

Lessons Learned in Recovering from an Explosion in an Herbicide Manufacturing Facility

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Abstract

On April 12, 2000 Lomac experienced an explosion in the herbicide manufacturing process, which leveled a portion of the facility. The objective of this presentation is to describe the lessons learned in recovering from this catastrophic event. The many facets of emergency response will be covered from dealing with and responding to all of the governmental agencies (MIOSHA, USEPA, MDEQ, State Police, Local Emergency Planning Committees, local POTW) and the news media. Responding to the news media and the local community is critical in these circumstances and the presentation will describe the frustrations, failures, and successes we had at Lomac.

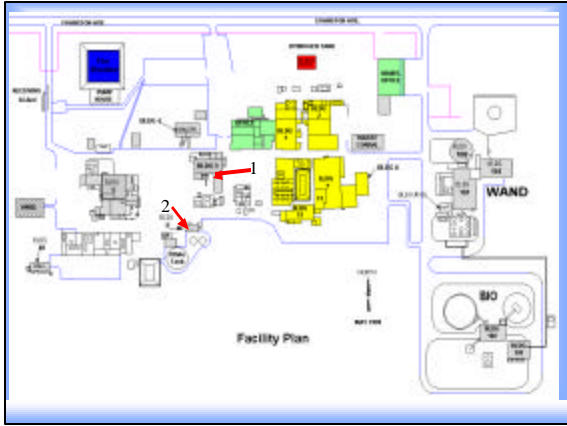






Lomac Incident Review

- Explosion Occurred at 1:10pm on 4/12/00
- 2 distinct explosions were heard. The first occurred in a pipe, and the 2nd in the “wet well”
- Emergency response agencies were on-site within 5 minutes
- First injured person arrived at the hospital within 12 minutes





Lomac Incident Review

- Many injured people were scattered around the plant - Rescue operations implemented
- 8 people seriously injured and taken to hospital. Many more with minor injuries.
- Debris was “raining” from the sky for 30 seconds after explosion
- Debris found as far as 3/4 mile away
- Massive confusion as to what had happened

Emergency Response

- ☞ Many Governmental Agencies Regulate Aspects of Emergency Response - EPA, OSHA, LEPC, State, Local - SARA, CERCLA, RCRA
- ☞ Requirements include - Training, Notification, Reporting, Response

Emergency Response

- ☞ Written Plans must be developed and up to date
- ☞ Active training on plan must be implemented
- ☞ Lomac's written plan was activated
- ☞ Improvements made to plan
- ☞ Media interaction should be discussed

Emergency Response

- ☞ Lomac employees began administering first aid immediately
- ☞ Time from explosion until first person arrived at hospital - 12 minutes
- ☞ Contracted with Northern A-1 to conduct primary HAZMAT functions
- ☞ Lomac HAZMAT Trained employees assisted

Investigation Timeline

April 12th

- ☞ Explosion.
- ☞ Alerted appropriate governmental authorities.
- ☞ LOMAC retained HAZMAT team to monitor for chemical vapors & spills.

Investigation Timeline

April 13th

- ☞ Structural Engineer retained by LOMAC to ensure structural integrity of buildings.

April 14th

- ☞ East side of the facility returned to LOMAC by governmental authorities. This sector of the facility was the furthest from the blast site.

Investigation Timeline

April 14th

- ☞ Began setting up teams consisting of key operators, chemists and engineers to determine the status of every process shut down on the east side of the facility.

April 18th

- ☞ Explosion experts retained by LOMAC (Burgoyne, Inc.) arrived on site to assist in the investigation.

Investigation Timeline

April 20th

- Determination was made that the DCB buildings were not a factor in the April 12th explosion.
- Remainder of the facility returned to LOMAC by government officials.
- Facility boiler system inspected by certified inspector - in good order.
- Hydrogen storage tank system inspected by PraxAir - in good order.

Investigation Timeline

April 27th

- Additional experts retained by LOMAC. Reactive chemists retained to assist our chemists in the investigation.
- Process Safety Management auditors to review our start up plans as an additional safety precaution. (ERM)

Investigation Timeline

May 3rd

- Reactive chemists retained by LOMAC arrive on site to assist our chemists in the investigation.

