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REPORT TO
ENVIRONMENT CANADA

THE HYDE PARK LANDFILL CASE:

Canadian Citizen Action in the U.S. Courts

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I. OVERVIEW

The failure to manage and dispose of hazardous wastes has led to the creation of 'ticking time bombs' throughout North America. Perhaps the most lethal of these hazardous waste sites are the four landfills owned by Hooker Chemicals and Plastics Corporation, located in Niagara County, New York. These four sites are the Love Canal, "S" Area, 102nd Street, and the Hyde Park landfill.

In December, 1979, the United States government launched four separate lawsuits against Hooker Chemicals regarding these sites. Hyde Park was the first case to be dealt with and on January 19, 1981, a proposed settlement agreement was placed before the United States District Court in Buffalo for ratification. The Hyde Park landfill, containing approximately 80,000 tons of hazardous wastes, is leaching into the Niagara River and Lake Ontario and poses a direct threat to the drinking water supply of over four million Canadians and approximately 1½ million Americans.

It was in this judicial forum that the Canadian Environmental Law Association (CELA), on behalf of Pollution Probe and Operation Clean-Niagara, found itself arguing as amicus curiae (friend of the Court) that the proposed settlement agreement did not adequately protect Canadian public health and the environment.

This review outlines the scope of the environmental problem; the nature of the lawsuit; the terms and limitations of the proposed settlement agreement; CELA's involvement in the case; the amicus curiae brief, and fact-finding hearings that arose as a result of that brief; as well as subsequent revelations and reports brought to the Court's attention by the U.S. governmental parties, Hooker, and amici. The role of the Canadian government and the implications for the future arising from this precedent-setting case are also examined.

II. HYDE PARK LANDFILL: THE SCOPE OF THE PROBLEM

A. The Setting

The Hyde Park landfill is situated in the extreme northwest corner of the Town of Niagara, New York, in an industrial complex on the fringe of a residential area. It is bounded on the north by the boundary line between the Towns of Niagara and Lewiston, on the east by undeveloped property, on the south by TAM Ceramics, Inc., and on the west by the Niagara Steel Finishing Company, Home Oil Company, and a monument works owned by the Paonessa family.[1] Grief Brothers, Inc. to the north, and a New York Power Authority right-of-way also bound the site. (See Figure 1)

The site is approximately 15 acres in size. Surface water from the site drains to the Bloody Run Creek which flows from the northwest corner of the landfill. Bloody Run Creek ultimately flows down the Niagara Gorge face and empties into the Niagara River.

The Hyde Park landfill is only about 2000 feet from the Niagara Gorge and 2400 feet from the Niagara River, which flows into Lake Ontario.[2]

In 1953, Hooker Chemicals and Plastics Corp. (hereinafter "Hooker") discontinued disposing of its wastes at the Love Canal landfill, in the City of Niagara Falls, New York, and moved its disposal operations to the Hyde Park site, which it had just purchased.

From 1953 to August, 1974, Hooker disposed of more than 80,000 tons of chemical wastes in the Hyde Park landfill.[3] The most toxic wastes buried in the landfill include an

estimated 200 tons of dechlorane (Mirex) residues, 5600 tons of C-56 (hexachlorocyclopentadiene) and C-56 derivatives, 16,500 tons of chlorobenzenes, 1700 tons of chlorotoluenes, and 2000 tons of BHC (Lindane). Hooker has also admitted that polychlorinated biphenyls (PCBs) were buried at the site and they have been found in leachate samples.[4]

The most significant waste buried at the Hyde Park landfill is the 3300 tons of trichlorophenol still bottoms containing an estimated 2000 pounds of dioxin (the 2,3,7,8-TCDD isomer), the most toxic chemical ever synthesized by man. The dioxin deposit is believed to be the largest in the world. Dioxin from the landfill has been detected in Bloody Run Creek sediment.[6]

The chemicals buried at Hyde Park are extremely dangerous and are known to have adverse effects on human health and the environment. Dioxin is acutely toxic at low doses, and causes cancer, birth defects, mutations, and fetal death in laboratory animals. One additional cancer case per million people can be expected by exposure to just .000000046 micrograms per litre (ppb) of dioxin.[7] Other chemicals buried at Hyde Park, such as lindane, tetrachloroethylene, benzene, and Mirex, are known carcinogens.

These chemicals were deposited directly on top of the bedrock. There was no preparation of the site or consideration of the geology or hydrogeologic characteristics of the site prior or during the 22 years of waste disposal at Hyde Park.

An understanding of the geology and hydrogeology of the site is key both in terms of determining where the contaminated ground water (leachate) is travelling and whether it is possible to contain the wastes 'in situ' or look to other remedial strategies.

The Hyde Park landfill is situated on a thin glacial till deposit (overburden) which overlies dolomite bedrock of the Lockport formation. This Lockport Dolomite contains significant amounts of ground water that moves in vertical fractures and through horizontal bedding planes. These bedding planes can extend for miles, and act as virtual pipelines able to move contaminated ground water (leachate) toward the Niagara Gorge. The Lockport Dolomite overlies a Rochester Shale formation which is less permeable than the dolomite but can still transmit ground water toward the Gorge. Below the Rochester Shale there is a formation of interlayered sandstone, limestone, and shale which is similar to the Lockport Dolomite in terms of its hydraulic characteristics. This, in turn, overlies the Queenston Shale formation.

The most significant environmental and health implications of the Hyde Park landfill is the fact that presently 80,000 tons of toxic wastes are slowly leaching out through the Lockport Dolomite zone and below and finding their way into the Niagara River and Lake Ontario. The approximately 4 million Canadians and 1.5 million Americans who take their drinking water from these sources, and those who use the water for fishing, recreation, and industrial uses, are threatened by this leaky landfill.

III. THE NATURE OF THE LAW SUIT

The Hyde Park landfill received very little public or governmental attention until 1978. It was in 1978 that Occidental Petroleum Corporation, Hooker's parent company, attempted to acquire the Mead Corporation, a paper producer. Mead's efforts to avoid being taken over (which were ultimately successful) included investigating and publicizing Occidental's potential liability to lawsuits and clean up expenses relating to Hooker's landfill operations, including Hyde Park.[8] Several consultants, including Dr. Edward Kleppinger,[9] were retained by Mead to examine Hooker's landfill sites. The Hyde Park site, and its link to Niagara River pollution was revealed at this time.

It was only after these revelations by Mead Corporation, that the United States, for the Administrator of the Environmental Protection Agency (hereinafter "EPA") decided to initiate a civil action against Hooker. The suit was launched on December 20, 1979 against Hooker Chemicals and its parent companies pursuant to:

(a) Section 7003 of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. 6973 for injunctive relief concerning an imminent and substantial endangerment to health and the environment;

(b) The common law of nuisance, for injunctive relief concerning the escape of hazardous chemical wastes from Hyde Park into the Niagara River and the escape of hazardous chemical wastes from the Hyde Park landfill into the environment where citizens of the U.S. have come and continue to come in contact with those wastes;

(c) Section 13 of the Rivers and Harbors Act of 1899, 33 U.S.C. 407, for injunctive relief;

(d) Section 309 of the Clean Water Act, 33 U.S.C. 1319, for injunctive relief and penalties for violation of the Clean Water Act;[10]

In their request for a mandatory permanent injunction, the United States asked the Court to require Hooker to install and maintain various monitoring programs and leachate collection systems in perpetuity.

New York State was initially joined as a defendant in the law suit as a result of a motion by Hooker on June 11, 1980. However, the State subsequently brought its own motion before the Court and was realigned as a plaintiff on September 11, 1980. The Towns of Lewiston and Niagara were also joined as defendants on July 11, 1980.[11]

On January 19, 1981, the United States, New York State, Hooker, and the other parties entered into a proposed settlement agreement which they put before the U.S. Federal District Court in Buffalo for ratification by Judge John Curtin.

The Court has limited powers regarding a settlement agreement placed before it for ratification. It can either approve the agreement as it is constituted or disapprove the agreement. If the Judge disapproves the settlement, he can suggest to the parties that if certain modifications are made, he would ratify the agreement. However, the Court cannot amend or rewrite the agreement in any way.

Indeed, the proposed settlement agreement stipulates that any modifications proposed prior to the entry of the judgment shall require the written consent of each party. If the parties do not consent to any proposed modifications within ten days after the Court submits the modifications to them, the agreement will be void, and all previously-filed stipulations will not apply.[12]

IV. THE PROPOSED SETTLEMENT AGREEMENT

This section will outline the main features of the proposed settlement agreement which is currently before the Court for ratification.

According to the settlement agreement itself, the Court is required to review any agreement and be satisfied that the terms and conditions are reasonable and adequate to "protect against endangerment" to human health or the environment in and about the Hyde Park landfill and the Bloody Run drainage area.[13]

A. Who is Bound?

The United States, New York State, Hooker, the Town of Lewiston, and the Town of Niagara are the parties to this agreement. Paragraph 5 provides that the agreement will not affect the rights of persons or entities who are not parties to the action.[14]

However, Hooker's compliance with the agreement would constitute a complete defence to any future actions brought by the governmental parties for migration or discharge of chemicals from the site, where the parties knew or could have reasonably anticipated that the problem could occur.[15]

This, in effect, means that if the terms of the agreement themselves do not provide for the major plume of contaminants to be detected and properly remedied, Hooker's compliance with the agreement constitutes a complete defence to any future actions ever being brought by the governmental parties.

B. The Goal of the Agreement

The settlement agreement sets out containment, monitoring, and maintenance programs for the landfill site with the avowed goal of protecting against endangerment to human health and the environment in the Hyde Park - Bloody Run area. An environmental health and safety plan is also to be implemented during construction activities associated with the containment program.

A number of remedial measures, which Hooker would be required to undertake, are specified in the agreement. These include:

- capping the landfill and perimeter areas;[16]
- installation of a tile drain system to remove chemicals migrating through the overburden;[17]
- installation of a barrier collection system of purge wells to a maximum depth of 15 feet below the Lockport Dolomite to collect contaminated ground water;[18]
- use of activated carbon and other waste water treatment to remove the organics and metals from the waste water;[19]
- a surface clean up of the area 4 feet on either side of the centre line of Bloody Run Creek where it intersects the Gorge face and 10 feet on either side at the shore area where Bloody Run flows into the Niagara River;[20]
- the capping or excavation of a specified area in the Bloody Run drainage basin.[21]

The agreement also provides for the use of indicator chemicals to delineate the areal and vertical extent of the chemical migration from the landfill in the overburden and Lockport Dolomite zone.[22] If chemicals are found to be in excess of certain "plume definition levels" in the area of the Lockport Dolomite not dealt with by the technologies outlined above, then studies are to be initiated to determine what "requisite remedial technology" is required.

Monitoring wells are also required to measure the effectiveness of the barrier-collection system of purge wells. The agreement provides that the bedrock barrier collection system shall be deemed effective if the monitoring wells down gradient of the purge wells measure less than 10% of chemical loading calculated to be present in the up gradient wells.[23] There are provisions for the termination of any of the barrier systems if over a period of four consecutive years, specified indicator chemical parameters have not been detected at more than 10 mg/l in liquids collected by such systems.[24]

C. Requisite Remedial Technology

Under certain conditions set out in the agreement, Hooker is required to examine and employ "Requisite Remedial Technology" (hereinafter "RRT").

