

Issue Date DEC 17 1993

Effective Date DEC 17 1993

BEFORE THE

OHIO ENVIRONMENTAL PROTECTION AGENCY

In the Matter of

Fusite Corporation
6000 Fernview Avenue
Cincinnati, Ohio 45212

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DIRECTOR'S FINAL FINDINGS
AND ORDERS

Respondent

OHIO EPA.

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OHIO ENVIRONMENTAL PROTECTION AGENCY

PREAMBLE

It is hereby agreed by and among the Parties hereto as follows:

I. JURISDICTION

1. These Director's Final Findings and Orders ("Orders") are issued pursuant to the authority vested in the Director of the Ohio EPA under Sections 3734.13, 3734.20, and 3745.01 of the Ohio Revised Code. Respondent consents to and agrees not to contest Ohio EPA's jurisdiction to issue these Orders and to enforce its terms.

II. PARTIES BOUND

2. These Orders shall apply to and be binding upon Respondent and its successors and assigns.

3. No change in ownership or corporate status relating to Respondent will in any way alter Respondent's obligations under these Orders.

4. Respondent shall provide a copy of these Orders to all contractors, subcontractors, and consultants retained to conduct or monitor any portion of the Work performed pursuant to these Orders.

Respondent shall ensure that any contractors, subcontractors, laboratories,

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and consultants hired to perform Work pursuant to these Orders comply with the provisions of these Orders.

5. The signatories to these Orders certify that they are fully authorized to execute and legally bind the Party they represent.

III. DEFINITIONS

6. Unless otherwise expressly provided herein, terms used in these Orders or in any attachments to these Orders shall have the same meaning as used in R.C. Chapter 3734. Whenever the terms listed below are used in these Orders or in any attachments to these Orders, the following definitions shall apply:

a. "Days" shall mean calendar days, including weekends and holidays.

b. "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. "Document" shall be construed broadly to promote the effective sharing of information and views concerning the Work to be done between Respondent and the Ohio EPA.

c. "NCP" means the National Oil and Hazardous Substances Pollution Contingency Plan, codified at 40 C.F.R. Part 300 (1990), as amended.

d. "Ohio EPA" means the Ohio Environmental Protection Agency and its designated representatives.

e. "Paragraph" means a portion of these Orders identified by an arabic numeral or an upper case letter.

f. "Parties" means Respondent and the Ohio EPA.

g. "Respondent" means Fusite Corporation, its successors and assigns.

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h. "Response Costs" means all costs, including but not limited to, payroll costs, contractor costs, travel costs, oversight costs, laboratory costs, and the costs of reviewing or developing plans, reports, and other items pursuant to these Orders, verifying the Work, or otherwise implementing or enforcing these Orders.

i. "Section" means a portion of these Orders identified by a roman numeral.

j. "Site" means the facility located at 6000 Fernview Avenue, Cincinnati, Ohio, 45212 where treatment, storage, and/or disposal of hazardous waste has occurred, including any other area where such waste has or may migrate.

k. "Statement of Work" or "SOW" means the statement of work for the investigation, design, and implementation of source control measures to be performed under these Orders as set forth in Attachment A.

l. "Work" means all activities Respondent is required to perform under these Orders.

IV. FINDINGS OF FACT AND CONCLUSIONS OF LAW

7. The Director of the Ohio EPA has determined the following findings of fact and conclusions of law:

a. Respondent is a corporation doing business in the State of Ohio and is the subsidiary of Emerson Electric Co., a Missouri corporation.

b. Respondent has owned or leased the property located at 6000 Fernview Avenue, Cincinnati, Ohio, from approximately 1954 to the present.

c. Respondent has operated a manufacturing facility on the property located at 6000 Fernview Avenue, Cincinnati, Ohio from approximately 1954 to the present.

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d. Respondent generates hazardous waste such as tetrachloroethene and methylene chloride at its facility located at 6000 Fernview Avenue, Cincinnati, Ohio. Until approximately October of 1992, Respondent generated 1,1,1 trichloroethane at its facility located at 6000 Fernview Avenue, Cincinnati, Ohio.

e. Respondent performed a groundwater sampling survey at its facility and on adjacent property owned by Cincinnati Gas & Electric Company in April of 1992. Results of the sampling revealed the presence of tetrachloroethene at up to 2,030 ppb (parts per billion), 1,1,1-trichloroethane at up to 12,890 ppb, and trichloroethene at up to 1,470 ppb in the ground water on property owned by Cincinnati Gas & Electric Company. Results of the sampling also revealed the presence of tetrachloroethene at up to 53 ppb, 1,1,1 trichloroethane at up to 202 ppb, and trichloroethene at up to 53 ppb on the southcentral portion of Respondent's facility.

f. Sterling Winthrop, Inc., Conrail, and Cincinnati Gas & Electric Company own property to the southwest of Respondent's facility.

g. A hydrogeological investigation performed by Sterling Winthrop, Inc. during 1993 revealed the presence of 1,1,1-trichloroethane at up to 19,000 ppb, tetrachloroethene at up to pure product, trichloroethene at up to 8,900 ppb, methylene chloride at up to 3,600 ppb, and associated degradation products of these wastes, in the ground water on adjacent properties and in surface seeps on property owned by Sterling Winthrop, Inc.

h. The hydrogeological investigations performed by Sterling Winthrop, Inc. determined that shallow ground water generally flows from the southwest portion of Respondent's facility to the southwest and onto the properties owned by Sterling Winthrop, Inc., Conrail, and Cincinnati Gas & Electric Company.

