The Episodic Release Reduction Initiative

July 5, 2001

An innovative voluntary effort
among the U.S. Environmental Protection Agency, the Louisiana Department of Environmental Quality, the Texas Natural Resource Conservation Commission, and thirteen petroleum refining and chemical-producing facilities
to evaluate and implement methods for emissions reduction, for the measurement and reporting of progress, and for information sharing.

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Executive Summary

The Episodic Release Reduction Initiative (ERRI) is an innovative voluntary effort among the U.S. Environmental Protection Agency (EPA) Region 6, the Louisiana Department of Environmental Quality (LDEQ), the Texas Natural Resource Conservation Commission (TNRCC), and the petroleum/chemical industry to evaluate the causes of releases to the air associated with startups/shutdowns, equipment failures, and process upsets.

The terms “accidental,” “episodic,” or “emergency” releases are sometimes used interchangeably. These terms generally refer to unplanned emissions from industrial facilities that are not covered by a state or federal permit.

ERRI was organized in response to concerns about the number of episodic releases and, in particular, about the publics concern regarding the effects that flaring has on the environment and quality of life in communities near industrial plants. The initiative partners committed to work together to identify ways to reduce the number of releases and quantity of chemicals released. Since September 1999, participants held in-depth, candid discussions focused on ways to achieve episodic release reductions. The workgroup believes that the process developed by ERRI will be a model for other agencies and facilities to use as a guide in reducing emissions from episodic releases.

The key to developing effective solutions involved discussion and identification of the causal factors that resulted in releases and included appropriate facility personnel participating in the discussions, a definition of best management practices, commitment from the participants to implement processes that would result in reductions of episodic releases, and a meaningful measurement of the results. The workgroup also felt that top management support and focus on long-term solutions, rather than quick fixes, was essential to the success of the program. The regulatory agencies provided the framework that was necessary to keep the workgroup focused on their established goals.

The workgroup developed a 4-phase process to reduce emissions.

1. Analyze and share trends and factors that contribute to releases.
2. Share practices and programs currently in place to reduce releases.
3. Analyze effectiveness of programs and practices and identify any gaps.
4. Prepare and publish a findings report.

Over fifteen months, the workgroup developed a process—first to identify the cause of releases and then to share programs and practices that resulted in a 28% reduction in the number of reported releases and a 48% reduction in the quantity released. The process is continuous and is expected to result in further reductions in the future.

Introduction

The ERRI began in September 1999 as an innovative voluntary effort between the EPA, the LDEQ, the TNRCC, and 13 petroleum refining and chemical-producing facilities, located in Louisiana and Texas.

The Initiative's goal is to address concerns over the number of episodic releases and to identify and share programs and practices that lead to the reduction of episodic releases. The group agreed to measure progress by the success in reducing the number and quantity of releases subject to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)[1] and also releases of sulfur dioxide (SO_2) that are not subject to CERCLA reporting.

The EPA, LDEQ and TNRCC have permitting programs that authorize most routine emissions from facilities. There are, however, other emissions that have not traditionally been included in permitting programs. These include accidental releases from equipment leaks, equipment failure, maintenance problems, and human error. Others, such as startup and shutdown events or emissions during planned maintenance activities, are often predictable and may or may not have been included in the regulatory permits issued to facilities. Failsafe systems may result in releases or flaring to prevent a catastrophic failure of process equipment that would result in greater hazards than the release. Any of these emissions not authorized by the facility's permit are subject to CERCLA reporting to the Emergency Response Notification System (ERNS) database. The ERNS is a computer database containing information on reports of hazardous substances and oil releases. The types of reports available in ERNS fall into three categories: substances designated as hazardous under CERCLA, oil and petroleum products, and other types of materials. Referral to the ERNS database in this report concerns only releases of hazardous substances to the atmosphere.

The participating facilities were identified using the ERNS database with input from the states. The final selection of companies resulted in a good cross section of the refineries and chemical plants in Louisiana and Texas. These selected companies have the expertise and resources to address the problems, identified by the agencies, and would commit to reductions in releases.

EPA, LDEQ and TNRCC, and the facilities—all realize that the enforcement process is still required to address unauthorized releases. EPA and the state partners continue to be committed to enforcement actions against facilities that disregard environmental regulations.

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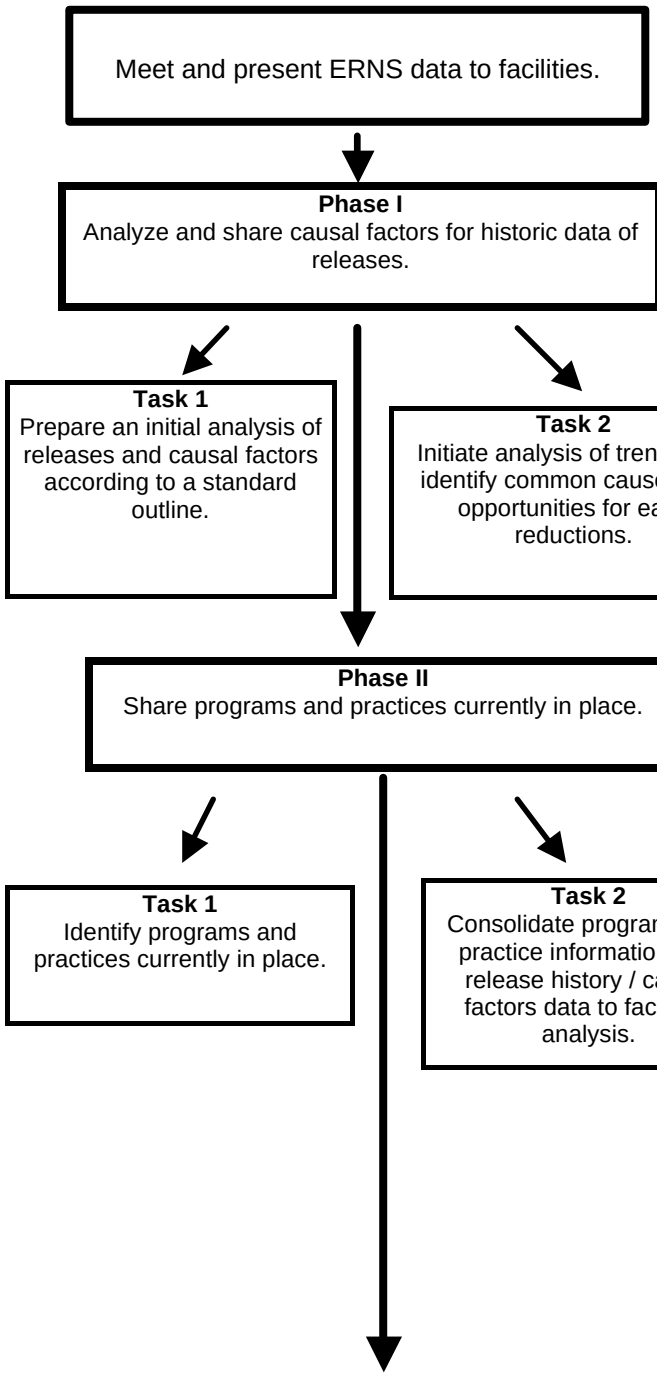
1 Requires reporting to the National Response Center (NRC) when a specified reportable quantity (RQ) of hazardous substances listed in 40 CFR 302.4 is released. The RQ is based on the intrinsic, physical, chemical, toxicological properties, including aquatic and mammalian toxicity, ignitability, and reactivity. While SO_2 is not required for reporting under CERCLA, the workgroup decided to include it in the measurement of release data, as it is an emission of concern to the community.

The Initiative partners committed to work together over approximately eighteen months to identify, communicate, and implement effective programs and practices to reduce episodic releases. No specific date was set to end the Initiative. The work product is a report that documents the process as well as the conclusions reached through this effort. The hope is to share the knowledge and experience gained with other facilities, which will encourage those facilities to follow suit and further reduce their emissions from episodic releases.

Program Process

The following is a more detailed description of the steps designed to achieve the goal of the voluntary episodic release reduction initiative.



