

# **SDMS US EPA REGION V -1**

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## UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION V

9/1/02

In the Matter of: ) Final Response of Olin Corporation  
 ) to the May 16, 1986 U.S. EPA Request  
FIELDS BROOK ) for Information Pursuant to  
ASHTABULA COUNTY, OHIO ) Section 104 of the Comprehensive  
 ) Environmental Response,  
 ) Compensation and Liability Action  
 ) of 1980, 42 U.S.C. Section 9604, and  
 ) Section 3007 of the Resource  
 ) Conservation and Recovery Action,  
 ) 42 U.S.C. Section 6927.

INTRODUCTORY STATEMENT

Olin Corporation ("Olin") submits this final response to the May 16, 1986 U.S. EPA Request for Information concerning Fields Brook.

Olin affirmatively objects to this request, to the extent it is inconsistent with the Paperwork Reduction Act of 1980. In addition, Olin objects to certain specific questions to the extent they seek information not related to solid or hazardous wastes or hazardous substances, outside the scope of EPA's information gathering authority under 42 U.S.C. Section 6927 and 9604. Without waiving these objections or its rights not to respond to this request, Olin voluntarily answers this request, as set forth hereinafter.

Some of the requests seek information which has previously been submitted to EPA and/or Ohio EPA. In order to avoid the unnecessary burden of submitting documents which EPA already has and thereby complicating the task of document review and maintenance, Olin is describing some documents but not producing them herewith. If EPA no longer has these documents, Olin will provide the agency with copies of such documents or an opportunity to copy them at EPA's request.

In addition to the specific objections supra, Olin also objects to certain of the instructions. Olin objects to the instruction requiring it to provide estimates and its method of estimation where specific responsive information is not available or accessible. Olin further objects to instructions requiring it to respond based on information in possession or control of third persons, including retained counsel. In addition, Olin specifically objects to the instructions to the extent that they seek the disclosure of communications protected by the attorney-client privilege. Olin also objects to the instructions calling for continuing or correcting responses based on information acquired after the submission of its response.

RESPONSES TO REQUESTS FOR INFORMATION

1. Please provide the date, State of incorporation, Registered Agent and his address for Olin Chemicals Corp., (hereinafter referred to as OCC).

Olin Corporation was incorporated in the Commonwealth of Virginia in 1892, and its registered agent is CT Corporation, 1633 Broadway, New York, NY 10019.

2. Provide the addresses of all facilities that have ever been owned or operated by OCC in the Fields Brook water basin area in Ashtabula County, Ohio. If any of the facilities that have been operated by OCC were not at all times of operation owned by OCC, provide the name(s) of the other owner(s) of the facility and a description of each property's location.

Olin Corporation operated a chemical facility at Middle Road, Ashtabula Township, Ashtabula, OH 44004. Initially, Olin and General Tire and Rubber Company were the co-operators of the facility. The owner of the property was General Tire and Rubber Company (Gen Corp.), One General Street, Akron, OH 44329.

Answer to Request 4 provides a description of the property leased by Olin Corporation from General Tire and Rubber Company.

3. If any of the property owned by OCC in the Fields Brook water basin has been sold, leased or interests in said property otherwise conveyed by OCC to a third party to OCC, state the third party's name and the date of any conveyance or sale.

Not Applicable

4. Provide a legal description of any Olin Chemicals Corporation facility or property located in the Fields Brook Water basin in Ashtabula County, Ohio.

Being known as part of Lot 6, Erie Tract in the Township of Ashtabula, County of Ashtabula, State of Ohio and being more generally described as follows:

Beginning at a point in a chain link fence known as station 752.258. - 450.0E., General Tire survey as shown on a drawing titled Map of Lands - North Side Middle Road, revised November, 1963; thence running N. 0° 08' 30" E. along said fence about 120' Ft. to a fence post; thence running S. 89° 51' 30" E. along said fence about 140' Ft. to a fence post; thence running N. 0° 08' 30" E. along said fence about 205' Ft. to a fence post; thence running S. 89° 51' 30" E. along said fence about 305' Ft. to a point in the Westerly line of land now owned by the Cleveland Electric Ill. Co.; thence running S. 18° 19' 20" E. along said westerly line the Cleveland Electric Ill. Co., about 566' Ft. to a stone mon.; thence running S. 0° 09' E. along said westerly

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line of the Cleveland Electric Ill. Col, 436.2' Ft. to a stone monument in a northerly line of land now owned by Cabot Titania Corp.; thence running S. 87° 21' W. along said northerly line of Cabot Titania Corp. 354.5' Ft. to a stone monument; thence running S. 0° 22' 45" W. along the westerly line of said Cabot Titania Corp. about 185' Ft. to the Southerly low bank of a small stream known as Fields Brook; thence running westerly along said southerly low bank of Fields Brook 410' Ft. to the easterly said of a bridge crossing over said Fields Brook; thence running northerly along said easterly line of said bridge and the easterly pavement edge of an existing 24' Ft. asphalt pavement roadway as shown on about indicated drawing about 810' Ft. to a chain link fence near the northwest corner of a metal guard bldg.; thence running easterly along said fence about 16' Ft. to a fence post; thence running N. 0° 08' 30" E. along said fence about 120' Ft. to a fence post; thence running S. 89° 51' 30" E. along said fence about 14' Ft. to a fence post; thence running N. 0° 08' 30" E. along said fence about 100' Ft. to the place of beginning.

5. Provide copies of any and all documents pertaining to the use and ownership of any Olin Chemicals Corporation facility or property in the Fields Brook water basin in Ashtabula County, Ohio, including, but not limited to, deeds, contracts, leases, subleases, purchase agreements and related correspondence.

Olin objects to this question which relates to matters outside of the scope at 42 U.S.C. Section 6927 and 9604 and which is overly broad and unreasonably burdensome. Notwithstanding this objection, and without waiving it herewith, copies of principal documents pertaining to the ownership of the Ashtabula facility are attached.

6. Provide a list of all present and former plant managers, production managers and plant engineers at any of the above-described facilities. Please state the dates of their employment with OCC, position held and last known address. Also, please indicate the numbered Requests regarding which they may have information.

Plant Managers

<u>Name</u>	<u>Approximate Dates</u>	<u>Last Known Address</u>
Joseph H. Bianco	10/1/63 - 10/31/64	Deceased
George P. Palmer	11/64 - 11/66 11/1/71 - 9/72	17415 Comstock Circle Houston, TX 77090
Richard W. Papenfuss	11/1/66 - 8/1/69	44 Wolf Pit Rd. Apt. 98 Wilton, CT 06897
Steven Cupach	2/70 - 12/71	1207 Eldorado Blvd. Houston, TX 77062
George Latta Acting Manager Manager	9/1/72 10/1/73 - 9/1/74	Olin Corporation Olin Road McIntosh, AL 36553
Larry D. Hinson	11/1/74 - 10/8/76	P.O. Box 58113 Houston, TX 77058
James Langford	10/76 - 6/78	Unknown
William McGlasson	3/78 - 11/81	Olin Corporation Olin Road McIntosh, AL 36553

<u>Name</u>	<u>Approximate Dates</u>	<u>Last Known Address</u>
Curt Richards Acting Plant Mgr.	7/80 - 12/81	Olin Corporation I-10 West Lake Charles, LA 70602
Bruce Jacobsen Acting Plant Mgr.	10/81 - 12/82	N. Kingsville Ohio Office 6551 S. Main N. Kingsville, OH 44068

Production Managers

Neal Haineline	1968 - 1970	No Record in Personnel
Dorsey Ayers	1970 - 1972	No Record in Personnel
Steven Cupach	1/66 - 2/70	1207 Eldorado Blvd. Houston, TX 77062
Arnold L. Matson	10/1/74 - 10/81	Olin Corporation 95 Mac Corkle Ave. S. Charleston, WV 25383

Plant Engineers

<u>Name</u>	<u>Approximate Dates</u>	<u>Last Known Address</u>
George Latta	1/1/64 - 9/1/70	Olin Corporation Olin Road McIntosh, AL 36553
Richard A. Brendler	6/70 - 11/81	Olin Corporation 95 Mac Corkle Ave. S. Charleston, WV 25383
Jim Tindall	6/20/77 - 5/1/81	Olin Corporation Lower River Road Charleston, TN 37310
Gary Wright	1/79 - 11/81	Olin Corporation 95 Moc Corkle Avenue S. Charleston, WV 25383
Cary Franklin	3/1/79 - 7/6/79	Olin Corporation I-10 West Lake Charles, LA 70602

7. Provide the names of any predecessor or successor corporations or partnerships which owned or operated any OCC facility, as described above, in Ashtabula County, Ohio.

None

8. On what date did OCC commence operations of its Middle Road facility at or near Ashtabula, Ohio?

The exact date when Olin Corporation commenced operation of its Middle Road facility is currently unknown but is believed to have occurred sometime in late 1963 or early 1964.

9. Provide all information you may have regarding contamination from your plant(s) entering Fields Brook, or a tributary thereto, either directly or indirectly.

Virtually all contamination entering Fields Brook from Olin's plant were permitted discharges from the plant's wastewater collection and treatment system. Information describing these discharges during the plant's operation was routinely filed with and obtained by EPA, Ohio EPA, Corps of Engineers, Coast Guard, and their respective predecessor agencies. This information is set forth in numerous permits, permit applications, permit negotiation letters, self-monitoring reports, incident reports and compliance inspection reports. This information should be contained in EPA's own files. Because of the large number of these documents, it is unreasonably burdensome to Olin to produce  
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them all or to list them. If EPA has a list of the documents of this type which it already has or has access to, upon request Olin will provide copies of any documents that EPA does not have or have access to or will provide EPA with an opportunity to copy such documents.

Olin has reviewed its relevant files and provides the following documents describing non routine discharges which may not have been reported to the above-listed agencies:

July 8, 1964 memorandum from J. P. Adams to J. H. Bianco describing a lime overflow from the settling pond into Fields Brook during the period of June 30 to July 5, 1964.

July 9, 1965 memorandum from G. L. Pigg to G. P. Palmer about an oil slick traced to Olin's outfall.

Two additional documents, which do not relate to non routine discharges, are being provided because they state that certain materials might possibly be present in the plant effluent. They are a January 30, 1967 letter from R. H. Papenfuss to W. C. Martin and an April 29, 1971 memorandum from S. Cupach to R. Henderson.

Olin objects specifically to the request to the extent that it requires additional information and documents pertaining to routine wastewater discharges because of the difficulty in locating and producing all such information.

Between December, 1978 and September, 1983 Olin conducted a groundwater monitoring program at the plant site. Sampling data through 12/14/82 and estimates of the potential for contaminants to enter Fields Brook via groundwater were reported previously to USEPA Region V in the July 13, 1983 report to Mrs. Elizabeth Utley. Data from samples subsequently taken on 7/26/83 and 9/14/83 are attached. The 1983 sample results show a continued low level of groundwater contamination and confirm that groundwater migration from Olin's former plant site has no significant environmental impact on Fields Brook.

10. Provide all knowledge or information you may have regarding any property owned by you in Ashtabula County, Ohio, which may have been contaminated by prior owners or users. Your response should include, but not necessarily be limited to:

- a. Names of prior owners or users.
- b. Use of facility and property by prior owners or users.
- c. Disposal practices of prior owners or users.
- d. Volume and nature of sources of such contamination.

Not applicable as Olin did not own any such property. Olin has not located any information regarding contamination of its former plant site by others.

11. Provide all information you may have regarding any other sources of contamination of Fields Brook.

Olin objects to this question as being overly broad, unreasonably burdensome and calling for speculation on Olin's part. See also answer to No. 36.

12. Provide the following information regarding any sewer lines (including storm, sanitary or combined sewers) or french drains which receive or have received runoff or discharges from the property located near Middle Road in Ashtabula, Ohio.

- a) The location and nature of each sewer line.
- b) Whether each sewer line is connected to the main trunk line.
- c) Does any sewer line have direct or indirect access to Fields Brook or a tributary thereto?

The plant had internal process wastewater, stormwater and sanitary sewer systems. All these systems discharged initially through two permitted outfalls and later through a combined single permitted outfall to Fields Brook. The attached schematic shows the plant sewer systems in 1972.

13. Provide the following information regarding any drainage ditches which receive or have received runoff or discharges from the property located near Middle Road in Ashtabula, Ohio:

- a) The location of each drainage ditch.
- b) Whether the runoff or discharge from each drainage ditch has direct or indirect access to Fields Brook or a tributary thereto.
- c) Any information regarding the presence, or potential for releases, of hazardous substances or constituents in the ditches.

See response to 12

During plant demolition and closure a filled in drainage ditch was discovered along the eastern edge of the plant area. We have not been able to determine what the function of this ditch was or whether runoff from the ditch formerly entered Fields Brook. Contaminated sediments in this ditch were removed as part of plant closure.

14. Does your company have, or did your company ever have, an NPDES permit for discharges to Fields Brook or a tributary thereto? Please identify any such permit.

Olin Corporation had an NPDES Permit. The numbers are Ohio EPA F314; USEPA OH 0001376 initially issued 3/8/74 to be effective 4/8/74. The plant also had an Ohio Department of Health industrial discharge permit initially issued 7/16/64.

15. Describe each manufacturing process that OCC has operated at any of its Ashtabula County, Ohio, facilities, including the facility on Middle Road. For each facility and process provide the years that the operations occurred and all the raw materials associated with or relating to the process.

From 1964 until 1981 Olin operated a toluene diisocyanate manufacturing plant which produced hydrochloric acid and orthotoluene diamine as co-products. Raw materials used were coke, oxygen, chlorine, carbon monoxide, carbon dioxide and toluene diamine. Monochlorobenzene was used as a solvent in the process.

Coke was burned with oxygen and carbon dioxide to form carbon monoxide. Carbon monoxide and chlorine were used to produce carbonyl chloride (phosgene). Carbonyl chloride and toluene diamine were used to make toluene diisocyanate. Benzoyl chloride and butylated hydroxy toluene (BHT), chemical name 2, 6 di-tert-butyl-para-cresol, were added to the finished toluene diisocyanate.

16. Describe any hazardous substances that may have been contained in any by-products or wastes from each of the manufacturing processes described in Request 15. Also describe the amounts of wastes, by-products or hazardous substances generated by each of such processes on a yearly basis.

The major by-products from the process are hydrochloric acid and orthotoluene diamine. The major waste is TDI residue. These materials are hazardous substances. TDI residue contains the hazardous substances monochlorobenzene and depending upon the age of the residue, toluene diisocyanate and toluene diamine.

Hydrogen sulfide from the water scrubber at the carbon monoxide plant was discharged in the plant effluent in the early years of operation. The source of the sulfur was the coke. In later years, a different source of coke with a reduced sulfur content was used in the carbon monoxide plant.

Carbon tetrachloride was formed periodically in small amounts in the phosgene plant when chlorine reacted with impurities in the carbon monoxide stream. This carbon tetrachloride collected in the middle trays of the purge column in the TDI plant and was periodically drawn off into a 500 gallon purge tank as a mixture with monochlorobenzene and phosgene. Phosgene was removed by venting to the scrubber system and then adding ammonia to the mixture. The mixture was then drummed for off-site disposal. This procedure was followed from at least the middle 1970s but it is not known currently when it was first used. The monochlorobenzene/carbon tetrachloride mixture may have been removed from the purge tank three or four times a year.

Sulfuric acid wastes were generated from cleaning the pollution control equipment. Dichlorobenzenes were impurities in waste monochlorobenzene solvent. Attached is a copy of a draft response to a USEPA questionnaire on TDI manufacture which describes the major waste streams from Olin's plant and their estimated annual generation rate in 1981.

Actual annual generation rates of wastes varied over life of the plant, depending upon plant capacity, actual production rates, production efficiency, maintenance requirements and process improvements. In addition to the response to the USEPA questionnaire on TDI manufacture, the following records have been located which describe the amounts of hazardous substances, by-products or wastes generated by manufacturing processes. The January 30, 1967 letter from R. H. Paperfuss to W. C. Martin included in response to request 9 stated that 36 tons of waste H<sub>2</sub>S and 1800 tons of TDI residue were generated in 1966. The enclosed November 30, 1970 letter from George Latta to John H. Robertson describes the estimated annual volume of incinerable wastes. The July 25, 1974 memorandum from H. T. Emerson to George Latta estimates the number of drums of waste vacuum pump oil. The hazardous waste materials disposed of off-site in 1978 are described in the January 25, 1979 memorandum from R. A. Smith to S. Johnson. The enclosed 1980 solid waste inventory further describes the types of wastes generated, their major constituents, annual generation rates and projected disposal. Facility and Generator Annual Hazardous Waste Reports for the years 1981, 1982 and 1983 have been previously submitted to the Ohio EPA.

Hazardous substances in the plant effluent, are also described in the response to request 9.

17. Describe the storage, treatment and disposal practices for any by-products or wastes associated with each of the manufacturing processes described in response to Request 15. This description should identify any use of drums, tanks, lagoons, ponds, waste piles, ditches, marshes, swamps, land treatment or disposal areas, public sewers, landfills, creeks, or waterways used or affected by such practices.

By-product hydrochloric acid was transported by pipeline and sold to neighboring plants and stored in tanks and sold in bulk to other customers. In the early years of plant operation when all the hydrochloric acid could not be sold or stored, the acid was neutralized in the plant wastewater treatment system and discharged to Fields Brook.

The toluene diamine purification process which generated the orthotoluene diomine by-product was installed sometime around 1969. In this process, orthotoluene diamine was separated from the metatoluene diamine which used to manufacutre toluene diisocyanate. This orthotoluene diamine is reported to have been burned in General Tire's boilers initially. In later years it was stored in tanks and railcars and sold. One truckload was sent off-site for incineration.

TDI residue was aged on-site and then shipped off-site for burial. Initially cardboard and steel drums were used for residue storage. Later, residue was stored in piles at the north end of the plant. Finally, residue aging was carried out in sheds followed by storage in waste piles at the south end of the plant. All residue is believed to have been removed from the plant site.

The waste sulfuric acid was neutralized in the plant wastewater system and discharged to Fields Brook in the early years of plant operation. Later waste sulfuric acid was used to neutralize the north lagoons. Because of changes in maintenance procedures, the use of sulfuric acid to clean the pollution control equipment was greatly reduced, but the time when this reduction occurred is currently unknown.

Monochlorobenzene was normally recycled in the manufacturing process. Monochlorobenzene was present in the plant effluent and controlled by the NPDES permit. Monochlorobenzene also was present in the TDI residue, in a waste mixture with carbon tetrachloride, and in waste vacuum pump oil. Vacuum pump oil was drummed, stored on site and then shipped off-site for disposal. The TDA hotwell stream and the TDI scrubber solutions were discharged to the plant wastewater treatment facility. Fly ash and sediments removed from the settling ponds were dried at the solar ponds and shipped off-site for disposal. All other wastes were drummed and shipped off-site for disposal.

See also the response to Request 16 and 31.

18. Describe the nature and state of any records and recordkeeping practices that have ever been maintained relating to any storage, treatment or disposal practices for any by-products or wastes associated with each manufacturing process described in response to Request 15.

The following records are known to have been maintained.

- (1) Accounting and shipping records on the sale of by-products and disposal of waste;
- (2) RCRA inspection reports and manifests;
- (3) Miscellaneous memos and reports.

Shipping records were initially maintained at the Ashtabula plant; copies of some shipping records were initially maintained at Olin's headquarters in Stamford, CT. Accounting records were initially maintained at the Ashtabula plant and at Olin's headquarters. Most accounting and shipping records have been destroyed pursuant to routine corporate record retention practices. The remaining documents are now located at corporate headquarters or its nearby record retention facility.

Documents in categories (2) and (3) were initially maintained at the Ashtabula plant; copies of some such records were initially maintained in Stamford, CT. Some of these documents have been

destroyed pursuant to routine corporate record retention practices. The remaining documents are now located at corporate headquarters or in its record retention facility.

19. Describe each chemical reclamation process that OCC has operated at its Ashtabula County, Ohio facilities. For each facility and process state the years during which operation of the process occurred, the type of process equipment used, the types of chemicals associated with each reclamation process, the volume processed annually by each process, and the sources of the chemicals.

No reclamation of chemicals from outside sources occurred at the plant site. By design, the manufacturing process included recycling of various chemical streams.

20. Describe the nature and state of any records and recordkeeping practices that have ever been maintained relating to the volume and kinds of chemicals received and processed as described in response to Request 19.

Not applicable.

21. Describe the characteristics and the nature of wastes or by-products associated with each reclamation process. Such description should include any characteristics or listing that such waste would likely have under 40 CFR Part 261. The description should also include any hazardous substances the waste would likely contain.

Not applicable.

22. Describe the nature and state of any records and recordkeeping practices that have ever been maintained relating to the characteristics and nature of the wastes or by-products described in response to Request 21.

Not applicable.

23. Describe the practices and conditions relating to the storage of hazardous wastes or hazardous substances upon their arrival at each of OCC's Ashtabula County, Ohio facilities until the time of their reclamation. Such a description should include, along with any dates when any significant changes occurred:

- a. What types of wastes were/are stored in drum.
- b. What types of wastes were/are stored in tanks.
- c. What type of containment system for spills or releases was provided at the storage areas.
- d. The location of any storage areas.
- e. Whether drums have been marked with generator's or transporter's name.
- f. Whether hazardous wastes from more than one source were ever mixed or commingled in a tank. How common was this practice? Did this include emptying drums into tanks?
- g. What was the practice regarding the cleanup of spilled materials from these stored hazardous wastes?

- h. Did spills or releases (including those caused by fire) of these materials ever occur while they were awaiting processing?
- i. Whether such wastes were ever stored in lagoons or ponds.
- j. What types of such wastes were stored in lagoons or ponds?
- k. What types of liners or any other impervious barriers did lagoons or ponds have to prevent the release of materials?
- l. What types of wastes, if any, were ever stored in waste piles?
- m. What records and recordkeeping practices have ever been maintained on storage, and what is the state of those records.

Not applicable.

24. Describe OCC's practices relating to the disposal and treatment of still bottoms, sludges and other non reclaimed materials accumulated in any reclamation process itself. Please include in such a description, along with the dates for different practices:

- a. Whether the non reclaimed materials were drummed up for disposal.
- b. If such non reclaimed materials were drummed up, whether they were normally [or necessarily] put back in the drums of the seller from whom they originated.
- c. Whether the non reclaimed material was allowed to accumulate and was stored prior to treatment or disposal.

- d. The locations and types of storage areas used for storage of the non reclaimed materials. Examples of types of storage areas could include drums, tanks, pits, waste piles, ponds or lagoons.
- e. Any containment system utilized at these storage areas to help prevent releases of these stored materials.
- f. Whether any spills or releases of these stored materials ever occurred. Approximately when?
- g. Where and how such materials were disposed.
- h. What records and recordkeeping practices have ever been maintained in regard to the above practices. What is the state of those record?

Not Applicable

25. Describe practices relating to any incineration process used for disposal of wastes or materials from each of OCC's Ashtabula County, Ohio facilities. This description should include:

- a. The location and years during which each incinerator operated.
- b. The rated capacity for each incinerator.
- c. The normal operating and peak temperature for each incinerator.
- d. The rated retention time for material during the burn.
- e. The type of fuel used to bring the incinerator up to operating capacity.

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- f. How the material was fed to the incinerator.
- g. What types of operating records were kept, including temperature and feed rate.
- h. The types of air pollution control devices that were installed on each incinerator and stack test results.
- i. Whether any misting or raining from the incinerator stacks ever occurred.
- j. What quantities of incinerator ashes or sludges were generated from the incineration processes.
- k. What types of materials and volumes were burned in these incinerators.
- l. Were PCBs known to have been burned in these incinerators.
- m. Did the materials that were burned include non reclaimable materials from stills.
- n. Were materials from stills accumulated and stored prior to incineration.
- o. Did the materials sent to OCC include materials sent there solely for purposes of incineration.
- p. Were materials sent to OCC for incineration on occasion otherwise disposed. How and why?
- q. How and where were by-products of the incineration process (including ash bottoms, fly ash, sludges and scrubber water) disposed.
- r. Any records and recordkeeping practices that have ever been maintained relating to the described practices. What is the state of those records?

No incineration of wastes took place on site.

In 1967 a trial incineration of approximately 500 gallons of waste liquids took place at Diamond Alkali Company in Ashtabula. Olin has not determined the nature of the waste liquids or if further incineration was conducted.

A 1972 Olin report states that impurities from raw toluene diamine distillation were burned in a boiler with natural gas to produce steam. Presumably this means that ortho toluene diamine was being burned in the boilers of the neighboring General Tireplant which supplied steam to Olin.

When the phosgene plant was down and the carbon monoxide plant was in operation, carbon monoxide was burned in a flare. The flare was permitted by the OEPA.

26. Has OCC disposed or arranged for the disposal of any materials in the Reserve Environmental Services, Inc. disposal facility located in Ashtabula Country, Ohio? If so, please state:

- a. When the disposal occurred.
- b. The nature of the solid wastes.
- c. The nature of the liquid wastes.
- d. Whether the wastes contained hazardous substances.
- e. The amount of wastes involved.
- f. If known, where at the Reserve disposal facility the wastes were disposed.

- g. Describe all terms of any arrangement for the disposal of these materials.
- h. What records, if any, have ever been maintained documenting such disposal and arrangements for disposal.

Olin has arranged for the disposal of toluene diisocyanate residue and spent caustic scrubber solution at Reserve Environmental Services. However, Reserve Environmental Services operations are not located within the designated Fields Brook area but rather are located near La Bounty Road within the drainage basin of an unnamed river system which discharges directly to Lake Erie approximately one-half mile west of Kingsville On-the-Lake. Therefore, Olin's dealings with Reserve Environmental Services do not relate to the release or threatened release of hazardous substances into Fields Brook and are irrelevant to the subject matter of this request for information.

27. Has OCC ever observed any leachate escaping or being released from any disposal area on property owned or operated by OCC in Ashtabula County, Ohio? If so, describe the location, and physical characteristics of the leachate such as color, odor, or viciousness. When and by whom has this been observed?

No.

28. Do you have any information indicating that leachate from any of the disposal areas on property owned or operated by OCC may have escaped or been released into surrounding ditches, Fields Brook, or a tributary thereto? If so, please state it, and include when such occurrences took place and who observed them.

No.

29. Have soil samples been collected and analyzed or monitoring wells ever been installed in or adjacent to the OCC Middle Road plant to monitor for release of pollutants or hazardous waste constituents? If so, please provide any data you have from such monitoring activities.

Yes. For groundwater monitoring wells see the answer to Request No. 9. Data relating to 336 soil samples which were analyzed during plant closure were previously submitted to Mrs. Elizabeth Utley of USEPA Region V in a report dated 7/13/83. Data relating to soil and sludge samples taken during the closure of the North Lagoon were submitted to USEPA Region V in Olin's response to EPA request for information No. OHD-001813708. Soil analyses taken during the installation of the monitoring wells in 1978 are attached.

Also attached are an April 1, 1974 report to the Ohio EPA which includes the log for the test borings made prior to the

construction of the plant, a February 2, 1976 soil sampling report and a 1980 report of soil borings at the new emergency spill basin by Herron Testing Laboratories, Inc.

30. Describe any location on OCC property located in the Fields Brook water basin at which waste from OCC operations have been disposed. Please state the approximate time of disposal, the types of materials, their chemical characteristics and volumes involved. Also, provide any information you have regarding sample analyses that have been conducted of materials in or adjacent to any other location on the OCC property at which wastes from OCC operations have been disposed.

At the time of closure of the plant, an investigation of the site was made to determine if there had been disposal of chemical wastes in the past. A drainage ditch on the east side of the plant area was found to have been filled with contaminated materials. These materials, all toluene diisocyanate residue and a large volume of contaminated soil were removed at closure and sent off-site outside the Fields Brook area for disposal in permitted facilities. Olin is of the opinion that no waste remains.

31. Describe the location and size of each lagoon, pond, waste pile, trench or pit that has existed on the OCC Middle Road property and its purpose. For each lagoon, pond, waste pile, trench or pit describe:

- a. Any hazardous substances that may be or have been contained in them.
- b. The dates of each structure's existence and use.
- c. Any construction properties of each pit, pond, waste pile, trench or lagoon which would help prevent the release of materials.
- d. If not in use now, explain how it was closed or has been modified and the present use of the area.
- e. Any pictures, sketches or maps of these facilities.

#### Lagoons and Ponds

A total of eight lagoons and ponds existed at the plant. The approximate size and location of these lagoons and ponds are shown in three attachments:

- (1) a September 28, 1979 letter from W. P. McGlasson to Robert E. Zimmerman, ("1979 letter"),
- (2) a January 7, 1980 drawing entitled Ground Water Well Locations ("1980 drawing"),
- (3) a March 25, 1981 facilities drawing, entitled "Ashtabula TDI Plant ("1981 drawing")

Three lagoons were known as the "north lagoons". They are listed as lagoons 6, 7 and 8 in the 1979 letter, as the "north emergency spill basins" in the 1980 drawing and as number 40 in the 1981

drawing. Their dates of construction are listed in the 1979 letter. The date and method of closure are described in the April 11, 1986 and June 19, 1986 responses to Basil G. Constantelos of USEPA Region V about the closure of the Ashtabula plant.

The north lagoons were part of the plant's wastewater treatment process. The substances in the wastewater are described in the attached August 22, 1978 wastewater characterization report.

The bottom and sides of the north lagoons were constructed out of native clay which is highly impermeable. They were diked and designed so that any significant overflow would be collected by the plant's stormwater collection system and discharged through a permitted outfall.

Three lagoons, located at the south end of the plant, were known as the west pond, middle pond and east pond.

The west pond is listed as lagoon 3 in the 1979 letter, as the "west pond" in the 1980 drawing and as number 34 in the 1981 drawing. The middle pond is listed as lagoon 2 in the 1979 letter, as the "middle pond" in the 1980 drawing, and as number 30 in the 1981 drawing. The east pond is listed as lagoon 1 in the 1979 letter, as the "east pond" in the 1980 drawing, and as

number 31 in the 1981 drawing. Their dates of construction are listed in the 1979 letter. The east and middle settling ponds were excavated and then filled during plant demolition in 1982. The excavated sediments were sent to a secure landfill. The west settling pond was cleaned and turned over to General Tire for use in their waste water treatment system in 1982.

The west, middle and east ponds were part of the plant's wastewater treatment process. The substances in the wastewater are described in the attached August 22, 1978 and January 26, 1979 wastewater characterization reports and in the response to Request 9.

The bottom and sides of the west pond and east ponds were constructed out of native clay which is highly impermeable, as were the sides of the middle pond. The bottom of the middle pond was constructed of concrete. They were diked.

Two ponds were known as the solar ponds.

The south solar pond is listed as lagoon 4 in the 1979 letter and as the "south solar pond" on the 1980 drawing. It is not listed on the 1981 drawing because it was replaced by the emergency spill basin (number 52), a concrete tank. The east solar pond is listed as lagoon 5 in the 1979 letter and as the "east solar pond" on the 1980 drawing. Their dates of construction are

listed in the 1979 letter. The south solar pond was replaced by the new concrete emergency spill basin in 1980. The east solar pond was eliminated during plant closure in 1982.

The east and south solar ponds were used primarily to dewater fly ash and sludges that had been dredged from wastewater settling ponds.

The bottom and sides of the south solar pond were the constructed out of native clay which is highly impermeable. It was diked.

The east solar pond was a flat area which was not diked. Runoff from the east solar pond went to the plant stormwater collection system.

#### Waste Piles

Waste piles existed in three areas at the plant.

Toluene diisocyanate residue was reportedly stored on the north portion of the plant during its early years of operation. This area was underlain with nature clay, which is highly impermeable, and was located within the stormwater collection area of the plant. It is not currently known whether this area was diked. No pictures, sketches or maps showing waste piles in this area are known to exist. The composition of TDI residue is described in the response to Request 16.

During the later years of the plant's operations, toluene diisocyanate residue was stored in waste piles in the southeast portion of the plant shown on the 1980 drawing as the "residue aging area" and as number 45 on the 1981 drawing. This area was diked, underlain with native clay, which is highly impermeable, and was located within the stormwater collection area of the plant.

#### Trenches and Pits

Sand and other debris was placed in a portion of a drainage ditch at an unknown time and covered with native clay. This ditch is described in the answers to question 13 and 30. This ditch was located in native clay, which is highly impermeable.

In addition to the drawings attached hereto, Olin has submitted on previous occasions drawings, maps and photographs to the EPA and Ohio EPA depicting one or more of the above-described facilities. Because of the burden, cost and duplication of effort involved, Olin objects to being requested to submit all such pictures, sketches or maps. To the extent that EPA needs additional documents of this type, Olin will produce readily available pictures, sketches or maps for inspection and copying.

See also the response to Request 17.

32. Provide any information that you have concerning the disposal of hazardous substances from OCC operations at Reserve Environmental Services, Inc., including:

- a. Description of the method of operations at the site (e.g. how drums were rinsed, materials used in drum cleaning, methods of disposal of waste residues from drums, disposal of rinse water, etc.)
- b. The disposal locations used by Reserve Environmental Services, Inc. for residues, rinse water and solid wastes generated by their operations. This description should include locations both on and off their properties.
- c. The disposal locations for any drums discarded by the company.
- d. The estimated quantity of drums and waste residue disposed of at each location by the company.
- e. Whether the company received drums for cleaning from parties other than OCC.

See response to Request 26.

33. Provide the name of each customer from whom OCC has received hazardous substances for purposes of treatment or disposal, including incineration or reclamation. Further, provide any information you have on the kinds of wastes received, the quantity of each kind of

waste received, the processes used by OCC in handling these wastes, the period during which each kind of waste was received and processed, and the likely disposition of any residues from that process.

Not applicable.

34. Provide copies of any documents that you now have that contain information indicating the receipt of hazardous wastes for reclamation, incineration, or other treatment by OCC. Such documents would include logs, invoices, bills of lading, purchase orders, work orders, trucking records, correspondence, contracts or other agreements.

Non applicable.

35. Provide the names of all other off-site facilities that have been used by OCC for the disposal of unreclaimed chemical wastes and hazardous wastes, incineration process wastes and manufacturing process wastes. Provide the dates during which such disposal has occurred and the kinds of wastes sent to each facility.

Except as described in the response to Requests 25 and 36, all off-site disposal facilities which receive such wastes from the plant are located outside the Fields Brook watershed and thus are irrelevant to the subject matter of this request for information.

36. Describe any information OCC may have obtained regarding contaminated fill material or debris deposited in or near Fields Brook or its tributaries. Such should include any information regarding fill allegedly disposed by Brenkus Excavating at or near the residence of [REDACTED]

Olin has two types of information regarding contaminated fill materials or debris deposited in or near Fields Brook or its tributaries.

First, Olin employees have observed fill material located in what has been identified to them as the backyard of the [REDACTED] property at [REDACTED]. At the request of Ohio EPA, Olin inspected this site and sampled fill material located thereon. Olin analyzed the samples to determine whether the material was TDI residue, and for its composition and leaching potential. Results of this sampling, which were previously submitted to Ohio EPA, are attached.

Olin employees also accompanied Ohio EPA personnel to a nearby location, identified to them as the [REDACTED] property, which contained fill material. Olin has not sampled this material.

Second, Olin employees have received information at various times from Ben Brenkus regarding his disposal of material near Fields Brook or its tributaries. Mr. Brenkus has advised Olin that he

deposited dump truck loads of TDI residue at the Herl property. Mr. Brenkus has advised Olin that he presently does not recall the amount of residue deposited at this site; however, on one occasion Mr. Brenkus advised an Olin employee that about 60 dump truck loads were taken to a location in this area. Mr. Brenkus also advised Olin that a far lesser amount of material was disposed of on the [REDACTED] property.

On one occasion Mr. Brenkus also advised an Olin employee that he deposited one truck load of residue at his shop. However, Mr. Brenkus has subsequently advised Olin employees that he did not dispose of any residue at his shop and could not have done so because there was no room to do so.

Olin never arranged for or authorized the disposal of any material at any of the locations mentioned above.

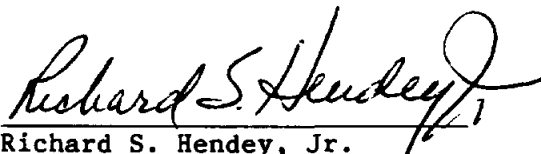
37. A list and description of all liability insurance coverage that is or was carried by you or any predecessor or successor corporations or partnerships, including any self-insurance provisions, that relates to hazardous substances and/or the above reference sites. Provide copies of all of these insurance policies.

A confidential list of the names of companies with whom Olin has liability insurance coverage is enclosed. Olin objects to

providing copies of such policies because it is unnecessarily burdensome and outside of the scope of 42 USC Section 6927 and 9604.

38. Provide any information you have regarding the waste disposal methods utilized by surrounding property owners or users.

Olin objects to this question as being unnecessarily broad, unduly burdensome and unreasonable. EPA already has or is directly obtaining from summoned property owners extensive information about such methods. Notwithstanding this objection, and without waiving it, Olin in searching its records for responses to other Requests herein has found two additional documents, which may not have been furnished to EPA or be otherwise publicly available. A 12/31/68 internal Olin report notes that CEI had a large cinder pile on the north side of Fields Brook east of Olin's plant. A slurry of this material in distilled water had a ph of 4.2. Attached is a 7/8/71 General Tire report on toxins used in their plant which was found in Olin's files.

  
Richard S. Hendey, Jr.  
Manager, Regional  
Environmental Affairs

RSH:has

7480e

As to Introductory Statement including general and specific objections.

William J. A. Sparks  
William J. A. Sparks  
Counsel

What are the properties (solid, liquid, flammable, corrosive, etc.) of the waste streams generated by your process?

<u>Waste Stream</u>	<u>Properties</u>
<u>C (TDA Hotwell)</u>	<u>Liquid</u>
<u>*D (Ortho TDA--by-product)</u>	<u>Liquid</u>
<u>H (TDI Residue)</u>	<u>Semi-solid when generated</u>
<u>I (TDI Scrubber solution)</u>	<u>Liquid</u>
<u>J (Vacuum Pump Oil [spent])</u>	<u>Liquid</u>

Using available data what are the compositions and concentrations of material in these streams?

<u>Waste Stream</u>	<u>Composition</u>	<u>Concentration</u>
<u>C (TDA Hotwell)</u>	<u>TDA and H<sub>2</sub>O</u>	<u>200-500 ppm TDA; 99±% H<sub>2</sub>O</u>
<u>*D (Ortho TDA--by-product)</u>	<u>TDA</u>	<u>99% + 1% TDA</u>
<u>H (TDI Residue)</u>	<u>Polymerized TDI- Isocyanurates Carbodiinides (unsaturated compound with -N=C=N-group)</u>	<u>~45%</u>
	<u>Methyl-benzimidazolones (Cyclic Ureas)</u>	<u>~40%</u>
	<u>Ureas</u>	<u>5%</u>
<u>I (TDI Scrubber solution)</u>	<u>NaOH</u>	<u>10%</u>
	<u>Na<sub>2</sub>CO<sub>3</sub></u>	<u>2-4%</u>
	<u>NaHCO<sub>3</sub></u>	<u>1-2%</u>
	<u>NaCl</u>	<u>Trace</u>
	<u>MCE</u>	<u>2-4%</u>
	<u>H<sub>2</sub>O</u>	<u>1-10 ppm</u>
<u>J (Vacuum Pump Oil)</u>	<u>Vacuum Pump Oil</u>	<u>90-95%</u>
	<u>TDI, Urea, MCE</u>	<u>90-100%</u>
	<u>COCl<sub>2</sub></u>	<u>0-10%</u>
		<u>0 - trace</u>

For each waste stream describe the management of the waste through ultimate disposal (e.g., Waste stream A is neutralized with NaOH, stored in a surface impoundment for typically 60 days and hauled to an off-site, independently-owned landfill).

<u>Waste Stream</u>	<u>Management</u>
<u>C (TDA Hotwell)</u>	<u>Waste stream C is treated through a carbon adsorption system, pH adjusted, and expended thru the Plant outfall (F514001).</u>
<u>*D (Ortho TDA--by-product)</u>	<u>This stream is stored in holding tanks, purified to 99±1% Ortho-TDA and sold as a by-product.</u>
<u>H (TDI Residue)</u>	<u>Waste stream H is taken to aging sheds for 3-7 days, stored in surface impoundment for approximately 60-120 days, and hauled to a secured landfill for disposal.</u>

Waste Stream

Management

I (TDI Scrubber solution)

Waste stream I is pumped to a holding tank (Spent Caustic tank), used for pH control in the wastewater treatment system, and expended through the Plant outfall (F314001).

J (Vacuum Pump Oil [spent])

Waste stream J is drummed, stored on oil pad for 30-40 days, and then shipped to an approved disposal firm via tank truck for incineration.

4. For the waste streams noted in Question 3, what components are present as a result of such things as catalyst, solvents, and impurities in raw materials used in the process?

Waste Stream

Components

C (TDA Hotwell)

TDA

I (TDI Scrubber solution)

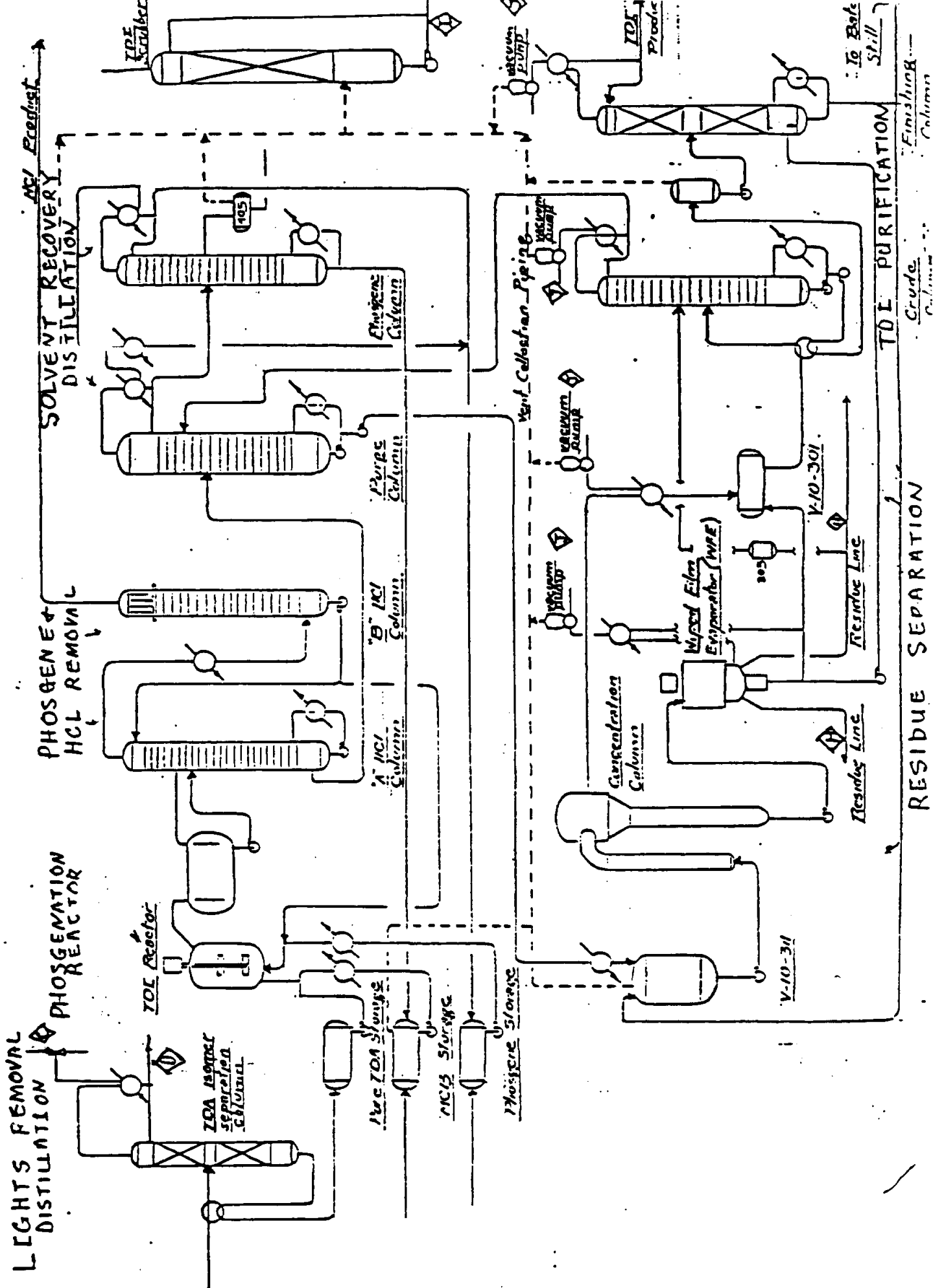
MCB

J (Vacuum Pump Oil [spent])

MCB

\*By-product, not waste stream

# TOLUENE PLANT



In Response to Request #29

April 1, 1974

Mr. Raymond Shaeffer  
Ohio EPA  
2110 E. Aurora Rd.  
Twinsburg, Ohio 44087

Dear Mr. Shaeffer:

As per our telephone conversation today, enclosed is a copy of the log for the test borings made prior to the construction of the plant. I have indicated in red the approximate location of the new pond.

I had contacted Mr. Wilson of the U. S. D. A. Soil Conservation Office located in Jefferson, Ohio, to determine whether their soil survey had any record of test borings on the plant site. Unfortunately, the survey did not encompass the industrial area and therefore no information was available.

I would appreciate your reviewing of the enclosed log and advise me if they are satisfactory. If there are any other questions, please contact me.

Very truly yours,

OLIN CORPORATION

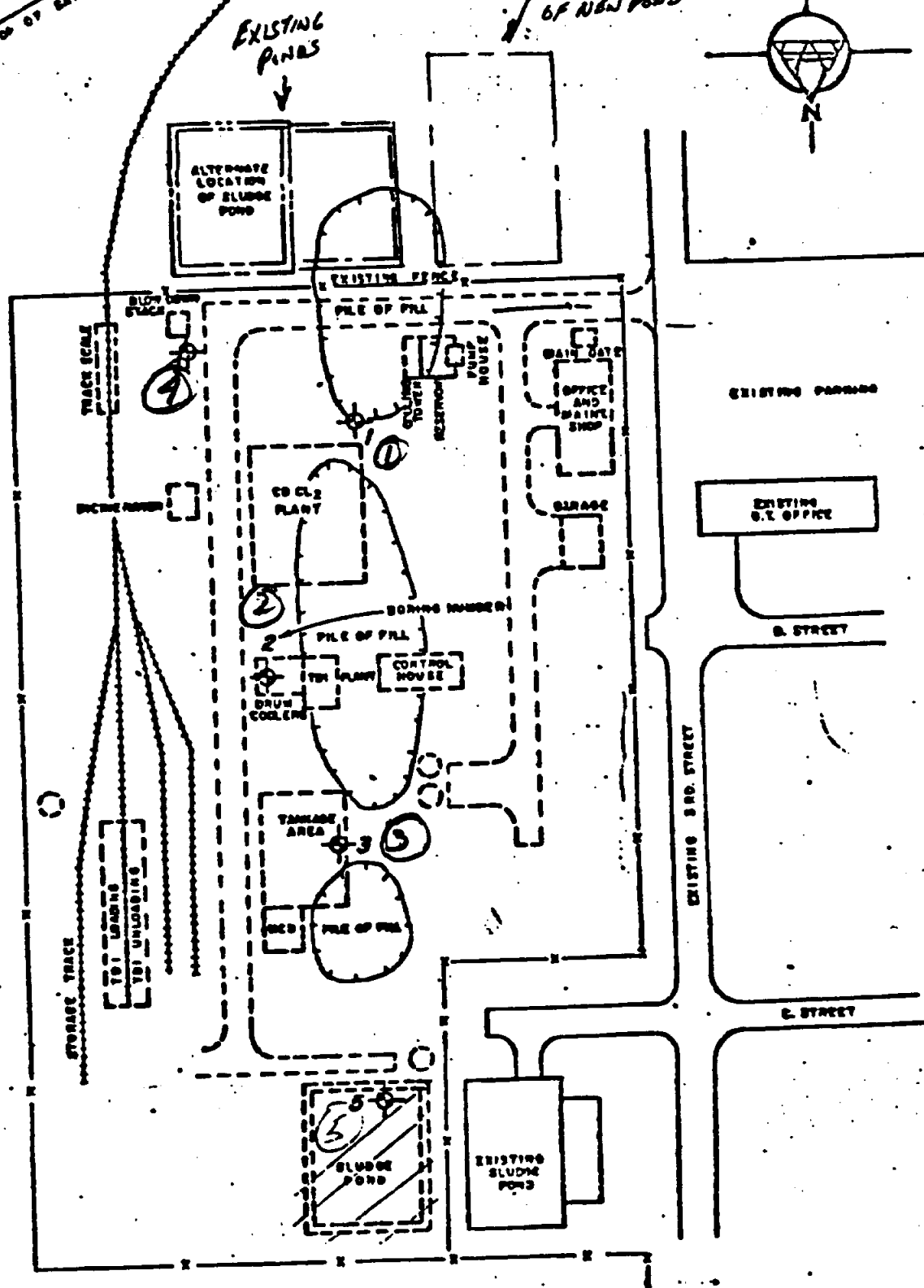
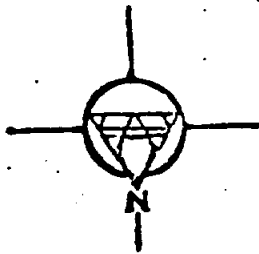
George Latta  
Plant Manager

/mf  
Enclosure

Olin - Ashtrabula, Oh.

