1996 CONSOLIDATED AUDIT

REACTIVE CHEMICAL REVIEWS

TEAM LEADER -

FUNCTIONAL LEADERS -

Louisiana Division
Consolidated Audit Process
Guidelines

Audit Process		Before/After Audit
1.	Deliver questionnaires on computer disk to plant superintendent for distribution to plant team.	4 months before
2.	Plant coordinator submit plant contact names and completed critical path check-list to the Consolidated Audit department office professional.	3 1/2 months before
3.	Plant team member contact Functional Team Leader to help update questionnaires and identify needs.	" " " "
4.	Plant team member submit completed questionnaire to Functional Team Leader	6-8 weeks before
5.	LAD Auditors complete pre-audit inspections and interviews.	4 weeks before
6.	All audits/inspections completed.	4 weeks before
7.	Functional Team Leaders review recommendations (draft) with plant contact or superintendent.	3 weeks before
8.	LAD Audit Administrator conduct pre-audit conference with Plant Superintendent to answer questions and review agenda format for wrap-up session.	3 weeks before
9.	Plant Superintendent submit a copy of all completed questionnaires to the Consolidated Audit Department Office Professional, Safety Superintendent and Technology Center Representative.	2 weeks before

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10.	One day audit wrap-up	
11.	Functional Audit Team Leaders submit recommendations to Audit Administrator.	7 calendar days after
12.	LAD Audit Administrator consolidates separate reports into one report (draft) for the plant. (computer disk)	10 calendar days after
13.	Plant superintendent/staff review draft report and comment to LAD Administrator.	14 calendar days after
14.	Audit Administrator submit final report to plant superintendent.	15 calendar days after
15.	Plant review report/actions plans with Major Manager and replies to Core Audit Team with implementation plans.	60 calendar days after
16.	Audit Administrator issue one year status report reminder letter to the plant.	11 months after
17.	Plant issues follow-up status report and each one year following.	1 year after
18.	Technology Center review results of implementation plans at the next Technology Review.	1 year after
19.	Close-out action plans of previous audit.	6 months before next audit

Consolidated Audit Guidelines
Auditing Process

1. The Consolidated Audit Group will keep the overall Louisiana Division audit schedule. (plant/department is responsible for working out a swap if there is an unavoidable conflict and inform the Louisiana Division Audit Group, phone 8338 or 1883).

2. The Louisiana Division Audit Group will send to the plant/department the audit package questionnaires (computer disk) for the audit sections approximately 3-4 months in advance. (plant/department may request the package earlier.)

3. Questionnaires are to be completed by the plant/department being audited and returned to the Louisiana Division Audit Administrator and copied to the Safety Superintendent and Technology Center Representative at least 2 weeks in advance of audit "wrap-up". The plant contact will get the appropriate questionnaire to the leader of the Functional Audit Groups prior to pre-audit inspections.

4. For purposes of the consolidated audit process, the permanently assigned block maintenance personnel and the in-block maintenance shop facilities will be included in the scope of the audit.

5. The consolidated audit for each plant will be led by a team consisting of the Plant Superintendent/Department Head, the Safety Superintendent, a Technology Center Representative, and the Audit Administrator from the Louisiana Division Audit Group. This will be referred to as the Core Audit Team. The role of each Core Audit Team member is explained in detail by attachments.

6. All "OTHER" applicable audits and inspections that are to be included in the consolidated audit should be scheduled and completed 4 weeks in advance. A list of "OTHER" applicable audits should be made well in advance to allow time for completion.

7. All audit participants are required to follow the established schedule (arrange backups for vacation, conflicts, etc.).

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8. A short wrap-up session will replace the three day sessions that were held in the first round of consolidated audits. No plant overview or self evaluation questionnaire presentation will be required.

   The wrap-up sessions will focus on dialog and auditor's explanations. Timing will be set by the Plant Superintendent, Audit Administrator and each Functional Team Leader.

9. Each Functional Audit Team will be responsible to furnish the Consolidated Audit Department Office Professional a written (VAX) audit report of their recommendations seven days after the audit wrap-up date. If no wrap-up is necessary recommendations are due by the deadline date. Each recommendation must be identified as M = MUST DO, (based on compliance issues - government regulation, Dow policy or S&LP) and HR = Highly Recommended, (necessary to mitigate an anticipated or potential hazard).

10. The Audit Administrator will review the recommendations and submits a draft to the Plant Superintendent within fifteen days after the audit.

11. The Plant develops an implementation plan as a response to the recommendations. The plan should include the name(s) of the employee(s) assigned to each action item along with an estimate of the time required to complete. This plan is reviewed and approved by the Major Manager (or Section Manager) within 45 days of the audit. The approved implementation plans are sent to the Audit Administrator and then copied to each member of the Core Audit Team and the appropriate section to the Functional Audit Team Leader 60 days after the audit.

12. A follow-up status report will be issued by the plant 12 months after the audit to the Major Manager, Section Manager, and to the Consolidated Audit Department Office Professional for distribution to the other Core Audit Team Members and the appropriate section to the Functional Audit Team Leader.

13. In keeping with the OSHA STAR Program and OSHA's PSM standard 1910.119 a close-out status report will be due 6 months prior to the next audit. The Plant/Department will be required to send the close out status report to the Major Manager and the Consolidated Audit Department Office Professional for distribution to the other Core Audit Team members and the appropriate section to the Functional Audit Team Leaders.

    (To effectively close-out the prior audit action plans the Audit Administrator and Functional Team Leaders will work with the plant/departments to complete this task).

14. The Technology Center will also review the status of approved implementation plan responses to the consolidated audit during its next plant technology review.

DOW USA

LOUISIANA DIVISION
CONSOLIDATED AUDIT PROGRAM GUIDELINES

LAD ORGANIZATION

1) LOUISIANA DIVISION AUDIT GROUP

- Louisiana Division Office Professional

  Connie Kalencki 504-353-8338
- Louisiana Division Audit Administrator

  Howard Wilkinson 504-353-8338

2) CORE AUDIT TEAM

- Plant Superintendent
- Safety Superintendent
- Technology Center Representative
- Louisiana Division Audit Administrator

3) FUNCTIONAL AUDIT TEAM LEADERS

• Safety	Don Jones
• Chemical Exposure Index	Buck Bailey
• Hazardous Materials Transportation Review	Dean Smith
• Occupational Health	Ralph McLaurey
• Reactive Chemicals	Gerald Wagener
• Loss Prevention/Fire/ Burner Management	Buck Bailey
• Security	Charles Almond
• Laboratory	Al Ribes
• Process Control Network	Steve Villarrubia
• Electrical 5-Point Audit	Mike Gee

From: LACSDC::MILES 8-JUL-1996 17:04:45.37
To: @CONSAUD.DIS
CC: MILES
Subj: Please review

dy
Howard
Troy

Please review the minutes. Let me know if you want to make any changes before I send out the notes.

cc: J.J. Hiemenz
Brian Harris
Scott Daigle
John Williams
Charles Douglas
Hellen Causey
Greg Schultz
Steve Caldwell

re: CONSOLIDATED AUDIT PLANS FOR OCT. 15, 1996 AUDIT

Roddy, Howard, Troy,

The following are the timing and issues that we agreed upon for the October 15, 1996 Consolidated Audit for Chlorine and Cell Service:

Timing

September 16	Questionaires completed with input from Functional Leaders
September 16 - Oct.1	Auditors complete inspections Troy to facilitate audits
October 15	Consolidated Audit Wrap-up mtg.

2. The reactive chemical section of the Consolidated Audit will be eliminated. (The New Superintendent RC review will suffice)

3. The VPP inspection will replace the Consolidated Audit walk through inspection.

4. The VPP documentation inspection will replace the Consolidated Audit documentation review.

5. Howard will provide a list of the team leaders for the Consolidated Audit.

6. Questionaire assignments:

HMTR	Hellen Causey
Lab	Steve Caldwell
NA Safety	Roddey - Troy
Occ Health	Greg Schultz - Charles Douglas
Security	Bruce Miles
Loss Prev	Scott Daigle, Brian Harris, Bruce Miles
Process Control	John Williams

Please let me know if I have misinterpreted any of the agreements that were made for the audit or if we need to change any of the assignments.

.nks,

Bruce Miles

March 1991

Louisiana Division

LOUISIANA DIVISION GUIDELINES FOR REACTIVE CHEMICALS REVIEW

The enclosed package contains guidelines to assist you in preparing for a productive and comprehensive Reactive Chemicals Review. It is important to realize that Reactive Chemicals considerations are YOUR responsibility. The Reactive Chemicals Committee is made up of people experienced in this area and helping you fulfill your reactive chemicals responsibility is our primary goal.

Evaluation of past incidents shows that inadequate operating procedures, lack of positive raw material identification, critical instrument problems, and material of construction incompatibility cause serious concerns. Consider these items carefully.

Attached is a Reactive Chemicals Review checklist which will guide you in preparing for your review. Please complete this checklist and include as the cover sheet for your review package. Attachments are also provided for updating Reactive Chemicals data and to assist you in developing "Worst Case" scenarios. A list of resources to help you prepare is included.

The final attachment is a self evaluation questionnaire which we encourage you to fill out to help you recognize strengths and weaknesses of your program. We think this questionnaire will be an asset to you in further development of your Reactive Chemicals Program. The results of the self evaluation should be a topic of discussion at your review.

Make every attempt to limit your review presentation to chemical reactivity. The Reactive Chemicals Committee does not deal with other problems unless they bear on chemical hazards. Do not review markets, costs, strategy, etc.

The Plant should send one copy of the completed Questionnaire to the LAD Audit Facilitator 10 calendar days before the audit. Send 10 copies of the presentation packet to Cindy Gum (Reactive Chemicals Office Professional, Building 2510, Ext. 1601) at least 1 week prior to the review.

Gerald Wagener, Chairman
Reactive Chemicals Committee
Building 2511, Ext. 1828

CHLORINE / CELL SERVICE

REACTIVE CHEMICALS REVIEW

New Superintendent

11-19-96

Reactive Chemicals review conducted on 11-13-96

Chlorine\Cell Service - New Superintendent\Consolidated Audit Review

Attendees: Joe Schell, Don Jones, John Young, John Monroe, Buck Bailey, Dean LeBlanc, Bruce Miles, John Gross, Brian Harris, Scott Daigle, Dhaval Buch, Gerald Wagener, J.J. Hiemenz

Review results\recommendations

Chlorine\Cell Service new superintendent has successfully demonstrated a high level of knowledge and sensitivity to reactive chemical hazards and controls in his new area of responsibility. The following recommendations resulted from this review:

1. Heavies Removals Scenario: Trays in ST-55 become dry and concentrate nitrogen trichloride to critical (explosive) concentrations.

   Calculate the maximum amount of NCl3 that can form on the trays under current conditions and determine if this is a credible scenario.

   Review the safeguards in place for keeping the trays wet to avoid this scenario. Review the Tech Center initiative in this area and ask them to review the Oxy Chem incident and make recommendations.

2. Taffy Pots: One of the lines of defense for safe operation of the taffy pots is to avoid "blocking in" the taffy pots. Review the taffy pot operating discipline and make sure it prevents "blocking in" scenarios. Add this safeguard to the list of preventive measures for avoiding an explosion the taffy pots.

3. Liquefaction Scenario: Hydrogen-chlorine explosion in tail gas.

   The preventive measures for avoiding a hydrogen explosion in the tail gas need to be modified to include the specific action to be taken if the hydrogen in the tail gas gets to 5%. Several safeguards were mentioned during the review such as keeping the concentration below 1% and injecting nitrogen into the chlorine to control hydrogen at or below 3.5% (CO_2 free basis), but there is no consensus on action to be taken if the hydrogen ever gets to 5%.

4. Plant Safety Requirement #11 (Sulfuric acid corrosive to carbon steel):

   Add concentration and velocity limits ie. "below 90% and above 3 ft/sec sulfuric acid is highly corrosive". Check with Tech Center and make sure these are the correct numbers.

5. MDEA in mining water at Promix:

As a result of Promix changing ownership, a review of their safeguards for avoiding MDEA in mining water should be conducted. A comment was made that Promix is considering installing an analyzer to detect this problem. Operating discipline needs tc be developed at the Chlorine Plant to insure that the Chlorine Plant is quickly notified whenever MDEA enters the mining water.

Please respond within one month as to action taken or planned in regards to these concerns.

Gerald Wagener, Chairman
Reactive Chemicals Committee

CHLORINE/CELL SERVICE
CONSOLIDATED AUDIT
REACTIVE CHEMICALS

SPOT CHECK OF PLANT PROCEDURES & IPT MODULES

CRITICAL & EMERGENCY PROCEDURES

(CONDITION, LIMIT, CONSEQUENCES OF DEVIAT ION, ACTION TO BE TAKEN)

Chlorine /iron fire at 155 deg C, chlorine-organic reactivity, Chlorine-titanium reactivity in environmental scrubber, NCl3 reactivity in evaporators, High hydrogen in chlorine, deadheaded pumps resulting in Cl2/iron fires.

REACTIVE CHEMICAL MODULES FOR EACH SECTION OF PLANT

(POTENTIAL PROBLEMS & PREVENTIVE MEASURES)

Nitrogen Trichloride explosion in Taffy Pot, Nitrogen Trichloride explosion in reboiler, Chlorine/organic reaction from lubricants, Hydrogen/chlorine explosion in tail gas, Dry chlorine/titanium reaction in brine scrubbers.

IPT MODULES

MATERIAL OF CONSTRUCTION

C-100 A/B , C-100 A/B suction and discharge piping

The different parts of a cell –Cell body, Cell backboard, Anode, Cathode, Cell cover

Identify What is considered dry chlorine and what metals will dry chlorine react with.

What metal is good to use in wet chlorine.

What effect does chlorine have on hydrocarbon based oils and grease?

List the metals that are rapidly attacked by caustic.

List what solvents are acceptable to clean chlorine equipment.

Explain the reaction of dry chlorine and hot steel.

COMPREHENSIVE REACTIVE CHEMICALS TEST MODULE -draft

Chlorine Plant Personnel Reactive Chemical Interview Questions

1. HOW DOES THE CHLORINE PLANT PREVENT HYDROGEN AND CHLORI MIXTURES IN THE CELL COVERS (ANOLYTE)?

	Correct OS	Correct SOS
1. Chlorine compressor low suction pressure trip at 10" of water vacuum.	1/1	2/2
2. Vacuum relief seal pots in cell area. Seal pots are designed to relieve at 6" of water vacuum.		Y
3. Monitor hydrogen in chlorine concentration continuously on each series with on-line GC's.	Y	YY
4. One head level transmitter with three bubblers. One high and one low level probe. (Note: As circuits are converted to Mod5 controls, level of redundancy is increased.) Three level extremes with deviation alarms.		Y
5. Minimum operating head level is 6" of water. Trip at 4" of water.	Y	YY

2. HOW DOES THE CHLORINE PLANT PREVENT A LARGE HEAT OF REACT BETWEEN STRONG ACID AND MOISTURE IN THE T-103 STRONG H2SO4 TOWER?

	Correct OS	Correct SOS
	1/1	2/2
1. Use Carbon Steel vessel and piping.		
2. Monitor tower, gas, and acid temperatures. (<=25 Degrees C. >=5 Degrees C.).	Y	YY
3. Monitor acid concentration.	Y	YY
4. Use Stainless Steel tray materials.		
5. Monitor moisture out of D-103.		

3. HOW DOES THE CHLORINE PLANT HANDLE AMMONIA CONTAMINATION MT-1 (INCOMING BRINE)? (AMMONIA FORMS NCl3 IN CELLS WHICH CONCENTRATES IN LIQUEFACTION.)

	Correct OS	Correct SOS
1. Sodium Hypochlorite added to achieve 170 ppm excess. Hypos react with NH3.	1/1 Y	2/2 YY
2. Samples analyzed bi-weekly by R&D for Ammonia and Amines. Sodium Hypochlorite added to chlorinate amines.		YY

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4. HOW DOES THE CHLORINE PLANT PREVENT A CHLORINE-IRON REAC INSIDE THE HIGH STAGE COMPRESSOR?

