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REPORT ON THE

REMEDIAL INVESTIGATION
OF THE
ROSE CHEMICALS SITE
HOLDEN, MISSOURI

FOR

CLEAN SITES, INC.
VOLUME I

February, 1990

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February 22, 1990

Mr. Steven E. Kinser
U.S. EPA, Region VII
726 Minnesota Avenue
Kansas City, Kansas 66101

SUBJECT: ROSE CHEMICALS SITE, HOLDEN, MISSOURI
REVISED REMEDIAL INVESTIGATION REPORT

Dear Steve:

Attached are five (5) copies of the revised Remedial Investigation Report (RI) for the Rose Chemicals Site, Holden, Missouri. One copy is being sent directly to the Missouri DNR. Revisions have been made in keeping with your comments dated November 6, 1989, and the MDNR comments dated October 26, 1989.

In order to facilitate your review of the revisions, the attachment to this letter gives your table number, the paragraph number, and the revisions we have made.

We have not repeated the five volumes of data, Appendix F, due to its bulk. Only two analyses are changed from the original volumes. Five sheets covering those two analyses are included with this letter. They should be inserted at the appropriate spots in the original documents.

We appreciate the constructive manner in which you, Jim Bell, and Black and Veatch have worked with Clean Sites, Burns & McDonnell, and the Rose Chemical Technical Sub-Committee in preparing and revising this major document. If there are further steps required of us, please let me know.

Very truly yours,

Jay A. Pruett

Jay A. Pruett, Vice-Chairman
Rose Chemicals Steering Committee

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EXECUTIVE SUMMARY

A. INTRODUCTION

This report presents the findings of the Remedial Investigation (RI) of the Rose Chemicals Site (Site) in Holden, Missouri. The data generated by the RI has been used to describe the nature and extent of the contamination present at the Site and to assess potential impacts of this contamination on public health, welfare, and the environment.

B. SITE INVESTIGATIONS

Several complementary investigation activities were carried out as part of this RI. The activities consisted of:

- A geologic and hydrogeologic investigation that included drilling 8 deep and 8 shallow borings, sampling of the 8 deep borings, installation of 16 groundwater monitoring wells in the boreholes, and subsequent sampling of groundwater from the 16 new and 6 pre-existing monitoring wells.

- Surface soil sampling of excavated areas which previously showed high concentrations of polychlorinated biphenyls (PCBs).

- Surface tracking sampling of present and former traffic routes to and from the Site.

- Sewer investigations that included sampling 11 test pits adjacent to on-site sewers, performing 3 dye tests, and obtaining a sewer sediment samples.

- Surface water and sediment sampling of the East Pin Oak Creek, its unnamed tributary which runs through the southwest corner of the Site, and on-site ponds.

- Air quality sampling during on-site work activities.

- Building and structures investigations which included a building inspection and structural evaluation; wipe sampling of interior and exterior building surfaces; destructive sampling of concrete, insulation, and impervious surfaces; and subsurface soil sampling via 21 borings and 2 test trenches.

- Area features investigations including identification of land uses and climatic conditions.

- Validation of data obtained from previous Site screening and characterization activities.

C. PHYSICAL CHARACTERISTICS

The Site is located within the corporate limits of Holden, Missouri. Surface features at the Site include a spill containment pond, three storm water retention ponds, and an unnamed tributary to East Pin Oak Creek. The

Site slopes gently to the southwest. Land uses adjacent to the Site include agricultural, residential, and business/commercial. No federally listed threatened or endangered wildlife species are expected to be found in the vicinity of the Site.

The predominant wind direction at the Site is southerly with a secondary maximum from the north to northwest. Average annual precipitation for the area is 36.55 inches.

Surface water occurs at the Site as overland flow during rainfall events, in the surface water impoundments, and in an intermittent unnamed tributary to East Pin Oak Creek. Overland flow tends to follow the slope in a southwestward direction and enters either one of the four surface water impoundments or the unnamed tributary to East Pin Oak Creek that crosses the southwest corner of the Site.

Three primary geologic units were investigated at the Site. From the surface downward they include the unconsolidated soil and weathered shale overburden, a series of shale and limestone interbeds, and a sandstone stratum.

The overburden soils consist of variable clays and silty clays ranging in thicknesses from 2 to 13.5 feet. The weathered shale ranges in thickness from 2 to 5 feet. Overburden soils cover the Site with no bedrock exposures discovered during the investigation. Hydraulic conductivity was in the range of 4×10^{-5} cm/sec for the in-situ slug tests. The permeability of the

overburden is substantially higher than that of the bedrock, thus a small amount of groundwater is perched on top of the bedrock surface. The flow rate of the groundwater through the Site in the overburden is approximately 360 gallons per day with an average linear groundwater velocity of 15 feet per year. The flow discharges into the subcrop and rock outcrop areas in the unnamed tributary on the southwestern part of the Site.

The series of shale and limestone beds varies in depth from 15 to 40 feet and has a very low permeability (normally on the order of 1×10^{-7} cm/sec). As such, it acts as an underlying confining layer for the overburden and an upper confining layer for the sandstone of the Labette Formation.

The sandstone is confined below by another series of shale and limestone interbeds. Groundwater flow in the sandstone is predominantly horizontal in a general northwest direction. The groundwater flow rate beneath the Site is calculated to be approximately 1.2 gallons per day with an average linear groundwater velocity of approximately 0.03 feet per year. The hydraulic conductivity is approximately 10^{-6} cm/sec. This groundwater discharges to the outcrops in the ravine bottom of East Pin Oak Creek approximately 7,000 feet to the north and northwest of the Site.

The overburden and the sandstone stratum are the most important potentially water-bearing geologic units. However, neither unit can be classified an aquifer since minimal hydraulic conductivities of aquifers are typically 5×10^{-3} cm/sec, while those reported for the overburden and bedrock formation are approximately 4×10^{-5} and 10^{-6} cm/sec, respectively. In

addition, it is unlikely that any significant amounts of contamination could be transported through the sandstone formation due to its low transmitting ability. The potential for the upper shallow groundwater to percolate through the shales and limestones to the sandstone layer exists, but it is believed this movement could occur only over very long time periods because of the low hydraulic conductivity of the shales and limestone.

D. NATURE AND EXTENT OF CONTAMINATION

Environmental samples taken during the RI activities were analyzed for PCBs, volatile organic compounds (VOCs), and semivolatile organic compounds (SVOCs), or for PCBs only, depending upon the media. SVOCs rarely were detected in significant quantities. Therefore, the conclusions presented below deal mainly with PCBs and VOCs.

1. EXTERIOR SUBSURFACE SOILS

- The major PCB concentrations were found in the on-site sewer test pits indicating that PCB liquid was released from the sewers. PCBs were found in the soil adjacent to and under the Site storm and sanitary sewers leading from the Main Building at concentrations up to 700 ppm. PCBs (concentrations less than 1 ppm) were detected along the Holden sanitary sewer line.

- Other PCBs found in the subsurface tend to be around the buildings in the upper part of the overburden soil. These PCBs are suspected to be from spills and releases.

- VOCs in concentrations up to 9,400 ppb are found mainly in the soil around the Holden sanitary sewer and are thought to originate from sewer leaks.

- The source of VOCs found in the borehole for MW-104 is thought to be a suspected former degreasing pit in the South Warehouse. VOCs found in the borehole for MW-110 are thought to be from VOC-containing waste which was released at this location (the north door of the Main Building).

2. INTERIOR SUBSURFACE SOILS

- PCBs (maximum concentration of 18.5 ppm and normally less 5 ppm) were found beneath the Main Building. The probable source was PCB liquid traveling through the concrete slab via cracks or seams.

- PCBs were not found in the sample from Boring B-10 in the South Warehouse.

- VOCs are found under both buildings and are variable (maximum concentration of 3,325 ppb), corresponding to areas where spills may have taken place.

- Due to the low permeability of the soil, PCBs and VOCs are found mainly at the top of the overburden soil underneath the Main

Building. At the South Warehouse, the overburden soil is thinner (approximately 3 feet) and VOCs are found down to the bedrock/soil interface.

3. GROUNDWATER

- Sampling procedures in rounds 1 and 2 were suspected to have allowed contamination of the samples by on-site surface soils. Increased efforts were made during round 3 to avoid the possibility of contaminating samples, and it appears that the third round does provide the most representative data on PCB concentrations in groundwater at the Site.

- PCBs were detected in groundwater (unfiltered) from MW-207 and MW-204 in third sampling round. PCBs in MW-207 groundwater may be from releases of PCB liquid at the loading dock on the west side of the Main Building. The source of PCBs in MW-204 is not clear; however, the concentration of PCBs detected (1.3 ppb) was only slightly greater than detection limit (0.5 ppb).

- VOCs were primarily restricted to the shallow groundwater and were found in all three sampling rounds in Monitoring Wells MW-201, MW-204, MW-210, and MW-211. VOCs in MW-201 and MW-204 may be from the upgradient former degreasing pit in the South Warehouse. VOCs in MW-210 are thought to be the results of dumping of VOC waste in this

area. VOCs in MW-211 are thought to be from leakage from the nearby sanitary and/or storm sewers.

- After purging, no PCBs were detected in the groundwater from the two shallow Anderson wells adjacent to the Site.

4. SURFACE SOILS

- Surface soils with PCB concentrations of 10 ppm or higher are located around the Main Building and the South Warehouse, the area between the two buildings, and the area to the west of the South Warehouse. These areas represent less than 10 percent of the total Site area. The highest concentration (540 ppm) of PCBs is found to the southwest of the South Warehouse.

- Significant vertical movement of PCBs has not been observed and would not be expected due to the low permeability of the soil and the affinity of PCBs for soil.

- Movement of PCBs through soil erosion is minimal. A small amount of erosion is occurring in the areas south and west of the Main Building. Most soil eroded from these areas is deposited either in the southern portion of the Site or in the storm water retention ponds.

5. SURFACE TRACKING

- PCBs were detected at concentrations below U.S. EPA's established levels for nonrestricted access in soils just north of the Site at a little-used access gate.

- PCBs were detected at concentrations below U.S. EPA's established levels for nonrestricted access in wipe samples taken on asphalt roadways just off-site at the major east and south access gates.

6. SEDIMENTS

- Sediments in on-site surface water bodies show PCB concentrations ranging from 0.3 to 122 ppm. The values appear to correspond to residual concentrations or to eroded on-site soils which have settled in the ponds and drainageways.

- No PCBs were detected in the sediment sample taken from the Holden sanitary sewer line. VOCs (maximum concentrations - 12,213 ppb total) were detected and appear likely to be from an off-site source.

- Trichloroethene was found in downstream parts of the unnamed tributary in concentrations up to 40 ppb. These concentrations generally decreased from east to west. Potential on-site sources include the reported former degreasing pit in the Southwest

Warehouse. The pathway to the unnamed tributary would be the shallow groundwater.

- Four sediment samples taken between 200 and 500 feet downstream of the Holden wastewater treatment plant outfall showed PCB concentrations up to 293 ppm. No PCBs were detected in the sediment samples obtained more than 500 feet downstream of the POTW. The PCBs are thought to be either residual deposits of PCB-laden sediment or deposits of PCB-laden sludge from the treatment plant.

- Toluene was found in 7 of 17 sediment samples from East Pin Oak Creek. Because only minor amounts of toluene were found on-site (except in the Holden sanitary sewer sediment) an off-site source of contamination is probable; however, toluene could have left the Site prior to the plugging of the on-site sewers.

7. SURFACE WATER

- PCBs were detected in two samples from the on-site spill containment pond at a maximum concentration of 10 ppb. Ethanol was the only VOC detected in these samples (16 ppb).

- PCBs were detected in unfiltered samples from the main pit in the Main Building at concentrations between 3500 and 4500 ppb. VOCs were also detected in these samples at concentrations between 690

and 1134 ppb. These constituents appear to be the result of residues leaching from the concrete walls of the pit.

- VOCs (maximum concentration - 78 ppb) and PCBs (maximum concentration - 3.9 ppb) were detected in surface water samples from the unnamed tributary. Stream sediments are the probable source of the PCBs.

- VOCs (maximum concentration - 148 ppb) and PCBs (maximum concentration - 7.9 ppb) were detected in downstream surface water samples from East Pin Oak Creek. The source is probably desorption of the constituents from sediments. Another source may be the shallow site groundwater which discharges to the unnamed tributary.

8. AIR

- Airborne dust samples collected during on-site investigations did not contain detectable concentrations of PCBs.

9. BUILDINGS AND STRUCTURES

- Of all building surfaces, the floors contain the highest PCB concentrations. In some areas PCBs have moved downward into concrete and are present in concentrations greater than 100 ppm to a depth of 2 inches.

- The PCB concentrations detected at unbiased locations on interior wall, horizontal and ceiling surfaces range from below detection limit to 830 ug/100 cm^2. At biased locations, the PCB concentrations ranged from below detection limit to 1180 ug/100 cm^2.

- The total PCB concentrations detected on exterior building surfaces ranged from below detection limit to 21.9 ug/100cm^2.

- Visibly stained surfaces tend to exhibit higher concentrations of PCBs.

- In general, the Main Building shows higher concentrations of PCBs than the South Warehouse.

E. ENDANGERMENT ASSESSMENT

An Environmental Endangered Assessment (EA) was performed according to U.S. EPA guidance to assess the potential risks to public health and the environment associated with the potential release of chemicals at the Site. The findings of the EA are as follows:

- Eleven indicator chemicals were selected for the Site based upon their frequency of detection, concentration, toxicity, mobility, and persistence. They are Aroclor 1242, Aroclor 1254/1260, 1,1-dichloroethane, 1,1-dichloroethene, g-hexachlorocyclohexane (lindane), methylene chloride, tetrachloroethene, toluene, 1,2,4-trichlorobenzene, 1,1,1-trichloroethane, and trichloroethene.

- A toxicological evaluation of the indicator chemicals was conducted using the U.S. EPA's References Doses (RfDs) and Cancer Potency Factors (CPFs).

- Three potential uses of the Site were identified. They were: no action, industrial development, and residential development. Exposure pathways were developed based on these scenarios. Both "typical" (using average environmental concentrations) and "reasonable worst" (using upper 95th percentile environmental concentrations) case exposures were calculated.

- For all scenarios considered, both carcinogenic and noncarcinogenic risks are primarily due to PCBs.

- Cancer risks exceed 10^{-4} (excess lifetime upper-bound cancer risk of one in 10,000) for ingestion of local beef by off-site residents in the no action scenario (typical and reasonable worst case). There is also potential for adverse noncarcinogenic effects through beef ingestion and dermal exposure to creek sediment (reasonable worst case).

- Cancer risks exceed 10^{-4} for the vapor inhalation and direct dermal contact with floor and wall surfaces in on-site buildings by trespassers in the no action scenario (reasonable worst case). There is also potential for adverse noncarcinogenic effects for vapor inhalation and dermal contact with the floor surfaces in on-site buildings (typical and reasonable worst case), as well as for dermal contact with water and

sediment in on-site ponds, and sediment ingestion, and dermal contact with the wall surfaces (reasonable worst case).

- Cancer risks exceed 10^{-4} for inhalation of vapors by future on-site residents in the residential development scenario (reasonable worst case). There is also potential for adverse noncarcinogenic effects via this pathway (typical and reasonable worst case).

- Cancer risks exceed 10^{-4} (typical and reasonable worst case) for the pathways of vapor inhalation and dermal contact with floor (typical and reasonable worst case) and wall (reasonable worst case) surfaces in the on-site buildings by on-site workers in the industrial development scenario. There is also potential for adverse noncarcinogenic effects for the pathways of vapor inhalation and dermal contact with floor (typical and reasonable worst case) and wall (reasonable worst case) surfaces.

- Chemical concentrations are above potential applicable or relevant and appropriate requirements (ARARs) in groundwater, soil, surface water, interior air, and building surfaces. No potential ARARs were identified for ambient air.

- An environmental risk assessment conducted for the Site concluded that no there are no known environmentally "important" habitats or sensitive environments on-site. There are no known threatened, endangered, or rare species on-site. The available data indicate no known risks to

terrestrial wildlife, livestock, terrestrial vegetation, or aquatic life.

F. SUMMARY AND CONCLUSIONS

- The shallow groundwater system in the Site's overburden is separated from the bedrock groundwater by a sequence of interbedded shales and limestone which acts as an aquitard. Because of inadequate water yields, neither groundwater system can be classified as an aquifer nor be developed as an economical water source.

- PCBs in the Site soils appear to be the result of periodic spills and releases rather than systematic disposal in or on the Site soils.

- VOCs originating from Rose operations appear to be located primarily in the upper portions of the soil overburden under or immediately adjacent to Site buildings or beneath the storm sewer extending to the southwest from the Main building. VOCs in soils beneath the Holden sanitary sewer appear to be from an off-site source.

- Sediments containing PCBs at concentrations greater than 10 ppm were identified in East Pin Oak Creek, the unnamed tribuatry, the on-site spill containment pond, and the drainage ditch to the on-site storm water retention ponds.

- PCBs and VOCs were detected in random locations in the waters of East Pin Oak Creek and its unnamed tributary.

- The interior surfaces of the Main Building and the South Warehouse generally exhibited PCB concentrations greater than 10 ug/100cm^2. The exterior surfaces of both buildings generally exhibited PCB concentrations less than 10 ug/100 cm^2.

- The data indicate that PCB releases in the buildings were primarily contained in the concrete floor slabs.

- The results of the EA indicate that the major sources of current and future potentially significant risk are the floors and walls of the existing Site buildings, Site ponds, Site soils, and sediments in East Pin Oak Creek and its unnamed tributary.

- A feasibility study will be completed to develop and evaluate appropriate remedial action plans for the Site.

* * * * *

PART I

INTRODUCTION

A. PURPOSE

This document contains the findings of the Remedial Investigation (RI) of the Rose Chemicals Site (Site) in Holden, Missouri. The nature and extent of Site contamination is documented, and an assessment of the impact this contamination may have on public health and welfare and the environment is presented. This report fulfills the objective of the second Administrative Order on Consent (AOC-2), entered into by the Rose Chemicals Steering Committee (RCSC) and the U.S. EPA, to prepare an RI report of the Site. The RI activities were conducted in accordance with the approved Final Work Plan for Remedial Investigation/Feasibility Study at Rose Chemicals Site in Holden, Missouri, ERT Engineering Company, June 30, 1988 (Final Work Plan).

This report was prepared by Burns & McDonnell Engineering Company of Kansas City, Missouri for Clean Sites, Inc. and the RCSC. Environ Corporation of Washington, D.C. was a subcontractor to Burns & McDonnell and was responsible for preparation of the Endangerment Assessment.

B. BACKGROUND

The Site is located at 500 West McKissock Street, immediately north of Missouri Highway 58, in Holden, Missouri (see Figure I-1). Holden is approximately 50 miles southeast of Kansas City, Missouri. The approximately 13-acre Site contains two major buildings, the Main Building and the South Warehouse (combined floor area greater than 100,000 sq. ft.),

and spill and storm water containment ponds. An intermittent unnamed tributary to East Pin Oak Creek flows through the southwest corner of the Site.

The Site is owned by the City of Holden and was previously known as the Holden Industrial Park. The South Warehouse was built in the late 1940s, and International Harvester Company is believed to have initially used it as a shop. The Main Building was constructed in stages in the 1960s. Royal Industries, Inc. was the first company to lease the Site with the Main Building, having entered a lease with the City on June 1, 1976. Lear Siegler, Inc. in early 1977 acquired the stock of Royal and in June, 1977 Royal was merged into Lear with the result that Lear succeeded to Royal's interest under the lease. Royal operated a farm implement assembly and painting operation at the Site until early 1980. In December, 1979 Lear entered into a sublease with W. C. Carolan Company, Inc. and assigned Lear's option to purchase the Site to Carolan. Carolan's first PCB handling company was named PCB Eliminators which was a transfer facility and was in business for approximately one year. In 1982, Martha C. Rose Chemicals, Inc. (Rose) began processing PCBs and PCB-contaminated equipment at the Site, although, so far as can be determined, there was no written sub-lease or assignment between Carolan and Rose. Carolan was one of several companies all operating under the same ownership, primarily that of Mr. Walter C. Carolan, which included: Dust Suppression, Inc.; American Steel Works, Inc.; as well as W. C. Carolan, Company, Inc. and Rose.

Rose operated on-site from 1982 to February 1986. Rose had been granted approvals by the U.S. EPA under the Toxic Substances Control Act (TSCA) to decontaminate certain PCB-contaminated mineral oil dielectric fluids and to process PCB electrical equipment for disposal. During the Rose operation, approximately 23 million pounds of PCB materials were received at the Site. Rose failed to manage the PCB materials according to applicable federal regulations or U.S. EPA agreements or orders and subsequently ceased operations in February 1986. Approximately 14 million pounds of PCB materials were abandoned at the Site.

Since then, the RCSC has entered into two AOCs with U.S. EPA, Region VII. In accordance with these AOCs, the RCSC has carried out preliminary assessments of the Site, secured the Site, inventoried and removed PCBs, PCB materials, and PCB debris from the Site, and is currently conducting a Remedial Investigation/Feasibility Study (RI/FS) of the Site. The results of the RI are presented here.

Additional background material relating to the Site may be found in:

- The approved Final Work Plan.
- Appendix C, Part I.
- Appendix E, Part II.

C. SCOPE

This report identifies the nature and extent of contamination of the Site and assesses the impact this contamination may have on public health and welfare and the environment. The format follows the suggested Remedial

Investigation report format presented in Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA, U.S. EPA (OSWER Directive 9355.3-01), March 1988.

The report consists of an executive summary, six parts, and appendices. Part I is an introduction which presents the purpose of the report, background information on the Site, and the report scope. Part II summarizes field activities which were conducted at the Site. Part III presents the physical characteristics of the Site. Part IV discusses the nature and extent of contamination in the vicinity of the Site based upon the analytical results of samples taken of the various media present. Part V summarizes the Endangerment Assessment which assesses potential public health, welfare and environmental risks based upon data from RI activities. Finally, Part VI includes a summary and conclusions of the RI investigations. The appendices contain the various technical memoranda which provide detailed documentation to support the main body of the report, the Endangerment Assessment, and the analytical result reports for samples obtained and analyzed during the RI.

* * * * *

PART II

SITE INVESTIGATION ACTIVITIES

This part describes activities performed during the RI. Activities were carried out both on the Site and in various off-site locations. The areal extent of RI activities is shown on Figure II-1. Off-site areas are labeled to indicate the types of investigations carried out in each. All field activities performed during the RI were carried out in accordance with health and safety requirements set forth in the Site Health and Safety Plan, Rose Chemicals Site, Holden, Missouri, Burns & McDonnell Engineering Company, January 1989 (HSP).

Analyses of samples collected during Site investigation activities were performed by EMS Laboratories of Kansas City, Missouri, in accordance with the approved Quality Assurance Project Plan, Rose Chemicals Site, Holden, Missouri, Burns & McDonnell Engineering Company, January 1989 (QAPP). EMS also provided the appropriate sizes and types of pre-cleaned sample containers as specified in the QAPP.

A. EXISTING DATA VALIDATION AND ASSESSMENT

Appendix C contains Existing Data Validation Technical Memorandum, Rose Chemicals Site, Holden, Missouri, Burns & McDonnell Engineering Company, August 1989. This document compiled, assessed, and validated all previously existing analytical data concerning the Site. The identification of valid uses for the data was based on Data Quality Objectives for Remedial Response

Activities: Development Process, U.S. EPA, March 1987. Appropriate data uses may include:

- o Site Characterization
- o Health and Safety
- o Risk Assessment
- o Evaluation of Alternatives
- o Engineering Design of Alternatives

Existing data were divided into media-specific groups including: surface soil, sediment, subsurface soil, soil gas, surface water, groundwater, air, and animal tissue. A summary of the results of the data validation and assessment is presented in Table II-1.

B. EXTERIOR GEOLOGIC/HYDROGEOLOGIC INVESTIGATIONS

The Subsurface Exploration Technical Memorandum, Rose Chemicals Site, Holden, Missouri, Burns & McDonnell, August 1989, was prepared to document the procedures used to perform the exterior subsurface exploration activities at the Site. This technical memorandum is presented in Appendix D. Applicable portions are summarized in this section.

1. SUBSURFACE SOIL SAMPLING AND INSTALLATION OF MONITORING WELLS

Sixteen monitoring wells were installed by Layne-Western Company under the supervision of personnel from Burns & McDonnell Engineering Company. Six monitoring wells had been previously installed by John Mathes and Associates, Inc. (Rose Chemical Project, Holden, Missouri,

Site Investigation, Preliminary Site Assessment Report, John Mathes and Associates, July 31, 1987). All monitoring wells were installed in groups, or "nests," of two wells. Each "nest" consists of one deep well, designated by the alpha characters MW and a 100 series number, and one shallow well, designated by the alpha characters MW and a 200 series number. The locations of the well nests are presented on Figure II-2.

The deep monitoring wells were installed in boreholes which were advanced into bedrock to a total depth of approximately 50 feet. Soil samples from the deep well boreholes were collected and analyzed for PCBs, VOCs and selected semivolatile organic compounds (SVOCs). The samples were selected in accordance with the criteria in the approved Sampling and Analysis Plan, Rose Chemicals Site, Holden, Missouri, Burns & McDonnell Engineering Company, January 1989 (SAP). Samples were also submitted to the Kansas City Testing Laboratory for moisture content, Atterburg limits, hydrometer, and hydraulic conductivity analyses. Packer tests were conducted on three deep boreholes prior to well installation to determine hydraulic conductivity, according to methods referenced in Appendix D. The screens of the deep monitoring wells then were set to acquire groundwater samples and hydraulic information from the various bedrock strata underlying the Site. After well installation, a slug test was also conducted on Monitoring Well MW-104 to document in-situ hydraulic conductivity according to methods referenced in Appendix D.

Eight shallow monitoring wells were installed in shallow boreholes adjacent to the eight deep wells. Boring and monitoring well installation consisted of augering to refusal in bedrock and setting well screens at the bedrock/soil interface. Slug tests were conducted on three shallow monitoring wells to determine the in-situ hydraulic conductivity of the soil.

Appendix D contains detailed explanations of exterior soil boring and sampling procedures and well installation procedures, as well as boring logs, a soil sample matrix, geologic profiles, and hydraulic conductivity test results.

2. ON-SITE GROUNDWATER SAMPLING

Appendix D also documents monitoring well development procedures, including pH and water level measurement activities. Elevated pH levels of the groundwater in all of the deep monitoring wells were detected.

Groundwater sampling was performed on all monitoring wells during winter, spring, and summer to examine seasonal variations in groundwater quality. The sampling dates were:

Round 1: February 24 through March 10, 1989

Round 2: April 5 through April 12, 1989

Round 3: June 15 through June 22, 1989

Filtered and unfiltered groundwater samples were obtained from all groundwater monitoring wells when possible. However, the slow recharge of some of the monitoring wells necessitated a lengthy recovery period after purging before sufficient water was available. In several cases, even after the maximum wait allowed by the Final Work Plan (24 hours), there was insufficient water available to obtain a complete groundwater sample set. Tables II-2 through II-4 present a summary of the samples taken and analyses conducted during the three rounds of groundwater sampling and analysis.

The groundwater sampling was performed in accordance with procedures detailed in the approved SAP, except for the following:

- A new polypropylene bailing rope was used for each well instead of each sample.

- For the third round of groundwater sampling, a tent with a sewn-in floor was set up over each well during purging and sampling. In addition, samples were handled on a clean table inside the tent, and filtering was done at EMS Laboratories instead of on-site. These extra precautions were observed because of suspected contamination of first and second round groundwater samples with localized airborne dust near or at ground level.

- For very slow recovering wells, sampling crews returned to the well to collect additional sample volume every 24 hours (up to a maximum of 3 days) instead of every 2 hours.

- Trip blanks were submitted with all groundwater sample shipments, except for those on March 10, April 5, June 15, 20 and 22, 1989. These were oversights, and a discussion of impacts can be found in Appendix A. All other QA/QC procedures were performed in accordance with the approved SAP and QAPP.

3. OFF-SITE GROUNDWATER SAMPLING

Groundwater samples were collected from two off-site shallow wells owned by Ms. Metta Anderson and located on her property immediately west of the Site. All sampling was done in accordance with the SAP and Addendum No. 1 to the Sampling and Analysis Plan, Rose Chemicals Site, Holden, Missouri, Burns & McDonnell Engineering Company, June 1989, (SAP-Addendum 1). Equipment decontamination was carried out as detailed in Appendix D.

C. SURFACE SOIL SAMPLING

Surface soil samples were obtained from both on- and off-site locations. All surface soil samples were analyzed for PCBs. Decontamination of sample equipment followed the same procedures as outlined for the subsurface soil sampling equipment in Appendix D.

1. ON-SITE GRIDS

Previous surface soil sampling of the Site performed by Chemical Waste Management, Inc. (Sampling/Analytical Survey, Rose Chemicals Site, Holden, Missouri, Dr. Harry Drushel, Clean Sites, Inc., June 12, 1987) identified areas of the Site with PCB concentrations exceeding 10 ppm. Figure II-3 shows the areas where soils were removed during the preliminary removal operations. Soils in these areas generally were excavated and removed to a depth of 6 inches, except for a few areas excavated to greater depths due to elevated PCB concentrations as follows:

- Spill containment pond
- East half of the east stormwater retention pond
- Areas directly north of the loading dock ramp on the west side of the Main Building.

The excavated areas generally corresponded to those areas identified in the 1987 sampling as having PCB concentrations greater than 10 ppm, with the following exceptions:

- The three grids at the southeast corner of the Main Building were not removed because the area is either paved or is part of the main Site access.
- A small concrete pad at the southeast corner of the South Warehouse was not removed.

- Soils in the southwest corner of the Site near Missouri Highway 58 were not removed because of poor access.
- Soils south of the fence, but on the Site property just north of the unnamed tributary were not removed because of poor access.
- An area of hard-packed gravel just south of the dock on the west side of the Main Building was not removed to allow continued access to the dock.
- Sediment in the east half of the east stormwater retention pond was removed as a response to sampling during the preliminary removal operations.
- Various grids and portions of grids located near the South Warehouse were not removed.
- A grid located just south of the Main Building near its center was not removed.
- Two grid quadrants located between the Main Building loading dock and the south property line were not excavated.
- A grid located northwest of the Main Building loading dock was not excavated.

Figure II-4 shows grids and portions of grids where surface soil sampling was performed during the RI investigations. Most but not all of these areas were excavated during preliminary removal operations. These areas do correspond to the areas identified as containing greater than 10 ppm PCB in the 1987 sampling with the following two exceptions:

- No sampling was done of the concrete drive on the east side of the Main Building near the south end.
- No sample was taken of the concrete pad at the southeast corner of the South Warehouse.

The grids were subdivided and sampled in accordance with the approved SAP. A total of 50 grids were sampled. Fifty-five samples including five replicates were analyzed for PCBs. Over one-half of the areas from which surface soils were removed during preliminary removal operations showed subsequent PCB concentrations of less than 10 ppm.

2. OFF-SITE GRID

Figure II- 5 shows the off-site grid which was sampled for surface PCB contamination. This grid was composed of eight 40 x 40-foot quadrants. The grid is located adjacent to the east Site boundary and north of McKissock Street. The quadrant subdividing and sampling was done in accordance with the SAP and the SAP-Addendum 1. Each quadrant provided a maximum 4 x 4 matrix of sampling points. A total of eight off-site surface soil samples were analyzed for PCBs. No replicate samples were submitted.

D. SURFACE TRACKING SAMPLING

Surface tracking sampling and analyses were performed to assess the potential for off-site tracking of contaminants by vehicles and personnel leaving the Site. Six locations were sampled as shown in Figure II- 6. Wipe samples were taken at four paved locations and surface soil samples

were taken at two locations. Two collocated wipes samples were taken for quality control purposes. One was submitted to EMS Laboratories and one was submitted to the U.S. EPA Region VII Laboratory. Sampling and handling procedures were in accordance with the approved SAP.

E. SANITARY AND STORM SEWER INVESTIGATIONS

The sanitary and storm sewer investigation activities consisted of excavating 11 test pits adjacent to on-site sewers, sampling soil from beneath the sewers, sampling sediment from a sewer, and conducting three sewer dye tests. These activities were performed to assess the potential for migration of contaminants via the storm and sanitary sewer lines. Locations of the various sewer investigations are shown in Figure II- 7.

As indicated in Figure II- 7, the only active sewers on-site are the Holden sanitary sewer and the Main Building storm sewer system which discharges to a ditch that drains to the surface water retention pond. Currently, there is no direct sanitary sewer connection between the Main Building and the Holden sanitary sewer system. Likewise, there is no direct storm sewer connection between the on-site buildings and the unnamed tributary to East Pin Oak Creek.

1. SEWER TEST PITS

Eleven test pits were excavated adjacent and parallel to both abandoned and active sewer lines. Procedures used to excavate and sample the test pits can be found in Appendix D, which also includes logs, profiles, and

locations of the test pits. A total of 13 samples, including 2 replicates, were taken.

2. SANITARY SEWER SEDIMENT

The sediment in the Holden sanitary sewer that crosses the Site from east to west was sampled. Three samples (one sediment sample, one replicate, and one EPA replicate) were taken from the manhole northwest of the South Warehouse. The sewer sediment samples were taken using the same procedures as those used for ladle sampling of sediment (See Section F of this part). The samples were analyzed for PCBs, VOCs, and SVOCs.

At three other locations, the manhole east of the western boundary, the upgradient manhole at McKissock Street, and the upgradient manhole at Missouri Highway 58, sediment samples were also planned. No sediment deposits were found in the sewer at these locations.

3. SEWER DYE TESTING

Three on-site sewers were dye tested (see Figure II- 7). The dye testing was performed in accordance with the approved SAP and SAP - Addendum 1.

a. Dye Test No. 1

Dye Test No. 1 was performed on the Site sanitary sewer flowing south from the Main Building to the Holden sanitary sewer to assess the integrity of a previously installed plug. The plug was located

just south of the Main Building. The flow in the off-site manhole of the Holden sanitary sewer located northwest of the South Warehouse was visually monitored from the ground surface after the dye was added. The manhole was observed continuously for 30 minutes and then periodically for at least two hours. Dye was not observed in the Holden sanitary sewer, and it was concluded that the previously installed plug in the Site sanitary sewer had retained its integrity.

b. Dye Test No. 2

The storm sewer flowing from a drain located in the east trailer bay of the loading dock on the west side of the Main Building was tested to determine its outlet. After initiating the test, dye was observed to be flowing into the spill containment pond.

c. Dye Test No. 3

Dye Test No. 3 was performed on the abandoned Holden sanitary sewer line on the southwest side of the Site to determine its outlet. The dye and water were added to the sewer through a hole in the sewer located in Test Pit TP-8. An outlet for this sewer line was not found.

F. WATERWAY AND POND SEDIMENT SAMPLING

Sediment sampling was conducted to determine the presence and extent of contaminants in the on-site ponds and waterways and the off-site waterways (both upstream and downstream of the Site).

A total of 50 sediment samples, including 9 replicates, were obtained at the locations shown on Figures II- 8 (on-site) and II- 9 (off-site). Each sediment sample was analyzed for PCBs, VOCs, and SVOCs. The sampling procedures were in accordance with the approved SAP and the SAP-Addendum 1 with one exception. For sampling sediment under less than 12 inches of water, a decontaminated Teflon ladle was used instead of a Petite Ponar device. The revised procedure was as follows:

- The clean ladle was lowered into the water until contact was felt.
- The ladle was scraped along the sediment surface to scoop a sample at a maximum depth of 3 inches.
- The ladle was slowly raised clear of the water surface.
- Excess water was decanted from the ladle, and for replicate samples the sediment was placed into a stainless steel bowl.

After this point the sample was handled in the same manner as samples collected with the Petite Ponar device. In all cases the sampling equipment was decontaminated by procedures identical to those used for subsurface sampling equipment and documented in Appendix D.

In addition to the chemical analyses of sediment, four representative sediment samples were submitted for moisture content, Atterburg limits, and hydrometer analyses in accordance with the approved SAP.

G. SURFACE WATER SAMPLING

On- and off-site surface water was characterized by collecting 24 surface water samples, including six replicates, from the locations shown on Figure II- 10 (on-site) and II- 11 (off-site). A filtered sample and an unfiltered sample were taken from each location. Samples were submitted for analyses for PCBs, VOCs, and SVOCs.

In addition, three unfiltered surface water samples, including one replicate, were collected from the pit area (Grid 23) of the Main Building early in the Site investigations.

The sampling was done in accordance with the approved SAP procedures, except for the pit area where no filtered samples were obtained. The decontamination procedures for the surface water sampling equipment were the same as those presented for the sampling equipment in Appendix D.

H. AIR QUALITY

Air quality testing performed during the RI activities was limited to health and safety documentation. In accordance with the HSP, air sampling was performed during inside operations. The samples were taken from the breathing zone during boring, trenching, and wipe sampling activities in the Main Building. Table II-5 shows sample date, parameters analyzed, and

activities being conducted at the time of air sampling. The sampling procedures and analytical methods were in conformance with the HSP.

I. BUILDING AND STRUCTURES INVESTIGATIONS

The Buildings and Structures Investigation Technical Memorandum, Rose Chemicals Site, Holden, Missouri, Burns & McDonnell, July 1989, was prepared to document the investigation activities concerned with the Site buildings and adjacent structures. Investigation activities included: reviewing records, inspecting buildings and structures, and sampling the buildings and structures and the soil beneath them. The technical memorandum is Appendix E.

1. RECORDS REVIEW

Burns & McDonnell reviewed all documents provided by Clean Sites, Inc. and the Missouri Department of Natural Resources pertaining to past operations and activities at the Site to obtain information on construction dates; uses over time; and the possible usage, nature, and location of contaminants in and around the Site.

2. BUILDING AND STRUCTURES INSPECTION

The building and structures inspection at the Site consisted of:

a. Recording all grid locations and visibly stained areas and their proximity to floor cracks, joints, drains or exposed soils.

b. Recording materials of construction and assessing the general structural conditions of both buildings.

3. BUILDINGS AND STRUCTURES SAMPLING

Sampling activities conducted at the Site to characterize contamination of the buildings and structures included: wipe sampling of the buildings' floor, wall, ceiling and roof surfaces; structural (destructive) sampling of concrete, insulation, and nonimpervious materials; and soil sampling from beneath the buildings. The sampling procedures used and sample locations are described in Appendix E, Part IV.

a. Wipe Sampling

A total of 215 wipe samples were taken from the floors, walls, ceilings, horizontal surfaces, and roofs. Wipe samples were taken by wiping a 100 cm^2 area with a filter paper wetted with hexane. All wipe samples were analyzed for PCBs.

b. Structural Sampling

Three types of structural sampling activities were performed: concrete coring of floors, coring of insulation on walls and ceilings, and destructive sampling of nonimpervious surface materials. All structural samples were analyzed for PCBs.

Twenty-five concrete cores were taken. Of these, 12 were unbiased cores taken at predesignated locations and 13 were biased cores

taken from stained or dirty areas. The upper 1/2-inch of each core was analyzed for PCBs. Two representative concrete core sections (one biased and one unbiased) which previously had the top 1/2-inch removed and analyzed were subsampled over three additional 1/2-inch layers and submitted for analysis.

Forty-one insulation samples were taken from the walls and ceilings of the Main Building and South Warehouse. Unbiased insulation samples were taken when the area predesignated for a wipe sample was covered with insulation. Biased insulation samples were taken from visibly stained areas.

Eight destructive samples of nonimpervious surface material consisting of rubber, wood, and linoleum were also taken.

c. Subsurface Soil Sampling

Soil samples were taken from the soils underlying the Main Building, the loading dock of the Main Building, and the South Warehouse. Samples were taken from 21 shallow interior borings (B-1 through B-21) and 2 test trenches (TT-1 and TT-2).

B-1 through B-12 were shallow soil borings sampled continuously to bedrock. Eighty-three soil samples, including 12 replicates, were taken of which 57, based on visual observation and field screening, were analyzed for PCBs, VOCs, and SVOCs. Eleven of these 57 samples also were tested for moisture content, Atterburg limits, and

hydrometer analysis. The boring logs, sample matrix, and boring locations for B-1 through B-12 can also be found in Appendix E.

B-13 through B-21 were sampled to further define the presence of potential contamination beneath the loading dock of the Main Building in grids 1, 2, 9 and 10. These borings were sampled in the same manner as B-1 through B-12, and, as such, are considered part of the interior boring series. Appendix E also contains the boring logs, a sample matrix, and boring locations for B-13 through B-21. Fifty soil samples were taken from B-13 through B-21 of which 33 were submitted for chemical analysis for PCBs, VOCs, and SVOCs, in accordance with SAP-Addendum 1 criteria.

TT-1 was excavated to bedrock in the Main Building. Sixteen soil samples were taken. Ten, including one replicate, were selected for analyses for PCBs, VOCs and SVOCs based on criteria presented in the SAP. The procedures used to excavate and sample the test trench, a profile of the test trench, and a location map are presented in Appendix E.

TT-2 was excavated in the loading dock of the Main Building to further define the presence of potential contamination beneath the loading dock. The trench was excavated and sampled in the same manner as TT-1. A profile of TT-2 and its location are shown in Appendix E. All nine samples taken from TT-2 were submitted for analyses of PCBs, VOCs, and SVOCs. Both trenches were filled with

bentonite and clean gravel from an off-site source upon completion of sampling. The tops were sealed with concrete to grade.

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PART III

PHYSICAL CHARACTERISTICS

A. SURFACE FEATURES

Figure III-1 illustrates the major topographic features in and around the Site. The Site slopes gently from an elevation of 836 feet in the northeast corner of the property, where the Main Building stands, to 805 feet in the southwest corner of the property, where an unnamed tributary of East Pin Oak Creek is located. A small portion of the Site in the extreme northeast corner slopes to the northeast. A spill containment pond (elevation 822 feet) is adjacent to the Main Building loading dock. The unnamed tributary, which runs intermittently for 225 feet across the southwest corner of the site, runs from Missouri Highway 58 to East Pin Oak Creek.

Missouri Highway 58 forms the southern boundary of the Site property line. One of the two access points to the Site is on the southern boundary and accesses Highway 58. The other point of access is from McKissock Street on the Site's eastern boundary. A spur of the Missouri Pacific Railroad lies 325 feet north of the northeast corner of the Site.

B. METEOROLOGY

Figure III-2 displays the wind rose developed from historical wind data collected at the Richards-Gebaur Air Force Base in Grandview, Missouri for the years 1967 to 1970 and 1973 to 1979 (summary data received from the National Climatic Data Center, Asheville, N.C.). Data from airports at

Warrensburg, Missouri and Whiteman Air Force Base were not available. However, the wind rose is representative of the Holden, Missouri area because the general terrain features and the latitude and longitude of the two sites are similar. The predominant wind direction is southerly (SSE, S, SSW), constituting more than one third of all the observations. A secondary maximum in the frequency distribution occurs for winds out of the north to northwest, most likely during the winter months. The strongest winds occur with the predominant wind directions.

The average annual precipitation as recorded at KCI Airport is 36.55 inches and is indicative of precipitation at the Site which is only 55 miles southeast of KCI. The precipitation is distributed throughout the seasons in the following order: spring, 28 percent; summer, 37 percent; fall, 24 percent; winter, 11 percent (Local Climatological Data, 1980, Kansas City, Missouri International Airport, National Climatic Center).

The summer season is characterized by warm days and mild nights, with moderate humidity. The fall season is normally mild. The first freezing temperatures of fall usually occur in late October. Winters are not severely cold. The distribution of measurable snow normally extends from November to April. Early spring brings a period of frequent and rapid fluctuations in weather, with the fluctuations generally less frequent as spring progresses. The last freezing temperatures in the spring usually occur in early April.

The monthly average temperatures range from the low of February, at 25.2 degrees F, to a high of July, at 85.2 degrees F.

C. DEMOGRAPHY AND LAND USE

The Site is located within the N.E. 1/4, Section 10, Township 45N, Range 28W, Johnson County, Missouri, within the corporate limits of the City of Holden, Missouri. The City of Holden had an estimated population of 2,280 as of July 1, 1986. This represents a 0.63 percent annual growth compared to the 1980 population of 2,195. During the 1970-80 period, the annual population growth was 0.50 percent (personal communication with U.S. Bureau of the Census, June, 1989).

General land use characteristics, based on site investigations, are shown on Figure III-3, along with the City of Holden's block and parcel number system. The total acreage of the adjacent land parcels is 31.0 acres. Adjacent parcels to the Site can be classified by land use as follows:

	Adjacent Area		Perimeter	
Land Use	Acres	Percent	Feet	Percent
Agricultural (Crops)	14.2	45.8	950	28.2
Business/Commercial	1.9	6.1	320	9.5
Agricultural (Grazing)	10.0	32.3	580	17.3
Industrial	0.3	1.0	114	3.4
Residential	4.6	14.8	1,400	41.6
Total	31.0	100.0	3,364	100.0

The agricultural land identified as parcel 14-4 has a low degree of cultivation and is currently fallow. It also shows as fallow in the November, 1980 aerial photo in Figure III-3. The industrial parcel 15-1 is of the light industrial classification since it consists of a city shop/garage.

D. ECOLOGY

Johnson County is one of 13 counties that make up the West Prairie Zoogeographic Region in Missouri. Before cultivation, the primary vegetation was tall grass prairie and oak-hickory forest. Today only scattered remnants of the original prairie remain. Trees now grow mostly along the streams and water courses. The original ecosystem has been changed by land clearing and soil cultivation.

The wildlife species found in Johnson County are adapted to an open land agricultural type of habitat. Small blocks of timber, waterways, hedge rows, fence rows, and other areas of wooded or brushy cover supply the mix of habitat types that is essential for the majority of open land wildlife. The presence and quality of these habitat types in the vicinity of the Site will influence the use of the area by wildlife. No federally listed threatened or endangered wildlife species are expected to be found in the vicinity. Chapter 10 of Appendix B contains a discussion of potential wildlife inhabitants in the area.

E. SURFACE WATER HYDROLOGY

1. SURFACE WATER BODIES

Surface water is present at the Site in four surface water impoundments and the unnamed tributary. The spill containment pond is located southwest of the loading dock and is approximately 30x20 feet in plan. The area of the spill containment pond varies with precipitation and site activities. The areas of the three storm water retention ponds

average 70x50 feet in plan each but vary with utilization of their storage capacity. Flow in the unnamed tributary varies with precipitation; water is mainly present as intermittent small pools (5x10 feet).

2. DRAINAGE PATTERNS

Over most of the Site, surface water occurs only as intermittent overland flow. Due to the site topography and low hydraulic conductivity of the unconsolidated overburden (See Section F of this part), the bulk of the surface water discharges as overland flow off-site and to the on-site ponds. Only a small percentage of the surface water enters the groundwater system.

Generally the Site is topographically higher than the area immediately to its north, west and south (See Figure III-1). The area immediately east of the Site is topographically higher. Therefore, surface drainage can enter the Site from the east.

The Site drainage is generally to the southwest at an overall slope of approximately 5 percent. Figure III-1 shows the four main Site drainage areas: A/A', B, C, and D. The figure also indicates the general direction of overland flow. Note that precipitation into Area A' flows the north and west. Precipitation on the Main Building (Area D, Figure III-1) enters the storm sewer system. The storm sewer has been diverted at a point southwest of the loading dock and now flows into a drainage ditch which enters the eastern-most storm water retention pond.

The unnamed tributary flows northwestward for approximately 1000 feet where it confluences with East Pin Oak Creek. East Pin Oak Creek flows in a northern direction.

Soil erosion at the Site is minimal. A small amount of erosion is occurring in the disturbed areas south and west of the Main Building. Most eroded soil from these areas is deposited either in the southern part of the site (due to a decrease in the ground surface gradient) or in the storm water retention ponds.

F. GEOLOGY

1. GENERAL

A detailed description of the Site geology is contained in Appendix D. This section summarizes aspects which are important to evaluating the extent of Site contamination.

From the top downwards, the geologic section beneath the Site generally consists of (1) clay soils, 2 to 15 feet thick, (2) a 15- to 40-foot thick sequence of shale and limestone interbeds, (3) an 8-foot thick sandstone bed, and (4) another sequence of shale and limestone beds beneath the sandstone. The first three sequences named above are the most important in terms of defining the extent of contamination at the Site.

2. SOILS

Detailed descriptions of soils encountered during the RI activities are included in Appendix D. This section summarizes important findings.

Soil covers the entire Site with no bedrock exposures. The soil thickness varies from 2 feet to 13.5 feet. A net soil thickness map is presented in Figure III-4.

The unconsolidated soils are residual in nature, consisting of an upper brown silty clay underlain by a gray and orange mottled stiff clay. The thickness of the upper clay varies from 2 to 8 feet where penetrated by borings. The lower clay varies in thickness from 1 foot to 6 feet and grades into a weathered shale bedrock at most of the boring locations. Beneath the gradational interface with the soils, the top several (2 to 5) feet of the shale bedrock was seen to be clayey and extremely weathered. The augers usually were able to penetrate into this weathered shale, illustrating its decomposed condition. The weathered shale bedrock is the parent material for the overlying soils and is considered a part of the same hydrogeologic unit beneath the site. This unit consisting of the overlying soils and the uppermost weathered shale, is referred to as "overburden" in the remainder of the geologic and hydrogeologic discussion.

Samples of the overburden soils were submitted to Kansas City Testing Laboratory for analysis of engineering properties. Moisture content of the subsurface soil samples tested ranged from 17.9 percent to 34.3

percent, and averaged 23.5 percent, and all soil samples analyzed for physical properties were clays as shown by the Atterburg limits analyses. In addition, most were classified under the Unified Soil Classification System as being clay with high plasticity. The silt and clay content ranged from 88.2 percent to 95.6 percent with an average of 91 percent. Among the samples tested, the liquid limit ranged from 44 to 87 percent, the plastic limit ranged from 19 to 28 percent, and the plasticity index ranged from 21 to 65 percent.

The laboratory hydraulic conductivities of three undisturbed samples analyzed using the consolidation method were:

MW-105/ST-1	1.9×10^{-8} cm/sec
MW-106/ST-1	2.5×10^{-8} cm/sec
MW-110/ST-1	3.0×10^{-8} cm/sec

Slug tests were performed on three shallow monitoring wells. The hydraulic conductivities of the monitoring wells over the area screened are:

MW-205	1.6×10^{-5} cm/sec
MW-206	4.4×10^{-5} cm/sec
MW-210	1.5×10^{-5} cm/sec

Hydraulic conductivities also have been calculated based on water level data over time. The results of these evaluations are:

MW-206	7.6×10^{-5} cm/sec
MW-210	5.5×10^{-5} cm/sec

The differences in hydraulic conductivity between the laboratory test results and the in-situ slug test results occur because the laboratory test uses a small soil sample, while the in-situ test involves the major structural features of the overburden, including the joints and fractures. The field values (slug tests) are considered to be more representative of the overburden unit as a whole.