Remedial technology is defined as "engineering and construction practices used or accepted for use in landfill containment projects or other industrial projects which are applicable to the materials and hydrogeologic conditions found at the landfill site".[25]

In determining whether a remedial technology is requisite, various factors are to be weighed. These include (1) the nature of the endangerment to human health and the environment which remedial technology is designed to address, (2) the extent to which application of remedial technology would reduce such endangerment and (3) the economic costs required to apply the remedial technology. Hooker

may not have to employ RRT if the Court determines, among other things, that "it would be arbitrary and capricious to require Hooker to bear the costs incurred in applying such technology".[26]

Hooker is required to use RRT to address aqueous phase liquid contamination in the overburden and in the Lockport Bedrock zone, which is not dealt with by the required barrier collection system of purge wells. RRT will also have to be employed in relation to non-aqueous phase liquids anywhere in the overburden and Lockport Dolomite zones.[27]

The technologies to be examined are:

1. a tile drainage system to collect non-aqueous phase liquids up to 15 feet below the top of the Lockport Bedrock zone;

2. a grout curtain wall designed to prevent the migration of non-aqueous phase liquids from the site;

3. grouting through controlled fractures to contain non-aqueous phase liquids in the bedrock;

4. a system to remove non-aqueous phase liquids directly from the landfill site; and

5. a purge well system designed to collect liquids migrating from the landfill site to the top of the Rochester Shale zone.[28]

D. The Payment and Guarantee

The only specific monetary provision in the proposed agreement is the requirement for Hooker to pay $1,500,000 to the State of New York primarily for the cost of (a) supervision of the implementation of the agreement, and (b) development of technology and remediation programs to address environmental problems associated with the generation and disposal of chemical wastes.[29] In addition, Hooker's parent company, Occidental Petroleum Corporation, is to sign a guarantee for a maximum of $10,000,000 to be paid in the event that Hooker becomes insolvent or cannot perform its obligations pursuant to agreement.[30] This $10 million guarantee is only a fraction of the estimated cost of even partial clean-up of the site.[31]

E. Public Reaction to the Settlement

According to a Department of Justice regulation,[32] any proposed consent decree of judgment involving the discharge of pollutants must be made available for public comment for a period of 30 days before being entered and made final by a Court. On February 5, 1981, public notice of the settlement agreement was placed in the Federal Register.[33] The comment period, which would have ended on March 9, 1981, was extended until March 20, 1981.

On February 10, 1981, the Court heard a presentation by the parties setting out the elements of their proposed settlement. Then, on February 12, 1981, the Court issued an order requiring the parties to comment on a number of issues. These included:

1. Whether the Court should appoint an expert to advise it on the technical issues raised in the settlement;

2. Whether 'requisite remedial technology' and other terms have been used in other environmental settlements;
3. Under what circumstances might relocation of individual homeowners take place;
4. How would the site be maintained after the 35 year period envisioned by the judgment.[34]

In addition, because of the extraordinary public interest in this case, the Department of Justice held a public hearing on Thursday, February 19, 1981. A transcript of this meeting was submitted to the Court. Among the groups submitting comments were the College Heights Property Owners' Association, the Niagara County Citizens' Alliance, and the Ecumenical Task Force. The first two groups consist of residents of the City of Niagara Falls and Town of Niagara and residents in the vicinity of the landfill site. Both groups are represented by attorney Lewis Steele and have filed motions to intervene as parties to the action. Judge Curtin has still not ruled on these motions.[35]

The Ecumenical Task Force, represented by Buffalo attorney Barbara Morrison, was granted amicus curiae status on March 20, 1981.[36] The Ecumenical Task Force is a multi-denominational organization dedicated to the resolution of environmental and public health problems in western New York originating from chemical and/or radioactive contamination.

A joint response to the Court order of February 12, 1981 was filed in the Court on March 17, 1981 by Hooker, U.S. EPA, and New York State.[37] Their answers to the Court's questions stated:

1. A Court appointed expert would be impractical prior to the entry of judgment and would cause undue delay.[38]
2. Requisite remedial technology was chosen specifically because it had no prior legal history.
3. Relocation of individual homeowners could be required:
   (a) if the air borne particulate studies to be implemented under the agreement show that there is an endangerment to human health and the environment; and
   (b) if air borne particulates resulting from remedial activities pose a danger to human health.
4. The parties believe the 35 year maintenance period is appropriate but, under the settlement agreement, it may be extended to meet the goal of the agreement, i.e. to protect against endangerment to human health and the environment.

Finally, on April 3, 1981, the U.S. and New York filed a joint response document to over 133 public comments with the Court.[39]

V. CELA'S INVOLVEMENT IN THE CASE - THE ROLE OF THE AMICUS CURIAE

A. Introduction

On May 4, 1981, Anne Wordsworth, researcher with Pollution Probe, approached the Board of Directors of the Canadian Environmental Law Association (CELA) with a request for assistance in obtaining amicus curiae status for Probe and Operation Clean-Niagara in U.S. District Court in Buffalo.[40] CELA agreed to take the case.

On May 7, 1981, CELA wrote to Judge Curtin indicating our intention to bring a motion for our clients to appear as amicus curiae in the Hyde Park case. We noted that the proposed settlement agreement had far-reaching international implications which had not been addressed. We stated that the Niagara River, as an international water body shared by the U.S. and Canada, is covered by the 1978 Great Lakes Water Quality Agreement and that the proposed settlement agreement may be in breach of the purpose and certain objectives of the Great Lakes Water Quality Agreement.

On May 12, 1981, Pollution Probe and Operation Clean-Niagara held a press conference outlining their concerns with the proposed settlement agreement and calling on both the federal and provincial governments to protect the integrity of the Niagara River. Specifically, a letter sent by Probe to federal Minister of the Environment, John Roberts, on the same day asked the federal government, on behalf of Canadian citizens who are dependent on the Great Lakes for their water supply, to intervene in the U.S. Court and to press for much more stringent financial and technical conditions in the agreement.[41]

Both the letter and the press conference stressed the fact that the government had a moral responsibility to become involved in the case, and that it was shocking that the Agreement had not even been reviewed by the Canadian government. Finally, Probe and Operation Clean-Niagara announced that, with CELA's assistance, they were going to seek amicus curiae status in the U.S. Courts.

B. The Motion for Amicus Curiae

On May 29, 1981, a motion was brought by Barbara Morrison, before Judge Curtin, asking for an order that the author be allowed to appear pro hac vice ("for this occasion") in the Court to argue a motion to allow Pollution Probe and Operation Clean-Niagara to appear as amici curiae.[42] The Court allowed Ms. Morrison's motion, and permitted the author to argue the specifics of the motion for Pollution Probe and Operation Clean-Niagara to appear jointly as amici curiae in the Hyde Park proceedings.

1. Amicus Curiae - Defined

Traditionally, an amicus curiae or "friend of the Court" is:

> "...one who, as a stander-by, when a judge is in doubt or mistaken in a matter of law, may inform the Court. He is only heard by leave, and for the assistance of the Court, upon a case before it...[The practice is] to allow an attorney, or other person, to appear as a friend of the Court in a case, to act as an adviser of the Court, and to make suggestions as to matters appearing upon the record, or in matters or practice."[43]

Generally, U.S. courts are more familiar with, and have been more receptive to, amicus curiae applications than in Canada, where the courts have been more restrictive in allowing amicus curiae participation.[44]

An amicus curiae is not a party to an action and is therefore not accorded the rights usually associated with party status. For example, an amicus cannot subpoena witnesses, obtain discovery, order the service of documents,[45] and has no right of appeal.

As contrasted to a party intervenor,[46] an amicus curiae does not have a direct interest in the suit, only a general interest in the outcome of the litigation. An intervenor will therefore be bound by the Court's judgment - whereas an amicus is only bound by the precedent of the case.

The extent of amicus participation in proceedings is entirely within the discretion of the Court. The function of an amicus is to call the Court's attention to law or facts or circumstances in a matter that may otherwise escape its consideration.[47] The practice is usually to allow an amicus to file a written brief with the Court. While generally an uncommon occurrence, amicus curiae may, with permission of the Court, introduce evidence and present oral argument.

2. The Contents of the Motion

The written memorandum and oral arguments made by CELA for the granting of amicus curiae status included the following points:

- the implications of the proposed settlement on the Niagara River and Lake Ontario, international boundary waters, have not been addressed by the terms and conditions of the settlement agreement;
- Pollution Probe and Operation Clean-Niagara are in a unique position to bring to the Court's attention

the impact of the proposed settlement on Canadian public health and the environment and to advise it on matters relating to international law, equity, and policy;

- the Ecumenical Task Force (amicus curiae) and the proposed intervenors have not addressed the Canadian public interest and the impact of the agreement on international boundary waters and therefore, Probe and Operation Clean-Niagara represent an interest which has not been raised before the Court;

- Pollution Probe and Operation Clean-Niagara through their technical advisory committees and through the support offered by the Canadian government have the expertise to address the novel and complex issues raised by the proposed settlement agreement;

- case law establishes that leave to file an amicus curiae brief should be granted where complex and novel issues have been raised by the parties.(48) This agreement is precedent-setting in establishing remedial technologies for hazardous waste landfill sites, and also complex, which the Court recognized in its consideration of the appointment of an expert to advise it on the difficult technical issues raised in the settlement;

- the request for amicus curiae status will not inconvenience the Court and will not cause undue delay. Probe only became aware on May 1, 1981 that the settlement regarding the Hyde Park landfill had been proposed by the parties and was before the Court for ratification. Probe and Operation Clean-Niagara had also been unaware that a public comment period existed. It was argued that the short time necessary to file an amicus brief would be minimal in relation to the importance of ratifying an agreement that will ensure that the public interest is being protected.

Hooker filed a memorandum and argued in opposition to CELA's motion for amici status. Hooker argued that Pollution Probe and Operation Clean-Niagara did not represent a special interest in the proceeding, that they were raising old issues which had already been addressed and that their participation would not assist the Court in

its review of the proposed agreement and would only delay the determination.[49] Hooker's attorneys also argued orally before the Court that matters of international law and policy were not matters which came within the Court's jurisdiction.

Judge Curtin, in granting the motion allowing Pollution Probe and Operation Clean-Niagara to appear as amici curiae in the Hyde Park landfill case, specifically noted that international matters would be best dealt with "in another forum". The amici were given until June 30, 1981 to file a brief.

3. The Role of the Canadian Government

On May 15, 1981, John Roberts, federal Minister of the Environment, responded to the letter sent to him by Pollution Probe, urging the government to intervene in the Hyde Park case. Mr. Roberts stated that he "shared the concerns which have been expressed that the provisions contained in the settlement do not appear adequately to prevent the leaching of highly toxic chemicals into the Niagara River".[50] However, he went on to say that there were limits on the extent to which he could appropriately intervene in a matter before a U.S. Court, but that the government was taking direct action by way of a diplomatic note and also by raising the matter with Ann Gorsuch, the new Administrator of EPA.

Finally, Mr. Roberts stated that Environment Canada's technical assistance would continue to be available and that he hoped that the government's action would "complement and support your own in meeting our common objective of ensuring that there is no further degradation of the Niagara River and that the long-term integrity of the River is protected

for Canadians and Americans".[51]

This letter was filed by CELA in the Buffalo Court as part of the motion for amicus curiae status. It was used primarily to show that Pollution Probe and Operation Clean-Niagara had the support of the Canadian government in their amicus application and further that technical support would also be given to the two groups.

This technical support would prove to be key in enabling the two environmental groups, with limited resources of their own, to proceed on the case.

While a number of diplomatic notes had been sent by Canada to the U.S. government concerning the pollution of the Niagara River,[52] a note specifically dealing with the proposed Hyde Park settlement agreement was sent to the U.S. government on May 21, 1981.[53] The note stated that the Canadian government was concerned about the adequacy of the proposed settlement agreement and wanted to be satisfied that "all reasonable and practical means are being undertaken to prevent the release into the Great Lakes system of any toxic materials pursuant to the objectives of the Great Lakes Water Quality Agreement".[54]

The note asked for: (1) a meeting between the two governments regarding the Hyde Park case, (2) an inventory of all waste disposal sites with a possible impact on the Great Lakes, and (3) consultation prior to decisions being taken on disposal or containment measures regarding sites in the Great Lakes area known or suspected to contain dioxin or other toxic substances.[55]

VI. THE AMICUS BRIEF

A. Summary of the Amicus Brief

After the motion for amicus curiae was granted, it was decided that, although the Ecumenical Task Force and Pollution Probe and Operation Clean-Niagara had distinct concerns as amici in the case, there were a number of fundamental issues and technical matters which were of common concern to both the American and Canadian groups.[56] A request was therefore made and subsequently granted by Judge Curtin for permission to file a joint amicus brief.[57]

The joint amicus brief, filed on June 30, 1981, included affidavits from Grant Anderson, consulting hydrogeologist and partner in the firm of Gartner Lee Associates Ltd., Ontario; Dr. Douglas Hallett, research scientist and chemist with Environment Canada; Dr. Edward Kleppinger, chemist and private consultant with expertise in the area of hazardous waste control, Washington, D.C.; and Dr. James Allen, environmental toxicologist and pathologist.[58]

The brief concluded that the agreement was fundamentally defective and unable to accomplish its intended purpose of providing protection for human health and the environment. Further, the remedial strategy was conceived in partial ignorance of the hydrogeologic conditions of the Hyde Park site.

