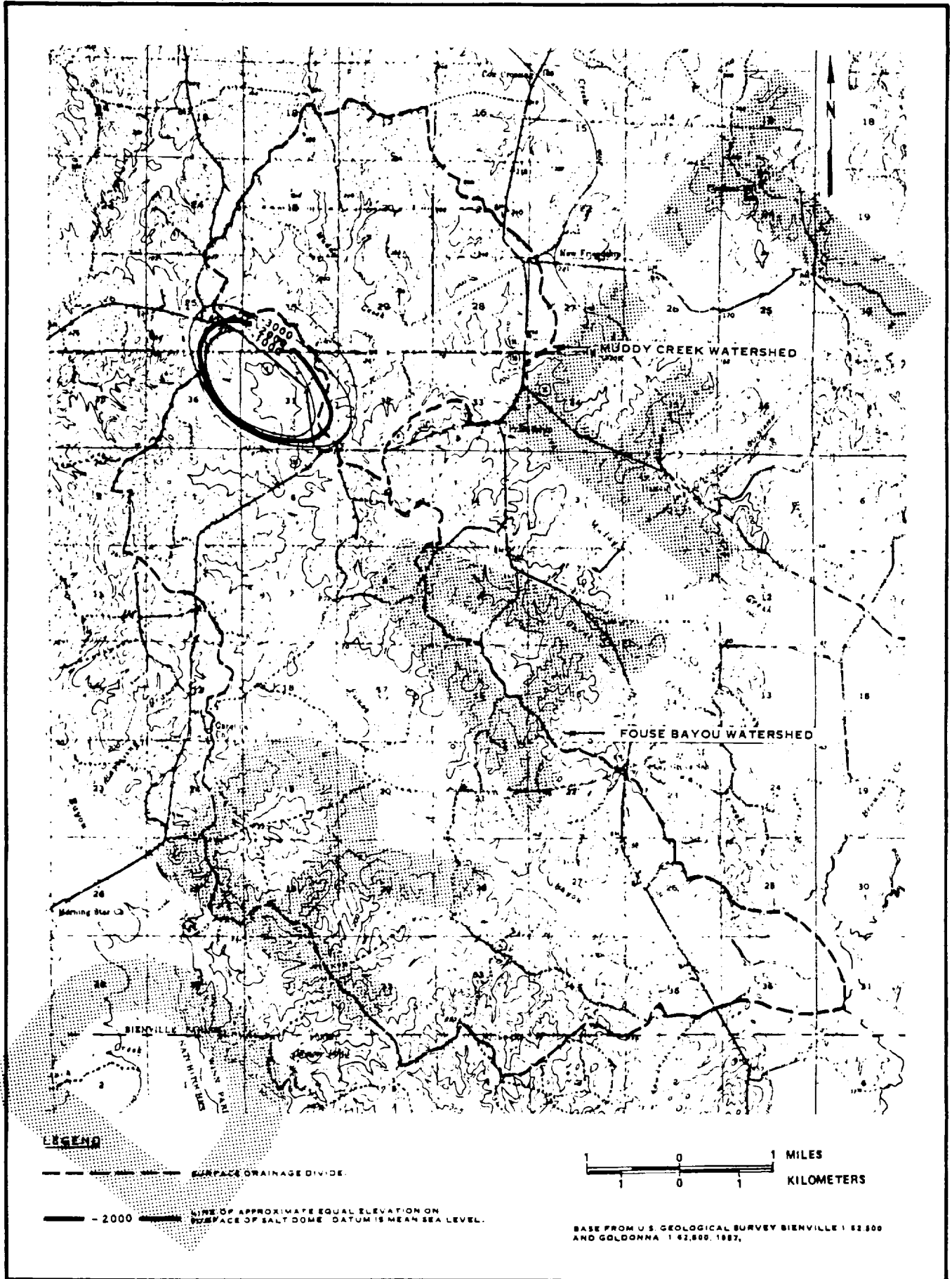
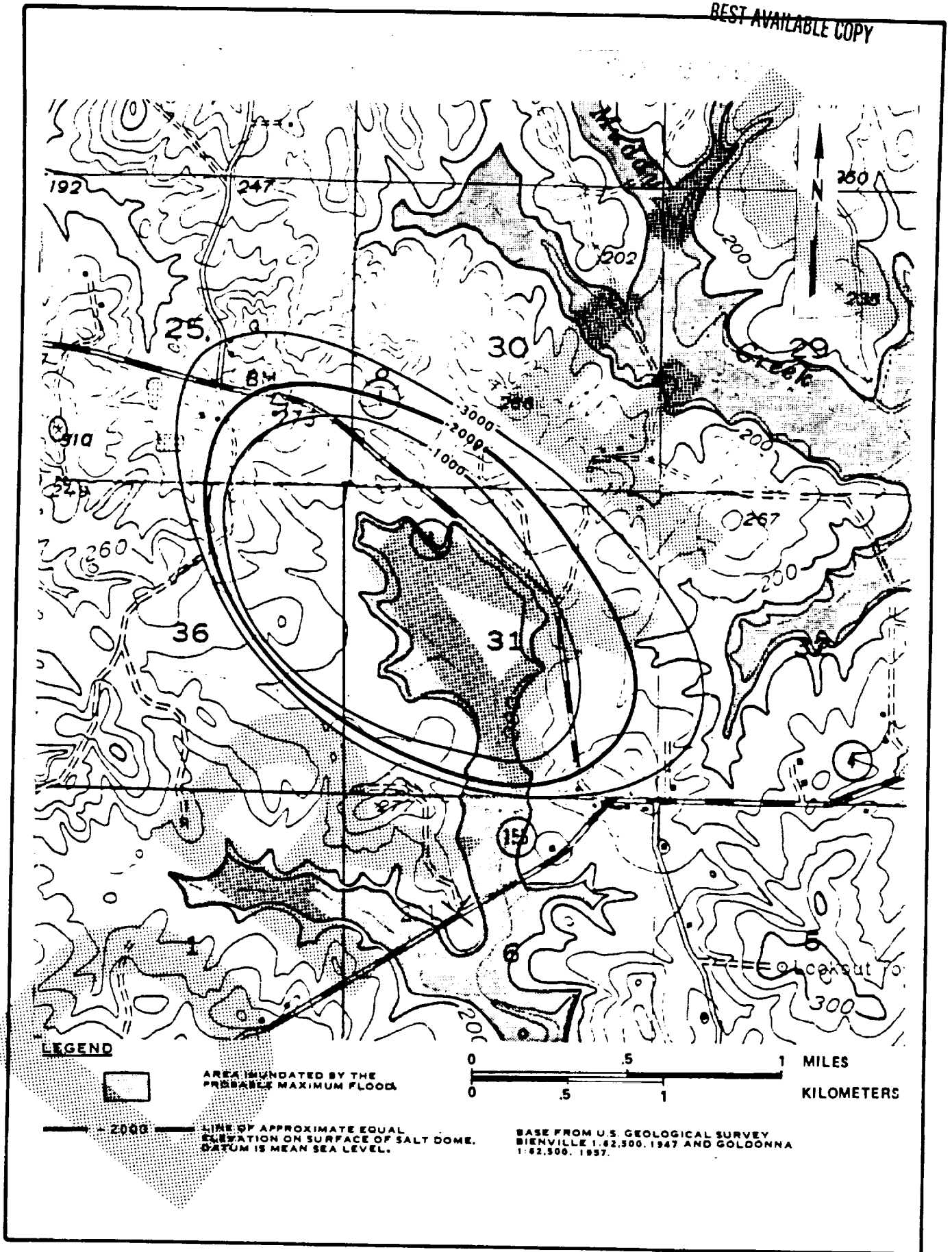


FIGURE A-4. MAP SHOWING TOPOGRAPHY AND DRAINAGE - BIENVILLE AND GOLDDONNA VICINITY

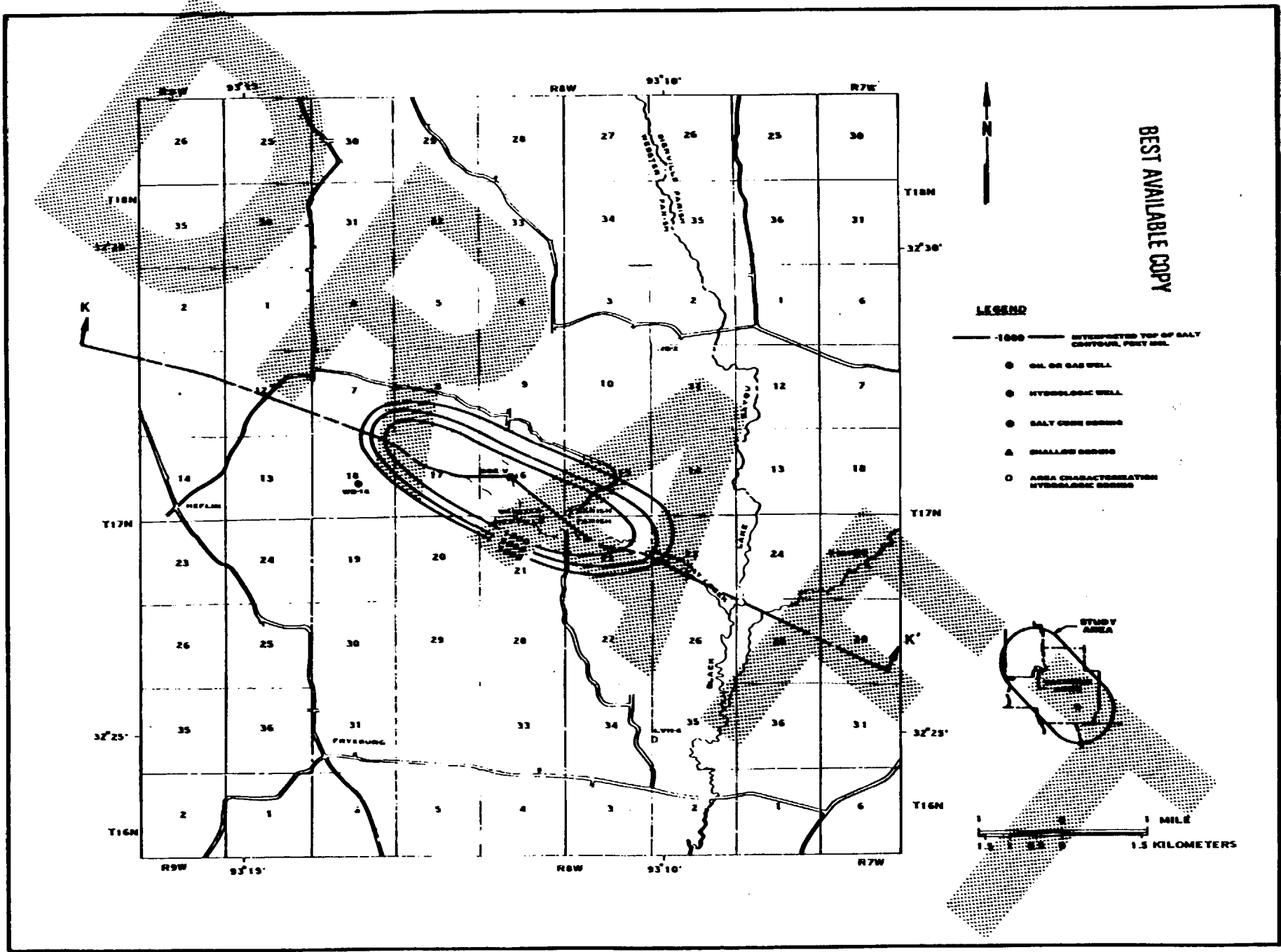
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FIGURE A-5. RAYBURN'S DOME TOPOGRAPHIC MAP SHOWING AREA OF PROBABLE MAXIMUM FLOOD

90600300

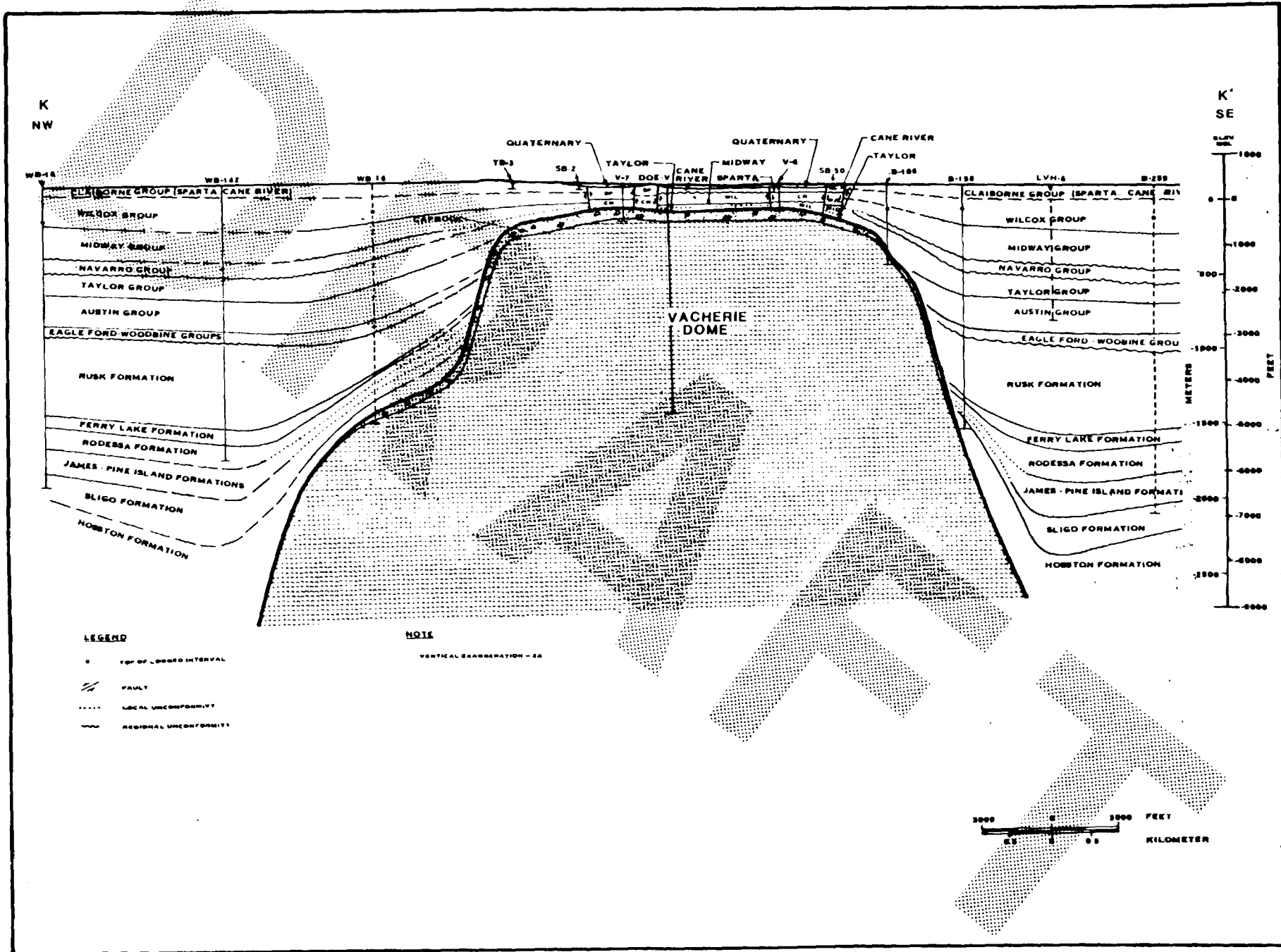


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A-10

FIGURE A-6. VACHERIE DOME OUTLINE AT DEPTH AND LOCATION OF GEOLOGIC CROSS SECTION K-K'

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 U.S. GEOLOGICAL SURVEY
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FIGURE A-7. VACHERIE DOME GEOLOGIC SECTION K-K'

