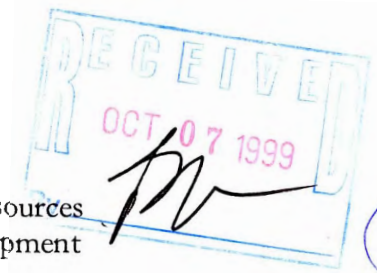
ENTACT
environmental tactics in waste management



September 21, 1999

Mr. Jim Schmidt
Wisconsin Department of Natural Resources
Bureau for Remediation and Redevelopment
Southeast District Annex
4041 North Richards Street
P.O. Box 12436
Milwaukee, Wisconsin 53212-0436

BRTS# 02-41-150484
FID# 241233740

RE: Johnson Controls, Inc. - Badger Facility
Interim Action Design Report

Dear Mr. Schmidt:

On June 13, 1997, Johnson Controls received correspondence from the Wisconsin Department of Natural Resources regarding impacts of volatile organic compounds (VOCs) at the above referenced Site. This correspondence instructed Johnson Controls to proceed with activities necessary to define and address soils and groundwater that have been impacted with VOCs. Since 1995, Johnson Controls has been undertaking activities to define and address the impacts resulting from the release of the substances. In addition, Johnson Controls has also been working with the City of Milwaukee to determine the best redevelopment scenario for the property. Toward that end, the former building was razed during the fall of 1998 and substantial preliminary investigative work has occurred.

Johnson Controls will be undertaking an interim action as defined in NR 708 to remove and treat impacted media above the groundwater table. Impacted soils will be treated by indirect heat volatilization, which will utilize steam injection to remove VOCs from subsurface soils. This work is being conducted to reduce impacts to the environment and to allow grading and hydroseeding of the property, which will make it more compatible with the landscaping of the surrounding neighborhood while the investigation is completed and final decisions are made about the disposition of the Site.

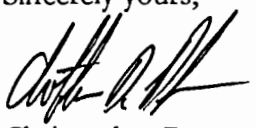
Enclosed for your records is an Interim Action Design Report which includes the relevant information required in NR 724.09, 724.11 and 724.13. ENTACT, on behalf of Johnson Controls, will be performing the interim action during the next two months. This interim action will be implemented with the goal of reducing the contaminant mass in the unsaturated subsurface to support a natural attenuation remedy for groundwater.

Chicago Office
1360 North Wood Dale Road, Suite A • Wood Dale, IL 60191 • 630.616.2100 • Fax 630.616.9203
Chicago • Dallas • Indianapolis

The site information is as follows:

Property Location:	SW 1/4, Section 9, T7N, R22E 3238 North Bremen Street Milwaukee, Wisconsin 53212
Current Property Owner:	Johnson Controls, Inc. 5757 Green Bay Road Milwaukee, Wisconsin 53201-0591
Property Owner Contact:	Mr. Ted Jankowski Johnson Controls, Inc. 5757 Green Bay Road Milwaukee, Wisconsin 53201-0591 Phone: 414.228.2444
Consultant:	ENTACT, Inc. 1360 North Wood Dale Road Suite A Wood Dale, IL 60191
Consultant Contact:	Mr. Christopher Preston Phone: 630.616.2100

Sincerely yours,



Christopher Preston
ENTACT

cc: Mr. Ted Jankowski, Johnson Controls
Mr. Dennis Reis, Quarles & Brady
Ms. Rachel Schneider, Quarles & Brady
Mr. Patrick Dunne, ENTACT
file

INTERIM
REMEDIAL ACTION DESIGN REPORT

for the
Johnson Controls, Inc. Badger Facility
3238 N. Bremen St.
Milwaukee, WI

Prepared for:

JOHNSON CONTROLS

JOHNSON CONTROLS, INC.
MILWAUKEE, WISCONSIN

Prepared by:

ENTACT, INC.
1360 N. WOOD DALE ROAD, SUITE A
WOOD DALE, ILLINOIS 60191

September 21, 1999

INTERIM REMEDIAL ACTION DESIGN REPORT

Johnson Controls, Inc.
3238 N. Bremen St., Milwaukee, WI
WDNR Facility ID: 241233740

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1.0 INTRODUCTION

This Interim Remedial Action Design Report is being submitted to fulfill the State of Wisconsin's Department of Natural Resources reporting requirements under NR724.05 (complex site) and NR724.11-13. The report details the design of an interim remedial action for the removal of source area soils at the former Johnson Controls, Incorporated (JCI), Badger Facility (Wisconsin Facility Identification Number 241233740) in Milwaukee, Wisconsin.

1.1 SITE LOCATION AND DESCRIPTION (NR724.09(1)(2))

The JCI Badger Facility property is located at 3238 North Bremen Street in Milwaukee, Wisconsin. The parcel is located in the southwest quarter of Section 9, Township 7 North, Range 22 East of Milwaukee County. The Site is bordered on the west by North Bremen Street, on the east by North Weil Street, on the north by Concordia Avenue, and on the south by a public alley that is directly north of Auer Avenue. The dimensions of the Site are approximately 475 feet by 280 feet, resulting in an area of 2.8 acres. The area surrounding the property is predominantly single and two-family residential properties. A small commercial property is located northeast of the site at the intersection of Concordia Avenue and North Weil Street. The location of the Site is shown in Figure 1.

The general layout of the Site is illustrated in Figure 2. The eastern half of the site contains an asphalt-surfaced parking area. The parking area is bordered by a security fence on the north, south and east sides and by the facility building on the west side. A propane above ground storage system consisting of four tanks and propane dispenser were located in the central portion of the parking lot. An underground storage tank (UST) system was previously located outside of the southeast corner of the facility building and was used to store heating oil for the facility boiler (Triad, June 1995). The UST was removed sometime during the mid to late 1980s.

The single one-story building that formerly occupied the western portion of the site was originally constructed in 1916, based upon information provided by Ogden Real Estate Company. The building was a masonry structure occupying an area of approximately 69,000 square feet. The building roof consisted of a series of triangular trusses aligned in a north-south direction. The clear ceiling height from the building floor to the bottom of the roof framing was approximately 12 feet.

A 60 foot by 40 foot partial basement was located in the southeast corner of the building. The basement once housed the facility's steam boiler, water tank, electrical transformer and switch gear. A rooftop structure containing two oil-filled transformers was also located in the southeast corner of the building. The structure originally housed the facility's electrical service prior to the placement of the service in the basement.

Four two-foot-diameter sumps and two shallow collection trenches were present in the central and north portions of the building. A former chemical storage room and associated sump are located in the southwest corner of the building and two sumps are contained in the partial basement.

