UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

STATEMENT OF BASIS

Johnson Controls, Inc.
(former Stanley Tools facility)
Fowlerville, Michigan
MID 099 124 299

1.0 INTRODUCTION

This *Statement of Basis* explains a set of proposed cleanup remedies that address contamination in the soil, groundwater and sediments at the Johnson Controls, Inc. facility, formerly known as the Stanley Tools Facility ("the facility"), in Fowlerville, Michigan (see Figure 1). The proposed remedies focus on reducing human and ecological exposure to contaminated media through removal of contaminated materials, the use of institutional controls, and monitoring the attenuation of contaminant concentrations in groundwater over time. Contamination at the facility consists of volatile organic compounds (VOC's), metals, polychlorinated biphenyls (PCBs) and polycyclic aromatic hydrocarbons (PAH's) in soil, groundwater and in sediment in the nearby Red Cedar River. The contaminants were released from 1949 until 1985 when manufacturing operations at the facility ceased. Buildings at the facility were demolished in 1993, and no structures of any type remain. The facility currently consists of a relatively flat grassy field. Johnson Controls, Inc. ("JCI") currently owns the facility.

The U.S. Environmental Protection Agency (EPA) and the Michigan Department of Environmental Quality (MDEQ) determined through inspections and document review that releases of hazardous waste and hazardous constituents into the environment, were occurring and had occurred at the facility, within the meaning of Section 3008(h) of the Resource Conservation and Recovery Act (RCRA). In 1988, the Stanley Works, the facility owner at the time, agreed in an Administrative Order on Consent (AOC) under RCRA to define the nature and extent of the contamination at, or emanating from, the facility (U.S. EPA Docket No. V-W-88-R-032, September 2, 1988). After completion of a three-phase RCRA Facility Investigation (RFI) in 2001, EPA and JCI later entered into a performance-based RCRA AOC in December 2002. The 2002 AOC required JCI to pursue corrective measures designed to control current human exposure to contamination at or from the facility to within acceptable risk levels as established by MDEQ or USEPA by February 2004. The 2002 AOC also required JCI to submit a Final Corrective Measures Proposal describing additional cleanup measures, as well as a description of the cleanup work already completed by JCI, since the 2002 AOC's

effective date. JCI submitted the *Final Corrective Measures Proposal* to U.S. EPA in February 2004.

EPA is issuing this *Statement of Basis* as part of its public participation responsibilities under RCRA. The *Statement of Basis's* purposes are (1) to invite public comment on the cleanup measures that EPA is proposing for site remediation, and (2) to invite proposals for alternative remedies. EPA will review the public comments, respond to them, select specific remedies and describe these remedies in a public notice called a *Response to Comment and Final Decision.* JCI will then produce a document for EPA's approval titled *Corrective Measures Final Design*, *which* will describe in detail how the remedial measures will be designed and built. Following EPA's approval, JCI will complete the cleanup remedies.

In this *Statement of Basis,* EPA proposes measures to remove, control, and contain the contamination present in the soil, groundwater and Red Cedar River sediments. The proposed measures' purpose is to eliminate, or minimize, exposure of human and environmental receptors (i.e., plants and animals) to unsafe levels of contamination.

To protect people from exposure to contamination ("human health exposures"), EPA is using cleanup levels that would be acceptable for an industrial use setting. MDEQ established these levels under the Natural Resources and Environmental Protection Act, Act 451, Part 201 and they are generally referred to as the MDEQ Part 201 criteria. In selecting the MDEQ Industrial and Commercial II, III and IV land use categories for soil, EPA considered historic facility use, current property zoning, and planned future uses of the property. The degree of cleanup in the river sediments are based on the goal of protecting the animals that live part or all of their lives in the sediment ("benthic organisms"), which are important in the food chain of the river's ecosystem. Cleaning up sediments to protect the benthic organisms is expected to benefit the fish, birds, and mammals that inhabit or feed in the river; this will also help to keep the surface water clean.

This *Statement of Basis* summarizes information that is provided in greater detail in the *RCRA Facility Investigation*, the *Corrective Measures Proposal* and other documents that comprise the Administrative Record for this facility. Section 8 of this *Statement of Basis* identifies the locations where the Administrative Record can be reviewed, and provides instructions on how the general public can submit comments.

2.0 Summary of Proposed Remedies

The U.S. EPA is proposing corrective action remedies for soil, groundwater and sediment at the JCI facility. These proposed remedies are discussed in the following subsections.

2.1 Implement Institutional Controls for Contaminated Soils

Because past sampling showed that facility soils were heavily contaminated, JCI conducted Interim Remedial Measures in 2003. This consisted of removing and disposing of 83,900 tons of contaminated soil from areas across the facility property and from two areas referred to as the North Ditch and South Ditch, which feed into the Red Cedar River. Clean soil was used to replace contaminated soil. Some of the remaining soil is still contaminated in pockets. By comparing MDEQ Part 201 criteria for human exposure to current contaminant levels in soils, we have found that unacceptable health risks could arise if the land use could change from industrial to residential. Therefore, EPA proposes to require institutional controls that would restrict future facility uses to industrial purposes. The proposed remedy calls for a detailed review of existing local ordinances and other potential use restrictions regarding the property, followed by the imposition of future use restrictions to ensure that any direct human exposure to on-site soils would be so incidental as to pose little or no health threat. This remedy would include the development of procedures and protocols that address appropriate land use and the imposition of industrial worker safety precautions that minimize human exposure to residual soil contamination.