	Correct OS	SOS
1. Monitor and alarm compressor discharge temperature.	0/1	2/2 YY
2. Trip compressor on high discharge temperature at 140 Degrees C.		YY

5. HOW DOES THE CHLORINE PLANT PREVENT A H2-O2 EXPLOSION/FIRE THE HYDROGEN AREA?

	Correct OS	SOS
1. Trip system at 1/8" water at compressor suction (2 seconds delay).	1/1 Y	2/2
2. Redundant O2 analyzers, trip at 0.70% O2, (T-702-A).	Y	YY
3. Strict inert gas purging procedures with explosimeter checks at various points.		
4. Automatic N2 purge on system trip to maintain a slight positive pressure.	Y	YY
5. H2 header pressure is controlled by recycle from discharge.		
6. Explosimeter check to work/vehicle entry. No smoking, N2 purge analyzers.		
7. Detailed procedures for H2 stack fires. Steam purge to maintain backpressure on stacks.		

6. HOW DOES THE CHLORINE PLANT PREVENT A DRY CHLORINE-TITANIUM REACTION IN THE BRINE SCRUBBERS?

	Correct OS	SOS
1. Alarm low brine flow to scrubber.	1/1	2/2
2. Alarm low level in brine scrubber.		
3. Inject water purge on brine scrubber inlet gas flow to protect Titanium.	Y	YY

7. IF A TITANIUM/CHLORINE REACTION DOES INITIATE, WHAT IS THE ONLY EFFECTIVE WAY TO STOP THE REACTION FROM CONTINUING?

	Correct OS	SOS
	1/1	2/2
1. Remove the source of chlorine.	Y	YY

8. HOW DOES THE CHLORINE PLANT PREVENT A NITROGEN TRICHLORI EXPLOSION IN THE TAFFY POT?

	Correct OS	SOS
	1/1	2/2
1. Operate taffy pots at low temperatures.	Y	YY
2. Monitor and alarm temperature in each pot (redundant).	Y	YY
3. Alarm rate of temperature rise in pots.		Y
4. Analyze brine for NH3 content bi-monthly (R&D).		
5. Analyze taffy weekly for NCl3.		
6. Monitor and alarm pressure on each taffy pot.		
7. Lowered psv setting to 150# to catch overpressure.		
8. Maintain 100 PPM Hypochlorite in the brine.		
9. Maintain level below 66% to allow room for dilution should a reaction take place.		
10. Maintain automatic dump valve from the control room to provide liquid Chlorine for the taffy pot in the event of a trip or pressure rise.	Y	YY
11. Register taffy pots with the Pressure Vessel Committee for yearly inspection and cleaning.		
12. Carbon-tet injection system to dilute taffy from reboiler.	Y	YY

9. HOW DOES THE CHLORINE PLANT PREVENT A NITROGEN TRICHLORIDE EXPLOSION IN THE REBOILER?

	Correct OS	SOS
	1/1	2/2
1. Maintain a minimum 35% level.		YY
2. Dump E-55/65 when temperature rises to 0 Deg C.	Y	YY
3. Alarm high tube side chlorine flow to reboiler.		

10. HOW DOES THE CHLORINE PLANT CLEAN THEIR CHLORINE VESSELS T PREVENT A CHLORINE/ORGANIC CHEMICAL REACTION AFTER THEY ARE P BACK IN SERVICE?

	Correct OS	SOS
	0/1	2/2
1. Prohibit use of hydrocarbon based compounds inside Chlorine vessels.	?	YY
2. Use only hot water for cleaning.	Y	Y

The OS scored 80%.
The SOS's averaged 100%.

CHLORINE/CELL SERVICE REACTIVE CHEMICALS REVIEW

NEW SUPERINTENDENT

REACTIVE CHEMICAL REVIEW AGENDA

IMPROVEMENTS SINCE THE LAST REVIEW

PROCESS SAFETY REQUIREMENTS

RECOMMENDATIONS FROM PREVIOUS REVIEWS (1993 AUDIT)

REVIEW QUESTIONNAIRE BY EXCEPTION

REACTIVE CHEMICAL INCIDENTS SINCE LAST REVIEW

REVIEW PLANT SYSTEMS (SIMPLIFIED FLOWSHEETS, SCENARIOS & DEFENSE)

REACTIVE CHEMICAL IMPROVEMENTS
SINCE THE 93 REVIEW

CELL AREA INSTRUMENT/MOD V UPGRADE

DEDICATED N2 TO LIQUEFACTION

LEAK REPAIR SEALANT DATABASE

CRITICAL PROCEDURES

REACTIVE CHEMICALS IPT

C-550/650 & CHLORINE PUMP HAZOP

WET & DRY COMPRESSOR COVERSION TO MOD V

COMPATABILITY CHARTS

10 PROCESS SAFETY REQUIREMENTS

1. CHLORINE REACTS WITH OIL, LUBRICANTS AND SEALANTS
2. DRY CHLORINE AND TITANIUM BURN
3. CHLORINE AND HYDROGEN CAN BE EXPLOSIVE AT > 3% HYDROGEN IN CHLORINE
4. CHLORINE AND WATER ARE CORROSIVE AT > 10 PPM WATER IN CHLORINE
5. CHLORINE AND CARBON STEEL BURN AT > 140 C
6. HYDROGEN AND AIR CAN BE EXPLOSIVE BETWEEN 5 AND 95 %
7. NITROGEN TRICHLORIDE (NCL3) CAN BE EXPLOSIVE AT > 30,000 PPM
8. CELL SALT CONCENTRATION AT > 300 GPL CAN CAUSE CELL ARCHING
9. CHLORINE CELLS OPERATE AT HIGH VOLTAGE POTENTIAL TO GROUND
10. BLOCKING IN LIQUID FULL CHLORINE LINES WILL CAUSE A LOSS OF CONTAINMENT.
11. SULFURIC ACID IS HIGHLY CORROSIVE TO CARBON STEEL.

1993 Reactive Chemical Followup

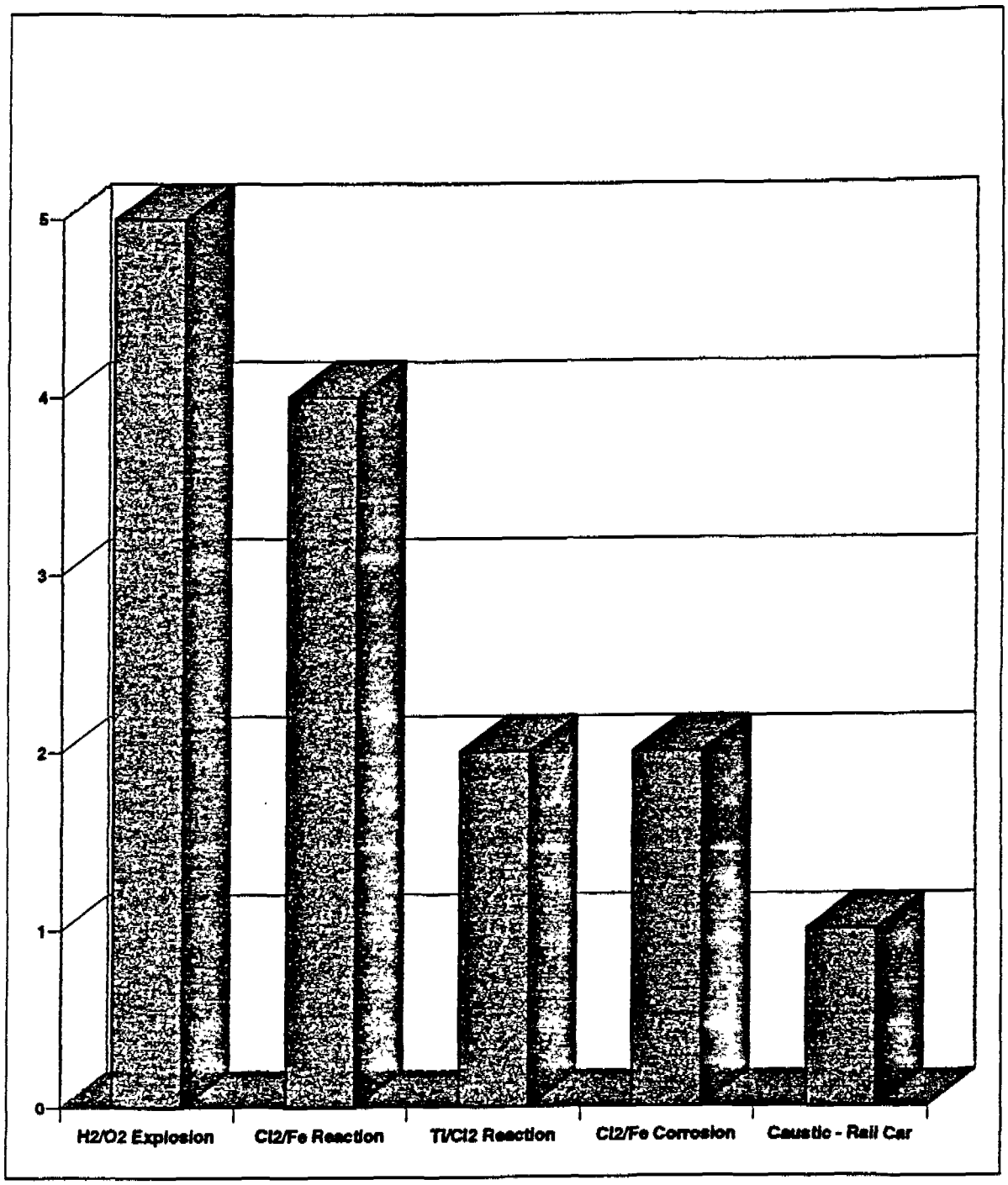
RxChem committee does not feel comfortable with controlling hydrogen in tailgas at 3.8 mole %. Review this issue with the CATC.

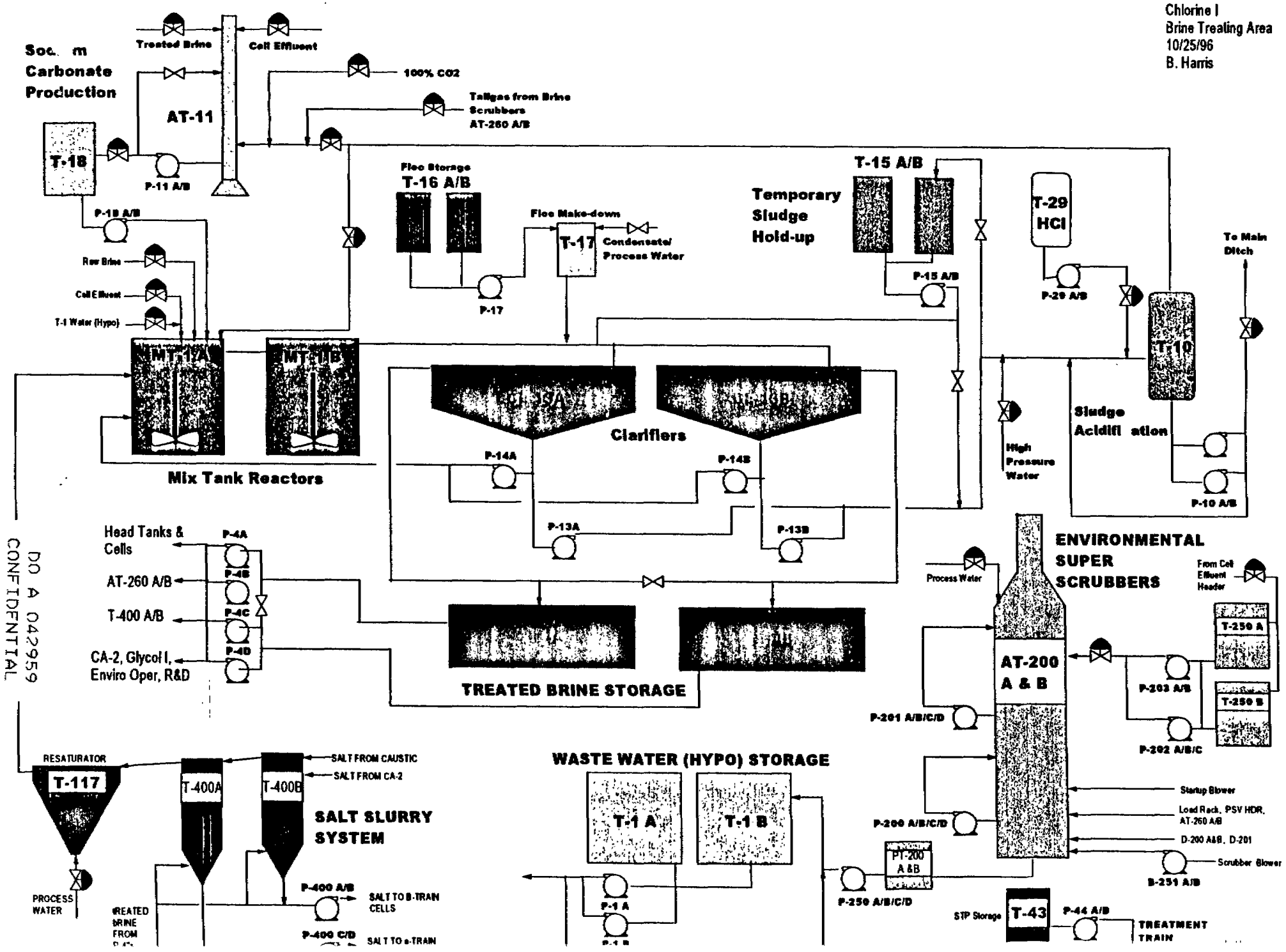
- Contacted CATC on 6/20/94
- Control is now at 3.5 mole%

During startup of a chlorine circuit more frequent GC analyses of hydrogen in chlorine is recommended.

- Issue is still be resolved by the CATC. When a final determination is made equipment will be installed as necessary to meet the requirements.