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i. Tetrachloroethene, trichloroethene and methylene chloride are known or suspected carcinogens according to the Agency for Toxic Substances and Disease Registry. The Maximum Contaminant Levels (MCLs) for tetrachloroethene, trichloroethene, 1,1,1-trichloroethane, and methylene chloride are 5, 5, 200, and 5 ppb respectively.

j. Respondent is a "person" as defined in R.C. 3734.01(G).

k. Because of their quantity, concentration, or physical or chemical characteristics, the Director has determined that tetrachloroethene, trichloroethene, and other contaminants detected in the soil and ground water at the Site are "hazardous wastes" as defined in R.C. 3734.01(J).

l. The property located at 6000 Fernview Avenue, Cincinnati, Ohio is a "facility" as defined in R.C. 3734.01(N).

m. Respondent disposed of hazardous waste in a location causing or contributing or threatening to cause or contribute to air or water pollution or soil contamination.

n. The presence of hazardous waste at the Site constitutes a substantial threat to public health or safety.

V. ORDERS

8. These Orders are designed to prevent, minimize, or mitigate the substantial threat to public health or safety or to the environment.

9. All Work to be performed by Respondent under these Orders shall be under the direction and supervision of a qualified environmental engineer, geologist, or other appropriate professional person with experience in hazardous waste site investigation and remediation. Prior to the initiation of the Work, Respondent shall notify the Ohio EPA in writing regarding the name, title, and qualifications of such engineer, geologist, or other appropriate professional person and of any contractors, subcontractors,

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laboratories, and consultants to be employed in carrying out the terms of these Orders.

10. Attachment A to these Orders contains the Statement of Work for the investigation, design and implementation of source control measures at the Site. Within forty-five (45) days of the effective date of these Orders, Respondent shall submit to the Ohio EPA a draft workplan for the implementation of the Work required by the SOW. This workplan and any required documents shall be developed in conformance with these Orders, the SOW, the NCP, and applicable laws, including R.C. Chapter 3734, and the regulations promulgated thereunder. The Statement of Work is not specific to the Site and is to be used as an outline in developing the Site specific workplan. In the workplan, Respondent shall present the justification for the proposed omission of any of the tasks of the Statement of Work because of work that has already been performed or work that is not appropriate to the site. Any omission proposed by Respondent is subject to review and approval by the Ohio EPA.

11. Attachment B to these Orders contains a list of guidance documents for the development of the workplan. Respondent shall develop the workplan in conformance with the most current version of the guidance documents listed in Attachment B. If Ohio EPA determines that any additional guidance documents affect the Work to be performed under these Orders, Ohio EPA will notify Respondent in writing of the additional guidance documents and the workplan shall be modified accordingly.

12. Respondent shall incorporate any written comments that may be made by the Ohio EPA into the draft workplan for the implementation of the Work. Respondent shall submit a revised draft workplan for the implementation of the Work to the Ohio EPA within thirty (30) days of receipt of the Ohio EPA's

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comments.

13. Following receipt by the Ohio EPA of the revised draft workplan for the implementation of the Work, the Ohio EPA will approve or disapprove, in writing, the workplan for the implementation of the Work. Ohio EPA may approve the workplan with specified conditions and/or modifications.

14. Upon written approval of the workplan for the implementation of the Work, Respondent shall implement the Work detailed in the workplan in accordance with any conditions and modifications attached to the approval of the workplan and in accordance with the schedules contained within the approved workplan. Schedules contained within the workplan may be amended by mutual agreement among the Parties.

15. Respondent shall provide monthly progress reports to the Ohio EPA Site Coordinator concerning the Work carried out by Respondent during the previous calendar month. The monthly progress reports shall be submitted on or before the tenth (10th) day of each month. The monthly progress reports shall, at a minimum:

- a. Describe the status of the Work and progress to date;
- b. Summarize all relevant findings including, but not limited to, water level measurements, flow maps, sampling results, boring logs, monitoring well construction diagrams, etc.;
- c. Once implemented, an evaluation of the current effectiveness of all Interim Action systems in achieving the purpose of these Orders;
- d. Describe difficulties encountered during the reporting period;
- e. Describe actions taken to rectify any difficulties encountered;
- f. Describe activities planned for next month;

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- g. Identify changes in key personnel;
- h. Provide an explanation for any deviation from the time schedules in the approved workplans.

VI. DESIGNATED SITE COORDINATORS

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

17. Without limitation of any authority conferred on Ohio EPA by statutes or regulations, the Ohio EPA Site Coordinator's authority includes, but is not limited to: (1) observing, and taking photographs and making such other reports on the progress of the work as deemed appropriate; (2) directing that Work stop whenever the OEPA Site Coordinator determines that activities at the Site may create a threat to public health or welfare or the environment; and (3) reviewing records, files and documents relevant to these Orders. At the request of Ohio EPA, Respondent shall allow Ohio EPA to take split samples and/or duplicates of samples collected by Respondent during the implementation of these Orders. At the request of Respondent, Ohio EPA shall allow Respondent to take split samples and/or duplicates of samples collected by Ohio EPA related to fulfilling the purpose and objectives of these Orders. Respondent shall notify the Ohio EPA Site Coordinator not less than thirty

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(30) days in advance of all sample collection to be performed at the Site unless otherwise agreed to by Ohio EPA.

18. Respondent's designated Site Coordinator or alternate shall be present on-site or on call during all hours of Work at the Site and shall make himself/herself available for the duration of these Orders. The absence of the Ohio EPA Site Coordinator from the Site shall not be cause for stoppage of work unless otherwise provided.

19. Ohio EPA and Respondent each have the right to change their respective Site Coordinator. Such a change shall be accomplished by notifying the other Party in writing prior to the change.

