Salzburg Landfill
Michigan Act 64
Operating License Reapplication

Environmental Assessment

prepared for

Dow Chemical U.S.A.
Michigan Division
Midland, Michigan

August, 1984
20224

EDI ENGINEERING & SCIENCE
ENGINEERS / GEOLOGISTS / BIOLOGISTS / CHEMISTS
611 CASCADE W. PKWY, S.E., GRAND RAPIDS, MI 49506, (616) 942-0970

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INTRODUCTION

This Environmental Assessment addresses the impacts of constructing and operating a landfill in Section 35, T14N, R2E, City of Midland, Midland County - southwest of the intersection of Waldo and Salzburg Roads. This report contains three major sections: 1) a description of the existing environment; 2) a description of the project; and 3) a discussion of the potential impact the project may have on the existing environment.

1.0 DESCRIPTION OF EXISTING ENVIRONMENT

The following sections present a description of the existing environment of the site and its environs. Much of this has already been given in greater detail in the Hydrogeologic Study; in order to avoid repetition, this report gives only summary coverage to the hydrogeologic aspects of the environment.

1.1 TOPOGRAPHY

The detailed topography of the site is shown on Plate 1 of the Hydrogeologic Study. This map is based on aerial photography taken in October of 1979.

The site is generally flat with an average relief of approximately five feet. Localized highs and lows are present with the highest ground near the center of the site and slight depressions along the western side.

Drainage of the site is both to the north and southwest. The site is in two separate watersheds, both of which drain to the Tittabawassee River.

1.2 GEOLOGY AND SOILS

Based on 22 continuous split-spoon borings and 21 shallow auger borings, the upper 40 feet of soils can be divided into three stratigraphic units; namely, Surface Sand, Lakebed Clay, and Glacial Till.

The Surface Sand unit generally covers most of the site to an average depth of about four feet. It consists of a fine sand and silt that is often highly stratified and includes thin layers of clay.

The Lakebed Clay unit lies directly below the surface sand, is approximately 20 feet thick, and underlies the entire site. This unit consists mostly of clay mixed with varying fractions of sand and silt.

The Glacial Till is also a clay unit readily identifiable by the extremely hard drilling and the presence of rock fragments. These rock fragments consist primarily of shale, sandstone, limestone, and coal.

1.3 HYDROLOGY

A deep, Regional Aquifer underlies a portion of the site. Localized aquifers above the deep Regional Aquifer are present as evidenced by private residential wells along Waldo Road; however, they are difficult to locate and none were found in the five 100-foot deep borings drilled on the site.

Groundwater is present within the clayey formations and was found in most of the borings. This water seeped into the bore holes from thin seams of sand and silt located primarily within the Lakebed Clay unit.

1.4 CLIMATE[1/]

The following climatological summary is based on data derived from the weather station at the City of Midland Wastewater Treatment Plant approximately two miles northwest of the landfill site.

The lake influence, so noticeable in many areas of Michigan, is minimal at Midland, since it is partially sheltered by the higher plateau region to the northwest. The continental-type climate of the Midland area is characterized by greater daily, monthly and annual temperature ranges than experienced in other areas at the same latitude but nearer to the Great Lakes.

Normal daily temperatures in January range from a normal maximum of 30.4°F to a daily normal minimum of 16.0°F, the average temperature being 23.2°F. In July, the daily normal maximum temperature is approximately 82.7°F and the daily minimum low is 60.2°F, the average

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[1/] "Climate of Michigan by Stations", Michigan Weather Service cooperating with the Weather Bureau, United States Department of Commerce, 1980.

daily temperature being 71.4°F. Summers are dominated by moderately warm temperatures, with an average of 10 days exceeding the 90°F mark. The lake influence is reflected by milder minimum temperatures with an average of six days between November and March experiencing zero temperatures.

Precipitation is well distributed throughout the year, with the growing season (May through October, averaging 143 days) receiving an average of 17.06 inches, or 58% of the average annual total.

The normal annual precipitation is 29.28 inches. The record maximum monthly amount of precipitation received was in August 1975, with a total of 12.76 inches. Minimum monthly precipitation was recorded in September 1979, with only a trace received for the month. The mean total annual snowfall is 36.3 inches, with the maximum monthly amount being received in February 1949, which totaled 29.4 inches. The average date for Midland's first 1-inch snow depth is November 29; first 3-inch snow depth, December 20; and first 6-inch snow depth, January 8. The average date of the last freezing temperature in spring is May 12, while the average day of the first freezing temperature is October 2.

Prevailing winds are generally from the southwest. Strongest winds occur in late fall and early spring, with the strongest being recorded in May 1956 at 81 miles per hour. The mean annual hourly wind speed is approximately ten miles per hour.

1.5 FLORA AND FAUNA

The site was inspected on October 16 and 17, 1979, by Environmental Data, Inc. The purpose of this investigation was to inventory the flora and fauna of the site. The site was examined in a season of the year when a number of herbaceous forms which might have developed early would not be in evidence. This fact should also be taken into consideration in respect to migrating birds, aquatic animals, and hibernating forms which might not have been in evidence at the time

of this investigation but which would normally be active in this ecosystem.

1.5.1 Flora

The flora of this site shows evidence of past impacts of human activities (see Figure 1). The site displays typical herbaceous pioneer plants which are ordinarily found recollecting and establishing regulative cover over disturbed areas. A list of these plants is found in Appendix A. To the south of the railroad, active agriculture is occurring on the eastern half of that property with a crop of corn approaching a harvestable condition. No active agriculture was noted on the site itself.

The southeast old-field area of the site contains pioneer-type successional organisms which gradually give way to small mixed hardwoods and brush on the north and northwest portion of the site. This community transformation eventually forms mixed hardwood secondary growth forests on the northern and northwestern portion of the site. The west central portion of the site has been largely denuded by bulldozing, with extensive excavation leaving this area essentially free of actively growing plants.

The northwest corner is essentially open with low shrubs predominating, and some cattails. Larger trees have been removed from this area within the power line right-of-way. The plants present in this area are listed in Appendix A and represent species which are found in habitats where moisture is readily available from some source.

The northern and eastern portions of the site are covered by mixed hardwoods, brush, scattered conifers, and an understory of herbaceous vegetation which ranges from extremely well-developed to sparce. This is clearly a regrowth community, and considerable evidence of spatial competition exists by virtue of the extremely etiolated condition of many of the juvenile woody plants. None of the trees present in this area have attained full size, clearly suggesting that the community is undergoing a well-advanced process of succession but

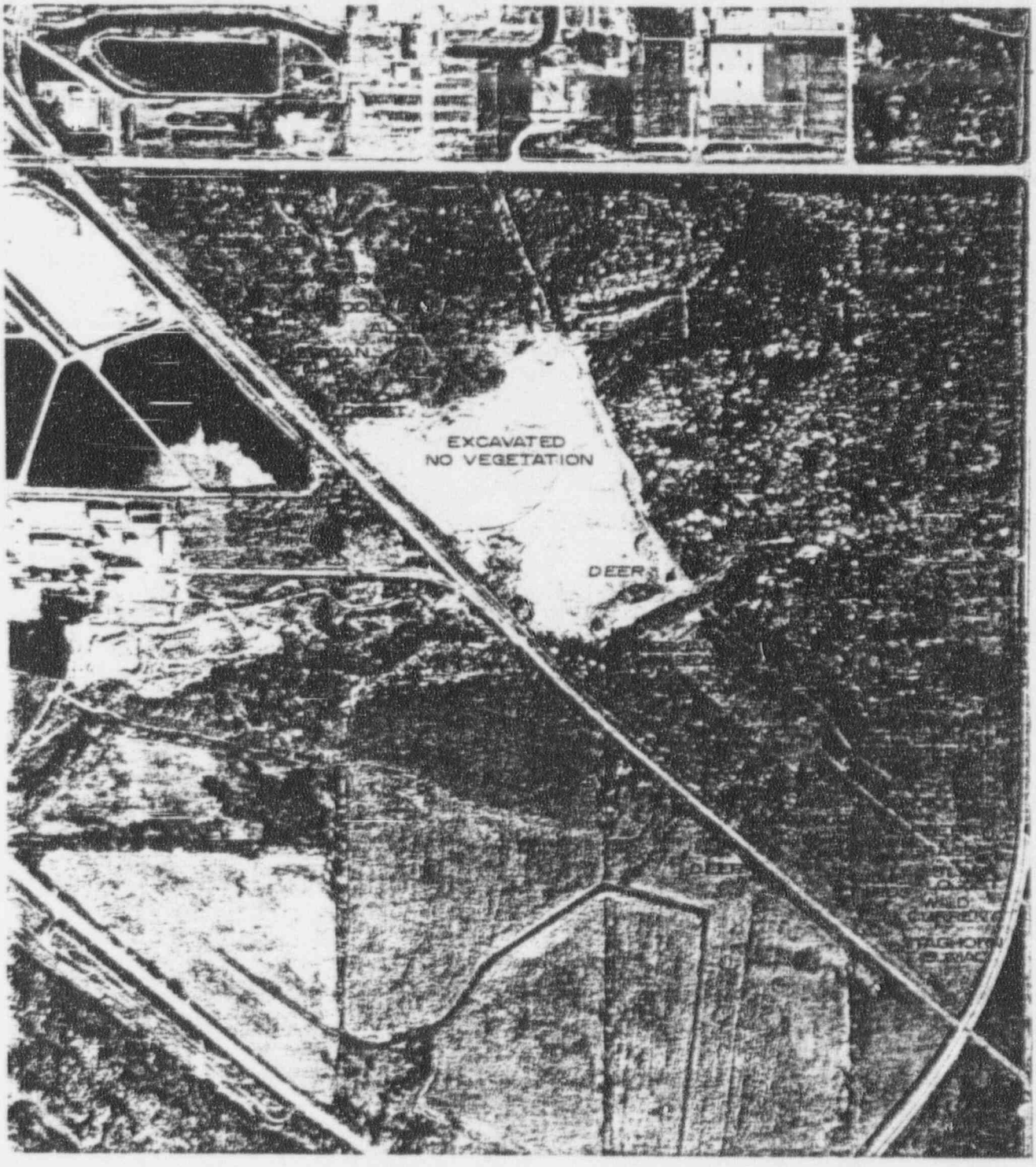

FIGURE 1 FLORA / FAUNA SURVEY

LEGEND:

DOW CHEMICAL

CITY OF MIDLAND
AND
MIDLAND TOWNSHIP

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has not as yet arrived at which might be described as a climax community.

The vegetation on the site displayed no remarkable components in the species mix which would indicate the possible existence of endangered or threatened organisms. None were observed during the site inspection. Those organisms present on the site are also well represented in the forest and fields - either adjacent to the site or in the general area. Hence, the clearing of the site should not result in destruction or elimination of any unique botanical resources.

To the east on Waldo Road are several single-family residences. Removal of vegetation on the west side of Waldo Road for landfill operations would negatively impact the vistas available to some of the homeowners; however, greenbelts maintained along parameters of the site have reduced this impact.