A loading dock area was located in the northeast corner of the building. The area contained two loading dock bays equipped with a mechanical dock leveler, overhead sectional door, exterior loading dock shelter and truck dock bumpers.

1.2 SITE OPERATIONAL HISTORY (NR724.09(1)(2))

The property has been owned and/or operated by JCI or Globe Union, Inc. (a subsidiary of JCI) since approximately 1910. The Site has been utilized for storage and light manufacturing since the early 1900s. The property was operated by Badger Carton Company, a box manufacturer, for at least four years form 1940 to 1944. Globe Union, Inc., manufactured electrical radio components at the facility from 1944 to the mid-1970s. The property was subsequently used to manufacture expander produced from barium sulfate, activated carbon and filler materials until the mid-1980s. (RMT, December 1995). Following cessation of operations, the facility was used as a warehouse.

1.3 PREVIOUS INTERIM ACTION ACTIVITIES (NR724.09(1)(2))

In September of 1998, JCI retained ENTACT to perform activities that would prepare the property for non-industrial (residential or recreational) redevelopment. Activities would be performed in a phased approach, starting with the demolition of the Site structure.

Pre-demolition activities included the performance of an asbestos survey to identify asbestos containing materials (ACM), sampling the two oil-filled transformers in the rooftop structure for polychlorinated biphenyls (PCBs), surveying the fluorescent light ballasts to determine if they were PCB-containing and the disconnection of all utilities to the building.

The results of the asbestos survey indicated the presence of ACM in steam pipe insulation, office floor tiles and the insulating jacket of the basement boiler. An asbestos abatement was performed during October 19 to October 23, 1998. All ACM was bagged and disposed of at the Emerald Park Landfill in Muskego, Wisconsin.

Samples of transformer oil were collected from the two oil-filled transformers located in the rooftop structure. Analytical results indicated that the transformers contained PCBs at concentrations of 28 mg/Kg and 36 mg/Kg, which is less than the Toxic Substance Control Act (TSCA) criteria of 50 mg/Kg. The transformer oil and empty transformers were handled and disposed of as non-regulated special waste. Approximately 150 gallons of transformer oil was drained, containerized in DOT-approved, 55-gallon drums and disposed of by Superior Special Services, Inc. of Fond du Lac, Wisconsin. The empty transformer casings were wrapped in visqueen and disposed of by Superior Special Services.

A survey of fluorescent light ballasts was conducted to determine if PCB-containing ballasts were present. Several PCB-containing ballasts were found, prompting a complete removal of all fluorescent light ballasts. Ballasts were sorted and drummed into two separate waste streams: PCB-containing and non PCB-containing. Ballasts that contained PCBs were collected and disposed of by Superior Special Services.

Following completion of abatement activities and the disconnection of utilities, demolition of the structure began. Work areas were misted with water throughout demolition activities to control fugitive dust emissions. Demolition debris was segregated into three separate waste streams for disposal. Ferrous and non-ferrous metals (including the basement boiler) were transported to various recycling facilities around the Milwaukee area. Exterior masonry and brick was transported to a Milwaukee recycling firm for crushing and reuse, while the roofing material and wood structures were disposed of as construction and demolition debris at the Emerald Park Landfill in

Muskego, Wisconsin.

Demolition activities resulted in the facility structures being razed to a concrete slab on grade, with the exception of a small roofed, 10 foot by 10 foot interior structure that is currently being utilized for secure storage. All equipment was removed from the basement of the structure and the resulting void was filled with brick from the exterior walls of the facility, mitigating any potential physical hazard. At the completion of demolition activities, a chain link fence was installed in areas around the slab and connected to the existing fence, preventing access by unauthorized persons.

1.4 REMEDIAL ACTION OBJECTIVES

The interim remedial action was designed to meet the following objectives:

- Excavate subsurface soils in the unsaturated zone that are impacted with VOCs in exceedence of the WDNR COMM 46 standards for petroleum hydrocarbons and direct contact criteria for PCE and TCE (1.2 mg/Kg and 5.8 mg/Kg, respectively);
- Treatment of excavated, contaminated soils to WDNR COMM 46 and direct contact standards by indirect heat volatilization (steam injection);
- Support a natural attenuation remedy for groundwater by reducing contaminant mass in the unsaturated subsurface;
- Removal of the concrete slab and asphalt parking lot, regrading and hydroseeding of the property to make it more compatible with the surrounding neighborhood;
- Minimize current and future impacts to the air, lands and waters of the state; and,
- Be protective of public health, safety, welfare and the environment.

The purpose of this interim action is the removal of impacted source area soils present above the groundwater table at the site. The remedial action objectives for this interim action will focus solely on the effective remediation of VOC impacted soils at the former facility.

2.0 APPLICABLE REGULATIONS AND STANDARDS (NR724.09(7))

Applicable or relevant and appropriate regulatory requirements (ARARS) are summarized in Table 1. ARARS have been subdivided into three categories: chemical-specific, location-specific and action-specific. Chemical-specific ARARs define acceptable exposure levels and are used in establishing soil cleanup goals. Location-specific ARARs set restrictions on activities within sensitive locations such as wetlands or floodplains, or in the case of this Site, urban areas, where regulations governing general aesthetic impacts (such as noise, traffic disruption, increased truck traffic, etc.) as a result of the remedial activity, may be applicable or appropriate. Action-specific ARARs set controls or restrictions for particular treatment and disposal activities related to the management of hazardous wastes.

Based on the future anticipated land use of the Site, Residential Direct Contact goals for the contaminants of potential concern in the Site soils will be used as the interim remedial action cleanup goals for the site soils. The direct contact cleanup criteria that will be utilized during the interim action are as follows:

Soil Cleanup Criteria
Residential Direct Contact Scenario

Compound	Direct Contact Criteria (mg/Kg)
Benzene	1.1[1]
1,2-Dichlororethane (1,2-DCA)	0.54[1]
Ethylbenzene	400[1]
Toluene	670[1]
Xylenes	470[1]
Tetrachloroethene (PCE)	1.2[2]
Trichloroethene (TCE)	5.8[2]
Cis-1,2-Dichloroethene (Cis-1,2-DCE)	42[3]
Vinyl Chloride	0.034[2]
1,1-Dichloroethane (1,1-DCA)	570[3]

Footnotes:
[1] Represents values published in COMM 46, May, 1999
[2] Calculated by Montgomery Watson using WDNR default assumptions
[3] Region IX EPA default values

These criteria will be used to define the lateral and vertical extent of soil impacts during the interim remedial action, and to determine if the excavated soils have been effectively remediated after on-site treatment.

