OLEUM AND SULFURIC ACID
PIPELINE SAFETY
MAINTENANCE

PRESENTED BY:

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The Caraiba Metais’ sulfuric acid facility was designed by Natron Engenharia with an initial capacity of 1.870 t/day.

The main purpose of the facility is to treat the gases from the copper fundition.

1982: H2SO4 facility start-up.

Actual production capacity: 2.475 t/day after debottlenecking.
Background

1. The pipeline is in operation since 1993 and occurred one oleum spillage happened in 1998, one chemical burn accident and one acid spillage to the ground in 2003, during preventive maintenance.

2. After 2003, more than 30 preventive interventions inside and outside Caraiba without accidents.
   - Two general painting and 15 pipeline sections paintings;
   - Five pipeline sections replacements / external area valve relocation;
   - Eight pipeline sections inside Caraiba;
   - Thickness measurement on semester basis and quarterly vegetation cleanness.
System characteristics: 1- 12,000 meter long pipelines
System characteristics: 2- Height differences up to 30 m

1. PROQUIGEL
2. BRASKEM CPL
3. PUMPING STATION CIBRAFERTIL
4. CETREL ACCESS
5. COPPER PUMPING STATION
6. CARAIBA METAIS
7. PUMPING STATION CARAIBA
System characteristics: 3- places with difficult access (height and vegetation)
System characteristics: 4- places with difficult access (Pipe way inside complex)
MAIN OBJECTIVE: Pipeline maintenance jobs without accidents and environmental events.

MAIN STAGES:

• Job planning:
  • Caraiba operation, Braskem and clients selling, maintenance, safety and environmental areas has to work together;
  • Client autonomy less than 03 days;
  • Police and environmental agency official notice.

• Operational procedure:
  • Pipeline drainage and start-up procedures;
  • Task risk analysis.
Operational procedure (resumed):

1. Acid transfer interruption;
2. Pipeline gravity drain to storage tanks and nitrogen purge;
3. Depressurize and isolate the pipeline section;
4. Open drains and collect the residual product with vacuum truck;
5. Maintenance job execution and shut down the pipeline section;
6. Pipeline start-up and confirm that there are no leaks;
7. The pipeline is ready again for acid transfer.
Labels

isolating Caraíba side

Labels and locks

isolating the client side
Non destructive testing

New screws and gasket
Task Risk Analysis:

Dangers:
1. Sulfuric acid 98% and oleum 28%;

Risks:
1. Skin and/or eyes chemical burns;
2. Product spillage;
3. \( \text{SO}_3 \) inhalation;

Risks Mitigation (next slide):
Skin, eyes and respiratory protection
Skin, eyes and respiratory protection
Emergency drills: foam over oleum
Collecting tray

Sodium carbonate

Vacuum truck

Suction in progress
DIPHOTERINE

PORTABLE DIPHOTERINE
5,000 mL

BOARD EYE WASH
500 mL

PLASTIC BAG
500 mL

EYE WASH
100 mL

MINI PD
200 mL

MICRO PD
100 mL
30 min after the accident

After diphoterine use

After 6 hours

Next morning
Task Risk Analysis:

Dangers:
2. Flammable products and/or heated products in nearby pipelines;

Risks:
1. Explosion;
2. Heat burns;

Risks Mitigation (next slide):
Flammable atmosphere testing

Huts

anti-heating hut

anti-heating cloth
Task Risk Analysis:

Dangers:
3. Confined area and poisonous animals;

Risks:
• Asphyxia and/or poisoning;
• Poisonous animals stings;

Risks Mitigation (next slide):
Eg: confined area and/or animals habitats

Mitigation: cleaning, leg protection and boots

Mitigation: oxygen measurements; air; exhaust, ladders
Task Risk Analysis:

Dangers:
4. Weather;

Risks:
- Drown e sudden illness;

Risk Mitigation (next slide):
Normal condition – ducts in both sides

Flooded location – vapor formation

Normal condition – duct depth

Flooded location – vapor formation
Task Risk Analysis:

Dangers:
5. Road proximity, weight lifting machinery;

Risks:
- Vehicle crashes, running overs;
- Equipment fall;

Risk Mitigation (next slide):
Automobile crashes

Pipe section lifting

Traffic signs; blockage road and police help

Traffic signs; Industrial complex vigilance
Pipe ends are isolated to avoid acid droplets

Droplets events
Cramps to avoid leakages or pipeline drainage

- Cold connection cramp
- Pipeline leaks cramps
- Hot pipeline drain
- Stanch leakages near the drain
- Drain containment
Example: Job inside Caraiba area
Resources are always available

- Lifting truck
- Emergency truck
- Vacuum truck
- Emergency KIT
Fire response team and operators are trained in several emergency situations.
THE END