



MEMORANDUM OF MEETING

by: James F. Crum

Company: Armco, Middletown
Date: July 28, 1989
Distribution: G. A. Iannazzo, B. R. Brewer, Attendees
Attendees: J. F. Crum, M. A. Bach, C. J. Ryburn
J. D. Chivers, P. T. Marshall
Subject: Armco Stove Rebuilds
Contract No. 1492

Summary of Discussion

The purpose of the meeting was to assess what has gone wrong with the first stove reline and what can be done to correct these problems on stoves 2 and 3.

Problems Encountered

1. Delay in starting job - Armco proposed but McGraw agreed.
2. Project Management - key people not involved from the start.
3. Asbestos removal - no contractor had ever removed asbestos from a stove under new stringent OSHA guidelines. Big learning curve. Areas containing asbestos were incorrectly identified.
4. Shell and plate work - bottom work was greater than anticipated. Hot blast nozzle fit up problems. Cut wrong by McGraw under direction of Armco. Armco insisted all welding complete prior to any brickwork.
5. Handling of brick inefficient - scaffold system not producing expected gains.
6. Quality/quantity of bricklayers - leaving this job at 85% rate to work walking beam at 100% rate.

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7. Bailey-Hoogovens disrupting work - within their rights but should be done through supervision not stopping entire job.
8. Cost of the first stove is about \$600,000 more than estimates. This is detailed both by dollars and manhours in attachment I.
9. Details of these problems and others are presented in the Chivers-Distribution memorandum of June 23, 1989, Attachment II.
10. Indirects such as crane rental are extremely high.

Suggestions for Improvement

1. Change asbestos contractors.
2. Maintain existing Project Management.
3. Do not start refractory work until plate work is done.
4. Have new bottom ready.
5. Meet with Bailey-Hoogovens to explore their suggestions to expedite the next two stoves. Note: This meeting was held and will be covered by separate minutes.
6. Investigate different method of feeding brick into the stove. This might include an exterior elevator and skidding in brick through holes cut in the shell. Note: This method was used in the top of No. 1 stove and appeared to speed up work.
7. Armco has already agreed to permit laying of brick once an inside seal pass is made.
8. Armco has already agreed to modify the cut line on the hot blast connection.

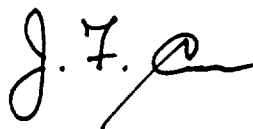
Action Plan

1. Analyze all suggestions for improvement.
2. Finish first stove.
3. Draft game plan for stoves 2 and 3 (CJR).

Page Three

4. Re-estimate costs for stoves 2 and 3 (JDC).
5. Go back to Armco if total costs are negative.
6. Reschedule stoves 2 and 3. See Attachment III for No. 3.
7. Aggressively pursue all possible extras for the first stove, some of which include:
 - a) Misidentification of asbestos insulation on Armco drawings.
 - b) Extra plate work.
 - c) Miscut of hot blast connection.

JFC/jf
c/24



Enclosures: Attachments I, II AND III.

STOVE REBUILD FOR BLAST FURNACE NO. 3
 CLIENT: ARNCO STEEL -MIDDLETOWN
 FINAL CUSTOMER: ARNCO STEEL -MIDDLETOWN
 LOCATION: MIDDLETOWN, OHIO
 CONTRACT NO.: 1492

