VCM TANK FARM
COMPRESSOR UPGRADE

OPERATING PROCEDURES

September 8,1992

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TABLE OF CONTENTS

I. PROJECT BACKGROUND.....2

II. PROCESS DESCRIPTION.....4

III. NORMAL OPERATIONS.....7

IV. NON-ROUTINE CONDITIONS.....9

V. SAFETY AND ENVIRONMENTAL.....13

VI. DCS TIE - IN LIST.....14

VII. DCS INTERLOCKS.....15

VIII. DCS GRAPHIC.....17

IX. PIPING AND INSTRUMENTS DIAGRAM.....18

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VCM TANK FARM COMPRESSOR UPGRADE
OPERATING PROCEDURE
September 8, 1992

I. Project Background

On several occasions the railcar unloading system has shut down. There has been a catastrophic failure of the compressors causing damage to the compressor housing and internals. Most failures also have caused some emission of VCM. These failures are caused by liquid entering the compressor chamber or the compressors running outside their design conditions.

This project installed instrumentation for safer operation of the Corken compressors in the VCM tank farm. The instrumentation installed will shut down the railcar unloading system before it can reach its designed operational limits.

The tank farm instrumentation includes the following:

1. INDIVIDUAL COMPRESSOR SHUT DOWN

   A. Low oil pressure switch on each compressor crank case.

   B. Low pressure switch on each compressor inlet.

   C. High temperature switch on each compressor discharge line.

   D. High liquid level switch on each compressor knock-out pot suction line.

   E. High compressor head temperature.

2. ALL COMPRESSORS SHUT DOWN

   A. High pressure switch on any compressor discharge line.

   B. High high level switch on VCM storage sphere knock-out pot.

   C. Interlocks with existing instrumentation:
      1. Liquid VCM unloading valve (00H102) closed.
      2. VCM Vapor unloading valve (00H103) closed.

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VCM TANK FARM COMPRESSOR UPGRADE
OPERATING PROCEDURE
September 8, 1992

I. Project Background (continued)

3. Sphere deluge system (00H105) on.
4. Railcar deluge system (00H001) on.
5. Railcar unloading isolation valve, (00X120) closed.
6. Bullet deluge (00H002) on.

D. High pressure in emission recovery system K.O. pot.

Each of the above switches provides an input to the DCS. The DCS is responsible for providing output for enabling the motor run circuit for the compressors. Ladder logic is used to implement the interlocking for compressor shutdowns.

VCM TANK FARM COMPRESSOR UPGRADE
OPERATING PROCEDURE
September 8, 1992

II. Process Description

High temperature switches, 00TSH214-254, located on the discharge line of the compressors are DCS inputs (see attached P&I D). The DCS will shut down the individual compressor it is serving at 230 degrees F.

High temperature switches, 00TSH210-250, connected to the compressor heads are tied into the DCS. The DCS will shut down the individual compressor at 340 degrees F.

Low pressure switches, 00PSL210-250, located on each compressor crank case is tied into the DCS. The DCS will shut down the individual compressor when the oil pressure drops to 12 psig. A 10 second delay is included with each switch to allow for start-up.

Low pressure switches, 00PSL212-252, connected to the inlet of the compressors are tied into the DCS. The DCS will shut down the individual compressors at 8 psig.

High level switches, 00LSH213-253, are located on the suction of each compressor knock-out pot. These switches are tied onto the DCS. The DCS will shut down the individual compressor when a high level of liquid VCM is detected.

High pressure switches, 00PSH211-251, are connected to the discharge line of each compressor. These switches are DCS inputs. All compressors will be shut down if any discharge lines reach 150 psig. The flex hoses are the weak link in the unloading system. All compressors will be shut down before the flex hoses reach a hazardous pressure (625 psi is the flex hose MAWP).

The high pressure switch, 00PSH012, on the emissions recovery system (ERS) knock-out pot, is tied into the DCS. The DCS will shut down all compressors when the ERS pressure reaches 75 psig.

The high-high level switch, 00LSHH011, is located on the sphere knock-out pot. This switch is tied into the DCS. All compressors will be shut down if high liquid VCM level is detected. This will keep the

II. Process Description (Continued)

sphere knock-out pot from overflowing into the compressor inlet.

