ADEM

ALABAMA
DEPARTMENT OF ENVIRONMENTAL MANAGEMENT

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#26944

August 16, 1994

Mr. Brian Farrier
EPA CERCLA PA/SI Regional Project Officer
Site Investigation Support Section
Waste Management Division
US. EPA Region IV
345 Courtland Street
Atlanta, GA 30365

RE: Site Investigation Prioritization / Degussa
Mobile County, Alabama -- EPA ID # ALD075045575

Dear Mr. Farrier:

Enclosed please find a copy of the SIP narrative, references, and SI Worksheet for the Degussa Corporation site located in Mobile county. If you have any questions, please call me at 205/260-2712.

Sincerely,

Clayton N. Scott
Compliance Section
Field Operations

cc: Jymalyn Redmond

Printed on Recycled Paper

Site Investigation Prioritization
Degussa Corporation
Mobile County, Alabama
EPA ID # ALD075045575

August 1994

Reviewed by:_____

Site Investigation Prioritization
Degussa Corporation
Mobile County, Alabama
EPA ID # ALD075045575

1.0 INTRODUCTION

Under authority of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) and the Superfund Amendments and Reauthorization Act of 1986 (SARA) the Alabama Department of Environmental Management (ADEM), Field Operations Division, conducted a Site Investigation Prioritization (SIP) of the Degussa Corporation site.

The purpose of the investigation was to assess the threat this site may pose to human health and to the environment. Existing regulatory files concerning this site, including any past CERCLA reports were evaluated utilizing the Hazard Ranking System (HRS).

2.0 SITE DESCRIPTION

Degussa is an active regulated site (RCRA, CWA and CAA) at this writing doing business as the Degussa Corporation. The facility is located on about 500 acres in the Theodore Industrial Park, about 15 miles south of Mobile Alabama. Degussa generates numerous intermediaries to produce the final "shipped" products, with the primary being: methionine, H_2O_2 and fumed silica. [1,2,3]

2.1 Location

The site is located in Mobile County south of Theodore, section 23 of Township 6 South, Range 2 West. at a the approximate coordinates: latitude 30° 31' 23" and longitude 88° 08' 23".[3]

Generally, the setting is industrial with several other large chemical or manufacturing facilities within 3 miles of Degussa. Suburban areas associated with Theodore/Mobile exist in the 1 mile to 4 mile radii, primarily toward the north west. Other inhabited areas include the community of South Orchard, located 3 to 4 miles south of the site. Headwaters of Dykes Creek and associated lowlands are located adjacent to the south side of the site and the Alabama State

this aquifer is recharged by precipitation in areas west and north of the facility. The water table aquifer may discharge to local streams and form swamps in topographic lows, such as near Dykes Creek to the south. Sand and gravel units are generally too thin around the facility for significant aquifer usage. However, small quantities of good quality water are available for domestic use.[1,6]

3.2 Targets -- Ground Water

Within four miles of the site, are several industrial water supply wells and one public water supply well. The public well belongs to the Mobile County Water and is about three miles north of the site. This well is 148 feet deep and screened in the alluvium. Mobile County Water Works services 3,920 connections (2.5 persons/connection based on county average) or about 9,800 individuals. [7,8]

4.0 SURFACE WATER PATHWAY

4.1 Hydrology

Facility/site drainage for the vast majority of the facility is southward into headwaters of Dykes Creek with additional drainage northwestward into wetlands. Additionally, an NPDES outfall from a biological treatment unit on site is discharged north of the site in the Theodore Industrial Canal. During the reconnaissance, Dykes Creek had no flow south southeast of the facility at Laurendine Road, and is therefore considered an intermittent stream. Mobile Bay lies approximately 2.5 miles east of the Degussa facility. The facility is located in the Coastal Lowlands District and the Coastal Plain physiographic province above the 100 year flood plain. The area is best described as flat to gently undulating plains which are locally swampy. Topographic relief on the facility varies from approximately 30 to 40 feet above mean sea level. [1,2]

The climate is described as subtropical, with long, hot, humid summers showing relatively stable temperatures. The coldest months are on average December through February, when there are frequent shifts between warm, moist Gulf air and cool, dry continental air masses. Precipitation averages about 65 inches per year. July through September are the wettest months with March also averaging 6.5 inches of rainfall. The driest months being October and November. The maximum daily rainfall recorded between 1951 and 1984 was 13.4 inches in April 1955.[1,6]

REFERENCES

1.	Preliminary Assessment, August 1984	Appendix A
2.	Telephone conversation writer with Mr. Gene Sheppard	
3.	7.5 minute Topographic Maps with buffer zones	Appendix B
4.	SARA Title 313 File excerpts	
5.	Ground water files review	
6.	Geology excerpts from adjacent site "Kay Fries" July 1994	
7.	County Population/Statistics	
8.	FRDS Database of Public Drinking Water Systems -- area excerpts	
9	U.S. Fish and Wildlife review of "Endangered Species"	
10.	"Vertebrate Animals of Alabama in Need of Special Attention" excerpts	

Conversation: Writer C. Scott with Degussa's Gene Sheppard 205 443-4287
8/11/94

Re:
1. State Docks property and usage by Degussa never occured
2. Ash and affected soil was cleaned up and removed
   No storage or treatment of waste occurs on site
3. Products review in brief
4. NPDES discharge
5. Size of facility
6. Number of employees

reference 2

Degussa

Degussa
Corporation

TRI Facility ID Number: 36590 DGSSC DEGUS

JUN 1991
RECEIVED
ADEM-FO
MONTGOMERY

June 26, 1991

E. John Williford, Chief of Operations
Alabama Emergency Response Commission
Alabama Department of Environmental
Management
1751 Conressman W.L. Dickinson Drive
Montgomery, AL 36109

Dear Sirs:

Enclosed please find our Toxic Chemical Release Inventory Reporting forms as required by SARA Title III Section 313 for the calendar year 1990.

CHEMICAL NAME	CAS NUMBER
CARBON TETRACHLORIDE	000056-23-5
1,2-DICHLOROETHANE	000107-06-2
ACETALDEHYDE	000075-07-0
ACETONE	000067-64-1
AMMONIA	007664-41-7
AMMONIUM SULFATE (SOLUTION)	007783-20-2
CHLORINE	007782-50-5
ETHYLENE GLYCOL	000107-21-1
FORMALDEHYDE	000050-00-0
HYDROCHLORIC ACID	007647-01-0
HYDROGEN CYANIDE	000074-90-8
METHANOL	000067-56-1
NITRIC ACID	007697-37-2
PHOSPHORIC ACID	007664-38-2
SULFURIC ACID	007664-93-9

If you have any questions concerning this submittal, please advise.

Sincerely,

Bill Irwin
Environmental Manager

BI/lh

Enclose

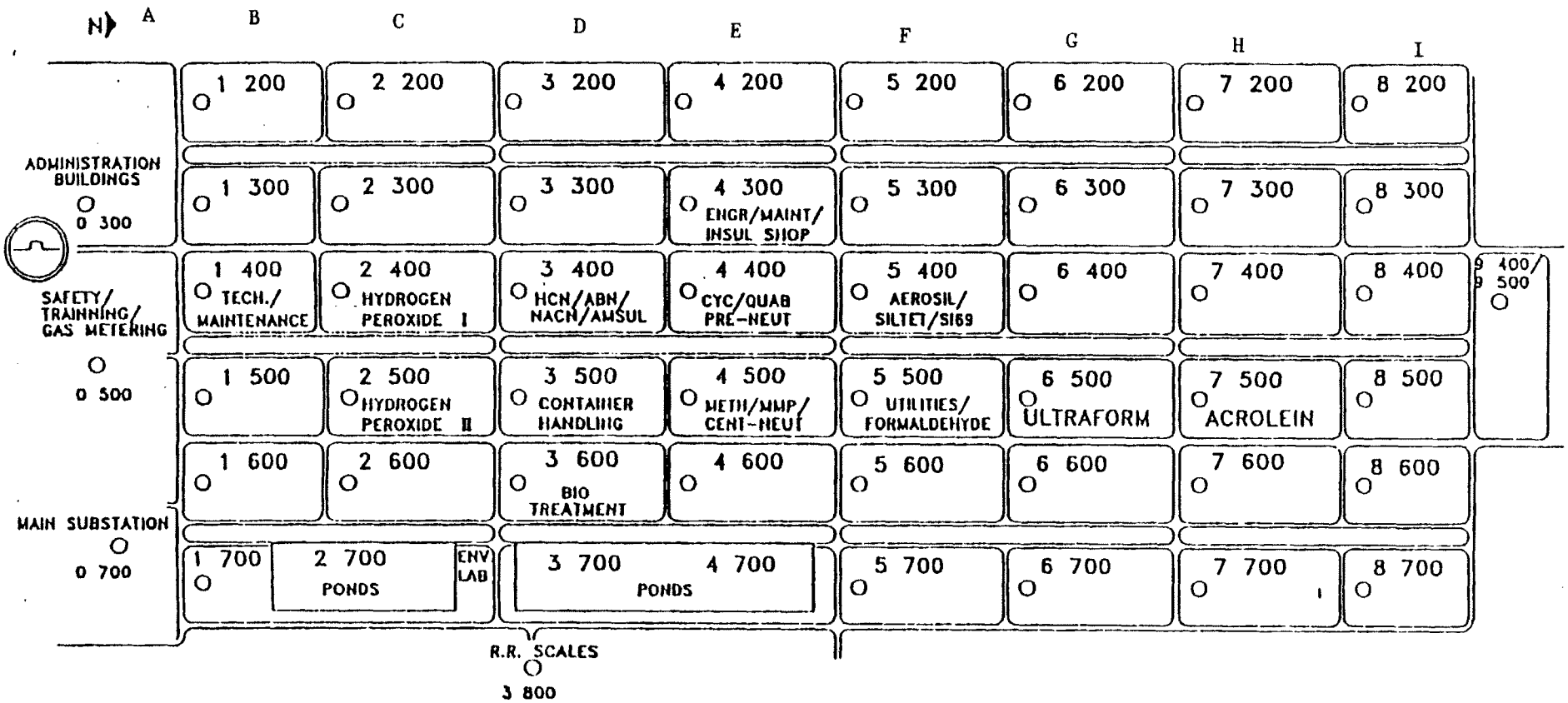
JUN 1991
RECEIVED
ADEM-FO
MONTGOMERY

reference 4

Theodore Industrial Park PO Box 606 Theodore Ala 36590 205-653-7933 Telex 505514

EMERGENCY ALARM

PLANT BLOCK LOCATION



August 11, 1994

A review of the ground water files revealed that an ordered action by ADEM required monitoring of ground water chlorides and total dissolved solids from the lagoon /pond area on the East side of the facility. The past release is of little concern as of this writing.

The facility is generally on slightly elevated ground bounded by surface water bodies to the east and west. Muddy Creek lies approximately 0.75 miles west of the facility and flows southward. Dykes Creek lies within 0.25 miles of the facility and flows south-southeastward. The headwaters for Dykes Creek appear to originate in a swamp located east-northeast of the facility. Both creeks discharge into Fowl River, three miles south of the facility. Mobile Bay lies approximately 2.5 to 3 miles east of Kay-Fries (Reference 94).

Several soil series are present on the facility, including Benndale, Escambia, Grady, Heidel, Malbis, Notcher, Poarch, and Smithton. These soils generally consist of sandy loam or loam which are low in organic content and natural fertility. Soils on the more elevated areas are generally moderately-well to well drained, while soils in the low-lying areas are generally poorly drained due to the higher percentage of fine-grained sediment in the soil. All soils are generally acidic, with a pH of 4.5 to 5.5. Seasonal water tables in winter and spring are at depths of four feet or less. Most soils have a moderate water retention (Reference 159). The areal extent of the soil types at the facility site in 1980 is shown in Figure II-10, prior to facility construction. Soil from the west side of the facility was reportedly moved to fill low areas near Dykes Creek before the Surface Impoundments were constructed. Thus, Benndale sandy loam was probably placed on

reference 6

top of Smithton sandy loam in the northeastern section of the facility. For more detail on soil characteristics at the site, see Appendix F.

Kay-Fries is located in the Flood Plain, Terrace, and Beach subprovince of the Coastal Plain physiographic province, in the onshore extension of the Gulf Coast geosyncline and on the east flank of the Mississippi Embayment (Figure II-11). The key geologic formation underlying the facility are undifferentiated Pleistocene and Holocene clastics, the Pliocene Citronelle Formation, and undifferentiated Miocene Series sediments. These geologic units, with their geologic and hydrologic characteristics,are shown in Figure II-12.

Unconsolidated Miocene sediments, which are laterally and vertically discontinuous, consist primarily of very-fine to coarse-grained sands, which are locally conglomerate and contain minor cross-bedding. A sandy, silty clay is also present in the upper section, while the lower half of the Miocene series in Mobile County consists of limestone and marl. Miocene sediments in the Kay-Fries area are 1900 to 2200 feet thick and dip approximately 10 to 45 feet per mile (References 25, 94).

The overlying Citronelle Formation has a variable lithology, both vertically and horizontally, consisting of fine- to coarse-grained sandstone, gravelly sand, and lenses of sandy clay and clay balls.

Series	Geologic units	Thickness (feet)	Lithology	Yield	Quality of water
Holocene and Pleistocene	Alluvium, low-terrace, and coastal deposits	0-150	Sand, white, gray, orange, and red, very fine to coarse-grained, contains gravel in places; gray and orange sandy clay.	Will yield 10 gpm where saturated sands are of sufficient thickness. Potential source of 0.5 to 1 mgd per well in the Mobile River basin.	Water generally suitable for most uses but commonly contains iron in excess of 0.3 mg/l and may be sufficiently acidic to be corrosive. Locally, in areas close to Mobile Bay and Mississippi Sound, water is very hard, has high chloride and dissolved-solids contents, and contains iron in excess of 0.3 mg/l.
	High-terrace deposits	0-40		Will yield 10 gpm or more where saturated sands are of sufficient thickness.	Probably soft and low in dissolved solids. May contain iron in excess of 0.3 mg/l.
Pliocene	Citronelle Formation	0-200	Sand, brown, red, and orange, fine- to coarse-grained, gravelly in places, contains clay balls and partings; gray, orange, and brown lenticular sandy clay, ferruginous cemented sandstone.	Miocene-Pliocene aquifer: Will yield 1 mgd or more per well.	Water generally is soft and low in dissolved solids but may contain iron in excess of 0.3 mg/l and may be sufficiently acidic to be corrosive. In areas adjacent to Mobile River, Mobile Bay, and Mississippi Sound, water may have a dissolved-solids content that exceeds 1,000 mg/l, a sulfurous odor, and a chloride content that exceeds 100 mg/l.
Miocene	Miocene Series undifferentiated	400-3,400	Sand, gray, orange, and red, very fine to coarse-grained, contains gravel in places; gray thin-bedded to massive sandy silty clay; gray thin-bedded limestone in subsurface.		

Figure II-12. Lithologic and Hydrologic Characteristics of Stratigraphic Units of Interest , Kay-Fries (Reference 25).

