

Ohio Environmental Protection Agency

**Decision Document
for the
PPG Industries of Ohio, Inc. Site
Circleville, Ohio**

June 2000

DECISION DOCUMENT

PPG INDUSTRIES OF OHIO, INC.
CIRCLEVILLE, OHIO
PICKAWAY COUNTY
OHIO ID# 165-0641

June 26, 2000

DECLARATION

This decision document presents the Ohio Environmental Protection Agency's (Ohio EPA's) selected remedial action for PPG Industries of Ohio, Inc. (PPG), located south of Circleville, Ohio at 559 Pittsburgh Road (the "Site"). The major components of the selected remedial actions are as follows:

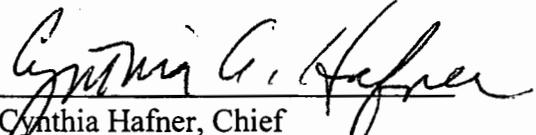
Buried Pond Residue Area (PSA-2):

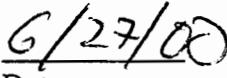
Institutional & Engineering Controls
Long-Term Monitoring

Off-Property Ground Water Contaminants:

Institutional & Engineering Controls
Ground Water Extraction
Long-Term Monitoring

The selected remedial actions are protective of human health and the environment, attain applicable State requirements, and are cost effective. They utilize permanent solutions and alternative treatment technologies to the maximum extent practicable for this Site. Because these remedial actions will result in hazardous substances remaining on-site, the Ohio EPA will monitor the status of the remedial actions to ensure they continue to provide adequate protection of human health and the environment. The remedial actions will be required to meet the performance standards contained in this document.


Cynthia Hafner, Chief
Division of Emergency & Remedial Response
Ohio Environmental Protection Agency


Date

DECISION SUMMARY

PPG began facility operations in 1962 to produce resins used in the manufacturing of paints. Resins are shipped to other PPG locations where they are combined with pigments and additives to produce architectural, automotive, beverage can, and industrial paints or coatings.

On December 21, 1989, PPG Industries, Inc. entered into a consent order with the Ohio EPA in order to address historical releases of contamination into the environment associated with PPG's facility operations. PPG completed remedial investigations (RI) in 1991 and 1996 to characterize the nature and extent of contamination at the Site, and to evaluate risks to human health and the environment. In 1996, PPG completed a feasibility study (FS) to screen and evaluate viable remedial alternatives for the Site. In 1998, additional ground water monitoring was completed to update the RI ground water information. PPG finalized the FS in February 1999. Ohio EPA approved the FS Report in May 1999. In September 1999, Ohio EPA issued a preferred plan, which proposed remedies for the Site. PPG, in entering the 1989 consent order, has committed to implement the selected remedial alternatives as set forth in this decision document.

Based on results of the RI completed by PPG, site conditions are summarized as follows:

- Seventeen (17) locations at the Site were identified and evaluated as potential contamination source areas (PSAs) during the RI. The contaminants were primarily limited to the individual PSAs except for 1,4 dioxane, which migrated off the property via ground water. A baseline risk assessment indicated that 15 of the 17 PSAs do not pose unacceptable risks to human health or the environment and, therefore, no further action is required at these PSAs.
- Contaminants of concern in soils at the Site include the volatile organic compounds (VOCs) ethylbenzene, toluene, xylene, and PCBs, specifically Aroclor-1248.
- The major source of ground water contamination was the former wastewater infiltration ponds (PSA-1). These ponds no longer act as a source of contaminants to ground water as a result of upgrades, and finally, their closure in 1980. Contaminants of concern leached into the shallow ground water bearing zone include the VOCs ethylbenzene, toluene, and xylene and have not migrated significantly beyond the individual PSAs. Physical properties of the shallow ground water zone, contaminant properties, and natural attenuation have limited the horizontal migration of VOCs. Only 1,4 dioxane and related compounds have migrated off the PPG property via ground water. PPG completed a cleanup of PCB contaminants from the storm sewer system and Scippo Creek in the late 1980s.
- Ground water occurs in the shallow, intermediate, and deep sand and gravel water bearing zones or aquifers beneath the Site. The three zones are generally found at depths of 10-20

feet, 30-60 feet, and 80 to 180 feet, respectively. Each zone is separated by clay layers, which impede the migration of both ground water and contaminants, and provide an effective barrier to the vertical migration of contaminants to higher yield, deeper aquifer zones.

