



State of Ohio Environmental Protection Agency

STREET ADDRESS:

Lazarus Government Center
50 W. Town St., Suite 700
Columbus, Ohio 43215

TELE: (614) 644-3020 FAX: (614) 644-3184
www.epa.state.oh.us

MAILING ADDRESS:

P.O. Box 1049
Columbus, OH 43216-1049

February 9, 2010

Mr. Robert J. Schmidt, Jr., Esq.
Porter, Wright, Morris & Arthur
Huntington Center, 41 S. High Street
Columbus, Ohio 43215-6194

Re: Georgia Pacific Resins, Inc., 1975 Watkins Road, Columbus, Ohio
Director's Final Findings and Orders; Environmental Covenant

Dear Mr. Schmidt:

This letter follows my receipt of your January 29, 2010 letter regarding the above-referenced matter. Enclosed please find one of the two fully executed originals of: (1) the journalized Director's Final Findings and Orders for Remedial Design and Remedial Action; and (2) the Environmental Covenant for the above-referenced site. Please arrange for recording of the Environmental Covenant in the Franklin County Recorder's Office and return a file and date-stamped copy to me. In addition, please arrange for signature, notarization and recording of the Deed Notice in the Franklin County Recorder's Office and return a file and date-stamped copy to me.

Should you have any questions in this regard, please call me at your convenience, 644-3037. Thank you for your cooperation.

Sincerely,

Mark J. Navarre
Supervising Attorney

RECEIVED

FEB 10 2010

OHIO EPA/CDO

Enclosures (as noted)

cc: David O'Toole/Deborah Strayton, DERR/CDO (with enclosures)
Mark Rickrich/Peter Whitehouse, DERR/CO (with enclosures)

Ted Strickland, Governor
Lee Fisher, Lieutenant Governor
Chris Korleski, Director

BEFORE THE
OHIO ENVIRONMENTAL PROTECTION AGENCY

OHIO E.P.A.

FEB -9 2010

ENTERED DIRECTOR'S JOURNAL

In the Matter of:

Georgia-Pacific Chemicals LLC
Georgia Pacific LLC
133 Peachtree Street, N.E.
P.O. Box 105605
Atlanta, Georgia 30348

Respondent

For the Site Known As:

Georgia-Pacific Resins, Inc.
1975 Watkins Road
Columbus, OH 43207

**Director's Final
Findings and Orders
For Remedial Design and
Remedial Action**

I certify this to be a true and accurate copy of the official documents as filed in the records of the Ohio Environmental Protection Agency.

BY Debra Lassiter Date 2-9-10

PREAMBLE

It is hereby agreed to by the Parties as follows:

I. JURISDICTION

1. These Director's Final Findings and Orders ("Orders") are issued to Georgia-Pacific Chemicals LLC, pursuant to the authority vested in the Director of Ohio EPA under Ohio Revised Code ("ORC") §§ 3734.13, 3734.20, 6111.03, and 3745.01 and section 107(a)(4)(A) of CERCLA, 42 U.S.C. § 9607(a)(4)(A).

II. PARTIES BOUND

2. These Orders shall apply to and be binding upon Respondent and its successors in interest liable under Ohio law.
3. No change in ownership or corporate status of the Respondent, or of the Facility owned by Respondent including, but not limited to, any transfer of assets or real or personal property, shall in any way alter Respondent's obligations under these Orders.
4. Respondent shall provide a copy of these Orders to all contractors, subcontractors, laboratories and consultants retained to conduct any portion of the Work performed pursuant to these Orders. Respondent shall ensure that all contractors, subcontractors, laboratories and consultants retained to perform the Work pursuant

to these Orders also comply with the applicable provisions of these Orders.

III. DEFINITIONS

5. Unless otherwise expressly provided herein, all terms used in these Orders or in any appendices shall have the same meaning as defined in ORC Chapters 3734 and 6111, and the rules promulgated thereunder. Whenever the terms listed below are used in these Orders or in any appendices, attached hereto and incorporated herein, the following definitions shall apply:
- A. "CERCLA" means the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended, 42 U.S.C 9601 *et seq.*
 - B. "Day" means a calendar day unless expressly stated to be a business day. "Business day" shall mean a day other than a Saturday, Sunday, or state holiday. In computing any period of time under these Orders, where the last day would fall on a Saturday, Sunday, or state holiday, the period shall run until the close of the next business day.
 - C. "Decision Document" means the remedial action selected by the Director of Ohio EPA for the Site as set forth in the document attached to these Orders as Appendix A.
 - D. "Facility" means the Respondent's facility located at 1975 Watkins Road in Columbus, Franklin County, Ohio,
 - E. "NCP" means the National Oil and Hazardous Substances Pollution Contingency Plan, codified at 40 C.F.R. Part 300 (1990), as amended.
 - F. "Ohio EPA" means the Ohio Environmental Protection Agency and its designated representatives.
 - G. "Paragraph" means a portion of these Orders identified by an arabic numeral or an uppercase or lowercase letter.
 - H. "Parties" means Respondent and the Ohio EPA.
 - I. "Remedial Action" ("RA") means those activities to be undertaken by Respondent to implement and maintain the effectiveness of the remedy, as detailed in the final plans and specifications submitted by Respondent pursuant to the Remedial Design and Remedial Action Work Plan and approved by Ohio EPA.

- J. "Remedial Design" ("RD") means those activities to be undertaken by Respondent to develop the final plans and specifications for the Remedial Action pursuant to the Remedial Design and Remedial Action Work Plan and approved by Ohio EPA.
- K. "Remedial Design and Remedial Action Work Plan" ("RD/RA Work Plan") means the document submitted by Respondent and approved by Ohio EPA pursuant to the Performance of Work Section of these Orders.
- L. "Respondent" means Georgia-Pacific Chemicals LLC ("Georgia-Pacific"), a Delaware corporation and an indirect, wholly owned, subsidiary of Georgia-Pacific LLC, a Georgia corporation, its successors and assigns.
- M. "Response Costs" means all costs, not inconsistent with the NCP, including, but not limited to, payroll costs, contractor costs, travel costs, direct costs, overhead costs, legal and enforcement related 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.
- N. "Section" means a portion of these Orders identified by a roman numeral.
- O. "Site" means the Georgia-Pacific Chemicals LLC facility, formerly Georgia-Pacific Resins, Inc., located at 1975 Watkins Road, Columbus, Franklin County, Ohio where the historical releases or disposal of hazardous waste, and/or the discharge to waters of the state of industrial waste or other wastes have occurred, including any other area where such hazardous wastes, industrial wastes, and/or other wastes historically had migrated or threaten to migrate.
- P. "Statement of Work" ("SOW") means the statement of work for the implementation of the Remedial Design and Remedial Action at the Site, as set forth in Appendix B to these Orders. The SOW is not specific to this Site, and shall be used as an outline in developing site-specific work plans.
- Q. "Subject Property" means the footprint of the closed landfill, as described by the legal description in the attached Environmental Covenant (Appendix E).
- R. "Transferee" means any future owner of any interest in the Site, including but not limited to, owners of an interest in fee simple, mortgagees, easement holders, and lessees.

- S. "Waste Material" means (1) any "hazardous waste" under ORC § 3734.01(J); (2) any "solid waste" under ORC § 3734.01(E); (3) any "industrial waste" under ORC § 6111.01(C); and (4) any "other waste" under ORC § 6111.01(D).
- T. "Work" means all activities Respondent is required to perform under the Performance of Work and Additional Work Sections of these Orders.

IV. FINDINGS

- 6. All of the findings necessary for the issuance of these Orders pursuant to ORC §§ 3734.13, 3734.20, 6111.03, and 3745.01 have been made and are outlined below. The Director of Ohio EPA has made the following findings:
 - A. The Georgia-Pacific Chemicals LLC facility ("Facility") is located at 1975 Watkins Road in Columbus, Franklin County, Ohio, and has operated since 1970. Formaldehyde is manufactured at the Facility, using methyl alcohol (methanol) as its primary raw material. Phenol and formaldehyde are used to manufacture various synthetic resins used in the production of building materials, fertilizers and insulation.
 - B. Data collected by Ohio EPA indicate that there have been releases of Waste Materials containing formaldehyde, methanol or phenol at the Site. Some of the specific incidents are outlined below:
 - i. On May 17, 1976, as a result of a spill, Georgia-Pacific discharged an unknown quantity of a phenol/formaldehyde reaction product to the waters of the state. Testing of the Obetz Creek tributary ("stream") by Ohio EPA Emergency Response personnel indicated a phenol concentration of over 150 parts per million (ppm), a 0.37 percent concentration of formaldehyde and a 0.30 percent concentration of methanol. Testing by Georgia-Pacific indicated up to 300 ppm phenol in the stream.
 - ii. On January 3, 1984, Ohio EPA Emergency Response personnel responded to a phenol release from Georgia-Pacific to a creek. The quantity of phenol released was undetermined.
 - iii. On February 7, 1984, Ohio EPA Emergency Response personnel responded to a 1,500 pound release of phenol into an Obetz Creek tributary stream. Testing by Ohio EPA indicated levels up to 222 ppm

of phenol in the waters of the stream.

- iv. On May 7, 1984, Ohio EPA Emergency Response 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 released mixture was not confined to the Facility.
 - v. On July 9, 1984, Ohio EPA Emergency Response personnel responded to an 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 into the secondary containment system.
 - vi. On September 26, 1985, Ohio EPA Emergency Response 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, 150 to 500 gallons were lost due to evaporation.
 - vii. On April 13, 1990, Ohio EPA Emergency Response personnel responded to a 558 gallon methanol release at the Facility. The source of this methanol leak was an underground transfer pipeline.
 - viii. On April 15, 1991, Georgia-Pacific reported a second leak from the underground methanol pipeline. According to the Ohio EPA Emergency Response investigation report, 1,000 gallons of methanol was recovered from this release.
- C. An October 1, 1979 letter from Georgia-Pacific to Ohio EPA proposed a two phase clean-up of the landfill area at the Facility. An Ohio EPA letter dated November 29, 1979 to Georgia-Pacific concurred with the proposal. A follow-up inspection by Ohio EPA on March 27, 1980 confirmed closure of the on-site landfill. 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 the 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.
- D. Since approximately 1979, Georgia-Pacific has operated an unlined two million gallon aerated biological pretreatment pond ("bio-pond") to serve as a wastewater pretreatment system for the resin process wastewater. The resin

process wastewater is a combination of two waste streams, one from the total distillate and one from the seal pit operations, with the reported average concentrations of 27,500 ppm of formaldehyde, 7,100 ppm of methanol, and 5,200 ppm of phenol. The bio-pond is permitted for discharge to the city of Columbus sanitary sewer system under Georgia-Pacific's industrial user discharge permit number 010060-1.

- E. Georgia-Pacific has monitoring and production wells on the Site. Georgia Pacific sampled four monitoring wells and one production well from May 1982 through June 1991. These wells have detected various levels of chemicals during this time, including formaldehyde - up to 25 ppm and phenol - up to 4.1 ppm.
- F. Sampling of fifteen residential wells in the vicinity of the Facility by the Columbus Health Department in May 1984 detected low levels of phenol (0.036 ppm) in the water well located at 2056 Watkins Road. Sampling of five residential wells by the health department in November 1990 detected trace levels of phenol (0.009 ppm each) in two water wells located at 2056 and 2149 Watkins Road.
 - i. The levels identified in the residential wells were below the U.S. EPA Region 9 Preliminary Remediation Goals established for tap water of 11.0 ppm for phenol.
 - ii. The levels identified in the residential wells were below the U.S. EPA Lifetime Health Advisory limit established at 2.00 ppm for phenol.
 - iii. The U.S. EPA 2006 Drinking Water Standards do not have a maximum contaminant level established for phenol.
- G. Sampling of five residential wells in the vicinity of the Facility by the Ohio EPA in March 1992 detected low levels of phenol ranging from 0.050 to 0.220 ppm, including 0.050 ppm at 2056 Watkins Road and 0.220 ppm at 2149 Watkins Road. Sampling of seven Watkins Road residential wells by Ohio EPA in December 1996 did not detect phenol above the laboratory detection limits of 0.010 ppm. The levels of phenol identified in Ohio EPA's sampling of the residential water wells appear to be below the levels described in Paragraph 6(F).
- H. The April 1990 underground methanol pipeline release was addressed through an administrative consent order, issued by the Director of Ohio EPA on October 29, 1990 to Georgia-Pacific for the performance of an interim

action.

- i. The extent of the second reported leak in April 1991 was not determined because Georgia-Pacific concluded that its remediation would be addressed by the interim action required by the October 1990 administrative consent order.
 - ii. Georgia Pacific ceased the interim action's ground water recovery operation in December 1991, stating the satisfaction of the terms required under the October 1990 administrative consent order. Ohio EPA agreed with the completion of work, and terminated the October 1990 administrative consent order on February 7, 1992.
- I. The Director of Ohio EPA issued another administrative consent order to the Respondent on December 22, 1994, to complete a remedial investigation ("RI") to determine the level and extent of contamination, and a feasibility study ("FS") to define and analyze appropriate remedial alternatives at the Site.
- i. Before the RI was completed, a batch reactor (Kettle #2) used to manufacture thermo set resin in the Facility's process area exploded on September 10, 1997. This explosion released approximately 1,400 pounds of a phenol/formaldehyde resin mixture over the grounds of the Site, and onto a limited area of the adjacent Sherwin-Williams property. As a result of the batch reactor explosion, additional areas of concern were investigated that were not part of the initial RI's scope of work.
 - ii. During the subsequent emergency response activities by Georgia-Pacific after the September 1997 explosion, the remaining proposed RI activities were completed at the Site. The emergency response activities included collecting soil samples, installing ground water monitoring wells, controlling the on-site perched ground water, excavating contaminated soils and removing the explosion-damaged facility structures. These activities were completed by Georgia-Pacific in November 1998 with the reconstruction of the resin process area.
 - iii. Because of the September 1997 explosion and subsequent emergency response activities before the completion of the RI, no baseline risk assessment was performed for the Site by Georgia Pacific. Instead, a risk exposure assessment using the U.S. EPA Region 9 Preliminary Remediation Goals found that the existing

contamination levels detected were below the residential exposure risks for direct soil contact and the public drinking water tap water levels for lifetime consumption of ground water. Therefore, the risk exposure assessment concluded that the Site's remaining contamination levels did not pose unacceptable risks to human and ecological receptors at levels sufficient to require further remedial actions. However, the closed landfill and the operating bio-pond were not included in this risk exposure assessment.

- iv. Ohio EPA approved the RI Report on September 27, 2001 and approved the FS Report on April 10, 2002. The health and environmental risks of the Site evaluated by Ohio EPA resulted from past releases of hazardous wastes and/or hazardous constituents and the materials released by the September 1997 batch reactor explosion into the surrounding air, soil and ground water. The RI characterized the nature and extent of the contaminants released at the Site and the potential risks to human health and safety and the environment. The RI revealed that the principal contaminants of concern are formaldehyde, methanol and phenol. Potential risk factors arising from these contaminants are due to the possible discharge of methanol and phenol into the ground water from the existing, active on-site biopond and the potential exposure of on-site workers (e.g., facility employees or contractors such as construction workers) to any residual soil contamination.

- J. On June 13, 2005, Georgia-Pacific reported to Ohio EPA the discovery of diesel fuel in the excavation area of the footer for the extension of the boiler room building at the Facility. The historical factory layout's detailed plans indicated that a diesel fuel underground storage tank with a vehicle dispenser was located near the excavated area. Therefore, this fuel release was under the jurisdiction of the Ohio State Fire Marshal, Bureau of Underground Storage Tank Regulations ("BUSTR"). BUSTR took the lead for the investigation and corrective action relating the diesel fuel release under Case No. 25010888. On August 9, 2006, BUSTR issued a No Further Action letter to Georgia-Pacific regarding further corrective action for the diesel fuel release.

- K. On January 26, 2006, Ohio EPA notified the public of its Preferred Plan for remediation of the Site and solicited public comments. The Preferred Plan summarized the information presented in the RI and FS prepared by Environmental Strategies Corporation on behalf of Georgia Pacific, and identified and explained Ohio EPA's preferred alternative for the remedial

action at the Site. The preferred remedial alternative in the Preferred Plan included the following elements:

- i. Institutional Control.
 - ii. Engineering Controls.
 - iii. Bio-pond decommissioning.
 - iv. Operation and Maintenance ("O&M") Plan.
- L. On March 14, 2006, Ohio EPA held a public meeting and hearing on the Preferred Plan. The public comment period for the Preferred Plan ended on April 24, 2006.
- M. On October 31, 2006, Ohio EPA issued a Decision Document, which selected the remedy for the Site. The Decision Document is attached hereto as Appendix A, and incorporated by reference herein.
- N. Results of the sampling by Ohio EPA of the water wells of eight Watkins Road residents in May of 2007 indicated no elevated levels of semi-volatile organic compounds or volatile organic compounds, including phenol. The residents were notified by Ohio EPA of these results in June of 2007.
- O. Respondent is a "person" as defined in ORC §§ 3734.01(G) and 6111.01(I) and is or has been an "owner" or "operator" of a "facility" as that term is defined in ORC § 3734.01(N).
- P. The Site is a location where hazardous waste was released or disposed.
- Q. Respondent has been a generator of Waste Material at the Site. The formaldehyde, methanol and phenol became Waste Material when they were released to the soil, ground water and surface water at the Site.
- R. Historically, because of their quantity, concentration, physical or chemical characteristics, the formaldehyde, methanol and phenol released at the Site constituted "hazardous wastes" as defined in ORC § 3734.01(J). The formaldehyde, methanol and phenol released at the Site constituted "industrial waste" or "other wastes" as defined in ORC §§ 6111.01(C) and (D).
- S. Conditions at the Site constituted a substantial threat to public health or safety as provided in ORC § 3734.20(B). Engineering controls have been

implemented by the Respondent to mitigate this threat.

- T. The ground and surface waters at the Site are "waters of the state" as defined in ORC § 6111.01 (H).
- U. The un-permitted discharge of Waste Material into waters of the state is prohibited under ORC §6111.04.
- V. The migration and threatened migration of Waste Material into the ground water and/or surface water at or from the Site, constitutes pollution of waters of the state.
- W. The Work required by these Orders will contribute to the prohibition or abatement of the discharge of Waste Material to waters of the state.
- X. Ohio EPA has incurred Response Costs and continues to incur Response Costs associated with the Site.
- Y. The actions to be taken pursuant to these Orders are reasonable and necessary to protect the public health or safety or the environment.
- Z. The Director has given consideration to and based his determination on evidence relating to the technical feasibility and economic reasonableness of complying with these Orders and to evidence relating to conditions calculated to result from compliance with these Orders, and their relation to the benefits to the people of the state of Ohio to be derived from such compliance.

V. GENERAL PROVISIONS

7. Objectives of the Parties

The objectives of the Parties in entering into these Orders are to protect public health and safety and the environment from the disposal, discharge, or release of Waste Material at the Site through the design, construction, operation and maintenance of the remedy as set forth in the Decision Document.

8. Commitment of Respondent

Without admission of fact, violation or liability, Respondent agrees to perform the Work in accordance with these Orders including but not limited to the SOW, all relevant guidance documents, and all standards, specifications, and schedules set forth in or developed pursuant to these Orders. Respondent also agrees to reimburse Ohio EPA for all Response

Costs and perform all other obligations of these Orders.

9. Compliance With Law

- A. All activities undertaken by Respondent pursuant to these Orders shall be performed in accordance with the requirements of all applicable federal, state and local laws and regulations, and in a manner consistent with the NCP.
- B. Ohio EPA expects that activities conducted pursuant to these Orders, if approved by Ohio EPA, would be considered necessary and consistent with the NCP.
- C. Where any portion of the Work requires a permit, license or other authorization, Respondent shall submit applications in a timely manner and take all other actions necessary to obtain such permit, license or other authorization. These Orders are not, and shall not be construed to be, a permit, license or other authorization issued pursuant to any statute or regulation.

VI. PERFORMANCE OF THE WORK BY RESPONDENT

10. Supervising Contractor

All Work performed pursuant to these Orders shall be under the direction and supervision of an employee or contractor with expertise in hazardous waste site investigation and remediation. Prior to the initiation of the Work, Respondent shall notify Ohio EPA in writing of the name of the supervising employee or contractor and any subcontractor to be used in performing the Work under these Orders.

11. Remedial Design and Remedial Action

- A. Within twenty-one (21) days of the effective date of these Orders, unless otherwise mutually agreed to by the Parties, Respondent shall meet with Ohio EPA to discuss the requirements of the RD/RA Work Plan.
- B. Within forty-five (45) days after the effective date of these Orders, unless otherwise specified in writing by Ohio EPA, Respondent shall submit to Ohio EPA a work plan and schedule for implementation of the Work required under the Performance of Work Section of these Orders. The RD/RA Work Plan shall provide for the design, construction, operation and maintenance of the remedy as set forth in the Decision Document.

- C. The RD/RA Work Plan shall be developed in conformance with the SOW, Appendix B of these Orders, and the guidance documents listed in Appendix C of these Orders, attached hereto and incorporated herein. If Ohio EPA determines that any additional or revised guidance documents affect the Work to be performed in implementing the RD/RA, Ohio EPA will notify Respondent, and the RD/RA Work Plan and other affected documents shall be modified accordingly.
- D. Should Respondent identify any inconsistency between any of the laws and regulations and guidance documents that Respondent is required to follow by these Orders, Respondent shall notify Ohio EPA in writing of each inconsistency and the effect of the inconsistencies upon the Work to be performed. Respondent shall also recommend, along with a supportable rationale justifying each recommendation, the requirement Respondent believes should be followed. Respondent shall implement the affected Work as directed by Ohio EPA.
- E. Ohio EPA will review the RD/RA Work Plan pursuant to the procedures set forth in the Review of Submittals Section of these Orders. Upon approval of the RD/RA Work Plan by Ohio EPA, Respondent shall implement the RD/RA Work Plan. Respondent shall submit all plans, reports, or other deliverables required under the approved RD/RA Work Plan, in accordance with the approved RD/RA schedule set forth therein, for review and approval pursuant to the Review of Submittals Section.

12. Health and Safety Plan

Within forty-five (45) days of the effective date of these Orders, Respondent shall submit to Ohio EPA for review and comment a health and safety plan developed in conformance with the guidance listed in Appendix C.

13. Operation and Maintenance Plan

The O&M Plan, including a schedule for implementation, shall be submitted in accordance with the approved RD/RA Work Plan. Ohio EPA will review the O&M Plan pursuant to the procedures set forth in the Review of Submittals Section of these Orders. Upon approval of the O&M Plan by Ohio EPA, Respondent shall implement the O&M Plan. Respondent shall submit all plans, reports, or other deliverables required under the approved O&M Plan, in accordance with the approved O&M schedule set forth therein, for review and approval pursuant to the Review of Submittals Section of these Orders.

VII. ASSURANCE OF ABILITY TO COMPLETE WORK

14. Within ninety (90) days of the effective date of these Orders, unless otherwise specified in writing by Ohio EPA, Respondent shall establish and maintain financial security in the amount of five hundred forty thousand dollars (\$540,000) in order to ensure performance and completion of the Work under these Orders. The financial security shall be a financial assurance mechanism approved by Ohio EPA.

15. Verification of the existence and adequacy of the approved financial assurance mechanism shall be submitted to the Ohio EPA annually by the Respondent on the anniversary of the effective date of these Orders, or upon the request of Ohio EPA. In the event that the Ohio EPA determines at any time that the financial assurance mechanism provided pursuant to this Section is inadequate, Respondent shall, within thirty (30) days of receipt of notice of Ohio EPA's determination, obtain and present to Ohio EPA another financial assurance mechanism to be approved by Ohio EPA. The Respondent may change the form of the financial assurance mechanism provided under this Section at any time, upon notice to and approval by Ohio EPA. Respondent's inability to demonstrate financial ability to complete the Work shall not excuse performance of any activities required under these Orders.

16. If Respondent can show that the estimated cost to complete the remaining Work has diminished below the financial security amount set forth in this Section, the Respondent may request that the amount of the financial security be reduced to the estimated cost of the remaining Work to be performed. This request for a reduction is available no more frequently than biannually. Information relied upon in calculating the revised estimate of costs must be provided with the request for reduction. A reduction in the amount of the financial security can only be made with the approval of the Ohio EPA.

VIII. LAND USE AND CONVEYANCE OF TITLE

17. Deed Notice

Within forty-five (45) days of the effective date of these Orders, Respondent shall record with the Franklin County Recorder's Office a deed notice for the Facility property that is owned by the Respondent (Appendix D). The deed notice shall be consistent with the template attached to these Orders and shall be approved by Ohio EPA. The deed notice shall reference the existence of these Orders, identify any security, monitoring, treatment, or containment systems present on the Facility property, and the need to contact the Respondent before any construction or excavation is undertaken at the Facility property. A copy of the recorded deed notice shall be submitted to Ohio EPA within thirty (30) days of recording the notice. Thereafter, if Respondent conveys any interest in the Facility property, each deed, title, or other conveyance instrument shall contain a notice stating that the Facility property is subject to these Orders and shall reference any security, monitoring,

treatment, or containment systems present on the Facility property as a result of these Orders. The Respondent shall record a new deed notice for the Facility property to reflect the subsequent construction of any security, monitoring, treatment or containment systems at the Facility property.

18. Environmental Covenant

Within forty-five (45) days after the effective date of these Orders, Respondent shall record, in the Franklin County Recorder's Office, the executed Environmental Covenant attached to these Orders as Appendix E. The Environmental Covenant must be recorded in the deed or official records of the Franklin County Recorder's Office. The terms and conditions of the Environmental Covenant are incorporated into these Orders and shall be binding upon Respondent.

19. Proof of Filing Environmental Covenant

Within forty-five (45) days after filing with the Franklin County Recorder's Office the executed Environmental Covenant, Respondent shall certify to Ohio EPA that the Environmental Covenant has been filed for recording, and shall include with the certification a file and date-stamped copy of the recorded Environmental Covenant. Upon each conveyance by Respondent of an interest in any portion of the Facility property, including but not limited to easements, deeds, leases and mortgages, Respondent shall include in the instrument of conveyance a restatement consistent with paragraph 10 of the Environmental Covenant. The terms and conditions of the Environmental Covenant are hereby incorporated into these Orders and shall be binding upon the Respondent. If the Environmental Covenant is violated or breached by Respondent, the Respondent shall be in violation of these Orders.

20. Land Use Self-Reporting Requirement

Respondent shall ensure that no portion of the Facility property will be used in any manner that would adversely affect the integrity of any security, monitoring, treatment or containment systems at the Facility property, or violate any activity and use limitations applicable to the Facility property under these Orders. Respondent shall submit on an annual basis, written documentation verifying that required elements of the preferred alternative in the Decision Document, Appendix A, are implemented and operational.

