Field Investigation Evaluation Report

NON-PROPRIETARY VERSION

Skull Valley Goshute
Skull Valley, Utah

and

NEW Corporation
Shoshoni, Wyoming

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TABLE OF CONTENTS

SECTION 1

EXECUTIVE SUMMARY

SECTION 2

INTRODUCTION AND PURPOSE

SECTION 3

SKULL VALLEY GOSHUTE RESERVATION, UTAH

3.1 Topography

The proposed site on the Skull Valley Reservation encompasses all of Sections 6, 7, and 18 of T5S, R8W. Section 18 and about the southern 1/3 of Section 7 include exposures of elevated bedrock known as the Hickman Knolls, standing 100 ft to 500 ft above the gently, north-sloping floor of the Skull Valley. It is unlikely that the exposed bedrock portions of these sections will be utilized by the facility except as a natural screen. The remaining land is nearly flat and slopes gently to the north. A series of shallow (1-3 ft) dry washes, marked by more dense vegetation, drains the area during infrequent thunderstorms or spring runoff. Several low (1-2 ft) linear soil ridges rise above the valley bottom in the eastern part of Section 7 and adjacent Section 8, trending northward. These types of features provide the only topographic relief on the valley bottom in this area. Sack (1993) has mapped a preserved shoreline, the Stansbury level of Lake Bonneville, through Section 6.

3.2 Geology

The site is situated near the east side of Skull Valley, a north-south trending structural basin, between the Stansbury Mountains on the east and the Cedar Mountains on the west. The area is within the Basin and Range Physiographic Province, characterized by north-south trending, fault-bound mountain ranges separated by valleys occupying the down-dropped block between the ranges. Unconsolidated sediment derived from the adjacent ranges fills the valley floor and may be several thousand feet thick near the center of the valley. Development of this physiography occurred during the last 30 million years, and continues today as evidenced by the seismic activity in the region and by the numerous locations where Quaternary (1.6 million years) soils or geomorphic features are disturbed or offset along fault traces. The Stansbury Fault along the west side of the Stansbury Mountains is a good example of this relationship. Ground surface

dislocations of this type have been mapped about 6 miles east of the proposed facility location at the base of the Stansbury Mountains (Helm, 1995).

Bedrock - Bedrock exposed at the Hickman Knolls is believed to be the Fish Haven Dolomite of Late Ordovician age (440 to 450 million years). It is described as a dark gray to black dolomite (magnesian limestone) with some interbeds of very light to medium gray dolomite. A few fossils, thin beds of siltstone, thin sandstone, and intra-formational conglomerate were noted in the site area. The rock is fairly massive but does show some enlargement of joints due to dissolution. Small caves and openings (1 to 4 ft deep) can be seen on the steep faces of Hickman Knolls. Differential erosion has produced a very rough and irregular rock surface (mesoscopic scale). Karst conditions are not believed to exist due to the arid climate but should be verified by additional investigation.

An isolated outcrop of the dolomite was found near the center of Section 7. This indicates that the depth to bedrock may be quite shallow in Sections 6 and 7, but not so shallow as to require blasting for foundations.

Soils and Geotechnical Engineering - Surficial soils at the proposed site are mainly fine grained sand, silt, and clay deposited in and by Lake Bonneville which occupied the valley during the late Pleistocene and early Holocene (30,000 to 10,000 years ago). These soils are typically calcareous and saline and may be reworked by wind or alluvial processes. They can be corrosive to steel and concrete and have severe limitations for leach fields, as roadfill, and in embankments. However, limitations for shallow foundations are slight (USDA-SCS, unpublished data). However, the dry conditions of the siting area will tend to minimize the corrosive nature of the soil.

A source of gravel for structural fill was developed near the Reservation village when the Hercules Tekoi rocket engine test facility was constructed. It is possible this source could be utilized for construction of this facility.

Groundwater - The main groundwater reservoir in Skull Valley is the unconsolidated rocks underlying the central part of the valley. The source of this water is precipitation which falls on the Stansbury and Cedar Mountains and enters the reservoir by way of the alluvial fans along the edges of these ranges. The best quality water is from springs or streams in the mountains, but good quality water can be found in the alluvial fan developments. Toward the center and northern parts of the valley, the water quality is generally poor due to saline or alkaline conditions in the soils. Specific data for wells drilled on the Reservation are not known at this time. Information gathered from tribal members indicates some wells yield good water and others yield poor quality water. Water for the village is believed to be piped to a storage tank from a surface source in the Stansbury Mountains. Information provided by David Tillson (1996), a consultant to the Tribe, indicates a well drilled at the Tekoi Rocket Test Facility can produce 300 gpm with no appreciable drawdown. The quality of the water and the depth of the well are unknown at this time. Tillson estimates the depth to groundwater in the area is around 400 ft.

Surface Hydrology - The floor of Skull Valley slopes gently northward to the Great Salt Lake. High gradient streams originating in the mountains are mainly ephemeral by the time they reach the main valley bottom, having disappeared into the coarse soils of the bordering fans. Drainage in the immediate site area appears to be developed strictly as a result of local topographic and meteorological conditions. A minor exception is a dry stream channel in the northeast corner of Section 6 that appears to originate in the Stansbury Mountains. It may carry water more frequently than the dry washes or arroyos at the site proper but was dry during the site visit in late June. As discussed previously in Topography and indicated on the topographic map, the washes trend northerly and appear to be spaced at somewhat regular intervals across Sections 6 and 7. Incision is minimal due to the near-desert conditions, low gradient of the old lake bottom, and small watershed area. Little or none of the flow in these washes reaches the groundwater table because of the small volumes and because the presence of near surface clay and silt inhibits infiltration. A few locations indicate that shallow ponding of water may occur from time to time. There are no wetlands within the siting area or along the prospective highway transportation corridor. However, as described under Aquatic Resources below, there are a number of springs and wetlands along the existing county road (but outside the 1/4 mile wide corridor).

Faulting and Seismicity - The Skull Valley siting area is located in the intermountain seismic belt (Wasatch Front region) of the continental United States extending from New Mexico to Idaho. Earthquakes up to magnitude 7.5 can be expected in this region and a magnitude 5.0 earthquake has an estimated average return period of about 10 years (Helm, 1995).

Active faults or "capable faults" (as the NRC identifies them) are defined as those that have shown movement at least once in the past 35,000 years, recurring movement within the past 500,000 years, or macroseismicity (seismic activity correlatable to a specific structure). A large body of evidence indicates that the mountain ranges adjacent to the Skull Valley site and parallel ranges to the east and west are the result of movements on faults during the last 30 million years. These faults show evidence of movement history that the NRC would consider as "capable." Numerous studies have been performed in attempts to determine the frequency of movements, the amount of displacements, and the lengths of rupture so that estimates of probable maximum earthquake magnitude can be made and a recurrence interval can be calculated. Using this information, a likely probable maximum acceleration for design purposes is determined.

In the vicinity of the proposed siting area, two other projects have been proposed or implemented which have published numerical estimates of the accelerations anticipated from earthquakes: the DOE preliminary site assessment of the Skull Valley Goshute siting area and the Low Level radwaste disposal facility at Clive, Utah.

A DOE sponsored preliminary site assessment of the same land area offered by the Skull Valley Goshute for this project was issued in October, 1993. In this document, TRW Environmental Safety Systems concluded that the estimated bedrock acceleration was approximately .3 g from the Stansbury Fault and was within design feasibility.