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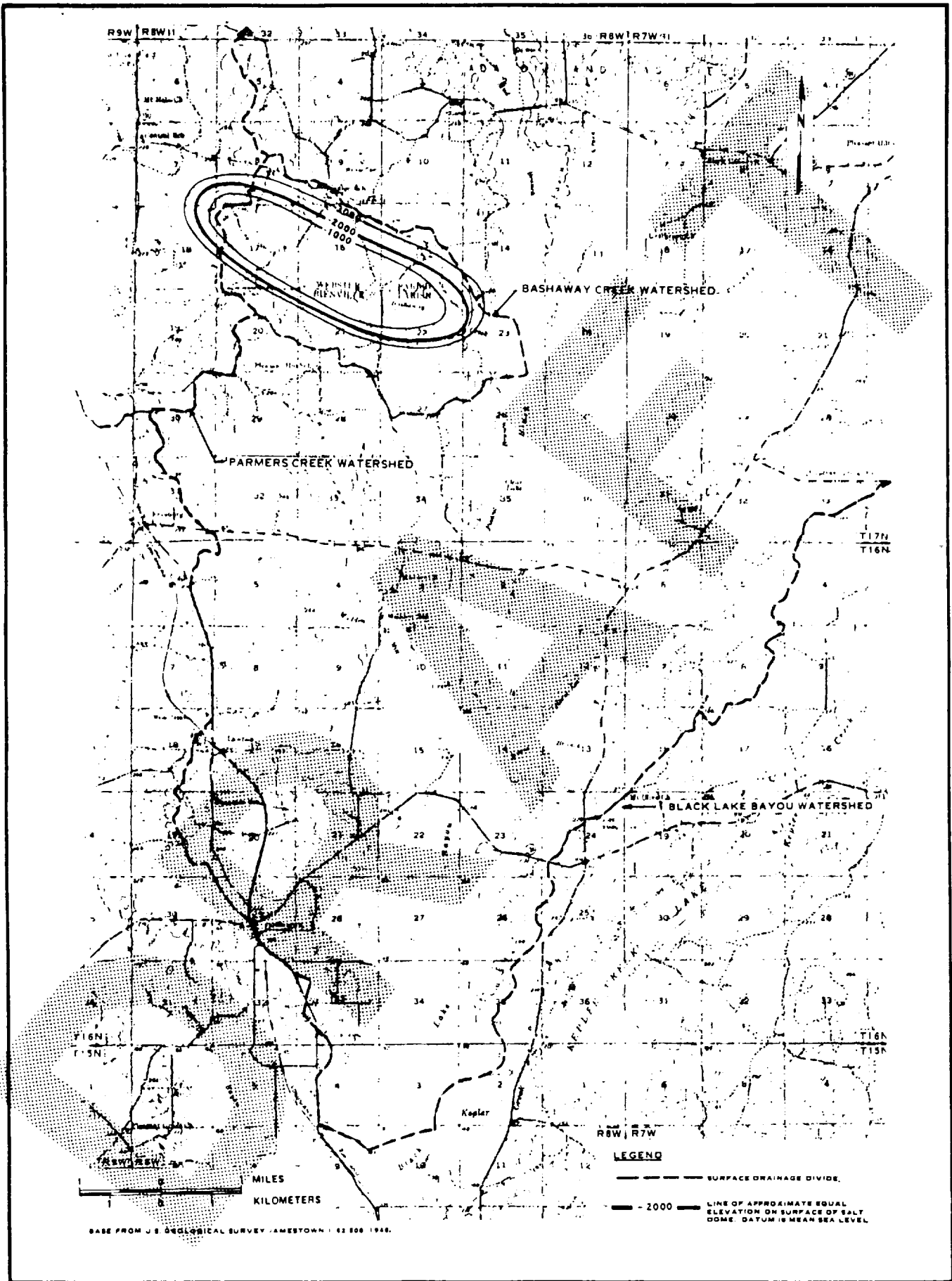
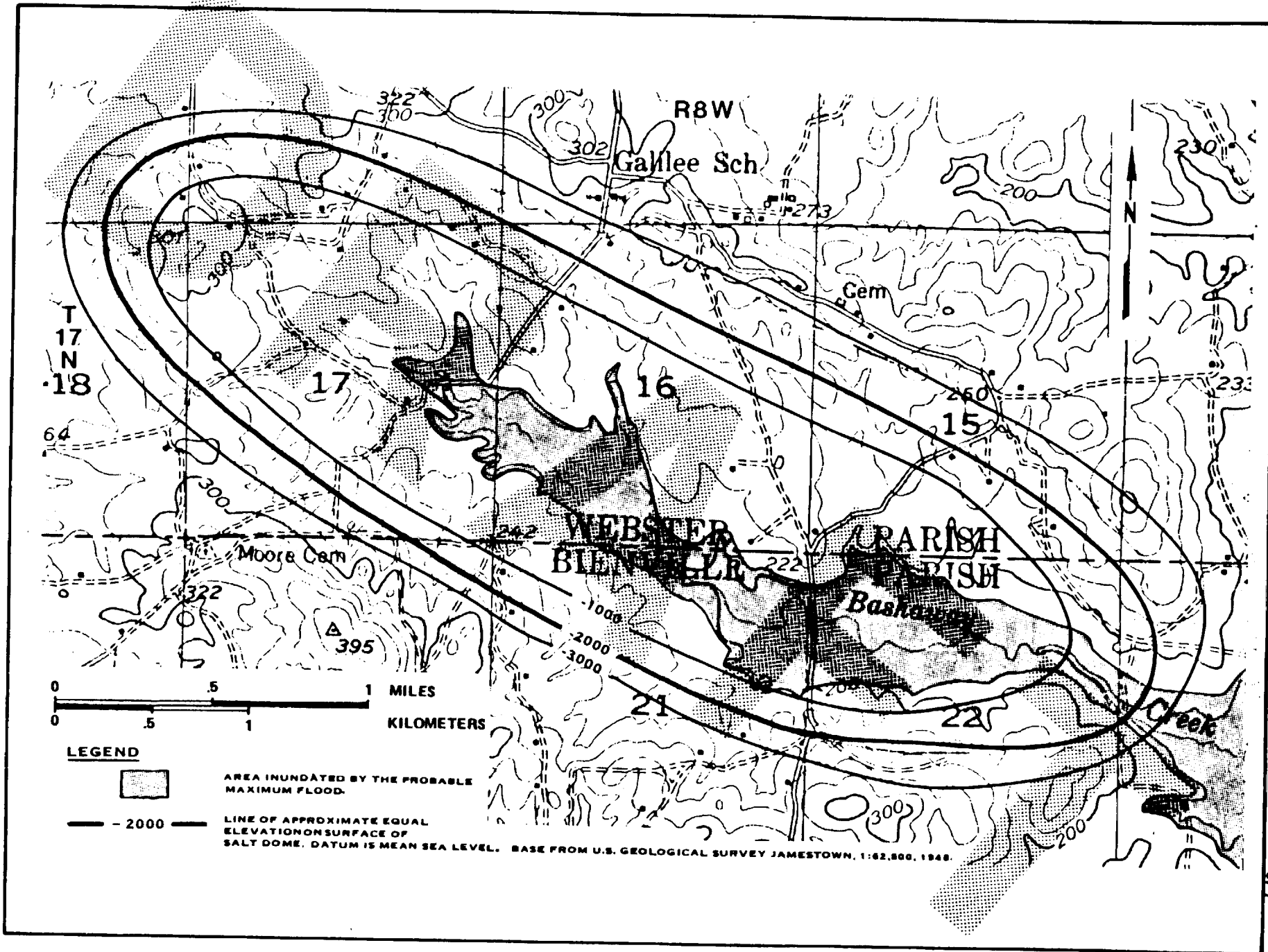


FIGURE A-8. MAP SHOWING TOPOGRAPHY AND DRAINAGE - VACHERIE DOME VICINITY

2
0
9
1
2
3
0
3
0



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FIGURE A-9. VACHERIE DOME TOPOGRAPHIC MAP SHOWING AREA OF PROBABLE MAXIMUM FLOOD

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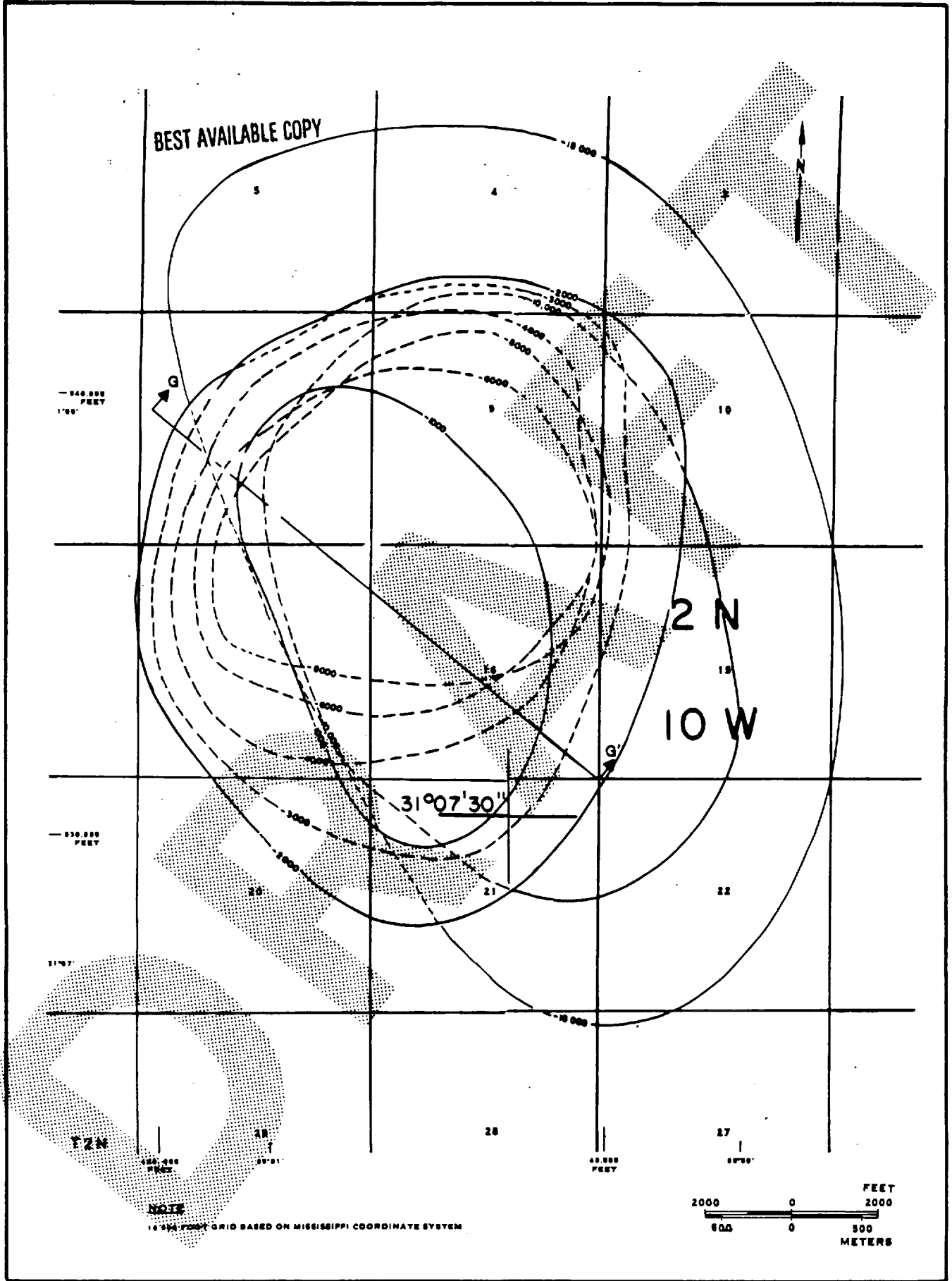
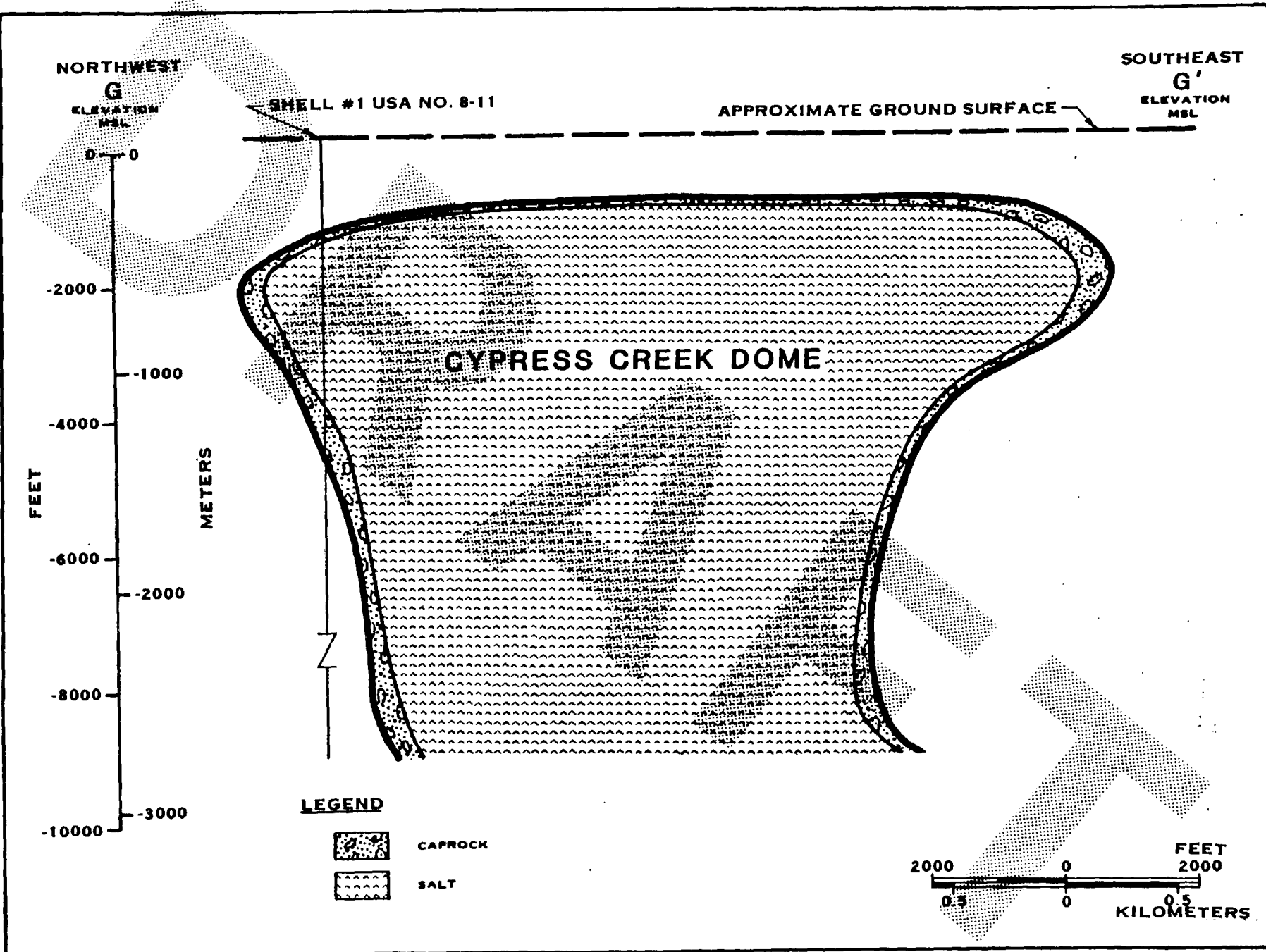


FIGURE A-10. CYPRESS CREEK DOME OUTLINE AT DEPTH AND LOCATION OF GEOLOGIC CROSS SECTION 'G'

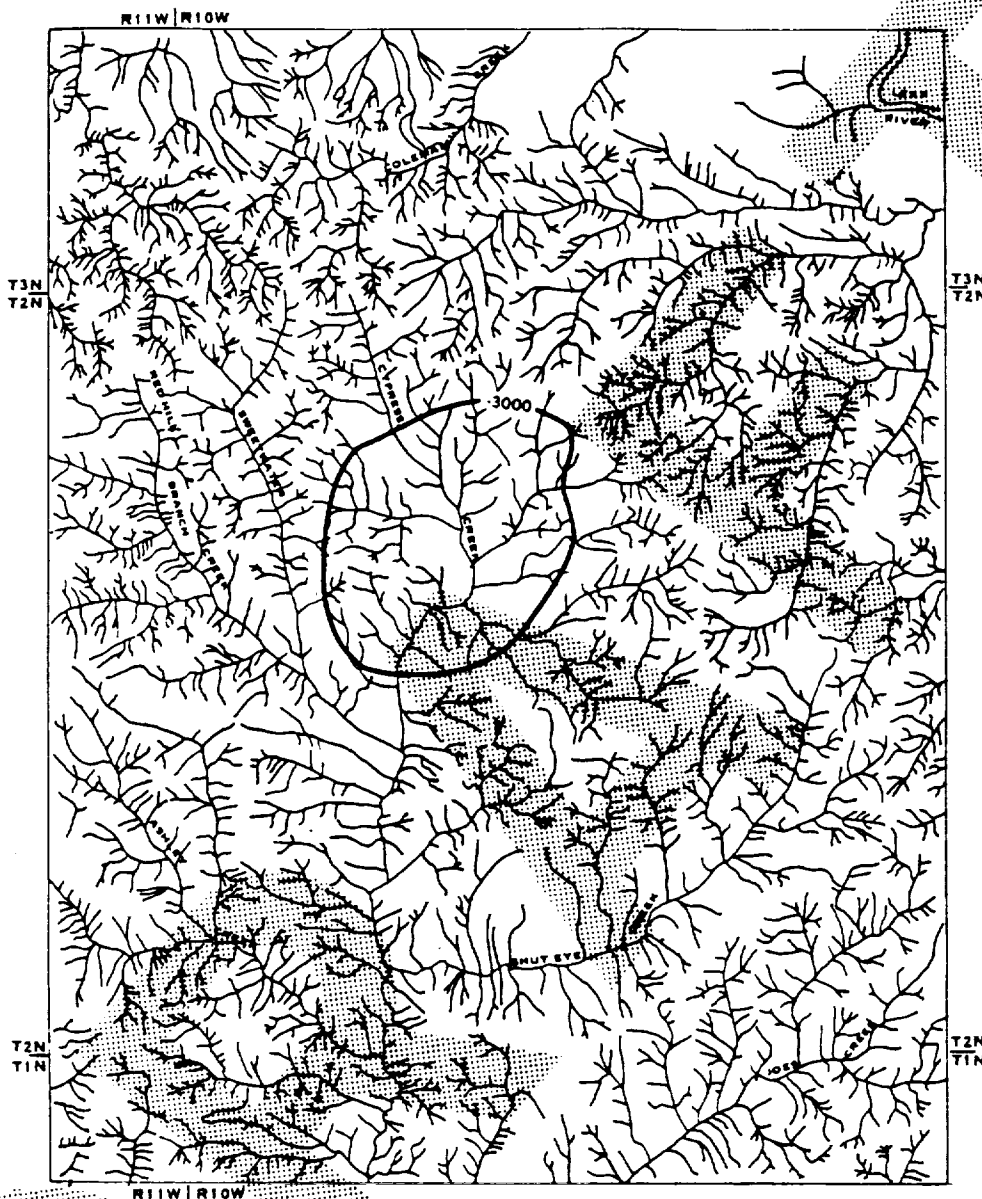
90030 0914



A-15

FIGURE A-11. CYPRESS CREEK SALT DOME GEOLOGIC SECTION G-G'