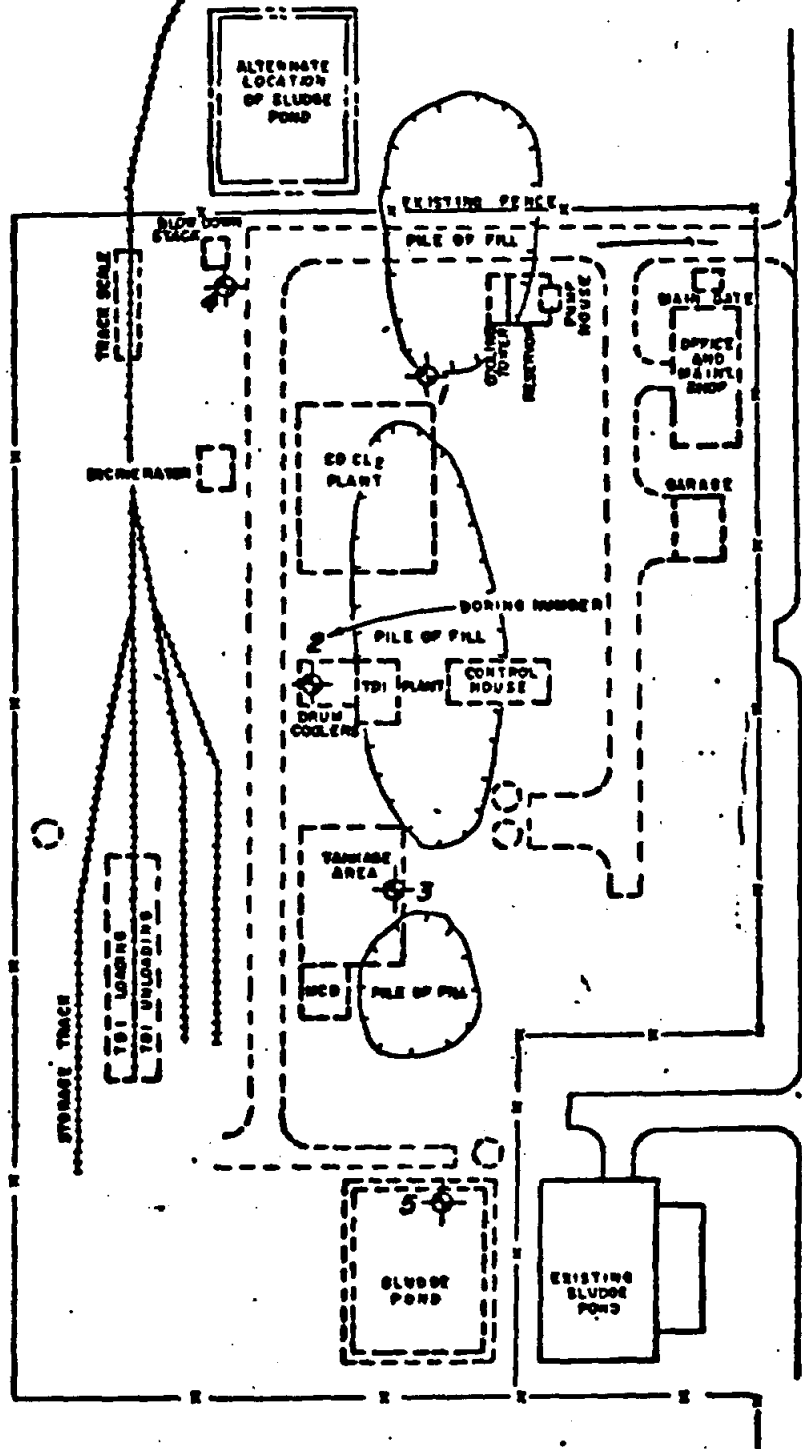
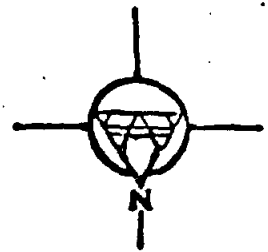
FIELDS BROOK  
TOP OF BANK

APPROX  
LOCATION  
OF NEW POND



PLOT PLAN

FIELDS BROOK  
TOP OF BANK



EXISTING PARKING

EXISTING S.E. OFFICE

B. STREET

EXISTING 3RD STREET

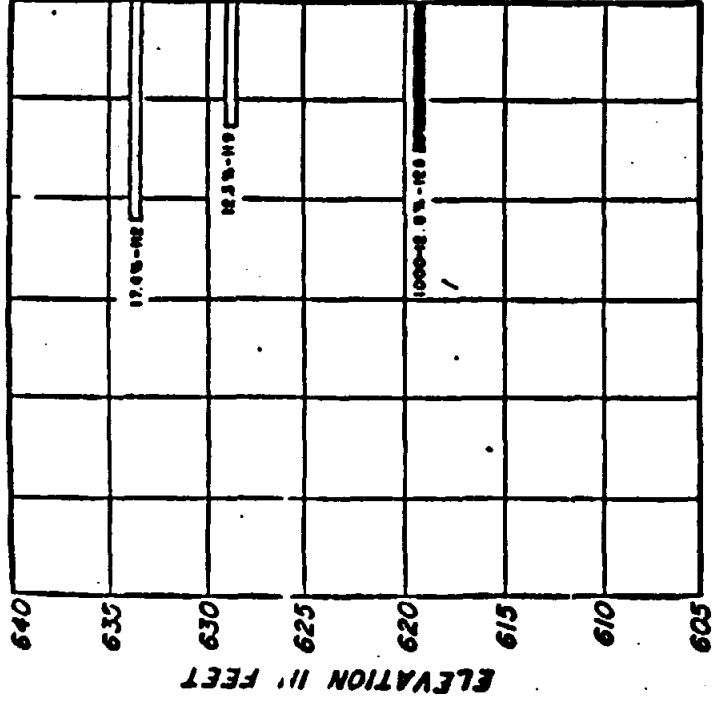
C. STREET

# PLOT PLAN

### BORING 1

SURFACE ELEVATION 638.9

SHEARING STRENGTH IN LBS./SQ.FT.  
6000 5000 4000 3000 2000 1000 0



SYMBOLS



DESCRIPTIONS

BROWN SANDY SILTY TOP SOIL - FILL  
BROWN CLAYEY SILTY - FILL  
GRAY SAND WITH GRAVEL - FILL  
END OF FILL  
BROWN SILTY CLAY  
-- DEGRADE WATER  
GRAY SILTY CLAY

SOME LENSES OF FINE SAND

GRABING GRAVEL

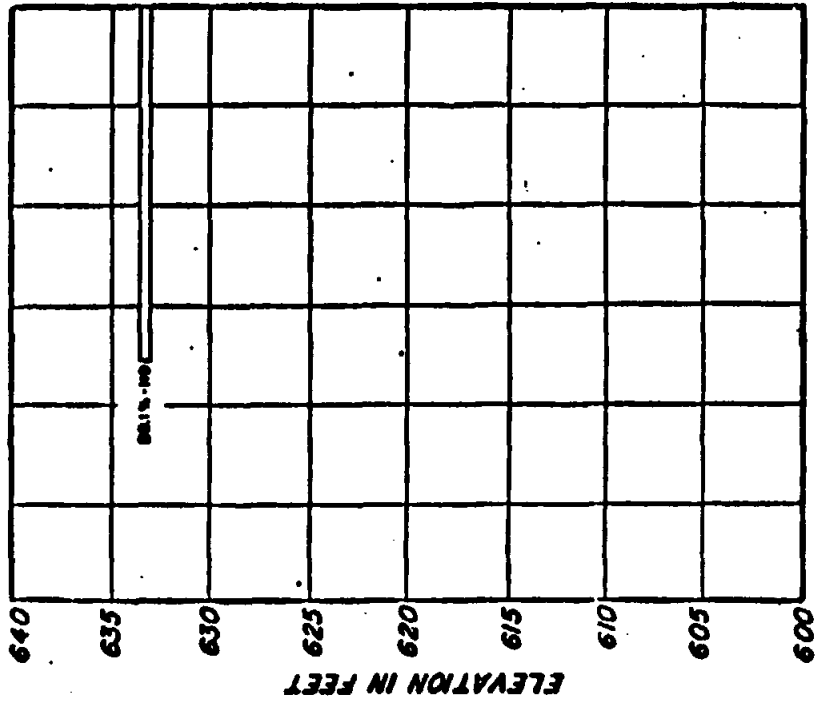
GRAY CLAYEY SILTY WITH SOME FINE SAND AND GRAVEL

BORING COMPLETED 8/27/58

### BORING 2

SURFACE ELEVATION 638.4

SHEARING STRENGTH IN LBS./SQ.FT.  
6000 5000 4000 3000 2000 1000 0



SYMBOLS



DESCRIPTIONS

BROWN SANDY SILTY TOP SOIL - FILL  
BROWN CLAYEY SILTY - FILL  
-- DEGRADE WATER END OF FILL  
BROWN AND RED SILTY CLAY

GRAY SILTY CLAY

GRABING SOME GRAVEL

GRABING SOME SILTY WITH FINE SAND

GRAY CLAYEY SILTY WITH GRAVEL

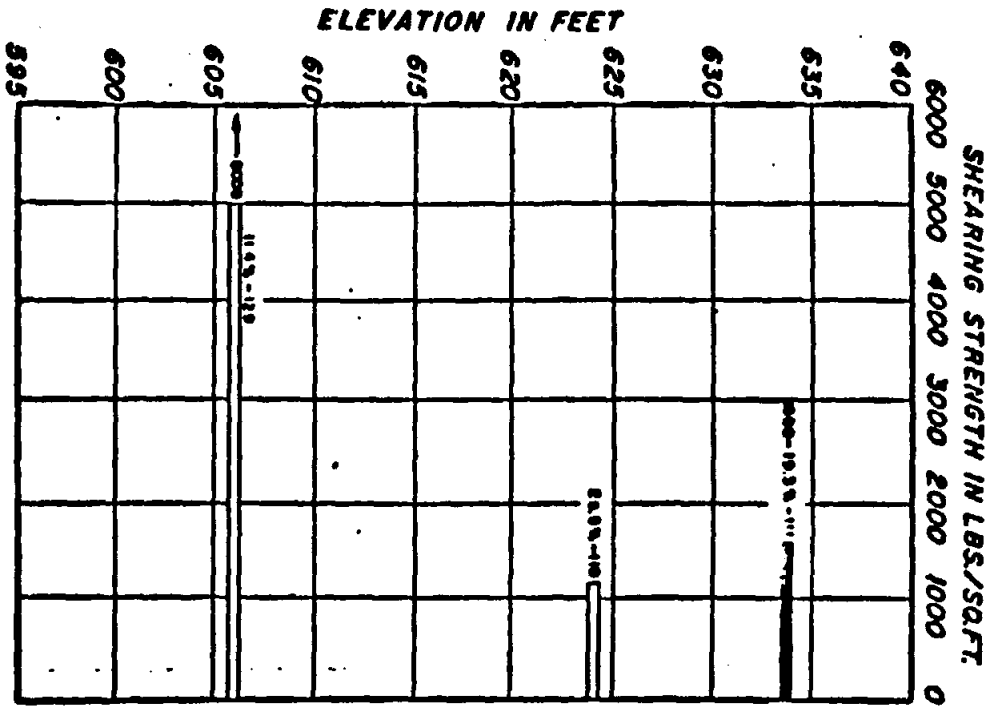
BORING COMPLETED 8/27/58

## LOG OF BORINGS

NOTE:  
ELEVATIONS REFER TO  
M.S.S. DATUM

SHAW-WALKER & COMPANY

# LOG OF BORINGS



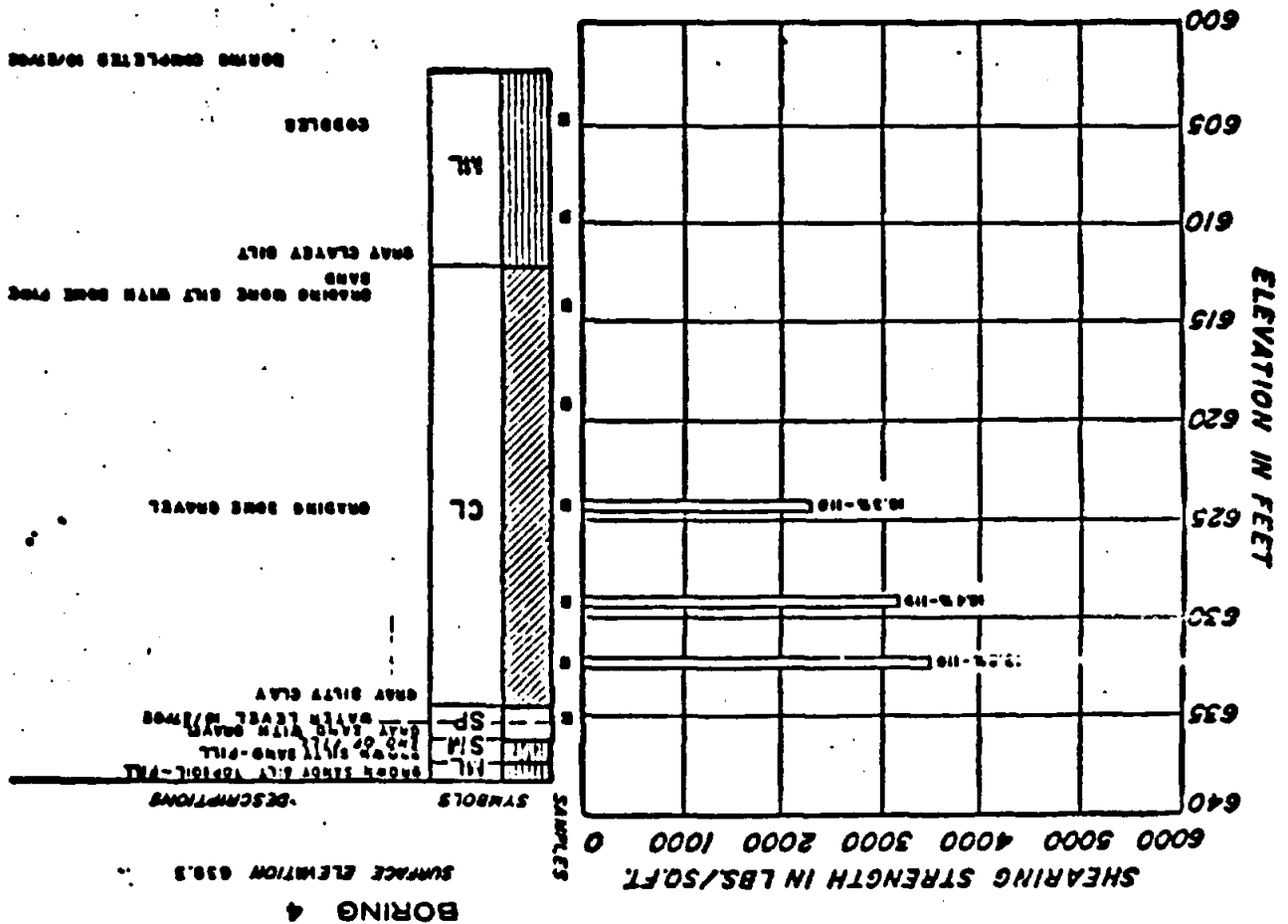
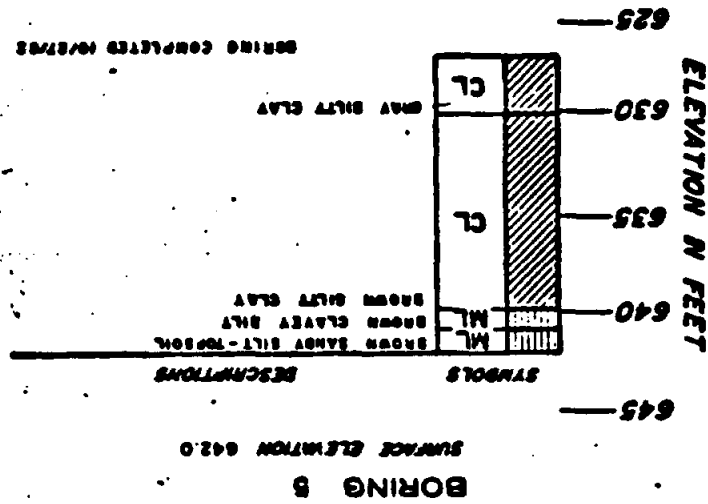
SAMPLES

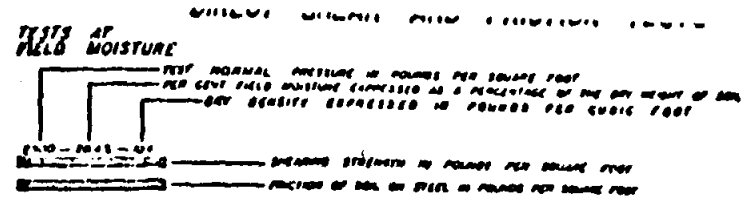
SYMBOLS	DESCRIPTIONS
ML	BROWN SANDY SILTY TOPSOIL
ML	WETTED BROWN AND RED SILTY CLAY
CL	SEEPAGE WATER
CL	GRAY SILTY CLAY
CL	GRADING SAND AND GRAVEL
CL	GRADING BROWN SILTY SOILS
ML	GRAY CLAYEY SILT

SMALL DISCONTINUED BORING CORRECTED B/W/166

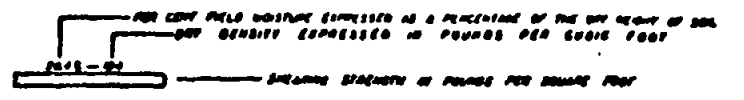
BORING 3  
SURFACE ELEVATION 636.8

# LOG OF BORINGS

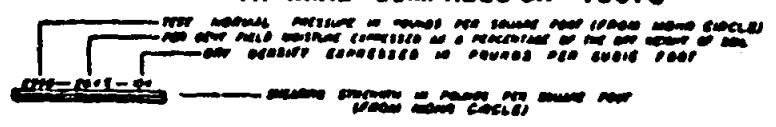




UNCONFINED COMPRESSION TESTS



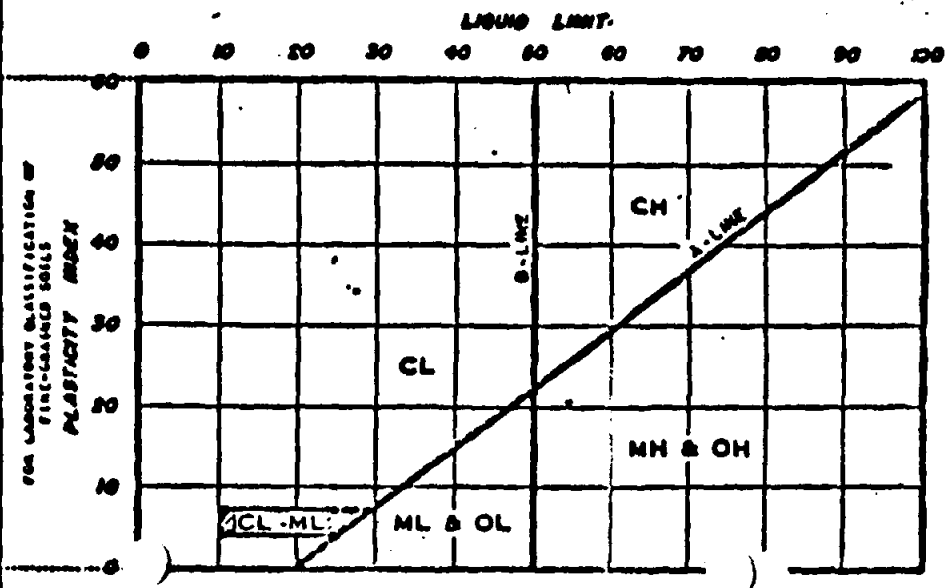
TRIAxIAL COMPRESSION TESTS



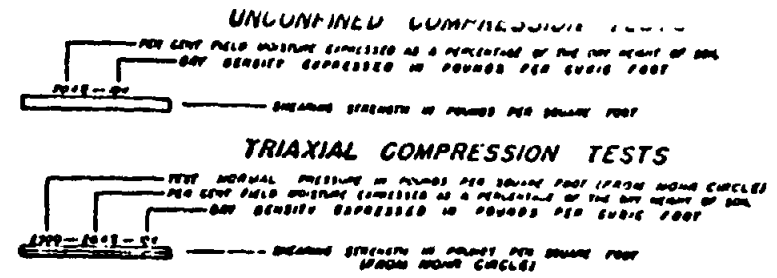
KEY TO TEST DATA

*Slate A-2*

MAJOR DIVISIONS		GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS	
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES	
		GM	SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES		
	MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 4 SIEVE	GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
				SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)		SM	SILTY SANDS, SAND-SILT MIXTURES	
			SC	CLAYEY SANDS, SAND-CLAY MIXTURES	
	MORE THAN 50% OF COARSE FRACTION PASSING NO. 6 SIEVE	SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)			
FINE GRAINED SOILS	SILTS AND CLAYS		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
			OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
	SILTS AND CLAYS		MH	INORGANIC SILTS, MICACEOUS OR BITUMINOUS FINE SAND OR SILTY SOILS	
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
MORE THAN 50% OF MATERIAL IS PASSING NO. 200 SIEVE SIZE	LIGUID LIMIT GREATER THAN 50				

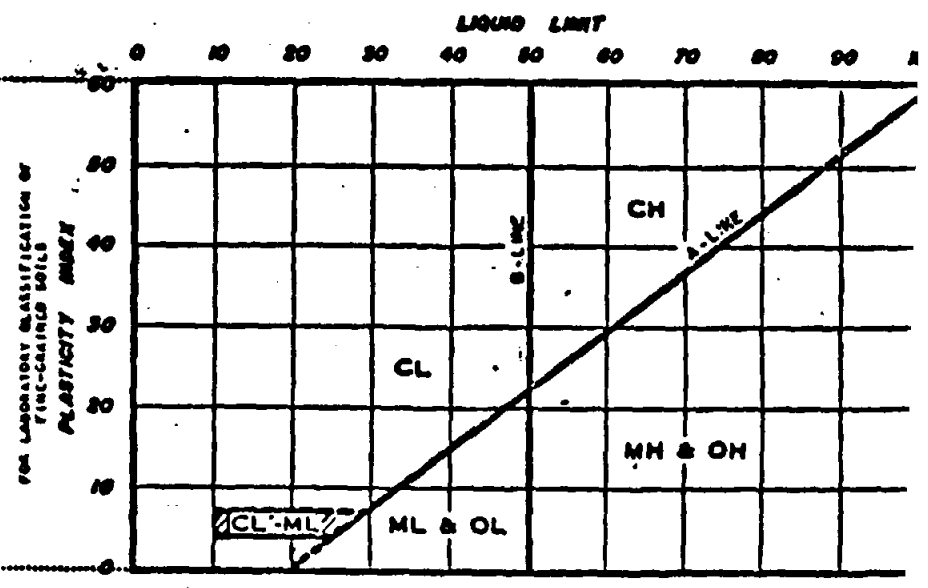


PEAT, HUMUS, SWAMP SOILS



**KEY TO TEST DATA**

MAJOR DIVISIONS			GRAPH SYMBOL	LETTER SYMBOL	TYPICAL DESCRIPTIONS		
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS (LITTLE OR NO FINES)		GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES		
		GRAVELS WITH FINES (APPRECIABLE AMOUNT OF FINES)		GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES, LITTLE OR NO FINES		
		MORE THAN 50% OF COARSE FRACTION RETAINED ON NO. 40 SIEVE	SAND AND SANDY SOILS	CLEAN SAND (LITTLE OR NO FINES)		SW	WELL-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES
			SANDS WITH FINES (APPRECIABLE AMOUNT OF FINES)		SP	POORLY-GRADED SANDS, GRAVELLY SANDS, LITTLE OR NO FINES	
	FINE GRAINED SOILS	SILTS AND CLAYS	LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
					CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
					OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY	
		SILTS AND CLAYS	LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILTY SOILS	
					CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS	
					OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
HIGHLY ORGANIC SOILS				PT	PEAT, MARLS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS		



**PLASTICITY CHART**

NOTE: DUAL SYMBOLS ARE USED TO INDICATE BORDERLINE SOIL CLASSIFICATIONS.

**SOIL CLASSIFICATION CHART**



In Response to Request #16

TO P. B. Duff AT Stamford  
FROM W. C. Rankin AT Ashtabula  
SUBJECT USEPA QUESTIONNAIRE--TDI MANUFACTURE

DATE March 12, 1981  
COPY TO B. F. Davidoff  
C. M. Richards  
R. A. Smith

I have completed Part I of the USEPA questionnaire concerning TDI manufacture at the Ashtabula facility. Per your instructions, I did not complete the economic section of the questionnaire.

Please review and submit the following to the USEPA. I have enclosed a flow diagram of the process in relation to Figure 1 of the questionnaire.

If you have any questions concerning this information, please contact me.

*W. C. Rankin*  
W. C. Rankin

WCR/bjw

Enclosures

STATE OF CONNECTICUT  
COUNTY OF FAIRFIELD

Richard S. Hendey, Jr. being first duly sworn, states he is an authorized agent of Olin Corporation, that while he does not have personal knowledge of all the facts recited in the foregoing response of Olin, and responses of Olin of June 23, 1986 and July 21, 1986, incorporated by reference herein, information contained herein has been collected, based upon discussions with knowledgeable Olin personnel and upon a search of those files of Olin Corporation, located in Stamford, Connecticut and Charleston, Tennessee, which were believed to have contained responsive information, and made available to him by others and is true to the best of his knowledge and belief.

Richard S. Hendey Jr

Sworn to and subscribed before me  
this 5 day of September, 1986.

Gloria Castagna - Notary  
Exp March, 1989

July 8th, 1964

To: J. H. Bianco

CC: S. Cupach

From: J. P. Adams

V. Hartmann

L. Reed

Subject: WASTE DISPOSAL

F. Valentich

During the period of June 30th to July 5th, 1964, at which time a sustained run was achieved in the TDI unit, considerable quantities of lime overflowed the settling pond and flowed into Field's Brook. A considerable lime inventory has built up in the settling pond, which was cleaned at a cost in excess of \$900.00, just prior to the run.

Difficulties are being experienced with the lime neutralizing system. The pH control system does not seem to be operable. The control valve is continually plugging, necessitating its being by-passed by stringing hoses from the pump to the neutralizing tank. The pH, in the neutralizing tank, varies from 12.5, at which time excess lime goes to the settling pond, to 0.2, at which time the neutralizing tank and agitator are being corroded with strong acid.

If we are to protect our equipment and fulfill our responsibility to the State, it will be necessary to evaluate our acid neutralizing system. The existing equipment must be made to operate, or changed, so that it will operate.

One of the factors effecting the amount of lime which overflows the settling pond to Field's Brook, is the excessive amounts of water from the sumps and the caustic scrubber, which flow into the settling pond. The water from the sumps is sufficient to decrease the residue time in the settling pond, by a factor of as high as 10. It may be advisable to have the sump discharges by-pass the settling pond. The liquid from the caustic scrubbers could possibly be diverted to the lime storage tank and fed to the neutralizing tank. By so doing, the following could be accomplished:

1. The lime slurry would be diluted.
2. The average particle size from the lime tank would be decreased.
3. Plugging of the control valve may be lessened.
4. More suitable material will be fed to the neutralizing tank.
5. The lime requirements would be decreased.

It is possible that calcium carbonate would be formed in the lime tank. This may not be as much of a problem as the solid lime, due to the particle size of the calcium carbonate. Mixing of the lime and the spent caustic would cause the following reaction:



As can be seen from the above reaction, formation of the calcium carbonate is accompanied by converting the lime to caustic. There can be no question that the caustic would be more satisfactory than lime, for neutralizing acid. The

*This was done by Adams. The pH control system does not seem to be operable. The control valve is continually plugging, necessitating its being by-passed by stringing hoses from the pump to the neutralizing tank. The pH, in the neutralizing tank, varies from 12.5, at which time excess lime goes to the settling pond, to 0.2, at which time the neutralizing tank and agitator are being corroded with strong acid.*

*How do you propose to keep tank of residual neutralizing value in the tank, or do you propose to add another operator to test continuously effluent?*

*Let us not forget that this is a solid as was recently demonstrated to you by plant laboratory. What about buffering action of NaOH? You should not ignore the*

*I was interested in this. The present installation can be worked off by ourselves. This is the way to go. I am sure you will find this interesting.*

*You should not ignore the*

J. H. Bianco

July 8th, 1964

Page 2

$\text{Na}_2\text{CO}_3$  in the spent caustic would also be more satisfactory than lime for neutralizing acid. It should be pointed out also, that the original proposal submitted to the Ohio State Department of Health provides for the spent caustic to be fed continuously to the neutralizing tank.

*J. P. Adams*  
J. P. Adams

JPA:eb

INTER OFFICE MEMO


*Stream Pollution*  
 IN RESPONSE TO REQUEST #9

TO G. P. Palmer AT Ashtabula DATE July 9, 1965

FROM G. L. Figg AT " COPY TO S. Capach ✓  
L. Rosney  
R. Tindell

SUBJECT Talk with Mr. John Funk about Oil Slick  
Traced to our Outfall

CONFIDENTIAL

Mr. Funk called today to report a complaint he received last night from the boat owners who dock on the Ashtabula River near the point where Field's Brook discharges into it. Time of complaint was 6:00 p.m. (July 8, 1965). Subject of complaint was an oil deposit showing up at about 5:30 p.m. This material was sampled (1 Gal.) and was reported by boat owners to be greater than 500 gallon in the river. This oil has been traced to above General Mills' outfall by Mr. Funk on visits accompanied by the other Plant Managers to their respective outfalls. Mr. Funk reports Field's Brook above Olin did not contain oil (?).

Mr. Funk's call was only to inform us of the complaint and that we would probably receive a copy of it from Mr. Herb Gordon. He said that the boat owners were quite "violent" when he went down last night, that in his estimation, there would not have been a complaint if there had not been heavy discharges of Ferric Chloride on July 1 & July 5. These discharges were reported by Mr. Funk to have been heavy enough to drop the pH at the mouth of Field's Brook to 2.4 and to leave deposits on the bank of the Ashtabula River opposite Field's Brook. Of course being a holiday weekend amplified the situation.

I reported to Mr. Funk that oil discharges from our plant could not have exceeded 50 gallons and that the discharge would have been continuous over 24 hr period. To support this statement I pointed out that we are paying high prices for this oil and we do not "dump" it as a matter of economics. He said that he estimated no more than 25-50 cc of oil in the gallon sample that the boat owners obtained from the river but they were in no mood to be reasoned with.

As to Mr. Funk's inquiry about the color (orange-our downstream) I informed him that we were aware of this problem, it was due to the ground spill last year and was a result of rain washing this material out of the ground. I told him of our plans to dike the possible offending pumps etc. and to remove much of the contaminated fill. His comment was that being a Plant Manager himself, he felt that since we were aware of the problem and were taking steps to solve, or at least minimize it, the problem was 95% solved.

Talk with Mr. John Funk about Oil Slick  
Traced to our Outfall

Pg. 2 of 2  
7/9/65

The investigation of Field's Brook by J. Ecker and myself this morning verified Mr Funk's and Bill Martin's observations earlier in the day. There was an apparent oil film on Field's Brook below our storm sewer outlet but in our estimation this was negligible at this time. We had been pumping out our TDI sump all day yesterday, however we cannot account for even 50 gal. of oil and certainly not a sudden large discharge. Since this occurred at precisely (5:30 p.m. (according to Mr. Funk) and we had stopped pumping out the sump at 4:00 p.m. , I don't see how we can be the only contributor to the problem.

ORIGINAL SIGNED BY

G. L. Figg

/mf



January 30, 1967

Mr. W. C. Martin  
Staff Engineer  
General Tire  
Ashtabula, Ohio

Dear Bill:

This letter will confirm our telephone conversation of this date regarding your November 22, 1966 letter on Ashtabula Pollution checks.

We are currently making the following weekly analysis:

- |                           |                           |
|---------------------------|---------------------------|
| 1. Suspended solids       | 5. Turbidity              |
| 2. Settleable solids      | 6. Odor                   |
| 3. pH                     | 7. Chemical Oxygen Demand |
| 4. Acidity for alkalinity |                           |

It is our general feeling the Bacteria density, (coliforms), B.O.D., and surfactants are analysis that might not be entirely applicable at this plant. We also feel more knowledge is required in these areas:

- |                     |                       |
|---------------------|-----------------------|
| 1. Total Solids     | 4. Surface appearance |
| 2. Dissolved Solids | 5. Hardness           |
| 3. Dissolved oxygen | 6. Temperature        |

Possible toxic materials in our effluent are  $H_2S$ , TDA, MEA, MCB,  $HCl$ ,  $NaOH$ ,  $Ca(OH)_2$ , TDI, and  $COCl_2$ . It is felt that all these materials are toxic to some degree, however, a more concise definition of what is or what isn't toxic is needed.

With respect to air pollution, our normal control vent streams contain carbon dioxide, nitrogen and small amounts of oxygen and carbon monoxide. During upset periods, varying amounts of  $HCl$  and  $COCl_2$  will be present in these vent streams. Defining the frequency of these upsets is a very nebulous thing, however, if I were to make a guess, I would say this might occur once a month.

Other wastes consist of  $H_2S$  (approximately 36 tons) as a by-product from our incoming Coke. This material is sewered. Some odor of  $H_2S$  is detectable from our sewer. Also TDI residue (approximately 1800 tons in 1966) is "drummed" from our Kentro bottoms. The approximate composition of this residue:

COPY



- 9.2% TDA residue
- 15.3% Benzimidazolones
- 30.6% Isocyanurates
- 13.6% Carbodumides
- 21.8% 'Bound' TDI
- 9.3% 'Free' TDI

With respect to the availability of laboratory manpower to perform the analysis requested, it should be stated that our current expansion efforts are placing an excessive analytical load on our 4 technician laboratory staff. It is my feeling that these test runs and subsequent higher than normal laboratory work loads will be required for the next two months to support these expansion plans.

Although additional work loads of this type are never impossible, it would seem to me that a program of this type, at this time, would be somewhat impractical unless a "blank check" were used for overtime coverage. Since you indicated that Akron might be of service to us in this respect, I await your comments relative to the implementation of this pollution program.

Very truly yours,

ORIGINAL SIGNED BY

R. H. Papenfuss  
Plant Manager

RHP/prp

cc: S. Cupach  
R. G. Scharff  
J. E. Troyan  
J. A. Kleinhans (C. T.)  
R. W. Landrie (G. T.)  
M. G. Glenn (C. T.)

COPY

INTER OFFICE MEMO



TO **Dr. R. Henderson** AT **New Haven**

FROM **S. Cusach** AT **Ashtabala**

SUBJECT **Discharge of Toxins to Waters of the State of Ohio  
Ashtabala TDI Plant**

Ref: **L. S. Howe to Distribution, same title,  
dated April 16, 1971.**

DATE **April 29, 1971**

COPY TO **R. C. Burroughs  
J. C. Hance  
L. S. Howe  
R. H. Papenfuss  
I. W. Posnoy  
A. E. Slesinger**

A survey of all the materials that could possibly be discharged directly or indirectly from the TDI plant into waters of the state has resulted in the following listing.

<b>Toluene diamine</b>	<b>Toluene diisocyanate</b>
<b>Phosgene (liquid)</b>	<b>Monochloro benzene</b>
<b>Chlorine (liquid)</b>	<b>Muriatic Acid</b>
<b>Aqueous Ammonia</b>	<b>Benzoyl chloride</b>
<b>Caustic Soda (concentrations of 50%, 10%, 2%)</b>	
<b>Sulfuric Acid (concentrations of 75-98%)</b>	
<b>Hexane</b>	<b>Monethanolamine</b>
<b>Dimethyl formamide</b>	<b>Sun Vis Oil #41</b>
<b>Mobile Gargoyl Artic Oil 300</b>	<b>Gulf Oil 64</b>
<b>TDI residue (solids)</b>	<b>Sodium chloride solutions</b>
<b>Hydrogen Sulfide water solution</b>	<b>Sodium Carbonate solutions</b>
<b>Dowtherm "A"</b>	<b>Metallurgical Grade Coke</b>
<b>Fly Ash</b>	<b>Alum</b>
<b>American Cyanamid 837A (polyelectrolyte flocculating agent)</b>	

I believe this constitutes all materials utilized at this time. I will be looking forward to your reply concerning their status as pertains to the definition of "toxins".

  
S. Cusach  
Ashtabala TDI Plant Manager

SC:mi

**Olin** CHEMICALS

120 LONG RIDGE ROAD, P.O. BOX 1355, STAMFORD, CT 06904-1355

WILLIAM J. A. SPARKS  
Counsel  
(203) 356-2347

September 5, 1986

Mr. Basil G. Constantelos, Director  
Waste Management Division  
United States Environmental Protection Agency  
Region V  
230 South Dearborn Street  
Chicago, IL 60604

RECEIVED  
SEP 10 1986

U.S. ENVIRONMENTAL PROTECTION AGENCY  
WASTE MANAGEMENT DIVISION  
REGION V

Dear Mr. Constantelos:

Re: FIELDS BROOK, ASHTABULA COUNTY, OHIO

This communication completes our response to EPA's Request for Information dated May 16, 1986, relating to the above-referenced matter.

A substantial amount of additional information is being provided herewith in this Response. Additional information relating to Requests Nos. 9, 16, 17, 29, 31 and 36 is being provided, as well as additional documents. This Response also refers to documents previously submitted in prior Responses to this Request.

If you or your staff have any questions on any of the foregoing, please don't hesitate to call me at (203) 356-2347.

Sincerely,

*William Sparks*

William J. A. Sparks  
Counsel

WJAS:mal  
Enclosure

see'd  
9/24/86  
mjt

7809e



120 LONG RIDGE ROAD, P.O. BOX 1355, STAMFORD, CT 06904-1355

June 23, 1986

Mr. Basil G. Constantelos, Director  
Waste Management Division  
United States Environmental Protection Agency  
Region V  
230 South Dearborn Street  
Chicago, Illinois 60604

U.S. EPA, REGION V  
WASTE MANAGEMENT DIVISION  
HAZARDOUS WASTE ENFORCEMENT BRANCH

RECEIVED  
JUN 25 1986

Re: FIELDS BROOK, ASHTABULA COUNTY, OHIO

Dear Mr. Constantelos:

Enclosed herewith is Olin's response to EPA's Request for Information dated relating to May 16, 1986 to the above-referenced matter.

By this letter, I am also requesting a limited extension of time, specifically until July 18, 1986 to permit Olin to finalize its search for information responsive to the Request, and submit a certified response.

The request is based on several factors. First, the Request seeks substantial information going back more than 20 years. Because of the fact that Olin is no longer operating the Ashtabula plant, the normal search for relevant records is far more time consuming for Olin than would ordinarily be the case. This information is not in one central location, making a through completion of the job more difficult. Nonetheless, all relevant records are being searched for and reviewed.

This Request has been reviewed and responded to during the time that Olin personnel have been heavily involved in completing another Request for Information relating to this same Ashtabula plant.

Finally, a substantial amount of information is being provided herewith, in Olin's Response. Most questions are being answered, and a good faith effort to comply with all EPA requirements is being made. By seeking this short extension, we will not delay EPA review of Olin's substantive information.

In summary, we ask for this limited extension to finalize our response. In the meantime, we continue to work toward that goal as our top priority. If you, or your staff have any questions on any of the foregoing, please don't hesitate to call me at (203) 356-2347.

Sincerely,

*William J.A. Sparks*

William J.A. Sparks  
Counsel

Enclosure  
ml

7598e

bcc: S. Cupach ✓

IN RESPONSE TO REQUEST #16



November 30, 1970

Mr. John H. Robertson, Manager  
Environmental Systems Division  
Catalytic Incorporated  
1528 Walnut St.  
Philadelphia, Pa. 19102

Dear Mr. Robertson:

I wish to apologize for the delay in obtaining the requested information for the pollution abatement program. As per our phone conversation, enclosed is the plant site plans showing the elevations and settling ponds and in reference to your letter of November 12, 1970, the requested items are as follows:

A. Annual volume of incinerable waste:

- |                            |                |
|----------------------------|----------------|
| 1. Contaminated vacuum oil | 52,000 gallon  |
| 2. Residue (750,000 lbs.)  | 372 cubic yds. |
| 3. Trash                   | 520 cubic yds. |

B. Liquid waste retention pond:

No chemical additives are used, but the ph is controlled by process wastes. Approximately \$7,500 per year is expended for dredging the ponds.

C. Annual expenditure and volume of waste being hauled away by contract is as follows:

Cost	\$26,500
Volume	1,150 cubic yards.

Very truly yours,

OLIN CORPORATION

COPY  
George Latta



TO S. Johnson AT Stamford 3-D DATE January 25, 1978  
 FROM R. A. Smith AT Ashtabula COPY TO B. McGlasson  
 P. Duff  
 SUBJECT Hazardous Waste Materials Disposed of in 1978

Listed below are the hazardous waste materials generated at the Olin-Ashtabula facility and disposed of in 1978.

<u>Hazardous Materials</u>	<u>Quantity</u>
1. Drummed Solids Contaminated with Chemical Residue	52 drums
2. Oil and Water Sludge	16 drums
3. Water Contaminated with MEA	331 drums
4. Spent Carbon	44 drums
5. Waste Sulfuric Acid	17,000 gallons
6. Waste Vacuum Pump Oil	44,000 gallons
7. Contaminated TDA Solids	125 drums
8. Crushed Sample Bottles	5 drums
9. Alumina Pellets	7 drums
10. TDI Residue (includes disposal at Reserve Environmental Services)	4,500 cubic yards
11. MCB Waste	94 drums
12. Reacted TDI (including 1/2 pint TDI sample cans)	79 drums

Listed below are the additional hazardous waste materials which may be generated at the Olin-Ashtabula facility.

<u>Hazardous Materials</u>	<u>Est. Quantity</u>
1. Water Contaminated with Hexane	10 drums/year
2. Lab Waste Chemicals	10 drums/year
3. Contaminated Scrap Metal	10 tons/month
4. Earth Contaminated with TDA	100 tons/year
5. CO Sump Flyash Sludge	5,000 cubic yards/year

If any additional information is needed, please don't hesitate to contact me.

R. A. Smith

CD567

TYPE OF WASTE	DISCRIPTION OF WASTE	TYPE OF DISPOSAL	GENERATION RATE LBS PER YR
✓Waste Drums ✓	Contaminated scrap drums	SCL	40,000#
✓Scrap Metal ✓	Contam. with TDA-TDI/residue	SCL	200,000#
✓Trash Trailer	Paper - General Trash	SNTLF	2,000 C.Yards
✓Spent Activated Carbon	75% Carbon 25% Water - TDA	Recycled	120,000#
✓Alumina Pellet	100% Alumina Pellets	SCL	5 drums - 2,000#
✓CO Sump Ash	Fly Ash from Wellman	NSCL	3,000,000# (1500%)
✓Lab Samples			
1 crush bottles	95% Glass, 5% TDI/Urea-MCB-H <sub>2</sub> O	SCL	15 drums - 6,000#
2			
3			
✓TDA Sample Can	35% M-TDA, 35% O-TDA, 30% cans	SCL	15 drums - 4,500#
✓TDI Sample Can	35% TDI, 35% Residue, 5% MCB	SCL	15 drums - 4,500#
	25% cans		
✓Lab Waste	Methanol/Propanol-TDI Residue - Solids	SCL	3 drums - 1,800#
✓MEA in Water	10% MEA - 90% Water	WT <sup>onside?</sup>	200 drums - 80,000
✓MCB in Water	5% MCB - 95% Water	WT	30 drums - 12,000
✓Waste MCB	85% MCB, 20% TDI	INC	4,000 Gal - 40,000
✓Vacuum Oil	95% Oil, 5% MCB-TDI-Urea	INC	45,000 Gal-383,000
✓TDI Residue	100% TDI Urea/Residue	NSCL	6,500,000#
✓TDA Spill Debris	0-100% TDA - Gravel, etc.	SCL	10,000#
✓Spent Acid - Organic	70% H <sub>2</sub> SO <sub>4</sub> , 20% MCB, 10% residue	WT	60,000# (?)
✓Oily Sludge	50% H <sub>2</sub> O, 30% Oil/Grease, 20% adsorbent material	SCL	100 drums - 50,000
✓MCB Spill Debris	70-80% Dirt, 20-30% MCB-TDI/residue	SCL	2,000#
✓Solid Debris	0-100% TDA - Dirt-Cloths, etc.	SCL	500 drums - 150,000
✓Black Lagoon	70% Dirt, 20% H <sub>2</sub> O, 10% MCB-TDA	SCL	

Wastewater Treatment (WT)  
 Incineration (INC)  
 Secured Chemical Landfill (SCL)  
 Sanitary Landfill (SNTLF)  
 Non-Secured Chemical Landfill (NSCL)  
 Deep Well Injection (D)

TYPE OF DISPOSAL



IN RESPONSE TO REQUEST #16

TO Mr. George Latta AT Ashtabula DATE July 25, 1974  
 FROM H. T. Emerson AT Paulsboro COPY TO H. H. Hogeman  
 SUBJECT OFF-SITE DISPOSAL - C. L. Knowles  
 WASTE OIL R. H. Papenfuss  
 J. F. Utley

RECEIVED

AUG 5 1974

H.H. HOGEMAN

Attached is a cost proposal from Rollins Environmental Services, Inc. for disposal of Ashtabula phosgene contaminated waste oil. The analysis I gave was as follows:

Oil	-	86%
MCB	-	4.9
DCB	-	.05
TDI	-	6.4
COCl <sub>2</sub>	-	2.5

If my arithmetic is correct, this amounts to \$5,837/year, F.O.B., Bridgeport, New Jersey assuming 7 - 50 gallons drums per week. We could probably save a part of the drum handling costs if the material was shipped in bulk.

I hope this information will be of value to you.

H. T. Emerson

HTE:ks

Attachment

TOLUENE DIISOCYANATE PROCESS

1. Figure 1 represents a flow diagram of a typical toluene diisocyanate process starting with nitration grade toluene. The steps in this process are the nitration of toluene, the reduction of dinitrotoluene to toluene diamine and the phosgenation of toluene diamine to toluene diisocyanate. Hydrochloric acid is recovered as a by-product.

Does your specific process involve these steps?

Yes      No  
 \_\_\_\_\_ X

If not, what steps should be deleted and/or added to represent your specific process? Either describe briefly below or correct Figure 1.

The nitration of toluene and the reduction of dinitrotoluene to toluene diamine steps should be deleted. The Ashtabula TDI process begins with the purification of crude TDA. See attached flow diagram describing deletions/additions as compared to Figure 1 flow diagram.

2. Figure 1 also indicates potential sources of waste streams (streams A-H) from a toluene diisocyanate manufacturing process.

Does your process have these waste streams?

Yes      No  
 \_\_\_\_\_ X

If not, what waste(s) should be deleted and/or added to represent your process? Either describe briefly below or correct Figure 1.

Waste stream A, B, E, F, and G from Figure 1 flow diagram should be deleted from the Ashtabula TDI process. Waste streams C (TDA Hotwell), D (No waste stream--by-product Ortho TDA), and H (TDI residue) are waste streams at the Ashtabula facility. Additional waste streams I (TDI Scrubber Solution) and J (Vacuum Pump Oil) are part of Ashtabula's TDI process.

Of the waste streams you have added, from what unit operation(s) (i.e., distillation bottoms, filter solids, etc.) do these streams originate?

Waste stream I originates from the TDI Caustic Scrubber used to treat all vent gasses from the TDI Plant and from the vacuum pumps. Waste stream J originates from the changing of vacuum pump oil in the vacuum pumps. See attached flow diagram for identification purposes.

3. What is the quantity (give either absolute quantities - lb waste/yr or based on TDI capacity - lb waste/lb TDI) of each waste stream generated within your process?

