



Dow U.S.A.

The Dow Chemical Company
P.O. Box 180
Plaquemine, Louisiana 70765-0180

**DOW
LOUISIANA DIVISION
CONSOLIDATED AUDIT PROGRAM
VINYL II PLANT
SEPTEMBER 10, 11, 12, 1991**

Date of Report: September 20, 1991
Superintendent: Chris Messelt, Building 6601

cc: Tom Perilloux, Bldg. 3701
Matt Miller, CEP Tech Center, Texas
Tom Morris, CEP Tech. Center, Texas
Gary Meier, Bldg. 3502W, LAD
Ed Supple, Bldg. 3801, LAD
Art Royals, Bldg. 3502W, LAD

Enclosed are the recommendations from the various audits for your response. You should develop 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 time required to complete each item. Your plan must be reviewed and approved by the area Major Manager (or Section Manager) within 30 days of the audit. The results of the audit will be communicated to the General Manager by the Major Manager (or Section Manager). Please send your approved implementation plans to me within 45 days of the audit. I will forward a copy to members of the Core Audit Team and the appropriate section to the Functional Team Leaders.

Enclosed Audit Recommendations:

1. Reactive Chemical Audit
2. Electrical Reliability Audit
3. Laboratory Audit
4. Loss Prevention/Fire/Burner Management Audit
5. Occupational Health Audit
6. Safety/Security Audit
7. Hazardous Materials Transportation (HMTR)
8. Chemical Exposure Index (CEI)


Howard R. Wilkinson, Facilitator
LAD Consolidated Audit Program

Attachment

cmk

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VINYL II PLANT
CONSOLIDATED AUDIT PROGRAM

- I. OPENING
(TUESDAY, SEPTEMBER 10, 1991 -- 7:30 AM TO 10:30 AM)
DOW CONFERENCE CENTER

ATTENDANCE:

Howard Wilkinson of the Audit Group began the opening session by expressing gratitude to the Vinyl II 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 and everyone introduced themselves.

II. VINYL II PLANT OVERVIEW PRESENTATIONS

ORGANIZATION & PLOT PLAN

PROCESS & UNIT OPERATIONS (Process Description, Flow Sheets, Chemistry Including Side Reactions, Instrumentation and Critical Instruments)

- *FURNACE AREA
- *DISTILLATION
- *OXY
- *ECOLOGY

REVIEW OF PLANT/DEPARTMENT
POLICIES/PROCEDURES AND COMMUNICATIONS

* INDICATES PRIORITY ITEM

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REVIEW OF TRAINING AND RETRAINING PROGRAMS

REVIEW OF SIGNIFICANT INCIDENTS/ MAJOR CONCERNS

- *LOSSES
- *REACTIVE CHEMICALS
- *SAFETY
- *MEDICAL

Plant Superintendent of Vinyl II reviewed the plant organization/structure and some of the process control. Almost 30% of the plant process is controlled by Mod-5. The plant operates with 6 operators per shift, 3-SOS's and 3-OS's.

reviewed the process and unit operations which included Process Description, Flowsheets, Chemistry-Side Reactions, Instrumentation and Critical Instruments. Presentations included some Start-up and Shut-down procedures/checklists.

reviewed the plant Policies, Procedures, and Communications. Safety responsibility is clearly defined in the Vinyl II Plant Safety Policy (Each employee is responsible for his/her safety and that of co-workers).

also reviewed the Vinyl II Safe Job Procedure Manual, Personal Protective Equipment Policy, Industrial Hygiene Policy, and Training Policy. Procedures are assigned to each shift to be up-dated. This is done by a Procedure Audit/Development Status Checksheet. Different methods of communicating are used at Vinyl II (Control Room Operations Logbook, Operations Instruction Logbook, Communications Manual, Daily Shift Tailgate Meetings, Safety Meetings, Bulletin Boards and Letters). Weekly Maintenance and Project Reviews are also held.

The Vinyl II Plant Safety, Project Review, and Key Parameter Programs looks to be extremely effective and driven by line employees. Daily Production and Tailgate meetings are held. A plant representative attends the plant Contractor safety meetings. Goal Setting for all employees is on-going and we support this effort. We also support your efforts to standardized your Red Tag System which is already in progress.

RECOMMENDATIONS:

The following recommendations are based on the Vinyl II Plant defined opportunities for improvement. Other opportunities will be addressed during the audit sessions.

1. Consider centralizing all plant operating procedures to one location. During the pre-audit inspections, procedures were found to be in several places.
2. We support your plans to up-date your Operations Manuals. Consider developing a timetable for this project and submit it with your action plans.

**TRAINING AND RETRAINING PROGRAMS:
SUMMARY:**

The Vinyl II Plant plans are to convert all training efforts to the the IPT (In-Plant-Training) concept. The Loading Area and Gold Hat Safety Training are now using the "IPT" concept. All other employee (exempt and non-exempt) training is completed via checklist. A new technical employee training checklist was recently developed. About 5% of the IPT modules are complete and an IPT Flowsheet has been developed. Some opportunities for improvement were identified in this area that will be addressed during the audit sessions.

**SIGNIFICANT INCIDENTS/MAJOR CONCERNS:
SUMMARY:**

reviewed the current plant Statistics, Significant Incidents from 1990 - 1991, Repetitive Incident Causes, and Areas of Concern.- Quality Performance Improvement Index data is generated to track the plant performance in several areas. Significant Incidents are broken down into key areas to help identify problem areas. Some opportunities for improvement were identified in this area that will be addressed during the audit sessions.

