ATTACHMENT 6

SOUTHERN ENVIRONMENTAL LAW CENTER

1033 Demonbreun Street, Suite 205
Nashville, TN 37203

Telephone 615-921-9470
Facsimile 615-921-8011

October 31, 2024

Via Electronic Mail: Wasim.Khokhar@shelbycountytn.gov

Wasim Khokhar, Technical Manager
Shelby County Health Department
Air Pollution Control
1826 Sycamore View Road
Memphis, TN 38134

RE: Public Comments on Air Permit Application for Ideal Chemical and Supply Company

Dear Mr. Khokhar:

The Southern Environmental Law Center, Memphis Community Against Pollution, Young Gifted & Green, and the Chickasaw Group of the Tennessee Chapter of the Sierra Club (hereinafter "Commenters") hereby submit public comments on the September 4, 2024, air permit application from Ideal Chemical and Supply Company (hereinafter "Ideal Chemical" or "the facility"), which is currently out for public notice and comment with the Shelby County Health Department (SCHD).[1] The facility is a wholesale chemical distributor located at 4025 Air Park Street Memphis, Tennessee.

On September 29, shortly after Hurricane Helene passed through Conyers, Georgia, a fire ignited at a BioLab facility and set off a chemical reaction, sending a plume of chlorine gas into the air. [2] In response, nearly 17,000 residents had to evacuate their homes and another 90,000 residents were asked to shelter in place.[3] The chemical disaster at BioLab came about despite warnings in the form of similar accidents at that plant, a report investigating a similar incident at a BioLab facility in Louisiana,[4] and calls from the Chemical Safety Board ("CSB") for increased safety protocols to account for risks from climate change.[5] In light of the recent Biolab chemical disaster in Conyers, Georgia, we are asking Shelby County to act with the utmost caution to protect residents from a similar incident in Memphis.

Ideal Chemical's now expired permit describes 44 storage and processing tanks storing various chemicals, including VOCs. The facility is permitted as a minor source under Title V and an area source of hazardous air pollutants (HAPs). This application is for a permit renewal without any changes; Ideal Chemical claims they maintain the same processes and products. As discussed

[1] Letter from Nick Ridge, Regul. Affairs Manager, Ideal Chemical and Supply Co., to Jeffery Grill, Engineer, Major Sources Branch, Shelby Cnty. Health Dept. (Sept. 4, 2024) [hereinafter "Ideal Chemical Permit Application"], (**Attachment 1**).
[2] Katya Schwenk, *The Toxic Loophole Behind A Chemical Plant Disaster*, THE LEVER (Oct. 3, 2024), https://www.levernews.com/the-toxic-loophole-behind-a-chemical-plant-disaster/.
[3] *Id.*
[4] U.S. CHEM. SAFETY & HAZARD INVESTIGATION BD., NO. 2020-05-I-LA, TRICHLOROISOCYANURIC ACID REACTION, DECOMPOSITION, AND TOXIC GAS RELEASE AT BIO-LAB, INC. (Apr. 24, 2023), https://www.csb.gov/assets/1/6/biolab_investigation_report_2023-4-24.pdf.
[5] U.S. GOV'T ACCOUNTABILITY OFF., GAO-22-1044494, CHEMICAL ACCIDENT PREVENTION: EPA SHOULD ENSURE REGULATED FACILITIES CONSIDER RISKS FROM CLIMATE CHANGE (2022).

below, Ideal Chemical's permit application requires further detail as the proposed application is not the same as the current permit. Additionally, in order to protect the citizens of Memphis, SCHD should conduct regular inspections to ensure that the facility is operating safely to prevent a chemical disaster.

I. Ideal Chemical's application does not reflect a permit renewal without change to process or products.

Ideal Chemical's brief letter accompanying their permit renewal application states that the facility requests "renewal of the operating permits as they were previously issued."[6] However, there seems to be an accounting error in the application. The previous application lists 44 tanks, numbered one (1) to thirty-nine (39), including non-integers, fourteen of which are listed as permitted.[7] The most current application, however, has 39 tanks numbered non-consecutively from one (1) to forty-one (41), and eleven of these tanks are listed as permitted. Further, the letter states that a drawing of the tanks is included with the letter. However, there is no drawing of the tanks in the copy received by SELC as described.

These discrepancies indicate at the very least that there is insufficient information in the permit application to accurately assess if a renewal of the operating permits, as they were previously issued, is appropriate. The facility states that fewer permitted tanks are operational, and the permit should reflect this change.

II. Shelby County Health Department should conduct site investigations as permitted by the facility's operating permit to maintain a safe and clean facility and to prevent any potential chemical disasters.

Ideal Chemical distributes a vast offering of chemicals, as described on their website.[8] The facility has an EPA-required risk management plan (RMP) for ammonia.[9] However, the facility also handles chemicals that do not require a RMP by EPA, despite calls from the Chemical Safety Board to include these chemicals as hazardous and highly reactive chemicals requiring an RMP.[10] The BioLab facility in Conyers, Georgia did not have a RMP.[11] The chemical involved, trichloroisocyanuric acid (TCCA), caused the fire and release of chlorine gas, but TCCA does not require a risk management plan by EPA.[12]

---

[6] Ideal Chemical Permit Application.
[7] Shelby Cnty. Health Dept., Air Pollution Control, Ideal Chemical and Supply Co. Operating Permit, No. 00421-08P (Sept. 20, 2019), (**Attachment 2**).
[8] Ideal Chemical and Supply Co., *Chemical Products*, https://www.idealchemical.com/wp-content/uploads/2022/07/Ideal-Line-Sheet-Apr2021.pdf, (last visited Oct. 30, 2024), [hereinafter "Ideal Chemical List"], (**Attachment 3**).
[9] ENV'T PROT. AGENCY, *Risk Mgmt. Plan for Ideal Chemical and Supply Co.* (Oct. 21, 2024), (**Attachment 4**).
[10] U.S. CHEMICAL SAFETY & HAZARD INVESTIGATION BOARD, NO. 2003-15-D, INCIDENT DATA REACTIVE HAZARD INVESTIGATION (2003), (**Attachment 5**).
[11] *Supra* note 2, *Schwenk*.
[12] *Id.; see also* ENV'T. PROT. AGENCY, *List of Regulated Substances under the Risk Management Program* (June 5, 2024), https://www.epa.gov/rmp/list-regulated-substances-under-risk-management-program.

In a 2003 report, the CSB investigated 167 chemical incidents listing the chemicals involved and highlighting those that do not require an RMP.[13] A number of the chemicals in that report are handled by Ideal Chemical, namely: sodium hydrosulfite, acetic anhydride, aluminum chloride, and sodium hypochlorite, which is listed to be on site in tank 14.[14] Sodium hypochlorite decomposes if heated under light, or if it comes into contact with an acid.[15] In the material safety data sheet for another facility, the facility cautions that "use of water spray when fighting fire may be inefficient."[16] Under any decomposition, sodium hypochlorite releases chlorine gas. Chlorine gas is the chemical released at BioLab that required evacuation and shelter in place orders in the community. Shelby County Health Department must ensure that these chemicals are handled properly at Ideal Chemical.

The BioLab facility had other chemical incidents. Maya Nye of Coming Clean, a nonprofit working in chemical industry oversight, stated '"We know that when there are multiple incidents at a facility, it's more likely that another incident is going to occur . . . It's a sign that there will be another one. It's just a matter of when.'"[17] Therefore, a facility with past violations should be more closely monitored to protect the community.

Though Ideal Chemical has not had a disaster on the scale of those at BioLab, it has had a history of noncompliance with environmental and safety regulations. In September of this year, Ideal Chemical received an informal warning from Shelby County Health Department for a clean air act violation, for failure to timely renew their operating permit.[18] According to the Bureau of Labor Statistics, Ideal Chemical has consistently had a higher incidence rate of nonfatal workplace injuries under OSHA than other facilities under the same NAICS codes for 2022.[19] Further, in 22 inspections on Ideal Chemical's trucks from 2022-2024, the Federal Motor Carrier Safety Administration found seven (7) violations for improper handling of hazardous materials. Ideal Chemical has had a pattern of negligence resulting in injuries and chemical safety violations. Ideal Chemical and the Memphis community could benefit from additional oversight to ensure compliance with environmental and safety regulations.

Finally, Shelby County has the authority to inspect Ideal Chemical to ensure compliance and safety. In order to carry out the Memphis Air Pollution Control Code, health department employees are "permitted at all reasonable times to enter into any manufacturing plants, business

---

[13] U.S. CHEMICAL SAFETY & HAZARD INVESTIGATION BOARD, NO. 2003-15-D, INCIDENT DATA REACTIVE HAZARD INVESTIGATION (2003).
[14] Ideal Chemical List; Ideal Chemical Permit Application.
[15] INT'L LABOUR ORG. & WORLD HEALTH ORG., ICSC 0482, SODIUM HYPOCHLORITE (2017). This code is for sodium hypochlorite solutions with less than 10% active chlorine.
[16] Spectrum Chemical, *Safety Data Sheet* (Nov. 3, 2022), https://www.spectrumchemical.com/media/sds/S1316_AGHS.pdf?srsltid=AfmBOoqU9yQB_NLCIuoVhLgdL4fcGU4y6RGcPLOaJ6eskA5VGc6dfuIb.
[17] *Supra* note 2, *Schwenk*.
[18] *See* ENV'T PROT. AGENCY, *Detailed Facility Report*, https://echo.epa.gov/detailed-facility-report?fid=110069992084 (last visited Oct. 27, 2024).
[19] U.S. BUREAU OF LABOR STATISTICS, *Injuries, Illnesses, and Fatalities* (Nov. 8, 2023), https://www.bls.gov/web/osh/table-1-industry-rates-national.htm.

buildings or other buildings, and all lots, grounds and premises, in order to thoroughly examine any items in relation to public health and air pollution thereon and therein."[20]

In order to keep Memphians safe from the threat of a chemical disaster, Shelby County should ensure compliance with environmental and safety regulations at Ideal Chemical.

III. Shelby County Health Department should consider the cumulative impact on the health of Memphians.

SCHD hasn't yet incorporated cumulative impact analysis officially into their air permitting decision-making framework; however, in a May 2023 newsletter, Shelby County Health Department pledged their "commit[ment] to creating cleaner air for everyone by righting historic wrongs and integrating environmental justice into all programs, policies and activities."[21] Cumulative impacts analysis has been held out as a powerful tool to correct environmental injustice. The EPA guidance, Legal Tools to Advance Environmental Justice, points out that cumulative impacts have been a concern of environmental justice communities for decades.[22] SCHD should incorporate cumulative impact analysis into their permitting decisions to protect Memphians.

Other local permitting authorities have already opted to incorporate cumulative impact analysis into their decisions. Massachusetts has required its permitting authority to consider cumulative impact in their analysis of air quality permits.[23] In 2023, twelve states proposed legislation attempting to address cumulative impacts of pollution acknowledging the increased burden of pollution on People of Color, low-income, and limited English proficiency communities.[24] This is in line with EPA's recent guidance on how to incorporate cumulative impact analysis into all permitting decisions.[25] When discussing cumulative impacts from hazardous air pollutants, the EPA guidance states that EPA is required "to assess risk to public health that remains after implementation of a National Emission Standard for Hazardous Air Pollutants . . . and to determine whether additional standards. . . are necessary to provide ample margin of safety to protect public health."[26]

---

[20] Memphis Shelby Cnty. Code 9-12-11.
[21] Shelby Cnty. Health Dept., Monthly E-Newsletter, "Shelby County Celebrates Clean Air Month" (May 2023), https://www.shelbytnhealth.com/CivicSend/ViewMessage/message/201088.
[22] *See* ENV'T PROT. AGENCY, *EPA Legal Tools To Advance Environmental Justice* at 6 (May 2022), https://www.epa.gov/ogc/epa-legal-tools-advance-environmental-justice.
[23] Mass. Dept. of Env't Prot., Press Release, *Massachusetts Becomes First State to Require Analysis of Cumulative Impacts for Air Quality Permits near Environmental Justice Populations* (Mar. 28, 2024) (available at https://www.mass.gov/news/massachusetts-becomes-first-state-to-require-analysis-of-cumulative-impacts-for-air-quality-permits-near-environmental-justice-populations).
[24] NAT'L CAUCUS OF ENV'T LEGISLATORS, *U.S. States Begin 2023 by Introducing Bills to Address Cumulative Impacts of Pollution* (Apr. 3, 2023), https://www.ncelenviro.org/articles/u-s-states-begin-2023-by-introducing-bills-to-address-cumulative-impacts-of-pollution/.
[25] *See* ENV'T PROT. AGENCY, *EPA Legal Tools to Advance Environmental Justice: Cumulative Impacts Addendum* (Jan. 2023), https://www.epa.gov/system/files/documents/2022-12/bh508-Cumulative%20Impacts%20Addendum%20Final%202022-11-28.pdf.
[26] *Id*. at 9.

The community around Ideal Chemical is subject to the burden of many air pollution sources. According to EJScreen, in the two-mile radius surrounding the facility, there are 22 sources of air pollution reporting to EPA.[27] Additionally, the community is burdened by air pollution from the Memphis International Airport, which is the second-busiest cargo airport in the World.[28] All of these sources affect the air quality in the community; EJScreen reports that the EJ index for toxic releases to air are in the 97th percentile nationally and RMP facility proximity is in the 95th percentile nationally.

EPA guidance states that non-pollutant stressors also contribute to cumulative impacts and include "indicators of sensitive populations . . . and socioeconomic factors."[29] The two-mile ring surrounding the facility is predominately people of color at 94%.[30] Additionally, the unemployment rate in the same 2-mile ring is considerably higher than the state and national average at 13%.[31] This facility is one of many air pollution sources around the Airport. In order to back up the Department's commitment to environmental justice, the impacts of this facility must be considered cumulatively.

Conclusion

We appreciate the opportunity to provide input on Ideal Chemical and Supply Company's air permit application. As discussed above, however, the facility has not accurately accounted for differences between this application and their last permit. Further, SCHD should ensure that environmental and safety regulations are met through regular inspections in order to protect the community from harm of a possible chemical disaster. In order to consider environmental justice, SCHD should consider the cumulative impacts of all nearby air pollution sources before permitting this facility. Finally, we ask that SCHD provide notification of any future actions related to this facility, as well as SCHD's response to the comments, to the undersigned.

---

[27] *See* ENV'T PROT. AGENCY, *EJScreen Community Report for 2-mile ring surrounding Ideal Chemical* 1 (Oct. 31, 2024), [hereinafter "EJScreen Report"], (**Attachment 6**).
[28] *Properties and Cargo*, MEMPHIS INT'L AIRPORT, https://flymemphis.com/properties-and-cargo/#:~:text=Memphis%20International%20Airport%20(MEM)%20is,square%20feet%20of%20ramp%20area, (last visited Oct. 30, 2024).
[29] ENV'T PROT. AGENCY, *EPA Legal Tools to Advance Environmental Justice* at 6 (May 2022), https://www.epa.gov/ogc/epa-legal-tools-advance-environmental-justice.
[30] *See* EJScreen Report.
[31] *Id.*

Respectfully submitted,

KeShaun Pearson
President
Memphis Community Against Pollution
kpearson@memphiscap.org

LaTricea D. Adams
Founder, CEO, and President
Young, Gifted & Green

Rita Harris
Chair of the Chickasaw Group
Tennessee Chapter of the Sierra Club

/s/ Sami Harrell
Sami Harrell
Southern Environmental Law Center
1033 Demonbreun Street, Suite 205
Nashville, Tennessee 37203
(615) 921-9470
sharrell@selctn.org

/s/ Patrick Anderson
Patrick J. Anderson
Southern Environmental Law Center
Ten 10th Street, NW, Suite 1050
Atlanta, Georgia 30309
(404) 521-9900
panderson@selcga.org

TABLE OF ATTACHMENTS TO COMMENTERS' OCT. 31, 2024 PUBLIC COMMENTS ON AIR PERMIT APPLICATION FOR IDEAL CHEMICAL AND SUPPLY COMPANY

Attachments available at: https://southernenvironment.sharefile.com/d-s5014e8e039b446f7851ff0fd7fe85c34

Attachment 1, Letter from Nick Ridge, Regul. Affairs Manager, Ideal Chemical and Supply Co., to Jeffery Grill, Engineer, Major Sources Branch, Shelby Cnty. Health Dept. (Sept. 4, 2024).

Attachment 2, Shelby Cnty. Health Dept., Air Pollution Control, Ideal Chemical and Supply Co. Operating Permit, No. 00421-08P (Sept. 20, 2019).

Attachment 3, Ideal Chemical and Supply Co., *Chemical Products*, https://www.idealchemical.com/wp-content/uploads/2022/07/Ideal-Line-Sheet-Apr2021.pdf, (last visited Oct. 30, 2024).

Attachment 4, ENV'T PROT. AGENCY, *Risk Mgmt. Plan for Ideal Chemical and Supply Co.* (Oct. 21, 2024).

Attachment 5, U.S. CHEMICAL SAFETY & HAZARD INVESTIGATION BOARD, NO. 2003-15-D, INCIDENT DATA REACTIVE HAZARD INVESTIGATION (2003).

Attachment 6, ENV'T PROT. AGENCY, *EJScreen Community Report for 2-mile ring surrounding Ideal Chemical* 1 (Oct. 31, 2024).

Attachment 1

RECEIVED SEP 04 2024

RECEIVED SEP

IDEAL®

Jeff Grill
Pollution Control Section - Major Sources Branch
Shelby County Health Department
1826 Sycamore View Road
Memphis, TN 38134

RE: Permit to Operate Renewal Request
Ideal Permits 00421-01P and 00421-08P

Mr. Grill,

Enclosed please find applications to renew Ideal's operating permits numbered 00421-01P and 00421-08P. I have also enclosed a drawing and list of tanks and contents.

We are requesting renewal of the operating permits as they were previously issued, our operation has not changed in the last several years. We still maintain the previous processes and products. The last three reporting years were as follows:

	PM		VOC		Total HAP		Max Single HAP	
Description	(lbs)	(tons)	(lbs)	(tons)	(lbs)	(tons)	(lbs)	(tons)
2021	2,715.60	1.36	3,987.52	1.99	406.15	0.20	0.39	0.00
2022	2,567.25	1.28	3,750.29	1.88	88.67	0.04	0.07	0.00
2023	2,715.60	1.36	3,469.99	1.73	54.51	0.03	0.07	0.00
Annual Permit Limits		25.54		15.33		<25		<10

If you have any questions please contact me.

Nick Ridge

Nick Ridge
Regulatory Affairs Manager
Ideal Chemical and Supply Company
(901)375-5543

2012
APC-2-01

SHELBY COUNTY HEALTH DEPARTMENT
POLLUTION CONTROL SECTION
1826 Sycamore Road
Memphis, TN 38134
Telephone: (901) 222-9942
FAX: (901) 222-9561

NOT TO BE USED FOR TITLE V APPLICATIONS

PERMIT APPLICATION
GENERAL INFORMATION

SCHD RECEIPT DATE

PLEASE TYPE OR PRINT AND SUBMIT IN DUPLICATE FOR EACH EMISSION SOURCE. ATTACH APPROPRIATE SOURCE DESCRIPTION FORMS.

1. ORGANIZATION'S LEGAL NAME: Ideal Chemical and Supply Company			**SCHD-APC FACILITY ID.:**
2. MAILING ADDRESS (ST/RD/P.O. BOX): 4025 Air Park Street			TENNESSEE SECRETARY OF STATE REGISTERED BUSINESS NUMBER:
CITY: Memphis	STATE: TN	ZIP CODE: 38118	PHONE WITH AREA CODE: (901)363-7720
3. PRINCIPAL TECHNICAL CONTACT AND TITLE: Nick Ridge			PHONE WITH AREA CODE: (901) 375-5543
4. SITE ADDRESS (ST/RD/HWY): 4025 Air Park Street			PHONE: (901)363-7720 / FAX:
CITY OR DISTANCE/DIRECTION TO NEAREST REFERENCE POINT: Memphis, Tennessee			ZIP CODE: 38118 / E-MAIL:

5. NORTH AMERICAN INDUSTRIAL CLASSIFICATION SYSTEM (NAICS) 424690

PRIMARY X SECONDARY ____ TERTIARY ____ QUATERNARY ____

6. BRIEF DESCRIPTION OF EMISSION SOURCE(S). INCLUDE AN OVERALL FACILITY PLOT PLAN INDICATING THE EMISSION SOURCE LOCATION WITHIN THE PLANT:

Permit 00421-08P - Batch Liquid Mixing Process and Loading of Liquid Materials from Storage Tank, Mixing Tanks and Tank trucks to tank trucks and various Sizes of totes.