<u>Waste Stream</u>	<u>Quantity</u>
<u>C (TDA Hotwell)</u>	<u>18M lbs/yr</u>
<u>*D (Ortho TDA--by-product)</u>	<u>1.2MM lbs/yr</u>
<u>H (TDI Residue)</u>	<u>6MM lbs/yr</u>
<u>I (TDI Scrubber solution)</u>	<u>~2.8MM lbs/yr (dry wt)</u>
<u>J (Vacuum Pump Oil [spent])</u>	<u>300M lbs/yr</u>



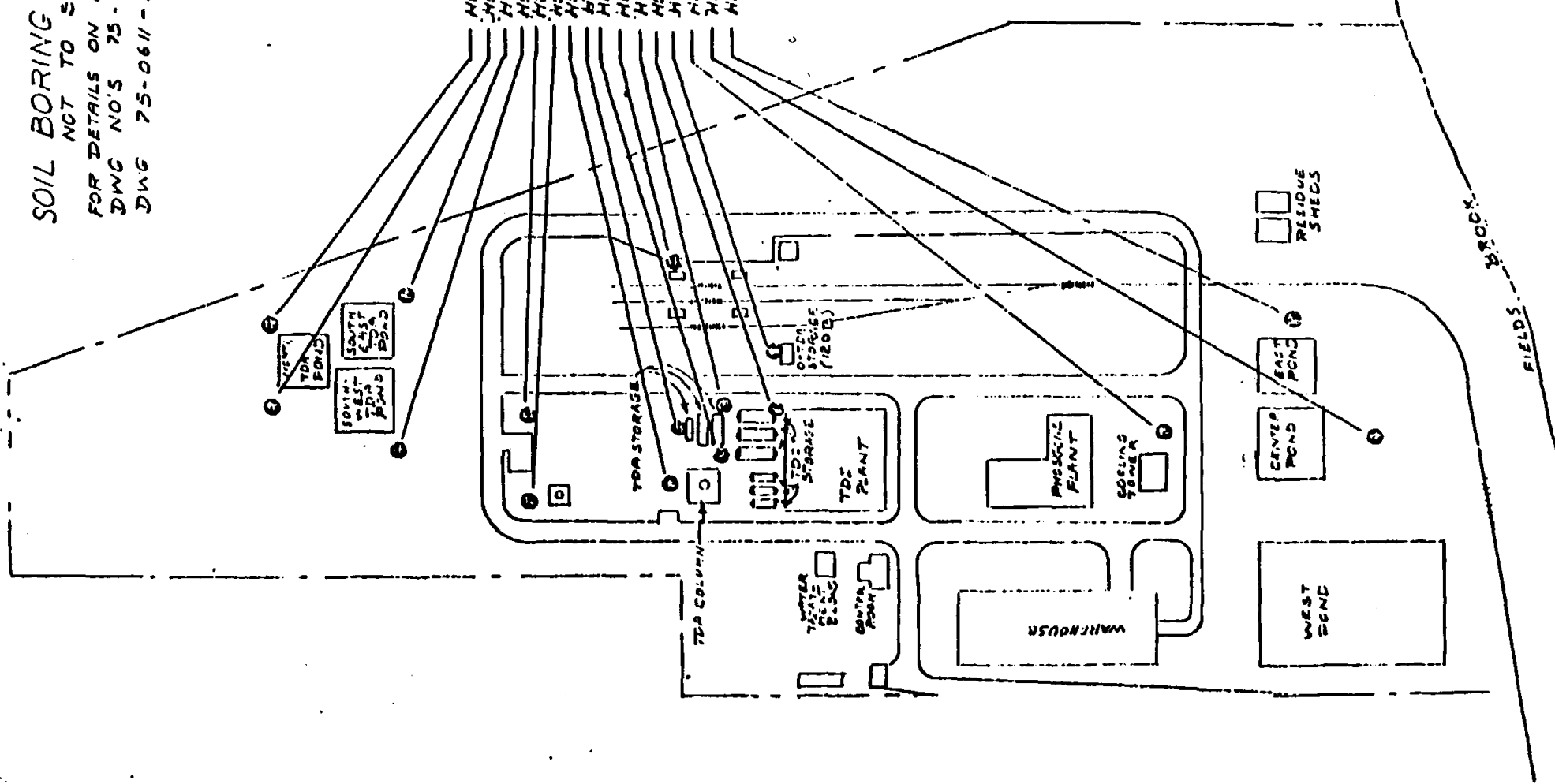
# SOIL BORING LOCATIONS

NOT TO SCALE

FOR DETAILS ON HOLE LOCATIONS SEE  
 DWG NO'S 75-0611-000-001 REV 1 AND  
 DWG 75-0611-000-002 REV 1



- HOLE # 16
- HOLE # 15
- HOLE # 14
- HOLE # 13
- HOLE # 12
- HOLE # 11
- HOLE # 7
- HOLE # 5
- HOLE # 9
- HOLE # 6
- HOLE # 4
- HOLE # 10
- HOLE # 2
- HOLE # 1
- HOLE # 17



RESULTS OF TDA ANALYSIS ON 1/16/76 SOIL FEORINGS

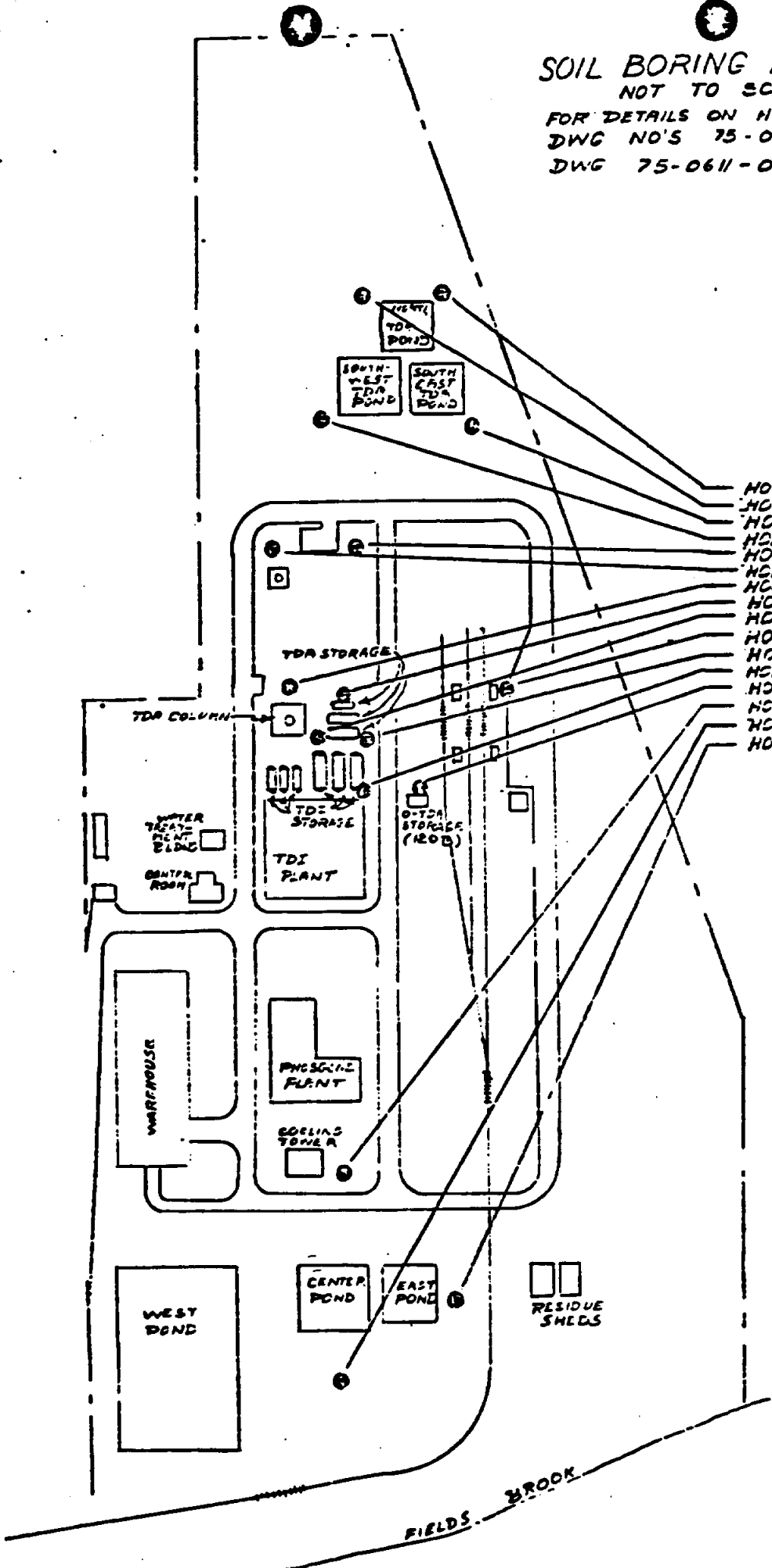
HOLE NO.	DESCRIPTION OF HOLE LOCATION	PPM TDA IN SOIL			WT. % MOISTURE		
		5'0" TO 6'6"	10'0" TO 11'6"	15'0" TO 16'6"	5'0" TO 6'6"	10'0" TO 11'6"	15'0" TO 16'6"
1	SOUTH OF CENTER SETTLING POND	N.D.	N.D.	N.D.	19.58	14.96	23.10
2	EAST OF THE COOLING TOWER	NO SAMPLE REQUIRED	—	—	—	—	—
3	SAMPLE OMITTED	—	—	—	—	—	—
4	SOUTHWEST CORNER OF THE STORAGE TANKS	N.D.	N.D.		22.38	17.46	
5	SOUTH OF TDA STORAGE TANK PUMPS	114.8	16.57		14.39	16.34	
6	EAST OF TDA STORAGE TANKS	N.D.	N.D.		19.75	16.22	
7	NORTH OF TDA COLUMN END	216.1	N.D.	N.D.	20.62	15.19	13.45
8	NORTH OF TDA STORAGE TANKS	17.68	N.D.		18.17	15.32	
9	EAST OF TDA UNLOADING DOCK	88.00	N.D.		21.80	18.35	
10	NORTHEAST SIDE OF TDA STORAGE (120 M)	N.D.	N.D.	N.D.	19.87	18.30	23.84
11	WEST SIDE OF DECON PAD	N.D.	N.D.		17.43	19.33	
12	EAST SIDE OF DECON PAD	N.D.	N.D.	N.D.	19.57	17.74	17.42
13	SOUTHWEST CORNER OF TDA PONDS	N.D.	N.D.		16.98	18.71	
14	SOUTHWEST CORNER OF TDA PONDS	N.D.	N.D.		17.28	16.69	
15	NORTHWEST CORNER OF TDA PONDS	N.D.	N.D.	N.D.	18.43	17.31	17.05
16	NORTHEAST CORNER OF TDA PONDS	N.D.	N.D.		19.04	21.72	
17	EAST SIDE OF EAST SETTLING POND	N.D.	N.D.	N.D.	19.08	15.57	12.51

Results of MCB analysis of 1-16-76 soil borings

Test hole No.	Depth of sample (ft below grade)	PPM MCB in soil (dry basis)	Wt % moisture in soil sample
1	5' - 6'6"	95.3	19.58
1	10' - 11'6"	7.4	14.96
1	13' - 15'	3.0	23.10
17	5' - 6'6"	12.1	19.08
17	10' - 11'6"	1.0	15.57
17	15' - 16'6"	3.8	12.51

# SOIL BORING LOCATIONS NOT TO SCALE

FOR DETAILS ON HOLE LOCATIONS SEE  
DWG NO'S 75-0611-000-001 REV 1 AND  
DWG 75-0611-000-002 REV 1



- HOLE # 16
- HOLE # 15
- HOLE # 14
- HOLE # 13
- HOLE # 12
- HOLE # 11
- HOLE # 7
- HOLE # 8
- HOLE # 5
- HOLE # 9
- HOLE # 6
- HOLE # 4
- HOLE # 10
- HOLE # 2
- HOLE # 1
- HOLE # 17

Results of MCB analysis of 1-16-76 soil borings

<u>Test hole No.</u>	<u>Depth of sample (ft below grade)</u>	<u>PPM MCB in soil (dry basis)</u>	<u>Wt % moisture in soil sample</u>
1	5' - 6'6"	95.3	19.58
1	10' - 11'6"	74	14.96
1	13' - 15'	3.0	23.10
17	5' - 6'6"	12.1	19.08
17	10' - 11'6"	1.0	15.57
17	15' - 16'6"	3.8	12.51

RESULTS OF TDA ANALYSIS ON 1/16/76 SOIL BORINGS

HOLE NO.	DESCRIPTION OF HOLE LOCATION	PPM TDA IN SOIL			WT. % MOISTURE		
		5'0" TO 6'6"	10'0" TO 11'6"	15'0" TO 16'6"	5'0" TO 6'6"	10'0" TO 11'6"	15'0" TO 16'6"
1	SOUTH OF CENTER SETTLING POND	N.D.	N.D.	N.D.	19.58	19.96	23.10
2	EAST OF THE COOLING TOWER	NO SAMPLE REQUIRED			NO SAMPLE REQUIRED		
3	SAMPLE OMITTED	—	—	—	—	—	—
4	SOUTHEAST CORNER OF TDI STORAGE TANKS	N.D.	N.D.		22.38	17.46	
5	SOUTH OF TDA STORAGE TANK PUMPS	114.8	16.57		14.39	16.39	
6	EAST OF TDA STORAGE TANKS	N.D.	N.D.		19.75	16.22	
7	NORTH OF TDA COLUMN PAD	216.1	N.D.	N.D.	20.62	15.18	13.45
8	NORTH OF TDA STORAGE TANKS	17.68	N.D.		18.17	18.32	
9	EAST OF TDA UNLOADING DOCK	88.00	N.D.		21.80	18.35	
10	NORTHEAST SIDE OF TDA STORAGE (120 M)	N.D.	N.D.	N.D.	19.87	18.30	23.89
11	WEST SIDE OF DECON PAD	N.D.	N.D.		17.43	19.38	
12	EAST SIDE OF DECON PAD	N.D.	N.D.	N.D.	19.57	17.74	17.42
13	SOUTHWEST CORNER OF TDA PONDS	N.D.	N.D.		16.98	18.71	
14	SOUTHEAST CORNER OF TDA PONDS	N.D.	N.D.		17.28	16.69	
15	NORTHWEST CORNER OF TDA PONDS	N.D.	N.D.	N.D.	18.43	17.31	17.05
16	NORTHEAST CORNER OF TDA PONDS	N.D.	N.D.		19.04	21.72	
17	EAST SIDE OF EAST SETTLING POND	N.D.	N.D.	N.D.	19.08	15.57	12.51

In Response to Request #29

REPORT OF SOIL BORING OPERATIONS

AT

AREA OF NEW EMERGENCY SPILL BASIN

SOUTH OF CENTER POND

ASHTABULA, OHIO

F O R

THE OLIN CORPORATION  
OLIN CORPORATION PURCHASE ORDER NO. AS-TDI-6080 (Verbal)

HCI Project NO. M-9382.1

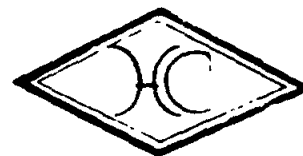
Report Submittal Date: June 10, 1980



HERRON TESTING LABORATORIES, INC.

# HERRON CONSULTANTS, INC.

ENGINEERING • TESTING • INSPECTION  
5425 SCHAAF ROAD CLEVELAND, OHIO 44131



July 10, 1980

The Olin Corporation  
P. O. Box 206  
Ashtabula, OH 44004

SUBJECT: REPORT OF SOIL BORING OPERATIONS  
AREA OF NEW EMERGENCY SPILL BASIN  
SOUTH OF CENTER POND  
ASHTABULA, OHIO

HCI Project No. M-9382.1  
Olin Corporation Purchase Order No. AS-TDI-6080 (Verbal)

This report summarizes the performance and results of field exploratory operations conducted at the above-referenced location to determine the vertical sequence of the existing subsoil materials and overall groundwater conditions. The investigation was as requested and authorized by The Olin Corporation per their verbal Purchase Order No. AS-TDI-6080.

A series of two (2) test holes were drilled on July 1, 1980 by conventional rotary-drive drilling procedures employing hollow-stem flight augers. The locations and depths of the individual test holes were laid out by us prior to drilling operations at locations as selected by The Olin Corporation.

Test holes were drilled at the following co-ordinates:

Test Hole No. B-1	-	East 700.00 feet
		South 1350.00 feet
Test Hole No. B-2	-	East 705.00 feet
		South 1300.00 feet

The approximate test hole positions are graphically illustrated on the accompanying plot plan which has been taken directly from a drawing titled "Test Boring Plan, Olin Corp., Dwg. SK-1".

Representative samples of existing subsoil materials are taken at regular intervals, as shown on the accompanying Test Boring Logs, by means of a two-inch o.d. split-spoon sampling device, driven by a 140-pound hammer, free-falling through a distance of 30 inches. The number of hammer blows required to achieve 18 inches of sample spoon penetration is noted and recorded in individual six-inch increments. The sum of the blow counts associated with the second and third six-inch penetration intervals represents the standard penetration resistance (N).

The samples of materials retained by split-spoon sampling techniques are removed from the sampler, visually classified in the field and placed in properly-identified sealed glass sample jars for return to our Cleveland soil mechanics laboratory.

All samples obtained during field investigation operations are classified in the soil mechanics laboratory following the Unified Soil Classification System and Visual-Manual Procedures. The results of visual-manual classification operations, together with data developed during field exploration operations, are included on the accompanying Test Boring Logs.

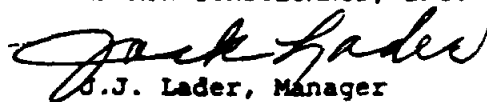
Soil samples will be retained for a period of six months, after which, they will be disposed of, unless we are requested to the contrary.

It is recognized that this investigation is limited to field exploratory operations as requested by The Olin Corporation and does not include development of physical or structural parameters that may be required to develop recommendations relative to proposed site development. Such services - laboratory test studies and engineering evaluation, if needed, can be furnished upon request.

We wish to thank you for the opportunity to work with you on this project and look forward to continued association in the future.

Should you have any questions, please feel free to contact us.

HERRON CONSULTANTS, INC.

  
J.J. Lader, Manager  
Drilling Department

Original and 2cc: The Olin Corporation

HELDON CONSTRUCTION INC.

HCI Project No. M-9382.1

July 10, 1980

Page -3-

TEST BORING LOGS AND PLOT PLAN

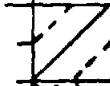
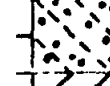


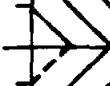
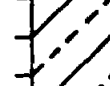


**TEST BORING LOG**

FILE NO.: M-9082.1

PROJECT: AREA OF NEW EMERGENCY SPILL BASIN - SOUTH OF CENTER POND - ASHTABULA, OHIO

FOR THE OLIN CORPORATION - ASHTABULA, OHIO

LEV. DATUM: OLIN SITE DATA DRILLED: JULY 1, 1980 BY L. HUMPHREY

ELEV. (FT.)	DEPTH (FT.)	LOG	SAMPLE		BLOW COUNT	CLASSIFICATION
			NO.	TYPE		
100.5	0		1	CA		Dark Brown <u>SILT-CLAY</u> , Sandy. Some Gravel. Fill. Moist. (ML-CL)
			2	SS	5-7-8	Brown <u>SILTY COARSE TO FINE SAND</u> with Gray Clayey Silt. Fill. Medium. Moist. (SM)
95.5	5		3	SS	3-7-9	Brown and Gray Mottled <u>SILTY CLAY</u> . Very Stiff. Moist. (CL)
			4	SS	7-10-13	Gray <u>SILTY CLAY</u> . Trace Sand and Gravel. Very Stiff. Moist. (CL)
90.5	10		5	SS	7-10-11	
			6	SS	7-9-11	Gray <u>SILT-CLAY</u> . Some Sand. Trace Gravel. Very Stiff. Moist. (ML-CL)
85.5	15					
80.5	20		7	SS	10-14-16	

GROUNDWATER: ENCOUNTER: NONE  
 AT COMPLETION: NONE  
 AFTER: 28.0'  
 TERMINAL DEPTH: 28.0'



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 ENGINEERING • TESTING • INSPECTION



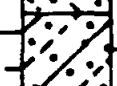






**TEST BORING LOG**

FILE NO.: M-9352.1

PROJECT: AREA OF NEW EMERGENCY SPILL BASIN - SOUTH OF CENTER POND - ASHTABULA, OHIO

FOR: THE OLIN CORPORATION - ASHTABULA, OHIO

ELEV. DATUM: OLIN SITE DATA DRILLED: JULY 1, 1980 BY L. HUMPHREY

ELEV. (FT.)	DEPTH (FT.)	LOG	SAMPLE		BLOW COUNT	CLASSIFICATION
			NO.	TYPE		
99.9	0		1	SS	2-6-9	Brown <u>SILTY COARSE TO FINE SAND</u> . Trace Gravel. Fill. Medium. Moist. (SM)
			2	SS	5-5-2	Brown <u>SILTY FINE SAND</u> . Loose. Saturated. (SM)
94.9	5		3	SS	3-4-8	Layers of Gray <u>SILTY CLAY</u> and Gray <u>SILTY FINE SAND</u> Stiff. Moist. (CL) and (SM)
			4	SS	6-7-9	Gray <u>SILTY CLAY</u> . Some Thin Layers of Gray Silt not in formation. Very Stiff. Moist. (CL)
89.9	10		5	SS	3-6-7	Gray <u>SILTY CLAY</u> . Trace Sand and Gravel. Stiff. Moist. (CL)
			6	SS	7-11-14	Gray <u>SILT-CLAY</u> . Some Sand. Very Stiff. Moist. (ML-CL)
84.9	15					
			7	SS	9-11-13	
79.9	20					

GROUNDWATER: ENCOUNTER: 1.8'  
 AT COMPLETION: 11.5'  
 AFTER \_\_\_\_\_ AT \_\_\_\_\_  
 TERMINAL DEPTH: 20.0'



**HERRON CONSULTANTS INC.**  
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## GENERAL NOTES FOR TEST BORING LOGS

### ENTERED UNDER SAMPLE TYPE:

- CA — Continuous Flight Auger Sample
- HA — Hand Auger Sample

Disturbed sample obtained from auger flight.

- SS — Split Barrel Sample (2" O.D., 1.375" I.D.)\*

Driven sampler for disturbed sample.

- ST-2 — Thin-Walled Shelby Tube Sample (2" O.D., 1.875" I.D.)
- ST-3 — Thin-Walled Shelby Tube Sample (3" O.D., 2.875" I.D.)
- PT — Thin-Walled Piston Tube Sample

Static force pressed sampler for "undisturbed" sample.

- LS — Sectional Liner Sample (Ring Shear)

- W — Wash Sample

Obtained from churn-drive boring methods.

- DC — Diamond Rock Core Barrel Sample (unspecified size)
- NX — 2.125" I.D. Diamond Rock Core Barrel Sample
- BX — 1.625" I.D. Diamond Rock Core Barrel Sample
- AX — 1.1875" I.D. Diamond Rock Core Barrel Sample

### ENTERED UNDER SAMPLE NO.:

- ② — Indicates sample number and acquisition interval.

### ENTERED UNDER BLOW COUNT:

EXAMPLE: 6/9/12 — The number of blows of a 140-pound hammer, free falling through a distance of 30 inches, required to drive a standard (2" O.D., 1.375" I.D.) split barrel sampler into the soil, including an initial six-inch seating penetration. Blows recorded in 6-inch increments for a distance of 18 inches.

EXAMPLE: 60/2" — The number of blows (60) required to drive a standard split barrel sampler for a distance (2") of less than one foot.
















SSR — Split barrel sampler penetration refusal at advance of less than one inch for 50 blows.

AR — Auger refusal.

(\* Other diameters, when employed, are noted on Boring Log.



# SOIL CLASSIFICATION CHART

MAJOR DIVISIONS			GROUP SYMBOL	GRAPHIC SYMBOL	TYPICAL NAME
COARSE GRAINED SOILS	GRAVEL AND GRAVELLY SOILS	CLEAN GRAVELS	GW		WELL GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
			GP		POORLY-GRADED GRAVELS OR GRAVEL-SAND MIXTURES, LITTLE OR NO FINES
		GRAVELS WITH FINES	GM		SILTY GRAVELS, GRAVEL-SAND-SILT MIXTURES
			GC		CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SAND AND SANDY SOILS	CLEAN SAND	SW		WELL-GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
			SP		POORLY GRADED SANDS OR GRAVELLY SANDS, LITTLE OR NO FINES
		SAND WITH FINES	SM		SILTY SANDS, SAND-SILT MIXTURES
			SC		CLAYEY SANDS, SAND-SILT MIXTURES
FINE GRAINED SOILS	SILTS AND CLAYS LL < 50	ML		INORGANIC SILTS AND VERY FINE SANDS, ROCK FLOUR, SILTY OR CLAYEY FINE SANDS OR CLAYEY SILTS WITH SLIGHT PLASTICITY	
		CL		INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS	
		OL		ORGANIC SILTS AND ORGANIC SILT-CLAYS OF LOW PLASTICITY	
	SILTS AND CLAYS LL > 50	MH		INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS, ELASTIC SOILS	
		CH		INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAY	
		OH		ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS	
	HIGHLY ORGANIC SOILS			Pt	

BOULDERS— COARSER THAN 6 INCHES

COBBLES— 3 INCHES TO 6 INCHES

**GRAVEL**

COARSE— .75 INCHES TO 3 INCHES

FINE — 4.76 MM. TO .75 INCHES

**SAND**

COARSE— 2.00MM. TO 4.76 MM.

MEDIUM— .42MM. TO 2.00MM.

FINE — .074MM. TO .42MM.

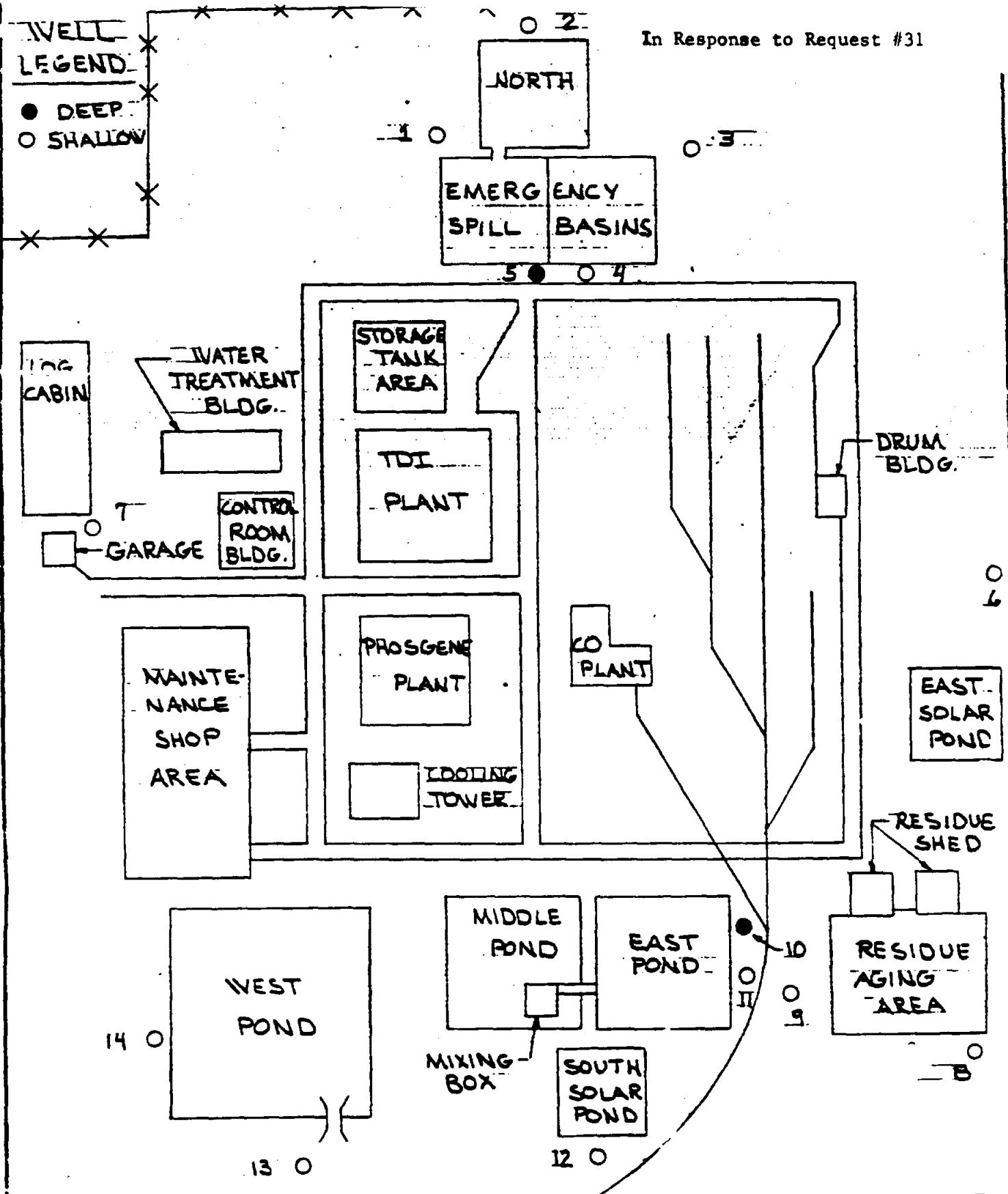
SILT— .005MM. TO .074MM.

CLAY— FINER THAN .005MM.

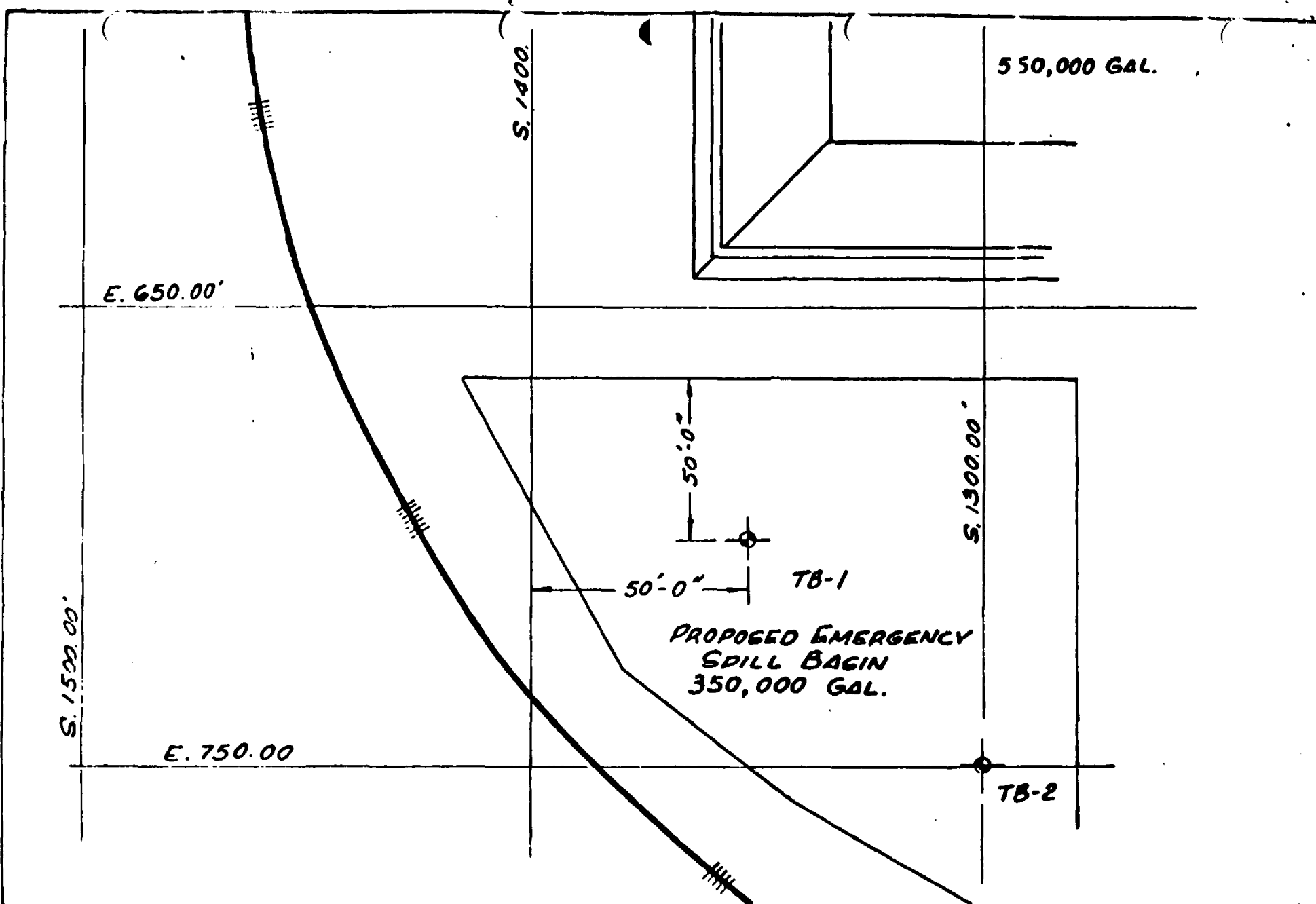
PER ASTM D 2487



**HERRON CONSULTANTS, INC.**  
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			<b>Olin</b>		GROUND WATER WELL LOCATION		
			ASHTABULA, OHIO				
			DRAWN BY M. KIRK		DATE 1/7/80		
			CHECKED BY		DATE		
			APP. BY		DATE		
			APP. BY		DATE		
NO.	REVISION	BY	DATE	SCALE NONE		DWG.	REV



HERRON CONSULTANTS, INC.



REVISIONS

DATE	REMARK
	BORING LOCATION PLAN
ΔT:	AREA OF NEW EMERGENCY SPILL BASIN
FOR:	OLIN CORPORATION ASHTABULA, OHIO

CHECKED

APPROVED

SCALE

1" = 30'

DRAWN

A. J.

DATE

7-9-80

PROJECT NUMBER

M-9382.1

DRAWING NUMBER

SD-597

In Response to Request #31

**Olin** CHEMICALS GROUP  
P.O. BOX 206, ASHTABULA, OHIO 44004

September 28, 1979

Mr. Robert E. Zimmermann, Geologist  
State of Ohio Environmental Protection Agency  
Northeast District Office  
2110 E. Aurora Road  
Twinsburg, Ohio 44087

Dear Mr. Zimmermann:

Attached to this correspondence is a response to the requests for data that were outlined in your correspondence dated 6-21-79.

If you require any additional information, please do not hesitate to call this office.

Sincerely,

OLIN CORPORATION

*W. F. McGlasson*

W. F. McGlasson  
Plant Manager

WGM/cap

Attachment

bcc: R. A. Smith

RECEIVED  
SEP 28 1979

R. A. SMITH

Olin-Ashtabula Plant Impoundment Data

No.	Name of Lagoon	Age	Surface Area	Average Influent	Average Effluent	Bottom Liner	Total Impoundments (8)		
							Contents	Wells	Monitoring Frequen
1	Southeast Settling Pond	15 years	2025 sq. ft.	158 gpm	158 gpm	Indignous clay type soil	Wastewater	Yes	Quarter
2	South/middle Settling Pond	15 years	2750 sq. ft.	349 gpm	349 gpm	Concrete	Wastewater	No	
3	Southwest Settling Pond	4 years	18000 sq. ft.	349 gpm	349 gpm	18" of compacted clay	Wastewater	Yes	Quarter
4	South/South Solar Pond	2 years	3150 sq. ft.	<.2 gpm	<.2 gpm	Indignous clay type soil	Wastewater Dredgings	Yes	Quarter
5	East Solar Pond	6 months	3600 sq. ft.	<.2 gpm	0 gpm	Indignous clay type soil	Wastewater Dredgings	No	
6	North/North Emergency Spill Basin	5 years	3900 sq. ft.	7 gpm	7 gpm	Indignous clay type soil	Wastewater	Yes	Quarter
7	Northeast Emergency Spill Basin	10 years	4225 sq. ft.	7 gpm	7 gpm	Indignous clay type soil	Wastewater	Yes	Quarter
8	Northwest Emergency Spill Basin	15 years	4500 sq. ft.	7 gpm	7 gpm	Indignous clay type soil	Wastewater	Yes	Quarter

July 8, 1971

State of Ohio  
Department of Health  
450 East Town Street  
P.O. Box 118  
Columbus, Ohio 43216

Attention: Mr. James F. Shea  
Engineer, Industrial Waste Section

Subject: "Toxin" Resolution  
February 9, 1971

Gentlemen:

This ~~is~~ report is in response to the request by the State of Ohio concerning information regarding "toxins" used by the General Tire & Rubber Company at its Ashtabula PVC facility. The information contained in this report pertains to the "Resolution Adopted By The Ohio Water Pollution Control Board on February 9, 1971, Regarding Discharge of Toxins to Waters of the State" and "Safeguards for Toxins."

Per telecom on July 7 with you pertaining to guidelines for this report, we have listed only liquids which are stored in our plant and could possibly be spilled to the waters of the State.

1. In Plant Safeguards for "Toxins"

We have surveyed all the chemicals used in the plant and investigated<sup>(1)</sup> the toxicity of each item. We have attempted, where possible, to substitute toxic chemicals with chemicals of a non-toxic nature. An educational program is being instituted to insure that all in-plant personnel who are handling "toxins" at the Ashtabula plant are aware of their hazards. At present, we have safety procedures already established for handling these materials.

(1) Dangerous Properties of Industrial Materials, N. Irving Sax

Emergency holding facilities to prevent accidental discharges of large amounts of raw materials have been installed. Each major storage tank has a permanent concrete dike with normally closed valves to prevent an accidental spill to Fields Brook. The included list shows type of storage and protection.

2. With regard to discharge of "toxins" to the waters of the State, we have implemented measures to prevent a discharge of "toxins" to Fields Brook. In view of the fact that the suspected organic "toxins" used at the Ashtabula plant all float on water, a skimming device which will retain 4 to 5 inches of floating (oils) has been installed on our primary lagoon. We have also installed a switching station which allows us to hold a spill in one lagoon and operate the other lagoons normally while the spill is being removed.
  
3. In regards to the memorandum issued by the State of Ohio Department of Health on "toxins" dated May 6, 1971, we have the following information compiled for your consideration. The "toxins" listed below are materials which may be detrimental to human and aquatic life if they were discharged to the waters of the State, however, we are not certain that if the total quantities stored in the plant, should they be discharged or lost to the "waters of the State," would cause a detrimental effect even when present in very small concentrations.

We have taken into account the chemicals listed below which vary significantly in degree of toxicity.<sup>(1)</sup> They are listed in the order we believe them to be the most toxic to human or aquatic life at or near the vicinity of Fields Brook if the total stored amount was actually discharged.

<u>Common Name</u>	<u>Chemical Name</u>	<u>Type of Storage</u>
1. Acrylonitrile	Vinyl Cyanide	Drums - 55 gal.
2. --	Vinyl Acetate	Bulk - diked
3. Styrene	Vinyl Benzene	Bulk - diked
4. Trichlor	1,1,1, Trichloroethane	Bulk - diked
5. Vinyl Monomer	Vinyl Chloride	Bulk - diked
6. Toluene	Methyl Benzene	Drums - 55 gal.
7. Fuel Oil	#2 Fuel Oil	Bulk - diked
8. --	Sulfuric Acid	Bulk - diked
9. Caustic	Sodium Hydroxide 50%	Bulk - no dike
10. Salt Solution	13% Sodium Chloride	Bulk - no dike
11. Lime Slurry	20% Calcium Hydroxide	Bulk - no dike

The effect of the liquids listed below cannot be predicted, as their chemical composition is not known:

1. Betz J-12
2. Betz 408
3. Betz Octafilm

---

(1) Dangerous Properties of Industrial Materials, N. Irving Sax

The Ashtabula plant maintains an inventory of the above chemicals, and the quantities used in the process daily are known. This procedure would enable the plant to detect any unknown or accidental spill. In addition to inventorying of above listed materials, we visually inspect the waste treatment system several times a day to detect any unusual appearances.

If you have any further questions regarding the above information, please do not hesitate to contact the writer at the General Tire plant in Ashtabula.

Very truly yours,

J. R. Mudd  
Plant Manager

CASR-14-78

RECEIVED

In Response to Request 31

SEP 11

DAVID G. PIVARNIK

OLIN ASHTABULA - WASTEWATER CHARACTERIZATION

PERIOD: July - August, 1978

REFERENCES: Scattered

STAFF: J. P. Dawson  
P. C. Berry  
T. Groom  
R. D. Householder  
W. A. Nichols  
C. C. Noonan  
J. A. Horvath  
S. R. Oberson  
J. M. Myjak  
J. D. Kaufman  
A. Vagnini  
R. J. Thomas

WRITTEN BY:

T. Groom  
T. Groom

APPROVED BY:

I. A. Capuano  
I. A. Capuano

APPROVED BY:

A. W. Sawyer  
A. W. Sawyer

CHEMICALS DIVISION  
CENTRAL ANALYTICAL DEPARTMENT  
OLIN CORPORATION  
275 WINCHESTER AVENUE  
NEW HAVEN, CONNECTICUT

ABSTRACT

An analytical study of the aqueous effluent from Olin's Ashtabula, Ohio TDI manufacturing facility has been completed. In addition to the plant outfall, eleven point sources which contribute to this outfall have also been defined in terms of organic composition, phenols, cyanide, total organic carbon and thirteen metals.

DISTRIBUTION

I. A. Capuano  
P. B. Duff  
R. Hendey  
W. G. McGlasson  
V. M. Norwood  
A. W. Sawyer  
J. L. Morgan

## OLIN ASHTABULA WASTE WATER CHARACTERIZATION

SCOPE

At the request of Chemicals Division Environmental Affairs and Ashtabula plant management and in conjunction with Lake Charles Process Technology, Central Analytical has completed a study of the aqueous effluent from Olin's Ashtabula, Ohio TDI chemical manufacturing facility. In addition to the final plant wastewater outfall, eleven point sources which contribute to this outfall were examined. The results of this study include the identification of organic species in the effluents with quantitation of those species defined by U.S. EPA as "Priority Pollutants". Total organic carbon analysis, total phenols, total cyanides, and quantitation of thirteen metals are also reported.

RESULTSA. Organic Components

Over 180 compounds (including isomers) have been identified by Gas Chromatography/Mass Spectrometry in the twelve composite samples. It was the intention of this study to quantitate all "Priority Pollutants" detected but it proved practical only to quantitate those priority pollutants which appeared in the Volatile Organics Analysis (VOA). In nearly every case those peaks representing priority pollutants were contaminated with various other organic species precluding quantitation by Flame Ionization Gas Chromatography. For the final effluent, West Pond, (See Table 1) three priority pollutants were detected in the Base/Neutral Extract which were not quantitated. Of these trichloroethene would have been readily detected in the VOA analysis if it were present at the 5-10 ppb level. Although a dichlorobenzene was detected its level is substantially less than monochlorobenzene

(100-500 ppb) by at least a factor of 10. Dibutylphthalate was also detected in West Pond effluent. Indeed it was observed in 9 of the twelve samples including Process Water. It is likely that this component is being leached out of the Tygon Tubing used during the sampling. The level of dibutylphthalate is substantially less than 1 ppm.

A number of chlorinated cyclohexanes, cyclohexenes, cyclohexanols and cyclohexenols were observed in West Pond Effluent, Center Pond Effluent and Neutralization Outlet. All of these components were found in the Acid Extract (methylenechloride extract of the aqueous effluent sample at a pH <2). The chlorinated cyclohexane and cyclohexenes should have been observed in the Base/Neutral Extract (methylenechloride extract of the aqueous effluent sample at a pH >11) which was performed before the acid extract. It is possible to explain this anomaly. Due to a chlorine spill known to have occurred during or shortly before the sampling period, these samples contained high residual chlorine. During the Base/Neutral Extraction this is converted to hypochlorite and does not interfere with the extraction procedures. On acidification though, the hypochlorite is converted back to chlorine which then reacts with cyclohexene present as a stabilizer in the methylene chloride extract<sup>ion</sup> solvent. Alcohols may be then produced by hydrolysis. It is extremely unlikely that cyclohexyl compounds are being produced in the neutralization tank at Ashtabula.

A separate extraction (methylenechloride/hexane) was performed for the three samples from West, Center and East Ponds to check for the presence of pesticides. No pesticides were detected by mass chromatographic techniques in any of the samples. For the West Pond sample, electron capture gas chromatography was used to check for pesticides. Although peaks with the retention time of various pesticides were observed, these were not

confirmed by a subsequent GC/MS analysis. Observation of Table 1 shows that 33 components were identified in West Pond effluent. It is not at all unlikely that a number of these would have the retention time of various pesticides.

Table 1 lists all of the organic species identified in this study. It should be noted that numerous other species were detected but as yet remain unidentified. It can be said with confidence that none of these are priority pollutants. If, after review of this data it is deemed desirable to quantitate any component in West Pond Effluent, procedures can be developed. Tables 2 through 12 contain the quantitative data for the various effluent samples. Total Organic Carbon, Total Phenols and Total Cyanide are reported in Table 13. It should be noted that no TDA was observed in the West Pond Effluent. This is consistent with Liquid Chromatographic data taken during the compositing period (6/10/78-6/12/78) which showed <0.5 ppm.

The diphenylether and biphenyl observed in many of the samples are components of DowTherm, a heat exchange fluid used at the plant and is therefore indicative of spills and/or leaks. This is probably also true for the "oils" listed in Table 1. Although many individual hydrocarbons were found in samples such as CO Sump, TDI Sump, and Carbon Bed Steam Condensate there are many higher molecular weight hydrocarbons and esters present which contributed to large unresolved peaks on the GC/MS curves for a number of samples. No attempt was made to identify all the constituents of these unresolved peaks.

#### B. Inorganic Analysis

Table 13 lists the quantitative data for those thirteen metals designated as "Priority Pollutants" by U.S. EPA.

In the West Pond Effluent those metals detected were found to be less than 80 parts per billion.

C. Analytical Methodology

The procedures used in this wastewater study are basically those dictated in "Sampling and Analysis Procedures for Screening of Industrial Effluents for Priority Pollutants", U.S. Environmental Protection Agency, Environmental Monitoring and Support Laboratory, April, 1977. A number of non-critical modifications were made and are listed below:

1. All quantitation was done by Gas Chromatography rather than GC/MS mainly due to time and workload considerations. Identical GC columns were used on the GC/MS and quantitative GC runs to assure correct structure assignments.
2. In the extraction procedures the composites were serially extracted with 250 x 100 x 100 x 100 x 100 ml of solvent instead of the recommended 200 x 100 x 100 ml portions.
3. The column used in the GC/MS analysis of the acid fraction was a 6' 1/8" o.d. stainless steel column packed with 60/80 mesh Tenax-GC and programmed from 150 - 300°C at 8°/min.
4. The GC column used in the analysis of the Base/Neutral and pesticide extracts was a 6' 2 mm i.d. glass column packed with 3% OV-17 on Gas Chrom Q. Program 60° for 4 min. then 8°/min to 260°C.
5. Atomic Absorption:  
As, Sb, and Se were quantitated by Atomic Absorption using the borohydride technique. The remaining metals were determined on an SMI plasma spectrometer.



Table 1 (Cont'd)  
Ashtabula Wastewater Characterization  
Organic Components

Priority Pollutants	Organic Components	Isomers	West Pond	Center Pond to West Pond	East Pond to Center Pond	Neutralization Outlet	Lift Station	CO Sump	TDA Hotwell	TDI Sump	TDA Carbon Filter	Process Water	Carbon-Bed Steam Condensate	North TDA Pond
	1,2,3-Trichloropropane			x		x								
	2,3-Dichloro-1-propanol			x	x	x		x	x	x		x		
	Chlorocyclohexenol			x		x								
*	1,1,1,-Trichloroethane			x								x		
	n heptanol			x										
	1,1,1,3,3,-Pentachloro- propane			x										
	Benzimidazole			x										
	possible CN(CH <sub>2</sub> ) <sub>6</sub> CN			x										
*	Hexachloroethane									x				
*	Dimethylphthalate			x		x								
	Dibenzofuran			x										
	C <sub>10</sub> H <sub>18</sub>			x										
	C <sub>12</sub> H <sub>24</sub>			x				x						
	Dibromochlorobenzene					x								
	Methylthiophene				x			x					x	
	Styrene				x			x			x		x	
	Xylene	3			x			x					x	
*	Phenol				x		x	x	x		x		x	
	Cyclopentadiene							x			x		x	
	1,1-Dichloro-2-bromo- ethane				x	x		x	x	x	x	x		
	-- oil --				x			x	x	x		x		
	an octanal				x									
	Methylnaphthalene	2			x			x					x	x
	Dimethylnaphthalene				x			x					x	
*	Acenaphthalene				x			x						
	C <sub>8</sub> H <sub>10</sub>				x			x						
	Tetrahydrofuran					x					x			
*	1,2-Dichloroethane					x					x	x		
	Sulfur dioxide					x								
*	Bromoform					x								
	Dichlorobromocyclo- pentadiene					x								
	Bromochlorobenzene	2				x								
*	Trichlorobenzene					x								x
	Bromobenzene					x								
	Hexamethylcyclotri- siloxane						x			x	x			



Table 1 (Cont'd)  
Ashtabula Wastewater Characterization  
Organic Components

Priority Pollutants	Organic Components	ISOBELS	West Pond	Center Pond to West Pond	East Pond to Center Pond	Neutralization Outlet	Lift Station	CO Sump	TDA Hotwell	TDI Sump	TDA Carbon Filter	Process Water	Carbon-Bed Steam Condensate	North TDA Pond
*	Fluorene							x					x	
	Vinylpropylbenzene												x	
	Benzocyclopentanone												x	
	1,3,5-Trithiacyclohexane												x	
	a C <sub>7</sub> skyldisulfide												x	
	C <sub>16</sub> H <sub>34</sub>							x					x	
*	Diethylphthalate								x				x	
	a C <sub>7</sub> alkenyldisulfide												x	
	Elemental Sulfur												x	
	Methylphenol						x				x		x	
	Dimethylphenol												x	
*	Chlorophenol	2								x	x			x
→*	Aminochlorotoluene										x			x
	Triaminotoluene													x
	Methylnaphthyridine													x
	Methylbenzotriazole													x
	Dihydrobenzothiazophene													x
	Aminoquinoline													x
	Chlorotoluenediamine													x
	Dimethylbenzimidazole													x
*	Benzophenanthrene (Pyrene)							x						x
	C <sub>14</sub> H <sub>20</sub> N <sub>2</sub>	2												x
	N-Methyltoluenediamine								x		x			
	Methylphenanthrene	3						x	x		x			
	Dimethylbenzotriazole								x					
	Methylethylbenzimidazole								x					
	Octamethylcyclotetra-siloxane										x			
	Trimethylnaphthalene							x						
	Octanoic Acid										x			
	Benzoic Acid										x			
	N,N-dimethyldihydrobenzimidazole								x		x			

Table 1 (Cont'd)  
Ashtabula Wastewater Characterization  
Organic Components

Priority Pollutants	Organic Components	Isomers	West Pond	Center Pond to West Pond	East Pond to Center Pond	Neutralization Outlet	Lift Station	CO Sump	TDA Hotwell	TDI Sump	TDA Carbon Filter	Process Water	Carbon-Bed Steam Condensate	North TDA Pond
	3,3-Dichloro-1-propene					x								
	Acetamide					x								
	1,1,1,2-Tetrachloro- ethane					x								
	Chlorocyclohexane					x								
	Dichlorocyclohexenol					x								
	Tetrachlorocyclohexene					x								
	1-Chloro-2-butanol						x							
	2-Methylbutanoic acid						x							
*	Pentachlorophenol						x							
	Benzenediamine										x			
*	1,2-Dichloroethene						x							
	a heptanal									x				
	Cyclohexenol			x										
*	Ethylbenzene							x						
	Methyl-dihydroindene							x						
	Ethyl-naphthylene							x						
	Methylbiphenyl							x						
	C <sub>13</sub> H <sub>20</sub>							x						
	Methylfluorene							x						
	Dihydrophenanthrene							x						
	Methyldibenzothiophene							x						
	C <sub>17</sub> H <sub>14</sub>							x						
	Dimethylphenanthrene							x						

188 chemical species (including isomers, but discounting "oils")

31 priority pollutants detected, 13 in West Pond Effluent

TABLE 2

ASHTABULA WEST POND EFFLUENT  
VOLATILE ORGANIC ANALYSIS

<u>COMPOUND</u>	<u>6/10/78</u> <u>ppb</u>	<u>6/11/78</u> <u>ppb</u>	<u>6/12/78</u> <u>ppb</u>
Acetone and/or ?	—		
* Methylenechloride	12	} 286	} 207
* Chloroform	1050	682	517
* Carbontetrachloride	5	X	X
* Dichlorobromomethane	16	16	14
* Dibromochloromethane	X	X	X
* Tetrachloroethane	X	7	—
* Benzene	5	10	7
Dichloroacetone	7	7	10
* Tetrachloroethene	3	3	3
* Toluene	0.5	26	22
* Monochlorobenzene	456	171	116

\* Priority Pollutant

? Compound observed by VPC but not by GC/MS. Could happen if compound has mol. weight less than 40.

