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SR/H--835

G. J. Benick
Name Title Date *11/2/88*
REPORT

OF

MATERIAL & EQUIPMENT

SECTION'S

ACTIVITIES

AT

NEW YORK SHIPBUILDING CORP.

DURING FABRICATION

OF

AXC 167_{1/2}

STARTING MAY 18, 1951

PART IV

**DOES NOT CONTAIN
UNCLASSIFIED CONTROLLED
NUCLEAR INFORMATION**

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11/3/88

NOV. 1, 1953

MASTER

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DRAWING LIST FOR TELESCOPE ACTUATOR SYSTEM

The following list covers all du Pont drawings and vendor "take-off" drawings pertaining to fabrication.

Since du Pont drawings do not show all fabrication details, it was necessary for New York Ship to prepare their own drawings. M & E Group used both sets for final inspection purposes.

This list was prepared from existing drawing files located in the M & E office at New York Ship on October 17, 1953. Du Pont drawings are listed by number, revision and title. New York Ship's take-off drawings are listed opposite the corresponding du Pont drawing.

<u>Du Pont</u> <u>Dwg. No.</u>	<u>Rev.</u> <u>No.</u>	<u>N.Y.S.</u> <u>Dwg. No.</u>	<u>Unit Used</u> <u>On</u>	<u>Title</u>
M118508	13	8032-45	All	Template
D118509	31	8032-49	All	Gage handle, gage adapter
D118510	0	8032-48	All	Clamp, stud handle
M118511	8	8032-46	All	Template stud clamp
M118518	0	8032-47	All	Plug
M119308	0	8032-30	All	Screw plug, pin, nut, fork
D119309	3	8032-29	All	Hook - Pin
M119383	0	8032-34	All	Lever(Weldment) Link
D119463	16	8032-60	All	Cap - sleeve flange plate Retainer plate - fixed plate
M119474	13	8032-26	All	Lower Tube (RH) weldment
				Lower Tube (LH) weldment
D119899	17	8032-36	All	Inner hanging guide tube Sect. No. 1
				Inner hanging guide tube Sect. No. 2
D119900	9	8032-35	All	Inner hanging guide tube Sect. No. 3 Hanging guide tube coupling
D119907	7	8032-37	All	Outer telescoping hanging guide tube
D119908	17	8032-38	All	Outer guide tube - Inner guide tube
D119933	23	8032-27	All	Plug tube
M119934	10	8032-28	All	Spacer handle
D119935	10	8032-32	All	Tube coupling, latch tubes
M119973	8	8032-31	All	Upper tube, stop pin
M126055	12	8032-20	R & P	Hanging Guide Deck Plate
M137134	0	None	All	Bushing
M126055	2	8032-51	(L, F, C)	Hanging Guide Lock Plate
M142168	8	None	R	Plenum template for Actuator erection Bushing water bushing

<u>Du Pont</u> <u>Dwg. No.</u>	<u>Rev.</u> <u>No.</u>	<u>N.Y.S.</u> <u>Dwg. No.</u>	<u>Unit Used</u> <u>On</u>	<u>Title</u>
D143193	23	8032-50	All	Gage handle
D143167	0	None	All	Threaded coupling
W133297	0	8032-1	R	Locating Deck plate - splice locations
W133298	0	8032-2	R	AG deck plate - splice locations
W133299	0	8032-3	R	AI deck plate - splice locations
W133316	0	8032-5	R	Make up plate assembly Deck plate splice locations
W133317	0	8032-4	R	Forest lower deck plate - splice locations
W133319	0	8032-6	R	Forest upper deck plate - splice locations
W133329	0	None	R	Lifting deck plate and service deck plate - splice
W133339	0	8032-18	R	Hanging guide deck plate splice locations
W152038	1	None	R	AH deck plate
W152051	1	"	R	AG " "
W152083	1	"	R	Locating deck plate
W152276	0	"	R	Gen. Arrangement - plan 25' 8-5/8"
W152415	0	"	R	Gen. arrangement-plan at "AG" level
W152416	0	"	"	Gen. arrangement - plan at locating level
W152834	Study	"	Study	General arrangement
W153028	10	8032-10	All	Forest structure - steel framing
W153063	10	8032-15	All	Make up plate assembly - steel framing
W153072	2	8032-25 & 19	All	Hanging buide steel framing
W153096	6	8032-11	R & P	Forest lower deck plate
W153096	2	8032-53	(L, K, & C)	" " " "
W153100	3	None	All	Rack extension lower hanging guide
W153130	14	8032-12	R & P	Forest upper deck plate
W153130	2	8032-52	(L, K & C)	" " " "
W153146	5	8032-16	R & P	Make up plate assembly deck plate
W153146	2	8032-54	(L, K & C)	Make up plate assembly deck plate
W153158	29	None	All	Forest assembly (elevation)
W153159	17	None	All	Forest assembly (upper deck)
W153160	15	None	All	Forest assembly (Lower deck)

<u>Du Pont Dwg. No.</u>	<u>Rev. No.</u>	<u>N.Y.S. Dwg. No.</u>	<u>Unit Used On</u>	<u>Title</u>
W153318	10	None	All	Make up plate assembly
W153366	11	8032-14	All	Latch lifting carrier - steel framing
W153375	11	None	All	Lifting deck assembly
W153390	14	8032-13	R & P	Latch lifting carrier - lifting deck plate
W153390	2	8032-14	(L, K, C)	Latch lifting carrier - lifting deck plate service deck plate
W153398	27	8032-23	All	Forest latch assembly
W153404	11	None	All	Service deck assembly
W153422	5	None	R	Actuator Arrangement study
W153423	10	None	R	" "
W153424	28	None	R	General arrangement
W153583	0	8032-23	R	Plenum template for actuator erection steel framing
W153617	2	None	R	Plenum template for actuator erection plenum template assembly
W153673	3	8032-41	All	Forest lower deck drill jig assembly ("C" rod hole)
W153718	4	8032-42	All	Forest lower deck drill jig assembly ("S" rod hole)
W153722	2	8032-44	All	Drill jig & plenum template alignment gage assembly "S" rod
W153723	2	8032-43	All	Drill jig & plenum template alignment gage assembly "C" rod
W153787	4	None	All	Telescope lower hanging guide
W153788	5	None	All	Telescope upper hanging guide
W153789	4	None	All	Rack extension upper hanging guide
W154308	4	None	R	Plenum template for actuator erection deck plate
W154316	0	None	P-L-K-C	Gen. arrangement telescope act. system, 66'-0" to 120' 0"
W154317	0	None	P-L-K-C	Gen. arrangement telescope act. system 120'-145'
W154318	0	None	P-L-K-C	Gen. arrangement telescope act. system, 0'-0" 66'-0"
		8032-21 (3)	All	Details of steel framing for forest structure.
		8032-22 (2)	All	Details of steel framing for latch lifting carrier

<u>Du Pont</u> <u>Dwg. No.</u>	<u>Rev.</u> <u>No.</u>	<u>N.Y.S.</u> <u>Dwg. No.</u>	<u>Unit Used</u> <u>On</u>	<u>Title</u>
		8032-24 (1)	All	Details of steel framing for plenum template for actuator erection
		8032-51	(P, L & K)	Hanging guide deck plate
		8032-52	(P, L & K)	Forest upper deck plate
		8032-53	(P, L & K)	Forest lower deck plate
		8032-54	(P, L & K)	Make up plate assembly deck plate
		8032-55	(P, L & K)	Latch lifting carrier lifting deck plate, service deck

SCRIBED & ON
EA. END OF JIG

ALL HOLES
 $1\frac{3}{4}$ " DIA.

SKETCH #1

A B C D E F G H J K

ENGINEERING SKETCH SHEET
E. I. DU PONT DE NEMOURS & CO.

PROJ. No.

SIGNATURE

PROJ. TITLE

DATE

SUBJECT: STAINLESS STEEL STRIP JIG

No. E-42451

PART IV

I. Telescope Actuator System

A. General

Five telescope actuator systems designated as "R", "P", "L", "K" and "C" were fabricated at New York Ship. All five were similar in specifications except for minor detail. For overall assembly refer to du Pont arrangement drawings W-153422, W-153423, and W-153424. These drawings illustrate "R" unit; however, they are representative of all units. They show a complete listing of material required and an overall view of the telescoping assembly.

Since jigs and special tooling were set up to conform to a definite deck plate fabrication sequence, the inspection procedures and methods described in this book will follow logically the fabrication steps.

1. Deck Plate Template

A full size steel template was fabricated by New York Ship for producing the actual deck plate pattern. It was used on all deck plates for locating, drilling and reaming pilot holes for the trepanning tool.

In the paragraphs to follow, a resume of the layout, problems encountered, and inspection of this template is presented.

a. Strip Jig

The strip jigs (7.000" centers) used for drilling and reaming baffle and deflector plate holes for process units was also used for locating, drilling and reaming the telescope actuator deck plate template pattern. (See Sketch #1) It was inspected dimensionally by M & E Inspectors using vernier calipers and found to be within required tolerances. The jig was identified as follows: Drill Jig "A" - Baffle Plates and Deflector Plates - 7.000" centers. Overall dimensions: 9' x 1½' x 1½". Material - Stainless steel Type 304.

b. Template Fabrication Problems and Inspection

Six carbon steel plates (each approximately 17' x 2½' x 13/16") were butt welded together to form the full size template blank which had the overall dimensions of 11½' x 17' x 13/16". After grinding all welds on both sides flush with the plates, X and Y centerlines were established. From these centerlines a secondary set of axes designated as T1

and B1 were established. (See Exhibit #1) Next, working off the secondary axes, the deck plate pattern was laid out on the top side of the template blank. This pattern was established from fractional dimensions as specified on the drawing. Then, from the X and Y centerlines, two points in the pattern were located off the X1-X2 centerline which corresponded to the strip jig locating holes when its centerline was matched to the template X1-X2 line. (See Sketch #1). After these two holes were located, drilled and reamed to 1-3/8" diameter, the strip jig was removed. Next, bushings were press fit into these two holes. The O.D. of the bushings was 1.3765". The original I.D. of these bushings was 31/32"; however, after pressing them into the deck plate template, they were reamed out to 1". This was done since the pilot on the trepanning tool used for deck plates was 1" in diameter. Then the strip jig was placed back on the template and its centerline mated to the template X axis. At the same time plug gages were inserted through the strip jig into the two locating holes. This was done to hold the jig in alignment with the X axis during the initial drilling and reaming operation. The jig was now properly located and ready for use. This jig was so designed that the locating holes would always line up with holes previously drilled and reamed in the template blank. After all holes were machined in the template, one hardened steel bushing was pressed into each hole and then reamed to 1".

During the initial machining operation on the template pattern, it was discovered by New York Ship that in several cases the holes established on the template from layout did not line up with the strip jig pattern. Therefore, the strip jig was shifted slightly to make it possible to drill and ream these holes to conform with the pattern layout which was established from the T1 and B1 axes. Du Pont Inspection was not aware of this condition until "R" deck plates had been machined. At the time of inspection, it was revealed that some trepanned holes in the "R" deck plates were not within the required center-to-center tolerance.

