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State of Ohio
Environmental Protection Agency

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Division of Emergency and Remedial Response

OCT 31 2006

ENTERED DIRECTOR'S JOURNAL

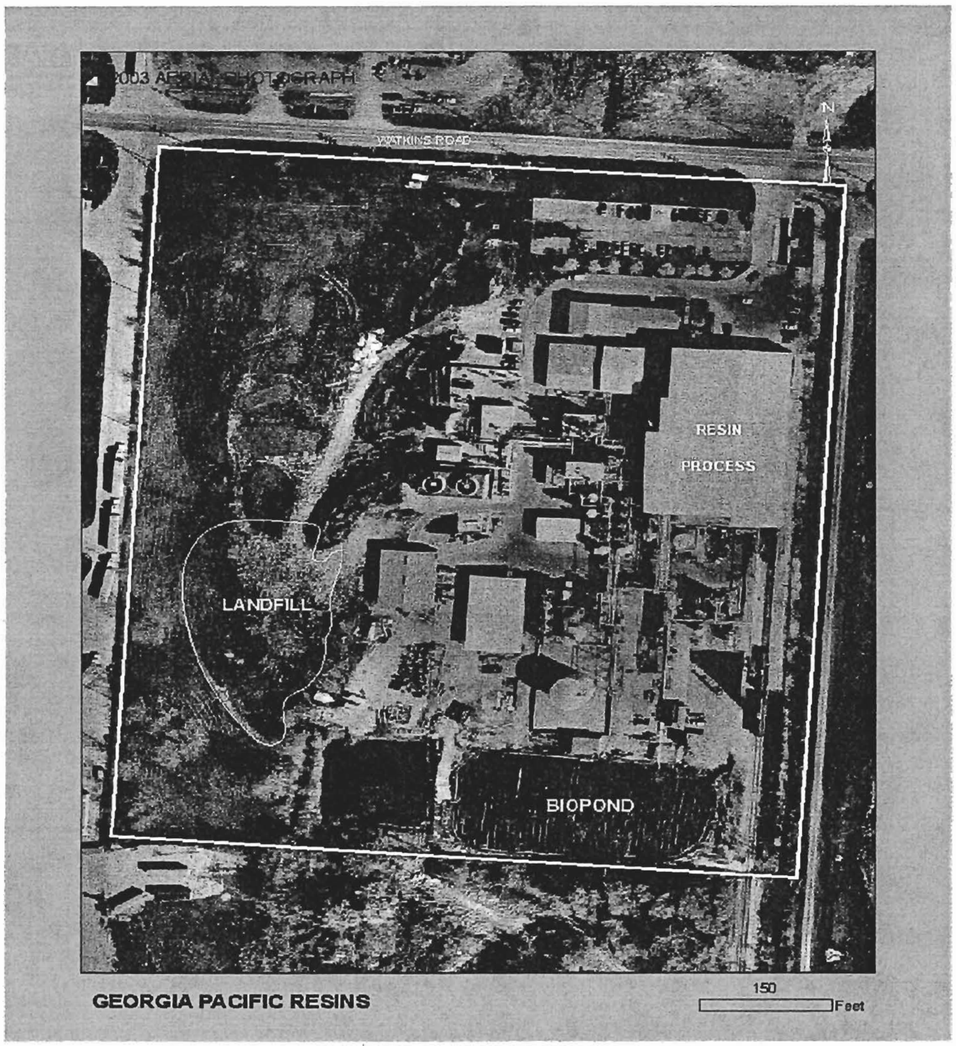
DECISION DOCUMENT

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: Donna 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 reminder 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

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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 and13 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 RAO 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.

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 S.U.*	*pH Field S.U.*	*S.C. Lab umhos/cm*	*S.C. Field umhos/cm*
14-May-82	110	<0.200	5.0	NR	<0.005	NR	7.4	NR	NR	NR
26-May-82	140	0.400	10.0	NR	0.006	NR	6.9	NR	NR	NR
8-Oct-84	45	<0.006	1.8	NR	0.07	NR	7.0	NR	NR	NR
24-Jan-85	160	<0.006	3.5	NR	<0.05	102.0	6.9	NR	1330	NR
30-Apr-85	55	<0.006	3.1	NR	<0.05	18.0	6.9	NR	1640	NR
29-Jul-85	100	1.25	4.0	5.33	<0.05	16.2	6.9	7.1	1415	1430
5-Feb-86	240	4.80	4.2	1.10	<0.05	18.0	6.9	6.5	1600	1600
14-Apr-86	34	1.00	5.2	0.73	<0.05	22.3	7.2	6.7	1500	1500
9-Jul-86	85	5.20	1.9	1.00	<0.05	19.0	6.8	NR	1400	NR
30-Jan-87	98	8.00	2.9	0.72	<0.05	18.0	7.0	6.6	1500	1850
28-Jul-87	48	11.00	5.3	1.80	<0.05	22.0	6.9	5.9	1800	1800
10-Sep-87	NR	6.80	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	1600	2000
3-Aug-88	71	14.00	6.5	12.00	<0.05	25.0	6.8	7.3	2200	2250
3-Mar-89	93	21.00	9.6	0.44	<0.05	34.0	6.4	NR	2410	NR
16-Aug-89	110	25.00	6.8	1.70	0.05	43.0	7.1	6.7	2320	2200
14-Mar-90	11	8.00	<1.0	2.00	<0.05	26.0	7.1	6.8	1988	2600
17-Oct-90	<5	9.30	2.0	1.20	<0.05	18.0	6.8	6.7	1700	2000
14-Jun-91	25	3.30	1.1	12.00	<0.05	24.0	6.5	6.8	1700	1990

Note:

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

Note:

(1) Formaldehyde concentrations anaylzed 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 anaylzed 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) Region 9 SSL	Region 9 PRG	Site Criterion	Water PRGs (mg/L) 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)flouranthene	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)perylne	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) Region 9 SSL	Region 9 PRG	Site Criterion	Water PRGs (mg/L) 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 Levelsa
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

TABLE 3

Phase II RI Groundwater Data
Remedial Investigation Report
Georgia-Pacific Resins, Inc. Facility
Columbus, Ohio