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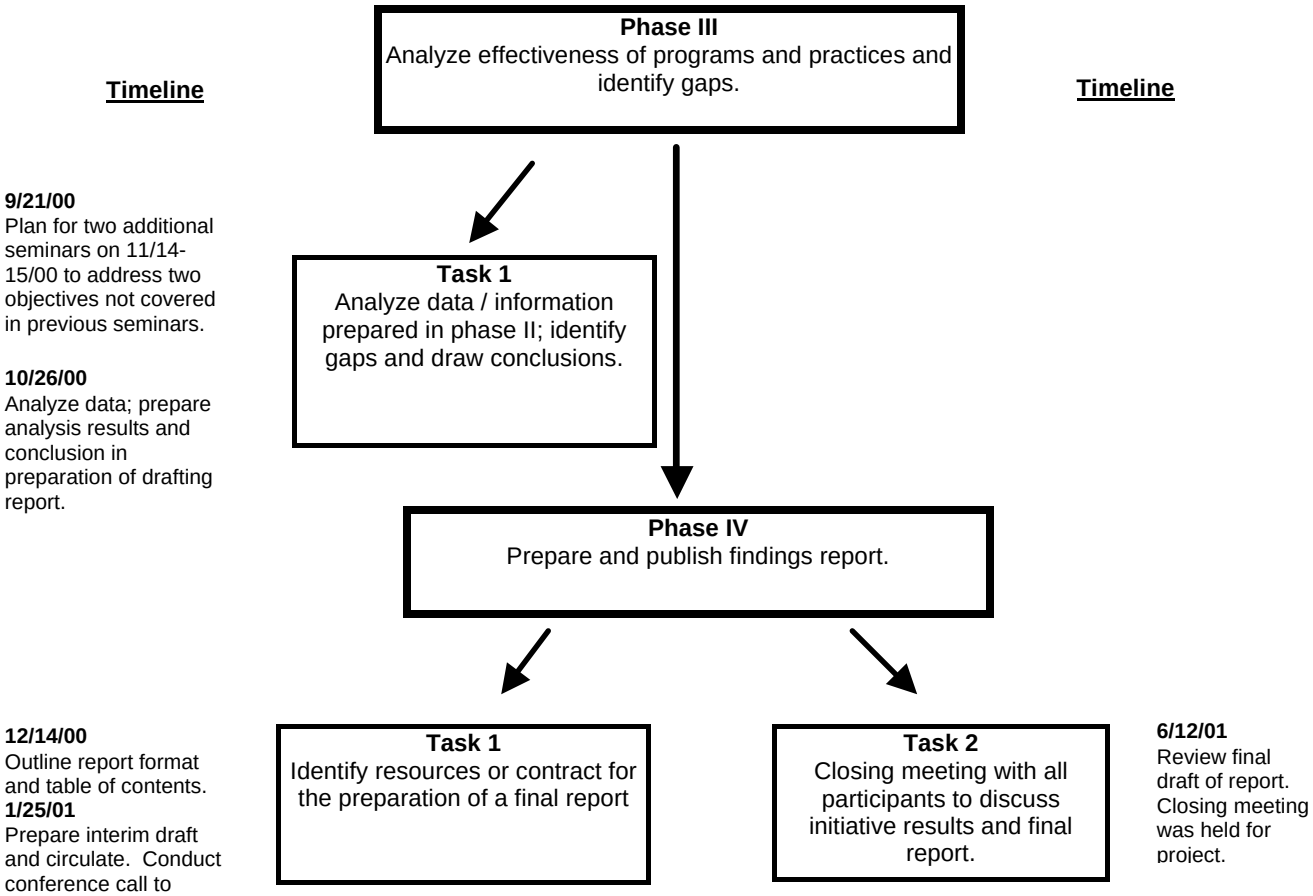
Timeline
Phase III
Analyze effectiveness of programs and practices and identify gaps.
Timeline
9/21/00
Plan for two additional seminars on 11/14-15/00 to address two objectives not covered in previous seminars.
10/26/00
Analyze data; prepare analysis results and conclusion in preparation of drafting report.
Task 1
Analyze data / information prepared in phase II; identify gaps and draw conclusions.
Phase IV
Prepare and publish findings report.
12/14/00
Outline report format and table of contents.
1/25/01
Prepare interim draft and circulate. Conduct conference call to review and comments.
3/30/01
Prepare and circulate full draft.
5/7/01
Consolidated edits back by authors.
5/23/01
Circulate final draft report for final comments.
Task 1
Identify resources or contract for the preparation of a final report
Task 2
Closing meeting with all participants to discuss initiative results and final report.
6/12/01
Review final draft of report. Closing meeting was held for project.

Development of Initiative

In Brief...

Eleven facilities in Louisiana and Texas were requested to meet in Dallas with the U.S. Environmental Protection Agency, the Louisiana Department of Environmental Quality and the Texas Natural Resource Conservation Commission. The facilities were presented with the ERNS data from 1994 to 1999 and asked to participate in an initiative to reduce episodic releases of the kind that are subject to the ERNS reporting requirements. The first reaction was, "why me?" Comments were made that the ERNS database does not accurately reflect either the number or quantity of releases. However, the facilities representatives upon further discussion supported regulatory agency efforts in an attempt to identify ways to reduce the release of toxic chemicals. Two operating facilities, co-located with two of the original eleven facilities, also volunteered to participate. (See Appendix A for list of initiative participants.)

Process Development

- **Evaluate the ERNS data—**Each participating facility reviewed releases that had occurred at its facility over the time period from 1994 to 1999.

- **Define terms—**Due to the broad diversity of the companies, it was necessary to define terms related to the releases and causal factors that resulted in releases. In order to discuss the information that was collected in a meaningful context, a template (Appendix B) was developed and utilized to evaluate the data. This ensured consistency in the data collected.

- **Establish time and frequency of meetings—**Due to the number of people attending the meetings (20 to 23), it was necessary to establish a set time to meet, so everyone could block out their calendar in advance. It was decided to meet 1 to 2 days, once per month. If the information could be covered in a conference call, a meeting was not held. As a practical matter, preparation for the meeting and attendance was time consuming, and 2 days a month was the maximum time that the participants could be available.

- **Require consistent attendance at meetings—**The workgroup felt it was important to have consistent attendance at the meetings. Each meeting builds on the last, so continuity is required. While different people were invited to give presentations, the team makeup remained consistent.

- **Expand beyond technical focus—**To identify problems and to develop solutions, the meetings initially focused on technical issues. However, the regulatory agencies also wanted to concentrate on addressing competing perceptions of potential risk and harm from within the communities surrounding the participating facilities. A primary example

was the disparity between the industry's view of flaring as a safety measure, and the local citizen's views that periodic flaring at the facility involves health risks.

Process Output

Each company presented their trend data of historical releases from their facility and the causal factors that resulted in the releases. The causal factors were analyzed and grouped into common categories for further discussion. The chart below depicts the results of the analysis.

Root Cause of Release (No. of releases)	***Percentage***
Equipment Failure	27
Process Upsets	14
Human Factors	10
Startup/Shutdown	9
Equipment Design	8
Procedures	8
Corrosion	7
Instrument Failure	5
Other	5
Seal or Gasket	3
Piping or Tubing	2
Pressure Relief Valve	2

A discussion of the factors caused the companies to look at releases from a different perspective. The causes of the releases were not as apparent or attributed to particular equipment until they were analyzed in this manner.

Ten Areas Investigated

After each facility determined the causal factors for their releases, they were all grouped into 10 areas that were most important for further discussion. Not all 10 areas were focused on causal factors leading to releases. Some were important community factors that were drivers for the project.

TOPIC	ISSUE	ACTION	STATUS?
1. Steps taken to reduce the community impact of flaring events	Ways to communicate and educate the local community with respect to usage and importance of flaring.	Informal sharing of programs of facilities to enlist group discussion on approaches that have been successfully used to reduce community concern with flaring events.	Action Performed (Technical Seminar)
	Ways to change plant operations to reduce the negative impacts of flaring events on the surrounding community (smoke, noise, and large flames).	Presentations and discussions from facilities on steps that have been taken to minimize events traditionally leading to flaring and thereby reducing smoking, noise and large, bright flames.	Action Performed (Technical Seminar)
2. Startup/ Shutdown Procedures to Reduce Flaring	Successful procedures identified that were implemented to decrease the magnitude and/or duration of flaring during startup and shutdown.	Presentations and discussions from facilities on processes that have been implemented to minimize flaring during startup and shutdown of units.	Action Performed (Technical Seminar)
3. Flare Gas Recovery Systems	Flare Gas Recovery system configurations and their contribution to reducing flaring events.	Facility presentations on their flare gas recovery system configurations and its role in reducing releases/flaring episodes.	Action Performed (Technical Seminar)
4. Flare Destruction Efficiency	Variables affecting the destruction efficiency (98%-99.5%) of flares.	Presentation by a technical expert(s) on the basis for and variables affecting flare destruction efficiency (someone from EPA's technical staff, vendor representation, other?).	Action Discussed
5. Sulfur Recovery Unit Reliability	General discussion by refinery representatives on approaches used to successfully increase the reliability of sulfur recovery units.	Technical Session for refining representatives.	Action Performed (Technical Seminar)