3.0 REMEDIAL ACTION DESIGN (NR724.09(3))

3.1 PERMITTING AND SITE PREPARATION (NR724.09(6))

3.1.1 Health And Safety

Mobilization to the Badger facility will begin with the implementation of a site specific Health and Safety Plan (HASP). The HASP details site activities, hazards associated with each task, required levels of personnel protective equipment (PPE) and associated action levels, emergency procedures, and personnel roles. All project personnel and any visitors will be required to read, understand and sign the manual prior to any admittance to the work areas.

Breathing Zone and perimeter air monitoring will be performed using personal air sampling pumps at regular intervals throughout the interim remedial action to monitor any potential exposure to fumes emanating from interim action activities. The personal air monitors will be equipped with sorbent sampling tubes (Anasorb CSC charcoal) to analyze for the presence of PCE, TCE, xylene and toluene.

All on-site personnel will be properly trained for working with Hazardous Materials to a minimum of the requirements set forth by OSHA in 29 CFR 1910.120. Key personnel will also have additional training which may include Hazardous Material Site Supervisor (29 CFR 1910.120), Confined Space Entry (29 CFR 1910.120), First Aid, CPR and Excavation Safety (Competent Person). Crews will consist of a Project Manager, technicians and heavy equipment operators.

3.1.2 Site Preparation

A mobile field office trailer containing the necessary administrative support equipment including computer, facsimile and telephone equipment will be set up in place for project reporting and communication purposes. An eight foot high chain link fence runs along the entire of perimeter of the Site. This fence will be periodically inspected and repaired as needed to prevent unauthorized access to the work areas.

Exclusion zones will be established and demarcated with appropriate signs, fencing, and barriers. A Contamination Reduction Zone was constructed to allow proper decontamination of personnel and equipment entering and exiting the exclusion zone.

Equipment to be utilized may consist of an excavator, front end loader, bobcat, compactor, concrete breaker and engineering controls such as misters for dust suppression and decontamination. Additional equipment will include the necessary air monitoring devices. Equipment chosen for the project will be sized appropriately to facilitate excavation to the required depth.

3.1.3 Water Discharge Permitting

The basement located in the southeast corner of the former building was backfilled with debris during the demolition phase of the project to prevent any potential accidents. One of the activities that will be conducted as part of this interim action will be the removal of the demolition debris from the basement. In addition to the debris, approximately 70,000 gallons of water resulting from

rain events and snow melt will need to be managed.

In preparation for water discharge, Notice of Intent 99.0034 was submitted to the Milwaukee Metropolitan Sewerage District (MMSD) for a one time discharge of water to the treatment facility. The MMSD approved the discharge on September 2, 1999, pending permission from the City of Milwaukee to discharge to a combined sewer manhole. Approval to discharge was obtained from the City of Milwaukee on September 9, 1999.

3.1.4 Air Emissions Permitting

The treatment technology that will be employed during the interim action is called the Indirect Heat Volatilization / Steam Injection System. This treatment system is a totally enclosed loop technology with no single point source of air emissions. Based upon discussions with representatives from the Southeastern District Air Quality Section this technology does not require an air permit, merely a notification that treatment will be conducted. WDNR Form 4500-168, Notification to Treat or Dispose of Petroleum Contaminated Soil & Water has been completed and submitted to the Southeast District Air Quality Group.

3.1.5 Utility Clearances

All utilities servicing the former facility (gas, electric, telephone and water) were disconnected prior to demolition activities during the fall of 1998. The only remaining utility was the former parking lot security lights, which were disconnected and in early September.

3.2 SUBSURFACE SOURCE REMOVAL

The interim remedial action calls for the removal of impacted soils present beneath the former facility foundation and adjoining asphalt pavement. The foundation/pavement and underlying impacted soils will be removed in accordance with the following Sections.

3.2.1 Hard Surface Removal

The existing concrete slab and asphalt parking lot will be removed as part of the interim action. All concrete footings, including the basement walls, will be removed to a depth of at least three (3) feet below ground surface (bgs). All asphalt and concrete will be transported to a local crusher for recycling.

3.2.2 Impacted Unsaturated Zone Soils (NR724.09(4))

Unsaturated zone soils impacted with VOCs will be excavated and treated as part of the interim response. The results of preliminary subsurface investigations (as described in Montgomery Watson, August 23, 1999) have determined that subsurface soils have been impacted by aromatic and chlorinated hydrocarbons. The lateral and vertical extent of VOC impacts has been determined in two areas: the former chemical storage area in the southwest corner of the site and the central one-third of the former building. The identified VOC contaminants of potential concern are toluene, ethylbenzene, xylene, PCE and TCE.

The cleanup criteria for VOCs that will be utilized during the interim action are direct contact

values for residential soils. Wisconsin has published residual contaminant levels (RCLs) for petroleum hydrocarbons in the form of COMM 46, while direct contact criteria for chlorinated solvents have been calculated by Montgomery Watson using WDNR default assumptions (Montgomery Watson, August 30, 1999). These action levels were previously identified in Section 2.0.

Lateral Extent

The lateral extent of impacted soils within the unsaturated zone has been generally determined in the investigative work done to date. The main areas of impact are within the southwest corner of the site, near the former chemical storage area, and the central portion of the former building. The approximate amount of surface area impacted in the former chemical storage room and central building area are 8,500 square feet and 18,000 square feet, respectively. These areas will be used as a general guide for excavation during the implementation of the interim action, however, the areal and vertical extent of excavation during the interim action will be guided by a combination of photo-ionization detector (PID) and sidewall/bottom verification sampling. Figure 3 shows the approximate areal extent of unsaturated zone impacts.

Vertical Extent

Subsurface source area soils containing VOC concentrations above the direct contact cleanup criteria will be excavated to its vertical extent within the unsaturated zone. Preliminary Site investigation data collected prior to the interim action initially will be used to generally define the vertical extent of soil excavation above the water table; a PID will be used during the excavation of source area soils to guide excavation activities.

The depth to groundwater across the site is currently being determined by Montgomery Watson, as described in their August 23, 1999, Supplemental Investigation Workplan. Preliminary results indicate the depth to groundwater varies from 4 to 8 feet bgs across the impacted areas of the site. An additional two to three feet will be added to these depths to approximate the seasonal low water table in the area of the site. This will result in excavation depths, if necessary, between 7 and 10 feet bgs.

3.2.3 Verification Sampling (NR724.09(8))

Unsaturated soil zone samples will be collected throughout the on-site excavation of the source area soils to: 1) define the lateral and vertical extent of impacts and 2), ensure that the interim action has removed on-site source area soils exhibiting VOC concentrations above direct contact criteria. Verification sampling will be performed along the excavation sidewalls to confirm the lateral extent of contamination, and on the excavated floor to define the vertical extent of contamination above the water table. The interim action verification sampling strategy for the sidewalls and floor of the areas to be excavated are discussed below.