Chlor-Alkali Reactive Chemical Incidents
94 Thru 96




Chlorine I
Brine Treating Area
10/25/96
B. Harris
Soda Ash
Carbonate
Production
Treated Brine
Cell Effluent
100% CO2
Tailgas from Brine
Scrubbers
AT-260 A/B
AT-11
T-18
P-11 A/B
P-18 A/B
Floc Storage
T-16 A/B
Floc Make-down
T-17
Condensate/
Process Water
P-17
Temporary
Sludge
Hold-up
T-15 A/B
P-15 A/B
T-29
HCl
P-29 A/B
To Main
Ditch
Raw Brine
Cell Effluent
T-1 Water (Hypo)
MT-1A
MT-1B
Mix Tank Reactors
Clarifiers
P-14A
P-14B
P-13A
P-13B
T-10
P-10 A/B
Sludge
Acidifi ation
High
Pressure
Water
Head Tanks &
Cells
AT-260 A/B
T-400 A/B
CA-2, Glycol I,
Enviro Oper, R&D
P-4A
P-4B
P-4C
P-4D
TREATED BRINE STORAGE
ENVIRONMENTAL
SUPER
SCRUBBERS
Process Water
From Cell
Effluent
Header
AT-200
A & B
T-250 A
T-250 B
P-203 A/B
P-202 A/B/C
P-201 A/B/C/D
P-200 A/B/C/D
Startup Blower
Load Rack, PSV HDR,
AT-260 A/B
D-200 A&B, D-201
Scrubber Blower
B-251 A/B
PT-200
A &B
P-250 A/B/C/D
RESATURATOR
T-117
PROCESS
WATER
TREATED
BRINE
FROM
T-400A
T-400B
SALT FROM CAUSTIC
SALT FROM CA-2
SALT SLURRY
SYSTEM
P-400 A/B
SALT TO B-TRAIN
CELLS
P-400 C/D
SALT TO a-TRAIN
WASTE WATER (HYPO) STORAGE
T-1 A
T-1 B
P-1 A
P-1 B
STP Storage
T-43
P-44 A/B
TREATMENT
TRAIN
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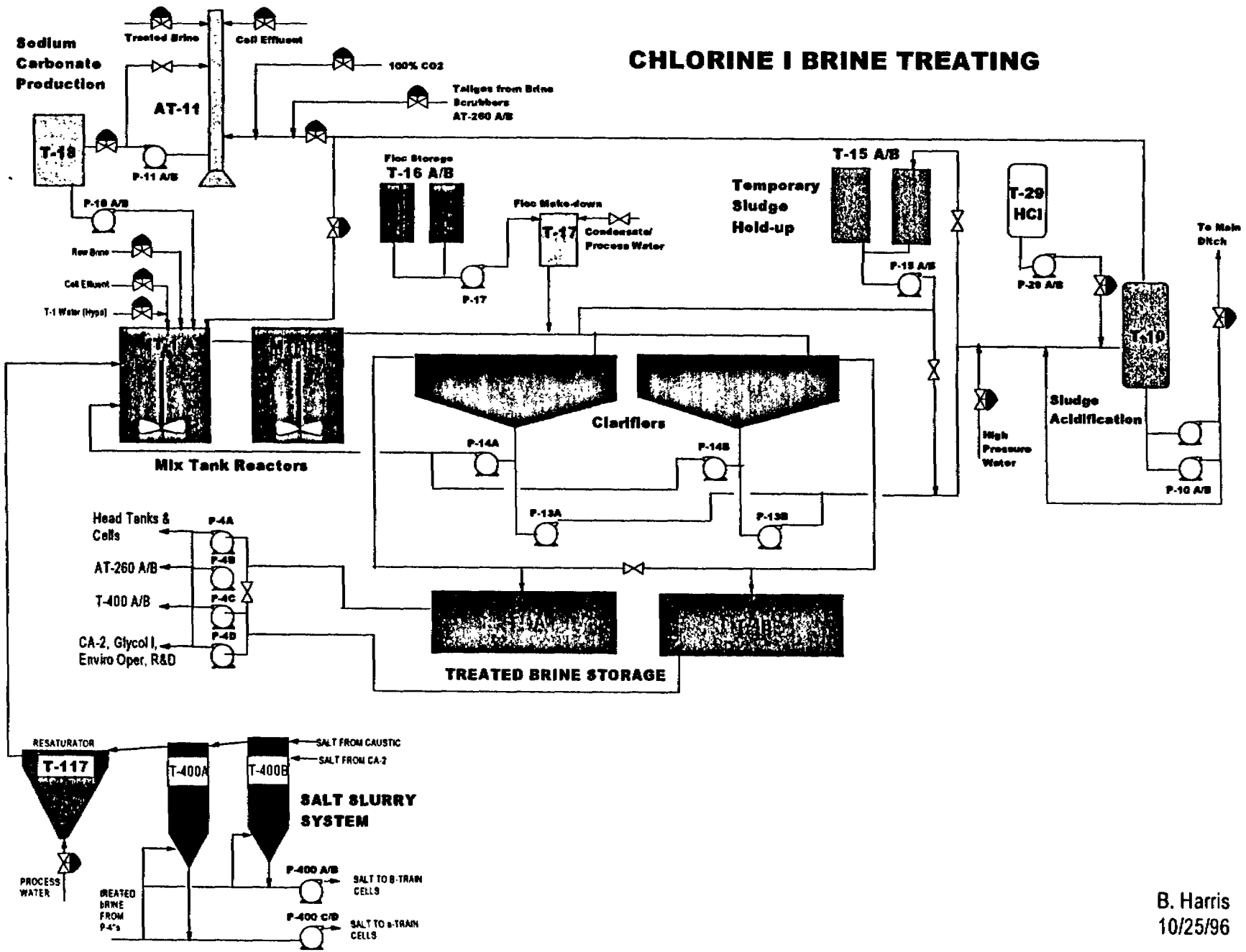

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B. Harris
10/25/96

CHLORINE I

IX. Procedure / Description

Steps List steps in procedure in order or the informatiom you want document to contain.

REACTION CHEMICAL:BRINE

EQUIPMENT	POTENTIAL PROBLEMS	PREVENTIVE MEASURES
MT-1 A&B RAW BRINE	Ammonia contamination as well as other naturally occurring Nitrogen based compounds can react and form Nitrogen Tri-chloride (NCl_3) in the chlorine cells and then be concentrated to explosive levels in the Purification and Liquefaction Processes.	Sodium Hypochlorite added to achieve a minimum of 100 ppm excess in Treated Brine. Hypochlorites react and destroy nitrogen based compounds. Samples analyzed weekly by the Chlor-Alkali Consolidated Lab for Ammonia and other Amines. Sodium Hypochlorite added to chlorinate amines. Brine Production in the process of adding an onstream ammonia analyzer.

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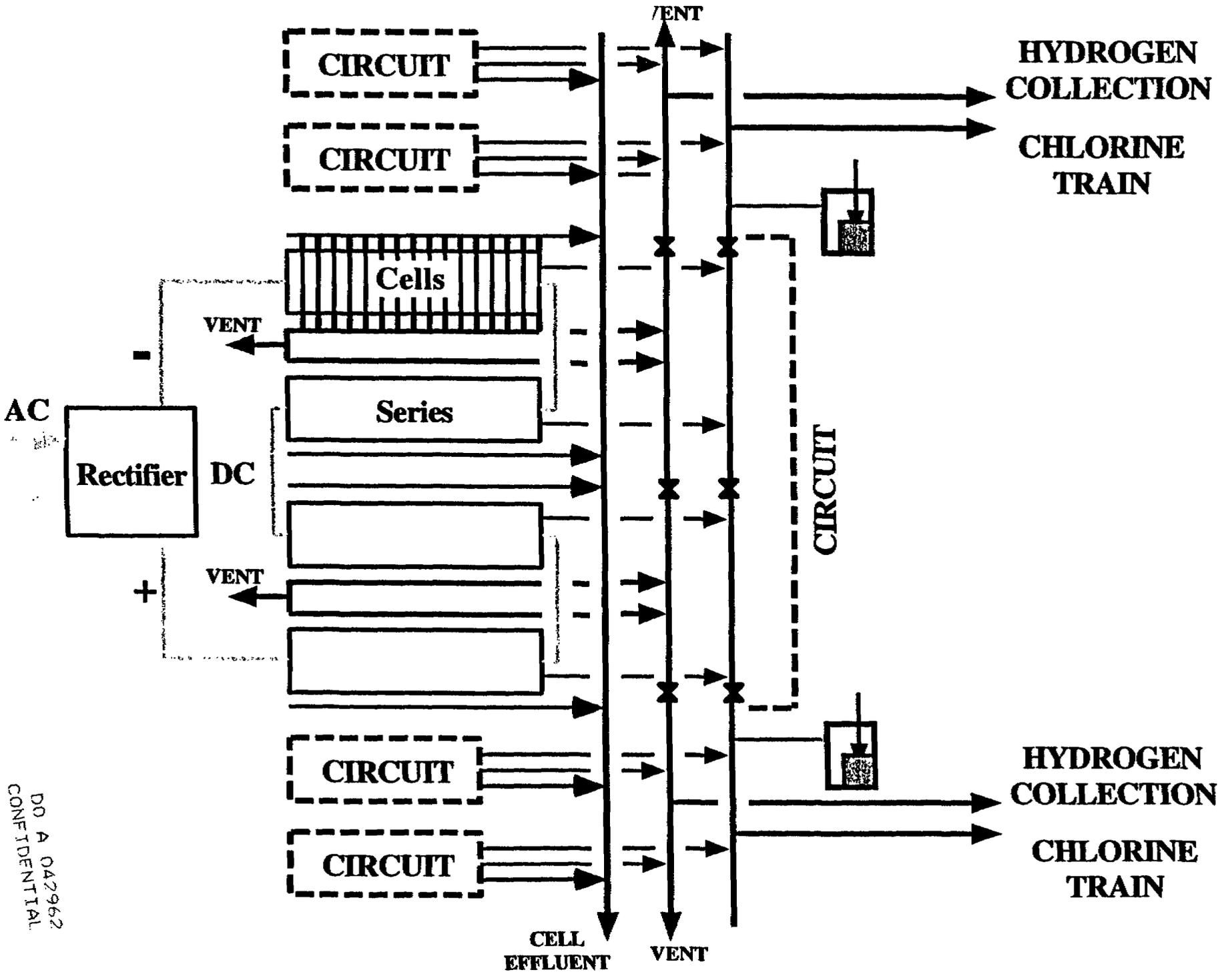
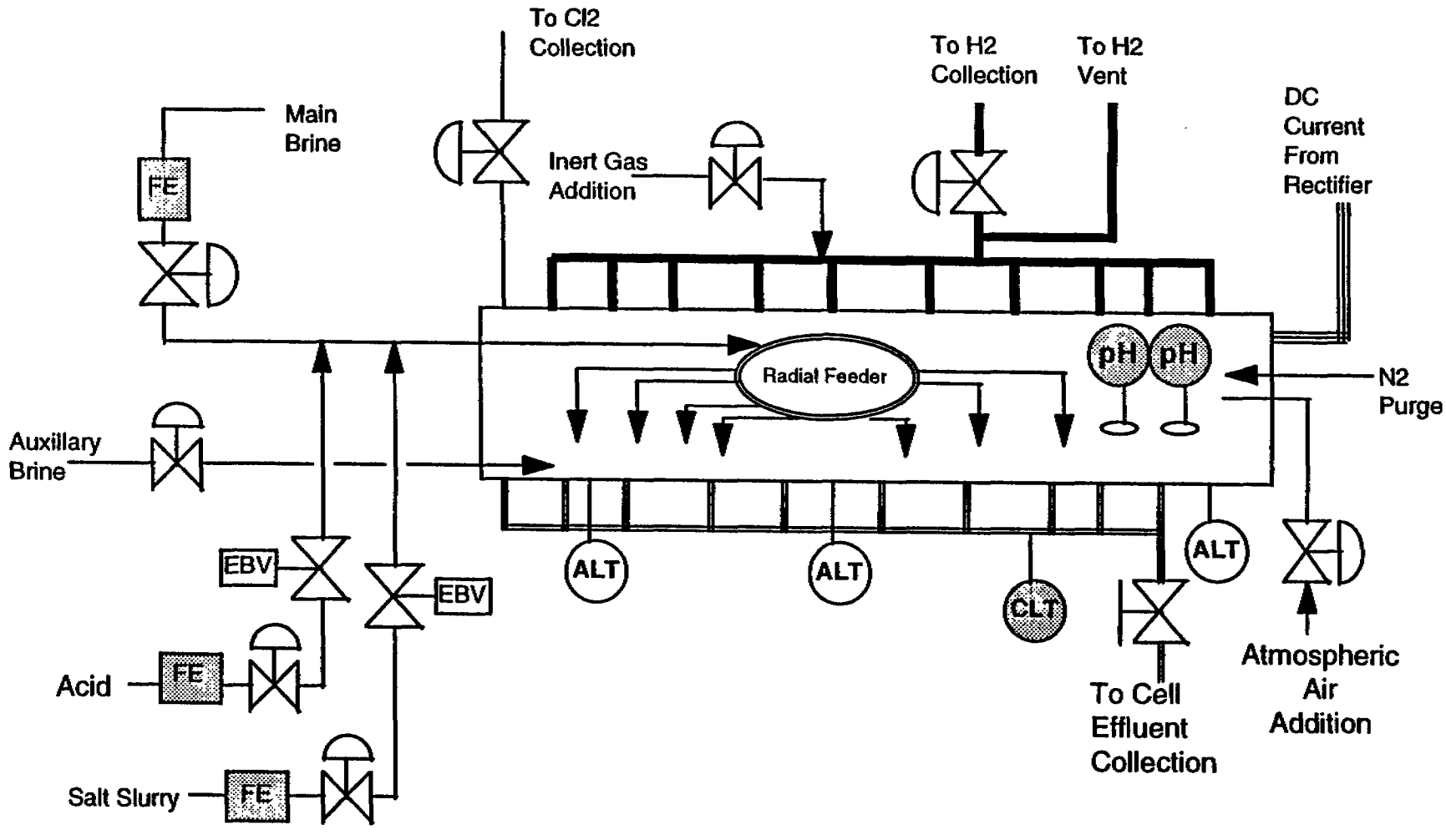


Series Block Diagram



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VI. CELL OPERATION - Figure 1

CELL OPERATION THEORY

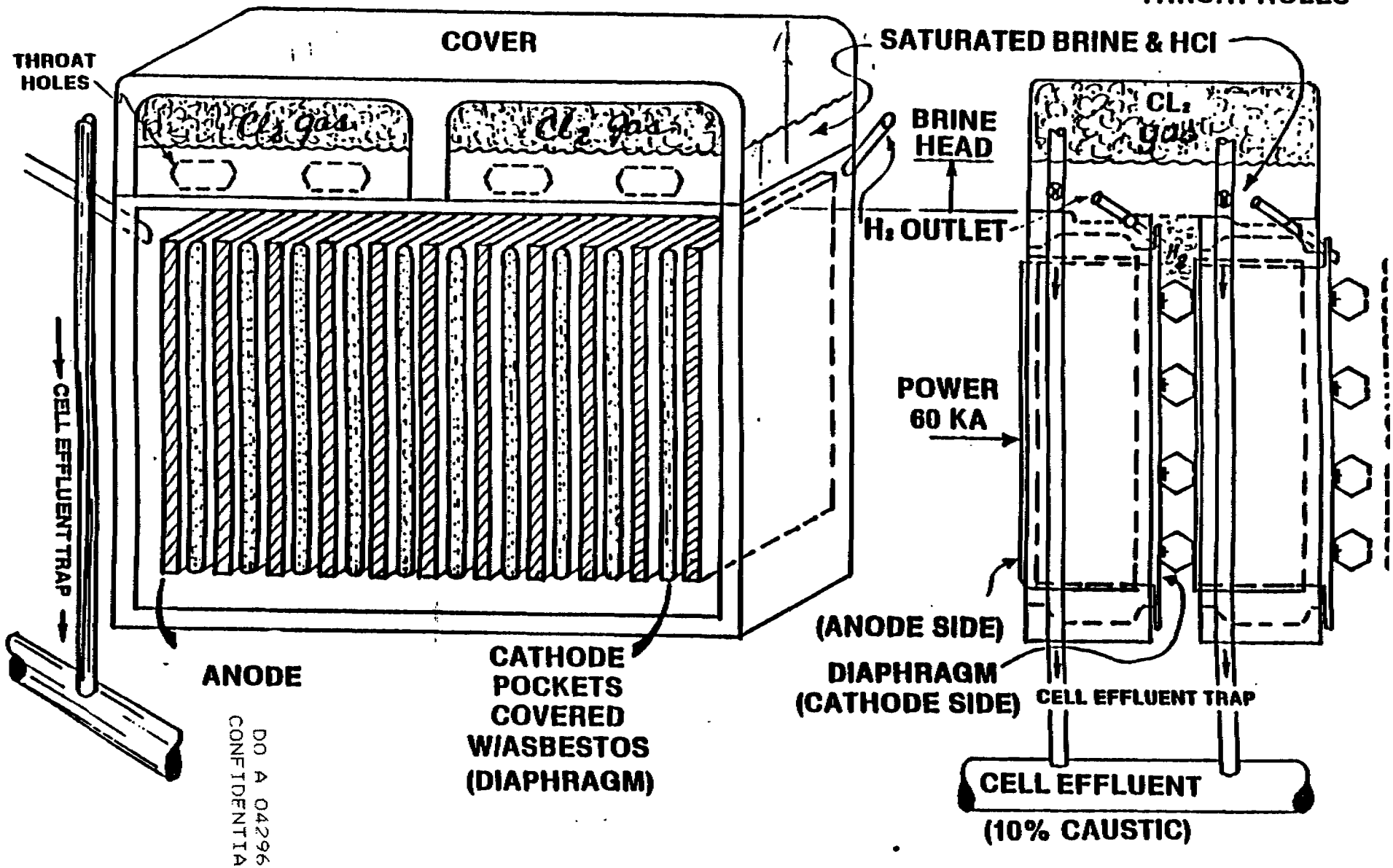

FIGURE 2

COMING ON-LINE.