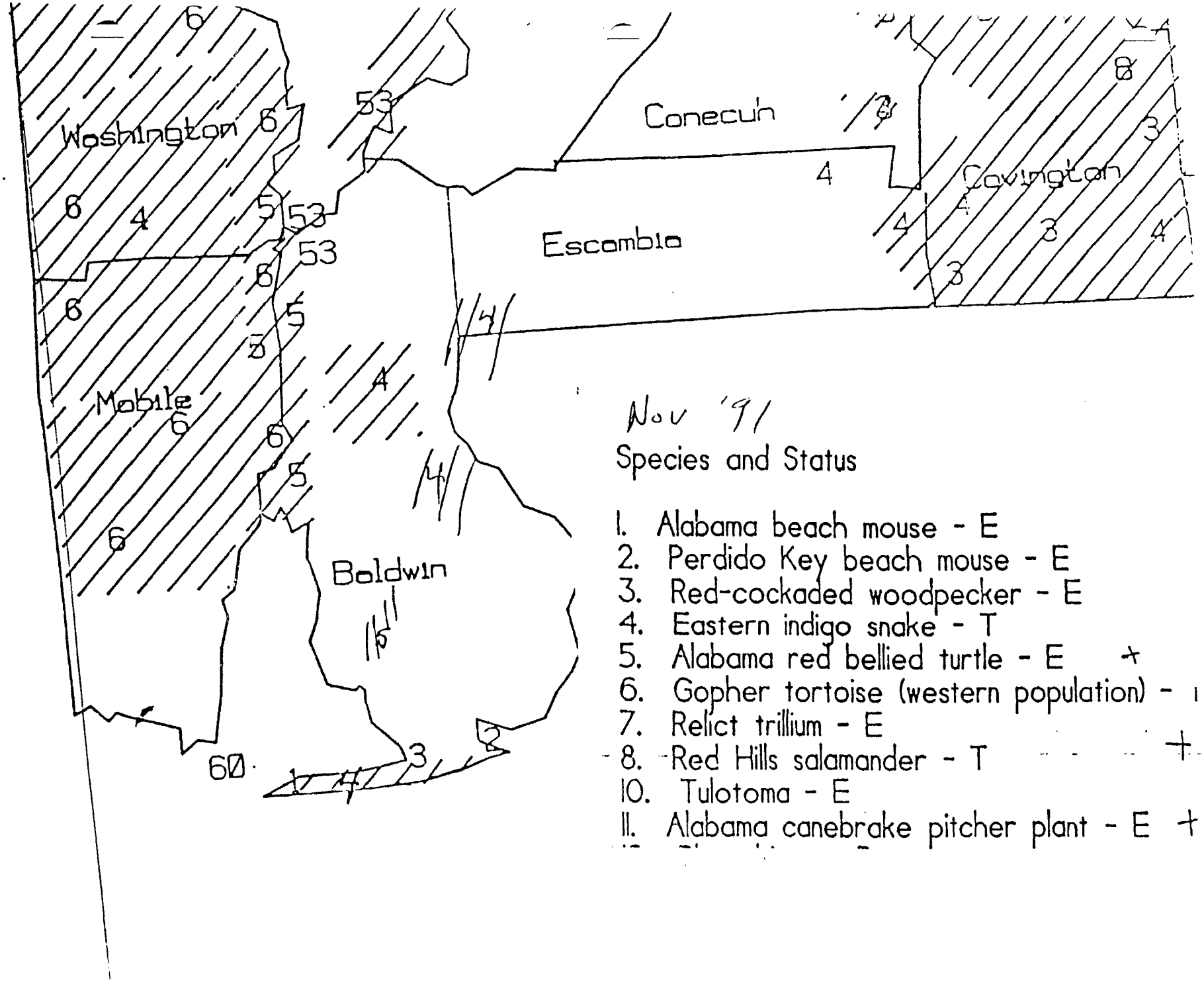
Table 1. Selected Population and Housing Characteristics: 1990
Mobile County, Alabama

The population counts set forth herein are subject to possible correction for undercount or overcount. The United States Department of Commerce is considering whether to correct these counts and will publish corrected counts, if any, not later than July 15, 1991. The user should note that there are limitations to many of these data. Please refer to the technical documentation provided with Summary Tape File 1A for a further explanation on limitations of the data.

Total population	378,643
SEX	
Male	179,577
Female	199,066
AGE	
Under 5 years	29,633
5 to 17 years	78,400
18 to 20 years	17,984
21 to 24 years	21,429
25 to 44 years	116,996
45 to 54 years	37,951
55 to 59 years	15,727
60 to 64 years	15,868
65 to 74 years	26,622
75 to 84 years	14,155
85 years and over	3,878
Median age	31.9
Under 18 years	108,033
Percent of total population	28.5
65 years and over	44,655
Percent of total population	11.8
HOUSEHOLDS BY TYPE	
Total households	136,899
Family households (families)	100,814
Married-couple families	73,628
Percent of total households	53.8
Other family, male householder	4,309
Other family, female householder	22,877
Nonfamily households	36,085
Percent of total households	26.4
Householder living alone	31,851
Householder 65 years and over	12,548
Persons living in households	371,562
Persons per household	2.71
GROUP QUARTERS	
Persons living in group quarters	7,081
Institutionalized persons	3,951
Other persons in group quarters	3,130
RACE AND HISPANIC ORIGIN	
White	254,853
Black	117,872
Percent of total population	31.1
American Indian, Eskimo, or Aleut	1,940
Percent of total population	0.5
Asian or Pacific Islander	3,398
Percent of total population	0.9
Other race	580
Hispanic origin (of any race)	3,164
Percent of total population	0.8

Total housing units	151,220
OCCUPANCY AND TENURE	
Occupied housing units	136,899
Owner occupied	91,513
Percent owner occupied	66.8
Renter occupied	45,386
Vacant housing units	14,321
For seasonal, recreational, or occasional use	1,083
Homeowner vacancy rate (percent)	2.3
Rental vacancy rate (percent)	10.1
Persons per owner-occupied unit	2.81
Persons per renter-occupied unit	2.52
Units with over 1 person per room	5,961
UNITS IN STRUCTURE	
1-unit, detached	107,031
1-unit, attached	2,678
2 to 4 units	10,311
5 to 9 units	8,066
10 or more units	10,191
Mobile home, trailer, other	12,943
VALUE	
Specified owner-occupied units	75,273
Less than $50,000	34,210
$50,000 to $99,999	32,696
$100,000 to $149,999	5,171
$150,000 to $199,999	1,617
$200,000 to $299,999	1,049
$300,000 or more	530
Median (dollars)	53,300
CONTRACT RENT	
Specified renter-occupied units paying cash rent	40,878
Less than $250	22,940
$250 to $499	16,910
$500 to $749	798
$750 to $999	98
$1,000 or more	132
Median (dollars)	233
RACE AND HISPANIC ORIGIN OF HOUSEHOLDER	
Occupied housing units	136,899
White	96,804
Black	38,408
Percent of occupied units	28.1
American Indian, Eskimo, or Aleut	616
Percent of occupied units	0.4
Asian or Pacific Islander	893
Percent of occupied units	0.7
Other race	178
Hispanic origin (of any race)	1,068
Percent of occupied units	0.8

reference 7


Washington
Mobile
Baldwin
Escambia
Conecuh
Covington
Nov '91
Species and Status
1. Alabama beach mouse - E
2. Perdido Key beach mouse - E
3. Red-cockaded woodpecker - E
4. Eastern indigo snake - T
5. Alabama red bellied turtle - E +
6. Gopher tortoise (western population) -
7. Relict trillium - E
8. Red Hills salamander - T +
10. Tulotoma - E
11. Alabama canebrake pitcher plant - E +

components of the range, where losses have been most severe. Memoranda of understanding similar to that executed with I.P.C. should be secured, whenever possible, from landowners. Educational efforts directed at enhancing the welfare of the Red Hills cove and ravine fauna and flora would be helpful.

SELECTED REFERENCES

BRANDON, R. A. 1965. Morphological Variation and Ecology of the Salamander *Phaeognathus hubrichti*. Copeia 1965:67-71.

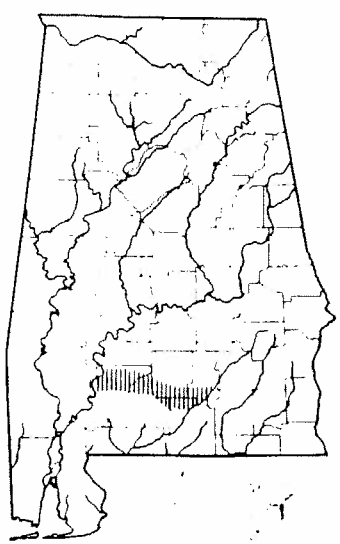
_____ AND E. J. MARUSKA. 1982. *Phaeognathus hubrichti* (Red Hills Salamander): Reproduction. Herp. Rev. 13(2):46.

FRENCH, T. W. AND R. H. MOUNT. 1976. Current Status of the Red Hills Salamander, *Phaeognathus hubrichti* Highton, and Factors Affecting its Distribution. J. Ala. Acad. Sci. 49:172-179.

JORDAN, J. R., JR. 1975. Observations on the Natural History and Ecology of the Red Hills Salamander, *Phaeognathus hubrichti* Highton (Caudata: Plethodontidae). M.S. thesis. Auburn Univ., Auburn, Alabama. 59 pp.

SCHWANEBECK, T. D. AND R. H. MOUNT. 1970. Notes on the Distribution and Ecology of the Salamander *Phaeognathus hubrichti* Highton. Copeia 1970:571-573.

PREPARED BY: Robert H. Mount, Department of Zoology-Entomology, Auburn University, Alabama 36849.



Range of the Red Hills salamander.

Threatened

SOUTHERN HOGNOSE SNAKE

Heterodon simus (Linnaeus)
Family Colubridae
Order Squamata
Suborder Serpentes

OTHER NAMES. Puff adder, spreading adder, and ground rattler.

DESCRIPTION. A short, stout snake attaining a maximum length of 610 mm (24 inches), but averaging 360-510 mm (14-20 inches). Snout shovel-shaped and *sharply* upturned; underside of tail and belly about the same color. (In the eastern hognose, the snout is pointed, but not conspicuously upturned, and the tail undersurface is usually lighter than the belly.) Back with mid-dorsal dark blotches, these alternating with smaller dorsolateral blotches. Ground color gray, brown, or yellowish, often with tinges of red between dorsal blotches. Melanistic (black) individuals unknown.

FIG. 28. Southern hognose snake (Robert H. Mount).

RANGE. Generally, the Coastal Plain from North Carolina to southern Florida and southern Mississippi. In Alabama records are available from Butler, Clarke, Baldwin, Escambia, Covington, and Dale counties in the southern portion; Autauga and Shelby counties in the central portion; and Calhoun County in the northeastern portion. The Shelby and Calhoun county localities are in the Ridge and Valley Region, above the Fall Line.

HABITAT. Open woods, fields, and waste places having relatively sandy soils. Most specimens have been found in dry situations, although one was recently picked up while swimming in the open water of Lake Eufaula (Ed Wester, per comm.), near the Georgia shore.

LIFE HISTORY AND ECOLOGY. The natural history of this snake remains poorly known. Some observations suggest that it is more inclined to be fossorial (burrowing) than its more common relative, the eastern hognose. Like the latter, the southern hognose often displays a fearsome appearance and a menancing behavior when molested—hissing, blowing, and spreading the head and neck in cobralike fashion. These manifestations belie the snake's true demeanor—for if the molestation continues, it rolls over, feigns death, and steadfastly refuses to bite its tormentor.

The southern hognose is oviparous, but natural nests are unknown. Data suggest that clutch size ranges from 6-10. Apparently, the diet is limited almost exclusively to toads.

BASIS FOR STATUS CLASSIFICATION. Although the southern hognose may never have been particularly common in Alabama, it could until a decade or so ago be found in a few places in the State with some regularity. This appears to be no longer the case, and population densities today are believed to be at an all-time low. Reasons for the decline are not apparent. Imported fire ant predation on the eggs and/or young is believed by one herpetologist to be a factor in the decline. Persecution by man and highway mortality may be contributing.

RECOMMENDATIONS. A comprehensive status survey is needed, as are studies to determine limiting factors. This snake would profit, as would most other harmless snake species, from educational programs designed to develop a greater environmental awareness on the part of Alabama's citizens and its leaders.

SELECTED REFERENCES

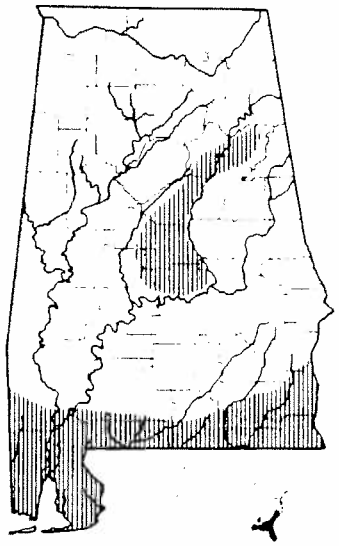
EDGREN, R. A. 1955. The Natural History of the Hog-nosed Snakes, Genus *Heterodon*: A Review. Herpetologica 11:105-117.

MOUNT, R. H. 1975. The Reptiles and Amphibians of Alabama. Ala. Agr. Expt. Sta., Auburn. 347 pp.

_____. 1980. Survey for the Presence or Absence of Threatened or Endangered Reptiles and Amphibians, Conecuh National Forest, Alabama. Unpubl. Rept. to U. S. For. Serv. 108 pp.

_____. 1981. The Red Imported Fire Ant, *Solenopsis invicta* (Hymenoptera: Formicidae), as a Possible Serious Predator on Some Native Southeastern Vertebrates: Direct Observations and Subjective Impressions. J. Ala. Acad. Sci. 52:71-78.

PREPARED BY: Robert H. Mount, Department of Zoology-Entomology, Auburn University, Alabama 36849.



Range of the southern hognose snake.

Threatened

BLACK PINE SNAKE

Pituophis melanoleucus lodingi Blanchard
Family Colubridae
Order Squamata
Suborder Serpentes

OTHER NAMES. Black bull snake.

DESCRIPTION. Large, attaining a maximum tot of 188 cm (74 inches). Rostral scale (at snout tip) c curving backward and ending in a point between color of adults almost uniform black or dark brown, occasional individual having a few white scales and/or a pattern; young tend to be patterned, with black blo a brown background, on the posterior three-fourth body. Scales on body keeled. (The only other blac found within the range of the black pine snake are t racer and eastern indigo snake, both of which have body scales).

FIG. 29. Black pine snake (Robert H. Mount).

RANGE. Southern Mississippi, extreme sout Louisiana (?), and southwestern Alabama, where it recorded from Mobile, Clarke, and Washington c The snake may ultimately be found in southern County. The black pine snake intergrades with the pine snake, in Alabama, in Baldwin, Escambia, and ton counties.

HABITAT. Most often found in areas with sand drained soil. Sandhill (longleaf pine-scrub oak) ass and similar habitats, and relatively small openings places, seem well suited.

LIFE HISTORY AND ECOLOGY. Aside from a eral observations, little is known of this rare snake i ural environment. It is believed to spend consider underground, in burrows of gopher tortoises and rod possibly in some it constructs itself. Principal food lieved to be rodents, birds, and bird's eggs.

The black pine snake has been bred successfully i ity. In a detailed account of such, courtship and m curred in late April, oviposition of 7 eggs occurr May, and hatching 65-68 days later.

BASIS FOR STATUS CLASSIFICATION. Bl snakes have declined substantially in Alabama d past 15-20 years. No longer can they be found wit gree of predictability as was the case previously. In

RANGE. The species is restricted to the Apalachicola River system. This includes the Chipola (from which it was first described in 1952) and Apalachicola rivers in Florida, the Flint River in Georgia, and the Chattahoochee River along the Alabama-Georgia border. In the last it occurs northward at least to Russell County but is exceedingly scarce throughout. Some Alabama tributaries of the Chattahoochee and Chipola rivers are possibly inhabited.

HABITAT. *Graptemys barbouri* is exclusively a turtle of rivers and associated habitats. Greatest numbers occur along stretches with considerable amounts of exposed limestone and abundant snags and stumps for basking. Occasionally the ies may be found in river swamps or impoundments, but e habitats seem suboptimal.

LIFE HISTORY AND ECOLOGY. Barbour's map turtle is wholly carnivorous. Diets of males and small females consist principally of caddisfly larvae and other aquatic insects. Adult females use the massive head musculature and expanded oral crushing surfaces to feed almost exclusively on molluscs, particularly native snails of the genus *Elimia* and the introduced bivalve, *Corbicula manilensis*.

Nesting occurs during late spring and early summer with most adult females presumably nesting three to four times during this period. Four to 11 eggs typically are laid in a cavity a few centimeters beneath the surface, within a few meters of the water, on sandbars and riverbanks. Although males may mature in 3 to 4 years, females may take as long as 15 to 20 years to achieve sexual maturity.

