CHEMICALS PPG INDUSTRIES INTEROFFICE / LAKE CHARLES

TO	VCSA File	DATE	May 22, 1985
FROM	B. D. Reynolds	SUBJECT	Vinyl Chloride Safety Association

The 1983 meeting of the Vinyl Chloride Safety Association was held in New Orleans on October 20 and 21, 1983. Bob Byars, Lamar White, and Ben Reynolds attended from PPG, Lake Charles. Topics of discussion included old and current case histories, safety equipment and program, health and environmental, and regulatory issues. The following is a summary of those items most applicable to us.

1) Thompson Chemical Explosion - J. Barr, Air Products

This incident, which occurred on June 12, 1964, was one of the incidents which led to the formation of the VCSA. There were 7 fatalities, 22 injuries, and the plant was closed down. A Pfaudler-type sight glass (plain piece of tempered glass) was being used on the reactor. A leak was found on the sight glass while the reactor was in operation. When an attempt was made to tighten the sight glass, the glass broke emptying the contents of the reactor. The explosion/fire destroyed several buildings. Contributing factors leading to the incident were:

1) No hydrotest had been done on the reactor,
2) The type of sight glass used, and
3) Working on the equipment while the reactor was on-line.

Other problems encountered during the incident included: 1) the plant was located too close to a school, 2) crowd control was very poor, and 3) construction of the building hampered firefighting efforts.

A survey of PVC producers at the meeting revealed that most do not use sight glasses on their reactors, and all use a hydrotest or N_2 test prior to restoring to service.

2) Hooker-Burlington - Joe King, Occidental

The incident occurred in 1968 at the start-up of the first bulk VCM process (French dry process) in the U.S. The plant had been on-line 3 weeks. French engineers had been assisting in start-up but had left the plant for a weekend in New York City. A VCM release occurred as the second batch (since start-up) was being transferred from the pre-po (pre-polymerizer) to the po-po (post-polymerizer). As the operator activated the remote operated transfer valve, he saw a flash. The deluge system was immediately dumped. The lower 4" flange on the valve was found to be leaking and on fire. The cause of the leak was later found to be the asbestos gasket (tongue and groove joint) was not fitted properly. The valve had been removed after the first batch to repair a damaged seat. When the valve was reinstalled, it was tested on only one side, i. e. the valve was closed. The source of ignition was not identified.

The firefighting effort was worthy of note. The plant had a 400,000 gallon water tank which was almost empty after only 2 hours of firefighting. They had to resort to 15 minute cycles of fire water pumps off/on. The tank was made up by two 100 GPM wells, and the fire water pumps were two 6000 GPM pumps. Fire hoses were strung from a gypsum plant next door and from the Delaware River a mile away. Over 20,000' of hose was used. Over 100 firefighters from 9 townships assisted. They also built a dam to catch the fire water run-off so the water could be reused. The French engineers finally returned to the plant after the fire had burned for 13 hours. They could not be found in New York. By putting N_2 on the vessels and using CO_2 extinguishers, they put the fire out in 2 hours. Damage was estimated at $200,000 and downtime was 4-6 weeks. Probably 20,000 lbs. of VCM was involved in the fire. The insurance carrier required the plant to install a larger water tank, develop proper pressure testing procedures, and develop contingency plans and a fire brigade.

3) Goodyear-Plaquemine - D. Langlois, BFG

This incident occurred in 1972 in a plant using the same PVC process as in the previous incident. Three minutes after operating pressure of 128# was reached, the dome of the poly vessel blew off releasing 19,000# of VCM. The vinyl ignited and burned for 3 hours. There were 3 serious burn injuries - 75% of their bodies were 2° and 3° burns. There was significant damage to piping and electrical but no structural damage. The 30" diameter dome was held in place by a locking ring. They went to a lugged locking ring design with a wedge and proximity switch installed so the reactor can't be charged unless the lid is properly aligned.

The Nissan representative reported a similar failure during a pressure test in one of their plants. They went to a different manway design.

4) Update on BFG Sphere Release - (reported last year) H. Waltemate, BFG

Almost 750 T of VCM were released when an air operated valve came open as some piping was being removed from the bottom of the sphere. A safety audit team was formed and hardware standards were developed for VCM storage vessels. A copy of the revised standards is attached. The maintenance work order procedure was also revised. A copy is attached.

