FINAL REPORT
for

TEMPORARY STAGING
for
SHIPYARDS

PrePared for

SNAME Panel SP-8
MarAd Task ES-8-15
Under the direction of
H,B, Maynard % Co,

Prepared by

Industrial Engineering Department
Bethlehem Steel Corporation
Marine Construction Group
Sparrows Point, Maryland
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SECTION 1
FINAL REPORT - INTRODUCTION

l.1 INTRODUCTION

A. SCOPE

This report shows the application of the labor standards for staging developed in Phase II. The application of the standards will be on an Integrated Tug-Barse (ITB) and will be used for the purpose of production control.

B, TYPES OF STAGING

There are several types of staging that apply to the ITBs. The types of staging and the areas that they apply to are listed below

1. CENTER TANK

There are five (5) center tanks on an ITB, three are 100′ X 50′ and the remainins two are 85′ x 50′+ The staging is erected from within the tank using a grove crane. Three carpenters are in the tank. one handles the material. the other two erect the staging,

a. Smooth Bulkhead

Two board or three board bracket staging is used on smooth bulkheads. (see fig. 1)

b. Bulkheads with Floors

The floors on these bulkheeds are approximtely 20′ x 50′ and are connected be inclined stairways. Bracket staging is locatecl at the floor level and below the floor level. (see fig. 2 & 3) Two board bracket staging is usualls used for this type of staging

c. Tank Staging Platform (see fig. 4)

A tank staging platform is used for easy access to the area below the main deck. The platform is assembled in a platen area and then placed in the center tank of the ship. Tower cranes are used to transport the tank staging platforms from the platen area to the ship. After the main deck is erected, the tank staging platform is raised (by tower crane) and secured to the main deck. The tank stagingl platforms are approximately 35′x20′ and there are two per tank. The tank staging platforms are connected by three board bracket staging.

d. Boards beneath the main deck

Boards are spread beneath the. main deck from the tank staging platform to existing bracket staging+ This allows mechanics to ●move about freely under the main deck.

FINAL REPORT - INTRODUCTION

SKETCHES

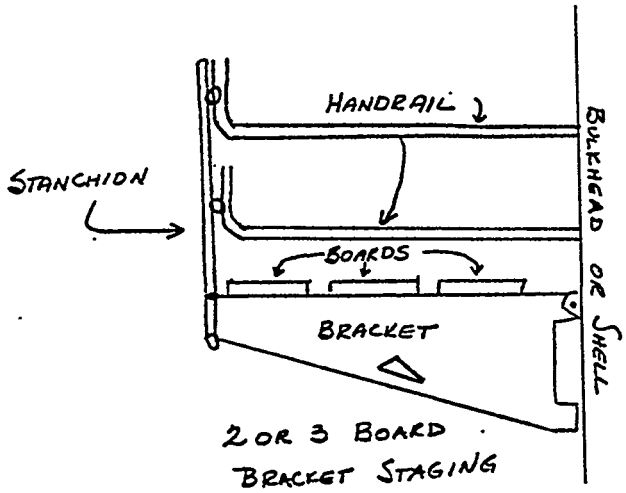

FIGURE 1

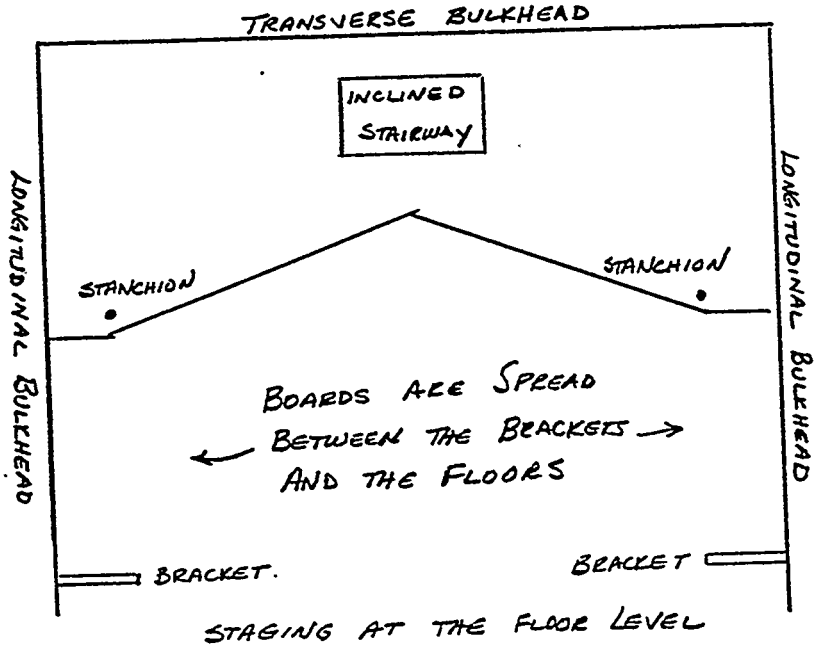

FIGURE 2

INDEX

INDEX

2. WING TANK
There are five (5) wins tanks on each side of an ITB, three are 100′ x 30′ and the remeinins two are %5′ x 30′, The staging is erected using the tower cranes. There are three carpenter, one is located at the material and the other two erect the staging in the wins tank.

a. Smooth Bulkheed
Similar to the center tank

b. Bulkheads with Floors .
Similar to the center tank

c. Bulkheads with Webs
Bracket staging, either two or three board, is installed to the webs, Staging boards are spread from the bracket. staging to the inboard or outboard bulkheads (see fig. 5)

3. EXTERIOR SHELL
On the ITBs the only staging needed on the exterior shell is at the bow and the stern of the ship, The staging is either two or three board bracket staging. There are three carpenters who erect the staging from an aerial platform. The aerial platform is held in place by a tower crane.