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LEGEND
 - - - - - 3000 - - - - - INTERMITTENT DASHED CONTOUR
 ELEVATION, FEET MSL

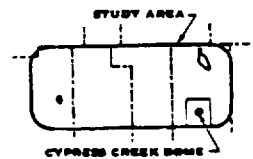


FIGURE A-12. CYPRESS CREEK DOME DRAINAGE NETWORK

9 0 0 3 0 0 9 1 6

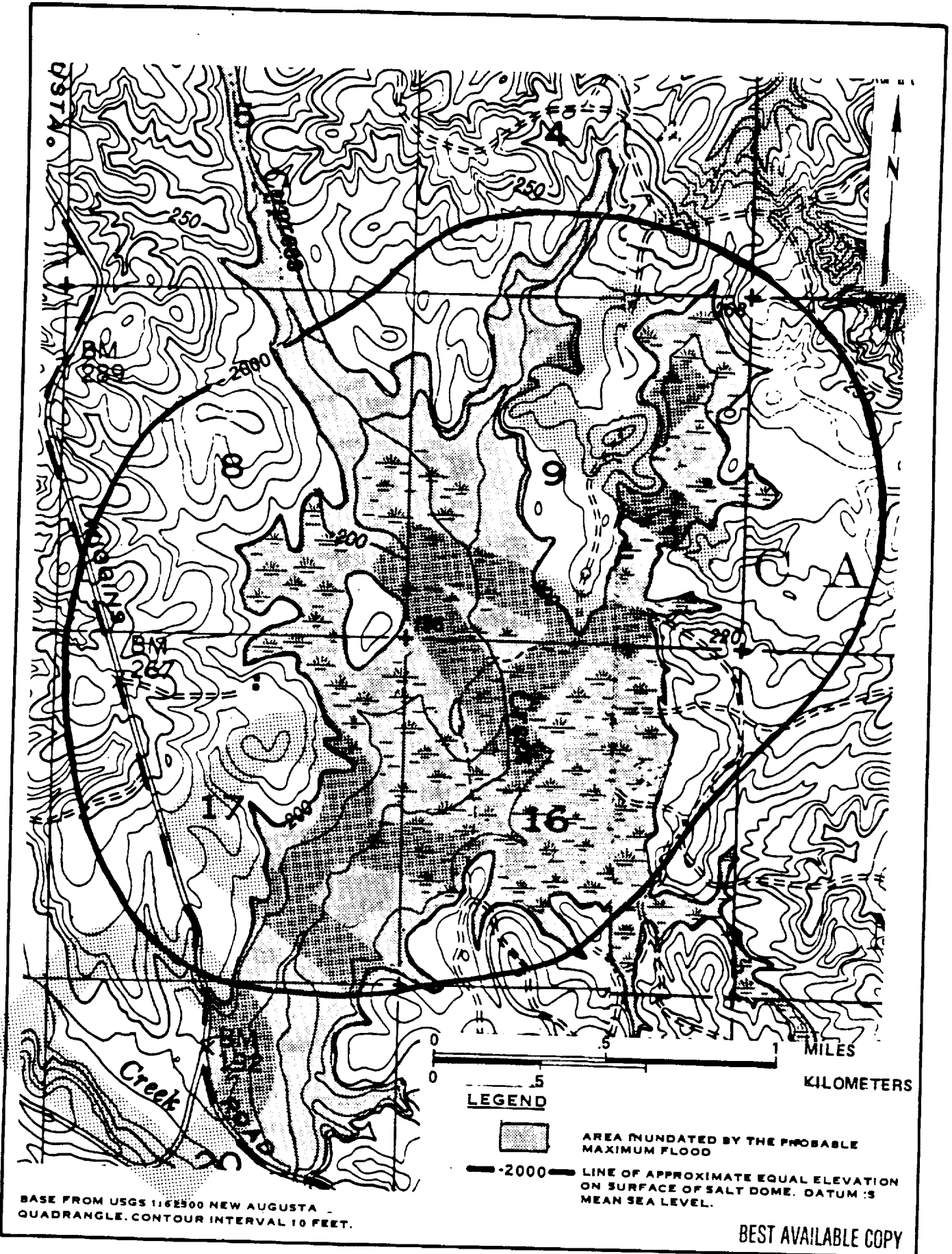


FIGURE A-13. CYPRESS CREEK DOME TOPOGRAPHIC MAP SHOWING AREA OF PROBABLE MAXIMUM FLOOD

900300917

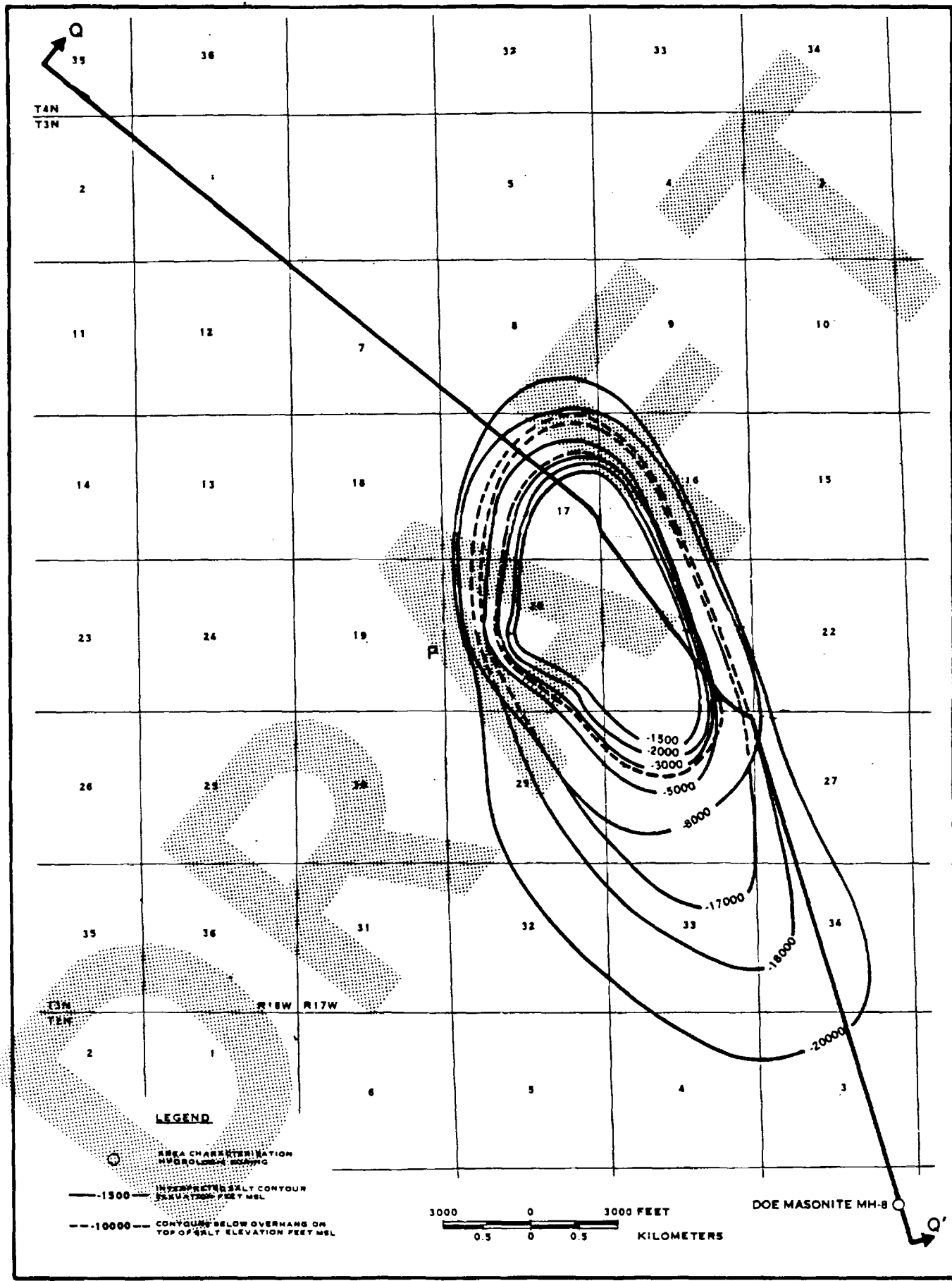


FIGURE A-14. LAMPTON DOME OUTLINE AT DEPTH AND LOCATION

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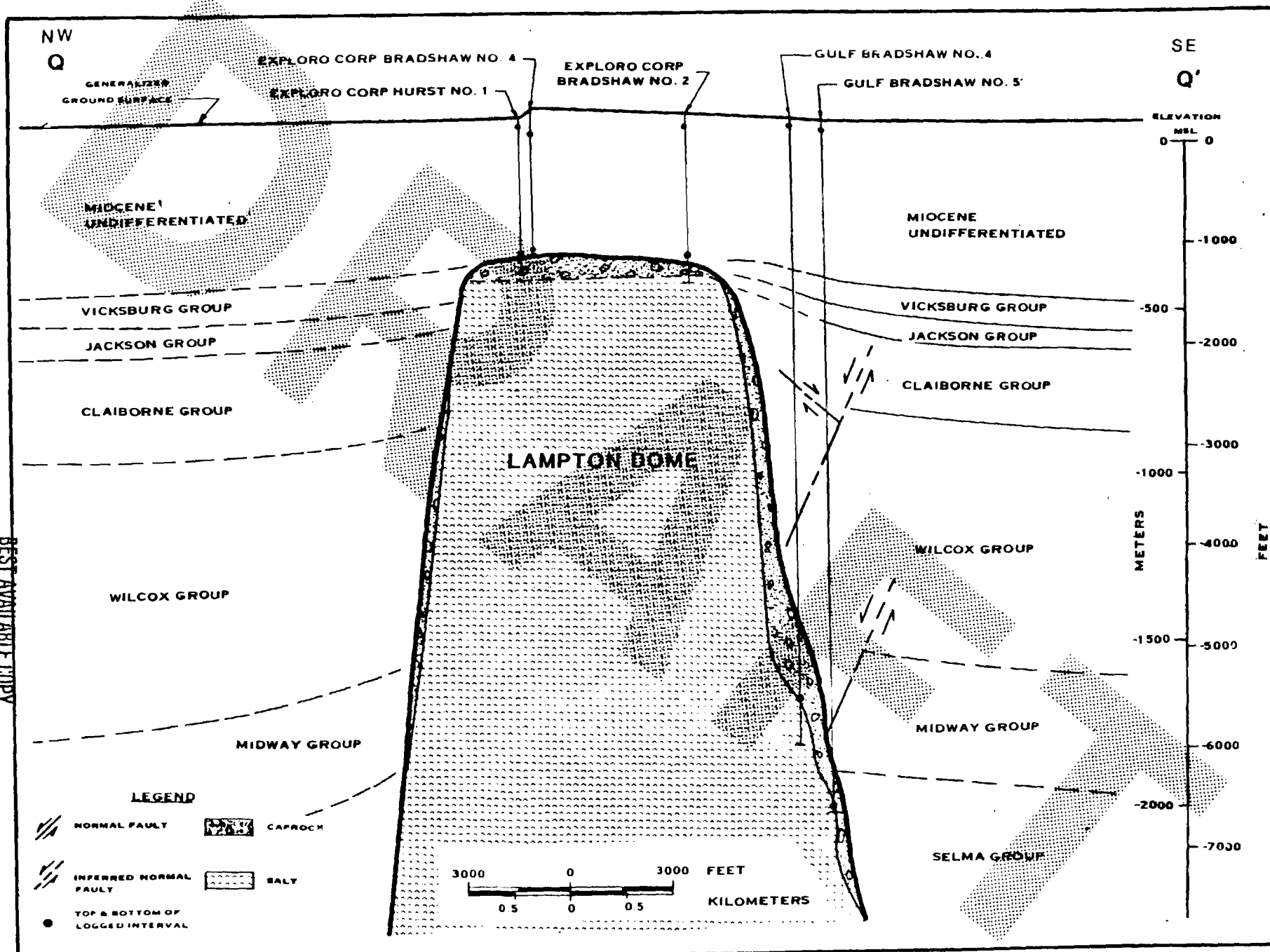
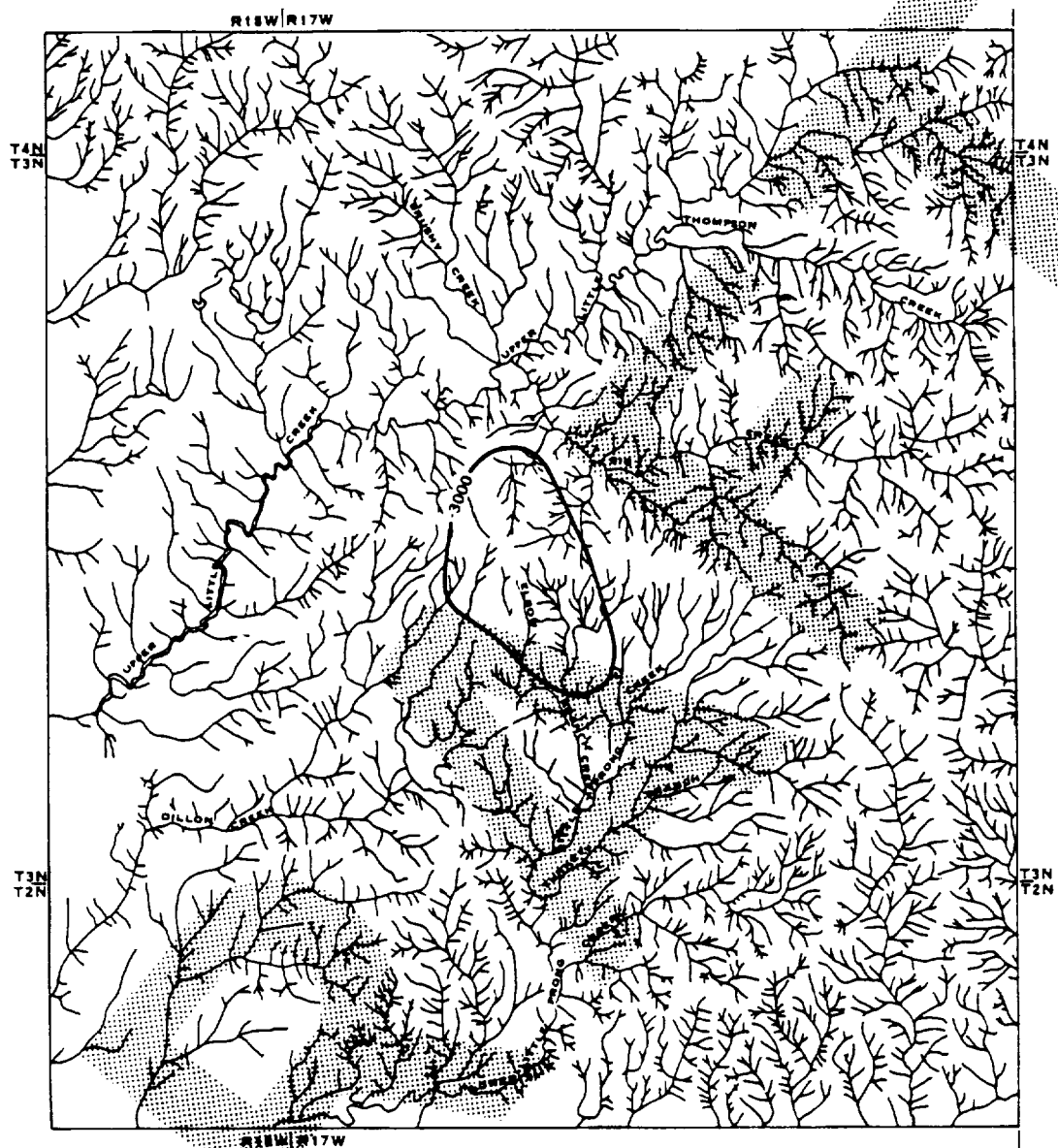


