WILM-MADEP

Olin

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November 27, 2002

Stephen M. Johnson, Chief
Site Management Section
Bureau of Waste Site Cleanup
Commonwealth of Massachusetts
Department of Environmental Protection
205A Lowell Street
Wilmington, MA 01887

Re: Request for Information; 51 Eames Street; DEP RTN 3-0471

Dear Mr. Johnson:

This responds to the Department's October 18, 2002 Request for Information to Olin concerning raw materials used, products manufactured, and chemical wastes disposed of at the 51 Eames Street facility in Wilmington, Massachusetts.

Before turning to Olin's responses, it is important to register two reservations about the information available to Olin on the subject matter of the requests. The Certification of Submittal attached to this letter is subject to these reservations.

First, the information requested is about events prior to Olin's involvement with the facility, including events that took place more than two decades before Olin's first involvement. Thus, Olin's responses are not based on the personal knowledge of Olin employees. Instead they are based on documents turned over to Olin when Olin purchased the facility, as well as documents, witness interviews and depositions obtained by Olin during a lawsuit against the prior owners

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and operators of the facility. While Olin believes that the information provided in this letter and its attachments is generally reliable and complete, Olin can only certify that it is accurate to the extent that those sources were and are accurate.

Second, while Olin believes that its responses fairly represent the body of information available on these subjects, that cannot be guaranteed. Olin has over 900 boxes of documents, containing over two million pages of information, stored in several locations as a result of the lawsuit against prior owners and operators of the facility. The time, manpower and funds have not been available to recover all of those documents from storage and to search through them to supplement Olin's responses to the Commonwealth's requests for information. If the Department wishes to review those documents, Olin will make them available at their storage sites for review and for copying.

Responses to Information Requested

> Request. Please provide a complete list of all raw materials used at the 51 Eames Street facility during operations prior to Olin's ownership at the site. For any raw materials that are comprised of a mixture of chemical compounds, please provide information (such as Material Safety Data Sheets) that identify the components of such materials.

Response. Attachment 1 is a copy of an Appendix to an expert report prepared by Dr. Andy Davis of Geomega, in connection with the lawsuit discussed above. In that Appendix, Dr. Davis presents comprehensive information about six products manufactured at the facility, including information about their raw materials, their chemical composition, and the wastes that were generated as they were manufactured. As explained by Dr. Davis the six products accounted for most of the liquid process wastes that were disposed of to the ground and into the groundwater at

the facility over its life. We understand the Department's purpose in requesting information from Olin is to identify the full range of chemicals that might have contaminated the groundwater below and adjacent to the facility, and the information in Attachment 1, by itself, should go a long way toward meeting that purpose.

Attachment 2 is an environmental disclosure given to Olin by Stepan Chemical Company when Olin bought the facility in 1980. That disclosure lists products then being made and previously made at the facility, as well as the raw materials used and the waste/byproducts generated in the manufacture of those products.

Attachment 3 presents an additional list of raw materials believed by Olin to have been used at the facility during its life. The information in this list was originally assembled by Olin during the lawsuit discussed above for internal purposes, with no expectation that it would subsequently need to be provided to anyone outside the company. Thus, the information was not collected in a way to cross-reference the records or other sources from which it came. Nevertheless, Olin believes the list fairly represents information drawn largely from documents then available to Olin.

> Request. Please provide a complete list of all products manufactured at the 51 Eames Street facility prior to Olin's operations, and the individual chemical components of those products.

Response. Olin again refers the Department to Dr. Davis' study, included in Attachment 1 and to the 1980 environmental disclosure in Attachment 2. Additionally, Attachment 4 contains a list of products believed by Olin to have been manufactured at the 51 Eames Street facility

during operations prior to Olin's ownership at the site, based on a review of technical bulletins published then by the facility's marketing department and provided to customers and potential customers. Olin has had no reason to investigate or determine the individual chemical components of these products.

> Request. Please provide a complete list of all chemical wastes and by-products that are known to have been disposed at the 51 Eames Street facility prior to Olin's operations.

Response. Attachment 1 lists the chemical wastes and by-products that were disposed of at the facility in the manufacture of the six products identified by Dr. Davis as accounting for all but a small amount of the liquid process waste that entered the ground and groundwater at the facility. Attachment 2, the environmental disclosure provided to Olin when it purchased the facility, also identifies chemical wastes associated with specific products. Additionally, Attachment 5, which is a copy of Olin's Supplemental Answers to Interrogatories posed by the Biltrite Corporation during the lawsuit discussed above, lists by location at the facility and time period, known releases of chemical wastes and by-products throughout the operating history of the facility. Further, I refer you to the information Olin submitted by letter to Mr. Pyott on May 16, 2002. The vast majority of potential contaminants of concern listed in Table 1 of that letter were chemicals used in making products both before and after Olin purchased the facility and that list is also thus responsive to your request. The Department should not assume that the chemicals were placed in the environment during the period of Olin's ownership simply because the information about them came from post – 1980 sources. To the extent those contaminants are found at the facility, Olin believes, based on all the evidence available, that, they were most likely disposed of there before Olin arrived on the scene.

Finally, in the interest of fully responding to the Department's requests for information, Olin asked Dr. Davis to go through his facility related records and to identify all chemicals referred to in connection with the facility. Attachment 6 presents the results of Dr. Davis's search.

Please let me know if you have questions regarding the above.

Sincerely,

Thomas P. O'Brien

Thomas P. O'Brien,
Manager Environmental Sites

Attachments

CERTIFICATION OF SUBMITTAL REQUIRED AT 310 CMR 40.0009(1) AND (6)

Re:

REQUEST FOR INFORMATION

I, Thomas P. O'Brien, attest under the pains and penalties of perjury (i) that I have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this submittal, (ii) that, based on my inquiry of those individuals immediately responsible for obtaining the information, the material information contained in this submittal is, to the best of my knowledge and belief, true, accurate and complete, and (iii) that I am fully authorized to make this attestation on behalf of the person or entity legally responsible for this submittal. I/the person or entity on whose behalf this submittal is made am/is aware that there are significant penalties, including, but not limited to, possible fines and imprisonment, for willfully submitting false, inaccurate or incomplete information.

Date: November 27, 2002

By: _____

ATTACHMENT 1

Appendix B: Product Formulation, Waste Streams, and Production

B-1 Introduction

Manufacturing and production records, as well as the report from Richard Strauss (1999), were used to calculate the amount of process waste that was sent to pits, ponds, and lagoons at the Wilmington property from 1953 to 1986. Products with liquid waste streams that were included in the analyses for this report were Opex, Kempore, hydrazine, Wytox ADP, OBSC/OBSH, and Wiltrol-N (Boynton, 1973; Ecology and Environment, 1980; Environmental Disclosure, 1980; McBrien, 1983c). Nitropore 5PT and phenolic and urea formaldehyde resins were identified in various documents as also producing liquid waste streams. Because Nitropore 5PT was produced only in small quantities (24,000 lb/yr) from 1973 to 1986, first in the pilot plant and later in Plant D-1, it was not included (Environmental Disclosure, 1980; Landry, 1999; McBrien, 1983b). Resins were produced from 1961 to 1967, first in the pilot plant and later in Plant B (Cantwell, 1997; Environmental Disclosure, 1980; Judd, 1997). Documents suggest that the resin waste products, which included only raw materials (phenol and formaldehyde), may have been removed by lime treatment in a trap pit outside Plant B (Environmental Disclosure, 1980; MIC, 1958; NPI, 1954; Riley, 1997a). Because there was no apparent filtering or washing step in the resin manufacturing process that would have generated significant quantities of waste, resins were not considered further in the analyses for this report (Judd, 1997; Riley, 1997a; Wandell, 1997).

The following sections describe the product formulation, waste stream composition, and production levels for Opex, Kempore, hydrazine, Wytox ADP, OBSC/OBSH, and Wiltrol-N. All chemical reactions in this section are taken from Strauss (1999).

B-2 Opex

Opex, also referred to by other names, such as Product A, RPC, 4X, dinitroso-pentamethylenetetramine (DNPT), was produced in Plant A (Figure B-1) from 1953 to 1986 (Cantwell, 1997; Environmental Disclosure, 1980; Judd, 1997; Swanson, 1997).

Opex is a nitrogen-blowing agent used in the manufacture of shoe soles, mechanical goods, insulation, and athletic equipment (Lasman, 1965).

B-2.1 Opex Product Formulation

The raw materials used in the manufacture of Opex at the Wilmington property included hexamethylenetetramine (hexa), sodium nitrite, and dilute hydrochloric acid (HCl). The manufacturing information summarized in this section is taken from Badger (1969), Strauss (1999), and Swanson (1958). To make a batch of Opex ($C_6H_{12}N_4$), solutions of hexa ($C_6H_{12}N_4$) and a slight excess of sodium nitrite ($NaNO_2$) were charged to a reactor with water. A dilute hydrochloric acid (HCl) solution was slowly added with ice to control the temperature of the reaction, which proceeded according to,

$$C_6H_{12}N_4 + 2NaNO_2 + 2HCl \rightarrow C_5H_{10}O_2N_6 + HCHO + 2NaCl + H_2O \quad . \qquad \text{(B-1)}$$

Formaldehyde (HCHO) and sodium chloride (NaCl) were generated as waste products. A portion of the hexa that was not reacted according to equation B-1 was decomposed by hydrochloric acid to ammonium chloride (NH_4Cl) and formaldehyde, i.e.,

$$C_6H_{12}N_4 + 4HCl + 6H_2O \rightarrow 4NH_4Cl + 6HCHO \quad . \qquad \text{(B-2)}$$

A schematic of the general steps in the process is presented in Figure B-2. As the temperature of the mixture cooled, Opex precipitated out of solution and 598 Oil was added to coat the solid. The oily mixture was pumped to a pan filter and washed with water. The solid Opex was retained on the filter, and the water-soluble products in the filtrate were sent to a drain.

B-2.2 Opex Waste Streams

The composition of the drain liquid included water soluble reaction products (formaldehyde, ammonium chloride, sodium chloride) and unreacted raw materials (sodium nitrite, 598 Oil). In addition, the drain liquid included water from the batch charge, a small amount from ice, and sodium nitrite and hydrochloric acid solutions (Badger 1969; Moorman, 1963; Strauss, 1999; Swanson, 1958). A small loss of water occurred through chemical reaction (equations B-1 and B-2). The oily mixture, that included Opex, was washed and filtered, however, insufficient information was available to calculate this quantity on a batch basis. The filtration water was accounted for indirectly in the calculation of other water streams in the effluent, as discussed in Section B-8.

Figure B-2 illustrates the general steps in the process, with typical quantities of batch reactants and products. The composition of the waste stream is summarized in Table B-1. Opex wastes were sent to Lake Poly from 1953 to 1969, the Acid Pits from 1970 to 1971, and the wastewater treatment plant from 1972 until the plant closure in 1986 (Figure B-1; Badger, 1969; Raytheon, 1970; Riley, 1997a; Willwerth, 1997).

B-2.3 Opex Production

Annual production levels of Opex (Table B-2) were determined from available production records (ABR, 1963; Badger, 1969; NPI Operations Reports, 1965; NPI Operations Reports, 1966; McBrien, 1980b; McBrien, 1983a; McBrien, 1984; NPI Daily Production Summaries for Weeks Ending August to December, 1961; Swanson, 1961). An interpolation between two known values was used for years that information was not available. An interpolation from zero in 1952 to the level of production that was obtained from documents for 1961 was used to determine production from 1953 through 1960. This assumption is consistent with the increase of sales from 1953 to 1958 (ABR Sales Summary, 1959). Production decreased from 1969 to 1984, therefore, the production levels for 1985 and 1986, which were not available, were assumed to be the same as

production levels in 1984. The 1986 production level was scaled down to reflect that production had ceased by September of 1986.

B-3 Kempore

Kempore, also referred to by other names, such as Product K-1, azodicarbonamide or azobisformamide (HDCI), was produced in Plant C-1 (Figure B-1) from 1956 to 1986 (Environmental Disclosure, 1980; Hwozdek, 1997; Judd, 1997). Kempore is a nitrogen-blowing agent used in the manufacture of vinyl-coated upholstery, luggage, garments, handbags, and vinyl flooring (Lasman, 1965).

B-3.1 Kempore Product Formulation

The Kempore manufacturing process was changed several times from 1956 to 1986 (Badger, 1969; D.Y.K., 1974; J.A.M., 1965; McBrien, 1978; Riley, 1964; Riley, 1965; Riley, 1966b; Strauss, 1999; Walker, 1965). The primary changes included the source of hydrazine used as a reactant, and the oxidizer used in the oxidation process. The first source of hydrazine used in the manufacture of Kempore was monohydrazine sulfate (MHS) from 1956 through 1963 (Strauss, 1999). From 1964 through most of 1970, hydrazine was produced in the CCU process at the site, and after that, hydrazine was purchased. Sodium dichromate was used as the oxidizing agent from 1956 until April, 1967, when sodium dichromate was used. The manufacturing information summarized in this section is taken from Badger (1969), NPI Kempore Operating Instructions (1967), NPI Kempore Operating Procedure, McBrien (1978), and Strauss (1999).

B-3.1.1 Sodium Dichromate Oxidation

Hydrazocarbonamide (HDCA, $NH_2CONHNHCONH_2$), an intermediate to Kempore, was produced by reaction of urea (NH_2CONH_2) and MHS ($N_2H_4 \cdot H_2SO_4$) or hydrazine (N_2H_4) in the presence of a sulfuric acid (H_2SO_4) catalyst, i.e.,

$$2NH_2CONH_2 + N_2H_4 \cdot H_2SO_4 \rightarrow NH_2CONHNHCONH_2 + (NH_4)_2SO_4 \quad , \qquad \text{(B-3)}$$

$$2NH_2CONH_2 + N_2H_4 + H_2SO_4 \rightarrow NH_2CONHNHCONH_2 + (NH_4)_2SO_4 \quad . \qquad \text{(B-4)}$$

The HDCA reaction mixture was pumped to a second reactor for oxidation. From 1956 until April 1967, solid sodium dichromate ($Na_2Cr_2O_7 \cdot 2H_2O$) and sulfuric acid were used in the oxidation step, i.e.,

$$NH_2CONHNHCONH_2 + 1/3Na_2Cr_2O_7 \cdot H_2O \ + 1/3H_2SO_4 \rightarrow \qquad \text{(B-5)}$$

$$NH_2CON:NCONH_2 + 1/3Cr_2O_3 + 1/3Na_2SO_4 + 2H_2O.$$

The Kempore ($NH_2CON{:}NCONH_2$) slurry was filtered and washed free of salts. The combined filtrate and washwater, containing urea, sulfuric acid, chrome oxide (Cr_2O_3), sodium sulfate (Na_2SO_4), and ammonium sulfate ($(NH_4)_2SO_4$) were sent to a drain. The wet cake from the filter press was dried, and the dry cake was ground into various particle sizes for sale. A schematic of the general steps in the process using sodium dichromate is presented in Figure B-3.

B-3.1.2 Sodium Chlorate Oxidation

From April, 1967 to 1986, hydrazine from the CCU process or purchased hydrazine was used in the HDCA step (equation B-4), and sodium chlorate ($NaClO_3$) was used in the oxidation step to produce Kempore, i.e.,

$$NH_2CONHNHCONH_2 + 1/3NaClO_3 + 1/6H_2SO_4 \rightarrow \qquad \text{(B-6)}$$

$$NH_2CON:NCONH_2 + 1/3HCl + 1/6Na_2SO_4 + H_2O.$$

The HDCA slurry was thickened prior to oxidation, generating a filtrate that was sent to a drain. A small amount of bromine, added as sodium bromide (NaBr), was added as a catalyst in the oxidation step, reacting according to,

$$6NaBr + 3Na_2SO_3 + NaClO_3 + 7/2H_2SO_4 \rightarrow 6HBr + HCl + 13/2Na_2SO_4 \ . \qquad \text{(B-7)}$$

The Kempore slurry was filtered and washed free of salts. The combined filtrate contained urea, sulfuric acid, hydrochloric acid (HCl), sodium sulfate, ammonium sulfate, and hydrogen bromide (HBr). A schematic of the general steps in the process using sodium chlorate is presented in Figure B-4.

B-3.2 Kempore Waste Streams

The drain liquid from 1956 through March of 1967 was composed of the water soluble reaction products chrome oxide, sodium sulfate, and ammonium sulfate, and the unreacted raw materials urea and sulfuric acid (Strauss, 1999). From April, 1967 to 1986, the drain liquid was composed of the water soluble reaction products hydrochloric acid, sodium sulfate, ammonium sulfate, and hydrogen bromide, and the unreacted raw materials urea and sulfuric acid. In addition, the drain liquid included water from the filtration step, batch reactants, and chemical reaction (McBrien, 1978; NPI Kempore Operating Instructions (1967), NPI Kempore Operating Procedure; Strauss, 1999).

Figures B-3 and B-4 illustrate the general steps in the process for the sodium dichromate and sodium chlorate processes, respectively, with typical quantities of batch reactants and products. The composition of the waste stream is summarized in Table B-3 for the sodium dichromate process, and in Table B-4 for the sodium chlorate process. Two numbers are presented for the water added to the HDCA reactor to reflect the difference in water content of the hydrazine source (MHS, CCU hydrazine, and purchased hydrazine) and the batch water added. Liquid wastes were sent to Lake Poly from 1956 to 1957, the East and West Pits from 1958 to 1965, the Acid Pits from 1966 to 1971, and the wastewater treatment plant from 1972 until the plant closure in 1986 (Figure B-1; Badger, 1969; Hwozdek, 1997; Raytheon, 1970; Riley, 1997a; Willwerth, 1997).

B-3.3 Kempore Production

Annual production levels of Kempore (Table B-5) were determined from available production records (ABR, 1963; Badger, 1969; NPI Operations Reports, 1965; NPI

Operations Reports, 1966; McBrien, 1980a; McBrien, 1983a; McBrien, 1984; Production, 1967; NPI Daily Production Summaries for Weeks Ending August to December, 1961; Swanson, 1961). An interpolation between two known values was used for years that information was not available. For 1956 through 1960, an interpolation from zero in 1955 to the level of production identified in documents for 1961 was assumed, which is consistent with the increase in sales from 1953 to 1958 (ABR Sales Summary, 1959). Kempore dispersions (Kempore SD) produced at the property were a mixture of manufactured Kempore with another chemical such as di-octyl phthalate (DOP). It was assumed that in production records, the amount of Kempore reported as a Kempore dispersion was also counted as Kempore, and therefore, Kempore dispersions were not included in production numbers (Strauss, 1999). Production decreased from 1979 to 1984, therefore, production levels for 1985 and 1986, which were not available, were assumed to be the same as production levels in 1984. The 1986 production level was scaled down to reflect that production had ceased by September of 1986.

