Great Lakes Chem
1077-AR-6

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ARKANSAS DEPARTMENT OF POLLUTION CONTROL AND ECOLOGY
DIVISION OF AIR POLLUTION CONTROL

Summary Report Relative to Permit Application

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CSN: 70-0012 **Permit No.:** 1077-AR-6 **Date Issued:**

Submittals: 11/13/95, 5/14/96

Summary

The Great Lakes Chemical Corporation has operated, since 1967, a large complex south of El Dorado on Highway 15. This facility, known as the El Dorado Plant, actually consists of a number of process units. A wide variety of products are manufactured at this plant. These products can be classified into one of three categories: bromine, brominated organics, and brominated inorganics.

When this facility was built there were no air permitting requirements. The Arkansas Air Pollution Control Code, promulgated July, 1969, required all equipment in operation or use on or before July 30, 1969, to be registered with the Department. After July 30, 1969, any "installation, alteration or replacement of equipment" would require a permit from this Department. Great Lakes received their first air permit in March, 1974. Between then and March 1993, they have received 21 air permits or permit modifications.

The existence of all these permits resulted in a confusing situation and made it difficult to determine which permit regulated which source. In an effort to remedy this situation, the Department rescinded all of the air permits issued to Great Lakes' El Dorado Plant and issued one permit which includes all of the process units and emission sources at this facility which require

Installation: Upon Receipt of Permit **Operation:** Upon Installation
Control Equipment: $N/A **Total Project:** $N/A
Reviewed By: Proffitt/Porta **Approved By:** Keith Michaels
Applicable Regulation: Air Code SIP NSPS NESHAP PSD

a permit. This permit has been modified several times and Great Lakes is proposing to modify permit #1077-A again.

This is a minor modification to the exisiting permit and will:

1. Increase the emissions of nitrogen dioxide from the spray dryer (SN-801);
2. Increase the amount of products drummed in the packaging and shipping unit and identified the time the canning machine (SN-1503) is routed to the BRU;
3. Change the language of the third and fourth paragraph of the brine section process summary;
4. Increase the emissions from TBBPA bulk loading (SN-1005) and methanol tank (T-63) (SN-1008) and document the installation of two additional chilled methanol tanks;
5. Identify the HALAR/Teflon coating section which had previously been classified under the Miscellaneous section as a independent section
6. Document the installation a second centrifuge to the existing Methylene Chloride Recovery Unit (MCRU) at the TCO.

Facility Wide - Specific Conditions

1. All air permits previously issued to the Great Lakes Corporation -- El Dorado Plant are hereby rescinded.

2. All opacity measurements at the facility shall be performed in accordance with EPA Reference Method #9.

3. Great Lakes shall maintain production records at each facility on the amount of product produced. This information shall be maintained either within the respective unit or at the main office located within the property boundary. These records shall be kept on site and made available to Department personnel upon request.

4. Great Lakes shall maintain a copy of each stack test results within the property boundary for Department personel to verify compliance with specific condition #3.

5. The permittee shall provide a copy of the layout drawing(s) for each area available to any Department personnel upon arrival, and will provide an escort who is familiar with the equipment.

6. The emission points listed in the permit are the only emission points being permitted at each facility. Emission of pollutants from any other point, source or area, or the emissions of any pollutant which does not have a limit specified in the permit is a violation of this permit and all applicable air pollution control laws (unless the source is temporarily approved by the department). However, it is recognized that certain trace quantities of other, related, pollutants may be present. If the emission of other pollutants is discovered, the permittee shall submit such information to the Department within 10 working days of such discovery. The permittee shall, upon notice from the Department, submit an application for permit modification to add to the permit an emission limit for any of these pollutants.

The allowable emissions for the entire facility are summarized below.

Facility Wide Allowable Emission Rate Summary		
Pollutant	lb/hr	ton/yr
PM/PM_{10}	53.3	225.9
SO_2	120.7	528.5
Total VOC	611.8	351.6
CO	86.6	225.8
NO_x	153.6	672.9
Non-VOC (Methane and Methylene Chloride)	9.0	19.6
H_2S	1.8	7.8
Br_2	13.6	49.6
HBr	11.8	46.9
HCl	10.6	29.4
HF	4.1	2.4
Cl_2	5.6	14.6
BrCl	9.0	13.9
NH_3	0.9	3.0
Carbon Tetrachloride	0.4	1.8
Hydrogen	1.4	6.1
Hydrazine	0.1	0.4

Bromine Production

Process Summary

Bromine containing brine occurs naturally in specific south Arkansas geological formations. The separation of bromine from the brine is the oldest chemical process at the El Dorado Plant.

When the brine first comes out of the ground it contains sour gas and sodium bromide. This gas is separated and sent to the NaHS plant for treatment (see page 18 for details.) Most of the degassed brine goes directly to the bromine towers where it is mixed with chlorine. The rest is sent to a scrubber brine cooling system (SBCS). There is no permanent chlorine storage at the El Dorado Plant. Liquid chlorine is unloaded directly from railcars and passed through a vaporizer. The chlorine gas is injected into the bromine towers under flow control.

In the bromine towers the brine is chlorinated to remove the bromine which is steam stripped and condensed. The bromine vapors are condensed, purified and then packaged in tank trucks, railcars, ISO's or bulk containers. Each bromine tower has its own scrubber (SN-401 & SN-402) but vapors are normally routed to a third scrubber (SN-407) which vents to the atmosphere. Vapors leaving SN-401, SN-402, and SN-407 are continually monitored in the bromine control room by a color TV camera. Bromine is highly visible even when present in very low concentrations. The TV camera arrangement allows early detection of possible process upsets.

Bromine vapors displaced during the packaging and loading operations are controlled by a caustic scrubber (SN-405). The caustic in this scrubber is analyzed once per shift. When the caustic concentration drops to 5%, the scrubber is recharged.

Great Lakes also ships bromine overseas in portable tanks known as ISO's. These containers must be internally inspected on a regular basis in order to comply with international transport regulations. Before they, or other containers, can be entered, residual bromine vapors are removed by pulling a vacuum on the container using a vacuum jet. The vacuum jet is powered by a caustic or ammonia solution. The vacuum jet vent, which can be considered a venturi scrubber, is known as SN-406.

The debrominated brine flows from the towers, though a heat recovery system which has a atmospheric vent (SN-403 and SN-404), and then to the tail brine system.

In addition to the sources mentioned above, the bromine production area also includes a lime silo (SN-408), a chlorine transfer station (SN-409), and a HCl transfer station (SN-410). Great Lakes uses lime, caustic, or ammonia to neutralize the tail brine. The chlorine transfer station is used to transfer chlorine from railcars to tank trucks for shipment to the West Plant. GLCC produces bromine chloride at this transfer station by mixing bromine and chlorine in rail cars. The rail cars also serve as shipping containers for the bromine chloride. The hydrochloric acid transfer station is used to unload HCl from rail cars to a storage tank and from the storage tank to tank trucks so it can be taken to various process units. HCl can also be transferred directly to the tank trucks from the rail car. Vapors generated during the transfer of HCl and Cl_2 are controlled by scrubbers.

Specific Conditions - Bromine Production

7. Any emissions to the atmosphere from SN-401 and SN-402, except that these sources are each allowed to emit 1.0 pound per hour of Br_2 for two hours per day while the caustic in SN-407 is being changed, shall be considered an upset and shall be reported in accordance with general condition #7.

8. On or before December 31, 1993, and annually thereafter, the permittee shall measure the bromine emissions from the Heat Recovery System, Tower #4 (SN-403) and Tower #5 (SN-404) in accordance with a test procedure which has been specifically approved by this Department prior to the testing.

9. On or before December 31, 1993, and annually thereafter, the permittee shall measure the bromine emissions from Packaging and Loading (SN-405) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. The bromine testing shall be conducted when bromine is being loaded.

10. On or before December 31, 1993, and annually thereafter, the permittee shall measure the bromine emissions from ISO vent scrubber (SN-406) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. Each test run shall be coordinated with an ISO venting so that all stages of venting are accurately represented.

11. On or before December 31, 1993, and annually thereafter, the permittee shall measure the bromine emissions from Bromine Towers (SN-407) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. During the test, the bromine towers and all associated equipment shall be operated normally.

12. The permittee shall replace the scrubbing solution used in the packing and loading scrubber, SN-405, and the common vent scrubber, SN-407, before the solution reaches

5% by weight caustic with a solution which contains approximately 18% by weight caustic. The solution shall be sampled at least 12 hours after replacement. If the caustic concentration is above 5%, sampling shall be repeated every 3 hours until the solution is replaced and the cycle repeats. The permittee may conduct emission testing while simultaneously sampling the caustic concentration in order to establish alternate operating parameters which can then be submitted to the Department for approval.

13. The emission limits for the chlorine and BrCl loading station, SN-409, shall be 2.2 pounds of Cl_2 per day and 4.0 pounds of BrCl per day.

14. On or before December 31, 1993, and annually thereafter, the permittee shall measure the Chlorine emissions from Chlorine BrCl Loading Station (SN-409) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. The chlorine testing shall be conducted during chlorine loading.

15. SN-401, SN-402, SN-403, SN-404, SN-405, SN-406, SN-407, and SN-409 shall have a maximum of 5 percent opacity for 2 hours per day. These sources shall have no visible emissions for the remainder of the day. For purposes of this condition, visible emissions mean any emissions, except for water vapor, which are visible to the naked eye.

16. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Bromine Production -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
401	Bromine Tower #4	Scrubber	1.0	*	--	Br_2	SIP	***
402	Bromine Tower #5	Scrubber	1.0	*	--	Br_2	SIP	***
403	Bromine Tower #4 (heat recovery vent)	None	0.1	8760	0.4	Br_2	SIP	***
404	Bromine Dryer #5 (heat recovery vent)	None	0.1	8760	0.4	Br_2	SIP	***
405	Packaging and Loading	Scrubber	0.1	8760	0.4	Br_2	SIP	***
406	ISO Cleaning	Scrubber	0.1	8760	0.4	Br_2	SIP	***
407	Bromine Towers (Common Vent)	Scrubber	0.2	8760	0.9	Br_2	SIP	***
408	Lime Silo	Baghouse	0.5	8760	2.2	PM/PM_{10}	SIP	5
409	Chlorine BrCl Loading Station	Scrubber	2.2 6.0	** **	0.4 1.1	Cl_2 BrCl	SIP	***
410	HCl Transfer Station	Scrubber	0.6	8760	2.7	HCl	SIP	5

* -- SN-401 and SN-402 vent to SN-407 and have no emissions except during process upsets and when the caustic is being changed in SN-407.

** - Emissions expressed in pounds per day.

*** - See Specific Condition #15

Bromine Production Emission Rate Summary

Pollutant	lb/hr	ton/yr
Br_2	2.6	2.5
Cl_2	2.3	0.8
PM/PM_{10}	0.5	2.2
HCl	0.6	2.7
BrCl	6.0	1.1

Bromine Recovery Unit (BRU)

Process Summary

The Bromine Recovery Unit, or BRU, consists of equipment designed to recover bromine and chlorine from liquid feed streams. It is also used to process vapor streams generated by the handling of methyl and ethyl bromide. The sources of the vapor streams are discussed in the Fine Chemicals, TBBPA, and Packaging & Shipping sections of this permit.

During the operation of the BRU, natural gas, combustion air, and the liquid feed stream are fed to the combustion system. The hot combustion gases go to a waste heat boiler, HBr absorber, packed scrubber, and venturi scrubber before being vented to the atmosphere (SN-102).

Liquid recycle streams processed in the BRU are stored in one of two storage tanks (SN-101 & SN-103) which are vented directly to the atmosphere.

The BRU is regulated under the Air Code and the State Implementation Plan. The original permit for this facility was #344-A issued May 30, 1980.

Specific Conditions - Bromine Recovery Unit

17. Natural gas is the only auxiliary fuel the permittee is allowed to use at this facility.

18. The permittee is only allowed to burn the following recycle streams in the BRU:

    TBBPA Bottoms (UK-60 material)
    TBBPA Vacuum Pump Vents
    Methyl Bromide Area Vents
    Methyl and Ethyl Bromide Transfer Area Vents

    Should the permittee wish to burn any other materials in the BRU, this permit will require modification. Such a modification will include a new public notice.

19. On or before December 31, 1993, and annually thereafter, the permittee shall measure the bromine (Br_2), hydrogen bromine (HBr), particulate matter (PM_{10}), volatile organic compounds (VOC), nitrogen oxides (NO_x), and sulfur dioxide (SO_2) emissions from the

bromine recovery unit (SN-102) in accordance with a test procedure which has been specifically approved by this Department prior to the testing.

20. When conducting the testing required by specific condition #19, the permittee shall use the following test methods:

Pollutant	Test Method
PM_{10}	EPA Reference Method 5 (with all particulate assumed to be PM_{10})
SO_2	EPA Reference Method 6
NOx	EPA Reference Method 7E
VOC	EPA Reference Method 18
Opacity	EPA Reference Method 9
HBr	*
Br_2	*

In those instances where no test method is indicated the permittee may use any test method or methods they wish provided the method(s) is suitable for measuring the pollutants in the quantities expected and provided further that the test method is submitted in writing to the Department prior to the test and the Department has approved its use. Failure by the permittee to submit an approvable test method(s) in a timely manner shall not exempt them from enforcement action if such a failure results in the testing deadline being missed.

21. The BRU shall be considered "out of service" for an hour if, for more than five minutes during that hour, methyl bromide vapors which are generated elsewhere at this facility are not efficiently incinerated in the BRU.

22. If the BRU is out of service more than 1,314 hours per year (15%), then any further downtime will require that the transfer of methyl bromide be discontinued and may not be resumed until the BRU is back in operation unless the methyl bromide vapors generated by the transfer of methyl bromide are routed to an alternate control device. Specifically, this includes the vapors from the methyl bromide storage tanks (SN-651 and SN-652).

23. If the BRU is out of service more than 1,314 hours per year (15%), then any further downtime will require that the production of ethyl bromide in the alkyl bromide area be

discontinued and may not be resumed until the BRU is back in operation unless the ethyl bromide vapors generated by the production of ethyl bromide in the alkyl bromide area are routed to an alternate control device. Specifically, this includes the vapors from the ethyl bromide storage tanks (SN-660).

24. If the BRU is out of service more than 1,314 hours per year (15%), then any further downtime will require that operation of the TBBPA process be discontinued and may not be resumed until the BRU is back in operation unless the methyl bromide vapors generated by the production of TBBPA are routed to an alternate control device. Specifically, this includes the vapors from the TBBPA primary vent stack (SN-1004).

25. If the BRU is out of service more than 1,314 hours per year (15%), then any further downtime will require that the permittee no longer empty, depressurize, clean, or otherwise vent methyl bromide cylinders. These operations may not resume until the BRU is back in operation.

26. If the BRU is out of service more than 1,314 hours per year (15%), then any further downtime will require that the permittee shall not begin the loading of any bulk shipping container, including but not limited to rail cars, ISO's and portable tanks.

27. If the BRU is out of service more than 1,314 hours per year (15%), then any further downtime will require that the permittee shall not transfer any material into the methyl bromide, methyl bromide/chloropicrin, and methyl bromide/chloropicrin/naptha storage tanks mentioned in the Packing and Shipping section of the application. Tank filling may not resume until the BRU is back in operation.

28. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

BRU -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
101	BRU Primary Storage Tank	None	1.3	8760	5.7	VOC (methanol)	SIP	5
102	BRU - Final Vent	Scrubber	1.0 0.1 0.1 33.5 0.5 1.0 0.2	8760	4.4 0.4 0.4 146.7 2.2 4.4 0.9	PM/PM_{10} SO_2 VOC CO NO_x Br_2 HBr	SIP	20
103	BRU Secondary Storage Tank	None	1.3	8760	5.7	VOC (methanol)	SIP	5
104	HBr Solution Tank	None	0.1	8760	0.4	HBr	SIP	5

BRU Plant Emission Rate Summary		
Pollutant	lb/hr	ton/yr
PM/PM_{10}	1.0	4.4
SO_2	0.1	0.4
VOC	2.7	11.8
CO	33.5	146.7
NO_x	0.5	2.2
Br_2	1.0	4.4
HBr	0.3	1.3

Sodium Hydrosulfide Plant, Brine Supply Wells, and Brine Pretreatment

Process Summary

The Great Lakes Chemical Company currently operates eight brine supply wells in conjunction with the El Dorado Plant. These wells produce brine which contains dissolved sour gas. Since the gas interferes with the operation of the bromine towers, Great Lakes removes as much of it as possible before the bromine is recovered.

The gas separation begins at the well site. The gas separated at the well is cooled and transported to the El Dorado Plant through a buried pipeline. The brine is sent to the plant in a separate pipeline. At the plant, incoming brine is acidified to make gas removal easier and then sent to a vacuum stripper. After the vacuum stripper, most of the brine is sent directly to the bromine towers. The remaining brine is sent to the scrubber brine cooling system (SBCS) and then the bromine towers. The acid used to treat the brine is stored on site. This storage tank is equipped with a scrubber (SN-901) which uses degassed brine as the scrubbing media.

The sour gas stripped at the well sites come to the El Dorado plant by pipeline from the brine supply wells, and from GLCC's South and Newell plants. This incoming gas is combined with gas removed by the vacuum stripping operation and routed to the NaHS facility or to a JV Amine unit, after the sour gas is combined with incoming sour gas from GLCC's West plant. The JV Amine unit is operated by Lion Oil at their refinery site. Gas at the JV Amine "sweetener" plant is returned to GLCC's El Dorado plant and routed to either boiler #2 or #3 as fuel gas.

When gas cannot be routed to Lion Oil Company the sour gas is routed to the sodium hydrosulfide (NaHS) units located at the El Dorado and West plants. Gas from El Dorado, South, and Newell plants is routed to the El Dorado plant's NaHS unit. In the NaHS unit H_2S in the gas reacts with sodium hydroxide to form sodium hydrosulfide which is used as a raw material by some paper mills. From the reactor, the mixture is routed to a reactor/separator, where the liquid NaHS is separated from the "sweetened" gas. The NaHS is routed to product storage tanks; the sour gas is routed to boiler #2 as fuel gas.

The NaHS plant was built with two separate reactor processing trains, either one of which can process the entire gas flow. This arrangement results in an on-stream time of the El Dorado NaHS plant in excess of 99%. In the event both reactor trains are down, the plant is equipped with a flare (SN-902) to burn the sour gas. Each brine supply well is also equipped with a flare but these are used only in extreme emergencies. The NaHS plant flare is also used to burn ethylene vapors generated during ethylene unloading operations at the Ethylene Dibromide Facility. Previously, these emissions were vented to the atmosphere.

The scrubber brine cooling system was installed to replace the feed brine ponds during the first quarter of 1990 as part of a ground water cleanup program. The SBCS was originally covered by permit 1006-A. The SBCS consists of one brine surge tank, three cascade coolers (SN-903, SN-904, SN-905), support structures, and feed pumps. The system is also equipped with instrumentation to monitor the surge tank level and the brine temperature. The cascade system works by pumping the brine to the top of an inclined trough which contains obstructions down its length. As the brine flows down the trough it is cooled by air flowing the other way. The brine contains trace amounts of hydrogen sulfide, some of which is stripped by the cooling air. (Previously the brine was pumped into a pond where it was cooled by evaporation. The existing pond had H_2S emissions but they were fugitive and not point source emissions.)

Specific Conditions - NaHS Plant

29. The permittee shall operate the feed brine vacuum stripper so that the brine feed to the SBCS does not contain more than 25 ppm of H_2S.

30. The permittee shall operate the NaHS plant so that the gas leaving this plant (NaHS gas) contains less than 63.75 pounds per hour of H_2S.

31. With the exception of the acid tank scrubber and the SBCS, no point sources are being permitted at the NaHS plant.

32. The permittee shall continue a program to sample the NaHS gas. This sampling shall be conducted every two hours when the unit is running using a Tutweiller procedure. All data and calculations shall be maintained in a log for the time period as provided in general condition #4.

33. The permittee is only allowed to burn the NaHS gas in boiler #2, SN-301.

34. The permittee shall only use degassed brine as the scrubbing media in the acid tank scrubber, SN-901.

35. Except when flaring ethylene from the EDB facility or sweet gas when the #2 boiler is down, operation of the emergency flare, SN-902, is considered an upset and shall be reported in accordance with general condition #7. Maintenance of a pilot flame shall not be considered operation.

36. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

NaHS -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
901	Acid Storage Tank	Scrubber	0.1	8760	0.4	HCl	SIP	5
			0.1		0.4	HBr		
902	NaHS Plant/Ethylene Unloading	Flare	0.1	8760	0.4	PM/PM_{10}	SIP	5
			0.1*		0.4	SO_2		
	Pilot Flame Natural Gas (1.25 MMBtu/hr)		0.1		0.4	VOC		
			0.1		0.4	CO		
			0.1		0.4	NO_x		
			0.1		0.4	Methane		
			1.1	500	0.5	VOC (ethylene)		
903	Brine Cooling System #A	Scrubber	0.6	8760	2.6	H_2S	SIP	5
904	Brine Cooling System #B	Scrubber	0.6	8760	2.6	H_2S	SIP	5
905	Brine Cooling System #C	Scrubber	0.6	8760	2.6	H_2S	SIP	5

* - This source is used to burn sour gas only in the event the NaHS plant is down. Since this is considered an upset and regulated by Section 6 of the SIP, only the SO_2 emission from the natural gas combustion is being permitted.

NaHS Plant Emission Rate Summary		
Pollutant	lb/hr	ton/yr
PM/PM_{10}	0.1	0.4
SO_2	0.1	0.4
Total VOC	1.2	0.9
CO	0.1	0.4
NO_x	0.1	0.4
Methane	0.1	0.4
HBr	0.1	0.4
HCl	0.1	0.4
H_2S	1.8	7.8

Boilers

Process Summary

Great Lakes operates three boilers (#2, #3 and #4) at the El Dorado Plant.

Boiler #2 (SN-301) has a rated capacity of 150 million Btu per hour. It burns natural gas, "sweetened" gas from the JV Amine unit at Lion Oil Company's facility, and/or waste gas from the sodium hydrosulfide (NaHS) unit and the EDB unit.

Boiler #3 (SN-302) has a rated capacity of 113 million Btu per hour. It burns natural gas and/or "sweetened" gas from the JV Amine unit at Lion Oil Company's facility. Boiler #4 (SN-303) has a rated capacity of 89 million Btu per hour and burns natural gas as the primary fuel.

The boilers are capable of burning #2 fuel oil in the event of a natural gas curtailment. This oil will have a sulfur content of no greater than 0.5% by weight.

Boilers #2 (SN-301) and #3 (SN-302) were installed before June 19, 1984; therefore, they are not subject to the NSPS for industrial boilers. They are subject to the SIP and Air Code.

Boiler #4 (SN-303) is subject to the requirements of the *Standards of Performance for New Stationary Sources* (NSPS) as contained in Title 40 of the *Code of Federal Regulations* Part 60, Subpart Dc - *Standards of Performance for Small Industrial-Commercial Steam Generating Units.*

Specific Conditions - Boilers

37. During normal operation the permittee shall burn sweet natural gas, NaHS waste gas, sweetened gas from the Lion Oil JV Amine unit, and/or the non-condensible gases from the EDB unit in boiler #2. In addition, the permittee may burn sweet natural gas and/or sweetened gas from the Lion Oil JV Amine unit in boiler #3 and sweet natural gas only in boiler #4. The boilers may burn low sulfur fuel oil (less than 0.5% sulfur by weight) during periods of natural gas curtailment.

38. The NaHS waste gas burned in boiler #2 shall contain no more than 63.75 pounds per hour of H_2S. The permittee shall measure the H_2S concentration of the gas leaving the NaHS unit every two hours when the plant is running at a constant sour gas flow and every 15 minutes when the flow is not constant. These measurements shall be conducted

using ASTM E-260, or the method contained in 40 CFR 60.648, or an equivalent method provided it is first approved by the Department. The measured H_2S concentration shall be converted to pounds of SO_2 out the boiler stack through the use of a mass balance. The results of these measurements shall be logged and submitted to the Department by October 1 of each year.

39. On or before September 28, 1995, Great Lakes shall test the #4 boiler (SN-303) exhaust for NO_x and CO emissions in accordance with EPA Reference Method 7E for NO_x and Method 10 for CO. During the test, the boiler shall be operated within 10 percent of the rated throughput capacity. Failure to test at this rate shall invalidate the test.

40. The maximum heat input to each boiler expressed in terms of natural gas equivalence shall not exceed the following:

Boiler #2	150,000 scf/hr
Boiler #3	113,000 scf/hr
Boiler #4	89,000 scf/hr

41. The permittee shall install and operate a device to continuously monitor and record the fuel flow rate to each boiler. These records can be used by the Department for enforcement purposes and shall enable Department personnel to determine compliance with this condition. These records shall be kept on site and shall be provided to Department personnel upon request.

42. Boiler #4 shall comply with all applicable provisions of New Source Performance Standards (NSPS), 40 CFR Part 60, Subpart Dc, at all times. See Attachment E.

43. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Boilers -- Allowable Emission Rates

SNA	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
301A	Boiler #2 (150 MMBtu/hr) NaHS Gas	None	0.8	8760	3.5	PM/PM_{10}	SIP	20
			120.0		525.6	SO_2 (**NaHS Unit On-line**)		
			0.2		0.9	VOC		
			6.0		26.3	CO		
			82.5		361.4	NO_x		
			1.4		6.2	HBr		
			0.7		3.1	VOC (ethylene)		
			0.1		0.4	VOC (EDB)		
			0.1		0.4	Methane		
301B	Boiler #2 (150 MMBtu/hr) Natural Gas or Amine Sweetened Gas	None	0.8	8760	3.5	PM/PM_{10}	SIP	20
			7.6		33.3	SO_2 (**Natural Gas or Amine Unit On-line**)		
			0.2		0.9	VOC		
			6.0		26.3	CO		
			82.5		361.4	NO_x		
			1.4		6.2	HBr		
			0.7		3.1	VOC (ethylene)		
			0.1		0.4	VOC (EDB)		
			0.1		0.4	Methane		

Boilers -- Allowable Emission Rates

SNA	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
302A	Boiler #3	None	0.6	8760	2.7	PM/PM$_{10}$	SIP	20
	(113 MMBtu/hr)		0.1		0.4	SO$_2$ (**NaHS Unit On-line**)		
	Natural Gas		0.2		0.9	VOC		
			4.6		20.2	CO		
			62.2		272.5	NO$_x$		
			0.1		0.4	Methane		
302B	Boiler #3	None	0.6	8760	2.7	PM/PM$_{10}$	SIP	20
	(113 MMBtu/hr)		5.7		25.0	SO$_2$ (**Amine Unit On-line**)		
	Amine Sweetened Gas					VOC		
			0.2		0.9	CO		
			4.6		20.2	NO$_x$		
			62.2		272.5	Methane		
			0.1		0.4			
303	Boiler #4	Low NO$_x$	1.3	8760	5.7	PM/PM$_{10}$	SIP	20
	(89 MMBtu/hr)	Burner	0.1		0.4	SO$_2$		
	Natural Gas		0.3		1.3	VOC	NSPS	
			5.4		23.7	CO		
			7.2		31.6	NO$_x$		
			0.3		1.3	Methane		

Boilers Emission Rate Summary		
Pollutant	lb/hr	ton/yr
PM/PM_{10}	2.7	11.9
SO_2	120.2	526.4
VOC	1.5	6.6
CO	16.0	70.2
NO_x	151.9	665.5
HBr	1.4	6.2
Methane	0.5	2.1

Ethylene Dibromide

Process Summary

Ethylene dibromide (EDB) is made by reacting ethylene and bromine. Vapors from the reactor are controlled by a freeze condenser and recycled to the process. Vapors not condensed are vented to the #2 boiler. The EDB storage tanks are also vented to the #2 boiler. When the #2 boiler is down, the EDB storage tanks are vented to the atmosphere.

The ethylene storage tank is vented to the NaHS plant flare during filling; otherwise, the ethylene is stored under pressure. The bromine used in this process is stored at the bromine area.

Specific Conditions - EDB Production

44. The EDB facility shall be operated with no emission points. Vapors from the EDB reactor, EDB storage tank, rail car loading, and tank truck loading shall be vented to the #2 boiler. When the ethylene storage tank is being filled, those vapors shall be vented to the NaHS plant flare; otherwise, the ethylene will be stored under pressure and the tank will not be vented.