FIGURE A-15. LAMPTON DOME GEOLOGIC SECTION Q-Q'

90030 0919



LEGEND
—— 3000 —— INTERPRETED SKETCHED
ELEVATION FEET MSL

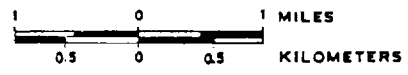
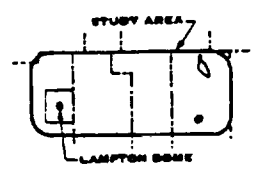


FIGURE A-16. LAMPION DOME DRAINAGE NETWORK

90030 0920

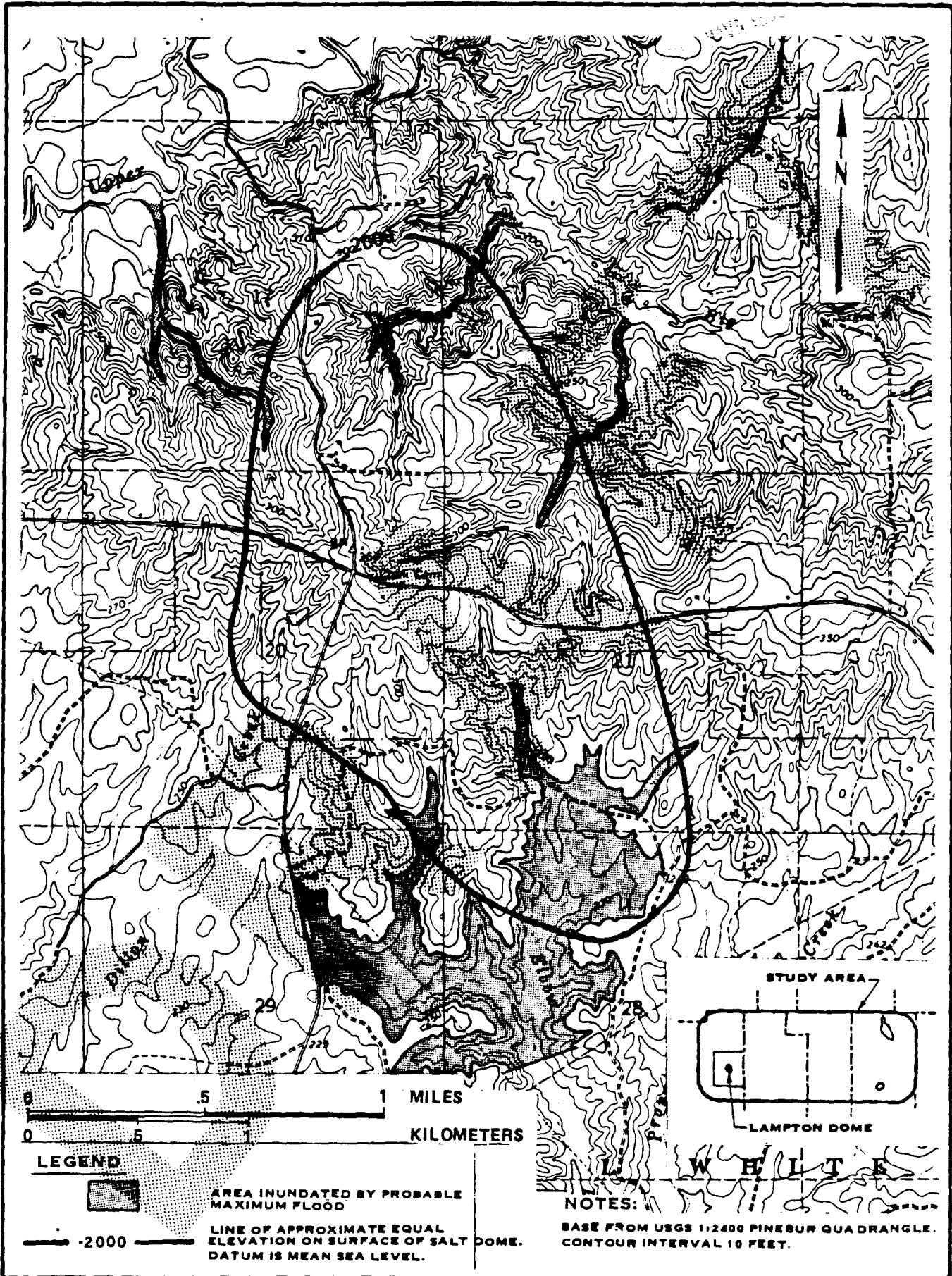


FIGURE A-17. LAMPION DOME TOPOGRAPHIC MAP SHOWING AREA OF PROBABLE MAXIMUM FLOOD

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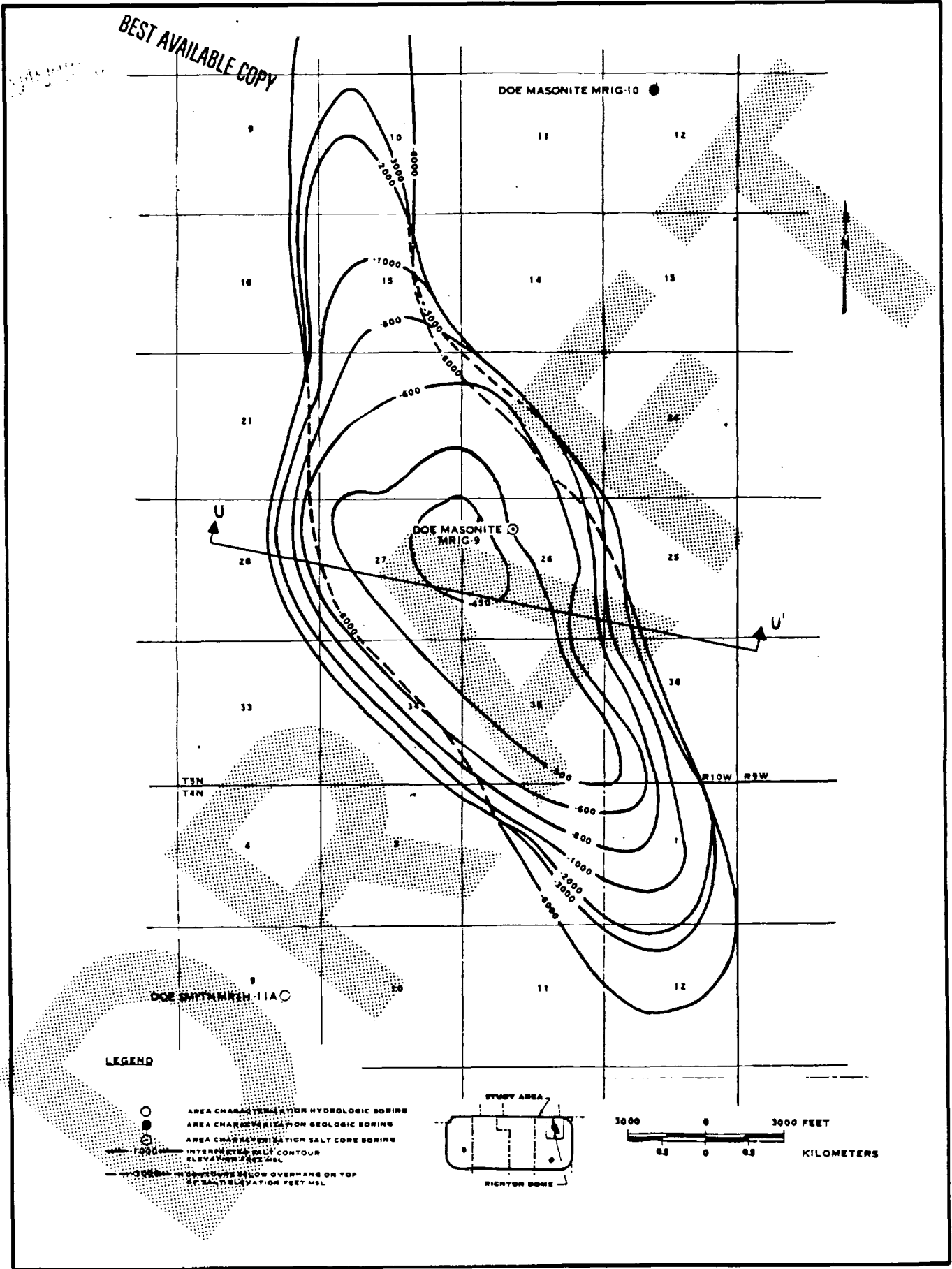
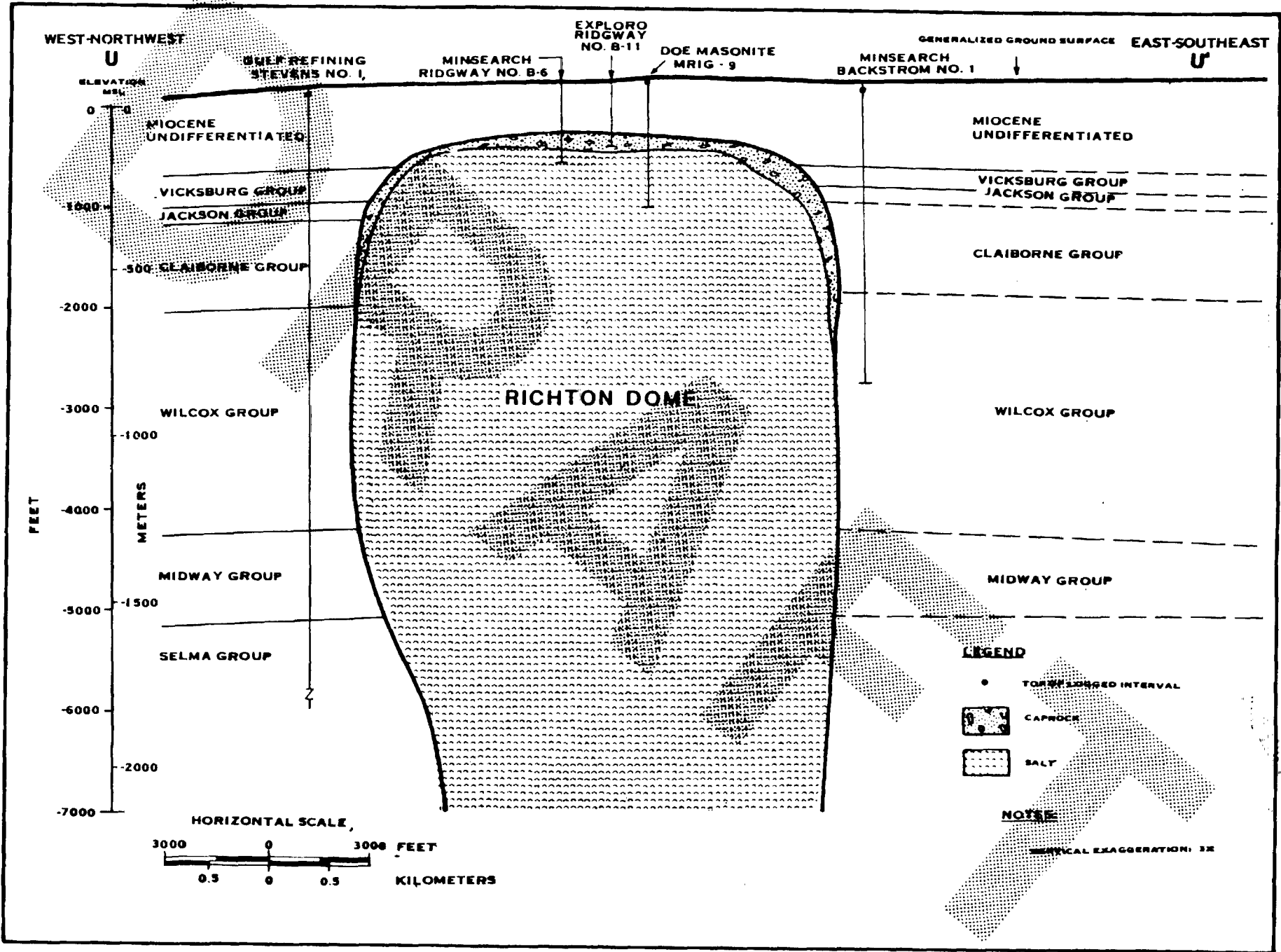


FIGURE A-18. RICHTON DOME OUTLINE AT DEPTH AND LOCATION OF GEOLOGIC CROSS SECTION U-U'

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A-23

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FIGURE A-19. RICHTON DOME GEOLOGIC SECTION U-U'

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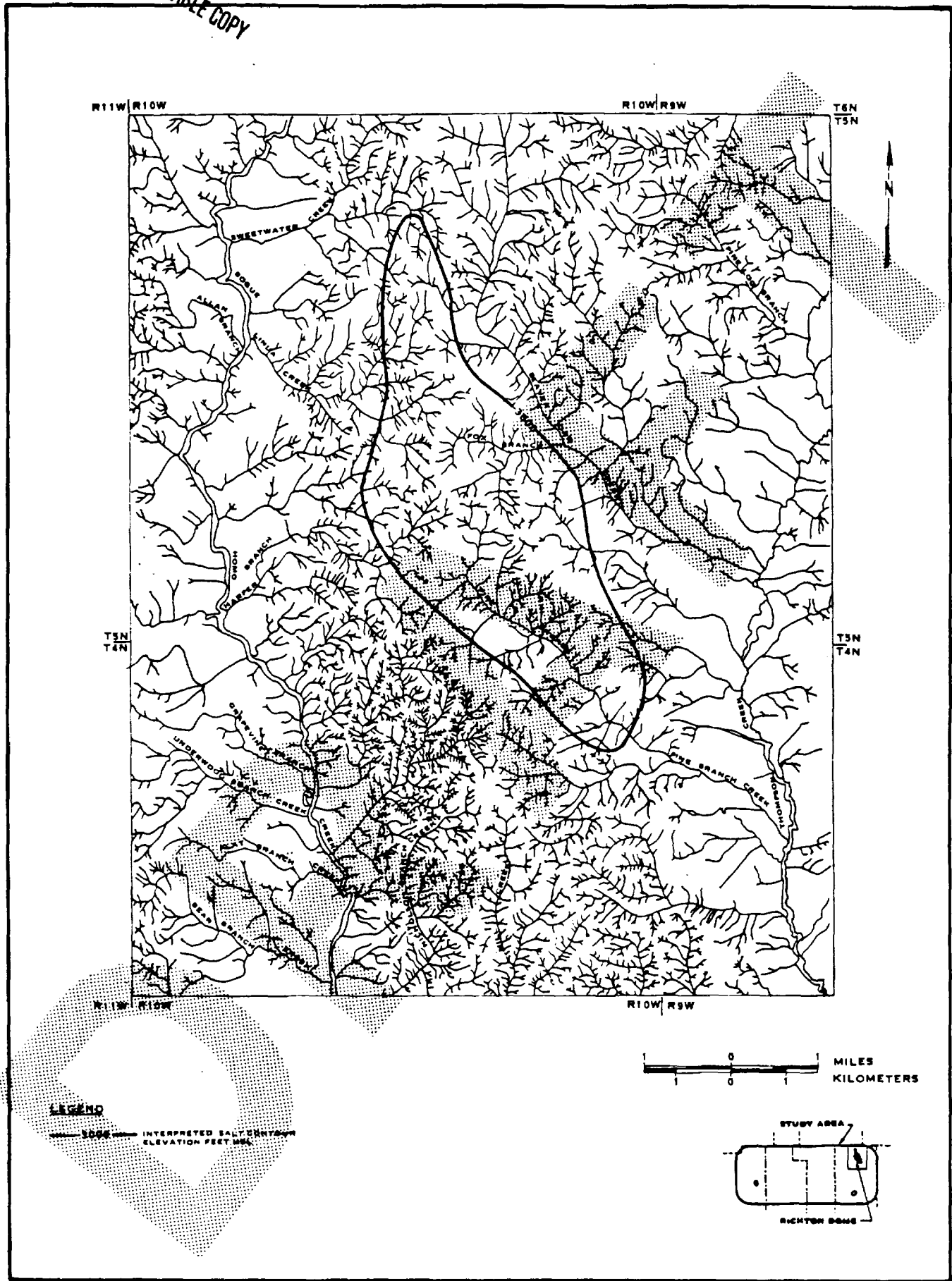