B-4. Hydrazine

The chlorourea (CCU) process was developed at the Wilmington property to manufacture hydrazine for the production of Kempore. The CCU process was carried out in Plant C-3 (Figure B-1) from 1963 until sometime in 1970 (Environmental Disclosure, 1980; McBrien, 1980a; Papazian, 1967b; Strauss, 1961; Strauss, 1999). After 1970, hydrazine for the Kempore process was purchased.

B-4.1 Hydrazine Product Formulation

The manufacturing procedures and chemical reactions summarized in this section are taken from Strauss (1999). The CCU process was conducted in several steps. The first step was completed in a glass-lined Pfaudler reactor, where liquid chlorine (Cl_2) was mixed with a large excess of urea (NH_2CONH_2) suspended in a small quantity of water. The chlorourea mixture, containing chlorourea, urea hydrochloride complex, and urea, was metered into a pipeline reactor with an excess of sodium hydroxide solution (NaOH). The reaction products from the pipeline reactor were charged to a covered quench tank

containing excess sulfuric acid (H_2SO_4). Carbon dioxide was generated in this step and was vented to a scrubber, where it was absorbed and drained to a floor drain. The overall chemical reaction is

$$NH_2CONH_2 + Cl_2 + 4NaOH + H_2SO_4 \rightarrow N_2H_4 + 2NaCl + Na_2SO_4 + H_2CO_3 + 2H_2O \quad . \tag{B-8}$$

The quenched slurry was pumped into a horizontal filter box to remove precipitated sodium chloride (NaCl) and sodium sulfate (Na_2SO_4) salts. The salts were washed with cold water to remove adhered solution, and the filtrate solution containing the hydrazine (N_2H_4) was transferred to the Kempore process in Plant C-1. The remaining salts on the filter box were dissolved in hot water and discharged to the drain. A schematic of the general steps of the process is presented in Figure B-5.

B-4.2 Hydrazine Waste Streams

The discharges to the drain included the salt solution from the hot water wash (sodium chloride and sodium sulfate) and the scrubber water (Table B-6). At least from 1969 on, water for the hydrazine scrubber (20 gpm) was taken from cooling water (Badger, 1969). Therefore, water for the hydrazine scrubber was not calculated as part of the hydrazine waste stream but was included in the water calculation for the cooling water and other miscellaneous water streams (Section B-8). The amount of hot water added to dissolve the salts was the amount required to produce a 30% salt solution (Strauss, 1999). Wastes were sent to the East and West Pits from 1963 through 1965 and the Acid Pits from 1966 through 1970 (Figure B-1; Papazian, 1997a). Figure B-5 illustrates the general steps in the process, with typical quantities of batch reactants and products.

B-4.3 Hydrazine Production

Annual production of hydrazine (Table B-7) was estimated with available production records (Badger, 1969; NPI Operations Reports, 1965; NPI Operations Reports, 1966).

For years that data were not available, hydrazine production was estimated from Kempore production. The ratio of hydrazine to Kempore (0.34) was calculated from the years of available data, averaged, and applied to Kempore production for the years that no hydrazine data were available.

B-5 Wytox ADP

Wytox ADP, also referred to by other names, such as dioctyldiphenylamine (DODPA), Lestane, or Lestane X, is a rubber stabilizer used to protect rubber products from heat deterioration and flex cracking (Environmental Disclosure, 1980; Judd, 1997; Lasman, 1965; McBrien, 1983c). Wytox ADP was manufactured in Plant B (Figure B-1) from 1961 until 1971 (Badger, 1969; Judd, 1997; Riley, 1997a; Strauss, 1999).

B-5.1 Wytox ADP Product Formulation

The manufacturing information summarized in this section is taken from Strauss (1999). Wytox ADP ($C_{23}H_{43}N$) was produced by reacting diphenylamine (DPA, $C_{12}H_{11}N$) and di-isobutylene (DIB, C_8H_{16}) in the presence of an aluminum chloride ($AlCl_3$) catalyst, i.e.,

$$C_{12}H_{11}N + 2C_8H_{16} \xrightarrow{AlCl_3} C_{28}H_{43}N \quad . \qquad \text{(B-9)}$$

The aluminum chloride catalyst was removed from the batch by repeated washing with dilute caustic in water, which reacted to form aluminum hydroxide ($Al(OH)_3$) and sodium chloride (NaCl), i.e.,

$$AlCl_3 + 3NaOH \rightarrow Al(OH)_3 + 3NaCl \quad . \qquad \text{(B-10)}$$

After each water addition, the mixture was allowed to settle and the water layer containing the aluminum hydroxide and sodium chloride drained from the bottom of the reactor. A schematic of the general steps in the process is presented in Figure B-6. The finished product was drained in liquid form into long metal pans equipped with a heavy

chain on the inside of the pan (Wandell, 1997). The pans were placed outside of Plant B to dry. When the product had dried to a solid, the chain in the pan was pulled, breaking up the product into chunks that could be picked up and placed in barrels. The barrels were then removed to the grinding area where the Wytox ADP was ground to a prescribed particle size and packaged for shipping.

B-5.2 Wytox ADP Waste Streams

The drain liquid included aluminum hydroxide, DIB, Wytox ADP, sodium chloride, and sodium hydroxide (Table B-8). In addition, the drain liquid included water (200 gallons) from the dilute caustic wash to remove the catalyst (Strauss, 1999). Liquid wastes were sent to Lake Poly from 1961 to 1969 and to the Acid Pits from 1970 to 1971 (Badger, 1969; Environmental Disclosure, 1980; Riley, 1997a). Figure B-6 illustrates the general steps in the process, with typical quantities of batch reactants and products.

B-5.3 Wytox ADP Production

Annual production levels of Wytox ADP (Table B-9) were determined from available production records (Badger, 1969; Papazian and Moorman, 1963; NPI Operations Reports, 1964; NPI Operations Reports, 1965; NPI Operations Reports, 1966; NPI Daily Production Summaries for Weeks Ending August to December, 1961; Swanson, 1961). For years that data were not available, Wytox ADP production was determined by interpolating between available data.

B-6 OBSC/OBSH

OBSH (4,4' oxybisbenzenesulfonylhydrazide) is a rubber blowing agent that was produced in Plant D at the Wilmington property from 1970 until 1975 (Badger, 1969; McBrien, 1974a; McBrien, 1974b; Riley, 1997b; Strauss, 1999). OBSC (4,4' oxybisbenzenesulfonylchloride), an intermediate in producing OBSH, was sold as a wet cake from 1972 until 1975 (McBrien, 1974a; McBrien, 1974b). Liquid wastes were generated both in the production of OBSH and OBSC.

B-6.1 OBSH Product Formulation

The manufacturing information summarized in this section is taken from McBrien (1974b) and Strauss (1999). OBSH was formulated in a two step reaction. In the first step, chlorosulfonic acid (CSA, $HClSO_3$) and diphenyloxide (DPO, $C_{12}H_{10}O$) were reacted to form the intermediate OBSC ($C_{12}H_8O_5S_2Cl_2$), i.e.,

$$C_{12}H_{10}O + 4HClSO_3 \rightarrow C_{12}H_8O_5S_2Cl_2 + 2HCl + 2H_2SO_4 \quad . \qquad \text{(B-11)}$$

The hydrochloric acid (HCl) generated in this reaction was absorbed by water in a scrubber and sold as an impure muriatic acid solution and was therefore not part of the drain liquid (Strauss, 1999). The excess CSA was converted to sodium chlorosulfonate ($ClSO_3Na$) by reaction with sodium chloride (NaCl),

$$HClSO_3 + NaCl \rightarrow ClSO_3Na + HCl \, . \qquad \text{(B-12)}$$

The OBSC batch solution was filtered and washed several times to remove the acidity. When OBSC was also sold as a wet filter cake from 1972 to 1975, the material was additionally washed with a salt solution. Hydrazine (N_2H_4), ammonium hydroxide (NH_4OH), oil, and water were added to the OBSC solution in a second step to formulate OBSH ($C_{12}H_{14}O_5S_2N_4$), i.e.,

$$C_{12}H_8O_5S_2Cl_2 + 2N_2H_4 + 2NH_4OH \rightarrow C_{12}H_{14}O_5S_2N_4 + 2NH_4Cl + 2H_2O \quad . \qquad \text{(B-13)}$$

The reaction solution was then filtered, generating a filtrate containing unreacted CSA, sodium chlorosulfonate, sulfuric acid, hydrochloric acid, and ammonium chloride. A schematic of the general steps in the process is presented in Figure B-7.

B-6.2 OBSC/OBSH Waste Streams

The drain liquid included unreacted CSA, and hydrochloric acid, sulfuric acid, sodium chlorosulfonate, and ammonium chloride produced by reaction (Table B-10). In addition, water added for filtration, added to the OBSH reactor, contained in the hydrazine and ammonium hydroxide solutions, and produced by reaction were included in the drain liquid (McBrien, 1974b). When OBSC was sold as a wet filter cake, an additional washing step was conducted that generated additional liquid wastes. This contribution was calculated indirectly with other miscellaneous waste streams in Section B-8. Wastes were sent to the Acid Pits from 1970 to 1971 and to the wastewater treatment plant from 1972 to 1975 (Environmental Disclosure, 1980; Riley, 1997b). Figure B-7 illustrates the general steps in the process, with typical quantities of batch reactants and products.

B-6.3 OBSC/OBSH Production

Annual production levels of OBSC/OBSH (Table B-11) were determined from available production records (Badger, 1969; McBrien, 1974b). Production from 1970 to 1973 did not show a growth trend, therefore, production for 1973 was used for the later years that data were not available (1974 and 1975).

B-7 Wiltrol-N

Wiltrol-N (n-nitrosodiphenylamine), a retarder used to inhibit scorching and enhance the cure of rubber at processing and vulcanizing temperatures (Lasman, 1965), was produced in Plant B (Figure B-1) from mid-1966 to 1967 (Environmental Disclosure, 1980; Papazian, 1997a; Riley, 1997a; Strauss, 1999).

B-7.1 Wiltrol-N Product Formulation

The manufacturing information summarized in this section is taken from Riley (1966a) and Strauss (1999). Wiltrol-N was manufactured by reacting diphenylamine (DPA, $C_{12}H_{11}N$) in a warm solution of sulfuric acid (H_2SO_4) and water in a 1,000 gallon glass-

lined Pfaudler reactor. A 40% sodium nitrite ($NaNO_2$) solution was added over a 2- to 3-hour period. Wiltrol-N ($C_{12}H_{10}N_2O$), was formed according to the chemical reaction,

$$C_{12}H_{11}N + NaNO_2 + \tfrac{1}{2}H_2SO_4 \rightarrow C_{12}H_{10}N_2O + \tfrac{1}{2}Na_2SO_4 + H_2O \quad . \qquad \text{(B-14)}$$

When the reaction was complete, the batch was allowed to separate into two layers and the bottom layer containing water and wastes was drained to the sewer. The remaining product layer was washed with 400 gallons of water, which was also sent to the sewer. The batch was then pumped to a tank containing cold water (prilling tank), where the Wiltrol-N solidified. The "prilled" product was drained on a filter box and dried at low temperature. The prilling liquid, which contained water and a small amount of Witrol-N was also sent to the sewer. A schematic of the general steps in the process is presented in Figure B-8.

B-7.2 Wiltrol-N Waste Streams

The drain liquid included sulfuric acid, Wiltrol-N, and sodium sulfate (Table B-12). In addition, the discharge included water added to the batch, used to wash the batch, produced by chemical reaction (equation B-14), and used during the prilling step (Riley, 1966a; Strauss, 1999). It was calculated from available information that the prilling step was conducted in a 1,000-gal tank, similar to the reaction tank, and that the tank contained 500 gallons water (Riley, 1966a). Liquid wastes from the Wiltrol-N process were sent to Lake Poly from 1967 to 1968 (Riley, 1997a). Figure B-8 illustrates the general steps in the process, with typical quantities of batch reactants and products.

B-7.3 Wiltrol-N Production

Annual production levels of Wiltrol-N (Table B-13) were estimated from available production records (NPI Operations Reports, 1966). No data were available for 1967, therefore, production for the half year of production for 1966 was doubled for 1967.

B-8 Miscellaneous Waste Streams

The previous sections describe the liquid waste streams generated by the Opex, Kempore, hydrazine, Wytox ADP, OBSC/OBSH, and Wiltrol-N processes at various times from 1953 to 1986. In addition to those wastes, other liquid wastes were sent to the sewer from time to time, such as plant upsets, waste product, equipment washes, plant washes, and cooling water (Cantwell, 1997; Knight, 1999; McBrien, 1973; McBrien, 1981; NPI, 1966; Riley, 1997b; Strauss, 1999; Willwerth, 1997). Insufficient information was available to calculate these streams individually, therefore, they were calculated together as the difference between the total amount of process waste described in the previous sections and the total process waste flows reported in available documents (Badger, 1969; Garman, 1967; Raytheon, 1970; Riley, 1973). For years that information was not available, an interpolation was done between known values. For 1952 to 1967, an interpolation from 0 gpm in 1952 to the value reported in documents for 1967 was used (Table B-14).

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Tables

OW 793980

Table B-1. Opex Waste Composition

Compound	Waste Stream (lbs/lbs Opex)
Sodium Nitrite	0.089
598 Oil	0.037
Formaldehyde	0.34
Ammonium Chloride	0.21
Sodium Chloride	0.64
Water	6.76

Table B-2. Opex Production

Year	Amount (lbs)	Reference	Notes
1953	76,369		linear increase from 1952 to 1961
1954	152,738		linear increase from 1952 to 1961
1955	229,107		linear increase from 1952 to 1961
1956	305,476		linear increase from 1952 to 1961
1957	381,846		linear increase from 1952 to 1961
1958	458,215		linear increase from 1952 to 1961
1959	534,584		linear increase from 1952 to 1961
1960	610,953		linear increase from 1952 to 1961
1961	687,322	Weekly Production, 1961a; Swanson, 1961	
1962	1,443,661		linear increase between 1961 and 1963
1963	2,200,000	ABR, 1963	
1964	2,200,000	ABR, 1963	
1965	842,575	NPI Operations Reports, 1965	
1966	931,268	NPI Operations Reports, 1966	
1967	1,020,845		linear increase between 1966 and 1969
1968	1,110,423		linear increase between 1966 and 1969
1969	1,200,000	Badger, 1969	
1970	1,146,000		linear decrease between 1969 and 1979
1971	1,092,000		linear decrease between 1969 and 1979
1972	1,038,000		linear decrease between 1969 and 1979
1973	984,000		linear decrease between 1969 and 1979
1974	930,000		linear decrease between 1969 and 1979
1975	876,000		linear decrease between 1969 and 1979
1976	822,000		linear decrease between 1969 and 1979
1977	768,000		linear decrease between 1969 and 1979
1978	714,000		linear decrease between 1969 and 1979
1979	660,000	McBrien, 1980b	
1980	552,220		linear decrease between 1979 and 1982
1981	444,440		linear decrease between 1979 and 1982
1982	336,660	McBrien, 1983a	
1983	387,137		linear increase between 1982 and 1984
1984	437,614	McBrien, 1984	
1985	437,614		same as 1984
1986	285,401		same as 1984 levels, production ceased Sept 1, 1986

OW 793982

Table B-3. Kempore Waste Composition For Sodium Dichromate Process (1956-3/1967)

Compound	Waste Stream (lbs/lbs Kempore)
Urea	0.74
Sulfuric Acid	1.83
Chrome Oxide	0.56
Sodium Sulfate	0.52
Ammonium Sulfate	1.34
Water (1956-1963)	12.8
Water (1964-3/1967)	16.4

Table B-4. Kempore Waste Composition For Sodium Chlorate Process (4/1967-1986)

Compound	Waste Stream (lbs/lbs Kempore)
Urea	0.74
Sulfuric Acid	0.65
Hydrochloric Acid	0.12
Sodium Sulfate	0.24
Ammonium Sulfate	1.34
Hydrogen Bromide	0.0055
Water (4/1967-1970)	15.0
Water (1971-1986)	10.3

Table B-5. Kempore Production

Year	Amount (lbs)	Reference	Notes
1956	63,241		linear increase from 1955 to 1961
1957	126,482		linear increase from 1955 to 1961
1958	189,724		linear increase from 1955 to 1961
1959	252,965		linear increase from 1955 to 1961
1960	316,206		linear increase from 1955 to 1961
1961	379,447	Weekly Production, 1961a; Swanson, 1961	
1962	739,724		linear increase from 1961 to 1963
1963	1,100,000	ABR, 1963	
1964	1,100,000	ABR, 1963	
1965	815,031	NPI Operations Reports, 1965	
1966	1,743,823	NPI Operations Reports, 1966	
1967	1,279,924	Production, 1967	
1968	1,489,962		linear increase from 1967 to 1969
1969	1,700,000	Badger, 1969	
1970	1,452,960	McBrien, 1980a	
1971	1,982,620	McBrien, 1980a	
1972	2,188,750	McBrien, 1980a	
1973	2,627,929	McBrien, 1980a	
1974	3,281,140	McBrien, 1980a	
1975	1,731,045	McBrien, 1980a	
1976	2,891,903	McBrien, 1980a	
1977	2,662,276	McBrien, 1980a	
1978	3,309,138	McBrien, 1980a	
1979	3,559,821	McBrien, 1980a	
1980	3,198,414		linear decrease from 1979 to 1982 levels
1981	2,837,007		linear decrease from 1979 to 1982 levels
1982	2,475,600	McBrien, 1983a	
1983	2,605,962		linear increase from 1982 to 1984
1984	2,736,324	McBrien, 1984	
1985	2,736,324		same as 1984
1986	1,784,559		same as 1984 levels, production ceased Sept 1, 1986

OW 793985

Table B-6. Hydrazine Waste Composition

Compound	Waste Stream (lbs/lbs Hydrazine)
Sodium Chloride	5.21
Sodium Sulfate	6.48
Carbonic Acid	2.76
Water	27.3

Table B-7. Hydrazine Production

Year	Amount (lbs)	Reference	Notes
1963	370,700		derived as ratio (0.34) of Kempore production
1964	370,700		derived as ratio (0.34) of Kempore production
1965	279,983	NPI Operations Reports, 1965	
1966	432,766	NPI Operations Reports, 1966	
1967	431,334		derived as ratio (0.34) of Kempore production
1968	502,117		derived as ratio (0.34) of Kempore production
1969	572,900		derived as ratio (0.34) of Kempore production
1970	361,913		derived as ratio (0.34) of Kempore production, production ceased Sept 1, 1986

