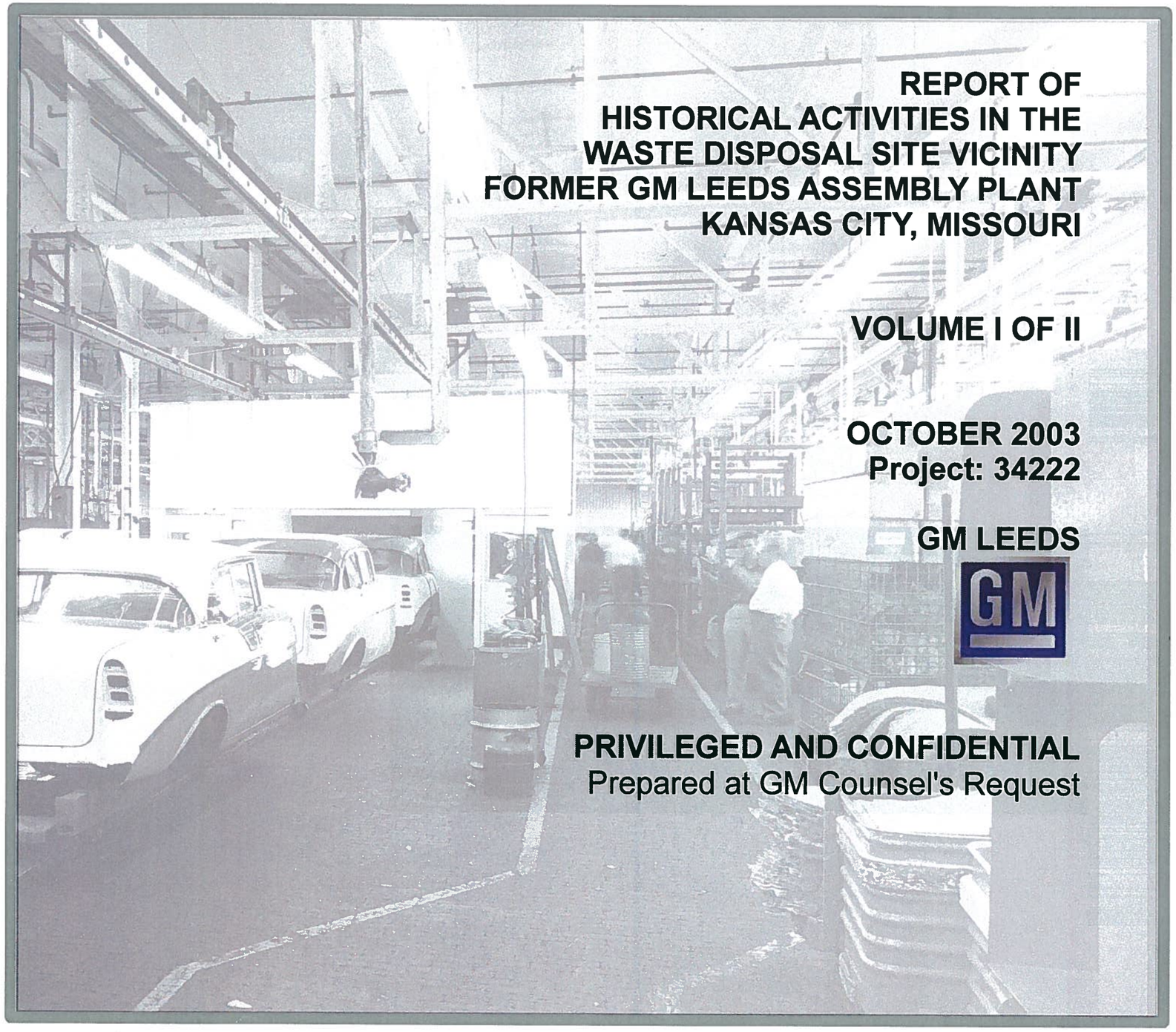


REPORT OF HISTORICAL ACTIVITIES IN THE WASTE DISPOSAL SITE VICINITY FORMER GM LEEDS ASSEMBLY PLANT KANSAS CITY, MISSOURI

VOLUME I OF II

OCTOBER 2003
Project: 34222

GM LEEDS

PRIVILEGED AND CONFIDENTIAL
Prepared at GM Counsel's Request

Burns & McDonnell
SINCE 1898

DRAFT

REPORT OF
HISTORICAL ACTIVITIES IN THE
WASTE DISPOSAL SITE VICINITY
FORMER GM LEEDS ASSEMBLY PLANT
KANSAS CITY, MISSOURI

VOLUME I OF II

OCTOBER 2003

34222
GMLEEDS

PRIVILEGED AND CONFIDENTIAL
Prepared at GM Counsel's Request

Burns & McDonnell Engineering Company, Inc.
Engineers – Geologists – Scientists
Kansas City, Missouri

TABLE OF CONTENTS

TABLE OF CONTENTS, CONT'D.

LIST OF APPENDICES

LIST OF FIGURES (VOLUME II OF II)

TABLE OF CONTENTS, CONT'D.

LIST OF ACRONYMS / ABBREVIATIONS

Acronym / Abbreviation	Full Name
AOC	Agreement of Consent
AST	Aboveground Storage Tank
Assembly Building	Original GM Leeds Plant Automobile Assembly Building and Subsequent Building Additions
bgs	Below Ground Surface
Burns & McDonnell	Burns & McDonnell Engineering Company
CAD	Computer-Aided Drafting
CALM	Cleanup Levels for Missouri
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act (Superfund)
CFR	Code of Federal Regulations
Closure Plan	RCRA Closure Plan
cm^2	Square Centimeter
EDR	Environmental Data Resources, Inc.
ESP	Enamel Storage Pit
GM Plant	General Motors Leeds Assembly Plant
GM	General Motors Corporation
GTARC	Groundwater Target Concentrations, CALM
mg/Kg	Milligrams/Kilogram
MDNR	Missouri Department of Natural Resources
PAH	Polynuclear Aromatic Hydrocarbons
PCB	Polychlorinated Biphenyl
PID	Photoionization Detector
Leeds Industrial	Leeds Industrial Park
RCRA	Resource Conservation and Recovery Act
SVOC	Semivolatile Organic Compound
STARC	Soil Target Concentrations, CALM
TCLP	Toxicity Characteristic Leaching Procedure
TPH	Total Petroleum Hydrocarbons
µg/Kg	Micrograms/Kilogram
µg/L	Micrograms/Liter
UMKC	University of Missouri - Kansas City
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VOC	Volatile Organic Compound

* * * * *

EXECUTIVE SUMMARY

The former GM Plant operated from 1929 until 1988. In 1993, approximately 97 acres of the approximately 117-acre GM Plant property was sold to Leeds Industrial. GM retained ownership of the southernmost 20-acres of the GM Plant property that included the known extent of a former waste disposal site. In 1999, buried drums were discovered on property owned by Leeds Industrial in an area not previously thought to have been part of the known waste disposal site. Paint sludge collected and analyzed from one of the buried drums contained lead and benzene at levels above the toxicity characteristic for hazardous waste per 40 CFR 261.24. In 2003, MDNR issued a draft Agreement of Consent to GM for inclusion in the State Cooperative Superfund Program. The Agreement of Consent is still being negotiated as of the time of writing of this report.

GM requested that Burns & McDonnell perform a background review of available historical documents related to operations at the GM Plant in order to determine the sequence of filling activities. The primary resources used for this task were historical aerial photograph stereopairs. Aerial photo stereopairs of the former GM Plant were obtained for the following years: 1936, 1940, 1945, 1950, 1952, 1955, 1957, 1963, 1964, 1965, 1969, 1976, 1978, 1989 and 2001. Oblique, non-stereo aerial photographs from 1928 and 1960 and historical photographs of GM Plant construction progress dating from 1928 through the mid-1950's, were also reviewed. Historic topographic maps and current and historic plat maps were also obtained and reviewed.

From examination of aerial photos with a stereoscope (which allowed three-dimensional viewing), it was apparent that the southern end of the GM Plant property adjacent to the Blue River was originally topographic low ground related to abandoned channel meanders on the floodplain of the Blue River. From the earliest aerial photo stereopair of the area (1936) through 1950, there was no evidence of fill being placed in these topographically low abandoned channel meanders.

In the time interval from 1950 until 1989, the topographic low areas at the southern end of the GM Plant (totaling approximately 19 acres) were systematically in-filled and brought to grade level with the rest of the GM Plant property. The majority of the fill operations (18 acres) took place from 1950 until 1969, generally proceeding from north to south. From 1950 to 1952, approximately six acres immediately south of the GM Plant buildings were in-filled and paved for parking. From 1952 until 1960, approximately five acres south and west of the 1950 to 1952 fill area were in-filled. The western edge of the 1952 to 1960 fill area is where the buried drums were discovered and recovered during 1999. A portion of the 1952 to 1960 fill area shows up as a 30-foot deep closed depression on topographic maps constructed from a 1957 aerial photo base. From approximately 1957 until 1969, an area of approximately seven acres was in-filled directly south of the 1950 to 1952 fill area. The 1957 to 1969 fill area includes the known waste disposal site documented in subsurface investigations conducted during 1990 and 1991. Between 1978 and 1989, an additional 1-acre of fill in two separate areas was emplaced at the extreme southern end of the GM Plant property.

Volumetric estimates of fill emplaced have been made based on assumed average fill depths across the 19-acre fill area. The volumetric estimates range from 153,270 cubic yards (229,900 tons) based on a 5-ft. average fill thickness to 613,070 cubic yards (919,600 tons) based on a 20-ft. average fill thickness.

Laboratory results for analyses performed on soil and groundwater samples collected during the subsurface investigations at the former waste disposal site (1957-1969 fill area) were compared to current MDNR CALM Scenario C (Industrial Land Use) STARCs, GTARCs and 40 CFR 261.24 TCLP concentrations. Subsurface soil analytical results from the 1990 and 1991 investigations detected beryllium and arsenic levels in excess of current MDNR CALM Scenario C STARCs. Sediment and surface soil analytical results from the 1990 and 1991 investigations detected beryllium in excess of current MDNR CALM Scenario C STARCs. During the drum discovery investigation and removal operations in 1999 and 2000, samples of paint sludge were collected from a recovered drum and submitted for analysis. Several VOCs (n-propylbenzene,

1,3,5-trimethylbenzene and 1,2,4-trimethylbenzene); SVOCs (di-n-octylphthalate, benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, dibenz(a,h)anthracene, naphthalene, and TEH); and lead, were detected at levels exceeding MDNR CALM Scenario C STARCs. Drum sludge samples subsequently submitted for TCLP analysis had lead and benzene above the toxicity characteristic level for hazardous waste per 40 CFR 261.24. In groundwater and surface water samples from the 1990 and 1991 investigations, VOCs (chloroform, toluene, ethylbenzene, and xylenes); SVOCs (bis[2-ethylhexyl]phthalate); and metals (arsenic, cadmium, iron, lead, and manganese), were detected at concentrations above the MDNR CALM Scenario C GTARCs.