May 5th

- Samples removed from a tank at the rear of building # 3 were found to contain Tetranitromethane. Local authorities notified and LOMAC evacuated site.

Timeline

May 5th

- Literature search initiated to define hazards and expand knowledge of LOMAC personnel with respect to TNM.

May 7th

- Special HAZMAT team retained by LOMAC began remediation efforts in concert with local and state authorities.

Emergency Response - Round 2

- TNM identified as a chemical in Tank 003
- Lomac needed a specialized HAZMAT team to handle this situation
- Clean Harbors - High Hazard/Reactive Materials Team was retained
- Contacted Clean Harbors at around 7:00pm on May 5th. Drove from Baltimore and arrived in Muskegon around 12 noon on 6th.

Emergency Response - Round 2

- Evacuation of site for 1/4 mile
- Shutdown of 6 businesses and roadway
- Every agency on-site
- Site controlled by State Police
- Lomac set up offices in local hotel
- Clean Harbors worked 10 hours/day for 15 straight days - cleaning piping & equipment

Investigation Timeline

May 9th

- Samples removed from a process tank and line in Building # 3 were also found to contain tetranitromethane. Plan developed by LOMAC personnel to sample process equipment to determine the risk potential and aid in determining origins.

Timeline

May 10th

- Tetranitromethane found in the tank at rear of Building # 3 stabilized and removed from the site.

Timeline

May 15th

- Initial Root Cause Analysis Team Meeting underway. Team comprised of LOMAC process operators, supervisors, engineers and chemists in addition to retained team of reactive chemists, explosion experts and Root Cause Analyst Team Leader.

Investigation Timeline

May 16th

- ☞ Extent of TNM contamination determined. Remediation efforts nearing completion.

May 18th

- ☞ TNM contamination removed from all lines and vessels, system flushed.
- ☞ Sulfonator and nitrator to be drained at a later date (.2% and .16% levels of TNM).

Investigation Timeline

Week of May 22nd

- ☞ Complete all PSM protocols for DCB operations
- ☞ Restarted Building # 12. - Mechanical Process
- ☞ Restarted Building # 1 - Chemical Process
- ☞ Restarted Wand Operations - Chemical Process

Investigation Timeline

- ☞ Months of June, July, August, September
 - Completed remediation of the site.
 - Over 300 tons of debris and sludge were removed from the site
 - Over 150 tons of scrap metal was removed

Investigation Timeline

- ☛ Inspections from every agency continued
 - MDEQ - ERD, WMD, AQD
 - USEPA - RCRA, WATER
 - MIOSHA
 - MCWMS
 - Fire Dept.
 - State Police

Investigation Timeline

- ☛ Month of October
 - Root Cause Analysis was released to the agencies and general public
 - Well received
 - MIOSHA retained outside consultant to assist in investigation

Request for Information

- ☛ **MIOSHA - 189 Items**
 - PSM
 - Emergency Response
- ☛ **MDEQ - 30 Items**
 - Release to Environment - TNM
 - Remediation Efforts
 - Hazardous Waste Disposal
 - Preparation of Investigative Work Plan

Media Relations

- Should have a defined plan
- Media will not go away
- If you don't talk to them, they will make up their own story
- Prepare press releases as soon as possible
- Have a consistent position when talking to all parties
- Maintain your credibility

Media Relations

- Camera stationed outside plant for several days
- Reporters very anxious to talk to Lomac officials
- Rated number 2 story in Muskegon - after visit by President Bush













Lessons Learned

- ☞ Ensure you have a complete material and energy balance of your process
- ☞ Be cautious of adding or modifying recycling loops that may build up impurities and cause chemical transformation
- ☞ Know your emergency responders

Lessons Learned

- ☞ Be prepared for the worst - Loss of communication and facilities
- ☞ Know your media and community leaders
- ☞ Have an updated public relations plan
- ☞ Have a pre-defined response teams - include attorneys and consultants
- ☞ **BE PREPARED - THE FIRST 5 MINUTES MAY BE WORTH THE NEXT 5 HOURS**