OW 793987

Table B-8. Wytox ADP Waste Composition

Compound	Waste Stream (lbs/lbs Wytox ADP)
Diisobutylene (DIB)	0.021
Wytox ADP	0.030
Aluminum Hydroxide	0.050
Sodium Chloride	0.11
Sodium Hydroxide	0.036
Water	0.67

Table B-9. Wytox ADP Production

Year	Amount (lbs)	Reference	Notes
1961	144,601	Weekly Production, 1961a; Swanson, 1961	
1962	157,637		linear increase from 1961 to 1963
1963	170,673	Papazian and Moorman, 1963	
1964	347,561	NPI Operations Reports, 1964	
1965	356,186	NPI Operations Reports, 1965	
1966	456,785	NPI Operations Reports, 1966	
1967	504,523		linear increase from 1966 to 1969
1968	552,262		linear increase from 1966 to 1969
1969	600,000	Badger, 1969	
1970	600,000		same as 1969 levels
1971	600,000		same as 1969 levels

OW 793989

Table B-10. OBSC/OBSH Waste Composition

Compound	Waste Stream (lbs/lbs OBSH)
Chlorosulfonic Acid (CSA)	0.51
Hydrochloric Acid	0.49
Sodium chlorosulfate	0.61
Sulfuric Acid	0.84
Ammonium Chloride	0.21
Water (OBSH)	10.4
Water (OBSC)	7.7

Table B-11. OBSC/OBSH Production

Year	Amount (lbs OBSH)		Reference	Notes
	OBSH	OBSC		
1970	300,000	0	Badger, 1969	
1971	314,925	0	McBrien, 1974b	
1972	293,828	163,730	McBrien, 1974b	
1973	287,430	230,301	McBrien, 1974b	
1974	287,430	230,301		same as 1973
1975	287,430	230,301		same as 1973

OW 793991

Table B-12. Wiltrol-N Waste Composition

Compound	Waste Stream (lbs/lbs Wiltrol-N)
Sulfuric Acid	0.037
Wiltrol-N	0.087
Sodium Sulfate	0.392
Water	6.1

OW 793992

Table B-13. Wiltrol-N Production

Year	Amount (lbs)	Reference	Notes
1966	108,940	NPI Operations Reports, 1966	production for 5.5 months
1967	227,784		scaled 1966 production to full year for 1967

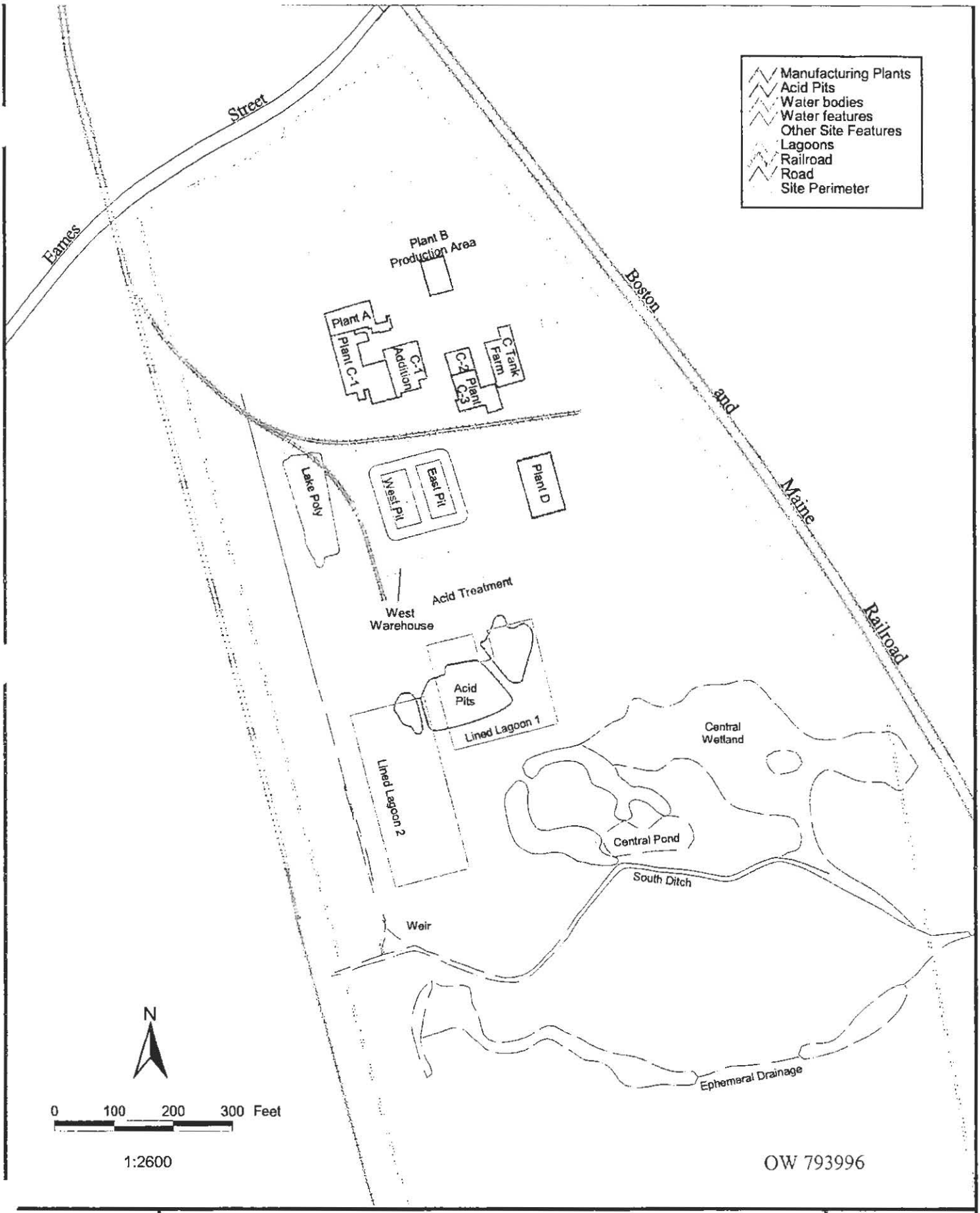
OW 793993

Table B-14. Miscellaneous Liquid Wastes

Year	Miscellaneous Wastes (lb/yr)
1953	44,791,633
1954	89,583,265
1955	134,374,898
1956	178,098,870
1957	221,822,842
1958	265,546,815
1959	309,270,787
1960	352,994,759
1961	396,588,448
1962	401,802,273
1963	537,846,652
1964	591,599,889
1965	665,773,530
1966	772,851,294
1967	842,933,701
1968	1,210,541,851
1969	1,352,700,000
1970	599,845,907
1971	683,224,194

Figures

OW 793995



Generation Date: 7/27/99	Figure B-1. Manufacturing Plants and Pits, Ponds, and Lagoons at the Wilmington Property from 1953 to 1986.	Geomega

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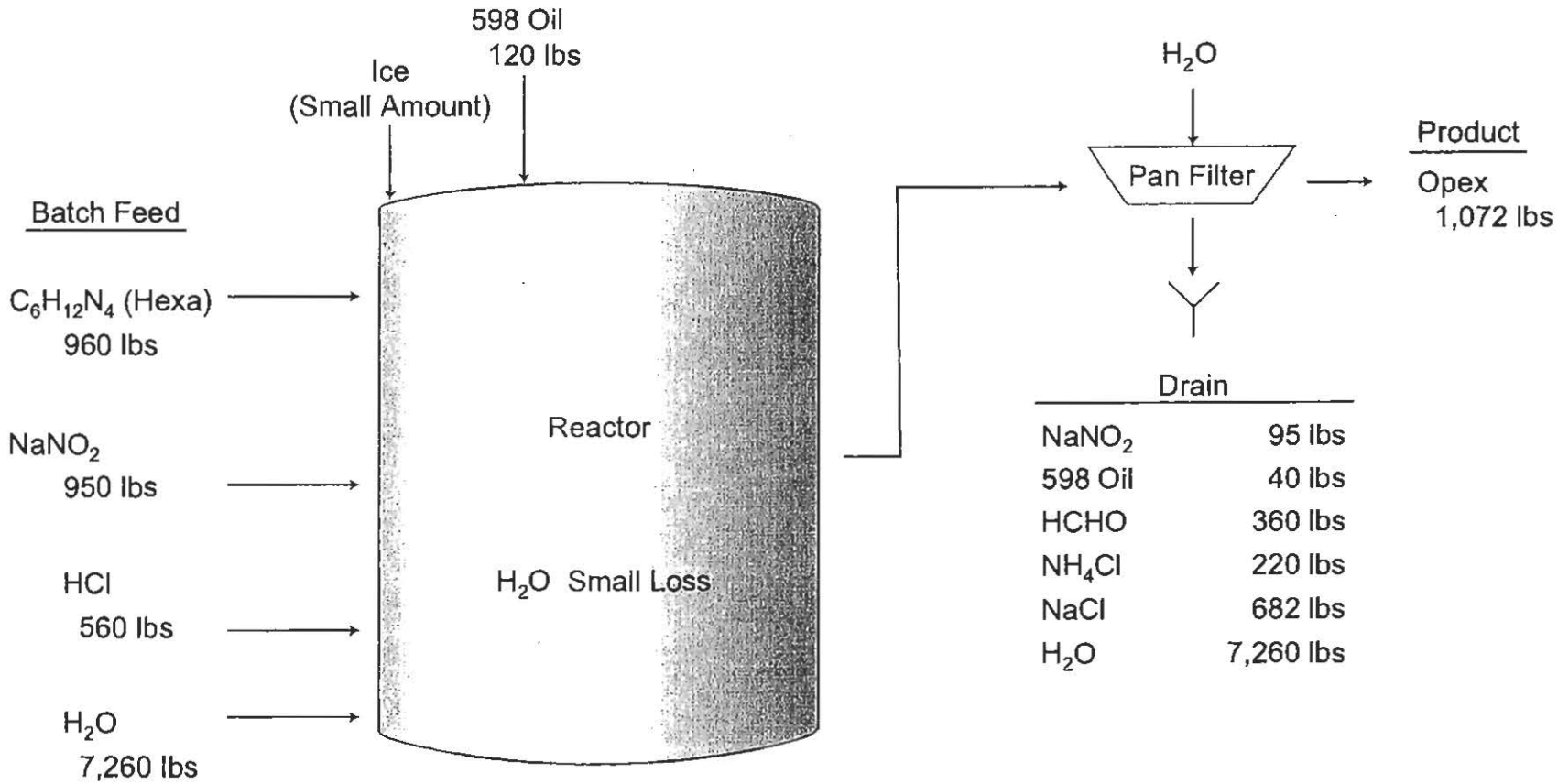

OW 79397

Generation Date: 7/28/99	Figure B-2. Opex process diagram (typical batch).	Geomega

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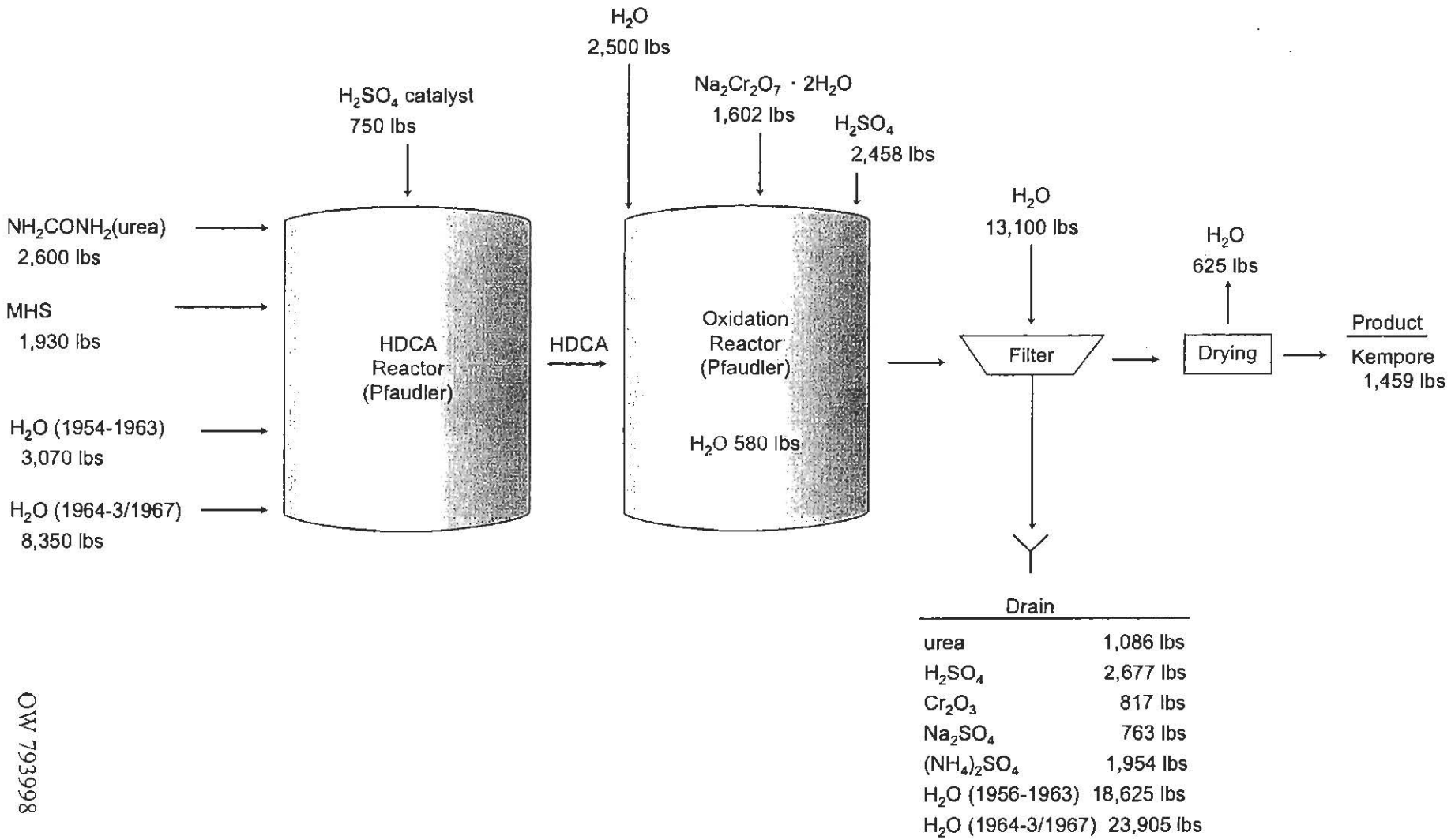

OW 193998

Generation Date: 7/28/99	Figure B-3. Kempore process diagram (typical batch) using sodium dichromate from 1956 to March 1967.	Geomega

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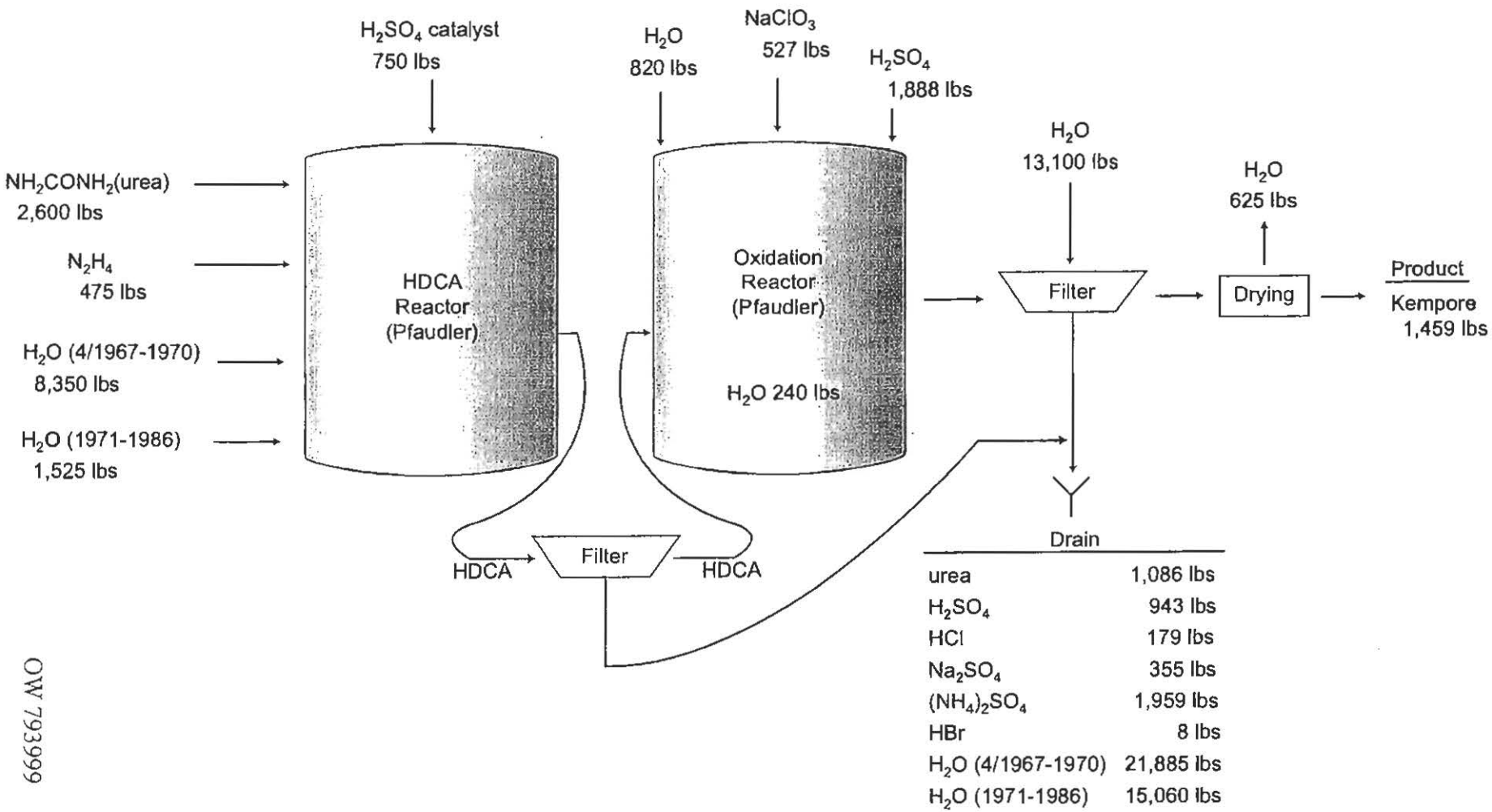