Sample Location: / Sample ID:	GPRI-GW-MW5-400			GPRI-GW-MW6		GPRI-GW-MW7		GPRI-GW-MW8		GPRI-GW-MW9		GPRI-GW-MW9B	
Other:			(D)										
Sample Date:	04/12/2000	07/19/2000	04/12/2000	04/12/2000	07/20/2000	04/12/2000	07/20/2000	04/11/2000	07/19/2000	04/12/2000	07/19/2000	04/12/2000	07/19/2000
Parameters													
TCL VOCs (ug/L) (a)	ND (b)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TCL SVOCs (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methanol (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
pH	7.51	7.66	7.57	7.22	7.20	7.21	7.15	7.21	7.13	7.22	7.16	7.35	7.29
Specific Conductance @ 25C	853	839	846	915	901	914	892	804	801	989	1020	922	908
TAL Total Metals (mg/L)													
Aluminum	<0.050	<0.050	<0.050	0.21	0.12	<0.050	<0.05	<0.05	<0.05	<0.050	<0.050	<0.050	<0.050
Antimony	<0.005	<0.0050	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.018	<0.005	0.008
Arsenic	0.017	0.005	0.012	0.019	0.021	0.007	<0.002	0.019	0.016	0.021	0.022	0.002	0.01
Barium	0.21	0.18	0.21	0.074	0.062	0.5	0.045	0.16	0.13	0.52	0.3	0.4	0.29
Beryllium	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.0010	<0.001	<0.0010	<0.001	<0.0010	<0.0010	<0.0010	<0.0010
Cadmium	<0.002	<0.0010	<0.0010	0.001	<0.001	0.002	<0.001	<0.0010	<0.001	0.002	<0.0010	0.002	<0.0010
Calcium	71	61	71	110	100	110	110	99	95	140	130	110	100
Chromium	0.004	0.004	0.003	0.014	0.002	0.003	<0.001	0.002	<0.001	0.005	0.001	0.003	<0.0010
Cobalt	<0.0050	<0.0050	<0.0050	0.008	<0.005	<0.0050	<0.005	<0.0050	<0.005	<0.0050	0.005	<0.005	<0.0050
Copper	0.027	0.006	0.025	0.028	<0.005	0.03	<0.005	0.3	<0.005	0.03	<0.0050	0.036	<0.0050
Iron	3	0.92	3	3.4	2.7	6.3	0.98	3.6	2.6	4	2.7	5	3.6
Lead	0.008	0.003	<0.0020	<0.0020	<0.002	0.003	<0.002	0.003	<0.002	0.005	0.006	0.007	0.002
Magnesium	41	36	41	41	37	60	36	35	33	47	32	41	33
Manganese	0.043	0.64	0.043	0.058	0.048	0.78	0.033	0.045	0.035	0.28	0.19	0.12	0.1
Mercury	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.00020	<0.0002	<0.00020
Nickel	<0.010	<0.010	<0.010	0.013	<0.001	0.015	<0.01	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010
Potassium	2.9	2.9	3.1	2.9	1.8	3.9	4.3	1.5	0.07	2.8	1.2	3.2	1.7
Selenium	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	0.01	<0.002	<0.002	<0.002	0.016	0.016	<0.0020	<0.0020
Silver	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.0010	<0.001	<0.0010	<0.001	0.001	0.007	<0.0010	<0.0010
Sodium	39	36	39	10	10	17	9.2	6.2	6	14	15	13	12
Thallium	<0.0020	0.005	<0.0020	<0.0020	0.013	<0.0020	<0.002	<0.002	0.005	0.005	<0.0020	<0.0020	<0.0020
Vanadium	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zinc	0.043	0.017	0.04	0.033	0.014	0.065	<0.005	<0.005	0.006	0.03	0.019	0.043	0.009
TAL Dissolved Metals (mg/L)													
Aluminum	<0.050	<0.050	<0.050	<0.050	<0.05	<0.050	<0.005	<0.050	<0.05	<0.050	<0.050	<0.050	<0.050
Antimony	<0.0050	<0.005	<0.0050	<0.0050	<0.005	<0.0050	<0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.0050	<0.0050
Arsenic	0.009	0.011	0.004	0.022	0.014	0.011	0.009	0.015	<0.002	0.019	0.011	0.003	<0.0020
Barium	0.22	0.2	0.22	0.63	0.06	0.65	0.048	0.77	<0.010	0.88	0.29	0.9	0.29
Beryllium	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cadmium	0.002	<0.001	0.001	0.002	<0.001	0.002	<0.001	<0.0010	<0.001	0.001	<0.0010	0.003	<0.0010
Calcium	70	65	69	110	100	110	100	100	<1.0	120	110	110	100
Chromium	0.001	<0.001	0.001	0.001	<0.001	0.003	<0.001	<0.0010	<0.001	0.002	<0.0010	0.004	<0.0010
Cobalt	<0.0050	<0.005	<0.0050	<0.0050	<0.005	<0.005	<0.005	<0.0050	<0.005	<0.0050	<0.0050	<0.005	<0.0050
Copper	0.025	<0.005	0.026	0.024	<0.005	0.018	<0.005	<0.0050	<0.005	0.027	<0.0050	0.092	<0.0050
Iron	1.9	0.53	1.9	2.2	1.4	3.8	2.9	2.6	<0.03	3.3	2.5	4.8	3.6
Lead	<0.0050	0.006	<0.0050	0.01	0.03	0.005	<0.002	<0.0020	<0.002	0.004	<0.0020	0.008	0.004
Magnesium	41	39	41	41	37	38	25	36	<0.70	41	33	41	32
Manganese	0.046	0.049	0.046	0.051	0.043	0.098	0.033	0.038	<0.005	0.26	0.2	0.12	0.099
Mercury	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Nickel	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.021	<0.010
Potassium	3	2.4	3	1.9	1.9	3.6	4.3	0.88	0.61	1.8	<0.00020	2.5	<0.00020
Selenium	<0.0020	<0.002	<0.0020	0.015	<0.002	0.005	<0.002	<0.0020	<0.002	<0.0020	<0.0020	<0.0020	<0.0020
Silver	<0.0010	<0.001	<0.0010	0.001	<0.001	<0.0010	<0.001	<0.0010	<0.001	<0.0010	<0.0010	0.002	<0.0010
Sodium	39	39	39	15	11	13	10	11	<1.0	16	14	18	13
Thallium	<0.0020	<0.002	<0.0020	<0.0020	<0.002	<0.0020	<0.002	<0.0020	0.002	<0.0020	<0.0020	<0.0020	<0.0020
Vanadium	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zinc	0.049	0.043	0.043	0.19	0.007	0.23	0.011	0.18	<0.005	0.19	0.01	0.36	0.016