- The flow of ground water containing 1,4 dioxane is controlled by the significant pumping rates at both PPG and the neighboring E.I. DuPont de Nemours and Co. (DuPont) facility, located approximately 3000 feet west of PPG. This ground water pumping controls the ground water flow direction causing the migrating 1,4 dioxane compounds to flow directly to DuPont's non-potable water production wells. DuPont receives potable water from the Earnhart Hill Water District (EHWD). Based on monitoring well data and ground water modeling, the 1,4 dioxane contamination forms a plume that is currently confined to an area between the PPG and DuPont facilities.
- DuPont pumps over 3 million gallons per day for use in its production processes. All wastewater is managed and discharged under an Ohio EPA issued National Pollution Discharge Elimination System (NPDES) permit. Monitoring of DuPont's effluent discharges between 1992 and 1995 indicated 1,4 dioxane concentrations ranging from below detection limits to 1 mg/l, which are well below their wasteload allocation of 1140 mg/l. Sampling data between 1993-1997 from the outfall where the discharge enters the Scioto River indicates 1,4 dioxane concentrations from below detection limits to 0.010 mg/l.
- The nearby Jefferson Addition housing subdivision lies outside the area of the off-property ground water contaminant plume. Existing wells at Circle Plastics and Ankrom Farm (now owned by Don Goodchild and Marathon Oil) are not being used, and potable water lines of the EHWD service the area. The EHWD's water supply production wells are located north of DuPont, and have not been impacted by the contaminant plume.
- Based on treatability studies completed by PPG, an effective technology to remediate 1,4 dioxane is not available. 1,4 dioxane is infinitely soluble in water, has limited volatility, and low biodegradability, which makes treatment difficult and contributes to its high ground water mobility and subsequent off-property migration.
- PPG is an operating industrial facility. Areas impacted by the off-property 1,4 dioxane contaminated plume in the ground water are currently zoned commercial/industrial. Future land use of the impacted area as residential is unlikely based on this zoning.
- PPG entered into a twenty year agreement with DuPont in 1998 to maintain long-term hydraulic control of the off-property 1,4 dioxane contamination plume. This will ensure continued containment and extraction of the plume. The agreement can be renewed annually when the twenty years expire.

- The following properties overlie the plume: Circle Plastics, Night Owl Trucking, Don Goodchild property, Marathon Oil, Georgia-Pacific Corp., and Colomet (undeveloped industrial-zoned property owned by American Electric Power).

A quantitative human health risk assessment was completed in 1996 as part of the RI. The contaminants identified during the RI were evaluated to determine whether or not the level of risk they pose to public health and the environment is acceptable. Acceptable risks were exceeded for the future construction worker at PSA-2 and future residential use of the off-property ground water as a potable source of drinking water. Due to lower on-property concentrations of 1,4 dioxane (below detection limits to 0.018 mg/l) and non-use of ground water for ingestion, unacceptable risks were not identified for uses of ground water at the PPG facility. Both PSA-2 and the off-property plume were evaluated in the FS for potential remedial alternatives.

Since PPG has no plans to develop the PSA-2 portion of the property, the potential future exposure scenario for the construction worker at PSA-2 is unlikely to occur. Currently, the land overlying the off-property plume is zoned industrial, ground water is not used as a potable source and potable water supply lines are present in the area. Furthermore, no contaminants have been identified in the EHWD water supply wells, located north of DuPont. The RI ground water sampling data and the ground water model indicate that pumping at DuPont production wells have contained the plume to its present dimensions. There are no indications that the plume is expanding in size, so additional down gradient receptors will not be impacted, provided DuPont continues pumping.

The FS describes the screening and evaluation of various clean up technologies to assist in the selection of appropriate remedies to address site contamination. The FS evaluated a wide range of remedial approaches to reduce potential exposure risks at PSA-2 and the off-property plume. Seven technologies received a detailed evaluation in the FS. A treatability study was also completed and concluded that effective removal of 1,4 dioxane from the off-property plume was not feasible. The Ohio EPA used the following eight evaluation criteria to select the remedies for the Site:

1. Overall protection of human health and the environment
2. Compliance with regulatory requirements
3. Short-term effectiveness
4. Long-term effectiveness and permanence
5. Reduction of toxicity, mobility, or volume through treatment
6. Implementability
7. Cost
8. Community acceptance

A summary of the Ohio EPA comparative analysis of the seven remedial alternatives evaluated in the FS is provided in Table 1.