21. Notice of Transfer of Property

Prior to each conveyance by Respondent of an interest in any portion of the Facility property, including but not limited to easements, deeds, leases and mortgages, Respondent shall notify Transferee of the existence of the ground water monitoring system and activity

and use limitations in the Environmental Covenant, and shall provide a copy of these Orders and the Environmental Covenant to Transferee. Respondent shall notify Ohio EPA at least thirty (30) days in advance of each conveyance of an interest in any portion of the Facility property. Respondent's notice shall include the name and address of the Transferee and a description of the provisions made for the continued access to and maintenance of the security, monitoring, treatment and containment systems.

22. Confirmation of Conveyance

Within thirty (30) days after each conveyance of an interest in any portion of the Facility property, the Respondent shall submit to Ohio EPA, the following information:

- A. A copy of the deed or other documentation evidencing the conveyance;
- B. The name, address, and telephone number of the new property owner and the name, address, and telephone number of the contact person for the property owner;
- C. A legal description of the property, or the portion of the property, being transferred;
- D. A survey map of the property, or the portion of the property, being transferred;
- E. The closing date of the transfer of ownership of the property, or portion of the property.

IX. ADDITIONAL WORK

23. Ohio EPA may determine that in addition to the tasks defined in the approved RD/DA Work Plan, additional Work may be necessary to accomplish the Objectives of the Parties as provided in the General Provisions Section of these Orders and the SOW and guidance documents identified as Appendices B and C. Any additional Work proposed under this section shall not exceed the scope of the remedy selected in the Decision Document.
24. Within thirty (30) days of receipt of written notice from Ohio EPA that additional Work is necessary, unless otherwise specified in writing by Ohio EPA, Respondent shall submit a Work Plan and a schedule for the performance of the additional Work ("Additional Work Work Plan"). In addition, Respondent shall submit revisions for any other schedules impacted by the additional Work. To the extent the Respondent disputes that additional Work is necessary, Respondent shall initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders

within fourteen (14) days after receipt of Ohio EPA's notification of the need for additional Work. The Additional Work Work Plan shall conform to the standards and requirements set forth in the documents attached to these Orders as Appendices B and C. Upon approval of the Additional Work Work Plan and schedule by Ohio EPA pursuant to the Review of Submittals Section of these Orders, Respondent shall implement the approved Additional Work Work Plan in accordance with the revised schedules contained therein.

25. In the event that Respondent determines that additional Work is necessary, Respondent shall submit an initial letter to Ohio EPA to explain why the additional Work is necessary, what the additional Work is, and what impact, if any, the additional Work will have on the overall Work schedule. If Ohio EPA concurs with the request for additional Work, Respondent shall submit an Additional Work Work Plan and schedule for the performance of additional Work. The Additional Work Work Plan shall conform to the standards and requirements set forth in the documents attached to these Orders as Appendices B and C. Upon approval of the Additional Work Work Plan and schedule by Ohio EPA pursuant to the Review of Submittals Section of these Orders, Respondent shall implement the approved Additional Work Work Plan in accordance with the schedules contained therein.

X. SAMPLING AND DATA AVAILABILITY

26. Unless otherwise agreed to by the Site Coordinators, Respondent shall notify Ohio EPA not less than seven (7) business days in advance of all sample collection activity. Upon request, Respondent shall allow split and/or duplicate samples to be taken by Ohio EPA or its designated contractor. Ohio EPA shall also have the right to take any additional samples it deems necessary. Upon request, Ohio EPA shall allow Respondent to take split and/or duplicate samples of any samples Ohio EPA takes as part of its oversight of Respondent's implementation of the Work.
27. Within seven (7) business days of a request by Ohio EPA, Respondent shall submit to Ohio EPA electronic copies of the results of all sampling and/or tests or other data, including raw data and laboratory reports, generated by or on behalf of Respondent with respect to the Site and/or the implementation of these Orders. An electronic copy shall be provided in a format approved by Ohio EPA. Respondent may submit to Ohio EPA any interpretive reports and written explanations concerning the raw data and laboratory reports. Such interpretive reports and written explanations shall not be submitted in lieu of laboratory reports and raw data. Should Respondent subsequently discover an error in any report or raw data, Respondent shall promptly notify Ohio EPA of such discovery and provide the correct information. Upon request, Ohio EPA agrees to provide Respondent electronic copies of the results of all sampling and/or tests or other data, including raw data and laboratory

reports, generated by or on behalf of Ohio EPA with respect to the Site and/or implementation of these Orders.

XI. ACCESS

28. Ohio EPA and its contractors shall have access at all reasonable times to the Site and any other property to which access is required for the implementation of these Orders, to the extent access to the property is controlled by Respondent. Access under these Orders shall be for the purposes of conducting any activity related to these Orders including but not limited to the following:
- A. Monitoring the Work.
 - B. Conducting sampling.
 - C. Inspecting and copying records, operating logs, contracts, and/or other documents related to the implementation of these Orders.
 - D. Monitoring compliance with use restrictions.
 - E. Conducting investigations and tests related to the implementation of these Orders.
 - F. Verifying any data and/or other information submitted to Ohio EPA.
29. To the extent that the Site or any other property to which access is required for the implementation of these Orders is owned or controlled by persons other than Respondent, Respondent shall use its best efforts to secure from such persons access for Respondents and Ohio EPA and its contractors as necessary to implement these Orders. Copies of all access agreements obtained by Respondent shall be provided to Ohio EPA upon request. If any access required to implement these Orders is not obtained within thirty (30) days of the effective date of these Orders, or within thirty (30) days of the date Ohio EPA notifies Respondent in writing that additional access beyond that previously secured is necessary, Respondent shall promptly notify Ohio EPA in writing of the steps Respondent has taken to attempt to obtain access. Ohio EPA may, as it deems appropriate, assist Respondent in obtaining access.
30. Notwithstanding any provision of these Orders, the State of Ohio retains all of its access rights and authorities, including enforcement authorities related thereto, under any applicable statute or regulation including but not limited to ORC §§ 3734.20 and 6111.05.

XII. DESIGNATED SITE COORDINATORS

31. Within seven (7) days of the effective date of these Orders, the Respondent shall notify Ohio EPA, in writing, of the name, address and telephone number of its designated Site Coordinator and Alternate Site Coordinator. If a designated Site Coordinator or Alternate Site Coordinator is changed, the identity of the successor will be given to the other Party at least seven (7) days before the changes occur, unless impracticable, but in no event later than the actual day the change is made.
32. To the maximum extent practicable, except as specifically provided in these Orders, communications between Respondent and Ohio EPA concerning the implementation of these Orders shall be made between the Site Coordinators. Respondent's Site Coordinator shall be available for communication with Ohio EPA regarding the implementation of these Orders for the duration of these Orders. Each Site Coordinator shall be responsible for ensuring that all communications from the other Party are appropriately disseminated and processed. Respondent's Site Coordinator or Alternate Site Coordinator shall be present on the Site or on call during all hours of Work at the Site.
33. Without limitation of any authority conferred on Ohio EPA by statute or regulation, the Ohio EPA Site Coordinator's authority includes but is not limited to the following:
 - A. Directing the type, quantity and location of samples to be collected by Respondent pursuant to an approved Work Plan.
 - B. Collecting samples.
 - C. Subject to paragraph 54 of these Orders (regarding confidential business information), observing, taking photographs, or otherwise copying information related to the implementation of these Orders, including the use of any mechanical or photographic device. In consideration of Respondent's site security concerns and confidential business information, Ohio EPA's Site Coordinator will inform Respondent's Site Coordinator or Alternate Site Coordinator before taking any photographs or copying information at the Facility. Respondent's Site Coordinator or Alternate Site Coordinator shall, at the time any such photographs are taken or information copied, inform Ohio EPA's Site Coordinator as to whether or not Respondent intends to assert a claim of confidential business information pursuant to Paragraph 54 of these Orders. If such a claim of confidential business information is made by the Respondent, Ohio EPA's Site Coordinator shall maintain as confidential any photographs taken or other information copied until a formal determination

regarding the confidentiality of such information is made by the Director. Nothing in this paragraph limits the ability of Respondent to make a claim of confidential business information regarding other information submitted or provided to Ohio EPA.

- D. Directing that the Work stop whenever the Site Coordinator for Ohio EPA determines that the activities at the Site may create or exacerbate a threat to public health or safety, or threaten to cause or contribute to air or water pollution or soil contamination.
- E. Conducting investigations and tests related to the implementation of these Orders.
- F. Subject to paragraph 54 (regarding confidential business information) and paragraph 55 (regarding privileged information) of these Orders, inspecting and copying records, operating logs, contracts and/or other documents related to the implementation of these Orders.
- G. Assessing Respondent's compliance with these Orders.

XIII. PROGRESS REPORTS AND NOTICE

- 34. Unless otherwise directed by Ohio EPA, Respondent shall submit a written progress report on the implementation of the Work to the Ohio EPA on an annual basis by the tenth (10) day following the anniversary of these Orders. At a minimum, the progress reports shall include:
 - A. A description of the Work performed during the reporting period including an estimate of the percentage of the RD/RA completed.
 - B. A list of all target and actual completion dates for each element of activity including project completion.
 - C. An explanation for any deviation from any applicable schedule.
 - D. Summaries of all findings and sampling during the reporting period.
 - E. Summaries of all changes made in the RD/RA during the reporting period, indicating consultation with Ohio EPA and date of approval by Ohio EPA of those changes, when necessary.
 - F. Summaries of all contacts with representatives of the local community, public

interest groups or government agencies during the reporting period.

- G. Summaries of all problems or potential problems encountered during the reporting period, including those that delay or threaten to delay completion of project milestones with respect to the approved work plan schedule or Remedial Action Implementation Plan schedule.
- H. Summaries of actions taken and/or planned to rectify or prevent problems.
- I. Summaries of actions taken to achieve and maintain cleanup standards and performance standards.
- J. Changes in personnel during the reporting period.
- K. Projected Work for the next reporting period.
- L. Copies of daily reports, inspection reports, sampling data, and laboratory/monitoring data, etc.
- M. The quantity and disposition of the following media treated, removed, or contained as part of remedial activities under these Orders:
 - i. Soil treated or removed – Soil treated or removed shall be reported by volume and soil contained shall be reported by area.
 - ii. Surface water load reduction - Load reduction shall address all contaminants of concern.
 - iii. Ground water treated, removed, or contained - Ground water treated shall be reported by volume and ground water contained shall be reported as an estimated area of the plume.
 - iv. Leachate treated, removed or contained - Leachate treated, removed or contained shall be reported by volume.
 - v. Sediments treated, removed, or contained - Sediments treated or removed shall be reported by volume and sediments contained shall be reported by area.
 - vi. Waste and debris treated, removed, or contained - Waste and debris shall be defined as regulated materials not otherwise covered in roman number i. through v. above. Waste debris treated or contained shall

be reported by either volume or area as appropriate.

- N. The disposition of contaminated soil, sediments, and waste material that was treated on or off site, or the disposal location for any quantity of contaminated ground water and/or surface water that was pumped and treated or disposed.
35. Progress reports (one copy only) and all other documents (two copies) required to be submitted pursuant to these Orders to Ohio EPA shall be sent to the following agency address:

David M. O'Toole
Ohio EPA, Central District Office
P.O. Box 1049
Columbus, Ohio 43216-1049

or 50 West Town Street, Suite 700
Columbus, Ohio 43215

Or e-mailed to David.O'Toole@epa.state.oh.us

All written correspondence to Respondent shall be directed to:

Ms. Julie B. Raming, Manager, Environmental Affairs
Georgia-Pacific Corporation
133 Peachtree Street, NE
P.O. Box 105605
Atlanta, Georgia 30348-5605

and

Mr. David Mason, Plant Manager
Georgia-Pacific Chemicals LLC
1975 Watkins Road
Columbus, Ohio 43207

A Party may designate an alternative contact name or address upon written notification to the other Party and in accordance with the Designated Site Coordinator Section of these Orders, if applicable.

XIV. REVIEW OF SUBMISSIONS

36. Ohio EPA shall review any work plan, report, or other item required to be submitted

- pursuant to these Orders. Upon review, Ohio EPA may in its sole discretion: (a) approve the submission in whole or in part; (b) approve the submission upon specified conditions; (c) modify the submission; (d) disapprove the submission in whole or in part, notifying Respondent of deficiencies; or (e) any combination of the above. The results of Ohio EPA's review shall be in writing and provided to the Respondent. Approval or disapproval of submissions shall not be inconsistent with the NCP or with applicable federal or state statutes or regulations.
37. In the event of approval, approval upon condition, or modification of any submission by the Ohio EPA, Respondent shall proceed to take any action required by the submission as approved, conditionally approved, or modified by Ohio EPA.
 38. In the event that Ohio EPA initially disapproves a submission, in whole or in part, and notifies Respondent in writing of the deficiencies, Respondent shall within thirty (30) days, or such longer period of time as specified by Ohio EPA in writing, correct the deficiencies and submit the revised submission to Ohio EPA for approval. The revised submission shall incorporate all of the undisputed changes, additions, and/or deletions specified by Ohio EPA in its notice of disapproval. Revised submissions shall be accompanied by a letter indicating how and where each of Ohio EPA's comments was incorporated into the submission. Any other changes made to the submission by Respondent shall also be identified in the letter. To the extent that Respondent disputes any changes, additions, and/or deletions specified by the Ohio EPA, Respondent shall initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders, within fourteen (14) days after receipt of Ohio EPA's disapproval of a submission. Notwithstanding the disapproval, Respondent shall proceed to take any action required by a non-deficient portion of the submission.
 39. In the event that Ohio EPA disapproves a revised submission, in whole or in part, and notifies Respondent in writing of the deficiencies, Respondent shall within thirty (30) days, or such longer period of time as specified by Ohio EPA in writing, correct the deficiencies and incorporate all changes, additions, and/or deletions, and submit the revised submission to Ohio EPA for approval. If Respondent fails to submit a revised submission incorporating all changes, additions, and/or deletions within thirty (30) days, or such period of time as specified by Ohio EPA in writing, Respondent shall be considered in breach and/or violation of these Orders. If Respondent is in breach and/or violation of these Orders, Ohio EPA retains the right to terminate these Orders, perform any additional remediation, conduct a complete or partial Remedial Design or Remedial Action and/or enforce the terms of these Orders as provided in the Reservation of Rights Section of these Orders.
 40. All work plans, reports, or other items required to be submitted to Ohio EPA under

these Orders shall, upon approval by Ohio EPA, be deemed to be incorporated in and made an enforceable part of these Orders. In the event that Ohio EPA approves a portion of a work plan, report, or other item, the approved portion shall be deemed to be incorporated in and made an enforceable part of these Orders.

XV. DISPUTE RESOLUTION

41. The Site Coordinators shall, whenever possible, operate by consensus. In the event that there is a dispute about the adequacy of any work plan, report, or other item required to be submitted or Work or activity to be performed pursuant to the Additional Work Review of Submittals or Periodic Review Sections of these Orders, the Respondent shall have thirty (30) days from the date the dispute arises to invoke the dispute resolution procedures of this Section by notifying Ohio EPA in writing of the dispute. After Ohio EPA's receipt of such written notice of dispute, the Site Coordinators may, for the remainder of the thirty (30) day period, negotiate in good faith in an attempt to resolve the dispute. This thirty (30) day period may be extended by mutual agreement of the Parties; however, any such extension shall be confirmed in writing by Ohio EPA and any such negotiation period shall not exceed forty-five (45) days from the date of Ohio EPA's receipt of the written notice of dispute.
42. The dispute shall be considered to have arisen when a Respondent's Site Coordinator becomes aware of the disputed issue(s). If written notice is not provided within thirty (30) days from the date the dispute arises, the dispute resolution procedures may not be invoked for the disputed issue(s). Within thirty (30) days of Ohio EPA's receipt of the written notice of dispute, Respondent shall provide Ohio EPA with the rationale supporting the Respondent's position. If Ohio EPA concurs with the position of Respondent, then the Work plan, report or other item required to be submitted or Work or activity to be performed pursuant to these Orders shall be modified accordingly.
43. If Ohio EPA does not concur with Respondent, Ohio EPA's Site Coordinator shall notify the Respondent in writing that Ohio EPA does not concur. Upon receipt of such written notice, the Respondent shall have fourteen (14) days from receipt of the non-concurrence notification from Ohio EPA to provide a written statement of the dispute to the DERR Manager and request a formal resolution of the dispute. The Respondent's written statement instituting the formal dispute resolution procedure shall include the rationale supporting the position of the Respondent. If the Respondent does not provide such a statement, rationale and request within fourteen (14) days from receipt of Ohio EPA's non-concurrence notification, Ohio EPA will adopt the position of its Site Coordinator and the Work plan, report, other item required to be submitted pursuant to these Orders, or any other item subject to the dispute resolution procedures of this Section shall be modified accordingly. If the

Respondent provides such a statement, rationale and request within fourteen (14) days from receipt of Ohio EPA's non-concurrence notification, the DERR [District or Central Office] Manager shall review the written positions of the Parties and shall resolve the dispute based upon and consistent with these Orders including the SOW and any applicable approved Work plan, and other appropriate federal and state laws and regulations. In the event that Respondent disagrees with the DERR Manager's resolution of the dispute, and the matter is referred by Ohio EPA to the Ohio Attorney General for enforcement of compliance with these Orders, the parties agree that these Orders shall not be construed to preclude Respondent from raising any legal or equitable defense including, but not limited to, those based on Respondent's position regarding the dispute, in any such action to enforce compliance with these Orders.

44. The pendency of a dispute under this Section shall extend only the time period for completion of the tasks related to the matters in dispute, except that upon mutual agreement of the Parties, any time period may be extended as is deemed appropriate under the circumstances. Such agreement shall not be unreasonably withheld by Ohio EPA. Elements of the Work not affected by the dispute shall be completed in accordance with applicable schedules and time frames. The opportunity to invoke dispute resolution under the Dispute Resolution Section shall not be available to Respondent unless otherwise expressly provided in these Orders.

XVI. UNAVOIDABLE DELAYS

45. Respondent shall cause all Work to be performed in accordance with applicable schedules and time frames unless any such performance is prevented or delayed by an event that constitutes an unavoidable delay. For purposes of these Orders, an "unavoidable delay" shall mean an event beyond the control of Respondent that prevents or delays performance of any obligation required by these Orders and that could not be overcome by due diligence on the part of Respondent. Increased cost of compliance shall not be considered an event beyond the control of Respondent.
46. Respondent shall notify Ohio EPA in writing within ten (10) days after the occurrence of an event that 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 constitutes an unavoidable delay. A delay in performing Work attributed by Respondent to lack of access to property not owned by Respondent shall be considered by Ohio EPA in its determination whether such delay constitutes an unavoidable delay, provided that Respondent exercised its reasonable best efforts to obtain such access.

47. If Ohio EPA does not agree that the delay has been caused by an unavoidable delay, Ohio EPA will notify the Respondent in writing. To the extent that Respondent disputes Ohio EPA's conclusion that the delay was not unavoidable, Respondent shall initiate the procedures for dispute resolution set forth in the Dispute Resolution Section of these Orders, within fourteen (14) days after receipt of Ohio EPA's determination. Subject to the Dispute Resolution Section of these Orders, Ohio EPA reserves the right to terminate these Orders, perform any additional remediation, conduct a partial or complete Remedial Design and Remedial Action, and/or enforce the terms of these Orders in the event that Ohio EPA determines that the delay has not been caused by an unavoidable delay. If Ohio EPA agrees that the delay is attributable to an unavoidable delay, Ohio EPA will notify Respondent in writing of the length of the extension for the performance of the obligations affected by the unavoidable delay.

XVII. REIMBURSEMENT OF COSTS

48. Ohio EPA has incurred and continues to incur Response Costs in connection with the Site. Respondent shall reimburse Ohio EPA for all Response Costs incurred both prior to and after the effective date of these Orders.
49. Within thirty (30) days after the effective date of these Orders, Respondent shall remit a check to the Ohio EPA for \$121,728.36 for all Response Costs incurred prior to December 31, 2007.
50. For Response Costs incurred after December 31, 2007 and before January 1, 2010, Ohio EPA will submit to Respondent, in 2010, an itemized invoice of its Response Costs that time period. For Response Costs incurred after January 1, 2010, Ohio EPA will submit to Respondent on an annual basis an itemized invoice of its Response Costs for the previous year. Within thirty (30) days of receipt of such itemized invoice, Respondent shall remit payment for all of Ohio EPA's Response Costs for applicable time period.
51. Respondent shall remit payments to Ohio EPA pursuant to this Section as follows:
- A. Payment shall be made by certified check payable to "Treasurer, State of Ohio" and shall be forwarded to Office of Fiscal Administration, Attn: Brenda Case, Ohio EPA, P. O. Box 1049, Columbus, Ohio 43216-1049.
 - B. A copy of the transmittal letter and certified check shall be sent to the Fiscal Officer, DERR, Ohio EPA, P. O. Box 1049, Columbus, Ohio 43216-1049, and to the Site Coordinator.

- C. Each payment shall identify the name and address of the party making payment, the site name, and Ohio EPA's revenue number identified on the associated invoice.
52. To the extent the Respondent disputes the accuracy of the state of Ohio's request for reimbursement or whether costs are inconsistent with the NCP, Respondent shall initiate the formal dispute provisions of the Dispute Resolution Section, within thirty (30) days after receipt of Ohio EPA's request for reimbursement of costs. Should the Respondent dispute a portion of the response costs set forth in an itemized statement, but not all of the costs, Respondent shall timely pay the uncontested portion pursuant to the provisions of the Reimbursement of Costs Section.

XVIII. ACCESS TO INFORMATION

53. Upon request, Respondent shall provide to Ohio EPA within fourteen (14) days, copies of all documents and information within its possession or control or that of its contractors or agents relating to events or conditions at the Site including, but not limited to manifests, reports, correspondence, or other documents or information related to the Work.
54. Respondent may assert a claim that documents or other information submitted to Ohio EPA pursuant to these Orders are confidential under the provisions of OAC 3745-50-30(A) or ORC § 6111.05(A). If no such claim of confidentiality accompanies the documents or other information when it is submitted to Ohio EPA, it may be made available to the public without notice to Respondent.
55. Respondent may assert that certain documents or other information are privileged under the attorney-client privilege or any other privilege recognized by state law. If Respondent makes such an assertion, it shall provide Ohio EPA with the following: (1) the title of the document or information; (2) the date of the document or information; (3) the name and title of the author of the document or information; (4) the name and title of each addressee and recipient; (5) a general description of the contents of the document or information; and (6) the privilege being asserted by Respondent.
56. No claim of confidentiality shall be made with respect to any data or reports, including but not limited to laboratory or interpretive reports, and all sampling, analytical, and monitoring data, to the extent required to be submitted to Ohio EPA under these Orders.
57. Respondent shall preserve for the duration of these Orders and for a minimum of ten

(10) years after termination of these Orders, all documents and other information within its possession or control, or within the possession or control of its contractors or agents, which in any way relate to the Work notwithstanding any document retention policy to the contrary. Respondent may preserve such documents by microfiche, or other electronic or photographic device. At the conclusion of this document retention period, Respondent shall notify Ohio EPA at least sixty (60) days prior to the destruction of these documents or other information; and upon request, shall deliver such documents and other information to Ohio EPA.

XIX. PERIODIC REVIEW

58. Respondent shall conduct studies and investigations as requested by Ohio EPA in order to permit Ohio EPA to conduct reviews as to the effectiveness of the Remedial Action at least every five years as described in section 121(c) of the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended and any applicable regulations.
59. If Ohio EPA determines that information received, in whole or in part, during a review conducted pursuant to the Periodic Review Section of these Orders indicates that the Remedial Action is not protective of public health and safety and the environment, the Respondent shall undertake any further response actions Ohio EPA has determined are appropriate. Respondent shall submit a plan for such work to Ohio EPA for approval in accordance with the procedures set forth in the Review of Submittals Section of these Orders, within thirty (30) days of receiving a request from Ohio EPA to submit such a work plan.
60. Respondent may invoke the procedures in the Dispute Resolution Section to dispute (1) Ohio EPA's determination that the Remedial Action is not protective of public health and safety and the environment or (2) Ohio EPA's selection of further response actions as unlawful or unreasonable.

XX. MODIFICATIONS

61. These Orders may be modified by agreement of the Parties. Modifications shall be in writing, signed by the authorized representative of the Respondent and by the Director, and shall be effective on the date entered in the Journal of the Director of Ohio EPA.

XXI. INDEMNITY

62. Respondent agrees to indemnify, save, and hold harmless Ohio EPA from any and all claims or causes of action arising from, or related to, the implementation of these Orders or to events or conditions at the Site, including any acts or omissions of

Respondent, its officers, employees, receivers, trustees, agents, or assigns. Said indemnification shall not apply to acts or omissions of the state of Ohio, its employees, agents or assigns at, on, upon, or related to the Site if said acts are negligent, performed outside the scope of employment or official responsibilities, or performed with malicious purpose, in bad faith, or in a wanton or reckless manner. Ohio EPA 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 these Orders. Ohio EPA agrees to provide notice to Respondent within thirty (30) days after receipt of any claim that may be the subject of indemnity as provided in this Section, and to cooperate with Respondent in the defense of any such claim or action against Ohio EPA.

XXII. OTHER CLAIMS

63. 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 a Party to these Orders, for any liability arising from, or related to, events or conditions at the Site.

XXIII. RESERVATION OF RIGHTS

64. Ohio EPA reserves the right to seek legal and/or equitable relief to enforce the terms and conditions of these Orders, including penalties against Respondent for noncompliance with these Orders. Except as provided herein, Respondent reserves any rights it may have to raise any legal or equitable defense in any action brought by or on behalf of Ohio EPA to enforce the terms and conditions of these Orders.
65. Ohio EPA reserves the right to terminate these Orders and/or perform all or any portion of the Work or any other measures in the event that the requirements of these Orders are not wholly complied with within the time frames required by these Orders.
66. Ohio EPA reserves the right to take any action against Respondents if conditions at the Site, previously unknown to the State, are discovered after the effective date of these Orders, or information is received, after the effective date of these Orders and these previously unknown conditions or this information shows that the remedy for the Site as set forth in the Decision Document is not protective of public health or safety or the environment.
67. Subject to the Agreement Not To Refer Section of these Orders, Ohio EPA reserves the right to take any action, including but not limited to any enforcement action, action to recover costs, or action to recover damages to natural resources, pursuant

to ORC Chapters 3734, 3745, or 6111, or any available legal authority as a result of past, present, or future violations of state or federal laws or regulations or the common law, and/or as a result of events or conditions arising from, or related to, the Site. Respondent reserves all defenses it may have to any of the actions that may be taken by Ohio EPA.

XXIV. AGREEMENT NOT TO REFER

68. During the implementation of these Orders, and provided Respondent is considered by Ohio EPA to be in compliance with these Orders, Ohio EPA agrees not to refer Respondent to the Ohio Attorney General's Office, or take administrative enforcement action against Respondent, for Work required by these Orders. Upon termination of these Orders pursuant to the Termination Section, Ohio EPA agrees to not refer Respondent to the Ohio Attorney General's Office, or take administrative enforcement action against Respondent for Work required under these Orders.

