

BEFORE THE  
OHIO ENVIRONMENTAL PROTECTION AGENCY

In the Matter of :  
:   
GEORGIA-PACIFIC RESINS, INC. :   
GEORGIA-PACIFIC CORPORATION : DIRECTOR'S FINAL  
133 Peachtree Street, N.E. : FINDINGS AND ORDERS  
P.O. Box 105605 :   
Atlanta, Georgia 30348 :   
:   
:   
Respondents :

ADMINISTRATIVE ORDER ON CONSENT

I. JURISDICTION

This Administrative Order on Consent (Consent Order) constitutes Director's Final Findings and Orders and is issued pursuant to the authority vested in the Director of the Ohio Environmental Protection Agency (OEPA) by Ohio Revised Code (ORC) Sections 3734.13, 3734.20, 3745.01 and 6111.03.

II. STATEMENT OF PURPOSE

In entering into this Consent Order, the mutual objectives of OEPA and Respondent are to: (1) complete a remedial investigation of the Site, as described in Section III.L. below, to determine the nature and extent of contamination at the Site caused by the disposal of hazardous, industrial and/or other wastes; and (2) develop and evaluate a program of appropriate remedial measures employing sound scientific, engineering and construction practices which shall be consistent with federal, state and local law.

III. DEFINITIONS

The terms used in this Consent Order, and the workplans and any document required by this Consent Order, shall have the same meaning as used in ORC Chapters 3734. and 6111. and as defined below:

A. "Contractor" means a qualified contractor retained by Respondent

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pursuant to this Consent Order, and any subcontractor, representative, agent, employee or designee thereof.

- B. "Days" means calendar days, including weekends and holidays.
- C. "Document" means any record, report, photograph, videotape, correspondence, computer disk or tape, recorded or retrievable information of any kind, including raw data, narrative reports and any and all documentary evidence, relating to treatment, storage, or disposal and concerning the investigation and remediation of hazardous waste or industrial waste or pollutants or other waste at the Site. "Document" shall be construed broadly to promote the effective sharing of information and views concerning the work to be done between the Respondent and OEPA.
- D. "Feasibility Study" ("FS") means the development, evaluation and analysis of remedial alternatives for cleanup action conducted by Respondent in accordance with state environmental laws and this Consent Order.
- E. "Hazardous constituent or constituents" shall have the same meaning as defined in Ohio Administrative Code (OAC) Rule 3745-50-10(A).
- F. "Hazardous substances" shall have the same meaning as defined in Section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended, 42 USC 9601.
- G. "Hazardous waste" shall have the same meaning as defined at ORC Section 3734.01(J).
- H. "NCP" means the National Oil and Hazardous Substances Pollution Contingency Plan, referred to in CERCLA as the National Contingency

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Plan, and codified at 40 C.F.R. Part 300 (1990) (as subsequently amended).

- I. "OEPA" means the Ohio Environmental Protection Agency and its designated representatives, including any contractor retained by OEPA, pursuant to this Consent Order.
- J. "Party" or "Parties" means Respondent and/or OEPA.
- K. "Remedial Investigation" ("RI") means the investigation conducted in accordance with state environmental laws and this Consent Order by Respondent, to determine the nature and extent of the contamination at the Site, and includes the gathering of necessary data to support the Feasibility Study.
- L. "Remedial Investigation/Feasibility Study" ("RI/FS") means Remedial Investigation and Feasibility Study together.
- M. "Respondent" means Georgia-Pacific Resins, Inc. (Georgia-Pacific), a Delaware Corporation and a wholly owned subsidiary of Georgia-Pacific Corporation, a Georgia Corporation, its successors and assigns.
- N. "Response Costs" means all costs, including, but not limited to, payroll costs, contractor costs, travel costs, direct costs, indirect costs, legal and enforcement-related costs, oversight costs, laboratory costs, and the costs of reviewing or developing plans, reports, and other items pursuant to this Consent Order, verifying the work, or otherwise implementing or enforcing this Consent Order.
- O. "Site" means the "facility," as defined in ORC 3734.01(N), which is located at 1975 Watkins Road, Columbus, Franklin County, Ohio, described at Section IV below, where treatment, storage, placement or disposal of hazardous waste and/or industrial waste and/or other

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waste were conducted, including any other area contaminated or threatened to be contaminated by hazardous waste and/or industrial waste and/or other wastes migrating therefrom.

- P. "U.S. EPA" means the United States Environmental Protection Agency.
- Q. "Workplan" means that document detailing the requirements for characterizing the Site and in support of the Remedial Investigation and Feasibility Study. Each required Workplan shall include a detailed description of the proposed investigations and/or implementation activities; a time schedule for those actions; and personnel and equipment requirements. Each Workplan, which includes sampling as an element, shall also include: a sampling plan together with the rationale for sampling activities; locations, quantity and frequency of sampling; sampling and analytical methods; constituents for analysis; and quality control/quality assurance procedures. The required content of the Workplans is outlined in the Generic Statement of Work (SOW) for the RI/FS attached hereto and incorporated herein as Attachment A.

#### IV. FINDINGS OF FACT, DETERMINATIONS, AND CONCLUSIONS OF LAW

OEPA has determined that all findings of fact necessary for the issuance of this Consent Order pursuant to ORC Sections 3734.13, 3734.20 and 6111.03 have been made and are outlined below. OEPA has determined the following:

- A. Georgia-Pacific has owned and operated a facility located at 1975 Watkins Road, Franklin County, Ohio since 1970 (the Site). Formaldehyde and synthetic resins for fertilizers, insulation and the auto industry are manufactured at this facility. Formaldehyde, methyl alcohol (methanol), phenol and acetone are used in the manufacturing process.

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B. Data collected by OEPA indicates that there have been releases of Hazardous Wastes and/or Hazardous Constituents at the Site. Some of the specific incidents are outlined below:

1. On May 12, 1976, Georgia-Pacific discharged, as a result of a spill, an unknown quantity of a phenolformaldehyde reaction product to the waters of the State. Testing of the stream by OEPA Emergency Response (ER) personnel indicated a phenols concentration of over 150 parts per million (ppm), a 0.37 percent formaldehyde and a 0.30 percent methanol. Testing by Georgia-Pacific indicated up to 300 ppm phenol in the stream.
2. On January 3, 1984, OEPA ER personnel responded to a phenol release from Georgia-Pacific to a creek. The quantity of phenol was undetermined.
3. On February 7, 1984, OEPA ER personnel responded to a 1,500 pound release of phenol into an Obetz Creek tributary stream. Testing by OEPA indicated levels up to 222 ppm of phenol in the stream.
4. On May 7, 1984, OEPA ER personnel responded to a 2,000 gallon release of a formaldehyde-phenol mixture to the atmosphere. The release was quantified as 2,000 pounds by Georgia-Pacific. The mixture was not confined to the Georgia-Pacific facility.
5. On July 9, 1984, OEPA ER personnel responded to a 8,000 pound release of a formaldehyde-phenol mixture to the atmosphere. The release was quantified as 10,000 pounds by Georgia-Pacific. Safety devices directed this discharge to the secondary containment system.
6. On September 26, 1985, OEPA ER personnel responded to a 7,000 gallon release of phenol. The release was quantified as 12,000 gallons by Georgia-Pacific. The spill was contained within a concrete dike area and recovered. According to Georgia-Pacific personnel, 150 to 500 gallons were lost due to evaporation.
7. On April 13, 1990, OEPA ER personnel responded to a 558 gallon methanol release at the Georgia-Pacific facility. The source of this leak was an underground pipeline. This release was addressed through an Administrative Order on Consent (AOC) for the performance of an interim action (dated October 29, 1990) between Georgia-Pacific and OEPA.
8. On August 15, 1991, Georgia-Pacific reported a second leak from the underground methanol pipeline. According to the OEPA ER investigation report, 1,000 gallons of methanol had been recovered from this release. The extent of this spill was not determined because Georgia-Pacific concluded remediation would be addressed by the interim action called for in the October 29, 1990 AOC.

C. The releases in 1976 and 1984 resulted in Director's Final Findings and

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Orders being issued by OEPA's Division of Water Pollution Control in 1976 and OEPA's Division of Water Pollution Control and the Ohio Attorney General entering into a Consent Decree with Georgia-Pacific in 1984, all of which have been complied with by the Respondent.

- D. Georgia-Pacific indicated in a U.S EPA Notification of Hazardous Waste Site Form, dated May 7, 1981 and filled out in accordance with Section 103 (c) of CERCLA, that Hazardous Wastes (U-122 and U-188) had been disposed of in an on-site landfill. The form indicated disposal of 900 cubic feet of material, but Georgia-Pacific later revised its original estimate to several thousand cubic yards of waste resins. An October 1, 1979 letter from Georgia-Pacific to OEPA proposed a two phase clean-up of the landfill area. An OEPA letter dated November 29, 1979 to Georgia-Pacific concurred with the proposal. A follow-up inspection by OEPA on March 27, 1980 confirmed closure of the landfill.
- E. On December 9, 1981, Georgia-Pacific received approval for a Hazardous Waste Permit Application (part A) that has now been withdrawn. This application stated that there were a Hazardous Waste storage tank, a Hazardous Waste drum storage area and a "closed Hazardous Waste management facility" (the aforementioned landfill) at the Site. U.S. EPA, in its letter dated March 9, 1987, stated that the facility "had not, since November 19, 1980, stored Hazardous Wastes longer than ninety (90) days," therefore, withdrawal of the Part "A" application was approved. Procedural closure of the hazardous waste storage areas was completed and the Site was redesignated from Interim Hazardous Waste storage status to Generator status, as defined under 40 CFR 262.34.
- F. Since approximately 1979, Georgia-Pacific has maintained a two million

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gallon biological pretreatment pond (bio-pond) for its wastewater. The facility wastewater concentrations to the bio-pond average 3,000 ppm phenol and 1,500 ppm formaldehyde. The aerated lagoon was permitted for discharge to the City of Columbus sanitary sewers in 1982 by OEPA and is regulated under 40 CFR 414.55, 40 CFR 403, and is exempted from RCRA based on 40 CFR 261.4(a)(1)(iii).

- G. Georgia-Pacific has four monitoring wells and one production well on the Site. Georgia-Pacific has been sampling these wells since May, 1982. These wells have shown various levels of detectable chemicals over the last ten years, including the following: formaldehyde - up to 25 ppm; phenol - up to 4.1 ppm; nitrate - up to 42 ppm; and high Chemical Oxygen Demand (COD) - up to 330 ppm.
- H. Sampling of residential wells in the vicinity of the Georgia-Pacific facility was done by the Columbus Health Department in May, 1984. These samples detected trace levels of phenol (.036 ppm) in a residential well located at 2056 Watkins Road. Sampling of residential wells by OEPA in November, 1990 detected low levels of phenol (.009 ppm each) in two residential wells located at 2056 and 2149 Watkins Road. In a OEPA Interoffice Memo, dated March 15, 1984, from Ken Applegate, it is noted that under the Safe Drinking Water Act (SDA), the maximum phenol level is 150 ug/L, which includes cresols, xylenes. The levels identified in the residential supply wells appear to be below the SDA maximum allowable phenol level.
- I. Sampling at the Georgia-Pacific facility, including area residential wells, was conducted by OEPA Division of Emergency and Remedial (DERR) personnel on March 24, 1992. The following data were collected:

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GROUND WATER RESULTS

<u>Well I.D.</u>	<u>Compound</u>	<u>Concentration</u>
2179 Watkins Road	phenol, total	0.090 ppm*
2173 Watkins Road	phenol, total	0.160 ppm
2149 Watkins Road	phenol, total	0.220 ppm
2020 Watkins Road	phenol, total	0.050 ppm
2056 Watkins Road	phenol, total	0.050 ppm
GPGW-2 (MW-4)	phenol, total	0.020 ppm

\*ppm = parts per million

BIO-POND RESULTS

<u>Sample I.D.</u>	<u>Compound</u>	<u>Concentration</u>
GPSE-1 (west end) SVOCs/  VOCs/	phenol, total	4.3 ppm
	formaldehyde	2.9 ppm
	2,4-dimethylphenol	.400 ppm
	2-methylphenol	.360 ppm
	phenol	.500 ppm
	acetone	.190 ppm
	carbon disulfide	.009 ppm
	toluene	.005 ppm
	other TIC VOC unknowns	.113 ppm
	GPSE-2 (east end) SVOCs/ GPSE-2 (Continued)  VOCs/	phenol, total
formaldehyde		15.9 ppm
2,4-dimethylphenol		.660 ppm
2-methylphenol		.460 ppm
4-methylphenol		.500 ppm
acetone		.500 ppm
carbon disulfide		.015 ppm
toluene		.012 ppm
other TIC VOC unknowns		.018 ppm

SVOCs = semi-volatile organic compounds    VOCs = volatile organic compounds

LANDFILL RESULTS

<u>Sample I.D.</u>	<u>Compound</u>	<u>Concentration</u>
GPSO-2    SVOCs/	phenol, total	2.5 ppm
	bis(2-ethylhexyl)phthalate	.099 ppm

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In an OEPA Interoffice Memo, dated March 15, 1984, from Ken Applegate, it was noted that under the SDA the maximum phenol level is 150 ug/L, which includes cresols, xylenes. Two concentration levels in the residential

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wells noted above appear to be above the SDA maximum allowable phenol level.

- J. The acetone, formaldehyde, phenol, methanol, 2,4-methylphenol and methylphenols became "industrial waste" and/or "other wastes," as defined in ORC Section 6111.01(C) and (D), and/or "Hazardous Waste," as defined in ORC Section 3734.01(J), and/or "Hazardous Substance," as defined in Section 101(14) of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), as amended, when they were released to the soil and groundwater.
- K. The Site is a "Facility," as that term is defined in ORC Section 3734.01(N).
- L. The discharging, depositing, injecting, dumping, leaking, spilling or placing of industrial waste, Hazardous Waste, solid waste, other wastes, or pollutants into or on ground or surface waters constitutes pollution of the "waters of the State," as that term is defined at ORC Section 6111.01(H).
- M. The unpermitted discharge of industrial waste, other wastes and/or Hazardous Wastes and Substances into "waters of the State" is prohibited under ORC Section 6111.04.
- N. Respondent is the person who placed, caused to be placed, allowed to be placed, disposed of, allowed, or arranged for, the disposal of Hazardous, solid, industrial, other wastes, or pollutants at the Site in a manner which constitutes pollution of the "waters of the State."
- O. The release or disposal of industrial waste and/or Hazardous Waste from the Site may constitute a substantial threat to public health or safety or may be causing or contributing to or threatening to cause or contribute

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to air or water pollution or soil contamination.