Lateral Extent Verification Sampling Methodology

Soil samples will be collected from the sidewalls of all excavated areas to verify that interim action excavation activities have removed the lateral extent of unsaturated source area soils exhibiting VOC contaminant concentrations above direct contact criteria. Preliminary PID head space

screening will be performed to guide the lateral extent of excavation. The preliminary PID screening samples will be collected at a frequency of no less than one sidewall head space per ten linear feet of side wall excavated. As source area soils are removed vertically during excavation, the sidewall will be resampled at depth approximately every two vertical feet of excavation. Once preliminary field screening has defined the approximate lateral and vertical sidewall extent of impacts in each area of excavation, a fixed lab verification sample will be collected from the vertical interval of the sidewall exhibiting the highest PID reading. Fixed lab verification samples will be collected at a rate of no less than one per twenty lineal feet of excavation perimeter to ensure that the lateral extent of impacts has been defined. Sidewall samples will be collected in accordance with NR 700.13 sample preservation and analysis requirements and submitted to the off-site laboratory for analysis of VOCs using SW-846 Method 8260.

Vertical Extent Verification Sampling Methodology

Soil samples will be collected from the floor of all excavated areas to verify that interim action excavation activities have removed the vertical extent of unsaturated source area soils exhibiting VOC contaminant concentrations above direct contact criteria. For areas excavated to elevations above the water table, the excavation floor will be subdivided into approximately 50 foot by 50 foot grid areas. Each grid area will be quartered, and a grab sample will be collected from each quadrant for PID head space analysis. The quadrant sample exhibiting the highest PID head space reading will be resampled in accordance with NR 700.13 sample preservation and analysis requirements and submitted to the off-site laboratory for analysis of VOCs using SW-846 Method 8260. For areas excavated to the water table, no verification samples will be collected.

3.3 INDIRECT HEAT VOLATIZATION/STEAM INJECTION

3.3.1 System Design (NR724.09(3))

The remedial technology that will be employed during the interim action is called Indirect Heat Volatilization / Steam Injection (IHV). The system operates on the combined principles of soil vapor extraction, steam stripping, soil flushing and thermal desorption. The treatment system mounted on four tractor-trailers and is fully contained and mobile. Two of the tractor-trailers contain the soil processor tanks and heat exchangers, while the remaining trailers each house a diesel fired, steam boiler and generator.

The IHV unit contains four soil processor tanks that hold approximately 16 cubic yards of soil. Contaminated soil is loaded into the treatment system and the tanks are sealed shut. Once loaded into the processor tanks the soil mass is subjected to a high-pressure, steam flushing process, which fractures the soil and creates a loose matrix. Volatile organic compounds are removed from the soil matrix by a combination of two methods. As the steam is injected in to the soil, the ambient temperature of the soil increases over time, allowing low boiling point compounds to volatilize from the soil. The second mechanism is the removal of higher boiling compounds (≥215 degrees F) by steam stripping. The heat and pressure of the introduced steam increases the temperature of the ambient soil moisture (and contaminants) to the steam state, causing a phase change. The VOCs, now in the gaseous phase, are drawn through the porous floors and false walls of the processor tanks. The steam and gaseous phase contaminants are then passed through a primary and secondary heat exchanger, where they are condensed back into the liquid phase.

The resultant VOC-containing water is filtered for particulates, then routed to a primary collection tank, where it is stored for recycle in to the system. Water from the storage tank is treated with liquid-phase activated carbon prior to being reintroduced to the feedwater tank and the boilers, completing a closed loop system.

Any VOCs that may remain in the air stream (< 1 cfm) following condensation are passed through twin vapor-phase carbon canisters, operated in series. A photo-ionization detector is placed in-line between the carbon canisters to monitor for any potential breakthrough. The system is operated in a "closed-loop" fashion, ensuring a virtually VOC free emission process. Due to this nature of operation, the system does not require an air permit to operate, unlike other thermal forms of treatment. A general schematic of the treatment process is shown in Figure 4.

3.4 RESTORATION

Restoration of the areas of excavated source area soils will be performed incrementally following the excavation and verification sampling of each subsection of the source areas. This will be done to minimize the size and time that any significant open excavation is present at the Site. Restoration of the excavation areas will be accomplished by backfilling, compacting and grading each excavation area. Backfill material will consist of clean soil fill from an off-site source, and soils treated on-site to levels treated below direct contact criteria.

3.4.1 Verification Sampling Of Treated Material (NR724.09(8))

Soils treated on-site will be used as backfill material in the excavation areas. All treated soils will be sampled at a sampling frequency of 1 sample per 64 cubic yards of treated soils to ensure that the mass of the contaminants of concern has been sufficiently reduced to yield soil concentrations below direct contact criteria. Treated soil samples will be collected in accordance with NR 700.13 sample preservation and analysis requirements and submitted to the off-site laboratory for analysis of VOCs using SW-846 Method 8260.

3.4.2 Backfilling

Backfill material will consist of clean soil fill from an off-site source, and soils treated on-site. Off-site soils will be used as backfill to fill excavation areas to an elevation no less than three feet above the high water table level as determined by Montgomery Watson. The remaining portion of the excavation will be backfilled with soils treated by the on-site IHV system.

3.4.3 Compaction And Grading

Fill material will be compacted using site equipment as it is placed in excavation areas. After completion of excavation and backfilling activities the Site surface will be regraded and hydroseeded.

4.0 QUALITY ASSURANCE/QUALITY CONTROL (NR724.09(8))

Sampling, analysis, and data management during the interim remedial action at the Site will be performed in accordance with Quality Assurance Project Plan (QAPP) objectives and procedures described in this Section. Quality Assurance and Quality Control guidelines to be employed for sample collection and data management during the interim action include the following:

- Data Quality Objectives
- Field Documentation
- Sampling Procedures
- Sample Tracking and Shipment
- Field Instrument Operation and Calibration
- Field Quality Assurance and Quality Control
- Laboratory Quality Assurance and Quality Control
- Data Evaluation
- Performance and System Audits
- Corrective Actions

The following Sections describe Quality Assurance and Quality Control (QA/QC) methods to be employed during the implementation of the interim action.

4.1 QUALITY ASSURANCE OBJECTIVES

The objectives of the quality assurance program are to ensure that technical data gathered during the interim action will be accurate, precise, complete, and representative of actual field conditions.

For the interim remedial action, it is necessary to gather sufficient information to verify that certain wastes were properly characterized for disposal, and that site specific metal action levels were achieved.

There will be Two levels of data quality objectives for interim remedial action. Data Quality Objective Level 1 consists of field screening using a PID. Data Quality Objective Level 2 consists of soil samples obtained for laboratory analysis.