Observed static water level elevations for Monitoring Wells MW-205, MW-206, and MW-210 were seen to be 827.01 feet, 823.94 feet, and 823.11 feet, respectively on October 2, 1989. These elevations represent changes of less than 0.1 feet, 0.2 feet, and 1.5 feet, respectively, from readings taken after the last purgings in June, 1989. Appendix D contains water level reading logs for all the wells.

3. BEDROCK

The bedrock which underlies the Site is primarily sedimentary rock of Pennsylvanian age and includes sandstones, limestones, and shales (Geologic Map of Missouri, Kenneth Anderson, DGLS-MDNR, 1979 and personnel correspondence with Bruce Netzler, geologist at DGLS-MDNR, March 1989). The upper, eroded surface of the bedrock slopes in a southwest direction at a 7 percent gradient. A top of rock contour map can be seen in Figure III-5. In the northeast corner of the Site, the upper surface of the bedrock slopes slightly to the northeast.

The stratified layers within the bedrock at the Site dip to the northeast at less than 1 percent gradient. The dip of the beds varies from 0.7 percent to 0.9 percent. This is due to the variable thickness of the beds and is quite common in Western Missouri.

A stratigraphic column for the Site is presented in Figure III-6. The two uppermost formations found at the Site are the Bandera and Pawnee Formations. These two formations comprise the 15- to 40-foot-thick sequence of limestones and shales. They overlie the third important formation, the Labette Formation, which includes the 8-foot-thick sandstone.

a. Bandera Formation

Well screens for two monitoring wells (MW-106 and MW-110) were set in the Bandera Formation. Static water elevations for these monitoring wells were 822.01 and 826.39 feet above sea level, respectively, on October 2, 1989. MW-106 recovered more than 15 feet since its last purging in June, 1989. For the September to October period, the recovery was down to approximately 0.5 foot. The elevation of MW-110 increased less than 0.5 foot in the entire June to October period.

In addition, four packer tests were conducted in boreholes in the Bandera Formation prior to monitoring well installation (Appendix D). The hydraulic conductivities indicated by these tests ranged

from less than 1 x 10^{-7} cm/sec (three tests) to 6 x 10^{-6} cm/sec for the fourth test. Slug test calculations using water elevation data from Monitoring Well MW-106 yielded a hydraulic conductivity of 1.3 x 10^{-8} cm/sec.

b. Pawnee Formation

Well screens for three monitoring wells (MW-105, MW-107, and MW-109) were set in the Pawnee Formation. Static water elevation for MW-105 was 821.33 feet above sea level on October 2, 1989. MW-105 recovered to essentially this elevation within one month after its last purging in June, 1989. The water level in the other two wells never achieved equilibrium throughout the duration of on-site activities. The screen for MW-105 is set in the upper weathered zone of the limestone unit, which may account in part for a more rapid recharge rate.

Five packer tests were performed in the various strata of the Pawnee Formation (Appendix D). Four of the tests indicated hydraulic conductivities of less than 1 x 10^{-7} cm/sec. The fifth yielded a hydraulic conductivity of 3 x 10^{-7} cm/sec. In addition, slug test calculations using water elevation data for Monitoring Well MW-109 yielded a hydraulic conductivity of 2.5 x 10^{-8} cm/sec.

c. Labette Formation

Three monitoring wells (MW-104, MW-108, and MW-111) were screened in the sandstone of the Labette Formation. The static water

elevations for the three wells screened in the sandstone were 810.92 feet in MW-104, 809.21 feet in MW-108, and 809.65 feet in MW-111 on October 2, 1989. The water levels in these wells recovered from 8 to 25 feet since their last purging in June. In all cases, recovery was essentially complete within the first week after purging. Several rounds of water level measurements were taken to determine directions of groundwater flow in the sandstone. The piezometric surface slopes northwestward at an approximate gradient of 0.01.

A packer test was performed on one borehole in the sandstone, resulting in a calculated hydraulic conductivity of approximately $1x10^{-6}$ cm/sec (Appendix D). After installation of Monitoring Well MW-104 in the borehole, a slug test was also performed. The slug test confirmed the previous packer test, indicating a calculated hydraulic conductivity of $2.5x10^{-6}$ cm/sec (Appendix D). The sandstone's order-of-magnitude higher hydraulic conductivity, when compared to the other strata studied at the Site, makes it the principal water bearing unit in the bedrock.

Water level measurements over a period of several months, while the water levels in several slowly recharging wells returned to static water level after sampling, allowed the calculation of hydraulic conductivities for two additional bedrock wells screened in the shales and limestones beneath the Labette. The hydraulic

conductivities calculated by this method are 7×10^{-9} cm/sec (MW-101) and 1.7×10^{-8} cm/sec (MW-103).

4. HYDRAULIC CONDUCTIVITY SUMMARY

The calculated hydraulic conductivities for the various geologic units based on in-situ testing are summarized below (note that some wells were tested in various intervals):

Unit	Monitoring Well	Test Type	Hydraulic Conductivity (cm/sec)
Overburden	MW-205	Slug	1.6×10^{-5}
	MW-206	Slug	4.4×10^{-5}
	MW-206	Slug	7.6×10^{-5}
	MW-210	Slug	1.5×10^{-5}
	MW-210	Slug	5.5×10^{-5}
Bandera (Bedrock)	MW-104	Packer	$<1 \times 10^{-7}$
	MW-107	Packer	6×10^{-6}
	MW-110	Packer	$<1 \times 10^{-7}$
	MW-110	Packer	$<1 \times 10^{-7}$
	MW-106	Slug	1.3×10^{-8}
Pawnee (Bedrock)	MW-107	Packer	$<1 \times 10^{-7}$
	MW-107	Packer	$<1 \times 10^{-7}$
	MW-110	Packer	3×10^{-7}
	MW-104	Packer	$<1 \times 10^{-7}$
	MW-104	Packer	$<1 \times 10^{-7}$
	MW-109	Slug	2.5×10^{-8}
Labette Sandstone (Bedrock)	MW-104	Packer	1×10^{-6}
	MW-104	Slug	2.5×10^{-6}
Labette Shale and Higginsville Limestone (Bedrock)	MW-101	Slug	7×10^{-9}
	MW-103	Slug	1.7×10^{-8}

G. HYDROGEOLOGY

1. GENERAL

This section summarizes the hydrogeology of the Site. A more detailed discussion of the Site hydrogeology is found in Appendix D. The principal hydrogeologic units beneath the Site include the overburden, with a hydraulic conductivity ranging from 1.5×10^{-5} cm/sec to 7.6×10^{-5} cm/sec. The overburden is underlain by a sequence of interbedded shales and limestones with an overall hydraulic conductivity of approximately 10^{-7} cm/sec (range of 1.3×10^{-8} cm/sec to 6.0×10^{-6} cm/sec). Beneath the unit comprised of the limestones and shales, the Labette Sandstone was seen to have a hydraulic conductivity of approximately 1×10^{-6} cm/sec.

The unconsolidated overburden and the sandstone of the Labette Formation comprise the two principal water-bearing units beneath the Site. The intermediate limestone and shale interbeds hydraulically function as an aquitard and for all practical purposes hydraulically separate the two more important units. Piezometric levels in the monitoring wells placed within the Labette Sandstone were above the top of the formation, illustrating that the groundwater within that formation is confined by the lower-permeability shales and limestones.

A comparison of the piezometric and water levels for the wells completed within the Labette and the overburden, respectively, indicates that these two principal water-bearing formations are hydraulically separated

by the intervening shales and limestones. The following are the "head" differences measured in the indicated wells on October 2, 1989:

Formation	Monitoring Wells	Water Level Elevation (ft)	Head Differences (ft)
Labette	MW-103	804.61	
Overburden	MW-203	810.02	5.41
Labette	MW-104	810.92	
Overburden	MW-204	820.95	10.03
Labette	MW-108	809.21	
Overburden	MW-208	820.13	10.92
Labette	MW-111	809.65	
Overburden	MW-211	806.32	3.33

These differences indicate that the hydraulic connection between these formations is poor.

The primary direction of groundwater flow within the overburden will be horizontal along the top of the bedrock to the southwest, because of the large hydraulic conductivity contrast between the overburden and the underlying shales and limestones. Based on piezometric levels, the primary flow direction in the Labette Sandstone is west-northwest to northwestward.

Although the groundwater within the overburden and that within the Labette are two separate systems, the possibility of downward groundwater migration from the overburden to the Labette cannot be entirely ruled out. That is, a small fraction of the groundwater within the overburden may migrate downward toward the Labette, albeit at very low rates.

Neither the overburden nor the sandstone examined during this investigation constitutes an aquifer. A value of 5×10^{-3} cm/sec is considered to be a minimum value for hydraulic conductivities of aquifers, while those reported for the overburden and sandstone are approximately 10^{-5} cm/sec to 10^{-6} cm/sec, respectively. These characteristics, plus the availability of local public water supplies, preclude the installation of drinking water production wells in the shallow subsurface on or near the Site.

2. OVERBURDEN

Although the overburden consists primarily of clay and silty clay, its in-situ permeability as measured by slug tests is substantially higher than that of the underlying shale and limestone bedrock. This contrast in hydraulic conductivity results in predominantly horizontal flow within the overburden.

The water table within the overburden generally occurs within a saturated zone (which at times includes areas of weathered shales) approximately 1 to 7 feet thick immediately above the bedrock surface and at depths from 1 to 12 feet below the ground surface. Thus, the groundwater within the unconsolidated overburden comprises a very small volume of water that is basically situated on top of the bedrock surface. Figure II-22 in Appendix D illustrates the general shape of the water table surface on April 5, 1989.

The predominant groundwater flow in the soil overburden is to the southwest, parallel to the upper bedrock surface. The estimated flow rate is approximately 360 gallons per day beneath the entire Site (assumed to consist of a 3-foot thick saturated zone over a width perpendicular to the direction of flow of approximately 1,000 feet). The average linear groundwater velocity was calculated to be 0.04 feet per day which is equivalent to approximately 15 feet per year. Within a limited area of the northeastern corner of the Site, the top of rock slopes northeastward. In this area, it is believed that the predominant flow of the groundwater within the overburden will initially be to the northeast (generally following the slope of the terrain) and then to the northwest to discharge to the subcrops and rock outcrops of East Pin Oak Creek northwest of the Site.

The recharge for the unconsolidated overburden is primarily on-site precipitation percolating downward. The overburden groundwater discharges to the subcrops and rock outcrops in the ravine bottom of the unnamed tributary on the southwestern part of the Site and west of the Site. As mentioned previously, a small fraction of the overburden groundwater may migrate downward toward the Labette at very low rates.

Although minor seasonal variations in the groundwater flow conditions in the unconfined overburden may exist, they are not anticipated to have

a significant effect on the evaluation of the overburden groundwater flow beneath the Site.

3. LABETTE FORMATION

The sandstone of the Labette Formation is both overlain and underlain by very low permeability shale and limestone interbeds, which act as aquitards. The depth to the top of the sandstone ranges from approximately 31 to 44 feet below ground surface at different locations on the Site. The depth to the piezometric surface of the groundwater within the sandstone ranges from approximately 4 to 10 feet below ground surface at different locations on the Site. Thus, the piezometer levels within the Labette were at least 25 feet above the top of the sandstone for each measurement.

The groundwater flow direction within the sandstone appears to be predominantly horizontal, because of the confining layers located above and below the sandstone. On several measurements, groundwater flow appeared to be west-northwest to northwestward, with some variation in direction in different parts of the Site. However, the hydraulic gradient within the sandstone appears to be slight so that minor changes in piezometric levels may result in variations in estimated flow directions.

The groundwater flow rate within the sandstone beneath the Site is calculated to be approximately 1.2 gallons per day based on a 5,400 square-foot cross-sectional area perpendicular to flow (9 feet thick by

approximately 600 feet width). The average linear groundwater velocity is calculated to be approximately 0.00008 feet per day, equivalent to approximately 0.03 feet per year.

The principal recharge area for the sandstone is the upland area to the south and southeast of the Site, where infiltration of groundwater recharges the sandstone at the locations where the sandstone outcrops or where the shale and limestone aquitard is thin or nonexistent. Additional minor recharge to the sandstone will occur over the entire Site as rainfall percolates downward at slow rates through the overburden and overlying shales and limestones.

The discharge area for the groundwater and any potential contamination which may enter the sandstone beneath the site is outcrops and subcrops in the ravine bottoms of East Pin Oak Creek approximately 7,000 feet to the north and northwest of the Site. Seasonal variations of the groundwater flow within the sandstone are expected to be very minor because of the extremely slow flow rates within the sandstone and its position between two aquitards.

* * * * *

PART IV

NATURE AND EXTENT OF CONTAMINATION

A. INTRODUCTION

This part is divided into sections based upon specific investigation tasks. Each section presents the analytical results from environmental samples obtained on or in the vicinity of the Site in tabular and/or graphical form. Only those results which passed the quality review are used to characterize the Site and related off-site areas with respect to nature and extent of contamination. Appendix A contains a detailed examination of the analytical results with respect to accuracy and precision, completeness, and representativeness.

B. SUBSURFACE SOILS

As described in Part II, subsurface soil samples were obtained from 29 soil borings (both interior and exterior to the buildings), 11 sewer test pits, and 2 test trenches on the Site. The analytical results from these samples provide information concerning both areal and vertical extent of subsurface contamination at the Site.

Subsurface soil samples were analyzed for PCBs, VOCs, and SVOCs. The laboratory analytical reports for these samples are in Appendix F. The analytical results from the exterior and interior borings, the sewer test pits, and the test trenches are summarized in Tables IV-1 through IV-5, respectively. These tables show only results which exceed the method

detection limits for the 49 target compounds identified in the approved SAP. If none of the target compounds was detected, this also is indicated.

Figures IV-1 through IV-11 show contours of the chemical analyses results for 11 chemicals selected because of their frequency of detection in subsurface soil samples. In the figures, the individual chemical's concentration is plotted next to the sample location. Where several samples were taken vertically at the same location (i.e., borings and trenches), the highest value detected is plotted. Where a "ND" is plotted next to a sampling location, the subject compound was not detected at that location above the method detection limit.

Contour lines indicating the horizontal boundaries of concentrations of one-half the method detection limit for the subject compound are shown on each figure. The boundary lines were developed using all site characterization information (including analytical results, sources, and migration routes) and engineering judgment. Conventional contour plotting techniques were modified to account for known migration routes (sewer lines) and the nature (clayey) of the on-site soils.

The vertical distribution of VOCs and PCBs was analyzed qualitatively. For these analyses the data was grouped according to exterior and interior categories. Exterior subsurface soils are defined as those soils that do not lie directly under any of the on-site buildings or structures. The samples which were used to characterize the exterior subsurface soils were obtained from the exterior borings and the sewer test pits. Interior

subsurface samples were obtained from borings inside the buildings and under the loading dock and from the two test trenches.

Tables IV-6 and IV-7 present the calculated vertical distributions of total VOCs and total PCBs, respectively, in discrete depth intervals for the exterior and interior subsurface soil. The vertical distributions are based on sums of detectable concentrations in samples that were analyzed from the various depth intervals.

Gamma-hexachlorocyclohexane (lindane) was the only target SVOC that was detected. However, the lindane was detected only in four locations which do not reveal a source or, in our judgement, represent a plume or appear to have common source. Lindane was not documented to have been associated with Rose operations and is most likely residue from previous agricultural uses of the Site.

1. EXTERIOR SUBSURFACE SOILS

As indicated in Figures IV-1 and IV-2, the highest total PCB concentrations for all Aroclors (up to 700 ppm) in the exterior subsurface soils appear in locations adjacent to sanitary and storm sewers. Lower concentrations (up to 6.3 ppm) of PCBs are found generally around the perimeter of the Main Building.

The maximum exterior subsurface soil PCB concentrations for both Aroclor 1242 and 1254/60 were found in sanitary sewer Test Pit TP-1 and storm sewer Test Pit TP-4. Probable sources may have been related to PCB liquid releases which may have occurred in and around the Main Building.

The PCBs most likely flowed through the on-site storm and sanitary sewers and leaked through sewer line cracks or leaking joints into the surrounding soils. The PCBs, however, appear to be highly localized due to their hydrophobic nature and the adsorptive qualities of the Site soils which minimize their mobility.

The data on vertical distribution of PCBs in the exterior subsurface soils shown in Table IV-7 indicate that the great majority of the PCBs lie within the top 6 feet of overburden soil. This suggests that the sources of the PCBs were surface releases and spills which may have occurred around the Main Building and leakage from the storm and sanitary sewers leaving the building.

Figures IV-3 through IV-11 indicate that the major concentrations of VOCs have been detected in the exterior subsurface soils mainly underneath and adjacent to the storm and sanitary sewers and in two boreholes, those being the boreholes for MW-104 and MW-110. MW-104 is adjacent to the west side of the South Warehouse. The overburden at MW-104 is approximately 5 feet deep; therefore, the VOCs at this location are near the soil/bedrock interface. MW-104 is near a degreasing solvent pit that was reportedly located in the northwest interior corner of that warehouse. The VOCs may have been introduced into the subsurface soil from this source. MW-110 is adjacent to the north side of the Main Building, near the largest doorway on that side of the building. Waste solvent, a source of VOCs, may have been released to the ground directly outside this doorway.

Table IV-6 provides insight into the vertical extent of the VOCs in the subsurface soils. Close review of the boring logs and test pit profiles (see Appendix D) and the depth interval where VOCs were found (Tables IV-1 and IV-3) shows that, of the VOCs detected at these locations, 99 percent were found in soil samples taken adjacent to and beneath the on-site sewers. The low permeability of the soils on the Site are expected to retard the downward migration of the VOCs.

2. INTERIOR SUBSURFACE SOILS

As indicated in Figures IV-1 and IV-2, concentrations up to 18.5 ppm of total PCBs were detected in the subsurface soils under the Main Building. The likely source was PCB liquid releases which traveled through the concrete slab via cracks or seams in the concrete. No PCBs were quantified in the soil samples obtained from under the South Warehouse, although this conclusion is based upon samples taken from only one boring.

The PCB levels in B-12 were not used in the Site characterization. It was concluded that the PCB levels detected in B-12 are extremely localized and not representative of soil conditions under the dock slab. More discussion of this conclusion can be found in Appendix A.

Figures IV-6 through IV-11 indicate varying concentrations of VOCs in the subsurface soils under both the Main Building and the South Warehouse. The highest concentration was 2,800 ppb of xylene under the Main Building. All other VOCs were found at concentrations lower than 1,000 ppb. The areas surrounded by the contour lines appear to

correspond to areas where spills may have taken place, where painting operations existed, or where degreasing operations existed.

VOCs were detected at various depth intervals. The data are recorded as total VOC concentration by 2-foot depth intervals on Table IV-6. The data suggest that over 80 percent of the VOCs lies within the top 8.5 feet under the concrete slab with over 60 percent in the top 4.5 feet. The data shows few VOCs at the soil/bedrock interface under the Main Building. VOCs are expected near the soil/bedrock surface in the northwest corner of the South Warehouse, based on the earlier exterior subsurface soil contamination discussion.

C. GROUNDWATER

Groundwater samples were obtained during three separate rounds of sampling at the Site. Where sufficient groundwater sample was obtained, all samples were analyzed for VOCs, PCBs, and SVOCs. Also, when possible, both filtered and unfiltered groundwater samples were collected and analyzed.

The laboratory analytical reports can be found in Appendix F. A summary of the analytical results from the three rounds is presented in Tables IV-8 through IV-10. The tables also indicate whether there was sufficient groundwater to enable analysis for all target parameters and to provide both filtered and unfiltered samples.

During data quality review, it was discovered that during the first two sampling rounds, samples were handled at or near the ground surface. Analytical results from these two rounds were not consistent with the

chemical properties of PCBs, the characteristics of the water bearing units at the Site, or known spill events. The results appear to indicate a consistent low level source of contamination. It was concluded that the results of the PCB analyses from the first two sampling rounds were not representative of the Site characteristics due to suspected low level contamination of samples from localized ground level dust. During the third sampling round, extra precautions were taken to avoid sample contamination via localized dust. The results of the third round seemed to confirm the contamination phenomenon hypothesized for the first two rounds. PCB results from the third round are the only data used to characterize the PCB contamination present in the water bearing units at the Site. More detailed discussion of this phenomenon and the methodology for the conclusion to consider PCB data from sampling rounds 1 and 2 unrepresentative is presented in Appendix A.

Also during the data quality review, it was concluded that selected VOC analytical results were unrepresentative of Site conditions. Unrepresentative data is not used to characterize the Site contamination. More detailed discussion and rationale is presented in Appendix A.

1. ROUND ONE OF GROUNDWATER SAMPLING

During the first groundwater sampling round, 55 samples were collected and analyzed. This consisted of 20 VOC samples and 17 filtered and 18 unfiltered samples analyzed for PCBs and SVOCs. The analytical results for this round are in Table IV-8. Two deep well and four shallow well samples showed detectable concentrations of VOCs. For PCBs, two deep well samples and two shallow well samples had detectable concentrations;

however, as discussed previously, these results are not used to characterize the Site contamination.

The VOC results for the round one groundwater samples are shown on Figure IV-12. The filtered and unfiltered PCB results for these samples are shown in Figures IV-15 and IV-18, respectively. Data QA/QC-qualified as sampling or laboratory artifact or unrepresentative is indicated on the figures.

a. PCB Results

No results from this sampling round are used to characterize the Site.

b. VOC Results

The VOC results from the first sampling round indicate that VOCs are restricted to the shallow overburden groundwater. VOCs were detected in the shallow well samples from MW-201, MW-204, MW-210, and MW-211. The presence of VOCs in MW-204 and MW-210 is consistent with the suspected prior Site activities which occurred in the vicinity of those well locations. A former degreasing pit is located in the northwest corner of the South Warehouse near MW-204. Releases of VOC wastes onto the ground outside the Main Building door near MW-210 also were suspected to have occurred.

The VOC levels found in MW-201 are likely due to contaminant migration from the degreasing pit in the South Warehouse. The shallow groundwater flow gradient (Figure II-2, Appendix D) in the

overburden soils is to the southwest towards the unnamed tributary. Also, the degreasing pit is thought to have been in use many years prior to Rose's use of the site. At a shallow groundwater velocity of 15 feet per year (see Part III), a minimum of approximately 10 years would be required for the VOCs to move from the former degreasing pit to MW-201. Based upon the groundwater flow direction, there is potential for these contaminants, or their degradation products to reach the unnamed tributary.

The VOCs found in MW-211 are thought to result from leakage of nearby sanitary and/or storm sewers. VOCs were also found in the subsurface soil samples collected in this area. The potential origin of the VOCs in sewers is discussed later in this part (Section F).

c. SVOC Results

No target SVOCs were detected.

2. SECOND ROUND OF GROUNDWATER SAMPLING

During the second groundwater sampling round, 61 samples were collected. These consisted of 23 VOC samples and 18 filtered and 20 unfiltered samples to be analyzed for PCBs and SVOCs. Table IV-9 summarizes analytical results for this sampling round. The analytical results (with QA/QC-qualified data indicated) are also presented in Figures IV-13, IV-16, and IV-19. In the second round, PCBs were detected in samples from seven deep wells and nine shallow wells; however, as discussed previously, these results are not used to characterize the

contamination at the Site. VOCs were found at detection limit concentrations and above in three deep well and five shallow well samples.

a. PCB Results

No results from this sampling round are used to characterize the Site.

b. VOC Results

The VOC constituents in the shallow wells were similar between rounds one and two. Three wells (MW-201, MW-204, and MW-211) which exhibited VOC concentrations during the first round of sampling yielded samples containing similar constituents and concentrations during the second round, supporting the previous discussion of round one results. The second round results from shallow wells MW-210 and MW-208 and deep wells MW-101, MW-104, and MW-107 were not used for Site characterization due to lack of representativeness.

c. SVOC Results

No target SVOCs were detected.

3. THIRD ROUND OF GROUNDWATER SAMPLING

During the third groundwater sampling round, sixty-one samples were collected. These consisted of twenty-four VOC samples, and twenty-three filtered and twenty-three unfiltered samples to be analyzed for PCBs and SVOCs. Table IV-10 summarizes analyses results for this round of sampling. Analyses results for the wells are also shown in Figures

IV-14, IV-17, and IV-20. QA/QC-qualified data not used in the Site characterization is indicated on these figures. In the third sampling round, PCBs were detected in two shallow well samples and no deep wells. VOCs were detected in five shallow and four deep well samples. Results from one shallow and three deep wells were QA/QC qualified.

a. PCB Results

Part II described the procedures used during the third round of sampling to avoid introducing PCBs into samples via localized ground level dust. The results from the sampling round appear to confirm the hypothesis made concerning the contamination of samples by dust, since no inconsistencies from the expected properties of PCBs were observed during analysis of the third round results. PCBs were detected in samples from only two wells in the third round. Those wells were MW-207 and MW-204, and the total PCB concentrations detected were 22.5 and 1.3 ppb, respectively. Both samples were unfiltered. Since no PCBs were detected in the groundwater from MW-206, it appears that the PCBs detected in samples from MW-207 and MW-204 are from distinct sources, and do not constitute a plume.

b. VOC Results

The results from the third sampling round of shallow wells generally reconfirmed the two previous sampling rounds. Three shallow well samples (from MW-201, MW-204, and MW-211) which exhibited VOC concentrations during the first two sampling rounds showed VOCs at similar levels and constituents. The sample from a fourth shallow well, MW-210, showed similar constituents and concentrations as the

Round 1 sample. The results of the second round analyses of the MW-210 sample were QA/QC-qualified as not representative as discussed previously.

VOCs also were detected in the sample from deep well MW-108. Trichloroethene (6 ppb) and 1,2-dichloroethene (total - 14 ppb) were quantified. No VOCs were detected in samples from this well in previous rounds. Potential sources of these chemicals are discussed in Appendix A.

c. SVOC Results

No target SVOCs were detected.

4. ANDERSON WELLS

In accordance with the SAP - Addendum 1, a total of five groundwater samples were collected from two different livestock water wells located on property adjacent to the Site owned by Ms. Metta Anderson. Three of the samples were unfiltered, and two were filtered prior to analysis.

A sample of water was first obtained from a well located approximately 200 feet west of the Site's west boundary and adjacent to the north bank of the unnamed tributary. This well is hereafter referred to as the North Anderson Well. The sample was collected unfiltered and analyzed for VOCs, PCBs, and SVOCs. The analyses detected only PCBs at 6.7 ppb.

Two additional samples, one filtered and one unfiltered, were subsequently obtained from the North Anderson Well. No PCBs were

detected above method detection limits in either sample. A summary of the analytical results for the North Anderson Well is in Table IV-11.

A second well (South Anderson Well) on the Anderson property was sampled after the North Anderson Well was sampled. This well is approximately 250 feet west of the Site's west boundary. It is approximately 15 feet south of the unnamed tributary. Two groundwater samples were obtained, one filtered and one unfiltered. No PCBs were detected above method detection limits in either sample. A summary for the analytical results from the South Anderson Well is in Table IV-12.

D. SURFACE SOILS

During the RI, 63 surface soil samples were obtained from the Site and from the off-site property adjacent to the east property line of the Site and north of McKissock Street. Surface soil samples also were collected during earlier investigation activities at the Site as well (See Appendix C for more information on pre-existing data). The analytical results from these sampling events provide information concerning the distribution and concentrations of PCBs in surface soils at the Site.

The surface soil samples collected during the RI were analyzed for PCBs. The laboratory analytical reports can be found in Appendix F. A summary of the analytical results is in Table IV-13.

The extent of PCBs in the surface soil is presented in Figures IV-21 (on-site sampling) and IV-22 (off-site sampling). Figure IV-21 includes validated data from previous surface soil investigation activities. The

figures show that the surface soils containing PCBs at concentrations of 10 ppm or higher are generally located adjacent to the Main Building and the South Warehouse, in the area between the two buildings, and in the area to the west of both buildings. Samples from approximately half of the surface soil grids at the Site contain below detection limit concentrations of total PCBs. Less than 10 percent of the surface soil area has concentrations of total PCBs above 10 ppm. The highest concentration of total PCBs (540 ppm) found during the surface soil investigations was in a sample taken from the northwest quadrant of a 50- by 50-foot grid (No. Q2) in the southwest corner of the Site near the South Warehouse.

Although no soil sampling was done in agriculturally zoned properties west and north of the Site, the soil sampling conducted in the northern and western portion of the Site, in the vicinity of these areas, has not shown high concentrations of PCBs. Based on these results, no pathways are known which would suggest that higher PCB concentrations could exist in the off-site soils which are farther from the on-site sources of PCBs. A possible exception is the north side of the Main Building where at least one ventilation fan is believed to have been located in the building wall at a height of approximately 7 to 10 feet. A review of the interior wall wipes in this area shows the following:

Height (ft)	No. of Wipes	PCB Concentration (ug/100 cm^2		
		Max	Min	Ave
1-3	3	1,180	6.1	425
5-8	4	36	5.4	20.1

These results show that while relatively high PCB concentrations were detected at lower elevations on the interior north wall, the concentrations of PCBs at the height of the ventilation fans were much lower. It also should be noted that all of the 1- to 3-foot height samples were biased samples, that is, the locations were selected in the field to be the most highly stained parts of the wall. Based on these results and the exterior soil sample results just north of the north wall of the Main Building shown in Figure IV-21 (maximum surface soil PCB concentration of 2.02 ppm), the ventilation fans are not believed to have created a pathway to cause significant concentrations in the off-site property to the north of the Site.

E. SURFACE TRACKING

Surface tracking samples were obtained from areas adjacent to and outside of the Site boundaries. These areas were used as entrances/exits during previous and current Site operations. Seven samples were collected, two were soil samples and five were asphalt wipe samples. In addition, two collocated wipe samples were taken of the asphalt.

The surface tracking samples collected during the RI were analyzed for PCBs. The laboratory analyses reports are in Appendix F. A summary of the analytical results for the surface tracking is presented in Table IV-14.

The results of the surface tracking sampling are also shown on Figure IV-23. Surface Tracking Samples 1 and 2 were both soil samples obtained at the former north entrance. The sample taken closest to the Site boundary had

only 0.1 ppm total PCBs. No PCBs were detected above the detection limit in the other soil sample.

The remainder of the samples were asphalt wipe samples obtained at the east entrance to the Site at McKissock Street and the former south entrance to the Site off of Missouri Highway 58. These samples showed total PCB concentrations between below detection limits and 6.1 ug/100 cm^2.

In summary, the surface tracking analytical results for locations most likely to be contaminated by tracking, show PCB concentrations below EPA's established levels for nonrestricted access.

F. SEDIMENT

A total of forty-seven on- and off-site sediment samples were obtained during RI activities. The results provide information concerning the extent of the contamination of the sediments in on-site ponds, sewers, East Pin Oak Creek, and the unnamed tributary.

In all cases, the sediment samples were analyzed for VOCs, PCBs, and SVOCs. A summary of the on- and off-site sediment sample analyses results is in Table IV-15.

1. ON-SITE SEDIMENT

A total of 12 sediment samples were collected on-site. Of these 12 samples, 3 were replicates. The sample locations and validated results are shown on Figure IV-24.

The figure shows that the on-site storm water retention ponds have total PCB sediment concentrations ranging between 0.8 ppm to 2.7 ppm. The sources of these PCBs are likely on-site soils which have eroded and washed into the ponds. A sample from a storm water retention pond also contained lindane at a concentration of 1.1 ppm. The source of lindane is unknown; however, it is a common agricultural residue and has not been documented to be associated with Rose operations. Toluene was detected at a concentration of 28 ppb. Toluene in subsurface soils was detected only under the buildings, and the only other sediment sample which showed detectable concentrations was the City sanitary sewer sediment sample. There is no apparent pathway between the sanitary sewer and the stormwater retention pond. The toluene was most likely carried into the pond by surface runoff or by storm sewer discharge to the connecting ditch.

The drainage ditch which carries storm water from the storm sewer outfall to the storm water retention ponds contains total PCB concentrations ranging between 2.2 ppm to 24.1 ppm. The likely source of these PCBs is Site runoff. In addition, 1,2,4,5-tetrachlorobenzene, pentachlorobenzene, and 1,2,4-trichlorobenzene were found at concentrations ranging from 0.1 to 0.3 ppb in samples from the ditch.

Total PCB concentrations ranged from 23.9 ppm to 122 ppm in the spill containment pond sediment.

Three replicate samples were obtained of sediment from the Holden sanitary sewer manhole south of the Main Building and northwest of the

South Warehouse. Two replicates were analyzed by EMS and no PCBs were detected. The third replicate was analyzed by the U.S. EPA Laboratory and 4.3 ppm total PCBs were detected. VOCs were detected in this sediment, including toluene at 11,000 ppb. This manhole is hydraulically upgradient (approximately 15 feet) from the location of TP-1 where the now-abandoned sanitary sewer from the Main Building connects to the Holden sanitary sewer system. The sample from TP-1 showed a total PCB concentration of 700 ppm, the likely source of which was leakage from the sewer. The lack (or low concentration) of PCBs in the upgradient sewer manhole indicates that: (1) PCBs never significantly backed up in the Holden sanitary sewer line to the manhole or (2) most PCBs that did back up to the manhole have been flushed from the line. In either case, any PCBs previously introduced from the Main Building sanitary sewer into the Holden sanitary sewer are nearly absent, and it is likely that any VOCs similarly introduced to the Holden sanitary sewer also are nearly absent.

Another potential source of toluene in the sewer sediments is shallow groundwater infiltration. However, toluene was found in the shallow groundwater only in MW-204 (three rounds) and in MW-210 (one round). The sanitary sewer is approximately 120 feet from MW-204 and at approximately the same elevation with respect to the shallow groundwater piezometric surface (See Appendix D). It is unlikely that toluene would move laterally to the sanitary sewer system when it has not moved downgradient to MW-201 approximately the same distance. Also, if groundwater were the source of the toluene, the soil and fill material around the sewer would be expected to contain detectable concentrations

of toluene also. Toluene was not detected in the sediment sample from TP-1, which is approximately 15 feet downgradient from the sanitary sewer manhole. Analyses of the MW-210 sample from the second round of groundwater sampling is suspect as discussed previously. In addition, toluene has not been detected in shallow wells located between MW-210 and the sanitary sewer manhole.

For the above reasons, the toluene detected in the sanitary sewer is thought to be from an off-site source.

Total PCB concentrations in the sediment from the on-site portions of the unnamed tributary ranged from 0.3 to 20.8 ppm. The sediments in the ditch draining to the east storm water retention pond exhibited similar PCB levels. The sediments appear to have a common source, based on similar ranges of PCB concentrations. This source appears to be eroded surface soils, which contain PCBs and have washed into the stream.

Trichloroethene in concentrations of 9 to 40 ppb was also found in the unnamed tributary sediments. Potential sources include the degreasing pit in the northwest corner of the South Warehouse or leakage from the Holden existing or abandoned sanitary sewer lines. MW-211, which lies between the sewer line and the tributary, has shown detectable trichloroethene in all three rounds of groundwater sampling.

2. OFF-SITE SEDIMENT

A total of 35 off-site sediment samples were taken in East Pin Oak Creek and its unnamed tributary. Of these 35 samples, 4 were replicate samples. The sample locations and validated results are shown on Figure IV-25.

Two sediment samples were taken from the unnamed tributary south of the Site. These showed methylene chloride at a concentration of 110 ppb and trichloroethene at a concentration of 53 ppb. The methylene chloride concentration is above the detection limit (modified for laboratory contamination as discuss in Appendix A) of 87 ppb, but the source is unknown. A known potential source for the trichloroethene is the shallow groundwater moving downgradient from the area of MW-204.

Ten regularly spaced samples were taken in the portion of the unnamed tributary from the western Site boundary to the confluence with East Pin Oak Creek. PCBs were not detected in two samples, and the maximum concentration detected was 6.7 ppm. The source appears to be surface soils which have eroded into the stream or residual deposits. Half of the samples in this portion of the unnamed tributary contained trichloroethene at levels from 6 to 8 ppb, slightly above the detection limit. These samples continued the trend of steadily decreasing trichloroethene concentrations in the unnamed tributary sediments which began with the sediment taken on the south side of Missouri Highway 58. Xylene was detected in one sample at a concentration of 24 ppb.

Two samples were taken upstream on East Pin Oak Creek from the confluence of the creek and its tributary. Total PCB concentrations were 1.4 and 2.7 ppm. Since a direct pathway from the Site to these locations cannot be identified, the analytical results of these samples indicate a potential for sources of PCBs in the creek other than the Site. Toluene (6 ppb) was also detected.

Downstream of the unnamed tributary's confluence with East Pin Oak Creek, sediment samples were gathered at 17 locations. At the confluence a replicate sample showed 77 ppm total PCBs. From the confluence to the Holden POTW outfall, a distance of approximately 200 feet, 2 additional locations were sampled and showed PCB concentrations of 119 and 5.2 ppm. Four samples then were taken between 200 and 500 feet downstream of the POTW outfall indicating total PCB concentrations ranged from 73 to 293 ppm. This interval of sediment is thought to be either residual deposits of PCB-laden sediment slowly migrating down the creek from the Site or PCB-laden sludge previously discharged from the POTW. POTW sludge samples analyzed in 1988 showed nondetectable concentrations of PCBs, indicating that discharge of PCB contaminated sludge from the POTW is not a continuing source.

From 500 to 1,400 feet downstream of the POTW outfall, 9 consecutive sediment samples at 100-foot intervals were gathered. These samples contained no detectable PCB concentrations.

The most significant VOC detected over the sampled portion of East Pin Oak Creek downstream of the confluence point was toluene. Toluene was

detected in 7 of 17 locations sampled over this interval at concentrations of 46 to 6200 ppb. Toluene was found on the Site in soils only under the buildings and in groundwater only in MW-204 and MW-210. No current hydraulic connection or pathway between these on-site toluene sources and the toluene detected in the creek sediments has been demonstrated. An off-site source of the toluene appears to be likely; however, pathways from the Site to the unnamed tributary and East Pin Oak Creek did exist before on-site storm and sanitary sewers were plugged.

Trichloroethene was present detected in the creek sediments downstream of the confluence point in four samples at a maximum concentration of 39 ppb. This maximum was from a sample taken at 1,500 feet downstream of the confluence, near a pool created by limestone outcrops which was observed to concentrate sediments. Potential sources for trichloroethene in the creek include fill material around the Holden sanitary sewer in the southwest part of the Site; the former degreasing pit in the South Warehouse; and the Holden POTW discharge. The pathway from the two former sources to the creek is the shallow groundwater discharging to the unnamed tributary which in turn discharges to East Pin Oak Creek.

Xylene was detected in sediment at two locations at approximately 1,100 and 1,300 feet downstream of the confluence at concentrations of 960 and 1,800 ppb, respectively. While potential sources of on-site xylenes exist, shallow groundwater pathways between these on-site xylenes and the unnamed tributary, have not been confirmed by the shallow

groundwater sampling results. An off-site source of xylenes appears likely, although pathways from the Site to the unnamed tributary and East Pin Oak Creek did exist before on-site storm and sanitary sewers were plugged.

G. SURFACE WATER

A total of 34 on- and off-site surface water samples were obtained during RI activities. The analytical results from these samples provide information concerning the extent of contamination of surface water in on-site ponds and in East Pin Oak Creek and its unnamed tributary.

At all sample locations except the main pit in the Main Building, two surface water samples collected. One of the samples was filtered and analyzed for PCBs and SVOCs. The other sample was left unfiltered and was analyzed for VOCs, PCBs, and SVOCs. A summary of the on- and off-site surface water analytical results is in Table IV-16.

1. ON-SITE SURFACE WATER

A total of 17 surface water samples were collected on-site. These included four samples from on-site ponds, two samples from the unnamed tributary to East Pin Oak Creek, three samples from the main pit in the Main Building, three replicates, three field blanks, one replicate for the EPA, and one potable water sample. The sample locations (except for the main pit, field blank, and potable water samples) and validated results are shown in Figure IV-26.

The results of the unfiltered sample from the spill containment pond indicated that a concentration of 16 ppb of ethanol was present in the pond. This was an isolated occurrence and the source of the ethanol is unknown. Aroclor 1242 and 1254/60 were present in the unfiltered sample at concentrations of 5.8 and 4.2 ppb, respectively. The filtered sample had 2.6 ppb of Aroclor 1242 only. Two other water samples (filtered and unfiltered) collected from the containment pond contained similar levels of PCBs. The source of the PCBs in the surface water of the spill containment pond is the same as that of the sediments in the pond.

Two surface water samples were obtained at the former storm water sewer discharge from the Site to the unnamed tributary. No compounds above the method detection limit were found in the filtered sample. The VOC 1,1,2-trichloroethane was detected at 78 ppb in the unfiltered sample. This compound was not detected in any on-site monitoring wells or subsurface soils. An off-site source for 1,1,2-trichloroethane appears likely.

Two unfiltered water samples were collected from the main pit in the Main Building. At the time of sampling, a sheen of oil was observed on the approximately 4 inches of water in the pit. The analyses of these water samples showed total PCBs at concentrations from 3.5 to 4.5 ppm which is far above the solubilities of PCBs in water. The observed oil sheen apparently contained PCBs, thus accounting for the PCB concentrations. In addition to PCBs, these water samples also contained elevated levels of 1,1-dichloroethene (5-68 ppb); 1,1,1-trichloroethane (45-490 ppb); 1,2,4-trichlorobenzene (200-410 ppb); and 1,2,4,5-

tetrachlorobenzene (160-230 ppb). Toluene and xylene were detected at concentrations less than 15 ppb. The source of all these compounds is likely residue leaching from the concrete walls of the pit.

An unfiltered sample of potable water was obtained from an on-site faucet. No target compounds were detected in the sample above method detection limits.

2. OFF-SITE SURFACE WATER

A total of 17 surface water samples were collected off-site. These included eight samples from East Pin Oak Creek, four samples from the unnamed tributary, two replicates, two field blanks, and one EPA replicate. The sample locations and validated results are shown in Figure IV-27.

A set of surface water samples was collected in the unnamed tributary approximately 400 feet upstream of the Site storm sewer outfall at Missouri Highway 58. The only contaminant of interest found in either sample was methyl ethyl ketone which was present at near the method detection limit.

The first set of surface water samples taken in the unnamed tributary downstream of the Site was taken 1,200 feet downstream of the abandoned Site storm sewer outfall to the unnamed tributary. The only compounds of concern detected in either sample were PCBs at a total concentration of 3.9 ppb in the unfiltered sample. The source of the PCBs in the surface water is the same as that of the sediments in the tributary.

Filtered and unfiltered surface water samples were collected approximately 80 feet upstream of the confluence of East Pin Oak Creek and the unnamed tributary to determine the background concentrations in the surface waters of East Pin Oak Creek. The unfiltered sample showed 21 ppb total PCBs and the filtered sample showed 6.5 ppb. At the time of sampling, this portion of the creek was frozen, and ice had to be broken to obtain a water sample. During the breaking of ice, some disturbance of sediments was noted. Because the sediment sample collected subsequently at this location contained 1.4 ppm total PCBs, creek sediments are the likely source of the PCBs in these samples.

At the midpoint between the confluence of East Pin Oak Creek and its unnamed tributary and the Holden POTW, an unfiltered sample contained no detectable PCBs; however, 1.4 ppb of Aroclor 1242 was detected in the filtered sample collected at the same location. The samples do not appear to be representative. Exposure of the filtered sample to ground level dust containing PCBs appears to be a possible explanation. The analytical results suggest no PCB contamination of surface water at this location.

Below the Holden POTW outfall, East Pin Oak Creek was flowing at the time of surface water sampling. A set of unfiltered and filtered samples was collected at the POTW outfall. PCBs were detected in the unfiltered sample at a concentration of 7.9 ppb. Tetrachloroethane (at 8 ppb) and 1,1,2-trichloroethane (at 140 ppb) were also detected in the unfiltered sample. No compounds were detected in the filtered sample

above method detection limits. PCBs and trichloroethene were subsequently detected in the sediment sample collected at this location as well. Potential on-site sources of trichlorethene in the off-site creeks may reach the creeks through the shallow groundwater pathway. Trichloroethene has been detected in the shallow monitoring wells nearest the unnamed tributary.

The VOC 1,1,2-trichloroethane was previously detected in a surface water sample in the unnamed tributary. These are the only two detections of 1,1,2-trichloroethane during the RI. Therefore, off-site sources appear to be likely.

At the furthest downstream surface water sampling point (500 feet downstream of the POTW outfall), the unfiltered sample contained less than 10 ppb each of trichloroethene and toluene. No PCBs were detected in these samples.

H. AIR

The results of analyzing the air samples taken from the breathing zone for health and safety documentation discussed in Part II are shown in Table IV-17. Detectable quantities of dust were found during all three indoor activities (trenching, boring and wipe sampling) which were tested. However, the highest dust value encountered was 0.5 milligrams per cubic meter or approximately 3 percent of the OSHA permissible exposure limit for dust. No PCBs or VOCS were detected in any of the air samples.

The results confirm that activities carried out in the buildings will generate dust in the breathing zone, but the dust is not necessarily contaminated with PCBs or VOCs. The results document that the Health and Safety Plan requirement for Level C personnel protection when working in the building is appropriate but conservative.

I. BUILDINGS AND STRUCTURES

The investigation quantified detectable concentrations of PCBs on various building structural surfaces, concrete floors at depth (0.5 to 2 inches), wall ceiling insulation, and miscellaneous structural materials in the buildings.

Tables IV-18 through IV-27 contain summaries of analytical results of the various sampling efforts. Figures IV-1 through IV-13 of Appendix E show the sample locations.

1. SURFACES

Surface sampling was accomplished using the wipe sampling procedure described in Appendix E. Surfaces which were sampled included floors, interior walls, ceilings, exterior walls, and horizontal structural surfaces.

a. Floors

Forty-three unbiased wipe samples were taken from the approximate center of the floor of each grid in the Main Building and the South Warehouse. Thirteen biased samples were taken from stained floor

areas of the same buildings. The results, including two Burns & McDonnell collocates, are characterized as follows:

Location	Sample Type	No. of Samples	Total PCBs (ug/100cm^2) Average	Maximum	Minimum
Main Building	Unbiased	38	545	4,700	BDL
Main Building	Biased	9	180,000	1,160,000	109
South Warehouse	Unbiased	5	155	420	3.5
South Warehouse	Biased	4	6,000	19,500	95

Three of the unbiased samples from the Main Building showed PCB concentrations less than the method detection limit (1 ug/100 cm^2).

The results indicate, in general, that the Main Building floor contains more PCBs than that of the South Warehouse. Also, they show that visually stained areas of the floors normally indicate the presence of higher concentrations of PCBs.

b. Interior Walls

A total of 58 interior wall wipe samples were taken from the two major buildings and the shed. In addition, one Burns & McDonnell collocate was obtained. The samples were taken at the midpoint of the designated grid area and up 5 feet from the floor when possible. If the wall height was greater than 5 feet, another sample was taken at the midpoint from 5 feet to the top of the wall. When insulation was present, it was removed and the wipe sample was taken on the actual wall surface. Biased samples were taken from stained areas, as appropriate.

The analytical results are contained in Table IV-19 and sample locations are shown in Figures IV-3 and IV-4 of Appendix E. The results are characterized as follows:

Main Building - Unbiased Samples

Height (ft)	Surface	No.of Samples	Total PCB (ug/100cm^2) Average	Maximum	Minimum
0-5	Metal	6	32.2	154	0.21
0-5	Concrete	6	13.9	52	BDL
>5	Metal	10	25.8	218	BDL
>5	Concrete	4	11	37	0.16

Main Building - Biased Samples

Surface	No.of Samples	Total PCB (ug/100cm^2) Average	Maximum	Minimum
Metal	6	220	1180	3.4
Concrete	2	20	22.2	18.3

Main Building - Pits

Pit Location	No.of Samples	Total PCB (ug/100cm^2) Average	Maximum	Minimum
Grid 23 - Unbiased	4	139	222	18.5
Grid 23 - Biased	1	3,390	3,390	3,390
Grid 27 - Unbiased	4	87	191	28

Shed - Unbiased

Height (ft)	Surface	No. of Samples	Total PCB (ug/100cm^2) Average	Maximum	Minimum
5	Metal	2	3.4	5.2	1.5

South Warehouse - Unbiased Samples

Height (ft)	Surface	No.of Samples	Total PCB (ug/100cm^2) Average	Maximum	Minimum
0-5	Metal	3	31	85.6	BDL
>5	Metal	3	6	14	BDL

South Warehouse - Biased Samples

Surface	No.of Samples	Total PCB (ug/100cm^2) Average	Maximum	Minimum
Metal	3	19	30	3.6

PCBs were found on all interior surfaces of the Main Building. Surfaces in the South Warehouse have lower PCB levels than those in the Main Building. The surface of the two pits in the Main Building have higher concentrations of PCBs than the building walls in general.

In the Main Building the higher wall sampling locations (above 5 feet) generally show about the same concentration of PCBs as the lower sampled locations (5 feet or less). In the South Warehouse the PCB concentrations at higher locations appear to be less than the concentrations of PCBs at lower locations.

The obviously stained areas in the Main Building show more PCBs than those in the South Warehouse, another indication that the overall PCB level of the South Warehouse is significantly less than that of the Main Building.

c. Ceilings

Wipe samples were obtained from the ceiling of the two buildings above the center of selected grid areas. Wipes were taken on the interior surface of the metal roof; insulation was removed prior to sampling when required. The results are summarized in Table IV-20 and characterized below:

Location	No.of Samples	Total PCB ($ug/100cm^2$) Average	Maximum	Minimum
Main Building	14	15	81.5	BDL
South Warehouse	3	14.5	29.7	3.5

The results show that the building ceilings contain similar levels of PCBs and significantly lower concentrations than the walls.

d. Horizontal

Unbiased wipe samples were taken from the upper surface of horizontal beams or fixtures located approximately in the center of selected grids.

Biased samples were taken from obviously stained areas. The locations are shown in Figures IV-7 and IV-8 of Appendix E.