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III. VINYL II PLANT TOUR
(10:30 a.m. to 11:30 a.m.)

Before leaving for the plant tour the Vinyl II plant indoctrination video was reviewed by the audit teams.

Excellent job on your overview presentations.

Thanks, LAD Consolidated Auditors

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REACTIVE CHEMICALS AUDIT
(TUESDAY, SEPTEMBER 10, 1991 --- 12:00 PM - 4:00 PM)

AUDIT TEAM:

PRESENTER:

ATTENDANCE:

WRITER:

The Reactive Chemicals Committee is very appreciative of the effort Vinyl II personnel put into this reactive chemicals review. Obviously there was a tremendous amount of work which went into the preparation. The presentation was very well organized.

The Reactive Chemicals Committee agrees with all the opportunities for improvements listed in the packet. The following are opportunities which were emphasized during the review.

ACCOMPLISHMENTS SINCE LAST 2 YEAR REVIEW

There was lots of improvements since the last 2 yr review such as increasing coke recycle length by reduction in carbon tet, more MOD Y control, better furnace temperature/cracking control, improved catalyst, change over to Kynar packing in C-211, O2 analyzer on C270, new THROX scrubber train, bleed-valves to identify leaking PSV's

RECOMMENDATIONS:

- * 1. Consider developing a cross compatibility chart for all process chemicals in use at Vinyl II. Texas Division has excellent compatibility charts based on the CHEMPAT computer program that perhaps could be modified for your purposes. A contact which was mentioned that may be of some assistance is _____ in Texas Reactive Chemicals Lab. This chart could also be used in your reactive chemicals training program.
- 2. It was mentioned that chlorine addition to C-255 is based on analytical results from grab sampling. It was also mentioned that rate changes make it difficult to exactly adjust the chlorine flow. Consideration should be given to implementing more reliable flow control.
- * 3. Oxygen Service: Review P&ID's to make sure that spec breaks are located properly. Determine and indicate areas where oxygen can backflow and create a reactive chemicals hazard. This effort should also be extended to chlorine service.
- * 4. Chlorine service: Develop procedures for performing maintenance on chlorine lines.
- * 5. Chlorine service: A pipe spec for chlorine service does not currently exist at Vinyl II. Obtain a copy of the pipe spec which is used at CA 2 & Cl2 and implement at Vinyl II.
- 6. Oxygen reactivity: Implementation of dual flow meter on all feeds to OXY-EDC should be considered.
- * 7. Consider obtaining documentation on the worse case credible scenarios which were used for sizing the reliefs on the Oxy-EDC reactor. This information should reside in the Vinyl II reactive chemicals file and could be used in your reactive chemicals training program.
- * 8. Procedures should be developed which specify the time frame for changing out rupture disks at Vinyl II. Also, ruptures disks should be an integral part of the pressure vessel program.

9. Consider developing procedures that address the adding of waste materials to T-410. These procedures should address reactivity and flammability concerns. Written procedures should be established for minimizing the risk of inadvertently mixing together incompatible waste.
10. Consider performing positive identification tests on the Betz chemicals and also on sodium thiosulfate. Certificate of analysis is provided by the vendor but this is not considered fool-proof.
11. The Reactive chemicals Reactive chemicals binder should be updated with more current reactive chemicals tests data.
12. It was mentioned that has a flow diagram for determining if an instrument should be considered critical. Obtain this flow chart and discuss with Review the plant instrument list and determine the criticality of instruments in areas where key reactive chemicals concerns exist.
- * 13. Due to the problems of stress crack corrosion the piping specs for Vinyl II should be reviewed to assure that stainless steel bolts are not being used in areas where this could be a problem.
14. Determine if the type of insulation used in the Dowtherm area is appropriate with respect to avoiding spontaneous ignition hazards.
- * 15. In order to minimize the potential for acetylene/chlorine explosion problems in Vinyl II scrubber review operation of the Miracle column with respect to the possibility of chlorine being sent to Vinyl II. If this potential exists safeguards should be installed to avoid the hazard.
16. Adsorbents used for spill clean-up at Vinyl II should be tested in the reactive chemicals lab to assure compatibility with plant chemicals.
17. The Reactive Chemicals Committee agrees with the need for evaluating and documenting worse case scenarios for each area of the process.
18. The Committee also agrees with the need to continue to develop, document and implement corrective action plans to address all relief system deficiencies.

* INDICATES PRIORITY ITEM

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- * 19. Another area that is in need of improvement is training. The suggestion to consolidate pertinent reactive chemicals information into a dedicated training program is excellent and right on target. This could be included on C-9 checklist for documentation and follow-up.

ELECTRICAL RELIABILITY AUDIT:

(Tuesday, September 10, 1991--12:00 p.m. to 12:30 p.m.)

Audit Team:

Presenter:

Attendance:

Writer:

ELECTRICAL RELIABILITY AUDIT SUMMARY:**ACCOMPLISHMENTS/IMPROVEMENTS SINCE LAST AUDIT (1989):**

1. Excess equipment has been removed/relocated; the floor sections of computer room and building 6601 have been replaced; wiring is more orderly and the room is in good condition.
2. The 15 kv feeders have been replaced with new feeders.
3. The control room is clean, neat and except for the mezzanine deck, the random storage of miscellaneous items is more or less negligible. Panels and cabinetry are in an improved condition and wiring is more orderly.
4. For the most part, motor enclosures, conduits and auxiliary devices have been painted and the equipment is in good condition.
5. Marked improvement is visually apparent in all major categories except transformers, which remains the same.