BASIS FOR STATUS CLASSIFICATION. Restriction to a single drainage system makes any species highly vulnerable. The Apalachicola River system repeatedly has been impounded for reservoirs, dredged for barge traffic, and poisoned and otherwise polluted through human negligence. Additionally, female *Graptemys barbouri* have been depredated by man in the past for food. Although effects of these multiple threats to the species have not been analyzed, their impact on a late-maturing, mollusc-feeding species could be severe. The species also has considerable demand in the pet , which could contribute to the decline of some popu- ns.

RECOMMENDATIONS. Populations of this species should be surveyed and monitored throughout the range to obtain baseline data against which the effects of the aforementioned threats can be measured. Pollution and dumping in the rivers should be kept at a minimum. Collecting, except for valid scientific research, should be prohibited, and shooting the turtles should be made illegal. The impact of using "bush hooks" may be substantial in some places, and consideration should be given to regulating such use.

SELECTED REFERENCES

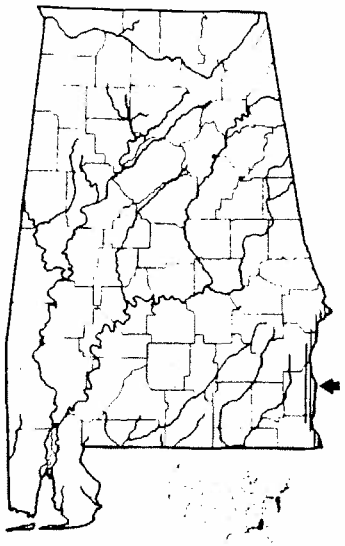
CAGLE, F.R. 1952. The Status of the Turtles *Graptemys pulchra* Baur and *Graptemys barbouri* Carr and Marchand, With Notes on Their Natural History. Copeia 1952:223-234.

CARR, A.F. 1952. Handbook of Turtles: Turtles of the United States, Canada, and Baja California. Comstock Publ. Assoc., Ithaca, New York. 542 pp.

_____ & L. J. Marchand. 1942. A New Turtle From the Chipola River, Florida. Proc. New England Zool. Club 20:95-100.

SANDERSON, R. A. 1974. Sexual Dimorphism in the Barbour's Map Turtle, *Malaclemys barbouri* (Carr and Marchand). M. S. Thesis, Univ. South Florida, Tampa.

WAHLQUIST, H. AND G. W. FOLKERTS. 1973. Eggs and Hatchlings of Barbour's Map Turtle, *Graptemys barbouri* Carr and Marchand. Herpetologica 29:236-237.



Range of Barbour's map turtle.

PREPARED BY: Dale R. Jackson, Florida Natural Areas Inventory, 254 East Sixth Avenue, Tallahassee, Florida 32303.

Threatened

ALABAMA RED-BELLIED TURTLE

Pseudemys alabamensis Baur
Family Emydidae
Order Testudines

OTHER NAMES. Red-belly.

DESCRIPTION. A large freshwater turtle attaining a carapace length of 335 mm (13.2 inches) in females and 295 mm (11.6 inches) in males. Shell high-domed and thick. Carapace oval, slightly serrated behind and wrinkled, becoming increasingly so anteriorly. Prominent oblique rugosities develop with age on outer margins of costal scutes. Background carapace coloration greenish, olive, brown, or blac ical markings on costals and marginals cream, yellow, orange, or red. Plastron and bridge large, rigid, the surfaces grainy in large individuals. Plastron plain to ornate, the markings consisting of dark bars and variously shaped dark figures that may be isolated or interconnected. Plastral ground color cream, yellow, orange, or red. Soft parts and head deep olive to black with cream or yellow striping.

Terminal notch of upper jaw normally flanked on each side by distinct toothlike cusp, a feature found in no other *Pseudemys* turtle in Alabama.

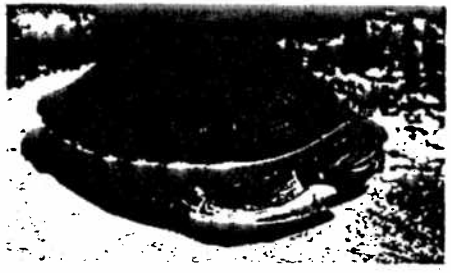


FIG. 32. Alabama red-bellied turtle (Robert H. Mount).

RANGE. Currently considered by most authorities to occur only in Alabama, where it is found chiefly in the lower portion of the Mobile Bay drainage in Mobile and Baldwin counties. Other records include Little River State Park Lake, Monroe County, and Dauphin Island, Mobile County, the latter doubtless represented by a waif. "Records" from Florida are believed to be *P. concinna*, *P. floridana*, or *P. nelsoni*, and those from Texas and Tennessee are probably misidentified *P. concinna*. Reports of this species' occurring in the lower Pascagoula River Drainage in Mississippi are being investigated. A status survey of the species has recently been completed. (See Addendum.)

HABITAT. This turtle is most abundant in fresh to moderately brackish water in a stretch of the Tensaw River between Hurricane Landing and the causeway across the northern part of Mobile Bay. Areas where submerged aquatic vegetation is abundant are preferred.

LIFE HISTORY AND ECOLOGY. The species is primarily if not exclusively herbivorous. Gravine Island, Baldwin County, is believed to be the primary nesting site, where nesting occurs during a period of about 3 months. Clutch size is between 4 and 9; average number of nestings per female per season is unknown. Nothing is known about growth, age to maturity, courtship, mating, or population dynamics.

BASIS FOR STATUS CLASSIFICATION. This species has declined noticeably within the past 1 to 2 decades. The animal is trapped and netted for food. On Gravine Island, fish crows take an extremely high proportion of the eggs, as humans and hogs once did, and recent research indicates a high rate of egg predation by the imported fire ant. Recreationists using the island disrupt the turtle's nesting inadvertently. The beds of elodea (*Anacharis* sp.) and other aquatic vegetation in the Tensaw River, believed to be an important food source, have declined recently, perhaps as a result of herbicide application. Alligators, known to prey on emydid turtles, have increased substantially in the turtle's range a contributing to the decline. "Snagging" decrease site availability, and heavy boat traffic on the rive deleterious. These factors, along with species' v range, warrant the indicated status.

RECOMMENDATIONS. Additional studies on cies' life history and ecology are needed. Serious c tion should be given to acquiring Gravine Island for sanctuary for this species and several other turtle in of the lower Tensaw River area. Meanwhile, the n bicides in the aquatic habitats in the area should be aged, and snagging done only where absolutely n Commercial collecting of this species should be ma ful.

SELECTED REFERENCES

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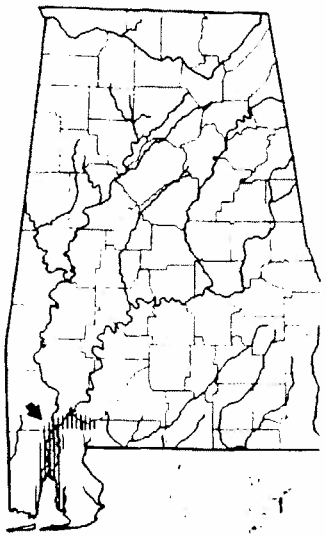
PREPARED BY: James L. Dobie, Department of Entomology, Auburn University, Alabama 36849.



Range of the Alab bellied turtle.

during the first 2 weeks in June and clutch size ranges from 4 to 12, which is very low in comparison to most of our other native turtles. Females are successful in producing young on the average of only once in about 10 years, chiefly as a result of the high rate of nest predation, averaging about 87 percent. For the first few years of life, juveniles are also vulnerable to predators. The tortoise grows slowly and, in Georgia and probably in Alabama, attainment of sexual maturity requires 16 to 21 years.

The gopher tortoise burrow is used not only by the tortoise but by some 30 other species of vertebrates and numerous invertebrates. Some of the latter are found nowhere else. The burrow of an adult gopher may extend from 1.8 m (6 feet) to r 12 m (39 feet) in length. However, few are longer than 10 32 feet). Its cross-sectional dimensions vary with the animal's size. The depth may be from 1.5 m (5 feet) to 2.7 m (9 feet) or more, depending on soil depth and moisture. It is believed that animal biomass in the sandhill habitat is greatly increased by the presence of tortoise burrows. This habitat frequently has little cover and is subject to extremes of heat and cold. Research showed that indigo snake population density varied with the number of tortoise burrows on a study area. Relationships among the inhabitants of gopher burrows remain poorly understood.

BASIS FOR STATUS CLASSIFICATION. Conservationists have been concerned over declining gopher tortoise populations for several years. The rapid loss and alteration of sandhill habitat, the most important type, has been pointed out by numerous biologists, and the tortoise population decline documented as well. The gopher tortoise has a low reproductive potential and a low rate of reproductive success. It is slow to mature. The gopher is also widely exploited for food by people. The tortoise population can be severely affected by habitat changes; for example total fire exclusion brings about declining populations. In 1981, concern over the decline of the gopher in Alabama resulted in a conservation regulation designating the gopher tortoise a game animal and declaring, "there is no open season during which the gopher ' 'oise may be lawfully hunted, taken, caught, captured, or d."

RECOMMENDATIONS. Forestry practices that maintain good habitat quality should be promoted. Trees should be widely spaced and burning should be practiced. Sandhill habitat sanctuaries should be established where possible. Control of the mammals that are serious predators on tortoise eggs (especially raccoons) would be desirable, either through hunting or trapping. Man's activities have improved habitat for small predators and have destroyed the larger predators that once controlled their numbers. The public should be educated about the species' problems and the value of the gopher to the entire sandhill community.

SELECTED REFERENCES

AUFFENBERG, W. 1978. Gopher Tortoise (Daudin). Pages 33-35 *in* R. W. McDiarmid ed. Rare and Endangered Biota of Florida, Vol. 3: Amphibians and Reptiles. Univ. Presses of Fla., Gainesville.

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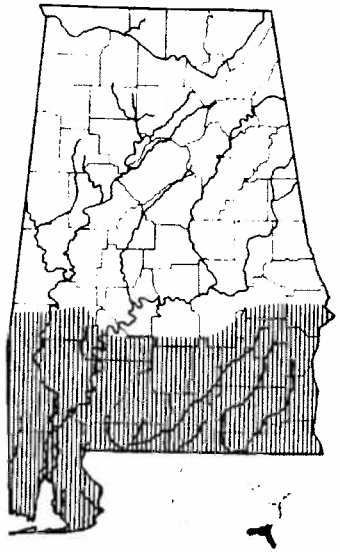


Range of the gopher tortoise.

LANDERS, J. L. AND W. A. MCRAE. 1980. Reproduction of the Gopher Tortoise (*Gopherus polyphemus*) in Southwestern Georgia. Herpetologica 36(4):353-361.

_____, W. A. MCRAE, AND J. A. GARNER. 1982. Growth and Maturity of the Gopher Tortoise in Southwestern Georgia. Bull. Fla. Sta. Mus., Biol. Sci. 27(2):81-110.

MOUNT, R. H. 1975. The Reptiles and Amphibians of Alabama. Ala. Agr. Expt. Sta., Auburn. 347 pp.

PREPARED BY: Dan W. Speake, Alabama Cooperative Fish and Wildlife Research Unit, Auburn University, Alabama 36849.

Special Concern

FLATWOODS SALAMANDER

Ambystoma cingulatum (Cope)
Family Ambystomatidae
Order Caudata

OTHER NAMES. None.

DESCRIPTION. A somewhat stocky salamander, up to about 15 cm (5 inches) long, with a relatively small head and fat tail. Entire body blackish with fine light gray or white lines on the back sides, forming a reticulum or netlike pattern; pattern fainter dorsally, venter with small, disconnected light specks. Small grooves below nostril on upper lip absent. Larva broad-headed, bushy gilled, belly white, side with a single, narrow yellow or white longitudinal stripe, passing through a chocolate brown dorsal ground color. The light brown face has a thin dark brown stripe passing through the eye from the nostril to the gills. No other broad-headed salamander larva has conspicuous lateral stripes.

FIG. 35. Flatwoods salamander (Ray E. Ashton, Jr.)

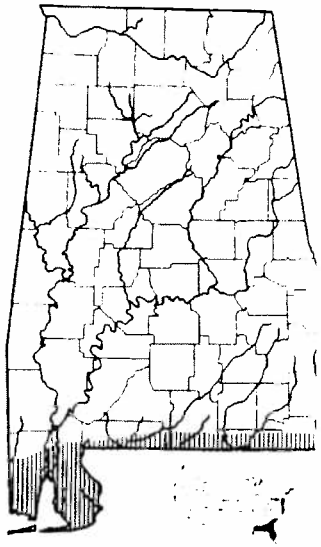
RANGE. Restricted to the southeastern U. S. Coastal Plain, from the southern half of South Carolina southward to Marion County in northern-central Florida, and westward at least to Mobile County, Alabama. In Alabama, the range is confined to the southernmost tier of counties (Mobile, Baldwin, Escambia, Covington, Geneva, and Houston), in the Lower Coastal Plain, although recent records are available only from Houston and Covington counties.

HABITAT. Pine flatwoods. Larvae are found in shallow cypress-gum ponds, flooded roadside ditches, and other such aquatic habitats in flatwoods. Adults live in the flatwoods surrounding breeding sites and may be dependent upon some microhabitat aspect of the wiregrass (*Aristida stricta*) - dominated groundcover for long-term survival.

LIFE HISTORY AND ECOLOGY. This species is one of only two members of its family that breed in the fall and lay eggs on land. Adults migrate to the breeding sites during rainy weather in October and November, before they fill with water, where they court. The females lay groups of 1-35 eggs (for a total of up to at least 225) at the bases of bushes, small trees, and clumps of grass, usually in the lowest parts of the depressions. Embryos begin developing immediately; but remain within the eggs until heavy rains fill the depressions, usually in December or January. Metamorphosis occurs in March and April. The post-larval life of the flatwoods salamander is totally unknown. Age at maturity, longevity, survivorship, and limiting factors are important aspects that need study.

BASIS FOR STATUS CLASSIFICATION. The entire range of this secretive species is small and few recent records are available from Alabama. Its pine flatwoods-wiregrass habitat is diminishing rapidly due to agriculture, silvicultural site preparation, and urban and suburban development. If the species is unable to survive in edificarian habitats, its prospects for long-term survival may be inversely related to the rate of disappearance of the natural groundcover of the low pine flatwoods habitat.

RECOMMENDATIONS. Not only should studies be undertaken to reveal important and possibly critical aspects of its life history and ecology, but a census of likely habitats in



Range of the flatwoods salamander.

Alabama should be made and efforts should be und determine the full extent of the Alabama range. In land management practices that favor maintenance pine flatwoods-wiregrass habitats should be encou recommended to the extent that they are economic ble. However, the impact of "prescribed" winter l pine flatwoods, an artificial fire regime, should l gated, in as much as the salamander tends to be ne face during winter.

SELECTED REFERENCES

ANDERSON, J. D. AND G. K. WILLIAMSON. 1976. Mode of Reproduction in *Ambystoma cingulat* Herptologica 32(2):214-221.

MARTOF, R. S. 1968. *Ambystoma cingulatum*. (Amphib. Rept. 57.1-57.2.

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_____. 1980. Survey for the Presence or Threatened or Endangered Reptiles and Amphi neculh National Forest, Alabama. Unpub. Rept For. Serv. 108 pp.

PREPARED BY: D. Bruce Means, Coastal Pl tute, 1313 N. D ' St., Tallahassee, Florida 3230

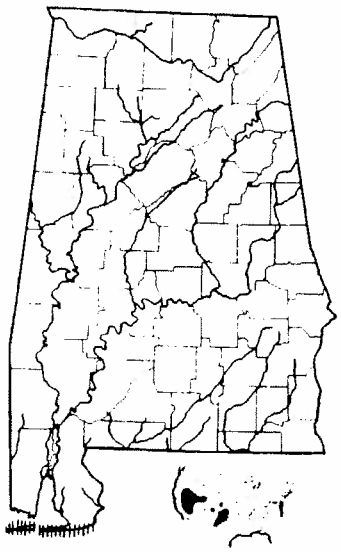
The Snowy Plover requires undisturbed, sandy beaches and, more so than most other creatures, its numbers are greater on islands. The Piping and Snowy plovers appear to be complementary sister species. The more cosmopolitan Snowy Plover is replaced in the northeast by the Piping Plover, which winters with it on the Gulf Coast where there appears to be no competition.