TOPIC	ISSUE	ACTION	STATUS?
6. Equipment failures	Processes to identify the "root cause" of equipment failures.	Facility presentations on root cause analysis techniques used and the processes for applying them to release events.	Action Performed (Technical Seminar)
	Re-analysis of existing event data attributed to "equipment failure" to further segregate the causes for equipment failure.	Establishment of a template and guidelines to further segregates the causes for equipment failures leading to releases. Presentation of the results of that data, in aggregate or by facility.	Action Performed
	How to best share ideas and success stories	Technical Session for participating companies.	Action Performed (Technical Seminar)
7. Instrument Reliability Programs	Programs in use to improve the reliability of instrumentation to minimize chemical releases.	Facility presentations on their programs for instrument reliability as it applies to release prevention/reduction. Open discussions at a technical seminar.	Action Performed (Technical Seminar)
8. "Fence-line" Monitoring	Fence-line or ambient monitoring for specific chemicals as a means to address the concerns the community has with the potential hazard created by accidental releases.	Group discussion and/or EPA presentation on the relationship/ benefit of chemical specific ambient monitoring to address community concerns with accidental releases.	Action Performed
	Pros and Cons of having Fence-line monitoring.	Discussion on the pros/cons of Fence-line monitoring. Topics to discuss: EPA perspective; technical problems, costs, benefits, etc.	Action Performed
9. Compressor Reliability/Trip Avoidance	Programs to maintain/ increase compressor reliability.	Facility presentations on their programs for reliability on major compressors to prevent unscheduled down times and trips - ethylene plant compressors, FCCU compressors, etc.	Action Performed (Technical Seminar)
10. NOx Emissions from Flaring vs. NOx Emissions from Permitted Sources	The rationale for reporting NO and NO_2 as hazardous releases, with a 10 lb. RQ, in light of the significantly larger, permitted emissions of NOx.	Further group discussion on issue, development of language on the issue for use in the final report, and/or development of longer-term action items to change the requirement for reporting, as an accidental release, NOx from flares and other control devices.	Action Discussed

ERRI Technical Exchange Seminars

Technical Exchange Sessions—General Comments

A series of technical exchange sessions were held for focused discussions on selected topics. The topics were those identified as having the highest potential for identifying constructive ideas or solutions that could be transferred to other participating facilities. The areas were identified from the analysis of common causes for episodic releases or for dealing with episodic releases. The theory was that a discussion of ideas and solutions that had been implemented at one facility would give rise to improvements. Previously, these improvements may not have been thought of as quickly or at all and could be implemented at other participating facilities now.

Each session was organized with a facilitator, note takers, two or three leadoff presentations to catalyze the discussion, and an open discussion among representatives from each participating facility. The invited discussion participants were persons who were actively working in the area of discussion at their home facility. Participants were asked to respond to a questionnaire related to the topic one or two weeks in advance of the session to prime thinking on the key topics and to assist the facilitator in keeping the open discussion moving.

Each technical exchange was scheduled to last approximately four hours.

As a precaution, a reminder was given at the beginning of each session that the discussions were to involve nonproprietary information only, and participants were reminded of the type of topics that antitrust laws prohibits competitors to discuss.

On June 22 and 23, 2000, four half-day seminars were held at the Equistar facility in Channelview, Texas on topics identified as requiring further investigation. Each of the four meetings consisted of opening remarks by an agency to present the background and purpose of the seminar. The chairman of the topic stated the problem, the ground rules for discussion, and facilitated the meeting; one to two people took real-time notes on a computer hooked up to a projector, so everyone could see the notes as they evolved from the discussion.

The attendees received a handout in packets that included information on antitrust matters. Several companies sponsored icebreakers and lunches to provide an opportunity for people to talk with one another in an informal setting.

Evaluation sheets were used to determine the effectiveness of the sessions. A brief general summary of the evaluations and general notes on the sessions are included in the following sections.

The four topics discussed at the seminars were:

1. **Management Systems—**Audits, recognition, and resolution of problems; training of staff to address problems; communication among employees; and the critical importance of accountability. (Appendix E)

2. **Instrumentation and Control Systems—**Evaluation of instrument reliability issues; may need third level causal analysis, knowledge of variables (KOV) for critical devices, control system design, safety interlock systems, redundant safety controls, specialty areas, lightning protection, and consultation with instrumentation department and outside instrumentation experts about reliability issues. (Appendix D)

3. **Equipment Failure/Reliability—**Training; instrument failure; risk-based inspection program; maintenance accountability; root cause vendor analysis; operating procedures; preventative maintenance; corrosion under insulation; working conditions; incident investigation criteria process; compressor reliability; flare design; destruction efficiency and smoke minimization; key operating variable; how to minimize emissions when they occur; case studies for success stories; internal/external corrosion; dealing with human error; electrical reliability; management of change; flare gas recovery systems; and ways to change plant operations to reduce negative impact of flaring events on the community. (Appendix C)

4. **Startup/Shutdown/Flaring—**Share best practices used to reduce flaring, focus on episodic releases, share success stories. Many of the companies have developed startup/shutdown procedures that can be shared and may be applicable at other facilities. Success stories may treat the symptom and not the cause. May need to look at causes if warranted. NOx emissions from flaring vs. NOx emissions from permitted sources. (Appendix F)

Two additional seminars were held November 14 and 15, 2000 at the Motiva Refinery and Shell Chemical Plant in Norco, Louisiana. The same format was followed as the first four seminars.

1. **Sulfur Plant/ System Reliability—**Share best practices to improve reliability and avoid disruptions and downtime. (Appendix G)

2. **Continuing the Dialogue—**How to effectively address growing concerns of communities regarding episodic releases (such as flaring and overall environmental concerns with chemical manufacturing facilities and refineries). (Appendix H)

Conclusions and Recommendations

With the perspective provided by hindsight, the participants have judged the initiative a very productive mechanism for driving improvement on issues applicable to multiple facilities and recommend the selected use of this process to augment traditional enforcement for similar issues. However, they unanimously agreed that the process would not work without a strong commitment of time and resources by all participants. Like most team interactions, the process required several meetings to develop a common understanding of terminology and to build trust among members. Several more meetings were required to analyze data and to identify common causes for episodic releases. These were judged to be the areas with the highest potential for finding benefits from sharing experience and solutions. Active agency participation in the process was essential to provide perspectives and priorities those representatives from the manufacturing facilities were not likely to identify in isolation (e.g., the impact that large flaring episodes have on the quality of life in communities surrounding refineries and chemical plants.).

Technical exchanges, focused on the identified areas of common interest, were deemed successful and were judged to be an efficient way of identifying good practices that had been implemented at the participating facilities that could be replicated in whole or part at other facilities. Critical to the success of the exchanges was the participation of knowledgeable, interested plant personnel. The invited participants were personnel who work in the areas of discussion on a routine basis at their individual facility. From each exchange, the participants were able to identify at least one or two ideas that they could apply to the systems or equipment currently in place at their own facility.

Just as an analysis of the data required the facilities to look at the causes of releases differently or at least in amore focused manner the agencies also found that the causes of the releases were more varied and complex then first thought. Reducing emissions due to episodic releases is not a “one size fits all” solution, but requires a different approach at each facility. The benefit of dealing with multiple facilities was that individual problem solving experiences as related to preventing episodic releases became a collective pool of knowledge that everyone could draw from to apply to individual facility problems.

As of December 31, 2000, the numbers of reportable air releases of hazardous chemicals (CERCLA plus SO_2) were 28% lower than the average for 1994 through 1999. The pounds of emissions from such releases were 48% lower. While much of this reduction can be attributed to activities initiated at the facilities prior to the ERRI, part of the reduction was a direct result of the attention this initiative focused on episodic releases at the participating facilities. Other reductions are yet to come, as the facilities fully implement the ideas gleaned from sharing other company's approaches to reducing releases and from the continuing efforts to proactively build on those ideas.

The group would highly recommend considering this process with other groups of facilities where there is a significant number of releases if the facilities and local regulatory agencies are interested and willing to commit the necessary resources to the effort. The process is

also recommended for other issues common to multiple facilities if they can be worked without infringing on the limitations of either antitrust regulations or proprietary company technology.

APPENDIX A

Initiative Participants

The initiative involves a core group from thirteen facilities operating in EPA Region 6, the U.S. Environmental Protection Agency, the Texas Natural Resource Conservation Commission, and the Louisiana Department of Environmental Quality.

The participants listed below served as the spokespersons for the initiative.

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APPENDIX B

Data Analysis Format

Initial Data Sharing for EPA Release Reduction Initiative

(1). **Baseline Trend Analysis.** Provide a trend plot for the period 1994 to present showing the number of releases and the pounds of pollutant released. The number of releases should be based on company data for releases to air that were reportable to the National Response Center (NRC) (CERCLA and Extremely Hazardous Substances). Pounds should be based on the sum of the Reportable Quantity (RQ) chemicals contained in the releases during each year, and, if available, the total pounds of chemicals released during the reportable releases each year.