OW 793999

Generation Date: 7/28/99	Figure B-4. Kempore process diagram (typical batch) using sodium chlorate from April 1967 to 1986.	Geomega

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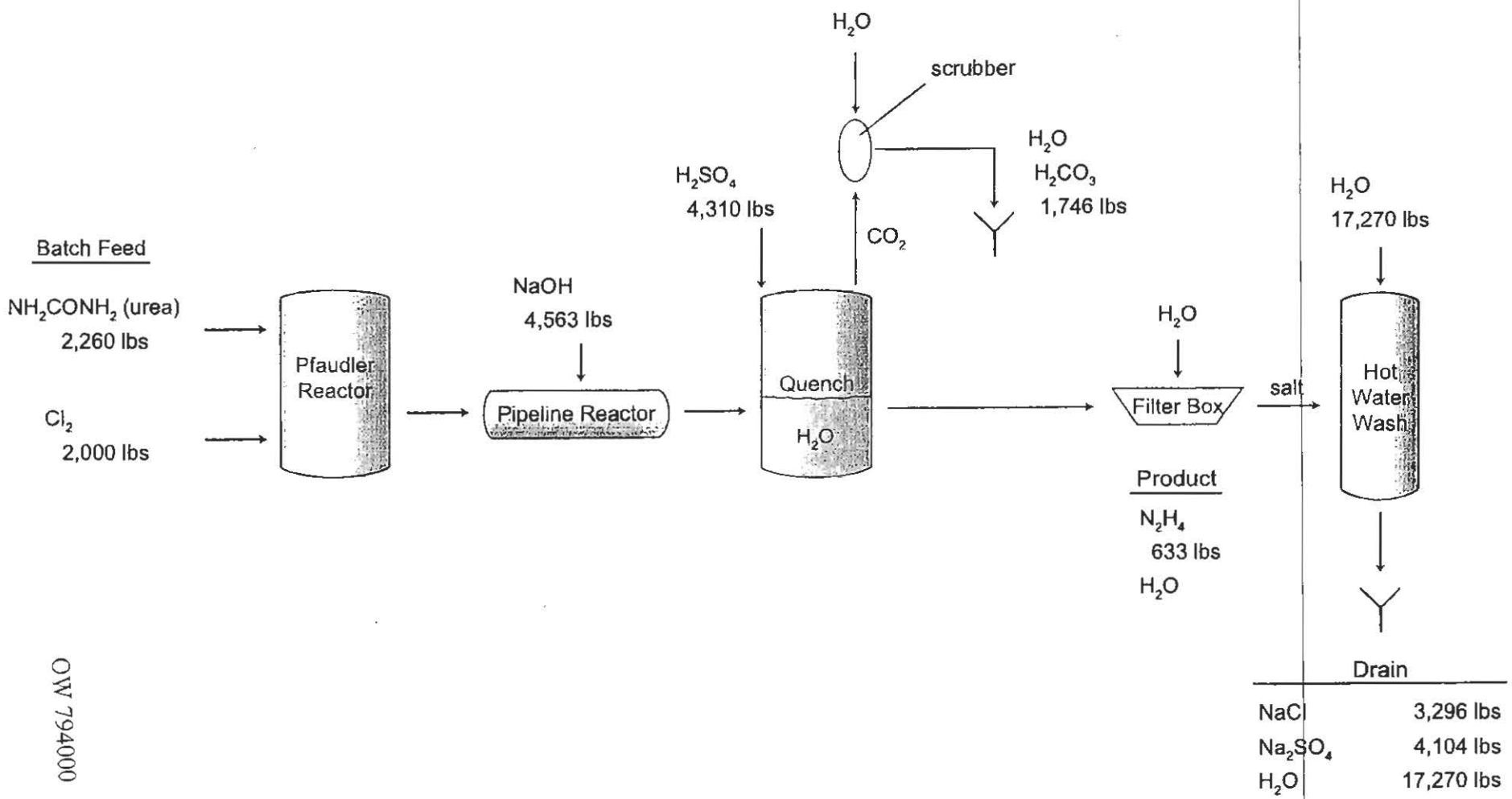

OW 794000

Generation Date: 7/28/99	Figure B-5. Hydrazine process diagram (typical batch).	Geomega

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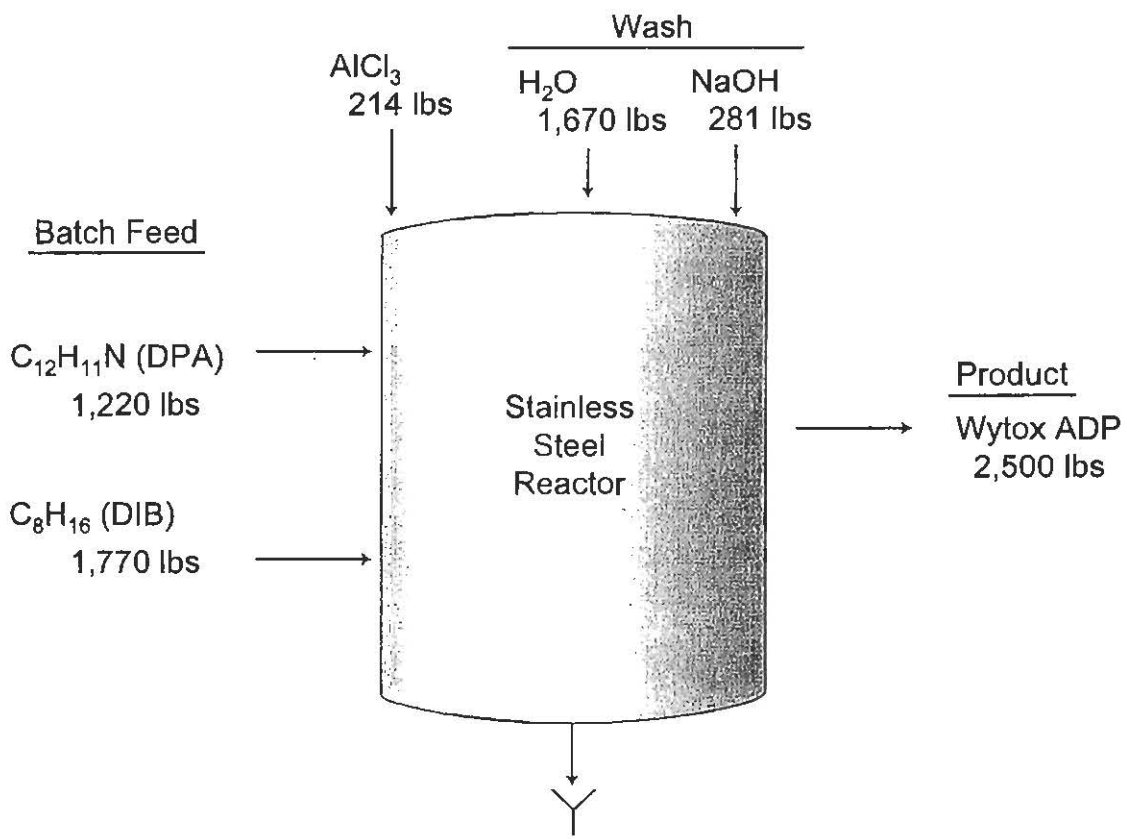


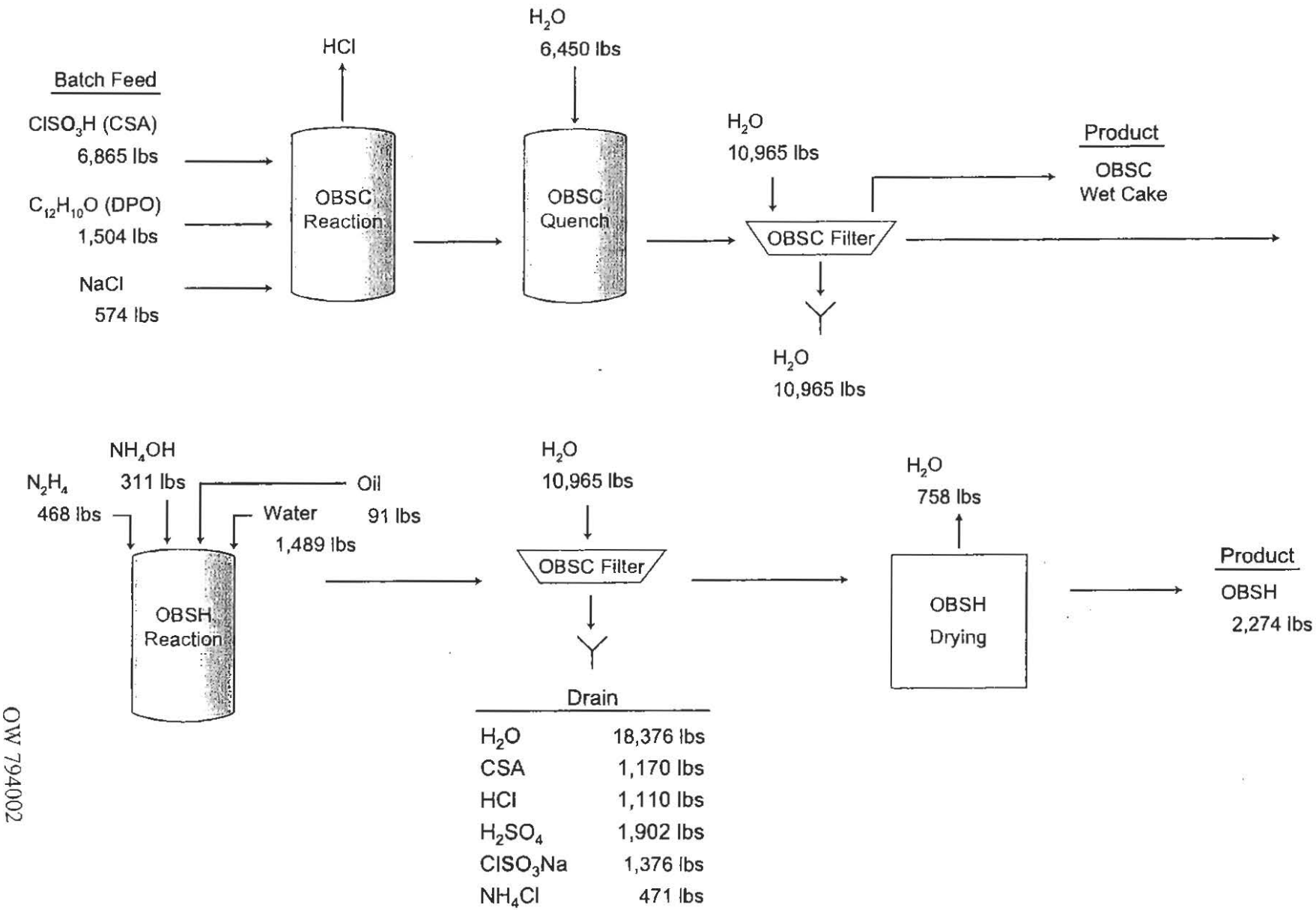
Drain

Wytox ADP	75 lbs
$Al(OH)_3$	125 lbs
NaCl	281 lbs
NaOH	89 lbs
DIB	53 lbs
H_2O	1,670 lbs

OW 794001

Generation Date: 7/28/99	Figure B-6. Wytox ADP process diagram (typical batch).	Geomega

o:\Olin\Litigation\Wytox ADPProcess799.nl



OW 794002

Generation Date: 7/28/99	Figure B-7. OBSC/OBSH process diagram (typical batch).	Geomega

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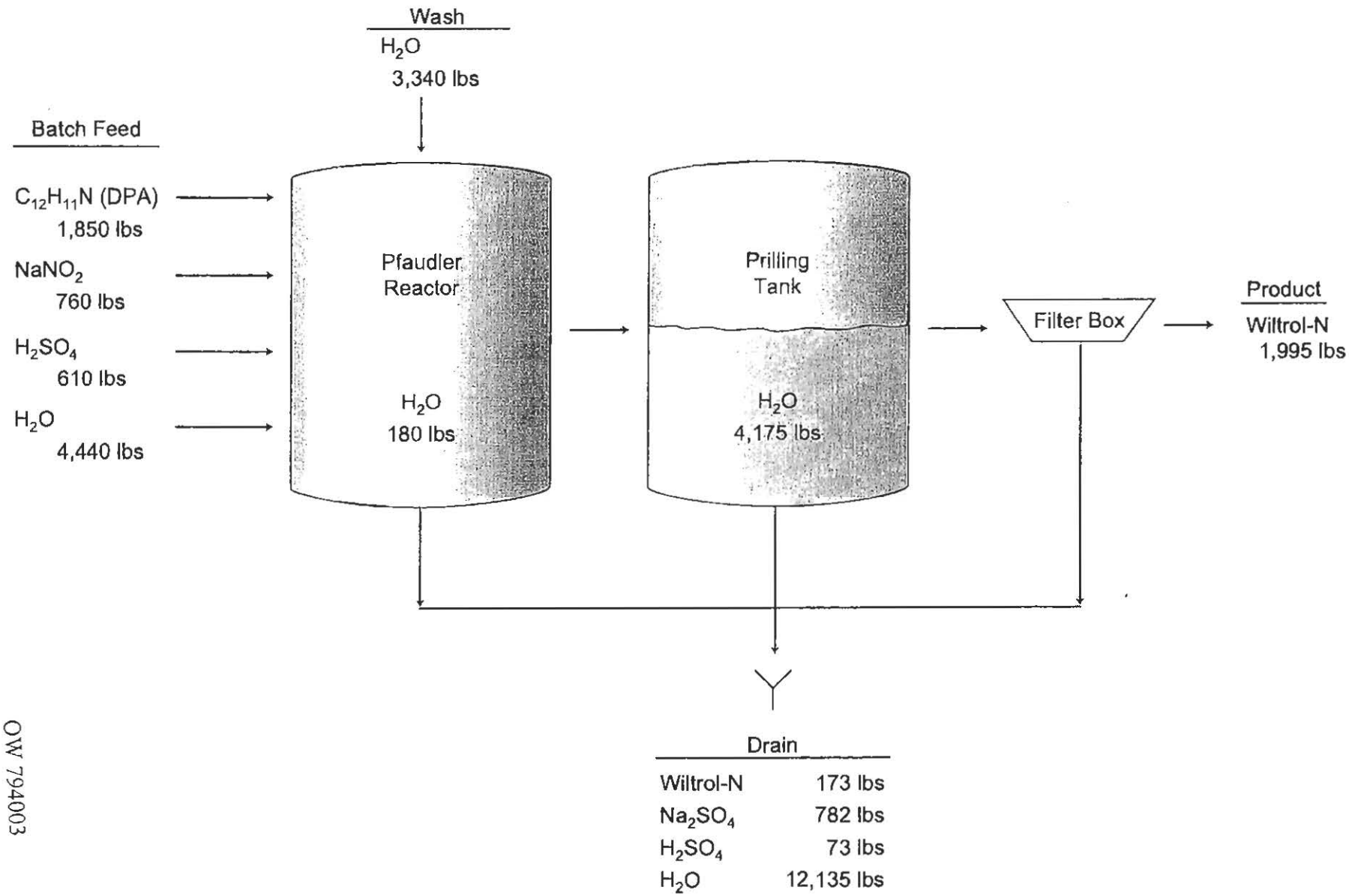

OW 794003

Generation Date: 7/28/99	Figure B-8. Wiltrol-N process diagram (typical batch).	Geomega

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ATTACHMENT 2

Stepan

Telephone 312 4 500

F. Wilm
1983 - Gen
cc JCM

ENVIRONMENTAL DISCLOSURE

JULY 23, 1980

In accordance with the requirements of Section 3.05 and 3.06 of the Agreement of Purchase and Sale between Olin and Stepan Chemical Company, the attached disclosure sets forth the pollution litigation and administrative proceedings, manufacturing processes and chemical waste disposal with regard to the Polychem (Wilmington) plant which occurred subsequent to Stepan's purchase of the plant late in 1968. In addition, this same type of information with regard to processes and waste disposal practices, which occurred prior to Stepan's ownership, are shown where they are known.

The Corporate and Plant Management personnel who have reviewed these matters and prepared the enclosure are:

Charles P. Riley, Jr.	-	Corporate Director of Manufacturing and Engineering
Ronald J. McBrien	-	Wilmington Plant Manager
Walter Beck	-	Group Leader, Corporate Research and formerly Polychem Technical Manager

WWM:gb

July 23, 1980

Exhibit 3.06

Environmental Disclosure*

1. Suits

Commonwealth of Massachusetts vs. Stepan Chemical Co., Inc. Suffolk Superior Court (served April 22, 1980) cites violation of the Massachusetts Hazardous Waste Management Act and violation of the Massachusetts Clean Waters Act in the storage and disposal of hazardous wastes.

In a joint meeting on April 30, 1980 at the Boston office of Sullivan and Worcester, representatives of Olin, Stepan, the Attoney General's office, and the Division of Water Pollution Control discussed the disposition of the above court action. It was agreed between the representative of the Attorney General and the representative of the Division of Water Pollution Control that if Olin Corporation purchased the Stepan, Wilmington plant site, the following would apply:

a.) Olin would have 12-18 months for an engineering study to define pollution problems and to suggest remedies.

b.) There would be no prosecution by the State during this period.

c.) Olin could expect to expand operations at the site.

The Attorney General and Stepan's counsel have jointly applied for a two month extension of the court action to accomodate Olin's decision on purchase of the property.

The seller has no knowledge of any other suit, threatened suit, actions, proceedings or claims under any applicable federal, state or local law or other environmental matters.

2. Manufacturing Processes Conducted on Wilmington Site, Sellers' Best Knowledge

a.) Opex - (Dinitrosopentamethylenetetramine)

Raw materials: Hexamethylenetetramine
Sodium ~~nitrate~~ nitrite
Hydrochloric acid
Processing oil - Ammonia

Product: Dinitrosopentamethylenetetramine (solid)

By-products in waste: ✓Sodium chloride
✓Sodium ~~nitrite~~ nitrate
✓Formaldehyde
✓Processing oil - Ammonium Chloride

Process operated: 1953-1980

*All information prior to Stepan's purchase of plant in 1968 is based on knowledge of Ron McBrien and Charles P. Riley, Jr. Stepan has not made any investigation with regard to matters before it acquired the plant in 1968.