7. TYPE OF PERMIT REQUESTED

- ☐ NEW CONSTRUCTION
- ☐ MODIFICATION
- ☐ PERMIT TO OPERATE (INITIALREQUEST-NO PREVIOUS PERMITS)
- ☐ PERMIT TO OPERATE (INITIALREQUEST-CONSTRUCTION PERMIT PREVIOUSLY ISSUED)
- ☑ PERMIT TO OPERATE (RENEWAL REQUEST)
- ☐ CHANGE OF LOCATION (PORTABLE AND/OR PERMANENT)
- ☐ CHANGE OF NAME AND/OR OWNERSHIP

ESTIMATED COST OF EQUIPMENT OR MODIFICATION: $NA

AIR POLLUTION CONTROL EQUIPMENT COST: $NA

BASIC EQUIPMENT COSTS: $NA

FOR NEW CONSTRUCTION, MODIFICATION, CHANGE OF LOCATION, CHANGE OF NAME AND/OR OWNERSHIP, PROVIDE THE ESTIMATED STARTING AND COMPLETION DATES: NA

PREVIOUS LOCATION OR LOCATION MOVING FROM, PREVIOUS NAME AND/OR OWNER , IF APPLICABLE (FOR PORTABLE AND NON-PORTABLE SOURCES): NA

PREVIOUS SOURCE NUMBER(S) AND PERMIT NUMBER(S) IF APPLICABLE: 00421-08P

8. DESCRIBE CHANGES THAT HAVE BEEN MADE TO THIS EQUIPMENT OR OPERATION SINCE THE LAST CONSTRUCTION OR OPERATING PERMIT APPLICATION:

none

9. SIGNATURE (SEE NOTE): Nick V. Ridge		DATE: 9/3/24
10. SIGNER'S NAME (TYPE OR PRINT): Nick Ridge	TITLE: Regulatory Affairs Manager	PHONE WITH AREA CODE: (901)375-5543

NOTE: APPLICATION MUST BE SIGNED TO BE PROCESSED. SIGNATURE VERIFIES THAT INFORMATION ON ALL FORMS PROVIDED IS TRUE, ACCURATE AND COMPLETE TO THE PERSON'S BEST KNOWLEDGE AND BELIEF. APPLICATIONS SHOULD BE SIGNED BY THE OWNER/OPERATOR OR SENIOR MANAGEMENT OFFICIAL

(OVER)

2012
APC-2-01

SHELBY COUNTY HEALTH DEPARTMENT
POLLUTION CONTROL SECTION
1826 Sycamore Road
Memphis, TN 38134
Telephone: (901) 222-9942
FAX: (901) 222-9561

NOT TO BE USED FOR TITLE V APPLICATIONS

PERMIT APPLICATION
GENERAL INFORMATION

SCHD RECEIPT DATE

PLEASE TYPE OR PRINT AND SUBMIT IN DUPLICATE FOR EACH EMISSION SOURCE. ATTACH APPROPRIATE SOURCE DESCRIPTION FORMS.

1. ORGANIZATION'S LEGAL NAME: Ideal Chemical and Supply Company			**SCHD-APC FACILITY ID.:**
2. MAILING ADDRESS (ST/RD/P.O. BOX): 4025 Air Park Street			TENNESSEE SECRETARY OF STATE REGISTERED BUSINESS NUMBER:
CITY: Memphis	STATE: TN	ZIP CODE: 38118	PHONE WITH AREA CODE: (901)363-7720
3. PRINCIPAL TECHNICAL CONTACT AND TITLE: Nick Ridge			PHONE WITH AREA CODE: (901) 375-5543
4. SITE ADDRESS (ST/RD/HWY): 4025 Air Park Street			PHONE: (901)363-7720 / FAX:
CITY OR DISTANCE/DIRECTION TO NEAREST REFERENCE POINT: Memphis, Tennessee			ZIP CODE: 38118 / E-MAIL:

5. NORTH AMERICAN INDUSTRIAL CLASSIFICATION SYSTEM (NAICS) 424690

PRIMARY X _____ TERTIARY _____
SECONDARY _____ QUATERNARY _____

6. BRIEF DESCRIPTION OF EMISSION SOURCE(S). INCLUDE AN OVERALL FACILITY PLOT PLAN INDICATING THE EMISSION SOURCE LOCATION WITHIN THE PLANT:

Permit 00421-01P - Unloading, Blending and Packaging of Dry (Solid or Powder) Materials (Insignificant Units : 2-30 HP Boilers and 1-30 kW emergency generator)

7. TYPE OF PERMIT REQUESTED

- ☐ NEW CONSTRUCTION
- ☐ MODIFICATION
- ☐ PERMIT TO OPERATE (INITIALREQUEST-NO PREVIOUS PERMITS)
- ☐ PERMIT TO OPERATE (INITIALREQUEST-CONSTRUCTION PERMIT PREVIOUSLY ISSUED)
- ☑ PERMIT TO OPERATE (RENEWAL REQUEST)
- ☐ CHANGE OF LOCATION (PORTABLE AND/OR PERMANENT)
- ☐ CHANGE OF NAME AND/OR OWNERSHIP

ESTIMATED COST OF EQUIPMENT OR MODIFICATION: $NA

AIR POLLUTION CONTROL EQUIPMENT COST: $NA

BASIC EQUIPMENT COSTS: $NA

FOR NEW CONSTRUCTION, MODIFICATION, CHANGE OF LOCATION, CHANGE OF NAME AND/OR OWNERSHIP, PROVIDE THE ESTIMATED STARTING AND COMPLETION DATES: NA

PREVIOUS LOCATION OR LOCATION MOVING FROM, PREVIOUS NAME AND/OR OWNER , IF APPLICABLE (FOR PORTABLE **AND** NON-PORTABLE SOURCES): NA

PREVIOUS SOURCE NUMBER(S) AND PERMIT NUMBER(S) IF APPLICABLE: 00421-01P

8. DESCRIBE CHANGES THAT HAVE BEEN MADE TO THIS EQUIPMENT OR OPERATION SINCE THE LAST CONSTRUCTION OR OPERATING PERMIT APPLICATION:

none

9. SIGNATURE (SEE NOTE): Nick V. Ridge		DATE: 9/3/24
10. SIGNER'S NAME (TYPE OR PRINT): Nick Ridge	TITLE: Regulatory Affairs Manager	PHONE WITH AREA CODE: (901)375-5543

NOTE: APPLICATION MUST BE SIGNED TO BE PROCESSED. SIGNATURE VERIFIES THAT INFORMATION ON ALL FORMS PROVIDED IS TRUE, ACCURATE AND COMPLETE TO THE PERSON'S BEST KNOWLEDGE AND BELIEF. APPLICATIONS SHOULD BE SIGNED BY THE OWNER/OPERATOR OR SENIOR MANAGEMENT OFFICIAL

(OVER)

Ideal Chemical and Supply Company ASTs			8/28/2024				
Tank#	**Product Description**	**Diameter**	**Height**	**Ideal**	**Construction**	**Status**	
				Capacity	**Material**		
		(ft)	**(ft)**	**(gal)**			
1	Caustic Soda Liquid 50%	30	24	125,000	Steel	Permitted	Non VOC
2	Caustic Soda Liq 50% Membrane	12	24	12,000	Steel	Exempt	Non VOC
3	Empty / Blend Tank	10	10	4,000	Steel	Exempt	Non VOC
4	Caustic Potash 45%	12	24	20,000	Steel	Exempt	Non VOC
27	Caustic Potash 45%	12	24	20,000	Steel	Exempt	Non VOC
5	Rampage (<40% NaOH)	10	12	10,000	Polyethylene	Exempt	Non VOC
6	Versene 100	10	12	6,500	Polyethylene	Exempt	Non VOC
7	Aqua Ammonia	10	14	7,900	Polyethylene	Exempt	Non VOC
8	Drum Wash Tank	Process			Polyethylene	Exempt	Non VOC
9	Acetic Acid Glacial	10	10.3	8,000	Polyethylene	Permitted	VOC
10	Isoproponol	12	24	20,000	Steel	Permitted	VOC
11	Isoproponol	12	24	20,000	Steel	Permitted	VOC
12	Muratic Acid 20'	10	17	8,500	Polyethylene	Exempt	Non VOC
13	Sulfuric Acid 66'	10	16.5	4,000	Polyethylene	Exempt	Non VOC
14	Sodium Hypochlirite	10	17	8,500	XL Polyethlene	Exempt	Non VOC
15	Ethyl Alochol 200 (west Tank)	12	24	20,000	Steel	Permitted	VOC
16	Butyl Cellosolve	12	24	20,000	Steel	Permitted	VOC
17	n-Propanol	12	24	20,000	Steel	Permitted	VOC
18	Ethyl Acetate	12	24	20,000	Steel	Permitted	VOC
19	Proponol/Propyl Acetate 80/20	12	24	20,000	Steel	Permitted	VOC
20	Proponol/Propyl Acetate 80/20	12	24	20,000	Steel	Permitted	VOC
21	Empty	6	12	2,538	Stainless Steel	NA	NA
22	Empty	6	12	2,538	Stainless Steel	NA	NA
23	Empty	6	12	2,538	Stainless Steel	NA	NA
24	Empty	6	12	2,538	Stainless Steel	NA	NA
25	Hydrogen Peroxide 30%	10	11	8,000	Polyethylene	Exempt	Non VOC
26	Hydrogen Peroxide 50%	11	11.5	8,000	Aluminum	Exempt	Non VOC
30	Soda Ash Light Grade 100 (LT 39)	Silo		4,582	Steel	Exempt	Non VOC
31	NP-9 Surfactant	11.92	9.67	8,046	Polyethylene	Exempt	Non VOC
32	Maxfac DDBSA	10	14	8,206	Polyethylene	Exempt	VOC
33	Lauramidopropyl Betaine	10.5	16	10,339	Steel	Exempt	Non VOC
34	Maxfac SXS 40%	10	10	4,200	FRP	Exempt	Non VOC
35	Citric Acid 50%	10	11	5,500	Polyethylene	Exempt	Non VOC
36	Propylene glycol USP	9.5	15	8,000	Stainless Steel	Exempt	Non VOC
37	Liquid Room Blend Tank	Process		6,000	Stainless Steel	Exempt	NA
38	Liquid Room Blend Tank	Process		1,100	Stainless Steel	Exempt	NA
39	Liquid Room Blend Tank Small	Process		3,800	Stainless Steel	Exempt	NA
40	NP-4	12	24	20,000	Steel	Permitted	Non VOC
41	NP-4	12	24	20,000	Steel	Permitted	Non VOC

All tanks have 110% secondary containment excapt process tanks

Attachment 2

AIR POLLUTION CONTROL

Shelby County Health Department

Public Health
Prevent. Promote. Protect.

OPERATING PERMIT

COMPANY NAME: IDEAL CHEMICAL AND SUPPLY COMPANY

COMPANY ADDRESS: 4025 Air Park Street, Memphis, TN 38118

ISSUANCE DATE: 9/20/2019 **PERMIT NUMBER:** 00421-08P

EXPIRATION DATE: 9/20/2024

SOURCE DESCRIPTION

Batch Liquid Mixing Process and Loading of Liquid Materials from Storage Tank, Mixing Tanks and Tank Trucks to Tank Trucks and Various Sizes of Totes and Containers.

EMISSION POINTS: Non-Stack
(Insignificant Units Storage Tanks)

The holder of this permit shall comply with all conditions contained in this permit as well as all applicable provisions of the City of Memphis Code. A permit condition may be appealed by filing a petition for reconsideration within thirty (30) days after the mailing date of the permit.

This permit may be subject to revocation, suspension, modification or amendment by the Technical Manager for cause including evidence of non-compliance with any of the above; or for any misrepresentation made in the application(s) received 08-23-2018 and supporting data entered therein or attached thereto, or any subsequent submittal or supporting data; or for any alterations affecting the emissions from this source.

This Permit is further subject to and conditioned upon the terms, conditions, limitations, standards, or schedules contained in or specified on the attached 08 pages.

Robert Rogers

ROBERT ROGERS, PE
TECHNICAL MANAGER POLLUTION CONTROL

Issuance of this permit shall not relieve any owner or operator of the responsibility to comply fully with any other requirements of local, State, or Federal law.

NON TRANSFERABLE *POST OR FILE AT INSTALLATION ADDRESS*

DL

PERMIT CONDITIONS:

1. This permit is issued for the batch liquid mixing process and loading of liquid materials from storage tanks, mixing tanks, railcars, and tank trucks to storage tanks, tank trucks and a 6,700 gallon mixing tank. (*Storage tanks are listed in Table 1 below.*)

2. The maximum Volatile Organic Compound (VOC) emissions from this source shall not exceed 15.33 tons per any consecutive twelve-month rolling period.

   a. *These totals include emissions from the batch liquid mixing process and loading of liquid materials from storage tanks, mixing tanks, railcars, and tank trucks to storage tanks, tank trucks and various sizes of totes and containers.*

3. The maximum throughput for the liquid mixing process shall not exceed 20,000 pounds per hour and 20,800 tons per any twelve-month rolling period.

Equipment Description		**VOCs Tons/Year (1)**
Batch Liquid Mixing Process and Loading of Liquid Materials		**11.77**
Tanks 1,5,6,10,11, 15, 16,17,18, 19, 20,37,38, and 39	Loading Loss	**3.66**
Total VOCs		**15.33 (2)**
	Single	**Combined**
HAPS	**< 10.0**	**< 25.0**

(1) Allowable VOC emissions. (Consecutive 12-month rolling period)
(2) HAPS are counted within the VOC emissions. The facility will be required to report HAPs emissions and must remain below 10.0 TPY for any single HAP and 25.0 TPY for combined total HAPs.

4. The maximum hazardous air pollutant (HAP) emissions of all operations including insignificant and exempt activities at this facility shall be less than 10.0 tons of any single HAP or 25 tons of any combination of HAPs per consecutive twelve-month rolling period.

5. Records of the monthly throughput for all VOC-containing materials (e.g. solvents) shall be maintained on site for a period of three (3) years from the date of the records and made available to this Department upon request. These records shall contain the necessary data (including HAP and VOC content of the materials) to demonstrate compliance with the limits specified in Condition numbers 2, 3 and 4 of this permit.

6. The permittee is placed on notice that Condition numbers 2, 3 and 4 of this permit contain limitations that allow the permittee to opt-out of the major source operating permit program requirements specified in Section 16-77, Reference 1200-3-9-.02(11) of the Memphis City Code. Failure to abide by these limits will not only subject the permittee to enforcement action by the Department, but it may also result in the imposition of Federal enforcement action by the EPA and the loss of Federal recognition as a conditional minor source.

DL WK RP

7. Compliance demonstration for each calendar year shall include submitting an annual report, summarizing the consecutive twelve-month rolling period, having the following information:

   (a) Actual material throughput of all VOC and HAP containing materials (actual usage amounts in pounds or gallons)
   (b) Annual emissions for VOCs and HAPS (with supporting calculations)
   (c) Density of material in pounds per gallon
   (d) Molecular Weight
   (e) Vapor Pressure, psia

   Note: This report may coincide with the submittal of the annual emissions report that is required by February 28th of each year. (See Appendix A, Condition No. 16)

8. Visible emissions from this source shall not exceed twenty percent (20%) in opacity (6-minutes average).

9. The facility is subject to additional rules (40 CFR 63, Subpart Kb) for VOCs stored in the 125,000 gallon tank if the true vapor pressure of the stored VOC liquid is greater than or equal to 3.5 kPA (kiloPascals).

10. Current storage tank inventory is listed in Table 1. Exemption or Listing as insignificant emissions is based on the following regulations:

    a. *City of Memphis Code 16-77, Reference the Rules and Regulations of the State of Tennessee 1200-3-9-.04(4) (d) 12. "All storage tanks with a capacity less than 10,000 gallons and all process tanks with a capacity less than 3,000 gallons."*

General permit conditions are attached in Appendix A.

DL WE PR

Storage Tanks:

Table 1: Current Storage Tank Inventory

Tank Number	Position	Capacity (gallons)	Construction Material	Current Contents	Installation Date
1	Vertical	125,000	Steel	Non-VOC (PERMITTED)	1985
2	Vertical	7,500	Steel	EXEMPT	2003
3	Vertical	4,000	Steel	EXEMPT	1990
4	Vertical	6,500	Polyethylene	EXEMPT	1988
5	Vertical	20,000	Steel	Non-VOC (PERMITTED)	1988
6	Vertical	6,500	Polyethylene	Process Tank(PERMITTED)	1993
7	Vertical	6,000	Polyethylene	EXEMPT	1991
8	Vertical	6,800	Polyethylene	EXEMPT	1999
9	Vertical	6,000	Polyethylene	EXEMPT	2012
10	Vertical	20,000	Steel	VOC (PERMITTED)	2012
11	Vertical	20,000	Steel	VOC (PERMITTED)	2012
12	Vertical	8,500	Polyethylene	EXEMPT	2005
13	Vertical	4,000	Polyethylene	EXEMPT	1993
14	Vertical	6,510	Polyethylene	EXEMPT	2002
15	Vertical	20,000	Steel	VOC (PERMITTED)	NA
16	Vertical	20,000	Steel	VOC (PERMITTED)	1982
17	Vertical	20,000	Steel	VOC (PERMITTED)	2012
18	Vertical	20,000	Steel	VOC (PERMITTED)	1982
19	Vertical	20,000	Steel	VOC (PERMITTED)	2012
20	Vertical	20,000	Steel	VOC (PERMITTED)	1982
21	Vertical	2,538	Stainless Steel	EXEMPT, EMPTY	1994
22	Vertical	2,538	Stainless Steel	EXEMPT, EMPTY	1994
23	Vertical	2,538	Stainless Steel	EXEMPT, EMPTY	1994
24	Vertical	2,538	Stainless Steel	EXEMPT, EMPTY	1994
25	Vertical	4,500	Polyethylene	EXEMPT	2003
26	Vertical	8,000	Aluminum	EXEMPT	1992
27.1	Horizontal	6,000	Steel	EXEMPT	1992
27.2	Horizontal	6,000	Steel	EXEMPT, EMPTY	1992
27.3	Horizontal	6,000	Steel	EXEMPT, EMPTY	1992
28.1	Horizontal	6,000	Steel	EXEMPT, EMPTY	NA
28.2	Horizontal	6,000	Steel	EXEMPT, EMPTY	NA
28.3	Horizontal	6,000	Steel	EXEMPT, VOC	NA
29.1	Horizontal	6,000	Steel	EXEMPT, VOC	NA
29.2	Horizontal	6,000	Steel	EXEMPT, EMPTY	NA
29.3	Horizontal	6,000	Steel	EXEMPT, VOC	NA
31	Vertical	6,800	Stainless Steel	EXEMPT	1992
32	Vertical	6,800	Polyethylene	EXEMPT	1992
33	Vertical	3,000	Polyethylene	EXEMPT	1992
34	Vertical	1,400	Stainless Steel	EXEMPT	NA
35	Vertical	8,000	Stainless Steel	EXEMPT	2003
36	Vertical	8,000	Polyethylene	EXEMPT	2003
37	Vertical	10,000	Stainless Steel	Non-VOC (PERMITTED)	2012
38	Vertical	20,000	Steel	Non-VOC (PERMITTED)	NA
39	Vertical	20,000	Steel	Non-VOC (PERMITTED)	NA

(Storage Tank Inventory as of 08-29-2019)

DL VT RR

APPENDIX A
General Permit Conditions for Synthetic Minor Sources

SECTION I: OPERATIONAL REQUIREMENTS

1. The facility owner or operator shall control dust, fumes, gases, mist, vapors, or any combination thereof in such a manner as to not cause a nuisance in accordance with City of Memphis Code Section 16-88(a).

2. The facility owner or operator shall not cause, suffer, allow, or permit any air contaminant source to be operated without employing suitable measures for the control of the emission of objectionable odors in accordance with City of Memphis Code Section 16-88(b).

3. The facility owner or operator shall not discharge from any source whatsoever such quantities of air contaminant, uncombined water, or other materials, which cause a traffic hazard, in accordance with City of Memphis Code Section 16-77 [Reference Rules and Regulations of Tennessee, Rule 1200-3-9-.03(3)].

4. The facility owner or operator shall not cause, suffer, allow, or permit any materials to be handled, transported, or stored; or a building, its appurtenances, or a road to be used, constructed, altered, repaired or demolished without taking reasonable precautions to prevent particulate matter from becoming airborne, in accordance with City of Memphis Code Section 16-89.

5. The open burning of residential, commercial, institutional, or industrial solid waste is prohibited except as specified in this permit or in City of Memphis Code Section 16-50.

6. Air contaminant sources must take all reasonable measures to keep emissions to a minimum during startups, shutdowns, and malfunctions in accordance with City of Memphis Code Section 16-87 [Reference Rules and Regulations of Tennessee, Rule 1200-3-20-.02]. These measures may include installation and use of alternate control systems, changes in operating methods or procedures, cessation of operation until the process equipment and/or air pollution control equipment is repaired, maintaining sufficient spare parts, use of overtime labor, use of outside consultants and contractors, and other appropriate means. Failures that are caused by poor maintenance, careless operation or any other preventable upset condition or preventable equipment breakdown shall not be considered malfunctions, and shall be considered in violation of the emission standard exceeded and this rule.

