JUSTIFICATION
FOR WAIVER OF
LANDOWNERSHIP REQUIREMENT

URANIUM MILL TAILINGS DISPOSAL AREA

Prepared for:

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1.0 INTRODUCTION

The Anaconda Copper Company is requesting an exemption from the uranium mill licensing requirement that the ownership of the tailings disposal site be transferred to the state or federal government. Anaconda is requesting this exemption because the ownership of the proposed disposal site does not reside with Anaconda. The land is leased by Anaconda for mining purposes only. Future use of the land will revert to the owner after mining and reclamation ceases. The justification for the request for exemption is based on Anaconda's proposal to return the tailings from the mill to the mine pit in the same relative stratigraphic position as the ore was mined. This method of disposal is the "prime option" of the Nuclear Regulatory Commission.

The surface emanation of radon-222 is the primary concern of tailings disposal. Radon emanation is expected to be approximately equal to or less than the pre-mining background measurements at the time the land reverts to its pre-mining use. Over the long term, radon emanation will diminish because of the removal of uranium from the ore-bearing sediments.

2.0 PROPOSED ACTIVITIES - GENERAL

The location of the main ore body is shown on the topographic location map (RRA-2) in the appendix. Dashed lines enclose areas of additional ore which may or may not be mined. The ore-bearing material to be mined is 586,600 bank cubic yards. Overburden quantity is 21 million bank cubic yards.

Presently, Anaconda is considering the use of a conveyor system to handle the removal of overburden. Mining will be done using a combination of dozers, front-end loaders, trucks and a conveyor system to bring the ore out of the pit. Topsoil removal, storage and replacement will be handled by dozers, front-end loaders, and trucks. Trucks will be used to haul ore to the plant and return with tailings from the plant. The tailings will be placed in the pit and spread by dozers to ensure that they are returned to the same stratigraphic location as the original ore.

A tentative schedule for one month of operation is as follows:

a. Mine operations will be on a five day per week, two shifts per day schedule

b. Topsoil removal will take three shifts per month

c. Stripping will use 24 shifts per month

d. Ore removal and associated waste mining will require 13 shifts per month

e. Reclamation will take three shifts per month

After the pit has been filled with overburden, it will be contoured to approximate its original condition. and topsoil will be replaced. Pasture grass will be seeded and after four years the land will be used for cattle grazing.

3.0 SITE DESCRIPTION AND BACKGROUND CONDITIONS

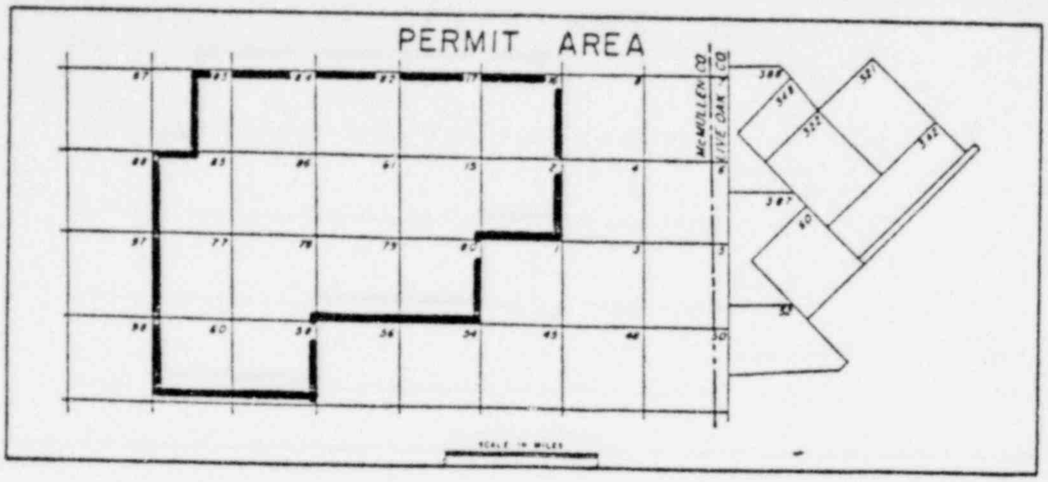
Location, Population, Land Use, History, and Archaeology

Location

The Anaconda Company surface uranium mining and milling operation is located approximately 25 miles southwest of George West, Texas and two miles north of State Highway 624, in McMullen County. There are no schools, churches, population centers or commercial activities within several miles of the project area. Figure 3-1 shows the location of the proposed permit area in relation to the adjacent areas. The closest residence to the permit area is located approximately three miles northeast of the proposed mill site and within the permit area. It is the residence of the ranch foreman for the Lindholm ranch. The next closest residence is approximately seven to eight miles northeast of the permit area.

Population and Land Use

McMullen County is very sparsely populated. With a land area of 1,159 square miles and a population of 800, the population density of the county is less than one person per square mile. With the exception of several small concentrations in Tilden, Cross, and Calliham, the population is fairly evenly distributed throughout the county. When examining changes in the local population growth over the past 20 years, two interesting trends can be noted. Between 1960 and 1970, for example, the county population increased from 1,074 to 1,095--an increase of only 21 persons. Then, during the next five years (1970-1975), McMullen County experienced a sharp decline in population. Between 1970 and 1975 the population had fallen off to 853--a decline of 22.1 percent. Net migration during this period accounted for 20.8 percent of the loss while natural increase (births minus deaths) accounted for 1.3 percent of the loss. According to the U.S. Census Bureau and the Texas Department of Water Resources, the population in McMullen County is not expected to grow during the next 20 years.



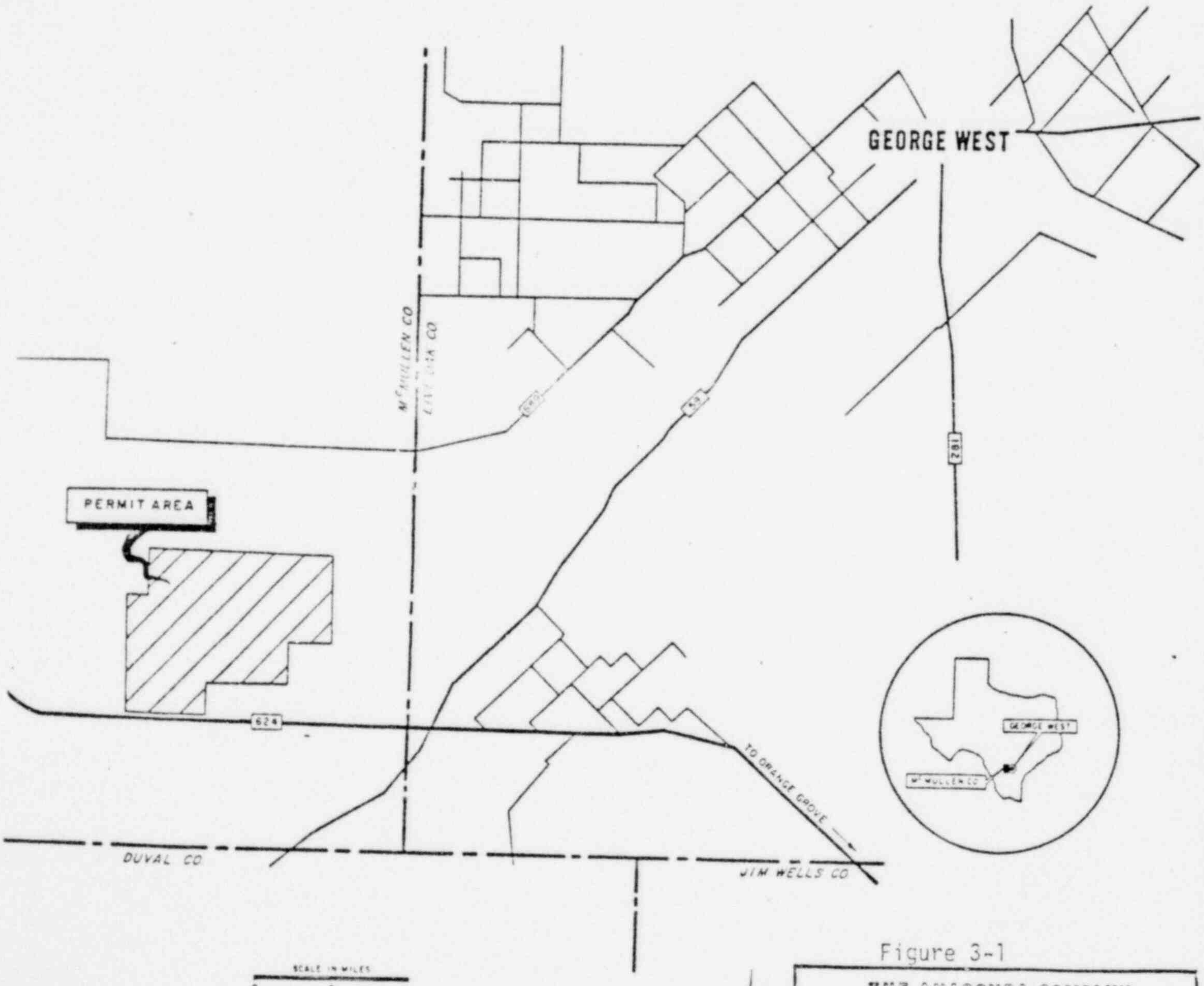


Figure 3-1

THE ANACONDA COMPANY
URANIUM OPERATIONS
CORPUS CHRISTI, TEXAS

RHODE RANCH AREA
McMULLEN COUNTY, TEXAS

VICINITY MAP

DRAWN BY: D. HAAS	APPROVED BY: R. H. Ford	SCALE AS SHOWN
DRAWING NO. RR-VPI		DATE 4-23-79
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Projections show the population tapering off to 800 by late 1980, and remaining at this level through the year 2000. Finally, the population distribution is also expected to remain unchanged within the county during the next 20 years.