- The Lockport Dolomite underlying the landfill is highly permeable with vertical fractures and horizontal bedding plains acting as conduits for the ground water to reach the Niagara Gorge and enter the Niagara River.

- Hooker's consultants' (Conestoga-Rovers) data indicates that chemicals have been deposited directly on top of the permeable bedrock and that the wastes have already contaminated the bedrock aquifer to the depth of 50 feet and at least 500 feet beyond the site within the aquifer.

- Ground water velocities in the bedrock are about 10,000 times faster than in the glacial till soils.

In addition, the potential quantity of leachate outflow into the rock could be at least 200 times greater than outflow through the clay till soils.

- If the ground water flow is not accurately determined, a monitoring or purge well system will not be correctly designed and contaminants will by-pass the wells. The parties, in the agreement, focus their attention on controlling ground water flow in the overburden and not in the bedrock, even though they knew since 1979 that contaminants had migrated deeply into the rock and beyond the Hooker site.

- Mr. Anderson estimated that contaminants could reach the Niagara River in as little as a one year period.

- Further, Dr. Hallett estimated that if as little as one shovelfull (3 pounds or 1200 grams) of dioxin were to reach the Niagara River over a period of six months, the present levels of TCDD would rise to a level that would jeopardize the survival of certain species of wildlife.

- Dr. Hallett, Dr. Kleppinger, and Mr. Anderson are all in agreement that the removal of the wastes followed by destruction or reburial in a properly designed site is the only option that will effectively control further migration from the site.(59)

The amicus brief also dealt with the issue of the standard of review that the Court must use in determining whether to ratify the agreement. It was submitted that the remedial

requisite remedial technology will accomodate the problems raised by amicus".[63] The Judge further noted that, because of the nature of the material in the landfill and the government's duty to protect the public interest, he was most concerned about the charges contained in the "well-drawn" amicus brief.

B. The Parties' Response

All three major parties filed separate, and in respect to certain issues, contradictory, responses to the amicus brief.

1. New York State

The major argument contained in the New York State response document was that, while they agreed with amici that there was bedrock contamination, Requisite Remedial Technology, even though not specified in the agreement, would contain and isolate any chemical contamination found in deep bedrock.[64] As will be discussed below,[65] amici maintains that the agreement does not include a requirement that any remedial action take place below the Rochester Shale and underlying strata (i.e. those layers below the Lockport Dolomite) where amici contend that chemicals are presently moving toward the Niagara Gorge and into the Niagara River.

New York State also argued that there is no need to excavate, if technology can be applied to contain the wastes on site, which they maintained they would be able to do. Affidavits from Dr. Kernan Davis, a geologist, and Mr. Paul Counterman, an engineer, formed part of New York's response. Mr. Counterman noted that he had "known of the presence of non-aqueous phase organic chemicals in observation well 18-79 roughly 500 feet

from the landfill site and 50 feet into the bedrock".[66] He also noted that excavation and reburial would be a technology which could and should be included in RRT.[67]

2. The United States of America

The United States' response to the amicus brief argued that the proposed agreement guarantees the clean-up result sought by amici. As was the case in the New York document, the U.S. admits that all parties have recognized throughout the negotiations that the upper portion of the Lockport Formation is permeable and that there is no natural barrier beneath the landfill to prevent the vertical migration of chemical wastes.[68] On the issue of excavation, the U.S. asserted that excavation was not at this time feasible or desirable and should not be considered unless the remedies provided in the proposed agreement prove to be ineffective. The U.S. brief also asserted that at a minimum, 1,860,000 tons of soil and 870,000 tons of rock would have to be removed.[69]

The U.S. response also argued that any commitment to specified technology, beyond that already in operation or provided for in the proposed agreement is premature in the absence of the studies and information required by the proposed agreement.[70] Affidavits from Dr. Benjamin Mason, soil scientist, David Twedell, hydrogeologist,[71] Richard Johnston, hydrogeologist with the U.S. Geological Survey (USGS), Alfred Lindsey and Russell Wyer, engineer, were also included.

3. Hooker Chemicals

Hooker also acknowledged in its response brief that it was well aware that the Lockport Dolomite bedrock beneath the landfill was fractured and that it contained both vertical and horizontal ground water flow. Hooker also stated that, under the vector bedrock survey program, well drilling must continue until no contamination is found at any depth in the approximately 100 feet thick Lockport Bedrock zone.[72]

On the issue of excavation, Hooker clearly stated that it "will not be voluntarily associated with any remedial effort which includes such a plan".[73] Further, it noted that the December 19, 1979 complaint by the U.S. which launched the lawsuit only called for in situ remedies and not for excavation. Hooker stated that "had the government pressed for waste removal proposal along the lines proposed by amici (i.e. excavation)" Hooker would have immediately rejected settlement as a viable option in this case.[74]

4. Comment

It is important to note that Hooker, in its response brief, notes the limitations of the survey program and RRT. First of all, as amici maintain, there is no requirement for survey and subsequent remedial action below the Lockport Dolomite. Secondly, the concept of "no contamination" is linked to the finding of no indicator chemicals above certain set limits. As the leachate is extremely dilute, the detection limits set do not preclude chemicals from continuing to migrate from the site in minute, but still toxic quantities.

Amici's position, as elaborated below,[75] is that the parties knew enough from the existing data to do an

analysis of the extent of the problem, including the velocity, quantities, and direction of ground water flow, in order to be able to recommend bottom line technologies to be specified in the agreement. Further, amici contend that the emphasis for clean-up in the agreement is on the overburden and top 15 feet of the Lockport Dolomite, rather than the lower strata where chemicals have already migrated. It is also clear from the response briefs that all parties knew, at the time of negotiation, of the migration of chemical-laden ground water at least 500 feet from the site and 50 feet below the site, yet these chemicals were not specifically addressed in the settlement agreement, except by the RRT concept. There is nothing in the agreement which compels any testing or remedial measures to be taken below the Rochester Shale.

C. The Judge's Order

It is clear that Judge Curtin did not regard the parties' submissions as adequate to deal with amici's concerns. Therefore, on August 7, 1981, in a precedent-setting move, he ordered a fact-finding hearing to take place in September 1981, at which time the governmental parties and Hooker would be required to present testimony in order to explain the various elements of the settlement in the simplest language possible.

The Court stated that, as a Court of equity, it had to be satisfied that the settlement it is asked to enforce meets at least some minimal standards.[76] In an 8 page appendix to the Order, Judge Curtin set out approximately 80 questions for the parties to answer, including definitions of various terms used in the agreement, as well as specific questions concerning mapping;[77] containment;[78] treatment; and monitoring.

Finally, the Order provided that amici would have the right to cross-examine the parties' experts and present limited testimony of their own.[79] The proposed intervenors were also given leave to participate in the hearings to the same extent as amici.[80]

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VII. THE FACT-FINDING HEARING

A. Note on Procedure

The fact-finding hearing into the premises of the settlement agreement took place during eight days in September and October, 1981, with final argument by the parties, amici, and proposed intervenors, taking place on October 16, 1981.

At the outset of the hearing, Judge Curtin laid out a number of ground rules for the conduct of this precedent-setting fact-finding hearing. Judge Curtin stated that he did not look at this as an "adversarial" hearing and that there would not be extensive cross-examination. He noted that the proceedings were not a 'trial' but were 'educational' in nature.[81] The Judge also ruled that only one counsel representing the amici and the proposed intervenors would be allowed to examine each witness.[82] Counsel for amici and the proposed intervenors raised this matter with Judge Curtin during the initial stages at the hearing, arguing unsuccessfully that their clients had very different interests.[83]

B. The Governmental Witnesses

On September 4, 1981, governmental parties filed a "Joint Response to the Court's Order and Prehearing Statement". This statement dealt with many of the definitional questions set out in the Judge's order and also outlined the areas the witnesses would address on the stand.[84] This section will summarize the testimony and cross-examination of those governmental witnesses that dealt with the matters most in contention.[85]

Dr. Lemar Miller

The United States first witness was Dr. Lemar Miller, an organic chemist and Technical Director, EPA Waste Programs Enforcement. Dr. Miller briefly described the functions of his office since 1979 in identifying over 9700 potential hazardous waste sites and initiating 61 lawsuits. He noted that the Hyde Park landfill was one of the highest priorities and had the unusual allocation of a full-time technical person and a full-time attorney assigned to the case.[86] Dr. Miller stated that he reviewed and approved all the technical decisions as they were made during the course of the negotiations. Miller also noted that, in this case, the defendant, Hooker, was being asked to do the investigation under the terms of the agreement before establishing remedial solutions. Dr. Miller also described the differences in migration patterns between aqueous phase chemicals (those that are dissolved in water) and non-aqueous phase chemicals (those that are organic as opposed to water soluble). He also testified as to the rationale for the choice of indicator chemicals to identify the extent of the migration of chemicals in the soil and groundwater.

Mr. Sugarman,[87] co-counsel for the Niagara County Citizens' Alliance and the College Heights Property Owners' Association, cross-examined Dr. Miller. He established that, while indicator chemicals may be useful in determining the presence of chemicals, they could not determine the concentration of chemicals in the ground water. Mr. Sugarman also questioned Dr. Miller about the use of indicator chemicals as action levels; e.g. the level for determining when various remedial technologies (e.g. purge wells) may be turned off. Mr. Sugarman also asked Dr. Miller why indicator chemicals were chosen if testing equipment could routinely analyze for all chemicals in the landfill leachate.[88] Dr. Miller's answer was that there were time and

money constraints on testing for all chemicals in the leachate. He later stated that the analysis for dioxin is very time-consuming and that there are only three or four laboratories with the competence to do dioxin testing in the concentration ranges required.[89]

As Dr. Hallett later testified for amici, it is entirely possible to screen for TCDD quite routinely and quite inexpensively with modern technology and that, due to the fact that TCDD is the most toxic organic ever created, it should be analyzed for separately.

Charles Morgan

The second witness called by the United States was Mr. Charles Morgan. Mr. Morgan, with a M.S. in veterinary bacteriology, is employed by the office of Waste Programs Enforcement Division of EPA. Mr. Morgan is the technical coordinator for the federal government litigation team in all the Hooker cases. Mr. Morgan testified regarding the establishment of a six man technical assistance team for the Hooker suits.[90] Mr. Morgan testified briefly as to the geographical location of the site and the extent of chemical migration.

Ms. Morrison conducted cross-examination on behalf of the amici. She questioned Mr. Morgan regarding the extent of any sampling done by EPA at the Gorge face. Mr. Morgan testified that there were a number of samples taken where Bloody Run empties into the Niagara River, but not up and down the Gorge face. He testified that he saw some water seepage in the spring of 1981, but did not take any samples or attempt to repeat the examination during a dry period. He also noted that his staff had taken another observation journey to the Gorge in 1979 and that neither trip showed any chemical contamination or extensive seepage of ground water coming out of the bedding plains.