5) Formosa Plastics Fire - J. Fields

The incident occurred on July 30, 1983 during a tank car loading operation. Loading had been completed on 2 cars, but the loading hoses could not be cleared with nitrogen into the cars because of low N_2 pressure. The loader sampled the cars and went to the lab. A second loader was at the rack when the incident occurred, but he was seriously burned (over 60% of his body, 2°/3°) and Formosa officials have been unable to determine from him what happened. They feel that the loader either disconnected a hose or the hose blew off. The VCM ignited almost immediately. The ignition source is not known, but could possibly have been a nonintrinsically-safe radio the loader was carrying. The first car emptied in several hours. The flames from the open loading connection on the first car resulted in a blow torch effect, impinging on the second car. The safety opened on the second car and did not reseat. The flame impingement also resulted in weakening of the shell on the second car, causing several holes/splits to develop in the tank wall. The second car burned for 6 days. The car was hot-tapped on the fourth day, but attempts to pump out the remaining 13,000 gallons of VCM failed. They finally drained the car to a container in an open ditch and had a controlled burn until the car was emptied (done with the permission of DNR). Monitoring detected no increase in contaminants during the burn.

The investigation revealed that the excess flow checks in the tank car valves had not been fully screwed down. This prevented them from operating.

Corrective Action

1. Cam-lock connections were replace with hammer unions.

2. Check valves were installed in the loading piping.

3. Emergency shut-off valves were installed.

4. Procedures were updated.

5. Loading hoses are now hydrotested every 6 months.

Note: A report on the incident by the Hazardous Materials Unit of the Louisiana State Police is also available.

6) High Pressure Water Cleaning Fatality - J. King, Occidental

In September, 1983, a 45 year old maintenance employee was killed as he was hydroblasting a horizontal heat exchanger. In the past, these exchangers had been drilled out. In the 1970's, Occidental made the transition to hydroblasting, using outside contractors. Because of pressure from the union, maintenance took over the job in 1981. Prior to this incident, there had been no serious problems during the cleaning operation. The equipment being used consisted of a hydroblast rig developing 4200 psi at the nozzle, 18' of stainless flex hose (¼"), and a dead man foot switch. The nozzle was drilled with 1 hole forward and 6 holes backward to provide a forward motion. As the employee started on the 8th tube, his helper noticed him jump, grab his throat, and then fall to the floor. The flex hose had kicked back from a plugged tube, entered the man's chest at his collarbone and travelled 16" into his chest. All attempts at CPR failed, and the man was pronounced dead less than one hour later. The cause of death was respiratory failure due to a torn esophagus and a lacerated lung.

Corrective Action

1. Occidental is no longer doing their own hydroblasting. They may consider going back to doing it at a later date. They are investigating improvements in procedure, such as drilling out the tubes to a certain depth before hydroblasting.

2. They are performing job training analyses.

3. They are working with the German company which supplied the hydroblasting equipment to improve the safety aspect of the job -- considering anchoring the flex hose to the exchanger.

7) Resin Transport Trailer - J. Wallace, Esso - Canada

This incident illustrates the consequences of improper repair procedures. A trailer (1800 ft^3) loaded with PVC suspension resin split apart as it was being unloaded. The trailer was equipped with 2 SRVs set at 15 psig. The unloading blower was capable of a peak pressure of 22 psig. The unloading line was plugging and the operator saw the pressure rise to 14 psi before the trailer came apart. It was later determined that the tank had been in an accident and had rolled over. It was rewelded, but the seam weld that failed had little penetration.

8) VCM Line Failure - J. Wallace, Esso - Canada

A leak was found at a flange on a 2" 304 SS line in recovered VCM service. The leak had been detected by the air monitor. When maintenance started to work on the line, the flange/pipe weld collapsed. It was determined that the contractor had installed a monel flange instead of stainless and galvanic corrosion had developed.

Esso has since gone to more stringent material checks.

9) OHC Explosion - B. Reynolds, PPG

The 1977 explosion was reviewed. A copy of the presentation is in B. Reynolds' VCSA file.

10) VCM Pump Failure - L. White, PPG

The May, 1983 frame adapter failure was reviewed. Since the meeting, we have been contacted by others who have had the same problem. Dow - Freeport is suspect of all of their pumps. They are considering replacing the frame adapters on the pumps in their storage areas as we are doing. Shintech had a failure very similar to ours. A cast iron frame adapter sheared completely at the bowl.