In an effort to find the source of trouble, the template was then inspected. It was found that some of the holes in the template were also outside the required tolerance, and rejected holes in the "R" deck plates corresponded to the rejected holes in the deck plate template.

To prevent a repetition of the above situation on subsequent deck plates, du Pont Inspection requested that New York Ship weld plugs in all holes in the template that were improperly located. These holes were then redrilled, reamed, bushed and inspected. In spite of the extreme care exercised in re-working these holes, they were still found to be outside the required tolerance; however, New York Ship stated that they could compensate for this while machining

EXHIBIT #1

deck plates for the "P" unit. During inspection of "P" unit deck plates, holes again were found incorrectly located. These holes also corresponded to those found out-of-tolerance on the template prior to machining "P" deck plates. New York Ship then admitted that it was impossible for them to compensate for the error.

The above situation was partially a result of Design's original dimensioning of the deck plate pattern in fractions of an inch. Hole locations in this case were dimensioned from the Tl-B1 axes. These dimensions were calculated from the plenum chamber theoretical pattern which was in decimals. Design rounded off these original dimensions to the nearest fraction of an inch and used them for dimensioning the template pattern. New York Ship laid out the template pattern from the Tl-B1 axes using the fractional dimensions. Then they drilled and reamed the pattern referencing from the "X" axis using the 7" strip jig which was machined to decimal dimensions. In doing so, some of the holes laid out from the secondary axes (Tl-B1) did not coincide with the jig pattern; therefore, the jig was shifted slightly to make up the difference. When deck plates were machined using this template and then inspected, the difference in shifting the strip jig on the template showed up during deck plate inspection.

Design's apprehension of this error in dimensioning their drawings was rectified by converting deck plate fractional dimensions to decimal dimensions. This made New York Ship's jig conform to the new dimensions.

Hence, du Pont Inspection requested New York Ship to plug and relocate holes in the template outside the required tolerance before machining "L" and subsequent units. This was done, and there were no further troubles with the template.

2. Deck Plates

a. General

The inspection procedure followed for any one deck plate was typical for all. These are nine deck plates for each telescope actuator systems, and one system for each 5 areas. The approximate overall dimensions for the forest deck plates, latch lifting carrier deck plates and one make up plate were 16'-11" x 16'-11" x 1/4". Material for all deck plates was mild carbon steel. (See photo Serial #163) All others were 16'-11" x 16'-11" x 1/4".

Deck plates were all similar in design except:

- (1) Hole diameters varied on certain plates within a system.

Serial Number 163

New York Shipbuilding Corporation
Camden, New Jersey
November 28, 1952

PROJECT 8980 - SAVANNAH RIVER PLANT

This view shows the drilling and reaming of
the make-up deck plate (du Pont dwg. # W-153146)
for the telescope actuator system, "R" Unit.

A $31/32$ " drill and 1" reamer is being used to
drill and ream pilot holes.

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- (2) The lower seven deck plates for "K", "L", and "C" units had fourteen (14) additional holes.

Special tools were fabricated to cover the complete deck plate inspection for all units. These are shown in photograph serial numbers 161 and 162, and are described on the back of each picture.

b. Inspection Procedure for Measuring Deck Plates:

- (1) The diameters of all holes were measured using inside micrometers, bore gages and outside micrometers.
- (2) Using the X and Y axis lines on a deck plate as reference lines, B1-B2 and T1-T2 axis lines were scribed on the surface of the plate by New York Ship layout men. These scribed lines were used as base lines for determining the location of all holes. (See Exhibit #1) The angle alpha as shown on Exhibit #1 was checked by first measuring from the intersection of the T1-T2 axis and X1-X2 axis a nominal distance along the X1-X2 axis in the X2 direction. At this point a perpendicular line was erected and extended until it intersected the T1-T2 axis. This perpendicular line was measured to the nearest $1/64$ ". By trigonometry the angle alpha was calculated. The angle beta, also shown on Exhibit #1, was determined in a similar manner.
- (3) One machined plug was inserted into the hole whose location was being determined, and another machined plug was inserted into a hole on an axis line.
- (4) A vernier scale was inserted into the machined plug located on the axis line. (See photo, Serial #162, item 2)
- (5) A stud post (item #3 in photo serial #162) was put through the eye on the end of the 50' stainless steel tape, and then inserted into a machined hole in the other plug.
- (6) The tape was then stretched from the stud post across the vernier scale and the reading was read to the nearest $1/64$ ".

Where there was no hole in the B1-B2 and T1-T2 axes, the plug and vernier arrangement was not necessary. The tape was stretched from the hole being located as described above across the scribed axis line and read directly. The hole in the corners of each plate was

Serial Number 161

New York Shipbuilding Corporation
Camden, New Jersey
November 28, 1952

PROJECT 8980 - SAVANNAH RIVER PLANT

This view shows M & E Inspectors taking
pattern measurements on the Telescope
Actuator Systems service deck plate -
drawing number W-153390-B.

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SER. #162

Serial Number 162

New York Shipbuilding Corporation
Camden, New Jersey
November 28, 1952

PROJECT 8980 - SAVANNAH RIVER PLANT

Instruments used for measuring actuator deck plate
pattern identified numerically on the photograph -

Number 1 - $3\frac{1}{2}$ " Plug for inserting in trepanned holes

Number 2 - Vernier graduated to read $1/64$ "

Number 3 - Stud post for holding end of 50' tape

Number 4 - 50' tape - $1/16$ " graduations

Number 5) - 2" plug for inserting in trepanned holes
Number 6)

Number 7 - Same as Number 1.

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not located from the B1-B2 and T1-T2 axes, but rather from the X and Y axes; therefore, they were not directly tied into the pattern. To measure their locations, the tape was read directly between axis line and inside of hole. To this measurement was added $1/2$ the hole diameter. As an additional check diagonal measurements across corners were also taken.

c. Deck Plate Irregularities

As mentioned in the section covering the template, all deck plates for "R" and "P" telescope actuator systems had some holes in each plate that were improperly located, and consequently were not accepted by the M & E Inspection Group. When these conditions were found, Design Division was immediately contacted for comments. Design outlined the following procedure to make the plates acceptable:

- (1) In all cases where pattern and corner hole centers were more than $\pm 1/32"$ over drawing dimensions, they were to be consulted.
- (2) Pattern and corner holes would be acceptable, provided the coordinates of the hole were not more than $7/64"$ from the drawing location.
- (3) Where this was exceeded locations could be corrected by increasing the diameter of the hole by not more than $1/8"$ (shifting center of hole back to correct location).

In all cases encountered, holes out of tolerance were corrected in the above manner and found satisfactory.

The inspection report for "P" unit deck plates is included as Exhibit #2.

The above deck plate irregularities were not encountered on "L", "K" and "C" units. These were all inspected in a similar manner as described in paragraph "b" and found satisfactory. However, in some cases holes in these deck plates were outside required tolerances, but were acceptable to Design since they fell within the limits outlined above.

d. Sandblasting and Painting Deck Plates

(1) "R" Unit

The deck plates for this unit were sandblasted below elevation 66'-0", or below the latch carrier steel framing. Deck plates above this elevation did not require sandblasting prior to painting.

EXHIBIT #2

Typical Illustration of all Teck Plate Inspections
Exemplified in Report Form for "P" unit telescope
Actuator System.

E. I. DU PONT DE NEMOURS & CO., INC.

Report Number 369-P

Construction Division

CC: H. W. Gosney, F.P.M.
R. K. Mason-K. R. Leifermann
Savannah River Plant (3)
H. L. Bunker - J. G. Brewer
J. G. Brewer
H. B. Gage
F. C. Breuninger
S. R. Cochran (2)
J. B. Johnson - File

January 13, 1953
New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORT

TO C. J. VEITH - M & E FILE

FROM W. F. Quillen

DATE January 12, 1953

PROJECT NO. 8980 PLANT Savannah River ORDER NO. AYC-1674

EQUIPMENT Deck Plates for Telescope Actuator System EQ.PC.NO. 160.1P, 161.5

DRAWING NOS. D-126055, W-153096, W-153130, W-153145, W-153590 JOE RATING

VENDOR New York Shipbuilding Corporation LOCATION Camden, N. J.

Scope: Dimensional inspection of nine (9) deck plates for building 105-P Telescope Actuator System. These inspections were made between November 24 and December 5, 1952 by the following inspectors: Dahlke, Jarczynski, Louder and Mergenthaler.

Procedure: The location of each deck plate hole, with respect to the layout center lines was checked using machined plugs and a 50' tape. The appropriate size plug with vernier attachment was inserted into the hole being checked and after tape was properly positioned on center line, a reading was taken at center of plate hole. If a hole was located on the center line, a plug was also inserted in that hole, tape was automatically centered, and measurement was made as before. All tape measurements were read to nearest 1/64" with the aid of the vernier attachment.

FIELD INSPECTOR'S REPORT

Report Number 369-P

FROM W. F. Quillen

Page 2 of 5

Results: The locations of some holes in each plate were found to be out of tolerance, and these holes are listed on the attached sheets. To correct this condition, Mr. W. Lord of Design granted permission to increase the radius of any hole, whose location exceeded the allowable tolerance, by an amount equal to the deviation above tolerance. For example, if the location of a hole deviated from the specified drawing dimension plus tolerance by $1/32"$, the radius of that hole was increased by $1/32"$.

To eliminate the necessity of making several sizes of reamers for enlarging these holes, the diameter of all holes which were located out-of-tolerance by $1/32"$ or less were enlarged by $1/16"$; those out-of-tolerance by more than $1/32"$ were enlarged by $1/8"$. No hole locations deviated from specified drawing dimension plus allowable tolerance by more than $1/16"$.

The location of all holes whose diameter was increased were re-inspected and accepted.

The diameter of all holes in each plate was within the specified tolerance prior to the enlarging of the above mentioned holes.

To identify the four hanging guide plates, each was stamped with an A, B, C, or D.

The holes in each plate which were originally located out-of-tolerance and required correcting are listed below.

