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Accidents Will Happen

POLLUTION FROM PLANT MALFUNCTIONS, STARTUPS, and SHUTDOWNS IN PORT ARTHUR, TEXAS

“Accidents Will Happen” analyzes emissions resulting from startup, shutdown, and malfunctions at refineries and chemical plants in Port Arthur, Texas, and the problems associated with pollution from such unpermitted emissions. The specific plants addressed in this Report include Atofina Petrochemicals, Inc., BASF Fina Petrochemicals, Chevron Phillips Chemical Co., Motiva Enterprises, and The Premcor Refining Group, Inc.

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Introduction

On January 21st of this year, a brand new BASF-Atofina ethylene plant in Port Arthur, Texas, reported that "a surging of hydrocarbon flow tripped out the C2/C3 compressor," which forced the company to route the hydrocarbon feed flow to a flare.[1] Over the course of three days, the flare released into the atmosphere over 65 tons (130,805 pounds) of hazardous volatile organic compounds (VOCs).[2] Earlier that month, the aging Premcor refinery nearby released 208 tons (416,492 pounds) of sulfur dioxide (SO_2), nearly 25 tons (49,710 pounds) of VOCs, and over 2 tons (4,516 pounds) of hydrogen sulfide in a week due to "an unexpected inability to transfer sour fuel gas" to its sulfur recovery unit.[3]

Unfortunately, these accidents are apparently a way of life in Port Arthur, a city of 58,000 people located on the Gulf Coast less than a hundred miles east of Houston, where a cluster of refineries and chemical plants crowd the fencelines of residential neighborhoods. Documents obtained from the Texas Commission on Environmental Quality (TCEQ) show that in the first seven months of 2002, accidents and equipment startups, shutdowns, or maintenance at five Port Arthur plants and refineries, including Atofina Petrochemicals Refinery Inc., BASF Fina Petrochemicals L.P., Chevron Phillips Chemical Co., Motiva Enterprises, L.L.C., and the Premcor Refining Group, Inc., released almost 725 tons (1,449,069 pounds) of SO_2, nearly 10 tons (19,927 pounds) of hydrogen sulfide, 844 tons (1,688,077 pounds) of VOCs, nearly 42 tons (83,426 pounds) of benzene, a probable human carcinogen, and over 57 tons (115,483 pounds) of carbon monoxide. For example:

- On February 13, 2002, Atofina Petrochemicals refinery reported a release of almost 5 tons (9,716 pounds) of VOCs, approximately 70 tons (139,205 pounds) of SO_2, and over 6 tons (12,250 pounds) of carbon monoxide.
- On March 19, 2002, Premcor's refinery released nearly 60 tons (119,431 pounds) of SO_2, 1,274 pounds of hydrogen sulfide, and almost two and a half tons (4,842 pounds) of VOCs.
- On April 7, 2002, Motiva Enterprises, L.L.C., refinery reported the release of nearly 4 tons (7,462 pounds) of SO_2 resulting from a partial shutdown of the delayed coking unit.
- On May 21, 2002, BASF Fina Petrochemicals, L.P., chemical plant released over 5 tons (10,699 pounds) of benzene and nearly 65 tons (129,757 pounds) of VOCs.

- On June 20, 2002, the Chevron Phillips chemical plant reported a release of over 22 tons (44,575 pounds) of VOCs because of a "faulty power card in the DCS system" which caused a "loss of various unit controls including the inadvertent closing of the Hydrogen supply valve."[4]

- On July 24, 2002, a fire at a hydrotreater unit at Motiva Enterprises, L.L.C., occurred when hydrocarbons leaking from an exchanger were ignited.[5] As a result, the refinery released over 4 tons of VOCs (8,636 pounds) and almost 2 tons (3,969 pounds) of SO_2.

Table A provides a month-by-month summary of SO_2, hydrogen sulfide, VOCs, benzene, and carbon monoxide emissions from accidents, shutdowns, startups, and maintenance activity from the five Port Arthur plants. Table A, however, does not include other pollutants--such as nitric oxide--also released during the same period.

Emissions May Be Underestimated

The summaries provided in this Report are based on data submitted by the five plants to the Beaumont office of the TCEQ. Company reports may underestimate emissions for three reasons:

(1) Companies are only required to report releases above certain amounts under both federal and state law. For example, companies in Port Arthur must report the release of carbon monoxide only if more than 5,000 pounds is emitted in a twenty-four hour period.[6] Port Arthur companies sometimes report smaller releases, but often do not, as they are not required to do so.

(2) When a malfunction occurs, gases are typically routed to a flare, where they are burned off, until the problem can be fixed. Company emission reports usually assume that the flare is operating at maximum efficiency, destroying 98-99% of emissions through combustion. But those same reports sometimes state that the flare is smoking or that opacity is poor, which indicates that combustion is incomplete (and therefore not operating at 98-99% efficiency) as a result, the flare may be releasing more than reported estimates of pollution into the atmosphere.

(3) Some reports do not state the amount of pollution released at all, but simply note that the reportable quantity has been exceeded.

How Port Arthur's Pollution Can Affect the Public's Health

Monitoring of benzene and other hazardous chemicals in the air that Port Arthur residents breathe is scarce. However, a recent "bucket sample" taken on July 13, 2002, using U.S. Environmental Protection Agency (EPA) approved protocols, revealed benzene levels of 6.77

parts per billion (ppb) at one sampling location, and 15 ppb at another site.[7] Both readings exceed the levels of concern for EPA Region 6 health-based screening thresholds.[8]

The unpermitted release of over 886 tons of smog-forming VOCs is of special concern for Port Arthur, as the community is a non-attainment area that does not meet health-based standards for ozone. (Ozone is formed when nitrogen oxides and VOCs react with oxygen molecules in the presence of sunlight.) High levels of ozone in the atmosphere can result in several known health effects, including irritation of the respiratory system, reduction of lung capacity, aggravation of asthma, and inflammation and damage of the lung lining. Scientists also suspect that ozone may aggravate chronic lung diseases, such as emphysema and bronchitis.[9]

In addition to elevating the risk of cancer, lung disease, and other ailments associated with long-term exposure to the pollutants released from these Port Arthur facilities, the release of high volumes of pollution in a short period of time can trigger acute health effects such as asthma, nausea, depression of the nervous system, heightened cardiac sensitivity, and heart attack. For example, exposure to high concentrations of benzene (2,000 ppm) can depress the nervous system and cause death, while lower concentrations (1,000 ppm) may cause nausea, headaches, heart arrhythmia, anemia, and blood cancers such as leukemia.[10] While BASF-Atofina released almost 28 tons of benzene in May, no public data is available to determine whether benzene levels increased in surrounding neighborhoods.