45. The permittee shall continue to operate a device to continuously monitor and record the temperature of the gases exiting the freeze condenser. The temperature of these gasses shall not exceed 47°F.

Fine Chemicals

Introduction

The Fine Chemical Facility at the El Dorado Plant is divided into two production areas--the alkyl bromides area and the primary production area. This section will cover the different chemical processes at these two areas.

The primary products produced at the fine chemicals facility are:

Octabromodiphenyl Oxide (DE-79)
Pentabromodiphenyl Oxide (DE-71)
Decabromodiphenyl Oxide (DE-83)

All of the above products are made in the same equipment; however, all three cannot be made at the same time. Typically each is produced in sufficient quantities to fulfill market demands or replenish inventories.

A by-product from the production of DE-79, DE-71, and DE-83 is hydrogen bromide gas (HBr). HBr is collected in one of two absorbers and used as a raw material in the production of other products. One of these absorbers is located in the primary production area and is referred to as the heavy fluids reactor. The other absorber is located in the alkyl bromide area and is known as the alkyl bromide area HBr absorber. Products made, one at a time, in these absorbers are:

HBr Solutions
Ammonium Bromide
Alkyl Bromides
Heavy Fluids

The heavy fluids Great Lakes is permitted to make are Calcium Bromide ($CaBr_2$), Zinc/Calcium Bromide ($ZN/CaBr_2$), Zinc Bromide ($ZnBr_2$), and Manganous Bromide ($MnBr_2$). The alkyl bromides include ethyl bromide, isopropyl bromide, n-propyl bromide, sec-butyl bromide, stearyl bromide, n-butyl bromide, amyl bromide, hexyl bromide, n-octyl bromide, myristyl bromide, lauryl bromide, cetyl bromide, and 2-bromopentane.

In addition to the HBr produced as a by-product in the primary production area, HBr can be produced on purpose elsewhere in the plant and sent to either absorber.

Octabromodiphenyl Oxide (DE-79)

Process Summary

Octabromodiphenyl oxide (DE-79) is a flame retardant primarily used in thermoplastics. It is produced in a batch process by reacting diphenyl oxide with bromine in the presence of a catalyst. HBr and Br_2 gas are generated by the reaction. These gases are either sent to a scrubber and/or to one of the two absorbers.

The crude product is mixed with toluene, neutralized, and filtered. After being filtered, the solution is transferred to a vessel where the toluene is stripped. The product is then filtered into containers where it is allowed to solidify. It is then transferred to a warehouse, where it is ground and packaged.

Specific Conditions - DE-79

46. The allowable emission rate from sources SN-611 and SN-615 shall be 13.8 pounds per batch total, and 6.9 pounds per batch each.

47. The permittee shall produce no more than 1176 batches of DE-79 per year.

48. Some off gases produced by this process are sent to the alkyl bromide area HBr absorber or the heavy fluids reactor. This process shall not be operated when the absorbers off gases are not being properly controlled or otherwise not meeting the emission limits.

49. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Fine Chemicals Plant

DE-79 -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
606	Product Filter Vents	None	0.1	8760	0.4	VOC (toluene)	SIP	5
609	Atmospheric Toluene Strip	Water-Cooled Condenser	3.8[1]	*	2.2	VOC (toluene)	SIP	5
610	Toluene Storage Tank	None	0.2	8760	0.9	VOC (toluene)	SIP	5
611	3 Stage Vacuum Jet	None	6.9 0.1	* 8760	4.1 0.4	VOC (toluene) HBr	SIP	5
615	2 Stage Vacuum Jet	None	6.9[2] 0.1	* 8760	4.1 0.4	VOC (toluene)	SIP	5

* - Emission rates in the table above which are marked with an asterisk (*) represent lb/batch limits not lb/hr.

1. - SN-609 was tested for toluene in March of 90 and the average measurement was 0.0076 pounds per batch.
2. - SN-615 was tested for toluene in November of 90 and the average measurement was 1.2336 pounds per batch.

Pentabromodiphenyl Oxide (DE-71)

Process Summary

Pentabromodiphenyl oxide, DE-71, is a flame retardant used primarily in thermosets (urethane foam, epoxy and polyester resins). It is produced in batches at the primary production area of the fine chemicals plant by reacting diphenyl oxide with bromine in the presence of a catalyst. HBr and Br_2 gas are generated by the reaction. These gases are either sent to a scrubber and/or to one of the two absorbers. The only emission points used for this process are SN-611 and SN-615. Since no solvents are used in this process, emissions are very low.

The crude product is neutralized and filtered. After being filtered, the solution is transferred to a vessel where the water is stripped. A plasticizer may also be added at this point. When the product leaves the stripper, it is filtered, packaged, and sent to the warehouse prior to shipment.

Specific Conditions - DE-71

50. Some off gases produced by this process are sent to the methyl bromide area HBr absorber or the heavy fluids reactor. This process shall not be operated when the absorber off gases are not being properly controlled or otherwise not meeting the emission limits.

51. The permittee shall comply with the emission rates specified in the table on the following page.

TABLE I

Fine Chemicals Plant								
DE-71 -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
611	3 Stage Vacuum Jet	None	0.1	8760	0.4	HBr	SIP	5
615	2 Stage Vacuum Jet	None	0.1	8760	0.4	HBr	SIP	5

Decabromodiphenyl Oxide (DE-83)

Process Summary

Decabromodiphenyl Oxide, DE-83, is a flame retardant used in a variety of applications. It is made in batches at the primary production area of the fine chemicals plant by reacting diphenyl oxide with bromine in the presence of a catalyst. HBr and Br_2 gas are generated by the reaction. These gases are either sent to a scrubber and/or to one of the two absorbers. The crude product then enters a stripper, where excess bromine and water are removed. The product is then washed, packaged, and transferred to the BOC facility for final processing.

There are three emission points from this process: two process wash vents, SN-620 and SN-621, and one process water neutralization vent, SN-622.

Specific Conditions - DE-83

52. Some off gases produced by this process are sent to the methyl bromide absorber or the heavy fluids reactor. This process shall not be operated when the methyl bromide absorber or the heavy fluids reactor is not operating properly or otherwise not meeting its emission limits.

53. The permittee shall comply with the emission rates specified in the table on the following page.

TABLE I

Fine Chemicals Plant								
DE-83 -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
620	Centrifuge Feed Tank Vent	None	0.1	8760	0.4	Br_2	SIP	5
621	Centrifuge Wash Tank Vent	None	0.1	8760	0.4	Br_2	SIP	5
622	Neutralization Tank Vent	None	0.1	8760	0.4	Br_2	SIP	5

Zinc Bromide (Optical Grade) and Manganous Bromide

Process Summary

Optical grade zinc bromide ($ZnBr_2$) and manganous bromide ($MnBr_2$) are made in the primary production area reactors by reacting zinc oxide (for $ZnBr_2$) or manganous oxide (for $MnBr_2$) with HBr. The product is then purified and, if necessary, water is removed.

There are four emission points associated with this process. Two, SN-611 and SN-615, are the vacuum jets (with only one being used at a time) and two, SN-617 and SN-618, are emission point sources from reactor manways when they are open.

Specific Conditions - $ZnBr_2$ (optical) and $MnBr_2$ Production

54. The permittee shall comply with the emission rates specified in the table on the following page.

TABLE I

Fine Chemicals Plant

$ZnBr_2$ (optical) and $MnBr_2$ -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
611	3 Stage Vacuum Jet	None	0.1	8760	0.4	HBr	SIP	5
615	2 Stage Vacuum Jet	None	0.1	8760	0.4	HBr	SIP	5
617	Brominator Manway	None	0.1	8760	0.4	HBr	SIP	5
618	Stripper Manway	None	0.1	8760	0.4	HBr	SIP	5

Primary Production Area

Ammonium Bromide

Process Summary

Ammonium bromide, NH_4Br, is produced by reacting ammonia, water and hydrogen bromide. After the reaction, water is added to bring the solution to the desired concentration, then the product is filtered and stored (in alkyl bromides area) prior to shipping. This is essentially a closed process. The only emissions are a small amount of HBr which vents from the reaction vessels, SN-614 or SN-619.

Great Lakes used to produce NH_4Br by a second process which involved reacting ammonia directly with bromine. This process in no longer used and is not being permitted here.

Specific Conditions - Ammonium Bromide

55. The permittee shall comply with the emission rates specified in the table on the following page.

TABLE I

Primary Production Area

NH_4Br -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
614	Reactor Vent	None	0.1 0.1	8760	0.4 0.4	HBr NH_3	SIP	5
619	Reactor Vent	None	0.1 0.1	8760	0.4 0.4	HBr NH_3	SIP	5

48% HBr in the Heavy Fluids Reactor (Absorber)

Process Summary

48% hydrogen bromide is made in the HBr absorber/heavy fluids reactor by simply absorbing HBr gas in water. The water is recirculated until the proper HBr concentration is reached. Any HBr which passes through the absorber is sent to a scrubber. Gases from the scrubber are scrubbed a final time before being released to the atmosphere (SN-603). The other emission sources associated with this process (SN-601, SN-612, SN-613, and SN-614) are storage tank vents which may be routed to the scrubber.

The HBr gas used in this process is often a by-product of other reactions (e.g. DE-79, DE-71, and DE-83). When using this waste gas as a raw material for the HBr absorber, this entire process can be considered a control device as well as a chemical process. If it is not working properly, DE-71, DE-79, and DE-83 can not be made.

Specific Conditions - HBr Absorber

56. On or before December 31, 1993, and annually thereafter, the permittee shall measure the ammonia and hydrogen bromide emissions from Final Vent (SN-603) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. The test shall be conducted while the HBr is being produced from the DE-79 process. The permittee shall record DE-79 production rates during the test.

57. The permittee shall comply with the emission rates specified in the table on the following page.

TABLE I

Primary Production Area

HBr Absorber -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
601	Adjustment Tank	None	0.2	8760	0.9	HBr	SIP	5
603	Final Vent	Scrubber	0.1 0.1	8760	0.4 0.4	HBr NH_3	SIP	5
612	HBr Storage Tank #1	None	0.3	8760	1.3	HBr	SIP	5
613	Storage Tank	None	0.1 0.1	8760	0.4 0.4	HBr NH_3	SIP	5
614	HBr Storage Tank #2	None	0.1	8760	0.4	HBr	SIP	5

Heavy Fluids Production in the Heavy Fluids Reactor

Process Summary

In addition to HBr, three heavy fluids are produced in the heavy fluids reactor. These are calcium bromide, zinc/calcium bromide, and zinc bromide (fluids grade). They are marketed as oil field chemicals. These compounds are made by reacting the appropriate oxide with HBr. Excess HBr is controlled in the same manner as it is when 48% HBr is being produced.

Specific Conditions - Heavy Fluids

58. The permittee shall comply with the emission rates specified in the table on the following page.

Hydrogen Bromide in the Alkyl Bromide Area Reactor

Process Summary

HBr is made in the alkyl bromide area reactor in much the same way it is made in the heavy fluids reactor; it is simply absorbed in water. It is made in either 48% or 62% concentrations by varying the amount of water added and distilling the final product. The gases which pass through the absorber are routed to a caustic scrubber before being vented to the atmosphere (SN-657). Overheads from the batch still are condensed and sent to the NaHS unit. In addition to these sources, there are two product tanks, SN-658 and SN-659, which have atmosphere vents.

Specific Conditions - Alkyl Bromide Area Reactor

59. During the next production run, Great Lakes shall measure the hydrogen bromide emissions from HBr Absorber (SN-657) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. The hydrogen bromide testing shall be conducted during the production of 62 % HBr.

60. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Primary Production Area								
Heavy Fluids -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
601	Adjustment Tank	None	0.2	8760	0.9	HBr	SIP	5
602	Formic Acid Storage Tank	None	0.1 7.8	8660 100	0.5 0.4	VOC (Formic Acid) **Breathing Losses** VOC (Formic Acid) **Filling Losses**	SIP	5
603	Final Vent	Scrubber	0.1 0.1	8760	0.4 0.4	HBr NH_3	SIP	5

TABLE I

Alkyl Bromide Reactor								
HBr -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
657	HBr Absorber	Packed Column Water Scrubber	0.4	8760	1.8	HBr	SIP	5
658	HBr Storage Tank	None	0.1	8760	0.4	HBr	SIP	5
659	HBr Storage Tank	None	0.1	8760	0.4	HBr	SIP	5

Ammonium Bromide in the Alkyl Bromide Area Reactor

Process Summary

Ammonium bromide is formed by mixing ammonia with HBr. The HBr is absorbed in the alkyl bromide reactor as described in the previous section. Ammonia is added to the HBr solution and ammonium bromide (NH_4Br) is formed. Water is added to bring the solution to the desired concentration; no distillation is necessary.

Two emission points are associated with this process, the HBr absorber (SN-657) and the ammonium bromide storage tank vent (SN-662).

Specific Conditions - Ammonium Bromide

61. During the next production run, the permittee shall measure the ammonia and hydrogen bromide emissions from HBr Absorber (SN-657) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. The ammonia and hydrogen bromide testing shall be conducted during the production of ammonium bromide.

62. The permittee shall comply with the emission rates specified in the table on the following page.

TABLE I

Alkyl Bromide Reactor								
NH_4Br -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
657	HBr Absorber	Packed Column Water Scrubber	0.4 0.1	8760	1.8 0.4	HBr NH_3	SIP	5
662	NH_4Br Storage Tank	None	0.1 0.1	8760	0.4 0.4	HBr NH_3	SIP	5

Alkyl Bromides

Process Summary

Great Lakes produces at the fine chemicals unit, one at a time as demand indicates, the following alkyl bromides:

ethyl bromide
isopropyl bromide
n-propyl bromide
sec-butyl bromide
stearyl bromide
n-butyl bromide
n-amyl bromide
h-hexyl bromide
h-octyl bromide
myristyl bromide
lauryl bromide
cetyl bromide
2-bromopentane
n-heptyl bromide
n-nonyl bromide
n-decyl bromide

In addition to the above products, methyl bromide produced at the TBBPA facility is stored, purified, and packaged in the Alkyl Bromides area.

Alkyl bromides are made by reacting anhydrous HBr and the appropriate alcohol in the alkyl bromide reactor. After the reaction the crude product is transferred to a hold tank. Here, the reaction water, which contains HBr, is transferred to an intermediate storage tank or a still where more product is extracted. The crude product is filtered and transferred to storage.

Vapors from the reactor, still, distillate receiver, and intermediate storage tank, are sent through a caustic scrubber, condenser system, and finally the crude product storage tank. When ethyl bromide is being produced, the vent from the crude product storage tank is sent to a second condenser system and ultimately to the BRU. (When the BRU is down, the vapors are vented to the atmosphere through SN-660). When products other than ethyl bromide are being produced, the crude product storage tank is vented directly to the atmosphere as SN-653.

There are three alcohol storage tanks (SN-661, SN-664, and SN-665) and two alkyl bromide storage tanks (SN-605 and SN-655). These tanks are vented directly to the atmosphere. When alkyl bromides are being packaged at this facility, a suction fan is used. The vent for this fan is vented directly to the atmosphere as SN-607. The two methyl bromide storage tanks are normally vented to the BRU. When the BRU is down, they are vented to the atmosphere as SN-651 and SN-652. Spent sulfuric acid from the purification of methyl bromide during the manufacture of TBBPA is stored in a railcar at the fine chemicals facility. This railcar vents to the atmosphere as SN-663.

Specific Conditions - Alkyl Bromides

63. The permittee may produce any of the alkyl bromides listed in the process summary; however, they may only produce one alkyl bromide at a time. Furthermore, they may only produce isopropyl bromide, n-propyl bromide, sec-butyl bromide, and n-butyl bromide 3,600 hours per year (150 days) for each product. Production of the other alkyl bromides is not limited. Since they can produce only one alkyl bromide at a time, the emissions rates listed for SN-653 are not additive. They shall keep records, on a daily basis of the alkyl bromide produced.

64. The permittee shall not emit from SN-653 while producing ethyl bromide.

65. If the BRU is out of service more than 1,314 hour per years (15%), then any further downtime will require that ethyl bromide production and methyl bromide transfer operations be discontinued and may not be resumed until the BRU is back in operation unless the methyl bromide vapors generated by the production of TBBPA and the methyl and ethyl bromide transfer operations are routed to an alternate control device. Specifically, this includes the vapors from SN-651, SN-652, and SN-660.

66. The permittee shall continue a fugitive leak detection and repair program for the alkyl bromide area of the Fine Chemicals facility, while producing ethyl bromide or any other compound listed in 40 CFR 60.489. This program shall be operated as described in 40 CFR 60.482 or as described in an alternate program which the Director has approved prior to its implementation.

67. The permittee shall comply with the emission limits specified in the table on the following pages.

TABLE I

Alkyl Bromides								
Alkyl Bromides -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
605	Alkyl Bromide Storage Tank	None	0.7	8760	3.1	VOC	SIP	5
607	Packaging Vent	None	6.7	**	1.2	VOC	SIP	5
651	MeBr Storage	BRU Unit	8.5	*	5.5	VOC (MeBr)	SIP	5
652	MeBr Storage	BRU Unit	10.2	*	6.6	VOC (MeBr)	SIP	5

Alkyl Bromides

Alkyl Bromides -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
653	Intermediate Storage Tank and Process Vent	None	260.9	**	32.2	iso-propyl bromide	SIP	5
			138.1			n-propyl bromide		
			68.8			sec-butyl bromide		
			32.1			n-butyl bromide		
			14.4			2-bromopentane		
			6.9			n-amyl bromide		
			1.7			n-hexyl bromide		
			0.6			h-heptyl bromide		
			0.1			n-octyl bromide		
			0.1			stearyl bromide		
			0.1			myrstyl bromide		
			0.1			lauryl bromide		
			0.1			cetyl bromide		
			0.1			n-hptyl bromide		
			0.1			n-nonyl bromide		
			0.1			n-decyl bromide		
655	Alkyl Bromide Storage Tank	None	1.1	4400	2.4	VOC	SIP	5
660	EtBr Storage	BRU Unit	9.5	*	6.2	VOC (EtBr)	NSPS Subpart VV	5

Alkyl Bromides

Alkyl Bromides -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
661	Alcohol Storage Tank	None	0.2	8760	0.9	VOC	SIP	5
663	H_2SO_4 Railcar Storage	None	0.1	8760	0.4	VOC (MeBr)	SIP	5
664	Alcohol Storage Tank	None	0.2	8760	0.9	VOC	SIP	5
665	Alcohol Storage Tank	None	0.2	8760	0.9	VOC	SIP	5

* - These sources are normally routed to the BRU. See specific condition #65 for details.

** - The emission limits for these sources are expressed in lbs/day instead of lb/hr.

Fine Chemicals Emission Rate Summary		
Pollutant	lb/hr	ton/yr
HBr	2.0	8.4
NH_3	0.6	2.4
Br_2	0.3	1.2
VOC	67.7	72.9

Spray Dryer

Process Summary

Great Lakes operates a spray drying operation at the El Dorado Plant which is used to dry a variety of chemicals. The spray drying plant consists of a blending tank, storage tank, drying chamber, cyclone separators and a scrubber.

The unit operates by atomizing the solution to be dried and injecting it into the drying chamber where it is mixed with hot air in the 800-900°F range. The hot gas instantly drives off the water and carries the dry solids to the two cyclones. The gases next go through a scrubber before they are vented to the atmosphere through SN-801.

The air used in the spray dryer is heated by a direct fired natural gas burner which has the capacity of 7,500,000 Btu per hour. Whenever natural gas is used some pollutants associated with its use are emitted.

The material being dried does not contain any organic contaminant which can be driven off during the drying process.

The spray dryer building is vented to remove fugitive particulate emissions associated with the collection of dried product from the cyclone separators. Dust is removed from this air by a water scrubber SN-802. Spray dried material and small quantities of other solids produced by Great Lakes are bagged at this facility. Dust generated during the bagging operation is collected and controlled by a baghouse, SN-803.

Specific Conditions - Spray Dryer

68. On or before December 31, 1993, and annually thereafter, the permittee shall measure the particulate matter emissions from the spray dryer stack (SN-801) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. During the test, Great Lakes shall operate the appropriate equipment within 10 percent of the rated throughput capacity. If 90 percent of rated throughput capacity can not be achieved, the permittee shall be limited to 10 percent above the actual tested throughput.

69. The material being dried shall not contain any organic contaminant which can be driven off during the drying process.

70. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Spray Dryer								
Spray Dryer -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
801	Spray Dryer Natural Gas (5.25 MMBtu/hr)	Scrubber	6.1 0.1 0.1 0.1 0.2 0.8	8760	26.7 0.4 0.4 0.4 0.9 3.5	PM/PM_{10} SO_2 VOC Methane CO NO_x	SIP	20
802	Spray Dryer Building	Scrubber	3.4	8760	14.9	PM/PM_{10}	SIP	20
803	Bagging Operation	Baghouse	0.2	8760	0.9	PM/PM_{10}	SIP	5

Spray Dryer Emission Rate Summary

Pollutant	lb/hr	ton/yr
PM/PM_{10}	9.7	42.5
SO_2	0.1	0.4
VOC	0.1	0.4
Methane	0.1	0.4
CO	0.2	0.9
NO_x	0.8	3.5

Tetrabromobisphenol-A

Process Summary

Tetrabromobisphenol-A (TBBPA) is made by reacting bromine and bisphenol-A (BPA). TBBPA is used as a flame retardant as well as feed stock in other Great Lakes processes. This facility was originally permitted in February, 1980, under permit 610-A.

The process begins with BPA being dissolved in methanol prior to transfer to the reactor where bromine is added. Products of this reaction are TBBPA, methyl bromide (MeBr), and hydrobromic acid (HBr). A slurry consisting of TBBPA in a HBr solution is filtered, purified, and dried. The TBBPA is further dried and packaged.

In addition to being produced as a co-product of the TBBPA reaction, methyl bromide is produced from the solvent liquor in a vaporizer reactor and in a dedicated reactor at TBBPA facility. In this reactor, HBr is mixed with methanol to form methyl bromide. The crude methyl bromide is purified, then treated with sulfuric acid.

Vapors from the bromine storage tanks are vented to a caustic scrubber before being released to the atmosphere. Particulate emissions are controlled by baghouses. SN-1002 controls emissions from the BPA storage silo, SN-1003 and SN-1006 control emissions from the TBBPA dryers. SN-1005 controls dust emissions from the bulk loading and SN-1007 controls packaging emissions. Vents from the BPA mix tank, process slumps, and the filter belt cloth are discharged through SN-1004. Some storage tanks have atmospheric vents. These are the fresh methanol storage tank, SN-1008, the refrigerated methanol storage tanks, SN-1010, SN-1015, SN-1016, and SN-1017, the MeCl storage tank, SN-1011, the HBr surge tank, SN-1012, the process water surge tank, SN-1013, the recycle water tank, SN-1014, and the process water surge tank, SN-1018.

Specific Conditions - TBBPA

71. If the BRU is out of service more than 1,314 hours per year (15%), then any further downtime will require that operation of the TBBPA process be discontinued and may not be resumed until the BRU is back in operation unless the methyl bromide vapors generated by the production of TBBPA are routed to an alternate control device. Specifically, this includes the vapors from SN-1004.

72. The methylene chloride storage tank, SN-1011, shall be filled at a rate no greater than 5 gallons per minute and no more than 3,600 gallons per year.

73. The permittee shall comply with the emission limits specified in the table on the following pages.

TABLE I

Tetrabromobisphenol-A

Tetrabromobisphenol-A -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1001	Caustic	Scrubber	0.2[1]	8760	0.9	Br$_2$	SIP	5
1002	BPA	Baghouse	0.5	8760	2.2	PM/PM$_{10}$	SIP	5
1003	Line 1	Baghouse	2.0	8760	8.8	PM/PM$_{10}$	SIP	5
1004	TBBPA Vent (green stack)	None	4.4[2] 2.3[2] 8.0 54.0	7446 7446 1314[3] 1314[3]	16.4 8.6 5.3 35.5	VOC (Methanol) VOC (Methyl Bromide) VOC (Methanol) VOC (Methyl Bromide)	SIP	5
1005	TBBPA Bulk Loading	Baghouse	2.5	8760	11.0	PM/PM$_{10}$	SIP	5
1006	TBBPA IOB II	Baghouse	2.0	8760	8.8	PM/PM$_{10}$	SIP	5
1007	TBBPA Packaging	Baghouse	2.5	8760	11.0	PM/PM$_{10}$	SIP	5
1008	Methanol Tank (T-63)	None	1.1	8760	4.9	VOC (Methanol)	SIP	5
1009		Reserved						
1010	Chilled Methanol Tank	None	0.1	8760	0.4	VOC (Methanol)	SIP	5

Tetrabromobisphenol-A								
Tetrabromobisphenol-A -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1011	Methylene Chloride Tank	None	0.1 4.6	8748 12	0.5 0.1	MeCl **Breathing Losses** MeCl **Filling Losses**	SIP	5
1012	HBr Solution Storage Tank	None	0.1	8760	0.4	HBr	SIP	5
1013	Process Storage Tank	None	0.1	8760	0.4	VOC	SIP	5
1014	Process Water Tank	None	0.2	8760	0.9	VOC	SIP	5
1015	Chilled Methanol Tank #1	None	0.1	8760	0.4	VOC (Methanol)	SIP	5
1016	Chilled Methanol Tank #2	None	0.03	8760	0.2	VOC (Methanol)	SIP	5
1017	Chilled Methanol Tank #3	None	0.03	8760	0.2	VOC (Methanol)	SIP	5
1018	Process Water Surge Tank	None	0.03	8760	0.2	VOC	SIP	5

1. - SN-1001 was tested for bromine in June of 93 and the highest measurement was 0.0015.

2. - SN-1004 was tested for methanol and methyl bromide in March of 94 and the average emissions were 1.4 and 1.1 pounds per hour, respectively.
3. - This source is normally routed to the BRU. See specific condition #72 for details.

TBBPA Facility Emission Rate Summary

Pollutant	lb/hr	ton/yr
PM/PM_{10}	9.5	41.8
VOC	63.7	73.4
Methylene Chloride	4.6	0.6
Br_2	0.2	0.9
HBr	0.1	0.4

Brominated Organic Compounds (BOC)

Introduction

The primary product made at the Brominated Organic Compounds (BOC) facility is decabromodiphenyl oxide (DE-83R). During the production of DE-83R, hydrogen bromide (HBr) is generated. This HBr is used to produce calcium bromide ($CaBr_2$) and 48% HBr. In addition to these products, DE-79, which is produced at the fine chemicals facility, is sent to BOC where it can be ground and packaged. Also, heavy fluids, produced at fine chemicals and the calcium bromide facility, are filtered at this facility.

Permit 1077-AR-2 allowed Great Lakes to increase production of DE-83R.

Decabromodiphenyl Oxide (DE-83R) Production

Process Summary

Decabromodiphenyl Oxide (DE-83R) is produced by reacting diphenyl oxide (DPO) with bromine in the presence of a catalyst. Hydrogen bromide is produced as a byproduct and is sent to an absorber which is part of the calcium bromide HBr process (see page 65 of this permit). After bromination, the crude DE-83R is transferred to the strippers where it is water washed and then to filters. After being filtered, the DE-83R is dried, ground, and packaged.

Vapors from the bromine feed tanks and strippers are controlled by a caustic scrubber, SN-1107. Vents from the filter receivers discharge through vacuum pumps, SN-1109 and SN-1110. The slurry hold tanks vent to the atmosphere (SN-1120 and SN-1121). Particulate emissions from drying and grinding are controlled by baghouses (SN-1103, SN-1104, SN-1105, SN-1106, SN-1113, SN-1114, SN-1115, and SN-1116) and wet cyclone scrubbers (SN-1102 and SN-1112).

Specific Conditions - DE-83R

74. The permittee shall comply with the emission limits specified in the table at the end of this section.

Calcium Bromide/Hydrogen Bromide Production

Process Summary

HBr off-gas from the production of DE-83R is sent to the calcium bromide facility or the HBr absorber/calcium bromide reactor at the BOC facility. The HBr can then be sent to the calcium bromide unit or processed at the BOC facility.