Sample Location: / Sample ID:	GPRI-GW-MW10			GPRI-GW-MW11		GPRI-GW-MW12		GPRI-GW-MW13		GPRI-GW-MW14		GPRI-GW-MW15	
Other:			(D)										
Sample Date:	04/12/2000	07/19/2000	07/19/2000	04/12/2000	07/19/2000	04/11/2000	07/19/2000	04/11/2000	07/20/2000	04/11/2000	07/19/2000	04/11/2000	07/18/2000
Parameters													
TCL VOCs (ug/L) (a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TCL SVOCs (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methanol (mg/L)	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50
pH	7.02	6.98	6.94	7.08	7.13	7.07	7.11	7.06	7.09	7.00	7.21	7.12	7.26
Specific Conductance @ 25C	1310	1260	1270	1030	1030	972	938	1330	1340	1230	1150	910	914
TAL Total Metals (mg/L)													
Aluminum	1.1	<0.050	<0.050	1	<0.050	0.097	0.27	0.097	1.7	<0.05	<0.05	0.18	0.24
Antimony	<0.005	<0.0050	<0.0050	<0.005	<0.0050	<0.0050	0.006	<0.005	0.024	<0.0050	<0.005	<0.005	0.012
Arsenic	0.015	0.02	0.011	0.024	0.015	0.023	0.01	0.033	0.036	0.022	0.011	0.003	<0.0020
Barium	0.043	0.016	0.016	0.056	0.039	0.037	0.041	0.035	0.05	0.62	0.027	0.053	0.14
Beryllium	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.0010	0.001
Cadmium	0.002	<0.0010	<0.0010	0.003	<0.0010	<0.001	<0.001	<0.001	0.003	<0.001	0.002	<0.0010	0.003
Calcium	200	160	160	140	120	130	120	180	240	160	150	120	280
Chromium	0.013	0.002	<0.0010	0.012	<0.0010	0.007	0.002	0.001	0.017	<0.001	<0.001	0.013	0.003
Cobalt	<0.0050	0.008	0.008	0.006	<0.0050	0.015	<0.005	<0.005	0.036	0.025	<0.005	0.014	0.018
Copper	0.03	<0.0050	<0.0050	0.029	<0.0050	<0.005	<0.005	<0.005	0.022	0.018	<0.005	0.015	<0.0050
Iron	4	2.5	2.5	5.2	0.27	2.3	2.8	4.8	26	3.7	0.25	2	3.2
Lead	0.005	<0.0020	<0.0020	0.015	0.004	<0.002	0.011	<0.002	0.029	0.005	<0.002	0.005	0.003
Magnesium	47	40	41	42	36	39	35	57	70	53	42	42	54
Manganese	0.28	0.58	0.56	0.27	0.2	0.28	0.25	0.13	0.54	0.24	0.23	0.31	2.3
Mercury	<0.0002	<0.00020	<0.00020	<0.0002	<0.00020	<0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	0.006
Nickel	<0.010	<0.010	<0.010	0.015	<0.010	<0.01	<0.01	<0.01	0.024	<0.01	<0.01	0.013	0.012
Potassium	2.8	1.5	1.4	2.2	0.82	2.1	1.7	1.8	1.9	1.1	0.78	1.7	1.3
Selenium	0.016	<0.0020	<0.0020	<0.0020	0.004	<0.002	0.026	<0.002	<0.002	<0.002	<0.002	0.016	<0.0020
Silver	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.001	<0.001	<0.001	<0.0010	<0.001	<0.001	<0.0010
Sodium	14	12	12	8.6	10	7	6.5	6.2	6.6	15	8.6	6.4	9.1
Thallium	0.008	<0.0020	<0.0020	<0.0020	<0.0020	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.0020
Vanadium	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zinc	0.03	0.048	0.006	0.052	0.012	<0.005	0.015	<0.005	0.12	0.27	0.038	<0.005	0.048
TAL Dissolved Metals (mg/L)													
Aluminum	<0.05	<0.050	<0.050	0.061	<0.050	<0.050	<0.05	<0.050	<0.05	0.071	<0.05	<0.050	0.06
Antimony	0.006	0.014	<0.0050	0.011	0.012	<0.0050	<0.005	<0.005	0.02	<0.0050	<0.005	<0.0050	<0.0050
Arsenic	0.017	0.013	0.013	0.022	0.021	0.017	0.015	0.025	0.027	0.015	<0.011	<0.0020	0.003
Barium	0.59	0.019	0.016	0.6	0.043	0.65	0.031	0.39	0.025	0.025	0.03	0.69	0.045
Beryllium	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.002
Cadmium	0.002	<0.0010	<0.0010	0.002	<0.001	<0.0010	<0.001	0.001	<0.001	<0.0010	<0.001	<0.0010	<0.0010
Calcium	170	170	150	140	130	130	120	190	180	170	150	120	110
Chromium	0.002	<0.0010	<0.0010	0.002	<0.001	<0.0010	<0.001	<0.0010	<0.001	0.019	<0.001	0.001	<0.0010
Cobalt	<0.005	0.006	0.007	<0.0050	<0.005	0.008	<0.005	<0.0050	0.022	0.041	<0.005	0.011	<0.0050
Copper	0.025	<0.0050	<0.0050	0.031	<0.005	<0.0050	<0.005	<0.0050	<0.005	0.015	<0.005	<0.0050	<0.0050
Iron	3.3	3.4	2.3	1.7	0.074	1.9	0.96	4.3	31	4.4	0.25	1.4	0.057
Lead	0.007	<0.0020	<0.0020	<0.0020	<0.002	<0.0020	0.007	<0.0020	0.011	<0.0020	0.008	0.003	0.004
Magnesium	48	44	37	39	38	37	35	57	52	51	44	40	44
Manganese	0.6	0.62	0.52	0.22	0.21	0.27	0.25	0.12	0.12	0.24	0.23	0.29	0.29
Mercury	<0.00020	0.0002	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Nickel	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	<0.010	0.027	0.017	<0.01	<0.010	<0.010
Potassium	<0.0002	0.0002	1.3	1.3	0.94	1	1.7	1.1	1.8	1.9	0.93	0.92	0.79
Selenium	<0.002	<0.0020	0.009	<0.0020	0.006	<0.0020	0.008	<0.0020	<0.002	<0.0020	0.005	<0.0020	0.021
Silver	<0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.0010	<0.001	<0.0010	<0.001	<0.0010	<0.0010
Sodium	19	13	11	13	11	11	8.4	9.9	8.3	9.4	9.3	11	6
Thallium	0.011	<0.0020	<0.0020	<0.0020	0.003	<0.0020	<0.002	<0.0020	<0.002	<0.0020	<0.002	<0.0020	<0.0020
Vanadium	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zinc	0.26	0.033	0.029	0.26	0.031	0.23	0.012	0.19	0.015	<0.0050	0.025	0.21	0.016