Reporting Requirements: How Do I Find Out What Is Being Released in My Neighborhood?

Unlike some communities, Port Arthur does not have a system for notifying residential neighborhoods when accidents occur or what is being done to stop them. Texas law now requires individual plants to send upset reports, usually by fax, to TCEQ's Region 10 Beaumont Field Office, which is responsible for inspecting local plants and tracking upset events and emissions. Information contained in an individual refinery upset report, which includes the pollutants released and the amount, can be obtained by making a personal visit to the Beaumont office, located about twenty miles outside of Port Arthur. Alternatively, an individual can request that TCEQ make copies of the faxed reports and mail them to the resident. However, TCEQ will

not pull individual company reports for specific dates from the file. Instead, upon receiving a request, TCEQ will make a copy of the company's entire file. This file contains all upset reports for the year, as well as other miscellaneous items. Charges for copies of files can run anywhere from $25 to $200 – too much for Port Arthur residents to pay to get information about pollution released in their own backyard.[11]

All accidental releases, as well as many that result from maintenance or shutdown activity of hazardous chemicals above a specified amount, must also be reported to the federal government's National Response Center within twenty-four hours. Such reports are available online to those who have internet access.[12] However, as Table B indicates, over two-thirds of the incidents reported to the state could not be found on the National Response Center's website.[13]

The incidents listed in Table B include both releases that result from accidents and those that result from startup or shutdown of a unit for regularly scheduled repairs. While federal guidance requires that unanticipated emissions from accidents should always be reported, releases from startups and shutdowns do not have to be reported if the releases are subject to federally enforceable limits or pollution controls and are part of a plan approved by the permit authority. It is not always clear from company reports, however, whether startup or shutdown releases meet these exemptions or whether the shutdown was a planned activity or part of the emergency response to an accident. Premcor apparently decided not to report one release to EPA on the theory that it did not exceed 1972 emission limits from a "grandfathered unit," although EPA guidance issued in April of 2001 makes clear that such releases should be reported.[14]

"Unavoidable" Violations: Did the Facility Meet Its Burden of Proof?

Why should pollution of this magnitude be treated as "business as usual" under the Clean Air Act? Following the Exxon Valdez disaster, Congress established strict liability for any spills of oil or hazardous chemicals in our waterways, regardless of whether the spill was triggered by an accident. Clean Air Act regulations, however, excuse the release of thousands of pounds of even

a cancer-causing pollutant like benzene if it is beyond the reasonable control of the plant operator and meets other specific conditions.

The emissions surveyed in Table A reflect releases that result from a sudden breakdown of process or control equipment, as well as, from regularly scheduled startup, shutdown, or maintenance activities needed to cope with predictable wear and tear. Regardless of the cause, EPA considers these emissions illegal, as they generally exceed established permit limits. At the same time, EPA and states generally do not seek penalties for these releases, so long as they are beyond the control of the operator.

But this "affirmative defense" does not provide companies with a free pass. Even where penalties are excused, EPA and state agencies retain the authority to order plant operators to investigate and fix the underlying cause of the accident by, for example, installing better pollution control equipment. Moreover, to avoid penalties, a company has the burden of proof to show that the accident could not have been prevented and that all steps were taken to minimize emissions.

For instance, in cases involving a startup or shutdown, the defendant must prove that "the periods of excess emission that occurred during startup and shutdown were short and infrequent and could not have been prevented through careful planning and design." [15] In addition, the excess emissions cannot be "part of a recurring pattern indicative of inadequate design, operation, or maintenance."[16] Most importantly, the defendant must show that "all possible steps were taken to minimize the impact of the excess emissions on ambient air quality."[17]

To make use of the affirmative defense for malfunctions, the defendant carries the burden to prove that:

> The excess emissions were caused by a sudden, unavoidable breakdown of technology, beyond the control of the owner or operator;… [t]he excess emissions (a) did not stem from any activity or event that could have been foreseen and avoided, or planned for, and (b) could not have been avoided by better operation and maintenance practices;…[and] [t]he excess emissions were not part of a recurring pattern indicative of inadequate design, operation or maintenance.[18]

EPA has warned that accidents that should have been anticipated and prevented will not be excused under the Clean Air Act.

Are accidents as frequent and severe as those found in Port Arthur unavoidable? In addition, should EPA or TCEQ exercise their authority to require companies to improve air monitoring and build better backup pollution controls? The following section answers these questions.

Improved Technology and Work Practices Can Eliminate Pollution from Accidents, Startups, and Shutdowns

The Port Arthur experience shows that equipment malfunctions unfortunately have become a part of everyday life for large, complex manufacturing operations like refineries and petrochemical plants. Facilities reported an average of twenty-one excess emission incidents a month for five of the largest refineries and chemical plants in Port Arthur. On average, between January and July 2002, each plant experienced at least one "unavoidable" emission a week. For residents of Port Arthur, that means that hardly a day goes by without at least one unpermitted release of hazardous pollutants in excess of permit limits set by the Clean Air Act. While occasional incidents related to true emergency situations are to be expected from any source, the amount and frequency of such occurrences in Port Arthur deserve special attention. With proper plant maintenance and the replacement of outdated plant equipment, many of these emission releases could be eliminated, which could significantly improve Port Arthur air quality.

Volatile organic compounds vary widely in their toxicity and include probable carcinogens like benzene and ethylene. The flaring system in widespread use at today's petrochemical plants generally do not include adequate flow gas meters or VOC analyzers needed to accurately determine which specific chemical pollutants are being released and in what quantities. Even more disturbing is evidence that flares do not destroy 98-99% of VOCs like ethylene or benzene as is commonly reported.

