

**Declaration for the Decision Document
Dura Avenue Landfill Site
Toledo, Ohio**

Introduction

This Decision Document presents the selected remedial action for the Dura Avenue Landfill Site, in Toledo, Ohio. This document summarizes the site history, the Remedial Investigation/Feasibility Study (RI/FS), and the clean-up alternatives presented in the 1999 Preferred Plan for the Site. The Decision Document presents Ohio EPA's selected Alternative to address site contamination and the rationale and justification for that preference. The Decision Document also incorporates the responses to comments received during the public comment period on the Preferred Plan. Ohio EPA's Responsiveness Summary, detailing the comments received and Ohio EPA's responses, is attached to this document.

Community Participation

Documents pertaining to the investigation at the Site including the RI/FS and subsequent documents are public documents in the Ohio EPA files. Public documents pertaining to activities at the Dura Avenue Landfill are available to the public at the Ohio EPA Northwest District Office in Bowling Green, Ohio.

Document repositories have been established in the Lucas County Library, Main Downtown Branch and the Point Place Branch. The document repositories contain copies of the RI/FS and the 1999 Preferred Plan. A copy of this Decision Document will be added to these repositories. Copies of all final design documents and site reports will also be added to the repositories after they are received and approved by the Ohio EPA.

Description of the Selected Remedy

The selected remedial action for the Dura Avenue Landfill site addresses the discharge of contamination to the surface water and sediment in the Ottawa River and Sibley Creek through the management of the leachate within the landfill. The leachate will be directly managed by installing a leachate extraction system in the areas of highest contaminant concentration near the main gate of the landfill, and continuing to operate the existing Interim Remedial Measure (IRM) in the Southeast Chemical Disposal Area. Also, an impermeable cover system will be placed over the landfill to reduce surface water infiltration and leachate production.

Additional measures to be implemented in the primary phase of the remedy include the following:

- regrading of the landfill surface to promote surface water drainage;
- construction of surface water diversion and letdown structures;
- riverbank stabilization and slope repair;
- collection/control of landfill gas;
- a hydrogeologic investigation into the northeast boundary of the Site;

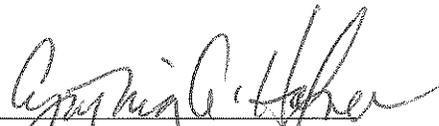
- evaluation of the ecological impacts and aquatic health of the Ottawa River resulting from the primary phase of the remedy;
- estimation of the volume and composition of leachate escaping the Site to the Ottawa River and Sibley Creek for at least 5 years; and
- operation and maintenance of all components of the remedy to ensure that performance standards are maintained.

To date, only nominal levels of contaminants associated with the Dura Avenue Landfill have been detected in ground water beneath the landfill. Due to the unique location and nature of this landfill, the bulk of leachate discharges to the Ottawa River rather than migrating through subsurface geologic units. Therefore, management of the ground water will be limited to installation of additional ground water monitoring wells and piezometer networks along the perimeter of the Site, measurement of water levels, sampling of ground water/leachate monitoring wells, and determination of ground water flow direction(s). A long-term ground water monitoring sampling and analysis plan will then be developed and implemented.

Institutional & Engineering Controls and Operations and Maintenance Plans for the selected remedial action include the installation of a perimeter fence and signage around the landfill to limit access to the Site. Deed restrictions will be placed on the landfill property to ensure that no activities will be conducted on the property which will disturb the remedy. An Operations and Maintenance Plan for the Site will be developed to assure that all components of the remedy are operating effectively, and performance standards are being met.

Ohio EPA anticipates that the primary phase of the remedy will effectively decrease the amount of leachate generated and discharged from the site, thereby reducing the risk associated with the Site to acceptable levels within a reasonable time frame. Monitoring of the leachate concentrations and volume discharging to the Ottawa River, along with assessment of the ecological impacts and aquatic health of the Ottawa River will be used to gauge the efficacy of the primary phase of the remedy. Should the selected remedial action prove to be less effective than projected, Ohio EPA may require, the implementation of the contingent phase of the remedy.

The contingent phase of the remedy would be a more active approach to dewatering the Site and reducing the volume of leachate discharged to the Ottawa River, including but not limited to any the following measures: preventing influx of off-site ground water in the northeast area of the Site; installing an active leachate extraction system in the main body of the landfill; and installing sheetpile barriers between the Ottawa River and the landfill.


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9/07/99
Date

I. SITE BACKGROUND

A. Physical Description

Dura Avenue Landfill (the Site) is approximately 70 acres in size. Located in the northeast section of the City of Toledo, Ohio (Figure 1), in a primarily industrial area, it rises approximately 60 feet above the adjacent landscape. The site is bordered on its east by the Ottawa River and south by Sibley Creek. The landfill is situated approximately 5.2 miles upstream from the point where the Ottawa River discharges into lake Erie. The landfill surface is generally barren and moderately sloping, except along the adjacent streams, where vegetation has become more established over parts of the very steep banks. The landfill cover varies in thickness from a few inches (with waste protruding) to over five feet. Erosion is common over the landfill surface and along the steep stream banks.

B. Site Characteristics

The landfill commenced operation in 1952 and no longer accepted refuse after 1980. Throughout this period it received municipal wastes, and substantial quantities of commercial and industrial waste. The site has been filled partially by trenching, in the central and west sections, and partly by area filling. The eastern half of the site consists of fill pushed into, and built upon, a former channel and marsh adjacent to the Ottawa River. The average depth of fill across the site is approximately 40 feet and the total estimated in-place volume of on-site fill is approximately 4.65 million cubic yards. Municipal waste overlies combined municipal/commercial/industrial wastes throughout most of the site, except in the newer western section of the landfill, where municipal waste occurs almost exclusively. The Dura Avenue Landfill received substantial quantities of industrial wastes. Based upon eyewitness accounts and aerial photographs, these industrial wastes included a wide variety of potentially hazardous materials, delivered in both bulk and containerized form, which were disposed at various locations throughout the site.

Although located in an industrial area, Dura Landfill is within a short distance of human population centers, including large residential developments within one mile on the south and west.

The Ottawa River and Sibley Creek are the dominant surface water hydrologic features in the vicinity of the site (Figure 1). The Ottawa River has a drainage area of approximately 162 square miles and an average flow of approximately 138 cubic feet per second adjacent to the landfill. Corresponding values for Sibley Creek are 0.5 square miles and 0.5 cubic feet per second.

Site geology is characterized by four stratigraphic layers overlying Silurian Bedrock. The deepest and oldest (Layer 4) is a gravel-rich till. The next two (Layers 3 and 2) consist of glacio-lacustrine deposits which include silty clay, and the shallowest, youngest (Layer 1) consists of silty flood plain and lacustrine deposits. These layers include two separate water-bearing zones, with a third zone identified in bedrock. Water level measurements in the

different wells indicate a gradient in all zones from northwest to southeast. Migration of leachate from the landfill appears to be predominantly lateral, with Layer 2 (lacustrine clay) acting as an aquitard (confining layer) and directing flow from the upper water-bearing zone toward the Ottawa River and Sibley Creek.

A water balance analysis of the landfill indicates that annual leachate production from precipitation averages approximately 54,700 gallons per day, with 53,000 gallons per day of this discharging laterally to the adjacent streams, and the remaining 1,700 gallons per day discharging downward through Layer 2 lacustrine clay.

C. Other Remedial Measures to Date

In 1994 the Immediate Remediation Measure (IRM) was installed at the Dura Avenue Landfill. The objective of this measure was to collect and treat the most serious discharge from the SECDA. This system consists of the following:

- A lined sheetpile barrier along approximately 750 feet of Sibley Creek and the Ottawa River.
- Massive repair and regrading of the riverbank behind this barrier.
- A drainage system to collect the shallow ground water (HSCL - hazardous substance containing liquid).
- A pumping system to convey the collected leachate to the treatment plant.
- An on-site pretreatment system to render the leachate suitable for discharge to the Toledo Wastewater Treatment Plant (POTW).

II. Nature and Extent of Contamination

The Remedial Investigation, performed 1989-1992 by the City of Toledo without the oversight of the Ohio EPA, included a number of tasks designated to identify the nature and extent of chemical contaminants in media, on and within the vicinity of the landfill. These tasks included sampling of soil, sediment, surface water, and ground water. The data obtained from the investigation were used to conduct a baseline risk assessment and to determine the need to pursue remedial alternatives. This Decision Document contains only a brief summary of the findings of the investigations. (The reader is directed to the Remedial Investigation Report for additional information on specific contaminant concentrations).

Sampling conducted as part of the investigation has documented that chemical contaminants from source areas have migrated to the surrounding media, e.g. soil. Addressing these contaminated media in a manner which ensures the long-term protection of human health and the environment is the objective of the proposed remedy.

The nature and extent of contamination at Dura Avenue Landfill in each environmental medium and the "contaminants of concern" attributable to the Site are described below:

A. Soil Contamination

Soil contamination was evaluated under separate categories of surficial and subsurface soils. Although some surficial soil contaminants are present on-Site, they generally do not exceed background levels. By contrast, a large number of contaminants of concern were identified in deeper on-Site soils. A majority of these are classified as polynuclear (or polycyclic) aromatic hydrocarbons (PAHs), which were widely distributed throughout the Site.

B. Ground Water Contamination

Ground water contamination was likewise evaluated under two categories: shallow ground water (leachate, or water that has percolated through refuse) and deep ground water. Very limited sampling of the deep ground water was conducted, and the presence of some contaminants of concern, including volatiles, semivolatiles and a pesticide was indicated. In contrast, numerous samples have shown that the shallow ground water leachate is highly contaminated by a wide variety of hazardous chemicals. Shallow ground water (leachate) contamination is strongly influenced by the area of the Site in which it occurs. In a southeastern area of the landfill where industrial disposal took place, leachate characteristics are much different than over the rest of the Site. This area, hereafter referred to as the "Southeast Chemical Disposal Area" or SECDA, is characterized by the presence of a nonaqueous layer floating on the water table surface. Consequently, shallow ground water (leachate) contamination at the Site has been subdivided as follows: 1) light non-aqueous phase liquid (LNAPL) occurring in the SECDA; 2) aqueous phase liquid (APL), occurring in the SECDA; and 3) aqueous phase liquid (APL), occurring across the main body of the landfill outside the SECDA. LNAPL in the SECDA is highly contaminated by a wide range of organic contaminants, most notably: BTEX (benzene, toluene, ethylbenzene and xylene), PAHs (polynuclear aromatic hydrocarbons), phthalates, pesticides and PCBs. Some of these organic chemicals (e.g., bis[2-ethylhexyl]phthalate) occur as high as the percent level (10,000 Parts per million (ppm)). APL in the SECDA is also contaminated by the same type of chemicals found in the LNAPL, though the concentrations of these contaminants are typically

ten (10) to fifty (50) times less than in the LNAPL. Leachate occurring across the main body of the landfill contains similar chemicals, but at concentrations one hundred (100) to one thousand (1,000) times less than found in the SECDA.

C. Surface Water Contamination

Surface water analyses of samples collected adjacent to the Site in the Ottawa River and Sibley Creek generally did not show any significant variation from upstream to downstream of the landfill, despite the known discharge of contaminated leachate into these streams from the landfill. It is believed that dilution of leachate contaminants by the much larger stream flows is responsible for this observation. Ottawa River sediment data is not extensive. The limited data does indicate that the landfill is a contributor, although not the sole contributor, to contamination in the Ottawa River sediments. Among the more noteworthy contaminants in sediments were PAHs, phthalates, and PCBs, which were also detected in leachate.