Land use in McMullen County can be divided into three major types: 1) dry cropland, 2) forest land, and 3) rangeland. As Figure 3-2 shows, rangeland is by far the single largest land use in the county, accounting for approximately 78 percent of the land. Dry cropland farming is the second largest land use covering roughly 21 percent of the land area, and forest makes up the remainder. According to projections made by the Texas Department of Water Resources, the present land use in McMullen County will, for the most part, remain unchanged through the year 2000.

The land in the permit area is used as pasture for cattle. Approximately ten percent of the area is under an active brush control practice. Approximately three percent is in improved pasture grass and the rest is covered with native brush. Deer, quail, and dove are hunted during open season. Public access to the area surrounding the permit site is limited by means of locked gates and fencing.

Historic, Scenic, Cultural, and Archaeological Significance of the Site

In determining whether the proposed mining operation will affect any sites or structures having historic, cultural, scenic, or archaeological significance, CDM reviewed the National Registry of Natural Landmarks and the Texas Historical Commission's records. A thorough review of the records has shown that there are no sites or structures (fitting the criteria for inclusion in the National Register of Historic Places) within or adjacent to the Anaconda lease. To date, only one site in McMullen County has been found which qualifies for inclusion in the National Register, namely Mustang Branch.

The Texas Historical Commission nominated the Mustang Branch Site 41 MC 163, Calliham, McMullen County for inclusion in the National Register, and it

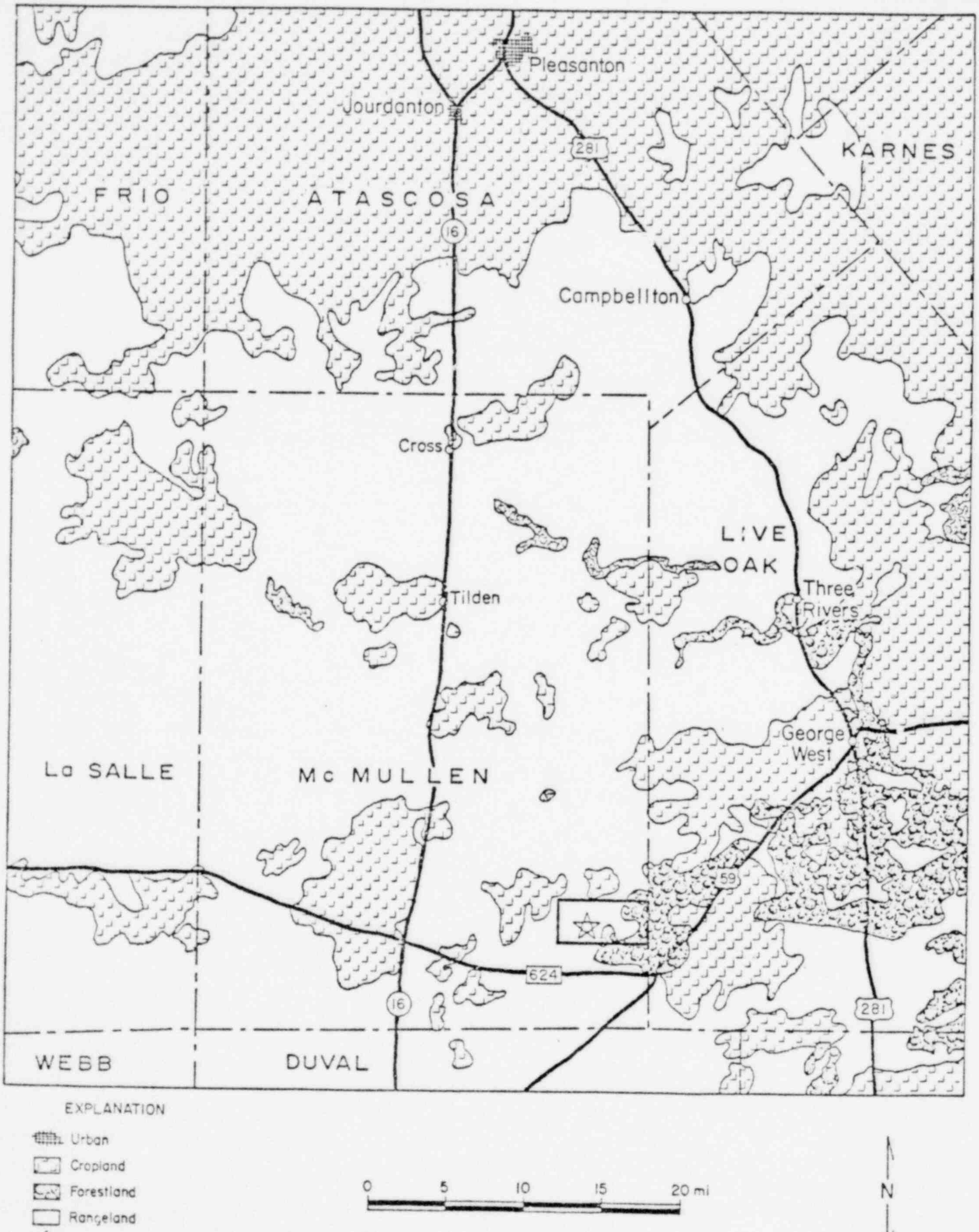


Figure 3-2 Land Use

was officially entered on August 10, 1978. The site is located 30 miles northwest of the Anaconda lease (Figure 3-3). The site is currently located on private land, but public acquisition is in progress. According to the Texas Historical Commission, the Mustang Branch site contains artifacts from the aboriginal people who occupied this area from 4000 B.C. to 1400 A.D. The records do not show the existence of any other sites or structures within or adjacent to the Anaconda lease which are being considered for inclusion in the National Register of Historical Places.

Biology

Vegetation

Eight identifiable vegetative assemblages were found in the Rhode Ranch area. These eight assemblages are as follows:

a. Cenizo-Blackbush-Guajillo Upland Shrub
b. Mesquite-Lime Prickly Ash-Mescal Upland Shrub
c. Whitebush-Blue Sage-Snakewood Terraces
d. Mesquite-Whitebush-Guajillo Ravine Flats
e. Improved Buffelgrass Pastures
f. Native Pastures and Right-of-Way (Predominant species found were grama grasses, three-awn grass, and buffalo grass)
g. Roadsides and Senderos (Predominant species found were love grass, cow-pen daisy, prairie tea, and windmill grass)
h. Windmill, Cistern and Cattle Tank Sites (Predominant species found were large mesquite, sugar berry, huisache, and Texas persimmon trees)

Although all eight of the above assemblages occur in the proposed mine area, the upland shrub and native pasture assemblages account for 90 percent of the vegetative cover.

Figure 3-3 Mustang Branch Archaeological Site

Mustang Branch Site — Anaconda Lease

Species diversity on the mine site is fairly high; a total of 195 vascular plant species were identified.

Fauna: Small Mammals

Small mammals were collected in five different habitat types. The five habitat types that occur on the mine site are: Mesquite Brush, Grass Brush, Scrub Brush, Low Brush and Rangeland Pasture. The scrub brush habitat covers the greatest area on the site and is the most productive for small mammals with a mean of 15 individuals per 100 trap-nights. The low brush is the next most productive (mean = 14/100 trap-nights) followed by grass brush (mean = 12/100 trap-nights) and mesquite bush (mean = 9/100 trap-nights). The rangeland pasture yielded the lowest trapping rate, averaging 5/100 trap-nights. This implies that the scrub brush habitat had the highest density of small mammals per acre and rangeland pasture the lowest.