SECTION II: TESTING REQUIREMENTS

7. The facility owner or operator may be required to conduct or have conducted such tests as are necessary to establish the quantity or identity of air contaminants emitted from an air contaminant source. Such tests shall be conducted in a manner approved in advance by the Technical Manager, in accordance with City of Memphis Code Section 16-85.

DL WL RR

8. Whenever the Technical Manager has reason to believe that the emission limits of the regulations set forth herein are being violated, the Technical Manager may require The facility owner or operator to conduct or have conducted at the owner's or operator's expense, tests to determine the emission level of specific air contaminants, in accordance with City of Memphis Code Section 16-85.

9. The facility owner or operator of an air contaminant source to be tested shall provide the Technical Manager at least 30 days prior written notice of any performance test and the test protocol form, except as otherwise specified in a promulgated test method, to afford the Technical Manager the opportunity to have an observer present and to approve the test protocol, in accordance with City of Memphis Code Section 16-85.

10. Performance tests shall be conducted under representative performance conditions of the tested air contaminant source(s) for which compliance is to be demonstrated by the test. Samples shall be taken in such number, duration and location as to be statistically significant and representative of performance conditions for which compliance is to be demonstrated by the test, in accordance with City of Memphis Code Section 16-85. Unless otherwise specified in the test method, each performance test shall be corrected to standard conditions, defined as a temperature of 293 K (68° F) and a pressure of 101.3 kilopascals (29.92 in Hg).

11. The facility owner or operator may be required to retest at the request of the Technical Manager if the maximum production rate that occurred during compliance testing is exceeded by 10 percent or more, in accordance with City of Memphis Code Section 16-86.

12. Unless otherwise specified in the test method, each performance test shall consist of three separate runs using the applicable test method. Each test run shall be conducted for the time and under the conditions specified in the applicable test method. For the purpose of determining compliance with an applicable standard, the arithmetic mean of results of the three runs shall apply. In the event that a sample is accidentally lost or conditions occur in which one of the three runs must be discontinued because of forced shutdown, failure of an irreplaceable portion of the sample train, extreme meteorological conditions, or other circumstances beyond the owner or operator's control, compliance may, upon the Administrator's approval, be determined using the arithmetic mean of the results of the two other runs, in accordance with City of Memphis Code Section 16-85, [Reference the Rules and Regulations of Tennessee, Rule 12003-10].

SECTION III: MONITORING/RECORDKEEPING REQUIREMENTS

13. A log of all malfunctions, startups, and shutdowns resulting in emissions in excess of the standards in the City of Memphis Code or any permit issued thereto must be kept at the facility in accordance with City of Memphis Code Section 16-87 [Reference Rules and Regulations of Tennessee, Rule 1200-3-20-.04]. This log must record at least the following:

    a) Stack or emission point involved;

    b) Time of malfunction, startup, or shutdown or when first noticed;

DL WF RR

c) Type of malfunction and/or reason for shutdown;

d) Time startup or shutdown was complete or time the air contaminant source returned to normal operation; and

e) The company employee making entry on the log must sign, date and state the time of each log entry. The information under items (a) and (b) above must be entered into the log by the end of the shift during which the malfunction, startup, or shutdown began.

All information shall be entered in the log no later than twenty-four (24) hours after the startup or shutdown is complete, or the malfunction has ceased or has been corrected. Any later discovered corrections can be added in the log as footnotes with the reason given for the change.

SECTION IV: REPORTING/NOTIFICATION REQUIREMENTS

14. When any air contaminant source malfunctions in such a manner as to cause the emission of air contaminants in excess of the applicable emission standards contained in Division 1200-3 or any permit issued thereto, or of sufficient duration to cause damage to property or public health, The facility owner or operator of the air contaminant source shall promptly notify the Technical Manager of such malfunction and provide a statement giving all pertinent facts, including the estimated duration of the malfunction, in accordance with City of Memphis Code Section 16-87 [Reference Rules and Regulations of Tennessee, Rule 1200-3-20-.03]. Violations of the visible emission standard (excluding visible emissions caused by hazardous air pollutants named in Chapter 1200-3-11), which occur for less than 20 minutes in one day (midnight to midnight) need not be reported. Prompt notification will be within 24 hours of the malfunction and shall be provided by telephone to the Shelby County Health Department, Pollution Control Section.

15. The Technical Manager shall be notified when the malfunction has been corrected, in accordance with City of Memphis Code Section 16-87 [Reference Rules and Regulations of Tennessee, Rule 1200-3-20-.03]. In attainment and unclassified areas if emissions other than from sources designated as significantly impacting on a nonattainment area in excess of the standards will not and do not occur over more than a 24-hour period (or will not recur over more than a 24-hour period) and no damage to property and or public health is anticipated, notification is not required. Any malfunction that creates an imminent hazard to health must be reported by telephone immediately to the Shelby County Health Department, Pollution Control Section and the Emergency Management Agency.

16. The facility owner or operator shall submit a report to the Department, on an annual basis, that establishes the amount of actual emissions of each regulated pollutant for the facility according to the provisions in City of Memphis Code Section 16-98. This report shall be submitted no later than February 28th of each calendar year and shall include emissions that occurred during the previous calendar year.

SECTION V: MISCELLANEOUS GENERAL REQUIREMENTS

DL VS RP

17. The facility owner or operator shall apply for a permit renewal at least sixty (60) calendar days prior to the expiration of this permit in accordance with City of Memphis Code Section 16-77 [Reference Rules and Regulations of Tennessee, Rule 1200-3-9-.02(3)(a)].

18. The facility owner or operator shall pay fees in accordance with City of Memphis Code Sections 16-93 through 16-96.

19. This permit is not transferable from one person to another person, nor from one air contaminant source to another air contaminant source, nor from one location to another location pursuant to City of Memphis Code Section 16-77 [Reference Rules and Regulations of Tennessee, Rule 1200-3-9-.03(6)].

20. The facility owner or operator shall maintain this operating permit readily available for inspection by the Technical Manager or his/her designated representative on the operating premises. A person required by regulations to have one or more operating permits shall keep at least one operating permit prominently and conspicuously displayed on the operating premises in accordance with City of Memphis Code Section 16-77 [Reference Rules and Regulations of Tennessee, Rule 1200-3-9-.02(5)].

21. The Shelby County Health Department in conjunction with the Memphis and Shelby County Air Pollution Control Board shall have authority, at their option, to institute and litigate proceedings for violations as set out therein, in accordance with City of Memphis Code Section 16-57. Any person who knowingly:

    a) Violates or fails to comply with any provision of the City of Memphis Code, any board or administrative order or any permit condition;

    b) Makes any false material statement, representation, or certification in any record, report, plan or other document required by permit to be either filed or maintained;

    c) Falsifies, tampers with, renders inaccurate or fails to install any monitoring device or method required to be maintained or followed; or

    d) Fails to pay a fee

    commits a Class C misdemeanor pursuant to the Tennessee Code Annotated with the fine not to exceed ten thousand dollars ($10,000) per day per violation. For the purpose of this section, each day of continued violation constitutes a separate offense and is punishable as such.

22. The facility owner or operator of any air contaminant source shall be responsible for complying with emission regulations as contained in other chapters of these regulations at the earliest practicable time and for this purpose the Board shall have the authority and responsibility to require compliance with these regulations at an earlier date than indicated where such earlier compliance may reasonably be accomplished, in accordance with City of Memphis Code Section 16-77 [Reference Rules and Regulations of Tennessee, Rule 1200-3-9-.03(1)].

DL VA RR

23. The facility owner or operator shall not use any plan, activity, device or contrivance which the Technical Manager determines will, without resulting in an actual reduction of air contaminants, conceal or appear to minimize the effects of an emission which would otherwise constitute a violation of these Regulations, in accordance with City of Memphis Code Section 16-77 [Reference Rules and Regulations of Tennessee, Rule 1200-3-9-.03(2)]. Methods considered circumvention of the regulations include but are not limited to the following:

    a) Air (or other gases) introduced for dilution purposes only; or

    b) The staggered installation and operation of a facility to avoid coverage by a standard that applies only to operations larger than a specified size.

24. The Technical Manager may suspend or revoke any construction or operating permit if the permit holder fails to comply with the provisions, stipulations, or compliance schedules specified in the permit; all provisions of these regulations; and all provisions of the Tennessee Air Quality Act, in accordance with City of Memphis Code Section 16-77 [Reference Rules and Regulations of Tennessee, Rule 1200-3-9-.03(7)]. Upon permit suspension or revocation, if the permit holder fails to take remedial action, he shall become immediately subject to enforcement actions prescribed by law.

25. Failure to comply with any of the provisions of the City of Memphis Code shall constitute a violation thereof and shall subject the person or persons responsible therefore to any and all of the penalties provided by law, in accordance with City of Memphis Code Section 16-57.

26. For the purpose of carrying out the requirements of the City of Memphis Code, the Technical Manager or his/her authorized representatives shall be permitted at all reasonable times to enter into any manufacturing plants, business buildings or other buildings, and all lots, grounds and premises, in order to thoroughly examine any items in relation to public health and air pollution thereon and therein, in accordance with City of Memphis Code Section 16-61.

27. The facility owner or operator shall not begin the construction of a new air contaminant source or the modification of an air contaminant source which may result in the discharge of air contaminants without first having applied for and received from the Technical Manager a construction permit for the construction or modification of such air contaminant source, in accordance with City of Memphis Code Section 16-77 [Reference Rules and Regulations of Tennessee, Rule 1200-3-9-.01(1)(a)], except as specifically exempted in Rule 1200-3-9-.04 or excluded in subparagraph 1200-3-2-.01(1)(aa) or subparagraph 1200-3-2-.01(1)(cc).

28. The application for a construction permit shall be made on forms available from the Technical Manager not less than ninety (90) days prior to the estimated starting date of construction in accordance with City of Memphis Code Section 16-77 [Reference Rules and Regulations of Tennessee, Rule 1200-3-9-.01(1)(b)]. Sources identified in Paragraph 1200-3-9-.01(4) shall make application for a construction permit not less than one hundred twenty (120) days prior to the estimated date of construction.

DL WL RR

Attachment 3

CHEMICAL PRODUCTS

A

Acetic Acid
Acetic Anhydride
Acetone
Activated Carbon
Alcohol Ethoxylates (91-6, 91-8, etc)
Alkanolamides
Alkyl Ether Sulfates
Alkyl Sulfates
Aloe Vera
Alpha Methyl Styrene (AMS)
Aluminum Chloride
Aluminum Stearate
Aluminum Sulfate (Dry or Liquid)
Amido-Amines
Amine Oxides
Ammonia, Aqua
Ammonium Bifluoride
Ammonium Chloride
Ammonium Lauryl Sulfate
Ammonium Persulfate
Ammonium Sulfate
Ammonium Thioglycolate
Ammonium Thiosulfate
Amphoterics
Amyl Acetate
Antifoams
Aromatic 100
Aromatic 150
Ascorbic Acid

B

Barium Carbonate
Barium Sulfate
Bentonite
Benzyl Alcohol
Bleach
Borax
Boric Acid
Botanical Extracts
Butyl Acetate
Butyl Alcohol
Butyl Carbitol
Butyl Cellosolve
Butylene Glycol

C

Calamide®
Calcium Acetate
Calcium Carbonate
Calcium Chloride
(Pellets, Flake, or Liquid)
Calcium Hypochlorite
Calcium Nitrate
Calcium Stearate
Calfax®
Calfoam®
Calprint 35
Calsoft®
Caltaine®
Caramel Color
Carbowax®
Carboxymethylcellulose (CMC)
Castor Oil
Caustic Potash (Liquid or Crystal)
Caustic Soda, Dry (Beads or Flake)
Caustic Soda, Liquid
(Diaphram or Membrane)
Caustic Soda, Liquid (Gluconated)
Cetyl Alcohol
Chromic Acid
CIP Cleaner
Citric Acid (Dry or Liquid)
Cocamide DEA
Cocamide MEA
Cocamidopropyl Betaine
Copper Cyanide
Copper Nitrate
Copper Sulfate
Cosmetic Oils
Cyclohexane
Cyclohexanone
Cyclohexylamine

D

Dequest®
Diacetone Alcohol
Diammonium Phosphate
Diatomaceous Earth
Dibasic Esters
Dicalcium Phosphate
Dicalite®
Diethanolamine (DEA)
Diethylene Glycol
Diethylenetriamine
Dimethyl Formamide (DMF)
Dimethylethanolamine (DMEA)
Dioctyl Phthalate (DOP)
Dioctyl Sodium Sulfosuccinate
Dipotassium Phosphate
Dipropylene Glycol
Disodium Phosphate
D'Limonene
DMDM Hydantoin
Dodecylbenzene Sulfonic Acid
(DDBSA)
Dowanol®, Glycol Ethers
Dowfax®
Dowfrost®
Dowtherm®

E

Epsom Salts
Erythorbic Acid
Ethoxylated Alcohols
Ethyl Acetate
Ethyl Alcohol
(CDA, SDA, 190 or 200 Proof)
** Ideal is a DSP
Ethylene Dichloride
Ethylene Glycol
Ethylenediaminetetraacetic Acid
(EDTA)
Eversol®

F

Fatty Acid Esters
Fatty Acids
Fatty Alcohols
Ferric Chloride 42°
Ferric Sulfate Liquid
Ferrous/Iron Sulfate
Filter Aids
Formaldehyde Solution 37%
Formic Acid
Fumaric Acid

G

Gluconate Liquid
Gluconic Acid
Glycerine (Crude, Tech, or USP)
Glycol Ether, "E" Series
Glycol Ether, "P" Series
Glycol Stearate
Glycolic Acid

H

Heptane
Hexane
Hexylene Glycol
Hydrazine
Hydrochloric Acid
(Inhibited Available)
Hydrofluoric Acid
Hydrofluosilicic Acid
Hydrogen Peroxide
Hydroxyacetic Acid
Hydroxylamine Sulfate
Hypophosphorous Acid

I

Isobornyl Acetate
Isobutyl Acetate
Isobutyl Alcohol
Isopropanol
Isopropanolamines
Isopropyl Myristate N.F. (IPM)
Isopropyl Palmitate N.F. (IPP)

K

KCL
Kerosene

L

Lacquer, Diluents And Thinner
Lactic Acid
Lime Hydrated

M

Magnesium Chloride
Magnesium Hydroxide
Magnesium Sulfate
Maleic Acid
Maleic Anhydride
Malic Acid
Maxfac®
Mayoquest®
Methanol
Methyl Acetate
Methyl Amyl Ketone
Methyl Ethyl Ketone (MEK)
Methyl Isobutyl Ketone (MIBK)
Methyl Paraben NF
Methyl Salicylate
Methyl Soyate
Methyldiethanolamine (MDEOA)
Mineral Oil
Mineral Seal Oil
Mineral Spirits
(<1%, Rule 66, Odorless)
Monoaluminum Phosphate
Monoammonium Phosphate
Monocalcium Phosphate
Monoethanolamine (MEA)
Monopotassium Phosphate
Monosodium Glutamate (MSG)
Monosodium Phosphate
Muriate of Potash (KCL)
Muriatic Acid (HCL)

N

Nickel Chloride
Nickel Sulfate
Nitric Acid
N-Methyl Pyrrolidone
NPE Surfactant (NP-4, NP-6, NP-9)
N-Propyl Acetate
N-Propyl Alcohol
NTA

O

Oxalic Acid

P

Pearlizing Agents
Penpure® Mineral Oils
Peracetic Acid
Petrolatum
Phosphate Esters
Phosphoric Acid
Pine Oil
Polyethylene Glycols (PEG)
Polyoxyethylene Ethers
Polyoxyethylene Glycol Esters
Polypropylene Glycol (PPG)
Polysorbates
Potassium Carbonate
Potassium Chloride
Potassium Cocoate
Potassium Cyanide
Potassium Permanganate
Potassium Persulfate
Potassium Sorbate
Potassium Stannate
Potassium Sulfate
Potassium Tripolyphosphate (KTPP)
Preservatives
Propionic Acid
Propyl Cellosolve
Propyl Paraben
Propylene Glycol
Proteins
Pure-Flo®

Q

Quaternary Amines
Quaternary Ammonium Compounds
Quaternary Conditioners

R

Rodine, Acid Inhibitors

S

Salt (Granular, Pellets, or Rock)
Silicone Fluids

CHEMICAL PRODUCTS

Soda Ash (Dense, Light, or Liquid)
Sodium Acetate
Sodium Acid Pyrophosphate
Sodium Ascorbate
Sodium Benzoate
Sodium Bicarbonate
Sodium Bichromate
Sodium Bisulfate
Sodium Bisulfite
Sodium Carbonate
Sodium Chlorate
Sodium Chlorite
Sodium Citrate
Sodium Cyanide
Sodium Erythorbate
Sodium Fluoride
Sodium Fluosilicate
Sodium Glucoheptonate
Sodium Gluconate
Sodium Hexametaphosphate
Sodium Hydrosulfite
Sodium Hypochlorite
(EPA or NSF Approved)
Sodium Lauryl Ether Sulfate (SLES)
Sodium Lauryl Sulfate (SLS)
Sodium Lauryl Sulfoacetate
Sodium Metabisulfite
Sodium Metasilicate
(Anhydrous or Pentahydrate)
Sodium Nitrate
Sodium Nitrite
Sodium Persulfate
Sodium Salicylate
Sodium Silicate
Sodium Sulfate
Sodium Sulfide
Sodium Sulfite
Sodium Thiosulfate (Liquid or Dry)
Sodium Tripolyphosphate (STPP)
Sodium Xylene Sulfonate (SXS)
Sorbitol
Soy Methyl Ester
Speedplus®
Starch
Stearic Acid
Stearyl Alcohol
Sulfamic Acid
Sulfosuccinates
Sulfur Dioxide
Sulfuric Acid
Sunscreen Products
Surfactant Concentrate Blends

T

Tall Oil Fatty Acids
Tergitol®
Terpenes
Tetrahydrofuran (THF)
Tetrahydrofurfyl Alcohol (THFA)
Tetrapotassium Pyrophosphate
(TKPP)
Tetrasodium Pyrophosphate (TSPP)
TOFA
Toluene
Tributyl Phosphate
Tricalcium Phosphate
Trichloroethylene
Triethanolamine (TEA)
Triethylene Glycol
Triisopropanolamine
Tripotassium Phosphate
Trisodium Phosphate (TSP)
Trolamine, NF

U

Urea (Prilled, Solutions)
Urea Ammonium Nitrate (UAN)

V

Versene®
Vitamins
VM&P Naphtha

W

Water Treatment Coagulants
Water Treatment Corrosion Controls
Water Treatment Disinfectants
Water Treatment Flocculents
Water Treatment Polymers
Water Treatment Sequesterants
White Oils

X

Xanthan Gum
Xylene

Z

Zinc Ball Anodes
Zinc Chloride
Zinc Oxide
Zinc Sulfate

#

1,4-Butanediol
142 Flash Naptha (<1% or Rule 66)
2-Ethyl Hexanol
210-245 Solvent <1%
300-360 Solvent
400-500 Solvent
600 Solvent

Partial List of Major Suppliers

Acme-Hardesty
Archer Daniels Midland (ADM)
Arkema
Ashland
Axiall
Blue Grass Chem Specialties
Calabrian
Cal-Chlor
Calumet Refining
Calumet-Penreco
Cargill
Carmeuse Lime
CHT-ICM Products
Columbus Vegetable Oils
Cornerstone Chemical
Dicalite Minerals
Dow Chemical
Enterprise Specialty Products
Ethox Chemicals
Environmental Fluids
Florida Chemical
G2O Technologies
Genesis Alkali
Helm Fertilizer
ICL Performance Products
Ineos Acetyls
Ineos Calabrian
Ineos Oxides
Italmatch (BWA)
Jeen International
Jones-Hamilton
Macallen Chemical
Mason Chemical
Mississippi Lime
Mosaic
Nyrstar
Occidental Chemical
Oil-Dri Corporation
PCS Sales (Nutrien)
Peroxychem (Evonik)
Pilot Chemical
PMC Biogenix
PMP Fermentation Products
Saltex
Searles Valley Minerals
Sethness Products
SNF
Solvay Chemicals
Southern Chemical & Textile
Southern Ionics
SQM North America
Tauber Petrochemical
Terry Laboratories
Tetra Technologies
United Mineral & Chemical
Valero Energy
Vantage Corn Processors
Vertex Chemical

Ideal Chemical & Supply Co.

