



Interoffice Communication

To J. A. DeBernardi
From J. W. Ware
Date September 15, 1982
Subject 1982 Turnaround Critique

Summary

The 1982 turnaround was completed on-schedule, under budget and with the best safety record ever for a VCM Plant turnaround. The turnaround was budgeted for 23 days, stream-to-stream, and a total cost of \$1,085.2M. The turnaround was actually completed in 26 calendar days following a cost-saving three day suspension of turnaround activities during the Memorial Day holiday weekend. Turnaround cost accounting indicates a total actual cost of \$963.0M (to be confirmed by receipt of actual invoices at a later date). This represents a favorable cost variance of \$122.2M. Three injuries requiring first aid treatment were reported during the 1982 turnaround. The best previous record was associated with the 1980 turnaround which recorded four first aid injuries and one medical treatment case.

The improved overall performance achieved by the Plant during this turnaround must be considered to be a significant accomplishment, especially in light of the Plant Modernization Project workload.

General elements which were factors in making the 1982 turnaround a success are as follows:

- 1) Favorable weather conditions during the turnaround period.
- 2) Relatively complete, experienced plant staff.
- 3) Close coordination of the work effort in daily meetings.
- 4) Decreased Plant Modernization activities.
- 5) Institution of an improved cost control program.
- 6) Availability of more qualified casual craftsman.

Attached you will find a more detailed analysis of the various aspects of the turnaround with plans for further improvement where appropriate.

J. W. Ware
Plant Superintendent

CCR 000009539

br
cc: RB-MLA-JRH-JHB-SRA-PLF

Safety and Security

The 1982 turnaround was completed with three injuries requiring first aid treatment being reported. This statistic represents the best turnaround safety performance in the Plant's history. In addition fewer potentially hazardous "near miss" incidents were reported.

All injuries recorded during the turnaround involved casual personnel. The fact that the number of injuries was substantially less than previous turnarounds is attributed to increased direct supervision and employment of a casual work force which, for a variety of reasons, was more committed to established plant work practices.

Contractor safety performance improved considerably as compared to the 1981 turnaround. Factors contributing to this improvement include:

- 1) Fewer contract personnel in the plant.
- 2) Increased communication of plant safety requirements to contract personnel prior to the turnaround.
- 3) Depressed economic conditions in the Lake Charles area which permitted the use of more experienced contract personnel.

Plant security and employee/contractor control was adequate. Separate gates were designated for employees and contract personnel. Employees and plant contract personnel were provided identification badges and Plant Modernization contract personnel were required to wear specially designed identification tags along with their union identification buttons in full view for plant entry. This made possible improved gate control and coordination of personnel once they were in the plant.

May 1, 1982, marked the expiration of contracts between various craft unions and the Association of General Contractors in Lake Charles. Crafts with contracts which expired on May 1 included the carpenters, iron workers, cement finishers, brick layers, teamsters, operating engineers, pipefitters and boilermakers. The VCM Plant experienced no problems as a result of the expiration of these contracts.

Planning and Scheduling

The work planning effort for the turnaround was begun in early March, approximately two months prior to the start of the turnaround. The planning effort was directed toward identification of plant maintenance and Modernization Project work items and then organization of these work items into a schedule. This effort is well standardized for plant maintenance items and is based primarily upon past experience.

A special effort was made during the 1982 turnaround to apply a risk/benefit analysis to standard work items. Selected items were then eliminated in support of the cost control program. This effort yielded true cost savings during the turnaround. An Operations Shift Supervisor was assigned to work with Maintenance Department, Modernization Project and CED Planning personnel to update/improve

upon the computerized work schedule developed prior to the 1981 turnaround. The Shift Supervisor was occupied full time with this assignment for approximately three weeks. This Operations manpower commitment is critical to the success of the planning effort and the three week period was adequate. A similar commitment by Maintenance Department personnel was not possible while pre-planning the 1982 turnaround due to an understaffed condition. This deficiency manifested itself during the turnaround in deviations from the established work schedule and the resulting conflicts for available work space and manpower. An increased interaction between Maintenance and Modernization personnel is needed prior to the next turnaround. Due to the extent of the Modernization Project work and the projected duration of the 1983 turnaround, planning and scheduling work has already begun for this next turnaround.

Mechanical

In general the mechanical work went well. Unanticipated major work items which had an effect upon efficiency and scheduling included repairs to R-201A cracking furnace walls, replacement of five trays in the HCl column, C-202, and replacement of two tantalum sleeves in the spare primary oxychlorination separator, S-309 (which was installed during the turnaround).

A significant amount of extra time and money were spent cleaning the EDC Vaporizer (H-201A & B) bundles. This is believed to be due to the fact that these bundles were not cleaned when the furnaces were decoked during the previous run. As a result of this experience, the plant will return to the practice of cleaning the vaporizer bundles during routine decokings.