* * * * *

1.0 INTRODUCTION

The former General Motors (GM) Leeds Assembly Plant (GM Plant), located at 6817 Stadium Drive in Kansas City, Missouri, was constructed between July 1928 and December 1928. Several structural additions / modifications were subsequently made to the original GM Plant buildings (Assembly Building) between 1928 and 1988. The legal description of the GM Plant is as follows:

Jackson County, Missouri
Section 24, Township 49, Range 33
All South 1/2 of the Northeast 1/4 of Section 24-49-33
Lying South of 37th Street, North of Blue River
East of present East line of Missouri Pacific R/W
West of present West line of Kansas City Southern R/W

More than 8.2 million vehicles were manufactured at the GM Plant beginning in 1929 until 1988. Manufacturing activities performed at the GM Plant included:

- Welding of car bodies and component parts
- Assembly of complete automobiles
- Cleaning and preparation of automobiles for priming, painting, and finishing

The 117-acre GM Plant was idled in April 1988 and officially closed in October 1990. In 1993, approximately 97-acres of the GM Plant property was sold to a group of local investors (Leeds Depot, Ltd.). GM retained ownership of approximately 20 acres at the southern end of the GM Plant property which included the known extent of a former waste disposal site. Leeds Depot, Ltd. was later changed to Leeds Industrial Park (Leeds Industrial). Leeds Industrial leases space to light industrial tenants at the GM Plant. Among the various tenants, commercial storage appears to be the predominant use.

The land surrounding the GM Plant is zoned M2 Heavy Industrial and lies within the 100-year floodplain of the Blue River. It is anticipated that future land use at the GM Plant will remain industrial (Burns & McDonnell, 2000b).

Anecdotal records indicated that a waste disposal site was operated near the south end of the GM Plant during the early 1950's to 1968 although no records were kept of the exact type or amounts of wastes buried. A "Notification of Hazardous Waste Site" was submitted by GM to the United States Environmental Protection Agency (USEPA) in June 1981. The USEPA conducted a preliminary assessment at the time consisting of a literature search, phone calls, and an on-site inspection. In 1985, the USEPA sent a letter to GM indicating that no further action was anticipated (Burns & McDonnell, 1991).

In 1990 and 1991, subsurface soil and groundwater investigations were conducted in the vicinity of the former waste disposal site. Subsurface soil analytical results from the investigations detected beryllium and arsenic in excess of current Missouri Department of Natural Resources (MDNR) Cleanup Levels for Missouri (CALM) Scenario C Soil Target Concentrations (STARC's). Arsenic, cadmium, iron, lead, and manganese were detected above current MDNR CALM Groundwater Target Concentrations (GTARC's) in groundwater samples from the same investigations. A groundwater sample from one monitoring well also had a number of volatile organic compounds (VOCs) and semi-volatile organic compounds (SVOCs) above MDNR CALM GTARC's. All of the monitoring wells at the GM Plant were abandoned in 1997.

In 1999, buried drums were discovered by Leeds Industrial in an area not previously known to have been the site of waste disposal activities (Burns & McDonnell, 1999b). The drum discovery site was subsequently investigated and excavated to remove drums and associated debris. Upon commencement of drum removal activities, it became apparent that the vertical and lateral extent of buried drums was greater than originally anticipated. Drum removal activities were subsequently curtailed and the excavation was backfilled. Paint sludge collected and analyzed

from one of the buried drums contained several VOCs, SVOCs, and lead at concentrations above MDNR CALM Scenario C STARC's. Subsequent Toxicity Characteristic Leaching Procedure (TCLP) analysis of the paint sludge detected lead and benzene above levels characteristic of hazardous waste.

In May 2003, MDNR issued a draft Agreement of Consent (AOC) to GM for investigation/remediation in the Missouri Superfund Cooperative Program. The AOC is still being negotiated as of the time of writing of this report.

GM tasked Burns & McDonnell Engineering Company (Burns & McDonnell) to obtain and review available information regarding the drum discovery area and adjacent areas of the GM Plant. The primary purpose of the review was to determine what areas of the GM Plant (in addition to the known waste disposal site) may have received fill over the years of GM Plant operation. This report details the results of that review effort. Section 2.0 describes the historical information sources reviewed. Section 3.0 summarizes the findings of previous environmental investigations performed by Burns and McDonnell at the GM Plant. Section 4.0 summarizes historic activities at the GM Plant from 1928 until 2001 as interpreted from review of the various historical information sources and the previous investigation reports. Section 5.0 presents the report summary and conclusions.

* * * * *

2.0 HISTORICAL INFORMATION SOURCES

In performing this historical assessment of activities at the GM Plant, a number of information sources were utilized. The historical information sources are described in the paragraphs below.

2.1 AERIAL PHOTOGRAPHY

Stereographic aerial photography exists for the site dating back to at least 1936. Aerial photo stereo pairs are sequential images with overlap such that some of the same features visible on each of the photos are viewed from a slightly different angle. This different viewing angle (or parallax) between photos, with the help of a stereoscope, allows for three-dimensional viewing of topographic features. More specifically, buildings and hills on the photo's appear to be convex while recesses and valleys appear to be concave.

Stereographic aerial photographs of the GM Plant were obtained for the following years: 1936, 1940, 1945, 1950, 1952, 1955, 1957, 1963, 1964, 1965, 1969, 1976, 1978, and 1989. A single aerial photo image was obtained for 2001. In addition, oblique aerial photos were obtained for (approximately) 1928, the early 1950's and 1960. The aerial photographs were obtained from the sources listed below:

- General Motors - 1960
- M.J. Harden, Kansas City, MO – 1964, 1965, 1969, 1976, 1978, 1989, and 2001
- National Archives – 1936, 1940, 1945, 1952
- United States Department of Agriculture – 1957
- United States Geological Survey EROS – 1950, 1955, and 1963
- University of Missouri – Kansas City Western Historical Manuscript Collection – 1928 and early 1950's

The procedure used to create the aerial photo maps for Figures 6 through 22 is explained in the following paragraph. Film negatives of the aerial photographs were scanned at 3,600 dots per

inch to create digital images. A process called "georeferencing" was then used to overlay the digitized 2001 aerial photo image to the digital computer-aided drafting (CAD) file that contained the survey information (Anderson, 1993 and Anderson, 2000). The software used to perform the georeferencing was ArcGIS 8.3 ArcMap®. Points on the 2001 aerial photo that matched points in the surveyed CAD drawing (Figure 22) such as building corners, railroad/road intersections, and bridge crossings, were used to "fit" the digital aerial photograph file to the surveyed CAD drawing. The rest of the aerial photos (back to 1936) were then georeferenced using the 2001 aerial CAD overlay as a template. This resulted in a relatively accurate portrayal of existing GM Plant layout / topography relative to historical GM Plant layout / topography.

Each of the aerial photo stereopairs was viewed and interpreted three-dimensionally with the stereoscope. Qualitative interpretations of topographically low and high areas were delineated on each of the georeferenced aerial photos (Figures 8 through 22). On each of these aerial photos, a line was drawn at the breakpoint between relatively flat-lying ground and the top of slopes leading downward to topographic low areas. By three-dimensional viewing of the aerial photo pairs in chronological order, areas of fill emplaced since the previous photograph was taken could be interpreted. Two generations of fill are depicted on each of the aerial photo figures: fill placed between the dates of the current and the previous photos; and cumulative fill placed between the date of the previous photo and the first photo showing fill emplacement (1952).

2.2 GM LEEDS PLANT CONSTRUCTION PHOTOGRAPHS

The contractor for construction of the GM Plant, beginning in 1928, was Salvatore Patti Construction Company. The company's large collection of construction-related documents currently resides in the Western Historical Manuscript Collection at the University of Missouri-Kansas City (UMKC, 1928-1955). Large format, 8" x 10" black & white photographs of construction progress at the GM Plant are included in this collection. Digital copies of representative photographs documenting construction of the original GM Plant in 1928 through building expansion projects in the mid-1950's were obtained and are included in Appendix A of this report. The photographs were used along with stereographic aerial photo pairs to interpret historical activities in the vicinity of the former waste disposal site (Section 4.0). The

construction photos were also used to interpret the chronological order of structural additions made to the GM Plant from 1928 through 1989 (see Figure 7).

2.3 HISTORIC TOPOGRAPHIC MAPS

A search for historic topographic maps of the former GM Plant was conducted by Environmental Data Resources, Inc. (EDR). Historic topographic maps from six years were identified : 1996, 1991, 1975, 1970, 1964 and 1957 (see Appendix B). All six topographic maps were constructed upon the same 1957 topographic base. On each of the topographic maps the former waste disposal sites adjacent to the Blue River are visible. The east-west trending topographic depression that the drums were discovered in is shown as 30 feet below the surrounding grade. Waste disposal appears to have taken place in this area from approximately 1952 until 1960 (see Figures 6, 13 & 14). The area of the documented waste disposal site investigated in the early 1990's (Burns & McDonnell, 1991 and 1992a) is shown on the topographic maps as 20 feet below the surrounding grade. Waste disposal appears to have taken place in this area from approximately 1957 until 1969 (see Figures 6, 15, 16 & 17).

2.4 PLAT MAPS

Current and historic plat maps of the GM Plant were obtained from the Jackson County, Missouri assessors office and the Jackson County Historical Society archives, respectively (see Appendix C). The current landowner property boundaries, as approximated from the current plat maps, are shown on Figures 6 through 22.

2.5 SANBORN MAPS

A Sanborn map search was conducted by EDR. EDR reported that no Sanborn coverage is available for the GM Plant.

* * * * *

3.0 PREVIOUS INVESTIGATION / REMEDIATION ACTIVITIES IN THE WASTE DISPOSAL SITE VICINITY

A number of investigations have been conducted at the GM Plant since the early 1990's to assess the environmental conditions in the vicinity of the former Assembly Building and at the former waste disposal site. The investigation findings are summarized in the following sections.

3.1 1988 UST SITE ASSESSMENT

Underground storage tanks (USTs) were identified at three locations at the GM Plant (exclusive of the Enamel Storage Pit [ESP] area discussed in Section 3.8). The three areas were:

- the tank farm (seven, 15,000-gallon USTs that contained primer, urethane purge thinner [predominantly composed of toluene], topcoat purge thinner [composed of a 50/50 mixture of toluene and naphtha], power steering fluid, and automatic transmission fluid);
- the diesel UST area (1,000-gallon fiberglass UST); and
- the unleaded gasoline UST area (two USTs of 12,000 gallon and 10,000 gallon capacity).