Memphis, TN:
4025 Air Park Street
Memphis, TN 38118
(901) 363-7720
(800) 232-6776
Fax: (901) 366-0864

Jackson, MS:
106 Ware Street
Jackson, MS 39208
(601) 932-4920
(800) 824-0356
Fax: (601) 939-3874

Shreveport, LA:
3848 Industrial Circle
Bossier City, LA 71112
(318) 746-4358
(800) 231-6776
Fax: (318) 746-9905

Attachment 4

Section 1. Registration Information

Source Identification

Facility Name:	Ideal Chemical & Supply Co. - Memphis Facility
Parent Company #1 Name:	Ideal Chemical & Supply Co.
Submission Type:	Resubmission
Receipt Date:	July 2021

Facility Identification

Facility ID:	1000 0007 4126

Dun and Bradstreet Numbers (DUNS)

Facility DUNS:	7040348

Facility Location Address

Street 1:	4025 Air Park Street
Street 2:	N/A
City:	Memphis
State:	TN
ZIP:	38118
ZIP4:	N/A
County:	Shelby

Facility Latitude and Longitude

Latitude (decimal):	35.038611
Longitude (decimal):	-089.932222

Local Emergency Planning Committee and Regulations

LEPC:	Shelby County LEPC
OSHA PSM:	N/A
EPCRA 302:	Yes
CAA Title V:	N/A

Process Chemicals

Program Level:	Program Level 2 process
Chemical Name:	Ammonia (conc 20% or greater)
CAS Number:	7664-41-7
Flammable/Toxic:	Toxic

Process NAICS

NAICS Code:	42469
NAICS Description:	Other Chemical and Allied Products Merchant Wholesalers

Section 6. Accident History

No records found.

Section 9. Emergency Response

Written Emergency Response (ER) Plan

Community Plan (Is facility included in written community emergency response plan?):	N/A
Facility Plan (Does facility have its own written emergency response plan?):	Yes
Response Actions (Does ER plan include specific actions to be taken in response to accidental releases of regulated substance(s)?):	Yes
Public Information (Does ER plan include procedures for informing the public and local agencies responding to accidental release?):	Yes
Healthcare (Does facility's ER plan include information on emergency health care?):	Yes

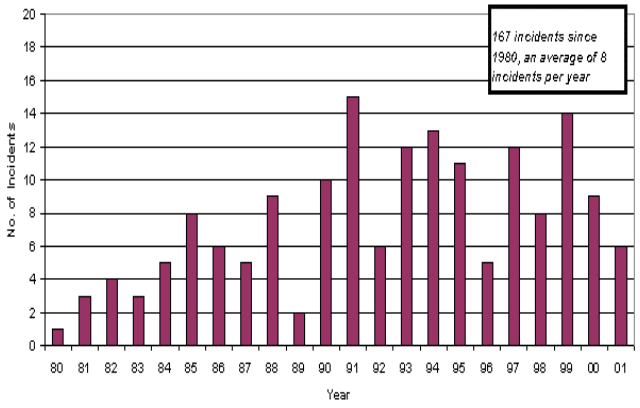
Local Agency

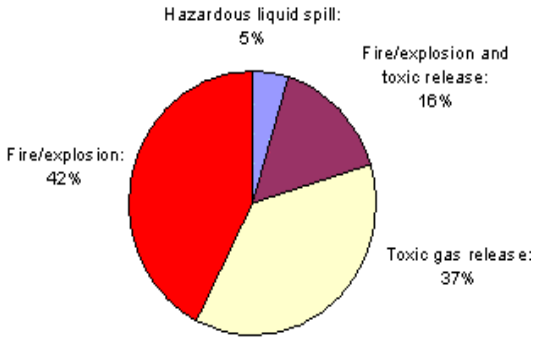
Agency Name (Name of local agency with which the facility ER plan or response activities are coordinated):	Memphis Fire Department
Agency Phone Number (Phone number of local agency with which the facility ER plan or response activities are coordinated):	(901) 365-4837

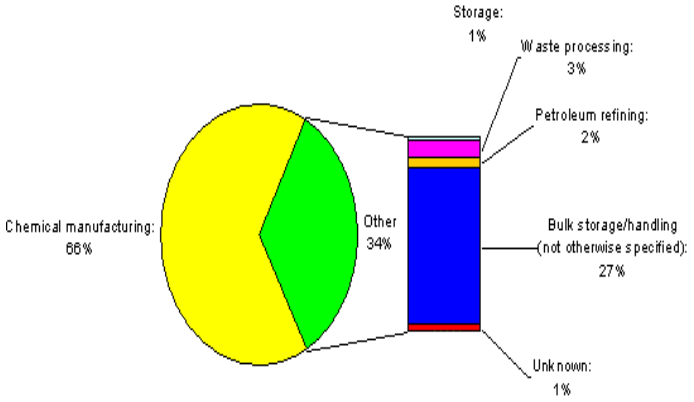
Attachment 5

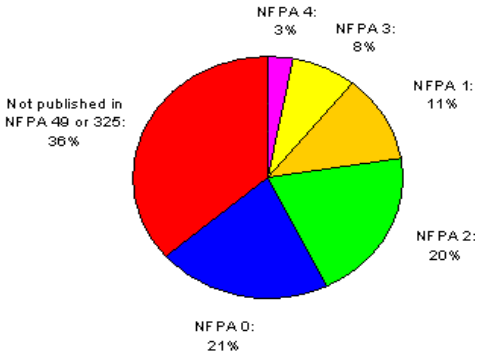
INCIDENT DATA

REACTIVE HAZARD INVESTIGATION









No. 2003-15-D
Issue Date: September 2003

INVESTIGATION DATA RELEASE

Contents

1.0 BACKGROUND 8

2.0 DATA SOURCES AND METHODS 11

3.0 DATA LIMITATIONS 12

4.0 DATA ANALYSIS HIGHLIGHTS 14

5.0 REACTIVE INCIDENT DATA 16

APPENDIX A: HAZARD INVESTIGATION INCIDENT DATA SOURCES 36

Tables

1 Reactive incident data 17

2 Data field description of reactive incident data 34

Acronyms and Abbreviations

ACC	American Chemistry Council
ANSI	American National Standards Institute
API	American Petroleum Institute
APELL	Awareness and Preparedness for Emergencies at Local Level (UNEP)
ARIP	Accidental Release Information Program (EPA)
CAER	Community Awareness and Emergency Response (ACC Responsible Care)
CCPS	Center for Chemical Process Safety
CDCIR	The Community Documentation Centre on Industrial Risk (MAHB)
Chem. Manufact.	Chemical Manufacturing
CHETAH	Chemical Thermodynamic and Energy Release Evaluation (ASTM)
CHRIS	Chemical Hazards Response Information System (USCG)
CIMAH	Control of Industrial Major Accident Hazards (U.K.)
CIRC	Chemical Incident Reports Center (CSB)
COMAH	Control of Major Accident Hazards Involving Dangerous Substances (U.K., replaced CIMAH in 1999)
CSB	U.S. Chemical Safety and Hazard Investigation Board
DOE	U.S. Department of Energy
EC	European Community
EHS	Environmental health and safety
EPA	U.S. Environmental Protection Agency
EPCRA	Emergency Planning and Community Right-to-Know Act
EU	European Union
F&E	Fire & Explosion
HA	Hydroxylamine
HarsNet	Hazard Assessment of Highly Reactive Systems Thematic Network

Acronyms and Abbreviations (cont'd)

HASTE	The European Health and Safety Database
HSE	Health and Safety Executive (U.K.)
HSEES	Hazardous Substances Emergency Events Surveillance (MAHB)
IChemE	Institution of Chemical Engineers (U.K.)
Incompat. Matls.	Incompatible Materials
IMIS	Integrated Management Information System (OSHA)
MAHB	Major Accident Hazard Bureau (European Communities)
MARS	Major Accident Reporting System (MAHB)
MHIDAS	Major Hazard Incident Data Service (HSE)
NA	Not Applicable
NAICS	North American Industry Classification System
NFIRS	National Fire Incident Reporting System
NFPA	National Fire Protection Association
NIST	National Institute of Standards and Technology
NOAA	National Oceanic and Atmospheric Administration
NOS	Not Otherwise Specified
NRC	National Response Center (USCG)
NTSB	National Transportation Safety Board
OSHA	Occupational Safety and Health Administration
RMP	Risk Management Program (EPA)
SOCMA	Synthetic Organic Chemical Manufacturers Association
TCPA	Toxic Catastrophe Prevention Act (New Jersey)
TG	Toxic Gas
TGA	Thermogravimetric analysis

Acronyms and Abbreviations (cont'd)

TL	Toxic Liquid
TNO	Netherlands Organisation for Applied Scientific Research
USCG	U.S. Coast Guard

1.0 Background

On September 17, 2002, The U.S. Chemical Safety and Hazard Investigation Board (CSB) unanimously approved a total of 18 recommendations intended to reduce the number of serious industrial accidents caused by uncontrolled chemical reactions. The approval culminated a two-year special CSB investigation, http://www.csb.gov/completed_investigations/docs/DS-Reactives.pdf, into hazards at U.S. sites that manufacture, store, or use potentially reactive chemicals. This hazard investigation examined 167 serious chemical accidents in the U.S. over the last 22 years that have involved uncontrolled chemical reactions. These accidents caused 108 deaths as well as hundreds of millions of dollars in property damage.

The investigation prompted the Board to call on government agencies and industry to improve reactive hazard management. In particular, Occupational Safety and Health Administration (OSHA) and the U.S. Environmental Protection Agency (EPA) were asked to extend their process safety regulations — known as the Process Safety Management standard and the Risk Management Program rule — to better control hazards associated with chemical reactivity.

The Board requested that OSHA broaden the application of the PSM standard to cover both individual chemicals and combinations of chemicals that can undergo hazardous reactions under specific process conditions. The standard currently applies to only 137 listed chemicals, plus a class of flammable substances (there are estimated to be thousands of chemicals in common industrial use). Only 38 of these chemicals are currently covered by the PSM standard because of their reactivity. The CSB investigation documented numerous examples where chemicals that were not listed caused reactions resulting in explosions, fires, or toxic gas releases, often with fatal consequences.

EPA currently does not specifically regulate reactive hazards under its RMP rule. The Board

investigation pointed to numerous examples where reactive accidents had a public or environmental impact. For example, the 1999 Concept Sciences explosion near Allentown, PA, killed a member of the public and damaged nearby businesses. The chemical involved, hydroxylamine, is not covered under the EPA rule.

The Board further called on OSHA to modify the PSM standard by requiring companies to evaluate the potential for hazardous reactions in each covered process. Companies would also be required to consult a wider array of scientific and technical literature on reactivity in compiling process safety information — information that is critical in designing safe processes and in protecting employees from workplace hazards. The Board cited deficiencies in process safety information as a root cause of the 1998 Morton explosion in Paterson, NJ, a reactive accident which injured nine workers and gave rise to the Board's reactive hazard investigation.

EPA and OSHA were also requested to collect additional information on reactive accidents within their respective jurisdictions. CSB staff identified that progress on preventing reactive accidents was hampered by a general lack of reliable data — including information on root causes and lessons learned. They also noted that the tally of 167 reactive incidents was almost certainly an underestimate due to data deficiencies.

Citing inadequacies in existing industry guidance on reactives, the Board called on the American Chemistry Council (ACC), the National Association of Chemical Distributors (NACD), the Synthetic Organic Chemical Manufacturers Association (SOCMA), and the Center for Chemical Process Safety (CCPS) to develop new voluntary codes and standards for controlling reactive hazards. Two of those groups - ACC and SOCMA - were also called on to cooperate with the National Institute of Standards and Technology (NIST) in developing a new national database of reactivity test information. This public database of industrial test data would complement existing knowledge on reactive hazards available from

the published literature.

A critical function of the investigation was the collection and analysis of incident data. This incident data provided the framework for many of the key findings, conclusions, and recommendations of the investigation. After the publication of the report, various stakeholders requested that CSB make the raw data collected as part of the reactives hazard investigation publicly available. The raw data and significant findings from it are presented in this publication.

2.0 Data Sources and Methods

CSB data collection efforts involved searching over 40 data sources, focusing on incidents where the primary cause was related to chemical reactivity. For the purposes of the investigation, an "incident" was defined as a sudden event involving an uncontrolled chemical reaction—with significant increases in temperature, pressure, and/or gas evolution—that has caused, or has the potential to cause, serious harm to people, property, or the environment.

The data search focused on recent domestic incidents (since 1980) where the primary cause was related to chemical reactivity; however, the 1980 cutoff is not intended to diminish the important lessons learned from prior incidents. The search covered both chemical manufacturing (i.e., raw material storage, chemical processing, and product storage) and other industrial activities involving bulk chemicals, such as storage/distribution, waste processing, and petroleum refining.[1] For purposes of the incident search, only reactive incidents that caused serious consequences[2] were examined.

Sources of incident data included a variety of public-domain databases, technical literature, and news accounts. Appendix A lists the major data sources used to retrieve incident data.

[1] Incidents involving transportation, pipelines, laboratories, minerals extraction, mining, explosives manufacturing, pyrotechnic manufacturing, or military uses are beyond the scope of this investigation, in addition to events involving simple combustion (i.e., rapid reaction of fuel [liquid, vapor, or dust] with oxygen in air).
[2] Serious consequences are injuries or fatalities, significant property damage, environmental contamination, and offsite evacuation or shelter-in-place.

3.0 Data Limitations

CSB believes that most major reactive incidents that have had high public visibility (e.g., government agency investigations, technical literature, national press coverage), over the 22 year period from 1980 to 2001 were captured within the 167 incidents. However, less severe and near-miss reactive incidents were difficult to capture due to data deficiencies. Thus, the tally of 167 reactive incidents is almost certainly an underestimate. Therefore, the results of the CSB incident data analysis were acknowledged as representing only a sampling of recent reactive incident data. This limitation precluded CSB from drawing statistical conclusions on incidence rates or inferring trends in the number or severity of incidents.

The availability of data was limited because of the following:

- No single data source provides a comprehensive collection of chemical incidents from which to retrieve or track reactive incident data.

- Incident data collected by OSHA and EPA provide no functional capability to track the occurrence of reactive incidents with serious worker or public impacts;[3] such data are a valuable resource for analyzing incident trends and developing prevention actions at a national level.

- No one comprehensive data source contains the data needed to adequately understand root causes and lessons learned from reactive incidents or other process safety incidents.[4]

[3] Research indicates that the OSHA Integrated Management Information System (IMIS) identified 70 percent of the reactive incidents in Section 3.3, but none were tracked as "reactive incidents." Only 25 percent of the reactive incidents that occurred from June 1994 through June 1999 were reported to EPA. These reports are contained in the RMP 5-year accident histories sent to EPA prior to the June 1999 deadline for initial submissions.

[4] Only one publicly available database is designed to provide such information. The Accident Database from the Institution of Chemical Engineers (IChemE) contains lessons learned for one-fourth of the 12,000 incidents in the database.

- It is difficult to identify causes and lessons learned in existing sources of process safety incident data because industry associations, government agencies, and academia generally do not collect this information.

- Data sources contained incomplete and sometimes inaccurate incident information—for example, on numbers of injuries and community impacts. Descriptions of incidents and causal information were sometimes vague and incomplete.

- There are limited Federal or state requirements to report incidents unless they involve specific consequences.

However, despite these limitations, the data provided useful insights into the profile and causes of reactive incidents.

4.0 Data Analysis Highlights

The following is a list of findings from the analysis of the data collected by CSB:

1. The limited data analyzed by CSB include 167 serious incidents in the United States involving uncontrolled chemical reactivity from January 1980 to June 2001. Forty-eight of these incidents resulted in a total of 108 fatalities. The data include an average of six injury-related incidents per year, resulting in an average of five fatalities annually.

2. Nearly 50 of the 167 incidents affected the public.[5]

3. Over 50 percent of the 167 incidents involved chemicals not covered by existing OSHA or EPA process safety regulations.[6]

4. Approximately 60 percent of the 167 incidents involved chemicals that either are not rated by NFPA or have "no special hazard" (NFPA "0").[7] Only 10 percent of the 167 incidents involved chemicals with NFPA published ratings of "3" or "4."

5. The OSHA PSM Standard lists 137 highly hazardous chemicals—only 38 of which are considered highly reactive based on NFPA instability ratings of "3" or "4."

6. Reactive hazards are diverse. The reactive incident data analyzed by CSB included:

    - Over 40 different chemical classes (i.e., acids, bases, monomers, oxidizers, etc.), with no single dominating class.

[5]" Public impact" is defined as known injury, offsite evacuation, or shelter-in-place.
[6] OSHA PSM Standard (29 CFR 1910.119) and EPA Accidental Release Prevention Requirements: Risk Management Programs (RMP) Under the Clean Air Act, Section 112(r)(7) (40 CFR 68).

[8]An NFPA instability rating of "0" means that materials in themselves are normally stable, even under "fire" conditions.

- Several types of hazardous chemical reactivity, with 36 percent attributed to chemical incompatibility, 35 percent to runaway reactions, and 10 percent to impact-sensitive or thermally sensitive materials.

- A diverse range of chemical process equipment—including reaction vessels, storage tanks, separation equipment, and transfer equipment. Storage and process equipment (excluding chemical reaction vessels) accounts for over 65 percent of the equipment involved; chemical reaction vessels account for only 25 percent.

7. Reactive incidents can result in a variety of consequences, including fire and explosions (42 percent of incidents) as well as toxic gas emissions (37 percent).

8. Causes and lessons learned are reported in only 20 percent of the 167 incidents. (Industry associations, government agencies, and academia typically do not collect this information.) However, more than 60 percent of the incidents for which some causal information was available involved inadequate practices for identifying hazards or conducting process hazard evaluations; nearly 50 percent involved inadequate procedures for storage, handling, or processing of chemicals.[11]

9. Over 90 percent of the incidents analyzed by CSB involved reactive hazards that are documented in publicly available literature accessible to the chemical processing and handling industry.

10. Approximately 70 percent of the 167 incidents occurred in the chemical manufacturing industry. Thirty percent involved a variety of other industrial sectors that store, handle, or use chemicals in bulk quantities.

[11]The summation of causal factor statistics exceeds 100 percent because each major incident can, and often does, have more than one cause.

5.0 Reactive Incident Data

The reactive incident data collection effort was comprehensive. It took nearly 6 months to complete. As stated in Section 2.0, over 40 data sources were examined. These include a variety of public-domain databases, technical literature, and news accounts. In certain cases, incident investigation reports from companies were requested (voluntary submission) and interviews with OSHA compliance officers were conducted to obtain detailed information (e.g., initiating event, management system deficiencies).

Reactive incidents that met the CSB definition and were within criteria limits (e.g., non-transportation, non-military) were collected. CSB staff ensured that each incident had a unique date and location to minimize double counting of incidents. To further ensure data quality, a contractor was hired to review CSB data collection procedures, collected data and the CSB data analysis.

Table 1 presents the raw reactive incident data collected as part of the reactive hazard investigation. Table 2 provides a brief description of each data field.