4.2 FIELD DOCUMENTATION

In order to ensure proper sample tracking and record keeping, documentation of sample custody and analytical requests will be maintained throughout the interim remedial action. To ensure valid sampling data, procedures for sample labeling, preservation, tracking, and laboratory QA/QC methods were reviewed periodically.

The Project Manager and QA/QC Coordinator will be responsible for maintaining complete and up-to-date sample records. Sampling personnel will record pertinent sampling information (i.e., time, date, sample I.D., analysis, etc.) in a field sample journal.

4.3 SAMPLING PROCEDURES

Soils samples collected for VOC analysis will be collected using stainless steel EnCore samplers in

accordance with Manufacturer guidelines and WDNR requirements.

4.4 SAMPLE TRACKING AND SHIPMENT

The sample collection process involves certain methods of tracking and shipping each sample. Each step involved in the tracking and shipping of verification samples collected as part of the interim action are described in the following Sections.

4.4.1 Custody Procedures

Custody is one of several factors which is necessary for the admissibility of environmental data as evidence in a court of law. Custody procedures help to satisfy the two major requirements for admissibility: relevance and authenticity. Sample custody was addressed in three parts: field sample collection, laboratory analysis, and final evidence files.

Sample identification documents will be carefully prepared to maintain identification and chain-of-custody records and to control sample disposition. Components of the field documentation procedures included the use of field logbooks, sample labels, and chain-of-custody forms. Original data recorded in field logbooks, chain-of-custody records, and other forms will be written in waterproof ink. The field sampler will be personally responsible for the care and custody of the samples until they are transferred or properly dispatched.

4.4.2 Field Logbook

ENTACT will maintain daily job logs and daily work order reports during the interim action. These job logs and work order reports will summarize all site activities performed, personnel on-site, problems encountered and corrective action taken. Daily reports were prepared by the project manager or his designee in a bound book with sequentially numbered pages. ENTACT will utilize these job logs to track the project status. ENTACT also will record project activities through photographic documentation, some of which is included in this Final Report. Additional photographic documentation and a copy of the daily work order reports are maintained in the administrative file.

Field logbooks will be used by the QA/QC Coordinator to record sampling activities on a daily basis. The field logbook will be bound and will have consecutively numbered pages. Entries in the field logbook will be made in ink and will include: the name of the author; date and time of entry; location of activity; names and affiliations of personnel on site; sample collection or measurement methods; number of samples collected; daily weather report; sample identification numbers; field observation and comments; sampling depth increment for soils; field measurements; locations of photographs; and any deviations from the sampling plan. The field log book will be stored in the locked ENTACT field trailer when not in use.

4.4.3 Sample Labels

Sample labels are necessary to prevent misidentification of samples. Preprinted labels will be used to label all sample containers. Each label will contain the following information: sample location/identification, project number, date and time of sample collection, name of sampler, preservatives, and types of analyses to be performed.

4.4.4 Chain-of Custody

A Chain-of-Custody (COC) form will be completed as samples are collected to record the custody of every sample collected. A COC form will accompany every shipment of samples to the analytical laboratory in order to establish the documentation necessary to trace sample possession from the time of sample collection through sample analysis. The COC form will include:

- Project number, name and location;
- Sample identification
- Name of Project Manager, Sampler, and Recorder
- Sampling information (sampling area, depth, media type, type of sample, date and time of collection, etc.)
- Analysis to be performed
- Preservatives used, if any
- Signatures of persons involved in the COC possession, including dates

When a Chain-of-Custody form is filled out, one page of the three-part form will be retained and placed in a file at the field office. The other two parts of the form will accompany the sample to the laboratory. One of those pages will be retained by the laboratory and the other will be returned with the sample result report. Once the sample report is received, it will be cross-checked with the COC file record and both COC pages and the laboratory report were placed in a file in fireproof storage.

4.4.5 Laboratory Custody

The custody for each sample will be transferred by the signing of the COC record by the receiving laboratory sample custodian. Each contracted laboratory will maintain strict written protocols for internal sample custody. Upon receipt of samples, information on the COC shipped with the samples will be verified and recorded as to agreement or non-agreement. Labels will be checked for notation of proper preservation. If there was an apparent document non-agreement or incorrect preservation noted, the apparent problem was recorded and the Project Manager notified. Samples will also be checked for leaking or broken containers. The samples will then be marked or labeled with laboratory sample numbers and placed in appropriate storage and/or secure areas to await analysis.

4.4.6 Shipping Procedures

For shipping, all samples were stored on ice and packaged in such a manner as to prevent damage or breakage during shipment or transport. Samples which were not hand delivered to, or picked up by, the laboratory were shipped through an overnight parcel service by sampling personnel. Samples will be placed into suitable containers, labeled and sealed in such a manner that tampering with the seal would be obvious. All sample holding times will be tracked and a copy of the Chain-of-Custody form will accompany the samples in a sealed plastic bag.

4.5 MAINTENANCE AND CALIBRATION OF EQUIPMENT

Proper calibration, maintenance, and use of instruments and equipment is imperative to ensure the quality of all data collected.

Instruments and equipment used to gather, generate or measure environmental and physical testing data will be calibrated in accordance with manufacturer guidelines and with sufficient frequency to ensure that accuracy and reproducibility will be consistent with the manufacturer's specifications throughout the duration of the interim remedial action.

4.5.1 Field Instrument Calibration

All instruments and equipment used in the field will be inspected to ensure that the item meets and performs to manufacturer specifications and project specifications. Instruments will be used by a field technician trained in instrument operation.

Field instruments used during project will include several photoionization detectors with 10.2 and 11.7 eV lamps, and low-volume personal air samplers. The PIDs and air samplers will be calibrated at the start of each day.

A record of the instrument calibrations will be maintained in bound field notebooks. Information recorded included the following:

- Date of calibration
- All data pertaining to the calibration procedures
- Name of analyst performing calibration

4.5.2 Laboratory Instrument Calibration

The laboratory instruments used during analysis of samples will be calibrated according to and at the frequency indicated by the QA and QC procedures for each SW-846 testing method used and any additional manufacturer's recommendations. Records of calibration, repair, or replacement will be filed and maintained by the designated laboratory personnel performing analyses and quality control activities. Calibration records of assigned laboratories are filed and maintained at the laboratory location where the work is performed.

4.6 Field Quality Assurance and Quality Control

Two different levels of sampling methods and quality objectives will be employed during this project. These will consist of PID head space field screening, and the collection of soil samples for laboratory VOC analysis. The following methods and procedures will be employed for each respective level of sampling.