PLEASE NOTE:
 % COMPLETE AS OF 18JUL89

SECTION ITEM	DESCRIPTION	BUDGET DOLLARS	BUDGET HOURS	PERCENT COMPLETE	EARNED \$	ACTUAL \$	EST TO COMP.	EST @ COMP.	VARIANCE
1060	SCAFFOLD	\$17,681	322	0.80	\$14,145	\$62,601	\$3,536	\$66,137	(\$48,456)
2100	ANCHOR BOLTS	\$12,365	392	0.95	\$11,747	\$9,758	\$618	\$10,376	\$1,989
2120	DOVE ACCESS PLATFORM -RENV/REIN STL	\$10,873	346	0.50	\$5,437	\$250	\$5,437	\$5,687	\$5,187
4140	STOVE TEAROUT & DISPOSE	\$308,908	7,121	1.00	\$308,908	\$84,800	\$0	\$84,800	\$224,108
4140	ASBESTOS REMOVAL	\$175,637	1,944	1.00	\$175,637	\$174,481	\$0	\$174,481	\$1,156
4140	STOVE MONITORING	\$16,657	296	1.00	\$16,657	\$23,236	\$0	\$23,236	(\$6,579)
170	STV SHELL ALT -NEW BRNR NZL & PTCH	\$9,839	303	0.95	\$9,347	\$21,853	\$492	\$22,345	(\$12,506)
4180	STV DOME STEEL WORK -INSTL NEW DOME	\$85,239	1,988	0.95	\$80,977	\$91,768	\$4,262	\$96,030	(\$10,791)
4200	STOVE BOTTOM & FOUNDATIONS REPAIR	\$30,827	1,025	1.00	\$30,827	\$30,089	\$0	\$30,089	\$738
4220	CHECKER SUPPORT STEEL -INSTALL	\$39,244	1,474	1.00	\$39,244	\$11,231	\$0	\$11,231	\$28,013
4230	STOVE REFRACTORY	\$627,243	23,561	0.69	\$432,798	\$875,654	\$194,445	\$1,070,099	(\$442,856)
4230	BURNER BOX -REMOVE & REPLACE	\$7,433	279	0.30	\$2,230	\$22,375	\$5,203	\$27,578	(\$20,145)
4410	COOLING WATER -DISCONNECT/RECONNECT	\$8,919	335	0.10	\$892	\$0	\$8,027	\$8,027	\$892
5330	STV GAS MAINS -CHG 3' SECT/ORIFICE	\$1,784	67	1.00	\$1,784	\$632	\$0	\$632	\$1,152
5340	CHIMNEY VALVES -REMOVE & REPLACE	\$4,608	173	1.00	\$4,608	\$12,761	\$0	\$12,761	(\$8,153)
5510	BURNER VALVES -REMOVE & REPLACE	\$10,406	391	0.30	\$3,122	\$15,801	\$7,284	\$23,085	(\$12,679)
5570	HOT BLAST VALVES -REMOVE & REPLACE	\$13,379	502	0.30	\$4,014	\$14,045	\$9,365	\$23,410	(\$10,031)
5590	BLOW OFF VALVES -REMOVE & REPLACE	\$3,865	145	1.00	\$3,865	\$425	\$0	\$425	\$3,440
5610	HOT BLST CONNECTION -REALIGN W/ STV	\$12,901	469	1.00	\$12,901	\$0	\$0	\$0	\$12,901
5640	COMB AIR VALVS -REMOVE & REPLACE	\$4,608	173	0.90	\$4,147	\$110	\$461	\$571	\$4,037
5680	STV SERV PIPING -DISCONNECT/RECON	\$8,919	335	0.30	\$2,676	\$0	\$6,243	\$6,243	\$2,676
5710	FIELD PAINTING -STOVE & WALKWAYS	\$10,554		0.00	\$0	\$0	\$10,554	\$10,554	\$0

STOVE REBUILD FOR BLAST FURNACE NO. 3
 CLIENT: ARMCO STEEL -MIDDLETOWN
 FINAL CUSTOMER: ARMCO STEEL -MIDDLETOWN
 LOCATION: MIDDLETOWN, OHIO
 CONTRACT NO.: 1492

PLEASE NOTE:
 % COMPLETE AS OF 18JUL89

SECTION ITEM	DESCRIPTION	BUDGET DOLLARS	BUDGET HOURS	PERCENT COMPLETE	EARNED \$	ACTUAL \$	EST TO COMP.	EST @ COMP.	VARIANCE
5720	STOVE LIGHTING	\$6,826	168	0.78	\$5,324	\$2,330	\$1,502	\$3,832	\$2,994
5800	COLD BLAST VALVES -REMOVE & REPLACE	\$11,149	419	1.00	\$11,149	\$4,725	\$0	\$4,725	\$6,424
	EQUIPMENT OPERATOR SUPPORT	\$0	0	0.78	\$0	\$127,284	\$0	\$127,284	(\$127,284)
	INDIRECTS WOL EQUIP RENTAL	\$0	0	0.78	\$0	\$440,404	\$0	\$440,404	(\$440,404)
	SUB-TOTALS: TOTALS:	\$1,700,000	42,228	0.78	\$1,182,434	\$2,026,613	\$257,430	\$2,284,043	(\$584,043)



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CJ12 - COMMENTS AND
WHAT ACTION IS BEING
TAKEN TO TRY AND
PLAY CATCHUP?

JFC 7/1

MEMORANDUM

CONT. NO. 1492
TO: DISTRIBUTION
FROM: John D. Chivers
SUBJECT: Stove Rebuild
Status Report

DATE: June 23, 1989

ATTACHMENT
II

Attached for your review is an analysis of
Stove Rebuild at Armco Steel.

If you have any further questions, please contact
me.