VII. OTHER CLAIMS

20. Nothing in these Orders shall constitute or be construed as a release from any claim, cause of action, or demand in law or equity against any person, firm, partnership, or corporation, not subject to these Orders for any liability arising from, or relating to, events or conditions at the Site.

VIII. OTHER APPLICABLE LAWS

21. All Work required to be taken under these Orders shall comply with the requirements of applicable local, state, and federal laws and regulations. Nothing in these Orders shall be construed as waiving or compromising in any way the applicability and enforcement of any statutes or regulations applicable to the Site. The OEPA reserves all rights and privileges except as specified herein.

IX. INDEMNITY

22. Respondent agrees to indemnify, save, and hold harmless Ohio EPA from any and all claims or causes of action arising from, or related to, or on account of, acts or omissions of Respondent, its contractors, and subcontractors in the performance of Work at the Site. Ohio EPA shall not be

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considered a party to and shall not be held liable under any contract entered into by Respondent in carrying out the activities pursuant to these Orders.

23. Ohio EPA 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 22., above, and to cooperate with Respondent in the defense of any such claim or action against Ohio EPA.

X. DISPUTE RESOLUTION

24. The Site Coordinators shall, whenever possible, operate by consensus. In the event that there is a disagreement about the adequacy of the workplan, the Site Coordinators shall have five (5) days to negotiate in good faith an attempt to resolve the differences.

25. In the event that the Site Coordinators are unable to reach consensus on the disagreement about the adequacy of the workplan, then each Site Coordinator shall reduce his/her position to writing within five (5) days of the end of the good faith negotiation period described in Paragraph 24. Those written positions shall be immediately exchanged by the Site Coordinators. Following the exchange of written positions, the Site Coordinators shall have an additional five (5) days to resolve their differences. If the Ohio EPA concurs with the position of Respondent, then the workplan will be amended accordingly.

26. If the Ohio EPA does not concur with the position of Respondent, Ohio EPA will resolve the dispute based upon and consistent with these Orders, the SOW, and Chapter 3734 of the Ohio Revised Code, the regulations promulgated thereunder and any other appropriate state or federal law.

XI. UNAVOIDABLE DELAYS

27. Respondent shall cause all Work to be performed within the agreed time schedules provided for in the approved workplan for the implementation of

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the Work, unless any such performance is prevented or delayed by an event which constitutes an unavoidable delay. For purposes of these Orders, an "unavoidable delay" shall mean any event(s) beyond the control of Respondent which prevents or delays performance of any obligation required by these Orders 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.

28. Respondent shall notify the Ohio EPA in writing no later than ten (10) days after their 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 or causes of the delay, the measures taken and to be taken by Respondent to minimize the delay, and the timetable under which these measures will be implemented. Respondent shall have the burden of demonstrating that the event(s) constitute(s) an unavoidable delay, and Ohio EPA shall make any determination with regard to such a claim. In the event that Respondent fails to demonstrate that the delay(s) constitute(s) an "unavoidable delay," as determined by Ohio EPA and defined in these Orders, Ohio EPA reserves the right to enforce the terms and conditions of these Orders against Respondent.

29. In the event that Ohio EPA agrees that an unavoidable delay has occurred, these Orders, including incorporated documents and any affected schedules thereunder, may be modified in the event the unavoidable delay affects such schedules.

XIII. REIMBURSEMENT OF COSTS

30. Ohio EPA has incurred and continues to incur response costs in connection with the Site. Respondent shall reimburse Ohio EPA for all response costs not inconsistent with the NCP incurred both prior to and after

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the effective date of these Orders.

31. Within sixty (60) days of the end of each calendar year, Ohio EPA will submit to Respondent an itemized statement of its response costs for the previous year. Within forty-five (45) days of receipt of such itemized statement, Respondent shall remit payment for Ohio EPA's response costs as follows:

- a. Payment to Ohio EPA shall be made by certified check payable to "Treasurer, State of Ohio" and shall be forwarded to Fiscal Officer, Division of Emergency and Remedial Response, P.O. Box 1049, 1800 Watermark Drive, Columbus, Ohio 43266-0149.
- b. A copy of the transmittal letter and the check shall be sent to the Site Coordinator.

XIII. ACCESS

32. Ohio EPA is authorized to enter and freely move about all property at Respondent's facility for purposes consistent with these Orders including, but not limited to, reviewing the progress of Respondent in carrying out the terms of these Orders and verifying the reports and data submitted to Ohio EPA by Respondent.

33. To the extent that the Work required by these Orders must be done on property not owned or controlled by Respondent, Respondent will use its best efforts to obtain site access agreements from the present owner(s) of such property within ten (10) days of the approval of the workplan required by these Orders. Each access agreement shall be incorporated by reference into these Orders. In the event that agreements for access are not obtained within ten (10) days of approval of the workplan, Respondent shall notify Ohio EPA in writing regarding the efforts undertaken by Respondent to obtain access and its failure to obtain the agreements.

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34. Nothing herein limits or otherwise affects the statutory authority of Ohio EPA to conduct inspections and gather information.

XIV. NOTICE

35. All documents demonstrating compliance with these Orders and any other documents required under these Orders are to be submitted to the Ohio EPA and shall be addressed to:

Ohio Environmental Protection Agency
Southwest District Office
40 South Main Street
Dayton, Ohio 45402-2086
ATTN: Fusite Site Coordinator, DERR
(2 copies)

and

Ohio Environmental Protection Agency
1800 WaterMark Drive
P. O. Box 1049
Columbus, Ohio 43266-0149
Attn: Technical Support Unit, DERR
(1 copy)

unless otherwise specified in these Orders or to such persons and addresses as may hereafter be otherwise specified in writing.

