

1991 CONSOLIDATED AUDIT S&LP CHLORINE I

DD A 022930
CONFIDENTIAL

CHLORINE I PLANT

SAFETY AND LOSS PREVENTION AUDIT

BARRY GUILLORY

July 31, 1991

DO A 022931
CONFIDENTIAL

LOSS PREVENTION AUDIT:

Audit Team: Bill Franklin, Buck Bailey, Al Lott

Presentation: Barry Guillory

RECOMMENDATIONS:

ELECTRICAL:

- *1. The electrical area classification plot plan needs to be reviewed and updated. Consideration should be given to reclassification of some currently unclassified hydrogen process areas. This evaluation should include participation by production, Loss Prevention, and the Electrical Emphasis Team. In progress updated 2/12
- *2. Recommendations from the Electrical Audit team should be considered as part of this list. See Electrical Audit Section.

FIRE PROTECTION:

- Done
- *1. The plant consideration for use of foam for a large liquid spill around the sphere has changed, based on recent test results. This needs to be reviewed with the Fire Protection and Security Dept. In progress by Charlie Cooke.

EMERGENCY BLOCK VALVES:

- Done
- 1. Audit the plant EBV's and identify them in the field per LPP 1.5.5. ?????????
No action taken
 - *2. I support the CEI recommendation to review the possible need for additional EBV's in the purification area. ????????? No action taken

EMERGENCY PLAN:

- Bill Franklin
Complete
- *1. Review the Fire Protection Plot Plan drawing and assign someone to get it revised to existing conditions. Create a CHAMPS project number to get on the Engineering drafting work list and I can work with the draftsman to review and approve it. ???????????????
 - *2. Schedule a planning meeting with the Fire Protection Dept. to identify potential fire scenario situations. Develop tentative plans of action for their assistance upon arrival. In progress by Charlie Cooke.
 - 3. Add some information about the potential for an iron - chlorine fire and actions to take (or not take) if it happens. Contained in operations procedures and is not required in Emergency Procedures. Recommendation addressed and action considered completed.

CRITICAL EQUIPMENT:

1. Review the critical equipment list to see if it is still acceptable and complete. Completed 12/91 by Ronnie Tullier.

BUILDINGS:

- Done ✓
- *1. Review the current positive pressure condition of the control room. Determine what would be required to guarantee a continuous positive pressure in the building? Building will be sealed. Further improvements will be considered when spending constraints are eased. (Sealing building to be completed by 12/92 by Jimmy Lumonville).

EXPANSION JOINTS:

1. Review the need for expansion joints in service on the HCl pumps. In progress.

CONTROL OF CHANGE:

- ✓
1. Send me a copy of your Management of Change implementation plans when they are developed. In progress. (Jimmie Grissom by 12/92)

HAZOP:

- ✓
1. Contact the Texas Operations-Chlorine Liquidfaction plant and discuss the results of their HAZOP study to see if there is any learning for the LAD Chlorine plant. Completed 7/92. Texas HAZOP study was very specific to their operation.
 2. What area of the LAD plant would you consider as a candidate for a HAZOP study? Liquefaction Area. However, there are no current plans for a HAZOP study. Action considered complete.
 3. What upcoming capital projects should be considered for a HAZOP study? NC13 Decomposition project. HAZOP study will be considered at the appropriate time. Action considered complete.

OTHER:

1. Not included in this list but considered as recommendations are the items identified by the plant as "Opportunities for Improvement".

CHLORINE I PLANT 1993 CONSOLIDATED AUDIT

SCHEDULE

Aug. 30 - Sept. 3:

- Assign plant contacts and distribute questionnaires

Sept. 6 - 27

- Fill out questionnaires
- Schedule individual audits for October
- Conduct internal review of "first pass" answers to questionnaires
- Submit completed questionnaires to Howard Wilkinson for distribution to individual audit teams (must be done at least 2 weeks prior to the scheduled audit date)

Oct. 3 - 29

- Conduct individual audits

Nov. 4

- All audits and questionnaires complete
- Finalize agenda for wrap-up session

Nov. 9

- Consolidated audit wrap-up session

DO A 022934
CONFIDENTIAL

CHLORINE I PLANT 1993 CONSOLIDATED AUDIT

PLANT CONTACT ASSIGNMENTS

<u>Section</u>	<u>Functional Team Leader</u>	<u>Plant Contact</u>
Safety	Don Jones	Troy Creel
CEI	Jim Gibson	Clark Ponthier
HMTR	Dean Smith	Charlie Cooke
Occ Health	Gary Meier Geof Kusch	Billy Hood
RXChem	Gerald Wagener	Jim Haney Katrina Smith
Loss Prev.	Buck Bailey	Monty Heins Scott Daigle
Security	Al Lott	Scott Daigle
Electrical	Mike Gee	J. Jumonville
Process Control Network	Steve Villarrubia	John Williams
Lab	Steve Caldwell	Chawan Palmer

DO A 022935
CONFIDENTIAL

SUBJECT

SHEET

CP

Questions for Buck Bailey

Hours 2

1) Last inspection for insurance purposes	4	2	
2) Pipeline info	10	6	9/30
3) Overall evaluation - written summary	15	5	10/1
	17	2	10/4
	20	3	10/5
	25	5	10/6
	26	1	10/11
	27	1	10/12
	32	5	10/13
	35	3	10/14
	39	4	10/15

Questions for Jimmy Jurnonville

550 26

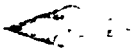
Elect classification Areas well-defined
Elect. " drawings up to date

Complete
✓ Elect.
✓ Human Factors
✓ Fire Prot.
Fired Equip.
Equip/Bldg Location
Flam/comb Mix
Hazop
MOC

✓ 17 - Elect
✓ 13 - Human
✓ 18 - Fire P
✓ 19 - DEL
✓ 20 - FE
✓ 22 - Equip
✓ 29 - Flam
✓ 15 - Hazop
✓ 28 - MOC
✓ 20 - PR
✓ 30 - PSSR

15 2618 MCC SA+B
15 ZONES
⑦ Comp Room
⑥ " Shop
⑤ " Eg Rm
349 Comp Rm
2 TDC
1 TDC/Medicon
8 Switchhouse 1
9 #2
10 #3
11 480 MCC
12 UPS
13 15 KV MCC
14 2400 MCC

DO A 022936
CONFIDENTIAL



CONFIDENTIAL

TO: _____
FROM: _____
SUBJECT: _____

DATE: _____
BY: _____
DATE: _____

SHEET _____ OF _____

Documents Needed For SLP Audit

- 1) Elected Class Dwg P7-030/050
- 2) C-9 Master List B01-600
- 3) Cell Service & PSV info
- 4) Fire Ext. Checklists - Shift 4 Fire Dept
- 5) Smoke Detectors Maint
- 6) Monitor Gun Maint
- 7) Mod 5 procedures
- 8) Grounding test results

Questions

Drainages - Q4
EBVIs Q1

DO A 022937
CONFIDENTIAL

CHLORINE I PLANT CONSOLIDATED AUDIT PROGRAM

I. OPENING (MONDAY, JULY 29, 1991-- DOW CONFERENCE CENTER)

Howard Wilkinson of the LAD Auditing Group began the opening session by expressing gratitude to the Chlorine I plant personnel for the time and effort put into completing all the pre-work involved in preparing for the consolidated audit. The three day audit agenda was also reviewed.

II. CHLORINE I PLANT OVERVIEW PRESENTATION

Joe Muller and Stew Serpas presented an overview of the plant's Process, Policies, Organization, Communication Methods, Training Programs, Significant Incidents, Employee Job Descriptions and Expectations.

III. CHLORINE I PLANT TOUR (10:30 a.m. to 11:30 a.m.)

Before leaving for the plant tour the Chlorine I plant indoctrination video was reviewed by the audit teams. Stew appointed each Chlorine plant contact to his respected functional audit team to serve as a tour guide.

HAZARDOUS MATERIAL TRANSPORTATION
LOSS PREVENTION/FIRE/SECURITY

SAFETY
OCCUPATIONAL HEALTH

CHEMICAL EXPOSURE INDEX
REACTIVE CHEMICALS

JIM HANEY/CHARLIE COOK/
BARRY GUILLORY/
JOE MULLER
STEW SERPAS
KEITH JEFFERIES/
MURPHY TORRES
PAUL YONTS/STEVE LANDERS
STEVE LANDERS/DON HULL

SUMMARY:

The Chlorine I plant overview presentation gave a clear understanding of the plants overall effort to make Chlorine a safe and productive place to work. We support the efforts being spent to implement the In-Plant-Training (IPT) concept at Chlorine and your efforts to up-date your plant procedures.

Excellent job on your overview presentations.

Thanks, LAD Consolidated Auditors

HAZARDOUS MATERIAL TRANSPORTATION REVIEW

(Monday, July 29, 1991--12:00 p.m. to 1:30 p.m.)

Audit Team: Dean Smith, Bill Herrin, Fritz Simonson, Ernie Wall,
John Gallamore(U.S. Area)

Presentation: Jim Haney

Attendance: Charlie Golden, C/A Tech Center--C. Cooke, CL2--Marty
Morrison, Power/Utilities--Allan Sandow, C/A Administration
M. Thompson CL2--Buck Bailey, Loss Prevention--Joe Muller,
CL2--Gary Meier, LAD Auditing Dept.

Writer: Dean Smith

The Chlorine Plant pre-planning and team work in the area of hazmat transportation has earned them a reputation for quality and excellence. The preaudit information was sent in in a timely manner and allowed both the plant and the auditors ample time to review necessary items.

RECOMMENDATIONS:

1. As mentioned in the presentation, the plant will continue to support the Product Dept development of product quality Distribution Specifications for non-Dow shippers involved in Swaps, Tolls or Trades. Written documentation of compliance is required from the non-Dow shipper.
2. Concerning the IPT modules for T/C Securement, Loading/Unloading procedures, be sure this training coincides with the new Dot Hazardous Materials regulations that are coming into effect. Contact Dean Smith for review.
3. Consider reviewing with the carrier/supplier of Freon (DuPont) concerning regulatory compliance including E/R planning/capabilities of their drivers and equipment.
4. There was a question raised concerning the integrity of the load/off load hoses. Documentation has been supplied that address and confirm that the hoses are included in a pressure test program.