4. PIPE STAGING (see fig, 6)
Pipe staging is used at the bilge level of the exterior side shell. The pipe steging is two levels high and consists of two 16′ sections connected by a span of boards.

C. LAYOUT OF THE SHIP (see fig. 7)
The diagram shows a side view and plan view of an ITB.

D. DIFFERENCES
The sub-ops that were developed in phase II were based on a vessel being built on a way. The vessel we are currently constructing is being built in a building basin. The basic differences in the areas is the distance that the crane has to travel from the material to the ship. Our data has been massaged to account for these differences by creating new work areas and applying our existing sub-ops to them.

SKETCHES

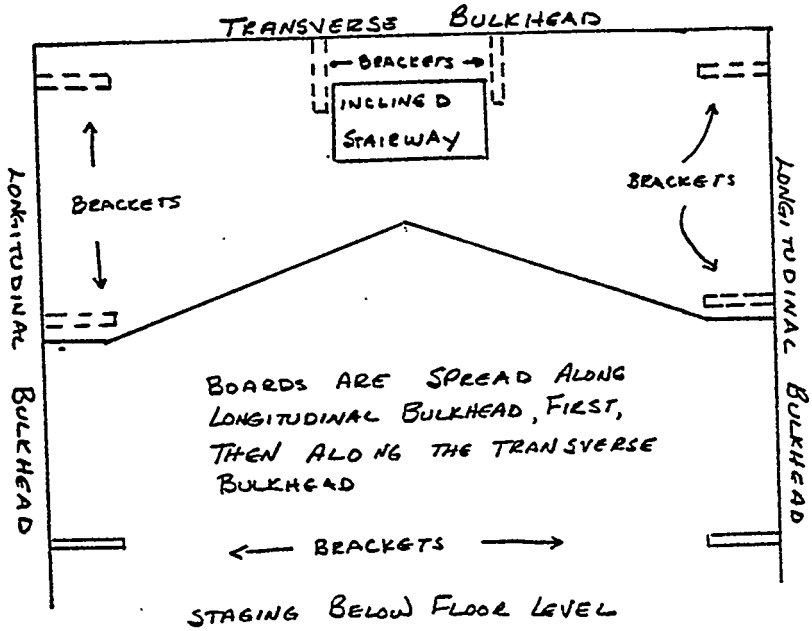

FIGURE 3

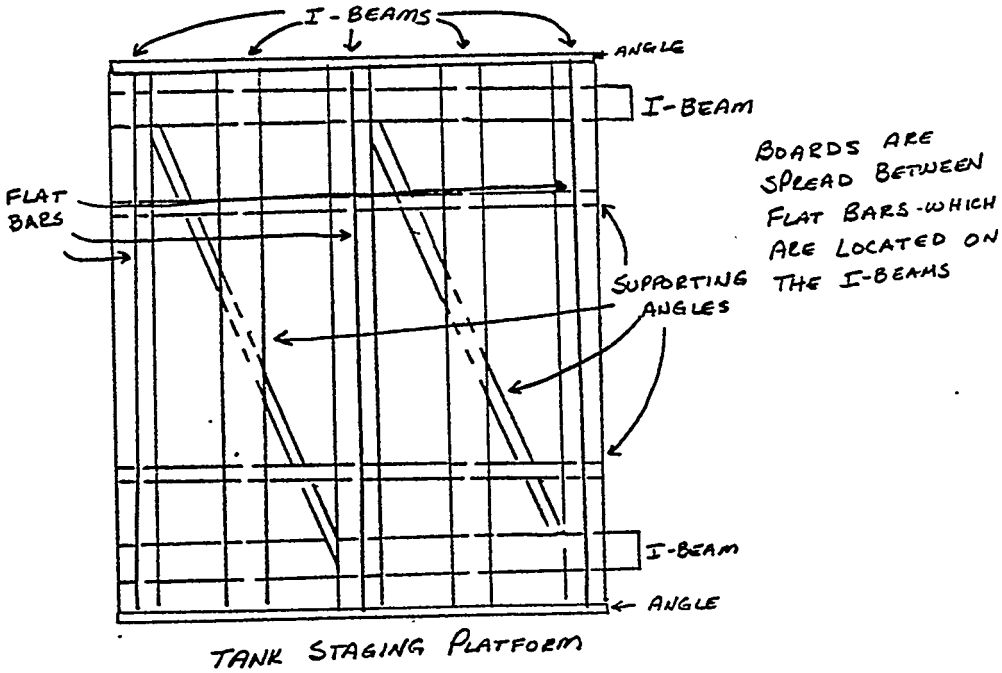

FIGURE 4