XXV. TERMINATION

69. Respondent's obligations under these Orders shall terminate upon approval in writing of Respondent's written certification to Ohio EPA that all Work required to be performed under these Orders including payment of Response Costs has been completed. The Respondent's certification shall contain the following attestation, "I certify that the information contained in or accompanying this certification is true, accurate, and complete." This certification shall be submitted by Respondent to Ohio EPA and shall be signed by a responsible official of Respondent. The termination of Respondent's obligations under these Orders shall not terminate the Respondent's obligations under the Reservation of Rights, Access to Information, Indemnity, Other Claims and Land Use and Conveyance of Title Sections of these Orders. Upon termination of these Orders in accordance with this section, and subject to the Reservation of Rights section of these Orders, Ohio EPA will release Respondent and its agents, assigns and successors from (1) any and all liability for Work required under these Orders and (2) any requirements to perform additional work at the Site pursuant to these Orders.

XXVI. WAIVER AND AGREEMENT

70. In order to resolve disputed claims, without admission of fact, violation, or liability, Respondent consents to the issuance of these Orders, and agrees to comply with these Orders.
71. Respondent hereby waives the right to appeal the issuance, terms and conditions, and service of these Orders and Respondent hereby waives any and all rights that it

may have to seek administrative or judicial review of these Orders either in law or equity.

72. Notwithstanding the limitations herein on Respondent's right to appeal or seek administrative or judicial review, Ohio EPA and Respondent agree if these Orders are appealed by any other party to the Environmental Review Appeals Commission, 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.

XXVII. EFFECTIVE DATE

73. The effective date of these Orders shall be the date these Orders are entered in the Journal of the Director of Ohio EPA.

XXVIII. SIGNATORY AUTHORITY

74. Each undersigned representative of a Party to these Orders certifies that he or she is fully authorized to enter into these Orders and to legally bind such Party to these Orders.

IT IS SO ORDERED AND AGREED:

OHIO ENVIRONMENTAL PROTECTION AGENCY



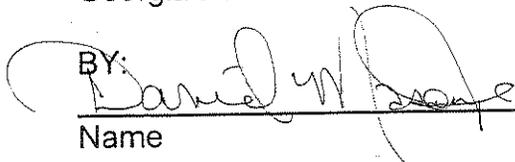
Chris Korleski, Director
Ohio Environmental Protection Agency

FEB 9 2010

Date

IT IS SO AGREED:

Georgia-Pacific Chemicals LLC

BY: 

Name

Plant Manager

Title

19 January 2010

Date

APPENDIX A

Decision Document

APPENDIX B

SOW

APPENDIX C

List of Relevant Guidance Documents

APPENDIX D

Deed Notice

APPENDIX E

Environmental Covenant



State of Ohio
Environmental Protection Agency

OHIO E.P.A.

Division of Emergency and Remedial Response 2006

ENTERED DIRECTOR'S JOURNAL

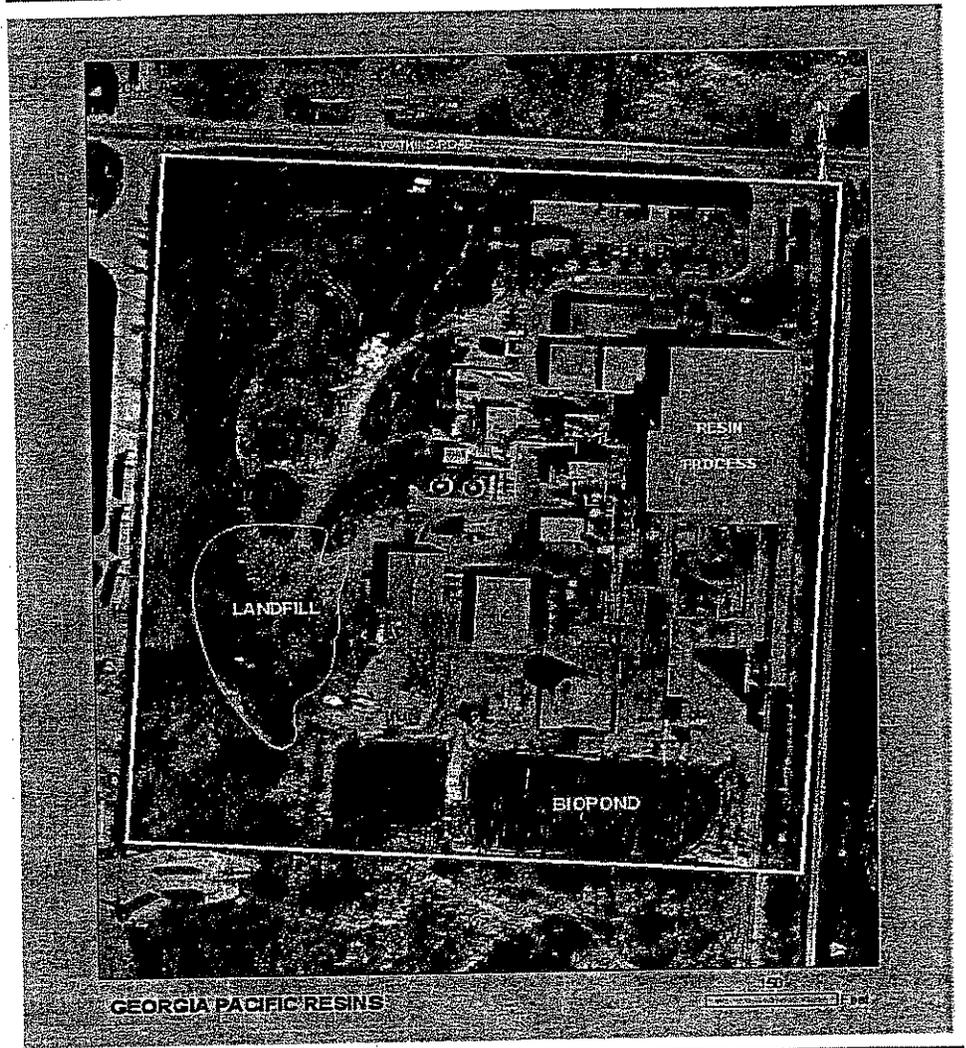
DECISION DOCUMENT

FOR THE REMEDIATION OF
Georgia Pacific Resins, Inc.
Franklin County, Ohio

I certify this to be a true and accurate copy of the official documents as filed in the records of the Ohio Environmental Protection Agency.

By: *David Jackson* Date: 10-31-06

prepared by
THE OHIO ENVIRONMENTAL PROTECTION AGENCY



October 2006

Bob Taft, Governor
Joseph P. Koncelik, Director

DECLARATION

SITE NAME AND LOCATION

Georgia Pacific Resins, Inc. (Georgia Pacific)
Franklin County, Ohio

STATEMENT OF BASIS AND PURPOSE

This Decision Document presents the selected remedial actions for the Georgia Pacific facility located at 1975 Watkins Road in Columbus, Ohio, chosen in accordance with the policies of the Ohio Environmental Protection Agency (EPA), statutes and regulations of the state of Ohio, and the National Contingency Plan, 40 CFR Part 300.

ASSESSMENT OF THE SITE

The actual and threatened releases of industrial wastes at the facility, if not addressed by implementing the remedial actions selected in the Decision Document, constitute a substantial threat to public health or safety and may cause or contribute to air or water pollution or soil contamination.

The health and environmental risks of the Georgia Pacific facility evaluated by Ohio EPA, resulted from past releases of hazardous wastes and/or hazardous constituents at the facility and the materials released by the September 1997 batch resin explosion, into the surrounding atmosphere, soil and ground water. The contaminants of concern are acetone, phenol, methanol and formaldehyde. The most significant risk factors arising from these contaminants are due to the possible discharge of methanol and phenol into the ground water from the existing, active two million gallon wastewater biological pretreatment pond (bio-pond) and the potential exposure of on-site workers (e.g., facility employees or contractors such as construction workers) to any residual soil contamination.

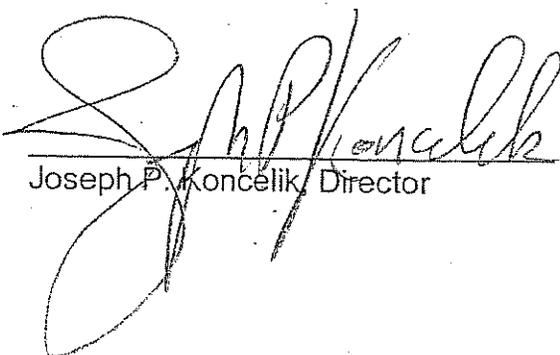
DESCRIPTION OF THE SELECTED REMEDY

- Institutional Controls
 - An environmental covenant would be recorded by Georgia Pacific with the Franklin County Recorder's Office in accordance with Ohio Revised Code §5301.80 et. seq. to prohibit excavation in, and the construction of structures on, the closed landfill.
- Engineering Controls
 - The bio-pond's artificial cap and accumulated resins materials would be maintained by Georgia Pacific during the remainder of its operation.

- The closed landfill's soil and vegetative cover would be maintained by Georgia Pacific to prevent any exposure to the existing waste materials.
- The two recovery trenches and collection sumps would be maintained by Georgia Pacific until such time that the sampling results demonstrate that the recovery trenches and collection sumps no longer need to be operated and maintained.
- Security measures equivalent to the existing security measures would be maintained by Georgia Pacific as long as the bio-pond, closed landfill, and recovery trenches and collection sumps remain at the facility, to restrict unauthorized public access.
- Bio-pond Decommissioning
 - The bio-pond would be decommissioned by Georgia-Pacific when it is no longer needed for the plant's manufacturing operations in accordance with the approved decommissioning plan.
- Operation and Maintenance (O&M) Plan
 - An O&M Plan would be submitted by Georgia Pacific for approval by Ohio EPA that includes the following components: the closed landfill cover, the recovery trenches and water collection sumps, bio-pond maintenance, and the periodic sampling of six ground water monitoring wells.

STATUTORY DETERMINATIONS

The selected remedial actions are protective of human health and the environment, comply with legally applicable state and federal requirements, are responsive to public participation and input and are cost-effective. The remedy utilizes permanent solutions to the maximum extent practicable to reduce toxicity, mobility and volume of hazardous substances at the facility. The effectiveness of the remedy will be reviewed regularly.



 Joseph P. Koncelik, Director

10/30/06

 Date

TABLE OF CONTENTS

	Page Number
1.0 SITE BACKGROUND	1
1.1 Site History	1
1.2 Summary of the Remedial Investigation	2
1.2.1 Soil Contamination	3
1.2.2 Ground Water Contamination	4
1.2.3 Surface Water Contamination	7
1.2.4 Air Releases	8
1.3 Interim or Removal Actions Taken to Date	9
1.4 Emergency Response Activities	9
1.4.1 Soil Investigation	9
1.4.2 Surface Water Investigation	10
1.4.3 Emergency Response Site Stabilization Activities	10
1.4.4 Post-Emergency Response Activities	12
2.0 SUMMARY OF SITE RISKS	13
2.1 Risks to Human Health	14
2.1.1 Contaminants of Concern	14
2.1.2 Exposure Assessment	15
2.1.3 Limited Human Health Risk Assessment	16
2.1.4 Exposure Pathways	17
2.1.4.1 Soil Pathway	18
2.1.4.2 Air Pathway	18
2.1.4.3 Ground Water Pathway	19
2.1.4.4 Surface Water and Sediment Pathway	20
3.0 FEASIBILITY STUDY	20
4.0 REMEDIAL ACTION OBJECTIVES	21
5.0 SUMMARY OF REMEDIAL ALTERNATIVES	22
5.1 No Action Alternative	22
5.2 Institutional Controls	22
5.3 Engineering Controls	22
5.4 Bio-pond Decommissioning	23
5.5 Operation and Maintenance	24
6.0 COMPARISON AND EVALUATION OF ALTERNATIVES	25
6.1 Evaluation Criteria	25
6.2 Analyses of Evaluation Criteria	27

6.2.1	Overall Protection of Human Health and the Environment	27
6.2.2	Compliance with Applicable or Relevant and Appropriate Requirements	28
6.2.3	Long-Term Effectiveness and Permanence	28
6.2.4	Reduction of Toxicity, Mobility or Volume Through Treatment	29
6.2.5	Short-Term Effectiveness	30
6.2.6	Implementability	31
6.2.7	Cost	31
6.2.8	Community Acceptance	32
7.0	SELECTED REMEDIAL ALTERNATIVE	32
7.1	Institutional Controls	33
7.2	Engineering Controls	33
7.3	Bio-pond Decommissioning	33
7.4	Operation and Maintenance	34
8.0	GLOSSARY	36

List of Tables

Table 1	Summary of Historical Analytical Results - Ground Water
Table 2	Background Concentrations and Preliminary Reduction Goals
Table 3	Phase II Remedial Investigation Ground Water Data

List of Figures

Figure 1	Site Location (United States Geological Survey map)
Figure 2	Site Plan Layout of Manufacturing Operations
Figure 3	Remedial Investigation Areas of Interest and Site Stabilization Locations
Figure 4	Potentiometric Surface Map, Shallow Aquifer (April 10, 2000)

APPENDIX A	Human Health Risk Memo for Georgia Pacific Resins
APPENDIX B	Human Health Risk Assessment Assumptions and Calculations used for Appendix A
APPENDIX C	Spreadsheet of Risk Assessment Assumptions and Calculations
APPENDIX D	Responsiveness Summary

DECISION SUMMARY

for Georgia Pacific Resins, Inc.
Franklin County, Ohio

1.0 SITE BACKGROUND

1.1 Site History

The Georgia Pacific Resins, Inc. facility is located in Franklin County at 1975 Watkins Road in Columbus, Ohio. See **Figure 1**. The on-site drainage system flows into a small tributary stream of Obetz Creek. The surrounding land use is a mixture of agricultural, industrial, and residential uses. Georgia Pacific is bordered by industrial properties; to the west is the Norfolk Southern Corp. railroad switch yard and to the east is the Sherwin-Williams paint manufacturing facility. South of the facility is fallow, partially wooded, agricultural land, which is traversed by a railroad spur. Watkins Road borders the facility to the north. The areas northeast of Watkins Road and to the west past the railroad switch yard, are residential; and to the northwest is the L-S II Electro-Galvanizing Company facility.

The Georgia Pacific facility was constructed in 1970, and began operations as Pacific Resins. Georgia Pacific Corporation purchased the facility in 1976. Koch Industries, Inc. purchased Georgia Pacific Corporation in 2005. The manufacturing facility encompasses approximately 16 acres. See **Figure 2**. The facility manufactures synthetic resins and formaldehyde for sale to customers who then produce building materials, fertilizers, insulation, and various automobile products. Formaldehyde is manufactured at the facility, using methyl alcohol (also known as methanol or MeOH) as its primary raw material. Formaldehyde and phenol are then used to manufacture synthetic resin products. In the past, acetone had also been used in the resin manufacturing process.

Approximately two-thirds of the facility supports manufacturing process operations, including the existing two million gallon bio-pond and the closed solid waste landfill (closed landfill). Access to the plant facility is restricted by a perimeter chain-link fence, and a key-card entry gate monitored by a security guard or control room personnel 24 hours per day.

Since approximately 1979, Georgia Pacific has operated an unlined, two-million gallon capacity bio-pond, south of the main plant area, which serves as a wastewater pretreatment system for the resin process. The wastewater is a combination of two wastewater streams, one from the total distillate operation and one from the seal pit operation, with reported average concentrations of 27,500 milligrams per liter (mg/L) of formaldehyde, 7,100 mg/L of methanol, and 5,200 mg/L of phenol. The reported average wastewater discharge rate was 1,000 gallons per day in 2004. The bio-pond's effluent is combined with formaldehyde process wastewater, non-contact cooling water and part of the manufacturing area's storm water from rainfall events, before being discharged to the Columbus sanitary sewer system as authorized by Georgia Pacific's industrial user discharge permit.

The closed landfill is located in the grassy area to the west of the main plant area and encompasses approximately 35,000 square feet. This landfill was used for the disposal of waste resins, dredgings from settling basins and filter cake waste. Georgia Pacific closed the landfill in December 1979. The landfill was closed by grading the solid waste materials, covering the waste with a layer of high-clay soil, and seeding the area to prevent erosion of the soil cover. The Ohio EPA Division of Solid and Infectious Waste Management inspected and approved the landfill closure in March 1980.

Since 1974, Ohio EPA has documented various releases and spills of formaldehyde, methanol and phenol from the facility to air, soil and surface water. These include a 2,000 pound release of formaldehyde and phenol into the atmosphere in May 1984 and a 10,000 pound release of formaldehyde and phenol into the atmosphere in July 1984. These releases resulted in Ohio EPA issuing consensual Director's Final Findings and Orders (DFF&Os) to Georgia Pacific in December 1984 for past air and water pollution violations and releases. On September 10, 1997, a batch reactor exploded and released a "partially polymerized resin" mixture consisting of an estimated 1,100 pounds of phenol, 250 pounds of formaldehyde, and 70 pounds of sulfuric acid. The September 1997 plant explosion and subsequent emergency response activities are discussed in further detail in Section 1.4.

On December 22, 1994, Ohio EPA issued consensual DFF&Os to Georgia Pacific to conduct a remedial investigation/feasibility study (RI/FS) to determine the nature and extent of contamination caused by the disposal of hazardous, industrial and/or other wastes (*i.e.*, the RI) and to develop and evaluate a program of appropriate remedial measures employing sound scientific, engineering practices consistent with all applicable laws (*i.e.*, the FS). Georgia Pacific had completed the RI Phase I with the submittal and approval in March 1997 of Technical Memorandum No. 1, and was finalizing the RI Phase II Work Plan when the reactor explosion occurred in September 1997.

On June 13, 2005, Georgia Pacific reported to Ohio EPA the discovery of diesel fuel in the excavation of the footer for the extension of the boiler room building. A check of the historical factory layout's detailed plans revealed that a diesel fuel underground storage tank with a vehicle dispenser was near this area. It has been determined that this fuel release is under the jurisdiction of the Ohio State Fire Marshal, Bureau of Underground Storage Tank Regulations (BUSTR). Therefore, BUSTR has taken the lead for investigation and any corrective action relating to this diesel fuel release (Case No. 25010888).

1.2 Summary of the Remedial Investigation

The RI was conducted by Georgia Pacific and included a number of tasks to identify the nature and extent of site-related contaminants of concern (COCs). The RI was conducted with oversight by Ohio EPA, and the RI Phase I Work Plan was approved on June 25,

1995. The RI tasks included the collection of 162 soil samples, two surface water samples, seven sediment samples, and 143 ground water samples; the installation of 19 monitoring wells; a geophysical survey of the closed landfill; the excavation and off-site disposal of approximately 1,200 cubic yards of potentially impacted soil and construction of two perched ground water recovery interceptor trenches during the emergency response activities. The RI was conducted in three main phases between 1995 and 2001: Phase I from November 1995 to September 1997; the emergency response activities (because of the plant's batch reactor explosion) from September 1997 to November 1998; and the modified Phase II (revised because of the batch reactor explosion) from January 1999 to September 2001. Ohio EPA approved the RI Report on September 25, 2001.

The data obtained from these investigations were used to conduct an exposure assessment and to determine the need to evaluate remedial alternatives. This Decision Document contains only a brief summary of the findings of the RI and FS Reports. Refer to the Critical Incident Report (November 1997), the Emergency Response Report (November 1998), the RI Report (September 2001) and the FS Report (March 2002) for additional information on the facility's contaminant concentrations. The nature and extent of contamination in each environmental medium and the COCs attributable to the facility are described in Sections 1.2.1 through 1.2.4.

1.2.1 Soil Contamination

During the RI Phase I, 13 soil samples, collected from the closed landfill, near the bio-pond and the eastern drainage ditch, were analyzed for metals. A comparison of the metals concentrations detected to the approved background values found only two exceedances, both in the same sample, SB-9. Barium and manganese were present at concentrations of 214 milligrams per kilogram (mg/kg) and 1,480 mg/kg in the duplicate soil sample collected from 2-4 feet below ground surface (bgs) at SB-9. The RI background value for barium is 185 mg/kg and for manganese is 1,058 mg/kg. See **Table 2** for the site-specific background concentration values and the United States Environmental Protection Agency (U.S. EPA) Region 9 Preliminary Remediation Goals (PRGs) for soil contact.

An additional 23 surface soil samples, collected from the closed landfill, railroad spur swale, eastern drainage ditch and the former drum storage areas, were analyzed for various metals, volatile organic compounds (VOCs), and semi-volatile organic compounds (SVOCs) including acetone, formaldehyde, methanol and phenol. Neither VOCs nor SVOCs were detected above the method detection limits in any of the 23 soil samples. Four more soil samples, collected from the former underground methanol transfer pipeline area, were analyzed for methanol. Methanol was detected at concentrations of 0.950 mg/kg and 0.520 mg/kg; both samples were collected from SB-8, one at 6-8 feet bgs and the other from 8-10 feet bgs. However, methanol was not detected in the other two soil samples collected from SB-7 at 2-4 and 4-6 feet bgs.

During the RI Phase II, 27 soil samples were collected from seven locations at various depths. The 20 soil samples, collected from four different boreholes at various depths around the methanol tank, were analyzed for methanol. Borehole MT-7 had the maximum concentrations of methanol, ranging from 11,000 mg/kg in the surface sample to 28,000 mg/kg at 10-12 feet bgs.

The six soil samples, collected during the installation of Monitoring Wells MW #18 and MW #19, were analyzed for metals, VOCs, and SVOCs. In these six samples, metals concentrations did not exceed the approved background concentrations, trace amounts of the VOCs methylene chloride and carbon disulfide were detected, and no SVOCs (or methanol) were detected. One sample, RS-3, collected from beneath the active railroad spur, detected concentrations of polycyclic aromatic hydrocarbons (PAHs), which were similar to earlier results from samples collected in the eastern ditch and the railroad spur swale during the emergency response activities.

1.2.2 Ground Water Contamination

The depth to bedrock at the Georgia Pacific facility is approximately 155 feet bgs. Unconsolidated glacial deposits overlie the bedrock, and consist of alternating sequences of sand, gravel and glacial till. Two unconsolidated water bearing zones are present beneath the facility, which are referred to as the shallow and deep aquifers. The shallow aquifer consists of a 20-30 feet thick sand and gravel unit located at an approximate depth 40 to 70 feet bgs. The deep aquifer unit extends from the bottom of the lower till unit at a depth of 90 feet bgs to the top of the bedrock located at a depth of 155 feet bgs.

Ground water in the shallow aquifer system flows to the south at an average rate of 200 feet per year under the Georgia Pacific facility. See **Figure 4**. The ground water in the deep aquifer flows to the southeast at an average rate of less than one foot per year. The village of Obetz and the city of Columbus are both hydraulically downgradient users of the deep aquifer system. There are no known users of the shallow aquifer hydraulically downgradient of the facility. However, residential water wells at 16 private homes are located to the northeast on Watkins Road. These upgradient private wells are believed to be using the shallow aquifer system.

The Obetz wellfield is located approximately 11,000 feet south of the Georgia Pacific facility. The facility is outside of Obetz's wellhead protection plan's five-year time of travel zone, which is calculated to be at 7,000 feet. The Columbus wellfield is located approximately five miles southwest of the Georgia Pacific facility. The facility is outside of the five-year time of travel zone, which is calculated to be at three miles. Both the Obetz and Columbus wellfields are developed (use as their water source) in the deep aquifer system.

In 1982, Burgess and Niple, Ltd performed a ground water investigation at the facility by installing four shallow monitoring wells (MW #1, MW #2, MW #3 and MW #4) around the perimeter of the bio-pond. These monitoring wells, and the plant production well were sampled 18 different times between 1982 and 1991. The ground water samples were analyzed for various parameters including chemical oxygen demand (COD), formaldehyde, nitrate, phenol and total organic carbon (TOC). See **Table 1**. Phenol was detected only in trace amounts or "non-detect" concentrations in the four shallow wells; but it was detected in the plant production well at 0.008 mg/L in May 1982, 0.05 mg/L in October 1984, 4.10 mg/L in January 1985 and 0.96 mg/L in March 1985. However, the remaining samples detected only trace amounts of phenol in the plant production well. Formaldehyde was detected in the four shallow wells and the plant production well during the various ground water sampling events conducted by Burgess and Niple as shown in the table below:

Formaldehyde Results (expressed in mg/L)

Date	MW #1	MW #2	MW #3	MW #4	Plant Well
05/26/82	<1.0	1.0	1.60	<1.0	<1.0
07/29/85	1.25	1.40	<1.0	<1.0	<1.0
02/05/86	4.80	1.40	<1.0	<1.0	1.40
04/04/86	1.0	<1.0	<1.0	<1.0	<1.0
07/09/86	5.20	2.50	1.0	<1.0	<1.0
01/30/87	8.0	1.80	<1.0	<1.0	<1.0
07/28/87	11.0	1.10	<1.0	<1.0	<1.0
09/10/87	6.80	<1.0	<1.0	<1.0	<1.0
01/27/88	18.0	2.50	<1.0	1.0	<1.0
08/03/88	14.0	14.0	6.30	<1.0	<1.0
03/03/89	21.0	<1.0	<1.0	<1.0	<1.0
08/16/89	25.0	<1.0	<1.0	<1.0	1.30
03/14/90	8.0	1.10	<1.0	<1.0	<1.0
10/17/90	9.30	<1.0	<1.0	<1.0	<1.0
06/14/91	3.30	1.0	<1.0	<1.0	<1.0

The Columbus Department of Health collected ground water samples in 1984 and 1994 from various residential wells located on Watkins Road, northeast of the Georgia Pacific facility, and from the plant production well. Phenol was detected at 0.036 mg/L in one sample collected in 1984 from a residential water well. The health department's 1994 ground water sampling results did not identify elevated levels of any VOCs or SVOCs in the residential water wells. Ground water samples were also collected by Ohio EPA from seven residential water wells located along Watkins Road in March 1992 and December 1996. The Ohio EPA sampling events results did not detect elevated levels of metals, VOCs or SVOCs.

During the RI Phase I, three rounds of ground water samples were collected from the facility's four monitoring wells. See **Figure 2**. Acetone was not detected above the method detection limit in any of the ground water samples. Phenol was detected in ground water samples collected from MW#6, MW#7, and MW#8; however, the maximum concentration detected was 0.030 mg/L, which was below the Maximum Contaminant Levels (MCLs) established for public drinking water. Methanol was detected during each of the sampling rounds in three of the four existing ground water monitoring wells as shown in the table below:

Methanol Results (expressed in mg/L)

Monitoring Well	01/17/96	06/21/96	12/21/96
MW #6	0.580	0.130	0.260
MW #7	0.340	ND	0.120
MW #8	1.30	ND	ND

ND = not detected

During the emergency response activities, ground water quality characterization activities were performed, including the installation of nine monitoring wells to monitor the shallow aquifer system at the facility (MW #10 through MW #14, MW #17, BP-1, BP-2 and BP-3) and two monitoring wells at the Sherwin-Williams property (MW #15 and MW #16). Two additional wells to monitor the deep aquifer were also installed hydraulically downgradient from the rest of the facility (MW #9 and MW #9B). Four rounds of ground water samples were collected in September and October 1997, January 1998, April 1998, and July 1998 from each of these 13 new wells.