2.2 Implement Institutional Controls for Groundwater

VOC's and metals have been detected in facility groundwater at concentrations that could pose a risk to people if they were to drink it. However, there is no need for anyone to drink the contaminated groundwater. A review of existing local ordinances, deeds and current use restrictions regarding the property would be performed to develop a plan to ensure that facility groundwater and offsite areas to which contaminated groundwater has migrated is not used as drinking water or for irrigation. If necessary, additional restrictions would be placed on the facility and other affected areas to restrict future groundwater use and limit access in order to control potential exposures.

2.3 Monitored Natural Attenuation and Mixing Zone Determination

Monitored Natural Attenuation (MNA) would consist of routine monitoring of the groundwater contaminants in accordance with an approved RCRA Groundwater Monitoring Program Plan, to assess the gradual reduction of groundwater contamination to acceptable levels. Over time, the groundwater quality will be restored through natural processes. The MDEQ has established maximum allowable chemical concentrations for groundwater that discharges into the Red Cedar River. These maximum chemical concentrations in groundwater are known as “Final Acute Values” and are established for compliance monitoring wells installed located near the Red Cedar River.

2.4 Excavation of Red Cedar River Sediments

Areas of river sediments that are contaminated at levels considered unsafe for aquatic animals would be removed from the river. Approximately 52 sediment samples were analyzed and found to have chemicals in concentrations that exceed “Threshold Effects Concentrations” (or “TECs,” as explained in Section 4.2, below), indicating unhealthy effects on animals living in and near the sediment. Additionally, another 30 sediment samples whose contaminant concentrations did not exceed TECs still exceeded background chemical concentrations. Red Cedar River sediments will be tested in a laboratory to further evaluate their level of toxicity, in order to isolate the areas of sediment that will be removed and to establish site-specific cleanup goals based upon the protection of aquatic life.

Each of these remedies is described in further detail in Section 5 of this Statement of Basis.

3.0 Facility History

The JCI facility was built by Utilex Manufacturing Company in 1949 and began operating as a zinc die casting production. In 1952, the plant expanded to include an electroplating department. In 1978, the plant changed its name to Hoover Universal Incorporated, Die Cast Division. In 1980, the plant was bought by Stanley Works and was operated by its Stanley Tools Division until it ceased manufacturing in December 1985. JCI purchased the facility in 1985. The plant remained unused until 1993, when the on-site buildings were demolished.

Facility investigations have identified trichloroethene (TCE), TCE-breakdown products (1,2-dichloroethene, vinyl chloride), PCBs, PAHs, cyanide and metals (arsenic, chromium, nickel, lead, mercury and zinc) in surface soils, subsurface soils, groundwater, and river sediments. Several known spills and releases of wastes resulted in contamination of many areas of the facility. Wastes were discharged onto the soil surface at various locations, into two drainage ditches and into the Red Cedar River.

Much of the current information about the facility is the result of soil and water testing conducted between 1991 and 2000. The testing results are reported in the *Summary Report, RCRA Facility Investigation,* submitted to U.S. EPA in October 2001. The report concludes that organic and inorganic chemicals are present in soil, groundwater, surface water, and sediment at the facility and downstream in the Red Cedar River. The report includes:

1) a summary of the facility background and history,
2) a description of the scope of the field investigations,
3) a description of the conditions within and around the facility,

4) a conceptual site model,
5) an evaluation of data generated during investigations,
6) a discussion of the fate and transport of contaminants, or site-related chemicals,
7) an uncertainty analysis, and
8) a discussion of potential preliminary remedial technologies.

Other key documents include the *Final Corrective Measures Proposal* (February 2004), the *Interim Measures Report* (provided as Appendix D of the *Final Corrective Measures Proposal*) and the *Environmental Indicator RCRIS Code CA725* and *CA750 Reports* (February 2004).

Soil remediation was undertaken at the facility as an Interim Remedial Measure (clean up), during the summer and fall of 2003, when approximately 83,900 tons of contaminated soil were excavated and taken to a landfill for disposal. The effect was to remove contaminant source materials that were contributing to potentially unacceptable human health risks. Free product (kerosene) in underground pools at the facility was also excavated and disposed of. Excavation of contaminated soil and free product kerosene proceeded to the water table, ranging from four to eight feet in depth at approximately 95% of the excavation areas. The excavations were then backfilled with clean soil material.

The North Ditch and South Ditch, which extend from the JCI facility to the Red Cedar River, were also excavated and backfilled with clean soil material during the 2003 Interim Remedial Measures. EPA views this excavation and the sitewide soil excavation as having removed the pathways for soil-based contaminants to migrate to the Red Cedar River during periods of precipitation.

Contaminated groundwater remains beneath the JCI facility and off-site, west of the Red Cedar River. In addition, it has been determined that groundwater from beneath the facility discharges into the Red Cedar River. Analysis of surface water samples collected from the river indicate that site-related chemicals are not present in surface water of the Red Cedar River at concentrations that pose a risk to human health or aquatic life.

JCI intends to further eliminate unacceptable risks to public health and the environment, and to redevelop the property for beneficial industrial use.

4.0 Summary of Risks to Human Health and the Environment

After the contaminated soil was removed in 2003, testing verified that soils left in place at the facility would not pose unacceptable risks to persons working at the facility in an industrial future use scenario. By contrast, comparing analytical data to MDEQ Part 201 criteria indicates that soils left in place could pose unacceptable risks to people if the site were to be used for residential housing development. In addition, groundwater is contaminated with TCE and its breakdown products, (1,2-dichloroethene, vinyl chloride) and the Red Cedar River sediments have been contaminated by surface runoff. Some of the chemical compounds in these media are carcinogenic.