In 1994, the NRC issued a Final Safety Evaluation Report on a license application to store and dispose of low level radwaste at Clive, UT, about 25 miles northwest of the Reservation. The applicant completed a detailed analysis of the regional and local seismicity, as well as a

hypothetical "random event" earthquake. They submitted, and the NRC accepted, a maximum ground acceleration of 0.37g for the Clive site. However, the Skull Valley site is only 6 miles (10 km) from the surface trace of the Stansbury Mountain fault, capable of a maximum 7.3 magnitude earthquake. An event of that size could produce a maximum (peak) ground acceleration of about 0.7g in the siting area. This value maybe lower when attenuation, damping, and recurrence intervals are factored in, but that effort is beyond the scope of the present work.

EPA PGA

3.3 Biological Conditions

The site is currently unused high desert/chaparral and open space. There are no known Federal-listed threatened or endangered species in the area. State-listed species may occur and a Natural Heritage Program database search has been requested. The site has no future planned use. The surrounding land is sparsely populated and is used for some grazing. There are also some agricultural fields, primarily hay and alfalfa within the five-mile radius of the site. There are no apparent historic/archeological/cultural sites which would be affected by a new facility on the proposed site. More detailed information on specific resources is provided below.

<u>Vegetation Resources</u> - The proposed site area consists of Sections 6, 7, and 18 of T5S/R8W. Sections 7 and 18 contain portions of Hickman Knolls, a rocky outcrop that juts several hundred feet above the valley floor. The vegetation community results from the low precipitation and the highly alkaline soils, with a high desert comprising the valleys floors and a coniferous forest (pinion/juniper) creeping down the mountain slopes. Bailey (1978) identifies this area as the Bonneville Saltbush-Greasewood section of the Intermountain Sagebrush Province. He states that in addition to sagebrush, other important plants include shadscale, fourwing saltbush, rubber rabbitbrush, spiny hopsage, and horsebrush.

According to a report by David Tillson (1996) plant communities in Skull Valley include saltgrass, mud flat, greasewood scrub, mixed desert scrub, annual grassland, sagebrush scrub, and juniper woodland. Sagebrush, tumbleweed, cacti, yucca, greasewood, creosote bush, freckled milkvetch, Indian rice grass, cheat grass, saltbush, and shadscale occur within the site area.

Farther north in the valley, particularly in saline lowlands, iodine bush, pickleweed, salt grass, and alkali grass occur. Some of this type of vegetation may occur along the northern portions of the highway transportation corridor and the existing rail line.

Within the site and a 5-mile radius, there are no trees or tall brush communities and the predominant vegetation includes xeric grasses and shrubs. However, cottonwood and several other tree species occur in locations around seeps, homesteads, and irrigation.

Wildlife Resources - Information on wildlife species is sparse. Pronghorn antelope, mourning dove, ravens, desert packrat (nests and food cache among rocks of Hickman Knoll), grasshoppers, coyote (scat observed), wild horses, turkey vulture, hawk (large pellet), sparrows, vesper sparrow, and western meadowlark were observed in the site area.

According to the USDA-SCS soils information for the site area portion of Skull Valley, soils are poor in terms of supporting vegetation that would provide wildlife habitat. Bailey (1978) states that few large mammals live in the Intermountain Sagebrush Province, but mule deer, mountain lion, bobcat and badger occasionally penetrate it. Small mammals are more common and include ground squirrels, jackrabbits, kangaroo mice, wood rats, and kit fox. Some species, such as the Belding and Townsend ground squirrels, become dormant during the hot dry summer.

In the northern portion of Skull Valley, waterbirds, shorebirds, and wading birds are present, in association with water and wetlands adjacent to Great Salt Lake. A great blue heron was observed at Horseshoe Spring.

Aquatic Resources - There are no aquatic resources within the Sections being offered by the Goshute Indians. There are no wetlands or ponds within the five-mile radius of this siting area; however, there are roughly 20 stream channels identified on the USGS quadrangles. These stream channels are ephemeral or at best intermittent and have no features that can be considered aquatic. They are essentially dry washes that probably have short-term flow following infrequent

precipitation or perhaps during a period of snowmelt. The infrequency and small magnitude of these flows precludes the development of wetlands and definitely prevents the streams from offering aquatic habitat.

The transportation corridor evaluated for this report is 0.25 mile wide, centered on the existing paved, 20 foot wide county road, starting at the existing rail line adjacent to I-80/existing county road interchange to the reservation. The corridor enters the Skull Valley Indian Reservation, at which point it is assumed a new road would be constructed to the site. The existing county road continues through the reservation to where it terminates at State Route 199 near Dugway, Utah. Within this corridor, there are two mudflat wetland areas, three farm ponds, two springs, and 56 stream channels. Nearly all of these streams are dry washes that do not provide wetland or aquatic habitats. The mudflats are highly saline and have a plant community tolerant of these soil conditions. The mudflats offer ephemeral aquatic habitats with an unknown periodicity of flooding. One mudflat is located within the Timpie Springs State Wildlife Management area north of I-80 and the adjacent railroad. This area occasionally may be flooded by changing water levels in the Great Salt Lake.

The second mudflat consists of a small finger of a much larger mudflat, located about 1 mile south of I-80 along the west side of the existing county road. This area probably offers only periodic aquatic conditions, either during spring snowmelt periods, or perhaps less frequently, when the level in the Great Salt Lake rises.

Threatened and Endangered Species - Based on personal communications with Ben Franklin and George Oliver of the Utah Natural Heritage Program (June 24, 1996), there are not likely to be any State-listed threatened or endangered plant or animal species in the site area.

U.S. Forest Service or BLM sensitive species on nearby lands are unknown but could include golden eagle, burrowing owl, and great horned owl. These species are unlikely given either the distance to Forest Service land or the lack of unique habitat present at the site and near vicinity.

Based on the report by David Tillson (1996), there are no Federal-listed threatened and endangered species other than occasional foraging bald eagles. Federal candidate species in the area include ferruginous and Swainson's hawks, western snowy plover, long-billed curlew, and white-faced ibis. The US Fish and Wildlife Service (USFWS) is currently removing many candidate species from listing and some of those listed above may be dropped.

3.4 Archeological and Historic Resources

There appear to be no known archeological or historic sites within the siting area, based on communication with Leon Bear, Chairman of the Skull Valley Goshute (June 25, 1996). There is a State-listed historical site in Iosepa, within the highway transportation corridor, but the occurrence of archeological sites is unknown.

3.5 Human Settlement

There are no major towns or cities within 10 miles of the site. The Skull Valley Band of the Goshute Indians have their village approximately 3.5 miles east of the site. This village consists of about 6 residences and several community buildings. The settlement of Iosepa is located about 10 miles north of the site and consists of about 6 residences. Another settlement of about 10 residences occurs in Terra, about 11 miles southeast of the site area. Lastly, the town of Dugway (population approximately 1200 people), located within the Dugway Proving Grounds, is located about 14 miles south of the site area. The local population appears stable with no reason to change significantly in the future. The Town of Grantsville is approximately 24 miles northeast of the site in Rush Valley and has a population of almost 5,000. Tooele County 1990 population was 26,601.

Based on observations during the June 1996 site visit, an estimate was made of the number of occupied houses within the site, 5-mile radius, and along the existing county road. There appear to be no houses within the site, 14 houses within the 5-mile radius, and 8 houses along the existing county road.

Property taxes average $1.6027/$1000 for Tooele County. State sales tax and corporate income tax rates are 5 percent.

3.6 Existing Area and Site Land Use

The siting area is currently unused high desert/chaparral and open space. No form of human development occurs within the area. The northern portion of section 7 (see Figure 3) represents the most favorable location to begin detailed siting evaluations. This location is to the west and north of the Hickman Knolls prominance on the reservation and is within areas suggested by the Skull Valley Goshute. The Hickman Knolls prominance offers direct line of sight isolation from the rocket test motor facility to the section 7 siting area. Photos of the siting area are included in this report (see Figure 6) for reference.