For example, a recent study published in the Journal of the Air and Waste Management Association (JAWMA) explained that although "it is assumed that flaring achieves complete combustion with relatively innocuous byproducts such as CO [carbon monoxide] and H_2O," in actuality, "flaring is rarely successful in the attainment of complete combustion."[19] According to the study, flaring seldom achieves full combustion "because entrainment of the air into the region

of combusting gases restricts flare sizes to less than optimum values."[20] In addition, the study showed that optimum efficiency is also affected by wind speed as "combustion efficiencies decreased rapidly as wind speed increased from 1 to 6 m/sec [meters per second]. As wind speeds increased beyond 6 m/sec, combustion efficiencies tended to level off at values between 10 to 15%."[21] The study reported that the mean combustion efficiencies for flaring activity were less than 70%, significantly less than the 98-99% assumed efficiency.[22] In addition, a 2001 staff report for the Texas Natural Resource Conservation Commission (now TCEQ) noted that "investigations identified a broad scale lack of good engineering practice and Environmental Management practices."[23] The report concluded that "[i]ndustry must embrace the use of good engineering practice and Environmental Management practices in control of their events and in estimating the associated emissions."[24]

Fortunately, alternatives exist to relying on outdated flaring systems that will provide more complete combustion and that are at the same time both safe and affordable. An important first step is better management of the flow of raw materials to avoid overwhelming production units and triggering shutdowns or emergency upsets. As described in an EPA Enforcement Alert published in October 2000,

> [R]egular switching between high and low sulfur crude may cause fluctuations of the acid gas feed to the [Sulfur Recovery Plants]. This can create operational problems for the SRP and/or its pollution control equipment, resulting in a perceived need to flare. These upsets should be addressed through improved operational control systems, improved and frequent training of operators, and continued optimal performance of the SRP, **not by bypassing or flaring acid gas and sour water stripper gas**.[25]

Because accidents are inevitable, facilities should incorporate a variety of practices and technologies to minimize the effects of an accidental release. For instance, facilities could recycle VOCs back into the manufacturing process through a closed-loop system; add temporary storage capacity for all waste gases normally flared; and build redundancies and backup systems, including triple backup or redundant systems for electronic controls or major compressor units and other sensitive equipment that can fail due to false electronic glitches.

A consent decree reached between EPA and BP Amoco serves as a good example of how pollution from flaring can be reduced by improving plant operations and installing backup

controls. Through the consent decree, a BP Amoco facility in Toledo, Ohio, was able to reduce flaring incidents from 16 to 3, and reduced SO_2 emissions from 180 tons to 49 tons a year – compared to the 660 tons of SO_2 released from the Atofina and Premcor plants alone. Included within the consent decree are requirements to diagnose the root causes of malfunction and emergency releases. Once diagnosed, repeated releases for the same cause are seen as predicted releases and are no longer considered true malfunctions or emergencies. At this point, the facility must implement corrective measures, including operational and facility practice improvements, to prevent future occurrences.

Similar equipment and operational changes should be implemented by other sources in order to reduce flaring incidents to only those that are truly accidental as defined by the New Source Performance Standards (NSPS). Companies can improve backup pollution controls used when equipment goes down, substituting “tail gas units” that are much more efficient at destroying hazardous pollutants than the flares on which Port Arthur companies now rely. Sources have no excuse for not incorporating these practices into their manufacturing processes when they can stop the continued unpermitted release of air pollutants from accidents, as well as, startup, shutdown, and maintenance activities.

Conclusion

Accidents will happen even at the best run plants, but they do not need to become a way of life. Four actions should be taken, based on experience in other communities, to make sure that neighborhoods get better information, companies comply with the law, and the frequency and severity of accidents are reduced:

(1) *Better reporting of emissions:* Port Arthur residents should not have to travel to TCEQ's Beaumont office or incur copying charges for hundreds of pages of paper to find out after the fact about the release of pollutants in their own backyards. A "reverse 911" program piloted in Wurtland, Kentucky, requires plants to notify residents immediately after an accident has occurred, explain what is being done about it and whether precautions should be taken. EPA should investigate whether companies have violated federal "right-to-know" requirements by failing to report upset and shutdown emissions to the National Response Center, which provides online access to company reports.[26]

(2) *Monitor air quality around Port Arthur plants:* Both EPA and TCEQ need to improve fenceline monitoring in Port Arthur to better understand the impact of these large releases on pollutant levels in the neighborhoods surrounding the plants. Responding to a request at a town meeting of Port Arthur residents, Congressman Nick Lampson has asked EPA to make its mobile monitoring truck – the Toxic Atmospheric Gas Analyzer (TAGA) – available to sample the air at various sites. TAGA truck data has been used in other communities to determine the best location for fixed monitoring stations that can provide real-time data on an ongoing basis. Monitoring activity should, where possible, be timed to take samples when malfunction or shutdown elevates emissions from nearby plants.

(3) *Enforce the law that requires accident prevention:* EPA needs to investigate the pattern of "malfunctions" in Port Arthur, and take enforcement action to require better equipment or maintenance programs to eliminate pollution from accidents. Both EPA and TCEQ

should exercise their authority to require better alternatives to flaring, like closed-loop recycling and backup systems for electronic controls that malfunction on major units. EPA has negotiated settlements with other refiners to install state-of-the-art controls that capture and destroy pollutants that would otherwise be released through accidents, and to require accidents that occur repeatedly to be diagnosed and prevented.[27] Port Arthur residents have asked Congressman Lampson to request an investigation by EPA's top experts on refinery malfunctions.

(4) *Close the loophole for unpermitted releases:* Current law needs to be tightened to increase liability for polluters that accidentally release large amounts of cancer-causing chemicals like benzene, which make smog worse in areas that already fall short of health-based standards. A Senate hearing chaired by Senator Joseph Biden threw the spotlight on this loophole in the Clean Air Act, which has plagued communities like those near the Sunoco Marcus Hook refinery in Delaware.[28] Polluters are expected to pay when their accidents release oil or chemicals into our water. We ought to demand the same accountability when the same kinds of chemicals are released into the air, where they may be even more threatening to the public's health, and degrade the quality of life in towns like Port Arthur.