DO A 022939
CONFIDENTIAL

5. During the plant operations tour, there were several questions raised concerning the "attendance" requirements for loading/off-loading. I will forward the relevant DOT regulations as well as an interpretation of those by the Chief Council to the DOT.

CHEMICAL EXPOSURE INDEX (CEI)

(Monday, July 29,1991--1:45 p.m. to 4:00 p.m.)

Audit Team: Jim Gibson, Mark McCullough, John Gallamore (U.S. Area).

Presenter: Paul Yonts

Attendance: Charlie Golden, C/A Tech Center--S. Landers, CL2--C. Cooke, CL2--M. Morrison, Power/Utilities--J. Thomerson, C/A Tech Center--A. Sandow, C/A Administration--B. Bailey, Loss Prevention--Joe Muller, CL2--Gary Meier and Howard Wilkinson, LAD Auditing Dept.

Writer: Jim Gibson

In general the Chlorine Plant appears to be in excellent shape from a CEI stand point. The plant P&ID's are up to date, IPT concept is well underway, the operators are knowledgeable, and plant personnel in general have a good attitude.

ACCOMPLISHMENTS/MAJOR CHANGES SINCE LAST REVIEW (1989):

1. Installed dual train, titanium chlorine scrubbers.
2. Eliminated "Worst Case Scenario" chlorine liquid manifold by removing all one inch nipples.
3. Implemented Mod V control on Rectifiers 2 and 3.
4. Program initiated to replace standard packed valves with bellows seal valves in liquid chlorine service.
5. Preventative maintenance completed on gas distribution to EDC, Solvents,and Glycol I.
6. The Chlorine Plant N2 pressure was increased with an additional feed from the Division N2 header.

DO A 022940
CONFIDENTIAL

* INDICATES PRIORITY ITEM

7. Piping upgrades have increased Chlorine Plant Air reliability.

RECOMMENDATIONS:

- * 1. Continue to pursue the idea of reducing the chlorine sphere pressure to near ambient. At the current storage pressure any spill would result in a 6.5% adiabatic flash.
- * 2. The Chlorine Plant eliminated one inch nipples on the liquid distribution header after the last CEI audit. This search should be expanded into the rest of the block with emphasis on high traffic, high risk areas. Any unnecessary small nipples should be removed.
- 3. The Chlorine plant personnel have identified the areas where surface corrosion has reached an unacceptable level mainly in T-54 piping area and in six emergency dump lines. Spot thickness checks show that pipe wall loss is minimal. Plans have been in place to sanblast and paint or replace affected piping this year.
- 4. "Worst Case Scenarios" should be developed for the next CEI review from sections of the plant where relatively large quantities of liquid chlorine are located other than the sphere. The diking, sump drainage, blower and scrubbing available to aid the containment of any spill from the sphere may keep it from being the worst case.
- 5. Testing of the EBV's at the bottom of T-54 should be implemented later this year as planned. Results of such testing should be documented and plans made to implement a similar plan for T-56.

SECURITY AUDIT

(Tuesday, July 30, 1991--8:00 a.m. to 8:30 a.m.)

Audit Team: Bill Franklin, Buck Bailey, Al Lott

Presenter: Barry Guillory

Attendance: A. Sandow, C/A Administration--J. Thomerson,
C/A Tech Center--D. Hull, CL2--T. Creel, CL2--J. Williams,
CL2--J. Muller, CL2--J. Haney, CL2--G. Meier
and H. Wilkinson, LAD Auditing Dept.

Writer: Bill Franklin

DO A 022941
CONFIDENTIAL

* INDICATES PRIORITY ITEM

ACCOMPLISHMENTS:

1. Personnel adhere to Corporate and Division Security Policies.
2. Personnel have a good basic understanding of their responsibility to protect company assets.
3. The C-9 checklist is used for documentation of several Security requirements.
4. Anti-Virus programs have been installed on all PC's.
5. All PC's are under lock and key.
6. Personnel are well trained on computer security.
7. Personnel have been trained to challenge visitors/strangers in their work areas.
8. Emergency Response and training is covered in IPT modules.

RECOMMENDATIONS:

1. Consider identifying a Chlorine Plant Representative to serve as a manufacturer representative for P & ID's. Area piping and instrument diagrams should be released only through this employee and returned to him/her for disposal when no longer needed.
2. Consider developing a control system for P & ID's that will include a numbering system and document who drawings have been released to.
3. P & ID's should be stamped "Do Not Copy".
4. Computer prints should be properly disposed of by a paper shredder or burn barrel.
5. The equipment file room, production records and accounting information should be placed in a locked room.

ELECTRICAL RELIABILITY AUDIT:

July 30, 1991

SPECIFIC AREAS OF IMPROVEMENT:

(Since Audit of 11/88)

- - Observation: 480 volt MCC building walls show severe crackling.

Corrective Action: Walls repaired.
- - Observation: Electrical rooms out of compliance with LPP i.e. no smoke detectors in building.

Corrective Action: Building smoke detectors have been installed in all electrical rooms. Also smoke detectors have been installed in 480 V MCC's per latest recommendations of LPP.
- - Observation: No records of routine battery maintenance.

Corrective Action: LAD Battery Maintenance Group has taken over battery maintenance and has posted maintenance records.
- - Observation: Several electrical equipment rooms cited for poor housekeeping.

Corrective Action: In most electrical rooms, the housekeeping, generally was much more improved.
- - Observation: External corrosion noted on several components of each of the rectifiers.

Corrective Action: With the exception of reactifier 1, all other rectifiers showed marked improvement in areas of external corrosion.

DO A 022943
CONFIDENTIAL

RECOMMENDATIONS:

1. Clean, prime and paint transformers T-1A and T-1B (especially the radiators). Consideration should be given to removing the cooling fans from radiators and mounting on a freestanding rack to minimize future corrosion of the radiators.
2. Repair/replace exterior doors in 15 KV switchgear room (especially the battery room).
- * 3. Repair/replace exterior door on northeast entrance to MCC-4/5 building to curb corrosion becoming evident on MCC-E, 5A, and 5B.
- * 4. Seal cable tray entrances to MCC-4/5 building especially on north wall where water leakage is evident.
- * 5. Provide additional supports for open wiring on north wall of TDC room (specifically the Modicon Room) to remove the strain from the wiring terminations on the wall mounted terminal strips. (This is wiring for extremely critical system).
6. Label all electrical equipment and devices (especially buildings and transformers).
7. Install emergency lighting in electrical equipment rooms.

Notes: The following general recommendations require long-term, continuous attention and action but will result in a much improved electrical installation enhancing the overall electrical reliability of the plant.

8. Discontinue the use of "unistrut" and conduit clamps to the largest extent possible on exterior support systems for field wiring and/or devices. Angle iron or channel iron and u-bolts are recommended instead.
9. Physically remove field wiring and conduit that has been identified for "demolition" as the equipment is removed. This will ease cable tray overloading and conduit clutter, etc.
10. Review all electrical equipment room seold's yearly and have them dated.

11. Continue with the good p/m program for motor starters, transformers, etc. (Ex. Battery condition and C-40A imminent failure discovered during last p/m work).

General Comments:

1. Overfilled and overloaded cable trays are common sights that can be observed in many sections of the plant. For the greatest part, cabling and cable trays are in good condition; however, at entries into electrical rooms and at transition points, cable trays tend to be over filled and overloaded, cables are not tied or anchored to the trays and cabling is dangling, jumbled, disorganized and/or not installed in a good workmanlike manner.
2. Electrical rooms are, for the most part, structurally sound and in good condition. Noted exceptions include:
 - A. The laboratory or test building (no label) located in the brine area appears to be taking weight or for some other reason, the overhead concrete is breaking apart. Dangling bits and pieces could conceivably fall and injure someone.
 - B. During inclement weather, there is a severe water leak at the cable tray entrance in the MCC room, building 2625. This building was audited during fair (not raining) weather and the statement made here is work of mouth. However, two brooms and three mops should be sufficient to attest the authenticity of the statement.
3. Non compliance with the Louisiana Division's Safety and Loss Prevention (S&LP) standard S-316, Electrical Safety, is common place throughout the plant. Noted areas worthy of concern include:

Paragraph F. Identification of Electrical Equipment

Unlabeled or incorrectly labeled equipment is commonplace for transformers, motors, enclosures, switches and other electrical devices. At least two buildings are unlabeled and one building 2605 is incorrectly labeled. In addition, on the Safety Electrical One Line Diagram, B7-012A-C50-001, feeder H-207 is incorrectly labeled and the rectifier aux. backup power transformer, the north block service transformer and a transformer for the new office building are not identified (labeled).

DO A 022945
CONFIDENTIAL

Paragraph E. Safety Electrical One Line Diagram (SEOLD)

None of the audited electrical rooms were in compliance with S&LP standard S-316, Paragraph E. Safety Electrical One Line Diagrams are available in four electrical rooms; however, the drawings have not been updated within the preceding 12 month interval there are no posted Safety Electrical One Line Diagrams in the other rooms.

Paragraph G. Safety Clothing

S&LP standard S-316 does not require safety clothing for each electrical room but it does require the availability of protective clothing for switching and emergencies. Also, it requires periodic high voltage proof testing of the 15 kv rubber gloves.

Protective clothing is available in the switchgear room, building 2627 and an incomplete set is available in switch house No. 3. The 15 kv rubber gloves, part of the protective clothing is located in the switchgear room, have not been high voltage tested during the preceding six month interval and when audited, there were no 15 kv gloves with the protective clothing located at switch house no. 3.

Equipment audited has been in service for sometime and excluding the condition of cabling and cable trays in certain areas, the effects of corrosion (especially so for unistrut and exposed metallic parts) and some items not in compliance with Divisional safety standards, audited equipment appears functional, in relatively good condition and well maintained.

In comparing statistics of this audit with those contained in the last electrical audit (November, 1988) improvement is indicated for the overall plant and for three of six audit categories. Electrical switchgear - starters or electrical rooms, transformers and rectifiers show improvement; whereas, electrical power feed, field wiring and motors remain the same or as before.