FIGURE A-20. RICHTON DOME DRAINAGE NETWORK

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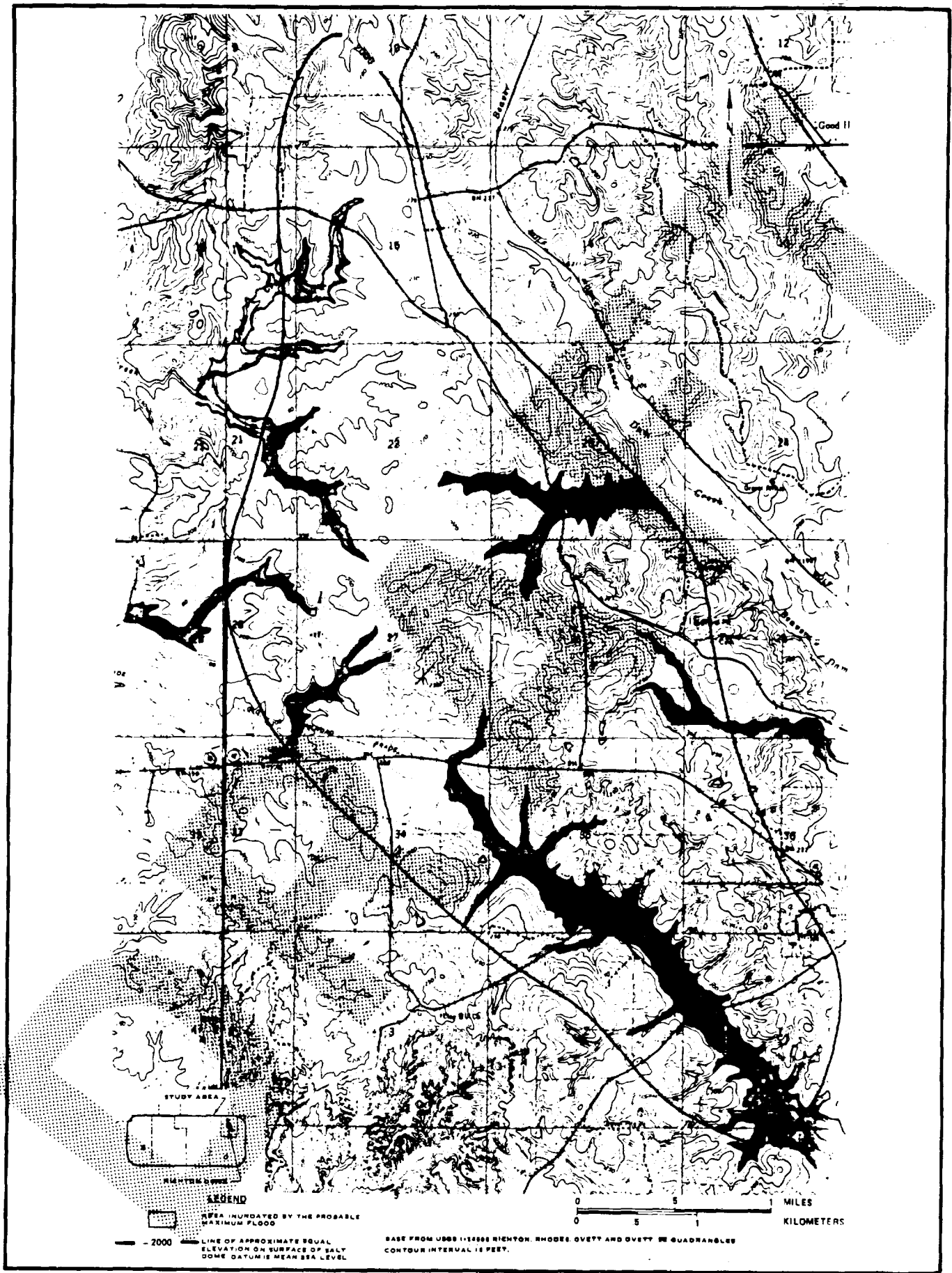


FIGURE A-21. RICHTON DOME TOPOGRAPHIC MAP SHOWING AREA OF PROBABLE MAXIMUM FLOOD

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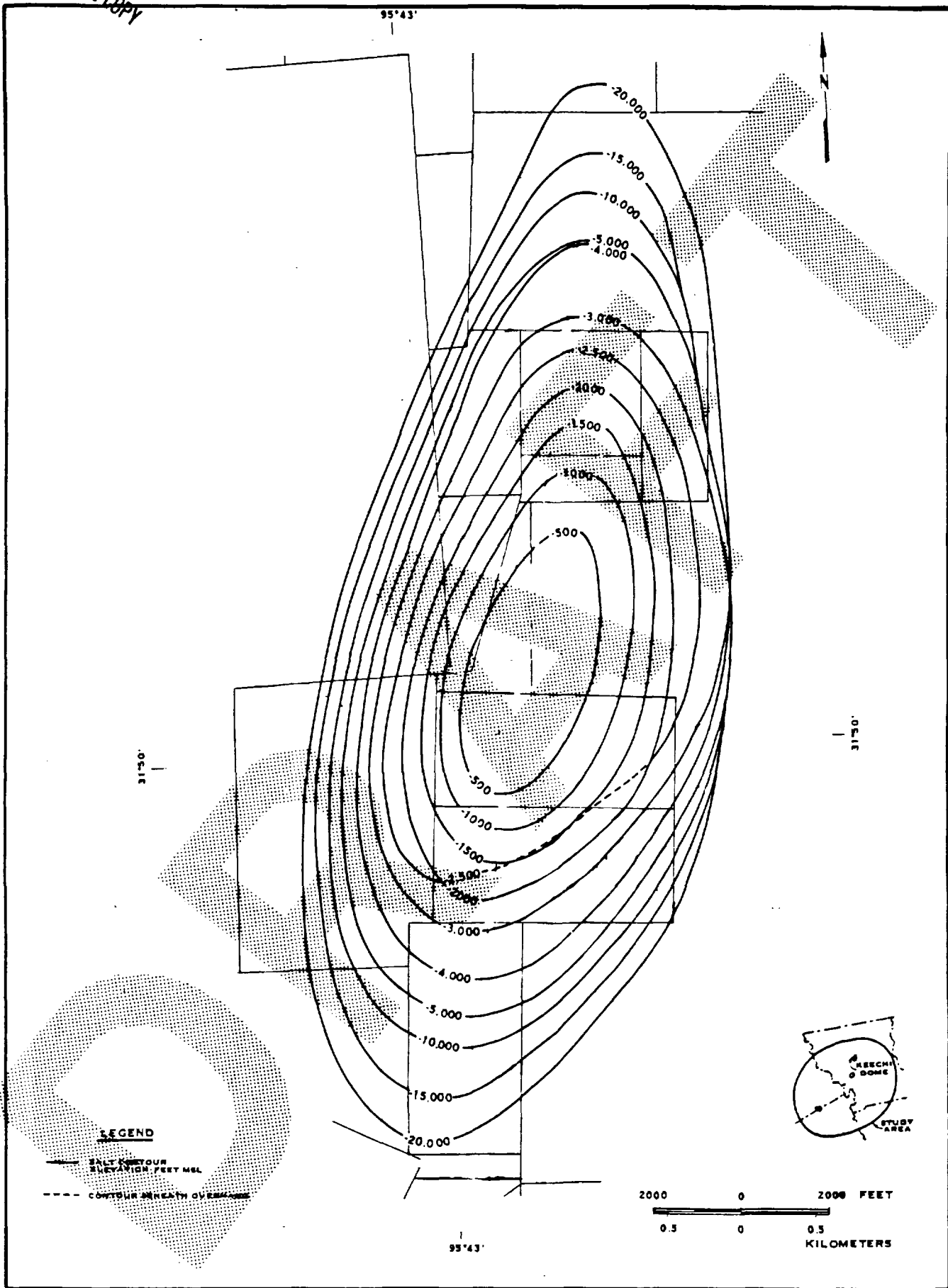
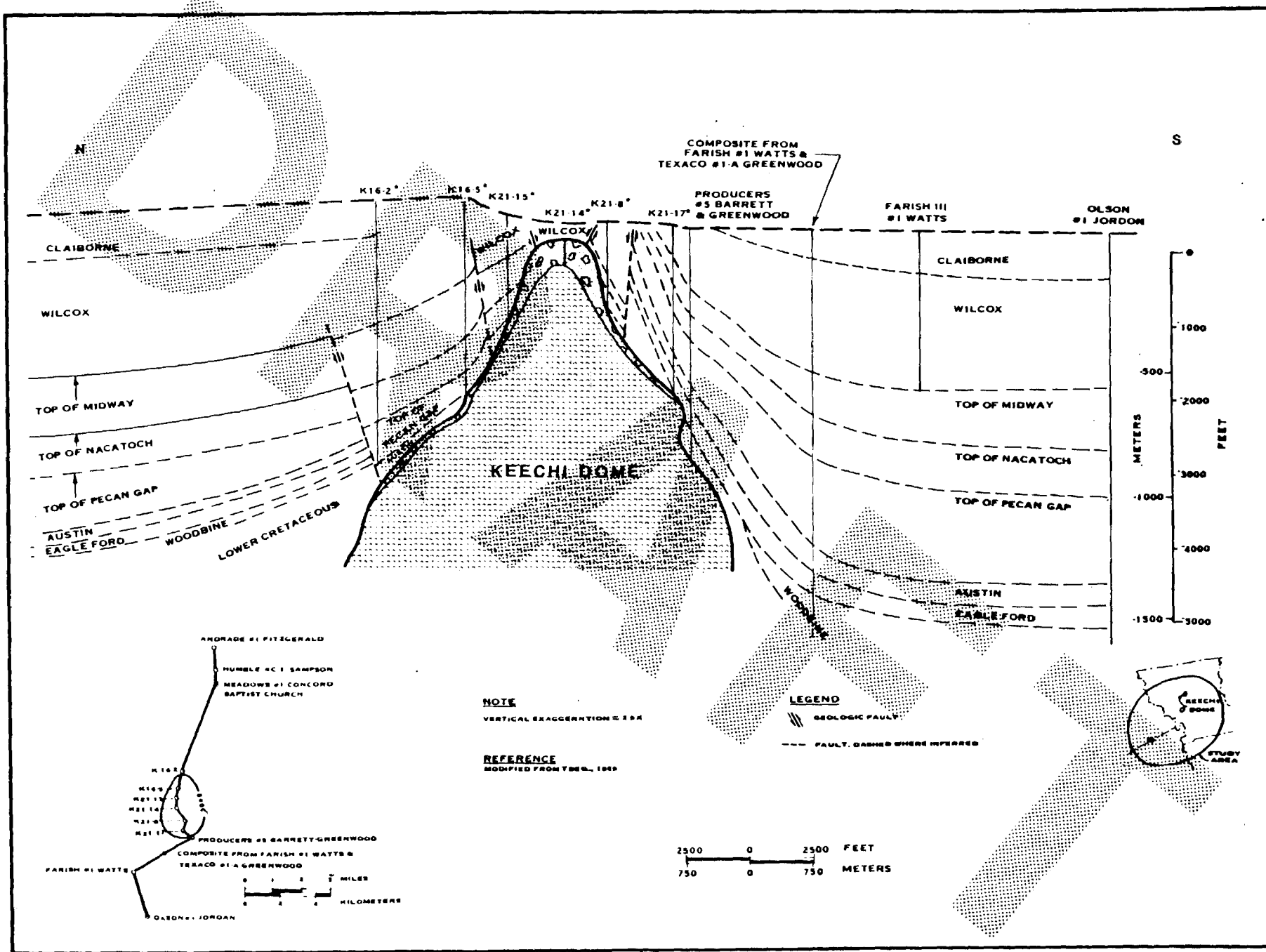


FIGURE A-22. KEECHI DOME OUTLINE AT DEPTH

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FIGURE A-23. KEECHI DOME AREA NORTH-SOUTH CROSS SECTION

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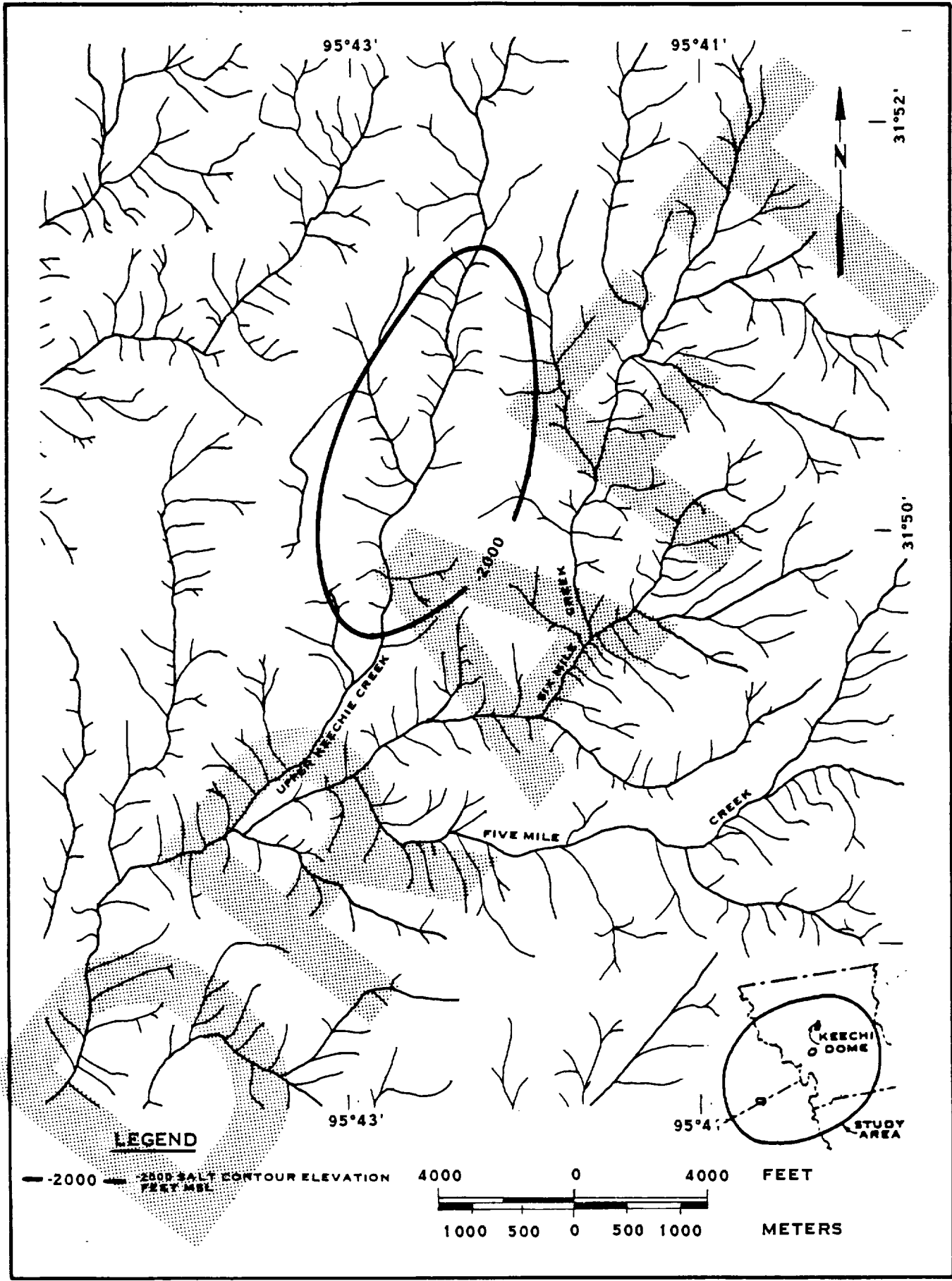