Ms. Morrison questioned Morgan about the extent of the Gorge area clean up specified in the settlement agreement, which she noted would be limited to only the area on the Gorge face from where Bloody Run emerges to the point where Bloody Run flows into the Niagara River.[91]

Mr. Morgan also testified that "Dr." Twedell was the U.S. hydrogeologist on his six man technical assistance team and that "his expertise was used to advise us on water flow and the type of technologies that could be used to interrupt that water flow and collect the contaminant ground water for treatment".[92]

Richard Johnston

The next witness was Richard Johnston, a hydrogeologist with the United States Geological Survey and author of a 1964 report entitled "Ground Water in the Niagara Falls Area, New York". It is important to note that Mr. Johnston was not involved in the Hyde Park case prior to his testimony in Court and was not consulted nor did he make recommendations about the proposed settlement agreement prior to the time it was lodged with the Court.[93]

Mr. Johnston described the geological strata in the Niagara Falls area. He described the types of fractures in the Lockport Dolomite, noted that the upper part of the Dolomite was more permeable than the lower Dolomite and stated that his observation that vertical joints were closed below the upper fifteen feet of the Dolomite did not include the area along the Gorge.[94]

Mr. Johnston also indicated that the Rochester Shale had a low permeability as demonstrated by the fact that wells would not produce water for domestic purposes.[95] It is amici's position, as testified to

by Mr. Anderson, that the Rochester Shale does transmit water, and that no assumption of impermeability can be made solely on the inability to pump water from domestic wells.[96]

Under cross-examination by Ms. Morrison for amici, Mr. Johnston stated that vertical permeability is higher near the Gorge, but that he did not know how far east of the Gorge that condition occurred.[97] Mr. Johnston agreed that there were not more seeps or springs showing above the Rochester Shale because water could be moving downward vertically as it approached the Gorge, into the Rochester Shale and below.[98]

Kernan Davis

Kernan Davis, geologist with the New York Department of Environmental Conservation, was the next governmental witness. Mr. Davis testified about the direction of ground water flow from the landfill which he stated was generally northwesterly through the bedrock.[99] He also testified about the vertical joints and horizontal bedding plains in the bedrock and stated that he had no information as to how far back from the Gorge the rock became more or less permeable. He also stated that he could not make any estimates as to the relative volume or speed of water moving horizontally as opposed to vertically in the bedrock.[100] Mr. Davis stated that the settlement agreement would be the vehicle to obtain such data to make these calculations. This was a constant theme throughout the testimony of the governmental witnesses; that the data they had amassed to date was not sufficient for making determinations about various characteristics of ground water (and hence contaminant) flow beneath the Hyde Park landfill. It is therefore ironic that, in the U.S. government's post-hearing report by Mr. Johnston,[101] these types of calculations were made.

In cross-examination, Ms. Morrison for amici questioned Mr. Davis on the nature of the data he had reviewed and why he had never made velocity calculations. Ms. Morrison questioned the fact that Mr. Davis did not estimate the quantity and velocity of ground water flow even though he had access to data on the permeability, gradient, and area the water is flowing through.

Mr. Davis agreed that there could be situations where the ground water can move through the bedrock and continue flowing down through the more permeable and fractured area of the Rochester Shale near the Gorge.[102]

David Twedell

The government's next witness was "Dr." David Twedell, a "hydrogeologist" by profession with a PhD in Geology. As discussed below, in November, 1981 it was revealed that Mr. Twedell had falsified his credentials and had only a B.A. in Physical Science.[103] However, it is important to note that Mr. Twedell was the sole hydrogeologist for the United States and one of the "six man technical assistance team" assembled by Charles Morgan.

In cross-examination, Ms. Morrison questioned Mr. Twedell's ability to interpret hydrogeologic data commonly used in the field to ascertain the direction of ground water flow.[104] Twedell testified that, if the bedrock barrier collection system did not collect at least 90% of the contaminants, then additional RRT would be triggered.[105] However, as Ms. Morrison noted, and as Twedell agreed, if the studies and surveys to be conducted prior to remedial construction were not accurate, contaminants could move through the bedrock or other strata unintercepted.[106]

Paul Counterman

Mr. Counterman, an engineer with the New York State Department of Environment Conservation, Division of Solid Waste, testified very briefly with regard to how the tile drain and purge well systems would operate. He also dealt with the lagoons on the Hooker site and the carbon filtration system that could be used to treat aqueous phase liquids. Mr. Counterman was cross-examined by Mr. Steele, who questioned him on the effectiveness of the tile drain system and the proposed clean up options for Bloody Run Creek. The Court suspended the cross-examination at one point when it became obvious that

Mr. Counterman was "quessing" in response to some of Mr. Steele's questions.[107]

Donald Oberacker

Mr. Oberacker, mechanical engineer with the Incineration Research Branch at EPA's Research Laboratory in Cincinnati, Ohio, testified about the feasibility of incineration. Mr. Oberacker's testimony was limited by the fact that he had not been involved in the negotations on the Hyde Park agreement nor was he familiar with its terms. He did testify that it was possible to incinerate most or all of the chemicals found at Hyde Park and that it would also be possible to incinerate rock and soil.[108] He further noted that the "state of the art" incinerators can handle about 25,000 gallons of liquids per day and a ton and a half per day in terms of solids.[109] Mr. Oberacker testified that, on the basis of a figure of 10 million tons of material given to him by Dr. Mason (EPA consultant), it would take 760 years for one incinerator to completely destroy that amount of material.[110]

Under cross-examination, Mr. Oberacker agreed that, if a figure of 100,000 tons were used (i.e. the approximately 80,000 tons of wastes presently buried at Hyde Park and 20,000 tons of contaminated soil) it would take only 6-7 years to incinerate that quantity of material.

The author alsc questioned Mr. Oberacker about new portable units currently being tested by EPA which would have the capability of incinerating the type of chemicals buried at the Hyde Park landfill.[11]

Dr. Benjamin Mason

Dr. Mason, soil scientist and consultant to EPA, testified about the migration of the chemicals through the soil, the

use of indicator chemicals, and also testified about the possibility of excavation of the landfill. He noted that the solubility of a chemical, its absorption co-efficient, the amount of clay in the soil, and the organic matter in the soil are factors that determine how fast a chemical will move through the soil.[112] Dr. Mason also entered a chart into evidence showing the relative solubility of various Hyde Park chemicals.

Dr. Mason stated that excavation was considered by the governmental parties but that they concluded it would not be practical. Dr. Mason stated that the estimates range between 500,000 to 1,000,000 cubic yards of materials in the landfill area above the original surface[113] and that he estimated 4,780,000 cubic yards of landfill wastes, contaminated overburden, and contaminated rock would have to be excavated. Dr. Mason, in his calculations of how much rock would have to be removed, included the entire area where contaminants had been found migrating off-site.[114] Dr. Mason also testified that excavation would create adverse health effects.

Under cross-examination, Dr. Mason admitted to the author that he was not familiar with other sites where excavations had taken place, that he did not review the literature on excavation at other sites, and he had not contacted any other consulting firms who specialize in excavation.[115] Dr. Mason was also not familiar with the Hooker landfill site at Montague, Michigan which is being excavated.[116]

Dr. Mason also agreed that, if the primary source of contamination were evacuated (i.e. the actual landfill wastes), only the chemicals that have migrated off-site would need to be cleaned up. He also agreed that there would not be a continuing source of leachate migrating into the bedrock.

Finally, Dr. Mason, after testifying that any secure landfill where the wastes would be taken would have to be monitored "in perpetuity", admitted that Hyde Park (a non-secure landfill) would also have to be monitored and maintained in perpetuity.[117]

Ms. Morrison questioned Dr. Mason on the migration of chemicals moving through the soil and water and whether chemicals (such as TCDD) could be present in some quantity where the indicator chemicals were below plume detection limits.[118]

Dr. Mason agreed that the chemicals had already migrated vertically at least fifty feet through the bedrock and that the Dolomite was more permeable than the overburden.[119]

C. Hooker's Witnesses

Dr. Philip Levins

Dr. Levins, an organic chemist and Vice-President of the consulting firm of Arthur D. Little, Inc., Massachusetts, has been one of Hooker's main consultants in the Hyde Park matter since December, 1979. Dr. Levins testified briefly on the use of indicator chemicals, the purpose of capping the landfill, and the use of activated carbon for the treatment of the Hyde Park leachate.

Ms. Morrison questioned Dr. Levins about the adequacy of the detection limits (i.e. 10 parts per billion (ppb)) his firm used to detect certain chemicals, such as TCDD, which has a very low solubility in water of approximately 200 parts per trillion (ppt).

In response to questions about the presence of PCBs at Hyde Park, Dr. Levins noted that, while Hooker's records never indicated PCBs in the landfill, PCBs were present in leachate samples from the landfill although he did not know the specific isomers.[120]

Finally, Ms. Morrison questioned Dr. Levins about the ratio analysis between trichlorphenol (TCP) and TCDD at Hyde Park.[121] Dr. Levins agreed that there was no constant ratio between TCP and TCDD in the ground water or in sediments.[122]

Mr. Frank Rovers

Mr. Rovers, civil engineer and principal in the consulting firm of Conestoga Rovers and Associates, Ontario, has been involved with the Hyde Park landfill since 1978. Mr. Rovers testified about various remedial work concluded in 1978 and 1979, including the installation of a tile drain system, the

reconstruction of lagoons at the landfill site; the capping of the landfill site; and the security of the landfill site with a security fence.[123] Mr. Rovers also testified about the hydrogeologic characteristics of the landfill site, noting that there was a strong vertical gradient downward.[124]

During cross-examination by Ms. Morrison, Mr. Rovers agreed that, on the basis of his own data, during a ten month period in 1980-81, infiltration through the cap was six inches, rather than two inches as he had previously claimed. Further, he admitted that this infiltration took place after the cap was put on in 1979.[125] Mr. Rovers also testified that he did not expect any contaminants from the Hyde Park landfill to move down through the Rochester Shale, though he admitted he had done no testing on the Shale.

D. Amici's Witnesses

Mr. Grant Anderson

Mr. Anderson, hydrogeologist and partner in the consulting firm of Gartner Lee Associates Ltd., Ontario, was retained by amici in June, 1981 to review the settlement agreement and data provided by the parties. Mr. Anderson testified about the hydrogeology of the site, noting that ground water flow in the overburden and Lockport Dolomite is in a northerly, westerly, and southerly direction.[126] Mr. Anderson testified that all the ground water ultimately moves to the Gorge and that the Gorge acts like a suction for the water moving through the rock under the landfill.[127] Mr. Anderson also testified that there is a vertical gradient down through the Rochester Shale and that water will move through the Shale.[128]

Mr. Anderson was the only witness to calculate the velocities of the contaminants moving from the landfill in the overburden and bedrock. He testified that the lateral rate of speed in

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the overburden will be only inches per year, while vertical movement in the overburden would be in the order of one foot per year vertically downwards.[130] Mr. Anderson also determined that the horizontal velocity of groundwater in the Lockport Dolomite ranged from 2400 feet per year to 5300 feet per year.[131] Mr. Anderson testified that, if contaminants were moving as fast as the ground water, they would be at the Gorge in less than one year.[132] This calculation led Mr. Anderson to conclude that chemicals would be at the Gorge face. In order to validate his theory, Mr. Anderson made four visits to the Gorge and took samples of both sediment and water from various locations on the Gorge face. Mr. Anderson noted that one of the most striking features he saw was the lack of seepage in the Lockport Dolomite on top of the Rochester Shale, yet there was considerable seepage cascading down the Rochester Shale.[133]

Mr. Anderson stated that many of the samples he took were analyzed by three different laboratories; two Environment Canada laboratories and Technical Services Laboratory, a private laboratory. The results showed lindane, PCBs and chlorobenzenes in both water and sediment.[134] What is most significant is that chemicals were found in sediment samples taken in the whirlpool sandstone formation approximately 300 feet below ground surface. Mr. Anderson also did calculations determining the quantity of ground water moving laterally through the bedrock. He calculated that about 132,000 gallons per day moved through the entire thickness of the Dolomite.[135] This would compare to less than 1000 gallons per day that would move laterally through the soil.