P. The Director has given consideration to the evidence related to documented activities which have occurred and/or will occur at the Site. Based upon the facts as presented, the Director believes that issuance of this Consent Order is furthering the intent of the General Assembly, that OEPA will prevent, control, or abate pollution of the environment for the protection and preservation of the health, safety, welfare, and property of the people of the State.

#### V. COMMITMENT OF RESPONDENT

Respondent consents to and will not challenge OEPA's jurisdiction to enter and enforce this Consent Order, and hereby agrees to undertake, at its expense, all actions required by the terms and conditions of this Consent Order within the time frames specified herein, except as the provisions of Article XXI are deemed to apply to the time for performance.

#### VI. PARTIES BOUND

A. This Consent Order shall apply to and be binding upon Respondent, its successors and assigns. The signatories to this Consent Order certify that they are fully authorized to execute and legally bind the parties they represent to this Consent Order. Unless agreed upon by OEPA, no change in ownership or corporate status of the Respondent shall alter its responsibilities under this Consent Order. The Respondent shall provide a copy of this Consent Order to any subsequent owners or successors before ownership rights are transferred.

B. Respondent will notify OEPA of the selection of all contractors and subcontractors, who perform work under this Consent Order. Respondent shall provide a copy of this Consent Order and all applicable Sections of the Workplan to all contractors, subcontractors and consultants which are retained to conduct

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any work performed under this Consent Order, according to the schedules set forth in the approved Workplan.

C. Notwithstanding the terms of any contract, Respondent shall be responsible for providing sufficient oversight of and effective communication with all contractors, consultants, firms, and other persons acting for them in order that there will be compliance with the terms of this Consent Order.

#### VII. ACCESS

A. To the extent that portions of the Site or areas where work is to be performed are presently owned by parties other than Respondent, Respondent shall use its best efforts to obtain access agreements from the owners, including any agreements necessary to provide access to OEPA and its authorized representatives. Copies of these agreements are attached or will be provided to OEPA.

In the event Respondent is unable to obtain such access, Respondent shall notify OEPA promptly in writing regarding both the lack of access agreements and the efforts to obtain such access agreements. In the event OEPA agrees that Respondent has used its best efforts, OEPA will contact the landowners.

B. Pursuant to any access agreements, OEPA, through its authorized representatives, shall have authority to enter all property at the Site and freely move about at all reasonable times for purposes consistent with this Consent Order, and ORC Sections 3734.20 and 6111.05 including, but not limited to: inspection of records, operating logs, and contracts related to the investigative and cleanup work at the Site; reviewing the progress of the Respondent in carrying out the terms of this Consent Order; conducting such tests as OEPA or its Site Coordinator deems necessary; and verifying data submitted to OEPA by the Respondent. The Respondent shall permit such OEPA

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representatives to inspect and request copies of all records, files, photographs, documents and other writings, including all sampling and monitoring data, which pertain to this Consent Order. OEPA representatives shall follow the following procedure in order to enter and move freely about the Respondent's facility: present his/her business card or equivalent to the Georgia-Pacific staff and such card or equivalent is placed in the Georgia-Pacific log book for the duration of the visit.

C. All Parties with access to the Site and other areas where work is to be performed pursuant to this Section shall comply with all health and safety plan(s).

D. Nothing herein shall act to limit the statutory authority of OEPA to conduct inspections and gather information.

E. The provisions of Section XV, Dispute Resolution, shall apply to Paragraph A of this Section.

VIII. WORK TO BE PERFORMED

A. All work to be performed by Respondent pursuant to this Consent Order shall be under the direction and supervision of a qualified environmental engineer, geologist, or other appropriate professional person with expertise in Hazardous Waste site investigation. Prior to the initiation of site work, the Respondent shall notify OEPA in writing regarding the name, title, and qualifications of such engineer, geologist, or other appropriate professional person and of any contractors and/or subcontractors to be used in carrying out the terms of this Consent Order.

B. Attachment A to this Consent Order, which is incorporated into and made a part of this Consent Order, contains the Generic Statement of Work (SOW) for implementation of the complete RI/FS. The SOW is not specific to this Site,

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and shall be used as a general outline in developing the Site-specific Workplan.

C. Respondent shall contact OEPA to schedule a meeting to discuss the requirements for a Data Collection Quality Assurance Plan, which is described in Task 2 of the SOW, and the Workplan to be submitted, as required by this Consent Order. This meeting shall take place within seven (7) days of the effective date of this Consent Order, unless otherwise agreed to by Parties.

D. Within forty-five (45) days of the effective date of this Consent Order, Respondent shall submit a draft Workplan for the implementation of the complete RI/FS at the Site. This RI/FS Workplan shall be developed in conformance with this Consent Order, the SOW, state law including ORC Chapters 3734. and 6111., and the regulations promulgated thereunder, the NCP, and the most current version of the guidance documents, which are listed in Attachment B and incorporated into this Consent Order. The FS portion of the RI/FS Workplan shall: indicate the tasks that will be completed; provide a schedule for said tasks; and guarantee that the RI and FS activities are performed as an integrated process.

If OEPA determines that any additional guidance documents in addition to those listed in Attachment B affect the work to be performed under this Consent Order, OEPA will notify Respondent and any affected Workplan or reports shall be amended accordingly.

E. Should Respondent identify any inconsistency between any of the laws, rules, regulations, or guidance documents (Attachment B) which it is required to follow by this Consent Order and which will affect any of the work required by this Consent Order, Respondent shall notify OEPA in writing of each such inconsistency and its effect on the work to be performed. Respondent shall recommend, along with a supportable rationale justifying each recommendation,

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the requirement which it believes should be followed. Respondent shall implement the affected work based upon OEPA's direction in resolving any inconsistencies.

F. The draft RI/FS Workplan, any plans or reports required by this Consent Order or approved Workplans, and any amendments or supplements to the Workplans shall be subject to review, and approval or disapproval by OEPA in accordance with the procedures set forth in Section XIV of this Consent Order.

G. Upon approval of the RI/FS Workplan, Respondent shall implement the work detailed therein in accordance with the schedule contained in the RI/FS Workplan.

H. The provisions of Section XV, Dispute Resolution, shall apply to Paragraphs D, E and F of this Section.

**IX. AMENDMENT OF THE WORKPLAN**

A. OEPA may determine that in addition to tasks defined in the approved RI/FS Workplan and any previously approved amendments, additional work may be necessary to accomplish the purpose and objectives of this Consent Order, as set forth in the Statement of Purpose and SOW. OEPA may require, in a written notice, that Respondent perform this work in addition to the work required by the approved RI/FS Workplan and any previously approved amendments, if OEPA determines that such work is necessary. Respondent shall confirm its willingness to perform the work in writing to OEPA within ten (10) days of receipt of OEPA's written notice and shall submit the draft amendment in the time frame specified in OEPA's written notice. Respondent shall implement the tasks which OEPA determines are necessary. The work shall be completed according to the standards, specifications, and schedule approved by OEPA in written amendment to the RI/FS Workplan.

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B. If at any time during the implementation of this Consent Order Respondent seeks to perform additional field work which will require an amendment of the work required under this Consent Order, including changes to any schedules, Respondent shall submit a prior written request for Amendment to OEPA explaining the need for and nature of the additional work or extension. OEPA shall respond in writing in a timely manner to Respondent's request and shall either approve or disapprove such request.

C. OEPA reserves the right to conduct additional work to accomplish the purpose and objectives of this Consent Order at any point, to seek reimbursement from Respondent, and/or to seek any other appropriate relief.

D. Work beyond the purposes of this Consent Order may be implemented through modification of this Consent Order in accordance with Section XXIII.

E. The provisions of Section XV, Dispute Resolution, shall apply to this Section.

#### X. DESIGNATED SITE COORDINATORS

A. Within ten (10) days of the effective date of this Consent Order, Respondent and OEPA shall each designate a Site Coordinator and an alternate for the purpose of overseeing the implementation of this Consent Order. To the maximum extent possible, except as specifically provided in this Consent Order, communications between Respondent and OEPA concerning the terms and conditions of this Consent Order shall be made between the designated Site Coordinators. Each designated Site Coordinator shall be responsible for assuring that all communications from the other Party is appropriately disseminated and processed. The Site Coordinators shall attempt to resolve disputes informally through good faith discussion on the technical issues.

B. Without limitation of any authority conferred on OEPA by statutes or

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regulations, the OEPA Site Coordinator's authority includes, but is not limited to: (1) taking samples or, in accordance with the terms of any Workplan, directing the type, quantity and location of samples to be taken by the Respondent; (2) observing, taking photographs, recording information, including but not limited to the use of sound and visual recording equipment, and making such other reports on the progress of the work as deemed appropriate; (3) directing that work stop, for a period not to exceed seventy-two (72) hours, whenever the OEPA Site Coordinator determines that activities at the Site may create or exacerbate a threat to public health or welfare or the environment; (4) reviewing Documents relevant to the Consent Order.

C. The Respondent's designated Site Coordinator or alternate shall be on-site or on-call at the Site during all hours of work at the Site and shall make himself/herself available for the duration of this Consent Order. The absence of the OEPA Site Coordinator from the Site shall not be cause for stoppage of work unless otherwise provided.

D. OEPA and Respondent each have the right to change their respective Site Coordinator or alternate. Such a change shall be accomplished by notifying the other Party in writing seven (7) days prior to the change.

#### XI. REPORTING

A. Respondent shall submit written progress reports which describe the activities which have been taken toward achieving compliance during the previous month, as well as activities which are scheduled for the next month, to OEPA by the tenth day of every month following the effective date of this Consent Order, or on a schedule that is mutually agreed to by the Parties, unless otherwise designated pursuant to this Consent Order.

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These reports shall:

1. Identify the Site and activity;
2. Describe status of work at the Site and progress to date;
3. Demonstrate the percentage of work completed in accordance with the approved schedule;
4. Describe difficulties encountered during the reporting period;
5. Describe actions being taken to rectify problems;
6. Describe activities planned for the next month;
7. Identify changes in key personnel;
8. List target and actual completion dates for each element of activity, including the project completion; and
9. Provide an explanation of any deviation from the milestones in the Workplan schedules.

Additional information may be included in the reports, upon mutual agreement of the Parties.

B. Such progress reports and any other documents, reports, approvals or correspondence submitted pursuant to this Consent Order shall be sent by certified mail return receipt requested (or the equivalent) to the OEPA at the following addresses (or to such address as the OEPA may hereafter designate in writing):

Ohio EPA  
1800 WaterMark Drive  
P. O. Box 163669  
Columbus, Ohio 43266-3669  
ATTN: DERR File Manager

Ohio EPA  
Central District Office, DERR  
3232 Alum Creek Drive  
Columbus, Ohio 43207-3417  
Attn: Georgia-Pacific Site Coordinator

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All correspondence to the Respondent will be directed to the following:

Georgia-Pacific Resins, Inc.  
133 Peachtree Street  
Atlanta, Georgia 30303  
Attn: Scott Bailey, Environmental Engineering

Georgia-Pacific Resins, Inc.  
1975 Watkins Road  
Columbus, Ohio 43207  
Attn: L. A. Norman, Plant Manager

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C. OEPA may, at its discretion, direct that reports or plans or proposals made pursuant to the Consent Order be submitted at extended intervals or that no further reports need be submitted.

**XIII. SAMPLING AND DATA/DOCUMENT AVAILABILITY**

A. OEPA and Respondent shall make available to each Party the results of sampling, tests or other data, including raw data, generated by any of them, or on their behalf, with respect to the implementation of this Consent Order.

B. Upon request of OEPA, Respondent shall require all laboratories and/or contractors to simultaneously deliver all raw data and all original reports of analytical procedures and results to OEPA and Respondent.

C. Respondent may submit to OEPA any interpretive reports and written explanations concerning raw data and original laboratory reports. Such interpretive reports or explanations may not be submitted in lieu of original laboratory reports and raw data. Should Respondent subsequently discover any error in any report or raw data, Respondent shall promptly notify OEPA of such discovery and provide the correct information.

D. At the request of OEPA, the Respondent shall allow OEPA to take split and/or duplicate samples collected by the Respondent during the implementation of the Consent Order. Likewise, at the request of Respondent, OEPA shall allow Respondent to take split samples and/or duplicates of samples collected by OEPA

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related to fulfilling the purpose and objectives of this Consent Order. Respondent shall notify the OEPA Site Coordinator not less than fifteen (15) days (unless otherwise agreed between the Site Coordinators) in advance of all sample collection to be performed in the implementation of this Consent Order.

E. Respondent shall preserve, during the duration of this Consent Order and for a minimum of ten (10) years after its termination, copies of all records and documents within its possession or that of its divisions, employees, agents, accountants or contractors which relate to work performed under this Consent Order. Respondent shall notify OEPA of its intention to destroy documents within thirty (30) days prior to the destruction of any such documents required to be kept pursuant to this Section after the ten (10) year period has expired. Upon request by OEPA, Respondent shall make available to OEPA such records or copies of any such records.

#### XIII. CONFIDENTIAL INFORMATION

A. Respondent reserves any rights it may have pursuant to law to claim that it may withhold from disclosure those documents protected by attorney-client communication or attorney work product privilege. Respondent shall make available to OEPA any analytical data or technical documents that are created, generated, or collected pursuant to the requirements of this Consent Order, regardless of whether the document has been generated in the form of attorney-client communication or other generally privileged manner.

B. Respondent may assert a claim of business confidentiality covering the information requested by this Consent Order, except for analytical data, pursuant to OAC Rule 3745-50-30(A), ORC Section 6111.05(A), and ORC Section 149.43. If no such claim accompanies the information when it is submitted to OEPA, it may be made available to the public by the OEPA without further notice

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to Respondent.