GENERAL COMMENTS:

1. For the most part, cabling and cable tray installations throughout the plant are in good condition; however, some installations, such as those located at the substations and at some of the transition points, are in need of attention. At these locations, cable trays tend to be overfilled and overloaded, Re.-NEC 318; cabling has not been installed in a neat and workmanlike manner, Re.-NEC 110-12, and in cable tray runs, other than horizontal, cables are not tied to transverse members of the cable trays, Re.-NEC 318-8(b). For additional details, see field wiring, item 1, this audit.
2. The Safety Electrical One Line Diagram (SEOLD), drawing no. B07-001-V51-001, is not in compliance with Dow's Safety and Loss Prevention Standard S-316-3.E. The drawing depicts transformer TR-1C and it's associated circuitry; however, the transformer nomenclature has not been included; the most recent revision date on the drawing is August, 1990.
3. Either the grounding conductors are hidden from view or seven of a total nine plant power transformer cases are not grounded. Motors are grounded; however, at least 80 percent are not grounded in accordance with Dow's preferred method for motor grounding. Re.-DES 7C-0101 (L) 5.4.2. Other audited electrical equipment (components and devices) appear to be adequately grounded and in compliance with established codes and standards.
4. Equipment labeling has either faded, fallen away, is incomplete or it has never been installed on numerous pieces/components of electrical equipment such as transformers, motors, local control stations, control panel and junction box enclosures, and the like. Proper equipment identification labeling is a mandatory requirement of the Louisiana Division, Safety and Loss Prevention Standard, S-316.

5. Both battery rooms/installations are in need of maintenance attention. In the old battery room - corrosion is present on the cell interconnecting bus linkages, the battery support racks, the exhaust fan, conduits and associated hardware; the ceiling is in poor condition; one of two lighting fixtures is out and housekeeping can be improved. In the Mod5 Battery Room - Some of the cells have low electrolyte levels. Cold air is being drawn into the room from the adjoining switchgear room and condensation and/or high humidity is present.
6. Vinyl II, Block 66, grounding wells were visually audited to determine the condition of access and availability of each individual well. Results are identical to the results of the electrical audit performed in July, 1990 with one exception; two additional wells, not depicted on the reference drawing, dwg. no. B7-012-V51-001, Rev.P, are included as part of this audit.
7. Plant electrical equipment has been in service for some time and excluding overfilled and overloaded cable trays at transition points and at the substations, a corrosive effect in the furnace and cooling tower areas and a deteriorated condition with respect to the battery installations, plant electrical equipment appears to be in good condition and well maintained.

RECOMMENDATIONS:

1. Investigate and determine reason for temperature differentials between radiator tubes/sections on transformers TR-1B and TR-3B. Corrective action requirements to be in accordance with investigation results.
2. Inspect integrity of transformer grounding. Transformers shall be grounded in accordance with Dow's engineering specification (D.E.S.) 7C-0101 (L) 5.6.
3. Rehabilitate the old battery room in building 6601, the batteries and all associated equipment/hardware. Rehabilitation should include sealing all conduits and wall openings between the batteries and adjacent rooms.
4. Provide some form of follow-up/supervision to insure all batteries are properly maintained, Re. Safety and Loss Prevention (S&LP) references E-2 and C-9.

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5. Seal cable tray and conduit entrances into electrical rooms, analyzer and instrument houses.
6. Update the Safety Electrical One Line diagram (SEOLD), dwg. No. B07-001-V51-001 and properly post in an appropriate accessible location in all electrical rooms, Re.-S&LP S-316-3.E.
7. Label all buildings, electrical equipment and devices in accordance with S&LP S-316-3.

NOTE: 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. When equipment is being removed from service or relocated, physically remove field wiring and conduit that has been identified "for demolition". Also, refrain from further overfilling and overloading of existing cable trays and conduits.
9. All new motor installations and motor change outs/replacements should be grounded in accordance with Dow's preferred method for motor grounding, Re.-D.E.S. 7C-0101 (L) 5.4., i.e., the grounding conductor should be connected directly to the motor frame. Field corrections should be made when feasible.
10. Discontinue the usage of beam type conduit clamps (korns) and the usage of unistrut and unistrut straps in weather exposed and corrosive atmospheres. Angle/channel iron and u-bolts are recommended.
11. Continue existing PM program for motor starters, transformers, circuit breakers, etc. and in addition, attention should be directed towards formalizing an effective predictive and preventative maintenance (P/PM) program.

LABORATORY AUDIT:

(Wednesday, September 11, 1991--7:30 a.m. to 8:00 a.m.)

Audit Team:

Presenter:

Attendance:

Writer:

The Vinyl II Plant Lab manual looks to be in very good condition. All lab procedures were reviewed and revised in January, 1991. Appropriate warning signs are posted throughout the lab. A lab instruction log was developed in March, 1991 and is being utilized.

RECOMMENDATIONS:

- * 1. Audit/Review the use of all hazardous chemical storage cabinets in the Vinyl II Plant with all employees at Vinyl II (Instrument and Shop employees should be included in such training).
- 2. Consider replacing all rusted 55 gallon chemical drums stored outside the lab. Some drum labels were not in place also.
- * 3. Consider incorporating Dow's labeling system for lab chemicals.
- * 4. Consider installing a high temperature alarm on the lab refrigerator.
- 5. Consider storing hazardous chemicals below eye level.
- * 6. Remove all excess flammables from the lab and store in outside solvents cabinet. Remove excess hazardous chemicals such as nitric acid, nitromethane, nitroethane, vinylidene chloride, epoxy butene, etc. These chemicals should be removed from the Vinyl II Plant. Contact R&D or Environmental Services for assistance.