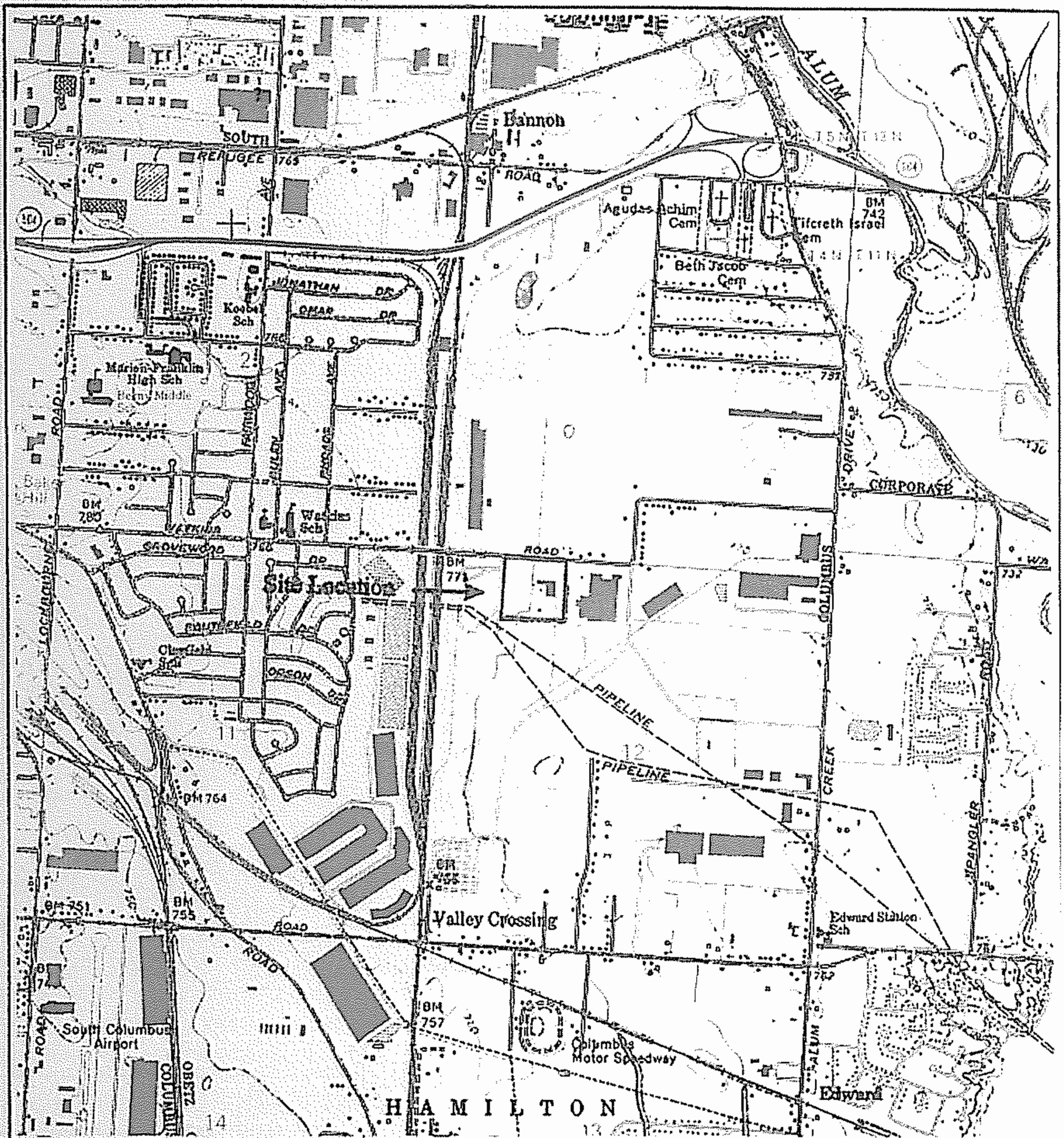
TABLE 3

Phase II RI Groundwater Data
Remedial Investigation Report
Georgia-Pacific Resins, Inc. Facility
Columbus, Ohio