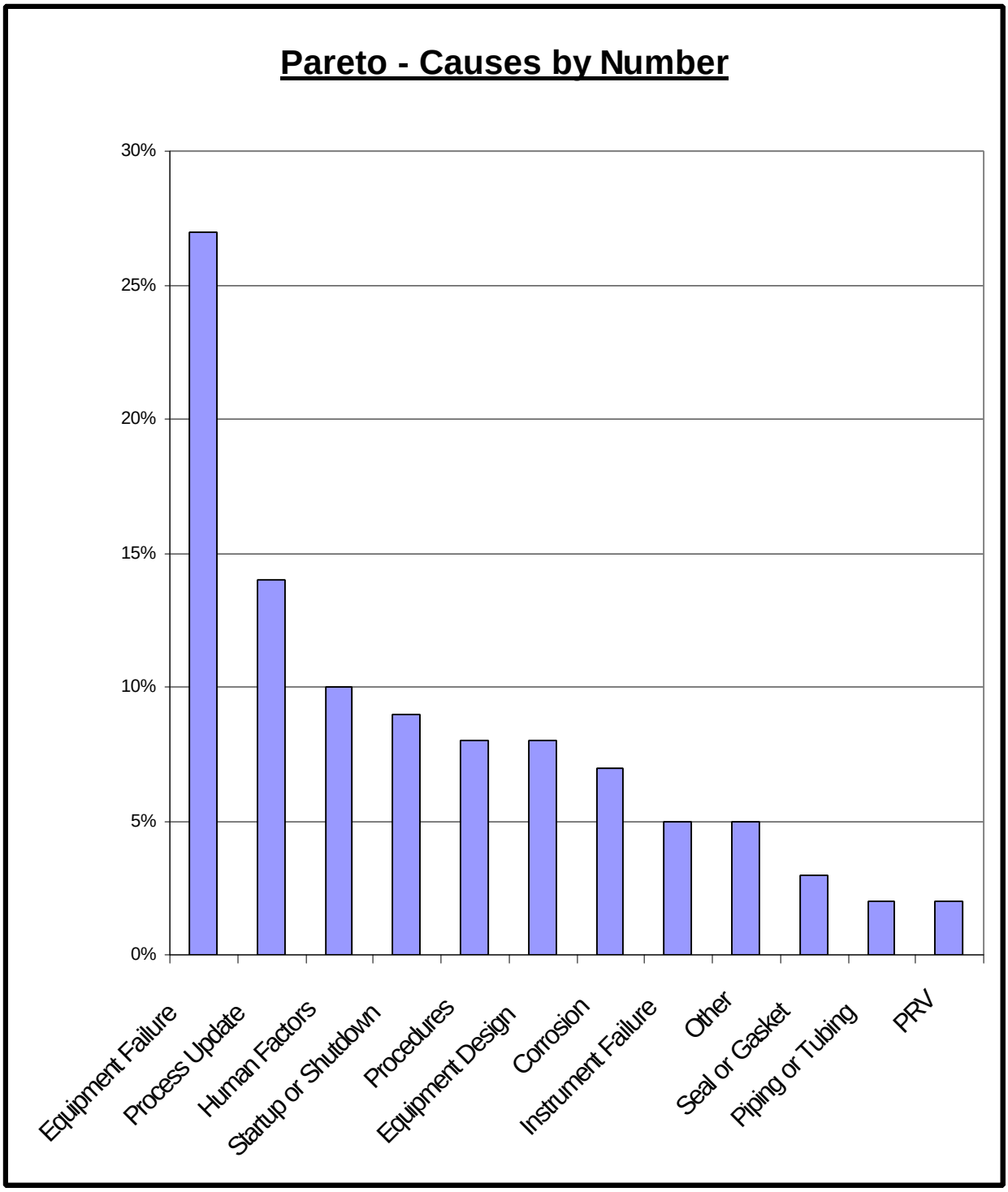
(2). **Pattern Analysis.** Provide pie charts illustrating the patterns, if any, in releases with factors such as type of operation (normal, product transfer, process upsets, start-up/shutdown, equipment preparation, maintenance, etc.), time of day (e.g., shift), unit area, etc. Two analyses should be presented: one versus the number of releases and one versus the pounds of RQ chemical released.

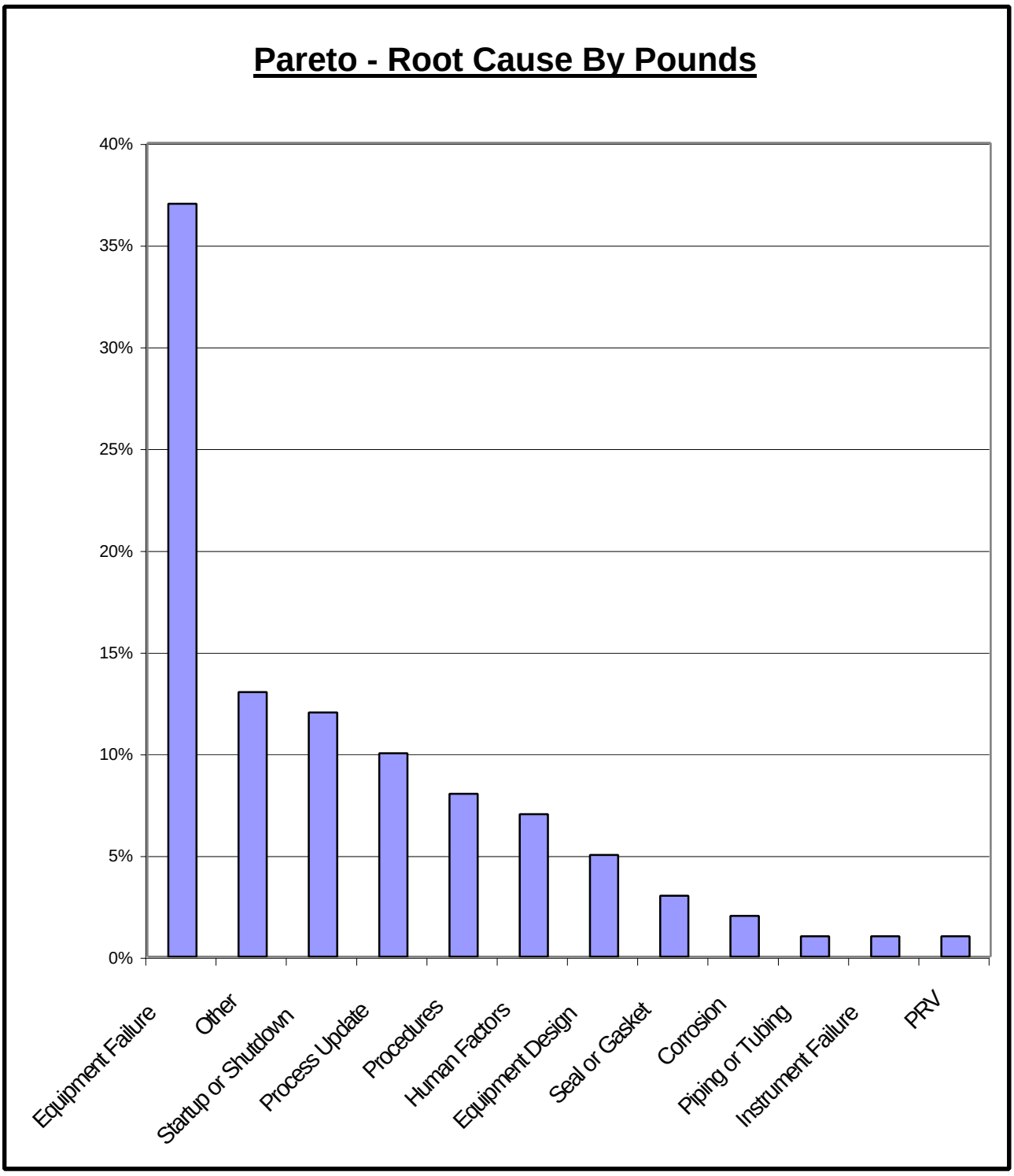
(3). **Causal Factor Analysis.** Provide pie charts illustrating the distribution of primary causal factors for the releases. Suggested categories are the following:

- Equipment failure (failed seal on a pump, agitator, etc.).
- Other pump or compressor failure; electrical or instrument component failure; gasket failure; block valve failure; etc.
- Corrosion (preferably split into internal and external).
- Piping or tubing leaking (not caused by corrosion).
- Process upset (safety valve release or release from a flare or other control device, not due to failure of instrumentation, etc.).
- Enhanced training needed.
- Improved facility design needed.
- Enhanced procedures needed.

A safety valve that is leaking through would be an equipment failure; a safety valve release, when properly operating, would be a process upset (unless the upset was caused by an instrument failure, etc.). For particular cases, use your best judgment. Again, two analyses should be presented: one versus the number of releases and one versus the pounds of RQ chemical released.

(4). **Trend for Each Primary Causal Factor.** For the primary causal factors (those responsible for the top 50-80% of the number of releases or pounds of RQ chemicals released), provide a trend plot for each causal factor 1994 to present. Separate plots should be provided for the causal factors versus the number of releases and for the causal factors versus the pounds of RQ chemicals released.