****

Disclaimer: The contents of this data set are not a comprehensive listing of all reactive incidents that have occurred. This data was compiled from a variety of existing sources, which are inadequate to fully identify the frequency and causes of reactive incidents. Therefore, this data may be of limited usefulness for drawing statistical conclusions on incidence rates or inferring trends in the number or severity of incidents. Although the CSB is committed to gathering and disseminating accurate information, the CSB was unable to independently verify all information contained in the various data sources. These sources, especially those based on initial incident reports, may contain incomplete or inaccurate information. Users of this data are requested to attach this disclaimer to the data and cite the CSB as the source. No CSB endorsement of or agreement with third-parties' analysis or conclusions should be implied from or suggested by those parties' use of this data.
****

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Consequences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
1	3/13/2001	Augusta, Georgia	BP Amoco	Polyamides	Organic	Undetermined	NA	NA	Polymerization/ Decomposition	Known	Process Tank	Chem Manufact	3	No	Yes	F&E	No	Other (Slow, gassy decomposition)	Inadequate hazard identification	No	No	CSB Case File
2	3/7/2001	Deer Park, Texas	Hampshire Chemical Company (subsidiary of DOW)	Hydrogen cyanide and formaldehyde in a high pH environment	Cyanide salt	2	Aldehyde	0	Unknown	NA	Reactor	Chem Manufact	0	No	No	TC	Yes	Thermal run away - Lack of inhibitor	Unknown	Yes (Listed)	Yes (Toxic)	NRC Report #558837, 03/07/01, Company investigation report
3	2/27/2001	Mesa, Arizona	TRW Inc.	Sodium azide	Sodium azide	Undetermined	NA	NA	Decomposition	Known	Storage area	Other	0	Yes	Yes	F&E	No	Thermal/ Mechanical Shock - (NOS)	Unknown	No	No	Associated Press, 02/28/2001
4	2/7/2001	Lexington, South Carolina	Tin Products, Inc.	Tri-n-butyl aluminum, water, and air	Organometallic	3	NA	NA	Water reactive / Pyrophoric	Known	Process Tank	Chem Manufact	0	Yes	Yes	F&E	Yes	Incompat. Matls. - (NOS)	Unknown	Yes (flammable)	No	Associated Press, 2/07/2001
5	2/1/2001	Kansas City, Missouri	Phillips Service Corporation	Aluminum paste and oil solvents	Inorganic-Metal	Unknown	Hydrocarbon	0	Unknown	NA	Unknown	Waste	0	Yes	Yes	F&E and TL	No	Unknown	Unknown	No	No	KSHB, KCTV 5, KMBC (TV stations, 02/01/2001
6	1/26/2001	Columbus, Georgia	Eastman Chemical (Formerly McWhorter Technologies)	Organic peroxide	Organic peroxide	Unknown	NA	NA	Decomposition	Known	Process Tank	Chem Manufact	0	Yes	Yes	F&E	No	Thermal run away - Excess heating	Inadequate operating procedures, and inadequate hazard evaluation during management of change	Yes (flammable)	No	Associated Press, Company Incident Report
7	12/16/2000	Port Neches, Texas	Huntsman Corp	Ethylene oxide and oxygen	Ethylene oxide	3	Oxidizer	0	Oxidation / Decomposition	Known	Reactor	Chem Manufact	0	No	Yes	F&E	No	Thermal run away - Incorrect operating conditions	Unknown	Yes (Listed)	Yes (Toxic)	Beaumont Enterprise 12/19/00, NRC Report
8	10/3/2000	West Chester, Ohio	Three Bond USA	Unknown	NA	Unknown	NA	NA	Unknown	NA	Process Tank	Other	0	Yes	No	TC	Unknown	Unknown	Unknown	Unknown	Unknown	Associated Press, 10/03/2000
9	7/5/2000	Pasadena, Texas	Dixie Chemical Company	Glycidol and methanol	Alcohol	0	Alcohol	0	Polymerization/ Decomposition	Known	Reactor	Chem Manufact	0	Yes	Yes	F&E and TC	No	Thermal run away - (NOS)	Unknown	Yes (flammable)	No	Houston Chronicle 07/06/2000, 07/10/2000
10	4/12/2000	Muskegon, Michigan	Lomac LLC	Tetranitromethane and hydrocarbon fuel	Oxidizer	Undetermined	Hydrocarbon	0	Oxidation	Known	Waste System	Chem Manufact	0	Yes	Yes	F&E and TC	No	Thermal/ Mechanical Shock - Excess Heating	Inadequate understanding of process chemistry	No	Yes (toxic)	WoodTV8 News website, The Muskegon Chronicle, July 03, 2000
11	3/29/2000	Deer Park, Texas	Rohm and Haas Texas Inc	Acrylic acid	Monomer	2	NA	NA	Polymerization	Known	Storage Tank	Chem Manufact	0	No	No	TC	Yes	Thermal run away (near miss) - Contamination	Unknown	No	No	Reuters Online, 03/29/2000, Company investigation report

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
12	3/27/2000	Pasadena, Texas	Phillips Chemical	Butadiene and styrene copolymer, butadiene polyperoxide	Organic peroxide	Undetermined	NA	NA	Decomposition	Known	Storage Tank	Chem Manufact	1	Yes	$20,000,000	F&E	No	Thermal/ Mechanical Shock - (NOS)	Unknown	Yes (flammable)	Yes (flammable)	The Oil Daily, April 2000, Industrial Fire World Magazine, 03/27/2000, Chem Week 04/26/2000, OSHA National News release 03/21/2000, Marsh Loss Control Newsletter, #1, 2000
13	3/23/2000	Lily, Kentucky	AISIN Automotive	Unknown	NA	Unknown	NA	NA	Unknown	NA	Unknown	Other	0	Yes	No	TG	Unknown	Incompat. Matls - Inadvertent Mixing	Unknown	Unknown	Unknown	Associated Press, 03/24/2000
14	2/29/2000	Nashville, Tennessee	Metro Water Services	Ferric chloride and sodium hypochlorite	Acid	Undetermined	Sodium hypochlorite	Undetermined	Acid/base	Known	Storage Tank	Other	0	Yes	No	TG	No	Incompat. Matls - Inadvertent Mixing	Unknown	No	No	Associated Press, 2/29/2000
15	1/13/2000	Pasadena, Texas	Goodyear Tire and Rubber Company	Mercaptan polymer and methylacrylate, and/or possible other chemicals	NA	Unknown	NA	NA	Unknown	NA	Process Tank	Chem Manufact	0	No	No	TG	Unknown	Unknown	Unknown	Unknown	Unknown	Houston Chronicle, 01/13/2000
16	12/8/1999	Oak Ridge, Tennessee	DOE Y-12 Plant	Potassium superoxide and mineral oil	Oxidizer	1	Hydrocarbon	0	Oxidation	Known	Unknown	Chem Manufact	0	Yes	Yes	F&E	No	Thermal/ Mechanical Shock - Inadvertent Mixing	Inadequate hazard identification and evaluation, Inadequate procedures and training for controls to prevent the loss o control resulting i a spill or to preclude the addition of mineral oil and impact in the presence of potassium superoxide during spill recovery	No	No	DOE Type A Accident Investigation of the NaK explosion in building 9201-5 at the Y-12 plant in Oak Ridge
17	11/2/1999	West Paterson, New Jersey	CCP Inc.	Various chemicals, including potassium compounds	NA	Unknown	NA	NA	Unknown	NA	Unknown	Chem Manufact	0	Yes	No	TG	Yes	Unknown	Unknown	Unknown	Unknown	Bergen Record, 11/03/1999 and 11/15/1999
18	10/29/1999	Livonia, Michigan	McGean ROHCO Inc.	Water and chromium oxide	Oxidizer	1	Water	NA	Unknown	NA	Process Tank	Chem Manufact	0	Yes	Yes	F&E and TG	Yes (Injury)	Unknown	Unknown	No	No	Detroit Free Press, 10/30/1999, National Response Center Incident Report #504151
19	9/4/1999	Bucks, Alabama	Celanese Chemicals Inc.	Sodium hydrosulfite and water	Sodium hydrosulfite	2	Water	NA	Water reactive	Known	Separation Equipment	Chem Manufact	1	Yes	No	TG	No	Incompat. Matls - Operating procedure	Inadequate identification and evaluation chemical reactivity hazards, inadequate communication and training on chemical hazards	No	No	Chemical Process Safety Report 5/00, Associated Press 09/06/99, OSHA Incident Summary Interview

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
20	9/2/1999	El Dorado, Arkansas	Con-Agra Poultry Co.	Chlorine dioxide and ferric chloride	Oxidizer	Undetermined	Inorganic-salt	Undetermined	Acid/base	Known	Storage Tank	Other	0	Yes	Yes	F&E and TG	Unknown	Incompat. Matls - Inadvertent Mixing	Unknown	Yes (Listed)	Yes (toxic)	National Response Center Incident Report # 497329
21	8/11/1999	Rehoboth Beach, Delaware	City of Rehoboth Beach Waste Water Treatment Plant	Sodium hypochlorite and ferric chloride	Sodium hypochlorite	Undetermined	Acid	Undetermined	Acid/base	Known	Storage tank	Waste	0	Yes	No	TG	Unknown	Incompat. Matls - Inadvertent Mixing	Unknown	No	No	National Response Center Incident Report # 494744
22	8/6/1999	Alamogordo, New Mexico	Alamogordo waste water pump station (Professional Services Group, Inc.)	Sodium hypochlorite and urea	Sodium hypochlorite	Undetermined	Amine	Undetermined	Redox / Decomposition	Known	Storage tank	Waste	1	Yes	Yes	F&E	No	Incompat. Matls - Inadvertent Mixing	Unknown	No	No	Albuquerque Journal, 08/10/1999
23	8/2/1999	Pasadena, Texas	Akzo Nobel	Peroxy-dicarbonate	Organic peroxide	Undetermined	NA	NA	Decomposition	Known	Transfer	Chem Manufact	0	Yes	Yes	F&E	Unknown	Thermal run away - (NOS)	Unknown	No	No	Marsh Quarterly Loss Report 11/1999, Chem Week, 08/11/1999
24	7/13/1999	Azusa, California	Reichold Chemicals	Unknown	Monomer	Unknown	NA	NA	Polymerization	Known	Reactor	Chem Manufact	0	Yes	No	TG	Yes	Thermal run away - Control system failure	Unknown	Unknown	Unknown	City News Service, 07/13/1999
25	6/23/1999	Pasadena, Texas	Phillips Chemical	Butadiene	Monomer	2	NA	NA	Polymerization	Known	Reactor	Chem Manufact	2	Yes	Yes	F&E	No	Thermal run away - Mischarge	Inadequate hazard evaluation during management of change, inadequate procedures/ training, inadequate process hazards analysis, inadequate emergency relief design	Yes (flammable)	Yes (flammable)	OSHA Incident Summary Interview
26	6/4/1999	Whitehall, Michigan	Whitehall Leather Company	Sodium hydrosulfide and ferrous sulfate	Base	Undetermined	Acid	Undetermined	Acid/base	Known	Storage Tank	Other	1	Yes	No	TG	No	Incompat. Matls - Inadvertent Mixing	Inadequate procedures to prevent inadvertent mixing of incompatible chemicals, practices and management controls to ensure safe delivery of chemicals	No	No	NTSB report
27	2/19/1999	Allentown, Pennsylvania	Concept Sciences Inc.	Hydroxylamine	Hydroxylamine	3	NA	NA	Decomposition	Known	Separation Equipment	Chem Manufact	5	Yes	Yes	F&E	Yes (Fatality)	Thermal/ Mechanical Shock - Incorrect operating conditions	Inadequate safe operating limits and inadequate hazard evaluation during design	Yes (listed)	No	Hazard Research Corporation Report 8034 to Department of Labor 7/2/99; OSHA Incident Summary Interview; IChemE

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Consequences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
28	2/18/1999	Clymers, Indiana	Essroc Cement Corporation	Toluene diisocyanate	Monomer	3	NA	NA	Polymerization	Known	Storage Tank	Other	0	No	Yes	F&E	Yes	Thermal run away - Excess heating	Inadequate procedures for offloading railcars resulting in excess heating of a polymerizable material	No	Yes (Toxic)	NTSB Report HZM-01/01
29	1/28/1999	Beaumont, Texas	Arch Chemicals, Inc (Olin Corporation)	Unknown	NA	Unknown	NA	NA	Unknown	NA	Storage Tank	Chem Manufact	0	No	No	TO	Unknown	Unknown	Unknown	Unknown	Unknown	EPA RMP #1000 0015 2416; ERNS Report # 611094
30	11/19/1998	Louisville, Kentucky	Ford Motor Co.	Nickel nitrate and phosphoric acid solution (CHEMFOS 700), sodium nitrate solution (CHEMFOS LIQ)	Oxidizer	Undetermined	Inorganic	Undetermined	Redox	Known	Storage Tank	Other	0	Yes	Yes	TO	Yes	Incompat. Matls - Inadvertent Mixing	Inadequate training on procedures for unloading chemicals, inadequate design to prevent human error	No	No	NTSB report DCA 99MZ003, NRC #32-98
31	11/6/1998	Crosby, Texas	Atofina Chemicals, Inc.	Sulfated isobutylene intermediate	Organic peroxide	Unknown	NA	NA	Decomposition	Known	Process Tank	Chem Manufact	0	No	Yes	TO	Yes	Thermal run away - (NOS)	Unknown	Unknown	Unknown	RMP Submission Facility ID 1000 00124457; Houston Chronicle, 10/7/98
32	10/13/1998	Baltimore, Maryland	Condea Vista	Aluminum, aluminum chloride, water	Inorganic-metal	1	Inorganic-metal halide	2	Water reactive	Known	Reactor	Chem Manufact	0	No	$14,400,000	F&E	No	Thermal run away - Operating procedure	Inadequate hazard identification and assessment, inadequate communication of hazards, and inadequate management of change	No	No	CSB Case File; RMP Submission Facility ID 1000 00040261
33	8/20/1998	Philadelphia, Pennsylvania	Ashland Chemical Company	Dicyclopentadiene, (and other chemicals including maleic anhydride, ethylene glycol, diethylene glycol)	Monomer	1	NA	NA	Polymerization/ Decomposition	Known	Reactor	Chem Manufact	0	No	No	TO	Yes	Thermal run away - Excess heating	Inadequate design to prevent human error, Inadequate Safe Operating Limits	Yes (flammable)	No	NRC incident summary 23-98, Ashland Chemical Investigation Report
34	7/29/1998	Covington, Virginia	Westvaco	Sodium hydrosulfide and sulfuric acid	Base	Undetermined	Acid	2	Acid/base	Known	Storage Tank	Chem Manufact	0	Yes	No	TO	No	Incompat. Matls - Operating procedure	Unknown	No	No	National Response Center Incident Report #448068, 07/29/1998, Letter from Westvaco company describing the incident 04/26/2001
35	7/21/1998	Holland, Michigan	Holland Public Works	Sodium hypochlorite and aluminum sulfate	Sodium hypochlorite	Undetermined	Inorganic-salt	Undetermined	Acid/base	Known	Storage tank	Other	0	Yes	No	TO	Unknown	Incompat. Matls - Inadvertent mixing	Unknown	No	No	National Response Center #447365

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
36	4/8/1998	Paterson, New Jersey	Morton International	Ortho-nitrochlorobenzene (o-NCB) and 2-ethylhexylamine (2-EHA)	Nitro compound	0	Amine	0	Amination / Decomposition	Known	Reactor	Chem Manufact	0	Yes	Yes	F&E and TG	Yes	Thermal run away - Incorrect Operating Conditions	Inadequate communication of chemical hazards, inadequate management of change, inadequate hazard assessment	No	No	CSB Morton Incident Report 1998-5 I-NJ
37	1/14/1998	Freeport, Texas	Dow Chemical Co.	Unknown	NA	Unknown	NA	NA	Unknown	NA	Reactor	Chem Manufact	0	Yes	No	TG	No	Unknown	Unknown	Unknown	Unknown	National Response Center Incident Report # 419781
38	12/19/1997	Marcus Hook, Pennsylvania	Sun Oil	Sodium hypochlorite and an acid	Sodium hypochlorite	Undetermined	Acid	Unknown	Acid/base	Known	Storage Tank	Refinery	0	Yes	No	TG	Unknown	Incompat. Matls - Inadvertent mixing	Unknown	No	No	National Response Center Incident Report #416599, 12/19/1997
39	10/4/1997	Houston, Texas	Cook Composites and Polymers	n-butyl acrylate, di-tertiary-butyl peroxide (catalyst)	Monomer	2	Organic peroxide	Undetermined	Polymerization	Known	Reactor	Chem Manufact	0	No	Yes	F&E and TG	No	Thermal run away - Mischarge	Inadequate operating procedures/ training, inadequate hazard evaluation, inadequate human factors engineering, inadequate near miss reporting and incident investigation	No	No	CCPS Conference - Michael Cromaki October 2000
40	9/10/1997	Columbus, Ohio	Georgia Pacific Resins	Phenol-formaldehyde	Alcohol	0	Aldehyde	0	Polymerization	Known	Reactor	Chem Manufact	1	Yes	Yes	F&E	Yes	Thermal run away - Mischarge	Inadequate hazard assessment, inadequate human factors engineering, inadequate emergency relief system design	Yes (listed)	Yes (toxic)	EPA Case Study "How to Prevent Runaway Reactions," EPA 550-F99-004, August 1999, Chem Week 09/09/1998, US Dept. Labor News Release, 98-89, 03/02/1998
41	8/21/1997	Bennettville, South Carolina	Willamette Industries, Inc.	Chlorine dioxide and ac acid	Oxidizer	Undetermined	Acid	Unknown	Acid/base	Known	Process Tank	Chem Manufact	0	Yes	Yes	TG	Unknown	Incompat. Matls. - (NOS)	Unknown	Yes (listed)	Yes (toxic)	EPA RMP #1000 0007 7418
42	7/30/1997	Cedar City, Utah	Western Electro Chemical, a division of American Pacific Ammonium Perchlorate	Ammonium perchlorate	Oxidizer	4	NA	NA	Decomposition	Known	Process Tank	Chem Manufact	1	Yes	Yes	F&E	No	Thermal/ Mechanical Shock - Operating Procedure	Inadequate hazard evaluation, inadequate safe work procedures and training for cleaning of equipment with reactive chemical	Yes (listed)	No	Las Vegas Review Journal, Chemical Week, 07/31/1997, OSHA Inspection 126775006

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
43	5/14/1997	Richland, Washington	US DOE Hanford Site Plutonium Reclamation Facility	Hydroxylamine nitrates and nitric acid	Hydroxylamine	Undetermined	Acid	0	Decomposition	Known	Storage Tank	Other	0	No	Unknown	F&E	No	Thermal run away - Incorrect Operating Conditions	Inadequate hazard evaluation, inadequate auditing of safety management systems, inadequate training for personnel on reactive hazards.	Yes (listed)	No	US DOE/RL-97-59
44	5/8/1997	West Helena, Arkansas	BPS, Inc.	Azinphos methyl (AZM 50 W	Organo-phosphate	Undetermined	NA	NA	Decomposition	Known	Storage Area	Storage	3	Yes	Yes	F&E and TG	Yes (Fatality)	Thermal run away - Incorrect Storage Conditions	Lack of knowledge of all the hazards posed by the chemicals stored on-site (inadequate hazard identification). Inadequate hazard evaluation. Lack of procedures for material storage and handling.	No	No	EPA/OSHA Joint Chemical Accident Investigation Report, EPA-550-R-99-003 4/1999
45	3/29/1997	Haskell, Oklahoma	Chief Supply Corporation	Chlorates, perchlorates, nitrites, and fuels (spent solvents and cleaners)	Oxidizer	3	Hydrocarbon	0	Oxidation	Known	Process Tank	Waste	1	Yes	Yes	F&E and TL	Yes	Incompat. Matls - Operating procedure	Inadequate hazard identification and hazard evaluation, inadequate communication of hazards to operators, no controls to prevent human error.	Yes (flammable)	No	CEPPO-Chemical Case Study, EPA 550-F00-001, 4/2000
46	3/25/1997	Newark, New Jersey	Fairmount Chemical	4,4 diazido stilbene disodium sulfonate	Sulfonated compound	Undetermined	NA	NA	Decomposition	Undetermined	Process Tank	Chem Manufact	0	No	Yes	F&E	No	Thermal run away - Incorrect Operating Conditions	Inadequate knowledge of process chemistry hazards (inadequate hazard identification).	No	No	OSHA Incident Summary Interview
47	2/20/1997	Hammond, Indiana	Rhodia Inc.	Hydrochloric acid and chloroform	Acid	Undetermined	Chloroform	0	Unknown	NA	Storage Tank	Chem Manufact	0	Yes	No	TG	Yes (Injury)	Unknown	Unknown	No	Yes (toxic)	RMP Submission Facility ID 1000 0009 0538
48	1/23/1997	Blooming Prairie, Minnesota	Elf Atochem North America, Inc.	Acetic acid, hydrogen peroxide, water	Acid	0	Peroxide	3	Unknown	NA	Transfer	Chem Manufact	1	Yes	Yes	F&E	Unknown	Unknown	Unknown	Maybe (con-centration)	No	OSHA IMIS, Chemical Marketing Reporter 2/17/97
49	1/21/1997	Martinez, California	Tosco Avon Refinery	Light oils, hydrogen, and catalysts	Hydrocarbon	0	Hydrogen	0	Catalytic cracking	Known	Reactor	Refinery	1	Yes	$20,000,000	F&E	Yes	Thermal run away - Incorrect Operating Conditions	Inadequate hazard assessment, inadequate human factors design, inadequate operating procedures/ training, and inadequate maintenance of safety critical devices	Yes (flammable)	Yes (flammable)	EPA Investigation Report 550-R-98-009; Marsh and McLennan 15th Edition, RMP Summary Facility ID 1000 0014 5194