Visually, improvements are more readily apparent in the switchhouses, in the building structure repairs (MCC building 2625), rectifiers and in some of the electrical rooms.

REACTIVE CHEMICALS AUDIT

(Tuesday, July 30 -- 8:30 a.m to 11:30 a.m.)

AUDIT TEAM: Gerald Wagener, Mark Mitchell, Don Jones, Steve Milligan,
John Gross

Plant Team: Steve Landers, Joe Muller, Stew Surpas

ACCOMPLISHMENTS SINCE LAST 2 YEAR REVIEW:

The Reactive Chemicals package which has been prepared since the last 2 yr review is excellent and Chlorine Plant personnel did a superb job at focusing in on the pertinent reactive chemicals concerns.

Significant progress has been observed in the area of Operating Discipline, specifically with IPT modules. Also, reactive chemicals information is included in operating discipline.

50% of all the relief systems have been cataloged and excellent progress is being made to complete this survey. All liquid versus gaseous chlorine vents have been segregated.

Excellent improvements have been observed in the critical instrument area with respect to alarms aimed at rapid detection of instrument failures.

Reactive chemicals improvements have also been observed in the area of chlorine scrubbing with the new titanium scrubber system.

Excellent lab chemical storage policies have been established to minimize reactive chemicals hazards.

Elimination of metal containers for waste handling has reduced the reactive chemicals hazard potential in that area.

Excellent program in place for avoiding incompatible heels in chlorine tank cars.

RECOMMENDATIONS:

1. Consider obtaining more complete documentation on the worse case credible scenarios which were used for sizing the taffy pot PSV's. This information should reside in the Chlorine Plant reactive chemicals file and should be used in your reactive chemicals training program.

2. Chlorine cells are not designed with conventional pressure relief devices for relieving pressure problems resulting from reactive chemicals excursions--instead the cell covers are the relief devices. Consider reviewing this with the Pressure Relief Emphasis Team.
3. Consider performing positive identification tests on Freon 12 deliveries. Certificate of analysis is provided by the vendor but this is not considered fool-proof.
4. The recommended spec and analytical testing requirements for HCL should be re-evaluated/re-written whenever the source is changed to reflect the particular contaminants that are possible at the new source. Currently HCL is obtained from DuPont, BASF and Texas. Acid obtained from the CMP plant in Texas contains methanol. Since methanol has been responsible for a taffy pot explosion at another location (due to formation of methyl nitrate) shipments from Texas should definitely be analyzed for methanol content prior to off-loading.
5. It was mentioned that not all critical instruments are truly redundant. Review the critical instrument list and determine if true redundancy exist in areas where key reactive chemicals concerns exist.
6. Document the fail safe positions of all critical instruments that are in area where key reactive chemical concerns exist.
7. Written policy should be established for covering set point changes for critical instruments.
8. Consider developing a comprehensive program for training in plant craftsmen and operators on the reactive chemical hazards pertaining to materials of construction with respect to process chemicals.
9. Concerning materials of construction: Review and if necessary update procedures aimed at assuring that parts issued are compatible with the process chemicals. Facts such as the voltage wire in the cells being made of titanium should be communicated to the appropriate plant personnel. The hazards of using aluminum in the wrong service should also be communicated.
10. Concerning operating discipline: Start-up procedures are in need of improvement and critical operating parameters with respect to reactive chemicals hazards should be reviewed for detection of failure.

11. A written policy should be established for ownership of lab chemicals.
12. Consider getting Maintenance Tech Service (Mark Bartel) to do a spot audit of your spare parts inventory to confirm the material of construction is indeed what you expect it to be. MTS has a portable x-ray analyzer that is used to verify materials of construction.
13. The hazards of potentially explosive levels of hydrogen in the tail gas scrubber should be communicated (perhaps in the reactive chemicals training program). It was mentioned that hydrogen concentrates in this area are due to removal of chlorine and carbon dioxide.
14. Concerning waste handling: Written procedures should be established for minimizing the risk of inadvertently mixing together incompatible waste.
15. Concerning NCL3 in the he heavies reboiler: Documentation of worse case credible scenarios should be obtained for establishing the various alarm set points and the zero deg C/24 hr dump cycle. This information should be reside in the Chlorine Plant reactive chemicals file and would be an excellent topic for reactive chemicals training program.
16. Consider developing a cross compatibility chart for all process chemicals in use at the Chlorine Plant. Unit 2 in Texas has an excellent compatibility chart based on the CHEMPAT computer program that perhaps could be modified for your purposes. Two contacts were mentioned that may be of some assistance (Eugene at Unit 2 and Dave Leggett in Texas Reactive Chemicals Lab). This chart could also be used in your reactive chemicals training program.
17. It was mentioned that ruthenium tetroxide can get into the the chlorine plant taffy pot and act as a chlorination catalyst which could lead to a reactive chemicals incident. An explosion occurred in due to this condition. Consider obtaining more detailed information on this incident for review and, if necessary, modify your lines of defense for avoiding a similar incident.
18. It was mentioned that a reactive chemicals hazard would result if excess HCL is pumped to the cells. A suggestion was made to review the shutdown trip logic to assure that lines of defense are adequate.
19. The potential problem of hydrogen backflow through the seal pots was discussed. A suggestion was made to document the known scenarios which could lead to this condition.

COMMENTS:

With respect to scrubbers it was mentioned that pH of greater than 10 does not guarantee the elimination of plugging problems due to bicarb formation.

OCCUPATIONAL HEALTH AUDIT

(Tuesday, July 30, 1991--12:00 p.m. to 4:00 p.m.)

Audit Team: Gary Meier, Geof Kusch, Bruce Heinze, Marty Morrison, Freddie Gascon

Presenter: Keith Jefferies

Attendance: A. Sandow, C/A Administration--M. Torres, CL2
--J. Thomerson, C/A Tech Center--J. Muller, CL2
--H. Wilkinson, LAD Auditing Dept.

Writer: Gary Meier

EDUCATION AND TRAINING:

Hazard Communication is emphasized through the annual employee meetings, a complete and readily available HAZCOM Manual and pre-job evaluations through the safe work permit process. This was also verified from the employee survey where all responses indicated they knew the hazards of the chemicals and where to find MSD sheets. The standard lab labeling system is used extensively.

RECOMMENDATIONS:

- * 1. The new employee orientation video for Contractor and Dow (including technical and clerical) employees is an effective method to convey consistent information in multiple sessions, but because it is about 4 years old, some updating is needed. The HAZCOM section could be strengthened with introduction to HAZCOM and more specific health hazard effects from the chemicals in the block. The Industrial Hygiene department can assist you with this.
- 2. Efforts to make the CPAI as complete and representative as possible for the job assignments will result in a helpful resource for indoctrination training and documentation purposes.

3. We support your plans to develop IPT training modules for Industrial Hygiene. This will help improve the timeliness and formal documentation for new employee orientation as well as other reviews.
4. Documentation of safety meetings (including monthly, tailgate and prejob) could be improved with a more detailed agenda describing the items covered, along with your sign-up sheet that is currently being used.
- * 5. In general, labeling of vessels and containers was good except we did find some five gallon plastic sampling containers not labeled. It would be a good exercise to verify that all vessels listed in your HAZCOM manual have the ID numbers printed on them (Are there any other vessels that should be on this?) and further communicate labeling requirements.

RESPIRATORY PROTECTION PROGRAM:

Chlorine has a good weekly and monthly respirator inspection program and backed-up with inspection records and C-9 checklist. Annual training is done by the IH plant contact and this involves that each employee demonstrate SCBA proficiency. Full face respirators are checked out from the store room for daily usage and returned to the cleaning station at the end of the shift for cleaning and re-stocking in plastic bags.

RECOMMENDATIONS:

- * 1. Consider upgrading the control room auxiliary air supply system by:
 - a. replace the old Robt Shaw facepieces with the Scott-O-Ramic units with egress capability.
 - b. include these masks in the Vallen's annual maintenance service program.
 - c. simplify activating (opening all of the manifold valves) the breathing air cylinder system located outside.
2. We would also suggest replacing the Robt Shaw escape units at the loading racks with the more commonly used Elsa or Life Air.

DO A 022951
CONFIDENTIAL

- * 3. We appreciate your support to review sulfuric acid sampling procedures and frequency and to select proper respiratory protection (such as Confo II or equivalent) while taking samples until an in-line system is developed. Industrial Hygiene will work with you to find the best combination of protective equipment.
- 4. We agree with your plans to emphasize the proper cleaning of the mouth-bit respirator.
- * 5. We did find several respirators in the shop area that need immediate cleaning and storage attention. Further communication may help prevent a recurrence.
- 6. The written respirator program was last updated in August, 1989. This should be revisited and address fit testing and medical approval requirements.

VENTILATION PROGRAM:

Special task, such as analyzing cell samples are done in a fume hood. The main lab hood has a cell effluent scrubber to neutralize chlorine. There is an on-going inspection/maintenance program. Hoods are equipped with Dwyer II static pressure manometer. Housekeeping in the hoods was good.

RECOMMENDATIONS:

- 1. The new Dwyer manometer needs to be calibrated, (arrange a time with Industrial Hygiene to do that). The Dwyer manometer on the cell operations lab hood had been overfilled with fluid and can not be zeroed.
- 2. There is very little ventilation in the shop welding area other than natural draft through the large doors. Welding fume monitoring should be conducted under closed-up conditions. Local ventilation at the source of the fume is the best engineering control.

HEARING CONSERVATION:

The plant has a written Hearing Conservation Program and all personnel are given annual training and audiograms. All areas of the plant with noise levels above 90 decibels are posted to require the use of hearing protection. The chlorine drying train compressors and pumps accounted for most of the noise above 90 decibels. The OSHA Occupational Noise Standard 29CFR 1910.95 is posted in the control building.

RECOMMENDATIONS:

1. Although limited personal audio dosimeter data suggest that only one job assignment (Liquidfaction Operator) exceeds 50% of the allowable daily dose, more data are needed to verify this and complete the exposure profiles.
2. Over the next 5 years, the compressors will be replaced and if noise abatement is in the design, the background noise levels in the plant can be significantly reduced. We agree with your plans to have octave band analysis done to identify those areas for engineering improvements.
3. It would be beneficial to include off the job noise exposure information in the hearing conservation training program. A program on off-the-job noise exposure is available through M.J. Joffrion R.N. in the Medical Dept.