To evaluate community acceptance, the Ohio EPA issued the *Preferred Plan for the PPG Industries, Inc. Site, Circleville, Ohio* on September 17, 1999. An information session and public hearing were held on October 25, 1999 at the Circleville City Hall and written comments were accepted through December 6, 1999. A summary of the community response is provided in the Responsiveness Summary section of this document. The proposed remedies are acceptable to the community, although objections were expressed by one property owner regarding implied industrial use restrictions of the ground water.

SELECTED REMEDY

The chosen remedial alternatives for the Site are summarized below:

Buried Pond Residue Area (PSA-2):

- Institutional & Engineering Controls:
An industrial use deed restriction will be required on the PPG property. Public and employee training programs will be developed to inform the community, visitors/contractors, and employees of site issues. Engineering controls will be required at the PPG facility in order to maintain adequate security and prevent access by the public to PSA-2. In addition, vegetation and soil cover must be maintained at PSA-2 to prevent exposure to the remaining soil contaminants.
- Long-Term Monitoring:
A ground water monitoring program will be developed to ensure releases are not occurring to ground water beneath PSA-2. Further soil sampling will be conducted in the future to confirm soil contaminant levels before further development of the PSA-2 area will be allowed. The deed restriction, training programs, and engineering controls will be monitored for effectiveness.

Off-Property Ground Water Contaminants:

- Institutional & Engineering Controls:
Deed restrictions, utilizing restrictive covenants and equitable servitudes to the extent possible, restricting potable uses of ground water will be negotiated in a timely fashion with neighboring property owners impacted by the plume. Alternative institutional controls, that meet the required performance standards, must be implemented should negotiations for deed restrictions fail. Existing and future landowners must be notified about the 1,4 dioxane contaminated ground water and regulatory requirements regarding its non-potable use. An evaluation of the effects of ground water pumping from existing and future industrial users on the plume is required.

Educational programs to inform employees, site visitors/contractors, and the

public of potential risks from the plume will be developed.

Engineering controls, through plume containment, will be maintained via a joint agreement between PPG and DuPont to maintain pumping rates as may be appropriate to contain the plume.

- **Ground Water Extraction:**
DuPont ground water pumping rates currently control the plume and are effectively removing the contaminants. DuPont pumping will be maintained to clean up the plume in approximately 20 years. Should failure of the pumping agreement with DuPont occur, a contingent ground water extraction plan is required.
- **Long-Term Monitoring:**
A ground water monitoring program will be developed to assess both on-property and off-property ground water quality, to monitor the nature and extent of contamination, and to verify cleanup. Surface water sampling will be conducted at the Scioto River to determine any potential impacts to stream quality. Monitoring of all institution controls, education programs, and engineering controls will be required to determine their effectiveness.
- **Future Ground Water Users:**
Future owners and or users of contaminated ground water at properties impacted by the plume must be notified of the 1,4 dioxane contamination and the regulatory requirements for it's non-potable use.

PERFORMANCE STANDARDS

Performance standards are the applicable standards and criteria for the remedial design/remedial action, and operation and maintenance of the remedial alternatives. Ohio EPA identified the applicable standards that specifically address the remedial actions or circumstances for each component of the remedy. The remedy is expected to achieve these standards; if it does not, then additional work, remedy modifications, or contingent remedies will be considered.

Performance Standards for Soil Alternative 2, Institutional Controls with Monitoring. A performance monitoring and evaluation program will be developed and implemented in accordance with remedial action objectives to establish the following at PSA-2:

- Institutional and engineering controls must be effective, be maintained, and include periodic evaluations of current property uses, and future building plans. Institutional and engineering controls will achieve performance standards if:
 - 1) There remains a legal restriction for industrial use of the PPG property.

- 2) Fences, security, education programs, cover soil, and vegetation are maintained.
- 3) A means to detect and correct violations within 90 days is employed.

- No impacts to ground water occurring above U.S. EPA, maximum contaminant levels (MCLs) or risk-based cleanup levels (hazard quotient less than 1 and a cancer risk of 1×10^{-5}) if no MCL exists. Compliance will be documented through the long-term ground water monitoring program. Exceedances of cleanup levels at the edge of PSA-2 will require a re-evaluation of the selected remedial alternative.
- Continuous monitoring and evaluation activities for as long as the soil contamination remains in place. No restrictions will be necessary when risk based clean up goals for soil are met for unrestricted uses. All monitoring, evaluation activities, notification, and appropriate work plans are required should future development be considered for PSA-2.