All switches in the VCM tank farm compressor area are tied into the DCS. This system consists of 37 discrete inputs and 5 discrete outputs (see DCS tie-in list). A VCM unloading graphic is located on the dryer operator terminal. The switches generate alarms on the DCS when engaged. These alarms are included in the ladder logic for energizing the compressors. This provides compressor shut downs when alarm conditions occur (see DCS interlocks list).

Interlocks with other equipment also shut down the compressors in the following instances:

1. Either the liquid VCM unloading valve (00H102) or the VCM vapor supply valve is closed (00H103).

2. The sphere deluge system is activated (00H105).

3. The railcar deluge system is activated (00H001).

4. Bullet deluge system is activated (00H002).

5. Railcar unloading isolation valve is activated (00X120).

The vinyl lead operator will use two-way radios to communicate with the yard operator. The vinyl lead operator must enable the compressors from the tank farm graphic to allow them to be started. Although the compressors are energized from the DCS, the yard operator is required to start the compressors from a local hand switch. The compressors' hand switches are located at each compressor.

A drain line runs from the vapor header of the sphere to the ERS. This line is used to drain any liquid out of the vapor line before the compressors are started. A check valve is installed in this line.

VCM TANK FARM COMPRESSOR UPGRADE
OPERATING PROCEDURE
September 8, 1992

II. Process Description (Continued)

All lines down stream of the drain line including the compressor knock-out pots and compressor inlets, are heat traced and insulated to keep VCM from condensing during winter conditions.

VCM TANK FARM COMPRESSOR UPGRADE
OPERATING PROCEDURE
September 8, 1992

III. Normal Operation

The VCM Tank Farm Compressor Upgrade project installed equipment for constant monitoring of the VCM compressors by the DCS. When design conditions are met, the DCS will energize the compressors to a field hand switch. The operator will visually check the system before the unloading process is started. The compressors must be started by the yard operator.

The following steps will be taken during unloading startup:

1. Hook up railcars.

2. Check the valves that are between the railroad tracks going to each unloading station which is to be used for unloading railcars. All the valves must be open.

3. Go to the compressor shed and put on the breathing air mask and hook up to breathing air system.

4. Open the main liquid valve on the west side of the compressor shed on the sphere liquid line. This valve normally stays open.

5. Visually inspect each liquid unloading line. The valves on this line must be open to allow liquid flow.

6. Open the main vapor valve on the sphere vapor line. This valve normally stays open.

7. Position the 4-way valve to allow vapor flow to the suction of the compressors.

***8. **Before starting any compressor open the valve on the line from the sphere vapor header to the Emissions Recovery System (ERS) to remove any liquid VCM in the vapor lines. Also open header to compressor suction line and K.O. pot. Close these valves after liquid removal this should take approximately 1 minute.**

VCM TANK FARM COMPRESSOR UPGRADE
OPERATING PROCEDURE
September 8, 1992

III. Normal Operation (Continued)

9. Open the inlet and outlet valves on the sphere knock-out pot. These valves normally stay open.

10. Inspect the vapor lines through the shed to insure all of the appropriate valves are open.

11. Check liquid VCM level in the sphere knock-out pot. If high level exists manually pump out some of the liquid from the knock-out pot. If you cannot see through the sight glass, turn the pump to the manual position and then turn it to the auto position. The pump will run in the auto position if there is a high level in the K.O. pot.

12. Check valves on compressor knock-out pots. These valves should be closed during normal operation.

13. Start compressors by putting the Hand-Off-Auto switch in auto and depressing the start button.

14. If compressors do not start, follow the outline in section IV for non-routine conditions.

15. Monitor compressor discharge pressure.

16. Monitor flow indicators. Green indicates flow.

17. Log in railcar numbers.

VCM TANK FARM COMPRESSOR UPGRADE
OPERATING PROCEDURE
September 8, 1992

IV. Non-Routine Conditions

Any conditions which result in the compressors shutting down or not starting is a non-routine condition. The DCS is set up to shut down the compressors or keep them from starting under the following condition:

1. High Compressor Discharge Temperature.
2. High Compressor Head Temperature.
3. Low Compressor Oil Pressure.
4. Low Compressor Inlet Pressure.
5. High Liquid Level in the compressor knock-out pots.
6. High Compressor Discharge pressure.
7. High-High Liquid Level in the sphere knock-out pot.
8. High Pressure in the ERS pot.
9. The Liquid VCM Unloading and the Vapor VCM Supply Valves are closed.
10. The Sphere, Railcar, or Bullet Deluge systems are activated.
11. The Railcar Unloading Isolation Valve is closed.