PERSONAL PROTECTIVE EQUIPMENT:

Personal protective equipment is noted in all job procedures and reviewed when safe work multi-permits are issued. Verification of dielectric effectiveness of rubber boots is required and documented before entrance into the cell area.

RECOMMENDATIONS:

1. We found several examples of where PPE was left in the work area and not properly stored. Better housekeeping is needed. Boxes for face shields could be located near the wheel grinders which would help to keep them clean and available.
2. You have identified that contractor employees could emphasize proper use of PPE in their training and will use opportunities to promote that issue. We all share and support that effort.

DATA GENERATION AND MONITORING:

An extensive data base for potential chlorine exposure has been built through the Dow-Tulane Epidemiology Study. The Industrial Hygiene annual report has been completed for 1990. Chlorine warning device probes continuously monitor the plant and alarm in case of an upset.

RECOMMENDATIONS:

DO A 022953
CONFIDENTIAL

1. On-going monitoring activities have been identified and we need your continued support to complete evaluations along with the proper documentation and reports.
2. Although there are chlorine warning devices through the plant, none are located inside the analyzer houses. We ask that you review this situation for the expanded use of probes or what procedural control could be adapted.
3. We agree with your plans to develop a plant IH-9 (similar to the C-9) checklist to organize and keep track of required IH activities.
- * 4. Follow-up is needed regarding wipe testing for Hex's during turnarounds.

ASBESTOS:

There is an Asbestos Abatement Team that oversees activities in the plant. The survey of asbestos usage is current (6/91). The hazards are communicated via an IPT module and annual HAZCOM training. All asbestos insulation and gasket work is handled by non-Dow employees with specialized training. There is an active program to evaluate gasket replacements. Asbestos is the only OSHA regulated chemical in the block.

RECOMMENDATIONS:

1. Specialized task, such as pulping cells, should continue to be monitored to ensure regulatory compliance.
- * 2. The storage place for asbestos gaskets is in a high traffic area and even though Petrin cleans the area weekly, a more protective/enclosed location is needed to prevent the escape of any friable fibers.

RADITION:

Administration and inspection schedule is conducted by the Division Radiation Officer and follows Division Safety Standard S-307. Required posting are in the control room building.

RECOMMENDATIONS:

1. Radiation hazard training should be part of the HAZCOM program, IPT module, block indoctrination film and listed on the CPAI.
2. The Ohmart unit will be removed from T-56 tank when the vessel is scheduled for inspection.
3. The radiation sign on the unit in the cell operation lab hood is weathered and needs to be replaced.

GENERAL-INDUSTRIAL HYGIENE:

There are designated areas for storing food and eating lunch and washrooms are strategically located. Dermatitis has not been a problem in the block.

RECOMMENDATIONS:

1. We agree with your plans to formalize a policy of washing hands and face before eating or smoking.
2. The cleaning of lunch rooms are done by the janitors but refrigerators are not on their routine. Some refrigerators are in need of cleaning.

MEDICAL:

The employees in the Chlorine Plant undergo periodic medical surveillance examinations every two years and audiograms yearly. They have recently completed a five year involvement in the Dow/Tulane Chlorine Study. The results of this study should be available in the near future and will be communicated to the plant personnel.

RECOMMENDATIONS:

1. A policy needs to be developed to check with the Medical Department when a new employee transfers into the plant to be certain that the employee does not have any medical problems which could affect his/her ability to safely work in the plant.

DO A 022955
CONFIDENTIAL

2. All employees need respirator fit testing, and this will be completed in 1992 after the next round of medical surveillance exams. Prior to performing these fit tests, the plant IH contact should get in touch with the Medical Department to be certain that all employees have medical approval for fit testing.
3. In the future, contractors will be responsible for their own medical surveillance. We will need to develop an auditing system (at the Division level with verification by the plant) which will allow us to be certain that necessary medical surveillance and training is being performed.

NON-DOW EMPLOYEES:

PPE is supplied to the permanent (nesters) in-block contractors and receive the same medical surveillance as Dow employees. Lunch rooms and change/shower facilities are provided for contractors. A Dow staff member attends the contractor safety meetings. IPT modules have been developed for contract loaders and employees are well on their way to completing the formal training.

RECOMMENDATIONS:

1. A mechanism is needed to insure the results of the I.H. monitoring is conveyed to contractor employee/management in a timely manner and properly documented.
2. Other contractor items are noted throughout this report.

LOSS PREVENTION AUDIT:

(Wednesday, July 31, 1991 - 8:30 a.m. to 11:30 a.m.)

Audit Team: Bill Franklin, Buck Bailey, Al Lott

Presentation: Barry Guillory

Attendance: J. Muller, CI2--A. Sandow, C/A Administration--J. Haney, CI2 --J. Thomerson, C/A Tech Center--J. Williams, CI2--T. Creel, CI2--G. Meier and H. Wilkinson, LAD Auditing Dept.

The Chlorine plant appears to be in good condition with no serious Loss Prevention concerns.

ACCOMPLISHMENTS:

1. The pro-audit preparations by the plant staff were very helpful in contributing to a successful audit.
2. Though not yet started up, the chlorine scrubber project has been a significant accomplishment in properly engineering and installing a new system.

RECOMMENDATIONS:

ELECTRICAL:

- * 1. The electrical area classification plot plan needs to be reviewed and updated. Consideration should be given to reclassification of some currently unclassified hydrogen process areas. This evaluation should include participation by production, Loss Prevention, and the Electrical Emphasis Team.
- * 2. Recommendations from the Electrical Audit team should be considered as part of this list.

FIRE PROTECTION:

- * 1. The plant consideration for use of foam for a large liquid spill around the sphere has changed, based on recent test results. This needs to be reviewed with the Fire Protection and Security Dept.

EMERGENCY BLOCK VALVES:

1. Audit the plant EBV's and identify them in the field per LPP 1.5.5.
- * 2. I support the CEI recommendation to review the possible need for additional EBV's in the purification area.

EMERGENCY PLAN:

- * 1. Review the Fire Protection Plot Plan drawing and assign someone to get it revised to existing conditions. Create a CHAMPS project number to get on the Engineering drafting work list and I can work with the draftsman to review and approve it.

LOSS PREVENTION: Recommendations continued:

- * 2. Schedule a planning meeting with the Fire Protection Dept. to identify potential fire scenario situations. Develop tentative plans of action for their assistance upon arrival.
- 3. Add some information about the potential for an iron - chlorine fire and actions to take (or not take) if it happens.

CRITICAL EQUIPMENT:

- 1. Review the critical equipment list to see if it is still acceptable and complete.

BUILDINGS:

- * 1. Review the current positive pressure condition of the control room. Determine what would be required to guarantee a continuous positive pressure in the building?

EXPANSION JOINTS:

- 1. Review the need for expansion joints in service on the HCl pumps.

CONTROL OF CHANGE:

- 1. Send me a copy of your Management of Change implementation plans when they are developed.

HAZOP:

- 1. Contact the Texas Operations-Chlorine Liquidfaction plant and discuss the results of their HAZOP study to see if there is any learning for the LAD Chlorine plant.
- 2. What area of the LAD plant would you consider as a candidate for a HAZOP study?
- 3. What upcoming capital projects should be considered for a HAZOP study?

OTHER:

1. Not included in this list but considered as recommendations are the items identified by the plant as "Opportunities for Improvement".

SAFETY AUDIT:

(Wednesday, July 31, 1991--12:00 p.m. to 4:00 p.m.)

Audit Team: Don Jones, Brad Marks, Gervy Smith, Howard Wilkinson and Gary Meier

Presenter: Stew Serpas

Attendance: J. F. Grissom, CI2--A. Sandow, C/A Administration
--J. Haney, CI2--P. Yonts, CI2--T. Austin, C/A Administration
--T. Creel, CI2--J. Williams, CI2--J. Thomerson, C/A Tech Center

Writer: Don Jones

SAFETY PROGRAM FUNDAMENTALS:

The Chlorine Plant has a written Safety Policy. The Policy has been communicated to all employees by means of a letter. The safety committee has developed a mission statement. Also, safety is included in the Chlorine Plant and Chlor-Alkali group mission statement.

RECOMMENDATIONS:

None at this time.

EMPLOYEE RESPONSIBILITY FOR SAFETY:

Management/Supervision works with employees to set goals and review them twice a year. The new employee Safety JPR has been reviewed with all employees and goals set for the remainder of 1991.

RECOMMENDATIONS:

1. Utilized the Safety Performance Improvement Process (SPIP) to help in identifying safety goals.

PROGRAM STRUCTURE - ORGANIZATION - PLANNING:

All employees are responsible for safety. However an active plant safety committee exists with members from that serve a one year rotation. The committee conducted a survey in 1990 to aid in improving the safety program. The safety coordinator spends 90% of his time writing/reviewing permits and conducting on-site inspections. Permit writing has improved in quality the past six months. The coordinator also handles paperwork that drive the C-9 activity. The coordinator works approximately 20% overtime on a regular basis.

RECOMMENDATION:

- * 1. Provide opportunity for operations employees to serve as chairman of the plant safety committee.
- * 2. Safety Coordinator:
 - a. Provide help for the safety coordinator
 - b. Re-evaluate the role of the safety coordinator relative to the LAD safety coordinator job description.
- 3. Utilize the Safety Performance Improve Process (SPIP) in formulating safety objective, goals and plans.

SAFETY TRAINING:

All new Dow and Contract employees receive a plant safety indoctrination. Dow employees are trained using IPT's and videos. Contract employees are trained using a video and checklist. The plant felt that the LAD Contractor indoctrination needs improving and would be willing to work with Maintenance/Construction to improve. The plant has gone beyond the normal plant contractor indoctrination in a couple of instances:

- a. Developed a IPT training module for chlorine tank car loaders.
 - b. Shutdown Training. Operating procedures/IPT's are used in lieu of a safety training manual.
- * 1. Consider developing a IPT module for the block indoctrination video. The module should be detailed enough to cover all aspect of the indoctrination. This will also help verify comprehension. Also, up-date the indoctrination video.