D. Gaseous Releases

Real-time air measurements taken during the RI indicate that gaseous emissions are occurring at the Site, but that these emissions seem to be quickly diluted within the atmosphere to a point where they are generally not detectable away from intrusive activities. To date, the gas sampling has been quite limited, thus additional measurements are needed to fully assess gas emission risks of this Site.

E. Impacts to Adjacent Biological Resources

The Ohio Environmental Protection Agency has conducted evaluations of the aquatic health of the Ottawa River using established biocriteria indices. These surveys have shown a substantial deterioration in the health, variety and numbers of fish and other aquatic species in the Ottawa River along the length of the Site. While the Stickney Avenue Landfill, located across the Ottawa River from the Site, undoubtedly contributes to the deterioration of habitat in the Ottawa River in this region, based on the volume and composition of leachate from the Site, the Ohio EPA has concluded that the Site is a major source of local surface water pollution.

III. THREATS TO PUBLIC HEALTH or WELFARE or the ENVIRONMENT

A baseline risk assessment was conducted to evaluate current and future potential risks to human and ecological receptors associated with contaminants present at the Site. The results demonstrated that the existing concentrations of contaminants in the environmental media pose risks to human and ecological receptors at a level sufficient to trigger the need for remedial actions.

A. Threats to Public Health or Welfare

The Remedial Investigation/Feasibility Study included a human health evaluation. This was performed to estimate the human health risks associated with contaminants at the Dura Avenue Landfill. As part of this risk characterization, 10 indicator chemicals were selected from among the leachate contaminants of concern as representative of the highest risk chemicals on-Site. The selected indicators are: four potential carcinogens (benzene, carcinogenic polynuclear aromatic hydrocarbons (PAHs), polychlorinated biphenyls (PCBs), and arsenic); five non-carcinogens (toluene, -ethylbenzene, total xylenes, phenol, and non-carcinogenic PAHs); and one compound (bis(2-ethylhexyl)phthalate) which is classified under both categories. Three potential human exposure pathways were evaluated, including:

- Ingestion of fish from the Ottawa River;
- Dermal contact with leachate by persons trespassing on, and/or wading in waters adjacent to, the Site; and
- Inhalation of vapors volatilizing off leachate by persons trespassing on, and/or wading in waters adjacent to, the Site.

Potential health risks were characterized in terms of both noncarcinogenic effects and carcinogenic risk. In its present condition, with the IRM systems operating, the waste contained in the Dura Avenue Landfill is a source of unacceptable carcinogenic risks to persons eating fish from the Ottawa River or spending reasonable amounts of time on the Site. In addition, chemical releases from the landfill pose serious noncarcinogenic health risks to persons on the Site. Contamination of deep ground water is not considered to pose a significant risk due to the remote possibility of any person coming in contact with it in this industrialized area served by city water.

B. Threats to the Environment

Uncontrolled leachate discharge into adjacent surface waters is considered likely to be adversely impacting aquatic life. As described above, the Ohio EPA has evaluated biological indices of aquatic health along the Dura Avenue Landfill waterfront of the Ottawa River. These evaluations consist of capturing fish and other aquatic species and determining their numbers and health. The various criteria of biological health all show a marked deterioration moving downstream from the junction of Sibley Creek and the Ottawa River along the Site (see Table 1). The Ottawa River and Sibley Creek both currently fail to meet their legal designations as Warm Water Habitats (as defined in the Ohio Administrative Code 3745-1-07) in the areas adjacent to the Dura Avenue Landfill. In addition, some fish were analyzed for tissue PCB concentrations. Adjacent to the Site, fish tissue PCB levels as great as 500 ppm were detected.

Such high levels have led the Ohio Department of Health to advise against eating any fish from this river.

While the pollution of the Ottawa River certainly results from numerous sources, the Dura Avenue Landfill is clearly a major contributor to degradation of this river's condition. Implementing the remedy selected in this Decision Document is expected to mitigate the landfill's impact to the Ottawa River, and will certainly contribute to the successful restoration of this river to an acceptable condition. Full restoration of the Ottawa River will require remediation of all of the major sources of contamination along its length.

IV. OVERVIEW OF REMEDIAL ALTERNATIVES

A total of nine alternatives (with several sub-alternatives) were considered in the Feasibility Study (FS). A brief description of the major features of each of these alternatives follows. More detailed information about these alternatives can be found in the Feasibility Study and addendum located in the public repository.

It is the Agency's task to analyze these alternatives and select the best remedial action. In addition to evaluating the effective elements of these alternatives, the Agency also considers the effectiveness of implementing the alternative in stages or phases.

The principal features of these alternatives are presented in Table 2. Figures 3, 4 and 5 show the details of the extraction wells, slurry wall and sheetpile barriers used in FS Alternatives 6a, 6b, 7, 8 and 9. These designs are based on the Feasibility Study by URS Consultants except for Alternative 9 which was formulated by Ohio EPA in the FS Addendum.

A. No Action Alternative - FS Alternative 1

The no action alternative, would include discontinuation of the current IRM measures including collection and treatment of fluids from the SECDA. Those fluids would be discharged directly to the Ottawa River. This option is included for comparison purposes.

B. Capping (Synthetic Membrane I), No HSCL Treatment - FS Alternative 2

FS Alternative 2 consists of capping the Site (which includes repairs to the banks) and maintaining access controls with no other significant action. The IRM treatment plan would be discontinued after 5 years and the leachate would be discharged directly to the river. The details of the various cap designs discussed in these alternatives are presented in Figure 2, which is based on the Feasibility Study by URS Consultants.

C. Capping (Synthetic Membrane I), SECDA and Main Gate HSCL Treatment - FS Alternative 3a

FS Alternative 3a includes capping the landfill and collection and treatment of fluids from both the SECDA and main gate areas. The current IRM treatment system would be maintained. There would be no collection of leachate from the main body of the landfill.

D. Capping (Synthetic Membrane II), SECDA and Main Gate HSCL Treatment - FS Alternative 3b

FS Alternative 3b is the same as 3a, except that a geosynthetic clay liner is added to the cap design with the intent of reducing infiltration and, hence, reducing the discharge to the river.

E. Capping (Multi-Layer Soil), SECDA HSCL Treatment - FS Alternative 4

FS Alternative 4 retains treatment of the SECDA leachate but, unlike FS Alternatives 3a or 3b detailed in section 6.3 and 6.4, does not include collection and treatment of the

main gate area liquids. It also uses an all-soil cap design and, like the earlier plans, repairs the banks.

F. Capping (Multi-Media), no HSCL Treatment - FS Alternative 5

FS Alternative 5 is essentially Alternative 2 with a different cap design. It includes no long-term treatment of SECDA fluids, which would be discharged into the river.

G. Capping (Synthetic Membrane I), SECDA HSCL Treatment, Main Body Extraction Wells and HSCL Treatment. - FS Alternative 6a

This alternative includes capping, retention of the IRM treatment system for the SECDA area and a series of extraction wells around the perimeter of the main body to collect HSCL (for treatment as needed, before discharge to the sewer system). These extraction wells would collect most of the ground water to prevent its discharge to the river. This alternative does not have a dedicated system to extract HSCL from the main gate area.

H. Capping (Synthetic Membrane II), SECDA HSCL Treatment, Main Body Extraction Wells and HSCL Treatment - FS Alternative 6b

FS Alternative 6b is identical to 6a except that the cap design is changed to include a geosynthetic clay liner which would reduce infiltration into the landfill.

I. Capping (Synthetic Membrane I), SECDA HSCL Treatment, Main Body Slurry Wall, HSCL Collection Drain, HSCL Treatment - FS Alternative 7

This alternative combines capping to reduce infiltration with a barrier (underground slurry wall) to separate the Site from the river and a drain system similar to that of the IRM to collect ground water from the perimeter of the Site. The IRM treatment plant is retained to treat HSCL collected from the main body and SECDA. Phased implementation of Alternative 7 would mean all components would be implemented immediately with the exception of the installation of the underground slurry wall. Implementation of this element would be delayed several years in order to assess the effectiveness of the primary remedial phase. The delayed element could be implemented as needed.

J. Capping (Multi-Media), SECDA HSCL Treatment, Main Body Sheetpile Wall, Extraction Wells, HSCL Treatment - FS Alternative 8

This alternative combines capping, to reduce infiltration, with a sheetpile barrier (similar to that of the current IRM) to separate the rest of the Site from the river. A series of perimeter wells will collect HSCL from the main body of the Site. The IRM treatment plant is retained and HSCL collected from the main body and SECDA will be treated. Phased implementation of Alternative 8 would mean all remedial components would be implemented immediately, with the exception of the installation of the sheetpile barrier or main body extraction wells. Implementation of these elements would be delayed several years in order to assess the effectiveness of the primary remedial phase. The delayed elements could be implemented as needed.

K. Capping (Multi-Media), SECDA and Main Gate HSCL Treatment, Main Body Sheetpile Wall, Extraction Wells, HSCL Treatment - FS Alternative 9

FS Alternative 9 is essentially Alternative 8 with the addition of an extraction well to collect main gate HSCL and the addition of a sheetpile barrier and/or extraction well system to prevent ground water influx from the northeast area of the Site. That barrier, as well as the perimeter sheetpile barrier, would only be installed if necessary to control leachate influx and discharge. Phased implementation of Alternative 9 would mean all components would be implemented immediately with the exception of the installation of the sheetpile barrier or main body extraction wells. Implementation of these elements would be delayed several years in order to assess the effectiveness of the primary remedial phase. The delayed elements could be implemented as needed.

V. SELECTION CRITERIA FOR REMEDIAL ALTERNATIVES

In selecting a remedy for a contaminated Site, Ohio EPA considers the following eight criteria as outlined under USEPA's the National Contingency Plan (NCP) promulgated under CERCLA (40 CFR 300):

1. Overall protection of human health and the environment - addresses whether or not a remedy provides adequate protection, and describes how risks are eliminated, reduced or controlled through treatment, engineering controls, and/or institutional controls;
2. Compliance with all State, Federal and Local laws and regulations - addresses whether or not a remedy will meet all of the applicable State, Federal and Local environmental statutes;
3. Long-term effectiveness and permanence - refers to the ability of a remedy to maintain reliable protection of human health and the environment over time once pollution has been abated and clean-up goals have been met;
4. Reduction of toxicity, mobility, or volume through treatment - is the anticipated performance of the treatment technologies to yield a permanent solution. This includes the ability of the selected alternative to reduce the toxic characteristics of the chemicals of concern or remove the quantities of those chemicals to an acceptable risk concentration or regulatory limit and/or decrease the ability of the contaminants to migrate through the environment;
5. Short-term effectiveness - involves the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until pollution has been abated and clean-up goals are achieved;
6. Implementability - is the technical and administrative feasibility of a remedy, including the availability of goods and services needed to implement the chosen solution;
7. Cost - includes capital and operation and maintenance costs;
8. Community acceptance - is assessed in the Responsiveness Summary based upon review of the public comments received on the Remedial Investigation and Feasibility Study (RI/FS) report and the Preferred Plan.

The first two are threshold criteria required for acceptance of an alternative as both accomplishing the goal of health and environmental protection and complying with the law. The next five are the balancing criteria for picking the best option of the group. The cost estimates are based on figures provided by URS. Those estimates include only the direct costs of implementing an alternative at the Site and do not include other costs, such as damage to the environment or human health associated with an alternative. The last criterion, community

acceptance, is determined by the public comment and hearings on these alternatives.

VI. ANALYSIS OF ALTERNATIVES

This section looks at how each of the selection criteria enumerated in the previous section of this report is applied to the remedial alternatives found in Section IV.