Methanol was detected in April 1998 in the ground water samples collected from MW#10 at 2.0 mg/L, MW#13 at 1.4 mg/L, and BP-1 at 1.8 mg/L. Various metals were also detected at low levels below the public drinking water MCLs in the various on-site ground water samples, including arsenic, barium, lead, and mercury. However, these on-site

metals concentrations were consistent with the metals concentrations found in the residential water wells located northeast of Georgia Pacific. The VOCs benzene, 2-butanone and methylene chloride were detected intermittently at low concentrations. One SVOC, bis(2-ethylhexyl)phthalate, was detected in the ground water samples collected in April 1998 from MW#8, MW#12, MW#13, and MW#16 at low concentrations.

During the RI Phase II, two rounds of ground water samples were collected from the facility's entire monitoring system, including the two adjacent wells at the Sherwin Williams property (except for MW #4), in April 2000 and July 2000. Two additional rounds of ground water samples were collected in October 2000 and January 2001 from two new monitoring wells, MW #18 and MW #19, completed in March 2000 and installed downgradient of the bio-pond. The metals concentrations detected were generally uniform between the upgradient and downgradient monitoring wells across the facility. The detected metals concentrations were consistent with the naturally-occurring metals concentrations found in the seven residential drinking water wells located upgradient of the facility, to the northeast along Watkins Road. No VOCs or SVOCs (including acetone, methanol and phenol) were detected in any ground water samples collected in 2000 and 2001. See **Table 3**.

During October 28-31, 2002, Georgia Pacific abandoned and sealed 13 ground water monitoring wells following the procedures in Ohio Administrative Code (OAC) rules 3745-9-07 and 3745-9-10, and the "State of Ohio Technical Guidance for Sealing Unused Wells (1996)." Eleven on-site monitoring wells, BP-3, MW#4, MW#5, MW#6, MW#7, MW#8, MW#9, MW#10, MW#11, MW#13, and MW#14, were abandoned and sealed. Two monitoring wells on the Sherwin Williams property, MW#15 and MW#16, were also abandoned and sealed. However, six monitoring wells, BP-1, BP-2, MW#9B, MW#12, MW#18, and MW#19, still remain at the facility for periodic ground water sampling.

1.2.3 Surface Water Contamination

Storm water runoff from Georgia Pacific's resin process areas is directed to the bio-pond for initial treatment. The bio-pond discharges to the Columbus sanitary sewer system. This storm water runoff is included as part of the industrial wastewater discharge of 35,000 gallons per day allowed under Georgia Pacific's industrial user discharge permit with the Columbus Department of Sewerage and Drainage.

The former storm water retention pond (now used for fire protection purposes) no longer receives storm water runoff from any part of the facility after earthen berms were built around it to deflect any storm water runoff into the on-site drainage ditch system. The former storm water retention pond receives only water from direct precipitation events; and there is no off-site surface water discharge from it. One surface water sample was collected from the approximate center of the former storm water retention pond during the RI Phase I. The surface water sample was analyzed for acetone, phenol and methanol but

not metals. The water sample results did not detect VOCs (acetone and phenol), SVOCs or methanol.

Bottom sediment samples were collected at three locations in the former storm water retention pond (SED-1, SED-2 and SED-3) during the RI Phase I. See **Figure 3**. The sediment samples were analyzed for acetone, phenol and methanol but not metals. Acetone was detected in SED-1 and SED-2 at concentrations of 0.170 mg/L and 0.130 mg/L; and in the duplicate sample collected from SED-1 at a concentration of 0.170 mg/L. However, phenol was not detected in the sediment samples from the former storm water retention pond. Laboratory analyses for SVOCs and methanol were not performed for these sediment samples.

The eastern drainage ditch located along the eastern and northeastern perimeter of the Georgia Pacific facility collects surface water runoff from Watkins Road, areas north of the road, the Sherwin-Williams property, and the Georgia Pacific facility. The storm water runoff in this ditch flows intermittently off-site to the south of the facility, and ultimately discharges (via several streams such as Obetz Creek) to Big Walnut Creek located approximately 2.5 miles south-southeast of the facility. Because no visible water was flowing in the ditch during the RI Phase I sampling event, no surface water was collected for analysis from the eastern drainage ditch. However, there have been earlier spills/releases of contaminants from the facility to the eastern drainage ditch.

The drainage ditch on the facility's west side that was used to discharge non-contact cooling water to the south has been eliminated. This cooling water is now included in facility's wastewater discharge to the Columbus sanitary sewer system. The drainage ditch along the road on the facility's north side that receives the office area parking lot runoff did not receive any process or spill impacted runoff; and therefore this ditch was not a part of the RI Phase I, RI Phase II, and the emergency response reports. Runoff that was formerly collected between the former storm water retention pond and the west ditch was blocked off by Georgia Pacific and no longer discharges off-site.

1.2.4 Air Releases

Georgia Pacific had an estimated 2,000 pound release of phenol and formaldehyde into the atmosphere in May 1984. In July 1984, Georgia Pacific had a 10,000 pound release of phenol and formaldehyde mixture into the atmosphere, but process safety devices directed this discharge into a secondary containment system at the facility. The batch reactor explosion on September 10, 1997, released a "partially polymerized resin" mixture, consisting of an estimated 1,100 pounds of phenol, 250 pounds of formaldehyde and 70 pounds of sulfuric acid. The September 10, 1997, batch reactor explosion, the resulting emergency response activities, investigation and cleanup are discussed in more detail in Section 1.4.

1.3 Interim or Removal Actions Taken to Date

In October 1990, Ohio EPA issued consensual DFF&Os to Georgia Pacific for an interim remedial action to address a reported 580 gallon leak from the underground methanol transfer pipeline. Georgia Pacific began this interim remedial action in January 1991 with the installation of ground water recovery wells around the underground methanol transfer pipeline. The collected ground water-methanol mixture was discharged to the Columbus sanitary sewer system under Georgia Pacific's existing industrial user discharge permit. In August 1991, Georgia Pacific reported to Ohio EPA a second leak from the methanol underground transfer pipeline, stating that 1000 gallons of methanol had been recovered from this second release. Georgia Pacific's interim action ground water recovery operation for the methanol underground transfer pipeline's leakage ceased in December 1991. Ohio EPA terminated the 1990 interim remedial action DFF&Os on February 7, 1992.

1.4 Emergency Response Activities

On September 10, 1997, a batch reactor used to manufacture thermoset resin exploded. This explosion released a phenol/ formaldehyde resin mixture onto the plant's structures, over the grounds within the plant, and onto a limited area of the adjacent Sherwin-Williams property to the east. Several above ground storage tanks and water lines adjacent to the batch reactor were also damaged by the explosion. The mixture of storm water from two subsequent days of rain, water from the damaged water lines, partially polymerized resin chemicals, and the contents of the damaged aboveground storage tanks flooded the resin process area. However, this liquid mixture was contained within the paved and bermed areas of the plant. These liquids were conveyed to the diked methanol tank containment area and the bio-pond for temporary storage. After being stored on-site for two days, the recovered liquids were pumped through the bio-pond for initial treatment, and then discharged to the sanitary sewer system.

Emergency response activities included collecting 35 on-site soil samples and 13 soil samples from the Sherwin-Williams property; installing nine shallow and two deep on-site ground water monitoring wells; installing two shallow ground water monitoring wells on the Sherwin-Williams property; controlling and remediating the on-site perched ground water; demolishing and removing damaged facility structures and tanks; excavating 135 cubic yards from the Sherwin-Williams property and 1,100 cubic yards of potentially impacted on-site soil. The emergency response activities were completed by Georgia Pacific in November 1998 with the reconstruction of the resin process area.

1.4.1 Soil Investigation

Surface and subsurface soil samples were collected at various locations at the Georgia Pacific facility, on the Sherwin-Williams property, and at different residential properties located on Watkins Road north and to the east of the facility.

Phenol, formaldehyde and methanol were detected in subsurface soil samples collected from the areas of the Georgia Pacific facility that were proximate to the location of the explosion as shown by Areas A, B and C in **Figure 3**, but none of the concentrations exceeded the soil PRGs: A total of 1,100 cubic yards of on-site soil and 135 cubic yards of soil from the Sherwin-Williams property were excavated. Phenol was not detected in the final confirmatory surface soil samples, SW-10 and SW-11, collected from the Sherwin-Williams property, nor in the subsurface soil samples collected during the installation of Monitoring Wells MW#15 and MW#16.

1.4.2 Surface Water Investigation

During the emergency response activities, surface water samples were collected from the former storm water retention pond and its associated drainage swale and tested in the field for phenol. Phenol was not detected in these samples, nor in the confirmatory sample, SW-1, collected later from the pond itself for laboratory analysis. Metals concentrations detected in SW-1 were consistent with naturally-occurring background concentrations, and further evaluation of the swale and storm water pond was not performed during the emergency response activities.

After the batch reactor explosion, discolored water with a red tint indicating the presence of phenol, was observed in the eastern drainage ditch and railroad spur swale. Stabilization measures were implemented in both areas to limit potential offsite migration of any COCs as described in Section 1.4.3.

1.4.3 Emergency Response Site Stabilization Activities

Site stabilization measures were performed at Georgia Pacific after the initial emergency response activities were completed to address the immediate problems caused by the September 10, 1997, batch reactor explosion. The site stabilization measures were performed to prevent the migration of the released materials from the batch reactor explosion and to reduce the potential for the exposure of off-site human and ecological receptors. The locations of these measures are shown in **Figure 3**. All of the summary information provided in this section of the Decision Document is described in further detail in the November 1998 Ohio EPA Emergency Response Spill Report.

Discolored water (with a red tint) was observed in the railroad spur swale several days after the explosion. Field testing of the discolored water by Georgia Pacific confirmed that the water contained phenol. Its source was determined to be perched ground water that had seeped under the asphalt, and was present within the fill material underneath the pavement and the railroad spur ballast. The perched ground water had migrated laterally on top of the clayey soil layer beneath the soil's surface to exit at the railroad spur swale.

Georgia Pacific installed three passive recovery trenches (TR-1, TR-2 and TR-3, Area C in **Figure 3**) perpendicular to the railroad spur swale, which directed the phenol-contaminated water into the spur's swale to prevent it from entering the adjacent eastern drainage ditch. The affected railroad spur ballast and fill material area were then flushed with clean water for several days. The water collected in the railroad spur swale was pumped to the bio-pond. The contaminated soil in the swale was excavated and disposed at a licensed solid waste landfill. Confirmation samples were collected from the excavated area soil to confirm that the soil removal was complete. A passive recovery trench and water collection sump (Sump #2) was then installed in the swale to collect and pump the water from TR-1, TR-2, and TR-3 into the bio-pond.

Trench 1 was excavated within the concrete floor of the resin process area truck bay (Area B in **Figure 3**) to evaluate the presence and quality of any perched ground water and affected soil beneath the floor. Methanol (12.0 to 22.0 mg/L), phenol (1.60 to 13.0 mg/L), and p-cresol (0.18 to 0.92 mg/L) were detected in the perched ground water samples collected from Trench 1. Formaldehyde (2.10 to 8.20 mg/kg), phenol (0.45 to 2.90 mg/kg), and p-cresol (0.83 to 1.10 mg/kg) were detected in the soil samples collected from Trench 1. The soil concentrations were below the PRGs, but several of the water samples were above the PRGs. Because no contaminant migration pathway was identified, and only a limited volume of perched ground water was observed, Trench 1 was backfilled by Georgia Pacific.

Trench 2 was excavated between the northern railroad spur and the resin process area (Area B in **Figure 3**). Formaldehyde (0.97 to 3.40 mg/kg), phenol (up to 6.20 mg/kg), and p-cresol (up to 3.30 mg/kg) were detected in the soil samples collected from Trench 2, and a large volume of discolored, perched ground water had gathered in the trench. Trench 2 was then converted to a passive recovery trench and a collection sump (Sump #3) was installed. The water collected in the recovery trench is pumped to the bio-pond. Also, two water collection sumps (Sump #4 and Sump #5) were installed south of the resin process area to assist in the capture of the perched ground water. The shallow ground water recovered in these collection sumps is pumped to the bio-pond.

Several days after the batch reactor explosion, field testing of surface water samples from the eastern drainage ditch detected phenol. The source of the phenol appeared to be surface water runoff and the migration of perched ground water within the railroad spur ballast (before the installation of the railroad spur passive recovery system). Georgia Pacific built two earthen dams in the eastern drainage ditch, and the water that pooled in the drainage ditch was pumped to the bio-pond. When phenol was no longer detected in the pooled water, the earthen dams were removed by Georgia Pacific, and recovery of the water in the eastern drainage ditch ceased.

A week after the batch reactor explosion, field testing of pooled water in several of the deep tire ruts in the grassy area west of the parking lot (West Area in **Figure 3**) detected

phenol. Exploratory Trench 3 was excavated through this rutted area, and the water collected in this trench was pumped to the bio-pond. When phenol was no longer detected in the accumulated water in the trench, it was backfilled.

During the initial emergency response activities, the water collected throughout the facility was pumped into the methanol storage tank containment area for temporary storage. This water was subsequently pumped to the bio-pond. A shallow soil boring was advanced between the plastic soil liners and the methanol storage tank's concrete floor. Field testing of the perched ground water detected phenol. A sump was installed beneath the concrete floor, and water was used to flush the area between the concrete floor and plastic liners. After several days, field testing of samples collected from the water in this sump did not detect phenol. The water flushing operation in the methanol storage tank area ceased, and the sump was removed.

In addition, approximately 135 cubic yards of soil were removed from the Sherwin-Williams property because of the presence of partially polymerized resin and debris on the ground surface. The materials (released from the batch reactor explosion) and surface soils were removed by Georgia Pacific, and disposed at a licensed solid waste landfill. Analytical data for the final two subsurface soil samples collected within the excavated area at the Sherwin-Williams property did not detect the presence of phenol.

1.4.4 Post-Emergency Response Activities

The sample results from three sediment samples, collected from the eastern drainage ditch (ED-1, ED-2, and ED-3), showed that no phenol was present in the ditch, but several PAHs were detected in ED-2. The source of these PAHs was believed to be the commonly used wood preservatives from the adjacent railroad spur ballast and railroad ties. Two additional samples of soil were collected from the rail spur (RS-1 and RS-2) to verify this conclusion, and the PAHs found in the RS-2 sample were similar to levels found in ED-2.

In September and October 1998, Georgia Pacific removed the concrete floor in Area A and the western part of Area B as shown in **Figure 3**. Trench 4 was excavated in Area A to collect subsurface soil samples to evaluate the presence of phenol because the earlier shallow soil samples had detected phenol. Laboratory analysis results for the soil samples from Trench 4 are summarized in the RI Report's Table 9. No acetone, phenol or p-cresol were detected in T4N and T4C at depths of 4-5 feet bgs and 5-6 feet bgs. However, acetone, phenol and p-cresol were present in T4N and T4S at the following concentrations as shown in the table below.

Trench 4 (expressed in mg/kg)

Sample ID	acetone	p-cresol	phenol
T4N at 0-2 feet bgs	0.125	1.55	43.60
T4N at 4-5 feet bgs	0.120	ND	ND
T4S at 4-5 feet bgs	0.162	1.22	8.28
T4S at 5-6 feet bgs	0.214	0.492	4.71

Georgia Pacific excavated the soil underlying Area A to a depth of approximately 4 feet. Soil samples were collected throughout this excavation along both the floor (EXC-1 to EXC-8) and the sidewalls (EXC-9 to EXC-12). Laboratory analysis results for these soil samples are summarized in the RI Report's Table 9. Acetone, phenol and p-cresol were detected at the following concentrations as shown in the table below.

Area A's Excavation (expressed in mg/kg)

Sample ID	acetone	p-cresol	phenol
EXC-1 at 4 feet bgs	ND	0.530	1.010
EXC-2 at 4 feet bgs	ND	ND	0.590
EXC-3 at 4 feet bgs	ND	1.190	20.60
EXC-4 at 4 feet bgs	ND	ND	1.040
EXC-5 at 4 feet bgs	0.142	ND	7.40
EXC-6 at 4 feet bgs	ND	0.457	11.80
EXC-12 at 3 feet bgs	ND	0.773	22.50

Georgia Pacific placed clean soil as fill material in the Area A excavation, which was then compacted by heavy machinery as part of the reconstruction of the resin process area. Crushed stone base material was placed on top of the compacted soil (the initial layer of fill material), and the resin process area's concrete floor was then poured and installed over the crushed stone base.

2.0 SUMMARY OF SITE RISKS

Normally, a baseline risk assessment is conducted to evaluate current and potential future risks to human health. However, no baseline risk assessment was performed for the facility by Georgia Pacific because of the occurrence of the batch reactor explosion and subsequent emergency response activities before the completion of the RI Phase II. An

exposure assessment using the U.S. EPA Region 9 PRGs for residential exposure risks for soil contact was conducted as part of the emergency response activities for the facility.

In addition to the exposure assessment conducted by Georgia Pacific, Ohio EPA generated a limited human health risk assessment for the facility using two hypothetical ("what-if") scenarios. The first scenario assumes that after the batch reactor explosion, no emergency response activities were performed to estimate the risk to a hypothetical on-site resident. The second scenario estimates the residual risk to a hypothetical resident following the completion of these cleanup activities. Georgia Pacific's baseline exposure assessment is part of the RI Report, and the limited human health risk assessment completed by Ohio EPA is attached as **Appendix A**.

The results of the exposure assessment and the limited human health risk assessment demonstrated that the existing concentration of COCs in environmental media pose risks to human health and ecological receptors at a level sufficient to trigger the need for remedial actions.

2.1 Risks to Human Health

2.1.1 Contaminants of Concern

The five chemical compounds listed in this section are the primary materials used in Georgia Pacific's manufacturing operation and were involved in the earlier releases and spills. Acetone was detected during the RI Phase I in a sediment sample from the storm water retention pond, and during post-emergency response activities in a soil sample from the floor of the resin process area's excavation.

Formaldehyde was detected in ground water samples collected from 1982 through 1991. It was also detected in soil samples collected during the emergency response activities in the areas proximate to the location of the batch reactor explosion; the site stabilization activities; the exploratory trenches excavations in and near the resin process area; and the post-emergency response soil excavation in the resin process area's reconstruction (Area A in **Figure 3**).

Methanol was detected in soil samples collected during the 1991 interim remedial action performed at the underground methanol transfer pipeline; the RI Phase I at the underground methanol transfer pipeline; the RI Phase II at the methanol storage tank and the underground methanol transfer pipeline; the emergency response activities in areas proximate to the location of the batch reactor explosion; the site stabilization activities; the exploratory trench excavations in and near the resin process area; and the post-emergency response soil excavation in the resin process area's reconstruction (Area A in **Figure 3**). Methanol was also detected in the shallow ground water samples collected during the RI

Phase I in MW #6, MW #7 and MW #8; and the April 1998 emergency response activities in BP-1, MW #10, and MW #13. Methanol was not detected in the ground water samples collected during the RI Phase II.

Phenol was detected in soil samples collected during the reconstruction of the resin process area. Georgia Pacific excavated the soil in this area (Area A in **Figure 3**) down to a depth of four feet. Compacted fill (soil), crushed stone base material, and a concrete floor slab were then installed over the location of the elevated phenol soil samples. Phenol was only detected in one ground water sample collected during the RI Phase I, and it was not detected in the subsequent ground water samples collected during both the emergency response activities and the RI Phase II.

Several PAHs were detected in sediment samples from the eastern drainage ditch. The PAH concentrations are similar to levels found in the railroad spur samples, and they are believed to be associated with the creosote-preserved railroad ties and ballast in the adjacent railroad spur. Georgia Pacific does not use any raw materials that would be similar in composition to the PAHs detected in the ditch.

2.1.2 Exposure Assessment

After the completion of the emergency response activities, the risk to human health from COCs detected at the facility was evaluated by Georgia Pacific using the U.S. EPA Region 9 PRGs for soil and the public drinking water MCLs for ground water. See **Table 2**. Region 9 PRGs combine U.S. EPA toxicity values with "standard" exposure factors to provide contaminant concentrations in environmental media (air, soil, water) that the U.S. EPA considers protective of humans (including sensitive groups) over a lifetime.

Region 9 PRGs are based on direct contact pathways for which generally accepted methods, assumptions and models have been developed (*i.e.*, dermal contact, ingestion, and inhalation) for specific land-use conditions and do not consider impacts to ecological receptors. These PRGs are chemical concentrations that correspond to fixed levels of risk for carcinogenic (cancer) compounds or hazards for non-carcinogenic compounds in the air, soil, and water. The PRGs for carcinogenic compounds are developed using an excess lifetime cancer risk goal of $1E-6$. Carcinogenic risks are the probability of an individual developing cancer over a lifetime from exposures to chemical compounds that are considered cancer causing. The PRGs for non-carcinogenic hazards are developed using a hazard quotient (HQ) for each compound, which is the expected safe concentration one can be exposed to over a lifetime without any adverse effects.

The exposure assessment found that the concentrations of the site-related COCs detected in the environmental media following the emergency response activities were below the Region 9 PRGs for residential exposure risks for soil contact and the public drinking water MCLs for lifetime consumption of ground water. Therefore, the risk exposure assessment

concluded that the COCs found in the environmental media at the facility do not pose risks to humans at levels sufficient to require further active remedial actions. However, the closed landfill and the operating bio-pond were not included in the exposure assessment.

2.1.3 Limited Human Health Risk Assessment

Ohio EPA reassessed the potential human health hazards and cancer risk from the facility using the COCs, formaldehyde, methanol and phenol, detected in the soil and ground water to the most sensitive human receptors, hypothetical on-site residents. These human health risk assessments were calculated for two "what if" scenarios using limited sampling data results, and do not address any type of real-life situation. The two limited risk assessments are detailed in the Ohio EPA February 10, 2004 memo. See **Appendix A**. The assumptions and calculations used in these risk assessments are detailed in **Appendix B**. The abbreviated template used for the additive risk calculations is in **Appendix C**.

The first scenario assumes that immediately after the batch reactor explosion, no emergency response activities were performed and the facility was open to residential development. The risk assessment used the sampling results below (from Table 1 in **Appendix A**):

First Risk Assessment Scenario

Chemical	Soil in mg/kg	Ground Water in mg/L
Formaldehyde	8.30	ND
Methanol	250	22.0
Phenol	7,800	13.0

Using the modeling methods detailed in **Appendix A**, the hazard indices (HI), the sum of the hazard quotients (HQs), in this case the exposure to soil plus ground water were calculated for formaldehyde = 6E-4, methanol = 1E0, and phenol = 2E0.

The second scenario assumes that immediately after the plant explosion, the emergency response activities were performed and completed, and then the facility was opened to residential development. This risk assessment used the sampling results below (from Table 2 in **Appendix A**):

Second Risk Assessment Scenario

Chemical	Soil in mg/kg	Ground Water in mg/L
Formaldehyde	2.10	ND
Methanol	ND	ND
Phenol	22.5	ND

HQ values were then again calculated, with the HI based on exposure to soil and ground water for formaldehyde = $1E-4$, methanol = N/A (not applicable because of non-detection in the sampling results), and phenol = $1E-3$.

The excess cancer risk of $6E-7$ based on the hypothetical exposure to formaldehyde before remediation and $1E-7$ after the emergency response activities, were both below the *de minimis* level ($1E-6$). Before the facility's remediation activities, the HQs for both methanol and phenol each exceeded a value of 1. After the completion of the emergency response activities and plant reconstruction, all the HQs were below the desired goal of 1.

2.1.4 Exposure Pathways

Exposure pathways that are considered "complete" represent a potential for exposure to the COCs. Pathways that are determined to be "incomplete" represent situations where exposure is unlikely to occur. Without exposure, there is no contact with any COCs; and, therefore, no risk of associated adverse health effects. A review of the potential exposure pathways shows the air, ground water, and surface water pathways are incomplete (e.g., exposure to residual contamination is unlikely to occur) because of the following:

- Site-related COCs are not currently detected in the air, ground water, or surface water above the U.S. EPA Region 9 PRGs for residential exposure risks for soil contact or public drinking water MCLs.
- There are no nearby downgradient receptors for surface water and the ground water's shallow and deep aquifer systems.
- The facility is outside the wellhead protection zones for the Obetz and Columbus wellfields.

The review of the potential pathways shows that the soil pathway is complete for only on-site workers (e.g., facility employees and outside contractors such as construction workers) because of the following:

- Georgia Pacific has used this facility as an industrial property for the last 30 years, and it is expected to remain so for the foreseeable future.
- The security fence, security personnel and the 24-hour facility operations also make it unlikely that individuals can trespass on the property.

2.1.4.1 Soil Pathway

Site-related COCs were detected in the soil samples collected at the Georgia Pacific facility and on the Sherwin-Williams property. However, these impacted soils were either excavated and removed during the emergency response activities, or the concentrations of the COCs detected in the soil were below the Region 9 PRGs for residential exposure risks for soil contact.

Currently, the remaining site-related COCs residing in the soil are situated below grade or below surface barriers (building or concrete slab); and, therefore, soil exposure cannot easily occur. The location of the elevated phenol in the soil is currently covered by the concrete floor of the resin process area, and the location of the elevated methanol is 10-12 feet bgs underneath the methanol storage tank containment area. The soil exposure pathway is potentially complete only for the on-site worker during future on-site O&M and construction activities that may disturb the current surface barriers. However, the detected concentrations of the COCs are below the Region 9 PRGs for residential exposure risks for soil contact, and the residential soil PRGs are more conservative than the industrial soil PRGs. Therefore, the soil exposure pathway is determined to be insignificant and was not evaluated further.

The closed landfill, bio-pond areas and the areas beneath the main factory building were not evaluated in the soil exposure pathway assessment.

2.1.4.2 Air Pathway

The operating bio-pond currently has a synthetic cover, and the Ohio EPA Division of Air Pollution Control (DAPC) has evaluated its air emission exposure risks. The closed landfill has been covered with a layer of soil and vegetation. Both of these covers are maintained by Georgia Pacific as a part of their current manufacturing operations. Therefore, these areas were not considered during the evaluation of the air pathway; the focus of the air pathway evaluation was in the areas affected by the batch reactor explosion.