Mr. Anderson also testified that the Rochester Shale did not form an impermeable barrier to ground water moving downward.[136] In addition, he noted that visual observation of rock cores, as undertaken by a number of governmental witnesses, could not

determine the permeability of the Shale. What is most significant is that, as Mr. Anderson indicated, the proposed settlement agreement provides no specific requirements to perform studies below the top of the Rochester Shale.[137]

Mr. Anderson also testified that it was hydrogeologically impossible to predict the effectiveness of a purge well system, as there would be no way of determining whether the contaminants moving through the highly fractured rock will go to the purge wells.[138] He indicated that it would be impossible for the parties to know whether their stated performance standard of 90% collection of the contaminants would ever be achieved.[139]

In addition, Mr. Anderson stated that he believed that in situ remediation is not viable because even if the 90% performance standard was met, the 10% of the leakage that would get by would represent a signficant impact on the Niagara River and Lake Ontario in the long term.[140]

Finally, Mr. Anderson made a number of specific recommendations for changes he would like to see made to the agreement:

- there should be an immediate assessment and analysis of sediment and water samples at the Niagara Gorge face and a subsequent determination of any remedial action that should be taken as a result of the analysis;
- the Rochester Shale should be investigated for chemical contamination. Pump tests should be done in wells placed below the Rochester Shale. As well, a minimum of six observation wells should be placed into the Shale down gradient from the site;
- a more specific study should be done regarding the placement of the overburden tile drain system;
- the primary source of chemical wastes and any overburden that underlies these wastes, should be excavated to the top of the Lockport Dolomite. In addition, purge wells should be installed to collect as much of the contaminated ground water in the bedrock as possible.[141]

Mr. Truitt cross-examined Mr. Anderson about the fact that he had changed his opinion about a possible easterly ground water flow. Mr. Anderson noted that his opinion changed after he received a package of Hooker data just prior to the filing of the amicus brief.[142] Mr. Truitt also questioned Mr. Anderson about the length of time purge wells would have to operate if the primary source was removed. Mr. Anderson stated that, while he could not provide a specific figure, it would be considerably less than it would be if the waste was left in place.

Mr. Truitt also questioned Mr. Anderson about the change in his estimation of the amount of contaminated ground water that would have to be collected from the purge well system from 60,000 gallons to 150,000 gallons per day. Mr. Anderson noted that the latter figure was based on his conclusions that purge wells would be needed in both the Lockport Dolomite zone and the limestone area below the Rochester Shale.[143]

Dr. Douglas Hallett

Dr. Hallett, environmental chemist with Environment Canada, testified about the validity of using indicator chemicals. He emphasized that 2,4,5, trichlorophenol is not a very good indicator of TCDD, as there are significant toxicological differences as well as differences in their relative solubilities.[144] Further, he noted that it was entirely feasible to routinely screen for TCDD in a number of laboratories.

Dr. Hallett testified that the gamma isomer of lindane and the chlorobenzenes found at the Gorge are indicative of chemicals in the landfill site and could not have come from a source other than Hyde Park landfill.[145]

Dr. Hallett also testified that, if the purge well system will only collect 90% of the contaminated ground water, the other 10% would go into the river and would bio-accumulate up the food chain.[146]

Dr. Hallett was cross-examined by Ms. Borland for New York State about the migration of chemicals through the soil and the feasibility of laboratories doing dioxin testing in a short period of time.

Dr. Robert Rickles

Dr. Rickles, a chemical engineer and private consultant,[147] testified on behalf of amici as to the relative costs of various possible remedial strategies for the Hyde Park landfill with a view to ascertaining whether the Occidental guarantee of 10 million dollars would be adequate. The four scenarios he examined included (1) the cost of the remedial strategy set out specifically in the agreement; (2) a scenario involving two sets of purge wells, both in the Lockport Dolomite and below the Rochester Shale; (3) excavation and removal; (4) excavation and incineration.

Dr. Rickles concluded that all four scenarios would cost far in excess of the $10,000,000 maximum guarantee that may be sought from Occidental Petroleum. In addition, Dr. Rickles found that excavation and reburial or incineration were cost competitive with the costs of installing the two sets of purge wells set out in scenario (2). However, the excavation scenarios would provide the greatest degree of protection to the environment.[148]

Mr. Truitt cross-examined Dr. Rickles regarding his excavation experience and the cost differences of the various scenarios depending on the length of time they had to be in existence.

E. Final Argument

On October 14,1981, the parties, amici, and the proposed intervenors filed post hearing submissions, which formed the basis of oral argument heard in the Court on October 16, 1981.

Amici presented their argument prior to the parties and were then given a short period at the end of the hearing for rebuttal.

1. The Government's Position[149]

The governmental parties argued that the agreement has taken into consideration each of the issues raised by amici and the proposed intervenors and that the agreement adequately addresses these concerns.

The U.S. and New York governments noted that all witnesses agreed that chemical wastes had already migrated out from the landfill site downward into the bedrock. However, in their written submission, the governments stated that the full extent of the contamination would be determined by wells installed "down to the Rochester Shale".

The governmental parties argued that the Rochester Shale is relatively impermeable and that the agreement provides several mechanisms for confirming the characteristics of the Rochester Shale. They argued that, by necessity, Hooker would have to drill partially into the Shale to determine where the dolomite ends and the Shale begins.[150] They also argued that, if the purge well system does not collect at least 90% of all material, Hooker must take corrective action.[151]

In oral argument, Judge Curtin asked the governmental parties why they could not, outside of the agreement, do testing and monitoring for chemicals at the Gorge face.[152] As a result of the Judge's request, the U.S. government, notified the Court, prior to its oral argument, that EPA would do chemical tests at the Gorge face.[153]

Finally, the governmental parties argued that they should be allowed a presumption of agency expertise and that deference should be given to the administrative judgments of EPA.[154]

2. Hooker's Position[155]

Hooker argued that the settlement agreement should be ratified as presently constituted because:

- no credible objections can be raised to the use of indicator chemicals under the settlement agreement;
- vector bedrock survey and any necessary follow-up data gathering will resolve any outstanding uncertainties relevant to the settlement agreement concerning the nature and direction of chemical migration from the landfill via ground water flow in the bedrock.

Hooker argued that it "may satisfy certain parochial Canadian interests" to propose excavation "since those interests are not responsible to those put at risk - both environmentally and economically - by such a proposal". However, Hooker stated that its longstanding position is that it will not voluntarily be associated with excavation or any other proposal at odds with the principles of in situ containment reflected in the settlement agreement.

Hooker also argued that the settlement agreement reflected a good faith multi-disciplinary resolution of the lawsuit based on "extensive experience" and should be approved.

Finally, Hooker argued that amici have been presented an opportunity greater than that to which they are legally entitled to challenge the efficacy of the settlement agreement.

3. Amici's Position [156]

Amici argued that, due to substantial defects in the proposed agreement, the Court should disapprove the agreement in its present form. Amici stated that, at the minimum, numerous modifications should be required by the Court to at least ensure that the nature and scope of the contaminant problem will be accurately ascertained.

Amici argued that the parties had never fully utilized the data within their possession, since the proposed agreement nowhere sets forth the actual scope of the contaminant problem which was known to exist from 1979. The parties never advised the Court that due to the fact chemicals were found at least 50 feet below and 500 feet off-site, that RRT provisions would per se be triggered, and that the overburden and shallow bedrock were not, in fact, the proper primary focus of concern.

Amici noted that, while technical data need not be included in a viable remedial plan, a strategy which pinpoints keys areas of forseeable concern and which sets forth a minimum baseline performance standard is necessary.

Amici argued that certain facts were established during the testimony of Mr. Anderson and Dr. Hallett. These included:

- discovery of landfill-derived chemicals at the Gorge face after visual inspection and chemical analysis;

- vertical movement of contaminants in ground water through the Rochester Shale and below to the Niagara River;

- dilution of leachate migrating below the landfill site with large quantities of uncontaminated ground water, precluding detection of contaminants under the proposed monitoring provisions;

- purge wells are only viable as a remedial technology in combination with removal of the primary contaminant source;

- current analytical technology has rendered extensive use of surrogate chemicals unnecessary since GCM prescans for multiple chemical combinations are fast, inexpensive and available.

Amici specifically focused their argument on the areas where it is believed that the agreement fails and requires alteration. Specifically, amici stated that the evidence clearly established that chemical contaminated ground water is flowing below the Rochester Shale zone rather than laterally to the Gorge through the Lockport Dolomite. Amici argued that the proposed containment program, set out in Addendum I, does not provide for any testing or remedial action to be taken for contaminants which have migrated through the Rochester Shale. Specifically, RRT study will only evaluate potential remedial technologies to address contaminants discovered pursuant to the studies undertaken in C(2)(6) of Addendum I, all of which clearly exclude study, sampling, or monitoring below "the top of the Rochester Shale".

Further, the only provision in the proposed agreement dealing with Gorge clean-up is paragraph C-I (at I-46) which merely contemplates limited surficial clean-up of overflow materials from the landfill which moved down Bloody Run Creek to the Gorge face and into the River. While the parties have contended

that the movement of chemicals to the Gorge will be discovered in the vector drilling program set forth in paragraph C of Addendum I, amici argued that the vector drilling program will fail to provide discovery of the contaminant flow to the Gorge since:

- drilling extends only to the Rochester Shale, and therefore the majority of contaminants flowing through the Shale will be missed;
- dilution of the landfill contaminants leaking from the site with large volumes of laterally flowing uncontaminanted ground water in the Lockport Dolomite will render the plume undetectable especially as plume definition levels are only in the 10 mg/l (ppb) range.

Amici also argued that, due to the presence of the chemicals on the Gorge face, the agreement must be modified to include studies and remediation north and south of Bloody Run Creek along the Gorge face.

In oral argument, Judge Curtin specifically asked Ms. Morrison whether he should reject the proposed agreement.[157] Ms. Morrison replied in the affirmative, arguing that if the agreement is signed as constituted, and if the terms of the agreement are not restructured to provide for the major plume of contaminants to be detected and properly remedied, Hooker's compliance with the agreement constitutes a complete defense to any future action brought by the governmental parties to properly remediate the site.[158]

Ms. Morrison also argued that, if the agreement was rejected and the case had to go to trial, while there would be a delay, it would be preferable to allowing the continued migration to the Niagara River of a possible 10% of the 80,000 tons of hazardous wastes buried at the Hyde Park landfill.

Finally, amici argued that, if the agreement is signed in its present form, the parties would be back in Court "with an agreement that does not provide the studies to detect the problem, does not provide the remediation to stop it, and which allows the Defendant a complete defense to any problems which become manifest through the years."[159]

VIII. THE TWEDELL FRAUD

On November 30, 1981, all counsel of record in the Hyde Park matter were summoned to Judge John Curtin's chambers. At that time, we were served with a Motion, supporting affidavits, and a Memorandum by the United States government asking to withdraw the testimony and affidavit of David Bruce Twedell.[160] David Twedell, an employee of JRB Associates, Inc. Virginia, had been retained by the U.S. government as their sole hydrogeologist to provide technical advice and to participate in the negotiation sessions with Hooker which led to the signing of the proposed agreement on January 19, 1981. Mr. Twedell also had filed in July, 1981, an affidavit in response to the amicus Brief and, as well, had appeared as a government witness in the fact-finding hearings on September 10-11, 1981.

"Dr." Twedell, according to his resume filed with the Court on March 17, 1981, and his testimony during the fact-finding hearing, indicated that he had received a B.S. and Ph.D in geology from the University of Houston, Clear Lake, Texas.[161] According to the affidavit of Robert Morgan, filed with the Court on November 19, 1981, EPA received allegations that Twedell did not possess a Ph.D as had been represented to the Court. The government's preliminary investigation revealed that Mr. Twedell only had a B.A. degree in Physical Science from the University of Houston, which he received in 1979. The Government noted that the allegations had been referred to the Department of Justice's Criminal Division and Office of Professional Responsibility for further investigation.

However, the Government, while stating that Mr. Twedell's misrepresentations were "an extremely serious matter", in its motion asked the Court to:

1. withdraw Twedell's testimony and affidavit from the record in this case; and

2. sign the settlement agreement as presently constituted as it did not "stand or fall on the basis of Mr. Twedell's technical assistance and testimony".

