

Chinese Petroleum Corp. Kaohsiung Refinery



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Chinese Petrochemical Corp Kaohsiung Refinery

- Founded 1946
- Refines crude oil into various petroleum products and petrochemical raw materials
 - Products: Fuel Gas, Diesels, LPG, Asphalt
 - Capacity: 270,000 Barrels/Stream Day



Overview

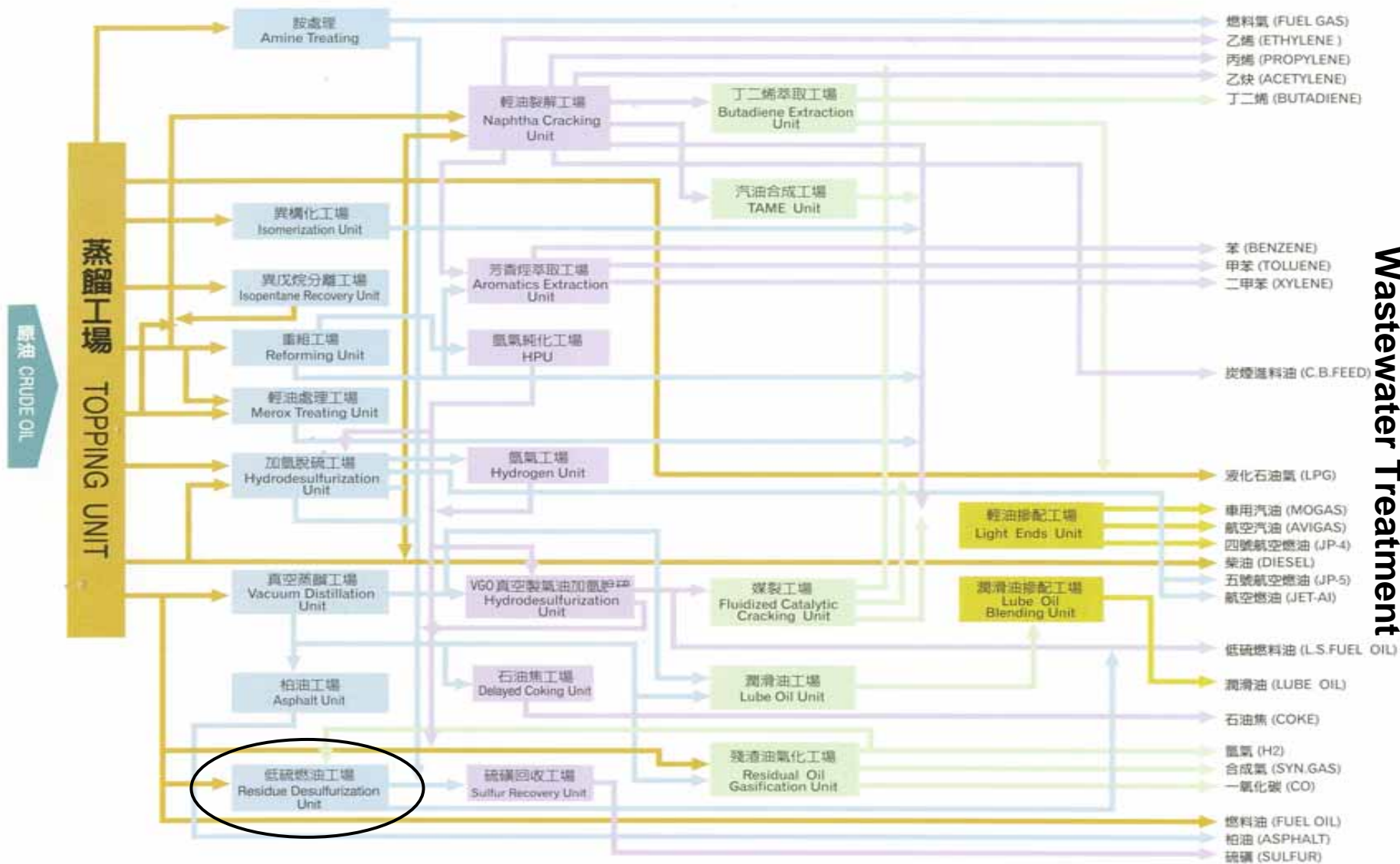
- Residue Desulfurization Unit (RDS)
- Wastewater Treatment Facility
- Maintenance/Contract Workers
- Health Screening
- Recommendations