FINAL REPORT - INTRODUCTION

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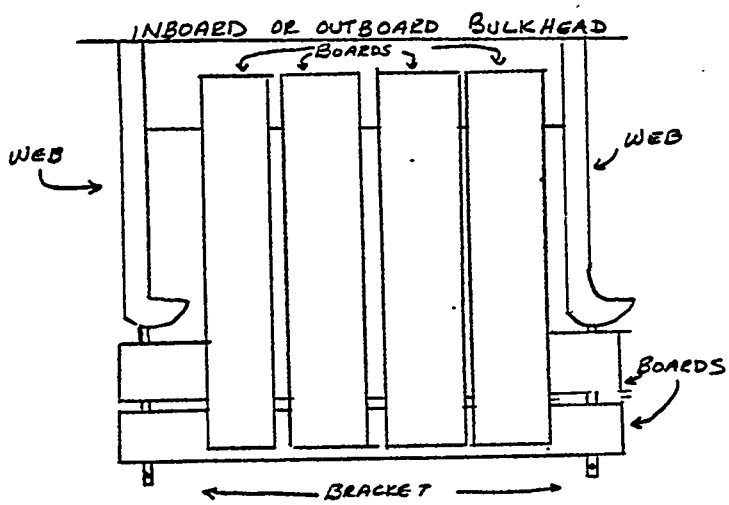

BRACKET STAGING ON WEBS IN WING TANK

FIGURE 5

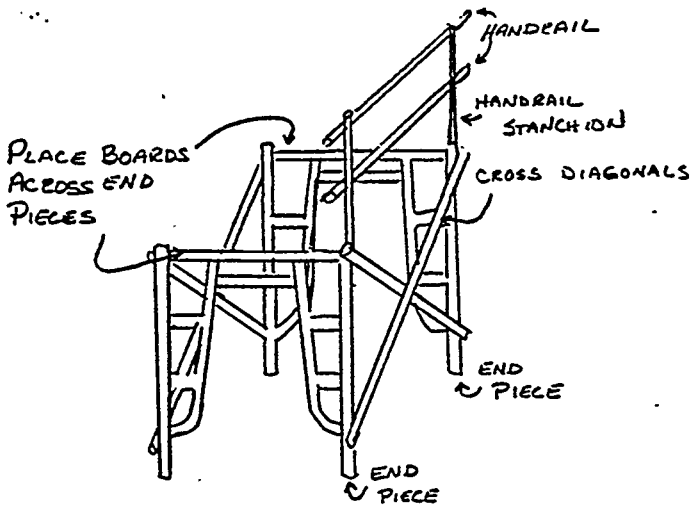

FIGURE 6

FINAL REPORT - INTRODUCTION

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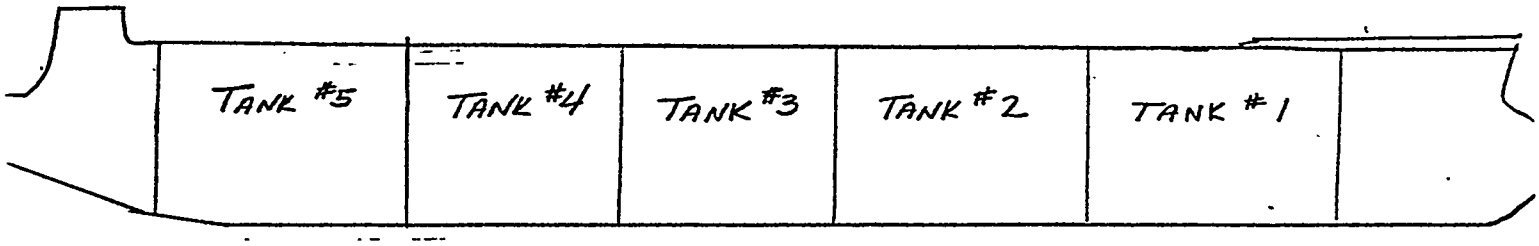
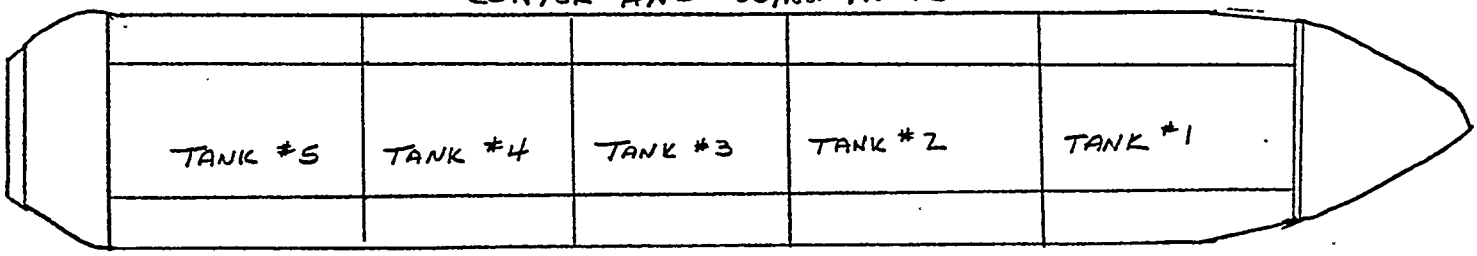


SIDE VIEW

CENTER AND WING TANKS



PLAN VIEW

FIGURE 7.

SECTION 2
FINAL REPORT - APPLICATION OF STANDARDS

2,1 APPLICATION

A. SCOPE

A catalog of the engineered labor standards has been established for the production control department, This catalog includes the type of staging, the applicable rates and the amount of staging material neededt

B. CATALOG

The catalog is divided into three sections: (1) Set-up, (2) Tear downs and (3) Material needed.