Fauna: Big Game

Deer graze freely the entire site and will not be restricted from the mine area. The big game study surveyed the deer population on the project site by examination of pellet groups. Densities of White-tailed Deer varied from 0.01 per acre in low brush to 0.05 per acre in rangeland pasture (6.4-32.0/square mile). The average density was 0.03/acre on Rhode Ranch. The estimated population for the entire lease area was 17.7/square mile.

Domestic Animals

Cattle are the only commercial domestic animals in the project area. Although they will be restricted from grazing in the mine area, grazing will occur in adjacent areas.

Cattle herds are entirely composed of cow-calf operations based on crossbred (Brahma X) cows. Calving percentage in these herds has been 90 percent based on calves shipped at 400-450 lbs. Forage value has been good enough on native grass pastures to produce these calf weights in 240 days or 29.8 to 33.5 pounds shipped per acre.

Carrying capacity of this grazing land is generally considered to be 12-15 acres per cow or 0.07-0.09 cows per acre.

Soils

The soils at the Anaconda site have been classified into nine soil series types. These series are shown on Figure 3-4 in the Appendix. Five of the series at the site are considered suitable for reclamation throughout the 60-inch depth analyzed. The lower horizons of the remaining four types (Monteola Clays, Dant Clay Loams, Clareville Clay Loams, Tordilla Clays) are not suitable due to chemical deficiencies. The upper horizons of these soils are suitable seedbed material if kept separate from the lower horizons when they are removed prior to mining. In the projected mining area of the site (outlined in dotted lines on the soils map) only 10-15 percent of the area contains these four soil types. Anaconda will not use these four unsuitable soil types for reclamation purposes.

Contour and Drainage

A topographic map of the site is shown in Figure RRA-2 (Appendix). The proposed mining areas have a very slight ground slope. The southwest mining area has a southwest to northeast slope of approximately two percent while the northeast mine area has a slope of approximately one percent. All drainage from the mine areas is presently natural. Any new roadways which are made on the site will be such that the natural drainages are disturbed to a minimum extent possible. As shown in Figure RR-VP-8 (Appendix), diversion dikes and runoff control dikes will be constructed around the mining area and the overburden stockpile area. The channeling of surface runoff for Phase I of the mining operation will be as shown in Figure RR-VP-4 (Appendix). All runoff from the plant process area, cleanup area, and ore and tailings storage areas will be transferred to the site collecting pond and this pond water will be used as make-up water in the mill processing circuit. Figure RR-E5 (Appendix) shows the control and handling of plant area drainage.

Annual average rainfall is 20-25 inches at the nearest weather station at Beeville, Texas, 50 miles northeast of the mill site. The 10, 25, 50, and 100-year maximum 24-hour rainfall for McMullen County is 7.0, 8.2, 9.2, and 10.7 inches respectively. The runoff which would occur during the periods of maximum rainfall would be conveyed by the natural drainages, with some small temporary overflow in certain portions of the site. No sheet flooding would be expected to occur. All diked, bermed, and holding pond areas have been designed to contain a maximum 24-hour rainfall of 13.1 inches. Therefore, the project site would not suffer severe damage from the maximum 24-hour rainfalls shown above.

Geology

History, Sedimentology and Structure

The area under consideration is located within the regional outcrop of the Oakville formation. This unit consists of thick (30 to 60 feet) interbedded sands, clays and mudstones. These fluvial sediments were deposited uncomformably on top of the Catahoula formation during a Miocene regression of the Gulf of Mexico. Rapid deposition of large amounts of sediment on the coastal plain caused the formation of broad alluvial sheets.

Compaction of this large clastic wedge has caused many growth faults that trend northeast/southwest. One of these inactive down-to-the coast fault zones is present approximately one-half mile southeast of the mine area. It consists of several intermingled growth faults in a zone about one mile wide with a cumulative throw of 250 feet.

Stratigraphy

Due to erosion and surface topography, only the lowermost 120 to 250 feet of the Oakville formation is present and locally has been called the Lower Oakville Sand.

In general, the sands of the Lower Oakville are crossbedded and moderately well-graded, tending to be dominantly medium-grained. They are composed mostly of granitic-type silicates and chert. Consolidation ranges from loose, highly permeable aggregates to impermeable, carbonate cemented rock. Small chert pebbles and granules are common in the basal zones.

Both the clays and mudstones are montmorillonitic. The clays are blocky and occasionally contain bentonitic or carbonate lenses. The mudstones often trend more toward argillaceous silt. The silt grains are of similar composition to the sand grains. The mudstones and clays within the zone of surface oxidation (40 to 60 feet deep) contain abundant gypsum which locally may represent up to ten percent of the unit.

On the site, the Lower Oakville Sand has been divided into three subunits by Anaconda (see Figure RRS-20A in the Appendix). These are the Magnolia, the Manuel and the Rincon. The Magnolia is the uppermost unit and is composed of mudstone and silt. The Manuel and Rincon are the next two units in succession with the Rincon lying uncomformably on the Catahoula Clay. Both the Manuel and Rincon consist of a clean sand unit and its overlying clay, each of which is 20 to 35 feet thick. As is shown in Figure RRS-20A, the majority of the roll-front uranium is in a 3 to 12 foot zone in the Manuel Sand, however, there is also considerable mineralization in the Rincon Sand. Mining will remove the uranium from both sands.

Seismology

A review of the seismic history of Texas has shown that the state very rarely experiences damaging earthquakes. According to the records of the Coast and Geodetic Survey, 17 earthquakes ranging in intensity from V to VIII, as measured by the Modified Mercalli Intensity Scale of 1931, were recorded in Texas since 1882. Based on the Modified Mercalli Scale, earthquakes with intensities of I through VI cause varying degrees of relatively minor damage. Localized moderate damage can be expected from earthquakes which register an intensity of VII, while an intensity of VIII can cause major damage. The highest intensity on the scale is XII. An earthquake of this magnitude could cause serious and relatively widespread damage, depending on where it occurs.

Figure 3-5 shows the respective location, strength, and date of each earthquake (with intensities of V and greater) that have occured in Texas since 1882. As can be seen from the figure, only two of the 17 earthquakes had intensities greater than VI. The strongest earthquake occured in West Texas on August 16, 931 and the second strongest occured in East Texas on January 8, 1891. Figure 3-5 further shows that in South Texas (where Anaconda's proposed mine site is located), no earthquakes with intensities of V or greater have been recorded since 1892. The stability of South Texas (i.e., the absence of damaging seismic activity) is further shown in Figure 3-6. As Figure 3-6 shows, a large portion of Texas lies in zone 0 where no damage is expected to be experienced from earthquakes.