POTENTIAL PROBLEMS	PREVENTIVE MEASURES
HYDROGEN AND AIR MIXTURE IN THE HYDROGEN HEADER OF SERIES COMING OFF-LINE.	1. Purge series Hydrogen header with CO2 after coming off-line. CA2 uses N2.
HYDROGEN AND AIR MIXTURES IN CELL COVERS OF OFF-LINE SERIES.	1. Keep minimum 6-inch head on off-line series 2. Double block and bleed on series Hydrogen header. 3. Purge off-line series with N2 under covers and CO2 in the Hydrogen header. CA2 uses only N2.
HYDROGEN AND AIR MIXTURES IN THE HYDROGEN HEADER OF ON-LINE SERIES.	1. The Hydrogen headers and Hydrogen stacks are run at a slight pressure. 2. O2 in H2 analyzers at Hydrogen Collection Trains.
DISINTEGRATION OF M-83 CELL TITANIUM ANODES OPERATING AT 5 VOLTS OR HIGHER.	1. Monitor series and individual cell voltages. Alarms on series voltage. 2. Clip drop profiles once per quarter. 3. Guidelines for operating high voltage series/cells.
HYDROGEN PRODUCTION CAUSED BY REACTION OF IRON AND CELL EFFLUENT AT HIGH TEMPERATURES.	1. Purging of lines and equipment when welding and burning.
INCREASED PRODUCTION OF NITROGEN TRI-CHLORIDE USING AMMONIA CONTAMINATED CELL EFFLUENT FROM CAUSTIC PLANT.	1. Closely monitor Ammonia levels in treated brine to the cells when using this cell effluent stream
PROCESS CHANGE CAUSES SALT STRENGTH TO INCREASE	1. Sampling of the anolyte salt strength twice per shift. Salt is taken off if over 305 gpl for one round or over 300 gpl for two rounds. 2. Visual inspection of the causitc outlets and radial feeder twice per shift for signs of salting up. 2. Alarm for high series voltage and voltage increase.

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CHLORINE I

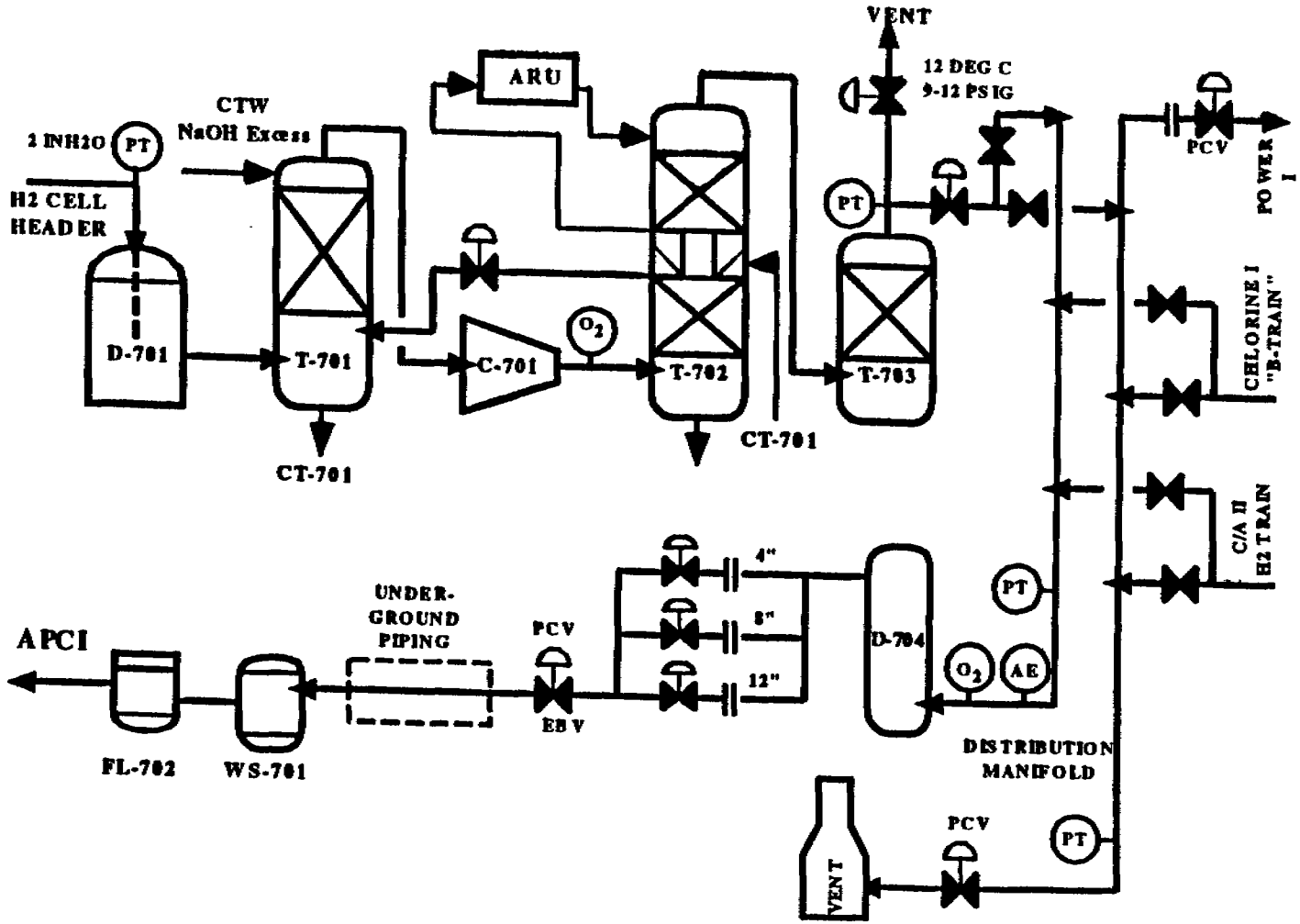
POTENTIAL PROBLEMS	PREVENTIVE MEASURES
LEAVING SALT ON OFF-LINE SERIES	1. Automatic block on salt slurry with brine flush upon a rectifier trip.
PLUGGING OF INDIVIDUAL RADIAL FEED	1. Salt density controller. 2. Visual inspection of radial feeders. 3. Velocity is maintained by design. 4. Rock salt screen on column at CA2. 5. Screens in feed lines. 6. Cover salt profiles once per qtr. 7. Sample 2 cells at least 2 covers apart on each round.
LOW anolyte CIRCULATION.	1. Operate at lower salt strength at lower loads.
BOILING OFF OF THE WATER IN THE ANOLYTE AND/OR THE CELL EFFLUENT.	1. Monitor cell temperature and volts with increased frequency on hi-volt cells.

RL000125.DOC 49-13-09-00
RL001103.DOC 55-01-27-03

CIRCUIT SHUTDOWN

Condition	Limit	Consequences	Action(s) to be taken
Blocking in the cell effluent manual valve when the Rectifier is running.	During running conditions this valve must remain wide open.	Elimination of diff ' l across diaphragm will cause hydrogen to back up into the anolyte. The H2 gas will mix with the Cl2 gas and could cause an explosion.	Leave valve in wide open position until Rectifier is down and ready to be bottled.
Low anolyte head when the Rectifier is energized.	4" Mod trip 5" Mod alarm	Trip to prevent H2 from backing up into anolyte side of cell and into Chlorine gas. A Cl2 / H2 explosion could result.	Mod will trip Rectifier if head less than 4". Mod will alarm at 5" - Ensure main brine, side feed and/or temp. brine control valves are open. - Open bypass(es) if necessary
High Chlorine pressure when Rectifier is energized.	0" Mod alarm 2 stages of tap backs 2" and not rapidly coming down or 2.8" for 5 sec Mod trip	Chlorine spill and Rectifier trip if condition does not correct itself in preset limit.	- Check start up blower valve - Check start up blower - Look at train stability - High initial current in-rush
Low Chlorine pressure when the Rectifier is energized.	-1.7" and -2.5" Mod alarms	Pull Hydrogen across diaphragm and possibly cause H2/Cl2 explosion	- Check start up blower valve - Check start up blower - Look at train stability - Open air dilution valve
Rapid corrosion of cathodes while off-line.	M/B and HCl double blocked and bled. M/B degas valve closed, if appropriate	High hydrogen on next start up which could lead to explosion.	Always block or double block and bleed without delay as per procedure. Ensure cathodes are flooded while circuit is off-line.
Failure to manually block hydrogen header.	Manually close valve in field after Ckt is down.	Hydrogen leaking by AOV into hydrogen log and cells creating an explosive mixture.	Always close manual hydrogen valve after Ckt is deenergized as per procedure.
Not bottling cell effluent log after shutdown.	Manually close C.E. outlet valve(s)	Hydrogen is not displaced from cell which could lead to an explosion.	Always close manual C.E. valve(s) within 5 minutes after Ckt is deenergized.

HYDROGEN AREA OVERVIEW



IX. Procedure / Description

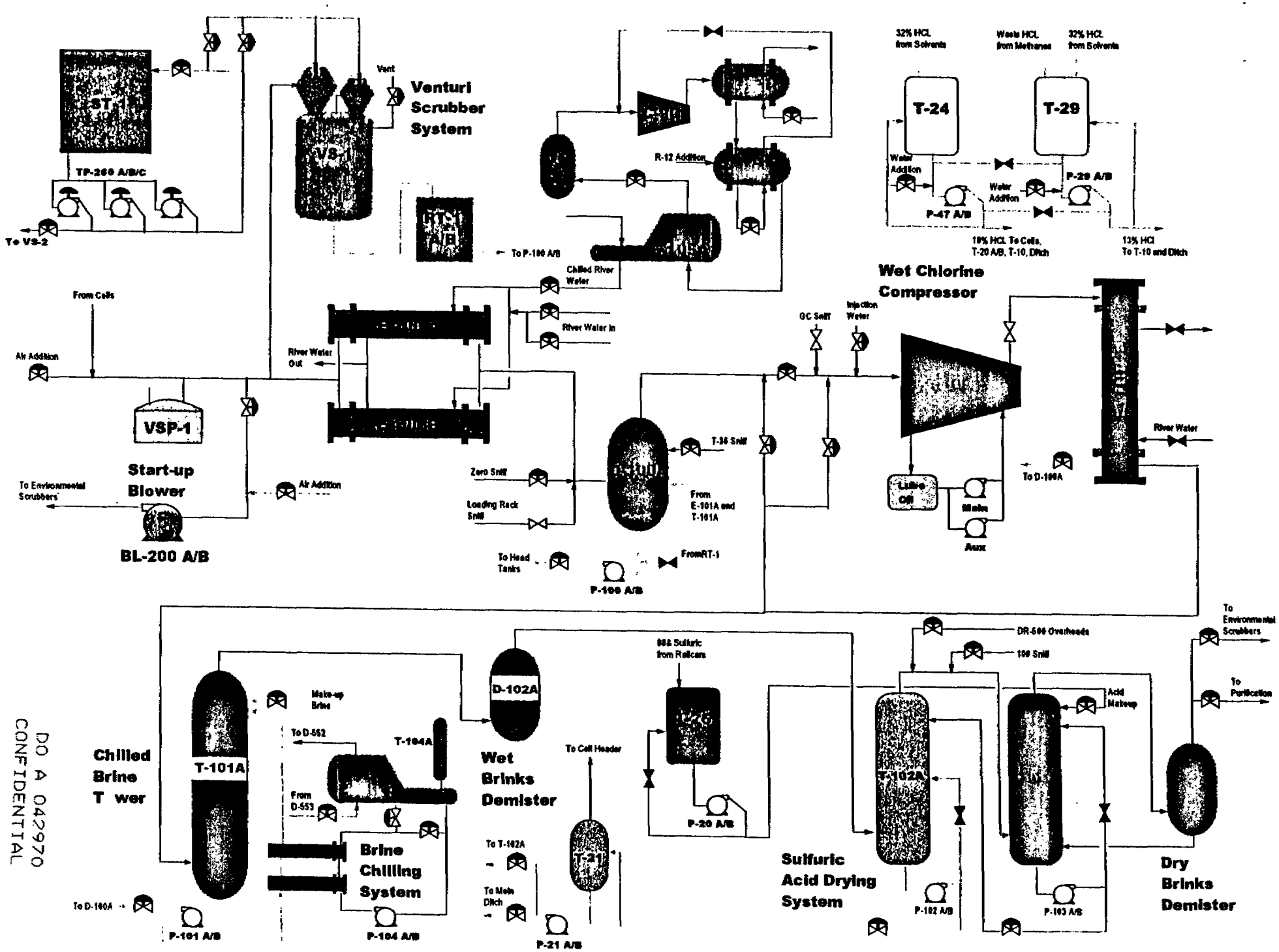
Steps List steps in procedure in order or the informatiom you want document to contain.

HYDROGEN AREA

POTENTIAL PROBLEMS PREVENTIVE MEASURES

H2-O2 EXPLOSION/FIRE	1.	Trip system at 1/8" water at compressor suction (2 seconds delay).
	2.	Redundant O2 analyzers, trip at .70% O2, (T-702-A).
	3.	Strict inert gas purging procedures with explosimeter checks at various points.
	4.	Automatic N2 purge on system trip to maintain a slight positive pressure.
	5.	H2 header pressure is controlled by recycle from discharge.
	6.	Explosimeter check to work/vehicle entryntrinsically safe, no smoking, N2 purge analyzers.
	7.	Detailed procedures for H2 stack fires. Steam purge to maintain backpressure on stacks.

RL000124.DOC 49-13-07-00



IX. Procedure / Description

Steps List steps in procedure in order or the informatiom you want document to contain.

DRYING TRAINS

EQUIPMENT	POTENTIAL PROBLEMS	PREVENTIVE MEASURES
E-100 RIVER WATER HEAT EXCHANGER	TITANIUM TUBES IN EXCHANGER REACTING WITH DRY CHLORINE.	1. Have exchanger in wet Chlorine service. 2. Water purge on gas out line.
C-100 WET CHLORINE COMPRESSOR	TITANIUM WHEEL IN COMPRESSOR REACTING WITH DRY CHLORINE.	1. Have compressor in wet Chlorine service.
	HIGH DISCHARGE TEMPERATURE.	1. Have H2O purge directly on compressor. Record this in control room (low alarmed). 2. High discharge temperature trip, 90 Deg C.
E-101 RIVER WATER EXCHANGER	TITANIUM TUBES REACTING WITH DRY CHLORINE.	1. Have exchanger in wet chlorine service. 2. H2O purge on C-100 inlet until saturated on discharge
T-101 CHILLED BRINE TOWER	TITANIUM TRAY SUPPORTS REACTING WITH DRY CHLORINE.	1. Brine recycle, keep tower wet 2. Water purge on C-100 inlet.
E-104A/B FREON HEAT EXCHANGER	HASTELLOY C-276 TUBES, FREON 123 AND CHLORINE	1. Chlorine comes into exchanger in the brine, so it is always wet. 2. Chlorine in Freon has alarms that are checked once per day.