If processed at the BOC facility, the HBr is mixed with lime slurry. This slurry is then added to the absorber/reactor to produce $CaBr_2$ and HBr. The crude product is next sent to an adjustment tank where the composition can be adjusted using bromine, acid, or lime slurry. Crude $CaBr_2$ from the calcium bromide facility can also be sent to this tank for adjustment. After adjustment the material is filtered and stored then packaged at the calcium bromide facility. Heavy fluids from other areas of the plant can be filtered at the BOC facility.

The absorber/reactor vents to the BOC facility's caustic scrubber, SN-1107. The lime is stored in a silo which is controlled by a baghouse, SN-1108. The acid used in the adjustment process is stored in a tank which is vented to the atmosphere, SN-1119. The vacuum filter pumps, SN-1122 and SN-1124, also vent to the atmosphere.

Specific Conditions - $CaBr_2$/HBr Production

75. On or before December 31, 1993, and annually thereafter, the permittee shall measure the hydrogen bromide and bromine emissions from $CaBr_2$/HBr Caustic (SN-1107) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. During the test the permittee shall measure the caustic concentration of the scrubber liquid. The caustic concentration shall be maintained at or above the tested concentration which has demonstrated to satisfactorily meet the emission limits specified in Table I. The permittee may conduct emission testing while simultaneously sampling the caustic concentration in order to establish alternate operating parameters which can be submitted to the Department for approval.

76. The permittee shall comply with the emission limits specified in the table at the end of this section.

DE-79 Grinding and Packaging

Process Summary

DE-79 is cast in blocks and allowed to solidify at Fine Chemicals. These blocks are transported to the BOC warehouse where they are broken up and coarsely ground. This material is stored in bulk bags until it can be fed into a second grinder for a "finished" grind. After the second grind, the DE-79 is put into a small hopper and packaged. Dust from the grinding and packaging is controlled by a baghouse.

Specific Conditions - DE-79 Grinding and Packaging

77. The permittee shall comply with the emission limits specified in the table at the end of this section.

TABLE I

Brominated Organic Compounds (BOC)

BOC Facility -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1101		Reserved						
1102	DE-83R	Wet Cyclone Scrubber	4.7[1]	8760	20.6	PM/PM_{10}	SIP	5
1103	DE-83R Dryer	Baghouse	1.5	8760	6.6	PM/PM_{10}	SIP	5
1104	DE-83R Primary Grinder	Baghouse	1.0	8760	4.4	PM/PM_{10}	SIP	5
1105	DE-83R Grinder/Transfer	Baghouse	0.9	8760	4.0	PM/PM_{10}	SIP	5
1106	DE-83R Secondary Grinder	Baghouse	0.9	8760	4.0	PM/PM_{10}	SIP	5
1107	$CaBr_2$/HBr Caustic	Scrubber	0.5 0.5	8760	2.2 2.2	HBr Br_2	SIP	5
1108	$CaBr_2$ Lime Silo	Baghouse	0.2	8760	0.9	PM/PM_{10}	SIP	5
1109	Filter System Vacuum Pump Discharge	None	0.1[4] 0.1	8760	0.4 0.4	HBr Br_2	SIP	5

Brominated Organic Compounds (BOC)								
BOC Facility -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1110	Vacuum Pump Discharge	None	0.1^2 0.1^2	8760	0.4 0.4	HBr Br_2	SIP	5
1111		Reserved						
1112	DE-83R Production	Wet Cyclone Scrubber	4.7^3	8760	20.6	PM/PM_{10}	SIP	5
1113	DE-83R Production	Baghouse	1.5	8760	6.6	PM/PM_{10}	SIP	5
1114	DE-83R Production	Baghouse	0.9	8760	4.0	PM/PM_{10}	SIP	5
1115	DE-83R Production	Baghouse	0.9	8760	4.0	PM/PM_{10}	SIP	5
1116	DE-83R Production	Baghouse	0.9	8760	4.0	PM/PM_{10}	SIP	5
1117	Belt Filter Fume Hood	Removed from Service in 1993						
1118	Belt Filter Fume Hood	Removed From Service in 1993						

Brominated Organic Compounds (BOC)

BOC Facility -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1119	Formic Acid Storage Tank	None	0.1	8660	0.5	VOC (Formic Acid) **Breathing Losses**	SIP	5
			6.3	100	0.4	VOC (Formic Acid) **Filling Losses**		
1120	Slurry Tank Vent	None	0.1	8760	0.4	HBr	SIP	5
			0.1		0.4	Br_2		
1121	Slurry Tank Vent	None	0.1	8760	0.4	HBr	SIP	5
			0.1		0.4	Br_2		
1122	Rotary Filter Vacuum Pump Discharge	None	0.1	8760	0.4	HBr	SIP	5
			0.1		0.4	Br_2		
1123	Grinding and Packaging	Baghouse	0.5	8760	2.2	PM/PM_{10}	SIP	5
1124	Heavy Fluids Filter Vacuum Pump Discharge	None	0.1	8760	0.4	HBr	SIP	5
			0.1		0.4	Br_2		

1. - SN-1102 was tested for particulate matter in June of 93 and the highest measurement was 1.905 pounds per hour.
2. - SN-1110 was tested for bromine and hydrogen bromide in September of 94. The highest measurements were 0.003 and 0.036 pounds per hour, respectively.
3. - SN-1112 was tested for particulate matter in June of 93 and the highest measurement was 2.643 pounds per hour.

4. - SN-1109 was tested for hydrogen bromide during DE-83R production in February 94 and the highest measurement was 0.019 pounds per hour.

BOC Facility Emission Rate Summary

Pollutant	lb/hr	ton/yr
PM/PM_{10}	18.6	81.9
HBr	1.1	4.6
Br_2	1.1	4.6
VOC	6.3	0.9

Calcium Bromide/Hydrogen Bromide

Introduction

The calcium bromide-hydrogen bromide facility produces liquefied anhydrous hydrogen bromide, 48% hydrogen bromide solution, calcium bromide (a heavy fluid), SP-1 (a mixture of $CaBr_2$ and $CaCl_2$), and other heavy fluids, namely zinc/calcium bromide, zinc bromide, and sodium bromide. In addition to these processes, a limited portion of the bromine recovery process is performed at the $CaBr_2$ facility.

This facility is located near and is closely associated with, the BOC facility. Heavy fluids produced at the $CaBr_2$ facility are sent to BOC for adjustment and filtering. Heavy fluids produced at fine chemicals are stored at the $CaBr_2$ facility before being sent to BOC for filtering. In addition, some of the HBr used at this facility comes from BOC.

The HBr "burner" was originally permitted in 1978 under permit 525-A. The calcium bromide facility was issued permit 553-A in May 1979. Both of these processes were included in permit 1077-AR-1 which was issued on March 12, 1993.

Anhydrous Hydrogen Bromide

Process Summary

Anhydrous Hydrogen Bromide gas is produced by reacting elemental hydrogen and bromide in a flow-controlled, proprietary designed "burner". The HBr gas is cooled and piped to the calcium bromide ($CaBr_2$) unit.

The HBr "burner" does not have any direct emission points. However, a hydrogen tank which is equipped with an emergency relief vent (SN-1201), is present.

Calcium Bromide

Process Summary

Calcium bromide is made by contacting the HBr gas with a lime slurry. Alternately the gas can be contacted with water to make a 48% HBr solution. If sodium bromide is being produced, sodium hydroxide is used instead of lime. If SP-1 is the desired end product, lime/$CaCl_2$ slurry is mixed with $CaBr_2$ and sent to the BOC absorber/reactors.

The reactors vent to a caustic scrubber designated as SN-1202. A second scrubber, SN-1204, controls the vapors from the bromine storage tanks. Other emissions points at this facility include the lime silo which is controlled by a Baghouse, SN-1203, the HBr loading operation, SN-1208, and the HBr recycle tank, SN-1209. The HBr solution adjust tanks, SN-1205, SN-1206, SN-1207, SN-1211, SN-1212, and SN-1213, vent to the atmosphere or to scrubber SN-1204.

Bromine Recovery

Process Summary

Process water from other production units at this plant are recycled at the $CaBr_2$ facility. This water is clarified, using polymer to enhance solids separation. The clarified water is returned to the bromine towers for bromine recovery.

Specific Conditions - Bromine Recovery

78. On or before December 31, 1993, and annually thereafter, the permittee shall measure the bromine emissions from bromine tanks (SN-1202) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. During the test the permittee shall measure the caustic concentration of the scrubber liquid. The caustic concentration shall be maintained at or above the tested concentration which has demonstrated to satisfactorily meet the emission limits specified in Table I. This test shall be conducted while the bromine tanks are being filled. The permittee may conduct emission testing while simultaneously sampling the caustic concentration in order to establish alternate operating parameters which can then be submitted to the Department for approval.

79. On or before December 31, 1993, and annually thereafter, the permittee shall measure the hydrogen bromine emissions from reactors (SN-1204) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. During the test the permittee shall measure the caustic concentration of the scrubber liquid. The caustic concentration shall be maintained at or above the tested concentration which has demonstrated to satisfactorily meet the emission limits specified in Table I. This test shall be conducted while the process is operating normally. The permittee may conduct

emission testing while simultaneously sampling the caustic concentration in order to establish alternate operating parameters which can then be submitted to the Department for approval.

80. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Calcium Bromide/Hydrogen Bromide								
Calcium Bromide/Hydrogen Bromide Facility -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1201	H_2 Tank, HBr Production	Relief Vent	1.4	8760	6.1	H_2	SIP	5
1202	Bromine Tanks'	Scrubber	0.2	8760	0.9	Br_2	SIP	5
1203	Lime Silo	Baghouse	0.2	8760	0.9	PM/PM_{10}	SIP	5
1204	Reactors'	Scrubber	1.2	8760	5.3	HBr	SIP	5
1205	48% HBr Storage #1	None	0.2	8760	0.9	HBr	SIP	5
1206	48% HBr Storage #2	None	0.2	8760	0.9	HBr	SIP	5
1207	48% HBr Storage #3	None	0.2	8760	0.9	HBr	SIP	5
1208	48% HBr Tank Truck Loading	None	0.1	8760	0.4	HBr	SIP	5
1209	Recycle HBr Storage	None	0.1	8760	0.4	HBr	SIP	5
1210	$CaBr_2$	None	0.1	8760	0.4	HBr	SIP	5
1211	HBr Solution Storage Tank #1	None	0.2	8760	0.9	HBr	SIP	5

Calcium Bromide/Hydrogen Bromide

Calcium Bromide/Hydrogen Bromide Facility -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1212	HBr Solution Storage Tank #2	None	0.2	8760	0.9	HBr	SIP	5
1213	HBr Solution Storage Rank #3	None	0.2	8760	0.9	HBr	SIP	5

CaBr/HBr Facility Emission Rate Summary		
Pollutant	lb/hr	ton/yr
PM/PM_{10}	0.2	0.9
HBr	2.7	11.9
Br_2	0.2	0.9
H_2	1.4	6.1

OCP Plant

Introduction

The OCP facility (organic chemicals processing, formerly known as the MPBz facility) is used to manufacture sixteen different products. These products are:

Metaphenoxybenzaldehyde (MPBZ)
Metaphenoxybenzyl Alcohol (MPBA)
Dibromodimethylhydantoin (DBDMH)
Bromochlorodimethylhydantoin (BCDMH)
Dichlorodimethylhydantoin (DCDMH)
DE-71/DE-60F/DE-60F Special (DE-60FS)
HP-36/FM-836/FM-642
Levulinic Acid
FF-680 Drying
CN-438
DP-45
DE-83
HBr

All the products cannot be produced at the same time although there are many possible combinations of products which can be manufactured simultaneously. There are fourteen different atmospheric emission points at the OCP facility. Those products which use the same emission point can be produced at the same time as long as the worse case emission limits are not exceeded.

Specific Conditions - OCP Plant

81. A pilot flame shall be present on the flare at all times. A thermocouple or equivalent device shall be used to monitor the presence of a pilot flame on the flare.

82. When burning natural gas only, the flare, SN-1301, may emit products of combustion of natural gas. These include less than 0.1 pounds of NO_x, PM/PM_{10}, CO, VOC, and SO_2 per hour. These emissions can be considered as baseline emissions for the flare.

83. The permittee shall install a pressure drop device on the baghouses (SN-1303, SN-1312, SN-1314, and SN-1315). The pressure drop shall be maintained between one (1) inch

and six (6) inches of water. The pressure drop shall be checked at a minimum of once per week. When the pressure drop is below one (1) or above six (6) inches of water, the permittee shall clean or replace the bag filters. The permittee shall maintain records of pressure drop and maintenance. These records shall be kept on site and provided to Department personnel upon request.

84. The permitee shall install a flow meter on the scrubbers (SN-1302 and SN-1313). The minimum flow rate to each scrubber shall be maintained at or above seven (7) gallons per minute. The flow rate shall be checked at a minimum of once per week. The permittee shall maintain records of the flow rate. These records shall be kept on site and provided to Department personnel upon request.

85. The permittee shall measure the emissions from SN-1302 during production of the following products for the pollutants specified in the Table I's.

Dibromodimethylhydantoin (DBDMH)
Bromochlorodimethylhydantoin (BCDMH)
Dichlorodimethylhydantoin (DCDMH)
DE-71/DE-60F/DE-60F Special (DE-60FS)
HP-36/FM-836/FM-642
Levulinic Acid
FF-680 Drying
CN-438
DP-45
DE-83

The permittee shall test all pollutants from at least 25% of the products which are produced during each calendar year including simultaneous production runs at this unit. Each product shall be tested at least once every four years.

If any product is not produced during any four year period, it shall be considered a new product upon production.

In addition, the permittee shall test each new product which is produced in OCP for all permitted or any new pollutants which are/may be emitted from SN-1302. This test shall occur within 30 days of start-up of production of the new product. The testing shall be in accordance with a test procedure which has been specifically approved by this Department prior to the testing.

During the testing the permittee shall measure the caustic concentration of the scrubber liquid. They shall maintain the caustic level at or above this level during subsequent operation of the scrubber at all times.

During the testing, the plant operate the process within 10 percent of the rated throughput capacity. Failure to test at the rated throughput shall limit GL to 90 percent of the tested throughput. In the event that a pollutant fails to test at or below permitted limits, GL shall re-test all pollutants from that product.

A production run of less than 30 days shall not exclude that product from being tested, if it has not been tested within the last four years. The permittee may conduct emission testing while simultaneously sampling the caustic concentration in order to establish alternate operating parameters which can then be submitted to the Department for approval.

Metaphenoxybenzaldehyde (MPBz) Production

Process Summary

Metaphenoxybenzaldehyde (MPBz) is produced by brominating metaphenoxytoluene in the presence of a carbon tetrachloride solvent and a catalyst. After this reaction, water is added and the solvent is stripped and recovered.

After stripping, a second reaction is used to make the crude MPBz. Hexamethylene tetramine (HMTA) and acetic acid are used in this step. The crude MPBz is then purified using toluene, hydrochloric acid, soda ash, and water.

There are three atmospheric emission points associated with MPBz production. All the process vessels except those which store materials which have a vapor pressure less than 0.1 mmHg at STP are vented to a flare, which has been designated as SN-1301. The hydrochloric acid and acetic acid tanks have been designated as SN-1305 and SN-1307, respectively. (Please Note: The flare and hydrochloric acid tank are used when making other products.)

Specific Conditions - MPBz Production

86. The permittee shall not fill the hydrochloric acid tank, SN-1305, or the acetic acid tank, SN-1307, at a rate faster than 20 gallons per minute.

87. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

OCP Plant								
MPBz Production -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1301		Flare	0.1 0.1 0.1 0.1 0.1 0.1 0.4 4.8 2.3 0.1 0.1	8760	0.4 0.4 0.4 0.4 0.4 0.4 1.8 21.0 10.1 0.4 0.4	PM/PM_{10} SO_2 VOC Methane CO NO_x CCl_4 VOC (Toluene) HCl VOC (HTMA) HBr	SIP	5
1305	HCl Storage Tank	None	1.8	8760	7.9	HCl	SIP	5
1307	Acetic Acid Storage Tank	None	0.7	8760	3.1	VOC (Acetic Acid)	SIP	5

Metaphenoxybenzyl Alcohol (MPBA) Production

Process Summary

Metaphenoxybenzyl Alcohol (MPBA) is made by reacting MPBz with a catalyst and water. After the reaction, the crude product is purified and shipped. All emissions generated by the process are routed to the OCP flare (SN-1301). There are no other emission points associated with the production of MPBA. MPBA cannot be made at the same time as MPBz.

Specific Conditions - MPBA Production

88. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

OCP Plant

MPBA Production -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1301		Flare	0.1	8760	0.4	PM/PM_{10}	SIP	5
			0.1		0.4	SO_2		
			0.1		0.4	VOC		
			0.1		0.4	Methane		
			0.1		0.4	CO		
			0.1		0.4	NO_x		
			4.8		21.0	VOC (Toluene)		
			0.1		0.4	HBr		

DE-71/DE-60F/DE-60F Special (DC-60FS)

Process Summary

Pentabromodiphenyl Oxide, DE-71, is produced by reacting diphenyl oxide (DPO) and bromine in the presence of a catalyst. When the first reaction is complete, the crude product is transferred to a neutralizer. After neutralization, the product is purified by filtration and vacuum stripping. At this point the DE-71 can be packaged and sold as a product or it can be mixed with a plasticizer to produce DE-60F or DE-60F Special.

The bromine and hydrogen bromide gas, which are by-products of this reaction, are vented to other processes at the El Dorado plant, a condensing system, or an absorber. The absorber is vented to the caustic scrubber, SN-1302. In addition, the neutralizer, as well as the bromine and DPO storage tanks, are vented to SN-1302. The vacuum stripper is vented to the flare, SN-1301.

Specific Conditions - DE-71/DE-60F/DE-60F Special (DC-60FS)

93. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

OCP Plant

DE-71/DE-60F/DE-60F Special (DC-60FS) Production -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1301		Flare	0.1	8760	0.4	PM/PM_{10}	SIP	5
			0.1		0.4	SO_2		
			0.1		0.4	VOC		
			0.1		0.4	Methane		
			0.1		0.4	CO		
			0.1		0.4	NO_x		
			0.1		0.4	HBr		
1302	OCP Facility	Scrubber	0.4	8760	1.8	HBr	SIP	5
			0.4		1.8	Br_2		

HP-36/FM-836/FM-642

Summary

The production of HP-36, FM-836, and FM-642 starts with the condensation of phosphorus trichloride (PCl_3) and neopentyl-glycol. The product of this reaction is brominated and then reacted with ethylene oxide. (HCl gas is produced as a byproduct of the first reaction. It is absorbed in water to produce 30% HCl.)

The crude product is next purified and sold as HP-36. HP-36 can be mixed with an additive to produce FM-836. FM-836 can then be blended with DE-71 to produce FM-642.

Process gases from the initial reaction, the bromination reaction, the phosphorus trichloride rail car, and the bromine storage tank are vented to a caustic scrubber, SN-1302. A flare, SN-1301, is used to control emissions from sources associated with the ethylene oxide reaction. The HCl storage tank is vented to the atmosphere, SN-1306.

Specific Conditions - HP-36/FM-836/FM-642

94. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

OCP Plant

HP-36/FM-836/FM-642 Production -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1301		Flare	0.1 0.1 0.1 0.1 0.1 0.1 0.7	8760	0.4 0.4 0.4 0.4 0.4 0.4 3.1	PM/PM_{10} SO_2 VOC Methane CO NO_x VOC (ethylene oxide)	SIP	5
1302	OCP Facility	Scrubber	0.5 0.2	8760	2.2 0.9	HCl Br_2	SIP	5
1306	HCl Storage Tank	None	0.1	8760	0.4	HCl	SIP	5

CN-438

Process Summary

CN-438 is produced by reacting ethanolamine with HBr and then bromine. The product is then filtered and packaged for sale. Process gases are vented to the caustic scrubber, SN-1302. When shipping containers are filled, they are vented to the atmosphere.

Specific Conditions - CN-438

95. The permittee shall fill CN-438 shipping containers, and thus, emit from source SN-1311, no more than 40 hours per month.

96. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

OCP Plant

CN-438 Production -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1302	OCP Facility	Scrubber	3.7 0.7 0.1 0.1	8760	16.2 3.1 0.4 0.4	VOC (CN-438) Br_2 HBr VOC (Ethanolamine)	SIP	5
1311	Shipping Container Filling	None	9.4	480	2.3	VOC (CN-438)	SIP	5

DE-83

Process Summary

Decabromodiphenol Oxide (DE-83) is produced by reacting diphenol oxide and bromine. The crude product is then transferred to a stripper where the excess bromine is removed. The crude product, now in a water slurry, is sent to a centrifuge. After being centrifuged, the product is either dried and ground at OCP or sent to the BOC facility for final processing. Dust emissions from the drying and grinding operations are controlled by baghouses that vent to the atmosphere as SN-1303, SN-1312, SN-1314, and SN-1315. These operations also have an associated scrubber that vents to the atmosphere as SN-1313.

The DE-83 process is set up so that two reactors and strippers can be operated simultaneously. When this occurs, it is known as "two line operation".

When making DE-83, hydrogen bromide (HBr) is produced as a by-product. It is either sent to the CaBr facility, the TCO facility, or to an absorber where it is absorbed in water to produce 48% HBr. The bromine removed in the strip phase is either dried in an acid dryer and returned to the process, used in other processes at the El Dorado facility, or transferred to the BOC facility for drying.

The vents from the HBr absorber, the diphenyl oxide feed tank, the bromine feed tank, the stripper, and the wet bromine tank are routed to the building scrubber (SN-1302).

Specific Conditions - DE-83

97. DE-83 production at this facility shall not exceed 372 lots per month and 4380 lots per year on a rolling 12-month period. Compliance with this condition shall be verified by maintaining monthly records of the amount of DE-83 produced. These records shall be kept on site and provided to Department personnel upon request.

98. Within the time limits specified by general condition 5, the permittee shall test the grinder baghouse (SN-1312) exhaust for PM using EPA Reference Method 5. This specific condition requires two stack testing events each of three hour duration: during product transfer and recirculation.

99. Within the time limits specified by general condition 5, the permittee shall test the tray dryer scrubber (SN-1313) exhaust for PM using EPA Reference Method 5. This specific condition requires two stack testing events each of three hour duration: during product transfer and recirculation.

100. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

OCP Plant

DE-83 Production -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1302	OCP Facility	Scrubber	0.7 0.7 0.1	8760	3.1 3.1 0.4	Br_2 Hbr VOC (DPO)	SIP	5
1303	Flash Drying	Baghouse	0.7	8760	3.1	PM/PM_{10}	SIP	5
1312	Grinding	Baghouse	1.3[1] 0.4[2]	4380 4380	2.9 0.9	PM/PM_{10} PM/PM_{10}	SIP	5
1313	Tray Dryer	Scrubber	2.0[1] 0.1[2]	4380 4380	4.4 0.2	PM/PM_{10} PM/PM_{10}	SIP	5
1314		Baghouse	0.3[1] 0.1[2]	4380 4380	0.7 0.2	PM/PM_{10} PM/PM_{10}	SIP	5
1315	Final	Baghouse	1.3[1] 0.4[2]	4380 4380	2.9 0.9	PM/PM_{10} PM/PM_{10}	SIP	5

1. This pound per hour emission rate is for the twelve (12) hours per day, when the material is being transferred.
2. This pound per hour emission rate is for the twelve (12) hours per day, when the material is being recirculated.

FF-680 Drying

Process Summary

FF-680 is produced at Great Lakes Chemical Corporation's South Plant and shipped to the El Dorado Plant's OCP facility for drying.

At the OCP facility, the product is transferred to a tank where water is added to produce a slurry which is routed to a filter. The filter is vented to the facility's caustic scrubber, SN-1302. After being filtered, the material is transferred to a dryer. After the final drying it is packaged in bulk bags, which are returned to the South Plant for packaging. Dust generated during the drying and bagging is controlled by a baghouse, SN-1303.

Specific Conditions - FF-680 Drying

101. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

OCP Plant								
FF-680 Drying -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1302	OCP Facility	Scrubber	0.1	8760	0.4	VOC (Isopropyl Alcohol)	SIP	5
1303	Flash Drying	Baghouse	0.2	8760	0.9	PM/PM_{10}	SIP	5

Levulinic Acid (LVAC)

Process Summary

Levulinic acid ($C_5H_8O_3$) is made by reacting furfuryl alcohol ($C_5H_6O_2$) with water (H_2O). The process begins by mixing furfuryl alcohol, water, and the solvent methyl isobutyl ketone (MIBK). This mixture is added to the reactor which has been charged with HCl and additional MIBK.

When the reaction is complete, excess water and MIBK are distilled out. The crude product next goes through a number of purification steps where the remaining water and MIBK are removed. The levulinic acid (LVAC) is then stored for shipment. Recovered acid and MIBK are recycled.

The HCl storage tank vents directly to the atmosphere, SN-1305. The other vessels which contain acid are routed to the building's scrubber, SN-1302. Process vessels which contain MIBK but not catalyst, are vented to the flare, SN-1301. LVAC has a vapor pressure less than 0.1 mm Hg as stored, so no vent designations have been made for product storage and/or drumming.

Specific Conditions - Levulinic Acid

102. The permittee shall not fill the hydrochloric acid tank, SN-1305, at a rate faster than 20 gallons per minute.

103. The permittee shall comply with the emissions limits specified in the table on the following page.

TABLE I

OCP Plant								
Levulinic Acid Production -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1301		Flare	0.1 0.1 0.1 0.1 0.1 0.1 1.3 0.1	8760	0.4 0.4 0.4 0.4 0.4 0.4 5.7 0.4	PM/PM_{10} SO_2 VOC Methane CO NO_x VOC (Methyl isobutyl ketone) VOC (Furfuryl Alcohol)	SIP	5
1302	OCP Facility	Scrubber	2.0 0.1 0.1	8760	8.8 0.4 0.4	VOC (Methyl isobutyl ketone) VOC (Furfuryl Alcohol) HCl	SIP	5
1305	HCl Storage Tank	None	1.8	8760	7.9	HCl	SIP	5

HBr Condensation

Process Summary

HBr gas is produced as a co-product during both DE-71 and DE-83 production. Great Lakes has installed a system to purify, condense, and package some of this HBr. The process consists of a series of condensers which remove impurities and free bromine.

The only air emissions from this process will be nitrogen. Uncondensed HBr is sent to the CaBr process unit. Liquid streams containing impurities are sent to the BOC unit.

OCP Worst Case Operating Scenario

Process Summary

The issue of simultaneous production was mentioned in previous permit applications but was never addressed in the permit. The Department and Great Lakes have reviewed all possible operating scenarios and decided which combination of products reflects the worst case emissions scenario. Permit #1077-AR-3 defined the worst case emissions from each point source at the OCP facility. These worst case emissions are based on previous permitted emissions.

Additional information on the worse case operating scenarios can be obtained from the individual product non-confidential application.

Specific Conditions - OCP Worst Case Operating Scenario

104. When one process is operating the permittee shall comply with all specific conditions for the product being produced under the appropriate product heading in the permit.

105. When multiple processes are operating the permittee shall comply with the emissions limits specified in the table on the following page.