A. Overall Protection of Human Health and the Environment

The assessment of risks to human health requires that pathways for exposure be identified and the quantitative risks of each path be estimated. Three chemical exposure routes have been identified: inhalation, dermal contact and fish ingestion. The first two routes are only applicable to persons who walk on the Site or who wade in the river near the Site. The third can apply to anyone eating fish which have been exposed to runoff from the Site. The normal criteria for acceptability of risk is that no one in the general public be subject to an incremental lifetime cancer risk greater than 1 in 10,000, with risks less than 1 in 1,000,000 preferred and that the total noncarcinogenic health risk have a hazard index less than 1.

Tables 3 and 4 summarize the estimated cancer and noncancer risks from each alternative for each of the three exposure routes.

As the Tables show, Alternatives 6 - 9 reduce the cancer and noncancer health risks to below calculable levels. Alternatives 3a and 3b reduce the cancer and noncancer risks to a very low but theoretically calculable level. Alternative 4 reduces the cancer risks to less than 1 in 10,000 but still more than the ideal 1 in 1,000,000 and maintains low noncancer risks. Alternatives 1, 2 and 5 retain unacceptably high cancer risks. A phased implementation of Alternative 9 results in short term cancer and noncancer risks identical to that of Alternative 3b and allows for the further risk reduction over the long term if needed.

B. Compliance with Applicable Regulations

Alternatives 7, 8 and 9 appear to offer the best compliance with applicable regulations in that those alternatives control discharge to the river, secure the Site, and control gas releases in an acceptable manner. The remaining major regulatory issue associated with these options is potential ground water contamination and migration from the main gate area. Continued ground water contamination would constitute a violation of the ban on water pollution contained in ORC 6111.04. The cap design in Alternative 7 does not comply with the appropriate regulations, although an exception may be approved.

Alternatives 6a and 6b offer similar compliance with the applicable regulations so long as the perimeter well system performs as anticipated. A failure of that system to capture the leachate could create a discharge in violation of ORC 6111.04 and water pollution rules. These alternatives also fail to capture and treat leachate from the main gate area. The other issues of cap design and ground water monitoring apply to these options as well.

Alternatives 3a and 3b would provide a long-term reduction of leachate discharges to the river, although that reduction might take several years to achieve. During that time, residual leachate

would drain into the river, despite the presence of a cap that restricts infiltration. Alternative 4 would allow a greater residual discharge to the river. The discharge issues associated with the main gate area are addressed by Alternatives 3a and 3b but not by Alternative 4. Ohio regulations require that caps meet certain design standards or that they are technically equivalent to those requirements; 3a and 3b have been determined to be technically approvable by Ohio EPA. Also, the non-regulation cap designs of 3a and 3b would have to qualify for a variance, in order to comply with state law. A phased implementation of Alternative 9 would result in discharge reductions similar to that of Alternative 3b, but would also retain the discharge interception element as a secondary phase should the remedy fail to achieve the expected leachate discharge reduction in the primary remedial phase.

Alternatives 1, 2 and 5 violate such substantial portions of state regulations on pollution and hazardous waste management that they could not be considered from a regulatory standpoint to be appropriate remedial actions at this Site.

C. Long-term Effectiveness and Permanence

Alternatives 7, 8 and 9 offer the best long-term effectiveness in that they include a physical barrier between the river and the landfill and have active treatment of the leachate that is collected. The proposed plans call for maintaining the collection and treatment operations for at least 30 years with possible discontinuation if contamination levels drop sufficiently that the leachate can be discharged to the POTW or the river without treatment. This approach may require that the mechanical systems of the pumps, transfer pipes and treatment plant be kept in good working order for up to the 30 year design period. Also the barriers, cap and gas collection systems must be maintained for that same time period and the ground water test wells monitored. The slurry wall/drain system of Alternative 7 appears to be the feature most vulnerable to long-term damage, particularly from high water in the river. In contrast, any other alternative that is selected would include riprap protection, or retention of natural vegetative cover where appropriate, of the banks up to the 581 foot height of the estimated 100 year flood.

Alternatives 6a and 6b have nearly the same long-term effectiveness as 7 through 9, provided that the perimeter well system works as planned. These alternatives do not require long-term maintenance of barriers, but instead will require constant attention to the ground water pumping system, which probably cannot tolerate long outages. This group lacks long-term control of leachate from the main gate area.

Alternatives 3a, 3b and 4 provide less long-term protection to human health and the environment than those of the two previous groups. They have the advantage of control of the main gate HSCL (Alternatives 3a and 3b) and comparatively less equipment to maintain.

Alternative 1, 2 and 5 do not offer adequate long-term effectiveness in reducing health and environmental risks.

D. Reduction of Toxicity, Mobility or Volume by Treatment

The treatment plant of the IRM is a significant factor in reducing toxicity and volume of hazardous substances from this Site. Its multiple systems are designed to remove the various contaminants found in the ground water of this Site. Leachate collected from the perimeter wells could probably be treated by the Toledo city sewer system, which is required to meet the standards for a discharge permit. Thus options 6a, 6b, 7, 8 and 9 would best satisfy this requirement by collecting the greatest volume of leachate for treatment and accounting for very low leachate discharges. Alternatives 3a, 3b and 4 would continue treatment of leachate collected behind the IRM barrier wall. Alternatives 1, 2 and 5 provide no treatment. Phased implementation of Alternatives 8 or 9 would collect and treat leachate volumes similar to that of Alternatives 3a and 3b respectively, in the short term, and would result in same low leachate discharges in the long term.

The barriers in Alternatives 7, 8 and 9 would be most effective in reducing mobility of the leachate by blocking its flow to the river.

E. Short-term Effectiveness

Alternatives 7 and 8 are estimated to require approximately 12 months construction time, while the others require 6 months. All of the options will produce some short-term disturbance of the Site during construction along with some release of hazardous waste. Those activities could pose some hazard to Site workers and the surrounding community, as well as polluting the river, although careful construction practice could minimize these risks. Of these options, Alternative 7 would pose the greatest risks of hazardous chemical release because it includes the greatest amount of fill excavation.

Alternatives 6a, 6b, 7, 8 and 9 would provide the quickest reduction in discharges to the Ottawa River and Sibley Creek because they would have active leachate collection and/or physical barriers to leachate discharge. Options 2, 3a, 3b, 4 and 5 and phased implementation of Alternatives 7 or 9 would provide less short-term effectiveness because they would allow for drainage of the residual leachate from the refuse to the river. However, after that drainage period (estimated at 5 to 7 years) the residual discharge should be reduced to acceptable levels.

F. Implementability

Administrative - Alternatives 7, 8 and 9 would probably pose the fewest permitting problems because they would leave the least uncontrolled discharges to the environment. Alternatives 6a and 6b would have similar requirements and approvals would probably depend on performance of the perimeter well system. Alternatives 3a, 3b and 4 and phased implementation of Alternatives 7, 8 or 9 would have to be carefully examined because of the larger volume discharges and higher human health risks. Alternatives 1, 2 and 5 could not be permitted under existing regulations.

Technical - The technical challenges of implementation are greatest with Alternatives 7 and 8, which involves the most extensive and complex construction. Both the sheetpile barrier and the slurry wall will require special construction techniques and will require additional engineering

studies to determine their ultimate feasibility. Alternatives 6a and 6b are more readily installed but their long-term performance depends on the unproven capabilities of the perimeter wells. In a similar manner, the technical barriers of installation are less with the remaining alternatives.

G. Cost

Table 2 summarizes estimated costs on these options, expressed in present worth of construction and maintenance for 30 years of operation. These cost estimates include the approximately \$5.5 million already spent on the IRM construction. The variability in these estimates derives from uncertainty in the time period over which different treatment options must be continued.

Alternative 9 presents an even wider range of costs because of the range of additional measures, such as leachate collection wells and sheetpile barriers that may be needed, should that intended reduction in discharge not be achieved by capping. Phased implementation of Alternative 9 offers great flexibility in cost to achieve Remedial Action Objectives (RAOs) as each phase can be implemented and its effectiveness evaluated to allow an informed decision on the necessity of further expenditures on subsequent phases.

H. Community Acceptance

The Ohio EPA received comments from three interested parties during the public comment period and at the public meeting which was held in Toledo. Those comments and OEPA's responses are included in the Responsiveness Summary. The Ohio EPA will take into account the concerns presented by the interested parties during the remedial design and implementation, however, there were no changes to the major components of the selected remedy based upon public comment.

VII. OHIO EPA'S SELECTED REMEDY

The selected remedial alternative is *phased implementation of FS Alternative 9*, with the addition of further investigation of the Northeast Boundary Area and appropriate monitoring of the primary remedial phase to determine its effectiveness.

A. **Alternative 9 with Phased Implementation - Primary Phase**

The elements of the primary phase of FS Alternative 9 are detailed below. For purposes of comparison, it can be noted that this primary phase is essentially equivalent to FS Alternative 3b with modifications as detailed below.

i. **Institutional Controls**

- a. Shallow Ground Water (Hazardous Substance Containing Leachate - HSCL) and Intermediate Ground Water Monitoring - involves the use of background and down gradient monitoring wells in the shallow (HSCL) and intermediate zones.
- b. Access Controls - consist of a fence, signs and deed restrictions.
- c. Hazardous Substance Containing Gas (HSCG) Monitoring - consists of a perimeter gas monitoring well system.

ii. **Source (Hazardous Substance Containing Waste - HSCW) Control**

The Site will be capped with a system of soil and waterproof membrane barriers to reduce the infiltration of rain water through the fill material and to eliminate the direct contact exposure pathway.

- a. Capping - this includes a synthetic membrane Type II cap (see FS for description) for the main body, SECDA (southeast chemical disposal area) and main gate area consistent with OAC 3745-27-11 or the equivalent.
- b. Sub Surface Barrier - maintenance of the existing IRM barrier in the SECDA.

iii. **Repair of Landfill Surface**

Consists of regrading and the construction of diversion berms and let down structures to promote adequate drainage and runoff.

iv. **Shallow Ground Water Leachate (HSCL) Collection Containment**

- a. SECDA (southeast chemical disposal area) - operation and maintenance of the existing IRM (Immediate Remediation Measure) collection system, including as necessary the removal of accumulated aqueous and non aqueous phase chemicals.
- b. Main Gate Area - includes interior pumping and free product recovery via a dedicated extraction system which will collect the contaminated ground water from the main gate chemical disposal area, including as necessary the removal of accumulated aqueous and non aqueous phase chemicals.

v. **HSCL Treatment**

The current IRM (Immediate Remediation Measure) treatment plant will be retained to

process the leachate for discharge to the sewer system.

- a. SECDA - treatment will be performed by the existing IRM pre-treatment system. Expect pre-treatment to last 30 years, may end earlier as appropriate.
- b. Main Gate Area - treatment will be performed by the existing IRM pre-treatment system. Expect pre-treatment to last 30 years, may end earlier as appropriate.

vi. River Bank Stabilization and Slope Repair

The river banks will be stabilized to the extent necessary to prevent washouts during high water periods and the landfill slopes will be stabilized, as necessary, to prevent failure.

- a. Placement of riprap at the toe of the riverbank/landfill slope, where appropriate.
- b. Regrading and revegetation, where appropriate.

vii. Hazardous Substance Containing Gas (HSCG)

A gas collection system will be installed to control buildup and emission of hazardous gases produced in the landfill in accordance with the requirements of OAC 3745-27-08 (C)(15)(g) and OAC 3745-27-12 [effective 1994].

viii. Northeast Study Area

The northeast boundary (Northeast Study Area) of the Site will be studied to determine its geological and hydrologic properties in lieu of immediate capping. Sufficient information will be developed to determine if measures are needed to control groundwater influx.

ix. Enhanced Environmental and Performance Monitoring to Determine Primary Phase Effectiveness

- a. The ecological impacts and aquatic health of the Ottawa River (biocriteria indices) of the primary phase will be monitored and evaluated. This will be done in accordance with the specifications in Appendix A.
- b. The additional monitoring will include measurements and sampling that can be used to estimate the volume and composition of any leachate escaping the Site to the Ottawa River and Sibley Creek for a period of at least 5 years after the remedy is constructed.

x. Operation and Maintenance

All remedial features will be operated and maintained as necessary to ensure performance standards are maintained.