Each of these conditions will cause an alarm in the vinyl control room at the dryer operator's console (see VCM tank farm graphic). Should an alarm occur, the dryer lead operator will immediately contact the yard operator, using the two-way radio, to inform him of the alarm that occurred.

The yard operator should contact the dryer panel operator if a compressor will not start when the hand switch is switched on. The dryer operator can now help in trouble-shooting these type of problems.

VCM TANK FARM COMPRESSOR UPGRADE
OPERATING PROCEDURE
September 8, 1992

IV. Non-Routine Conditions (Continued)

Action should be taken on each alarm as indicated below:

1. High Discharge Temperature - Individual compressor shut down.

   Should high discharge temperature occur, check the compressor discharge line for closed or partially closed valves. Open any valves that may be closed. Try again to start up the compressor.

   If no valves are closed, isolate the compressor and allow to cool. After the compressor has cooled, determine the cause of the high temperature before restarting.

2. High Head Temperature - Individual compressor shut down.

   In the event of a high head temperature shut down, isolate the compressor and allow to cool. After cooled determine the cause of the high head temperature before restarting the compressor.

3. Low Oil Pressure - Individual compressor shut down.

   Have the oil level checked by maintenance and also check for leaks.

4. Low Inlet Pressure - Individual compressor shut down.

   This is an indication that there is liquid in the compressor knock-out pot. Open the valve on the bottom of the compressor knock-out pot that goes to the ERS. After pot has drained, close this valve.

   Should more than one compressor have liquid in the knock-out pot the drain line on the sphere vapor line should be opened to allow liquid to be removed from this line. The sphere knock-out pot should also be drained using the procedure

VCM TANK FARM COMPRESSOR UPGRADE
OPERATING PROCEDURE
September 8, 1992

IV. Non-Routine Conditions (Continued)

outlined in 7. below (High-High Liquid Level in the sphere knock-out pot).

5. High Liquid Level in the compressor knock-out pot - Individual compressor shut down.

   Follow the same procedure outlined in 4. above (Low Inlet Pressure).

6. High Outlet Pressure - All compressors shut down.

   This indicates that one of the valves going from the compressors to the railcars is probably closed or partially closed. Inspect the lines from the compressor for any closed valves.

7. High-High Liquid Level in the sphere knock-out pot - All compressors shut down.

   To manually drain the sphere knock-out pot, place the VCM recycle pump switch in the "HAND" position. This switch is located on a panel on the south side of the knock-out pot. The recycle pump will pump the contents of the pot to the sphere. When the level in the pot has dropped below the low level switch, place the pump switch back in the "AUTO" position.

8. High Pressure in the ERS knock-out pot - All compressors shut down.

   A high ERS pressure shutdown indicates that the emissions recovery system is backed up or not functioning properly. The yard operator should inform the vinyl supervisor of the situation. VCM unloading must be halted until the ERS problems are corrected.

9. Either the liquid VCM unloading or the VCM vapor supply valves are closed - All compressors shut down.

   The yard operator will determine the reason the valve is closed. Open the valve if no reason for its closure is determined, and re-start the

IV. Non-Routine Conditions (Continued)
compressors.

10. Sphere, Railcar, or Bullet Deluge systems are activated - All compressors shut down.

    The yard operator will determine the reason the deluge system is activated. Compressors should not be re-started until the deluge is shut off.

11. The Railcar Unloading Isolation Valve is closed - All compressors shut down.

    The yard operator will determine the reason the railcar unloading isolation valve is closed. If no reason for its closure is determined, open the valve and re-start the compressors.

VAB.0001107951

VCM TANK FARM COMPRESSOR UPGRADE
OPERATING PROCEDURE
September 8, 1992

V. SAFETY AND ENVIRONMENTAL

This project provides a safer operation of the compressors during railcar unloading procedures. The ultimate result of this project is a reduced chance for VCM emissions. This project provides an added security to plant workers, the community, and the environment.