The extent to which site-related constituents in these areas exceed human-health screening criteria is described in detail in the *Environmental Indicator CA725, Current Human Exposures Under Control* (February 2004) and *Environmental Indicator, CA750, Migration of Contaminated Groundwater Under Control* (February 2004) Reports.

4.1 Soils Exposure Risk

Remaining contaminated soils at the facility contain methylene chloride, TCE, PAHs and inorganics at concentrations that exceed background levels. The human exposure routes of concern are dermal contact, ingestion, and inhalation. The following site chemicals in soil exceed MDEQ Part 201 criteria for the protection of groundwater and drinking water sources:

> methylene chloride, TCE, fluoranthene, pyrene, arsenic, total cyanide, hexavalent chromium, copper, lead, mercury, selenium, silver, zinc, and cyanide.

In addition, arsenic was detected at three sample locations in surface soil at concentrations greater than the MDEQ Part 201 direct contact cleanup criteria of 37 mg/kg. All other chemicals were detected at concentrations less than direct contact cleanup criteria.

4.2 Groundwater Exposure Risks

Groundwater is contaminated with chemicals used during die casting and electroplating operations including TCE and TCE-breakdown products, cyanide and metals. Groundwater from both on- and off-site monitoring wells was found to be contaminated. Numerous monitoring well samples were found to contain contaminants above MDEQ Part 201 Generic Cleanup Criteria for safe drinking water. The following site constituents in groundwater pose a potentially unacceptable risk to human health based on one or more MDEQ criteria:

> TCE, cis-1,2-dichloroethene, vinyl chloride, arsenic, copper, nickel, hexavalent chromium and cyanide.

However, although contaminant levels exceed screening criteria, there are no identified uses or users of groundwater within two miles of the facility borders (with one exception, discussed below). Groundwater is not used on-site for any purpose, and there is no known use of groundwater to the east, north or south of the facility. These off-site areas are also served by the municipal water supply. One residential well is located approximately 950 feet west of the facility across the Red Cedar River. However, the house is located 850 feet upgradient of the closest known impacted monitoring well, and it has been determined that groundwater west of the Red Cedar River flows east, toward the river and away from residential areas. Therefore, groundwater in the vicinity of the residential well is not expected to be impacted. Based on this information, it is unlikely that anyone is ingesting groundwater contaminated by the facility. To prevent future exposure to contamination through ingestion, JCI would prohibit any groundwater use at the facility through "institutional control" remedies (see Section 5.1, below).

4.3 Sediment Exposure Risks

Sediments in the Red Cedar River contain VOC's, PAHs, PCBs and metals. Surface water drainage at the JCI facility is toward the Red Cedar River via overland flow and up until the completion of the backfilling during the 2003 Interim Measures the North Ditch and the South Ditches. Interim Remedial Measures (cleanup), included removal of sediment from the North and South Ditches. The Red Cedar River is not a drinking water source, and is used for occasional recreational activities such as swimming, canoeing and fishing. Aquatic life may be exposed to contaminated sediment, and people may be exposed to contaminants in the sediment by ingesting fish in which contaminants have bio-accumulated, or through direct contact with sediment during recreational activities. While there may be occasional recreational activity such as swimming or canoeing, the river is too small to support regular recreational activities. There are no swimming beaches or canoe liveries nearby.

Game size fish of any species were not caught during an extensive survey of the river during October 2003 and there is no indication that the Red Cedar River near the facility supports a significant sport fishery as there are no bait shops or marinas nearby. However, Michigan has published fishing advisories that are currently in effect for the Red Cedar River.

Chemical concentrations in sediment samples were compared to cleanup criteria or screening criteria for the following pathways; direct (dermal) contact, incidental ingestion, protection of surface water, protection of ambient air and protection of aquatic life. Screening criteria for the protection of human health based on dermal contact and incidental ingestion were developed using MDEQ-approved methodologies. Part 201 generic cleanup criteria for soil, based on the inhalation of hazardous substances in ambient air, were used to evaluate the potential impact of sediment contamination on air quality with respect to human health. Criteria developed for direct contact, incidental

ingestion, protection of surface water and protection of ambient air were not exceeded for any chemical.

In order to assess impacts of sediment contamination on aquatic receptors, EPA is implementing an approach to screening called the *Consensus-Based Approach to Sediment Quality Guidelines,* (MacDonald et al.), which identifies concentration levels of chemicals in the sediment as likely or unlikely to harm the organisms that live there. The concentration levels are called Threshold Effect Concentrations (TECs) and Probable Effect Concentrations (PECs). Sediment concentrations that are below the TEC level are unlikely to cause harm to organisms, whereas sediment concentrations above the PEC are likely to be lethal to 80% of the organisms. Since concentrations of VOC's, PAH's, PCB's and/or metals exceeded TEC's and PEC's. EPA has concluded that Red Cedar River sediments may pose an unacceptable risk to bottom dwelling or benthic organisms.