Fill operations are in the northwest corner of the site. There are currently ten cells delineated for use (see Figure 2). Cells 1 and 2 are closed and being re-seeded and Cell 3 will soon be closed. Approximately 50% of the site has been prepared for fill operations.

1.5.2 Fauna

The site is frequented by several species of birds, with some species occurring in numbers approaching several thousand. This is particularly true in the mixed hardwood secondary growth near the railroad right-of-way. In the evenings during this season, thousands of blackbirds accumulate in those trees, probably gathering following a day of foraging in the adjacent corn fields. There is suitable habitat for upland songbirds, scavengers, and game birds in the southeast portion of the site. On the northeast portion of the site, bird numbers were not as high, probably as a result of extensive human disruption of that area. There was evidence, however, of habitat potential for large numbers of red-winged blackbirds and other marsh species. While no large avian predators were seen in this area, the potential for supporting at least a few owls and hawks does exist.

The contribution of reptiles and amphibians to the fauna of this site in this season was marginal. Small leopard frogs, a few toads, and a water snake were noted but in no great numbers.

The mammalian population of this site includes a wide variety of small rodents, moles, white-tailed deer, rabbits, and in one location what appeared to be a fox burrow with droppings. The northwest corner of the site would provide suitable habitat for racoon, but none were noted. Deer signs were present throughout the site, but there were indications that these animals frequented the corn fields south of the site for feeding purposes. A listing of animals which frequent the site is found in Appendix B.

1.6 AIR QUALITY

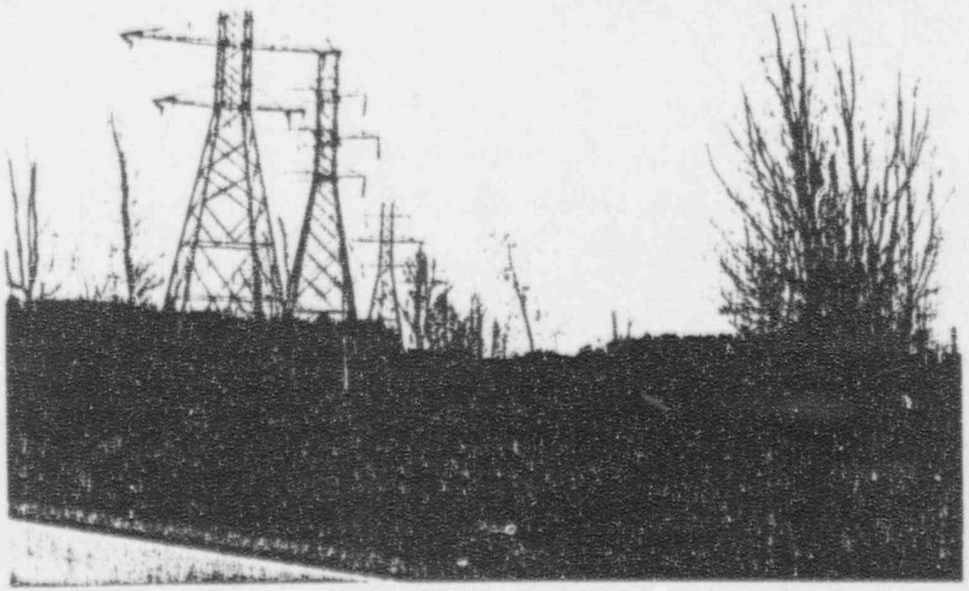
Since the site is adjacent to a variety of industries, the quality of air typifies that of an industrial area. At times, the site is permeated with the odor of the manufacturing operations in the area. Due west of the site is an industrial impoundment. At times, the odor off this impoundment can be detected over most of the northwest end of the site. Ambient air monitoring data is regularly collected from two stations; one is located on the facility proper and the other is located north of the landfill (see Environmental Monitoring). The results are well within ambient air quality guidelines.

1.7 AESTHETICS

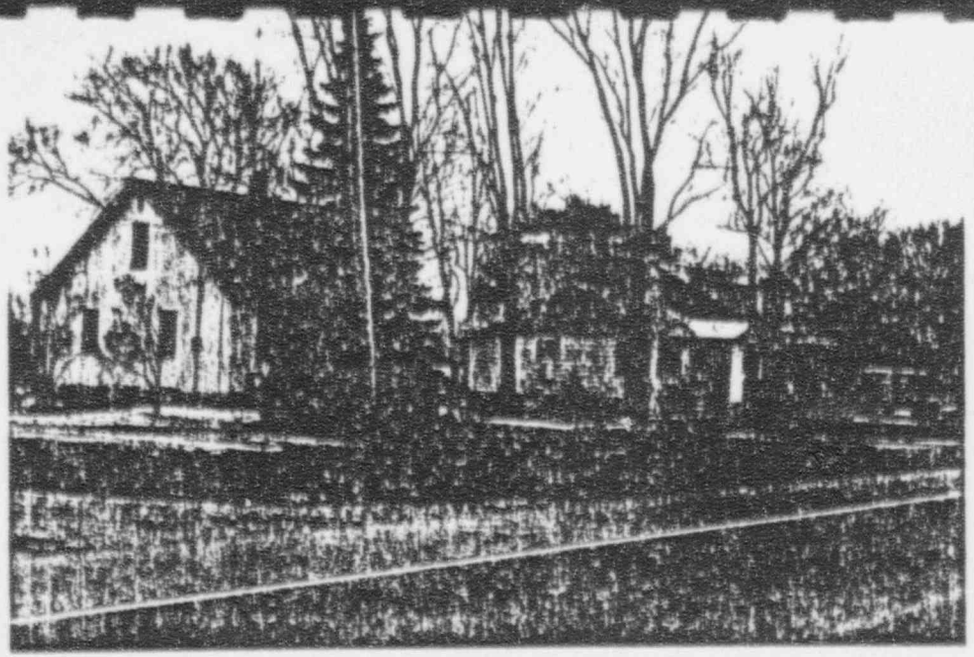
The photographs on the following pages, coupled with the physical features shown in Figure 2, illustrate the aesthetic values of the site and the surrounding residential area. Much of the site is without significant tree cover.

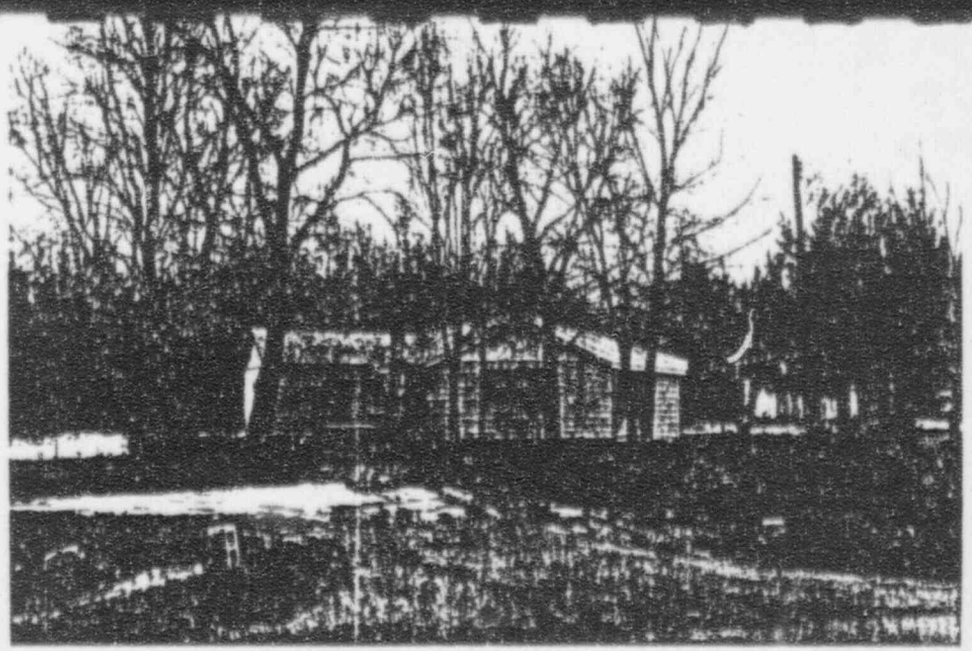
1.8 LAND USE

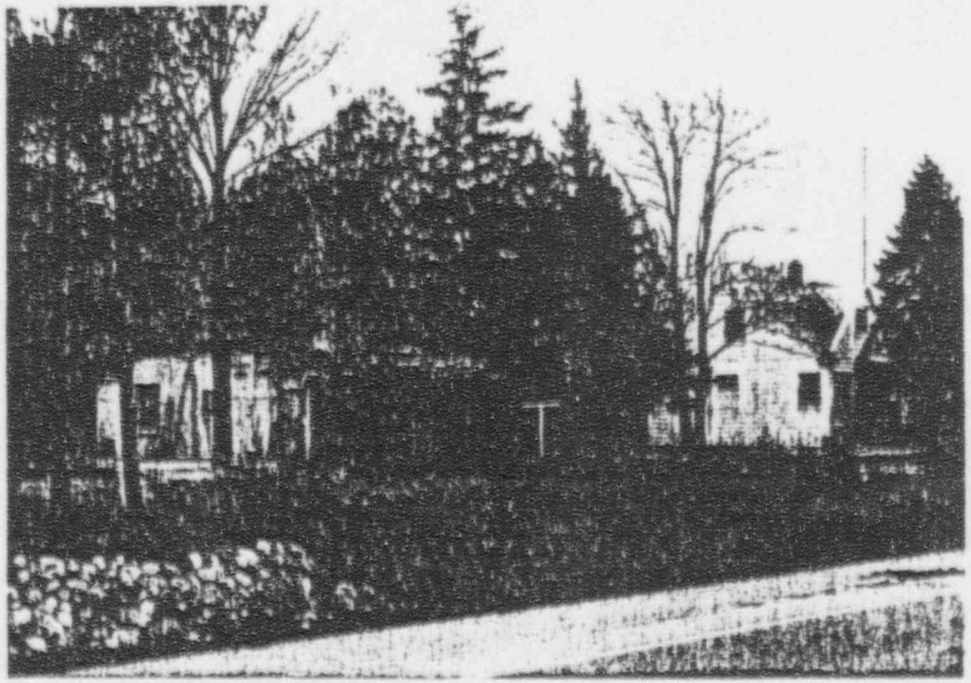
Figure 2 represents an aerial view of the site upon which has been recorded features and activities which have impacted or altered the physical characteristics of the site. The major physical feature is