XV. RESERVATION OF RIGHTS

36. Nothing contained herein shall be construed to prevent OEPA from seeking legal or equitable relief to enforce the terms of these Orders, including penalties against Respondent for noncompliance with these Orders.

37. Nothing contained herein shall be construed to prevent Ohio EPA from completing any Work required by these Orders.

38. Ohio EPA reserves the right to take any action pursuant to any available legal authority for past, present, or future violations of state or federal laws and regulations or the common law as a result of events or conditions arising from, or related to, the Site.

39. Ohio EPA specifically reserves the right to perform or require

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40 SOUTH MAIN STREET DAYTON, OHIO

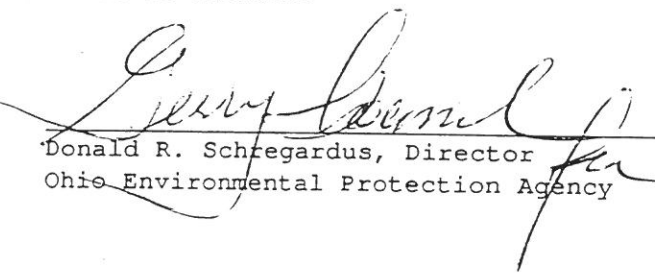
Respondents to perform additional investigation, removal, and remediation at the Site (including ground water investigation) pursuant to R.C. Chapters 3734 or 6111 or other applicable authority for these or any other conditions at the Site.

40. Respondent reserves any rights it may have to raise any administrative, legal, or equitable defense in any action brought by the Ohio EPA.

XVI. SIGNATORIES

41. Each undersigned representative of a signatory to these Orders certifies that he or she is fully authorized to enter into these Orders and to legally bind such signatory to this document.

IT IS SO ORDERED:



Donald R. Schregardus, Director
Ohio Environmental Protection Agency

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ATTACHED DIRECTOR'S JOURNAL

XVII. WAIVER AND AGREEMENT

A. In order to resolve disputed claims, without admission of fact, violation, or liability, Respondent agrees that these Findings and Orders are lawful and reasonable, and agrees to perform all actions required by these Orders.

B. Respondent hereby waives the right to appeal the issuance, terms and service of these Orders and hereby waives any and all rights they may have to seek judicial review of these Orders either in law or equity.

C. Notwithstanding the limitations herein on Respondent's right to appeal or seek judicial review, the Ohio EPA and Respondent agree that in the event that these Orders are 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 these Orders notwithstanding such appeal and intervention unless these Orders are stayed, vacated or modified.

IT IS SO AGREED:

Fusite Corporation

Paul Weaver

12/6/93
Date

President

Title

OHIO ENVIRONMENTAL PROTECTION AGENCY

Donald R. Schregardus
Donald R. Schregardus, Director

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Date

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ATTACHMENT A

STATEMENT OF WORK (SOW) FOR CONDUCTING SOURCE CONTROL

INTERIM ACTION(S) AT THE FUSITE SITE

PURPOSE:

The purpose of conducting the work described herein is to control the source(s) of ground-water contamination which have resulted from the disposal of industrial wastes, pollutants, other wastes, and/or hazardous wastes, constituents, and substances (contaminants) at the Fusite site (the Site). Respondent(s) shall conduct a Focused Site Characterization (FSC) to characterize the source(s) of contaminant release at the Site, determine Site physical characteristics, develop cleanup goals, and obtain all other data necessary to design and implement the source control interim action(s) (SCIA(s)). Concurrent with the FSC, Respondent(s) shall evaluate potential SCIA(s), propose appropriate SCIA(s) for the Site, and prepare a conceptual design of the proposed SCIA(s). Following Ohio EPA approval of the proposed SCIA(s), Respondent(s) shall design and implement the approved SCIA(s), and operate, maintain and monitor the constructed system(s). Successful completion of the required work will result in the elimination of identified sources of contaminant releases and control of identified pathways of contaminant migration. The FSC and conceptual design of the proposed SCIA(s) are interactive and are to be conducted concurrently so that the data collected during the FSC influences the evaluation of and the conceptual design of the proposed SCIA(s).

Respondent(s) shall conduct all required activities and provide all required deliverables in accordance with the Director's Final Findings and Orders (Orders) and this SOW. Respondent(s) shall furnish all necessary personnel, materials, and services needed, or incidental to, performing the activities described in this statement of work.

Respondent(s) shall obtain all site access agreements required to perform the work outlined in this SOW. Site access shall extend for the duration of the project and shall include allowances for all operation and maintenance considerations.

At the completion of the FSC, the Ohio EPA will approve or modify as appropriate Respondent(s)' proposed SCIA(s). To obtain Ohio EPA approval, proposed SCIA(s) must at a minimum protect human health and the environment, comply with the requirements of federal, state and local laws and regulations, minimize cross-media transfer of contaminants and utilize permanent solutions to the maximum extent practicable.

TASKS:

1. Develop Workplan;
2. Conduct field investigations to characterize contaminant source(s) and obtain all data necessary to evaluate, select and design SCIA(s).

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3. Design and implement SCIA(s).

DELIVERABLES:

1. Workplan
2. Focused Site Characterization and Conceptual Design Report
3. Detailed Plans and Specifications for SCIA(s)
4. Operation, Maintenance and Monitoring Plans for SCIA(s)
5. Monthly progress reports

With prior agency approval, Respondent(s) may incorporate into the Workplan or otherwise submit simultaneously any of the above required deliverables upon demonstration that doing so will expedite the work required by this SOW.

1.0 DEVELOP WORK PLANS

Respondent(s) shall submit a FSC Workplan (Workplan), a sampling and analysis plan (SAP) consisting of a field sampling plan (FSP) and a quality assurance project plan (QAPP), and a Site health and safety plan (HSP). The Workplan and supporting documents must be approved by Ohio EPA prior to the initiation of field activities.