X Detected but not quantitated either due to extremely low concentration, interference or no reference standard.

TABLE 3  
 ASHTABULA - CENTER TO WEST POND  
 VOLATILE ORGANIC ANALYSIS

<u>COMPOUND</u>	<u>6/10/78</u> <u>ppb</u>	<u>6/11/78</u> <u>ppb</u>	<u>6/12/78</u> <u>ppb</u>
?			
* Methylene Chloride	27	} 212	} 275
* Chloroform	1623	212	378
Thiophene	X	X	--
* Carbontetrachloride	X	X	X
* Dichlorobromomethane	43	9	22
* Benzene	15	10	10
C <sub>2</sub> HCl <sub>3</sub> O ?	X	23	20
* Monochlorobenzene	644	449	266
* Toluene	7	12	19
* Trichloroethane	2	4	--
* Tetrachloroethene	7	3	3
* Tetrachloroethane	X	X	X

\* Priority Pollutants

? Compound observed by VPC but not by GC/MS. This could happen if compound has a mol. weight less than 40.

X Detected but not quantitated either due to extremely low concentration, interference or no reference standard.

TABLE 4  
ASHTABULA EAST POND TO CENTER POND  
VOLATILE ORGANIC ANALYSIS

<u>COMPOUND</u>	<u>6/10/78</u> <u>ppb</u>	<u>6/11/78</u> <u>ppb</u>	<u>6/12/78</u> <u>ppb</u>
?	} 171	} 65	} 221
* Methylene Chloride			
* Chloroform	14	5	61
Thiophene	13	10	5
* Benzene	65	63	35
Methylthiophene	5	4	4
* Toluene	37	34	43
* Monochlorobenzene	24	26	26
Styrene	X	X	X
Xylene (2 isomers)	X	X	X

\* Priority Pollutants

- ? Compound observed by VPC but not by GC/MS. Could happen if compound has a mol. weight less than 40.
- X Detected but not quantitated either due to extremely low concentration, interference or no reference standard.

TABLE 5  
 ASHTABULA - NEUTRALIZATION OUTLET  
 VOLATILE ORGANIC ANALYSIS

<u>COMPOUND</u>	<u>6/17/78</u> <u>ppb</u>	<u>6/18/78</u> <u>ppb</u>	<u>6/19/78</u> <u>ppb</u>
Acetone	X	X	--
* Methylene Chloride	X	X	X
Tetrahydrofuran	X	X	X
* Chloroform	192	285	11
* Dichloroethane	7	10	6
* Carbontetrachloride	414	X	251
* Dichlorobromomethane	100	48	X
* Benzene	0.7	--	--
* Trichloroethane	--	--	2
* Dibromochloromethane	82	X	X
* Tetrachloroethylene	220	37	309
* Monochlorobenzene	32390	6521	54688
Sulfur Dioxide	--	--	X

\* Priority Pollutants

X Detected but not quantitated either due to extremely low concentration, interference, or no reference standard.

TABLE 6  
ASHTABULA - LIFT STATION  
VOLATILE ORGANIC ANALYSIS

<u>COMPOUND</u>	<u>6/17/78</u> <u>ppb</u>	<u>6/18/78</u> <u>ppb</u>	<u>6/19/78</u> <u>ppb</u>
Acetone	X	} 14	X
* Methylene Chloride	X		X
* Dichloroethylene	X	--	X
* Chloroform	X	--	X
* Trichloroethylene	X	X	X
* Tetrachloroethylene	4	1	12
* Toluene	3	--	1
* Trichloroethane	--	--	--
* Monochlorobenzene	393	152	622

\* Priority Pollutants

X Detected but not quantitated either due to extremely low concentration, interference or no reference standard.

TABLE 7  
ASHTABULA CO SUMP  
VOLATILE ORGANIC ANALYSIS

<u>COMPOUND</u>	<u>6/17/78</u> <u>ppb</u>	<u>6/18/78</u> <u>ppb</u>	<u>6/19/78</u> <u>ppb</u>
Acetone	X	} 236	} 264
* Methylene Chloride	X		
Carbon Disulfide	X		
Cyclopentadiene	20	X	—
Thiophene	14	16	19
* Benzene	94	98	92
Methyl thiophene	7	8	16
* Toluene	68	52	38
* Monochlorobenzene	X	1	1
Styrene	X	X	X
Xylene	X	X	X

\* Priority Pollutant

X Detected but not quantitated either due to extremely low concentration, interferences or no reference standard.

TABLE 8  
 ASHTABULA - TDA HOTWELL  
 VOLATILE ORGANIC ANALYSIS

<u>COMPOUND</u>	<u>6/24/78</u> <u>ppb</u>	<u>6/25/78</u> <u>ppb</u>	<u>6/26/78</u> <u>ppb</u>
Acetone	} 14	} 28	} 3
* Methyl Chloride			
* Benzene	0.2	X	0.3
* Monochlorobenzene	0.7	X	0.7

\* Priority Pollutant

X Detected but not quantitated either due to extremely low concentration, interferences or no reference standard.

TABLE 9  
 ASHTABULA TDA CARBON FILTER  
 VOLATILE ORGANIC ANALYSIS  
 (SAMPLE TAKEN FROM 1 GAL. COMPOSITE)

<u>COMPOUND</u>	<u>6/28/78</u> <u>ppb</u>
Acetone	} 1400
* Methylene Chloride	
Cyclopentadiene	X
Tetrahydrofuran	X
* Chloroform	X
* Dichloroethane	77
* Carbontetrachloride	6
* Benzene	14
* Trichloroethane	3
* Toluene	6
* Monochlorobenzene	20
Styrene	X

\* Priority Pollutant

X Detected but not quantitated either due to extremely low concentration, interference, or no reference standard.

TABLE 10  
ASHTABULA PROCESS WATER  
VOLATILE ORGANIC ANALYSIS

<u>COMPOUND</u>	<u>6/19/78</u> <u>ppb</u>
* Dichloroethane	X
* Monochlorobenzene	0.7

TABLE 11  
ASHTABULA NORTH TDA POND  
VOLATILE ORGANIC ANALYSIS

<u>COMPOUND</u>	
* Monochlorobenzene	X
Toluenediamine	185 ppm

\* Priority Pollutant

X Detected but not quantitated either due to extremely low concentration, interferences or no reference standard.

TABLE 12  
 ASHTABULA CARBON BED STEAM CONDENSATE  
 VOLATILE ORGANIC ANALYSIS

<u>COMPOUND</u>	<u>6/27/78</u>	<u>0800</u>
	<u>ppb</u>	
Acetone	X	
Carbon Disulfide	X	
Dimethylsulfide	X	
Cyclopentadiene	X	
Thiophene	426	
* Benzene	10143	
Dimethyldisulfide	X	
Methylthiophene	1443	
Methylethyldisulfide	X	
* Toluene	2026	
Ethylthiophene	X	
Dimethyltrisulfide	X	
Xylene	X	
Styrene	X	

\* Priority Pollutant

X Detected but not quantitated either due to extremely low concentration, interferences or no reference standard.

TABLE 12  
 ASHTABULA CARBON BED STEAM CONDENSATE  
 VOLATILE ORGANIC ANALYSIS

<u>COMPOUND</u>	<u>6/27/78</u>	<u>0800</u>
	<u>ppb</u>	
Acetone	X	
Carbon Disulfide	X	
Dimethylsulfide	X	
Cyclopentadiene	X	
Thiophene	426	
* Benzene	10143	
Dimethyldisulfide	X	
Methylthiophene	1443	
Methylethyldisulfide	X	
* Toluene	2026	
Ethylthiophene	X	
Dimethyltrisulfide	X	
Xylene	X	
Styrene	X	

\* Priority Pollutant

X Detected but not quantitated either due to extremely low concentration, interferences or no reference standard.

January 26, 1979

RECEIVED  
FEB 15 1979

In Response to Request 31

OLIN ASHTABULA - WASTEWATER CHARACTERIZATION

*[Handwritten notes and signatures in a circled area]*  
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R. D. Householder  
A. C. [unclear]

PERIOD: September, 1978 - January, 1979

REFERENCES: Scattered

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ABSTRACT

An analytical study of the aqueous effluent from Olin's Ashtabula, Ohio, TDI manufacturing facility has been completed. The plant outfall to Fields Brook has been examined for organic composition, phenols, cyanide, TOC, COD, TDA and thirteen metals. Data has also been recorded on the Volatile Organic Analysis from samples taken from Center Pond and the Neutralization Outlet.

DISTRIBUTION

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OLIN ASHTABULA - WASTEWATER CHARACTERIZATIONSCOPE

Due to the high level of available chlorine observed in the plant effluent system (a chlorine tank rupture disk blew) during the period of 6/10/78 - 6/12/78 while the first Ashtabula effluent characterization was being undertaken and the subsequent destruction of TDA by available chlorine and concomitant high level of chloroform observed (0.5 - 1.0 ppm in West Pond effluent) it was decided by Environmental Affairs and Plant Management to re-examine the outfall.

During the sampling period of 9/27 - 9/29/78, daily grab samples for available chlorine were taken to assure a representative effluent. Although a complete effluent characterization was performed only on the West Pond effluent, VOA grab samples were collected daily from Center Pond and the Neutralization Outlet to follow the concentrations of chloroform.

RESULTSA. VOA Analysis

The identification and concentration of volatile species found in the West Pond effluent is shown in Table I. The peak quantitated by GC as methylene chloride is known to be contaminated with acetone. The reported values, therefore, are the maximum possible concentration of methylene chloride. There appears to be no significant level of any volatile priority pollutant found in Ashtabula's West Pond effluent. This data supports the contention that the high level of chloroform detected previously was due predominantly to high available chlorine.

Tables II and III show the levels of volatile organics found in the Center Pond and Neutralization Outlet during the sampling period. Note especially the low levels of chloroform detected. Once again the value for methylene chloride is a maximum value.

B. Extractables1. Base/Neutral Fraction

Table IV shows the 35 components identified by GC/MS. Quantitative values are given for the priority pollutants detected. The main peak detected in the Ashtabula effluent remains unidentified. This peak is actually composed of more than 1 compound and was incorrectly identified as butoxyethoxyethanol in the previous effluent characterization. Reference to CASR-14-78

shows that it was found in 8 of 12 streams analyzed at that time. These same species have also been found to be the main contaminants in the Base/Neutral fraction of the Joliet effluent. This suggests perhaps some sort of specialized cleaning solvent or water treatment chemical.

Two other compounds detected at significant levels were isomeric methylbenzodihydrothiophenes. These two species were incorrectly identified in the previous wastewater characterization report (CASR-14-78) as dimethyl-TDA's. The source of these compounds is probably the effluent from steam treatment of the CO Plant's carbon beds.

Significant levels of 4 isomeric high boilers were also detected. These compounds remain unidentified but some information is available. The probable molecular weight is 223 and the compound contains 1 or 3 nitrogen atoms. The same mass spectrum was generated by examination of the solids obtained by filtering a previous sample of West Pond effluent. The chlorinated analog, mol. wt. 257 with 1 chlorine atom, was also detected.

## 2. Acid Fraction

Very few components were detected in this fraction. Their structural assignments and concentration in the original effluent are shown in Table V.

## 3. Pesticides

No pesticides were detected using a separate hexane/methylene chloride extraction GC/MS on a 2 liter effluent sample and examination by GC/MS. Our limits of detection are approximately 1 ppb for any single chemical species.

## C. TDA

The primary reason for the re-examination of the Ashtabula West Pond effluent was the high level of available chlorine found during the 6/10/78 - 6/12/78 sampling period and the subsequent decrease in TDA content. Table VI shows data on both TDA content and available chlorine in the effluent stream during the 9/27/78 - 9/29/78 effluent survey. This data was developed by Ashtabula plant personnel. TDA was also detected by GC/MS in the Base Neutral Fraction.

#### D. Miscellaneous Analysis

Table VII contains data pertaining to Total Cyanide, Total Phenol, Mercury, Total Organic Carbon, Chemical Oxygen Demand and Total Ionic Chloride.

#### E. Metals

The results of the analysis for those metals on the EPA Priority Pollutant list are shown in Table VIII.

#### GENERAL COMMENTS

Fifty-two organic compounds (compared to 33 in the previous study) were identified in Ashtabula West Pond Effluent. Twenty of these are Priority Pollutants as defined by USEPA, although the highest concentration of any Priority Pollutant was 168 ppb. Not all components detected were identified, in fact, the three major components in the effluent remain uncharacterized. It is impossible to state the exact number of constituents present. In the GC/MS analysis a computer controlled peak detection and identification system is used. The number of components detected can vary greatly depending on the values given to the variables involved.

It is unlikely that any organic Priority Pollutant remains undetected at a level above 1 ppb.

All GC/MS data pertaining to this study has been transferred to magnetic tape for archival storage and is available for future reference.

#### EXPERIMENTAL

The procedures used in this wastewater study are basically those outlined in "Sampling and Analysis Procedures for Screening of Industrial Effluents for Priority Pollutants", U.S. Environment Protection Agency, Environmental Monitoring and Support Laboratory Cincinnati, Ohio, April, 1977. A number of non-critical modifications were made and are shown below.

1. In the extraction procedures the composite samples were extracted with 1 x 250 ml and 4 x 100 ml portions of methylene chloride.
2. All quantitation was accomplished by gas chromatography. Quantitative VOA data was generated by conventional packed column GC while the Base/Neutral and Acid Fractions were examined by Capillary Column GC using a 16 meter, 0.51 mm i.d. glass column coated with 0.4  $\mu$  SE-30 and programmed from 60-270°C at 4°C/min.

3. As, Sb, and Se were quantitated by Atomic Absorption using the borohydride technique. The remaining 8 metals were analyzed by Plasma Spectrometry.
4. A separate 2 liter sample of the composite was extracted and concentrated for pesticide analysis by GC/MS. Electron Capture Gas Chromatography was not used.

TABLE I  
VOA ANALYSIS  
ASHTABULA WEST POND EFFLUENT

<u>COMPOUND</u>	<u>9/27/78</u> <u>(ppb)</u>	<u>9/28/78</u> <u>(ppb)</u>	<u>9/29/78</u> <u>(ppb)</u>
Acetone			
* Methylene Chloride ✓	8	110	20
* Chloroform ✓	4	4	4
* Carbontetrachloride ✓	6	6	17
* Bromodichloromethane	X	-	-
* Benzene ✓	4	4	4
* Toluene ✓	4	4	1
* Monochlorobenzene ✓	7	8	4
Tetrahydrofuran	X	X	X
* 1,2-Dichloroethane	X	-	-
Butanol	X	X	X
Dichloroacetonitrile	X	X	-
Dimethoxymethane	X	X	X
Ethyleneglycolmono- butylether	X	X	X

- Not Detected

X Detected by GC/MS but not quantitated by GC, due either to extremely low level or to interferences.

\* Priority Pollutants as defined by USEPA.

TABLE II  
VOA ANALYSIS  
ASHTABULA CENTER POND

<u>COMPOUND</u>	<u>9/27/78</u> <u>(ppb)</u>	<u>9/28/78</u> <u>(ppb)</u>	<u>9/29/78</u> <u>(ppb)</u>
* Methylene Chloride ✓	-	63	36
* Chloroform ✓	4	4	4
* Carbontetrachloride ✓	-	25	21
* Benzene ✓	X	2	2
* Toluene ✓	X	1	1
* Monochlorobenzene ✓	X	3	2
* Tetrachloroethene ✓	-	6	2
Tetrahydrofuran	X	-	-
Butanol	X	7	X
Ethyleneglycolmono- butylether	X	X	-
* Dichloroethene	-	-	X
Dimethoxymethane	-	-	X
Thiophene	-	X	-

- Not Detected

X Detected but not quantitated

\* Priority Pollutant as defined by USEPA

TABLE IIIVOA ANALYSISASHTABULA NEUTRALIZATION OUTLET

<u>COMPOUND</u>	<u>9/27/78</u> <u>(ppb)</u>	<u>9/28/78</u> <u>(ppb)</u>	<u>9/29/78</u> <u>(ppb)</u>
* Methylene Chloride ✓	45	69	-
* Chloroform ✓	8	17	8
* Carbontetrachloride ✓	16	28	54
* Benzene ✓	1	1	1
* Toluene ✓	1	3	1
* Monochlorobenzene ✓	129	66	516
* 1,2-Dichloroethane	X	X	X
Dimethoxymethane	X	X	X
Methylbutenoate	X	-	-
* Tetrachloroethene	-	X	-
Ethyleneglycolmono- butylether	-	X	X
Butanol	-	-	X

- Not Detected

X Detected but not quantitated.

\* Priority Pollutant as defined by USEPA.

TABLE IV  
BASE NEUTRAL EXTRACT  
ASHTABULA WEST POND EFFLUENT  
COMPOSITE SAMPLE 9/27/78 - 9/29/78

<u>COMPOUND</u>	<u>CONCENTRATION (ppb)</u>
* Bromoform	X
* Hexachloroethane	X
* Trichlorobenzene	0.15
* Naphthalene	0.14
* Acenaphthalene	<0.9
* Pyrene	0.06
* Fluoranthene	0.13
✓ * Diethylphthalate	2.2
✓ * Di-n-butylphthalate	0.6
✓ * Butylbenzylphthalate	34
* Dichlorobenzene	X
? - Bis-2-ethylhexylphthalate	168
Xylene	
Methylethylbenzene	
Methylstyrene	
Dichlorocyclohexane	
Methylnaphthyridine	
Indene	
Methylbenzodihydrothiophene (2 isomers)	
2-Methoxystyrene	
Ethyleneglycolmonobutylether	
Dibutoxymethane	
Methylnaphthalene	
Biphenyl	
Dimethylnaphthalene	
Methylethyl-naphthalene	
Trimethylnaphthalene	
A Nonane	

TDA RELATED COMPOUNDS

TDA  
 Chloroaniline  
 Chlorotoluidine  
 Chloro-TDA  
 Dichloro TDA (2 isomers)

X - detected but not quantitated due to interference  
 \* - Priority Pollutants as defined by USEPA  
 Olin Research Center - Analytical Department - New Haven, Ct. 06511

TABLE V  
ACID FRACTION  
ASHTABULA WEST POND EFFLUENT  
COMPOSITE SAMPLE 9/27/78 - 9/29/78

<u>COMPOUND</u>	<u>CONCENTRATION (ppb)</u>
* Phenol	1.0
* Chlorophenol	0.6
* Dichlorophenol	0.7

\*Priority Pollutants as defined by USEPA.

TABLE VITDA AND AVAILABLE CHLORINEASHTABULA WEST POND EFFLUENT

9/27/78	2,6-TDA	0.3	ppm	Available Chlorine- N
	2,4-TDA	0.4		
	2,3-TDA	2.0		
	3,4-TDA	1.9		
	Toluidine	1.3		
9/28/78	2,6-TDA	0.3	ppm	Available Chlorine- N
	2,4-TDA	0.8		
	2,3-TDA	3.6		
	3,4-TDA	4.2		
	Toluidine	0.6		
9/29/78	2,6-TDA	0.4	ppm	Available Chlorine- N
	2,4-TDA	1.4		
	2,3-TDA	5.2		
	3,4-TDA	7.4		
	Toluidine	1.6		

TABLE VIIMISCELLANEOUS ANALYSISASHTABULA WEST POND EFFLUENT

<u>DATE</u>	<u>CYANIDE (ppm)</u>	<u>PHENOL (ppb)</u>	<u>MERCURY (ppb)</u>
9/27/78	0.02	.55	0.6 0.5
9/28/78	0.02	<5	0.3 0.3
9/29/78	0.02	<5	0.3 0.3

## Total Organic Carbon (TOC)

Acidified 23 ppm  
Non-Acidified 103 ppm

Chemical Oxygen Demand (COD) 37 ppm; 40 ppm

Total Ionic Chloride 2,455 ppm

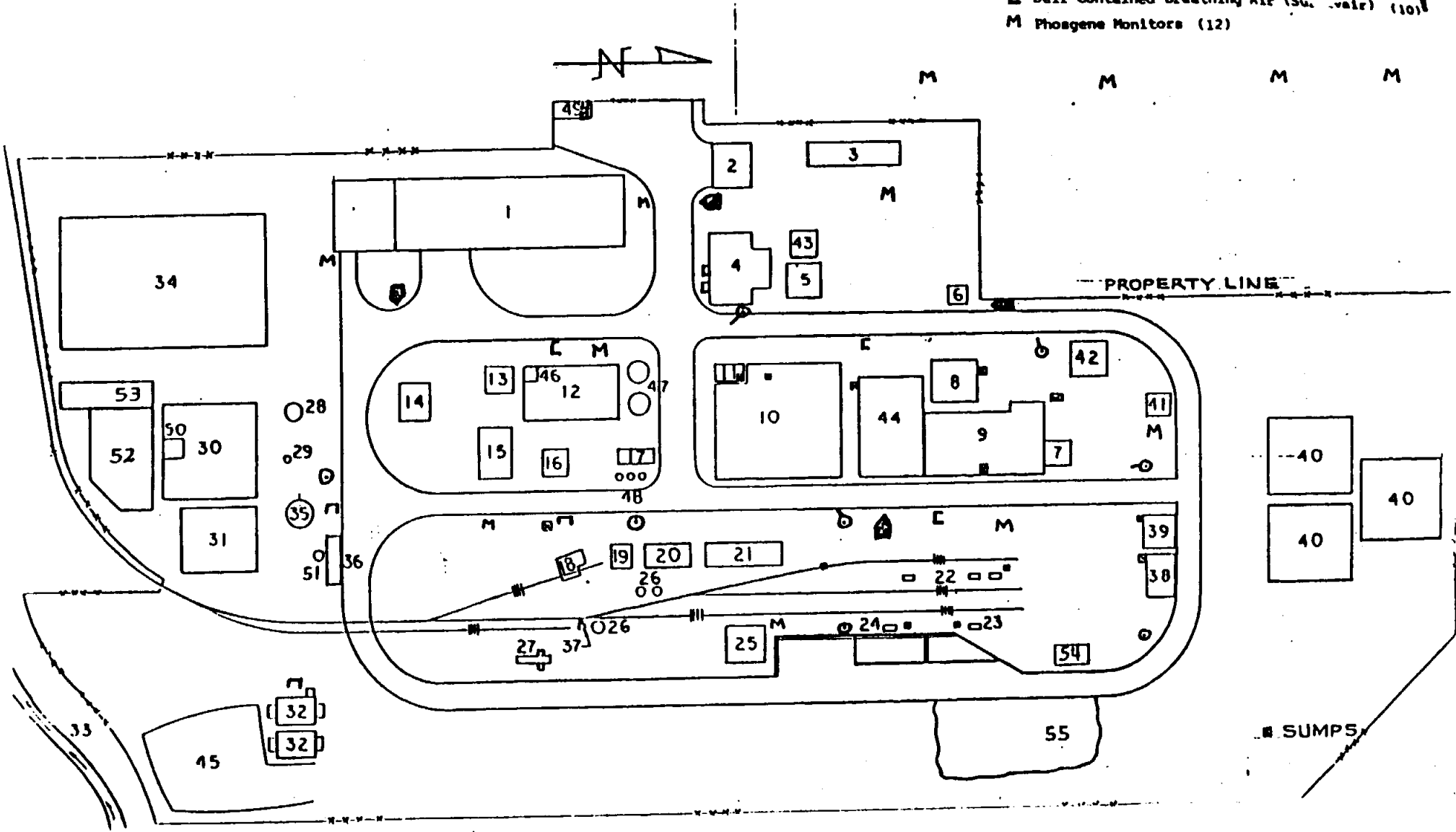
TABLE VIII  
METALS ANALYSIS  
ASHTABULA WEST POND EFFLUENT  
COMPOSITE SAMPLE 9/27/78 - 9/29/78

<u>METAL</u>	<u>CONCENTRATION (ppb)</u>	<u>LEAD</u>
Sb (ANTIMONY)	<10	50
As (ARSENIC)	<10	50
Be (BERYLLIUM)	<10	50
Cd (CADMIUM)	<2	1.2
Cr (CHROMIUM)	<2	50
Cu (COPPER)	15.3 13.9	5
Pb (LEAD)	.16 ✓ 22	50
Ni (NICKEL)	6 17	30
Se (SELENIUM)	13 12	10
Ag (SILVER)	20 ✓ 20	50
Tl (THALLIUM)	2.5 2.5	—
Zn (ZINC)	42.0 44.9	30
	36 ✓ 48	

IN RESPONSE TO REQUEST #31

# AS TABULA TDI PLANT

- Fire Hydrant (8)
- with monitor
- Firehose house (4)
- Self Contained Breathing Air (Su. Air) (10)
- M Phosgene Monitors (12)



NO.DESCRIPTION

1.	Warehouse and Maintenance Offices
2.	Garage
3.	Warehouse and Training Office
4.	Control Room, Motor Control Center, and Production Offices
5.	Water Treatment Building
6.	Dowtherm Vaporizer
7.	Monochlorobenzene Storage Tank
8.	Toluene Diamine Purification Column
9.	Toluene Diamine Storage Tanks
10.	TDI Production and Purification Plant
11.	Recycle Monochlorobenzene Storage Tanks
12.	Phosgene Production and Purification Plant
13.	Phosgene Plant Caustic Scrubber
14.	TDI Plant Cooling Tower
15.	Phosgene Storage Tanks
16.	DeIonized Water Building
17.	Monoethanolamine Plant
18.	CO Generation Building
19.	20°Be Muriatic Acid Production
20.	Blowdown Storage Tanks
21.	TDI Plant Caustic Scrubber and Caustic Storage and Caustic Unloading
22.	Chlorine Unloading Area
23.	Toluene Diamine and Monochlorobenzene Unloading Area
24.	Toluene Diisocyanate Loading Area
25.	Drum Loading Building
26.	Muriatic Acid Storage Tanks
27.	Muriatic Acid Loading Area
28.	Spent Caustic Hold Tank
29.	Neutralization Tank
30.	Center Pond
31.	East Retention Pond
32.	TDI Residue Sheds
33.	Fields Brook
34.	West Settling Pond
35.	Carbon Treatment Feed Tank
36.	Carbon Treatment Building
37.	Muriatic Acid Vapor Scrubber
38.	Waste Drum Storage Pad
39.	Waste Oil Storage Pad
40.	North Emergency Spill Basin
41.	Decon Pad
42.	Oil Storage Tank
43.	Motor Control Center Building II
44.	Toluene Diisocyanate Storage Tanks
45.	TDI Residue Storage Area
46.	Phosgene Plant Cooling Tower
47.	Liquid CO Storage Tanks
48.	CO Purification Filters
49.	Guard House
50.	Mix Box
51.	Sand Filter Backwash Tank
52.	Emergency Spill Basin
53.	Emergency Spill Basin, Storm Sewer Compartment
54.	Lab Drum Waste Storage Pad
55.	Drum Waste Storage Area (east side)



120 LONG RIDGE RD., STAMFORD, CONN. 06904

November 11, 1985

Mr. Gary Gifford  
State of Ohio Environmental Protection Agency  
Northeast District Office  
2110 East Aurora Road  
Twinsburg, OH 44087

Dear Mr. Gifford:

As agreed in our meeting of April 17, 1985, Olin has taken and analyzed additional residue samples from the 19th Street site in Ashtabula. Over 50 additional TDI residue samples were collected from the site in accordance with the attached sampling plan (May 30, 1985 Olin memo to R. S. Hendey from M. J. Bellotti). A total of 12 samples were analyzed for various parameters. (See attached September 30, 1985 Olin memo to R. S. Hendey from T. Groom.) The results of these analyses are summarized as follows:

- o No toluene diisocyanate (TDI) was detected in three solid residue samples. The limit of detection was 20 ppm for the 2,4 TDI isomer. Because TDI reacts with water, an analysis for TDI was not conducted on leachate.
- o Toluene diamine (TDA) was detected in three solid residue samples at levels of 62, 66 and 69 ppm. However, no TDA was found in the leachate from 12 residue samples. The limit of detection was 0.5 ppm.
- o Arsenic, barium, chromium, lead and zinc were detected in solid residue samples. However, all metals in leachate were below 1 ppm and most results were below a low ppb detection limit.
- o Solid residue samples were not analyzed for monochlorobenzene (MCB) or dichlorobenzene (DCB). Both chemicals were found in the leachate from 12 residue samples. The maximum concentration for MCB was 1027 ppb and for DCB was 524 ppb. Higher concentrations were found in the EP-III toxic leachate than in the EP toxic leachate. Zero headspace containers as specific by the EP-III leachate procedure were not available and, therefore, were not used. A spike recovery sample analysis of the EP-III

3988d

Mr. Gary Gifford

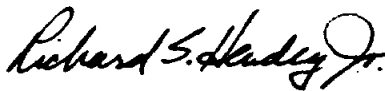
-2-

November 11, 1985

leachate procedure used resulted in 38% recovery of DCB at low ppb levels and a 67% recovery for MCB. (See attached October 10, 1985 Olin memo to R. S. Hendey from T. Groom.)

These results support Olin's opinion that the TDI residue at the 19th Street site does not present a substantial hazard to human health or the environment. When you have reviewed these results, we would be pleased to discuss the matter further.

Sincerely,



Richard S. Hendey, Jr.  
Manager, Regional  
Environmental Affairs

RSH:mdc  
Attachments

3988d

INTER OFFICE MEMO



R. S. HENDEY

DATE May 30, 1985

TO R. S. Hendey AT Stamford

FROM M. J. Bellotti AT Charleston

SUBJECT 19th Street Residue Sampling Plan
 COPY TO  
 J. C. Brown  
 G. B. Butaud  
 D. L. Cummings  
 T. Groom  
 K. D. Hiltgen  
 B. Jacobsen  
 V. M. Norwood
Purpose:

Determine the leaching potential for the TDI residue at the 19th Street site.

Sampling Approach:

1. We will collect TDI residue samples in a grid covering the slope and the creek level area adjacent to Fields Brook.
2. The grid will consist of 18 sample locations: 15 on the slope and 3 at creek level (see attached map).
3. At each of the 15 slope locations, we will collect 3 samples (Table 1)
  - a) Surface porous residue
  - b) Surface non-porous residue
  - c) Buried residue, near surface (either porous or non-porous)
4. At each of the three creek level locations, we will collect 3 samples (Table 1)
  - a) Surface porous residue
  - b) Surface non-porous residue
  - c) Moss covered residue (either porous or non-porous)

Sampling Procedure:

1. We will collect buried samples using a small shovel or trowel.
2. We will collect surface samples by hand.
3. All handling of residue samples will be done using protective rubber or plastic gloves.
4. Each sample will be retained in a plastic zip-lock bag.
5. Each sample will be identified by a label, written in permanent ink and placed in the sample bag.

6. The sample label will identify the grid location and sample type (surface, buried, porous, non-porous, moss covered).
7. All samples will be shipped to Olin-Cheshire lab, attention Ted Groom.
8. All samples will weigh approximately 2 lbs to provide adequate sample volume.

Analysis of Samples:

1. We will analyze samples from three representative slope locations and one creek level location.
2. All other samples will be retained for any future analyses that might be required.
3. Analysis will be done on each sample for (see Table 2):
  - a) Free TDI, TDA, MCB, DCB
  - b) Total metals
  - c) MCB/DCB/TDA in EP toxic leachate
  - d) MCB/DCB/TDA in EP III leachate (EPA proposed method)
  - e) EP toxic metals

Evaluation: We will determine the degree of leachate potential

1. On an absolute level
2. On a relative level. Relative evaluations will consist of comparisons between
  - a) Porous vs. non-porous samples
  - b) Buried vs. surface
  - c) Moss covered vs. non-moss covered
  - d) Total metals vs. EP extract metals
  - e) Free TDA/TDI/MCB and DCB vs. EP toxic leachate for TDA/TDI/MCB/DCB
  - f) EP toxic leachate method vs. EP III leachate method

TABLE 1  
RESIDUE SAMPLING PLAN

<u>Sample Type</u>	<u>Collection Points (on Fig. 1)</u>																			
	A <sub>1</sub>	A <sub>2</sub>	A <sub>3</sub>	B <sub>1</sub>	B <sub>2</sub>	B <sub>3</sub>	C <sub>1</sub>	C <sub>2</sub>	C <sub>3</sub>	D <sub>1</sub>	D <sub>2</sub>	D <sub>3</sub>	E <sub>1</sub>	E <sub>2</sub>	E <sub>3</sub>	F <sub>1</sub>	F <sub>2</sub>	F <sub>3</sub>		
Surface/Porous (P)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Surface/Non-Porous (NP)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	
Buried/Porous or Non-Porous (B)	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X					
Moss Covered (M)																		X	X	X

MJB/vrp  
98/MJB1

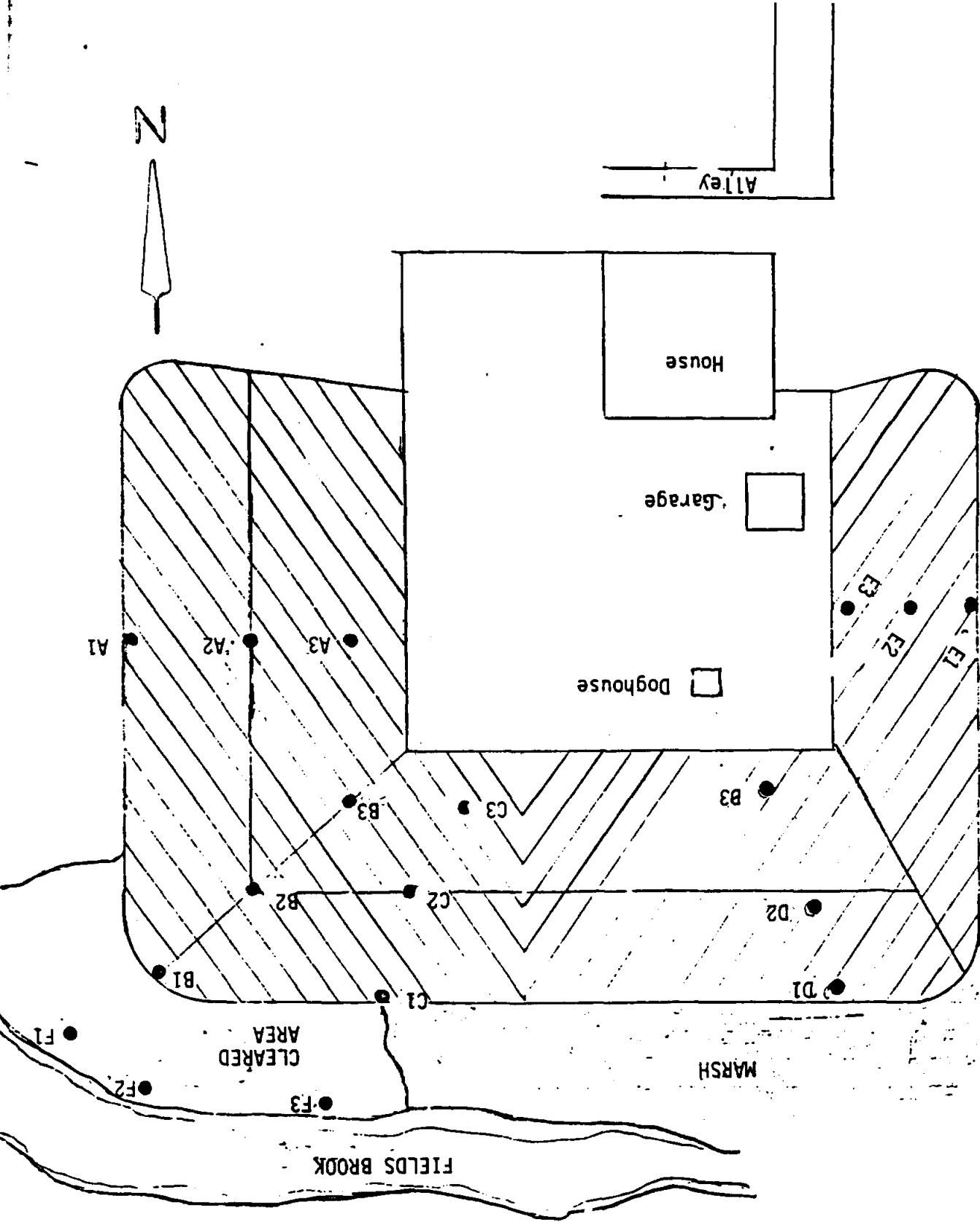
TABLE 2

ANALYTICAL PLAN

(For three selected slope sample locations: X, Y and Z and for one selected creek level location: S)

<u>Analytical Test</u>	XP	XNP	XB	YP	YNP	<u>Sample</u>		ZNP	ZB	SP	SNP	SM
						YB	ZP					
Free TDI/TDA/ MCB/DCB in Residue	X	X	X									
Total Metals in Residue	X	X	X									
MCB/DCB/TDA in EP Toxic Leachate	X	X	X	X	X	X						
MCB/DCB/TDA in EP III Leachate	X	X	X	X	X	X	X	X	X	X	X	X
EP Toxic Metals	X	X	X									

MJB/vrp  
98/MJB1



SAMPLING PLAN

FIGURE 1

**INTER OFFICE MEMO** 

**R S HENDEY**

TO R. S. Hendey AT Stamford DATE Sept. 30, 1985  
 FROM T. Groom AT Cheshire COPY TO FILE #22  
 M. J. Bellotti  
 SUBJECT 19th St. Residue Analysis

Pursuant to the memo M. J. Bellotti to R. S. Hendey, May 30, 1985 we have completed the analysis of 27 TDI Residue samples for the various components as indicated in the memo. Results are listed in the attached tables.

Note that monochlorobenzene is a 'volatile' organic. No special precautions were taken to prevent evaporation of this species in the EP Leachate procedure or in the EP-III Leachate procedure. Zero headspace containers as described in the procedure are not yet available. Significant levels of this species could be lost in the filtering required after extraction.

One sample was duplicated (2223-CE, F3 SP). Results for MCB were 464 ppb and 243 ppb. Results for Dichlorobenzene were 34.5 ppb and 25.9 ppb. As might be expected more variation in results were noted with the more volatile component. For the same sample metals analysis showed nearly identical results.

Both monochlorobenzene and dichlorobenzene were determined by GC/MS techniques, MCB by the standard Method 624 for volatile organics using a three point calibration curve on each day that analysis was performed. Method recovery was 88% for MCB. Dichlorobenzene was extracted from the aqueous leachate as per EPA Method 625 and analysis was accomplished by GC/MS using multiple ion detection techniques and a seven point calibration curve.

Metals were determined by ICP except Mercury which was determined by the cold vapor technique and arsenic and selenium which were analyzed by the borohydride method.

In order to get some idea of total recovery one sample was prepared in duplicate and one of these two was spiked with both mono and dichlorobenzene. Results of this analysis are not yet available but will be forwarded shortly.

No TDA was found in any of the aqueous EP Leachate samples using Olin CAM 20-78. The limit of detection was 0.5 ppm by this method.

Solid residue samples themselves were examined by the procedures outlined in Olin CASR-2-1985. No TDI was detected with a limit of detection of 20 ppm for the 2,4-TDI isomer. Concentrations of TDA are listed below for the three samples of interest.

	2,4-TDA	2,6-TDA	Total TDA
	(Concentrations in PPM)		
2193-CE C2 XP	46.6	19.6	66.2
2194-CE C2 XNP	37.3	24.3	61.6
2195-CE C@ XB	40.8	28.5	69.3



T. Groom  
for the Central Analytical Staff

19TH STREET ASHTABULA

Sample	Monochlorobenzene (PPB)		Dichlorobenzene (PPB)	
	EP Toxic Leachate	EP-III Toxic Leachate	EP Toxic Leachate	EP-III Toxic Leachate
2193-CE C2 XP	13.4	321	<1 (Trace)	23.2
2194-CE C2 XMP	0	387	0.0	12.7
2195-CE C2 XB	53.5	450	<1 (Trace)	20.9
2178-CE A3 YP	566	962	5.3	179
2179-CE A3 YMP	<1 Trace	1.7	0.5	<1 (Trace)
2180-CE A3 YB	25.5	70.5	12.4	0.6
2199-CE D1 ZP		1027		21.7
2200-CE D1 ZMP		071		524
2201-CE D1 ZB		612		153
2223-CE F3 SP		464		34.5
2223-CE F3 SP (Duplicate)		259, 227		25.9
2224-CE F3 SMP		730		440
2225-CE F3 SM		362		31.6

EP Toxic Metals

Sample	Arsenic	Barium	Cadmium	Chromium (Concentrations in ppb)	Lead	Mercury	Selenium	Silver	Zinc
2193-CE C2 1P EP Leachate	<1	181	<2	61	29	<1	<2	<5	41
2193-CE C2 1P EP-III Leachate	<1	231	28	<10	<25	<1	<2	<5	67
2193-CE C2 1P Residue	810	13450	<400	14300	6250	<150	<200	<400	3350
2194-CE C2 1MP EP Leachate	<1	130	<2	<10	<25	<1	<2	<5	51
2194-CE C2 1MP EP-III Leachate	1	284	11.8	<10	61	<1	<2	<5	58
2194-CE C2 1MP Residue	187	1480	<400	1885	<2500	<150	<200	<400	<1000
2195-CE C2 1B EP Leachate	<1	162	<2	<10	27	<1	<2	<5	65
2195-CE C2 1B EP-III Leachate	<1	234	7	<10	32	<1	<2	<5	43
2195-CE C2 1B Residue	378	4450	<400	12650	<2500	<150	<200	<400	<1000
2178-CE A3 1P EP Leachate	<1	163	<2	<10	<25	<1	<2	<5	81
2178-CE A3 1P EP-III Leachate	<1	253	<2	<10	31	<1	<2	<5	49
2179-CE A3 1MP EP Leachate	<1	226	<2	<10	<25	<1	<2	<5	<10
2179-CE A3 1MP EP-III Leachate	<1	691	<2	<10	<25	<1	<2	<5	<10
2180-CE A3 1B EP Leachate	<1	88	<2	<10	<25	<1	<2	<5	<10
2180-CE A3 1B EP-III Leachate	3	272	<2	<10	<25	<1	<2	<5	<10
2199-CE B1 2P EP-III Leachate	<1	265	<2	<10	<25	<1	<2	<5	38
2200-CE B1 2MP EP-III Leachate	<1	281	<2	<10	<25	<1	<2	<5	25
2201-CE B1 2B EP-III Leachate	<1	238	<2	<10	<25	<1	<2	<5	123
2223-CE F3 5P EP-III Leachate	<1	282	<2	<10	<25	<1	<2	<5	35
2223-CE F3 5P EP-III (Duplicate)	<1	267	<2	<10	<25	<1	<2	<5	41
2224-CE F3 5MP EP-III Leachate	<1	227	<2	<10	<25	<1	<2	<5	28
2225-CE F3 5H EP-III Leachate	<1	257	<2	<10	<25	<1	<2	<5	29

All results are the average of two determinations.

<X Indicates no metal was detected at a detection limit of X





190 LONG RIDGE ROAD, P.O. BOX 1355, STAMFORD, CT 06904-1355

February 25, 1985

Ms. Christine Mikoy Frazier  
Environmental Scientist  
Division of Hazardous Materials Management  
State of Ohio Environmental Protection Agency  
Northeast District Office  
2110 East Aurora Road  
Twinsburg, OH 44087

Dear Ms. Frazier:

We have completed an analysis of the TDI residue found at 19th Street in Ashtabula for toluene diamine and toluene diisocyanate content. 18.6 ppm of toluene diamine was detected by a liquid chromatography method. 3.2 ppm of toluene diisocyanate was detected using a variation of the Popitti method. The analytical report is attached. When you have reviewed this report, we would like the opportunity to meet and discuss the 19th Street site.

Sincerely,

A handwritten signature in cursive script that reads "Richard S. Hendey".

Richard S. Hendey  
Manager, Regional Environmental  
Affairs.

RSH/is

Attachment

1784d



TO R. S. Hendey

AT Stamford

DATE February 21, 1985

FROM R. Thomas

AT Cheshire

COPY TO T. Groom  
File #22SUBJECT ANALYSIS OF ASHTABULA TDI RESIDUE  
FOR TDA and TDI

RECEIVED

FEB 20 1985

R. S. HENDEY

Ashtabula TDI residue (2039CE) was extracted with methanolic KOH and the extract analyzed for TDA and the 2,4 - isomer of TDI by liquid chromatography. The method used is based on the work described by Nieninan et al (Ref 1). Methanol was used instead of ethanol for urethane formation and anacetonitrile-water mixture was used for the mobile phase. The results obtained for the analysis of 2,4-TDA, 2,6-TDA and 2,4-TDI are shown in Table I. An interfering component was found to elute at the same retention as 2,6-TDI and as yet, we have not separated this isomer for quantitation.

R. Thomas

*T. Groom for RST*

RJT:nc  
Enclosure

TABLE I

TDI AND TDA BY L.C.

2,6-TDA	3,7 ppm
2,4-TDA	14.9 ppm
2,4-TDI	ND <14 ppm

Recovery added TDA components to 2030CE are in Table 2.

TABLE 2

TDA RECOVERY BY L.C.

2,6-TDA at 20 ppm	78% recovery
2,4-TDA at 20 ppm	160% recovery
2,6-TDA at 200 ppm	75% recovery
2,4-TDA at 200 ppm	98% recovery

Total TDI was also analyzed by a variation of the Popitti method, (Ref.2). The method was used as described except a capillary column was substituted for the packed column on the G.C.-FID.

Analysis was done on a Varian 3700 with an automatic sampler.

Column Temp: 150°C isothermal  
Injection Temp: 260°C  
Detector Temp: 270°C  
Carrier: Hydrogen at 6 psig  
Sample size: 3 ul  
Column : 30 meter, 0.32 min ID. Fused silica  
DB5, 1.0 um film thickness

The total TDI obtained was 3.2ppm. A recovery was run concurrently at 446 ppm and 100% of the added Olin TDI-80 was obtained.

(1) E.H. Nieninen, et all, Journal of Liquid Chromatography, 6 (3), 453-469 (1983).

(2) Poppitti Method - Allied Chemical Corporation.

lett 7543-118.

port Chemfo #54.

port Chemfo #61.

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SIMULTANEOUS DETERMINATION OF AROMATIC ISOYANATES  
AND SOME CARCINOGENIC AMINES IN THE WORK  
ATMOSPHERE BY REVERSED-PHASE HIGH-PRESSURE  
LIQUID CHROMATOGRAPHY

E.H. Nieminen, L.H. Saarinen and J.P. Liskio  
Uusimaa Regional Institute of Occupational Health,  
Arinatie 3, SF-00270 Helsinki 27

ABSTRACT

A reversed-phase high-pressure liquid chromatographic method with UV-detection is described for the simultaneous determination of aromatic isocyanates and some carcinogenic aromatic amines which may be present together in the work atmosphere of the polyurethane industry. The air is sampled through a filter which is made alkaline by potassium hydroxide (KOH). The isocyanates react instantaneously with the hydroxyl groups of ethyl urethanes, while the amines remain in nonionized state. The urethanes, which has been added to catalyze the ethyl urethane reaction and eliminate the side reactions, is precipitated out with hydrochloric acid and the sample solution is evaporated to dryness. The residue is dissolved in 10 ml ethanol and water (1:1). A 50- $\mu$ l aliquot of the resulting solution is chromatographed on a  $\mu$ -bondapak C<sub>18</sub> column eluted isocratically with a mixture of tetrahydrofuran, acetonitrile and water buffered with acetate to a constant value in the pH range 5.5-7.0. The use of this pH range is favored both by the retention characteristics and UV-absorbance of the aromatic amines.