B. Alternative 9 with Phased Implementation - Contingent Phase Elements

These elements, or portions thereof, will be implemented as necessary, and under separate orders, based on the effectiveness of the primary phase. Actual remedial actions may be a modification of those noted below, such modifications shall be based on the most current information available at the time and consistent with the RAOs.

i. A system to prevent influx of water from the Northeast

- a. Appropriate remedial measures (e.g. extraction wells and/or sheetpile barrier and/or cap extension) will be implemented in the Northeast Boundary Area consistent with the rest of the Site as determined by the study.

ii. Main Body Subsurface Barriers

- a. Main Body Extraction Wells - If after cap installation the volume and toxicity of leachate discharges do not generally drop as projected by Ohio EPA's model, river bank leachate extraction wells will likely be required to reduce the total chemical load discharged to the river and the creek.
- b. Sheetpile barriers - These will be required only if perimeter extraction wells cannot effectively control discharge to the river.
- c. Main Body HSCL Treatment - Discharge of main body HSCL will be to the POTW so long as is necessary with the option of discharge to the IRM treatment plant if contaminants should become significantly worse.

VIII. CONCLUSION

The phased implementation of FS Alternative 9 was selected because the Primary Phase of FS Alternative 9 is expected to achieve all RAOs identified in Section 5.0 of the Preferred Plan; however, should the Primary Phase fail to meet the RAOs, the preferred alternative retains a Contingent Phase that can be implemented under a separate order and is designed to ensure all RAOs are achieved. This option was selected over other measures that feature more immediate leachate control because the long-term results are projected to be similar, while phased implementation preserves the potential for significant cost savings in the event the primary phase meets all performance goals and the contingent phase(s) prove unnecessary.

A performance monitoring program will be implemented to evaluate the effectiveness of the Primary Phase of Alternative 9 in meeting its performance standards. The results of the performance monitoring will allow Ohio EPA to determine whether the contingent phase elements will be required. Should performance monitoring indicate that adequate leachate reduction is not achieved, or risk goals are not being met, then the Contingent Phase measures may be implemented under a separate order.

STANDARD DEFINITIONS:

Administrative Record File - Those important and official records maintained by an agency in conjunction with a remediation effort.

APL - Aqueous Phase Liquid, water based fluids.

Background levels: Levels at which substances are commonly found in the environment. These may have been deposited naturally, as in the case of arsenic and other heavy metals in soil, or through human intervention, such as lead in the soil due to automotive emissions.

Baseline Risk Assessment - An assessment to evaluate potential risks to human health and the environment.

CERCLA - Comprehensive Environmental Response, Compensation and Liability Act.

Carcinogenic Risk - Risk to an individual of contracting cancer.

Contaminants of Concern - Chemicals considered in the risk evaluation because of their quantity, mobility and/or severe health effects.

FML - Flexible membrane liner, a sheet of plastic or similar material used to prevent water infiltration.

GCL - Geosynthetic clay liner, a thin sheet of bentonite clay used to prevent water infiltration.

HSCL - Hazardous substance containing liquid.

Lacustrine Clay - Clay deposited as sediment on the bottom of a lake.

Leachate: Leachate consists of water that has filtered through wastes and contaminated soils, picking up contaminants as it moves.

LNAPL - Light Non-aqueous Phase Liquid, non-water-based liquid which is lighter than water.

parts per billion (ppb) / parts per million (ppm): Units used to express low concentrations of contaminants. For example, one drop in an Olympic sized swimming pool equals one ppb.

Part per million - Volume or mass equal to one millionth of the total.

PCB - Polychlorinated biphenyl.

Permeable: Allowing passage through a material, especially liquids.

POTW - Publicly owned treatment works.

Remedial Action Objectives - Goals of environmental protection and restoration from the remedial activities.

Silurian Bedrock - Rock formations deposited during the Silurian geologic era.

Volatile Organic Compounds (VOCs): An organic compound that evaporates readily at room temperature, i.e. solvents.

Reports and Documents

Decision Document - Formal announcement of an agency's selected alternative for site remediation.

Preferred Plan - Document to inform the public and concerned parties of an agency's preferred alternative for site remediation and to solicit public input.

Feasibility Study Report - Study which identifies and evaluates various remediation options.

Remedial Investigation Report - Document which reports the results of a site investigation including the nature and extent of pollution problems.

INTRODUCTION TO RESPONSIVENESS SUMMARY FOR COMMENTS RECEIVED ON THE PREFERRED PLAN OF 1999.

On February 10, 1999, Ohio EPA conducted a public hearing on the Preferred Plan for the Dura Avenue Landfill (the Site) located at 444 Dura Avenue, Toledo, Ohio. The Preferred Plan summarized the Site history, hazardous waste contamination investigation activities, interim measures taken at the Site, removal actions, along with the final clean-up alternative. The Preferred Plan chosen by Ohio EPA also contained the preferred remedial alternative for the Site, a summary of the human health risk assessment findings and the rationale for the proposed remedial alternative. Written comments were accepted until the close of business on February 16, 1999. The following is a summary of responses to comments received by Ohio EPA during the comment period and at the public hearing.

Response to Comments made by Sue Horvath Received at Public Meeting, February 10, 1999:

1. *The comment related to a risk assessment of a swimmer downriver from the site.*

In assessing risk at a site, Ohio EPA considers a reasonable maximum exposure (RME) scenario based on the current conditions at the site. For purposes of the Dura Avenue Landfill, one of the RMEs consists of an individual wading in the Ottawa River adjacent to the landfill, exposed to river water which has been contaminated by leachate. This exposure scenario yields an unacceptable risk based on the estimated chemical impact to the Ottawa River from the Dura Avenue Landfill.

A scenario considering exposure of a swimmer near the Dura Avenue Landfill would result in an even greater risk because of the larger area of the body exposed. However, given the depth of water in the proximity of the landfill (2 to 4 feet), the consumption/contact advisories in place, and the general lack of recreational use in the area near the landfill, the swimmer scenario was not regarded as a reasonable exposure scenario.

Assessing the risk to a swimmer exposed to river water downstream of the landfill near the mouth of the Ottawa River is reasonable. However, it would result in a nominal level of risk due to the excessive dilution of the leachate by the river water, and the resultant low exposure point concentrations of contaminants. The wading scenario provides a more conservative estimate of risks resulting from exposure to contaminants at the Site. The leachate concentrations adjacent to the landfill are not expected to be diluted via mixing with river water, and therefore exposure concentrations are highest in the wading scenario. When the future risk assessment indicates that risk to an individual wading adjacent to the landfill is within acceptable range, the risk to a swimmer downstream of the landfill is expected to be acceptable as well.

1. *Comment regarding a review at five years of the completion of the cap.*

The Agency is not committed to a review at five years after completion of the cap. Rather, cap

performance and leachate impact on the Ottawa River will be monitored continually and additional remedial actions may be ordered when necessary. The standard for additional action would be a chemical impact on the river significantly greater than what would be predicted from the drainage models.

2. *Comment regarding the monitoring well system.*

Ohio EPA will review and approve any monitoring well system which is proposed for the remedy. The Agency will ensure that the system is adequate to evaluate leachate entering the Ottawa River from all areas, including near the IRM wall.

Response to Comments made by Rick VanLandingham Received at Public Meeting, February 10, 1999:

1. *The first part of these comments deals with the grass cover for the Site.*

The remedial design will consider the appropriate varieties of grass cover for this location and the desired remedial goals. Restoration of habitat will be considered for the landfill, the riparian areas and the Ottawa River itself. The Agency must consider, however, that restoration of a habitat conducive to burrowing animals may not be desirable as they may damage the waterproof barrier layer system, that will only be two feet below the cap surface.

Ohio EPA will ensure that the vegetative cover selected for the Site will function as an effective engineering control to limit erosion of the protective cover, and achieve the remedial action objectives. Other selection criteria for the vegetative cover is ultimately the choice of the Potentially Responsible Parties (PRPs). Ohio EPA will encourage the PRPs to consider a variety of grasses to cover the Site, some of which will encourage the restoration of habitat. However, the ultimate purpose of the cover is to protect the main components of the capping system.

2. *The second issue raised in these comments is the long period needed for leachate drain-out.*

The Agency must clarify that the chart of predicted leachate drainage, included in the Preferred Plan, does not indicate a permanent final drainage rate of 5,000 gallons per day. Rather, it is the estimated rate of drainage approximately 10 years after capping. The rate will continue to decrease with time as the landfill dries out. That long drain-out period is an unavoidable consequence of the unique nature of this landfill - a large volume of saturated porous refuse, above water level, in a clay-lined river corridor. Those conditions focus the gravity-driven drainage into the Ottawa River.

Currently, the volume of leachate discharging from the landfill into the Ottawa River is estimated to be as much as 10 million gallons per year. The expeditious implementation of the proposed remedial action will immediately begin to reduce this large volume of leachate flow.

The drainage curve provided in the Preferred Plan indicates that the flow of leachate from the Dura Avenue Landfill will decrease to half of the present rate within four years of the remedy's implementation. Based upon the results of the risk assessment, risk levels at the Site are expected to be within an acceptable range within a reasonable time frame (2 to 5 years). Although leachate will continue to discharge from the landfill after 2 to 5 years of capping, the risk associated with the reduced volume of leachate discharge is expected to be nominal. The quantity and chemical composition of the leachate will be monitored and if the total impact on the Ottawa River is found not to be decreasing as predicted, then other remedial measures such as leachate collection will be considered.

Response to Comments made by Judith Junga, Toledo, Ohio:

1. *In reading through the above-mentioned document, I especially noted the third paragraph under "1.3" on Page 5: "Second, as a result of a study prepared by the United States Environmental Protection Agency, the estimate of the cancer risk of the chemicals known as polychlorinated biphenyls (PCB's), a chemical of concern at this site, has been revised. While still considered a potent carcinogen, the risk posed by those chemicals is now considered to be less than was previously thought". With all due respect, this last sentence does not make sense. It is my understanding that the studies were conducted on laboratory animals. Too often in the past studies conducted on laboratory animals were the object of scorn; i.e., how does one translate such studies to risk in humans?*

The studies cited by the U.S. EPA are based on animal exposures because studies on human response to hazardous chemicals are generally few in number and limited to unintentional or accidental exposures, where dosage is difficult to accurately determine. The animal studies generally indicate a linear relationship between dosage and resultant incidence of cancer. That relationship is called the slope factor. The U.S. EPA revised its value of slope factor downward by approximately a factor of four in view of newer data it judged to be more reliable. As a consequence, while PCB's are still considered carcinogens, the number of cancer cases estimated to result from a given dosage to an animal population is now believed to be about a fourth of the previous number. In making the conversion from animal to human risk estimates, the difference in body weight is considered because slope factors are based on a ratio of weight of chemical ingested to body weight.

2. *There are still many unanswered questions about the numbers and locations of other unregulated dumps in the area of the Dura dump and the geology, hydrogeology, and the flow patterns in this area. The Preferred Plan states that "The northeast boundary of the Site will be extensively studied to determine its geological and hydrogeological properties." I think, as I stated in the earlier public comments, that this must be done and the parameters of any such studies should be set and presented to the public for comment.*

Ohio EPA, in conjunction with the City of Toledo and the Industrial Parties to this Site, has conducted some preliminary investigations of the area northeast of the landfill. Future studies will be conducted during the course of remediation. The details of such studies, as well as other aspects of the remedial action, will be a part of the public record for this Site, but are not subject to the public participation process during their planning.