#### XIV. REVIEW OF SUBMITTALS

- A. Respondent shall submit all documents required by the Consent Order in accordance with the schedule contained in the RI/FS Workplan.
- B. OEPA agrees to review and approve or disapprove each Document specified in the Consent Order requiring OEPA approval in a timely manner. Documents which are submitted in sections or which form the basis for a more extensive final required submittal shall be reviewed when the final completed Document is submitted to OEPA, unless otherwise agreed to by OEPA. In the event Respondent is notified that a Document is disapproved in whole or in part, OEPA shall include a statement in the notification as to the changes, deletions, or additions which shall be made to the Document prior to approval, and an explanation as to why such changes, deletions, or additions are necessary. Within fourteen (14) days of receipt of OEPA notification requiring changes, deletions, or additions, Respondent shall amend and submit to OEPA a revised Document, correcting the deficiencies and incorporating all of the required changes, deletions, or additions.
- C. In the event such changes, deletions, or additions delay the time schedules set forth in the Workplans, schedules may be adjusted accordingly upon agreement of the Parties; such agreement will not be unreasonably withheld by OEPA, and such delay shall not be considered a violation of this Consent Order. The period for performance of only those activities contingent on completion of OEPA document review shall be extended, if needed, upon agreement of the Parties.
- D. In the event of subsequent disapproval of any revised document, failure to submit a document, or submittal of a document of unacceptable quality, OEPA

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retains the right to terminate this Consent Order, to perform additional studies or remediation, to conduct a complete or partial RI/FS, and enforce the terms of this Consent Order, or any combination of all of the above.

E. The provisions of Section XV, Dispute Resolution, shall apply to this Section.

#### XV. DISPUTE RESOLUTION

A. Unless it is expressly noted that a particular Section of this Consent Order is subject to the provisions of this Section, the dispute resolution section does not apply.

B. The Site Coordinators shall, whenever possible, operate by consensus. In the event that there is a disagreement about the adequacy or conduct of the work performed under this Consent Order or Workplans, or modified or additional work or schedules required by OEPA under this Consent Order, the Site Coordinators shall have seven (7) days to negotiate in good faith in an attempt to resolve the differences.

C. In the event that the Site Coordinators are unable to reach consensus on the disapproval or disagreement in seven (7) days, then each Site Coordinator shall reduce his/her position to written form within seven (7) days of the end of the good faith negotiations referenced above. This writing shall contain a detailed description of the basis for the dispute. Those written positions shall be immediately exchanged by the Site Coordinators. Following the exchange of written positions, the Parties, with the participation of the Group Leader and Unit Supervisor, Division of Emergency and Remedial Response (DERR), Central District Office, shall have an additional seven (7) days to resolve their differences. If OEPA concurs with the position of the Respondent, OEPA will amend the Workplans or modify the Consent Order to include necessary extensions

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of time or variances of required work.

D. If OEPA does not concur with the position of the Respondent, OEPA's Site Coordinator shall notify Respondent in writing. Upon receipt of such written notice, Respondent shall have seven (7) days to forward a written statement of the dispute and a request for a meeting with the Chief of DERR. Any such requested meeting shall be attended by the Chief of DERR or his/her designee. The designee pursuant to this paragraph shall be either the Assistant Chief or a Section Manager of DERR. The meeting shall be limited to concise presentations of each Party's position on the dispute, first by the Respondent, followed by the OEPA district office staff. The Chief of DERR or his/her designee shall be free to ask questions of either Party. The Chief of DERR or his/her designee shall resolve the dispute based upon and consistent with this Consent Order, the SOW, the workplan, and other appropriate state or federal law within seven (7) days of the requested meeting.

E. The pendency of dispute resolution set forth in this Section shall not affect the time period for completion of work to be performed under this Consent Order or the Workplans, except that upon mutual agreement of the Parties, any time may be extended as appropriate under the circumstances. Such agreement will not be unreasonably withheld by OEPA. Elements of work not affected by the dispute will be completed in accordance with the schedules contained in the Workplan.

**XVI. RESERVATION OF RIGHTS**

A. OEPA reserves the right to take any action pursuant to any available legal authority, including, but not limited to the right to seek injunctive relief, monetary penalties, recovery of oversight and Response Costs, natural resources damages, and punitive damages for any violation of this Consent Order or state,

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federal laws or regulations, or common law arising from or related to events or conditions at the Site.

B. Except as otherwise provided in Section V, above, the Respondent and OEPA expressly reserve all rights and defenses that they may have, including OEPA's right both to disapprove any work performed by Respondent and to request that Respondent perform tasks in addition to those detailed in the RI/FS Workplans, including RI work and/or engineering evaluation necessary to conform with the purpose and objectives of this Consent Order. In the event that Respondent declines to perform the work or declines to perform any additional and/or modified tasks, OEPA will have the right to undertake any Remedial Investigation, Feasibility Study work, and/or remedial action. In addition, OEPA reserves the right to undertake removal actions and/or remedial actions in accordance with ORC Sections 3734.20 through 3734.26, or Section 107 of CERCLA, or any applicable law. In any event, OEPA reserves the right to seek reimbursement from Respondent thereafter for such costs incurred by the State of Ohio. Except as provided herein, but notwithstanding the provisions of Paragraph B of Section XXVI, Waiver, which waive the Respondent's rights to seek judicial review of this Consent Order either in law or equity, Respondent reserves any rights it may have to raise any administrative, legal or equitable defense in any action brought by OEPA to enforce the terms and conditions of this Consent Order.

C. Nothing herein shall waive the right of OEPA to enforce this Consent Order under any applicable legal authority.

D. Upon issuance of the certification, in accordance with Section XXIV of this Consent Order, Respondent shall have resolved its liability to OEPA for only the work performed by Respondent pursuant to this Consent Order.

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DIRECTOR

Respondent is not released from any and all other liability.

E. Informal advice, guidance, suggestions, or comments by OEPA regarding reports, plans, specifications, schedules, or any other writings submitted by Respondent shall not relieve Respondent of its obligation to obtain such formal approval as may be required by this Consent Order.

**XVII. OTHER CLAIMS**

Nothing herein is intended to release, discharge or in any way affect any claims, causes of action or demands in law or equity against any person or entity, not a signatory to this Consent Order from any liability arising out of or relating in any way to the generation, storage, treatment, handling, transportation, release, or disposal of any Hazardous Wastes, Hazardous Substances, industrial wastes, other wastes, or pollutants at, to or from the Site. The Parties to this Consent Order expressly reserve all rights (including any right to contribution or indemnity possessed by the Respondent against any other parties who may be responsible for actual or threatened releases at the Site), claims, demands, and causes of the action they have or may have against any and all other persons and entities not parties to this Consent Order.

**XVIII. NOTICE, LAND USE AND CONVEYANCE OF TITLE**

Respondent shall assure OEPA that no portion of the Site will be used in any manner which would adversely affect the integrity of any containment systems which may remain at the Site or monitoring systems installed pursuant to this Consent Order. Respondent shall notify OEPA by registered mail at least ninety (90) calendar days prior to any conveyance or an intent to convey any interest in land which is known to comprise the Site and of the provision made for continued maintenance of the system(s). Respondent shall provide any prospective buyer, by registered mail, with written notification indicating the

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specific location of any containment systems, structures, or monitoring systems located at the Site. Such notification shall include a written survey description and map which details the location of any of the aforementioned systems or structures. Such written notification to any prospective buyer shall first be approved by OEPA.

**XIX. OTHER APPLICABLE LAWS**

All actions required to be taken pursuant to this Consent Order shall be undertaken in accordance with the requirements of all applicable local, state, and federal laws and regulations including all environmental laws and regulations.

**XX. INDEMNITY**

A. Respondent agrees to indemnify, save, and hold harmless OEPA from any and all claims or causes of action arising from or on account of acts or omissions of Respondent with respect to events or conditions at the Site. OEPA shall not be considered a party to and shall not be held liable under any contract entered into by Respondent in carrying out the activities pursuant to this Consent Order.

B. OEPA agrees to provide notice to Respondent within thirty (30) days of receipt of any claim which may be the subject of the indemnity in paragraph A., above, and to cooperate with Respondent in the defense of any such claim or action against OEPA.

**XXI. UNAVOIDABLE DELAYS**

A. Respondent shall cause all work to be performed within the agreed time schedules provided for in this Consent Order and/or any approved Workplan, unless any such performance is prevented or delayed by an event which constitutes an unavoidable delay. For purposes of this Consent Order, an

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"unavoidable delay" shall mean any event(s) beyond the control of Respondent which prevents or delays performance of any obligation required by this Consent Order and which could not be overcome by due diligence on the part of Respondent. Increased costs of compliance shall not be considered circumstances beyond the control of Respondent.

B. Respondent shall notify the OEPA in writing no later than ten (10) business days after its discovery of the occurrence of any event which Respondent contends is an unavoidable delay. Such written notification shall describe the anticipated length of the delay, the cause(s) of the delay, the measures taken and/or to be taken by the Respondent to minimize the delay, and the timetable under which these measures will be implemented. The Respondent shall have the burden of demonstrating that the event(s) constitute(s) an unavoidable delay, and OEPA shall make any determination with regard to such a claim.

C. In the event that OEPA agrees that an unavoidable delay has occurred, any affected schedules shall be modified upon mutual agreement of the Parties.

D. The provisions of Section XV, Dispute Resolution, shall apply to this Section.

#### XXIII. REIMBURSEMENT OF COSTS

A. Respondents shall reimburse OEPA for all oversight costs and Response Costs not inconsistent with the NCP incurred by OEPA in connection with this Consent Order both prior to and after the effective date of this Consent Order. Within sixty (60) days of the receipt of an itemized statement of response costs incurred prior to the effective date of this Consent Order, Respondent shall remit a check to OEPA for the full amount claimed.

OEPA will submit to Respondent an itemized statement of such costs of OEPA

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for the previous year within sixty (60) days of the end of each calendar year. Upon request, Respondent will be afforded an opportunity to discuss such itemized statement with the Chief of DERR or his/her designee prior to Respondent's payment of such costs. The designee pursuant to this Paragraph shall be either the Assistant Chief or a Section Manager of DERR.

Payment shall be due and owing upon receipt of the itemized statement from OEPA. Respondent shall pay within sixty (60) days such sums as follows: payment to OEPA shall be made by check payable to "Treasurer, State of Ohio," and shall be forwarded to Fiscal Officer, Division of Emergency and Remedial Response, P. O. Box 163669, 1800 WaterMark Drive, Columbus, Ohio 43266-3669.

B. A copy of the transmittal letter and a photocopy of the check shall be sent to the Site Coordinator.

C. A copy of the transmittal letter and a photocopy of the check shall be sent to Counsel for the Director of the Environmental Protection Agency, at the address above.

D. In the event that Respondent fails to complete the RI/FS in compliance with the terms of this Consent Order, OEPA reserves its right to bring an action against Respondent to enforce this Consent Order for recovery of past Response Costs in connection with the Site and any costs incurred in oversight of Respondent's implementation of this Consent Order (which are not paid pursuant to paragraph A of this Section) and all costs associated with OEPA's performance of the RI/FS or any part thereof. Nothing in this Consent Order shall be construed as a waiver of any right that OEPA may have to seek reimbursement of any Response Costs from any person not a party hereto.

**XXIII. EFFECTIVE DATE AND SUBSEQUENT MODIFICATION OF CONSENT ORDER**

A. The effective date of this Consent Order shall be the date on which it is

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entered in the Journal of the Director of OEPA.

B. This Consent Order may be modified by mutual agreement of the Parties. Modifications shall be in writing and shall be effective on the date the modification is entered in the Journal of the Director of OEPA.

C. Any reports, plans, specifications, schedules, and attachments and amendments required by this Consent Order are, upon approval by OEPA, an enforceable part of this Consent Order.

#### XXIV. AGREEMENT NOT TO REFER

Upon termination of this Consent Order pursuant to Section XXV and reimbursement to OEPA, as provided in Section XXII, OEPA agrees not to refer the Respondent to the Attorney General or to take administrative action against the Respondent for costs incurred by OEPA associated with the conduct and completion of the activities called for in this Consent Order, and Respondent shall be released from obligations embodied in this Consent Order with the exception of any ongoing maintenance, monitoring and reporting requirements developed pursuant to Section VIII, Work to be performed, above.

#### XXV. TERMINATION AND SATISFACTION

The provisions of this Consent Order shall be terminated when Respondent demonstrates in writing and certifies to OEPA's satisfaction that all activities required under this Consent Order (including any additional tasks which OEPA determined to be necessary in accordance with the provisions of this Consent Order and payment of oversight costs) have been completed and OEPA approves such certification in writing. Such approval shall not be unreasonably withheld by Ohio EPA. This notice shall not, however, terminate the obligation of Respondent to comply with Sections XII and XVI (record preservation and reservation of rights).

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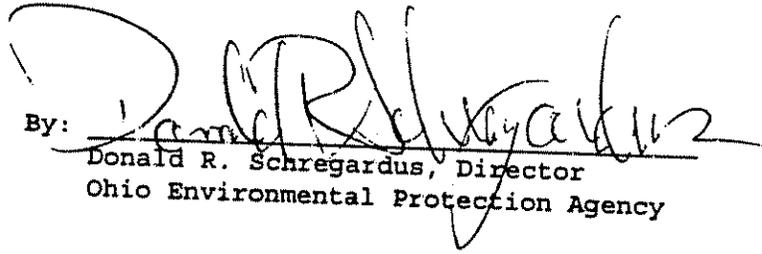
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IT IS SO ORDERED:

By:   
Donald R. Schregardus, Director  
Ohio Environmental Protection Agency

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Date

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XXVI. WAIVER

A. In order to resolve disputed claims, without admission of fact, violation, or liability, Respondent agrees that this Consent Order is lawful and reasonable, and agrees to perform all actions required by this Consent Order.

B. Respondent hereby waives all rights to appeal the issuance, terms and service of this Consent Order, and hereby waives any and all rights it might have to seek judicial review of said Consent Order either in law or equity.

C. Notwithstanding the preceding, OEPA and Respondent agree that in the event that this Consent Order is appealed by any other party to the Environmental Board of Review, or any court, Respondent retains the right to intervene and participate in such appeal. In such event, Respondent shall continue to comply with this Consent Order notwithstanding such appeal and intervention unless such Consent Order is stayed, vacated or modified.