1.1 FSC Workplan

The Workplan shall be developed in conjunction with the SAP and the HSP although each plan may be submitted under separate cover. The Workplan shall include the supporting rationale for performing each task in the manner described. The Workplan shall describe in detail all tasks necessary to perform the work required by this SOW, including materials and procedures required for each task, and work products to be submitted to the Ohio EPA. This includes deliverables as required by the Orders and this SOW, and meetings with Ohio EPA. The Workplan shall provide fixed date schedules for accomplishing the required work.

The Workplan shall clearly state the objectives of the FSC, identify actual or potential threats to human health and the environment posed by the Site, and identify preliminary cleanup goals for those contaminants previously identified at the Site. Based on review of existing information, Respondent(s) shall include in the Workplan a summary of the Site background including geographic location, and describe Site physiography, hydrology, geology, and history with regard to the use, storage and disposal of contaminants. The Workplan shall describe any previous response actions conducted by local, state, federal, or private parties; provide a summary of existing data in terms of physical and chemical characteristics of identified contaminants, describe their distribution among the environmental media; and demonstrate compliance with federal, state and local laws and regulations which apply to the work to be performed. The Workplan shall identify

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potential SCIA(s) which shall address each media of interest, identifying treatment, excavation, pumping, or other actions, either singly or in combination, to satisfy interim action objectives. Data collection activities necessary to evaluate potential SCIA(s) shall be identified. Following Ohio EPA approval of the Workplan and supporting documents, Respondent(s) shall implement the work in accordance with the schedules described therein.

In performing the work required by this SOW, Respondent(s) may rely upon data and/or information gathered from other sources to the extent that Respondent(s) can demonstrate that QA/QC procedures acceptable to Ohio EPA were followed in the generation and presentation of the data and/or information. Respondent(s) shall include all supporting documentation in the Workplan for all data and/or information gathered from other sources and clearly identify the intended use(s) for such data and/or information. Ohio EPA will evaluate the adequacy of supporting QA/QC documentation and determine the acceptability of all data and/or information gathered from other sources during review of the draft Workplan.

If the need for additional work is identified at any time during the performance of the work required by this SOW, Respondent(s) shall submit a Workplan amendment with schedule documenting the need for the additional work and describing in detail the tasks to be performed. Respondent(s) shall be responsible for completing any additional work approved or required by the Ohio EPA in a manner consistent with the purpose and objectives of this Statement Of Work.

1.2 Sampling and Analysis Plan

Respondent(s) shall prepare a SAP consisting of the following:

A. *Field Sampling Plan*

The FSP shall specify and detail all activities necessary to obtain Site data. It shall explain what additional data are required to adequately characterize the Site and support the evaluation of potential SCIA(s). The FSP shall describe sampling objectives; equipment and procedures; sample types, locations, and frequencies; and parameters of interest; and shall be tied to the schedules contained in the Workplan.

B. *Quality Assurance Project Plan*

The QAPP shall address all investigations to be conducted at the Site and shall include the following:

1. A project description;
2. Analytical methods and laboratory procedures;

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3. Quality assurance objectives for data such as the required precision and accuracy, completeness of data, representativeness of data, comparability of data, and the intended use of collected data;
4. Chain of custody procedures during sample collection and in the laboratory;
5. The type and frequency of calibration procedures during sample collection and in the laboratory;
6. Preventative maintenance procedures and schedule and corrective action procedures for field and laboratory instruments;
7. Specific procedures to assess data precision, representativeness, comparability, accuracy, and completeness of specific measurement parameters; and
8. Data documentation and tracking procedures.

C. *Health and Safety Plan*

Respondent(s) shall submit an HSP which shall comply with the requirements of applicable federal, state, and local laws. The HSP shall be consistent with:

1. NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);
2. Section 111(c)(6) of CERCLA;
3. U.S. EPA Order 1440.3 -- Respiratory Protection;
4. U.S. EPA Occupational Health and Safety Manual;
5. U.S. EPA Interim Standard Operating Safety Procedures and other U.S. EPA guidance as developed;
6. OSHA regulations, particularly in 29 CFR 1910 and 1926;
7. State and local regulations; and
8. Site or facility conditions.

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The HSP shall 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, including monitoring, shall also be provided.

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2.0 SITE INVESTIGATION AND CONCEPTUAL DESIGN

Respondent(s) shall collect data on the physical characteristics of the Site to the extent necessary to define potential contaminant transport pathways and provide sufficient engineering data for screening and selecting proposed SCIA(s). Respondent(s) shall screen the potential SCIA(s) identified in the Workplan concurrent with the Site characterization tasks.

2.1 Hydrogeology

Respondent(s) shall perform a Site-wide hydrogeologic study to evaluate the subsurface geology and water bearing formations, and to characterize ground-water contamination. The study shall determine the location of water bearing formations, confining layers, bedrock, and other subsurface geologic features, and shall support the determination of the vertical and horizontal distribution of source contaminants. Efforts shall begin with a survey of previous hydrogeologic studies and other existing data.

A detailed technical description of all methods to be used in gathering data for this task shall be included in the Workplan. This shall include a diagrammatic representation of proposed monitoring well and piezometer locations, monitoring well and piezometer design and construction, information on construction materials, drilling techniques, and well development methods.