Performance Standards for GW Alternative 2, Institutional Controls, Existing Extraction, and Monitoring. A performance monitoring and evaluation program will be developed and implemented to establish the following:

- Institutional and engineering controls will be effective, be maintained, and include an evaluation of compliance, property ownership, property uses, and development plans. This will also include periodic evaluations of the pumping agreement with DuPont to ensure appropriate production rates are maintained and to monitor contaminant concentrations. Institutional and engineering controls will achieve performance standards if:
 - 1) There remains a legal prohibition against ground water use for potable purposes.
 - 2) Owners and/or users are made aware of restrictions and the need for them, at least annually, including regulatory requirements for the non-potable use of 1,4 dioxane contaminated ground water.
 - 3) A means to detect and correct violations within 90 days is employed.
- Future industrial ground water users will not alter current plume dimensions. The plume will be defined by concentrations that exceed the risk-based cleanup standard. The plume will not be substantively modified by future industrial pumping anywhere in or around the existing plume. All current and future property owners or lessees above or near the plume will be notified that ground water is contaminated and pumping for industrial uses could impact the plume and the extracted ground water must be properly handled and disposed. Technical assistance, and ground water modeling to establish the potential impacts of additional pumping due to ground water uses for industrial purposes are required. Any additional assistance to neighboring property owners or lessees to develop future industrial ground water uses without impacting the plume must also be considered.

- A long-term ground water monitoring program. The program must include ground water monitoring wells located within the highest concentrations of the plume, at the edges of the plume, and outside the plume. The monitoring program will be used to:
 - 1) confirm the fate and transport model of residual soil contamination at PSA-2;
 - 2) assess contamination within the shallow, intermediate, and deep ground water zones, both on and off-property;
 - 3) assess the results of the RI ground water modeling;
 - 4) determine that current exposure pathways remain unchanged;
 - 5) determine the horizontal and vertical extent of contamination to below detection limit values;

Appropriate steps shall be taken to prevent exposures to human health or the environment should the long-term monitoring program indicate significant changes from the site conceptual model of the RI report.

- A long-term surface water monitoring program. The water quality of the discharge and the downstream reach of the Scioto River will be monitored for 1,4 dioxane to determine concentrations being discharged to the river. This monitoring will be used to determine the concentrations of contaminants transferred to the river. Action by PPG will be necessary if DuPont's NPDES discharge limits for 1,4 dioxane are exceeded. Surface water monitoring will continue until no further action is required for the off-property plume.

No further action will be required for the plume when the cleanup objective of 35 ug/l (or ppb) for 1,4 dioxane has been achieved throughout the entire plume. This concentration represents a 1×10^{-5} excess cancer risk. Appropriate monitoring must document achievement of the cleanup level for five years after the cleanup objective is met. Long-term monitoring at on-property wells will cease when all ground water concentrations are shown to be less than MCLs or risk-based cleanup levels, where MCLs do not exist, for at least five years.

Compliance with these performance standards will be documented through routine reporting and five year reviews, which will occur no less often than every five years after initiation of the selected remedy. The five year review will provide a comprehensive summary and discussion to evaluate the effectiveness of the remedy's performance. Under this review, performance standard compliance will continue to be evaluated against collected monitoring information to ensure that the selected remedy continues to meet remedial action objectives, including protection of human health and the environment. Information to be evaluated includes, but is not limited to, concentration trends, pumping scenarios, production well efficiency, ground water modeling, fate and transport of contaminants, pathways of exposure, and gradient changes.

RESPONSIVENESS SUMMARY

To evaluate community acceptance of the preferred plan, the Ohio EPA held an information session and public hearing on October 25, 1999 at the Circleville City Hall. Written comments were originally accepted through November 2, 1999. Based on comments received at the public hearing, the Ohio EPA extended the written comment deadline until December 6, 1999. Three people provided testimony at the public hearing and a transcript of their testimonies is on file at the Ohio EPA, Central District Office. One written comment was received in a December 3, 1999 letter. The following provides responses to the public hearing testimonies and written comment:

Public Hearing Comments

Ben Pfefferle, Thompson, Hine & Flory, representing Circle Plastics Products, Inc., and Night Owl Enterprises, Ltd., testified for an extension to the public comment period to allow the property owner to review the impacts of the preferred plan on both facility's operations. They were also concerned that the preferred plan requires restrictions on the use of water for industrial purposes, not just potable purposes. Circle Plastic Products currently uses ground water for industrial purposes, and they are concerned about their future ability to use the ground water and any future modifications to pumping needs.