IT IS SO AGREED:

By: James R. Taylor <sup>DPR</sup> 11/22/94  
Georgia-Pacific Corporation Resins, Inc. Date  
James R. Taylor  
Typed or Printed Name  
VP Chemical DW  
Title

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Ohio Environmental Protection Agency:

Donald R. Schregardus  
Donald R. Schregardus, Director

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Attachment A

Revised 05/26/92

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GENERIC STATEMENT OF WORK  
REMEDIAL INVESTIGATION/FEASIBILITY STUDY  
STATE VERSION

PURPOSE:

The purpose of this remedial investigation/feasibility study (RI/FS) is to investigate the nature and extent of releases of hazardous waste or constituents, pollutants, wastes, industrial wastes or contaminants at the Site, assess the potential risk to human health and the environment, and develop and evaluate potential remedial alternatives. The RI and FS are interactive and may be conducted concurrently so that the data collected in the RI influences the development of remedial alternatives in the FS, which in turn affects the data needs and the scope of treatability studies.

The Respondent shall conduct this RI/FS and shall produce an RI and FS report that are in accordance with this statement of work, the Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA (RI/FS Guidance) (U.S. EPA, Office of Emergency and Remedial Response, October 1988), and any other guidances that Ohio EPA uses in conducting an RI/FS (a list of the primary guidances is attached), as well as any additional requirements in the administrative order. The RI/FS Guidance describes the report format and the required report content. The Respondent shall furnish all necessary personnel, materials, and services needed, or incidental to, performing the RI/FS, except as otherwise specified in the administrative order.

At the completion of the RI/FS and the terms of this Order, the Ohio EPA shall be responsible for the selection of a site remedy. The remedial action alternative selected by the Ohio EPA shall meet the cleanup standards specified in the How Clean Is Clean Policy. That is, the selected remedial action will be protective of human health and the environment, shall be in compliance with applicable or relevant and appropriate requirements of other laws, will be cost-effective, shall utilize permanent solutions and alternative treatment technologies or resource recovery technologies, to the maximum extent practicable, and shall address the statutory preference for treatment as a principal element. The final RI and FS reports, as approved by the Ohio

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EPA, shall, with the administrative record, form the basis for the selection of the site's remedy and will provide the information necessary to support the development of a decision document.

The Ohio EPA shall provide oversight of the Respondent's activities throughout the RI/FS. The Respondent shall support the Ohio EPA's initiation and conduct of activities related to the implementation of oversight activities.

**TASKS/DELIVERABLES:**

The Remedial Investigation/Feasibility Study consists of eleven tasks:

**TASK 1 -- Scoping of the RI/FS**

- A. Site Background/Site History
- B. Current or Previous Interim/Emergency Actions

**TASK 2 -- Work Plan Requirements**

- A. RI/FS Work Plan
- B. Quality Assurance Project Plan
- C. Field Sampling Plan
- D. Health and Safety Plan

**TASK 3 -- Interim Actions**

**TASK 4 -- Community Relations**

**TASK 5 -- Remedial Investigation**

- A. Environmental Setting
- B. Source Characterization
- C. Contamination Characterization
- D. Ecological Assessment
- E. Potential Receptor Identification
- F. RI report

**TASK 6 -- Human Health Baseline Risk Assessment**

- A. Conceptual Site Model
- B. Human Risk Assessment Report

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TASK 7 -- Environmental Baseline Risk Assessment

- A. Conceptual Site Model
- B. Environmental Risk Assessment Report

TASK 8 -- Development and Screening Alternatives

- A. Remedial Action Objectives
- B. Technologies Screening
- C. Alternatives Array

TASK 9 -- Treatability Study

- A. Treatability Study Work Plan
- B. Treatability Study Evaluation Report

TASK 10 -- Detailed Analysis of Alternatives

- A. Detailed Analysis of Alternatives Report
- B. Feasibility Study Report

TASK 11 -- Monthly Progress Reports

TASK 1 -- SCOPING OF THE RI/FS

The Respondent shall describe the background of the Site, its history and current condition and outline the purpose and need for remedial investigation of the Site. Data gathered during previous investigations, site inspections and other relevant activities shall be used. Previous investigations shall be summarized and referenced. This information shall be documented in the RI/FS Work Plan (Task 2.A.).

A. Site Background/Site History

The Respondent shall review and analyze all existing site background information and will conduct a site visit to assist in planning the scope of the RI/FS.

1. Collect and analyze existing data and document the need for additional data

Before planning RI/FS activities, all existing site data will be thoroughly compiled and reviewed by the Respondent. Specifically, this will include presently available data relating to the varieties and quantities of hazardous, industrial and/or other wastes at the Site, and past disposal practices. This will also include results from any previous sampling events that may have been conducted. The Site background may reference applicable existing reports. The Respondent shall

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provide, at a minimum, the following:

- a. Map(s) depicting property lines, topography and surface drainage, all known active or past treatment, storage or disposal areas, all known past and present product and waste underground storage tanks and associated piping, surrounding land use and location of wells;
- b. A history and description of ownership and operation;
- c. A summary of past and present permits requested and/or recieved;
- d. A summary of known or suspected source areas; and
- e. A summary of any previous response action conducted by state, local, federal or private parties.

The Respondent shall refer to Table 2-1 of the RI/FS Guidance for a comprehensive list of data collection information sources. This information will be utilized in determining additional data needed to characterize the Site, better define potential applicable requirements, and develop a range of preliminarily identified remedial alternatives. Data Quality Objectives (DQOs) will be established subject to Ohio EPA approval which specify the usefulness of existing data. Decisions on the necessary data and DQOs will be made by the Ohio EPA.

The Respondent shall provide an annotated bibliography of existing reports for the Site, including reports relevant to the RI/FS.

2. Conduct Site Visit

The Respondent shall conduct a site visit during the project scoping phase to assist in developing a conceptual understanding of sources and areas of contamination as well as potential exposure pathways and receptors at the site. During the site visit the Respondent shall observe the Site's physiography, hydrology, geology, and demographics, as well as natural resources, ecological and cultural features and receptors. This information will be utilized to better scope the project and to determine the extent of additional data necessary to characterize the site, better define potentially applicable requirements and narrow the range of preliminarily identified remedial alternatives.

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B. Implementation of Interim/Emergency Actions.

1. The Respondent's report shall document any interim or emergency action which were or are being undertaken at the Site. This shall include:
  - a. Objectives of the interim or emergency actions: how the action has mitigated or is mitigating a potential threat to human health and the environment and/or is consistent with and integrated into any long term remedial action at the Site;
  - b. Design, construction, operation and maintenance requirements;
  - c. Schedules for design, construction and monitoring; and
  - d. Schedule for progress reports.

Respondent shall submit a report to the Ohio EPA documenting the results of Tasks 1.A.1., 1.A.2. and 1.B.1. as part of the of the RI/FS Work Plan.

TASK 2 -- RI/FS WORK PLAN REQUIREMENTS

At the conclusion of the scoping phase, the Respondent will submit an RI/FS work plan, a field sampling plan, a Quality Assurance Project Plan (QAPP), and a site health and safety plan. The RI/FS work plan, field sampling plan, and QAPP must be reviewed and approved by Ohio EPA prior to the initiation of field activities.

A. RI/FS Work Plan

A work plan documenting the decisions and evaluations completed during the scoping process will be submitted to Ohio EPA for review and approval. The work plan should be developed in conjunction with the QAPP, field sampling plan and the site health and safety plan, although each plan may be delivered under separate cover. The RI/FS Work Plan will also include a comprehensive description of the work to be performed as outlined in this SOW, including the methodologies to be utilized, as well as a corresponding schedule for completion. In addition, the work plan must include the rationale for performing the required activities.

In the RI/FS Work Plan, the Respondent shall present the

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justification for the proposed omission of any tasks of this SOW because of work that has already been performed or work that is not appropriate to the Site.

The RI/FS Work Plan will present a statement of the real or potential problem(s) posed by the Site and the objectives of the RI/FS. Furthermore, the plan will include a site background summary setting forth the Site description including the geographic location of the Site, and to the extent possible, a description of the Site's physiography, hydrology, geology, demographics, ecological, cultural and natural resource features; a synopsis of the site history and a description of previous responses that have been conducted at the site by local, state, federal, or private parties; a summary of the existing data in terms of physical and chemical characteristics of the contaminants identified, and their distribution among the environmental media at the site.

In addition, the plan will include a description of the site management strategy developed during scoping and data needs for evaluation of remedial alternatives. The plan will reflect coordination with treatability study requirements. The RI/FS Work Plan shall provide sufficient information for the Ohio EPA to identify applicable or relevant and appropriate Federal and state requirements (chemical specific, location-specific and action-specific).

The RI/FS work plan shall provide a detailed description of the tasks to be performed, information needed for each task (e.g., for human health and environmental risk evaluation) information to be produced during and at the conclusion of each task, and a description of the work products that will be submitted to the Ohio EPA. This includes the deliverables set forth in the remainder of this statement of work: a schedule for each of the required activities; the conceptual site model for and the human health baseline risk assessment; the conceptual site model for and the environmental baseline risk assessment; the RI report; the FS report and required interim deliverables; monthly reports to the Ohio EPA; and meetings and presentations to the Ohio EPA at the conclusion of each major phase of the RI/FS.

Because of the unknown nature of the Site and iterative nature of the RI/FS, additional data requirements and analyses may be identified throughout the process. The Respondent will submit a technical memorandum documenting the need for additional data, and identifying the DQOs whenever such requirements are identified. In any event, the Respondent is responsible for fulfilling additional data and analysis needs identified by the Ohio EPA consistent with the purposes and objectives of this RI/FS.

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B. Quality Assurance Project Plan

The Respondent shall prepare a plan to document all monitoring and investigation procedures: sampling, field measurements, sample analysis, toxicity testing, bioassays, and all modeling performed during the investigation to characterize the environmental setting, source(s), contamination, and human and biological receptors to ensure that all information, data and resulting decisions are technically sound, statistically valid and properly documented. This plan shall comport with Ohio EPA's Guidelines and Specifications for Preparing Quality Assurance Projects Plans, policy number DERR-00-RR-008. As required by Section VIII, Paragraph C, of this Order, Respondent shall schedule a meeting with this Agency to discuss the requirements of this plan.

1. Data Collection Strategy

The strategy section of the (QAPP) shall include but not be limited to the following:

- a. Description of the types and intended uses for the data, relevance to remediation or restoration goals, and the necessary level of precision, accuracy, and statistical validity for these intended uses;
- b. Description of methods and procedures to be used to assess the precision, accuracy and completeness of the measurement data;
- c. Description of the rationale used to assure that the data accurately and precisely represent a characteristic of a population, variation of physical or chemical parameters throughout the Site, a process condition or an environmental condition. Factors which shall be considered and discussed include, but are not limited to:
  - i) Environmental conditions at the time of sampling;
  - ii) Sampling design (including number, location and distribution);
  - iii) Representativeness of selected media, exposure pathways, or receptors; and
  - iv) Representativeness of selected analytical parameters.

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- v) Representativeness of testing procedures and conditions; and
  - vi) Independence of background or baseline from site influences.
- d. Description of the measures to be taken to assure that the following data sets can be compared quantitatively or qualitatively to each other:
- i) RI data collected by the Respondent over some time period;
  - ii) RI data generated by an outside laboratory or consultant employed by the Respondent versus data collected by the Respondent, and;
  - iii) Data generated by separate consultants or laboratories over some time period not necessarily related to the RI effort.
  - iv) Data generated by Ohio EPA or by an outside laboratory or consultant employed by Ohio EPA;
- e. Details relating to the schedule and information to be provided in quality assurance reports. These reports should include but not be limited to:
- i) Periodic assessment of measurement data accuracy, precision and completeness;
  - ii) Results of performance audits;
  - iii) Results of system audits;
  - iv) Significant quality assurance problems and recommended solutions; and
  - v) Resolutions of previously stated problems.

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2. Sample Analysis

The Sample Analysis section of the Quality Assurance Project Plan shall specify the following:

a. Chain-of-custody procedures, including:

- i) Identification of a responsible party to act as sample custodian at the laboratory facility authorized to sign for incoming field samples, obtain documents of shipment and verify the data

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- entered onto the sample custody records;
- ii) Provision for a laboratory sample custody log consisting of serially numbered lab-tracking report sheets; and
  - iii) Specification of laboratory sample custody procedures for sample handling, storage and dispersment for analysis.
- b. Sample storage procedures and storage times;
- c. Sample preparation methods;
- d. Analytical procedures, including:
- i) Scope and application of the procedure;
  - ii) Sample matrix;
  - iii) Potential interferences;
  - iv) Precision and accuracy of the methodology;
  - v) Method detection limits;
  - vi) Special analytical services required to ensure contract required detection limits do not exceed known toxicity criteria; and
  - vii) Verification and reporting of tentatively identified compounds.
- e. Calibration procedures and frequency;
- f. Data reduction, validation and reporting;
- g. Internal quality control checks, laboratory performance and systems audits and frequency, including:
- i) Method blank(s);
  - ii) Laboratory control sample(s);
  - iii) Calibration check sample(s);
  - iv) Replicate sample(s);
  - v) Matrix-spiked sample(s);
  - vi) "Blind" quality control sample(s);

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- vii) Control charts;
  - viii) Surrogate samples;
  - ix) Zero and span gases; and
  - x) Reagent quality control checks.
- h. Preventative maintenance procedures and schedules;
  - i. Corrective action (for laboratory problems); and
  - j. Turnaround time.
3. Modeling

The Modeling section of the Quality Assurance Project Plan shall apply to all models used to predict or describe fate, transport or transformation of contaminants in the environment and shall discuss:

- a. Model assumptions and operating conditions;
  - b. Input parameters; and
  - c. Verification and calibration procedures.
4. In Situ or Laboratory Toxicity Tests

The Toxicity Test section of the Quality Assurance Project Plan shall apply to all tests or bioassays used to predict or describe impacts of contaminants on a population, community, or ecosystem level.