11) Conoco VCM Tank Car Derailment - D. Ashby, Conoco

The April, 1982 derailment in Pittsburgh, Texas was reviewed. Five VCM cars were involved. Ashby was notified that there had been a derailment of VCM cars and that some leakage had occurred. By the time he reached the site some 5 hours later, he found that one car had been punctured and was empty. This car was punctured by a flat car which was the third car back and jumped over the other cars. The couplers on the VCM cars worked as intended. Two others were laying in a creek and VCM was bubbling into the water. The president of the railroad took charge of the site. Major considerations were for the environment and some cows downstream of the wreck. Water samples from the creek showed 3% VCM 50 ft. downstream of the cars (this is higher than solubility of VCM in H_2O!) and 10-20 ppm 150 ft. downstream. They had no air monitor other than an L.E.L. meter. They considered detonation and burning but finally decided to vent the cars under water. Of the 800,000 lbs. of VCM involved in the wreck, 500,000 lbs. were saved and 300,000 lbs. were lost. The government representative took no air or water samples and made no recommendations. There was very little media coverage.

12) Solvay Tank Car Rupture

This incident occurred in Austria in April, 1983. A VCM car was loaded in Germany and was bound for a PVC plant in Italy. It was stopped by Italian customs at the border. Someone decided to unload the car in Austria (the plant did not know why). There was no paperwork on the car, and it was not cleared by customs for Austria. It was left on the principal tracks in the middle of the plant, 300 m. from a PVC unit and 100 m. from the powerhouse. The tank car split open releasing a jet of VCM. An electrician saw the vapor cloud and tripped the alarm system. Everything was shut down. The firemen arrived 10 minutes later. The split was found to be 150 cm. long by 20 cm. wide. There was no fire. The car was sprayed with water. VCM levels outside the plant were less than 10 ppm. Levels of 1000-2000 ppm were seen inside the plant, but this was some time after the initial release. One person was overcome by VCM vapors.

The investigation revealed:

The car had been overfilled due to a math error. Twenty cars were filled with 40,100 kg VCM. This car had been loaded with 45,100 kg. A series of human failures led to the incident.

1) Math error.

2) Loader did not check ticket.

3) Cars were supposed to be weighed twice, but scale had been out-of-service since 1977.

4) German railway did not pick up overload.

5) German/Austrian customs did not pick up overload.

6) Italian customs did not tell the plant where the car had gone. It was Easter holiday and they waited until Tuesday, the day of the incident.

7) The Italian customs did not advise that the car was overloaded.

There was no SRVs on the tank car. They do not protect their cars with SRVs.

13) Angio Sarcoma Update - through April, 1983, J. Barr - Air Products

Country	Fatalities Reported
U.S.	31
West Germany	21
France	14
Canada	10
U.K.	8
Sweden	5
Yugoslavia	4
Italy	3
Czechoslavakia	2
Japan	2
Norway	1
Belgium	1
Total	102

Two still alive in U.S; no reports from Iron Curtain.

14) Safety/VCM Monitoring Equipment - Mike Nevill, Dow

Area Monitoring - Beckman 6700 and 6710, 4-10 stream analyzers. Calibrated a 5 ppm, span - 25 ppm, 50 min. cycle time. They are spanned daily and given full calibration weekly. They use NBS standard in N_2. Action level is 5 ppm.

Leak Patrol - Use HNU, leak is defined as 10 ppm at 6". The operators calibrate HNU - (Others defined leak as 10 ppm at 1' or 25 ppm at 6".) They have seen some interference of HNU with NH_3.

Personnel Monitoring - Dow uses DuPont pumps. Borden does each employee once/month. Several companies reported using badge type monitors (3M). They claimed good accuracy and repeatability for 8 hour samples. Nineteen companies were using pumps; 11 were using badges.

15) Plant Evacuation Planning and Training - Mike Jones, BFG-Convent

They have a drill twice/year. They test fire alarms daily and Cl_2 alarm weekly. They have plant plot plans with vessel capacities, etc. for use in emergencies.

Dow reported using employees to imitate the press.

16) <u>Livingston Train Derailment</u> - Capt. W. Poe, La. State Police

Captain Poe gave a very good account of the incident. We have a copy of the video-tape documentary of the incident and a training film for emergency response.

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Attachment

SA - 132
Date: 11/15/82

BFGOODRICH CHEMICAL GROUP

SAFETY STANDARD

Hazardous Material Storage Tank Standard

Vinyl Chloride Storage Tanks
(Non-Process)

Tank Valves and Nozzles

I. All tank nozzles must have one of the following:

1. If Not In Use - Blank on the tank nozzle flange.

2. Vapor Service Nozzles - Ball valve mounted on tank nozzle flange. Valves in conjunction with relief valves will be covered in the relief valve section.