All three UST areas were located between the powerhouse and the company car garage on the northwest side of the GM Plant. During UST removal at the tank farm in July 1988, hydrocarbons were found in soil and a release report was filed with MDNR. Hydrocarbons were also detected in soil samples from the diesel and gasoline UST areas. Contaminated soils were excavated from the former gasoline UST excavation. The lateral and vertical extent of soil and groundwater contamination in all three areas was found to be limited due to the clayey native soil surrounding the former UST excavations (Burns & McDonnell, 1988).

3.2 1989 AST SITE ASSESSMENT

Aboveground storage tanks (ASTs) were identified at three locations at the GM Plant (exclusive of the ESP area discussed in Section 3.8). During removal of the USTs (Section 3.1), product was noted in backfill surrounding a pipeline that lead to the ASTs. The release was reported to

MDNR and an investigation of the area was conducted. Soil borings and monitoring wells were installed in the vicinity of the ASTs to assess subsurface soil and groundwater contamination. Limited hydrocarbon contamination was detected in soil adjacent to one of the ASTs. The ASTs did not appear to be a contributor to groundwater contamination (Burns & McDonnell, 1989).

3.3 1990 - 1999 PCB CHARACTERIZATION AND REMEDIATION

Polychlorinated biphenyl (PCB) characterization and remediation activities were performed in transformer rooms at the GM Plant beginning with identification and removal of 14 PCB-containing transformers in seven transformer rooms in October 1990. Sampling and analysis of PCB-contaminated concrete was conducted in 1991, 1994, and 1997. Approximately 1,300 square feet of concrete were subsequently solvent washed for PCB removal and 58 tons of concrete were demolished and removed off-site (Burns & McDonnell, 1999a).

3.4 1990 PRELIMINARY INVESTIGATION

Anecdotal records indicated that a waste disposal site was operated during the early 1950's to 1968 near the south end of the GM Plant. No records were kept of the exact type or amounts of wastes buried. A "Notification of Hazardous Waste Site" was submitted by GM to the USEPA in June 1981. A preliminary assessment was conducted by the USEPA at that time consisting of a literature search, phone calls, and an on-site inspection in 1982. In 1985, the USEPA sent a letter to GM indicating that the waste disposal site did not pose a current threat to the public or the environment and no further action by the USEPA was anticipated. From August through October 1990, the waste disposal site was investigated as part of a larger, voluntary GM Plant-wide environmental assessment related to the closure and potential sale of the property (Burns & McDonnell, 1991).

The former waste disposal site was believed to be generally bounded by the Blue River on the west, Round Grove Creek on the south, an abandoned railroad line on the east, and rail and truck loading/shipping areas on the north. A magnetometer survey was conducted over the site of the suspected waste disposal site to check for the presence of buried metallic debris. Nine soil borings were subsequently installed in the waste disposal site vicinity, seven of which were

completed as groundwater monitoring wells. Two sediment samples were also collected from the edge of the Blue River.

The soil samples collected were analyzed for metals, total petroleum hydrocarbons (TPH), total phenols, VOCs and SVOCs. The soil and sediment analytical results are summarized on Figures 2 and 3. Exceedences of CALM STARCs for Scenario C land use (industrial) are also shown. Beryllium, arsenic, and mercury were detected above CALM STARC Scenario C concentrations in several soil samples.

3.5 1991 SITE CHARACTERIZATION OF THE FORMER WASTE DISPOSAL SITE

A second investigation in the vicinity of the former waste disposal site was conducted during 1991 to further characterize potential surface and subsurface contamination resulting from past waste disposal activities (Burns & McDonnell, 1992a).

Fill material encountered in 11 of 19 borings ranged in thickness from 0 to 22 feet. The fill was underlain by relatively tight clays and gravel. Shale bedrock was encountered at approximately 55 to 60 feet below ground surface (bgs) and groundwater was encountered at approximately 13 to 22 feet bgs. Groundwater flow was generally to the southwest at a velocity of 0.2 to 1.7 feet per year. Vertical groundwater gradients ranged from 0.03 to 0.43.

Investigation activities employed included non-intrusive surveying using magnetometer and electromagnetic methods, installation of shallow and deep monitoring wells, and sampling/analysis of surface and subsurface soils, sediment, groundwater, and surface water. Samples were analyzed for various parameters, including VOCs, SVOCs, inorganics, and general indicators of contamination. The results of the magnetometer and electromagnetic surveys were used to define the approximate boundaries of the suspected waste disposal area. The areal extent of the waste disposal site defined was approximately 9.5 acres.

VOCs and SVOCs were detected at low to moderate levels in subsurface soil samples from the former waste disposal site. Low to moderate levels of TPH were detected in most surface soil and sediment samples. The highest detections of VOCs and SVOCs encountered in subsurface soil were in the B-2A/B-

2B cluster. Samples from these borings also had a strong hydrocarbon odor. TPH and total phenols were not detected at significant levels in subsurface soil samples. The highest TPH level was 190 milligrams/kilogram (mg/Kg) in Boring B-6B. Arsenic, beryllium, and lead were detected above MDNR CALM Scenario C STARCs.

Arsenic, cadmium, iron, lead, and manganese were detected in groundwater at concentrations above current MDNR CALM Groundwater Target Concentrations (GTARCs). Several VOCs and one SVOC (bis[2-ethylhexyl]phthalate) were detected in groundwater samples above MDNR CALM GTARCs.

The fate and transport of chemicals of concern at the site were investigated. Physical and chemical properties of these chemicals were examined in order to interpret relevant environmental characteristics such as adsorption on soil, potential runoff with soil, transport to air from soil and water, and bioaccumulation. The persistence of these contaminants in the environment and possible environmental sources was also examined.

Transport via soil erosion was considered insignificant, as two-thirds of the site was paved with asphalt and the remainder covered by heavy vegetation. Conclusions reached concerning specific chemicals of concern are shown below.

- The physical properties of certain polynuclear aromatic hydrocarbon (PAH) compounds, found primarily in soils, indicate that they would be strongly adsorbed on soil and slowly degrade in place.

- Butyl-benzyl phthalate, which was also strongly adsorbed on soil, was expected to remain in place and degrade fairly rapidly due to its relatively short half-life in soil and water.

- Tetrachloroethene, detected in very low concentrations at the site, was expected to degrade prior to reaching a surface water body.

- Arsenic in soil was expected to migrate very slowly (one half foot per year) with the groundwater and be substantially diluted prior to reaching the Blue River. No significant contamination was expected to result.

- Cadmium, present in a few samples, was strongly adsorbed by soil and not expected to migrate.

- Although some groundwater samples contained soluble lead, only a very small amount of lead, if any, was expected to reach the Blue River. This was due to the following reasons: (1) the very slow groundwater flow; (2) the gradual conversion of soluble lead to insoluble lead compounds, and (3) dilution by groundwater.

A baseline risk assessment was conducted to review the chemicals detected and their toxicity, as well as the potential for exposure pathways and exposed populations. The risk assessment concluded that no complete exposure pathways existed and therefore no significant health risk exists to on-site or off-site populations. Given the lack of significant risk to the environment or human health, no further investigation was recommended for this site.

3.6 1992 ENVIRONMENTAL SITE ASSESSMENT

Environmental sampling activities were conducted at the GM Plant between August and October of 1991 (Burns & McDonnell, 1992b). Samples of subsurface soils, groundwater, wood blocks, PCBs, concrete cores, PCB wipes, PCB oils, roof cores, roof gravel, residue, and miscellaneous liquids/solids were collected from over 150 locations within and around the former Assembly Building. The samples were analyzed for organic and inorganic compounds.

Subsurface soil samples collected below and around the Assembly Building showed varying concentrations of organic compounds. In most of the samples, the levels detected were relatively low. In a few samples just below the Assembly Building floor, elevated levels of organics were detected. Inorganics were not detected above regulatory levels in any of the subsurface soil samples.

Eleven groundwater monitoring wells were installed during the investigation. Groundwater samples were collected in two rounds from these wells and analyzed for organics and inorganics. Organic compounds were detected (at minimal levels) in groundwater samples from two of these wells. Arsenic was detected at 169 micrograms/Liter (µg/L) in one monitoring well during the second round of groundwater sampling.

Nine wood blocks were collected and analyzed for the hazardous waste characteristics. Two of the samples were characterized as hazardous waste due to elevated lead levels. PCB analysis was performed on collected concrete cores, wipes, and oil samples. Several samples showed significant PCB concentrations. The highest level detected was 18,000 µg/100 cm^2 in a wipe sample and 19,000 micrograms/Kilogram (µg/Kg) in a concrete core sample. Virtually all of the roofing material samples collected near exhaust stacks on the roof were characterized as hazardous waste due to excessive lead concentrations.

Various residue samples were collected from locations throughout the Assembly Building. Levels of organic compounds in the residue samples were not elevated; however, several were characterized as hazardous waste due to high concentrations of metals, particularly lead.

Miscellaneous liquid samples collected at the site did not exceed TCLP limits for the chemicals of concern. Several miscellaneous solid samples (particularly scrapings collected from storm sewers) were reported to contain lead (up to 78,900 mg/Kg) and TPH (up to 120,000 mg/Kg).

3.7 1992 PHASE II ENVIRONMENTAL SITE ASSESSMENT

A second phase of environmental sampling activities was conducted at the GM Plant in November 1991 (Burns & McDonnell, 1992c). Field activities included:

- Drilling and sampling of 17 soil borings
- Completion of five soil borings as groundwater monitoring wells
- Analysis of soil and groundwater samples from borings and wells
- Collection of 10 PCB wipe samples
- Collection of 16 asphalt block samples

- Collection of 20 roof core samples
- Surveying of all boring and monitoring well locations

3.8 1992 ENAMEL STORAGE PIT AND ABANDONED PIPELINE ASSESSMENT

Environmental sampling activities were conducted in the vicinity of ESP and the related kerosene line during the fall of 1991. The ESP contained 12 USTs that stored paint and primer for automobiles. The ESP was abandoned in the 1930's and later covered by a concrete floor slab during expansion of the Assembly Building. There is no record that the USTs were removed; hence, they were assumed to be abandoned in-place. Five soil borings and two groundwater monitoring wells were installed in the vicinity of the ESP and buried pipeline to assess soil and groundwater contamination. A contaminant fate/transport and health impact assessment concluded that the low levels of SVOCs and VOCs associated with this former structure did not pose a significant risk to human health or the environment (Burns & McDonnell, 1992c).