Pareto - Causes by Number
30%
25%
20%
15%
10%
5%
0%
Equipment Failure
Process Update
Human Factors
Startup or Shutdown
Procedures
Equipment Design
Corrosion
Instrument Failure
Other
Seal or Gasket
Piping or Tubing
PRV


Pareto - Root Cause By Pounds
40%
35%
30%
25%
20%
15%
10%
5%
0%
Equipment Failure
Other
Startup or Shutdown
Process Update
Procedures
Human Factors
Equipment Design
Seal or Gasket
Corrosion
Piping or Tubing
Instrument Failure
PRV

APPENDIX C

Session 1
Technical Exchange on Equipment Reliability

1. Seminar Abstract

Subject: Fixed equipment and the relationship to episodic releases—Common problems and solutions implemented with success.

Objective: (1). Review the data on the contribution of equipment failures to episodic releases (see attached chart).

(2). Identify and discuss practices for preventing equipment failures that lead to episodic releases.

(3). Identify those programs/practices most promising for providing an opportunity for facilities to skip a generation in their improvement cycles.

Recommended Attendees: Mid level engineers or others knowledgeable of and responsible for initiating and implementing equipment reliability programs at the facility level.

2.Selected Opening Presentations

Design for Reliability - Ted Bennett, Dow Chemical Company, Freeport, Texas.

Tools & Technologies Currently Utilized to Increase Mechanical and Environmental Reliability - Mike Badeen, Phillips Petroleum, Borger, Texas.

3. Key Leanings from Dialogue

The equipment reliability discussion was the first held. The following two items were key learning's about the process that improved the information that we were able to immediately capture from succeeding sessions.

- Needed to improve the ability for the note takers to capture ideas and comments as generated—acoustics/speaker volume; added a second note taker.
- Requested feedback from each participant before ending the session on the one or two most useful ideas that they would take back for application at their site.

Key leanings on the session topic are as follows:

Root Cause Analysis

- All the participating companies have some type of program in place to identify the root

cause of incidents. A variety of processes are employed.

- A key to successful root cause analysis is capturing the needed data and ensuring consistent quality of that data.
- Use of an impartial, trained facilitator was believed by some participants to be critical to the development of an effective process.
- Use of a multi-functional team to conduct the analysis greatly improves the quality.

Risk Based Inspection Programs

- All the participating companies have some type of risk based inspection program in place.
- As for root cause analysis, a key to successful risk based inspection is capturing the needed data and ensuring consistent quality of that data.
- Risk based inspection is an effective tool for planning inspections and repair, but we have a long way to go in learning how to best use the process.

Corrosion Under Insulation

- Corrosion under insulation is a common cause of episodic releases at all participating companies. None are satisfied with the means that they have identified to date to prevent CUI.
- Improving coatings for use in CUI service was considered to be a key strategy
- Steps taken to prevent CUI include:
  - Not installing insulation in CUI prone services unless absolutely necessary -- challenge designers and operations on the need for insulation.
  - Ceramic coatings are an option for certain applications instead of standard insulation.
  - Metalized coatings were being explored by one facility.

Rupture Discs

- Most problems from rupture discs derive from improper installation.

General Comments on QA/QC Programs

- Quality can be greatly enhanced through accountability—identifying the person responsible for installing, adjusting, calibrating, and inspecting equipment.

APPENDIX D

Session 2
Technical Exchange on Instrumentation/Control Systems

Seminar Abstract

SUBJECT: Control system and instrumentation impact on episodic releases.

EPISODIC RELEASE: The unpermitted release of a CERCLA reportable chemical above the reportable quantity (RQ).

PURPOSE: (1) Review the number of episodic releases where control system or Instrumentation (CSI) problems were part of the cause. (2) Identify and discuss CSI practices, which have been successful in preventing episodic releases. (3) Identify and discuss CSI challenges in preventing episodic releases.

DESIRED OUTCOME: Dialogue among those knowledgeable of plant CSI practices on successes and challenges in preventing episodic releases.

MEANS: This will be a four-hour facilitated workshop consisting of a review of the release data from the eleven participating companies, presentations on best practices, and open discussions on key topics.

RECOMMENDED ATTENDEES: Individuals knowledgeable of plant control system and instrumentation design and practices and in a position to implement ideas generated in this meeting.

Selected Discussion Topics

1. Maintenance and Design of Control Systems
2. Classification, Design and Maintenance of Safety Instrumented Systems

Key Learnings From Dialogue

- Operators/technicians need to understand what data to utilize in making operating decisions. The use of on-line advisory systems may facilitate these decisions.
- Risk-based fault tree analyses are helpful in classifying events.
- Training needs to be simplified to the “need to know” information.
- Alarm management system should be designed to prevent overload or ”alarm avalanche.”

- Failure data should be completely captured by mechanics.
- Control systems need to be designed to prevent episodic events.
- Self-diagnostic design of systems, through both embedded device diagnostics, and DCS-level software diagnostics are beneficial in reducing episodic releases.
- Enhanced human engineering and Root Cause Analysis (RCA) are parts of a strategy to reduce episodic releases.
- Rigorous preventative maintenance (PM) programs are required to minimize episodic releases.
- Bad actors should be eliminated through identification and follow-up (e.g., training, equipment design, and selection, etc).
- Two out of three voting on certain reliability-critical and fault-tolerant measurements.
- Triple Modular Redundant (TMR) logic solver architectures for safety, environmental, and reliability-critical applications should be considered.
- Management commitment is needed for the improvement/integrity of control systems.
- The “Abnormal Situation Management” (ASM) consortium is a source of best practices.
- Separate shutdown systems from the DCS eliminate common mode failures.
- The use of a formal process to identify critical instruments in preventing episodic releases should be considered.
- Focused improvement teams have reduced failures.
- Cross-functional RCA’s are successful at improving system performance.
- Standards for PM’s on critical instruments should be established.

Takebacks

At the end of the session, each participant was asked to identify one item they would act on when they returned to their work location. The following is that list.

- Focus on bad actors.
- Use a full-blown PM program, a part of which would be a “bad actors” program.
- Reliability and training.
- Safety Instrument/Interlock System (SIS) audit system.
- Use of TMR technology in critical control and logic solver platforms.
- Investigate PIP recommended practices utilization.
- Tagging and labeling safety systems.
- Review instrumentation performance with business managers on a quarterly basis.
- Use more specialized maintenance persons as opposed to jack-of-all-trades.
- Data management system for tracking reliability information.
- PM checklist for field craftsman.

- Operator/craftsman getting together to understand system before beginning work (huddle). Example: Huddle being before craftsmen begin SIS maintenance testing while the unit is in operation.
- On-line advisory systems.
- Sign-off checklist for technicians.
- Need for improved maintenance and database.
- Improved instrument database.
- Risk management system maybe using simulator.
- Use more simulator systems for training.
- Work on documentation and auditing.

APPENDIX E

Session 3
Technical Exchange on Management Systems

Seminar Abstract

TITLE

Identification Of Management Systems That Are Effective In Reducing Episodic Releases

DEFINITIONS

Episodic Release: The unpermitted release of a CERCLA-reportable chemical above the reportable quantity (RQ).

Management System: Corporate and/or plant operating philosophies, manufacturing standards, policies, programs, and initiatives, including organizational structure, used to promote reliability, reduce episodic releases, and enhance organizational effectiveness.

PURPOSE

1. Identify and discuss management systems that have proven to be successful in reducing episodic releases.
2. Understand the underlying motivation for changing or developing management system.
3. Identify and discuss processes for implementing management systems and measuring their effectiveness.

DESIRED OUTCOMES

1. Dialogue among those knowledgeable of Management Systems in reducing episodic releases.
2. Document success stories where Management Systems were effective in reducing episodic release paying particular attention to the following:
   (a). The problem or root cause.
   (b). The management system solution.

MEANS

A four-hour facilitated workshop consisting of a case study presented by EPA and success stories from several participating companies, followed by open discussions on how to use Management Systems to facilitate performance improvement in terms of the reduction of episodic releases.

RECOMMENDED ATTENDEES

Individuals who are knowledgeable of corporate and plant Management Systems and are in a position to implement change.

POTENTIAL DISCUSSION TOPICS

1. How are unit or plant reliability and release reduction targets established?
2. How is unit or plant reliability factored into the development of engineering standards?
3. What organizational structure is used to help achieve release reduction goals?
4. How is responsibility assigned to achieve release reduction goals?
5. What role does corporate and/or plant standards, policies, goals, programs and initiatives play in promoting or facilitating episodic release reduction?
6. What role do special emphasis teams such as best practice teams play in achieving release reduction goals?

Agency Case Study

BACKGROUND

A facility in Region 6 had a pinhole leak that developed on a discharge line. The leak was repaired using a clamp, and an investigation report was written. A mechanical integrity inspection report written nine days prior to the leak indicated that additional support was needed on the line to prevent stress cracking.

Within two weeks of the original leak, a second pinhole leak developed on the same line and was repaired using a second clamp. Another report was written, which recommended that the line be replaced at the next scheduled unit shutdown, projected to be 18 months later.

Six months later the unit was shutdown, but the line was not replaced.