BASIS FOR STATUS CLASSIFICATION. In recent decades, the Snowy Plover's critical beaches have been subjected to excessive human activity. Some human recreation is not detrimental, but when a great many people take part or when the activity includes vehicles, the beach as a habitat for creatures, plant and animal, suffers.

Development of beaches is an even more serious threat because it is permanent. The building of houses, apartments, and other structures on the beach has become excessive.

RECOMMENDATIONS. Although legislation exists to limit the use of off-road vehicles, it is often violated and should be more vigorously enforced. The few remaining relatively pristine beaches in Alabama should be kept as natural as possible. Recreational use of beaches should be regulated to the extent practicable to avoid unnecessary disturbance of the fragile habitat. The public should constantly be reminded that the plant and animal life associated with the coast are important in making it attractive.

Ideally, no human intrusion at all is best for the Snowy Plover, especially during breeding. If possible, Sand and Pelican islands, the western portion of Dauphin Island, Fort Morgan, and some part of the Alabama Point area should be set aside as sanctuaries.



Range of the S[illegible]over.

SELECTED REFERENCES

AMERICAN BIRDS. 1971-1983 (Audubon Field Notes, 1947-1970, Vols. 1-24) Vols. 25-37 Bi-Monthly. National Audubon Society, New York; four issues contain season reports, one the Christmas Count, all of which contain distributional data on the Snowy Plover.

CHAPMAN, F. M. 1966. Handbook of Birds of Eastern North America. Dover, N.Y. 581 pp.

HARRISON, C. 1978. A Field Guide to the Nests, Eggs, and Nestlings of North American Birds. Collins, Glasgow. 416 pp.

IMHOF, T. A. 1976. Alabama Birds. Second Ed. Univ. Ala Press, Tuscaloosa. 445 pp.

PREPARED BY: Thomas A. Imhof, 1036 Pike Road, Birmingham, Alabama 35218.

Endangered

RED-COCKADED WOODPECKER

Picoides borealis (Vieillot)
Family Picidae
Order Piciformes

OTHER NAMES. None.

DESCRIPTION. The Red-cockaded Woodpecker is about the size of the Hairy Woodpecker, which it resembles except it has a zebra-like back, a black crown and a large white cheek patch. Male birds have a small red spot near the ear; otherwise the sexes are similar. Length 20 cm (8½ inches).

FIG. 66. Red-cockaded Woodpecker (Ed Tyberghein).

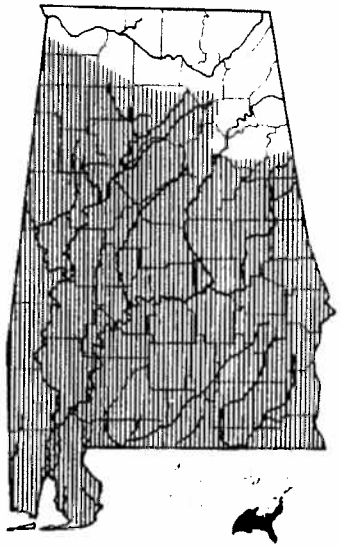
RANGE. This woodpecker is resident from eastern Oklahoma, Kentucky, and southern Maryland south to eastern Texas and southern Florida. In Alabama, it is found locally in most of the State south of the Tennessee River.

HABITAT. Red-cockaded Woodpeckers reside [illegible]n pine woods. Requirements include living mature pi[illegible]

ing dead hearts, within which the birds excavate their nest cavities. Optimal habitat has, in addition, interspersed stands of young pines, which provide good sites for foraging.

LIFE HISTORY AND ECOLOGY. Red-cockaded woodpeckers travel through open pine woods in small bands searching limbs, twigs, and cones for the insects that comprise the main portion of their food. Some seeds are also eaten. This species invariably nests in the aforementioned mature pines. The nest hole is dug into the center of the tree and angles upward until the dead heartwood is reached. The bird then digs straight down for about 30 cm (1 foot). Small holes are pecked above and below the nest entrance, allowing sap to flow and cover the surface around the hole and downward for about 1 m or so. The sticky surface apparently tends to repel such predators as snakes and flying squirrels. Two to 6 glossy white eggs are laid in the cavity. Old cavities are used for roosting.

BASIS FOR STATUS CLASSIFICATION. The culling of "substandard" trees and the increasingly extensive areas devoted to short-rotation forestry have greatly reduced Red-cockaded Woodpecker populations. Large pine trees with dead hearts are undesirable in the view of commercial foresters, and many have been removed. Many forest managers, knowing the endangered status of this species, now leave the nesting trees as well as a few large trees that surround them. At the present time, the extent of the area that should be left alone to enable a nesting colony to survive indefinitely is unknown. It has been estimated, however, that the home range size may approach 80 ha (200 acres). THE SPECIES IS CONSIDERED ENDANGERED BY THE UNITED STATES DEPARTMENT OF THE INTERIOR



Range of the Red-cockaded Woodpecker.

RECOMMENDATIONS. Life history and habitat studi[illegible] on the Red-cockaded Woodpecker are underway throughou[illegible] the range. These studies are being coordinated through t[illegible] Endangered Species Office of the U. S. Fish and Wildl[illegible] Service. Until concrete information is available on the sp[illegible]cies' requirements, little can be done to assure that the po[illegible]ulation can be brought out of danger. All corporate and in[illegible]vidual owners of large tracts of forestland should be ke[illegible] informed of current research and encouraged to set aside few acres of trees surrounding Red-cockaded Woodpecl[illegible] nesting sites.

SELECTED REFERENCES

IMHOF, T. A. 1976. Alabama Birds. Second Ed., Univ. of A[illegible] Press, Tuscaloosa. 445 pp.

ROBBINS, C. S., B. BRUUN, AND H. S. ZIM. 1966. Birds [illegible] North America. Golden Press, N.Y.

U. S. FISH AND WILDLIFE SERVICE. 1976. Red-cockad[illegible] Woodpecker Recovery Plan. U.S. Fish and Wildl. Ser[illegible] Washington, D.C.

PREPARED BY: James E. Keeler, 3576 N. Georgeto[illegible] Dr., Montgomery, Alabama 36109

Endangered

BACHMAN'S WARBLER

Vermivora bachmani (Audubon)
Family Emberizidae
Order Passeriformes

OTHER NAMES. None.

DESCRIPTION. Length: 11.5 cm (4.5 inches). Ad[illegible] males with yellow forehead and chin and black cap a[illegible] throat, or bib. Amount of black in the cap and throat pa[illegible] varies. Upper parts olive-green and under parts yellow [illegible]cept for white undertail coverts. Adult females with yel[illegible] forehead, gray crown and cheeks, and prominent yellow [illegible] ring. Breast buff-colored or only slightly yellowish. B[illegible] adult males and females have noticeable yellow shoul[illegible] patch, not always stressed in field guides, which may b[illegible] useful field mark. Immatures buff below, brown above, [illegible] have whitish eye ring.

RANGE. Breeding has been recorded only in Alabar[illegible] Arkansas, Kentucky, Missouri, and South Carolina. The s[illegible]cies has also been recorded in Florida, Georgia, India[illegible] Louisiana, Mississippi, North Carolina, Oklahoma, and [illegible]ginia. The winter range is Cuba, including the Isle of Pi[illegible] The present distribution is unknown, and no populations [illegible] known.

HABITAT. Bachman's Warbler frequents, or formerly [illegible]quented, mature hardwood bottoms and headwater swa[illegible] where openings permit the development of second gro[illegible] vegetation. Apparently it does not inhabit swamps that [illegible] subject to flooding for extended periods of time. From [illegible]scriptions of 32 nesting habitats in the southern Coastal P[illegible] reported between 1897 [illegible]d 1919, the plant communities [illegible] for nesting were swe[illegible]swamp tupelo-red maple ass[illegible]

EPA

POTENTIAL HAZARDOUS WASTE SITE
PRELIMINARY ASSESSMENT
PART 3 - DESCRIPTION OF HAZARDOUS CONDITIONS AND INCIDENTS

I. IDENTIFICATION	
01 STATE	02 SITE NUMBER

II. HAZARDOUS CONDITIONS AND INCIDENTS *(Continued)*

01 ☐ J. DAMAGE TO FLORA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ K. DAMAGE TO FAUNA — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION *(Include name(s) of species)*

01 ☐ L. CONTAMINATION OF FOOD CHAIN — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ M. UNSTABLE CONTAINMENT OF WASTES *(Spills/runoff/standing liquids/leaking drums)* — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
03 POPULATION POTENTIALLY AFFECTED: _____ 04 NARRATIVE DESCRIPTION

01 ☐ N. DAMAGE TO OFFSITE PROPERTY — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ O. CONTAMINATION OF SEWERS, STORM DRAINS, WWTPs — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

01 ☐ P. ILLEGAL/UNAUTHORIZED DUMPING — 02 ☐ OBSERVED (DATE: _____) ☐ POTENTIAL ☐ ALLEGED
04 NARRATIVE DESCRIPTION

05 DESCRIPTION OF ANY OTHER KNOWN, POTENTIAL, OR ALLEGED HAZARDS

III. TOTAL POPULATION POTENTIALLY AFFECTED: _____

IV. COMMENTS

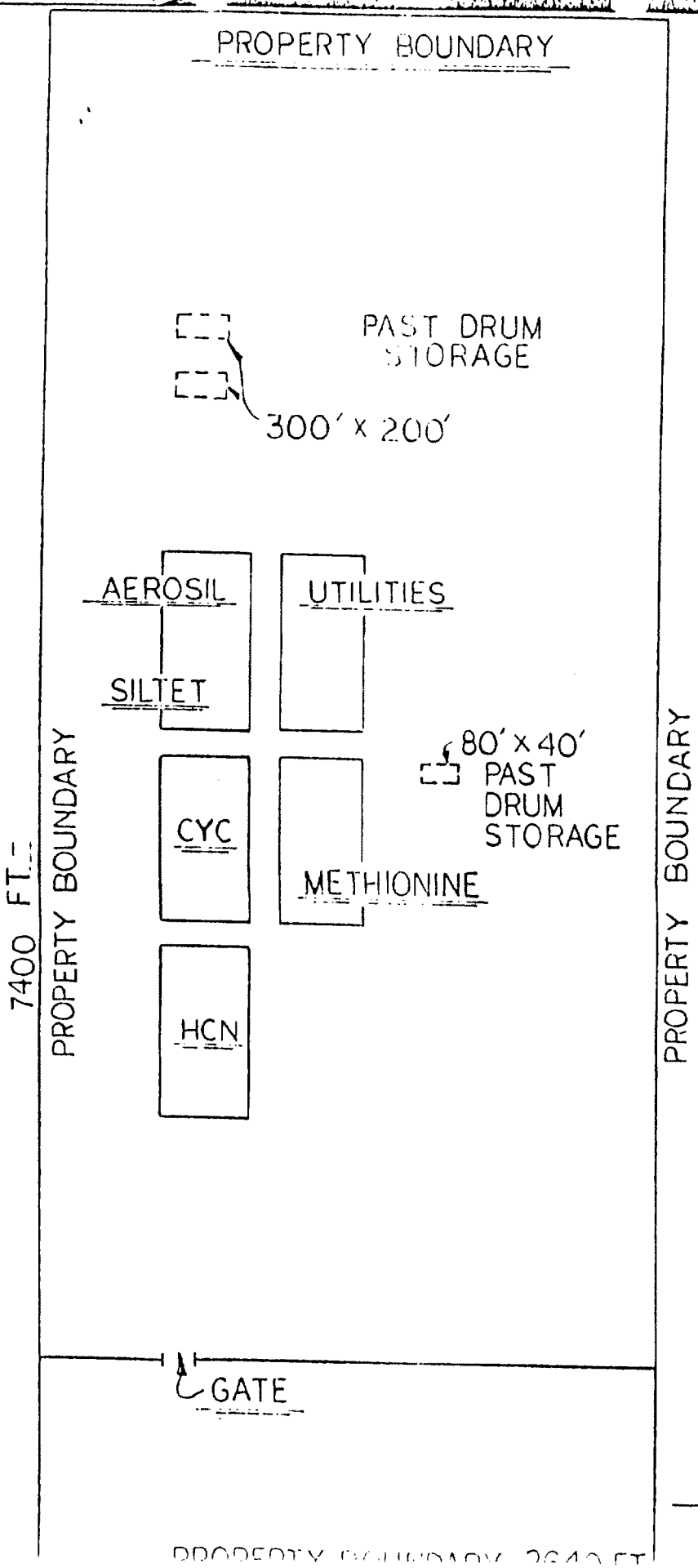
V. SOURCES OF INFORMATION *(Cite specific references, e.g., state files, sample analysis, reports)*

EPA FORM 2070-12 (7-81)

2/42

FACILITY DRAWING (see page 4)

Form Approved OMB No. 158-S80034



ATTACHMENT 1

VI. Waste Identification Continuation Sheet:

	A. EPA Waste Number	B. Waste Description	C. Amount of Waste (lbs)	D. Receiving Facility	E. Receiving Facility ID Number	F. Transporter Name	G. Transporter ID Number
7.	D003	HCN Column Packing	800	Rollins Enviro Svcs. LA, Inc.	LAD010395127	Rollins Env. Svc	LAD010395127
8.	D003, U211	Carbontetrachloride (Cyanide solution)	48,660	Chemical Waste Management	TXD000838896	Disposal Systems Inc.	TXD000719518
9.							
10.							
11.							
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23.							
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Degussa

Degussa Corporation
P.O. Box 606
Theodore, Alabama 36590
Telephone 205-653-7933
Telex: 505514

December 19, 1983

Mr. Michael Smith
Division of Solid & Hazardous Waste
Department of Environmental Management
434 Monroe St.
Montgomery, Alabama 36130-1701

Dear Mike,

I have conducted an investigation into the complaint at the county landfill at Chunchula. The four bags filled with the white fluffy material contained a brand of Aerosil, which is a fumed silica product, imported from Degussa in Europe. This material is totally inert and not harmful to personnel at the landfill.

It is part of a shipment of 355 bags imported from overseas and stored in the Baldwin Warehouse. This material is sold for use by numerous industries throughout the South. This particular lot was damaged by water and disposed of at the landfill beginning September 29, 1983. Mr. Tony Dean, with Waste Pick-Up, who disposed of this material was advised that this material was harmless before handling this material.

I personally visited the Chunchula landfill and advised the equipment operators, and personnel on duty, that it was a form of Aerosil and was totally harmless to them.

Yours truly,

William H. Howard

William H. Howard
Chief Chemist
Environmental Dept.

WHH/cbt

DEC 1983
RECEIVED
ADEM
Land Division

0/5

BARIUM IN LEACHATE FOR

FURNACE ASH

DATE	Ba (ppm)
Feb 29, 1980	48
Apr 16, 1980	76
Jul 16, 1981	22
Oct 6, 1981	33.8
Oct 13, 1981	37.6
Oct 20, 1981	20.2
Oct 27, 1981	63.7
Nov 3, 1981	54.8
Nov 16, 1981	45.8
Nov 30, 1982	65.8
Nov 9, 1981	74.4
Dec 16, 1981	30.9
Jan 21, 1982	17.3
Feb 16, 1982	17.0
Mar 1982 (composite)	45.0
Apr 1982 (composite)	40.8

AEROSIL

1. MTCS tankfarm (Methyltrichlorosilane - 1 tank)

2. HCL tankfarm (8 tanks)

3. Caustic tankfarm (5 tanks)

HCN

1. Acetone storage (1 tank)

2. H_2SO_4 storage (1 tank)

3. ABN storage (Aminoisobytryronitrile - 2 tanks)

CYC

1. Wastewater tankfarm #1001 and #1002 (2 tanks - 1 rain water and 1 process wastewater. Possible contaminants are HCN, Cyanuric Chloride, Ammonia and organics)

2. Solvent storage tank (1 tank containing Metachlorbenzotri-flouride)

3. Dowtherm storage tank

4. Dowtherm heater

5. HCN destruction area and tankfarm (consists of 4 HCN storage tanks, 1 HCN contaminated water vessel, 2 HCN destruction tanks, various pumps and compressors)

There are a number of other diked areas, both process and tankfarms which are drained only to Central Neutralization and discharged through our wastewater treatment system. In fact most of the tankfarms and diked areas listed above are presently also drained to our wastewater treatment system, but we would like the option of being able to discharge uncontaminated rain water directly into the storm sewer in the cases mentioned above.