* INDICATES PRIORITY ITEM

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7. New employees receive mostly hands on training and is reviewed by the lab specialist and supervision. Very little to no documentation of such training was found. Consider developing an IPT module for this training. Documentation should be kept in one location.

LOSS PREVENTION/FIRE/BURNER MANAGEMENT AUDIT (Wednesday, September 11, 1991--8:00 a.m. to 11:30 a.m.)

Audit Team:

Presenter:

Attendance: _

Writer:

The plant appears to be in good condition with no serious loss prevention concerns. The plant staff was very helpful in compiling the necessary pre-audit information and in evaluating the results to determine areas that need further attention.

There are some excellent programs in place in the plant to assure that process changes and modifications receive the necessary attention before implementation. Recent capital project activity that I have been involved with has been well organized and planned. The implementation of burner management programs has progressed very well within the framework of available capital.

This list of recommendations will contain some but probably not all of the items that were identified as "Opportunities For Improvement" by the Vinyl II Plant. They should be added to the overall list of action items.

ELECTRICAL:

RECOMMENDATIONS:

The Electrical Emphasis group should be considered as supported by the Loss Prevention group. Refer to Electrical Reliability Audit Recommendations.

* INDICATES PRIORITY ITEM

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FIRE PROTECTION:**RECOMMENDATIONS:**

1. Schedule Maintenance and Loss Prevention to review the condition of the plant fireproofing and areas of protection.
2. Initiate a program of annual inspection.
- * 3. Sprinkler protection needs to be added to D-109. Contact Engineering and Loss Prevention to design coverage and arrange the installation.
- * 4. Review the existing Fire Protection drawing and update the coverage areas to include the new sprinkler systems that have been added. Set up a CHAMPS request to have Engineering update the Fire Protection drawings. This is an area where the insurance carrier has requested current information.
- * 5. Schedule a meeting with the Fire Protection Department and Loss Prevention to identify the 2-3 most likely fire situations to expect in Vinyl II and outline a plan of action for the different areas.

FIRE EQUIPMENT:

We have reviewed and support the list of items that were identified by the plant staff in the area of fired equipment.

RECOMMENDATIONS:

1. Consider compiling the individual documentation files, including calculations, for each furnace system.
- * 2. Schedule all Vinyl II Plant Employees for fire extinguisher training.
3. Consider adding a fire wall between MOD V battery chargers.

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CRITICAL INSTRUMENTS:

RECOMMENDATIONS:

- * 1. The instrumentation testing procedures should be reviewed to be sure your specific intentions are being implemented. Many of the procedures are simple functions tests and do not appear to check a range of operation that may be needed in some cases. These should be reported back to a responsible plant or technical supervisor.
- * 2. Develop a plant policy for bypassing trips, shutdowns, alarms, etc.

DRAINAGE:

RECOMMENDATIONS:

- * 1. Observe sprinkler operation to determine if this causes flooding conditions. Is it a problem that needs further correction? Would it create a further problem in the event of a fire in the area?
- 2. Continue to evaluate sealing/testing of dike walls.

PRESSURE VESSELS/PSV's:

RECOMMENDATIONS:

- * 1. Develop a definite schedule to get unregistered vessels on the pressure vessel inspection program.
- * 2. Continue with the PSV review program to update calculations and documentation. What is the level of activity that is currently - planned?
- 3. Add the steam boilers to the pressure vessel program as a way to prompt the annual required State Fire Marshall inspections by the insurance company.

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CRITICAL EQUIPMENT:

RECOMMENDATIONS:

- * 1. Review Loss Prevention Principle 6.2.3B regarding protection for air cooled fan exchangers. Contact Maintenance Tech to see if there is reliable-equipment available to comply with this recommendation.

MAINTENANCE:

RECOMMENDATIONS:

- 1. An area of future anticipated interest is detailed inspection and testing of certain pipeline systems. What pipelines would you identify (in block and out of block) as candidates for more detailed routine inspections?

INSURANCE PACKAGE:

RECOMMENDATIONS:

- * 1. Schedule a follow up meeting with me to compile a good original copy of the insurance package to send to Midland.

OCCUPATIONAL HEALTH AUDIT

(Wednesday, September 11, 1991 12:00 - 4:00 p.m.)

Audit Team :

Presenter:

Attendance:

Writer:

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EDUCATION AND TRAINING:

Employees receive Hazard Communication training in annual plant training review meetings. The written Hazard Communication manual and MSDS's are current. The plant orientation film is an excellent example of addressing health and physical chemical hazards.

RECOMMENDATIONS:

- * 1. Documentation of Safety Meetings (include monthly, tailgate and pre-job) could be improved by providing a more detailed agenda describing the items covered, and name of presenter, along with your sign-up sheet.
- * 2. We support your plans to have a duplicate HAZCOM/MSDS Manual located in the control room to ensure that it is readily available to all employees. The MSDS section should be expanded to include maintenance and janitorial items.
- 3. Efforts to make the CPAI as complete and representative as possible for the job assignments will result in a helpful resource for indoctrination and annual training and for documentation purposes.
- 4. The orientation film is very well done, but when it is updated it should include Asbestos and address the mouthbit respirator usage.
- 5. There are various HAZCOM training aids and Industrial Hygiene is available to help assist you with items for better presentations.
- * 6. We noted several small brown bottles in the lab without labels. Also, several 55 gallon storage drums had weathered labels or no labels at all. Some of the drums were in poor condition.