DCS TIE – IN LIST

INPUT

DCS TAG	COMPONENT	P&I D NUMBER
00LA213	00LSH213	LSH-101
00LA223	00LSH223	LSH-102
00LA233	00LSH233	LSH-103
00LA243	00LSH243	LSH-104
00LA253	00LSH253	LSH-105
00LA011	00LSHH011	LSHH-101
00TA210	00TSH210	TSH-106
00TA220	00TSH220	TSH-107
00TA230	00TSH230	TSH-108
00TA240	00TSH240	TSH-109
00TA250	00TSH250	TSH-110
00TA214	00TSH214	TSH-101
00TA224	00TSH224	TSH-102
00TA234	00TSH234	TSH-103
00TA244	00TSH244	TSH-104
00TA254	00TSH254	TSH-105
00PA212	00PSL212	PSL-106
00PA222	00PSL222	PSL-107
00PA232	00PSL232	PSL-108
00PA242	00PSL242	PSL-109
00PA252	00PSL252	PSL-110
00PA210	00PSL210	PSL-101
00PA220	00PSL220	PSL-102
00PA230	00PSL230	PSL-103
00PA240	00PSL240	PSL-104
00PA250	00PSL250	PSL-105
00PA211	00PSH211	PSH-101
00PA221	00PSH221	PSH-102
00PA231	00PSH231	PSH-103
00PA241	00PSH241	PSH-104
00PA251	00PSH251	PSH-105
00PA012	00PSH012	PSH-106
00HM210	00HMR210	CP-101
00HM220	00HMR220	CP-102
00HM230	00HMR230	CP-103
00HM240	00HMR240	CP-104
00HM250	00HMR250	CP-105

OUTPUT

COMPONENT	TO
00HM210	CP-101
00HM220	CP-102
00HM230	CP-103
00HM240	CP-104
00HM250	CP-105

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DCS INTERLOCKS LIST

ALL COMPRESSOR SHUT DOWN INTERLOCK

DCS TAG	DISCRIPTION	COMPONENT	P&I D NUMBER
00PA211	HIGH DISCHARGE PRESSURE ON CP-101	00PSH211	PSH-101
00PA221	HIGH DISCHARGE PRESSURE ON CP-102	00PSH221	PSH-102
00PA231	HIGH DISCHARGE PRESSURE ON CP-103	00PSH231	PSH-103
00PA241	HIGH DISCHARGE PRESSURE ON CP-104	00PSH241	PSH-104
00PA251	HIGH DISCHARGE PRESSURE ON CP-105	00PSH251	PSH-105
00LA011	HIGH LEVEL IN THE VCM SPHERE KNOCK-OUT POT	00LSHH011	LSHH-101
OOPA012	HIGH PRESSURE IN THE ERS KNOCK-OUT POT	00PSH012	PSH-106
00HA105	SPHERE DELUGE SYSTEM ACTIVATED		
00HA001	RAILCAR DELUGE SYSTEM ACTIVATED		
00HA002	BULLET DELUGE SYSTEM ACTIVATED		
00XV120	RAILCAR ISOLATION VALVE		
00HV102	VCM LIQUID UNLOADING VALVE		
00HV103	VCM VAPOR SUPPLY VALVE		

CP-101 SHUT DOWN INTERLOCK

DCS TAG	DESCRIPTION	COMPONENT	P&I D NUMBER
00LA213	COMPRESSOR KNOCK-OUT POT HIGH LIQUID LEVEL	00LSH213	LSH-101
00PA212	COMPRESSOR K.O. POT LOW DISCHARGE PRESSURE	00PSL212	PSL-106
00TA210	HIGH COMPRESSOR HEAD TEMPERATURE	00TSH210	TSH-106
00TA214	HIGH COMPRESSOR DISCHARGE TEMPERATURE	00TSH214	TSH-101
00PA210	LOW COMPRESSOR OIL PRESSURE	00PSL210	PSL-101
ALL COMPRESSOR SHUT DOWN ACTIVATED			

WHEN ALL ALARMS ARE OFF, THE VINYL LEAD OPERATOR MUST ENABLE THE COMPRESSOR FROM THE TANK FARM GRAPHIC BEFORE THE DCS WILL ENERGIZE 00HM210 . A YARD OPERATOR WILL BE REQUIRED TO START CP-101 THROUGH A LOCAL HAND SWITCH.