Exhibit 3.06
Environmental Disclosure

b.) Kempore - (Azodicarbonamide)

Raw materials: Hydrazine
Urea
Sulfuric acid
Sodium chlorate
Sodium Bromide ~~Bromine~~ (catalyst level)

Product: Azodicarbonamide (solid)

By-products in waste: Sodium sulfate
Sulfuric acid
Urea
Sodium chloride
Ammonium sulfate
Sodium Bromide

Up to 1967, sodium dichromate was used in the process instead of Sodium chlorate. The by-product waste contained chrome sulfate instead of sodium chloride and sodium sulfate.

Process operated: 1956-1980

c.) Hydrazine

Raw materials: Urea
Chlorine
Sodium hydroxide
Sulfuric acid

Product: Hydrazine and Semicarbazide solution

By-products in waste: Sodium sulfate
Sodium chloride
Ammonium Sulfate

Note: This process was shut down in the fall of 1970 with hydrazine then purchased from Olin Corporation. (operated 1963-1970)

d.) Kempore Dispersions

Raw materials: Azodicarbonamide
Dioctyl phthalate

Product: 50 percent dispersion of Azodicarbonamide in Dioctyl Phthalate

By-products in waste: None

Process operated: 1960-1980

e.) Wytox 312 - (trisnonylphenyl phosphite)

Raw materials: Nonyl phenol
Phorphorus trichloride

OW 091251

Product: Trisnonylphenyl phosphite (liquid)

By-products in waste: None (hydrogen chloride scrubbed in water)

Process operated: 1965-1980

Exhibit 3.06
Environmental Disclosure

f.) Actafoam R-3

Raw materials: 2-ethylhexoic acid
Zinc oxide
Dioctyl phthalate
~~Sodium oleate~~ Potassium oleate

Product: Liquid Azodicarbonamide activator

By-products in waste: None

Process operated: 1963-1980

g.) Wytox Pap - (Alkylated phenol)

Raw materials: Nonyl phenol
Dinonyl phenol
Formaldehyde

Product: Liquid Alkylated phenol

By-products in waste: None

Process operated: 1971-1980

h.) Nitropore 5PT - (5-phenyltetrazole)

Raw materials: Benzonitrile
Sodium azide
Sodium nitrite
Ammonium chloride
Hydrochloric acid
Dimethyl Formamide

Product: 5-phenyltetrazole (solid)

By-products in waste: Sodium chloride
Sodium nitrate
Dimethyl Formamide
Benzonitrile

(produced 1973-1980, limited quantities 24,000 lbs./yr.)

i.) Nitropore OT - (4,4' oxybisbenzenedisulfonylhydrazide)

Raw materials: Diphenyl oxide
Chlorosulfonic acid
Hydrazine
Ammonia

Product: 4,4' oxybisbenzenedisulfonylhydrazide

By-products in waste: Sulfuric acid
~~Hydrochloric acid~~ Ammonium Chloride

Process operated: 1969-1975 (Hydrochloric acid scrubbed in water and sold).

j.) Wytox ADP - (Dioctyl Diphenylamine)

Raw materials: Diphenylamine
Diisobutylene
~~Aluminum hydroxide~~
~~Sodium chloride~~
Aluminum chloride
Sodium hydroxide

Exhibit 3.06
Environmental Disclosure

Product: Dioctyldiphenylamine

By-products in waste: Aluminum hydroxide
~~Sodium chloride~~ Sodium hydroxide

Process terminated in 1971. (Operated 1962-1971)

k.) Phenolic and Urea Formaldehyde Resins

Raw Materials: Phenol
Urea
Formaldehyde

Products: Solid and liquid resins

By-products in waste: Phenol
Formaldehyde

Process operated 1961-1967

l.) Phthalate Plasticizers - (dioctyl phthalate, dibutyl phthalate)

Raw materials: Phthalic anhydride
2-ethylhexanol
Butyl alcohol

Products: Liquid plasticizers

By-products in waste: None

Process operated: 1955-1961

m.) Wiltrol N - (N-Nitrosodiphenylamine)

Raw materials: Diphenylamine
Sodium nitrite
Sulfuric acid

Product: N-Nitrosodiphenylamine (solid)

By-products in waste: Sodium nitrite
Sodium sulfate

Process operated: 1965-1967

n.) *

3. Chemical Waste Disposal

To the seller's best knowledge, chemical manufacturing commenced on the Wilmington plant site around 1953. No waste treatment facility or sewer was included in the original plant facilities. The main plant effluents were discharged to a small man-made pond on the west side of the property which flowed to a brook bisecting the property. The brook exited the property at the east side along the railroad right of way.

Strong acid wastes were conducted separately to unlined man-made lagoons on the south side of the operating plant buildings.

* Small quantities of miscellaneous materials were manufactured at various times which had no by-product wastes.

Exhibit 3.06
Environmental Disclosure

In 1969, Stepan Chemical Company, Inc. and the Division of Water Pollution Control of the Commonwealth of Massachusetts entered into a consent order whereby Stepan was to build a waste treatment plant and the effluents from the treatment plant would be discharged to a Metropolitan District Commission sewer which was to be extended to the immediate area of the plant. Stepan was allowed to continue to discharge chemical wastes in the same manner until the treatment plant was completed. In 1970, with the completion of the treatment plant construction, Stepan was requested to operate the plant and discharge the treated wastes through its property until the sewer construction was complete. The sewer was finished in 1972 and approval was granted to Stepan to discharge the effluents from the treatment plant into the sewer by the Metropolitan District Commission.

The Stepan treatment facility neutralizes sulfuric acid and sulfate wastes with a lime system. The resulting calcium sulfate by-product is separated from the effluent by settling in vinyl lined lagoons. The Department of Public Health of the Commonwealth of Massachusetts approved the construction of a landfill on the Stepan property for the disposal of the calcium sulfate by-products.

The seller has no knowledge of chemical or other dumping on the plant site during its ownership by its own personnel or third parties except as described previously with the discharge of operating wastes. The seller has no knowledge of chemical or other dumping on the property in prior periods.

CPR, Jr./lmg

ATTACHMENT 3

RAW MATERIALS

Acetone
Acryloid K-120n
Aluminum chloride
Anhydrous ammonia
Analine HCL salt
Antifoam 60
Aqua ammonia
Aquarex-L
Arquad 25 75
Arquard 2 ht 75 varisoft
Bentone 27
Bentone 38
Boric acid
Butanol
n-butyl aceate
cab-o-cil
Calcium searate
C S A
D i b
Dinonylphenol
D O P
Liquid DPA
DPO
Deoderant 1056
Ethomeen S-12
2-ethylhexoic acid
Ethylene glycol
Santicizer 722
Liquid Nitrogen
Calcium Carbonate
Darvan-L\
Fare rapeseed
Fast spermoil
Liq. Formalin
Glycerine
Aerosil 380
Vikoflex 71710
Nurostabe V144
Potassium Stearate
P-TSA
Benzonitrile
Dimethylformamide
Ammonium Chloride
Sodium Azide

RAW MATERIALS

Calcium Oxide
Hydrogen Peroxide
Calcium Chloride
Barium Chloride
Sodium Dicarbonate
Dimethyl carbonate
Methanol
N-butanol
Benzophenone
Adipic Acit
Heptane
Formamide
Soda Ash
Hydrazine 64%
Hi-sil 233
Nedex lead octate
100% liquid hexa
Maleic anhydride
Mineral spirits
monohydrazine sulfate
Natrosol
Nurosperse 657
Oxalic acid
Paraformaldehyde powder
Phthalic anhydride
999 salt
Satocel FRC
Silica
Sodium chlorate solid
Sodium nitrite
sodium sulfite
7AT soft
Stantone 12PCOL yel
Stantone 90PCOL black
Sun Par 120
Tall oil liqro
Trancoa 375B
#2 Bordens Urea Form
Uformite MM57
Zinc stearate
hexamine granular
ice
Liquid caustic
microcel E

RAW MATERIALS

Mineral oil
mono ethanolmine
Muriatic acid
Nonyl phenol
415 oil
Paraplex G-62
PCL3
potassium oleate
Safe 7MT
Shellflex 212
Sodium bromide
Sodium chlorate liq
Sodium stearate
sodium acetate
Stantone 10PCOL white
Stantone 26PCOL red
Sulfuric acid
Styreene
Toluene
T.I.A. Tr. Isopropalamine
Prilled Urea
Zinc Oxide

ATTACHMENT 4

TECHNICAL BULLETINS

Opex 40
Kempore 125
Kempore
Kempore Dispersions
Kempore SDA-200
Kempore R-125
Kempore SD-125
Cellular Vinyl Coated Fabrics
Pigmentation of Kempore
Actafoam R-3
RIA NC
RIA 66
Antidust
Antidust - 1060
Acetone
FI-Line' Sensitizers
Tetra-Phen S-201
Tetra -Flex Resins
Poly-Cone
Poly-Cone 125X
Poly-Cone Emulsions
Poly-Cone 200X
Poly-Cone 1000
Poly-Zole AZDN
Poly-Sperse AP-2
Poly-Phen
Wiltrol-P
Wiltrol-N
Wytox
Wytox-ADP
Wytox-BHT
Wytox 355
Wytox 438
NPI 201
NPI 222
NPP 202
Dee-Tac NP-27
Dee-Tac 2000
Dee-Tac NP-27
Synthetic Resins

ATTACHMENT 5

IN THE UNITED STATES DISTRICT COURT
FOR THE DISTRICT OF MASSACHUSETTS

OLIN CORPORATION,	)	
Plaintiff,	)	
v.	)	C.A. No. 93-11166-MLW
FISONS PLC, et al.,	)	
Defendants.	)	

PLAINTIFF OLIN CORPORATION'S SUPPLEMENTAL OBJECTIONS AND ANSWERS TO DEFENDANTS THE BILTRITE CORPORATION AND AMERICAN BILTRITE INC.'S FIRST SET OF INTERROGATORIES

Pursuant to Fed. R. Civ. P. 33 and Local Rule 33.1, Plaintiff Olin Corporation ("Olin") hereby supplements its Objections and Answers to Defendants The Biltrite Corporation and American Biltrite Inc.'s First Set of Interrogatories to Olin Corporation ("Olin's Answers" and "the Biltrite Companies' First Interrogatories"). The General Objections made in Olin's Answers are incorporated by reference in these Supplemental Answers.

SUPPLEMENTAL ANSWERS

Interrogatory No. 7: Identify and state the basis (in accordance with Local Rule 26.5(C)(8)) for each of the "releases" and "threatened releases" of hazardous substances which Olin alleges have occurred at the Wilmington plant from 1952 to the present (including the source of each such release, the date(s) on which each release occurred, the amount of hazardous substances released in each instance, and the location of the release), which "releases", according to the allegations contained in paragraph 65 of the Complaint, "have caused Olin to incur 'necessary costs of response'" and "will continue to cause Olin to incur 'necessary costs of response' within the meaning of [CERCLA]", including:

(a) identify all releases and threatened releases (the source of each such release, the date(s) on which each release occurred, the amount of hazardous substances released in each instance, and the location of the release) of "hazardous substances" (as defined by CERCLA) and "hazardous materials" (as defined by Massachusetts General Laws Chapter 21E) during the period 1952 to January,

1964, which Olin claims caused or may cause the incurrence of response costs by Olin;

(b) identify all releases and threatened releases (the source of each such release, the date(s) on which each release occurred, the amount of hazardous substances released in each instance, and the location of the release) of "hazardous substances" (as defined by CERCLA) and "hazardous materials" (as defined by Massachusetts General Laws Chapter 21E) during the period February, 1964 to August, 1980 which Olin claims caused or may cause the incurrence of response costs by Olin.

Response: Olin incorporates its previous response to this interrogatory by reference. Olin continues to object to this interrogatory on the grounds that it is vague and ambiguous in using undefined terms such as "release," "source of release," "amount of release," and "location of release." Olin also objects to the extent it calls for expert opinions before the date required for such opinions by the Revised Pretrial Schedule. Without waiving its objections, Olin further responds as follows:

(a) Releases from 1952 to January, 1964 that have caused, or may cause, the incurrence of response costs are listed below, by location.

Lake Poly

Pipes from yard drains and drains in Plants A, B and C carried process waters, wash waters, and other flows of liquids to Lake Poly. Lake Poly was unlined. Thus, liquids placed in Lake Poly seeped into the ground. Additionally, overflow from Lake Poly ran over the surface of the ground on the west side of the Plant and also entered the ditch system that ran along the west side of the Plant and cut across the Plant property south of the manufacturing facilities to the East Ditch.

Beginning in around 1954 and continuing through January, 1964, hazardous substances and/or materials used in or generated by the Opex manufacturing process were released into Lake Poly, in at least the following ways. First, effluent from the Opex manufacturing process was piped to Lake Poly. Second, wash water generated in weekly cleanings of Plant A carried hazardous substances and/or material used or created in the Opex manufacturing process to Lake Poly. Third, on at least one occasion, in 1954, a batch of unfinished Opex was piped to Lake Poly. Fourth, off-spec Opex was either dumped into Lake Poly or piped there from Plant A. Hazardous substances and/or materials, or compounds containing hazardous substances and/or materials that were released into the environment at Lake Poly by these means included sodium chloride, sodium nitrate, formaldehyde, ammonium chloride, processing oil, hydrochloric acid, hexamethylenetetramine, and Opex (dinitropentamethylenetetramine).

Additionally, beginning in 1956, and continuing until some time after the East-West Ponds were built, as late as July, 1957, an acidic effluent from the Kempore manufacturing process was piped to Lake Poly. From 1957 through January, 1964, wash water generated in daily washing of Plant C's floor and weekly cleanings of all of Plant C, carried hazardous substances and/or material used or created in the Kempore manufacturing process to Lake Poly. On at least one occasion, an off-spec batch of Kempore was flushed down the drain to Lake Poly. Hazardous substances and/or materials, or compounds containing hazardous substances and/or materials that were released into the environment at Lake Poly by these means included chromium sulfate, sodium dichromate, sulfuric acid, sodium sulfate, urea, ammonium sulfate and Kempore (azodicarbonamide).

Additional releases to Lake Poly of hazardous substances and/or materials, or compounds containing hazardous substances and/or materials, between 1954 and January, 1964, included:

- Drums of aluminum chloride were dumped into Lake Poly in 1963 or 1964.
- Throughout the period, acetone used for cleaning purposes in the laboratory and the plants was piped to Lake Poly after its use.
- From 1961 through January, 1964, phenol and formaldehyde wastes from the resin manufacturing process were piped to Lake Poly. Wash water from weekly cleanings of Plant B was also piped to Lake Poly containing these wastes, as well as hazardous substances and/or materials used or created in the plasticizer manufacturing process, at least through 1961, which included dioctylphthalate, dibutylphthalate, 2-ethylhexanol and butyl alcohol.
- From 1961 until January, 1964, dioctyldiphenylamine, aluminum chloride, aluminum hydroxide, sodium chloride and diisobutylene were piped to Lake Poly from the Wytox ADP manufacturing process.
- Periodically throughout the period from 1952 to January, 1964, drums containing a variety of hazardous substances and/or materials were dumped into Lake Poly.

East-West Ponds

Beginning in 1957, and continuing through January, 1964, an acidic effluent from the Kempore manufacturing process was piped to and released into the unlined East-West Ponds. Hazardous substances and/or materials, or compounds containing hazardous substances and/or materials released to the East-West Ponds in that effluent included chromium sulfate, sulfuric acid, sodium sulfate, urea, ammonium sulfate and Kempore.

Additionally, from 1963 through January, 1964, an acidic effluent containing sodium sulfate and sodium chloride was released into the East-West Ponds from the hydrazine manufacturing process in Plant C-3.

Other Releases

Other releases during the period from 1952 through January, 1964 included at least the following:

- From 1961 through January, 1964, dioctyldiphenylamine (DODPA a/k/a Wytox ADP) was routinely spilled onto the ground outside Plant B as the liquid produced from the reactor was being moved in pans to a drying or hardening area.

- From 1961 through January, 1964, effluent from the DODPA manufacturing process was released directly onto the ground outside Plant B. Hazardous substances and/or materials, or compounds containing hazardous substances and/or materials in that effluent included dioctyldiphenylamine, aluminum chloride, sodium chloride and diisobutylene.

- From 1961 through January, 1964, diisobutylene frequently overflowed from a tank in Plant B and ran out of the building onto the ground adjacent to it.

- In 1962 a batch of resin exploded and sprayed on the ground around Plant B. That material contained phenol and/or formaldehyde.

- From 1961 through January, 1964, dust from the resin grinding process escaped Plant B and settled on the ground adjacent to Plant B. This dust contained phenol and/or formaldehyde.

- From 1961 through January, 1964, pans in which resin was dried were cleaned outside Plant B and the residue from the cleaning process was poured onto the ground. The residue contained phenol and/or formaldehyde.

- From 1954 through January, 1964, waste materials of various types, including Opex, were incinerated South of Lake Poly and the residues were left on the ground.

- From 1954 or 1955 through January, 1964, periodic releases in the form of leaks or spills from the above-ground storage tanks located to the East of Plant B occurred. Hazardous substances and/or materials, or compounds containing hazardous substances and/or materials stored in the tanks included 2-ethylhexanol, butanol, oils, caustic, formaldehyde, diisobutylene and dibutylphthalate.

- Sometime between 1952 and 1968, a variety of hazardous substances and/or materials, or compounds containing hazardous substances and/or materials were buried at various locations around the Wilmington site, both in drums and unpackaged. Continued discovery may narrow-down the time period in which these substances and/or materials were buried. The locations of the drum burials and the identification of the hazardous substances and/or materials found at those locations can be found in Olin's Supplemental Phase II Report, June 1997 (at OW450587, et seq.). The burden of obtaining that information through an examination of that document is substantially the same for the Biltrite Companies as for Olin and, therefore, Olin refers the Biltrite Companies to that document, pursuant to Fed. R. Civ. P. 33(d).

(b) Releases from February, 1964 to August, 1980 that have caused, or may cause, the incurrence of response costs, are listed below, by location of release.

Lake Poly

From February, 1964 until September, 1969, the waste streams identified below continued to be sent to Lake Poly. The hazardous substances and/or materials, or compounds containing hazardous substances and/or materials contained in those streams, did not change from those identified in Supplemental Response 7(a), with the exception that, beginning in or around April, 1967, waste water from Plant C no longer contained chromium sulfate and instead contained sodium sulfate and sodium chloride.

- Effluent from the Opex manufacturing process.
- Waste water from the periodic cleanings of Plants A, B and C.
- Until 1966, wastes from the resin manufacturing process.
- Wastes from the Wytox ADP manufacturing process.