Sample Location: Sample ID:	GPRI-GW-MW16		GPRI-GW-MW18				GPRI-GW-MW19				GPRI-GW-BP1		GPRI-GW-BP2		GPRI-GW-BP3		GPRI-EB-0412
Other:																	(Equipment Blank)
Sample Date:	07/18/2000	10/18/2000	04/11/2000	07/18/2000	10/19/2000	01/29/2001	04/11/2000	07/18/2000	10/19/2000	01/29/2001	04/11/2000	07/20/2000	04/11/2000	07/20/2000	04/11/2000	07/20/2000	4/12/00
Parameters																	
TCL VOCs (ug/L) (a)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
TCL SVOCs (ug/L)	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND	ND
Methanol (mg/L)	<0.50	<2.0	<0.50	<0.50	<2.0	<1.0	<0.50	<0.50	<2.0	<1.0	<0.50	<0.50	<0.50	<0.50	<0.50	<0.50	0.59
pH	7.15	7.35	7.08	7.08	6.92	6.90	7.02	7.06	6.96	7.14	6.99	7.12	7.24	7.09	7.24	7.10	4.20
Specific Conductance @ 25C	935	956	1190	1190	1330	1400	1100	1070	1140	1100	1150	1290	978	988	1050	1050	48.7
TAL Total Metals (mg/L)																	
Aluminum	0.82	2.7	1.4	0.36	1	4.5	0.39	0.28	0.66	1.8	0.25	0.21	0.19	0.79	0.86	0.22	<0.50
Antimony	0.012	<0.0050	<0.005	0.018	<0.0050	<0.0050	<0.005	0.007	<0.005	0.0050	<0.005	<0.005	<0.005	0.009	<0.005	0.009	0.005
Arsenic	0.012	0.078	0.011	0.017	0.019	0.020	0.016	0.021	0.0037	0.044	0.017	<0.002	0.023	0.02	0.034	<0.002	0.011
Barium	0.081	0.13	0.058	0.068	0.05	0.12	0.054	0.063	0.088	0.10	0.039	0.084	0.048	0.049	0.08	0.086	<0.010
Beryllium	0.001	<0.0010	<0.0010	0.001	<0.0010	0.0030	<0.0010	0.001	<0.0010	0.0040	<0.0010	<0.001	<0.0010	<0.001	<0.0010	<0.001	<0.0010
Cadmium	0.003	0.0021	0.002	0.003	<0.0010	0.0090	0.001	0.005	<0.0010	0.014	<0.0010	<0.001	<0.0010	<0.001	0.001	<0.001	0.002
Calcium	280	290	240	360	210	610	150	330	440	400	160	700	130	150	150	450	<1.0
Chromium	0.003	0.022	0.045	0.002	0.0062	0.017	0.005	0.001	<0.0010	0.0030	0.004	0.001	0.002	0.006	0.011	0.001	0.003
Cobalt	0.018	0.017	0.027	0.007	<0.0050	<0.0050	0.007	0.008	0.005	<0.0050	0.005	0.014	<0.0050	0.019	0.009	0.006	<0.0050
Copper	<0.0050	0.018	0.019	<0.0050	0.0083	<0.0050	0.043	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.0050	0.007	0.03	<0.005	0.022
Iron	5.5	1.2	11	8.2	9.3	38	5.7	5.4	2.6	58	3.5	0.77	3.6	8.4	8.9	1.8	0.098
Lead	0.004	0.048	<0.0020	0.003	0.0036	0.024	<0.0020	0.01	<0.0020	0.047	<0.0020	0.008	0.004	0.01	0.008	0.007	0.008
Magnesium	82	77	83	92	68	170	48	66	54	110	44	57	41	45	46	49	<0.20
Manganese	1.3	1.2	0.68	1.5	0.5	2.4	0.18	1.4	1.6	2.1	0.38	2.8	0.1	0.22	0.2	1.3	<0.0050
Mercury	<0.0002	0.00032	<0.0002	<0.00020	0.0003	<0.0002	<0.0002	<0.00020	<0.002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.00020
Nickel	0.024	0.069	0.06	0.031	<0.010	0.017	<0.010	0.028	0.018	<0.010	<0.010	0.038	<0.010	<0.01	0.012	0.026	<0.010
Potassium	1.5	4.4	5.4	4.8	4.5	9.6	1.9	0.91	3.5	3.6	2.3	4.6	1.8-	1.5	2.1	2.9	<0.50
Selenium	0.018	<0.0020	<0.0020	0.015	<0.0020	<0.0020	<0.0020	0.008	<0.0020	<0.0020	<0.0020	0.01	<0.0020	<0.002	<0.0020	0.007	0.006
Silver	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.0010	<0.001	<0.0010	<0.001	<0.0010
Sodium	9.4	13	9.2	11	11	12	5.7	9.1	6.9	6.4	8	10	5.9	5.5	6.2	6.4	<1.0
Thallium	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0060	<0.0020	<0.005	<0.0020	<0.002	<0.0020	0.01	0.009
Vanadium	<0.0050	0.0035	<0.0050	<0.0050	<0.0050	0.0060	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zinc	0.073	0.073	0.023	0.054	0.013	0.022	0.029	0.2	0.044	0.065	0.022	0.039	<0.0050	0.035	0.06	0.081	0.04
TAL Dissolved Metals (mg/L)																	
Aluminum	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0.050	<0	<0.050	<0.050	<0.05	<0.050	<0.05	<0.050	<0.05	<0.050
Antimony	0.01	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	0.023	<0.050	0.0090	<0.0050	0.027	<0.0050	<0.005	<0.0050	0.007	<0.0050
Arsenic	0.008	0.045	0.006	0.009	0.018	0.011	0.024	0.019	0.035	0.011	0.019	0.046	0.028	0.022	0.021	0.022	<0.0020
Barium	0.026	0.14	0.48	0.035	0.72	0.043	0.64	0.032	0.4	0.041	0.65	0.033	0.65	0.039	0.65	0.019	0.17
Beryllium	0.001	<0.0010	<0.0010	0.001	<0.0010	0.0030	<0.0010	0.001	<0.0010	0.0020	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010
Cadmium	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.001	<0.0010	<0.0010	<0.0010	<0.0010	<0.001	<0.0010	<0.001	<0.0010	<0.001	<0.0010
Calcium	110	130	160	140	180	190	150	130	150	140	160	180	130	120	140	130	<1.0
Chromium	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.031	<0.0010	<0.0010	<0.001	<0.0010	<0.001	<0.0010	<0.001	0.001
Cobalt	<0.0050	<0.0050	0.007	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.0050	0.014	<0.0050	<0.005	<0.0050
Copper	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.005	<0.0050	<0.005	<0.0050	<0.005	0.023
Iron	0.18	1.2	2.9	0.051	4.9	0.061	3.5	0.11	1.3	<0.030	2.7	0.083	2.9	1.3	2.9	0.34	0.07
Lead	0.008	<0.0010	<0.0020	0.005	<0.0010	<0.0050	<0.0020	<0.0020	<0.0010	<0.0010	<0.0020	0.007	<0.0020	0.01	<0.0020	0.01	0.007
Magnesium	40	37	47	53	54	56	46	48	47	46	43	45	41	38	44	41	<0.20
Manganese	0.33	0.33	0.32	0.29	0.37	0.43	0.13	0.13	0.13	0.17	0.34	0.37	0.09	0.087	0.096	0.095	0.065
Mercury	<0.00020	0.0003	<0.00020	<0.00020	0.0003	0.00026	<0.00020	<0.00020	0.0002	0.00080	<0.00020	0.0003	<0.00020	<0.00020	<0.00020	<0.00020	<0.00020
Nickel	<0.010	0.014	<0.010	0.011	<0.010	0.012	<0.010	<0.010	0.013	<0.010	<0.010	<0.010	<0.010	<0.01	<0.010	<0.010	<0.010
Potassium	1	1.6	2.7	4.8	2.6	6.6	0.88	<0.50	0.95	2.8	1.1	3.2	1.2	1.4	0.98	2	0.65
Selenium	0.009	<0.0020	<0.0020	0.006	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	0.0030	<0.0020	0.018	<0.0020	<0.002	<0.0020	0.006	0.017
Silver	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	<0.0010	0.002	<0.0010	<0.0010	<0.0010	<0.001	<0.0010	<0.001	<0.0010	0.001	<0.0010
Sodium	6.5	13	14	8.4	17	14	10	4.8	12	10	12	11	10	6.3	10	7.2	5.8
Thallium	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	<0.0020	>0.0020	<0.0020	<0.0020	<0.0020	<0.002	<0.0020	<0.002	<0.0020	0.005	0.008
Vanadium	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050	<0.0050
Zinc	0.016	0.17	0.23	0.008	0.27	0.036	0.23	0.011	0.28	0.0056	0.22	0.01	0.18	0.009	0.23	0.012	0.13