FOREST LOWER DECK PLATE - DWG. W-153096, EQ.PC.NO. 169.1P

<u>HOLE LOCATION</u>		<u>MEASURED FROM AXIS</u>
<u>X</u>	<u>Y</u>	
21	27	B-B
14	34	"
20	36	"
49	69	"
17	21	T-T
15	39	"
24	42	"
36	46	"
42	48	"
17	49	"
26	52	"
7	55	"
35	55	"

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FOREST UPPER DECK PLATE DWG. W-153130- EQ. PG. NO. 160.1P

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
23	29	B-B	23	79	B-B
21	27	"	17	71	T-T
21	25	"	8	46	"
21	21	"	17	49	"
41	29	"	26	42	"
52	22	"	32	54	"
27	43	"	35	55	"
51	41	"	56	51	"

HARBOR GUARD DECK PLATE "D" DWG. D-126025

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
37	9	B-B	22	63	B-B
26	10	"	25	61	"
18	22	"	16	72	"
36	23	"	23	79	"
35	27	"	20	78	"
19	31	"	32	82	"
34	36	"	19	87	"
27	43	"	18	12	T-T
26	52	"	27	15	"
6	53	T-T	45	49	"
9	57	"	15	67	"
15	29	"	18	40	"
46	40	"	24	42	"
27	47	"	27	43	"
33	45	"	36	46	"

HARBOR GUARD DECK PLATE "C" DWG. D-126055

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
22	5	B-B	25	33	B-B
7	67	"	37	79	"
19	27	"	23	9	T-T
22	16	T-T	26	36	"
26	67	"	21	55	"
33	27	"			

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HANGING GUIDE DECK PLATE "B" DWG. D-126055

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
37	9	B-B	31	36	B-B
26	10	"	38	43	"
30	18	"	36	60	"
23	27	"	20	78	"
35	27	"	17	21	T-T
41	37	"	7	55	"

HANGING GUIDE DECK PLATE "A" DWG. D-126054

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
13	17	B-B	23	79	B-B
41	27	"	17	21	T-T
46	27	"	8	46	"
47	27	"	17	49	"
42	39	"	26	52	"
47	47	"	32	54	"
27	13	"	35	55	"
51	33	"	50	60	"

114-382 DECK PLATE DWG. W-153390 - EQ.PC.NO. 161.51

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
37	9	B-B	33	36	B-B
43	17	"	12	66	"
26	27	"	21	69	"
40	21	"	35	69	"
49	27	"	33	73	"
39	23	"	20	76	"
20	36	"	23	79	"
9	27	"	33	87	"
32	37	"	17	21	T-T
46	40	"	46	46	"
24	44	"	27	43	"
38	42	"	45	46	"
52	47	"	12	61	"
27	43	"	30	72	"

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SERVICE DECK PLATE DWG. W-153390 - EQ.PC.NO. 161.5P

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
28	6	E-B	23	9	T-T
29	25	"	17	21	"
28	34	"	20	22	"
6	36	"	8	46	"
23	79	"	26	52	"

MADE UP PLATE ASSEMBLY DECK PLATE DWG. W-153146 - EQ.PC.NO. 161.5P

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
25	10	E-B	17	21	T-T
13	13	"	28	34	"
25	19	"	17	49	"
31	49	"	23	51	"

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After sandblasting deck plates (below elev. 66'-0") for the "R" unit telescope actuator system, they were painted in accordance with Specification No. 3062 (Specifications for Painting Metallic Surfaces with Vinyl Base Paint for High Humidity and Damp Exposure); however, the top coat (Amercoat #33) or sealer was not applied on plates prior to field shipment. During transit to the plant site, deck plates rusted in spots, and consequently all deck plates below elevation 66'-0" had to be sandblasted again at Savannah River and repainted. As a result of this, the decision was made by du Pont that subsequent unit deck plates (below elev. 66'-0") would not require either sandblasting or painting prior to shipment from New York Ship. This operation would be done at the plant site.

Deck plates above 66'-0" elevation did not require sandblasting and were painted in accordance with Specification #3019 prior to shipment to the field.

(2) "P", "L", "K" and "C" Units

Deck plates above elevation 66'-0" did not require sandblasting. Deck plates above this elevation were painted in accordance with Specification #3019. Deck plates below elevation 66'-0" did not require either sandblasting or painting at New York Ship; the reason being as discussed in above section, paragraph 2.

e. Problem Encountered on "K" Deck Plates

During erection of the "K" telescope actuator system at Savannah River, it was discovered that the deck plate patterns in the assembly were not in alignment with the "K" unit plenum template pattern.

To give a clearer conception of the above problem and how it was corrected, it is necessary to revert back to the initial fabrication of the NYX plenum chamber. This is discussed in the following paragraphs.

After exhaustive welding experiments were completed on the 8' mock-up (see Part I), it was deducted from mathematical calculations that the tube patterns for all NYX unit tube sheets would be drilled on 7.021" centers. This additional 0.021" (from the center of any one tube hole to the next) was allowed for shrinkage which was a

natural resultant from the welding of tubes in any sub-assembly. Also, this allowance for shrinkage had to be made because Design Division specified that all tube coordinates were to be on 7.000" centers after all fabrication and machining was completed. It was contemplated by du Pont Design and New York Ship that this allowance was sufficient to give the final results required. However, after all tube welding and machining was completed on the NYX plenum chamber, the center to center distance between any two tubes was less than the 7.000" theoretical center required. It must be stated at this point, that it was not necessary that the resultant tube pattern conform to the theoretical 7.000" center to center dimension; however, it was desirable that this figure be approached within reasonable limits as set forth by Design's specifications.

After the decision was made that the NYX experimental unit be converted into a usable process unit ("K"), design of the actuator deck plate did not consider the effect of additional shrinkage to the pattern which would be incurred in converting the NYX unit. After all welding and machining was completed on "K" plenum chamber, the overall shrinkage across the twenty-six tube lattice was found to be between .150" to .180". Deck plates were drilled for "K" unit telescope actuator system on 7.000" centers using the conventional strip jig as discussed above in Section 1. It can now be readily seen that the deck plates drilled on 7.000" centers were not concentric with the plenum template which was set from the top side of the "K" unit plenum chamber.

To rectify the above mistake, it was necessary to re-work "K" unit deck plates at Savannah River before erection work could continue. Seventy percent (70%) of all holes in five deck plates below elevation 66'-0" were re-worked by grinding holes oval in some cases to a maximum of 7/32" over drawing size before they were concentric with the plenum template pattern. (7/32" is only an approx. figure)

3. Forest Assembly

a. Dimensional Inspections (Typical for all units)

(1) Forest Lower and Upper Deck Plate Assemblies

The forest lower and upper deck plate framing was assembled and fabricated on a level platen. After all fabrication was completed, a dimensional check was made for squareness using a 50' stainless steel tape graduated in 1/16". Beam locations in relation to framing were also checked with the 50' stainless steel tape. The bow of

all beams was checked with the aid of a chalk line and a 6" scale graduated in 1/64".

The above inspections were found satisfactory on all five units.

(2) Inspections After Fabrication of Forest Assembly

The unit was assembled bottom side up prior to fitting the lower deck plate framing to the four legs. Elevations were established at 13'-1/4" from the platen to each of the four legs of the assembly. These elevations were established by NYS layout men and checked by Inspections using the Wild N111 Precision Level to determine if they were in the same relative plane. Next, the lower deck plate framing was lowered in place by an overhead crane and matched to these lines on each of the four legs and bolted (See Exhibit #3).

Four locking devices (See detail "Z" du Pont drawing #W-153028) were then located and welded 25 1/4" above the 13'-1/4" elevation. Overall lengths from the face of the locking devices to the platen were checked with a 50' stainless steel tape graduated in 1/64". The location of these locking devices were found to be satisfactory on all five units.

In each leg were eight (8) holes which were located, drilled and tapped by New York Ship. (See du Pont drawing W-153028 - basic detail for location and size of holes) Drilled and tapped holes in all five forest structures were inspected and found satisfactory with the exception of "C" unit in which the following problem was encountered: Eight holes on each leg of the structure (4) were drilled and tapped 1/2"-13NC-2. Location of the holes were layed out and then jig drilled with reference to bottom side of bearing pad. After inspecting, it was found that holes were layed out from the top side of bearing pad which was distorted due to welding and not level; therefore, holes were not drilled in proper location.

This problem was solved by plug welding all holes, grinding bearing pads level, and then re-locating holes with respect to the plane on the bottom side of bearing pads. Holes were then redrilled, tapped, inspected and accepted. See Exhibit #4 for typical illustration in report form on final inspection of tapped holes on "C" Unit.

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EXHIBIT #3

Typical Illustration of all Forest Structure Assembly
Inspections Exemplified in Report Form for "K" Unit
Forest Assembly Structure.

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Construction Division

CC: H. W. Gosney, F.P.M.
R. K. Mason-D.A. Hauser-SRP-3
R. K. Mason-J. D. Cook-SRP
H. L. Bunker - J. G. Brewer
H. B. Gage
F. C. Breuninger
S. R. Cochran (2)
R. H. Barto - NYS (3)
J. B. Johnson - File

June 18, 1953

New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORTTO C. J. VEITH - M & E FILEFROM J. R. StewartDATE May 1, 1953PROJECT NO. 8980 PLANT Savannah River ORDER NO. AEC-1674EQUIPMENT "K" Unit Forest Assembly EQ. PC. NO. 160.1K2DRAWING NOS. W-153028 JOB RATING _____VENDOR New York Shipbuilding Corp. LOCATION Camden, N. J.

Scope: Dimensional inspection of "K" unit forest assembly.

Procedure:

General -

The subject equipment was assembled and welded bottom side up. All elevation measurements were taken from the level platen on which the unit was assembled.

The following is a resume of the inspection procedures incorporated to determine the acceptance or rejection of the subject equipment.

1. Forest lower deck framing

After welding the lower deck framing to the inside of four struts, preliminary elevation measurements (elv. 13' 1/4") were taken at the four corners. These measurements were taken with a 50' stainless steel tape (duPont #2) graduated in 1/16" and estimated to the nearest 1/64". (See result sheet #1.)

2. Bearing pads on base of support struts.

With the assembly bottom side up, the plane of the bearing pads (with respect to each other) on each of the four support struts were checked using the Wild NIII Level. (See results #2).

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FIELD INSPECTOR'S REPORT

FROM: J. R. Stewart

• Overall alignment check at four (4) bearing pads:

The alignment of the bearing pad on each of the four support struts were measured with respect to the platen using the 50' stainless tape described in #1. (See #3 result sheet)

• Platen

The plane of the platen was checked at the four corners of the support struts using the Wild NIII Level. This was done to determine if the high and low points on the plane of the platen corresponded to the high and low points on the bearing pads within a reasonable amount ($\pm .010"$). The platen level readings were compared to the bearing pad level readings as described in #1. For comparison see result sheet #2.

• Squareness check

The upper and lower forest deck structures were checked for squareness using the 50' stainless steel tape described in #1. All measurements were taken from "heel" to "heel" on the framing. (See #6 result sheet)

• Centerline check: Lower forest deck framing axes vs upper forest deck framing axes.

To determine if the axes on the lower forest deck framing coincided with the axes on the upper forest deck framing, a Starrett mercury plumb bob was suspended from each of the four axis extremities (namely: X_1 , X_2 , Y_1 , Y_2) on the lower forest deck framing. Each plumb bob was then checked visually for coincidence with the axis extremities on the upper forest deck framing. (See #5 result sheet)

• Locking devices:

The alignments of two locking devices welded to each of the four support struts were checked using the 50' stainless steel tape described in #1. For alignment of locking devices see detail drawing #K-153028, detail "Z" (see #4 result sheet).

Results: See attached sheets

RM
attach. 2

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5. SQUARENESS CHECK:

NOTE:

1. ALL MEASUREMENTS WERE TAKEN FROM "HEEL" TO "HEEL" ON ANGLE, ONLY.
2. DIAGONALS WERE CHECKED ON ALL FRAMING & FOUND WITHIN TOLERANCE.