RESPIRATOR PROTECTION PROGRAM:

There is a written respiratory protection program which addresses the elements of S&LP Standard S-206. Personnel receive annual training and SCBA users must demonstrate proficiency. There is a designated cleaning station.

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RECOMMENDATIONS:

- * 1. The written respirator program is in need of updating and should include name of reviewer, date, reference to OSHA 29CFR 1910.134 and 1910.1017 and LAD S&LP S-206, medical approval, frequency of fit testing, frequency of cartridge change, the policy that breathing air is used only with potential exposures to vinyl chloride, and add the Scott-O-Ramic. With completeness of this written program it should be referenced as part of training documentation.
- 2. Respirator fit testing needs to be completed in 1991.
- * 3. The SCBA units stored in the control room area need to be cleaned and placed in plastic bags. Masks need to be supported and not stored hanging by straps.
- 4. Scott-O-Vista respirators stored in personal lockers need to be stored in tight closing plastic bags, name of individual on facepiece and date cartridges were installed and stored so as not to distort mask.
- 5. When Vallen does annual inspection/service, include all of the community air line respirator regulations in this program. One of the egress air cylinders (in control room) is due for the 5 year inspection.
- 6. We support your continued efforts to engineer out potential exposures to EDC with vent recovery on pumps and closed loop sampling.
- 7. To ensure that the proper respirator cleaning procedure is followed, it would be helpful to post the procedure on the cabinet above sink at the designated cleaning station. Consult manufacture's guidelines and recent division guidelines communicated through the Safety/I.H. network.

VENTILATION PROGRAM:

Special lab operations, such as working with vinyl chloride are done in a hood. The hood is equipped with a flow sensing device which alarms in the control room if air flow is lost. Ventilation fans have been installed in several of the analyzer houses.

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RECOMMENDATIONS:

- * 1. Only one of the four lab hoods is equipped with a functioning flow indicators and all hoods need them. This needs to be completed ASAP so that hood surveys can be performed by I.H. and proper operation conditions obtained. It has been over a year since the last surveys.
- 2. We agree with your plans to implement weekly sensing device inspections and annual maintenance on your hoods (per the checklist).
- 3. Housekeeping of the lab hoods need to be stressed. Shelves are being used to keep items up allowing air flow to the bottom baffel which is very good.
- 4. Several wall mounted fans and floor fans provide ventilation in the shop during welding. Floor fans disperse fumes rather than capture them and monitoring should be conducted to evaluate if current ventilation is good enough. Local ventilation at the source of the fume is the best engineering control.

HEARING CONSERVATION:

Due to the number of areas with noise >90 dB(A), hearing protection is required in most areas outside the control room (signs posted on door). The plant layout has been designed to strategically reduce noise levels. Personnel are included in hearing conservation program involving training and annual audiograms. Hearing protection signs are posted throughout the shop areas requiring hearing protection when using shop tools.

RECOMMENDATIONS:

- * 1. It has been several years since employees were evaluated for noise exposures using personal audio dosimeters and it is recommended that these profiles be re-established for each job assignment. Histograms from the Quest M-27 will be helpful in pinpointing potential noise exposures. The written Hearing Conservation program should be updated using the new Division format.
- * 2. If noise exposures exceed 50% of the allowable daily dose (based on OSHA PEL 90 dB(A) as a 8-Hr. TWA), the OSHA Nose Standard 29CFR 1910.95 must be posted. It would be a good idea to post this standard at least until personal audio dosimeter data can re-confirm your earlier data.

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3. Since recreational noise also can contribute to hearing loss, 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 _____ in the Medical Department.
4. We support your suggestion to have the Division Noise expert perform octave band analysis and make recommendations for engineering controls.
5. You may want to consider purchasing a noise dosimeter such as the Quest M-27 with data logger capability.
6. When new equipment is purchased, emphasis should be made to ensure that the Division Engineering Spec of 85 dB(A) is adhered to.

PERSONAL PROTECTIVE EQUIPMENT:

Personal protective equipment is required by job procedures and by safe work multi-permit.

RECOMMENDATIONS:

1. All of the different types of PPE used for various job tasks should be listed and then reviewed with Industrial Hygiene to ensure the proper selection was made for the task and that back-up test performance data is available where applicable.
2. A topic for a safety meeting might be on how to properly wear, care for and limitations of PPE. The training video "We've got you Covered" available from I.H. may be an appropriate resource. -

DATA GENERATION AND MONITORING:

The I.H. contact performs exposure monitoring for the block. An early warning device system for VCM and EDC using a sequential area air monitors is used to alert personnel if a leak should occur.

RECOMMENDATIONS:

- * 1. An annual Industrial Hygiene report is currently being written for activities conducted in 1989 and 1990. This needs to be completed ASAP.

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2. As part of the planning process we agree with your plans to develop a current set of written process description, simplified flow sheets, floor layout and job descriptions with notations of potential sources of exposure.
3. On-going monitoring activities should be identified (using CPAI) and annually structured to include such examples as VCM, EDC, alpha-tri, beta-tri, noise, welding fume and solvent cleaning operation.
4. We suggest you consider using Environmental Services Lab 3502E to analyze your I.H. samples. A lot of time is required for you to comply with Good Laboratory Practices that could be used on other I.H. related programs.
5. A helpful tool may be to develop a plant "I.H. - 9" (similar to the C-9) checklist to organize and keep track of I.H. activities.
6. You should consider replacing some of the personnel sampling equipment as some pumps are fourteen years old and many have been repaired several times.