5. Data Record

The QAPP shall also provide the format to be used to present the raw data and the conclusions of the investigation, as described in a, b, and c below:

- a. The data record shall include the following:
  - i) Unique sample or field measurement code;
  - ii) Sampling or field measurement location and sample or measurement type;
  - iii) Sampling or field measurement raw data;
  - iv) Laboratory analysis ID number;

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- v) Property or component measured; and
- vi) Result of analysis (e.g., concentration).

b. Tabular Displays

The following data shall be presented in tabular displays:

- i) Unsorted (raw) data;
- ii) Results for each medium, organism, or for each constituent measured;
- iii) Data reduction for statistical analysis;
- iv) Sorting of data by potential stratification factors (e.g., location, soil layer, topography, vegetation form);
- v) Summary data (i.e., mean, standard deviation, min/max values, and sample number); and
- vi) Comparisons with background or reference data.

c. Graphical Displays

The following data shall be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three dimensional graphs, etc.):

- i) Display sampling locations and sampling grid;
- ii) Indicate boundaries of sampling area, and areas where more data are required;
- iii) Display levels of contamination at each sampling location or location from which organism was taken;
- iv) Display geographical extent of contamination;
- v) Display contamination levels, averages and maxima;
- vi) Illustrate changes in concentration in relation to distance from the source, time, depth or other parameters;

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- vii) Indicate features affecting intramedia transport and show potential receptors;
- viii. Compare nature and extent of contamination with results of ecological or biological sampling or measurements; and
- ix) Display comparisons with background or reference analyses or measurements.

C. Field Sampling Plan

1. Sampling

The Sampling section of the Field Sampling Plan shall discuss:

- a. Sufficient preliminary sampling to ensure the proper planning of b through o below;
- b. Selecting appropriate sampling locations, depths, vegetation strata, organism age, etc. and documenting relevance of sample for intended biological toxicity tests or analyses;
- c. Providing a sufficient number of samples to meet statistical or other data useability objectives;
- d. Measuring all necessary ancillary data such as ambient conditions, baseline monitoring, etc.;
- e. Determining environmental conditions under which sampling should be conducted;
- f. Determining which media, pathways, or receptors are to be sampled (e.g., ground water, air, soil, sediment, biota, etc.);
- g. Determining which parameters are to be measured and where;
- h. Selecting the frequency and length of sampling period;
- i. Selecting the sample design (e.g., composites, grabs, random, repeated, etc.);
- j. Selecting the number, location, media or organisms for determining background conditions or reference conditions (refer to Appendix B, Background Sampling Guidance, of Ohio EPA's How Clean Is Clean Policy);

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- k. Measures to be taken to prevent contamination of the sampling equipment and cross contamination between sampling points;
- l. Documenting field sampling operations and procedures, including;
  - i) Documentation of procedures for preparation of reagents or supplies which become an integral part of the sample (e.g., filters and adsorbing reagents);
  - ii) Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;
  - iii) Documentation of specific sample preservation method;
  - iv) Calibration of field devices;
  - v) Collection of replicate and field duplicate samples;
  - vi) Submission of field-biased and equipment blanks, where appropriate;
  - vii) Potential interferences present at the site or facility;
  - viii) Construction materials and techniques associated with monitoring wells and piezometers;
  - ix) Field equipment listing and sample containers;
  - x) Sampling order; and
  - xi) Decontamination procedures.
- m. Selecting appropriate sample containers;
- n. Sample preservation; and
- o. Chain-of-custody, including:
  - i) Standardized field tracking reporting forms to establish sample custody in the field prior to and during shipment;
  - ii) Sample sealing, storing and shipping

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procedures to protect the integrity of the sample; and,

- iii) Pre-prepared sample labels containing all information necessary for effective sample tracking.

## 2. Field Measurements

The Field Measurements section of the Field Sampling Plan shall discuss:

- a. Selecting appropriate field measurement locations, depths, organism age etc.;
- b. Providing a sufficient number of field measurements that meet statistical or data useability objectives;
- c. Measuring all necessary ancillary data such as ambient or baseline environmental conditions;
- d. Determining conditions under which field measurement should be conducted;
- e. Determining which media, pathways, or receptors are to be addressed by appropriate field measurements (e.g., ground water, air, soil, sediment, biota, etc.);
- f. Determining which physical, chemical, or biological parameters are to be measured and where;
- g. Selecting the frequency and duration of field measurement; and
- h. Documenting field measurement operations and procedures, including:
  - i) Procedures and forms for recording raw data and the exact location, time and Site specific considerations associated with the data acquisition;
  - ii) Calibration of field devices;
  - iii) Collection of replicate measurements;
  - iv) Submission of field-biased blanks, where appropriate;
  - v) Potential interferences present at the Site;

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- vi) Construction materials and techniques associated with monitoring wells and piezometers used to collect field data;
  - vii) Field equipment listing;
  - viii) Order in which field measurements were made; and
  - ix) Decontamination procedures; and
- i. Selecting the number, location, media, and organisms for determining background or reference conditions.

D. Health and Safety Plan.

The Respondent shall develop a Health and Safety plan to protect the health and safety of personnel involved in the site investigations and the surrounding community.

1. Major elements of the Health and Safety Plan shall include:
  - a. Facility or site description including availability of resources such as roads, water supply, electricity and telephone service;
  - b. Description of the known hazards and an evaluation of the risks associated with the incident and with each activity conducted;
  - c. Listing of key personnel (including the site safety and health officer) and alternates responsible for site safety, response operations, and for protection of public health;
  - d. Delineation of work area, including a map;
  - e. Description of levels of protection to be worn by personnel in the work area;
  - f. Description of the medical monitoring program for on-site responders;
  - g. Description of standard operating procedures established to assure the proper use and maintenance of personal protective equipment;
  - h. The establishment of procedures to control site access;

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- i. Description of decontamination procedures for personnel and equipment;
  - j. Establishment of site emergency procedures;
  - k. Availability of emergency medical care for injuries and toxicological problems;
  - l. Description of requirements for an environmental monitoring program. (This should include a description of the frequency and type of air and personnel monitoring, environmental sampling techniques and a description of the calibration and maintenance of the instrumentation used.);
  - m. Specification of any routine and special training required for responders; and
  - n. Establishment of procedures for protecting workers from weather-related problems.
2. The Health and Safety Plan shall be consistent with:
- a. NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);
  - b. Section 111(c)(6) of CERCLA;
  - c. EPA Order 1440.3 -- Respiratory Protection;
  - d. EPA Order 1440.2 -- Health and Safety Requirements for Employees Engaged in Field Activities;
  - e. EPA Occupational Health and Safety Manual;
  - f. EPA Interim Standard Operating Safety Procedures and other EPA guidance as developed by EPA;
  - g. OSHA regulations particularly in 29 CFR 1910 and 1926;
  - h. State and local regulations; and
  - i. Site or facility conditions.

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The Safety Plan should identify problems or hazards that may be encountered and their solution. Safety procedures to be followed to protect third parties, such as visitors or the surrounding community, should also be provided.

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TASK 3 -- INTERIM ACTIONS

A. At any time during the Remedial Investigation, the Respondent may propose to conduct or the Ohio EPA may require that the Respondent conduct an interim remedial action(s). Any interim remedial action proposed by the Respondent for the Site must be approved by the Ohio EPA prior to implementation. The following factors shall be considered in determining the appropriateness of an interim remedial action:

1. Actual or potential exposure to nearby human populations, animals, or the food chain from hazardous wastes or substances;
2. Actual or potential contamination of drinking water supplies or sensitive ecosystems;
3. Hazardous waste or substances in drums, barrels, tanks or other bulk storage containers that may pose a threat of release;
4. High levels of hazardous waste or substances in soils largely at or near the surface that may migrate;
5. Weather conditions that may cause hazardous waste or substances to migrate or be released;
6. Threat of fire or explosion; and
7. Other situations or factors that may pose threats to public health, welfare or the environment.

B. The Respondent shall develop and submit for approval an Interim Action Work Plan that includes, but is not limited to, the following:

1. A discussion of the technical factors of importance for implementing the Interim Action;
2. A justification for selection of the preferred action and/or system modification based on its ability to meet the interim action criteria of preventing, minimizing or mitigating a substantial threat to the public health or the environment;
3. Treatment, storage or disposal of contaminated media in a manner that complies with federal and state laws, requirements and guidance documents adopted thereunder. Respondent shall obtain any permits necessary for implementation of the Interim Action. Ohio EPA shall consider, in a timely manner, such permit applications

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which Respondent may be required to submit pursuant to the Interim Action Work Plan;

4. A schedule of tasks, length of tasks and completion times, including any permits, permits-to-install and permits-to-operate, according to calendar days;
  5. A monitoring strategy to determine the effectiveness of the Interim Action;
  6. A Quality Assurance Project Plan (QAPP) for the Interim Action;
  7. a Health and Safety Plan (HASP) for the Interim Action.
- C. Within twenty (20) calendar days following Ohio EPA approval of the Interim Action Work Plan, Respondent shall commence implementation of the work as approved and in accordance with the schedule contained therein.
- D. Progress on the Interim Action shall be reported in the Monthly Progress Report per Task 11.

TASK 4 -- COMMUNITY RELATIONS

This task shall be completed by the Ohio EPA.

TASK 5 -- REMEDIAL INVESTIGATION

The Respondent shall conduct those investigations necessary to: characterize the site (Environmental Setting); define the source (Source Characterization); define the degree and extent of contamination (Contamination Characterization and Ecological Assessment); and identify actual or potential receptors (Ecological and Human Risk Assessment).

The investigations should result in data of adequate technical quality to support the development of the Human Health Baseline Risk Assessment and the Ecological Risk Assessment and the evaluation of remedial action alternatives of the Feasibility Study.

Remedial Investigation activities shall follow the plans set forth in Task 2. All sampling, analyses, and measurements shall be conducted in accordance with the QAPP. All sampling and measurement locations shall be documented in a log and identified on a detailed site map.

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A. Environmental Setting

The Respondent shall collect information to supplement and verify existing information on the environmental setting at the site as well as the environmental setting adjacent to and surrounding the Site. The Respondent shall characterize the following:

1. Regional Hydrogeology

The Respondent shall conduct a program to evaluate the regional hydrogeologic characteristics surrounding the facility. Regional information can be obtained as described in Task 1. This shall include but not be limited to:

- a. Depth to bedrock and lithology;
- b. Characteristics of major stratigraphic units and the depositional environment;
- c. Identification of regional aquifer(s);
- d. Identification of all residential, municipal, industrial and agricultural wells within a four (4) mile radius of the Site. Include any available information such as well logs, construction details, average yield and chemical analyses;
- e. Direction of ground water flow in the regional aquifer(s);
- f. Identification and characterization of recharge and discharge areas, with amount of recharge and discharge;
- g. Description of regional geomorphology, including locations of surface water bodies and floodways, etc. This description should include an analysis of any topographic features that may influence the ground water flow system; and
- h. Description of structural features such as jointing, faulting and folding.

2. Site Hydrogeology and Soil Characteristics

The Respondent shall conduct a program to evaluate site-specific hydrogeologic characteristics and soil characteristics at the Site. This description shall be based on data collected from

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bore holes, piezometers, laboratory and field tests. The description shall include:

- a. An accurate classification and description of the consolidated and unconsolidated stratigraphic units beneath the Site. This shall include:
  - i) Hydraulic conductivity (vertical and horizontal);
  - ii) Porosity, effective porosity, and bulk density;
  - iii) Rock and soil (ASTM 2488 and 2487) classification;
  - iv) Grain size distribution (sieve and hydrometer) curves;
  - v) Thickness;
  - vi) Lateral extent;
  - vii) Moisture content;
  - viii) The attenuation capacity and mechanisms of attenuation of the natural earth material and/or fill (i.e., ion exchange capacity, base saturation, organic carbon content, mineral content, soil sorptive capacity, storage capacity);
  - ix) Soil Ph;
- b. The Respondent shall conduct a program to characterize the near surface soil and rock units. This shall include:
  - i) SCS soil classification;
  - ii) Surface soil distribution;
  - iii) Infiltration;
  - iv) Evapotranspiration;
- c. A discussion of the local occurrence of ground water including:
  - i) Identification of all aquifer systems, including depth from the surface and lateral

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and vertical extent. (Aquifer system means one or more geologic unit or formation that is wholly or partly saturated with water and is able to store, transmit and yield significant amounts of water to wells or springs.);

- ii) Identification of all significant saturated zones above the aquifer systems;
  - iii) Depth to the water table;
  - iv) Ground water flow direction and rates in the aquifers and all strata above the aquifers;
  - v) Effects of stratification on saturated and unsaturated flow;
  - vi) Description of the interconnection between the saturated zones and the aquifers, surface water, seeps and springs;
  - vii) Description of recharge and discharge areas within the site boundaries. This shall include any relationship between ground water and springs, streams and other surface water features;
  - viii) Temporal fluctuations (i.e., seasonal and man-made) in ground water levels and their effects on ground water flow direction; and
  - ix) Identification of zones of high permeability that may act as a migration route for contaminants.
- d. Hydrogeologic cross sections showing the extent (depth, thickness and lateral extent) of each hydrogeologic unit shall be developed. Cross sections shall be developed in various orientations across the Site (e.g., in the direction of ground water flow and orthogonal to ground water flow). At a minimum the following shall be identified:
- i) Structures such as zones of fracturing or channeling likely to influence contaminant migration in the consolidated or unconsolidated deposits;

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- ii) Zones of higher permeability, such as sand and gravel deposits, that might direct the flow of contaminants;
  - iii) Zones of low permeability that may restrict and/or attenuate the flow of contaminants; and
  - iv) Water-bearing zones above the confining layer that may serve as pathways for contaminant migration including perched zones of saturation.
- e. Based on data obtained from ground water monitoring wells and piezometers installed upgradient and downgradient of the potential contaminant source, a representative description of water level or fluid pressure monitoring including:
- i) Water level contour and/or potentiometric surface maps;
  - ii) Hydraulic cross sections showing vertical gradients;
  - iii) Flow nets, including the vertical and horizontal components of flow and the interconnection between waterbearing strata; and
  - iv) Any temporal changes in hydraulic gradients and flow directions due, for example, to seasonal or man-made influences.
- f. A description of man-made influences that may affect the hydrogeology of the Site, identifying:
- i) Active and inactive water supply and production wells with appropriate pumping schedules; and
  - ii) Man-made structures such as pipelines, french drains, ditches, unlined and lined ponds, lagoons, septic tanks, NPDES permitted outfalls, retention areas and utility lines.
- g. An area-specific description of the geomorphology at the Site. At a minimum this shall include:
- i) An analysis of any topographic feature that may influence the ground water flow system;

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- ii) A surface topography map depicting (at a minimum) streams, wetlands, topographic depressions and springs. The topographic map shall be constructed by a qualified professional and shall provide contour intervals at a level of detail appropriate for the site specific hydrogeologic investigation (e.g., two-foot intervals). The map shall depict the location of all borings, monitoring wells and cross sections.
- h. An area-specific description of the structural geology at the Site;
- i. The RI report shall document the methods and procedures used to gather and evaluate the hydrogeologic data. These methods and procedures shall be in accordance with Ohio EPA and U.S. EPA guidance. This may include but is not limited to:
  - i) The drilling and soil sampling methods used in characterizing the soil and hydrogeologic characteristics of the Site (including all boring logs and raw data);
  - ii) The analytical procedures and methods used to characterize the soil and rock materials obtained from the borings and/or test pits;
  - iii) The methods, equipment and procedures used to define the aquifer systems and all significant zones of saturation above the uppermost aquifer system including:
    - 1) Well and piezometer location, depth, construction and installation specifications (including diagrams);
    - 2) Water level measurements and procedures;
    - 3) Ground water seepage observations during drilling; and
    - 4) Pumping tests and slug tests (including type, description and rationale for its use, raw data and method of interpreting the results).
  - iv) A description, rationale and raw data of indirect methods such as soil survey, geophysical and modeling. (These methods can be used to infer ground water characteristics and support or guide direct methods. However, no

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site remedial investigation can be based strictly on these methods.)