3. *I am concerned about the long-term dedication to the remedial action. Considerable oversight by Ohio EPA and the public are crucial to maintain the plan implemented and to address other problems which may show up in the future. How will this be funded?*

The Agency will maintain oversight of this project for as long as necessary to assure protection of the public health and the environment. This will include review of all data collected from the proposed long-term monitoring plan. Details of cost-recovery are finalized, and it has been agreed that the costs of Agency oversight will be sustained by the responsible parties at this Site.

4. *I do not favor any type of activity on, or around, the Dura Dump. This includes buildings of any kind or recreational settings of any kind. Natural erosion will take its toll over the years on any engineered structure of this kind: disruption by any human endeavors and activities will only accelerate degradation.*

At present, there is no future reuse envisioned for the Dura Avenue Landfill. If at some future date the City of Toledo wishes to redevelop the Site, it would require approval from the Agency to do so. Such approval could only be granted upon a showing the reuse would not threaten human health or damage the environment. The operations and maintenance plan requires inspection for erosion of the remediated Site and repairs should any damage occur.

5. *I favor regular testing of waters, soils and fish and wildlife over the years to determine the effectiveness of remediation measures. Sediment (boring) samples should be taken along the Ottawa River by the Dura Dump, in addition to upstream and downstream of the dump.*

The long-term operations and maintenance plan requires testing of ground water on and around the Site as well as evaluation of aquatic life adjacent to the Site. That sampling will likely include Ottawa River sediments.

6. *A document depository of significant information should be established at the Toledo-Lucas County Main Branch and Point Place Branch Libraries. Regular updates on the progress of remediation, along with results of all testing and analyses reports should be maintained at the Northwest District Office of Ohio EPA in Bowling Green, Ohio.*

Significant documents, such as the Remedial Investigation/ Feasibility Study are deposited at those libraries. The Northwest District Office maintains all other documents relevant to this Site. With few exceptions, those documents are subject to Ohio's public record laws and may be examined at the district office.

7. *Water and sediment samples should be taken on a regular basis at the mouth of the Ottawa River in North Maumee Bay. If at all possible fish testing should be done at a regular basis at this location.*

The Agency is presently conducting an extensive study of sediment contamination along the Ottawa River from Maumee Bay to approximately 8.5 miles inland. Biological samples are also regularly collected along the Ottawa River in conjunction with the City of Toledo's sewer system discharge permit.

8. *The Ottawa River has been greatly abused, and long-term remediation and oversight will be necessary to improve the condition of this waterway, both in the area of the Dura Dump and in the other areas of concern.*

Ohio EPA is committed to the restoration of this river. However, it is a long-term process that must first include remediation of major pollution sources such as the Dura Avenue Landfill.

INTRODUCTION TO RESPONSIVENESS SUMMARY FOR COMMENTS RECEIVED ON THE PREFERRED PLAN OF 1995

Ohio EPA first published its "Preferred Plan for the Remediation of the City of Toledo's Dura Avenue Landfill" on April 19, 1995. This Plan described a proposed remedy at the Dura Avenue Landfill. The Agency solicited and received comments from the public on the remedial proposals contained in the Plan, and upon consideration of those comments and further discussions with responsible parties, republished a new Preferred Plan on January 7, 1999. The new Plan should be viewed as part of the response by Ohio EPA to the comments received on the original Plan. Further responses to the comments received in 1995 are included below.

Response to September 1995 comments by Thompson, Hine and Flory (TH&F). The actual comments made by TH&F can be found in the Document Repository:

The issues presented in the "Overview" to the comments submitted by the law firm of Thompson, Hine and Flory on behalf of Allied Signal, Inc., AP Parts Manufacturing Company, Browning Ferris Industries of Ohio and Michigan, Centerior Corporation (Toledo Edison), Chrysler Corporation, Dana Corporation, the Dial Corporation, E.I. du Pont de Nemours Corporation, GenCorp, Inc., Libbey-Owens-Ford Co., Mather Seal Company, Owens-Illinois Inc., Sun-Dell Refining and Marketing Company, Tecumseh Products Company, Teledyne Ryan Aeronautical, and the Toledo Blade (hereinafter, "the THF Comments"), do not address the technical sufficiency of the proposed remedial action at the Dura Avenue Landfill, but argue, instead, that Ohio EPA lacks the legal authority to proceed as proposed. To the contrary, Ohio EPA has the legal authority to design and select remedial actions at sites where hazardous waste has been treated, stored, or disposed and which cause pollution of the air, soil, and/or waters of

the State, as is the case at the Dura Avenue Landfill Site.

The "Overview" to the THF Comments suggests that Ohio EPA was acting on "speculation." There is no speculation involved in the fact that the Dura Avenue landfill has never been certified as closed, nor that contamination from the Dura Avenue Landfill is causing pollution of the waters of the State. The State of Ohio, through the RI/FS produced by the City of Toledo and through its own inspections and investigations of the Site, has obtained sufficient information to reach a decision regarding necessary remedial action at the Dura Avenue Landfill. While the Agency found the Remedial Investigation and Feasibility Study conducted by the City to be incomplete, it does not reject the data contained in those documents. The addendum, prepared by the Agency in 1995, completes the RI/FS.

The comments repeatedly assert that the Dura Avenue Landfill was closed in 1980 and that current rules do not apply to closure at that site. The Ohio EPA rejects that claim on the grounds that simple cessation of dumping does not constitute legal closure, in that closure was never certified to any governmental body. Since the initial creation of the Dura Landfill, Ohio has promulgated three sets of solid waste landfill rules. Ohio's most recent revision of solid waste rules became effective 06/01/94, which superseded rules from 1990 and 1976. OAC 3745-27-11 discusses which of these rules apply to closures. The important part, from the perspective of this site, is 3745-27-11 (M) and (N). From these rules, it would appear that a landfill engaging in closure by 1990 could have closed under the 1976 rules, so long as closure was certified as complete by 06/01/94. If the closure was not certified as complete by 1994, then the landfill must be closed by today's rules.

With regard to the application mentioned in the THF Comments to perform well drilling operations on the Dura Avenue Landfill, it should be noted that the application was submitted after the applicants had received a unilateral administrative order to perform the interim action at the Site, and were in violation of the order.

Furthermore, the THF Comments incorrectly ascribe perceptions and/or motivations to Ohio EPA with the comment that "Ohio EPA is trying to recapture what it perceives to be lost time...." In fact, Ohio EPA sees no reason for any further delay on a project which has been the subject of years of debate.

Response to October 1995 comments by Laura Gooch, P.E. of URS Consultants on behalf of the City of Toledo on the first Preferred Plan:

Section 2.1 General Comments

1. *The City's statement in the FS Executive Summary (and elsewhere in the FS) that the Dura Avenue Landfill was closed in 1980 is a factually and legally correct statement.*

OEPA maintains its position that the simple discontinuation of operations does not constitute legal closure of a landfill, even by the standards in effect in 1980. This landfill has never been

issued a certificate of closure.

2. *The City disputes a number of other legal comments by the Ohio EPA. A few key disputes are as follows:*

The City maintains its positions, set forth in the FS, as to which requirements constitute "ARARs." Moreover, "ARAR" is the appropriate term since the City, in responding to releases of hazardous substances, initiated the cleanup activities, including the RI/FS, pursuant to CERCLA.

Since the Dura Avenue Landfill remediation is presently being conducted under Ohio law and is not a listed CERCLA site, those Ohio statutes and regulations which are applicable will be imposed there. "Appropriate and relevant" has no meaning under state law, where regulations are either applicable or they are not.

3. *Even if the capping regulations did apply (and the City maintains they do not), both of the synthetic membrane cap designs "...might be approved by the Ohio EPA if their performance is deemed adequate." As is discussed elsewhere in these comments, both the Synthetic Membrane Type I and Type II caps would satisfy the performance requirements. In addition, the Synthetic Membrane Type II cap includes a GCL/FML barrier, so that it complies with the regulatory preference for use of a double barrier where an FML is used. The Synthetic Membrane Type II cap is therefore a viable alternative which is allowable under OAC 3745-27-15-08(C)(15)(I). Recent public statements by the Ohio EPA recognize the superiority of membrane caps.*

Please refer to Ohio EPA's 1999 Preferred Plan which discusses the Synthetic Membrane Type II cap design.

4. *Finally, the Ohio EPA does not appear to have the legal authority to select a "Preferred Plan" and impose it on the City or the private parties. There is no authority under Ohio law granting the Ohio EPA such power. Nonetheless, the City has demonstrated its willingness to cooperate with the Ohio EPA's reasonable and lawful pronouncements on NCP compliance so that the City can evaluate the "regulatory acceptance" factor of the NCP as required by that document. In addition, the Ohio EPA would be in a better position to "select a remedy" if it intervened as a necessary party in the case of the City of Toledo v. Allied-Signal et al. Case No. 3-90-CV-7140, pending in the United States District Court for the Northern District of Ohio, before Hon. James Carr.*

OEPA bases its legal authority to prepare a plan for remediation on ORC 3734.21 (B), which states that "Before beginning to clean up any facility under this section, the director shall develop a plan for the cleanup and an estimate of the cost thereof". As a point of information, while OEPA is not a party to the legal action mentioned above, it has participated in the court ordered mediation process.

2.2 Misunderstandings of Material in the FS and Technical Clarifications.

Comments to Ohio EPA

5. *Most of the content of the Ohio EPA's general comment relates to legal and policy issues which are discussed in Section 2.1; however, the following statement in the general comment indicates a misunderstanding of material presented in the FS:*

The Ohio EPA does not agree or disagree with the conclusion that the impact of the landfill is obscured by other sources of contamination along the Ottawa River.

The statement that the impact of the landfill is obscured by other sources of contamination along the Ottawa River appears twice in the FS (page ES-5 and page I-11). In both cases, the statement is part of a discussion of contamination to sediments and refers specifically to sediment contamination. Both paragraphs also contain the statement that the landfill presents a threat of contamination to the sediments, although it is not the only source of contamination along the river.

An examination of available data on sediment contamination with the contaminants of concern for Dura Avenue Landfill supports this conclusion. These data, summarized on Table 1, show that the maximum detected concentration of 8 of the 14 contaminants of concern for the landfill were detected in sediment samples from one of the following three locations: 1) Sibley Creek, approximately 1,200 feet upstream from the western boundary of the landfill; 2) the upstream reaches of the Ottawa River at River Mile (RM) 7.1 or 10.3, approximately 1.5 to 4.7 miles upstream from the upstream boundary of the landfill; 3) an unnamed tributary to the Ottawa River approximately 0.4 miles upstream from the upstream boundary of the landfill. None of these maximum concentrations can reasonably be attributed to the Dura Avenue Landfill, and the statement that the impact on sediments of contamination from Dura Avenue Landfill is obscured by other sources of contamination is correct and appropriate when taken in context. The data summarized in the table also indicate a number of contaminants of concern in sediment samples collected adjacent to the landfill, particularly in samples collected adjacent to the SECD, supporting the statement that the landfill presented a threat of contamination to the river prior to the construction of the IRM.

This discussion deals with the role of the Dura Avenue Landfill in contaminating the sediments of the Ottawa River. The Preferred Plan does not deal with sediments. Future remediation of Ottawa River sediments cannot proceed until all major sources of discharge, including the Dura Avenue Landfill have been remediated.