Hydrology

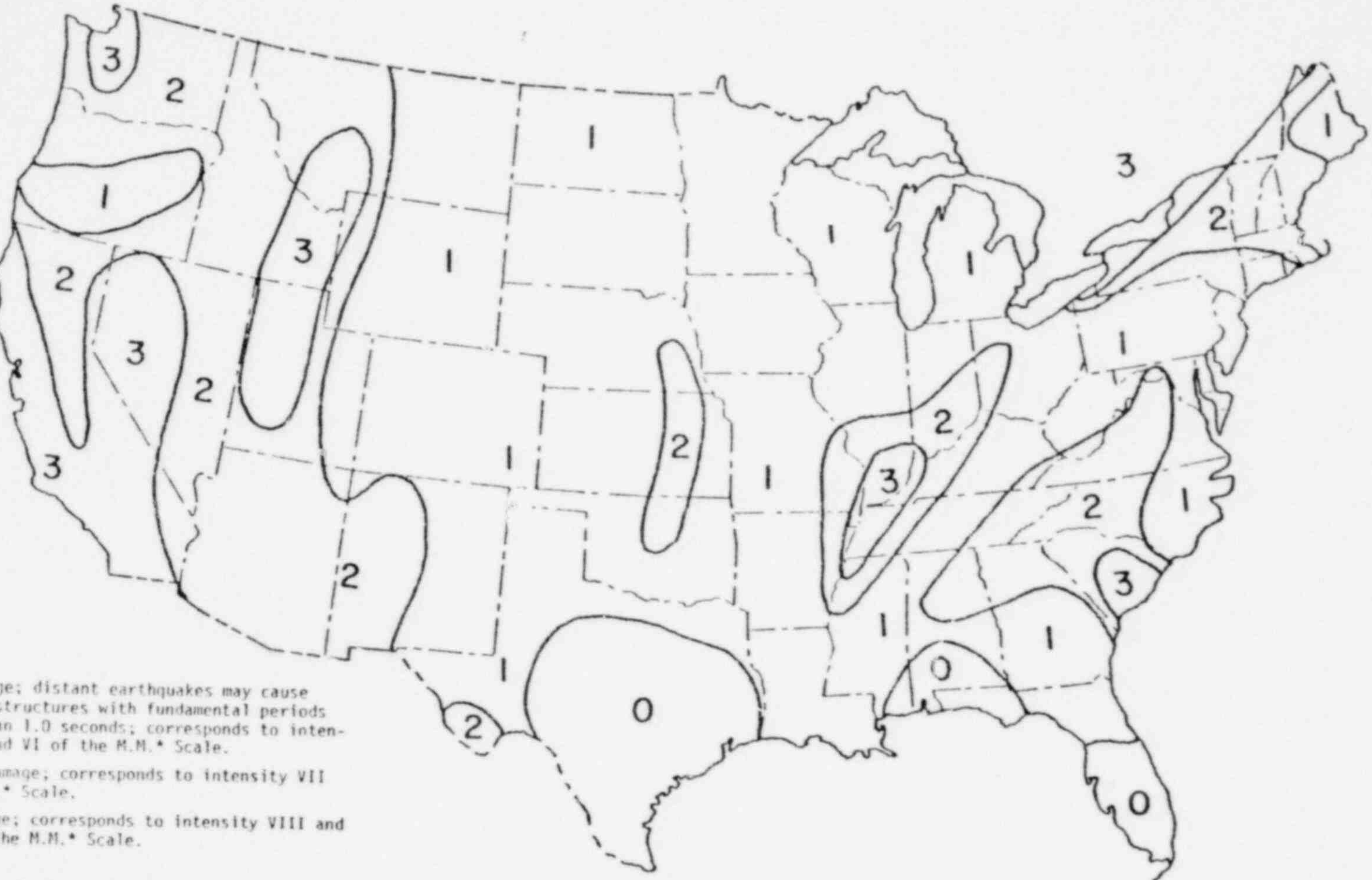
Ground Water

The Oakville Formation from which the uranium will be recovered is nonwater-bearing within the proposed mine and mill area. Several hundred wells have been air-drilled within this area, and none of them encountered water. The first ground water encountered is in lenticular sands of the Catahoula Clay several hundred feet below the ore zones. The ground water of these deeper aquifers is mineralized, nonpotable, and often contains hydrocarbon gases. One well drilled by Anaconda in this area had to be abandoned when the water tested a mineral content of 6,200 mg/l of total dissolved solids and continued to blow hydrocarbons. The gas and water were produced from one or more sands in the interval from 550 to 1,100 feet beneath the ground surface.

The upper sediments of the Catahoula Clay occur as massive beds of clay that form a thick aquiclude between the ore zone and the lower aquifers. The low permeability of the clay beds of the Catahoula is shown by the analyses of several representative core samples (Table 3-1). There is therefore no vertical movement of ground water from the Oakville to the Catahoula.

Intensity is Modified Mercalli Scale

Figure 3-5 Texas Earthquakes



Zone 0 - No damage.

Zone 1 - Minor damage; distant earthquakes may cause damage to structures with fundamental periods greater than 1.0 seconds; corresponds to intensities V and VI of the M.M.* Scale.

Zone 2 - Moderate damage; corresponds to intensity VII of the M.M.* Scale.

Zone 3 - Major damage; corresponds to intensity VIII and higher of the M.M.* Scale.

This map is based on the known distribution of damaging earthquakes and the M.M.* intensities associated with these earthquakes; evidence of strain release; and consideration of major geologic structures and provinces believed to be associated with earthquake activity. The probable frequency of occurrence of damaging earthquakes in each zone was not considered in assigning ratings to the various zones.

*Modified Mercalli Intensity Scale of 1931.

Seismic risk maps. Because of the relatively short recorded history of seismic events in the United States; such maps can give only a rough idea of the long-term hazard. The maps are based on the actual occurrence of earthquakes and major geologic structures and provinces, but do not consider local physical conditions. No common time-scale is implied; actually, major earthquake damage would not be expected to occur as frequently in an East Coast Zone 3 as in a West Coast Zone 3.

Figure 3-6 Seismic Risk Map of the United States

Table 3-1 to be provided by Anaconda

Two to five miles east of the mine and mill area, the Oakville yields small amounts of slightly mineralized water to stock wells (Anders & Baker, 1961). This area is separated from the prospective mine area by several small faults amounting to a total of approximately 200 feet of displacement. This displacement, added to the regional dip of the beds, places the water-bearing Oakville sands approximately 200 to 300 feet lower than the equivalent sands in the mine area. The potentiometric surface of the Oakville aquifer, as measured in one well approximately two miles downdip from the nearest boundary of the prospective mine area, was 150 feet above mean sea level (305 feet below surface). The base of the ore-bearing Oakville sands ranges from 355 to 405 feet above mean sea level, about 205 feet above the saturated zone.

The nearest pumping test to the proposed mine area was conducted ten miles to the northeast on property formerly owned by the parent company of Anaconda Copper Company. The pump test occured in 1976 in conjunction with a solution mine project (Reed & Assoc.). The results indicated a transmissibity ranging from 1,530 gpm/foot to 6,370 gpm/foot, and a storage coefficient ranging from 0.013 x 10^{-3} to 5.4 x 10^{-3}. This variability is typical of the Oakville sands.

Not enough data are available at this time to determine if the downdip Oakville section in Live Oak County has one, two or three separate aquifers A preliminary hydrologic investigation (Reed & Assoc., 1977) suggested that more than one aquifer probably existed in this area, but the investigation in the mine area (updip) found the Oakville unsaturated.

The aquifers in the Catahoula formation are lenticular and generally have small yields from thin sands. One well located west of the proposed mine area reportedly yielded 60 gpm from a depth of 700 feet (Devil's Water Hole). Electric log control on oil and gas tests indicate that there is not any well-developed or widespread sand within the Catahoula mine area. Water from all of the wells is mineralized with none containing water that would be classified as fresh by USGS standards (<1,000 mg/l dissolved solids). The arsenic content was above drinking water standards from two wells. From 100 to 400 feet of sediments, primarily clay, separate the base of the Oakville ore-bearing zone from the stratigraphically equivalent water-bearing beds of the Catahoula. See Exhibit RRS-20A (Appendix) for typical logs of the area.

As the Oakville in the proposed mine area is above the saturated zone, the question arises whether Oakville formation is located within the recharge zone. Based on the wells drilled, and one exploratory pit within the mine area, it does not appear to be an active recharge area. This may be accounted for in part by the low permeability of the lower Oakville sandstone at the outcrop. The sand is cemented into a sandstone that is resistant to erosion, forming a westward sloping cuesta at the outcrop. The low rainfall in the area would also contribute to slow recharge. It cannot be ruled out that recharge may be occurring at a very slow rate, but if so, it would gravitate to the more permeable lower levels of the formation. The movement through the tailing zone would go from an oxidizing to a reducing condition and any metals solubilized should return to a natural condition. It must be emphasized that movement of recharge through this zone has not been observed and if it does occur, it probably moves in selected zones of lowest elevation.

None of the ground water either in the Oakville or the Cathoula of this area is utilized for human consumption.

Surface Water

Within the proposed mine area there are no permanent watercourses. The drainage ways are very shallow and are not generally well developed. Because of the low rainfall (23 inches annually), a xeric flora develops along the drainage instead of the expected riparian type of flora. Where the drainage crosses areas of low relief, the streams deposit sediments during rainfall. Such areas can be observed in north-east part of Section 81 and the southeast part of Section 58.

Three farm ponds are located within the proposed mine area that are fed by surface runoff. One goes dry very soon after an extended dry period. The other two are subject to drying during a drought.

4.0 BACKGROUND RADIOLOGICAL AND NON-RADIOLOGICAL CHARACTERISTICS

Anaconda has conducted extensive sampling throughout the project site to determine the background, or baseline, levels of radiological and non-radiological concentrations in various parts of the environmental biosphere. The following data have been obtained: 1) gamma dose rate survey measurements at the potential mill site, mining area and other locations in the permit area 2) radiological and heavy metal profiles for subsurface soils at the tailings disposal area and other locations at the site 3) surface radon-222 emanation rates at nine locations 4) ambient radon-222 gas concentrations at four sites 5) total suspended particulate matter (TSP) determinations at three sites and continuous low-volume air particulate sampling at four sites 6) measurement of radiological and heavy metal concentrations in representative food pathway biota.