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
60	11/17/1996	Bessemer City, North Carolina	FMC Corporation	Lithium and water	Inorganic-metal	2	Water	NA	Water reactive	Known	Reactor	Chem Manufact	0	No	Yes	F&E	Yes	Incompat. Matls - Operating Procedure	Unknown	No	No	Gaston Observer, 04/21/1997; The Charlotte Observer, 09/25/1996.
61	9/28/1996	North Adams, Massachusetts	Modern Aluminum Anodizing Co	Mix of chemicals	NA	Unknown	NA	NA	Unknown	NA	Waste System	Other	2	No	No	TG	No	Incompat. Matls. - (NOS)	Unknown	Unknown	Unknown	Associated Press
62	9/27/1996	Victoria, Texas	Lyondell Polymers	Ethylene	Hydrocarbon	2	NA	NA	Decomposition	Known	Reactor	Chem Manufact	0	No	Yes	F&E	No	Thermal run away - Incorrect Operating Conditions	Equipment design and operating conditions promoted an uncontrolled reaction	Yes (flammable)	Yes (flammable)	Ethylene decom-position event Daniel E. Black CCPS International Conference Oct 1997
63	9/0/1996	Newton, Illinois	Central Illinois Public Service Company	Sodium hydroxide and sulfuric acid	Base	1	Acid	2	Acid/base	Known	Storage tank	Other	0	Yes	Yes	F&E and TL	Unknown	Incompat. Matls - Inadvertent Mixing	Unknown	No	No	OSHA IMIS
64	4/12/1996	Toccoa, Georgia	Aeroquip Corp. Aerospace Marine Group Clamp Prod.	Nitric acid and unknown chemical	NA	Undetermined	NA	NA	Unknown	NA	Process Tank	Other	0	Yes	No	TG	Unknown	Incompat. Matls. - (NOS)	Unknown	Maybe (con-centration)	Maybe (con-centration)	OSHA IMIS
65	12/5/1995	Nitro, West Virginia	FMC Corporation	Phosphorus and chlorine	Inorganic	1	Halogen	0	Chlorination	Known	Reactor	Chem Manufact	0	No	No	TG	Yes	Thermal run away - Incorrect operating conditions	Unknown	Yes (listed)	Yes (toxic)	FMC Nitro incident report to Responsible Care Coordinator at Great Lakes Nitro, WV.; Charleston Daily Mail, Henley vs. FMC Corp
66	11/3/1995	Auburn, Washington	Boeing Co. dba Boeing Commercial Airline Group	Acids and unknown chemical	Acid	Unknown	NA	Unknown	Redox	Known	Storage Tank	Other	0	Yes	No	TG	Unknown	Incompat. Matls. - (NOS)	Unknown	Unknown	Unknown	OSHA IMIS
67	10/23/1995	Bogalusa, Louisiana	Gaylord Chemical Corp.	Nitrogen tetroxide	Oxidizer	Undetermined	Water	NA	Water reactive	Known	Storage area	Chem Manufact	0	Yes	No	TG	Yes (Injury)	Incompat. Matls - Inadvertent Mixing	Inadequate procedures to prevent or detect the contamination of nitrogen tetroxide with water	Yes (listed)	No	NTSB Report DCA-96-MZ-001; Chemical Week, July 10, 1996
68	10/7/1995	Cincinnati, Ohio	Spring Grove Resource Recovery	Sodium azide and an acidic aqueous solution	Sodium azide	Undetermined	Acid	Unknown	Decomposition	Known	Drum	Chem Manufact	1	No	Yes	F&E	No	Thermal/ Mechanical Shock - (NOS)	Unknown	No	No	OSHA IMIS; Cincinnati Enquirer
69	9/14/1995	Danbury, Connecticut	Bedoukian Research, Inc	Lithium aluminum hydride (LASH) and water.	Reductant	2	Water	NA	Water reactive	Known	Reactor	Chem Manufact	0	Yes	Yes	F&E	Unknown	Incompat. Matls - Inadvertent Mixing	Unknown	No	No	OSHA IMIS
60	8/18/1995	Tonawanda, New York	FMC Corporation	Ammonium persulfate	Inorganic-persulfate	Undetermined	NA	NA	Decomposition	Unknown	Storage area	Chem Manufact	1	Yes	Yes	F&E	No	Thermal run away - (NOS)	Unknown	No	No	NFPA Report, Chem Week Sept 6, 1995; ICHEME Sedgwick Loss Control Newsletter, Issue 4, 1995
61	5/26/1995	Sulphur, Louisiana	Westlake Polymers Corp	Ethylene	Hydrocarbon	2	NA	NA	Decomposition	Known	Transfer	Chem Manufact	0	Yes	Yes	F&E	Unknown	Thermal run away - (NOS)	Unknown	Yes (flammable)	Yes (flammable)	RMP Submission Facility ID 1000-0014-4471

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
62	5/16/1995	Morris, Illinois	Reichold Chemicals	Maleic anhydride and water	Anhydride	1	Water	NA	Water reactive	Known	Reactor	Chem Manufact	0	Yes	Unknown	TL	Unknown	Incompat. Matls. - (NOS)	Unknown	No	No	Chemical Week, May 31, 1995, July 12, 1995
63	5/9/1995	Fountain Inn, South Carolina	Holly Oak Chemical Co.	2-ethylhexanol, phosphoric anhydride (powder form) and hydrogen peroxide	NA	Unknown	Peroxide	3	Unknown	NA	Reactor	Chem Manufact	0	Yes	Yes	F&E	Unknown	Unknown	Unknown	Maybe (con-centration)	No	OSHA IMIS
64	5/6/1995	Bennettville, South Carolina	Williamette Industries, Inc.	Hydrogen and chlorine dioxide	Hydrogen	0	Oxidizer	Undetermined	Decomposition	Known	Process Tank	Chem Manufact	0	No	Yes	TG	No	Incompat. Matls. - (NOS)	Unknown	Yes (listed)	Yes (Toxic)	EPA RMP #1000 0007 7418, ERNS report 442065
65	4/21/1995	Lodi, New Jersey	Napp Technologies	A gold precipitating agent identified as ACR 9031 CPA, composed of sodium hydrosulfite, aluminum powder, potassium carbonate and benzaldehyde	Sodium hydrosulfite	2	Inorganic-metal	1	Water reactive / Decomposition	Known	Process Tank	Chem Manufact	5	Yes	$20,000,000	F&E and TG	Yes	Incompat. Matls. - Mechanical Failure	Inadequate hazard evaluation, inadequate procedures/ training, inadequate communication between vendor/supplier, improper equipment design	No	No	EPA/OSHA Joint Accident Investigation Report, 550-R-97-002, 10/1997, OSHA Investigation Report, Marsh & McLennan 30 Year Review, 18th Ed.
66	12/20/1994	Riceboro, Georgia	SNF Holding Company	Monomer, methyl chloride and iron (catalyst)	NA	0	NA	NA	Polymerization	NA	Reactor	Chem Manufact	0	Yes	No	TG	Yes (Injury)	Thermal run away - Contamination	Unknown	Yes (listed)	Yes (toxic)	RMP Submission EPA ID 1000 0002 9774
67	12/16/1994	Dublin, California	Trilox	Activated carbon and ozone	Carbon	Undetermined	Oxidizer	Undetermined	Oxidation	Known	Process Tank	Other	0	No	Yes	F&E	Unknown	Incompat. Matls. - (NOS)	Unknown	Yes (listed)	No	OSHA IMIS
68	12/13/1994	Port Neal, Iowa	Terra Industries	Ammonium nitrate and nitric acid	Oxidizer	3	Acid	0	Decomposition	Known	Reactor	Chem Manufact	4	Yes	$120,000,000	F&E	Yes	Thermal/ Mechanical Shock - Incorrect Operating Conditions	Inadequate standard operating procedures, inadequate hazard evaluation	No	No	EPA Chemical Accident Investigation Report, Terra Industries, Marsh & McLennan 30 Year Review, 18th ed, Chem Week 7/26/95, 12/21/94, 1/31/95, Wilfred Baker Engineering Energetic Events Publication
69	9/16/1994	Mesa, Arizona	TRW	Sodium azide	Sodium azide	Undetermined	NA	NA	Decomposition	Known	Transfer	Other	1	Yes	Yes	F&E	No	Thermal/ Mechanical Shock - (NOS)	Unknown	No	No	Crane's Cleveland Business, 11/27/1995; Automotive News, 11/20/1995
70	8/17/1994	Columbus, Ohio	Capital Resins Corp	Phenol-formaldehyde	Alcohol	0	Aldehyde	0	Polymerization	Known	Reactor	Chem Manufact	0	No	Unknown	TL	Yes	Thermal run away - Insufficient Cooling	Inadequate human factors engineering, inadequate procedures and training	Yes (listed)	Yes (toxic)	EPA How to Prevent Runaway Reaction, August 1999, EPA Region 5 Chemical Safety Audit

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
71	07/07/94	San Diego, California	Toppan West Inc.	Ammonium hydroxide and hydrogen peroxide	Base	Undetermined	Peroxide	3	Decomposition	Known	Drum	Other	0	Yes	Yes	F&E	Unknown	Incompat. Matls - Inadvertent mixing	Unknown	Maybe (con-centration)	No	OSHA IMIS
72	6/21/1994	Bristol, Pennsylvania	United Chemical Technologies	Trichlorosilane and styrene	Chlorosilane	2	Monomer	2	Polymerization	Known	Drum	Chem Manufact	0	Yes	Yes	F&E and TG	Yes	Thermal run away - Excess Heating	Unknown	Yes (listed)	Yes (flammable)	Chemical Week, 6/29/94, Waste Environment Today, 1994, 7
73	5/31/1994	Enfield, Connecticut	Town of Enfield Water Pollution Control Plant	Ferric chloride and sodium hypochlorite	Acid	Undetermined	Sodium hypochlorite	Undetermined	Acid/base	Known	Storage tank	Waste	0	Yes	No	TG	Unknown	Incompat. Matls - Inadvertent mixing	Unknown	No	No	OSHA IMIS
74	5/27/1994	Belpre, Ohio	Shell Chemical	Butadiene	Monomer	2	NA	NA	Polymerization	Known	Reactor	Chem Manufact	3	No	$100,000,000	F&E and TG	Yes	Thermal run away - Mischarge	Inadequate process controls, inadequate training, inadequate inspection/ maintenance program for pressure relief devices, the reaction "kill system" was inadequate, emergency relief system sizing was inadequate, inadequate siting/separation of the process from the control room and the tank farm	Yes (flammable)	Yes (flammable)	Marsh & McLennan 30 Year Review, 15th Ed., Risk Management Program handbook, 11/94 Vol 1, IChemE Accident Database, OSHA Incident Summary Interview.
75	5/6/1994	Hagerstown, Maryland	C.M. Offrey & Sons, Inc.	Thiourea and sulfuric acid	Amine	Undetermined	Acid	2	Acid/base	Known	Process Tank	Other	0	Yes	No	TG	Unknown	Thermal run away - Mischarge	Unknown	No	No	OSHA IMIS
76	3/23/1994	Philadelphia, Pennsylvania	Unknown	Sodium hydrosulfite and water	Sodium hydrosulfite	2	Water	NA	Water reactive	Known	Drum	Unknown	0	Yes	No	TG	Unknown	Incompat. Matls - Inadvertent mixing	Unknown	No	No	Appendix of EPA/OSHA Joint Accident Investigation Report (EPA 550-R-97-002)
77	3/19/1994	Taft, Louisiana	Occidental Chemical Corporation	Nitrogen trichloride	Nitrogen trichloride	Undetermined	NA	NA	Decomposition	Known	Separation Equipment	Chem Manufact	0	Yes	Yes	F&E and TG	No	Thermal/ Mechanical Shock - Incorrect Operating Conditions	Inadequate process understanding led to equipment design and operating conditions which promoted accumulation of nitrogen trichloride and uncontrolled reaction	No	No	Nitrogen trichloride, a collection of papers, Pamphlet 21, edition 4, 1/97.
78	1/12/1994	Cardon, California	Lonza Corporation	Sodium chlorite and sodium borohydride	Oxidizer	1	Inorganic-hydride	Undetermined	Unknown	NA	Process Tank	Chem Manufact	0	Yes	Yes	F&E	Unknown	Incompat. Matls. - (NOS)	Unknown	No	No	OSHA IMIS
79	12/2/1993	Abingdon, Maryland	Alcore	Aluminum and water	Inorganic-metal	1	Water	NA	Water reactive	Known	Drum	Other	0	Yes	Yes	F&E	Unknown	Incompat. Matls - Inadvertent mixing	Unknown	No	No	OSHA IMIS

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
80	9/4/1993	Pittsburgh, Pennsylvania	Unknown	Aluminum powder	NA	1	NA	NA	Unknown	NA	Process Tank	Other	1	No	Yes	F&E	Unknown	Unknown	Unknown	No	No	Appendix of EPA/OSHA Joint Accident Investigation Report (EPA 550-R-97-002)
81	8/27/1993	Elyria, Ohio	Aztec Chemical Co. (division of Phillips petroleum)	Organic peroxide	Organic peroxide	Unknown	NA	NA	Decomposition	Known	Transfer	Chem Manufact	0	No	Yes	F&E and TG	Yes	Thermal run away - Incorrect Operating conditions	Unknown	Unknown	Unknown	Chemical Process Safety Report January 1994, Chem Week 8/25/93, MHIDAS
82	8/18/1993	Institute, West Virginia	Rhone Poulenc	Insoluble by-products o the reaction between acetyl oxime and chlorine primarily dichloro-nitrosoethane (DCNE)	Unknown	Undetermined	Unknown	Undetermined	Decomposition	Known	Reactor	Chem Manufact	1	Yes	Yes	F&E and TL	No	Thermal/ Mechanical Shock - Incorrect Operating Conditions	Modifications to process operation without adequate assessment of reactivity hazards, inadequate investigation of previous incidents	Yes (listed)	Yes (toxic)	Chemical Week, 02/17/1994, OSHA Incident Summary Interview
83	7/16/1993	Laporte, Texas	Akzo Chemicals	Organic peroxides	Organic peroxide	Unknown	NA	NA	Decomposition	Known	Drum	Chem Manufact	0	No	Yes	F&E	Unknown	Thermal run away - Insufficient Cooling	Unknown	Unknown	Unknown	Chemical Week, 7/28/93, NRC # 188988
84	7/21/1993	Crosby, Texas	Elf Atochem, Inc.	Organic peroxides	Organic peroxide	Unknown	NA	NA	Decomposition	Known	Storage area	Chem Manufact	0	Yes	No	TG	Yes (Injury)	Unknown	Unknown	Unknown	Unknown	Chemical Week, 08/04/1993, NRC 187870
85	5/28/1993	Kansas City, Missouri	Cook Composites and Polymers	Styrene	Monomer	2	NA	NA	Polymerization	Known	Process Tank	Chem Manufact	0	Yes	No	TG	Yes (Injury)	Unknown	Unknown	Yes (flammable)	No	NRC #177100, 05/29/1993
86	5/27/1993	Fort Mill, South Carolina	R-M Industries, Inc	Unknown (solvent)	NA	Unknown	NA	NA	Unknown	NA	Reactor	Chem Manufact	0	Yes	Yes	F&E	Unknown	Unknown	Unknown	Unknown	Unknown	OSHA IMIS
87	4/28/1993	Baton Rouge, Louisiana	Formosa Plastics Corp.	Sulfuric acid, polyglyco	Acid	2	Alcohol	Undetermined	Unknown	NA	Transfer	Chem Manufact	1	No	Unknown	TL	No	Incompat. Matls - Inadvertent mixing	Unknown	Maybe (con-centration)	Maybe (con-centration)	OSHA IMIS
88	3/5/1993	Hammond, Indiana	American Maize	Water and phosphorus oxychloride	Water	Undetermined	Phosphorus halide	2	Water reactive	Known	Drum	Other	0	Yes	No	TG	Unknown	Incompat. Matls. - (NOS)	Unknown	Yes (listed)	Yes (toxic)	National Response Center Incident Report, #160304, 03/06/1993
89	1/26/1993	Phoenix, Arizona	Dolphin Inc.	Hydrofluoric acid and sodium hydroxide	Acid	Undetermined	Base	1	Acid/base	Known	Drum	Other	0	Yes	Unknown	TL	Unknown	Incompat. Matls. - (NOS)	Unknown	No	No	OSHA IMIS
90	1/14/1993	Charleston, South Carolina	Albright & Wilson	Chlorakyl phosphite	Organo-phosphate	Undetermined	NA	NA	Unknown	NA	Reactor	Chem Manufact	0	Yes	No	TG	Unknown	Thermal run away - Mischarge	Unknown	No	No	OSHA IMIS
91	11/9/1992	Morristown, New Jersey	Allied Signal Inc.	Dimethyl sulfate and dimethyl-hydroxylamine	NA	0	Hydroxylamine	Undetermined	Unknown	NA	Reactor	Chem Manufact	0	Yes	Yes	F&E and TG	No	Unknown	Unknown	No	No	National Response Center Incident Report #144035
92	7/21/1992	Ventura, California	Applied Silicone Corporation	Sodium hydroxide, cyanopyridine	Base	1	Nitrile	Undetermined	Redox	Known	Reactor	Chem Manufact	1	No	Unknown	TL	Unknown	Unknown	Unknown	No	No	OSHA IMIS
93	6/22/1992	Martinez, California	Unknown	Sulfuric and acid sludge containing hydrocarbons, metal	Acid	2	NA	Unknown	Redox	Known	Waste System	Chem Manufact	1	Yes	Yes	F&E	Unknown	Unknown	Unknown	No	No	NFPA Journal, July/Aug. 93

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
94	2/29/1992	Vienna, Georgia	Georgia Pacific	Phenol-formaldehyde and unknown catalyst	Alcohol	0	Aldehyde	0	Polymerization	Known	Reactor	Chem Manufact	0	Yes	Yes	F&E and TL	Yes	Thermal run away - (NOS)	Unknown	Yes (listed)	Yes (toxic)	EPA How to Prevent Runaway Reaction, August 1999, EPA Region 4 compliance inspection report
95	1/13/1992	Alvin, Texas	Monsanto Company	Glyphosphate herbicide (trade name Roundup herbicide)	Organo-phosphate	Undetermined	NA	NA	Decomposition	Undetermined	Process Tank	Chem Manufact	0	No	$32,000,000	F&E and TG	Unknown	Thermal run away - Excess Heating	Unknown	No	No	Marsh & McLennan 30 Year Review, 18th Ed., Chemical Week, V. 158, No. 15, P. 18
96	1/10/1992	Newark, New Jersey	Reichold Chemicals	n-butyl acrylate and initiator (Vaso 64)	Monomer	2	NA	Unknown	Polymerization/ Decomposition	Known	Process Tank	Chem Manufact	0	Yes	Yes	F&E	Unknown	Thermal run away - (NOS)	Unknown	No	No	NRC Report #102412, EPA ARIP, Associated Press, 1/12/92
97	12/31/1991	South Charleston, West Virginia	Union Carbide	Acetic anhydride, water	Anhydride	1	Water	NA	Water reactive	Known	Process Tank	Chem Manufact	1	No	Yes	F&E	Unknown	Incompat. Matls. - (NOS)	Unknown	No	No	OSHA IMIS
98	12/17/1991	Romeo, Michigan	TRW Inc.	Sodium azide	Sodium azide	Undetermined	NA	NA	Decomposition	Known	Storage area	Other	0	Yes	Yes	F&E	Unknown	Thermal/ Mechanical Shock - (NOS)	Unknown	No	No	Detroit Free Press, 12/18/1991, Automotive News, 5/22/1995
99	8/16/1991	Newark, New Jersey	Crompton Knolls Colors Inc.	Nitrosylsulfuric acid	NA	Undetermined	NA	NA	Unknown	NA	Reactor	Chem Manufact	0	Yes	Yes	F&E	Unknown	Thermal run away - (NOS)	Unknown	No	No	OSHA IMIS
100	7/26/1991	Sacramento, California	Aerojet Industries	Potassium perchlorate, aluminum powder	Oxidizer	Undetermined	Inorganic-metal	1	Oxidation	Known	Unknown	Other	0	Yes	Yes	F&E	Unknown	Unknown	Unknown	No	No	EPA/OSHA Joint Chemical Accident Investigation Report Napp Tech—EPA 550-R-97-02
101	7/26/1991	Trion, Georgia	Mount Vernon Mills, Inc	Chemicals forming hydrogen sulfide gas.	NA	Unknown	NA	NA	Unknown	NA	Waste System	Other	0	Yes	No	TG	Unknown	Unknown	Unknown	Unknown	Unknown	OSHA IMIS
102	7/19/1991	Bowling Green, Kentucky	Guardsmark, Inc. and Eaton Corp. Cutler Hammer Products	Chromic acid bright dip (chromic acid and sulfuric acid 1%)	NA	Unknown	NA	NA	Unknown	NA	Drum	Other	0	Yes	No	TG	Unknown	Unknown	Unknown	No	No	OSHA IMIS
103	6/17/1991	Charleston, South Carolina	Albright and Wilson	Organophosphate (flame retardant chemical)	Organo-phosphate	Undetermined	NA	NA	Decomposition	Unknown	Reactor	Chem Manufact	9	Yes	$10,000,000	F&E	Yes	Thermal run away - Insufficient Cooling	Inadequate hazard identification	No	No	Marsh & McLennan 30 Year Review, 14th Ed, OSHA IMIS, Company Investigation Report, Charleston Post and Courier, 6/18/91, 12/20/91, 6/11/94, 2/16/95, 7/23/95.