TABLE A

UPSET EMISSIONS FOR ATOFINA, BASF CORP., CHEVRON PHILLIPS CHEMICAL CO., MOTIVA ENTERPRISES, and PREMCOR REFINING in PORT ARTHUR, TEXAS
REPORTED TO TEXAS COMMISSION ON ENVIRONMENTAL QUALITY
(FORMERLY TEXAS NATURAL RESOURCE CONSERVATION COMMISSION)
JAN-JULY 2002

Emissions Measured in Pounds

		Sulfur Dioxide	Hydrogen Sulfide	Hazardous Substances/ VOCs*	Benzene	Carbon Monoxide
ATOFINA	JAN	76,667	854	438	-	2,097
	FEB	160,448	1,709	70,754	78	17,020
	MAR	13,355	145	1,306	90	2,843
	APR	2,400	26	18,074	-	3,955
	MAY	61,576	671	4,098	-	1,145
	JUNE	115,945	2,653	27,036	18	54,160
	JULY	151,148	1,639	16,787	92	3,464
BASF	JAN	-	-	374,099	10,284	-
	FEB	-	-	128,084	-	-
	MAR	-	-	5,968	-	-
	APR	-	-	81,222	-	-
	MAY	-	-	514,783	56,006	-
	JUN	-	-	9,624	4,375	-
	JULY	-	-	39,109	5,428	-
CHEVRON	JAN	-	-	28,920	705	-
	FEB	-	-	37,966	184	-
	MAR	-	-	434	32	-
	APR	-	-	-	-	-
	MAY	-	-	-	-	-
	JUN	-	-	61,164	322	13
	JULY	-	-	14,946	-	19,599
MOTIVA	JAN	4,263	-	233	-	149
	FEB	15,216	126	2,198	-	1,108
	MAR	3,041	17	442	-	853
	APR	8,988	97	2,278	-	1,000
	MAY	81,324	817	7,697	12	4,345
	JUN	278	3	877	-	489
	JULY	16,584	337	11,150		1,386
PREMCOR	JAN	496,165	7,017	70,915	-	2
	FEB	-	1,066	47,280	-	-
	MAR	119,507	1,270	85,062	-	-
	APR	-	-	203	-	-
	MAY	115,563	1,240	922	-	970
	JUNE	-	-	21,783	2,740	-
	JULY	6,601	240	2,225	268	-
TOTAL		**1,449,069**	**19,927**	**1,688,077**	**83,426**	**115,483**

Figures obtained from final upset reports from TCEQ (formerly TNRCC)
**Emissions of benzene, a recognized VOC, are not included in this column, but are instead listed as a separate entry.*

TABLE B

DATA NOT REPORTED TO NATIONAL RESPONSE CENTER*
Emissions Measured in Pounds

	DATE OF UPSET	SO_2	Hydrogen Sulfide	HAZ/ VOCs Includes emissions of Ethylene, Propylene, Toluene, Butanes, and other pollutants as identified	BENZENE	CO
ATOFINA PETRO-CHEMICALS INC.	01/03/02	2,446		338 (VOCs)		
	02/05/02			58,257 (VOCs)		12,707
	02/13/02			1,333 (VOCs)		
	02/13/02	139,206	1,479	9,716 (VOCs)		
	02/24/02	17,925	194			
	02/26/02			1,410 (VOCs)		
	03/27/02			411 (VOCs)		
	03/27/02**			133 (VOCs)		
	03/09/02			762 (VOCs)		
	04/24/02	18,000				
	05/25/02			1,594 (VOCs)		
	05/10/02			2,500 (VOCs)		
	05/05/02	51,369				
	06/28/02			1,885 (VOCs)		
				122 (VOCs)		
	06/01/02		300	20,909 (VOCs)		32,336
	07/03/02		1,107			
	07/06/02	150,450	1,631	16,056 (VOCs)		3,190
	07/09/02			674 (VOCs)		
	07/30/02	698				
BASF FINA PETRO-CHEMICALS	01/03/02				576	
	01/15/02			7,866 (Propylene)		
	01/21/02			74,178 (Ethylene), 56,627 (Propylene)		
	01/25/02			112,492 (Ethylene), 73,887 (Propylene), 493 (Propane), 10,604 (Butylene), 2,172 (Butane), 5,220 (Butadiene), 8,190 (Pentane), 6,900 (Hexane), 2,773 (Nonane), 9,924 Toluene, 2,052 (Xylene), 499 Styrene, 222 (Decane)	9,708	
	02/05/02			15,956 (Ethylene)		
	02/06/02			20,426 (Ethylene)		
	02/13/02			37,389 (Propylene)		
	02/20/02			29,325 (Ethylene)		
	02/22/02			17,623 (Ethylene), 4,203(Propylene)		
	02/25/02			15,639 (Ethylene)		
	03/19/02			5968 (Ethylene)		

	DATE OF UPSET	SO_2	Hydrogen Sulfide	HAZ/ VOCs	BENZENE	CO
BASF FINA PETRO-CHEMICALS (cont'.)	04/08/02			36,924 (Butadiene)		
	05/30/02			991 (Toluene)	750	
	05/21/02			5,752 (Butadiene), 41,269 (Ethylene), 28,483 (Propylene), 10,936 (Toluene), 9,026 (Pentane), 7,604 (Hexane), 2,261 (Xylene), 11,686 (Butylene), 6,495 (Propane), 2,394 (Butane), 551(Styrene), 244 (Decane), 3,056 (Nonane)	10,699	
	05/12/02			49,252 (Butylene), 23,252 (Butadiene), 72,649 (Ethylene), 38,924 (Propylene), 44,204 (Toluene), 26,186 (Pentane), 30,736 (Hexane), 9,119 (Xylene)	43,242	
	05/10/02			386 (Butadiene), 151 (Xylene)	717	
	05/08/02			153 (Butadiene), 45,058 (Ethylene), 34,168 (Propylene), 14 (Propane), 311 (Butylene), 64 (Butane) , 240 (Pentane), 202 (Hexane), 60 (Xylene), 291 (Toluene), 81 (Nonane), 15 (Styrene), 6 (Decane)	284	
	05/03/02			8,513 (Ethylene)		
	07/06/02			9832 (Ethylene)		
	07/08/02			18,133 (Ethylene)		
CHEVRON PHILLIPS CHEMICAL CO.	1/6/2002			809 (Butadiene), 1,073 (Butane), 23,295 (Ethylene), 151 (Acetylene), 326 (Pentane), 393 (Propane), 1,273(Propylene)	673	
	01/12/02			1,415 (Ethylene)		
	02/03/02			149 (Toluene)		
	02/14/02			325 (Ethylene)		
	02/18/02			11,414(Propane), 325 (Ethylene), 24,588 (Propylene), 325 (Methyl Acetylene), 325 (Propadiene)		
	03/07/02			157 (Ethylene)		
	03/06/02			185 (Ethylene)		
	06/17/02			16,032(Ethylene), 288 (Acetylene)		
	06/22/02			149 (Toluene)		
	06/20/02			117 (Butadiene), 119 (Butane), 26,970 (Ethylene), 102 (Acetylene), 5,649 (Propane), 11,618 (Propylene)		
	07/08/02			5,118 (Ethylene)		
MOTIVA ENTER-PRISES	01/11/02	3,669				
	01/21/02	594				
	02/05/02	681, 724, 599, 1,030, 590				
	02/05/02**	761		151 (Isobutane)		
	02/12/02			222 (Isobutane), 106 (n-Butane)		
	02/27/02	1,076				