### Chemicals

Acetonitrile and tetrahydrofuran of HPLC grade were obtained from Rathburn Chemicals (Walkerburn, Peebleshire, Scotland). Water was doubly distilled. Acetic acid, sodium acetate and phosphoric acid were purchased from E. Merck (Darmstadt, G.F.R.). Potassium biphosphate was purchased from May & Baker Ltd, (Dagenham., England). Toluene diisocyanate (TDI), a mixture of 80 % 2,4 TDI and 20 % 2,6 TDI, was purchased from Fluka AG, (Buchs, Switzerland) and Diphenylmethane-4,4'-diisocyanate (MDI) from ICI Pharmaceuticals, (Plainview, N. Y., U.S.A.). 4,4'-Diaminodiphenylmethane (MDA) and 2,4-diaminotoluene (TDA) were purchased from Fluka AG. Dimer of 2,4-toluene-diisocyanate (Desmodur TT) and triphenylmethane 4,4',4"-triisocyanate (Desmodur R) were obtained from Bayer AG (Leverkusen, G.F.R.). Ethanol 99,5 % was obtained from Alko Oy (Rajamäki, Finland) and potassium acetate from J.T. Baker (Gross Gerau, G.F.R.). Dibutyltin dilaurate was a product from Merck-Schuchardt. Methylene chloride and potassium hydroxide were products from E. Merck. DABCO (diethylenetriamine), Desmorapid PP (a mixture of organic amines), TEA (triethylamine) and 3,3'-dichloro-4,4'-diaminodiphenylmethane (MOCA) were obtained from polyurethane manufacturing plants. The indicator paper was Merck Universal Indikator Papier.

### Preparation of the absorption solution

About 2 g of potassium hydroxide was dissolved in 1 l 99,5 % ethanol.

### Preparation of the standard solutions

Stock solutions of the aromatic isocyanates and amines were prepared in dry methylene chloride: about 10 mg of the pure isocyanate or amine was dissolved in 50 ml of methylene chloride. A suitable aliquot of the solution was added to 20 ml of the absorption solution where the isocyanates immediately reacted to form the corresponding ethyl urethanes. The amines remained in nonionized state. Hydrochloric acid (37 %) was carefully added to the standard solution until indicator paper showed the apparent pH of the solution to be between 7 and 7.5. (At lower pH the amines, especially MOCA which is very sensitive, may be precipitated.) KCl-precipitate was separated out by filtration or centrifugation and washed with ethanol. The clear standard solution together with the washing solution was evaporated to dryness at 35°C under vacuum. The residue was dissolved in 1 ml of ethanol:water (1:1) or 1 ml eluent, and 20-50 µl of the solution was injected into the chromatograph.

### Air sampling and sample preparation

The air was sampled through an impinger bottle filler with 20 ml absorption solution at a rate of 1 to 2 l/min. Sampling time was 15-30 min. To investigate the collection efficiency, sampling was done through two impingers connected in series each filled with 20 ml of absorption solution. Since no isocyanates or amines were detected in the second impinger at a flow rate of 1 or 2 l per min, the single impinger can reliably be used to collect the air samples. The sample solutions were handled as described above for the standard solutions.

## RESULTS

Experimental conditions affecting the ethylurethane reaction.

Certain organic amines (TEA, DABCO and Desmorapid PP) used as catalysts in the polyurethane industry were found to interfere with the formation of ethyl urethanes. TEA (triethylamine) and Desmorapid PP (a mixture of organic amines) are used as catalysts in the production of MDI-based polyurethanes and DABCO (diethylenetriamine) is a catalyst used in the production of TDI-based polyurethanes.

When MDI or TDI (10 ug) was added to ethanol solution (20 ml) containing these amines up to the concentration of 50 ug/ml, the HPLC-ethyl urethane peaks obtained from the solutions were smaller than those obtained from pure ethanol.

The MDI ethyl urethane peak obtained from ethanol containing TEA was reduced by 30 %, and when Desmorapid PP was present in ethanol no MDI ethyl urethane peak was found at all. The TDI ethyl urethane peak obtained from ethanol containing DABCO was reduced by 70 %.

Since both TDI- and MDI ethyl urethanes are formed rather slowly (FIG. 1), there obviously had been enough time for interfering reactions to occur. A suitable catalyst for the ethyl urethane reaction was therefore sought.

Of all the compounds tested the best accelerator of the reaction rate proved to be a simple base: potassium hydroxide (KOH). The TDI and MDI ethyl urethanes formed immediately in ethanol made alkaline with KOH (FIG. 1).

The isocyanate ethyl urethanes formed quantitatively even

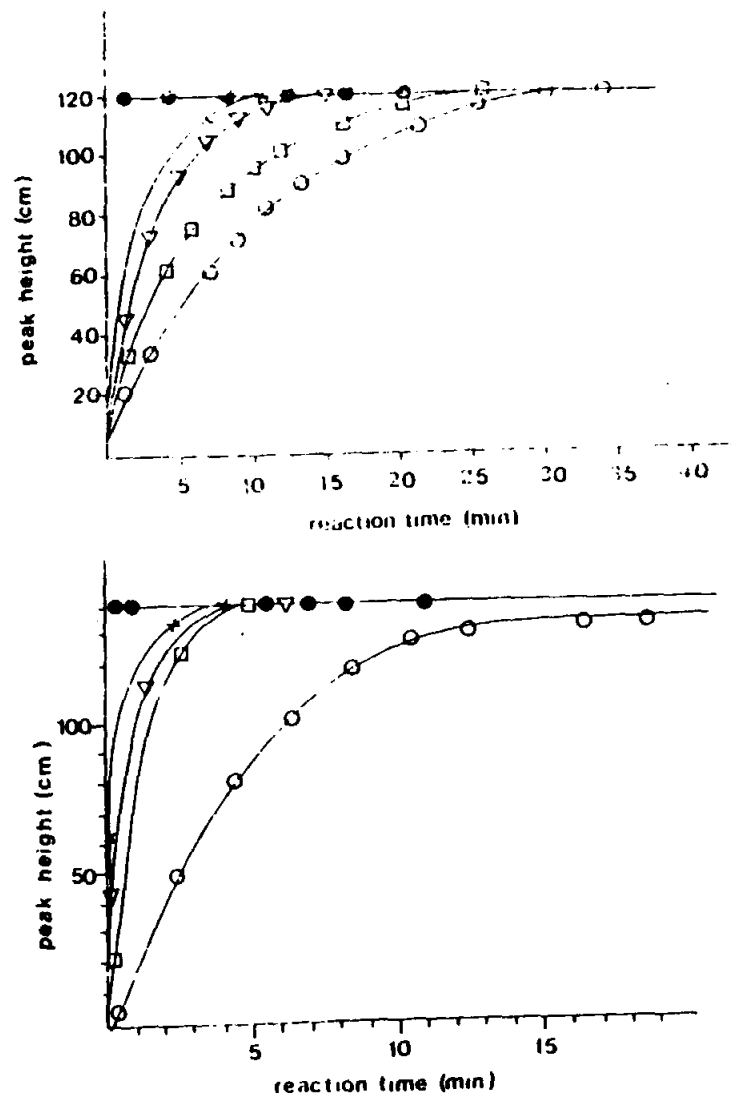


FIGURE 1

The reaction rate of TDI ethyl urethane (A) and MDI ethyl urethane (B). The HPLC-peak height versus reaction time of TDI (A) and MDI (B) in ethanol

- in the absence of catalyst
- in the presence of 0.01 % dibutyltin dilaurate
- ▽ in the presence of 0.1 % dibutyltin dilaurate
- × in the presence of 0.1 % potassium acetate
- in the presence of 0.02 % potassium hydroxide

in the presence of TFA, DABCO and D-smorapid BP. Dibutyltin dilaurate, a catalyst commonly used in urethane technology, and potassium acetate also had satisfactory accelerating effects, (FIG. 1) but they did not counteract the interfering reactions.

Even a small amount of KOH in ethanol is enough to catalyze the ethyl urethane reaction, but when air samples are taken it is necessary to add considerable more KOH to the ethanol since atmospheric carbon dioxide precipitates some of the KOH to potassium carbonate.

The aromatic amines 2,4-TDA, MDA and MOCA did not interfere with the formation of ethyl urethanes. This was proved experimentally by adding TDI or MDI to ethanol that contained these aromatic amines in amounts up to 5 equivalents of the isocyanate added. The reaction rates of TDI and MDI followed the same curve as their reaction rates in pure ethanol when the amines were not present. In ethanol with KOH the ethyl urethanes formed immediately.

#### Selection of the RPIC conditions

Acetonitrile, tetrahydrofuran and water (3:3:4) as mobile phase gave good isocratic separation and short elution times for the isocyanates (FIG. 2). The tetrahydrofuran (THF) was found to improve the shapes of the peaks when Rad PAK C<sub>18</sub> columns were used. In later experiments with another commercial column (ODS-Hypersil) THF had no apparent effect on the shapes of the peaks, and mere acetonitrile and water was used as eluent.

For the determination of the amines (2,4-TDA, MDA and MOCA) the mobile phase was buffered with acetate.

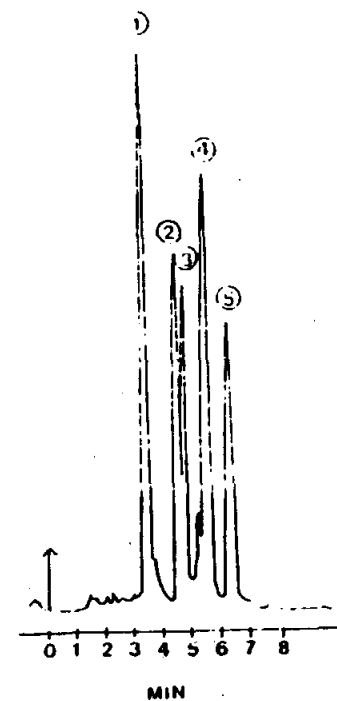


FIGURE 2

Chromatogram of the ethyl urethane derivatives of the aromatic isocyanates: 1. Phenyl isocyanate, 2. Toluene diisocyanate (TDI), 3. Dimer of 2,4-TDI (Desmodur TI), 4. Diphenylmethane 4,4'-diisocyanate (MDI), 5. Triphenylmethane 4,4',4''-triisocyanate (Desmodur R.) Conditions: Rad PAK C<sub>18</sub> column; tetrahydrofuran, acetonitrile and water (3:3:4) as mobile phase; flow rate 1 ml/min; sample volume 50  $\mu$ l; detection at 245 nm and 0.04 AUFS.

The retentions of MDA and TDA increased drastically when the pH decreased (FIG. 3). This phenomenon, which is in contradiction to the ion suppression theory (8), is possibly caused by the ability of acetate to form ion pairs.

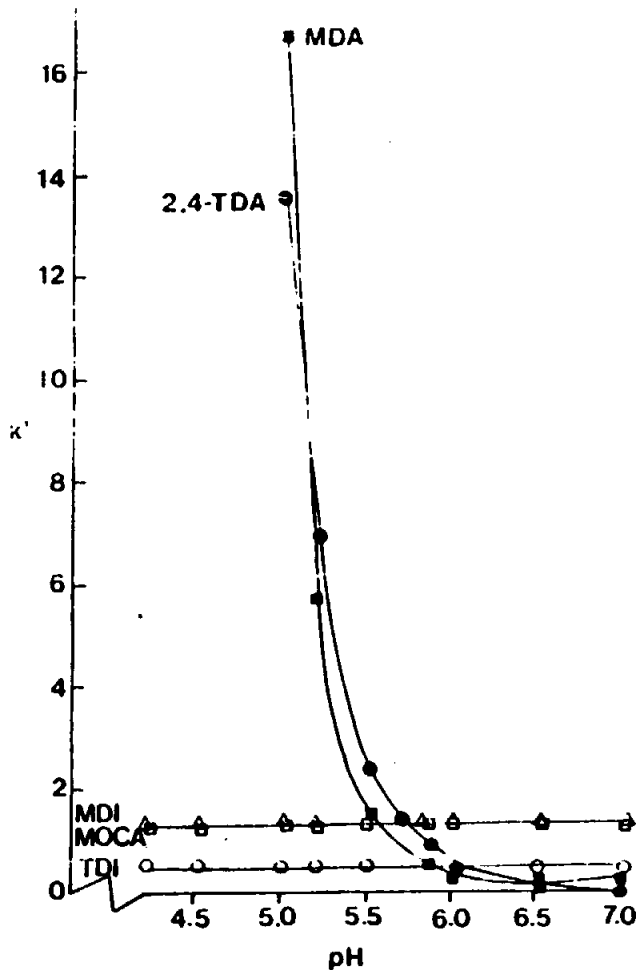


FIGURE 3

Plot of the capacity factor ( $k'$ ) versus pH of the eluent: tetrahydrofuran, acetonitrile and water (3:3:4) buffered with 0.005 M acetate.

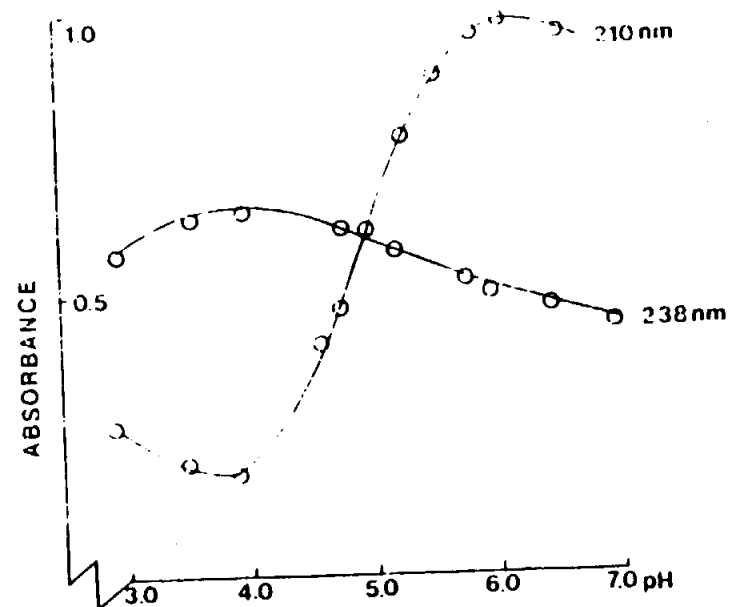


FIGURE 4

The UV absorbance of 2,4-TDA versus pH of the eluent.

A phosphate buffer was also tested for the pH control of the eluent. No significant changes in retention times were obtained in the pH range 4.5-7.0. Below pH 4.5 a slight reduction was found in the retention of both 2,4-TDA and MDA. 2,4-TDA and MDA behaved according to the mechanism of ion suppression proposed for weak bases (8), but for the regulation of the retention times the phosphate buffer was not suitable.

The pH had a clear effect on the intensity of the UV-absorbances of 2,4-TDA and MDA (FIGS 4 and 5), but no effect on the UV absorbances of MOCA, TDI ethyl urethane or MDI ethyl urethane. The UV-absorbances of 2,4-TDA and

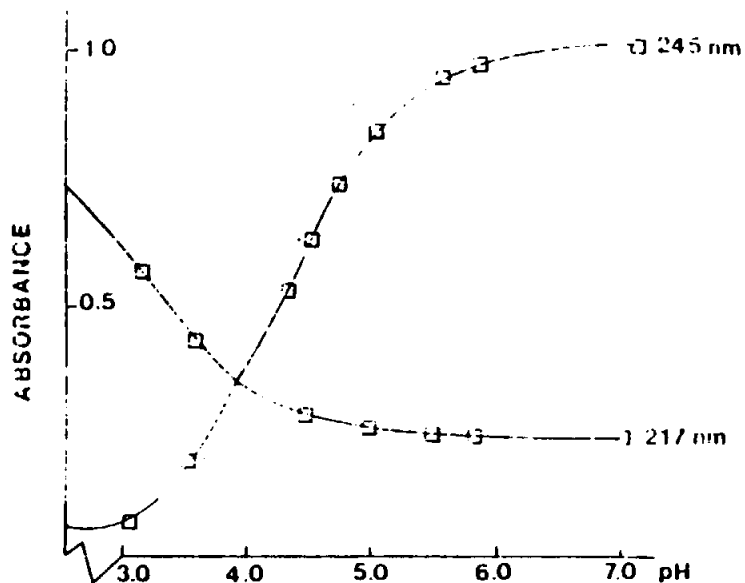


FIGURE 5

The UV absorbance of MDA versus pH of the eluent.

MDA at 245 nm (a wavelength sensitive enough to determine all the present substances) is shown as a function of the pH in FIG. 7. The maximum absorbance for MDA is found between pH 5.5 and 7.0, while the absorbance of 2,4-TDA is 75 % of its maximum in this pH range.

The maximum UV absorbance of 2,4-TDA and TDI ethyl urethanes was found at 210 nm. When greater sensitivity was required the RPLC runs were done near this wavelength. It was possible to use the wavelength 220 nm when THF, acetonitrile and water with acetate buffer was used as the eluent.

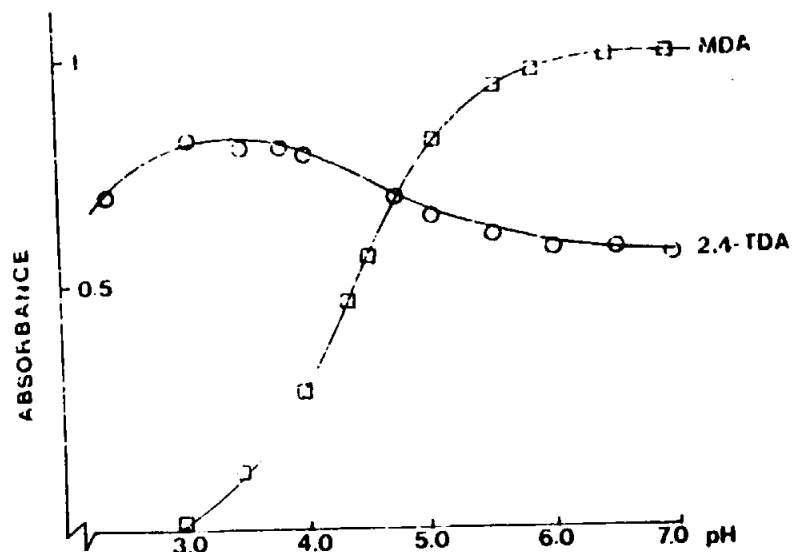


FIGURE 6

The UV absorbances of 2,4-TDA and MDA as function of pH of the eluent at 245 nm.

The use of acetate buffered eluent in the pH range 3.5-7.0 is favored both by the retention behavior and UV-detectability of these aromatic amines. By selecting a suitable pH value in this pH range the elution sequence of the compounds can also be changed (FIG. 7).

#### Detection limits and molar absorption coefficients

The detection limits of the method at 245 nm, are on the order of about  $1 \times 10^{-3} - 5 \times 10^{-3} \mu\text{g}/\text{m}^3$  based on 10 l air samples ( $1 \times 10^{-4} - 10 \times 10^{-4} \text{ ppm}$  at 25°C and 760 mmHg). The exact detection limits of the

TABLE

The Molar Absorption Coefficients of MDI and TDI ethyl urethanes and Amines at pH 6.0 :

the compound:	245 nm	220 nm
MDI-ethyl urethane	$47.1 \times 10^3$	$28.6 \times 10^3$
TA	$16.9 \times 10^3$	-
TDI-ethyl urethane	$26.7 \times 10^3$	$26.7 \times 10^3$
TDA	$5.0 \times 10^3$	$11.0 \times 10^3$
MOCA	$13.9 \times 10^3$	-

amines depend on the pH of the eluent. The molar absorption coefficients are given in the Table.

#### DISCUSSION

The advantage of this method is its versatility. Many of the most hazardous chemicals present in the occupational environment where polyurethanes are manufactured can be determined simultaneously from the same sample. Most of the previously published HPLC methods for isocyanates emphasize the separation of different isocyanates from each other. Seldom, however, are there more than one or two different isocyanates at the same workplace. The aromatic isocyanates are widely used, while aliphatic isocyanates are usually used only for special purposes. The ethyl urethane derivative is highly stable, and standards and samples can be stored for long periods without deterioration. Ethanol is a readily procurable reagent and since it does not absorb in the ultraviolet region it is superior to amine-based reagents.

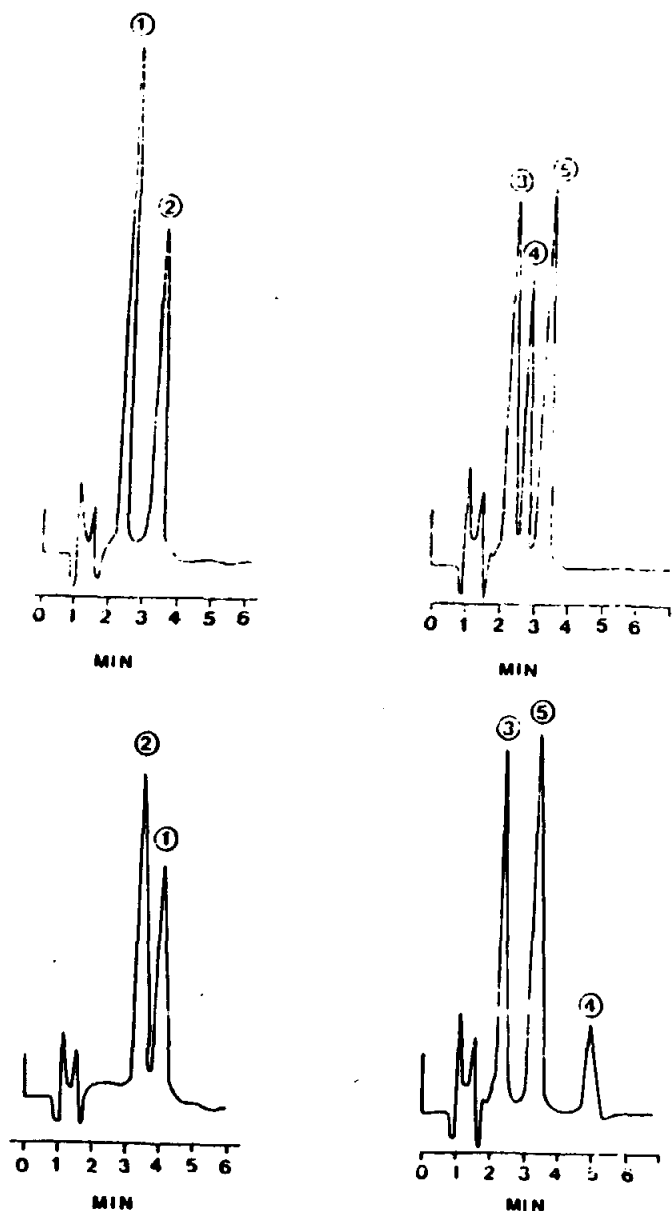


FIGURE 7

The effect of pH of the eluent on the chromatograms of 1. MDA 2. MDI ethyl urethane 3. TDI ethyl urethane 4. TDA and 5. MOCA.

Eluent: Tetrahydrofuran, acetonitrile and water (3:3:4) buffered with 0.005 M acetate to pH 5.85 (A) and pH 5.50 (B).

The addition of KOH as catalyst assures that the reaction takes place so rapidly that disturbing side reactions are avoided.

The acetate buffer was found easy to use for regulating the retention of the amines, though the mechanism of its behavior is not yet fully understood. The unreacted silanol groups in the column can adsorb protonated amino groups, an effect which is minimized by phosphate ion (9). Consistent with this the retention times of 2,4-TDA and MDA showed a pH-dependent increase in acetate buffers below pH 7.0, whereas the retention times in phosphate buffers were practically constant from pH 5.0 up to pH 8.0. However, when a mixture of acetate and phosphate buffer was used, both 2,4-TDA and MDA showed the same pH-dependent increase in retention times as in acetate buffer alone. This finding supports the assumption that the pH-dependent retention behavior of aromatic amines in acetate buffer is explained by the ion pair mechanism.

#### ACKNOWLEDGEMENTS

We thank Ms. Päivi Huovila, M.Sc., Ms. Marja-Leena Dahlberg and Mr. Pentti Laukkanen, M.Sc. for their cooperation.

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120 LONG RIDGE ROAD, P.O. BOX 1355, STAMFORD, CT 06904-1355

WILLIAM J.A. SPARKS  
Counsel  
(203) 356-2347

July 21, 1986

Mr. Basil G. Constantelos, Director  
Waste Management Division  
United States Environmental Protection Agency  
Region V  
230 South Dearborn Street  
Chicago, IL 60604

Dear Mr. Constantelos:

Re: FIELDS BROOK, ASHTABULA COUNTY, OHIO

Enclosed herewith is Olin's Amended Response to IPA's Request for Information dated May 16, 1986, relating to the above-referenced matter.

By this letter, I am also requesting a limited extension of time, specifically until August 20, 1986, to permit Olin to finalize its search for information responsive to the Request, and submit a final certified response.

The request is based on the fact that we recently have received the Fields Brook Feasibility Study, with a present comment date in early August. Olin is giving this task as well as this Response priority, and the same Olin personnel are involved in both tasks. As a result, and for the additional reasons stated in my letter of June 23, 1986, we make this request.

Finally, a substantial amount of additional information is being provided herewith, in Olin's Amended Response. Additional information relating to Requests Nos. 6, 12, 14, 15, 16, 25, 29, 31 and 38 is being provided, as well as additional documents. We continue our good faith effort to comply promptly with EPA requests, both as to comments regarding the Feasibility Study and as to this Request. By seeking this extension, we will not delay EPA review of additional Olin substantive information.

7809e

O L I N C O R P O R A T I O N

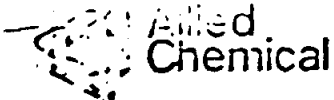
In summary, we ask for this limited extension to finalize our response. In the meantime, we continue to work toward that goal as our top priority. If you or your staff have any questions on any of the foregoing, please don't hesitate to call me at (203) 356-2347.

Sincerely,

*William J. A. Sparks*

William J. A. Sparks  
Counsel

WJAS:has  
Enclosure



Specialty Chemicals Division  
PO Box E  
Martinsburg, West Virginia 26041  
(304) 645-5670

August 21, 1981

Mr. James Poppiti  
US Environmental Protection Agency  
WH 565  
401 M Street S.W.  
Washington, D.C. 20460

Dear Mr. Poppiti:

Regarding our August 13, 1981 phone conversation.

We have enclosed our revised method for TDI residue analysis. After modifying the method as you suggested the method sensitivity is 10 ppm on a consistent basis.

Your assistance in this matter is appreciated.

Should you have any questions, please call me at 304-845-5670.

Very truly yours,

A handwritten signature in cursive script, appearing to read "R. L. Higgins".

R. L. Higgins  
Manager - Safety  
& Environmental

RLH/clp

Attachment

ALLIED CORPORATION

MOUNDSVILLE PLANT

STANDARD ANALYTICAL METHOD NO. 14678-038

1. MATERIAL: TDI Residue
2. NATURE OF TEST: Determination of trace amounts of TDI  
(0 to 125 ppm)
3. PRINCIPLE: The residue is ground to a fine powder, dissolved in monochlorobenzene, and the TDI content determined by gas chromatography.
4. HAZARDS: TDI and solvents (MCB) used in this method are harmful and must be handled with care, using necessary protective equipment and in well ventilated fume hoods.
5. EQUIPMENT:
  - 5.1 Hewlett Packard Model 5840A gas chromatograph with FID.
  - 5.2 The instrument parameters are given on the attached process print-out. Attachment No. 1.
  - 5.3 The injection port of the instrument is fitted with a glass liner.
  - 5.4 The GC column is 6 ft. x 1/8 in. with 10% UCW 982 on 80/100 mesh chromsorb with DMCS treated.
6. COLUMN CONDITIONING:
  - 6.1 Age the column over night at 225°C.
  - 6.2 Reset oven temperature to 160°C and inject 1.0 microliter of pure TDI-80 observing the instrument parameters shown on Attachment No. 1. After the GC scan is completed, replace the used teflon faced septum with a new one.
  - 6.3 Inject 4.0 microliters of dry MCB, using a clean dry syringe, in the same manner. Observe the scan for traces of TDI. If no measurable TDI peak is found, proceed. Otherwise, repeat with a second injection of MCB.

7. PREPARATION OF STANDARDS:

- 7.1 Weigh 4.0 microliters (5mg) of pure TDI-80 in a clean dry syringe into a 100 ml volumetric flask. Touch the side of the flask with the needle tip to remove the last drop of TDI. Reweigh the syringe with plunger withdrawn to the 4.0 graduation and record the weight to nearest 0.1 milligram. Dilute the volumetric flask to the mark with MCB, stopper and mix thoroughly. This solution will contain approximately 50 micrograms per ml.
- 7.2 Accurately pipet 1.0 ml, 2.0 ml, 4.0 ml, 6.0 ml, and 8.0 ml of the above solutions into dry 10 ml volumetric flasks, dilute each to the mark with MCB, stopper and mix. (Standards are stable for 3 days or longer when kept sealed and dry.)
- 7.3 Inject 4.0 microliters of the prepared standards, including the master standard of paragraph 7.1, into the gas chromatograph commencing with the lowest to the highest in that order. See Attachment No. 2 and No. 3.

NOTE: The instrument may be calibrated for external standard (ESTD) after the first standard, so that only the TDI area and amount will be shown on the print-out.

- 7.4 Calculate the exact concentrations for each of the standards and prepare a calibration curve of area versus micrograms per 1.0 ml of MCB. See Attachment No. 4.

8. PREPARATION OF SAMPLE:

- 8.1 Grind a representative sample with mortar and pestil to a fine powder. If necessary, complete the grinding by use of a WIG-L-BUG grinder. CAUTION: Avoid breathing dust by wearing a dust mask while handling this sample.
- 8.2 Weigh a 2.00 gram sample on glycine weighing paper to nearest 0.01 gram. Transfer the sample to a 5 dram glass vial containing a small magnetic stirrer.
- 8.3 Pipet 5.0 ml of MCB into the vial. Place the vial on a magnetic stirrer hot plate and heat while stirring until a liquid reflux is noted. Remove from hot plate and let cool.

8. PREPARATION OF SAMPLE: (cont'd)

- 8.4 Filter the solution through previously dried No. 4 Whatman paper into a second vial.
- 8.5 Inject 4.0 microliters of the sample solution into the chromatograph.
- 8.6 When the scan is complete, record the area of the TDI peak.
- 8.7 If a number of samples are to be determined, periodically run a standard sample equivalent to near sample concentration calibration.

9. CALCULATIONS:

- 9.1 From the calibration curve read the micrograms of TDI per ml and calculate as follows:

$$\text{PPM TDI} = \frac{\text{micrograms TDI/ml}}{\text{sample weight in grams}} \times 5$$

- 9.2 Report results to nearest 1 ppm.

10. SENSITIVITY OF METHOD: 10 ppm

11. METHOD WRITTEN BY: A. D. Kimble

12. APPROVALS: C. W. Tribett

13. DATE: 8/20/81

INSTRUMENT PARAMETERS

TEMP1 300 160 160  
 TIME1 6.00  
 RATE 30.00  
 TEMP2 300 225  
 TIME2 22.00  
 INJ TEMP 400 325 325  
 FID TEMP 400 300 300  
 TCD TEMP 400 200 200

CHT SPD 0.50  
 ZERO 10.0  
 ATTH 2↑ 5  
 FID SGNL A  
 SLP SENS 0.01  
 AREA REJ 0  
 FLOW A 36.0 36.4  
 FLOW B 40.0 39.2

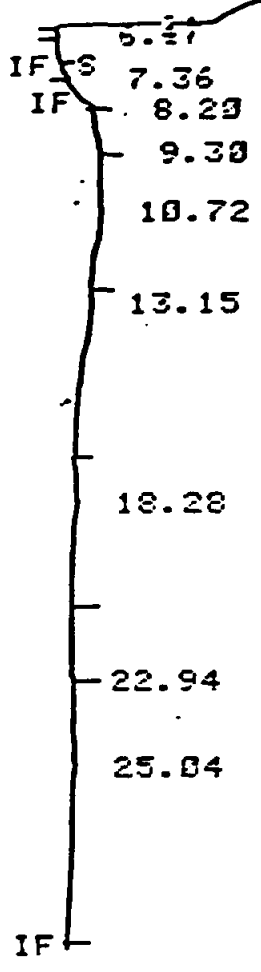
6.00 ATTH 2↑ 0  
 7.00 IFN 0  
 8.00 IFN 2  
 30.00 IFN 0

COLUMN: A, 6ft. XI/8 in. SS  
 10% UCW 982 on 80/100 CW-HP DMCS TREATED

HYDROGEN FUEL at 20 PSI

AIR at 20 PSI

INJECTION PORT: Pyrex glass liner, 6 in.  
 X 1/4 in. OD & 4mm ID, Silanized glass  
 wool plug located 2 in. from base.



SUB # 67  
STD

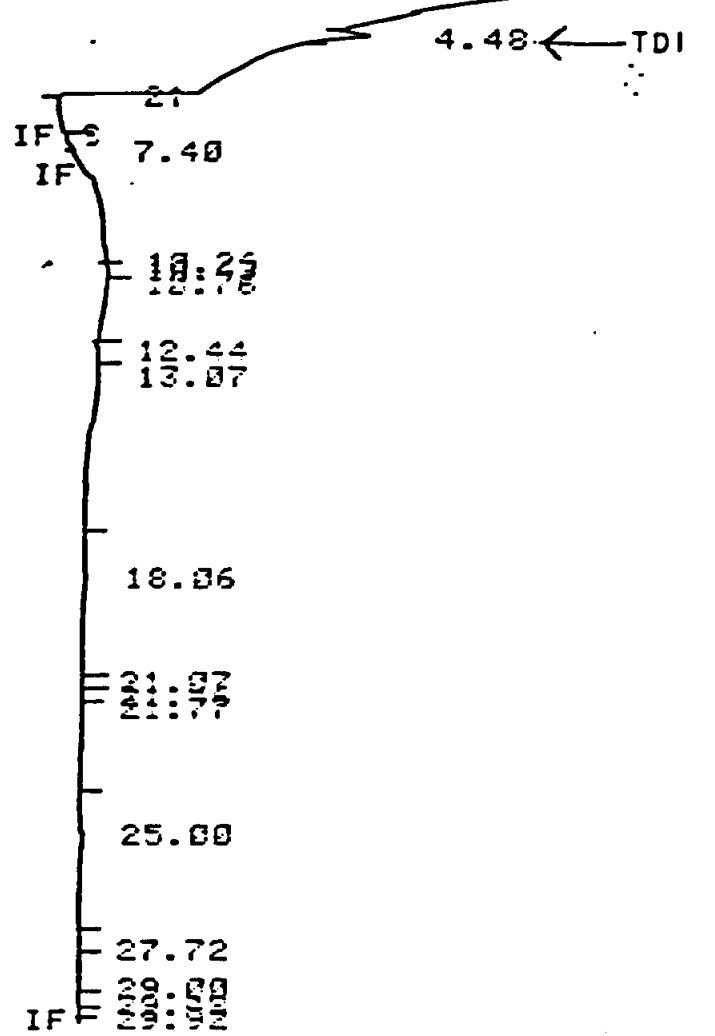
AUG/20/81

TIME 12:37:39

RT	EXP RT	AREA	CAL #	AMT
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IL FACTOR: 1.0000 E+ 0

TART 3.15 3.3 micrograms TDI/mL XCS 0.64  
1.32



HP RUN # 63                      AUG/19/81                      TIME 15:39:27  
ID:1  
ESTD

RT	EXP RT	AREA	CAL #	AMT
4.48	4.48	1370	(R) 1	2.375

DIL FACTOR: 1.0000 E+ 0

CALIBRATION CURVE

FOR

TDI IN MONOCHLOROBENZENE

35

30

25

20

15

10

5

AREA X 10<sup>-3</sup>

MICROGRAMS OF TDI PER ML

5

10

15

20

25

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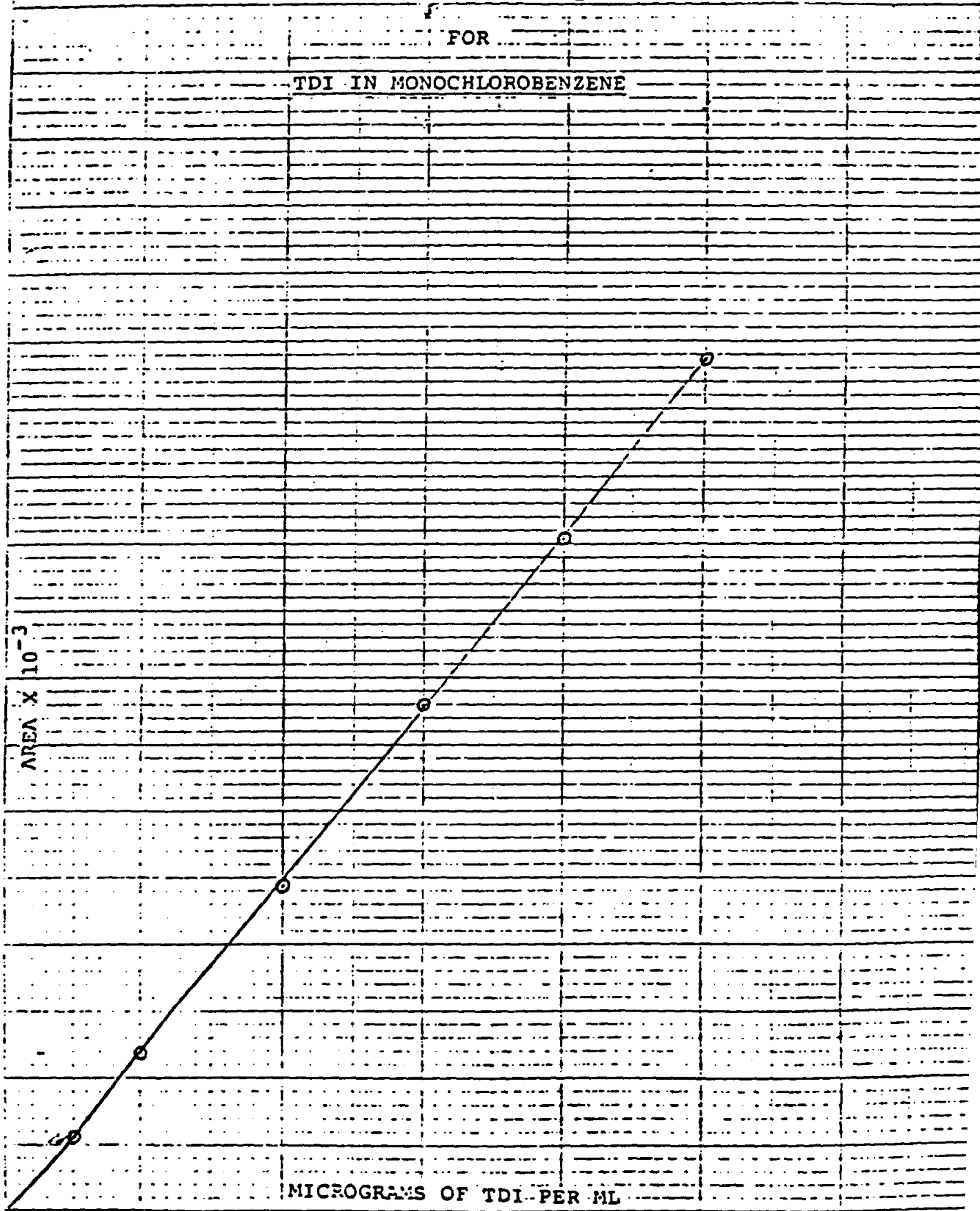
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A.D.K

8/13/



III. REQUEST FOR INFORMATION

1. Please provide the date, State of incorporation, Registered Agent and his address for Olin Chemicals Corp., (hereinafter referred to as OCC).
2. Provide the addresses of all facilities that have ever been owned or operated by OCC in the Fields Brook water basin area in Ashtabula County, Ohio. If any of the facilities that have been operated by OCC were not at all times of operation owned by OCC, provide the name(s) of the other owner(s) of the facility and a description of each property's location.
3. If any of the property owned by OCC in the Fields Brook water basin has been sold, leased or interests in said property otherwise conveyed by OCC to a third party or by a third party to OCC, state that third party's name and the dates of any conveyance or sale.
4. Provide a legal description of any Olin Chemicals Corporation facility or property located in the Fields Brook Water basin in Ashtabula County, Ohio.
5. Provide copies of any and all documents pertaining to the use and ownership of any Olin Chemicals Corporation facility or property in the Fields Brook water basin in Ashtabula County, Ohio, including, but not limited to, deeds, contracts, leases, subleases, purchase agreements and related correspondence.

6. Provide a list of all present and former plant managers, production managers and plant engineers at any of the above-described facilities. Please state the dates of their employment with OCC, positions held and last known address. Also, please indicate the numbered Requests regarding which they may have information.

7. Provide the names of any predecessor or successor corporations or partnerships which owned or operated any OCC facility, as described above, in Ashtabula County, Ohio.

8. On what date did OCC commence operations of its Middle Road facility at or near Ashtabula, Ohio?

9. Provide all information you may have regarding contamination from your plant(s) entering Fields Brook, or a tributary thereto, either directly or indirectly.

10. Provide all knowledge or information you may have regarding any property owned by you in Ashtabula County, Ohio, which may have been contaminated by prior owners or users. Your response should include, but not necessarily be limited to:

- a. Names of prior owners or users.
- b. Use of facility and property by prior owners or users.
- c. Disposal practices of prior owners or users.
- d. Volume and nature of sources of such contamination.

11. Provide all information you may have regarding any other sources of contamination of Fields Brook.

12. Provide the following information regarding any sewer lines (including storm, sanitary or combined sewers) or french drains which receive or have received runoff or discharges from the property located near Middle Road in Ashtabula, Ohio:

- a) The location and nature of each sewer line.
- b) Whether each sewer line is connected to the main trunk line.
- c) Does any sewer line have direct or indirect access to Fields Brook or a tributary thereto?

13. Provide the following information regarding any drainage ditches which receive or have received runoff or discharges from the property located near Middle Road in Ashtabula, Ohio:

- a) The location of each drainage ditch.
- b) Whether runoff or discharge from each drainage ditch has direct or indirect access to Fields Brook or a tributary thereto.
- c) Any information regarding the presence, or potential for releases, of hazardous substances or constituents in the ditches.

14. Does your company have, or did your company ever have, an NPDES permit for discharges to Fields Brook or a tributary thereto? Please identify any such permit.

15. Describe each manufacturing process that OCC has operated at any of its Ashtabula County, Ohio, facilities, including the facility on Middle Road. For each facility and process provide the years that the operations occurred and all the raw materials associated with or relating to the process.

16. Describe any hazardous substances that may have been contained in any by-products or wastes from each of the manufacturing processes described in Request 15. Also describe the amounts of wastes, by-products or hazardous substances generated by each of such processes on a yearly basis.

17. Describe the storage, treatment and disposal practices for any by-products or wastes associated with each of the manufacturing processes described in response to Request 15. This description should identify any use of drums, tanks, lagoons, ponds, waste piles, ditches, marshes, swamps, land treatment or disposal areas, public sewers, landfills, creeks, or waterways used or affected by such practices.

18. Describe the nature and state of any records and recordkeeping practices that have ever been maintained relating to any storage, treatment or disposal practices for any by-products or wastes associated with each manufacturing process described in response to Request 15.

19. Describe each chemical reclamation process that OCC has operated at its Ashtabula County, Ohio, facilities. For each facility and process state the years during which operation of the process occurred, the type of process equipment used, the types of chemicals associated with each reclamation process, the volume processed annually by each process, and the sources of the chemicals.

20. Describe the nature and state of any records and recordkeeping practices that have ever been maintained relating to the volume and kinds of chemicals received and processed as described in response to Request 19.

21. Describe the characteristics and the nature of wastes or by-products associated with each reclamation process. Such description should include any characteristics or listing that such waste would likely have under 40 CFR Part 261. The description should also include any hazardous substances the waste would likely contain.

22. Describe the nature and state of any records and recordkeeping practices that have ever been maintained relating to the characteristics and nature of the wastes or by-products described in response to Request 21.

23. Describe the practices and conditions relating to the storage of hazardous wastes or hazardous substances upon their arrival at each of OCC's Ashtabula County, Ohio facilities until the time of their reclamation. Such a description should include, along with any dates when any significant changes occurred:

- a. What types of wastes were/are stored in drums.
- b. What types of wastes were/are stored in tanks.
- c. What type of containment system for spills or releases was provided at the storage areas.
- d. The location of any storage areas.
- e. Whether drums have been marked with the generator's

or transporter's name.

- f. Whether hazardous wastes from more than one source were ever mixed or commingled in a tank. How common was this practice? Did this include emptying drums into tanks?
- g. What was the practice regarding the cleanup of spilled materials from these stored hazardous wastes?
- h. Did spills or releases (including those caused by fire) of these materials ever occur while they were awaiting processing?
- i. Whether such wastes were ever stored in lagoons or ponds.
- j. What types of such wastes were stored in lagoons or ponds?
- k. What types of liners or any other impervious barriers did lagoons or ponds have to prevent the release of materials?
- l. What types of wastes, if any, were ever stored in waste piles?
- m. What records and recordkeeping practices have ever been maintained on storage, and what is the state of those records?

24. Describe OCC's practices relating to the disposal and treatment of still bottoms, sludges and other non-reclaimed materials accumulated in any reclamation process itself. Please include in such a description, along with the dates for different practices:

- a. Whether the non-reclaimed materials were drummed up for disposal.
- b. If such non-reclaimed materials were drummed up, whether they were normally [or necessarily] put back in the drums of the seller from whom they originated.
- c. Whether the non-reclaimed material was allowed to accumulate and was stored prior to treatment or disposal.
- d. The locations and types of storage areas used for storage of the non-reclaimed materials.

Examples of types of storage areas could include drums, tanks, pits, waste piles, ponds or lagoons.

- e. Any containment system utilized at these storage areas to help prevent releases of these stored materials.
- f. Whether any spills or releases of these stored materials ever occurred. Appromixately when?
- g. Where and how such materials were disposed.
- h. What records and recordkeeping practices have ever been maintained in regard to the above practices. What is the state of those records?

25. Describe practices relating to any incineration process used for disposal of wastes or materials from each of OCC's Ashtabula County, Ohio, facilities. This description should include:

- a. The location and years during which each incinerator operated.
- b. The rated capacity for each incinerator.
- c. The normal operating and peak temperature for each incinerator.
- d. The rated retention time for material during the burn.
- e. The type of fuel used to bring the incinerator up to operating capacity.
- f. How the material was fed to the incinerator.
- g. What types of operating records were kept, including temperature and feed rate.
- h. The types of air pollution control devices that were installed on each incinerator and stack test results.
- i. Whether any misting or raining from the incinerator stacks ever occurred.
- j. What quantities of incinerator ashes or sludges were generated from the incineration processes.
- k. What types of materials and volumes were burned in these incinerators.

- l. Were PCBs known to have been burned in these incinerators.
  - m. Did the materials that were burned include non-reclaimable materials from stills.
  - n. Were materials from stills accumulated and stored prior to incineration.
  - o. Did the materials sent to OCC include materials sent there solely for purposes of incineration.
  - p. Were materials sent to OCC for incineration on occasion otherwise disposed. How and why?
  - q. How and where were by-products of the incineration process (including ash bottoms, fly ash, sludges and scrubber water) disposed.
  - r. Any records and recordkeeping practices that have ever been maintained relating to the described practices. What is the state of those records?
26. Has OCC disposed or arranged for the disposal of any materials in the Reserve Environmental Services, Inc. disposal facility located in Ashtabula County, Ohio? If so, please state:
- a. When the disposal occurred.
  - b. The nature of the solid wastes.
  - c. The nature of the liquid wastes.
  - d. Whether the wastes contained hazardous substances.
  - e. The amount of wastes involved.
  - f. If known, where at the Reserve disposal facility the wastes were disposed.
  - g. Describe all terms of any arrangement for the disposal of these materials.
  - h. What records, if any, have ever been maintained documenting such disposal and arrangements for disposal.
27. Has OCC ever observed any leachate escaping or being released

from any disposal area on property owned or operated by OCC in Ashtabula County, Ohio? If so, describe the location, and physical characteristics of the leachate such as color, odor or viscousness. When and by whom has this been observed?

28. Do you have any information indicating that leachate from any of the disposal areas on property owned or operated by OCC may have escaped or been released into surrounding ditches, Fields Brook, or a tributary thereto? If so, please state it, and include when such occurrences took place and who observed them.

29. Have soil samples been collected and analyzed or monitoring wells ever been installed in or adjacent to the OCC Middle Road plant to monitor for release of pollutants or hazardous waste constituents? If so, please provide any data you have from such monitoring activities.

30. Describe any location on OCC property located in the Fields Brook water basin at which waste from OCC operations have been disposed. Please state the approximate time of disposal, the types of materials, their chemical characteristics and volumes involved. Also, provide any information you have regarding sample analyses that have been conducted of materials in or adjacent to any other location on the OCC property at which wastes from OCC operations have been disposed.

31. Describe the location and size of each lagoon, pond, waste pile, trench or pit that has existed on the OCC Middle Road property and its purpose. For each lagoon, pond, waste pile,

trench or pit describe:

- a. Any hazardous substances that may be or have been contained in them.
- b. The dates of each structure's existence and use.
- c. Any construction properties of each pit, pond, waste pile, trench or lagoon which would help prevent the release of materials.
- d. If not in use now, explain how it was closed or has been modified and the present use of the area.
- e. Any pictures, sketches or maps of these facilities.

32. Provide any information that you have concerning the disposal of hazardous substances from OCC operations at Reserve Environmental Services, Inc., including:

- a) description of the method of operations at the site (e.g. how drums were rinsed, materials used in drum cleaning, methods of disposal of waste residues from drums, disposal of rinse water, etc.)
- b) the disposal locations used by Reserve Environmental Services, Inc. for residues, rinse water and solid wastes generated by their operations. This description should include locations both on and off their properties.
- c) the disposal locations for any drums discarded by the company.
- d) the estimated quantity of drums and waste residue disposed of at each location by the company.
- e) whether the company received drums for cleaning from parties other than OCC.