3. Liquid Service Nozzles (usually on bottom of tank, but would also include top entering dip pipes) - Remote air actuated ball valve mounted on tank nozzle flange. The following exceptions apply:

(a) Tank nozzles with thermowells. Thermowells must be welded to the tank flange.

(b) A manually operated ball valve that meets criteria in Appendix I, mounted between the tank nozzle flange and the air actuated ball valve is optional.

(c) Fill lines into the VCM spheres at the VCM plants. These lines require a check valve that is inspected annually and an air actuated valve that is activated only by a remote air switch.

Air actuators must include the following features:

(a) Air to open, spring to close.

(b) Contain section of burn-through tubing. 3 ft. (minimum) of plastic tubing.

(c) Valve, with air actuators mounted on them, bench tested for leaks before installed on tank and during vessel turnaround.

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4. All tank nozzles must be a minimum of 1-1/2" pipe size.

5. No threaded connections should be attached to the tank.

II. Valve requirements for Section I and a list of valves that meet these requirements are in Appendix I.

III. Air actuated valves are required to have two local and one remote manual air switch. The two local air switches will be 180° apart and located just outside the tank containment system. A LEL vapor detector, discussed later, will also operate these valves.

IV. It is required that all air actuated valves be cycled every two weeks.

V. Excess flow valves may be used in conjunction with air actuated valves.

Vapor Detectors

I. LEL type vapor monitor with continuous sampling that alarms at a maximum of 25% and closes air valves and activates deluge system at 50% are required.

II. Three LEL detectors will be located below tank and one at pump. It is not required that the LEL detector at the pump activate the deluge system.

III. Vapor detectors should be tested and calibrated every four months.

Fire Protection

I. An automatic deluge fire water system is required for each tank.

II. Vessel supports need either a deluge system or fire proofing with a 3 HR rating.

Relief Valves

I. One of the following two, (a) or (b), may be used for vessel pressure relieving systems:

(a) A three-way valve with two relief valves.

(b) Two-way valves, multi-nozzle with "Castell" locking system. LIKE KIRK KEY SYSTEM

See Appendix II for relief valve design and installation requirements.

II. Manual valves below relief valves must be mounted on tank nozzle flange. Valves for this service must meet the requirements in Appendix I.

III. Each relief valve will be bench tested every three years.

IV. Rupture discs will continue to be used per the EPA Regulations.

V. Sizing of relief valves must adhere to BFG Policy ST-1317.

Tank Internal Inspection

I. Storage tanks will be inspected a minimum of once in five years; tanks in rework VCM service every two years.

II. The minimum inspection requirements are:

(a) Visually inspect for internal corrosion, especially around flange welds, thermowells, level indicators, etc.

(b) Ultrasonically test wall thickness in several representative locations.

(c) Record results of each inspection and thickness measurement and compare with previous inspections.

III. Connecting piping will be inspected at the same time tank is inspected.

ADDENDUM

HAZARDOUS MATERIALS STORAGE TANKS SAFETY STANDARD SA-132

To be used for existing installations and specific applications only.

(1) Existing high performance butterfly valves, manufactured by Posi-Seal, may be used in vinyl chloride service at Calvert City in place of the ball valves required by the standard. When these valves are replaced, however, they must conform to the standard. (11/15/82)

(2) Existing six inch pipe elbows may remain between the tank nozzle flange and the air actuated valve on the butadiene tanks at Port Neches. These elbows must be inspected every year, however. (11/15/82)

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11/9/82

BFGOODRICH CHEMICAL GROUP
SAFETY STANDARD

MAINTENANCE WORK ORDER STANDARD

Purpose

The objective of this standard is to eliminate personnel injuries, ch mical spills, chemical exposures, and equipment damage which may result as a consequence of maintenance work being performed by p rsons who are not always familiar with the particular equipment or facility and the inherent related hazards.

D finition

Maintenance Work -

- is any activity to install, adjust, repair, test, inspect, remove or re-install workplace equipment or facilities, wh n performed by persons not directly responsible for the operation of such equipment or facilities.

Maintenance Work Order -

A permit which is used to define in written form:

(a) A description of the maintenance work.
(b) Safety related information.
(c) Authorization for the maintenance work to begin.
(d) Acknowledgement of work completion.

Procedure

Each plant/facility shall prepare and maintain a written procedure for authorizing maintenance work. This procedure must require the following:

I. The transaction of releasing equipment involving hazardous chemicals to maintenance personnel must occur at the equipment site. The foreman/operator who authorizes the maintenance work to commence in his area must release the equipment in the presence of the craftsman.