4.6.1 PID Field Screening of Samples

A PID with a 11.7eV and/or 10.2 eV lamp will be used to screen soil in the field for VOCs throughout excavation activities. The proper use of the PID will be critical to the success of excavation activities as field screening results will be used to guide excavation activities. The PID will be, at a minimum calibrated on a daily basis. Additional calibration may be performed throughout the day depending on site conditions and PID response. PID measurements will be made through head space analysis. Head space analysis will be performed by placing the soil sample in a plastic bag and warming the sample to allow for volatilization of the compounds within soil matrix. After warming the PID probe will be placed in the sealed bag and a measurement will be

taken.

4.6.2 Samples for Laboratory Analysis

To ensure that appropriate procedures will be followed during field sampling for laboratory analysis, sampling methods, record keeping, and sample control will be continuously monitored by quality control measures.

Throughout the sampling efforts as part of the quality assurance procedures, various quality assurance samples will be collected during the field activities.

4.6.3 Duplicate Samples

These samples will consist of identical samples which were collected, preserved, and transported in the same manner. Field duplicate samples will be collected at a rate of 1 per 10 verification samples.

4.6.4 Field Rinsate Blank Samples

Field Rinsate blank samples will be utilized to identify possible sources of cross-contamination during sample collection and preservation when non-disposable sampling equipment is used. The field blank will consist of a sample obtained by rinsing decontaminated sampling equipment with analyte-free water. This water will be sampled and submitted for analysis to ensure that cross-contamination did not occur during sampling. Rinsate blanks will be collected at a rate of 1 per 20 verification samples.

4.7 LABORATORY QUALITY ASSURANCE AND QUALITY CONTROL

The laboratories to be used for fixed-laboratory analysis will be ENCHEM, Inc., of Green Bay, Wisconsin, and Great Lakes Analytical of Buffalo Grove, Illinois. Both of these laboratories are WDNR -certified and maintain extensive quality assurance and control programs which are available upon request.

The laboratory analytical programs for each of these laboratories include the use of method blanks, reagent blanks, independent calibration verification standards, continuing calibration verification standard, laboratory control standard, duplicate analysis, and matrix spikes.

The laboratories also participate in internal and external audit programs with the EPA, state agencies, and independent third parties.

Additional laboratory information is presented below:

ENCHEM
1795 Industrial Drive
Green Bay, Wisconsin 54302
(920) 469-2436
Facsimile: (920) 469-8827

Great Lakes Analytical
1380 Busch Parkway
Buffalo Grove, Illinois 60089
(847) 808-7766
Facsimile: (847) 808-7772

5.0 IMPLEMENTATION SCHEDULE (NR724.09(10)

5.1 INTERIM ACTION ACTIVITIES

The anticipated schedule for the interim action is approximately seven weeks. Removal of the existing slab and asphalt and excavation and treatment of impacted soils will occur concurrently over a period of approximately five weeks. The remaining two weeks will be spent upon restoration activities, including the importation and grading of topsoil and hydroseeding of the site. The actual time frame for the completion of the interim action will varying depending upon true volume of impacted soils, treatment rates and weather considerations.

5.2 REPORTING

Upon completion of field activities related to the interim action a report will be prepared in consideration of ch. NR 708.15, Wisconsin Administrative Code requirements. The report will include at a minimum: a site location map, a discussion of the interim action implemented, location and effluent quality of any permitted discharges, the type and total volume of impacted media treated, tabulated field and laboratory data, and laboratory analytical reports.

TABLE 1: APPLICABLE REGULATIONS

Interim Action Design Report
Johnson Controls, Inc- 3238 North Bremen Street, Milwaukee, WI

Regulation/ Statute Citation	Description	Site-Specific Applicability
29 CFR 1910 29 CFR 1926	Occupational Health and Safety Regulations (Hazardous Waste Operations and Construction Agency)	Regulatory requirements for safe work practices at hazardous waste and construction areas. Applicable requiremnts incorporated into the site-specific health and safety plans followed during all interim remedial action activities.
Section S292.11	Hazardous Spill Law	Identifies owners responsibility to take actions necessary to restore the environment to the extent practicable and minimize the harmful effects of the impacts.
NR419	Control of Organic Compound Emissions	Identifies treatment requirements for air permitting of on-site soil treatment system. Zero emissions treatment system to be used at the Site. (Submittal of Form 4500-168: *Notification to Treat or Dispose of Petroleum Contaminated Soil & Water*, submitted to notify state of intended treatment process.
NR700.13	Sample Preservation and Analysis	Regulatory requirements for the collection and analysis of soil samples collected as part of the confirmatory sampling of the interim action.
NR708	Immediate and Interim Actions	Identifies requirements and specific interim actions such as source removal to address identified environmental impacts. Removal and treatment of impacted source area soils will be performed as part of this remedial action.
NR718	Management of Solid Wastes Excavated During Response Actions	Identifies applicable actions for the proper management of contaminated soils excavated and treated on the Site. No more than 2,500 cubic yards of contaminated soil will be stored for more than 15 days at the Site. Excavated source area soils will be treated and replaced as part of the interim remedial action.
NR720	Soil Cleanup Standards	Identifies applicable Interim Action Cleanup Criteria (Refer to Section 2.0) for soils at the the Site. Residential Direct Contact criteria will be used to define the 1) lateral extent and vertical extent of soil impacts, and 2), limits of excavation, above the water table. Also defines the appropriate practical quantitation limits to be used for analysis of the soil verification samples collected to define the extent of impacts.
NR 724	Remedial and Interim Action Design, Implementation, Operation, Maintenance and Monitoring Requirements	Regulatory requirements for the design, implementation and operation of the interim remedial measure. The regulation also defines the report submittal requirements associated with the selected interim action.
Ch. 11 of the City of Milwaukee MMSD Rules	POTW Ordinance	City of Milwaukee Ordinance governing discharge of Site water to Milwaukee Metropolitan Sewerage District (MMSD). Site requires discharge of water collected in basement of former facility. Notice of Intent to Discharge to MMSD was granted; Notice of Intent Number 99.0034.