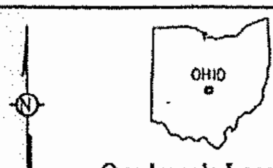
a/ ug/L = micrograms per liter; mg/L = milligrams per liter.
b/ NA = Sample not analyzed for identified parameter
ND = Chemical parameters of interest not detected above the method detection limits
D = Duplicate

FIGURES



Reference

USGS 7.5 Minute Topographic Quadrangle, Southeast Columbus, Ohio, Dated 1964, Revised 1994. Scale 1:24.000



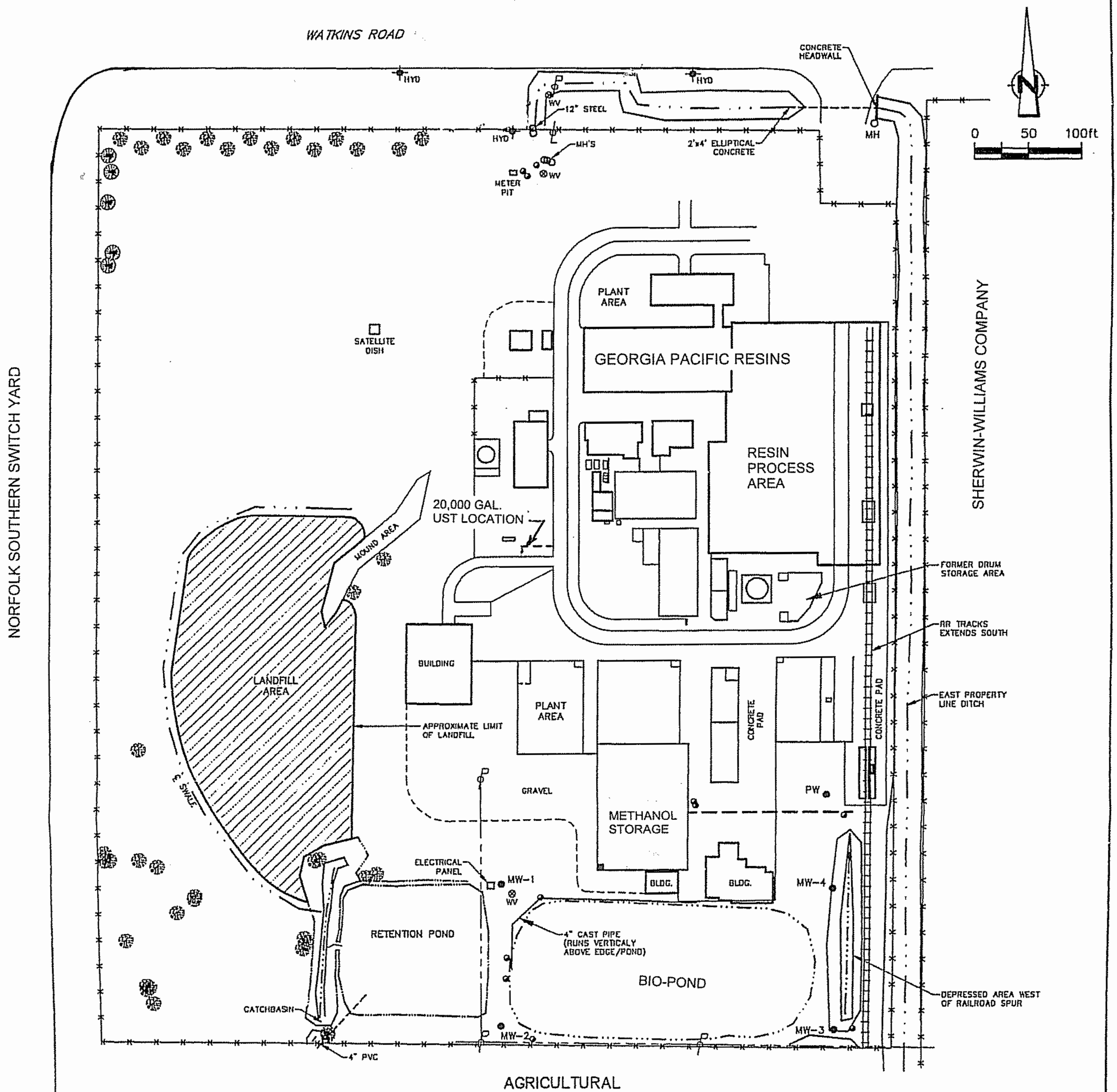
Quadrangle Location

0 2000 4000

Scale in Feet

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

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



LEGEND

- CHAIN LINK FENCE
- CENTERLINE OF WATER FLOW
- POWER LINE
- APPROX. FORMER LOCATION OF TANK 85 PIPELINE
- LIGHT POLE
- POWER POLE
- TBM #4 ELEV. = 770.77 BENCHMARK
- 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

6127 (6) NOV 28/96(W) REV.0 (P-13)