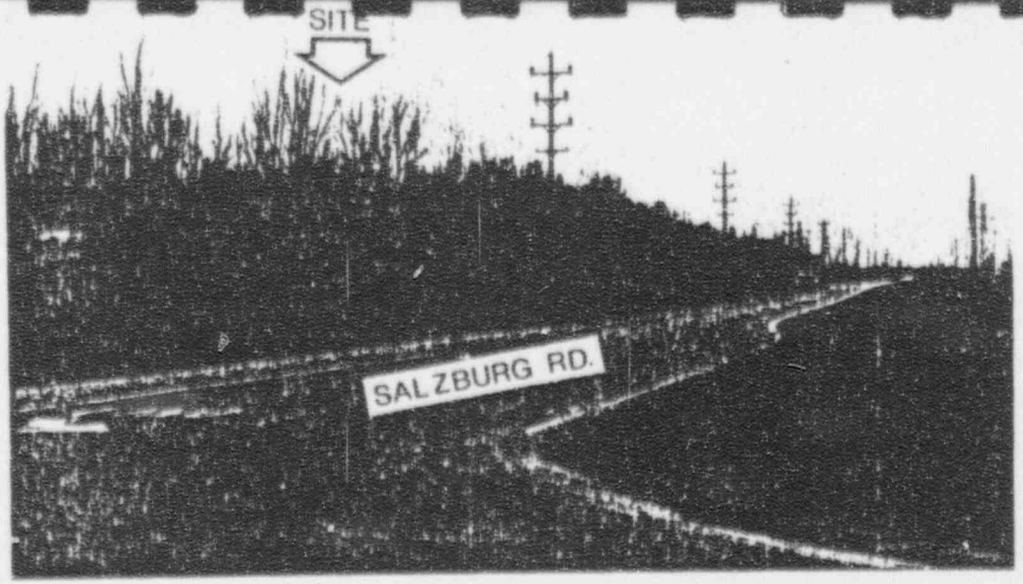
VIEWS FROM SALZBURG RD. - SOUTH



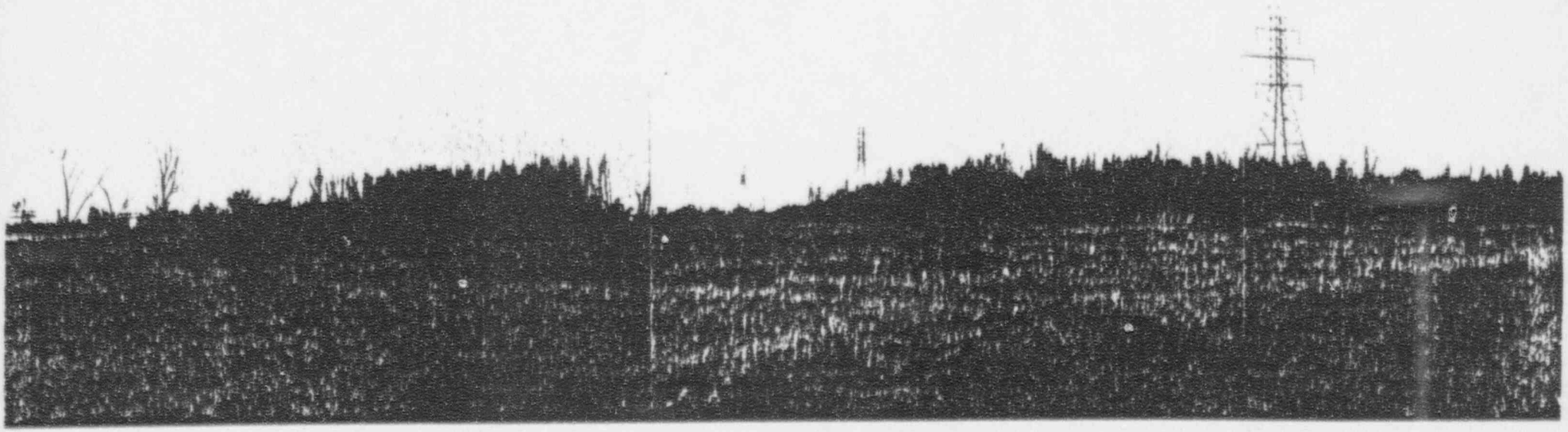




RESIDENCES ALONG EAST
SIDE OF WALDO ROAD
NEAR SITE



VIEW OF NORTHEAST CORNER OF SITE AND INTERSECTION OF WALDO ROAD AND SALZBURG ROAD



VIEW FROM SOUTHEAST CORNER OF SITE FROM WALDO ROAD

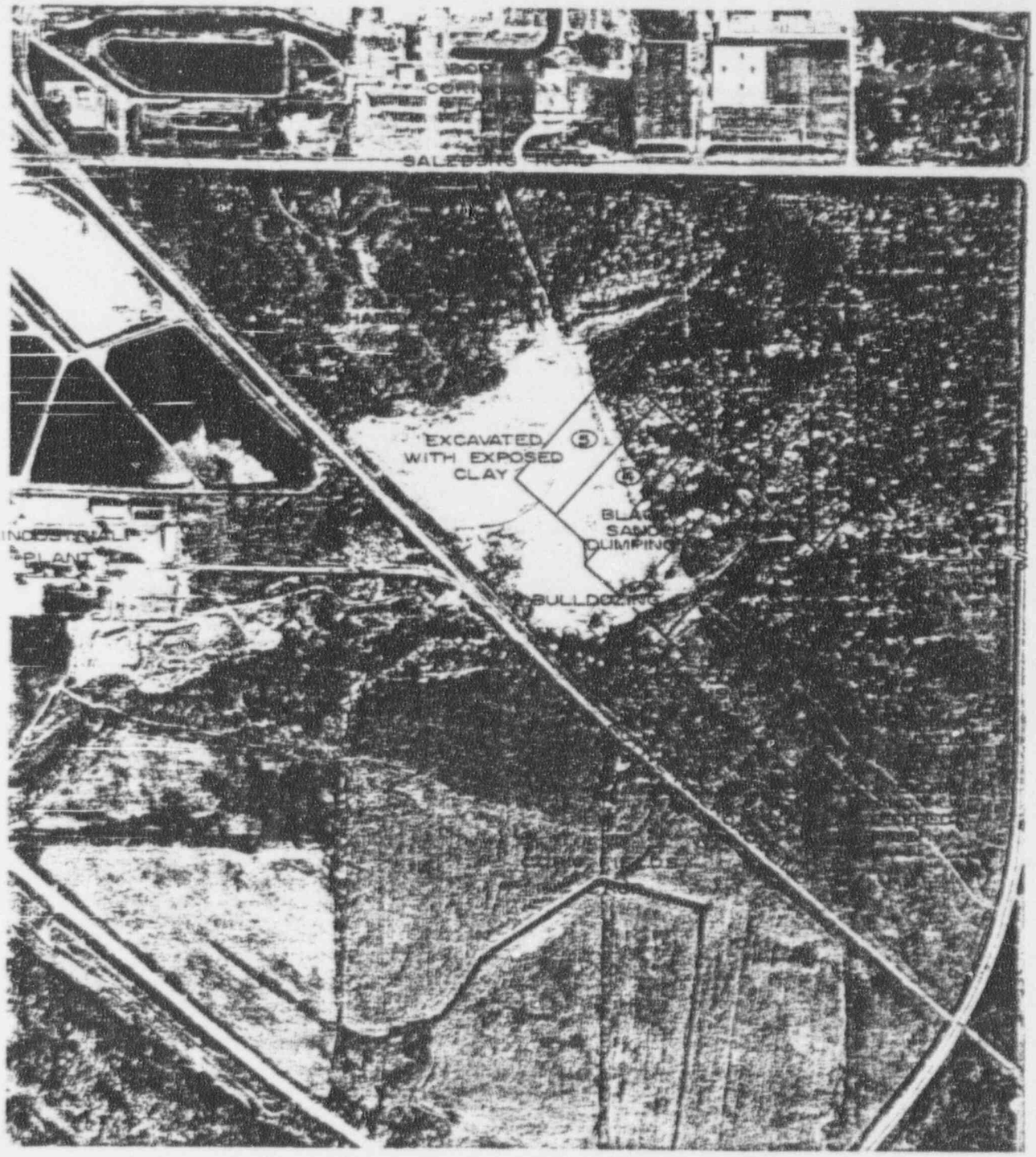


FIGURE 2 PHYSICAL FEATURES

LEGEND:

④ LANDFILL CELL

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CITY OF MIDLAND
AND
MIDLAND TOWNSHIP

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a large excavation in the center where a considerable volume of soil has been removed to a depth of approximately eight feet. Power transmission lines parallel the long side of the triangle, crossing this area of excavation.

Roadways are present into this site from Waldo Road and from Salzburg Road. The Salzburg Road entrance is the primary route of access and has a locked steel access gate.

The site is in the midst of an expanding industrial complex. The majority of property in the area is heavily industrialized. The exception to this is immediately east of Waldo Road where three residential structures exist (Dow is purchasing these houses as they become available). The industrial uses in the area are consistent with City and Township development plans (see Figure 3).

In August, 1979, the City of Midland Planning Commission approved a Comprehensive Development Plan to guide future growth in and adjacent to the City of Midland. Midland Township has also approved a development guide which generally corresponds to the City Plan. Contacts made with Midland Township Planning Commissioners and Midland City Planning Department during July, 1984, indicate zoning designations and land use have not changed since that time for the area surrounding the site.

Specifically, the site and adjacent property (City and Township) are designated for ultimate industrial development. These plans basically state that this land use category (industrial) provides for existing and future development of industry.

The City Zoning Ordinance (a development plan implementation tool) places the site into the Industrial "B" District (see Figure 4). This zoning district is intended for a variety of intense industrial uses, including a landfill.

The Midland Township Zoning Ordinance has the property adjacent to the site zoned residential. This should only be considered a

FIGURE 3

LEGEND:

- RESIDENTIAL
- INDUSTRIAL
- UTILITIES

GENERALIZED DEVELOPMENT PLAN

DOW CHEMICAL

CITY OF MIDLAND
AND
MIDLAND TOWNSHIP

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NO SCALE

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FIGURE 4 ZONING MAP

LEGEND:

RESIDENTIAL

INDUSTRIAL

DOW CHEMICAL

CITY OF MIDLAND AND MIDLAND TOWNSHIP

N

NO SCALE

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temporary zoning designation, since the Township Master Plan proposes this property be developed as industrial in the future.

Road access to the site is provided by two local county roads - Salzburg and Waldo Roads. Both roads are two-lane, all-weather, hard-surface highways with low to moderate traffic volumes.

1.9 ARCHAEOLOGICAL AND HISTORIC RESOURCES AND SITES

Inquiries to the State Archaeologist and State Historian indicate there is one prehistoric and two historic sites that have been located in Section 35. An archaeological study has been performed and no diagnostic artifacts were recovered. It was recommended that no further archaeological work be undertaken at this site (see Appendix C).

1.10 SOCIAL-ECONOMIC ENVIRONMENT[2/]

In 1970, the population of the City of Midland was 35,176, a growth of 27% over 1960's population of 27,779. The City's population in 1980 was 37,269, a 5.95% increase from 1970. The City of Midland's population constitutes 50.6% of the county population (73,578). In 1980, there were 566 blacks in Midland County, 519 of which were located in the City of Midland; there were 810 persons of Spanish origin, 528 of which were located in the City.

Median housing value for Midland County and the City of Midland in 1980 was $45,300 and $60,000, respectively. In 1980, median family income in the City was $26,853, with the average number of persons per family being 3.23. Median family income for the county was $23,598, with an average number of persons per family of 3.79. The margin of difference in City versus County incomes was larger in 1980 than in 1970. The 1970 median family incomes were $13,428 for the City and $11,618 for the County, a difference of $1,810; the 1980 difference is $3,255.