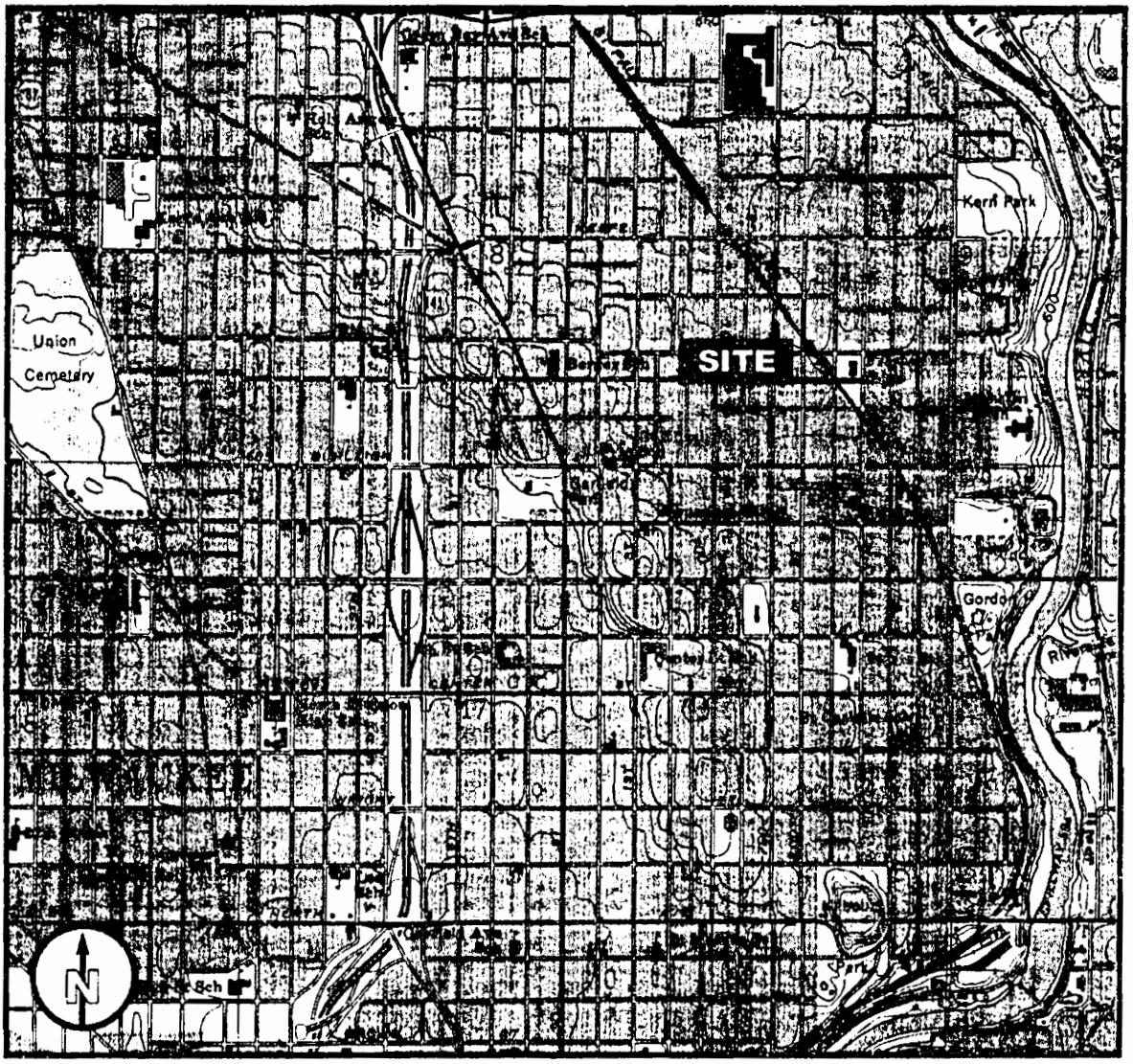
ENTACT
Leading the Nation in Customer Care

Figure 1-1

SITE LOCATION MAP

Johnson Controls Inc. - Badger Facility
Milwaukee, WI

MILWAUKEE QUADRANGLE WISCONSIN - MILWAUKEE CO.
7.5 MINUTE SERIES (TOPOGRAPHIC)



SCALE 1:24 000

1/2 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 5 0 1 KILOMETER

CONTOUR INTERVAL 10 FEET
NATIONAL GEODETIC VERTICAL DATUM OF 1929
DEPTH CURVES AND SOUNDINGS IN FEET—DATUM IS 578 FEET

MN
GN
0°38'
11 MILS
1°
18 MILS

UTM GRID AND 1971 MAGNETIC NORTH DECLINATION AT CENTER OF SHEET

THIS MAP COMPLIES WITH NATIONAL MAP ACCURACY STANDARDS

N

N. BREMEN STREET
(70' R.O.W.)

MANHOLE
ELEC. METER BOX
FND CHISLED CROSS
WATER VALVE
GAS VALVE
UTILITY POLE
WEPCO MANHOLE
GRASS
35.0'
ASPHALT
MANHOLE
CATCH BASIN
CONCRETE LIGHT POLE
MANHOLE
MANHOLE
MANHOLE
WATER VALVE
CATCH BASIN
FND CHISLED CROSS
WATER VALVES
CONCRETE LIGHT POLE
MANHOLE
6' CONCRETE SIDEWALK
602.0'
GAS VALVE
VALVE
GRASS
MW-5
4" CLAY PIPE
4" HOLE
4" HOLE
4" CLAY PIPE
4" CLAY PIPE
VALVE
4" HOLE
DRAIN
4" PIPE
DRAIN
FOUNDATION
4" HOLE
VALVE
MANHOLE
8" HOLE
MW-3
4" HOLE
DRAIN
4" PIPE
4" HOLE
DRAIN
4" HOLE
4" PIPE
VALVE
GRASS
HOLE
PIPE
CONCRETE BLDG.
13.3'
10.7'
VALVE
4" PIPE
DRAIN
4" HOLE
CATCH BASIN
8" HOLES
PIPE
2" HOLE
UTILITY POLE
CONCRETE
4" HOLE
2' HOLE
2' HOLE
CONCRETE
ELECT. PIPE
15' CONCRETE ALLEY
4" PIPES
24" HOLE
24" HOLE
BASEMENT (FILLED IN)
38.2'
63.4'
4" PIPE
4" PIPE
4" HOLE
DRAIN
4" HOLES
DRAIN
VALVE
VALVE
4" HOLE
4" PIPE
STANDPIPE
WOOD LIGHT POLE
2" HOLE
PIPE
DRAIN
FOUNDATION
4" HOLE
2" HOLE
MANHOLE
WATER VALVE
MANHOLE
6' CONCRETE SIDEWALK
GRASS
MW-4
ASPHALT
4" HOLE
4" PIPE
2" PIPE
2" PIPE
MW-7
PZ-3
MW-6
PZ-2
WOOD LIGHT POLE
METAL FENCE
MW-8
WOOD LIGHT POLE
GUARD RAIL
WOOD LIGHT POLE
ASPHALT
253.4'
33.13'
UTILITY POLE
2" HOLE
TRENCH-END
GUARD RAIL
CATCH BASIN
METAL FENCE
CATCH BASIN
MW-2
GUARD RAIL
CATCH BASIN
MW-1
CATCH BASIN & TRENCH-END
CATCH BASIN
MANHOLE
CATCH BASIN
GRASS
601.3'
GRASS
WATER VALVE
6' CONCRETE SIDEWALK
FND CHISLED CROSS
FND CHISLED CROSS
CONCRETE LIGHT POLE
CATCH BASIN
CONCRETE LIGHT POLE
35.0'
CONCRETE LIGHT POLE
SITE B.M.:
FND 1" I.P.
N 5000.00
E 5000.00
CATCH BASIN
MANHOLE
MANHOLE
MANHOLE
N. WEIL STREET
(70' R.O.W.)
CONCRETE