Ohio EPA Response:

Ohio EPA granted the request for an extension, which resulted in comments being accepted through December 6, 1999 instead of November 2, 1999. Regarding industrial use restrictions, the Ohio EPA has no plans to restrict ground water uses for industrial purposes. The preferred plan proposes the use of institutional controls to prevent potable uses, the primary exposure pathway identified in the RI. The preferred plan does require notification to industrial users to avoid alteration of the current plume dimensions. This follows US EPA's Final Policy Toward Owners of Property Containing Contaminated Aquifers (May 24, 1995 Memorandum), and protects property owners from incurring liability. This policy defines US EPA's interpretation regarding the liability of "innocent" landowners who have contaminants migrate onto their property from an off-property source. Liability can still be incurred if the "innocent" landowner utilizes a well that affects the migration of contamination in the aquifer. Other than pumping at DuPont, which is controlling the plume, Circle Plastics is the only downgradient industrial user of ground water. The Ohio EPA will not restrict Circle Plastics' non-potable use of the ground water. However, applicable regulations must be adhered to when handling and disposing of any generated wastewater containing 1,4 dioxane. Based on RI data, clean ground water for industrial uses is available further north on the Circle Plastic's property. For other undeveloped properties near the plume, steps will be taken to locate any future wells in positions so that the plume will not be substantively altered.

Mitch Magee, on behalf of PPG Industries, Inc. testified that the company supports Ohio

EPA's proposed remedy. They believe the remedy is protective of human health and the environment.

Ohio EPA Response: The Ohio EPA acknowledges PPG Industries, Inc. support for the remedy.

Polly Miller, private citizen and nearby landowner, in her testimony she thanked the Ohio EPA for the notices and opportunity to comment on the preferred plan. She indicated that PPG had recently changed their corporate name to PPG Industries of Ohio, Inc. PPG has impacted the community and her farm directly. In the past, PCBs were removed from the Scippo Creek at PPG's outfall and cleanup occurred during bridge repair on Route 23. She questioned why Ohio EPA permitted spills into lagoons, burning toxic substances into the air, and discharging pollutants to Scippo Creek surface water. PPG's pollution has deprived the people of Ohio the beneficial use of waters of the State for the purposes of providing domestic and industrial supplies. PPG only came to the community because of the quantity of water, and have ended up polluting it. She doesn't trust PPG to monitor her wells. She was very concerned about the problems that would develop should DuPont stop pumping at its production wells.

Ohio EPA Response: The Ohio EPA is aware of PPG's name change, but this has not impacted Ohio EPA's 1989 consent agreement with PPG. The consent order applies to and is binding to PPG, "their agents, successors, and assigns..." Regardless of name changes at the Circleville, facility, PPG is bound to the agreement. The Ohio EPA became aware of impacts to the ground water in the 1980s, which resulted in the 1989 consent order between Ohio EPA and PPG to investigate and address these impacts. The preferred plan is the culmination of the investigation process. Prior to and after the consent order, PPG completed numerous cleanup activities at the Site. The former wastewater ponds were removed, PCBs were cleaned up at the facility and in Scippo Creek. (Scippo Creek was evaluated separately and now meets all cleanup standards.) The investigation has determined that the contaminant plume is currently being controlled and remediated through existing pumping at the DuPont facility. Unfortunately, the Ohio EPA has not been able to find an effective treatment process that would speed up the current cleanup time frame estimated at 15-20 years. PPG has an agreement with DuPont and is currently implementing the agreement, to maintain current pumping levels. Should this agreement fail, PPG will still be required by the Ohio EPA to continue cleanup of the plume.

The Ohio EPA enforces environmental laws mandated by the state legislature and where authorization from US EPA is granted to enforce federal laws. The state and federal legislative bodies have allowed for some releases of pollutants to the environment, but only at levels that are protective of human health and the environment. This has resulted in an extensive permitting process for businesses to release their wastes into the air, land, and water only after appropriate analysis and treatment of the wastes has been conducted. PPG, like any other Ohio business, is required to meet all appropriate regulations when handling its wastes. Other divisions of the Ohio EPA may be consulted to determine the ongoing status of PPG's compliance with these regulations.