SECTION 1 - SET-UP

TYPE OF STAGING	APPLICABLE RATE
10 CENTER TANK	
at Smooth bulkhead: 2 board	2.187/100 lin. ft.
: 3 board	2.356/100 lin. ft.
b. Bulkhead with floors: at floor	1.993/100 lin. ft.
: below floor	2.395/100 lin. ft.
c. Tank staging platform	0.697/100 SR. ft
d. Connections of 2 tank staging platforms	7+157/100 lin. ft.
e. Boards beneath the main deck	7.360/100 lin. ft.
2. WING TANK	
a. Webs: 2 board	3.362/100 lin. ft.
b, Smooth bulkhead: 2 board	2.414/100 lin. ft.
c, Bulkhead with floors: at floor	3.330/100 lin. ft.
: below floor	2.396/100 lin. ft.
3. EXTERIOR SHELL	
a, Bracket staging: 2 board	2.853/100 lin. ft.
4. PIPE STAGING	
a. At side shell	6.954/100 lin. ft.

SECTION 2 - TEAR DOWN

TYPES OF STAGING	APPLICABLE RATE
l,CENTER TANK	
a.Smooth bulkhead: 2 board	1.67/100 lin.ft
: 3 board	1.464/100 Iin. ft.
b, Bulkhead with floors: at floor	1.236/100 lin. ft.
: below floor	1.447/100 li. ft.
c. Tank stasins platform	0.583/100 sQ. ft.
d. Connections of 2 tank stasins platforms	2.132/100 lin. ft.
e, Boards beneath the main deck	1.530/100 lin.ft.
2. WING TANK	
a Webs: 2 board	2.268/100 lin. ft.
b. Smooth bulkheed: 2 board	1.326/100 lin. ft.
c. Bulkhead with floors: at floor	2.283/100 lin. ft.
: below floor	1.497/100 lin. ft.
3. EXTERIOR SHELL	
a. Bracket stagins: 3 board	1.354/100 lin. ft.
4. PIPE STAGING	
a. At side shell	8.140/100 lin. ft.

SECTION 3 - MATERIAL NEEDED*

TYPE OF STAGING	BRACKETS	STANCHIONS	BOARDS	HANDRAIL	LADDERS
1. CENTER TANK					
a. Smooth bulkhead					
(2 board	6	6	10	12	2
3 board	6	6	15	12	2
b. Bulkhead with floors					
at floor	6	12	12	12	
below floor	8	8	14	12	2
c. Connection of two Platforms	6		32		
d. Boards beneath deck			300		
2. WING TANK					
a. Webs	6	6	34	12	l
b. Smooth Bulkhead	6	6	10.	14	1
c. Bulkhead with floors					
at floor	6	6	40	10	
below floor	6	6	20	10	
3. EXTERIOR SHELL	8	8	21	14	2

4. PIPE STAGING	END PIECES	BRACES	BOARDS	STANCHIONS	HANDRAIL
	18	24	24	6	6

5. TANK STAGING PLATFORM	I-BEANS	ANGLES	BOARDS	NUTS & BOLTS
	12x8: 2 12x6 1/2: 5	3x3: 2 4x4: 2	64	144

NOTE: There is one stasins clip and one nut and bolt per staging bracket. There is 4 ladder clips per ladder. There are 2 nuts and bolts per two level pipe staging.

* Material needed is based on 100 linear feet of bracket stasins. The tank staging platform material is based on buildins one 35’ by 70’ platform.

2.2 WORKSHEETS FOR PRODUCTION CONTROL

A. SCOPE

Worksheets have been developed for use by the production control department. These worksheets are used to determine the unit Frodúctïve hours, manhours and the amount of the material needed. There are four worksheets: (1) Unit Productive hours - by area (ie. center tenk, etc,), 0(2) Manhours - by area, (3) Summary of unit productive hours, and (4) Summary of manhours.

The followins section shows examples of how the worksheets can be used on an Integrated Tug-Barge.

FINAL REPORT - APPLICATION OF STANDARDS

WORKSHEETS FOR PRODUCTION CONTROL
UNIT PRODUCTIVE HOURS - BY AREA

PRODUCTION CONTROL

AREA OF SHIP: DATE:

TYPE OF STAGING	AMOUNT	RATE	UNIT FROD. HOURS
A. SET-UP			
1.			
2.			
3.			
4.			
5.			
TOTAL UNIT PRODUCTIVE HOURS: SET-UP			
B. TEAR DOWN			
1.			
2.			
3.			
4.			
5.			
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOUN			

C. MATERIAL NEEDED

BRACKETS
STANCHIONS:
BOARDS :
HANDRAIL:
LADDERS:
STAGING CLIPS:
LADDER CLIPS:

END PIECES:
BRACES :
I-BEAMS - 12x8:
- 12x6 l/2:
ANGLES - 3X3:
- 4X4:
NUTS/BOLTS:

FINAL REPORT - APPLICATION OF STANDARDS

WORKSHEETS FOR PRODUCTION CONTROL
MANHOURS - BY AREA

PRODUCTION CONTROL

AREA OF SHIP: DATE:

TYPE OF STAGING	UNIT PROD. HOURS	# MEN*	MANHOURS
A. SET-UP			
1.			
2.			
3.			
4.			
5.			
TOTAL MANHOURS: SET-UP			
B. TEAR DOWN			
1.			
2.			
3.			
4.			
5.			
TOTAL MANHOURS: TEAR DOWN			

* # MEN includes the number of carpenters and welders needed to do the Job. There is usually one welder and the number of carpenters can be found in the Back-up Data on page 327

FINAL REPORT - APPLICATION OF STANDARDS

WORKSHEETS FOR PRODUCTION CONTROL
UNIT PRODUCTIVE HOURS - SUMMARY

PRODUCTION CONTROL

TYPE OF SHIP: DATE:

AREA OF SHIP	UNIT PROD. HOURS	# AREAS*	TOTAL HOURS
A. SET-UP			
1.			
2.			
3.			
4.			
5.			
TOTAL UNIT PRODUCTIVE HOURS: SET-UP			
B. TEAR DOWN			
1.			
2.			
3.			
4.			
5.			
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOWN			

C. TOTAL MATERIAL NEEDED :

BRACKETS:
STANCHIONS:
BOARDS:
HANDRAIL
LADDERS:
STAGING CLIPS:
LADDER CLIPS:

END PIECES:
BRACES
I-BEAMS - 12x8:
- 12X6 1/2:
ANGLES - 3x3:
- 4x4:
NUTS/BOLTS:

* # AREAS: There are 5 center tanks, 3 are 100'x50' and 2 are 85'x50', There are 10 wins tanks 06 are 100'x30' and 4 are 85'x30'.

FINAL REPORT - APPLICATION OF STANDARDS

WORKSHEETS FOR PRODUCTION CONTROL
MANHOURS - SUMMARY

PRODUCTION CONTROL

TYPE OF SHIP: DATE:

AREA OF SHIP	MANHOURS	# AREAS*	TOTAL HOURS
A. SET-UP			
1.			
2.			
3.			
4.			
5.			
TOTAL MANHOURS: SET-UP			
B. TEAR DOWN			
1.			
2.			
3.			
4.			
5.			
TOTAL MANHOURS: TEAR DOWN			

* # AREAS: There are 5 center tanks, 3 are 100'x50' and 2 are 85'x50'.
There are 10 wins tanls, 6 are 100'x30' and 4 are 85'x30'.

SECTION 3
FINAL REPORT - EXAMPLES OF APPLICATION

3.1 WORKSHEET: UNIT PRODUCTIVE HOURS - BY AREA

PRODUCTION CONTROL
AREA OF SHIP: CENTER TANK (1,2,5) DATE: JUNE, 1983

TYPE OF STAGING	AMOUNT	RATE	UNIT PROD. HOURS
A. SET-UP			
1. SMOOTH BULKHEAD			
2 BOARD	1200 FT	2.187	26.2
3 BOARD	450 FT	2.356	10.6
2. BULKHEAD WITH FLOORS			
AT FLOOR	120 FT	1.993	2.4
BELOW FLOOR	260 FT	2.395	6.2
3. TANK STAGING PLATFORM	1400 SQ FT	0.697	9.8
4. CONNECTIONS OF 2 TANK STAGING PLATFORMS	20 FT	7.157	1.4
5. BOARDS BENEATH DECK	300 FT	7.360	22.1
TOTAL UNIT PRODUCTIVE HOURS: SET UP			78.7
B. TEAR DOWN			
1. SM00TH BULKHEAD			
2 BOARD	1200 FT	1.267	15.2
3 BOARD	450 FT	1.464	6.6
2. BULKHEAD WITH FLOORS			
AT FLOOR	120 FT	1.236	1.5
BELOU FLOOR	260 FT	1.447	3.8
3. TANK STAGING PLATFORM	1400 SQ FT	0.583	8.2
4. CONNECTIONS OF 2 TANK STAGING PLATFOMS	20 FT	2.132	0.4
5. BOARDS BENEATH DECK	300 FT	1.530	4.6
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOWN			40.3

C. MATERIAL NEEDED

BRACKETS - 2 BOARD: 104
- 3 BOARD: 22
STANCHIONS: 126
BOARDS: 678
HANDRAIL: 222
LADDERS: 40
STAGING CLIPS: 126
LADDER CLIPS: 160

END PIECES: -
BRACES: -
I-BEAM - l2x8: 4
- 12x6 1/2: 10
ANGLES - 3x3: 4
- 4x4: 4
NUTS/EOLTS: 392

WORKSHEET: UNIT PRODUCTIVE HOURS - BY AREA

PRODUCTION CONTROL

AREA OF SHIP: CENTER TANK (3.4) DATE: JUNE, 1983

TYPE OF STAGING	AMOUNT	RATE	UNIT PROD. HOURS
A. SET-UP			
1 SMOOTH BULKHEAD			
2 BOARB	990 FT	2.187	21.7
3 BOARD	420 FT	2. 356	9.9
2. BULKHEAD WITH FLOORS			
AT FLOOR	120 FT	1.993	2.4
BELOW FLOOR	260 FT	2.395	6.2
30 TANK STAGING PLATFORM	1400 SQ FT	0.697-	9.8
4. CONNECTIONS OF 2 TANK STAGING PLATFORMS	20 FT	7.157	1.4
!3. BOARDS BENEATH DECK	300 FT	7.360	22.1
TOTAL UNIT PRODUCTIVE HOURS: SET-UP			73.5
B. TEAR DOWN			
1. SMOOTH BULKHEAD			
2 BOARD	990 FT	1.267	12.5
3 BOARD	420 FT	1.l 464	6.1
2. BULKHEAD WITH. FLOORS			
AT FLOOR	120 FT	1.236	1.5
BELOW FLOOR	260 FT	1.447	3.8
3. TANK STAGING PLATFORM	1400 SQ FT	0.583	8.2
4. CONNECTIONS OF 2 TANK STAGING PLATFORMS	20 FT	2.132	0.4
5 BOARDS BENEATH DECK	300 FT	1.530	4.6
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOWN			37.I