Additionally, between 1965 and 1967, process wastes from the Wiltrol-N manufacturing process were piped to Lake Poly, as were hazardous substances and/or materials used or created in the Wiltrol-N manufacturing process, when Plant C was washed down once a week. These included sodium nitrite, sulfuric acid, diphenylamine and N-Nitrosodiphenylamine.

Further, until at least 1967, acetone used for cleaning purposes in the laboratory and the plants was piped to Lake Poly after its use.

East-West Ponds

From February, 1964 until 1965 and/or 1966 when they were replaced, sequentially, with the unlined acid pits, the East-West Ponds continued to receive acidic effluent from the Kempore and hydrazine manufacturing processes. The effluent streams contained the hazardous substances and/or materials, or compounds containing hazardous substances and/or materials identified above in Supplemental Response 7(a), including chromium sulfate. Additionally, drums containing substances and/or materials not yet identified by Olin were placed into the East-West Ponds.

Unlined Acid Pits

From 1965 until December, 1971, when they were replaced by the first lined lagoon, the unlined acid pits received effluents from the Kempore and hydrazine manufacturing processes that had formerly been piped to the East-West Ponds. With the exception of chromium sulfate, which was not present in the Kempore effluent after April, 1967, and the additions of sodium sulfate and sodium chloride to the Kempore effluent after April, 1967, the hazardous substances and/or materials, or compounds containing hazardous substances and/or materials in those effluent streams remained the same. After July, 1971, these effluent streams were neutralized and treated for sulfate content.

Additionally, from the time of the closure of Lake Poly in 1969, the unlined acid pits also received all processing effluent from the Opex manufacturing process (until 1972), all processing effluent from the Wytox ADP manufacturing process (until 1971), and wastewater from periodic cleanings of Plants A, B and C (until 1972). Those waste streams contained the hazardous substances and/or materials, or compounds containing hazardous substances and/or materials, identified in Supplemental Response 7(a), except that after July 1971, these streams were neutralized and treated for sulfate content.

Other Releases

Other releases of hazardous substances and/or materials, or compounds containing hazardous substances and/or materials during the period from February, 1964 through August, 1980 included:

- Liquid dioctyldiphenylamine (DODPA a/k/a Wytox ADP) was routinely spilled onto the ground outside Plant B from February, 1964 until some time between 1967 and 1970.

- Between February, 1964 and 1971, diisobutylene periodically overflowed from a tank in Plant B and ran out of the building onto the adjacent ground.

- From February, 1964 to 1966, dust from the resin grinding process escaped Plant B and settled on the ground adjacent to Plant B. This dust contained phenol and/or formaldehyde.

- From February 1964 through 1966, pans in which resin was dried were cleaned outside Plant B and the residue from the cleaning process was poured onto the ground. The residue contained phenol and/or formaldehyde.

- In 1965 or 1966, two batches of resins exploded and sprayed material on the ground around the exterior of Plant B. That material contained phenol and/or formaldehyde.

- In 1965, a tank of diphenylamine in the Plant B area tank farm ruptured and released its contents to the ground.

- Between 1965 and 1968, dust from the fertilizer plant operated by PATCO in the eastern-most warehouse settled onto the ground outside the warehouse. That dust contained urea.

- From 1965 until 1971, effluent from the Wytox ADP process containing dioctyldiphenylamine, aluminum chloride, aluminum hydroxide, sodium chloride and diisobutylene was released into an open ditch running from Plant B to the East Ditch.

- From 1964 to 1965, on at least five to twelve occasions, azodiisobutyronitrile was spilled to the ground at the warehouse, either from containers being unloaded or from the loading dock. The material was left to the elements.

- Sometime between 1952 and 1968, a variety of hazardous substances and/or materials, or compounds containing hazardous substances and/or materials were buried at various locations around the Wilmington site, both in drums and unpackaged. Continued discovery may reveal the dates on which these substances and/or materials were buried. The locations of the drum burials and the identification of the hazardous substances and/or materials found at those locations can be found in Olin's Supplemental Phase II Report, June 1997 (at OW450587, et seq.), in accordance with Fed. R. Civ. P. 33(d).

- The recent Phase II Investigation of the Wilmington Site has identified the presence of pesticides in several locations around the Site. These locations are identified in Olin's Supplemental Phase II Report, June 1997. That report has been produced to the parties in this action. Documents produced by Fisons plc suggest that pesticides were shipped to Fisons Corporation at the Wilmington site by Fisons Ltd. or a subsidiary in the 1966 to 1970 period.

Olin has no knowledge of releases during the period from 1968 to 1980 other than those identified above. To the extent Olin has information regarding such possible releases, it is from deposition testimony and accompanying exhibits. The Biltrite Companies are as familiar with that deposition testimony and those exhibits as is Olin, and Olin refers the Biltrite Companies to them, pursuant to Fed. R. Civ. P. 33(d). Olin reserves all of its rights with respect to such testimony.

Documents not previously identified in Olin's Answers that provide information regarding the facts presented in Supplemental Responses 7(a) and 7(b) include: The Badger Pollution Control Study (OW017576-618); Site Plot Plan (OW000694); Blueprint, December 6, 1957 (OW001072); Blueprint, February 9, 1960 (OW001160); Blueprint, March 30, 1961 (OW373798); Blueprint, April 13, 1954 (OW373792); Kempore Filter Press, July 12, 1957 (HP00663-671); Operating Procedure - Product A, March 5, 1958 (HP00526-538); Blueprint, November 7, 1952 (OW373805); June 26, 1956 Site Photo (OW104043A); 1958 Insurance Plot Plan (OW1161); 1961 Insurance Plot Plant (OW373804); September 13, 1969 Site Photo (OW104081); 1967 Site Photo (OW014676A; 9/7/72 Letter from R. McBrien to Wilmington Town Manager (OW009629-631); 4/5/73 Letter from R. Williams to District Sanitary Engineer (OW009890-891); 8/17/71 Letter from Water Resources Commission to R. McBrien and Response (OW003015-016); 4/1/65 Letter from J.S. Walker to Osberg (OW008674-687); 9/15/66 Document from CPR to Dave (OW008627-628); Operating Procedure - BIOP, 7/19/58 (HP00615-623); Contract for Sale of Resin Business, 3/9/66 (BDG002427); Drum Burial Questionnaire (OW005317-367); 9/19/67 Herbicide Marketing Proposal (BDG011144-158); 8/23/67 Letter from F.R. Johnson to D.T. Smith (BDG011257); 9/19/67 Agricultural Division Progress Report (BDG011258-260); 9/19/67 Fisons Corp. Annual Board Meeting Minutes (JMW05105-116); 2/3/67 Fisons Corp. Board Minutes (2000107-117); 9/19/67 Fisons Corp. Board Minutes (3001379-389); 11/1/67 Agricultural Chemical Division Progress Report (3001459-461); 8/23/67 Letter to D. Smith from F. Johnson (JMW05024); 9/67 Agricultural Chemical Division Progress Report (JMW05025-027); 12/15/67 Agricultural Chemical Division Progress Report (JMW05365-366); 2/68 Agricultural Chemical Division Progress Report (JMW05443-445); 2/8/68 Agricultural Chemical Division Budget Review (JMW05460-467); 4/68 Agricultural Chemical Division Progress Report (JMW05588-593); 7/22/68 (JMW05782-785). Both these documents and the documents identified in Olin's Answers have been produced to the Biltrite Companies previously. Both sets of documents contain additional information responsive to this interrogatory request. For that information, Olin refers the Biltrite Companies to those documents pursuant to Fed. R. Civ. P. 33(D), because the burden of examining those documents is substantially the same for the Biltrite Companies as for Olin.

Persons who know, or may know, about these facts, including deponents, are identified in Olin's Supplemental Response to Interrogatory No. 8 below.

Discovery is still underway. Olin will identify additional relevant facts, documents and individuals with knowledge when and as required by the Federal Rules of Civil Procedure.

Interrogatory No. 8: Identify all persons with knowledge of:

(a) any fact relied on in your response to each of the foregoing interrogatories;

(b) any fact asserted or alleged in the Complaint filed by Olin in this action;

(c) the environmental condition of the Wilmington plant, including any fact concerning the environmental condition of the Wilmington plant; and

(d) Olin's reports and disclosures to regulatory agencies concerning the environmental condition of the plant.

Response: Olin incorporates its previous response to this interrogatory by reference. Further, Olin continues to object to this interrogatory on the grounds that it is vague and ambiguous in not defining "any fact asserted or alleged," "environmental condition," "fact concerning the environmental condition," "regulatory agencies" and "disclosures." Without waiving its objections, Olin further responds as follows:

(a) and (b) Appendix C has been revised to list persons presently known to Olin with knowledge of facts relied on in both Olin's Answers and these Supplemental Answers, as well as facts asserted or alleged in the complaint filed by Olin in this action.

Appendix D has been revised to list persons presently known to Olin who may have knowledge of facts regarding the plant.

(c) and (d) An additional person who has knowledge of environmental conditions at the Plant and of Olin's reports and disclosures to regulatory agencies is M. Margaret Hanley of GEI Consultants, Inc. Ms. Hanley was recently retained by Olin as a Licensed Site Professional and consultant regarding the Wilmington Plant.

Interrogatory No. 10: State the total amount of damages, including response costs and interest, Olin seeks to recover in this action; identify each response action which you allege Olin has undertaken at the Wilmington plant site, including a description of the nature of the work performed and the identity of the entities or individuals who performed the work; and state the amount of costs you seek to recover for each such response action.

Response: Olin incorporates its previous response to this interrogatory by reference. Further, Olin continues to object to this interrogatory on the grounds that it is vague and ambiguous in not defining "the nature of the work performed" and the "entities or individuals who performed the work." Without waiving its objections, Olin further responds as follows:

With respect to investigation activities, additional firms involved include Groundwater Technology, Gately Construction Co., E.C. Jordan Co., Soil Exploration Corp., and C.E. Environmental Services.

Documents that have been provided to all parties regarding expenditures at the site, in addition to those identified in Olin's Answers, include documents at OW507777-510085; OW520209-520500; OW516652-516915; OW519069-519160; OW519250-519785; OW592851-592981; OW593288-593535; OW607519-610214. The burden of obtaining information from those documents, including those previously identified, is the same for the Biltrite Companies as for Olin and, therefore, Olin refers the Biltrite Companies to those documents, pursuant to Fed. R. Civ. P. 33(d).

As to Objections:

OLIN CORPORATION

By Its Attorneys,

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Date: January 30, 1998

VERIFICATION

I, Thomas P. O'Brien, Manager, Environmental Sites, Olin Corporation, state that I have read the foregoing Supplemental Answers of Olin to the Biltrite Companies' First Interrogatories, that the answers include information not known to me personally, that I have relied on others to obtain such information not known to me personally, and that the answers contained therein are true to the best of my knowledge, information and belief.

Executed under penalty of perjury on this 30th day of January, 1998.

Thomas P. O'Brien

Thomas P. O'Brien

CERTIFICATE OF SERVICE

I hereby certify that on this 30th day of January, 1998, I served a copy of Plaintiff Olin Corporation's Supplemental Objections and Answers to Defendants The Biltrite Corporation and American Biltrite Inc.'s First Set of Interrogatories, by first class mail, postage prepaid, to Defendants' counsel of record, Robert G. Jones, and to all other Counsel of Record.

Charles Swinburn

Charles Swinburn

ATTACHMENT 6

Constituents Found in "Business Records and Correspondence" in Geomega's Files

(Shaded records denote existing PCOCs)

Potential Contaminant of Concern	Common Names	Raw, Product, Waste, Unknown, By-product	Pre- or Post-Olin	Reference	On existing PCOC List	CAS#
#6 oil		Unknown	Unknown	Oils used at Wilmington	N	
1,1'Azobisformamide		Unknown	Unknown	NP Wilmington List	N	
1,2 Dichloroethane		Unknown	Unknown	OW 023181	N	
1,2,4 Triazole		Product	Unknown	Wilmington Finished Goods	N	
1-Nitropropane		Unknown	Unknown	OW 373720 Stepan Technical Information	N	
2,6 di-tert-butylphenol		Unknown	Unknown	OW 797568	N	
2,6,B		Unknown	Unknown	OW 797361	N	
201-C Resin		Product	Pre	OW 373719-M Production Summary	N	
201-F Resin		Product	Pre	Wilmington Finished Goods	N	
202-C Resin		Product	Pre	OW 373719-M Production Summary	N	
202-F Resin	cashew nut oil	Product	Pre	OW 373719-M Production Summary	N	
218-C Resin		Product	Pre	OW 373719-M Production Summary	N	
218-F Resin		Product	Pre	OW 373719-M Production Summary	N	
222-P Resin		Product		OW 1285-1339	N	
2-ethylhexanol		Raw	Pre	Table 2.2 from CSA	Y	104-76-7
2-ethylhexoic acid	Octanoic acid	Raw	Pre	OW 021018 List of Raw materials	Y	00149-57-5
2-MT Lever		Product	Pre	AB 04322 Unit Summary	N	
2-nitrophenol		Unknown	Unknown	OW 023180 Olin memo	N	
3,3-thiodipropionic acid		Raw	Unknown	OW 005215	N	
3-Amino 1,2,4 Triazole		Product	Unknown	OW 797474	N	
4,4 oxybisbenzenedisulfonylhydrazide		Product	Pre	Table 2.2 from CSA	Y	
4-Amino-1,2,4 Triazole		Coproduct	Unknown	OW 797464	N	
4-aminourazole		Unknown	Unknown	OW 023366 Olin	N	
598 Oil		Unknown	Unknown	OW 1285-1339	N	
5-Aminotetrazone		Unknown	Unknown	OW 797339	N	
5-Phenyltetrazole	Expandex 5-PT	Product	Pre	Wilmington Finished Goods	Y	18039-42-4
Accel MBTS		Product	Pre	AB 04322 Unit Summary	N	
Acetone	acetone filtrate	Unknown	Unknown	Wilmington Raw Materials sheet 2	Y	00067-64-1
acetone filtrate	acetone				N	
Acetone Semicarbazone		Product	Unknown	Wilmington Finished Goods	N	
Acetonitrile		Unknown	Unknown	OW 373720 Stepan Technical Information	N	
Acrylic Resins		Raw	Unknown	Table 2.2 from CSA	Y	
Acryloid K-120N		Unknown	Unknown	Wilmington Raw Materials sheet 2	N	
Actafoam F-2 paste		Product	Unknown	Wilmington Finished Goods	N	
Actafoam F-2 powder		Product	Unknown	Wilmington Finished Goods	N	
Actafoam R-1		Product	Unknown	OW 005211 Olin memo	N	
Actafoam R-10		Product	Unknown	OW 567715 Olin ltr	N	
Actafoam R-3		Product	Unknown	Wilmington Finished Goods	N	
Actafoam R-5		Product	Unknown	OW 005211 Olin memo	N	

Potential Contaminant of Concern	Common Names	Raw, Product, Waste, Unknown, By-product	Pre- or Post-Olin	Reference	On existing PCOC List	CAS#
Actafoam XR-16		Product	Unknown	Wilmington Finished Goods	N	
Actafoam XR-34		Product	Unknown	Wilmington Finished Goods	N	
Additive W		Product	Unknown	Wilmington Finished Goods	N	
Adipic Acid	Hexanedioic acid; 1,4-butane-dicarboxylic	Unknown	Unknown	OW 093469 Olin Memo	Y	00124-04-9
Adipic dihydrazide		Product	Unknown	Wilmington Finished Goods	N	
Aerosol M-35		Product	Pre	AB 04322 Unit Summary	N	
Alkyl Phenol					Y	68555-24-8
Alkylated diphenylamine		Unknown	Unknown	NP Wilmington List	N	
Aluminum		Waste	Unknown	GEO 25377 Deposition Exhibit	Y	7429-90-5
Aluminum Chloride		Raw	Pre	Table 2.2 from CSA	Y	07446-70-0
Aluminum Hydroxide		Waste/Byproduct	Pre	Table 2.2 from CSA	Y	21645-51-2
Aminoguanidine Bicarbonate	AGB	Unknown	Unknown	OW 797339	N	
Ammonia		Raw	Pre	OW 021018 List of Raw materials	Y	7664-41-7
Ammonium Chloride		Raw & Waste/Byproduct	Pre	Table 2.2 from CSA	Y	12125-02-9
Ammonium Hydroxide		Raw	Unknown	OW 021018 List of Raw materials	Y	01336-21-6
Ammonium salts of Alkylphosphate	Aquarex L.; Anionic surfactant	Raw	Unknown	OW 005200 Olin Memo	Y	
Ammonium Sulfate		Waste/Byproduct	Pre	Table 2.2 from CSA	Y	7783-20-2
Ammonium Thiocyanate	Ammonium sulfocyanate	Unknown	Unknown	OW 797273	Y	01762-95-4
Anhydrous Ammonia	ammonia	Raw	Unknown	OW 005200 Olin Memo	N	
Aniline	aminobenzene	Unknown	Unknown	OW 1285-1339	Y	00062-53-3
Antidust 1060		Product	Unknown	Wilmington Finished Goods	N	
Antidust 1060N		Product	Pre	AB 04322 Unit Summary	N	
Aquard 25;75		Unknown	Unknown	OW 005200 Olin Memo	N	
Asbestos		Waste	Unknown	OW 021839 Annual Report	Y	1332-21-4
AZDN FF		Product	Unknown	Wilmington Finished Goods	N	
AZDN LC dry		Product	Unknown	Wilmington Finished Goods	N	
AZDN Lm dry		Product	Unknown	Wilmington Finished Goods	N	
Azobisisobutyronitrile		Unknown	Unknown	OW 005200 Olin Memo	N	
Azodicarbonamide	Kempore	Raw & Product	Pre	Table 2.2 from CSA	Y	123-77-3
azone		Unknown	Unknown	OW 023366 Olin	N	
Barium azocarbonate	Expandex 177	Product	Unknown	OW 006285 Olin	N	
Barium Chloride		Unknown	Unknown	Wilmington Raw Materials sheet 2	Y	10361-37-2
Barium oxide		Raw	Unknown	OW 022668	N	
Bentone		Raw	Unknown	Table 2.2 from CSA	Y	
Benzaldehyde		Unknown	Unknown	OW 795562	Y	00100-52-7