Comments to Ohio EPA

6. *Filling to the north of the landfill in the northeast corner of the site is discussed in some detail in the RI, as are the configurations of the Ottawa River and Sibley Creek prior to filling (pages 1-3 through 1-23), the bottom of fill elevation (Figures 1-7 and 1-8), and*

the hydrogeology of the landfill (pages 3-25 through 3-32). The data presented are based on available historical mapping (extending back to 1939) and aerial photography which allow delineation of the topography prior to filling. Because the pre-filling topography of this area can be identified with some certainty by existing mapping and photography, we do not agree that extensive investigation is required to evaluate any possible groundwater flow from this area. Further discussion of the appropriate evaluation of the impact that any possible groundwater flow is given in Section 2.3 of this document.

OEPA does not yet have adequate information to assess the possible influx of ground water from the northeast and northern boundaries of the site. Of particular concern is the total extent and depth of fill which may be hydrologically connected to the landfill and the depth and extent of conductive surface soil layers. The extent of fill in the Perstorp (DuPont) property is important because it appears to extend beyond the massive fill area near the riverbank. Even if the fill is not deep, it may act as a conductive layer, routing rainwater toward the Dura Avenue site. Our best estimate, based on studies of old aerial photographs and computer modeling, indicates that at least 2000 gallons/day may flow in from the Perstorp after capping.

7. *Section 1.4.2 states "...no evidence of contamination originating from the landfill [underlining added] was found in samples from the intermediate and deep aquifers..." Observed very low concentrations (generally on the order of 1 ppb) of organic compounds in the deep and intermediate aquifers are discussed both in the RI and in the AI (page C-3-33 and following). As the discussions in these documents indicate, the observed concentrations occur both upgradient from the landfill (MW-II and MW-IB) and downgradient from the landfill, and the only constituent that exceeds the drinking water Maximum Contaminant Levels (MCLs) is bis(2-ethylhexyl) phthalate (DEHP) in the upgradient wells. Because the landfill is in an industrial and urban area, the detection of low levels of organic chemicals in groundwater is not surprising, and cannot be attributed to the landfill.*

The 20 to 50 feet of low permeability clay that separate the landfill from the intermediate aquifer will continue to form an effective barrier to any migration of HSCL, including any phase-separated DNAPLs which may be present at the site, to the deep and intermediate groundwater. It should be noted that no data from the site demonstrate that phase-separated DNAPLs are present, and the statement that they may be present represents speculation on the part of the Ohio EPA.

Ohio EPA acknowledges that the deeper aquifers are probably part of a larger system whose pollution comes from multiple sources. It is not the intent of the current Preferred Plan to remediate that aquifer, although the plan will reduce rainwater infiltration through the refuse, thus reducing the impact of the Dura Avenue Landfill on the deeper aquifer.

The results of investigations so far presented to the Ohio EPA have not indicated the presence or absence of DNAPL (Dense Non Aqueous Phase Liquids) phases at the bottom of the fill. However, the presence of low-solubility, heavier-than-water compounds, like trichloroethene, suggest that a source reservoir (DNAPL) pocket may be present.

8. *The City has questioned the legal applicability of OAC 3745-27-08 to the Dura Avenue Landfill. Notwithstanding this legal dispute, the following discussion presents technical data on the proposed cap in the framework of the cited regulations and associated guidances. The Synthetic Membrane Type I and Type II caps meet the purpose of these regulations. The discussion below relates to the evaluation of both types of caps.*

Ohio EPA considers that the capping requirements of OAC 3745-27-08 are applicable in the closure of the Dura Avenue Landfill. Please refer to the 1999 Preferred Plan regarding discussions of the Synthetic Membrane Type II design.

9. *As is discussed in the FS (see pages 2-52, 4-17, 4-19, 4-34, etc.), the possibility of creating an effective hydraulic barrier at the Dura Avenue Landfill by means of pumping wells is uncertain, and, in the unlikely event that such a barrier is needed, further hydraulic testing would be required prior to design. Although it is extremely unlikely that a perimeter pumping system would lead to sufficient inflow from the north to render the pumping system ineffective (Ohio EPA has estimated an inflow of less than 2 gpm), hydraulic testing performed to allow the design of the system would also establish any impact of the boundary in this area. Even in the unlikely event that the risks posed by the site are judged to make some form of perimeter barrier necessary, it is very doubtful that an expensive sheetpile barrier to the northeast would be an appropriate or necessary addition to the Dura Avenue remedial action.*

We agree that it would be necessary to monitor the effectiveness of a perimeter pumping system if such a system is installed. However, if an effective hydraulic barrier can be developed by the use of pumping wells, and is demonstrated to be effective by the use of piezometers between the wells, the addition of monitoring wells outside of the barrier to detect migration would be superfluous. HSCL will not migrate against the hydraulic gradient.

Several points need to be clarified. Ohio EPA recognizes that, based on computer modeling studies that were not completed at the time of release of the Preferred Plan, that influx from the north side of the site would probably not overwhelm the perimeter pumping system. Also, with the installation of an effective perimeter pump system, sheetpile barriers along the Perstorp boundary would probably be unnecessary. If water table monitoring along the line of the perimeter wells (through piezometers) demonstrated that an effective hydraulic barrier was being maintained, then composition monitoring of the leachate from the refuse would not be needed.

10. *There are no existing pathways for human or ecological receptors to be exposed to LNAPL in the main gate area. In addition, the distance of the main gate area from the river and creek makes it unlikely that any direct exposure to main gate LNAPL would occur under post-closure conditions. The FS statement that no unacceptable health risk or release is associated with the main gate LNAPL is therefore correct and appropriate. Any risk posed by APL from the main gate area was considered appropriately in the FS risk analyses.*

Ohio EPA's major concern with contamination from the Main Gate hot spot is that it might migrate north toward occupied buildings across Dura Avenue. The available data on the water table in that region indicates that the gradient is flat or even slightly northward near the main gate. The incremental costs of an extraction well near the main gate are low and can be justified by the need to remove potential risks of offsite migration.

11. *Reexamination of aerial photographs of the site taken in August 1992 indicates that the nearest building is over 400 feet from the landfill boundary in the northeast area.*

Reexamination of those aerial photographs indicates that the structure referred to by Ohio EPA is a storage tank.

2.3 Analysis of Uncertainty in Risk Estimates

12. *It is also worth noting that even if the estimated risk is distorted by increasing flow from the landfill by the 2,500 gpd that the Ohio EPA has estimated may enter the site from the northeast (or even by nearly 10 times that amount), no unacceptable risk results for Alternative 3b, the most protective of the no-barrier alternatives. Finally, the Ohio EPA comment on Appendix B of the FS suggests that other significant risk pathways may have been omitted from the FS, specifically citing the possibilities of oral ingestion of dirt, dust, or leachate or the inhalation of HSCG. It is not reasonable to suppose that any of these pathways will contribute significantly to the risk after remediation. All remedial alternatives (other than no action) include further capping which would completely eliminate the possibility of dirt or dust ingestion for over 90 % of the landfill surface. Although the additional capping will not extend down the slopes for most alternatives, existing surface soil at the site has low levels of contamination and therefore presents minimal ingestion risk. Regular oral intake of leachate in the Ottawa River is not a reasonable exposure scenario, since the landfill is in the middle of an urban area with readily available public water supply. All alternatives include post-remedy monitoring of HSCG, with conversion to an active collection system if necessary. Long-term exposure to contaminated HSCG is therefore not an appropriate post-remedy exposure pathway.*

Ohio EPA acknowledges that proper capping of the site will virtually eliminate risks from soil ingestion and inhalation and from leachate contact to persons on the site. In addition, migration of hazardous liquids off-site from the Main Gate area and hazards from fish ingestion will diminish substantially with time after capping.

2.4 Section 4.0, Evaluation of Alternatives

13. *Section 4.1.7 Cost - Although Ohio EPA states that the cost estimate for Alternative 9 was based on their understanding of URS' cost estimates for other alternatives, the cost estimate for Alternative 9 was not provided by URS. The Ohio EPA estimate and discussion of costs fail to adequately consider factors which could significantly increase the cost of this alternative. As is discussed above, there is much more uncertainty associated with costs for Alternative 9 than for many other alternatives, and this*

uncertainty distorts the assessment of the relative costs of the alternatives. For example, the cost of the alternative is very sensitive to the volume of river water that might be drawn into the pumping well system; each 5 gpm increase in flow from the river will result in an estimated \$1,000,000 increase in the cost of the alternative. In addition, the number of pumping wells required, the feasibility of a sheetpile barrier, and the type of sheetpile that will be required can only be determined after further testing at the landfill. Finalization of the design of these elements of the remedy could lead to many millions of dollars of increase in the cost of the remedy proposed by Alternative 9.

Ohio EPA acknowledges that URS Consultants did not estimate the cost of the Preferred Plan's Alternative 9. Rather, Ohio EPA made that estimate based on figures presented in the FS. The base price for Alternative 9 is that of Alternative 6b plus the added costs for the main gate area extraction well and the multi-media cap. If the synthetic membrane type II cap were approved, the baseline cost of this option becomes nearly identical to that of 6b because the only difference would be the extra extraction well. Additional costs of sheetpile barriers would only be incurred if absolutely necessary. Thus the City of Toledo and URS Consultants should consider the basic cost estimate for Alternative 9 to be as reliable as their own estimate for 6b. The primary cause of concern about the cost of the Preferred Plan is the uncertainty in the design and performance of the perimeter pumping system. That uncertainty also applies to Alternative 6b.

14. *Section 4.2.3 Alternative 3a - In the discussion of compliance with applicable regulations, the evaluation states that the cap design is not in accordance with ARARs. For discussion of this issue, see item 4 under Section 2.2 of this document.*

The cap design issues were discussed previously.

Section 4.2.8 Alternative 6a -

Please refer to the 1999 Preferred Plan for discussion on this section.

15. *Section 4.2.11 Alternative 9 - The discussion on long-term effectiveness and permanence includes the assumption that leachate from the main body of the landfill will need to be treated at the IRM pre-treatment plant prior to discharge to the City of Toledo POTW. Evaluation of available data on water quality in the main body of the landfill does not indicate that pretreatment will be necessary. If treatment should be needed, the cost of Alternative 9 would be much higher than estimated by Ohio EPA.*

Please refer to the 1999 Preferred Plan for discussion on this section.

2.5 Ecological Risk Assessment

16. *None of the data presented in the ERA make any distinction between conditions that existed before construction of the IRM and conditions that exist since the IRM construction. The completion of the IRM in 1994 dramatically reduced the impact of the landfill on the river by reducing the estimated contaminant loading to a small fraction of*

its pre-IRM value (by an estimated 99.9% for PCBs, for example). The evaluation of most of the remedial alternatives involves determining the amount of further reduction in impact to the river that is needed to protect human health and the environment. None of the ecological data presented in the ERA allow an evaluation of the relative ecological improvement that will be provided by different remedial alternatives.

The statement that "...the numerous leachate seeps discharging from the Dura Avenue Landfill serve as sources of significant contaminants of concern, especially PCBs..." (p. 56) is not true under post-IRM conditions, since the IRM has eliminated such a large fraction of the contaminant discharge.

Fish, sediment, and water quality data discussed in general terms in the report were collected prior to the construction of the IRM. In addition, the data were collected from the length of the Ottawa River, and the EPA does not provide an adequate profile of relative concentrations along the river to allow impacts which may be attributable to Dura Avenue to be evaluated relative to impacts which may be from other contaminant sources. As a result, the discussion presented is relevant to the overall health of the Ottawa River, but of questionable relevance to the selection of remedial action at Dura Avenue Landfill.