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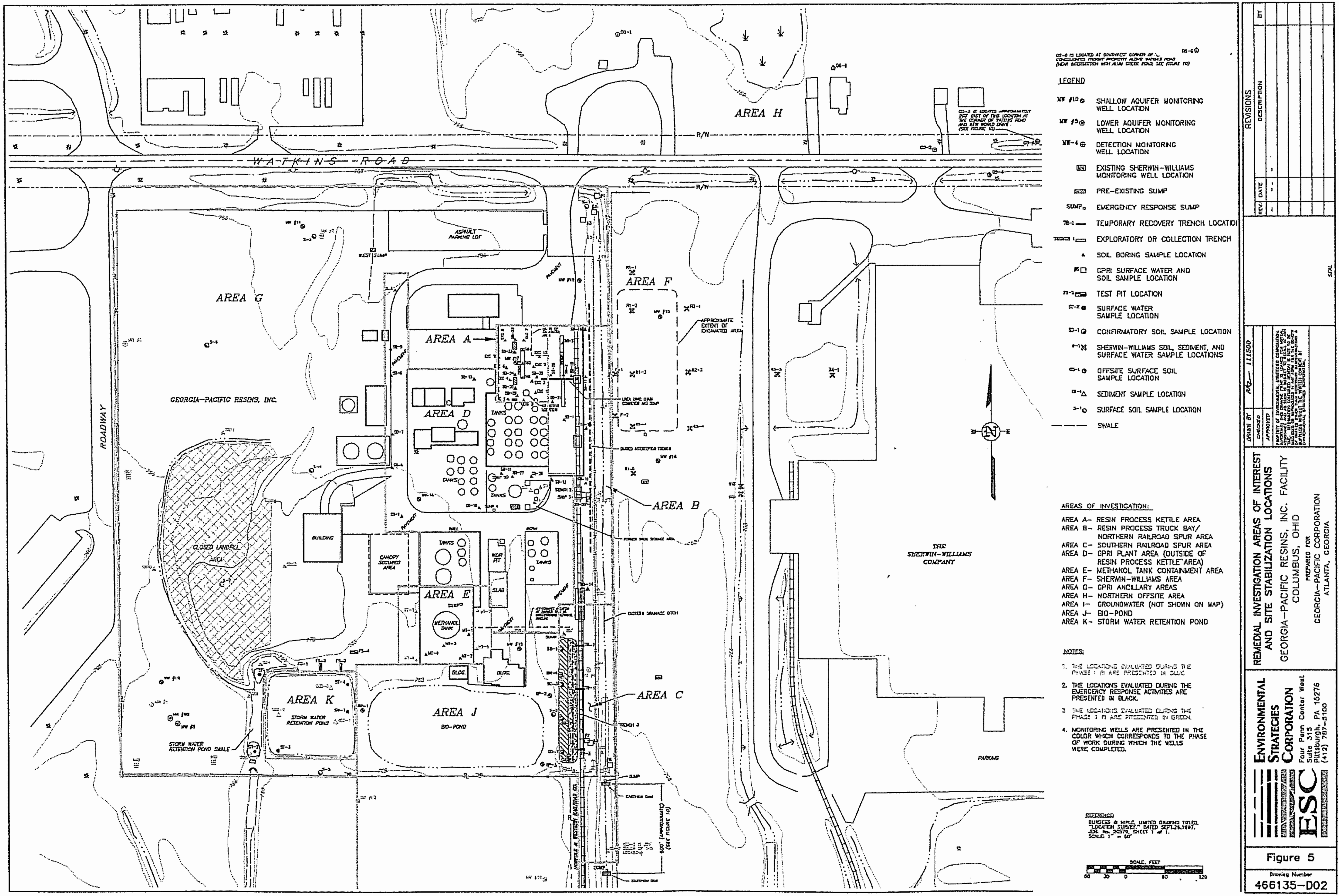
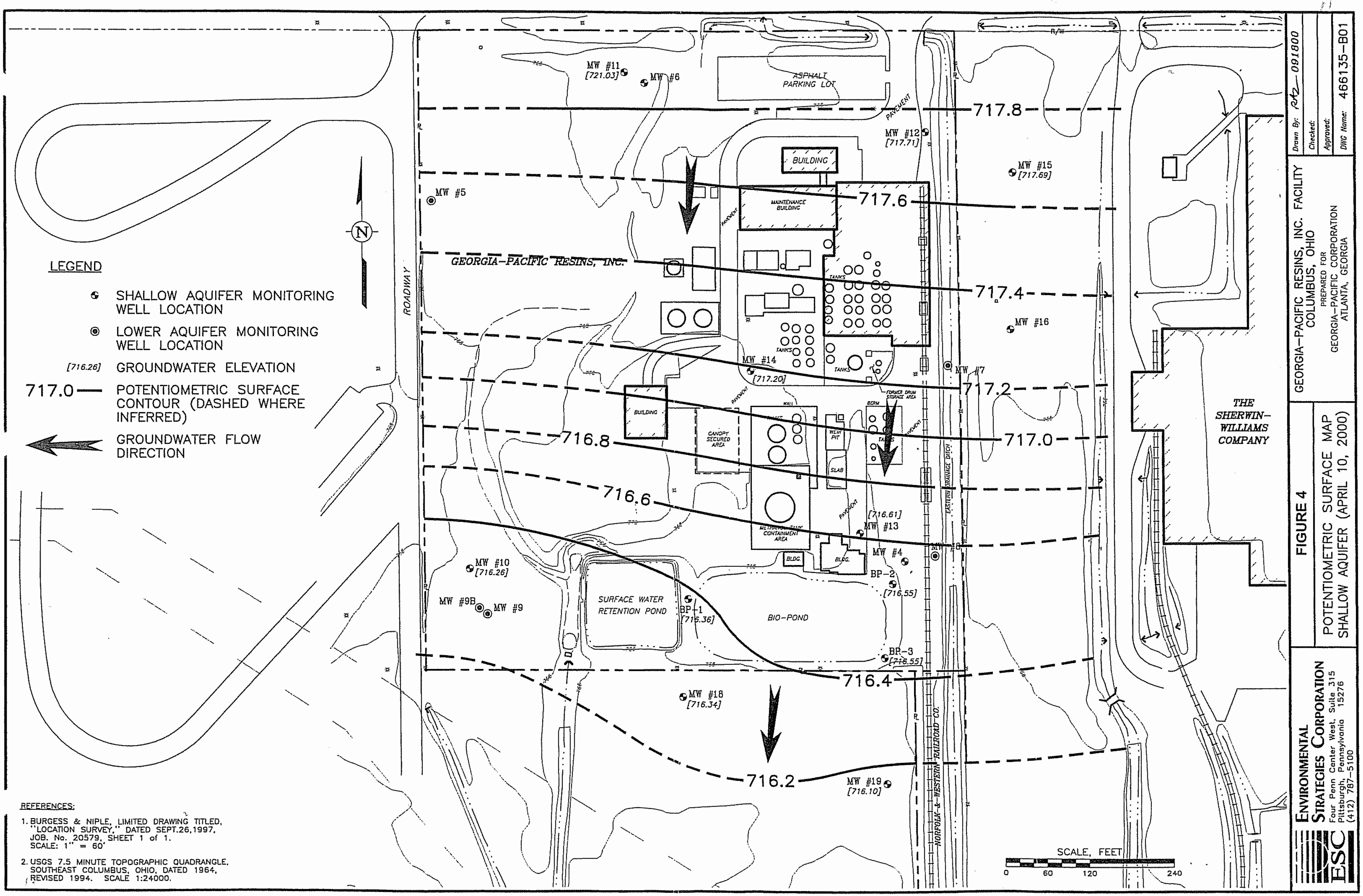