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EXHIBIT #4

Typical Illustration on all Inspections Exemplified in
Report Form for Layout, Drilling and Tapping of
Thirty-two (32) $\frac{1}{2}$ " - 13NC-2 Holes in Four (4) Corner
Struts on the "C" Unit Forest Assembly.

E. I. DU PONT DE NEMOURS & CO., INC.

CC:

Report number 529-C

Construction Division

CC: H. W. Gosney, F.P.M.
R. K. Mason-D.A. Hauser-SRP (3)
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R. H. Barto - NYS (3)
J. B. Johnson - File

June 18, 1953
New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORT

TO C. J. VEITH - M & E FILE

FROM D. M. Leland

DATE June 3, 1953

PROJECT NO. 8980 PLANT Savannah River ORDER NO. AXC-167 $\frac{1}{2}$

EQUIPMENT Actuator System - Forest Framing EQ.PC.NO. 160.102

DRAWING NOS. NYS Dwg. 8032-10 JOB RATING

VENDOR New York Shipbuilding Corp. LOCATION Camden, N. J.

Scope: To check the layout, drilling and tapping of the 32 1/2"-13NC
tapped holes in the four struts

Procedure - The layout and drilling of the holes was checked with a
vernier caliper. A 1" X 4" cap screw was used to check straightness
of tapping. The drilling was done by template.

Results: For results of the layout and drilling see attached sheet.
Results were satisfactory.

lnw
attach.

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ACTUATOR SYSTEM - FOREST FRAMING.

Report number 529-C

6-3-53

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After assembly of the forest structure was completed, alignment of the lower and upper deck plate framings were checked using a plumb bob. XI and XII centerlines on each of the two framings had been previously established and these were used as check points. The plumb bob was suspended from each of the axis lines located on the outer beams on the lower deck framing and checked against the corresponding axis lines on the upper deck plate framing. (Note: Unit was assembled bottom side up and elevations and alignment measurements were checked in this position.) Next, the length, width and height of the forest structure were checked using a 50' stainless steel tap graduated in 1/16". Diagonals were checked on the top and bottom of structure to determine if the framing was warped. (See Exhibit #3)

4. Latch Lifting Carrier Steel Framing

a. Dimensional Inspections

Generally, the same inspection was performed on this assembly as described in Section 3. For general arrangement of the latch lifting carrier steel framing in the telescope actuator system, see du Pont drawing W-153423 and for detail reference drawings see du Pont drawing W-153424. Also, see photo serial #160. This photograph shows points at which all check measurements were made on the assembly. It also illustrates the points at which corresponding check measurements were taken on the forest assembly. (See Exhibit #5)

Explanation of photo serial #160

- (1) Length, width and height measurements were taken on all four sides of the assembly as shown on the one side in the foreground.
- (2) Diagonal measurements were taken on both top (B) and bottom (C) frames (illustrated on frame "A").
- (3) Framing alignment was checked by suspending plumb bob at (1) and (2) (also at points on opposite sides of the framing), and checked against the corresponding axis lines on "A".

5. Forest Latch Assembly and Telescope Hanging Guides

a. General:

The component parts of the forest latch assembly and telescope hanging guides are machined to layout and completely assembled for final inspection before shipment to the plant site. All components and sub-assemblies in

- Photograph Serial #244 - Inspection of lower outer hanging guides for "C" unit telescope actuator system.
- Photograph Serial #245 - Chrome plating preparation illustrating high ground finishes required on all surfaces and radii on all corners.
- Exhibit #7 - Typical illustration of all telescope actuator hanging guide inspections exemplified in report form for "R", "L", "K" and "C" units.

DRAWING LIST FOR TELESCOPE ACTUATOR SYSTEM

The following list covers all du Pont drawings and vendor "take-off" drawings pertaining to fabrication.

Since du Pont drawings do not show all fabrication details, it was necessary for New York Ship to prepare their own drawings. M & E Group used both sets for final inspection purposes.

This list was prepared from existing drawing files located in the M & E office at New York Ship on October 17, 1953. Du Pont drawings are listed by number, revision and title. New York Ship's take-off drawings are listed opposite the corresponding du Pont drawing.

<u>Du Pont</u> <u>Dwg. No.</u>	<u>Rev.</u> <u>No.</u>	<u>N.Y.S.</u> <u>Dwg. No.</u>	<u>Unit Used</u> <u>On</u>	<u>Title</u>
D118508	13	8032-45	All	Template
D118509	31	8032-49	All	Gage handle, gage adapter
D118510	0	8032-48	All	Clamp, stud handle
D118511	8	8032-46	All	Template stud clamp
D118518	0	8032-47	All	Plug
D119308	0	8032-30	All	Screw plug, pin, nut, fork
D119309	3	8032-29	All	Hook - Pin
D119383	0	8032-34	All	Lever(Weldment) Link
D119463	16	8032-60	All	Cap - sleeve flange plate Retainer plate - fixed plate
D119474	13	8032-26	All	Lower Tube (RH) weldment Lower Tube (LH) weldment
D119899	17	8032-36	All	Inner hanging guide tube Sect. No. 1 Inner hanging guide tube Sect. No. 2
D119900	9	8032-35	All	Inner hanging guide tube Sect. No. 3 Hanging guide tube coupling
D119907	7	8032-37	All	Outer telescoping hanging guide tube
D119908	17	8032-38	All	Outer guide tube - Inner guide tube
D119933	23	8032-27	All	Plug tube
D119934	10	8032-28	All	Spacer handle
D119935	10	8032-32	All	Tube coupling, latch tubes
D119973	8	8032-31	All	Upper tube, stop pin
D126055	12	8032-20	R & P	Hanging Guide Deck Plate
D137134	0	None	All	Bushing
D126055	2	8032-51	(L, F, C)	Hanging Guide Deck Plate
D142168	8	None	R	Plenum template for Actuator erection Pushing water bushing

<u>De Pont Dwg. No.</u>	<u>Rev. No.</u>	<u>N.Y.S. Dwg. No.</u>	<u>Unit Used On</u>	<u>Title</u>
D113193	23	8032-50	All	Gage handle
D113167	0	None	All	Threaded coupling
W133297	0	8032-1	R	Locating Deck plate - splice locations
W133298	0	8032-2	R	AG deck plate - splice locations
W133299	0	8032-3	R	AH deck plate - splice locations
W133316	0	8032-5	R	Make up plate assembly Deck plate splice locations
W133317	0	8032-4	R	Forest lower deck plate - splice locations
W133319	0	8032-6	R	Forest upper deck plate - splice locations
W133329	0	None	R	Lifting deck plate and service deck plate - splice
W133339	0	8032-18	R	Hanging guide deck plate splice locations
W152038	1	None	R	AH deck plate
W152051	1	"	R	AG " "
W152083	1	"	R	Locating deck plate
W152276	0	"	R	Gen. Arrangement - plan 25' 8-5/8"
W152415	0	"	R	Gen. arrangement-plan at "AG" level
W152416	0	"	"	Gen. arrangement - plan at locating level
W152834	Study	"	Study	General arrangement
W153028	10	8032-10	All	Forest structure - steel framing
W153063	10	8032-15	All	Make up plate assembly - steel framing
W153072	2	8032-25 & 19	All	Hanging guide steel framing
W153096	6	8032-11	R & P	Forest lower deck plate
W153096	2	8032-53	(L, K, & C)	" " " "
W153100	3	None	All	Rack extension lower hanging guide
W153130	14	8032-12	R & P	Forest upper deck plate
W153130	2	8032-52	(L, K & C)	" " " "
W153146	5	8032-16	R & P	Make up plate assembly deck plate
W153146	2	8032-54	(L, K & C)	Make up plate assembly deck plate
W153158	29	None	All	Forest assembly (elevation)
W153159	17	None	All	Forest assembly (upper deck)
W153160	15	None	All	Forest assembly (Lower deck)

<u>Du Pont Dwg. No.</u>	<u>Rev. No.</u>	<u>N.Y.S. Dwg. No.</u>	<u>Unit Used On</u>	<u>Title</u>
W153318	10	None	All	Make up plate assembly
W153366	11	8032-14	All	Latch lifting carrier - steel framing
W153375	11	None	All	Lifting deck assembly
W153390	14	8032-13	R & P	Latch lifting carrier - lifting deck plate
W153390	2	8032-14	(L, K, C)	Latch lifting carrier - lifting deck plate service deck plate
W153398	27	8032-23	All	Forest latch assembly
W153404	11	None	All	Service deck assembly
W153422	5	None	R	Actuator Arrangement study
W153423	10	None	R	" "
W153424	28	None	R	General arrangement
W153583	0	8032-23	R	Plenum template for actuator erection steel framing
W153617	2	None	R	Plenum template for actuator erection plenum template assembly
W153673	3	8032-41	All	Forest lower deck drill jig assembly ("C" rod hole)
W153718	4	8032-42	All	Forest lower deck drill jig assembly ("S" rod hole)
W153722	2	8032-44	All	Drill jig & plenum template alignment gage assembly "S" rod
W153723	2	8032-43	All	Drill jig & plenum template alignment gage assembly "C" rod
W153787	4	None	All	Telescope lower hanging guide
W153788	5	None	All	Telescope upper hanging guide
W153789	4	None	All	Rack extension upper hanging guide
W154308	4	None	R	Plenum template for actuator erection deck plate
W154316	0	None	P-L-K-C	Gen. arrangement telescope act. system, 66'-0" to 120' 0"
W154317	0	None	P-L-K-C	Gen. arrangement telescope act. system 120'-145'
W154318	0	None	P-L-K-C	Gen. arrangement telescope act. system, 0'-0" 66'-0"
		8032-21 (3)	All	Details of steel framing for forest structure.
		8032-22 (2)	All	Details of steel framing for latch lifting carrier

<u>Du Pont</u> <u>Des. No.</u>	<u>Rev.</u> <u>No.</u>	<u>N.Y.S.</u> <u>Des. No.</u>	<u>Unit Used</u> <u>On</u>	<u>Title</u>
		8032-24 (1)	All	Details of steel framing for plenum template for actuator erection
		8032-51	(P, L & K)	Hanging guide deck plate
		8032-52	(P, L & K)	Forest upper deck plate
		8032-53	(P, L & K)	Forest lower deck plate
		8032-54	(P, L & K)	Make up plate assembly deck plate
		8032-55	(P, L & K)	Latch lifting carrier lifting deck plate, service deck

PART IV

I. Telescope Actuator System

A. General

Five telescope actuator systems designated as "R", "P", "L", "K" and "C" were fabricated at New York Ship. All five were similar in specifications except for minor detail. For overall assembly refer to du Pont arrangement drawings W-153422, W-153423, and W-153424. These drawings illustrate "R" unit; however, they are representative of all units. They show a complete listing of material required and an overall view of the telescoping assembly.

Since jigs and special tooling were set up to conform to a definite deck plate fabrication sequence, the inspection procedures and methods described in this book will follow logically the fabrication steps.