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
104	5/1/1991	Sterlington, Louisiana	Angus Chemical, IMC Fertilizers (operating company)	Nitro methane	Nitroparafins	4	NA	NA	Decomposition	Known	Transfer	Chem Manufact	8	Yes	$105,000,000	F&E	Yes (Injury)	Thermal/ Mechanical Shock - Excess Heating	Inadequate design and inadequate hazard evaluation; inadequate management of change to address reactivity hazards	Yes (flammable)	No	Marsh & McLennan 30 Year Review, 18th Ed. , Chemical Week 10/27/93, OSHA Settlement Agreement 10/31/91, CCPS Guideline to Chemical Incident Investigation, p250, OSHA Incident Summary Interview, OSHA IMIS
105	4/26/1991	Roseville, Georgia	Klean A Matic	Muriatic acid and sodium hypochlorite	Acid	Undetermined	Sodium hypochlorite	Undetermined	Acid/base	Known	Storage Tank	Other	0	Yes	No	TG	Unknown	Incompat. Matls - Inadvertent Mixing	Unknown	No	No	National Response Center, Incident Report #89627, 04/26/91
106	4/24/1991	Newark, Ohio	Wiley Organics Technologies, Inc dba Organic Technology	Alcohol, cumene hydroperoxide, and methylene chloride	Organic peroxide	4	Organic chloride	0	Decomposition	Known	Reactor	Chem Manufact	1	No	Yes	F&E	Unknown	Unknown	Unknown	Yes (listed)	No	OSHA Review Commission and Admin Law Judge Decisions - Wiley Organics - Docket Number 91-3275, OSHA IMIS
107	4/8/1991	Milpitas, California	Lite-On Inc.	Propanol, concentrated hydrofluoric and nitric acids	Alcohol	0	Acid	0	Oxidation	Known	Process Tank	Other	0	Yes	No	TG	Unknown	Incompat. Matls - Inadvertent Mixing	Unknown	Yes (flammable)	Yes (toxic)	OSHA IMIS
108	4/5/1991	Titusville, Florida	PB&S Chemical	Sodium hypochlorite and acid	Sodium hypochlorite	Undetermined	Acid	Unknown	Acid/base	Known	Storage Tank	Chem Manufact	0	Yes	No	TG	Unknown	Incompat. Matls - Inadvertent Mixing	Unknown	No	No	National Response Center, Incident Report #89791
109	3/12/1991	Seadrift, Texas	Union Carbide	Ethylene oxide	Ethylene oxide	3	NA	NA	Decomposition	Unknown	Separation Equipment	Chem Manufact	1	Yes	$80,000,000	F&E	No	Thermal run away - Unexpected Catalytic Activity	Previously unknown reactive hazard caused by processing conditions and presence of catalyst	Yes (flammable)	Yes (flammable)	Lees, Loss Prev. Symposium March 29 - April 1, 1993; Chem Week, Jan 15, 1992; Chemical Engineering Progress, Aug 1993; IChemE Accident Database
110	2/18/1991	South Connellsville, Pennsylvania	Unknown	Hydrazide oil, soybean oil (Vikoxides)	NA	Unknown	NA	NA	Unknown	NA	Drum	Other	0	Yes	Yes	F&E and TG	Unknown	Unknown	Unknown	Unknown	Unknown	MHIDAS

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
111	2/16/1991	Madawaska, Maine	Fraser Paper Limited	Sodium hypochlorite and acid	Sodium hypochlorite	Undetermined	Acid	Unknown	Acid/base	Known	Storage tank	Other	0	Yes	Yes	TG	Yes	Incompat. Matls - Inadvertent Mixing	Unknown	No	No	National Response Center Incident Report #99824, 02/16/1991
112	12/26/1990	Kearns, Utah	SPS Technologies	Freon TF	Chloro-fluorocarbon	Undetermined	NA	NA	Decomposition	Known	Separation Equipment	Other	0	Yes	No	TG	Unknown	Thermal run away - Excess Heating	Unknown	No	No	OSHA IMIS
113	11/8/1990	Madawaska, Maine	Fraser Paper Limited	Sodium hydrosulfite	Sodium hydrosulfite	2	NA	NA	Decomposition	Known	Unknown	Other	0	Yes	No	TG	Unknown	Unknown	Unknown	No	No	EPA/OSHA Joint Chemical Accident Investigation Report Napp Tech----EPA 550-R-97-026 NRC#46699, ARIP
114	10/22/1990	Tonawanda, New York	FMC Corporation	Potassium persulfate	Oxidizer	Undetermined	NA	NA	Decomposition	Known	Transfer	Chem Manufact	1	No	Yes	F&E	Unknown	Unknown	Unknown	No	No	OSHA IMIS
115	10/3/1990	Rosemont, Illinois	Redi Cut Foods	Sodium metabisulfite and acid	NA	Undetermined	Acid	Unknown	Oxidation	Known	Unknown	Other	0	Yes	No	TG	Unknown	Incompat. Matls. - (NOS)	Unknown	No	No	OSHA IMIS
116	7/5/1990	Channelview, Texas	ARCO Chemical Company	Organic peroxides	Organic peroxide	Unknown	NA	NA	Decomposition	Known	Process Tank	Chem Manufact	17	No	$12,000,000	F&E	No	Thermal run away - Incorrect Operating Conditions	Inadequate safe operating procedures for the peroxide decomposition, inadequate redundant controls to monitor tank contents, inadequate design to prevent human error, use of equipment unsuitable for oxygen enriched atmosphere	No	No	OSHA Report (The ARCO Chemical Company Channelview Complex Explosion and Fire), December 1990
117	5/29/1990	Freeport, Texas	DOW Chemical Co.	Amino-ethyl-ethanolamine and 1,3-dichloropropene	Amine	Undetermined	Chlorinated hydrocarbon	0	Polymerization/ Decomposition	Known	Storage Tank	Chem Manufact	0	No	No	TG	Yes	Incompat. Matls - Inadvertent Mixing	Inadequate procedural controls to prevent human error	Yes (flammable)	No	Loss Prevention Symposium, Management of reactive chemicals incident; IChEME Accident Database; NRC Report #24343
118	4/22/1990	Muskegon, Michigan	Lomac Inc.	Phosphorus oxychloride and limestone	Phosphorus halide	2	Base	Undetermined	Redox	Known	Unknown	Chem Manufact	0	Yes	No	TG	Yes (Injury)	Incompat. Matls. - (NOS)	Unknown	Yes (listed)	Yes (toxic)	IChemE Accident Database, Detroit Free Press, 4/22/90
119	4/21/1990	Valdosta, Georgia	Chemical Conservation of Georgia, Inc.	3,4 dichloro-1-butene	Chlorinated hydrocarbon	2	NA	NA	Polymerization	Known	Storage Tank	Chem Manufact	0	Yes	Unknown	TL	Unknown	Unknown	Unknown	Yes (flammable)	No	OSHA IMIS
120	4/18/1990	Barberton, Ohio	PPG Industries	Herbicide	NA	Unknown	NA	NA	Unknown	NA	Separation Equipment	Chem Manufact	1	Yes	Yes	F&E	Unknown	Thermal run away - (NOS)	Unknown	Unknown	Unknown	OSHA IMIS
121	1/20/1990	Lima, Ohio	BP Chemicals	Acrylonitrile and caustic	Monomer	2	Base	1	Polymerization	Known	Process Tank	Chem Manufact	0	Yes	Yes	F&E and TG	Unknown	Thermal run away - contamination	Unknown	Yes (flammable)	Yes (toxic)	NRC Report #1451, IChemE Accident Database
122	9/25/1989	West Helena, Arkansas	Cedar Chemical Corporation	Methyl thiotinacolone	NA	Undetermined	NA	NA	Decomposition	Undetermined	Process Tank	Chem Manufact	0	Yes	Yes	F&E	Unknown	Unknown	Unknown	No	No	OSHA IMIS

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
123	6/29/1989	Rocky Mountain, North Carolina	Unknown	Sodium hydrosulfite and water	Sodium hydrosulfite	2	Water	NA	Water reactive	Known	Drum	Chem Manufact	0	Yes	No	TG	Unknown	Incompat. Matls - Inadvertent mixing	Unknown	No	No	EPA/OSHA Joint Chemical Accident Investigation Report Napp Tech—EPA 550-R-97-026
124	10/17/1988	Wilmington, California	US Borax	Hydrochloric acid and sodium chlorite	Acid	Undetermined	Oxidizer	1	Oxidation	Known	Drum	Chem Manufact	0	Yes	Yes	F&E	Unknown	Incompat. Matls. - (NOS)	Unknown	No	No	EPA ARIP
125	9/3/1988	Commerce, California	Unknown	Trichlorocyanuric acid and water	Acid	2	Water	NA	Water reactive	Known	Unknown	Storage	0	Yes	Yes	TG	Yes	Incompat. Matls. - (NOS)	Unknown	No	No	MHIDAS; IChemE Accident Database
126	7/21/1988	Deer Park, Texas	Rohm and Haas	Methylacrylic acid (TMAA)	Monomer	2	NA	NA	Polymerization	Known	Storage Tank	Chem Manufact	0	No	Yes	F&E	Unknown	Thermal run away - Lack of inhibitor	Inadequate administrative/ procedural controls for inhibitor level, lack of adequate procedures to prevent contamination	No	No	Annual Loss Prevention Symposium, 8/22/91
127	6/29/1988	Auburn, Indiana	Bastian Plating Company	Zinc cyanide and muriatic acid	Cyanide salt	0	Acid	Undetermined	Redox	Known	Unknown	Other	5	Yes	No	TG	No	Incompat. Matls - Operating Procedure	Inadequate procedures and training on chemical hazards (includes operators and emergency responders)	No	No	Charleston Gazette, 6/29/88; Indianapolis Star 6/4/91; IChemE Accident Database; IMIS; US DOE Occupational Safety Observer, Sept. 1994
128	5/23/1988	Sterling, Virginia	Automata, Inc.	Sodium chlorite, sulfuric acid	Oxidizer	1	Acid	2	Oxidation	Known	Transfer	Other	1	Yes	Yes	F&E	Unknown	Incompat. Matls - Inadvertent mixing	Unknown	No	No	OSHA IMIS
129	5/13/1988	Willow Island, West Virginia	American Cyanamid Company	Sulfur dichloride, toluene, and iron chloride (catalyst)	Non-metal halide	Undetermined	Organic	0	Chlorination / Oxidation	Unknown	Reactor	Chem Manufact	1	Yes	Yes	F&E and TG	Unknown	Thermal run away - unexpected catalytic activity	Unknown	Yes (flammable)	No	OSHA IMIS, Bretherick's Handbook
130	5/4/1988	Henderson, Nevada	Pacific Engineering and Production Company Plant (PEPCON)	Ammonium perchlorate	Oxidizer	4	NA	NA	Decomposition	Unknown	Storage Tank	Chem Manufact	2	Yes	Yes	F&E	Yes	Thermal/ Mechanical Shock - Excess Heating	Unknown	Yes (listed)	No	Las Vegas Review Journal, May 3, 1998; CCPS Guidelines for Investigating Chemical Process Incidents- Appendix D; IChemE Accident Database
131	3/21/1988	Charlotte, North Carolina	Unknown	Sodium hydrosulfite	Sodium hydrosulfite	2	NA	NA	Water reactive	Known	Drum	Unknown	0	No	Yes	F&E	Unknown	Incompat. Matls - Inadvertent Mixing	Unknown	No	No	NFPA Fire Journal, Sept/Oct 1988
132	1/9/1988	Houston, Texas	Archem Co.	Methanol, caustic, ortho nitrochlorobenzene	Nitro compound	0	Alcohol-caustic	0	Redox	Undetermined	Reactor	Chem Manufact	1	Yes	Yes	F&E	Unknown	Unknown	Unknown	Yes (flammable)	No	OSHA IMIS

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
133	11/24/1987	Torrance, California	Mobil	Potassium hydroxide and hydrofluoric acid	Base	1	Acid	Undetermined	Acid/base	Known	Process Tank	Refinery	0	No	$15,000,000	F&E	Unknown	Incompat. Matls. - (NOS)	Unknown	Yes (listed)	Yes (toxic)	Marsh & McLennan, A Thirty-Year Review, 15th edition
134	8/24/1987	Seneca, South Carolina	Englehard Corp. Specialty Chemicals Div.	Hydrochloric acid, ammonia	Acid	Undetermined	Base	0	Acid/base	Known	Separation Equipment	Chem Manufact	0	Yes	No	TG	Unknown	Incompat. Matls - Inadvertent mixing	Unknown	Maybe (con-centration)	Maybe (con-centration)	OSHA IMIS
135	7/30/1987	Minden, Nevada	ETI Group International, Bentley Nevada-Main Plant	Sulfuric acid, caustic solution, ammonium chloride, and water	Acid	2	Base	1	Acid/base	Known	Drum	Other	0	Yes	No	TG	Unknown	Incompat. Matls. - (NOS)	Unknown	No	No	OSHA IMIS
136	5/26/1987	Cincinnati, Ohio	United Service Company	Sodium hypochlorite and acid	Sodium hypochlorite	Undetermined	Acid	Unknown	Acid/base	Known	Unknown	Other	0	Yes	No	TG	Unknown	Incompat. Matls. - (NOS)	Unknown	No	No	OSHA IMIS
137	01/07/87	Bath, Pennsylvania	Savage Industries Inc.	Sulfuric acid, isopropyl alcohol and acrylonitrile	Monomer	2	Acid	2	Oxidation	Known	Reactor	Chem Manufact	1	Yes	Yes	F&E and TG	Unknown	Thermal run away - Mischarge	Unknown	Yes (flammable)	Yes (toxic)	OSHA IMIS, MHIDAS
138	12/13/1986	Lobeco, South Carolina	Lobeco Products Inc.	Herbicide intermediate known as A.D.D.	NA	Unknown	NA	NA	Decomposition	Undetermined	Reactor	Chem Manufact	0	Yes	Yes	F&E	Unknown	Thermal run away - (NOS)	Unknown	No	No	OSHA IMIS
139	8/18/1986	Newark, Delaware	Helix Associates, Inc.	Glycerin, sulfuric acid, anisol, and iodine	Organic	0	Acid	2	Unknown	NA	Reactor	Chem Manufact	0	Yes	No	TG	Unknown	Unknown	Unknown	Maybe (con-centration)	Maybe (con-centration)	OSHA IMIS, MHIDAS
140	8/15/1986	Hunt Valley, Maryland	McCormick-Stange Flavor Division	Salt, sugar, propylene glycol, caramel coloring, sodium nitrate sodium nitrite	NA	Unknown	NA	NA	Unknown	NA	Process Tank	Other	0	Yes	No	TG	Unknown	Unknown	Unknown	No	No	OSHA IMIS, MHIDAS
141	6/15/1986	Pascagoula, Mississippi	First Chemical Corp.	Aniline	Amine	0	NA	NA	Unknown	NA	Separation Equipment	Chem Manufact	0	No	$10,000,000	F&E	Unknown	Thermal run away - Incorrect Operating conditions	Unknown	No	No	Marsh & McLennan 10th edition, MHIDAS
142	6/12/1986	Barceloneta, Puerto Rico	Merck Sharp & Dohme Quimica De P.R., Inc.	Nitro ethane (and possibly other chemicals including toluene and ammonia)	Nitroparaffins	3	NA	NA	Decomposition	Known	Reactor	Chem Manufact	3	Yes	Yes	F&E	Unknown	Thermal run away - Excess Heating	Unknown	Yes (flammable)	No	OSHA IMIS
143	1/22/1986	Zellwood, Florida	Douglas Fertilizer & Chemical, Inc.	Magnesium nitrate solution and nitric acid	Oxidizer	Undetermined	Acid	0	Unknown	NA	Unknown	Chem Manufact	1	No	Yes	F&E and TL	Unknown	Incompat. Matls. - (NOS)	Unknown	No	No	OSHA IMIS
144	11/22/1985	St. Petersburg, Florida	Eci Division of E-Systems, Inc	Silver cyanide and hydrogen peroxide	Cyanide salt	Undetermined	Peroxide	3	Decomposition	Known	Drum	Other	0	Yes	Yes	F&E and TG	Unknown	Incompat. Matls. - (NOS)	Unknown	Maybe (con-centration)	No	OSHA IMIS
145	11/8/1985	Cary, North Carolina	Town of Cary Department of Public Works	Trichloro-s-triazine, calcium hypochlorite	Acid	2	Inorganic	1	Water reactive	Known	Waste System	Other	0	Yes	Yes	F&E	Unknown	Unknown	Unknown	Unknown	Unknown	OSHA IMIS
146	10/1/1985	Dayton, Ohio	Monsanto Company	Bromine liquid, acetone	Inorganic-halogen	0	Organic	0	Halogenation	Known	Process Tank	Chem Manufact	0	Yes	No	TG	Unknown	Incompat. Matls - Inadvertent Mixing	Unknown	Yes (listed)	Yes (toxic)	OSHA IMIS
147	8/29/1985	Roebuck, South Carolina	Abco Industries Inc.	Thiourea dioxide and water	Urea	Undetermined	Water	NA	Water reactive	Known	Process Tank	Chem Manufact	0	Yes	No	TG	Yes	Incompat. Matls. - (NOS)	Unknown	No	No	OSHA IMIS, MHIDAS
148	8/28/1985	West Chester, Pennsylvania	Unknown	Unknown	NA	Unknown	NA	NA	Unknown	NA	Unknown	Chem Manufact	0	Yes	No	TG	Yes	Unknown	Unknown	Unknown	Unknown	MHIDAS
149	8/11/1985	Institute, West Virginia	Union Carbide	Methylene chloride, and aldicarb oxime	Organic chloride	0	Organic	Undetermined	Decomposition	Known	Storage Tank	Chem Manufact	0	Yes	No	TG	Yes (Injury)	Thermal run away - Excess heating	Unknown	No	No	The Charleston Gazette, 11/27/1985, Houston Chronicle, 08/23/1985, MHIDAS
150	6/26/1985	Eugene, Oregon	All American Plating Service	93% sulfuric acid and 31% hydrochloric acid, soda ash	Acid	2	Base	1	Acid/base	Known	Process Tank	Other	0	Yes	No	TG	Unknown	Incompat. Matls. - (NOS)	Unknown	No	No	OSHA IMIS
151	5/8/1985	Bensenville, Illinois	Access Plating Industries	Hydrochloric, sulfuric, and nitric acids (possibly other chemicals).	NA	Unknown	NA	NA	Unknown	NA	Storage Tank	Other	0	Yes	No	TG	Unknown	Incompat. Matls. - (NOS)	Unknown	Maybe (con-centration)	Maybe (con-centration)	OSHA IMIS