Ohio EPA has conducted additional sampling of water quality, sediments and biocriteria in the Ottawa River and Sibley Creek to assess the current, post-IRM conditions. This evaluation, was conducted during the summer of 1996, and included an evaluation of the numbers, types and health of aquatic species found near the Dura Avenue Landfill site. The results of this sampling indicate that Ottawa River and Sibley Creek still suffer from serious environmental pollution and the effects of that pollution become greater along the length of the Dura Landfill. Furthermore, Ohio EPA field personnel have observed leachate seeps from this site in areas removed from the IRM barrier.

2.6 Selection of Alternative 9 as the Ohio EPA Preferred Plan

17. ***Section 5.1 Risk to Human Health*** - *The statement that the landfill currently poses unacceptable non-carcinogenic risk with the IRM operating is incorrect. The hazard index is less than 1 under current conditions.*

Ohio EPA bases that statement on the possibility of direct dermal exposure to undiluted leachate seeps from an uncapped landfill surface, which is what currently exists. That aspect of risk is equivalent to the risks of Alternative 1, as described in the City's Feasibility Study and presented in Table 7b of Appendix B of that study.

18. ***Section 5.2 Risks to Ecological Receptors*** - *The fish tissue data cited were collected prior to the construction of the IRM.*

Fish tissue samples collected during 1996 show serious contamination, especially from PCB's.

19. *Section 6. Remedial Action Objectives - The Ohio EPA's Preferred Plan appears to redefine the remedial action objectives for the site. Since the EPA has made no comment on the objectives presented in the FS, it is assumed that they have accepted these objectives, and that the redefinition in the Preferred Plan is inappropriate.*

While Ohio EPA may have stated its objectives differently than URS Consultants, we believe that the results of achieving those objectives will be essentially the same - the reduction of hazardous chemical discharges to acceptable levels. Ohio EPA is not obliged to accept the objectives exactly as stated in the feasibility study.

Response to June 1995 comments by Judith Junga of Toledo Ohio:

1. *The Immediate Remedial measure facilities for the Dura Avenue dump consist of a barrier wall in the Ottawa River and Sibley Creek along the portion of the dump down gradient from the Southeast Chemical Disposal Area, a shallow ground water collection system, a pumping system to convey hazardous liquids to an on-site treatment facility, and a treatment system for hazardous liquids which are then discharged to Toledo's waste water treatment plant.*

Question: How efficient is this pump and treat system?

At present the IRM is trapping approximately 5000 gallons of highly contaminated leachate each day. That leachate is transferred to the treatment plant where it is treated to the acceptance standards for the Toledo sewer system. Ohio EPA has no reason to believe that leachate from the Southeast Chemical Disposal Area is escaping through or under this barrier system which consists of lined sheet steel driven deep into the underlying clay bed.

2. *Page Eight of Ohio EPA's "Preferred Plan" document states that surface water analyses of samples from the Ottawa River and Sibley Creek generally did not show any significant variation from upstream to downstream of the Dura dump despite the known discharge of contaminated leachate into these streams from the dump.*

Question: Since there are, reportedly, numerous other contributing sources of contaminant discharge in this area, what is meant by "significant variation"? Also, dilution of leachate contaminants by the much larger stream flows is believed to be responsible for the lack of significant variation in surface water analyses from upstream to downstream. Does this "dilution" serve to reduce the risks posed by these contaminants? What, exactly, happens to these contaminants once they have been "diluted" by the stream flow?

Upstream and downstream water sampling in the Ottawa River is complicated by the presence of the Stickney Landfill across from the Dura Avenue site, and by the variability in the height, flow rate and even flow direction of the Ottawa River. For these reasons the precise contribution of

any given nonpoint source, such as the Dura Landfill, can be difficult to determine. However, the total contribution from the Dura Landfill to Ottawa River pollution can be estimated from leachate sampling within the site and from estimates of flow volume in the site. The effects of dilution are calculated when determining risks from this site. In particular, the fish-consumption route of human health risk is based on calculations which include dilution into the river followed by bioconcentration into the fish tissue prior to consumption by humans. In its evaluation of the Dura Avenue Landfill discharges into the Ottawa River, the Ohio EPA Division of Surface Water considered dilution effects in the river (as is also done in any point-source discharge permit application) and found the current discharges to be unacceptable.

3. *Page Nine of the Ohio EPA's "Preferred Plan" document states that a thorough ecological assessment is warranted and will be performed prior to remediation.*

Question: Who will set the parameters for such an assessment and who will perform and oversee that assessment? How will the impact of contaminant contributions from the Dura dump be determined as opposed to the numerous other reported contaminant sources in the area?

The Ohio EPA has a standard set of biocriteria tests, based on the number of fish, number and type of species and the health of aquatic species caught in a body of water. Those tests are used to evaluate the aquatic health of rivers all over the state. In the Summer of 1996, Ohio EPA staff members conducted standard biocriteria assessments in the Ottawa River and Sibley Creek near the Dura Landfill. Those assessments, described in the revised Preferred Plan, indicate that the river and creek fail to meet their designated habitat criteria and that the biocriteria indices become significantly worse along the stretch of the river that touches the landfill. While the relative contributions of the Dura and Stickney sites cannot be exactly quantified, based on the volumes and compositions of leachate discharges from those sites, we can fairly state that the Dura site has seriously impacted the aquatic health of the river.

4. *Page 14 of Ohio EPA's "Preferred Plan" document states that the remedial action objective is to permanently repair existing bank failures and take appropriate measures to prevent future damage to the banks, including washout during flood conditions.*

Question: Considering the Dura dump is located in the Ottawa River, how will this objective be accomplished?

The objective of riverbank repair is to reduce the risks of washout and erosion from the banks. This would be accomplished by a combination of regrading, addition of clean soil, replanting grass and the addition of a heavy rock barrier (riprap) up to the 100 year flood stage. In this manner, gross washout of refuse into the river could be significantly reduced. A schematic diagram of the repaired banks appears in Figure 3-4 of the City's Feasibility Study. Where appropriate, the existing wooded portions of the riverbank will be maintained, both to prevent washout and to provide a better natural habitat than a rock-lined bank.

5. *Page Two of the Ohio EPA's "Comments on and Addendum to the Dura Avenue Landfill RI/FS" states that ". . . a thorough and extensive geological evaluation of the northeast border of the site is needed."*

Question: Who will set the parameters for such an assessment and who will perform and oversee such an assessment?

This assessment would probably be performed by an experienced geotechnical engineering firm under the direction of Ohio EPA. The parameters would be set by Ohio EPA in consultation with the firm performing the assessment.

Response to comments by the Dumps and Landfills Group, MRIC:

1. *This public meeting profiling the Ottawa River resulted in the Dumps and Landfills Group of the Maumee Remedial Action Plan Committee formulating a resolution calling for the designation of the Ottawa River between Lagrange and Stickney Avenues as a Superfund site. Said resolution was subsequently adopted by the Board of Trustees of the Toledo Metropolitan Area Council of Government on December 21, 1994, with said resolution forwarded to the Director of Ohio EPA.*

Actions under the USEPA Superfund Program are not controlled by Ohio EPA. The Stickney and Tyler sites are already in that program. Other sites along the Ottawa River will be addressed by the state's continuing program for remediation of this area and perhaps by Superfund at some future time.

2. *Therefore, we have grave concern with Ohio EPA's Preferred Plan limiting remediation to the property lines. The waste fill extended into an adjacent area beyond the northeast property boundary and was a part of the Dura Landfill when it operated. Subsequently, it is important that any grading plan, soil cover and cap include this area. A cap covering only a portion of the landfill will never fulfill the capping function of eliminating infiltration and, therefore, negates the value of any engineered system regardless of its complexity.*

Ohio EPA should immediately approach the property owners with intent to initiate a united grading plan, soil cover and necessary cap so that cost factors can be placed on the table in conjunction with the Dura project if possible, or as a separate project. Such action should be considered in lieu of any hydrologic study of the northeast area known as Perstorp to determine infiltration.

At present Ohio EPA believes that ground water is not flowing in from the Perstorp site, but might if the Dura Avenue site were capped. That water, which is not known to be contaminated, might pick up contamination as it passed through the Dura site. The monitoring program presented in the Preferred Plan is intended to detect all harmful discharges involving the Dura

Landfill. If infiltration from the Perstorp property is found to create an unacceptable impact on the Ottawa River, additional remedial activities will be included.

The Perstorp property is an active industrial facility, not an abandoned landfill, and remediation activities in that area could be quite complicated by efforts not to disrupt production. In an extreme and probably unlikely case, barriers would be added to isolate the north side of the Dura site from outside influx.

3. *We believe that the 18 proposed perimeter extraction wells should be replaced with strategically located extraction wells at the main gate area, and if necessary hot spots and the deep isolated waste areas (those areas involving waste below the river level). A bottom contour plan should be developed in order to more accurately identify these areas. LNAPL and DNAPL, if found, should be collected and sent to the current IRM treatment facility.*

The revised Preferred Plan will include an extraction well in the main gate area. A bottom contour plan, based on the elevation of the underlying clay bed, exists and has been used by Ohio EPA for modeling leachate production and drainage.

4. *Ohio EPA has indicated that the leachate mound within the landfill contains approximately 40 million gallons. Please provide the assumptions and calculations used to determine this value. Extracting this volume of leachate will reduce the volume of landfill to some degree and result in unavoidable surface settlement. Please provide reasonable estimates of the maximum probable total settlement and maximum probable differential settlement resulting from leachate extraction.*

The calculation of leachate volume is based on an analysis of the current water table (potentiometric surface) within the waste of the Dura Avenue Landfill. A map showing that water table is contained in Figure 1-4 of the City's Feasibility Study Report (January 1995). The recoverable volume of water, above the current river level, was estimated by dividing the site into blocks, 100 feet square, and multiplying the average water height within each block by the area of the block and the estimated storage coefficient of 0.3. Only that volume of water above the current river level was included, because only that water would be expected to drain by gravity. That total volume of water equals approximately 40 million gallons. These calculations were refined with the use of the MODFLOW ground water modeling software, developed by the U.S. Geological Survey. That model predicts the drainage of the waste following capping. Of the 40 million gallons of leachate, approximately 10 million would be captured by the current IRM system and the remaining 30 million gallons would go to the Ottawa River or Sibley Creek.

Settlement problems which follow drainage require additional engineering study and are beyond the scope of the Preferred Plan. Design for settlement would be a part of the remedial design phase of implementing the Preferred Plan. Any plan for a capping system would have to address potential settlement issues and allow a safe margin for anticipated settlement.

5. *With respect to the proposed preferred capping system involving a geodrain, flexible membrane liner and bentonite under seal, please provide a cost benefit analysis using an all soil and locally available clay liner for comparison. In the analysis address settlement issues due to gravity drainage, leachate extraction and total cap surcharge. Provide estimates of liner survivability and long term performance in the presence of these estimated settlements for both capping system.*

As indicated elsewhere in response to comments, Ohio EPA has seriously considered use of a multiple layer capping system which includes 24 inches of soil cover, a geotextile drainage net, a flexible membrane layer and a geosynthetic clay layer. Estimates from the City's Feasibility Study indicate that this membrane-based capping system would cost approximately \$7.6 million compared with \$8.6 million for a soil-based system. Settlement would probably be less for multiple layer membrane system because it would only be about 3 feet thick, compared with 5 feet for a soils-based cap. The lighter weight from reduced thickness would lead to less settlement. The leachate control performance of the multiple membrane system is estimated to be equivalent or better than that of a soils-based cap. A high density polyethylene (HDPE) liner has excellent resistance to stretching under the effects of settlement. Typically these liners can be pulled to 700 percent of their original length before tearing. That exceeds the deformability of any soil material. The exact needs for resistance to settlement would be determined in the remedial design. Polyethylene plastics have high chemical resistance and are well known for their long durability and lack of biodegradation in the environment. In this case such qualities would be useful for preserving the liner's barrier properties.