The hydrogeologic investigation shall provide the following information for the Site:

- A. A representative and accurate classification and description of the hydrogeologic units which may be part of contaminant migration pathways (i.e., the aquifers and any intervening saturated and unsaturated units), including but not limited to:
1. Hydraulic conductivity (vertical and horizontal) and porosity (total and effective);
 2. Storativity and transmissivity;
 3. Lithology, grain size, sorting, and degree of cementation;
 4. A determination of hydraulic interconnections between saturated zones; and
 5. The retardation capacity and mechanisms of the natural earth materials (e.g., organic carbon content, clay content, etc.).
- B. Hydrogeologic cross-sections showing the extent (depth, thickness, lateral extent) of hydrogeologic units which may be part of the contaminant migration pathways, identifying:
1. Sand, gravel, and other unconsolidated deposits;

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2. Zones of higher or lower permeability that might direct and restrict the flow of contaminants;
 3. Aquifers: geologic formations, groups of formations, or parts of formations capable of yielding usable amounts of ground water to wells or springs; and
 4. Water-bearing zones that may serve as a pathway for contaminant migration including perched zones of saturation.
- C. A representative description of water level or fluid pressure monitoring including:
1. Potentiometric surface maps;
 2. Hydrogeologic cross sections showing vertical gradients and interconnection between water bearing strata; and
 3. Temporal changes in hydraulic gradients and flow directions.
- D. A description of man-made influences that may affect the hydrogeology of the Site identifying:
1. Active and inactive local water supply and production wells with an approximate schedule of pumping; and
 2. Man-made hydraulic structures (pipe-lines, french drains, ditches, unlined ponds, septic tanks, wastewater outfalls, retention areas, utility lines, etc.).

Respondent(s) shall document the procedures used in making the above determinations.

2.2 Soil and Sediments Investigations

Respondent(s) shall conduct a program to characterize the soil and unconsolidated deposits in the vicinity of the contaminant release(s). This process may overlap with certain aspects of the hydrogeologic study (e.g., characteristics of soil strata are relevant to both the transport of contaminants by ground water and to the locations of contaminants in the soil). A survey of existing data on soils and sediments may be useful. The characterization shall include as appropriate the following information:

- A. Soil classification using the Unified Soil Classification System;
- B. Surface soil distribution;
- C. Soil profile, including ASTM classification of soils;
- D. Transects of soil stratigraphy;
- E. Hydraulic conductivity;

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- F. Relative permeability;
- G. Bulk density;
- H. Porosity;
- I. Soil sorptive capacity;
- J. Soil organic content;
- K. Particle size distribution;
- L. Depth to water table;
- M. Moisture content;
- N. Effect of stratification on unsaturated flow;
- O. Infiltration rate; and
- P. Storage capacity.

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Respondent(s) shall document the procedures used in making the above determinations.

2.3 Contamination Characterization

Respondent(s) shall identify and characterize contamination of Site ground water and soils. Data collected shall be sufficient to define the magnitude, origin, direction, and rate of contaminant migration.

A. Ground-water Contamination

Respondent(s) shall conduct an investigation to characterize ground-water contamination to the extent necessary to characterize contaminant sources and obtain design data. The investigation shall at a minimum provide the following information:

1. A characterization of any immiscible or dissolved contaminant plume(s) originating from the Site including non-aqueous phase liquids (free product);
2. An estimate of aquifer transverse and longitudinal dispersivity;
3. The velocity of contaminant movement;
4. The horizontal and vertical concentration profiles of contaminants in identified plumes;

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5. An evaluation of factors influencing contaminant movement; and
6. Background contaminant concentrations in areas upgradient of and unaffected by Site-related contaminant source(s).

Respondent(s) shall follow the guidance identified in the Orders for well design, construction, development, purging, sampling, geophysics, modeling, etc. and shall document the procedures used in making the above determinations.

B. Soil Contamination

Respondent(s) shall conduct an investigation to characterize surface and subsurface soil contamination at the Site. The investigation shall be designed to collect the following information:

1. The vertical and horizontal concentration profiles of contaminants in Site soils;
2. A description of soil chemical properties which might affect contaminant migration and transformation;
3. Identification of contaminants present;
4. Background soil contaminant concentrations in areas unaffected by Site related contaminant source(s).

2.4 Refine and Develop Cleanup Goals and Design Criteria

Respondent(s) shall refine the cleanup goals previously identified in the Workplan. Cleanup goals shall be developed and refined in accordance with the guidance documents identified in the Orders. Volumes or areas of media to which potential SCIA(s) apply shall be identified, taking into account the chemical and physical characteristics of the Site and the requirements for protectiveness as identified in the refined cleanup goals.

Using the Freundlich Equation with Site specific data. Respondent(s) shall estimate the volume of water moving vertically and horizontally through contaminated media so as to determine unsaturated soil organic contaminant cleanup goals. The objective shall be to establish SCIA design criteria for soils which will be protective of ground water and not elevate ground-water organic contaminant levels above ground-water cleanup goals. Unsaturated soil organic contaminant cleanup goals shall be calculated for each individual organic contaminant of concern.

2.5 Site Characterization Report

Respondent(s) shall summarize all investigations and their results to ensure that the investigation data are sufficient in quality and quantity to describe the nature and extent of identified source(s) of contamination, define contaminant transport mechanisms and

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support the selection and design of the proposed SCIA(s). Any data gaps shall be identified and their impact upon the work shall be fully described. The analysis and summary shall be presented in a written report which shall at a minimum include the following:

- A. Data on Site physical characteristics (soils, geology, hydrogeology, etc.)
- B. Data on source characteristics describing:
 - 1. The source location;
 - 2. The type and integrity of any existing waste containment; and
 - 3. A description of the vertical and horizontal extent of contamination in the source area (quantity of contaminated source media).
- C. Data on the nature and extent of contamination within the source area.
- D. Cleanup goals and supporting calculations for all contaminated media.