3.9 1997 MONITORING WELL ABANDONMENT

GM installed 43 monitoring wells at the GM Plant between July 1988 and November 1991. Three additional wells were installed in December of 1995. The original purpose of these monitoring wells was to monitor groundwater quality and piezometric surface elevations in association with environmental studies and projects. In 1994, GM determined that the necessary information had been obtained from the 43 monitoring wells and the wells could be abandoned. In November of 1996, the MDNR gave approval for the abandonment of the three wells installed in 1995 based on the quarterly groundwater sampling analytical results.

All of the wells were abandoned between July 19 and 23, 1994, and November 20, 1996 in accordance with state regulations then in effect. Two of the wells and one piezometer (MW-9, MW-105, and P-l) could not be located due to construction, vegetative overgrowth, or other obstructions; subsequently they were not abandoned. All abandoned wells were properly registered with MDNR. Waste materials generated during well abandonment activities were managed appropriately (Burns & McDonnell, 1997).

3.10 1997 - 2001 RCRA DRUM STORAGE PAD CLOSURE

In November 1980, GM submitted a Resource Conservation and Recovery Act (RCRA) Part A Permit Application for interim status to the USEPA. The application was submitted to permit a hazardous waste container storage area at the GM Plant. The GM Plant operated under USEPA ID No. MOD000822668. The hazardous waste container storage area consisted of a concrete drum storage pad used for temporary storage of hazardous waste prior to transport to off-site disposal facilities. A RCRA Part B Permit Application was submitted to the USEPA in February 1983.

GM petitioned for withdrawal of the Part A and Part B RCRA applications in July 1984. In September 1984, the USEPA denied the RCRA hazardous waste permit and terminated the Leeds GM Plant's interim status. Due to economic reasons, the GM Plant was permanently idled by GM in April of 1988. In May 1992, a RCRA Closure Plan (Closure Plan) for the drum storage pad was submitted to MDNR. The Closure Plan (prepared by Argonaut AEC of Detroit, Michigan) was reviewed by MDNR and approved on March 16, 1993, contingent upon the specified modifications. When GM sold the approximately 97-acre parcel to Leeds Depot Ltd. in 1994, both parties agreed that GM would perform the activities described in the Closure Plan (Burns & McDonnell 2000a).

In 1996, GM retained Burns & McDonnell to implement the Closure Plan for the drum storage pad. Based on a data review, GM submitted a letter to MDNR in July 1996, with proposed amendments to the Closure Plan sampling parameters. After limited soil remediation and additional sampling of the concrete floor, GM received a no further action letter from MDNR regarding the RCRA drum storage pad in 2001.

3.11 1999 DRUM DISCOVERY INVESTIGATION

On May 18, 1999, several steel drums were unearthed at the former GM Plant on property owned by Leeds Industrial (Burns & McDonnell, 1999b). The discovery was made during a sewer extension project conducted by Leeds Industrial. During excavation of the sewer trench, debris was uncovered that included metal wire and banding, bottles, and steel drums. Relatively

homogeneous layers of red, blue, and purple pigmented material were observed in the drums. The pigmented material was assumed to be paint waste from former automobile finishing operations at the GM Plant.

A total of 13 soil borings were advanced in the vicinity of the drum discovery trench on May 25, 1999 (see Figure 5). The soil borings encircled the area where the drums were discovered and were advanced to 15 feet bgs. Groundwater was not encountered in any of the borings.

The purpose of the subsurface investigation was to define the horizontal limits of the buried drums and characterize the materials for disposal. Each soil sample was analyzed for TCLP VOCs and TCLP RCRA 8 metals. Benzene (the only VOC detected) was detected in one of the 13 soil samples above the method detection limit but below the practical quantitation limit. The estimated benzene concentration was below the TCLP concentration for characterization as hazardous waste. Arsenic, barium, cadmium, lead, and mercury were each detected in two or more samples, but the metals concentrations were also below TCLP hazardous levels.

Fragments of various artificial fill materials including bricks and metallic debris were encountered in several of the borings. Bricks were found in samples from Borings B-2 and B-8. Fragments of metal bands, wire, and foam rubber were found in samples from Borings B-1, B-5, B-9, and B-10.

No evidence of buried drums was found at the west end of the trench; however, the eastern 30 feet of the trench contained drums. Based on the results of the subsurface investigation, the horizontal extent of buried drums was considered bounded by Borings B-5 and B-6 to the north; Boring B-4 to the east; and Borings B-1 and B-2 to the south. The results of the 1999 drum discovery investigation indicated the following:

- The pavement encountered consisted of 4 inches of asphalt and 4 inches of granular sub-base.

- Artificial fill beneath the pavement ranged from approximately 8 to 12 feet in thickness.

- Groundwater was not encountered above 15 feet bgs.

- The horizontal limits of the buried drums apparently did not extend beyond a 2,000 square foot square area (45 feet on a side) encompassing the east end of the existing trench.

- Debris, including brick, metal fragments, and foam rubber, was recovered from several of the borings.

- No soil samples collected during the investigation exceeded the TCLP hazardous levels defined in Code of Federal Regulations (CFR) Chapter 40, Section 261.24 (40 CFR 261.24); therefore, the soil recovered was not classified as characteristic hazardous material.

3.12 1999 DRUM RECOVERY

Based on the results of the drum investigation (see Section 3.9), the area underlain by drums was assumed to be approximately 40 feet on a side by 12 feet bgs and the decision was made to excavate (Burns & McDonnell, 2000b). The drum excavation was initiated on December 20, 1999 with excavation depths ranging from 15 to 20 feet bgs. Groundwater was not encountered during excavation activities except for minor perched water in debris voids. Approximately 1,400 cubic yards of soil and debris were removed from the excavation. Drums and drum fragments were observed in a visually distinct layer of debris measuring 12 feet thick. The drums recovered were corroded, crushed and broken making it impossible to segregate drums and related debris from the other fill materials. It was also apparent that the debris layer was dipping steeply to the east. In the western portion of the excavation, the top of the debris layer was found immediately below the pavement. In the eastern portion of the excavation, approximately 40 feet away, the top of the debris layer was 15 feet bgs. Distinct horizontal bands of green and red material were observed in the eastern wall of the excavation.

Due to the steeply dipping debris layer, it became apparent that the extent of the buried drums and debris was not limited to a relatively small area and excavation was stopped. A geophysical

survey was subsequently conducted to assess the lateral extent of buried metal-containing debris. The results of the survey are overlain on Figures 2, 3 and 5.

Approximately 400 cubic yards of excavated overburden material (classified as clean based on photoionization detector [PID] readings and subsequent laboratory sample analysis) were segregated for use as excavation backfill material.

Five samples were collected from the floor of the excavation for laboratory analysis to document the contamination levels of materials left in place. Four of the samples were soil and the fifth was greenish material collected from a drum recovered in the trench portion of the excavation (see PW-Trench on Figure 5). The samples were analyzed for TPH, VOCs, SVOCs and RCRA 8 metals. Analytical results for the four soil samples did not exceed the 20 times (20X) TCLP hazardous levels. Burns & McDonnell and MDNR collected a split sample of the greenish material from the drum. The sample results had cadmium, chromium, lead, and selenium above the 20X TCLP concentration. Benzene was close to the 20X TCLP level. The samples were subsequently analyzed for TCLP RCRA 8 metals. The MDNR split sample (see PW-MDNR on Figure 5) was analyzed for TCLP lead, TCLP benzene, and TCLP 2-butanone. The TCLP results indicated that lead and benzene were present in the greenish material above the toxicity characteristic level for hazardous waste per 40 CFR 261.24. A soil sample was collected adjacent to the drum containing the greenish material. The soil sample contained lead above the 20X TCLP concentration but below hazardous waste levels with TCLP analysis (see S-Trench on Figure 5).

A representative sample of the drum debris stockpile was sampled and analyzed. The analytical results indicated that the stockpiled materials were non-hazardous. Approximately 1,520 tons of stockpiled materials were subsequently transported to a RCRA Subtitle C landfill (Lone Mountain) for disposal. The contents of the recovered drum containing the greenish material were re-drummed and transported as hazardous waste to another RCRA Subtitle C landfill (Aragonite Facility).

* * * * *

4.0 HISTORIC ACTIVITY IN THE WASTE DISPOSAL SITE VICINITY

This section presents the history of events that have occurred in the vicinity of the former waste disposal site at the GM Plant. Resources utilized for this historical research are discussed in Section 2.0 and include historic aerial photographs, construction photographs, historic topographic maps, plat maps, and previous investigation reports.

4.1 FILL PLACEMENT CHRONOLOGY

From stereoscopic examination of aerial photo stereo pairs that predated landfilling (1936 to 1950), it appears that the former low-lying areas at the southern end of the GM Plant were abandoned meander loop channels within the floodplain of the Blue River. Before human settlement and engineering modifications were made to the river during the 1900's, the Blue River channel migrated back and forth across it's floodplain by forming new meander loops and cutting off old ones. Periodically, the neck of a meander loop would be breached by the active channel of the river, thereby abandoning the meander loop and creating an oxbow lake. With time, these oxbow lakes were filled in with sediment leaving topographically low areas several feet below the surrounding land surface. The majority of these topographic low areas at the south end of the GM Plant were subsequently filled in starting sometime between 1950 and 1952 and ending before 1969. A relatively small amount of fill was also placed at the extreme southern end of the GM Plant sometime between 1978 and 1989.

The chronology of fill placement (as determined by interpretation of aerial photo stereo pairs) is shown graphically on Figure 6. In general, fill placement proceeded from north to south over time. Between 1950 and 1952, the northernmost area of fill was emplaced, totaling approximately 6 acres. Between 1952 and 1960, the approximately 5 acre area (southwest of the 1950 – 1952 fill area) was filled in. The western edge of the 1952-1960 fill area is where the drum discovery and recovery operations took place during 1999 and 2000. Between 1957 and 1969, the 7 acre area (south of the 1950-1952 fill area) was filled. The 1957-1969 fill area is the location of the documented waste disposal site where subsurface soil and groundwater

investigations were conducted during 1990 and 1991 (Burns & McDonnell, 1991 and 1992a). Between 1978 and 1989, two smaller areas of fill (encompassing a combined total of approximately 1 acre) were emplaced south of the 1957-1969 fill area. The easternmost of these two smaller fill areas appears to be structural fill emplaced prior to or during wastewater treatment plant construction. Although the precise nature of the fill material used in each of the areas is unknown, there is good indication that metallic debris was mixed in with the other fill materials. The indicators include metallic anomalies detected during the magnetic survey (see Figures 2, 3 and 5) and the steel drums and related debris excavated during 1999 and 2000.