Results are summarized in Table IV-21 and characterized below:

Location	No. of Samples	Total PCB (ug/100cm^2) Average	Maximum	Minimum
Main Building - Unbiased	14	143	830	6.7
Main Building - Biased	11	55	217	BDL
South Warehouse - Unbiased	3	46	68	7.1
South Warehouse - Biased	2	45	69	21

The Main Building again shows higher PCB concentrations than the South Warehouse. Also, visibly stained areas appear to contain no more PCBs than the horizontal surfaces in general. Horizontal surfaces appear to have more PCBs than walls and ceilings, probably due to their ability to collect dust particles.

e. Exterior

Exterior wall and roof wipe sample locations are shown in Figures IV-9 and IV-10 in Appendix E. The results are summarized in Table IV-22 and characterized below:

Location	No. of Samples	Total PCB (ug/100cm^2) Average	Maximum	Minimum
Main Building				
Wall - Unbiased	11	2.6	6.1	BDL
Wall - Biased	4	3.0	5.0	BDL
Roof - Unbiased	4	5.0	9.6	BDL
Roof - Biased	3	2.7	4.0	0.1
South Warehouse				
Wall - Unbiased	4	5.7	21.9	BDL
Wall - Biased	2	0.8	1.6	BDL
Roof - Unbiased	1	6.8	6.8	6.8
Roof - Biased	2	BDL	BDL	BDL

Only one exterior PCB concentration greater than 10 ug/100 cm^2 was found. Both buildings are consistently between detection limit and 6 ug/100 cm^2.

2. CONCRETE CORES

A total of 12 unbiased and 13 biased (from visibly stained areas) concrete cores were removed from the building slabs. The top 0.5 inch of each of these cores was ground and analyzed for PCBs as specified in the approved SAP. The locations from which the cores were taken are shown in Figures IV-11 and IV-12 of Appendix E. The results are summarized in Tables IV-23 and IV-24 and are characterized below.

Type of Sample	No. of Samples	PCB Concentration (mg/kg) Average	Maximum	Minimum
Main Building				
Unbiased	11	979	4,390	0.15
Biased	11	214,000	670,000	4,900
South Warehouse				
Unbiased	1	548	548	548
Biased	2	137,000	270,000	3,500

The results indicated that the slabs generally contain high concentrations of PCBs in the top 0.5 inch. Further investigation was done on two of the previously removed cores (one biased and one unbiased) to determine how deep the PCBs extended into the slab. Three additional one-half inch sections of the core were analyzed. The results of these additional analyses are characterized as follows:

Grid No.	Core No.	0-0.5 in. (original)	PCB Concentration (mg/kg) 0.5-1.0 in.	1.0-1.5 in.	1.5-2.0 in.
32	CC-17	231,000	10,300	780	113
12	CC-2	874	75,000	10,000	3,920

The analyses show that PCB concentrations decrease considerably with depth; however, PCB concentrations exist down to at least the 2-inch level. The total depth of detectable PCB concentrations cannot be ascertained from the data. It is concluded that qualitative characterization of PCB concentrations at depth is not possible based on visual appearance or analyses of the top 0.5-inch surface of the concrete.

3. INSULATION CORES

Insulation cores were removed from walls and ceilings of the Main Building and South Warehouse. Some areas were removed from preselected random locations (unbiased) and some were removed from stained areas encountered during the investigation. The locations of the insulation cores are shown in Figures IV-3 and IV-4 of Appendix E. The results are summarized in Tables IV-25 and IV-26 and are characterized below:

Type Sample	Location	No. of Samples	Total PCB (ug/sample) Average	Maximum	Minimum
Main Building					
Unbiased	Wall	5	451	1,590	18.3
Biased	Wall	6	557	1,150	96
Unbiased	Ceiling	14	3,640	25,800	5.7
Biased	Ceiling	6	614	1,830	119
South Warehouse					
Unbiased	Wall	1	24	24	24
Biased	Wall	No sample			
Unbiased	Ceiling	3	3,320	7,900	435
Biased	Ceiling	1	3,950	3,950	3,950

The results show that the ceiling insulation contains more PCBs than the wall insulation. In addition, the ceiling in the South Warehouse was found to exhibit PCB concentrations similar to those of the Main Building.

The sample units were ug/sample. To relate these units to concentrations, a representative group of cores was removed and weighed. The sample average weight was 0.4 grams each. Therefore, as a qualitative indication of PCB concentrations in these samples, the analytical results can be multiplied by 2.5 to obtain a mg/kg concentration. Representative conversions are shown below:

Analytical Result (ug/sample)	Approximate Concentration (mg/kg)
3,000	7,500
600	1,500
20	50

4. DESTRUCTIVE SAMPLES

Eight destructive samples, including one replicate, were taken of nonimpervious materials in the Main Building. The materials included rubber, wood, and linoleum. The locations of destructive sample removal are shown on Figure IV-13 of Appendix E. The results are summarized in Table IV-27.

The analytical results were reported in terms of total mass of PCBs per sample. The values ranged from 8 to 9,300 ug PCBs per sample. Qualitatively, the results show that all of the samples showed concentrations of PCBs. The lowest level of PCBs was found in a sample of linoleum from the previous office area of the building. The highest value was from a sample of rubber from the loading dock.

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PART V

ENDANGERMENT ASSESSMENT

A. INTRODUCTION

The objective of the Endangerment Assessment (EA) is to assess the potential risks to public health, welfare, and the environment associated with the release or threatened release of chemicals at the Site. The EA evaluates the potential impacts under the assumption that no further remedial actions are implemented at the Site. The analytical process used in the EA is in accordance with U.S. EPA guidance and is based on data presented in Part IV. A summary of the analytical process and results is presented below. Detailed background and description of the EA analyses are included in Appendix B.

B. SELECTION OF INDICATOR CHEMICALS

Because of the large number (44) of chemicals detected at the Site, indicator chemicals were selected to focus the EA on those chemicals that pose the greatest potential public health and nalytical results from samples of environmental media Indicator chemicals were then selected based on the of detection, concentration, toxicity, environmental mobility, and persistence. The eleven indicator chemicals selected for the Site are: Aroclor 1242; Aroclor 1254/1260; 1,1-dichloroethane; 1,1-dichloroethene; g-hexachlorocyclohexane (lindane); methylene chloride; tetrachloroethene; toluene; 1,2,4-trichlorobenzene; 1,1,1-trichloroethane; and trichloroethene.

Not consistent w/ RAGs issued in 1989 - 1 year before this document. Use 8 indicators

C. TOXICOLOGICAL EVALUATION

To assess the potential health risk associated with exposure to the indicator chemicals at the Site, it was necessary to determine what effects have been observed in humans or laboratory animals exposed to the chemical and at what exposure levels these effects occurred. The U.S. EPA has conducted such assessments on many frequently occurring environmental chemicals, the results of which are published by the U.S. EPA and updated regularly.

The toxic effects of chemicals can be expressed through the use of Reference Doses (RfDs) and Cancer Potency Factors (CPFs). An RfD is a conservative estimate of a daily human exposure that is unlikely to result in deleterious effects following chronic exposure. A CPF represents the slope of the tumorigenic dose-response curve in the low-dose region. The U.S. EPA has developed and published both route-specific RfDs for carcinogenic and noncarcinogenic chemicals and CPFs for carcinogens. For the purposes of this EA, U.S. EPA's RfDs and CPFs are used unconditionally, i.e., without review or validation of methods or calculations. No independent review of the toxicological literature was performed for chemicals for which U.S. EPA has not developed a CPF or RfD.

D. EXPOSURE ASSESSMENT

Exposure assessment is the identification of populations potentially exposed to chemicals and the determination of the potential magnitude and duration of their exposures. In this EA, the exposure assessment included three

steps: identification of exposure pathways; estimation of environmental concentrations; and estimation of human dose.

Pathways by which a population or an individual could be exposed to chemicals originating from the Site under current or hypothetical future uses of the Site and surrounding area were identified. Three potential uses of the Site were evaluated. The first scenario assumes that the Site continues to exist as it does today (i.e., restricted access). Under this scenario, trespassers and off-site residents located in the vicinity of the Site could be exposed to chemicals originating from the Site. The second scenario assumes that industrial manufacturing operations occur in the existing buildings sometime in the future. Under this scenario, workers could be exposed to chemicals, primarily associated with the buildings. The third scenario assumes that the Site is used for residential development in the future. This scenario does not technically represent a no further action scenario in that the existing buildings, slabs, and ponds are removed. This assumption is made in order to present a realistic future non-restricted use scenario and to avoid duplication of analyses already accomplished under the first two scenarios. Under this scenario, a resident could be exposed to chemicals on-site.

The exposure pathways identified for the Site for the three hypothetical scenarios listed above are summarized in Table V-1.

The level of potential exposure through the various pathways is dependent upon an individual's location and behavior. For each pathway considered in the EA, "typical" and "reasonable worst" case exposures have been

calculated. The typical case represents the exposure of an individual with somewhat normal activity patterns and generally makes use of assumptions considered to be best estimates. The reasonable worst case provides a more conservative, but still possible, upper bound on exposure. In estimating doses to the potentially exposed populations, the average environmental concentrations were combined with the typical case exposure assumptions, and the upper 95th percentile concentrations were combined with the reasonable worst case exposure assumptions. Measured chemical concentration data were used as a basis for estimating environmental concentrations in soils, surface water, sediment, ground water, and on building surfaces. Fate and transport models were used to estimate the chemical concentrations in air, vegetables, and beef. The resulting reasonable worst case exposure estimates represent an upper bound on exposure and are highly unlikely to reflect an exposure that would be received by an actual population.

E. RISK CHARACTERIZATION

Carcinogenic and noncarcinogenic health risks to the populations of concern were estimated for both the current use and future use scenarios, using typical and reasonable worst case exposure assumptions. Thus, these risk estimates are not estimates of actual risks to people at or near the Site. Because of the generally conservative assumptions that underlie both the toxicity criteria (i.e., CPFs and RfDs) and exposure estimates, the estimated risks are almost certainly greater than the actual risks.

Estimates of excess lifetime cancer risk were calculated by multiplying the lifetime average daily dose (LADD) by the CPF. In interpreting cancer risk estimates, it is noted that U.S. EPA Superfund guidance considers the target

total individual carcinogenic risk resulting from exposures at a Superfund site to fall in the range of 10^{-4} to 10^{-7}.

The potential for adverse noncarcinogenic effects was derived by calculating the MDD/RfD ratio, where the MDD is the maximum daily dose. A ratio greater than one suggests that the exposure should be closely examined for potential adverse effects, although there is no sharp demarcation between safe and unsafe. Because the exposure is based on conservative assumptions and the RfD is derived using safety factors, the MDD may exceed the RfD somewhat without adverse effects occurring.

The pathways that pose the highest potential risks (i.e., excess cancer risk greater than 10^{-4} or MDD/RfD ratio greater than one) to each of the populations are described below. For all scenarios considered, both carcinogenic and noncarcinogenic risks are primarily due to PCBs. PCBs contribute 96 percent or more of the total carcinogenic risk in all cases and at least 99 percent of the total carcinogenic risk in 56 of the 58 risk estimates. PCBs similarly pose the highest potential for noncarcinogenic health effects. Tables V-2 and V-3 summarize the carcinogenic risks and noncarcinogenic risks for populations and pathways considered in this EA.

1. <u>CURRENT OFF-SITE RESIDENT</u>

Cancer risk estimates exceed 10^{-4} only for ingestion of local beef, reflecting the potential for cattle to bioconcentrate PCBs and the conservative assumption that cattle regularly ingest creek sediment and ground water. The MDD/RfD ratio is greater than one for the pathways

of beef ingestion and dermal exposure to creek sediment (reasonable worst case).

2. CURRENT ON-SITE TRESPASSER

Cancer risk estimates exceed 10^{-4} for the on-site trespasser for vapor inhalation inside the Main Building and direct dermal contact with floor and wall surfaces inside the building under reasonable worst case exposure assumptions. These risks reflect the PCB concentrations on building surfaces and in the concrete slab, conservative modeling of air concentrations in the building, conservative assumptions about transfer and dermal absorption of PCBs on building surfaces, and conservative assumptions about daily and lifetime exposures of the trespasser to site contaminants.

The MDD/RfD ratio is greater than one for these same pathways (vapor inhalation and dermal contact with building surfaces) and, in addition, slightly exceeds one for dermal contact with water in on-site ponds, sediment ingestion, and dermal contact with sediment under reasonable worst case assumptions.

3. FUTURE ON-SITE WORKER

Cancer risk estimates exceed 10^{-4} for the pathways of vapor inhalation and direct contact with PCBs on floors and walls. Similarly for noncarcinogenic health risks, the MDD/RfD ratio is greater than one for the same pathways. As with the on-site trespasser, these risks reflect the PCB concentrations on building surfaces and in the concrete slab, conservative modeling of air concentrations in the building, and

conservative assumptions used to estimate daily and lifetime exposure of the workers to building contaminants.

4. FUTURE ON-SITE RESIDENT

Cancer risk estimates exceed 10^{-4} only for inhalation of vapors inside the residence under reasonable worst case assumptions. These risks reflect the extremely conservative assumptions regarding PCB concentrations in soils below the residence, conservative modeling of air concentrations in the residence, and conservative assumptions about lifetime exposures of the resident. The MDD/RfD ratios for the vapor inhalation pathways are also greater than one.

F. COMPARISON OF ENVIRONMENTAL CONCENTRATIONS TO POTENTIAL ARARS

According to the Superfund Amendments and Reauthorization Act, remedial actions at sites must comply with all applicable or relevant and appropriate requirements (ARARs). Of the three general types of ARARs (chemical-specific, location-specific, and action-specific), only the potential chemical-specific ARARs were identified for indicator chemicals in various media because chemicals, and not location or action, serve as the basis for the EA. Location and action specific ARARs will be considered in the FS. Potential chemical-specific ARARs were compared to the chemical concentrations found or modeled at the Site. Some chemical concentrations are above potential ARARs in groundwater, soil, surface water, and building surfaces. In addition, the predicted PCB concentration in beef under a reasonable worst case scenario exceeds the potential ARAR. No potential ARARs were identified for ambient air. Interior air concentrations are below potential ARARs.

G. UNCERTAINTIES AND LIMITATIONS IN THE RISK ASSESSMENT

Risk assessment provides a systematic means for organizing, analyzing, and presenting information on the nature and magnitude of potential risks to public health, welfare, and the environment posed by chemical exposures. Nevertheless, uncertainties and limitations are present in all risk assessments because of the quality of available data and the need to make assumptions and develop inferences based on incomplete information about existing conditions and future circumstances. In general, the uncertainties and limitations in the risk assessment can be classified in the following categories:

- environmental sampling and laboratory measurement;
- mathematical fate and transport modeling;
- receptor exposure assessment; and
- toxicological assessment.

In addressing such uncertainties, the EA attempted to err on the side of overestimating risk.

H. ENVIRONMENTAL RISK ASSESSMENT

An environmental risk [illegible] d of the Site. Available information suggests t[illegible] environmentally "important" habitats or sensitive [illegible] threatened, endangered, or rare species are known [illegible] iven the nature and location of the Site, the range [illegible] ity of the Site is expected to be limited. For purposes of this assessment, consideration was given to

the following categories of environmental receptors: terrestrial wildlife, livestock, terrestrial vegetation, and aquatic life.

Representative species considered likely to be found on-site included mice, rabbits, and small birds. Although terrestrial wildlife may be exposed to the Site contaminants by a number of pathways, adequate data are not available to estimate exposure via these pathways with the exception of surface water consumption. The current analysis shows that use of the on-site ponds or creek as drinking water sources is not likely to pose risks to terrestrial wildlife. Due to lack of data on potential exposure, conclusions about environmental risks from other media cannot be drawn with available information.

Beef cattle are raised locally and could be exposed to PCBs released from the Site. Comparison of estimated exposures of PCBs for cattle (including exposures via drinking water, soils, sediments, vapors, and particulates) with mammalian toxicity data suggests that PCB contamination from the site is unlikely to be associated with adverse effects on livestock.

Given the nature of the Site, neither terrestrial vegetation nor aquatic species were considered to be significant environmental receptors for on-site chemicals. The Site is currently covered by grassy vegetation and the current industrial nature of the site and likely future uses of the Site would not tend to favor the succession to more mature or diverse plant species.

Surface waters in the vicinity of the Site (East Pin Oak Creek and its unnamed tributary) do not support fish populations, are expected to have a low species diversity, and are unlikely to serve as important habitats for spawning or aquatic invertebrate communities. A major reason for this lack of aquatic life appears to be the effect of the Holden Wastewater Treatment Plant's discharge on East Pin Oak Creek. Furthermore, to the extent that PCBs are not transported beyond their current distribution in the project area, PCBs are unlikely to result in significant impacts on downstream fish populations.

* * * * *

PART VI

SUMMARY AND CONCLUSIONS

Based upon information collected during the RI at the Site, the following summary and conclusions were reached:

A. SITE PHYSICAL FEATURES

1. GEOLOGY

The shallow geologic sequence at the Site consists of four units. By order of increasing depth, the four units are described as follows:

- o overburden, consisting of clayey soil, 2 feet to 13.5 feet thick, and weathered shale, 2 to 5 feet thick;
- o sequence of shale and limestone interbeds, 15 feet to 40 feet thick;
- o sandstone bed, 8 feet thick; and
- o another sequence of shale and limestone interbeds.

The first three units are the most important in terms of defining Site characteristics.

2. HYDROGEOLOGY

Only two of the geological units at the Site exhibited even a limited potential to transmit water. The first unit, the overburden, is a

shallow and unconfined water bearing system. The unit is recharged by local rainfall infiltration. The direction of groundwater flow is primarily southwest and parallel to the upper bedrock surface. The flow velocity was calculated to be approximately 15 feet per year. This unconfined groundwater discharges to the subcrops and rock outcrops associated with the unnamed tributary on the southwest and west side of the Site. This shallow groundwater represents a potential pathway for migration of chemicals off the Site to the unnamed tributary.

The second geological unit, the sandstone bed of the Labette Formation, is separated from the shallow unconfined system by the alternating shale and limestone units which act as an aquatard. The sandstone is underlain by another confining layer of shale and limestone units. The groundwater flow direction within the sandstone unit is to the northwest at an approximate velocity of 0.03 feet per year. The principal recharge area is the upland area to the south and southeast of the Site. Additional minor recharge to the sandstone will occur over the entire site as rainfall percolates downward at show rates through the overburden and overlaying shale and limestones. The discharge area for the sandstone is East Pin Oak Creek approximately 7,000 feet north and northwest of the Site.

Because of inadequate water yields, neither groundwater system can be classified as an aquifer nor be developed as an economical drinking water source.

3. SURFACE WATER HYDROLOGY

The Site surface water drainage is to the southwest at an overall slope of approximately 5 percent. An unnamed tributary to East Pin Oak Creek intercepts this drainage to the southwest and west of the Site. The unnamed tributary also is recharged by the shallow groundwater flowing in the Site overburden soils. The quality of the water in the tributary thus may be affected by surface water as well as groundwater from the Site. The tributary flows northwestward for approximately 1,000 feet where it combines with East Pin Oak Creek. East Pin Oak Creek flows in a northern direction. Neither of these streams is a classified stream, according to the Missouri Department of Natural Resources.

Four surface water impoundments are located on the Site. Any overflow from these impoundments would drain to the unnamed tributary to East Pin Oak Creek.

B. NATURE AND EXTENT OF ROSE CONTAMINANTS

Two groups of compounds, PCBs and VOCs, were found to be the predominant contaminants present at the Site.

1. SOILS

The RI results indicate that PCBs in the Site soils are the result of periodic spills and releases, rather than systematic disposal in or on Site soils. PCBs were detected in surface soils primarily over the eastern part of the Site where Rose operations were carried out. Total PCB concentrations in surface soil samples varied from below detection

limit (BDL) to 540 ppm with an average of 5.7 ppm. Over one-half of the areas from which surface soils were removed during preliminary removal operations showed subsequent PCB concentrations of less than 10 ppm. In subsurface soils, PCBs were detected in locations adjacent to the Site buildings and sewers.

VOCs were detected in soil samples from beneath the Site storm sewer extending southwest from the Main Building; beneath the Holden sanitary sewer line crossing the Site from east to west; and from borings just north of the Main Building and just west of the South Warehouse. No pathways from potential on-site VOC sources to the Holden sanitary sewer system were found. Therefore, VOCs in soils along the sanitary system appear to be from an off-site source.

An average PCB concentration of 1.1 ppm with a range of BDL to 3.4 ppm characterizes the distribution of PCBs in surface soils in an off-site area extending from the east Site boundary a distance of 80 feet to the east and from McKissock Street north a distance of 160 feet. Wipe samples taken in the road at the two major Site access points showed average total PCB surface concentrations of less than 4 ug/100 cm^2.

2. <u>GROUNDWATER</u>

Three sets of groundwater samples were collected. Samples from rounds 1 and 2 were apparently contaminated by ground level airborne dust thought to contain low concentrations of PCBs. The results of these two rounds with respect to PCB concentrations, therefore, were judged to be

unrepresentative, and the results are not used in the Site characterization. For the third round of sampling, samples were collected in a fashion to avoid contamination by ground level airborne dust. Therefore, the third round data was used as the basis to characterize PCB concentrations in groundwater at the Site. During the third round of sampling, PCBs were only detected in groundwater (unfiltered) in two shallow groundwater monitoring wells. Total PCBs in the shallow groundwater ranged from BDL to 22.5 ug/l with an average of 2.4 ug/l.

VOCs are primarily restricted to the shallow groundwater and were consistently found at four of eleven shallow monitoring wells. A summary of the results from these four wells is as follows:

Monitoring Well	Constituent	Average Concentration (ug/l)
101	Trichloroethene	1,013
	1,2-dichloroethene	64
104	Ethylbenzene	3,570
	Tetrachloroethene	3,570
	Toluene	14,700
	1,2-dichloroethene	4,200
	Trichloroethene	8,400
	Xylenes	32,000
	1,1,1-trichloroethane	2,500
	1,1-dichloroethane	1,160
	1,1-dichloroethene	47
	Vinyl chloride	27
110	1,1-dichloroethene	2,000
(rounds 1&3 only)	1,1-dichloroethane	35
	Tetrachloroethene	5,600
	1,2-dichloroethene	8
	1,1,1-trichloroethane	2,550
	Trichloroethene	10
111	Trichoroethene	92
	1,2-dichlorethene	24

3. SEDIMENTS

Sediments containing PCBs at concentrations greater than 10 ppm were identified in East Pin Oak Creek, the unnamed tributary, the on-site spill containment pond and the drainage ditch to the on-site storm water retention ponds.

a. On-Site

The on-site source of PCBs in the sediments appears to be eroded soils from areas of past on-site releases of PCBs. PCB concentrations in on-site sediments range from 0.3 to 122 mg/kg with an average value of 20 mg/kg.

b. Off-Site

The off-site PCB concentrations in sediments range from BDL to 293 mg/kg with an average of 26.1 mg/kg. The highest PCB concentrations were found in a segment of East Pin Oak Creek from the Holden POTW outfall to approximately 500 feet downstream. The sources of these PCBs are thought to be residual sludge from the Holden POTW or PCBs transported from the Site.

VOCs, mainly toluene, were detected in the sediments in East Pin Oak Creek. The values ranged from BDL to 6,255 ppb with an average value of 374 ppb. The toluene is thought to be from a non-Site source because it was also found in sediments in the Holden sanitary sewer line upgradient from previous Site connection to the sewer. Also, no toluene has been detected in groundwater samples obtained

from wells close to the unnamed tributary, and therefore toluene is not thought to discharge to the unnamed tributary. However, toluene and other VOCs found in the sediment in East Pin Oak Creek and the unnamed tributary could have originated from the Site and been discharged into the unnamed tributary and East Pin Oak Creek prior to the plugging on the on-site sewers.

4. SURFACE WATERS

Quantifiable levels of PCBs were found in the on-site spill containment pond. Surface water in East Pin Oak Creek and the unnamed tributary contained quantifiable levels of PCBs in approximately one-half of the locations sampled. Concentrations ranged from BDL to 21 ug/l with an average of 6 ug/l. The source of these PCBs is most likely due to the entrainment of sediment during sampling or desorption of PCBs from the sediment. The distribution of PCBs in East Pin Oak Creek water appears to be random.

VOCs were detected in on-site surface water only in the Main Building pit and in the unnamed tributary. VOCs were also detected in the off-site portions of the unnamed tributary as well as in East Pin Oak Creek. Total VOC concentrations in the unnamed tributary and East Pin Oak Creek, excluding suspected laboratory artifacts, ranged from BDL to 78 ug/l with an average value of 15.6 ug/l. There are no apparent trends or distributions relative to sample location and VOC concentrations. VOCs may have originated from sediments and mobilized through entrainment during sampling or desorption. Trichloroethene may be

discharged to the creeks from the site via the pathway of shallow groundwater recharge to the unnamed tributary.

5. AIR

Health and safety documentation air samples collected from worker breathing zone space during the in-building RI activities contained dust (particulate) concentrations of 0.2 to 0.5 mg/m^3. No PCBs or VOCs were detected in these samples.

6. BUILDINGS

a. Main Building

Wipe samples from the interior surfaces of the Main Building exhibited concentrations of PCBs exceeding 10 ug/100 cm^2. Wipe samples from the exterior surfaces of the Main Building exhibited PCB concentrations ranging from BDL to 9.6 ug/100 cm^2.

Total PCB concentrations in the top half-inch of concrete core samples taken from the Main Building floor are summarized as follows:

	Total PCBs (mg/kg)		
Sample	Max.	Avg.	Min
Unbiased concrete core	4,390	979	0.15
Biased concrete core	670,000	214,000	4,900

Additional samples were removed and analyzed from two of the cores to determine the vertical extent of PCB migration into the 6-inch concrete slab. These analyses indicate that PCB concentrations generally decrease with depth. PCB penetration exceeded a two-inch depth in both cores.

Analyses of soils obtained from under the floor of the Main Building indicate quantifiable concentrations of PCBs at levels less than 20 mg/kg. PCB values for subsoils range from BDL to 18.5 mg/kg with an average of 0.9 mg/kg. Based upon the concrete floor and subsoil PCB analyses, it is believed that appreciable PCB migrations through the floor of the Main Building have been isolated and infrequent. PCB releases have been primarily contained within the 6-inch floor slab.

VOC analyses of subsoils indicate that VOCs are present in concentrations greater than the detection limit under the western half of the building. The highest VOC concentrations were found between the two pits where solvents were reportedly used and stored by Rose.

b. <u>South Warehouse</u>

The interior surfaces of the South Warehouse generally exhibited lower PCB concentrations than the Main Building but greater than 10 ug/100 cm^2. Samples from one soil boring beneath the South Warehouse were analyzed for PCBs and VOCs. There were no detectable

levels of PCBs. Total VOC concentrations varied with depth from 488 to 64 ppb with an average of 226 ppb. Concrete core samples from the South Warehouse floor contained PCBs, but they were detected at lower concentrations than in the cores from the Main Building floor. As concluded for the Main Building, PCB releases in the South Warehouse are believed to have been primarily contained in the concrete floor slab.

C. ENDANGERMENT ASSESSMENT (EA)

An EA was performed to assess the potential risks to public health, welfare, and the environment associated with the potential releases of chemicals at the Site. The results of the EA indicate that the major sources of current and future potentially significant risk are the floors and walls of the existing Site buildings, Site ponds, Site soils, and sediment in East Pin Oak Creek and its unnamed tributary. A summary of the results of the EA are:

- Current risks to off-site residents are within the range of acceptability with the exception of the potential ingestion of beef cattle raised along the unnamed tributary or the potential incidental ingestion of sediments from the unnamed tributary.

- Current risks to hypothetical trespassers on the Site are within the range of acceptability with the exception of exposure to Site buildings and on-site ponds.

- Other potentially significant risks may be realized if current Site conditions are changed. Construction of residences on the Site could pose significant risks through indoor inhalation of vapors from Site soils. Future industrial use of the Site could result in potentially significant risks to workers in the existing buildings.

- Chemical concentrations are above potential applicable or relevant and appropriate requirements (ARARs) in some samples of groundwater, soil, surface water, interior air, and building surfaces. The predicted PCB concentration in beef under a reasonable worst use scenario exceeds a potential ARAR. No potential ARARs were identified for ambient air.

- The environmental risk assessment indicated that there are no known risks to terrestrial wildlife, livestock, terrestrial vegetation, or aquatic life.

D. FEASIBILITY STUDY

A feasibility study will be completed to develop and select an appropriate remedial action plan for the Site. Because of the successful initial removal program, the Site in its current configuration does not pose any immediate risk to human health, welfare or the environment; therefore, immediate removal actions are not required. The selection of potential remedial technologies will be influenced by:

- The distribution of PCB residues in the soil above the EPA Spill Policy criteria;

- The current low risk posed by the Site;
- The absence of a practical groundwater resource beneath the Site and the lack of Site impact on the groundwater;
- The intermittent distribution of PCB residues in the unnamed tributary and East Pin Oak Creek sediments.

As required by the RI/FS Work Plan, the RI report must identify potential remedial technologies for consideration within the Feasibility Study (FS). This preliminary list will be revised upon development of response action objectives during the FS. The technologies are listed by media as follows:

SOILS

- NO ACTION
- INSTITUTIONAL ACTIONS
  - Deed Restriction
  - Fencing
- REMOVAL TECHNOLOGIES
  - Conventional Excavation
- TREATMENT
  - Thermal
    - Incineration (On-Site or Off-Site)
      - Infrared Thermal Treatment (Shirco)
      - Rotary Kiln Incineration
      - Circulating Bed Combustion
    - Vitrification
      - In Situ Vitrification
      - Electric Pyrolyzer
  - Low Temperature Thermal Stripping
    - X-TRAX™
  - Chemical
    - Chemical Extraction
      - B.E.S.T.
      - CF Systems
      - Soil Washing
    - Chemical Extraction/Treatment
      - Galson APEG System

- Chemical/Physical
  - Stabilization/Solidification
    - Hazcon
  - Soil Mixing
    - Detoxifier™
    - Geo-Con Deep Soil Mixing
- Biological
  - Detrox Industries system
  - Biotrol Soils Treatment System

- CONTAINMENT
  - On-Site Landfill
  - Off-Site TSCA Landfill
  - Capping

SEDIMENTS

- NO ACTION

- INSTITUTIONAL ACTIONS
  - Deed Restriction
  - Dredging
  - Fencing

- REMOVAL TECHNOLOGIES
  - Conventional Excavation
  - Dredging
  - Hydraulic Mining Technology

- TREATMENT
  - Thermal
    - Incineration (On-Site or Off-Site)
      - Infrared Thermal Treatment (Shirco)
      - Rotary Kiln Incineration
      - Circulating Bed Combustion
    - Vitrification
      - In Situ Vitrification
      - Electric Pyrolyzer
    - Low Temperature Thermal Stripping
      - X-TRAX™
  - Chemical
    - Chemical Extraction
      - B.E.S.T.
      - CF Systems
      - Soil Washing
    - Chemical Extraction/Treatment
      - Galson APEG System
    - Solidification/Treatment
      - Hazcon

- Chemical/Mixing
  - Detoxifier™
  - Geo-Con Deep Soil Mixing
- Biological
  - Detrox Industries System
  - Biotrol Soil Treatment System
  - Physical
    - Dewatering

- CONTAINMENT
  - On-Site RCRA Landfill
  - Off-Site RCRA Landfill
  - Lining of channel

BUILDINGS AND STRUCTURES

- NO ACTION

- INSTITUTIONAL ACTIONS
  - Fencing
  - Deed Restriction

- REMOVAL TECHNOLOGIES
  - Demolition
  - Dismantling

- TREATMENT
  - Thermal
    - Incineration (On-Site or Off-Site)
      - Infrared Thermal Treatment (Shirco)
      - Rotary Kiln Incineration
      - Circulating Bed Combustion
  - Vitrification
    - In Situ Vitrification
    - Electric Pyrolyzer
  - Low Temperature Thermal Stripping
    - X-TRAX™
  - Chemical
    - Chemical Extraction
    - Envirosolv
    - adKleen
    - Solvent Cleaning
    - Vapor-Phase Solvent extraction
    - Photochemical Degradation
  - Physical
    - Dusting/Vacuuming
    - Scarification
    - Grid Blasting
    - Hydroblasting
    - Steam Cleaning

- Encapsulation
  - Painting/Coating
  - K-20 Sealant or Similar Material
  - Epoxy Cement
- Biological

- CONTAINMENT
  - On-Site RCRA Landfill
  - Off-Site RCRA Landfill
  - Capping

SURFACE WATERS

- TREATMENT

- INSTITUTIONAL ACTIONS
  - Deed Restriction
  - Fencing

- REMOVAL TECHNOLOGIES
  - Pumping

- TREATMENT
  - Physical/Chemical
    - Activated Carbon

- DISCHARGE
  - On-Site Discharge
    - Discharge to Stream
    - Land Application
  - Off-Site Discharge
    - Discharge to POTW

- CONTAINMENT
  - On-Site Ponds

GROUNDWATER

- NO ACTION

- INSTITUTIONAL ACTIONS
  - Deed Restrictions
  - Fencing
  - Continued Monitoring

- CONTAINMENT OPTIONS
  - Capping
  - Vertical Barriers
  - Horizontal Barriers

- EXTRACTION TECHNOLOGIES
  - Groundwater Collection/Pumping

- TREATMENT TECHNOLOGIES
  - Physical Treatment
  - Chemical Treatment
  - Biological Treatment
  - In-Situ Treatment

- DISPOSAL TECHNOLOGIES
  - On-Site Discharge
    - Discharge to Stream
    - Land Application
  - Off-Site Discharge
    - Discharge to POTW

* * * * *

TABLES

Table II-1
SUMMARY OF EXISTING DATA

Sample Matrix	Company*	Description of Samples	Usability Conclusions**
Surface Soil	OHM	Sample from site perimeter, biased locations on the site, background locations in Holden	1, 2
Surface Soil	CWM	Comprehensive soil sampling of site	1, 2, 3, 4, 5
Surface Soil	JMA	Sampled southern part of site	2
Sediment	MDNR	Sediment from upstream and downstream of the site	None
Sediment	OHM	Sediment from unnamed tributary	None
Sediment	CWM	Sediment from on-site storm water and spill containment ponds	2
Subsurface Soil	JMA	3 test borings to bedrock, 25 shallow soil borings, 8 shallow borings beneath Main Building, 11 soil borings to bedrock beneath building floors	2
Soil Gas Data	JMA	39 locations on the site	2
Surface Water	MDNR	18 water samples from upstream and downstream of the site	None
Surface Water	CWM	10 water samples from on site	None
Groundwater	JMA	6 monitoring wells	2
Air	OHM	7 air samples taken during sampling	None
Air	CWM	Air sampling during site work	None
Animal Tissue	MDNR	12 composite samples of fish and frog	None

*
OHM—O.H. Materials Company
CWM—Chemical Waste Management, Inc.
JMA—John Mathes & Associates, Inc.
MDNR—Missouri Department of Natural Resources

**
1—Health and safety education
2—Site characterization
3—Evaluation of alternatives
4—Engineering design
5—Risk assessment

Table II-2
ANALYTICAL SUMMARY
GROUNDWATER SAMPLING ROUND NO. 1 (2/24/89 TO 3/10/89)

Monitoring Well No.	VOC	PCB (Filtered)	PCB (Unfiltered)	Semivolatile (Filtered)	Semivolatile (Unfiltered)
MW-101	X	X	X	X	X
MW-102		X		X	
MW-103	X	X	X	X	X
MW-104	X (E)	X	X (E)	X	X (E)
MW-105	X	X	X	X	X
MW-106	X	X	X	X	X
MW-107	X				
MW-108	X (R)	X (R)	X (R)	X (R)	X (R)
MW-109	X		X		X
MW-110	X	X	X	X	X
MW-111	X	X	X	X	X
MW-201	X	X	X	X	X
MW-202	X	X	X	X	X
MW-203	X (E)	X	X (E)	X	X (E)
MW-204	X				
MW-205	X	X	X	X	X
MW-206	X (E)	X	X (E)	X	X (E)
MW-207	X		X		X
MW-208					
MW-209	X				
MW-210	X	X	X (2)	X	X (2)
MW-211	X	X	X	X	X

R—Replicate sample obtained.
E—EPA replicate sample obtained.
2—Sampled twice during sampling round.

Table II-3
ANALYTICAL SUMMARY
GROUNDWATER SAMPLING ROUND NO. 2 (4/5/89 TO 4/12/89)

Monitoring Well No.	VOC	PCB (Filtered)	PCB (Unfiltered)	Semivolatile (Filtered)	Semivolatile (Unfiltered)
MW-101	X	X	X	X	X
MW-102	X	X	X	X	X
MW-103	X	X	X	X	X
MW-104	X	X	X	X	X
MW-105	X	X	X	X	X
MW-106	X	X	X	X	X
MW-107					
MW-108	X (R)	X (R)	X (R)	X (R)	X (R)
MW-109	X				
MW-110	X (E)	X	X (E)	X	X (E)
MW-111	X	X	X	X	X
MW-201	X	X	X	X	X
MW-202	X	X	X	X	X
MW-203	X	X	X	X	X
MW-204	X				
MW-205	X	X	X	X	X
MW-206	X	X	X	X	X
MW-207	X (R)		X (R)		X (R)
MW-208	X				
MW-209	X	X	X	X	X
MW-210	X	X	X	X	X
MW-211	X	X	X	X	X

R—Replicate sample obtained.
E—EPA replicate sample obtained.

Table II-4
ANALYTICAL SUMMARY
GROUNDWATER SAMPLING ROUND NO. 3 (6/15/89 TO 6/22/89)

Monitoring Well No.	VOC	PCB (Filtered)	PCB (Unfiltered)	Semivolatile (Filtered)	Semivolatile (Unfiltered)
MW-101	X	X	X	X	X
MW-102	X	X	X	X	X
MW-103	X	X	X	X	X
MW-104	X	X	X	X	X
MW-105	X (R)	X (R)	X (R)	X (R)	X (R)
MW-106	X	X	X	X	X
MW-107	X				
MW-108	X (E)	X	X (E)	X	X (E)
MW-109	X	X	X	X	X
MW-110	X	X	X	X	X
MW-111	X	X	X	X	X
MW-201	X	X	X	X	X
MW-202	X	X	X	X	X
MW-203	X	X	X	X	X
MW-204	X	X	X	X	X
MW-205	X	X	X	X	X
MW-206	X	X	X	X	X
MW-207	X	X	X	X	X
MW-208	X		X		X
MW-209	X	X	X	X	X
MW-210	X	X	X	X	X
MW-211	X (R)	X (R)	X (R)	X (R)	X (R)

R—Replicate sample obtained.
E—EPA replicate sample obtained.

Table II-5
HEALTH AND SAFETY DOCUMENTATION
AIR SAMPLING MATRIX

Sample No.	Date	Sample Time (Min.)	Activity	Analyses
PCB1	1/10/89	397	Soil Drilling	PCBs
PCBBL1*	1/10/89	–	–	PCBs
DUST1	1/10/89	400	Soil Drilling	Dust
DUSTBL1*	1/10/89	–	–	Dust
VOC1	1/10/89	405	Soil Drilling	VOCs
VOCBLK1*	1/10/89	–	–	VOCs
PCB2	1/12/89	474	Trenching	PCBs
PCBBL2*	1/12/89	–	–	PCBs
DUST2	1/12/89	467	Trenching	Dust
DUSTBL2*	1/12/89	–	–	Dust
VOC2	1/12/89	471	Trenching	VOCs
VOCBLK2*	1/12/89	–	–	VOCs
DUST3	1/27/89	192**	Wipe Sampling	Dust
DUSTBL3*	1/27/89	–	–	Dust
PCB3	1/27/89	174**	Wipe Sampling	PCBs
PCBBL3*	1/27/89	–	–	PCBs

**Blank sample.*
***No wipe sampling performed in afternoon.*

TABLE IV- 1
SUMMARY OF ANALYTICAL RESULTS - EXTERIOR SUBSURFACE SOIL BORINGS
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

WELL NO.	SAMPLE NO.	SAMPLE INTERVAL (ft)	PARAMETER	VALUE	DETECTION LIMIT	UNITS
MW-104	/SS-1	0.0-2.0	1,1-Dichloroethane	16	5	ug/kg
			Methylene chloride	11	5	ug/kg
			Acetone	16	10	ug/kg
MW-104	/SS-2	2.0-3.0	Aroclor 1242	0.06	0.04	mg/kg
			2-Butanone	10	5	ug/kg
			Methylene chloride	12	5	ug/kg
			Ethylbenzene	190	5	ug/kg
			Xylenes (total)	460	5	ug/kg
			Acetone	68	10	ug/kg
MW-105	/SS-3	4.0-6.0	Aroclor 1242	0.12	0.02	mg/kg
			Aroclor 1254/1260	0.02	0.20	mg/kg
MW-105	/SS-5	9.5-10.0	Aroclor 1242	0.06	0.02	mg/kg
			Aroclor 1254/1260	0.11	0.02	mg/kg
MW-106	/SS-4	6.0-8.0	Methylene chloride	4	5	ug/kg
MW-106	/SS-5	9.5-11.5	Aroclor 1242	0.18	0.02	mg/kg
			Aroclor 1254/1260	0.15	0.02	mg/kg
MW-106	/SS-6	11.5-13.5	Aroclor 1242	0.04	0.04	mg/kg
			Acetone	58	10	ug/kg
			Ethylbenzene	9	5	ug/kg
			1-Ethyl-3-Methyl Benzene	35	5	ug/kg
MW-106	/SS-10	6.0-8.0	Acetone	110	10	ug/kg
			Methylene chloride	9	5	ug/kg
MW-106	/SS-11	9.5-11.5	No Compounds Detected			
MW-107	/SS-3	4.0-6.0	Aroclor 1242	0.20	0.04	mg/kg
			Aroclor 1254/1260	0.30	0.04	mg/kg
			Methylene chloride	9	5	ug/kg
			Gamma - Hexachlorocyclohexane	0.2	0.04	mg/kg
MW-107	/SS-4	8.0-10.0	Acetone	29	10	ug/kg
			Xylenes (total)	5	5	ug/kg
			Methylene chloride	12	5	ug/kg
MW-108	/SS-1	0.0-2.0	Aroclor 1242	1.9	0.02	mg/kg
			Aroclor 1254/1260	1.7	0.02	mg/kg
			Methylene chloride	8	5	ug/kg
MW-108	/SS-3	4.0-6.0	No Compounds Detected			
MW-109	/SS-3	4.0-6.0	Aroclor 1242	0.73	0.02	mg/kg
			Aroclor 1254/1260	0.67	0.02	mg/kg

TABLE IV- 1
SUMMARY OF ANALYTICAL RESULTS - EXTERIOR SUBSURFACE SOIL BORINGS
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

WELL NO.	SAMPLE NO.	SAMPLE INTERVAL (ft)	PARAMETER	VALUE	DETECTION LIMIT	UNITS
			Acetone	83	10	ug/kg
			Methylene chloride	15	5	ug/kg
MW-109	/SS-5	8.0-10.0	Gamma-Hexachlorocyclohexane	0.06	0.04	mg/kg
MW-110	/SS-3	4.0-6.0	Aroclor 1242	0.18	0.02	mg/kg
			Aroclor 1254/1260	0.15	0.02	mg/kg
			Methylene chloride	9	5	ug/kg
			Tetrachloroethene	42	5	ug/kg
			1,1-Dichloroethane	25	5	ug/kg
MW-110	/SS-5	10.0-12.0	Aroclor 1242	0.03	0.02	mg/kg
			1,1-Dichloroethane	10	5	ug/kg
			Tetrachloroethene	39	5	ug/kg
			1,1,1-Trichloroethane	5	5	ug/kg
MW-111	/SS-5	8.0-10.0	No Compounds Detected			
MW-111	/SS-6	10.0-12.0	Methylene chloride	480	5	ug/kg
			Xylenes (total)	10	5	ug/kg
MW-111	/SS-11	10.0-12.0	Aroclor 1242	0.06	0.02	mg/kg
			Aroclor 1254/1260	0.03	0.02	mg/kg
			Methylene chloride	200	5	ug/kg
			Tetrachloroethene	170	5	ug/kg
MW-209	/SS-1		Aroclor 1242	1.8	0.04	mg/kg
			Aroclor 1254/1260	4.5	0.04	mg/kg
			Methylene chloride	110	25.	ug/kg

TABLE IV- 2
SUMMARY OF ANALYTICAL RESULTS - INTERIOR SUBSURFACE SOIL BORINGS
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

BORING NO.	SAMPLE NO.	SAMPLE INTERVAL (ft)	PARAMETER	VALUE	DETECTION LIMIT	UNITS
B-1	/SS-1	1.0-3.0	Aroclor 1242	0.18	0.02	mg/kg
			Aroclor 1254/1260	0.15	0.02	mg/kg
			Acetone	39	10	ug/kg
			Methylene chloride	7	5	ug/kg
B-1	/SS-3	5.0-7.0	Aroclor 1242	0.03	0.02	mg/kg
			Aroclor 1254/1260	0.02	0.02	mg/kg
			Methylene chloride	7	5	ug/kg
B-1	/SS-6	10.5-12.0	Aroclor 1242	0.04	0.04	mg/kg
			Aroclor 1254/1260	0.24	0.04	mg/kg
			Acetone	13	10	ug/kg
			Methylene chloride	5	5	ug/kg
B-2	/SS-1	1.0-3.0	Aroclor 1242	0.06	0.02	mg/kg
			Aroclor 1254/1260	0.04	0.02	mg/kg
			Acetone	140	10	ug/kg
			Methylene chloride	10	5	ug/kg
B-2	/SS-3	5.0-7.0	Aroclor 1242	1.3	0.02	mg/kg
			Aroclor 1254/1260	0.85	0.02	mg/kg
B-2	/SS-4	7.0-9.0	Aroclor 1242	1.5	0.02	mg/kg
			Aroclor 1254/1260	0.23	0.02	mg/kg
B-2	/SS-6	11.0-11.5	Aroclor 1242	0.62	0.02	mg/kg
			Aroclor 1254/1260	1.1	0.02	mg/kg
			Methylene chloride	10	5	ug/kg
B-3	/SS-1	0.8-1.8	Aroclor 1242	0.06	0.02	mg/kg
			Aroclor 1254/1260	0.13	0.02	mg/kg
B-3	/SS-2	1.8-2.6	Aroclor 1242	0.88	0.02	mg/kg
			Aroclor 1254/1260	0.74	0.02	mg/kg
			Acetone	53	10	ug/kg
B-3	/SS-4	1.8-2.6	Aroclor 1242	0.92	0.02	mg/kg
			Aroclor 1254/1260	2.4	0.02	mg/kg
B-4	/SS-1	1.0-3.0	Aroclor 1242	0.07	0.02	mg/kg
			Aroclor 1254/1260	0.16	0.02	mg/kg
B-4	/SS-3	5.0-7.0	Aroclor 1242	0.26	0.02	mg/kg
			Aroclor 1254/1260	0.11	0.02	mg/kg
			gamma-Hexachlorocyclohexane	0.03	0.02	mg/kg
B-4A	/SS-3	5.0-7.0	Aroclor 1242	0.50	0.10	mg/kg

TABLE IV- 2
SUMMARY OF ANALYTICAL RESULTS - INTERIOR SUBSURFACE SOIL BORINGS
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

BORING NO.	SAMPLE NO.	SAMPLE INTERVAL (ft)	PARAMETER	VALUE	DETECTION LIMIT	UNITS
B-4	/SS-4	7.0-8.5	Aroclor 1242	0.02	0.02	mg/kg
			Methylene chloride	120	5	ug/kg
			Acetone	14	10	ug/kg
			Xylenes (total)	7	5	ug/kg
B-4	/SS-5	8.5-10.2	Aroclor 1242	0.14	0.04	mg/kg
B-5	/SS-2	3.0-5.0	Acetone	69	10	ug/kg
			Methylene chloride	150	5	ug/kg
			Toluene	7	5	ug/kg
B-5	/SS-3	5.0-7.0	Aroclor 1242	1.62	0.02	mg/kg
			Aroclor 1254/1260	0.13	0.02	mg/kg
			Acetone	27	10	ug/kg
			Methylene chloride	82	5	ug/kg
			Xylenes (total)	5	5	ug/kg
			2-Butanone	9	5	ug/kg
B-5	/SS-4	7.0-8.5	Aroclor 1242	0.39	0.02	mg/kg
			Aroclor 1254/1260	0.82	0.02	mg/kg
			Acetone	29	10	ug/kg
			Methylene chloride	10	5	ug/kg
B-5	/SS-6	10.0-11.3	Aroclor 1254/1260	0.3	0.04	mg/kg
			Methylene chloride	77	5	ug/kg
B-6	/SS-2	3.0-5.0	Aroclor 1254/1260	0.06	0.02	mg/kg
B-6	/SS-3	5.0-7.0	Aroclor 1242	0.16	0.02	mg/kg
			Aroclor 1254/1260	3.1	0.02	mg/kg
			Methylene chloride	110	5	ug/kg
B-6	/SS-4	7.0-9.0	No Compounds Detected			
B-6	/SS-5	9.0-10.6	Aroclor 1242	0.21	0.02	mg/kg
			Aroclor 1254/1260	0.04	0.02	mg/kg
			Acetone	23	10	ug/kg
			Methylene chloride	110	5	ug/kg
			Xylenes (total)	6	5	ug/kg
B-7	/SS-2	3.0-5.0	Aroclor 1242	2.9	0.02	mg/kg
			Aroclor 1254/1260	0.07	0.02	mg/kg
			Acetone	21	10	ug/kg
			Methylene chloride	56	5	ug/kg
			Xylenes (total)	19	5	ug/kg
B-7	/SS-3	5.0-7.0	Methylene chloride	5	5	ug/kg

TABLE IV- 2
SUMMARY OF ANALYTICAL RESULTS - INTERIOR SUBSURFACE SOIL BORINGS
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