FIGURE A-24. KEECHI DOME AREA DRAINAGE NETWORK

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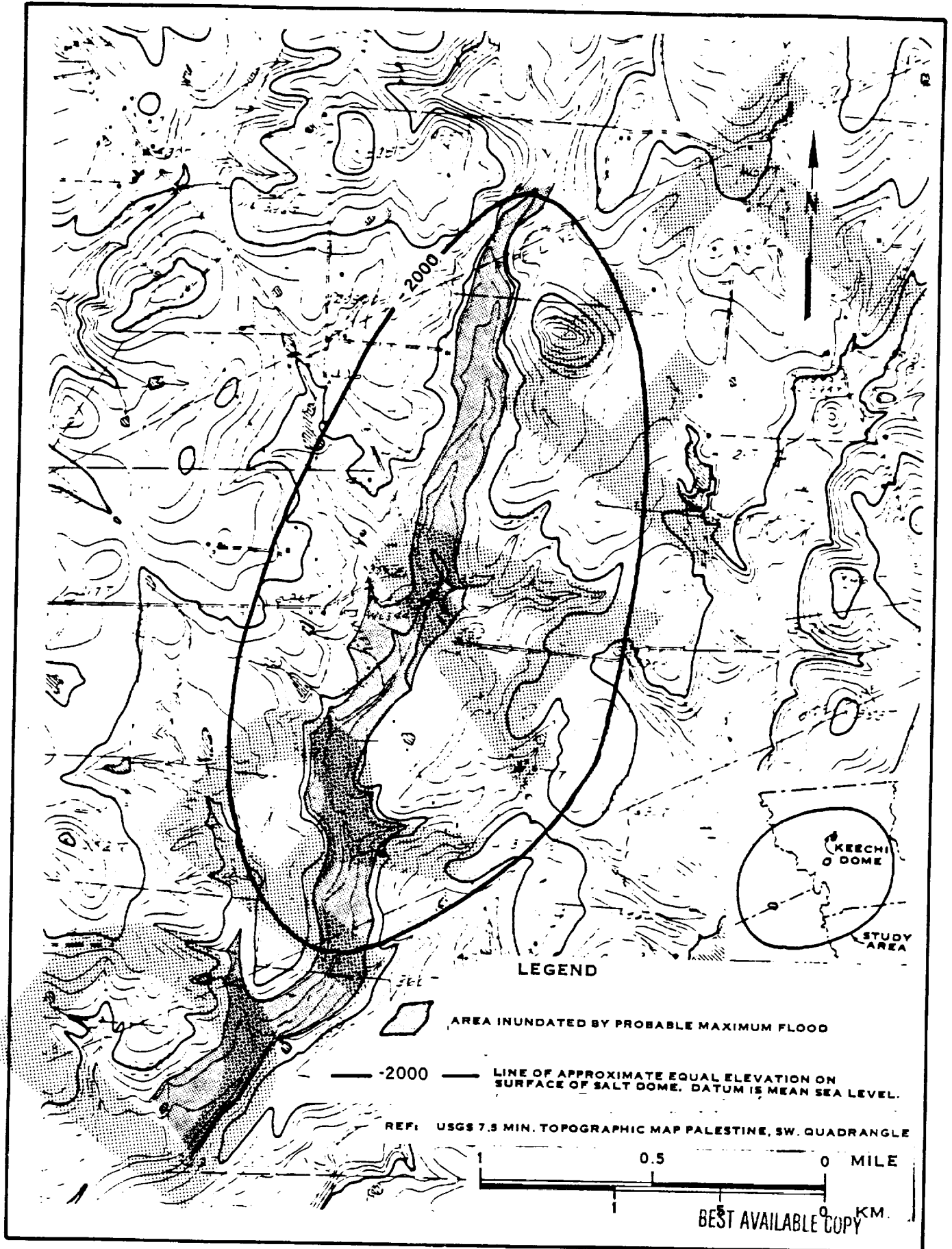
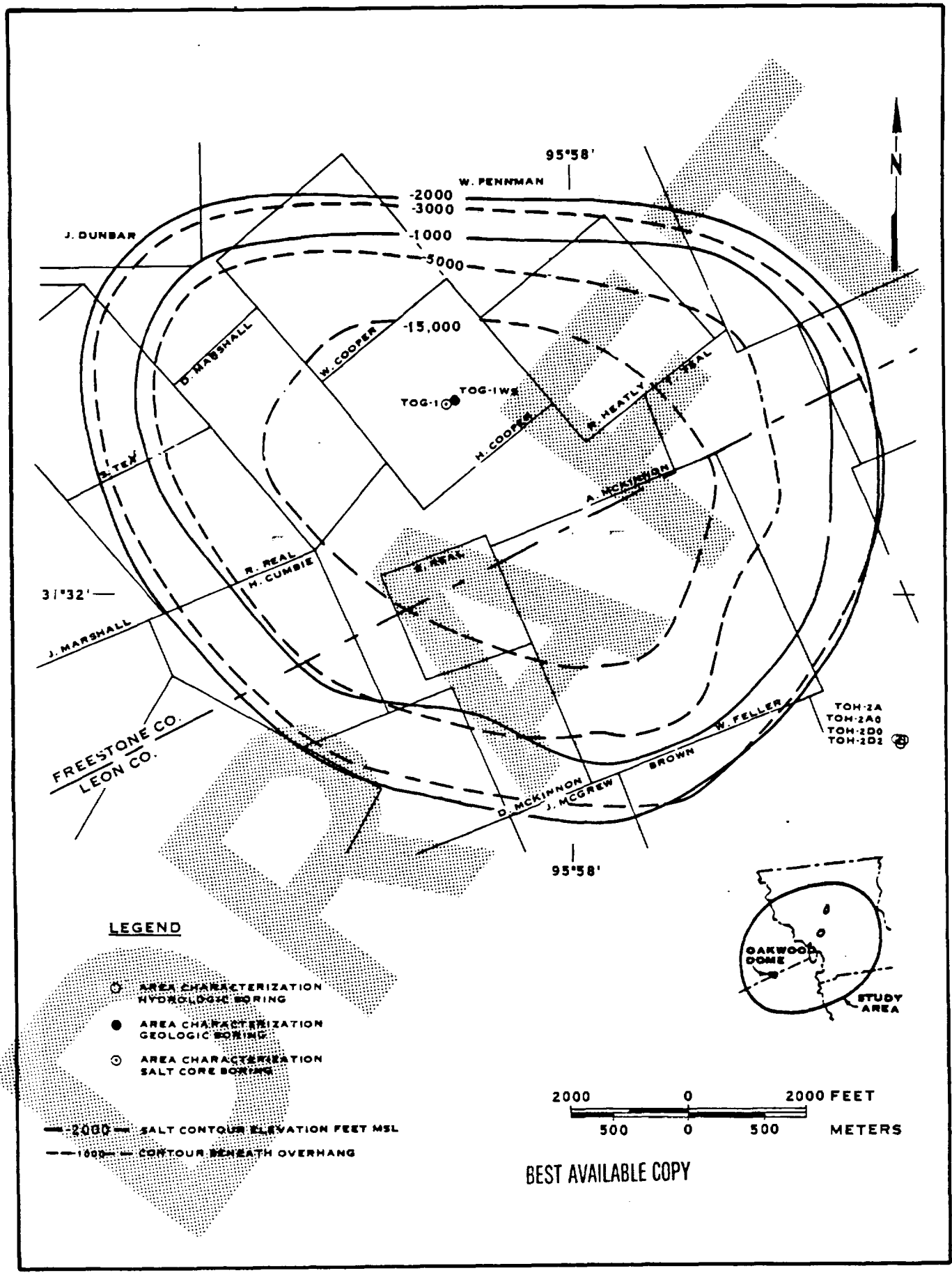


FIGURE A-25. KEECHI DOME TOPOGRAPHIC MAP SHOWING AREA OF PROBABLE MAXIMUM FLOOD

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LEGEND

- ● AREA CHARACTERIZATION HYDROLOGIC BORING
- AREA CHARACTERIZATION GEOLOGIC BORING
- ● AREA CHARACTERIZATION SALT CORE BORING

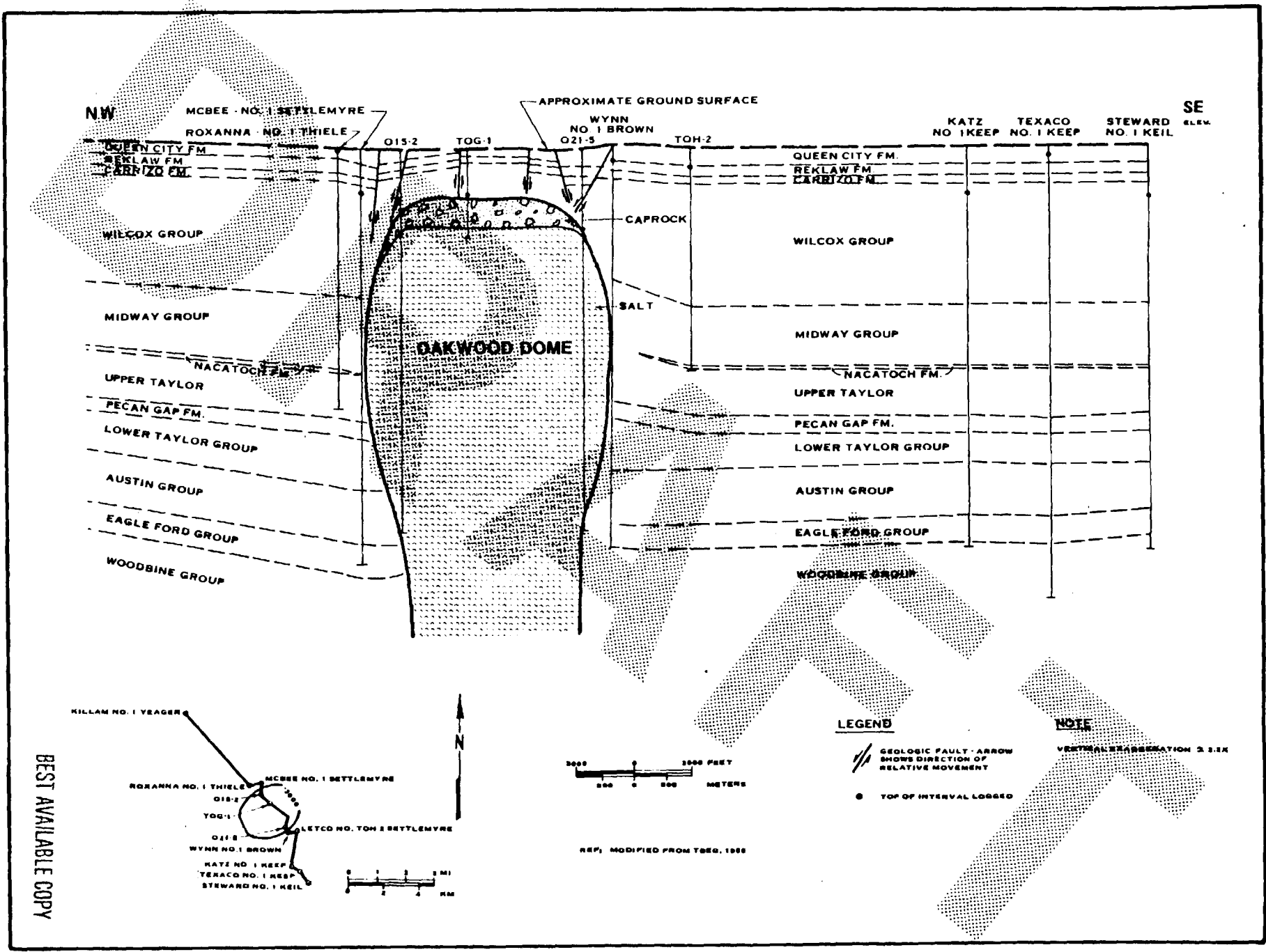
— 2000 — SALT CONTOUR ELEVATION FEET MSL
 - - - 1000 - - - CONTOUR BENEATH OVERHANG

2000 0 2000 FEET
 500 0 500 METERS

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FIGURE A-26. OAKWOOD DOME OUTLINE AT DEPTH WITH WELL LOCATIONS

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A-31

FIGURE A-27. OAKWOOD DOME NORTHWEST-SOUTHEAST CROSS SECTION

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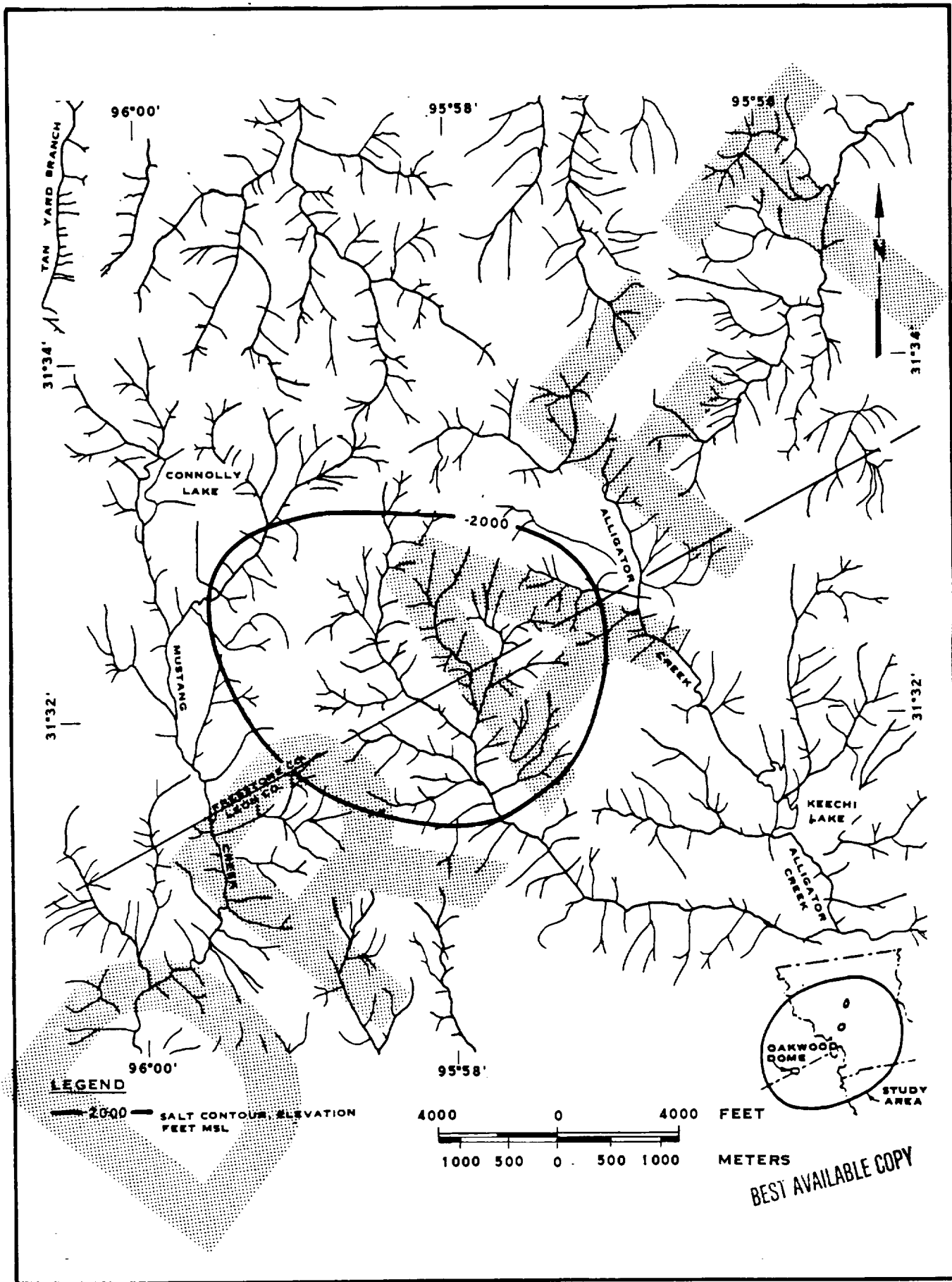