Air monitoring at the facility has not detected site-related COCs in ambient air since the day following the September 10, 1997, batch reactor explosion. The Region 9 PRGs for residential exposure risks for soil contact incorporate the potential soil-to-air transfer rate for the chemical compounds, and these PRGs for the site-related COCs were not exceeded. As a result, there appears to be minimal potential for exposure to the COCs in the air, and the air exposure pathway was not evaluated further for the facility.

2.1.4.3 Ground Water Pathway

Potable water for Georgia Pacific is provided exclusively by the city of Columbus. The village of Obetz withdraws water from the deep aquifer approximately 11,000 feet south-southeast of the facility, and the city of Columbus withdraws water from the deep aquifer approximately five miles southwest of the facility. The wellhead protection plans for the Obetz and the Columbus wellfields indicate that the facility is outside of the hydraulic zone of influence of both wellfields. Modeling performed by Georgia Pacific using the wellfields' extreme withdrawal assumptions show that these two wellfields do not hydraulically affect the deep aquifer at the facility. Residential water wells are located northeast of the facility. The predominant direction of flow in the shallow and deep aquifers is to the south; therefore, the residential wells are located hydraulically upgradient of the facility. See **Figure 4**.

Before the RI, Georgia Pacific performed a ground water investigation from 1982 through 1991, collecting samples 18 different times from four on-site monitoring wells. Formaldehyde was detected at values from 230 to 1,400 micrograms per liter, (ug/L), but these values were below the public drinking water MCL value of 5,500 ug/L. Phenol was detected at trace concentrations, except for the four values ranging from 8 to 4,100 ug/L, which were below the public drinking water MCL value of 11,000 ug/L. Methanol was detected numerous times in the four on-site monitoring wells, with the values of 18,000, 21,000 and 25,000 ug/L detected in 1988 and 1989, at or above the public drinking water MCL value of 18,000 ug/L.

During the RI Phase I when ground water samples were collected from the four on-site monitoring wells, acetone was not detected while phenol was detected at trace concentrations. However, methanol was detected in each of the sampling rounds in three of the four monitoring wells, but the maximum value detected was 1,300 ug/L.

During the emergency response activities, 13 new monitoring wells were installed, and four rounds of ground water samples were collected from each well. Phenol and formaldehyde were not detected above trace concentrations in any of the ground water samples. Only methanol was detected in several of the April 1998 samples, but the maximum value detected was 2,000 ug/L.

During the RI Phase II, two additional monitoring wells were installed, and four rounds of ground water samples were collected from the entire ground water monitoring well system. Acetone, formaldehyde, methanol and phenol were not detected above trace concentrations in any of the ground water samples collected in the RI Phase II.

As long as the closed landfill's cover is maintained and monitored, the potential for releases to the ground water exposure pathway should be minimal. Also, the ongoing O&M at the bio-pond, along with periodic ground water monitoring for releases into the

ground water, should minimize the potential impact to the ground water exposure pathway. Therefore, the ground water exposure pathway was determined to be insignificant, and was not evaluated further. However, potential releases from the closed landfill or bio-pond could increase the significance of the ground water exposure pathway; therefore, periodic ground water monitoring will continue at the facility.

2.1.4.4 Surface Water and Sediment Pathway

Site-related COCs were not detected in the surface water samples collected from the storm water retention pond, retention pond swale (formerly the western drainage ditch), and the eastern drainage ditch. The storm water retention pond, retention pond swale, and the eastern drainage ditch are not located near any residences and are unlikely to be used for any type of recreational activities. The bio-pond discharges to the Columbus sanitary sewer system. Furthermore, Georgia Pacific has blocked storm water drainage from leaving the facility from the storm water retention pond and the retention pond swale. These storm water drainage elements do not discharge to any off-site surface waters and were not evaluated as part of the surface water and sediment pathways. Therefore, the surface water exposure pathway was considered insignificant, and was not evaluated further.

Acetone was detected in a sediment sample from the storm water retention pond. However, acetone was not detected at a concentration that exceeded the residential risk PRG in the sediment. PAHs were detected in the eastern drainage ditch's sediment samples at locations south of the railroad spur. The PAHs are believed to be associated with the creosote-preserved railroad ties and ballast from the adjacent rail spur. Currently, Georgia Pacific is fenced to restrict public access, which prevents exposure to the PAHs in the sediment of the eastern ditch. On-site workers do not come into direct contact with the eastern ditch's sediment during their normal manufacturing operations. Therefore, the sediment exposure pathway was considered insignificant and was not evaluated further.

3.0 FEASIBILITY STUDY

A FS was conducted by Georgia Pacific to define and analyze appropriate remedial alternatives. The FS was conducted with Ohio EPA oversight, and was approved on April 10, 2002. The Critical Incident Report (November 1997), the Emergency Response Report (November 1998), the RI Report (September 2001) and the FS Report (March 2002) are the basis for the selection of Ohio EPA's preferred remedial alternative(s).

4.0 REMEDIAL ACTION OBJECTIVES

As part of the RI/FS process, remedial action objectives (RAOs) were developed in accordance with the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), codified at 40 CFR Part 300 (1990), as amended, which was promulgated under the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 U.S.C. §9601 et. seq., as amended, and U.S. EPA guidance. The RAOs are goals that a remedy should achieve in order to ensure the protection of human health and the environment. The goals are designed specifically to mitigate the potential adverse effects of site contaminants present in the environmental media.

PRGs for the protection of human health were established using the acceptable excess lifetime cancer risk and non-cancer hazard goals identified in the Ohio EPA Division of Emergency and Remedial Response (DERR) Technical Decision Compendium (TDC) document "Human Health Cumulative Carcinogenic Risk and Non-carcinogenic Hazard Goals for DERR Remedial Response and Federal Facility Oversight", dated April 26, 2004. These goals were stated as 1E-5 excess lifetime cancer risk and a HI of 1, and were established using the default exposure parameters provided by U.S. EPA. This TDC document can be found at the Ohio EPA's webpage: <http://www.epa.state.oh.us/derr/policies/riskgoal.pdf>

The carcinogenic risk levels refer to the increased likelihood that someone exposed to the chemical releases from the facility would develop cancer during his or her lifetime as compared with a person not exposed to the facility. For example, a 1 in 100,000 (equal to 1/100,000 or 1E-5) risk level means that if 100,000 people were chronically exposed to a carcinogen at the specified concentration, then there is a probability of one additional case of cancer in this population. Note that the risks refer only to the incremental risks created by exposure to the chemicals at the facility. They do not include the risks of cancer from other non-site related factors to which people could be exposed to in their lifetime. Non-carcinogenic hazards are generally expressed in terms of a HQ or HI, which combines the concentration of chemical exposures with the toxicity of the chemicals (quotient refers to the effects of an individual chemical whereas index refers to the combined effects of all chemicals). A HI of 1 represents the exposure at which no harmful effects are expected.

The RAOs were developed to ensure that remedial actions reduce the projected risk to humans to acceptable levels. The U.S. EPA through the NCP defines acceptable remediation goals for known or suspected carcinogens to be concentration levels that represent an upper bound excess (*i.e.*, above background) lifetime cancer risk to an individual between 1 in 10,000 and 1 in 1,000,000, using information on the relationship between dose and response, with the 1 in 1,000,000 risk level as the point of departure (the level of risk at which further remedial action is considered unnecessary). Likewise, noncarcinogenic risks are also to be reduced to an acceptable level, which corresponds to a HI of 1, at which harmful effects are generally not observed in exposed persons.

The RAOs developed for the Georgia Pacific facility are detailed below.

1. Reduce or eliminate direct exposure to contaminated ground water, sediment, and soil to ensure the beneficial use of the facility for commercial/industrial and/or potential future residential use.
2. Prevent the leaching of COCs from the soil or other sources into ground water underneath the facility in excess of the public drinking water MCLs.
3. Prevent contaminant migration into unaffected areas at the facility or off of the facility.

5.0 SUMMARY OF REMEDIAL ALTERNATIVES

Because the earlier emergency response activities remediated, contained or removed the site-related COCs, the remedial alternatives selected for the facility focus on the operation and maintenance of the existing remedial alternatives. Therefore, Ohio EPA modified the FS remedial alternatives so that a total of five remedial alternatives were incorporated in the Decision Document. A brief description of the major features for each remedial alternative is listed below. More detailed information about these alternatives can be found in the FS.

5.1 No Action - (FS Alternative 3.1.1) (Alternative 1: No Action)

The no action alternative is a baseline against which the other alternatives are compared, and is retained in accordance with the NCP. This alternative assumes that no further actions will be implemented to operate and maintain the existing remedial actions.

5.2 Institutional Controls (FS Alternative 3.1.2, modified by Ohio EPA) (Alternative 2: Institutional Controls)

Deed restrictions at the facility were stated to be unnecessary in the FS due to the commercial zoning restrictions that are already in place at Georgia Pacific and the surrounding properties. However, Ohio EPA has added to this alternative (not a FS Alternative originally proposed) activity and use limitations, in a recorded environmental covenant in accordance with Ohio Revised Code (ORC) §5301.80 et. seq., to prohibit excavation in, and the construction of permanent or temporary buildings on, the closed landfill.

5.3 Engineering Controls (FS Alternative 3.1.2, modified by Ohio EPA) (Alternative 3: Engineering Controls)

The Ohio EPA DAPC and Division of Surface Water (DSW) currently monitor the operation of the bio-pond. The bio-pond has an artificial cap to control emissions to the air; it also has demonstrated a degree of impermeability due to the accumulated resin materials that line its walls. During routine dredging operations to maintain the bio-pond's capacity, Georgia Pacific should minimize disturbing this layer of materials. During the remainder of the bio-pond's time in operation at the facility, these engineering controls must be maintained.

Georgia Pacific also maintains a soil and vegetative cover over the closed landfill located on the west side of the facility. The closed landfill was capped with soil and closed in 1979 following the solid waste regulations in effect at that time. The closed landfill's soil and vegetative cover must be maintained in good condition.

Several other remedial activities were completed by Georgia Pacific during the emergency response activities to stabilize conditions at the facility and the reconstruction of the resin process area and truck bay after the September 10, 1997, batch reactor explosion. Vertical barriers, in the form of passive recovery trenches and water collection sumps, were installed to control the horizontal migration of the shallow perched ground water (containing phenol) beneath the soil's surface. Two of these recovery trenches and collection sumps remain in operation at the facility and they must be maintained in good condition until they are no longer needed.

A perimeter chain link fence now surrounds the entire facility and provides security against unauthorized public access to the facility. In addition, public access to Georgia Pacific is limited by a key-card entry entrance gate at the front of the plant, monitored on a 24-hour basis by a security guard or plant control room personnel. Equivalent security measures must be maintained as long as the manufacturing plant is in operation.

5.4 Bio-pond Decommissioning (not a FS Alternative, added by Ohio EPA) (Alternative 4: Bio-pond Decommissioning)

The bio-pond will be decommissioned when its operation is no longer needed for the plant's manufacturing operations. Georgia Pacific will prepare and submit a decommissioning plan to the Ohio EPA DERR for approval. The plan will provide details on the bio-pond's decommissioning, such as the dewatering operation, removal and disposal of sludge, disposal of any contaminated soils, sampling results, and future plans for the bio-pond area. Georgia Pacific will also obtain a permit-to-install (PTI) from the Ohio EPA DSW prior to decommissioning the bio-pond. Georgia Pacific will notify Ohio EPA DERR 90 days in advance of the startup of the bio-pond decommissioning. Once the bio-pond decommissioning activities are completed, Georgia Pacific will submit a final closure report to Ohio EPA DERR for approval.

After the bio-pond's decommissioning, two consecutive ground water sampling events will be performed by Georgia Pacific at six month intervals. If no COCs are detected during these two sampling events, Georgia Pacific can request a release from continued periodic ground water monitoring. When periodic ground water sampling ceases at the facility, the six monitoring wells will be abandoned in accordance with OAC Rules 3745-9-07 and 3745-9-10, and the "State of Ohio Technical Guidance for Sealing Unused Wells (1996)." A copy of the monitoring wells' abandonment reports will be submitted to the Ohio Department of Natural Resources, and a copy of these reports will be sent to Ohio EPA DERR.

5.5 Operation and Maintenance (O&M) (FS Alternatives 3.1.2 and 3.1.3, modified by Ohio EPA) (Alternative 5: O&M)

The bio-pond will be operated and maintained in good condition by Georgia Pacific prior to its decommissioning by following the standard conditions and requirements stated in "City of Columbus, Division of Sewerage and Drainage, Wastewater Discharge Permit #010060-1," effective March 29, 2004 and in the "GP Bio-pond Operation and Maintenance Plan, Columbus, Ohio" dated August 30, 2004.

Georgia Pacific will inform Ohio EPA DERR of any maintenance activities that may impact the integrity of the bio-pond, such as dredging or enlarging or decreasing its size, 30 days before starting such activities. Georgia Pacific will submit a report to Ohio EPA DERR after the maintenance activity is complete, which will provide details on the maintenance activity, such as the amount of sludge removed, the disposal of the sludge, the depth of the bio-pond before and after dredging and sampling results. These requirements were added by Ohio EPA (not a FS Alternative originally proposed).

A ground water monitoring plan will be developed and implemented by Georgia Pacific as part of the O&M plan. The ground water monitoring plan will include the sampling schedule and testing parameters. A ground water contingency monitoring plan will also be developed by Georgia Pacific as part of the O&M plan, and implemented by Georgia Pacific if increased COC concentrations are detected in the ground water sampling results. In addition to the routine sampling of monitoring wells, Georgia-Pacific will also sample BP-1, BP-2, MW#18 and MW#19 four to six months after undertaking any maintenance activities that may impact the integrity of the bio-pond. Georgia Pacific will submit a summary report to Ohio EPA, which will provide details and results of the ground water sampling event. The requirement for a ground water monitoring plan to be developed and implemented by Georgia Pacific was added by Ohio EPA (not a FS Alternative originally proposed).

Six ground water monitoring wells (BP-1, BP-2, MW#9B, MW#12, MW#18 and MW#19) will continue to be sampled by Georgia Pacific on a periodic basis to ensure that no COCs are migrating from the bio-pond and the resin process area into the shallow and/or deep

aquifer systems. See **Figure 3**. MW#12, located at the facility's northeast corner, will be used to monitor the shallow aquifer system closest to the residential houses on Watkins Road. BP-1 and BP-2, located at the north side of the bio-pond, will be used to monitor the shallow aquifer system. MW#18 and MW#19, located in the fallow field south of the bio-pond, will be used to monitor the shallow aquifer system. MW#9B, located at the facility's southwest corner, will be used to monitor the deep aquifer system. The periodic sampling of these six ground water monitoring wells was listed in the FS as Alternative 3.1.2.

In addition, the closed landfill's soil and vegetative cover, the two recovery trenches and collection sumps, and the current security measures will be maintained in good condition at the facility. Georgia Pacific will prepare and submit an O&M Plan for Ohio EPA approval that will detail the periodic inspection and routine maintenance of the closed landfill's cover, the two recovery trenches and collection sumps, and the current security measures. The O&M Plan will provide for the reporting of bio-pond maintenance activities by Georgia Pacific to Ohio EPA. This requirement for an O&M Plan to be developed and implemented by Georgia Pacific was added by Ohio EPA (not a FS Alternative originally proposed).

6.0 COMPARISON AND EVALUATION OF ALTERNATIVES

6.1 Evaluation Criteria

In selecting the remedy for this facility, Ohio EPA considered the following eight criteria as outlined in U.S. EPA's NCP promulgated under CERCLA (40 CFR 300.430):

1. Overall protection of human health and the environment - Remedial alternatives shall be evaluated to determine whether they can adequately protect human health and the environment, in both the short- and long-term, from unacceptable risks posed by hazardous substances, pollutants, or contaminants present at the site.
2. Compliance with ARARs - Remedial alternatives shall be evaluated to determine whether a remedy will meet all of the applicable or relevant and appropriate requirements (ARARs) under state and federal environmental laws.
3. Long-term effectiveness and permanence - Remedial alternatives shall be evaluated to determine the ability of a remedy to maintain reliable protection of human health and the environment over-time, once pollution has been abated and RAOs have been met. This includes assessment of the residual risks remaining from untreated wastes, and the adequacy and reliability of controls such as containment systems and institutional controls.

4. Reduction of toxicity, mobility, or volume through treatment - Remedial alternatives shall be evaluated to determine the degree to which recycling or treatment are employed to reduce toxicity, mobility, or volume, including how treatment is used to address the principal threats posed by the site.
5. Short-term effectiveness - Remedial alternatives shall be evaluated to determine the following: (1) Short-term risks that might be posed to the community during implementation of an alternative; (2) Potential impacts on workers during remedial action and the effectiveness and reliability of protective measures; (3) Potential environmental impacts of the remedial action and the effectiveness and reliability of mitigative measures during implementation; and (4) Time until protection is achieved.
6. Implementability - Remedial alternatives shall be evaluated to determine the ease or difficulty of implementation and shall include the following as appropriate: (1) Technical difficulties and unknowns associated with the construction and operation of a technology, the reliability of the technology, ease of undertaking additional remedial actions, and the ability to monitor the effectiveness of the remedy; (2) Administrative feasibility, including activities needed to coordinate with other offices and agencies and the ability and time required to obtain any necessary approvals and permits from other agencies (for off-site actions); and (3) Availability of services and materials, including the availability of adequate off-site treatment, storage capacity, and disposal capacity and services; the availability of necessary equipment and specialists, and provisions to ensure any necessary additional resources; the availability of services and materials; and the availability of prospective technologies.
7. Cost - Remedial alternatives shall evaluate costs and shall include the following: (1) Capital costs, including both direct and indirect costs; (2) Annual operation and maintenance costs (O&M); and (3) Net present value of capital and O&M costs. The cost estimates include only the direct costs of implementing an alternative at the site and do not include other costs, such as damage to human health or the environment associated with an alternative. The cost estimates are based on figures provided by the FS.
8. Community acceptance - Remedial alternatives shall be evaluated to determine which of their components interested persons in the community support, have reservations about, or oppose.

Evaluation Criteria 1 and 2 are threshold criteria required for acceptance of an alternative that has accomplished the goal of protecting human health and the environment and complied with the law. Any acceptable remedy must comply with both of these criteria.

Evaluation Criteria 3 through 7 are the balancing criteria for picking the best remedial alternatives. Evaluation Criterion 8, community acceptance, was determined, in part, by written responses received during the public comment period and statements offered at the public meeting held on March 14, 2006.

6.2 Analyses of Evaluation Criteria

This section looks at how each of the evaluation criteria is applied to each of the remedial alternatives found in Section 5.0 and compares how the alternatives achieve the criteria.

6.2.1 Overall Protection of Human Health and the Environment

The assessment of cancer risks and non-cancer hazards to human receptors requires that pathways for exposure be identified and the risks and hazards of each pathway be numerically estimated. An exposure assessment using the U.S. EPA Region 9 PRGs was conducted as part of the emergency response activities at the facility. In addition to the exposure assessment conducted by Georgia Pacific, Ohio EPA generated a limited human health risk assessment for the facility. The normal criteria for acceptability of risk represent an upper bound excess lifetime cancer risk to an individual to between 1 in 10,000 and 1 in 1,000,000. The total non-carcinogenic adverse health effects should result in a HI of less than 1.

- Alternative 1: No Action. This alternative will not be protective of human health and the environment since RAOs 1, 2, and 3 will not be met for each of the affected media at the Georgia Pacific facility.
- Alternative 2: Institutional Controls. The activity and use limitations will prohibit excavation in the closed landfill and prohibit construction of permanent or temporary buildings on the closed landfill, and will prevent future possible exposures to on-site workers (*i.e.*, facility employees and outside contractors such as construction workers). This alternative meets RAO 1, but does not meet RAOs 2 and 3.
- Alternative 3: Engineering Controls. The bio-pond's artificial cap minimizes air releases, while its accumulated resin materials minimizes ground water migration of COCs. The closed landfill soil and vegetative cover prevent direct contact to any waste materials. The two recovery trenches and collection sumps control the horizontal migration of shallow perched ground water beneath the soil's surface. The current security measures prevent unauthorized public access to the Georgia Pacific facility and possible exposure to the bio-pond. This alternative meets RAO 1, 2 and 3.
- Alternative 4: Bio-pond Decommissioning. The bio-pond will be decommissioned by Georgia Pacific when it is no longer necessary for the plant's manufacturing operations. This alternative meets RAOs 1, 2, and 3.

- Alternative 5: Operation and Maintenance (O&M). The bio-pond, the closed landfill's soil and vegetative cover, the two recovery trenches and collection sumps, and the current security measures will be maintained in good condition by Georgia Pacific. Periodic sampling of six ground water monitoring wells, and the recovery trenches and collection sumps, will be performed by Georgia Pacific to detect the potential migration of COCs. This alternative meets RAOs 1, 2, and 3.

6.2.2 Compliance with Applicable or Relevant and Appropriate Requirements

- Alternative 1: No Action. This alternative does not restrict access to potentially contaminated ground water, soil, or wastes within the landfill; therefore, it would not comply with the ARARs.
- Alternative 2: Institutional Controls. This alternative complies with the identified ARARs as long as the activity and use limitations are recorded in an environmental covenant in accordance with ORC §5301.80 et. seq.
- Alternative 3: Engineering Controls. This alternative complies with the identified ARARs as long as the controls are properly operated and maintained by Georgia Pacific, its successors, and any future owners of the facility.
- Alternative 4: Bio-pond Decommissioning. This alternative complies with the identified ARARs for the decommissioning of a surface water impoundment. Georgia Pacific will submit a decommissioning plan to Ohio EPA for approval. A PTI application from the Ohio EPA DSW will be required prior to decommissioning the bio-pond. After the bio-pond's decommissioning, the six monitoring wells can be abandoned in accordance with OAC Rules 3745-9-07 and 3745-9-10, and the "State of Ohio Technical Guidance for Sealing Unused Wells (1996)."
- Alternative 5: O & M. This alternative complies with the identified ARARs as long as the O&M activities continue to be performed by Georgia Pacific, its successors, and any future owners of the facility.

6.2.3 Long-Term Effectiveness and Permanence

- Alternative 1: No Action. This alternative does not provide long-term effectiveness or permanence because it does not include O&M for the existing remedial actions or monitoring of the remedial actions to prevent future potential exposure risks.
- Alternative 2: Institutional Controls. This alternative provides some long-term effectiveness and permanence because the excavation and building limitations are adequate methods to control potential exposure risks from future construction activities at the closed landfill. The long-term effectiveness and permanence of this

alternative will require a reliable mechanism to enforce the maintenance of these activity and use limitations, such as periodic compliance checks by Ohio EPA.

- Alternative 3: Engineering Controls. This alternative provides some long-term effectiveness and permanence because the bio-pond's artificial cap limits air emissions while the accumulated resin material minimizes ground water migration, the closed landfill's soil and vegetative cover prevents direct contact, the two recovery trenches and collection sumps control the horizontal migration of shallow perched ground water, and the current security measures restrict unauthorized public access; and will be effective in reducing potential future exposure risks if properly maintained by Georgia Pacific, its successors, and any future owners of the facility.
- Alternative 4: Bio-pond Decommissioning. This alternative should provide long-term effectiveness and permanence because the decommissioning of the bio-pond is a permanent method to control the migration of COCs, and to prevent the possible contamination of ground water. However, the decommissioning activities may create limited short-term exposure risks to the on-site workers involved in these decommissioning activities.
- Alternative 5: O & M. This alternative provides some long-term effectiveness and permanence because the bio-pond's artificial cap and accumulated resin materials, the closed landfill's soil and vegetative cover, the two recovery trenches and collection sumps, are adequate methods to control the migration of COCs when properly operated and maintained in good condition. In addition, the current security measures limit potential exposure to COCs. Periodic sampling of the six ground water monitoring wells and the collection sumps provide a reliable method of detecting any potential migration of COCs. Following the terms of the discharge permit and the maintenance plan with Columbus provides a reliable means to ensure the proper operation of the bio-pond. After any maintenance activities that may impact the integrity of the bio-pond, additional sampling of the monitoring wells is an effective method to detect any potential migration of COCs. Long-term operation and maintenance issues at the facility will be addressed in the O&M Plan to be submitted by Georgia Pacific to Ohio EPA.

6.2.4 Reduction of Toxicity, Mobility or Volume Through Treatment

- Alternative 1: No Action. This alternative does not reduce the toxicity, mobility or volume by treatment of the potential COCs including acetone, formaldehyde, methanol and phenol.
- Alternative 2: Institutional Controls. This alternative does not reduce the toxicity, mobility or volume by treatment of potential COCs.

- Alternative 3: Engineering Controls. This alternative does not reduce the toxicity, or volume by treatment of potential COCs. However, the mobility of the COCs will be reduced by proper operation and maintenance of the engineering controls.
- Alternative 4: Bio-pond Decommissioning. Once the decommissioning of the bio-pond occurs, it will reduce the toxicity, mobility and volume of the potential COCs at the facility by removing a potential source area.
- Alternative 5: O & M. The O&M activities for the bio-pond, the closed landfill's soil and vegetative cover, and the two recovery trenches and collection sumps, will reduce the mobility of potential COCs. The pumping of the perched ground water from the two recovery trenches and collection sumps may reduce the volume of potential COCs at the facility and prevent ground water and any perched ground water from mobilizing potential COCs in soils.

6.2.5 Short-Term Effectiveness

- Alternative 1: No Action. This alternative does not provide short-term effectiveness because it does not prevent potential exposure risks from the COCs to on-site workers or to the community.
- Alternative 2: Institutional Controls. This alternative provides short-term effectiveness because contact with the closed landfill contents will be limited by recording an environmental covenant on the property deed.
- Alternative 3: Engineering Controls. This alternative has already been implemented at the facility and provides short-term effectiveness because the bio-pond's artificial cap and accumulated resin materials limit potential COC releases to the air and ground water, the closed landfill's soil and vegetative cover limits direct contact, the two recovery trenches and collection sumps restrict the migration of perched ground water, and the existing security measures restrict unauthorized public access to the facility.
- Alternative 4: Bio-pond Decommissioning. This alternative does not provide short-term effectiveness because the decommissioning of the bio-pond will not be performed by Georgia Pacific until the bio-pond is no longer needed for the plant's manufacturing operations.
- Alternative 5: O & M. This alternative provides short-term effectiveness because these O&M activities are currently in place, they limit potential exposure risks from the COCs to on-site workers, and they monitor the potential migration of COCs.

6.2.6 Implementability

- Alternative 1: No Action. This alternative is readily implementable because no actions are required and no approvals are necessary.
- Alternative 2: Institutional Controls. This alternative will be readily implementable once Georgia Pacific prepares the legal documents to establish the facility's institutional controls for the closed landfill. Georgia Pacific will be required to file the environmental covenant with the Franklin County Recorder's Office.
- Alternative 3: Engineering Controls. This alternative has already been completed by Georgia Pacific.
- Alternative 4: Bio-pond Decommissioning. This alternative will be readily implementable once Georgia Pacific prepares and submits the bio-pond decommissioning plan for Ohio EPA approval.
- Alternative 5: O & M. This alternative will be readily implementable once Georgia Pacific prepares and submits an O&M Plan for Ohio EPA approval. The closed landfill's soil and vegetative cover and the two recovery trenches and collection sumps will require regular visual inspections to confirm their proper operation. The monitoring wells will need to be periodically sampled, and the ground water samples analyzed, as long as the bio-pond continues to be operated. The discharge permit, and the maintenance plan with the city of Columbus for the bio-pond has already been approved and issued to Georgia Pacific.