TABLE I

OCP Plant

Worst Case Operating Scenario -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1301		Flare	0.1	8760	0.4	PM/PM$_{10}$	SIP	5
			0.1		0.4	SO_2		
			5.0		22.0	VOC		
			0.1		0.4	Methane		
			0.1		0.4	CO		
			0.1		0.4	NO_X		
			0.4		1.8	CCl_4		
			2.3		10.1	HCl		
			0.1		0.4	HBr		
1302	OCP Facility	Scrubber	3.8	8760	16.6	VOC	SIP	5
			1.7		7.4	Cl_2		
			0.5		2.2	HCl		
			2.9		12.8	Br_2		
			0.8		3.5	HBr		
			1.1		4.5	BrCl		
1303	Flash Drying	Baghouse	0.9	8760	4.0	PM/PM$_{10}$	SIP	5
1305	HCl Storage Tank	None	1.8	8760	7.9	HCl	SIP	5
1306			0.1	8760	0.4	HCl	SIP	5

OCP Plant								
Worst Case Operating Scenario -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1307	Acetic Acid Storage Tank	None	0.7	8760	3.1	VOC (Acetic Acid)	SIP	5
1309	Slurry Tank #1	None	0.1 0.1 0.1 0.1 0.1	8760	0.4 0.4 0.4 0.4 0.4	Cl_2 HCl Br_2 HBr BrCl	SIP	5
1310	Slurry Tank #2	None	0.1 0.1 0.1 0.1 0.1	8760	0.4 0.4 0.4 0.4 0.4	Cl_2 HCl Br_2 HBr BrCl	SIP	5
1311	Shipping Container Filling	None	9.4	480	2.3	VOC	SIP	5
1312	Grinding	Baghouse	1.3 0.4	4380 4380	2.9 0.9	PM/PM_{10}	SIP	5
1313	Tray Dryer	Scrubber	2.0 0.1	4380 4380	4.4 0.2	PM/PM_{10}	SIP	5

OCP Plant

Worst Case Operating Scenario -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1314	Tray Dryer	Baghouse	0.3 0.1	4380 4380	0.7 0.2	PM/PM$_{10}$	SIP	5
1315	Final	Baghouse	1.3 0.4	4380 4380	2.9 0.9	PM/PM$_{10}$	SIP	5

OCP Facility Emission Rate Summary		
Pollutant	lb/hr	ton/yr
PM/PM_{10}	5.9	17.5
SO_2	0.1	0.4
VOC	18.9	44.0
Methane	0.1	0.4
CO	0.1	0.4
NO_x	0.1	0.4
HBr	1.1	4.7
Br_2	3.1	13.6
HCl	4.9	21.4
Cl_2	1.9	8.2
BrCl	1.3	5.3
Carbon tetrachloride	0.4	1.8

Dibromodimethylhydantoin (DBDMH) Production

Process Summary

Dibromodimethylhydantoin (DBDMH) is made by brominating dimethylhydantoin (DMH). DBDMH is used as a raw material in the production of MPBz. It can also be purified and sold as a product.

There are two emission points associated with this process. Bromine fumes are controlled by a scrubber (SN-1302) which can be considered the main process vent. The final product is a solid. Particulate caused by the handling of this material are controlled by two baghouses which vent through a single stack (SN-1303). The crude product is stored in one of two tanks. These tanks are routed through SN-1302.

Specific Conditions - DBDMH Production

89. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

OCP Plant								
DBDMH Production -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1302	OCP Facility	Scrubber	2.0 0.2	8760	8.8 0.9	Br_2 HBr	SIP	5
1303	Flash Drying	Baghouse	0.4	8760	1.8	PM/PM_{10}	SIP	5
1309	Slurry Tank #1	Routed to SN-1302 during DBDMH Production						
1310	Slurry Tank #2	Routed to SN-1302 during DBDMH Production						

Bromochlorodimethylhydatoin (BCDMH) Production

Process Summary

Bromochlorodimethylhydatoin (BCDMH) is made by reacting bromine, chlorine, and dimethylhydantoin (DMH). The reaction product is washed, dried, and packaged for shipment.

The same emission points used in the DBDMH production are used when BCDMH is manufactured. Bromine fumes are controlled by a scrubber, SN-1302. Particulates are controlled by two baghouses which vent through a single stack, SN-1303. The crude product is stored in one of two tanks. The vents from these tanks are designated as SN-1309 and SN-1310.

Specific Conditions - BCDMH Production

90. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

OCP Plant								
BCDMH Production -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1302	OCP Facility	Scrubber	1.7 1.0	8760	7.4 4.4	Cl_2 BrCl	SIP	5
1303	Flash Drying	Baghouse	0.6	8760	2.6	PM/PM_{10}	SIP	5
1309	Slurry Tank #1	None	0.1 0.1 0.1 0.1 0.1	8760	0.4 0.4 0.4 0.4 0.4	Br_2 HBr BrCl HCl Cl_2	SIP	5
1310	Slurry Tank #2	None	0.1 0.1 0.1 0.1 0.1	8760	0.4 0.4 0.4 0.4 0.4	Br_2 HBr BrCl HCl Cl_2	SIP	5

Dichlorodimethylhydantoin (DCDMH) Production

Process Summary

Dichlorodimethylhydantoin (DCDMH) is made by reacting chlorine, sodium hydroxide, and dimethylhydantoin (DMH) to form the DCDMH slurry. The DCDMH slurry is washed, dried, and packaged for shipment.

The same emission points used in the BCDMH Production are used when DCDMH is manufactured. Chlorine fumes are controlled by a scrubber, SN-1302. Particulates are controlled by two baghouses which vent through a single stack, SN-1303. The crude product is stored in one of two tanks. The vents from these tanks are designated as SN-1309 and SN-1310.

Specific Conditions - DCDMH Production

91. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

OCP Plant

DCDMH Production -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1302	OCP Facility	Scrubber	1.7 1.0 2.0 0.2	8760	7.4 4.4 8.8 0.9	Cl_2 BrCl Br_2 HBr	SIP	5
1303	Flash Drying	Baghouse	0.6	8760	2.6	PM/PM_{10}	SIP	5
1309	Slurry Tank #1	None	0.1 0.1 0.1 0.1 0.1	8760	0.4 0.4 0.4 0.4 0.4	Br_2 HBr HCl BrCl Cl_2	SIP	5
1310	Slurry Tank #2	None	0.1 0.1 0.1 0.1 0.1	8760	0.4 0.4 0.4 0.4 0.4	Br_2 HBr HCl BrCl Cl_2	SIP	5

DP-45

Process Summary

DP-45, the 2-Ethyl Hexanol (2-EH) Diester of PHT-4, is produced by reacting 2-EH with PHT-4. The reaction begins with 2-EH being transferred from storage to a heated reactor where PHT-4, soda ash, and a catalyst are added. After the reaction, the reaction mass is neutralized and purified for sale.

There are two alternate neutralization steps which can be used when DP-45 is being produced. In alternate one, the reaction mass is transferred to a neutralization tank where soda ash is added to neutralize the product. The water is vacuum stripped and the solids are filtered. In alternate two, the crude product is water washed before being neutralized.

After being neutralized, the excess 2-EH is removed in an evaporator. When alternate one is used, the purified product is filtered a final time. When alternate two is used, no final filtration is necessary.

DP-45 can be produced concurrently with DE-83 and DE-71/60F/60FS.

Specific Conditions - DP-45

92. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

OCP Plant								
DP-45 Production -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1301		Flare	0.1 0.1 0.2 0.1 0.5 0.1 0.1	8760	0.4 0.4 0.9 0.4 2.2 0.4 0.4	PM/PM_{10} SO_2 VOC Methane VOC (2-ethyl hexanol) CO NO_x	SIP	5
1302	OCP Facility	Scrubber	0.4 0.1 0.1	8760	1.8 0.4 0.4	VOC (2-ethyl hexanol) HBr Br_2	SIP	5

TCO Plant

Introduction

The TCO facility is currently permitted to manufacture tetrabromobisphenol-A (TBBPA) oligomers, bromochlorodimethylhydantoin (BCDMH), dibromodimethylhydantoin (DBDMH), phenyl chloroformate, ammonium bromide, sodium bromide, potassium bromide, HBr solutions, and heavy fluids.

In addition to the products listed above, this permit will allow Great Lakes to produce high purity salts, namely, sodium, potassium, and ammonium bromide, at the TCO facility. When high purity salts are being produced, neither BCDMH or DBDMH can be made.

Tetrabromobisphenol-A Oligomers

Process Summary

BC-52, BC-52HP, BC-54, BC-58, and CN-1427 are made in the TCO facility by using the same basic chemical process. All compounds are tetrabromobisphenol-A (TBBPA) oligomers. The difference between the compounds is the number of TBBPA units in each molecule. For the purposes of permitting, they will be treated as one compound.

The process begins by combining TBBPA, triethylamine (TEA), and methylene chloride. These materials are transferred to a reactor where phosgene is added. After the reaction and phase separation, the product is acid washed and separated. It is then centrifuged and dried. The dryer vents to a baghouse and then to the atmosphere (SN-1413). There are two centrifuges (SN-1406 and SN-1419), a centrifuge feed tank (SN-1412), and a centrifuge wash water tank (SN-1407) that vent to the atmosphere. The acid used in the acid wash is stored in a tank which is vented to the atmosphere (SN-1409). All other process vents which contain solvents are collected in a vent header and routed through one or more condensers to methylene chloride recovery (SN-1404).

At the initiation of a batch of oligomer, phosgene is fed to the reactor. At the conclusion of the reaction, small amounts of phosgene may be added to the reactor to achieve the desired results. Phosgene will be added to the oligomer process from cylinders or from the phosgene reactor. The phosgene will be produced as needed by reacting chlorine and carbon monoxide in the vapor phase over catalyst. By producing phosgene as needed, the amount stored on site can be reduced from approximately 42,000 pounds to a maximum of approximately 20,000 pounds. All phosgene transfers are monitored by a mass flow meter and the piping system is welded to reduce the potential of fugitive emissions. Should an accidental release occur, the caustic scrubber has the capacity to absorb 2,000 pounds of phosgene or 3,200 pounds of chlorine. The caustic concentration in the scrubber is measured once each day. If the concentration falls below 5%, the caustic is replaced. The caustic scrubber was formerly designated as SN-1402 and was vented to the atmosphere. It is now vented to methylene chloride recovery.

Specific Conditions - Tetrabromobisphenol-A Oligomers

106. The permittee shall purge the phosgene reactors, and thus emit CO from the methylene chloride unit, SN-1404, no more than fifteen minutes per day.

107. During the next production run, the permittee shall measure the methylene chloride, triethylamine, carbon monoxide, hydrogen chloride, hydrogen bromide, and phosgene emissions from Methylene Chloride Recovery Unit (SN-1404) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. During the test the permittee shall measure the caustic concentration of the scrubber liquid. They shall maintain the caustic level at or above this level during subsequent operation of the scrubber. The testing shall be conducted while the production facility is being operated normally. The permittee may conduct emission testing while simultaneously sampling the caustic concentration in order to establish alternate operating parameters which can then be submitted to the Department for approval.

108. The permittee shall comply with the emission rates specified in the table on the following page.

TABLE I

TCO Plant

Tetrabromobisphenol-A Oligomers Production -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1404	Methylene Chloride Recovery Unit	Caustic Scrubber	0.9	8760	3.9	VOC (Triethylamine)	SIP	5
			0.1	8760	0.4	VOC (Phenol/PCF)		
			2.4	8760	10.5	Methylene Chloride		
			36.2	365	6.7	CO		
			0.1	8760	0.4	HCl		
			0.1	8760	0.4	HBr		
			0.1	8760	0.4	VOC (Phosgene)		
1406	Centrifuge Vent	None	0.1	8760	0.4	Methylene Chloride	SIP	5
1407	Centrifuge Wash Water Tank	None	0.1	8760	0.4	Methylene Chloride	SIP	5
1409	Acid Storage Tank	None	0.3	8760	1.4	HCl	SIP	5
1412	Centrifuge Feed Tank	None	0.1	8760	0.4	Methylene Chloride	SIP	5
1413	TCO Dryer	Baghouse	2.5	8760	11.0	PM/PM_{10}	SIP	5
			0.7		3.1	Methylene Chloride		
1419	Centrifuge Vent	None	0.1	8760	0.4	Methylene Chloride	SIP	5

BCDMH/DBDMH Production

Process Summary

Bromochlorodimethyldantoin (BCDMH) and dibromodimethyldantoin (DBDMH), are produced by a simple substitution reaction. The process begins by mixing dimethylhydantoin (DMH) with water. This mixture is fed to a reactor along with bromine or sodium bromide and sodium hydroxide. When BCDMH or DBDMH is produced, chlorine is also added. The reaction produces a slurry which is sent to a centrifuge and then to a flash dryer. After drying, the product is packed for shipment.

The centrifuge feed tank has an atmospheric vent designated as SN-1417. The centrifuge also vents to the atmosphere through SN-1414. Particulate emissions from the drying and packaging are controlled by a baghouse (SN-1403). Vent gases from the reactor and slurry tank are controlled by a scrubber (SN-1415).

Specific Conditions - BCDMH/DBDMH

109. The next time BCDMH is produced at TCO, the permittee shall measure the bromine chloride and chlorine emissions from SN-1415 in accordance with a test procedure which has been specifically approved by this Department prior to the testing. During the test the permittee shall measure the caustic concentration of the scrubber liquid. They shall maintain the caustic level at or above this level during subsequent operation of the scrubber. The testing shall be conducted while the facility is producing BCDMH. The permittee may conduct emission testing while simultaneously sampling the caustic concentration in order to establish alternate operating parameters which can then be submitted to the Department for approval.

110. The next time DBDMH is produced at TCO, the permittee shall measure the bromine emissions from SN-1415 in accordance with a test procedure which has been specifically approved by this Department prior to the testing. During the test the permittee shall measure the caustic concentration of the scrubber liquid. They shall maintain the caustic level at or above this level during subsequent operation of the scrubber. The testing shall be conducted while the facility is producing DBDMH.

111. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

TCO Plant

BCDMH Production -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1403	Dryer	Baghouse	2.2	8760	9.6	PM/PM_{10}	SIP	5
1414	Centrifuge	None	0.1 0.1	8760	0.4 0.4	HBr HCl	SIP	5
1415		Scrubber	0.7 1.1	8760	3.1 4.8	BrCl Cl_2	SIP	5
1417	Centrifuge Feed Tank	None	0.1 0.1	8760	0.4 0.4	HBr HCl	SIP	5

TABLE I

TCO Plant

DBDMH Production -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1403	Dryer	Baghouse	2.2	8760	9.6	PM/PM_{10}	SIP	5
1414	Centrifuge	None	0.1 0.1	8760	0.4 0.4	HBr Br_2	SIP	5

TCO Plant								
DBDMH Production -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1415		Scrubber	3.3	8760	14.5	Br_2	SIP	5
1417	Centrifuge Feed Tank	None	0.1 0.1	8760	0.4 0.4	HBr Br_2	SIP	5

Phenyl Chloroformate

Process Summary

Phenyl chloroformate, a raw material used in the production of BC-52HP, is formed by reacting phenol with phosgene in methylene chloride. After the reaction is complete, the crude product is transferred to a decanter where it is phase separated. It is then sent to the wash column feed tank and then the wash column. After being washed the material goes to a stripper where residual methylene chloride is removed.

Vents from the methylene chloride tanks, decanter, neutralization and extraction vessel, wash column feed tank, stripper feed tank, and stripper are controlled by methylene chloride recovery. It has been designated as SN-1404 for this process. The phosgene reactor does not vent during normal operation. In the event of an emergency, the phosgene reactor will vent to the OCP facility's caustic scrubber, SN-1402.

Phenyl chloroformate cannot be made at the same time that oligomers are being produced. Emission limits for phenyl chloroformate are included in the emission rate table for oligomer.

High Purity Salt Production

Process Summary

High purity salts, namely sodium bromide, potassium bromide, and ammonium bromide, can be made, one at a time, in the reactor used to make BCDMH/DBDMH. Production of the salts and BCDMH/DBDMH cannot occur simultaneously.

The salts are produced by reacting bromine and/or HBr with sodium hydroxide, potassium hydroxide, or ammonia. When the reaction is complete, the salt solution is transferred to a pH adjust tank and then through a filter/purification system. The solution is then loaded into tank trucks for shipment or dried and granulated and shipped as a solid.

Specific Conditions - High Purity Salt

112. The permittee shall not manufacture BCDMH/DBDMH and High Purity Salts at the same time.

113. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

TCO Plant								
High Purity Salt Production -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1401	HBr Feed Tank	None	0.1	8760	0.4	HBr	SIP	5
1403	Dryer	Baghouse	2.2	8760	9.6	PM/PM$_{10}$	SIP	5
1415		Scrubber	3.3 0.1	8760	14.5 0.4	Br_2 HBr	SIP	5
1418	pH Adjust Tank	None	0.1 0.1	8760	0.4 0.4	Br_2 HBr	SIP	5

Ammonium Bromide

Process Summary

Ammonium bromide is produced by reacting ammonia and hydrogen bromide or bromine. The reactor vessel is vented through a condenser to the facility's caustic scrubber, SN-1402.

Specific Conditions - Ammonium Bromide

114. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

TCO Plant								
Ammonium Bromide Production -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1402	Ammonium Bromide Production	Scrubber	0.7 0.7 0.1	8760	3.1 3.1 0.4	HBr Br_2 NH_3	SIP	5

* - HBr and Br_2 cannot be emitted at the same time.

Sodium or Potassium Bromide

Process Summary

Sodium bromide is produced by reacting sodium hydroxide with hydrogen bromide. Potassium bromide is produced by reacting potassium hydroxide with hydrogen bromide. The reactor vessel is vented through a condenser to the facility's caustic scrubber (SN-1402).

Specific Conditions - Sodium or Potassium Bromide

115. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

TCO Plant

Sodium or Potassium Bromide Production -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1402	Sodium or Potassium Bromide Production	Scrubber	0.7	8760	3.1	HBr	SIP	5
			0.7		3.1	Br_2		
			0.1		0.4	NH_3		

* - HBr and Br_2 cannot be emitted at the same time.

HBr Solution

Process Summary

Hydrogen bromide solution is produced by absorbing gaseous HBr with water in the brominator vessel. After the absorption is complete, water is added or removed until the desired concentration is reached. The product is then filtered and transferred to shipping or storage. The brominator is vented through a condenser to the facility's caustic scrubber (SN-1402). The vent from drumming and tank truck filling losses have been designated SN-1405.

Specific Conditions - HBr Solution

116. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

TCO Plant

HBr Solution Production -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1402	HBr Solution Production	Scrubber	0.7 0.1 0.1	8760	3.1 0.4 0.4	HBr Br_2 Hydrazine	SIP	5
1405	Drumming Vent, HBr Solution Production	None	0.1	8760	0.4	HBr	SIP	5

Heavy Fluids

Process Summary

Heavy fluids, namely calcium bromide and zinc/calcium bromide, are produced at the TCO facility. The first step of this process is the production of a calcium hydroxide or zinc oxide slurry. The slurry is then transferred to the brominator where it is reacted with hydrogen bromide. When the reaction is complete, the mixture is transferred to a tank where the pH is adjusted. The product is then filtered and then sent to storage or packaged for sale.

The brominator vessels vent to the facility's caustic scrubber, SN-1402. The adjustment tanks vent through a refrigerated condenser system , SN-1416. The HBr solution is stored in a tank which vents directly to the atmosphere, SN-1410.

Specific Conditions - Heavy Fluids

117. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

TCO Plant								
Heavy Fluids Production -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1402	TCO Facility	Scrubber	0.7	8760	3.1	HBr	SIP	5
1410	HBr Storage Tank	None	0.1	8760	0.4	HBr	SIP	5
1416	TCO Vent	Condenser	0.1	8760	0.4	HBr	SIP	5

TCO Facility Emission Rate Summary		
Pollutant	lb/hr	ton/yr
PM/PM_{10}	4.7	20.6
VOC	1.1	4.7
CO	36.2	6.7
Methylene Chloride	3.5	15.2
HBr	1.6	6.7
Br_2	4.3	18.8
HCl	0.6	2.6
Cl_2	1.1	4.8
BrCl	0.7	3.1
NH_3	0.1	0.4
Hydrazine	0.1	0.4

Packaging & Shipping Area

Introduction

Many of the products produced at the El Dorado Plant are shipped in drums, cylinders, or other specialized containers. These containers are emptied, cleaned, repaired, and filled in the packaging and shipping facility. The packaging and shipping facility is divided into two areas known at the plant as the "Central Warehouse Area" and "Dock 1".

Dock 1 is used to fill containers with bromine, bromine chloride, and to drum EDB. All other activities take place at the central warehouse area.

Methyl Bromide Cylinder Recovery

Process Summary

Great Lakes ships some of the methyl bromide it produces in specially designed cylinders. When the customer is finished with them, these cylinders are returned to Great Lakes for recycling. (Rail cars, portable tanks, ISO's, and other bulk containers are filled with methyl bromide at the fine chemicals plant. Vapors from this filling operation are vented to the BRU. When the BRU is down, the vapors are vented to the atmosphere through SN-1502. Conditions relating to this venting can be found in the fine chemicals and BRU section of this permit.)

The first step in the recycling process is to empty the cylinders and depressurize them. After being depressurized, the cylinders are placed in a hot water bath to remove additional MeBr. Vapors generated during these operations are sent to a specially designed vessel. This vessel is normally vented to the BRU; when the BRU is down it is vented through the main building stack, SN-1502 (also known as the "blue stack").

Some of the empty cylinders are steam cleaned before being refilled. Vapors from the cleaning operation vent to the atmosphere as SN-1507. All the cylinders are buffed to remove old labels and loose paint and some are grit blasted. Dust from the grit blasting is controlled by a cartridge filter, SN-1511. The cylinders are then repainted before being filled. The vent from the painting process is SN-1509.

Specific Conditions - Methyl Bromide Cylinder Recovery

118. The permittee shall use no more than 2,500 gallons (as applied) per year and 35 gallons (as applied) per eight hours, of solvent based paint when painting cylinders. This paint shall contain no more than 5.6 pounds of VOC per gallon of paint as applied. The permittee shall keep records on the amount of paint (and solvents if any) used at this facility, and the content of this paint. These records shall be used to determine compliance with this condition and shall be available at the plant for inspection.

119. If the BRU is out of service more than 1,314 hours per year (15%), then any further downtime will require that the permittee no longer empty, depressurize, clean, or otherwise vent methyl bromide cylinders. These operations may not resume until the BRU is back in operation.

120. The total volume (internal) of all cylinders cleaned at this facility shall be no more than 7,000 cubic feet per week. Compliance with this condition shall be verified by maintaining weekly records of the total volume of cylinders cleaned. These records shall be kept on site and shall be made available to Department personnel upon request.

121. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Packaging & Shipping Area								
Methyl Bromide Cylinder Recovery -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1501	MeBr Cylinder Cleaning	Scrubber	13.2 0.5 0.5	2420	16.0 0.6 0.6	VOC (MeBr) VOC (Chloropicrin) VOC (Naphta)	SIP	5
1502	Methyl Bromide Cylinder Recovery Contribution to Main Building Vent "Blue Stack"	BRU Unit	-- -- --	*	9.9 0.2 0.1	VOC (MeBr) VOC (Chloropicrin) VOC (Naphta)	SIP	5
1507	Steam Cleaning of MeBr Cylinders	None	5.6 0.3	2420	6.8 0.4	VOC (MeBr) VOC (Chloropicrin)	SIP	5
1509	Cylinder Painting	None	24.5	1335	7.0	VOC	SIP	5
1511	Methyl Bromide Cylinder - Grit Blasting	None	0.3	8760	1.3	PM/PM_{10}	SIP	5

* - Emissions from this source are vented to the BRU. See specific condition #119 for details.

Cylinder Filling

Process Summary

Methyl bromide, chloropicrin, methyl bromide/chloropicrin blends, and methyl bromide/chloropicrin/naphtha blends are packaged in a variety of cylinder sizes. The blends can be mixed in storage tanks or in the cylinders during filling.

Most of the cylinders are shipped under pressure; therefore, they are not vented during filling. However, some cylinders are shipped as a low pressure product. These cylinders are vented to the BRU during filling.

Specific Conditions - Cylinder Filling

122. If the BRU is out of service more than 1,314 hours per year (15%), then any further downtime will require that the permittee no longer fill methyl bromide cylinders. These operations may not resume until the BRU is back in operation.

123. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Packaging & Shipping Area

Cylinder Filling -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1502	MeBr Cylinder Filling Contribution to Main Building Vent "Blue Stack"	BRU Unit	--	*	0.9	VOC (MeBr)	SIP	5
			--		0.1	VOC (Chloropicrin)		
			--		0.1	VOC (Naphta)		

* - Emissions from this source are vented to the BRU. See specific condition # 122 for details.

Bromine Drum Recovery

Process Summary

Some of the Bromine sold by Great Lakes is shipped in drums. These drums are returned to Great Lakes, emptied, cleaned (with water), and dried. Bromine vapors generated during these operations are collected and routed to the caustic scrubber, SN-1501.

Specific Conditions - Bromine Drum Recovery

124. The permittee may emit Br_2 or HBr from SN-1501 provided the total emissions do not exceed 0.4 pounds per hour.

125. On or before December 31, 1993, and annually thereafter, the permittee shall measure the bromine and hydrogen bromide emissions from bromine drum recovery (SN-1501) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. This test shall be conducted while the bromine drum recovery process is being operated normally.

126. At least once every twelve hours on those days SN-1501 is used, the permittee shall monitor the NaOH concentration of the scrubbing solution used in the caustic scrubber, SN-1501. The NaOH concentration of this solution shall not be allowed to drop below 5% by weight. The permittee shall keep records of these analyses in accordance with general condition #4. The permittee may conduct emission testing while simultaneously sampling the caustic concentration in order to establish alternate operating approval.

127. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Packaging & Shipping Area								
Bromine Drum Recovery -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1501	Bromine Drum Recovery	Scrubber	0.2 0.2	8760	0.9 0.9	Br_2 HBr	SIP	5

Product Drumming

Process Summary

Liquid products produced throughout the El Dorado Plant are drummed at the packaging and shipping area. These products include $CaBr_2$ and $Zn/CaBr_2$ from the Decabromodiphenyl Oxide plant; Ethylene Dibromide (EDB) from the Bromine department; Ethyl Bromide, Ammonium Bromide solution, DE-60F Special, Zinc Bromide, and 48% and 62% HBr from the Fine Chemicals Unit and EDB blends. Permit #1077-AR-6 allows GLCC to drum Alkyl Bromides at the packaging and shipping unit.

There are four air emission points at this facility. SN-1502 and SN-1504 vents are used while products are being blended and/or drummed. SN-1505 and SN-1506 are vented to the atmosphere or they are routed to the blue stack (SN-1502). These tanks are used to store materials for producing blends, or for the blends themselves. The emission rates listed in the emission rate table are total emissions.

Specific Conditions - Product Drumming

128. The permittee shall not operate SN-1502 more than 1000 hours per ~~twelve consecutive months~~ calendar year. For any time when the source is not operated, the record will be updated accordingly. These records shall be kept on site and provided to Department personnel upon request.

129. Because annual emissions are directly related to throughput for SN-1504, the permittee shall limit the throughput at the drum loading facility to the following amounts:

Product	Product Drumming Limit - maximum lots per ~~twelve consecutive months~~ calendar year
HBr (48% and 62%)	4,000
EtBr	4,000
EDB and EDB Blends	4,000

Product	Product Drumming Limit - maximum lots per ~~twelve consecutive months~~ calendar year
Naptha	4,000
Alkyl Bromides	4,000
Heavy Fluids	6,500
NH_4Br	~~3,500~~ 4,000
DE 60 FS	~~3,500~~ 4,000

Compliance with this condition shall be verified by maintaining monthly records of the amount of each product drummed. These records shall be kept on site and provided to Department personnel upon request.

130. The permittee shall comply with the emission limits specified in the table on the following page. The pollutants emitted from product drumming operation depend on what is being drummed; therefore, the short term (lb/hr) emissions from different sources are not additive.

131. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Packaging & Shipping Area

Product Drumming -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1502	Product Drumming Filling Loss Contribution to Main Building Vent "Blue Stack"	None	0.2	1000	0.1	VOC (EDB)	SIP	5
			0.1		0.1	VOC (Naptha)		
			0.2		0.1	VOC (Chloropicrin)		
			0.1		0.1	other VOC		
1504	Product Drumming Vent, Roof Blower (Some or all may be routed to Main Building Vent)	None	5.5	8760	2.8	VOC (Ethyl Bromide)	SIP	5
			0.2		0.1	VOC (EDB)		
			3.7		1.9	VOC (Alkyl Bromide)		
			0.1		0.1	other VOC		
			0.5		0.3	HBr		
			0.1		0.1	NH_3		
		SN-1504 emissions may be routed to SN-1502						

Packaging & Shipping Area								
Product Drumming -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1505	EDB Storage	None	1.4 0.4 2.3 0.1	1000	0.7 0.2 1.2 0.1	VOC (EDB) VOC (Naptha) VOC (Chloropicrin) other VOC	SIP	5
1506	Agricultural Blend Tank	None	1.4 0.4 2.3 0.1	1000	0.7 0.2 1.2 0.1	VOC (EDB) VOC (Naptha) VOC (Chloropicrin) other VOC	SIP	5

Methyl Bromide Canning & Can Recovery

Process Summary

Great Lakes fills 1 and 1½ pound cans with pure methyl bromide (MeBr) or with MeBr/Chloropicrin mixtures. The cans are filled and closed in a automatic canning machine which is enclosed and vents to the atmosphere (SN-1503). The cans then pass through a hot water bath where they are checked for leaks. The hot water bath is vented to atmosphere (SN-1502).