33. Provide the name of each customer from whom OCC has received hazardous substances for purposes of treatment or disposal, including incineration or reclamation. Further, provide any information

you have on the kinds of wastes received, the quantity of each kind of waste received, the processes used by OCC in handling these wastes, the period during which each kind of waste was received and processed, and the likely disposition of any residues from that process.

34. Provide copies of any documents that you now have that contain information indicating the receipt of hazardous wastes for reclamation, incineration, or other treatment by OCC. Such documents would include logs, invoices, bills of lading, purchase orders, work orders, trucking records, correspondence, contracts or other agreements.

35. Provide the names of all other off-site facilities that have been used by OCC for the disposal of unreclaimed chemical wastes and hazardous wastes, incineration process wastes and manufacturing process wastes. Provide the dates during which such disposal has occurred and the kinds of wastes sent to each facility.

36. Describe any information OCC may have obtained regarding contaminated fill material or debris deposited in or near Fields Brook or its tributaries. Such should include any information regarding fill allegedly disposed by Brenkus Excavating at or near the residence of [REDACTED] [REDACTED]

37. A list and description of all liability insurance coverage

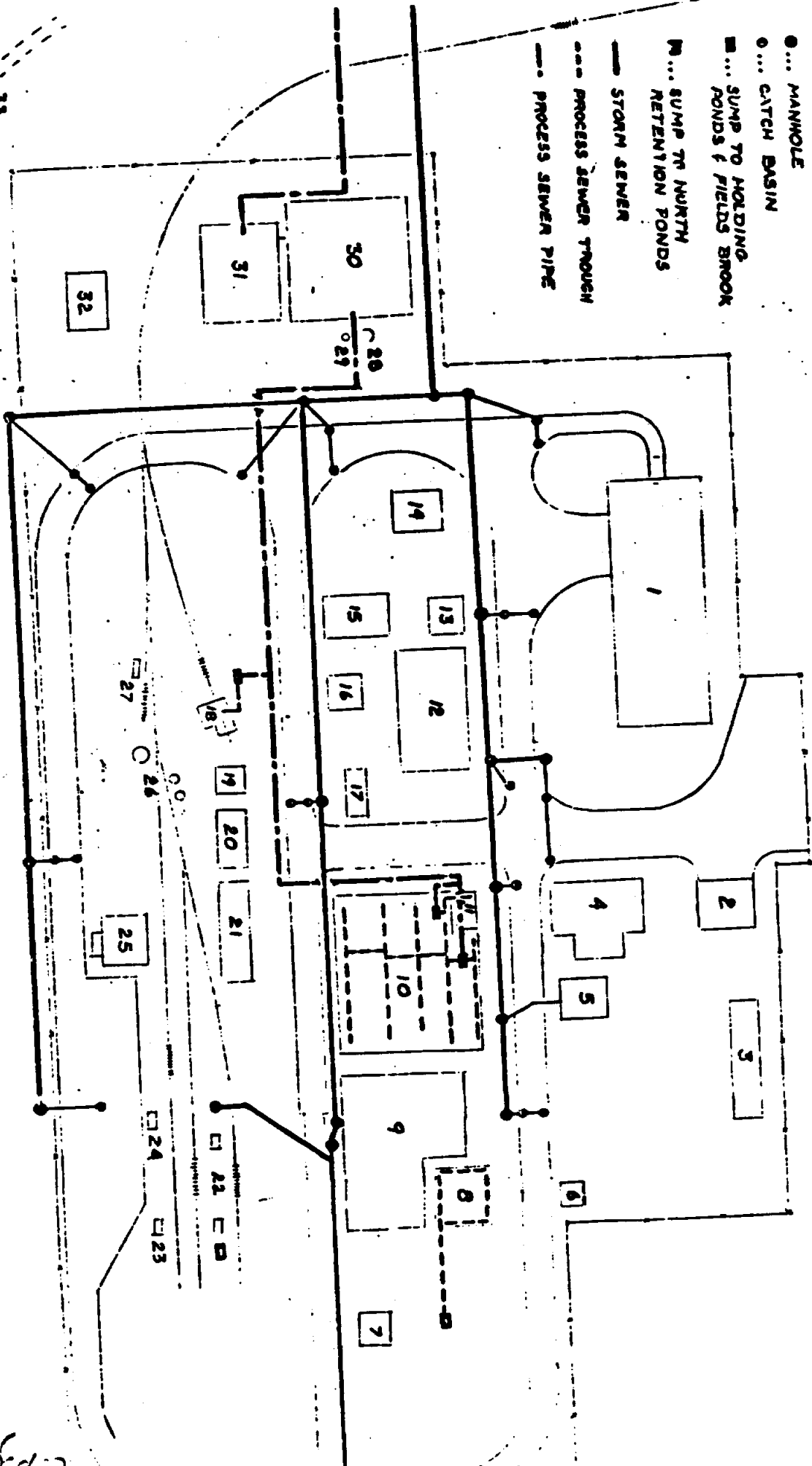
that is or was carried by you or any predecessor or successor corporations or partnerships, including any self-insurance provisions, that relates to hazardous substances and/or the above referenced sites. Provide copies of all of these insurance policies.

38) Provide any information you have regarding the waste disposal methods utilized by surrounding property owners or users.

**ASHTABULA TDI PLANT  
STORM SEWER & PROCESS SEWER**

**LEGEND**

- ... MANHOLE
- ... CATCH BASIN
- ... SUMP TO HOLDING PONDS & FIELDS BROOK
- ▣ ... SUMP TO NORTH RETENTION PONDS
- STORM SEWER
- PROCESS SEWER TROUGH
- PROCESS SEWER PIPE



<u>No.</u>	<u>Description</u>
1.	Warehouse and Maintenance Offices
2.	Garage
3.	Warehouse and Engineering Offices
4.	Control Room, Motor Control Center & Production Offices
5.	Water Treatment Building
6.	Dowtherm Vaporizer
7.	Monochlorobenzene Storage (For Make-up)
8.	Toluene Diamine Purification Column
9.	Toluene Diamine & Toluene Diisocyanate Storage
10.	TDI Production & Purification Plant
11.	Recycle Monochlorobenzene Storage
12.	Phosgene Production & Purification Plant
13.	Phosgene Plant Caustic Scrubber
14.	Cooling Tower
15.	Phosgene Storage Tanks
16.	DeIonized Water Building
17.	Monoethanolamine Plant
18.	CO Generation Building
19.	$^{20}\text{Be}$ Muriatic Acid Production
20.	Blowdown Storage Tanks
21.	TDI Plant Caustic Scrubber & Caustic Storage & Caustic Unloading
22.	Chlorine Unloading Area
23.	Toluene Diamine & Monochlorobenzene Unloading Area
24.	Toluene Diisocyanate Loading Area
25.	Drum Loading Building
26.	Muriatic Acid Storage Tanks
27.	Muriatic Acid Loading Area
28.	Spent Caustic Hold Tank
29.	Neutralization Tank
30.	West Pond
31.	East Retention Pond
32.	Residue Shed
33.	Fields Brook



Some of the requests seek information which has previously been submitted to EPA and/or Ohio EPA. In order to avoid the unnecessary burden of submitting documents which EPA already has and thereby complicating the task of document review and maintenance, Olin is describing some documents but not producing them herewith. If EPA no longer has these documents, Olin will provide the agency with copies of such documents or an opportunity to copy them at EPA's request.

In addition to the specific objections supra, Olin also objects to certain of the instructions. Olin objects to the instruction requiring it to provide estimates and its method of estimation where specific responsive information is not available or accessible. Olin further objects to instructions requiring it to respond based on information in possession or control of third persons, including retained counsel. In addition, Olin specifically objects to the instructions to the extent that they seek the disclosure of communications protected by the attorney-client privilege. Olin also objects to the instructions calling for continuing or correcting responses based on information acquired after the submission of its response. By letter of even date herewith, Olin is seeking a limited extension of time to complete its search for relevant information, and finalize its response.

RESPONSES TO REQUESTS FOR INFORMATION

1. Please provide the date, State of incorporation, Registered Agent and his address for Olin Chemicals Corp., (hereinafter referred to as OCC).

Olin Corporation was incorporated in the Commonwealth of Virginia in 1892, and its registered agent is CT Corporation, 1633 Broadway, New York, NY 10019.

2. Provide the addresses of all facilities that have ever been owned or operated by OCC in the Fields Brook water basin area in Ashtabula County, Ohio. If any of the facilities that have been operated by OCC were not at all times of operation owned by OCC, provide the name(s) of the other owner(s) of the facility and a description of each property's location.

Olin Corporation operated a chemical facility at Middle Road, Ashtabula Township, Ashtabula, OH 44004. Initially, Olin and General Tire and Rubber Company were the co-operators of the facility. The owner of the property was General Tire and Rubber Company (Gen Corp.), One General Street, Akron, OH 44329. Answer to Request No. 4 provides a description of the property leased by Olin Corporation from General Tire and Rubber Company.

3. If any of the property owned by OCC in the Fields Brook water basin has been sold, leased or interests in said property otherwise conveyed by OCC to a third party to OCC, state the third party's name and the date of any conveyance or sale.

Not Applicable

4. Provide a legal description of any Olin Chemicals Corporation facility or property located in the Fields Brook Water basin in Ashtabula County, Ohio.

Being known as part of Lot 6, Erie Tract in the Township of Ashtabula, County of Ashtabula, State of Ohio and being more generally described as follows:

Beginning at a point in a chain link fence known as station 752.258. - 450.0E., General Tire survey as shown on a drawing titled Map of Lands - North Side Middle Road, revised November, 1963; thence running N. 0° 08' 30" E. along said fence about 120' Ft. to a fence post; thence running S. 89° 51' 30" E. along said fence about 140' Ft. to a fence post; thence running N. 0° 08' 30" E. along said fence about 205' Ft. to a fence post; thence running S. 89° 51' 30" E. along said fence about 305' Ft. to a point in the Westerly line of land now owned by the Cleveland Electric Ill. Co.; thence running S. 18° 19' 20" E. along said westerly line the Cleveland Electric Ill. Co., about 566' Ft. to a stone mon.; thence running S. 0° 09' E. along said westerly

line of the Cleveland Electric Ill. Col, 436.2' Ft. to a stone monument in a northerly line of land now owned by Cabot Titania Corp.; thence running S. 87° 21' W. along said northerly line of Cabot Titania Corp. 354.5' Ft. to a stone monument; thence running S. 0° 22' 45" W. along the westerly line of said Cabot Titania Corp. about 185' Ft. to the Southerly low bank of a small stream known as Fields Brook; thence running westerly along said southerly low bank of Fields Brook 410' Ft. to the easterly said of a bridge crossing over said Fields Brook; thence running northerly along said easterly line of said bridge and the easterly pavement edge of an existing 24' Ft. asphalt pavement roadway as shown on about indicated drawing about 810' Ft. to a chain link fence near the northwest corner of a metal guard bldg.; thence running easterly along said fence about 16' Ft. to a fence post; thence running N. 0° 08' 30" E. along said fence about 120' Ft. to a fence post; thence running S. 89° 51' 30" E. along said fence about 14' Ft. to a fence post; thence running N. 0° 08' 30" E. along said fence about 100' Ft. to the place of beginning, shown on Exhibit "A" attached hereto and made a part hereof, as Item No. 13, and colored in pink.

5. Provide copies of any and all documents pertaining to the use and ownership of any Olin Chemicals Corporation facility or property in the Fields Brook water basin in Ashtabula County, Ohio, including, but not limited to, deeds, contracts, leases, subleases, purchase agreements and related correspondence.

Olin objects to this question which relates to matters outside of the scope at 42 U.S.C. Section 6927 and 9604 and which is overly broad and unreasonably burdensome. Notwithstanding this objection, and without waiving it herewith, copies of principal documents pertaining to the ownership of the Ashtabula facility are attached.

6. Provide a list of all present and former plant managers, production managers and plant engineers at any of the above-described facilities. Please state the dates of their employment with OCC, position held and last known address. Also, please indicate the numbered Requests regarding which they may have information.

Plant Managers

<u>Name</u>	<u>Approximate Dates</u>	<u>Last Known Address</u>
Joseph H. Bianco	10/1/63 - 10/31/64	Deceased
George P. Palmer	11/64 - 11/66	17415 Comstock Circle Houston, TX 77090
Richard W. Papenfuss	11/1/66 - 8/1/69	44 Wolf Pit Rd. Apt. 98 Wilton, CT 06897
Steven Cupach	2/70 - 12/71	1207 Eldorado Blvd. Houston, TX 77062
George Latta Acting Manager Manager	9/1/72 10/1/73 - 9/1/74	Olin Corporation Olin Road McIntosh, AL 36553
Larry D. Hinson	11/1/74 - 10/8/76	P.O. Box 58113 Houston, TX 77058
James Langford	10/76 - 6/78	Unknown
William McGlasson	3/78 - 11/81	Olin Corporation Olin Road McIntosh, AL 36553

<u>Name</u>	<u>Approximate Dates</u>	<u>Last Known Address</u>
Curt Richards Acting Plant Mgr.	7/80 - 12/82	Olin Corporation I-10 West Lake Charles, LA 70602
Bruce Jacobsen Acting Plant Mgr.	10/81 - 12/82	N. Kingsville Ohio Office 6551 S. Main N. Kingsville, OH 44068

Production Managers

Neal Haineline	1968 - 1970	No Record in Personnel
Dorsey Ayers	1970 - 1972	No Record in Personnel
Steven Cupach	1/66 - 2/70	1207 Eldorado Blvd. Houston, TX 77062
Arnold L. Matson	10/1/74 - 10/81	Olin Corporation 95 Mac Corkle Ave. S. Charleston, WV 25383

Plant Engineers

<u>Name</u>	<u>Approximate Dates</u>	<u>Last Known Address</u>
George Latta	1/1/64 - 9/1/70	Olin Corporation Olin Road McIntosh, AL 36553
Richard A. Brendler	6/70 - 11/81	Olin Corporation 95 Mac Corkle Ave. S. Charleston, WV 25383
Jim Tindall	6/20/77 - 5/1/81	Olin Corporation Lower River Road Charleston, TN 37310
Gary Wright	1/79 - 11/81	Olin Corporation 95 Mac Corkle Avenue S. Charleston, WV 25383.
Cary Franklin	3/1/79 - 7/6/79	Olin Corporation I-10 West Lake Charles, LA 70602

7. Provide the names of any predecessor or successor corporations or partnerships which owned or operated any OCC facility, as described above, in Ashtabula County, Ohio.

None

8. On what date did OCC commence operations of its Middle Road facility at or near Ashtabula, Ohio?

The exact date when Olin Corporation commenced operation of its Middle Road facility is currently unknown but is believed to have occurred sometime in late 1963 or early 1964.

9. Provide all information you may have regarding contamination from your plant(s) entering Fields Brook, or a tributary thereto, either directly or indirectly.

Virtually all contamination entering Fields Brook from Olin's plant were permitted discharges from the plant's wastewater collection and treatment system. Information describing these discharges during the plant's operation was routinely filed with and obtained by EPA, Ohio EPA and their respective predecessor agencies. This information is set forth in numerous permits, permit applications, self-monitoring reports and compliance inspection reports. Because this information should be contained in EPA's own files, Olin is preparing and will submit a general

list of these documents. Upon request Olin will provide copies of any documents that EPA does not have or have access to or will provide EPA with an opportunity to copy such documents.

In addition, Olin will review its relevant files and provide EPA with a copy of documents which describe any non-routine discharges, including spills entering Fields Brook, which are not identified in the listed documents.

Olin objects specifically to the request to the extent that it requires additional information and documents pertaining to routine wastewater discharges because of the difficulty in locating and producing all such information.

Between December, 1978 and September, 1983 Olin conducted a groundwater monitoring program at the plant site. Sampling data through 12/14/82 and estimates of the potential for contaminants to enter Fields Brook via groundwater were reported previously to USEPA Region V in the July 13, 1983 report to Mrs. Elizabeth Utley. Data from samples subsequently taken on 7/26/83 and 9/14/83 are attached. The 1983 sample results show a continued low level of groundwater contamination and confirm that groundwater migration from Olin's former plant site has no significant environmental impact on Fields Brook.

10. Provide all knowledge or information you may have regarding any property owned by you in Ashtabula County, Ohio, which may have been contaminated by prior owners or users. Your response should include, but not necessarily be limited to:

- a. Names of prior owners or users.
- b. Use of facility and property by prior owners or users.
- c. Disposal practices of prior owners or users.
- d. Volume and nature of sources of such contamination.

Not applicable as Olin did not own any such property. Olin has not located any information regarding contamination of its former plant site by others.

11. Provide all information you may have regarding any other sources of contamination of Fields Brook.

Olin objects to this question as being overly broad, unreasonably burdensome and calling for speculation on Olin's part. See also answer to No. 36.

12. Provide the following information regarding any sewer lines (including storm, sanitary or combined sewers) or french drains which receive or have received runoff or discharges from the property located near Middle Road in Ashtabula, Ohio:

- a) The location and nature of each sewer line.
- b) Whether each sewer line is connected to the main trunk line.
- c) Does any sewer line have direct or indirect access to Fields Brook or a tributary thereto?

The plant had internal process wastewater, stormwater and sanitary sewer systems. All these systems discharged initially through two permitted outfalls and later through a combined single permitted outfall to Fields Brook.

13. Provide the following information regarding any drainage ditches which receive or have received runoff or discharges from the property located near Middle Road in Ashtabula, Ohio:

- a) The location of each drainage ditch.
- b) Whether the runoff or discharge from each drainage ditch has direct or indirect access to Fields Brook or a tributary thereto.
- c) Any information regarding the presence, or potential for releases, of hazardous substances or constituents in the ditches.

See response to No. 12

During plant demolition and closure a filled in drainage ditch was discovered along the eastern edge of the plant area. We have

not been able to determine what the function of this ditch was or whether runoff from the ditch formerly entered Fields Brook. Contaminated sediments in this ditch were removed as part of plant closure.

14. Does your company have, or did your company ever have, an NPDES permit for discharges to Fields Brook or a tributary thereto? Please identify any such permit.

Olin Corporation had an NPDES Permit. The numbers are Ohio EPA F314; USEPA OH 0001376 initially issued 4/8/74. The plant also had an Ohio Department of Health industrial discharge permit initially issued 7/16/64.

15. Describe each manufacturing process that OCC has operated at any of its Ashtabula County, Ohio, facilities, including the facility on Middle Road. For each facility and process provide the years that the operations occurred and all the raw materials associated with or relating to the process.

From 1964 until 1981 Olin operated a toluene diisocyanate manufacturing plant which produced hydrochloric acid and orthotoluene diamine as coproducts. Raw materials used were coke, oxygen, chlorine, carbon monoxide, carbon dioxide and toluene diamine. Monochlorobenzene was used as a solvent in the process.

16. Describe any hazardous substances that may have been contained in any by-products or wastes from each of the manufacturing processes described in Request 15. Also describe the amounts of wastes, by-products or hazardous substances generated by each of such processes on a yearly basis.

The major by-products from the process are hydrochloric acid and orthotoluene diamine. The major waste is TDI residue. These materials are hazardous substances.

A further response is being prepared.

17. Describe the storage, treatment and disposal practices for any by-products or wastes associated with each of the manufacturing processes described in response to Request 15. This description should identify any use of drums, tanks, lagoons, ponds, waste piles, ditches, marshes, swamps, land treatment or disposal areas, public sewers, landfills, creeks, or waterways used or affected by such practices.

A response is being prepared.

18. Describe the nature and state of any records and recordkeeping practices that have ever been maintained relating to any storage, treatment or disposal practices for any by-products or wastes associated with each manufacturing process described in response to Request 15.

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The following records are known to have been maintained.

- (1) Accounting and shipping records on the sale of by-products and disposal of waste;
- (2) RCRA inspection reports and manifests;
- (3) Miscellaneous memos and reports.

Shipping records were initially maintained at the Ashtabula plant; copies of some shipping records were initially maintained at Olin's headquarters in Stamford, CT. Accounting records were initially maintained at the Ashtabula plant and at Olin's headquarters. Most accounting and shipping records have been destroyed pursuant to routine corporate record retention practices. The remaining documents are now located at corporate headquarters or its nearby record retention facility.

Documents in categories (2) and (3) were initially maintained at the Ashtabula plant; copies of some such records were initially maintained in Stamford, CT. Some of these documents have been destroyed pursuant to routine corporate record retention practices. The remaining documents are now located at corporate headquarters or in its record retention facility.

19. Describe each chemical reclamation process that OCC has operated at its Ashtabula County, Ohio facilities. For each facility and process state the years during which operation of the process occurred, the type of process equipment used, the types of chemicals associated with each reclamation process, the volume processed annually by each process, and the sources of the chemicals.

No reclamation of chemicals from outside sources occurred at the plant site. By design, the manufacturing process included recycling of various chemical streams.

20. Describe the nature and state of any records and recordkeeping practices that have ever been maintained relating to the volume and kinds of chemicals received and processed as described in response to Request 19.

Not applicable.

21. Describe the characteristics and the nature of wastes or by-products associated with each reclamation process. Such description should include any characteristics or listing that such waste would likely have under 40 CFR Part 261. The description should also include any hazardous substances the waste would likely contain.

Not applicable.

22. Describe the nature and state of any records and recordkeeping practices that have ever been maintained relating to the characteristics and nature of the wastes or by-products described in response to Request 21.

Not applicable.

23. Describe the practices and conditions relating to the storage of hazardous wastes or hazardous substances upon their arrival at each of OCC's Ashtabula County, Ohio facilities until the time of their reclamation. Such a description should include, along with any dates when any significant changes occurred:

- a. What types of wastes were/are stored in drum.
- b. What types of wastes were/are stored in tanks.
- c. What type of containment system for spills or releases was provided at the storage areas.
- d. The location of any storage areas.
- e. Whether drums have been marked with generator's or transporter's name.
- f. Whether hazardous wastes from more than one source were ever mixed or commingled in a tank. How common was this practice? Did this include emptying drums into tanks?
- g. What was the practice regarding the cleanup of spilled materials from these stored hazardous wastes?

- h. Did spills or releases (including those caused by fire) of these materials ever occur while they were awaiting processing?
- i. Whether such wastes were ever stored in lagoons or ponds.
- j. What types of such wastes were stored in lagoons or ponds?
- k. What types of liners or any other impervious barriers did lagoons or ponds have to prevent the release of materials?
- l. What types of wastes, if any, were ever stored in waste piles?
- m. What records and recordkeeping practices have ever been maintained on storage, and what is the state of those records.

Not applicable.

24. Describe OCC's practices relating to the disposal and treatment of still bottoms, sludges and other non-reclaimed materials accumulated in any reclamation process itself. Please include in such a description, along with the dates for different practices:

- a. Whether the non-reclaimed materials were drummed up for disposal.
- b. If such non-reclaimed materials were drummed up, whether they were normally [or necessarily] put back in the drums of the seller from whom they originated.

- c. Whether the non-reclaimed material was allowed to accumulate and was stored prior to treatment or disposal.
- d. The locations and types of storage areas used for storage of the non-reclaimed materials. Examples of types of storage areas could include drums, tanks, pits, waste piles, ponds or lagoons.
- e. Any containment system utilized at these storage areas to help prevent releases of these stored materials.
- f. Whether any spills or releases of these stored materials ever occurred. Approximately when?
- g. Where and how such materials were disposed.
- h. What records and recordkeeping practices have ever been maintained in regard to the above practices. What is the state of those record?

Not Applicable

25. Describe practices relating to any incineration process used for disposal of wastes or materials from each of OCC's Ashtabula County, Ohio facilities. This description should include:

- a. The location and years during which each incinerator operated.
- b. The rated capacity for each incinerator.

- c. The normal operating and peak temperature for each incinerator.
- d. The rated retention time for material during the burn.
- e. The type of fuel used to bring the incinerator up to operating capacity.
- f. How the material was fed to the incinerator.
- g. What types of operating records were kept, including temperature and feed rate.
- h. The types of air pollution control devices that were installed on each incinerator and stack test results.
- i. Whether any misting or raining from the incinerator stacks ever occurred.
- j. What quantities of incinerator ashes or sludges were generated from the incineration processes.
- k. What types of materials and volumes were burned in these incinerators.
- l. Were PCBs known to have been burned in these incinerators.
- m. Did the materials that were burned include non-reclaimable materials from stills.
- n. Were materials from stills accumulated and stored prior to incineration.
- o. Did the materials sent to OCC include materials sent there solely for purposes of incineration.
- p. Were materials sent to OCC for incineration on occasion otherwise disposed. How and why?

- q. How and where were by-products of the incineration process (including ash bottoms, fly ash, sludges and scrubber water) disposed.
- r. Any records and recordkeeping practices that have ever been maintained relating to the described practices. What is the state of those records?

No incineration of wastes took place on site.

In 1967 a trial incineration of approximately 500 gallons of waste liquids took place at Diamond Alkali Company in Ashtabula. Olin has not determined the nature of the waste liquids or if further incineration was conducted.

26. Has OCC disposed or arranged for the disposal of any materials in the Reserve Environmental Services, Inc. disposal facility located in Ashtabula Country, Ohio? If so, please state:

- a. When the disposal occurred.
- b. The nature of the solid wastes.
- c. The nature of the liquid wastes.
- d. Whether the wastes contained hazardous substances.
- e. The amount of wastes involved.
- f. If known, where at the Reserve disposal facility the wastes were disposed.
- g. Describe all terms of any arrangement for the disposal of these materials.

- h. What records, if any, have ever been maintained documenting such disposal and arrangements for disposal.

Olin has arranged for the disposal of toluene diisocyanate residue and spent caustic scrubber solution at Reserve Environmental Services. However, Reserve Environmental Services operations are not located within the designated Fields Brook area but rather are located near La Bounty Road within the drainage basin of an unnamed river system which discharges directly to Lake Erie approximately one-half mile west of Kingsville On-the-Lake. Therefore, Olin's dealings with Reserve Environmental Services do not relate to the release or threatened release of hazardous substances into Fields Brook and are irrelevant to the subject matter of this request for information.

27. Has OCC ever observed any leachate escaping or being released from any disposal area on property owned or operated by OCC in Ashtabula County, Ohio? If so, describe the location, and physical characteristics of the leachate such as color, odor, or viscousness. When and by whom has this been observed?

No.

28. Do you have any information indicating that leachate from any of the disposal areas on property owned or operated by OCC may have

escaped or been released into surrounding ditches, Fields Brook, or a tributary thereto? If so, please state it, and include when such occurrences took place and who observed them.

No.

29. Have soil samples been collected and analyzed or monitoring wells ever been installed in or adjacent to the OCC Middle Road plant to monitor for release of pollutants or hazardous waste constituents? If so, please provide any data you have from such monitoring activities.

Yes. For groundwater monitoring wells see the answer to Request No. 9. Data relating to 336 soil samples which were analyzed during plant closure were previously submitted to Mrs. Elizabeth Utley of USEPA Region V in a report dated 7/13/83. Data relating to soil and sludge samples taken during the closure of the North Lagoon were submitted to USEPA Region V in Olin's response to EPA request for information No. OHD-001813708. Soil analyses taken during the installation of the monitoring wells in 1978 are attached.

Olin will review additional records to determine whether other pertinent data exists.

30. Describe any location on OCC property located in the Fields Brook water basin at which waste from OCC operations have been disposed. Please state the approximate time of disposal, the types of materials, their chemical characteristics and volumes involved. Also, provide any information you have regarding sample analyses that have been conducted of materials in or adjacent to any other location on the OCC property at which wastes from OCC operations have been disposed.

At the time of closure of the plant, an investigation of the site was made to determine if there had been disposal of chemical wastes in the past. A drainage ditch on the east side of the plant area was found to have been filled with contaminated materials. These materials, all toluene diisocyanate residue and a large volume of contaminated soil were removed at closure and sent offsite outside the Fields Brook area for disposal in permitted facilities. Olin is of the opinion that no waste remains.

31. Describe the location and size of each lagoon, pond, waste pile, trench or pit that has existed on the OCC Middle Road property and its purpose. For each lagoon, pond, waste pile, trench or pit describe:

- a. Any hazardous substances that may be or have been contained in them.
- b. The dates of each structure's existence and use.
- c. Any construction properties of each pit, pond, waste pile, trench or lagoon which would help prevent the release of materials.

- d. If not in use now, explain how it was closed or has been modified and the present use of the area.
- e. Any pictures, sketches or maps of these facilities.

Three lagoons known as the North Lagoons were located at the north of the plant area and were part of the plant wastewater treatment system. The east, center and west ponds located at the south end of the plant were also part of the plant wastewater treatment system. Toluene diisocyanate residue was reportedly stored at one time at the north end of the plant in a pile and later in a permitted hazardous waste area in a pile. A drainage ditch on the east side of the plant has been discussed in the answers to questions 13 and 30. Flyash from the carbon monoxide manufacturing process which was non-hazardous was stored in a pile near the residue aging sheds. At various times this general area was used to store sediments removed from the east, center and west wastewater treatment ponds.

A response is being prepared in connection with a response to Request No. 17.

32. Provide any information that you have concerning the disposal of hazardous substances from OCC operations at Reserve Environmental Services, Inc., including:

- a. Description of the method of operations at the site (e.g. how drums were rinsed, materials used in drum cleaning, methods of disposal of waste residues from drums, disposal of rinse water, etc.)
- b. The disposal locations used by Reserve Environmental Services, Inc. for residues, rinse water and solid wastes generated by their operations. This description should include locations both on and off their properties.
- c. The disposal locations for any drums discarded by the company.
- d. The estimated quantity of drums and waste residue disposed of at each location by the company.
- e. Whether the company received drums for cleaning from parties other than OCC.

See response to Request No. 26.

33. Provide the name of each customer from whom OCC has received hazardous substances for purposes of treatment or disposal, including incineration or reclamation. Further, provide any information you have on the kinds of wastes received, the quantity of each kind of waste received, the processes used by OCC in handling these wastes, the period during which each kind of waste was received and processed, and the likely disposition of any residues from that process.

Not applicable.

34. Provide copies of any documents that you now have that contain information indicating the receipt of hazardous wastes for reclamation, incineration, or other treatment by OCC. Such documents would include logs, invoices, bills of lading, purchase orders, work orders, trucking records, correspondence, contracts or other agreements.

Not applicable.

35. Provide the names of all other off-site facilities that have been used by OCC for the disposal of unreclaimed chemical wastes and hazardous wastes, incineration process wastes and manufacturing process wastes. Provide the dates during which such disposal has occurred and the kinds of wastes sent to each facility.

Except as described in the response to Requests 25 and 36, all off-site disposal facilities which received such wastes from the plant are located outside the Fields Brook watershed and thus are irrelevant to the subject matter of this request for information.

36. Describe any information OCC may have obtained regarding contaminated fill material or debris deposited in or near Fields brook or its tributaries. Such should include any information regarding fill allegedly disposed by Brenkus Excavating at or near the residence of [REDACTED]

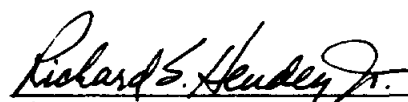
A response to this request is being prepared.

37. A list and description of all liability insurance coverage that is or was carried by you or any predecessor or successor corporations or partnerships, including any self-insurance provisions, that relates to hazardous substances and/or the above reference sites. Provide copies of all of these insurance policies.

A confidential list of the names of companies with whom Olin has liability insurance coverage is enclosed. Olin objects to providing copies of such policies because it is unnecessarily burdensome and outside of the scope of 42 USC Section 6927 and 9604.

38. Provide any information you have regarding the waste disposal methods utilized by surrounding property owners or users.

Olin objects to this question as being unnecessarily broad, unduly burdensome and unreasonable. EPA already has or is directly obtaining from summoned property owners extensive information about such methods. Olin is unaware of any information which it may have about such methods which is not already known to EPA or contained in publicly available documents.

  
Richard S. Hendey, Jr.  
Manager, Regional  
Environmental Affairs

RSH:tkh  
7480e

As to Introductory Statement including general and specific objections.

*William J. A. Sparks*  

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William J. A. Sparks  
Counsel



# THE GENERAL TIRE & RUBBER COMPANY

RECEIVED

MAIN OFFICE AND FACTORY  
AKRON 9, OHIO

DEC 14 1961

December 12, 1961

D.J.G. COPPS

# 7970

Olin Mathieson Chemical Corporation  
460 Park Avenue  
New York 22, New York

Gentlemen:

Representatives of The General Tire & Rubber Company (General) and Olin Mathieson Chemical Corporation (Olin) have been engaged in discussions regarding the construction and operation of a plant for the manufacture of Toluene Di-Isocyanate (TDI). General now makes the proposal set forth below:

## I. LOCATION AND CAPACITY OF PLANT

A. The location of the TDI plant shall be determined as a result of economic studies. Preliminary considerations indicate that the preferred location for the TDI plant may be adjacent to General's PVC plant at Ashtabula, Ohio. Location at Ashtabula may have a substantial adverse effect upon the supply of raw materials for and the economics of General's PVC plant. The existence or extent of such effect shall be determined by General and considered as a factor in determining the advisability of locating the TDI plant at Ashtabula. General will use its best efforts to determine and notify Olin of such effects as soon as possible, but not later than March 15, 1962. If General determines that an adverse effect is expected to its PVC plant, then the TDI plant will be located adjacent to an existing plant of Olin to be selected by Olin unless the parties should agree upon a different location.

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B. The party having the existing plant adjacent to which the TDI plant will be constructed will provide such plant with all or part of such utilities at cost, provided it is more economical than to construct the necessary facilities as a part of the TDI plant. The parties will agree upon a formula for the computation of such "cost" which will include an annual return of 10% (after Federal and State income taxes) on the capital cost of any additions which may be required in order to furnish utilities to the TDI plant. For the purpose of calculating the cost of utilities and the return on capital, depreciation shall be reflected on a straight line basis over a period of ten years.

C. The plant will be designed by an engineering firm (The Engineers) to be selected by the parties to have an annual design capacity of 20,000,000 pounds of TDI. The specifications prepared by the Engineers will be subject to the approval of General and Olin. Unless the parties should otherwise agree, lump sum contracts for the construction of the plant will be let on the basis of competitive bids which will be solicited after the engineering work has been substantially completed.

D. The start-up period shall be deemed to end when the plant shall have operated for seven (7) consecutive days at design capacity for at least 80% of the time producing TDI to specifications and at 90% of design yields.

## II. OWNERSHIP OF PLANT

A. The TDI plant will be erected on a suitable site of sufficient size to allow for future expansion. The land shall be free and clear of

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all liens, charges and encumbrances except for servitudes and easements which will not impair the use or value of the land for the purposes of erecting and operating a TDI plant with a capacity of 20,000,000 pounds per year or more and related facilities. The exact area shall be mutually agreed upon. Each party shall have a 50% undivided interest in the plant and in all related facilities erected or acquired jointly by the parties, whether realty or personalty, and shall bear 50% of all costs entailed in the design, construction or acquisition and start-up of such plant and facilities. The parties will develop promptly procedures for the authorization and payment of any such costs.

### III. SUPPLY OF TDA

A. Olin will erect or cause to be erected at its expense at a location to be determined by Olin a plant for the production of Toluene Di-Amine (TDA) having a design capacity of at least 16,500,000 pounds of TDA per year. Olin will use its best efforts to complete such plant no later than the TDI plant, subject to delays due to strikes or other circumstances beyond the reasonable control of Olin.

B. Olin will supply sufficient TDA from its TDA plant, having the specifications and quality required to produce merchantable TDI with Olin's TDI process, to meet the requirements of the TDI plant at its initial design capacity level, subject to Olin's inability to deliver or delays in delivery due to strikes or other circumstances beyond the reasonable control of Olin. Olin will supply all TDA, and any other raw materials which it may supply, substantially on its standard terms and conditions for the sale of organic chemical products, a copy of which is attached

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hereto as Exhibit "A", to the extent such terms and conditions are not inconsistent herewith. If the TDI plant should be expanded, Olin will be given the first opportunity to supply the additional TDA required in connection with such an expansion on a basis to be negotiated at the time.

C. Olin will be reimbursed for TDA at a price determined on the basis of calculated manufacturing cost plus 9% of manufacturing cost for G & A, plus a 10% annual return (after Federal and State income taxes) on the capital cost of the TDA facilities (including working capital) required to produce 16,500,000 pounds of TDA annually (regardless of the manner in which such capital cost may be raised), plus freight if any. The calculated manufacturing cost will be determined by agreement between the parties promptly following the completion of the engineering of the TDA plant and will reflect depreciation of the facilities on a straight line basis over a period of ten years. Any raw materials for TDA which Olin may furnish shall be included at cost if purchased or, if manufactured by Olin, at lowest market price available for like quantities on a long-term purchase basis. The foregoing establishes the base price for the supply of TDA, subject to paragraphs D and E of this Article. Such base price will be subject to escalation for increases or decreases in the cost of materials and labor on the basis of a formula to be agreed upon. If the parties should be unable to agree upon the computation of manufacturing cost or upon a formula for escalation, the matter will be submitted to an engineering firm selected by the parties for its determination by which both parties agree to be bound. If Olin's total TDA capacity should be or become greater than the capacity required to supply the TDI plant, any changes in

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unit cost attributable to such additional capacity would be excluded in computing the cost of TDA hereunder.

D. Olin will be free to sell TDA to third parties. If, during any period, Olin should be selling TDA for uses other than the manufacturing of TDI to any third party for longer than one (1) year at a price more favorable to the purchaser than the price calculated in accordance with paragraph C above, the latter price shall be reduced to the level of the former price for the period and quantity of such sale. For purposes of this comparison, cost of freight will be excluded.

If, during any period, Olin should be selling TDA, on a spot or contract basis, to be used as a raw material for the manufacture of TDI in the United States at a price more favorable to the purchaser than the price calculated in accordance with paragraph C above, the latter price shall be reduced to the level of the former price for the period and quantity of such sale. For purposes of this comparison, cost of freight will be excluded.

E. If any other reputable and established producer of TDA should make a bona fide offer in writing to furnish all of the TDA required by the TDI plant on a long-term basis (at least 2 years) at a delivered price lower than the price at which Olin is obligated to sell TDA under paragraphs C and D above, such competitive offer may be accepted unless Olin should agree within thirty (30) days of its receipt of such offer to meet the lower price for the period covered by such offer. If Olin should elect not to meet such lower price and such offer is accepted, Olin will continue to supply TDA for six months from the date of refusal, and Olin's obliga-

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tion with respect to the supply of TDA hereunder shall be deemed terminated once and for all at the end of the six months' period; provided, however, that Olin shall have the option to resume supplying TDA on the terms set forth in this Article at the conclusion of the period covered by said competitive offer.

#### IV. OPERATION

A. Except as specifically otherwise provided herein, the TDI plant will be operated for the benefit and account of General and Olin until the parties agree upon termination of joint operations or until otherwise terminated as provided herein. A committee (the Committee) consisting of an equal number of representatives of General and Olin will have responsibility for the management of the construction and operation of the TDI plant. The Committee will adopt and be governed by its own rules of procedure. The chairmanship of the Committee will rotate annually between General and Olin. The Committee will select a plant manager and a staff to supervise the day-to-day operation of the plant. Full-time plant personnel will be on the payroll of General or Olin respectively and will be entitled to the normal employee benefits of the particular employer company which makes their services available. All costs for such personnel, including costs of fringe benefits, will be charged to the operation of the plant. The parties contemplate that each of them may furnish certain services, such as maintenance, accounting and purchasing, required in connection with the operation of the TDI plant, if it should appear that such services can be performed more economically in this manner. The cost of such services would be subject to negotiation between the parties.

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V. OUTPUT OF TDI

A. General and Olin will each be entitled to one-half of the actual capacity of the TDI plant and, in addition, will be entitled to any capacity not utilized at any time by the other party. For purposes of this Article V, actual capacity is assumed to be 20,000,000 pounds per year. If the actual capacity should be more or less than 20,000,000 pounds, the figures which appear below will be adjusted to reflect this difference.

B. The parties will agree upon the classification of all costs into the categories of fixed or variable costs. The fixed costs of the TDI plant will be divided equally between General and Olin with respect to any year during which the take of neither party exceeds 10,000,000 pounds. If either party should take more than 10,000,000 pounds during any year, such party will pay an additional 1% of the total plant fixed costs for such year for each additional 200,000 pounds of TDI taken by it and an appropriate fraction of 1% for quantities of less than 200,000 pounds.

Example 1:

If Olin's take in a given year were 10,000,000 pounds and General's take for the same year were in the same quantity, each party would pay one-half the annual fixed costs of the plant.

Example 2:

If General's take in a given year were 12,000,000 pounds and Olin's take for the same year were 5,000,000 pounds, General would pay 60% of the fixed costs for such year and Olin would pay 40% of such costs.

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Example 3:

If General's take in a given year were 8,000,000 pounds and Olin's take for the same year were 5,000,000 pounds, each party would pay 50% of the fixed costs for such year.

Variable costs will be allocated on an annual basis to each party in direct proportion to the percentage of total TDI production actually taken by such party during the year.

C. The minimum amount of working capital required for the operation of the TDI plant following plant start-up will be determined from time to time by decision of the Committee. The parties will make monthly interim payments in an aggregate amount required to maintain working capital at no less than the agreed minimum level. The percentage of such interim payments to be contributed by each party will be determined by applying the formulae set forth in paragraph B of this article to the actual take of each party during the year to date.

D. Promptly after the close of each year, there shall be finally determined the fixed and variable costs for the year and the percentage thereof to be allocated to General and Olin. For the purpose of such final allocation, the take of each party and costs incurred shall be considered on the basis of a year ending November 30, disregarding variations in quantities taken and in costs incurred which may have occurred from month to month. Upon completion of such annual determination of fixed and variable costs and the allocation thereof, any adjustments called for by such determinations between the parties in the amount of interim payments theretofore made shall be effected without delay.

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E. Anything herein contained to the contrary notwithstanding, if the TDI plant should be shut down for a period of more than 72 consecutive hours in consequence of a strike or other circumstances beyond the reasonable control of the parties, any costs properly allocable to such period will be borne by the parties in the ratio of their capacity entitlement; i.e., on a fifty-fifty (50/50) basis unless a unilateral expansion should have taken place.

F. General and Olin at all reasonable times shall have access to all records, books and accounts relating to the TDI plant. Promptly after the close of each year, all such books and accounts shall be audited by a firm of reputable public accountants selected by agreement between the parties who shall not be the public accountants of either party. Any controversy between the parties with respect to costs and the allocation thereof shall be submitted to the public accountants selected pursuant to this paragraph. General and Olin each agree to be bound by the determination of such accountants.

G. Each party will advise the plant manager and the other party for information purposes only, at least ten days before the beginning of each quarter, of the quantity of TDI which such party expects to take during such quarter. Each party will advise the plant manager and the other party at least ten days before the beginning of each month of its firm estimate of the quantity of TDI which such party expects to take during such month. The plant will maintain an inventory of TDI in a quantity to be determined from time to time by the Committee in order to take care of reasonable fluctuations from the estimates.

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H. Each party will be free to process or sell all TDI taken by it independently of the other party and to produce, purchase, process and sell independently of the other party TDI not produced at the jointly owned TDI plant.

VI. OUTPUT OF HYDROCHLORIC ACID

A. If the parties should decide to locate the TDI plant at a location other than Ashtabula, the parties will use their best efforts to arrange for the economical disposition of the hydrochloric acid which will be produced as a by-product of TDI production. Proceeds or costs of such disposal of acid will be allocated to the parties during any year in the ratio in which the parties take TDI during such year.

B. If the parties should decide to locate the TDI plant at Ashtabula, Ohio, General will take the entire output of hydrochloric acid, free of impurities to the extent necessary and otherwise of satisfactory quality for the synthesis of MVC, up to the limits of its requirements for such acid at its Ashtabula PVC plant, commencing no later than January 1, 1965. During the period before January 1, 1965, General will use its best efforts to take all such hydrochloric acid up to the limits of such requirements. General is a party to an agreement for the purchase of General's hydrochloric acid requirements, up to 17.6 tons per day, until December 31, 1964. Under such agreement, General has the right to be relieved of its obligation to make further purchases by paying \$30 for each ton of acid not taken. However, General does not wish to invoke this right without the concurrence of the other contracting party. General will use its best efforts to negotiate in the near future a mutually

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acceptable basis for terminating the sale of hydrochloric acid by such other party to General on or about the date such acid becomes available from the TDI plant.

C. If the plant is located at Ashtabula, General will contribute toward the plant variable costs the amount of \$40 for each ton of hydrochloric acid which General takes or is required to take hereunder; provided, however, that if General can produce satisfactory evidence to the effect that a reputable established U. S. supplier is selling hydrochloric acid of like quality to another U. S. producer of vinyl chloride at a delivered price of less than \$40 per ton in substantially equal quantities under a contract for one year or more, General's contribution of \$40 per ton shall be reduced to such lower price for the period of such contract.

D. Any hydrochloric acid which General is not required to take pursuant to paragraphs B and C of this Article shall be handled in accordance with paragraph A of this Article.

VII. EXPANSION OF PLANT

A. The plant may be expanded at any time jointly by both parties or unilaterally by either party if the other does not wish to participate in the expansion.

B. The capital cost of any expansion of capacity other than by joint agreement of the parties will be borne by the party desiring such additional capacity. Such party will be entitled to take the additional output made possible by the expansion; provided, however, that the non-expanding party will be entitled to any capacity not utilized at any time by the expanding party.

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C. Unless other arrangements satisfactory to all interested parties can be worked out, an expanding party will be required to provide its own funds for any expansion. The parties will agree upon an equitable allocation of the ownership of the total plant and related facilities in the event of unilateral expansion.

D. In the event of an expansion, the total fixed costs of the TDI plant as expanded will be allocated between the parties in direct proportion to the capacity entitlement of each party as a percentage of the total capacity of the plant; provided, however, that in the event of a unilateral expansion fixed costs payable by the non-expanding party shall not be increased because of such expansion; and provided, furthermore, that if either party should take TDI in excess of its entitlement during any year, the percentage of the fixed costs for such year payable by such party shall increase in direct proportion to the ratio which such excess take bears to the total capacity of the plant.

E. In the event of an expansion, all variable costs will continue to be allocated to each party in direct proportion to the percentage of total TDI production taken by such party, with the exception that in the event of a unilateral expansion (i) the cost of additional quantities of raw materials required will be allocated to the expanding party on an incremental cost basis, and (ii) the variable costs payable by the non-expanding party shall not be increased because of such expansion.

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F. Subject to the provisions of the letter agreement between the parties, dated December 1, 1961 with respect to know-how, each party will be free to erect or participate in the erection of a TDI plant independently of the other party at any location other than the location at which the TDI plant contemplated hereby will be erected.

VIII. KNOW-HOW

A. Olin will supply to the project its first TDI process as to which Olin shall hold General harmless with respect to infringement of U. S. patents existing on the date hereof.

B. Olin is working on a second TDI process, and if the same is successful agrees to supply it to the project. Olin believes that such second process will be more economical than the aforesaid first process but that it may raise a question of infringement of existing U. S. patents of others. Olin agrees to disclose to General an opinion of its patent counsel as to infringement of existing U. S. patents by said second process. Should it be determined that said second process is more economical (taking such royalty payments as may be required into account) and should either Olin's or General's patent counsel be of the opinion that infringement is likely to exist, the procuring of any patent license shall be the joint responsibility of the parties, and neither party shall hold the other harmless with respect to such patent or patents.

C. Olin will supply to the Engineers all process specifications and design data for its TDI process to enable the Engineers to prepare

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full-scale engineering drawings required for the construction and operation of a TDI plant embodying said process. The cost of such engineering shall be shared equally by the parties.

**IX. TRANSFER OF INTEREST**

A. Subject to the provisions of paragraph B of this Article, General and Olin shall each have the right to transfer its right, title and interest in and to the TDI plant and related facilities in its entirety at any time to any third party, provided the acquiring party agrees in writing to be bound by all agreements relating to the TDI plant then in force to which the disposing party is a party. Unless the acquiring party is a successor to all or substantially all of the business of the disposing party, any such transfer shall not relieve the disposing party of its obligations under any such agreements, except to the extent to which such obligations are actually performed by the acquiring party. Neither General nor Olin may transfer a portion of its right, title and interest in and to the TDI plant and related facilities without the prior written approval of the other. Neither party may pledge or hypothecate or place or permit to be placed any liens, charges or encumbrances upon the TDI plant or related facilities or upon its right, title and interest therein without the prior written approval of the other party.

B. If either General or Olin shall wish to sell or otherwise transfer its right, title and interest in and to the TDI plant and related facilities to any party other than a successor to all or substantially all of its business, the party so desiring to sell or transfer (the Seller) shall first give to Olin or General, as the case may be (the Optionee) the

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preferential right to acquire such right, title and interest in the following manner. The Seller shall give to the Optionee a written notice (a) stating the price (the Refusal Price) and the terms of payment of such price at and upon which such right, title and interest can be sold or transferred to another pursuant to a bona fide offer, without other collateral terms or conditions, and the name or names and address or addresses of the prospective purchaser or purchasers, and (b) granting to the Optionee an option exercisable as hereafter provided at any time within 90 days thereafter to purchase or acquire such right, title and interest at the Refusal Price. If, prior to the expiration of said 90 days, the Optionee shall elect to exercise such option and shall stand ready to pay the Refusal Price in accordance with, and otherwise comply with, the terms of said option, the right, title and interest to the TDI plant and related facilities covered by said option shall be transferred by the Seller to the Optionee upon payment of the Refusal Price; provided, however, that if the aforesaid bona fide offer from a third party did not call for payment of the entire Refusal Price at the time of transfer, the transfer shall be effected upon receipt by the Seller of a binding commitment by the Optionee to make payment on the basis set forth in such offer. If, prior to the expiration of said 90 days, the Optionee shall not elect to exercise such option, the Seller shall be entitled for a period of 60 days after the expiration of said 90 days, in good faith, to sell or transfer such right, title and interest to the prospective purchaser or purchasers specified in said notice from the Seller at not less than the Refusal Price and upon the terms of payment thereof set forth in said notice. If the Seller shall not so sell such right, title and interest

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B. In the event of the abandonment of the project pursuant to paragraph A of this Article, each party shall contribute one-half of the costs incurred with outside parties in direct connection with the project to the date of abandonment, as well as any cancellation costs necessitated by the abandonment, it being agreed that no commitments with respect to the construction of the TDI plant, as contrasted from engineering, will be made until after said fifteen-day period.