Results are summarized in the following sections. Figures 4-1 and 4-2 in the appendix show the site locations where the above sampling has been carried out.

Gamma Surveys

Gamma radiation level surveys have been carried out at various locations on the hodagraph at the potential mill site, at the low-volume air sampling stations, and in the proposed mining areas. Figure 4-3 shows the locations where measurements were taken. Table 4-1 presents the gamma survey readings at these locations. Extensive gamma readings at over 200 points are currently being made in the proposed mine areas. The data will be available in about two weeks.

The annual gamma dose rate readings at the project site are about twice the U.S. natural background dose rate. However, the gamma readings at the Anaconda site are consistent with readings obtained throughout the uranium regions of the western U.S.

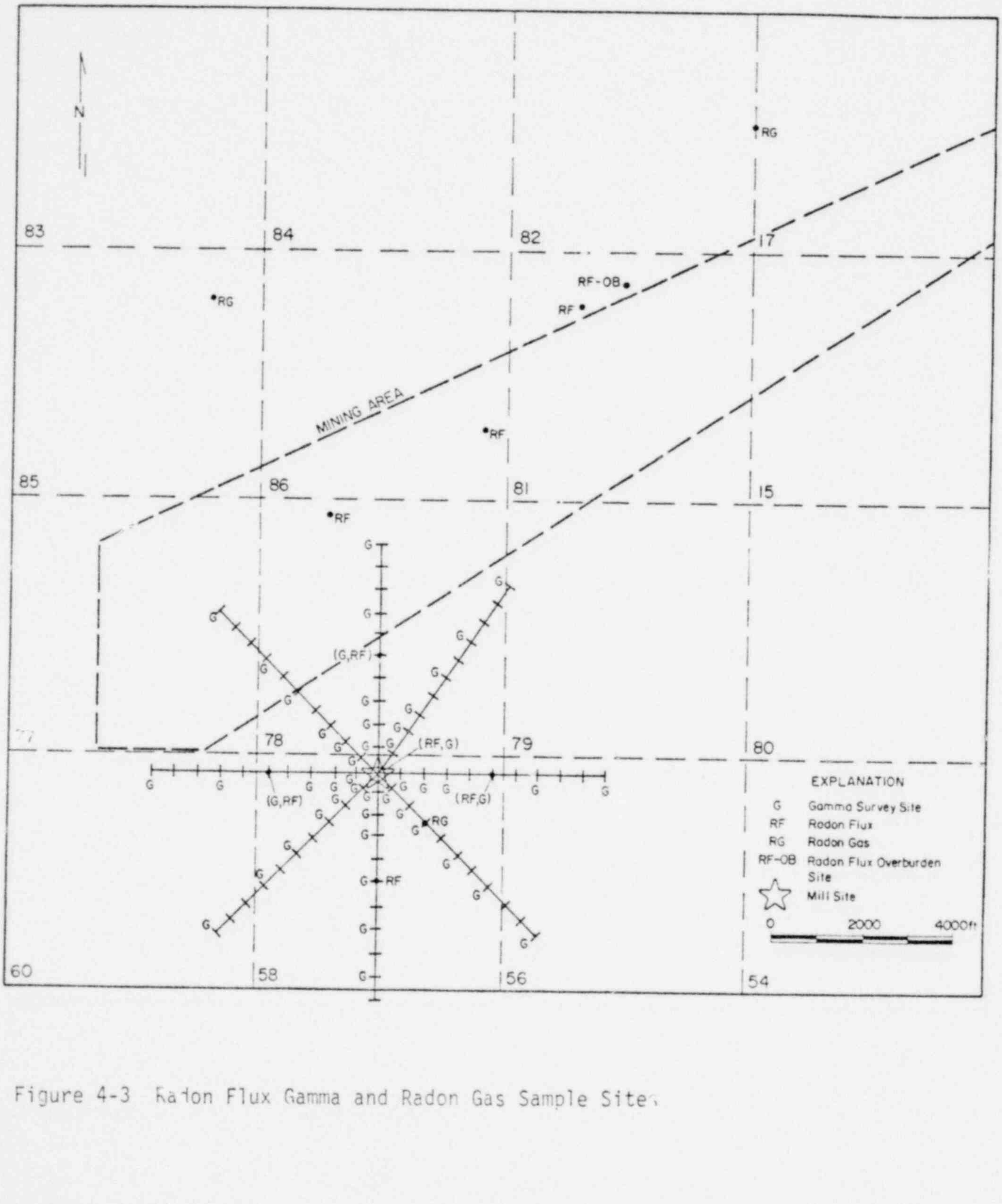


Figure 4-3 Radon Flux Gamma and Radon Gas Sample Sites

Table 4-1 Gamma Survey Readings

	mrem/hr	mrem/yr.
Mill Site	0.019	149
Low-Volume Air Sampling Sites	0.020	154
Section 86 Mine Area	0.015	116
Section 86 Overburden	0.012	93
Natural Background Dose Rate, U.S.	0.013	102

Subsurface Soil Radiological and Heavy Metal Profiles

To obtain radiological data on the overburden, the walls of the exploration pit shown on Exhibit RRA-2 were sampled and analyzed. The results of the analyses of soil and overburden samples are shown in Table 4-2. The radium content of the soil is almost as great as in any of the overburden except for the associated waste that immediately overlies the ore zone at 59 feet. The ore was located at 63 feet in this pit.

Heavy metal analyses were conducted on cores from two wells that penetrated the main ore body. The location of these wells is shown on Exhibit RRA-2 in the appendix. The overburden above the ore is an oxidized zone except for the associated waste. The results of the analyses for heavy metals are tabulated on Tables 4-3 and 4-4. Heavy metal and radiological results from the six wells cored into the Catahoula section are shown on Table 4-5.

Radon Flux

Measurement of radon-222 emanation (radon flux) from the ground was carried out at nine sites in the project area. Twenty-four-hour samples were obtained during October and November of 1979. Figure 4-3 presents the locations of radon flux measurements. Table 4-6 presents the values obtained at the nine sites. Additional measurements will be carried out at these same sites during the spring of 1980.

Ambient Radon-222

Ambient radon-222 concentrations are being measured at four sites in the project area. Table 4-7 presents the data at these four sites for the period July 2[illegible], 1979 through July 23, 1980. Figure 4-1 in the appendix shows the location of these four sites.

Radiological and Heavy Metal Concentrations in Representative Food Pathway Biota

Gross alpha, gross beta, and radium-226 values in vegetation and small mammals were all below normal expected levels (Texas Department of Health). No values for cattle are available at this time.

Table 4-2 Radiological and Molybdenum Concentrations in Overburden from Exploration Pits*

SAMPLE NUMBER	CLIENT ID	U_3O_8 %	EU_3O_8** %	Mo ppm	Ra-226 pCi/g
1	Topsoil pile				2.34 ± 0.52
2	Exp. Pit 7 feet				0.97 ± 0.038
3	Exp. Pit 13 feet				0.94 ± 0.33
4	Exp. Pit 20 feet				1.58 ± 0.50
5	Exp. Pit 24 feet				2.62 ± 0.56
6	Exp. Pit 29 feet				1.78 ± 0.49
7	Exp. Pit 49 feet				1.46 ± 0.47
8	Exp. Pit 52 feet				0.07 ± 0.36
9	Exp. Pit 59 feet	0.005	0.002	66	5.15 ± 0.74

*Analyses performed by Core Laboratories

**% U_3O_8, measured by closed can gamma

Table 4-3 Overburden Analyses Data[1] (Well No. 81-28-7.5c)

Sample No.	Core Depth (Ft.)	Lithology	Chemical %U_3O_8	%EU_3O_8***	PPM MO*	PPM CU*	PPM AS*	PPM SE*	PPM V*	PPM CR*	PPM B*
40	25-27	Clay, Sdy	.003	.003	<5	21	13	11	66	26	626
41	53-56	Sand, Oxid	.003	.001	7	24	9	9	37	28	393
42	64-66	Clay, Silty	.002	.005	<5	15	45	15	62	20	476
43	81-83	Clay	.003	.004	<5	20	12	11	57	30	367
44	105-107	Sandstone, Reduced	.008	.009	555	17	23	14	26	16	567
45	131-133	Clay	.009	.003	5	21	14	9	103	41	407