As the cans leave the water bath, a small percentage are removed and stored for a period of time so that they can be observed for leaks or other problems. After the testing period is over, the cans are sent to the MeBr recovery chamber. In addition, Great Lakes accepts returns from customers; these are sent to the recovery chamber as well. In the recovery chamber the cans are punctured and the contents are allowed to drain into a refrigerated holding tank. The entire chamber is then vented to the atmosphere (SN-1502).

Specific Conditions - MeBr Canning & Can Recovery

132. The permittee shall open for recovery or testing no more than 210 cans per hour and no more than 300,000 cans per ~~twelve consecutive months~~ calendar year.

133. The canning rate at this facility shall not exceed 12,500 pounds per hour and 7 million pounds per ~~twelve consecutive months~~ calendar year.

134. The permittee shall keep records which will enable the Department to determine compliance with conditions #132 and #133.

135. On or before December 31, 1993, and biennial thereafter, the permittee shall measure the methyl bromide and chloropicrin emissions from methyl bromide canning water bath (SN-1502) and methyl bromide canner vent (SN-1503) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. This testing shall be conducted while the methyl bromide canning and can recovery facility is being operated normally.

136. ~~The permittee shall not operate SN-1503 more than 1250 hours per twelve consecutive months. If he BRU is out of service more than 200 hours per year (16%), then any further downtime will require that the permittee no longer fill methyl bromide cans.~~ The

permittee shall not operate SN-1503 more than 200 hours per calender year (16%) while the BRU is out of service, nor shall SN-1503 be operated more than a total of 1250 hours per calender year. These operations may not resume until the BRU is back in operation. For any time when the source is not operated, the record will be updated accordingly. These records shall be kept on site and provided to Department personnel upon request.

137. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Packaging & Shipping Area

Methyl Bromide Canning & Can Recovery -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1502	Methyl Bromide Can Recovery & Water Bath Contribution to Main Building Vent "Blue Stack"	None	13.4 0.3	1250	8.4 0.2	VOC (MeBr) VOC (Chloropicrin)	SIP	5
1503	Canning Machine Vent	BRU Unit	29.7	1050	15.6	VOC (MeBr)	SIP	5
			0.2		0.2	VOC (Chloropicrin)		
		None	61.0	200	6.1	VOC (MeBr)		
			0.6		0.1	VOC (Chloropicrin)		

Bulk Container Packaging

Process Summary

Bulk shipments of methyl bromide, methyl bromide/chloropicrin, and methyl bromide/chloropicrin/naphtha are loaded at the Fine Chemicals Facility and at Packaging and Shipping. All rail cars are loaded at Fine Chemicals. Portable tanks and ISOs are also loaded at both places. The bulk containers are normally vented to the BRU during filling; however, when the BRU is down Great Lakes would like to vent these containers through SN-1502 to the atmosphere, releasing 75 pounds of methyl bromide each hour this occurs.

Specific Conditions - Bulk Container Packaging

138. If the BRU is out of service more than 1,314 hours per year (15%), then any further downtime will require that the permittee shall not begin the loading of any bulk shipping container, including but not limited to rail cars, ISO's and portable tanks.

MeBr Storage

Process Summary

Great Lakes has three storage tanks which are used to store methyl bromide, methyl bromide/chloropicrin, and methyl bromide/chloropicrin/naphtha mixtures. Each of these storage tanks vent through a refrigerated condenser and then to the BRU. It is physically possible to vent these tanks to the building stack, SN-1502.

Specific Conditions - MeBr Storage

139. If the BRU is out of service more than 1,314 hours per year (15%), then any further downtime will require that the permittee shall not transfer any material into the methyl bromide, methyl bromide/chloropicrin, and methyl bromide/chloropicrin/naptha storage

tanks mentioned in the Packaging and Shipping section of the application. Tank filling may not resume until the BRU is back in operation.

Dock 1 Packaging

Process Summary

The Dock 1 facility is used to drum EDB and to fill containers with bromine and bromine chloride. A bromine storage tank is associated with the filling process. All vents from this process are sent to a caustic scrubber, SN-1551.

Specific Conditions - Dock 1 Packaging

140. Great Lakes shall test the scrubber exhaust (SN-1551), when packaging bromine chloride at Dock 1. The test shall be conducted in accordance with a test procedure that this Department has approved prior to the testing.

141. At least once every twelve hours on those days SN-1551 is used, the permittee shall monitor the NaOH concentration of the scrubbing solution used in the caustic scrubber. The NaOH concentration of this solution shall not be allowed to drop below 5% by weight. The permittee shall keep records of these analyses in accordance with general condition #4.

142. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Packaging & Shipping Area								
Dock 1 Packaging -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1551	Dock 1 Packaging	Scrubber	0.3 0.3 1.0 0.1	8760	1.3 1.3 4.4 0.4	Br_2 VOC (EDB) BrCl Cl_2	SIP	5

Gasoline Storage

A gasoline storage tank is located in the packaging and shipping area. The tank vents directly to the atmosphere (SN-1510). The gasoline is used to fuel plant vehicles.

Specific Conditions - Gasoline Storage

143. The gasoline storage tank shall emit no more than 1.3 pounds of VOC (gasoline fumes) per hour.

Packaging & Shipping Worst Case Operating Scenario

The issue of simultaneous production was mentioned in previous permit applications but was never addressed in the permit. The Department and Great Lakes has reviewed all possible operating scenarios and decided which combination of products reflects the worst case emissions scenario. Permit #1077-AR-3 is defining the worst case emissions from each point source at the Packaging and Shipping facility. These worst case emissions are based on previous permitted emissions.

Additional information on the worst case operating scenarios can be obtained from the individual product non-confidential application.

Specific Conditions - Packaging and Shipping Worst Case Operating Scenario

144. The permittee shall comply with all specific conditions for the product being produced under the appropriate product heading in the permit.

145. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Packaging & Shipping Area

Worst Case Operating Scenario -- Allowable Emission Rates

SN	Description	Control	lb/hr	ton/yr	Pollutant	Regulation	%Opacity
1501	Bromine Drum Cleaning and Methyl Bromide Cylinder Recovery	Scrubber	14.2 0.2 0.2	17.2 0.9 0.9	VOC Br_2 HBr	SIP	5
1502	Main Building Vent "Blue Vent"	None	188.2 0.5 0.1	44.2 0.3 0.1	VOC HBr NH_3	SIP	5
1503	Canning Machine Vent	None	61.6	22.0	VOC	SIP	5
1504	Product Drumming Roof Vent	None	9.5 0.5 0.1	4.9 0.3 0.1	VOC HBr NH_3	SIP	5
1505	Product Drumming Blend Tank	None	4.2	2.2	VOC	SIP	5
1506	Product Drumming Blend Tank	None	4.2	2.2	VOC	SIP	5
1507	Methyl Bromide Cylinder Steam Cleaning	None	5.9	7.2	VOC	SIP	5

Packaging & Shipping Area							
Worst Case Operating Scenario -- Allowable Emission Rates							
SN	Description	Control	lb/hr	ton/yr	Pollutant	Regulation	%Opacity
1509	Methyl Bromide Cylinder Painting	None	24.5	7.0	VOC	SIP	5
1510	Gasoline Storage Tank	None	1.3	1.3	VOC	SIP	5
1511	Methyl Bromide Cylinder Grit Blasting	None	0.3	1.3	PM_{10}	SIP	5
1551	Dock 1 Packing	Scrubber	0.3 0.1 0.3 1.0	1.3 0.4 1.3 4.4	VOC (EDB) Cl_2 Br_2 BrCl	SIP	5

Packaging & Shipping Facility Emission Rate Summary		
Pollutant	lb/hr	ton/yr
PM/PM_{10}	0.3	1.3
VOC	313.9	109.5
HBr	1.2	1.5
Br_2	0.5	2.2
Cl_2	0.1	0.4
BrCl	1.0	4.4
NH_3	0.2	0.2

Process Water Treatment Plant

Process Summary

The Process Water Treatment Plant treats process waste water from specific process areas, landfill leachate, and storm water runoff. The water to be treated is collected and mixed. After mixing, the pH is neutralized by adding caustic, ammonia, sulfuric acid, NaHS, or hydrochloric acid. The pH of the mixture is maintained between 5 and 9.

After the initial neutralization, the water flows into a treatment basin, where sodium salt is added for corrosion control and the pH is readjusted if necessary. Next the water is sent to the equalization basin which serves as a surge tank for the clarifier.

In the clarifier, solids settle to the bottom and clear water flows off the top to the filter feed tank. After filtration, the treated water is deep-well injected.

The only emission point from this process will be the hydrochloric acid storage tank, SN-201. This tank is equipped with a packed scrubber. This treatment plant is designed for the neutralization and filtration of waste water. It is not designed to remove organic compounds from the waste water. No VOC emissions are being permitted at this unit.

Specific Conditions - Process Water Treatment Plant

146. The permittee shall only treat process waste water from the following process units:

(1) Fine Chemicals
(2) NaHS
(3) TBBPA
(4) BOC
(5) HBr/$CaBr_2$
(6) OCP
(7) TCO
(8) Packaging and Shipping
(9) Sanitary Landfill Leachate
(10) North/South Landfill Leachate
(11) Storm Water
(12) West Side Sump

(13) GWTP

147. The permittee shall operate the packed-column scrubber, SN-201, whenever hydrochloric acid is present at this facility.

148. No waste stream routed to the PWTP shall contain a organic concentration greater than the solubility of that organic in water. The permittee shall sample the waste water streams listed in specific condition #140 at least once per month in order to verify that the waste stream analysis is meeting expectations and to specifically determine that any VOC in the waste water are soluble.

149. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Process Water Treatment Plant								
PWTP -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
201	HCl Storage Tank	Scrubber	0.1[1]	8760	0.4	HCl	SIP	5

[1] - SN-201 was tested for Chlorine in October of 93 and the highest measurement was 0.001 pounds per hour.

Process Water Treatment Facility
Emission Rate Summary

Pollutant	lb/hr	ton/yr
HCl	0.1	0.4

Ground Water Treatment Plant

Process Summary

Groundwater from the recovery wells is filtered and collected in surge tanks. It is filtered again and transferred to a pH adjust tank, where it is acidified to prevent precipitation of solids. The water is then passed through granulated activated carbon bed(s) to remove organic contaminants. The treated groundwater is collected in a surge tank. At some point in the future, organics may be steam-stripped from the groundwater and recovered prior to passing the groundwater through the carbon beds.

Additional ammonia may be added to the collection tank for further pH adjustment. The groundwater is then transferred from the collection tank to the Process Water Treatment Plant for additional clarification and/or pH adjustment prior to deep well injection.

The control of air emissions will be achieved with a vent header system to collect fumes and breathing losses. The collected vapors will pass through a scrubbing jet, a packed scrubber, and a carbon absorber before being vented to the atmosphere (SN-1601).

Specific Conditions - Ground Water Treatment Plant

150. The permittee shall treat no more than 700 gpm of waste water.

151. On or before December 31, 1993, and annually thereafter, the permittee shall measure the HBr, HCl, and VOC from Ground Water Treatment Unit Exhaust (SN-1601) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. This testing shall be done while the GWTP is operating normally.

152. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Ground Water Treatment Plant

GWTP -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1601	Ground Water Treatment Plant	Condenser/ Carbon Absorber	1.2	8760	5.3	Total VOC	SIP	5
			0.1		0.4	HBr		
			0.1		0.4	HCl		

Ground Water Treatment Facility Emission Rate Summary		
Pollutant	lb/hr	ton/yr
VOC	1.2	5.3
HBr	0.1	0.4
HCl	0.1	0.4

Leachate Treatment Unit

Process Summary

Leachates from the North/South Landfill and from Cell #1 of the hazardous waste landfill are combined in a header and piped to a filter and surge tank (SN-1701) at the Leachate Treatment Plant (LTP). Additional storm water and washdown water is collected in a containment sump and piped to this tank. From the surge tank, the leachates are pumped to the Air Stripping Column where volatile organic compounds (VOCs) are removed.

"Stripped" leachates are again filtered and collected in the Ozone Reaction Feed Tank (SN-1702). Additional contaminants are then removed by oxidation in the Ozone Reaction System (SN-1703). Contaminants in the presence of ozone and ultraviolet radiation react to form carbon dioxide and water.

Decontaminated leachates are transferred from the ozone reaction system through a final filter for removal of precipitates. It is then passed through a granulated activated carbon (GAC) "polishing" bed and into the treated leachate surge tank (SN-1704). The treated leachate is sampled for contaminants and deep-well injected or returned to the beginning of the process for further treatment.

Specific Conditions - Leachate Treatment Plant

153. The permittee shall treat no more than 20 gpm of leachates.

154. Within the time limits specified by general condition 5, the permittee shall measure the methanol and VOC from the Leachate Treatment Plant exhaust (SN-1702) in accordance with a test procedure which has been specifically approved by this Department prior to the testing. This testing shall be done while LTP is operating normally.

155. On or before August 31, 1996, the permittee shall measure the volatile organic compounds (VOC), bromine (Br_2), chlorine (Cl_2), hydrogen bromine (HBr), and hydrogen chloride (HCl) emissions from the ozone reaction system (SN-1703) in accordance with a test procedure which has been specifically approved by this Department prior to the testing.

156. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Leachate Treatment Plant								
LTP -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
1701	Leachate Pretreatment Surge Tank	None	0.1	8760	0.4	VOC	SIP	5
1702	Air Stripping Column	None	0.9 0.2	8760	4.0 0.9	VOC (Methanol) Other VOC	SIP	5
1703	Ozone Reaction System	Scrubber/ Ozone Destruction Unit	0.5 0.3 0.2 0.1 0.1	8760	2.2 1.4 0.9 0.4 0.4	VOC (Methanol) Br_2 Cl_2 HBr HCl	SIP	5
1704	Treated Leachate Surge Tank	None	0.1	8760	0.4	VOC	SIP	5
1705	Ozone Reaction Surge Tank	None	0.1	8760	0.4	VOC	SIP	5

Leachate Treatment Facility Emission Rate Summary		
Pollutant	lb/hr	ton/yr
VOC	1.9	8.3
Br_2	0.3	1.4
Cl_2	0.2	0.9
HBr	0.1	0.4
HCl	0.1	0.4

HALAR/Teflon Coating Unit

Process Summary

HALAR/Teflon Coating Plant

Great Lakes Chemical Corporation operates a natural gas-fired oven to apply HALAR copolymer to various metal equipment used in the manufacturing process. In addition, the oven is also used to apply Teflon coatings manufactured by Du Pont. During coating application, the temperature in the oven is below the decomposition temperature of the polymer resulting in minimal emissions.

Occasionally, old Halar and Teflon coatings need to be removed prior to re-coating. In order to remove the coatings, the equipment is heated above the decomposition temperature of the polymers, emitting small quantities of HCl and HF gas (SN-701). Flue gas from natural gas combustion also exits the oven through this vent.

Specific Conditions - HALAR/Teflon Coating Plant

157. Coatings at this facility shall not exceed 12 c-lots per twelve consecutive months. Compliance with this condition shall be verified by maintaining monthly records of the amount of coatings. These records shall be kept on site and provided to Department personnel upon request.

158. The permittee shall not operate the coating removal more than 960 hours per twelve consecutive months. Compliance with this condition shall be verified by maintaining monthly records of the hours per year of coating removal. These records shall be kept on site and provided to Department personnel upon request.

159. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

HALAR/Teflon Coating Plant

HALAR/Teflon -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
701	HALAR/Teflon Coating Application and Removed Natural Gas (2.0 MMBtu/hr)	None	1.3	960	1.1	HCl	SIP	5
			0.1	7800				
			4.0	960	2.4	HF		
			0.1	7800				
			0.1	8760	0.5	PM/PM_{10}		
			0.1		0.5	SO_2		
			0.1		0.5	VOC		
			0.1		0.5	CO		
			0.2		0.9	NO_X		
			0.1		0.5	Methane		

HALAR/Teflon Coating Facility Emission Rate Summary		
Pollutant	lb/hr	ton/yr
PM/PM_{10}	0.1	0.5
SO_2	0.1	0.5
VOC	0.1	0.5
CO	0.1	0.5
NO_X	0.2	0.9
Methane	0.1	0.5
HCl	1.4	1.1
HF	4.1	2.4

Miscellaneous Process Units

Nitrogen Plant

During the operation of any chemical plant, significant quantities of nitrogen are required to purge equipment, blanket tanks, etc. Rather than purchase nitrogen, Great Lakes operates a nitrogen production facility.

The current facility was installed in 1988 and is known as a "pressure-swing absorption unit." It works by passing compressed air through a molecular sieve which absorbs the oxygen leaving nitrogen.

The present nitrogen plant emits no pollutants to the atmosphere. It replaced an inert gas generator which emitted 10.7 tons per year of carbon monoxide.

Methanol Refrigeration System

Two methanol storage tanks operate independently of the manufacturing processes. Methanol from these tanks is the non-contact refrigerant in a system that supplies coolant to vent condensers at both Fine Chemicals and Packaging and Shipping. The methanol continuously circulates through the refrigeration system independently of the manufacturing process. The tanks vent small amounts of methanol to the atmosphere (SN-616 and SN-654).

Specific Conditions - Methanol Refrigeration System

160. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Miscellaneous Process Units

Methanol -- Allowable Emission Rates

SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
616	Methanol Storage Tank #1	Condenser	0.1	8760	0.4	VOC (Methanol)	SIP	5
654	Methanol Storage Tank #2	Condenser	0.1	8760	0.4	VOC (Methanol)	SIP	5

Single Stage Vacuum Jet

The single vacuum jet (SN-656) is used to evacuate equipment containing methyl bromide prior to maintenance work. Emissions from this source will vary depending on the equipment to which it is connected but they will not exceed 11.2 tons per year.

Specific Conditions - Single Stage Vacuum Jet

161. The permittee shall comply with the emission limits specified in the table on the following page.

TABLE I

Miscellaneous Process Units								
Methanol -- Allowable Emission Rates								
SN	Description	Control	lb/hr	hr/yr	ton/yr	Pollutant	Regulation	%Opacity
656	Single Stage Vacuum Jet	None	131.2[1]	*	11.2	VOC (Methyl Bromide)	SIP	5

1. - The single stage vaccum jet is used for maintenance work and the emissions will vary depending on the equipment to which it is connected. The emissions shall not exceed 131.2 pounds per hour and 11.2 tons per year of methyl bromide.

Miscellaneous Process Units Emission Rate Summary		
Pollutant	lb/hr	ton/yr
VOC	131.4	12.0

ATTACHMENT A

LOCATION MAP

ATTACHMENT B

CALCULATIONS

The calculations were accepted as submitted in the application. The reviewing engineer made no changes to the calculations. Other than the emission limits were rounded to the nearest tenth according to Department's policy. The calculations are on file at the Department's Little Rock office.

ATTACHMENT C

PLOT PLAN

The plot plans are on file at the Department's Little Rock office. Attaching the plot plans to the permit is impractical due to their size.

Attachment D

Subpart VV-Standards of Performance for Equipment Leaks of VOC in the Synthetic Organic Chemicals Manufacturing Industry

Source: 48 FR 48335, Oct. 18, 1983, unless otherwise noted.

§ 60.480 Applicability and designation of affected facility.

(a)(1) The provisions of this subpart apply to affected facilities in the synthetic organic chemicals manufacturing industry.

(2) The group of all equipment (defined in § 60.481) within a process unit is an affected facility.

(b) Any affected facility under paragraph (a) of this section that commences construction or modification after January 5, 1981, shall be subject to the requirements of this subpart.

(c) Addition or replacement of equipment for the purpose of process improvement which is accomplished without a capital expenditure shall not by itself be considered a modification under this subpart.

(d)(1) If an owner or operator applies for one or more of the exemptions in this paragraph, then the owner or operator shall maintain records as required in § 60.486(i).

(2) Any affected facility that has the design capacity to produce less than 1,000 Mg/yr is exempt from § 60.482.

(3) If an affected facility produces heavy liquid chemicals only from heavy liquid feed or raw materials, then it is exempt from §60.482.

(4) Any affected facility that produces beverage alcohol is exempt from § 60.482.

(5) Any affected facility that has no equipment in VOC service is exempt from §60.482.

[48 FR 48335, Oct. 18, 1983, as amended at 49 FR 22607, May 30, 1984]

§ 60.481 Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Act or in subpart A of Part 60, and the following terms shall have the specific meanings given them.

Capital expenditure means, in addition to the definition in 40 CFR 60.2, an expenditure for a physical or operational change to an existing facility that:

(a) Exceeds P, the product of the facility's replacement cost, R, and an adjusted annual asset guideline repair allowance, A, as reflected by the following equation: $P = R \times A$, where

(1) The adjusted annual asset guideline repair allowance, A, is the product of the percent of the replacement cost, Y, and the applicable basic annual asset guideline repair allowance, B, as reflected by the following equation:

$$A = Y \times (B \div 100);$$

(2) The percent Y is determined from the following equation:

$Y = 1.0 - 0.575 \log X$, where X is 1982 minus the year of construction; and

(3) The applicable basic annual asset guideline repair allowance, B, is selected from the following table consistent with the applicable subpart:

Attachment D

Table for Determining Applicable for B	
Subpart applicable to facility	Value of B to be used in equation
VV	12.5
DDD	12.5
GGG	7.0
KKK	4.5

Closed vent system means a system that is not open to the atmosphere and that is composed of piping, connections, and, if necessary, flow inducing devices that transport gas or vapor from a piece or pieces of equipment to a control device.

Connector means flanged, screwed, welded, or other joined fittings used to connect two pipe lines or a pipe line and a piece of process equipment.

Control device means an enclosed combustion device, vapor recovery system, or flare.

Distance piece means an open or enclosed casing through which the piston rod travels, separating the compressor cylinder from the crankcase.

Double block and bleed system means two block valves connected in series with a bleed valve or line that can vent the line between the two block valves.

Equipment means each pump, compressor, pressure relief device, sampling connection system, open-ended valve or line, valve, and flange or other connector in VOC service and any devices or systems required by this subpart.

First attempt at repair means to take rapid action for the purpose of stopping or reducing leakage of organic material to atmosphere using best practices.

In gas/vapor service means that the piece of equipment contains process fluid that is in the gaseous state at operating conditions.

In heavy liquid service means that the piece of equipment is not in gas/vapor service or in light liquid service.

In light liquid service means that the piece of equipment contains a liquid that meets the conditions specified in § 60.485(e).

In-situ sampling systems means nonextractive samplers or in-line samplers.

In vacuum service means that equipment is operating at an internal pressure which is at least 5 kilopascals (kPa) below ambient pressure.

In VOC service means that the piece of equipment contains or contacts a process fluid that is at least 10 percent VOC by weight. (The provisions of § 60.485(d) specify how to determine that a piece of equipment is not in VOC service.)

Liquids dripping means any visible leakage from the seal including spraying, misting, clouding, and ice formation.

Open-ended valve or line means any valve, except safety relief valves, having one side of the valve seat in contact with process fluid and one side open to the atmosphere, either directly or through open piping.

Pressure release means the emission of materials resulting from system pressure being greater than set pressure of the pressure relief device.

Process improvement means routine changes made for safety and occupational health requirements, for energy savings, for better utility, for ease of maintenance and operation, for correction of design deficiencies, for bottleneck removal, for changing product requirements, or for environmental control.

Process unit means components assembled to produce, as intermediate or final products, one or more of the chemicals listed in §60.489 of this part. A process unit can operate independently if supplied with sufficient feed or raw materials and sufficient storage facilities for the product.

Attachment D

Process unit shutdown means a work practice or operational procedure that stops production from a process unit or part of a process unit. An unscheduled work practice or operational procedure that stops production from a process unit or part of a process unit for less than 24 hours is not a process unit shutdown. The use of spare equipment and technically feasible bypassing of equipment without stopping production are not process unit shutdowns.

Quarter means a 3-month period; the first quarter concludes on the last day of the last full month during the 180 days following initial startup.

Repaired means that equipment is adjusted, or otherwise altered, in order to eliminate a leak as indicated by one of the following: an instrument reading or 10,000 ppm or greater, indication of liquids dripping, or indication by a sensor that a seal or barrier fluid system has failed.

Replacement cost means the capital needed to purchase all the depreciable components in a facility.

Sensor means a device that measures a physical quantity or the change in a physical quantity such as temperature, pressure, flow rate, pH, or liquid level.

Synthetic organic chemicals manufacturing industry means the industry that produces, as intermediates or final products, one or more of the chemicals listed in § 60.489.

Volatile organic compounds or VOC means, for the purposes of this subpart, any reactive organic compounds as defined in

§ 60.2 Definitions.

[48 FR 48335, Oct. 18, 1983, as amended at 49 FR 22607, May 30, 1984; 49 FR 26738, June 29, 1984]

§ 60.482-1 Standards: General.

(a) Each owner or operator subject to the provisions of this subpart shall demonstrate compliance with the requirements of §§ 60.482-1 to 60.482-10 for all equipment within 180 days of initial startup.

(b) Compliance with §§ 60.482-1 to 60.482-10 will be determined by review of records and reports, review of performance test results, and inspection using the methods and procedures specified in §60.485.

(c)(1) An owner or operator may request a determination of equivalence of a means of emission limitation to the requirements of §§ 60.482-2, 60.482-3, 60.482-5, 60.482-6, 60.482-7, 60.482-8, and 60.482-10 as provided in § 60.484.

(2) If the Administrator makes a determination that a means of emission limitation is at least equivalent to the requirements of §§ 60.482-2, 60.482-3, 60.482-5, 60.482-6, 60.482-7, 60.482-8, or 60.482-10, an owner or operator shall comply with the requirements of that determination.

(d) Equipment that is in vacuum service is excluded from the requirements of §§ 60.482-2 to 60.482-10 if it is identified as required in § 60.486(e)(5).

[48 FR 48335, Oct. 18, 1983, as amended at 49 FR 22608, May 30, 1984]

§ 60.482-2 Standards: Pumps in light liquid service.

(a)(1) Each pump in light liquid service shall be monitored monthly to detect leaks by the methods specified in §60.485(b), except as provided in § 60.482-1(c) and paragraphs (d), (e), and (f) of this section.

(2) Each pump in light liquid service shall be checked by visual inspection each calendar week for indications of liquids dripping from the pump seal.

(b)(1) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(2) If there are indications of liquids dripping from the pump seal, a leak is detected.

(c)(1) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in § 60.482-9.

(2) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(d) Each pump equipped with a dual mechanical seal system that includes a barrier fluid system is exempt from the requirements of paragraph (a), Provided the following requirements are met:

(1) Each dual mechanical seal system is-

(i) Operated with the barrier fluid at a pressure that is at all times greater than the pump stuffing box pressure; or

(ii) Equipment with a barrier fluid degassing reservoir that is connected by a closed vent system to a control device that complies with the requirements of § 60.482-10; or

(iii) Equipped with a system that purges the barrier fluid into a process stream with zero VOC emissions to the atmosphere.

(2) The barrier fluid system is in heavy liquid service or is not in VOC service.

(3) Each barrier fluid system is equipped with a sensor that will detect failure of the seal system, the barrier fluid system, or both.

(4) Each pump is checked by visual inspection, each calendar week, for indications of liquids dripping from the pump seals.

(5)(i) Each sensor as described in paragraph (d)(3) is checked daily or is equipped with an audible alarm, and

(ii) The owner or operator determines, based on design considerations and operating experience, a criterion that indicates failure of the seal system, the barrier fluid system, or both.

(6)(i) If there are indications of liquids dripping from the pump seal or the sensor indicates failure of the seal system, the barrier fluid system, or both based on the criterion determined in paragraph (d)(5)(ii), a leak is detected.

(ii) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in § 60.482-9.

(iii) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(e) Any pump that is designated, as described in § 60.486(e)(1) and (2), for no detectable emission, as indicated by an instrument reading of less than 500 ppm above background, is exempt from the requirements of paragraphs (a), (c), and (d) if the pump:

(1) Has no externally actuated shaft penetrating the pump housing,

(2) Is demonstrated to be operating with no detectable emissions as indicated by an instrument reading of less than 500 ppm above background as measured by the methods specified in § 60.485(c), and

(3) Is tested for compliance with paragraph (e)(2) initially upon designation, annually, and at other times requested by the Administrator.