E. CONCORDIA AVENUE
(60' R.O.W)
ASPHALT

1360 N. Wood Dale Rd. Suite A
Wood Dale, Illinois 60191
phone: (630) 616-1546
fax: (630) 616-9203
ENTACT

JOHNSON CONTROLS, INC. - BADGER SITE
GENERAL SITE FEATURES

Job No: C601	Date: 5-12-99
Drawn By: CP	Sheet:
Checked By:	Scale: 1"=40'

FIGURE
2

N. BREMEN STREET
(70' R.O.W.)

N

A B C D E F G H I J

1 2 3 4 5 6 7

A1 A1-SW MW-5 D1 E1 F1 G1-SW MW-3 G1 H1 B1

DW-3

E1-NE

MANHOLE

CONCRETE BLDG.

A2 B2 C2 F2 G2 D2 E2

A3 DW-2 G3

BASEMENT (FILLED IN)

38.2' 63.4'

D3 F3 E3 B3 J3

H4

A4 MW-4 B4 MW-8 D4 MW-7 PZ-3 J4 MW-6 PZ-2

A5 D5 E5 H5

MW-2 DW-1 MW-1

E. CONCORDIA AVENUE
(60' R.O.W)

N. WEIL STREET
(70' R.O.W.)

LEGEND

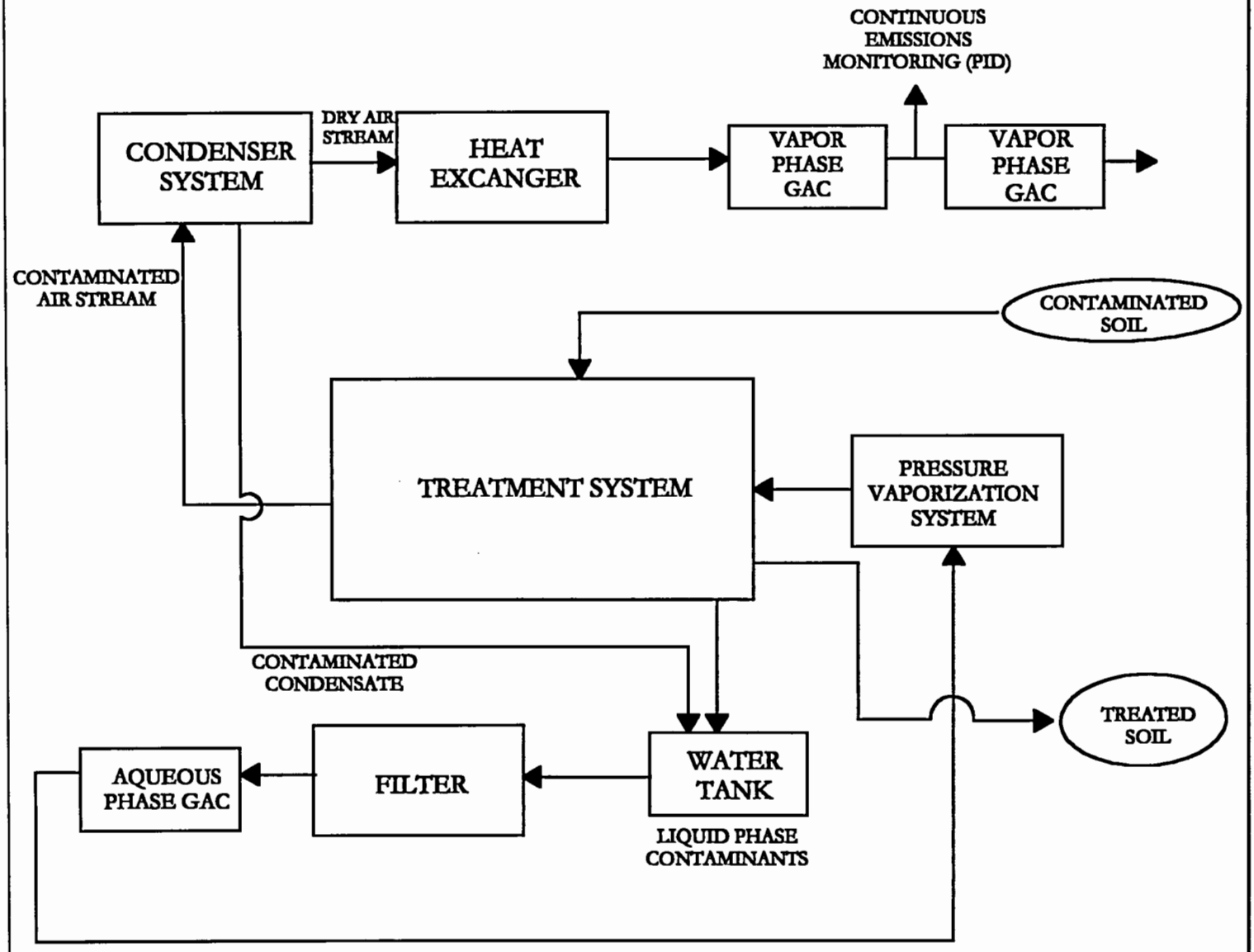
AREAL EXTENT OF CHLORINATED AND AROMATIC IMPACTS ABOVE WATER TABLE (~10' BGS)

1360 N. Wood Dale Rd. Suite A
Wood Dale, Illinois 60191
phone: (630) 616-1546
fax: (630) 616-9203
ENTACT

JOHNSON CONTROLS, INC. - BADGER FACILITY
AREAL EXTENT OF IMPACTED SOIL ABOVE ASSUMED WATER TABLE

Job No: C601 | Drawn By: CP | Checked By: | Date: 7-14-99 | Sheet: | Scale: 1" - 40'

FIGURE
3



JOB: JCI-BADGER C637	DATE: 9-21-99	FIGURE 4	Indirect Heat Volatilization / Steam Injection System Treatment Process Schematic	ENTACT	1360 N. Wood Dale Rd. Suite A Wood Dale, Illinois 60191 phone: (630) 616-1546 fax: (630) 616-9203
SCALE: NTS	DRAWN BY: CDP				
	CHECKED BY:				