Catalyst removal and charging of the oxychlorination reactors continues to be a manpower intensive task. Several contractors were approached prior to the 1982 turnaround in an attempt to identify any new technology in this area which might be practical and economical for the VCM reactors. One such contractor was allowed in the plant during the T/A to test newly developed equipment. The equipment appeared to be workable. Costs for catalyst removal and charging were carefully tracked during the 1982 turnaround and will be compared with a quote from Reactor Services, Inc., in a potential move to save costs and eliminate the hiring of some 55-60 casual employees during the 1983 turnaround.

Halliburton Services were used as the chemical cleaning contractor during the 1982 turnaround. Halliburton personnel were found to be more reliable, competent and safety conscious than personnel associated with cleaning contractors used in the past.

For the first time in the history of the VCM Plant no weld repairs were required in the direct chlorinator, R-101. In addition minimal repairs were required in S-206, T-101 and T-102.

Operations

Plant shutdown and start-up procedures are well established from many years of use. Minor modifications are implemented from turnaround to turnaround to accomodate revised mechanical work plans and improve efficiency. The

shutdown and start-up activities proceeded well during the 1982 turnaround. The following comments represent areas to be considered for the 1983 turnaround.

- 1) The use of breathing air for blinding operations will require additional emphasis prior to the next turnaround to ensure a greater commitment to this need by both Operations and Maintenance personnel.
- 2) The heavy ends column and light ends column were shutdown on Friday of the shutdown weekend. This is earlier than on past turnarounds, had no adverse effects and represented a considerable cost savings.
- 3) Samples were not taken during the EDC purge nor during equipment preparation for entry until, by past experience, it was reasonable to expect acceptable results. This saved lab time, limited the purging of lab equipment and resulted in more accurate sampling and analysis.
- 4) Incinerator operator double coverage was stopped on Saturday evening shift and the standby incinerator was shut down on Sunday morning. This was effective in reducing shutdown costs.
- 5) The HCl storage tank, T-204, is routinely vented to control the pressure during the turnaround. Previous to the 1982 turnaround the HCl was vented to T-500 which then required caustic addition to the plant effluent for neutralization. During the 1982 turnaround T-204 was vented to the acid concentration unit and used in muriatic acid production as a cost saving measure.
- 6) Reduced heat load on the cooling tower allowed reduction of treatment chemical injection to near zero. This was accomplished during the 1982 turnaround without adverse effects.
- 7) A delay was encountered during start-up due to a malfunction of the laboratory water analyzer; this occurring during azeo drying of the unit with EDC. A minimum of two workable water analyzers should be available prior to the turnaround.
- 8) Prior to and during start-up operations all vinyl check tanks should be vented to the incinerator on a pre-established frequency. This is needed to avoid the development of high pressures which could lead to operational problems in the caustic decanter, S-206.

Personnel

Programs have been established at the VCM Plant related to hiring, control and termination of casual employees with the following objectives:

- 1) Employing capable, qualified personnel.
- 2) Identifying good/poor performers to ensure continued improvement of overall casual workforce.

CCR 000009542

The established program used for many years is felt to be adequate. Several modifications/additions to this program were implemented with favorable results during the 1982 turnaround:

- 1) All potential casual employees were required to come to the plant prior to their employment to complete the "health" and "work restriction" forms. This allowed for improved crew strength by bringing to the attention of appropriate plant personnel potential casual employees with significant health or work restrictions.
- 2) A deadline was established three weeks prior to the turnaround after which the plant could not offer permanent employee references consideration. This again facilitated pre-planning for increased crew strength. This deadline will be moved to four weeks prior to the start of the 1983 turnaround.

Cost Control

During the recent May turnaround, a daily accounting procedure was implemented for the first time to aid in cost control and generate additional information on T/A expenditures. As a result of knowing these daily expenditures, measures could be taken to control T/A costs; and to correct any mischarged expenditures. In addition, this documentation will be useful in future T/A budgeting.

Turnaround expenditures were classified under five categories: contractor work orders-rentals, contractor work orders-other, warehouse issues, direct purchase orders, and plant labor. Within each category, the expenditures were charged to 31 specified maintenance management system (MMS) equipment codes (see Table I). These areas were specified because they represent the major sources of T/A costs. Daily expenditures for each equipment code were recorded along with a cumulative total for the T/A. Also, daily grand total T/A expenditures, and a cumulative grand total were recorded.

Expenditure information was received daily from warehouse and maintenance personnel, and in some cases, directly from contractors (i.e., insulators and chemical cleaners/hydroblasters). This information was filed in an "in" box, by equipment code, before being logged; and after logged, filed in an "out" box in the same manner and stored for future reference. The plant labor expenditures were determined by equipment codes from a daily MMS computer printout supplied by the VCM Plant accounting dept.