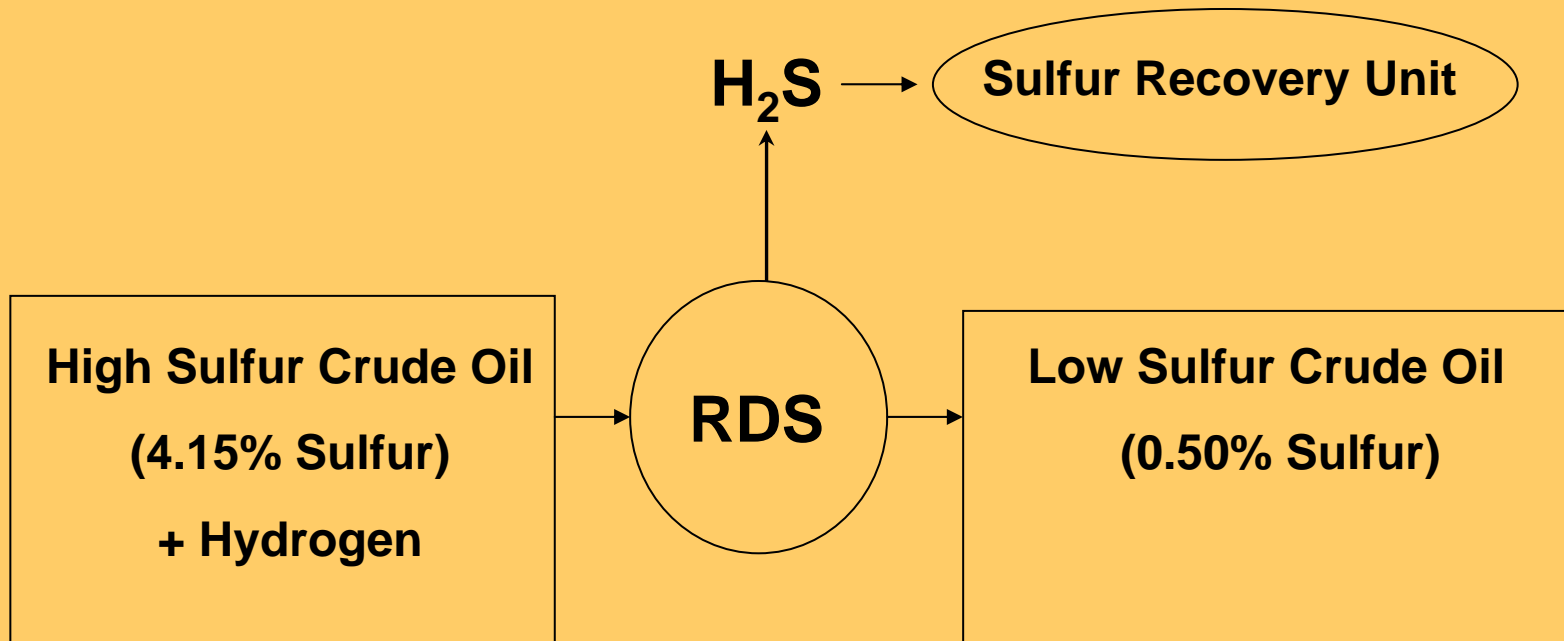
Company Overview

- 2,000 Employees
 - Average age: 45 yrs
 - 35 units
 - 4 shifts
- 200-300 Contract Workers





Residue Desulfurization Unit (RDS)



RDS Operation Tasks

- 6 Workers per shift (4 shifts total)
 - 1 Foreman
 - 1 Panelman
 - 4 Operators
- Most processes automated
- Majority of time inside positive control room
- Operators monitor outside of plant twice per hour
- Sampling occurs once per shift
- Contract workers for yearly maintenance & repair



Occupational Hazards - RDS Unit

- Explosion and Fires
- Chemical Exposures
 - Respiratory
 - Dermal
- Maintenance-Related Activities



Explosion and Fire (1)

- Prevention
 - Open flames & cell phone use prohibited
 - Smoking in designated areas
 - Safety release valves and 2^o emergency release valves
 - Pressure monitoring systems
 - Wireless mobile phone system



Explosion and Fire (2)

- Control
 - Positive pressure control room
 - Halogen fire extinguishing system
 - Fire detection and sprinkler system
 - On-site fire response
 - Emergency power system
 - Explosion proof design
 - Safety drills



Chemical Exposures (1)

- Chemicals include hydrogen sulfide, VOCs, amines, sulfuric acid products and steam
- Exposures
 - Sampling (open and closed system)
 - Leaks from joints (fugitive emissions)
 - Valve opening and closing
 - Accidents
 - Maintenance activities



Chemical Exposures (2)

- Prevention
 - Closed sampling system implemented
 - Monthly monitoring of emissions from joints
 - Use of respirators during sampling
 - Gloves



Wastewater Treatment Plant No.2

- Removal of oil
- Concentration and filtration
- Treatment via closed sequencing batch reactor
- Effluent released to sea



Wastewater Treatment Plant No.2

Operation Tasks

- 28 employees
- 4 shifts
- Outside monitoring by operators
- Periodic sampling



Occupational Hazards

- Chemical Exposures
 - Biological and water treatment reagents
- Hearing Loss
 - Areas over 85 dBA
 - Hearing protection provided



Maintenance

- Confined space entry
 - Formal procedures
- Contractual workers
 - Usually less training and experience
 - Hit by and fall injuries most common



Health and Safety Training

- Taiwan OSHA based training specific to area hazards
- 5 day pre-employment training
- 6 month internship
- Yearly updates



Health and Safety Programs

- Respirator Protection
 - Fit-testing and training
- Hearing Protection
 - Noise monitoring
 - Training and protective equipment
- Confined Space Entry
 - Permit requirements
 - Safety procedures
 - Training



Health Screening

- Dedicated clinic for employee and their families
- Annual health exam
- Routine monitoring
 - Pulmonary function testing
 - Audiometry testing
 - CBC, liver function and cholesterol
- Referrals to KMU Occupational Clinic



CPC Occupational Incidents over the Past Five Years

Year\ Item	Disabling Frequency	Disabling Severity	Overall Casualty Index
1999	0.63	23	3.79
2000	0.57	18	3.16
2001	0.55	26	3.78
2002	0.43	371	12.68
2003	0.27	7.86	1.46



Recommendations (1)

- Explosion/Fire Safety
 - Shoes should be worn in control room at all times incase of emergency egress
- Chemical Exposures
 - Continued implementation of closed sampling devices
 - Safety showers if not already incorporated
 - Automated monitoring of fugitive gas
 - Enforcement of respirator & protective equipment usage
 - Continued personal exposure monitoring
 - Re-evaluation of exposure standards (ACGIH Guidelines)



Recommendations (2)

- Health Screening
 - Continued longitudinal follow-up of workers including psychological & neurological screening
 - Periodic disease surveillance & analysis for industry related disorders
 - Promote collaboration with universities & governmental agencies
- Contract Workers
 - Evaluation and enhancement of contractor safety program



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