5.0 Scope of Proposed Remedies

The remedies proposed in this *Statement of Basis* consist of (1) institutional controls, (2) analysis and removal of river sediments and (3) long-term groundwater monitoring. These remedies, together with the remediation conducted during the 2003 Interim Remedial Measures are intended to ensure any remaining contamination at and near the facility pose no unacceptable risk to human and ecological receptors. A comparison of detected concentrations to MDEQ risk-based screening criteria indicates that risks to human health are not present from any potential direct contact with soil, groundwater or Red Cedar River sediment, as long as the facility is only used for industrial purposes. Therefore, EPA anticipates that the use of institutional controls and long-term monitoring will effectively limit contaminant exposures to humans and reduce human health risks to levels that are considered to be acceptable.

With respect to Red Cedar River sediments, EPA's remedial action objective is the protection of the reproduction, growth, and survival of benthic organisms. Based on the presence of an unacceptable risk recited in the foregoing section, a sediment remedy is necessary. Because the stream is generally only three feet deep, sediment removal is preferable to placing a clean cover over the sediments. The *Consensus-Based Approach* described above calls for "site-specific" testing of river sediment in a laboratory. This would be done as part of the excavation remedy design process, in order to limit the areas of contaminated sediment that need to be removed.
JCI will develop a set of “site-specific “sediment cleanup concentrations from the resulting sediment toxicity testing and study. Further “site-specific” study will better assess the actual impacts chemicals in sediments may have on the actual ecological habitat of the Red Cedar River.

A detailed description of the proposed measures will be submitted in the RCRA *Corrective Measures Final Design Plan*.

5.1 Implement Institutional Controls for Contaminated Soil

Soils on the facility property are contaminated with VOC's, metals, cyanide and PAHs. Since direct contact and inhalation risks would be acceptable under an industrial future use scenario, the proposed remedy includes a detailed review of existing local ordinances, deeds and current use restrictions regarding the property and areas affected by contaminated groundwater to determine whether these mechanisms currently control exposure pathways for direct contact and to determine what additional controls are necessary. This remedy would include the completion of closure documentation and using appropriate administrative or legal procedures to restrict future facility use, with appropriate opportunity for public comment.

An institutional control is a type of administrative or legal risk-control remedy that limits the use of a site or resource. Examples include easements, deed restrictions, covenants, and zoning ordinances. An institutional control should be used with source control and cleanup measures, and is meant to reduce the risk of human exposure to any contamination that remains after the remedial phase of a cleanup. At the JCI facility, future redevelopment would be limited to industrial uses, disclosure of potential hazards would be provided to current and future on-site construction workers through a Health and Safety Plan, and any use of groundwater would be prohibited. A set of institutional controls that accomplish these goals will be proposed in the *Corrective Measures Final Design Plan*.

5.1.1 Protection of Human Health and the Environment

The 2003 Interim Measures remediated soil contamination to levels that are considered acceptable for the protection of future industrial workers. The current JCI facility use is industrial and institutional controls will restrict it to such use; therefore the facility's viability as a future ecological habitat is not being evaluated. Based on the current and future intended uses of the facility property, the proposed remedy is adequately protective of human health and the environment.

5.1.2 Attaining Media Cleanup Standards

The 2003 Interim Measures remediated soil contamination to levels that are considered acceptable for the protection of future industrial workers. The proposed institutional controls would not further reduce contaminant concentrations, but would ensure that the property is used in a manner that remains protective of human health and the environment.

5.1.3 Controlling the Source of Releases

Most of the soil contamination was removed during the 2003 Interim Measures Implementation eliminating this source of releases. Periodic review of institutional controls will ensure that future facility use is limited to activities that do not pose an unacceptable human health risk.

5.1.4 Complying With Waste Management Standards

Waste generated during the 2003 Interim Measure implementation was handled and disposed of in accordance with applicable standards. The proposed institutional controls remedy for soils would not generate additional waste.

5.2 Implement Institutional Controls, Deed Restrictions and Long-Term Monitoring for Groundwater

On-site groundwater is contaminated with VOC's, metals and cyanide. VOC contamination consists largely of TCE and TCE-breakdown products, specifically cis-1,2-dichloroethene and vinyl chloride. Groundwater containing VOC's is located in the shallow aquifer at the southern portion of the facility, in a plume that migrates west toward the Red Cedar River. Metals detected in on-site groundwater include arsenic, copper, nickel and hexavalent chromium. Groundwater containing metals is also located in the shallow aquifer in the southwestern portions of the facility. Metals contamination is associated with historical handling of plating wastes at an Effluent Pond. Cyanide has been detected in monitoring wells across the facility, in both shallow aquifer and bedrock aquifer wells.

Off-site groundwater is contaminated with VOC's and cyanide. TCE and its breakdown products have been detected immediately west of the Red Cedar River at concentrations greater than screening criteria. Free cyanide has also been detected west of the Red Cedar River and south of the railroad tracks in both shallow aquifer and bedrock aquifer groundwater wells.

The proposed remedy consists of a combination of institutional controls, deed restrictions and a monitoring program designed to assess the long-term effectiveness of the 2003 soil removal Interim Measures. A risk and land-use based assessment of current contamination levels indicates that current groundwater contaminant characteristics do not pose an adverse risk to human or ecological receptors. As with the soils remedy described above, a review of existing local ordinances, deeds and current use restrictions relating to the JCI facility would be performed. If current institutional controls are found inadequate to protect human health, further restrictions would be placed on affected property to prohibit groundwater use for consumptive or irrigation purposes and to limit access in order to control potential exposures.