Five months after the shutdown, two additional leaks developed and were repaired with clamps. In addition, the original clamp leaked, and was repaired with an over clamp.

The projected unit shutdown date was pushed back.

A complete failure occurred on the line six weeks before the projected shutdown date, which resulted in approximately 250 people being sent to the hospital with chemical exposure. The compound had a very low reportable quantity.

The facility had procedures in place that addressed the proper application and use of temporary clamps, which included requirements for inspection, follow-up, and management overview. Inspection reports and work orders, consistent with the procedures, both indicated that the line needed to be replaced by a particular date.

GROUP DISCUSSION

<u>System Failures Identified/Discussed</u>

- Improper assessment of the risk potential.
- Failure to recognize a systemic issue and that the problem was escalating.
- Failure to follow and/or enforce established procedures.
- Failing to recognize the system failures.

Questions

- Was the information on the multiple clamps available to management when the shutdown delay/temporary repair decisions were made?
- Had previous management decisions regarding the use of temporary clamps resulted in unsafe behavior on the part of operations and maintenance?
- Did someone outside the business area evaluate the risk assessment?
- Did business pressures impact the decision-making process?
- Was an objective view forwarded to senior managers?
- Was the clamp an engineered solution?

Observations

- You should not depend on a single management system to prevent this type of incident. There may be at least three systems that could have caught this.
- Business needs to participate in risk taking (i.e., put into their plans that a T/A is needed).

Industry Case Studies

- Joe Bernard - Lyondell Chemical Company, Operational Excellence Manufacturing Standard Program.
- Easter Liggio – PPG, Root Cause analysis

Key Learning's from Dialogue

AUDITS

- Audits have surfaced issues that resulted in corrective actions, but some facilities struggle with sustainability. Facilities react by developing new procedures but sometimes fail to determine if personnel are following the new procedures.
- Audits should not be confined to record reviews, but should also incorporate interviews with operators and mechanics, the first-line owners of the process.
- Audits teams should be sufficiently staffed with experienced personnel from other sites and given enough time to do a thorough review.
- One company has tried to merge all the different types of audit recommendations into one document that can be prioritized through an in-house computer based program. This eliminates the issue of managers working off multiple lists.
- One company uses a scoring system to gain assurance that audit follow-up items are addressed.

MANAGEMENT SYSTEMS

- One company described their corporatewide operations management system, initiated about four years ago, that is composed within a framework of expectations. Each site develops specific procedures to meet those expectations. Corporate then assesses

whether the sites are meeting the expectations. Continuous improvement is part of the process. Metrics for measuring performance, including reliability, are defined and sites perform annual self-assessments. Corporate assessments are on a three-year cycle, primarily focused around Responsible Care Initiative. It is reliability and effectiveness oriented and incorporates meeting Process Safety Management (PSM) and Risk Management Plan (RMP) requirements, which is forcing PSM and RMP into international operations.

- Another company uses a maturity evaluation path to rate their progress on different areas of operational excellence. Each area is ranked on a 1 to 10 scale.
- One company gets managers together on a regular five-week interval for training on PSM-type issues.
- One company is implementing an operational excellence program that is patterned after the ISO system. They have had a system for quite a while but are now combining the separate systems into one system that covers Operations, Maintenance, and Environmental, Health, and Safety (EHS) and Responsible Care®.
- Management systems have to be totally integrated with other systems in the site and clear ownership should be defined.
- The same thing in essence drives process safety incidents, episodic releases, and reliability failures. Management systems need to be designed to address the systemic weaknesses that exist.

ROOT CAUSE ANALYSIS (RCA)

- One company admitted that they were performing a lot of RCA reviews but not getting the desired performance. As a result, they formed an RCA steering team to review or do a post mortem on the RCAs that were done. The RCA Steering Team is the ultimate sign-off.
- One common question: did the RCA find all of the root causes (people, system, and component roots)? Did you determine how to prevent recurrence?
- One company spent a lot of time writing the charter for their RCA teams to ensure that all potential root causes were addressed. They included a time element to enforce the basic premise of slowing down to find the true causes. As a result, investigations can take 2 to 3 weeks.
- One company has concluded that underlying root causes go back to management systems. Thus, they don't just come up with the prevention of recurrence that addresses things in "my" unit, but instead look at the management systems that caused it to occur.
- The underlying problems don't show up until you look at a history of many events and RCAs such as the idea of having a RCA steering team to do this. Another option is to not do RCAs on everything but digging deeper on a few.
- One company found that 30-35% of their environmental incidents were caused by the last solution. As a result, they are prompted to ask whether the new procedures will be utilized and will it really work.

- People involved in RCAs are generally the ones charged with implementing the corrective actions. Human nature tends to have them picking things that are easy for them to implement. To correct this, people should not rule out potential solutions without raising them to their supervisors.
- One company has focused on results but failed to understand the underlying system problem. Their action items had short-term improvements but lacked a sustainability mechanism. They would do a blitz and develop dozens of action items and get some short-term gains. As a result, they have now established management controls to slow down the process to ensure thorough evaluation.

FACILITY CULTURE

- One company has a system in place to find systemic mechanical reliability problems and communicating them to everyone. They built a network of equipment reliability experts across all their sites and then allow these experts to get together periodically.
- Facilities must "connect the dots" for people, so they can see what reliability does for everyone; not just cost performance but also safety and environmental.
- To reinforce management commitment and accountability, the managers at one company are going out and talking with people in the field 1.5 hours per week. Scorecards are kept to keep performance pressure on managers.
- One company has established empowerment teams. They have found that the higher they are in the empowerment cycle the better their environmental performance becomes.
- When failures occur, management should not confine their review to the operator level, but also evaluate the supervisory and managerial levels for failures, gaps, and mixed messages.
- The reward system for prevention of episodic releases is an intrinsic reward system. People need to do it because they live there and it is the right thing to do. If you have Key Performance Indicators (KPIs) in your plant, people work on the ones that management focuses on.

MEASUREMENT AND GOAL SETTING

- One company gets 60 supervisors together each year to set specific communication and empowerment goals. They have a measurement pyramid with environmental releases at the top and all the things that drive those releases make up the lower layers of the pyramid. You have to define your goal, how you compare to the goal, why you aren't meeting the goal. The pyramid levels are identified by RCAs. Eventually these are turned into key measures such as maintenance on seals. Identification of key measures is a cooperative effort.
- One company tracks releases that are less than the Reportable Quantity (RQ). They have developed an environmental performance index to try to measure ahead of time how the systems are working.
- Do you measure upstream KPIs or just downstream KPIs? There must be some correlation between some upstream measurements and downstream results.

- One company's measurement of reliability is lost opportunity due to controllable losses. Controllable losses are those things within your control.

SIX SIGMA IMPROVEMENT PROCESSES

- One company is using sigma logic training from a firm in Knoxville, Tennessee, and refers to the people that are trained as "catalysts". These people work on specific projects to reduce impurities, improve environmental performance, reduce cost, etc.
- Another company is bringing in Six Sigma for EHS. They have trained, full-time people, called "black belts," working on Six Sigma projects with part of their pay dependent on the project. They are looking at loss of primary containment releases and are starting a black belt project to look at reducing chemical exposures. The company has a couple thousand certified black belts and wants everyone in the organization to have gone through the black belt process.

TAKEBACKS

At the end of the session, each participant was asked to identify one item that they would act on when they returned to their work location. The following is that list.

- Evaluate creating a formal RCA steering team.
- Generate a lot of passion for reliability and use it to drive positive behavior. Look at recent events to see if 35% of our fixes may be our next problem.
- RCAs unsuccessful because we concentrate on components rather than systems.
- Evaluate the need to create a Value Pyramid.
- Evaluate the need to lengthen the time spent conducting audits.
- Evaluate the need to create a shared learning database for technical networks (e.g., Pearl).
- Evaluate the feasibility of conducting RCAs for repeat causes.
- The focus needs to be more proactive (prevention) rather than reactive (correction).
- Evaluate and strengthen the Management of Change system.
- Assess effectiveness and visibility of management systems commitment.
- Unit specific upstream measures.
- Evaluate the use of Key Performance Indicators as a measurement tool.
- Evaluate the need to create a mechanism to track corrective actions.
- Assess the need for dedicated experts who rotate through the audit teams.
- Evaluate the need to communicate RCA findings to all employees.
- Evaluate the need to share lessons learned with other plants.
- Engineering standards are not always followed by everyone.
- Reliability includes several key functions (Quality Assurance/Quality Control, Procedures, etc.) and are closely related to other key activities.

- Importance of accountability.
- Evaluate the benefit of conducting RCAs on RCAs.

APPENDIX F

Session 4
Technical Exchange on Startup/Shutdown Practices

Session Abstract

TITLE
Startup/Shutdown Best Practices to Minimize Emissions

PURPOSE
- Review practices to minimize releases to the environment during startup and shutdown.
- Review practices to minimize flaring during startup and shutdown.