1. Deck Plate Template

A full size steel template was fabricated by New York Ship for producing the actual deck plate pattern. It was used on all deck plates for locating, drilling and reaming pilot holes for the trepanning tool.

In the paragraphs to follow, a resume of the layout, problems encountered, and inspection of this template is presented.

a. Strip Jig

The strip jigs (7.000" centers) used for drilling and reaming baffle and deflector plate holes for process units was also used for locating, drilling and reaming the telescope actuator deck plate template pattern. (See Sketch #1) It was inspected dimensionally by M & E Inspectors using vernier calipers and found to be within required tolerances. The jig was identified as follows: Drill Jig "A" - Baffle Plates and Deflector Plates - 7.000" centers. Overall dimensions: 9' x 1 $\frac{1}{2}$ ' x 1 $\frac{1}{2}$ '. Material - Stainless steel Type 304.

b. Template Fabrication Problems and Inspection

Six carbon steel plates (each approximately 17' x 2 $\frac{1}{2}$ ' x 13/16") were butt welded together to form the full size template blank which had the overall dimensions of 11 $\frac{1}{2}$ ' x 17' x 13/16". After grinding all welds on both sides flush with the plates, X and Y centerlines were established. From these centerlines a secondary set of axes designated as T1

SCRIBED & ON
EA. END OF JIG

ALL HOLES
 $1\frac{3}{4}$ " DIA.

SKETCH #1

A B C D E F G H J K

ENGINEERING SKETCH SHEET E. I. DU PONT DE NEMOURS & CO.		PROJ. No. _____	SIGNATURE: _____
PROJ. TITLE: _____			DATE: _____
SUBJECT: <i>STAINLESS STEEL STRIP JIG</i>			No. E-42451 —

and B1 were established. (See Exhibit #1) Next, working off the secondary axes, the deck plate pattern was laid out on the top side of the template blank. This pattern was established from fractional dimensions as specified on the drawing. Then, from the X and Y centerlines, two points in the pattern were located off the T1-T2 centerline which corresponded to the strip jig locating holes when its centerline was matched to the template T1-T2 line. (See Sketch #1). After these two holes were located, drilled and reamed to 1-3/8" diameter, the strip jig was removed. Next, bushings were press fit into these two holes. The O.D. of the bushings was 1.3765". The original I.D. of these bushings was 31/32"; however, after pressing them into the deck plate template, they were reamed out to 1". This was done since the pilot on the trepanning tool used for deck plates was 1" in diameter. Then the strip jig was placed back on the template and its centerline mated to the template X axis. At the same time plug gages were inserted through the strip jig into the two locating holes. This was done to hold the jig in alignment with the X axis during the initial drilling and reaming operation. The jig was now properly located and ready for use. This jig was so designed that the locating holes would always line up with holes previously drilled and reamed in the template blank. After all holes were machined in the template, one hardened steel bushing was pressed into each hole and then reamed to 1".

During the initial machining operation on the template pattern, it was discovered by New York Ship that in several cases the holes established on the template from layout did not line up with the strip jig pattern. Therefore, the strip jig was shifted slightly to make it possible to drill and ream these holes to conform with the pattern layout which was established from the T1 and B1 axes. Du Pont Inspection was not aware of this condition until "R" deck plates had been machined. At the time of inspection, it was revealed that some trepanned holes in the "R" deck plates were not within the required center-to-center tolerance.

In an effort to find the source of trouble, the template was then inspected. It was found that some of the holes in the template were also outside the required tolerance, and rejected holes in the "R" deck plates corresponded to the rejected holes in the deck plate template.

To prevent a repetition of the above situation on subsequent deck plates, du Pont Inspection requested that New York Ship weld plugs in all holes in the template that were improperly located. These holes were then redrilled, reamed, bushed and inspected. In spite of the extreme care exercised in re-working these holes, they were still found to be outside the required tolerance; however, New York Ship stated that they could compensate for this while machining

deck plates for the "P" unit. During inspection of "P" unit deck plates, holes again were found incorrectly located. These holes also corresponded to those found out-of-tolerance on the template prior to machining "P" deck plates. New York Ship then admitted that it was impossible for them to compensate for the error.

The above situation was partially a result of Design's original dimensioning of the deck plate pattern in fractions of an inch. Hole locations in this case were dimensioned from the Tl-B1 axes. These dimensions were calculated from the plenum chamber theoretical pattern which was in decimals. Design rounded off these original dimensions to the nearest fraction of an inch and used them for dimensioning the template pattern. New York Ship laid out the template pattern from the Tl-B1 axes using the fractional dimensions. Then they drilled and reamed the pattern referencing from the "X" axis using the 7" strip jig which was machined to decimal dimensions. In doing so, some of the holes laid out from the secondary axes (Tl-B1) did not coincide with the jig pattern; therefore, the jig was shifted slightly to make up the difference. When deck plates were machined using this template and then inspected, the difference in shifting the strip jig on the template showed up during deck plate inspection.

Design's apprehension of this error in dimensioning their drawings was rectified by converting deck plate fractional dimensions to decimal dimensions. This made New York Ship's jig conform to the new dimensions.

Hence, du Pont Inspection requested New York Ship to plug and relocate holes in the template outside the required tolerance before machining "L" and subsequent units. This was done, and there were no further troubles with the template.

2. Deck Plates

a. General

The inspection procedure followed for any one deck plate was typical for all. These are nine deck plates for each telescope actuator systems, and one system for each 5 areas. The approximate overall dimensions for the forest deck plates, latch lifting carrier deck plates and one make up plate were 16'-11" x 16'-11" x 1/4". Material for all deck plates was mild carbon steel. (See photo Serial #163) All others were 16'-11" x 16'-11" x 1/4".

Deck plates were all similar in design except:

- (1) Hole diameters varied on certain plates within a system.

Serial Number 163

New York Shipbuilding Corporation
Camden, New Jersey
November 28, 1952

PROJECT 8980 - SAVANNAH RIVER PLANT

This view shows the drilling and reaming of
the make-up deck plate (du Pont dwg. # W-153146)
for the telescope actuator system, "R" Unit.

A 31/32" drill and 1" reamer is being used to
drill and ream pilot holes.

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- (2) The lower seven deck plates for "K", "L", and "C" units had fourteen (14) additional holes.

Special tools were fabricated to cover the complete deck plate inspection for all units. These are shown in photograph serial numbers 161 and 162, and are described on the back of each picture.

b. Inspection Procedure for Measuring Deck Plates:

- (1) The diameters of all holes were measured using inside micrometers, bore gages and outside micrometers.
- (2) Using the X and Y axis lines on a deck plate as reference lines, B1-B2 and T1-T2 axis lines were scribed on the surface of the plate by New York Ship layout men. These scribed lines were used as base lines for determining the location of all holes. (See Exhibit #1) The angle alpha as shown on Exhibit #1 was checked by first measuring from the intersection of the T1-T2 axis and X1-X2 axis a nominal distance along the X1-X2 axis in the X2 direction. At this point a perpendicular line was erected and extended until it intersected the T1-T2 axis. This perpendicular line was measured to the nearest 1/64". By trigonometry the angle alpha was calculated. The angle beta, also shown on Exhibit #1, was determined in a similar manner.
- (3) One machined plug was inserted into the hole whose location was being determined, and another machined plug was inserted into a hole on an axis line.
- (4) A vernier scale was inserted into the machined plug located on the axis line. (See photo, Serial #162, item 2)
- (5) A stud post (item #3 in photo serial #162) was put through the eye on the end of the 50' stainless steel tape, and then inserted into a machined hole in the other plug.
- (6) The tape was then stretched from the stud post across the vernier scale and the reading was read to the nearest 1/64".

Where there was no hole in the B1-B2 and T1-T2 axes, the plug and vernier arrangement was not necessary. The tape was stretched from the hole being located as described above across the scribed axis line and read directly. The hole in the corners of each plate was

Serial Number 161

New York Shipbuilding Corporation
Camden, New Jersey
November 28, 1952

PROJECT 8980 - SAVANNAH RIVER PLANT

This view shows M & E Inspectors taking
pattern measurements on the Telescope
Actuator Systems service deck plate -
drawing number W-153390-B.

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Serial Number 162

New York Shipbuilding Corporation
Camden, New Jersey
November 28, 1952

PROJECT 8980 - SAVANNAH RIVER PLANT

Instruments used for measuring actuator deck plate
pattern identified numerically on the photograph -

Number 1 - $3\frac{1}{2}$ " Plug for inserting in trepanned holes

Number 2 - Vernier graduated to read $1/64$ "

Number 3 - Stud post for holding end of 50' tape

Number 4 - 50' tape - $1/16$ " graduations

Number 5) - 2" plug for inserting in trepanned holes

Number 6)

Number 7 - Same as Number 1.

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not located from the B1-B2 and T1-T2 axes, but rather from the X and Y axes; therefore, they were not directly tied into the pattern. To measure their locations, the tape was read directly between axis line and inside of hole. To this measurement was added $1/2$ the hole diameter. As an additional check diagonal measurements across corners were also taken.

c. Deck Plate Irregularities

As mentioned in the section covering the template, all deck plates for "R" and "P" telescope actuator systems had some holes in each plate that were improperly located, and consequently were not accepted by the M & E Inspection Group. When these conditions were found, Design Division was immediately contacted for comments. Design outlined the following procedure to make the plates acceptable:

- (1) In all cases where pattern and corner hole centers were more than $1/32$ " over drawing dimensions, they were to be consulted.
- (2) Pattern and corner holes would be acceptable, provided the coordinates of the hole were not more than $7/64$ " from the drawing location.
- (3) Where this was exceeded locations could be corrected by increasing the diameter of the hole by not more than $1/8$ " (shifting center of hole back to correct location).

In all cases encountered, holes out of tolerance were corrected in the above manner and found satisfactory.

The inspection report for "P" unit deck plates is included as Exhibit #2.

The above deck plate irregularities were not encountered on "L", "K" and "C" units. These were all inspected in a similar manner as described in paragraph "b" and found satisfactory. However, in some cases holes in these deck plates were outside required tolerances, but were acceptable to Design since they fell within the limits outlined above.

d. Sandblasting and Painting Deck Plates

(1) "R" Unit

The deck plates for this unit were sandblasted below elevation 66'-0", or below the latch carrier steel framing. Deck plates above this elevation did not require sandblasting prior to painting.

EXHIBIT #2

Typical Illustration of all Teck Plate Inspections
Exemplified in Report Form for "P" unit telescope
Actuator System.

E. I. DU PONT DE NEMOURS & CO., INC.

Report Number 369-P

Construction Division

CC: H. W. Gosney, F.P.M.
R. K. Mason-K. R. Leifermann
Savannah River Plant (3)
H. L. Bunker - J. G. Brewer
J. G. Brewer
H. B. Gage
F. C. Breuninger
S. R. Cochran (2)
J. B. Johnson - File

January 13, 1953
New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORT

TO C. J. VEITH - M & E FILE

FROM W. F. Quillen

DATE January 12, 1953

PROJECT NO. 8980 PLANT Savannah River ORDER NO. AXC-1674

EQUIPMENT Deck Plates for Telescope Actuator System 160.1P, 161.5
B-126055, W-153095, EQ.PC.NO. 161.6 thru 161.9

DRAWING NOS. W-153130, W-153140, W-153190 JOE RATING

VENDOR New York Shipbuilding Corporation LOCATION Camden, N. J.