II. The foreman/operator who signs the Maintenance Work Order, authorizing the work to begin, must determine that:

(a) The craftsman is working on the correct piece of equipment.

(b) The equipment is safe to work on.

(c) The craftsman has been advised of the potential hazards and any special tools or protective equipment that is required.

(d) The appropriate personnel are aware of the maintenance work that is in progress.

Note: Many jobs performed by maintenance craftsmen require the following additional procedures: hot work, vessel entry, lockout and others required by the specific plant. It is the responsibility of the maintenance craftsman that these procedures are followed. However, the production foreman and the maintenance foreman must be held accountable.

III. The maintenance foreman will assign a craftsman to a job after determining that the necessary preparations have been made and will give him a copy of the maintenance work order. Communication with the production or operating area is required to determine whether equipment or systems have been made ready for maintenance.

The maintenance foreman must make certain that the work order accurately describes the work to be performed.

IV. The production foreman/operator releases the equipment to the craftsman by describing in written form, how the equipment has been safed-out and signing his name. The date and shift must also be included.

This signature assures the maintenance craftsman that the equipment has been made safe, the operators have been informed of the work to be performed, and if more than on department uses the equipment, each of the other department operators have been informed. The craftsman must be satisfied that the release is complete and conditions are safe prior to commencing work.

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V. The release of equipment is only valid for one shift. The craftsman must obtain another signed release whenever ther is a personnel shift change (this includes a personnel shift change by either the craftsman or production or both). The release requirements for subsequent shifts are identical to item #II. The possibility that conditions could change makes this duplication of the release procedure as important as the original.

When the equipment has the potential for a large chemical spill or release and cannot be drained or isolated by using a blank or locking a block valve, the foreman/operator must be present at the equipment site until the job has been completed by the craftsman.

VI. A Maintenance Work Order is used to authorize maintenance work. It must provide:

(a) A description of the maintenance work to be done.

(b) The location or job site.

(c) The date and estimated duration of the maintenance work.

(d) A section on safety that will accommodate a written description of how the equipment has been safed-out. This should include any permits, safety equipment, or activities that are required for the job to be performed safely.

(e) A signature from the foreman/operator for the releas of the equipment to the craftsman. The craftsman must countersign the foreman/operator's release signature.

(f) A signature from the foreman/operator signifying that the maintenance work has been approved. Before approval is given, however, the maintenance work, housekeeping conditions, and tool/equipment storage must be acceptable. If the maintenance work requirements are satisfactory, then the foreman/operator must sign the MWO, including the date and the time, indicating the acceptance of the work.

(Those plants that use a Hazardous Work Permit or a Permission to Start Work permit may substitute these for the safety requirements of this Maintenance Work Order Standard).

VIII. A system must be stablished for monitoring the release and approval process for Maintenance Work Orders. This can be accomplished by having the person who is responsible for charging the craftsman's hours verify the proper authorizations. Also, routine audits by line management and staff personnel should be used to monitor the release and approval process.

A thorough investigation must be conducted if a Maintenance Work Order is found without the proper release and approval signatures.

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JOB AUTHORIZATION

DESCRIBE HOW THE EQUIPMENT HAS BEEN SAFED-OUT.

AUTHORIZATION	DATE	SHIFT

CRAFTSMAN SIGNATURE

DESCRIBE HOW THE EQUIPMENT HAS BEEN SAFED-OUT.

AUTHORIZATION	DATE	SHIFT

CRAFTSMAN SIGNATURE

DESCRIBE HOW THE EQUIPMENT HAS BEEN SAFED-OUT.

AUTHORIZATION	DATE	SHIFT

CRAFTSMAN SIGNATURE

DESCRIBE HOW THE EQUIPMENT HAS BEEN SAFED-OUT.