	DATE OF UPSET	SO_2	Hydrogen Sulfide	HAZ/ VOCs	BENZENE	CO
MOTIVA ENTER-PRISES (cont'.)	02/27/02**	9,755	106	224 (Propylene)		
	03/31/02			223 (Isobutane)		
	03/25/02	3,029				
	04/07/02	7,462				
	04/12/02	137		148 (Propylene)		
	05/15/02					
	05/13/02	73,633	799	274 (Propane), 78 (Isobutane), 350 (n-Butane), 36 (Isopentane)		3,990
	05/08/02	7,455				
	05/08/02*			42 (Methane), 34 (Ethane), 71 (Propane), 53 (Butane), 11 (Pentane)		
	05/01/02			2746 (Ethylene)		
	06/23/02	278		145 (Propane), 41 (Isobutane), 174 (nButane)		
	06/10/02			45 (Propane), 465 (Isobutane)		
	07/08/02			117 (Propane), 418(Isobutane), 440 (nButane)		
	07/12/02	12,615		7 (Methane), 5 (Ethane), 6 (Ethylene), 306 (Propane), 232 (Propylene), 473 (Butanes) 234 (Butene)		
	07/24/02	3,969	243	8,636 (Hydrocarbons)		
PREMCOR REFINING GROUP, INC.	01/02/02	416,472	4,516	49,728 (VOCs)		
	01/13/02	14,531	155	1,868 (VOCs)		
	02/12/02			5,247 (Propane)		
	02/19/02		1066	42,033 (Propane)		
	03/11/02			80,000 (Propane/Butane Mix)		
	03/14/02			236 (VOCs)		
	03/19/02			4826 (VOCs)		
	05/11/02	49,674 500	529			
	05/07/02	65,389				
	05/04/02			457 (VOCs)		
	06/28/02			19,033 (VOCs)		
	07/01/02	4,796		2,044 (VOCs)		
	07/15/02	804	240			

* Information collected from Final Emissions Reports submitted to the Texas Commission on Environmental Quality (formerly Texas Natural Resource Conservation Commission) and the National Response Center. The corresponding reportable quantities for the pollutants listed in the table are 500 pounds for SO_2, 100 pounds for Hydrogen Sulfide, 100 pounds for Hazardous Substances/ Volatile Organic Compounds, 500 pounds for Benzene, and 5,000 pounds for CO.
** Represents a separate event which took place on the same day.

APPENDIX A
Pollutant Descriptions and Health Effects

According to recent health studies, pollutants such as those released by refineries and chemical plants in Port Arthur can cause serious respiratory problems and exacerbate cases of childhood asthma. Toxic air pollutants and smog-causing compounds such as nitrogen oxides, sulfur dioxide and volatile organic compounds are linked to cancer and even death.

Information taken directly from Agency for Toxic Substances and Disease Registry (ATSDR) Toxic Profiles at www.atsdr.cdc.gov/toxprofiles and the Environmental Health Center, a division of the National Safety Council, at www.nsc.org/ehc/indoor/carb_mon.htm

Sulfur Dioxide- Exposure to very high levels of sulfur dioxide can be life threatening. Exposure to 100 parts of sulfur dioxide per million parts of air (100 ppm) is considered immediately dangerous to life and health. Burning of the nose and throat, breathing difficulties, and severe airway obstructions occurred in miners who breathed sulfur dioxide released as a result of an explosion in a copper mine.

Long-term exposure to persistent levels of sulfur dioxide can affect your health. Lung function changes were seen in some workers exposed to low levels of sulfur dioxide for 20 years or more. However, these workers were also exposed to other chemicals, so their health effects may not have been from sulfur dioxide alone. Asthmatics have also been shown to be sensitive to the respiratory effects of low concentrations of sulfur dioxide.

Animal studies also show respiratory effects from breathing sulfur dioxide. Animals exposed to high concentrations of sulfur dioxide showed decreased respiration, inflammation of the airways, and destruction of areas of the lung.

Children who live in or near heavily industrialized areas where sulfur dioxide occurs may experience difficulty breathing, changes in the ability to breathe deeply, and burning of the nose and throat. It is not known whether children are more vulnerable to these effects than adults. However, children may be exposed to more sulfur dioxide than adults because they breathe more air for their body weight than adults do.

Long-term studies surveying large numbers of children indicate that children who have breathed sulfur dioxide pollution may develop more breathing problems as they get older, may make more emergency room visits for treatment of wheezing fits, and may get more respiratory illnesses than other children. Children with asthma may be especially sensitive even to low concentrations of sulfur dioxide, but it is not known whether asthmatic children are more sensitive than asthmatic adults.

Hydrogen Sulfide- Hydrogen sulfide is considered a broad-spectrum poison, meaning it can poison several different systems in the body.

Breathing very high levels of hydrogen sulfide can cause death within just a few breaths. There could be loss of consciousness after one or more breaths.

Exposure to lower concentrations can result in eye irritation, a sore throat and cough, shortness of breath, and fluid in the lungs. These symptoms usually go away in a few weeks. Long-term, low-level exposure may result in fatigue, loss of appetite, headaches, irritability, poor memory, and dizziness.

Because it is heavier than air, hydrogen sulfide tends to sink, and because children are shorter than adults, they may be more likely to be exposed to larger amounts than adults in the same situations.

The Occupational Safety and Health Administration (OSHA) has established an acceptable ceiling concentration of 20 parts per million (20 ppm) in the workplace, with a maximum level of 50 ppm allowed for 10 minutes if no other measurable exposure occurs.

The National Institute of Occupational Safety and Health (NIOSH) recommends a maximum exposure level of 10 ppm.

Hazardous Substances/VOCs – VOC's contribute significantly to ground level ozone, a principal component of smog, which can cause significant health and environmental problems.