CP-102 SHUT DOWN INTERLOCK

DCS TAG	DESCRIPTION	COMPONENT	P&I D NUMBER
00LA223	COMPRESSOR KNOCK-OUT POT HIGH LIQUID LEVEL	00LSH223	LSH-102
00PA222	COMPRESSOR K.O. POT LOW DISCHARGE PRESSURE	00PSL222	PSL-107
00TA220	HIGH COMPRESSOR HEAD TEMPERATURE	00TSH220	TSH-107
00TA224	HIGH COMPRESSOR DISCHARGE TEMPERATURE	00TSH224	TSH-102
00PA220	LOW COMPRESSOR OIL PRESSURE	00PSL220	PSL-102
ALL COMPRESSOR SHUT DOWN ACTIVATED			

WHEN ALL ALARMS ARE OFF, THE VINYL LEAD OPERATOR MUST ENABLE THE COMPRESSOR FROM THE TANK FARM GRAPHIC BEFORE THE DCS WILL ENERGIZE 00HM220 . A YARD OPERATOR WILL BE REQUIRED TO START CP-102 THROUGH A LOCAL HAND SWITCH.

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DCS INTERLOCKS LIST

(Continued...)

CP-103 SHUT DOWN INTERLOCK

DCS TAG	DESCRIPTION	COMPONENT	P&I D NUMBER
00LA233	COMPRESSOR KNOCK-OUT POT HIGH LIQUID LEVEL	00LSH233	LSH-103
00PA232	COMPRESSOR K.O. POT LOW DISCHARGE PRESSURE	00PSL232	PSL-108
00TA230	HIGH COMPRESSOR HEAD TEMPERATURE	00TSH230	TSH-108
00TA234	HIGH COMPRESSOR DISCHARGE TEMPERATURE	00TSH234	TSH-103
00PA230	LOW COMPRESSOR OIL PRESSURE	00PSL230	PSL-103
ALL COMPRESSOR SHUT DOWN ACTIVATED			

WHEN ALL ALARMS ARE OFF, THE VINYL LEAD OPERATOR MUST ENABLE THE COMPRESSOR FROM THE TANK FARM GRAPHIC BEFORE THE DCS WILL ENERGIZE 00HM230 . A YARD OPERATOR WILL BE REQUIRED TO START CP-103 THROUGH A LOCAL HAND SWITCH.

CP-104 SHUT DOWN INTERLOCK

DCS TAG	DESCRIPTION	COMPONENT	P&I D NUMBER
00LA243	COMPRESSOR KNOCK-OUT POT HIGH LIQUID LEVEL	00LSH243	LSH-104
00PA242	COMPRESSOR K.O. POT LOW DISCHARGE PRESSURE	00PSL242	PSL-109
00TA240	HIGH COMPRESSOR HEAD TEMPERATURE	00TSH240	TSH-109
00TA244	HIGH COMPRESSOR DISCHARGE TEMPERATURE	00TSH244	TSH-104
00PA240	LOW COMPRESSOR OIL PRESSURE	00PSL240	PSL-104
ALL COMPRESSOR SHUT DOWN ACTIVATED			

WHEN ALL ALARMS ARE OFF, THE VINYL LEAD OPERATOR MUST ENABLE THE COMPRESSOR FROM THE TANK FARM GRAPHIC BEFORE THE DCS WILL ENERGIZE 00HM240 . A YARD OPERATOR WILL BE REQUIRED TO START CP-104 THROUGH A LOCAL HAND SWITCH.

CP-105 SHUT DOWN INTERLOCK

DCS TAG	DESCRIPTION	COMPONENT	P&I D NUMBER
00LA253	COMPRESSOR KNOCK-OUT POT HIGH LIQUID LEVEL	00LSH253	LSH-105
00PA252	COMPRESSOR K.O. POT LOW DISCHARGE PRESSURE	00PSL252	PSL-110
00TA250	HIGH COMPRESSOR HEAD TEMPERATURE	00TSH250	TSH-110
00TA254	HIGH COMPRESSOR DISCHARGE TEMPERATURE	00TSH254	TSH-105
00PA250	LOW COMPRESSOR OIL PRESSURE	00PSL250	PSL-105
ALL COMPRESSOR SHUT DOWN ACTIVATED			

WHEN ALL ALARMS ARE OFF, THE VINYL LEAD OPERATOR MUST ENABLE THE COMPRESSOR FROM THE TANK FARM GRAPHIC BEFORE THE DCS WILL ENERGIZE 00HM250 . A YARD OPERATOR WILL BE REQUIRED TO START CP-105 THROUGH A LOCAL HAND SWITCH.