The U.S. government's arguments for asking the Court to enter the proposed agreement included:

- Mr. Twedell was only one of 21 scientists who lent their expertise to the negotiations on behalf of the federal government;
- none of the technical requirements of the settlement were the sole product of Mr. Twedell's advice and recommendations;
- Twedell's evidence did not differ substantially from amici's witness, Grant Anderson;
- Twedell's testimony was cumulative of other witnesses (e.g. Davis and Johnston);
- Twedell's hydrogeologic evaluations were merely preliminary in nature and that additional studies to be undertaken pursuant to the agreement will either substantiate or refute advice given by Twedell;
- EPA has committed itself to replacing Mr. Twedell with competent and qualified experts to aid in the evaluation of data as expeditiously as possible.[162]

Amici filed a Memorandum, and an affidavit by Grant Anderson, in opposition to the United States' motion to withdraw the testimony and affidavit of David Bruce Twedell.[163] Amici argued that the obliteration of Twedell's testimony from the public record would prejudice amici and the public interest it represents.

The following arguments were made:

- David Twedell was the sole hydrogeologist for the government team responsible for evaluation and interpretation of data supplied by Hooker Chemical. Not

one of EPA's "21" experts was capable of providing expertise or technical assistance in the field of hydrogeology, the key discipline involved in determining where chemical migration is taking place. Further, according to his retainer, David Twedell was deemed to be one of "the only people currently qualified to assist EPA in these particular negotiations". In addition, EPA memos showed that one of Twedell's tasks was to "ensure that clean up measures adequately address agency environmental concerns".

- While the State and Federal negotiating team never, in 20 months, perceived Twedell's lack of capability, amici were aware from the beginning that:

  (a) the governmental parties misunderstood the basic hydrogeology of the site and had failed to properly interpret the data provided by Hooker;

  (b) during cross-examination of Mr. Twedell, amici specifically advised the Court that the witness was unable to read data commonly used in the field;

  (c) irrespective of the competence of any future experts enlisted post-settlement, the defects and omissions in the agreement itself will preclude implementation of proper studies and effective remedial action;

  (d) the key issue here is whether Twedell's input in fact obscured the real issues and impeded the government's ability to negotiate a competent agreement and to properly protect the public interest.

Amici also advised the court that JRB Associates Inc. had known as of July 13, 1981 that David Twedell did not possess a Ph.D in geology.[164] Amici noted that it was disturbing that JRB Associates, which provides 85% of its consulting time to governmental agencies, may have withheld the information about Twedell's lack of credentials from U.S. EPA and permitted Twedell to be put forward as a witness.

Further, amici noted that every material objection to the proposed agreement raised by amici remained in contention

between the parties and amici. These major issues in contention include: the ability of the Rochester Shale to transmit water; its ability to serve as a pathway for chemical migration from the landfill; and the ability of the monitoring system to quantify contaminants escaping beneath the landfill and measure what amounts of contaminants can be recovered under the proposed remediation strategy.

Finally, amici opposed the Motion to withdraw the testimony of Twedell and argued that it be left on the record to further rebut the U.S. government claim that it is entitled to a "presumption of agency expertise".

Amici requested that the Court deny the U.S. government's Motion and, instead; accord Twedell's testimony zero weight; recall Twedell to the Court to answer questions; bring Mr. Flanagan of JRB Associates to clarify when JRB informed EPA regarding Twedell's falsified credentials; and have the government place on the record all documents regarding fraudulent information submitted by Twedell. Most importantly, amici requested the Court to disapprove the proposed Agreement as it is currently constituted.

Both New York State and Hooker Chemicals replied to amici's memorandum opposing the U.S. government's motion to strike Twedell's testimony. New York State's reponse consisted solely of an affidavit of Kernan Davis in which he stated that he did not rely on Twedell's data, but formed his own opinions based on his experience in interpreting hydrogeologic data. He tried to characterize amici's argument as turning on the definition of "hydrogeologist".[165] Hooker's response document argues that Twedell's testimony was completely cumulative and did not compromise the integrity of the governmental review process.[166]

IX. The U.S. Post-Hearing Reports

On February 19, 1982, the United States government filed with the Court a report done by West Coast Technical Service (WCTS) outlining the results of EPA chemical sampling at the Niagara Gorge face. The government also filed a hydrogeologic report by Morris Maslia and Richard Johnston entitled "Simulation of Ground Water Flow in the Vicinity of Hyde Park Landfill, Niagara Falls, New York" (hereinafter "Maslia/Johnston Report").[167]

Amici were given leave by the Court to submit a response to these reports and on March 12, 1982 filed a technical review by Grant Anderson evaluating the usefulness and validity of the Maslia/Johnston Report; comments on the adequacy of the simulation model by Richard Jackson (Hydrogeologist/Environment Canada); and a critique of the WCTS analytical testing report prepared by Dr. Douglas Hallett.[168]

A. The Maslia/Johnston Report

The Maslia/Johnston Report made the following conclusions regarding ground water flow patterns below the Hyde Park landfill site:

- a ground water divide exists east of the landfill, indicating that all ground water originating near or flowing beneath the landfill will flow toward and discharge in the gorge;
- the time required for ground water to move from the landfill to the gorge is approximately 5-8 years in the upper Lockport Dolomite and 7 years in the lower Lockport Dolomite. Real velocities are highest in the upper unit of the Lockport, ranging from about 1.5 to 4.8 feet per day.

- 80% of the groundwater reaching the gorge face is from the Lockport Dolomite;
- the model is only valid to the point where the ground water intercepts "open" vertical joints or rubble.[169]

However, according to the review by Grant Anderson, the model as prepared misrepresents hydrogeologic conditions in the area of the Hyde Park landfill and is invalid. Specifically:

1. The model does not simulate actual field conditions as previously measured by the Parties. The model was therefore never calibrated.

2. The assumptions plugged into the model were in direct contradiction to the field data as measured and presented to the Court. The most significant erroneous assumptions plugged into the model which destroy its validity are:

   (a) zero infiltration of precipitation through the landfill's clay cap into the chemical wastes;

   (b) extremely high horizontal hydraulic conductivity vs. very low vertical conductivity in the lower Lockport Dolomite and Rochester Shale which contributes to ground water flowing from the entire thickness of the Lockport Dolomite formation at the gorge face;

   (c) no groundwater flows vertically downward through the bottom of the Rochester Shale.[170]

In reality, as Grant Anderson points out in his report, it was acknowledged during the fact-finding hearings in 1981 that:

1. The clay cap is, in fact, permeable and does allow infiltration of approximately 6" per year through the cap into the 15 acre landfill. There is also an acknowledged ground water mound within the Hyde Park

landfill. The Maslia/Johnston model simulation shows the opposite configuration - a ground water valley. As a result of this incorrect assumption, the computer plotted ground water flowing laterally through the rock into the chemicals, rather than showing the actual vertical flow system.

2. The testimony of experts for the parties and amici showed that the Gorge face, within the Dolomite formation, is with rare exception, dry and devoid of seepage. However, the Maslia/Johnston model, by assuming a ratio of horizontal to vertical hydraulic conductivity in the lower Lockport Dolomite and Rochester Shale at 1000:1, came to the erroneous conclusion that ground water is discharging from the entire thickness of the Lockport Dolomite. There was therefore, no attempt to calibrate the model with actual field conditions at the Gorge.

3. As described in testimony, the bedrock layers below the Rochester Shale are more permeable than the Rochester Shale. Maslia/Johnston's assumption that no flow would occur through the bottom of the Rochester Shale contradicts actual data and chemical testing results presented by amici which indicated movement of contaminated groundwater downward through and below the Shale into the whirlpool sandstone formation approximately 300 feet below ground surface. Also, by placing a no-flow boundary at the bottom of the Rochester Shale, there is a resultant bias of greater velocity and quantity of lateral flow in the Lockport Dolomite.

4. Further, when actual field water level measurements are plotted onto the Maslia/Johnston Figure it is clear that calibration never occurred. Even in the upper layers (where ground water behavior is not in contention between the parties and amici), there is no replication of actual field data.[171]

In addition, Mr. Anderson concludes that:

1. Maslia/Johnston's calculation of 5-7 years for water to move from the landfill to the Gorge through the Lockport Dolomite is biased by assuming 10 feet of clay exists below the chemicals on top of the Lockport Dolomite. In actual fact, chemicals are in direct contact with the dolomite and using Maslia/Johnston's own velocity ranges, dissolved chemicals would reach

the Gorge in 1 to 3½ years. This does not differ significantly with Mr. Anderson's contention that chemicals would reach the Gorge face in less than one year.

2. Chemicals will move through the Rochester Shale. The importance of this movement should not be undermined by assuming impermeability based upon inability to pump significant quantities of water from a domestic well. Tests done by Gartner Lee Associates show that groundwater movement does occur through the Rochester Shale. Further, the chemical analysis showing the presence of indicator chemicals from the Hyde Park landfill substantiates that the Rochester Shale does not form a lower boundary for chemical movement.

3. Finally, nothing in the Maslia/Johnston Report alters his position that the proposed settlement agreement is based on a fundamental misunderstanding of the ground water flow system by the parties. As such, the ill-conceived studies provided for in the agreement will preclude the formulation of a proper remedial strategy at the site.[172]

Amici also argued that it was ironic that, at the same time the parties were telling the Court, during the fact-finding hearing, that inadequate data precluded determination of velocity, direction, and quantity of ground water flow in the lower geologic strata, that Johnston was preparing his model based on the available data and his earlier 1964 study on regional ground water. Further, neither the Court, amici, nor the public were advised that such a study was being undertaken.

Amici contended that the Maslia/Johnston report constituted attempt by the U.S. government to justify, post negotiation and post hearing, the hydrogeologic premises of its proposed agreement.[173]

B. The WCTS Analytical Testing Report (Gorge face samples)

On October 22, 1981, EPA collected ground water and sediment samples from four locations at the Niagara Gorge as well as a sample 7,000 feet downstream at the point where Bloody Run enters the Niagara River. These samples were split with Hooker Chemicals, and the EPA samples sent to West Coast Technical Service Inc. for analysis. While EPA acknowledged that there were low parts per trillion concentrations of trichlorophenol, chlorinated benzenes and PCBs at the Gorge face, it argued that these concentrations were no significantly different from the concentrations detected in the downstream or ambient samples. The United States also argued that the 'isomer' of PCB detected in the EPA sediment samples (PCB 1260) is not the same isomer of PCB as had been detected at the Hyde Park landfill.[174]

Dr. Douglas Hallett, in his critique of the WCTS Report, found that no valid data had been provided which altered the previous conclusions of amici. He found that WCTS did not use accepted EPA protocols or any substitute protocols accepted in the scientific community and that a majority of sampling results were rendered unusuable because of excessive interference, or inadequate recovery due to improper or inadequate protocols.[175]

Dr. Hallett also noted that the WCTS laboratory incorrectly reported many samples showing non-detectable levels of particular chemicals when, in fact, problems with recovery rate caused by gross interference precluded any scientifically justifiable conclusion as to absence or presence of those particular materials.

Dr. Hallett also noted that the testing equipment utilized by WCTS is incapable of testing for the presence or absence

of dioxin in environmental samples. As far as other specific chemicals, Dr. Hallett noted that:

1. The 2,4,6 isomer of Trichlorophenol found by EPA, is indicative of Hyde Park leachate in that seepage. Ambient 2,4,6 trichlorophenol could not account for the presence of this chemical in ground water at this point.

2. Mr. Elder is incorrect when he says that the concentration of PCBs found in sediment samples was not significantly different from the concentrations in the downstream sample. According to the WCTS data itself, there were no PCBs detected at the control location. Further, the statement that PCB 1260 is not the same isomer of PCB that has been detected in the Hyde Park landfill cannot be supported scientifically.[176] Further, Dr. Levins (Hooker's chemist) testified that there could be many unanalyzed isomers of PCBs in Hyde Park landfill for which no data or records exist.[177]

Amici concluded that the recent reports submitted by the U.S. government reinforce the position that the agreement, as it is constituted, must be rejected by the Court since it will not prevent the continued migration of chemical leachate through the underlying rock to the Gorge face and into the Niagara River.