Turnaround accountants during the May 1982 T/A were S. Reynolds from the VCM Plant Process Engineering Dept. and Felix Braggs from Chemicals Accounting in Ponca City. Braggs worked full time for 18 days of the T/A, and Reynolds averaged 75% of each day during the T/A (20 days), 2 days full time prior to T/A, and 10 days full time post T/A, for a combined total of 45 man-days. This personnel arrangement is most ideal because an accountant must devote full time to the books and accounting procedures, while a plant employee assists in the accounting procedures and handles plant-oriented accounting problems, while still performing normal plant T/A functions. Also, the plant employee is able to manage the full accounting procedure during off-peak times (i.e., pre and post T/A).

The overall accounting procedure was organized very well, and only minor changes were necessary:

- 1) The bookkeeping method was excellent, with expenditures broken down logically, and daily and cumulative information at hand quickly. (These books can be obtained through the plant superintendent, and are easily understood). Two changes to the original bookkeeping method were made: (a) a subtotal page was added to the general equipment categories (i.e., reactors, compressors, drums, exchangers, and columns) to allow a daily and cumulative total of these five equipment categories, and (b) a row must be designated in the books as pre T/A expenditures. These were kept at the top of each page during the May '82 T/A. Pre T/A expenditures should be accounted for in greater detail prior to future T/A's.
- 2) The flow of expenditure information was generally good. Warehouse issues and purchase orders were transferred consistently every day. Whereas, contractor work orders (rentals and others) were, at times, inconsistent and difficult to track down. A definite line of transfer must be established from all sources of contractor work. A useful line that was implemented during the May '82 T/A was: all contract expenditures were transferred to the maintenance supervisor(s) by the contractors, who in turn transferred them to the plant superintendent, who in turn transferred them to the T/A accountants.
- 3) The filing system proved adequate with no changes required.
- 4) Finally, determining the plant labor expenditures from the MMS computer printout was tedious and time consuming. This task usually took approximately two hours each day. A new program was written by H. E. Bible, of computer ORD in Ponca City, at the end of the May '82 T/A to condense most of the manual work. The program totals all plant labor costs per equipment code per day. This program was developed per the T/A accountants' suggestions and will be very useful during future turnarounds.

Specific cost control measures instituted during the turnaround which actually reduced costs included the following:

- 1) Only a few trays in selected, readily accessible sections of the light ends column, C-102, were manually cleaned. This is the first time in the history of the VCM plant that this risk was taken. To date, this has not presented any operating problems.
- 2) Some heat exchanger surfaces which were routinely cleaned during past turnarounds were removed from the cleaning work list following a visual inspection. Such exchanger surfaces included the tube side of the ethylene preheater, H-308; the tube side of the quench column condensers, H-202A & B; the shell side of the light ends condenser, H-106; the shell and tube side of the quench column interchanger, H-213; and the shell and tube side of the quench column reflux cooler, H-203.
- 3) Turnaround activities were suspended for the Memorial Day holiday weekend. This reduced total labor charges for the turnaround.
- 4) The top section of the vinyl column was not cleaned. Both the section above and the section below the feed tray are normally manually cleaned each turnaround. As with the light ends column, this has not presented any operating problems to date.

As the effect of eliminating the above work items which are normally standard for every plant turnaround is witnessed during the present run, the risk/benefit analysis will be extended to other "standard" turnaround work items, such as, BL-501 propylene compressor turbine overhaul and BL-301 air compressor overhaul.

Some other valuable lessons were learned from the institution of the above-described cost control program which warrant follow-up for future turnarounds:

- 1) It was found that pre-fabrication labor normally incurred in the three to four weeks prior to the turnaround were not previously budgeted in turnaround costs.
- 2) A significant amount of costs have been charged to previous turnarounds which should have been charged to such areas as extraordinary maintenance, capital expenditure projects or routine maintenance. Significantly improved control of charges was exercised during the 1982 turnaround. This, however, does not diminish the effect of the cost control program since these other areas where costs were charged were also controlled within budget.

TABLE I
MMS EQUIPMENT CODES

<u>CODE</u>	<u>CATEGORY</u>
05	Truck Driver
18	Warehouseman
27	Toolroom Mechanic
30	Rigging
31	Safety & Health
32	Hoses & Fittings
33	Reactors
34	Compressors
35	Turbines (BL-501)
36	Shop Tools, Portable
37	Painting
42	Insulation
45	Drums
49	Fans & Blowers
55	Exchangers
57	Control & Metering
58	Process Analyzers
62	Electrical & Telephones
64	Filters & Presses
69	Miscellaneous Structures
74	Rupture Discs
75	Wastewater Treatment Facilities
77	Piping & Valving
78	Relief Valves
79	Yards, Paving, Roads
84	Shop Equipment, Stationary
88	Towers
89/93	Tanks
59	Miscellaneous Equipment
92	Yard Machinery
Other	All others

CCR 000009546