As previously mentioned, I am enlcosing a number of prints and a preliminary engineering report for the proposed MMP (Methylmercaptopropionaldehyde) tankfarm which I have spoken to you about. If you have any questions on either of these matters please make me aware of same.

Sincerely,

Gene Sheppard
Environmental Supt.

GS/cbt
Enclosures

12/c

CERTIFICATION INFORMATION

WASTEWATER PERMIT APPLICATION - ALABAMA WATER IMPROVEMENT COMMISSION

A. NAME OF FACILITY - Methylmercaptopropionaldehyde tankfarm

B. TYPE OF FACILITY - Storage for unpurified methylmercaptopropionaldehyde and truck loading facility

C. DATE AND INITIAL OPERATION - September 1982

D. LOCATION OF FACILITY - Block E500, Degussa Corporation Plant Site
Theodore Industrial Park

E. NAME AND ADDRESS OF OWNER - Degussa Corporation
Alabama Group
P. O. Box 606
Theodore, AL 36590
Phone: (205) 653-7933

F. DESIGNATED PERSON RESPONSIBLE FOR PLANT - Dr. Sven-Peter Mannsfeld
President

G. MANAGEMENT APPROVAL - Full approval is extended by Management at a level with authority to commit the necessary resources.

SIGNATURE Sven-Peter Mannsfeld
NAME: Dr. Sven-Peter Mannsfeld

H. CERTIFICATION - I hereby certify that I have examined the proposed plans and information for a wastewater permit application to the Alabama Water Improvement Commission and find the plans in accordance with good engineering practice in meeting regulatory requirements for stormwater discharge from this storage and truck loading facility.

ALABAMA REGISTERED No. 8480 PROFESSIONAL ENGINEER JOSEPH ROBERT DUNCAN

SIGNATURE Joseph R Duncan
NAME: Joseph R. Duncan, P.E.

PRELIMINARY ENGINEERING REPORT

DEGUSSA CORPORATION

METHIONINE PLANT

METHYLMERCAPTOPROPIONALDEHYDE TANKFARM

THEODORE, ALABAMA

I. INTRODUCTION

The Degussa Corporation, Alabama Group plans to construct a methylmercaptopropionaldehyde (MMP) tankfarm and truck loading facility at their plant site in the Theodore Industrial Park. This represents an expansion of the existing methionine plant to enable unpurified MMP to be trucked to the site, unloaded and stored in the tankfarm. It is planned to import unpurified MMP by ocean-going vessels from Europe. The containers will be unloaded at the Port of Mobile, placed on truck and transported to the plant site.

The Degussa Corporation plant site is located near the middle of the Theodore Industrial Park on a 400-acre tract bordered on the north by the barge canal extension of the Theodore Ship Channel (Figure 1). Figure 2 shows the layout of the plant site. The proposed facility will be located in Block E500 (Drawing E500 - C205) in proximity to the existing central neutralization, mother liquor storage (FA 901) and the recently completed liquimeth tankfarm. (Preliminary Engineering Report - Liquid Methionine Tankfarm, Feb. 1982). The proposed tankfarm will occupy a space 31' by approximately 89'. The truck loading station will be 41' long by about 32' wide.

II. FACILITY DESCRIPTION

The new truck loading station and MMP tankfarm proposed will not change the existing methionine plant process or alter any of the process characteristics. MMP is an intermediate chemical used in the production of methionine. Figure 3 shows the product flow for the existing MMP production and how the proposed facility will fit into the overall process flow scheme. In the existing MMP production methylmercaptan is reacted with acrolein to B-methylmercaptopropionaldehyde. The unpurified

valves to the incinerator. Drawing 73/7892/0 shows the piping plan of the tank-farm. The tank area is diked by a five foot concrete wall to contain any overflow, accidental spills or retain contaminated stormwater. Drawing 73/21-0-019 shows the concrete foundation plans and details. The pump pad on the same drawing has a 6 inch curb with a sump to contain any leakage.

Any overflow or accidental spill from the MMP storage tanks will drain directly to the sump in the southwest corner of the diked area. The sump details are shown on Drawing 73/21-0-019. The sump pump (GA-1542) is a 5HP, 3500 RPM pump capable of pumping 83 gallons per minute. Any contaminated stormwater will be pumped to central neutralization, any accidental spill of MMP will be pumped to FA-901 tank and stored for disposal. (Piping is shown in Drawings 73/7892/0 and E500-C205). Stormwater, which collects in the concrete basin during a rain event will be checked for contamination. If uncontaminated, the collected rain water will be drained through the liquimeth tankfarm sump. Any pump leakage from the facility will be collected in the pump pad and flow through a 6 inch line to the front half of the sump in the diked tank area. This leakage would be pumped through the same sump pump (GA-1542) to FA-901 tank for disposal.

B. TRUCK LOADING STATION

A concrete pad about 41' by 32' will be used for unloading the MMP containers The pad will slope to 6 inch drain pipe for collection and containment of any leakage or accidental spill during unloading operations. This drain is connected to the front half of the sump in the diked tank area. Any leakage wash down of the pad or accidental spill would be pumped to the FA-901 tank. Any contaminated stormwater would go to the "Liquimeth" tankfarm sump for release to the stormwater drainage system.

During an 8 hour shift, a maximum of 8 container trucks can be unloaded. No more than 50 containers will be received per month. Shipments are expected on a weekly basis with about 12 containers per shipment.

drainage from the non-process areas of the plant site is transported through concrete open channels and flow into the barge canal extension and through the Theodore Ship Channel. In addition to the check valves in the sumps in the diked areas, there is a final check valve in the drainage ditch running under the truck loading station. This consists of a 6 inch pipe through a concrete wedge poured in the drainage ditch adjacent the environmental office building. A manually operated valve is located on the outlet of the pipe and is used as a precaution in the event of a spill or detection of contaminated stormwater in the methionine plant area.

VIII. SCHEDULE OF IMPLEMENTATION

Completion of construction is scheduled for early September 1982. Operation is tentatively scheduled for late September 1982, pending issuance of the wastewater permit.

IX. ACKNOWLEDGEMENTS

Information pertaining to the facility descriptions, unit operations and wastewater characteristics have been provided by Degussa Corporation, Alabama Group. Those assisting were Gene Sheppard, Environmental Superintendent, Wolfgang Heim, Project Engineer, and Dr. Horst Wenz, Methionine Superintendent. The report was prepared by Joseph R. Duncan, P. E. under Degussa Purchase Order Number D-54199 M.

X. LIST OF DRAWINGS

The following drawings have been referred to in this report and are submitted as an attachment for reference purposes:

Drawing Number	Title
73/7892/0	MMP STORAGE AREA PIPING PLAN AND SECTIONS
73/21-0-019 Sheet: 1-3	MMP TANKFARM/GENERAL OVERVIEW
73/21-0-019 Sheet 2-3	MMP TANKFARM CONCRETE FOUNDATIONS PLANS AND DETAILS
E500-C205	SITE/GRADING PLAN

State of Alabama

DEPARTMENT OF PUBLIC HEALTH

State Office Building
Montgomery, Alabama 36130

IRA L. MYERS, M.D.
STATE HEALTH OFFICER

January 25, 1982

Mr. John Bananek
Degussa Corporation
P. O. Box 606
Theodore, Alabama 36582

Re: Theodore, Alabama: ALD075045575

Dear Sir:

This is to acknowledge receipt of your request to withdraw your Part A, RCRA Permit Application. Since Alabama has Phase I Authorization, it will be our responsibility to determine if your request should be honored.

Based upon the information you supplied, it appears that your facility is no longer treating, storing, or disposing of hazardous waste and is, therefore, not subject to Alabama's Hazardous Waste Management Regulations. Therefore, your request to withdraw your Part A Application is granted.

You should be aware that your request to withdraw interim status means that you may not treat, store, or dispose of hazardous waste without a permit issued under the authority of Code of Ala. 1975, Section 22-30-12, as amended, and the Regulations adopted thereunder.

Should you have questions or comments, please feel free to contact this office.

Sincerely,

B.E. Cox Jr.

Bernard E. Cox, Jr., Chief
Industrial and Hazardous Waste Section
Division of Solid and Hazardous Waste
Environmental Health Administration

BEC:rc

cc: Mr. James Scarbrough
EPA Region IV

22/52

BEC

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JUL 10 1981

STATE HEALTH DEPARTMENT
DIVISION OF SOLID WASTE

File with EPA Inspection file

Degussa Corporation

Alabama Group
P.O. box 606
Theodore, Alabama 36582
Telephone 205-653-7933
Telex 505514

July 6, 1981

EPA Region IV
RCRA Activities
345 Courtland Street
Pensacola, Florida 30365

Gentlemen:

Enclosed is a revised application for hazardous waste activities. A number of deletions were made from the original application reflecting changes in EPA regulations or latest interpretations. Also, application for storage over ninety (90) days has been dropped.

Should there be any questions, please contact me.

Yours truly,

Bill Howard

Bill Howard
Chief Chemist

BH:mw

Enclosures

EPA I.D. NUMBER (enter from page 1)

	L	D	0	7	5	0	4	5	5	7	5	T/A	C

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IV. DESCRIPTION OF HAZARDOUS WASTES (continued)

LINE NO.	A. EPA HAZARD. WASTE NO. (enter code)	B. ESTIMATED ANNUAL QUANTITY OF WASTE	C. UNIT OF MEASURE (enter code)	D. PROCESSES 1. PROCESS CODES (enter)				2. PROCESS DESCRIPTION (if a code is not entered in D(1))
1	D002	1500	P	S01				CYC Lab Waste
2	D009	60	P	S01				Analytical Lab Waste
3	D002	9000	P	S01				CYC
4	D005	240000	P	S01				Furnace Ash
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HWJ

Degussa Corporation

Alabama Group
P.O. box 606
Theodore, Alabama 36582
Telephone 205-653-7933
Telex 505514

May 26, 1981

Mr. Harold Taylor
Alabama Division of Solid and Hazardous Waste
434 Monroe Street
Montgomery, Alabama 36130

Dear Harold,

Enclosed is a copy of John Herrmann's letter concerning the incinerators. He confirms that the hazardous waste regulations do not apply to our incinerators.

I am sending in a modified permit application to EPA to reflect these changes.

Yours truly,

Bill Howard

Bill Howard
Chief Chemist

BH/pls
Enclosure

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STATE HEALTH ...
DIVISION OF SOLID WASTE

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Degussa Corporation

Alabama Group
P.O. box 606
Theodore, Alabama 36582
Telephone 205-653-7933
Telex 505514

MAR 19 1981

STATE HEALTH DEPARTMENT
DIVISION OF SOLID WASTE

March 16, 1981

EPA Region IV
RCRA Activities
345 Courtland St.
Pensacola, Florida - 30365

Gentlemen:

I would like to request that one of the waste materials listed in our Form 3 be removed. The material in question is item number 9 on page 3 listed as shovel drier ash. Due to the change from total to Hexavalent chromium as per the November 12, 1980 rule of EPA, this material is found to contain chromium less than one tenth the specified limit. It therefore does not qualify as EP toxic.

Thank you for making this change in our application under ID number ALD075045575.

Sincerely,

William H. Howard

William H. Howard
Chief Chemist

WHH/pls

cc: Mr. Harold Taylor
(Alabama Division of Solid and Hazardous Waste)

30/52

VESTER J. THOMPSON, JR., INC.
CHEMICAL, MATERIALS AND GEOTECHNICAL
LABORATORIES

3707 COTTAGE HILL ROAD
MOBILE, ALABAMA 36609
TELEPHONE 205/666-2443

ORDER NO. 2305-79-632-CL

CLIENT'S NO. D26157M
D26166M

LABORATORY NO. 8650-8654

REPORT NO. 1

REPORT

September 11, 1979

REPORT OF: Analysis of Solid Wastes

REPORT TO: Degussa Alabama, Inc.
P.O. Box 606
Theodore, Alabama 36582

Attention: William H. Howard

Date Samples Submitted to Laboratory: 8/10/79

Sample Identification:		#1 Pond Sludge	#2 Dolomite Gangue	#3 Spent Carbon (Methionine)	#4 Spent Carbon (CYC)	#5 Shovel Drier Ash
Date of Analysis	Parameter	Lab No. 8650	Lab No. 8651	Lab No. 8652	Lab No. 8653	Lab No. 8654
8/22/79	Total Aluminum as Al, %	--	--	2.0	0.04	20.0
8/13/79	Total Arsenic as As, %	0.0001	0.012	0.00009	<.00005	0.0034
8/22/79	Total Barium as Ba, %	0.0067	0.020	0.010	<.005	0.037
9/7/79	Total Boron as B, %	--	--	0.002	--	--
8/22/79	Total Cadmium as Cd, %	<.0002	<.0002	<.0002	<.0002	<.0002
8/24/79	Total Calcium as Ca, %	10.6	0.060	0.046	0.0081	0.30
8/20/79	Chloride as Cl, %	4.47	0.65	--	--	27.5
8/21/79	Total Chromium as Cr, %	0.011	0.013	0.0077	0.0024	0.045
8/16/79	Total Cyanide as CN, %	<.00002	<.00002	<.00002	0.00009	--
8/23/79	Total Iron as Fe, %	1.1	3.4	0.38	0.092	8.2
8/22/79	Total Lead as Pb, %	<.001	<.001	<.001	<.001	<.001
9/4/79	Loss on Ignition @ 550 C, %	21.3	3.8	65.2	56.6	--
9/4/79	Loss on Ignition @ 800 C, %	23.5	63.6	65.4	85.1	--
8/24/79	Total Magnesium as Mg, %	13.5	2.3	0.050	0.0033	--
8/22/79	Total Manganese as Mn, %	--	--	0.010	--	--
9/4/79	Moisture Content, %	299	43	102	0.173	--
8/23/79	Total Nickel as Ni, %	--	--	<.001	--	--

REPORT ON SAMPLE BY CLIENT APPLIES ONLY TO SAMPLE. REPORT ON SAMPLE BY US APPLIES ONLY TO LOT SAMPLED.
INFORMATION CONTAINED HEREIN IS NOT TO BE USED FOR REPRODUCTION EXCEPT BY SPECIAL PERMISSION.
SAMPLES RETAINED FOR THIRTY DAYS MAXIMUM AFTER DATE OF REPORT UNLESS SPECIFICALLY REQUESTED OTHERWISE BY CLIENT.

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STATE HEALTH DEPARTMENT
DIVISION OF SOLID WASTE
& VECTOR CONTROL

Degussa Corporation

Alabama Group
P.O. box 606
Theodore, Alabama 36582
Telephone 205-653-7933
Telex 505514

November 24, 1980

Mr. Harold Taylor
Alabama Division of Solid and Hazardous Waste
434 Monroe Street
Montgomery, Alabama 36130

Dear Harold:

As requested, I am sending you the total and leachate analysis of sludge from the wastewater pond. We are requesting approval from the Alabama Division of Solid and Hazardous Waste to dispose of this material in the Barge Canal spoils site of the Alabama State Docks located adjacent to the Degussa plant site. There are approximately 50,000 cubic yards of this sludge which is composed of about 15% fused silica and 85% calcium and magnesium hydroxide and carbonates.

The spoils area covers approximately 90 acres. Engineering tests are being carried out to determine the effect of this material on the soil compaction.

We look forward to hearing from you concerning the land disposal of this material.

