EQ Fire in Apex, NC
Case Study

North Carolina
Department of Environment and Natural Resources
Division of Waste Management
Hazardous Waste Section
The Fire

- At approximately 7:30 PM on Thursday, October 5, 2006, the first call was received reporting a chlorine odor near the industrial park in which EQ was located.

- Apex Police patrolled the area but initially could not detect a source (several additional calls were also received).

- At approximately 9:30 PM a white cloud was observed at the industrial park by Apex Fire Dept. and by 10 PM the source was determined to be the EQ facility with just the beginning of the fire (confined to 4 by 8 foot area).

- As the facility was known to contain flammables, oxidizers, corrosives, pesticides and other toxic material, Fire Chief Haraway made the decision to evacuate the area and not risk personnel in fighting the fire.
Approximately 17,000 people were evacuated in 5 different phases. Smoke clouds traveled predominantly in a NW direction but shifting winds necessitated the relocation of the command center and increased the evacuation area.

- NC DENR Division of Air Quality was notified and responded with three mobile sampling units.

- The fire burned almost exclusively vertically with several explosions observed.

- Fire was declared extinguished at 1:00 AM on Saturday, October 7, 2006, although some subsequent flare ups did occur. No serious injuries were reported, only minor respiratory irritations and heat stress noted.

- Approximately 90% of the residents returned home by 9 AM on Saturday, with the remainder allowed to their homes by 6 PM.
Apex Fire Evacuation Area
First Explosion
Fire fully developed
20 Hours Later
Majority of Structure Collapsed
Basically Contained to Structure
Fire Extinguished

- Apex FD turns over site to EQ on Saturday, 10/7/06

- DENR’s Hazardous Waste Section conducts sampling (indoor and outdoor swipe samples, as well as soil samples were taken) at 37 locations around the facility.

- DENR’s Division of Water Quality samples adjacent creek.

- DENR’s Division of Air Quality continues to monitor air at a single mobile unit near the site.

- EQ develops and implements (following DENR review & approval) a site sampling and evaluation plan.
All HW Remained in Containment
EQ Facility
Sampling Results

- “The state gathered test results from 37 sites within a 2-mile radius of EQ. Some tests did show high chemical levels, but the state does not think EQ played a part. One property measured high levels of lead, which testers believe came from lead paint on a home.”

- “The conclusion is quite different from a private test for Apex Gymnastics, a business next door to EQ, which reported high levels of nickel, mercury and lead. Apex Gymnastic later paid for extensive cleaning. The state did not test the building or contact their test firm.” (Subsequently it was determined that floor coating used in the gymnasium was the source of the mercury.)

- No environmental impacts from the EQ fire
Initial Investigation

- Chemical Safety Board arrived Friday, 10/6/06

- DENR’s Hazardous Waste Section “Resident Inspectors” took the lead in the facility investigation (RI Program requires a minimum of 48 inspections per year for EQ).

- Review of Contingency Plan notifications (emergency responders could not initially locate required Contingency Plan notifications).

- EQ supplied copies of manifests, LDR forms, waste profiles, etc. (4 days required to scan and print)

- RI Program inspectors interviewed the EQ staff.
Fire’s Cause

- Apex Police during complaint investigation finally spotted a small fire in the NE corner of the “oxidizers” bay (location of the oxygen generators with pool chemical stored atop the O2 generators).
- Oxygen generators received by EQ stated as “spent” from PSC – Allworth.
- Mobile Aerospace Engineering Inc. (original generator) had mismarked/mislabeled the HW ?
- PSC – Allworth had removed the O2 generators from open-top steel drums and consolidated them into two fiber cubic yard containers (cardboard).
- EQ on the day of the fire (late afternoon) had moved the O2 generators while staging an outbound load.
EQ Facility Layout
Manifest for Oxygen Generators
Profile for Oxygen Generators
“A preliminary investigation by the CSB determined the fire might have started in an area of the plant containing oxidizers, which are highly combustible. But investigators said the cause of the fire might never be known.”

“Further investigation found that the unspent oxygen generators, which are used to supply oxygen to drop-down masks on commercial aircraft that have depressurized, were stored nearby and played a role in fanning what had been a small fire.”