Examples of VOC's:

Hexane- The only people known to have been affected by exposure to n-hexane used it at work. Breathing large amounts caused numbness in the feet and hands, followed by muscle weakness in the feet and lower legs. Continued exposure led to paralysis of the arms and legs. If removed from the exposure, the workers recovered in 6 months to a year.

In laboratory studies, animals exposed to high levels of n-hexane in air had signs of nerve damage. Some animals also had lung damage. In other studies, rats exposed to very high levels of n-hexane had damage to sperm-forming cells.

Toluene- Toluene may affect the nervous system. Low to moderate levels can cause tiredness, confusion, weakness, drunken-type actions, memory loss, nausea, loss of appetite, and hearing and color vision loss. These symptoms usually disappear when exposure is stopped.

Inhaling high levels of toluene in a short time can make you feel light-headed, dizzy, or sleepy. It can also cause unconsciousness, and even death.

High levels of toluene may affect your kidneys.

Xylene- Xylene affects the brain. High levels from exposure for short periods (14 days or less) or long periods (more than 1 year) can cause headaches, lack of muscle coordination, dizziness, confusion, and changes in one's sense of balance. Exposure of people to high levels of xylene for short periods can also cause irritation of the skin, eyes, nose,

and throat; difficulty in breathing; problems with the lungs; delayed reaction time; memory difficulties; stomach discomfort; and possibly changes in the liver and kidneys. It can cause unconsciousness and even death at very high levels.

Studies of unborn animals indicate that high concentrations of xylene may cause increased numbers of deaths, and delayed growth and development. In many instances, these same concentrations also cause damage to the mothers. We do not know if xylene harms the unborn child if the mother is exposed to low levels of xylene during pregnancy.

Benzene- Benzene is a colorless liquid with a sweet odor. Benzene evaporates into air very quickly and dissolves slightly in water. It is made mostly from petroleum sources. Brief exposure to very high levels of benzene in air (10,000-20,000ppm) can result in death. Lower levels (700-3,000 ppm) can cause drowsiness, dizziness, rapid heart rate, headaches, tremors, confusion, and unconsciousness.

Benzene may produce problems related to blood. People who breathe benzene for long periods may experience harmful effects in the tissue that form blood cells, especially the bone marrow. These effects can disrupt normal blood production and cause a decrease in important blood components. A decrease in red blood cells can lead to anemia. Reduction in other components in the blood can cause excessive bleeding. Blood production may return to normal after exposure to benzene stops. Excessive exposure to benzene can be harmful to the immune system, increasing the chance for infection and perhaps lowering the body's defense against cancer.

Benzene can cause cancer of the blood-forming organs. The Department of Health and Human Services (DHHS) has determined that benzene is a known carcinogen. The International Agency for Cancer Research (IACR) has determined that benzene is a human carcinogen. Long-term exposure to relatively high levels of benzene in the air can cause cancer of the blood-forming organs. This condition is called leukemia. Exposure to benzene has been associated with development of a particular type of leukemia called acute myeloid leukemia (AML).

Exposure to benzene may be harmful to the reproductive organs. Some women workers who breathed high levels of benzene for many months had irregular menstrual periods. When examined, these women showed a decrease in the size of their ovaries. However, exact exposure levels were unknown, and the studies of these women did not prove that benzene caused these effects. It is not known what effects exposure to benzene might have on the developing fetus in pregnant women or on fertility in men. Studies with pregnant animals show that breathing benzene has harmful effects on the developing fetus. These effects include low birth weight, delayed bone formation, and bone marrow damage.

Carbon Monoxide- Carbon monoxide (CO) is an odorless, colorless gas that interferes with the delivery of oxygen in the blood to the rest of the body. It is produced by the incomplete combustion of fuels.

Carbon monoxide interferes with the distribution of oxygen in the blood to the rest of the body. Depending on the amount inhaled, this gas can impede coordination, worsen cardiovascular conditions, and produce fatigue, headache, weakness, confusion, disorientation, nausea, and dizziness. Very high levels can cause death.

The symptoms are sometimes confused with the flu or food poisoning. Fetuses, infants, elderly, and people with heart and respiratory illnesses are particularly at high risk for the adverse health effects of carbon monoxide.

APPENDIX B
Texas Administrative Codes
(Note: These excerpts from the Texas Administrative Code reflect those that were in effect at the time of the incidents discussed in this Report. Recent revisions to the Texas Administrative Code which went into effect on September 12, 2002, have not been included in this Appendix but are available on the web at http://info.sos.state.tx.us/pub.)

§ 101.1 Definitions

§101.1(66) (E)(iii)-Beaumont/ Port Arthur (BPA) ozone non-attainment area. Classified as a Moderate ozone non-attainment area. Consists of Hardin, Jefferson, and Orange Counties.

§101.1(82) list Reportable Quantities

§101.1 (102) Upset- An unscheduled occurrence or excursion of a process or operation that results in an unauthorized emission of air contaminants.

§101. 6 Upset Reporting and Recordkeeping Requirements

§101.6(a)(1) As soon as practicable, but not later than 24 hours after discovery of an upset, the owner or operator shall:

(A) determine if the upset is a reportable upset; and

(B) notify the commission's regional office for the region in which the facility is located and all appropriate local air pollution control agencies if the upset is reportable.

(2) The notification for reportable upsets…shall identify:

(A) the cause of the upset, if known;

(B) the processes and equipment involved;

(C) the date and time of the upset;

(D) the duration or expected duration of the upset;

(E) the compound descriptive type of the individually listed compounds or mixtures of air contaminants…

(F) the estimated quantities for those compounds or mixtures…

(G) the actions taken or being taken to correct the upset and minimize the emission.

(b) The owner or operator of a facility shall create a final record of reportable and nonreportable upsets as soon as practicable, but no later than two weeks after the end of an upset.

§101.7 Maintenance, Startup, and Shutdown Reporting, Recordkeeping, and Operational Requirements.

(a) All pollution emission capture equipment and abatement equipment shall be maintained in good working order and operated properly during normal facility operations. Emission capture and abatement equipment shall be considered in good working order and operated properly when operated in a manner such that the facility is operating within air emission limitations established by permit, rule, or order of the commission or as authorized by TCAA, §382.0518(g).