BORING NO.	SAMPLE NO.	SAMPLE INTERVAL (ft)	PARAMETER	VALUE	DETECTION LIMIT	UNITS
B-7	/SS-4	7.0-9.0	Aroclor 1242	2.2	0.02	mg/kg
			Aroclor 1254/1260	6.5	0.02	mg/kg
			Methylene chloride	75	5	ug/kg
B-7	/SS-5	9.0-11.0	No Compounds Detected			
B-8	/SS-1	1.0-3.0	Acetone	93	10	ug/kg
			Methylene chloride	21	5	ug/kg
B-8	/SS-3	5.0-7.0	Acetone	31	10	ug/kg
			Methylene chloride	23	5	ug/kg
B-8	/SS-5	9.0-11.0	Acetone	23	10	ug/kg
			Xylenes (total)	5	5	ug/kg
B-8	/SS-6	11.0-11.9	Aroclor 1242	0.56	0.02	mg/kg
			Aroclor 1254/1260	0.56	0.02	mg/kg
			Methylene chloride	42	5	ug/kg
B-9	/SS-1	1.0-1.5	Acetone	64	10	ug/kg
B-9A	/SS-1	1.0-1.5	Acetone	110	10	ug/kg
			Methylene chloride	12	5	ug/kg
			Trichloroethene	10	5	ug/kg
B-9	/SS-3	2.0-2.5	gamma-Hexachlorocyclohexane	0.06	0.02	mg/kg
			Methylene chloride	62	5	ug/kg
			Xylenes (total)	13	5	ug/kg
B-9	/SS-4	2.5-3.0	Acetone	140	10	ug/kg
			Methylene chloride	130	5	ug/kg
			Xylenes (total)	27	5	ug/kg
			Toluene	5	5	ug/kg
			Ethylbenzene	6	5	ug/kg
			1,2-Dichloroethene (total)	180	5	ug/kg
B-9A	/SS-4	2.5-3.0	No Compounds Dectected			
B-9	/SS-6	3.5-4.0	1,2-Dichloroethene (total)	8	5	ug/kg
			2,4,4-Trimethyl-1-Pentene	36		ug/kg
			2-Butanone	9		ug/kg
			3,4,4-Trimethyl-2-Pentene	16		ug/kg
			Acetone	27	10	ug/kg
			Ethylbenzene	8	5	ug/kg
			Methylene chloride	150	5	ug/kg
			Styrene	5	5	ug/kg
			Toluene	7	5	ug/kg
			Xylenes (total)	39	5	ug/kg

TABLE IV- 2
SUMMARY OF ANALYTICAL RESULTS - INTERIOR SUBSURFACE SOIL BORINGS
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

BORING NO.	SAMPLE NO.	SAMPLE INTERVAL (ft)	PARAMETER	VALUE	DETECTION LIMIT	UNITS
B-10	/SS-1	0.5-1.0	Acetone	78	50.	ug/kg
			Ethylbenzene	410	25.	ug/kg
			Toluene	37	25.	ug/kg
			Xylenes (total)	2800	25.	ug/kg
B-10	/SS-2	2.0-3.0	Acetone	190	10	ug/kg
			Ethylbenzene	25	5	ug/kg
			Methylene chloride	43	5	ug/kg
			Toluene	3	5	ug/kg
			Xylenes (total)	270	5	ug/kg
B-10	/SS-3	3.0-4.0	Acetone	87	10	ug/kg
			Ethylbenzene	5	5	ug/kg
			Xylenes (total)	42	5	ug/kg
B-10	/SS-5	5.0-6.0	Aroclor 1242	0.1	0.04	mg/kg
			Aroclor 1254/1260	0.2	0.04	mg/kg
			Xylenes (total)	12	5	ug/kg
B-11	/SS-3	5.0-7.0	Methylene chloride	17	5	ug/kg
B-11	/SS-4	7.0-9.0	Acetone	10	10	ug/kg
			Methylene chloride	9	5	ug/kg
B-11	/SS-6	11.0-13.0	No Compounds Detected			
B-11	/SS-7	13.0-15.0	Aroclor 1242	0.08	0.04	mg/kg
			Aroclor 1254/1260	0.06	0.04	mg/kg
			Acetone	40	10	ug/kg
			Benzene	14	5	ug/kg
			Ethylbenzene	9	5	ug/kg
			2-Hexanone	19	10	ug/kg
			4-Methyl-2-pentanone	24	10	ug/kg
			Styrene	12	5	ug/kg
B-11A	/SS-7	13.0-15.0	Methylene chloride	13	5	ug/kg
B-12	/SS-1	1.0-3.0	Aroclor 1242	4.7	0.04	mg/kg
			Aroclor 1254/1260	3.1	0.04	mg/kg
B-12	/SS-3	5.0-7.0	Aroclor 1242	100	2	mg/kg
			Aroclor 1254/1260	1600	2	mg/kg
			Methylene chloride	19	5	ug/kg
B-12	/SS-4	7.0-9.0	Aroclor 1242	11	0.2	mg/kg
			Aroclor 1254/1260	18	0.2	mg/kg
			Methylene chloride	35	5	ug/kg

TABLE IV- 2
SUMMARY OF ANALYTICAL RESULTS - INTERIOR SUBSURFACE SOIL BORINGS
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

BORING NO.	SAMPLE NO.	SAMPLE INTERVAL (ft)	PARAMETER	VALUE	DETECTION LIMIT	UNITS
B-12	/SS-5	9.0-11.0	Methylene chloride	20	5	ug/kg
B-13	/SS-3	4.5-6.5	Acetone	350	20	ug/kg
			Methylene Chloride	8	5	ug/kg
			Methyl Ethyl Ketone	110	10	ug/kg
B-13	/SS-4	6.5-8.5	Methyl Ethyl Ketone	27	10	ug/kg
			Xylenes(total)	6	5	ug/kg
B-13	/SS-5	8.5-10.5	Methylene Chloride	12	5	ug/kg
			Methyl Ethyl Ketone	38	10	ug/kg
B-14	/SS-3	4.5-6.5	Aroclor 1242	0.6	0.02	mg/kg
			Aroclor 1254/60	0.5	0.02	mg/kg
			Acetone	140	20	ug/kg
			Methylene Chloride	13	5	ug/kg
			Methyl Ethyl Ketone	21	10	ug/kg
B-14	/SS-4	6.5-8.5	Acetone	130	20	ug/kg
			Methylene Chloride	8	5	ug/kg
			Tetrachloroethene	17	5	ug/kg
			1,2-Dichloroethene(total)	26	5	ug/kg
B-14	/SS4D	6.5-8.5	Acetone	120	20	ug/kg
			Methylene Chloride	6	5	ug/kg
			Methyl Ethyl Ketone	20	10	ug/kg
B-14	/SS-5	8.5-10.5	Acetone	70	20	ug/kg
			Methylene Chloride	15	5	ug/kg
			Methyl Ethyl Ketone	14	5	ug/kg
B-15	/SS-2	2.5-4.5	No Compounds Detected			
B-15	/SS-2D	2.5-4.5	No Compounds Detected			
B-15	/SS-3	4.5-6.5	No Compounds Detected			
B-15	/SS-3D	4.5-6.5	No Compounds Detected			
B-15	/SS-4	6.5-8.5	No Compounds Detected			
B-15	/SS-5	8.5-10.5	No Compounds Detected			
B-16	/SS-3	4.5-6.5	No Compounds Detected			
B-16	/SS-4	6.5-8.5	No Compounds Detected			

TABLE IV- 2
SUMMARY OF ANALYTICAL RESULTS - INTERIOR SUBSURFACE SOIL BORINGS
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

BORING NO.	SAMPLE NO.	SAMPLE INTERVAL (ft)	PARAMETER	VALUE	DETECTION LIMIT	UNITS
B-17	/SS-3	4.5-6.5	Acetone	150	20	ug/kg
			Methylene Chloride	8	5	ug/kg
			Methyl Ethyl Ketone	46	10	ug/kg
B-17	/SS-4	6.5-8.5	No Compounds Detected			
B-17	/SS-5	8.5-10.5	No Compounds Detected			
B-18	/SS-3	4.5-6.5	No Compounds Detected			
B-18	/SS-4	6.5-8.5	No Compounds Detected			
B-18	/SS-5	8.5-10.5	No Compounds Detected			
B-18	/SS-6	10.5-12.5	No Compounds Detected			
B-19	/SS-3	4.5-6.5	No Compounds Detected			
B-19	/SS-4	6.5-8.5	Acetone	95	20	ug/kg
			Methylene Chloride	10	5	ug/kg
			Methyl Ethyl Ketone	25	10	ug/kg
B-19	/SS-5	8.5-10.5	Acetone	160	20	ug/kg
			Methylene Chloride	20	5	ug/kg
			Methyl Ethyl Ketone	50	10	ug/kg
B-19	/SS-6	10.5-12.5	No Compounds Detected			
B-20	/SS-3	4.5-6.5	Aroclor 1242	10.8	0.02	mg/kg
			Aroclor 1254/60	7.6	0.02	mg/kg
B-20	/SS-4	6.5-8.5	No Compounds Detected			
B-20	/SS-4D	6.5-8.5	No Compounds Detected			
B-20	/SS-5	8.5-10.5	No Compounds Detected			
B-21	/SS-2	2.5-4.5	Acetone	120	20	ug/kg
			Methylene Chloride	5	5	ug/kg
			Metyl Ethyl Ketone	30	10	ug/kg
B-21	/SS-3	4.5-6.5	Acetone	44	20	ug/kg
			Methylene Chloride	18	5	ug/kg
B-21	/SS-4	6.5-8.5	Acetone	36	20	ug/kg
			Methylene Chloride	10	5	ug/kg

TABLE IV- 3
SUMMARY OF ANALYTICAL RESULTS - TEST PITS
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS
TP- 1	Aroclor 1242	530	2	mg/kg
	Aroclor 1254/1260	170	2	mg/kg
	Acetone	22	10	ug/kg
	1,2-Dichloroethene (total)	11	5	ug/kg
TP- 2	Aroclor 1242	0.1	0.02	mg/kg
	Aroclor 1254/1260	0.1	0.02	mg/kg
TP- 3	Aroclor 1242	13	0.2	mg/kg
	Aroclor 1254/1260	20	0.2	mg/kg
	Chlorobenzene	100	25.	ug/kg
	1,1-Dichloroethane	25	25.	ug/kg
	1,1,1-Trichloroethane	125	25.	ug/kg
TP- 4	Aroclor 1242	16	0.2	mg/kg
	Aroclor 1254/1260	30	0.2	mg/kg
TP- 5	No Compounds Detected			
TP- 5B	Trichloroethene	61	25.	ug/kg
	1,1,1-Trichloroethane	55	25.	ug/kg
	Tetrachloroethene	580	25.	ug/kg
TP- 6	Aroclor 1242	0.06	0.02	mg/kg
	Aroclor 1254/1260	0.2	0.02	mg/kg
	Tetrachloroethene	15	5	ug/kg
	Trichloroethene	110	5	ug/kg
	1,1,1-Trichloroethane	10	5	ug/kg
TP- 7	Aroclor 1242	0.04	0.02	mg/kg
TP- 8	Aroclor 1242	0.07	0.02	mg/kg
	Aroclor 1254/1260	0.09	0.02	mg/kg
	Tetrachloroethene	8	5	ug/kg
TP- 9	Aroclor 1242	0.06	0.02	mg/kg
	Aroclor 1254/1260	0.2	0.02	mg/kg
	Chlorobenzene	2400	500	ug/kg
	Fluorotrichloromethane	1600	500	ug/kg
	Tetrachloroethene	2700	500	ug/kg
	Trichloroethene	1500	500	ug/kg
	Xylenes	1200	500	ug/kg
TP- 10	No Compounds Detected			
TP- 11	Acetone	36	20	ug/kg
	Benzene	43	5	ug/kg

TABLE IV- 4
SUMMARY OF ANALYTICAL RESULTS - TEST TRENCH 1
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS
TT- 1	Aroclor 1242	13	2.0	mg/kg
	Aroclor 1254/1260	5.5	2.0	mg/kg
TT- 2	2-Butanone	49	NA	ug/kg
	Acetone	290	10	ug/kg
	Methylene chloride	340	5	ug/kg
	Toluene	7	5	ug/kg
	Xylenes (total)	29	5	ug/kg
	Ethylbenzene	6	5	ug/kg
TT- 5	2-Butanone	6	NA	ug/kg
	Acetone	55	10	ug/kg
	Xylenes (total)	19	5	ug/kg
	Methylene chloride	140	5	ug/kg
TT- 6	Toluene	5	5	ug/kg
	Xylenes (total)	32	5	ug/kg
	Acetone	140	10	ug/kg
	Ethylbenzene	5	5	ug/kg
	Methylene chloride	160	5	ug/kg
TT- 8	Methylene chloride	16	5	ug/kg
	Acetone	87	10	ug/kg
	Xylenes (total)	20	5	ug/kg
	Methyl ethyl ketone	39	10	ug/kg
TT- 10	Toluene	6	5	ug/kg
	Acetone	320	10	ug/kg
	Methylene chloride	150	5	ug/kg
	Ethylbenzene	6	5	ug/kg
	Xylenes (total)	35	5	ug/kg
TT- 10 A	Toluene	19	25.	ug/kg
TT- 13	Xylenes (total)	49	25.	ug/kg
	Acetone	130	50.	ug/kg
TT- 15	Xylenes (total)	371	25.	ug/kg

TABLE IV - 5
SUMMARY OF ANALYTICAL RESULTS - TEST TRENCH 2
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS
N-3	Acetone	820	20	ug/kg
	Methyl ethyl ketone	280	10	ug/kg
M-3	Methylene chloride	12	5	ug/kg
	Methyl ethyl ketone	23	10	ug/kg
	Xylenes (total)	9	5	ug/kg
3S	Acetone	103	20	ug/kg
	Methylene chloride	5	5	ug/kg
	Methyl ethyl ketone	25	10	ug/kg
6N	Acetone	220	20	ug/kg
	Methylene chloride	17	5	ug/kg
	Methyl ethyl ketone	88	10	ug/kg
	Toluene	6	5	ug/kg
	Xylenes (total)	16	5	ug/kg
6M	Acetone	290	20	ug/kg
	Methylene chloride	13	5	ug/kg
	Methyl ethyl ketone	97	10	ug/kg
5S	Methylene chloride	7	5	ug/kg
	Methyl ethyl ketone	15	10	ug/kg
5SA	2-Hexanone	7	10	ug/kg
	Methylene chloride	5	5	ug/kg
8N	Acetone	130	20	ug/kg
	Methylene chloride	11	5	ug/kg
	Methyl ethyl ketone	28	10	ug/kg
8M	Acetone	65	20	ug/kg
	Methylene chloride	8	5	ug/kg
	Methyl ethyl ketone	25	10	ug/kg
	Toulene	5	5	ug/kg
	Xylenes (total)	18	5	ug/kg
7S	Acetone	390	20	ug/kg
	Methylene chloride	13	5	ug/kg
	Methyl ethyl ketone	160	10	ug/kg
	Xylenes (total)	8	5	ug/kg

Table IV-6
VERTICAL EXTENT OF VOC CONTAMINATION

Exterior

Depth (Ft.)	Sum of Detectable VOCs (μg/kg)	Percent of Total
0-2	16	0
2-4	10,532	87
4-6	150	1
6-8	806	7
8-10	5	0
10-12	544	5
12-14	67	0
Total	12,120	100

Interior

Depth (Ft.)	Sum of Detectable VOCs (μg/kg)	Percent of Total
0.5-2.5	3,806	29
2.5-4.5	4,213	32
4.5-6.5	1,981	15
6.5-8.5	2,055	15
8.5-10.5	632	5
10.5-12.5	450	4
12.5-14.5	9	0
Total	13,186	100

Table IV-7
VERTICAL EXTENT OF PCB CONTAMINATION

Exterior

Depth (Ft.)	Aroclor 1242 Sum of Detectable PCBs (mg/kg)	Aroclor 1242 Percent of Total	Aroclors 1254/1260 Sum of Detectable PCBs (mg/kg)	Aroclors 1254/1260 Percent of Total
0-2	1.90	0	1.70	1
2-4	546.16	97	200.10	90
4-6	14.34	3	21.23	9
6-8	0.00	0	0.00	0
8-10	0.06	0	0.11	0
10-12	0.27	0	0.18	0
12-14	0.04	0	0.00	0
Total	562.77	100	223.32	100

Interior

Depth (Ft.)	Aroclor 1242 Sum of Detectable PCBs (mg/kg)	Aroclor 1242 Percent of Total	Aroclors 1254/1260 Sum of Detectable PCBs (mg/kg)	Aroclors 1254/1260 Percent of Total
0.5-2.5	15.17	39	9.12	29
2.5-4.5	2.90	7	0.13	0
4.5-6.5	15.37	39	12.51	40
6.5-8.5	4.11	11	7.55	24
8.5-10.5	0.35	1	0.04	0
10.5-12.5	1.22	3	2.20	7
12.5-14.5	0.08	0	0.06	0
Total	39.2	100	31.61	100

TABLE IV- 8
SUMMARY OF ANALYTICAL RESULTS - GROUNDWATER ROUND 1
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

WELL NO.	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
MW-101	/GW-22	No Compounds Detected				UNFILTERED
MW-101	/GW-23	No Compounds Detected				FILTERED
MW-201	/GW-24	Trichloroethene	940	5	ug/l	UNFILTERED
		Bromochloromethane	51		ug/l	
MW-201	/GW-25	No Compounds Detected				FILTERED
MW-102	/GW-4	Aroclor 1242	0.4	1.0	ug/l	FILTERED
		Aroclor 1254/1260	7.3	1.0	ug/l	
MW-102	/GW-3	Sample lost due to sampling error.				UNFILTERED
MW-202	/GW-1	Aroclor 1242	3.0	1	ug/l	UNFILTERED
		Aroclor 1254/1260	3.6	1	ug/l	
		Acetone	17	10	ug/l	
MW-202	/GW-2	No Compounds Detected				FILTERED
MW-103	/GW-12	No Compounds Detected				UNFILTERED
MW-103	/GW-13	No Compounds Detected				FILTERED
MW-203	/GW-10	No Compounds Detected				UNFILTERED
MW-203	/GW-11	No Compounds Detected				FILTERED
MW-104	/GW-34	No Compounds Detected				UNFILTERED
MW-104	/GW-35	No Compounds Detected				FILTERED
MW-204	/GW-36	1,1-Dichloroethane	280	50.	ug/l	UNFILTERED
		1,1-Dichloroethene	140	50.	ug/l	
		Ethylbenzene	4400	50.	ug/l	
		Tetrachloroethene	4700	50.	ug/l	
		Toluene	15,000	50.	ug/l	
		1,2-Dichloroethene (total)	3500	50.	ug/l	
		1,1,1-Trichloroethane	3900	50.	ug/l	
		Trichloroethene	8400	50.	ug/l	
		Vinyl chloride	82	100.	ug/l	
		Xylenes (total)	32,000	50.	ug/l	
		Not enough water available to analyze for PCB's.				
MW-204		Not enough water available for filtered sample.				FILTERED
MW-105	/GW-30	No Compounds Detected				UNFILTERED

TABLE IV- 8
SUMMARY OF ANALYTICAL RESULTS - GROUNDWATER ROUND 1
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

WELL NO.	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
MW-105	/GW-31	No Compounds Detected				FILTERED
MW-205	/GW-32	No Compounds Detected				UNFILTERED
MW-205	/GW-33	No Compounds Detected				FILTERED
MW-106	/GW-26	Chloroform.....	6	5	ug/l	UNFILTERED
		Trichloroethene.....	8	5	ug/l	
MW-106	/GW-27	No Compounds Detected				FILTERED
MW-206	/GW-28	No Compounds Detected				UNFILTERED
MW-206	/GW-29	No Compounds Detected				FILTERED
MW-107	/GW-37	Chloroform.....	25	5	ug/l	UNFILTERED
		Not enough water available to analyze for PCB's.				
MW-107		Not enough water available for filtered sample.				FILTERED
MW-207	/GW-38	Aroclor 1242.....	8.3	1.0	ug/l	UNFILTERED
		Aroclor 1254/1260.....	22	1.0	ug/l	
MW-207		Not enough water available for filtered sample.				FILTERED
MW-108	/GW-18	No Compounds Detected				UNFILTERED
MW-108	/GW-19	No Compounds Detected				FILTERED
MW-108A	/GW-20	No Compounds Detected				REPLICATE OF GW-18
MW-108A	/GW-21	No Compounds Detected				REPLICATE OF GW-19
MW-208		Well was dry during this round of sampling.				
MW-109	/GW-8	No Compounds Detected				UNFILTERED
MW-109	/GW-9	No Compounds Detected				UNFILTERED
MW-109		Not enough water available for filtered sample.				FILTERED
MW-209	/GW-40	No Compounds Detected				UNFILTERED
MW-209		Not enough water available to analyze for PCB's.				UNFILTERED
MW-209		Not enough water available for filtered sample.				FILTERED

TABLE IV- 8
SUMMARY OF ANALYTICAL RESULTS - GROUNDWATER ROUND 1
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

WELL NO.	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
MW-110	/GW-5	Aroclor 1242	0.4	1.0	ug/l	UNFILTERED
		Aroclor 1254/1260	3.0	1.0	ug/l	
MW-110	/GW-6	No Compounds Detected				FILTERED
MW-210	/GW-7	1,1-Dichloroethane	69	5	ug/l	UNFILTERED
		1,1-Dichloroethene	1500	5	ug/l	
		1,1,2,2-Tetrachloroethane	93	5	ug/l	
		Tetrachloroethene	3200	5	ug/l	
		1,2-Dichloroethene (total)	17	5	ug/l	
		1,1,1-Trichloroethane	2000	5	ug/l	
		Trichloroethene	21	5	ug/l	
MW-210	/GW-8	No Compounds Detected				FILTERED
MW-111	/GW-14	No Compounds Detected				UNFILTERED
MW-111	/GW-15	No Compounds Detected				FILTERED
MW-211	/GW-16	Trichloroethene	68	5	ug/l	UNFILTERED
MW-211	/GW-17	No Compounds Detected				FILTERED

TABLE IV- 9
SUMMARY OF ANALYTICAL RESULTS - GROUNDWATER ROUND 2
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

WELL NO.	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
MW-101	/GW-61	Aroclor 1242	0.5	0.5	ug/l	UNFILTERED
		Chloroform	19	5	ug/l	
MW-101	/GW-62	Aroclor 1242	1.8	0.5	ug/l	FILTERED
MW-201	/GW-59	Aroclor 1242	1.4	0.5	ug/l	UNFILTERED
		1,2-Dichloroethene (total)	97	50	ug/l	
		Trichloroethene	1000	50	ug/l	
		2-Methoxy-2-methyl-propane	90		ug/l	
MW-201	/GW-60	Aroclor 1242	1.1	0.5	ug/l	FILTERED
MW-102	/GW-43	No Compounds Detected				UNFILTERED
MW-102	/GW-44	Aroclor 1242	0.8	0.5	ug/l	FILTERED
MW-202	/GW-41	Aroclor 1242	2.9	0.5	ug/l	UNFILTERED
MW-202	/GW-42	Aroclor 1242	0.8	0.5	ug/l	FILTERED
MW-103	/GW-69	Aroclor 1242	0.6	0.5	ug/l	UNFILTERED
MW-103	/GW-70	No Compounds Detected				FILTERED
MW-203	/GW-57	No Compounds Detected				UNFILTERED
MW-203	/GW-58	Aroclor 1242	1.1	0.5	ug/l	FILTERED
MW-104	/GW-84	Ethanol	23		ug/l	UNFILTERED
MW-104	/GW-85	No Compounds Detected				FILTERED
MW-204		Not enough water available for filtered sample.				FILTERED
MW-204	/GW-86	1,1-Dichloroethane	3200	2500	ug/l	UNFILTERED
		Ethylbenzene	4500	2500	ug/l	
		Tetrachloroethene	4600	2500	ug/l	
		Toluene	17000	2500	ug/l	
		1,1,1-Trichloroethane	3600	2500	ug/l	
		Trichloroethene	8400	2500	ug/l	
		Xylenes (total)	34000	2500	ug/l	
		Not enough water available to analyze for PCB's.				
MW-105	/GW-55	No Compounds Detected				UNFILTERED
MW-105	/GW-56	Aroclor 1242	0.6	0.5	ug/l	FILTERED

TABLE IV- 9
SUMMARY OF ANALYTICAL RESULTS - GROUNDWATER ROUND 2
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

WELL NO.	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
MW-205	/GW-53	Acetone	15	10	ug/l	UNFILTERED
MW-205	/GW-54	Aroclor 1242	0.5	0.5	ug/l	FILTERED
MW-106	/GW-49	Aroclor 1242	0.7	0.5	ug/l	UNFILTERED
MW-106	/GW-50	Aroclor 1242	0.9	0.5	ug/l	FILTERED
MW-206	/GW-47	Aroclor 1242	3.5	0.5	ug/l	UNFILTERED
		Aroclor 1254/1260	1.3	0.5	ug/l	
MW-206	/GW-48	Aroclor 1242	1.0	0.5	ug/l	FILTERED
MW-107	/GW-78	Acetone	29	20	ug/l	UNFILTERED
		Chloroform	18	5	ug/l	
		Methylene chloride	5	5	ug/l	
		Not enough water available to analyze for PCB's.				
MW-107		Not enough water available for filtered sample.				FILTERED
MW-207	/GW-79	Aroclor 1242	4.5	2.0	ug/l	UNFILTERED
MW-207		Not enough water available for filtered sample.				FILTERED
MW-207A	/GW-80	Aroclor 1242	4.6	2.0	ug/l	REPLICATE OF GW-79
MW-207A		Not enough water available for filtered sample.				FILTERED
MW-207F	/GW-81	No Compounds Detected				UNFILTERED
MW-207F	/GW-82	No Compounds Detected				FILTERED
MW-108	/GW-71	Aroclor 1242	0.8	0.5	ug/l	UNFILTERED
MW-108	/GW-72	No Compounds Detected				FILTERED
MW-108A	/GW-73	Aroclor 1242	ND	0.5	ug/l	REPLICATE OF GW-71
MW-108A	/GW-74	No Compounds Detected				REPLICATE OF GW-72
MW-108F	/GW-75	No Compounds Detected				UNFILTERED
MW-108F	/GW-76	No Compounds Detected				FILTERED
MW-208	/GW-77	Chloroform	30	5	ug/l	UNFILTERED
		Not enough water available to analyze for PCB's.				

TABLE IV- 9
SUMMARY OF ANALYTICAL RESULTS - GROUNDWATER ROUND 2
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

WELL NO.	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
MW-208		Not enough water available for filtered sample.				FILTERED
MW-109		Not enough water available to analyze for PCB's.				UNFILTERED
MW-109		Not enough water available for filtered sample.				FILTERED
MW-109	/GW-83	No Compounds Detected				UNFILTERED
MW-209	/GW-63	No Compounds Detected				UNFILTERED
MW-209	/GW-64	Aroclor 1242	3.3	2.0	ug/l	FILTERED
MW-110	/GW-45	No Compounds Detected				UNFILTERED
MW-110	/GW-46	No Compounds Detected				FILTERED
MW-210	/GW-51	1,1-Dichloroethane	17000	7500	ug/l	UNFILTERED
		Methylene chloride	25000	7500	ug/l	
		Tetrachloroethene	12000	7500	ug/l	
		Toluene	49000	7500	ug/l	
		1,1,1-Trichloroethane	160000	7500	ug/l	
MW-210	/GW-52	Aroclor 1242	0.6	0.5	ug/l	FILTERED
MW-111	/GW-67	Aroclor 1242	0.6	0.5	ug/l	UNFILTERED
MW-111	/GW-68	No Compounds Detected				FILTERED
MW-211	/GW-65	Aroclor 1242	0.8	0.5	ug/l	UNFILTERED
		Tetrachloroethene	140	5	ug/l	
		1,2-Dichloroethene (total)	32	5	ug/l	
MW-211	/GW-66	Aroclor 1242	1.3	0.5	ug/l	FILTERED

TABLE IV- 10
SUMMARY OF ANALYTICAL RESULTS - GROUNDWATER ROUND 3
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

WELL NO.	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
MW-101	/GW-97	Trichloroethene.....	12	5	ug/l	UNFILTERED
MW-101	/GW-97	No Compounds Detected				FILTERED
MW-201	/GW-96	Trichloroethene.....	1100	5	ug/l	UNFILTERED
		Chloroform.....	6	5	ug/l	
		1,2-Dichloroethene(total).....	94	5	ug/l	
MW-201	/GW-96	No Compounds Detected				FILTERED
MW-102	/GW-88	Acetone.....	110	20	ug/l	UNFILTERED
		Chloroform.....	33	5	ug/l	
MW-102	/GW-88	No Compounds Detected				FILTERED
MW-202	/GW-87	No Compounds Detected				UNFILTERED
MW-202	/GW-87	No Compounds Detected				FILTERED
MW-103	/GW-111	No Compounds Detected				UNFILTERED
MW-103	/GW-111	No Compounds Detected				FILTERED
MW-203	/GW-102	1,2-Dichloroethene(total).....	14	5	ug/l	UNFILTERED
		Trichloroethene.....	5	5	ug/l	
MW-203	/GW-102	No Compounds Detected				FILTERED
MW-104	/GW-95	No Compounds Detected				UNFILTERED
MW-104	/GW-95	No Compounds Detected				FILTERED
MW-204	/GW-94	Aroclor 1254/1260.....	1.3	0.5	ug/l	UNFILTERED
		Ethlybenzene.....	1800	1000	ug/l	
		Tetrachlorethene.....	1400	1000	ug/l	
		Toluene.....	12000	1000	ug/l	
		1,2-Dichloroethene(total).....	9200	1000	ug/l	
		trans-1,3-Dichloropropene.....	2400	1000	ug/l	
		Trichloroethene.....	2200	1000	ug/l	
		Xylenes(total).....	30000	1000	ug/l	
MW-204	/GW-94	No Compounds Detected				FILTERED
MW-105	/GW-108	No Compounds Detected				UNFILTERED
MW-105	/GW-108	No Compounds Detected				FILTERED
MW-105R	/GW-109	No Compounds Detected				UNFILTERED

TABLE IV- 10
SUMMARY OF ANALYTICAL RESULTS - GROUNDWATER ROUND 3
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

WELL NO.	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
MW-105R	/GW-109	No Compounds Detected				FILTERED
MW-205	/GW-92	No Compounds Detected				UNFILTERED
MW-205	/GW-92	No Compounds Detected				FILTERED
MW-106	/GW-93	Chloroform.....	130	5	ug/l	UNFILTERED
		Methylene Chloride.....	10	5	ug/l	
		1,2-Dichloroethene(total).....	8	5	ug/l	
MW-106	/GW-93	No Compounds Detected				FILTERED
MW-206	/GW-91	No Compounds Detected				UNFILTERED
MW-206	/GW-91	No Compounds Detected				FILTERED
MW-107	/GW-98	No Compounds Detected				UNFILTERED
		Not enough water available to analyze for PCBs.				
MW-107		Not enough water available for filtered sample.				FILTERED
MW-207	/GW-99	Aroclor 1242.....	12.9	0.5	ug/l	UNFILTERED
		Aroclor 1254/1260.....	9.6	0.5	ug/l	
MW-207	/GW-99	No Compounds Detected				FILTERED
MW-108	/GW-103	1,2-Dichloroethene(total).....	14	5	ug/l	UNFILTERED
		Trichloroethene.....	6	5	ug/l	
MW-108	/GW-103	No Compounds Detected				FILTERED
MW-208	/GW-104	No Compounds Detected				UNFILTERED
MW-208	/GW-104	No Compounds Detected				FILTERED
MW-109	/GW-101	No Compounds Detected				UNFILTERED
MW-109	/GW-110	No Compounds Detected				UNFILTERED
MW-209	/GW-100	No Compounds Detected				UNFILTERED
MW-209	/GW-100	No Compounds Detected				FILTERED
MW-110	/GW-89	No Compounds Detected				UNFILTERED
MW-110	/GW-89	No Compounds Detected				FILTERED

TABLE IV- 10
SUMMARY OF ANALYTICAL RESULTS - GROUNDWATER ROUND 3
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

WELL NO.	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
MW-210	/GW-90	1,1-Dichloroethene.....	2500	250	ug/l	UNFILTERED
		Tetrachloroethene.....	8000	250	ug/l	
		1,1,1-Trichloroethane.....	3100	250	ug/l	
MW-210	/GW-90	No Compounds Detected				FILTERED
MW-111	/GW-107	No Compounds Detected				UNFILTERED
MW-111	/GW-107	No Compounds Detected				FILTERED
MW-211	/GW-105	Trichloroethene.....	180	5	ug/l	UNFILTERED
		1,2-Dichloroethene(total).....	37	5	ug/l	
MW-211	/GW-105	No Compounds Detected				FILTERED
MW-211R	/GW-106	Trichloroethene.....	180	5	ug/l	UNFILTERED
		1,2-Dichloroethene(total).....	40	5	ug/l	
MW-211R	/GW-106	No Compounds Detected				FILTERED

TABLE IV-11
SUMMARY OF ANALYTICAL RESULTS - NORTH ANDERSON WELL
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DATE SAMPLED	DESCRIPTION
SPRW-1	Aroclor 1254/1260	6.7	1	ug/l	1/27/89	UNFILTERED
	Acetone	14	10	ug/l		
SPRW-2	No contaminants detected.				4/17/89	UNFILTERED
SPRW-3	No contaminants detected.				4/17/89	FILTERED

TABLE IV-12
SUMMARY OF ANALYTICAL RESULTS - SOUTH ANDERSON WELL
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DATE SAMPLED	DESCRIPTION
SPRW-4	No contaminants detected.				4/20/89	UNFILTERED
SPRW-5	No contaminants detected.				4/20/89	FILTERED

TABLE IV- 13
SUMMARY OF ANALYTICAL RESULTS - SURFACE SOIL
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS
2	/SFS-49	Aroclor 1242	22	10	mg/kg
		Aroclor 1254/1260	210	10	mg/kg
2	/SFS-50	Aroclor 1242	120	10	mg/kg
		Aroclor 1254/1260	420	10	mg/kg
5	/SFS-7	Aroclor 1242	1.2	0.02	mg/kg
		Aroclor 1254/1260	2.4	0.02	mg/kg
6	/SFS-4	Aroclor 1242	1.7	0.02	mg/kg
		Aroclor 1254/1260	0.41	0.02	mg/kg
6	/SFS-6	Aroclor 1242	0.40	0.4	mg/kg
		Aroclor 1254/1260	0.93	0.4	mg/kg
7	/SFS-12	Aroclor 1242	2.9	0.02	mg/kg
		Aroclor 1254/1260	10.0	0.02	mg/kg
8	/SFS-5	Aroclor 1242	1.6	0.02	mg/kg
		Aroclor 1254/1260	9.1	0.02	mg/kg
9	/SFS-53	Aroclor 1242	2.4	2.0	mg/kg
		Aroclor 1254/1260	5.3	2.0	mg/kg
18	/SFS-51	Aroclor 1242	440	30	mg/kg
		Aroclor 1254/1260	89	30	mg/kg
20	/SFS-16	Aroclor 1242	2.0	0.4	mg/kg
		Aroclor 1254/1260	4.4	0.4	mg/kg
24	/SFS-57	Aroclor 1254/1260	0.11	0.04	mg/kg
26	/SFS-27	Aroclor 1242	10	4.0	mg/kg
		Aroclor 1254/1260	39	4.0	mg/kg
27	/SFS-18	Aroclor 1242	0.90	1.0	mg/kg
		Aroclor 1254/1260	3.5	1.0	mg/kg
28	/SFS-29	Aroclor 1242	0.06	0.02	mg/kg
		Aroclor 1254/1260	0.10	0.02	mg/kg
30	/SFS-28	Aroclor 1242	5.0	0.02	mg/kg
		Aroclor 1254/1260	4.1	0.02	mg/kg
32	/SFS-59	Aroclor 1242	8.4	2	mg/kg
		Aroclor 1254/1260	15	2	mg/kg
33	/SFS-60	Aroclor 1242	7.4	2	mg/kg

TABLE IV- 13
SUMMARY OF ANALYTICAL RESULTS - SURFACE SOIL
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS
		Aroclor 1254/1260	12	2	mg/kg
34	/SFS-9	Aroclor 1242	14	0.20	mg/kg
		Aroclor 1254/1260	28	0.20	mg/kg
35	/SFS-17	Aroclor 1242	0.3	0.02	mg/kg
		Aroclor 1254/1260	1.0	0.02	mg/kg
37	/SFS-26	Aroclor 1242	5.6	4.0	mg/kg
		Aroclor 1254/1260	86	4.0	mg/kg
39	/SFS-14	Aroclor 1242	7.5	0.20	mg/kg
		Aroclor 1254/1260	16	0.20	mg/kg
40	/SFS-15	Aroclor 1242	8.5	0.20	mg/kg
		Aroclor 1254/1260	14	0.20	mg/kg
41	/SFS-23	Aroclor 1242	4.5	1.0	mg/kg
		Aroclor 1254/1260	6.0	1.0	mg/kg
41	/SFS-25	Aroclor 1242	0.06	0.02	mg/kg
		Aroclor 1254/1260	0.15	0.02	mg/kg
44	/SFS-13	Aroclor 1242	15	0.20	mg/kg
		Aroclor 1254/1260	4.5	0.20	mg/kg
47	/SFS-30	Aroclor 1242	6.0	4.0	mg/kg
		Aroclor 1254/1260	18	4.0	mg/kg
48	/SFS-48	Aroclor 1242	3.2	0.2	mg/kg
		Aroclor 1254/1260	6.0	0.2	mg/kg
49	/SFS-19	Aroclor 1242	14	1.0	mg/kg
		Aroclor 1254/1260	46	1.0	mg/kg
51	/SFS-52	Aroclor 1242	9.8	8.0	mg/kg
		Aroclor 1254/1260	37	8.0	mg/kg
55	/SFS-41	Aroclor 1242	0.40	0.1	mg/kg
		Aroclor 1254/1260	1.0	0.1	mg/kg
56	/SFS-38	Aroclor 1242	0.30	0.02	mg/kg
		Aroclor 1254/1260	0.44	0.02	mg/kg
56	/SFS-39	Aroclor 1242	230	0.2	mg/kg
		Aroclor 1254/1260	420	0.2	mg/kg
57	/SFS-45	Aroclor 1242	1.6	0.2	mg/kg

TABLE IV- 13
SUMMARY OF ANALYTICAL RESULTS - SURFACE SOIL
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS
		Aroclor 1254/1260	2.8	0.2	mg/kg
58	/SFS-35	Aroclor 1242	61	0.20	mg/kg
		Aroclor 1254/1260	56	0.20	mg/kg
59	/SFS-36	Aroclor 1242	14	0.10	mg/kg
		Aroclor 1254/1260	47	0.10	mg/kg
59	/SFS-37	Aroclor 1242	25	0.02	mg/kg
		Aroclor 1254/1260	51	0.02	mg/kg
63	/SFS-33	Aroclor 1242	0.23	0.02	mg/kg
		Aroclor 1254/1260	0.61	0.02	mg/kg
64	/SFS-2	Aroclor 1242	1.2	0.02	mg/kg
		Aroclor 1254/1260	2.5	0.02	mg/kg
64	/SFS-3	Aroclor 1242	0.88	0.02	mg/kg
		Aroclor 1254/1260	1.6	0.02	mg/kg
65	/SFS-1	Aroclor 1242	1.2	0.02	mg/kg
		Aroclor 1254/1260	0.95	0.02	mg/kg
66	/SFS-31	Aroclor 1242	1.0	1.0	mg/kg
		Aroclor 1254/1260	9.9	1.0	mg/kg
67	/SFS-32	Aroclor 1242	5.2	0.02	mg/kg
		Aroclor 1254/1260	5.4	0.02	mg/kg
84	/SFS-42	Aroclor 1242	15	2	mg/kg
		Aroclor 1254/1260	140	2	mg/kg
84	/SFS-43	Aroclor 1242	4.6	0.4	mg/kg
		Aroclor 1254/1260	36	0.4	mg/kg
86	/SFS-34	Aroclor 1242	14	2.0	mg/kg
		Aroclor 1254/1260	26	2.0	mg/kg
97	/SFS-58	No Compounds Detected			
163	/SFS-56	Aroclor 1242	8.8	8.3	mg/kg
		Aroclor 1254/1260	26	8.3	mg/kg
164	/SFS-55	Aroclor 1242	4.8	0.04	mg/kg
		Aroclor 1254/1260	5.6	0.04	mg/kg
167	/SFS-54	Aroclor 1254/1260	0.3	0.20	mg/kg

TABLE IV- 13
SUMMARY OF ANALYTICAL RESULTS - SURFACE SOIL
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS
172	/SFS-47	Aroclor 1242	4.0	0.2	mg/kg
		Aroclor 1254/1260	8.3	0.2	mg/kg
181	/SFS-24	Aroclor 1242	3.8	1.0	mg/kg
		Aroclor 1254/1260	8.1	1.0	mg/kg
182	/SFS-22	Aroclor 1242	24	1.0	mg/kg
		Aroclor 1254/1260	95	1.0	mg/kg
200	/SFS-20	Aroclor 1242	1.6	0.4	mg/kg
		Aroclor 1254/1260	3.6	0.4	mg/kg
200	/SFS-21	Aroclor 1242	1.7	0.4	mg/kg
		Aroclor 1254/1260	3.9	0.4	mg/kg
205	/SFS-11	Aroclor 1242	7.2	0.20	mg/kg
		Aroclor 1254/1260	12	0.20	mg/kg
206	/SFS-10	Aroclor 1242	10	0.20	mg/kg
		Aroclor 1254/1260	14	0.20	mg/kg
207	/SFS-61	Aroclor 1242	0.4	0.02	mg/kg
		Aroclor 1254/1260	0.2	0.02	mg/kg
207	/SFS-62	Aroclor 1242	1.2	0.02	mg/kg
		Aroclor 1254/1260	0.6	0.02	mg/kg
207	/SFS-63	Aroclor 1242	2.0	0.02	mg/kg
		Aroclor 1254/1260	1.4	0.02	mg/kg
207	/SFS-64	Aroclor 1242	2.0	0.02	mg/kg
		Aroclor 1254/1260	0.1	0.02	mg/kg
207	/SFS-65	Aroclor 1242	BDL	0.02	mg/kg
		Aroclor 1254/1260	BDL	0.02	mg/kg
207	/SFS-66	Aroclor 1242	BDL	0.02	mg/kg
		Aroclor 1254/1260	BDL	0.02	mg/kg
207	/SFS-67	Aroclor 1242	BDL	0.02	mg/kg
		Aroclor 1254/1260	BDL	0.02	mg/kg
207	/SFS-68	Aroclor 1242	0.3	0.02	mg/kg
		Aroclor 1254/1260	0.3	0.02	mg/kg

TABLE IV- 14
SUMMARY OF ANALYTICAL RESULTS - SURFACE TRACKING
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS
STS- 1	Aroclor 1242	0.1	0.04	mg/kg
STS- 2	No Compounds Detected			
STS- 3	Aroclor 1242	1.4	1	ug/100 sq.cm.
STS- 4	Aroclor 1242	2.9	1	ug/100 sq.cm.
	Aroclor 1254/1260	3.2	1	ug/100 sq.cm.
STS- 5	Aroclor 1242	1.3	1	ug/100 sq.cm.
	Aroclor 1254/1260	1.2	1	ug/100 sq.cm.
STS- 6	Aroclor 1242	1.4	1	ug/100 sq.cm.
	Aroclor 1254/1260	1.7	1	ug/100 sq.cm.
STS- 7	Aroclor 1242	1.3	1	ug/100 sq.cm.
	Aroclor 1254/1260	1.9	1	ug/100 sq.cm.