DO A 022960
CONFIDENTIAL

* INDICATES PRIORITY ITEM

- * 2. Consider providing more complete formal documentation of safety training. The new documentation system for IPT's is a positive step.
- 3. We support your format of addressing safety at the beginning of each IPT module.
- 4. Consider developing a Chlorine Plant Safety Training Manual.

OPERATING PROCEDURES:

The IPT concept is the key. IPT module completion times are part of the goal setting and follow-up process by shift supervisors. A new IPT documentation system will provide the proper documentation.

RECOMMENDATIONS:

- 1. Consider bringing in another operator to serve as a member of the training review board.

EMERGENCY PLAN:

Plant Emergency Plan is presently being revised. Drills are held on a monthly basis.

RECOMMENDATIONS:

- * 1. Consider referencing shutdown procedures in the plant Emergency Plan.
- * 2. Consider addressing explosions and visitors in the plant Emergency Plan.
- 3. Consider developing an IPT module for the Emergency Plan.
- 4. Consider reviewing the Emergency Plan annually. Enter as a C-9 checklist item to insure review.
- 5. Consider formalize training meeting sheet to include "Header" of agenda items, presenter and attendance. This will include monthly emergency drills with space with "Learning Value", "Corrective Actions" and "Completion".

DO A 022961
CONFIDENTIAL

ACCIDENT/INCIDENT INVESTIGATIONS:

All accidents/incidents are investigated in the Chlorine Plant. The safety coordinator has primary responsibility for initiating the investigation. The supervisor and plant superintendent is also involved. Accident/Incident data is stored in a data base for retrieval and analysis. Also, the data base allows for tracking follow-up actions to completion. The Chlorine Plant is willing to share this system with the LAD committee working on a similar system.

RECOMMENDATIONS:

1. Write up all on and off-the-job accidents/incidents that are classified DAWC's in the Safe Working Styles format.
2. Consider greater distribution and visibility of the plant safety committee monthly report including follow-up actions on accidents/incidents.

SAFETY STANDARDS, GUIDES, REQUIREMENTS:

New standards and regulations are communicated at safety, staff, and tailgate meetings. Gauge glasses in freon service are not presently registered in the Pressure Vessel Program. However plans call for completing registration by 12/91.

RECOMMENDATIONS:

None at this time.

HAZARD DETECTION PROGRAM:

The plant superintendent makes inspections on a regular basis. Housekeeping, C-9, Projects, Pre-Shutdown and Pre-Startup audits are also conducted as required.

RECOMMENDATIONS:

1. Consider reinstating emphasis on Job Safety Analysis.
- * 2. Assure that all identified hazards are tracked to completion and the formal documentation exists to support the fact.
3. Consider developing a plan to better communicate the results of inspections/audits.

* INDICATES PRIORITY ITEM

DO A 022962
CONFIDENTIAL

SAFETY SUGGESTION SYSTEM:

The plant has a safety suggestion system. Approximately 300 are written each year. 90% are completed within 30 days (plan goal). The safety coordinator initiates follow-up action. Engineers are frequently involved in follow-up. The plant safety committee assures follow-up.

RECOMMENDATIONS:

- * 1. Assure that all suggestions are tracked to completion and the formal documentation exists to support the fact.

AWARD/RECOGNITION SYSTEM:

The Chlorine Plant has a Safety Award/Recognition Program. Everyone in the plant is eligible after achieving the goals set. Normal dollar value of a safety award is \$50.00.

RECOMMENDATIONS:

None at this time.

CONTRACTOR SAFETY:

Contract employees are required to adhere to the same safety requirements as Dow employees in Chlorine. A member of the Chlorine plant staff attends all weekly contractor safety meetings. All contract employees are given a Chlorine plant indoctrination consisting of a video and checklist.

RECOMMENDATIONS:

- 1. Consider involving contractors more in plant safety programs.
- 2. Consider documenting pre-job safety conferences and safety meetings.
- * 3. Consider developing an IPT module for the indoctrination film.

OFF-THE-JOB SAFETY:

Off-the-job safety is addressed in the plant safety program. Safety meeting topics such as Hunting Safety and Home Electrical Safety have proved to be the most successful.

RECOMMENDATIONS:

None at this time.

COMMUNICATIONS:

The Chlorine Plant uses a number of different materials for communicating with employees on safety.

RECOMMENDATIONS:

None at this time.

HOUSEKEEPING:

Overall plant housekeeping is very good.

RECOMMENDATIONS:

- Control Room:
- Overall housekeeping is very good.
 - * - Red Tag board is easily accessible. One master was out of date. Many masters have been rolled over. Make sure all work crew rosters are current. Be specific on task description for each craft accepting permit.
 - Safe work permit area is organized and neat.
- Office Area:
- Current information posted on bulletin board.
 - OSHA posting on board - Super!
 - * - Conference room looked good. Mechanical room needs attention. Sign on door indicated emergency equipment inside--none was found.
 - * - Microwave inspection has exceeded one year.

DO A 022964
CONFIDENTIAL

- Plant Operating Area:
- * - Safety shower visibility very good. Covers off many eye wash stations.
 - * - Several ladders missing safety gate.
 - * - Warehouse areas need attention. A thorough clean up should happen in the very near future--several tripping hazards, materials stood up against walls, asbestos gaskets laying around, flammable materials should be put back in storage cabinet.
 - * - Dimensions on grinders rest plate needs adjusting.
 - * - Add instruction sign at drill press.
 - * - Unsecured cylinders in rack. Bar not used. One bottle secured with rope.
 - Flammable storage area looks good.
 - * - Lab is neat and clean. Look at re-labeling sample bombs. Run pan duct behind center island to house wires. Re-visit drainage concern for safety shower.
 - * - Cell lab microwave needs an inspection sticker. Fire extinguisher should be made more accessible.
- Safety Files:
- Impressive computerized program with network capabilities.
 - * - Need to have follow-up on actual completion dates.
 - * - No dates under fire extinguisher training on C-9 check lists.
 - * - Recommend follow-up test after watching plant indoctrination film.
 - * - OSHA Star Box overall is in good shape. There were a few date concerns and need to add a few examples of follow-up actions/procedures.

EMPLOYEE SAFETY SURVEY:

There were 34 surveys returned. All surveys reflected job intervention (26 of 34 said they would not only intervene but would do more by showing/explaining other ways to complete the job and minimize risks). All employees knew the LAD was an OSHA Star site. However, only 40% knew their rights under the OSHA VPP/Star program. Responses to other questions are as follows:

- Supervisors view on safety - 97% very high to excellent.
- Training before starting something new - adequate to very well, several positive IPT comments.
- If acting at appropriate times, can accidents be prevented:
 - 44% all of the time
 - 56% most of the time
- 34 out of 34 said they knew where MSDS sheets were located.
 - several said they had used MSDS sheets

EMPLOYEE INTERVIEW SUMMARY:

Overall, familiarity with Safety Phase III Program was low. While some stated they remembered the name, no one could remember any of the specifics. No one remembered ever having seen the 19 Safety Principles. Everyone understood and most were in agreement with the policy that limits overall rating to no more than safety rating. There was some concern expressed about how off the job incidents might affect a person's safety rating. Everyone stated that they were comfortable intervening and knew that this was a condition of employment. Everyone felt that management was committed to safety. One person felt that "upper management" was more committed than first line supervision.

No one had been exposed to the Safety Performance Improvement Process.

Everyone was familiar with their emergency plan. They were all aware of their job responsibilities. The monthly emergency drills were felt to be very helpful in keeping everyone up to date on specific emergency procedures. While everyone interviewed knew the assembly points, most expressed some concern about how well the newer contract employees knew them. Over half of those interviewed had no knowledge of the new Division Emergency Plan.

When asked what suggestions for improvement do you have for Chlorine Plant Safety Program?

1. Put an additional person on days to work with the Safety Coordinator.
2. Continue to use incentive programs (money) to spark interest and participation.
3. Management should not accept unsafe acts in emergency situations and should provide more positive reinforcement.

When asked what safety concerns do you have?

1. Plugs on H₂SO₄ cars are sometimes so tight that a "cheater" is required to loosen them. This puts the person (who is working in an acid suit) in a very awkward position.
2. Almost everyone felt that the workload on the safety coordinator was too high.
3. Operations of the cell switches is of concern.
4. Catching unnecessary samples in the acid area was brought up as a concern.

HAZARDOUS MATERIAL TRANSPORTATION REVIEW

1. As mentioned in the presentation, the plant will continue to support the Product Dept development of product quality Distribution Specifications for non-Dow shippers involved in Swaps, Tolls or Trades. Written documentation of compliance is required from the non-Dow shipper.
3Q91-2Q92: C. Cooke, J. Muller via Chlor-Alkali CMT
2. Concerning the IPT modules for T/C Securement, Loading/Unloading procedures, be sure this training coincides with the new Dot Hazardous Materials regulations that are coming into effect. Contact Dean Smith for review.
3Q91-4Q91: T. Creel, S. Serpas
3. Consider reviewing with the carrier/supplier of Freon (DuPont) concerning regulatory compliance including E/R planning/capabilities of their drivers and equipment.
3Q91-4Q91: S. Landers
4. There was a question raised concerning the integrity of the load/off load hoses. Documentation has been supplied that address and confirm that the hoses are included in a pressure test program. No action required.