4.2 STRUCTURAL ADDITION CHRONOLOGY

The chronology of structural additions (as determined by interpretation of aerial photo stereo pairs and construction photo's) is shown graphically on Figure 7. Buildings and structures present between 1928 and 1936 are shown outlined in red on Figure 7 and included the Assembly Building, the Service Parts Building, the Power Plant and assorted other structures at the south end of the GM Plant. No significant structural additions were observed on the 1940, 1945 or 1950 aerial photos. However, it was observed that the farmhouse and the building on roughly the same footprint as the future Truck Dock, had been demolished. Between 1950 and 1952, structural additions (shown outlined in orange on Figure 7) were made to the south end of the Assembly Building, the northeast corner of the Assembly Building, and the Power House. An aboveground storage tank (AST) area was also added southwest of the GM Plant, east of the railroad tracks. Between 1952 and 1955, additions (shown outlined in green on Figure 7) were made to the southeast corner and east side of the Assembly Building. Between 1955 and 1957, two more ASTs (shown outlined in pink on Figure 7) were added south of the existing AST area. Between 1957 and 1965, the largest additions to date (shown outlined in blue on Figure 7) were made to the west side of the Assembly Building. The footprint of the Power Plant was also expanded and a covered rail siding was added at the south end of the GM Plant. Between 1965 and 1969, an addition (shown outlined in black on Figure 7) was made to the south end of the Assembly Building. Between 1969 and 1978, another large addition (shown outlined in yellow on Figure 7) was made at the south end of the Assembly Building. A number of structures were also added along the west side of the GM Plant including additional ASTs, the Paint Mix

Building, the Drum Storage Building, the Truck Dock, the Propane Storage area, a concrete stormwater structure at the southwest corner of the GM Plant, two railroad bridges across the Blue River and associated rail sidings. Between 1978 and 1989, building additions (shown outlined in dark blue on Figure 7) were added at the south end of the Assembly Building linking the GM Parts Building with the rest of the complex. The wastewater treatment plant was also added at this time. Between 1989 and 2001, no new structural additions were observed on the aerial photographs.

The following sections provide additional detail on the chronology and nature of fill placement and structural additions as interpreted from the various resources reviewed.

4.3 1928 – 1936 ACTIVITIES

GM Plant construction photographs (see Appendix A) from 1928 show the GM Plant as it appeared at that time. Photo #1 is a view to the northwest across the property at the beginning of construction on July 20, 1928. (Note: The approximate location and orientation of the construction photos are shown on Figure 7). It is evident from Photo #1 that the land beneath the future Assembly Building was relatively level which suggests that fill placement was not required prior to construction. Photo's #2 and #3 are GM Plant construction photos taken from the northeast corner of the GM Plant property looking toward the west-southwest (see Figure 7). Construction on the original Assembly Building was completed in December 20, 1928, approximately 5 months after startup. Photo #4 is an aerial view of GM Plant construction, circa summer or fall 1928, as viewed from west to east (see Figure 7).

Photos #5 and #6 document construction of the GM Service Parts Building in 1935. The views are from the railroad embankment southeast of the Parts building, looking toward the northwest (see Figure 7). Construction on the Parts Building was completed in 3 months. From examination of Photo #5, it appears that land surrounding the Parts Building is relatively level suggesting that fill placement was not required prior to construction of the building.

4.4 1936 – 1940 ACTIVITIES

The 1936 aerial photo overlay (Figure 8) shows the southern end of the GM Plant bounded by the Blue River to the south. The southern part of the GM Plant appears to be a combination of woods and pasture. When viewed through the stereoscope, the topographic low areas are apparent relative to the areas of higher topography. An approximately 6-acre triangular patch of higher ground is bounded on the south by the Blue River and on the north, east, and west by the topographic low area. Two other triangle-shaped areas of high ground above the abandoned meander loops (1.4 and 0.7-acres) are situated against the railroad embankment along the eastern edge of the GM Plant property. Uninterrupted tree lines and vegetation patterns indicative of pasture ground (linear and homogeneous vegetation) suggest that this area was still being used for agriculture. There is no activity visible in the photo that suggests filling operations were occurring in 1936.

The 1940 aerial photo overlay (Figure 9) has much better resolution than the 1936 photo; the tree and pasture vegetation patterns are much clearer. There are no indications in the 1940 photo that suggest filling operations were occurring.

4.5 1940 – 1945 ACTIVITIES

As discussed in the previous section, there is no activity visible in the 1940 photo to suggest that filling operations were taking place at that time. A gravel road does trend north-south from the southernmost GM Plant buildings that bound the north end of the low-lying area, thus providing access to this area.

In the 1945 photo (Figure 10) there are no marked changes in vegetation patterns from the 1940 photo. There is no activity visible in the 1945 photo to suggest that filling operations were occurring.

4.6 1945 – 1950 ACTIVITIES

The 1950 photo (Figure 11) is a high altitude photograph with fairly poor resolution. However, the basic vegetation patterns in the topographic low areas are visible and they are similar to the

earlier 1936, 1940 and 1945 photos. There is no activity visible in the 1950 photo to suggest that filling operations were occurring.

4.7 1950 – 1955 ACTIVITIES

The 1952 photo (Figure 12) is the first time that fill placement in the topographic low areas is apparent. The low area directly beneath the future rail loading building has been filled in and paved over during the previous 2 years. The fill area covers approximately 5.9 acres. The nature of the fill materials is not discernible from examination of the aerial photos. Also for the first time, a perimeter gravel road is visible around the edge of the 6.1-acre triangle shaped topographic high ground southwest of the fill area and adjacent to the Blue River.

There are more changes visible in the 1955 photo (Figure 13). The remaining portion of the topographic low, southwest of the area filled between 1950 and 1952, is being actively filled. In addition, the 6.1-acre triangular topographic high adjacent to the Blue River appears to have been cleared of vegetation. In the 1955 photo, it appears that most fill placement is taking place on the south side of the topographic low. An embankment of fill has been placed across the west end of the topographic low providing level access from the south end of the GM Plant to the high ground bordering the Blue River. The ravine (which is still present today) on the west side of the fill embankment is a continuation of this same topographic low. The lowest points in the area being filled appear to be impounding water. This is probably a result of the natural drainage being blocked by the fill embankment. The active fill area in 1955 encompassed approximately 5- acres.

Construction photographs #7 through #11 in Appendix A show the Fisher Body addition construction on the east side of the Assembly Building (see Figure 7 for the photo location/orientation information). Photo #12 is an oblique aerial photo of the GM Plant as viewed from north to south. The 1952-1960 waste disposal site is visible in Photo #12. Although the photo is undated, it is likely (judging from the location of the active fill area at the south end of the GM Plant property and the absence of the Fisher Body addition on the east side of the Assembly Building) that the photo was taken sometime between 1952 and 1954.

4.8 1955 – 1960 ACTIVITIES

Between 1955 and 1957, filling activity continued in the same area (Figure 13). From the examination of aerial photo stereo pairs, it is evident that fill placement was taking place on the west, south and southeast sides of the topographic low in 1957. The area being filled at this time included the drum discovery area. The timing of fill placement in this area corresponds well to license plates dated 1954 and 1955 found during the drum excavation project (Burns & McDonnell, 2000a). There also appears to be a body of water encompassing approximately 0.9-acres in the bottom of the topographic low in 1957.

An oblique, low-altitude aerial photograph from 1960 shows the GM Plant as viewed from north to south (see Photo #13 in Appendix A). At the south end of the property, it is apparent that the 1952 – 1960 fill area visible in the 1955 and 1957 photos, has been completely filled to grade, paved, and is being used for parking. In 1960, the area of active fill placement has apparently shifted to the topographic low area southeast of the 1955 - 1957 fill area (top of Photo #13, left of center). Impounded water in the topographic low being filled is visible just to the left of the treeline at the south end of the paved area in Photo #13.

The historic topographic maps in Appendix B are all built upon the same 1957 topographic base. On the topographic maps, the 1952 – 1960 waste disposal site shows up as an east-west trending depression approximately 30 feet bgs. The 1957-1960 waste disposal site is also evident on the topographic maps as a depression approximately 20 feet bgs.

4.9 1960 – 1965 ACTIVITIES

As mentioned in Section 4.8, the area of active fill placement shifted southward between 1957 and 1960. This is the area of the documented waste disposal site investigated in 1990 and 1991 (Burns & McDonnell, 1991 and 1992a). On the 1963 aerial photo (Figure 15), it is observed that the east-west trending tree line visible in the 1960 oblique aerial photo has been removed. It also appears that the area of impounded water has been largely filled in and active fill placement has migrated further eastward. As pointed out in Section 4.8, the 1955-1957 fill area has been completely filled to grade, paved, and is being used for car storage.

In 1964, filling operations continued in this same area, generally proceeding from west to east and abutting the topographic high along the eastern property boundary (Figure 16). At least three gravel roads now appear to cross over the railroad tracks that form the eastern property boundary and onto land currently owned by the Kansas City Southern Railroad and City of Kansas City. Much of the wooded land east of the railroad tracks in the same area appears to have been cleared since the previous year. One possible explanation is that GM had agreements with the adjacent landowner(s) to excavate and import fill material for use on GM Plant property.

In 1965 (Figure 17), it is apparent that fill placement was accelerated and completed in the active fill area west of the property line. Fill was brought to grade in 1965 to accommodate construction of new rail sidings and the rail loading building. A bridge was placed across the Blue River between 1964 and 1965 leading to a new perimeter road skirting the south side of the GM Plant property adjacent to the Blue River.

4.10 1965 – 1970 ACTIVITIES

As mentioned in Section 4.9, fill placement was completed between 1964 and 1965 to accommodate construction of new rail sidings and the rail loading building. The remaining topographic low west of the new rail sidings was brought up to grade by 1969. The majority of the documented waste disposal site was paved over by 1969. At this point, major fill placement on the property was complete. Buildings were added immediately south of the GM Plant between 1965 and 1969 (see Figures 7 and 18).

4.11 1970 – 1980 ACTIVITIES

In 1976 (Figure 19), the only change noted between the 1969 photo (Figure 18), is that the remainder of the documented 1957 – 1969 waste disposal site area has been paved over and is being used for parking. Since 1969, two new buildings have been added. One of those is the north part of the RCRA drum storage building. Two new railroad bridges across the Blue River were also installed with rail sidings leading to one of the new buildings. Rails leading to the Rail Loading Building were rerouted to the easternmost of these two bridges. A concrete drainage

structure has been added on the east side of the ravine adjacent to the Blue River. In addition, the propane AST area on the west side of the property has been added.

The 1978 photo (Figure 20), has better resolution than the 1976 photo (which was a high-altitude aerial photo). There were two new building additions between 1976 and 1978, one of which was the south part of the RCRA drum storage building.

4.12 1980 – 1989 ACTIVITIES

The 1989 aerial photo (Figure 21) suggests that two small areas of fill were emplaced at the south end of the property between 1978 and 1989. One area is below the southern end of the wastewater treatment plant and the other is between the two bridge abutments installed between 1969 and 1976. These appear to be the last two instances of fill placement in the area. Two new buildings were added at the south end of the GM Plant between 1978 and 1989. In addition, the wastewater treatment plant at the south end of the GM Plant property was added during this time interval.