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
152	10/8/1984	Port of New York, New Jersey	Unknown	Malathion	NA	Unknown	NA	NA	Unknown	NA	Storage Tank	Other	0	Yes	No	TG	Yes	Unknown	Unknown	No	No	MHIDAS
153	8/24/1984	Colorado Springs, Colorado	Honeywell Inc	Hydrogen chloride and hydrogen peroxide	Acid	Undetermined	Peroxide	3	Decomposition	Known	Process Tank	Other	0	Yes	No	TG	Unknown	Incompat. Matls. - (NOS)	Unknown	Maybe (con-centration)	No	OSHA IMIS
154	8/20/1984	Aurora, North Carolina	Texas Gulf Chemicals Co.	Super phosphate acid	NA	Unknown	NA	NA	Unknown	NA	Storage Tank	Chem Manufact	1	No	Unknown	TL	Unknown	Incompat. Matls - Inadvertent mixing	Unknown	No	No	OSHA IMIS
155	6/7/1984	St. Louis, Missouri	US Polymers Inc.	Phthalic anhydride, water	Anhydride	0	Water	NA	Water reactive	Known	Process Tank	Chem Manufact	1	Yes	Unknown	TL	Unknown	Unknown	Unknown	No	No	OSHA IMIS
156	5/23/1984	Fall River, Massachusetts	Swan Finishing Co.	Sulfuric acid and unknown chemicals	NA	2	NA	NA	Unknown	NA	Drum	Other	0	Yes	Yes	F&E and TL	Unknown	Incompat. Matls. - (NOS)	Unknown	Maybe (con-centration)	Maybe (con-centration)	OSHA IMIS
157	9/21/1983	Salisbury, North Carolina	Unknown	Acrylonitrile (and possibly other chemicals including methyl-isobutylketone)	Monomer	2	NA	NA	Unknown	NA	Reactor	Chem Manufact	0	Yes	Yes	F&E	Yes	Thermal run away - (NOS)	Unknown	Yes (flammable)	Yes (toxic)	MHIDAS
158	Apr-83	Ottawa, Illinois	Unknown	Cumene hydroperoxide, rust, and water	Organic peroxide	4	NA	NA	Decomposition	Known	Storage Tank	Chem Manufact	2	Yes	Yes	F&E	Unknown	Thermal run away - contamination	Unknown	Yes (listed)	No	NFPA Fire Journal, 1/1
159	Mar-83	South Charleston, West Virginia	FMC Corporation	Nitrogen trichloride	Nitrogen trichloride	Undetermined	NA	NA	Decomposition	Known	Separation Equipment	Chem Manufact	1	No	Yes	F&E	Unknown	Thermal/ Mechanical Shock - (NOS)	Unknown	No	No	Nitrogen trichloride case studies documented in the U.S. from the Chlorine Institute, 199
160	11/12/1982	Taft, Louisiana	Union Carbide	Acrolein and other chemicals	Monomer	3	NA	NA	Polymerization	Known	Storage Tank	Chem Manufact	0	No	Yes	F&E	Yes	Thermal run away - Control System failure	Unknown	Yes (listed)	Yes (toxic)	MHIDAS
161	8/2/1982	Gulfport, Mississippi	Plastiflex Inc., a division of NL Industries	2-ethylhexanol, nitric and sulfuric acids	Alcohol	0	Acid	2	Nitration	Known	Reactor	Chem Manufact	3	Yes	Yes	F&E	Yes	Thermal run away - Mischarge	Unknown	Maybe (con-centration)	Maybe (con-centration)	MHIDAS, OSHA Review Commission and Admin Law Judge Decisions - NL Industries - Docket Number 83-2
162	3/9/1982	Philadelphia, Pennsylvania	Allied Chemical	Cumene hydroperoxide (50%)	Organic peroxide	4	NA	NA	Decomposition	Known	Process Tank	Chem Manufact	0	Yes	$25,000,000	F&E	Yes	Thermal run away - Excess Heating	Unknown	Yes (listed)	No	Marsh & McLennan 30 Year Review, 18th Ed, Bucks County Courier Times, 03/10/82, Loss Prevention Symposium, 3/88
163	1/22/1982	Lyons, Illinois	Pelron Corporation	Ethylene oxide, phosphorous oxychloride, diethylene glycol	Ethylene oxide	3	Phosphorous halide	2	Decomposition	Known	Reactor	Chem Manufact	1	Yes	Yes	F&E	No	Thermal run away - Mischarge	Inadequate operating limits, inadequate procedures and training, inadequate engineering design of emergency relief system	Yes (listed)	Yes (toxic)	OSHA Review Commission and Admin Law Judge Decisions - Pelron Corp. Docket Number 82-358, OSHA Incident Summary Interview

ID#	Date	Location	Company	Chemical(s)	Chemical 1 Class	Chemical 1 NFPA Number from 49/325	Chemical 2 Class	Chemical 2 NFPA Number from 49/325	Type of Reaction	Known/ Unknown Chemistry	Equipment Involved	Facility Type	Fatality	Injury	Property Damage	Type of Conseq-uences	Public Impact	Reactive Hazards	Management System Deficiencies	OSHA PSM List	EPA RMP List	Data Source(s)
164	7/19/1951	Greens Bayou, Texas	Unknown	Water and terephthaloyl-dichloride	NA	Unknown	NA	NA	Hydrolysis	Known	Reactor	Chem Manufact	0	No	$10,000,000	F&E	Unknown	Thermal run away - (NOS)	Unknown	No	No	Marsh & McLennan 30 Year Review, 15th Ed., MHIDAS
165	5/20/1951	Childersburg, Alabama	Unknown	32% 2-sec-butyl-4,6-dinitrophenol	Nitro compound	Undetermined	NA	NA	Unknown	NA	Process Tank	Chem Manufact	0	No	Yes	F&E	Yes	Thermal run away - (NOS)	Unknown	No	No	MHIDAS
166	2/11/1951	Chicago Heights, Illinois	Unknown	Steam and catalyst	NA	Unknown	NA	NA	Unknown	NA	Process Tank	Chem Manufact	1	Yes	$15,540,000	F&E	Unknown	Thermal run away - Excess Heating	Unknown	Unknown	Unknown	Fire Protection Manual for Hydro-processing Plants, Vol. 1, MHIDAS
167	7/23/1950	Seadrift, Texas	Unknown	Ethylene oxide	Ethylene oxide	3	NA	NA	Oxidation / Decomposition	Known	Reactor	Chem Manufact	0	No	$12,000,000	F&E	Unknown	Thermal run away - (NOS)	Unknown	Yes (listed)	Yes (toxic)	Marsh & McLennan 30 Year Review, 18th Ed., MHIDAS

Table 2. Data field description of reactive incident data

Data Field	Description
ID #	Number given to track.
Date	Date of incident.
Location	Location of incident.
Company	Facility owner.
Chemicals	Chemicals involved in incident.
Chemical 1 Class	Chemical class for chemical 1.
Chemical 1 NFPA Number from 49/325	NFPA rating given in standard 49 or 325 for chemical 1.
Chemical 2 Class	Chemical class for chemical 2.
Chemical 2 NFPA Number from 49/325	NFPA rating given in standard 49 or 325 for chemical 2.
Type of Reaction	Type of reaction that caused the incident.
Known/Unknown Chemistry	Was knowledge of the chemical reaction involved in incident available in open literature?
Equipment Involved	Equipment where the reaction occurred.
Facility Type	Prominent business operation conducted at facility involved in incident (e.g., chemical manufacturing).
Fatality	Number of fatalities resulting from the incident.
Injury	Did the incident result in an injury?

Property Damage ($)	Did the incident result in property damage? And 12 incidents with largest costs regarding property damage.
Consequences	Type of consequences from the incident (e.g., toxic gas release, fire & explosion).
Public Impact	Did incident impact member of public? Public impact is fatality, injury, evacuation, or shelter-in-place of a member of the public.
Reactive Hazards	Classification of the type of reaction involved in the incident.
Management System Deficiencies	Deficiencies in management systems that contributed to the incident. In most cases, this information was not determined by CSB.
OSHA PSM List	For the purposes of analyzing the data, CSB determined if a chemical was covered by OSHA PSM by identifying whether it was listed in PSM or was covered as a flammable chemical by OSHA definition.
EPA RMP List	For the purposes of analyzing the data, CSB determined if a chemical was covered by EPA RMP by identifying whether it was listed in RMP.
Data Sources	Primary sources used to obtain information regarding the incident.

Appendix A: Hazard Investigation Incident Data Sources

Title	Source
NRC (National Response Center)	U.S. Coast Guard (USCG)
IMIS (Integrated Management Information System)	Occupational Safety and Health Administration (OSHA)
The Accident Database	Institution of Chemical Engineers (IChemE)
ARIP (Accidental Release Information Program)	U.S. Environmental Protection Agency (EPA)
RMP*Info (Five-Year Accident History Data)	EPA
MHIDAS (Major Hazard Incident Data Service)	Health and Safety Executive, United Kingdom (HSE)
CIRC (Chemical Incident Reports Center)	U.S. Chemical Safety and Hazard Investigation Board (CSB)
Fire Incident Data Organization Database	National Fire Protection Association (NFPA)
Reports of Chemical Safety Occurrences at U.S. Department of Energy (DOE) facilities	DOE
Various Chlorine Related Incident Reports	Chlorine Institute
Hazardous Materials Incident Reports	National Transportation Safety Board (NTSB)
Fire Incident Reports	NFPA
Annual Loss Prevention Symposium (CD ROM)	CCPS
Bretherick's Handbook of Reactive Chemical Hazards, 6th Ed.	Butterworth-Heinemann
Loss Prevention in the Process Industries	F. P. Lees
Large Property Damage Losses in the Hydrocarbon Chemical Industries, A Thirty-Year Review, 18th Ed.	Marsh and McLennan
NAPP Technologies Chemical Accident Investigation Report	EPA/OSHA

Title	Source
Prevention of Reactive Chemical Explosions	EPA
How to Prevent Runaway Reactions	EPA
Tosco Avon Refinery Chemical Accident Investigation Report	EPA
Surpass Chemical Company Chemical Accident Investigation Report	EPA
Incidents in the Chemical Industry Due to Thermal Runaway Reactions	Barton and Nolan

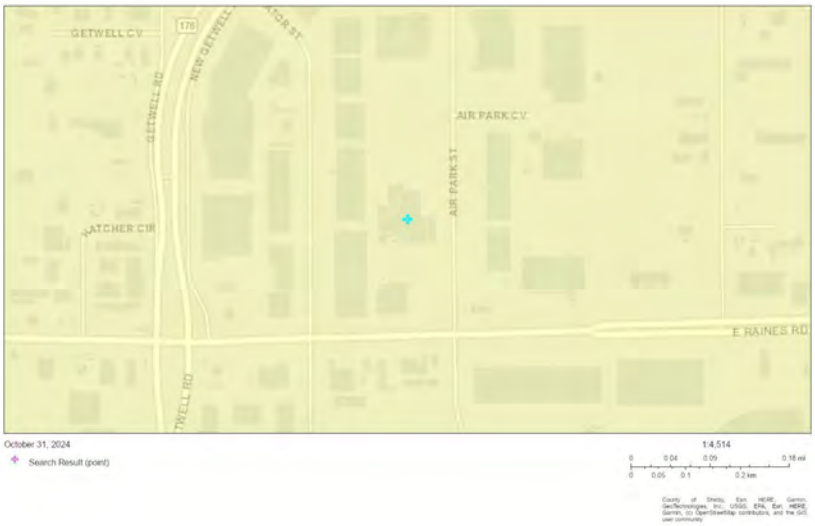
Attachment 6

EJScreen Community Report

This report provides environmental and socioeconomic information for user-defined areas, and combines that data into environmental justice and supplemental indexes.

Memphis, TN

2 miles Ring Centered at 35.038781,-89.932140
Population: 17,067
Area in square miles: 12.56

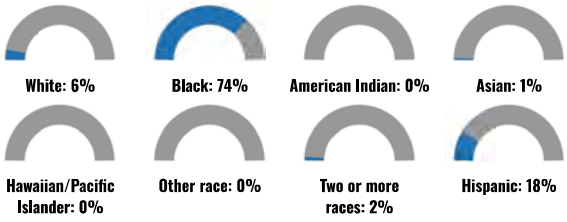


LANGUAGES SPOKEN AT HOME

LANGUAGE	PERCENT
English	83%
Spanish	15%
Other and Unspecified	1%
Total Non-English	17%

COMMUNITY INFORMATION

BREAKDOWN BY RACE



BREAKDOWN BY AGE

LIMITED ENGLISH SPEAKING BREAKDOWN

Notes: Numbers may not sum to totals due to rounding. Hispanic population can be of any race.
Source: U.S. Census Bureau, American Community Survey (ACS) 2018-2022. Life expectancy data comes from the Centers for Disease Control.

Report for 2 miles Ring Centered at 35.038781,-89.932140
Report produced October 31, 2024 using EJScreen Version 2.3

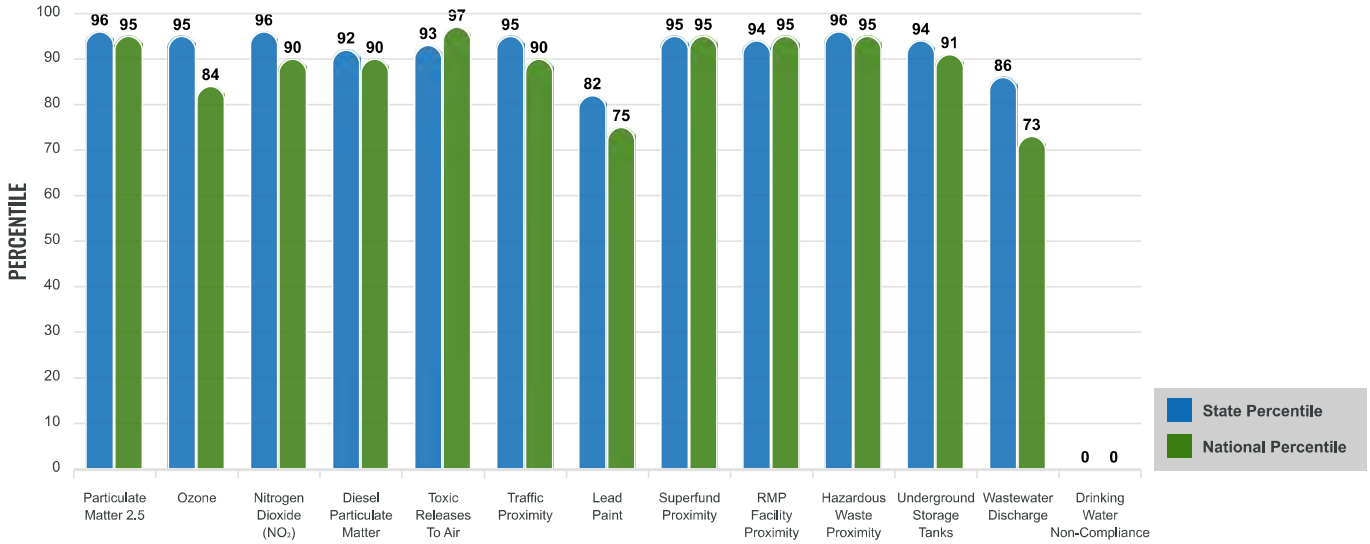
Environmental Justice & Supplemental Indexes

The environmental justice and supplemental indexes are a combination of environmental and socioeconomic information. There are thirteen EJ indexes and supplemental indexes in EJScreen reflecting the 13 environmental indicators. The indexes for a selected area are compared to those for all other locations in the state or nation. For more information and calculation details on the EJ and supplemental indexes, please visit the EJScreen website.

EJ INDEXES

The EJ indexes help users screen for potential EJ concerns. To do this, the EJ index combines data on low income and people of color populations with a single environmental indicator.

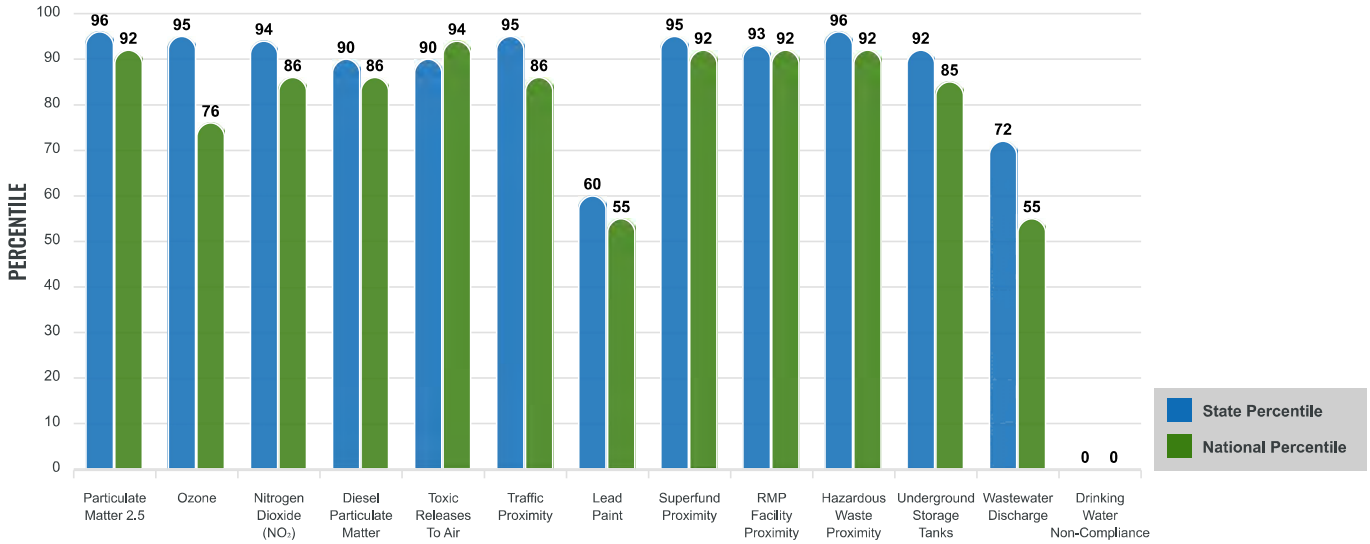
EJ INDEXES FOR THE SELECTED LOCATION



SUPPLEMENTAL INDEXES

The supplemental indexes offer a different perspective on community-level vulnerability. They combine data on percent low income, percent persons with disabilities, percent less than high school education, percent limited English speaking, and percent low life expectancy with a single environmental indicator.

SUPPLEMENTAL INDEXES FOR THE SELECTED LOCATION



Report for 2 miles Ring Centered at 35.038781,-89.932140

Report produced October 31, 2024 using EJScreen Version 2.3

EJScreen Environmental and Socioeconomic Indicators Data

SELECTED VARIABLES	VALUE	STATE AVERAGE	PERCENTILE IN STATE	USA AVERAGE	PERCENTILE IN USA
ENVIRONMENTAL BURDEN INDICATORS					
Particulate Matter 2.5 ($\mu g/m^3$)	9.11	7.52	98	8.45	77
Ozone (ppb)	60	56.6	90	61.8	48
Nitrogen Dioxide (NO_2) (ppbv)	9.2	6.1	90	7.8	67
Diesel Particulate Matter ($\mu g/m^3$)	0.203	0.156	72	0.191	64
Toxic Releases to Air (toxicity-weighted concentration)	5,200	5,300	77	4,600	86
Traffic Proximity (daily traffic count/distance to road)	1,500,000	590,000	87	1,700,000	65
Lead Paint (% Pre-1960 Housing)	0.14	0.21	52	0.3	41
Superfund Proximity (site count/km distance)	0.31	0.16	89	0.39	77
RMP Facility Proximity (facility count/km distance)	1.2	0.45	86	0.57	84
Hazardous Waste Proximity (facility count/km distance)	4.8	1.4	94	3.5	78
Underground Storage Tanks (count/km^2)	2.6	1.3	81	3.6	67
Wastewater Discharge (toxicity-weighted concentration/m distance)	6.6	810	47	700000	33
Drinking Water Non-Compliance (points)	0	1.3	0	2.2	0
SOCIOECONOMIC INDICATORS					
Demographic Index USA	2.87	N/A	N/A	1.34	93
Supplemental Demographic Index USA	2.37	N/A	N/A	1.64	86
Demographic Index State	3.04	1.32	94	N/A	N/A
Supplemental Demographic Index State	2.41	1.6	89	N/A	N/A
People of Color	94%	28%	94	40%	91
Low Income	59%	35%	86	30%	88
Unemployment Rate	13%	6%	88	6%	89
Limited English Speaking Households	7%	2%	92	5%	80
Less Than High School Education	22%	12%	86	11%	84
Under Age 5	8%	6%	77	5%	77
Over Age 64	8%	18%	15	18%	18

*Diesel particulate matter index is from the EPA's Air Toxics Data Update, which is the Agency's ongoing, comprehensive evaluation of air toxics in the United States. This effort aims to prioritize air toxics, emission sources, and locations of interest for further study. It is important to remember that the air toxics data presented here provide broad estimates of health risks over geographic areas of the country, not definitive risks to specific individuals or locations. More information on the Air Toxics Data Update can be found at: https://www.epa.gov/haps/air-toxics-data-update.

Sites reporting to EPA within defined area:

Superfund	0
Hazardous Waste, Treatment, Storage, and Disposal Facilities	5
Water Dischargers	63
Air Pollution	22
Brownfields	0
Toxic Release Inventory	23

Other community features within defined area:

Schools	9
Hospitals	2
Places of Worship	26

Other environmental data:

Air Non-attainment	Yes
Impaired Waters	Yes

Selected location contains American Indian Reservation Lands*	No
Selected location contains a "Justice40 (CEJST)" disadvantaged community	Yes
Selected location contains an EPA IRA disadvantaged community	Yes

Report for 2 miles Ring Centered at 35.038781,-89.932140

Report produced October 31, 2024 using EJScreen Version 2.3

EJScreen Environmental and Socioeconomic Indicators Data

HEALTH INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Low Life Expectancy	18%	22%	12	20%	38
Heart Disease	5.5	6.7	28	5.8	48
Asthma	13.4	10.9	95	10.3	96
Cancer	3.9	6.7	5	6.4	7
Persons with Disabilities	12.4%	16.1%	31	13.7%	47

CLIMATE INDICATORS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Flood Risk	4%	11%	15	12%	33
Wildfire Risk	0%	3%	0	14%	0

CRITICAL SERVICE GAPS

INDICATOR	VALUE	STATE AVERAGE	STATE PERCENTILE	US AVERAGE	US PERCENTILE
Broadband Internet	16%	16%	58	13%	68
Lack of Health Insurance	21%	11%	93	9%	93
Housing Burden	Yes	N/A	N/A	N/A	N/A
Transportation Access Burden	Yes	N/A	N/A	N/A	N/A
Food Desert	Yes	N/A	N/A	N/A	N/A

Report for 2 miles Ring Centered at 35.038781,-89.932140

Report produced October 31, 2024 using EJScreen Version 2.3