The western edge of the siting area abuts BLM land that is comparable high-desert, open space. No human development has occurred on the BLM land for many miles from the site. To the east of the siting area is the Goshute village, a country store along the road, and lands used for cattle grazing.

Approximately 3 miles S-SE of the siting area, beyond the Hickman Knolls prominence is the operational Hercules Tekoi rocket motor test facility, which is built on land leased from the Goshute Indians.

There is a greater mix of land uses along the transportation corridor, including irrigated croplands in hay and alfalfa, feed lots, residences, small gravel operations, and several abandoned commercial/retail businesses at the I-80 interchange. A large salt processing operation exists north of the rail line in this area.

3.7 Meteorological / Climatological Conditions

Skull Valley has a mid-latitude dry climate with hot summers and cold winters. For the period 1950 to 1986, Dugway had an average July temperature of 78 degrees F, average January

temperature of 27 degrees F, and an annual average temperature of 51 degrees F, which is similar to Tooele County's average annual temperature of 52 degrees F. In the same period, Dugway received an average annual precipitation of 7.63 inches, less than Tooele County's average of 15.48 inches. The average annual pan evaporation in Skull Valley has been estimated at 61 inches. Severe weather usually consists of thunderstorms and brief blizzards. The valley does experience fairly extreme temperatures, ranging from -20 to 110 degrees F.

3.8 Transportation Corridor

General

Field investigations for transportation access to the proposed siting area on the Skull Valley Goshute Reservation were conducted on June 26 and 27, 1996. Possible approaches to the site from the east, south and west are bounded by mountain ranges. This effectively eliminates these possibilities due to excessive grades which would not be suitable for either railroad or heavy haul highway traffic. Cross-country cask transportation would be via the Union-Pacific Railroad to its crossing of the Skull Valley on the north end.

Only two locations at the north end of Skull Valley appear feasible to support a cask transfer to the siting area from the mainline railroad. One potential railroad tie-in point is at Low, Utah, on the west side of Skull Valley. A second potential tie-in point is at Timpie, Utah, on the east side of the valley at an existing railroad siding. The Timpie location also supports an existing county road interchange with I-80. An existing county road starts at the interstate and heads south toward the reservation. Each of the potential access routes are described in the following sections.

A. Low, Utah Access Route

The Union-Pacific mainline railroad at Low is approximately thirty miles north and west from the siting area. Access to the siting area could be provided by constructing a new transportation corridor using a new railroad spur originating at the Union-Pacific mainline on the south side

(siting area side) of Interstate 80. This spur would extend along the east side of the Cedar Mountains in a southerly direction either directly to the siting area or to an Intermodal Facility (for heavy haul transfer) located along the route. Grades along this route could locally be as much as two percent but would generally be less than one percent. Drainage is estimated to be similar to that found along the existing county road on the opposite side of the valley. The route is considered technically feasible. However, the cost of a new corridor is significantly greater than the Timpie tie-in point corridor and is on Bureau of Land Management (BLM) property. Because of these issues, this option is not considered viable for the project.

Advantages of the Low, Utah access route are as follows:

- Very little existing vehicular activity at Low, Utah
- No local transportation access crossing Interstate 80
- Transportation access corridor is remote from other activity in the valley
- Elevations all along route well above the Salt Lake water surface elevation

Disadvantages of the Low, Utah access route are as follows:

- Right of Way (ROW) purchase across BLM property
- A seven percent longer route to the siting area when compared to the Timpie tie-in
- Higher cost of developing a new transportation corridor

B. <u>Timpie, Utah Acess Route</u>

The Union-Pacific mainline railroad and siding at Timpie, Utah, is approximately twenty-eight miles to the North from the siting area. Two modes of transportation could be used from this tie-in point to the facility location; building a new rail spur to the siting area or upgrading the existing county road to support a heavy haul trailer transfer to the siting area.

Railroad transfer direct to the siting area from the mainline requires the following issues to be resolved:

- Insufficient grade separation at the crossing of Interstate 80 exists for a train to pass under the highway. The existing height limit of 15'-8" through the overpass (dual bridges) will not meet Utah railroad clearance requirements of 6 feet minimum. Obtaining a clearance waiver from the State of Utah or lowering of the road bed are possible alternatives to replacement of the interstate bridges (at a significant cost). To lower the existing grade elevation through the overpass to obtain sufficient clearance under the bridge would result in being below the nearby Salt Lake water surface elevation and likely require some provisions for drainage of this low point.
- The existing I-80 overpass only provides sufficient width for the existing county road and does not provide the necessary additional room for a new rail spur through the common overpass. A possible solution in-lieu-of interstate bridge replacement would be to run the rail spur down the center of the highway under the two bridges. This would require temporary closure of the existing county road under the bridges during rail shipments from the mainline siding.
- The intermodal area provides a minimum or inadequate turning radius for a railroad spur to turn directly to the south. A possible solution would be to obtain additional land to the north (opposite side of the mainline) to enlarge the available turning radius. This would require crossing the existing mainline with the new rail spur heading south.
- Additional Right of Way (ROW) to the siting area would likely be required since the existing ROW is from inspection not wide enough for a road and railroad (approximately one-half the property along the route is privately-owned land with the balance under Bureau of Land Management (BLM) control). By closing the existing road during rail shipments to the site, hybrid combinations of rail and road on a common bed could be possible without expanding the existing ROW. However, the cost of building a new rail spur in conjunction with a rebuild or replacement of the existing county road, suitable for high speed vehicular traffic, is likely to be cost prohibitive.

Heavy haul access to the siting area could be provided by the construction of an Intermodal Transfer Facility at the Timpie railroad siding to transfer the casks from rail cars to a rubber tired transport trailer which would carry the cask along an improved existing county road to the siting area.

The Intermodal Transfer Facility could be constructed at the Timpie siding yard (see Figure 2) on property owned by the Union Pacific Railroad. At the siding yard, sufficient space is available for the structure and required sidings as shown in the figure. There is a considerable amount of vehicular traffic in proximity to the proposed intermodal facility location. Railroad crews were observed maintaining railroad cars, switching trains to the Akzo siding and moving rail cars from sidings to mainline. Road traffic around this intersection is quite active with tractor-trailers, recreational vehicles and others. Photos of the potential intermodal area (see Figure 5) are included in this report for reference.

An alternate location for the Intermodal Transfer Facility could be 1.3 miles further to the west on a dead end road (approximately 600' x 1700' in size). If this location were used, the only other traffic would be those vehicles going to the Mag Corp., the lone tenant on this dead end road. This location is owned by the BLM.

Either intermodal location would use the existing highway underpass for access to the existing county road traveling south to the siting area.

The existing county road runs just to the west of the Stansbury Mountains. Grades along the road to the siting area are less than five percent. Drainage crossings are numerous but small, with most being conveyed by 18 to 24 inch diameter concrete pipe. The largest pipe observed was 48 inches in diameter. The road cross-section consists of an approximate 70 foot ROW with a 20 foot wide asphalt pavement and varying (0 to 2 foot) width aggregate shoulders. The road bed has been elevated above surrounding grade with fill obtained by overexcavating roadside ditches. Traffic on the road is estimated to be 100 to 200 vehicles per day with a large tractor-

trailer volume. For this evaluation, it is assumed that the existing road (2-10 foot lanes) can be widened to accommodate 2-12 foot lanes with 6 foot paved shoulders using the existing pavement as-is with a common asphalt overlay.

Advantages of the Timpie, Utah access route are as follows:

- No ROW purchase is necessary
- Cost of improving the existing county road would be less than new route

Disadvantages of the Timpie, Utah access route are as follows:

- At Timpie, routine vehicular (salt truck traffic to/from Akzo and Mag Corporation) and railroad activity occurs in the vicinity of the proposed intermodal location.
- The existing county road passes in close proximity to two private residences and out buildings. Six other private residences are located along the highway to the siting area.