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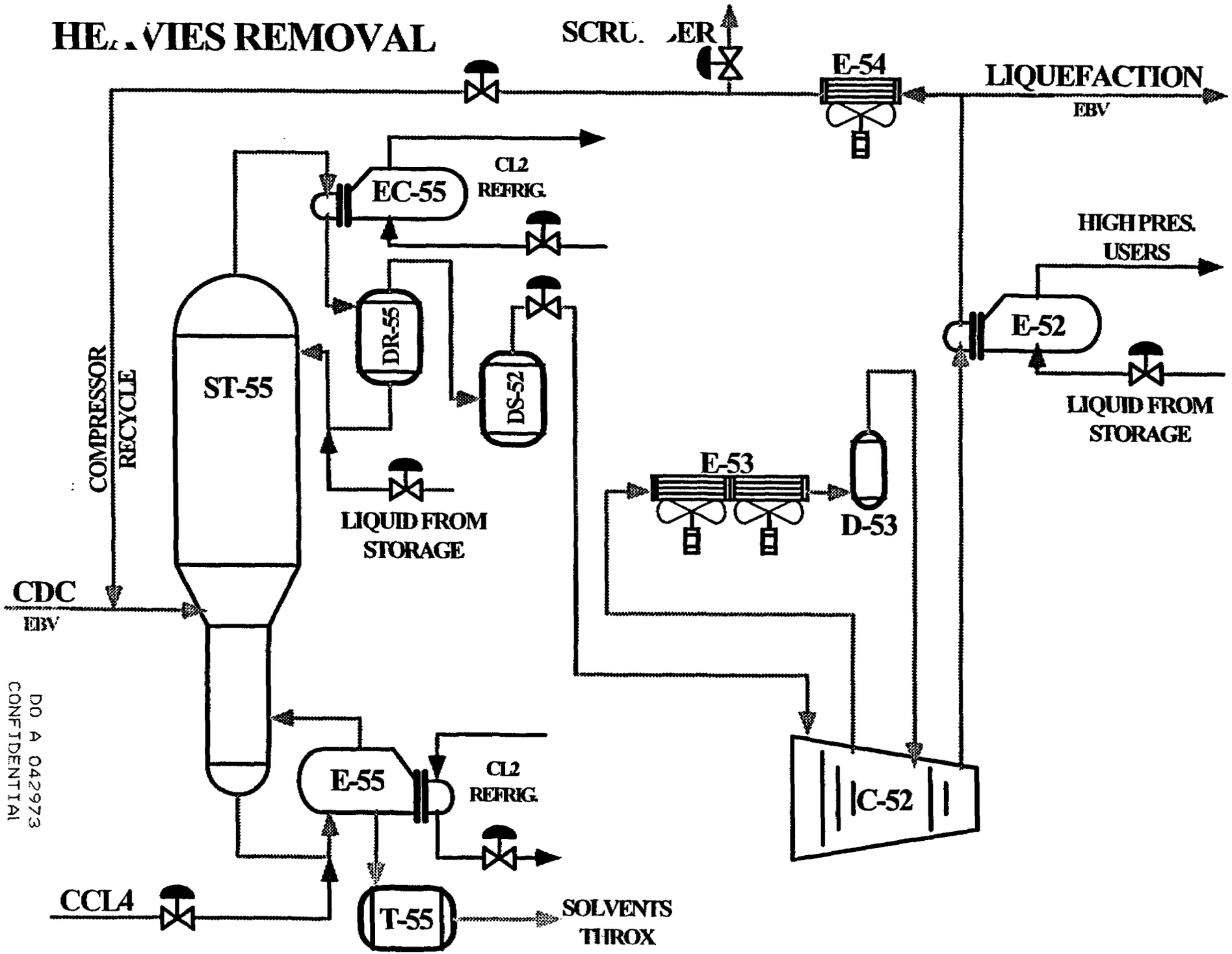
EQUIPMENT	POTENTIAL PROBLEMS	PREVENTIVE MEASURES
T-102 WEAK SULFURIC ACID TOWER	HEAT OF REACTION : STRONG ACID/MOISTURE	1. Use PVC lined FRP vessel, trays. 2. Monitor acid concentrations. 3. Monitor tower temperatures, gas temperatures, and acid temperatures. (shutdown at 50 Deg C.)
T-103 STRONG SULFURIC ACID TOWER	HEAT OF REACTION : STRONG ACID/MOISTURE	1. Use Carbon Steel vessel and piping 2. Monitor tower temperatures, gas and acid. (<=25 Deg C. >=5 Deg C.). 3. Monitor acid concentration. 4. Use Stainless Steel tray materials. 5. Monitor moisture out of D-103.


HEAVIES REMOVAL
SCRUBBER
E-54
LIQUEFACTION
EBV
CL2
REFRIG.
EC-55
HIGH PRES.
USERS
E-52
LIQUID FROM
STORAGE
DR-55
DS-52
ST-55
COMPRESSOR
RECYCLE
E-53
D-53
LIQUID FROM
STORAGE
CDC
EBV
E-55
CL2
REFRIG.
C-52
CCL4
T-55
SOLVENTS
THROX
DO A 042973
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IX. Procedure / Description

Steps List steps in procedure in order or the informatiom you want document to contain.

CL2 CELL AREA

POTENTIAL PROBLEMS	PREVENTIVE MEASURES
HYDROGEN AND CHLORINE MIXTURES IN THE CELL COVERS (ANOLYTE)	1. Chlorine compressor low suction pressure trip at 10" of water vacuum. CA2 - 9.5". 2. Vacuum relief seal pots in cell area. Seal pots are designed to relieve at 7.5" of water vacuum. 3. Monitor hydrogen in chlorine concentration continuously on each series with on-line GC's. 4. 3 level xtrmrs with deviation alarms. One high and one low level probe. CA2 has 2 xtrmrs and one low level probe. 5. Minimum operating head level is 6" of water for a flooded cell with a trip at 4" of water. Minimum operating head level is 4" of water for a non-flooded cell with a trip at 2" of water.
LOSS OF HEAD ON OPERATING SERIES.	1. 3 level xtrmrs with deviation alarms mid select. Shutdown at 2" non -flooded & 4"for flooded cells. CA2 as described above. 2. Conductance probe alarms at 5 inches for flooded and 3 inches for non-flooded cells. 3. Backup side feed level controller.
LOSS OF HEAD ON NON-OPERATING SERIES; CHLORINE DAMPER VALVE IS OPEN, AND HYDROGEN BLOCK VALVE LEAKS THROUGH.	1. Double block and bleed on series Hydrogen header.
BAD DIAPHRAGM (HOLES, RUST)	1. Cell treating 2. Good operational care of on-line and offline cells. 3. Series on-line G.C. 4. Guidelines for operating high hydrogen series.
HYDROGEN AND AIR MIXTURES IN THE HYDROGEN HEADER OF SERIES COMING ON-LINE.	1. Purge series hydrogen header with CO2 before coming on-line. CA2 uses N2.

IX. Procedure / Description

Steps List steps in procedure in order or the informatiom you want document to contain.

HIGH STAGE COMPRESSION AREA

POTENTIAL PROBLEMS	EXPLOSIVE LIMITS	PREVENTIVE MEASURES
CHLORINE-IRON REACTION INSIDE COMPRESSOR	155-165 DEG C.	1. Monitor and alarm compressor dis-charge temperature. 2. Trip compressor on high discharge temperature at 140 Deg C.
CHLORINE-LUBE OIL REACTION		1. Bearing housings separated from compressor seals by an air gap. 2. Compressor seals are Nitrogen purged
LUBE OIL FIRE		1. Installed sprinkler system at compressor and lube oil console.
NITROGEN TRICHLORIDE EXPLOSION IN E-52/62 SHELL SIDE		1. Dump to taffy pot each 48 hours operation. 2. Inspected during outages.
CHLORINE-ORGANIC CHEMICAL REACTION		same as HEAVIES REMOVAL SYSTEM.

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IX. Procedure / Description

Steps List steps in procedure in order or the informatiom you want document to contain.

HEAVIES REMOVAL AREA

POTENTIAL PROBLEMS		PREVENTIVE MEASURES
NITROGEN TRICHLORIDE EXPLOSION IN TAFFY POT	1.	Operate taffy pots at low temperatures
	2.	Monitor and alarm temperature in each pot(redundant)
	3.	Alarm rate of temperature rise in pots.
	4.	Analyze brine for NH3 content once/wk (CA Consol. Lab).
	5.	Analyze taffy weekly for NCl3.
	6.	Monitor and alarm pressure on each taffy pot.
	7.	Lowered psv setting to 150# to catch overpressure.
	8.	Maintain 100 PPM Hypochlorite in the brine.
	9.	Maintain level below 66% to allow room for dilution should a reaction take place.
	10.	Maintain automatic dump valve from the control room to provide liquid Chlorine for the taffy pot in the event of a trip or pressure rise.
	11.	Register taffy pots with the Pressure Vessel Committee for yearly inspection and cleaning.
	12.	Carbon-tet injection system to dilute taffy from reboiler.
NITROGEN TRICHLORIDE EXPLOSION IN REBOILER	1.	Maintain a minimum 35% level.
	2.	Dump E-55/65 when temperature rises to 0 Deg C.
	3.	Alarm high tubeside chlorine flow to reboiler.
CHLORINE-ORGANIC CHEMICAL REACTION lubricant	1.	Prohibit use of hydrocarbon based compounds inside Chlorine vessels and piping. Use Fluorolube as gasket and D/P cell fill fluid.
	2.	Use only hot water for cleaning exchanger tube bundles.
	3.	Training of operators, material controller, craftsmen, and instrument personnel.

Look up critical procedure

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IX. Procedure / Description

Steps List steps in procedure in order or the informatiom you want document to contain.

Dry Chlorine Compressor
Start-up, Operation, and ShutDown

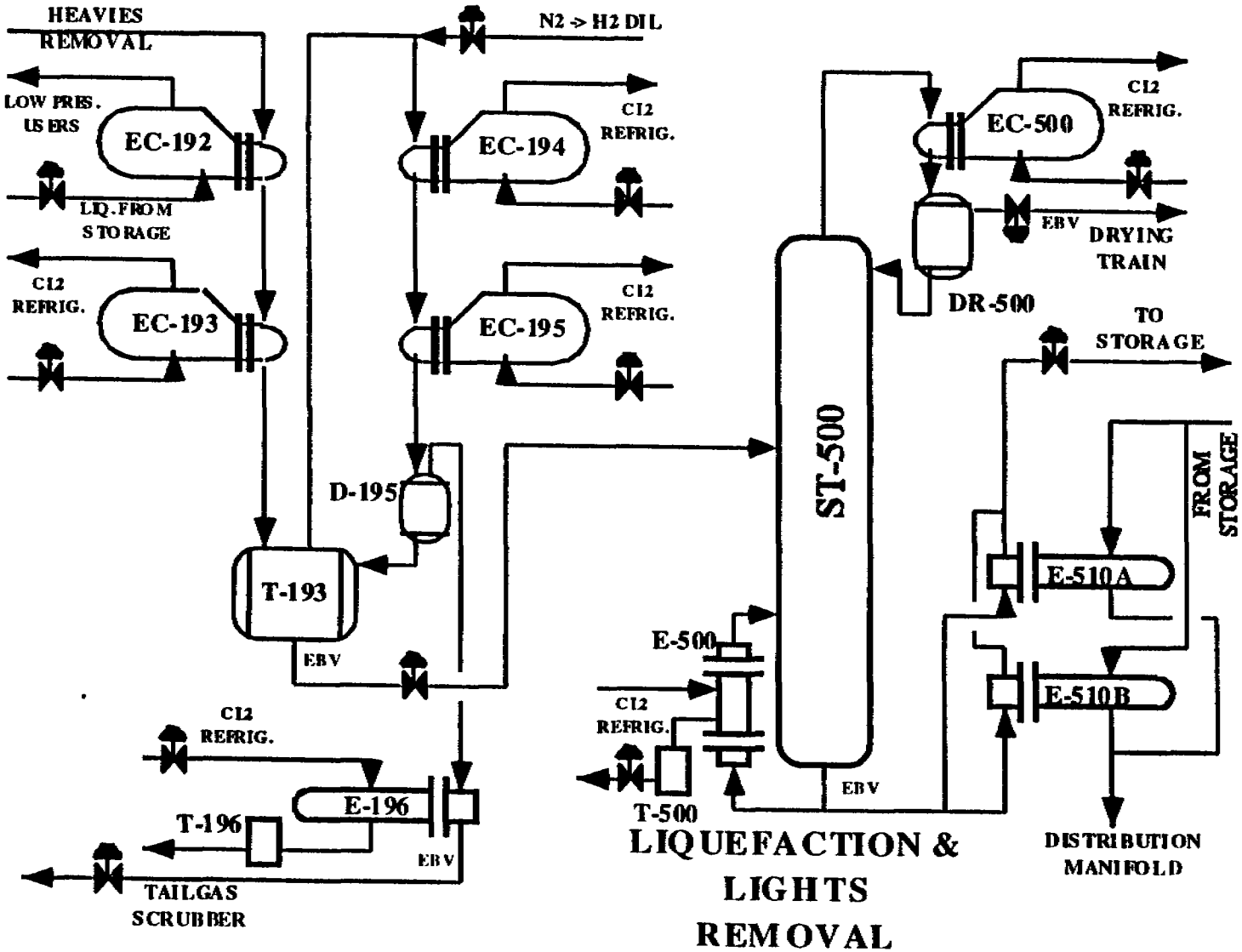
Condition	Limit	Consequences of Deviation	Action(s) to be taken
High 1st stage or 2nd stage temperature	140C	Cl2/iron fire will start at temperature of 155C - 165C	Mod5 automatically trips compressor Increase inner-stage cooling Decrease suction temp to compressor
Compressor surge	0.95 operating point (where 1 is surge)	Machine surge, possible mechanical damage which may lead to an environmental release	Mod5 automatically controls compressor at a predefined point away from surge Increase recycle to the compressor
Loss of nitrogen seal purge flow	3 lbs/hr	Oil/Cl2 reaction due to chlorine flow out of the compressor seals into the bearings	Increase seal purge flow to seals (use control valve bypass if necessary) If seal purge cannot be re-established the compressor should be shutdown
Loss of lubricant flow to Compressor, Gearbox, or Motor	Oil header pressure 8psig	Mechanical failure of rotating equipment which could result in a chlorine/iron fire	Mod5 trips compressor Check lube oil skid for possible problems Mod5 starts auxiliary pump
Chlorine-organic contact	No organic used in process	Possibility of a reactive chemical incident	Prohibit use of hydrocarbon based compounds in chlorine service vessels and piping If reaction occurs, trip compressor and stop chlorine flow to affected area

C-52 OPERATION PROCEDURE

A) START UP C-52 AUXILLARY SYSTEMS:

1) Start up seal purge system. see SA-52 operating procedure.

LIQUEFACTION OVERVIEW



IX. Procedure / Description

Steps List steps in procedure in order or the informatiom you want document to contain.

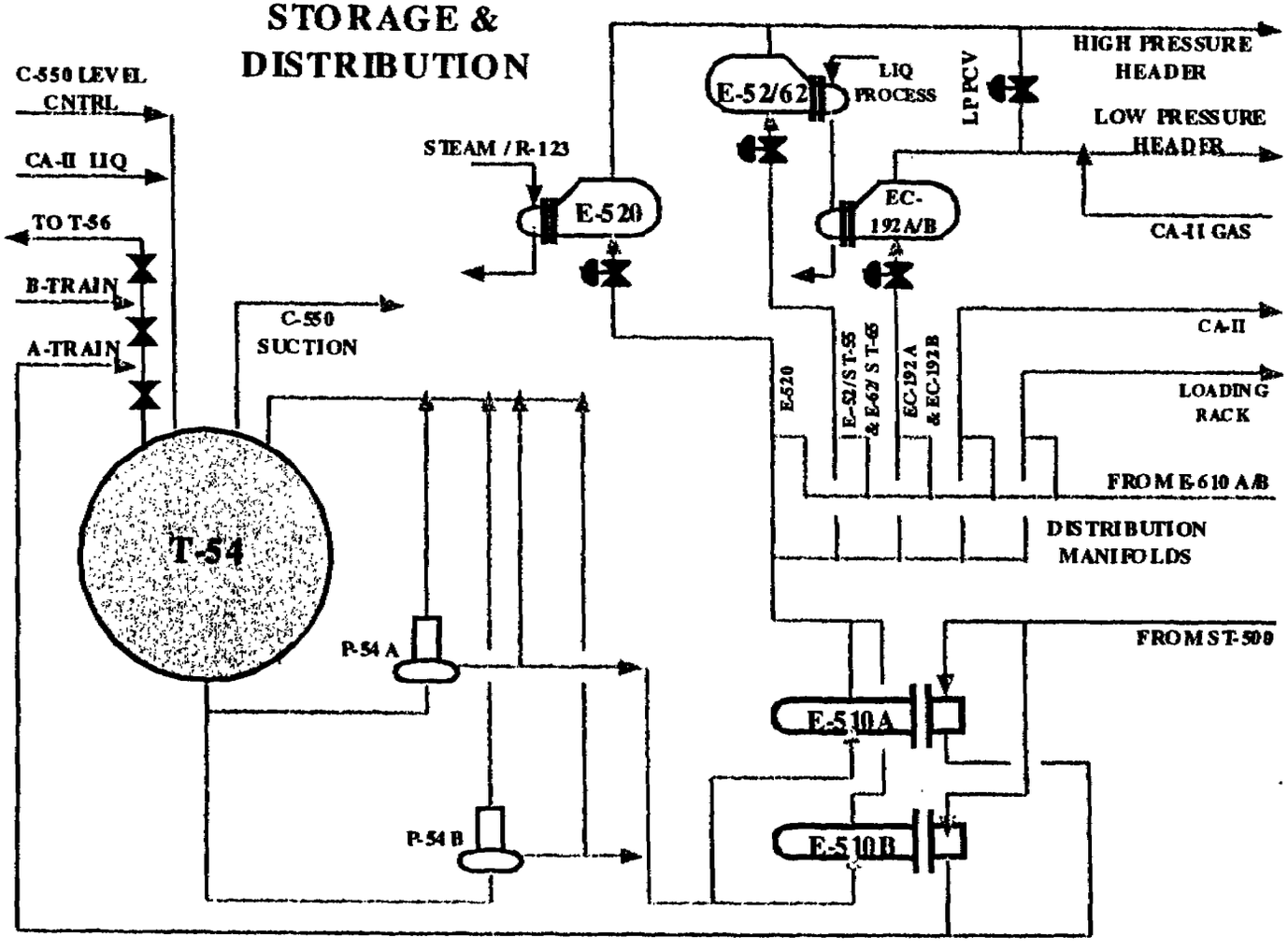
LIQUEFACTION AREA

POTENTIAL PROBLEMS	EXPLOSIVE LIMITS	PREVENTIVE MEASURES
HYDROGEN-CHLORINE EXPLOSION IN TAIL GAS	>5% HYDROGEN	1. Monitor Hydrogen in cell gas continously and keep below 1.0%. 2. Monitor Hydrogen in tail gas at inlet to brine scrubber with triple redundant thermal conductivity detectors. 3. Inject nitrogen into the chlorine stream upstream of the secondary condensers to control hydrogen in inerts in the tail gas at or below 3.5%. less CO2
DRY CHLORINE-TITANIUM REACTION IN BRINE SCRUBBERS		1. Alarm low brine flow to scrubber. 2. Alarm low level in brine scrubber. 3. Inject water purge on brine scrubber inlet gas flow to protect Titanium.