“The U.S. Chemical Safety and Hazard Investigation Board issued an "urgent recommendation" to warn other hazardous waste facilities of the potential danger posed by the canisters, also known as oxygen generators because they create and release oxygen in a chemical reaction. The move marks only the third time in the agency's history that such a recommendation has been issued.”
Spent Oxygen Generators

Containers of Spent Aircraft Chemical Oxygen Generators
Typical Oxygen Generators

Typical Examples of Spent Chemical Oxygen Generators
Oxygen Generators

- When heated, the sodium chlorate decomposes to produce oxygen and salt:
  - \(2\text{NaClO}_3 \rightarrow 2\text{NaCl} + 3\text{O}_2\uparrow\)
- To produce the heat the sodium chlorate is compounded with a fuel such as powdered iron, aluminum, etc.
- An additional minor reaction produces chlorine gas:
  - \(4\text{NaClO}_3 \rightarrow 2\text{Na}_2\text{O} + 2\text{Cl}_2\uparrow + 5\text{O}_2\uparrow\)
- Several methods are used to remove the chlorine including the addition of barium peroxide to the mix to scavenge the chlorine as barium chloride. (It is for this reason that some of the spent units contain materials that are TCLP hazardous for barium.)
- The decomposition temperature for the chlorate depends on the particular metal oxide catalyst used. Cobalt lowers the decomposition temperature of sodium chlorate from 890°F to 540°F, whereas iron lowers the decomposition temperature only to about 700°F.
Clean up & Remediation

- EQ corporate staff began site assessment on 10/7/06.

- Clean up/remediation extended through mid March ’07.

- During the clean up, EQ’s hazardous waste generated filled thirty-six 25 cubic yard roll-off containers and generated an additional 42,500 gallons of contaminated water.

- EQ also generated two 25 cubic yard roll-off containers of non-hazardous waste.

- The EQ site was manned 24 hours a day by both EQ and DENR personnel from 10/7/06 through early March (when the final shipment of hazardous waste left).
Investigation Reveals Hidden Problems

- During personnel interviews following the fire, one slip lead to numerous problems regarding waste processing at the EQ facility.

- From March 2004 to October 2006 (not including the fire) 5 incidents occurred resulting in releases from mixing of incompatible waste where EQ had not implemented their contingency plan, nor had the incidents been reported to DENR, nor had they been recorded in the operating record.
Compliance Order with Penalty Issued

- Based on the improper processing and additional violations regarding training, facility conducted inspections and container management, the Hazardous Waste Section issued a Compliance Order.
  - A) Failure to minimize the possibility of a fire, explosion....
  - B) Failure to immediately carry out the provisions of the contingency plan....
  - C) Failure to report to the Department any non-compliance which may endanger health....
  - D) Failure to record in the operating record, the time, date, and details of any incident that requires implementing the contingency plan....
  - E) Failure to conduct and document daily inspections and remediate....
  - F) Failure to maintain and operate the facility to minimize the possibility of a fire, explosion....
  - G) Failure to record in the operating record, waste analysis, compatibility testing....
  - H) Failure to mark and date containers....
  - I) Failure to conduct annual training for all employees....
  - J) Failure to construct and maintain observation wells....

- The total Penalty assessed for these violations was $553,225.00.
EQ – DENR Settlement

• EQ contested NC DENR’s Compliance Order.

• Judge sent the case to arbitration.

• A Settlement was reached after two days.

• EQ agreed to:
  • Pay recomputed penalty of $275,000
  • Pay DENR recovery of its sampling cost of $149,000
  • Pay past due HW Section fees of $13,000
  • Pay past due RI Program fees of $5,000
  • Perform final closure of the facility
  • Relinquish their Part B Operating Permit (request early termination of the permit)
Additional Impacts from the Incident

- Class-Action law suit by Apex residents resulted in a settlement in which EQ paid out $7.85 million (lawyers skimmed $3 million of the settlement).

- Chemical Safety Board issued advisory to all who service aircraft and dispose of oxygen generators. CSB also made recommendations to re-examine building code for Hazardous Waste TSD facilities.

- NC Legislature amended hazardous waste regulations.
• Require commercial TSD facilities to provide additional financial assurance to provide cleanup and remediation and funds for off-site screening monitoring following a “significant incident” (where a release of hazardous waste or its constituents occurs).

• Require applicants for permits for hazardous waste facilities to seek input from local government and emergency response agencies on their contingency plans for the facilities.

• Require operators of commercial TSD facilities to maintain certain information off-site to assist emergency response.

• Require commercial TSD facilities to provide certain information to all property owners & residents located within one quarter mile of their facility.
Require DENR to consider the population density/sensitive land use within ¼ mile of the facility boundary when determining the inspection frequency of that facility.

Require commercial TSD facilities to provide security and surveillance at the facility 24 hours a day, 7 days a week in order to monitor site conditions and to control entry to the site of the facility.

Require permits for commercial TSD facilities to be subject to renewal at least every five years.

Authorize DENR to regulate hazardous waste transfer facilities.

Require commercial TSD facilities to install and maintain on-site wind monitors.
QUESTIONS?