3.9 Utilities (Power, Sewer, Water)

An existing power line through the reservation from the Timpie substation to the north would probably be capable of servicing the needs of the facility without significant upgrade. If the existing Hercules Tekoi rocket test motor facility on the reservation is abandoned in the future, it is highly likely that sufficient power exists. Only an approximate 3 mile extension of the power line to the siting area would be needed. This must be confirmed with the local power company in the future.

Water and sewer service for the site would be developed as part of the facility infrastructure. Water supplies could originate from a local facility deep well or from a shallow well drilled closer to the Stansbury Mountain range possibly near the tribal water source and piped (approximately 4.5 miles) to the site (essentially downhill).

SECTION 4

NEW CORPORATION SITE, SHOSHONI, WYOMING

4.1 Topography

The land being proposed by the NEW Corporation is situated in Sections 23, 14, and 12 of Township 38N, Range 94W. The portion deemed suitable for development lies in the northern 3/4 of Section 23, southeast of the existing rail line. The topography of this portion is mainly flat to gently sloping in a northwesterly direction, towards Boysen Reservoir. The land surface rises abruptly near the east boundary of the site to a low ridge about 100 to 200 ft above the main part of the site. Two dry valleys have been incised in the terrain near the north boundary of the section to depths of about 10 to 20 ft.

4.2 Geology

The site is situated near the northern edge of the NW-SE trending structure known as the Wind River Basin. The edge of the basin occurs about 9 miles to the north at the base of the Owl Creek Mountains. The Wind River Basin is one of many large, sedimentary and structural basins that formed in the Rocky Mountain foreland in response to a compressional event during the late Cretaceous to early Eocene (about 75 to 42 million years ago), known as the Laramide Orogeny. Most basins have complementary adjacent uplifts, many of which were formed by southwesterly movement along faults that carried the uplifts over the basin margins. The basins formed primarily by downwarping in response to sedimentation and the overriding uplifts. Subsidence may be continuing today along some faults on the basin margins (Geomatrix, 1988).

Bedrock - Bedrock in the site area and vicinity is mapped as the Wind River Formation of Eocene age. The formation is mainly siltstone and sandstone in various shades of pale brown, yellow, orange, and red. Beds are horizontal, or nearly so, and are differentially weathered; more resistant

beds commonly overhanging softer horizons. Bedrock is exposed in the northern and eastern parts of the site area but will not interfere with development of a site. The depth to bedrock in the facility area is unknown at this time but is not expected to exceed 10 to 15 ft. The nature of the rock is such that, if areas of higher rock do occur in the facility area, they could be removed with conventional excavation equipment and would not require blasting.

Soils and Geotechnical Engineering - Surficial soils in the siting area are predominantly sandy loams derived from decomposition of the underlying sandstone and siltstone bedrock, and from alluvium carried down from the surrounding sandstone hills. These soils have severe limitations for use in embankments and are generally not suitable for roadbed materials due to excess fines. These soils would be corrosive to uncoated steel under wet conditions but have low corrosivity to concrete (USDA-SCS, 1993). A large portion of the site would be unsuitable for a sanitary leach field due to shallow bedrock, but certain areas appear to have only slight limitations. There appear to be few limitations for shallow foundations except in areas of shallow bedrock. A source of gravel or crushed stone for engineered backfill has not been identified in the vicinity as yet, but it is not expected to require excessive haul distances.

Groundwater - Interbeds of coarse sand in the Wind River Formation appear to be the primary source of groundwater to wells drilled in the vicinity of the NEW Corporation site. This water likely originates in the upland north and northeast of the site, as average annual precipitation is very low in the area, providing little recharge to the groundwater reservoir. Most domestic and stock wells are drilled to depths of between 300 and 400 ft in order to assure an adequate year-round supply. Water levels in most wells rise to between 20 and 50 ft below ground surface indicating the water-bearing strata may be under artesian pressure. Water quality is generally good and seems to improve with depth. Shallow water tends to have a high calcium sulfate or sodium sulfate content, making it suitable only for stock watering. There is little doubt that the modest water requirements of the proposed facility could be met at reasonable cost by a water well developed on the site.

Surface Hydrology - The site region drains northward via the Wind River. Base level for surface streams is the Boysen Reservoir, created by Boysen Dam on the Wind River. Drainage in the site

area is either northwestward to Badwater Creek or southwesterly toward Poison Creek. Both streams appear to be ephemeral with flow ceasing entirely during the hottest parts of the year, except perhaps in their lowermost reaches near Boysen Reservoir or in response to local storms in the adjacent mountains. Drainage at the site area is mainly subsurface except during infrequent local precipitation events. Two or three dry washes or arroyos have developed in the northern portion of Section 23 in response to these events. These arroyos originate in low hills in adjacent sections to the east and northeast. The main portion of the useable area is flat and gently slopes to the northwest. Sheet wash would be the main form of runoff during severe precipitation. There was no evidence of ponding at the site.

Faulting and Seismicity - The Wind River Basin exhibits a low level of seismicity, similar to levels in the Great Plains and the Colorado Plateau. However, high angle normal faults along the north edge of the basin appear to be similar in style to faults in the more active Basin and Range, except for their east-west or northwesterly trend. A tensional stress regime seems to be operating here as well. Historical seismicity does not appear to be associated with these faults, however.

Several authors have reported evidence of probable Quaternary activity on some of these faults, based on geomorphic expression. The most recent comprehensive study was performed by Geomatrix in 1988 for the Bureau of Reclamation as part of an effort to determine seismic risk to several dams, Boysen Dam being one of them. Their investigation identified the Stagner Creek Fault at the base of the Owl Creek Mountains as being the greatest threat to the Boysen Dam, and consequently, would have the greatest potential impact on the NEW Corporation site. Their analyses suggest a potential for a maximum magnitude 6.75 earthquake on the Stagner Creek Fault. A hypothetical random event for this region was estimated to be magnitude 6 to 6.5. The closest approach of the Stagner Creek Fault to the center of the NEW Corporation site is about 8 miles (13 km) to the north. The maximum ground acceleration corresponding to a magnitude 6.75 earthquake is approximately 0.34 g. Some damping and attenuation could be expected over the 8 mile distance that would reduce the value slightly. Maximum ground accelerations associated with the random event would be 0.25 g or less.

Other faults have been mapped north of Badwater Creek and were evaluated during the Geomatrix study. They concluded that none of the faults in the Cedar Ridge - Dry Creek fault system are active.

A small fault is mapped in the Bonneville Quadrangle through the proposed site area (Thaden, 1978). It trends WNW for about 1 mile in the Bonneville Quadrangle, through Sections 23 and 24, and its extent to the southeast is unknown because there is no map published of the adjacent area. The author of the map had no specific recollection of this particular feature but was confident that it was based on field observations and not on well data projections or air photo interpretation. He did not recall if there was evidence of offset of Quaternary or younger features, and the fault does not show up on any of several maps indicating faults with Quaternary or recent movement in the region (Case, 1991). Aerial reconnaissance and air photo analysis of the area by Geomatrix failed to identify this feature, even though they were able to discover other unknown faults with as little as 0.5 m of surface relief (not in the site area). The lack of surface expression of this fault in an area where geomorphic changes occur very slowly suggests the fault is very old and inactive. The limited extent of the fault as mapped makes it very unlikely the fault could produce surface offset, even if it was active. Surface offsets require minimum magnitude 5.5 to 6.5 earthquakes which are only generated by much larger features. The evidence does not eliminate the possibility that the fault is active, but does make it quite unlikely.

The presence of this small fault in the siting area limits the flexibility of the project to optimize a final site location. Sufficient land area is available for a single site location (A) near but not on the mapped location of the fault (900'). A successful field mapping investigation which discounted the existence or confirmed the nonactive status of this fault would allow movement of the site location further to the north to a more visually obscured location with respect to Shoshoni, Wyoming.