Also, a long-term groundwater monitoring plan would be implemented, as presented in the *RCRA Groundwater Monitoring Program Plan* (Appendix E of the *Corrective Measures Proposal*, February 2004), to assess the facility's impact on the groundwater quality. The program's short-term objective would be to establish a new baseline of groundwater flow and contaminant conditions, since the 2003 Interim Measures excavation removed overlying contaminant sources and disturbed the steady-state aquifer conditions. Its long-term objective would be to assess the concentration and migration rate of hazardous constituents in the groundwater on a regular basis until final facility closure. The reduction of hazardous constituents to acceptable levels would be achieved through natural attenuation. Selected monitoring wells would be analyzed for VOC's, Michigan 10 metals (plus nickel and hexavalent chromium), cyanide and Monitored Natural Attenuation (MNA) parameters.

For a more detailed description of the proposed monitoring program, refer to the *Corrective Measures Proposal,* February 2004.

5.2.1 Protection of Human Health and the Environment

Groundwater is currently contaminated both on- and off-site. However, there are currently no known users of contaminated groundwater. If the review of institutional controls establishes that additional controls are necessary to ensure against future human exposure through ingestion, imposition of such additional controls would immediately ensure that groundwater does not pose a risk to human health. The proposed monitoring program would protect human and ecological health in the future by assessing the concentration, migration and attenuation of hazardous constituents in groundwater. Monitoring would continue until groundwater cleanup standards are achieved.

5.2.2 Attaining Media Cleanup Standards

Criteria based on the protection of human health are currently exceeded in both on- and off-site groundwater originating at the JCI facility. However, since groundwater is not currently used for any purpose, there is no exposure risk for human receptors. The proposed long-term monitoring program would ensure that hazardous constituent concentrations in groundwater and potential exposure routes to groundwater remain acceptable for protecting human and ecological health. Monitoring would continue until groundwater cleanup standards are achieved. The applicable groundwater cleanup standards for on-site groundwater are the Michigan Department of Environmental Quality (MDEQ), Final Acute Values and the Part 201 Generic Groundwater/Surface Water Interface (GSI) Criteria. The MDEQ has established "Final Acute Values" which are maximum allowable chemical concentrations in groundwater that are protective of the environment. An analysis of the concentrations of chemicals that may be "discharging" to the Red Cedar River is calculated based upon site specific flow

dynamics of groundwater into the river. This is also referred to as a “mixing zone” determination. Final Acute Values are limits provided for chemicals determined to have a reasonable potential to exceed the acute mixing zone based GSI criteria or are chemicals in groundwater that is likely to discharge into the Red Cedar River. For the JCI facility, Final Acute Values have been established for selected chemicals, as shown in the table below.

Parameter	Final Acute Value (ug/L)	Chronic Value (ug/L)	Reported Worst Case Maximum Site Concentration (ug/L)
Trichloroethylene	3500	N/A	4200
Arsenic	680	N/A	161
Cadmium	77	N/A	13
Chromium, Hexavalent	32	N/A	20
Copper	144	N/A	103
Nickel	5800	N/A	1180
Cyanide, Free	44	N/A	10

Final Acute Values, as well as the generic GSI criteria for chemicals not identified in the table above, must not be exceeded at compliance monitoring well installations located near the Red Cedar River. Final Acute Values and Part 201 GSI Criteria are also applicable for to off-site areas where groundwater is flowing towards, and discharging to, the Red Cedar River.

5.2.3 Controlling the Source of Releases

Most of the contaminated soil that was the source of groundwater contamination was removed in 2003. The proposed long-term groundwater monitoring would verify that groundwater contamination is not extending beyond its current boundaries and that concentrations of hazardous constituents are declining through natural attenuation. Imposition and periodic review of institutional controls would ensure that future groundwater use is restricted so as to protect human health.

5.2.4 Complying With Waste Management Standards

The proposed groundwater remedy would not generate additional waste. The groundwater contamination source was eliminated or significantly reduced by the 2003 Interim Measures implementation, which was performed in accordance with applicable standards.

5.3 Excavation of Red Cedar River Sediments

EPA proposes removing areas of river sediments that are contaminated at levels considered unsafe for aquatic animals. Approximately 52 sediment samples were analyzed and found to have chemicals in concentrations that exceed Threshold Effects Concentrations for unhealthy effects to animals living in and near the sediment. Additionally, another 30 sediment samples that did not have developed Threshold Effects Concentrations, exceeded background chemical concentrations for the river sediments. Interim Measures completed in 2003 included the excavation and backfilling of the North Ditch and South Ditch, which drain into the Red Cedar River. EPA believes that the removal of contaminated ditch sediments has eliminated the inflow of contaminated sediments to the river. MDEQ screening criteria based on the protection of human health are not exceeded for any chemical constituent detected in the Red Cedar River.

Some areas of Red Cedar River sediment exceeded MDEQ screening guidance criteria that were developed to protect ecological receptors or aquatic life (the Consensus-Based Approach to Sediment Quality Guidelines, discussed in Section 4.2 above). These guidelines are based on an evaluation of contaminant concentrations in sediments and observed biological effects on bottom-dwelling organisms. Probable Effects Concentrations (PEC's), are contaminant concentrations in the sediment, above which harmful effects are likely to be observed. Threshold Effects Concentrations (TEC's), are contaminant concentrations in the sediment, below which adverse effects on bottom-dwelling organisms are not expected to occur, but above which toxicity may be observed.