X. IMPLICATIONS FOR THE FUTURE

There can be no doubt that the proposed settlement agreement put before the U.S. District Court in January, 1981, was being touted as a model for settling hazardous waste litigation across the United States.

Thus, amici's challenge that the Hyde Park agreement, as presently constituted, will not meet its avowed goal of protecting public health and the environment, has been closely followed in both the United States and Canada.

What makes this case especially significant to Canada, is that international water bodies, specifically the Niagara River and Lake Ontario, and the 5½ million Canadians and Americans who take their drinking water from these sources, are being endangered by the chemicals migrating from the Hyde Park site.

Other precedent-setting features of this case include:

- the intervention of Canadian environmental and citizens' groups in the U.S. Courts as amicus curiae;
- the presentation of a joint challenge to a proposed settlement agreement by Canadian and U.S. citizens' groups;
- the granting of a fact-finding hearing by a Court on the basis of an amicus brief;
- the granting of leave by a Court for amicus to participate in cross-examination and to call witnesses.

This case also has implications for the interaction between the Canadian government and environmental groups in intervening in lawsuits with transboundary implications.

Canadian environmental groups do not have the resources to pursue these cases in the U.S. Courts without substantial technical and financial support. In the Hyde Park case, the support of the federal government was crucial and it is important to realize that, in these complex and highly technical cases, the expertise in certain areas may only lie with the government. These experts should continue to be available to assist Canadian environmental groups in mounting their cases.

It is our conclusion, after participating in the Hyde Park case for almost an entire year, that citizens' group action in the U.S. Courts has been extremely effective. Further, since the government was not directly involved in the Court action, it could pursue through diplomatic channels, some of the matters in contention. This strategy also leaves the door open for the government itself to take legal action as a last resort.

Finally, citizen involvement resulted in stimulating public awareness in the environmental issues at stake.

We conclude that this case study shows that cooperation between government and citizens' groups can work in furtherance of our common goals of protecting public health and the environment at the regional, national, and international level.

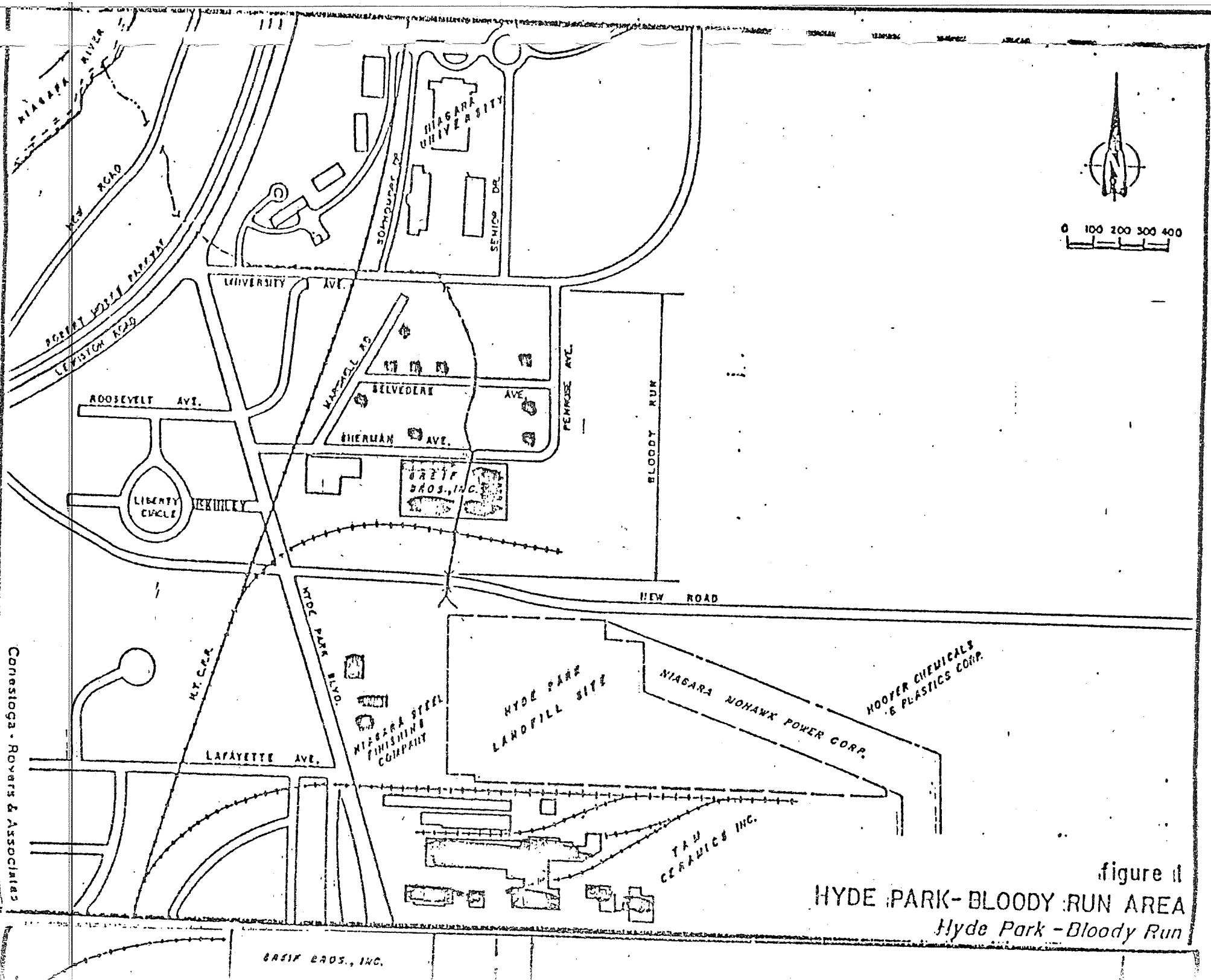

Figure 1

Conestoga-Rovers & Associates

figure 1
HYDE PARK-BLOODY RUN AREA
Hyde Park - Bloody Run

XI. NOTES

1. U.S. et al v. Hooker Chemicals & Plastics Corp. et al, Civil Action No. 79-989. United States District Court for the Western District of New York. Stipulation and Judgment Approving Settlement Agreement. January 19, 1981.

2. U.S. et al v. Hooker Chemicals & Plastics Corp. et al. Civil Action No. 79-989. United States District Court for the Western District of New York. Proceedings taken before the Honourable John T. Curtin, Judge of the United States District Court for the Western District of New York, Buffalo, New York, September 9,10,11 - October 1,2, 5,6, and 16, 1981 at Tr.224.

3. U.S. et al v. Hooker Chemicals and Plastics Corp. et al Civil Action No. 79-989. United States District Court for the Western District of New York. Complaint for Injunctive Relief, Restitution, and Civil Penalties. December 20, 1979. The inventory of wastes sited in the complaint was submitted by Hooker to the Interagency Task Force on Hazardous Wastes in November, 1978. See also Fred C. Hart Associates, Inc. December 11, 1978, Assessment of the Extent of Environmental Problems Posed by Hooker Chemical Dumps in Niagara Falls, New York and Estimated Cleanup Costs. This report was prepared for the Mead Corporation.

4. Supra note 2, at Tr.1182. See also Arthur D. Little, Chemical Concentration Data for Samples Associated with Hyde Park Landfill Site. July 1980. PCBs are not mentioned in the wastes inventory found in the U.S. Complaint for Injunctive Relief. Supra note 3.

5. The estimates of the dioxin buried at Hyde Park range from 264 pounds to over 2,000 pounds. By way of comparison, it is estimated that 130 pounds of dioxin were sprayed as part of the defoliant, Agent Orange, during the entire Vietnam war.

6. Supra note 3, U.S. Complaint for Injunctive Relief at page 10. Dioxin has been detected at levels of 200,80 and 18 ppb. in Bloody Run sediment. See also Arthur D. Little, Chemical Concentration Data for Samples Associated with Hyde Park Landfill Site. July 1980.

7. Supra note 3, U.S. Complaint for Injunctive Relief. See also U.S. EPA Dioxins, November 1980.

8. Supra note 3, Fred C. Hart Associates Inc.

9. Dr. Kleppinger, a chemist and private consultant, later provided amici with assistance in this case.

10. Supra note 3, U.S. Complaint at pages 1 and 2.

11. Supra note 1, at page 6. On September 11, 1980, the Court granted the State's motion to realign itself as a plaintiff.

12. See also U.S. et al v. Hooker Chemicals & Plastics Corp. et al. Civil Action No. 79-989. Response to Public Comments on the Stipulation and Judgment Approving Settlement Agreement at pages 53 and 54.

13. Supra note 1, at page 1.

14. Ibid. at page 8.

15. Ibid. at pages 22-25. See also U.S. et al v. Hooker Chemicals & Plastics Corp. et al. Civil Action No. 79-989. Post-Hearing Submission by Amici. October 14, 1981 and supra note 2, at Tr. 1839-1841.

16. Supra note 1 at Addendum I-I, Containment Program.

17. Ibid. Addendum I-21.

18. Ibid. Addendum I-22.

19. Ibid. Addendum I-25.

20. Ibid. Addendum I-46.

21. Ibid. Addendum I-37-46.

22. Ibid. Addendum I.

23. Ibid. Addendum II-6-8.

24. Ibid. Addendum III-2.

25. Ibid. at page 7

26. Ibid.

27. Ibid. Addendum I-17. Amicicontend that the agreement clearly and unequivocably excludes study, chemical sampling, or monitoring below "the top of the Rochester Shale". If no studies are undertaken which ascertain contaminant plumes below the Lockport Dolomite, migration in the Shale would never then be subject to remediation or evaluation.

28. Ibid. Addendum I-17-18.

29. Ibid. at page 21.

30. Ibid. Addendum IV-2.

31. Supra note 3, Fred C. Hart Associates Inc. in 1978 estimated clean up costs for Hyde Park to be $57,620,000 plus $500,000 per year. (Table 2) See Robert Rickles Cost Estimate of Remedial Technologies for the Hyde Park Landfill Site. September 1982 discussed infra at page 45.

32. 28 C.F.R. - Section 50.7 applies to consent judgments in actions to enjoin discharge of pollutants. The section establishes, as a policy of the Department of Justice, that prior to consenting to a proposed judgment in an action to enjoin discharges of pollutants into the environment, there be a 30-day period given for any person to comment on the proposed judgment. Section 50.7(b) provides that the judgment will be filed in the Court at least 30 days before it is entered by the Court and that any written comments be filed with the Court prior to entry of the judgment. The Department of Justice reserves its right to withdraw its consent to the judgment if the comments disclose considerations which indicate that the proposed judgment is inappropriate, improper, or inadequate.

33. 40 Fed. Reg. 11074 (Feb.5/81).

34. U.S. et al v. Hooker Chemicals & Plastics Corp. et al, Civil Action No. 79-989. Judge John T. Curtin, U.S. District Judge, Court Order of February 12, 1981.

35. These motions to intervene were filed on March 20 and April 31, 1981. Judge Curtin allowed these two groups to participate in the fact-finding hearing which took place in September and October, 1981. In addition, the Court allowed another proposed intervenor, Mr. Martelli, represented by Richard Berger, to participate in the fact-finding hearing.

36. Hooker opposed their motion for amicus on the basis that the Ecumenical Task Force had already had ample opportunity to comment on the agreement, that it had no special expertise which could supplement that of the parties, and finally, that it had no special interest in the Hyde Park landfill beyond its general charter of environmental concern. See. U.S. et al v. Hooker Chemicals & Plastics Corp. et al. Civil Action No. 79-989. United States District Court for the Western District of New York. Hooker Chemicals & Plastics Corp. Memorandum in Opposition to Request for Amicus Curiae Status.

37. U.S. et al v. Hooker Chemicals & Plastics Corp. et al, Civil Action No. 79-989. Hooker, United States, New York State. Response to Court Order of February 12, 1981. March 17, 1981.

38. Ibid. The parties stated that appointing one person would be impractical as the settlement agreement was "the composite input of no fewer than 44 technical advisers and consultants from government and industry". The resumes of these people were attached to the Response.