C. MATERIAL NEEDED

BRACKETS - 2 BOARD: 80
- 3 BOARD: 18

STANCHIONS: 102

BOARDS: 612

LADDERS: 40

STAGING CLIPS: 98

LADDER CLIPS: 160

END PIECES:

I-BEAMS - 12x8: 4
-12x6 1/2: 10

ANGLES - 3x3: 4
- 4x4: 4

NUTS/BOLTS: 368

FINAL REPORT - EXAMPLES OF APPLICATION

WORKSHEET: UNIT PRODUCTIVE HOURS - BY AREA

PRODUCTION CONTROL

AREA OF SHIP: WING TANK (1,2,5) DATE: JUNE. 1983

TYPE OF STAGING	AMOUNT	RATE	UNIT PROD. HOURS
A. SET-UP			
1. WEBS	1120 FT	3.362	37.7
2. SMOOTH BULKHEAD	300 FT	2.414	7.2
3. BULKHEAD WITH FLOORS			
AT FLOOR	250 FT	3.350	8.4
BELOW FLOOR	250 FT	2.396	6.0
TOTAL UNIT PRODUCTIVE HOURS: SET-UP			59.3
B. TEAR DOWN			
1. WEBS	1120 FT	2.268	25.4
2. SM00TH BULKHEAD	300 FT	1.326	4.0
3. BULKHEAD WITH FLOORS			
AT FLOOR	250 FT	2.283	5.7
BELOW FLOOR	250 FT	1.497	3.7
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOWN			38.8

C. HATERIAL NEEDED

BRACKETS - 2 BOARD: 106.
STANCHIONS: 106
BOARDS: 560
HANDRAIL: 226
LADDERS: 21
STAGING CLIPS: 92
LADDER CLIPS: 84

END PIECES: -
BRACES: -
I-BEAMS - 12x8: -
- 12X6 1/2:
ANGLES - 3x3: -
- 4x4: -
NUTS/BOLTS: 106

FINAL REPORT - EXAMPLES OF APPLICATION

WORKSHEET: UNIT PRODUCTIVE HOURS - BY AREA

PRODUCTION CONTROL

AREA OF SHIP: WING TANK (3,4) DATE: JUNE, 1983

TYPE OF STAGING	AUOUNT	RATE	UNIT PROD. HOURS
A. SET-UP			
1. WEBS	900 FT	3.362	30.3
2. SMOOTH RULKHEAD	300 FT	2.414	7.2
3. BULKHEAD WITH FLOORS			
AT FLOOR	250 FT	3.350	B . 4
BELOW FLOOR	250 FT	2.396	6.0
TOTAL UNIT PRODUCTIVE HOURS: SET-UP			51.9
B. TEAR DOWN			
1. WEBS	900 FT	2.268	20.4
2. SMOOTH BULKHEAD	300 FT	1.326	4.0
3. BULKHEAD WITH FLOORS			
AT FLOOR	250 FT	2.283	5.7
BELOW FLOOR	250 FT	1.497	3.7
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOWN			33.8

C. MATERIAL NEEDED

BRACKETS - 2 BOARD: 92
STANCHIONS: 92
BOARDS: 486
HANDRAIL: 200
LADDERS: 21
STAGING CLIPS: 92
LADDER CLIPS: 84

END PIECES: -
BRACES: -
I-BEAMS - 12x8: -
- 12X6 1/2: -
ANGLES - 3x3: -
0- 4x4: -
NUTS/BOLTS: 92

FINAL REPORT - EXAMPLES OF APPLICATION

WORKSHEET: UNIT PRODUCTIVE HOURS - BY AREA

PRODUCTION CONTROL

AREA OF SHIP: EXTERIOR SHELL DATE: JUNE. 1983

TYPE OF STAGING	AMOUNT	RATE	UNIT PROD. HOURS
A. SET-UP			
1. BRACKET STAGING			
BOW	960 FT	2.855	27.4
STERN	3700 FT	2.855	105.6
20 PIPE STAGING	1100 FT	6.954	76+S
TOTAL UNIT PRODUCTIVE HOURS: SET-UP			209.5
B. TEAR DOWN			
1. BRACKET STAGING			
Bow	960 FT	1.354	13.0
STERN.	3700 FT	1.354	50.1
2. PIPE STAGING	1100 FT	8 . 1 4 0	8 9 . 5
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOWN			152.6

C. MATERIAL NEEDED

BRACKET STAGING - 3 BOARD: 374
STANCHIONS: 440
BOARDS: 1244
HANDRAIL: 716
LADDERS: 94
STAGING CLIPS: 374
LADDER CLIPS: 376