Potential Contaminant of Concern	Common Names	Raw, Product, Waste, Unknown, By-product	Pre- or Post-Olin	Reference	On existing PCOC List	CAS#
Benzene	Benzol	Waste	Unknown	OW 021839 Annual Report	Y	00071-43-2
Benzene-sulfonyl-hydrazide	4,4-Oxybis				Y	80-51-3
Benzonitrile	cyanobenzene, phenyl cyanide	Raw & Waste/Byproduct	Pre	OW 021018 List of Raw materials	Y	100-47-0
Benzophenone	diphenyl ketone	Unknown	Unknown	OW 093469 Olin Memo	Y	00119-61-9
Benzophenone Hydrazone		Product	Unknown	Wilmington Finished Goods	N	
BHC		Pesticide	Unknown	Sheet on Pesticides at Olin (in 2nd big box)	N	
Bichromate		Unknown	Unknown	OW 1285-1339	N	
Bis(2-ethylhexyl) phthalate	Dioctyl phthalate, DOP, di(2-ethylhexyl) phthalate	Raw & Product	Pre	Table 2.2 from CSA	Y	00117-81-7
Borden's B-38		Unknown	Unknown	OW 1285-1339	N	
Boric Acid	Boracic acid; orthoboric acid; borofax	Unknown	Unknown	Wilmington Raw Materials sheet 2	N	
Butanol	see also butyl alcohol, n-butanol	Raw	Unknown	OW 021018 List of Raw materials	N	
Butyl alcohol	see also butanol, n-butanol	Raw	Pre	Table 2.2 from CSA	Y	00071-36-3
Butylacetate		Raw	Unknown	Table 2.2 from CSA	Y	00105-46-4
Cabosil		Unknown	Unknown	OW 1285-1339	N	
Cadmium octate		Raw	Unknown	OW 005200 Olin Memo	N	
Cadmium oxide		Raw	Unknown	OW 005211 Olin memo	Y	01306-19-0
calcium		Unknown	Unknown	Severn Trent Results 1998	N	
Calcium Carbonate		Unknown	Unknown	OW 009953 NP letter	Y	471-34-1
Calcium Chloride		Unknown	Unknown	OW 009953 NP letter	Y	10043-52-4
Calcium Oxide		Unknown	Unknown	OW 567715 Olin ltr	Y	1305-78-8
Calcium oxybisbenzene sulfonate		Unknown	Unknown	OW 009953 NP letter	N	
Calcium Silicate	Microcel-E	Unknown	Unknown	OW 005200 Olin Memo	Y	1344-95-2
Calcium Stearate		Raw	Unknown	OW 005200 Olin Memo	Y	1592-23-0
Carbohydrazide	1,3-diaminourea; carbazide	Product	Unknown	Wilmington Finished Goods	Y	497-18-7
Carbon Black		Product	Pre	AB 04322 Unit Summary	N	
carbon dioxide		Unknown	Unknown	OW 1285-1339	N	
carbon disulfide		Unknown	Unknown	OW 798061	N	
Carboxymethylcellulose		Unknown	Unknown	OW 005200 Olin Memo	N	
Cashew nut oil		Raw	Unknown	OW 005200 Olin Memo	N	
Caustic soda flake		Unknown	Unknown	OW 1285-1339	N	
Chlordane		Pesticide	Unknown	Sheet on Pesticides used at Olin	N	
Chlorine		Raw	Pre	Table 2.2 from CSA	Y	07782-50-5
Chlorosulfonic acid		Raw	Pre	Table 2.2 from CSA	Y	07790-94-5

Potential Contaminant of Concern	Common Names	Raw, Product, Waste, Unknown, By-product	Pre- or Post-Olin	Reference	On existing PCOC List	CAS#
Cho-ox 4	Thibisbenzaldehydepropanyl hydrazone	Unknown	Unknown	OW 797563	N	
chrome sulfate		Waste/Byproduct	Unknown	Table 4-14	N	
Chromium		Unknown	Unknown	Phase I Site Inspection (2nd)	N	
Cirasol oil		Unknown	Unknown	Oils used at Wilmington	N	
CNSL		Unknown	Unknown	OW 1285-1339	N	
copper		Unknown	Unknown	OW 023182	N	
COS-60		Product	Unknown	Wilmington Finished Goods	N	
CSA		Unknown	Unknown	Wilmington Raw Materials sheet 2	N	
Cumarone Resin		Product	Pre	AB 04322 Unit Summary	N	
cyanide	see hydrogen cyanide	Waste	Unknown	OW 030048 waste report	N	
Cyanox flakes		Product	Unknown	Wilmington Finished Goods	N	
Cyanox powder		Product	Unknown	Wilmington Finished Goods	N	
Cyclohexanol		Waste	Unknown	OW 021839 Annual Report	N	
Darvan-L		Raw	Unknown	Wilmington Raw Materials sheet 2	N	
Darvanol		Raw	Unknown	OW 021018 List of Raw materials	N	
Daxad		Unknown	Unknown	OW 1285-1339	N	
DDD		Pesticide	Unknown	Sheet on Pesticides at Olin	N	
DDE		Pesticide	Unknown	Sheet on Pesticides at Olin	N	
DDT		Pesticide	Unknown	Sheet on Pesticides at Olin	N	
dedusting oil		Unknown	Unknown	Oils used at Wilmington	N	
Deetac	NP 27	Product	Unknown	Wilmington Finished Goods	N	
Deodorant 1056		Raw	Unknown	Wilmington Raw Materials sheet 2	N	
Di(2-ethylhexyl)phthalate	bis(2-ethylhexyl)phthalate, DOP, dioctyl phthalate	Product	Unknown	National Polychemicals, Inc.	N	
Di(C7-9-11 Alkyl) phthalate	1,2-benzenedicarboxylic acid; Santicizer 711	Raw	Unknown	OW 021018 List of Raw materials	Y	39393-37-8
DIB		Unknown	Unknown	OW 005211 Olin memo	N	
dicarboxyhydrazide amide		Unknown	Unknown	OW 023366 Olin	N	
Dihydrazide		Unknown	Unknown	OW 797561	N	
Dihydrazine sulfate		Unknown	Unknown	HP 00654 K-1 operating	N	
Diisobutylene	2,2,4 trimethylpentene	Raw	Pre	Table 2.2 from CSA	Y	25167-70-8
Dimethyl Carbonate		Unknown	Unknown	OW 005200 Olin Memo	Y	616-38-6
Dimethyl Formamide		Raw & Waste/Byproduct	Pre	OW 021018 List of Raw materials	Y	
Dimethylphenol				ltr from Stepan	N	
Di-n-butyl phthalate		Product	Pre	Table 2.2 from CSA	Y	00084-74-2
Dinitrosopentamethylenetetramine	Opex	Product	Pre	Table 2.2 from CSA	Y	101-25-7
Di-nonylphenol	2,4 dinonylphenol, DVP	Raw	Pre	OW 021018 List of Raw materials	Y	
Dioctyl Diphenylamine		Unknown	Unknown	BDG 000006	Y	
Dioctylphthalate		Unknown	Unknown	OW 210384 Olin Memo		
Diphenyl amine		Raw	Pre	Table 2.2 from CSA	Y	00122-39-4

Potential Contaminant of Concern	Common Names	Raw, Product, Waste, Unknown, By-product	Pre- or Post-Olin	Reference	On existing PCOC List	CAS#
diphenyl methanol		Unknown	Unknown	OW 023366 Olin	N	
Diphenyl oxide	DPO??	Raw	Pre	Table 2.2 from CSA	Y	
diphenyl-4-4'disulfonyl		Unknown	Unknown	OW 797589	N	
diphenyl-4-4'disulfonyl		Unknown	Unknown	OW 797589	N	
DMTDH		Unknown	Unknown	OW 797562	N	
DMTDP	Dimethyl thiodipropionate	Unknown	Unknown	OW 797562	N	
DOEMEGAN		Unknown	Unknown	OW 797605	N	
Drakeol #35 oil		Unknown	Unknown	OW 005200 Olin Memo	N	
Elten		Product	Pre	AB 04322 Unit Summary	N	
Endosulfan		Pesticide	Unknown	Sheet on Pesticides at Olin (in 2nd big box)	N	
Endrin		Pesticide	Unknown	Sheet on Pesticides at Olin (in 2nd big box)	N	
Endrin Ketone		Pesticide	Unknown	Sheet on Pesticides at Olin (in 2nd big box)	N	
Ethemeen		Unknown	Unknown	OW 005200 Olin Memo	N	
Ether		Unknown	Unknown	OW 797581	N	
Ethyl acetate	Ethyl Ethanoate, Acetic Ester	Unknown	Unknown	OW 030048 waste report	Y	00141-78-6
Ethyl Acetoacetate		Unknown	Unknown	OW 373720 Stepan Technical Information	N	
Ethylene glycol	1,2-Thanediol	Unknown	Unknown	OW 005200 Olin Memo	N	
Ethylene oxide		Unknown	Unknown	OW 797613	N	
Fast Spermoil		Raw	Unknown	Oils used at Wilmington	N	
Fatty amines		Raw	Unknown	Table 2.2 from CSA	Y	
Ficel AC3F		Product	Unknown	Wilmington Finished Goods	N	
Ficel CRA		Product	Unknown	Wilmington Finished Goods	N	
FI-Guard		Unknown	Unknown	3000105 1964 ltr	N	
Fisons DNPT 80		Unknown	Unknown	Technical News FL-13085	N	
Formaldehyde		Raw & Waste/Byproduct	Pre	OW 021018 List of Raw materials	Y	00050-00-0
Formamide	Methanamide, carbamaldehyde	Unknown	Unknown	OW 005200 Olin Memo	N	
Formic acid		Unknown	Unknown	OW 1285-1339	N	
Fransil 251		Product	Pre	AB 04322 Unit Summary	N	
Glycerine	Glycerol; 1,2,3-propanetriol	Raw	Unknown	OW 021018 List of Raw materials	Y	00056-81-5
Glycol Ethers	glycol monethyl ether	Unknown	Unknown	OW 005200 Olin Memo	Y	00110-80-5
Hardener	S-7087	Product	Unknown	Wilmington Finished Goods	N	
HBr	Anhydrous hydrobromic acid??	Unknown	Unknown	OW 005211 Olin memo	N	
HCL AQ		Waste/Byproduct	Unknown	Table 4-14	N	
Heavy White Oil		Raw	Unknown	OW 021018 List of Raw materials	N	
Heptachlor		Pesticide	Unknown	Sheet on Pesticides at Olin (in 2nd big box)	N	
Heptachlor epoxide		Pesticide	Unknown	Sheet on Pesticides at Olin (in 2nd big box)	N	
Hexamethylenetetramine	Hexamine; Methenamine	Raw	Pre	Table 2.2 from SCA	Y	100-97-0
Hexane		Raw	Unknown	OW 021018 List of Raw materials	N	
Hexylene Glycol		Raw	Unknown	OW 021018 List of Raw materials	Y	00107-41-5

Potential Contaminant of Concern	Common Names	Raw, Product, Waste, Unknown, By-product	Pre- or Post-Olin	Reference	On existing PCOC List	CAS#
Hisil 233		Unknown	Unknown	OW 567715 Olin ltr	N	
Hydrazine	see hydrazine hydrate	Raw & Product	Pre	OW 021018 List of Raw materials	Y	00302-01-2
hydrazine hydrate	see hydrazine	Unknown	Unknown	OW 797586	N	
Hydrazodicarbonamide	Urazole; 1,2,4-triazolidine; 3,5-dione; bicarbaminide				Y	3232-84-6
Hydrochloric acid		Raw & Waste/Byproduct	Pre	OW 021018 List of Raw materials	Y	07647-01-0
Hydrogen Cyanide in Aq. Solution	Cyanide	Waste	Unknown	OW 030048 waste report	Y	00057-12-5
Hydrogen Peroxide		Unknown	Unknown	Wilmington Raw Materials sheet 2	Y	07722-84-1
Indupol H-100		Unknown	Unknown	OW 1285-1339	N	
Indusoil		Unknown	Unknown	HP 00548	N	
Inks		Unknown	Unknown	OW 005200 Olin Memo	N	
Iron		Unknown	Unknown	Severn Trent Results 1998	N	
Isooctyl alcohol		Raw	Unknown	BIOP HP 00615	N	
Isophthalic acid	1,3-Benzenedicarboxylic acid				Y	121-91-5
Kempore "B"		Product	Unknown	OW 1285-1339	N	
Kempore 117		Product	Unknown	OW 1285-1339	N	
Kempore 125		Product	Pre	AB 04322 Unit Summary	N	
Kempore 125A		Product	Unknown	OW 009047	N	
Kempore 125FF		Product	Unknown	Wilmington Finished Goods	N	
Kempore 125HS		Product	Unknown	OW 567715 Olin ltr	N	
Kempore 125LP		Product	Unknown	OW 567715 Olin ltr	N	
Kempore 125-MC		Product	Unknown	OW 567715 Olin ltr	N	
Kempore 150		Product	Pre	AB 04322 Unit Summary	N	
Kempore 200		Product	Pre	Wilmington Finished Goods	N	
Kempore 200FF		Product	Unknown	OW 567715 Olin ltr	N	
Kempore 200MC		Product	Unknown	OW 567715 Olin ltr	N	
Kempore 60		Product	Unknown	Wilmington Finished Goods	N	
Kempore 60/14		Product	Unknown	Wilmington Finished Goods	N	
Kempore 60/14 MC		Product	Unknown	OW 567715 Olin ltr	N	
Kempore 60/14 XL		Product	Unknown	OW 567715 Olin ltr	N	
Kempore 60/14FF		Product	Unknown	OW 567715 Olin ltr	N	
Kempore 80					N	
Kempore BA-101		Product	Unknown	OW 1285-1339	N	
Kempore HDCA		Product	Unknown	OW 567715 Olin ltr	N	
Kempore HDCI		Product	Unknown	OW 025792	N	
Kempore K-1		Product	Unknown	HP00653 Operating procedure	N	
Kempore R-125		Product	Unknown	AB 04322 Unit Summary	N	
Kempore SD-125		Product	Pre	Wilmington Finished Goods	N	
Kempore SD-150		Product	Pre	OW 373719-M Production Summary	N	
Kempore SD-200		Product	Pre	Wilmington Finished Goods	N	
Kempore SD-200/EPO		Product	Unknown	Wilmington Finished Goods	N	
Kempore SD-60		Product	Pre	Wilmington Finished Goods	N	

Potential Contaminant of Concern	Common Names	Raw, Product, Waste, Unknown, By-product	Pre- or Post-Olin	Reference	On existing PCOC List	CAS#
Kempore SDA-200		Product	Unknown	Wilmington Finished Goods	N	
Kempore UD					N	
KSP		Unknown	Unknown	OW 1285-1339	N	
K-tert-butoxide		Unknown	Unknown	OW 797580	N	
L-115 Resin		Product	Unknown	OW 1285-1339	N	
L-118-A Resin		Product	Unknown	OW 1285-1339	N	
L-119 Resin		Product	Unknown	OW 1285-1339	N	
L-303 Resin		Unknown	Unknown	OW 1285-1339	N	
lauryl alcohol		Byproduct	Unknown	OW 006285 Olin	N	
Lead octate		Raw	Unknown	OW 005200 Olin Memo	N	
LiH		Raw	Unknown	OW 797361	N	
Lime slurry	Lime	Raw	Unknown	OW 021018 List of Raw materials	N	
Liqro		Unknown	Unknown	Olin 1983 Aug. 30 memo	N	
Liquid DPA		Raw	Unknown	OW 1285-1339	N	
Magnesia 30-C		Product	Pre	AB 04322 Unit Summary	N	
Magnesia 5		Product	Pre	AB 04322 Unit Summary	N	
Magnesium		Unknown	Unknown	Severn Trent Results 1998	N	
Maleic anhydride		Raw	Unknown	Table 2.2 from CSA	Y	00108-31-6
Manganese		Unknown	Unknown	Severn Trent Results 1998	N	
Maple Resin		Product	Pre	AB 04322 Unit Summary	N	
MEA		Raw	Unknown	OW 005211 Olin memo	N	
melathane		Product	Unknown	Wilmington Finished Goods	N	
Mercury		Unknown	Unknown	OW 023181	Y	07439-97-6
Methanol	alcohol	Raw	Unknown	OW 021018 List of Raw materials	Y	00067-56-1
Methoxychlor		Pesticide	Unknown	Sheet on Pesticides at Olin (in 2nd big box)	N	
Methyl acrylate		Unknown	Unknown	OW 797578	N	
methyl carbazate		Unknown	Unknown	OW 797586	N	
Methyl Ethyl Ketone	2-Butanone	Unknown	Unknown	OW 373720 Stepan Technical Information	Y	00078-93-3
methyl glucoside		Unknown	Unknown	OW 797579	N	
Mineral Oil, Mineral Seal Oil		Raw	Unknown	OW 021018 List of Raw materials	Y	
Mineral Spirits		Raw	Unknown	OW 021018 List of Raw materials	Y	08030-30-6
Mixture of Silicone and Emulsions	CNC Antifoam 100	Raw	Unknown	OW 021018 List of Raw materials	Y	
Monochlorourea		Unknown	Unknown	OW 793233	N	
Monoethanolamine	2-aminoethanol	Raw	Unknown	OW 021018 List of Raw materials	Y	00141-43-5
Monohydrazine		Unknown	Unknown	OW 1285-1339	N	
monohydrazine sulfate	MHS	Unknown	Unknown	HP 00654 K-1 operating	N	
Morpholine		Unknown	Unknown	OW 373720 Stepan Technical Information	Y	00110-91-8
Muriatic acid		Raw	Unknown	OW 005200 Olin Memo	N	