[2/] 1980 Census data derived from the Planning Department, City of Midland, and the Department of County Development, Midland County.

There were 26,268 persons over 18 years old (70.5%) in the City of Midland in 1980. Of those, 21.9% had 1 to 3 years of college, 15.3% had 4 or more years of college, and 14.4% had 5 or more years of college. General education levels for the remainder of Midland County are lower. With 65.1% of the population over 18 years, 13.8% had 1 to 3 years of college, 4.6% had 4 or more years of college, and 3.6% had 5 or more years of college.

Major employers for the City and County are (as ranked by the Midland City Planning Department) Dow Chemical, Dow Corning, Consumers Power, Midland Hospital, Continental Forest Industries, Tri-City Plastic, and McKay Press. Bechtel Power, although a major employer, is a transient operation that is involved only with Consumers Power's Midland Power Plant construction.

1.11 EXISTING PUBLIC UTILITIES

The City of Midland has public water and sewer systems available to the site. A public water main is present along Waldo Road east of the site and could serve the homes along the east side of the road if these properties were annexed to the City. Present City policy is not to provide utility services outside the City limits.

1.12 NOISE

Noise considerations on this site include steady background noise associated with nearby manufacturing operations. Salzburg Road is a primary truck route; therefore, traffic on adjacent roadways, particularly heavy vehicles, can be heard in almost every area of this site. The railroad is used on a regular basis to transport raw materials and products related to the chemical industry. Noise from these activities is substantial over short periods of time. Noise generation from the site is much less than would be expected if an industrial facility were on the site.

2.0 DESCRIPTION OF LANDFILL PROJECT

2.1 GENERAL

This section provides a description of the landfill project. It also discusses landfill operation, management and closure. Since this material is discussed in depth in other supplemental data reports, only a summary will be provided.

2.2 PROJECT DESCRIPTION

The facility is designed for co-disposal of hazardous and nonhazardous wastes. In addition, an area for the holding of inert materials (i.e., salvageable building rubble) is also planned.

2.2.1 Elevations

Bottom elevation of the landfill is approximately at 602 feet. This will put the base of the landfill in the Glacial Till unit. Three lifts of landfilled material, with final elevation under the power lines at 640 and final elevation at 645 elsewhere, are proposed. These final elevations include the required clay cap of the final cover.

2.2.2 Drainage System

The landfill cells have leachate collection systems. A graded sand base collects leachate to underlying drains and sumps. Leachate is then transmitted by a closed pipe to the Dow wastewater treatment facility (See B2-001-810188, B2-002-810188 and B2-008-810188).

Other drainage on the site includes storm water runoff and groundwater dewatering. Storm water runoff for the open and active portions of the landfill goes into the leachate collection system and be processed as mentioned above. Storm water runoff from the undisturbed and completed landfill areas are drained into Lingle Drain and the unnamed surface drain to the southwest.

The surface sand unit which seasonally contains "perched" water may require some dewatering. This will be accomplished by a perimeter drainage ditch dug to the depth of the lakebed clay unit.

2.2.3 Regulatory Conformance

Construction of this project is in accordance with Public Act 64 of 1979 and the rules thereunder. The drainage systems conform to soil erosion, drainage and sedimentation control requirements. In addition, all local zoning codes and building requirements were adhered to. The only exception to the above is a 100-foot isolation to the railroad right-of-way along the west side of the site.

2.2.4 On-Site Support Facilities

Other on-site improvements include a vehicle wash-down (decontamination) facility, a facility building, perimeter fencing, aesthetic buffering, and monitoring wells. An aesthetic buffer was provided along Waldo Road. The other accessory improvements will be constructed prior to commencement of additional landfilling operations.

2.3 OPERATION AND MANAGEMENT

Day to day operations, minor problems, and emergencies are governed by a detailed operations manual. This manual is updated as necessary.

2.3.1 Organization Responsibilities

Operational management is the responsibility of the Dow Environmental Services Department. Support services are provided by Dow's Road Maintenance Department, Dow's In-Plant Services Department, Dow's Security Department, and outside contractors as necessary. This includes day to day operations at the landfill, including construction and maintenance. In-Plant Services Department is responsible for providing and dispatching vehicles transporting waste materials

to the landfill. Emergency response is provided by the Security Department or the Road Maintenance Unit or both, as may be appropriate.

2.3.2 Landfill Materials and Volumes

The basic tenants of Dow's Waste Management Policy are: resource recovery, minimizing waste volumes at the source, and landfilling only wastes which cannot be treated or effectively incinerated. A wide range of hazardous materials may be landfilled (see Disposal Operations Plan). Restrictions and conditions listed in Rule 421 of Act 64 pertaining to the waste types listed below will be adhered to:

1) Flammable waste
2) Reactive waste
3) Volatile waste
4) Bulk liquids, semi-solids, and sludges

Anticipated landfill waste materials and volumes are summarized in the Disposal Operations Plan.

2.3.3 Development Phasing

The Development Plan of the landfill is shown on Drawings B2-005-800199, B2-006-800199 and B2-006-810188 of the construction plans. This plan shows the direction and sequence by which cells will be developed. A clay barrier will separate the cells. However, under the Development Plan, the location of the barrier is flexible and need not be determined until after several years of landfill operation. Experience with the new solid waste rules will permit a more accurate determination on needed volumes of the respective landfills to be made in the future.

2.3.4 Waste Segregation

In general, the waste types shown in the Disposal Operations Plan have not had to be segregated into separate cells. It is anticipated

that this will continue. All non-routine wastes will be subject to disposal evaluation which includes consideration of special handling and disposal procedures.

2.3.5 Transportation

The transportation route from the Dow Industrial Complex to the landfill is over two all-weather public roads (Saginaw Road, Salzburg Road and Waldo Road). Under normal operations, 10 to 25 loads are transported to the landfills each day. A vehicle wash-down (decontamination) facility is provided at the hazardous waste landfill site.

2.3.6 Limited Active Face

As practiced in the past, it is anticipated that the landfill will have one to three cell areas open at a time to dispose of routine hazardous and nonhazardous wastes. Each cell will have three lifts. The sequence of steps by which a typical cell will be opened, filled, and closed is shown on Drawing B2-006-810188 of the construction plans. One front-end loader will remain at the facility for daily fill and cover operations. In the event of a breakdown or during peak loads, backup equipment is available from the Road Maintenance Department.

2.3.7 Security

Security and surveillance will be provided around the clock by the Security Department. A detailed description of site security is provided by the Site Security Plan.

2.3.8 Recordkeeping

Waste materials will be tracked by use of the manifest system and these records will be incorporated into the facility operating log. These and other required records such as inspection logs, contingency plan, spill and accident prevention plan, etc. will be maintained at

the Facility Control Building (3600 Building) in accordance with Act 64 license requirements.

2.3.9 Environmental Monitoring

Routine environmental monitoring includes: groundwater, surface water, leachate, liner failure detection system, gas vent, residential well, and ambient air monitoring. There are 12 monitoring wells located in the isolation area around the perimeter of the facility and their locations are shown on Drawings B2-005-800199 and B2-006-800199 of the construction plans. They have been designed to monitor local groundwater conditions. Monthly, quarterly, and yearly monitoring schedules have been designed, depending upon the relationship of the particular well to an undisturbed, active or completed portion of the landfill (see Environmental Monitoring).

Surface water runoff will be monitored primarily from the master drainage system discharge points. Surface water monitoring will be scheduled to coincide with significant storm events.

Air quality is primarily monitored by Dow's existing stations. One station is located approximately half a mile north of the landfill site and the other is located at the east border of the landfill. They are downwind in the prevailing wind direction. Additional air quality monitoring is currently being done by five other Dow operated total suspended particulate monitoring stations in the area and several additional county operated sites.

2.4 CLOSURE

The Disposal Operations Plan requires that once a landfill area reaches final elevation, the area will be closed with final cover, topsoil, and seeded. Therefore, in a sense, closure will be a normal part of landfill operations. The Closure Plan provides that hazardous wastes will not be stockpiled on-site for future burial prior to a cell being prepared. This will preclude the possibility of a

hazardous waste backlog on site when final closeout is scheduled. The Closure Plan also provides for an operational budget for the final closeout and for notification to the required parties.

Work tasks following closeout include:

a) placement of final cover, topsoil, and seeding;

b) final grooming; and

c) decontamination and removal of site equipment.

3.0 ASSESSMENT OF POTENTIAL ENVIRONMENTAL IMPACTS

3.1 GENERAL

This section discusses potential impacts on a number of environmental parameters. Where appropriate, mitigating measures or alternatives are presented. Foreseeable impacts, mitigating measures, and recommendations are also summarized.

The site is identified as industrial on the Midland General Development Plan and by the Zoning Ordinance. Presently, an industrial facility could be built on the site without an environmental assessment. An industrial facility would not eliminate the need for these landfill facilities and would probably add to their need. The "no action alternative" is not a viable alternative for this site.

3.2 TOPOGRAPHY

The topography of this site is conducive to the development of a landfill facility. The proposed maximum final elevation of 645 feet is 24 feet higher than the minimum road elevation of 621 abutting this site near the western end of Salzburg Road. However, the low point on Salzburg is in the vicinity of the electrical transmission towers (limited to a maximum elevation of 640); therefore, a 20-foot change in elevation would result. Elsewhere around the site, the road elevation averages approximately 625 feet, thus producing a 20-foot change in elevation. Such a change in elevation is reasonable, given the existing zoning and land uses in the area.

Interim and final contours will be provided such that drainage off the site is consistent with existing drainage patterns for the local watersheds.

3.3 HYDROGEOLOGY AND SOILS

A detailed hydrogeologic report has been prepared for this site. It indicates that, with proper design, operation, and monitoring, the

geology and hydrology of the site are suitable for the development of non-hazardous and hazardous waste landfills.

3.4 CLIMATE

Inappropriateness or incompatibility of the site use is not suggested by available climatological data.

3.5 FLORA

Vegetation on the site displayed no remarkable components in the species mix which would indicate the possible existence of endangered or threatened organisms. None were observed during the site inspection. Those organisms present on the site are also well represented in the forest and fields either adjacent to the site or in the general area. Therefore, further development of the site would not result in destruction or elimination of any unique botanical resource.

3.6 FAUNA

Overall, the fauna of the site is not remarkable and does not contain endangered or threatened animals. Furthermore, there is ample surrounding area to accommodate any displaced organisms resulting from the development of the site; and as cells are closed and reseeded, these areas will again accommodate organisms.

3.7 AIR QUALITY

Development of this site for landfill facilities, thus far, has not created an odor problem. The air quality could be impacted by blowing debris or dust from active landfill areas. This impact, however, is mitigated through operation procedures. These procedures include appropriate daily cover of landfilled material and brining of roads during extended dry periods to minimize dust. Air quality impacts will be further moderated by the limited operating scale of the active face and the on-going closure/reclamation activities.

3.8 AESTHETICS

Although much of the site is without significant trees, a residual aesthetic value remains as open space. Since the Closure Plan calls for the returning of this site to landscaped open space, the aesthetic impact will be of short-term duration. This impact will be further moderated by the limited active face and on-going reclamation activities. In addition, existing trees along the perimeter will be preserved and a buffer area will be provided, as needed, along Waldo Road.