DO A 022968
CONFIDENTIAL

5. During the plant operations tour, there were several questions raised concerning the "attendance" requirements for loading/off-loading. I will forward the relevant DOT regulations as well as an interpretation of those by the Chief Council to the DOT.
5 Sept 91: Dean Smith has provided a copy of DOT regulations
4Q91: Charlie Cooke

CHEMICAL EXPOSURE INDEX (CEI)

1. Continue to pursue the idea of reducing the chlorine sphere pressure to near ambient. At the current storage pressure any spill would result in a 6.5% adiabatic flash.
Included in Hard Freon Replacement Project Scope
2. The Chlorine Plant eliminated one inch nipples on the liquid distribution header after the last CEI audit. This search should be expanded into the rest of the block with emphasis on high traffic, high risk areas. Any unnecessary small nipples should be removed.
* 3Q91-4Q91: S. Landers
3. The Chlorine plant personnel have identified the areas where surface corrosion has reached an unacceptable level mainly in T-54 piping area and in six emergency dump lines. Spot thickness checks show that pipe wall loss is minimal. Plans have been in place to sanblast and paint or replace affected piping this year.
* 4Q91: S. Landers
4. "Worst Case Scenarios" should be developed for the next CEI review from sections of the plant where relatively large quantities of liquid chlorine are located other than the sphere. The diking, sump drainage, blower and scrubbing available to aid the containment of any spill from the sphere may keep it from being the worst case.
3Q93: CEI Section Engineer
5. Testing of the EBV's at the bottom of T-54 should be implemented later this year as planned. Results of such testing should be documented and plans made to implement a similar plan for T-56.
4Q91: S. Landers

SECURITY AUDIT

1. Consider identifying a Chlorine Plant Representative to serve as a manufacturer representative for P & ID's. Area piping and

instrument diagrams should be released only through this employee and returned to him/her for disposal when no longer needed.

4Q91: Barry Guillory

2. Consider developing a control system for P & ID's that will include a numbering system and document to whom drawings have been released.

4Q91: Barry Guillory

3. P&ID's should be stamped "Do Not Copy".

4Q91: Barry Guillory

4. Computer prints should be properly disposed of by a paper shredder or burn barrel.

4Q91: J. Williams

5. The equipment file room, production records and accounting information should be placed in a locked room.

2Q92: P. Yonts

ELECTRICAL RELIABILITY AUDIT:

1. Clean, prime and paint transformers T-1A and T-1B (especially the radiators). Consideration should be given to removing the cooling fans from radiators and mounting on a freestanding rack to minimize future corrosion of the radiators.

1Q92-4Q92: D. Hull

2. Repair/replace exterior doors in 15 KV switchgear room (especially the battery room).

1Q92-4Q92: D. Hull

3. Repair/replace exterior door on northeast entrance to MCC-4/5 building to curb corrosion becoming evident on MCC-E, 5A, and 5B.

1Q92-4Q92: D. Hull

4. Seal cable tray entrances to MCC-4/5 building especially on north wall where water leakage is evident.

1Q92-4Q92: D. Hull

5. Provide additional supports for open wiring on north wall of TDC room (specifically the Modicon Room) to remove the strain from the

DO A 022970
CONFIDENTIAL

wiring terminations on the wall mounted terminal strips. (This is wiring for extremely critical system).

1Q92-4Q92: D. Hull

6. Label all electrical equipment and devices (especially buildings and transformers).
1Q92-4Q92: D. Hull
7. Install emergency lighting in electrical equipment rooms.
1Q92-3Q93: D. Hull
8. Discontinue the use of "unistrut" and conduit clamps to the largest extent possible on exterior support systems for field wiring and/or devices. Angle iron or channel iron and u-bolts are recommended instead.
4Q91: D. Hull
9. Physically remove field wiring and conduit that has been identified for "demolition" as the equipment is removed. This will ease cable tray overloading and conduit clutter, etc.
1Q92-3Q93: D. Hull
10. Review all electrical equipment room seold's yearly and have them dated.
4Q91: D. Hull
11. Continue with the good p/m program for motor starters, transformers, etc. (Ex. Battery condition and C-40A imminent failure discovered during last p/m work).
No action required.

REACTIVE CHEMICALS AUDIT

1. Consider obtaining more complete documentation on the worse case credible scenarios which were used for sizing the taffy pot PSV's. This information should reside in the Chlorine Plant reactive chemicals file and should be used in your reactive chemicals training program.
Chlor-Alkali Tech Center recommends taffy pot PSV size.
2. Chlorine cells are not designed with conventional pressure relief devices for relieving pressure problems resulting from reactive chemicals excursions--instead the cell covers are the relief

devices. Consider reviewing this with the Pressure Relief Emphasis Team.

4Q91: Jim Haney

3. Consider performing positive identification tests on Freon 12 deliveries. Certificate of analysis is provided by the vendor but this is not considered fool-proof.
2Q92: Clark Ponthier
4. The recommended spec and analytical testing requirements for HCL should be re-evaluated/re-written whenever the source is changed to reflect the particular contaminants that are possible at the new source. Currently HCL is obtained from DuPont, BASF and Texas. Acid obtained from the CMP plant in Texas contains methanol. Since methanol has been responsible for a taffy pot explosion at another location (due to formation of methyl nitrate) shipments from Texas should definitely be analyzed for methanol content prior to off-loading.
4Q91: Charlie Cooke
5. It was mentioned that not all critical instruments are truly redundant. Review the critical instrument list and determine if true redundancy exist in areas where key reactive chemicals concerns exist.
2Q92: Stew Serpas
6. Document the fail safe positions of all critical instruments that are in area where key reactive chemical concerns exist.
2Q92: Stew Serpas
7. Written policy should be established for covering set point changes for critical instruments.
2Q92: Jimmie Grissom
8. Consider developing a comprehensive program for training in plant craftsmen and operators on the reactive chemical hazards pertaining to materials of construction with respect to process chemicals.
2Q92: Charlie Cooke
9. Concerning materials of construction: Review and if necessary update procedures aimed at assuring that parts issued are compatible with the process chemicals. Facts such as the voltage

wire in the cells being made of titanium should be communicated to the appropriate plant personnel. The hazards of using aluminum in the wrong service should also be communicated.

2Q92: Jimmie Grissom

10. Concerning operating discipline: Start-up procedures are in need of improvement and critical operating parameters with respect to reactive chemicals hazards should be reviewed for detection of failure.

2Q93: Stew Serpas

11. A written policy should be established for ownership of lab chemicals.

1Q92: Charlie Cooke

12. Consider getting Maintenance Tech Service (Mark Bartel) to do a spot audit of your spare parts inventory to confirm the material of construction is indeed what you expect it to be. MTS has a portable x-ray analyzer that is used to verify materials of construction.

2Q92: Jimmie Grissom

13. The hazards of potentially explosive levels of hydrogen in the tail gas scrubber should be communicated (perhaps in the reactive chemicals training program). It was mentioned that hydrogen concentrates in this area are due to removal of chlorine and carbon dioxide.

2Q92: Charlie Cooke

14. Concerning waste handling: Written procedures should be established for minimizing the risk of inadvertently mixing together incompatible waste.

1Q92: Charlie Cooke

15. Concerning NCL3 in the he heavies reboiler: Documentation of worse case credible scenarios should be obtained for establishing the various alarm set points and the zero deg C/24 hr dump cycle. This information should be reside in the Chlorine Plant reactive chemicals file and would be an excellent topic for reactive chemicals training program.

2Q92: Stew Serpas

16. Consider developing a cross compatibility chart for all process chemicals in use at the Chlorine Plant. Unit 2 in Texas has an

excellent compatibility chart based on the CHEMPAT computer program that perhaps could be modified for your purposes. Two contacts were mentioned that may be of some assistance (Eugene at Unit 2 and Dave Leggett in Texas Reactive Chemicals Lab). This chart could also be used in your reactive chemicals training program.

2Q92: Stew Serpas

17. It was mentioned that ruthenium tetroxide can get into the the chlorine plant taffy pot and act as a chlorination catalyst which could lead to a reactive chemicals incident. An explosion occurred in due to this condition. Consider obtaining more detailed information on this incident for review and, if necessary, modify your lines of defense for avoiding a similar incident.

3Q93: Stew Serpas

18. It was mentioned that a reactive chemicals hazard would result if excess HCL is pumped to the cells. A suggestion was made to review the shutdown trip logic to assure that lines of defense are adequate.

4Q92: Keith Jefferies as part of Cell Area Instrument Upgrade Project

19. The potential problem of hydrogen backflow through the seal pots was discussed. A suggestion was made to document the known scenarios which could lead to this condition.

2Q92: Jim Haney

**INSURANCE AUDIT
LOSS PREVENTION QUESTIONNAIRE**

1.
 - a. Provide a copy of the emergency plan: Latest on computer.
 - b. When was the emergency plan last updated: July 1989
 - c. Are hypothetical emergency drills held on a regular basis?
Yes. June 1989. Yearly division drills and monthly in block shift drills.
 - d. Can you document plant participation in emergency drills?
Yes. C-9 checklist.
 - e. Are contractors, maintenance people, and the staff instructed in emergency evacuation? Yes. "Contractors Orientation" sheet.
 - f. Are critical shut off valves and switches checked on a regular basis. Yes, monthly. C-9 Checklist. See EBV Test Procedure and Check List Sheets.
 - g. Who has the authority and responsibility to activate the emergency plan? Shift Supervisor.
 - h. How frequently is the emergency plan reviewed with operation and supervisory personnel? Yearly. C-9 Checklist.
2. What hazards will occur if you lose utilities separately?
Air-Shut down with fail safe position on valves.
Power-Power shed schedule. controlled shut down.
Water-controlled shut down.
3. In case of utilities loss, how would you prevent catastrophic release, runaway reactions? Fail safe valves, GSU backup, Power shed list.
4. What do you consider the area of highest loss potential in your plant? Hydrogen trains.
5.
 - a. Are Corporate Loss Prevention Guidelines followed in significant process changes? Yes. pre start-up audits, C-6.
 - b. Are proposed and new Loss Prevention Principles circulated to the technical staff? Yes. yearly.
6.
 - a. Are formal safety and loss prevention reviews held early on all capital projects? Yes.
 - b. Are pre-startup audits done on all new projects? Yes. New brine treating system.
7.
 - a. List major rotating equipment.
2 Air compressors
6 Freon compressors
4 Chlorine compressors
2 Hydrogen compressors
 - b. Do you have a preventive maintenance program for this equipment? Yes. weekly by out of block craftsmen.
8.
 - a. Provide a diagram showing area electrical classifications. B7-013A-C50-001.
 - b. Do you have emergency power? Two UPS to computer TDC / Mod V has battery backup, with emergency lighting in the control room.