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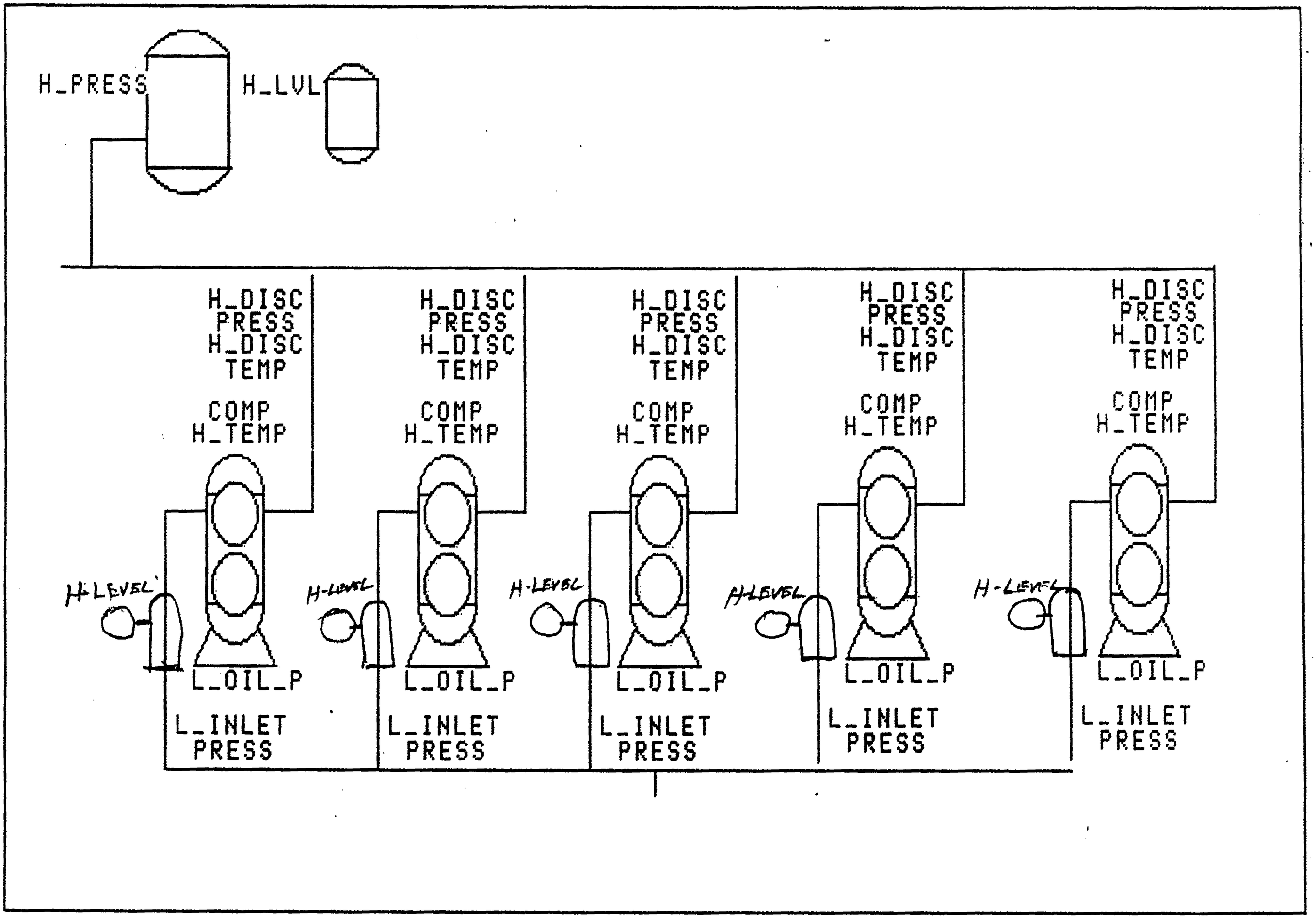