4.3 Biological Conditions

The site area is currently largely rangeland and open space. The presence of Federal or State-listed threatened or endangered species is unknown. The site has no future planned use. The land to the

east of the site areas is unpopulated. To the north of the site area is the small settlement of Bonneville, to the south is the outskirts of Shoshoni, and to the west is very sparsely populated outskirts of Shoshoni. The town of Shoshoni (population of 500) is about 1 mile southwest of the site. There are no apparent historic/archeological/cultural sites that would be affected by construction and operation of the proposed facility.

Vegetation Resources - The dominant land use is rangeland. Review of Bailey (1978) indicates that the site area falls within the Sagebrush-Wheatgrass section of the Wyoming Basin Province. The dominant vegetation is sagebrush or shadscale and a mixture of short grasses. In moist areas, such as along Badwater Creek, greasewood, willow, and sedges would be common.

Based on the July 1996 site visit, the dominant vegetation on the site area is short grasses, with lesser abundance of brush species, cacti, yucca, and vetches. Cottonwood, willow, bulrush, cattails, and sedges were observed along Badwater Creek.

Wildlife Resources - Evidence of wildlife during the site visit was very scarce, but signs of prairie dogs were observed. Other animals included pronghorn antelope, mourning dove, ground squirrel (amongst rocks of knoll to the east of the site), sparrows, and a probable ferruginous hawk on a nest east of the site area. Small minnow-like fish were observed in Badwater Creek and a killdeer was observed on the mudflats.

Aquatic Resources - There are no aquatic resources within the immediate area of the site location. One intermittent stream channel crosses under the existing railroad spur, but is probably just north of the proposed site.

In addition, the existing mainline railroad passes within several hundred feet of Badwater Creek for the portion that would be used for cask transport. After the existing rail spur takeoff, the mainline crosses Badwater Creek and passes into Bonneville. In this area the stream channel is about 100 feet wide. However, at the time of the site visit, the flowing water meandered within the stream channel to a width of 25 feet and was only several inches deep.

North of Badwater Creek is an unnamed intermittent tributary of Badwater Creek. Farther north, about 4 miles from the site, is Boysen Reservoir, out of which flows Reservoir Creek.

An arm of Boysen Reservoir extends to within about 2.5 miles northwest of the site, where Badwater Creek enters the reservoir. Another arm extends to within about 3.5 miles WSW of the site where Poison Creek enters the Reservoir. On the USGS quadrangles, the identified stream channel of Poison Creek extends to within 2 miles southwest of the site, although a broad channel extends further upstream to within 1 mile of the site area. Poison Creek parallels the south side of Route 20/26. On the south side of Poison Creek are several intermittent tributaries. Between four and five miles south of the site is a tributary to Muskrat Creek, which ultimately drains into the Wind River.

Streams other than Badwater Creek are presumed to be intermittent and offer minimal aquatic habitat. The amount and nature of riparian and wetland communities are unknown for all streams other than Badwater Creek.

Threatened and Endangered Species - It is unlikely that any Federal or State-listed threatened or endangered species inhabit the site area. A 1994 request by NEW Corporation to the Nature Conservancy, which handles the Natural Diversity Data Base, revealed that the common loon was the only identified State-listed animal species, and this was located at Boysen Reservoir. Two candidate plant species under the Endangered Species Act were identified, both of these from around the Reservoir.

Conversations with Bob Luce and Andrea Cryzowski of the Nongame Division of the Wyoming Fish and Game Department indicate that there is unlikely to be any State-listed endangered or threatened species present, but no formal surveys have been performed by the State in the area, and the database files would consist of reports from random observations.

The site visit included a probable identification of a nesting pair of ferruginous hawks on the west side of the bluff situated about 0.5 miles east of the site area. The ferruginous hawk is a hawk of the open plains and is a species of "special concern" in Wyoming as well as a "candidate species" for the USFWS.

In addition, the presence of prairie dog communities in the site area suggests the possible presence of the Federal-listed black-footed ferrets, a predator relying heavily on prairie dogs as prey. The black-footed ferret is a Federal endangered species.

4.4 Archeological and Historic Resources

According to a June 12, 1996 letter from Mr. Robert Anderson of the NEW Corporation to Mr. Scott Northard of Northern States Power, there are no known or designated historical, archeological, or cultural sites in the area.

4.5 Human Settlement

The towns of Shoshoni and Bonneville occur within 10 miles of the site. The local population appears stable with no reason to change significantly in the future. The Town of Riverton is approximately 25 miles west-southwest of the site and has a population of around 13,000.

The Town of Shoshoni is about 1 mile from the site and has a population of 497. Shoshoni has approximately 199 housing units. Per capita income is $9,224 in 1989 dollars, while median income is $19,545 per household. The majority of houses are valued under $50,000 with a smaller number valued between $50,000 and $100,000.

Figures on Bonneville are not known, although based on the site visit, it appears that there are about 12 households, with the probable value of the houses under $50,000.

4.6 Existing Area and Site Land Use

The siting area is located on privately-owned land on which the NEW Corporation holds a purchase option. Most of the land is used for seasonal grazing of livestock. The overall siting area offers two potential site locations of sufficient size (150 acres) to support the minimum needs of the facility (see Figure 4). Site A is located in the southeastern corner of the property. This site location is near a small mapped fault (reference section 4.2, Geology; Faulting and Seismicity). Depending on the verification of the existence of this feature, the site could be moved to the north (1400') to improve the visual impact of the site to the surrounding area. A second site (B) was initially thought to be available but research of the land ownership records indicate that not all the land is under the control of the NEW Corporation. The location of this site is due west of the ranch house on the property and due north of Shoshoni, Wyoming. Photos of the siting area are included in this report (see Figure 7) for reference.

Approximately 3 miles west of the siting area is a boundary of the Wind River Indian Reservation. This is a large reservation with Native American populations of both the Arapaho and Shoshoni Tribes.

In addition, Boysen State Park is within several miles of the siting area. The Park and associated Boysen Reservoir are popular fishing and boating destinations.

4.7 Meteorological / Climatological Conditions

Normal weather in the area consists of fairly moderate weather conditions. Severe weather usually consists of thunderstorms and brief blizzards. The Wind River Basin does experience fairly extreme temperatures, ranging from -30 to 105 degrees, but these occurrences are relatively infrequent. Snow fall is moderate and rarely results in interruptions of rail service or State highway closure. Winds may be 30 to 40 mph during thunderstorms. Tornadoes have a very low probability of occurrence in the area.

4.8 Transportation Corridor

This siting area offers only one potential site (A) to the south of the nearby mainline and existing privately owned railroad spur which terminates south of the town of Shoshoni, Wyoming approximately 1.9 miles away. This siting location will require a new transportation corridor of less than one mile in length to the site boundary. Only railroad access is considered in this evaluation since there would be no advantage to the project for heavy haul transport to the site.

Site access at the mainline railroad is across from the unincorporated town of Bonneville, Wyoming. A soda ash railroad loading facility is the only industrial activity nearby. At the mainline, in addition to the siding to Shoshoni, there are two additional switching tracks forming a small railroad yard, both of which deadend into a common derailer. The railroad track in the switching yard is 100 pound/yd rail. The railroad spur reduces to 72 pound/yd rail prior to Shoshoni.

The likely rail route to the site A would depart from the existing spur after a curve to the west and south. The spur then straightens out toward Shoshoni at approximately 1 mile from the mainline. A new switch would be installed on the spur after the curve with the new trackage running due south directly into the potential site. The length of new spur to the site boundary would be approximately .4 to .7 mile in length depending on the final location of site A.