ASBESTOS:

The plant asbestos management survey was updated in preparation for this audit. Transite siding, gaskets, oven insulation and floor tile glue are the known asbestos-containing materials in the plant and there is an active program to replace the gaskets with non-asbestos gaskets. We were impressed with the "purple" cabinet of removal supplies and disposal container.

RECOMMENDATIONS:

- * 1. We suggest you move the personnel footlockers and tailgate activities from the proximity of the asbestos gaskets area. A more protective location is needed to prevent the escape of any friable fibers. Is it practical to consolidate all asbestos gaskets to one location? (We found some garlock gasket stored on a shelf in the material controllers area). Petrin can provide a service to vacuum the area on a regular basis.
- * 2. Asbestos warning signs should be posted in the asbestos gasket storage area.

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3. Asbestos-containing materials (transite) should be labeled or asbestos signs posted at block entrances.
4. The Asbestos Training documentation that we inspected also needed more detail agenda information and the name of presenter.

RADIATION:

There are no radiation sources in the block.

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. Solvents used for degreasing are used outside in well ventilated area and then immediately and properly disposed of.

The catalyst change-out using Catalyst Technology by vacuuming tubes has eliminated a labor intensive and dusty operation. The VCM closed sampling loop and reduced sampling frequency on tankcar loading has reduced the potential employee exposure.

RECOMMENDATIONS:

1. The I.H. policy could be updated to include "good personal hygiene of washing before eating and using tobacco products".
- * 2. HAZWOPER items discussed during this section.
 - a. The written program has been written but needs to be typed.
 - b. A summary of employee training needs to be developed to verify the 24 hours initial and 8 hr. refresher training.
 - c. Certificates need to be issued to all employees hired since March, 1990 who complete the training that satisfy the HAZWOPER requirements.
 - d. HAZWOPER training needs to be included on the operator's checklist just as it is for technical employees.

3. There may be opportunities for ergonomic evaluations of physically demanding jobs such as the loading rack. The plant should take advantage of the opportunity to have Kent Smith evaluate this area and they should poll the operations personnel regarding other potentially strenuous physical tasks. It is possible that some limited interventions such as a pre-work stretching program could decrease the likelihood of musculoskeletal injuries.

MEDICAL:

The block adheres to the Division Medical Department's requirements for medical surveillance and testing. Results of medical tests are communicated to employees in a timely manner.

RECOMMENDATIONS:

1. All employees need respirator fit testing, and this should be completed in 1991. Prior to performing these fit tests, the plant I.H. contact should get in touch with the Medical Department to be certain that all employees have medical approval for fit testing.
2. 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:

All non-Dow employees receive indoctrination training which includes required PPE, emergency response; and hazard communication. Hearing protection and gloves are supplied to permanent in-block contractors. Non-Dow employees are included in I.H. monitoring program and results are communicated in a timely manner.

RECOMMENDATIONS:

1. Earlier comments regarding documentation of training would also apply here.

VINYL CHLORIDE:

Other than Asbestos, vinyl chloride is the only OSHA regulated chemical used in the block. Vinyl chloride is handled in a closed system minimizing the potential for exposure (an example is the closed sampling loop). Breathing air is used as respiratory protection for potential exposures to VCM.

RECOMMENDATIONS:

1. Comments in the Data Generation and Training Documentation sections as the annual report documentation, on-going monitoring strategy, and training documentation with detailed agenda apply here.
- * 2. We need to work with the Technology Center on the practical implementation of key elements of the vinyl chloride standard.

SAFETY/SECURITY AUDIT

(Thursday, September 12, 1991--7:30 a.m. to 11:30 a.m.)

Audit Team:

Presenter:

Attendance:

Writer:

SAFETY PROGRAM FUNDAMENTALS:

The plant has a safety mission statement. Also, a written safety policy.

RECOMMENDATIONS:

None at this time.

EMPLOYEE RESPONSIBILITY FOR SAFETY:

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Safety is a part of every job description. Individual safety goals are set and reviewed at least twice a year.

RECOMMENDATIONS:

- * 1. Complete Safety JPR's for all employees in the plant per Safety Phase III.

PROGRAM STRUCTURE - ORGANIZATION - PLANNING:

The safety program is organized in accordance with the plant safety goals and set by a safety committee composed of a good cross-section of plant personnel (management, supervision, operations, etc.). Daily tailgate and monthly safety meetings along with good measurement and incentives strongly reinforce the program.

RECOMMENDATIONS:

1. Utilize the Safety Performance Improvement Process (SPIP) in the plant and individual safety goal setting process.
2. Consider more involvement from operators in the goal setting process.

SAFETY TRAINING:

All new Dow and contract employees receive a block safety indoctrination. Daily tailgate, weekly and monthly safety meetings are used effectively. Staff JSA's are also effective. Special training is utilized in critical areas.

RECOMMENDATIONS:

- * 1. Update block indoctrination video relative to harnesses and respirators. Also, develop and utilize a test to check comprehension of what is discussed in the indoctrination session (including video). An IPT module would be helpful.
- 2. Check on the use of training aids for vessel entry, line opening and hot work.

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3. Obtain the updated LAD Safety & Loss Prevention Standards IPT and utilize.
- * 4. Develop a training documentation system for documenting training at meetings, on procedures, on IPT's, etc.
5. Develop a timetable for completing all IPT modules.

OPERATING PROCEDURES:

Operating Procedures , Safe Job Procedures and Red Tag Procedures are utilized. Operators write/up-date procedures with involvement of supervisor and Safety Coordinator.