3.9 LAND USE

The proposed use is compatible with the Midland Comprehensive Development Plan (industrial designation). Further, it is compatible with surrounding planned land uses. The proposed facility is compatible with existing on-site zoning.

To the east of the site (along Waldo Road), some property is zoned and used for single family residences. Since the General Development Plan identifies this area as industrial for future use, the residential zoning should be considered temporary. This does not eliminate the need to minimize the impact of this facility on existing residents. Land use impacts on existing residents will be moderate by the isolation distance (tree buffering) along Waldo Road, the limited scale of operations, and the on-going reclamation activities. The impacts on existing residents are short-term in nature, since the Closure Plan calls for the area to be landscaped and left as open space.

3.10 ARCHAEOLOGICAL AND HISTORIC RESOURCES

Available data does not identify nor create a suspicion of any significant archaeological or historic resource on site.

3.11 SOCIAL/ECONOMIC ENVIRONMENT

A disposal facility is not a major employment generator; however, it does support primary employment facilities. Thus, this facility will have indirect, positive benefit on the local economy.

Although landfills have come a long way from the days of open dumps, they still carry a social stigma and are generally unwelcome in most areas. The social impact of such a facility varies from individual to individual. This impact will be moderated by the tree buffering, limited scale of active operations, and final use of the site.

3.12 EXISTING PUBLIC UTILITIES

The impact of this facility on the City of Midland Public Utilities is anticipated to be minimal.

3.13 NOISE

On-site noise will be generated from this facility by construction-type equipment and trucks. This noise impact can be mitigated by the hours of operation, by the use of mufflers on equipment, the Waldo Road buffering, and by site isolation distances. Again, the scale of active operations (one front-end loader and 10 to 25 trucks/day) minimizes this impact.

Since Salzburg Road is already a primary truck route, waste transportation vehicles will have a limited noise impact. This impact may be mitigated and moderated by their regular hours of operations and equipment mufflers. The proximity of this facility to the Dow Industrial Complex moderates the noise impact from a regional perspective.

4.0 SUMMARY

Foreseeable impacts and mitigating measures are summarized in the following table:

TABLE 1

SUMMARY OF ENVIRONMENTAL IMPACTS AND MITIGATING CONDITIONS

Limited Duration Impacts	Mitigating Conditions
1) Disruption/removal of the flora and fauna during construction and operation.	1) The scale of operations at any given time is limited. Redevelopment is a continuing process. No remarkable resources were observed on site.
2) Blowing debris and dust may impact air quality.	2) The limited active face and reclamation process minimizes wind driven debris. Road brining minimizes dust generation.
3) The open space aesthetic value may be diminished.	3) This impact is less than if the site were developed with a manufacturing facility. Trees in the isolation area are preserved, and buffering has been added where needed along Waldo Road.
4) The construction and operations create noise.	4) The limited scale of operations, proper equipment maintenance, and isolation distances/buffers minimizes noise.
5) The operation creates additional truck traffic on the public roads.	5) The 10 to 25 trips per day is not a severe impact on these public roads. All over-the-road vehicles will pay their fair share in road use taxes.

Permanent Impacts	Mitigating Conditions
1) Site elevation will be raised.	1) Interim and final drainage plans will provide for proper storm water runoff. The additional height is in scale with acceptable structural development. The isolation area and buffering grades will not substantially change.
2) The potential for groundwater pollution exists.	2) Hydrogeological report indicates that the site conditions are suitable for the development of the landfill facilities. They will be developed, operated, and maintained in accordance with applicable state and local regulations. A thorough groundwater monitoring program is planned.
3) The existence of this facility may be a contributing factor to the displacement of the residents on Waldo Road.	3) The buffering and landscaping will moderate this impact.

5.0 CONCLUSIONS

This site is acceptable for use as a hazardous waste landfill. All site and regulatory constraints have been met or exceeded with regards to design.

Impacts of the project and its operation are primarily of a limited duration and can be mitigated or moderated. No significant permanent impacts have been identified which have not been mitigated.

Dow has the means to effect proper operation and management of an on-going basis. The state, through PA 64 of 1979, has the ability to monitor and enforce proper operation and management.

APPENDIX A

FLORA SPECIES LISTING

APPENDIX A

FLORA SPECIES LISTING

FLORA

Lower Plants and Ferns

Assorted Horsetail
Assorted Liverworts
Bracken Fern
Crustose and Foliose Terrestrial Lichen
Ink Cap Fungi
Mnium Moss
Polytricium Moss

Herbaceous Vascular Plants

Adder's Tongue
Alfafa
Assorted Goldenrods
Beggar's Tick
Bent Grass
Bladder Campion
Broad-leaf Cattail
Brown-eyed Susan
Butter & Eggs
Canadian Thistle
Common Milkweed
Common Mullein
Common Plantain
Common Thistle
Curled Dock
Cyperus
Dandelion
Foxtail Grass
June Grass
Narrow-leafed Cattail
Nightshade
Ox-eye Daisy
Pepper Cress
Purple Astor
Purple Nutsedge
Purple Thistle
Queen Anne's Lace
Ragweed
Red Clover
Sandburrs
White Sweet Clover
Wild Mustard
Wild Strawberry
Yellow Rocket
Yellow Sweet Clover

Appendix A (Cont.)

Woody Vascular Plant

Alder
American Elm
American Hornbeam
Apple
Balsam Fir
Basswood
Big-toothed Aspen
Blackberry
Black Locust
Black Raspberry
Black Willow
Boxelder
Chokecherry
Cottonwood
Dewberry
Dogwood
Hawthorne
Jack Pine
Mountain Ash
Pignut Hickory
Poplar
Quaking Aspen
Raspberry
Red Maple
Red Oak
Scotch Pine
Speckled Alder
Staghorn Sumac
Swamp Oak
Sycamore
Weeping Willow
White Birch
White Oak
White Pine
Wild Currant
Wild Grape
Yellow Birch

APPENDIX B

FAUNA SPECIES LISTING

APPENDIX B

FAUNA SPECIES LISTING

FAUNA

Amphibians

American Toad
Green Frog
Leopard Frog

Reptiles

Northern Water Snake

Birds

Blackbird
Blue Jay
Chickadee
Crow
Flicker
Indigo Bunting
Junco
Killdeer
Kingbird
Meadow Lark
Morning Dove
Pheasant
Red-winged Blackbird
Robin
Sparrow

Mammals

Cottontail Rabbit
Domestic Dogs
Eastern Chipmunk
Eastern Mole
Gopher
Gray Squirrel
Harvest Mouse
Raccoon
Red Fox
Red Squirrel
Skunk
White-tailed Deer

APPENDIX C

ARCHAEOLOGICAL SURVEY

APPENDIX C

Saginaw
Archaeological
Commission

CASTLE BUILDING 500 Federal Avenue, P.O. Box 359 • Saginaw, Michigan 48606 • 517-753-3537

15 May 1980

Dick Davis
47 Building
Dow Chemical Company
Midland, Michigan 48640

Dear Mr. Davis:

As you requested, The Saginaw Archaeological Commission has completed field testing on the triangular piece of property owned by Dow that is bounded by Salzburg and Waldo Roads and the railroad in Section 35 of Midland Township (T. 12 N., R. 2 E.,) and has located three sites therein. Two of the sites were determined as not significant by shovel testing. The third site was shovel tested and twenty square meters were excavated to sterile soil which in some units extended to more than 50 cm. in depth. No diagnostic artifacts were recovered and no features were found that would indicate a date for the occupation. Activities at the site included working of chert for tool manufacture. This site may be a small workshop satillite of a larger site (20 MD 406) that was reported by Taggart in 1979.

Since the test excavation represents a twenty percent (20%) sample of the site concentration, it is proposed that no further work be undertaken at this site and that the project being planned at this location proceed. A formal report will follow within fifteen days.

Best regards

Fel V. Brunett
Archaeologist

Saginaw
Archaeological
Commission

CASTLE BUILDING 500 Federal Avenue, P.O. Box 359 • Saginaw, Michigan 48606 • 517-753-0507

15 May 1980

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47 Building
Dow Chemical Company
Midland, Michigan 48640

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Best regards

Tel V. Brumett
Archaeologist

REPORT NO. 53080

A CULTURAL RESOURCE INVENTORY REPORT ON A PORTION OF SECTION 35, MIDLAND TOWNSHIP (T. 14 N., R. 2 E.,) MIDLAND COUNTY, MICHIGAN

By Fel V. Brunett

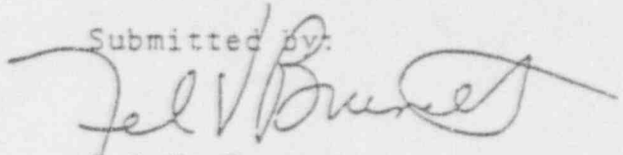
Prepared for Dick Davis, Michigan Division, Dow Chemical Company, U.S.A., 47 Building, Midland,Michigan 48640

Prepared by the Saginaw Archaeological Commission, P.O. Box 359, Saginaw, Michigan 48606

Principal Investigator

Fev V. Brunett

Submitted by:



Fel V. Brunett,
Director

Field Assistants:

Pat Brunett
Marian McClennan
Joe Rogers
Mike Shott
Mark Thogerson
Lois Wang
Bill Wang

TABLE OF CONTENTS

A CULTURAL RESOURCE INVENTORY REPORT ON A PORTION OF SECTION 35, MIDLAND TOWNSHIP (T. 14 N., R. 2 E.,) MIDLAND COUNTY, MICHIGAN

Introduction:

On the third of April, 1980, Dow Chemical U.S.A. contacted with the Saginaw Archaeological Commission to provide an archaeological survey of its holdings lying to the north and east of the railroad in Section 35, Midland Township (T. 14 N., R. 2 E.), Midland County, Michigan. The area is approximately 140 acres in extent.

Environmental Setting:

The survey area is located at elevations ranging from 615 to 630 feet above sea level and habitat shifts from standing water through beech-maple forest and sand ridge covered with Black Locust (Robinia pseudoacacia).A major portion of the sand ridge area has been removed from the center area of the NE1/4 of the section. It is estimated that 40 acres has been strip-mined here. Only a minor edge of the apparent initial ridge remains at its east margin and at the western boundary across the railroad tracks off the survey area. Spur ridges run from the main ridge area east where they are truncated by Waldo Road. These ridges support Witchhazel (Hammamelis virginiana L.) and immature stands of White Birch (Betula papyrifera L.) Low meadows are covered with Dogwood (Cornus sp.) and Trailing Arbutus (Epigaea repens L.) was noted.

Animal life observed in the survey area included Ruffled Grouse and Canadian Geese. Mammal populations include racoon and other small mammals. Deer tracks were observed while the survey was being carried out.