FIGURE A-28. OAKWOOD DOME AREA DRAINAGE NETWORK

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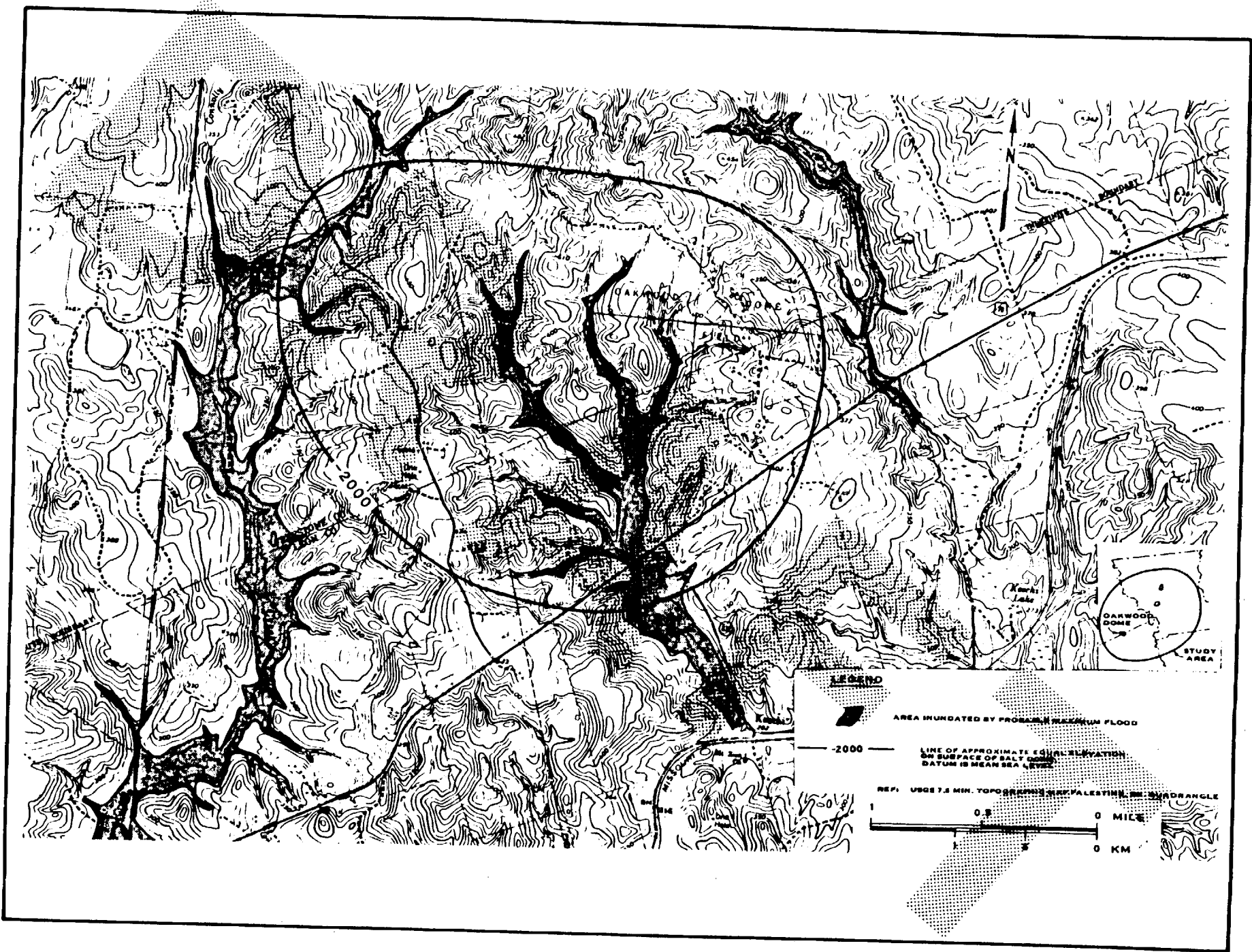


FIGURE A-29. OAKWOOD DOME TOPOGRAPHIC MAP SHOWING AREA OF PROBABLE MAXIMUM FLOOD

TABLE A-1. MODIFIED MERCALLI INTENSITY SCALE

- I. Not felt. Marginal and long-period effects of large earthquakes.
- II. Felt by persons at rest, on upper floors, or favorably placed.
- III. Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.
- IV. Hanging objects swing. Vibration like passing of heavy trucks, or sensation of a jolt like a heavy ball striking the walls. Standing motor cars rock. Windows, dishes, doors rattle. Glasses clink. Crockery clashes. In the upper range of IV, wooden walls and frames creak.
- V. Felt outdoors; direction estimated. Sleepers awakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clocks stop, start, change rate.
- VI. Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knickknacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D cracked. Small bells ring (church, school). Trees, bushes shaken (visibly, or heard to rustle).
- VII. Difficult to stand. Noticed by drivers of motor cars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roof line. Fall of plaster, loose bricks, stones, tiles, cornices (also unbraced parapets and architectural ornaments). Some cracks in masonry C. Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.
- VIII. Steering of motor cars affected. Damage to masonry C; partial collapse. Some damage to masonry B; none to masonry A. Fall of stucco and some masonry walls. Twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off. Branches from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.
- IX. General panic. Masonry D destroyed; masonry C heavily damaged, sometimes with complete collapse; masonry B seriously damaged. (General damage to foundations.) Frame structures, if not bolted, shifted off foundations. Frames cracked. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluviated areas sand and mud ejected, earthquake fountains, sand craters.

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TABLE A-1. (Continued)

- X. Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage of dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.
- XI. Rails bent greatly. Underground pipelines completely out of service.
- XII. Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into the air.

TABLE A-2. TABULATION OF SEISMIC EVENTS

SEISMO-TECTONIC REGION	HISTORIC RECORD (Years)	MODIFIED MERCALLI INTENSITY										
		IV-V	V	V-VI	VI	VI-VIII	VII	VIII	IX	X	XI	XII
Interior Salt Basins	88	1	7		1							
Gulf Coast	65	1	3	1								
Central Texas	62		4									
Ouachita	161	1	14	1	3		1					
New Madrid	168	14	56	2	27	2	6	1	2		3	
Wachita-Arbuckle	61		12		10		1					
Central Stable Region	112	1	16		1		3					
Total Number of Events		18	112	4	42	2	11	1	2		3	

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APPENDIX B--METRIC CONVERSION CHART

<u>To Convert</u>	<u>Into</u>	<u>Multiply By</u>
acres	hectares (ha)	0.4047
cubic yards	cubic meters (m ³)	0.7646
feet	meters (m)	0.3048
inches	centimeters (cm)	2.54
miles	kilometers (km)	1.61
square miles	square kilometers (km ²)	2.59

To convert Fahrenheit to Celsius (Centigrade),
subtract 32 and multiply by 5/9.

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APPENDIX C

PROPOSED NRC TECHNICAL CRITERIA*

(b) Potentially Adverse Conditions

The following paragraphs describe human activities or natural conditions which can adversely affect the stability of the repository site, increase the migration of radionuclides from the repository, or provide pathways to the accessible environment. The Department of Energy shall demonstrate whether any of the potentially adverse human activities or natural conditions are present. The Department shall document all investigations. The presence of any of the potentially adverse human activities or natural conditions will give rise to a presumption that the geologic repository will not meet the performance objectives. The conditions and activities in this section apply unless otherwise stated, to the volume of rock determined by the Department in 60.122 (a) (8).**

(VII-2)* (1) Potentially Adverse Human Activities.**

- (i) There is or has been conventional or in situ subsurface mining for resources.
- (VII-2) (ii) Except holes drilled for investigations of the geologic repository, there is or has been drilling for whatever purpose to depths below the lower limit of the accessible environment.
- (VII-1) (iii) There are resources which are economically exploitable using existing technology under present market conditions.
- (VII-1) (iv) Based on a resource assessment there are resources that have either higher gross or net value than the average for other areas of similar size in the region in which the geologic repository is located.
- (IV-1) (v) There is reasonable potential that failure of human-made impoundments could cause flooding of the geologic repository operations area prior to decommissioning.

*NRC will provide the policies, criteria, and regulations to be addressed in characterizing, licensing, and operating a repository. This table lists NRC's proposed criteria. Until final repository criteria are issued by the NRC, DOE is following the criteria in Table 2-1.

**Paragraph 60.122 (a) (8) indicates that the Department should perform a resource assessment for the region within 100 km of the site.

***Refers to Table 2-1.

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APPENDIX C
(Continued)

- (VI-1) (vi) There is reasonable potential based on existing geologic and hydrologic conditions and methods of construction for construction of large-scale impoundments which may affect the regional ground-water flow system.
- (N/C)**** (vii) There is indication that present or reasonably anticipatable human activities can significantly affect the hydrogeologic framework. Human activities include ground-water withdrawals, extensive irrigation, subsurface injection of fluids, underground pumped storage facilities or underground military activities.
- (II-3) (2) Potentially Adverse Natural Conditions--Geologic and Tectonic.
- (II-3) (i) There is evidence of extreme bedrock incision since the start of the Quaternary period.
- (II-3) (ii) There is evidence of dissolution, such as karst features, breccia pipes, or insoluble residues.
- (II-4) (iii) There is evidence of processes in the candidate area which could result in structural deformation in the volume of rock such as uplift, diapirism, subsidence, folding, faulting, or fracture zones.
- (II-2) (iv) The geologic repository operations area lies within the near field of a fault that has been active since the start of the Quaternary period.
- (II-1) (v) There is an area characterized by higher seismicity than that of the surrounding region or there is an area in which there are indications, based on correlations of earthquakes with tectonic processes and features, that seismicity may increase in the future.
- (II-3) (vi) There is evidence of intrusive igneous activity since the start of the Quaternary period.
- (N/C) (vii) There is a high and anomalous geothermal gradient relative to the regional geothermal gradient.
- (3) Potentially Adverse Natural Conditions--Hydrologic.
- (III-1) (i) There is potential for significant changes in hydrologic conditions including hydraulic gradient, average pore

****No criterion.

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APPENDIX C
(Continued)

velocity, storativity, permeability, natural recharge, piezometric level, and discharge points. Evaluation techniques include paleohydrologic analysis.

- (III-1) (ii) The geologic repository operations area is located where there would be long-term and short-term adverse impacts associated with the occupancy and modification of flood-plains. (Executive Order 11988).
- (II-2) (iv) There is a fault or fracture zone, irrespective of age of last movement which has a horizontal length of more than a few hundreds of meters.

(4) Potentially Adverse Natural Conditions--Geochemical.

The rock units between the repository and the accessible environment exhibit low retardation for most of the radionuclides contained in the radioactive waste.

A presumption that the geologic repository will not meet the performance objective can be rebutted upon showing that the presence of the potentially adverse condition does not adversely affect the performance of the geologic repository. In order to make this showing, the Department shall first demonstrate that:

- (N/C) (1) The potentially adverse human activity or natural condition has been adequately characterized, including the extent to which the particular feature may be present and still be undetected taking into account the degree of resolution achieved by the investigations;
- (N/C) (2) The effect of the potentially adverse human activity or natural condition on the geologic framework, ground-water flow, ground-water chemistry and geomechanical integrity has been adequately evaluated using conservative analyses and assumptions, and the evaluation used is sensitive to the adverse human activity or natural condition;
- (N/C) (3) The effect of the potentially adverse human activity or natural condition is compensated by the presence of favorable characteristics in Paragraph 60.122(c) of this Section; and
- (N/C) (4) The potentially adverse human activity or natural condition can be remedied during construction, operation, or decommissioning of the repository.

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APPENDIX C
(Continued)

(c) Favorable Characteristics.

Each of the following characteristics represent conditions which enhance the ability of the geologic repository to meet the performance objectives. Candidate areas and sites which exhibit as many favorable characteristics as practicable are preferred. The Department shall demonstrate the degree to which each favorable characteristic is present. The Department shall fully document all investigations. They shall perform evaluations to demonstrate to what extent the favorable characteristic contributes to assuring the stability of the site and/or the isolation of the waste by restricting the access of ground water to the waste, the rate of dissolution of the waste, or the migration of radionuclides from the geologic repository. The department shall use conservative analyses to demonstrate the significance of the favorable characteristics. The Department shall include evaluation of the degree to which the favorable characteristic has been adequately characterized, given the degree of resolution achieved by the investigations. The specific favorable characteristics are the following:

- 9 0 3 9
0 9 3 9
9 0 0 3 0
- (IV-1) (1) The Department shall select the site so that to the extent practicable the candidate area--
 - (II-5) (i) Exhibits demonstrable surface and subsurface geologic, geochemical, tectonic, and hydrologic stability since the beginning of the Quaternary Period; and
 - (ii) Contains a host rock and surrounding confining units that provide:
 - (III-1) (a) Long ground-water residence times and long flow paths between the repository and the accessible environment;
 - (III-1) (b) Inactive ground-water circulation within the host rock and surrounding confining units, and little hydraulic communication with adjacent hydrogeologic units due to ground-water characteristics such as low intrinsic permeability and low fracture permeability of the rock mass; and
 - (III-1) (c) Geochemical properties, such as reducing conditions which result in low solubility of radionuclides, and near-normal pH, or a lack of complexing agents.
 - (2) The Department shall select the site so that to the extent practicable the volume of rock--

APPENDIX C
(Continued)

-
- (i) Possesses the favorable characteristics described above;
- (III-2) (ii) Possesses a geologic framework that permits effective sealing of shafts, drifts, and boreholes, and that permits excavation of a stable subsurface opening, and the emplacement of waste at a minimum depth of 300 meters from the ground surface;
- (iii) Possesses ground-water flow characteristics that--
- (N/C) (a) Result in a host rock with very low water content;
- (N/C) (b) Prevent ground-water intrusion or circulation of ground water in the host rock;
- (N/C) (c) Prevent significant upward groundwater flow between hydrogeologic units or along shafts, drifts, and boreholes;
- (III-1) (d) Result in low hydraulic gradients in the host rock and surrounding confining units;
- (III-1) (e) Result in horizontal or downward hydraulic gradients in the host rock and surrounding confining units; and
- (III-1) (f) Result in ground-water residence times under ambient conditions, between the repository and the accessible environment that exceed 1,000 years.
- (V-2) (iv) Possesses geomechanical properties that provide stability during construction, operation, and under the influences of thermal load or other waste/rock/water interactions;
- (IX-3) (vi) Possesses a combination of meteorological characteristics (especially prevailing wind flow direction) and population distribution such as to assure that a radiological exposure of the population, which is within the limits of Part 20 of this chapter and
- (II-General) (vii) Is an area where climatic change is not expected to have an adverse impact on the geologic, tectonic, or hydrologic characteristics.
-

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APPENDIX D

GLOSSARY

Alluvium--Materials deposited by a stream or other running water.

ALO--DOE Albuquerque Operations Office

Alternative Design Concept--Any disposal concept other than geologic disposal in a mined repository.

Anhydrite--Mineral of composition CaSO_4 ; loosely applied to a bedded rock (or caprock) composed of that mineral. Commonly found in association with gypsum and rock salt.

Aquifer--A layer of permeable rock through which water flows.

Area--A geographical unit of approximately 1000 square miles (or about 2600 square kilometers). An area is part of a region. There are one or more locations within an area.

Backfilling--Placement of originally removed or new materials into evacuated areas of a mine, including holes drilled for waste canisters, drifts, accessways, and shafts.

Background Radiation--Radiation occurring naturally in the environment, including cosmic rays, the naturally radioactive elements of the earth, and radiation from the human body itself.

Banking--Identifying candidate repository lands and reserving them from any use which would compromise their qualifications as candidate sites.

Barrier--Any medium or mechanism that separates radioactive material from adjacent material, such as: a container, waste form, overpack, backfill material, or a geologic medium.

Basalt--A fine-grained, dark-colored, extrusive igneous rock, rich in iron magnesium minerals in a fine-grained groundmass.

Basin--1. (Topographic): the area drained by a stream or lake, bordered by a drainage divide. 2. (Sedimentary): a large, downwarped area which, over a long period of geologic time receives an accumulation of sediments.

Bedded--Arranged in layers.

Bedrock--Rock that is an integral part of the earth's crust (as opposed to a boulder, for example).

Biosphere--(1) Zone at and adjacent to the earth's surface where all life exists. (2) All living organisms of the earth.

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Borehole--A hole drilled into the earth, often to a great depth, as a prospective oil well or for exploratory purposes. A borehole is generally of small diameter, such that workers cannot work inside it, and is drilled mostly vertically, or possibly on a slant or horizontally. A borehole could be near the surface, or could penetrate into the repository formation or through it.

Bounding Calculation--Calculation based on an envelope of parametric values to indicate the limits of results that can be obtained.

Breach--Loss of integrity of containment or isolation. In the case of a repository, a channel created for ingress and egress of ground water.

Breccia--Fragmental rock whose components are angular and, therefore, as distinguished from conglomerates, are not waterworn.

Breccia Pipe--A roughly cylindrical occurrence of breccia, usually of volcanic origin.

Brine--Water containing dissolved salts in greater concentration than ordinary seawater. In salt deposits, brine may be present as fluid inclusions and would be in equilibrium with the surrounding crystalline salt.

Buffer Zone--A portion of the site that surrounds the repository facility and is composed of essentially undisturbed geologic and surficial environment.

Burnup--A measure of reactor fuel consumption, normally expressed as the amount of thermal energy produced per unit weight of uranium placed in the reactor.

Canister--A container for waste, spent fuel, and high-level waste. The waste will remain in this canister during and after burial in the repository. A canister affords physical containment but not radiation shielding.

Caprock--A heterogeneous, relatively impervious, rock that immediately overlies a salt dome, typically anhydrite, limestone, or gypsum, possibly all three arranged in layers.

CFR--Code of Federal Regulations

Characterization--The collecting of information necessary to evaluate suitability.

Closure--Filling an underground excavation through deformation, subsidence, or backfilling.

Cold--With reference to radioactive waste, no radioactive nuclides are present.

Conservative--Providing large margins of safety against undesirable outcomes without overestimating adverse consequences and underestimating mitigating factors.

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Containment--Confining radioactive wastes within prescribed boundaries.

Cretaceous--The last period in the Mesozoic Era, extending from 135 to 65 million years ago.

Criterion--A standard, rule, or test by which a decision or judgment may be based.

Decay (Radioactive)-- The spontaneous transmutation of a radionuclide into another nuclide by the emission of a charged particle or electromagnetic radiation.