Laboratory testing of sediment samples from the river would be done as part of the excavation remedy for chemicals in sediment that exceed TECs. Site-specific chemical concentrations in sediment developed from further sediment toxicity testing and study are expected to better characterize the risk to indigenous ecological receptors. The result of the site-specific sediment toxicity testing could be to limit the areas of contaminated sediment that need to be removed. The site-specific sediment chemical concentration cleanup goal will be based on EPA's sediment remedial action objective of protecting the reproduction, growth, and survival of benthic (aquatic) organisms.

5.3.1 Protection of Human Health and the Environment

The Red Cedar River is not a drinking water source, and is used for occasional recreational activities (such as swimming, canoeing or fishing). Aquatic life may be exposed to contaminated sediment, and people may be exposed to contaminants in the sediment by eating fish in which contaminants have bio-accumulated, or through direct contact with sediment during recreational activities. Fishing advisories are currently in effect for the Red Cedar River. Chemical concentrations in sediment samples were compared to cleanup criteria or screening criteria for the following pathways; direct contact (dermal), incidental ingestion, protection of surface water, protection of ambient air and protection of aquatic life (ecological receptors). Screening criteria for the protection of human health, based on dermal contact and incidental ingestion were developed using the MDEQ-approved methodologies. Part 201 generic cleanup criteria for soil, based on the inhalation of hazardous substances in ambient air, were used to evaluate the potential impact of sediment contamination on air quality with respect to human health. Chemical concentrations in sediment are considered to be acceptable for the protection of human health. Generic sediment screening criteria guidance indicates the potential for unacceptable risk to ecological receptors. The proposed remedy to remove areas of sediment posing unacceptable risks to benthic organisms would protect these organisms, and other components of the aquatic system, and would improve water quality. Further site-specific characterization of sediments would better assess observed biological effects on bottom dwelling organisms (benthic organisms) and define areas of sediment removal.

5.3.2 Attaining Media Cleanup Standards

The proposed remedy would establish sediment clean-up goals at chemical concentrations that are protective of aquatic life. The TECs would establish a clean-up baseline, or preliminary remediation goal. The results of site-specific sediment toxicity testing completed for the excavation design phase would identify the areas for excavation.

5.3.3 Controlling the Source of Releases

Interim Measures implemented in 2003 removed all or most of the contaminated soil that acted as a source of sediment contamination through direct precipitation runoff into the Red Cedar River. Contamination in the North Ditch and South Ditch, another source of contamination to the Red Cedar River, was also removed in 2003. EPA currently believes that all sources of contamination to the river have been controlled.

5.3.4 Complying with Waste Management Standards

The proposed sediment remedy would generate additional waste. Waste generated would be handled in accordance with applicable standards**.** Excavated sediments would be handled in accordance with the State of Michigan Standards for the generation and disposal of solid and hazardous wastes. Under the State of Michigan Standards, solid waste must be tested to determine if they are hazardous waste. Hazardous waste must be handled differently than non-hazardous solid waste.

6.0 Summary of Alternatives

These alternatives are described and analyzed in the February 2004 *Corrective Measures Proposal.*

6.1 Soil

Since soil cleanup objectives for future industrial use have been achieved, following the 2003 Interim Measures implementation, the only corrective measure alternative screened for soil was institutional controls. Institutional controls would consist of deed restrictions, local ordinances and/or zoning that would limit the future use of the property. Institutional controls would be implemented to restrict future uses to industrial scenarios. To the extent future conveyances of the facility property or any portion of it are planned, the institutional controls would ensure that the transferees were aware of, and bound by, the restriction.

6.2 Groundwater

6.2.1 Institutional Controls (Preferred Alternative)

Institutional controls would consist of deed restrictions, and/or zoning or other local ordinances devised to prohibit the extraction of groundwater for consumptive or irrigation purposes in areas affected by the contaminant plume. Such controls would be implemented to prohibit the placement of potable or irrigation wells, limit excavations below the water table, and/or limit land uses to commercial and industrial development.

6.2.2 MNA and Mixing Zone Determination (Preferred Alternative)

MNA would consist of routine monitoring of the contaminant plume in accordance with an approved RCRA Groundwater Monitoring Program Plan. The MDEQ has completed a Mixing Zone Determination that has established maximum allowable contaminant concentrations in groundwater at compliance well locations specified near the Red Cedar River (See Section 5.2.2). Monitoring would continue until attenuation achieves groundwater cleanup goals.

6.2.3 In-Situ Treatment

In-Situ Treatment would include chemical or physical treatment of groundwater in place. Specific treatment methods might include; alteration of geochemistry to enhance bioremediation of chemicals of concern; injection or application of chemicals to destroy or inhibit the movement of chemicals of concern and installation of permeable reactive barriers, electro-chemical barriers or bio-barriers.

6.2.4 Ex-Situ Treatment

Ex-Situ Treatment would consist of the extraction and treatment of impacted groundwater. After treatment, groundwater would be re-injected or otherwise discharged.

6.3 Sediment

6.3.1 Dredging (Preferred Alternative)

Dredging would consist of the removal of impacted sediment, following laboratory analysis to isolate impacted areas. If concentrations of contaminants are above direct contact values, impacted sediment would be disposed and/or placed outside of the aquatic environment. Proper controls would be implemented to ensure that impacted sediment would not return to the aquatic environment.

6.3.2 Institutional Controls

Institutional controls would take the form of a deed restriction prohibiting future land uses that might de-stabilize the sediments and maintenance of the existing riparian buffer strips to reduce the influx of contaminated soils into the aquatic environment. This option would be used in combination with other options.