XII. MISCELLANEOUS

A. The parties contemplate that this Agreement will be superseded or supplemented by an agreement or agreements setting forth in greater detail in certain respects and in additional respects the rights and obligations of the parties as stated herein, including but not limited to: designation of plant, maintenance of books of account, discharge of liabilities, limitation on right to obligate the venture, authority to sign, bank accounts, disposal of assets, title to land and valuation, limitation on working capital, disposition of funds generated by depreciation, insurance, etc. Subject to any such further agreement or agreements, this Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors. This Agreement may not be assigned by either party without the prior written consent of the other party, except in connection with a transfer permitted under Article IX.

B. Any notice, request or other communication given hereunder shall be deemed sufficient if given in writing addressed and mailed or delivered to the party for which such notice, request or other communication is intended, at the address herein stated, vis.; to Olin, at 460 Park Avenue,

Olin Mathieson Chemical Corporation  
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December 12, 1961

New York 22, New York, attention of Vice President and General Manager of Organics Division; and to General at Akron 9, Ohio, attention of General Manager, Chemical Division; or at such other address as such party may hereafter designate by notice in writing addressed and mailed or delivered to the other party hereto. Any such notice, request or other communication mailed by registered or certified mail shall be deemed to have been given or delivered at the time of the mailing thereof; if otherwise mailed or delivered, it shall be deemed given or delivered when received.

C. The provisions of this Agreement shall be severable so that if any provision hereof shall be held illegal or unenforceable, the remaining provisions hereof shall continue in full force and effect.

D. This Agreement supersedes all prior agreements and understandings between the parties relating to the subject matter hereof, with the exception of a letter from Olin to General dated December 1, 1961. This Agreement may not be modified except by written instrument executed by a duly authorized officer or representative of each party.

E. The failure of either party to insist in one or more instances upon the performance of any of the terms of this Agreement or to exercise any right hereunder shall not be construed as a waiver or relinquishment of the future performance of any such terms or the future exercise of such right, but the obligation of each party with respect to such future performance shall continue in full force and effect.

THE GENERAL TIRE & RUBBER COMPANY

Olin Mathieson Chemical Corporation  
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December 12, 1961

If the above proposal is acceptable to you, please signify your acceptance by signing the attached copy of this letter in the space provided for your signature and by returning such copy to us, whereupon this proposal will be deemed an agreement binding on both parties, subject to the approval thereof by the board of directors of each party (or by the Executive Committee in the case of Olin) within thirty days following the receipt by both parties of the detailed economic studies to be prepared pursuant to Article XI.

Very truly yours,

THE GENERAL TIRE & RUBBER COMPANY

By: [Signature]  
General Mgr., Chemical Division (Title)

By: [Signature]  
Vice-Pres (Title)

WITNESS:

[Signature]

ACCEPTED AND AGREED TO:

OLIN MATHIESON CHEMICAL CORPORATION

Witness:

By: [Signature]  
V.P. & G.M. Olin (Title) Div

[Signature]

Date: 12-12-61

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Olin Mathieson Chemical Corporation  
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December 12, 1961

within said 60 days, such right, title and interest shall continue subject in all respects to the provisions hereof.

C. If a party (the Defaulting Party) should

(i) become insolvent or commit an act of bankruptcy and such condition not be relieved within a period of 30 days or be adjudged a bankrupt, or

(ii) in the absence of a bona fide dispute default in making any payment when due and such default should continue for fifteen days following receipt of notice thereof and should remain uncured,

the other party shall have the right to acquire, without prejudice to any other remedies, the entire right, title and interest of the Defaulting Party in and to the TDI plant and related facilities at an amount equal to the depreciated value thereof (on the basis of straight line depreciation over a period of ten years), and net working capital, and said right, title and interest shall be transferred by the Defaulting Party to the other party upon tender by the latter of such amount.

D. If a party shall desire to terminate this agreement for any reason deemed sufficient, a right which each of the parties shall have at any time after five years from date of the plant's start-up, the other party shall have the right to acquire such interests at the price provided in paragraph C of this Article or the properties will be liquidated.

December 12, 1961

X. ARBITRATION

A. Except as otherwise provided, any controversy or claim arising out of or relating to this agreement or the breach thereof shall be settled by arbitration in accordance with the Rules of the American Arbitration Association, and judgment upon the award rendered by the Arbitrator(s) may be entered in any court having jurisdiction thereof.

XI. ABANDONMENT

A. Preliminary cost estimates indicate that (i) TDA can be delivered to the TDI plant at about \$0.295 per pound at designed capacity of 16,500,000 pounds per year (when calculated in accordance with paragraph III C) and (ii) that TDI can be produced at a cost of about \$0.34 per pound when the TDI plant is operating at its design capacity of 20,000,000 pounds per year, and (iii) that the fixed capital investment for the TDI plant is approximately \$4,800,000, excluding steam and water facilities. On the basis of such preliminary cost estimates, the construction of a TDA plant and a TDI plant as contemplated hereby would be economically feasible. Detailed economic studies will be undertaken by an engineering firm to be selected by the parties and should be completed within 120 days from the date of selection. If such studies should indicate that the cost of producing TDA and/or TDI will be higher than indicated by the preliminary cost estimates and/or the fixed capital investment will be higher than estimated, either party shall have the right to abandon the project by giving written notice of its decision to this effect to the other party within 15 days of its receipt of such detailed economic studies.

ORGANICS DIVISION  
460 PARK AVENUE, NEW YORK 22, NEW YORK



June 21, 1962

Mr. S. Salem, President  
Chemical Plastics Division  
The General Tire & Rubber Company  
Akron 9, Ohio

Dear Mr. Salem:

Representatives of The General Tire & Rubber Company (General) and Olin Mathieson Chemical Corporation (Olin) have been engaged in discussions regarding the construction and operation of a plant for the manufacture of Toluene Di-Isocyanate (TDI). Olin now makes the proposal set forth below:

I. LOCATION AND CAPACITY OF PLANT

A. Olin will erect or cause to be erected, at its sole cost and expense, at a location adjacent to General's PVC plant at Ashtabula, Ohio, a plant for the production of Toluene Di-Isocyanate (TDI) from Toluene Di-Amine (TDA), having an annual design capacity of 20,000,000 pounds of TDI, at an estimated cost of \$4,500,000, exclusive of steam.

B. The TDI plant will be located on land owned by General, which site shall be suitable for erection and operation of the TDI plant a sufficient size to allow for future expansion (shown on Exhibit "A"

General hereby grants to Olin a right and license, at a nominal consideration of Ten Dollars (\$10.00) annually, to use the land for a period from the date of signing hereof until General takes title to the TDI plant and related facilities as hereinafter provided (referred to as "transfer date"), for the purpose of erecting and constructing thereon, and operating the TDI plant and related facilities, together with suitable rights of easements and rights-of-way over, under and/or across other lands of General for ingress and egress, railroad tracks and roadways, pipelines, transmission lines, sewer lines, power lines, etc, as Olin and General may deem reasonable and necessary. Real estate taxes and special assessments assessed against the land licensed herein and the improvements being placed thereon shall be charged to Olin from the signing hereof until the transfer date. On the day of license of the land by General, and until the transfer date, the land shall be and remain free and clear of all liens, charges and encumbrances which may be created by General, except such as will not impair the use <sup>or</sup> of-value of the land or the TDI plant and related facilities for the purposes intended.

C. General will provide the TDI plant, to battery limits, with the TDI plant requirements of steam at cost, in monthly and daily minimum and maximum quantities and pressures to be mutually agreed upon at a later date, provided it is more economical than to construct the necessary facilities as a part of the TDI plant. General agrees to dedicate steam to meet said requirements on a first priority basis for the use of the TDI plant. The parties

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will agree upon a formula for the computation of such "cost" which will include an annual return of 10% (after Federal and State income taxes) on the capital cost of any additions which may be required in order to furnish steam to the TDI plant. For the purpose of calculating the cost of steam and the return on capital, depreciation shall be reflected on a straight line basis over a period of ten (10) years.

D. The TDI plant will be designed by an engineering firm (the Engineers) to be selected by the parties to have an annual design capacity of 20,000,000 pounds of TDI. The specifications prepared by the Engineers will be subject to the approval of General and Olin. Unless the parties should otherwise agree, lump sum contracts for the construction of the plant will be let on the basis of competitive bids which will be solicited after the engineering work has been substantially completed.

E. The start-up period shall be deemed to end and the plant to be on stream when over any seven (7) consecutive day period the plant shall have produced TDI to specifications at a <sup>total production</sup> rate equal to 80% of the seven (7) calendar day capacity and 90% design yields. For example:

Assume the plant capacity to be 20,000,000 pounds annually; the calendar day capacity, calculated on 365 operating days, would be 54,800 pounds, or 383,600 pounds for the seven (7) day period. If, during the seven (7) day period the plant produces 306,800 pounds and yields average 90% of design, then the plant shall for all purposes be deemed to be on stream.

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Promptly after the plant is on stream, the parties will acknowledge the date of such occurrence to each other, in writing. All operating expenses prior to the on-stream date shall be borne by the parties equally.

## II. OWNERSHIP OF PLANT

A. The TDI plant will be owned and operated by Olin until such time as General takes title thereto as hereinafter provided. Olin agrees to train and teach General's assigned personnel in the know-how of Olin's process for producing TDI from TDA in the TDI plant, and in the operation and management of the TDI plant. Olin will establish a committee (the Committee) consisting of an equal number of representatives of Olin and General to oversee the construction, operation and management of the TDI plant. Olin agrees that General's staff and workmen assigned to the TDI plant operation will be made thoroughly familiar with the Olin process and the operation and management of the TDI plant. The Committee will adopt and be governed by its own rules of procedure. Olin, after consulting with the Committee, will select a manager for the plant and a staff to supervise the day-to-day operation of the plant. Full-time plant personnel will be supplied by General and Olin and will remain on the payroll of and will be entitled to the normal employee benefits of the respective employer, as the case may be. All such costs, including fringe benefits, will be charged to the cost of the TDI plant operation.

B. The parties contemplate that General may be requested to furnish certain services (such as but not limited to accounting, clerical, traffic, laboratories, change rooms, office space, etc.) required in connection with the operation of the TDI plant. Any such services rendered or made available by General shall be at General's cost which shall be subject to negotiation between the parties, and such cost shall be determined as defined in Exhibit "B" attached.

### III. SUPPLY OF TDA

A. Olin will erect or cause to be erected at its sole cost and expense, at a location to be determined by Olin, a plant for the production of Toluene Di-Amine (TDA) having a design capacity of at least 16,500,000 pounds of TDA per year. Olin will use reasonable efforts to complete such plant no later than the TDI plant, subject to delays due to strikes or other circumstances beyond the reasonable control of Olin.

B. Olin will supply sufficient TDA from its TDA plant, having the raw material specifications as set forth in Exhibit "C", attached, required to produce merchantable TDI, having the production specifications as set forth in Exhibit "D", attached, with Olin's TDI process, to meet the requirements of the TDI plant at its initial design capacity level, subject to Olin's inability to deliver or delays in delivery due to strikes or other circumstances beyond the reasonable control of Olin.

C. For the purposes of computing Olin's costs of TDI made available to General for purchase in accordance with the provisions of Article IV below, the parties have agreed that prior to the transfer date Olin shall charge in its TDA supplied to the TDI plant operations, and after the transfer date will sell TDA to General, at a price which has been mutually agreed to be \$0.2924 per pound, 100% basis, F.O.B. Olin's Doe Run, Kentucky plant site, in Olin furnished tank cars. Payment to be in cash net thirty (30) days from date of invoice. This paragraph establishes the base price for the supply of TDA, which price shall be firm for three (3) years from the date the TDI plant goes on stream. If Olin's total TDA capacity should be or become greater than the capacity required to supply the TDI plant, any changes in unit cost attributable to such additional capacity would be excluded in computing the <sup>price</sup> cost of TDA hereunder. Olin will be free to sell TDA to third parties.

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D. General agrees that commencing on the date it acquires title to the TDI plant as set forth in Article VII hereof, and for a period of years thereafter which, when added to the period of time title to the TDI plant was in Olin, totals in the aggregate eight (8) years from the date the TDI plant goes on stream, it will purchase from Olin and Olin will sell 100% of General's TDA requirements for the TDI plant at the price set forth in Article III, paragraph C, and Olin agrees to sell General said TDA substantially on its standard Terms and Conditions for the sale of organic chemical products, a copy of which is attached hereto as Exhibit "E", to the extent such terms and conditions are not

inconsistent herewith; however, if

- (1) at any time after three (3) years from on stream date Olin should be selling specification TDA <sup>for any purpose,</sup> ~~which~~ will make ~~specification~~ TDI on a spot or contract basis, at a price more favorable to the purchaser than the price set forth in paragraph C above, the latter price shall be reduced to the level of the former price for the period and quantity of such sale. For purposes of this comparison, cost of freight will be excluded or
- (2) at any time after three (3) years from on stream date any other reputable and established producer or producers should make a bona fide offer or offers in writing to furnish all or part of the TDA required by the TDI plant at a delivered price or prices lower than Olin's delivered price, Olin, within thirty (30) days of its receipt of written notice from General of such offer or offers agrees to either reduce its price of specification TDA to meet such lower price or prices for the quantity and for the period covered by such offer or offers or refuse to meet such lower prices. In the event General has not received any notice from Olin that it will meet or will not meet such lower price at the end of such thirty (30) day period, then for all intents and purposes such failure to give notice on the part of Olin shall be

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deemed automatic notice by Olin that it will meet such lower price .

If Olin meets such offer , the price for TDA under paragraph C above shall be automatically reinstated at the end of the period covered by the competitive offer which it met . In the event Olin shall not meet such lower price , and General accepts such offer or offers , Olin and General shall be relieved from their obligations under this paragraph D to supply and purchase TDA with respect to the quantity of TDA supplied by the third party or parties for the period covered by said offer or offers ; it being understood that at the end of said period the obligations of both Olin to supply and General to take Olin's specification TDA at the price set forth in paragraph C of this Article III shall be automatically reinstated . If at any time after three (3) years , as referred to above , General receives another such bona fide offer or offers , and notifies Olin , in writing , as provided in this paragraph D (2) , Olin , on each such occasion shall have the same right of election and the rights and obligations of the parties hereto shall again be as in this paragraph D (2) recited above .

For purposes of this paragraph D (2) the words "to meet" shall be construed as in the following example:

If General receives a bona fide offer from a third party or parties as hereinabove recited, General agrees, in each such case, in its written notice to Olin, to reveal quality, quantity and price of the TDA offered and the period covered by such offer, together with information that will show General's cost, (based upon General's calculations) for producing a given unit of TDI in the TDI plant from the TDA so offered. Olin shall then have the right to either reduce its price of specification TDA to meet said offer or offers, or supply a comparable or better quality TDA which, when used in the TDI plant will produce TDI of substantially the same specifications in substantially equivalent quantity at no greater cost to General than if General had used the TDA offered by the third party or parties, as the case may be.

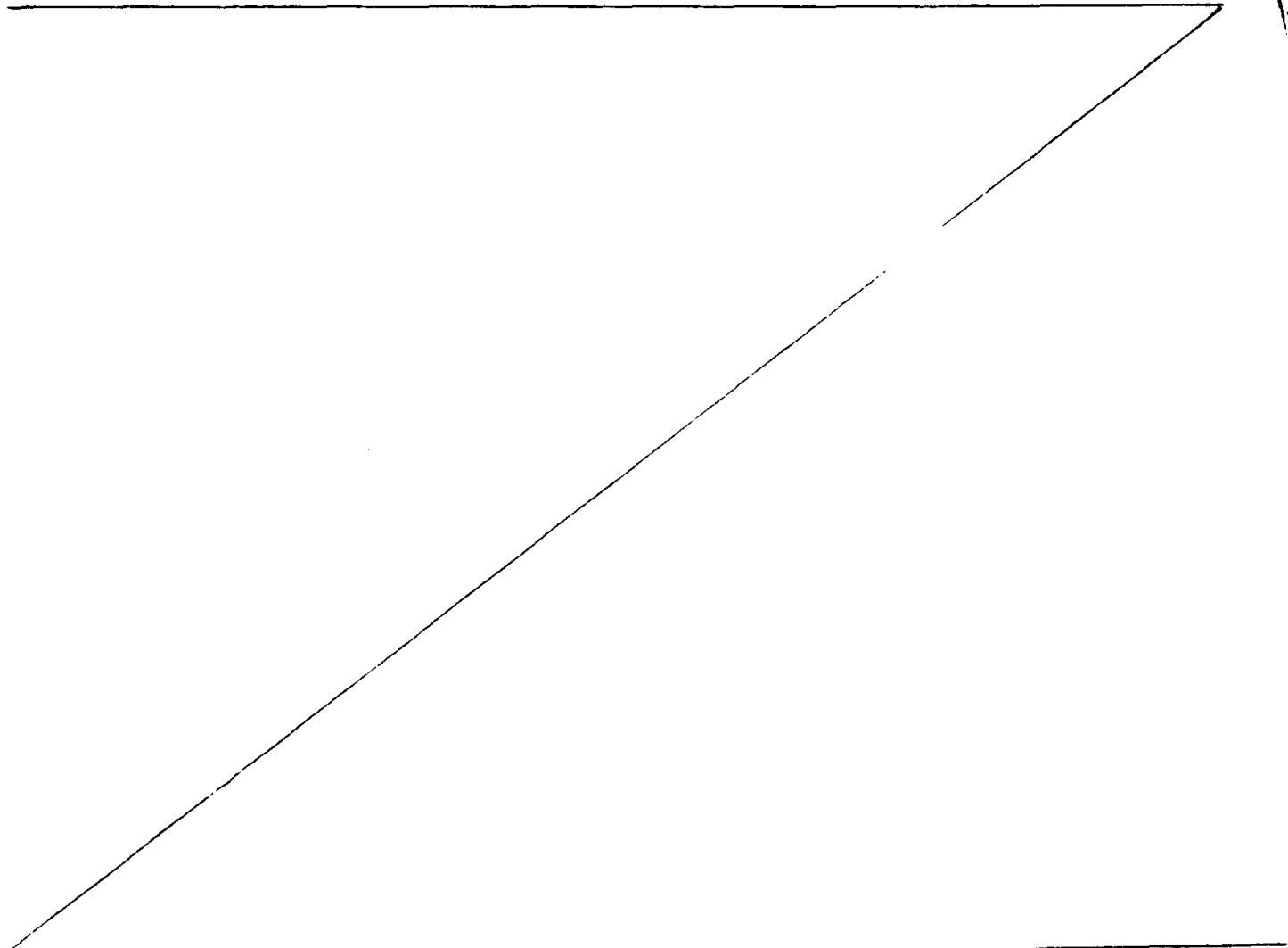
- (3) At any time after General takes title to the TDI plant Olin should be selling any quality of TDA on a spot or contract basis to be used as a raw material for the manufacture of TDI, Olin shall make said grade of TDA available to General on no less favorable terms than offered to other TDI producers, or, if at anytime after General takes title

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to the TDI plant Olin should be selling any quality of TDA on a spot or contract basis, for uses other than the manufacture of TDI, Olin, to the extent it has production capacity for such TDA and is not prevented from doing so by contract or agreement with a third party, will make such grade of TDA available to General, in the quantities and for a like period of such sale on no less favorable terms than sold to other purchasers.

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E. Olin will, on the first (1st) day of each contract year after the fourth (4th) such year from the date the TDI plant goes on stream, and on the first (1st) day of each contract year thereafter until the expiration of the eight (8) year period stipulated in paragraph D of this Article, furnish to General a certificate stating whether or not, during the preceding twelve (12) months, Olin has made any sales of the character described in the applicable paragraph D (1) or <sup>(3)</sup>~~(2)~~ of this Article III, and if Olin has made any such sales, setting forth information pertaining thereto. If, after General acquires title to the TDI plant, but within eight (8) years from on stream date, the TDI plant should be expanded, Olin will be given equal opportunity to supply the additional TDA required by General on a bid basis. If Olin's bid price is equal to or better than the competitive low bid, Olin will be given preference for the supply of TDA.

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F. Olin agrees to sell General any other raw materials for use in the manufacture of TDI, which Olin may supply to General, on substantially Olin's standard Terms and Conditions for the sale of organic chemical products, Exhibit "F" attached, as same may be amended from time to time.

#### IV. OUTPUT OF TDI

A. For the period of time that title to the TDI plant remains in Olin as herein elsewhere specified, Olin agrees to make available to General, for purchase, fifty per cent (50%) of the actual output capacity of the TDI plant. General will be entitled to purchase any capacity not utilized at any time by Olin. For purposes of this Article, actual capacity is assumed to be 20,000,000 pounds per year. If the actual capacity should be more or less than 20,000,000 pounds, the figures which appear below will be adjusted to reflect this difference.

B. The parties will agree upon the classification of all costs into the categories of fixed or variable costs. Amortization shall be calculated on the same basis in computing the price of TDI as is used by Olin for Federal income tax and in arriving at book value as used in Article VII - "TRANSFER OF TITLE".

C. Prior to the time the TDI plant goes on stream General agrees to purchase fifty per cent (50%) of the actual output of TDI produced therein at a purchase price equal to one-half (1/2) of all Olin's operating expenses (including start-up) of the TDI plant and related facilities. After the TDI plant goes on stream, General agrees to pay Olin, during such time as title to the TDI plant remains in Olin, in addition to the variable costs of whatever quantities of TDI General may purchase from Olin, an amount equal to fifty per cent (50%) of the fixed costs of the TDI plant and related facilities (including amortization), in any contract year in which neither General purchases nor Olin takes more than 10,000,000 pounds of TDI from the TDI plant. After the TDI plant goes on stream, if General purchases more than 10,000,000 pounds during any contract year, General will, in addition, pay in cash to Olin as a use charge an amount equal to an additional one per cent (1%) of the total fixed costs for such contract year for each additional 200,000 pounds of TDI purchased by General and an appropriate fraction of one per cent (1%) for quantities of less than 200,000 pounds. After the TDI plant goes on stream, if Olin should take more than 10,000,000 pounds of TDI

from the TDI plant during any contract year, General will be relieved of its requirement to pay fifty per cent (50%) of the fixed costs to the extent of one per cent (1%) of the total fixed costs for such contract year for each additional 200,000 pounds of TDI taken by Olin and an appropriate fraction of one per cent (1%) for quantities of less than 200,000 pounds.

Example 1: After TDI Plant is on Stream

If Olin takes in a given contract year 10,000,000 pounds and General purchases for the same year, the same quantity, each party would bear one-half (1/2) of the annual fixed costs of the TDI plant.

Example 2: After TDI Plant is on Stream

If General purchases in a given contract year 12,000,000 pounds and Olin, for the same year, takes 5,000,000 pounds, General would pay Olin, in addition to one-half (1/2) the annual fixed costs, a use charge in an amount equal to ten per cent (10%) of the annual fixed costs of the TDI plant. Conversely, if Olin takes 12,000,000 pounds and General, for the same year, purchases 5,000,000 pounds, General will be required to pay only forty per cent (40%) of the annual fixed costs of the TDI plant.

Example 3: After TDI Plant is on Stream

If General purchases in a given contract year 8,000,000 pounds and Olin, for the same year, takes 5,000,000 pounds, each party will pay fifty per cent (50%) of the fixed costs of the TDI plant.

Variable costs will be determined monthly and, subject to adjustment on an annual basis, will be charged to each party in direct proportion to the percentage of total TDI production actually purchased by General and taken by Olin, as the case may be, during the month.

D. On or before the tenth (10th) day of each month, Olin will notify General to advance, towards payment of General's TDI purchase for such month, an amount equal to the estimated fixed and variable cost calculated pursuant to paragraph C of this Article and predicated upon General's firm estimate of the quantity of TDI production General expects to purchase during such month in accordance with paragraph H of this Article IV. General agrees to advance Olin in cash the amount within ten (10) days after receipt of such notice. At the end of each month the actual fixed and variable costs shall be determined pursuant to paragraph C of this Article and an invoice shall be rendered to General for the actual purchases during the month. General, upon notification by Olin, will advance any shortage and will receive credit for an overage.

E. "Contract Year" as used herein shall be a twelve (12) month period figured from the first (1st) day of the month following the date the TDI plant is deemed to be on stream and shall be a twelve (12) month period commencing on the same day of each year thereafter. Promptly after the close of each contract year, there shall be finally determined the fixed and variable costs for the year and the percentage thereof to be chargeable to General and borne by Olin. For the purpose of such final allocation, the purchases by General and take by Olin and costs incurred shall be considered on the basis of the close of each contract year, disregarding variations in quantities purchased and taken and in costs incurred which may have occurred from month to month. Upon completion of such annual determination of fixed and variable costs and the allocation thereof, any adjustments called for by such determinations between the parties in the amount of interim payments theretofore made shall be effected without delay.

F. Anything herein contained to the contrary notwithstanding, if the TDI plant should be shut down for a period of more than seventy-two (72) consecutive hours in consequence of a strike or other circumstances beyond the reasonable control of the parties, any costs properly allocable to such period will be borne by the parties in the ratio of their capacity entitlement.

G. General at all reasonable times shall have access to all records, books and accounts directly relating to the TDI plant. Promptly after the close of each contract year, all such books and accounts shall be audited by a firm of reputable public accountants selected by agreement between the parties who shall not be the public accountants of either party. Any controversy between the parties with respect to costs and the allocation thereof shall be submitted to the public accountants selected pursuant to this paragraph. General and Olin each agree to be bound by the determination of such accountants.

H. Each party will advise the plant manager and the other party for information purposes only, at least ten (10) days before the beginning of each quarter, of the quantity of TDI which such party expects to purchase or take during such quarter. Each party will advise the plant manager and the other party at least ten (10) days before the beginning of each month of its firm estimate of the quantity of TDI which such party expects to purchase or take during such month. Olin will maintain an inventory of TDI within the storage capacity of the plant, in a quantity to be determined from time to time by the Committee in order to take care of reasonable fluctuations from the estimates.

I. Each party will be free to process or sell all TDI purchased or taken by it from the TDI plant independently or to produce (provided it is not in conflict with or contrary to Article VII, paragraphs D and E, hereof), purchase or produce independently of the other party TDI not produce

V. OUTPUT OF HYDROCHLORIC ACID

A. General agrees to purchase from Olin Corporation hydrochloric acid from the TDI plant, free of interest, necessary and otherwise of satisfactory quality up to the limits of its requirements for such acid at its Ashtabula PVC plant, commencing no later than January 1, 1965, and continuing until General acquires title to the TDI plant in accordance with Article VII hereof, at an agreed price of Forty Dollars (\$40.00) per ton. During the period from the time the TDI plant goes on stream until January 1, 1965, General will use reasonable efforts to take all such hydrochloric acid up to the limits of General's requirements and General will pay for any hydrochloric acid so taken the price of Forty Dollars (\$40.00) per ton. General is a party to an agreement for the purchase of General's hydrochloric acid requirements, up to 17.6 tons per day, until December 31, 1964. Under such agreement, General has the right to be relieved of its obligation to make further purchases by paying Thirty Dollars (\$30.00) for each ton of acid not taken. However, General does not wish to invoke this right without

the concurrence of the other contracting party. General will use reasonable efforts to negotiate in the near future a mutually acceptable basis for terminating the sale of hydrochloric acid by such other party to General on or about the date such acid becomes available from the TDI plant. Olin agrees to apply the proceeds of the sale of hydrochloric acid to General from the TDI plant towards the TDI plant variable costs.

B. If, from the time the TDI plant goes on stream, General can produce satisfactory evidence to the effect that a reputable established U. S. supplier is selling hydrochloric acid of like quality to another U. S. producer of vinyl chloride at a delivered price of less than Forty Dollars (\$40.00) per ton in substantially equal quantities under a contract for one year or more, Olin's price to General of Forty Dollars (\$40.00) per ton shall be reduced to such lower price for the period of such contract.

C. Any hydrochloric acid which General is not required to purchase from Olin pursuant to A and B above shall be neutralized or sold by Olin. The cost of neutralizing will be allocated to the parties during any contract year in the ratio in which the parties purchase and take TDI during such year. The proceeds of sale, if any, shall be credited by Olin against the TDI plant variable costs.

## VI. KNOW-HOW

A. Olin will supply to the TDI plant Olin's first TDI process as to which Olin shall hold General harmless with respect to infringement of U. S. patents existing on the date hereof.

B. Olin is working on a second TDI process, and if the same is successful agrees to supply it to the TDI plant with the mutual understanding that Olin believes that such second process will be more economical than the aforesaid first process but that it may raise a question of infringement of existing U. S. patents of others. Olin agrees to disclose to General an opinion of its patent counsel as to infringement of existing U. S. patents by said second process. Should it be determined that said second process is more economical (taking such royalty payments as may be required into account) and should either Olin's or General's patent counsel be of the opinion that infringement is likely to exist, the procuring of any patent license shall be the responsibility of both parties up until the date of transfer, and neither party shall hold the other harmless with respect to such patent or patents. Any royalties paid under the second process, up to the date of transfer, shall be charged into the cost of manufacture of TDI.

C. Olin will supply to the Engineers all process specifications and design data for its TDI process to enable the Engineers to prepare full-scale engineering drawings required for the construction and operation of a TDI plant embodying said process. The cost of such engineering shall be considered by General and Olin as a proper element of cost of the TDI plant.

VII. TRANSFER OF TITLE TO TDI PLANT TO GENERAL

A. Olin hereby agrees to sell, convey and transfer, and General hereby agrees to purchase and accept, all of Olin's right, title and interest in and to the TDI plant at any time between the end of the third (3rd) contract

year and the end of the fifth (5th) contract year following the on-stream date of the TDI plant as specified in paragraph E of Article 1 hereof. The sale and purchase price shall be Olin's current net book value of the TDI plant as of the date of transfer of title. For purposes of determining such net book value, amortization shall be calculated on the same basis as used by Olin for Federal income tax purposes.

B. General agrees to give Olin at least eighteen (18) months' prior written notice, via Registered Mail, before the settlement date set for the transfer of title to the TDI plant. In the event Olin has not received such notice at least eighteen (18) months prior to the end of the fifth (5th) contract year, then for all intents and purposes such failure to give notice on the part of General shall be deemed automatic notice by General that the settlement date for the transfer shall take place at the end of the fifth (5th) contract year, and Olin and General hereby agree to execute, or cause to be executed, documents and/or instruments reasonably deemed necessary and/or desirable to effectuate the sale and transfer of the TDI plant from Olin to General free and clear of all encumbrances on said date, excepting any liens or encumbrances as may have existed on the land when first licensed to Olin. Olin shall insure the TDI plant for all risk of loss, liability and damage to property and facilities in accordance with Olin's normal policy and mutually agreed between the parties until transfer of title to General. The cost of insurance and the deductible portion of

losses, liabilities and damages to property and facilities shall be charged as a fixed cost of manufacture of TDI. Any credits arising from insurance claims shall be correspondingly treated.

C. General agrees that as an earnest money payment towards its obligation to purchase and acquire the TDI plant from Olin as herein specified, it will, after the execution hereof by both parties, pay to Olin during the course of construction of the TDI plant, against monthly billings to be rendered by Olin, sums of money the aggregate of which shall not exceed fifty per cent (50%) of Olin's total capital cost (not including start-up) of the TDI plant. Said aggregate sum shall be credited by Olin against the ultimate sale and purchase price for the TDI plant as determined in accordance with paragraph A of this Article. The remaining balance, if any, of the sale and purchase price shall be due and payable, in cash, by General to Olin at the time of settlement and transfer of title to the TDI plant. If at any time the aggregate amount advanced by General under the terms of this paragraph C exceeds Olin's then net book value of the TDI plant (determined as provided in paragraph A of this Article VII), Olin will promptly refund to General an amount in cash equal to such excess. Commencing with the date the TDI plant goes on stream Olin agrees to pay General interest on the balance of said aggregate sum as such balance may exist from time to time until the transfer date, at the rate of 3.5% per annum. Said interest shall be paid on each January 1, April 1, July 1, and October 1, in respect of the preceding three month period, and shall be computed by averaging the outstanding amount advanced

by General to Olin hereunder at the end of each month during such period. Interest charges shall not be included in the cost of the TDI plant or related facilities or the cost of manufacturing TDI. If for any reason Olin shall be unable to transfer a free and clear title in and to the TDI plant and related facilities to General as provided herein (unless any such default shall be waived by General in its discretion), Olin agrees to refund to General, on the date on which title to the TDI plant would otherwise have been transferred, the complete earnest money payments made by General with interest as herein provided, as well as return to General any advances pending at the time which are in excess of any planned purchases by General.

D. (i) Olin shall divulge and disclose to General such information with detailed backup data on the economics of its process for the manufacture of Toluene Di-Amine (TDA) as is necessary to enable General reasonably to check the capital and manufacturing costs of a TDA plant of approximately 16,500,000 pounds per year design capacity. It is understood that Olin shall not be obliged to disclose to General any process information relating to TDA.

(ii) Olin shall divulge and disclose to General all technical information and know-how relating to its process for the manufacture of TDI from Toluene Di-Amine (TDA). In this connection Olin shall disclose only its research, development and engineering information and know-how required for or useful in the final design of the aforesaid plant. Similarly, General shall disclose to Olin its research, development and engineering information and know-how, if any, required for or useful in the final

design of the aforesaid plant .

(iii) Each party shall divulge and disclose to the other from time to time all technical information and know-how relating to the manufacture and production of TDI from TDA conceived or developed by their respective personnel regularly assigned to the operation of the plant including personnel up to and including the Plant Manager .

(iv) Each party agrees to grant and hereby grants to the other and their respective wholly-owned subsidiaries, for no additional consideration, a nonexclusive, royalty-free, nonassignable, nontransferable right to utilize technical information, know-how and trade secrets of the other, in its and their operations in the United States, Canada and Mexico, and a royalty-free, nonexclusive, nonassignable, nontransferable license under "Patents" of the other party hereto:

(a) to practice the process for the manufacture of TDI from TDA;

(b) to manufacture and/or have manufactured equipment and machinery for use in connection with the operation of such process; and

(c) to use and sell products so produced .

Technical information, know-how and trade secrets, as used in this subparagraph (iv), shall mean (a) technical information and know-how relating to the manufacture and production of TDI from TDA as practiced in the plant from time to time up to the transfer date, including without limitation, all drawings, manuals and operating instructions for machinery, equipment and processes employed therewith; (b) all technical information and

know-how known jointly to Olin and General as a result of the design, engineering, construction and operation of the plant up to the transfer date, but not necessarily practiced or used in the plant; and (c) all technical information and know-how derived from research mutually sponsored by the parties hereto, even though such research is not completed at the transfer date.

(v) If for any reason this Agreement should be terminated by either party, as provided in paragraph H of Article X, or if by mutual agreement the parties for any reason whatsoever abandon the engineering, construction, completion and/or operation of the TDI plant prior to on stream, then and in such event the right and license granted by Olin to General and by General to Olin herein shall be void ab initio. If, after on stream date the parties, by mutual agreement, abandon the operation of the plant, then and in such event the rights and licenses granted by Olin to General and General to Olin shall remain in full force and effect.

(vi) "Patents" shall mean U. S., Mexican and Canadian patents owned or controlled on the transfer date by the designated party hereto and U. S., Mexican and Canadian patent applications filed by the designated party hereto on or before the transfer date, and any continuation, division, or reissues thereof, whether filed or issued before or after the date of transfer, and U. S., Mexican and Canadian patents issuing thereon, relating to the manufacture of TDI from TDA

and apparatus and equipment therefor, and as to which the designated party shall have the right to grant the herein granted license without payment to others.

(vii) Olin and General do hereby grant to the other an option effective from and after the transfer date to acquire a license from the other on any new or improved development (not otherwise licensed here-  
from TDA  
under) for the manufacture or use of TDI (patented or otherwise) based on a reasonable royalty to be negotiated between the parties which both parties agree will be at least as favorable to the other as to any third party.

E. The technical information and know-how disclosed by each party hereto to the other pursuant to the provisions of paragraph D may not be disclosed or made available to others, in whole or in part, for a period of ten (10) years from the date of this Agreement; provided, however, that limitations contained in this paragraph shall not apply to:

- (i) information which at the time of disclosure is in the public domain;
- (ii) information which, after disclosure, becomes part of the public domain by publication or otherwise, except by breach of this Agreement by the receiving party;
- (iii) information which the receiving party can establish by competent proof was in its possession at the time of disclosure;

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- (iv) information which the receiving party receives from third parties in the absence of a secrecy agreement; and
- (v) information necessarily disclosed by reason of the sale of the TDI produced <sup>by the use of such technical</sup> ~~in any such plant or~~ information and know-how. <sup>\*</sup> ~~plants.~~ <sup>\*</sup>

*[Handwritten initials and marks]*

Nothing herein contained shall be construed as impairing or restricting in any way the right of the receiving party to use or disclose any technical information, know-how and trade secrets of its own, regardless of any similarity thereof to technical information, know-how and trade secrets or data made available hereunder by the disclosing party.

F. For purposes of this Agreement, the words "wholly-owned subsidiaries" shall be construed to mean all companies in which the designated party owns or controls all of the voting stock thereof. Should a party hereto be prevented by law in any country from owning all of such voting stock, ownership by such party of the maximum amount of voting stock permitted by the law of such country shall be deemed to satisfy the requirements as "wholly-owned subsidiaries".

**VIII. ARBITRATION**

Except as otherwise provided, any controversy or claim arising out of or relating to this Agreement or the breach thereof shall be settled by arbitration in accordance with the Rules of the American Arbitration Association, and judgment upon the award rendered by the Arbitrator(s)

may be entered in any court having jurisdiction thereof.


**IX. ABANDONMENT**

In the event of the abandonment of the TDI plant construction prior to the completion thereof, Olin and General shall bear one-half (1/2) of the costs incurred with outside parties in direct connection with the TDI plant to the date of abandonment, as well as any cancellation costs necessitated by the abandonment.

**X. MISCELLANEOUS**

A. Olin agrees that without the prior consent of the Committee, Olin will not make or incur liability for any capital expenditures for additions or improvements to the TDI facilities after it goes on stream; dispose of any of the assets of the TDI facilities, or mortgage, pledge or in any other manner encumber the TDI facilities.

B. The parties contemplate that this Agreement may be supplemented by an agreement or agreements setting forth in greater detail in certain respects and in additional respects the rights and obligations of the parties as stated herein, such as but not limited to: maintenance of books of account, discharge of liabilities, ~~supply of water~~, disposal of waste, etc. Subject to any such further agreement or agreements, this Agreement shall be binding upon and inure to the benefit of the parties hereto and their respective successors. This Agreement may not be assigned by either party without the prior written consent of the other

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party.

C. Any notice, request or other communication given hereunder shall be deemed sufficient if given in writing addressed and mailed or delivered to the party for which such notice, request or other communication is intended, at the address herein stated, vis; to Olin at 460 Park Avenue, New York 22, New York, attention Vice President and General Manager of Organics Division; and to General at Akron 9, Ohio, attention of President, Chemicals and Plastics Division; or at such other address as such party may hereafter designate by notice in writing addressed and mailed or delivered to the other party hereto. Any such notice, request or other communication mailed by Registered or Certified Mail shall be deemed to have been given or delivered at the time of the mailing thereof; if otherwise mailed or delivered, it shall be deemed given or delivered when received.

D. The provisions of this Agreement shall be severable so that if any provisions hereof shall be held illegal or unenforceable, the remainder of the provisions hereof shall continue in full force and effect. On the transfer date, as provided in Article VII of this Agreement, all provisions of this Agreement shall lapse except the terms and conditions of sale contained in Article III and the provisions of Article VII, paragraphs D, E and F.

E. This Agreement supersedes all prior agreements and understandings between the parties relating to the subject matter hereof.

This Agreement may not be modified except by written instrument

executed by a duly authorized officer or representative of each party.


F. The failure of either party to insist in one or more instances upon the performance of any of the terms of this Agreement or to exercise any right hereunder shall not be construed as a waiver or relinquishment of the future performance of any such terms or the future exercise of such right, but the obligation of each party with respect to such future performance shall continue in full force and effect.

G. Neither Olin nor General shall have liability for delay in or failure to carry out the duties and/or obligations imposed upon them by this Agreement when such delay or failure is due to Acts of God, Federal, State or local laws or regulations, or other causes beyond their control, such as but not limited to strikes, lockouts, shortage of labor, or other industrial disturbances, acts of public enemy, wars (whether or not affecting the countries of the contracting parties), blockades, hazards of navigation, epidemics, fires, shortages of or inability to obtain fuel, electric power, transportation, raw material or manufactured products, embargo, restriction of transportation facilities, action of any governmental authority, compliance with any law, order, direction <sup>OR</sup> regulation \* ~~or request~~ of the government of the United States or any agency, department or officer thereof, or of any State, civil disturbances, explosions, breakage or accident to machinery and any other causes beyond such control, whether of the kind herein enumerated or otherwise, interfering \* ~~with the production of any of Seller's production points or with the shipment, carriage or delivery by Seller, or acceptance of delivery by Buyer,~~

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*M* 12

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~~of the articles affected thereby, shall not subject the party so failing to any liability to the other party and at the option of either party, the total quantity hereunder shall be reduced by the deliveries so omitted. The provisions of this paragraph shall be effective even though the circumstances or contingencies invoked by the Seller or the Buyer shall have been operative on the date hereof.~~



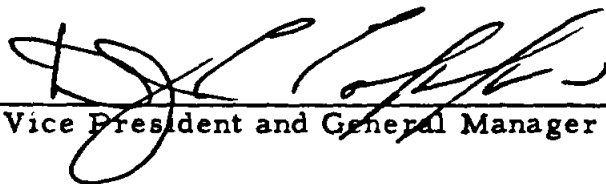
H. If the above proposal is acceptable to you, please signify your acceptance by signing the attached copy of this letter in the space provided for your signature and by returning such copy to us, whereupon this proposal will be deemed an agreement binding on both parties. The parties have estimated (a) that the final total estimated cost for the construction and erection of the TDI plant (final Olin and General approved Engineers' plans) will not exceed \$4,750,000 and (b) that the final estimated sales price of TDI to General, after the TDI plant is on stream, calculated in accordance with the provisions of this Agreement, will not exceed \$0.3750 per pound. The parties have agreed that the determination of final figures for (a) and (b) above shall be made no later than on or before November 1, 1962. If said final figures shall not have been determined by such date, or, having been determined, if either such figure is greater than the respective figure expressed in (a) and (b), then and upon either such event, anything herein to the contrary notwithstanding, either party may by not less than fifteen (15) days' prior written notice to the other via Registered

Mail, terminate and cancel this Agreement prior to December 1, 1962,  
it being mutually understood and agreed, however, that the provisions  
of paragraphs <sup>(v)</sup> D, E and F of Article VII hereof shall, in any event,  
survive and the parties shall be bound thereby.

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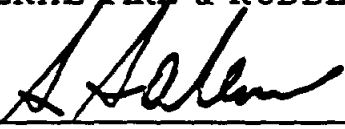
Very truly yours,

OLIN MATHIESON CHEMICAL CORPORATION  
Organics Division

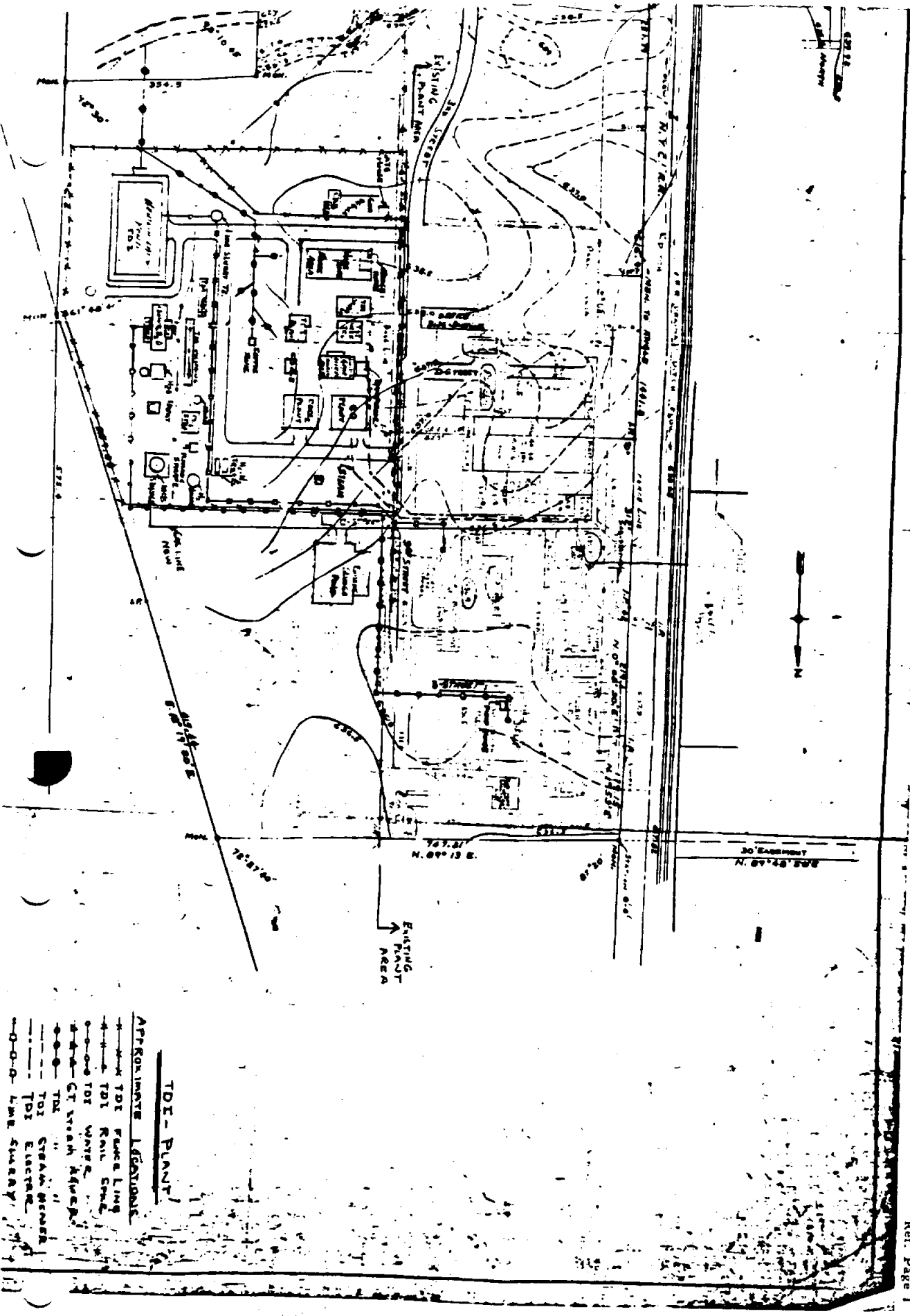
By:   
Vice President and General Manager

ACCEPTED AND AGREED TO:

THE GENERAL TIRE & RUBBER COMPANY

By:   
President, Chemical Plastics Division

Date: 6/28/62



APPROXIMATE LEGENDS

TDI-PLANT

--- TDI RAIL LINE

--- TDI RAIL CROSS

--- TDI WATER

--- CT WASH. W/ST. S.

--- TDX

--- TDI STEAM SERVICE

--- TDI ELECTRIC

--- TDI ELECTRIC

--- TDI ELECTRIC

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Attachment to  
AGREEMENT between  
OLIN and GENERAL TIRE  
dated June 21, 1962.

EXHIBIT "B" Page 1 of 2

Ref. Page 5

SERVICES

It is the intent of the parties that Olin's TDI plant at Ashtabula, Ohio will be charged for services rendered to it by General's PVC plant at General's cost. Determination of cost will be in accordance with General's accounting practices at the date of this agreement with the following two exceptions:

- a) Steam will be charged to all departments using same.
- b) The order of distribution of service departments will be as listed below.

Following is the services distribution and basis of allocation for same:

<u>Order</u>	<u>Departments (Gen'l's PVC Plant)</u>	<u>Distribution to PVC Plant</u>	<u>Basis of Distribution to PVC Plant</u>
1st	Factory Administration	All departments	Number of hourly and salary employees
2nd	General Office	All remaining departments	Number of hourly and salary employees
3rd	Maintenance Overhead	All remaining departments	Maintenance hours per maintenance work orders for each department
4th	Laboratory	Productive departments	Tests performed weighted for time required
5th	Warehouse and Shipping	Distribution Expense	In total

The basis of distribution to Olin's TDI plant shall be as follows:

Departments in  
Gen'l's PVC Plant

Basis of Distribution to Olin's TDI Plant

Factory Administration  
General Office

No direct distribution.  
Hourly Payroll - Ratio of hourly employees to total hourly employees.  
Accounts Payable - Ratio of invoices processed to total invoices.  
Purchasing - Ratio of purchase orders issued to total purchase orders.

The above are not all inclusive of the type services to be performed. The cost of similar services which may be required will be distributed on the basis of relative quantitative or time values.