Since the new rail siding is of limited length and would originate from the existing spur , only one local cut and fill (earthwork) would be required to access the site. The existing watershed is limited and drainage impacts would be minimum. The only existing drainage is to the North before the switch for the new rail spur to the site. No large railroad bridges or culverts are anticipated.

If the second site (B) land ownership issue is resolved by the NEW Corporation, the proposed takeoff of a new siding to this site would originate at the same point along the Shoshoni spur but would turn west instead of heading due south. The distances and issues are similar to site A with

the exception that a more significant cut would be required near a knoll to the North of site B. A natural drainage through this knoll provides the Shoshoni spur access to the south.

4.9 Utilities (Power, Sewer, Water)

The closest existing electric power service to the site is a power line to Bonneville, Wyoming from the west. This line is used to service a soda ash loading facility and local housing in Bonneville. The power line, if it has enough capacity, could be extended approximately 1.5 miles to the site A by crossing Badwater Creek and the mainline railroad. A second possible alternative would be to tap off of an existing power line to the south of site A, approximately 2 miles away, which feeds a natural gas pipeline pumping station (presumed to be a pumping station). This gas facility is approximately 2 miles from the site A to the east and south. This power line originates at the Shoshoni, Wyoming substation on the west side of town.

Water and sewer service for the site would be developed as part of the facility infrastructure. Water supplies would originate from a new well while sewer service would likely be a septic system and leach field conforming to local requirements.

SECTION 5

SITING EVALUATION RESULTS AND RECOMMENDATIONS

SECTION 6

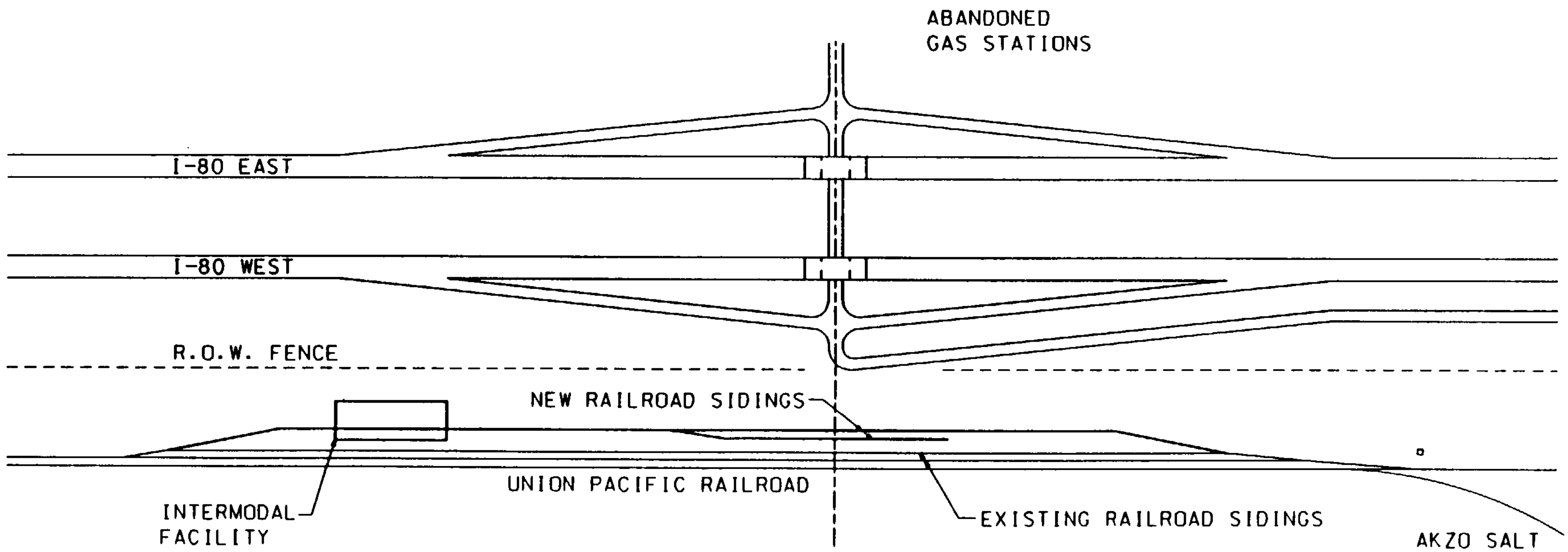
REFERENCES

SECTION 7

ATTACHMENTS

Figure 1	Evaluation Scoring Matrix
Figure 2	Timpie Railroad Spur Intermodal Point
Figure 3	Skull Valley Goshute Conceptual Siting Location
Figure 4	NEW Corporation Conceptual Siting Location
Figure 5	Timpie Rail Siding Photo
Figure 6	Skull Valley Goshute Site Area Photo
Figure 7	NEW Corporation Site Area Photo

FIGURE 1



TIMPIE INTERMODAL FACILITY

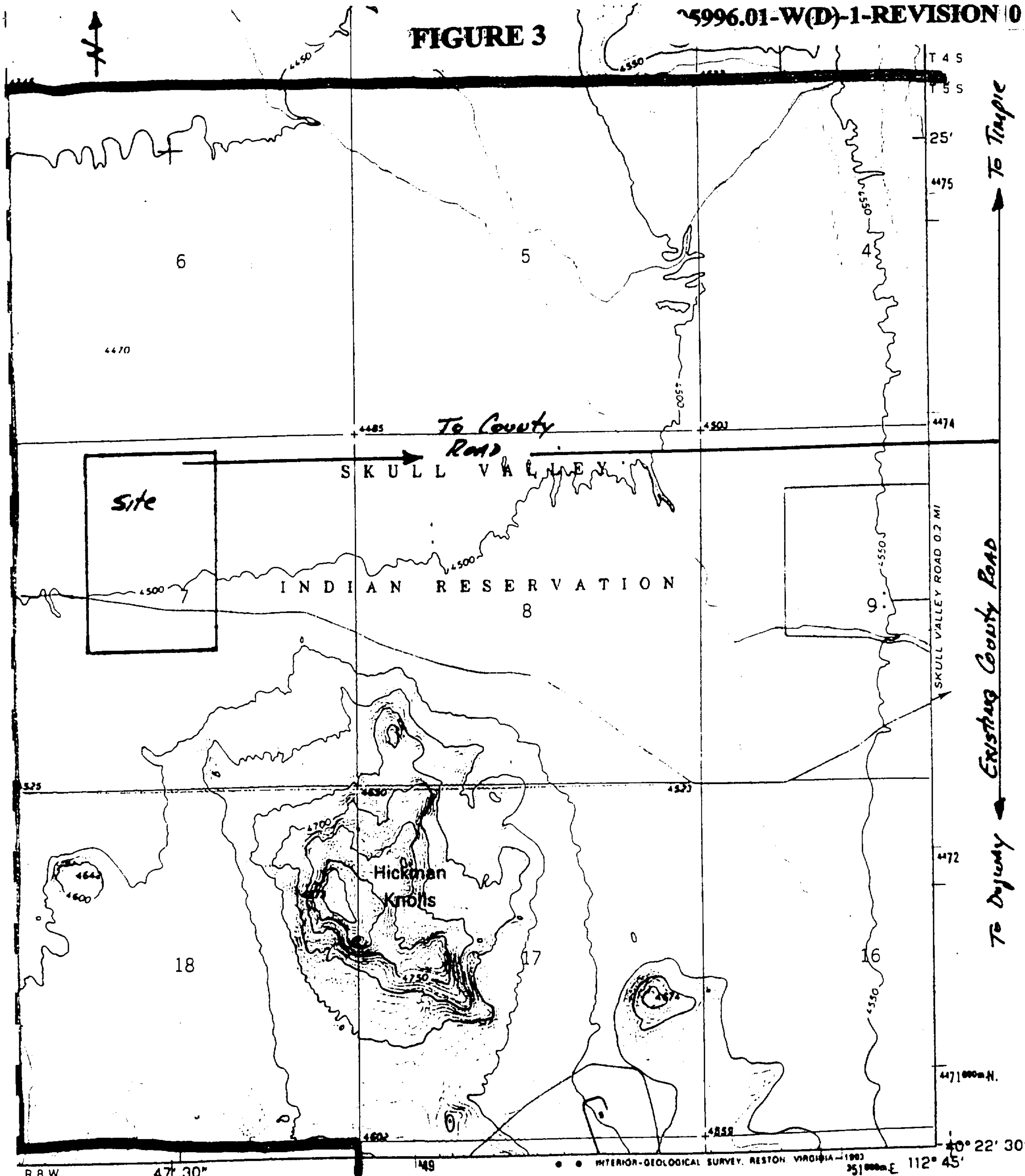
SCALE 1"=300'