(f) If any pump is equipped with a closed vent system capable of capturing and transporting any leakage from the seal or seals to a control device that complies with the requirements of § 60.482-10, it is exempt from the paragraphs (a) through (e).

§ 60.482-3 Compressors.

(a) Each compressor shall be equipped with a seal system that includes a barrier fluid system and that prevents leakage of VOC to the atmosphere, except as provided in §60.482-1(c) and paragraph (h) and (i) of this section.

(b) Each compressor seal system as required in paragraph (a) shall be:

(1) Operated with the barrier fluid at a pressure that is greater than the compressor stuffing box pressure; or

(2) Equipped with a barrier fluid system that is connected by a closed vent system to a control device that complies with the requirements of § 60.482-10; or

(3) Equipped with a system that purges the barrier fluid into a process stream with zero VOC emissions to the atmosphere.

(c) The barrier fluid system shall be in heavy liquid service or shall not be in VOC service.

(d) Each barrier fluid system as described in paragraph (a) shall be equipped with a sensor that will detect failure of the seal system, barrier fluid system, or both.

(e)(1) Each sensor as required in paragraph (d) shall be checked daily or shall be equipped with an audible alarm.

(2) The owner or operator shall determine, based on design considerations and operating experience, a criterion that indicates failure of the seal system, the barrier fluid system, or both.

(f) If the sensor indicates failure of the seal system, the barrier system, or both based on the criterion determined under paragraph (e)(2), a leak is detected.

(g)(1) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in § 60.482-9.

(2) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(h) A compressor is exempt from the requirements of paragraphs (a) and (b), if it is equipped with a closed vent system capable of capturing and transporting any leakage from the seal to a control device that complies with the requirements of § 60.482-10, except as provided in paragraph (i) of this section.

(i) Any compressor that is designated, as described in § 60.486(e) (1) and (2), for no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, is exempt from the requirements of paragraphs (a)-(h) if the compressor:

(1) Is demonstrated to be operating with no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as measured by the methods specified in § 60.485(c); and

(2) Is tested for compliance with paragraph (i)(1) initially upon designation, annually, and at other times requested by the Administrator.

(j) Any existing reciprocating compressor in a process unit which becomes an affected facility under provisions of § 60.14 or §60.15 is exempt from § 60.482(a), (b), (c), (d), (e), and (h), provided the owner or operator demonstrates that recasting the distance piece or replacing the compressor are the only options available to bring the compressor into compliance with the provisions of paragraphs (a) through (e) and (h) of this section.

§ 60.482-4 Standards: Pressure relief devices in gas/vapor service.

(a) Except during pressure releases, each pressure relief device in gas/vapor service shall be operated with no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as determined by the methods specified in § 60.485(c).

(b)(1) After each pressure release, the pressure relief device shall be returned to a condition of no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, as soon as practicable, but no later than 5 calendar days after the pressure release, except as provided in § 60.482-9.

(2) No later than 5 calendar days after the pressure release, the pressure relief device shall be monitored to confirm the conditions of no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, by the methods specified in § 60.485(c).

(c) Any pressure relief device that is equipped with a closed vent system capable of capturing and transporting leakage through the pressure relief device to a control device as described in § 60.482-10 is exempted from the requirements of paragraphs (a) and (b).

§ 60.482-5 Standards: Sampling connection systems.

(a) Each sampling connection system shall be equipped with a closed purge system or closed vent system, except as provided in § 60.482-1(c).

(b) Each closed purge system or closed vent system as required in paragraph (a) shall:

(1) Return the purged process fluid directly to the process line with zero VOC emissions to the atmosphere; or

(2) Collect and recycle the purged process fluid with zero VOC emissions to the atmosphere; or

(3) Be designed and operated to capture and transport all the purged process fluid to a control device that complies with the requirements of § 60.482-10.

(c) In-situ sampling systems are exempt from paragraphs (a) and (b).

§ 60.482-6 Standards: Open-ended valves or lines.

(a)(1) Each open-ended valve or line shall be equipped with a cap, blind flange, plug, or a second valve, except as provided in § 60.482-1(c).

(2) The cap, blind flange, plug, or second valve shall seal the open end at all times except during operations requiring process fluid flow through the open-ended valve or line.

(b) Each open-ended valve or line equipped with a second valve shall be operated in a manner such that the valve on the process fluid end is closed before the second valve is closed.

(c) When a double block-and-bleed system is being used, the bleed valve or line may remain open during operations that require venting the line between the block valves but shall comply with paragraph (a) at all other times.

[48 FR 48335, Oct. 18, 1983, as amended at 49 FR 22607, May 30, 1984]

§ 60.482-7 Standards: Valves in gas/vapor service in light liquid service.

(a) Each valve shall be monitored monthly to detect leaks by the methods specified in §60.485(b) and shall comply with paragraphs (b) through (e), except as provided in paragraphs (f), (g), and (h), § 60.483-1, 2, and § 60.482-1(c).

(b) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(c)(1) Any valve for which a leak is not detected for 2 successive months may be monitored the first month of every quarter, beginning with the next quarter, until a leak is detected.

(2) If a leak is detected, the valve shall be monitored monthly until a leak is not detected for 2 successive months.

(d)(1) When a leak is detected, it shall be repaired as soon as practicable, but no later than 15 calendar days after the leak is detected, except as provided in § 60.482-9.

(2) A first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(e) First attempts at repair include, but are not limited to, the following best practices where practicable:

(1) Tightening of bonnet bolts;

(2) Replacement of bonnet bolts;

(3) Tightening of packing gland nuts;

(4) Injection of lubricant into lubricated packing.

(f) Any valve that is designated, as described in § 60.486(e)(2), for no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background, is exempt from the requirements of paragraph (a) if the valve:

(1) Has no external actuating mechanism in contact with the process fluid,

(2) Is operated with emissions less than 500 ppm above background as determined by the method specified in § 60.485(c), and

(3) Is tested for compliance with paragraph (f)(2) initially upon designation, annually, and at other times requested by the Administrator.

(g) Any valve that is designated, as described in § 60.486(f)(1), as an unsafe-to-monitor valve is exempt from the requirements of paragraph (a) if:

(1) The owner or operator of the valve demonstrates that the valve is unsafe to monitor because monitoring personnel would be exposed to an immediate danger as a consequence of complying with paragraph (a), and

(2) The owner or operator of the valve adheres to a written plan that requires monitoring of the valve as frequently as practicable during safe-to-monitor times.

(h) Any valve that is designated, as described in § 60.486(f)(2), as a difficult-to-monitor valve is exempt from the requirements of paragraph (a) if:

(1) The owner or operator of the valve demonstrates that the valve cannot be monitored without elevating the monitoring personnel more than 2 meters above a support surface.

(2) The process unit within which the valve is located either becomes an affected facility through § 60.14 or § 60.15 or the owner or operator designates less than 3.0 percent of the total number of valves as difficult- to-monitor, and

(3) The owner or operator of the valve follows a written plan that requires monitoring of the valve at least once per calendar year.

[48 FR 48335, Oct. 18, 1983, as amended at 49 FR 22608, May 30, 1984]

§ 60.482-8 Standards: Pumps and valves in heavy liquid service, pressure relief devices in light liquid or heavy liquid service, and flanges and other connectors.

(a) Pumps and valves in heavy liquid service, pressure relief devices in light liquid or heavy liquid service, and flanges and other connectors shall be monitored within 5 days by the method specified in § 60.485(b) if evidence of a potential leak is found by visual, audible, olfactory, or any other detection method.

(b) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(c)(1) When a leak is detected, it shall be repaired as soon as practicable, but not later than 15 calendar days after it is detected, except as provided in § 60.482-9.

(2) The first attempt at repair shall be made no later than 5 calendar days after each leak is detected.

(d) First attempts at repair include, but are not limited to, the best practices described under § 60.482-7(e).

§ 60.482-9 Standards: Delay of repair.

(a) Delay of repair of equipment for which leaks have been detected will be allowed if the repair is technically infeasible without a process unit shutdown. Repair of this equipment shall occur before the end of the next process unit shutdown.

(b) Delay of repair of equipment will be allowed for equipment which is isolated from the process and which does not remain in VOC service.

(c) Delay of repair for valves will be allowed if:

(1) The owner or operator demonstrates that emissions of purged material resulting from immediate repair are greater than the fugitive emissions likely to result from delay of repair, and

(2) When repair procedures are effected, the purged material is collected and destroyed or recovered in a control device complying with § 60.482-10.

(d) Delay of repair for pumps will be allowed if:

(1) Repair requires the use of a dual mechanical seal system that includes a barrier fluid system, and

(2) Repair is completed as soon as practicable, but not later than 6 months after the leak was detected.

(e) Delay of repair beyond a process unit shutdown will be allowed for a valve, if valve assembly replacement is necessary during the process unit shutdown, valve assembly supplies have been depleted, and valve assembly supplies had been sufficiently stocked before the supplies were depleted. Delay of repair beyond the next process unit shutdown will not be allowed unless the next process unit shutdown occurs sooner than 6 months after the first process unit shutdown.

§ 60.482-10 Standards: Closed vent systems and control devices.

(a) Owners or operators of closed vent systems and control devices used to comply with provisions of this subpart shall comply with the provisions of this section.

(b) Vapor recovery systems (for example, condensers and adsorbers) shall be designed and operated to recover the VOC emissions vented to them with an efficiency of 95 percent or greater.

(c) Enclosed combustion devices shall be designed and operated to reduce the VOC emissions vented to them with an efficiency of 95 percent or greater, or to provide a minimum residence time of 0.75 seconds at a minimum temperature of 816°C.

(d) Flares used to comply with this subpart shall comply with the requirements of §60.18.

(e) Owners or operators of control devices used to comply with the provisions of this subpart shall monitor these control devices to ensure that they are operated and maintained in conformance with their designs.

(f)(1) Closed vent systems shall be designed and operated with no detectable emissions, as indicated by an instrument reading of less than 500 ppm above background and visual inspections, as determined by the methods specified in § 60.485(c).

(2) Closed vent systems shall be monitored to determine compliance with this section initially in accordance with § 60.8, annually and at other times requested by the Administrator.

(g) Closed vent systems and control devices used to comply with provisions of this subpart shall be operated at all times when emissions may be vented to them.

[48 FR 48335, Oct. 18, 1983, as amended at 51 FR 2702, Jan. 21, 1986]

§ 60.483-1 Alternative standards for valves-allowable percentage of valves leaking.

(a) An owner or operator may elect to comply with an allowable percentage of valves leaking of equal to or less than 2.0 percent.

(b) The following requirements shall be met if an owner or operator wishes to comply with an allowable percentage of valves leaking:

(1) An owner or operator must notify the Administrator that the owner or operator has elected to comply with the allowable percentage of valves leaking before implementing this alternative standard, as specified in § 60.487(b).

(2) A performance test as specified in paragraph (c) of this section shall be conducted initially upon designation, annually, and at other times requested by the Administrator.

(3) If a valve leak is detected, it shall be repaired in accordance with § 60.482-7(d) and (e).

(c) Performance tests shall be conducted in the following manner:

(1) All valves in gas/vapor and light liquid service within the affected facility shall be monitored within 1 week by the methods specified in § 60.485(b).

(2) If an instrument reading of 10,000 ppm or greater is measured, a leak is detected.

(3) The leak percentage shall be determined by dividing the number of valves for which leaks are detected by the number of valves in gas/vapor and light liquid service within the affected facility.

(d) Owners and operators who elect to comply with this alternative standard shall not have an affected facility with a leak percentage greater than 2.0 percent.

§ 60.483-2 Alternative standards for valves-skip period leak detection and repair.

(a)(1) An owner or operator may elect to comply with one of the alternative work practices specified in paragraphs (b)(2) and (3) of this section.

(2) An owner or operator must notify the Administrator before implementing one of the alternative work practices, as specified in § 60.487(b).

(b)(1) An owner or operator shall comply initially with the requirements for valves in gas/vapor service and valves in light liquid service, as described in § 60.482-7.

(2) After 2 consecutive quarterly leak detection periods with the percent of valves leaking equal to or less than 2.0, an owner or operator may begin to skip 1 of the quarterly leak detection periods for the valves in gas/vapor and light liquid service.

(3) After 5 consecutive quarterly leak detection periods with the percent of valves leaking equal to or less than 2.0, an owner or operator may begin to skip 3 of the quarterly leak detection periods for the valves in gas/vapor and light liquid service.

(4) If the percent of valves leaking is greater than 2.0, the owner or operator shall comply with the requirements as described in § 60.482-7 but can again elect to use this section.

(5) The percent of valves leaking shall be determined by dividing the sum of valves found leaking during current monitoring and valves for which repair has been delayed by the total number of valves subject to the requirements of this section.

(6) An owner or operator must keep a record of the percent of valves found leaking during each leak detection period.

§ 60.484 Equivalence of means of emission limitation.

(a) Each owner or operator subject to the provisions of this subpart may apply to the Administrator for determination of equivalance for any means of emission limitation that achieves a reduction in emissions of VOC at least equivalent to the reduction in emissions of VOC achieved by the controls required in this subpart.

(b) Determination of equivalence to the equipment, design, and operational requirements of this subpart will be evaluated by the following guidelines:

(1) Each owner or operator applying for an equivalence determination shall be responsible for collecting and verifying test data to demonstrate equivalence of means of emission limitation.

(2) The Administrator will compare test data for the means of emission limitation to test data for the equipment, design, and operational requirements.

(3) The Administrator may condition the approval of equivalence on requirements that may be necessary to assure operation and maintenance to achieve the same emission reduction as the equipment, design, and operational requirements.

(c) Determination of equivalence to the required work practices in this subpart will be evaluated by the following guidelines:

(1) Each owner or operator applying for a determination of equivalence shall be responsible for collecting and verifying test data to demonstrate equivalence of an equivalent means of emission limitation.

(2) For each affected facility for which a determination of equivalence is requested, the emission reduction achieved by the required work practice shall be demonstrated.

(3) For each affected facility, for which a determination of equivalence is requested, the emission reduction achieved by the equivalent means of emission limitation shall be demonstrated.

(4) Each owner or operator applying for a determination of equivalence shall commit in writing to work practice(s) that provide for emission reductions equal to or greater than the emission reductions achieved by the required work practice.

(5) The Administrator will compare the demonstrated emission reduction for the equivalent means of emission limitation to the demonstrated emission reduction for the required work practices and will consider the commitment in paragraph (c)(4).

(6) The Administrator may condition the approval of equivalence on requirements that may be necessary to assure operation and maintenance to achieve the same emission reduction as the required work practice.

(d) An owner or operator may offer a unique approach to demonstrate the equivalence of any equivalent means of emission limitation.

(e)(1) After a request for determination of equivalence is received, the Administrator will publish a notice in the Federal Register and provide the opportunity for public hearing if the Administrator judges that the request may be approved.

(2) After notice and opportunity for public hearing, the Administrator will determine the equivalence of a means of emission limitation and will publish the determination in the Federal Register.

(3) Any equivalent means of emission limitations approved under this section shall constitute a required work practice, equipment, design, or operational standard within the meaning of section 111(h)(1) of the Clean Air Act.

(f)(1) Manufacturers of equipment used to control equipment leaks of VOC may apply to the Administrator for determination of equivalence for any equivalent means of emission limitation that achieves a reduction in emissions of VOC achieved by the equipment, design, and operational requirements of this subpart.

(2) The Administrator will make an equivalence determination according to the provisions of paragraphs (b), (c), (d), and (e).

§ 60.485 Test methods and procedures.

(a) In conducting the performance tests required in § 60.8, the owner or operator shall use as reference methods and procedures the test methods in appendix A of this part or other methods and procedures as specified in this section, except as provided in § 60.8(b).

(b) The owner or operator shall determine compliance with the standards in §§ 60.482, 60.483, and 60.484 as follows:

(1) Method 21 shall be used to determine the presence of leaking sources. The instrument shall be calibrated before use each day of its use by the procedures specified in Method 21. The following calibration gases shall be used:

(i) Zero air (less than 10 ppm of hydrocarbon in air); and

(ii) A mixture of methane or n-hexane and air at a concentration of about, but less than, 10,000 ppm methane or n-hexane.

(c) The owner or operator shall determine compliance with the no detectable emission standards in §§ 60.482-2(e), 60.482-3(i), 60.482-4, 60.482-7(f), and 60.482-10(e) as follows:

(1) The requirements of paragraph (b) shall apply.

(2) Method 21 shall be used to determine the background level. All potential leak interfaces shall be traversed as close to the interface as possible. The arithmetic difference between the maximum concentration indicates by the instrument and the

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background level is compared with 500 ppm for determining compliance.

(d) The owner or operator shall test each piece of equipment unless he demonstrates that a process unit is not in VOC series, i.e., that the VOC content would never be reasonably expected to exceed 10 percent by weight. For purposes of this demonstration, the following methods and procedures shall be used:

(1) Procedures that conform to the general methods in ASTM E-260, E-168, E-169 (incorporated by reference-see § 60.17) shall be used to determine the percent VOC content in the process fluid that is contained in or contacts a piece of equipment.

(2) Organic compounds that are considered by the Administrator to have negligible photochemical reactivity may be excluded from the total quantity of organic compounds in determining the VOC content of the process fluid.

(3) Engineering judgment may be used to estimate the VOC content, if a piece of equipment had not been shown previously to be in service. If the Administrator disagrees with the judgment, paragraphs (d) (1) and (2) of this section shall be used to resolve the disagreement.

(e) The owner or operator shall demonstrate that an equipment is in light liquid service by showing that all the following conditions apply:

(1) The vapor pressure of one or more of the components is greater than 0.3 kPa at 20 °C. Standard reference texts or ASTM D-2879 (incorporated by reference-see § 60.17) shall be used to determine the vapor pressures.

(2) The total concentration of the pure components having a vapor pressure greater than 0.3 kPa at 20 °C is equal to or greater than 20 percent by weight.

(3) The fluid is a liquid at operating conditions.

(f) Samples used in conjunction with paragraphs (d), (e), and (g) shall be representative of the process fluid that is contained in or contacts the equipment or the gas being combusted in the flare.

(g) The owner or operator shall determine compliance with the standards of flares as follows:

(1) Method 22 shall be used to determine visible emissions.

(2) A thermocouple or any other equivalent device shall be used to monitor the presence of a pilot flame in the flare.

(3) The maximum permitted velocity (Vmax) for air-assisted flares shall be computed using the following equation:

$$V_{max}=8.706+0.7084\ HT$$

where:

Vmax=maximum permitted velocity, m/sec.

HT=net heating value of the gas being combusted, MJ/scm.

(4) The net heating value (HT) of the gas being combusted in a flare shall be computed as follows:

$$HT = K \sum_{i=1}^{n} C_i H_i$$

where:

K=conversion constant, 1.740X10↑7 [(g-mole)(MJ)]/[(ppm)(scm)(kcal).

Ci=concentration of sample component ``i", ppm.

Hi=net heat of combustion of sample component ``i" at 25 °C and 760 mm Hg, kcal/g-mole.

(5) Method 18 and ASTM D 2504-67 (incorporated by reference-see § 60.17) shall be used to determine the concentration of sample component ``i."

(6) ASTM D 2382-76 (incorporated by reference-see § 60.17) shall be used to determine the net heat of combustion of component ``i" if published values are not available or cannot be calculated.

(7) Method 2, 2A, 2C, or 2D, as appropriate, shall be used to determine the actual exit velocity of a flare. If needed, the unobstructed (free) cross-sectional area of the flare tip shall be used.

[54 FR 6678, Feb. 14, 1989, as amended at 54 FR 27016, June 27, 1989]

§ 60.486 Recordkeeping requirements.

(a)(1) Each owner or operator subject to the provisions of this subpart shall comply with the recordkeeping requirements of this section.

(2) An owner or operator of more than one affected facility subject to the provisions of this subpart may comply with the recordkeeping requirements for these facilities in one recordkeeping system if the system identifies each record by each facility.

(b) When each leak is detected as specified in §§ 60.482-2, 60.482-3, 60.482-7, 60.482-8, and 60.483-2, the following requirements apply:

(1) A weatherproof and readily visible identification, marked with the equipment identification number, shall be attached to the leaking equipment.

(2) The identification on a valve may be removed after it has been monitored for 2 successive months as specified in § 60.482-7(c) and no leak has been detected during those 2 months.

(3) The identification on equipment except on a valve, may be removed after it has been repaired.

(c) When each leak is detected as specified in §§ 60.482-2, 60.482-3, 60.482-7, 60.482-8, and 60.483-2, the following information shall be recorded in a log and shall be kept for 2 years in a readily accessible location:

(1) The instrument and operator identification numbers and the equipment identification number.

(2) The date the leak was detected and the dates of each attempt to repair the leak.

(3) Repair methods applied in each attempt to repair the leak.

(4) ``Above 10,000" if the maximum instrument reading measured by the methods specified in § 60.485(a) after each repair attempt is equal to or greater than 10,000 ppm.

(5) ``Repair delayed" and the reason for the delay if a leak is not repaired within 15 calendar days after discovery of the leak.

(6) The signature of the owner or operator (or designate) whose decision it was that repair could not be effected without a process shutdown.

(7) The expected date of successful repair of the leak if a leak is not repaired within 15 days.

(8) Dates of process unit shutdown that occur while the equipment is unrepaired.

(9) The date of successful repair of the leak.

(d) The following information pertaining to the design requirements for closed vent systems and control devices described in §60.482-10 shall be recorded and kept in a readily accessible location:

(1) Detailed schematics, design specifications, and piping and instrumentation diagrams.

(2) The dates and descriptions of any changes in the design specifications.

(3) A description of the parameter or parameters monitored, as required in §60.482-10(e), to ensure that control devices
are operated and maintained in conformance with their design and an explanation of why that parameter (or parameters) was selected for the monitoring.

(4) Periods when the closed vent systems and control devices required in §§ 60.482-2, 60.482-3, 60.482-4, and 60.482-5 are not operated as designed, including periods when a flare pilot light does not have a flame.

(5) Dates of startups and shutdowns of the closed vent systems and control devices required in §§ 60.482-2, 60.482-3, 60.482-4, and 60.482-5.

(e) The following information pertaining to all equipment subject to the requirements in §§ 60.482-1 to 60.482-10 shall be recorded in a log that is kept in a readily accessible location:

(1) A list of identification numbers for equipment subject to the requirements of this subpart.

(2)(i) A list of identification numbers for equipment that are designated for no detectable emissions under the provisions of §§ 60.482-2(e), 60.482-3(i) and 60.482-7(f).

(ii) The designation of equipment as subject to the requirements of § 60.482-2(e), § 60.482-3(i), or § 60.482-7(f) shall be signed by the owner or operator.

(3) A list of equipment identification numbers for pressure relief devices required to comply with § 60.482-4.

(4)(i) The dates of each compliance test as required in §§ 60.482-2(e), 60.482-3(i), 60.482-4, and 60.482-7(f).

(ii) The background level measured during each compliance test.

(iii) The maximum instrument reading measured at the equipment during each compliance test.

(5) A list of identification numbers for equipment in vacum service.

(f) The following information pertaining to all valves subject to the requirements of § 60.482-7(g) and (h) shall be recorded in a log that is kept in a readily accessible location:

(1) A list of identification numbers for valves that are designated as unsafe- to-monitor, an explanation for each valve stating why the valve is unsafe-to-monitor, and the plan for monitoring each valve.

(2) A list of identification numbers for valves that are designated as difficult- to-monitor, an explanation for each valve stating why the valve is difficult-to-monitor, and the schedule for monitoring each value.

(g) The following information shall be recorded for valves complying with §60.483-2:

(1) A schedule of monitoring.

(2) The percent of valves found leaking during each monitoring period.

(h) The following information shall be recorded in a log that is kept in a readily accessible location:

(1) Design criterion required in §§ 60.482-2(d)(5) and 60.482-3(e)(2) and explanation of the design criterion; and

(2) Any changes to this criterion and the reasons for the changes.

(i) The following information shall be recorded in a log that is kept in a readily accessible location for use in determining
exemptions as provided in § 60.480(d):

(1) An analysis demonstrating the design capacity of the affected facility,

(2) A statement listing the feed or raw materials and products from the affected facilities and an analysis demonstrating whether these chemicals are heavy liquids or beverage alcohol, and

(3) An analysis demonstrating that equipment is not in VOC service.

(j) Information and data used to demonstrate that a piece of equipment is not in VOC service shall be recorded in a log that is kept in a readily accessible location.

(k) The provisions of § 60.7 (b) and (d) do not apply to affected facilities subject to this subpart.

§ 60.487 Reporting requirements.

(a) Each owner or operator subject to the provisions of this subpart shall submit semiannual reports to the Administrator beginning six months after the initial start up date.

(b) The initial semiannual report to the Administrator shall include the following information:

(1) Process unit identification.

(2) Number of valves subject to the requirements of § 60.482-7, excluding those valves designated for no detectable emissions under the provisions of §60.482-7(f).

(3) Number of pumps subject to the requirements of § 60.482-2, excluding those pumps designated for no detectable emissions under the provisions of § 60.482-2(e) and those pumps complying with § 60.482-2(f).

(4) Number of compressors subject to the requirements of § 60.482-3, excluding those compressors designated for no detectable emissions under the provisions of §60.482-3(i) and those compressors complying with § 60.482-3(h).

(c) All semiannual reports to the Administrator shall include the following information, summarized from the information in § 60.486:

(1) Process unit identification.

(2) For each month during the semiannual reporting period,

(i) Number of valves for which leaks were detected as described in § 60.482(7)(b) or § 60.483-2,

(ii) Number of valves for which leaks were not repaired as required in § 60.482-7(d)(1),

(iii) Number of pumps for which leaks were detected as described in § 60.482-2(b) and (d)(6)(i),

(iv) Number of pumps for which leaks were not repaired as required in §60.482-2(c)(1) and (d)(6)(ii),

(v) Number of compressors for which leaks were detected as described in § 60.482-3(f),

(vi) Number of compressors for which leaks were not repaired as required in §60.482-3(g)(1), and

(vii) The facts that explain each delay of repair and, where appropriate, why a process unit shutdown was technically infeasible.

(3) Dates of process unit shutdowns which occurred within the semiannual reporting period.

(4) Revisions to items reported according to paragraph (b) if changes have occurred since the initial report or subsequent revisions to the initial report.

(d) An owner or opertor electing to comply with the provisions of §§ 60.483-1 and 60.483-2 shall notify the Administrator of the alternative standard selected 90 days before implementing either of the provisions.

(e) An owner or operator shall report the results of all performance tests in accordance with § 60.8 of the General Provisions. The provisions of § 60.8(d) do not apply to affected facilities subject to the provisions of this subpart except that an owner or operator must notify the Administrator of the schedule for the initial performance tests at least 30 days before the initial performance tests.

(f) The requirements of paragraphs (a) through (c) of this section remain in force until and unless EPA, in delegating enforcement authority to a State under section 111(c) of the Act, approves reporting requirements or an alternative means of compliance surveillance adopted by such State. In that event, affected sources within the State will be relieved of the obligation to comply with the requirements of paragraphs (a) through (c) of this section, provided that they comply with the requirements established by the State.

[48 FR 48335, Oct. 18, 1983, as amended at 49 FR 22608, May 30, 1984]

§ 60.488 Reconstruction.

For the purposes of this subpart:

(a) The cost of the following frequently replaced components of the facility shall not be considered in calculating either the ``fixed capital cost of the new components'' or the ``fixed capital costs that would be required to construct a comparable new facility'' under § 60.15: pump seals, nuts and bolts, rupture disks, and packings.

(b) Under § 60.15, the ``fixed capital cost of new components'' includes the fixed capital cost of all depreciable components (except components specified in § 60.488 (a)) which are or will be replaced pursuant

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to all continuous programs of component replacement which are commenced within any 2-year period following the applicability date for the appropriate subpart. (See the ``Applicability and designation of affected facility" section of the appropriate subpart.) For purposes of this paragraph, ``commenced" means that an owner or operator has undertaken a continuous program of component replacement or that an owner or operator has entered into a contractual obligation to undertake and complete, within a reasonable time, a continuous program of component replacement.

[49 FR 22608, May 30, 1984]

§ 60.489 List of chemicals produced by affected facilities.

(a) The following chemicals are produced, as intermediates or final products, by process units covered under this subpart. The applicability date for process units producing one or more of these chemicals is January 5, 1981.