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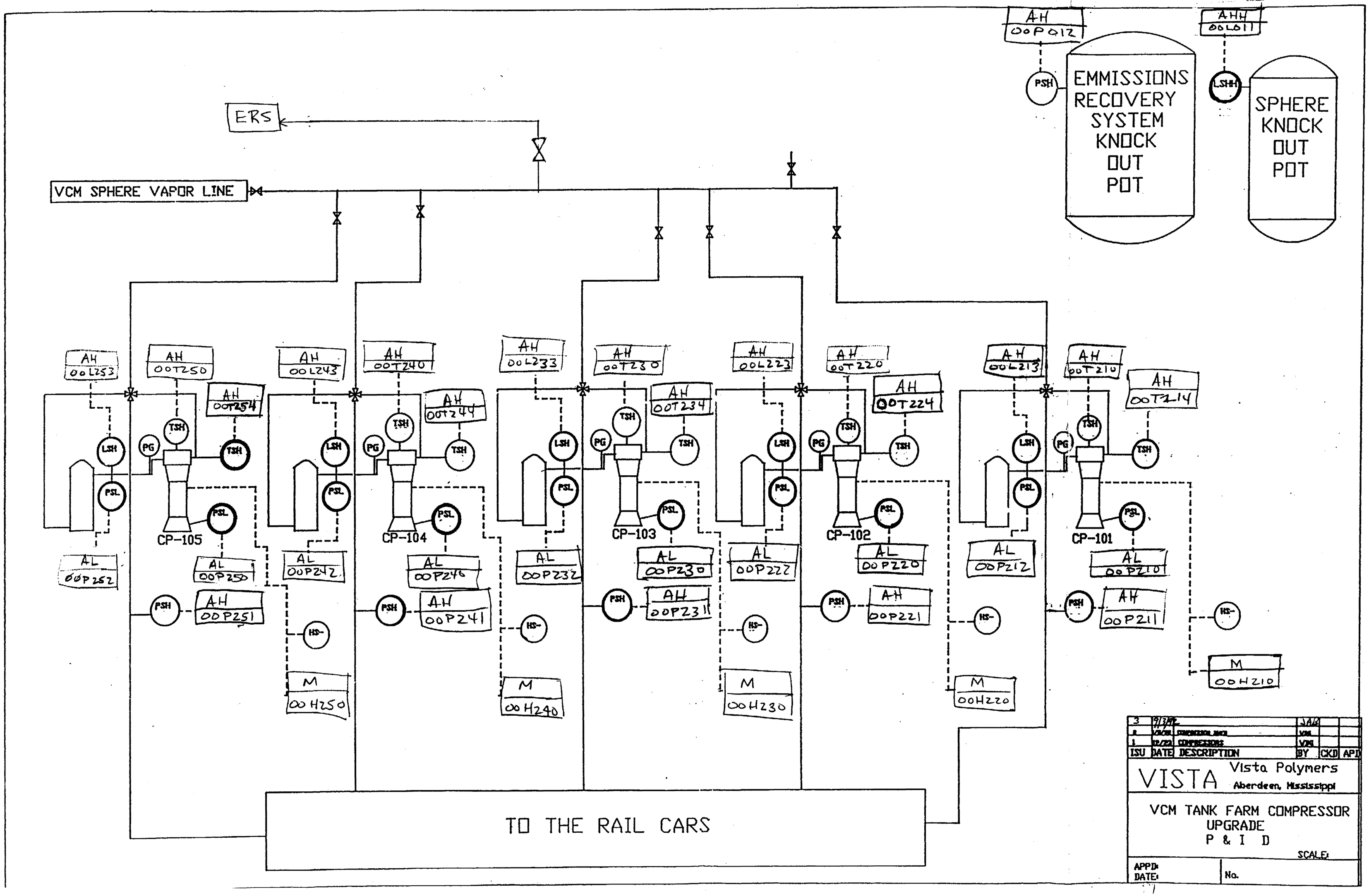

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2	6/6/96	COMPRESSOR MAPS	VPG		
1	12/20	COMPRESSORS	VPG		

VISTA Vista Polymers
Aberdeen, Mississippi

VCM TANK FARM COMPRESSOR UPGRADE
P & I D

SCALE:

APPD:
DATE:

No.