3. Surface Water and Sediment

The Respondent shall conduct a program to characterize any surface water bodies in the vicinity of the Site. Such characterization shall include, but not be limited to, the following activities and information:

- a. Description of the temporal and permanent surface water bodies including:
- i) For lakes and estuaries: location, elevation, surface area, inflow, outflow, depth, temperature stratification and volume;
  - ii) For impoundments: location, elevation, surface area, depth, volume, freeboard and purpose of impoundment;
  - iii) For streams, ditches, drains, swamps and channels: location, elevation, flow, velocity, depth, width, seasonal fluctuations and flood zones (i.e., 50 and 100 year events);
  - iv) Drainage patterns;
  - v) Evapotranspiration; and
  - vi) Any other known discharges including those permitted by NPDES.
- b. Description of the chemistry of the surface water and sediments. This includes determining the Ph, total dissolved solids, total suspended solids, biological oxygen demand, alkalinity, conductivity, dissolved oxygen profiles, nutrients, chemical oxygen demand, total and dissolved organic carbon, specific contaminant concentrations, etc.
- c. Description of sediment characteristics including:
- i) Deposition area, patterns, and rates;
  - ii) Thickness profile; and
  - iii) Physical and chemical parameters (e.g., grain size, density, organic carbon content, ion exchange capacity, Ph, etc.)

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4. Air

The Respondent shall provide information characterizing the climate in the vicinity of the Site in general, and at the time of the investigation(s). Such information shall include, but not be limited to:

- a. A description of the following parameters:
- i) Annual and monthly rainfall averages;
  - ii) Monthly temperature averages and extremes;
  - iii) Wind speed and direction;
  - iv) Relative humidity/dew point;
  - v) Atmospheric pressure;
  - vi) Evaporation data;
  - vii) Development of inversions; and
  - viii) Climate extremes that have been known to occur in the vicinity of the facility, including frequency of occurrence.
- b. A description of topographic and man-made features which affect air flow or emission patterns, including:
- i) Ridges, hills or mountain areas;
  - ii) Canyons or valleys;
  - iii) Surface water bodies (e.g. rivers, lakes, bays, etc.);
  - iv) Wind breaks and forests; and
  - v) Buildings; and
  - vi) Any other features that may affect air flow or emission patterns.

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B. Source Characterization

The Respondent shall collect analytical data to completely characterize the wastes and the areas where wastes have been placed, collected, came to be located or removed including: type (hazardous, solid, residential, industrial, etc.); quantity; physical form; disposition

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(containment or nature of deposits); and Site characteristics affecting release (e.g., Site security and engineering barriers). Data shall include all information referenced in the Remedial Investigation Work Plan (Task 2). This shall include quantification of the following specific characteristics, at each source area:

1. Unit/Disposal Area characteristics:

- a. Location of unit/disposal area;
- b. Type of unit/disposal area;
- c. Design features;
- d. Operating practices (past and present);
- e. Period of operation;
- f. Age of unit/disposal area;
- g. General physical conditions; and
- h. Method used to close the unit/disposal area.

2. Waste Characteristics:

a. Type of waste placed in the unit;

- i) Hazardous classification (e.g., listed, flammable, reactive, corrosive, oxidizing or reducing agent);
- ii) Quantity; and
- iii) Chemical composition.

b. Physical and chemical characteristics;

- i) Physical form (solid, liquid, gas);
- ii) Physical description (e.g., powder, oily sludge);
- iii) Temperature;
- iv) Ph;
- v) General chemical class (e.g., acid, base, solvent);
- vi) Molecular weight;

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- vii) Density;
- viii) Boiling point;
- ix) Viscosity;
- x) Solubility in water;
- xi) Cohesiveness of the wastes;
- xii) Vapor pressure; and
- xiii) Flash point.

c. Migration and dispersal characteristics of the waste;

- i) Sorption;
- ii) Biodegradability, bioconcentration, biotransformation;
- iii) Photodegradation rates;
- iv) Hydrolysis rates;
- v) Chemical transformations;
- vi) Chemical interactions; and
- vii) Products of all such reactions or processes.

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The Respondent shall document the procedures used in making the above determinations.

C. Contamination Characterization

The respondent shall collect analytical data on air, ground water, soils, surface water, sediment and subsurface gas contamination in the vicinity of the Site. This data shall be sufficient to define the extent, origin, direction and rate of movement of contaminants. Data shall include all information referenced in the Remedial Investigation Work Plan (Task 2). The Respondent shall address the following types of contamination at the Site:

1. Ground Water Contamination

The Respondent shall conduct a ground water investigation to characterize the nature and extent of any plumes of contamination at the Site. The investigation shall include a description and quantification of ground water quality in the aquifer systems and all

significant zones of saturation or permeable zones that may act as pathways for contaminant migration. This investigation shall at a minimum provide the following information:

- a. A description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the Site;
- b. The horizontal and vertical direction of contamination movement;
- c. The velocity of contaminant movement;
- d. The horizontal and vertical concentration profile of Appendix VIII constituents in the plume(s);
- e. An evaluation of site specific factors influencing the plume movement;
- f. An extrapolation of future contaminant movement; and
- g. An investigation to characterize the nature and extent of contamination of residential, municipal, industrial and agricultural wells within the vicinity of the Site.

The Respondent shall document the procedures used in making the above determinations (e.g., well design, well construction, geophysics, modeling, etc.). These procedures shall comport with appropriate U.S. EPA and Ohio EPA guidance.

## 2. Soil Contamination

The Respondent shall conduct an investigation to characterize the nature and extent of contamination of the soil and rock units in the vicinity of the contaminant release. The investigation shall include the following information:

- a. A description of the vertical and horizontal extent and pattern of contamination;
- b. A description of contaminant and soil chemical physical, and biological properties within the contaminant source area and plume. This includes a site specific discussion of contaminant solubility, speciation, adsorption, leachability, exchange capacity, biodegradation, hydrolysis, photolysis, oxidation and other factors that might affect contamination migration and transformation;

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- c. Specific contaminant concentrations;
- d. The velocity and direction of contaminant movement; and
- e. An extrapolation of future contaminant movement.

The Respondent shall document the procedures used in making the above determinations.

### 3. Surface Water and Sediment Contamination

The Respondent shall conduct a investigation to characterize the nature and extent of contamination in surface water bodies and sediment resulting from contaminant releases at the Site. The investigation shall include, but not be limited to, the following information:

- a. A description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the Site, and the extent of contamination in underlying sediments;
- b. The horizontal and vertical direction of contaminant movement in surface water and sediment;
- c. The contaminant velocity;
- d. An evaluation of the physical, biological and chemical factors influencing contaminant movement;
- e. An extrapolation of future contaminant movement; and
- f. A description of the chemistry of the contaminated surface waters and sediments. This includes determining the Ph, total dissolved solids, specific contaminant concentrations, etc.

Respondent shall document the procedures used in making the above determinations.

### 4. Air Contamination

The Respondent shall conduct an investigation to characterize the nature and extent of particulate and gaseous contaminants released into the atmosphere. The investigation shall provide the following information:

- a. A description of the horizontal and vertical direction and velocity of contaminant movement;

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- b. The rate and amount of the release;
- c. Chemical and physical nature of contaminated particulates including respirable portion, source emission rates, contaminant concentrations in respirable portions;
- d. Existing or potential human or biological receptors, of air contaminants, including respirable contaminant concentrations at known or potential receptors; and
- e. The chemical and physical composition of the contaminant(s) released, including vertical and horizontal concentration profiles; and
- f. Environmental factors that alter or mitigate fate and transport of contaminants in the atmosphere.

The Respondent shall document the procedures used in making the above determinations.

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5. Subsurface Gas Contamination

The Respondent shall conduct an investigation to characterize the nature and extent of subsurface gases emitted from buried hazardous, industrial and/or other waste and hazardous constituents in the soil and/or ground water. This investigation shall include the following information:

- a. A description of the horizontal and vertical extent of subsurface gases migration;
- b. The chemical composition of the gases being emitted from the subsurface or surface;
- c. The rate, amount, and density of the gases being emitted; and
- d. Horizontal and vertical concentration profiles of the subsurface gases emitted.

The Respondent shall document the procedures used in making the above determinations.

D. Ecological Assessment

The Respondent shall conduct an investigation to characterize any adverse effects to flora and fauna, at the population, community or ecosystem level, that is or has been caused or influenced by contamination from the facility. The data from

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this investigation shall be collected in a manner that is compatible and concurrent with the other sections of Task 4. The activities described for this section may be performed iteratively and/or in a phased approach as more data is gathered during other portions of the remedial investigation. Therefore, parts of the work plans(s) for this section may be submitted as separate deliverables from Task 2.C., Phase I Ecological Assessment.

1. Site Characterization

Based on existing data and limited field work, the respondent shall consider the following:

- a. See Task 1.A. (Site Background/Site History);
- b. Identification of potential and probable ecological receptors including threatened and endangered species, unique and sensitive habitats or resources, etc.;
- c. Identification of potential or probable exposure points for ecological receptors;
- d. Document known or suspected effects of site contaminants to biota; and
- e. Additional data needed for site characterization and the rationale for its necessity.

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2. Additional Site Characterization (Phase Ib Ecological Assessment)

Based on evaluations from Task 5.D.1. above, if existing information is insufficient to determine the extent and magnitude of adverse impacts and whether a Phase II Ecological Assessment is warranted, the Respondent shall develop work plans for and implement the following in keeping with the requirements of Tasks 2.B. and 2.C.:

- a. Identification and evaluation of habitats that are or may be exposed to contamination;
- b. Semiquantitative surveys of flora and fauna that are or may be exposed to contamination, which shall include, but not be limited to:
  - i) All vegetative strata;
  - ii) Flora and fauna in all contaminated media;
  - iii) Population parameters (e.g., density, frequency age distribution); and

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- iv) Community parameters (e.g., diversity, structure, stability).
  - c. Identification of background or reference area for each exposed population, community or ecosystem and completion of surveys for comparison to Tasks 5.D.2.a. and 5.D.2.b. above; and
  - d. Sampling of media or biota for accumulation or intake studies and toxicity tests to determine the extent of toxicity as related to areas of known or potential contamination. of contaminant concentrations or intakes.
3. Initial Toxicity Assessment (to be performed in conjunction with 5.D.1. and 5.D.2. above, as applicable)

The respondent shall perform a literature review of information regarding the toxicity, fate and transport characteristics, ecological effects, and likely biological receptors for the contaminants of concern.

4. Preliminary Ecological Assessment

The respondent shall combine the results of Tasks 5.D.3., above in order to define or evaluate the following on a site-specific basis:

- a. Initial identification of exposure pathways and ecological receptors;
  - b. The existence of or potential for current and future adverse effects to occur on a population, community or ecosystems level; and
  - c. Determine if the results of the Phase I Ecological Assessment indicate the need for further ecological studies.
5. Phase II Ecological Assessment

Respondent shall prepare and implement, following Ohio EPA approval, a detailed work plan for further site investigations that shall be compatible with requirements listed in 4.D.3, but also include the following:

- a. Study objectives and relevance to risk assessment objectives;
- b. Identification of ecological measurement endpoints, assessment endpoints, and endpoint selection criteria;

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- c. Semiquantitative and quantitative surveys of flora and fauna;
- d. Chemical sampling in potentially exposed habitats and reference sites;
- e. Laboratory and in situ toxicity testing; and
- f. Tissue analyses.

6. Ecological Assessment Report

The respondent shall prepare a report including all results from Tasks 5.D.1. to 5.D.5. above for incorporation into the Environmental Risk Assessment (see Task 6).

Special Note: Because seasonal effects can impart a profound influence on the results of biological or ecological sampling, the Ohio EPA requires that all sampling or testing of flora and fauna shall take place between April 1 and October 30 unless otherwise approved by the Site Coordinator.

E. Potential Receptor Identification

The Respondent shall collect data describing the human populations, plant and animal populations, communities, and ecosystems that are or may be susceptible to contaminant exposure from the Site. Chemical analysis of biological samples or data on observable effects in ecosystems may be needed to properly identify biological receptors. Some of this information shall be obtained from information gathered during the Ecological Assessment (see Task 5.D.). The following characteristics shall be identified:

- 1. Local current and potential future uses of ground water:
  - a. Type of use (e.g., municipal or residential, agricultural, domestic/non-potable and industrial, nonagricultural use by flora and fauna); and
  - b. Location of ground water users including wells and discharge areas.
- 2. Local current and potential future uses of surface waters in the vicinity of the Site:

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- a. Type of use (e.g., municipal or residential, agricultural, domestic/non-potable and industrial, nonagricultural use be flora and fauna); and
  - b. Location of surface water users or use areas.
3. Use of or access by humans or biota to the site or facility and adjacent lands, including but not limited to:
- a. Recreational;
  - b. Hunting;
  - c. Residential;
  - d. Commercial;
  - e. Zoning;
  - f. Nonagricultural use by flora and fauna; and
  - g. Future land use or access.
4. A demographic profile of the people who use or who have access to the facility and adjacent land including, but not limited to age, sex and sensitive subgroups.