CAS No.	Chemical
105-57-7	Acetal
75-07-0	Acetaldehyde
107-89-1	Acetaldol
60-35-5	Acetamide
103-84-4	Acetanilide
64-19-7	Acetic acid
108-24-7	Acetic anhydride
67-64-1	Acetone
75-86-5	Acetone cyanohydrin
75-05-8	Acetonitrile
98-86-2	Acetophenone
75-36-5	Acetyl chloride
74-86-2	Acetylene
107-02-8	Acrolein
79-06-1	Acrylamide

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79-10-7	Acrylic acid
107-13-1	Acrylonitrile
124-04-9	Adipic acid
111-69-3	Adiponitrile
(b)	Alkyl naphthalenes
107-18-6	Allyl alcohol
107-05-1	Allyl chloride
1321-11-5	Aminobenzoic acid
111-41-1	Aminoethylethanolamine
123-30-8	p-Aminophenol
628-63-7, 123-92-2	Amyl acetates
71-41-0 c	Amyl alcohols
110-58-7	Amyl amine
543-59-9	Amyl chloride
110-66-7 c	Amyl mercaptans
1322-06-1	Amyl phenol
62-53-3	Aniline
142-04-1	Aniline hydrochloride
29191-52-4	Anisidine
100-66-3	Anisole
118-92-3	Anthranilic acid
84-65-1	Anthraquinone
100-52-7	Benzaldehyde
55-21-0	Benzamide
71-43-2	Benzene
98-48-6	Benzenedisulfonic acid
98-11-3	Benzenesulfonic acid
134-81-6	Benzil
76-93-7	Benzilic acid
65-85-0	Benzoic acid
119-53-9	Benzoin

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98-87-3	Benzyl dichloride
119-61-9	Benzophenone
98-07-7	Benzotrichloride
98-88-4	Benzoyl chloride
100-51-6	Benzyl alcohol
100-46-9	Benzylamine
120-51-4	Benzyl benzoate
100-44-7	Benzyl chloride
100-47-0	Benzonitrile
92-52-4	Biphenyl
80-05-7	Bisphenol A
10-86-1	Bromobenzene
27497-51-4	Bromonaphthalene
106-99-0	Butadiene
106-98-9	1-butene
123-86-4	n-butyl acetate
141-32-2	n-butyl acrylate
71-36-3	n-butyl alcohol
78-92-2	s-butyl alcohol
75-65-0	t-butyl alcohol
109-73-9	n-butylamine
13952-84-6	s-butylamine
75-64-9	t-butylamine
98-73-7	p-tert-butyl benzoic acid
107-88-0	1,3-butylene glycol
123-72-8	n-butyraldehyde
107-92-6	Butyric acid
106-31-0	Butyric anhydride
109-74-0	Butyronitrile
105-60-2	Caprolactam
75-1-50	Carbon disulfide

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558-13-4	Carbon tetrabromide
56-23-5	Carbon tetrachloride
9004-35-7	Cellulose acetate
79-11-8	Chloroacetic acid
108-42-9	m-chloroaniline
95-51-2	o-chloroaniline
106-47-8	p-chloroaniline
35913-09-8	Chlorobenzaldehyde
108-90-7	Chlorobenzene
118-91-2, 535-80-8, 74-11-3 c	Chlorobenzoic acid
2136-81-4, 2136-89-2, 5216-25-1c	Chlorobenzotrichloride
1321-03-5	Chlorbenzoyl chloride
25497-29-4	Chlorodifluoromethane
75-45-6	Chlorodifluoroethane
67-66-3	Chloroform
25586-43-0	Chloronapthalene
88-73-3	o-chloronitrobenzene
100-00-5	p-chloronitrobenzene
25167-80-0	Chlorophenols
126-99-8	Chloroprene
7790-94-5	Chlorosulfonic acid
108-41-8	m-chlorotoluene
95-49-8	o-chlorotoluene
106-43-4	p-chlorotoluene
75-72-9	Chlorotrifluoromethane
108-39-4	m-cresol
95-48-7	o-cresol
106-44-5	p-cresol
1319-77-3	Mixed cresols
1319-77-3	Cresylic acid
4170-30-0	Crotonaldehyde

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3724-65-0	Crotonic acid
98-82-8	Cumene
80-15-9	Cumene hydroperoxide
372-09-8	Cyanoacetic acid
506-77-4	Cyanogen chloride
108-80-5	Cyanuric acid
108-77-0	Cyanuric chloride
110-82-7	Cyclohexane
108-93-0	Cyclohexanol
108-94-1	Cyclohexanone
110-83-8	Cyclohexene
108-91-8	Cyclohexylamine
111-78-4	Cyclooctadiene
112-30-1	Decanol
123-42-2	Diacetone alcohol
27576-04-1	Diaminobenzoic acid
95-76-1, 95-82-9, 554-00-7, 608-27-5, 608-31-1, 626-43-7, 27134-27-6, 57311-92-9 c	Dichloroaniline
541-73-1	m-dichlorobenzene
95-50-1	o-dichlorobenzene
106-46-7	p-dichlorobenzene
75-71-8	Dichlorodifluoromethane
111-44-4	Dichloroethyl ether
107-06-2	1,2-dichloroethane (EDC)
96-23-1	Dichlorohydrin
26952-23-8	Dichloropropene
101-83-7	Dicyclohexylamine
109-89-7	Diethylamine
111-46-6	Diethylene glycol
112-36-7	Diethylene glycol diethyl ether
111-96-6	Diethylene glycol dimethyl ether

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112-34-5	Diethylene glycol monobutyl ether
124-17-7	Diethylene glycol monobutyl ether acetate
111-90-0	Diethylene glycol monoethyl ether
112-15-2	Diethylene glycol monoethyl ether acetate
111-77-3	Diethylene glycol monomethyl ether
64-67-5	Diethyl sulfate
75-37-6	Difluoroethane
25167-70-8	Diisobutylene
26761-40-0	Diisodecyl phthalate
27554-26-3	Diisooctyl phthalate
674-82-8	Diketene
124-40-3	Dimethylamine
121-69-7	N,N-dimethylaniline
115-10-6	N,N-dimethyl ether
68-12-2	N,N-dimethylformamide
57-14-7	Dimethylhydrazine
77-78-1	Dimethyl sulfate
75-18-3	Dimethyl sulfide
67-68-5	Dimethyl sulfoxide
120-61-6	Dimethyl terephthalate
99-34-3	3,5-dinitrobenzoic acid
51-28-5	Dinitrophenol
25321-14-6	Dinitrotoluene
123-91-1	Dioxane
646-06-0	Dioxilane
122-39-4	Diphenylamine
101-84-8	Diphenyl oxide
102-08-9	Diphenyl thiourea
25265-71-8	Dipropylene glycol
25378-22-7	Dodecene
28675-17-4	Dodecylaniline

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27193-86-8	Dodecylphenol
106-89-8	Epichlorohydrin
64-17-5	Ethanol
141-43-5 c	Ethanolamines
141-78-6	Ethyl acetate
141-97-9	Ethyl acetoacetate
140-88-5	Ethyl acrylate
75-04-7	Ethylamine
100-41-4	Ethylbenzene
74-96-4	Ethyl bromide
9004-57-3	Ethylcellulose
75-00-3	Ethyl chloride
105-39-5	Ethyl chloroacetate
105-56-6	Ethylcyanoacetate
74-85-1	Ethylene
96-49-1	Ethylne carbonate
107-07-3	Ethylene chlorohydrin
107-15-3	Ethylenediamine
106-93-4	Ethylene dibromide
107-21-1	Ethylene glycol
111-55-7	Ethylene glycol diacetate
110-71-4	Ethylene glycol dimethyl ether
111-76-2	Ethylene glycol monobutyl ether
112-07-2 .... | Ethylene glycol monobutyl ether acetate	112-07-2 .... | Ethylene glycol monobutyl ether acetate
110-80-5	Ethylene glycol monoethy ether
111-15-9	Ethylene glycol monethyl ether acetate
109-86-4	Ethylene glycol monomethyl ether
110-49-6	Ethylene glycol monomethyl ether acetate
122-99-6	Ethylene glycol monophenyl ether
2807-30-9	Ethylene glycol monopropyl ether
75-21-8	Ethylene oxide

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60-29-7	Ethyl ether
104-76-7	2-ethylhexanol
122-51-0	Ethyl orthoformate
95-92-1	Ethyl oxalate
41892-71-1	Ethyl sodium oxalacetate
50-00-0	Formaldehyde
75-12-7	Formamide
64-18-6	Formic acid
110-17-8	Fumaric acid
98-01-1	Furfural
56-81-5	Glycerol
26545-73-7	Glycerol dichlorohydrin
25791-96-2	Glycerol triether
56-40-6	Glycine
107-22-2	Glyoxal
118-74-1	Hexachlorobenzene
67-72-1	Hexachloroethane
36653-82-4	Hexadecyl alcohol
124-09-4	Hexamethylenediamine
629-11-8	Hexamethylene glycol
100-97-0	Hexamethylenetetramine
74-90-8	Hydrogen cyanide
123-31-9	Hydroquinone
99-96-7	p-hydroxybenzoic acid
26760-64-5	Isoamylene
78-83-1	Isobutanol
110-19-0	Isobutyl acetate
115-11-7	Isobutylene
78-84-2	Isobutyraldehyde
79-31-2	Isobutyric acid
25339-17-7	Isodecanol

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26952-21-6	Isooctyl alcohol
78-78-4	Isopentane
78-59-1	Isophorone
121-91-5	Isophthalic acid
78-79-5	Isoprene
67-63-0	Isopropanol
108-21-4	Isopropyl acetate
75-31-0	Isopropylamine
75-29-6	Isopropyl chloride
25168-06-3	Isopropylphenol
463-51-4	Ketene
(b)	Linear alkyl sulfonate
123-01-3	Linear alkylbenzene (linear dodecylbenzene)
110-16-7	Maleic acid
108-31-6	Maleic anhydride
6915-15-7	Malic acid
141-79-7	Mesityl oxide
121-47-1	Metanilic acid
79-41-4	Methacrylic acid
563-47-3	Methallyl chloride
67-56-1	Methanol
79-20-9	Methyl acetate
105-45-3	Methyl acetoacetate
74-89-5	Methylamine
100-61-8	n-methylaniline
74-83-9	Methyl bromide
37365-71-2	Methyl butynol
74-87-3	Methyl chloride
108-87-2	Methylcyclohexane
1331-22-2	Methylcyclohexanone
75-09-2	Methylene chloride

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101-77-9	Methylene dianiline
101-68-8	Methylene diphenyl diisocyanate
78-93-3	Methyl ethyl ketone
107-31-3	Methyl formate
108-11-2	Methyl isobutyl carbinol
108-10-1	Methyl isobutyl ketone
80-62-6	Methyl methacrylate
77-75-8	Methylpentynol
98-83-9	a-methylstyrene
110-91-8	Morpholine
85-47-2	a-naphthalene sulfonic acid
120-18-3	b-naphthalene sulfonic acid
90-15-3	a-naphthol
135-19-3	b-naphthol
75-98-9	Neopentanoic acid
88-74-4	o-nitroaniline
100-01-6	p-nitroaniline
91-23-6	o-nitroanisole
100-17-4	p-nitroanisole
98-95-3	Nitrobenzene
27178-83-2c	Nitrobenzoic acid (o,m, and p)
79-24-3	Nitroethane
75-52-5	Nitromethane
88-75-5	2-Nitrophenol
25322-01-4	Nitropropane
1321-12-6	Nitrotoluene
27215-95-8	Nonene
25154-52-3	Nonylphenol
27193-28-8	Octylphenol
123-63-7	Paraldehyde
115-77-5	Pentaerythritol

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109-66-0	n-pentane
109-67-1	1-pentene
127-18-4	Perchloroethylene
594-42-3	Perchloromethyl mercaptan
94-70-2	o-phenetidine
156-43-4	p-phenetidine
108-95-2	Phenol
98-67-9, 585-38-6, 609-46-1, 1333-39-7 c	Phenolsulfonic acids
Phenyl anthranilic acid	Phenyl anthranilic acid
(b)	Phenylenediamine
75-44-5	Phosgene
85-44-9	Phthalic anhydride
85-41-6.......... | Phthalimide	85-41-6.......... | Phthalimide
108-99-6......... | b-picoline	108-99-6......... | b-picoline
110-85-0......... | Piperazine	110-85-0......... | Piperazine
9003-29-6, 25036-29-7c	Polybutenes
25322-68-3	Polyethylene glycol
25322-69-4	Polypropylene glycol
123-38-6	Propional dehyde
79-09-4	Propionic acid
71-23-8	n-propyl alcohol
107-10-8	Propylamine
540-54-5	Propyl chloride
115-07-1	Propylene
127-00-4	Propylene chlorohydrin
78-87-5	Propylene dichloride
57-55-6	Propylene glycol
75-56-9	Propylene oxide
110-86-1	Pyridine
106-51-4	Quinone
108-46-3	Resorcinol

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27138-57-4	Resorcylic acid
69-72-7	Salicylic acid
127-09-3	Sodium acetate
532-32-1	Sodium benzoate
9004-32-4	Sodium carboxymethyl cellulose
3926-62-3	Sodium chloroacetate
141-53-7	Sodium formate
139-02-6	Sodium phenate
110-44-1	Sorbic acid
100-42-5	Styrene
110-15-6	Succinic acid
110-61-2	Succinonitrile
121-57-3	Sulfanilic acid
126-33-0	Sulfolane
1401-55-4	Tannic acid
100-21-0	Terephthalic acid
79-34-5 c	Tetrachloroethanes
117-08-8	Tetrachlorophthalic anhydride
78-00-2	Tetraethyl lead
119-64-2	Tetrahydronapthalene
85-43-8	Tetrahydrophthalic anhydride
75-74-1	Tetramethyl lead
110-60-1	Tetramethylenediamine
110-18-9	Tetramethylethylenediamine
108-88-3	Toluene
95-80-7	Toluene-2,4-diamine
584-84-9	Toluene-2,4-diisocyanate
26471-62-5	Toluene diisocyanates (mixture)
1333-07-9	Toluenesulfonamide
104-15-4 c	Toluenesulfonic acids
98-59-9	Toluenesulfonyl chloride

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26915-12-8	Toluidines
87-61-6, 108-70-3, 120-82-1 c	Trichlorobenzenes
71-55-6	1,1,1-trichloroethane
79-00-5	1,1,2-trichloroethane
79-01-6	Trichloroethylene
75-69-4	Trichlorofluoromethane
96-18-4	1,2,3-trichloropropane
76-13-1	1,1,2-trichloro-1,2,2-trifluoroethane
121-44-8	Triethylamine
112-27-6	Triethylene glycol
112-49-2	Triethylene glycol dimethyl ether
7756-94-7	Triisobutylene
75-50-3	Trimethylamine
57-13-6	Urea
108-05-4	Vinyl acetate
75-01-4	Vinyl chloride
75-35-4	Vinylidene chloride
25013-15-4	Vinyl toluene
1330-20-7	Xylenes (mixed)
95-47-6	o-xylene
106-42-3	p-xylene
1300-71-6	Xylenol
1300-73-8	Xylidine

a CAS numbers refer to the Chemical Abstracts Registry numbers assigned to specific chemicals, isomers, or mixtures of chemicals. Some isomers or mixtures that are covered by the standards do not have CAS numbers assigned to them. The standards apply to all of the chemicals listed, whether CAS numbers have been assigned or not.

b No CAS number(s) have been assigned to this chemical, its isomers, or mixtures containing these chemicals.

c CAS numbers for some of the isomers are listed; the standards apply to all of the isomers and mixtures, even if CAS numbers have not been assigned.

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Attachment E

Subpart Dc-Standards of Performance for Small Industrial-Commercial-Institutional Steam Generating Units

Source: 55 FR 37683, Sept. 12, 1990, unless otherwise noted.

§ 60.40c Applicability and delegation of authority.

(a) The affected facility to which this subpart applies is each steam generating unit for which construction, modification, or reconstruction is commenced after June 9, 1989 and that has a maximum design heat input capacity of 29 megawatts (MW) (100 million Btu per hour (Btu/hr)) or less, but greater than or equal to 2.9 MW (10 million Btu/hr).

(b) In delegating implementation and enforcement authority to a State under section 111(c) of the Clean Air Act, §60.48c(a)(4) shall be retained by the Administrator and not transferred to a State.

§ 60.41c Definitions.

As used in this subpart, all terms not defined herein shall have the meaning given them in the Clean Air Act and in subpart A of this part.

Annual capacity factor means the ratio between the actual heat input to a steam generating unit from an individual fuel or combination of fuels during a period of 12 consecutive calendar months and the potential heat input to the steam generating unit from all fuels had the steam generating unit been operated for 8,760 hours during that 12-month period at the maximum design heat input capacity. In the case of steam generating units that are rented or leased, the actual heat input shall be determined based on the combined heat input from all operations of the affected facility during a period of 12 consecutive calendar months.

Coal means all solid fuels classified as anthracite, bituminous, subbituminous, or lignite by the American Society for Testing and Materials in ASTM D388-77, ``Standard Specification for Classification of Coals by Rank" (incorporated by reference-see § 60.17); coal refuse; and petroleum coke. Synthetic fuels derived from coal for the purpose of creating useful heat, including but not limited to solvent-refined coal, gasified coal, coal-oil mixtures, and coal-water mixtures, are included in this definition for the purposes of this subpart.

Coal refuse means any by-product of coal mining or coal cleaning operations with an ash content greater than 50 percent (by weight) and a heating value less than 13,900 kilojoules per kilogram (kJ/kg) (6,000 Btu per pound (Btu/lb) on a dry basis.

Cogeneration steam generating unit means a steam generating unit that simultaneously produces both electrical (or mechanical) and thermal energy from the same primary energy source.

Combined cycle system means a system in which a separate source (such as a stationary gas turbine, internal combustion engine, or kiln) provides exhaust gas to a steam generating unit.

Conventional technology means wet flue gas desulfurization technology, dry flue gas desulfurization technology, atmospheric fluidized bed combustion technology, and oil hydrodesulfurization technology.

Distillate oil means fuel oil that complies with the specifications for fuel oil numbers 1 or 2, as defined by the American Society for Testing and Materials in ASTM D396-78, ``Standard Specification for Fuel Oils" (incorporated by reference-see §60.17).

Dry flue gas desulfurization technology means a sulfur dioxide (SO2) control system that is located between the steam generating unit and the exhaust vent or stack, and that removes sulfur oxides from the combustion gases of the steam generating unit by contacting the combustion gases with an alkaline slurry or solution and forming a dry powder material. This definition includes devices where the dry powder material is subsequently converted to another form. Alkaline reagents used in dry flue gas desulfurization systems include, but are not limited to, lime and sodium compounds.

Duct burner means a device that combusts fuel and that is placed in the exhaust duct from another source (such as a stationary gas turbine, internal combustion engine, kiln, etc.) to allow the firing of additional fuel to heat the exhaust gases before the exhaust gases enter a steam generating unit.

Emerging technology means any SO2 control system that is not defined as a conventional technology under this section, and for which the owner or operator of the affected facility has received approval from the Administrator to operate as an emerging technology under § 60.48c(a)(4).

Federally enforceable means all limitations and conditions that are enforceable by the Administrator, including the requirements of 40 CFR Parts 60 and 61, requirements within any applicable State implementation plan, and any permit requirements established under 40 CFR 52.21 or under 40 CFR 51.18 and 40 CFR 51.24.

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Fluidized bed combustion technology means a device wherein fuel is distributed onto a bed (or series of beds) of limestone aggregate (or other sorbent materials) for combustion; and these materials are forced upward in the device by the flow of combustion air and the gaseous products of combustion. Fluidized bed combustion technology includes, but is not limited to, bubbling bed units and circulating bed units.

Fuel pretreatment means a process that removes a portion of the sulfur in a fuel before combustion of the fuel in a steam generating unit.

Heat input means heat derived from combustion of fuel in a steam generating unit and does not include the heat derived from preheated combustion air, recirculated flue gases, or exhaust gases from other sources (such as stationary gas turbines, internal combustion engines, and kilns).

Heat transfer medium means any material that is used to transfer heat from one point to another point.

Maximum design heat input capacity means the ability of a steam generating unit to combust a stated maximum amount of fuel (or combination of fuels) on a steady state basis as determined by the physical design and characteristics of the steam generating unit.

Natural gas means (1) a naturally occurring mixture of hydrocarbon and nonhydrocarbon gases found in geologic formations beneath the earth's surface, of which the principal constituent is methane, or (2) liquefied petroleum (LP) gas, as defined by the American Society for Testing and Materials in ASTM D1835-86, ``Standard Specification for Liquefied Petroleum Gases'' (incorporated by reference-see § 60.17).

Noncontinental area means the State of Hawaii, the Virgin Islands, Guam, American Samoa, the Commonwealth of Puerto Rico, or the Northern Mariana Islands.

Oil means crude oil or petroleum, or a liquid fuel derived from crude oil or petroleum, including distillate oil and residual oil.

Potential sulfur dioxide emission rate means the theoretical SO2 emissions (nanograms per joule [ng/J], or pounds per million Btu [lb/million Btu] heat input) that would result from combusting fuel in an uncleaned state and without using emission control systems.

Process heater means a device that is primarily used to heat a material to initiate or promote a chemical reaction in which the material participates as a reactant or catalyst.

Residual oil means crude oil, fuel oil that does not comply with the specifications under the definition of distillate oil, and all fuel oil numbers 4, 5, and 6, as defined by the American Society for Testing and Materials in ASTM D396-78, ``Standard Specification for Fuel Oils'' (incorporated by reference-see § 60.17).

Steam generating unit means a device that combusts any fuel and produces steam or heats water or any other heat transfer medium. This term includes any duct burner that combusts fuel and is part of a combined cycle system. This term does not include process heaters as defined in this subpart.

Steam generating unit operating day means a 24-hour period between 12:00 midnight and the following midnight during which any fuel is combusted at any time in the steam generating unit. It is not necessary for fuel to be combusted continuously for the entire 24-hour period.

Wet flue gas desulfurization technology means an SO2 control system that is located between the steam generating unit and the exhaust vent or stack, and that removes sulfur oxides from the combustion gases of the steam generating unit by contacting the combustion gases with an alkaline slurry or solution and forming a liquid material. This definition includes devices where the liquid material is subsequently converted to another form. Alkaline reagents used in wet flue gas desulfurization systems include, but are not limited to, lime, limestone, and sodium compounds.

Wet scrubber system means any emission control device that mixes an aqueous stream or slurry with the exhaust gases from a steam generating unit to control emissions of particulate matter (PM) or SO2.

Wood means wood, wood residue, bark, or any derivative fuel or residue thereof, in any form, including but not limited to sawdust, sanderdust, wood chips, scraps, slabs, millings, shavings, and processed pellets made from wood or other forest residues.

§ 60.42c Standard for sulfur dioxide.

(a) Except as provided in paragraphs (b), (c), and (e) of this section, on and after the date on which the initial performance test is completed or required to be completed under § 60.8 of this part, whichever date comes first, the owner the operator of an affected facility that combusts only coal shall neither:
(1) cause to be discharged into the atmosphere from that affected facility any gases that contain SO2 in excess of 10 percent (0.10) of the potential SO2

emission rate (90 percent reduction); nor (2) cause to be discharged into the atmosphere from that affected facility any gases that contain SO2 in excess of 520 ng/J (1.2 lb/million Btu) heat input. If coal is combusted with other fuels, the affected facility is subject to the 90 percent SO2 reduction requirement specified in this paragraph and the emission limit is determined pursuant to paragraph (e)(2) of this section.

(b) Except as provided in paragraphs (c) and (e) of this section, on and after the date on which the initial performance test is completed or required to be completed under § 60.8 of this part, whichever date comes first, the owner or operator of an affected facility that:

(1) Combusts coal refuse alone in a fluidized bed combustion steam generating unit shall neither:

(i) Cause to be discharged into the atmosphere from that affected facility any gases that contain SO2 in excess of 20 percent (0.20) of the potential SO2 emission rate (80 percent reduction); nor

(ii) Cause to be discharged into the atmosphere from that affected facility any gases that contain SO2 in excess of 520 ng/J (1.2 lb/million Btu) heat input. If coal is fired with coal refuse, the affected facility is subject to paragraph (a) of this section. If oil or any other fuel (except coal) is fired with coal refuse, the affected facility is subject to the 90 percent SO2 reduction requirement specified in paragraph (a) of this section and the emission limit determined pursuant to paragraph (e)(2) of this section.

(2) Combusts only coal and that uses an emerging technology for the control of SO2 emissions shall neither:

(i) Cause to be discharged into the atmosphere from that affected facility any gases that contain SO2 in excess of 50 percent (0.50) of the potential SO2 emission rate (50 percent reduction); nor

(ii) Cause to be discharged into the atmosphere from that affected facility any gases that contain SO2 in excess of 260 ng/J (0.60 lb/million Btu) heat input. If coal is combusted with other fuels, the affected facility is subject to the 50 percent SO2 reduction requirement specified in this paragraph and the emission limit determined pursuant to paragraph (e)(2) of this section.

(c) On and after the date on which the initial performance test is completed or required to be completed under § 60.8 of this part, whichever date comes first, no owner or operator of an affected facility that combusts coal, alone or in combination with any other fuel, and is listed in paragraphs (c)(1), (2), (3), or (4) of this section shall cause to be discharged into the atmosphere from that affected facility any gases that contain SO2 in excess of the emission limit determined pursuant to paragraph (e)(2) of this section. Percent reduction requirements are not applicable to affected facilities under this paragraph.

(1) Affected facilities that have a heat input capacity of 22 MW (75 million Btu/hr) or less.

(2) Affected facilities that have an annual capacity for coal of 55 percent (0.55) or less and are subject to a Federally enforceable requirement limiting operation of the affected facility to an annual capacity factor for coal of 55 percent (0.55) or less.

(3) Affected facilities located in a noncontinental area.

(4) Affected facilities that combust coal in a duct burner as part of a combined cycle system where 30 percent (0.30) or less of the heat entering the steam generating unit is from combustion of coal in the duct burner and 70 percent (0.70) or more of the heat entering the steam generating unit is from exhaust gases entering the duct burner.

(d) On and after the date on which the initial performance test is completed or required to be completed under § 60.8 of this part, whichever date comes first, no owner or operator of an affected facility that combusts oil shall cause to be discharged into the atmosphere from that affected facility any gases that contain SO2 in excess of 215 ng/J (0.50 lb/million Btu) heat input; or, as an alternative, no owner or operator of an affected facility that combusts oil shall combust oil in the affected facility that contains greater than 0.5 weight percent sulfur. The percent reduction requirements are not applicable to affected facilities under this paragraph.

(e) On and after the date on which the initial performance test is completed or required to be completed under § 60.8 of this part, whichever date comes first, no owner or operator of an affected facility that combusts coal, oil, or coal and oil with any other fuel shall cause to be discharged into the atmosphere from that affected facility any gases that contain SO2 in excess of the following:

(1) The percent of potential SO2 emission rate required under paragraph (a) or (b)(2) of this section, as applicable, for any affected facility that

(i) Combusts coal in combination with any other fuel,

(ii) Has a heat input capacity greater than 22 MW (75 million Btu/hr), and

(iii) Has an annual capacity factor for coal greater than 55 percent (0.55); and

(2) The emission limit determined according to the following formula for any affected facility that combusts coal, oil, or coal and oil with any other fuel:

Es=(KaHa+KbHb+KcHc)/Ha+Hb+Hc)

where:

Es is the SO2 emission limit, expressed in ng/J or lb/million Btu heat input,

Ka is 520 ng/J (1.2 lb/million Btu),

Kb is 260 ng/J (0.60 lb/million Btu),

Kc is 215 ng/J (0.50 lb/million Btu),

Ha is the heat input from the combustion of coal, except coal combusted in an affected facility subject to paragraph (b)(2) of this section, in Joules (J) [million Btu]

Hb is the heat input from the combustion of coal in an affected facility subject to paragraph (b)(2) of this section, in J (million Btu)

Hc is the heat input from the combustion of oil, in J (million Btu).

(f) Reduction in the potential SO2 emission rate through fuel pretreatment is not credited toward the percent reduction requirement under paragraph (b)(2) of this section unless:

(1) Fuel pretreatment results in a 50 percent (0.50) or greater reduction in the potential SO2 emission rate; and

(2) Emissions from the pretreated fuel (without either combustion or post-combustion SO2 control) are equal to or less than the emission limits specified under paragraph (b)(2) of this section.