LIQUEFACTION AREA

Condition	Limit	Consequences of Deviation	Action(s) to be taken
High stage temperature	140C	Cl2/iron fire will start at temperature of 155C - 165C	Mod5 automatically trips compressor Increase inner-stage cooling Decrease suction temp to compressor
Compressor surge	0.95 operating point (where 1 is surge)	Machine surge, possible mechanical damage which may lead to an environmental release	Mod5 automatically controls compressor at a predefined point away from surge Increase recycle to the compressor
Loss of nitrogen seal differential pressure	1.5 psi	Oil/Cl2 reaction due to chlorine flow out of the compressor seals into the bearings	Mod5 alarm Increase seal purge flow to seals (use control valve bypass if necessary) If seal purge cannot be re-established the compressor should be shutdown
Low balance piston flow	1900 lbs/hr	Possible mechanical failure, chlorine / iron fire, and environmental release	Mod5 automatically trips compressor at low flow If reaction occurs, manually activate system EBV,s and evacuate all chlorine from system
Loss of lubricant flow to Compressor, Gearbox, or Motor	Oil header pressure 6psig	Mechanical failure of rotating equipment which could result in a chlorine/iron fire	Mod5 trips compressor Check lube oil skid for possible problems Mod5 starts auxiliary pump
High machine vibrations or temperature	Current limits set by MTS	Possible motor, gearbox, or compressor mechanical failure	Mod5 automatically trips compressor based on Bentley-Nevada information If machine wreck/failure occurs, evacuate all chlorine from system and stop oil flow to equipment in question
Chlorine-organic contact	No organic used in process	Possibility of a reactive chemical incident	Prohibit use of hydrocarbon based compounds in chlorine service vessels and piping If reaction occurs, trip compressor and stop chlorine flow to affected area
Thermal expansion of liquid chlorine	No liquid full chlorine lines	possible line or equipment failure	Always isolate equipment/piping in such a way as not to have liquid full piping If a line failure does occur, isolate system as close to the failure as reasonably possible and evacuate through sniff and dump headers

STORAGE & DISTRIBUTION OVERVIEW



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CHLORINE I

IX. Procedure / Description

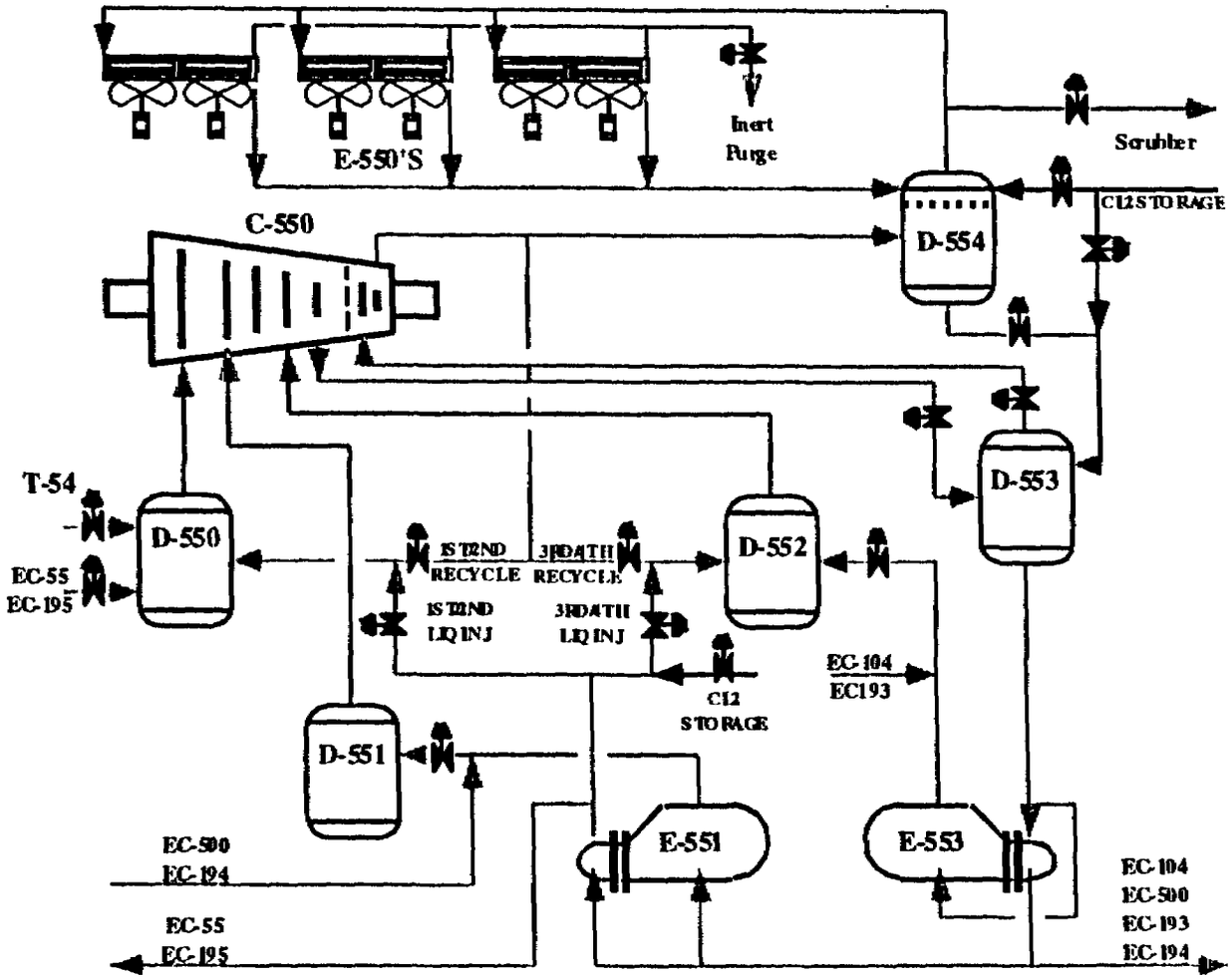
Steps List steps in procedure in order or the informatiom you want document to contain.

STORAGE AREA

POTENTIAL PROBLEMS	PREVENTIVE MEASURES
CHLORINE/IRON FIRE FROM TEIKUKO PUMPS OVERHEATING	1. Pumps trip on low cooling flow. 2. Minimum flow lines are provided on all pumps, preventing pumps from dead-heading.
NCl3 BUILD-UP IN EVAPORATORS	1. Evaporators are dumped every 48 hours. Internal in-spection per pressure vessel schedule.
CHLORINE/ORGANIC CHEMICAL REACTION	1. Prohibit use of hydrocarbon based compounds inside Chlorine vessels. 2. Use only hot water for cleaning.
LIQUID CHLORINE REACHING USER PLANTS	1. Superheat Chlorine gas 35 Deg C. (65#) and 60 Deg C.120 # 2. Alarm high pressure /low temperature on 100% lines. 3. All users except CPE and Solvents have knock-out pots.

RL000121.DOC 49-13-01-00

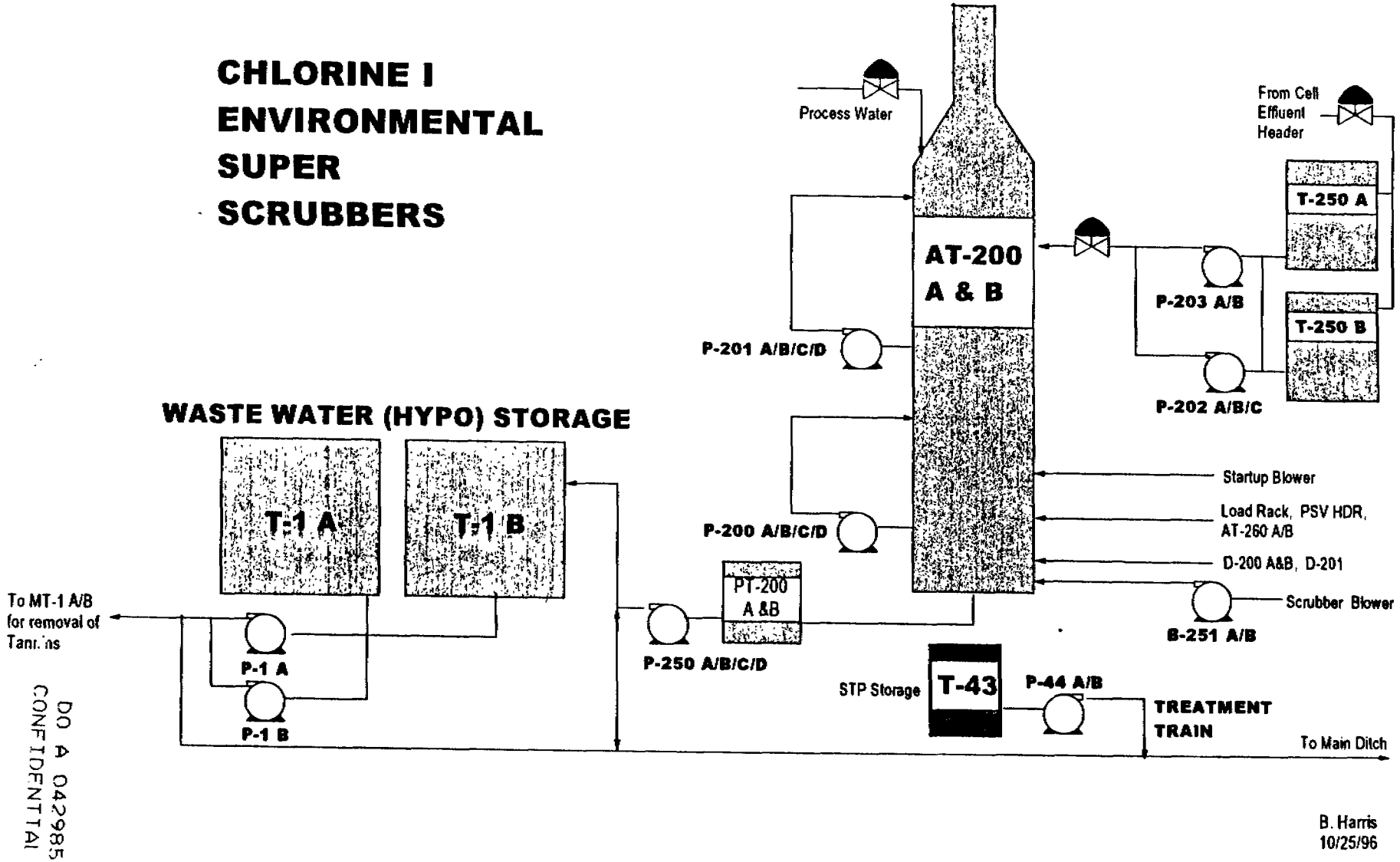
REFRIGERATION OVERVIEW



REFRIGERATION AREA

Condition	Limit	Consequences of Deviation	Action(s) to be taken
High stage temperature	140C	Cl2/iron fire will start at temperature of 155C - 165C	Mod5 automatically trips compressor Increase inner-stage cooling Decrease suction temp to compressor
Compressor surge	0.95 operating point (where 1 is surge)	Machine surge, possible mechanical damage which may lead to an environmental release	Mod5 automatically controls compressor at a predefined point away from surge Increase recycle to the compressor
Loss of nitrogen seal differential pressure	1.5 psi	Oil/Cl2 reaction due to chlorine flow out of the compressor seals into the bearings	Mod5 alarm Increase seal purge flow to seals (use control valve bypass if necessary) If seal purge cannot be re-established the compressor should be shutdown
Low balance piston flow	1900 lbs/hr	Possible mechanical failure, chlorine / iron fire, and environmental release	Mod5 automatically trips compressor at low flow If reaction occurs, manually activate system EBV,s and evacuate all chlorine from system
Loss of lubricant flow to Compressor, Gearbox, or Motor	Oil header pressure 6psig	Mechanical failure of rotating equipment which could result in a chlorine/iron fire	Mod5 trips compressor Check lube oil skid for possible problems Mod5 starts auxiliary pump
High machine vibrations or temperature	Current limits set by MTS	Possible motor, gearbox, or compressor mechanical failure	Mod5 automatically trips compressor based on Bentley-Nevada information If machine wreck/failure occurs, evacuate all chlorine from system and stop oil flow to equipment in question
Chlorine-organic contact	No organic used in process	Possibility of a reactive chemical incident	Prohibit use of hydrocarbon based compounds in chlorine service vessels and piping If reaction occurs, trip compressor and stop chlorine flow to affected area
Thermal expansion of liquid chlorine	No liquid full chlorine lines	possible line or equipment failure	Always isolate equipment/piping in such a way as not to have liquid full piping If a line failure does occur, isolate system as close to the failure as reasonably possible and evacuate through sniff and dump headers

CHLORINE I ENVIRONMENTAL SUPER SCRUBBERS



B. Harris
10/25/96

DO A 042985
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IX. Procedure / Description

Steps List steps in procedure in order or the informatiom you want document to contain.

SCRUBBER AREA

REACTIVE CHEMICAL

EQUIPMENT	POTENTIAL PROBLEM	PREVENTIVE MEASURES
AT-200	DRY CHLORINE/TITANIUM REACTION	Titanium wetted with cell effluent. Water purge on Chlorine into AT-200 with low flow alarm in control room.
	CHLORINE/CAUSTIC REACTION (EXOTHERMIC)	Temperature is recorded and alarmed

PRECAUTIONS FOR TITANIUM WELDING/CUTTING

Since AT-200 A/B and PT-200 A/B are made of titanium, any future modifications to the vessels that would require welding and/or cutting on or near the vessels should consider the following:

Titanium is very sensitive to oxygen, nitrogen, water or hydrogen under high temperature condition, such as found when welding and/or cutting on the metal. If proper precautions are not taken during these high temperature operations, the metal can be severely damaged. For this reason, Welding and Cutting on Titanium metal is to be completed only with very specific written procedures approved by Welding Technical Services.