JDC:lv
Attachment

DISTRIBUTION:

DHK, JFC, CJR, LJW, MAB, KRB, VNH

Bill Brewer is spending
100% of his time to
effect a turn-around
for this project.

Neibert has been
on the project for
3 weeks.

JFC,

Dutch + Mike Neibert are both
versed on Blast Furnace + Stove
work. They mostly worked in the material
handling of these projects. Apart they
may be reluctant to drive a project.
But together they would most probably
be able to drive it. Just a suggestion!
LEE



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CONTRACT NO: 1492
ARMCO: BLAST FURNACE NO. 3 STOVE RELINE

The following is a review of the site visit conducted by
P.T. Marshall and S.S. Warne.

During our visit, several items were found that pose problems or
are problems that have or will affect profitability and the
duration of the job. These items are described further in the
following pages.

CONTENTS:

- Item 1: Delays due to the removal of the Hot Blast Connection
Flange.
- Item 2: Extra costs due to a deviation from the original
schedule.
- Item 3: Field Management.
- Item 4: Material handling and coordination problems.
- Item 5: Construction supervision.
- Item 6: Review of cutting checkers.

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ITEM I

THE REMOVAL OF THE HOT BLAST CONNECTION FLANGE.

The scope of work for the contractor instructed McGraw to re-align the hot blast connection after the plumbing of the stove.

McGraw and Armco's original anticipation was to cut this connection at the neck nearest the stove, plumb the stove, and re-align the connection from the cut line to the hot blast main.

If this method were used, the re-alignment of the connection would not have affected the installation of the stove refractory.

However, after inspection of the connection flange on the stove, Armco requested that McGraw replace the flange. Armco gave McGraw a time and material extra work authorization to remove the flange on June 6, 1989. McGraw requested that this work be started on May 23, 1989. Armco elected to have the flange surveyed prior to removal, but did not do so until the first week of June.

At this point, McGraw expected to have the insulation brick on the ring wall installed up to the hot blast connection by June 12, 1989. Because the shell work on the hot blast connection flange lasted until June 17, 1989, the insulation brick on the ring wall was not installed to the elevation of the hot blast connection until June 19, 1989.

Thus, because the installation of the ring wall insulation brick is a critical path activity, a total job delay of six working days was incurred.

This delay cost McGraw an estimated \$126,000 and McGraw's only course of action is to obtain compensation for this delay.



ITEM II

MANPOWER PROBLEMS:

Manpower poses a problem in that 5643 M.H. are being expended per week (currently running 2-10-6's). At this rate, with approximately 5 weeks remaining on the refractory, 28,215 M.H. will be expended. As of 6/19/89, 42,604 M.H. have been used. With this, estimated at completion (see exhibit a) for manhours will be 63,005. However a bottom line credit to the cumulative total manhours has to be considered. Some 600 M.H. worth of prep has been done in the areas of walkways and ladders, dome steel work, scaffold fabrication and refractory material handling. This work was accomplished we feel, as a benefit to the overall project. Thus, a considerable amount of labor was saved.

With all aspects of manpower having been considered, approximately 16,000 M.H. will be overrun. Currently, labor dollars per hour are at \$23.67. With this manhour overrun, labor overrun in excess of \$350,000.

McGCon 4430



ITEM III

FIELD MANAGEMENT:

There appears to be a need for a full time McGraw field representative that has the authority and the experience to control and manage the project from the standpoint of cost, construction, engineering, and schedule.

McGraw is the General Construction Contractor on this job. However, Armco and Bailey Hoogovens appear to be managing the construction facets of this job to their satisfaction at McGraw's expense.



ITEM IV

In this stove we are using a 3 tier scaffold arrangement. On the top tier, we are installing the insulation brick for the ring wall. On the middle tier, we are installing the fire brick for the ring wall and the breast wall. On the bottom tier we are installing the checkers.

Because material is being installed on all three tiers, material has to be fed to each tier with one crane. This poses a material handling and coordination problem.

However, it is our opinion that the scaffolding arrangement is optimal, and that the material coordination problem can be rectified by better coordination of the material lifts. Such steps are being made by the field personnel to better coordinate the lifts and the feeding of material into the stove.

It should be noted, however, that this problem was a major contributor to low ineffecienies in the past weeks.



ITEM VI

CUTTING CHECKERS:

Currently, the most time consuming activity in installing the stove refractory is the cutting of the checkers.

At this time, the checkers are being hammer cut. However, because the checkers are made of a very hard material. Hammer cutting is very difficult and sometimes impossible.

Because the time required to cut and fit the checkers is so great, our present goal to install four (4) courses of checkers per shift may never be realized.