Scope: Dimensional inspection of nine (9) deck plates for building 105-P Telescope Actuator System. These inspections were made between November 24 and December 5, 1952 by the following inspectors: Dahlke, Jarczyński, Louder and Mergenthaler.

Procedure: The location of each deck plate hole, with respect to the layout center lines was checked using machined plugs and a 50' tape. The appropriate size plug with vernier attachment was inserted into the hole being checked and after tape was properly positioned on center line, a reading was taken at center of plate hole. If a hole was located on the center line, a plug was also inserted in that hole, tape was automatically centered, and measurement was made as before. All tape measurements were read to nearest 1/64" with the aid of the vernier attachment.

FIELD INSPECTOR'S REPORT

Report Number 369-P

FROM W. F. Quillen

Page 2 of 5

Results: The locations of some holes in each plate were found to be out of tolerance, and these holes are listed on the attached sheets. To correct this condition, Mr. W. Lord of Design granted permission to increase the radius of any hole, whose location exceeded the allowable tolerance, by an amount equal to the deviation above tolerance. For example, if the location of a hole deviated from the specified drawing dimension plus tolerance by $1/32"$, the radius of that hole was increased by $1/32"$.

To eliminate the necessity of making several sizes of reamers for enlarging these holes, the diameter of all holes which were located out-of-tolerance by $1/32"$ or less were enlarged by $1/16"$; those out-of-tolerance by more than $1/32"$ were enlarged by $1/8"$. No hole locations deviated from specified drawing dimension plus allowable tolerance by more than $1/16"$.

The location of all holes whose diameter was increased were re-inspected and accepted.

The diameter of all holes in each plate was within the specified tolerance prior to the enlarging of the above mentioned holes.

To identify the four hanging guide plates, each was stamped with an A, B, C, or D.

The holes in each plate which were originally located out-of-tolerance and required correcting are listed below.

FOREST LOWER DECK PLATE - DWG. W-153096, EQ.PC.NO. 100.1P

<u>HOLE LOCATION</u>		<u>MEASURED FROM AXIS</u>
<u>X</u>	<u>Y</u>	
21	27	B-B
14	34	"
20	36	"
49	69	"
17	21	T-T
15	39	"
24	42	"
36	46	"
42	48	"
17	49	"
26	52	"
7	55	"
35	55	"

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FOREST UPPER DECK PLATE DWG. W-153130- EQ. PG. NO. 160.1P

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
23	19	B-B	23	79	B-B
23	27	"	17	71	T-T
20	28	"	8	46	"
23	31	"	17	49	"
41	39	"	26	42	"
52	42	"	32	54	"
27	43	"	35	55	"
50	43	"	50	50	"

KARLENE GUNDS DECK PLATE "C" DWG. D-126025

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
20	9	B-B	22	60	B-B
20	10	"	25	61	"
18	12	"	16	72	"
36	18	"	23	79	"
35	17	"	20	78	"
19	21	"	32	82	"
34	26	"	19	87	"
27	43	"	18	12	T-T
26	54	"	27	15	"
6	13	T-T	45	49	"
9	14	"	15	67	"
15	29	"	18	40	"
46	40	"	24	42	"
27	41	"	27	43	"
33	45	"	36	46	"

KARLENE GUNDS DECK PLATE "C" DWG. D-126055

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
23	9	B-B	27	33	B-B
7	60	"	17	79	"
19	87	"	23	9	T-T
22	16	T-T	20	36	"
26	42	"	21	55	"
33	87	"			

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HANGING GUIDE DECK PLATE "B" DWG. D-126055

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
37	9	B-B	34	36	B-B
26	10	"	35	45	"
30	18	"	36	60	"
25	27	"	20	78	"
35	27	"	17	21	T-T
41	30	"	7	55	"

HANGING GUIDE DECK PLATE "A" DWG. D-126054

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
37	9	B-B	34	79	B-B
26	27	"	17	21	T-T
30	25	"	8	46	"
25	47	"	17	49	"
42	39	"	26	52	"
47	47	"	32	54	"
27	14	"	35	55	"
51	23	"	50	60	"

DECK PLATE DWG. W-153390 - EQ. PG. NO. 161.51

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
37	9	B-B	33	55	B-B
43	10	"	12	66	"
26	20	"	21	69	"
40	34	"	35	69	"
49	27	"	33	73	"
39	33	"	20	74	"
20	30	"	23	79	"
9	37	"	33	87	"
32	40	"	17	21	T-T
45	40	"	46	40	"
24	44	"	27	45	"
38	42	"	45	45	"
52	40	"	12	61	"
27	45	"	30	72	"

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SERVICE DECK PLATE DWG. W-153390 - EQ.PC.NO. 161.5P

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
28	6	E-B	23	9	T-T
29	25	"	17	21	"
28	34	"	20	22	"
6	36	"	8	46	"
23	79	"	26	52	"

MADE UP PLATE ASSEMBLY DECK PLATE DWG. W-153146 - EQ.PC.NO. 161.5P

HOLE LOCATION		MEASURED FROM AXIS	HOLE LOCATION		MEASURED FROM AXIS
X	Y		X	Y	
25	10	E-B	17	21	T-T
13	13	"	28	34	"
25	19	"	17	49	"
31	49	"	23	51	"

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After sandblasting deck plates (below elev. 66'-0") for the "R" unit telescope actuator system, they were painted in accordance with Specification No. 3062 (Specifications for Painting Metallic Surfaces with Vinyl Base Paint for High Humidity and Damp Exposure); however, the top coat (Amercoat #33) or sealer was not applied on plates prior to field shipment. During transit to the plant site, deck plates rusted in spots, and consequently all deck plates below elevation 66'-0" had to be sandblasted again at Savannah River and repainted. As a result of this, the decision was made by du Pont that subsequent unit deck plates (below elev. 66'-0") would not require either sandblasting or painting prior to shipment from New York Ship. This operation would be done at the plant site.

Deck plates above 66'-0" elevation did not require sandblasting and were painted in accordance with Specification #3019 prior to shipment to the field.

(2) "P", "L", "K" and "C" Units

Deck plates above elevation 66'-0" did not require sandblasting. Deck plates above this elevation were painted in accordance with Specification #3019. Deck plates below elevation 66'-0" did not require either sandblasting or painting at New York Ship; the reason being as discussed in above section, paragraph 2.

e. Problem Encountered on "K" Deck Plates

During erection of the "K" telescope actuator system at Savannah River, it was discovered that the deck plate patterns in the assembly were not in alignment with the "K" unit plenum template pattern.

To give a clearer conception of the above problem and how it was corrected, it is necessary to revert back to the initial fabrication of the NYX plenum chamber. This is discussed in the following paragraphs.

After exhaustive welding experiments were completed on the 8' mock-up (see Part I), it was deducted from mathematical calculations that the tube patterns for all NYX unit tube sheets would be drilled on 7.021" centers. This additional 0.021" (from the center of any one tube hole to the next) was allowed for shrinkage which was a

natural resultant from the welding of tubes in any sub-assembly. Also, this allowance for shrinkage had to be made because Design Division specified that all tube coordinates were to be on 7.000" centers after all fabrication and machining was completed. It was contemplated by du Pont Design and New York Ship that this allowance was sufficient to give the final results required. However, after all tube welding and machining was completed on the NYX plenum chamber, the center to center distance between any two tubes was less than the 7.000" theoretical center required. It must be stated at this point, that it was not necessary that the resultant tube pattern conform to the theoretical 7.000" center to center dimension; however, it was desirable that this figure be approached within reasonable limits as set forth by Design's specifications.

After the decision was made that the NYX experimental unit be converted into a usable process unit ("K"), design of the actuator deck plate did not consider the effect of additional shrinkage to the pattern which would be incurred in converting the NYX unit. After all welding and machining was completed on "K" plenum chamber, the overall shrinkage across the twenty-six tube lattice was found to be between .150" to .180". Deck plates were drilled for "K" unit telescope actuator system on 7.000" centers using the conventional strip jig as discussed above in Section 1. It can now be readily seen that the deck plates drilled on 7.000" centers were not concentric with the plenum template which was set from the top side of the "K" unit plenum chamber.

To rectify the above mistake, it was necessary to re-work "K" unit deck plates at Savannah River before erection work could continue. Seventy percent (70%) of all holes in five deck plates below elevation 66'-0" were re-worked by grinding holes oval in some cases to a maximum of 7/32" over drawing size before they were concentric with the plenum template pattern. (7/32" is only an approx. figure)

3. Forest Assembly

a. Dimensional Inspections (Typical for all units)

(1) Forest Lower and Upper Deck Plate Assemblies

The forest lower and upper deck plate framing was assembled and fabricated on a level platen. After all fabrication was completed, a dimensional check was made for squareness using a 50' stainless steel tape graduated in 1/16". Beam locations in relation to framing were also checked with the 50' stainless steel tape. The bow of

all beams was checked with the aid of a chalk line and a 6" scale graduated in $1/64$ ".

The above inspections were found satisfactory on all five units.

(2) Inspections After Fabrication of Forest Assembly

The unit was assembled bottom side up prior to fitting the lower deck plate framing to the four legs. Elevations were established at $13'-1/4"$ from the platen to each of the four legs of the assembly. These elevations were established by NYS layout men and checked by Inspections using the Wild N111 Precision Level to determine if they were in the same relative plane. Next, the lower deck plate framing was lowered in place by an overhead crane and matched to these lines on each of the four legs and bolted (See Exhibit #3).

Four locking devices (See detail "Z" du Pont drawing #W-153028) were then located and welded $25\frac{1}{4}"$ above the $13'-1/4"$ elevation. Overall lengths from the face of the locking devices to the platen were checked with a 50' stainless steel tape graduated in $1/64$ ". The location of these locking devices were found to be satisfactory on all five units.

In each leg were eight (8) holes which were located, drilled and tapped by New York Ship. (See du Pont drawing W-153028 - basic detail for location and size of holes) Drilled and tapped holes in all five forest structures were inspected and found satisfactory with the exception of "C" unit in which the following problem was encountered: Eight holes on each leg of the structure (4) were drilled and tapped $1/2"-13NC-2$. Location of the holes were layed out and then jig drilled with reference to bottom side of bearing pad. After inspecting, it was found that holes were layed out from the top side of bearing pad which was distorted due to welding and not level; therefore, holes were not drilled in proper location.

This problem was solved by plug welding all holes, grinding bearing pads level, and then re-locating holes with respect to the plane on the bottom side of bearing pads. Holes were then redrilled, tapped, inspected and accepted. See Exhibit #4 for typical illustration in report form on final inspection of tapped holes on "C" Unit.