2.6 Conceptual Design of Respondent(s)' proposed SCIA(s)

Using data generated during the FSC, Respondent(s) shall evaluate the potential SCIA(s) identified in the FSC Workplan for applicability to Site problems and recommend a proposed SCIA(s) for implementation at the Site. Respondent(s) shall include a technical description of each component of the proposed SCIA(s) outlining the waste management strategy involved and identifying regulatory requirements and cleanup goals. The Conceptual Design shall include discussion of the evaluation of the potential SCIA(s) and shall be included as part of or submitted concurrently with the Site Characterization Report. The Conceptual Design shall include but not be limited to the following:

- A. A narrative description of the proposed SCIA(s);
- B. Schematic drawings of treatment processes;
- C. A description of how treatment, storage, and disposal of contaminated media will comply with federal, state and local laws and regulations;
- D. Supporting data and documentation defining the functional aspects of the SCIA(s);
- E. Design calculations including removal and destruction efficiencies for all SCIA components (treatment works, extraction wells, vadose gases extraction networks, etc.);
- F. A Site map showing the location of all SCIA components and significant Site features;

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- G. A schedule for submittal of detailed plans and specifications including any required permit applications, initiation and completion of construction, attainment of operational level; and initiation of operation, maintenance, and monitoring; and
- H. Identification and assessment of all applicable regulatory requirements pertaining to the proposed SCIA(s) including:
 - 1. Identification of permitting authorities,
 - 2. Required construction/operation permits,
 - 3. Time required by permitting authorities to process applications,
 - 4. Monitoring and/or compliance testing requirements, and
 - 5. Reporting requirements.
- I. Monitoring requirements to verify system effectiveness.

Factors considered by Ohio EPA in approval of proposed SCIA(s) include but are not limited to the following:

- A. Time required for implementation;
- B. Time required to achieve protection of human health and the environment;
- C. Compliance with federal, state and local laws and regulations;
- D. Performance efficiencies;
- E. Use of treatment technologies which significantly reduce toxicity, mobility, and volume of contaminants;
- F. Ability to minimize or eliminate cross-media transfer of contaminants;
- G. Ability to verify SCIA(s) effectiveness;
- H. Frequency of routine maintenance and component replacement;
- I. Degree of permanence; and
- J. Degree of contribution to the efficient performance of any anticipated long-term remedial action(s).

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3.0 DESIGN/IMPLEMENTATION (D/I)

The purpose of D/I is to design and implement the approved SCIA(s) in order to protect the human health and the environment.

3.1 Detailed Plans and Specifications

Detailed plans and specifications for the approved SCIA(s) shall be submitted in accordance with the timetable contained in the Ohio EPA-approved Conceptual Design. The detailed plans and specifications shall include but not be limited to final construction drawings, specifications, plans, and design analyses with supporting calculations. Applications for any required permits shall be submitted simultaneously with the detailed plans and specifications. Following Ohio EPA approval of the detailed plans and specifications and receipt of any necessary construction permits, *Respondent* shall initiate construction of the approved SCIA(s) in accordance with the approved schedules contained in the Conceptual Design.

3.2 Operation and Maintenance (O&M) Plan

An O&M plan shall be submitted to Ohio EPA prior to the completion of construction. Appropriate elements are listed in Exhibit 1. Plan elements listed in Exhibit 1 are for illustrative purposes and should not limit the content of the O&M plan.

3.3 Design Changes During Construction

During construction, unforeseen Site conditions, changes in estimated quantities, and other problems associated with the project may require either major or minor changes to the approved design. Design changes require prior approval of Ohio EPA and may require modification of permit(s) to install to ensure that the intent and scope of the approved SCIA(s) is maintained. Changes to the SCIA(s) design which require Ohio EPA approval prior to implementation include:

- A. Those which involve the deletion or addition of a major component of the approved SCIA(s) (e.g. changing one treatment system for another, deleting any designed layer of a multilayer cap);
- B. Those which result in a less effective treatment for wastes associated with the Site;
- C. Any changes which may result in an increased exposure to Site contaminants and/or risk to human health or the environment;
- D. Those which result in a significant delay in the completion of the SCIA(s); and
- E. Any other changes which alter the scope or objectives of the approved SCIA(s).

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3.4 Construction Completion

As the construction of the SCIA(s) nears completion, the following activities shall be completed by Respondent(s) to ensure proper construction completion and transition to the O&M phase.

A. *SCIA(s) Construction Report and Certification*

A SCIA(s) Construction Report (CR) shall be prepared and submitted by Respondent(s) within 30 days of completion of construction and in accordance with the schedule contained in the Conceptual Design. The CR report shall include the following:

1. A synopsis of the construction work defined in the detailed plans and specifications and certification that this work was performed;
2. An explanation of any modifications to the work defined in the detailed plans and specifications and why they were necessary for the project; and
3. Certification that the constructed SCIA(s) is operational and functional and constructed according to the approved plans and specifications.