TABLE IV- 15
SUMMARY OF ANALYTICAL RESULTS - SEDIMENT
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS
SED- 1	Aroclor 1242	0.3	0.04	mg/kg
	Aroclor 1254/1260	1.1	0.04	mg/kg
	Acetone	47	10	ug/kg
SED- 2	Aroclor 1242	0.7	0.4	mg/kg
	Aroclor 1254/1260	2.0	0.4	mg/kg
	Acetone	23	10	ug/kg
	Toluene	6	5	ug/kg
SED- 3	Aroclor 1242	31	0.2	mg/kg
	Aroclor 1254/1260	90	0.2	mg/kg
	Acetone	41	10	ug/kg
SED- 4	Aroclor 1242	32	2.0	mg/kg
	Aroclor 1254/1260	41	2.0	mg/kg
	Acetone	56	10	ug/kg
	Toluene	120	5	ug/kg
SED- 5	Aroclor 1242	98	2.0	mg/kg
	Aroclor 1254/1260	195	2.0	mg/kg
	Toluene	600	5	ug/kg
	Chloromethane	11	10	ug/kg
	Acetone	100	10	ug/kg
SED- 6	Aroclor 1242	46	0.10	mg/kg
	Aroclor 1254/1260	32	0.10	mg/kg
	Acetone	37	10	ug/kg
	Toluene	46	5	ug/kg
SED- 7	Acetone	55	50.	ug/kg
	Toluene	6,200	25.	ug/kg
SED- 8	Aroclor 1242	5.2	0.2	mg/kg
	Acetone	11	10	ug/kg
	Trichloroethene	15	5	ug/kg
SED- 9	Methylene chloride	8	5	ug/kg
SED- 10	Aroclor 1242	0.2	0.04	mg/kg
	Aroclor 1254/1260	0.4	0.04	mg/kg
	Benzene	5	5	ug/kg
	Methylene chloride	7	5	ug/kg
	4-Methyl-2-pentanone	6	10	ug/kg
SED- 11	Aroclor 1242	13	0.4	mg/kg
	Aroclor 1254/1260	64	0.4	mg/kg
	Methylene chloride	23	5	ug/kg
	Trichloroethene	5	5	ug/kg

TABLE IV- 15
SUMMARY OF ANALYTICAL RESULTS - SEDIMENT
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS
SED- 12	Methylene chloride	10	5	ug/kg
SED- 13	Trichloroethene	8	5	ug/kg
	Xylenes (total)	24	5	ug/kg
SED- 14	Aroclor 1254/1260	0.3	0.04	mg/kg
SED- 15	Aroclor 1242	0.1	0.04	mg/kg
	Aroclor 1254/1260	0.9	0.04	mg/kg
	Trichloroethene	7	5	ug/kg
SED- 16	Aroclor 1242	2.1	2	mg/kg
	Aroclor 1254/1260	4.6	2	mg/kg
	Methylene chloride	6	5	ug/kg
	Trichloroethene	8	5	ug/kg
SED- 17	Aroclor 1242	6.0	2	mg/kg
	Aroclor 1254/1260	6.5	2	mg/kg
	Methylene chloride	15	5	ug/kg
	Trichloroethene	23	5	ug/kg
	2,2-dimethyl-3-hexene	74		ug/kg
	1,3-Butadien-1-01, acetate	57		ug/kg
	5-Methyl,1-Heptene	79		ug/kg
	3-Octene	22		ug/kg
	Morphinan,7-8-didehydri-3-methoxy-17-methyl-6-methylene	17		ug/kg
	2-ethyl-1-hexanol	110		ug/kg
SED- 18	Aroclor 1254/1260	1.9	1.7	mg/kg
	Trichloroethene	6	5	ug/kg
	3-Heptanone	31	5	ug/kg
	2-ethyl-1-hexanol	190	5	ug/kg
SED- 19	Aroclor 1242	0.2	0.04	mg/kg
	Aroclor 1254/1260	0.4	0.04	mg/kg
SED- 20	Aroclor 1242	0.4	0.04	mg/kg
	Aroclor 1254/1260	0.6	0.04	mg/kg
	Methylene chloride	14	25.	ug/kg
SED- 21	Aroclor 1242	0.3	0.04	mg/kg
	Aroclor 1254/1260	0.6	0.04	mg/kg
SED- 22	Aroclor 1242	0.3	0.04	mg/kg
	Aroclor 1254/1260	0.7	0.04	mg/kg
SED- 23	Aroclor 1254/1260	0.3	0.04	mg/kg

TABLE IV- 15
SUMMARY OF ANALYTICAL RESULTS - SEDIMENT
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS
	Trichloroethene	6	25.	ug/kg
SED- 24	Aroclor 1254/1260	0.3	0.04	mg/kg
	Trichloroethene	9	25.	ug/kg
SED- 25	Aroclor 1242	7.8	2	mg/kg
	Aroclor 1254/1260	13	2	mg/kg
	Methylene chloride	6	25.	ug/kg
SED- 26	Aroclor 1242	2.4	2	mg/kg
	Aroclor 1254/1260	6.6	2	mg/kg
	Trichloroethene	40	25.	ug/kg
SED- 27	Trichloroethene	53	25.	ug/kg
SED- 28	Methylene chloride	110	25.	ug/kg
SED- 29	Aroclor 1242	7.9	2.0	mg/kg
	Aroclor 1254/1260	16	2.0	mg/kg
	Methylene chloride	125	25.	ug/kg
SED- 30	Aroclor 1242	67	0.4	mg/kg
	Aroclor 1254/1260	55	0.4	mg/kg
	Methylene chloride	80	25.	ug/kg
SED- 31	Aroclor 1242	0.60	0.04	mg/kg
	Aroclor 1254/1260	1.6	0.04	mg/kg
SED- 32	Aroclor 1242	8.1	0.4	mg/kg
	Aroclor 1254/1260	16	0.4	mg/kg
	1,2,4,5-Tetrachlorobenzene	0.3	0.04	mg/kg
	Pentachlorobenzene	0.1	0.04	mg/kg
	1,2,4-Trichlorobenzene	0.1	0.04	mg/kg
	Methylene chloride	70	25	ug/kg
SED- 33	Aroclor 1242	0.3	0.04	mg/kg
	Aroclor 1254/1260	0.5	0.04	mg/kg
	Methylene chloride	170	25.	ug/kg
	Toluene	28	25.	ug/kg
SED- 34	Aroclor 1242	0.6	0.04	mg/kg
	Aroclor 1254/1260	2.1	0.04	mg/kg
	gamma-Hexachlorocyclohexane	1.1	0.04	mg/kg
	Acetone	60	50.	ug/kg
SED- 35	Aroclor 1242	0.3	0.04	mg/kg
	Aroclor 1254/1260	1.5	0.04	mg/kg
	Acetone	25	50.	ug/kg

TABLE IV- 15
SUMMARY OF ANALYTICAL RESULTS - SEDIMENT
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS
	Methylene chloride	50	25.	ug/kg
SED- 36	Acetone	350	50.	ug/kg
	Methyl ethyl ketone	30	50.	ug/kg
	Toluene	5100	25.	ug/kg
	Xylenes (total)	85	25.	ug/kg
SED- 37	Acetone	290	50.	ug/kg
	Chloroethane	140	50.	ug/kg
	Methylene chloride	730	25.	ug/kg
	Toluene	11000	25.	ug/kg
	Xylenes (total)	53	25.	ug/kg
SED- 38	Xylenes (total)	1800	500.	ug/kg
SED- 39	Tetrachloroethene	6	5	ug/kg
	Toluene	74	5	ug/kg
	Trichloroethene	39	5	ug/kg
SED- 40	No Compounds Detected			
SED- 41	Trichloroethene	10	5	ug/kg
SED- 42	No Compounds Detected			
SED- 43	Xylenes (total)	960	500.	ug/kg
SED- 44	No Compounds Detected			
SED- 45	No Compounds Detected			
SED- 46	2-Hexanone	130	100.	ug/kg
	Toluene	680	50.	ug/kg
SED- 47	Toluene	860	50.	ug/kg

TABLE IV- 16
SUMMARY OF ANALYTICAL RESULTS - SURFACE WATER
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
SW- 1	Aroclor 1242	1.3	1.0	mg/l	UNFILTERED
	Aroclor 1254/1260	3.2	1.0	mg/l	
	Acetone	22	10	ug/l	
	1,1-Dichloroethene	5	5	ug/l	
	1,2,4-Trichlorobenzene	410	30.0	ug/l	
	1,1,1-Trichloroethane	45	5	ug/l	
	1,2,4,5-Tetrachlorobenzene	230	30.0	ug/l	
SW- 2	Aroclor 1242	1.7	1.0	mg/l	UNFILTERED
	Aroclor 1254/1260	2.2	1.0	mg/l	
	1,2,4,5-Tetrachlorobenzene	230	30.0	ug/l	
	Toluene	8	5	ug/l	
	1,2,4-Trichlorobenzene	300	30.0	ug/l	
	Xylenes (total)	12	5	ug/l	
	1,1,1-Trichloroethane	490	5	ug/l	
	1,1-Dichloroethene	68	5	ug/l	
	1,1-Dichloroethane	26	5	ug/l	
SW- 3	Aroclor 1242	1.0	1.0	mg/l	UNFILTERED
	Aroclor 1254/1260	2.5	1.0	mg/l	
	Chlorobenzene	5	5	ug/l	
	1,1,1-Trichloroethane	490	5	ug/l	
	1,2,4,5-Tetrachlorobenzene	160	30.0	ug/l	
	1,2,4-Trichlorobenzene	200	30.0	ug/l	
	1,1-Dichloroethane	26	5	ug/l	
	Toluene	8	5	ug/l	
	Xylenes (total)	12	5	ug/l	
	1,1-Dichloroethene	63	5	ug/l	
SW- 6	Aroclor 1242	21	1.0	ug/l	UNFILTERED
SW- 7	No Compounds Detected				REPLICATE OF SW-6
SW- 8	Acetone	13	10	ug/l	FILTERED
SW- 9	Aroclor 1242	4.9	0.5	ug/l	REPLICATE OF SW-8
	Aroclor 1254/1260	1.6	0.5	ug/l	
SW- 10	Acetone	43	10	ug/l	UNFILTERED
	Methylene chloride	20	5	ug/l	
	Toluene	5	5	ug/l	
	Trichloroethene	9	5	ug/l	
SW- 11	No Compounds Detected				FILTERED
SW- 12	Aroclor 1242	1.9	0.5	ug/l	UNFILTERED
	Aroclor 1254/1260	6.0	0.5	ug/l	
	1,1,2-Trichloroethane	140	5	ug/l	

TABLE IV- 16
SUMMARY OF ANALYTICAL RESULTS - SURFACE WATER
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
	Acetone	13	10	ug/l	
	Tetrachloroethene	8	5	ug/l	
SW- 13	No Compounds Detected				FILTERED
SW- 14	No Compounds Detected				UNFILTERED
SW- 15	Aroclor 1242	1.4	1	ug/l	FILTERED
SW- 16	Aroclor 1242	2.0	1	ug/l	UNFILTERED
	Aroclor 1254/1260	1.9	1	ug/l	
SW- 17	No Compounds Detected				FILTERED
SW- 19	No Compounds Detected				FILTERED
SW- 20	Methylene chloride	19	5	ug/l	UNFILTERED
	Toluene	2	5	ug/l	
	1,1,2-Trichloroethane	78	5	ug/l	
SW- 21	No Compounds Detected				FILTERED
SW- 22	Acetone	45	10	ug/l	UNFILTERED
	Methyl ethyl ketone	7	10	ug/l	
SW- 25	Ethanol	16	5	ug/l	UNFILTERED
SW- 26	No Compounds Detected				FILTERED
SW- 27	Aroclor 1242	5.8	1	ug/l	REPLICATE OF SW-25
	Aroclor 1254/1260	4.2	1	ug/l	
SW- 28	Aroclor 1242	2.6	1	ug/l	REPLICATE OF SW-26
SW- 31	Aroclor 1242	5.6	1	ug/l	UNFILTERED
	Aroclor 1254/1260	4.0	1	ug/l	
SW- 32	Aroclor 1242	3.6	1	ug/l	FILTERED

Table IV-17
SUMMARY OF AIR SAMPLING RESULTS

Sample No.	Parameter	Detection Limit*	Result*
PCB1	PCB	0.003	BDL**
PCBBL1	PCB	0.003	BDL
DUST1	Dust	0.1	0.2
DUSTBL1	Dust	0.1	BDL
VOC1	VOC	0.2-0.3	BDL
VOCBLK1	VOC	0.2-0.3	BDL
PCB2	PCB	0.003	BDL
PCBBL2	PCB	0.003	BDL
DUST2	Dust	0.1	0.2
DUSTBL2	Dust	0.1	BDL
VOC2	VOC	0.2	BDL
VOCBLK2	VOC	0.2	BDL
DUST3	Dust	0.3	0.5
DUSTBL3	Dust	0.3	BDL
PCB3	PCB	0.006	BDL
PCBBL3	PCB	0.006	BDL

**Units are mg/cu. m. for Dust and PCB and ppm for VOC.*
***Below Detection Limit.*

TABLE IV- 18
SUMMARY OF ANALYTICAL RESULTS - FLOOR WIPES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SURFACE	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
1	F	/W-38	Aroclor 1242	1.4	1	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	0.6	1	ug/100 sq. cm.	
2	F	/W-37	Aroclor 1254/1260	1.3	1	ug/100 sq. cm.	UNBIASED
3	F	/W-1		BDL	1	ug/100 sq. cm.	UNBIASED
4	F	/W-3	Aroclor 1254/1260	90	1	ug/100 sq. cm.	UNBIASED
			Aroclor 1242	49	1	ug/100 sq. cm.	
4	F	/W-48	Aroclor 1242	750	100	ug/100 sq. cm.	BIASED
			Aroclor 1254/1260	1400	100	ug/100 sq. cm.	
5	F	/W-62	Aroclor 1242	21	1	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	22	1	ug/100 sq. cm.	
6	F	/W-7	Aroclor 1242	21.	1.0	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	38.	1.0	ug/100 sq. cm.	
7	F	/W-6	Aroclor 1242	500	50	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	800	50	ug/100 sq. cm.	
8	F	/W-8	Aroclor 1242	390	100	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	580	100	ug/100 sq. cm.	
9	F	/W-39	Aroclor 1242	40	1	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	29	1	ug/100 sq. cm.	
10	F	/W-40	Aroclor 1242	3.7	0.5	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	11	0.5	ug/100 sq. cm.	
11	F	/W-2	Aroclor 1242	650	50	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	400	50	ug/100 sq. cm.	
12	F	/W-4	Aroclor 1242	1700	500	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	1500	500	ug/100 sq. cm.	
13	F	/W-5	Aroclor 1242	500	50	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	800	50	ug/100 sq. cm.	
13	F	/W-41	Aroclor 1242	1400	500	ug/100 sq. cm.	BIASED
			Aroclor 1254/1260	1600	500	ug/100 sq. cm.	
14	F	/W-9	Aroclor 1254/1260	21	1	ug/100 sq. cm.	UNBIASED
15	F	/W-10	Aroclor 1242	13	1.0	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	25	1.0	ug/100 sq. cm.	

TABLE IV- 18
SUMMARY OF ANALYTICAL RESULTS - FLOOR WIPES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SURFACE	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
16	F	/W-11	Aroclor 1242	3.6	1	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	13	1	ug/100 sq. cm.	
17	F	/W-12	Aroclor 1242	10	1	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	21	1	ug/100 sq. cm.	
17	F	/W-49	Aroclor 1242	140	10	ug/100 sq. cm.	BIASED
			Aroclor 1254/1260	140	10	ug/100 sq. cm.	
18	F	/W-15	Aroclor 1242	730	200	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	920	200	ug/100 sq. cm.	
19	F	/W-24	Aroclor 1242	280	100	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	500	100	ug/100 sq. cm.	
20	F	/W-26	Aroclor 1242	64	0.5	ug/100 sq. cm.	UNBIASED
			Aroclor 1254	97	0.5	ug/100 sq. cm.	
20	F	/W-27	Aroclor 1242	90	50	ug/100 sq. cm.	COLLOCATED WITH W-26
			Aroclor 1254/1260	250	50	ug/100 sq. cm.	
21	F	/W-28	Aroclor 1242	310	100	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	670	100	ug/100 sq. cm.	
21	F	/W-42	Aroclor 1242	39000	2000	ug/100 sq. cm.	BIASED
			Aroclor 1254/1260	9000	2000	ug/100 sq. cm.	
22	F	/W-32	Aroclor 1242	50	0.5	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	69	0.5	ug/100 sq. cm.	
22	F	/W-47	Aroclor 1242	23	0.5	ug/100 sq. cm.	BIASED
			Aroclor 1254/1260	86	0.5	ug/100 sq. cm.	
23	F	/W-127	Aroclor 1242	100	2	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/60	140	2	ug/100 sq. cm.	
24	F	/W-13	Aroclor 1242	43	2	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	150	2	ug/100 sq. cm.	
25	F	/W-14	Aroclor 1242	9.6	1	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	8.6	1	ug/100 sq. cm.	
26	F	/W-23	Aroclor 1242	920	100	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	730	100	ug/100 sq. cm.	
27	F	/W-174	Aroclor 1242	3.4	1	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	2.7	1	ug/100 sq. cm.	

TABLE IV- 18
SUMMARY OF ANALYTICAL RESULTS - FLOOR WIPES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SURFACE	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
28	F	/W-30		BDL	1	ug/100 sq. cm.	UNBIASED
28	F	/W-45	Aroclor 1242	52000	10000	ug/100 sq. cm.	BIASED
			Aroclor 1254/1260	400000	10000	ug/100 sq. cm.	
29	F	/W-22	Aroclor 1242	190	2	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	200	2	ug/100 sq. cm.	
30	F	/W-46	Aroclor 1242	53	0.5	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	99	0.5	ug/100 sq. cm.	
30	F	/W-31	Aroclor 1242	110	50	ug/100 sq. cm.	BIASED
			Aroclor 1254/1260	210	50	ug/100 sq. cm.	
31	F	/W-16	Aroclor 1254/1260	0.90	1	ug/100 sq. cm.	UNBIASED
32	F	/W-17	Aroclor 1242	1.2	1	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	2.4	1	ug/100 sq. cm.	
32	F	/W-18		BDL	1	ug/100 sq. cm.	COLLOCATED WITH W-17
32	F	/W-43	Aroclor 1242	970000	20000	ug/100 sq. cm.	BIASED
			Aroclor 1254/1260	190000	20000	ug/100 sq. cm.	
33	F	/W-44	Aroclor 1242	64	0.5	ug/100 sq. cm.	BIASED
			Aroclor 1254/1260	72	0.5	ug/100 sq. cm.	
33	F	/W-19	Aroclor 1242	110	50	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	500	50	ug/100 sq. cm.	
34	F	/W-20	Aroclor 1242	1500	500	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	3200	500	ug/100 sq. cm.	
35	F	/W-21	Aroclor 1242	110	50	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	390	50	ug/100 sq. cm.	
36	F	/W-34		BDL	1	ug/100 sq. cm.	UNBIASED
37	F	/W-33	Aroclor 1242	1.6	1	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	1.1	1	ug/100 sq. cm.	
38	F	/W-51	Aroclor 1242	9.2	1	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	4.6	1	ug/100 sq. cm.	
39	F	/W-52	Aroclor 1242	42	0.5	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	96	0.5	ug/100 sq. cm.	
40	F	/W-54	Aroclor 1242	140	2	ug/100 sq. cm.	UNBIASED

TABLE IV- 18
SUMMARY OF ANALYTICAL RESULTS - FLOOR WIPES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SURFACE	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
			Aroclor 1254/1260	280	2	ug/100 sq. cm.	
40	F	/W-55	Aroclor 1242	2500	500	ug/100 sq. cm.	BIASED
			Aroclor 1254/1260	900	500	ug/100 sq. cm.	
41	F	/W-56	Aroclor 1242	42	0.5	ug/100 sq. cm.	BIASED
			Aroclor 1254/1260	53	0.5	ug/100 sq. cm.	
41	F	/W-53	Aroclor 1242	130	2	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	72	2	ug/100 sq. cm.	
41	F	/W-57	Aroclor 1242	400	1.0	ug/100 sq. cm.	BIASED
			Aroclor 1254/1260	57	1.0	ug/100 sq. cm.	
41	F	/W-57B	Aroclor 1242	9500	200.0	ug/100 sq. cm.	BIASED
			Aroclor 1254/1260	10000	200.0	ug/100 sq. cm.	
42	F	/W-58	Aroclor 1242	0.8	0.5	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	2.7	0.5	ug/100 sq. cm.	
62	F	/W-50	Aroclor 1242	81	0.5	ug/100 sq. cm.	UNBIASED
			Aroclor 1254/1260	28	0.5	ug/100 sq. cm.	

TABLE IV- 19
SUMMARY OF ANALYTICAL RESULTS - INTERIOR WALL WIPES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
1	/W-83	Aroclor 1242	2.3	2	ug/100 sq.cm.	UNBIASED - 3'
		Aroclor 1254/1260	6.3	2	ug/100 sq.cm.	CONCRETE
3	/W-67	Aroclor 1242	2.5	1	ug/100 sq.cm.	UNBIASED - 6'
		Aroclor 1254/1260	4.3	1	ug/100 sq.cm.	METAL
3	/W-68		BDL	1	ug/100 sq.cm.	UNBIASED - 9' METAL
6	/W-61		BDL	2	ug/100 sq.cm.	UNBIASED - 3' CONCRETE
7	/W-59	Aroclor 1242	57	1	ug/100 sq.cm.	UNBIASED - 5'
		Aroclor 1254/1260	97	1	ug/100 sq.cm.	METAL
7	/W-60		BDL	2	ug/100 sq.cm.	UNBIASED - 9' METAL
7	/W-141	Aroclor 1242	2.5	2	ug/100 sq.cm.	BIASED - 3'
		Aroclor 1254/1260	3.4	2	ug/100 sq.cm.	METAL
10	/W-82	Aroclor 1242	2.4	2	ug/100 sq.cm.	UNBIASED - 3'
		Aroclor 1254/1260	7.4	2	ug/100 sq.cm.	CONCRETE
10	/W-168	Aroclor 1242	1.4	1	ug/100 sq.cm.	UNBIASED - 13'
		Aroclor 1254/1260	1.1	1	ug/100 sq.cm.	METAL
11	/W-142	Aroclor 1242	1.1	1	ug/100 sq.cm.	BIASED - 3'
		Aroclor 1254/1260	2.3	1	ug/100 sq.cm.	METAL
12	/W-65		BDL	1	ug/100 sq.cm.	UNBIASED - 5' CONCRETE
12	/W-66	Aroclor 1242	0.06	0.02	ug/100 sq.cm.	UNBIASED - 8'
		Aroclor 1254/1260	0.10	0.02	ug/100 sq.cm.	CONCRETE
13	/W-140	Aroclor 1242	9.2	2	ug/100 sq.cm.	BIASED - 2'
		Aroclor 1254/1260	12	2	ug/100 sq.cm.	METAL
15	/W-63	Aroclor 1242	0.06	0.02	ug/100 sq.cm.	UNBIASED - 5'
		Aroclor 1254/1260	0.15	0.02	ug/100 sq.cm.	METAL
15	/W-64	Aroclor 1242	1.4	1	ug/100 sq.cm.	UNBIASED - 10'
		Aroclor 1254/1260	4.4	1	ug/100 sq.cm.	METAL
17	/W-69	Aroclor 1242	1.3	1	ug/100 sq.cm.	UNBIASED - 5'
		Aroclor 1254/1260	1.2	1	ug/100 sq.cm.	METAL

TABLE IV- 19
SUMMARY OF ANALYTICAL RESULTS - INTERIOR WALL WIPES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
17	/W-70	Aroclor 1242	1.2	1	ug/100 sq.cm.	UNBIASED - 12'
		Aroclor 1254/1260	1.0	1	ug/100 sq.cm.	METAL
17	/W-71	Aroclor 1254/1260	2.0	1	ug/100 sq.cm.	UNBIASED - 5' METAL
17	/W-144	Aroclor 1242	190	2	ug/100 sq.cm.	UNBIASED - 12'
		Aroclor 1254/1260	28	2	ug/100 sq.cm.	METAL
19	/W-80	Aroclor 1242	26	2	ug/100 sq.cm.	UNBIASED - 5'
		Aroclor 1254/1260	26	2	ug/100 sq.cm.	BRICK
19	/W-81	Aroclor 1242	17	2	ug/100 sq.cm.	UNBIASED - 11'
		Aroclor 1254/1260	20	2	ug/100 sq.cm.	BRICK
23	/W-129	Aroclor 1242	66	2	ug/100 sq.cm.	UNBIASED - 5'
		Aroclor 1254/60	150	2	ug/100 sq.cm.	CONCRETE
23	/W-131	Aroclor 1242	62	50	ug/100 sq.cm.	UNBIASED - 5'
		Aroclor 1254/1260	160	50	ug/100 sq.cm.	CONCRETE
23	/W-132	Aroclor 1242	990	500	ug/100 sq.cm.	BIASED - 1'
		Aroclor 1254/1260	2400	500	ug/100 sq.cm.	CONCRETE
23	/W-133	Aroclor 1242	40	2	ug/100 sq.cm.	UNBIASED - 5'
		Aroclor 1254/1260	61	2	ug/100 sq.cm.	CONCRETE
23	/W-134	Aroclor 1242	9.3	2	ug/100 sq.cm.	UNBIASED - 6'
		Aroclor 1254/1260	9.2	2	ug/100 sq.cm.	CONCRETE
25	/W-72		BDL	2	ug/100 sq.cm.	UNBIASED - 5' CONCRETE
25	/W-73		BDL	2	ug/100 sq.cm.	UNBIASED - 7' CONCRETE
25	/W-74		BDL	2	ug/100 sq.cm.	UNBIASED - 5' METAL
25	/W-135	Aroclor 1242	15	2	ug/100 sq.cm.	BIASED - 4'
		Aroclor 1254/1260	3.3	2	ug/100 sq.cm.	CONCRETE
25	/W-145	Aroclor 1242	8.6	2	ug/100 sq.cm.	UNBIASED - 7'
		Aroclor 1254/1260	6.6	2	ug/100 sq.cm.	METAL
27	/W-172	Aroclor 1242	110	20	ug/100 sq.cm.	UNBIASED - 2'
		Aroclor 1254/1260	81	20	ug/100 sq.cm.	WEST WALL

TABLE IV- 19
SUMMARY OF ANALYTICAL RESULTS - INTERIOR WALL WIPES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
27	/W-173	Aroclor 1242	70	1	ug/100 sq.cm.	UNBIASED - 2' SOUTH WALL
27	/W-170	Aroclor 1242	38	1	ug/100 sq.cm.	UNBIASED - 2'
		Aroclor 1254/1260	21	1	ug/100 sq.cm.	NORTH WALL
27	/W-171	Aroclor 1242	18	2	ug/100 sq.cm.	UNBIASED - 2'
		Aroclor 1254/1260	10	2	ug/100 sq.cm.	EAST WALL
30	/W-79	Aroclor 1242	3.6	1	ug/100 sq.cm.	UNBIASED - 5'
		Aroclor 1254/1260	7.5	2	ug/100 sq.cm.	CONCRETE
30	/W-163	Aroclor 1242	1.9	1	ug/100 sq.cm.	UNBIASED - 14'
		Aroclor 1254/1260	2.2	1	ug/100 sq.cm.	EAST WALL
32	/W-75		BDL	2	ug/100 sq.cm.	UNBIASED - 5' CONCRETE
32	/W-76	Aroclor 1242	6.5	2	ug/100 sq.cm.	UNBIASED - 8' CONCRETE
32	/W-77	Aroclor 1242	9.0	2	ug/100 sq.cm.	UNBIASED - 5'
		Aroclor 1254/1260	6.0	2	ug/100 sq.cm.	CONCRETE
32	/W-136	Aroclor 1242	19	2	ug/100 sq.cm.	BIASED - 0.5'
		Aroclor 1254/1260	3.2	2	ug/100 sq.cm.	CONCRETE
32	/W-137	Aroclor 1242	51	2	ug/100 sq.cm.	BIASED - 1'
		Aroclor 1254/1260	39	2	ug/100 sq.cm.	NORTH WALL DOOR
32	/W-148	Aroclor 1242	24	2	ug/100 sq.cm.	UNBIASED - 8' METAL
33	/W-138	Aroclor 1242	300	100	ug/100 sq.cm.	BIASED - 1'
		Aroclor 1254/1260	880	100	ug/100 sq.cm.	METAL
34	/W-78	Aroclor 1242	11	2	ug/100 sq.cm.	UNBIASED - 5'
		Aroclor 1254/1260	25	2	ug/100 sq.cm.	METAL
34	/W-158	Aroclor 1242	2.4	2	ug/100 sq.cm.	UNBIASED - 8'
		Aroclor 1254/1260	3.0	2	ug/100 sq.cm.	NORTH WALL
34	/W-159	Aroclor 1242	1.9	1	ug/100 sq.cm.	COLLOCATED WITH W-158 - 8' NORTH WALL
35	/W-139	Aroclor 1242	6.1	5	ug/100 sq.cm.	BIASED - 3' METAL

TABLE IV- 19
SUMMARY OF ANALYTICAL RESULTS - INTERIOR WALL WIPES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
37	/W-35	Aroclor 1242	1.3	0.5	ug/100 sq.cm.	UNBIASED - 5'
		Aroclor 1254/1260	3.9	0.5	ug/100 sq.cm.	METAL
37	/W-36	Aroclor 1254/1260	1.5	0.5	ug/100 sq.cm.	UNBIASED - 5' METAL
38	/W-84		BDL	2	ug/100 sq.cm.	UNBIASED - 5' METAL
38	/W-85		BDL	2	ug/100 sq.cm.	UNBIASED - 11' METAL
38	/W-89	Aroclor 1242	3.6	2	ug/100 sq.cm.	BIASED - 6' METAL
39	/W-91	Aroclor 1242	15	2.0	ug/100 sq.cm.	BIASED - 6'
		Aroclor 1254/1260	9.5	2.0	ug/100 sq.cm.	STEEL
40	/W-87	Aroclor 1242	5.6	2.0	ug/100 sq.cm.	UNBIASED - 5'
		Aroclor 1254/1260	80.	2.0	ug/100 sq.cm.	METAL
40	/W-88	Aroclor 1254/60	14	10	ug/100 sq.cm.	UNBIASED - 10' METAL
40	/W-90	Aroclor 1242	11	2	ug/100 sq.cm.	BIASED - 2'
		Aroclor 1254/60	19	2	ug/100 sq.cm.	METAL
41	/W-86	Aroclor 1242	6.3	2	ug/100 sq.cm.	UNBIASED - 5'
		Aroclor 1254/1260	5.5	2	ug/100 sq.cm.	METAL
41	/W-165	Aroclor 1242	2.1	1	ug/100 sq.cm.	UNBIASED - 12'
		Aroclor 1254/1260	2.3	1	ug/100 sq.cm.	METAL

TABLE IV- 20
SUMMARY OF ANALYTICAL RESULTS - CEILING WIPES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SURFACE	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
3	C	/W-151	Aroclor 1242	11	1.0	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	4.1	1.0	ug/100 sq.cm.	
7	C	/W-150	Aroclor 1242	9.9	1.0	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	1.7	1.0	ug/100 sq.cm.	
11	C	/W-152	Aroclor 1254/1260	2.4	1.0	ug/100 sq.cm.	UNBIASED
12	C	/W-169	Aroclor 1242	12	1.0	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	1.4	1.0	ug/100 sq.cm.	
14	C	/W-154	BDL		1.0	ug/100 sq.cm.	UNBIASED
15	C	/W-155	Aroclor 1242	2.3	1.0	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	1.5	1.0	ug/100 sq.cm.	
17	C	/W-160	Aroclor 1242	8.8	2.0	ug/100 sq.cm.	UNBIASED
19	C	/W-156	Aroclor 1242	2.8	1.0	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	2.1	1.0	ug/100 sq.cm.	
21	C	/W-153	Aroclor 1242	1.8	1.0	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	1.4	1.0	ug/100 sq.cm.	
25	C	/W-146	Aroclor 1242	44	1.0	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	8.4	1.0	ug/100 sq.cm.	
28	C	/W-149	Aroclor 1242	3.9	2	ug/100 sq.cm.	UNBIASED
30	C	/W-161	Aroclor 1242	75	1	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	6.5	1	ug/100 sq.cm.	
30	C	/W-162	Aroclor 1242	13	1	ug/100 sq.cm.	COLLOCATED
			Aroclor 1254/1260	13	1	ug/100 sq.cm.	WITH W-161
32	C	/W-147	Aroclor 1242	3.9	2	ug/100 sq.cm.	UNBIASED
34	C	/W-157	Aroclor 1242	0.8	2.0	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	7.5	2.0	ug/100 sq.cm.	
38	C	/W-166	Aroclor 1242	1.8	1	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	1.7	1	ug/100 sq.cm.	
40	C	/W-167	Aroclor 1242	5.9	1	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	4.4	1	ug/100 sq.cm.	
41	C	/W-164	Aroclor 1242	8.7	1	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	21	1	ug/100 sq.cm.	

TABLE IV- 21
SUMMARY OF ANALYTICAL RESULTS - HORIZONTAL WIPES
ROSE CHEMICAL SITE; HOLDEN, MISSOURI

GRID	SURFACE	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
1	C	/H-14	Aroclor 1242	52	2.0	ug/100 sq.cm.	BIASED
			Aroclor 1254/1260	120	2.0	ug/100 sq.cm.	
3	C	/H-1	Aroclor 1242	26	2	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	29	2	ug/100 sq.cm.	
4	C	/H-23	Aroclor 1242	4.9	1.0	ug/100 sq.cm.	BIASED
			Aroclor 1254/1260	13	1.0	ug/100 sq.cm.	
7	C	/H-2	Aroclor 1242	58	2	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	69	2	ug/100 sq.cm.	
7	C	/H-24	Aroclor 1242	5.5	1.0	ug/100 sq.cm.	BIASED
			Aroclor 1254/1260	7.2	1.0	ug/100 sq.cm.	
8	W	/H-25	Aroclor 1242	10	2.0	ug/100 sq.cm.	BIASED
			Aroclor 1254/1260	17	2.0	ug/100 sq.cm.	
10	C	/H-21	Aroclor 1242	3.5	1.0	ug/100 sq.cm.	BIASED
12	C	/H-5	Aroclor 1242	28	2.0	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	140	2.0	ug/100 sq.cm.	
12	C	/H-22	Aroclor 1242	11	1.0	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	23	1.0	ug/100 sq.cm.	
14	C	/H-3	Aroclor 1242	2.0	2	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	4.7	2	ug/100 sq.cm.	
15	C	/H-4	Aroclor 1242	4.2	2	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	78	2	ug/100 sq.cm.	
17	C	/H-13	Aroclor 1242	300	200	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	530	200	ug/100 sq.cm.	
19	C	/H-7	Aroclor 1254/1260	3.3	1	ug/100 sq.cm.	UNBIASED
19	C	/H-8	Aroclor 1242	41	1	ug/100 sq.cm.	COLLOCATED
			Aroclor 1254/1260	140	1	ug/100 sq.cm.	WITH H-7
20	C	/H-26	Aroclor 1242	13	2.0	ug/100 sq.cm.	BIASED
			Aroclor 1254/1260	24	2.0	ug/100 sq.cm.	
21	C	/H-6	Aroclor 1242	22	2.0	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	65	2.0	ug/100 sq.cm.	
22	C	/H-30		BDL	2	ug/100 sq.cm.	BIASED
24	C	/H-29	Aroclor 1242	34	1	ug/100 sq.cm.	BIASED

TABLE IV- 21
SUMMARY OF ANALYTICAL RESULTS - HORIZONTAL WIPES
ROSE CHEMICAL SITE; HOLDEN, MISSOURI

GRID	SURFACE	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
			Aroclor 1254/1260	27	1	ug/100 sq.cm.	
25	C	/H-9	Aroclor 1242	26	1	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	99	1	ug/100 sq.cm.	
28	C	/H-11	Aroclor 1242	170	1	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	48	1	ug/100 sq.cm.	
30	C	/H-15	Aroclor 1242	18	1	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	49	1	ug/100 sq.cm.	
32	C	/H-10	Aroclor 1242	5.7	1	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	8.6	1	ug/100 sq.cm.	
32	C	/H-27	Aroclor 1242	120	2.0	ug/100 sq.cm.	BIASED
			Aroclor 1254/1260	97	2.0	ug/100 sq.cm.	
34	C	/H-12	Aroclor 1242	3.6	1	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	5.3	1	ug/100 sq.cm.	
34	C	/H-28	Aroclor 1254/1260	1.3	1	ug/100 sq.cm.	BIASED
35	C	/H-31	Aroclor 1242	20	2.0	ug/100 sq.cm.	BIASED
			Aroclor 1254/1260	35	2.0	ug/100 sq.cm.	
38	C	/H-17	Aroclor 1242	65	1	ug/100 sq.cm.	UNBIASED
40	C	/H-19	Aroclor 1242	19	1	ug/100 sq.cm.	BIASED
			Aroclor 1254/1260	50	1	ug/100 sq.cm.	
40	C	/H-18	Aroclor 1242	13	1	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	53	1	ug/100 sq.cm.	
41	C	/H-16	Aroclor 1242	2.6	1	ug/100 sq.cm.	UNBIASED
			Aroclor 1254/1260	4.5	1	ug/100 sq.cm.	
41	W	/H-20	Aroclor 1242	4.3	1	ug/100 sq.cm.	BIASED
			Aroclor 1254/1260	17	1	ug/100 sq.cm.	

TABLE IV- 22
SUMMARY OF ANALYTICAL RESULTS - EXTERIOR WIPES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
W- 92	Aroclor 1242	15	2	ug/100 sq.cm.	UNBIASED WALL
	Aroclor 1254/1260	4.9	2		
W- 93	No Compounds Detected		2	ug/100 sq.cm.	UNBIASED WALL
W- 94	No Compounds Detected		2	ug/100 sq.cm.	UNBIASED WALL
W- 95	Aroclor 1254/1260	1.6	2	ug/100 sq.cm.	BIASED WALL
W- 96	No Compounds Detected		2	ug/100 sq.cm.	COLLOCATED WITH W-95
W- 97	No Compounds Detected		2	ug/100 sq.cm.	UNBIASED
W- 98	No Compounds Detected		2	ug/100 sq.cm.	BIASED
W- 99	No Compounds Detected		2	ug/100 sq.cm.	UNBIASED
W- 100	Aroclor 1254/1260	6.8	2	ug/100 sq.cm.	COLLOCATED WITH W-99
W- 101	No Compounds Detected		2	ug/100 sq.cm.	BIASED ROOF
W- 102	No Compounds Detected		2	ug/100 sq.cm.	BIASED ROOF
W- 103	Aroclor 1242	9.6	2	ug/100 sq.cm.	UNBIASED ROOF
W- 104	Aroclor 1242	0.8	2	ug/100 sq.cm.	COLLOCATED WITH W-103
	Aroclor 1254/1260	3.3	2		
W- 105	Aroclor 1254/1260	3.2	2	ug/100 sq.cm.	UNBIASED ROOF
W- 106	Aroclor 1254/1260	6.3	2	ug/100 sq.cm.	UNBIASED ROOF
W- 107	No Compounds Detected		2	ug/100 sq.cm.	UNBIASED ROOF
W- 108	Aroclor 1254/1260	4.0	2	ug/100 sq.cm.	BIASED ROOF
W- 109	Aroclor 1254/1260	4.0	2	ug/100 sq.cm.	BIASED ROOF
W- 110	Aroclor 1254/1260	0.1	0.04	ug/100 sq.cm.	BIASED ROOF
W- 111	No Compounds Detected		2	ug/100 sq.cm.	BIASED ROOF
W- 112	Aroclor 1254/1260	0.2	0.04	ug/100 sq.cm.	UNBIASED WALL
W- 113	Aroclor 1254/1260	4.0	2	ug/100 sq.cm.	UNBIASED WALL
W- 114	Aroclor 1254/1260	4.0	2	ug/100 sq.cm.	UNBIASED WALL

TABLE IV- 22
SUMMARY OF ANALYTICAL RESULTS - EXTERIOR WIPES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
W- 115	Aroclor 1254/1260.....	4.5	2	ug/100 sq.cm.	COLLOCATED WITH W-114
W- 116	Aroclor 1242.....	1.3	2	ug/100 sq.cm.	UNBIASED WALL
W- 117	Aroclor 1254/1260.....	5.0	2	ug/100 sq.cm.	BIASED WALL
W- 118	Aroclor 1254/1260.....	4.8	2	ug/100 sq.cm.	UNBIASED WALL
W- 119	Aroclor 1254/1260.....	4.8	2	ug/100 sq.cm.	BIASED WALL
W- 120	Aroclor 1254/1260.....	4.6	2	ug/100 sq.cm.	UNBIASED WALL
W- 121	Aroclor 1254/1260.....	6.1	2	ug/100 sq.cm.	UNBIASED WALL
W- 122	No Compounds Detected.....		2	ug/100 sq.cm.	BIASED WALL
W- 123	No Compounds Detected.....		2	ug/100 sq.cm.	UNBIASED WALL
W- 124	No Compounds Detected.....		2	ug/100 sq.cm.	BIASED WALL
W- 125	No Compounds Detected.....		2	ug/100 sq.cm.	UNBIASED WALL
W- 126	No Compounds Detected.....		2	ug/100 sq.cm.	UNBIASED WALL

TABLE IV- 23
SUMMARY OF ANALYTICAL RESULTS - UNBIASED CONCRETE CORES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS
1	/CC-9	Aroclor 1242	5.4	0.04	mg/kg
		Aroclor 1254/1260	10.6	0.04	mg/kg
7	/CC-1	Aroclor 1242	990	400	mg/kg
		Aroclor 1254/1260	3400	400	mg/kg
10	/CC-10	Aroclor 1242	173	4.0	mg/kg
		Aroclor 1254/1260	598	4.0	mg/kg
12	/CC-2	Aroclor 1242	287	4.0	mg/kg
		Aroclor 1254/1260	587	4.0	mg/kg
19	/CC-8	Aroclor 1242	18	0.2	mg/kg
		Aroclor 1254/1260	97	0.2	mg/kg
21	/CC-3	Aroclor 1242	380	4.0	mg/kg
		Aroclor 1254/1260	450	4.0	mg/kg
23	/CC-12	Aroclor 1242	0.05	0.02	mg/kg
		Aroclor 1254/1260	0.10	0.02	mg/kg
25	/CC-7	Aroclor 1242	48	0.02	mg/kg
		Aroclor 1254/1260	49	0.02	mg/kg
28	/CC-5	Aroclor 1242	251	4.0	mg/kg
		Aroclor 1254/1260	570	4.0	mg/kg
32	/CC-6	Aroclor 1242	50	0.4	mg/kg
		Aroclor 1254/1260	34	0.4	mg/kg
34	/CC-4	Aroclor 1242	680	400	mg/kg
		Aroclor 1254/1260	2000	400	mg/kg
39	/CC-11	Aroclor 1242	370	4.0	mg/kg
		Aroclor 1254/1260	178	4.0	mg/kg

TABLE IV- 24
SUMMARY OF ANALYTICAL RESULTS - BIASED CONCRETE CORES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS
8	/CC-15	Aroclor 1242	15000	330	mg/kg
		Aroclor 1254/1260	9000	330	mg/kg
8	/CC-16	Aroclor 1242	5200	330	mg/kg
		Aroclor 1254/1260	1600	330	mg/kg
12	/CC-25	Aroclor 1242	78000	3300	mg/kg
		Aroclor 1254/1260	23000	3300	mg/kg
13	/CC-24	Aroclor 1242	340000	33000	mg/kg
		Aroclor 1254/1260	230000	33000	mg/kg
28	/CC-20	Aroclor 1242	3400	330	mg/kg
		Aroclor 1254/1260	8100	330	mg/kg
29	/CC-21	Aroclor 1242	15000	330	mg/kg
		Aroclor 1254/1260	63000	330	mg/kg
29	/CC-22	Aroclor 1242	9300	330	mg/kg
		Aroclor 1254/1260	15000	330	mg/kg
30	/CC-23	Aroclor 1242	2700	330	mg/kg
		Aroclor 1254/1260	2200	330	mg/kg
32	/CC-17	Aroclor 1242	180000	3300	mg/kg
		Aroclor 1254/1260	51000	3300	mg/kg
32	/CC-18	Aroclor 1242	510000	33000	mg/kg
		Aroclor 1254/1260	160000	33000	mg/kg
33	/CC-19	Aroclor 1242	540000	3300	mg/kg
		Aroclor 1254/1260	94000	3300	mg/kg
40	/CC-13	Aroclor 1242	2500	170	mg/kg
		Aroclor 1254/1260	1000	170	mg/kg
40	/CC-14	Aroclor 1242	200000	3300	mg/kg
		Aroclor 1254/1260	70000	3300	mg/kg

TABLE IV- 25
SUMMARY OF ANALYTICAL RESULTS - WALL INSULATION CORES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SURFACE	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
17	W	/I-1	Aroclor 1242	9.0	20	ug/sample	UNBIASED
			Aroclor 1254/1260	360	20	ug/sample	
22	W	/I-27	Aroclor 1242	160	2.0	ug/sample	BIASED
			Aroclor 1254/1260	87	2.0	ug/sample	
24	W	/I-26	Aroclor 1242	17	1	ug/sample	BIASED
			Aroclor 1254/1260	79	1	ug/sample	
24	W	/I-32	Aroclor 1242	440	200	ug/sample	BIASED
			Aroclor 1254/1260	400	200	ug/sample	
25	W	/I-2	Aroclor 1242	12	2	ug/sample	UNBIASED
			Aroclor 1254/1260	6.3	2	ug/sample	
30	W	/I-20	Aroclor 1242	90	20	ug/sample	UNBIASED
			Aroclor 1254/1260	1500	20	ug/sample	
30	W	/I-33	Aroclor 1242	370	100	ug/sample	BIASED
			Aroclor 1254/1260	440	100	ug/sample	
32	W	/I-5	Aroclor 1242	11	2	ug/sample	UNBIASED
			Aroclor 1254/1260	25	2	ug/sample	
32	W	/I-29	Aroclor 1242	110	70	ug/sample	BIASED
			Aroclor 1254/1260	87	70	ug/sample	
34	W	/I-16	Aroclor 1242	3.5	1	ug/sample	COLLOCATED WITH I-15
			Aroclor 1254/1260	5.0	1	ug/sample	
34	W	/I-15	Aroclor 1242	90	70	ug/sample	UNBIASED
			Aroclor 1254/1260	150	70	ug/sample	
35	W	/I-28	Aroclor 1242	690	100	ug/sample	BIASED
			Aroclor 1254/1260	460	100	ug/sample	
41	W	/I-22	Aroclor 1242	11	1	ug/sample	UNBIASED
			Aroclor 1254/1260	13	1	ug/sample	

TABLE IV- 26
SUMMARY OF ANALYTICAL RESULTS - CEILING INSULATION CORES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SURFACE	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
3	C	/I-8	Aroclor 1242	200	2	ug/sample	UNBIASED
			Aroclor 1254/1260	200	2	ug/sample	
7	C	/I-7	Aroclor 1242	64	2	ug/sample	UNBIASED
			Aroclor 1254/1260	22	2	ug/sample	
7	C	/I-37	Aroclor 1242	200	1	ug/sample	BIASED
			Aroclor 1254/1260	180	1	ug/sample	
7	C	/I-34	Aroclor 1242	330	50	ug/sample	BIASED
			Aroclor 1254/1260	690	50	ug/sample	
11	C	/I-9	Aroclor 1242	810	20.0	ug/sample	UNBIASED
			Aroclor 1254/1260	520	20.0	ug/sample	
12	C	/I-25	Aroclor 1242	570	100	ug/sample	UNBIASED
			Aroclor 1254/1260	500	100	ug/sample	
14	C	/I-11	Aroclor 1242	700	200	ug/sample	UNBIASED
			Aroclor 1254/1260	700	200	ug/sample	
15	C	/I-12	Aroclor 1242	5.7	1	ug/sample	UNBIASED
17	C	/I-17	Aroclor 1242	120	20	ug/sample	UNBIASED
			Aroclor 1254/1260	1700	20	ug/sample	
17	C	/I-18	Aroclor 1242	22000	200.0	ug/sample	COLLOCATED WITH I-17
			Aroclor 1254/1260	3800	200.0	ug/sample	
18	C	/I-31	Aroclor 1242	130	100	ug/sample	BIASED
			Aroclor 1254/1260	1700	100	ug/sample	
19	C	/I-13	Aroclor 1242	5.0	2.0	ug/sample	UNBIASED
			Aroclor 1254/1260	63.0	2.0	ug/sample	
21	C	/I-10	Aroclor 1242	81	70	ug/sample	UNBIASED
			Aroclor 1254/1260	6900	70	ug/sample	
21	C	/I-30	Aroclor 1242	76	70	ug/sample	BIASED
			Aroclor 1254/1260	160	70	ug/sample	
25	C	/I-3	Aroclor 1242	3.9	2	ug/sample	UNBIASED
			Aroclor 1254/1260	6.6	2	ug/sample	
26	C	/I-36	Aroclor 1242	45	40	ug/sample	BIASED
			Aroclor 1254/1260	74	40	ug/sample	
28	C	/I-6	Aroclor 1242	8.2	2	ug/sample	UNBIASED

TABLE IV- 26
SUMMARY OF ANALYTICAL RESULTS - CEILING INSULATION CORES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SURFACE	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
			Aroclor 1254/1260	14	2	ug/sample	
29	C	/I-35	Aroclor 1242	66	50	ug/sample	BIASED
			Aroclor 1254/1260	76	50	ug/sample	
30	C	/I-19	Aroclor 1242	4600	200.0	ug/sample	UNBIASED
			Aroclor 1254/1260	880	200.0	ug/sample	
32	C	/I-4	Aroclor 1242	3500	500	ug/sample	UNBIASED
			Aroclor 1254/1260	1200	500	ug/sample	
34	C	/I-14	Aroclor 1242	2600	100	ug/sample	UNBIASED
			Aroclor 1254/1260	990	100	ug/sample	
38	C	/I-23	Aroclor 1242	6300	200.0	ug/sample	UNBIASED
			Aroclor 1254/1260	1600	200.0	ug/sample	
40	C	/I-23A	Aroclor 1242	410	20	ug/sample	UNBIASED
			Aroclor 1254/1260	25	20	ug/sample	
41	C	/I-21	Aroclor 1242	37	20	ug/sample	UNBIASED
			Aroclor 1254/1260	1600	20	ug/sample	
41	C	/I-24	Aroclor 1242	3400	100	ug/sample	BIASED
			Aroclor 1254/1260	550	100	ug/sample	

TABLE IV- 27
SUMMARY OF ANALYTICAL RESULTS - DESTRUCTIVE SAMPLES
ROSE CHEMICALS SITE; HOLDEN, MISSOURI

GRID	SAMPLE NO.	PARAMETER	VALUE	DETECTION LIMIT	UNITS	DESCRIPTION
2	/D-1	Aroclor 1242	7300	500	ug/sample	RUBBER
		Aroclor 1254/1260	9300	500	ug/sample	
4	/D-2	Aroclor 1242	160	2	ug/sample	WOOD
		Aroclor 1254/1260	150	2	ug/sample	
4	/D-3	Aroclor 1242	310	200	ug/sample	WOOD
		Aroclor 1254/1260	560	200	ug/sample	
14	/D-6	Aroclor 1242	15	2.0	ug/sample	LINOLEUM
		Aroclor 1254/1260	8.1	2.0	ug/sample	
15	/D-5	Aroclor 1242	97	2	ug/sample	WOOD
		Aroclor 1254/1260	53	2	ug/sample	
32	/D-4	Aroclor 1242	2900	200	ug/sample	WOOD
		Aroclor 1254/1260	960	200	ug/sample	
34	/D-7	Aroclor 1242	1400	100	ug/sample	WOOD
		Aroclor 1254/1260	740	100	ug/sample	

Table V-1
SUMMARY OF POTENTIAL EXPOSURE PATHWAYS

	Current Use/ No Action On-Site Trespasser	Current Use/ No Action Off-Site Resident	Future Use/ Industrial Development On-Site Worker[a]	Future Use/ Residential Development On-Site Resident
Inhalation of Vapors • Exterior • Interior of Buildings	X	X	–	X
Inhalation of Particulates	X	X	–	X
Dermal Contact with Soil	X	X	–	X
Ingestion of Soil	X	X[b]	–	X[b]
Ingestion of Vegetables	–	X	–	X
Ingestion of Beef[c]	–	X	–	–[i]
Ingestion of Sediments	X[d]	X[e]	–	–[h,i]
Dermal Contact with Surface Water	X[d]	X[e]	–	–[h,i]
Dermal Contact with Sediments	X[d]	X[e]	–	–[h,i]
Ingestion of Groundwater	–	–[f]	–[f]	–[f]
Exposures In Building • Inhalation of Vapors • Dermal Contact with Surfaces	X	–	X[g]	–[h]

[a]*Worker expected to spend majority of work day indoors.*
[b]*Child modeled in addition to adult male.*
[c]*Cattle exposed through sediments, soils, water, and air in the vicinity of East Pin Oak Creek and its tributary.*
[d]*Contact with on-site ponds by wading while trespassing.*
[e]*Exposure of children and teenagers to East Pin Oak Creek and its tributary while playing.*
[f]*Perched water-bearing subsurface units are not considered viable sources of drinking water because of low yields. Groundwater could be used for livestock watering in the future.*
[g]*Assumes no cleanup or major renovation of the interior of the building in the future.*
[h]*Assumes buildings, slabs, and ponds are removed.*
[i]*Potential exposure from these pathways for the on-site resident are assumed equivalent to the off-site resident.*

Table V-2
EXCESS UPPER-BOUND LIFETIME CANCER RISKS*

Exposed Population/Scenario	Typical Exposure	Reasonable Worst Case Exposure
Current Use Scenario		
Off-Site Resident		
Soil, Ingestion (Adult)	1.0×10^{-7}	2.0×10^{-6}
Soil, Ingestion (Child)	1.5×10^{-6}	4.0×10^{-6}
Soil, Dermal	9.9×10^{-8}	2.0×10^{-6}
Particulate, Inhalation	2.2×10^{-8}	2.8×10^{-7}
Vapor, Inhalation	1.0×10^{-5}	5.3×10^{-5}
Beef, Ingestion	1.3×10^{-4}	$>10^{-2}$
Vegetables, Ingestion	2.4×10^{-6}	1.8×10^{-5}
Wading, Dermal	6.9×10^{-7}	5.4×10^{-6}
Sediment, Ingestion	7.7×10^{-7}	6.9×10^{-6}
Sediment, Dermal	1.8×10^{-6}	1.6×10^{-5}
On-Site Trespasser		
Wading, Dermal	1.0×10^{-6}	8.8×10^{-6}
Soil, Ingestion	4.3×10^{-8}	9.4×10^{-7}
Soil, Dermal	8.2×10^{-8}	8.9×10^{-7}
Particulate, Inhalation	2.1×10^{-10}	4.5×10^{-9}
Vapor, Inhalation (Outdoors)	9.9×10^{-8}	8.8×10^{-7}
Vapor, Inhalation (Indoors)	1.6×10^{-5}	1.4×10^{-4}
Sediment, Ingestion	2.0×10^{-7}	8.1×10^{-6}
Sediment, Dermal	4.6×10^{-7}	9.3×10^{-6}
Floor, Dermal	6.0×10^{-5}	4.1×10^{-3}
Wall, Dermal	1.7×10^{-6}	2.1×10^{-4}
Future Use Scenario—Industrial Development		
On-Site Worker		
Vapor, Inhalation	3.8×10^{-3}	$>10^{-2}$
Floor, Dermal	1.7×10^{-3}	$>10^{-2}$
Wall, Dermal	4.9×10^{-5}	5.6×10^{-3}
Future Use Scenario—Residential Development		
On-Site Resident		
Soil, Ingestion (Adult)	2.5×10^{-7}	8.4×10^{-6}
Soil, Ingestion (Child)	3.7×10^{-6}	1.7×10^{-5}
Soil, Dermal	2.5×10^{-7}	8.4×10^{-6}
Particulate, Inhalation	1.9×10^{-8}	2.8×10^{-7}
Vapor, Inhalation	6.2×10^{-5}	5.3×10^{-4}
Vegetables, Ingestion	5.5×10^{-6}	7.4×10^{-5}

**PCBs (Aroclor 1242 and 1254/1260) contribute 96 percent or more to the total risk in all cases and at least 99 percent of the risk in 56 of the 58 risk estimates.*

Table V-3
MDD/RfD RATIOS FOR NONCARCINOGENIC EFFECTS[1]