FORMAT
- A four-hour workshop consisting of presentations from three experts, followed by a panel discussion and question and answer forum.

WHO SHOULD ATTEND?
- Facility managers
- Individuals knowledgeable of plant operations practices regarding shutdown and startup
- Individuals in a position to implement ideas generated in this meeting.
- Environmental professionals
- Turnaround planning professionals

PROPOSED DISCUSSION TOPICS
- Minimizing flaring and smoke from flaring
- Shut down procedures
- Operating discipline and philosophy
- Shutdown and startup planning
- Design considerations for startup and shutdown
- Permitting non-routine emissions

Questionnaire Sent Out To Attendees Prior To Session

Start Up/Shut Down/Flaring Emissions
Participants should be prepared to discuss the following issues.

OPERATING PRACTICES

1. What are your current practices for minimizing emissions during startup shutdowns?
   For minimization flaring?
   For minimizing noise, light, odor, and smoke?

TECHNOLOGY

1. Do you know of any technologies that reduce the need to create emissions during planned shutdowns?
2. Do you know of any technologies that contribute to emission controls during periods of shutdowns and startup?

PLANNING

1. How does the process for planning a major turnaround differ from planning smaller unexpected maintenance events? How are they similar?
2. What is your shutdown planning philosophy? How are environmental considerations evaluated with competing priorities?
3. With fewer limitations, what ideas do you have for minimizing or eliminating emissions during periods of startup and shutdown?
4. Do you have any particular area of emissions that you have been unable to come up with ideas for control?

Session attendees are invited to bring transparencies or electronic PowerPoint slides to illustrate a practice they are willing to share. AV equipment will be provided. If handouts are desired, please bring 30 copies.

"ICEBREAKER" PRESENTATIONS

<u>Concepts to Reduce Ethylene Plant Startup/Shutdown Flaring and Emissions</u>
Presented by Stan Labat, ExxonMobil Chemical Company, Baton Rouge, LA

- Event stewardship
- Types of facility modifications
- Startup/shutdown planning
- Integrated site supply flexibility

<u>Reduction in Emissions</u>
Presented by Michael DuBose, Chevron Phillips Chemical Company, Port Arthur, TX

- Team was formed to develop release reduction projects
- Prior to any shutdown or start-up, procedures are reviewed with a group representing technical, operations and maintenance
- One aspect of the review is to develop ways to reduce emissions
- Best practice examples

Key Learning's From Dialogue

- Ground flares are helpful in minimizing visibility of flaring events but may not have any impact on reducing emissions.
- There is value in managing the flare system.
- Flare gas recovery systems are good for smaller flare systems and for planned shutdown. There is a safety concern when purging to recovery systems.
- Flare gas recovery system can be used for routine venting as well as for planned shutdown.
- One facility recovery system has an absorber before the flare gas compressor.
- On an aromatics unit, for shutdown/startup, one facility does not rely on the flare system.
- One facility uses an on-line analyzer to monitor quality of wash water or purge gas during decontamination of vessels/equipment.
- One facility de-inventories to storage tanks, detergent washing captured in the tank.
- Handling of hydrocarbons has become a more important part of shutdown planning.
- One facility has rewritten procedures to identify environmental impact. Before a step is taken, a caution or warning is identified on the written procedure.
- During hot sweep of Claus sulfur unit, facility modified the procedure to keep the tail gas cleanup unit operating to reduce emissions.
- One company has a total technology package from startup to shutdown without flaring; importing technology from a Canadian plant – includes reduced load at startup, recycle feeds; have found that altering furnace load to eliminate flaring does not add much time.
- Sour water strippers – Spare equipment philosophy to maintain specifications and eliminate emissions; adding additional sufficient surge and feed capacity.
- Culture change starts with management support for adding a couple of hours to the shutdown schedule to minimize emissions.
- Challenge people to think of ways to shutdown without emissions.
- Sometimes physical modifications are required to shutdown and startup without emissions.
- One facility uses operators assigned during s/u and s/d with no responsibilities other than minimizing emissions.
- Catalyst regeneration using off-site facilities that may cost more but reduces facilities emissions.
- Improved decontamination procedures may improve shutdown time as well as reduce emissions.
- Teaching newly hired operators emission reduction procedures can help influence the culture of the experienced operators.
- Mentors can be used to influence culture improvements.

- Tools to identify/quantify events in the earliest stages of shutdown planning to determine if a reportable quantity (RQ) has been released. One facility has a DCS-based flare report that calculates RQs; calculated for every safety valve, how long it takes to exceed an RQ, They have spreadsheets for various scenarios. Leaks are quantified based on leak calculation methods.
- Get peripheral equipment started up first.
- Optimize destruction efficiencies for flares – testing for improved efficiencies; using flare tip designs to achieve higher efficiencies.
- Maintain high equipment reliability.
- Using root cause analysis to improve equipment reliability.
- More monitoring for areas of known corrosion; use of more corrosion inhibitors.
- Designing instrumentation using timed delays to avoid nuisance trips.
- Improved reliability of steam system.
- Triple-redundant dual modem systems installed to reduce steam methane reformer nuisance trips.
- One company's design philosophy of an ethylene plant is that no single instrument can cause a trip; dual coil automated block valves are used.
- Moved knockout pot to reduce sulfur plant liquid carryover.
- Failure Mode and Effects Analysis is a tool for instrumentation philosophies.
- Mist oil system used to reduce bearing failures
- One facility found double seals to be more reliable than tandem seals for pumps

ETHYLENE PLANT STRATEGY FOR STARTUP WITHOUT FLARING

(Discussion among ethylene producers present)

- Augment plant's steam capacity with additional supply, such as package boilers or integration with site steam grid.
- Design cracked-gas compressor system for startup operation on recycle. Understand compressor surge, automatic false load. Pack system to avoid vacuum operation.
- Install ground flare capacity to handle off-spec and startup load – design for s/u and off-spec scenarios; typically need superheater on cold header for water seal drum.
- Automate furnace feed ramp out to minimize flaring volumes and duration – smokeless capacity of elevated flare; crack-gas load required for startup.
- Cracked gas line interconnection between adjacent ethylene plants.
- Distillation designed for startup on total reflux
- Recycle off-spec ethane, propane and lighter streams to furnace feed.
- Cannot startup de-methanizer on false load.
- Use the same technology for shutting down; staged shutdown to minimize liquid inventories (move to product).

- Startup of ammonia reactor – Formerly went to the flare. Recently implemented project to startup into a recovery unit.

"SHORT NOTICE" TURNAROUND EMISSIONS REDUCTION

- Use the last turnaround shutdown procedure.
- Use of a tag system to identify bleeders that have been opened; use tag to identify "normal open" or "normal closed."
- Identifying flanges with a small tag to indicate who made it up.

Takebacks

- Recycle cracking of off-spec material
- Start up practices on ethylene plants
- Opportunity for training new operators
- Red tag system for bleeders
- On-line analysis during decontamination
- A pollution prevention plan for routine and turnaround
- Challenge mechanical equip group regarding the process gas compressor to find ways to startup without flaring
- Optimize flare efficiency of flares
- High integrity instrumentation versus relief valve capacity
- Specific effort and specific team to plan for emissions during startup and shutdown.

APPENDIX G

Session 5
Technical Exchange on Sulfur Plant/System Reliability

In Brief...

One of the other 10 topics not investigated was sulfur recovery unit reliability. It was decided that a technical exchange session would be best to discuss best management practices for sulfur recovery units. The session would be for refinery personnel.

Seminar Outline

WHEN: Tuesday, November 14, 2000
1 p.m. – 5 p.m.

WHERE: Motiva Refinery and Shell Chemical Plant, Norco, Louisiana

WHO: Operations Managers, Operations Representatives, Engineering Managers, Technical Support Staff, Reliability Support Staff, And Key Regulatory Representatives

OBJECTIVES: Share successful practices that have improved sulfur plant/ system reliability, resulting in reduced episodic releases.

Identify those practices that may be promising for improving sulfur plant/system reliability.

Identify common reliability problems warranting cooperative approaches for resolving.

PRESENTATIONS: Motiva Convent and Phillips Borger will present case studies on sulfur plant/system reliability.

DISCUSSION TOPICS:

1. What are your most frequent causes of sulfur plant/system disruptions and downtime?
2. What successful practices have resulted in overall improved reliability of sulfur plants and associated sulfur handling systems during normal operation?
3. What practices have resulted in minimizing emissions during startup and shutdown?

Key Learning's From Dialogue

Technical, operations, and environmental personnel representing 10 refining companies along with representatives of LDEQ, TNRCC, and EPA participated in the dialogue. From the dialogue, numerous refining personnel shared their "learning takeaways" from the dialogue and information-sharing process. Examples of the learnings and key comments are noted below.

OPERATIONAL

- Checking velocities through control valves.
- Routing reflux to flash drum.
- Ensure diverter valve opens in direction of flow.
- Increased monitoring of SRU feed.
- Watching amine system over-stripping.
- Eliminate fire eye trips.
- Monitoring H_2S/SO_2 ratio.
- Monitoring amine circulation rate.
- Seal leg flushing.