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RECORDS SECTION

EXHIBIT 1

Basic Elements of an Operation and Maintenance (O&M) Plan

- A. Normal O&M
 - 1. Description of tasks for operation
 - 2. Description of tasks for maintenance
 - 3. Description of prescribed treatment or operating conditions
 - 4. Schedules showing the frequency of each O&M task

- B. Potential Operating Problems
 - 1. Description and analysis of potential operating problems
 - 2. Sources of information regarding potential operating problems
 - 3. Description of means of detecting problems in the operating systems
 - 4. Common remedies for operating problems

- C. Routine Monitoring and Laboratory Testing
 - 1. Description of monitoring tasks
 - 2. Description of required laboratory tests and interpretation of test results
 - 3. Required QA/QC procedures
 - 4. Monitoring schedule

- D. Alternative O&M
 - 1. Description of alternate procedures to prevent undue hazard, should systems fail
 - 2. Vulnerability analysis and additional resources requirements should a failure occur

- E. Safety Plan
 - 1. Description of safety procedures, necessary equipment, etc. for site personnel
 - 2. Description of safety tasks required in the event of systems failure

- F. Equipment
 - 1. Description of equipment necessary to the O&M Plan
 - 2. Description of installation of monitoring components
 - 3. Description of maintenance of site equipment
 - 4. Replacement schedule for equipment and installed components

- G. Records and Reporting Mechanisms Required
 - 1. Daily operating logs
 - 2. Laboratory records
 - 3. Mechanism for reporting emergencies
 - 4. Personnel and maintenance records
 - 5. Monthly reports to Ohio EPA

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EXHIBIT 2

METHOD TO CALCULATE SOIL CLEANUP GOALS USING THE FREUNDLICH EQUATION

This document outlines a method using the Freundlich equation for establishing soil cleanup goals at hazardous waste sites where threats to ground water resources exist. The method is designed for use with organic compounds and will predict dry soil contaminant concentrations which will prevent ground-water contaminant levels from exceeding ground-water cleanup goals. A dry soil contaminant goal can be calculated for each contaminant of concern.

The method consists of two steps. In step 1, the maximum equilibrium soil water concentration for the contaminant of concern is calculated by setting the contaminant concentration in the top 10 feet of the aquifer beneath the contaminated portion of the site to the ground water cleanup goal, estimating the vertical and horizontal components of ground-water flow, and determining by mass balance calculations the maximum mass and concentration of contaminant which can be transported via vertical ground-water flow to ground water flowing horizontally beneath the site.

In step 2, a batch adsorption technique is used to assess the ability of on-site soils to remove contaminants from solution. An aqueous solution containing solutes of known composition and concentration is mixed with a given mass of adsorbent and allowed to equilibrate. The solution is separated from the adsorbent and analyzed to determine changes in chemical composition. The amount of solute adsorbed is assumed to be the difference between the initial concentration and the solute concentration after the mixing period. The results of the batch adsorption experiment are graphed and the Freundlich adsorption equation for the resulting line segment is derived. The Freundlich isotherm or curve is then used to determine how the solute will partition between soil and water.

The value for the maximum equilibrium soil water concentration for the contaminant of concern can be inserted into the Freundlich equation derived during step 2 to determine the maximum dry soil contaminant concentration.

Step 1. Calculate maximum equilibrium soil-water concentration for contaminant.

A simple ground-water flow model is constructed for the site. Assumptions of the model include:

- a. Darcy's Law, $q = -K dh/dl$, is valid
where q = specific discharge
 K = hydraulic conductivity
 dh/dl = hydraulic gradient
- b. Hydraulic conductivity in top 10 feet of aquifer is homogeneous and isotropic
- c. Uniform hydraulic gradient beneath site

The following steps are required to construct the model.

1. Measure the lateral source length perpendicular to the direction of ground-water flow.
2. Using Darcy's Law, calculate the lateral ground-water flow in the top ten feet of the aquifer beneath the contaminated portion of the site.

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3. Calculate the maximum mass of contaminant that can leave site (ground-water quality goal times yearly flux).
4. Measure the surface area of the contaminated portion of the site.
5. Calculate the infiltration rate through the contaminated portion of the site using the U.S.EPA Help Model.
6. Assuming the upgradient ground water contaminant concentration = 0, calculate the maximum concentration of the contaminant in the equilibrium soil water which can be transported via infiltration to ground water passing beneath the site such that the ground-water contaminant level will not exceed the ground-water cleanup goal.

Step 2. Assess ability of on-site soils to remove contaminants from solution.

1. Determine a suitable batch-type laboratory procedure for determining soil adsorption of contaminants. See EPA/530-SW-87-006-F: *Batch-Type Procedures for Estimating Soil Adsorption of Chemicals (USEPA, 1992)*.
2. Construct adsorption isotherm by conducting batch experiments and determining amount of solute adsorbed per mass of adsorbent by

$$x/m = (C_o - C)(V)/m$$

where x/m = amount of solute adsorbed per unit mass of adsorbent.
 m = mass of adsorbent added to reaction chamber
 C_o = initial solute concentration before exposure to adsorbent
 C = solute concentration after exposure to adsorbent, and
 V = volume of solute solution added to reaction container.

The isotherm is constructed by plotting equilibrium concentration (C) or $\log C$ on the x axis and the corresponding x/m or $\log x/m$ on the y axis. The linear expression of the Freundlich equation is

$$\log (x/m) = \log K_f + 1/n \log C$$

where x/m = amount of solute adsorbed per unit mass of adsorbent.
 K_f = a constant
 $1/n$ = a constant, and
 C = solute concentration after exposure to adsorbent.

A linear regression can be used to fit a curve through the adsorption isotherm where the intercept equals K_f and the slope equals $1/n$. The value for C calculated in Step 1 can be plotted on the isotherm in order to determine the corresponding value for x/m , the soil cleanup goal.

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ATTACHMENT B
GUIDANCE DOCUMENTS FOR THE DEVELOPMENT
OF THE WORKPLAN

- a) *RCRA Ground Water Monitoring Technical Enforcement Guidance Document (TEGD)*, OSWER Directive 9950.1, September, 1986.
- b) *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.
- c) *Guidelines and Specifications for Preparing Quality Assurance Project Plans*, Ohio EPA, Division of Emergency and Remedial Response, Policy No. DERR-00-RR-008.
- d) *Batch-Type Procedures for Estimating Soil Adsorption of Chemicals*, U.S.EPA, EPA/530/SW-87/006-F, April, 1992.

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