END PIECES: 19S
BRACES: 264
I-BEAMS - 12x8:
- 12X6 1/2:
ANGLES - 3x3:
- 4x4: -
NUTS/BOLTS: 814

3.2 WORKSHEET: MANHOURS - BY AREA

PRODUCTION CONTROL
AREA OF SHIP: CENTER TANK (1,2,5) DATE: JUNE, 1983

TYPE OF STAGING	UNIT PROD. HOURS	# MEN*	MANHOURS
A. SET-UP			
1. SMOOTH BULKHEAD			
2 BOARD	26.2	4	104.8
3 BOARD	10.6	4	42.4
2. BULKHEAD WITH FLOOR			
AT FLOOR	2.4	4	9.6
BELOW FLOOR	6.2	4	24.8
3. TANK STAGING PLATFORM	9.8	2	19.6
40 CONNECTIONS OF 2 TANK STAGING PLATFORMS	1.4	3	4.Z
5. BOARDS BENEATH DECK	22.1	2	44.2
TOTAL MANHOURS: SET-UP			249.6
B. TEAR DOWN			
1. SMOOTH BULKHEAD			
2 BOARD	15.2	6	91.2
3 BOARD	6.6	6	39.6
2. BULKHEAD WITH FLOORS			
AT FLOOR	1.5	6	9.0
BELOW FLOOR	3.8	6	22.8
3. TANK STAGING PLATFORM	8.2	6	49.2
4. CONNECTIONS OF 2 TANK STAGING PLATFORMS	0.4	6	2.4
5. BOARDS BENEATH DECK	4.6	6	27.6
TOTAL HANHOURS: TEAR DOWN			241.8

X # MEN includes the number of carpenters and welders needed to do the job. There is usually one welder (except for tank staging platforms and boards beneath the deck) and the number of carpenters can be found in the Rack-up Data on page 327.

WORKSHEET: MANHOURS - BY AREA

PRODUCTION CONTROL
AREA OF SHIP: CENTER TANK (3,4) DATE: JUNE, 1983

TYPE OF STAGING	UNIT PROD, HOURS	# MEN*	MANHOURS
A. SET-UP			
1. SMOOTH BULKHEAD			
2 BOARD	21.7	4	86.8
3 BOARD	9.9	4	39.6
2. BULKHEAD WITH FLOORS			
AT FLOOR	2.4	4	9.6
BELOW FLOOR	6.2	4	24.8
3. TANK STAGING PLATFORM	9.8	2	19.6
4. CONNECTIONS OF 2 TANK STAGING STAGING PLATFORMS	1.4	3	4.2
5. BOARDS BENEATH DECK	22.1	2	44.2
TOTAL MANHOURS: SET-UP			228.8
B. TEAR DOWN			
1. SMOOTH BULKHEAD			
2 BOARd	12.5	6	7 5 . 0
3 BOARD	6.1	6	36.6
2. BULKHEAD WITH FLOORS			
AT FLOOR	1.5	6	9.0
BELOW FLOOR	3.8	6	22.8
3. TANK STAGING PLATFORM	8.2	15	49.2
4. CONNECTIONS OF 2 TANK STAGING PLATFORMS	0 . 4	6	2.4
5. BOARDS BENEATH DECK	4.6	6	27.6
TOTAL MANHOURS: TEAR DOWN			222.6

* # MEN incluCles the number Of carpenters and welders needed to do the job. There is usually one welder (except for tank stasins platforms and boards beneath the deck) and the number of carpenters can be found in the Back-up Data on Page 327.

FINAL REPORT - EXAMPLES OF APPLICATION

WORKSHEET: MANHOURS - BY AREA

PRODUCTION CONTROL
AREA OF SHIP: WING TANK (1,2,5) DATE: JUNE, 1983

TYPE OF STAGING	UNIT PROD. HOURS	# MEN*	MANHOURS
A. SET-UP			
10 WEBS	37.7	4	150.8
2. SMOOTH BULKHEAD	7.2	4	28.13
3. BULKHEAD WITH FLOORS			
AT FLOOR	8.4	4	33.6
BELOW FLOOR	6.0	4	24.0
TOTAL MANHOURS: SET-UP			237.2
B. TEAR DOWN			
l.WEBS	25.4	6	152.4
2. SMOOTH BULKHEAD	4.0	6	24.0
3. BULKHEAD WITH FLOORS			
AT FLOOR	5.7	6	34.2
BELOW FLOOR	3.7	6	22.2
TOTAL MANHOURS: TEAR DOWN			232.8

* # MEN includes the number of carpenters and welders needed to to the job. There is usually one welder and the number of carpenters can be found in the Back-up Date on page 327.

FINAL REPORT - EXAMPLES OF APPLICATION

WORKSHEET: MANHOURS - BY AREA

PRODUCTION CONTROL
AREA OF SHIP: WING TANK (3,4) DATE: JUNE, 1983

TYPE OF STAGING	UNIT PROD. HOURS	# MEN*	HANHOURS
A. SET-UP			
1. WEBS	30.2	4	121.2
2. SMOOTH BULKHEAD	7.2	4	28.8
3. BULKHEAD WITH FLOORS			
AT FLOOR	8.4	4	33.6
BELOW FLOOR	6.0	4	24.0
TOTAL MANHOURS: SET-UP			207.6
B. TEAR DOWN			
1. WEBS	20.4	6	122.4
2. SMOOTH BULKHEAD	4.0	6	24.0
3. BULKHEAII WITH FLOORS			
AT FLOOR	5.7	6	34.2
BELOW FLOOR	3.7	6	22.2
TOTAL MANHOURS: TEAR DOWN			202.8

MEN includes the number of carpenters and welders needed to do the job. There is usually one welder and the number of carpenters can be found in the Back-IP Data on Page 327.