The elevation of the sand ridge suggests that it is a wave and wind formed feature that would have developed at the edge of what is today Lake Huron when it was at the 620' elevation and is now referred to by geologists as Lake Lundy or Elkton. This level is thought to predate the arrival of man in the area at some 14,000 years ago. A cross-section through the dune was made with a backhoe during this survey to determine if buried soil surfaces existed which would have supported occupation at former times. An east-west trench was excavated through the undisturbed east margin of the dune at point D on Map 4. No dark horizons were encountered and no obvious cross-bedding within the dune could be observed. Because of safety considerations no one was allowed into the narrow trench. From field observations of the cross-section it appears safe to say that the dune has been stable since deposition and initial forestation.

Cultural Sequence in Midland County:

The entire known range of Michigan Prehistory exists in Midland County. The work of Eldon Cornelius, Harold Moll, Cleve Pomranky and Lois Wang, among others, has resulted in documentation of over 400 sites within the county where

activities of man were carried out from approximately 12,000 B.C. to historic times. Part of Section 35, on the west bank of the Tittabawassee River, was included in the Little Forks Reservation set aside in the Treaty of Saginaw in 1819. Site location in Midland County include the upper elevations where hunter-gatherer sites exist on the low moraine and many sites on the former beach margins recognized in the county by the continuing sand ridge at elevations of 605, 610 (+/-), 620, 640 and 695 feet above sea level. Sites also exist on the former lake bed and within the flood plain of the area rivers dating to both hunter-gatherer and agrarian groups.

Survey Strategy:

Based on knowledge of the cultural sequence and known site location in Midland County, all areas above the water table were felt to have possibly hosted human occupation. Areas currently below the water table were considered to have been in that condition since drainage of the lake because a thick clay deposit underlays the enter region and the drainage system appears to have been stable since prior to the human occupation.

To locate all known sites, shovel testing on a ten-meter grid with careful examination of at least a two liter sample at each station was undertaken. This field work was carried out by Bill and Lois Wang, Marian McClennan, Pat Brunett, Mark Thogerson, Joe Rogers, Mike Shott and Fel

Brunett. Available open areas were also carefully examined for cultural evidence. Sites that were located during the survey were tested for cultural significance.

Survey Results:

One historic site and two prehistoric sites were located within the survey area. The historic site exists along Waldo Road to the east half of the southeast quarter of the northeast quarter of the section. This site is an historic home/farm site that appears on the 1897 map of Midland County as belonging to Jane Hilcox. Historic artifacts of the period from 1890 to 1940 were evident at the site. Two historic dumping sites believed to be associated with the recent homestead were also located in the Northeast quarter of the section. No cultural significance is placed on this material as it seemed to bear no special insight into our area history.

The prehistoric sites located have been designated 20MD409 and 20MD410. 20MD410 is present in very disturbed context within the study area (See Map 5, page16). To the west of the tracks, on Martin-Marietta property, a segment of the site appears to exist in better preserved context and should be monitored for future study. The position of 410 in the study area included six spalls of Bayport chert surface collected from a sand flow area (Cat. #1254). A one-meter test excavation included no additional cultural material. No further excavation is recommended for this area.

20MD409 is a lithic site defined as existing along the margin of the strip-mined dune obvious on Map It was defined in area A by the recovery of a Bayport spall that exhibits utilization on one edge (#1222) (Plate 1:a) from a bulldozer trail made in late 1979 to allow drilling equipment access to the area. Area B was discovered during surface investigation at the eroding edge of the dune margin. Lois Wang discovered two Bayport spalls (#1253) on the eroding soil profile. A two-meter square test was excavated here to a depth of 60 cm. and yielded 19 spalls weighing a total of 33.8 grams.

Ten units were excavated in Area A and represent 20 square meters of surface (See Map 3). A total of 214 spalls were recovered with a total weight of 269.39 grams. These are summarized in Table 1, page 7 and 8. Two possible tool fragments were recovered (#1225 and 1227). 1225 appears to be a minute portion of a uniface scraper showing steep retouch against the flake margin. 1227 (Plate 1:b) is a portion of a biface first thought to represent a shattered projectile point fragment. Microscopic examination brought out crushing at the latterals which would appear to indicate utilization as a wedge. From spalls recovered in the area it appears that raw nodules of Bayport Chert were imported to the site for working. Decortication and blocky shatter flakes remain from the process. In addition, working of preforms into tools appears to have taken place at the site as represented by edge trimming and thinning flakes and some

small pressure spalls from the final manufacturing phase. The total spall assemblage could have resulted from the work of one flint knapper working at the site on three nodules of chert of less than 10 cm. diameter for less than one hour's time. Total site area from test results is about 40 square meters with another small concentration around Unit 7.

Analysis and Recommendation:

20MD409 and 410 represent chipping stations which probably were small satellite work areas to a larger site which is thought to have existed on the removed beach ridge. A study of the Consumers Power Right-of-Way by David Taggert in 1979 identified segments of a site (20MD406) on the ridge between 409 and 410 which was destroyed during the period between field survey and report presentation by the owner.

Without features or diagonistic artifacts in the study sample, it is doubtful that further work at this site would contribute substantially to our knowledge of Michigan Prehistory. Therefore, it is my recommendation that this project be allowed to proceed without further archaeological work.

Table 1: Cultural Material from Area A - 20 MD 409

Unit 1 - Sterile 4 square meters

Unit 2: 4 Square Meters

A Zone (1223)			
Decortication Spalls	3	3.2	Grams
Blocky Fracture Spalls	3	23.6	
Biface Trimming	3	6.8	
B Zone (1224)			
Decortication Spalls	14	28.5	
Blocky Fracture Spalls	4	19.2	
Biface Trimming	26	22.8	
Pressure Spalls	21	4.3	
Uniface Scraper (Frag.)	1	1.5	(1225)
A to B Transition Zone (1226)			
Blocky Fracture Spalls	2	6.7	
Biface Trimming	8	3.7	

Unit 3: 4 Square Meters

A Zone (1228)			
Biface Trimming	7	2.5	
Biface (Fragment) 1227	1	3.2	
B Zone			
Decortication Spalls	2	1.4	
Biface Trimming	18	7.5	
Pressure Spalls	5	1.6	

Unit 4: 1 Square Meter

A Zone (1230)			
Pressure Flakes	1	0.1	

Unit 5: 1 Square Meter

0 - 35 cms. - Sterile			
35 - 40 cms.- (1232)			
Biface Trimming	1	0.8	
40 - 50 cms. (1231)			
Blocky Flakes	1	0.7	
50 - 60 cms. (1233)			
Pressure Flakes	1	0.1	

Table 1 : Cultural Material from Area A - 20 MD 409 (Cont.)

Unit 6:	1 Square Meter Sterile		
Unit 7:	1 Square Meter		
	12-22 Cms (1234)		
	Biface Trimming	4	2.4 Grams
	Pressure Spalls	2	0.3
	32-42 cms (1235)		
	Pressure Spall	1	0.09
	42-52 cms (1236)		
	Indet. Spall	1	0.5
Unit 8:	1 Square Meter Sterile		
Unit 9:	1 Square Meter Sterile		
Unit 10:	2 Square Meters		
	0-20 cms. (1237)		
	Decortication Spalls	7	32.5
	Blocky Shatter	3	14.4
	Biface Trimming	4	3.2
	Indet. Spalls	14	4.2
	20-25 cms (1238)		
	Decortication	3	9.7
	Blocky	3	12.9
	Biface Trimming	7	4.1
	Pressure	6	1.2
	25-30 Cms. (1239)		
	Decortication	1	0.6
	Blocky	1	3.4
	Biface Trimming	3	3.2
	Pressure	1	0.1
	30-35 cms. (1240)		
	Decortication	1	5.7
	Biface Trimming	2	1.1
	Pressure	7	1.5
	35-40 cms. (1241)		
	Decortication	1	8.9
	Biface Trimming	2	0.6
	Pressure	3	0.7
	40-45 cms. (1242)		
	Biface Trimming	5	2.6
	45-50 cms. (1243)		
	Decortication	3	5.9
	Biface Trimming	3	5.7
	50-55 cms. (1244)		
	Pressure	1	0.4
	55-60 Cms. (1245)		
	Decortication	1	4.6
	Biface Trimming	2	0.7

Table 2: Cultural Material from Area B - 20 MD 409

Surface - Area B (1253)		
Biface Trimming	2	0.9 Grams
Excavated Unit B-1 (4 Square Meters)		
0-15 Cms. (1249)		
Biface Trimming	3	1.3
20-25 cms. (1247 & 1248)		
Biface Trimming	3	1.9
Quartzite Blocky	2	0.8
25-30 cms. (1246)		
Blocky Fracture	1	0.7
Pressure	2	0.1
30-40 cms. (1250-51)		
Quartzite Blocky	3	26.6
Biface Trimming	3	2.1
40-50 cms. (1252)		
Biface Trimming	2	0.3