DO A 022975
CONFIDENTIAL

- c. Have you identified and trained people on each shift to make electrical switchovers? No, Plant power is provided by 3 feeders, H-207, H-25 and L-82 with automatic transfer capability between feeders H-207 and H-25. Power and Utilities is responsible for the operation and maintenance of incoming feeders and associated equipment.
 - d. Do electrical conduits and cable trays penetrate walls and floors in such a way that fire cannot be conducted through these penetrations? Yes, we use "Flame Stop" foam around conduit.
 - e. Are electrical conduits installed and/or sealed to prevent rain/snow exposure? Yes, and we use low drains and drip legs.
- 9.
- a. Are flammable, toxic, or hazardous liquids and liquefied gases stored in diked areas. Yes, T-54, T-56, T-1A, T-1B, T-45, CCl4 and oil drums.
 - b. Are dikes designed to prevent accumulation of flammable or toxic spills under or around process equipment or storage tanks? Yes.
- 10.
- a. Provide a list of glass or plastic devices in process service. All series have manometers, and level gauges. Hydrogen stacks have manometers, and 17 locations of glass rotometers, see list.
 - b. Are any in hazardous service? Yes.
 - c. Do you have a program to remove these devices? No.
- 11.
- a. Do you have a way to be certain that the proper materials of construction are used in maintenance or new projects? Engineers along with the review process and piping and valve specs.
 - b. Do you have cast iron in process service? Yes, Hydrogen blowers and some impellers.
 - c. Do you have a list of proper gaskets for your plant? Yes, see "Pipe, Gasket, Valve Specifications" sheet.
 - d. Do you try to improved and modern materials of construction to improve your plant when possible? Yes, titanium scrubbers, FRP and polyethylene pipe and FRP towers.
- 12.
- a. Do you avoid use of quick opening valves on "end of line" service? Yes.
 - b. If quick opening valves are used, are all open lines capped or plugged? Yes.
 - c. List cross connections between utility lines and between process and service or utility. None exist.
- 13.
- a. Have plant personnel had fire fighting training? Yes, in plant members of the LAD ERT members, see list.
 - b. Provide sketch showing fire protection system and equipment. B1-500-C50-001 and see "Fire Extinguishers Checklist" and "Emergency Escape Pak Checklist."

- c. What is the procedure when part of the fire protection system is down for repair? Notify security as per S-404 and make block announcement and post a fire watch in the area.
 - d. Provide documentation on testing of fire protection equipment. C-9 Checklist yearly and monthly.
- 14.
- a. Are flammable or toxic gas detectors used to monitor leaks of flammables or toxic gases? Yes. Chlorine monitors throughout block and Oxygen monitors in Hydrogen system.
 - b. Are process equipment and storage tanks adequately diked? Yes, T-54, T-56, T-1A, T-1B, Oil Areas, Carbon Tetrachloride, Acid Areas.
 - c. Is there a system to readily identify and locate key block valves both above and underground? Yes, well trained operators and automated systems.
 - d. Can you get to the valves safely in an emergency situation? Yes.
 - e. List places where overflows or leaks from process equipment can go directly to the sewers and how they are detected.

Acid / Caustic Spill	pH probes
CCl ₄	grab sample / visual
Oil	Visual
Chlorine	Detection Monitors
Brine/Water	Visual
 - f. What is your largest probable spill of a flammable or combustible material above its flash point? Hydrogen.
- 15.
- a. Do all automatic valves fail safe? Yes.
 - b. Provide list and maintenance schedule of critical instruments and testing procedures. IBM system.
 - c. Do you have documentation of how control systems are supposed to operate, including set point limits? Yes. Mod V programming and TDC computer library.
 - d. When have you had an indepth review of the English language program? Initially and at changes.
- 16.
- a. Are flammable materials handled within closed buildings? No.
 - b. Are auto and pedestrian traffic at a safe distance from process and storage areas? Yes, maximum radius of exposure is 30 feet.
 - c. If you have congested areas, do you have plans to improve? Not aware of the need.
- 17.
- a. When were pressure relief designs reviewed for adequacy? Initial installation.
 - b. Are you up-to-date on pressure relief system testing? Yes, March, 1989 C-9 Checklist, see examples attached.
 - c. Do you have regular test procedure for all pressure vessels? Yes.
 - d. Are you up-to-date on pressure vessel testing? Yes, see "Pressure Vessel Inspection Report".
- 18.
- a. If applicable, how often are checks and/or inspections made on buried tanks? Not applicable.

DO A 022977
CONFIDENTIAL

- b. What is the minimum separation distance of flammable and toxic storage from process equipment and from the control room? Chlorine storage to the control room is approximately 350 feet and the distance from the Chlorine storage tanks to the nearest process area is 50 feet, (salt columns).
 - c. Are contents of tanks identified using the Dow symbols or site safety standards? No.
- 19.
 - a. What is the most critical equipment in your process? C-100's, the wet Chlorine compressors.
 - b. Is it spared? Yes.
 - c. If not, how long would it take to replace it? Not applicable.
- 20. Has the plant had an indepth loss prevention review in the past three years? Yes.
- 21. do you have alternate sources of key raw materials that are shipped in? Yes on Sulfuric Acid. Hydrochloric Acid and brine are "in house".
- 22. If you have fired heaters. do the burner management systems satisfy existing guidelines? Not applicable.
- 23.
 - a. Describe your preventive maintenance program briefly. Maintenance Tech provides weekly rotating equipment checks and monthly lubrication checks. Operations swaps spare motors weekly. Leaks are repaired in a timely fashion to prevent greater damage. Year round painting is designed to prevent or reduce corrosion.
 - b. Do you have a system for spare parts inventory control and spare parts ordering? Yes. MSMS.
 - c. Do up-to-date maintenance safe job procedures exist? Yes. IPT.
 - d. Can you identify historical maintenance costs for your highest maintenance items? Yes. Champs. Work Order Cost Reports.
 - e. Do you have a plan to try to reduce maintenance on your highest maintenance items? Yes. fix root problems.
 - f. What unique approaches to maintenance are used in this plant that would be useful in other plants? Champs, daily morning meetings, weekly project meetings and weekly circulation of the daily work schedule.
- 24.
 - a. Is this a single source Dow plant or are there others? CAII.
 - b. Are raw materials purchased or produced internally? HCl, Brine, power internal.
 - c. Are products from the plant used internally within Dow or sold? Both. 80 % Internal, 20 % sold.
- 25. Describe your operator training program. IPT, 1 man's full time responsibility is to update and improve IPT with overtime operator help.

CONTRACTORS ORIENTATION

EMPLOYEE Benton Bailey CONTRACTOR Uip International
CRAFT Labor DATE: 10-27-89

I have viewed the Chlorine Plant Safety Indoctrination Film and I understand the Plant and Division policies in regards to:

1. Respirators
2. Monogoggles
3. Hard Hats
4. Hearing Protection
5. Boots
6. Contact with Caustic or Acid
7. Knowing area hazards
8. Wind direction and evacuation
9. Damaged equipment (process line, guage, instrument, etc.)
10. Spill Alarm
11. Special equipment & procedure for breaking into process lines
12. Smoking
13. Rings
14. Operating equipment
15. Seat belts
16. Clothing & Shoe restrictions
17. Contact lens
18. Access to Material Safety Data Sheets

Benton Bailey
EMPLOYEE'S SIGNATURE

Emmett J. Swin
CHLORINE REPRESENTATIVE'S SIGNATURE



DOW CHEMICAL U.S.A.

September 21, 1989

LOUISIANA DIVISION
P. O. BOX 150
PLAQUEMINE, LOUISIANA 70765-0150
804 389-8000

Joe Muller
Chlorine

CC: Don Hull
Ron Hendry
Kirk Theriot

RE: Electrical Start-Up Review: Rectifier No. 3

The new rectifier No. 3 installation was audited on the morning of September 19, 1989, at the request of Chlorine staff engineer, Mr. Don Hull. The review was performed by Mr. Kirk Theriot and myself with assistance from Mr. Jimmy Jumonville, and was completed in accordance with the Division's requirements regarding the start-up of new facilities:

The areas addressed by the review were as follows:

- I. Electrical System Design: The system design drawings were reviewed and assessed as to safety, reliability, and ease of maintenance. Good engineering practices were used and a walk through inspection verified safety of design/installation and the ease of accessibility for PPM. Generally, all equipment was clearly labeled however some labels were missing on the 15IV switchgear cubicle door and the 480 volt transfer gear. Mr. Jumonville assured us these labels were being manufactured and would be in place shortly. Also hi-voltage signs need to be added in the appropriate places.
- II. System Protective Relaying: The drawings showed all necessary and desirable system protection was considered and the walk through inspection verified the various devices existences. Mr. Jumonville stated that all protective devices had been properly calibrated and successfully passed a functional check-out test. One area of concern centered around the protected zone as covered by the AC/DC rectifier/transformer case ground system. It was recommended that the protected zone be reduced to cover only the rectifier cubicles and the rectifier transformers and exclude the transformer heat exchangers. The reason for this was to reduce the possibility of nuisance tripping of unit should one of the cooling medium pump motors fail to ground. Also, the grounding system of the regulator transformer offered the potential of multiple ground paths which could negate the reliability of its case ground protection system. It's recommended that the system be reviewed and the potential multiple ground paths be reduced to a single ground.

DO A 022980
CONFIDENTIAL

RE: Electrical Start-Up Review: Rectifier No. 3
September 21, 1989
Page 2

- III. Control Scheme: The rectifier system control scheme was discussed with both Mr. Hull and Mr. Jumonville. We agreed with the operating philosophy as stated and were told that the system had been tested to verify all component operations. The Mod V control appeared to be well documented and effectively utilized in on-line analysis. We did not actually witness the system in operation nor did we perform a detailed review of the logic design. We felt this was unnecessary owing to the experience and knowledge of both Mr. Hull and Mr. Jumonville in this area.
- IV. Installation: The equipment layout was good and all work was done in a neat and professional manner. All control wiring was clearly labeled and adequate clearances were evident. All wiring and cable was installed neatly and well protected by approved raceways. In general, a very well installed system.
- V. Conclusions: Except for the few recommendations relative to the labeling of equipment and system case ground system, we found the installation satisfactory and meeting all division practices, safety requirements, and applicable codes. We conveyed to Mr. Hull and Mr. Jumonville that we found everything satisfactory for release to operations.