Response to June 1995 comments by Karen Litscher Johnson, Attorney with Much, Shelist, Freed, Denenburg & Ament, P.C., representing U.S. Reduction Company. The actual comments made by Karen Litscher Johnson can be found in the Document Repository:

The first issue contained in these comments includes a discussion of the analytical chemical procedures used to determine arsenic levels in the leachate at the Dura Avenue Landfill. While the presence of arsenic in the leachate may be relevant to establishing liability for cleanup costs at this site, its absence would not significantly reduce the need for remediation.

The comments assert that the arsenic detected in the leachate samples is really a false-positive signal resulting from the presence of massive quantities of aluminum. While aluminum may present spectral interference which could be misinterpreted as arsenic (caused by a minor spectral peak from aluminum which is similar to a major peak of arsenic), the statistical analysis presented by the commentator fails to prove that such has actually occurred in these analyses. The comments include plots of aluminum and arsenic concentrations in the leachate specimens, which purport to show a linear relationship between the two, and would be consistent with a minor spectral peak of aluminum being interpreted as a spectral peak of arsenic. A careful examination of these analyses and a reexamination of the original data show that the commentator's analysis contains an inaccurate and inappropriate use of statistical regression

techniques which fails to prove the contention that the arsenic signals result from aluminum interference.

The original data for these chemical analyses are contained in the 1989 and 1992 Remedial Investigations performed by URS Consultants for the City of Toledo. Those data will be reproduced in plots which follow. The original data show that the aluminum concentrations usually fall below 10,000 ppb with three samples containing in excess of 100,000 ppb. It is generally inappropriate to combine data of such large range in the same regression analysis (as done in Figure A of the comments) because the larger values overwhelm and obscure the smaller ones. It is also inappropriate to include an average number based on several data points in a regression analysis, as was done in that figure. The data point corresponding to 105,000 ppb aluminum and 279 ppb is the average value for leachate from the Southeast Chemical Disposal Area and represents no actual specimen analysis. Thus it cannot be validly used in a regression analysis. Furthermore, as a practical matter, the regression line determined in Figure A results from only one data point, which contains the maximum observed values of aluminum and arsenic, and does not really indicate any trend between the two across a number of specimens.

Similar problems occur in Figure B which treats the lower range of aluminum and arsenic concentrations. The data point corresponding to 8980 ppb of aluminum and 36 ppb of arsenic does not represent a real data point. Rather it combines the maximum observed values of those two elements in aqueous phase specimens obtained from the main body of the landfill. Those values did not occur in the same specimen and are meaningless for regression analysis, which measures the correlations of values in specimens. Likewise, this plot contains two points which represent averages for the main body of the landfill and the main gate areas. Thus, only one point on this plot represents a real sample, making the plot meaningless for regression analysis.

A more accurate analysis of these data points is presented in the plots below. Figure 1 contains the lower range data points (aluminum less than 15,000 ppb). This plot shows a very low degree of correlation between the aluminum and arsenic levels. Indeed, a regression analysis shows a correlation coefficient, R , for these data of approximately 0.28 ($R^2 = 0.082$), which is below the level for statistical significance. At best these data indicate that the arsenic and aluminum levels generally increase together, as would be expected if they came from the same source waste stream. However, the claim that the arsenic signals result from a systematic misinterpretation of aluminum spectral emissions cannot be supported from these data. Such a conclusion would require a highly linear relationship between the two, which is not demonstrated here.

Figure 2 shows a similar plot for the 3 specimens with high aluminum and arsenic contents. A quick observation of the scatter of the data and the regression line show that the arsenic indications are not simply spectral interference from aluminum. The two highest aluminum content specimens show widely differing arsenic values, despite nearly the similar aluminum levels, which would not be expected if the arsenic indication resulted from a minor spectral peak of aluminum. Rather, the arsenic levels for those two specimens should be nearly identical because two spectral peaks from any one element should occur in a constant ratio. The regression line from these data points shows an even more serious problem. The regression line does not trend toward the origin of the plot as would be expected if the arsenic signals resulted

from aluminum spectral emissions (in which case the arsenic concentration would be directly proportional to the aluminum). Rather the regression line shows that the arsenic concentration is not directly related to the aluminum concentration.

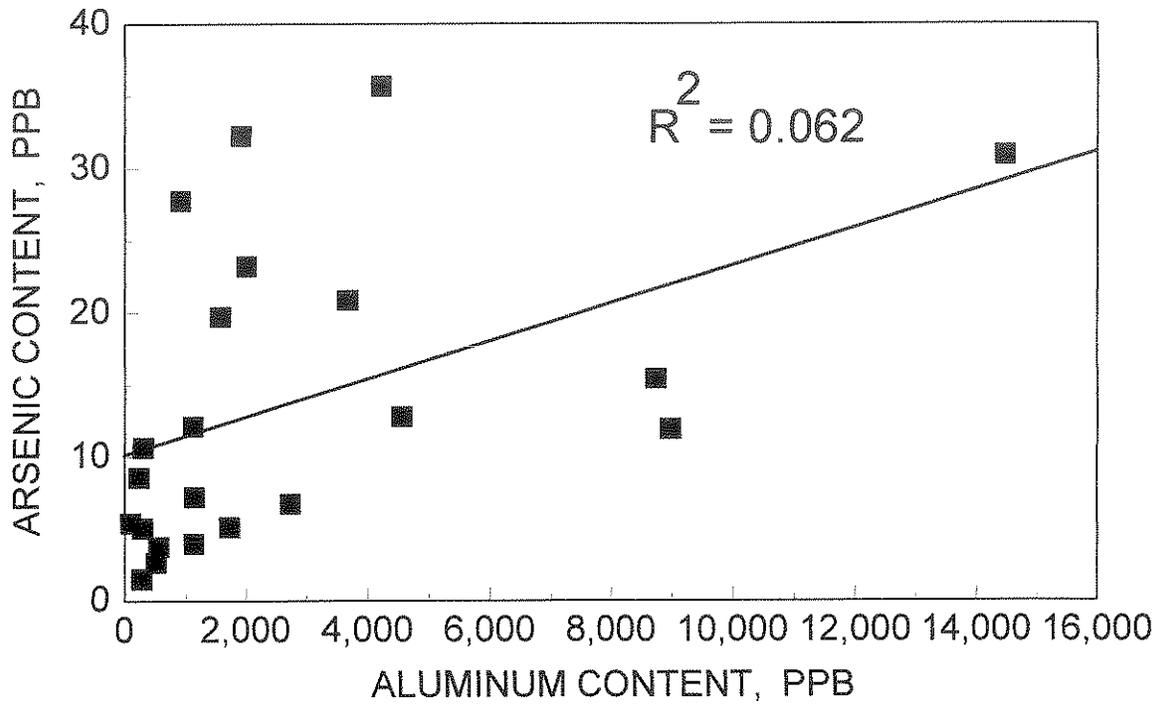


FIGURE 1. ARSENIC VS. ALUMINUM CONTENTS FOR Dura Avenue Landfill LEACHATE SAMPLES, LOWER CONCENTRATION RANGE.

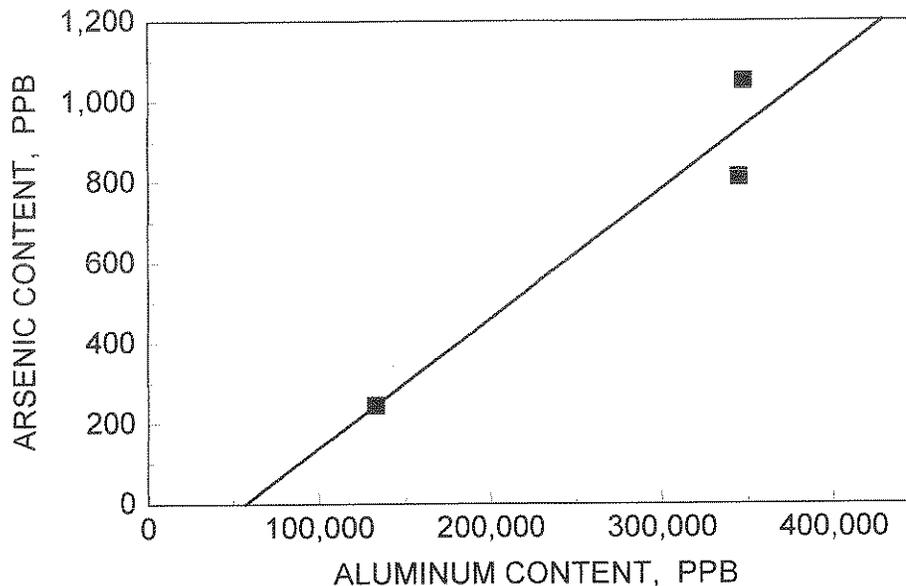


FIGURE 2. ARSENIC VS. ALUMINUM CONTENTS FOR Dura Avenue Landfill LEACHATE SAMPLES, HIGHER CONCENTRATION RANGE.

The second issue raised by this commentator (page 11) is the cost effectiveness of the Preferred Plan vs. that of Alternative 3b (as presented in the City of Toledo's Feasibility Study). The principal difference between these alternatives is that the Preferred Plan calls for the installation of a system of leachate extraction wells along the site perimeter, should chemical impacts to the river exceed those predicted for natural drainout of the capped landfill. Sheetpile barriers could also be installed, if the wells could not contain leachate discharge.

The evaluation of the Preferred Plan, contained in these comments, includes several misinterpretations of the features of the plan. Page 15 of the comments states that the sheetpile would be installed on the south and east boundaries of the landfill. The sheetpile barriers described in the Preferred Plan would be installed only if needed to control discharge and are not a part of the first phase of this plan. The collection wells would be installed along the southern and eastern boundaries (Sibley Creek and the Ottawa River) and not along the western boundary, as stated on page 16 of the comments. Again, those wells would only be installed if the chemical drainage from the capped site significantly exceeded predictions.

The cap design proposed in Alternative 3b violates the current regulations because its cover thickness is only 24 inches, rather than the required 36 inches for Lucas County (see page 17 of comments, which claims that such a design would be acceptable under Ohio regulations). The

36 inch cover is required to protect underlying clay layers from freeze/thaw cycle damage. However, the Agency believes that the 24 inch cover could be accepted at this site. Recent research has shown that geosynthetic clay liners (proposed as a alternative to a recompacted clay barrier) have excellent resistance to freeze/thaw cycles. Thus a 24 inch cover would be adequate in conjunction with a geosynthetic clay liner and the Agency believes that such a cover system (including a flexible membrane layer) would be technically acceptable.

These comments further discuss the costs of a slurry wall (page 19) as a barrier system. Slurry walls are not considered in the Preferred Plan.

On page 20, the comments state that there may be problems in the reliability of the sheetpile barriers. Those problems would only be encountered if the barrier were installed at all (if the extraction wells were installed and did not work). The feasibility of the sheetpile barrier and its cost-effectiveness would be carefully considered before installation.

Page 22 states that "except for the hypothetical advantage associated with the sheetpile barrier...Alternative 9 offers no significant advantage over Alternative 3b". Alternative 9 includes the significant option of leachate collections should it be necessary.

Appendix C discusses Ohio's landfill cap design requirements. As stated above, the problem with the proposed cap of Alternative 3b is the cover thickness, not the barrier system. That thinner cover design, in conjunction with the GCL/FML barrier system, is considered technically acceptable by the Agency.