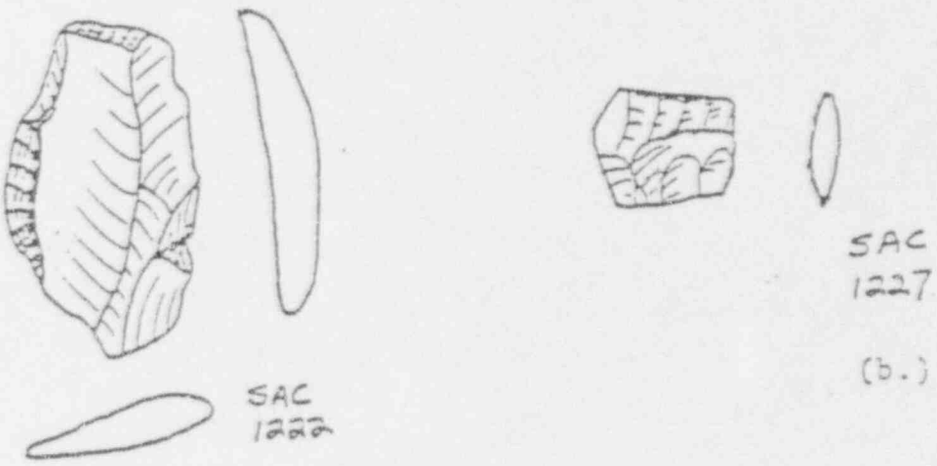
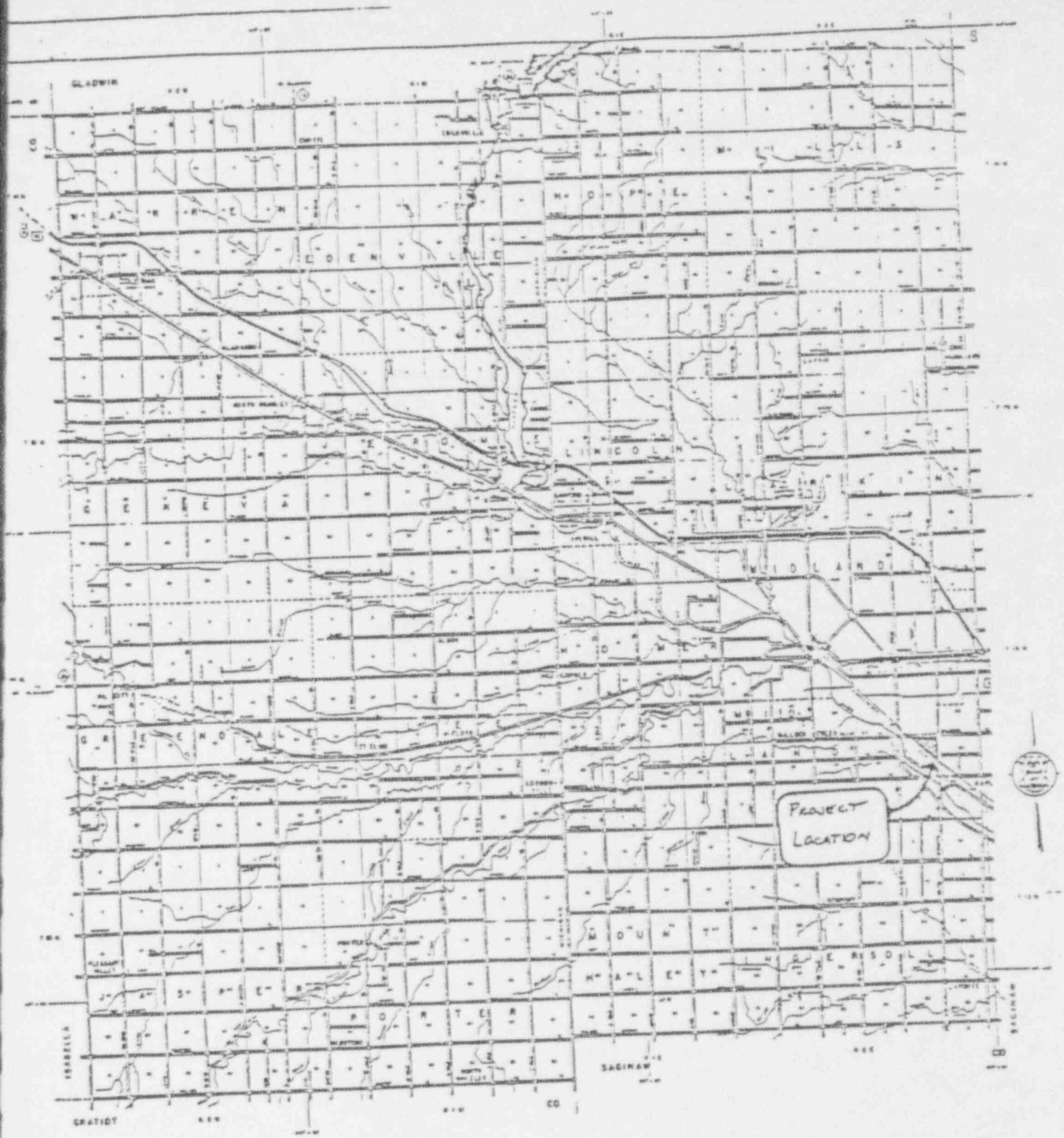