Departments in  
Gen'l's PVC Plant

Basis of Distribution to Olin's TDI Plant

Maintenance Overhead	Maintenance labor and direct materials - direct per work order. Maintenance overhead - maintenance hours per work orders for each department.
Laboratory	For tests performed - number of tests weighted for time required.
Warehouse and Shipping	No proration.

The cost of space utilized by TDI plant personnel in any department of General's PVC plant will be charged to Olin's TDI plant on the basis of square footage occupied. The cost of space includes applicable depreciation, taxes, insurance, utilities and maintenance.

The cost of any equipment utilized will be charged to Olin's TDI plant on the basis of a rental charge mutually agreed upon.

In the event, during such time as title to the TDI plant is in Olin, Olin should furnish services from the TDI operation to General, such services shall be at Olin's cost. Determination of cost will be in accordance with Olin's normal accounting practice.

Neither Olin nor General will apply any Divisional or Corporate overhead to cost as defined above.

Attachment to  
AGREEMENT between  
OLIN and GENERAL TIRE  
dated June 21, 1962.

EXHIBIT "C" - Ref. Page 5

RAW MATERIALS SPECIFICATIONS

TOLYLENE DIAMINE-80/20-Stripped

	<u>Analytical Method Number</u>	<u>Specification</u>
Purity (by perchloric acid titration)	CAM-46-61	94.0% min.
Total Reducibles as dinitro toluene (by $TiCl_3$ )	CAM-19-61	0.5% max.
Dinitro toluene (by polarograph)	CASR-22-61	Trace
Nitrotoluidines (by polarograph)	CASR-22-61	0.3% max.
Moisture (by vapor phase chromatography)	CAM-53-61	0.3% max.
Ash	CAM-17A-61	-
Iron	CAM-12-60	-
Isomer Ratio (2,4- to 2,6-)	CAM-51-61	80/20 <sup>±</sup> 2%

*(Handwritten signature)*  
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Attachment to  
AGREEMENT between  
CLIN and GENERAL TIRE  
dated June 21, 1962.

EXHIBIT "D" - Ref. Page 5

PRODUCT SPECIFICATIONS

TOLYLENE DI-ISOCYANATE - 80/20

	<u>Analytical Method Number</u>	<u>Specification</u>
Purity	CAM-47-61	99.5% min.
Monochlorobenzene	CAM-12-62	0.10% max.
Hydrolyzable Chloride	CAM-25-61	0.008% max.
Acidity (as HCl)	CAM-20-61	0.002-0.004
APHA Color	ASTM-D 1638-60T 70-75	15 max.
Isomer Ratio (2, 4-to 2, 6-)	ASTM-D 1638-60T, 14-25	80/20 ± 2%

*Handwritten signature/initials*

E A S E M E N T

I-5689

THIS AGREEMENT entered into this 23rd day of July, 1965, between THE GENERAL TIRE & RUBBER COMPANY, a corporation organized and existing under the laws of the State of Ohio, with its principal office and whose tax mailing address is 1708 Englewood Avenue, Akron, Ohio, the GRANTOR, and OLIN MATHIESON CHEMICAL CORPORATION, a corporation organized and existing under the laws of the State of Virginia, duly qualified to do business in the State of Ohio, with its principal office at 460 Park Avenue, New York 22, New York, the GRANTEE.

W I T N E S S E T H:

(1) That said GRANTOR, for and in consideration of the sum of Ten Dollars (\$10.00), and other valuable consideration to it now paid by said GRANTEE, as well as for and in consideration of the covenants herein contained, does hereby grant unto the GRANTEE, easements and rights-of-way (hereinafter sometimes referred to as "the easements") over, under, across and through the lands of GRANTOR, situated in the Township of Ashtabula, County of Ashtabula and State of Ohio, and known as being a part of Lot 6, Erie Tract in said Township, and containing in the aggregate, approximately 48.010 acres, more or less, and conveyed to the GRANTOR by diverse deeds as follows:

- (A) Deed dated August 31, 1953, and recorded in Volume 499 Page 518, Ashtabula County Records;
- (B) Deed dated May 14, 1953, and recorded in Volume 502, Page 446, Ashtabula County Records;
- (C) Deed dated December 14, 1956, and recorded in Volume 545, Page 384, Ashtabula County Records;
- (D) Deed dated September 20, 1956, and recorded in Volume 542, Page 270, Ashtabula County Records;

said easements being given in connection with a certain lease of even date herewith given by GRANTOR to GRANTEE to serve the premises therein leased and being more particularly described as specified below:

- (a) Easements and rights-of-way to construct, lay, maintain, operate, repair, replace and/or remove pipelines (hereinafter sometimes referred to as ("the pipelines")) for the transportation of chemicals,

oil, gas, water and any products thereof, or any other fluid or substance, together with such drains, valves, fittings, meters and similar appurtenances as may be necessary or convenient to the operation and maintenance of the pipelines on, over, under, across and through the following described three (3) parcels of land, to wit:

- (i) Being known as part 6, Erie Tract in the Township of Ashtabula, County of Ashtabula, State of Ohio:

Being a strip of land 15' wide and running from the northerly line of Middle Rd. to the southerly low bank of a small stream known as Fields Brook, the centerline of said 15' strip being more generally described as follows:

Beginning at a point in the northerly line of Middle Rd., said point being 20' Ft. east of the centerline of a 24' Ft. asphalt roadway leading from Middle Rd., northerly to The General Tire & Rubber Company main office bldg. as shown on a drawing titled Map of Lands on North Side Middle Rd., revised November 1963, as measured along the said north line of Middle Rd.; thence running N. 1° 04' 15" W., parallel to the said centerline of said roadway, and 20' Ft. easterly therefrom, about 430' Ft. to a point; thence running N. 14° 18' 15" E. about 82' Ft. to a point; thence running N. 4° 00' 15" W. parallel to said centerline of said roadway about 55' Ft. to a point in the southerly low bank of a small stream known as Fields Brook, said point also being in the southerly line of a lease parcel from General Tire & Rubber Co. to Olin Mathieson Chemical Corp., shown in Exhibit "A", attached hereto and made a part hereof, as Item No. 6, and colored in brown.

- (ii) Being known as part Lot 6, Erie Tract in the Township of Ashtabula, County of Ashtabula, State of Ohio:

Being a strip of land 15' Ft. wide and running easterly from the easterly line of the New York Central Railroad Co. land to the easterly pavement edge of an existing 24' Ft. roadway, the centerline of said 15' Ft. strip being more generally described as follows:

Beginning at a point in the easterly line of land of the New York Central Railroad Co., said point being 453.60' Ft. northerly from a southeast corner of said railroad land, as measured along the easterly line of said railroad land; thence running S. 89° 51' 30" E. about 420 Ft. to a point in the easterly pavement edge of an existing roadway leading

from Middle Road to The General Tire & Rubber Co. main office bldg. as shown on a drawing titled Map of Lands on North Side Middle Rd. revised November, 1963, said point also being on the easterly line of the lease parcel from General Tire & Rubber Co. to Olin Mathieson Chemical Corporation, shown on Exhibit "A" attached hereto and made a part hereof, as Item No. 7, and colored in green.

- (iii) Being known as part Lot 6, Erie Tract, in the Township of Ashtabula, County of Ashtabula, State of Ohio:

Being a strip of land 15'Ft. wide running from the easterly line of land of New York Central Railroad Co., to the westerly line of lease premises of Olin Mathieson Chemical Corp., the centerline of said 15'Ft. strip being more generally described as follows:

Beginning at a point in the easterly line of land of the New York Central Railroad Co., said point being about 120'Ft. northerly from an angle therein, as measured along the said railroad's easterly line; thence running S 89° 51' 30" E. about 175'Ft. to a point; thence running S. 0° 08' 30" W., parallel to an easterly line of said railroad about 570 Ft. to a point; thence running S. 89° 51' 30" E. about 200'Ft. to a point; thence running N. 0° 08' 30" E. about 14'Ft. to a point; thence running S. 89° 51' 30" E. about 211'Ft. to a point in a steel chain link fence, said point also being in a westerly line of lease premises from General Tire & Rubber Co. to Olin Mathieson Chemical Corp., shown on Exhibit "A" attached hereto and made a part hereof, as Item No. 8, and colored in purple.

- (b) An easement and right-of-way to construct, lay, maintain, operate, repair, replace and/or remove a railroad spur track, together with such switches, fittings, appliances, signals, meters and appurtenances as may be necessary or convenient to the operation and maintenance of the railroad spur track on, over, across and through the following described parcel of land, to wit:

Being known as part Lot 6, Erie Tract in the Township of Ashtabula, County of Ashtabula, State of Ohio:

Being a strip of land 50'Ft. wide running from the easterly line of land of the New York Central Railroad Co., to the westerly line of lease premises of Olin Mathieson Chemical Co., the centerline of said 50'Ft. strip being more generally described as follows:

Beginning at a point in the easterly line of land of the New York Central Railroad Company, said point being 70.91 Ft. northerly from a southeast corner of said railroad land as measured along said easterly line of railroad land; thence running northeasterly along a curve having a chord distance and bearing of 195.81'Ft., N. 67° 25' 50" E., an arc distance of 199.80'Ft. to a point; thence running N. 86° 51' 20" E. about 174'Ft. to a point in the easterly edge of pavement of an existing 24'Ft. roadway as shown on a drawing titled Map of Lands on North Side Middle Rd., revised November 1963, said point also being in a Westerly line of lease premises from General Tire & Rubber Co. to Olin Mathieson Chemical Corp., shown on Exhibit "A": attached hereto and made a part hereof, as Item No. 9, and colored in red.

- (c) An easement and right-of-way on, over and across the following described parcel of land to share in common with GRANTOR the use of a road and roadway, together with all surfaces, shoulders, abutments, bridges and/or crossings, a part of and used in connection thereto for ingress and egress, at all times, to and from GRANTEE's industrial facility located on premises leased by GRANTOR to GRANTEE, and being a part of the same lands of GRANTOR hereinabove first described; it being understood that GRANTOR shall maintain, repair and replace such road and roadway in a reasonably good condition at all times; and further understood by the parties hereto that GRANTEE and GRANTOR shall share, pro rata, as may be mutually agreed in writing between them from time to time, the cost and expense for maintaining, repairing and/or replacing said road and roadway, to wit:

Known as part of Lot 6, Erie Tract in the Township of Ashtabula, County of Ashtabula, State of Ohio:

Being an existing 24' Ft. wide asphalt pavement running northerly from Middle Rd. to a steel chain link fence gate by The General Tire & Rubber Co. main office bldg. to be used for ingress & egress purposes and being more generally described as follows:

Beginning at a point in the centerline of Middle Rd., said point being 401.4 Ft. easterly from the easterly line of land of the New York Central Railroad Co., as measured along the said centerline of Middle Rd.; thence running northerly along the westerly pavement edge of said 24 Ft. roadway as shown on a drawing titled Map of Lands on North Side Middle Road, as revised November 1963, about 1520 Ft. to a chain link fence gate, said gate being about 20' north of the southeast corner of said main office bldg. of The General Tire & Rubber Co.; thence running easterly along said gate 24 Ft. to a point, said point being near the northwest corner of a metal guard house bldg.; thence running southerly parallel to the first described line and 24 Ft. easterly therefrom, and along the easterly pavement edge of said existing roadway about 1520 Ft. to the said centerline of Middle Rd.; thence running westerly along the said centerline of Middle Rd. 24 Ft. to the place of beginning, shown on Exhibit "A" attached hereto and made a part hereof as Item No. 5, colored in blue.

(2) GRANTOR does hereby also grant unto the GRANTEE the right and privilege to enter upon the GRANTOR's abutting and adjacent land as may be necessary or required for the purpose of laying, installing, operating, repairing, maintaining or removing the pipelines and enjoying the easements above defined.

(3) GRANTOR makes no representation or warranty, expressed or implied, as to the condition of the premises or the suitability of the same for the uses or purposes desired. GRANTEE accepts the premises in its present condition.

(4)(a) GRANTOR reserves unto itself the right to use the land covered by the herein granted easements and rights-of-way for any purpose whatsoever in its own present and future operations, without limitations, so long as it does not interfere with or obstruct GRANTEE's use and enjoyment according to the terms of this Agreement.

(b) It is understood that there may be various pipelines on, over, under, through and across GRANTOR's lands within which these easements are granted, which lines may be used by GRANTOR and others. It is understood and agreed in this connection that GRANTEE's use of these easements, including any alterations or improvements made, maintenance or repairs, shall not in any manner interfere with, alter, or obstruct the use, operations, maintenance and repair of any such

pipelines, and that before GRANTEE undertakes to construct its improvements on the easements or rights-of-way, or alter the GRANTOR's premises for the purpose hereinabove described, it will locate and spot in cooperation with GRANTOR, all such pipelines and shall construct and maintain its improvements on the easements and rights-of-way in such manner so as not to cause harm or damage to any such lines.

(5) GRANTEE agrees to bear as its own expense the payment of any increase of any property tax or other taxes levied on GRANTOR against the herein described improvements to be made by GRANTEE, resulting from or attributed to the improvements by the GRANTEE hereunder.

(6) GRANTOR reserves unto itself, its successors and assigns, all rights of ownership not herein otherwise granted to GRANTEE, including but not limited to the right to cross and recross subject easements grant.

(7) GRANTEE shall observe and shall require all contractors performing work on GRANTOR's premises to observe all reasonable fire and safety procedures and such work shall be conducted in such a way as to not unreasonably interfere with GRANTOR's operations.

(8) GRANTEE shall procure all permits and licenses requisite to the activities of GRANTEE in the enjoyment of the grant herein set forth, and GRANTOR agrees to reasonably cooperate with GRANTEE in obtaining any such permits and licenses.

(9) TO HAVE AND TO HOLD the hereinabove such grant of easements and rights of way, rights and privileges to the said GRANTEE, its successors and assigns so long as the certain lease of even date herewith given by GRANTOR to GRANTEE shall remain in full force and effect.

IN WITNESS WHEREOF, GRANTOR and GRANTEE have hereunto set their hands and corporate seals this 23<sup>rd</sup> day of July, 1965.

THE GENERAL TIRE & RUBBER COMPANY

In the presence of:

Walter J. Ellison  
Allen K. Lewis

By W. R. Smith  
its Vice President

Approved as to Form  
LEGAL DEPARTMENT  
By [Signature]  
Date 7/14/65

(SEAL)

By [Signature]  
its Asst. Secretary

OLIN MATHIESON CHEMICAL CORPORATION  
Chemicals Division

In the presence of:

[Signature]  
[Signature]

By [Signature]  
Its Vice President & General Manager  
By [Signature]  
Its Asst. Secretary

RECEIVED  
OCT 5 1965  
E. F. CLAYTON

I-5688

AGREEMENT OF LEASE

THIS AGREEMENT OF LEASE made and entered into between THE GENERAL TIRE & RUBBER COMPANY, a corporation of the State of Ohio, with its principal office and tax mailing address at 1708 Englewood Avenue, Akron, Ohio, the LESSOR, and OLIN MATHIESON CHEMICAL CORPORATION, by its Chemicals Division, a corporation of the State of Virginia, duly qualified to do business in the State of Ohio, with its principal office located at 460 Park Avenue, New York, New York, the LESSEE.

W I T N E S S E T H:

For and in consideration of the premises and other good and valuable considerations, the parties hereto agree as follows:

LESSOR is the owner of a certain tract of land, situated in the Township of Ashtabula, County of Ashtabula, State of Ohio, and known as being a part of Lot 6, Erie Tract, in said Township, containing in the aggregate approximately 48.010 acres, more or less, and conveyed to the LESSOR by diverse deeds as follows:

- (a) Deed dated August 31, 1953 and recorded in Volume 499, Page 518, Ashtabula County Records.
- (b) Deed dated May 14, 1953 and recorded in Volume 502, Page 446, Ashtabula County Records.
- (c) Deed dated December 14, 1956, and recorded in Volume 545, Page 384, Ashtabula County Records.
- (d) Deed September 20, 1956, and recorded in Volume 542, Page 270, Ashtabula County Records.

LESSOR does hereby grant, demise and lease to the LESSEE, subject to easements and rights-of-way heretofore granted and conveyed by the LESSOR, for LESSEE'S exclusive use for manufacturing, production, industrial and commercial purposes, and other business purposes, a portion of the afore-said tract of land (hereinafter sometimes referred to as "leased premises"), more particularly bounded and described as follows:

Being known as part of Lot 6, Erie Tract in the Township of Ashtabula, County of Ashtabula, State of Ohio and being more generally described as follows:

Beginning at a point in a chain link fence known as station 752.25S. - 450.0E. General Tire survey as shown on a drawing titled Map of Lands - North Side Middle Rd., revised November 1963; thence running N. 0° 08' 30" E. along said fence about 120' Ft. to a fence post; thence running S. 89° 51' 30" E. along said fence about 140' Ft. to a fence post; thence running N. 0° 08' 30" E. along said fence about 205' Ft. to a fence post;

thence running S 89° 51' 30" E. along said fence about 305' Ft. to a point in the westerly line of land now owned by The Cleveland Electric Ill. Co.; thence running S. 18° 19' 20" E. along said westerly line of The Cleveland Electric Ill. Co. about 566' Ft. to a stone monument; thence running S. 0° 09' E. along said westerly line of The Cleveland Electric Ill. Co. 436.2' Ft. to a stone monument in a northerly line of land now owned by Cabot Titania Corp.; thence running S. 87° 21' W. along said northerly line of Cabot Titania Corp. 354.5' Ft. to a stone monument; thence running S. 0° 22' 45" W. along the westerly line of said Cabot Titania Corp. about 185' Ft. to the southerly low bank of a small stream known as Fields Brook; thence running westerly along said southerly low bank of Fields Brook 410' Ft. to the easterly side of a bridge crossing over said Fields Brook; thence running northerly along said easterly line of said bridge and the easterly pavement edge of an existing 24' Ft. asphalt pavement roadway as shown on above indicated drawing about 810' Ft. to a chain link fence near the northwest corner of a metal guard bldg.; thence running easterly along said fence about 16' Ft. to a fence post; thence running N. 0° 08' 30" E. along said fence about 120' Ft. to a fence post; thence running S. 89° 51' 30" E. along said fence about 14' Ft. to a fence post; thence running N. 0° 08' 30" E. along said fence about 100' Ft. to the place of beginning, shown on Exhibit "A" attached hereto and made a part hereof, as Item No. 13, and colored in pink.

The term of this Lease shall commence retroactively as of June 21, 1962, and shall continue thereafter for a period of five (5) years from the date the manufacturing facility erected on the leased premises goes on stream as set forth and defined in the amendatory Letter Agreement between the parties hereto dated July 23, 1965, which date has been mutually fixed as October 1, 1965, or until the LESSOR shall earlier take title to the TDI plant and related facilities, as more fully set out in the Letter Agreement between the parties dated June 21, 1962, as amended, whichever shall occur first.

As rental for the leased premises, LESSEE shall pay the LESSOR annually, during the term hereof. on or before each anniversary date of the term of this lease agreement, the sum of Ten Dollars (\$10.00).

LESSEE shall have the right to immediate possession of the leased premises.

Real estate taxes and such assessments assessed against the leased premises and any improvements placed thereon by LESSEE during the term or any extension or extensions hereof, shall be paid for by LESSEE.

During the term or any extension or extensions hereof, LESSEE shall, at its own cost and expense, maintain:

- (a) any and all insurance coverages it deems desirable and/or necessary for its improvements on the leased premises, and otherwise, and
- (b) the leased premises and the improvements placed thereon by LESSEE, in reasonably good condition and repair.

It is mutually agreed between the LESSOR and the LESSEE that all improvements placed on the leased premises by the LESSEE are and shall remain the property of the LESSEE during the term of this lease or any extension or extensions hereof.

The within lease shall be subject to those provisions in a certain Letter Agreement entered into between the parties on June 21, 1962, as amended, relating to the lease of the within described premises, the pertinent provisions relating to use and occupation of which are incorporated herein by reference as though fully rewritten herein.

It is mutually agreed between the LESSOR and the LESSEE this lease shall not be recorded.

This lease shall be binding upon and inure to the benefit of the LESSOR and LESSEE, their corporate successors and/or assigns.

IN WITNESS WHEREOF, the LESSOR and LESSEE have hereunto set their hands and corporate seals this 23rd day of July, 1965.

THE GENERAL TIRE & RUBBER COMPANY

In the presence of:

Erroy J. Collins

Helen K...

(SEAL)

By [Signature]

its Vice President

And [Signature]

its Ass't. Secretary

Approved as to Form  
LEGAL DEPARTMENT  
By [Signature]  
Date 7/23/65

OLIN MATHIESON CHEMICAL CORPORATION  
Chemicals Division

In the presence of:

Helen M. Hubert

Joseph V. Salvia

(SEAL)

By [Signature]

its Vice President & Gen

And [Signature]

its Asst. Secretary

REC  
OCT 5  
E. F. CLAYTON

March 10, 1971

Olin Plastics  
120 Long Ridge Road  
Stamford, Connecticut 06904

RE: Agreement of Lease dated July 23, 1965

Gentlemen:

Reference is made to the existing Agreement of Lease between us dated July 23, 1965, covering the lease of our premises upon which the TDI facilities are located. The original Lease term expiration date of October 1, 1970, was established under the guideline dated the parties originally established for General's takeover of the plant. Since the takeover date has been mutually amended, with General's takeover date presently scheduled for October 1, 1973, it is proposed that we extend the term of the Agreement of Lease to October 1, 1973.

Therefore, it is agreed the aforesaid Lease term is hereby amended to extend retroactively from October 1, 1970, to October 1, 1973, with all other terms and conditions remaining in full force and effect.

If the foregoing is agreeable to you, please signify by signing at the space provided below and returning the fully executed original to General, retaining the signed carbon copy as a record for your file.

Yours very truly,

THE GENERAL TIRE & RUBBER COMPANY

By S. Salem  
S. Salem, Vice President

Agreed to and Accepted this \_\_\_\_\_ day of \_\_\_\_\_, 1971.

By W. J. Cannon  
Title \_\_\_\_\_

*WJC*

## TDI PRODUCT SALES AGREEMENT

This Agreement entered into this 27th day of September, 1971 by and between Olin Corporation, Plastics Division (Seller), with principal offices located at 120 Long Ridge Road, Stamford, Connecticut, and The General Tire & Rubber Company (Buyer), with principal offices at One General Street, Akron, Ohio.

### A. Product - Quality

Seller agrees to sell to Buyer, and Buyer agrees to purchase from Seller, not less than 80% of Buyer's requirements but in no event more than 40,000,000 pounds per annum, unless mutually agreed, of Toluene Di-Isocyanate (TDI) meeting the specifications ("Specification TDI") set forth in Exhibit "A" attached hereto and made a part hereof.

Buyer agrees to notify Seller by November 1 of each contract year (each twelve (12) month period beginning October 1 being considered a "Contract Year") of its estimated TDI requirements for the subsequent Contract Year. Buyer further agrees to amend this estimate quarterly during each Contract Year, so that Seller may adjust availability of product to Buyer to make the estimated requirements.

### B. Commencement Date

The Commencement Date for performance under this Agreement shall be October 1, 1973.

### C. Term of Agreement

The initial term of this Agreement shall be for a period of five (5) years from the Commencement Date and shall continue thereafter for an indefinite term subject to cancellation by either party upon not less than two (2) years' written notice prior to the end of the initial term or at any time thereafter.

D. Deliveries - Destination

Seller shall ship product by Railway Tank Car, Tank Truck, or Barge. Barge shipments will only be made upon mutual agreement of the parties. Shipments will be made in 20,000 gallon tank cars. Tank Truck or other tank cars may be used at Seller's discretion without any additional cost to Buyer. Minimum shipments must be in full tank cars or tank trucks in sizes available at time of shipment. In the event that the price for TDI as determined pursuant to Paragraph E hereof shall be F.O.B. Seller's plant, General agrees to reimburse Olin for tank car rental cost less mileage credits.

Seller shall make shipments to Buyer's operations located at Marion, Indiana; Newnan, Georgia; Orange, California; and such other destinations as may be mutually agreed upon.

E. Price of TDI

Seller shall in no event be obligated to extend to Buyer a price for TDI lower than Nineteen Cents (19¢) per pound, less any by-product credits (as defined in Exhibit "B" - "Cost Elements J," attached hereto and made a part hereof) F.O.B. Seller's plant, except pursuant to Subparagraph 1(c)(1) or (ii) and Subparagraph 3(b)(1) or (ii) as it relates to Subparagraph 1(b) hereof.

If, however, the price of TDI shall by calculation pursuant to Subparagraph 1(a) or (b) (except as calculated under Subparagraph 3(b)(1) or (ii) as it relates to Subparagraph 1(b)) be reduced below Nineteen Cents (19¢) per pound, less any by-product credits as above provided Seller agrees to sell to Buyer at Nineteen Cents (19¢) per pound, less such by-product credits, if any, F.O.B. Seller's plant, and Buyer may at its option, purchase all or any part of the requirements hereunder

at said price until said calculations equal or are above Nineteen Cents (19¢) per pound, less such by-product credits, if any.

1. Subject to Subparagraph (c) below, the price per pound of TDI bought and sold hereunder for each Contract Year shall be the lower of (a) or (b) below. The parties shall meet within thirty (30) days after the first day of each Contract Year during the term hereof to calculate and establish the applicable price of TDI for that Contract Year pursuant to (a) or (b) below.

(a) TDI list price as shown in the Oil, Paint and Drug Reporter (OPD) less Ten Percent (10%), but in no event shall price as so calculated be below Twenty Cents (20¢) per pound of TDI (this price to be a delivered price, and the cost of transportation, equipment and freight charges shall be for Seller's account.) In the event the OPD ceases to be published or changes its present method of reporting TDI prices, the parties hereto agree that the average of the published list prices for TDI in effect at the beginning of each Contract Year of E. I. duPont de Nemours & Company, Inc., and Mobay Chemical Company shall be used as the list price of TDI for purposes of this provision; or

(b) the Calculated Cost of TDA as set forth in Subparagraph 3 below multiplied by the Conversion Ratio which is hereby defined as:

The pounds of TDA required to produce a pound of TDI ("Conversion Ratio") for the entire term of this Agreement shall be the lowest annual average Conversion Ratio for the seven preceding Contract Years as defined under the Letters of Agreement dated June 21, 1962, as amended (the Letters of Agreement) between the Buyer and Seller prior to October 1, 1973 at the plant at Ashtabula, Ohio;

plus the Conversion Cost of TDI (as defined in Exhibit "B" - "Conversion Cost") at the plant at Ashtabula, Ohio at normal rated capacity operation but not less than 40,000,000 pounds of TDI per annum;

(c) Notwithstanding (a) and (b) of this Subparagraph 1 if at any time during the term of this Agreement:

(i) Buyer is able to purchase Specification TDI in quantities of not less than 10,000,000 pounds from a third domestic party at a lower delivered price of TDI to Buyer at Buyer's plants, for the period and quantity of such offer, upon evidence of same satisfactory to Seller, Seller will within fifteen (15) days, either meet such price or permit Buyer to purchase such quantity from the third party at such price, in which event Seller and Buyer shall be relieved from their obligations under this agreement to supply and purchase TDI with respect to the quantity of TDI supplied by the third party or parties for the period covered by said offer or offers; it being understood that at the end of said period the obligations of both Seller to supply and Buyer to purchase at the price determined herein shall be automatically reinstated and the quantity of such purchase shall apply towards Buyer's purchase requirements as set forth in Paragraph A hereof. If at any time during the term of this Agreement or any extension thereof, Buyer receives another such bona fide offer or offers, and notifies Seller as herein provided, Seller on each such occasion shall have the same right of election and the rights and obligations of the parties hereto shall again be as herein recited above; or

(ii) If at any time after the Commencement Date Seller or any other domestic supplier in which Seller has a financial interest shall be selling TDI at a price more favorable to such purchaser than the price then in effect under this Agreement, the price of TDI to Buyer for the period and quantity of such sale shall be reduced to the level of said price.

2. In determining the price of TDI under Subparagraph 1 (b) above in each Contract Year, the following shall apply:

(a) The basis for Conversion Cost for the one (1) year period beginning with the Commencement Date, shall be the lowest cost determined under (i) or (ii) below:

(i) Least square trend method for the years beginning October 1, 1965 through September 30, 1973 in accordance with accepted standard practice as set out in Handbook of Chemistry & Physics, Chemical Company, publisher, Cleveland Ohio, 42nd Edition 1961, p. 336; or

(ii) The lowest actual annual Conversion Cost for the years beginning October 1, 1965 through September 30, 1973 as set forth in Exhibit "B" and escalated to take into effect 1973 costs.

(b) The basis for Conversion Cost for each Contract Year thereafter shall be the calculations set forth in (i) and (ii) of Subparagraph (a) above increased or decreased as set forth in Conversion Costs (see Exhibit "B").

3. In determining the price of TDI to Buyer from Seller under Subparagraph 1(b) above in any Contract Year, the Calculated Cost of TDA for each year shall be determined as follows:

(a) The Calculated Cost of TDA for each Contract Year beginning with October 1, 1973, shall be Eighteen Cents (18¢) per pound (which shall include, for calculation purposes, freight as though delivered to the plant at Ashtabula, Ohio) multiplied by the Conversion Ratio of TDA to TDI as defined in Subparagraph 1(b) above (for examples see Exhibit "D"). However, if on the Commencement Date the price of Toluene shall exceed Nineteen and One-Half Cents (19½¢) per gallon (which shall include, for calculation purposes, freight as though delivered to the plant at Lake Charles, La.) the Calculated Cost of TDA shall be increased as set forth in Exhibit "C" attached hereto as same applies to Toluene only. The Calculated Cost of TDA shall be adjusted in each subsequent Contract Year pursuant to Exhibit "C".

(b) Notwithstanding (a) of this Subparagraph 3, if

(1) Buyer is able to purchase TDA in minimum quantities equal to Buyer's annual requirements of TDI multiplied by the Conversion Ratio as defined in Subparagraph 1(b) at a price which shall include for calculation purposes, freight as though delivered to Ashtabula, Ohio, from a third party, which after adding Ashtabula Plant Unit Conversion Cost at normal rated capacity operation but in no event less than 40,000,000 pounds of TDI per annum, calculated in accordance with Subparagraph 2 above, would result in a lower delivered price of TDI to Buyer under Subparagraph 1(b) above, for the period and quantity of such offer upon evidence of same satisfactory to Seller,

Seller will within fifteen (15) days either meet such lowered delivered price of TDI or permit Buyer to enter into such contract for the supply of TDA with the third party at such price, and supply the TDA to Seller to be tolled through Seller's plant at Conversion Cost for the period covered by said offer, it being understood that at the end of said period the obligations of both Seller to supply TDI and Buyer to purchase TDI at the price determined herein shall be automatically reinstated and the quantity of such TDI delivered hereunder shall apply towards Buyer's purchase requirements as set forth in Paragraph A hereof. If at any time during the term of this Agreement or any extension thereof, Buyer receives another such bona fide offer or offers, and notifies Seller, in writing, as herein provided, Seller, on each such occasion shall have the same right of election and the rights and obligations of the parties hereto shall again be as herein recited above. The delivered cost of TDA to Ashtabula, Ohio, shall be calculated by taking the delivered price to Seller's plant deducting the applicable freight rate, and adding the applicable freight rate to Ashtabula, Ohio, or

(ii) if at any time after the Commencement Date Seller or any other domestic supplier in which Seller has a financial interest shall be selling TDA to any purchaser at a price more favorable to such purchaser than the price then in effect under this Agreement, the price of TDA as it affects the price of TDI to Buyer under

Subparagraph 1(b) above, for the period and quantity of such sale, shall be reduced to the level of said price.

F. Terms of Payment

Net thirty (30) days from date of Seller's invoice.

G. Warranty

Seller expressly warrants that the material covered by this contract is of the quality set forth in Exhibit "A". Seller does not warrant merchantability or fitness for any particular purpose.

H. Excuses for Non-Performance

Failure of Seller to make, or Buyer to take, any one or more deliveries hereunder when due, if such failure is due to any contingency beyond the reasonable control of the party affected, such as, but not limited to, acts of God, bad weather, strikes, lockouts, shortage of labor, or other industrial disturbances, acts of public enemy, wars, blockages, hazards of navigation, epidemics, fires, shortages of or inability to obtain fuel, electric power, transportation, raw material or manufactured products, embargo, restriction of transportation facilities, action of any governmental authority, compliance with any law, order, direction, regulation or request of the government of the United States or of any State or of any agency, department, or officer thereof, civil disturbances, explosions, breakage or accident to machinery and any other causes beyond such control, whether of the kind herein enumerated or otherwise interfering with the production of the material covered by this contract at any of Seller's production points, or with shipment, carriage or delivery by Seller, or acceptance of delivery by Buyer, of the material affected thereby, shall not subject the party so failing to any liability to the other party and at the opti

of either party, the total quantity hereunder shall be reduced by the deliveries so omitted. Seller shall not be obligated to deliver the material to be supplied hereunder from other than its own production plant or plants and Seller shall not be obligated to rebuild or repair any damage or destruction to said plant or plants in order to fulfill this contract. The provisions of this paragraph shall be effective even though the circumstances or contingencies invoked by the Seller or Buyer shall have been operative on the date hereof. In the event any of the foregoing contingencies occur, Seller agrees to distribute that portion of its available supply of the material covered by this contract to Buyer which represents Buyer's share of total production as same existed for the year immediately prior to the occurrence of such contingency, and in such event Seller shall not be liable to Buyer for failure to deliver all or any part of the quantities sold hereunder. The settlement of strikes or lockouts affecting Seller's or Buyer's performance hereunder shall be entirely within the discretion of the party affected.

I. Title

Except for Buyer supplied tank cars, title to and risk of loss of all material sold hereunder shall pass to Buyer upon Seller's delivery to Buyer's plant whether or not Buyer pays all or any part of the freight. Where delivery is made into Buyer's supplied tank cars, title and risk of loss shall pass to Buyer upon loading Buyer's tank cars.

J. Non-Waiver

Seller's or Buyer's waiver of any breach or failure to enforce any of the terms or conditions of this Agreement shall not in any way

affect, limit or waive such party's right at any time to enforce strict compliance with every term and condition hereof.

K. Liability

It is agreed that Buyer assumes all risks and liability for results arising out of unloading, discharge, storage, handling and use of the TDI covered by this Agreement, including the use of such material alone or in combination with other substances or in the operation of any process and for, or arising out of compliance or non-compliance with Federal, State, Municipal or local laws and regulations with reference thereto. Seller assumes no liability for the failure of discharge or unloading implements or materials used by Buyer with respect to the TDI covered by this Agreement.

L. Assignability

This Agreement is not assignable or transferable by either party in whole or in part without the prior written consent of the other.

M. Notices

All notices required by or given in connection with this Agreement shall be sufficiently given if reduced to writing and sent by registered or certified mail with return receipt, addressed to Seller at:

120 Long Ridge Road  
Stamford, Connecticut  
Attention: Contract Administrator,  
Chemicals Group

and to Buyer at:

One General Street  
Akron, Ohio 44309  
Attention: Secretary

or, if to either party addressed as may be otherwise directed by such party from time to time by proper notice hereunder.

N. Complete Agreement

This TDI Product Sales Agreement supersedes all prior agreements and understandings between the parties relating to the subject matter

hereof and may not be modified except by written instrument executed by a duly authorized officer or representative of each party.

IN WITNESS WHEREOF, the parties have caused this Agreement to be executed as of the date herein first designated.

Approved	By	Date
Director		
General	ADK	9/27/4
Financial		
Marketing		
Manufacturing		
Purchasing		
Distribution		

OLIN CORPORATION

By *W.A. Cannon*  
Title Vice President & General Manager  
Plastics Division

ATTEST:

*[Signature]*  
Asst. Secretary

THE GENERAL TIRE & RUBBER COMPANY

By *S. Salem*  
Title S. Salem, Vice President  
President, Chemical/Plastics Div.

ATTEST:

*[Signature]*  
J. J. Dalton, Secretary

AK

EXHIBIT A

Specifications:

Assay .....	99.5 per cent, minimum
Total Acidity (as HCl)	
Type I .....	0.002-0.004 per cent
Type II .....	0.008-0.010 per cent
Hydrolyzable Chlorides	
Type I .....	0.005-0.008 per cent
Type II .....	0.011-0.014 per cent
Total Chlorine .....	0.20 per cent, maximum
Isomer Ratios	
2,4-Tolylene Diisocyanate .....	80.0 ± 2 per cent
2,6 Tolylene Diisocyanate .....	20.0 ± 2 per cent
Color-APHA .....	15 maximum

Physical Properties:\*

Molecular Weight .....	174.163
Physical State .....	Clear, colorless liquid
Color .....	Water white to pale yellow
Odor .....	Sharp, pungent
Hygroscopicity .....	Reacts with water with evolution of carbon dioxide
Light Sensitivity .....	Ultra Violet causes yellowing
Boiling Point at 760 mm, Hg .....	251°C. (484°F.)
at 10 mm, Hg .....	121°C. (249.8°F.)
Flash Point (Cleveland Open Cup) .....	132°C. (270°F.)
Fire Point (Cleveland Open Cup) .....	149°C. (300°F.)
Latent Heat of Evaporation (120°-180°C.) ....	144.9 BTU/lb.
Specific Gravity (25°C./25°C.) .....	1.22 ± 0.01
Vapor Density (air = 1) .....	6.0
Vapor Pressure @ 20°C. ....	Approximately 0.01 mm Hg.
Viscosity at 50°C. ....	1.45 cs.
at 100°C. ....	0.8 cs.
at 135°C. ....	0.5 cs.
Freezing Point .....	14.4°C. (58°F.)
Ash .....	20 ppm
Refractive Index N <u>23°C.</u>	
D .....	1.566 ± 0.001
Melting Point .....	11.5-13.5°C. (53-56°F.)
Specific Heat (77-167°F.) .....	0.375 BTU/lb./°F.

Shipping Data:

Pounds per gallon at 15.5°C. (60°F.) .....	10.23
at 20°C. (68°F.) .....	10.19
at 38°C. (100°F.) .....	10.02
at 60°C. (140°F.) .....	9.86
Containers and Net Contents as specified in this Agreement	

\*Determined on a commercial sample

Buyer will advise Supplier ten (10) days prior to the effective date of this agreement and by the 20th of each month thereafter a nomination of the amount and specification of TDI Buyer desires to take during the next succeeding month.

AK ASE 02/11/02

EXHIBIT B

Conversion Cost

The Conversion Cost will be composed of the following Cost Elements as they occurred in the each year beginning October 1, 1966, and ending September 30, 1973. Depreciation Cost Element H and Technical Support Cost Element I will be added to the Cost Elements as they occurred in the years above. All Depreciation reflected in those years will be excluded except as defined in Cost Element H. By-Product Credits will be adjusted as defined below at the end of each "Contract Year." All Cost Elements defined as variable will be based on a cost per actual pounds of TDI produced in the year referenced. All Cost Elements defined as fixed will be based on a cost per 40 million pounds of TDI or annual rated capacity whichever is greater.

Cost Element A - Miscellaneous Raw Materials - Variable

Coke, Oxygen, Chlorine, Monochlorobenzene, Caustic Soda, Nitrogen, and Carbon Dioxide.

Escalation for "Contract Years" After October 1, 1973

The basis of escalation of these chemicals will be their usage in the year of the seven years preceding October 1, 1973, which generates the lowest "Conversion Cost."

Escalation will be achieved by the following formula:

$$\frac{A (X-Y)}{B} = Z$$

- A = Annual chemical usage as defined above.
- B = Actual pounds of TDI produced in year that chemical usage occurred.
- X = Competitive market price of chemical as of October 1 in current "Contract Year."
- Y = Competitive market price of chemical as of October 1, 1973.
- Z = Escalation factor to be added to the "Conversion Cost."

EXHIBIT B

Cost Element B - Steam - Variable and Fixed

Steam

Escalation for "Contract Years" After October 1, 1973

The basis of escalation of Steam will be the steam usage in the year of the seven years preceding October 1, 1973, which generates the lowest "Conversion Cost."

Escalation will be achieved by the following formula:

$$\frac{(EG+FB) [A (W-X) + C 70\% (W-X) + D (V-Y)]}{BG (E+F)} = Z$$

- A = Metered gas usage in year described above.
- B = Actual pounds of TDI produced in year described above.
- C = Metered gas to preheater and aerator in year described above.
- D = Soft water usage in boiler dedicated to TDI Plant in year described above.
- E = Pounds of Fixed Steam used in year described above.
- F = Pounds of Variable Steam used in year described above.
- G = Capacity pounds of TDI.
- V = Cost of soft water to Seller's plant as of October 1 in current "Contract Year."
- W = Cost of gas to Seller's plant as of October 1 in current "Contract Year."
- X = Cost of gas to Seller's plant as of October 1, 1973.
- Y = Cost of soft water to Seller's plant as of October 1, 1973.
- Z = Escalation factor to be added to the "Conversion Cost."

Cost Element C - Other Utilities - Variable and Fixed

Electricity, Natural Gas, Raw Water and Potable (city water)

EXHIBIT B

Escalation for "Contract Years" After October 1, 1973

The basis of escalation of these utilities will be their usage in the year of the seven years preceding October 1, 1973, which generates the lowest "Conversion Cost."

Escalation will be achieved by the following formula:

$$\frac{A (X-Y)}{B} + \frac{C (X-Y)}{D} = Z$$

- A = Annual Variable utility usage for period defined above.
- B = Actual pounds of TDI produced in year that utility usage occurred.
- C = Annual Fixed utility usage for period defined above.
- D = Capacity pounds of TDI.
- X = Utility cost per unit usage as of October 1 in current "Contract Year."
- Y = Utility cost per unit usage as of October 1, 1973.
- Z = Escalation factor to be added to the "Conversion Cost."

Cost Element D - Non-Escalated Cost - Fixed

Residue Removal (variable), Operating Supplies, Equipment Rental, Oxygen Facility Charge, Quality Control, General Tire Services, Olin Services, General Taxes and Insurance, Indirect Overhead, and Shipping. These "Cost Elements" exclude all wages, salaries, and maintenance costs.

Escalation for "Contract Years" After October 1, 1973

No escalation.

Cost Element E - Muriatic Credit - Variable

Muriatic Credit

Escalation for "Contract Years" After October 1, 1973

No escalation.

EXHIBIT B

Cost Element F - Labor - Fixed

Operating Labor, Vacation and Holiday Pay, Fringe Benefits, Quality Control Salaries and Wages, Indirect Overhead Salaries and Wages, Shipping Salaries and Wages, and Unloading and Handling Salaries and Wages.

Escalation for "Contract Years" After October 1, 1973

The basis of escalation of Labor will be labor costs incurred in the year of the seven years preceding October 1, 1973, which generates the lowest "Conversion Cost." Escalation will be achieved by the following formula:

$$\frac{A}{B} \left( \frac{X}{Y} - 1 \right) = Z$$

- A = Base labor costs incurred as defined above.
- B = Capacity of TDI plant.
- X = Average Labor cost of six major industries in Ashtabula, Ohio, as of October 1 in current "Contract Year."
- Y = Average Labor cost of six major industries in Ashtabula, Ohio, as of October 1, 1973.
- Z = Escalation factor to be added to the "Conversion Cost."

Cost Element G - Maintenance - Fixed

Maintenance Labor, Maintenance Material, Contract Maintenance, and Maintenance Overhead.

Escalation for "Contract Years" After October 1, 1973

The composite of these four Cost Elements will be computed by the following formula:

$$\frac{A}{B} X = Y$$

- A = Gross investment in Ashtabula TDI Plant as of October 1, 1973
- B = Capacity of TDI plant
- X = 7%
- Y = Cost of Maintenance per pound of TDI.

This Cost Element has no escalation.

EXHIBIT B

Cost Element H - Depreciation - Fixed

Depreciation of additional capital investment for pollution abatement required after October 1, 1973.

Escalation for "Contract Years" After October 1, 1973

The base charge for Depreciation per pound of TDI to be added to the other "Cost Elements" will be computed by the following formula:

$$\frac{A}{BC} = X$$

- A = Additional capital investment required for pollution abatement = \$300,000
- B = Asset Life = 10 years
- C = Capacity of TDI plant
- X = Depreciation cost per pound of TDI

This Cost Element has no escalation.

Cost Element I - Technical Support - Fixed

Technical Support

Escalation for "Contract Years" After October 1, 1973

The base charge for Technical Support per pound of TDI to be added to the other "Cost Elements" will be \$.0013 per pound.

Cost Element J - By-Product Credits - Variable

Ortho TDA Credit and Golden TDI Credit

Credits shall be calculated as of the end of each "Contract Year" as follows:

$$\frac{AX}{B} = Y$$

- A = Pounds of By-Product produced by Seller in "Contract Year."
- B = Pounds of TDI produced by Seller in "Contract Year."

EXHIBIT B

X = Average Selling Price of By-Product experienced by Seller in "Contract Year."

Y = By-Product Credit per pound of TDI for "Contract Year."

The total By-Product credits for each "Contract Year" shall be subtracted from the previously calculated Price of TDI as defined in Paragraph E, sub-Paragraph 1 (b). The difference between this new Price of TDI and the average price paid for TDI by Buyer during the "Contract Year" shall be rebated to Buyer.

EXHIBIT C

TDA COST ELEMENTS

COST FACTOR

ESCALATOR

Toluene

If the market price for toluene exceeds \$.195 per gallon (which shall include, for calculation purposes, freight as though delivered to the plant at Lake Charles, Louisiana), the price for TDA hereunder shall be increased at a ratio of \$.0012 per pound for each \$.01 per gallon or fraction thereof increase in said price of toluene.

If the market price for toluene becomes less than \$.18 per gallon (which shall include, for calculation purposes, freight as though delivered to the plant at Lake Charles, Louisiana), the price for TDA hereunder shall be decreased at a ratio of \$.0012 per pound for each \$.01 per gallon or fraction thereof decrease in said price of toluene.

Labor and Labor Related

If the Bureau of Labor Statistics Index of Average Weekly or Hourly earnings for Selected Occupational Groups as published in the most recent Handbook of Labor Statistics of the United States Department of Labor available as of October 1 of each "Contract Year" for the City of Louisville, Kentucky, increases or decreases from that in effect as of October 1, 1973, the price for TDA hereunder shall be increased or decreased at a ratio of \$.0002 per pound for each 1% or fraction thereof increase or decrease in said index.

Freight

If the railroad freight rate for shipments of TDA from Doe Run, Kentucky, to Ashtabula, Ohio, increases or decreases from that rate in effect as of October 1, 1973, the price for TDA hereunder shall be increased or decreased at a ratio of \$.00007 per pound for each 1% or fraction thereof increase or decrease in said rate.

EXHIBIT D

Examples of "Conversion Ratio" usage and price of TDI calculation  
formula as follows:  $AB + C = D$

	<u>1</u>	<u>2</u>	<u>3</u>	
A = Cost of TDA	.1800	.1800	.1800	x
B = "Conversion Ratio"	<u>.8100</u>	<u>.8000</u>	<u>.7900</u>	=
Cost of TDA in TDI	.1458	.1440	.1422	+
C = "Conversion Cost"	<u>.0900</u>	<u>.0900</u>	<u>.0900</u>	=
D = Price of TDI	.2358	.2340	.2322	

ORGANICS DIVISION  
460 PARK AVENUE, NEW YORK 22, NEW YORK



June 21, 1962

Mr. S. Salem, President  
Chemical Plastics Division  
The General Tire & Rubber Company  
Akron 9, Ohio

Dear Mr. Salem:

Reference is made to the agreement between us dated June 21, 1962 (Agreement), relating to the TDI plant (Plant) to be built by Olin near General's industrial facilities at Ashtabula, Ohio.

In recognition of the facts that:

(i) General has a definite obligation to take title to the Plant eventually and towards this end has committed itself to pay a substantial deposit against the ultimate purchase price,

(ii) General will be vitally concerned about the labor policies existent in the Plant when General takes over, because of the nearness of the Plant to General's present industrial facilities,

(iii) Olin has undertaken to train General's personnel assigned to the Plant in the Olin process for producing TDI from TDA, and in the operation and management

of the Plant, in anticipation of the ultimate acquisition of the Plant by General, and

(iv) General will have a genuine interest in the proper maintenance of the entire Plant, as well as the installation of any new and/or replacement machinery and equipment in the Plant at the time of takeover,

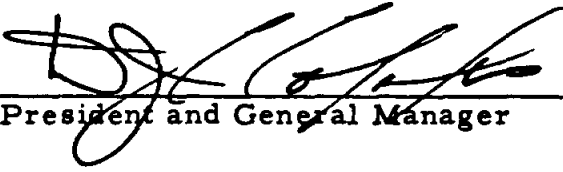
Olin states that the Committee members mentioned in Article I I of said Agreement will participate equally in establishing the management rules and regulations for the engineering, construction and operation of the Plant until such time as General takes title thereto. It is suggested by Olin that the Committee be comprised of four members, two each from General and Olin respectively.

Olin will appoint a Committee Manager who will represent the Committee in directing the activities of the plant management and will serve as Committee Chairman. The Committee Manager will receive his instructions from the Committee and he will be the only person authorized by the Committee to instruct the Plant Manager, who shall be competent to manage with minimum guidance from the Committee Manager.

If you are in agreement with the foregoing, would you please so indicate by signing at the space provided below for your signature, and return the fully executed carbon copy hereof to me. Thereupon, the necessary actions will be taken to follow through as outlined above.

Very truly yours,

OLIN MATHIESON CHEMICAL CORPORATION  
Organics Division

  
\_\_\_\_\_  
Vice President and General Manager

ACCEPTED AND AGREED TO:

THE GENERAL TIRE & RUBBER COMPANY

By:   
\_\_\_\_\_  
President, Chemical Plastics Division

Date: 6/28/62