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F. RI Report

The Respondent shall prepare a Remedial Investigation (RI) Report to present Task 5, above, and Tasks 6 and 7, described below. The RI Report shall be developed in draft form for Ohio review and approval (refer to Section XIV of this Order, Review of Submittals). The report shall describe the nature and extent of contamination (qualitative/quantitative) in relation to background areas indicative for the area.

TASK 6 -- HUMAN HEALTH BASELINE RISK ASSESSMENT

The Respondent shall prepare a thorough analysis and summary of all Site investigations and their results. The objective of this task will be to ensure that the investigation data are sufficient in quality (e.g, quality assurance procedures have been followed) and quantity to adequately describe the nature and extent of contamination, actual and potential future threats to human health and/or the environment and to support the feasibility study.

The results and data from all site investigations shall be or-

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ganized and presented logically so that the relationships between and among remedial investigations for all media and receptors are apparent.

A. Conceptual Site Model.

In order to expedite review and approval of the Human Risk Assessment by the Ohio EPA the Respondent shall prepare a Conceptual Site Model (CSM) prior to completing the Human Risk Assessment Report. The CSM is an interim document that shall briefly describe the following in tables or lists based on pre-existing site information and information gathered to date during the RI:

1. Goals of the assessment;
2. Types and sources of information or data that will be used in the assessment;
3. Major assumptions or limitations influencing the application of the assessment;
4. Criteria for selecting chemicals of concern;
5. Exposure pathways, scenarios, and assumptions; and
6. Other interim deliverables.

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B. Human Risk Assessment Report.

Based upon the CSM, the Respondent shall prepare a risk assessment which shall contain a discussion of and present the data required in the tasks outlined below:

1. Selection of Contaminants of Concern. Respondent shall:
  - a. Evaluate data based on approved data useability procedures (e.g., laboratory or data validation qualifiers, frequency and contaminant concentrations);
  - b. Further reduce the number of chemicals of concern based on chemical toxicity to human and biological receptors, number of chemicals, environmental mobility, background data, etc.; and
  - c. Develop a final list of Contaminants of Concern.
2. Estimate of Exposure Point Concentrations of Indicator Chemicals. Respondent shall:

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- a. Combine site monitoring data and environmental modeling results to:
  - i) identify exposure pathways;
  - ii) estimate exposure point concentrations; and
  - iii) compare these concentrations to requirements, standards and criteria.
  
- 3. Estimate of Chemical Intakes. Respondent shall:
  - a. Provide estimates of chemical intakes from:
    - i) Air
    - ii) Ground water
    - iii) Surface water
    - iv) Other exposure pathways (soils, food-stuffs, recreation, etc.)
  
  - b. Combine pathway-specific intakes to yield total oral and total inhalation routes.
  
- 4. Respondent shall evaluate critical toxicity values (i.e., numerical values describing a chemical toxicity) and review general toxicological information for the indicator chemicals.
  
- 5. Risk Characterization. Respondent shall provide a detailed characterization of the risk posed by releases of toxic chemicals from the site. The characterization shall include the following elements:
  - a. Noncarcinogenic effects using the Hazard Index approach, where:
 
$$HI = E(1)/RL(1) + E(2)/RL(2) + \dots E(i)/RL(i)$$

E(i) = Exposure level (or intake) for the (i)th toxicant

RL(i) = Reference level (or intake) for the (i)th toxicant
  
  - b. Potential carcinogenic effects using the predicted risk approach, where:

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$$Risk = CDI \times \text{Carcinogenic Potency Factor}$$

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CDI = Chronic Daily Intake

It is assumed that risks are additive and there is independence of action by the compounds involved. Therefore, the following equations are used:

Carcinogenic risk for chemical X = [CDI (inhalation) x PF (inhalation)] + [CDI (oral) x PF (oral)]

Total carcinogenic risk = (carcinogenic risk for chemical 1 + carcinogenic risk for chemical 2 + ... + carcinogenic risk for chemical (i))

c. Uncertainties.

Respondent shall provide a discussion of the uncertainties and assumptions made in the assessment process.

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TASK 7 -- ENVIRONMENTAL BASELINE RISK ASSESSMENT.

The Respondent shall prepare a risk assessment which shall contain a discussion of present and future potential risk to ecosystems and populations exposed to contamination; information necessary to evaluate the environmental impact of proposed remedial alternatives; and information that can be utilized for the development of subsequent cleanup criteria in the tasks outlined below (note the Site Coordinator may approve combination of Tasks 6 and 7 into a single set of deliverables):

A. Conceptual Site Model.

The respondent shall prepare an interim document as defined in Task 6.A. above with emphasis on site ecology and biological receptors.

B. Environmental Risk Assessment Report

1. Briefly Describe the Site and Study Area:

- a. Describe physical and chemical factors that impact site ecology (e.g., fate and transport of contaminants, bioavailability, etc.);
- b. Describe past or current practices, disturbances, or stresses that impact(ed) site ecology;
- c. Describe the areal extent of environmental assessment;

- d. Provide a full account of ecosystems and populations potentially exposed to contamination; and
- e. Describe current and projected land use in and around the site as relevant to site ecology.
2. Describe Contaminants and Ecological Endpoints of Concern:
- a. (See Task 6.B.1);
- b. Specifically consider contaminants that pose toxicity or bioaccumulation potential to biological receptors and/or are available for exposure to populations and ecosystems; and
- c. Measurement and assessment endpoints and indicator species and rationale for their selection.
3. Characterize Exposure:
- a. Combine site data, environmental modeling results and peer reviewed scientific literature to:
- i) identify exposure pathways; and
- ii) estimate exposure point concentrations by species, habitat, and exposure scenario; and
- iii) identify site specific fate and transport processes.
- b. Verify exposure to populations or ecosystems:
- i) show correlations between concentrations and appropriate ecological endpoints (e.g., toxicity tests and population studies) along likely exposure pathways; and
- ii) compare data from other toxicity tests, population studies, modeled uptakes, or reference areas to show exposure has occurred.
4. Characterize Risk or Threat.

The Respondent shall discuss and reduce the uncertainty over the receptor populations, communities, or ecosystems that are or may be affected; the estimation that adverse effect(s) will or are occur(ring); the magnitude of such an effect(s); and the temporal character of such an effect(s) by:

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- a. Identifying requirements, standards and criteria;
- b. Identifying relevant, peer reviewed literature toxicity values or toxicological effects where the above are lacking;
- c. Comparison of exposure concentrations to a. and b. above, using suitable uncertainty factors and considering both chronic and acute endpoints;
- d. Presenting the number and magnitude of exceedances of a and b above;
- e. Presenting supporting evidence of risk from:
  - i) contaminant concentrations in biota;
  - ii) toxicity test results;
  - iii) supporting literature;
  - iv) field surveys of receptor populations;
  - v) measures of community structure and ecosystem function;
  - vi) comparison with reference or background data or observations; and
- f. Discussing adverse or potential adverse effects under future use conditions.

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5. Summary and Conclusions:

- a. Summarize effects or potential effects of contamination to biological populations, communities or ecosystems under current and future use conditions;
- b. Describe future effects in absence of remedial action; and
- c. Describe population, community or ecosystem characteristics that may impact the nature of remedial actions.

6. Assessment of Uncertainties and Limitations:

- a. Describe all sources of uncertainty (e.g., variance estimates, underlying model assumptions, lack of toxicity information, unexpected influences on ecological assessment, etc.), their magnitude and direction of impact on estimation of risk; and

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- b. Describe assessment limitations (e.g., deviations from intended goals, data gaps, etc.).

TASK 8-DEVELOPMENT AND SCREENING OF REMEDIAL ALTERNATIVES

The development and screening of remedial alternatives is performed to develop an appropriate range of waste management options that will be evaluated. This range of alternatives should include as appropriate, options in which treatment is used to reduce the toxicity, mobility, or volume of wastes, but varying in the types of treatment, the amount treated, and the manner in which long-term residuals or untreated wastes are managed; options involving containment with little or no treatment; options involving both treatment and containment; and a no-action alternative. The following activities will be performed by the Respondent as a function of the development and screening of remedial alternatives.

The Respondent will begin to develop and evaluate a range of appropriate waste management options that at a minimum ensure protection of human health and the environment, concurrent with the RI site characterization tasks.

A. Remedial Action Objectives

1. Develop and document remedial action objectives

The Respondent shall develop preliminary remedial objectives, specifying the contaminant(s) and media or medium of interest, exposure pathway and preliminary remediation goals that establish a range of treatment and containment alternatives to be evaluated.

These remedial action objectives shall be based on information gathered during the Remedial Investigation, Ohio EPA's How Clean Is Clean policy and other pertinent Ohio EPA guidance, chemical specific ARAR's, when available other information (e.g., RfDs) and site specific factors, and shall be not inconsistent with section 300.430 of the NCP. Final remediation goals shall be determined by the Ohio EPA at or after the point the remedy is selected and are not part of this order.

In order to expedite review and approval of the Feasibility Study, the Respondent shall prepare a technical memorandum outlining the remedial action objectives.

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This interim deliverable will document the methods, rationale, and results of the alternatives screening process. The Respondent will refer to the U.S.EPA Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA for an outline of the report format and the required report contents. This report will become a major portion of the Feasibility Study Report to be submitted as part of Task 10.B.

Based upon the Alternatives Array Report, the Ohio EPA shall identify and provide to the Respondent ARARs for the range of alternatives presented. These ARARs may be modified by the Agency based upon the results of other tasks of this SOW.

## TASK 9 -- TREATABILITY STUDY

### A. Treatability Study Work Plan

#### 1. Determining the Need for Treatability Studies

##### a. Ohio EPA Required Treatability Studies

The Respondent shall conduct any necessary laboratory and treatability study(ies) required by the Ohio EPA to determine the applicability of remedial technologies.

##### b. Respondent-Proposed Treatability Studies

Upon approval by the Ohio EPA, the Respondent may conduct any laboratory and treatability study(ies) that it has proposed to the Agency to determine the applicability of remedial technologies.

#### 2. Treatability Study Work Plan

When required or approved of by the Ohio EPA, the Respondent shall develop and submit to this Agency for approval a testing work plan identifying the type(s) and goal(s) of the treatability study(ies), the level of effort needed, the experimental design, and the procedures to be used for data management, validation and interpretation. This work plan shall comport with U.S. EPA's guidance document, Guide for Conducting Treatability Studies Under CERCLA (Interim Final) EPA/540/2-89/058.

The work plan shall include the following elements:

##### a. Establishing data quality objectives

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## B. Technologies Screening

### 1. Develop general response actions

The Respondent shall develop general response actions for each medium of interest defining containment, treatment, excavation, pumping, or other actions, singly or in combination, to satisfy the remedial action objectives.

### 2. Identify areas or volumes of media

The Respondent shall identify volumes of media to which general response actions may apply, taking into account requirements for protectiveness as identified in the remedial action objectives. The chemical and physical characterization of the Site will also be taken into account.

### 3. Identify, screen, and document remedial technologies

The Respondent shall identify and evaluate technologies applicable to each general response action to eliminate those that cannot be implemented at the Site. General response actions will be refined to specify remedial technology types. Technology process options for each of the technology types will be identified either concurrent with the identification of technology types, or following the screening of the considered technology types. Process options shall be evaluated on the basis of effectiveness, implementability, and cost factors to select and retain one or, if necessary, more representative process for each technology type. Evaluation should typically focus on effectiveness factors at this stage with less effort directed at the implementability and cost factors. The technology types and process options will be documented for inclusion in the Alternatives Array Report as described below under Task 8.C.4. The reasons for eliminating technologies must be specified.

## C. Alternatives Array

### 1. Assemble and document alternatives

The Respondent shall assemble selected representative technologies into alternatives for each affected medium or operable unit. Together, all of the alternatives will represent a range of treatment and containment combinations that will address either the Site or the operable unit as a whole. A summary of the assembled alternatives will be prepared by the Respondent for

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inclusion in the Alternatives Array Report described below. The reasons for eliminating alternatives during the preliminary screening process must be specified.

2. Refine alternatives

The Respondent shall refine the remedial alternatives to identify contaminant volume addressed by the proposed process and sizing of critical unit operations as necessary. Sufficient information will be collected for an adequate comparison of alternatives. Remedial action objectives for each medium will also be refined as necessary to incorporate any new risk assessment information being generated from the remedial investigation. Additionally, Ohio EPA will update APARS as the remedial alternatives are refined.

3. Conduct and document screening evaluation of each alternative

The Respondent may perform a final screening process based on short and long term aspects of effectiveness, implementability, and relative cost. Generally, this screening process is only necessary when there are many feasible alternatives available for detailed analysis. If necessary, the screening of alternatives will be conducted to assure that only the alternatives with the most favorable composite evaluation of all factors are retained for further analysis.

As appropriate, the screening will preserve the range of treatment and containment alternatives that was initially developed. The range of remaining alternatives will include options that use treatment technologies and permanent solutions to the maximum extent practicable, and minimize media transfer. The Respondent shall prepare a summary of the results and reasoning employed in the screening, the assembly of alternatives that remain after screening. The summary will be submitted with the Alternatives Array Report as described below.

4. Alternatives Development and Screening Deliverables

In order to expedite review and approval of the Feasibility Study, the Respondent will prepare an Alternatives Array Report summarizing the work performed in and the results of each activity described above under Task 8, including an Alternatives Array summary. These alternatives shall be modified by the Respondent, if required by Ohio EPA's comments to assure identification of a complete and appropriate range of viable alternatives to be considered in the detailed analysis.

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- b. Selecting a contracting mechanism
  - c. Issuing the Work Assignment
  - d. Compliance with regulatory requirements
  - e. Execution of the study
  - f. Analyzing and interpreting the data
  - g. Reporting the results
  - h. Sampling and Analysis Plan
  - i. Health and Safety Plan
- B. Treatability Study Evaluation Report

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1. Conducting a Treatability Study

The Respondent will perform the treatability study in accordance with the approved work plan in a systematic fashion to ensure that the data generated can support the remedy evaluation process.