6.2.7 Cost

- Alternative 1: No Action. This alternative has no additional costs.
- Alternative 2: Institutional Controls. This alternative has an estimated cost of \$17,500 to record and monitor the property restrictions.
- Alternative 3: Engineering Controls. This alternative has an estimated cost of \$50,000 per year to maintain the current security measures at the facility.
- Alternative 4: Bio-pond Decommissioning. This alternative has an estimated cost of \$500,000 to complete the final decommissioning of the bio-pond.
- Alternative 5: O & M. The periodic sampling of the remaining six monitoring wells is estimated to cost \$20,000 per year. The estimated cost for the continued operation of the recovery trenches and collection sumps is \$5,000 per year including the monitoring and the repair and/or replacement as needed of the

pumping equipment. The estimated cost for the preventative maintenance of the closed landfill soil and vegetative cover is \$1,000 per year.

6.2.8 Community Acceptance

The Ohio EPA received comments from interested parties during the public comment period and at the public meeting held at the Ohio Department of Transportation's Auditorium, 1980 W. Broad Street, on March 14, 2006. Those comments and Ohio EPA's responses are included in the Responsiveness Summary in **Appendix D**.

7.0 SELECTED REMEDIAL ALTERNATIVE

The selected remedial alternative a combination of Alternative 2. Institutional Controls; Alternative 3. Engineering Controls; Alternative 4, Bio-pond Decommissioning; and Alternative 5, Operation and Maintenance. These alternatives focus on operating and maintaining the existing remedial actions initiated during the emergency response activities and monitoring systems; and protecting human health and the environment from exposure or potential exposure to COCs in the ground water, soil and surface water.

Under Alternative 2, Institutional Controls, Georgia Pacific shall record an environmental covenant at the Franklin County Recorder's Office to prohibit excavation in the closed landfill and the construction of permanent or temporary buildings on the closed landfill. This alternative prevents future possible exposures of the on-site workers (*i.e.*, facility employees and outside contractors such as construction workers) to COCs.

Under Alternative 3, Engineering Controls, Georgia Pacific shall maintain the bio-pond's artificial cap, closed landfill's soil and vegetative cover, and the two recovery trenches and collection sumps to prevent the migration of contaminants into unaffected areas at the facility or off of the facility. Security measures restricting unauthorized public access equivalent to the existing security measures shall be maintained as long as the bio-pond, closed landfill, and the recovery trenches and collection sumps remain at the facility to prevent potential exposure to COCs.

Under Alternative 4, Bio-pond Decommissioning, Georgia Pacific shall decommission the bio-pond when it is no longer needed for the plant's manufacturing operations. Georgia Pacific shall prepare and submit a decommissioning plan to Ohio EPA for approval. Ohio EPA shall be notified 90 days in advance of the startup of the bio-pond decommissioning. After the completion of the bio-pond's decommissioning, Georgia Pacific shall submit a final closure summary report to Ohio EPA for approval. Two consecutive ground water sampling events at six month intervals shall then be conducted by Georgia Pacific to confirm that COCs have not migrated from the bio-pond into unaffected areas at the facility.

Under Alternative 5, Operation and Maintenance, Georgia Pacific shall maintain the bio-pond, the closed landfill's soil and vegetative cover, the two recovery trenches and collection sumps, and the current security measures in good condition. Georgia Pacific shall prepare and submit an O&M Plan to Ohio EPA for approval. Georgia Pacific shall sample six ground water monitoring wells and collection sumps on a periodic basis to ensure that no COCs are leaching from the bio-pond and resin process area into the shallow and/or deep aquifer system.

7.1 Institutional Controls

Institutional controls in the form of activity and use limitations will be established in an environmental covenant to be recorded with the Franklin County Recorder that prohibit excavation in the closed landfill and prohibit construction of any permanent or temporary structure on the closed landfill.

Performance Standards: Institutional controls are necessary to achieve RAO 1 by preventing potential exposure to COCs. The performance standard will be achieved when the environmental covenant is recorded with the Franklin County Recorder and Ohio EPA is notified by Georgia Pacific that the environmental covenant has been recorded in accordance with ORC §5301.80 et. seq., and by the continued enforcement of the environmental covenant.

7.2 Engineering Controls

The bio-pond will be maintained during the remainder of its operation. The closed landfill's soil and vegetative cover will be maintained to prevent any exposure to the existing waste materials. The two recovery trenches and collection sumps will be maintained until such time that the sampling results demonstrate that the recovery trenches and collection sumps no longer need to be operated and maintained. Security measures equivalent to the existing security measures will be maintained as long as the bio-pond, closed landfill, and the recovery trenches and collection sumps remain at the facility, to restrict unauthorized public access.

Performance Standards. Engineering controls are necessary to achieve RAOs 1, 2 and 3. The performance standard is achieved as long as engineering controls are operated and maintained in a manner that prevents exposure to COCs, leaching of COCs into ground water and migration of COCs to other areas.

7.3 Bio-pond Decommissioning

The bio-pond will be decommissioned when it is no longer needed for the plant's manufacturing operations.

Performance standards. The bio-pond's decommissioning is necessary to achieve RAOs 1, 2 and 3. The performance standard will be achieved when the bio-pond is decommissioned according to a plan approved by Ohio EPA.

7.4 Operation and Maintenance

An O&M Plan will be submitted to Ohio EPA for approval and will include the following:

Closed landfill cover

During the closure of the on-site landfill in December 1979, Georgia Pacific constructed a soil and vegetative cover over the landfill's entire area as a horizontal barrier to minimize surface water infiltration into the soil, reduce the potential impact to the aquifer systems, and prevent any contact with any impacted media. The closed landfill's soil and vegetative cover will be periodically inspected, mowed, repaired and revegetated as needed, and maintained in good condition.

Performance standards: The operation and maintenance of the landfill cover is necessary to achieve RAOs 1 by preventing exposure to COCs and leaching of COCs to ground water. The performance standard is achieved as long as the landfill cover is maintained in good condition.

Recovery trenches and water collection sumps

As part of the emergency response activities, vertical barriers consisting of passive recovery trenches and water collection sumps were constructed to collect the shallow perched ground water beneath the soil's surface and to prevent the potential off-site migration of this perched ground water. Currently, two recovery trenches and collection sumps discharge the shallow perched ground water to the bio-pond, which discharges to the Columbus sanitary sewer system. The recovery trenches and collection sumps will be periodically inspected and maintained in good operating condition. The recovery trenches and collection sumps will continue to operate as needed. The pumping equipment in the recovery trenches and collection sumps will be repaired and/or replaced as needed. The perched ground water will continue to be periodically monitored for phenol.

Performance standards. The operation and maintenance of the recovery trenches and collection sumps is necessary to achieve RAQ 3 by preventing the migration of COC to other areas. The performance standard will be achieved when four consecutive quarters (every 3 months) of ground water samples collected from the two collection sumps demonstrate that remediation levels in the table listed below are met.

Ground Water Remediation Levels (expressed in ug/L)

COC	Remediation Level
Acetone	5.5E3
Formaldehyde	5.5E3
Methanol	1.8E4
Phenol	1.1E4

Bio-pond Maintenance

The bio-pond will be maintained in good condition prior to its decommissioning. Ohio EPA will be notified of any maintenance activities by Georgia Pacific that may impact the integrity of the bio-pond, such as dredging or enlarging or decreasing its size, 30 days prior to starting such activities. After the maintenance activities are completed, a summary report will be submitted to Ohio EPA that will provide details on these maintenance activities; such as the amount of sludge removed, the disposal methods used for the sludge, the depth of the bio-pond before and after dredging, and sludge sampling results.

Performance standards. Bio-pond maintenance is necessary to achieve RAOs 1, 2, and 3 by preventing potential exposure to COCs. leaching of COCs to ground water and the migration of COCs to other areas. The performance standard will be achieved when operation and maintenance is conducted in a manner that prevents exposure, leaching to ground water and migration to other areas.

Ground Water Monitoring Wells

As part of the O&M plan, a ground water monitoring plan for the periodic sampling of the six existing ground water monitoring wells (BP-1, BP-2, MW#9B, MW#12, MW#18 and MW#19) will be developed and implemented to ensure that no COCs are migrating from the bio-pond and the resin process area into the shallow and/or deep aquifer systems at the facility.

Performance standards. Ground water monitoring is necessary to achieve RAOs 1, 2, and 3 by ensuring that COCs in ground water do not exceed remediation levels and contaminants are not migrating to other areas. The performance standard will be achieved when the ground water is periodically monitored according to the plan approved by Ohio EPA. After the bio-pond's decommissioning, the performance standard will be achieved when two consecutive semi-annual sampling events of ground water monitoring demonstrate that remediation levels for the COCs listed in the table below are met.

Ground Water Remediation Levels (expressed in ug/L)

COC	Remediation Level
Acetone	5.5E3
Formaldehyde	5.5E3
Methanol	1.8E4
Phenol	1.1E4

8.0 GLOSSARY

- Acetone - A chemical compound that is a common industrial solvent.
- Aquifer - An underground geological formation capable of storing and yielding water.
- Applicable or Relevant and Appropriate Requirements (ARARS) - Those rules, including state and federal laws, which strictly apply to remedial activities at the site, or whose requirements would help achieve the remedial goals for the site.
- Baseline Risk Assessment - An evaluation of the risks to humans and the environment posed by a site.
- Below Ground Surface (bgs) - The vertical distance measured below the ground's surface.
- Bureau of Underground Storage Tank Regulation (BUSTR) - Part of the Division of the State Fire Marshal Office under the Ohio Department of Commerce, that regulates underground storage tanks used to dispense motor vehicle fuels.
- Carcinogen - A chemical compound that causes cancer in humans.

Comprehensive
Environmental Response,
Compensation and
Liability Act (CERCLA) -

A federal law established in 1980 that regulates cleanup of hazardous substance sites under the U.S. EPA Superfund Program.

Contaminant of Concern
(COC) -

Chemical compound

Decision Document -

A statement issued by the Ohio Environmental Protection Agency giving the Director's selected remedy for a site and the reasons for its selection.

Exposure Pathway -

Route by which a chemical is transported from the site to a human or ecological receptor.

Formaldehyde -

A common industrial chemical that is commonly used in the manufacture of resins or other chemicals; and as a preservative, fumigant and disinfectant.

Hazardous Substance -

A chemical that may cause harm to humans or the environment.

Hazardous Waste -

A waste product, listed or defined by federal law, which may cause harm to humans or the environment.

Hazard Index (HI) -

The sum of more than one hazard quotient for multiple chemicals and/or multiple exposure pathways. A hazard index of 1 represents an exposure at which no harmful effects are expected.

Hazard Quotient (HQ) -

The ratio of a single substance exposure level to a toxicity value (e.g., reference dose) for that substance.

Human Receptor -

A person exposed to the chemicals released from a site.

Maximum Contaminant
Levels (MCL) -

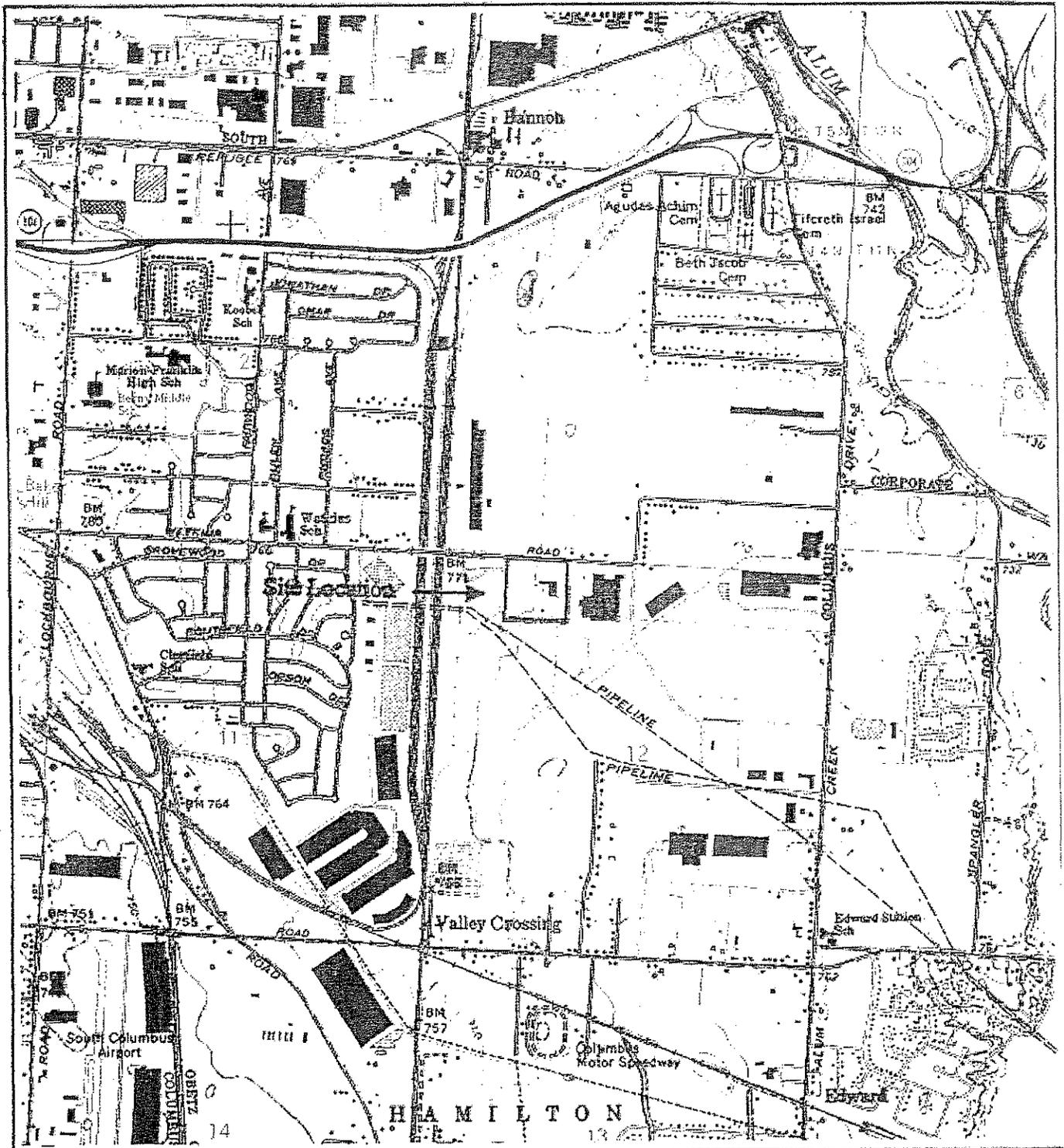
Concentrations established by the public drinking water standards in Ohio Administrative Code 3745-81-12.

Methanol -

Also known as Methyl Alcohol or MeOH. A common industrial chemical compound used as a solvent.

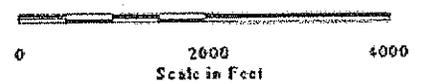
Milligrams per Kilogram (mg/kg) -	An expression for soil concentration of a chemical compound; equal to one part per million.
Milligrams per Liter (mg/L) -	An expression of water concentration of a dissolved material; equal to one part per million.
National Oil and Hazardous Pollution Contingency Plan (NCP) -	The NCP was codified at 40 CFR Part 300 (1990), as amended. A framework for the remediation of hazardous substance sites specified in CERCLA.
Operation and Maintenance (O&M) -	Those long-term measures taken at a site, after the initial remedial actions, to assure that a remedy remains protective of human health and the environment.
Polycyclic Aromatic Hydrocarbons (PAHs) -	A broad class of chemicals including multiple six-carbon rings. Often found as residue from coal-based chemical processes.
Preferred Plan -	The plan that evaluates the preferred remedial alternative chosen by Ohio EPA to remediate the site in a manner that best satisfies the evaluation criteria.
Phenol -	A chemical that is a common disinfectant and anesthetic.
PRG -	Preliminary remediation goal.
Remedial Investigation (RI) -	A study conducted to collect information necessary to adequately characterize the site for the purpose of developing and evaluating effective remedial alternatives.
Responsiveness Summary -	A summary of all comments received concerning the Preferred Plan, and Ohio EPA's response to all the issues raised in those comments.
Micrograms per Liter (ug/L) -	An expression of water concentration of a dissolved material; equal to one part per billion.

FIGURES



Reference

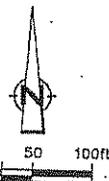
USGS 7.5 Minute Topographic Quadrangle,
 Southeast Columbus, Ohio, Dated 1964,
 Revised 1994. Scale 1:24,000



ENVIRONMENTAL STRATEGIES CORPORATION
 4 Penn Center West, Suite 315
 Pittsburgh, Pennsylvania 15276
ESC 412-787-5100

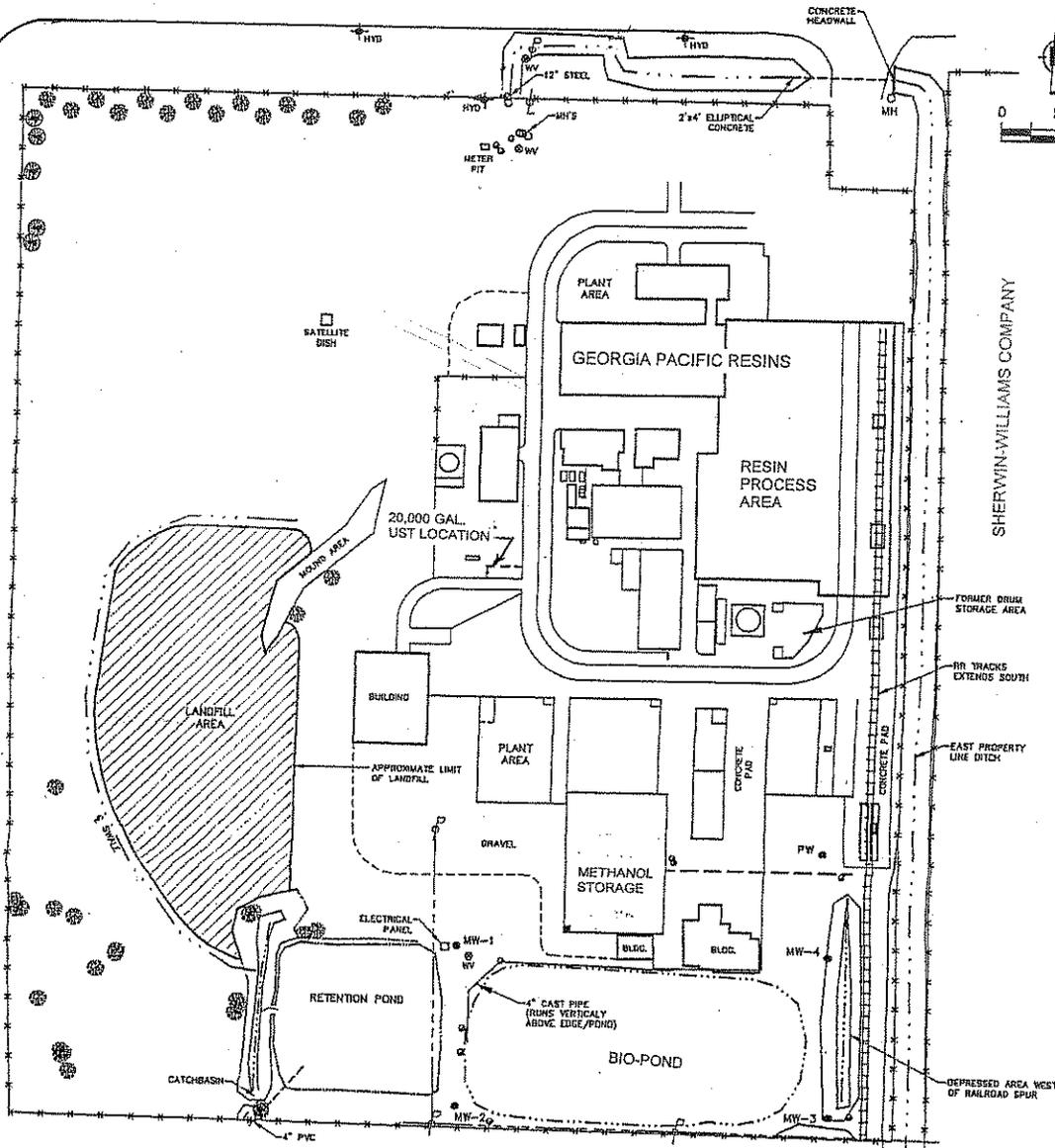
Figure 1
 Site Location
 Georgia-Pacific Resins, Inc. Facility
 Columbus, Ohio

WATKINS ROAD



NORFOLK SOUTHERN SWITCH YARD

SHERWIN-WILLIAMS COMPANY



AGRICULTURAL

LEGEND

- CHAIN LINK FENCE
- - - CENTERLINE OF WATER FLOW
- POWER LINE
- - - - - APPROX. FORMER LOCATION OF TANK BS PIPELINE
- ⊙ LIGHT POLE
- ⊙ POWER POLE
- BM #1 BENCHMARK
ELEV. = 776.77
- ⊙ HYD FIRE HYDRANT
- ⊙ WV WATER VALVE
- ⊙ STEEL POST
- ⊙ DECIDUOUS TREE
- ⊙ CONIFEROUS TREE
- ⊙ MH SANITARY MANHOLE
- ⊙ MW-1 SHALLOW MONITORING WELL
- ⊙ PW PLANT WELL

SURVEY NOTES:

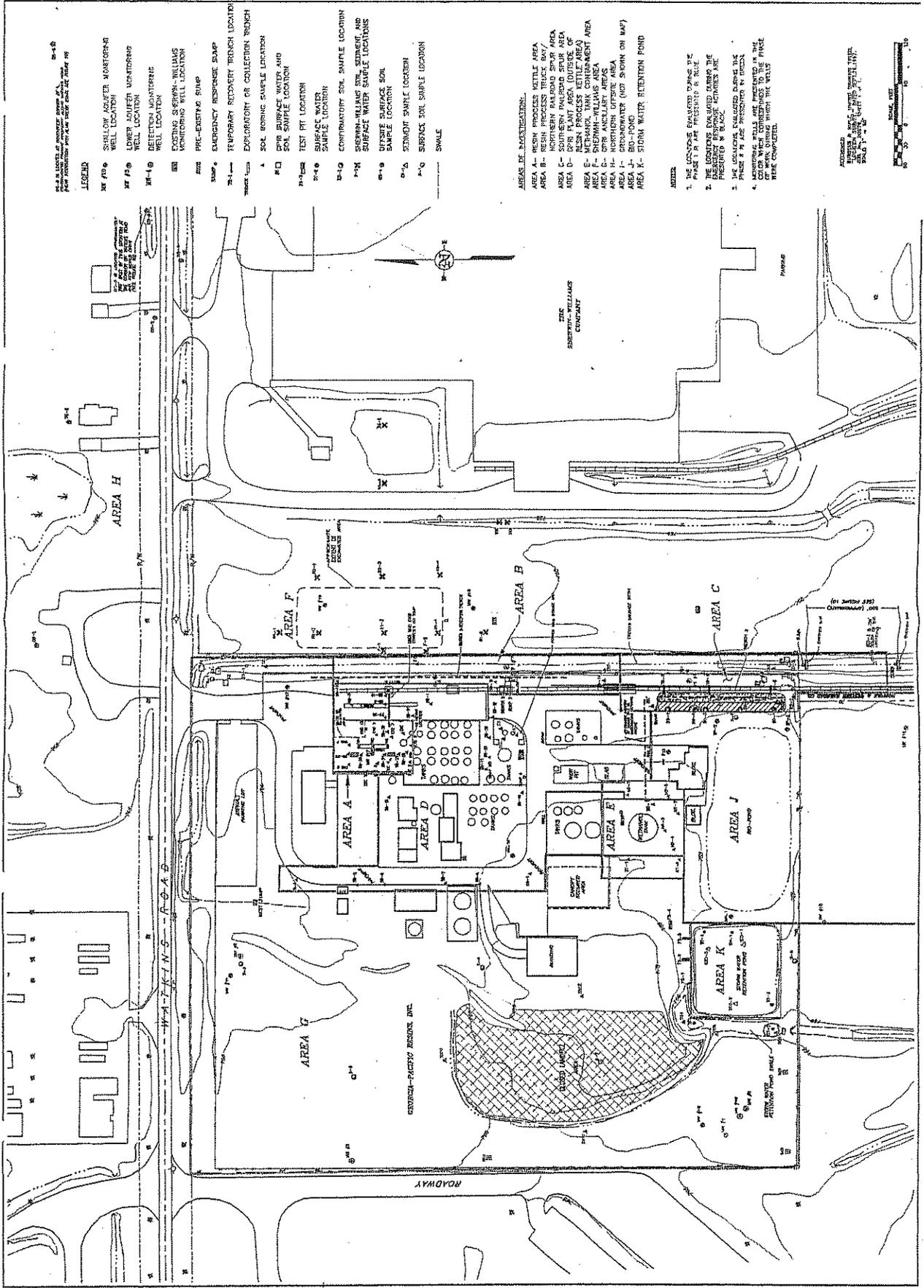
A FIELD SURVEY OF THE PREMISES WAS PERFORMED BY WOOLPERT, COLUMBUS, OHIO, IN JANUARY, 1995.
PLANT AREA NOT TO SCALE.