Yours truly,

William H. Howard

William H. Howard
Chief Chemist

WHH/pls
Enclosures

34/52

Sample Identification:

Date of Analysis	Parameter	#1 Pond Sludge Lab No. 8650	#2 Dolomite Gangue Lab No. 8651	#3 Spent Carbon (Methionine) Lab No. 8652	#4 Spent Carbon (CYC) Lab No. 8653	#5 Shovel Drier Ash Lab No. 8654
8/17/79	pH	8.9	4.6	10.5	2.8	3.2
8/24/79	Total Potassium as K, %	--	--	4.1	--	--
9/5/79	Total Selenium as Se, %	<.1	<.1	0.28	0.21	<.1
8/24/79	Total Silicon as Si, %	5.5	21.8	9.2	0.079	5.0
8/21/79	Total Silver as Ag, %	<.001	<.001	<.001	<.001	<.001
8/24/79	Total Sodium as Na, %	2.0	0.15	0.73	0.072	0.095
8/24/79	Total Titanium as Ti, %	--	--	--	--	2.3

The preceding determinations are reported as percent based on the dry weight of the sample.

VESTER J. THOMPSON, JR., INC.

James C. Sciple

JCS/mar

cement is being explored with EPC. Should this technique meet standards for safe disposal, we hope that these wastes can be handled in the Mobile County site operated by EPC. We will keep you advised of developments in this area as they arise.

Please contact me should there be any questions regarding this matter.

Very truly yours,

Bill Howard

Bill Howard
Chief Chemist

BH/pls

28/cm

FEB 21 1980
STATE HEALTH DEPARTMENT
DIVISION OF SOLID WASTE
& VECTOR CONTROL

Degussa Corporation

Alabama Group
P.O. box 606
Theodore, Alabama 36582
Telephone 205-653-7933
Telex 505514

February 15, 1980

Mr. Wade Pitchford
Department of Public Health
State Office Building
Montgomery, Alabama 36130

Dear Mr. Pitchford:

Enclosed is information concerning the waste streams at the Degussa Alabama plant as you requested. A description of the characteristics and quantities generated are listed in Table 1. Chemical analyses are shown in Table 2 and 3 for the solid and liquid wastes. Although in some cases these analyses are on composites taken over a period of several days, they could be subject to change resulting from raw material and/or production variables. Leachate analyses as per 43FR58946 Section 250.13 are listed in Table 4.

Plans are now underway to comply with disposal of these materials in accordance with the guidelines set forth in the Resource Conservation and Recovery Act of 1976.

Please contact me should there be any questions concerning these data.

Yours truly,

Bill Howard

Bill Howard
Chief Chemist

BH/pls
Enclosure

TABLE 2

ELEMENTAL ANALYSIS OF SOLID WASTES

PARAMETER	POND SLUDGE	DOLOMITE GANGUE	CARBON (METHIONINE)	CARBON (CYC)	SHOVEL DRIER ASH	FURNACE ASH	FLOOR SWEEPIN (AEROS
Al	- (%)	- (%)	2.0(%)	.04(%)	20.0(%)	1.6(%)	5.1(%)
As	.0001	.012	.0009	<.0005	.0034	<.01	<.01
Ba	.0067	.020	.010	<.005	.037	.26	.031
Cd	<.0002	<.0002	<.0002	<.0002	<.0002	<.001	<.001
Cr	.011	.013	.0077	.024	.045	.61	.017
Cl	4.47	.65	-	-	27.5	10.1	.0095
Fe	1.1	3.4	.38	.092	8.2	7.6	2.4
Si	5.5	21.8	9.2	.079	5.0	25.3	10.9
SiO_2	-	-	-	-	-	54.2	23.3
Se	<.1	<.1	.28	.21	<.1	<.1	<.1
Ag	<.001	<.001	<.001	<.001	<.001	<.005	<.005
Ti	-	-	-	-	2.3	.046	.29
pH	8.9	4.6	10.5	2.8	3.2	4.2	8.8

TABLE 4

LEACHATE ANALYSIS

PARAMETER	POND SLUDGE	DOLOMITE SLAG	CARBON (METHIONINE)	CARBON (CYC)	SHOVEL DRIER ASH	FURNACE ASH	FLOOR SWEEP (AERO
As	<.01mg/1	<.01mg/1	<.01mg/1	<.01mg/1	<.01mg/1	<.01mg/1	<.01m
Ba	.31	<.05	.20	.20	11	130	.20
Cd	<.002	<.002	<.002	<.002	<.002	<.002	.014
Cr	.050	.028	.11	.46	6.3	68	.015
Pb	<.01	<.01	<.01	.018	.20	<.01	<.01
Hg	<.0002	<.0002	<.0002	<.0002	.0003	<.0002	.000
Se	<.002	<.002	<.002	<.002	<.002	<.002	<.002
Ag	<.01	<.01	<.01	<.01	<.01	<.01	<.01

DOLOMITE GANGUE

COMPONENT	%WEIGHT
$MgCa(CO_3)_2$	39.2
Fe_2O_3	1.2
Al_2O_3	1.6
SiO_2	5.4
H_2O	41.4
NaCl	0.2
$CaCl_2$	5.9
$MgCl_2$	5.1
	100.0

The physical properties of the waste are:

Apparent density:	110 lbs/ft^3
Mass:	from 12,000 to 30,000 lbs per stream day
Volume:	from 110 to 280 ft^3 per stream day (from 4 to 10 yd^3 per stream day)

III.

A. Name: Degussa of Alabama, Inc.

B. Problem: Improper Waste Management

C. Background: In July, 1979, representatives of EPA and the Division of Solid Waste and Vector Control visited Degussa of Alabama, Inc., located in Theodore, Alabama. The purpose of the visit was to obtain waste type information and determine the disposition of the plant's waste products. It was discovered that waste products are stored in 55-gallon drums in a diked area to the rear of the plant. Many of the drums are in a deteriorated condition and their contents have spilled onto the ground. The problem is compounded by the fact that the area is characterized by sandy/clay soil and a high water table. The composition of the waste is uncertain at present; however, this Division has requested that Degussa supply a chemical analysis of each waste product that it generates.

D. Location: Degussa of Alabama, Inc., is located in Mobile County, Alabama, near Theodore in the Theodore Industrial Park.

E. Waste Type Information:
Uncertain at present; however, Degussa produces aerosol, methionine, cyanuric chloride, and hydrogen cyanide.

F. Status: The chemical analyses of Degussa's wastes are expected to be completed and furnished to this office shortly.

G. Point of Contact:

Mr. Gene Sheppard
Degussa Corporation
P. O. Box 606
Theodore, Alabama 36582
(205)653-7945

If you have any questions regarding the above or if we can be of further assistance to you, please feel free to contact this office.

Sincerely,

Alfred S. Chipley, Director
Division of Solid Waste & Vector Control
Environmental Health Administration

ASC:clr

CC: Mr. James E. Fibbe
Mobile County Health Department w/enclosures

Mr. Mark Pool
Mobile County Health Department w/enclosures

Mr. Bobby Marcet
Degussa Alabama, Inc., w/enclosures

Mr. Roy Howard
P. O. Box 1443
Mobile, Alabama w/enclosures

Additional solid waste occurs from time to time. When this happens, the material is placed in containers appropriate for the material and it is stored with a retaining dike around it. Material is then tested. If it is non-hazardous and approved by the county, a contractor is called in to transport the material to the county landfill. If the material cannot be put into the landfill without treatment, a waste management firm is called upon for recommendations. A contract is then issued to a reliable waste management firm for transport and disposal of the materials at an approved landfill.

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as can be seen from Fig. 5. The first compartment is of steel lined with firebrick and is the combustion space for oil or fuel gas furnishing hot combustion gases at 1100°F. These hot gases are led through heat- and

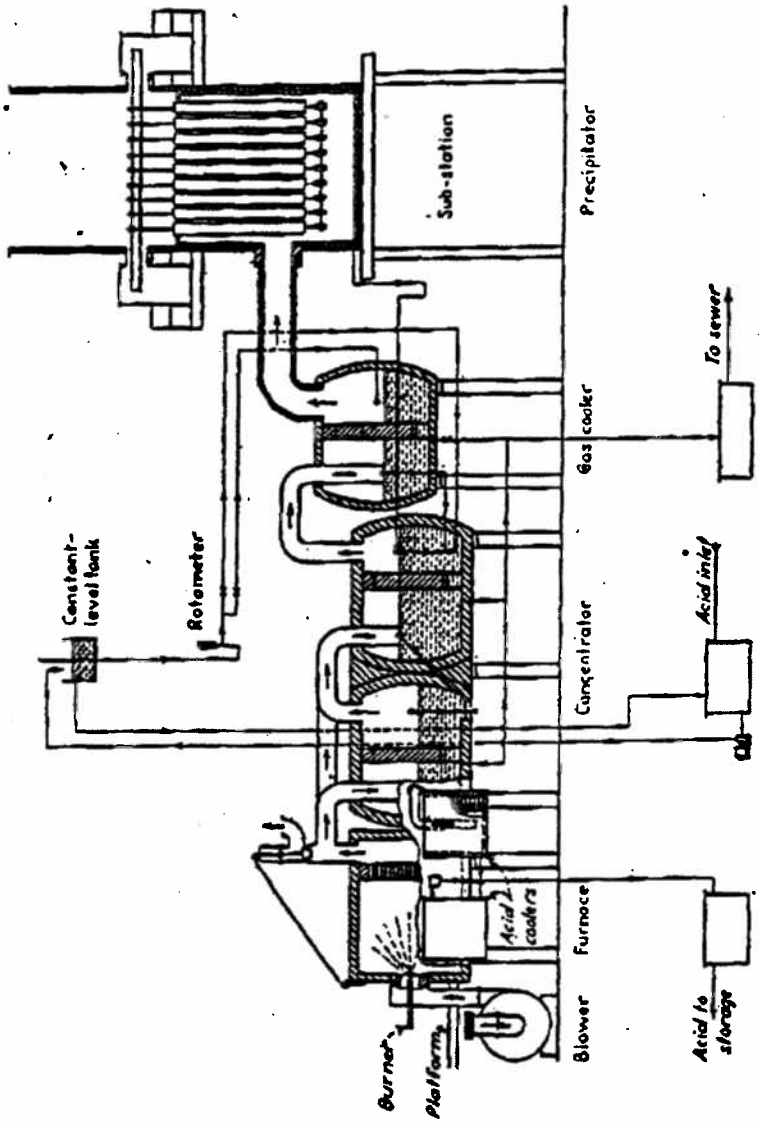

FIG. 5.—"Chemico" sulfuric acid concentrator, drum type. (Courtesy of Chemical Construction Corporation.)

acid-resistant iron pipes from one compartment to the other, being released slightly below the acid surface. The temperature of the gases entering the front concentrating compartment is around 1100°F., and

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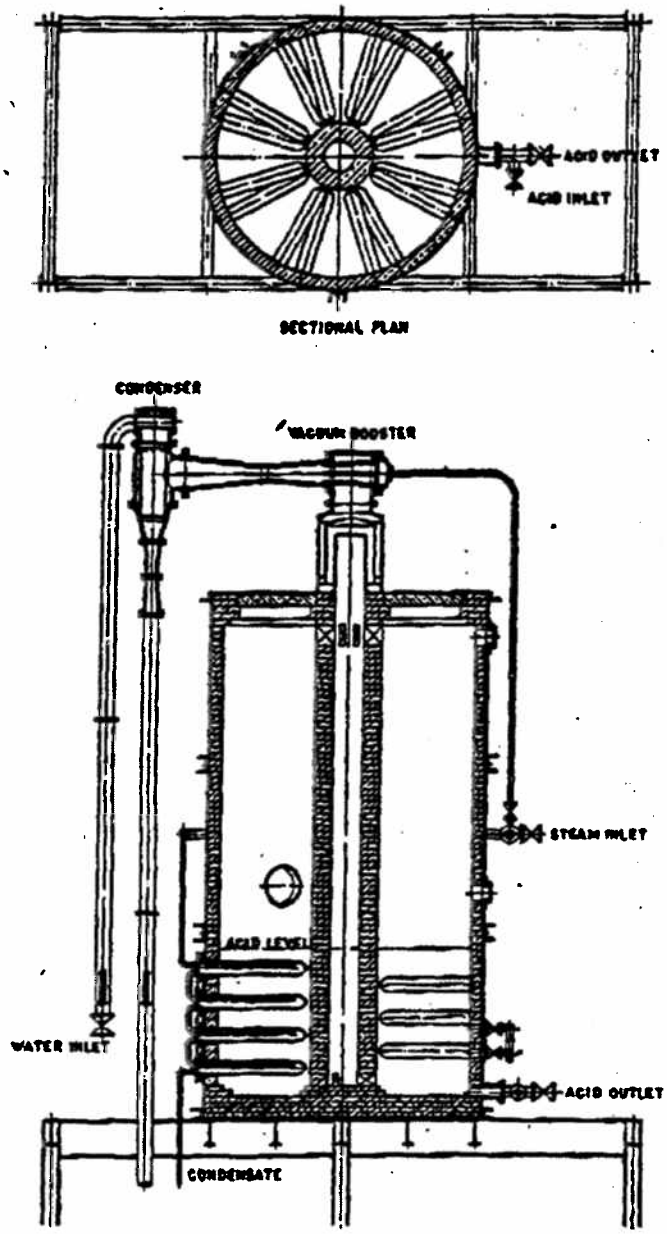


FIG. 6.—Simonson-Mantius vacuum concentrator for sulfuric acid. (*Courtesy of National Lead Company.*)

The Chemico flash film concentrator as shown by Fig. 7 is a continuous apparatus with the weak acid to be concentrated passing down through a series of connected return bends of high silicon acidproof pipe, jacketed for steam. It operates usually under vacuum produced by a steam ejector and a barometric leg. Because of the rapid acid flow in films, an efficient heat transfer is attained. This type of concentrator is also used to distill 95 per cent HNO_3 from tower nitric acid as weak as 50 per cent, using strong sulfuric acid as the dehydrating agent. The weakened sulfuric acid can then be reconcentrated in another such unit.

Improvements in the Chamber Process.—Because of the large volume of acid made by the chamber process, there have been many new designs introduced to better the economics of this process. One of the first of these was the Pratt procedure which obtained popularity between 1890 and 1910. It differed from the ordinary plants by having the first chamber much larger than the others and by placing between the first and second chambers a tower known as the *converter*. This was a packed tower, about 25 ft. in height, which provided intimate mixing and, therefore, produced a large amount of acid. The gases issuing from the top of the tower were divided and part of them fed back into the largest chamber, the other part being sent on to the smaller chambers.

In 1913 in England there were erected chambers in the shape of truncated cones with provision for water cooling on the outside. These were invented by Mills and Packard.[1] Such chambers reduce the space per pound of brimstone burned per day from 8 to about 3 cu. ft. Redesigned plants of this type may be constructed so compactly that chambers for a 100-ton plant may be erected on 100 sq. ft. of ground. Recently at Tampa, Fla., a 300-ton (60°Bé.) per day plant has been put into operation.[2] This is illustrated by Fig. 8. It needs only 2.75 cu. ft. of chamber space per pound of sulfur burned per day.

Another plant for the reduction of space is the Gaillard-Parrish acid-cooled chamber. This consists of a steel-framed cylindrical lead chamber which has at the top a "turbodispenser" that cools the chamber walls from the inside by spraying them with a shower by a finely divided precooled chamber acid. These towers are usually 50 ft. or more tall and may handle 500 to 2,000 tons of chamber acid per hour. Here again only about 3 cu. ft. of chamber space is needed per pound of brimstone burned per day.

An interesting plant has been installed by the Anaconda Copper Company at Anaconda, Mont. This consists of the usual Glover and

[1] FAIRLIE, Mills-Packard Sulfuric Acid Chambers, *Chem. & Met. Eng.*, 44, 728, (1937). For many improvements both in America and Europe, see Fairlie, "Manufacture of Sulfuric Acid," *op. cit.*, Chap. 9, etc.

[2] FAIRLIE, Building the World's Largest Mills-Packard Acid Plant, *Chem. & Met. Eng.*, 50, No. 9, 103 (1943).