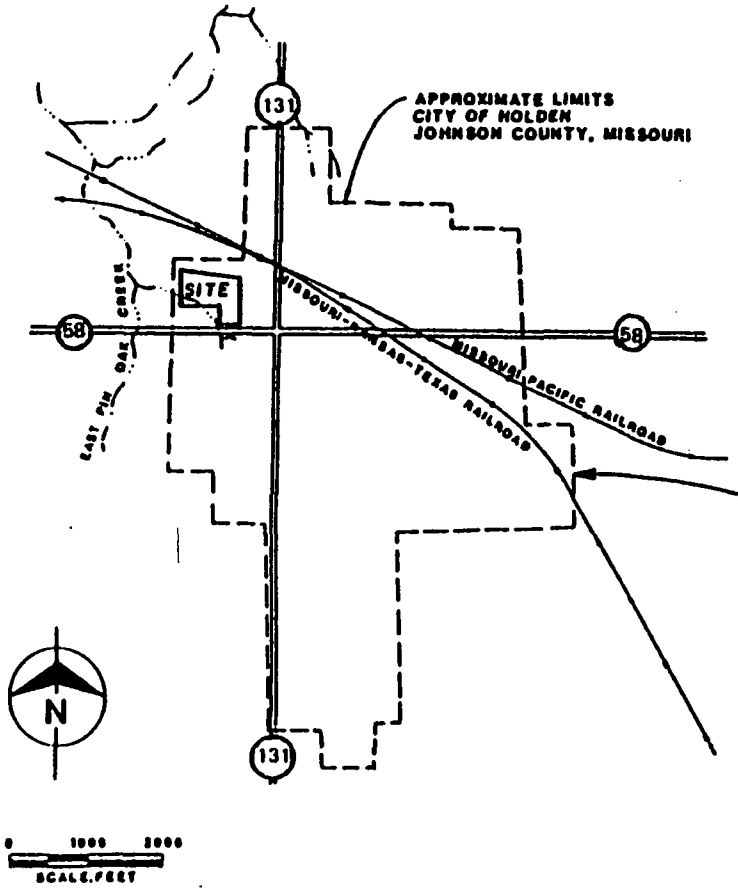
Exposed Population/Scenario	Typical Exposure*	Reasonable Worst Case Exposure*
Current Use Scenario		
Off-Site Resident		
Soil, Ingestion (Adult)	7.6×10^{-3}	1.3×10^{-2}
Soil, Ingestion (Child)	7.4×10^{-2}	1.3×10^{-1}
Soil, Dermal	7.5×10^{-3}	1.3×10^{-2}
Particulate, Inhalation	2.4×10^{-4}	9.1×10^{-4}
Vapor, Inhalation	4.5×10^{-1}	7.2×10^{-1}
Beef, Ingestion	1.4*	$7.4 \times 10^{+1}$
Vegetables, Ingestion	2.6×10^{-2}	6.0×10^{-2}
Wading, Dermal	8.2×10^{-2}	4.2×10^{-1}
Sediment, Ingestion	1.1×10^{-1}	6.6×10^{-1}
Sediment, Dermal	2.3×10^{-1}	1.4*
On-Site Trespasser		
Wading, Dermal	5.1×10^{-1}	1.1*
Soil, Ingestion	2.8×10^{-2}	1.4×10^{-1}
Soil, Dermal	4.5×10^{-2}	1.1×10^{-1}
Particulate, Inhalation	5.9×10^{-5}	2.9×10^{-4}
Vapor, Inhalation (Outdoors)	1.2×10^{-1}	2.7×10^{-1}
Vapor, Inhalation (Indoors)	8.8*	$1.8 \times 10^{+1}$*
Sediment, Ingestion	1.3×10^{-1}	1.2*
Sediment, Dermal	2.7×10^{-1}	1.3*
Floor, Dermal	$3.1 \times 10^{+1}$*	$4.9 \times 10^{+2}$*
Wall, Dermal	8.7×10^{-1}	$2.5 \times 10^{+1}$*
Future Use Scenario – Industrial Development		
On-Site Worker		
Vapor, Inhalation	$5.4 \times 10^{+1}$*	$5.4 \times 10^{+1}$*
Floor, Dermal	$2.4 \times 10^{+1}$*	$3.9 \times 10^{+2}$*
Wall, Dermal	6.9×10^{-1}	$2.0 \times 10^{+1}$*
Future Use Scenario – Residential Development		
On-Site Resident		
Soil, Ingestion (Adult)	1.9×10^{-2}	5.5×10^{-2}
Soil, Ingestion (Child)	1.8×10^{-1}	5.4×10^{-1}
Soil, Dermal	1.9×10^{-2}	5.5×10^{-2}
Particulate, Inhalation	2.0×10^{-4}	9.1×10^{-4}
Vapor, Inhalation	$1.4 \times 10^{+1}$*	$6.7 \times 10^{+1}$*
Vegetables, Ingestion	5.9×10^{-2}	2.4×10^{-1}

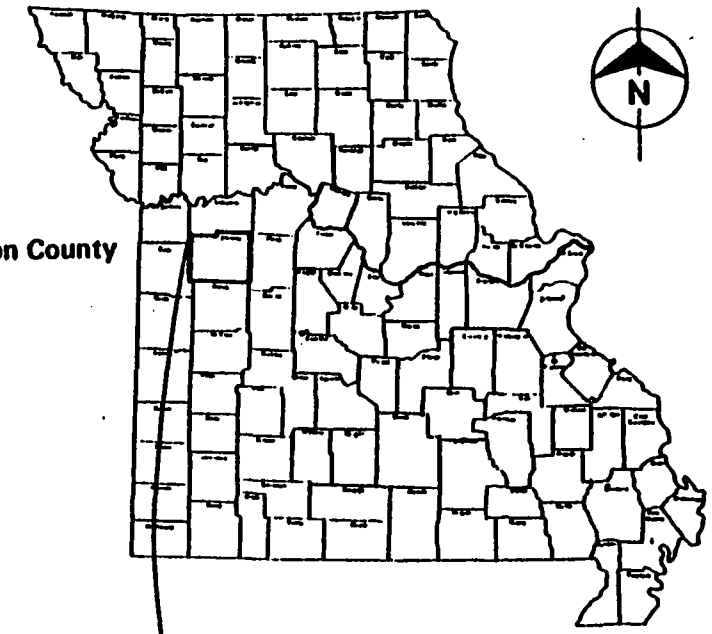
[1]*MDD/RfD ratios are for total PCB exposure (all Aroclors combined). This ratio was highest for PCBs for all pathways modeled. In scenarios involving nine- and fifteen-year-olds, the highest MDD/RfD ratio was listed.*

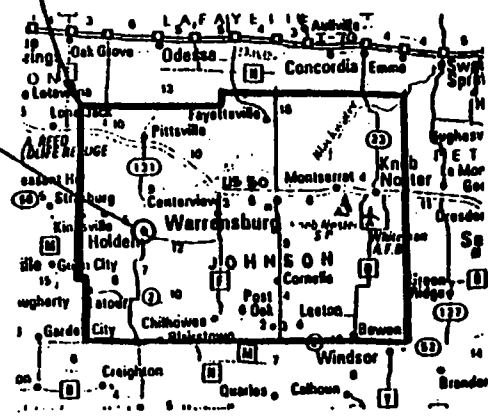
**MDD/RfD ratio greater than one, indicating an increased potential for adverse effects.*

FIGURES

ROSEFS1

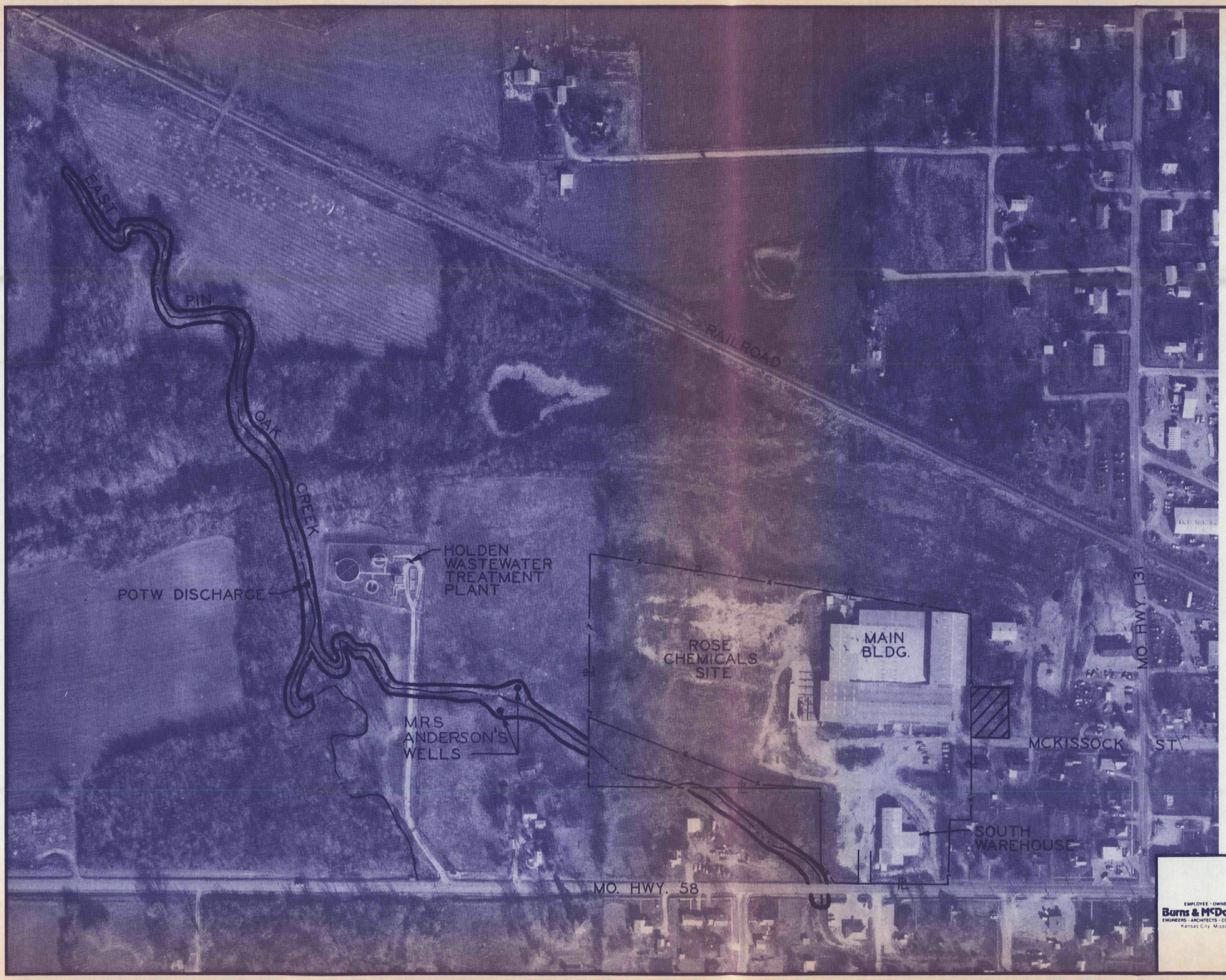






Burns & McDonnell
ENGINEERS · ARCHITECTS · CONSULTANTS

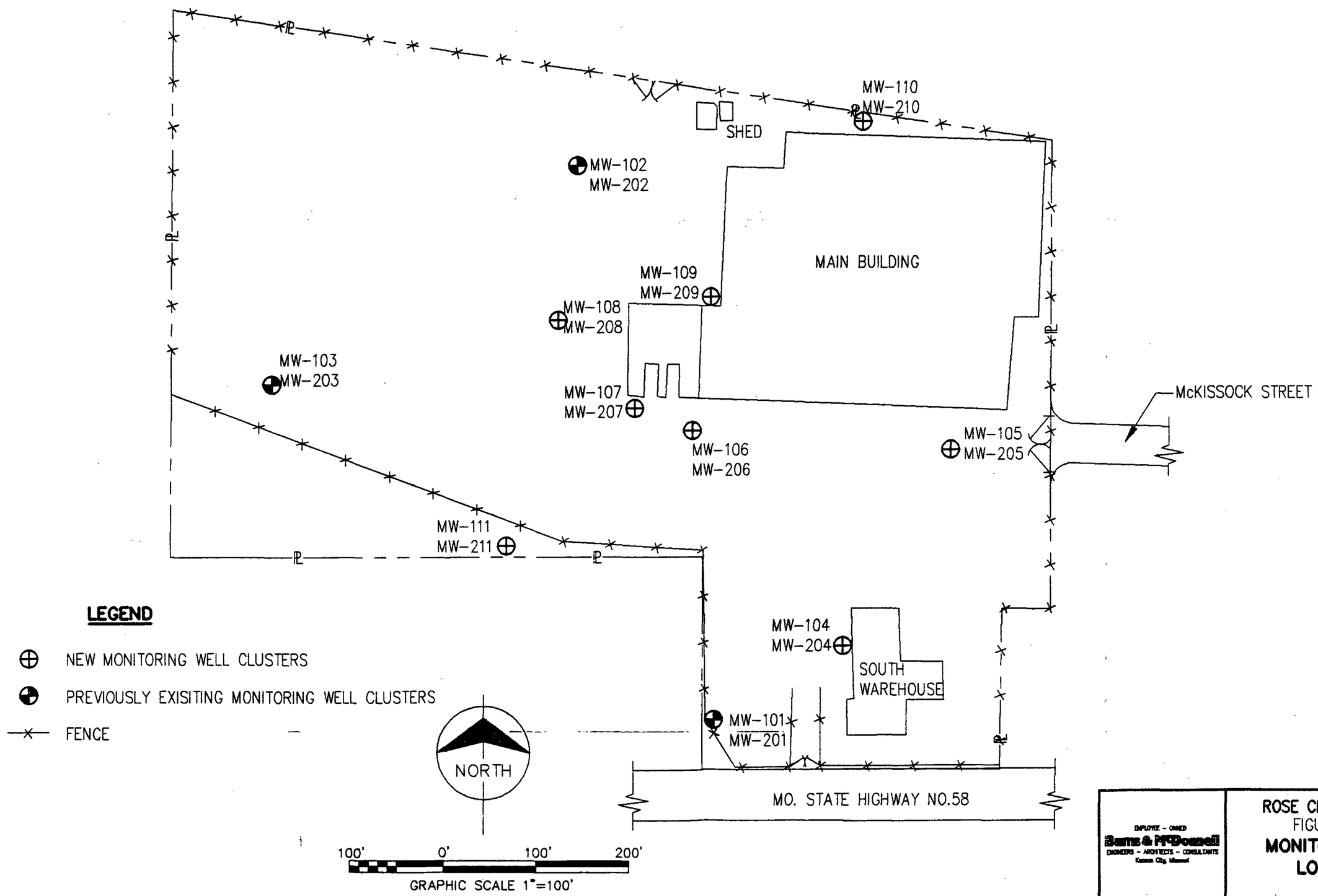
ROSE CHEMICALS SITE
Figure I-1
SITE LOCATION
(LOCUS MAP)



EMPLOYEE-OWNED
Burns & McDonnell
ENGINEERS · ARCHITECTS · CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE

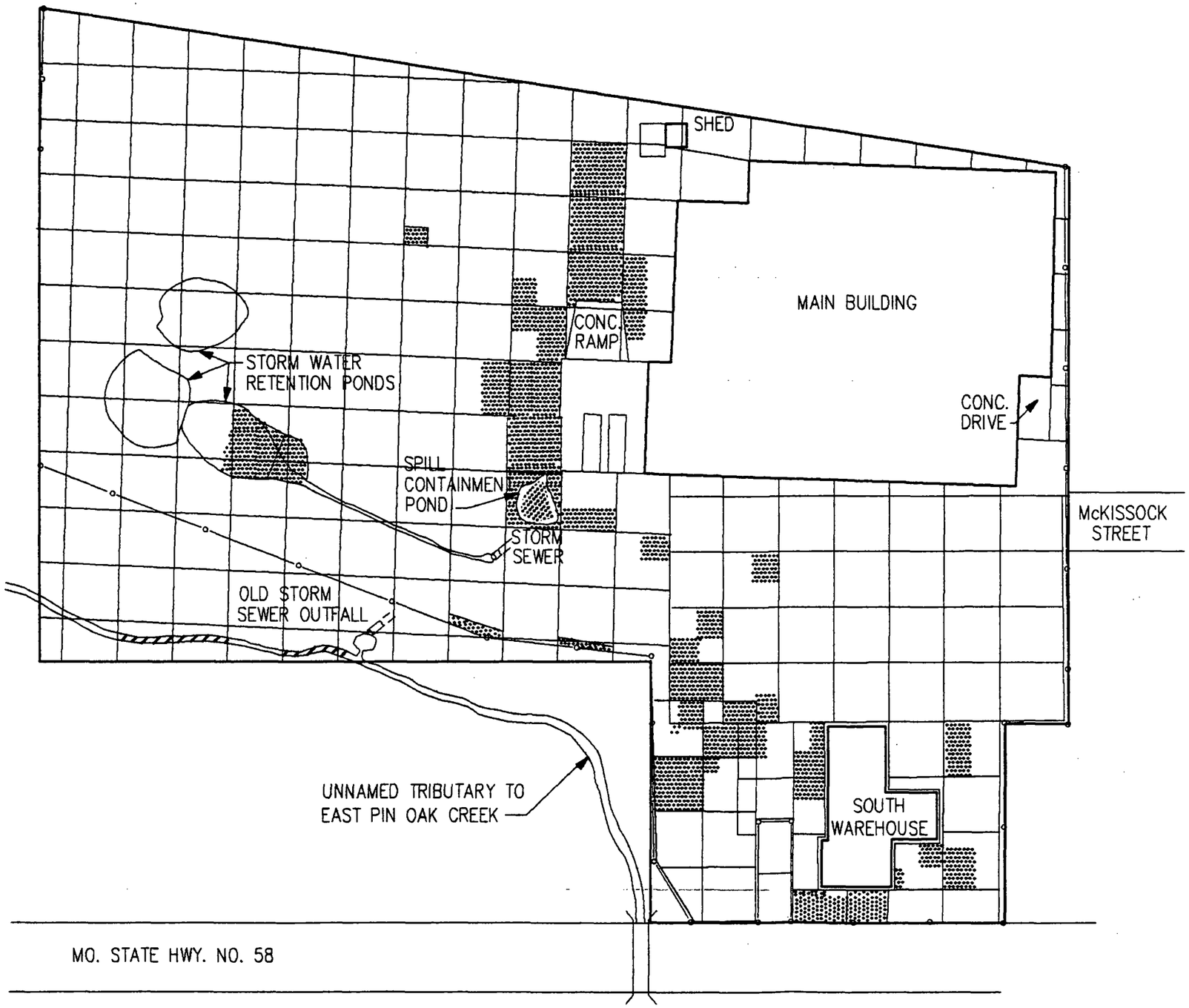
FIGURE II-1
AREA FEATURES



EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE II - 2
MONITORING WELL LOCATIONS

ROSE02 8-1-89



LEGEND

SURFACE SOILS REMOVED DURING PRELIMINARY CLEANUP OPERATION

FENCE

BASE MAP: DEC. 31ST 1986
SHERMAN & BOWERS SURVEY CO.
BOX 71. HARRISONVILLE MO 64701
DATA SOURCE – AERIAL PHOTO

NORTH

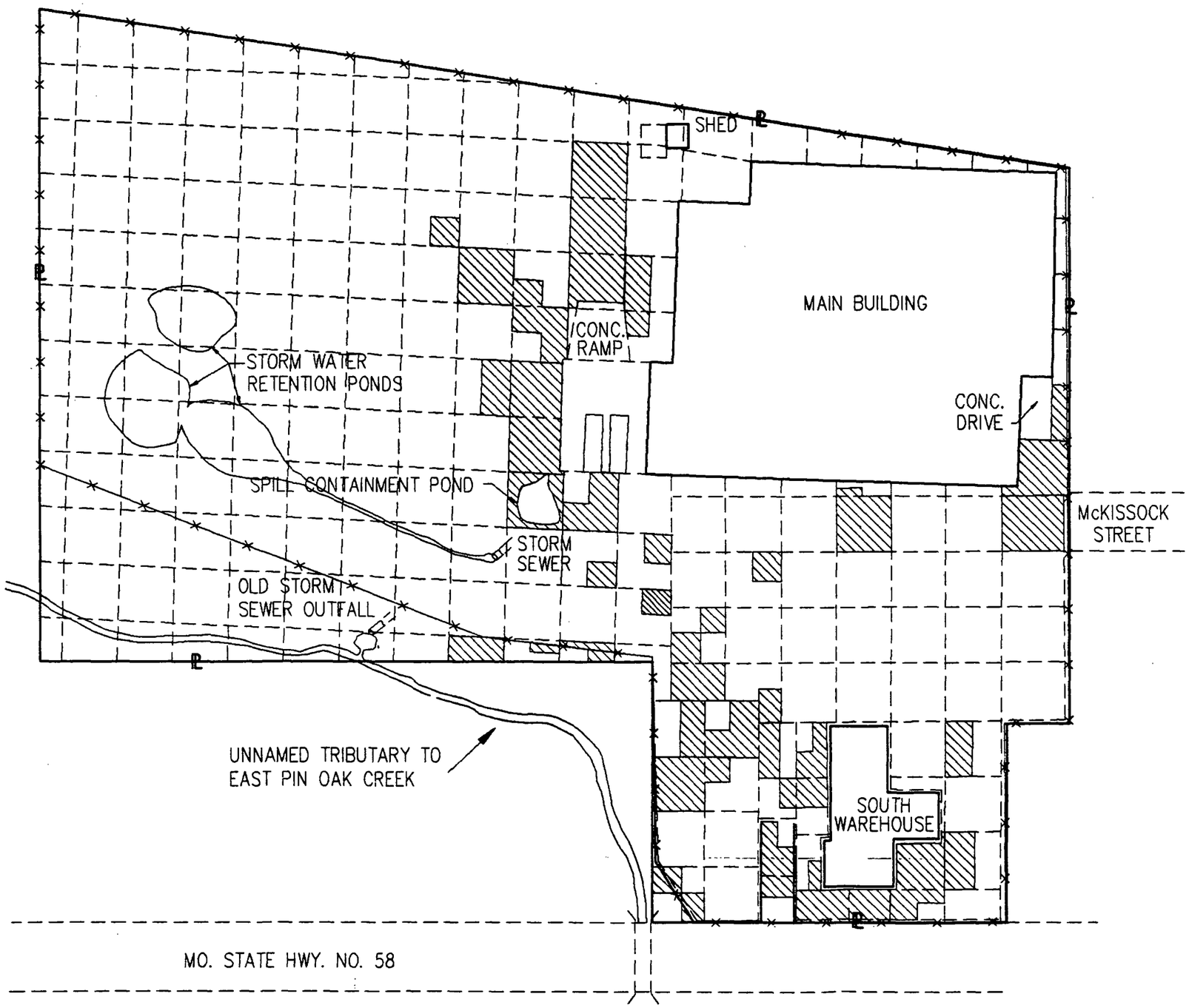
100 0 100 200

SCALE IN FEET

Burns & McDonnell
ENGINEERS – ARCHITECTS – CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE II–3
PRELIMINARY REMOVAL
SURFACE SOIL REMOVAL
AREAS

ROSE02A 2-22-90



LEGEND

GRID SAMPLED DURING RI/FS

FENCE

BASE MAP: DEC. 31ST 1986
SHERMAN & BOWERS SURVEY CO.
BOX 71 HARRISONVILLE, MO 64701
DATA SOURCE - AERIAL PHOTO

NORTH

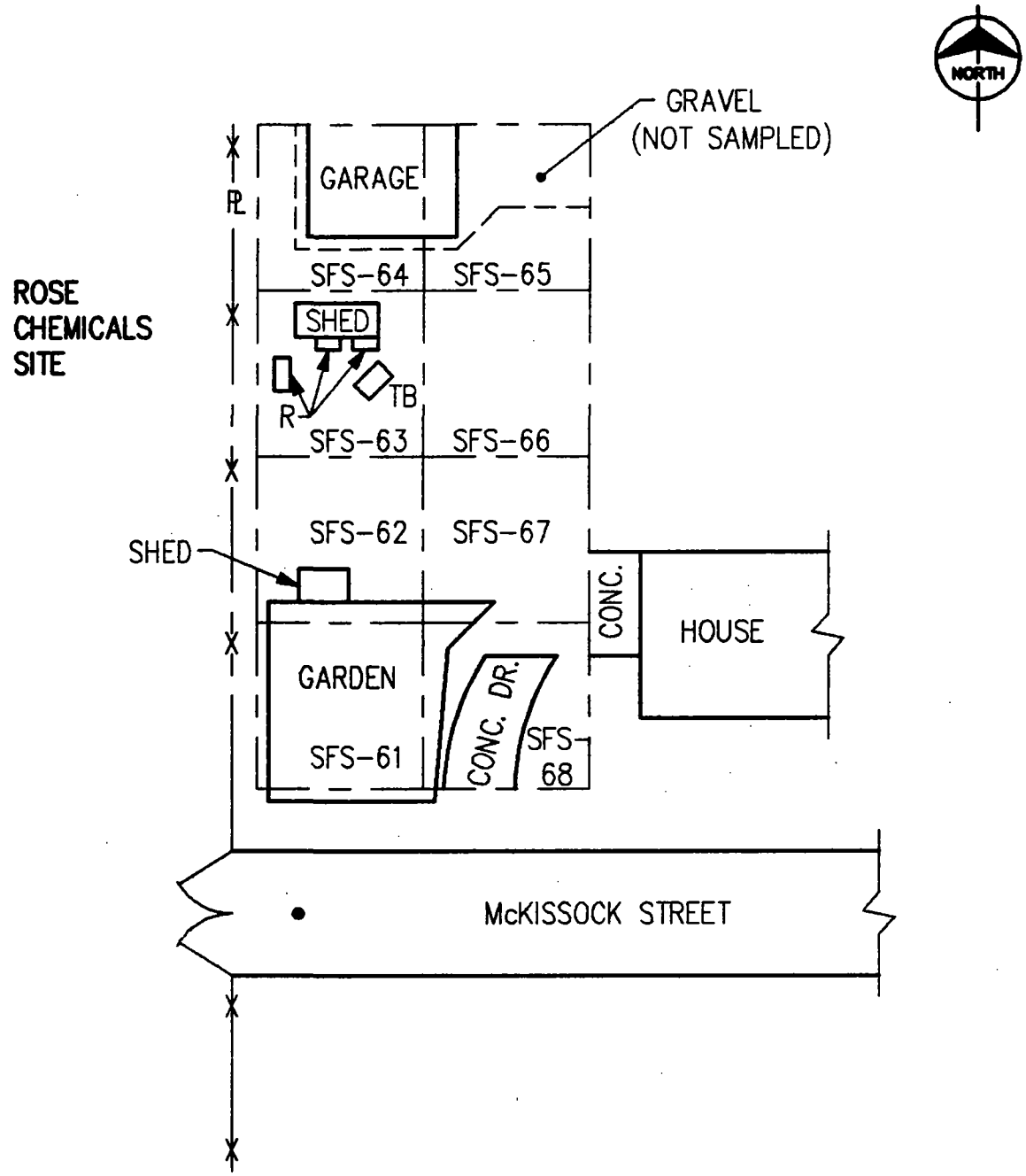
100 0 100 200

SCALE IN FEET

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE II-4
ON-SITE SURFACE SOIL SAMPLING PLAN

ROSE11 8-1-89



40' 0' 40' 80'

GRAPHIC SCALE 1"=40'

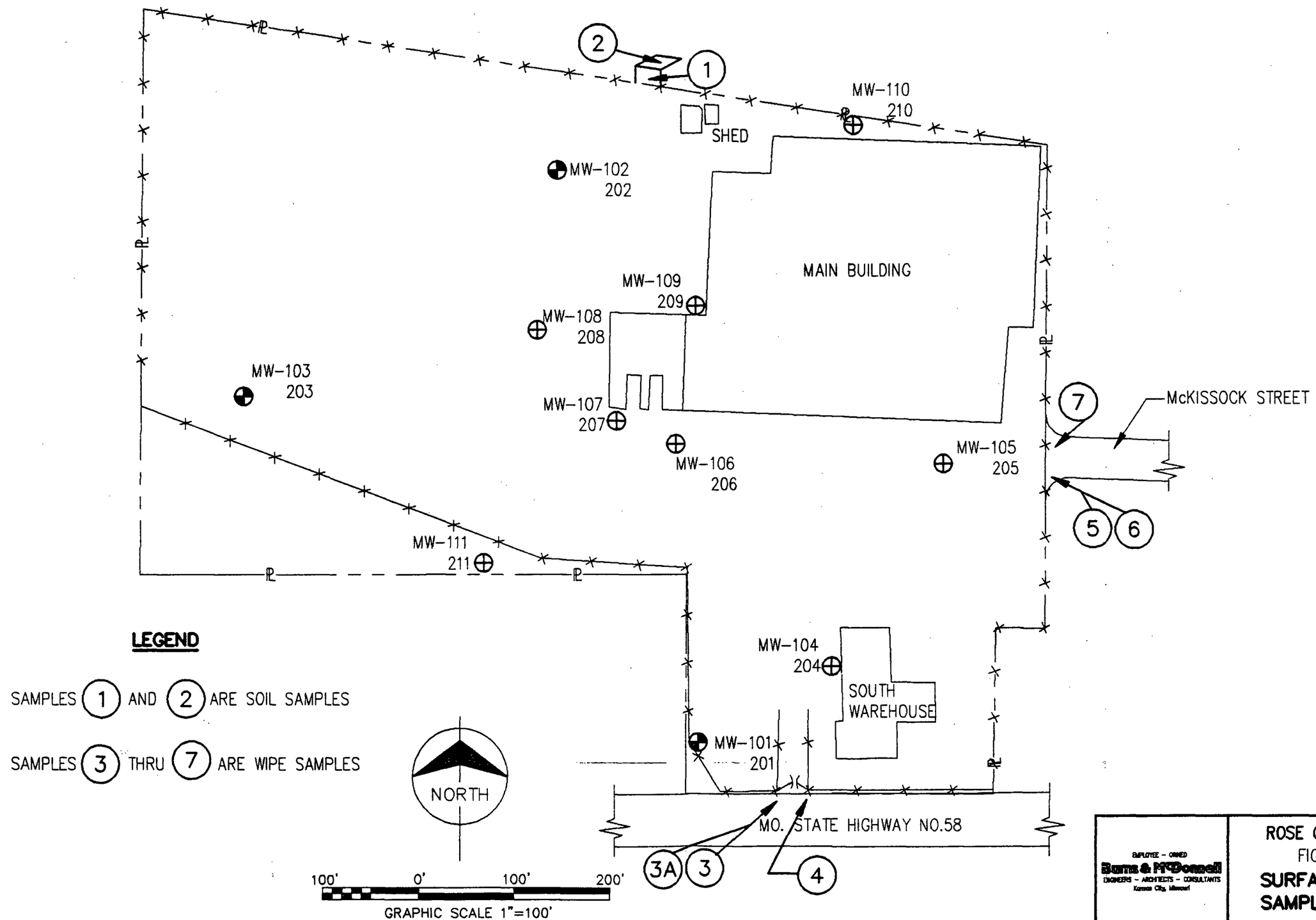
LEGEND

SFS-69	SAMPLE NUMBER
•	MANHOLE
✳ —✳—	FENCE
R	RABBIT HUTCHES
TB	TRUCK BED

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE II-5
OFF-SITE SURFACE SOIL SAMPLING PLAN

ROSE10 8-1-89



LEGEND

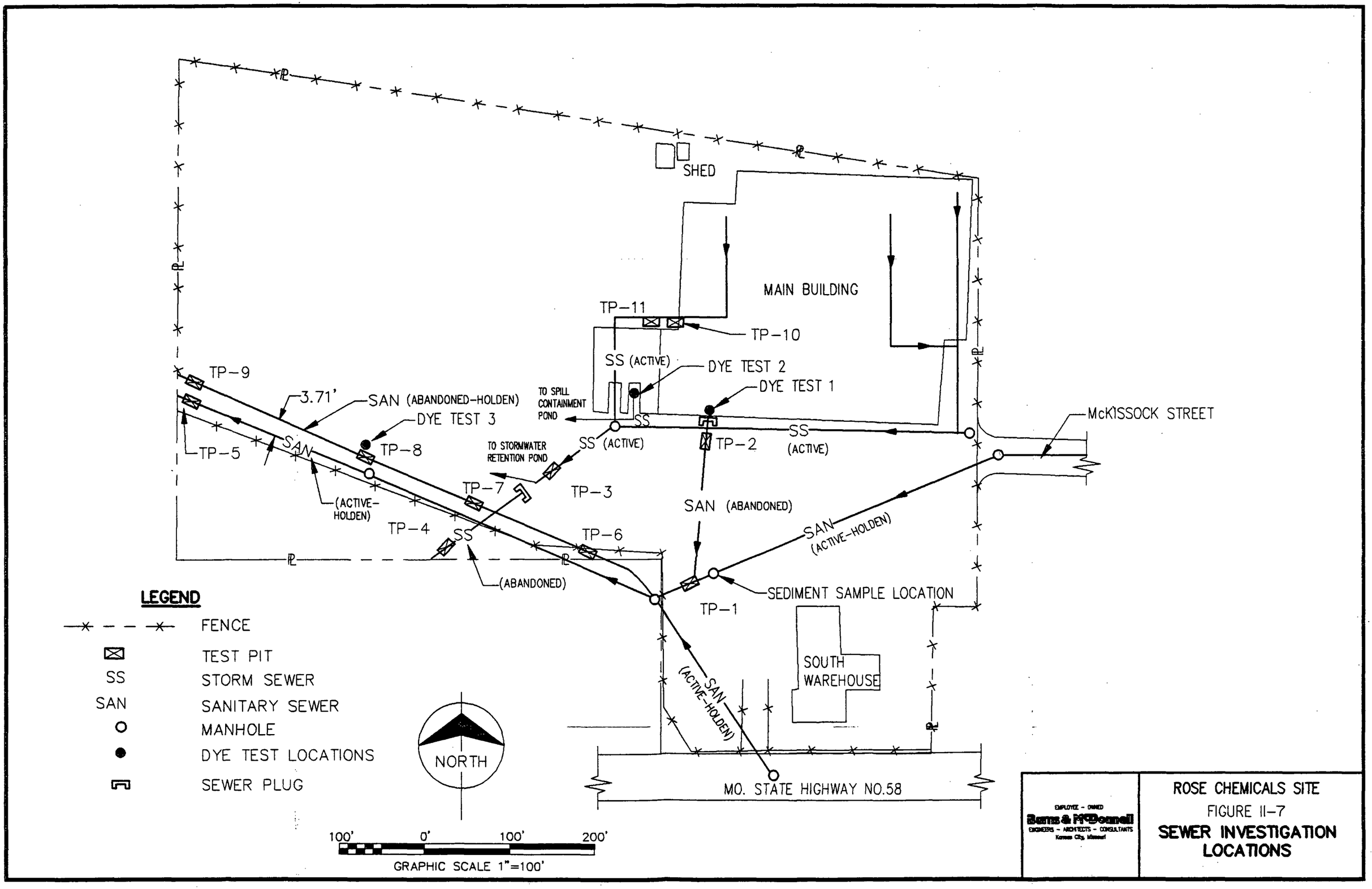
SAMPLES (1) AND (2) ARE SOIL SAMPLES

SAMPLES (3) THRU (7) ARE WIPE SAMPLES

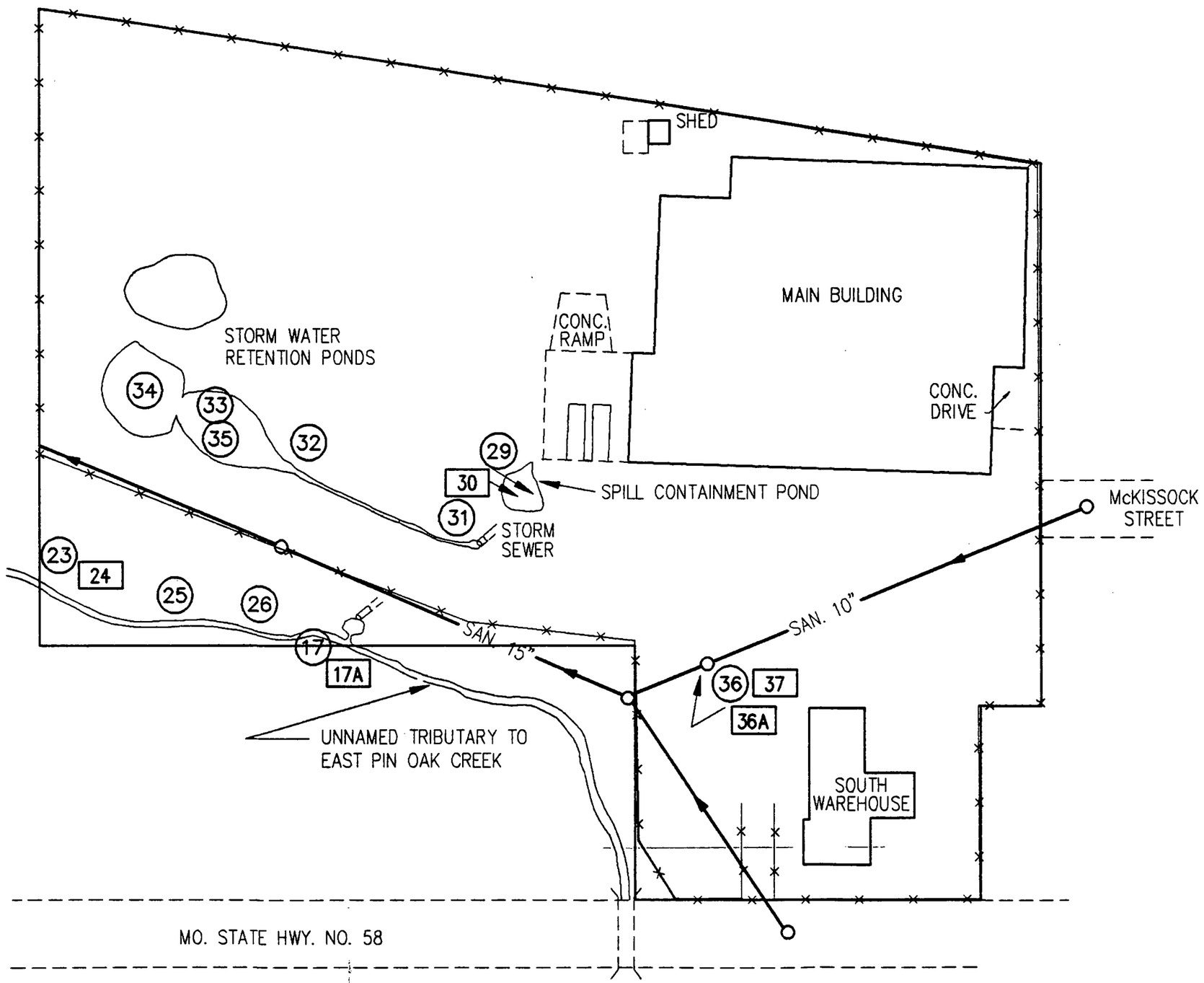
EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE II - 6
SURFACE TRACKING SAMPLE LOCATIONS

ROSE14 8-1-89



ROSE09 8-21-89



LEGEND

SAN	SANITARY SEWER
○	MANHOLE
(34)	SEDIMENT SAMPLE NUMBER
[34]	REPLICATE SAMPLE NUMBER
[34A]	EPA REPLICATE NUMBER
—✕—	FENCE

NORTH

100 0 100 200

SCALE IN FEET

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE II-8
ON-SITE SEDIMENT SAMPLING LOCATIONS

ROSE12 8-1-89

LEGEND

(99)	SAMPLE NO.
[99]	REPLICATE SAMPLE NO.
[99A]	EPA REPLICATE SAMPLE NO.

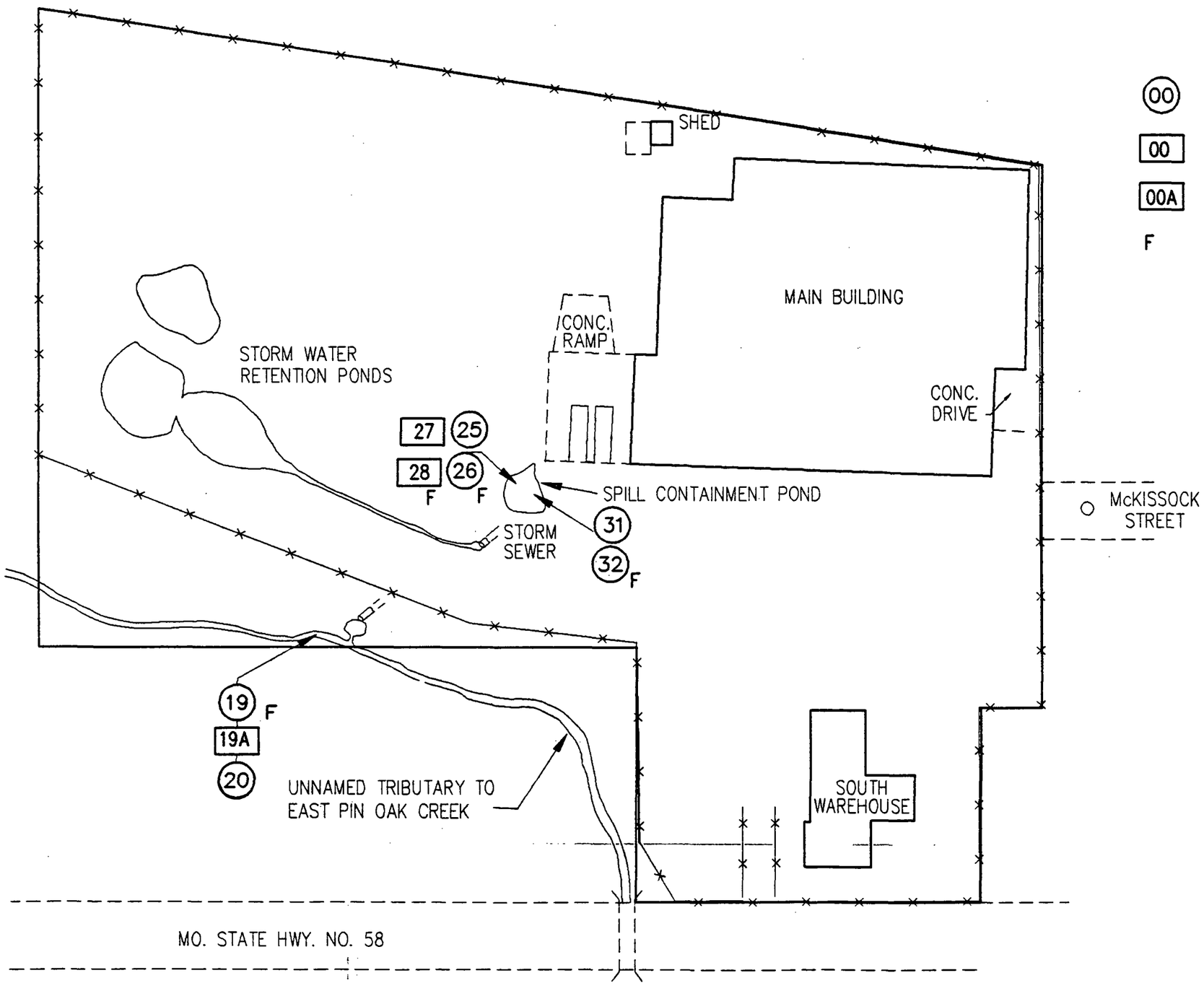
N

APPROX. SCALE: 1" = 230'

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

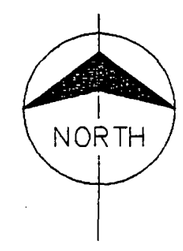
ROSE CHEMICALS SITE

FIGURE II-9
OFF-SITE SEDIMENT SAMPLING LOCATIONS



LEGEND

(00)	UNFILTERED SURFACE WATER SAMPLE NUMBER
[00]	REPLICATE SURFACE WATER SAMPLE NUMBER
[00A]	EPA REPLICATE SURFACE WATER SAMPLE NUMBER
F	FILTERED



EMPLOYEE - OWNED
Sams & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE II-10
ON-SITE SURFACE WATER SAMPLING LOCATIONS

ROSE13.DWG 01-25-1990 14:51

LEGEND

(99)	SAMPLE NO.
[99]	REPLICATE SAMPLE NO.
[99A]	EPA REPLICATE SAMPLE NO.
F	FILTERED SAMPLE

N

APPROX. SCALE: 1" = 230'

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE

FIGURE II-11
OFF-SITE
SURFACE WATER
SAMPLING LOCATIONS

LEGEND

A - DRAINAGE AREA

DRAINAGE FLOW DIRECTION

SCALE: 1" = 40'

CONTOUR INTERVAL = 1'

ROSE CHEMICALS SITE

SURFACE FEATURES & DRAINAGE

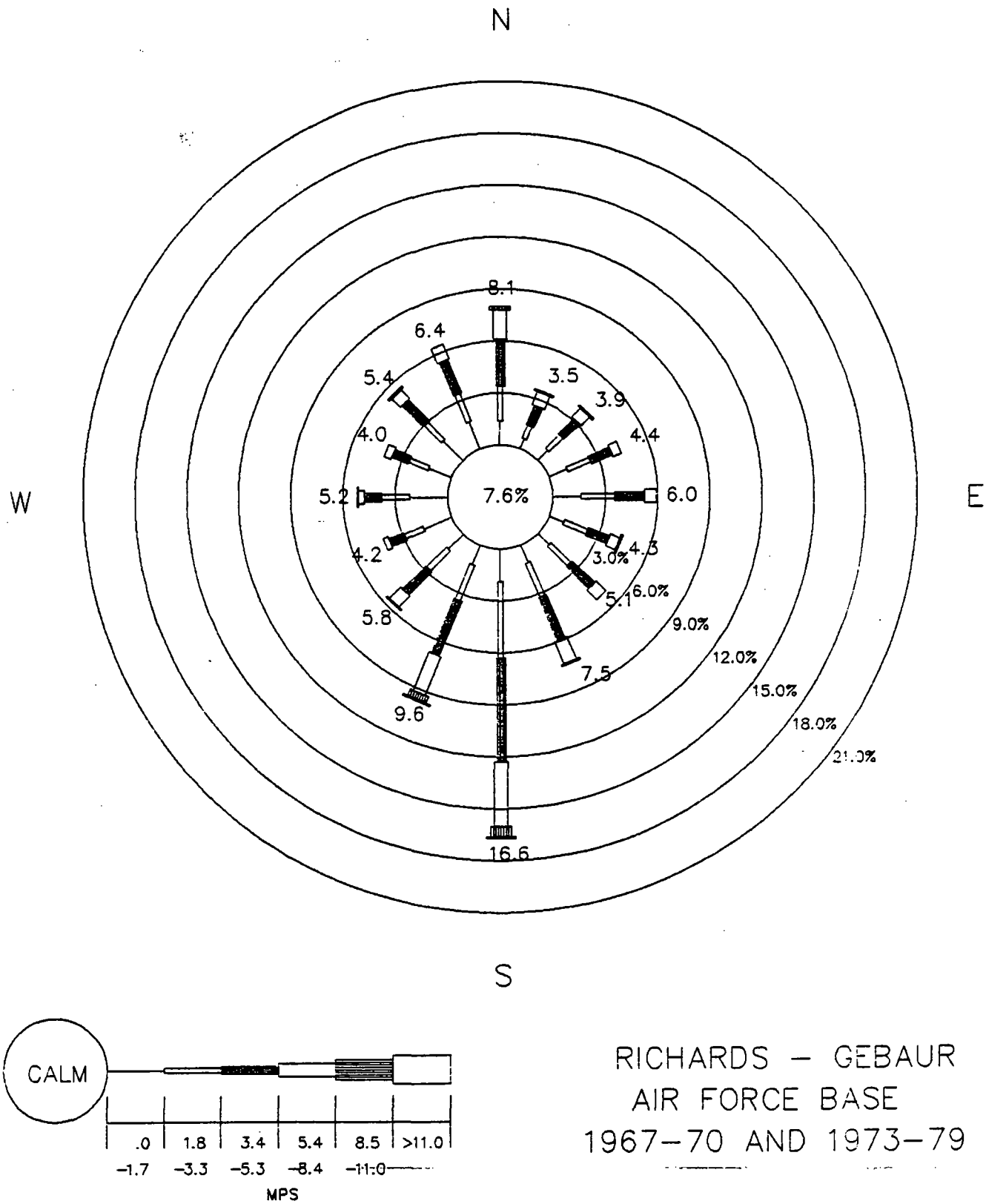
FIGURE III - 1

Burns & McDonnell

ENGINEERS - ARCHITECTS - CONSULTANTS

Kansas City, Missouri

DATE	DRAWING NO	REV.
DESIGNED	—	
DETAILED	PROJECT	
CHECKED	SHEET OF SHEETS	



RICHARDS – GEBAUR
AIR FORCE BASE
1967–70 AND 1973–79

Burns & McDonnell
EMPLOYEE-OWNED
ENGINEERS · ARCHITECTS · CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE

Figure III-2

ANNUAL WIND ROSE

JOHNSON COUNTY, MISSOURI DATE OF PHOTOGRAPHY: NOV 1980 SCALE: 1" = 100' NE 1/4 SEC 10 T 45 N R 28 W

LEGEND

AGR	AGRICULTURAL
BUS	BUSINESS
COM	COMMERCIAL
IND	INDUSTRIAL
RES	RESIDENTIAL
15-1	BLOCK & PARCEL NO.