2. Submission of Treatability Study Evaluation Report

Upon completion of the treatability study(ies), the Respondent will prepare a treatability study evaluation report. The Respondent will follow U.S. EPA's guidance document, Guide for Conducting Treatability Studies Under CERCLA (Interim Final) EPA/540/2-89/058, for the appropriate format and content.

TASK 10 -- DETAILED ANALYSIS OF REMEDIAL ALTERNATIVES

A. Detailed Analysis of Alternatives Report

The detailed analysis will be conducted by the Respondent to provide the Ohio EPA with the information needed for the selection of a site remedy. Respondent shall conduct a detailed analysis of the alternatives that pass through the initial screening. This detailed analysis shall consist of an analysis of each option against a set of eight evaluation criteria and a comparative analysis of all options using the same evaluation criteria as a basis for comparison.

The detailed analysis shall consist of the following elements:

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1. Detailed Description

The detailed description of each remaining alternative shall include as a minimum:

- a. Description of appropriate treatment and disposal technologies;
- b. Special engineering considerations required to implement the alternative, e.g., pilot treatment facility or additional studies needed to proceed with final remedial design;
- c. Operation, maintenance and monitoring requirements of the completed remedy;
- d. Off-site disposal needs and transportation plans;
- e. Temporary storage requirements;
- f. Safety requirements for remedial implementation, including both on-site and off-site health and safety considerations;
- g. An analysis of how the alternatives could be phased into individual operations and a discussion of how these operations could best be implemented (individually or in groups) to produce significant environmental improvement;
- h. A review of any off-site treatment or disposal facilities to ensure compliance with RCRA, TSCA and State requirements, both current and proposed; and
- i. An analysis of the projected performance and expected results of the alternative with emphasis on potential for further future release of hazardous substances.

2. Environmental Assessment

An Environmental Assessment (EA) shall be performed for each alternative including, as a minimum, an evaluation of each alternative's environmental effects, an analysis of measures to mitigate adverse effects, physical or legal constraints and compliance with Federal and State regulatory requirements.

Each alternative will be assessed in terms of the extent to which it will mitigate damage to or protect public health, welfare and the environment, in comparison to the other remedial alternatives.

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The no action alternative will be fully evaluated to describe the current site conditions and anticipate environmental conditions if no actions are taken. The no action alternative will serve as a baseline for the Environmental Assessment.

3. Apply Eight Criteria and Document Analysis

The respondent shall apply the eight evaluation criteria described below to the assembled remedial alternatives.

a. Overall Protection of Human Health and the Environment.

Alternatives shall be assessed as to whether they can adequately protect human health and the environment from unacceptable risks posed by hazardous substances, pollutants or contaminants present at the site by eliminating, reducing or controlling exposures to levels established during development of remediation goals. This is a threshold requirement and the primary objective of the remediation program.

b. Compliance with Applicable or Relevant and Appropriate Requirements.

The alternatives shall be assessed as to whether they attain applicable or relevant and appropriate standards, criteria and requirements of state and federal environmental and public health laws.

c. Long-term Effectiveness and Permanence.

Alternatives shall be assessed for the long-term effectiveness and permanence they afford, along with the degree of certainty that the alternative will prove successful. Factors that shall be considered, as appropriate, include the following:

- i) Nature and magnitude of total residual risks; potential for exposure of human and environmental receptors; concentrations of hazardous substances, pollutants or contaminants remaining following implementation of remedial alternative, considering the persistence, toxicity, mobility and propensity to bioaccumulate of such hazardous substances and their constituents;
- ii) The type, degree and adequacy of long-term management required for untreated substances and treatment residuals, including engineering con-

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trols (such as containment technologies), institutional controls, monitoring and operation and maintenance;

- iii) Long-term reliability of the engineering and institutional controls, including uncertainties associated with land disposal of untreated hazardous substances, pollutants and contaminants, as well as treatment residuals, and;
- iv) Potential need for replacement of the remedy, as well as the continuing need for repairs to maintain the performance of the remedy.

d. Reduction of Toxicity, Mobility or Volume.

The degree to which alternatives employ treatment that reduces toxicity, mobility or volume of contaminants shall be assessed. Alternatives which, at a minimum, address the principal threats posed by the site through treatment shall also be identified. Factors that shall be considered, as appropriate, include the following:

- i) The treatment or recycling processes the alternatives employ and materials they will treat;
- ii) The amount of hazardous substances, pollutants or contaminants that will be destroyed, or treated, or recycled;
- iii) The degree of expected reduction in toxicity, mobility or volume of the waste due to treatment or recycling and the specifications of which reduction(s) are occurring;
- iv) The degree to which the treatment is irreversible;
- v) The type and quantity of residuals that will remain following treatment, considering the persistence, toxicity, mobility and propensity to bioaccumulate;
- vi) The degree to which treatment will reduce the inherent hazards posed by the principal threats at the Site; and
- vii) The degree to which the treatment processes employed reduce the transfer of contaminants

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between environmental media.

e. Short-term Effectiveness.

The short-term impacts of the alternatives during the construction and implementation phase, and until the objectives of the remedial action have been met, shall be assessed considering the following:

- i) Short-term risks that may be posed to the community during construction and implementation of an alternative and until the remedial action objectives have been met;
- ii) Potential impacts on workers during remedial action and with the objectives of remedial action have been met, the effectiveness and reliability of protective measures;
- iii) Potential environmental impacts that may result from the remedial action and the effectiveness and reliability of mitigative measures during implementation and until the objectives of the remedial action have been met; and
- iv) Time until response action objectives are achieved.

f. Implementability.

The technical and administrative feasibility of implementing the alternatives shall be assessed by considering the following types of factors, as appropriate:

- i) Technical Feasibility
  - Degree of difficulty or uncertainty associated with construction and operation of the alternative;
  - Expected operational reliability of the alternative;
  - Ease of undertaking, additional remedial action(s); and
  - Ability to monitor the effectiveness of the remedy.
- ii) Administrative Feasibility

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- Activities needed to coordinate state, local, and federal agencies (e.g., obtaining necessary approvals and permits, right-of-way for construction)
- iii) Feasibility of Obtaining Services and Materials
  - Capacity and location of adequate treatment, storage, and disposal services;
  - Availability of necessary equipment and specialists and provisions to ensure any necessary additional resources;
  - Availability of services and materials; and
  - Availability of prospective technologies

g. Cost.

The types of costs that shall be assessed include the following:

- i) Direct and indirect capital costs, including contingency and engineering fees;
- ii) Annual operation and maintenance costs; and
- iii) Net present value of capital and O&M costs.

h. Community Acceptance.

This assessment includes determining which components of the alternatives interested persons in the community support, have reservations about, or oppose. This assessment, which will be completed by the Ohio EPA, will occur throughout the implementation of this RI/FS and will be completed after comments on the proposed remedy are received. It is not part of this order.

4. Compare Alternatives Against Each Other and Document the Comparison of Alternatives

The Respondent will perform a comparative analysis between the remedial alternatives. That is, each alternative will be compared against the others using the evaluation criteria as a basis of comparison. Identification and selection of the preferred alternative are reserved by the Ohio EPA and are not part of this Order. The comparative analysis will be documented and presented in the Feasibility Study Report described

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below.

#### B. Feasibility Study Report

The Respondent will submit a draft feasibility study report to the Ohio EPA for review, comment, and approval. This report will include the results of Tasks 9 and 10. The respondent will refer to the U.S.EPA Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA for an outline of the report format and the required report content. Upon satisfactorily addressing Ohio EPA's comments, the Respondent will prepare and submit a final feasibility study report.

#### TASK 11 -- Monthly Progress Reports

Monthly Technical Progress Reports are required of the Respondent. For each on-going work assignment, Respondent shall submit progress reports with the following elements:

1. Identification of site and activity.
2. Status of work at the site and progress to date.
3. Percentage of completion.
4. Data generated to date
5. Difficulties encountered during the reporting period.
6. Actions being taken to rectify problems.
7. Activities planned for the next month.
8. Changes in personnel.

The monthly progress report will list target and actual completion dates for each activity including project completion and provide an explanation of any deviation from the milestones in the work plan schedule.

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ATTACHMENT B

OHIO EPA AND U.S. EPA GUIDANCE DOCUMENTS

1. How Clean is Clean. Final. Ohio EPA. Division of Emergency and Remedial Response. Policy No. DERR-00-RR-009. July 26, 1991
2. Background Guidance. Final. Ohio EPA. Division of Emergency and Remedial Response. July 26, 1991
3. Guidance for Conducting Remedial Investigation and Feasibility Studies under CERCLA. Interim Final. OSWER 9355.3-01, EPA/540/G-89/004. October 1988
4. Conducting Remedial Investigations/Feasibility Studies for CERCLA Municipal Landfill Sites. OSWER Directive 9355.3- 11. EPA/540 P-91/001. February 1991
5. Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part A), Interim Final, EPA/540/1-89/002. December 1989
6. Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part B), "Development of Risk-based Preliminary Remediation Goals." OSWER Directive 9285.7-01B. December 1991. Interim
7. Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part C). "Risk Evaluation of Remedial Alternatives." OSWER Directive 9285.7-01C. December 1991. Interim
3. Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual. Supplemental Guidance: "Standard Default Exposure Factors." OSWER Directive 9285.6-03. March 1991. interim final
9. Risk Assessment Guidance for Superfund: Volume II -Environmental Evaluation Manual. OSWER Directive 9285.7-01, EPA/540/1-89/001A. March 1989. interim final
10. Superfund Exposure Assessment Manual. OSWER Directive 9285.5-1, EPA/540/1-88/001. April 1988
11. Exposure Factors Handbook, EPA/600/8-89/043, March 1990
12. RCRA Ground Water Monitoring Technical Enforcement Guidance Document (TEGD), OSWER Directive 9950.1, September 1986
13. Guidance for Remedial Actions for Contaminated Ground Water at Superfund Sites, OSWER Directive 9283.1-2, EPA/540/G-88/003, December 1988. interim final

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14. Leachate Plume Management. EPA/540/2-85/004. November 1985
15. Data Quality Objectives for Remedial Response Activities. Volume I - Example Scenario, OSWER Directive 9355.0-7B, EPA/540/G-87/004, March 1987
16. Superfund Remedial Design and Remedial Action Guidance, OSWER 9355.0-4A, June 1986
17. Ecological Assessments of Hazardous Wastes Sites: A Field and Laboratory Reference, EPA/600/3-89/013, March 1989
18. Guidelines and Specifications for Preparing Quality Assurance Project Plans, Ohio EPA, Division of Emergency and Remedial Response. Policy No. DERR-00-RR-008, March 1990
19. CERCLA Compliance with Other Laws Manual - Part I. OSWER Directive 9234.1-01, EPA/540/G-89/006, August 1988, interim final
20. CERCLA Compliance with Other Laws Manual - Part II. OSWER 9234.1-05 EPA/540/G-89/006. August 1988, interim final
21. U.S. EPA Integrated Risk Information System (IRIS) Data Base
22. Guidance for Data Usability in Risk Assessment, OSWER Directive 9285.7-05. EPA/540/G-90/008. October 1990, interim final
23. U.S. EPA Health Effects Assessment Summary Tables. Office of Emergency & Remedial Response, published annually
24. A Compendium of Technologies Used in the Treatment of Hazardous Wastes. EPA/625/8-87/014, September 1987
25. Guide for Conducting Treatability Studies Under CERCLA, EPA/540/2-89/058, December 1989, interim final
26. Guide for Conducting Treatability Studies Under CERCLA: Aerobic Biodegradation Remedy Screening, EPA/540/2-91/013A, July 1991, interim guidance
27. Guide for Conducting Treatability Studies Under CERCLA: Soil Vapor Extraction, EPA/540/2-91/019A, September 1991, interim guidance

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28. Handbook on In Situ Treatment of Hazardous Waste-Contaminated Soils. EPA/540/2-90/002, January 1990.
29. Handbook for Stabilization/Solidification of Hazardous Wastes. EPA/540/2-86/001. June 1986
30. Stabilization/Solidification of CERCLA and RCRA Wastes - Physical Tests, Chemical Testing Procedures, Technology Screening and Field Activities, EPA/625/6-89/022, May 1989
31. Technical Guidance Document: Final Covers on Hazardous Waste Landfills and Surface Impoundments, EPA/530-SW-89-047, July 1989
32. Technical Guidance Document: Construction Quality Assurance for Hazardous Waste Land Disposal Facilities. EPA/530-SW-86-031, October 1986
33. Seminar Publication - Requirements for Hazardous Waste Landfill Design, Construction, and Closure. EPA/625/4-89/022, August 1989
34. Technical Guidance Document: Inspection Techniques for the Fabrication of Geomembrane Field Seams. EPA/530/SW-91/051. May 1991
35. Technical Guidance for Corrective Measures - Subsurface Gas. EPA/530-SW-88-023. March 1985
36. Handbook - Guidance on Setting Permit Conditions and Reporting Trial Burn Results - Volume II of the Hazardous Waste Incineration Guidance Series. EPA/625/6-89/019, January 1989
37. Handbook - Hazardous Waste Incineration Measurement Guidance Manual - Volume III of the Hazardous Waste Incineration Guidance Series, EPA/625/6-89/021. June 1989
38. Handbook - Permit Writer's Guide to Test Burn Data - Hazardous Waste Incineration, EPA/625/6-86/012, September 1986
39. Handbook - Quality Assurance/Quality Control (QA/QC) Procedures for Hazardous Waste Incineration, EPA/625/6-89/023, January 1990
40. Guidance on Remedial Actions for Superfund Sites with PCB Contamination, OSWER

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Directive 9355.4-01, EPA/540/G-90/007, August 1990

41. Assessment of Technologies for the Remediation of Radioactively Contaminated Superfund Sites. EPA/540/2-90/001, January 1990
42. Handbook - Dust Control at Hazardous Waste Sites, EPA/540/2-85/003, November 1985
43. Surface Impoundment Clean Closure Guidance Manual, OSWER Directive 9476.00-8.C, EPA/530-SW-87-022, October 1987
44. Guide for Decontaminating Buildings, Structures, and Equipment at Superfund Sites, EPA/600/2-85/028, March 1985

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Note: This list of guidance documents is updated periodically. You should check with Ohio EPA to verify that this list is the most current available.

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