RECOMMENDATIONS:

- * 1. Develop a plan for updating all procedures that are out of date and implement a system to assure updating on a regular basis.

EMERGENCY PLAN:

A block emergency plan exists. Emergency drills are held on a quarterly basis.

RECOMMENDATIONS:

- * 1. Update block emergency plan and address explosions. Place a copy of the updated plan in the plant's copy of the LAD Emergency Plan Manual. Also, send a copy to _____ for the EOC.
2. Add review of the block emergency plan to the C-9 Checklist to assure updating and reviewing with employees on a yearly basis.
- * 3. Conduct a "hands-on" emergency drill at least once a year.
4. Develop an IPT for the block emergency plan.

ACCIDENT/INCIDENT INVESTIGATION REPORTING:

Accidents/incidents are investigated promptly. Learning value is communicated and follow-up work is tracked to completion. Employees are encouraged to report minor injuries.

RECOMMENDATIONS:

1. Write-up accidents/incidents in Safe Working Style format.

SAFETY STANDARDS, GUIDES, REQUIREMENTS:

LAD Safety & Loss Prevention Standards and safe job procedures are utilized.

RECOMMENDATIONS:

- * 1. Update safe job procedures.
- 2. Develop a plan for modifying sample points with quick open valves

HAZARD DETECTION PROGRAM:

Inspections are made by the Plant Superintendent, Engineers and Supervisors on a regular basis. C-9 Checklists are used as a tool. Staff JSA's are also effective.

RECOMMENDATIONS:

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

SAFETY SUGGESTION SYSTEM:

A Safety/Environmental Suggestion System exists. All suggestions are reviewed and tracked to completion.

RECOMMENDATIONS:

1. Develop a system to be used in prioritizing suggestions.

AWARD/RECOGNITION SYSTEM:

The block has a safety incentive program for which awards/recognition is given. Also, outstanding safety/environmental and process suggestions have awards/recognition quarterly.

RECOMMENDATIONS:

None at this time.

CONTRACTOR SAFETY:

Contractors follow the same policies/standards as Dow employees. All contractors receive the block safety indoctrination. The contractors also have their own safety incentive program.

RECOMMENDATIONS:

1. Involve contractors more in plant safety programs.

OFF-THE-JOB SAFETY:

Off-the-job safety is emphasized. Off-the-job safety is included in regular and tailgate safety meetings. Also, in the block safety incentive program.

RECOMMENDATIONS:

None at this time.

COMMUNICATIONS:

Closed circuit TV's and bulletin boards are utilized to communicate.

RECOMMENDATIONS:

- * 1. Develop a system (initial and date list, etc.) to communicate new or revised procedures, learning value items, new or revised regulations, ISA's, inspections, etc.

HOUSEKEEPING:

Control Room:

*Overall housekeeping is excellent.
Some cleanup needed on catwalk behind the board.

Active red tag masters are kept on a clipboard in the permit office and they are readily accessible to operators as well as contractors.

Long term masters are kept on a separate clipboard. Suggested they consider disabling some equipment to reduce the number of long term masters.

All masters were checked and we found no discrepancies.

Permit area organized and neat.

* A couple of the permits checked indicated that no on-site inspection was done and that lines to be opened had not been positively identified. When questioned the issuers said that both had been done, if so we should mark the permit as such.

Office Area:

All offices, conference rooms, closets and storage areas organized and neat.

Bulletin board postings current. OSHA posting present -- GOOD!!!

One corner in the men's dressing room being used to store a box of air conditioner filters, some P&ID's and some other paraphernalia. Rubber boot and old stencils in showers.

* Ladies room had a slicker suit on the wash basin counter.

Operating Area:

Safety showers visible and in good condition, painting program in progress.

- * Noted one ladder missing safety gate, suggest audit for others.
- * Oil absorbent pads throughout need replaced.
- * Some bleeds not plugged.

Trash in all of vessel skirts.

Some water standing in Oxy area.

- * Some unlabeled utility stations.
- * Plenty of signs (caution, directional, etc.); Many are faded and need restenciling or replacing.
- * Wooden ladders laying against switchgear in MCC, electrical one-lines need updating, one MCC had unsealed cables leading into building.

Warehouse Area:

* Warehouse work area clean and neat, grinder tool rests needs adjusting (to far from wheel). Warehouse east storage area needs attention, it's full and pretty cluttered, the bin areas looked good. Have some things stored against open walls that need to be properly stored.

* Noted some flammables improperly stored on open shelves.

Flammables storage area O.K., need to verify proper amounts. No fire extinguisher in area.

Lab Area:

- * Housekeeping fair.
- * Hoods cluttered and dirty.
- * Flammables stored under hood which also has 110v lights under it.
- * Doors on hoods were opened beyond the 18 inch limit.

Safety Files:

- * OSHA "Star" information needs to be compiled into one box (three years plus current). Need to initial and date paperwork upon completion of follow-up actions.

Good system for tracking follow-up test for plant indoctrination.

In the process of developing a follow-up test for plant indoctrination.

- * Posted C-9 checklist in not up to date, Safety coordinator keeps a master copy and it is up to date.

EMPLOYEE SURVEY SUMMARY:

There were 27 safety surveys returned. The safety definitions indicated a good safety attitude at Vinyl II. Eighty eight percent rated supervisors views on safety high to excellent. Starting up and shutting down equipment was thought to be the part of the job that required the most caution and that a fall would be the next serious accident. When asked if they notice a fellow employee performing work in a unsafe manner would they intervene, 100% of surveys said they would. 85% said they would explain other ways of performing the work in a safer manner. Some even stated some of the "Safe Working Styles" One Minute Manager Techniques. Only 30% of the surveys indicated that accidents could be prevented all the time and 70% some of the time.