(b) The owner or operator shall notify the commission's regional office for the region which the facility is located and all appropriate local air pollution control agencies at least ten days prior to any maintenance, start-up, or shutdown which is expected to cause an unauthorized emission which exceeds the reportable quantity in any 24-hour period. If notice cannot be given ten days prior to any start-up, shutdown, or maintenance which is expected to cause an unauthorized emission that will equal or exceed a reportable quantity in any 24-hour period, notification shall be given as soon as practicable prior to maintenance, start-up, or shutdown. Any maintenance, start-up, or shutdown, for which there was no notification under this

subsection was submitted, which results in unauthorized emissions that equal or exceed a reportable quantity, or any maintenance, start-up, shutdown which exceeds the estimates submitted under the notification requirements of this subsection shall be considered a reportable upset and subject to §101.6 of this title (relating to Upset Reporting and Recordkeeping Requirements).

§ 101.11. Demonstrations

(a) Upset emissions are exempt from compliance with air emission limitations established in permits, rules, and orders of the commission, or as authorized by TCAA, § 382.0518(g) if the owner or operator complies with the requirements of § 101.6 of this title (relating to Upset Reporting and Recordkeeping Requirements) and satisfies all of the following:

(1) the unauthorized emissions were caused by a sudden breakdown of equipment or process, beyond the control of the owner or operator;

(2) the unauthorized emissions did not stem from any activity or event that could have been foreseen and avoided and could not have been avoided by good design, operation, and maintenance practices;

(3) the air pollution control equipment or processes were maintained and operated in a manner consistent with good practice for minimizing emissions;

(4) prompt action was taken to achieve compliance once the operator knew or should have known that applicable emission limitations were being exceeded;

(5) the amount and duration of the unauthorized emissions and any bypass of pollution control equipment were minimized;

(6) all emission monitoring systems were kept in operation if possible;

(7) the owner or operator's actions in response to the unauthorized emissions were documented by, contemporaneous operation logs, or other relevant

evidence;

(8) the unauthorized emissions were not part of a recurring pattern indicative of inadequate design, operation, or maintenance; and

9) unauthorized emissions do not cause or contribute to a condition of air pollution.

(b) Emissions from any maintenance, start-up, or shutdown are exempt from compliance with air emission limitations established in permits, rules, and orders of the commission, or as authorized by TCAA, § 382.0518(g) if the owner or operator complies with the requirements of § 101.7 of this title (relating to Maintenance, Start-up and Shutdown Reporting, Recordkeeping, and Operational Requirements) and satisfies all of the following:

(1) the periods of unauthorized emissions from any maintenance, start-up, or shutdown and could not have been prevented through planning and design;

(2) the unauthorized emissions from any maintenance, start-up, or shutdown were not part of a recurring pattern indicative of inadequate design, operation, or maintenance;

(3) if the unauthorized emissions from any maintenance, start-up, or shutdown were caused by a bypass of control equipment, the bypass was unavoidable to prevent loss of life, personal injury, or severe property damage;

(4) the facility and air pollution control equipment were operated in a manner consistent with good practice for minimizing emissions;

(5) the frequency and duration of operation in maintenance, startup, or shutdown mode resulting in unauthorized emissions was minimized;

(6) all emissions monitoring systems were kept in operation if possible;

(7) the owner or operator's actions during the period of unauthorized emissions from any maintenance, start-up, or shutdown were documented by

contemporaneous operating logs, or other relevant evidence; and

(8) unauthorized emissions do not cause or contribute to a condition of air pollution.

(c) Smoke generators and other devices used for training inspectors in the evaluation of visible emissions at a training school approved by the commission are not required to meet the allow able emission levels set by the rules and regulations, but must be located and operated such that a nuisance is not created at any time.

(d) Equipment, machines, devices, flues, and/or contrivances built or installed to be used at a domestic residence for domestic use are not required to meet the allowable emission levels set by the rules and regulations unless specifically required by a particular regulation.

(e) Sources emitting air contaminants which cannot be controlled or reduced due to a lack of technological knowledge may be exempt from the applicable rules and regulations when so determined and ordered by the commission. The commission may specify limitations and conditions as to the operation of such exempt sources. The commission will not exempt sources from complying with any federal requirements.

(f) The owner or operator has the burden of proof to demonstrate that the criteria identified in subsection (a) of this section for upsets, or in subsection (b) of this section for maintenance, start-up, or shutdown occurrences are satisfied for each occurrence of unauthorized emissions. The executive director or any air pollution program with jurisdiction may request documentation of the criteria in subsections (a) and (b) of this section at their discretion. Satisfying the burden of proof is a condition to unauthorized emissions being exempt under this section.

ENDNOTES

[1] Data used for this report was obtained from company reports on file at the Beaumont office of the Texas Commission on Environmental Quality. Most of the records were initially obtained by Erin Koening, a reporter with the Texas newspaper, The Examiner, but the information has been subsequently checked and confirmed by reviewing both initial and final reports held by the TCEQ Region 10 Beaumont Field Office. Recent phone conversations with TCEQ Beaumont investigators indicated that BASF recently filed amended reports that made changes to releases reported for several events from January to May 2002. These amended reports were obtained by EIP and used to calculate reported releases from the BASF Plant. However, it is important to note that these amended reports are not located in the public file for BASF at the TCEQ office. This raises concern for area residents who should be able to obtain accurate and specific information on reported releases in their neighborhoods. BASF Fina Petrochemcals, L.P. January 21, 2002, Upset or Maintenance (U/M) Notification Form for Reportable Events, (Amended Report), Acct. No. JE-0843-F received at TCEQ, Beaumont Office on June 17, 2002.

[2] The new BASF plant includes a multi-point flare system (several hundred miniature flares located 5-6 feet above the ground) designed to achieve better destruction of pollutants than larger traditional flares. But reports so far for this year suggest serious start-up problems with the new system.

[3] Premcor Refining Group, Inc., January 2, 2002, Initial Upset Notification Report, Acct. No. JE-0042-B, received at TCEQ, Beaumont Office on January 2, 2002 (No final report for this event was submitted to TCEQ.).

[4] Chevron Phillips Chemical Co., June 20, 2002, Upset/Maintenance Notification Report, Acct. No. JE-0508W, received at TCEQ, Beaumont Office on July 2, 2002.

[5] Motiva Enterprises , L.L.C., July 24, 2002, Upset Maintenance (U/M) Notification Form for Reportable Events, Acct. No. JE-0095-D, received at TCEQ, Beaumont Office on Aug. 7, 2002.