2. PROJECT MANAGEMENT SUMMARY

Site Name: DEGUSSA CORP. ALABAMA GROUP

Site Number: ALD075045575

Owner: DEGUSSA CORP., SHELL CHEMICAL

Operator: DEGUSSA CORP.

Site Status: [X] Active [ ] Inactive [ ] Unknown

Priority: [ ] High [ ] Medium [ ] Low [X] None

3. FINAL DISPOSITION

I. EPS Final Review - Date: 8/4/84

Comments:

Site Inspection Required [ ] Yes [ ] No

II. ADEM Review - Date:

Comments:

Follow-up Action Required [ ] Yes [ ] No

III. Final Disposition:

Review & revise Date:

Edited & correct Date:

Transmitted Date:

File close-out Date:

Initiate site inspection Date:

4. ADDITIONAL COMMENTS (ONGOING & FINAL)

Doc. 1

waste disposal throughout the history of the facility but these have either been nonhazardous materials or they have been cleaned up by Degussa. These instances are documented in the ADEM files. There are three past disposal areas indicated on the facility line drawing. These areas have been cleaned up and in one instance where there was evidence of some soil contamination, sampling and analysis was done. At one time they did have a spill of cyanuric chloride. The entire spill area was on a concrete pad and the material was shoveled into drums and sent to Rollins. There is evidence in all the ADEM departmental files that close attention has been paid to this facility and the environmental interface. Any past problems are documented on the files and there is no evidence of any unresolved problems. This facility has withdrawn from interim status and retains status as a generator only.

There is a groundwater problem in the area associated with an ammonium sulfate spill. This is being resolved through the water division at ADEM.

3. Disposition:

Degussa has documented disposal activities during their ten year history at the site. There appear to be no problems associated with this company's disposal activities. See comments below for further site information.

4. Comments:

The entire Theodore Industrial Park was at one time an Army ammunitions dump. When this plant was built, there was no evidence of any ammunitions remaining on this property. There was a report that the Kerr-McGee facility on the property next door did have to destroy bunkers when they built their plant. Undisturbed bunkers may remain.

review process.

Review Codes: 1-Toxicology Review; 2-Chemical Review; 3-Ecology Review; 4-Chemical Engineer Review; 5-Geotechnical Review; 6-Project Manager Review; 7-Final Review

1. ANALYST/REVIEW STATUS

Form 2070 Part Number	Analyst/ Date	Review Code 1	Review Code 2	Review Code 3	Review Code 4	Review Code 5	Review Code 6	Review Code 7
1.I.-VI.	8/1/84 [illegible]							
							FAW 8/4	FAW 8/4
2.I.								
2.II.								
2.III.								
2.IV.								
2.V.								
2.VI.								
3.I.								
3.II.A								
3.II.B								
3.II.C								
3.II.D								
3.II.E								
3.II.F								
3.II.G								
3.II.H								
3.II.I								
3.II.J								
3.II.K								
3.II.L								
3.II.M								
3.II.N								
3.II.O								
3.II.P								
3.III.								
3.IV.								
3.V.								

*No further assessment/review required, enter NA

SITE INSPECTION WORKSHEETS

CERCLIS IDENTIFICATION NUMBER
EPA IOE ALD 075 045575

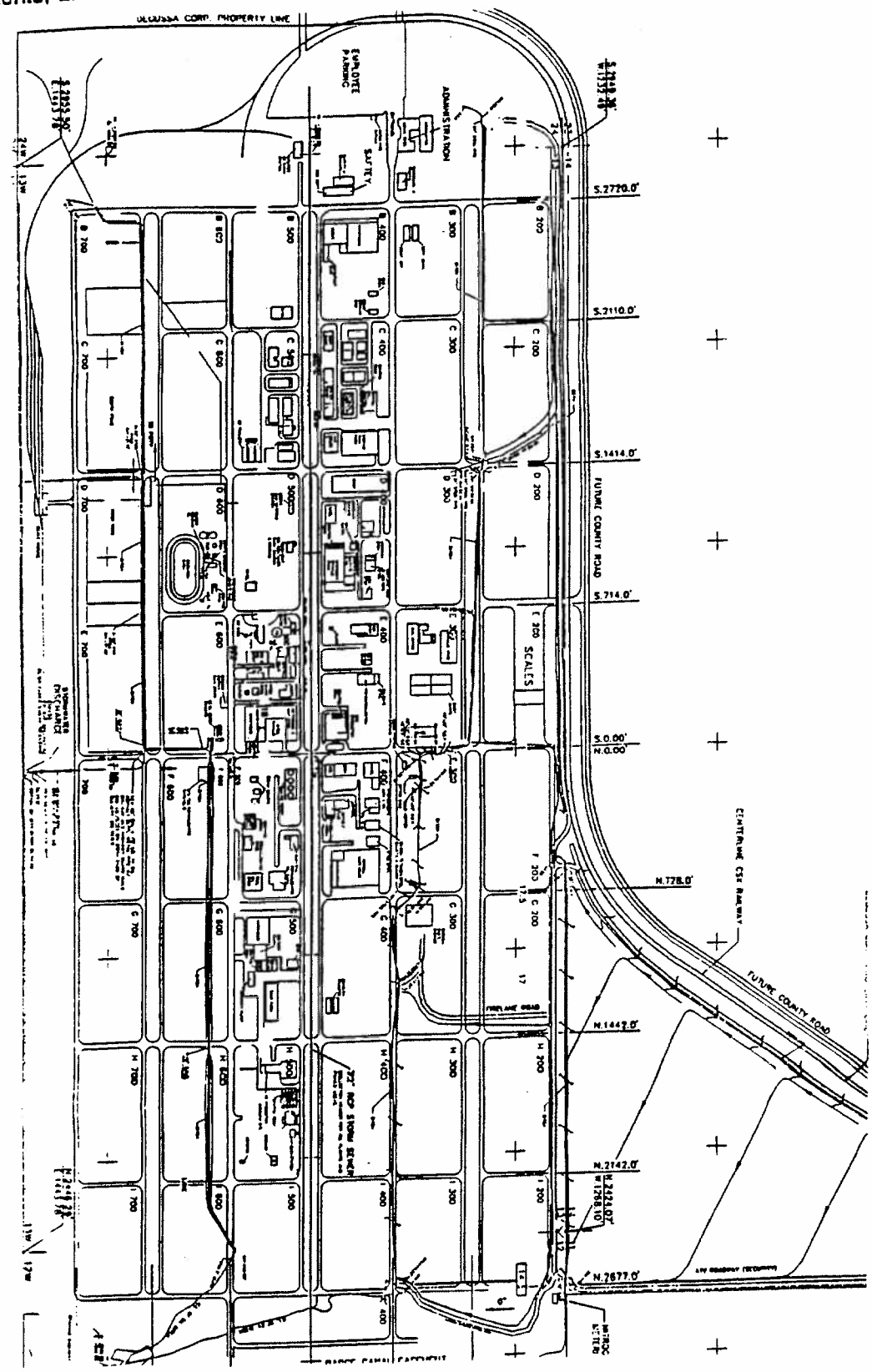
SITE LOCATION			
SITE NAME: LEGAL, COMMON, OR DESCRIPTIVE NAME OF SITE DEGUSSA CORP.			
STREET ADDRESS, ROUTE, OR SPECIFIC LOCATION IDENTIFIER THEODORE INDUSTRIAL PARK / POB 606			
CITY THEODORE	STATE AL	ZIP CODE 36590	TELEPHONE (205)
COORDINATES: LATITUDE and LONGITUDE 30° 31′23″ & 088° 08′23″	TOWNSHIP, RANGE, AND SECTION T6S, R2W, S23		

OWNER/OPERATOR IDENTIFICATION					
OWNER DEGUSSA CORP			OPERATOR		
OWNER ADDRESS			OPERATOR ADDRESS		
CITY			CITY		
STATE	ZIP CODE	TELEPHONE ( )	STATE	ZIP CODE	TELEPHONE ( )

SITE EVALUATION		
AGENCY/ORGANIZATION ADEM		
INVESTIGATOR C N SCOTT		
CONTACT		
ADDRESS 1751 DICKINSON DR.		
CITY MONTGOMERY	STATE AL	ZIP CODE 36130
TELEPHONE (205) 271-7700 / 260-2700		

GENERAL INFORMATION (continued)

Site Sketch: Provide a sketch of the site. Indicate all pertinent features of the site and nearby environments including sources of wastes, areas of visible and buried wastes, buildings, residences, access roads, parking areas, fences, fields, drainage patterns, water bodies, vegetation, wells, sensitive environments, and other features.



HAZARDOUS WASTE QUANTITY (HWQ) CALCULATION

For each migration pathway, evaluate HWQ associated with sources that are available (i.e., incompletely contained) to migrate to that pathway. (Note: If *Actual Contamination Targets* exist for ground water, surface water, or air migration pathways, assign the calculated HWQ score or 100, whichever is greater, as the HWQ score for that pathway.) For each source, evaluate HWQ for one or more of the four tiers (SI Table 1; HRS Table 2-5) for which data exist: constituent quantity, wastestream quantity, source volume, and source area. Select the tier that gives the highest value as the source HWQ. Select the source volume HWQ rather than source area HWQ if data for both tiers are available.

Column 1 of SI Table 1 indicates the quantity tier. Column 2 lists source types for the four tiers. Columns 3, 4, 5, and 6 provide ranges of waste amount for sites with only one source, corresponding to HWQ scores at the tops of the columns. Column 7 provides formulas to obtain source waste quantity values at sites with multiple sources.

1. Identify each source type.
2. Examine all waste quantity data available for each source. Record constituent quantity and waste stream mass or volume. Record dimensions of each source.
3. Convert source measurements to appropriate units for each tier to be evaluated.
4. For each source, use the formulas in the last column of SI Table 1 to determine the waste quantity value for each tier that can be evaluated. Use the waste quantity value obtained from the highest tier as the quantity value for the source.
5. Sum the values assigned to each source to determine the total site waste quantity.
6. Assign HWQ score from SI Table 2 (HRS Table 2-6).

Note these exceptions to evaluate soil exposure pathway HWQ (see HRS Table 5-2):

- The divisor for the area (square feet) of a landfill is 34,000.
- The divisor for the area (square feet) of a pile is 34.
- Wet surface impoundments and tanks and non-drum containers are the only sources for which volume measurements are evaluated for the soil exposure pathway.

SI TABLE 2: HWQ SCORES FOR SITES

Site WQ Total	HWQ Score
0	0
1[a] to 100	1[b]
> 100 to 10,000	100
> 10,000 to 1 million	10,000
> 1 million	1,000,000

a If the WQ total is between 0 and 1, round it to 1.
b If the hazardous constituent quantity data are not complete, assign the score of 10.

Ground Water Observed Release Substances Summary Table

On SI Table 4, list the hazardous substances associated with the site detected in ground water samples for that aquifer. Include only those substances directly observed or with concentrations significantly greater than background levels. Obtain toxicity values from the Superfund Chemical Data Matrix (SCDM). Assign mobility a value of 1 for all observed release substances regardless of the aquifer being evaluated. For each substance, multiply the toxicity by the mobility to obtain the toxicity/mobility factor value; enter the highest toxicity/mobility value for the aquifer in the space provided.

Ground Water Actual Contamination Targets Summary Table

If there is an observed release at a drinking water well, enter each hazardous substance meeting the requirements for an observed release by well and sample ID on SI Table 5 and record the detected concentration. Obtain benchmark, cancer risk, and reference dose concentrations from SCDM. For MCL and MCLG benchmarks, determine the highest percentage of benchmark obtained for any substance. For cancer risk and reference dose, sum the percentages for the substances listed. If benchmark, cancer risk, or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage or the percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate the population using the well as a Level I target. If these percentages are less than 100% or all are N/A, evaluate the population using the well as a Level II target for that aquifer.

GROUND WATER PATHWAY WORKSHEET

LIKELIHOOD OF RELEASE	Score	Data Type	Refs
1. OBSERVED RELEASE: If sampling data or direct observation support a release to the aquifer, assign a score of 550. Record observed release substances on SI Table 4.			
2. POTENTIAL TO RELEASE: Depth to aquifer: 15 feet. If sampling data do not support a release to the aquifer, and the site is in karst terrain or the depth to aquifer is 70 feet or less, assign a score of 500; otherwise, assign a score of 340. Optionally, evaluate potential to release according to HRS Section 3.	500		
LR =	500		

TARGETS			
Are any wells part of a blended system? Yes____ No ✓ If yes, attach a page to show apportionment calculations.			
3. ACTUAL CONTAMINATION TARGETS: If analytical evidence indicates that any target drinking water well for the aquifer has been exposed to a hazardous substance from the site, evaluate the factor score for the number of people served (SI Table 5). Level I: _____ people x 10 = _____ Level II: _____ people x 1 = _____ Total =	0		
4. POTENTIAL CONTAMINATION TARGETS: Determine the number of people served by drinking water wells for the aquifer or overlying aquifers that are not exposed to a hazardous substance from the site; record the population for each distance category in SI Table 6a or 6b. Sum the population values and multiply by 0.1.	112		
5. NEAREST WELL: Assign a score of 50 for any Level I Actual Contamination Targets for the aquifer or overlying aquifer. Assign a score of 45 if there are Level II targets but no Level I targets. If no Actual Contamination Targets exist, assign the Nearest Well score from SI Table 6a or 6b. If no drinking water wells exist within 4 miles, assign 0.	–		
6. WELLHEAD PROTECTION AREA (WHPA): If any source lies within or above a WHPA for the aquifer, or if a ground water observed release has occurred within a WHPA, assign a score of 20; assign 5 if neither condition applies but a WHPA is within 4 miles; otherwise assign 0.	0		
7. RESOURCES: Assign a score of 5 if one or more ground water resource applies; assign 0 if none applies. • Irrigation (5 acre minimum) of commercial food crops or commercial forage crops • Watering of commercial livestock • Ingredient in commercial food preparation • Supply for commercial aquaculture • Supply for a major or designated water recreation area, excluding drinking water use	0		
Sum of Targets T=	112		

SI TABLE 6 (From HRS TABLE 3-12): VALUES FOR POTENTIAL CONTAMINATION GROUND WATER TARGET POPULATIONS (continued)