PLATE 1 : Utilized Flake and Biface Fragment from 20 MD 409



Map 1 Project Location

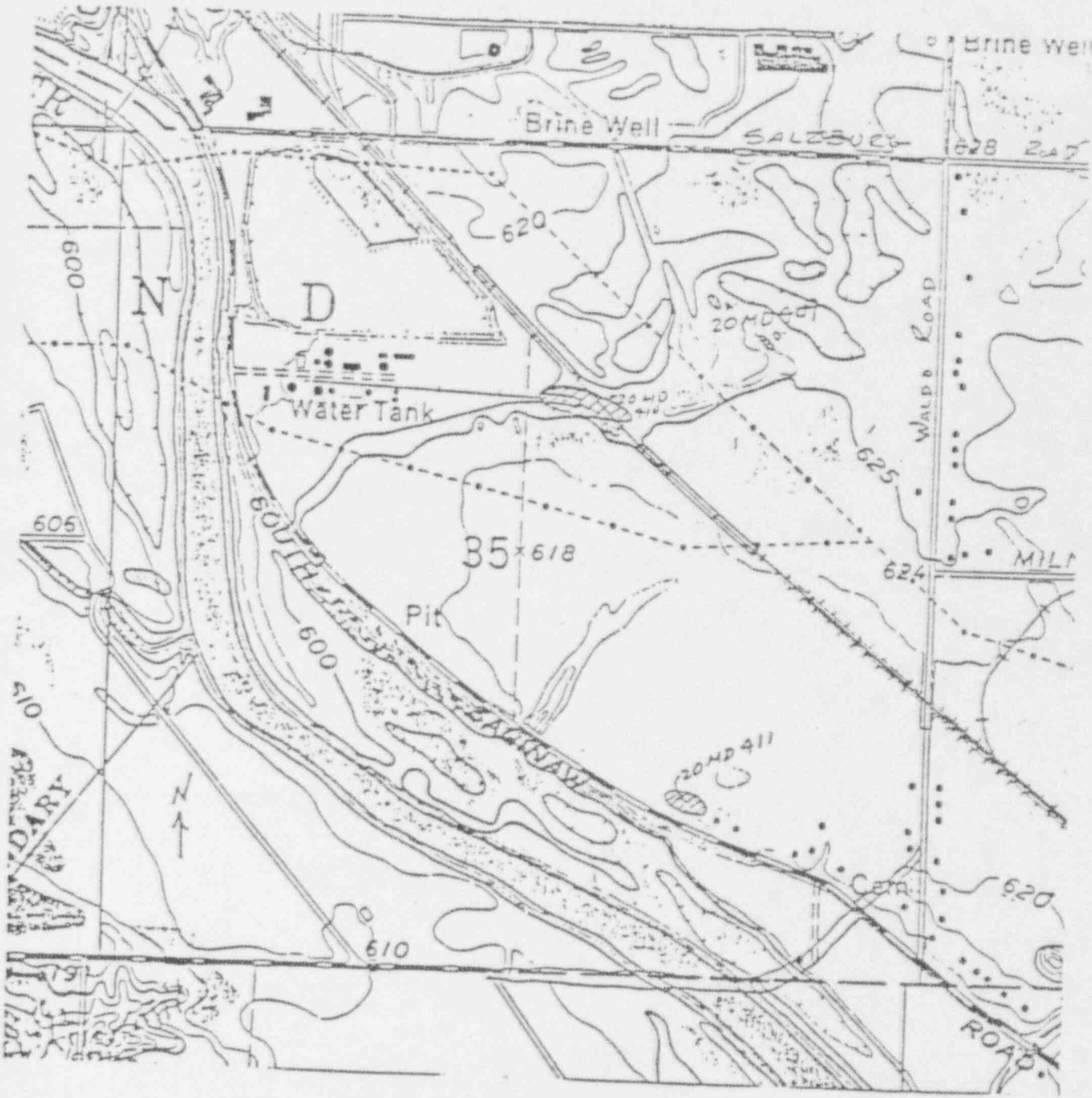
MIDLAND COUNTY

MICHIGAN

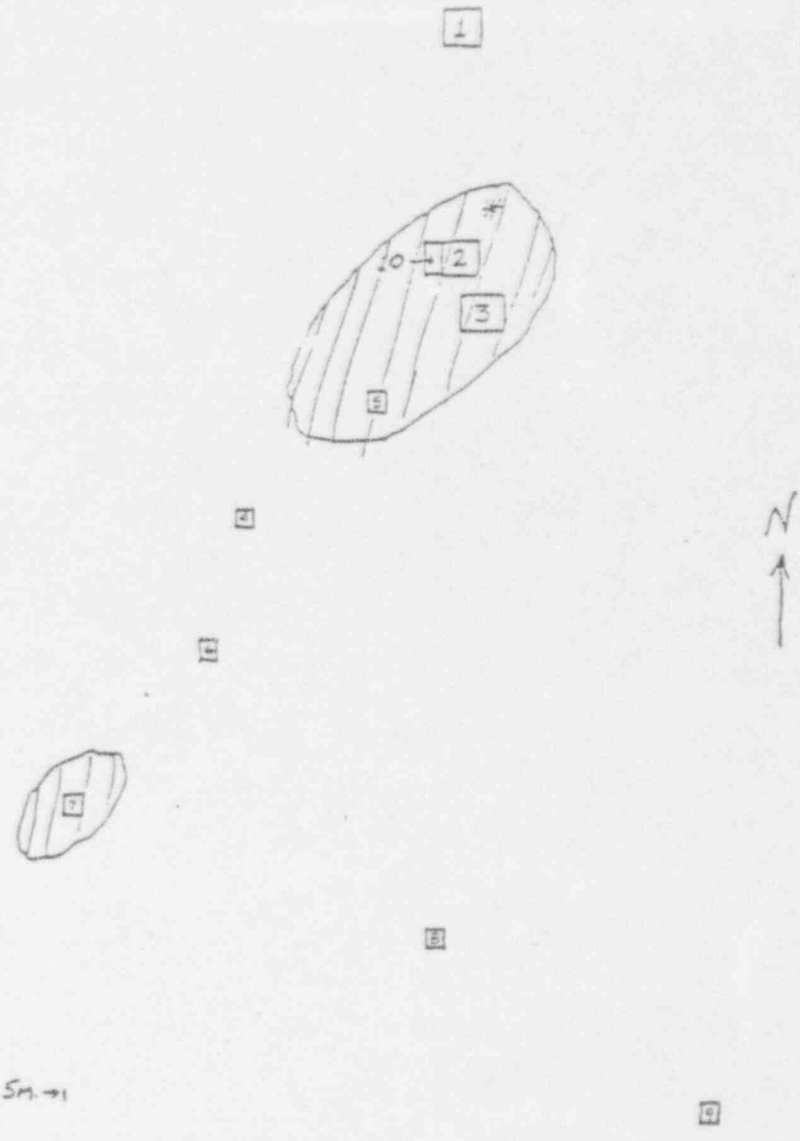
STATE HIGHWAY COMMISSION

DEPARTMENT OF STATE HIGHWAYS

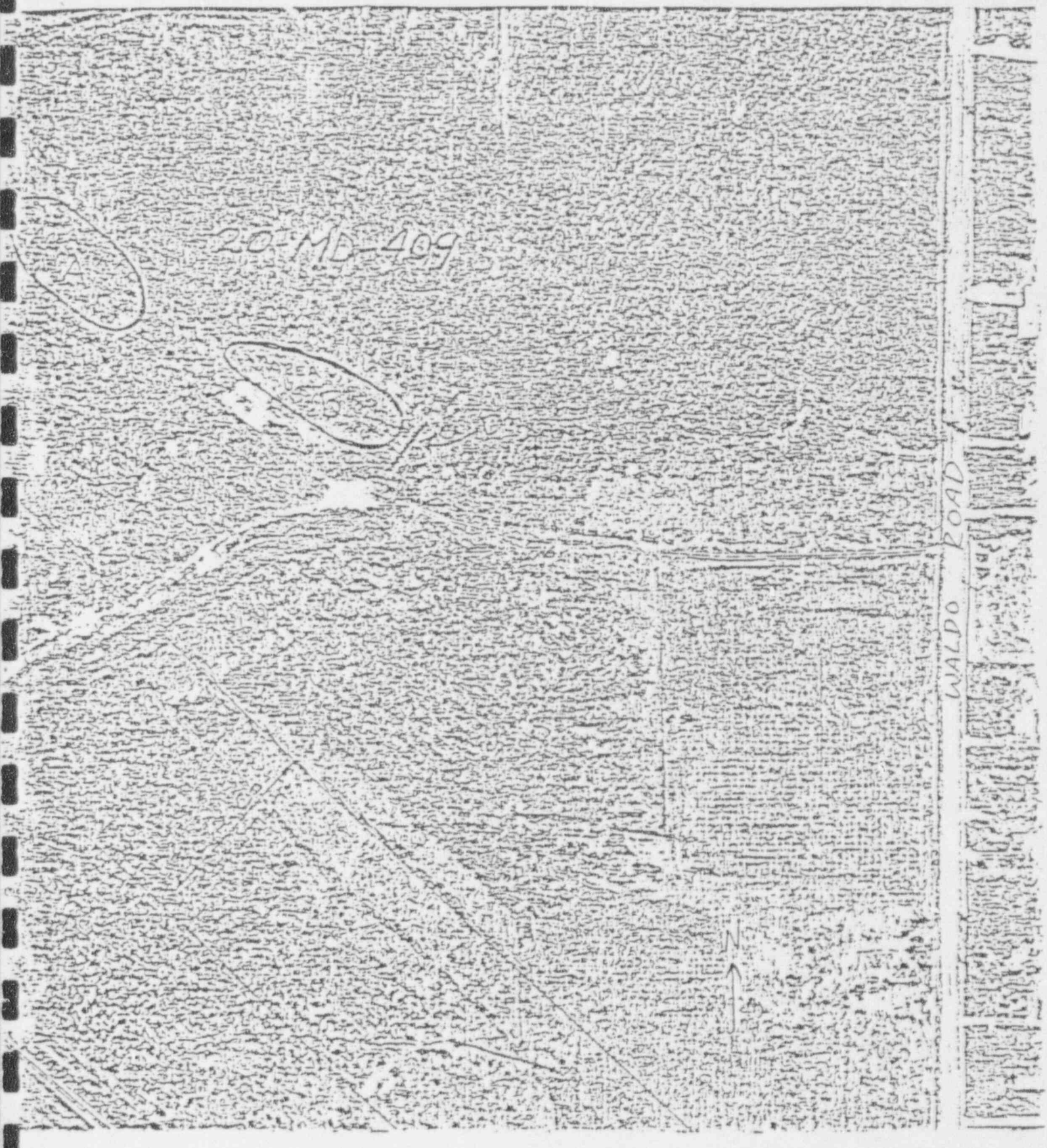
HIGHWAY PLANNING SURVEY



Map 2 Detail of Midland South 7.5 Min. USGS Quadrangle Map Showing Locations of 20 MD 409, 410 and 411



Map 3 Location of Excavated Tests at Area A, 20 MD 409
Circled areas are lithic concentrations



Map 4 Aerial Photo Location of 20 MD 409

Date 15 MAY 1980

ARCHAEOLOGICAL SURVEY RECORD

Site 20 MD 409 USGS Quad MIDLAND SOUTH

Other Designations for Site

SE ¼ of NW ¼ of NE ¼ of Section 35 Twp. 14N-2E
SW NE NE

Present Owner DOW CHEMICAL Address MIDLAND

Previous Owners, if known DOUGARD CURRIE

Description of Site LITHIC WORKSHOP ON LOW SPUR RIDGE AND ON MARGIN OF SAND MINED DUNE

Surface features NONE CULTURAL EXCEPT SMALL 20TH CENTURY DUMP

Artifacts FCR AND BAYPORT, QUARTZITE AND FLINTRIDGE CHERT

Other Collections from Site NONE KNOWN

Previous Excavations NONE KNOWN

Literature Citations AREA REPORTED IN TAGGART 1979 REPORT OF A PRELIMINARY ARCH. SURVEY... CONSOMERS POWER CO. CONTRACT 95304

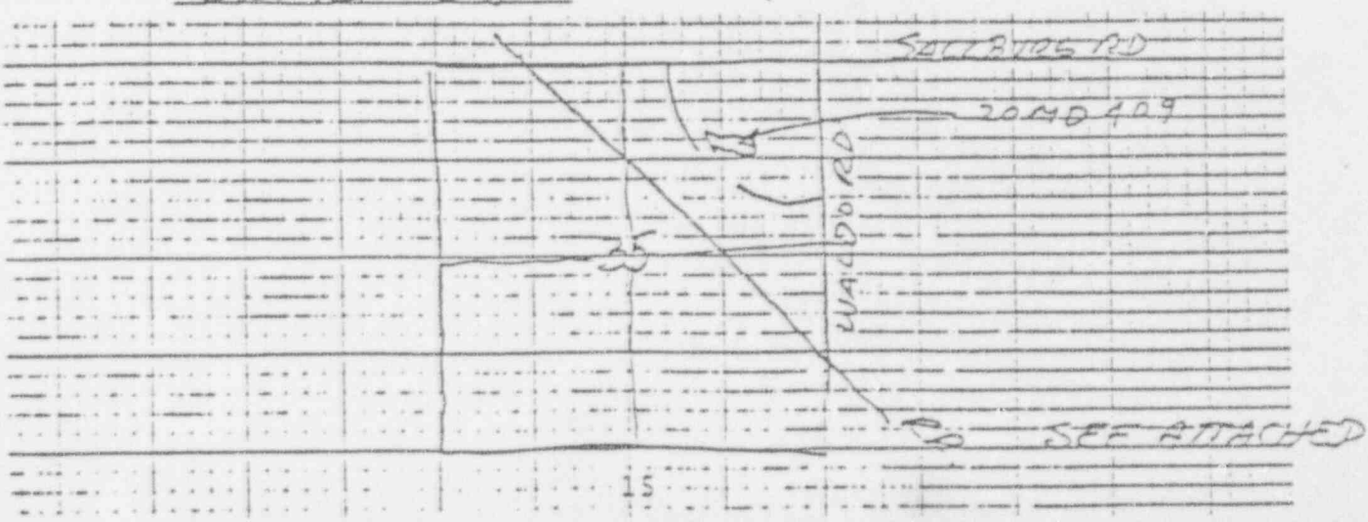
Soil Type SAND Plant Cover BIRCH, ASPEN, WITCH HAZEL

Size of Site 2 ACRES Cultural Horizon UNKNOWN

Type of Site LITHIC WORKSHOP

River Basin TITTABAWASSEE County MIDLAND

Recorder BRUNETTI SAC Sketch Map Below



Map 5 Aerial Photo Location of 20 MD 410

Date 15 MAY 1980

ARCHAEOLOGICAL SURVEY RECORD

Site 20 MD 410 USGS Quad MIDLAND SOUTH

Other Designations for Site

NW ¼ of SW ¼ of NE ¼ of Section 35 Twp. 14N-2E

Present Owner MARTIN-MARIETTA DOW CHEMICAL Address MIDLAND, MI

Previous Owners, if known DOUGLAS CURRIE

Description of Site FCR AND CHERT IN RR CUT

Surface features NONE

Artifacts FCR AND CHERT

Other Collections from Site NONE KNOWN

Previous Excavations NONE KNOWN

Literature Citations NONE KNOWN

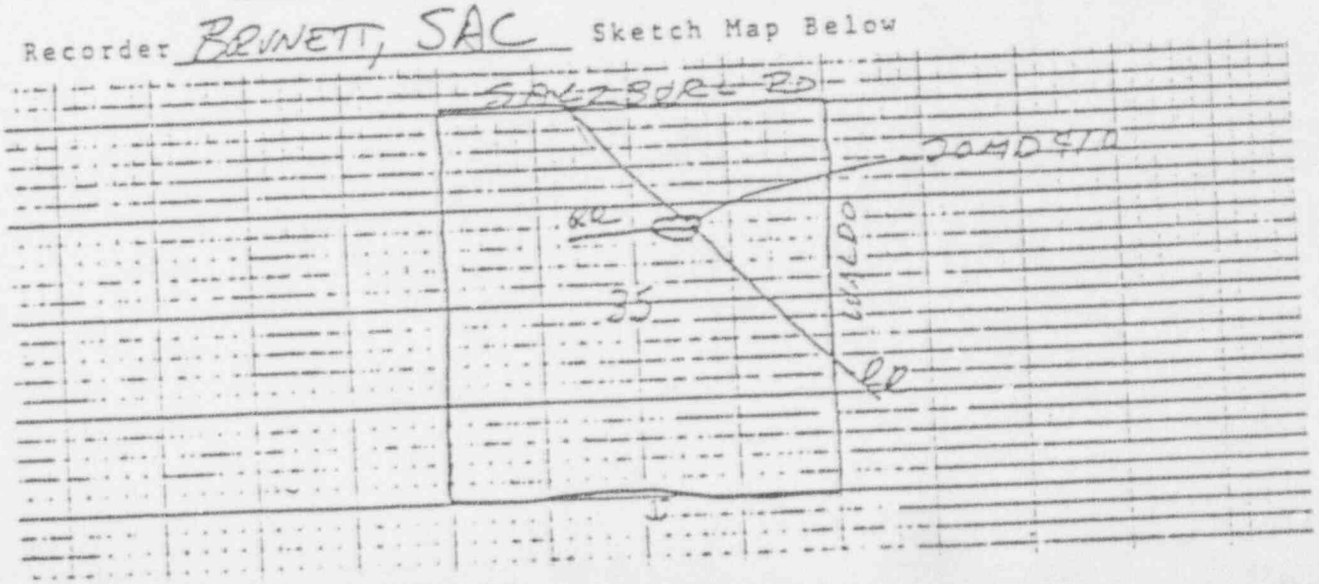
Soil Type SAND Plant Cover EXPOSED

Size of Site 1 ACRE Cultural Horizon UNKNOWN

Type of Site UNDETERMINED

River Basin TITTABAWASSEE County MIDLAND

Recorder BENNETT, SAC Sketch Map Below



Map 6 Aerial Photo Location of 20 MD 411

Date 15 MAY 1980

ARCHAEOLOGICAL SURVEY RECORD

Site 20 MD 411 USGS Quad MIDLAND SOUTH

Other Designations for Site

NE ¼ of SW ¼ of SE ¼ of Section 35 Twp. 14N-2E

Present Owner DOW CHEMICAL Address MIDLAND, MI

Previous Owners, if known DOUGALD CURRIE

Description of Site FCR AND CHERT IN OPEN FIELD

Surface features SAND KNOLL

Artifacts BIFACE FRAGMENT

Other Collections from Site COLLECTION HELD BY LOIS WANG, 2008 DILLOWAY, MIDLAND, MI 48640 517/832-3048

Previous Excavations NONE KNOWN

Literature Citations NONE KNOWN

Soil Type SAND Plant Cover FARM FIELD

Size of Site 1 ACRE Cultural Horizon UNKNOWN

Type of Site CAMPSITE (?)

River Basin TITTABAWASSEE County MIDLAND

Recorder BRUNETTI, SAC Sketch Map Below