FIGURE 3



TMT X:\DWG\466135 GP\ 466135B01.dwg :11 29, 2000 10:07a

APPENDIX A

Human Health Risk Memo for Georgia Pacific Resins

OhioEPA

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:

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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 m^2
- 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 m^3/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 m^2

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 m^3/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	
	mg/kg -- Soil	2.1
	mg/kg -- Food	
67561 - Methanol - Organic	mg/L -- Water	
	mg/kg -- Soil	
	mg/kg -- Food	
108952 - Phenol - Organic	mg/L -- Water	
	mg/kg -- Soil	22.5
	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 m^2
- 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 m^3/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

			SOIL		Soil	GROUND WATER		GW	Soil + GW	
		Ingestion*	Inhalation	Dermal	Aggregate	Ingestion	Dermal	Aggregate	Aggregate	
FORMALDEHYDE	HQ	5.30E-04		3.80E-05	5.68E-04				5.68E-04	Formaldehyde
	CA Risk		5.50E-07						**5.50E-07**	CA**
METHANOL	HQ	6.40E-03		4.50E-05	6.45E-03	1.20E+00	1.30E-03	1.20E+00	1.21E+00	Methanol
PHENOL	HQ	3.30E-01		2.10E-02	3.51E-01	1.20E+00	1.80E-02	1.22E+00	**1.57E+00**	Phenol
					Cumulative			Cumulative	**1.21E+00**	
					7.01E-03			N/A		

* Resident child

** Cancer endpoint by inhalation only

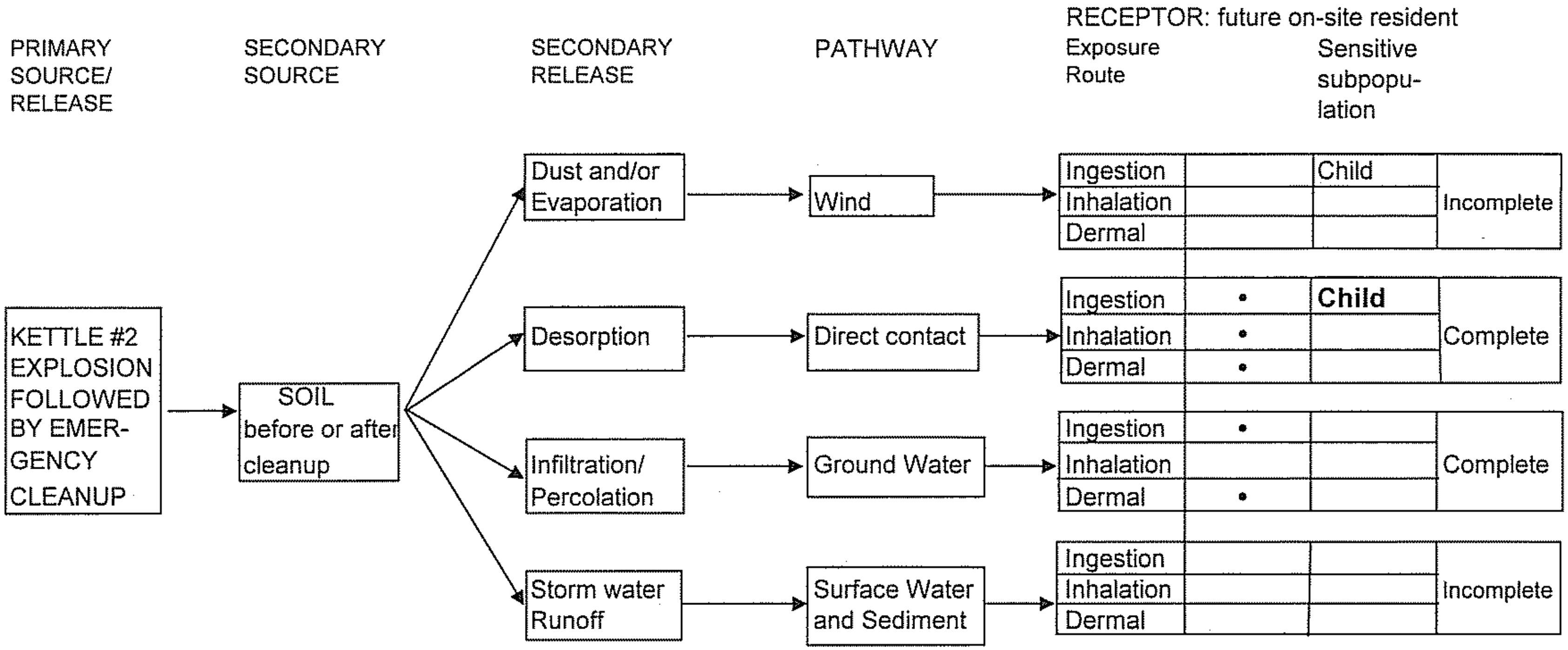
After emergency cleanup

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

* 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 then 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.