4.13 1989 – 2001 ACTIVITIES

The 2001 photo (Figure 22) indicates very few changes during the years between 1989 and 2001. The Kansas City tow lot is visible in the vicinity of the drum discovery. The location of the 2000 drum excavation is evidenced by the contrast between the darker, new asphalt placed after the excavation was backfilled and the lighter, pre-existing asphalt.

* * * * *

5.0 SUMMARY AND CONCLUSIONS

The GM Plant operated from 1929 until 1988. GM retained 20-acres of the 117-acre property when it was sold in 1993. It was believed that a former waste disposal site at the southern end of the GM Plant was wholly contained on the 20-acre parcel retained by GM. In 1999, Leeds Industrial discovered buried drums while trenching for a sewer line near the southern end of the GM Plant, outside of the 20-acre parcel still owned by GM. GM subsequently investigated and excavated a limited area of buried drums, stopping when it became apparent that the extent of the drums was greater than anticipated. Paint sludge from one of the drums was analyzed and found to contain hazardous levels of lead and benzene. A workplan to investigate impacts to groundwater downgradient of the drum discovery was prepared by GM and submitted to MDNR. In 2003, MDNR issued a draft AOC to GM to implement future assessment and remediation activities in the drum discovery area. GM subsequently tasked Burns & McDonnell with conducting a full review of previous investigation/remediation reports for the GM Plant and historic aerial photos and topographic maps to determine the extent of fill areas.

Several environmental investigation and remedial projects have been conducted at the GM Plant since 1988. The investigations include:

- UST site assessment in 1988
- AST site assessment in 1989
- Preliminary investigation of the former waste disposal site in 1990
- Site characterization of the former waste disposal site in 1991
- Phase 1 and 2 site assessment of the former Assembly Building in 1992
- Former enamel storage pit and abandoned pipeline assessment in 1992
- Buried drum discovery investigation and remediation in 1999 and 2000
- PCB characterization and remediation activities in the electrical transformer rooms in at the GM Plant from 1990 until 1999
- Closure and remediation of the RCRA drum storage pad from 1997 to 2001

The 1990 preliminary investigation and 1991 site characterization of the waste disposal site detected beryllium and arsenic in soil in excess of current MDNR CALM Scenario C STARC's. Arsenic, cadmium, iron, lead, and manganese were detected above current MDNR CALM GTARC's in groundwater samples from the same investigations. A groundwater sample from one monitoring well also had a number of VOCs and SVOCs above MDNR CALM GTARC's. All of the monitoring wells at the GM Plant were abandoned in 1997.

Aerial photo stereo pairs of the GM Plant were obtained for the following years: 1936, 1940, 1945, 1950, 1952, 1955, 1957, 1960, 1963, 1964, 1965, 1969, 1976, 1978, and 1989. When the aerial photos were viewed three-dimensionally with a stereoscope, it was apparent that there had originally been an extensive area of topographically low land at the south end of the GM Plant. The topographic lows are interpreted to have been abandoned meander loop channels within the floodplain of the Blue River. The following chronology of fill placement was interpreted from stereoscopic examination of the historical aerial photos.

- From 1936 until 1950, there is no evidence of fill placement in the topographic low areas.
- Between 1950 and 1952, fill with an areal extent of approximately 6 acres was emplaced in the topographic low area nearest the GM Plant. The fill was brought to level grade with land to the north containing the Assembly Building and other structures.
- Between 1952 and 1960 another fill area (approximately 5 acres in extent) was emplaced in the topographic low area southwest of the 1950-1952 fill area. The ravine existing today that extends from the southern end of the former propane AST area to the Blue River is the unfilled remainder of this abandoned meander channel. It was on the western edge of this fill area that the buried drums were encountered during excavation activities in 1999 and 2000.
- Between 1957 and 1969, filling activity took place in the topographic low area southeast of the earlier fill areas. This fill was approximately 7 acres in areal extent and is the documented waste disposal site later investigated during 1990 and 1991.
- Between 1978 and 1989, two small areas of fill, totaling approximately 1 acre, were emplaced at the extreme south end of the GM Plant, south of the areas previously filled. One

of the fills was likely a structural fill placed for construction of the wastewater treatment plant. The other appears to have been emplaced between the two railroad bridge abutments.

The total area of fill in the former topographic low areas encompasses approximately 19 acres or 827,640 sq. ft. The average thickness of the fill areas is not known. The following fill volume and tonnage estimates are based on various hypothetical fill thicknesses.

- 5-ft. average fill thickness over 19 acres = 153,270 cu. yds. (229,900 tons)
- 10-ft. average fill thickness over 19 acres = 306,530 cu. yds. (459,800 tons)
- 15-ft. average fill thickness over 19 acres = 459,800 cu. yds. (689,700 tons)
- 20-ft. average fill thickness over 19 acres = 613,070 cu. yds. (919,600 tons)

* * * * *

6.0 REFERENCES

Burns & McDonnell Engineering Company, Inc. (Burns & McDonnell). 2001. *Addendum No. 1 to Documentation Report for the Closure of a RCRA Drum Storage Pad at the Former General Motors Leeds Assembly Plant (EPA ID No. MOD000822668) 6817 Stadium Drive, Kansas City, Missouri.* Project No. 20588, dated February 2001.

Burns & McDonnell. 2000a. *Documentation Report for the Closure of a RCRA Drum Storage Pad at the Former General Motors Leeds Assembly Plant (EPA ID No. MOD000822668) 6817 Stadium Drive, Kansas City, Missouri.* Project No. 20588, dated November 2000.

Burns & McDonnell. 2000b. *Remedial Action Report, Recovery of Buried Drums, Former General Motors Leeds Assembly Plant, Kansas City, Missouri.* Project No. 96-620-3-005, dated August 2000.

Burns & McDonnell. 1999a. *Report of Findings for the Characterization and Remediation of PCB Contamination in Transformer Rooms, General Motors Corporation, Former Leeds Assembly Plant, Kansas City, Missouri.* Project No. 96-620-3-002, dated June 1999.

Burns & McDonnell. 1999b. *Subsurface Investigation Report, Buried Drum Discovery, Former General Motors Leeds Assembly Plant, Kansas City, Missouri.* Project No. 96-620-3-005, dated July 1999.

Burns & McDonnell. 1997. *Former General Motors Leeds Plant, Kansas City, Missouri, Well Abandonment Report.* Project No. 96-620-3-003, dated September 1997.

Burns & McDonnell. 1992a. *Report on the Site Characterization of the Former Waste Disposal Site, Leeds Assembly Plant, General Motors Corporation, Kansas City, Missouri.* Project No. 90-242-4-001, dated January 1992.

Burns & McDonnell. 1992b. *Environmental Site Assessment Report of Findings, Leeds Assembly Plant, General Motors Corporation, Kansas City, Missouri.* Project No. 91-223-4, dated February 1992.

Burns & McDonnell. 1992c. *Attachment A, Environmental Site Assessment, Phase II, Report of Findings , Leeds Assembly Plant, General Motors Corporation, Kansas City, Missouri.* Project No. 91-223-4, dated February 1992.

Burns & McDonnell. 1992d. *Enamel Storage Pit and Abandoned Pipeline Assessment Report, Leeds Assembly Plant, General Motors Corporation, Kansas City, Missouri.* Project No. 90-242-4-001, dated April 9, 1992.

Burns & McDonnell. 1991. *Preliminary Investigation of the Former Waste Disposal Site, Leeds Assembly Plant, General Motors Corporation, Kansas City, Missouri.* Project No. 90-242-4, dated March 1991

Burns & McDonnell. 1989. *Site Assessment Report, Aboveground Storage Tank Area, General Motors Leeds Auto Assembly Plant, Kansas City, Missouri.* Project No. 88-119-3-005, dated June 1989.

Burns & McDonnell. 1988. *Site Assessment Report, Underground Storage Tank Sites, General Motors Leeds Auto Assembly Plant, Kansas City, Missouri.* Project No. 88-119-3-005, dated September 1988.

L. Robert Kimball Consulting Engineers (Kimball). 1993. *Assessment Maps of Jackson County, Missouri, Map No.'s 31-130, 31-140, 31-610, and 31-620.* Based on aerial photography dated November 1993 with updates through April 1999.

National Archives and Records Administration (National Archives). 1936. *Aerial Photographs Dated August 21, 1936. RG 145~Can # 1716~Exps. DL 420 and DL 421.*

National Archives. 1940. *Aerial Photographs Dated September 25, 1940. RG 145~Can ON 31556~Exps. DL-2A-95 and DL-2A-96.*

National Archives. 1945. *Aerial Photographs Dated July 24, 1945. RG 373~Can ON 00661~Exps. 199 and 200.*

National Archives. 1952. *Aerial Photographs Dated October 20, 1952. RG 145~Can ON 39007~Exps. DL2K-47 and DL2K-48.*

M.J. Harden and Associates, Inc. (M.J. Harden). 1964. *Aerial Photographs Dated June 25, 1964. 257 8-12 and 8-13.*

M.J. Harden. 1965. *Aerial Photographs Dated April 22, 1965. 329 13-9 and 13-10*

M.J. Harden. 1969. *Aerial Photographs Dated August 29, 1969. 850 1 3-4 and 3-5.*

M.J. Harden. 1976. *Aerial Photographs Dated March 27, 1976. 358 29095 1 75-56 and 75-57.*

M.J. Harden. 1978. *Aerial Photographs Dated October 24, 1978. 2854 4-005 and 4-006.*

M.J. Harden. 1989. *Aerial Photographs Dated January 20, 1989. 7002 12-005 and 12-006.*

M.J. Harden. 2001. *Aerial Photograph Dated September 1, 2001. Map 7-14.*

United States Geological Survey EROS Data Center (USGS EROS). 1950. *Aerial Photographs*

Dated June 26, 1950. USGS EROS Entity ID ARDDA000700950661. VV.HU37 AMS 26 June 50 70, Exps. 3621 and 3622.