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EXHIBIT #3

Typical Illustration of all Forest Structure Assembly
Inspections Exemplified in Report Form for "K" Unit
Forest Assembly Structure.

UNCLASSIFIED

Construction Division

CC: H. W. Gosney, F.P.M.
R. K. Mason-D.A. Hauser-SRP-3
R. K. Mason-J. D. Cook-SRP
H. L. Bunker - J. G. Brewer
H. B. Gage
F. C. Breuninger
S. R. Cochran (2)
R. H. Barto - NYS (3)
J. B. Johnson - File

June 18, 1953

New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORTTO C. J. VEITH - M & E FILEFROM J. R. StewartDATE May 1, 1953PROJECT NO. 8980 PLANT Savannah River ORDER NO. AIC-167½EQUIPMENT "K" Unit Forest Assembly EQ. PC. NO. 160.1K2DRAWING NOS. W-153028 JOB RATING VENDOR New York Shipbuilding Corp. LOCATION Camden, N. J.

Scope: Dimensional inspection of "K" unit forest assembly.

Procedure:

General -

The subject equipment was assembled and welded bottom side up. All elevation measurements were taken from the level platen on which the unit was assembled.

The following is a resume of the inspection procedures incorporated to determine the acceptance or rejection of the subject equipment.

1. Forest lower deck framing

After welding the lower deck framing to the inside of four struts, preliminary elevation measurements (elv. 13' 1/4") were taken at the four corners. These measurements were taken with a 50' stainless steel tape (duPont #2) graduated in 1/16" and estimated to the nearest 1/64". (See result sheet #1.)

2. Bearing pads on base of support struts.

With the assembly bottom side up, the plane of the bearing pads (with respect to each other) on each of the four support struts were checked using the Wild NIII Level. (See results #2).

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FIELD INSPECTOR'S REPORT

FROM: J. R. Stewart

3. Overall elevation check at four (4) bearing pads:

The elevation of the bearing pad on each of the four support struts were measured with respect to the platen using the 50' stainless tape described in #1. (See #3 result sheet)

4. Platen

The plane of the platen was checked at the four corners of the support struts using the Wild NIII Level. This was done to determine if the high and low points on the plane of the platen corresponded to the high and low points on the bearing pads within a reasonable amount ($\pm .010''$). The platen level readings were compared to the bearing pad level readings as described in #2. For comparison see result sheet #2.

5. Squarness check

The upper and lower forest deck structures were checked for squarness using the 50' stainless steel tape described in #1. All measurements were made from "heel" to "heel" on the framing. (See #6 result sheet)

6. Centerline check: Lower forest deck framing axes vs upper forest deck framing axes.

To determine if the axes on the lower forest deck framing coincided with the axes on the upper forest deck framing, a Starrett mercury plumb bob was suspended from each of the four axis extremities (namely: X_1 , X_2 , Y_1 and Y_2) on the lower forest deck framing. Each plumb bob was then checked visually for coincidence with the axis extremities on the upper forest deck framing. (See #5 result sheet)

7. Locking devices:

The elevations of two locking devices welded to each of the four support struts were checked using the 50' stainless steel tape described in #1. For location of locking devices see detail drawing #4-153028, detail "Z" (see #4 result sheet).

Results: See attached sheets

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attach. 2

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FIELD INSPECTOR'S REPORT
FROM: J. R. Stewart

Results:

1. Preliminary elevation measurements after aligning and welding lower forest deck framing to four support struts.
Elevation measurements were taken at each of the four corner support struts and found to be $13' - 1/4" \pm 1/64"$ and accepted.

2. Bearing pad plane vs platen plane.
The figures in the table below are relative for comparison purposes:

Bearing Pad & Platen Positions	Bearing Pad Elevations	Platen Elevations
#1.	-.014"	-.014"
#2.	.000	.000
#3.	-.012"	-.014"
#4.	-.031"	-.033"

3. Elevations at four (4) bearing pads.
Measurements were taken from the top edge of the bearing pads to the platen. Drawing dimension: $15' - 1 3/4" \pm 1/32"$.

Support Strut Location	Elevation Measurement	Des. Dim. - Elv. Meas. Diff.
Between X_2, Y_1	$15' - 1 23/32"$	$-1/32"$
" X_1, Y_1	$15' - 1 47/64"$	$-1/64"$
" X_1, Y_2	$15' - 1 47/64"$	$-1/64"$
" X_2, Y_2	$15' - 1 3/4"$	0

4. Locking devices
See detail #2 on duPont drawing W-153026 for location of locking devices.

Support strut Location	Locking device @ $3' - 2 3/4"$ (Dwg. dir.)	Locking device @ $9' - 11 3/8"$ (Dwg. dir.)
Between X_2, Y_1	$3' - 11 47/64"$	$9' - 11 23/32"$
" X_1, Y_1	$3' - 11 23/32"$	$9' - 11 23/32"$
" X_1, Y_2	$3' - 11 3/4"$	$9' - 11 3/4"$
" X_2, Y_2	$3' - 11 47/64"$	$9' - 11 23/32"$

5. Centerline of lower forest deck framing now as upper deck framing axes.

All axis extremities (namely; X_1, Y_2, Y_1 and Y_2) on the lower forest deck framing checked plumb top to bottom with the axis extremities on the upper forest deck framing.

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6. SQUARENESS CHECK:

NOTE:

1. ALL MEASUREMENTS WERE TAKEN FROM "HEEL" TO "HEEL" ON ANGLE IRON.
2. DIAGONALS WERE CHECKED ON ALL FRAMING & FOUND WITHIN TOLERANCE.

EXHIBIT #4

Typical Illustration on all Inspections Exemplified in
Report Form for Layout, Drilling and Tapping of
Thirty-two (32) $\frac{1}{2}$ " - 13NC-2 Holes in Four (4) Corner
Struts on the "C" Unit Forest Assembly.

E. I. DU PONT DE NEMOURS & CO., INC.

CC:

Report number 529-C

Construction Division

CC: H. W. Gosney, F.P.M.
R. K. Mason-D.A. Hauser-SRP (3)
R. K. Mason- J.D. Cook-SRP
H. L. Bunker - J. G. Brewer
J. G. Brewer
H. B. Gage
F. C. Breuninger
S. R. Vochran (2)
R. H. Barto - NYS (3)
J. B. Johnson - File

June 18, 1953
New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORT

TO C. J. VEITH - M & E FILE

FROM D. M. Ieland

DATE June 3, 1953

PROJECT NO. 8980 PLANT Savannah River ORDER NO. AXC-167

EQUIPMENT Actuator System - Forest Framing EQ.PC.NO. 160.102

DRAWING NOS. NYS Dwg. 8032-10 JOB RATING

VENDOR New York Shipbuilding Corp. LOCATION Camden, N. J.

Scope: To check the layout, drilling and tapping of the 32 1/2"-13NC
tapped holes in the four struts

Procedure - The layout and drilling of the holes was checked with a
vernier caliper. A 1" X 1/4" cap screw was used to check straightness
of tapping. The drilling was done by template.

Results: For results of the layout and drilling see attached sheet.
Results were satisfactory.

lnw
attach.

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~~CONFIDENTIAL~~

6-3-53

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After assembly of the forest structure was completed, alignment of the lower and upper deck plate framings were checked using a plumb bob. XX and YY centerlines on each of the two framings had been previously established and these were used as check points. The plumb bob was suspended from each of the axis lines located on the outer beams on the lower deck framing and checked against the corresponding axis lines on the upper deck plate framing. (Note: Unit was assembled bottom side up and elevations and alignment measurements were checked in this position.) Next, the length, width and height of the forest structure were checked using a 50' stainless steel tap graduated in 1/16". Diagonals were checked on the top and bottom of structure to determine if the framing was warped. (See Exhibit #3)

4. Latch Lifting Carrier Steel Framing

a. Dimensional Inspections

Generally, the same inspection was performed on this assembly as described in Section 3. For general arrangement of the latch lifting carrier steel framing in the telescope actuator system, see du Pont drawing W-153423 and for detail reference drawings see du Pont drawing W-153424. Also, see photo serial #160. This photograph shows points at which all check measurements were made on the assembly. It also illustrates the points at which corresponding check measurements were taken on the forest assembly. (See Exhibit #5)

Explanation of photo serial #160

- (1) Length, width and height measurements were taken on all four sides of the assembly as shown on the one side in the foreground.
- (2) Diagonal measurements were taken on both top (B) and bottom (C) frames (illustrated on frame "A").
- (3) Framing alignment was checked by suspending plumb bob at (1) and (2) (also at points on opposite sides of the framing), and checked against the corresponding axis lines on "A".

5. Forest Latch Assembly and Telescope Hanging Guides

a. General:

The component parts of the forest latch assembly and telescope hanging guides are machined to layout and completely assembled for final inspection before shipment to the plant site. All components and sub-assemblies in

Serial Number 160

New York Shipbuilding Corporation
Camden, New Jersey
November 28, 1952

PROJECT 8980 - SAVANNAH RIVER PLANT

Telescope Actuator System

This view shows the Lifting Latch Assembly
for the telescope actuator system without
the deck plates.

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EXHIBIT #5

Typical Illustration of all Latch Lifting Carrier
Steel Framing Inspections Exemplified in Two
Report Forms.

E. I. DU PONT DE NEMOURS & CO., INC.

Report Number 449-K

Construction Division

CC: H. W. Gosney, F.P.M.
R. K. Mason - D. A. Hauser
Savannah River Plant (3)
R. K. Mason - J. D. Cook-SRP
H. L. Bunker - J. G. Brewer
J. G. Brewer
H. B. Gage
F. C. Breuninger
S. R. Cochran (2)
R. H. Barto - NYS (3)
J. B. Johnson - File

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April 9, 1953
New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORT

TO C. J. VEITH - M & E FILE

FROM A. J. Piatek

DATE April 6, 1953

PROJECT NO. 8980 PLANT Savannah River ORDER NO. AXC-167 $\frac{1}{2}$

EQUIPMENT Latch Lifting Carrier Assembly EQ.PC.NO. 161.5K
(NYS 8032-14)

DRAWING NOS. AMF dwg. W-153366 E.11 JOB RATING

VENDOR New York Shipbuilding Corporation LOCATION Camden, N. J.

Scope:

To measure the steel framing assembly, with lifting and service deck plates tack welded to framing, to see if measurements meet blueprint specifications.

Procedure:

After the framing was painted in accordance with duPont spec.3019 Sec. BR4, the framing was assembled. The distance from service deck to lifting deck was measured with a steel tape. Length and width of frame were also measured with a steel tape. Corner posts were checked for verticality by setting a one foot level against each post. Top and bottom of the framing were checked with one foot level set on each landing to determine if upper and lower level of framing were in a true vertical plane.

Results:

All corner posts were vertical within .005" per foot.
Upper and lower level of the framing were level and in a true vertical plane.
Lower level of frame length and width measurements 16'7-1/4", B.P. 16'7-1/4" $\pm$ 1/32.