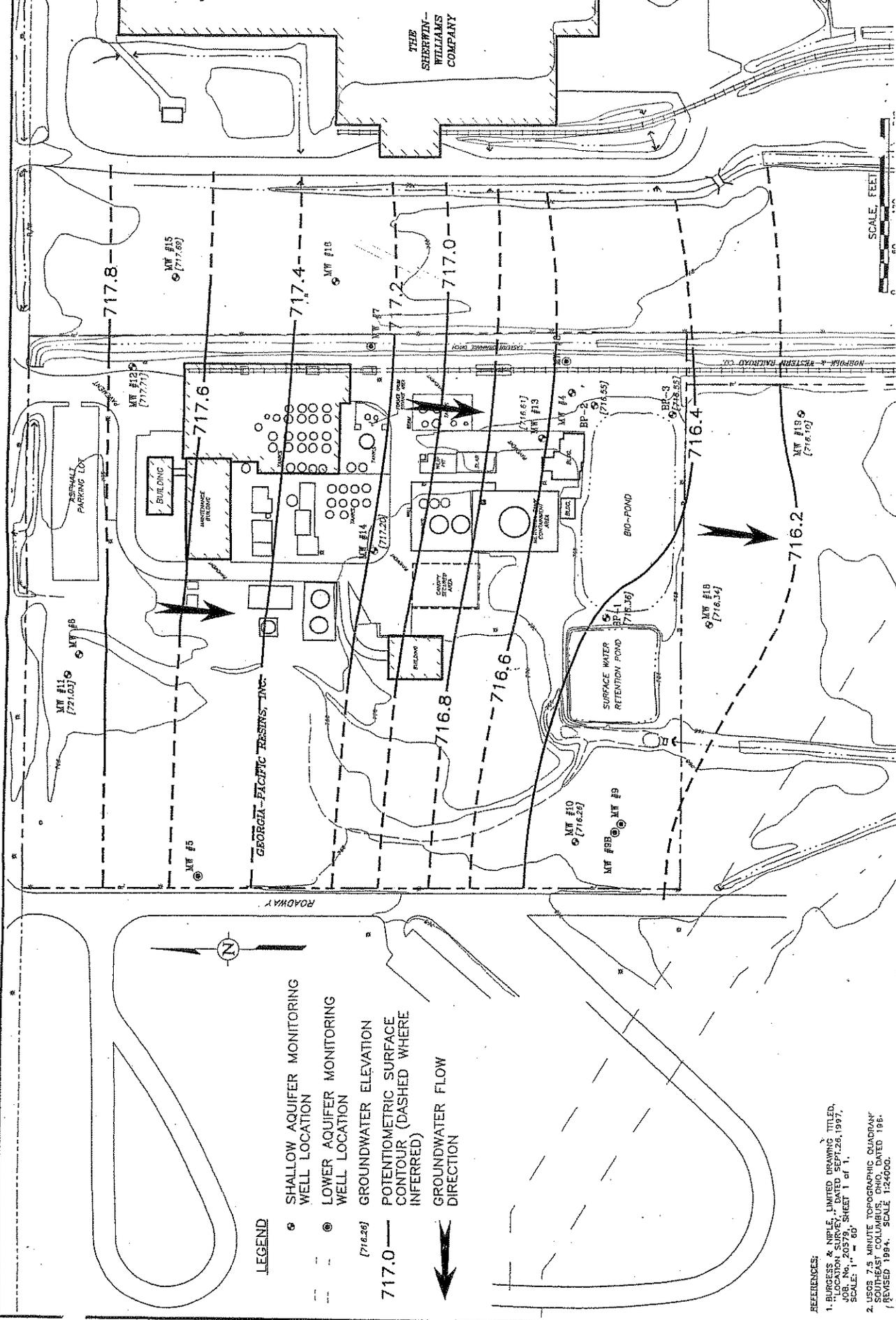
FIGURE 2

SITE PLAN LAYOUT - MANUFACTURING OPERATIONS
GEORGIA-PACIFIC RESINS, INC.
Columbus, Ohio

CRA

		Figure 5 Drawing Number 466135-D02													
ENVIRONMENTAL STRATEGIES CORPORATION 1000 Walnut Street Philadelphia, PA 19107 (215) 762-0100		REMEDIAL INVESTIGATION AREAS OF INTEREST AND SITE STABILIZATION LOCATIONS GEORGIA-PACIFIC RESINS, INC. FACILITY COLUMBUS, OHIO PROJECT NO. GEORGIA-PACIFIC CORPORATION ATLANTA, GEORGIA													
SHEET NO. 111-009 DATE: 11/19/90 DRAWN BY: [Name] CHECKED BY: [Name]		REVISIONS <table border="1"> <thead> <tr> <th>NO.</th> <th>DATE</th> <th>DESCRIPTION</th> </tr> </thead> <tbody> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> <tr> <td> </td> <td> </td> <td> </td> </tr> </tbody> </table>		NO.	DATE	DESCRIPTION									
NO.	DATE	DESCRIPTION													





LEGEND

- SHALLOW AQUIFER MONITORING WELL LOCATION
- LOWER AQUIFER MONITORING WELL LOCATION
- (716.2) GROUNDWATER ELEVATION
- POTENTIOMETRIC SURFACE CONTOUR (DASHED WHERE INFERRED)
- 717.0 — GROUNDWATER FLOW DIRECTION

REFERENCES:

1. BURGESS & NIPLE LIMITED DRAWING TITLED, "LOCATION SURVEY," DATED SEPT. 26, 1997, JOB. No. 20379, SHEET 1 of 1, SCALE: 1" = 60'
2. USGS 7.5 MINUTE TOPOGRAPHIC QUADRANG "SOUTHEAST COLUMBUS, OHIO, DATED 1964," REVISED 1984, SCALE 1:24,000.

TABLES

TABLE 1

SUMMARY OF HISTORICAL ANALYTICAL RESULTS
EXISTING SITE SHALLOW MONITORING WELLS AND PLANT PRODUCTION WELL
GEORGIA-PACIFIC RESINS, INC.
COLUMBUS, OHIO

MONITOR WELL 1

Date	COD mg/L	Formald. mg/L	Organic N mg/L	Nitrate mg/L	Phenols mg/L	TOC mg/L	pH Lab		pH Field		S.C. Lab umhos/cm	S.C. Field umhos/cm
							S.U.	S.U.	S.U.	S.U.		
14-May-82	110	<0.200	5.0	NR	<0.005	NR	7.4	NR	NR	NR	NR	NR
26-May-82	140	0.400	10.0	NR	0.006	NR	6.9	NR	NR	NR	NR	NR
8-Oct-84	45	<0.006	1.8	NR	0.07	NR	7.0	NR	NR	NR	NR	NR
24-Jan-85	160	<0.006	3.5	NR	<0.05	102.0	6.9	NR	NR	1390	NR	NR
30-Apr-85	55	<0.006	3.1	NR	<0.05	18.0	6.9	NR	NR	1640	NR	NR
29-Jul-85	100	1.25	4.0	5.33	<0.05	16.2	6.9	7.1	7.1	1415	1430	1430
5-Feb-86	240	4.80	4.2	1.10	<0.05	18.0	6.9	6.5	6.5	1600	1600	1600
14-Apr-86	34	1.00	5.2	0.73	<0.05	22.3	7.2	6.7	6.7	1500	1500	1500
9-Jul-86	85	5.20	1.9	1.00	<0.05	19.0	6.8	NR	NR	1400	NR	NR
30-Jan-87	98	8.00	2.9	0.72	<0.05	18.0	7.0	6.6	6.6	1500	1850	1850
28-Jul-87	48	11.00	5.3	1.80	<0.05	22.0	6.9	5.9	5.9	1800	1800	1800
10-Sep-87	NR	6.80	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR
27-Jan-88	54	18.00	0.5	0.15	0.05	4.1	7.3	6.97	6.97	1600	2000	2000
3-Aug-88	71	14.00	6.5	12.00	<0.05	25.0	6.8	7.3	7.3	2200	2250	2250
3-Mar-89	93	21.00	9.6	0.44	<0.05	34.0	6.4	NR	NR	2410	NR	NR
16-Aug-89	110	25.00	6.8	1.70	0.05	43.0	7.1	6.7	6.7	2320	2200	2200
14-Mar-90	11	8.00	<1.0	2.00	<0.05	26.0	7.1	6.8	6.8	1988	2600	2600
17-Oct-90	<5	9.30	2.0	1.20	<0.05	18.0	6.8	6.7	6.7	1700	2000	2000
14-Jun-91	25	3.30	1.1	12.00	<0.05	24.0	6.5	6.8	6.8	1700	1990	1990

Note:

- (1) Formaldehyde concentrations analyzed during May 1982 to April 1985 are expressed in percentages
(2) NR - not reported

TABLE 1

SUMMARY OF HISTORICAL ANALYTICAL RESULTS
EXISTING SITE SHALLOW MONITORING WELLS AND PLANT PRODUCTION WELL
GEORGIA-PACIFIC RESINS, INC.
COLUMBUS, OHIO

MONITOR WELL 2

Date	COD mg/L	Formald. mg/L	Organic N mg/L	Nitrate mg/L	Phenols mg/L	TOC mg/L	pH		S.C. Lab umhos/cm	S.C. Field umhos/cm
							Lab S.U.	Field S.U.		
14-May-82	240	<0.20	3.6	NR	<0.005	NR	7.5	NR	NR	NR
26-May-82	180	1.000	6	NR	0.007	NR	7.1	NR	NR	NR
8-Oct-84	66	<0.006	2	NR	<0.05	NR	7.2	NR	NR	NR
24-Jan-85	98	<0.006	2.8	NR	<0.05	622.0	6.9	NR	2310	NR
30-Apr-85	110	<0.006	5	NR	<0.05	35.0	6.9	NR	2800	NR
29-Jul-85	190	1.40	14	6.15	<0.05	31.8	7.2	6.8	2350	2030
5-Feb-86	170	1.40	8.5	28.00	<0.05	14.0	6.5	6.8	1300	1300
9-Jul-86	160	2.50	0.4	4.60	<0.05	19.0	7.1	NR	1500	NR
30-Jan-87	40	1.80	2.4	20.00	<0.05	16.0	7.1	6.8	1500	1840
28-Jul-87	130	1.10	0.56	0.80	<0.05	14.0	7.2	6.1	1200	1390
27-Jan-88	26	2.50	<0.10	57.00	<0.05	4.0	7.3	6.7	2100	2000
3-Aug-88	75	14.00	2.9	0.76	<0.05	29.0	7.0	6.9	2000	2100
3-Mar-89	17	0.45	0.1	21.00	<0.05	5.3	6.6	7.3	1310	1600
16-Aug-89	66	0.27	8.7	10.00	<0.05	14.0	7.2	7.0	870	895
14-Mar-90	<10	1.10	<1.0	12.00	0.06	12.0	7.5	7.2	955	800
17-Oct-90	<5	0.58	2.6	14.00	<0.05	12.0	7.0	7.2	970	1000
14-Jun-91	96	1.00	1.7	1.80	<0.05	22.0	6.8	8.9	1000	1270

Note:

- (1) Formaldehyde concentrations analyzed during May 1982 to April 1985 are expressed in percentages
(2) NR - not reported

TABLE 1

SUMMARY OF HISTORICAL ANALYTICAL RESULTS
EXISTING SITE SHALLOW MONITORING WELLS AND PLANT PRODUCTION WELL
GEORGIA-PACIFIC RESINS, INC.
COLUMBUS, OHIO

MONITOR WELL 3

Date	COD mg/L	Formald. mg/L	Organic N mg/L	Nitrate mg/L	Phenols mg/L	TOC mg/L	pH		S.C. Lab. umhos/cm	S.C. Field umhos/cm
							Lab S.U.	Field S.U.		
14-May-82	270	<0.20	2.5	NR	<0.005	NR	7.8	NR	NR	NR
26-May-82	110	1.600	3.5	NR	0.012	NR	7.5	NR	NR	NR
8-Oct-84	7	<0.006	1.1	NR	0.06	NR	7.3	NR	NR	NR
24-Jan-85	27	<0.006	0.3	NR	<0.05	519.0	7.2	NR	1310	NR
30-Apr-85	120	<0.006	2.8	NR	<0.05	8.0	7.1	NR	1660	NR
29-Jul-85	330	0.21	0.8	35.1	<0.05	7.0	7.1	7.5	1480	1250
9-Aug-85	160	0.34	0.3	26.8	<0.05	6.4	7.1	NR	1530	NR
5-Feb-86	190	0.22	7.4	36.0	<0.05	8.8	7.4	7	1600	1700
9-Jul-86	190	1.00	0.4	27.0	<0.05	10.0	7.1	NR	1500	NR
30-Jan-87	100	<0.10	0.4	33.0	<0.05	7.1	7.3	6.6	1400	1700
28-Jul-87	200	<0.10	<0.1	34.0	<0.05	11.0	7.2	6.1	1500	1600
27-Jan-88	23	0.33	<0.1	8.9	<0.05	2.4	7.3	7.6	1400	1475
3-Aug-88	18	6.30	1.5	42.0	<0.05	6.8	7.3	7.5	1300	1560
3-Mar-89	36	0.70	0.3	22.0	<0.05	7.5	6.7	7.0	1350	1500
16-Aug-89	28	0.86	0.2	28.0	<0.05	5.4	7.2	7.0	1286	1200
14-Mar-90	<10	<0.10	<1.0	26.0	<0.05	7.8	7.6	7.1	1294	1500
17-Oct-90	<5	0.22	<1.0	18.0	<0.05	8.0	7.0	7.3	1200	1100
14-Jun-91	56	<0.50	<1.0	18.0	<0.05	9.0	6.8	7.1	1200	1430

Note:

- (1) Formaldehyde concentrations analyzed during May 1982 to April 1985 are expressed in percentages
(2) NR - not reported

TABLE 1

SUMMARY OF HISTORICAL ANALYTICAL RESULTS
EXISTING SITE SHALLOW MONITORING WELLS AND PLANT PRODUCTION WELL
GEORGIA-PACIFIC RESINS, INC.
COLUMBUS, OHIO

MONITOR WELL 4

Date	COD mg/L	Formald. mg/L	Organic N mg/L	Nitrate mg/L	Phenols mg/L	TOC mg/L	pH Lab		pH Field		S.C. Lab umtios/can	S.C. Field umtios/can
							S.U.	S.U.	S.U.	S.U.		
14-May-82	310	<0.20	3.6	NR	<0.005	NR	7.3	NR	NR	NR	NR	NR
26-May-82	90	<0.600	3.5	NR	0.009	NR	7.2	NR	NR	NR	NR	NR
8-Oct-84	69	<0.006	1.5	NR	<0.05	NR	7.3	NR	NR	NR	NR	NR
24-Jan-85	15	<0.006	1.1	NR	<0.05	8.0	7.0	NR	NR	1180	NR	NR
30-Apr-85	160	<0.006	2.2	NR	<0.05	9.0	6.9	NR	NR	570	NR	NR
29-Jul-85	180	0.17	0.6	20.4	<0.05	8.4	6.9	7.3	7.3	1180	1320	1320
9-Aug-85	110	0.17	0.6	14.0	<0.05	8.1	6.7	NR	NR	1420	NR	NR
5-Feb-86	120	0.55	1.1	16.0	<0.05	7.6	7.1	6.5	6.5	1400	1300	1300
9-Jul-86	52	<0.10	0.6	17.0	<0.05	10.0	6.9	NR	NR	1200	NR	NR
30-Jan-87	82	0.10	0.3	20.0	<0.05	7.6	7.0	6.8	6.8	1200	1500	1500
28-Jul-87	13	0.50	<0.1	22.0	<0.05	11.0	7.0	6.5	6.5	1300	1400	1400
27-Jan-88	14	1.00	<0.1	8.9	<0.05	2.2	7.3	7.6	7.6	1300	1510	1510
3-Aug-88	37	0.27	0.3	39.0	<0.05	7.4	7.0	7.1	7.1	1400	1700	1700
3-Mar-89	13	0.32	2.1	15.0	<0.05	2.7	6.7	7.0	7.0	1250	1500	1500
16-Aug-89	42	0.51	1.4	28.0	<0.05	7.5	7.0	7.0	7.0	1259	1200	1200
14-Mar-90	<10	0.69	<1.0	24.0	<0.05	6.4	7.3	7.0	7.0	1145	1300	1300
17-Oct-90	16	0.53	<1.0	29.0	<0.05	6.9	6.9	7.0	7.0	1300	1200	1200
14-Jun-91	120	0.85	<1.0 ^a	30.0	<0.05	11.0	6.7	6.7	6.7	1300	1480	1480

Note:

- (1) Formaldehyde concentrations analyzed during May 1982 to April 1985 are expressed in percentages
(2) NR - not reported

TABLE 1

SUMMARY OF HISTORICAL ANALYTICAL RESULTS
EXISTING SITE SHALLOW MONITORING WELLS AND PLANT PRODUCTION WELL
GEORGIA-PACIFIC RESINS, INC.
COLUMBUS, OHIO

PLANT PRODUCTION WELL											
Date	COD mg/L	Formald. mg/L	Organic N mg/L	Nitrate mg/L	Phenols mg/L	TOC mg/L	pH Lab S.U.	pH Field S.U.	S.C. Lab umhos/cm	S.C. Field umhos/cm	
14-May-82	92	<0.20	6.0	NR	<0.005	NR	7.6	NR	NR	NR	
26-May-82	100	0.400	10.7	NR	0.008	NR	7.7	NR	NR	NR	
8-Oct-84	74	<0.006	2.4	NR	0.05	NR	7.4	NR	NR	NR	
24-Jan-85	71	<0.006	5.7	NR	4.10	28.0	7.4	NR	650	NR	
5-Mar-85	92	NR	NR	NR	0.96	NR	NR	NR	NR	NR	
30-Apr-85	150	<0.006	0.6	NR	<0.05	8.0	7.3	NR	860	NR	
29-Jul-85	90	0.23	0.3	0.26	<0.05	7.0	7.2	7.7	790	750	
5-Feb-86	70	1.40	1.1	0.60	<0.05	6.3	7.4	7.1	870	880	
14-Apr-86	48	<0.20	0.6	0.13	<0.05	7.4	7.4	7.1	900	890	
9-Jul-86	55	<0.10	0.4	0.16	<0.05	6.5	7.1	NR	720	NR	
30-Jan-87	15	<0.10	0.6	0.04	<0.05	6.0	7.3	6.8	730	970	
28-Jul-87	10	0.30	0.1	0.11	<0.05	9.8	7.3	6.1	700	840	
27-Jan-88	23	0.63	<0.1	0.04	<0.05	4.7	7.6	7.4	670	845	
3-Aug-88	15	0.32	0.3	<0.10	<0.05	5.5	7.2	7.2	750	840	
3-Mar-89	6.7	0.76	0.4	0.13	<0.05	3.8	6.8	7.2	650	820	
16-Aug-89	32	1.30	0.3	0.17	0.05	15.0	7.8	7.4	586	580	
16-Mar-90	<10	0.79	<1.0	<0.02	>0.05	6.8	7.7	7.2	635	NR	
17-Oct-90	<5	0.40	<1.0	<0.02	<0.05	4.3	7.1	7.3	690	700	

Note:

- (1) Formaldehyde concentrations analyzed during May 1982 to April 1985
are expressed in percentages
(2) NR - not reported

TABLE 2
Background Concentrations and Preliminary Remediation Goals (PRGs)
Remedial Investigation Report
Georgia-Pacific Resins, Inc. Facility
Columbus, Ohio (a)

	Background Concentration (mg/Kg)	U.S. EPA SSL (mg/Kg)	Soil Contact PRGs (mg/Kg)			Water PRGs (mg/L)		
			Region 9 SSL	Region 9 PRG	Site Criterion	Federal MCL	Region 9 PRG	Site Criterion
Organics								
Volatile Organic Compounds								
Acetone	NA	16.0	7,800	1,600	1,600	NA	0.610	0.610
Benzene	NA	0.030	0.800	0.670	0.670	0.005	0.00041	0.005
2-Butanone (MEK)	NA	NA	NA	7,300	7,300	NA	1.90	1.90
Carbon disulfide	NA	32.0	720	360	360	NA	1.00	1.00
Chloroform	NA	0.60	0.300	0.240	0.240	0.100	0.00016	0.100
p-Cresol	NA	9.0	1,600	310	310	NA	0.180	0.180
Formaldehyde	NA	NA	NA	9,200	9,200	NA	5.50	5.50
Methanol	NA	NA	NA	31,000	31,000	NA	18.0	18.0
Methylene chloride	NA	0.020	13.0	8.90	8.90	0.005	0.0043	0.005
Phenol	NA	100.0	47,000	37,000	37,000	NA	22.0	22.0
Toluene	NA	12.0	16,000	520	520	1.00	0.720	1.00
Xylenes	NA	200	160,000	320	320	10.0	1.40	10.0
Polynuclear Aromatic Hydrocarbons								
Acenaphthene	NA	570	4,700	3,700	3,700	NA	0.370	0.370
Anthracene	NA	12,000	23,000	22,000	22,000	NA	1.80	1.80
Benzo(a)anthracene	NA	2.00	0.900	0.620	0.620	NA	0.00009	0.00009
Benzo(b)fluoranthene	NA	5.00	0.900	0.620	0.620	NA	0.00009	0.00009
Benzo(k)fluoranthene	NA	49.0	9.00	6.20	6.20	NA	0.0009	0.0009
Benzo(g,h,i)perylene	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	8.0	0.090	0.060	0.060	0.0002	0.000009	0.0002
Carbazole	NA	0.600	32.0	0.240	0.240	NA	0.0034	0.0034
Chrysene	NA	160	88.0	62.0	62.0	NA	0.0092	0.0092
Fluoranthene	NA	4,300	3,100	2,300	2,300	NA	1.50	1.50
Fluorene	NA	560	3,100	2,600	2,600	NA	0.240	0.240
Indeno(1,2,3-cd)pyrene	NA	14.0	0.900	0.620	0.620	NA	0.00009	0.00009
Phenanthrene	NA	NA	NA	NA	NA	NA	NA	NA
Pyrene	NA	4,200	2,300	2,300	2,300	NA	0.180	0.180

TABLE 2 (continued)
 Background Concentrations and Preliminary Remediation Goals (PRGs)
 Remedial Investigation Report
 Georgia-Pacific Resins, Inc. Facility
 Columbus, Ohio (a)

	Background Concentration (mg/Kg)	U.S. EPA SSL (mg/Kg)	Soil Contact PRGs (mg/Kg)			Water PRGs (mg/L)		
			Region 9 SSL	Region 9 PRG	Site Criterion	Federal MCL	Region 9 PRG	Site Criterion
Inorganics								
Aluminum	23,630	NA	NA	76,000	76,000	NA	36	36
Antimony	18.6	5	31	31	31	0.006	0.015	0.006
Arsenic	31.1	29	0.4	0.39	0.39	0.05	0.000045	0.05
Barium	185	1,600	5,500	5,400	5,400	2	2.6	2
Beryllium	1.23	63	0.1	150	150	0.004	0.073	0.004
Cadmium	4.7	8	78	37	37	0.005	0.018	0.005
Calcium	172,169	NA	NA	NA	NA	NA	NA	NA
Chromium	32.5	38	390	210	210	0.1	NA	0.1
Cobalt	30.5	NA	NA	4,700	4,700	NA	2.2	2.2
Copper	47.1	NA	NA	2,900	2,900	1.3	1.4	1.3
Iron	50,266	NA	NA	23,000	23,000	NA	11	11
Lead	23.3	NA	400	400	400	0.015	NA	0.015
Magnesium	45,876	NA	NA	NA	NA	NA	NA	NA
Manganese	1,058	NA	NA	1,800	1,800	NA	0.88	0.88
Mercury	0.14	NA	NA	23	23	0.002	0.011	0.002
Nickel	74.9	130	1,600	1,600	1,600	NA	0.73	0.73
Potassium	2,733	NA	NA	NA	NA	NA	NA	NA
Selenium	1.4	5	390	390	390	0.05	0.18	0.05
Silver	1.4	34	390	390	390	NA	0.18	0.18
Sodium	703	NA	NA	NA	NA	NA	NA	NA
Thallium	2.9	0.7	NA	6.3	6.3	0.002	0.003	0.002
Vanadium	57.8	6,000	550	550	550	NA	0.26	0.26
Zinc	173.8	12,000	23,000	23,000	23,000	NA	11	11

a/ SSLs = U.S. EPA Soil Screening Levels

Region 9 PRG = U.S. EPA Region 9 Preliminary Remediation Goals for Residential Exposure Risks

MCL = maximum contaminant levels promulgated under the Safe Drinking Water Act

PAHs = polynuclear aromatic hydrocarbons

NA = not available

mg/kg = milligrams per kilogram = ppm

mg/l = milligrams per liter = ppm

ppm = parts per million

APPENDIX A

Human Health Risk Memo for Georgia Pacific Resins



State of Ohio Environmental Protection Agency

Interoffice Memorandum

To: David O'Toole, CDO-DERR

Date: 10 February 2004

From: Janusz Z. Byczkowski, DERR, CO

Subject: Human Health Risk Assessments for the Georgia Pacific Resins, Inc.

According to your additional request of 2/05/2003, I re-assessed the human health hazards and cancer risk for the Georgia Pacific Resins, Inc. (*Columbus, OH, Franklin County, Ohio EPA #125-0332*). This evaluation includes the new information that you have provided:

The COCs -

- Formaldehyde
- Methanol
- Phenol

The affected media -

- Soil
- Ground water

The most sensitive human receptors -

- Hypothetical and future on-Site Residents

This risk assessment includes two "what-if" scenarios. The first assumes that after the accident, no emergency clean-up had been performed and the site has been open to residential settlement (Table 1). The second risk assessment (Table 2) estimates, under current conditions, the residual risk to a hypothetical future resident following the cleanup and the Site reconstruction.

Please note, that from the previous review of the "Remedial Investigation Report" it seems that if the Site would be redeveloped in the future, it is possible that the current ground cover would be removed. If this were to happen, direct exposure of the future on-Site construction workers to contaminated soil (surficial and deeper, depending on the type of construction) and perched ground water may occur. The potential routes of exposure may include: incidental ingestion, dermal contact, and inhalation of particles and vapors. In such cases, additional risk assessment may be needed in the future, to assist in decisions regarding management of the Site.

Human Health Risk Assessment:

A conceptual Site model is presented in the Figure 1 (attached as Abbreviated Template.XLS). The adult on-Site resident was selected as the most sensitive receptor to oral, dermal, and inhalation exposures and a child resident as the receptor with the

highest rate of soil ingestion. Using this model, the following hazard quotients (HQ) were estimated for soil, ground water and aggregate exposures to chemicals of concern in these media (HI):

COC	Soil (HQ)	G.Water (HQ)	HI (Soil + GW)
If no remediation was performed (status before emergency cleanup):			
FORMALDEHYDE	5.7E-4	ND	5.7E-4
METHANOL	6.5E-3	1.2E+0	1.2E+0
PHENOL	3.5E-1	1.2E+0	1.6E+0
Residual risk (status after emergency cleanup):			
FORMALDEHYDE	1.4E-4	ND	1.4E-4
METHANOL	ND	ND	N/A
PHENOL	1.0E-3	ND	1.0E-3

N/A - not applicable; ND - not detected.

The excess cancer risk (ECR = 5.5E-7 before remediation and 1.4E-7 after emergency cleanup), quantifiable for hypothetical exposure to formaldehyde in soil, was below the *de minimis* level (1E-6).

The detailed list of human health risk assessment assumptions and calculations is included in the Appendix. The Abbreviated Template used for additive risk calculation is attached as a spreadsheet in MS Excel (*.XLS) format.

The hazard quotients for methanol and phenol before remediation, each exceeded the hazard goal value of 1. The contribution of formaldehyde to cumulative health hazards and risk of cancer was negligible. Since phenol and methanol affect different target tissues causing different "critical effects", there was no need to calculate a cumulative hazard index (HI) for this Site. After remediation, all hazard quotients were below unity.