USGS EROS. 1955. *Aerial Photographs Dated May 15, 1955. USGS EROS Entity ID ARCF1VGM000811126. VV 1373MCS M-170 1370PMG 15May55 54-AM-68 Roll 1A GS VGM, Exps. 18 and 19.*

USGS EROS. 1963. *Aerial Photographs Dated June 28, 1963. USGS EROS Entity ID ARDC1VAPV00160347. Exps. DL-2DD-9 and DL-2DD-10.*

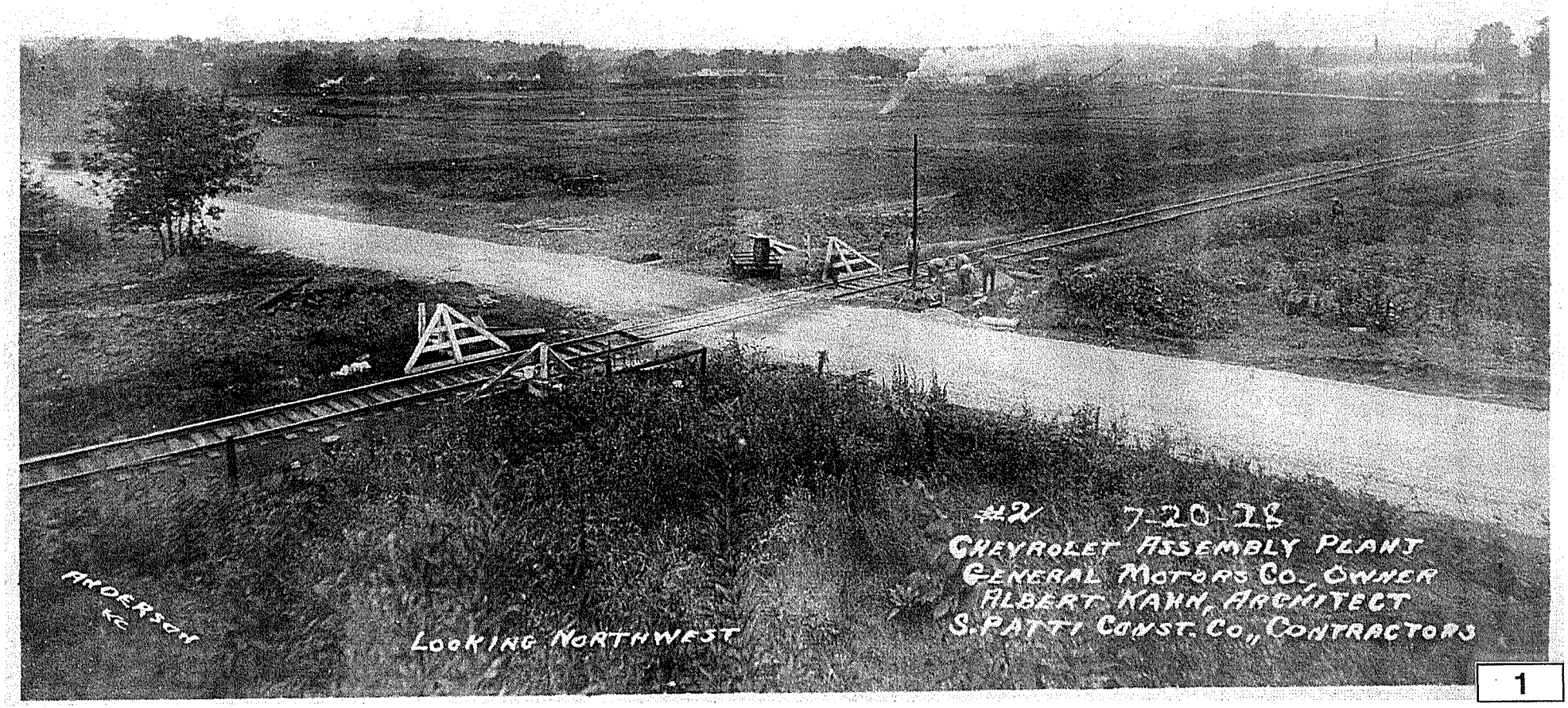
United States Department of Agriculture (USDA). 1957. *Aerial Photographs Dated June 10, 1957. Exps. DL-5T-66 and DL-5T-67.*

University of Missouri-Kansas City (UMKC). 1928 – 1955. *Salvatore Patti Photographs Documenting Construction Progress at the GM Leeds Assembly Plant, Western Historical Manuscript Collection, Kansas City.*