d:\goshute\timpie.dgn Jul. 19, 1996 09:15:43

FIGURE 2

05996.01-WD-I-REVISION 0

FIGURE 3



ROAD CLASSIFICATION

Primary highway, hard surface

Light-duty road, hard or improved surface

Secondary highway, hard surface

Unimproved road

Interstate Route U. S. Route State Route

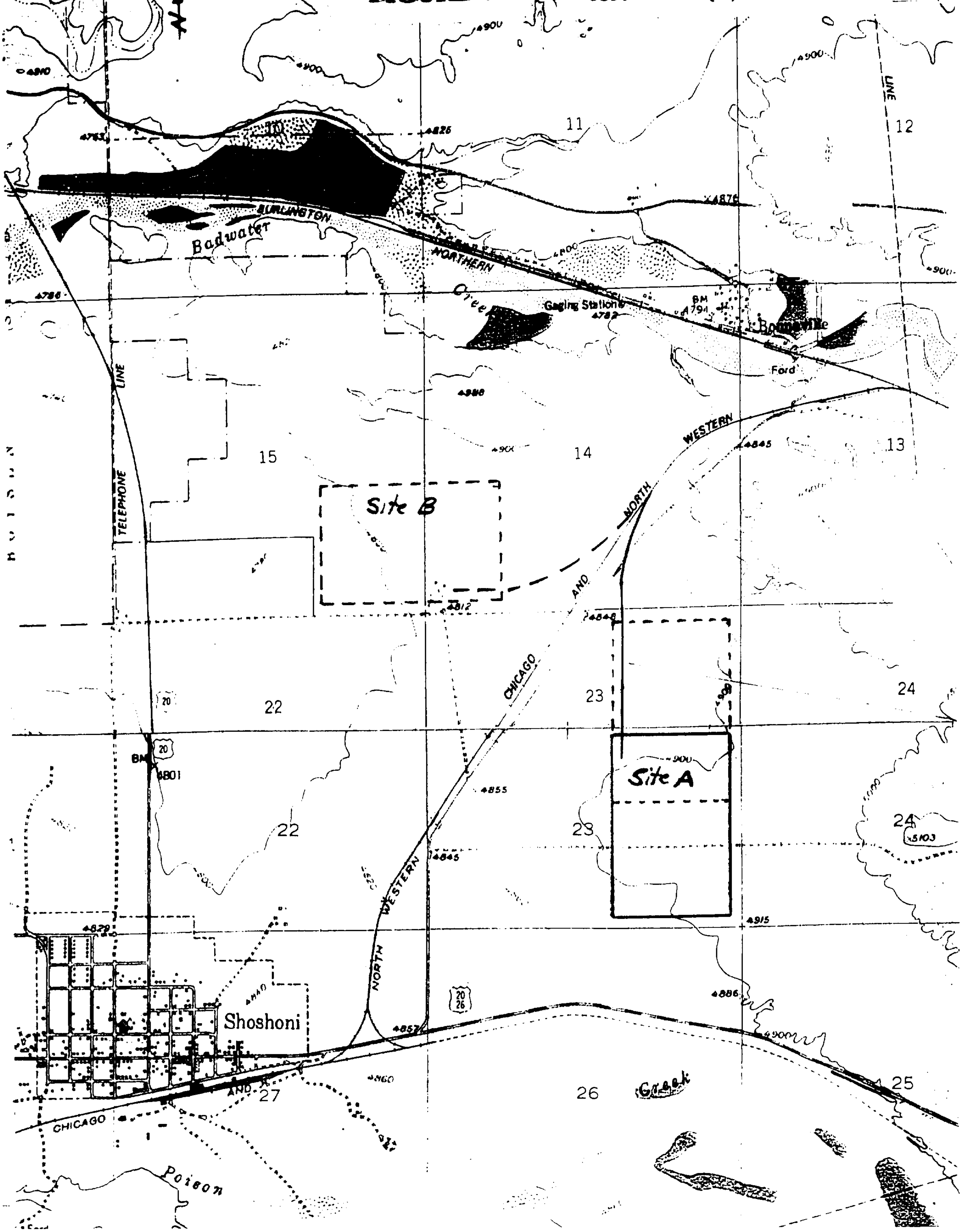