MANAGEMENT SYSTEMS

- Establishing a "Lessons Learned Log."
- Establishing a root cause, corrective action identification, and companywide learning communication process.
- Operator participation and buy-in to incident investigation.

TECHNICAL

- Use of tracer gas through diverter valves.
- Diverter valves in series.
- Sulfur flush system for seals.
- Waterwash system for acid gas.
- Flow meters on inlet and outlet of liquid/liquid absorbers.

TRAINING

- Operators and engineers doing same-site training.
- Enhanced troubleshooting training for Operations personnel.
- Using simulators for operator training.

APPENDIX H

Session 6
Technical Exchange on Continuing The Dialogue

In Brief...

A topic that continues to surface in this initiative is how to effectively address the growing concerns of communities regarding episodic releases such as flaring and overall environmental concerns with refining and chemical manufacturing facilities. The work group had addressed 8 of the 10 topics that were identified as being of interest for further study. One of the topics not addressed was community concerns. There was a lot of discussion about how to address community communications. There was recognition that updates on the ERRI are being provided at various times by each of the participating organizations through such activities as Citizen Advisory Panel meetings, conferences, and seminars. We decided to have a roundtable discussion that would include plant managers, public relation managers, and some regulatory people who have been involved in an environmental community project. It was decided to call the session, "Continuing the Dialogue."

Seminar Outline

WHEN: November 15, 2000
10:00 a.m. - 4:00 p.m.

WHERE: Motiva Refinery and Shell Chemical Plant
Norco, Louisiana

WHO: Plant Managers, Community Relations Managers
Key Regulatory Personnel

OBJECTIVES:

1. Share specific successful practices in responding to and resolving environmental concerns expressed by the community.
2. Explore mechanisms for technically driven organizations (industry) to successfully respond to community social concerns.
3. Discuss how to help the community understand technically complex environmental issues (air standards, air concentrations, determination of risk, etc.), and helping industry understand the community perspective.

PRESENTATIONS:

1. Lake Charles (Calcasieu Parish, Louisiana) Community Activism, Regulatory Viewpoint, Industry Viewpoint
2. Communicating With The Public During Episodic Release Events - Norco Case Study Learnings

DISCUSSION TOPICS:

How to: (a) educate employees on episodic releases, (b) conduct community outreach on episodic releases, and (c) educate the public on episodic release reduction efforts.

The regulators role in helping industry work with communities.

Community air-monitoring successes and failures.

Involving other companies and industries in this type of learning process.

The participants were asked to prepare answers for the following questions and to discuss the answers during the information sharing forums.

1. What is the organizational structure and process that your facility has in place to respond to community inquiries regarding episodic releases and related environmental issues within your facility?
2. Do you have a system in place to measure, on an ongoing basis, your relationship with your facility's surrounding community, and if so, what does that system look like and what results have you obtained over the last couple of years?
3. Do you have forums regularly with your employees and community members to apprise them of developments in your facility and to respond to environmental concerns, and if so, how is the forum structured (i.e., membership, meeting protocol, facilitation, etc.)?
4. Have you had any environmental permit applications receive additional scrutiny or been delayed due to community inquiry, and if so, how did you respond to these inquiries and how did you resolve the issues raised?
5. Has your facility been involved in any environmental justice issues, and if so, how have you resolved, or how are you resolving them?
6. What would you regard as a best practice by your facility in community outreach efforts to address environmental concerns?
7. What would you list as your most significant learnings in recent years, regarding addressing community concerns over environmental matters associated with your facility (what worked well, and what would you not want to repeat)?
8. What has been your experience in working with your respective regulatory agencies to address community environmental issues (and for the regulatory representatives, what has been your experience in working with your respective industries in

addressing community environmental issues?), and what might you suggest to improve the process?

9. Has your facility had any experience in conducting ongoing ambient air monitoring in the community, and if so, please describe.
10. If your answer to No. 9 above is yes, what activities did you undertake to implement the air-monitoring program, which was involved in the process, how have you handled the data reporting, and what has been the response from the community?
11. And if you knew 10 years ago that the community issues you/we/industry are addressing today would emerge, what would you have done differently?

Key Learning's From Dialogue

Plant managers, community relations, and environmental personnel representing eight refining and chemical companies along with representatives of the LDEQ, TNRCC, and EPA participated in the dialogue. From the dialogue, numerous refining personnel gave updates on their facility's successes, and others shared their "learning takeaways" from the dialogue and information sharing process. Examples of the learnings and key comments are noted below:

COMMUNICATIONS

- The community should be notified ahead of time about planned flaring events. We need to take the community's perspective into our maintenance plans (i.e., don't flare when they are asleep).
- CAPs have recommended that planned startups be advertised. There are very few complaints when people are aware of a planned activity.
- It is imperative for a company to find ways to communicate with disenfranchised communities.
- LDEQ has been organizing and facilitating the Community Business Panel in Norco, Louisiana. They have been very successful bringing in experts from other agencies, companies, and organizations to address community inquiries. These meetings are taped and shown on public access TV, so more people can view them and further the education processes,
- One community has created a CAP subcommittee for those members who are primarily interested in environmental issues in order not to disenfranchise those who are not interested while responding to the needs of others.

ENVIRONMENTAL EDUCATION

- Need to put tools for understanding a facilities business and environmental performance into the community education system—need to give the community knowledge.
- Companies can provide grants to the education system in the community for environmental education.

- The environmental education process should build some fundamental skills such as understanding the meaning of environmental terminology ("part per billion" = [PPB]).
- There is value in providing additional environmental training to operators and other plant personnel and then involve them in training the community.
- There is benefit in working closely with the school system through teachers by providing them with resources that they can use in their science projects.

SYSTEMS/TOOLS

- The Houston Ship Channel area has a shared CAER line for dispensing information during an incident. Several advertising methods for the CAER line have been used, including painting the number on storage tanks that can be seen from adjacent roadways.
- East Harris County has a web site that ties into 170 news outlets. A message can be put on the web site when there is an emergency. The message comes directly from the emergency response personnel at the emergency site.
- In Canada, companies have developed an air and water database cooperatively among themselves. This database has been valuable in that it has allowed the discussions to be based on data versus emotions.

RELATIONSHIPS

- A facilities involvement in the community is at least as important as the work they do to make their products.
- Retirees are a great resource for interfacing with the community regarding issues of concern.
- In-depth and frequent tours of a facility for the community and local schools can help build familiarity and trust.
- One company is making low interest loans available for low income and minority individuals.
- It is important for the community to know they have a beneficial stake in the facility at their fence line.
- Some companies are going into middle school classrooms to help students understand what they would need to know to get a job in their industry, while others develop opportunities with their contractors for some children.
- There is a lot of secondary work that facilities generate. There are opportunities to seed small businesses that can provide these needs.
- Companies need to sit down more often at this level with the regulatory community to ensure that the necessary communication is occurring.

Appendix I

Examples of Projects/Activities that are being studied for Implementation

Best Management Practices

Best Management Practice	Type of Project/Activity	Justification Required	Approved Date	Actual or Estimated Completion Date
Tower Modifications	Emissions reduction – redesigned the piping on 3 clay towers to eliminate emissions to the atmosphere when towers are dumped and reloaded.	Eliminate 3 recordable incidents per year. Complete modifications to 3 towers cost approximately $75,000.	2Q 2000	Actual 2Q 2000
Cold boxes	Flare reduction – added a step in start up procedure to externally cool cold boxes in ethylene unit.	Minimize flaring of approximately 2 million pounds of hydrocarbons during start-up of unit. Cost approximately $300,000 for nitrogen cool down step.	3Q 2000.	Actual September 2000
Protective instrument prevention maintenance program	Identify the best practices for conducting preventive maintenance on protective and critical instrument systems.	Improve instrument reliability.	Approved	1/02
Alarm response assessment program	Prioritize, minimize and organize unit alarms.	Eliminate operator confusion regarding alarms.	1999	Scheduled 2nd Quarter 2001

Best Management Practice	Type of Project/Activity	Justification Required	Approved Date	Actual or Estimated Completion Date
Sulfur recovery unit reliability	Commissioned a team to improve operational reliability at sulfur recovery unit in 4th Q 1999. Implement improvements that include catalyst replacement, heat exchanger cleaning, and installation of new control technology.	Reduction of sulfur recovery unit emissions.	4th Q 1999	7/2000
Community monitoring	Develop and hold an air toxics educational program for the community	Help the community understand the nature of Toxic Air Releases.	3 Q 01	
Operate compressors	Flare reduction – during shutdown operated compressor that historically had been shut down during a unit outage.	Approximately 1.5 million pounds reduction of VOC hydrocarbons. Cost approximately $500,000 for steam import to operate compressors.	3Q 2000	Actual - Ran compressors 16 days total while unit was down. All in 3Q 2000