

High-Temperature Industrial Facility and Environment Case Studies

1) S-OIL Ulsan Onsan Refinery Explosion and Fire — 2022-05-19

1. Incident Overview

A major explosion and fire occurred at the S-OIL refinery in Onsan Industrial Complex, Ulsan, resulting in 1 death and 9 injuries (moderate to severe).

2. Causes and Sequence (Reported)

At night, an explosion occurred in process facilities, spreading into a chain fire. The exact process cause remains under investigation and judicial review.

3. Reporting and Initial Response

Ulsan Fire Headquarters and the company fire brigade responded immediately, carrying out personnel evacuation and fire isolation.

4. Rescue and Emergency Response

Casualties were triaged and transported; extensive firefighting resources were deployed to prevent fire escalation

5. Agency Roles

- **Fire Department:** Fire suppression, rescue, site control.
- **Police & Local Government:** Cause investigation, enforcement support.
- **Company:** Provision of personnel/process information, cooperation with investigation.

6. On-Site Safety/Response Guidelines (Key Points)

Refinery/petrochemical processes involve explosive gases and high-temperature facilities. It is essential to enforce hazardous area restrictions, combine foam and cooling during fire suppression, and select extinguishing agents based on MSDS.

7. Follow-Up Measures

Multiple officials indicted for violations (e.g., Chemical Substances Control Act). Continuous safety inspection and policy review underway.

2) Shin Seocheon Thermal Power Plant Boiler System Explosion (Steam Release) — 2023-09-11

1. Incident Overview

An explosion in the boiler piping/valve area at the Shin Seocheon Thermal Power Plant (Chungnam Province) caused high-pressure steam release, resulting in 1 death and 3 injuries.

2. Causes and Sequence (Preliminary Report)

Explosion and steam release occurred during boiler valve inspection (detailed investigation ongoing).

3. Reporting and Initial Response

Fire and police units dispatched; plant operation suspended; area cordoned off. Fire confirmed not to have spread.

4. Rescue and Emergency Response

Severe burn and cardiac arrest victims were transported and treated; on-site hazard assessment conducted simultaneously.

5. Agency Roles

- **Fire Department:** Rescue and hazard evaluation.
- **Police, Ministry of Industry & Ministry of Labor:** Joint cause investigation and safety inspections.

6. On-Site Safety/Response Guidelines (Key Points)

In high-temperature, high-pressure steam areas, ensure system isolation and blind installation during maintenance. Confirm residual pressure/temperature release. Use heat-resistant PPE and face shields for nearby work.

7. Follow-Up Measures

Court of appeals found the main contractor and responsible executives guilty of safety duty violations, emphasizing supervisory liability.

3) POSCO Pohang Steelworks 3rd FINEX Plant Fire (Suspected Smelting Furnace System) — 2024-11-10

1. Incident Overview

At dawn, three explosive sounds were heard followed by a major fire at the 3rd FINEX Tower. Fire was fully extinguished after five hours. Among 8 workers, 1 suffered second-degree burns, while 7 evacuated safely.

2. Causes and Sequence (Reported)

Incident suspected to be linked to the smelting furnace system; detailed investigation ongoing.

3. Reporting and Initial Response

Level 1 response declared; 43 fire trucks and 120 personnel deployed, joined by the company's fire brigade.

4. Rescue and Emergency Response

Injured worker given emergency treatment and transported; fire expansion prevented; residual fires extinguished after stabilizing upper structures.

5. Agency Roles

- **Fire Headquarters:** Site control and suppression.
- **Police:** Access restriction and investigation support.
- **Company:** Plant shutdown, damage reporting, recovery planning.

6. On-Site Safety/Response Guidelines (Key Points)

Steel mill high-temperature processes (smelting, coke, gas) pose high blast and projection risks. Workers must wear heat-protective suits, face protection, and heat-resistant boots. Systems involving molten iron/gas must be isolated, drained, and inerted. Foam and cooling suppression should be combined during fires.

7. Follow-Up Measures

Checks for recurrence risk, root cause analysis, facility reinforcement, and systemic countermeasures required.

4) Hwaseong Aricell Lithium Battery Factory Explosion and Fire — 2024-06-24

1. Incident Overview

At a lithium primary battery factory in Hwaseong, Gyeonggi Province, a series of explosions triggered a large-scale fire, resulting in 23 deaths and 8 injuries. This marked a major industrial disaster with heavy casualties among migrant workers.

2. Causes and Sequence (Investigation/Administrative Findings)

An explosion occurred in a 2nd-floor workspace, spreading rapidly due to the presence of approx. 35,000 batteries. Toxic smoke and successive explosions exacerbated damage. Government ordered full investigation and plant shutdown

3. Reporting and Initial Response

Massive deployment of firefighting and rescue personnel/equipment. Fire point access restricted; re-ignition risk monitored. Missing persons searched.

4. Rescue and Emergency Response

Despite continuous explosions and toxic smoke, search and recovery operations were carried out. Bodies recovered, survivors treated and transported, site stabilized.

5. Agency Roles

- **Fire Department:** Suppression, search, removal of combustibles.
- **Police & Labor Authorities:** Raids, investigations of law violations.
- **Local & Central Government:** Designation as a key management facility, policy reforms.

6. On-Site Safety/Response Guidelines (Key Points)

Lithium and water-reactive material fires require **special extinguishing agents**; water use is restricted. Storage/workspaces must be separated; overstock prohibited. Mandatory sprinklers, detectors, and evacuation routes. Temporary storage must have explosion-proofing and ventilation.

7. Follow-Up Measures

Executives arrested; plant designated as a priority safety management site. Dedicated extinguishing agents and testing standards for battery factories mandated.