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HAZARDOUS MATERIAL TRANSPORTATION REVIEW (HMTR)

(Thursday, September 12, 1991 12:45 p.m. to 2:20 p.m.)

Audit Team:

Presenter:-

Attendance:

Writer:

The Vinyl II plant made an excellent HMTR presentation. Thanks to Bud Balentine and his in depth knowledge of the products and handling procedures. Information concerning the distribution process was thorough and clear. Pre-planning and teamwork was evident in the way the plant conducts its business.

RECOMMENDATIONS:

1. As noted in the review, there was concern generated relative to the correct materials of construction for marine vessels. Due to the recent increased attention being brought to our capabilities for emergency response, we would like to emphasize that the plant continue to work with the Marine Tech Center to identify the weakest areas that needs the most attention.
2. Consider conducting some sort of "Distribution Standards Audit" on all non-Dow shippers involved in swaps, tolls or trades.
- * 3. Initial and retraining for loading/unloading as well as for tankcar securement should be documented and reviewed.

* INDICATES PRIORITY ITEM

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CHEMICAL EXPOSURE INDEX AUDIT

(Thursday, September 12, 1991--2:15 p.m. to 4:00 p.m.)

Audit Team:

Presenter:

Attendance:

Writer:

CHEMICAL EXPOSURE INDEX:

The operator interview, emergency drill, and documentation review were completed in a pre-audit meeting Wednesday, 9-4-91. The actual CEI Review on 9-12-91 concentrated on exceptions to the pre-audit questionnaire. In general, the Vinyl II plant appears to be in excellent shape from a CEI stand point. Plant documentation is almost all up to date, operators are well trained and motivated, emergency procedures and drills are practiced, and many plant programs are in place that would act to decrease the potential of a CEI incident.

Two potential problems with the calculation methods used were noted. First, US Area Loss Prevention Manager, asked if our dispersion models used the dense gas phase corrections developed in Texas (contact Secondly, noted that our spill calculation methods across the LAD are not consistent and are not consistent with methods published in open literature such as Perry's. Both of these questions will be turned over to the appropriate engineering functions for resolution.

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ACCOMPLISHMENTS/MAJOR CHANGES SINCE LAST REVIEW (1989):

The following notes are meant to be a supplement to presentation at the CEI Review and to cover the portions of the review that took place in the pre-audit meeting.

1. No major changes have occurred in the plant to change the CEI scenarios since the review and follow-up in 1989.
2. Seven worst case credible scenarios resulting in releases of the following with CEI results as shown,

CHEMICAL	CEI VALUE
HCL	162
VCM	192
EDC	144
CL2	288

3. Three of the above chemicals have odor thresholds that will extend past the fence line (HCL, EDC, and Chlorine).
4. An extensive area monitoring system exists for EDC and VCM (in addition to flammable gas detectors). No system exists for the detection of HCL and chlorine.
5. Several general Safe Job Procedures and policies books were readily available.
6. Most plant process type documentation was in very good shape. Many P&IDs were out of date.
7. Operators take a great deal of pride in their ability to run the plant. Self-directed work team concept has been a great success. Superb teamwork was shown during the Chlorine release drill.
8. Operators feel the plant training program is effective and gives them all the information they need to operate the plant.
9. Operators mentioned that the Project Review meeting is a great way to get ideas considered.

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10. Operator training modules exist for many jobs. IPT concept partially implemented.
11. Carrying of personal respirators is no longer required in plant. Safety indoctrination film is out of date.
12. Talk-through emergency drills are done on at least a quarterly basis by each shift.
13. Plant preventative maintenance program was in good order. Monitoring of critical process piping for corrosion/erosion is being done.
14. Very good emergency communication procedures exist within the plant. The procedures were posted and followed.
15. Emergency contact telephone list was out of date.
16. MOD V control 30% implemented.
17. Installed new Chlorine distribution header and KO pot. Added electrical heat tracing.
18. Replacing corroded pipe sections with monel as required.
19. New throx scrubbers installed.
20. Ordering new E-140 to replace exchanger.

RECOMMENDATIONS:

- * 1. Plant management should review the need for an area monitoring system covering HCL and chlorine releases in light of the CEI numbers and other reviews.
- * 2. Add updating of the emergency contact phone list to a C-9 checklist.
- 3. Plant management should review the need to carry a personal respirator in the plant and should update the plant indoctrination film accordingly.
- 4. The plant should consider conducting a periodic walk-through drill simulating a CEI type incident.

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5. Review training of all plant personnel in the use of protective equipment for protection from liquid spills and vapor releases.
- * 6. Update the plant emergency communication procedure to include specific detection levels of VCM and EDC that require notifying.
7. Review the policy for installing leak-clamps in the plant to guard against over-stressing pipe and vessel nozzels. Update the installation checklist if required to include Dow engineering review of unusual installations.

The following were copied from Greg Schultz's presentation and are included for completeness.

8. Complete IPT modules for entire plant.
9. Video-tape or photograph leaks of different size to aid in estimating hole size.
10. Add shoes or teflon sheets to existing pipe supports.
- * 11. Evaluate double seals or seal-less pumps.
12. Review spill scenarios with contractors and neighboring plants.
13. Involve plant security in regular drills.
14. Develop written procedures for spill mitigation.
15. Review E/R personnel protective equipment with Industrial Hygiene.

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