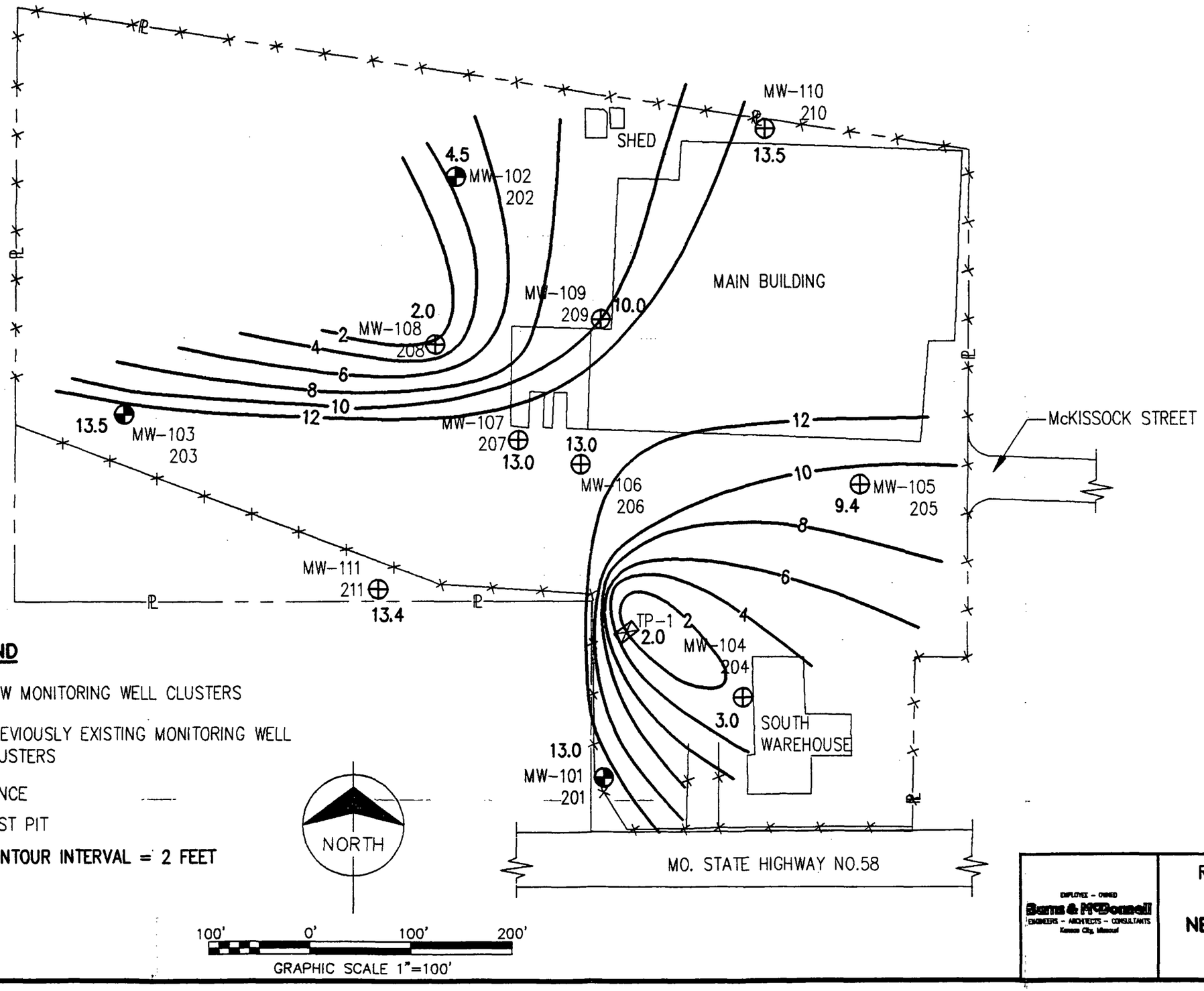
ROSE CHEMICALS SITE

FIGURE III-3

LAND USE OF ADJACENT PROPERTIES

Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

DATE	1-20-89	DRAWING NO.	REV.
DESIGNED	BROWN	DAM-006	—
DETAILED	LAIRMORE	PROJECT	88-025-4
CHECKED		SHEET 1 OF 1	SHEETS



LEGEND

- ⊕ NEW MONITORING WELL CLUSTERS
- ◐ PREVIOUSLY EXISTING MONITORING WELL CLUSTERS
- FENCE
- ⊠ TEST PIT

CONTOUR INTERVAL = 2 FEET

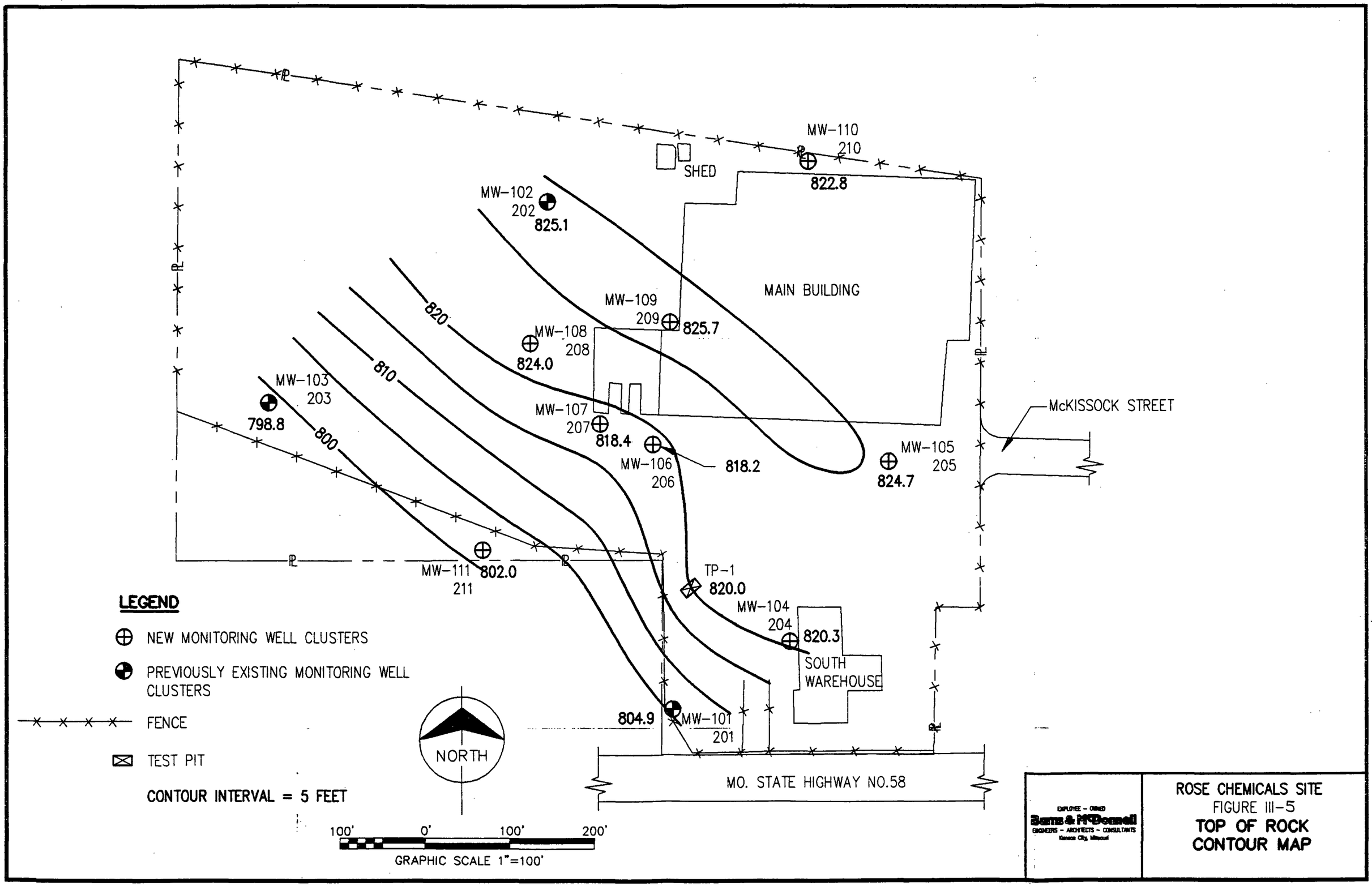
EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE

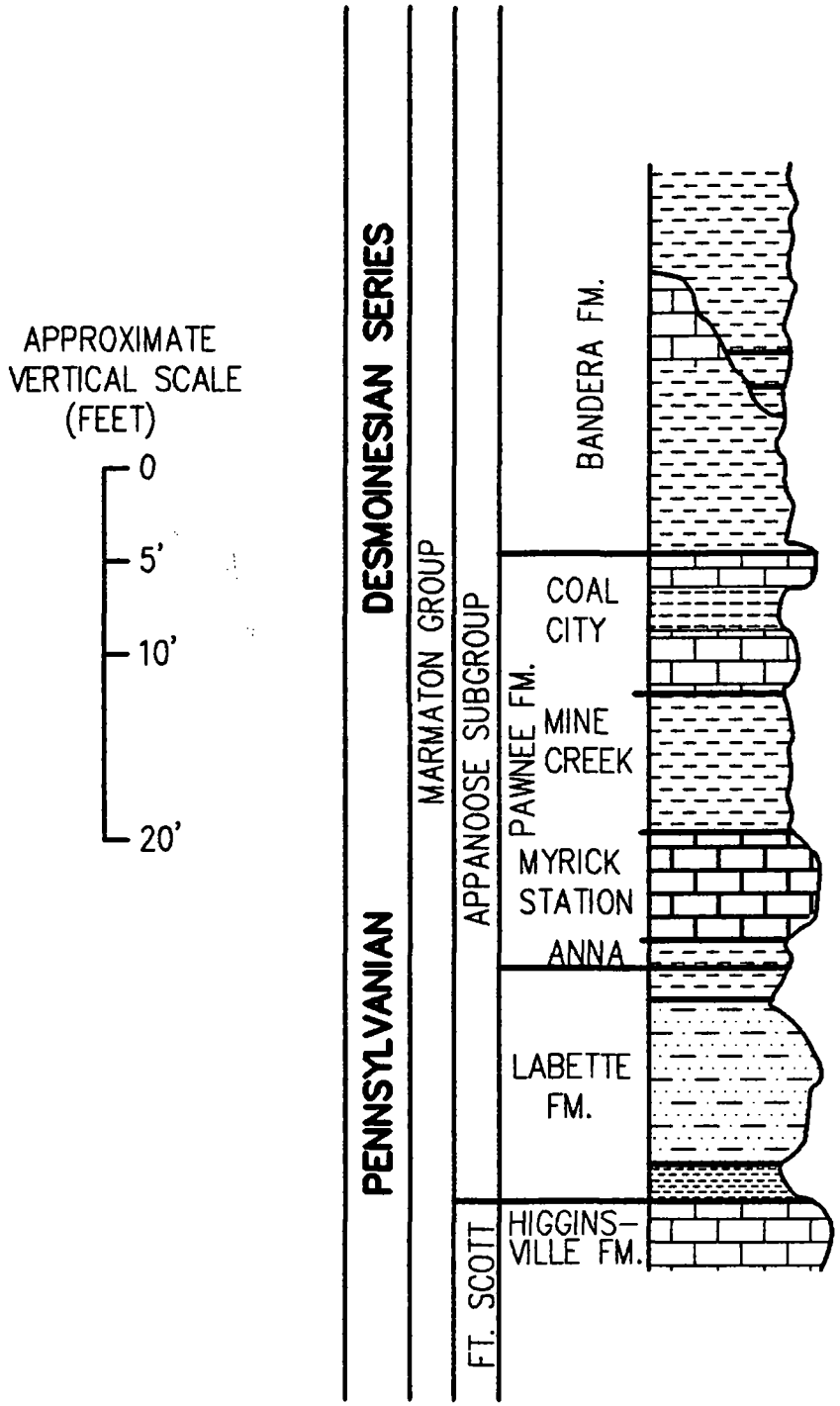
FIGURE III-4

NET SOIL THICKNESS

ROSE06 8-1-89


MW-110
210
822.8
SHED
MW-102
202
825.1
MAIN BUILDING
MW-109
209
825.7
MW-108
208
824.0
820
810
800
MW-103
203
798.8
MW-107
207
818.4
MW-106
206
818.2
MW-105
205
824.7
McKISSOCK STREET
MW-111
211
802.0
TP-1
820.0
MW-104
204
820.3
SOUTH WAREHOUSE
804.9
MW-101
201
MO. STATE HIGHWAY NO.58
LEGEND
NEW MONITORING WELL CLUSTERS
PREVIOUSLY EXISTING MONITORING WELL CLUSTERS
FENCE
TEST PIT
CONTOUR INTERVAL = 5 FEET
NORTH
100' 0' 100' 200'
GRAPHIC SCALE 1"=100'
EMPLOYEE - OWNED
Sam & McDonell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri
ROSE CHEMICALS SITE
FIGURE III-5
TOP OF ROCK
CONTOUR MAP

ROSE05 8-1-89



EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE III-6
STRATIGRAPHIC COLUMN

ROSEJTA.DWG 01-25-1990 16:14

NOTES:

1. Concentrations Shown are Highest Value Detected at Each Sample Location.
2. Concentrations are in ppm.

SHED
MAIN BUILDING
SOUTH WAREHOUSE
McKISSOCK STREET
MO. STATE HIGHWAY NO.58
SAN (ABAN)
SAN (ACTIVE)
SS (ACTIVE)
SS (ABAN)
SS
SAN
MW-107
NORTH
GRAPHIC SCALE 1"=100'

LEGEND

—✕ — — ✕—	FENCE
SS	STORM SEWER
SAN	SANITARY SEWER
○	MANHOLE
⊠	TEST PIT
⊕	NEW MONITORING WELL BORINGS
+	INTERIOR BORINGS
⌒	ONE-HALF DETECTION LIMIT CONCENTRATION CONTOUR
ND	NON DETECTABLE

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

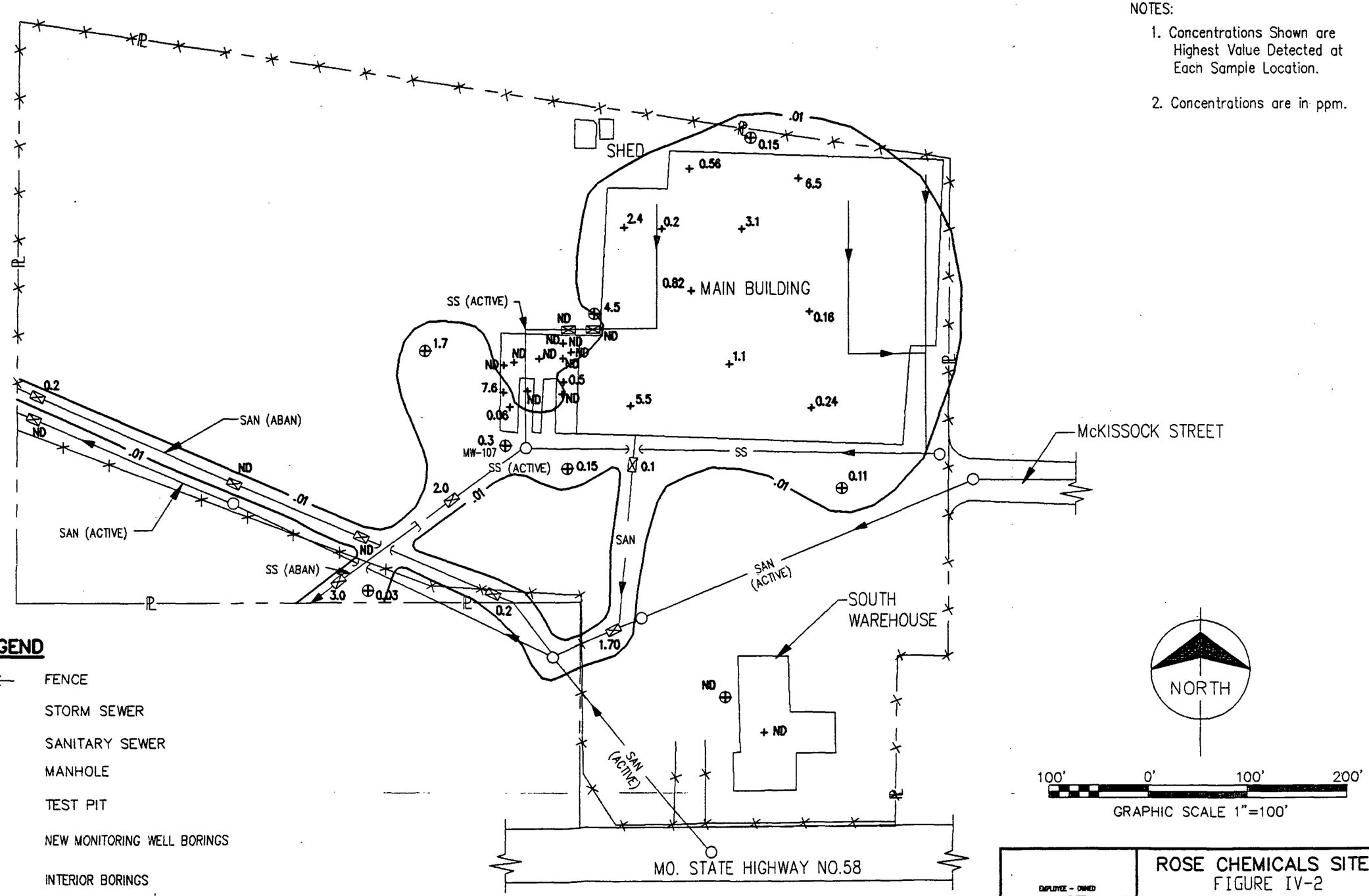
ROSE CHEMICALS SITE
FIGURE IV-1

EXTENT OF AROCLOR 1242 IN SUBSURFACE SOILS

ROSE51-1.DWG 01-26-1990 13:09

NOTES:

1. Concentrations Shown are Highest Value Detected at Each Sample Location.
2. Concentrations are in ppm.



LEGEND

—✕ — — ✕—	FENCE
SS	STORM SEWER
SAN	SANITARY SEWER
○	MANHOLE
⊠	TEST PIT
⊕	NEW MONITORING WELL BORINGS
+	INTERIOR BORINGS
⌒	ONE-HALF DETECTION LIMIT CONCENTRATION CONTOUR
ND	NON DETECTABLE

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV-2

EXTENT OF AROCLOR 1254/60 IN SUBSURFACE SOILS

ROSE51-2.DWG 01-26-1990 12:14

NOTES:

1. Concentrations Shown are Highest Value Detected at Each Sample Location.
2. Concentrations are in ppb.

SHED

MAIN BUILDING

SS (ACTIVE)

SAN (ABAN)

SAN (ACTIVE)

SS (ABAN)

MW-107

SS (ACTIVE)

SS

SAN

SAN (ACTIVE)

McKISSOCK STREET

SOUTH WAREHOUSE

MO. STATE HIGHWAY NO.58

NORTH

100' 0' 100' 200'

GRAPHIC SCALE 1"=100'

LEGEND

—✕— — —✕—	FENCE
SS	STORM SEWER
SAN	SANITARY SEWER
○	MANHOLE
⊠	TEST PIT
⊕	NEW MONITORING WELL BORINGS
+	INTERIOR BORINGS
⌒	ONE-HALF DETECTION LIMIT CONCENTRATION CONTOUR
ND	NON DETECTABLE

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV-3

EXTENT OF 1,1,1 – TRICHLOROETHANE IN SUBSURFACE SOILS

ROSE51-3.DWG 01-26-1990 11:34

NOTES:

1. Concentrations Shown are Highest Value Detected at Each Sample Location.
2. Concentrations are in ppb.

SHED

MAIN BUILDING

SS (ACTIVE)

SAN (ABAN)

SAN (ACTIVE)

SS (ABAN)

MW-107

SS (ACTIVE)

SS

SAN

SAN (ACTIVE)

McKISSOCK STREET

SOUTH WAREHOUSE

MO. STATE HIGHWAY NO.58

NORTH

100' 0' 100' 200'

GRAPHIC SCALE 1"=100'

LEGEND

—✕ – – ✕—	FENCE
SS	STORM SEWER
SAN	SANITARY SEWER
○	MANHOLE
⊠	TEST PIT
⊕	NEW MONITORING WELL BORINGS
+	INTERIOR BORINGS
⌒	ONE-HALF DETECTION LIMIT CONCENTRATION CONTOUR
ND	NON DETECTABLE

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV-4

EXTENT OF 1,1 – DICHLOROETHANE IN SUBSURFACE SOILS

ROSE51-4.DWG 01-26-1990 11:20

NOTES:

1. Concentrations Shown are Highest Value Detected at Each Sample Location.
2. Concentrations are in ppb.

SHED

MAIN BUILDING

SS (ACTIVE)

MW-107

SS

SAN (ABAN)

SAN (ACTIVE)

SS (ABAN)

SAN

McKISSOCK STREET

SOUTH WAREHOUSE

MO. STATE HIGHWAY NO.58

NORTH

100' 0' 100' 200'

GRAPHIC SCALE 1"=100'

LEGEND

—✕ — — ✕—	FENCE
SS	STORM SEWER
SAN	SANITARY SEWER
○	MANHOLE
⊠	TEST PIT
⊕	NEW MONITORING WELL BORINGS
+	INTERIOR BORINGS
⌒	ONE-HALF DETECTION LIMIT CONCENTRATION CONTOUR
ND	NON DETECTABLE

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

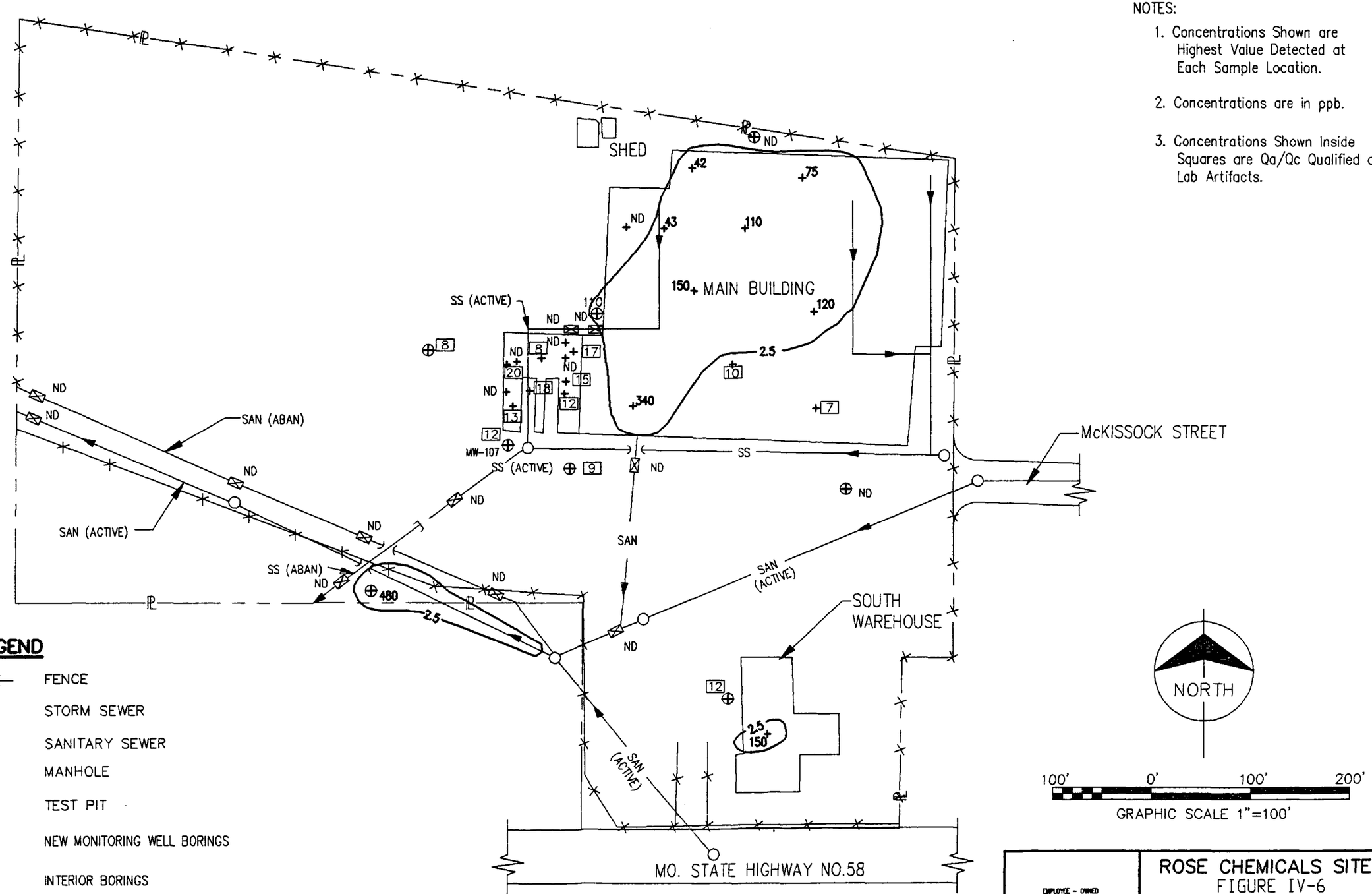
ROSE CHEMICALS SITE
FIGURE IV-5

EXTENT OF 1,2 – DICHLOROETHENE IN SUBSURFACE SOILS

ROSE51-5.DWG 01-26-1990 09:38

NOTES:

1. Concentrations Shown are Highest Value Detected at Each Sample Location.
2. Concentrations are in ppb.
3. Concentrations Shown Inside Squares are Qa/Qc Qualified as Lab Artifacts.



LEGEND

—✕ — — ✕—	FENCE
SS	STORM SEWER
SAN	SANITARY SEWER
○	MANHOLE
⊠	TEST PIT
⊕	NEW MONITORING WELL BORINGS
+	INTERIOR BORINGS
⌒	ONE-HALF DETECTION LIMIT CONCENTRATION CONTOUR
ND	NON DETECTABLE

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

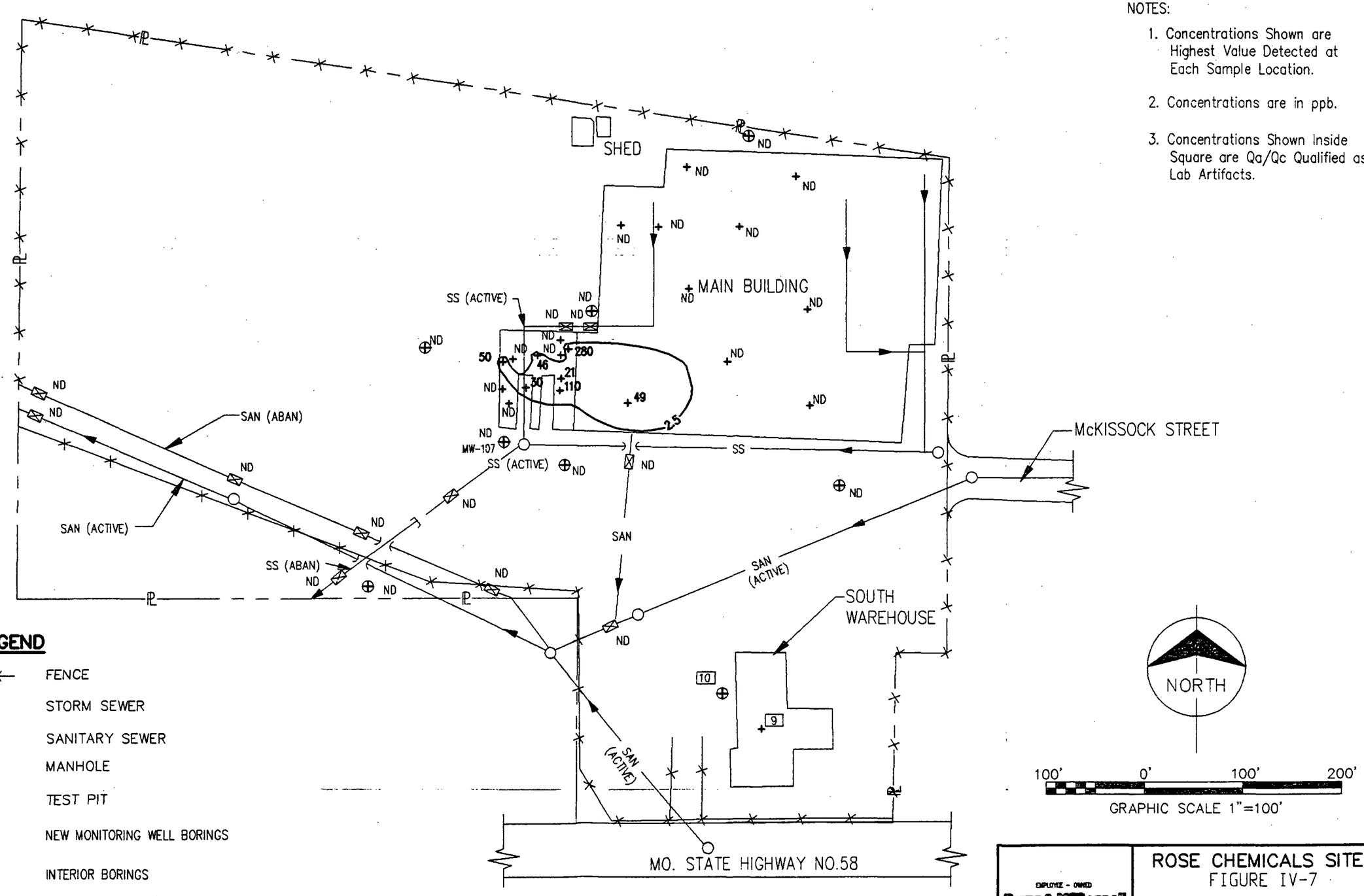
ROSE CHEMICALS SITE
FIGURE IV-6

EXTENT OF METHYLENE CHLORIDE IN SUBSURFACE SOILS

ROSE51-6.DWG 01-26-1990 10:21

NOTES:

1. Concentrations Shown are Highest Value Detected at Each Sample Location.
2. Concentrations are in ppb.
3. Concentrations Shown Inside Square are Qa/Qc Qualified as Lab Artifacts.



LEGEND

—✕ — — ✕—	FENCE
SS	STORM SEWER
SAN	SANITARY SEWER
○	MANHOLE
⊠	TEST PIT
⊕	NEW MONITORING WELL BORINGS
+	INTERIOR BORINGS
⌒	ONE-HALF DETECTION LIMIT CONCENTRATION CONTOUR
ND	NON DETECTABLE

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

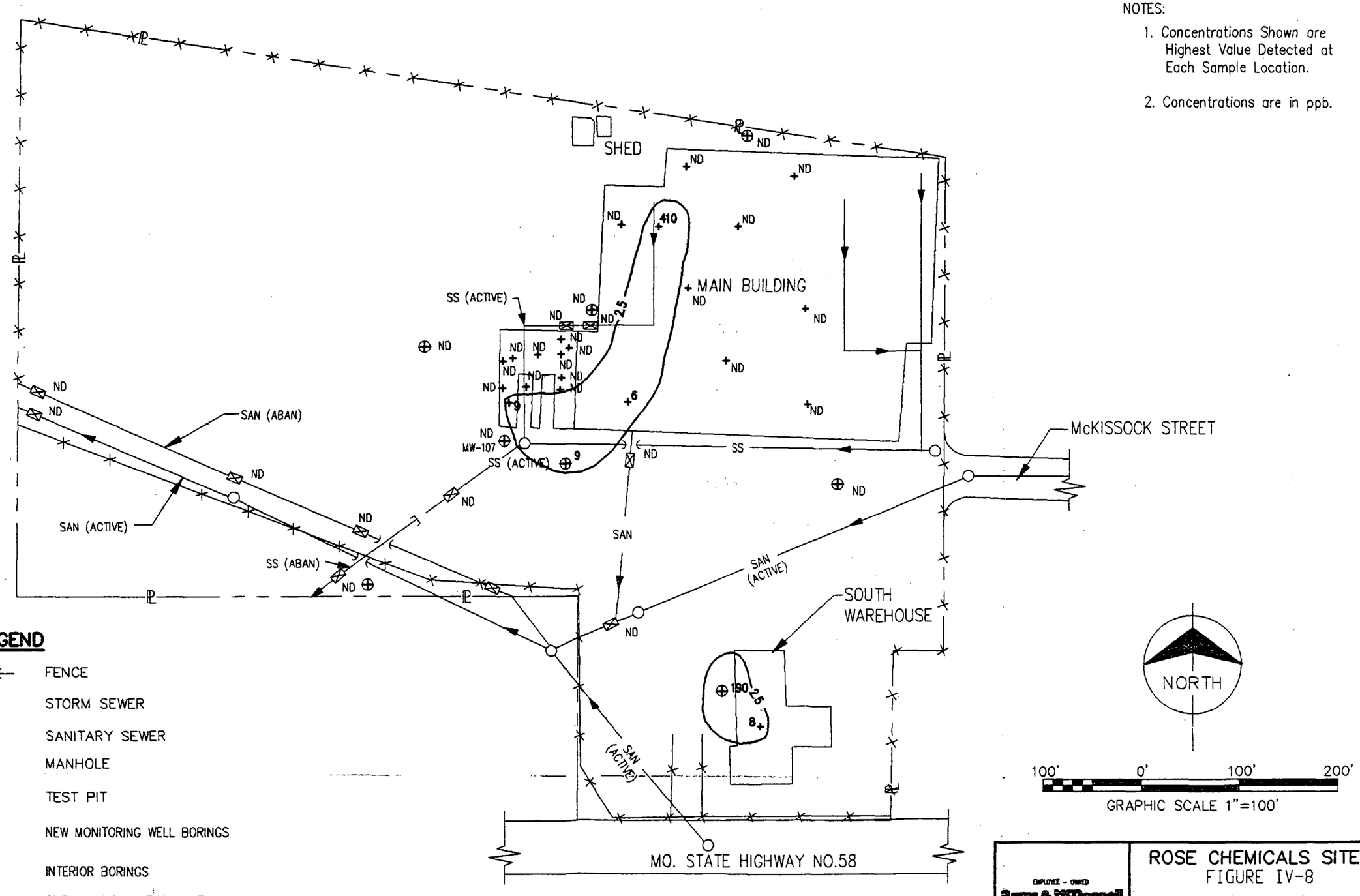
ROSE CHEMICALS SITE
FIGURE IV-7

EXTENT OF METHYL ETHYL KETONE IN SUBSURFACE SOILS

ROSE51-7.DWG 01-26-1990 10:22

NOTES:

1. Concentrations Shown are Highest Value Detected at Each Sample Location.
2. Concentrations are in ppb.



LEGEND

—✕— — —✕—	FENCE
SS	STORM SEWER
SAN	SANITARY SEWER
○	MANHOLE
⊠	TEST PIT
⊕	NEW MONITORING WELL BORINGS
+	INTERIOR BORINGS
⌒	ONE-HALF DETECTION LIMIT CONCENTRATION CONTOUR
ND	NON DETECTABLE

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV-8

EXTENT OF ETHYLBENZENE IN SUBSURFACE SOILS

ROSE51-8.DWG 01-26-1990 10:39

NOTES:

1. Concentrations Shown are Highest Value Detected at Each Sample Location.
2. Concentrations are in ppb.

SHED

MAIN BUILDING

SS (ACTIVE)

SAN (ABAN)

SAN (ACTIVE)

SS (ABAN)

MW-107

SS (ACTIVE)

SS

SAN

SAN (ACTIVE)

McKISSOCK STREET

SOUTH WAREHOUSE

MO. STATE HIGHWAY NO.58

ND

42

2.5

17

2700

580

2.5

8

170

2.5

15

LEGEND

—✕ — — ✕—	FENCE
SS	STORM SEWER
SAN	SANITARY SEWER
○	MANHOLE
⊠	TEST PIT
⊕	NEW MONITORING WELL BORINGS
+	INTERIOR BORINGS
⌒	ONE-HALF DETECTION LIMIT CONCENTRATION CONTOUR
ND	NON DETECTABLE

NORTH

100' 0' 100' 200'

GRAPHIC SCALE 1"=100'

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV-9

EXTENT OF TETRACHLOROETHENE IN SUBSURFACE SOILS

ROSE51-9.DWG 01-26-1990 10:41

NOTES:

1. Concentrations Shown are Highest Value Detected at Each Sample Location.
2. Concentrations are in ppb.

SHED

MAIN BUILDING

SS (ACTIVE)

SAN (ABAN)

SAN (ACTIVE)

SS (ABAN)

MW-107

SS

SAN

McKISSOCK STREET

SOUTH WAREHOUSE

MO. STATE HIGHWAY NO.58

NORTH

100' 0' 100' 200'

GRAPHIC SCALE 1"=100'

LEGEND

—✕ — — ✕—	FENCE
SS	STORM SEWER
SAN	SANITARY SEWER
○	MANHOLE
⊠	TEST PIT
⊕	NEW MONITORING WELL BORINGS
+	INTERIOR BORINGS
⌒	ONE-HALF DETECTION LIMIT CONCENTRATION CONTOUR
ND	NON DETECTABLE

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV-10

EXTENT OF TOLUENE IN SUBSURFACE SOILS

ROSE5110.DWG 01-26-1990 10:52

NOTES:

1. Concentrations Shown are Highest Value Detected at Each Sample Location.
2. Concentrations are in ppb.

SHED

MAIN BUILDING

SOUTH WAREHOUSE

McKISSOCK STREET

MO. STATE HIGHWAY NO.58

SAN (ABAN)

SAN (ACTIVE)

SS (ABAN)

SS (ACTIVE)

SS

SAN

MW-107

ND

5

19

2800

6

7

18

6

371

2.5

10

2.5

460

2.5

39

NORTH

100' 0' 100' 200'

GRAPHIC SCALE 1"=100'

LEGEND

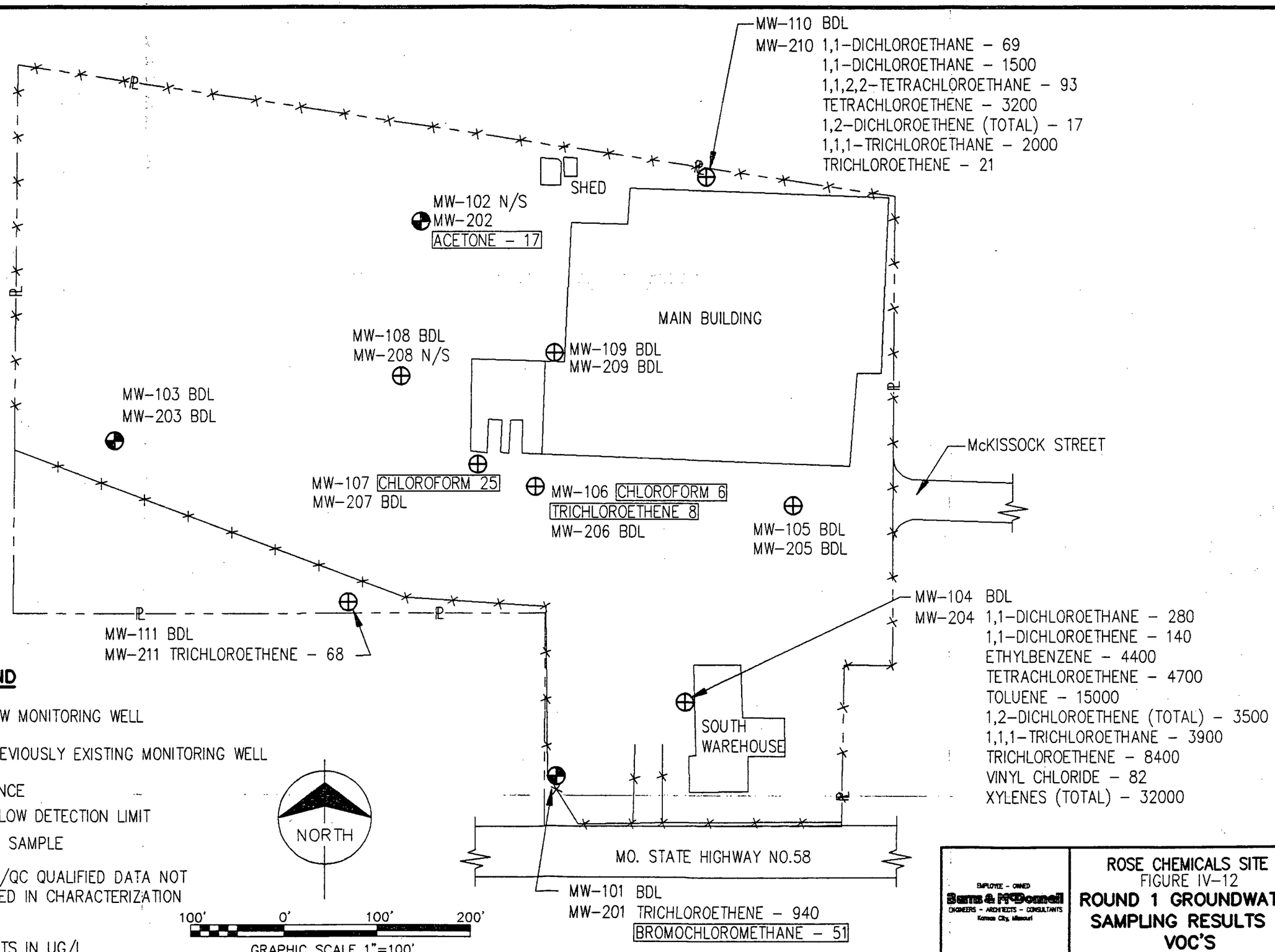
—✕— — —✕—	FENCE
SS	STORM SEWER
SAN	SANITARY SEWER
○	MANHOLE
⊠	TEST PIT
⊕	NEW MONITORING WELL BORINGS
+	INTERIOR BORINGS
⌒	ONE-HALF DETECTION LIMIT CONCENTRATION CONTOUR
ND	NON DETECTABLE

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

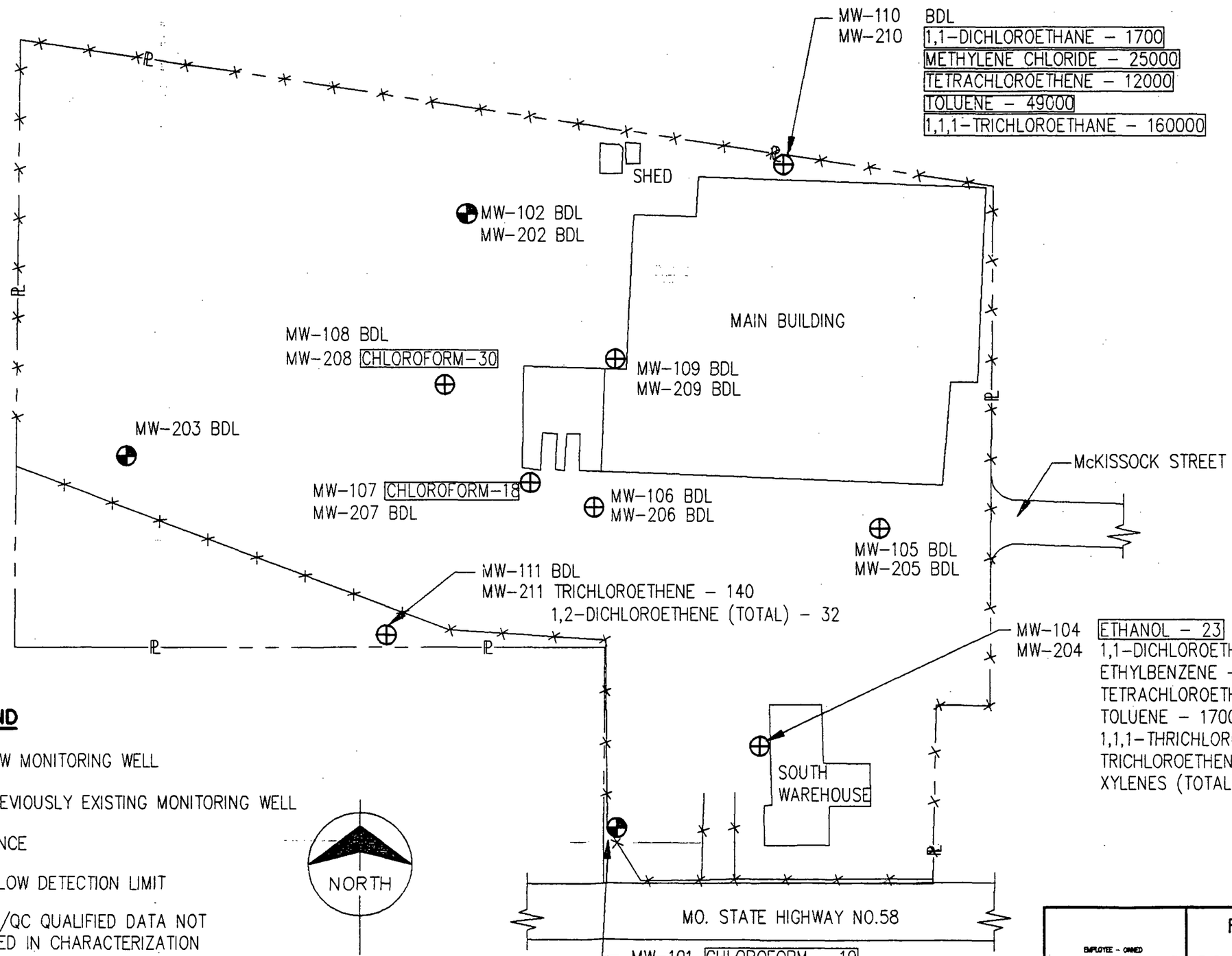
ROSE CHEMICALS SITE
FIGURE IV-11

EXTENT OF XYLENE IN SUBSURFACE SOILS

ROSE5111.DWG 01-26-1990 11:13



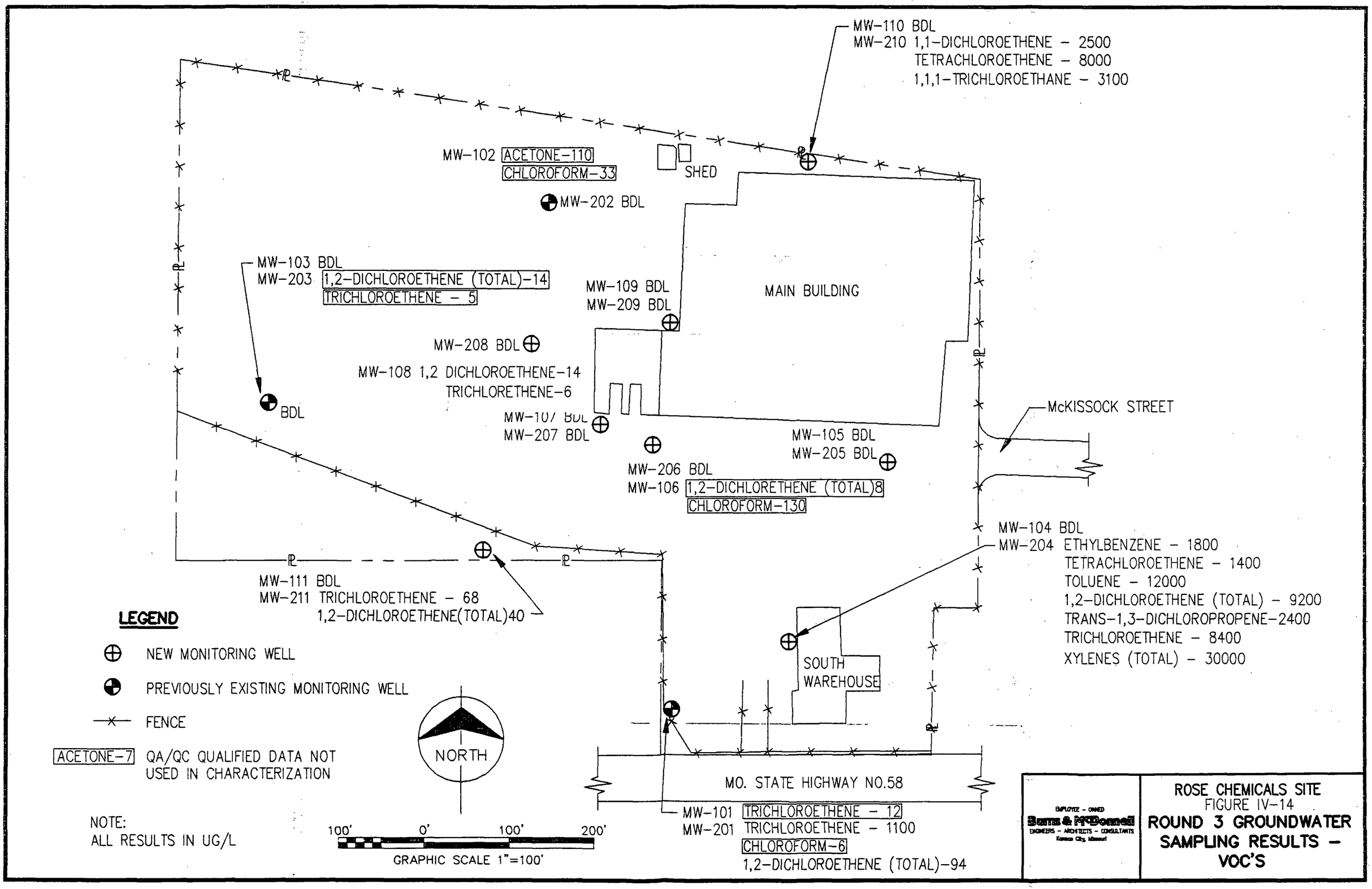
ROSE15 8-21-89



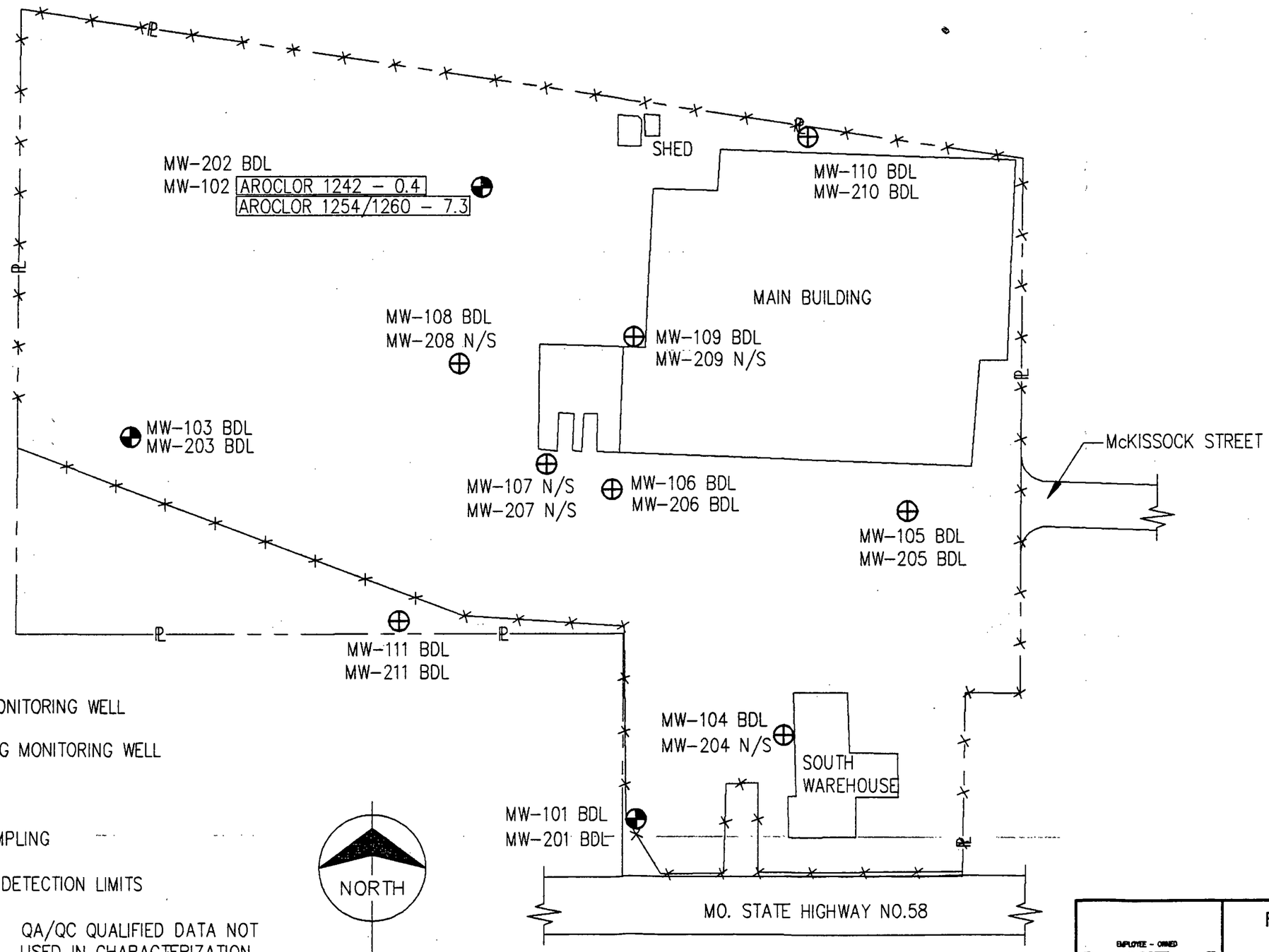
EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV-13
ROUND 2 GROUNDWATER SAMPLING RESULTS - VOC'S