1 MILE

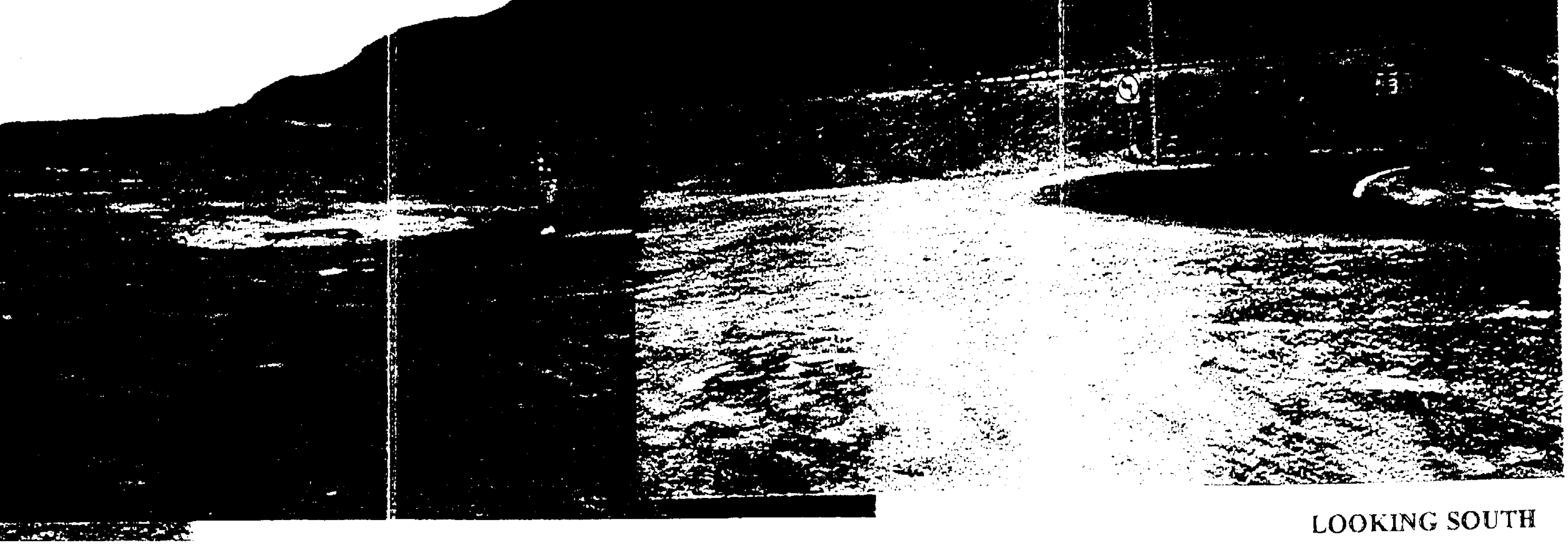
7000 FEET

KILOMETER

UTAH

FIGURE 4 05996.01-W(D)-1-REVISION 0





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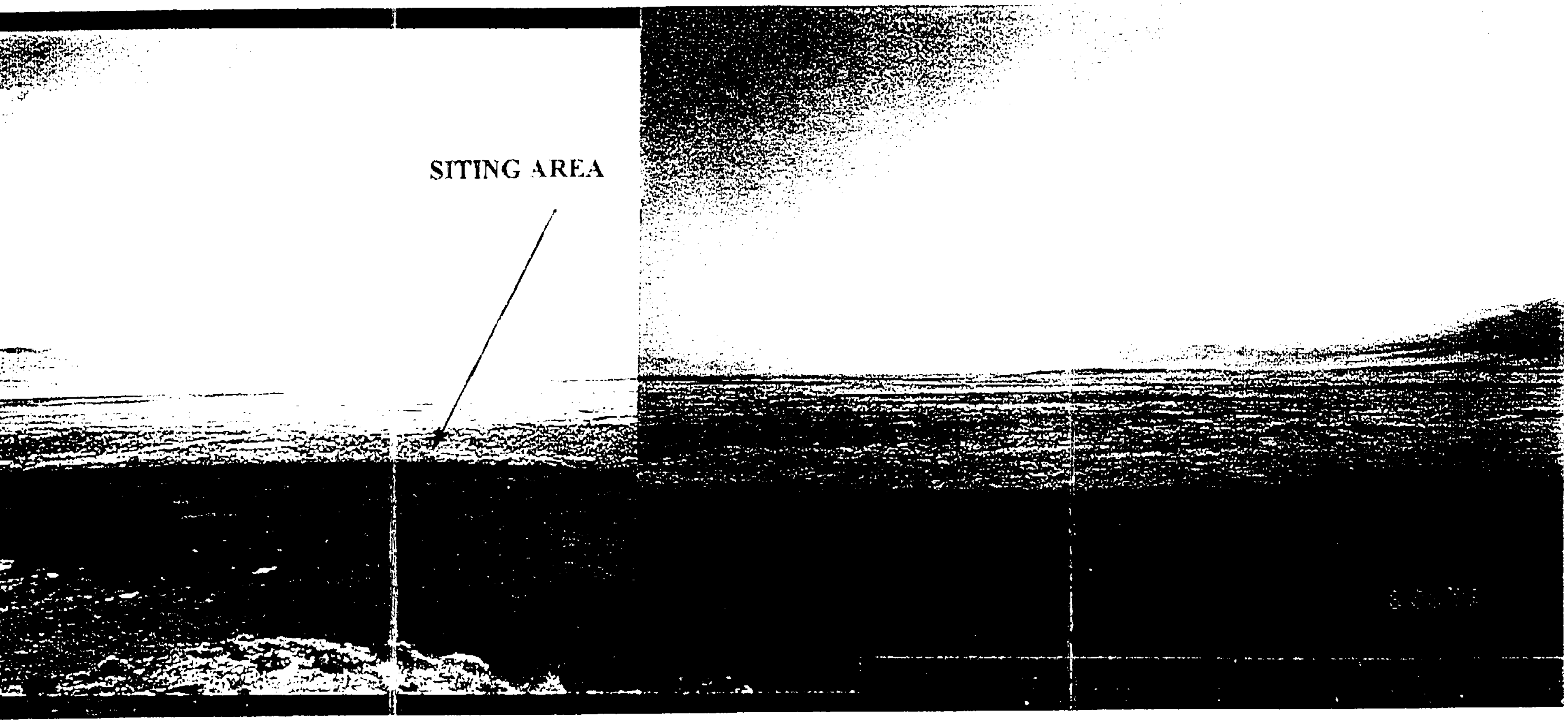
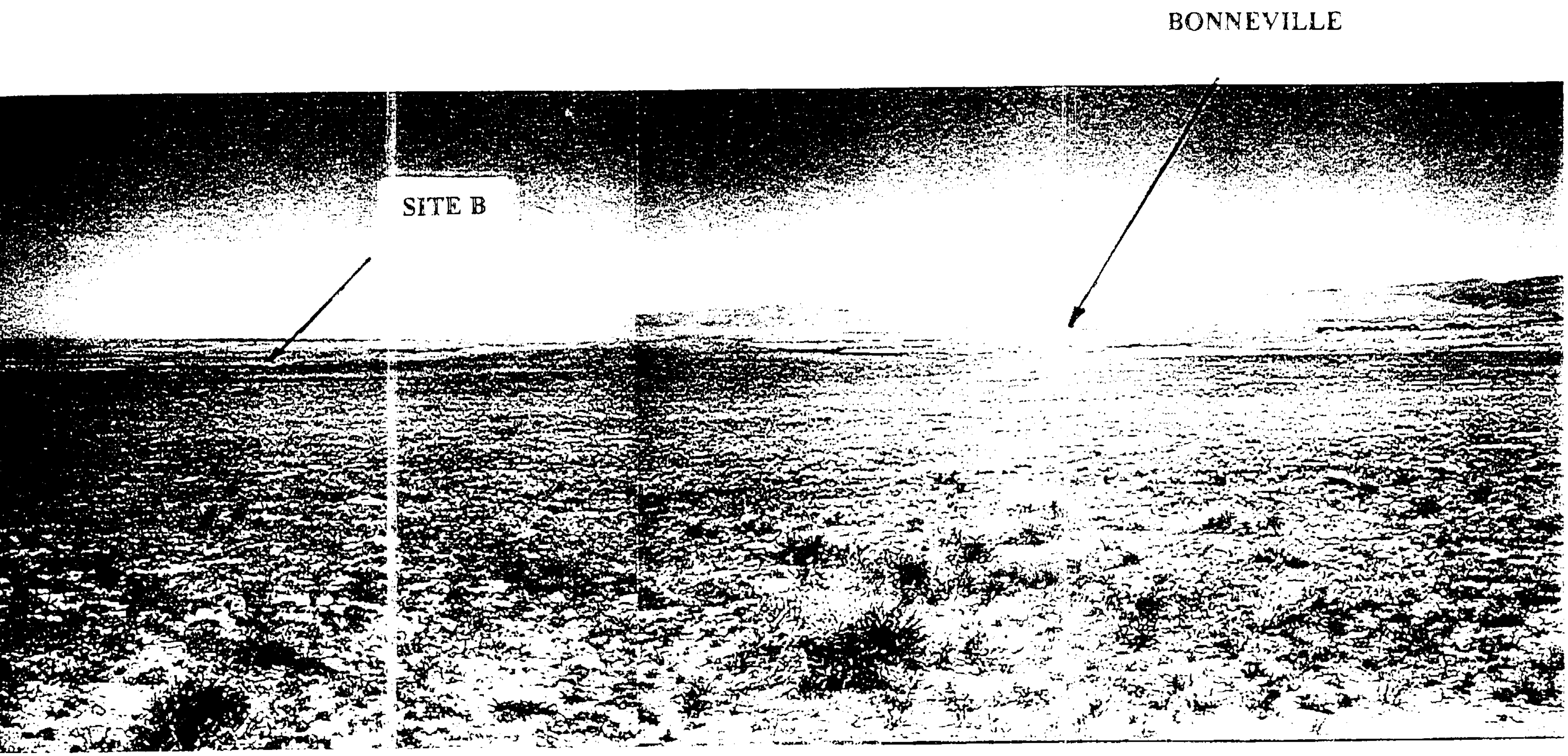


LOOKING NORTH



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