SI Table 6b: Karst Aquifers

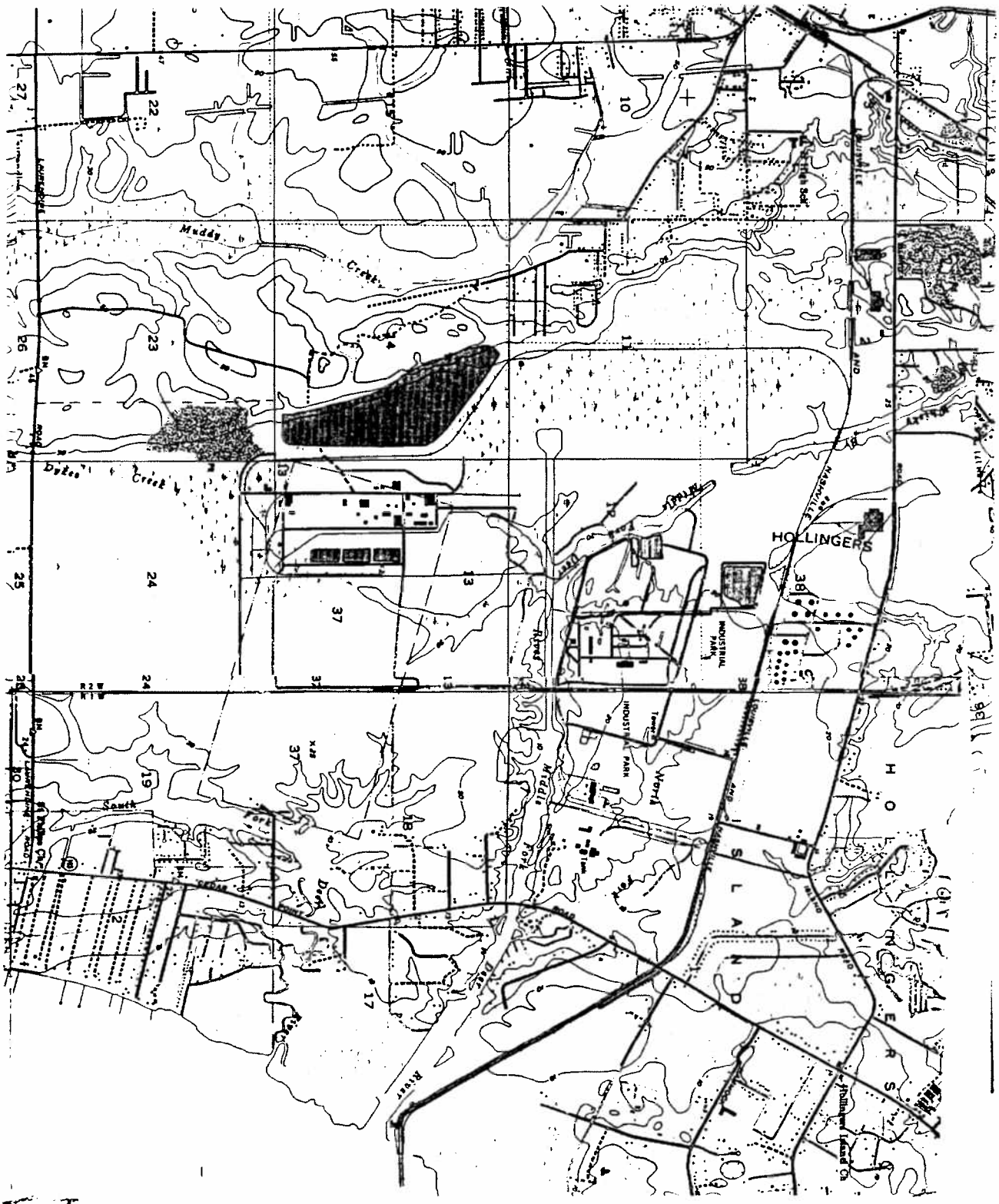
Distance from Site	Pop.	Nearest Well (choose highest)	Population Served by Wells within Distance Category												Pop. Value	Ref.
			1 to 10	11 to 30	31 to 100	101 to 300	301 to 1000	1001 to 3000	3001 to 10,000	10,001 to 30,000	30,001 to 100,000	100,001 to 300,000	300,001 to 1,000,000	1,000,000 to 3,000,000		
0 to $\frac{1}{4}$ mile		20	4	17	53	164	522	1,633	5,214	16,325	52,137	163,246	521,360	1,632,455		
> $\frac{1}{4}$ to $\frac{1}{2}$ mile		20	2	11	33	102	324	1,013	3,233	10,122	32,325	101,213	323,243	1,012,122		
> $\frac{1}{2}$ to 1 mile		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		
> 1 to 2 miles		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		
> 2 to 3 miles		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		
>3 to 4 miles		20	2	9	26	82	261	817	2,607	8,163	26,068	81,623	260,680	816,227		

Nearest Well = [ ]

Sum = [ ]

SURFACE WATER PATHWAY

Sketch of the Surface Water Migration Route:
Label all surface water bodies. Include runoff route and drainage direction, probable point of entry, and 15-mile target distance limit. Mark sample locations, intakes, fisheries, and sensitive environments. Indicate flow directions, tidal influence, and rate.



SI TABLE 7: SURFACE WATER OBSERVED RELEASE SUBSTANCES

Sample ID	Hazardous Substance	Bckgrd. Conc.	Toxicity/ Persistence	Toxicity/ Persis./ Bioaccum	Ecotoxicity/ Persis/ Ecobioaccum	References
		Highest Values				

SI TABLE 8: SURFACE WATER DRINKING WATER ACTUAL CONTAMINATION TARGETS

Intake ID: _____ Sample Type _____ Level I _____ Level II _____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

Intake ID: _____ Sample Type _____ Level I _____ Level II _____ Population Served _____ References _____

Sample ID	Hazardous Substance	Conc. (µg/L)	Benchmark Conc. (MCL or MCLG)	% of Benchmark	Cancer Risk Conc.	% of Cancer Risk Conc.	RfD	% of RfD
			Highest Percent		Sum of Percents		Sum of Percents	

SURFACE WATER PATHWAY
LIKELIHOOD OF RELEASE AND DRINKING WATER THREAT WORKSHEET (CONTINUED)

DRINKING WATER THREAT TARGETS	Score	Data Type	Refs
Record the water body type, flow, and number of people served by each drinking water intake within the target distance limit in the watershed. If there is no drinking water intake within the target distance limit, assign 0 to factors 3, 4, and 5. Intake Name / Water Body Type / Flow / People Served ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ ____ Are any intakes part of a blended system? Yes ____ No ____ If yes, attach a page to show apportionment calculations. 3. ACTUAL CONTAMINATION TARGETS: If analytical evidence indicates a drinking water intake has been exposed to a hazardous substance from the site, list the intake name and evaluate the factor score for the drinking water population (SI Table 8). Level I: ____ people x 10 = ____ Level II: ____ people x 1 = ____ Total =	0		
4. POTENTIAL CONTAMINATION TARGETS: Determine the number of people served by drinking water intakes for the watershed that have not been exposed to a hazardous substance from the site. Assign the population values from SI Table 9. Sum the values and multiply by 0.1.	0		
5. NEAREST INTAKE: Assign a score of 50 for any Level I Actual Contamination Drinking Water Targets for the watershed. Assign a score of 45 if there are Level II targets for the watershed, but no Level I targets. If no Actual Contamination Drinking Water Targets exist, assign a score for the intake nearest the PPE from SI Table 9. If no drinking water intakes exist, assign 0.	0		
6. RESOURCES: Assign a score of 5 if one or more surface water resource applies; assign 0 if none applies. • Irrigation (5 acre minimum) of commercial food crops or commercial forage crops • Watering of commercial livestock • Ingredient in commercial food preparation • Major or designated water recreation area, excluding drinking water use	5		
SUM OF TARGETS T=	5		

SURFACE WATER PATHWAY

Human Food Chain Actual Contamination Targets Summary Table

On SI Table 10, list the hazardous substances detected in sediment, aqueous, sessile benthic organism tissue, or fish tissue samples (taken from fish caught within the boundaries of the observed release) by sample ID and concentration. Evaluate fisheries within the boundaries of observed releases detected by sediment or aqueous samples as Level II, if at least one observed release substance has a bioaccumulation potential factor value of 500 or greater (see SI Table 7). Obtain benchmark, cancer risk, and reference dose concentrations from SCDM. For FDAAL benchmarks, determine the highest percentage of benchmark obtained for any substance. For cancer risk and reference dose, sum the percentages for the substances listed. If benchmark, cancer risk, or reference dose concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage sum calculated for cancer risk or reference dose equals or exceeds 100%, evaluate this portion of the fishery as subject to Level I concentrations. If the percentages are less than 100% or all are N/A, evaluate the fishery as a Level II target.

Sensitive Environment Actual Contamination Targets Summary Table

On SI Table 11, list each hazardous substance detected in aqueous or sediment samples at or beyond wetlands or a surface water sensitive environment by sample ID. Record the concentration. If contaminated sediments or tissues are detected at or beyond a sensitive environment, evaluate the sensitive environment as Level II. Obtain benchmark concentrations from SCDM. For AWQC/AALAC benchmarks, determine the highest percentage of benchmark of the substances detected in aqueous samples. If benchmark concentrations are not available for a particular substance, enter N/A for the percentage. If the highest benchmark percentage equals or exceeds 100%, evaluate that part of the sensitive environment subject to Level I concentrations. If the percentage is less than 100%, or all are N/A, evaluate the sensitive environment as Level II.

SURFACE WATER PATHWAY (continued)
HUMAN FOOD CHAIN THREAT WORKSHEET

	Score	Data Type	Refs
HUMAN FOOD CHAIN THREAT TARGETS			

Record the water body type and flow for each fishery within the target distance limit. If there is no fishery within the target distance limit, assign a score of 0 at the bottom of this page.

Fishery Name Dykes CR Water Body Fresh Flow [illegible] cfs

Species_____ Production_____ lbs/yr
Species_____ Production_____ lbs/yr

Fishery Name Fowl R Water Body Fresh Flow [illegible] cfs

Species_____ Production_____ lbs/yr
Species_____ Production_____ lbs/yr

Fishery Name_____ Water Body_____ Flow_____ cfs

Species_____ Production_____ lbs/yr
Species_____ Production_____ lbs/yr

FOOD CHAIN INDIVIDUAL

7. ACTUAL CONTAMINATION FISHERIES:

If analytical evidence indicates that a fishery has been exposed to a hazardous substance with a bioaccumulation factor greater than or equal to 500 (SI Table 10), assign a score of 50 if there is a Level I fishery. Assign 45 if there is a Level II fishery, but no Level I fishery.

8. POTENTIAL CONTAMINATION FISHERIES:

If there is a release of a substance with a bioaccumulation factor greater than or equal to 500 to a watershed containing fisheries within the target distance limit, but there are no Level I or Level II fisheries, assign a score of 20.

If there is no observed release to the watershed, assign a value for potential contamination fisheries from the table below using the lowest flow at all fisheries within the target distance limit:

Lowest Flow	FCI Value
<10 cfs	20
10 to 100 cfs	2
>100 cfs, coastal tidal waters, oceans, or Great Lakes	0
3-mile mixing zone in quiet flowing river	10

FCI Value = 20

SUM OF TARGETS T = 20

SI TABLE 12 (HRS Table 4-13): SURFACE WATER DILUTION WEIGHTS

Type of Surface Water Body		Assigned Dilution Weight
Descriptor	**Flow Characteristics**	
Minimal stream	< 10 cfs	1
Small to moderate stream	10 to 100 cfs	0.1
Moderate to large stream	> 100 to 1,000 cfs	0.01
Large stream to river	> 1,000 to 10,000 cfs	0.001
Large river	> 10,000 to 100,000 cfs	0.0001
Very large river	> 100,000 cfs	0.00001
Coastal tidal waters	Flow not applicable; depth not applicable	0.001
Shallow ocean zone or Great Lake	Flow not applicable; depth less than 20 feet	0.001
Moderate depth ocean zone or Great Lake	Flow not applicable; depth 20 to 200 feet	0.0001
Deep ocean zone or Great Lake	Flow not applicable; depth greater than 200 feet	0.000005
3-mile mixing zone in quiet flowing river	10 cfs or greater	0.5

SURFACE WATER PATHWAY (concluded)
WASTE CHARACTERISTICS, THREAT, AND PATHWAY SCORE SUMMARY

WASTE CHARACTERISTICS	Score
14. If an Actual Contamination Target (drinking water, human food chain, or environmental threat) exists for the watershed, assign the calculated hazardous waste quantity score, or a score of 100, whichever is greater.	100
15. Assign the highest value from SI Table 7 (observed release) or SI Table 3 (no observed release) for the hazardous substance waste characterization factors below. Multiply each by the surface water hazardous waste quantity score and determine the waste characteristics score for each threat.	

	Substance Value		HWQ		Product	WC Score (from Table) ~~(Maximum of 100)~~
Drinking Water Threat Toxicity/Persistence	Cr 10000	x	100	=	10^6	32
Food Chain Threat Toxicity/Persistence Bioaccumulation	50,000	x	100	=	[illegible]	32
Environmental Threat Ecotoxicity/Persistence/ Ecobioaccumulation	50	x	100	=	[illegible]	6

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 08 to <1E + 09	100
1E + 09 to <1E + 10	180
1E + 10 to <1E + 11	320
1E + 11 to <1E + 12	560
1E + 12 or greater	1000

SURFACE WATER PATHWAY THREAT SCORES

Threat	Likelihood of Release (LR) Score	Targets (T) Score	Pathway Waste Characteristics (WC) Score (determined above)	Threat Score $\frac{LR \times T \times WC}{82,500}$
Drinking Water	300	5	32	(maximum of 100) 0.582
Human Food Chain	300	20	32	(maximum of 100) 2.327
Environmental	300	251	6	(maximum of 60) 0.164

SURFACE WATER PATHWAY SCORE (Drinking Water Threat + Human Food Chain Threat + Environmental Threat) — (maximum of 100): 3.07

SI TABLE 15: SOIL EXPOSURE RESIDENT POPULATION TARGETS

Residence ID: _____ Level I _____ Level II _____ Population _____

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Highest Percent		Sum of Percents		Sum of Percents	

Residence ID: _____ Level I _____ Level II _____ Population _____

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Highest Percent		Sum of Percents		Sum of Percents	

Residence ID: _____ Level I _____ Level II _____ Population _____

Sample ID	Hazardous Substance	Conc. (mg/kg)	Cancer Risk Concentration	% of Cancer Risk Conc.	RfD	% of RfD	Toxicity Value	References
			Highest Percent		Sum of Percents		Sum of Percents	

SI TABLE 16 (HRS TABLE 5-5): SOIL EXPOSURE PATHWAY TERRESTRIAL SENSITIVE ENVIRONMENT VALUES

TERRESTRIAL SENSITIVE ENVIRONMENT	*ASSIGNED VALUE*
Terrestrial critical habitat for Federal designated endangered or threatened species National Park Designated Federal Wilderness Area National Monument	100
Terrestrial habitat known to be used by Federal designated or proposed threatened or endangered species National Preserve (terrestrial) National or State terrestrial Wildlife Refuge Federal land designated for protection of natural ecosystems Administratively proposed Federal Wilderness Area Terrestrial areas utilized by large or dense aggregations of animals (vertebrate species) for breeding	75
Terrestrial habitat used by State designated endangered or threatened species Terrestrial habitat used by species under review for Federal designated endangered or threatened status	50
State lands designated for wildlife or game management State designated Natural Areas Particular areas, relatively small in size, important to maintenance of unique biotic communities	25

SI TABLE 17 (HRS TABLE 5-6): ATTRACTIVENESS/ACCESSIBILITY VALUES

Area of Observed Contamination	Assigned Value
Designated recreational area	100
Regularly used for public recreation (for example, vacant lots in urban area)	75
Accessible and unique recreational area (for example, vacant lots in urban area)	75
Moderately accessible (may have some access improvements–for example, gravel road) with some public recreation use	50
Slightly accessible (for example, extremely rural area with no road improvement) with some public recreation use	25
Accessible with no public recreation use	10
Surrounded by maintained fence or combination of maintained fence and natural barriers	5
Physically inaccessible to public, with no evidence of public recreation use	0

SI TABLE 18 (HRS TABLE 5-7): AREA OF CONTAMINATION FACTOR VALUES

Total area of the areas of observed contamination (square feet)	Assigned Value
≤ to 5,000	5
> 5,000 to 125,000	20
> 125,000 to 250,000	40
> 250,000 to 375,000	60
> 375,000 to 500,000	80
> 500,000	100

SOIL EXPOSURE PATHWAY WORKSHEET (concluded)

WASTE CHARACTERISTICS

10. Assign the hazardous waste quantity score calculated for soil exposure	
11. Assign the highest toxicity value from SI Table 16	—
12. Multiply the toxicity and hazardous waste quantity scores. Assign the Waste Characteristics score from the table below:	WC = 32

Product	WC Score
0	0
>0 to <10	1
10 to <100	2
100 to <1,000	3
1,000 to < 10,000	6
10,000 to <1E + 05	10
1E + 05 to <1E + 06	18
1E + 06 to <1E + 07	32
1E + 07 to <1E + 08	56
1E + 08 or greater	100

RESIDENT POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 1; Targets = Sum of Questions 2, 3, 4, 5, 6)

$\frac{LE \times T \times WC}{82,500}$

18.13

NEARBY POPULATION THREAT SCORE:

(Likelihood of Exposure, Question 7; Targets = Sum of Questions 8, 9)

$\frac{LE \times T \times WC}{82,500}$

0

SOIL EXPOSURE PATHWAY SCORE:
Resident Population Threat + Nearby Population Threat

18.13
(Maximum of 100)

OVERSIZED

DOCUMENT