Lyn Crosby
Engineering Services

DO A 022981
CONFIDENTIAL

176

ITEM NO. PSV- 8.5.1		LOCATION	
TBM # 800029		(RELIEF) VALVES Serial # 8075-A2	
PRESSURE SAFETY			
SEAT	std.	INSPECTION DETAILS	
DESIGN		Farris 2611 Consolidated Type 1905RC.1	
BONNET			
BODY MATL.	GR8	DATE	REMARKS
SIZE	8-88	12-79	Shop Spare
FLANGE		7-80	Shop Spare on 304 steam line
FACING		3-81	To Shop. on 304 steam line
ORIFACE	16.00	3-82	To Shop on 304 steam line
TRIM SEAT	std 304 SS	10-82	To Shop - spare
GUIDE		4-83	To Shop - on 304 steam line
SPRING		6-84	To Shop - spare
ACCESSORIES		7-84	on 304 steam line
		5-85	Tested - spare (12)
SELECT: CODE		4-86	Tested - 10 - on header
FIRE		6-87	Tested - Spare - 15
OTHER		6-88	Tested - on line 10
SERVICE FLUID	Steam	10-89	Test - 10
CAPACITY	46940#/hr.	10-89	Tested 12. Replaced Farris Valve - Shot - NO good
MW OR SG	18		
VISCOSITY			
PRESS.	45 psig		
TEMP.	600 F		
OTHER:			

ITEM NO. PSV- 8.5.1
LOCATION

DO A 022982
CONFIDENTIAL

ITEM NO. PSV- 8.5.2		LOCATION	
IBM # 800030		PRESSURE SAFETY	
		(RELIEF) VALVES Serial # 38074-A10	
SEAT		INSPECTION DETAILS	
DESIGN		Farris	
S NNET		Type: 26 RA 20-140	
BODY MATL.		DATE	REMARKS
SIZE 6 R 8	7-80	Shp - Spare	
FLANGE	3-80	Shp - Spare	
FACING	3-82	Shp - Spare	
RIFACE R	10/82	on 30# steam header 4	
TRIM SEAT	5-83	To Shp - Spare	
GUIDE	5-84	To Shp - on 30# steam line	
SPRING	7-84	To Shp - Spare	
ACCESSORIES	5-85	Tested - on 30# line (10)	
	4-86	Tested - Spare 15	
SELECT: CODE	6-88	Tested - Spare 15	
FIRE	9-89	Tested - Installed 15	
OTHER			
SERVICE FLUID	30# Steam		
CAPACITY	45330#/hr.		
MW OR SG	Sat. Steam		
VISCOSITY			
PRESS.	45 psig		
TEMP			
OTHER.			
ITEM NO. PSV 8.5.2		LOCATION	



PRESSURE VESSEL DATA SHEET

17d

NOTE: THIS FORM WILL BE USED FOR IBM CODING. INFORMATION MUST BE RECORDED IN SPECIFIC FASHION. SEE REVERSE SIDE

1. IDENTIFICATION

PLEASE TYPE OR PRINT

ACCOUNT NO. 00028	INDEX NO. (CIRCLE CODE NO.)	01 - COLUMNS 02 - REACTORS	03 - HEAT EXCHANGERS 04 - AIR DRUMS & VESSELS	05 - FILTERS, DRUMS & SEPARATORS 06 - STORAGE TANKS	07 - OTHERS
IBM NO.	VESSEL NO.	VESSEL NAME STORAGE TANK			

2. CLASSIFICATION OF HAZARDS

DETERIORATION HAZARDS (CIRCLE CODE NO. OR NOS.)	FAILURE HAZARDS (CIRCLE CODE NO.)
01 - EMBRITTLEMENT 02 - CORROSION 03 - ER SI N 04 - FATIGUE 05 - CREEP (HIGH TEMP.) 06 - NONE 07 - OTHER (LIST)	10 - MAJOR DISASTER UPON FAILURE 11 - AVERAGE DAMAGE EXPECTED 12 - LITTLE OR NO DAMAGE EXPECTED

3. INSPECTION SCHEDULE

TYPE OF INSPECTION (CIRCLE CODE NOS.)	INSPECTION SCHEDULE (INDICATE BY MONTHS)	DATE OF LAST INSPECTION (SHOW MO. & YEAR)	DATE OF NEXT INSPECTION (SHOW MO. & YEAR)
20 - VISUAL - EXTERNAL	EVERY 12 MOS.		0470
21 - THICKNESS	EVERY 12 MOS.		0470
22 - VISUAL - INTERNAL	EVERY MOS.		0470
23 - HYDR STATIC	EVERY 108 MOS.		
24 - DYNAMIC	EVERY MOS.		
25 - PNEUMATIC	EVERY MOS.		
26 - FLAW DETECTION	EVERY MOS.		
27 - OTHER (LIST)	EVERY MOS.		
28 - NO TEST			

4. FABRICATION and DESIGN DATA

VESSEL SIZE 48' DIA. SPHERE	VERT OR HORIZ. ☐	FABRICATOR CHI. BRIDGE & IRON	FAB. DATE 1968	CODE ASNE	CODE STAMPED YES ☒ NO ☐	
LINING None		INSULATION YES ☒ NO ☐	STRESS RELIEVED YES ☒ NO ☐		RADIO GRAPHED 100% ☒ SPOT ☐ N. ☐	
DOW DRAWING NO.			IN SERVICE DATE 1-69		IN PRESENT SERVICE DATE 1-69	
VESSEL PART	CONSTRUCTION MATERIAL	SIZE AND THICKNESS	ORIG. HYDRO. TEST-PSIG	CORROSION ALLOW.	MAX. ALLOWABLE WORKING PRESS	MIN ALL W THICKNESS
SHELL	SA 516-70FBX NORM.	1.208	187.5	.125	125 PSIG @ 70 °F	
HEADS TOP	SA 516-70FBX NORM.	1.208	187.5		125 PSIG @ 70 °F	
HEAD BOT.	SA 168 ANNEXED INSERT	1.50			PSIG @ °F	
" "	SA-516-70FBX NORM	1.390	187.5		125 PSIG @ 70 °F	
					PSIG @ °F	
					PSIG @ °F	
ALLOWABLE WORKING PRESSURE LIMITED BY						

5. OPERATING DATA

DO A 022984
CONFIDENTIAL

VESSEL PART	MATERIALS HANDLED	NORMAL OPER. CONDS.		PRESSURE LIMITED BY	SET @ PSIG	SAFETY VALVE ITEM NO.
		PRESS PSIG	TEMP. °F			
SHELL	LIQUID SL	85	60	PSV	125	

DEPT SUPT SIGNATURE

DATE



PRESSURE VESSEL INSPECTION REPORT

NOTE: THIS FORM WILL BE USED FOR IBM CODING. INFORMATION MUST BE RECORDED IN SPECIFIC FASHION. SEE REVERSE SIDE.

1. IDENTIFICATION

PLEASE TYPE OR PRINT

ACCOUNT NO. 00028	INDEX NO (CIRCLE CODE NO.)	01 - COLUMNS 02 - REACTORS	03 - HEAT EXCHANGERS 04 - AIR DRUMS & VESSELS	05 - FILTERS, DRUMS & SEPARATORS 06 - STORAGE TANKS	07 - OTHERS
IBM NO. 600156	VESSEL NO. 754	VESSEL NAME STORAGE TANK			

2. CLASSIFICATION OF HAZARDS

DETERIORATION HAZARDS (CIRCLE CODE NO. OR NOS.)		FAILURE HAZARDS (CIRCLE CODE NO.)
01 - EMBRITTLEMENT	05 - CREEP (HIGH TEMP.)	10 - MAJOR DISASTER UPON FAILURE
02 - CORROSION	06 - NONE	11 - AVERAGE DAMAGE EXPECTED
03 - EROSION	07 - OTHER (LIST)	12 - LITTLE OR NO DAMAGE EXPECTED
04 - FATIGUE		

3. INSPECTION DATES and SCHEDULE

TYPE OF INSPECTION (CIRCLE CODE NOS.)	INSPECTION SCHEDULE (INDICATE BY MONTHS)	DATE OF THIS INSPECTION (SHOW MO. & YEAR)	DATE OF NEXT INSPECTION (SHOW MO. & YEAR)
20 - VISUAL - EXTERNAL	EVERY <u>12</u> MOS	<u>10</u> <u>8</u> <u>1</u>	<u>10</u> <u>8</u> <u>2</u>
21 - THICKNESS	EVERY <u>12</u> MOS	<u>10</u> <u>8</u> <u>1</u>	<u>10</u> <u>8</u> <u>2</u>
22 - VISUAL - INTERNAL	EVERY _____ MOS		
23 - HYDROSTATIC	EVERY _____ MOS		
24 - DYNAMIC	EVERY _____ MOS		
25 - PNEUMATIC	EVERY _____ MOS		
26 - FLAW DETECTION	EVERY _____ MOS		
27 - OTHER (LIST)	EVERY _____ MOS		
28 - NO TEST			

IS THIS INSPECTION SCHEDULE A REVISION TO THE ORIGINAL SCHEDULE ON THE PRESSURE VESSEL DATA SHEET? YES ☐ NO ☒

4. REMARKS

(NOTE ANY MEASURABLE CORROSION, EROSION OR ANY OTHER DETERIORATION.)

DO A 022985
CONFIDENTIAL

INSPECTED BY [Signature]

DEPT SUPT SIGNATURE [Signature]

DATE 10-14-81

D-103 A&B Head Installation

1. Assemble head gasket.
 - a. Glue dove tails using Fluoroelastomer Cement PLV 2000 HS with accelerator #4 PLV 2000 HS.
2. Clean gasket surface on head and vessel - buff with wire wheels on side grinders.
3. Inspect gasket surfaces on vessel and head.
4. Install gasket - silastic the gasket joints only.
5. Install head by lining up match marks on head and vessel.
6. Install teflon coated bolts and nuts.
7. Tighten bolts snugly using pattern below. Torque to 70 ft. lbs. using same pattern.

1
4 3
2

L. G. Hoffmann
Chlorine

gsh