It is our opinion that an alternate means of cutting the checkers should be reviewed, i.e.; guillotine brick cutters or masonry saws.



ITEM V

CONSTRUCTION SUPERVISION:

Currently, Construction Supervision for 1st shift is holding 4 positions. They are a Bricklayer General Foreman, 2 General Superintendents, 1 Superintendent in training. With the size and non complexities of this job, it is our opinion that field supervision (1st shift) should be reduced to having a General Bricklayer Foreman and General Superintendent. Thus, eliminating some 100 hrs./week of Field Supervision.

Thank you very much.

Sincerely,

A handwritten signature in dark ink, appearing to read 'Paul T. Marshall', written in a cursive style.

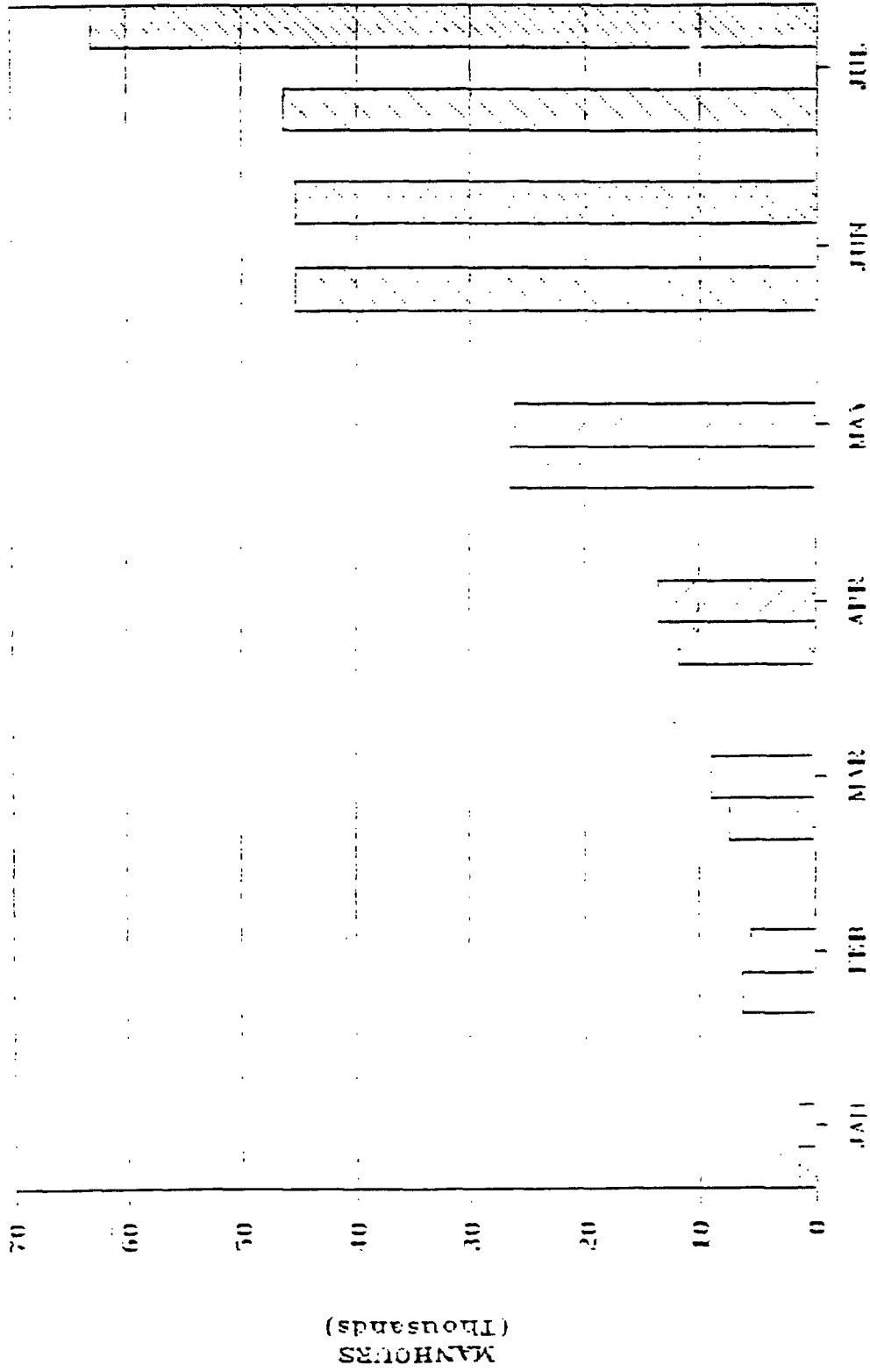
Paul T. Marshall
Senior Cost Engineer

A handwritten signature in dark ink, appearing to read 'Samuel S. Warne', written in a cursive style.