39. Supra note 11.

40. Pollution Probe, founded in 1969, is a non-profit, charitable foundation dedicated to providing public education on environmental matters, fostering public understanding on the nature and extent of the deterioration of the environment and undertaking scientific research related to the environment. Operation Clean-Niagara is a citizens' group based in Niagara-on-the-Lake which takes its water supply from the Niagara River.

41. Correspondence from Anne Wordsworth, Pollution Probe, to John Roberts, Minister of the Environment, May 12, 1981.

42. The papers were filed on May 19, 1981 and included the Notice of Motion and Affidavit by Ms. Morrison, as well as Affidavits of the author, Anne Wordsworth, Pollution Probe, and Margherita Howe, Operation Clean-Niagara.

43. In Re Perry, 83 Ind. App. 456, 148 N.E. 163 (1925)

44. For example, amicus curiae involvement in Ontario Courts is likely to be restricted to those cases in which the Court is clearly in need of assistance because there is a failure to present the issues (as for example, where one side of the argument has not been presented). Where a complete canvas of the legal issues by the parties is assured, amicus curiae applications are less likely to be granted, particularly where the intervention would only serve to widen the suit between the parties or introduce a new cause of action. See Re Clark and Attorney-General of Canada (1978), 17 O.R. (2d) 593.

45. Kemp v. Rubin, 64 N.Y.S. 2d 510 (Sup. Ct. 1946)

46. See U.S.C.A. Title 28 Federal Rules of Civil Procedure. Rule 24 deals with intervention.

47. Supra note 45.

48. Skandia America Reinsurance Corp. v. Shenck, 441 F. Supp. 715 (S.D. N.Y. 1977)

49. U.S. et al v. Hooker Chemicals & Plastics Corp. et al Civil Action No. 79-989. United States District Court for the Western District of New York. See Hooker Chemicals & Plastics Corp. Memorandum in Opposition to Motion by Pollution Probe and Operation Clean-Niagara for amicus curiae status. May 1981.

50. Correspondence from John Roberts, Minister of Environment, to author. May 15, 1981.

51. Ibid.

52. See Notes of Canadian Embassy. December 14, 1979, February 15, 1980, April 15, 1980, and November 28, 1980 and Responses by U.S. Department of State May 21, 1980, April 17, 1981, and April 30, 1981.

53. See Note of Canadian Embassy, concerning Niagara River - Hyde Park Landfill, delivered May 21, 1981.

54. Ibid.

55. Ibid.

56. Correspondence from Barbara Morrison, attorney for the Ecumenical Task Force, to Judge John Curtin, June 5, 1981.

57. While originally the joint brief was to be filed on June 23, 1981, due to the release of hydrogeologic data by New York State on June 17, 1981, long after requests had been made by Ms. Morrison pursuant to the New York Freedom of Information Law (FOIL) of the New York Department of Environmental Conservation (DEC) for hydrogeologic and chemical testing data pertaining to the Hyde Park landfill site, an extension was granted until June 30, 1981.

58. U.S. et al v. Hooker Chemicals & Plastics Corp. et al Civil Action No. 79-989. United State District Court for the Western District of New York. Brief of the Ecumenical Task Force of the Niagara Frontier Inc., Pollution Probe and Operation Clean-Niagara, Amici Curiae June 30, 1981.

59. Ibid.

60. Ibid. at page 16.

61. Ibid. at pages 16-25. While it has been held that a presumption of agency expertise exists where a consent decree is proposed by a private defendant and a government agency, the Court in U.S. v. City of Alexandria et al, 614 F.2d 1358 (5th Cir. 1980) indicated that the presumption could be overcome if the decree contained provisions which were unreasonable, illegal, unconstitutional, or against public policy.

62. Specifically, Article II, Annex 1 and Annex 12 of the 1978 Great Lakes Water Quality Agreement were cited. It was noted that the philosophy adopted for control of inputs of persistent toxic substances was that there should be zero discharge and that the concentration for "unspecified organic compounds" such as dioxin, in water or aquatic organisms should be substantially absent.

63. U.S. et al v. Hooker Chemicals & Plastics Corp. et al Civil Action No. 79-989. Order of John T. Curtin, U.S. District Judge, July 10, 1981.

64. U.S. et al v. Hooker Chemicals & Plastics Corp. et al. Civil No. 79-989. Response of State of New York to Court Order of July 10, 1981.

65. See infra at page 41-44 and 48-50.

66. Ibid. Affidavit of Paul R. Counterman.

67. Ibid.

68. U.S. et al v. Hooker Chemicals & Plastics Corp. et al. Civil No. 79-989. See Reply Brief of the United States of America. July 29, 1981 at page 9.

69. Ibid. at page 20. Amici maintains that this figure is a huge overestimation and that, more realistically, only approximately 500,000 tons would have to be removed. The test of the chemicals which have migrated off site could be collected by purge wells.

70. Ibid. at page 9.

71. As discussed below, Dr. Twedell was later found to have falsified his academic credentials. He did not have a PhD in geology; but only a B.A. from the University of Houston, Texas.

72. U.S. et al v. Hooker Chemicals & Plastics Corp. et al. Civil No. 79-989. See Hooker's Response to Court Order of July 10, 1981 at page 8, July 24, 1981.

73. Ibid.

74. Ibid. at page 16.

75. Infra. at page 41-44 and 48-50.

76. U.S. et al v. Hooker Chemicals & Plastics Corp. et al Civil No. 79-989. Order of John T. Curtin, United States District Judge, Buffalo, New York, dated August 7, 1981.

77. For example, the Court asked "What evidence is there that the 'fingerprint' chemicals are in fact the correct identifiers of the landfill chemicals?".

78. For example, the Court asked "To the best of the knowledge of each party, is the Rochester Shale Zone permeable?".

79. Supra note 76.

80. See Order of John T. Curtin, United States District Judge, Buffalo, New York, August 13, 1981.

81. Supra note 2 at Tr.4.

82. Ibid. at Tr. 18.

83. Amici were representing both the Canadian and the U.S. public interest, with an emphasis on long term impacts on the Niagara River while the proposed intervenors represented mainly the private interests of residents in the vicinity of the landfill. In addition, amici were contending that excavation and either burial or incineration were the only viable alternatives for ensuring the isolation of the wastes, while some of the proposed intervenors do not favour excavation. See Tr.225.

84. U.S. et al v. Hooker Chemicals & Plastics Corp. et al Civil No. 79-989. See United States and New York State Joint Response to the Court's Order and Prehearing Statement. September 4, 1981.

85. Mr. William Stasiuk's testimony on their air monitoring provisions and Dr. Schneiderman's general discussion on health effects are not summarized.

86. Supra note 2 at Tr.43.

87. Mr. Sugarman, was the former American chairman of the International Joint Commission.

88. Supra note 2 at Tr.116.

89. Ibid. at Tr.117-118.

90. Ibid. at Tr.146.

91. Ibid. at Tr.187.

92. Ibid. at Tr.220-221.

93. Ibid. at page 240.

94. Ibid. at Tr.234-235.

95. Ibid. at Tr. 237.

96. Ibid. at Tr. 1519-1520.

97. Ibid. at Tr.246. Yet in a post-hearing report filed with the Court on February 19, 1981, Mr. Johnston notes that groundwater movement would be more rapid in the last 400 feet before reaching the Gorge. See infra note 167 at page 17.

98. Ibid. at Tr.262.

99. Ibid. at Tr.280.

100. Ibid. at Tr.291-292.

101. See discussion at pages 56-59 infra.

102. Supra note 2 at Tr.353

103. See discussion at pages 52-55 infra.

104. Tr. 530 and 534. It is ironic that, at one point, Judge Curtin halted Ms. Morrison's cross-examination of Mr. Twedell saying that "this is not a criminal case". (See Tr.535)

105. Tr.551-552

106. Tr.552-553

107. Tr.732

108. Tr.664

109. Tr.667-670

110. Tr.672

111. Tr.678-680

112. Tr.912

113. Tr.953-954

114. Tr.956

115. Tr.1037,1050

116. Tr.1054-1055

117. Tr.1061

118. Tr.1122

119. Tr.1111

120. Tr.1183-1185

121. Tr.1186-1200

122. Tr.1199

123. Tr.1241

124. Tr.1257

125. Tr.1296

126. Tr.1461

127. Tr.1468

128. Tr.1469

129. Tr.1474

130. Tr.1505

131. Tr.1476

132. Tr.1484

133. Tr.1486

134. Tr.1510

135. Tr.1517. Mr. Anderson noted that Mr. Rovers' calculation of 10,000 gallons per day was just for the upper 15 feet of the Dolomite.

136. Tr.1519

137. Tr.1521

138. Tr.1530

139. Tr.1534

140. Tr.1536

141. Tr.1538-1543

142. Tr.1550

143. Tr.1596

144. Tr.1663

145. Tr.1673 to 1706

146. Tr.1677

147. Dr. Rickles was Commissioner of Air Resources for the City of New York from 1970 to 1972. Unfortunately, Dr. Rickles passed away early in 1982.

148. See Robert Rickles Cost Estimate of Remedial Technologies for the Hyde Park Landfill site. September 1981.

149. U.S. et al v. Hooker Chemicals & Plastics Corp. et al Civil No. 79-989. See Government's Response to Issues Raised during Court Hearing. October 14, 1981.

150. Ibid. at page 6. Amici argued that wells would have to be drilled into the limestone layers beneath the Rochester Shale in order to determine the extent of chemical migration through the Shale.

151. Ibid. at page 9. Amici argued that there is no way of determining whether the system is 90% effective.

152. Tr.1908-1909

153. Tr.1917

154. Tr.1927

155. U.S. et al v. Hooker Chemicals & Plastics Corp. et al Civil No. 79-989. See Hooker's Memorandum in Support of Court Approval of Settlement Agreement. October 14, 1981.

156. U.S. et al v. Hooker Chemicals & Plastics Corp. et al Civil No. 79-989. See Post Hearing Submission by the Amici, October 14, 1981.

157. Tr.1838

158. Tr.1840

159. Tr.1856

160. U.S. et al v. Hooker Chemicals & Plastics Corp. et al Civil No. 79-989. United States District Court for the Western District of New York. United States Motion and Memorandum in support of Motion to Withdraw Testimony and Affidavit of David Bruce Twedell to enter the Proposed Stipulation and Judgement Approving Settlement Agreement, November 30, 1981.

161. Supra note 2 at Tr.

162. Supra note 160

163. U.S. et al v. Hooker Chemicals & Plastics Corp. et al Civil No. 79-989. Amici Memorandum and Affidavit in Opposition to U.S. Motion to Withdraw Testimony and Affidavit of David Bruce Twedell. January 4, 1982.

164. Ibid. at pages 8-9.

165. U.S. et al v. Hooker Chemicals & Plastics Corp. et al Civil No. 79-989. New York State Affidavit of Kernan Davis. January 12, 1982.

166. U.S. et al v. Hooker Chemicals & Plastics Corp. et al Civil No. 79-989. United States District Court for the Western District of New York. Hooker's Memorandum in Response to Government's Motion to Withdraw Testimony January 15, 1982.

167. Morris Maslia and Richard Johnston. Simulation of Ground Water Flow in the Vicinity of Hyde Park Landfill, Niagara Falls, New York. USGS Open File Report 82-159. February, 1982.

168. U.S. et al v. Hooker Chemicals & Plastics Corp. et al Civil No. 79-989. United States District Court for the Western District of New York. Grant Anderson Hydrogeology Review- Hyde Park Landfill, March 12, 1982; Dr. Douglas Hallett Review of Analytical Report of West Coast Technical Services, Inc. March 12, 1982; and correspondence from amici to Hon. John T. Curtin, March 12, 1982.

169. Supra note 167.

170. Supra note 168, Anderson at page.

171. Ibid. at pages 3-6.

172. Ibid. at pages 15-19

173. Supra note 168, correspondence from amici to Hon. John T. Curtin, March 12, 1982.

174. West Coast Technical Services Inc. Final Report, January 21, 1982.

175. Supra note 168 Hallett at page

176. Ibid. at page 6

177. Supra note 2 at page 1182.