6.3.3 Encapsulation

Encapsulation would consist of trapping the sediment within a solid matrix so that contaminants could not leach from the sediment, or so that concentrations of chemicals in leached materials would meet criteria protective of ecological receptors.

6.3.4 Monitored Natural Recovery

Monitored Natural Recovery (MNR) would consist of periodic monitoring of the natural stream depositional environment. This remedy assumes that the natural influx of clean sediment and runoff from upstream will mix with contaminated sediments and, over time redistribute contaminant concentrations to acceptable levels.

6.3.5 Hydraulic Modifications

Hydraulic Modifications would consist of sediment trapping and/or re-routing of the stream channel. Either of these methods would isolate or remove contaminated sediment from the aquatic environment.

7.0 Evaluation of the Proposed Remedy and Alternatives Using Selection Decision Factors

7.1 Soil

Since soil cleanup objectives for future industrial use are currently achieved, following the 2003 Interim Remedial Measures implementation, the only corrective measure alternative screened for soil was institutional controls. Institutional controls would consist of deed restrictions, local ordinances and/or zoning that would limit the future use of the property. Institutional controls would be implemented to maintain the current commercial/industrial use. The cost for this alternative would be relatively low, and the schedule for implementation would be relatively quick.

Table 1 presents the estimated cost associated with the proposed soil remedy:

Table 1. Cost Comparisons of Alternatives for Soil

Alternative	Notes	Estimated Cost Range
Institutional Controls	Completion of closure documentation and public notifications will need to be addressed.	$20,000 - $50,000

7.2 Groundwater

7.2.1 Long-Term Reliability and Effectiveness

The combination of institutional controls and MNA/Mixing Zone Determination would provide long-term protection of human health and the environment by consistently evaluating chemical concentrations in groundwater against standards designed for the protection of human and ecological health.

The long-term reliability and effectiveness of both in-situ and ex-situ treatment technologies would depend on the physical and chemical characteristics of the groundwater and on the chemicals of concern.

7.2.2 Reduction of Toxicity, Mobility or Volume of Wastes

Institutional controls do not reduce the toxicity, mobility or volume of wastes. However, the use of institutional controls limits human exposure to such wastes until they have been reduced to an extent that any human exposure is considered acceptable. MNA should result in a reduction of the toxicity and volume of the hazardous constituents detected in groundwater. MNA monitoring will continue until the toxicity, mobility and volume are reduced to acceptable levels.

In-Situ and Ex-Situ treatment technologies have been proven to reduce the toxicity, mobility and/or volume of wastes. The extent of these reductions varies, depending on which specific technology was selected.

7.2.3 Short-Term Effectiveness

It is anticipated that institutional controls could be implemented within one to three months, and are therefore almost immediately effective.

The MNA/Mixing Zone Determination alternative could be implemented in approximately 12 to 36 months. Before implementation, it would be necessary to collect several rounds of groundwater data to determine steady-state groundwater conditions and implement any new institutional controls required by Mixing Zone Determination triggers. However, since this remedy relies on natural processes to reduce the concentrations of hazardous constituents, it will take much longer than treatment technologies to reduce concentrations to acceptable levels.

In-Situ and Ex-Situ treatment technologies would also be effective, but would take several months to design and implement. Therefore, the short-term effectiveness of any alternative involving water treatment technology is not as immediate as the use of institutional controls.

7.2.4 Implementability

There are no known barriers to implementing any of the proposed groundwater remedy alternatives.

7.2.5 Cost

The cost for implementing institutional controls would be relatively low. Costs associated with this alternative would reflect labor hours necessary to conduct a thorough review of any controls already in place and, if necessary, to develop and implement additional controls for preventing groundwater extraction for consumptive and irrigation purposes.

The cost for implementing MNA/Mixing Zone Determination would be moderate. These costs would include materials, time and labor devoted to installing and long-term monitoring of the network of groundwater wells.

The cost for implementing in-situ treatment would vary depending on the technology determined to be most appropriate for the facility (see Table 2). Costs associated with this alternative would include both capital and operation and maintenance (O&M). Regardless of the selected technology, the cost of in-situ treatment is expected to be high (from $125,000 to $2,400,000).

The cost for implementing ex-situ treatment would also vary depending on the selected technology, and would also include capital and O&M costs. In addition, the cost would depend on such treatment system and operating complexities as the water volumes, pretreatment and polishing requirements, permitting, testing and reporting obligations. Regardless of the selected technology, the cost of ex-situ treatment is expected to be high (from $300,000 to $2,400,000).

Table 2 presents the estimated cost associated with each alternative for groundwater:

Table 2. Cost Comparisons of Alternatives for Groundwater

Alternative	Notes	Estimated Cost Range
Institutional Controls		$20,000 - $50,000
MNA & Mixing Zone Determinations		$40,000 - $80,000 per year
In-Situ Treatment	Ozone Sparging System	$85,000 - $2,000,000 (capital) $40,000 - $150,000 (O & M)
	Permeable Reactive Barrier Wall	$300,000 - $2,000,000 (capital) $40,000 - $80,000 (monitoring)
	Bio-Remediation	$100,000 - $400,000 (capital) $30,000 - $90,000 (O & M)
	Chemical Oxidation	$150,000 - $800,000 (capital) $30,000 - $90,000 (O & M)
Ex-Situ Treatment	Pump and Treat	$200,000 - $2,000,000 (capital) $100,000 - $400,000 (O & M)

7.3 Sediment

7.3.1 Long-Term Reliability and Effectiveness

Institutional controls would provide long term reliability by preventing adjacent land uses that could otherwise enable residual facility soil contamination to migrate to the river.