Samuel S. Warne
Project Controls Engineer

STOVE REBUILT RP HR

MANHOURS COMPLETE



ACCUM DDCT MD ACCUM ACTL MD ACCUM FORST MD



CONSTRUCTION COMPANY, INC. / ENGINEERS & CONSTRUCTORS

MEMORANDUM

CONT. NO. 1492

DATE: 8/4/89

TO: Vernon Helton

FROM: Paul T. Marshall PTM

SUBJECT: Stove #3 Rebuild
Critical Path

Attached is the revised construction schedule for the #3 stove. The project is scheduled for 2-10-6 and includes all actual information regarding durations from the 1st stove rebuild.

If you should have any questions or need further clarifications, please do not hesitate to contact me.

PTM:lv

cc: JFC
CJR
BRB
JDC
TLP

ACTIVITY		UNIT	EARLY START	EARLY FINISH
001	STOVE OFF LINE (ARMCO)	5	16SEP89	21SEP89
002	WATER COOL-DOWN STOVE	1	16SEP89	16SEP89
003	CHECK DOME FOR ASBESTOS	1	16SEP89	16SEP89
004	REMOVE/INSTALL BURNER PLATES	1	16SEP89	16SEP89
005	INSTALL BURNER NOZZLE	1	16SEP89	16SEP89
006	REMOVE DOME STEEL WORK	1	22SEP89	22SEP89
007	ROUGH CUT OPENING FOR BURN AND TEAROUT MACHINES	1	22SEP89	22SEP89
008	INSTALL ACCESS OPENINGS	1	23SEP89	23SEP89
009	1" OPENINGS & REMOVE ASBESTOS	1	23SEP89	23SEP89
010	REMOVE DOME BRICK & RETAINING BRICK	1	26SEP89	26SEP89
011	INSTALL SMALL TEAROUT MACHINE	1	27SEP89	27SEP89
012	STOVE TEAROUT TO TOP OF CHECKER STEEL	7	28SEP89	30OCT89
013	REMOVE BOTTOM STEEL	1	30OCT89	30OCT89
014	REMOVE TEAROUT MACHINE	1	30OCT89	30OCT89
015	INSTALL SWAGING SCAFFOLD W/ TEMPORARY BRACKETS	1	7OCT89	7OCT89
016	REMOVE RING WALL BRICK TO 33 FEET DOWN	2	9OCT89	10OCT89
017	REMOVE ASBESTOS FROM 33 FEET UP	6	11OCT89	17OCT89
018	REMOVE HARD BRICK FOR 43'-3"	3	18OCT89	20OCT89
019	REMOVE INSULATION BRICK FOR 43'-3" (SUB)	8	21OCT89	30OCT89
020	REMOVE TEMPORARY SCAFFOLD	1	31OCT89	31OCT89
021	INSTALL TEAROUT MACHINE	1	1NOV89	1NOV89
022	REMOVE REMAINING BOTTOM BRICK AND CASTABLE	1	2NOV89	2NOV89
023	INSTALL BALLHEAD AT SCAFFOLD	1	3NOV89	3NOV89
024	REMOVE/RELOC 5TH STEEL WORK C & D FOR STV BTM	12	4NOV89	17NOV89
025	INSTALL DOME STEEL	35	4NOV89	15OCT89
026	INSTALL CASTABLE BOTTOM	1	18NOV89	18NOV89
027	INSTALL BRICK TO BOTTOM OF CHECKER SUPPORT STEEL	18	20NOV89	11OCT89
028	INSTALL CHECKER SUPPORT STEEL	2	12OCT89	13OCT89
029	INSTALL BOTTOM 2/3 OF DOME REFRACTORY	20	14OCT89	8JAN90
030	LAY 4" OF RING WALL AND BREAST WALL	1	8JAN90	9JAN90
031	DROP SCAFFOLD	1	10JAN90	10JAN90
032	INSTALL REMAINING STOVE REFRACTORY	66	11JAN90	28MAR90
033	INSTALL REMAINING DOME STEEL	3	29MAR90	31MAR90
034	INSTALL REMAINING DOME REFRACTORY	12	24APR90	14APR90
035	EIGHT DAY DRYOUT	8	16APR90	24APR90
036	TWENTY-ONE DAY OPERATING CYCLE	21	25APR90	18MAY90