Potential Contaminant of Concern	Common Names	Raw, Product, Waste, Unknown, By-product	Pre- or Post-Olin	Reference	On existing PCOC List	CAS#
N,N-Dimethylformamide	DMF	Raw & Waste/Byproduct	Pre	OW 021018 List of Raw materials	Y	00068-12-2
Napol		Product	Unknown	Wilmington Finished Goods	N	
Natrasol		Unknown	Unknown	OW 005200 Olin Memo	N	
NBA		Raw	Unknown	OW 797361	N	
n-butanol	see also butanol, butyl alcohol	Unknown	Unknown	OW 093469 Olin Memo	N	
NC 1978		Unknown	Unknown	BDG 011360 Fisons Corporations	N	
NC 3363		Unknown	Unknown	BDG 011360 Fisons Corporations	N	
NC 4676		Unknown	Unknown	BDG 011360 Fisons Corporations	N	
NC 4780		Unknown	Unknown	BDG 011360 Fisons Corporations	N	
NC 5016		Unknown	Unknown	BDG 011360 Fisons Corporations	N	
NC 5651		Unknown	Unknown	BDG 011360 Fisons Corporations	N	
NC 6583		Unknown	Unknown	BDG 011360 Fisons Corporations	N	
NC 6627		Unknown	Unknown	BDG 011360 Fisons Corporations	N	
NEV Paradine #2 Resin		Product	Pre	AB 04322 Unit Summary	N	
NEV R-16 Resin		Product	Pre	AB 04322 Unit Summary	N	
NEV R-29 Resin		Product	Pre	AB 04322 Unit Summary	N	
N-Heptane	Heptane	Raw	Unknown	OW 005200 Olin Memo	Y	00142-82-5
Nitric Acid					Y	07697-37-2
Nitrogen		Unknown	Unknown	OW 009680	Y	7727-37-9
nitrogen trichloride		Unknown	Unknown	B06000004 Fisons Limited	N	
Nitropore ATA		Product	Unknown	Wilmington Finished Goods	N	
Nitropore OT		Product	Pre	Table 2.2 from CSA	N	
Nitropore RP-10		Product	Unknown	OW 567715 Olin ltr	N	
N-Nitrosodiphenylamine	Wiltron N	Product	Pre	Table 2.2 from CSA	Y	00086-30-6
Nonylphenol		Raw	Pre	OW 021018 List of Raw materials	Y	25154-52-3
Nopco 1444-B		Unknown	Unknown	Deposition Exhibit 1979 date	Y	25154-52-3
NP061 Resin		Product	Unknown	OW 1285-1339	N	
NPH-15		Unknown	Unknown	OW 1285-1339	N	
NPI-11		Product	Unknown	Wilmington Finished Goods	N	
NPS-201C		Product	Unknown	Wilmington Finished Goods	N	
NP-SAL-1		Raw	Unknown	HP 00527	N	
Nuostabe V1444		Raw	Unknown	OW 021018 List of Raw materials	N	
Nurothane		Unknown	Unknown	OW 1285-1339	N	
OBSA		Unknown	Unknown	OW 797589	N	
OBSH	4-4'oxybisbenzenedisulfonyl hydrazide; Nitropore OBSH	Product	Unknown	Wilmington Finished Goods	N	
Octadecanol		Raw	Unknown	OW 797361	N	

Potential Contaminant of Concern	Common Names	Raw, Product, Waste, Unknown, By-product	Pre- or Post-Olin	Reference	On existing PCOC List	CAS#
Oleic acid		Raw	Unknown	Poly Brite HP 00562	N	
Opex	Product A; dinitrosopentamethylene tetramine	Product	Pre	OW 373719-M Production Summary	N	
Opex 100		Product	Unknown	Wilmington Finished Goods	N	
Opex 40		Product	Pre	AB 04322 Unit Summary	N	
Opex 42		Product	Unknown	Wilmington Finished Goods	N	
Opex 80		Product	Unknown	Wilmington Finished Goods	N	
Opex 93		Product	Unknown	Wilmington Finished Goods	N	
Opex PL-80		Product	Pre	AB 04322 Unit Summary	N	
Opex SBA		Product	Unknown	OW 1285-1339	N	
Opex-4X		Product	Unknown	HP 00527	N	
Opex-RPC		Product	Unknown	AB 04322 Unit Summary	N	
Opex-XBA		Product	Unknown	AB 04322 Unit Summary	N	
Oxalic acid	Ethanedioic acid	Raw	Unknown	OW 005200 Olin Memo	N	
Oxalic Dihydrazide	Semioxamazide, Aminooxoacetic acid, hydrazide, oxamic acid hydrazide				Y	515-96-8
Oxybisbenzenesulfonyl chloride	OBSC	Product	Unknown	Wilmington Finished Goods	N	
Para Toluene Sulfonic Acid water	PTSA	Raw	Unknown	OW 005200 Olin Memo	Y	6192-52-5
Paraformaldehyde	Paraform	Raw	Unknown	OW 005200 Olin Memo	Y	30525-89-4
Paraplex		Unknown	Unknown	Deposition Exhibit 1979 date	N	
PBNA	NP-20; 20-N	Product	PRe	AB 04322 Unit Summary	N	
PC oil		Unknown	Unknown	Oils used at Wilmington	N	
Phenol		Raw & Waste/Byproduct	Pre	Table 2.2 from CSA	Y	00108-95-2
Phenol formaldehyde Resin		Product	Pre	Table 2.2 from CSA	N	
Phosphorus Trichloride		Raw	Pre	OW 021018 List of Raw materials	Y	07719-12-2
Phthalate Ester		Unknown	Unknown	OW 567719	N	
Phthalic Anhydride	Phthalandione; Wiltrol P	Unknown	Unknown	OW 005200 Olin Memo	Y	00085-44-9
Poly brite 600		Product	PRe	AB 04322 Unit Summary	N	
Poly Brite PE 20		Product	Pre	AB 04322 Unit Summary	N	
Poly Brite W10		Product	Pre	AB 04322 Unit Summary	N	
Poly Sperse AP-2		Product	Pre	AB 04322 Unit Summary	N	
Poly Sperse AP-300		Product	Pre	AB 04322 Unit Summary	N	
Poly Sperse LC-20		Product	Pre	AB 04322 Unit Summary	N	
Poly Sperse R-100		Product	Pre	AB 04322 Unit Summary	N	
Poly-BUT 66-6		Unknown	Unknown	OW 1285-1339	N	

Potential Contaminant of Concern	Common Names	Raw, Product, Waste, Unknown, By-product	Pre- or Post-Olin	Reference	On existing PCOC List	CAS#
polychlorinated biphenyls		Waste	Unknown	OW 030047	N	
Polycone 1000		Product	Pre	AB 04322 Unit Summary	N	
Polycone 100X		Product	Pre	AB 04322 Unit Summary	N	
Polycone 125X		Product	Pre	AB 04322 Unit Summary	N	
Polycone 2000		Product	Pre	AB 04322 Unit Summary	N	
Polycone 500		Product	Pre	AB 04322 Unit Summary	N	
Polycone 5000		Product	Pre	OW 373719-M Production Summary	N	
Polycone Le 46 150x		Product	Unknown	Wilmington Finished Goods		
Polycone M-35 oil		Product	Pre	AB 04322 Unit Summary	N	
Polycone ORG 22		Product	Pre	AB 04322 Unit Summary	N	
Polycone XSP		Product	Pre	AB 04322 Unit Summary	N	
Polyethylene		Waste	Unknown	OW 021839 Annual Report	N	
Poly-Lube		Product	Unknown	Unit Summary???	N	
Polymag 500		Product	Pre	AB 04322 Unit Summary	N	
polymeric alkylated phenol		Waste	Unknown	OW 030046 Waste Report	N	
Polymyke		Product	Pre	AB 04322 Unit Summary	N	
PolyPeg E		Product	Unknown	Wilmington Finished Goods	N	
Polyphen 188					N	
Polyphen L-305		Product	Unknown	OW 1285-1339	N	
Polyphen S-201-C		Product	Pre	AB 04322 Unit Summary	N	
Polyphen S-202-C		Product	Pre	AB 04322 Unit Summary	N	
Polyphen S-202-F		Product	Pre	AB 04322 Unit Summary	N	
Polyurethane		Unknown	Unknown	OW 1285-1339	N	
Polyzole		Product	Unknown	Wilmington Finished Goods	N	
potassium		Unknown	Unknown	Severn Trent Results 1998	N	
Potassium bromate		Reagent	Unknown	OW 798168	N	
Potassium bromide		Reagent	Unknown	OW 798168	N	
Potassium F-80		Unknown	Unknown	ltr from Stepan	N	
Potassium hexoate		Raw	Unknown	OW 005200 Olin Memo	N	
Potassium Hydroxide		**Raw**	**Unknown**	**OW 005211 Olin memo**	Y	01310-58-3
Potassium octate		Raw	Unknown	OW 005200 Olin Memo	N	
Potassium oleate		**Raw**	**Pre**	**OW 021018 List of Raw materials**	Y	
Potassium Stearate		**Raw**	**Unknown**	**OW 005200 Olin Memo**	Y	593-29-3
Processing oil		Raw & Waste/Byproduct	Pre	Table 2.2 from CSA	N	
propionic hydrazine		Unknown	Unknown	OW 797564	N	
PVC		Unknown	Unknown	OW 1285-1339	N	
Pyridine		Unknown	Unknown	OW 373720 Stepan Technical Information	N	
Rapeseed oil		Unknown	Unknown	Wilmington Raw Materials sheet 2	N	
Reclaim oil NEV-LX-859		Product	Pre	AB 04322 Unit Summary	N	
RIA CS		Product	Unknown	Wilmington Finished Goods	N	
RIA G-62		Product	Unknown	OW 1285-1339	N	
RIA NC		Product	Pre	Wilmington Finished Goods	N	
RIA PL-66		Product	Pre	AB 04322 Unit Summary	N	

Potential Contaminant of Concern	Common Names	Raw, Product, Waste, Unknown, By-product	Pre- or Post-Olin	Reference	On existing PCOC List	CAS#
RIA X-66		Product	Pre	AB 04322 Unit Summary	N	
Rilsan		Unknown	Unknown	Miscellaneous Paper	N	
RP-3		Product	Unknown	Wilmington Finished Goods	N	
RPC		Unknown	Unknown	Written sheet 1997	N	
Rubber Process Oil #415		Raw	Unknown	OW 021018 List of Raw materials	N	
S 6150		Product	Unknown	Wilmington Finished Goods	N	
S 7554		Product	Unknown	Wilmington Finished Goods	N	
S 7613		Product	Unknown	Wilmington Finished Goods	N	
S 7614		Product	Unknown	Wilmington Finished Goods	N	
S 7615		Product	Unknown	Wilmington Finished Goods	N	
S 7707		Product	Unknown	Wilmington Finished Goods	N	
S 7708		Product	Unknown	Wilmington Finished Goods	N	
S 7842		Product	Unknown	Wilmington Finished Goods	N	
Santicizer 722		Raw	Unknown	Wilmington Raw Materials sheet 2	N	
Santocel	Silica aerogel	Raw	Unknown	Table 2.2 from CSA	Y	63231-67-4
Sebacic dihydrazide		Product	Unknown	Wilmington Finished Goods	Y	925-83-7
Semicarbazide hydrochloride		Unknown	Unknown	OW 023366 Olin	N	
Semicarbazide solution		Product	Pre	Table 2.2 from CSA	N	
Semi-gloss	S-7268	Product	Unknown	Wilmington Finished Goods	N	
Silica		Raw	Unknown	OW 005200 Olin Memo	N	
Silicon Dioxide	Sand; Aerosil 380	Unknown	Unknown	OW 567715 Olin ltr	Y	7631-86-9
Silicone	Polycone	Raw	Unknown	Table 2.2 from CSA	Y	
Soda ash		Raw	Unknown	Wilmington Raw Materials sheet 2	N	
sodium		Unknown	Unknown	Severn Trent Results 1998	N	
Sodium acetate		Raw	Unknown	OW 005200 Olin Memo	N	
Sodium Azide		Raw	Pre	Table 2.2 from CSA	Y	26628-22-8
Sodium Bicarbonate/Sodium Carbonate		Raw	Unknown	OW 005200 Olin Memo	Y	144-55-8/497-19-8
sodium bichromate		Unknown	Unknown	HP 00269	N	
Sodium Bromide		Raw & Waste/Byproduct	Pre	Table 2.2 from CSA	Y	7647-15-5
Sodium Chlorate	Soda Chlorate	Raw	Pre	OW 021018 List of Raw materials	Y	07775-09-9
Sodium Chloride		Waste/By-product	Pre	Table 2.2 from CSA	Y	7647-14-5
Sodium dicarbonate		Raw	Unknown	Wilmington Raw Materials sheet 2	N	
Sodium Dichromate		Unknown	Unknown	HP 00653 Product K-1 operating procedure	Y	10588-01-9
Sodium Hydroxide Liquid/Flake	Soda Lye Solution	Raw & Waste/Byproduct	Pre	OW 021018 List of Raw materials	Y	1310-73-2
Sodium Hypochlorite		Raw	Unknown	OW 006285 Olin	Y	07681-52-9
sodium lauryl sulfate		Unknown	Unknown	OW 797561	N	

Potential Contaminant of Concern	Common Names	Raw, Product, Waste, Unknown, By-product	Pre- or Post-Olin	Reference	On existing PCOC List	CAS#
Sodium Nitrate		Waste/By-product	Pre	Table 2.2 from CSA	Y	7631-99-4
Sodium Nitrite		Raw & Waste/Byproduct	Pre	OW 021018 List of Raw materials	Y	07632-00-0
Sodium Stearate		Raw		OW 005200 Olin Memo	Y	822-16-2
Sodium Sulfite/Sulfate		Waste/By-product	Pre	Table 2.2 from CSA	Y	7757-83-7/7757-82-6
Soybean Oil Epoxide	Vikoflex	Unknown	Unknown	OW 021018 List of Raw materials	Y	
Stearate		Unknown	Unknown	OW 1285-1339	N	
Styrene	Ethylbenzene, styro, styrolene, cinnamene, cinnamol, phenylethylen, vinyl benzene	Unknown	Unknown	OW 1285-1339	N	
Styrene butadiene rubber	SBR	Unknown	Unknown	Excerpt from Riley Deposition	N	
Sulfuric Acid		Raw & Waste/Byproduct	Pre	OW 021018 List of Raw materials	Y	07664-93-9
Sunpar 120		Raw	Unknown	OW 021018 List of Raw materials	N	
Sunthen 410 oil		Unknown	Unknown	Oils used at Wilmington	N	
SWS 233	silicon emulsion	Raw	Unknown	OW 021018 List of Raw materials	N	
Sytox ADP	DODPA, Lestane, dioctyldiphenylamine, ADP-F	Product	Pre	Wilmington Finished Goods	N	
Tall oil	Liqrene	Unknown	Unknown	Oils used at Wilmington	N	
TBA		Unknown	Unknown	OW 797580	N	
TBR		Unknown	Unknown	OW 1285-1339	N	
Tetraflex DBP		Product	Pre	AB 04322 Unit Summary	N	
Tetraflex DIDP		Product	Pre	AB 04322 Unit Summary	N	
Tetraflex DOP		Product	Pre	AB 04322 Unit Summary	N	
Tetraflex R-122		Product	Pre	AB 04322 Unit Summary	N	
Tetraflex RS-10		Product	Pre	AB 04322 Unit Summary	N	
Tetraphen 201-C		Unknown	Unknown	AB03289 NP	N	
Tetraphen 201-P		Unknown	Unknown	AB03289 NP	N	
Tetraphen 218 I		Unknown	Unknown	AB03295 NP	N	
Tetraphen 218 P		Unknown	Unknown	AB03295 NP	N	
Tetraphen S-201-F		Unknown	Unknown	AB03289 NP	N	
Tetrphen 218 C		Unknown	Unknown	AB03295 NP	N	
Thiosemicarbizide		Unknown	Unknown	OW 797273	N	
Titanium Dioxide	R-66	Product	Pre	AB 04322 Unit Summary	N	
TMTD		Product	Pre	AB 04322 Unit Summary	N	
Toluene		Raw	Unknown	Table 2.2 from CSA	Y	00108-88-3
Toluene Diisocyanate		Unknown	Unknown	Lab Record Book H57701	N	
Toluol		Unknown	Unknown	OW 005200 Olin Memo	N	
Trancoa 375 B		Unknown	Unknown	OW 1285-1339	N	
Trichloroethylene		Unknown	Unknown	Severn Trent Results 1998	N	

Potential Contaminant of Concern	Common Names	Raw, Product, Waste, Unknown, By-product	Pre- or Post-Olin	Reference	On existing PCOC List	CAS#
Triethanolamine		Raw	Unknown	OW 373732	Y	102-71-6
Triisopropanolamine		Unknown	Unknown	OW 005211 Olin memo	N	
Triphenyl phosphite		Unknown	Unknown	BDG 000007, Fisons limited	N	
Trivalent chromium		Unknown	Unknown	OW 373643	N	
Ucon 50 HB5100		Unknown	Unknown	OW 373732	N	
Ufamite MM 67		Raw	Unknown	Table 2.2 from CSA	Y	
Urea	Carbamide	Raw & Waste/Byproduct	Pre	Table 2.2 from CSA	Y	00057-13-6
Urea formaldehyde Resin		Product	Pre	Table 2.2 from CSA	N	
vanadium		Unknown	Unknown	Phase I Site Inspection (2nd)	N	
Wiltrol N	N-NDPA; n-nitrosodiphylamine	Product	Unknown	Wilmington Finished Goods	N	
Wiltrol P	phthalic anhydride	Product	Pre	AB 04322 Unit Summary	N	
Wytox 312	TNPP, trisnonylphenylphosphite	Product	Pre	Wilmington Finished Goods	Y	26523-78-4
Wytox 312-S		Product	Unknown	OW 567715 Olin ltr	N	
Wytox 320	alkaryl phosphite	Product	Unknown	OW 567716	N	
Wytox 345/355/438	Polymeric phosphite	Product	Unknown	Wilmington Finished Goods	N	
Wytox 438-S		Product	Unknown	OW 567715 Olin ltr	N	
Wytox 540		Product	Unknown	Wilmington Finished Goods	N	
Wytox 604		Product	Unknown	Wilmington Finished Goods	N	
Wytox 604IMS		Product	Unknown	OW 567715 Olin ltr	N	
Wytox ADP		Product	Unknown	Location of Acid Pits Figure	N	
Wytox BHT	butylated hydroxytoluene	Product	Unknown	JMW03455 Minutes	N	
Wytox LT	Diaurylthipropionate	Product	Unknown	JMW03455 Minutes	N	
Wytox NPD-J-S		Product	Unknown	OW 567715 Olin ltr	N	
Wytox PAP	alkylated phenol	Product	Pre	Wilmington Finished Goods	N	
Wytox PAP-S		Product	Unknown	OW 567715 Olin ltr	N	
Wytox PAPSE	self-emulsifying polmeric hindered phenol	Product	Unknown	OW 567715 Olin ltr	N	
Wytox PDA	polmeric hindered phenol	Product	Unknown	Wilmington Finished Goods	N	
Wytox PMW		Product	Unknown	Wilmington Finished Goods	N	
Xylene	dimethylbenzene	Solvent	Unknown	OW 797611	Y	01330-20-7
Zinc hexoate		Raw	Unknown	OW 005200 Olin Memo	N	
Zinc octate		Raw	Unknown	OW 005200 Olin Memo	N	
Zinc Oxide		Raw	Pre	Table 2.2 from CSA	Y	1314-13-2
Zinc Stearate		Raw	Unknown	OW 005200 Olin Memo	Y	557-0501

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