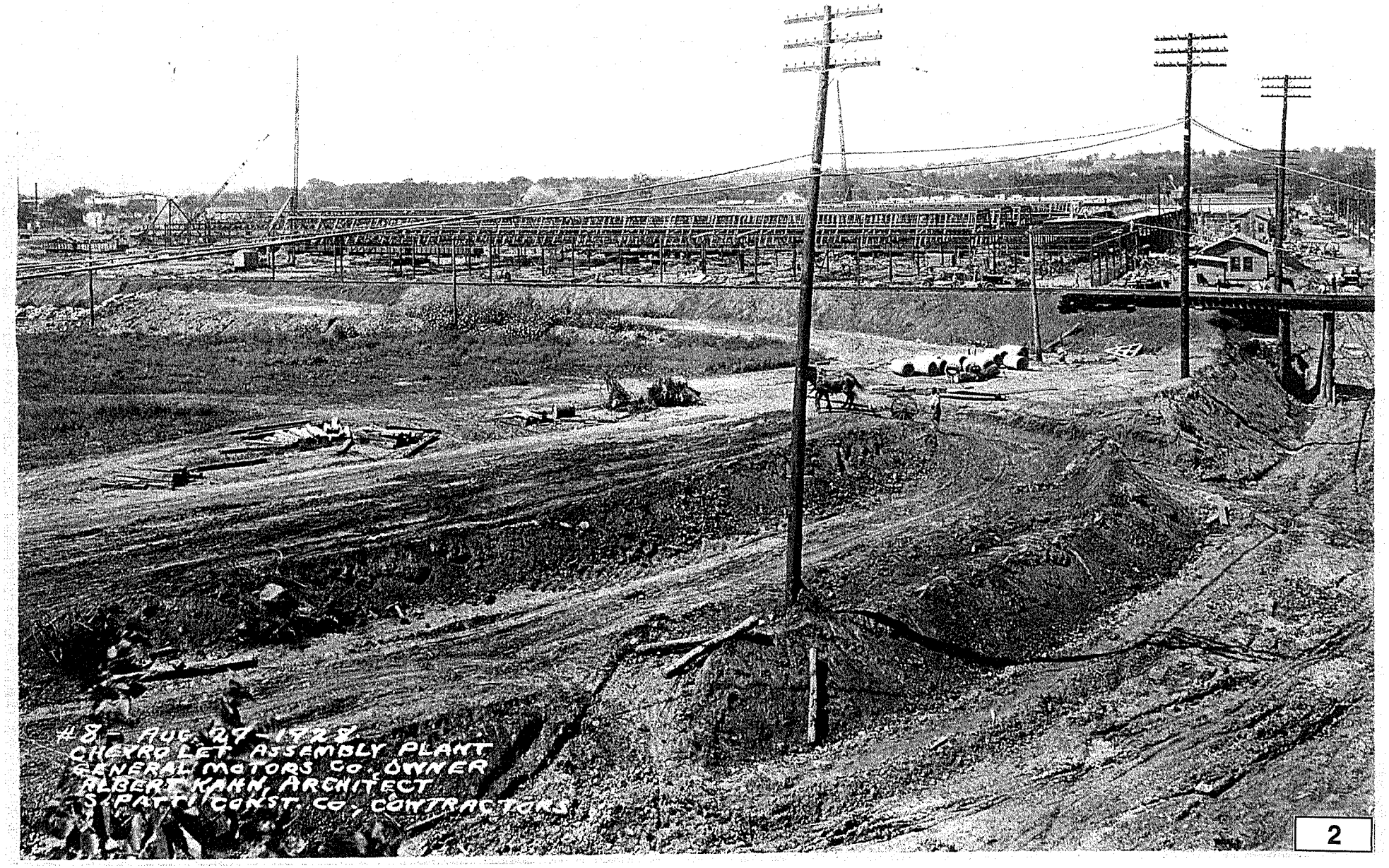
* * * * *

APPENDIX A
GM Leeds Plant Construction Photographs

CD Pocket
to be furnished

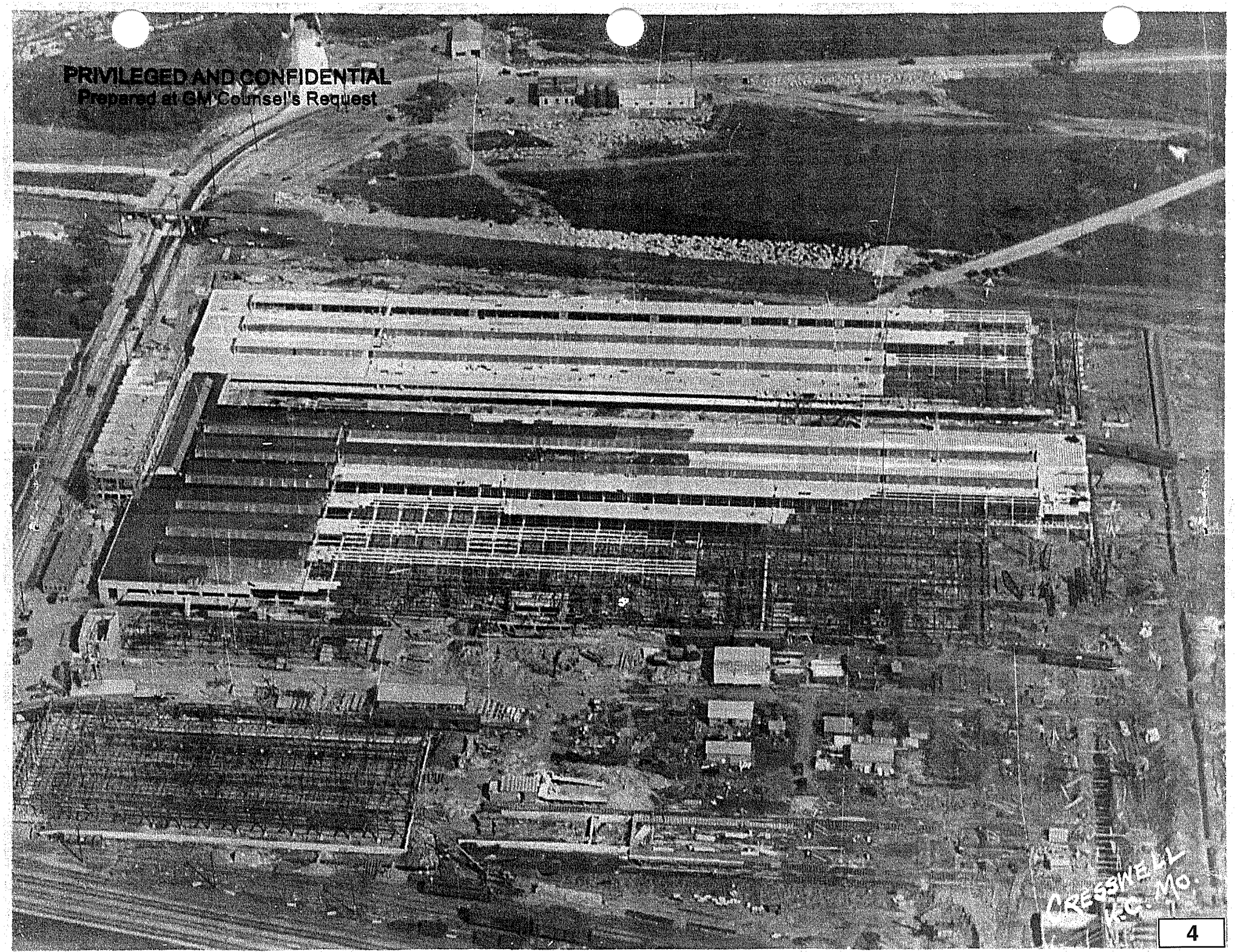


PRIVILEGED AND CONFIDENTIAL
Prepared at GM Counsel's Request



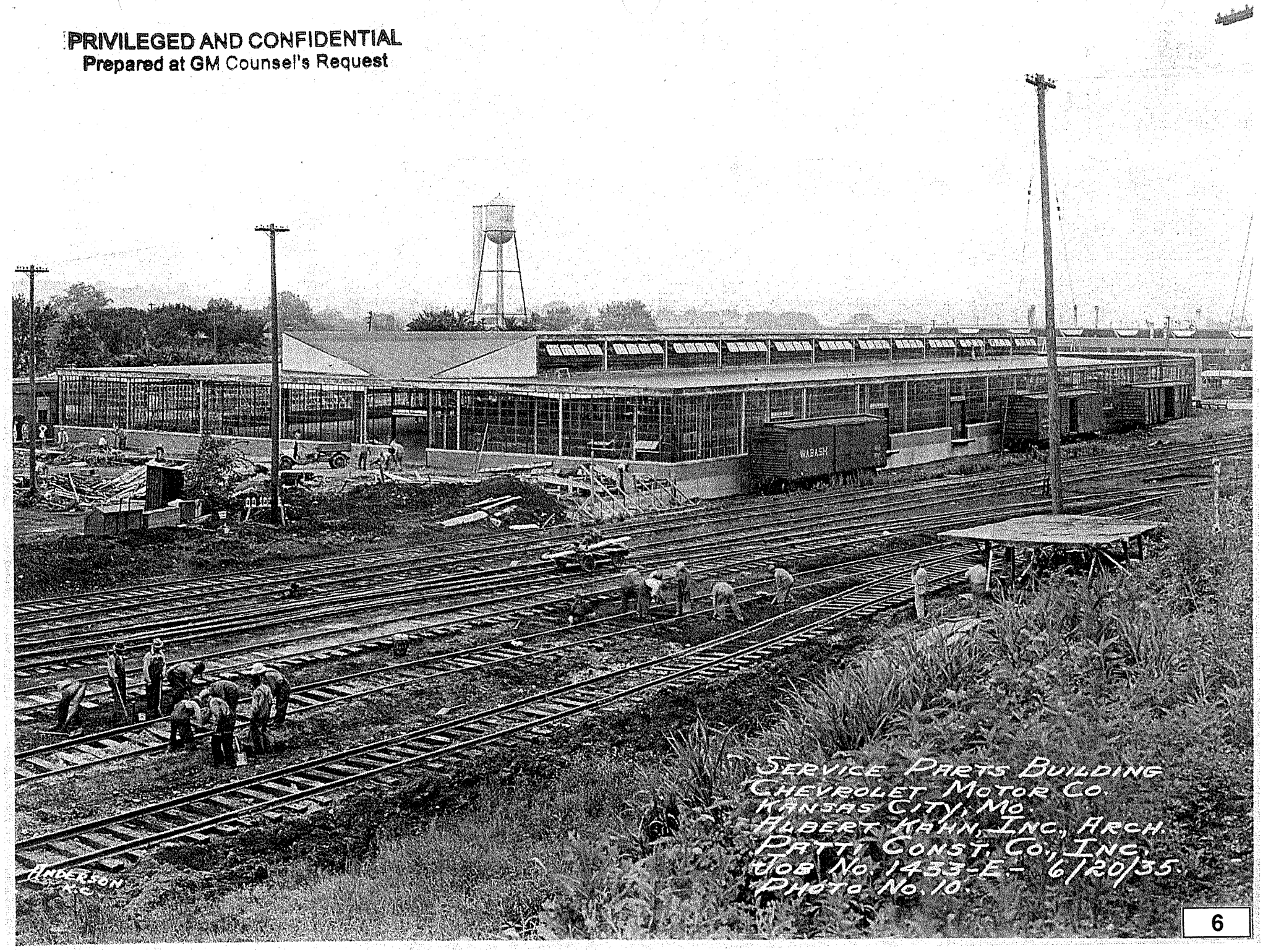
PRIVILEGED AND CONFIDENTIAL
Prepared at GM Counsel's Request

PRIVILEGED AND CONFIDENTIAL
Prepared at GM Counsel's Request

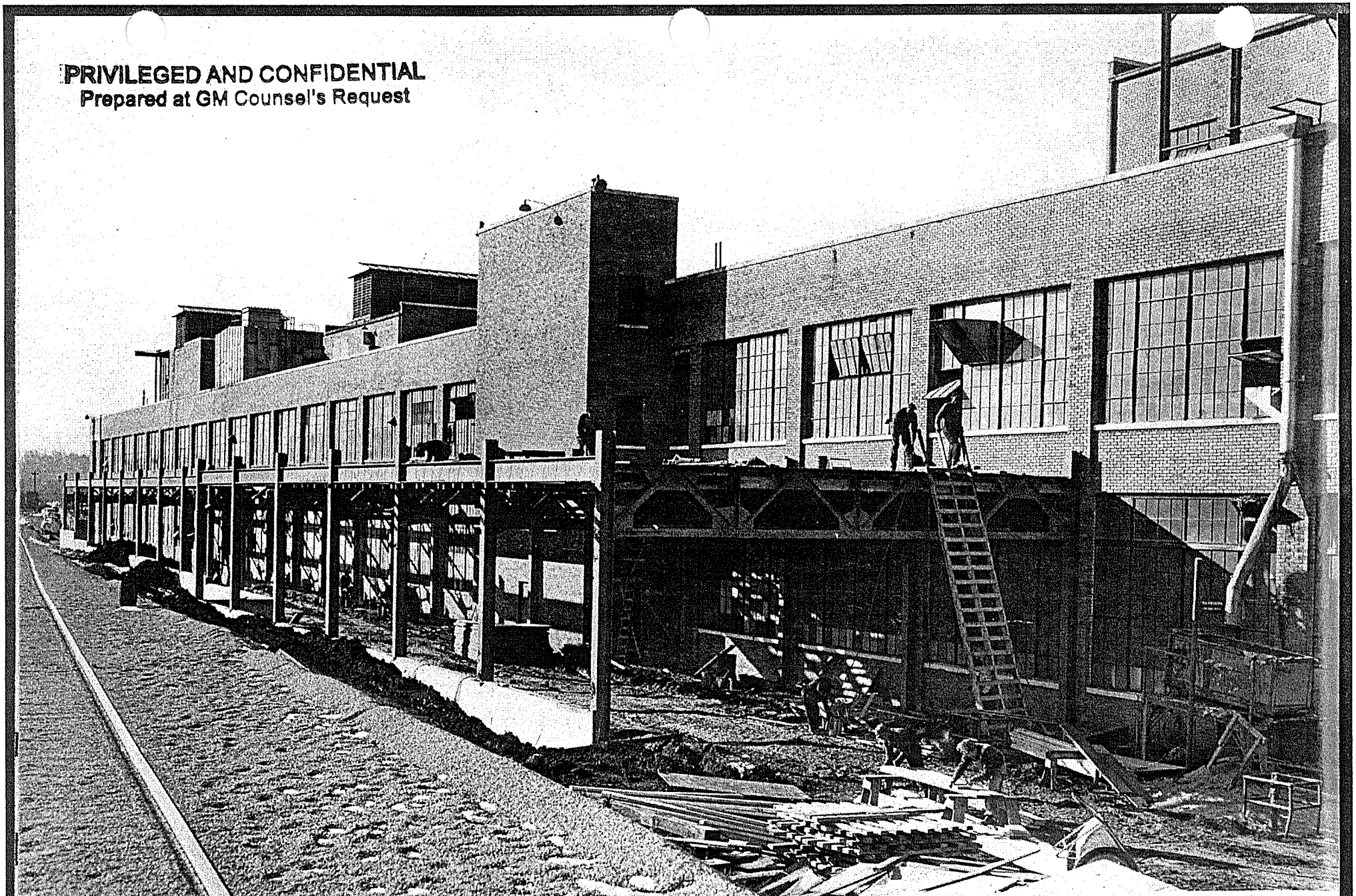


PRIVILEGED AND CONFIDENTIAL
Prepared at GM Counsel's Request

PRIVILEGED AND CONFIDENTIAL
Prepared at GM Counsel's Request



PRIVILEGED AND CONFIDENTIAL
Prepared at GM Counsel's Request



BUILDING — FISHER BODY ADDITION
OWNER — CHEVROLET-K.C. DIVISION GENERAL MOTORS CORP.
ARCHITECT — NEVILLE, SHARP, & SIMON
GEN. CONTRACTOR — S. PATTI CONSTRUCTION CO.
DATE 12-29-52 PHOTO NO: 11

PRIVILEGED AND CONFIDENTIAL
Prepared at GM Counsel's Request

BUILDING: FISHER CHEVROLET ADDITION: KANSAS CITY, MO.
JOB NO. 1433 "M", NORTH PORTION

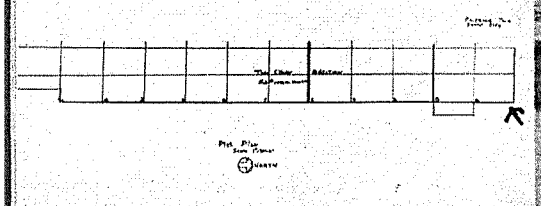
GENERAL CONTRACTOR: S. PATTI CONSTRUCTION COMPANY

ARCHITECT: ALBERT KAHN, ASSOCIATED ARCHITECTS AND ENGINEERS, DETROIT, MICHIGAN

PHOTOGRAPH NO. 20 DATE 1-14-65

8

PRIVILEGED AND CONFIDENTIAL
Prepared at GM Counsel's Request



BUILDING: FISHER CHEVROLET ADDITION: KANSAS CITY, MO.
JOB NO. 1433 "H", NORTH PORTION

GENERAL CONTRACTOR: S. PATTI CONSTRUCTION COMPANY

ARCHITECT: ALBERT KAHN, ASSOCIATED ARCHITECTS AND ENGINEERS, DETROIT, MICHIGAN

PHOTOGRAPH NO 59 DATE 6-3-55