AUTHORIZATION	DATE	SHIFT

CRAFTSMAN SIGNATURE

REPAIR REPORT CODES

COMPONENT

A1 ALARM
A2 ANALYZER
A3 ARMATURE
B1 BASE
B2 BATTERY
B3 BEARING
B4 BELLOWS (BOURDON-HELICAL)
B5 BELTS
B6 BLADE
B7 BOLTS (SCREWS, STUDS)
B8 BUSHING
C1 CABLE
C2 CASING
C3 CATALYST
C4 CHAIN
C5 CIRCUIT
C6 CLUTCH
C7 COILS-HEATER
C8 CONDUIT
C9 CONTROLLER (STARTER)
D1 DIAPHRAGM
E1 ELECT. SUPPLY
F1 FAN
F2 FILTER (SCREEN, STRAINER)
F3 FLOAT
F4 FUSE
G1 GASKET
G2 GAGE
G3 GEAR
H1 HOSE
H2 HOUSING OR FRAME (BODY)
I1 IMPELLER
I2 IMPULSE LINE
I3 INSULATION
L1 LAMP
L2 LEADS
L3 LINKAGE
M1 MAGNETS
M2 METER
M3 MOTOR
M4 MOUNTING
N1 NOZZLE
O1 OIL
P1 PACKING
P2 PIPE
P3 PISTON (PLUNGER)
P4 POSITIONER
P5 POWER SUPPLY
P6 PROBE
P7 PUMP (COMPRESSOR)
Q1 COOLANT
Q2 COUPLING (FLANGE, JOINT)
Q3 CUP
Q4 CYLINDER
R1 RECORDER
R2 REGULATOR
R3 RELAY
R4 RELIEF
R5 RING
R6 ROD
R7 ROLL
R8 ROLLER
R9 ROTOR
S1 SEAL-LIP
S2 SEAL-MECHANICAL
S3 SEAT
S4 SHAFT
S5 SHELL
S6 SHEAR PIN
S7 SHEAVE
S8 SLEEVE
S9 SOLENOID
T1 TERMINAL
T2 THERMAL SYSTEM
T3 THRUST BEARING
T4 TRACING
T5 TRANSFORMER
T6 TRANSMITTER
T7 TRAYS
T8 TRIM
T9 TUBES
V1 VALVE
V2 VENT
V3 VESSEL
W1 WIRING OR WINDINGS
X1 SPRING
X2 SPROCKET
X3 STATOR
X4 SUPPORT STRUCTURE
X5 SWITCH (BREAKER)
Z1 TUBING OR FITTING

CONDITION

B1 BENT
B2 BROKEN
B3 BURNT
C1 CALIB NEEDED
C2 CORRODED
D1 DIRTY
E1 EMPTY
E2 ERODED
F1 FAILED
F2 FAULTED
G1 GROUNDED
J1 JAMMED
L1 LEAKING
L2 LOOSE
L3 LUBE NEEDED
M1 MISALIGNED
M2 MISAPPLICATION
M3 MISSING
N1 NEEDED
N2 NEW
N3 NOISY
N4 NOTHING FOUND
O1 OFF
O2 OVERHEATED
P1 PLUGGED
S1 SHORTED
T1 TIGHT
V1 VIBRATING
W1 WET
W2 WORN
W3 WRONG SIZE

ACTION

A1 ADJUSTED
A2 ALIGNED
B1 BALANCED
C1 CALIBRATED
C2 CHECKED (TESTE
C3 CLEANED
F1 FABRICATED
I1 INSPECTED
I2 INSTALLED
L1 LOOSENED
L2 LUBRICATED
M1 MACHINED
M2 MODIFIED
N1 NONE
P1 PAINTED
P2 PICKLED
P3 PLUGGED
P4 PURCHASED
R1 REBUILT
R2 REINSULATED
R3 RELOCATED
R4 REPACKED
R5 REPAINTED
R6 REPLACED
R7 RESET (STARTED
R8 REWIRED
R9 REWOUND
S1 STRAIGHTENED
T1 TIGHTENED
U1 UNPLUGGED
W1 WELDED

COMPLETION SUMMARY / REPAIR REPORT

			LOC.		MWO NO.					
1	2	3	4	5	6	7	8	9	10	11
M	4	M								

MAIN PROBLEM — ADDITIONAL PROBLEMS (OPTIONAL) 1, 2, 3, 4, 5

CARD	COMPLETED BY (INIT.)	DATE MO	DATE DAY	DATE YR	REVISED JUST. CODE	MAIN COMP.	MAIN COND.	MAIN ACTION	1 COMP.	1 COND.	1 ACTION	2 COMP.	2 COND.	2 ACTION	3 COMP.	3 COND.	3 ACTION	4 COMP.	4 COND.	4 ACTION	5 COMP.	5 COND.	5 ACTION
12	13 14 15	16 17	18 19	20 21	22 23	24 25	26 27	28 29	30 31	32 33	34 35	36 37	38 39	40 41	42 43	44 45	46 47	48 49	50 51	52 53	54 55	56 57	58 5
1																							

FURTHER EXPLANATION (OPTIONAL)

2

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