[6] Federal reporting requirements for certain pollutants are set at lower limits for the Beaumont Port Arthur area than for other areas that are in attainment for ozone. Butene, ethylene, propylene, acetaldehyde, toluene, nitrogen oxide, and nitrogen dioxide all have a reportable quantity limit of 100 pounds for the Port Arthur Beaumont area. (In attainment areas, the reportable quantity is set at 5,000 pounds. 40 CFR pts. 355 and 370 (1998); 40 C.F.R. tbl. 302.4 (1997).

[7] Members of the Port Arthur Bucket Brigade, a community group of concerned residents, use buckets containing plastic tedlar bags designed with vacuum-triggered valves to collect grab air samples in their neighborhoods. The bucket brigade focuses mainly on the southwestern part of Port Arthur. Samples are then sent to an EPA-approved lab for scientific analysis. Samples cited were taken on July 13, 2002, at Austin and Gulf Roads, and Savannah and Gulf Roads in Port Arthur.

[8] The use of ground-level monitoring did detect dangerous levels of benzene from flaring in the city of Odessa, another Texas city. Using a TCEQ real-time ambient air monitor (auto-GC analyzer), monitoring for ground level impacts from flaring in Odessa in July, 2000, detected high concentrations of benzene well above state health levels giving 5-minute and 1-hr averages for benzene and 55 other VOC pollutants. The benzene was detected along with ethylene, propylene and acetylene, which were being flared from the olefins unit at the olefins flare about 1/4-1/2 mile south of the monitor. Conversation with Neil Carman, Sierra Club (Oct. 3, 2002).

[9] Environmental Protection Agency, Smog--Who Does It Hurt? What You Need to Know about Ozone and Your Health, at http://www.epa.gov/airnow/health/smog1.html#1 (last modified Sept. 19, 2002).

[10] California Office of Environmental Health Hazard Assessment, Determination of Acute Reference Exposure Levels for Airborne Toxicants (March 1999), at http://www.oehha.ca.gov/air/acute_rels/pdf/71432A.pdf (last visited Oct. 10, 2002).

[11] The TCEQ Beaumont office cannot provide information for a specific event or date specified by the caller. TCEQ works through a bonded copier and, at the caller's request, will send out the entire file for a specific refinery for copying. This file includes all the upset reports for the current year. Estimates of $25-$200 reflect actual copying costs incurred during the production of this Report. New state regulations which went into effect on September 12, 2002, will require facilities to submit future upset reports electronically through an on-line reporting system. However, the on-line reporting system, which will become operational on January 1, 2003, will only require electronic reporting of final upset emission reports. These reports often are not filed by facilities until at least two weeks after the end of the event in question and many times are not submitted until several weeks after the actual event took place. Additionally, in some cases, facilities have only filed initial reports without providing a follow-up final report. Because electronic reporting of initial reports will not be required until January 1, 2004, it is unclear what effect the electronic reporting system will have on the availability of information regarding events where only initial reports are filed.

[12] National Response Center at http://www.nrc.uscg.mil/nrchp.html (last visited Oct. 3, 2002). NRC data only includes reports of initial notification. Updated and more accurate information regarding releases is not collected by NRC.

[13] Reporting requirements are set by federal community right to know laws, including the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. §§ 9601-9675 (2002) and Emergency Planning and Community Right-to-Know Act (EPCRA), 42 U.S.C. §§ 11001-11050 (2002). See Guidance on the CERCLA §101(10)(H) Federally Permitted Release Definition for Certain Air Emissions, 67 Fed. Reg. 18,899 (Apr. 17, 2002); Guidance on the CERCLA §101(10)(H) Federally Permitted Release Definition for Clean Air Act "Grandfathered" Sources, 67 Fed. Reg.19,750 (Apr. 23, 2002) [hereinafter Grandfathered Sources Guidance]. Guidance materials are also available on EPA's website at http://www.epa.gov/fedrgstr/EPA-WASTE/2002/April/Day-17/f9322.htm.

[14] Grandfathered Sources Guidance, supra note 12.

[15] State Implementation Plans (SIPs): Policy Regarding Excess Emissions During Malfunctions, Startup, and Shutdown from Steven A. Herman, EPA Assistant Administrator for Enforcement and Compliance Assurance, and Robert Perciasepe, EPA Assistant Administrator for Air and Radiation, to Regional Administrators, Regions I-X (September 20, 1999), available at http://www.epa.gov/ttn/oarpg/t1/memoranda/excem.pdf (last visited October 3, 2002).

[16] Id.

[17] Id.

[18] Id.

[19] D.M. Leaher, K. Preston and M. Strosher, Theoretical and Observational Assessments of Flare Efficiencies, 51 Journal of the Air & Waste Management Association 1610 (Dec. 2001).

[20] Id.

[21] Id.

[22] Id.

[23] Memorandum re: Summary of Significant Events from March 1, 2000 through December 31, 2000 for the Gulf Coast Upset Maintenance Pilot Project from Michael Freer, Air Liaison, Gulf Coast Upset/Maintenance Coordinator, to TNRCC Commissioners (Jan. 10, 2001).

[24] Id.

[25] EPA Office of Regulatory Enforcement, "Frequent, Routine Flaring May Cause Excessive Uncontrolled Sulfur Dioxide Releases," 3 Enforcement Alert 9 (Oct. 2000) [hereinafter Enforcement Alert] (emphasis added).

[26] Ten counties surrounding the Wurtland, Kentucky, DuPont plant will be a part of this pilot notification program. More information about the settlement agreement reached with Wurtland can be found at http://www.epa.gov/Region4/oeapages/00press/000801.htm. United States v. E.I. duPont de Nemours, et. al No. CD-2000-16 (E.D. KY).

[27] Enforcement Alert, supra note 24 (citing United States v. B.P. Exploration Co. Consent Decree, C.A. No. 3:97CV7790 (N.D. Ind. entered May 5, 1999).

[28] New Source Review Policy, Regulations, and Enforcement Activities: Hearing Before the Senate Comm. on Environment and Public Works and the Senate Comm. on the Judiciary, 107th Cong. (July 16, 2002) (testimony of Eric Schaeffer, Director, Environmental Integrity Project, Rockefeller Family Fund), available at http://www.senate.gov/~epw/Schaeffer_071602.htm (last visited Oct. 11, 2002).