Sample No.	PPM CA*	PPM MG*	PPM NA*	PPM MO**	PPM CU**	PPM AS**	PPM SE**	PPM V**	PPM CR**	PPM B**	PPM CA**	PPM MG**	PPM NA**
40	86,700	3,310	11,200	<0.1	<0.1	<0.1	0.1	<0.4	<0.1	8	1210	85	308
41	83,000	1,920	10,900	<0.1	<0.1	<0.1	<0.1	<0.4	<0.1	7	65	6	190
42	98,000	6,450	9,450	<0.1	<0.1	<0.1	<0.1	<0.4	<0.1	8	11	2	271
43	69,800	10,200	4,920	<0.1	<0.1	<0.1	<0.1	<0.4	<0.1	7	17	3	194
44	53,000	1,170	9,010	15	<0.1	<0.1	0.1	<0.4	<0.1	6	35	28	92
45	67,200	8,640	4,970	0.5	<0.1	<0.1	<0.1	<0.4	<0.1	6	16	3	108

Sample No.	pH	Salinity Mg/L	%CL	%Total Sulfur	%Pyrite Sulfur	%Sulfate Sulfur	%Org. Sulfur
40	7.88	2,110	768	1.47	< .01	1.47	< .01
41	8.44	557	300	.02	.01	.01	< .01
42	8.29	755	271	.72	.64	.08	< .01
43	8.24	973	124	1.23'	1.06	.04	.13
44	8.38	576	72	.89	.69	.05	.15
45	8.31	896	87	1.41	1.28	.04	.09

*Total Metals
**Available Metals, ***As Closed Can Gamma
[1]All analyses by Core Laboratories, Inc., Corpus Christi, Texas

Table 4-4 Overburden Analyses Data[1] (Well No. 78-3-15.5C)

Sample No.	Core Depth (Ft.)	Lithology	PPM CR***	PPM B***	PPM CA***	PPM MG***	PPM NA***	PPM MO***	PPM CU***
30	12-15	Clay, Oxid	34	1,200	7,300	18,700	8,700	< 5	25
31	33'5"-36'4"	Clay, Oxid	31	861	102,000	10,700	7,370	< 5	20
32	43'9"-45'9"	Sandstone,Oxid	15	1,070	171,000	3,580	9,590	10	10
33	52-55	Clay, Silty	22	667	86,500	5,700	12,800	15	11
34	62-11"-64'10"	Sand, Hard	28	838	93,400	2,590	9,900	10	22
35	83-86	Sand, Gray	22	1,330	110,000	1,770	14,100	21	14
36	110-112'10"	Clay, Silty	27	355	88,800	6,670	7,550	5	16

Sample No.	PPM AS***	PPM SE***	PPM V***	pH	Salinity MG/L	PPM CL	%Total Sulfur	%Pyrite Sulfur	%Sulfate Sulfur	%Org. Sulfur	%U308
30	103	14	67	7.83	3,850	1,460	.14	.01	.08	0.06	.002
31	96	14	83	7.95	3,340	949	2.66	.01	1.26	1.39	.002
32	44	18	50	7.91	1,920	199	1.11	0.15	0.57	0.39	.002
33	46	14	57	8.42	1,020	498	1.81	1.15	0.13	0.53	.002
34	85	13	46	8.38	653	189	1.27	0.85	0.09	0.33	.004
35	28	10	34	8.24	1,200	90	1.23	0.85	0.09	0.19	.003
36	52	11	55	8.39	774	226	1.66	1.46	0.05	0.15	.004

Sample No.	%EU308**	PPM MO*	PPM CU*	PPM AS*	PPM SE*	PPM V*	PPM CR*	PPM B*	PPM CA*	PPM MG*	PPM NA*
30	.001	<0.1	<0.1	3	0.1	<0.4	<0.1	32	185	48	968
31	.005	<0.1	<0.1	2	<0.1	<0.4	<0.1	17	497	58	743
32	.003	0.1	<0.1	2	<0.1	<0.4	<0.1	56	821	66	386
33	.001	3	<0.1	2	<0.1	<0.4	<0.1	22	39	11	568
34	.001	1	<0.1	3	<0.1	<0.4	<0.1	29	34	10	313
35	.002	<0.1	<0.1	1	<0.1	<0.4	<0.1	39	362	37	187
36	.002	0.1	<0.1	<1	<0.1	<0.4	<0.1	7	21	7	388

1 All analyses by Core Laboratories, Inc. Corpus Christi, Texas

**As Closed Can Gamma ***Total Metals

*Available Metals

Table 4-5 Radiological and Heavy Metal Results

Well Core Location and Depth	As µg/g	Se µg/g	Mo µg/g	U_3O_8 µg/g	Ra-226 µg/g ± Precision*	Th-230 µg/g ± Precision
17-9-35; 112'-118'	26	<10	15	12	3.1 ± 1.6	0 ± 2.5
77-26-05; 135'	135	<10	19	5	61 ± 7	2.3 ± 3.2
81-26.5-6.75; 130'-140'	18	<10	9	13	3.2 ± 1.7	2.3 ± 3.2
82-4.25-16.05; 143'	24	<10	8	5	1.0 ± 1.6	1.7 ± 3.0
96-5-44.95; 162'-167'	1	<10	29	10	55 ± 5	4.0 ± 3.8
86-12.25-8; 126'	27	<10	7	8	1.0 ± 1.7	0 ± 2.5

*Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ

Table 4-6 Summary of Radon Flux

SITE	Radon Flux (pCi/m^2/sec. ± precision)(**) Average (*)	Range		
North of mill	0.140 ± 0.008 (6)	0.008 ± 0.002	-	0.318 ± 0.014
East of mill	0.027 ± 0.003 (5)	0.005 ± 0.001	-	0.063 ± 0.006
South of mill	0.022 ± 0.003 (3)	0.011 ± 0.002	-	0.036 ± 0.004
West of mill	0.082 ± 0.007 (6)	0.002 ± 0.0003	-	0.207 ± 0.013
Mill Site	0.021 ± 0.002 (6)	0.006 ± 0.001	-	0.082 ± 0.007
Section 78	0.090 ± 0.009 (3)	0.043 ± 0.006	-	0.123 ± 0.011
Section 81	0.171 ± 0.008 (3)	0.033 ± 0.005	-	0.420 ± 0.021
Section 86	0.121 ± 0.010 (3)	0.060 ± 0.007	-	0.153 ± 0.012
Section 81 (Overburden)	0.776 ± 0.031 (3)	0.438 ± 0.020		1.280 ± 0.043

(*) Number of Samples

(**) Variability of the radioactive disintegration process (counting error) at the 95% confidence level, 1.96σ.

Table 4-7 Ambient Radon-222 Concentrations (pCi/l)

Date	Section* 85	Section 82	Section 58	Section 7
7/24-26/79	0 ± 0.12	0.14 ± 0.19	0 ± 0.23	0 ± 0.10
7/31-8/2/79	0.05 ± 0.16	0.16 ± 0.28	0.21 ± 0.20	0.05 ± 0.12
8/8-10/79	0.24 ± 0.19	0.16 ± 0.14	0.08 ± 0.12	0.16 ± 0.23
8/15-17/79	0 ± 0.10	0.14 ± 0.22	0.05 ± 0.22	0 ± 0.20
9/11-13/79	0.26 ± 0.25	0.21 ± 0.26	0.64 ± 0.32	0.59 ± 0.33
9/17-20/79	0.05 ± 0.14	-----	0.05 ± 0.14	0.32 ± 0.24
9/24-26/79	0.16 ± 0.19	0.11 ± 0.20	0.11 ± 0.17	0 ± 0.11
10/1-3/79	0.47 ± 0.32	0 ± 0.18	0.24 ± 0.20	0.10 ± 0.15
10/8-10/79	-----	0.13 ± 0.18	0.30 ± 0.21	-----
10/15-17/79	0.14 ± 0.15	0.11 ± 0.14	0.04 ± 0.06	-----
11/28-30/79	0.27 ± 0.20	0.31 ± 0.21	0.19 ± 0.20	0.08 ± 0.13
12/3-5/79	0.35 ± 0.24	0.44 ± 0.26	0.13 ± 0.18	0.31 ± 0.21
12/11-13/79	0.27 ± 0.20	0.08 ± 0.13	0.19 ± 0.18	0.04 ± 0.07
12/18-20/79	0.23 ± 0.19	0.31 ± 0.23	0.08 ± 0.13	0.34 ± 0.24
1/7-9/80	0.35 ± 0.22	0.46 ± 0.27	0.31 ± 0.21	0.08 ± 0.13
1/14-16/80	0.17 ± 0.14	0.21 ± 0.18	0.14 ± 0.15	-----
1/21-23/80	0.35 ± 0.26	0.31 ± 0.23	0.43 ± 0.27	-----

* Section No. from Figure 4-1 in Appendix.