EMERGENCY RESPONSE TO A TITANIUM/CHLORINE REACTION

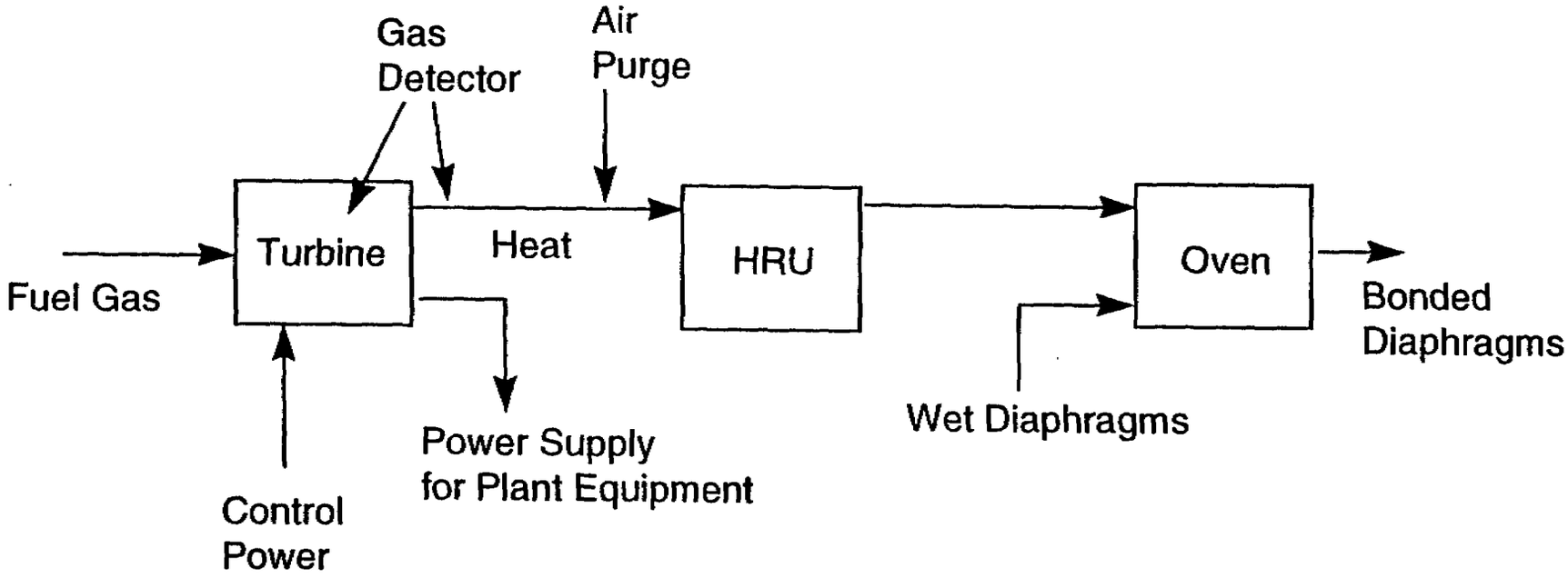
It is known that titanium and dry chlorine react violently in the presence of each other. This reaction is prevented by ensuring that the chlorine that comes in contact with titanium is passivated by "wetting" the chlorine with water vapor. If a titanium-chlorine reaction does initiate, the only effective way to stop that reaction from continuing is to **REMOVE THE SOURCE OF CHLORINE.** This can be accomplished by stopping all chlorine flow and re-routing to the opposite scrubber tower. The deluge guns in the scrubber area located next to T-250 A/B are to be used to protect the adjacent equipment from heat damage.

RL000122.DOC 49-13-01-00

Environmental Scrubber Critical Procedures

Condition	Limit	Consequences	Action(s) to be taken
Dry Chlorine entering Environmental Scrubbers, AT-200 A&B	No Dry Chlorine Flow	Titanium / Chlorine reaction resulting in chlorine release.	Titanium normally wetted with cell effluent. Additional water purge on Chlorine into AT-200 with low flow alarm in control room. If reaction starts, stop all chlorine flow into scrubber. Re-route chlorine flow to other scrubber if needed. Flood column with water. Protect adjacent equipment from heat damage using the fire water stations located next to the caustic storage tanks T-250 A&B.
High temperature in AT-200 A&B due to exothermic reaction of caustic and chlorine	90 deg C	Damage to fiberglass internal parts.	Temperature is recorded and alarmed. Route chlorine flow to alternate scrubber.

Cell Service Gas Turbine Block Diagram



* Cell Service has two turbines (GT-501A and GT-501B) in this part of the process.
* Only one turbine is operating at any given time; the other serves as a spare.

CELL SERVICE BLOCK
COMPATIBILITY CHART

MATERIAL	MEKP	DMA	COBALT NAPHTHENATE	DERAKANE	PROMOTED DERAKANE
METHYL ETHYL KETONE PEROXIDE	UNSTABLE ABOVE 60 C.	EXOTHERM AT 100 F ND	HIGHFIRE POTENTIAL KEEP APART	EXOTHERM AT 60 C ND	EXOTHERMS MIX ONLY BY RECIPE ND
N,N-DIMETHYLANILINE DMA	EXOTHERM AT 100 F ND	NO THERMAL ACTIVITY	NO THERMAL ACTIVITY ND	FLAMMABLE EXOTHERM ABOVE 150 C ND	FLAMMABLE EXOTHERM ABOVE 150 C BY RECIPE ND
COBALT NAPTHENATE	HIGHFIRE POTENTIAL KEEP APART	NO THERMAL ACTIVITY ND	NO THERMAL ACTIVITY	FLAMMABLE EXOTHERM ABOVE 150 C BY RECIPE	FLAMMABLE EXOTHERM ABOVE 150 C ND
DERAKANE	EXOTHERM AT 60 C ND	FLAMMABLE EXOTHERM ABOVE 150 C ND	FLAMMABLE EXOTHERM ABOVE 150 C BY RECIPE	FLAMMABLE EXOTHERM ABOVE 150 C BY RECIPE	FLAMMABLE EXOTHERM ABOVE 150 C ND
PROMOTED DERAKANE	EXOTHERMS MIX ONLY BY RECIPE	FLAMMABLE EXOTHERM ABOVE 150 C BY RECIPE	FLAMMABLE EXOTHERM ABOVE 150 C BY RECIPE	FLAMMABLE EXOTHERM ABOVE 150 C BY RECIPE	FLAMMABLE EXOTHERM ABOVE 150 C

ND-NOT DESIRED MIX
02/15/93:DW

LAD C[illegible]-ALKALI

Process Chemicals
REACTIVE CHEMICAL MATRIX

0=Minimal
1=Caution
2=Danger
3=Severe Danger
4=Extreme Danger

X=Unlikely Mixture
1=Not known to be reactive
2=Reactive (Potentially hazardous under certain circumstances)
3=Potential Hazard (Rapid Reaction with High Energy Release)

HEALTH	FLAMMABILITY	REACTIVITY	PROCESS CHEMICALS	Asbestos	Activated Alumina	Antifoam (DC) 1430	Balanced Polymer 76808	Betz CDP 90820	Betz Inhibitor 38K-38165	Carbon Tetrachloride	Caustic 50%	Cell Effluent	Chlorine-Gaseous	Chlorine-Liquid	Chloroform	Chlorothene	Diesel Fuel	Ethylene Glycol	Ferric Chloride	Freon 11	Freon 12	Freon 123	Hexachlorobenzene	Hexachlorobutadiene	Hexachloroethane	Hydrochloric acid	Hydrogen	Lithium Bromide	Magnesium Chloride	Methane	Oils (all)	Slimicide C-31	Sodium Bisulfite	Sodium Carbonate	Sodium Hypochlorite	Sodium Thiosulfate30%	Sulfuric Acid	Water
0	0	0	Asbestos	X	1	X	1	X	X	X	1	1	1	X	X	1	1	X	X	X	X	X	1	1	1	X	1	X	1	1	1	1	1	X	X	1	1
1	0	0	Activated Alumina	X	X	X	X	X	X	X	X	X	2	X	X	X	X	X	X	X	X	X	X	X	X	X	1	X	X	3	X	X	X	X	3	2	1
1	1	0	Antifoam (DC) 1430	X	X	1	X	X	X	X	X	1	3	X	1	X	X	X	X	X	X	X	X	X	X	1	1	X	1	X	X	X	1	1	1	X	X	1
1	1	0	Balanced Polymer 76808	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
0	1	0	Betz CDP 90820	X	X	X	X	X	X	X	1	3	X	X	X	X	X	X	X	X	X	X	X	X	X	1	1	X	1	X	X	X	1	1	1	1	3	1
1	1	0	Betz Inhibitor 38K-38165	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1
0	0	0	Carbon Tetrachloride	X	X	1	1	1	1	X	X	X	X	1	1	1	1	1	1	1	1	1	1	1	1	1	1	X	X	1	X	X	1	X	X	X	X	3	1
0	0	1	Caustic 50%	1	2	3	X	3	X	3	X	X	X	X	X	X	X	X	3	1	X	2	X	1	X	1	1	1	1	3	3	3
0	0	1	Cell Effluent	3	3	X	3	X	X	X	X	X	X	X	X	X	X	3	1	X	2	X	1	X	1	1	1	1	3	2
0	0	0	Chlorine-Gaseous	1	3	3	X	X	1	1	1	1	1	1	1	1	3	2	1	3	3	X	3	2	2	3	2	2
0	0	0	Chlorine-Liquid	3	3	3	3	1	2	2	1	1	1	1	1	1	3	2	1	3	3	X	3	2	2	3	2	2
0	0	0	Chloroform	1	X	X	X	1	1	1	1	1	1	1	1	1	1	1	X	X	1	X	X	X	1	1	2	1
0	1	1	Chlorothene	X	X	X	1	1	1	1	1	1	1	1	1	1	1	X	X	1	X	X	X	1	1	2	1
0	2	0	Diesel Fuel	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3	X	1
0	1	0	Ethylene Glycol	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	3	X	1
0	0	0	Ferric Chloride	X	1	1	1	1	1	X	X	X	X	X	X	X	X	X	X	2	X	X	X	X	X	2	3
0	0	0	Freon 11	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	X	X	1	1	3	1
0	0	0	Freon 12	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	X	X	1	3	1
0	0	1	Freon 123	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	X	X	1	X	X	1
0	1	0	Hexachlorobenzene	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	X	X	1	1	3	1
0	1	0	Hexachlorobutadiene	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	X	X	X	1	1	3	1
1	0	0	Hexachloroethane	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	X	X	X	1	3	1
2	0	0	Hydrochloric acid	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	2	1	X	1	3	1	3	3	3	3	3
0	2	0	Hydrogen	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	X	X	1	X	X	X	X	1	X	X	1
2	0	0	Lithium Bromide	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	1	X	X	X	X	1	2	1
0	0	0	Magnesium Chloride	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1	2	0	Methane	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X
1	1	1	Oils (all)	X	1	1	2	1	2	1
1	1	1	Slimicide C-31	X	X	X	X	X	X	1
0	0	0	Sodium Bisulfite	X	X	X	3	1
2	0	1	Sodium Carbonate	X	X	3	1
3	0	0	Sodium Hypochlorite	X	3	2
2	0	0	Sodium Thiosulfate30%	3	1
3	0	2	Sulfuric Acid	3
0	0	0	Water

*This reactive chemical matrix was created using the knowledge of process engineers, process technologists, chemists, and MSD sheets.
*This guide summarizes the potential reactivity hazards of mixtures of chemicals.
*The information herein is given in good faith, but no warranty, expressed or implied, is made. Consult The Dow Chemical Company for further information.
*For more detailed information, consult data on the individual chemical via MSD sheets, etc.

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Process Materials

1=Not known to be reactive
2=Reactive (Potentially hazard under some circumstances)
3=Potential Hazard (Rapid Reaction With High Energy Release)

PROCESS CHEMICALS	MATERIALS	Fiberglass	Carbon Steel	Titanium	Aluminum	Brass	Copper	Nickel	Polypropylene	Polyethylene	Teflon	PVC	CPVC	Kynar	Stainless Steel	Alloy 20	Monel
Carbon Tetrachloride	X	1	1	1	2	1	1	1	1	1	1	1	1	1	1	1	1
Caustic 50% < 120 degrees	X	1	1	1	3	3	3	1	1	1	1	1	1	1	1	1	1
Caustic 50% > 120 degrees	X	1	2	1	3	3	3	1	1	1	1	1	1	1	1	1	1
Cell Effluent <120 degrees	X	1	1	1	3	3	2	1	1	1	1	1	1	1	1	1	1
Cell Effluent >120 degrees	X	1	2	1	3	3	2	1	1	1	1	1	1	1	2	1	1
Chlorine-DRY	X	1	1	3	3	1	1	1	3	3	1	2	1	1	1	1	1
Chlorine-WET	X	1	3	1	3	3	3	3	3	3	1	2	1	1	3	1	2
Freon 11	X	1	1	1	1	1	1	1	2	1	1	1	1	1	1	1	1
Freon 12	X	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Freon 123	X	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Hydrochloric acid	X	1	3	3	3	3	3	2	1	1	1	1	1	1	3	3	2
Hydrogen	X	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Methane	X	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Oils (all)	X	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1
Sodium Bisulfite	X	1	2	3	2	2	1	1	1	1	1	1	1	1	1	1	1
Sodium Carbonate	X	1	1	3	1	1	1	1	1	1	1	1	1	1	1	1	1
Sodium Hypochlorite	X	1	2	2	2	2	2	2	1	1	1	1	1	1	2	2	2
Sodium Thiosulfate30%	X	1	2	2	2	2	1	1	1	1	1	1	1	1	1	1	1
Sulfuric Acid (weak<90%)	X	1	3	3	3	3	3	3	1	1	1	1	1	2	3	1	3
Sulfuric Acid (strong>=90%)	X	2	2	3	3	3	3	3	1	1	1	1	1	2	2	1	3

*This reactive chemical matrix was created using the knowledge of process engineers, process technologists, chemists, and MSD sheets
*This guide summarized the potential reactivity hazards of mixtures of chemicals.
*The information herein does not constitute or by any means suggest suitable material compatability for the chemicals and materials listed. Consult piping/instrument specifications for material f construction application.

IX. Procedure / Description

Steps List steps in procedure in order or the informatiom you want document to contain.

COMPATIBLE FITTINGS

COMPATIBLE TUBING & INSTRUMENT FITTINGS

CODE

1. PVC	- P	4. BRASS	- B
2. TEFLON	- T	5. COPPER	- C
3. MONEL	- M	6. TITANIUM	- Ti

SERVICE	TUBING	FITTINGS
WET CHLORINE	T, Ti	T, Ti
DRY CHLORINE	M, T	M, T
HYDROCHLORIC ACID	T or P	T or P
SULFURIC (ALL)	T	T
CAUSTIC	M or T	M or T
CARBON TETRACHLORIDE	M	M
HYDROGEN	M	M
SODIUM THIOSULFATE	T	T
FREON	M or C	M or B
TAFFY	M	M
CHLORINATED BRINE	M or T	M or T
OIL	C	B

RL000130.DOC 49-13-19-00

Title REACTIVITY OF SEALANT
File Name (RL#) RL005273.DOC

Author	Scott Daigle	Date Created	5/14/96
Approved By	Robert Politz		
Revision Number	0	Rev. Approved By	N/A
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File Description	REACTIVITY OF SEALANT WITH PROCESS CHEMICAL (SORTED PROCESS CHEMICAL)		
File Path	T:\08 Chlorine Library\49 Chlorine Plant Overview\09 Reactive Chemical:REACTIVITY OF SEALANT.doc		

Area Chlorine Plant **Equipment** N/A **Type** Procedure

I. Objective To inform plant personnel of the correct type sealant
II. Frequency When using sealant
III. Responsibility Operations and Staff
IV. Operating Limits _____
V. Consequences of deviation of Operating Limits :
Chemical reaction
VI. Revisions
Date _____ Revised By N/A
Comments Procedure changed from T-13 to T-10, new sludge treatment tank
Date _____ Revised By N/A
Comments N/A
Date _____ Revised By N/A
Comments N/A
VII. References N/A
VIII. Requirements
Notification N/A
Documentation N/A
Regulations N/A
IX. Preparation
Safety Equipment Block Safety Equipment
Hazards N/A
Precautions N/A
Equipment N/A
X. Important Notes N/A
IX. Procedure / Description
Steps List steps in procedure in order or the information you want document to contain.