Written Comment

December 3, 1999 letter from Heather A. Austin, Thompson, Hine & Flory, on behalf of Circle Plastics Products, Inc. and Night Owl Enterprises Ltd. Both Circle Plastics and Night Owl object to the implementation of the preferred plan. They allege that the plan adversely impacts these companies through the restriction of ground water use for drinking water under a deed restriction and that industrial uses of ground water could be limited on each property. They suggest that other remediation options may be selected that will not impact their properties or businesses. The two businesses are currently discussing these issues with PPG and would support the preferred plan if the companies' concerns are resolved.

Ohio EPA Response: The Ohio EPA has determined that the preferred plan outlines the best available remedy to address the contaminant plume resulting from past PPG operations. The commenter did not provide any substantive information that would provide for an alternate remedy to be selected. Because an alternate potable water source is available and is currently being used at all impacted properties, the Ohio EPA does not consider the potable use restriction a burdensome requirement. Furthermore, Ohio EPA and the Ohio Department of Health have existing regulations that effectively prevent the installation of a potable well into contaminated ground water. The Ohio EPA has not banned industrial uses of the ground water because this type of use would not impact human health. However, the Ohio EPA must caution any user of contaminated industrial waters to appropriately handle and discharge any wastewaters generated, and obtain any necessary discharge permits. Furthermore, US EPA policy has indicated that users of contaminated ground water can incur their own liability if they knowingly alter a plume. Ohio EPA would like to be aware of these industrial uses so that any future users can either avoid drilling into the plume or plan to manage the wastewaters as necessary. The current configuration of the plume on the neighboring properties also indicates that alternate locations for industrial use production wells are readily available at each impacted property. This remedy requires notification and monitoring of the institutional controls.

TABLE 1

Alternatives Evaluated	Protective of Human Health and Environment	Compliance with Regulatory Requirements	Short-Term Effectiveness	Long-Term Effectiveness	Reduction of Toxicity, Mobility, or Volume thru Treatment	Implementability	Cost
<i>SOIL 1 - No Action</i>	Not protective	Does not comply	No added risk	Not effective or permanent	No reduction.	Easily implemented	\$ 0.00
<i>SOIL 2 - Institutional Controls with Monitoring</i>	Protective, exposure pathways are eliminated	Complies	No added risk	Effective if controls are enforced	No reduction through treatment, natural degradation will reduce some volume. PCB has limited migration potential.	Readily available and easy to implement.	\$ 99,000 Cost effective for level of protection obtained.
<i>SOIL 3 - Excavation, Thermal Desorption, & off-site disposal</i>	Protective, contaminants are removed	Complies, necessary permits will be obtained	Some added risks to construction worker during excavation and to the community during treatment and transportation.	Contaminants are treated and removed from the site. All exposure pathways are eliminated.	Treatment will reduce toxicity, mobility of contaminants. Residual contaminants transferred to landfill.	Readily available, somewhat easy to implement. Potential for public concerns for on-site "incineration" technology.	\$ 4.7 million Expensive for the limited exposures prevented and the migration potential of PCBs.
<i>SOIL 4 - Excavation and Off-Site Disposal</i>	Protective, contaminants are removed	Complies, additional compliance with laws during remedy.	Construction worker and transportation exposures and risks are possible.	Contaminants are removed from the site.	Limited treatment occurs during handling. Contaminants directly transferred to new location (i.e. landfill).	Readily available and easy to implement.	\$ 4.7 million Expensive for the limited exposures prevented and to transfer contaminants to new location.
<i>GW 1 No Action</i>	Not Protective	Not Compliant	No added risk	Not effective or permanent	No reduction	Easily implemented	\$ 0.00
<i>GW 2 Institutional Controls with monitoring</i>	Protective, risks to human health and environment mitigated in 20 years.	Complies	Little or no added risks during implementation	Effective and permanent reduction of contaminants; requires effective controls	No treatment technology exists. GW toxicity and volume is reduced by pumping. Contaminants transferred to surface water via DuPont NPDES permit.	Readily available, easy to implement. Deed restrictions may be difficult.	\$ 224,000 Cost effective remedy to ensure protection and obtain clean up.
<i>GW 3 Institutional Controls, Additional Extraction, & Discharge to Surface Water</i>	Protective, risks to human health and environment mitigated in 10 to 17 years	Complies additional compliance with surface water laws for discharge.	Little or no added risks to human health during implementation; potential environmental impacts to surface water	Effective and permanent reduction of contaminants; requires effective controls	No treatment technology exists. GW toxicity and volume is reduced by pumping. Contaminants transferred to surface water via permit.	Readily available, easy to implement; deed restrictions may be difficult	\$ 2.5 million Less cost effective when only gaining 3 to 10 years in cleanup time.