Copper to molybdenum ratios in plants in the project area ranged from 1350:1-0.67:1. Five samples out of 56 taken (all grasses) fell below the recognized 2:1 minimum. Coastal bermudagrass had a summer value of 1.8:1. The four winter values below 2:1 were red grama (1.3:1). Sideoats grama was the only one of the five samples that occured specifically on the proposed mine area. Two of the five grasses, coastal bermuda and King Ranch bluestem, are important forage material for cattle. The low Cu:Mo ratios seen here are caused not by an excess of molybdenum but rather by the low amount of copper present (Texas Department of Health).

The Cu:Mo ratios for the summer samples were generally high. Three shrubs, soapbush (259:1), guajillo (225:1), and Texas persimmon (1350:1), were especially high. Although these species are not grazed by cattle, restricted browsing of these species by sheep might cause Cu toxicity (Hemkes & Hartmans, 1973).

While a few species in both summer and fall samplings had Cu and Mo improperly balanced for optimum ruminant biochemistry, the overall forage resource had acceptable balances of Cu and Mo.

Copper and molybdenum values of small mammal tissue sampled (1.5-4.8 ppm Cu, 0-07-0.24 Mo) were within the range expected in mammalian tissue (Chappell). Cu and Mo values in mammal tissue cannot be correlated with those of the vegetation. Cow samples have been taken and chemical analyses will be presented in the mill report.

Of the nine sites shown in Table 4-6 it is seen that the Section 81 overburden site has the highest radon flux. This is to be expected since the overburden was removed from an exploration test pit dug in Section 81. The radon flux from the overburden pile was approximately 4.5 to 37 times the values found at the other eight stations. The values found are consistent with values obtained in other uranium-bearing areas of the western U.S.

5.0 THE TAILINGS DISPOSAL OPERATION

Tailings Characteristics

Physical Characteristics

The mill design will be for a maximum of 1,500 tons per day ore input. This will also be the amount of tailings deposited back into the pit.

The tailings consist of silica, sand, and silt. A screen analysis of the tailings shows the following:

- +35 mesh is approximately one percent
- -200 mesh is approximately 22 percent
- -323 mesh is approximately 15 percent

The moisture content of the tailings is 25 percent. The grinding is disaggregation only, and involves no particle size reduction.

Chemical Characteristics

The following is a list of elements present in tailings leach filtrate from Anaconda's pilot plant test of Rhode Ranch ore:

Element	Amount in mg/l
As	6.25
Se	0.42
Hg	<0.001
Pb	<0.05
Cd	<0.01
Ba	1.25
Cr	<0.01
Ag	<0.01
Mo*	[illegible]

*Molybdenum will be recovered from the ore and will not be present in the amount shown above.

Radiological Characteristics

The highest concentration of radium-226 found in the tailings leach filtrate is 1.34 pCi/ml.

Mobilization of Metals

The three elements that are mobilized to significant levels are: arsenic, selenium, and radium.

Since there is not any ground water within the areas where the tailings are to be buried, there will not be any migration of these elements. There are indications of H_2S being present in the mineralized sands which will be helpful in immobilizing the three elements mentioned above.

Tailings Disposal

The plan of the tailings disposal is presented in drawing RRA-2 in the Appendix. Typical cross sections of the proposed disposal area are presented in drawings RRS-20A, 20B, and 20C in the Appendix.

The tailings are deposited directly onto the Catahoula and Frio formations, which consist of 1,400 feet montmorillonite clays which are relatively impermeable.

Since there is not any ground water, there will be no movement of the mobilized elements due to aquifer w. Some rainwater may penetrate through the replaced overburden and into the disposed tailings. If this were to happen, the water would remain on top of the Catahoula clay and be effectively trapped. The possibility of rainwater penetrating to the buried tailings is not likely due to the large amount of clay in the overburden that will be placed over the tailings. Therefore, the potential migration of any mobilized material is very slight.

Overburden Handling

Overburden will be handled in the following manner: Dozers will rip and push overburden into dozer traps. These traps contain apron feeders which will move the overburden and dump it onto a segmented conveyor system. The overburden will be moved by conveyor to an area that has been mined out and has received its allotment of tailings. The material will then move from the conveyor onto a stacker which will dump the overburden into the pit where it will cover the tailings to a depth of approximately 30 feet or more. The overburden will contain approximately 60 percent clay, and it is not planned to place a clay layer over the tailings. It is possible that trucks will be utilized rather than conveyors if economics show this to be a better choice.

For the concentrations of radiological and chemical parameters, see section 4.0.

Reclamation Plan

The stockpiled topsoil will be replaced after the overburden is contoured to approximate original contours. Because of the clay content of the overburden, there is expected to be a slight swelling effect; however, this will be minimized due to compaction caused by the heavy equipment in replacing the overburden. The drainage will be restored to its original position. The topsoil will be seeded to pasture grass in the spring. It is estimated that the restored pasture will have twice the carrying capacity compared with the pre-mining capacity.

Restoration of the mine area will proceed at the approximate rate of 37 acres per year. During a four-year interval, Anaconda will conduct an annual survey for radon flux. Additionally, soil and established grass will be analyzed for radium-226. A gamma survey will be conducted along the same traverses as originally conducted and reported in Section 4.0 With the approval of the Railroad Commission and the Texas Department of Health, the site will be returned to the owner sometime after the fourth year of monitoring.

6.0 ENVIRONMENTAL EFFECTS OF PROPOSED TAILINGS DISPOSAL

Surface Radon Emanation from Tailings

The surface radon emanation from the tailings disposal operations has been calculated using several different alternatives. These alternatives are 1) disposal of tailings in the mined-out pit area and using different thicknesses of clay, overburden, and topsoil, 2) above-ground disposal using thicknesses of clay and topsoil, and 3) above-ground disposal with no cover material. The basic assumptions used are as follows.

The radon flux from the surface of a bare tailings pile is given by the following:

$$J_o = C_{Ra} \rho E \sqrt{\lambda (D/P)}$$

where: J_o = Radon flux at surface of bare source,

C_{Ra} = Concentration of radium-226 in tailings (pCi/gm)

λ = Decay constant for radon (2.1×10^{-6}/second)

ρ = Density of tailings solids (gm/cm^3)

E = Emanating power of tailings (dimensionless) = 0.20

D = Effective bulk diffusion coefficient for radon from tailings solids (cm^2/second)

P = Porosity or void fraction for tailings (dimensionless)

The Anaconda tailings will have a radium-226 concentration of 420 pCi/gm and a bulk density of 110 lbs/ft.^{3} or 1.76 gm/cm^3. Values of D/P for different tailings moisture content were selected from the Nuclear Regulatory Commission Generic Environmental Impact Statement (NRC GEIS) and would reflect the values for the tailings. These D/P values are:

5×10^{-2} cm^2/second, eight percent moisture

1×10^{-2} cm^2/second, 15 percent moisture

1.76×10^{-3} cm^2/second, 25 percent moisture

5.7×10^{-6} cm^2/second, 37 percent moisture

Using these values and the above equation, the radon emanation from the bare tailings pile would be:

Moisture Content	Radon Emanation $pCi/m^2/sec.$
8%	479
15%	214
25%	90
37%	5.11

Effect of Cover Materials

An analysis was made of the radon emanation from the pile after covering with varying thicknesses of cover material. The radon emanation is given by the equation:

$$J = J_O \, e - \sum_{i=1}^{n} x_i \quad \lambda \; (D_i/P_i)$$

where: J = Radon emanation at surface after attenuation with various cover materials (pCi/m^2/second)

J_o = Radon emanation at surface of bare tailings pile

λ = Decay constant for radon 2.1×10^{-6}/second

D_i = Effective bulk diffusion coefficient for radon in cover material i (m^2/second)

P_i = Porosity or void fraction for cover material i

x_i = Thickness of cover material i (cm)

n = Number of cover materials

Using clay, overburden, and topsoil with D/P values of 1.0×10^{-3}, 2.5×10^{-2}, and 5.0×10^{-2} respectively, the radon flux for several different combinations of cover materials was calculated. Table 6-1 presents a summary of the radon flux values found.

Table 6-1 Radon Flux From Covered Tailings

Scheme Number	Cover Scheme	Radon Flux (pCi/m^2/second) % Moisture of Tailings 8	15	25	37
1	2' Clay 6' Overburden 2' Topsoil	3.75	1.67	0.71	0.04
2	5' Clay 10' Topsoil	6.18×10^{-2}	2.76×10^{-2}	1.16×10^{-2}	0.07×10^{-2}
3	5' Clay 10' Overburden 2' Topsoil	1.8×10^{-3}	8.19×10^{-3}	3.5×10^{-3}	0.19×10^{-3}
4	10' Clay 30' Overburden 2' Topsoil	6.33×10^{-8}	2.84×10^{-8}	1.2×10^{-8}	0.07×10^{-8}
5	No Cover	479	216.4	90	5.11

The five cover schemes shown in the table are those combinations which would be considered for the tailings. From this table it can be seen that for tailings less than about 10% moisture, ten feet of cover would not be sufficient to reduce the radon to less than the 2 pCi/m^2/second recommended by the NRC. Since the prime disposal option of Anaconda is placement of the tailings in the mined out portion of the mine, it can be seen that schemes 1, 2, 3, or 4 could result in radon surface flux values at negligible levels.