TEAM = TEAM LEAK REPAIR INC

REACTIVITY OF SEALANT WITH PROCESS CHEMICAL (SORTED BY PROCESS CHEMICAL)

PROCESS CHEMICAL	SEALANT	PLANT	REF. NO.	TEST	REACTIVITY
ACETYLENE	TEAM VALVEPACK B	LHC 2	86223C	DTA	NO EXO TO 210 C
ACID GAS BLEND	STEAM & PROCESS SP-1011	LGTI	4791-42A	DSC	EXO AT 45 C
ACID GAS BLEND	STEAM & PROCESS SP-60	LGTI	4791-42A	DSC	NO EXO TO 300 C
ACID GAS BLEND	STEAM & PROCESS SP-CM	LGTI	4791-42A	DSC	EXO AT 50 C
AIR	SP-1011 (30 MIN CURE 1ST RUN)	CHLOR-ALKALI 2	4791-35A	DSC	EXO AT 160 C
AIR	SP-1011 (30 MIN CURE 2ND RUN)	CHLOR-ALKALI 2	4791-35A	DSC	EXO AT 60 C
AIR	SP-1011 (30 MIN CURE 3RD RUN)	CHLOR-ALKALI 2	4791-35A	DSC	EXO AT 273 C
AIR	SP-1011 (UNCURED SAMPLE)	CHLOR-ALKALI 2	4791-35A	DSC	EXO AT 178 C
AIR	SP-102 (CURED @ 300 C / 48 HR)	POWER 2	4791-43B	DSC	EXO AT 420 C
AIR	TEAM SEALANT 2W	POWER 2	92320	DSC	NO EXO TO 500 C
AIR	TEAM SEALANT 2X	POWER 2	92320	DSC	NO EXO TO 500 C
AIR (INSTRUMENT)	STEAM & PROCESS SP-102	LGTI	4791-42A	DSC	NO EXO TO 300 C
AIR (INSTRUMENT)	STEAM & PROCESS SP-60	LGTI	4791-42A	DSC	NO EXO TO 300 C
AMMONIA (15%) - D-270	STEAM & PROCESS SP-60	LGTI	4791-5A	DSC	NO EXO TO 200 C
AMMONIA (15%) - D-270	STEAM & PROCESS SP-102	LGTI	4791-5A	DSC	NO EXO TO 200 C
AMMONIA (20% IN H2O)	TEAM SEALANT #6	LGTI	89336	DSC	NO EXO TO 235 C
AMMONIA (AQUEOUS)	TEAM PTFE SEALANT	DOWANOLS	RCL 1039	DTA	NO EXO TO 300 C
AMMONIUM HYDROXIDE	TEAM SEALANT 1X	DOWANOLS	91239	DSC	NO EXO TO 175 C
ANHYDROUS AMMONIA	DOW CORNING 44 LUBRICANT	DOWANOLS	93121	DSC	NO EXO TO 130 C
ANHYDROUS AMMONIA	FEL-PRO HI-TEMP NICKEL EASE	DOWANOLS	93121	DSC	NO EXO TO 155 C
ANHYDROUS AMMONIA	STEAM & PROCESS SP-1015	DOWANOLS	RCL 1232	DTA	NO EXO TO 250 C
ANHYDROUS AMMONIA	TEAM PTFE SEALANT	DOWANOLS	RCL 1038	DTA	NO EXO TO 320 C
ANHYDROUS AMMONIA	TEAM SEALANT #16	CAUSTIC	RCL 1010	DTA	NO EXO TO 200 C
ANHYDROUS AMMONIA	TEAM SEALANT #6	CAUSTIC	RCL 1007	DTA	NO EXO TO 200 C
ANHYDROUS AMMONIA	TEAM VALVEPACK B	CAUSTIC	RCL 1181	DTA	NO EXO TO 300 C
AT-200 SCRUBBER EFFLUENT	STEAM & PROCESS SP-2000	CHLORINE	91296	DSC	EXO AT 40 C
AT-200 SCRUBBER EFFLUENT	STEAM & PROCESS SP-CM	CHLORINE	91296	DSC	NO EXO TO 250 C
BENZENE	ROYAL PURPLE BARRIER FLUID 22	LHC 3	92169	DSC	NO EXO TO 200 C
BENZENE	ROYAL PURPLE BARRIER FLUID 22	LHC 3	92169	HOM	NO EXO AT 22 C
BENZENE (CRUDE)	STEAM & PROCESS SP-1011	BENZENE	8.40E+33	DTA	NO EXO TO 250 C
BENZENE (CRUDE)	STEAM & PROCESS SP-103	BENZENE	8.40E+32	DTA	NO EXO TO 250 C
BENZENE PLANT PYROLYSIS GAS	TEAM VALVEPACK B	BENZENE	85053A	DTA	NO EXO TO 300 C
BENZENE-TOLUENE-XYLENE (T-1602)	FURMANITE FSC-5B	LHC 3	92199	DSC	NO EXO TO 250 C
BENZENE-TOLUENE-XYLENE (T-1602)	FURMANITE FSC-6B	LHC 3	92199	DSC	NO EXO TO 250 C
BENZENE-TOLUENE-XYLENE (T-1602)	TEAM SEALANT #6 & F-14 FIBERS	LHC 3	92199	DSC	NO EXO TO 250 C
BETA-TRICHLOROETHANE	FURMANITE FSC-44D	VINYL 2	93154	DSC	EXO AT 269 C
BETA-TRICHLOROETHANE	FURMANITE FSC-44D	VINYL 2	93154	HOM	NO EXO AT 22 C
BETA-TRICHLOROETHANE	FURMANITE FSC-5B	VINYL 2	93154	DSC	NO EXO TO 350 C
BETA-TRICHLOROETHANE	FURMANITE FSC-5B	VINYL 2	93154	HOM	NO EXO AT 22 C
BETA-TRICHLOROETHANE	STEAM & PROCESS SP-289	VINYL 2	93154	DSC	NO EXO TO 350 C
BETA-TRICHLOROETHANE	STEAM & PROCESS SP-289	VINYL 2	93154	HOM	NO EXO AT 22 C
BETA-TRICHLOROETHANE	STEAM & PROCESS SP-3100	VINYL 2	93154	DSC	EXO AT 253 C
BETA-TRICHLOROETHANE	STEAM & PROCESS SP-3100	VINYL 2	93154	HOM	NO EXO AT 22 C
BETA-TRICHLOROETHANE	TEAM SEALANT #2X	VINYL 2	93154	DSC	NO EXO TO 350 C
BETA-TRICHLOROETHANE	TEAM SEALANT #2X	VINYL 2	93154	HOM	NO EXO AT 22 C
BETA-TRICHLOROETHANE	TEAM SEALANT #6	VINYL 2	93154	DSC	EXO AT 284 C
BETA-TRICHLOROETHANE	TEAM SEALANT #6	VINYL 2	93154	HOM	NO EXO AT 22 C
BETA-TRICHLOROETHANE	TEAM VALVEPACK A	VINYL 1	8.40E+191	DTA	EXO AT 275 C
BETZ BALANCED POLYMER 68701	FURMANITE FSC-6B	LHC 3	94092	HOM	SL. EXO AT 22 C
BETZ BALANCED POLYMER 68701	FURMANITE FSC-6B	LHC 3	94092	DSC	NO EXO TO 200 C
50% BETZ BP-P-1B + 50% COR-TROL 778P	TEAM SEALANT #6 & F-14 FIBERS	POWER 1	92175	DSC	NO EXO TO 335 C

CELL EFFLUENT (10% SODIUM HYDROXIDE)	STEAM & PROCESS SP-60	CHLORINE	92180	DSC	SL EXO AT 194 C
CHLORINE	ANCHOR VALVE PACKING 375	CHLORINE	8.40E+140	DSC	EXO < 30 C
CHLORINE	ANCHOR VALVE PACKING 4205	CHLORINE	8.40E+07	DTA	EXO AT 136 C
CHLORINE	BELZONA CERAMIC-R METAL	CHLORINE	85172D	DTA	EXO AT 35 C
CHLORINE	BELZONA E-METAL	CHLORINE	8.40E+186	DTA	EXO < 25 C
CHLORINE	BELZONA SUPER METAL	CHLORINE	85172A	DTA	EXO AT 30 C
CHLORINE	CELL PUTTY	CHLOR-ALKALI 2	ARC 91-647	ARC	EXO AT 86 C
CHLORINE	CHRYSOTILE ASBESTOS FIBER GASKET	CHLORINE	90022	DSC	NO EXO TO 250 C
CHLORINE	CONLEY TEFLON PASTE	CHLORINE	RCL 83-004	DTA	EXO AT 100 C
CHLORINE	FELPOXY STEEL	CHLORINE	8.40E+185	DTA	EXO < 25 C
CHLORINE	GARLOCK VALVE PACKING 6130	CHLORINE	8.40E+09	DTA	EXO AT -83 C
CHLORINE	GARLOCK VALVE PACKING 7130	CHLORINE	8.40E+10	DTA	EXO AT -76 C
CHLORINE	GORE PACKING PTFE W/ GRAPHITE	CHLORINE	86206A	DTA	NO EXO TO 200 C
CHLORINE	GORTEX PTFE	SOLVENTS/EDC	85136A	DTA	NO EXO TO 250 C
CHLORINE	GORTEX SEALANT (TEFLON)	CHLORINE	ARC 91-616	ARC	NO EXO TO 200 C
CHLORINE	JOHN CRANE VALVE PKG C-1050	CHLORINE	8.40E+143	DSC	EXO AT 36 C
CHLORINE	JOHN CRANE VALVE PKG C-60	CHLORINE	8.40E+142	DSC	EXO AT 46 C
CHLORINE	JOHN CRANE VALVE PKG C-7762	CHLORINE	8.40E+05	DTA	EXO AT 102 C
CHLORINE	JOHN MANSVILLE VALVE PKG AF-5331	CHLORINE	8.40E+146	DTA	EXO < 30 C
CHLORINE	LOCTITE #56747 PST	CHLOR-ALKALI 2	90282	DSC	EXO AT 115 C
CHLORINE	LOCTITE #59231 (WITH TEFLON)	CHLOR-ALKALI 2	90282	ARC	EXO AT 33 C
CHLORINE	LOCTITE 271 ADHESIVE/SEALANT	CHLOR-ALKALI 2	89071	DSC	EXO AT -5 C
CHLORINE	PARKER HANNIFIN VALVE PKG 2287-BR	CHLORINE	8.40E+144	DSC	EXO < 30 C
CHLORINE	PARKER HANNIFIN VALVE PKG 2287-GL	CHLORINE	8.40E+145	DSC	EXO AT 38 C
CHLORINE	PTFE/KEVLAR	CHLOR-ALKALI 2	89322	DSC	EXO AT 48 C
CHLORINE	SEAL-ITT #34	CHLORINE	90277	DSC	EXO AT 90 C
CHLORINE	SILASTIC 732-RTV SILICONE RUBBER	CHLOR-ALKALI 2	8.40E+102	DTA	EXO AT 160 C
CHLORINE	STEAM & PROCESS SP-1011	CHLOR-ALKALI 2	89322	DSC	EXO AT 40 C
CHLORINE	TEAM SEALANT #11	VINYL 1	RCL 83-093	DTA	EXO AT 90 C
CHLORINE	TEAM SEALANT #6 + F-14 FIBER	VINYL 1	RCL 83-095	DTA	EXO AT 130 C
CHLORINE	UNCURED EPDM RUBBER	CHLOR-ALKALI 2	ARC 91-648	ARC	EXO AT 98 C
CHLORINE (LIQUID)	CASTROL BRAYCOTE 1728	CHLORINE	ARC 91-585	ARC	EXO AT 167 C
CHLORINE (LIQUID)	COPALTITE HIGH TEMPERATURE SEALANT	CHLORINE	ARC 94-851	ARC	EXO AT 113 C
CHLORINE (LIQUID)	DOW CORNING 3120 RTV SEALANT	CHLORINE	ARC 94-848	ARC	EXO AT 36 C
CHLORINE (LIQUID)	GARLOCK 900 GASKET	CHLORINE	ARC 92-737	ARC	EXO AT 26 C
CHLORINE (LIQUID)	GOR-TEX GR GASKET	CHLORINE	ARC 93-771	ARC	NO EXO TO 175 C
CHLORINE (LIQUID)	GRAFOIL GHE	CHLORINE	ARC 91-586	ARC	EXO AT 104 C
CHLORINE (LIQUID)	KADEL SN N-75 SEALANT	CHLORINE	RCL-93-9809	ARC	EXO AT 182 C
CHLORINE (LIQUID)	KLINGER K-61 GASKET	CHLORINE	ARC 92-738	ARC	EXO AT 27 C
CHLORINE (LIQUID)	PERMATEX FORM-A-GASKET 2 (CURED)	CHLORINE	ARC 94-855	ARC	EXO AT 22 C
CHLORINE (LIQUID)	SAFE SEAL - CHEMOLA TEFLON	METHANES	94060	ARC	EXO AT 8 C
CHLORINE (LIQUID)	STEAM & PROCESS SP-2026	CHLORINE	ARC 92-692	ARC	EXO AT 20 C
CHLORINE (LIQUID)	STEAM & PROCESS SP-292	CHLOR-ALKALI 2	RCL-93-9831	ARC	NO EXO TO 250 C
CHLORINE (LIQUID)	STEAM & PROCESS SP-300D	CHLORINE	ARC 92-711	ARC	EXO AT 20 C
CHLORINE (LIQUID)	STEAM & PROCESS SP-375	CHLORINE	RCL-93-9830	ARC	NO EXO TO 250 C
CHLORINE (LIQUID)	STEAM & PROCESS SP-CM	CHLORINE	ARC 92-708	ARC	EXO AT 20 C
CHLORINE (LIQUID)	STEAM & PROCESS SP-TFLO	CHLORINE	ARC 92-715	ARC	NO EXO TO 175 C
CHLORINE (LIQUID)	TEAM VALVEPACK OX (TEFLON)	CHLOR-ALKALI 2	RCL-92-9764	ARC	NO EXO TO 250 C
CHLORINE (LIQUID)	TORLON SN T210 SEALANT	CHLORINE	RCL-93-9799	ARC	EXO AT 109 C
CHLORINE (LIQUID)	USADURIAN SBR RUBBER	CHLORINE	ARC 94-853	ARC	EXO AT 59 C
CHLORINE (TRACE WATER, HCBD)	CPE-TAC	CHLORINE	8.40E+213	DTA	EXO AT 135 C
CHLORINE VENT GAS	DERAKANE 470 (CURED 6/14/88)	CHLORINE	4792-21A	DSC	EXO AT 30 C
CHLORINE VENT GAS	IPI EPOXY (CURED)	CHLORINE	4792-21A	DSC	NO EXO TO 250 C
CHLORINE VENT GAS	RED PRIMER (CURED)	CHLORINE	4792-20A	DSC	EXO AT 40 C
CHLORINE VENT GAS	WHITE DURDICK 800 G	CHLORINE	4792-20A	DSC	EXO AT 35 C
CHLOROFORM	SAFE SEAL - CHEMOLA TEFLON	METHANES	94060	HOM	NO EXO AT 22 C
CHLOROFORM	SAFE SEAL - CHEMOLA TEFLON	METHANES	94060	DSC	EXO AT 310 C
CHLOROFORM	SAFE SEAL GRAFPAK (UCAR CARBON CO GRAFOIL)	METHANES	94060	HOM	NO EXO AT 22 C
CHLOROFORM	SAFE SEAL GRAFPAK (UCAR CARBON CO GRAFOIL)	METHANES	94060	DSC	EXO AT 200 C
CHLOROFORM	SAFE SEAL MULTIPAK (JOHN CRANE 6KB)	METHANES	94060	HOM	NO EXO AT 22 C
CHLOROFORM	SAFE SEAL MULTIPAK (JOHN	METHANES	94060	DSC	EXO AT 224 C