Decommissioning--Activities associated with removing a repository from service, i.e., backfilling, shaft sealing, and the end of surface-facility use (including demolition, dismantling, etc.).

Decrepitation--The process of cracking or spalling, possibly due to thermal stress.

Dehydrate--To remove bound water or oxygen and hydrogen in the proportion in which they form water.

Denudation--The process of wearing away or removing overlying matter from underlying rocks.

Diagenesis--Process involving physical and chemical changes in sediment after deposition that converts it to consolidated rock.

Diapir--A piercement through geological strata in which a mobile core, such as rock salt, has injected into the more brittle overlying rock, generally forming geological folds or anticlines.

Dissolution--Dissolving of minerals such as salt by fluids, typically water.

DOE--U.S. Department of Energy

Domed--Pertaining to salt domes.

Drift--A horizontal or nearly horizontal mined passageway.

Earth Sciences--In the context of NWS, earth sciences refers to the geological, geophysicals, geohydrological, and geochemical processes about which fundamental understanding is considered important to the establishment of a mined geological repository.

Ecosystem--The complex of a biological community and its environment functioning as a unit.

Embayment--An indentation in a shoreline forming an open bay.

Emplacement--Placing the waste in its location for storage or disposal.

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EPA--Environmental Protection Agency

Erosion--The general natural process which materials at the surface of the Earth are loosened, worn down, and transported from their original locations.

Exclusion Area--Area surrounding repository site over which DOE has authority to determine all activities.

Factor--A characteristic that is evaluated to determine whether a criterion is fulfilled.

Fault--A fracture or fracture zone along which there has been displacement of the sides relative to each other parallel to the fracture. Such a break in the continuity of a rock formation is accompanied by vertical or lateral displacement on one side or the other. What were once continuous rock strata or veins are separated or displaced vertically and/or horizontally during faulting.

Flood Basin--Flat areas between the sloping low plains on one side and the river lands on the other side, occupied by heavy soils and commonly having either no vegetation or a strictly swampy vegetation.

Folding--Bending or undulating in layers of rocks, usually caused by compression.

Fractures--This general term includes any break in a rock caused by mechanical failure resulting from stress, whether or not it causes displacement. Fractures may include joints, cracks, and faults.

Fuel Cycle--All of the steps involved in supplying and using fuel materials for nuclear power reactors, including related waste management operations.

Geohydrologic--Pertaining to ground water and its movements through geologic environment.

Geologic Isolation--Placement of nuclear waste in a deep stable geologic formation.

Geomorphology-Physiography--The branch of science that deals with the form of the earth, the general configuration of its surface, and the changes that take place in the evolution of landforms.

Geophysics--The science of the earth with respect to its structure, composition, development, and dynamic processes.

Geophysical Survey--A survey which involves probing the earth from measurement recorded at the surface. Among the rock properties which are commonly measured are electrical resistivity, self-potential, gamma radiation (both natural and induced), density, acoustic velocity, and magnetic and gravimetric fields.

Geosphere--The solid portion of the earth synonymous with the lithosphere.

Gneiss--A coarse-grained rock in which bands rich in granular minerals alternate with bands in which materials predominate.

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Gradient--Slope, particularly of a stream and land surface. In mathematical terms, a change in value of one variable with respect to another variable.

Gravity Survey--The systematic measurement of the gravity field of a specified area; useful for determining the distribution of rocks in the subsurface, based on density variations.

Ground Acceleration--Vibration of the earth's crust caused by earthquakes. It has both horizontal and vertical components.

Ground Water--Subsurface water existing in the zone of saturation, a subsurface zone in which all the interstices are filled with water under pressure greater than that of the atmosphere. Even if the zone contains gas-filled interstices or interstices filled with fluids other than water, it is still considered saturated.

Gypsum--A mineral, $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$. A possible caprock material.

Half-Life--The time required for the disintegration of half the atoms of some specific radioactive element.

High-Level (Radioactive) Wastes--Nuclear wastes resulting from reprocessing of spent fuel. They are characterized by intense, penetrating radiation and by high heat generation rates. Unless in protective canisters, such as shipping casks, high-level wastes must be handled remotely.

HLW--High-level waste

Host Medium--The geologic material, such as rock salt or granite, in which the waste is emplaced.

Hydraulic Head--The force exerted by a static fluid at a given level owing to the height of fluid above that level; ground water tends to flow from areas of high head to areas of low head.

Hydrocarbon--A compound consisting predominately of two elements, carbon and hydrogen, such as petroleum.

Hydrology--The science of the occurrence, distribution, and movement of the waters of the earth.

Igneous--Refers to rocks formed by cooling and solidification of molten material from earth's crust or below.

Impoundments--Bodies of water, such as ponds, confined by a dam, dike, floodgate, or other barrier.

Inner Control Zone--Area around the repository (about 1-mile radius) which would have some restrictions on surface and subsurface use.

In Situ--In its natural position or place within the selected site.

Intrusion--(1) The process by which molten igneous material penetrates surrounding rock; (2) the entrance into an area or space by humans or their artifacts.

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Isolation--Segregating wastes from the biosphere to the extent required to meet applicable radiological performance objectives.

Jurassic--The second period in the Mesozoic Era, extending from 195 to 136 million years ago.

Karst--A type of topography that is formed over limestone, dolomite, or gypsum by dissolving or solution, and that is characterized by haystack shaped hills adjacent to closed depressions or sinkholes, caves, and underground drainage.

LETCO--Law Engineering Testing Company, Atlanta, GA.

Licensing--The process of obtaining the permits and authorizations from responsible federal, state, and local regulatory agencies required to site, construct, operate, and decommission a repository. Includes preparing required documentation, submitting it to the appropriate agencies, responding to agency requests for additional information, and testifying as necessary at public hearings. Within the licensing framework, as defined in statutory requirements, approved permits or licenses must be available prior to the commencement of the activity involved.

Lithology--The physical characteristics of rocks as determined by microscopic study.

Location--Land contained within 30 square miles (or about 78 square kilometers) surrounding a repository site.

Migration--The movement of fluids through porous and permeable rock in geologic formations.

Model--In applied mathematics, the analytical or mathematical representative or quantification of a real system and the ways that phenomena occur within that system. Individual or sub-system models can be combined to give system models. Deterministic and probabilistic models are two types of mathematical models.

MSA--Major Systems Acquisition

MSC--Material Steering Committee

MTU--Metric tons of uranium dioxide in nuclear fuel.

NEPA--National Environmental Policy Act (1969)

NRC--U.S. Nuclear Regulatory Commission

Offset--Displacement of formerly contiguous bodies due to faulting.

ONWI--Office of Nuclear Waste Isolation

Operational Period--The period during which a nuclear installation is being used for its intended purpose until it is shut down and decommissioned.

Outer Control Zone--Area around the repository (a 2- to 3-mile radius) which would have restrictions on surface and subsurface activities, including drilling or mining.

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Paleohydrologic--Pertaining to ancient ground water, that is, water that has existed within a formation since its formation.

Permeability--In hydrology, the capacity of a rock, sediment, or soil for transmitting fluids. Permeability depends on the size and the shape of the pores, the size and shape of their interconnections, and the extent of the latter. It is measured by the rate at which a fluid of standard viscosity can move a given distance through a given interval of time. The unit of permeability is the darcy.

Piezometric Level--The level to which the water from a given aquifer will rise under its full head. (See Hydraulic Head)

Plasticity--The property of a material, e.g. rock salt, that enables it to undergo permanent deformation without appreciable volume change or elastic rebound, and without rupture.

Porosity--The ratio of the total aggregate volume of voids or interstices in a rock or soil to its total volume, usually expressed as a percentage.

Porous--Containing voids, pores, interstices, or other openings which may or may not interconnect.

Quaternary--The most recent geologic period, extending from 3 million years ago to the present.

Radioactive Waste--Any material containing or contaminated with radionuclides at concentrations or activities greater than exempt quantities established by the competent authorities and for which there is no foreseen use.

Region--Several thousand square miles of land within the U.S. that may include all or parts of several states.

Remote Sensing--The acquisition of information about the earth by the use of aircraft or satellites, such as high altitude photography or side-looking radar.

Repository--A place in a geologic formation in which to store radioactive wastes so that they are contained and isolated from the biosphere.

Reprocessing--The process by which spent fuel from a reactor is separated into waste material and material to be reused as nuclear fuel.

Retardation Factor (Rd)--A component of the hydrological or geochemical regime which slows the migration or transport of a radionuclide.

Retrievability--Capability of removing waste from its place of isolation using planned engineering procedures.

Rock Mechanics--The branch of mechanics concerned with the response of rock to the force fields (thermal, mechanical, hydrological) of its physical environment.

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Salinity--A measure of the total dissolved solids in a saline water.

Salt Dome--A salt structure resulting from the upward movement of a salt mass, generally due to diapirism.

Seal--A device, mechanism, or material utilized or employed to retard the flow of liquid or gas.

Seismic--Of or related to natural or artificially generated vibratory ground motion.

Seismic Reflection Method--A seismic exploration technique which produces a graphic cross-sectional representation of the disposition of rock units in the subsurface; based on the reflection of artificially generated seismic waves by subsurface formations.

Seismic Refraction Method--A seismic exploration technique used for determining the depths to various rock formations; based on variations in the velocity at which artificially generated seismic waves travel through the subsurface.

Shaft--An excavation of small cross-sectional area, compared with its depth, made for finding or mining ore or coal; raising water, ore, rock, or coal; hoisting and lowering men and material; or ventilating underground workings. Often specifically applied to approximately vertical shafts as distinguished from an incline or inclined shaft. A shaft in a repository will be large enough to permit workers to have access and do work related to the placing of seals.

Shale--Laminated consolidated rock consisting predominantly of fine-grained clay minerals, quartz, and other mineral and rock fragments.

Short-Term--The 50-year period after closing a repository.

Site--Any potential or actual repository land nominally 10 square miles (about 26 square kilometers) including the underground repository itself and about 240 acres (about 97 hectares) of controlled surface area where radioactive wastes are handled or stored. There can be one or more sites at a location.

Sorption--A broad term referring to reactions taking place within pores or on the surfaces of a solid. Its use avoids the problem of technical distinction between absorption and adsorption reactions. ABSORPTION is generally used to refer to reactions taking place largely within the pores of solids, in which case the capacity of the solid is proportional to its volume. ADSORPTION refers to reaction taking place on solid surfaces so that the capacity of a solid is proportional to its surface area. An example of the latter is ION EXCHANGE, whereby ions occupying charged sites on the surface of the solid are displaced by ions from solution.

Spent Fuel--Nuclear fuel that has been irradiated and subsequently removed from the reactor. It contains uranium, plutonium and other actinides, radioactive fission products, and other nuclides.

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Stratigraphy--(1) That branch of geology which treats of the formation, composition, sequence, and correlation of the stratified rocks as parts of the earth's crust. (2) By extension, the arrangement of strata as to geographic position and chronologic order of sequence.

Subsidence--A local movement downward as in settling or sinking of an area of the earth's surface with little or no horizontal motion.

Syncline--A fold in rocks in which the strata dip inward from both sides toward the axis.

Tectonic--Of, pertaining to, or designating the rock structure and external forms resulting from the deformation of the earth's crust. Frequently associated with earthquakes and volcanic activity. As applied to earthquakes, it is used to describe shocks not caused by volcanic action or by the collapse of caverns or landslides. Refers to those processes by which rocks of the earth's crust and upper mantle are deformed (faulted, fractured, folded, etc.).

Tertiary--The first of two periods in the Cenozoic era, extending from 65 to 3 million years ago.

Thermal Loading--The quantity of heat-generating materials placed in a given area or volume (e.g., kilowatts per hectare).

Transport Time--Time required for migration or hydrologic transport of a radionuclide from the repository to the accessible biosphere, taking into account sorption characteristics of the geosphere.

Transuranic Waste--Radioactive waste containing alpha emitting transuranic elements with half-lives greater than one year, in excess of 10 nanocuries per gram. Transuranic elements include 233U and the nuclides of all elements above uranium in the periodic table.

Triassic--The first period in the Mesozoic Era, extending from 225 to 195 million years ago.

TRU--Transuranic Waste

Tuff--A medium-grained rock formed of small compacted fragments of volcanic glass, mineral grains, and rock particles.

Uplift--A lifting up of the earth's crust by the movement of stratified or other rock.

USGS--U.S. Geological Survey of the Department of the Interior

Waste Form--Radioactive waste, in either treated or untreated condition, including any inerts, binder, or stabilizer. (Waste can be specially formed to serve special purposes, e.g., high-level waste can be fixed in a vitrified matrix to inhibit leaching waste.)

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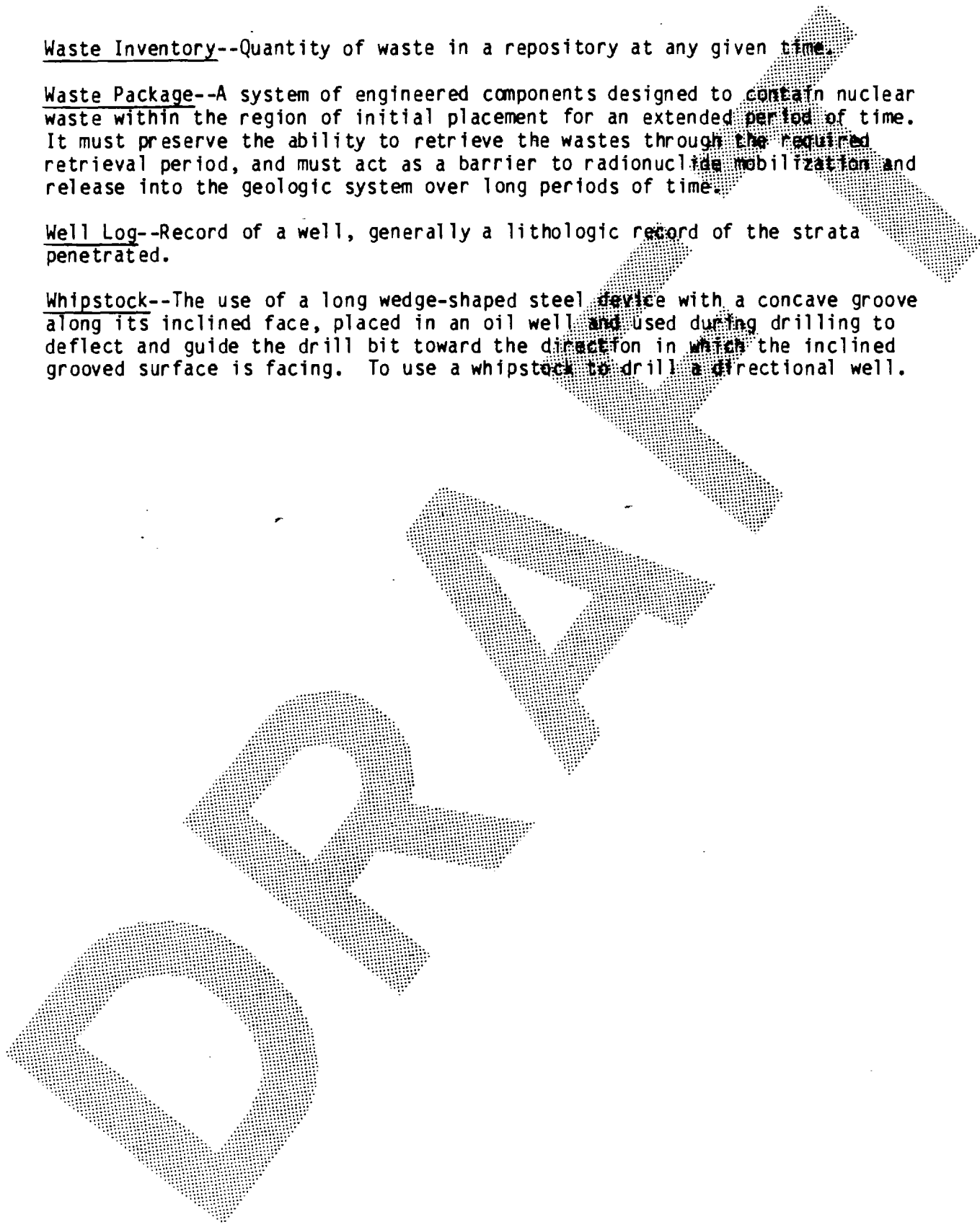
Waste Inventory--Quantity of waste in a repository at any given time.

Waste Package--A system of engineered components designed to contain nuclear waste within the region of initial placement for an extended period of time. It must preserve the ability to retrieve the wastes through the required retrieval period, and must act as a barrier to radionuclide mobilization and release into the geologic system over long periods of time.

Well Log--Record of a well, generally a lithologic record of the strata penetrated.

Whipstock--The use of a long wedge-shaped steel device with a concave groove along its inclined face, placed in an oil well and used during drilling to deflect and guide the drill bit toward the direction in which the inclined grooved surface is facing. To use a whipstock to drill a directional well.

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