ROSE16 8-21-89



ROSE35 8-21-89



LEGEND

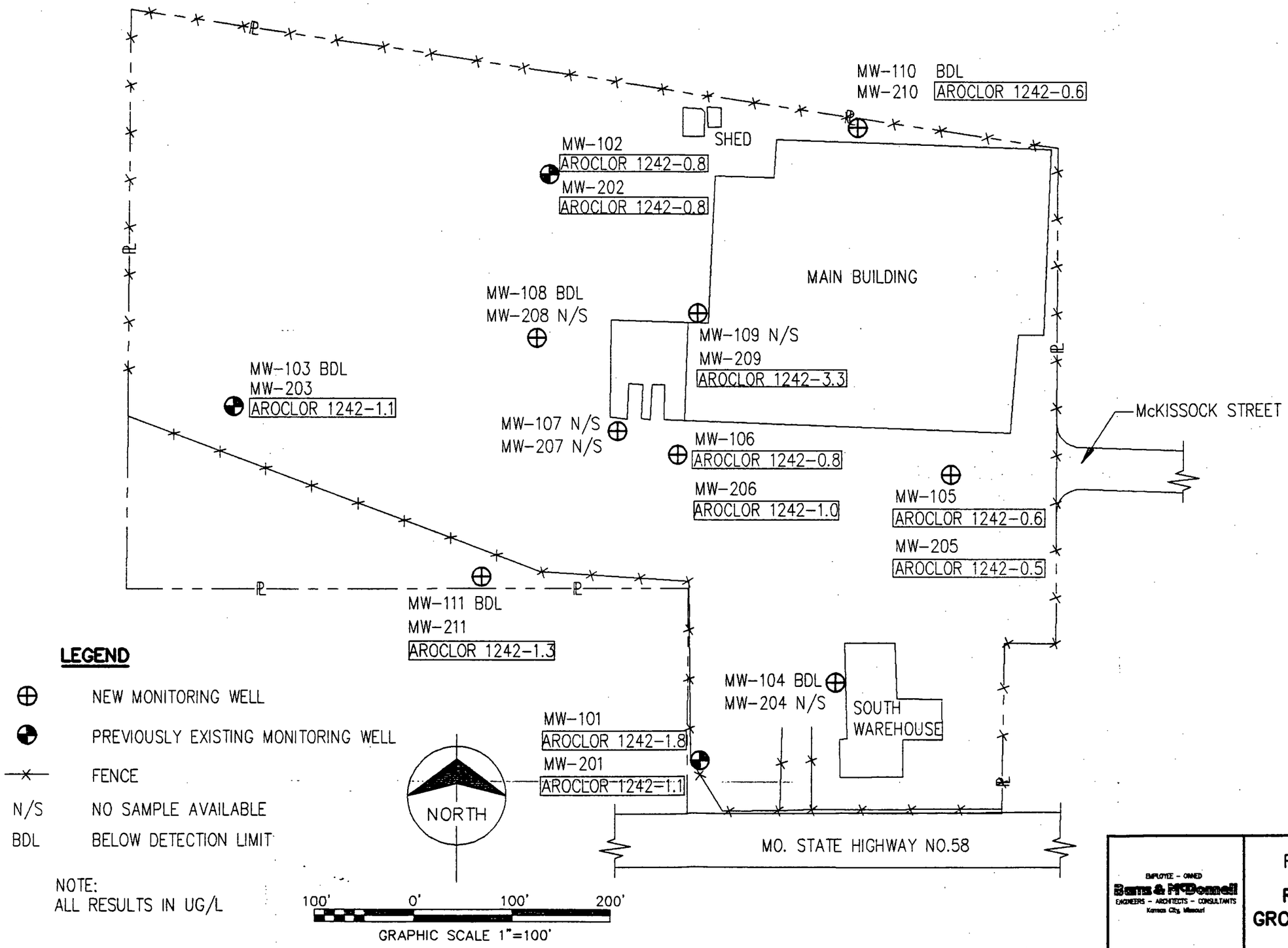
- ⊕ NEW MONITORING WELL
- ◐ EXISTING MONITORING WELL
- —×— FENCE
- N/S NO SAMPLING
- BDL BELOW DETECTION LIMITS
- AROCLOR 1242-0.2 QA/QC QUALIFIED DATA NOT USED IN CHARACTERIZATION

NOTE:
ALL RESULTS IN UG/L

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV-15
ROUND 1 FILTERED GROUNDWATER SAMPLING RESULTS - PCB'S

ROSE20 8-21-89



LEGEND

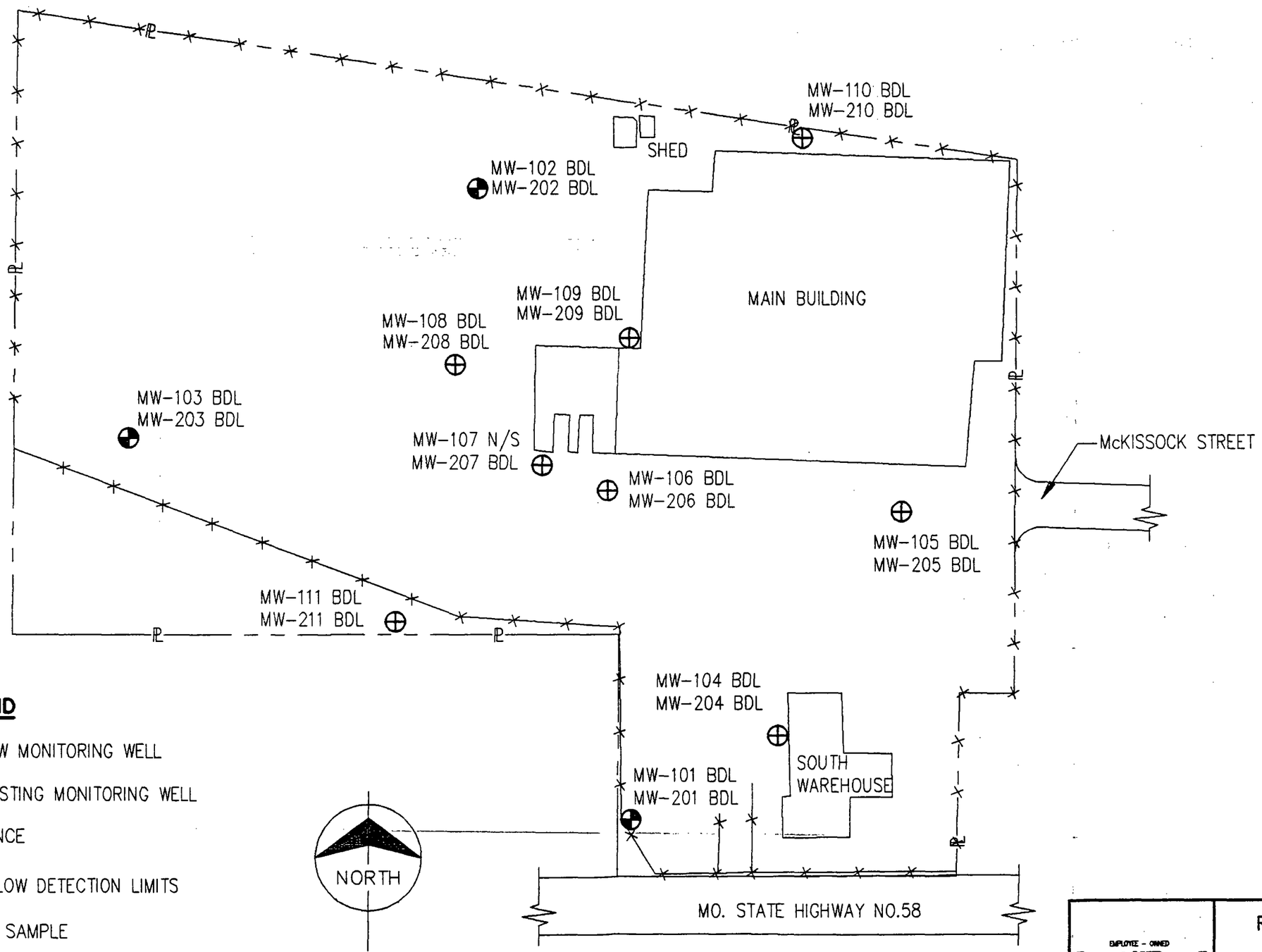
- ⊕ NEW MONITORING WELL
- ◐ PREVIOUSLY EXISTING MONITORING WELL
- —×— FENCE
- N/S NO SAMPLE AVAILABLE
- BDL BELOW DETECTION LIMIT

NOTE:
ALL RESULTS IN UG/L

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV - 16
ROUND 2 FILTERED GROUNDWATER SAMPLING RESULT - PCB'S

ROSE19 8-21-89



LEGEND

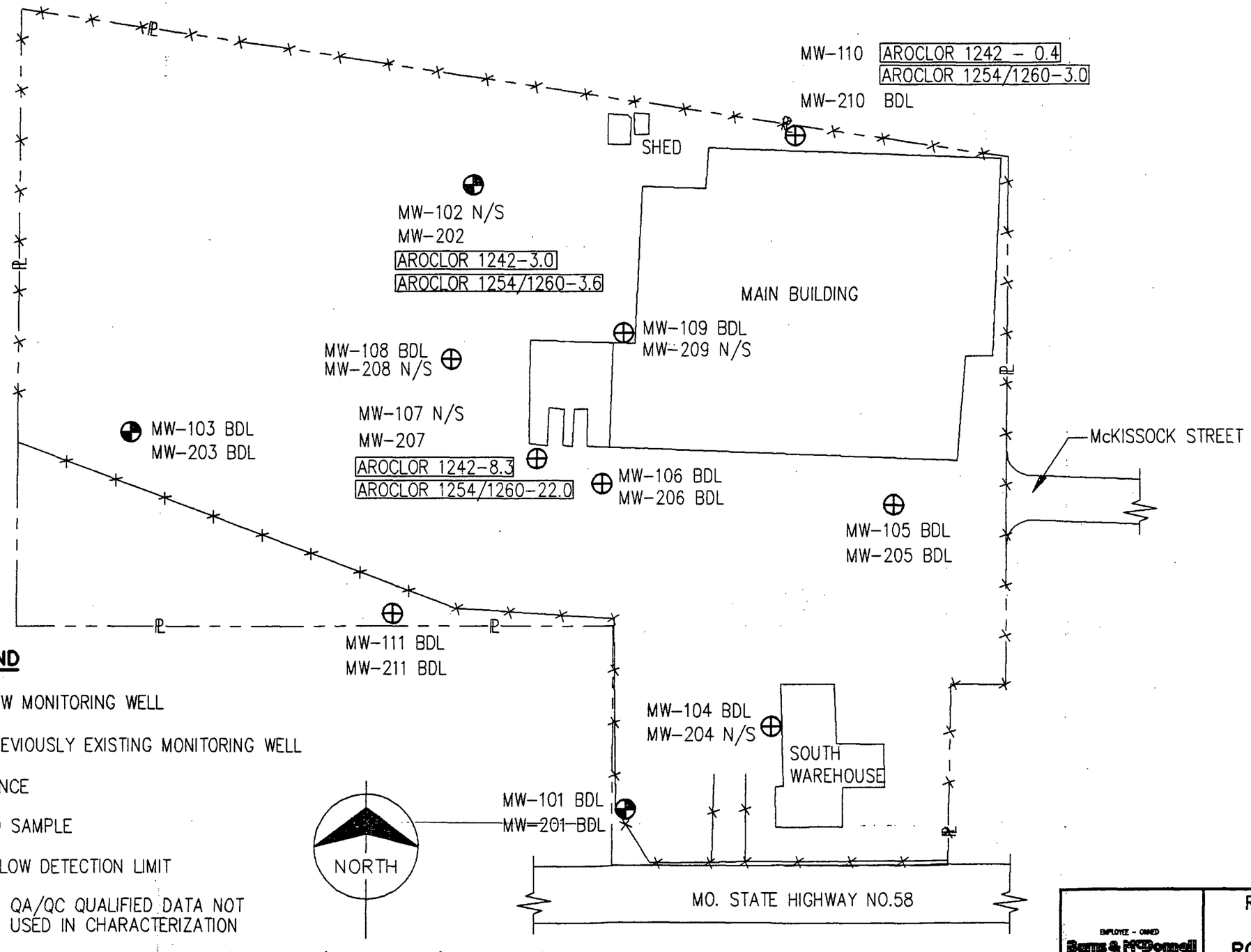
- ⊕ NEW MONITORING WELL
- ◐ EXISTING MONITORING WELL
- —×— FENCE
- BDL BELOW DETECTION LIMITS
- N/S NO SAMPLE

NOTE:
ALL RESULTS IN UG/L

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV-17
ROUND 3 FILTERED GROUNDWATER SAMPLING RESULTS – PCB'S

ROSE36 8-21-89



LEGEND

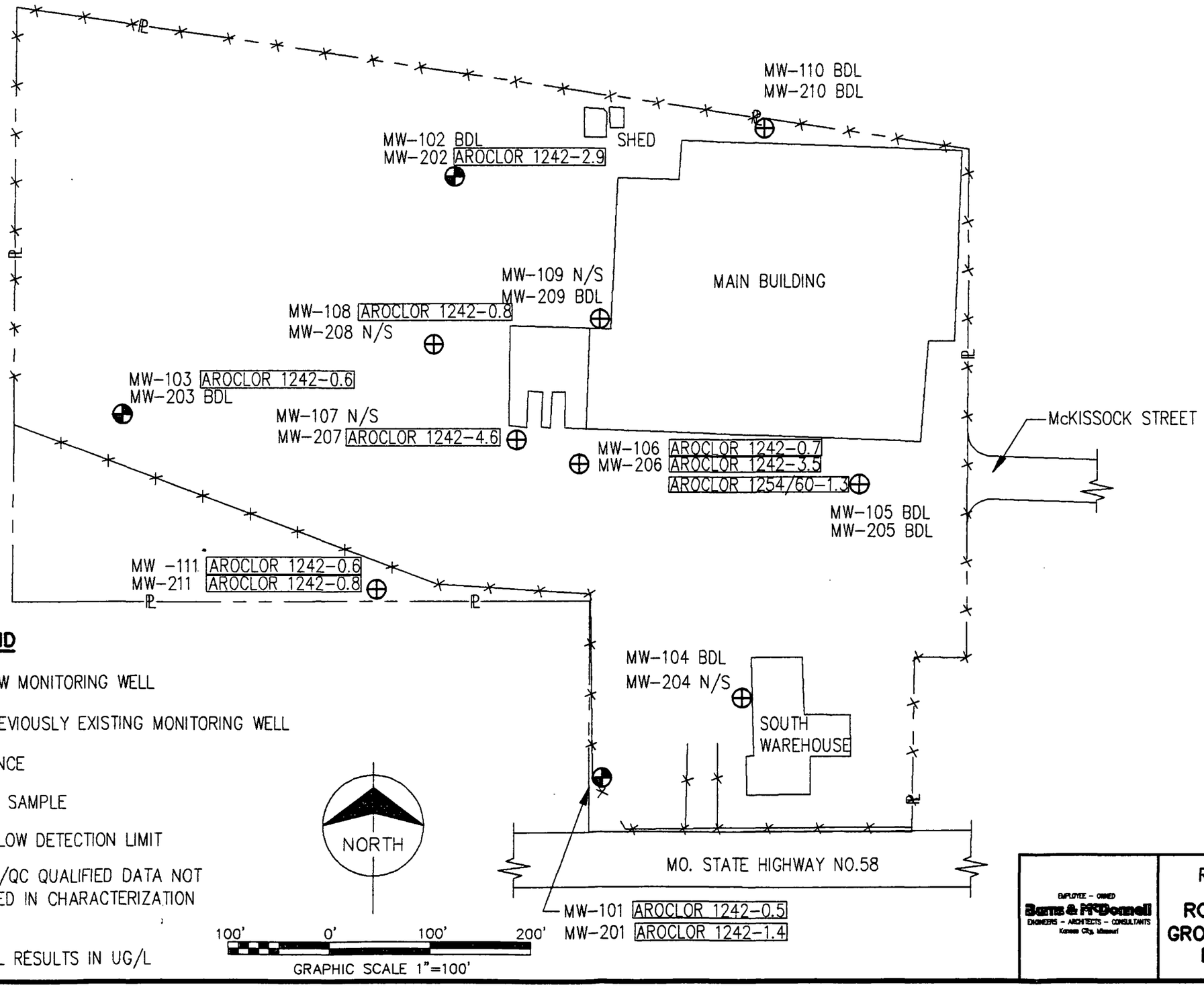
- ⊕ NEW MONITORING WELL
- ◕ PREVIOUSLY EXISTING MONITORING WELL
- —×— FENCE
- N/S NO SAMPLE
- BDL BELOW DETECTION LIMIT
- AROCLOR 1242-3.0 QA/QC QUALIFIED DATA NOT USED IN CHARACTERIZATION

NOTE: ALL RESULTS IN UG/L

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV - 18
ROUND 1 UNFILTERED GROUNDWATER SAMPLING RESULTS - PCB'S

ROSE21 8-21-89



LEGEND

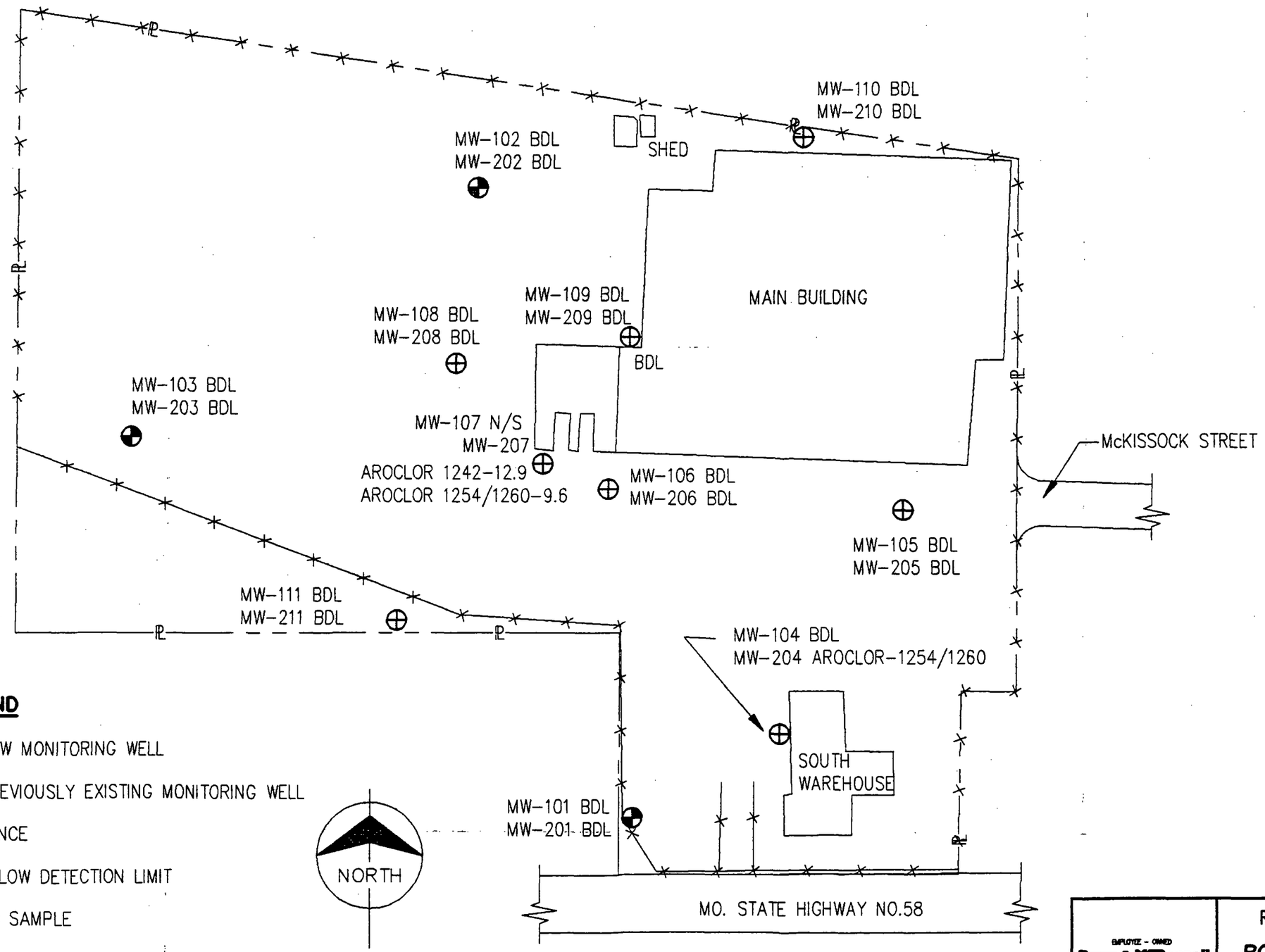
- ⊕ NEW MONITORING WELL
- ◐ PREVIOUSLY EXISTING MONITORING WELL
- —×— FENCE
- N/S NO SAMPLE
- BDL BELOW DETECTION LIMIT
- AROCLOR 1242-1 QA/QC QUALIFIED DATA NOT USED IN CHARACTERIZATION

NOTE: ALL RESULTS IN UG/L

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV - 19
ROUND 2 UNFILTERED GROUNDWATER SAMPLING RESULTS - PCB'S

ROSE22 8-21-89



LEGEND

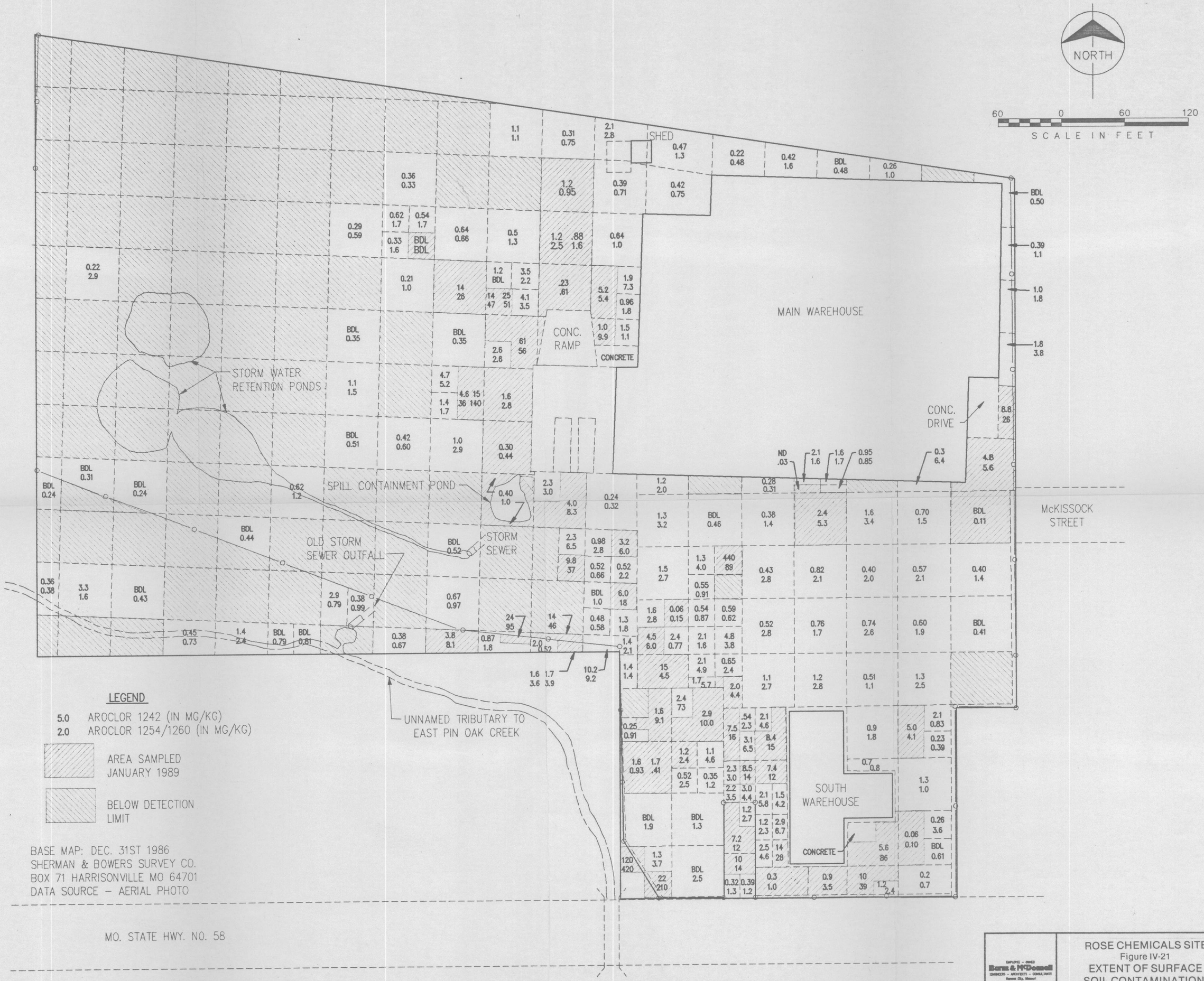
- ⊕ NEW MONITORING WELL
- ◐ PREVIOUSLY EXISTING MONITORING WELL
- —×— FENCE
- BDL BELOW DETECTION LIMIT
- N/S NO SAMPLE

NOTE: ALL RESULTS IN UG/L

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV - 20
ROUND 3 UNFILTERED GROUNDWATER SAMPLING RESULTS - PCB'S

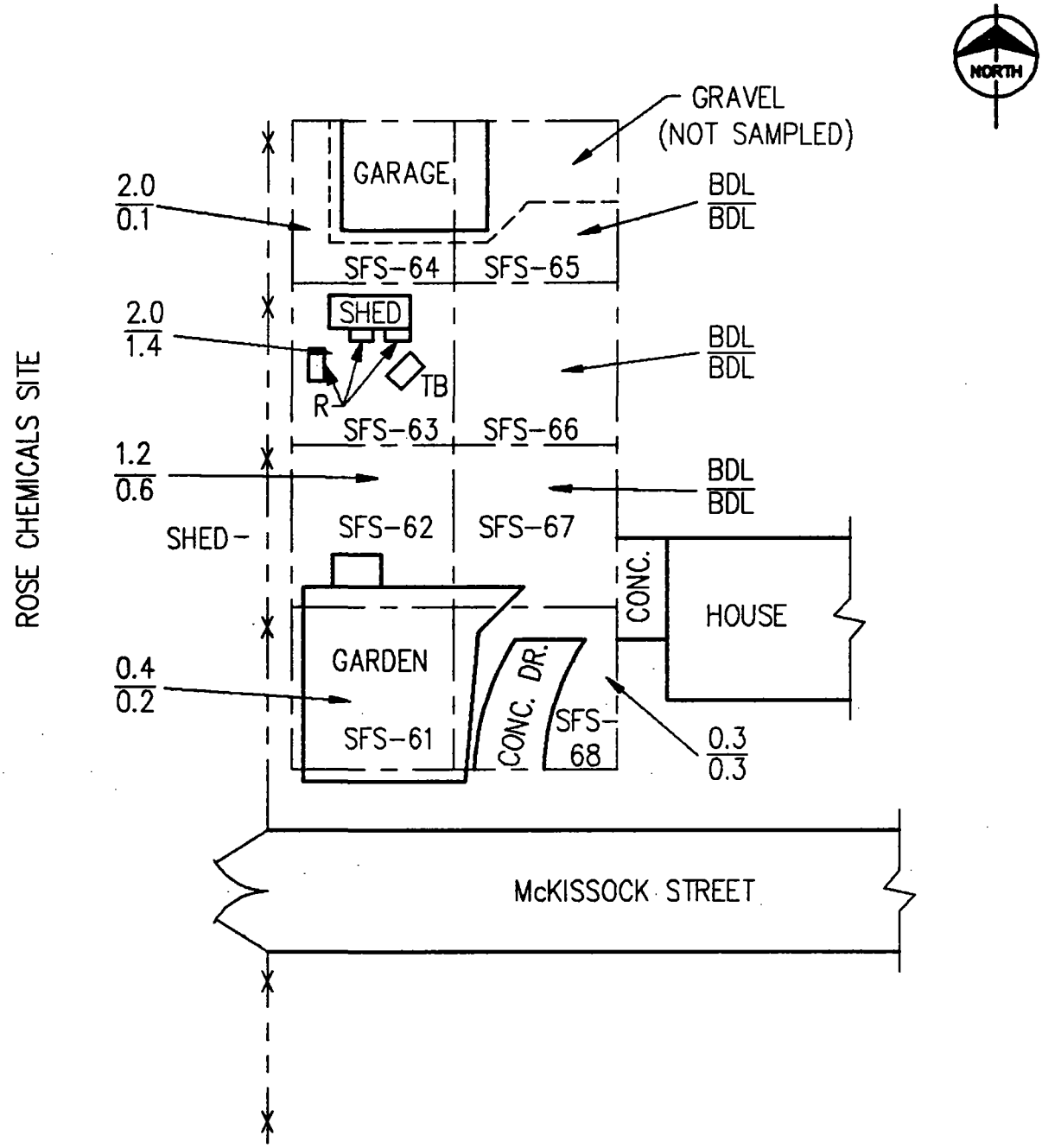
ROSE37 8-21-89



ROSE05

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
Figure IV-21
EXTENT OF SURFACE SOIL CONTAMINATION-ON-SITE



LEGEND

BDL	BELOW DETECTION LIMIT
$\frac{1.0}{2.0}$	$\frac{1242}{1254/60}$ PCB'S IN $\frac{mg}{kg}$
SFS-69	SAMPLE NUMBER
✳ —✳	FENCE
R	RABBIT HUTCHES
TB	TRUCK BED

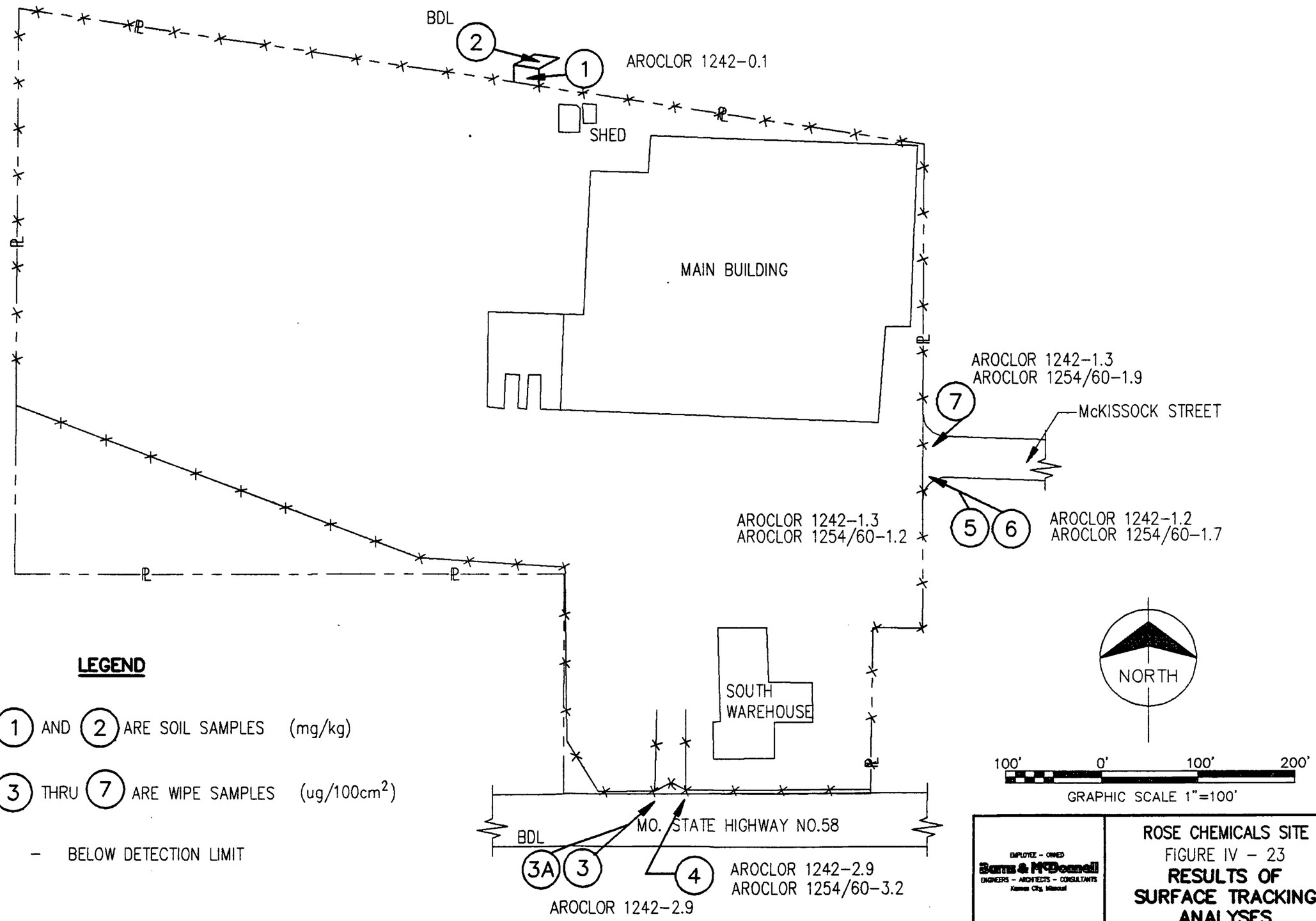
40' 0' 40' 80'

GRAPHIC SCALE 1"=40'

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV - 22
EXTENT OF SURFACE SOIL CONTAMINATION OFF-SITE

ROSE25 8-21-89



LEGEND

SAMPLES (1) AND (2) ARE SOIL SAMPLES (mg/kg)

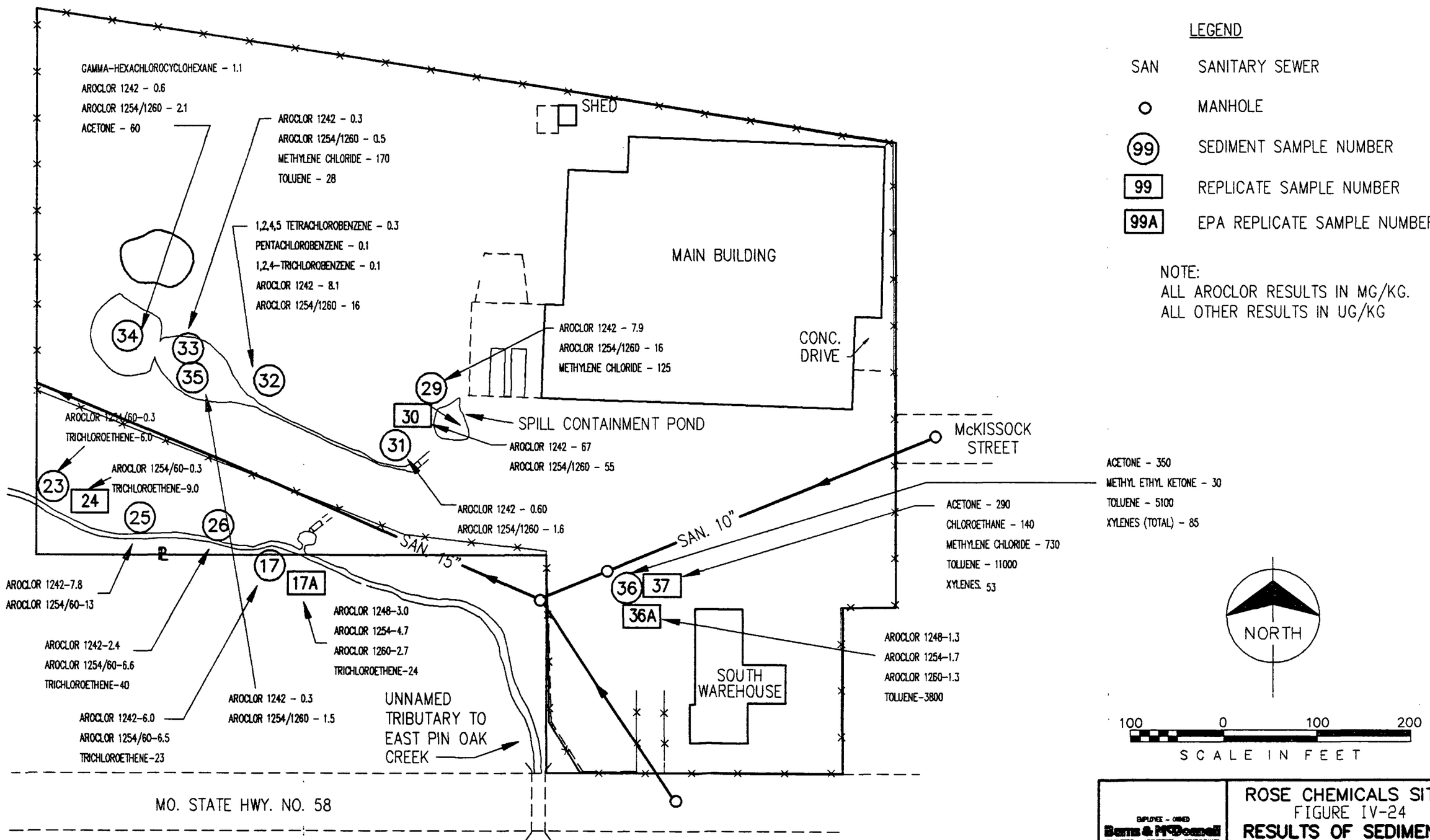
SAMPLES (3) THRU (7) ARE WIPE SAMPLES (ug/100cm^2)

BDL – BELOW DETECTION LIMIT

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS – ARCHITECTS – CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV – 23
RESULTS OF SURFACE TRACKING ANALYSES

ROSE26 8-21-89

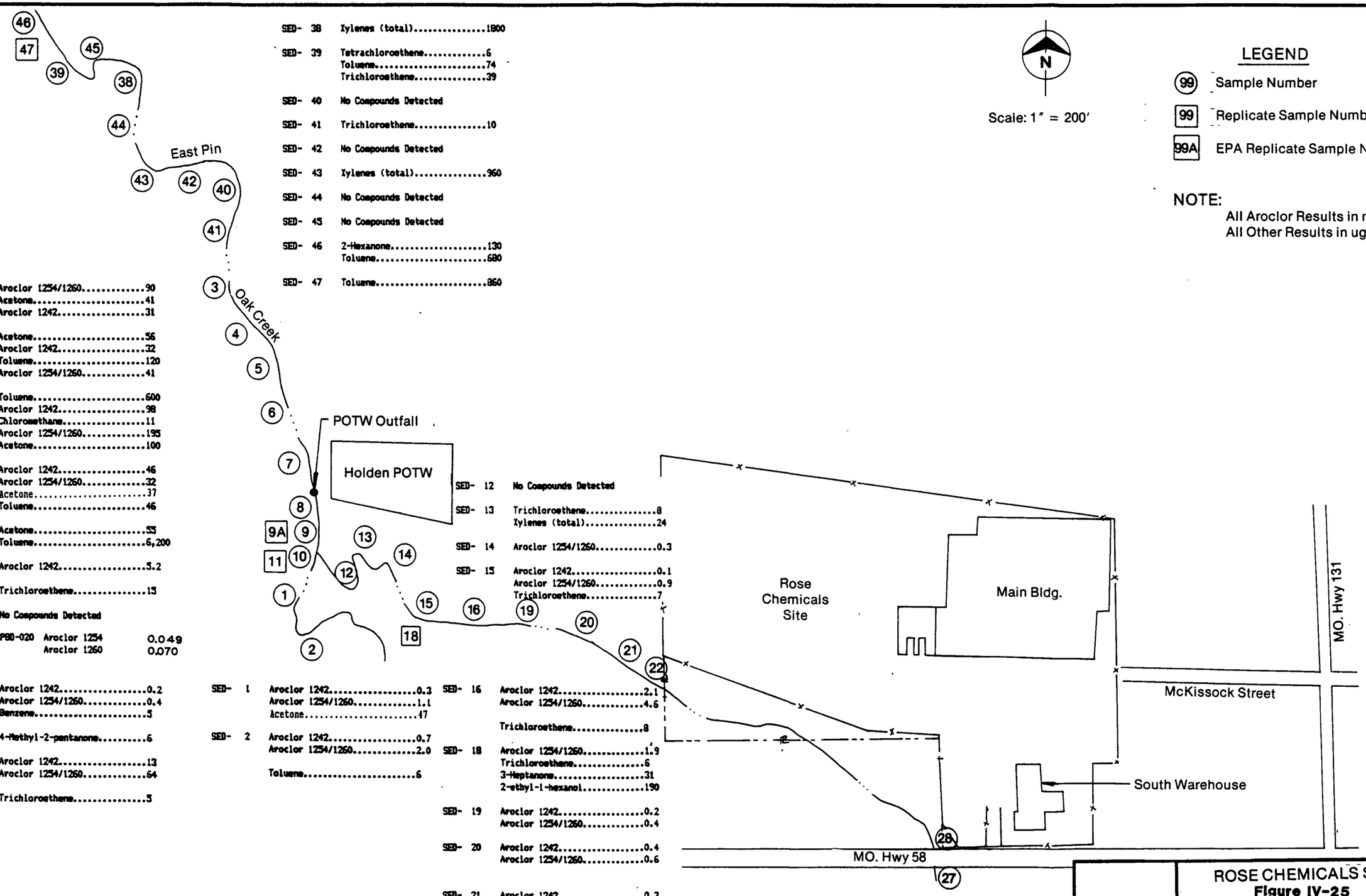


EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV-24
RESULTS OF SEDIMENT SAMPLE ANALYSES ON - SITE

8-1-89

ROSE27



SED- 3 Aroclor 1254/1260.....90
Acetone.....41
Aroclor 1242.....31

SED- 4 Acetone.....56
Aroclor 1242.....32
Toluene.....120
Aroclor 1254/1260.....41

SED- 5 Toluene.....600
Aroclor 1242.....98
Chloroethane.....11
Aroclor 1254/1260.....195
Acetone.....100

SED- 6 Aroclor 1242.....46
Aroclor 1254/1260.....32
Acetone.....37
Toluene.....46

SED- 7 Acetone.....53
Toluene.....6,200

SED- 8 Aroclor 1242.....5.2

Trichloroethene.....13

SED- 9 No Compounds Detected

SED-9A N3P80-020 Aroclor 1254 0.049
Aroclor 1260 0.070

SED- 10 Aroclor 1242.....0.2
Aroclor 1254/1260.....0.4
Benzene.....5

4-Methyl-2-pentanone.....6

SED- 11 Aroclor 1242.....13
Aroclor 1254/1260.....64

Trichloroethene.....5

SED- 1 Aroclor 1242.....0.3
Aroclor 1254/1260.....1.1
Acetone.....47

SED- 2 Aroclor 1242.....0.7
Aroclor 1254/1260.....2.0

Toluene.....6

SED- 38 Xylenes (total).....1800

SED- 39 Tetrachloroethene.....6
Toluene.....74
Trichloroethene.....39

SED- 40 No Compounds Detected

SED- 41 Trichloroethene.....10

SED- 42 No Compounds Detected

SED- 43 Xylenes (total).....960

SED- 44 No Compounds Detected

SED- 45 No Compounds Detected

SED- 46 2-Hexanone.....130
Toluene.....680

SED- 47 Toluene.....860

SED- 12 No Compounds Detected

SED- 13 Trichloroethene.....8
Xylenes (total).....24

SED- 14 Aroclor 1254/1260.....0.3

SED- 15 Aroclor 1242.....0.1
Aroclor 1254/1260.....0.9
Trichloroethene.....7

SED- 16 Aroclor 1242.....2.1
Aroclor 1254/1260.....4.6

Trichloroethene.....8

SED- 18 Aroclor 1254/1260.....1.9
Trichloroethene.....6
3-Heptanone.....31
2-ethyl-1-hexanol.....190

SED- 19 Aroclor 1242.....0.2
Aroclor 1254/1260.....0.4

SED- 20 Aroclor 1242.....0.4
Aroclor 1254/1260.....0.6

SED- 21 Aroclor 1242.....0.3
Aroclor 1254/1260.....0.6

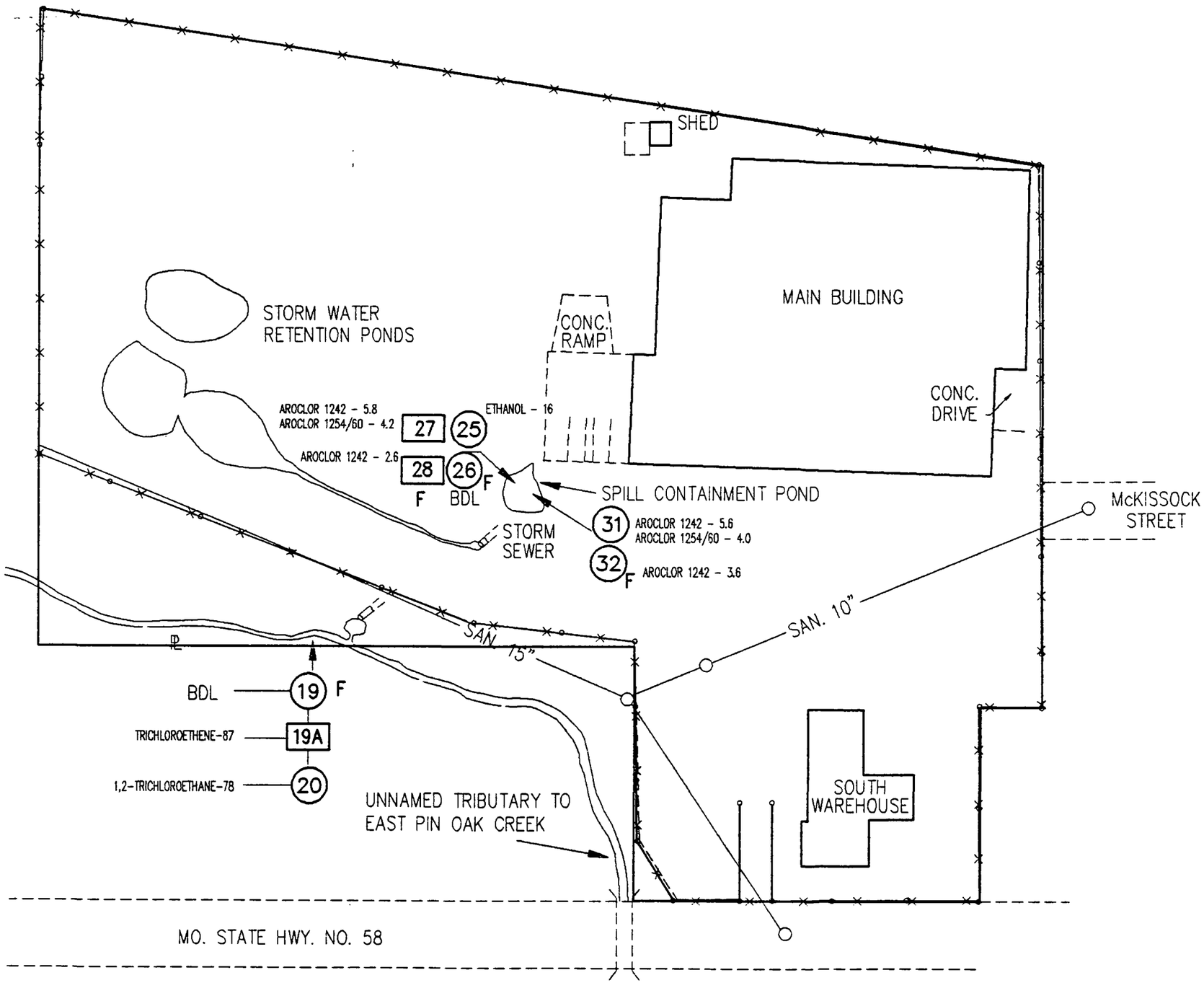
SED- 22 Aroclor 1242.....0.3
Aroclor 1254/1260.....0.7

SED- 27 Trichloroethene.....53

SED- 28 Methylene chloride.....110

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City Missouri

ROSE CHEMICALS SITE
Figure IV-25
RESULTS OF SEDIMENT SAMPLE ANALYSES
OFF-SITE



LEGEND

(00)	SURFACE WATER SAMPLE NUMBER
F	FILTERED SAMPLE
[00]	REPLICATE SAMPLE NUMBER
[00A]	EPA REPLICATE SAMPLE NUMBER
BDL	BELOW DETECTION LIMIT

NOTE:
ALL CONCENTRATIONS IN UG/L

NORTH

100 0 100 200
SCALE IN FEET

EMPLOYEE - OWNED
Burns & McDonnell
ENGINEERS - ARCHITECTS - CONSULTANTS
Kansas City, Missouri

ROSE CHEMICALS SITE
FIGURE IV-26

RESULTS OF SURFACE WATER SAMPLE ANALYSES ON-SITE

ROSE29 1-25-90