The possible, potential adverse human health effects that may be caused by adequately elevated and relevant intakes of methanol and phenol include, but are not limited to hepato- and neuro-toxicity (for methanol) and digestive tract disturbance (such as diarrhea and mouth sores), maternal- and/or feto-toxicity (for phenol).

Uncertainty:

- a) These estimates have been calculated for two hypothetical "what if" cases and do not address any real-life situation.
- b) Since the reported concentration of phenol in soil before emergency cleanup was measured in a sample of excavated and removed soil, this risk assessment does not address elevated health hazards from possible hot spots that might have been present before remediation.

- c) It is not clear if lack of information on concentration of methanol in soil after remediation is because methanol concentration was below detectable limit or because it was not measured in this area of concern (or simply not reported).
- d) Since hazard indices calculated for this Site before emergency cleanup were driven by contaminants in ground water, while those calculated after cleanup depended only on residues in soil, any quantitative comparison of the status before and after remediation may be problematic.

APPENDIX B

Human Health Risk Assessment Assumptions and Calculations for Appendix A

Two sets of data for soil and ground water were used as provided by David O'Toole Georgia Pacific Resins Sampling Results Memo dated 12/08/03, and then, updated on 02/05/04 to focus the assessment in the plant explosion area. As a health-protective measure, the maximum detected COC concentrations were used in the risk calculation:

- 1) Before emergency cleanup; and
- 2) After plant cleanup and reconstruction.

Human health hazard and carcinogenic risk were calculated as described in U.S. EPA Risk Assessment Guidance for Superfund (RAGS, Volume 1, Human Health Evaluation Manual (Part A), Appendix A, EPA/540/1-89/002. Available on-line: <http://www.epa.gov/superfund/programs/risk/ragsa/index.htm>), using defaults for residential exposure scenario, provided by Risk Assessment Information System (Available on-line: <http://risk.lsd.ornl.gov/CRE/tutorial.shtml>).

The adult on-Site resident was selected as the most sensitive receptor with the resident child considered to be the most exposed receptor, because of the highest ingestion rate of soil. The complete exposure pathways included desorption of COCs from the contaminated soil and direct contact (ingestion, inhalation, and dermal exposures), as well as, infiltration and percolation to ground water followed by ingestion and dermal exposures (Figure 1).

The following COCs toxicity values were used in human health risk assessment: The Inhalation Slope Factor was calculated from inhalation unit risk as described in Supplemental Guidance for RAGS: Region 4 Bulletins, Human Health Risk Assessment (Interim Guidance) (Nov. 1995).

The Data are current as of January 2004

Toxicity Values and Chemical-Specific Factors You Selected:

NOTE: If this page is too wide to print, try selecting a smaller font or printing in landscape mode.

□ □

Chemical	CAS #	Dermal RfD - Chronic (mg/kg-day)	Dermal SF (mg/kg-day) ⁻¹	Inhalation RfD - Chronic (mg/kg-day)	Oral RfD - Chronic (mg/kg-day)	Inhalation SF (mg/kg-day) ⁻¹	Oral SF (mg/kg-day) ⁻¹
Formaldehyde	50000	1.60E-01			2.00E-01	4.55E-02 ^u	
Methanol	67561	4.00E-01			5.00E-01		
Phenol	108952	2.70E-01			3.00E-01		

Table 1: Concentrations of COCs after explosion but before cleanup.

	Soil (mg/kg)	Ground Water (mg/L)
Formaldehyde	8.3	ND
Methanol	250.0	22.0
Phenol	7800.0	13.0

Enter a Concentration:

CAS Number/Analyte	Units - Media - Anatype	Concentration
50000 - Formaldehyde - Organic	mg/L -- Water	
	mg/kg -- Soil	8.3
	mg/kg -- Food	
67561 - Methanol - Organic	mg/L -- Water	22
	mg/kg -- Soil	250
	mg/kg -- Food	
108952 - Phenol - Organic	mg/L -- Water	13
	mg/kg -- Soil	7800
	mg/kg -- Food	

Residential/SOIL/Dermal

Your results were calculated using the following variables:

- ◆ Exposure Duration = 30 years
- ◆ Exposure Frequency = 350 events/year
- ◆ Body Weight = 70 kgs
- ◆ Surface Area = 0.53 m²
- ◆ Adherence Factor = 1 unitless

Your results are:

Nonradionuclides

Parameter	CAS Number	Concentration	Risk	Hazard	Carcinogenic CDI	Noncarcinogenic CDI
Formaldehyde	50000	8.3E+00	.	3.8E-05	2.6E-06	6.0E-06
Methanol	67561	2.5E+02	.	4.5E-04	7.8E-05	1.8E-04
Phenol	108952	7.8E+03	.	2.1E-02	2.4E-03	5.7E-03

Residential/SOIL/Ingestion - Adult

Your results were calculated using the following variables:

- ◆ Exposure Frequency = 350 events/year
- ◆ Exposure Time = 24 (hours/day)
- ◆ Adult Body Weight = 70 kgs
- ◆ Child Body Weight = 15 kgs
- ◆ Adult Ingestion Rate = 0.0001 kg/day
- ◆ Child Ingestion Rate = 0.0002 kg/day
- ◆ Adult Exposure Duration = 24 years
- ◆ Child Exposure Duration = 6 years

Your results are:

Nonradionuclides

Parameter	CAS Number	Concentration	Risk	Hazard	Carcinogenic CDI	Noncarcinogenic CDI
Formaldehyde	50000	8.3E+00	.	5.7E-05	1.3E-05	1.1E-05
Methanol	67561	2.5E+02	.	6.8E-04	3.9E-04	3.4E-04
Phenol	108952	7.8E+03	.	3.6E-02	1.2E-02	1.1E-02

Residential/SOIL/Ingestion - Child

Your results were calculated using the following variables:

- ◆ Exposure Frequency = 350 events/year
- ◆ Exposure Time = 24 (hours/day)
- ◆ Adult Body Weight = 70 kgs
- ◆ Child Body Weight = 15 kgs
- ◆ Adult Ingestion Rate = 0.0001 kg/day
- ◆ Child Ingestion Rate = 0.0002 kg/day
- ◆ Adult Exposure Duration = 24 years
- ◆ Child Exposure Duration = 6 years

Your results are:

Nonradionuclides

Parameter	CAS Number	Concentration	Risk	Hazard	Carcinogenic CDI	Noncarcinogenic CDI
Formaldehyde	50000	8.3E+00	.	5.3E-04	1.3E-05	1.1E-04
Methanol	67561	2.5E+02	.	6.4E-03	3.9E-04	3.2E-03
Phenol	108952	7.8E+03	.	3.3E-01	1.2E-02	1.0E-01

Residential/SOIL/Inhalation

Your results were calculated using the following variables:

- ◆ Exposure Duration = 30 years
- ◆ Exposure Frequency = 350 events/year
- ◆ Exposure Time = 24 (hours/day)
- ◆ Body Weight = 70 kgs
- ◆ Inhalation Rate = 20 m³/day

Your results are:

Nonradionuclides

Parameter	CAS Number	Concentration	Risk	Hazard	Carcinogenic CDI	Noncarcinogenic CDI
Formaldehyde	50000	8.3E+00	5.5E-07	.	4.2E-05	9.9E-05
Methanol	67561	2.5E+02	.	.	3.2E-03	7.4E-03
Phenol	108952	7.8E+03	.	.	6.7E-03	1.6E-02

Residential/WATER/Dermal

Your results were calculated using the following variables:

- ◆ Exposure Duration = 30 years
- ◆ Exposure Frequency = 350 events/year
- ◆ Exposure Time = 0.25 (hours/day)
- ◆ Body Weight = 70 kgs
- ◆ Surface Area = 1.94 m²

Your results are:

Nonradionuclides

Parameter	CAS Number	Concentration	Risk	Hazard	Carcinogenic CDI	Noncarcinogenic CDI
Methanol	67561	2.2E+01	.	1.3E-03	2.2E-04	5.0E-04
Phenol	108952	1.3E+01	.	1.8E-02	2.0E-03	4.8E-03

Residential/WATER/Ingestion

Your results were calculated using the following variables:

- ◆ Exposure Duration = 30 years
- ◆ Exposure Frequency = 350 events/year
- ◆ Body Weight = 70 kgs
- ◆ Ingestion Rate = 2 kg/d

Your results are:

Nonradionuclides

Parameter	CAS Number	Concentration	Risk	Hazard	Carcinogenic CDI	Noncarcinogenic CDI
Methanol	67561	2.2E+01	.	1.2E+00	2.6E-01	6.0E-01
Phenol	108952	1.3E+01	.	1.2E+00	1.5E-01	3.6E-01

Residential/WATER/Inhalation

Your results were calculated using the following variables:

- ◆ Exposure Duration = 30 years
- ◆ Exposure Frequency = 350 events/year
- ◆ Body Weight = 70 kgs
- ◆ Inhalation Rate = 20 m³/day

Your results are:

Nonradionuclides

Parameter	CAS Number	Concentration	Risk	Hazard	Carcinogenic CDI	Noncarcinogenic CDI
Methanol	67561	2.2E+01	.	.	1.3E+00	3.0E+00
Phenol	108952	1.3E+01	.	.		

Table 2: Concentrations of COCs after plant cleanup and reconstruction.

	Soil (mg/kg)	Ground Water (mg/L)
Formaldehyde	2.1	ND
Methanol	ND	ND
Phenol	22.5	ND

Enter a Concentration:

CAS Number/Analyte	Units - Media - Anatype	Concentration
50000 - Formaldehyde - Organic	mg/L -- Water	<input type="text"/>
	mg/kg -- Soil	2.1
	mg/kg -- Food	<input type="text"/>
67561 - Methanol - Organic	mg/L -- Water	<input type="text"/>
	mg/kg -- Soil	<input type="text"/>
	mg/kg -- Food	<input type="text"/>
108952 - Phenol - Organic	mg/L -- Water	<input type="text"/>
	mg/kg -- Soil	22.5
	mg/kg -- Food	<input type="text"/>

Residential/SOIL/Dermal

Your results were calculated using the following variables:

- ◆ Exposure Duration = 30 years
- ◆ Exposure Frequency = 350 events/year
- ◆ Body Weight = 70 kgs
- ◆ Surface Area = 0.53 m²
- ◆ Adherence Factor = 1 unitless

Your results are:

Nonradionuclides

Parameter	CAS Number	Concentration	Risk	Hazard	Carcinogenic CDI	Noncarcinogenic CDI
Formaldehyde	50000	2.1E+00	.	9.5E-06	6.5E-07	1.5E-06
Phenol	108952	2.3E+01	.	6.1E-05	7.0E-06	1.6E-05

Residential/SOIL/Inhalation

Your results were calculated using the following variables:

- ◆ Exposure Duration = 30 years
- ◆ Exposure Frequency = 350 events/year
- ◆ Exposure Time = 24 (hours/day)
- ◆ Body Weight = 70 kgs
- ◆ Inhalation Rate = 20 m³/day

Your results are:

Nonradionuclides

Parameter	CAS Number	Concentration	Risk	Hazard	Carcinogenic CDI	Noncarcinogenic CDI
Formaldehyde	50000	2.1E+00	1.4E-07		1.1E-05	2.5E-05
Phenol	108952	2.3E+01			1.9E-05	4.5E-05

Table 3: COCs toxicity characteristics and estimates of cumulative and aggregate human health risks.

Chemical	CAS #	EPA Cancer Class	Inhalation Study Reference	Inhalation Target Organ	Inhalation Tumor	RfD Basis	RfD Critical Effect	RfD Study Reference	RfD Target Organ
Formaldehyde	50000	B1	Kerns et al.	nasal cavity	squamous cell carcinoma	NOALE/LOAEL	reduced weight gain, histopathology	Til et al.	
Methanol	67561					NOEL/LOAEL	increased SAP and SGPT, decreased brain weight	U.S. EPA	
Phenol	108952	D				BMDL	decreased maternal weight gain	Argus Research Laboratories	

APPENDIX C

Spreadsheet of Risk Assessment Assumptions and Calculations

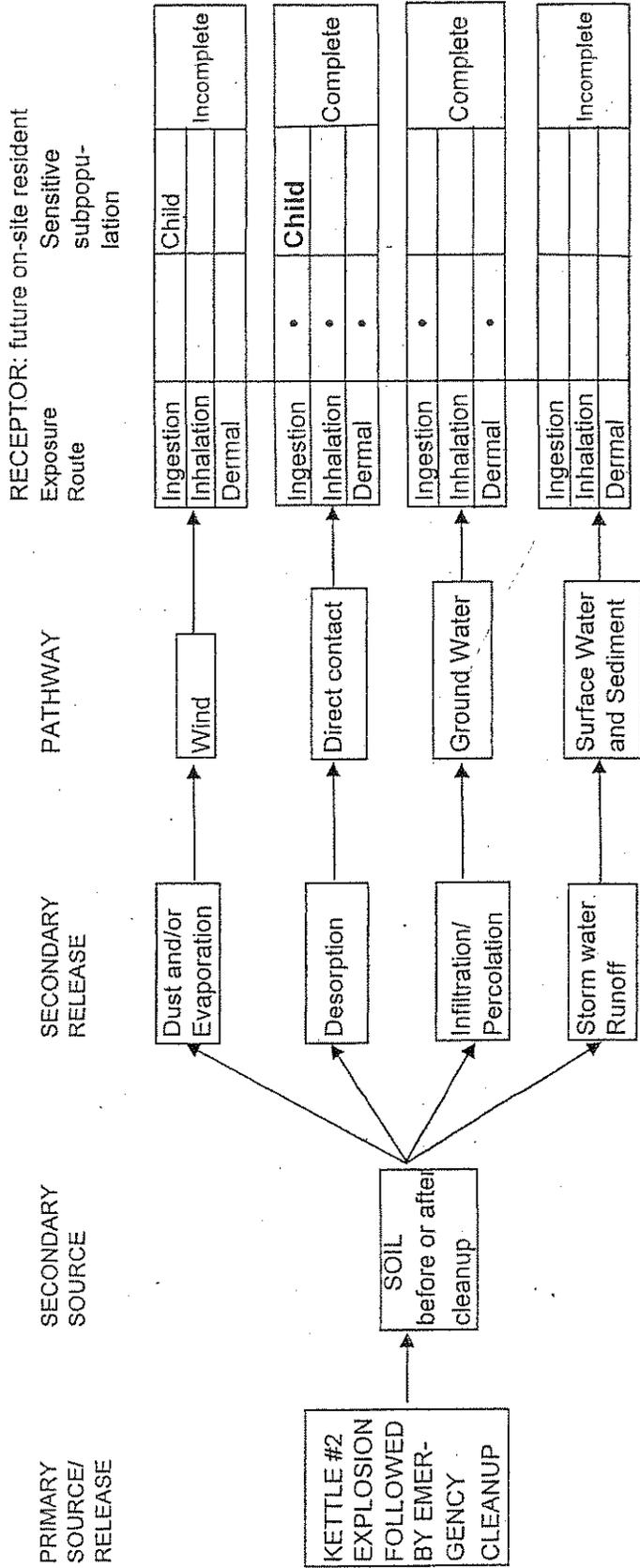
ADDITIVE RISK CALCULATION ABBREVIATED SPREADSHEET: Georgia - Pacific Resins, Inc.

	Before emergency cleanup			GROUND WATER			Soil + GW	
		SOIL		Ingestion	Dermal	Aggregate	Aggregate	Aggregate
FORMALDEHYDE	HQ	Ingestion* 5.30E-04	3.80E-05	1.20E+00	1.30E-03	1.20E+00	5.68E-04	5.68E-04
	CA Risk	5.50E-07					5.50E-07	5.50E-07
METHANOL	HQ	6.40E-03	4.50E-05	1.20E+00	1.80E-02	1.22E+00	1.21E+00	1.21E+00
PHENOL	HQ	3.30E-01	2.10E-02	Cumulative 7.01E-03			1.57E+00	1.57E+00
							Cumulative 1.21E+00	1.21E+00

	After emergency cleanup			GROUND WATER			Soil + GW	
		SOIL		Ingestion	Dermal	Aggregate	Aggregate	Aggregate
FORMALDEHYDE	HQ	Ingestion* 1.30E-04	9.50E-06	1.40E-03	1.40E-04	1.40E-04	1.40E-04	1.40E-04
	CA Risk	1.40E-07					1.40E-07	1.40E-07
METHANOL	HQ	9.60E-04	6.10E-05	1.02E-03			1.02E-03	1.02E-03
PHENOL	HQ		Cumulative N/A				Cumulative 1.40E-04	1.40E-04

* Resident child
 ** Cancer endpoint by inhalation only

Figure 1. Georgia - Pacific Resins, Inc. Conceptual Site Model



COCs:
 FORMALDEHYDE
 METHANOL
 PHENOL

APPENDIX D

Responsiveness Summary

RESPONSIVENESS SUMMARY

for Comments Received on the Preferred Plan at the
Georgia Pacific Resins Facility, Columbus, Ohio
August 2006

This Responsiveness Summary has been prepared to address each of the oral comments made during the March 14, 2006 public hearing on the Preferred Plan for the Georgia Pacific Resins facility (the facility) located at 1975 Watkins Road in Columbus, Ohio. No written comments were received by Ohio Environmental Protection Agency's (EPA) Division of Emergency and Remedial Response on the Preferred Plan for the facility during the public comment period that ended on April 24, 2006.

Comments from Mike Jones, Citizen

Comment 1:

Mr. Jones expressed concern regarding Ohio EPA's efforts to notify local citizens and other interested parties about this hearing.

Ohio EPA Response 1:

Ohio EPA published a public notice in the Columbus Dispatch newspaper on February 12, 2006 announcing the March 14, 2006 public meeting and public hearing for the Preferred Plan. Ohio EPA's Public Interest Center issued a news release and interested parties letter on February 28, 2006 announcing this March 2006 public meeting for the facility. In addition, the Agency's Division of Emergency and Remedial Response mailed a letter on February 14, 2006 notifying the two scientists (the liaisons) about this March 14, 2006 meeting and enclosed a copy of the Preferred Plan for the facility.

Comment 2:

Mr Jones asked for a time frame for the decommissioning of the bio-pond on Georgia Pacific's facility.

Ohio EPA Response 2:

Ohio EPA has not specified a time frame for Georgia Pacific to decommission the bio-pond. Georgia Pacific can continue to operate the bio-pond as long as it is being used in their manufacturing operations. The Preferred Plan requires Georgia Pacific to collect periodic ground water samples from the facility's monitoring well system as long as the bio-pond continues to operate. Some of the monitoring wells are located downgradient (south) from the bio-pond, while one monitoring well is located at the northeast corner (upgradient) of the facility, between the bio-pond and the residential homes farther to the east on Watkins Road. The periodic samples will be used to monitor the conditions of the on-site ground water aquifer system, and to notify Ohio EPA if any chemicals of concern are migrating from the bio-pond.

When Georgia Pacific stops using the bio-pond in their manufacturing operation, Ohio EPA will receive a decommissioning plan for the bio-pond to ensure that human health and the environment are protected. The bio-pond's decommissioning plan will provide the details on the closure, such as the dewatering operation, the removal and disposal of sludge and contaminated soils, sampling results and future plans for the bio-pond area. Georgia Pacific will submit its plan to decommission the bio-pond to Ohio EPA for review and approval. However, as stated above, this plan will not be submitted until the bio-pond is no longer needed for the manufacturing operations at the facility. In delaying this submittal, Ohio EPA believes that this will allow any new technologies to be considered.

Comment 3:

Mr. Jones is concerned about contamination from the bio-pond leaching into the shallow aquifer. He is also concerned that contamination could make its way to the deep aquifer and threaten the local public drinking water supplies.

Ohio EPA Response 3:

From the beginning of the remedial investigation in November 1995 to its completion in April 2001, Georgia Pacific collected ground water samples at various intervals. After the remedial investigation (RI) was completed, Georgia Pacific has continued to collect ground water samples from six monitoring wells once a year. This has occurred for four years and will continue to ensure that contaminants from the bio-pond are not migrating into the ground water.

Two water bearing zones (aquifers) are present beneath the facility, the shallow aquifer is found approximately 40 feet below ground surface and the deep aquifer is found at 90 feet below ground surface. The shallow aquifer is separated from the lower aquifer by a dense layer of clay ranging from 20 to 50 feet thick. The ground water flows generally to the south in both the shallow and deep aquifers. The nearby residents on Watkins Road use the shallow aquifer for their drinking water supply. However, their homes are northeast of the facility in the opposite direction of the ground water flow.

The Columbus Department of Health collected ground water samples in 1984 and in 1994 from various residential wells located northeast (upgradient) of the facility along Watkins Road. Ohio EPA's Division of Emergency and Remedial Response also collected ground water samples in 1992 and in 1996 from these residential wells along Watkins Road. Metals, semi-volatile organics and volatile organics were detected at trace amounts, well below the levels established for public drinking water standards by both the Columbus Department of Health and Ohio EPA. The

values are reported because they are above the minimum detection limits established by the U.S. EPA analytical procedures.

The five-year time of travel mentioned in the Preferred Plan is the area surrounding a well that contributes ground water to the well within five years. This five-year time of travel is a theoretical area established by the water supplier. Its purpose is to allow time to respond to any ground water contamination before it reaches the water supplier's wellfield. The Obetz wellfield five-year time of travel is calculated to be 7,000 feet. The Obetz wellfield is approximately 11,000 feet south of the facility. The Columbus wellfield five-year time of travel is calculated to be three miles. Columbus wellfield is approximately five miles southwest of the facility. Therefore, if any materials are released at the facility into the ground water, it would take longer than five years to reach either the Obetz or Columbus wellfields. The on-site monitoring wells should detect releases, if they occur, long before the five years elapses.

Comments from Robert Patterson, Citizen

Comment 4:

Mr. Patterson expressed concern about the potential for residential drinking water to be contaminated from the facility.

Ohio EPA Response 4:

As stated in Ohio EPA's response to Comment #3, the private water wells located on Watkins Road are upgradient of the facility. This means that the ground water is not flowing east toward the residences; it is flowing to the south away from the homes. In addition, the monitoring wells will continue to be sampled as long as chemicals of concern that have any potential to affect the soil or ground water remain at the facility to ensure that none are migrating off-site.

Comments from J. C. Shivers, Citizen

Comment 5:

J.C. Shivers asked that once the bio-pond is decommissioned, is it true that nothing can be built on it?

Ohio EPA Response 5:

If the proposed decommissioning plan leaves any chemicals of concern where the bio-pond currently exists, then Ohio EPA could direct Georgia Pacific to restrict land use (e.g., excavation or construction) of this area. However, if Georgia Pacific decides to remove all chemicals of concern and clean the facility, then the bio-pond area could be unrestricted in the future. In the Preferred Plan, Ohio EPA's preferred remedial alternative includes a land use restriction to restrict any excavating or building in the area of the closed landfill as long as the waste materials remain there.

No oral comments were made by the Georgia Pacific Company during the public hearing on the Preferred Plan. Written comments were received from Julie Raming in an e-mail message on behalf of the Georgia Pacific Company on December 1, 2005 during Ohio EPA's development of the Preferred Plan. Ohio EPA's response to this e-mail is provided below.

Comment from Georgia Pacific:

After reviewing your November 22, 2005 letter in response to our January 11, 2005 letter "Summary of Operations and Plans for the Bio-pond", I feel a few points of clarification should be made to the Ohio EPA's response No. 4, 5, and 7. First, I agree that the use of the term "measurable" was inappropriate. However, to state that the ground water around the Bio-pond had "elevated" levels of formaldehyde, methanol and phenol before, during and after the RI was completed may be at the same time be [sic] inappropriate [in the Preferred Plan]. It leads the reader to believe there is a huge issue with the bio-pond.

In the Phase I RI, the ground water surrounding the bio pond was analyzed for methanol and all results were less than the detection limits (DL). However at that time, methanol was detected in 3 wells on facility at levels of .34 to 1.3 mg/l, likely from other sources than the pond. These levels are also well below the preliminary remediation goal (prg) of 18 mg/l for methanol in tap water. The Phase II RI stated that "based on the results of that investigation where no indicator compound was found in the soil or ground water from these wells, no Phase II activities were conducted in this area."

Prior to the RI, concentrations of formaldehyde ranged from 1 to 21 mg/l during ground water sampling events from 1982 to 1991. However, since that time the results of the samples taken from around the pond during our annual sampling event have been below the prg of 5.5 mg/l. The sampling event cited in your letter in September of 2004 had 1.1 mg/l of formaldehyde in one well. It is also stated

that phenol with a prg of 11 mg/L was detected at "elevated" levels in January and March 1985. These levels were in the plant's production well at 4.1 and .96 mg/l, respectively and not in the wells surrounding the bio-pond.

Please let me know if I am missing something, but this does not paint the picture of any continued uncontrolled releases from the pond.

Ohio EPA Response:

Because the bio-pond is unlined, there are no controls in place to prevent potential releases of chemicals of concern into the ground water. In order to achieve the remedial action objectives of the Preferred Plan, Ohio EPA believes it is necessary to address any potential releases of contaminants from the bio-pond into the ground water. Therefore, the Preferred Plan focuses on operation and maintenance issues, and requires ground water monitoring until Georgia Pacific no longer needs the bio-pond for its manufacturing operations.

The Phase I RI ground water sampling results were collected from monitoring wells MW #5, MW #6, MW #7 and MW #8. Only MW #8 was located relatively close to the bio-pond, approximately one hundred feet to the northeast across the railroad track spur. No sample results were collected from any of the existing monitoring wells surrounding the bio-pond, MW #1, MW #2, MW #3 and MW #4, during this phase of the RI. Ohio EPA agrees that the detection of methanol in MW #6, MW #7 and MW #8 was likely from sources other than the bio-pond, and these detections were below the preliminary remediation goals (PRGs). Therefore, the areas around these wells were not included in any of the Phase II activities of the RI.

Ohio EPA agrees that the recent ground water sampling events results (2004 and 2005) were below the PRGs for formaldehyde, methanol and phenol. However, these compounds were not detected in the Phase II RI ground water sampling results collected in April and July 2000. In August/September 2003, Georgia Pacific performed a dredging operation to remove the accumulated waste materials (sludge) from the bottom and sides of the bio-pond. The next ground water sampling event in September 2004 detected formaldehyde at elevated levels in two adjacent wells and one downgradient monitoring well. The December 2005 ground water sampling event again detected elevated formaldehyde levels in two of the same three monitoring wells. As mentioned in the Preferred Plan, formaldehyde degrades within a few days when it is released into the environment. Ohio EPA is concerned about the continued appearance of detectable formaldehyde levels in the ground water two years after the bio-pond dredging operation. This indicates to Ohio EPA that the bio-pond is continuing to release chemicals of concern into the

ground water at the facility.

Based on this, Ohio EPA has concluded that ground water monitoring by Georgia Pacific is needed until after the bio-pond is no longer deemed necessary for resin manufacturing operations, and then an Ohio EPA approved bio-pond decommissioning plan will address long-term remediation goals.