(g) Except as provided in paragraph (h) of this section, compliance with the percent reduction requirements, fuel oil sulfur limits, and emission limits of this section shall be determined on a 30-day rolling average basis.

(h) For affected facilities listed under paragraphs (h)(1), (2), or (3) of this section, compliance with the emission limits or fuel oil sulfur limits under this section may be determined based on a certification from the fuel supplier, as described under §60.48c(f)(1), (2), or (3), as applicable.

(1) Distillate oil-fired affected facilities with heat input capacities between 2.9 and 29 MW (10 and 100 million Btu/hr).

(2) Residual oil-fired affected facilities with heat input capacities between 2.9 and 8.7 MW (10 and 30 million Btu/hr).

(3) Coal-fired facilities with heat input capacities between 2.9 and 8.7 MW (10 and 30 million Btu/hr).

(i) The SO2 emission limits, fuel oil sulfur limits, and percent reduction requirements under this section apply at all times, including periods of startup, shutdown, and malfunction.

(j) Only the heat input supplied to the affected facility from the combustion of coal and oil is counted under this section.

No credit is provided for the heat input to the affected facility from wood or other fuels or for heat derived from exhaust gases from other sources, such as stationary gas turbines, internal combustion engines, and kilns.

§ 60.43c Standard for particulate matter.

(a) On and after the date on which the initial performance test is completed or required to be completed under § 60.8 of this part, whichever date comes first, no owner or operator of an affected facility that combusts coal or combusts mixtures of coal with other fuels and has a heat input capacity of 8.7 MW (30 million Btu/hr) or greater, shall cause to be discharged into the atmosphere from that affected facility any gases that contain PM in excess of the following emission limits:

(1) 22 ng/J (0.05 lb/million Btu) heat input if the affected facility combusts only coal, or combusts coal with other fuels and has an annual capacity factor for the other fuels of 10 percent (0.10) or less.

(2) 43 ng/J (0.10 lb/million Btu) heat imput if the affected facility combusts coal with other fuels, has an annual capacity factor for the other fuels greater than 10 percent (0.10), and is subject to a federally enforceable requirement limiting operation of the affected facility to an annual capacity factor greater than 10 percent (0.10) for fuels other than coal.

(b) On and after the date on which the initial performance test is completed or required to be completed under § 60.8 of this part, whichever date comes first, no owner or operator of an affected facility that combusts wood or combusts mixtures of wood with other fuels (except coal) and has a heat input capacity of 8.7 MW (30 million Btu/hr) or greater, shall cause to be discharged into the atmosphere from that affected facility any gases that contain PM in excess of the following emissions limits:

(1) 43 ng/J (0.10 lb/million Btu) heat input if the affected facility has an annual capacity factor for wood greater than 30 percent (0.30); or

(2) 130 ng/J (0.30 lb/million Btu) heat input if the affected facility has an annual capacity factor for wood of 30 percent (0.30) or less and is subject to a

federally enforceable requirement limiting operation of the affected facility to an annual capacity factor for wood of 30 percent (0.30) or less.

(c) On and after the date on which the initial performance test is completed or required to be completed under § 60.8 of this part, whichever date comes first, no owner or operator of an affected facility that combusts coal, wood, or oil and has a heat input capacity of 8.7 MW (30 million Btu/hr) or greater shall cause to be discharged into the atmosphere from that affected facility any gases that exhibit greater than 20 percent opacity (6-minute average), except for one 6-minute period per hour of not more than 27 percent opacity.

(d) The PM and opacity standards under this section apply at all times, except during periods of startup, shutdown, or malfunction.

§ 60.44c Compliance and performance test methods and procedures for sulfur dioxide.

(a) Except as provided in paragraphs (g) and (h) of this section and in § 60.8(b), performance tests required under § 60.8 shall be conducted following the procedures specified in paragraphs (b), (c), (d), (e), and (f) of this section, as applicable. Section 60.8(f) does not apply to this section. The 30-day notice required in § 60.8(d) applies only to the initial performance test unless otherwise specified by the Administrator.

(b) The initial performance test required under § 60.8 shall be conducted over 30 consecutive operating days of the steam generating unit. Compliance with the percent reduction requirements and SO2 emission limits under § 60.42c shall be determined using a 30-day average. The first operating day included in the initial performance test shall be scheduled within 30 days after achieving the maximum production rate at which the affect facility will be operated, but not later than 180 days after the initial startup of the facility. The steam generating unit load during the 30-day period does not have to be the maximum design heat input capacity, but must be representative of future operating conditions.

(c) After the initial performance test required under paragraph (b) and § 60.8, compliance with the percent reduction requirements and SO2 emission limits under § 60.42c is based on the average percent reduction and the average S02 emission rates for 30 consecutive steam generating unit operating days. A separate performance test is completed at the end of each steam generating unit operating day, and a new 30-day average percent reduction and SO2 emission rate are calculated to show compliance with the standard.

(d) If only coal, only oil, or a mixture of coal and oil is combusted in an affected facility, the procedures in Method 19 are used to determine the hourly SO2 emission rate (Eho) and the 30-day average SO2 emission rate (Eao). The hourly averages used to compute the 30-day averages are obtained from the continuous emission monitoring system (CEMS). Method 19 shall be used to calculate Eao when using daily fuel sampling or Method 6B.

(e) If coal, oil, or coal and oil are combusted with other fuels:

(1) An adjusted Eho (Ehoo) is used in Equation 19-19 of Method 19 to compute the adjusted Eao (Eaoo). The Ehoo is computed using the following formula:

Ehoo=[Eho-Ew(1-Xk)]/Xk

where:

Ehoo is the adjusted Eho, ng/J (lb/million Btu)

Eho is the hourly SO2 emission rate, ng/J (lb/million Btu)

Ew is the SO2 concentration in fuels other than coal and oil combusted in the affected facility, as determined by fuel sampling and analysis procedures in Method 9, ng/J (lb/million Btu). The value Ew for each fuel lot is used for each hourly average during the time that the lot is being combusted. The owner or operator does not have to measure Ew if the owner or operator elects to assume Ew=0.

Xk is the fraction of the total heat input from fuel combustion derived from coal and oil, as determined by applicable procedures in Method 19.

(2) The owner or operator of an affected facility that qualifies under the provisions of § 60.42c(c) or (d) [where percent reduction is not required] does not have to measure the parameters Ew or Xk if the owner or operator of the affected facility elects to measure emission rates of the coal or oil using the fuel sampling and analysis procedures under Method 19.

(f) Affected facilities subject to the percent reduction requirements under § 60.42c(a) or (b) shall determine compliance with the SO2 emission limits under § 60.42c pursuant to paragraphs (d) or (e) of this section, and shall determine compliance with the percent reduction requirements using the following procedures:

(1) If only coal is combusted, the percent of potential SO2 emission rate is computed using the following formula:

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$$\%Ps=100(1-\%Rg/100)(1-\%Rf/100)$$

where

%Ps is the percent of potential SO2 emission rate, in percent

%Rg is the SO2 removal efficiency of the control device as determined by Method 19, in percent

%Rf is the SO2 removal efficiency of fuel pretreatment as determined by Method 19, in percent

(2) If coal, oil, or coal and oil are combusted with other fuels, the same procedures required in paragraph (f)(1) of this section are used, except as provided for in the following:

(i) To compute the %Ps, an adjusted %Rg (%Rgo) is computed from Eaoo from paragraph (e)(1) of this section and an adjusted average SO2 inlet rate (Eaio) using the following formula:

$$\%Rgo=100\ [1.0-Eaoo/Eaio)]$$

where:

%Rgo is the adjusted %Rg, in percent

Eaoo is the adjusted Eao, ng/J (lb/million Btu)

Eaio is the adjusted average SO2 inlet rate, ng/J (lb/million Btu)

(ii) To compute Eaio, an adjusted hourly SO2 inlet rate (Ehio) is used. The Ehio is computed using the following formula:

$$Ehio=[Ehi-Ew\ (1-Xk)]/Xk$$

where:

Ehio is the adjusted Ehi, ng/J (lb/million Btu)

Ehi is the hourly SO2 inlet rate, ng/J (lb/million Btu)

Ew is the SO2 concentration in fuels other than coal and oil combusted in the affected facility, as determined by fuel sampling and analysis procedures in Method 19, ng/J (lb/million Btu). The value Ew for each fuel lot is used for each hourly average during the time that the lot is being combusted. The owner or operator does not have to measure Ew if the owner or operator elects to assume Ew = O.

Xk is the fraction of the total heat input from fuel combustion derived from coal and oil, as determined by applicable procedures in Method 19.

(g) For oil-fired affected facilities where the owner or operator seeks to demonstrate compliance with the fuel oil sulfur limits under § 60.42c based on shipment fuel sampling, the initial performance test shall consist of sampling and analyzing the oil in the initial tank of oil to be fired in the steam generating unit to demonstrate that the oil contains 0.5 weight percent sulfur or less. Thereafter, the owner or operator of the affected facility shall sample the oil in the fuel tank after each new shipment of oil is received, as described under § 60.46c(d)(2).

(h) For affected facilities subject to §60.42c(h)(1), (2), or (3) where the owner or operator seeks to demonstrate compliance with the SO2 standards based on fuel supplier certification, the performance test shall consist of the certification, the certification from the fuel supplier, as described under § 60.48c(f)(1), (2), or (3), as applicable.

(i) The owner or operator of an affected facility seeking to demonstrate compliance with the SO2 standards under § 60.42c(c)(2) shall demonstrate the maximum design heat input capacity of the steam generating unit by operating the steam generating unit at this capacity for 24 hours. This demonstration shall be made during the initial performance test, and a subsequent demonstration may be requested at any other time. If the demonstrated 24-hour averaged firing rate for the affected facility is less than the maximum design heat input capacity stated by the manufacturer of the affected facility, the demonstrated 24-hour average firing rate shall be used to determine the annual capacity factor for the affected facility; otherwise, the maximum design heat input capacity provided by the manufacturer shall be used.

(j) The owner or operator of an affected facility shall use all valid SO2 emissions data in calculating %Ps and Eho under paragraphs (d), (e), or (f) of this section, as applicable, whether or not the minimum emissions data requirements under §60.46c(f) are achieved. All valid emissions data, including valid data collected during periods of startup, shutdown, and malfunction, shall be used in calculating %Ps or Eho pursuant to paragraphs (d), (e), or (f) of this section, as applicable.

§ 60.45c Compliance and performance test methods and procedures for particulate matter.

(a) The owner or operator of an affected facility subject to the PM and/or opacity standards under § 60.43c shall conduct an initial performance test as required under § 60.8, and shall conduct subsequent performance tests as requested by the Administrator, to determine compliance with the standards using the following procedures and reference methods.

(1) Method 1 shall be used to select the sampling site and the number of traverse sampling points. The sampling time for each run shall be at least 120 minutes and the minimum sampling volume shall be 1.7 dry square cubic meters (dscm) [60 dry square

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cubic feet (dscf)] except that smaller sampling times or volumes may be approved by the Administrator when necessitated by process variables or other factors.

(2) Method 3 shall be used for gas analysis when applying Method 5, Method 5B, of Method 17.

(3) Method 5, Method 5B, or Method 17 shall be used to measure the concentration of PM as follows:

(i) Method 5 may be used only at affected facilities without wet scrubber systems.

(ii) Method 17 may be used at affected facilities with or without wet scrubber systems provided the stack gas temperature does not exceed a temperature of 160 °C (320 °F). The procedures of Sections 2.1 and 2.3 of Method 5B may be used in Method 17 only if Method 17 is used in conjuction with a wet scrubber system. Method 17 shall not be used in conjuction with a wet scrubber system if the effluent is saturated or laden with water droplets.

(iii) Method 5B may be used in conjunction with a wet scrubber system.

(4) For Method 5 or Method 5B, the temperature of the sample gas in the probe and filter holder shall be monitored and maintained at 160 °C (320 °F).

(5) For determination of PM emissions, an oxygen or carbon dioxide measurement shall be obtained simultaneously with each run of Method 5, Method 5B, or Method 17 by traversing the duct at the same sampling location.

(6) For each run using Method 5, Method 5B, or Method 17, the emission rates expressed in ng/J (lb/million Btu) heat input shall be determined using:

(i) The oxygen or carbon dioxide measurements and PM measurements obtained under this section,

(ii) The dry basis F-factor, and

(iii) The dry basis emission rate calculation procedure contained in Method 19 (appendix A).

(7) Method 9 (6-minute average of 24 observations) shall be used for determining the opacity of stack emissions.

(b) The owner or operator of an affected facility seeking to demonstrate compliance with the PM standards under § 60.43c(b)(2) shall demonstrate the maximum design heat input capacity of the steam generating unit by operating the steam generating unit at this capacity for 24 hours. This demonstration shall be made during the initial performance test, and a subsequent demonstration may be requested at any other time. If the demonstrated 24-hour average firing rate for the affected facility is less than the maximum design heat input capacity stated by the manufacturer of the affected facility, the demonstrated 24-hour average firing rate shall be used to determine the annual capacity factor for the affected facility; otherwise, the maximum design heat input capacity provided by the manufacturer shall be used.

§ 60.46c Emission monitoring for sulfur dioxide

(a) Except as provided in paragraphs (d) and (e) of this section, the owner or operator of an affected facility subject to the SO2 emission limits under § 60.42c shall install, calibrate, maintain, and operate a CEMS for measuring SO2 concentrations and either oxygen or carbon dioxide concentrations at the outlet of the SO2 control device (or the outlet of the steam generating unit if no SO2 control device is used), and shall record the output of the system. The owner or operator of an affected facility subject to the percent reduction requirements under § 60.42c shall measure SO2 concentrations and either oxygen or carbon dioxide concentrations at both the inlet and outlet of the SO2 control device.

(b) The 1-hour average SO2 emission rates measured by a CEM shall be expressed in ng/J or lb/million Btu heat input and shall be used to calculate the average emission rates under §60.42c. Each 1-hour average SO2 emission rate must be based on at least 30 minutes of operation and include at least 2 data points representing two 15-minute periods. Hourly SO2 emission rates are not calculated if the affected facility is operated less than 30 minutes in a 1-hour period and are not counted toward determination of a steam generating unit operating day.

(c) The procedures under § 60.13 shall be followed for installation, evaluation, and operation of the CEMS.

(1) All CEMS shall be operated in accordance with the applicable procedures under Performance Specifications 1, 2, and 3 (Appendix B).

(2) Quarterly accuracy determinations and daily calibration drift tests shall be performed in accordance with Procedure 1 (Appendix F).

(3) For affected facilities subject to the percent reduction requirements under §60.42c, the span value of the SO2 CEMS at the inlet to the SO2 control device shall be 125 percent of the maximum estimated hourly potential SO2 emission rate of the fuel combusted, and the span value of the SO2 CEMS at the outlet from the SO2 control device shall be 50 percent of the maximum estimated hourly potential SO2 emission rate of the fuel combusted.

(4) For affected facilities that are not subject to the percent reduction requirements of § 60.42c, the span value of the SO2 CEMS at the outlet from the SO2 control device (or outlet of the steam generating unit if no SO2 control device is used) shall be 125 percent of the maximum estimated hourly potential SO2 emission rate of the fuel combusted.

(d) As an alternative to operating a CEMS at the inlet to the SO2 control device (or outlet of the steam generating unit if no SO2 control device is used) as required under paragraph (a) of this section, an owner or operator may elect to determine the average SO2 emission rate by sampling the fuel prior to combustion. As an alternative to operating a CEM at the outlet from the SO2 control device (or outlet of the steam generating unit if no SO2 control device is used) as required under paragraph (a) of this section, an owner or operator may elect to determine the average SO2 emission rate by using Method 6B. Fuel sampling shall be conducted pursuant to either paragraph (d)(1) or (d)(2) of this section. Method 6B shall be conducted pursuant to paragraph (d)(3) of this section.

(1) For affected facilities combusting coal or oil, coal or oil samples shall be collected daily in an as-fired condition at the inlet to the steam generating unit and analyzed for sulfur content and heat content according the Method 19. Method 19 provides procedures for converting these measurements into the format to be used in calculating the average SO2 input rate.

(2) As an alternative fuel sampling procedure for affected facilities combusting oil, oil samples may be collected from the fuel tank for each steam generating unit immediately after the fule tank is filled and before any oil is combusted. The owner or operator of the affected facility shall analyze the oil sample to determine the sulfur content of the oil. If a partially empty fuel tank is refilled, a new sample and analysis of the fuel in the tank would be required upon filling. Results of the fuel analysis taken after each new shipment of oil is received shall be used as the daily value when calculating the 30-day rolling average until the next shipment is received. If the fuel analysis shows that the sulfur content in the fuel tank is greater than 0.5 weight percent sulfur, the owner or operator shall ensure that the sulfur content of subsequent oil shipments is low enough to cause the 30-day rolling average sulfur content to be 0.5 weight percent sulfur or less.

(3) Method 6B may be used in lieu of CEMS to measure SO2 at the inlet or outlet of the SO2 control system. An initial stratification test is required to verify the adequacy of the Method 6B sampling location. The stratification test shall consist of three paired runs of a suitable SO2 and carbon dioxide measurement train operated at the candidate location and a second similar train operated according to the procedures in § 3.2 and the applicable procedures in section 7 of Performance Specification 2 (Appendix B). Method 6B, Method 6A, or a combination of Methods 6 and 3 or Methods 6C and 3A are suitable measurement techniques. If Method 6B is used for the second train, sampling time and timer operation may be adjusted for the stratification test as long as an adequate sample volume is collected; however, both sampling trains are to be operated similarly. For the location to be adequate for Method 6B 24-hour tests, the mean of the absolute difference between the three paired runs must be less than 10 percent (0.10).

(e) The monitoring requirements of paragraphs (a) and (d) of this section shall not apply to affected facilities subject to § 60.42c(h) (1), (2), or (3) where the owner or operator of the affected facility seeks to demonstrate compliance with the SO2 standards based on fuel supplier certification, as described under § 60.48c(f) (1), (2), or (3), as applicable.

(f) The owner or operator of an affected facility operating a CEMS pursuant to paragraph (a) of this section, or conducting as-fired fuel sampling pursuant to paragraph (d)(1) of this section, shall obtain emission data for at least 75 percent of the operating hours in at least 22 out of 30 successive steam generating unit operating days. If this minimum data requirement is not met with a single monitoring system, the owner or operator of the affected facility shall supplement the emission data with data collected with other monitoring systems as approved by the Administrator.

§ 60.47c Emission monitoring for particulate matter.

(a) The owner or operator of an affected facility combusting coal, residual oil, or wood that is subject to the opacity standards under § 60.43c shall install, calibrate, maintain, and operate a CEMS for measuring the opacity of the emissions discharged to the atmosphere and record the output of the system.

(b) All CEMS for measuring opacity shall be operated in accordance with the applicable procedures under Performance Specification 1 (appendix B). The span value of the opacity CEMS shall be between 60 and 80 percent.

§ 60.48c Reporting and recordkeeping requirements.

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(a) The owner or operator of each affected facility shall submit notification of the date of construction or reconstruction, anticipated startup, and actual startup, as provided by § 60.7 of this part. This notification shall include:

(1) The design heat input capacity of the affected facility and identification of fuels to be combusted in the affected facility.

(2) If applicable, a copy of any Federally enforceable requirement that limits the annual capacity factor for any fuel or mixture of fuels under § 60.42c, or § 60.43c.

(3) The annual capacity factor at which the owner or operator anticipates operating the affected facility based on all fuels fired and based on each individual fuel fired.

(4) Notification if an emerging technology will be used for controlling SO2 emissions. The Administrator will examine the description of the control device and will determine whether the technology qualifies as an emerging technology. In making this determination, the Administrator may require the owner or operator of the affected facility to submit additional information concerning the control device. The affected facility is subject to the provisions of § 60.42c(a) or (b)(1), unless and until this determination is made by the Administrator.

(b) The owner or operator of each affected facility subject to the SO2 emission limits of § 60.42c, or the PM or opacity limits of § 60.43c, shall submit to the Administrator the performance test data from the initial and any subsequent performance tests and, if applicable, the performance evaluation of the CEMS using the applicable performance specifications in appendix B.

(c) The owner or operator of each coal-fired, residual oil-fired, or wood-fired affected facility subject to the opacity limits under § 60.43c(c) shall submit excess emission reports for any calendar quarter for which there are excess emissions from the affected facility. If there are no excess emissions during the calendar quarter, the owner or operator shall submit a report semiannually stating that no excess emissioins occurred during the semiannual reporting period. The initial quarterly report shall be postmarked by the 30th day of the third month following the completion of the initial performance test, unless no excess emissions occur during that quarter. The initial semiannual report shall be postmarked by the 30th day of the sixth month following the completion of the initial performance test, or following the date of the previous quarterly report, as applicable. Each subsequent quarterly or semiannual report shall be postmarked by the 30th day following the end of the reporting period.

(d) The owner or operator of each affected facility subject to the SO2 emission limits, fuel oil sulfur limits, or percent reduction requirements under § 60.42c shall submit quarterly reports to the Administrator. The initial quarterly report shall be postmarked by the 30th day of the third month following the completion of the initial performance test. Each subsequenty quarterly report shall be postmarked by the 30th day following the end of the reporting period.

(e) The owner or operator of each affected facility subject to the SO2 emission limits, fuel oil sulfur limits, or percent reduction requirements under § 60.43c shall keep records and submit quarterly reports as required under paragraph (d) of this section, including the following information, as applicable.

(1) Calendar dates covered in the reporting period.

(2) Each 30-day average SO2 emission rate (ng/J or lb/million Btu), or 30-day average sulfur content (weight percent), calculated during the reporting period, ending with the last 30-day period in the quarter; reasons for any noncompliance with the emission standards; and a description of corrective actions taken.

(3) Each 30-day average percent of potential SO2 emission rate calculated during the reporting period, ending with the last 30-day period in the quarter; reasons for any noncompliance with the emission standards; and a description of corrective actions taken.

(4) Identification of any steam generating unit operating days for which SO2 or diluent (oxygen or carbon dioxide) data have not been obtained by an approved method for at least 75 percent of the operating hours; justification for not obtaining sufficient data; and a description of corrective actions taken.

(5) Identification of any times when emissions data have been excluded from the calculation of average emission rates; justification for excluding data; and a description of corrective actions taken if data have been excluded for periods other than those during which coal or oil were not combusted in the steam generating unit.

(6) Identification of the F factor used in calculations, method of determination, and type of fuel combusted.

(7) Identification of whether averages have been obtained based on CEMS rather than manual sampling methods.

(8) If a CEMS is used, identification of any times when the pollutant concentration exceeded the full span of the CEMS.

(9) If a CEMS is used, description of any modifications to the CEMS that could affect the

ability of the CEMS to comply with Performance Specifications 2 or 3 (appendix B).

(10) If a CEMS is used, results of daily CEMS drift tests and quarterly accuracy assessments as required under appendix F, Procedure 1.

(11) If fuel supplier certification is used to demonstrate compliance, records of fuel supplier certification as described under paragraph (f)(1), (2), or (3) of this section, as applicable. In addition to records of fuel supplier certifications, the quarterly report shall include a certified statement signed by the owner or operator of the affected facility that the records of fuel supplier certifications submitted represent all of the fuel combusted during the quarter.

(f) Fuel supplier certification shall include the following information:

(1) For distillate oil:

(i) The name of the oil supplier; and

(ii) A statement from the oil supplier that the oil complies with the specifications under the definition of distillate oil in §60.41c.

(2) For residual oil:

(i) The name of the oil supplier;

(ii) The location of the oil when the sample was drawn for analysis to determine the sulfur content of the oil, specifically including whether the oil was sampled as delivered to the affected facility, or whether the sample was drawn from oil in storage at the oil supplier's or oil refiner's facility, or other location;

(iii) The sulfur content of the oil from which the shipment came (or of the shipment itself); and

(iv) The method used to determine the sulfur content of the oil.

(3) For coal:

(i) The name of the coal supplier;

(ii) The location of the coal when the sample was collected for analysis to determine the properties of the coal, specifically including whether the coal was sampled as delivered to the affected facility or whether the sample was collected from coal in storage at the mine, at a coal preparation plant, at a coal supplier's facility, or at another location. The certification shall include the name of the coal mine (and coal seam), coal storage facility, or coal preparation plant (where the sample was collected);

(iii) The results of the analysis of the coal from which the shipment came (or of the shipment itself) including the sulfur content, moisture content, ash content, and heat content; and

(iv) The methods used to determine the properties of the coal.

(g) The owner or operator of each affected facility shall record and maintain records of the amounts of each fuel combusted during each day.

(h) The owner or operator of each affected facility subject to a Federally enforceable requirement limiting the annual capacity factor for any fuel or mixture of fuels under § 60.42c or § 60.43c shall calculate the annual capacity factor individually for each fuel combusted. The annual capacity factor is determined on a 12-month rolling average basis with a new annual capacity factor calculated at the end of the calendar month.

(i) All records required under this section shall be maintained by the owner or operator of the affected facility for a period of two years following the date of such record.

Attachment F

Chronology of Permit Emission Changes			
Unit Modified	Permit #	Emission Increases Only (tpy)	Pollutant
Leachate Treatment Unit (Minor Mod)	1077AR-5	1.8	VOC
		1.4	Br_2
		0.9	Cl_2
		0.4	HBr
		0.4	HCl
Spray Dryer Unit (Minor Mod)	1077-AR-6	0.9	NO_X
Packaging & Shipping Unit (Minor Mod)		3.2	VOC
Brine Supply/Pre-Treatment &NaHS Unit (Minor Mod)		Process summary language changes are the only modifications to this section.	
TBBPA Unit		8.8	PM/PM_{10}
		2.4	VOC
HALAR/Teflon Coating Unit		0.5	PM/PM_{10}
		0.5	SO_2
		0.5	VOC
		0.5	CO
		0.9	NO_X
		0.5	Non-VOC (Methane)
		1.1	HCl
		2.4	HF
TCO Unit		0.4	Non-VOC (Methylene Chloride)

Arkansas Department of Pollution Control and Ecology
Division of Air Pollution Control

DETERMINATION OF APPLICABILITY

Name & Location: Great Lakes Chemical Corporation

Contact Name: Pete Howard

Mail Address: P.O. Box 7020

City: El Dorado State: AR Zip: 71731-7020

Process Description: Manufactures bromine and bromine related Chemicals

CSN: 70-0012 Permit No.: 1077-AR-6 Engr. G. PROFFITT

Date(s) of DOA Attempts: 6/5/96, ______, Applicable Programs: SIP ✓: PSD ___: NSPS ✓: NESHAPS: ___:
Non-Attainment ___: Air Code Only ___: Not Determinable at this time ___

EMISSION SUMMARY TOTALS (TPY)

Pollut.	Existing	Contemp. Decrease	Contemp. Increase	Net Change	Sig. Inc.	After Permit
PM10	216.6			9.3	15	225.9
SO2	5.28.0			0.5	40	528.5
NOx	671.1			1.8	40	672.9
CO	225.3			0.5	100	225.8
VOC	345.5			6.1	40	351.6
ACl OTHER	28.3			1.1		29.4
HF OTHER	–			2.4		2.4

Is facility on 28 list (100 T/Y)? [✓ YES] ___NO ___add. info.
Facility is "major Source" before permit [✓ YES] ___NO, Facility is "Major Source" after permit [✓ YES] ___NO
"Major Modification ___YES [✓ NO] ___N.A., Will facility emit toxic emissions? ___Yes ___No
Is the source within 10 km of a Class I area? ___YES [✓ NO], If Yes, is maximum impact > 1 ug/m3 (24Hr)___YES ___NO
Is facility located in a non-attainment area? ___YES [✓ NO],
For PSD/Non-Attainment Review :

	Monitoring (ug/m3-time)	Amb. Impact (ug/m3)	Mon. Req. YES / NO	BACT/LEAR
PM10				
SO2				
NOX				
CO				
VOC				
OTHER				

limits on hours of operation, feed rates, etc. are required ___Yes ___No

CERTIFICATE OF SERVICE

I, Keith A. Michaels, hereby certify that a copy of this permit has been mailed by first class mail to Great Lakes Chemical Corporation - El Dorado Plant, P.O. Box 7020, El Dorado, Arkansas 71730, on this 13th day of November, 1996.

Keith A. Michaels, Chief, Air Division