Subsurface Effect of Tailings

The uranium ore after processing is returned to the same horizon from which it came. That horizon is above the water table. No movement of radionuclides or heavy metals will occur.

There are no ground-water aquifers in contact with the ore before mining. The potential for chemical, physical, and radiological migration is considered minimal to non-existent.

Erosion Potential of Tailings

The covering of the tailings which have been placed in the mined-out mine will consist of approximately 30 or more feet of mine overburden material and two feet of topsoil contoured to the original ground contours which existed prior to mine activities. It is the final topsoil cover that will be subject to erosion.

Based on the soil types in the mine and surrounding areas, an analysis has been made of the erosion potential of the tailings disposal area compared to the surrounding area. This analysis was carried out utilizing the Universal Soil Loss Equation. This is the equation which is used to estimate the water erosion from surface mining areas, which is similar to that from agricultural land, and considers such influencing factors as rainfall and runoff for the area, soil erodibility which relates to the soil properties, slope-length and slope-steepness factors, type of cover, and type of contouring and terracing practices in the area in question.

In making this analysis it has been assumed that the topsoil types used as the final cover material on the tailings will be that which was removed during mining operations. It has been further assumed that the topsoil cover material will be compacted, fertilized, and revegetated with the native vegetation. The topsoil cover, after placement, will be subject to erosion until the revegetation cover takes hold. Based on the predominant soil types in the tailings disposal area, the calculated soil losses range from 0.028 to 0.630 tons per acre per year. This compares to a range of 0.043 to 0.393 tons per acre per year for the soil in the surrounding undisturbed existing areas. The soil loss from the tailings disposal area will diminish as the revegetation cover grows. This, coupled with the diversion berming and contouring during mining operations, will not result in excessive erosion from the covered tailings. (The flatness of the surface of the covered tailings area further reduces the possibility of excessive erosion.

7.0 CURRENT LANDOWNERSHIP SITUATION

The land which is to be mined is presently owned by private persons and is used for grazing cattle. Uranium mining leases provide for temporary withdrawal of the land from grazing during mining. Terms of the lease provide that after mining and reclamation, the land will be returned to the surface owner for grazing. It would be most difficult for the Operator to negotiate outright purchase of these lands to satisfy the requirement that a fee simple title be transferred to the federal government.

8.0 ALTERNATIVES TO THE PROPOSED PLAN

Anaconda believes subsurface disposal of tailings into the mined-out area at substantially the same geologic horizon that produced the ore is the most environmentally sound disposal method. This is the "prime option" recommendation of the Nuclear Regulatory Commission. Outside of the mining area, land has been bought which could be utilized for conventional surface disposal of tailings if this alternative becomes necessary. The problems of erosion and of blowing dust from surface tailings ponds will be eliminated if deep pit burial can be accomplished. With deep pit burial a minimum of approximately 30 feet up to a maximum of 150 feet of material will cover all tailings.

9.0 JUSTIFICATION FOR WAIVER OF LANDOWNERSHIP

The Uranium Mill Tailings Radiation Control Act of 1978 requires that title to lands which are the recipient of uranium mill tailings be transferred after reclamation to the federal or state government for safekeeping and for the preservation of health and safety until such time as the depository no longer constitutes a health hazard. Provision is made for exception to this requirement of title transfer to the federal government in the event that, in the opinion of the Nuclear Regulatory Commission, transfer of title is not necessary for the preservation of health and safety. The geologic and environmental safeguards for the proposed disposal operation are sufficient in Anaconda's view to render unnecessary the need for transfer of the lands to the federal government to protect health and safety. Mill tailings will be returned to the horizons whence they came and in exactly the same manner as the depleted uranium ore residues following in situ leaching which is currently exempt from the Mill Tailings Act. Anaconda Copper Company requests an exemption by the Department of Health and the Nuclear Regulatory Commission from the requirement of title transfer to the federal government.

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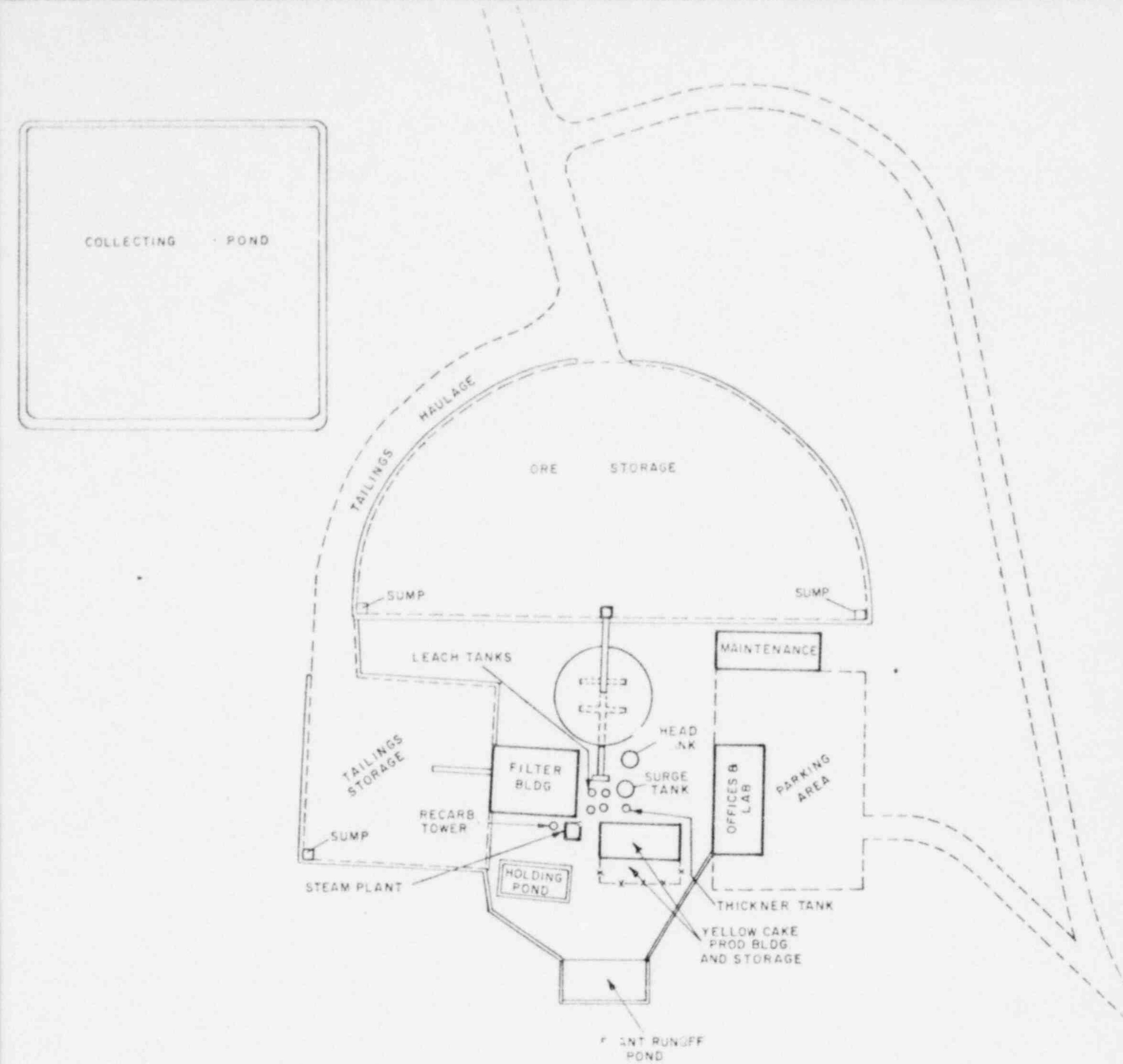

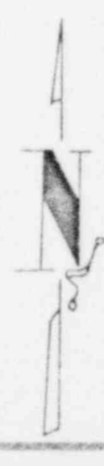

THE ANACONDA COMPANY

RHODE RANCH AREA

McMULLEN COUNTY, TEXAS

TENTATIVE PLANT LAYOUT

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