MNR would be effective and reliable in the long-term, since the remedy is dependent on the natural degradation and/or redistribution of chemicals in sediment. However, this remedy is also dependent on the influx of clean materials from upstream, which could be influenced by new activities at the JCI facility or at any facility upstream of the current contamination.

It is expected that dredging would be reliable and effective in the long-term, since contaminated sediment would be removed and would no longer impact the aquatic environment.

The long-term reliability and effectiveness of encapsulation would rely on the integrity of the solid matrix in which sediment would be trapped. The cap would likely require long-term maintenance to remain effective.

Hydraulic modifications to the stream channel would likely be effective in the long-term, but would also require maintenance to remain effective.

7.3.2 Reduction of Toxicity, Mobility or Volume of Wastes

Institutional controls do not reduce waste toxicity, mobility or volume. However, their use should limit human exposure to such wastes until toxicity, mobility or volumes have been reduced to an extent that the level of risk from human exposure is considered acceptable.

MNR reduces the toxicity and volume of contaminated sediment because it relies on the influx of clean upstream materials that will mix with and redistribute contaminant concentrations to levels that are acceptable over time. MNR will not reduce the mobility of contaminated sediment.

Dredging would immediately reduce the toxicity, mobility and volume of contaminated sediment by removing them from the streambed.

Encapsulation would reduce the mobility of contaminated sediment by trapping it within a solid matrix. The toxicity and volume of sediment would remain unchanged, but would not be available to human or ecological receptors.

Hydraulic modifications would reduce the mobility of contaminated sediment by isolating it from the aquatic environment. The toxicity and volume of sediment would remain unchanged, and would require excavation and off-site disposal.

7.3.3 Short-Term Effectiveness

It is anticipated that institutional controls could be implemented within one to three months, and are therefore almost immediately effective.

MNR could be implemented in approximately 12 to 36 months. However, since this remedy relies on the natural influx of clean sediment material, it would not be effective until a sufficient volume of clean sediment had mixed with and redistributed the contaminated sediment.

Dredging, encapsulation and hydraulic modifications would take several months to implement (4-12 months expected) and would therefore not be immediately effective. However, any of these remedies, once implemented, would be immediately effective by eliminating the sediment from the aquatic environment.

7.3.4 Implementability

There are currently no barriers to implementing any of the sediment remedy alternatives. Dredging, encapsulation and hydraulic modifications would require additional construction capital and materials such as a mechanical dredge, hydraulic cement or other encapsulation material, or construction equipment for rerouting the stream channel.

7.3.5 Cost

The cost for implementing institutional controls would be relatively low. Costs associated with this alternative would reflect labor hours necessary to conduct a thorough review of any institutional controls in place and/or necessary to limit use of the river.

The cost for implementing MNR would be moderate. These costs would include time and labor associated with occasional monitoring of concentrations of hazardous constituents in sediment.

The cost for implementing dredging, encapsulation or hydraulic modifications would be moderate to high, depending on the materials, time and labor needed to implement the selected remedy. Estimates for the cost of dredging, encapsulation or hydraulic modification of the stream channel range from $200,000 to $2,000,000.

Table 3 presents the estimated cost associated with each alternative for sediment:

Table 3. Cost Comparisons of Alternatives for Sediment

Alternative	Notes	Estimated Cost Range
Dredging (Wet/Dry)	Spot dredging or full area	$200,000 - $2,000,000
Institutional Controls		$20,000 - $100,000
Encapsulation		$300,000 - $1,000,000
Monitored Natural Recovery		$20,000 - $100,000 per year
Hydraulic Modifications		$200,000 - $2,000,000

Based on the estimated capital and O&M costs, the proposed alternatives are among the least costly. It is expected that, with the completion of interim measures in 2003, the

proposed alternatives will provide adequate protection of human health and the environment.

8.0 PUBLIC PARTICIPATION

Through this notice, the USEPA requests comment on the proposed remedy. The public comment period starts on August 31, 2006 and ends on October 24, 2006. If there is substantial interest in a public hearing, the USEPA will hold a public meeting at a location to be announced in Fowlerville, Michigan, to discuss the Statement of Basis, and any additional remedial actions the public may propose.

The supporting documents cited in this Statement of Basis, along with various other background documents related to investigations, interim measures and the proposed remedies will be available for review at the sites listed below:

Fowlerville District Library
131 Mill Street
Fowlerville, Michigan 48836
517-223-9089

Record Center, USEPA, Region 5
USEPA Waste, Pesticides and Toxics Division
77 West Jackson Boulevard, 7th Floor
Chicago, Illinois 60604
Phone (312) 353-5821
Hours: Mon-Fri, 8a.m. - 4p.m.

After considering the public comments, USEPA will summarize them and prepare responses in a second notice called “Final Decision/Response to Comments.” If a public meeting is requested, a newspaper notice will publish the meeting location in advance of the meeting.

Please note that the selected remedies may need to be modified, or additional remedies imposed, based on the performance and effectiveness of those selected, or on new information. Should new remedies be proposed, another Statement of Basis will be prepared.

This document will be incorporated into the Administrative Record. To send written comments or obtain further information, contact:

Mr. Juan Thomas, Project Manager
U.S. Environmental Protection Agency
77 West Jackson Boulevard, DE-9J
Chicago, Illinois 60604
call toll-free 800 621-8431 or directly at (312) 886-6010