FINAL REPORT - EXAMPLES OF APPLICATION

WORKSHEET: MANHOURS - BY AREA

PRODUCTION CONTROL
AREA OF SHIP: EXTERIOR SHELL DATE: JUNE, 1983

TYPE OF STAGING	UNIT PROD. HOURS	# MEN*	HANHOURS
A. SET-UP			
1. BRACKET STAGING			
BOW	27.4	4	109.6
STERN	105.6	4	422 . 4
2. PIPE STAGING	76.5	4	306.0
TOTAL MANHOURS: SET-UP			838.0
B. TEAR DOWN			
1. BRACKET STAGING			
BOW	13.0	3	39.0
STERN	50.1	3	150.3
20 PIPE STAGING	89.5	3	268.S
TOTAL MANHOURS: TEAR DOWN			457.8

MEN includes the number of carpenters and the welders needed to do the job. There is usually one welder and the number of carpenters can be found in the Back-up Data on page 327.

3.3 WORRKSHEET: UNIT PRODUCTIVE HOURS - SUMMARY

PRODUCTION CONTROL
TYPE OF SHIP: INTEGRATED-TUG-BARGE DATE: JUNE, 1983

AREA OF SHIP	UNIT PROD. HOURS	# AREAS*	TOTAL HOURS
A. SET-UP			
1. CENTER TANK (1,2,5)	79.7	3	236. 1
2. CENTER TANK (3,4)	73.5	2	147.0
3. WING TANK (1,2,5)	59.3	6	355.8
4. WING TANK (3.4)	38.8	4	155.2
5. EXTERIOR SHELL	209.5	1	209.5
TOTAL UNIT PRODUCTIVE HOURS: SET-UP			1103.6
R. TEAR DOWN			
1. CENTER TANK (1,2,5)	40.3	3-	120.9
2. CENTER TANK (3,4)	37.1	2	74.2
3. WING TANK (1,2,5)	51.9	6	311.4
4. WING TANK (3,4)	33.8	4	135.6
5. EXTERIOR SHELL	152.6	1	152.6
TOTAL UNIT PRODUCTIVE HOURS: TEAR DOWN			794.3

C. TOTAL MATERIAL NEEIIED

BRACKETS - 2 BOARD: 974
- 3 BOARD: 476

STANCHIONS: 1524

ROARDS: 7154

HANDRAIL: 2848

LADDERS: 399

STAGING CLIPS: 1450

LADDER CLIPS: 1595

END PIECES: 198

BRACES: 264

I-BEAMS - 12x8: 20
- 12X6 1/2: 50

ANGLES - 3x3: 20
- 4x4: 20

NUTS/BOLTS: 3S96

* # AREAS: There are S center tanks, 3 are 100'x5O' and 2 are 85'x50'. There are 10 wins tanks, 6 are 100'x3O' and 4 are 85'x30'. Exterior shell consists of bracket stasins on the shell (at bow and stern) and Pipe staging at the side shell.

3.4 WORKSHEET: MANHOURS - SUMMARY

PRODUCTION CONTROL
TYPE OF WORK: INTEGRATED TUG-BARGE DATE: JUNE, 1983

AREA OF SHIP	MANHOURS	# AREAS*	TOTAL HOURS
A. SET-UP			
1. CENTER TANK (1,2,5)	249.7	3	749.1
2. CENTER TANK, (3,4)	228.8	2	457.6
3. WING TANK (1,2,5)	237.2	6	1423.2
4. WING TANK (3,4)	207.6	4	830.4
5. EXTERIOR SHELL	838.0	1	838.0
TOTAL MANHOURS: SET-UP			4298.5
B. TEAR DOWN			
1. CENTER TANK (1,2,5)	241.8	3	725.4
2. CENTER TANK (3,4)	228.6	2	457.2
3. WING TANK (1,2,5)	232.8	6	1396.8
4. WING TANK (3,4)	202.8	4	811.2
5. EXTERIOR SHELL	457.8	1	457.8
TOTAL MANHOURS: TEAR DOWN			3948.4

* # AREAS: There are 5 center tanks, 3 are 100'X50' and 2 are 85'x50'. There are 10 wins tanks, 6 are 100'x3O' and 4 are 85'X50'. Exterior shell eansists of bracket stasins on the shell (at bow and stern) and pipe staging at the side shell

SECTION 4
FINAL REPORT - SUMMARY

4.1 SUMMARY

The worksheets that were developed for this final report and the information that thes contains will be verY useful to several departments in the shiPyard. For example: (1) Production control: for scheduling and manpower levelinss (2) Carpenter department: for manpower scheduling and material orderins; (3) Industrial Engineerins: for incentive development and progress; and (4) Estimating: for use in estimstins new work.

All of the necessary back-up data is included with this report, The back-up data consists of the following: (1) Work areas, (2) Manual - methods, (3) Titlesheets, (4) Time standards, and (5) Method analysis.