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[REDACTED]

FIELD INSPECTOR'S REPORT
FROM: A. J. PIATEK

Report // 449-K
Page 2 of 2

Results Cont.

Upper level of frame measurement 16'7-31/32"-B.P. 16'8" $\pm 1/32"$.
Distance between upper and lower levels 7'3"-B.P. 7'3" $\pm 1/32"$.

Note: Assembly was satisfactory and was released for shipment.

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E. I. DU PONT DE NEMOURS & CO., INC.

Report number 530-C

Construction Division

CC: H. W. Gosney, F.P.M.
R. K. Mason-D.A. Hauser-SRP (3)
R. K. Mason-J. D. Cook-SRP
H. L. Bunker - J. G. Brewer
J. G. Brewer
H. B. Gage
F. C. Breuninger
S. R. Cochran (2)
J. B. Johnson - File
R. H. Barto - NYS (3)

June 18, 1953

New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORT

TO C. J. VEITH - M & E FILE

FROM S.R.Cochran-J.R.Stewart-R.E.Chaney DATE June 12, 1953

PROJECT NO. 8980 PLANT Savannah River ORDER NO. AYC-167½

EQUIPMENT Latch Lifting Carrier-Framing EQ.PC.NO. 161.502

DRAWING NOS W-153366 JOB RATING _____

VENDOR New York Shipbuilding Corp. LOCATION Camden, N. J.

Scope: To dimensionally check subject framing in accordance with blue-print. Inspection was made on May 22, 1953.

Procedure: All measurements were made with a 25' steel tape. Centerlines were checked with a plumb bob.

Results: Alignment of centerlines on top side of framing with those on bottom side of framing was checked with a plumb bob. The centerlines were in perfect alignment and framing was square.

Overall length, width, and height were checked. All measurements were within blueprint tolerances.

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process are inspected as welding, machining and fitting is completed at the given area before being moved to the next successive working area for further welding, machining or layout.

Forest latch assemblies and telescope hanging guides fabricated at New York Shipbuilding Corp., for "R", "P", "K", "L", and "C" process units are identical in specifications; therefore, only one complete assembly ("P" Unit) will be discussed from the standpoint of inspection.

b. Forest Latch Assembly ("P" Unit)

1. Latch Mechanism

For assembly drawing and specifications refer to du Pont drawing number W-153398. The inspection of the latch mechanism for alignment and parallelism of hook to axis of $8\frac{1}{2}$ " tube was performed in the following manner:

- (a) Surface plate (size: $2' \times 2' \times 1\frac{1}{2}"$) was placed under the hook and parallel to axis of tube.
- (b) The position of jam nuts on lever fork minus $\frac{3}{4}"$ from lower radius at bottom of threads was checked.
- (c) To insure the specified $\frac{1}{32}"$ clearance between the hook pin and hook when the latter is in the down position, a $\frac{1}{32}"$ shim was inserted between the jam nuts and the top of the end piece of the upper tube and left in this position throughout the remainder of the check.
- (d) Jam nuts were brought down against the $\frac{1}{32}"$ shim by releasing lever arm and letting hook drop to the down position.
- (e) With a surface gage on the surface plate (mentioned in (1) above) the following inspections were made:
 1. Parallelism of back side of hook to surface plate.
 2. Check was made to determine if the specified $1"$ center of the $2"$ hook pin to the inside flit of the hook throat was within tolerance.

This completed the inspection for parallelism of hook to axis of the $8\frac{1}{2}"$ tube. All dimensions were within specified tolerances and accepted.

2. Throw of Hook

The following inspection technique was used to check the throw of hook:

- (a) Surface gage was left in position as described above in 1, Section 5b.
 - (b) Lever arm was moved by hand until the jam nuts were to the $1\frac{1}{2}$ " specified distance from the top of the upper tube end pieces.
 - (c) The distance from this pointer and the height gage (pre-set to drawing dimensions) to the lowest point on the swinging end of the hook was checked. All were found to be more than $1\frac{1}{2}$ " which allowed a 50% safety factor and was accepted. (See photo serial #193 for view of height gage and pointer used to perform the inspection described above)
3. Dimensional Inspection of Four (4) Tube Assemblies Required for "F" Unit Forest Latch Assembly.

The following dimensions were checked on each of the four (4) tube assemblies required on the "F" forest latch assembly. (See sketch #2 for detail assembly of each tube)

(a) Outside diameters

The O.D. of all four tube assemblies were checked using a 9" outside measurements and found to be $8\frac{1}{2}" \pm 1/32"$, which was acceptable.

(b) Counter-bore for Support Pin and Upper Tube Weldment (see de Pont Drawing I-119L74).

All counter-bores for support pin and upper tube weldment (see photo serial #247) were checked dimensionally using inside micrometers and a 6" scale graduated in $1/64"$. The upper end piece counter-bore in assembly "F" was found to be $1/8"$ too deep on one side. (See photo #2) The stainless steel washer was inserted to compensate for the improper depth and accepted. The other three tube assemblies were found to be within tolerance and accepted.

(c) Overall Length

The four tube assemblies were then checked for overall length using a 100' stainless steel tape

Serial Number 193

New York Shipbuilding Corporation
Camden, New Jersey
February 9, 1953

PROJECT 8980 - SAVANNAH RIVER PLANT

Functional check of forest latch hook
for required movement at New York Ship
complete after assembly of the latch
tube and before shipment to sub-vendor
for chromium plating and painting.

SUBJECT:

PROJ. TITLE:

ENGINEERING SKETCH SHEET

E. I. DU PONT DE NEMOURS & CO.

PROJ. NO.:

SIGNATURE:

DATE:

No. E-12420

FOUR ASSBL. REQ'D FOR EA. UNIT

THESE MARKINGS ON EA SIDE OF JOINTS TO BE PRECEDED BY LETTER OF UNIT

NOTE:

MARKING ON TUBES FOR FOREST
LATCH ASSBL. ON ARRL DWG.
W-153398

SKETCH #2

"R" FOR "R" UNIT
"P" FOR "P" UNIT
"L" FOR "L" UNIT
"K" FOR "K" UNIT

A	B	C	D	E	F	G	H	J	K
---	---	---	---	---	---	---	---	---	---

Serial Number 247

New York Shipbuilding Corp.
Camden, New Jersey
May 27, 1953

PROJECT 8980 - SAVANNAH RIVER PLANT

Forest Latch Assembly Upper Tube "C"
Unit

Grinding and dressing "upper tube" assembly.

For construction details, see du Pont dwg.

B-119973.

graduated in $1/16"$ and estimated to the nearest $1/64"$. All tube assemblies were found to be within tolerance except assembly D which was $7/16"$ short. (This was later accepted by Design)

(d) Discrepancies

Assembly B, (see Sketch #2) lower tube weldment bottom face was $1/8"$ over the specified distance from the center point of the hook pins. (This was later accepted by Design). The other three tube assemblies were checked and found within specified tolerances.

4. Surface Finish (RMS)

All areas and parts requiring a high surface finish were checked using a profilometer and accepted. (Refer to list of detail drawings for location of surfaces requiring high finish.

5. Pipe Threads

All pipe threads were checked with standard thread gage prior to shipment and accepted.

This completed the inspection of the forest latch assembly for "P" Unit.

The forest latch assemblies for "B", "L", "I" and "C" units were inspected as outlined above, except discrepancies encountered on each unit were somewhat different in each case. A resume of inspection reports pertaining to inspections and discrepancies found on each assembly are presented herewith as Exhibit C.

c. Telescope Hanging Guides

1. General

A total of sixteen sections make up the telescope hanging guide system. For reference convenience they are broken down into four categories, namely:

- (a) Four upper inner hanging guides (see photo Serial #248)
- (b) Four upper outer hanging guides.
- (c) Four lower inner hanging guides (see photo Serial #249)

EXHIBIT #6

Typical Illustration of all Forest Latch Assembly
Inspections Exemplified in Report Form for "F",
"FP", "IP", "EP", and "CP" Units.

Construction Division

CC: J. B. Johnson
R. K. Mason-D.A. Hauser-SRP (3)
R. K. Mason-R.H. McNew-SRP
H. L. Bunker- J. G. Brewer
J. G. Brewer
H. B. Gage
F. C. Breuninger
S. R. Cochran (2)
R. H. Barto - NYS (3)
R. V. Graham - File

SECURITY

UNCLASSIFIED*H.E.D.*

August 18, 1953
New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORT

TO C. J. VEITH - M & E FILE
FROM M. H. Scholes & L. W. Mergenthaler DATE 1-10-53
PROJECT NO. 8980 PLANT Savannah River ORDER NO. AXC-167½
EQUIPMENT Forest Latch Assembly EQ.PC.NO. 161.5R2
DRAWING NOS. W-153398 JOB RATING _____
VENDOR New York Shipbuilding Corp. LOCATION Camden, N. J.

Scope: Final inspection of above equipment to determine dimensional, mechanical, and surface compliance with B/P specifications.

Procedure: All dimensions were checked with micrometer calipers, steel rule and calibrated steel tape.

The mechanical specifications were checked by completely assembling the unit and operating while in a horizontal position with the following methods being used:

A. Checking alignment and parallelism of the hook to the axis of the 8 1/2" tubes.

1. A surface plate was set under the hook keeping the plate parallel to the axis of the tubes.
2. Check the position of the jam nuts on the lever fork 3/4" from the lower radius at the bottom of the throats.
3. To insure the specified 1/32" clearance between the hook pin and the hook, when the hook is in the down position, a 1/32" shim was inserted between the jam nuts and the top of the end piece of the upper tube and is left in that position throughout the remainder of operation.

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4. The jam nuts were brought down against the $1/32$ " shim, dropping the hook to the down position.
5. The parallelism of the back side of the hook to the surface plate and the 1" distance from the center of the 2" hook pin to the inside flat of the hook throat was checked with a surface gage from the surface plate.

B. Throw of the Hook

1. Leaving the surface gage in the same position as A-5, above, the lever is pulled until the jam nuts are the specified $1\ 1/2$ " from the top of the upper tube end piece. Then the distance, from the pointer of the height gage to the lowest point of the swinging end of the hook, was checked to see that it was $1\ 1/2$ ".

All surfaces were spot checked with a profilometer.

All threads were checked with a thread gage, coated with vaseline, fully engaged and covered with linen before shipping.

Results: The following discrepancies were found.

1. The assembly identified as "R-C" is $1/2$ " short on overall length and the finish on the O.D. of the $8\ 1/2$ " pipe does not conform with E/P specifications. This pitted surface condition was discussed by Mr. Lewis, of the Simmons Plating Co., Atlanta, Ga., Mr. Reid, of New York Ship, and Mr. Lord of the DuPont Design Division. Mr. Lord agreed that plating over this surface condition would be acceptable.
2. The $8\ 1/2$ " O.D. tubing averages 8.525 and is within $\pm\ 1/32$ ".

Note: The four assemblies are identified as "R-A"; "R-B"; "R-C"; and "R-D". All parts are identified with the assembly prefix and a digit, starting with "Prefix-1" at the top and numbering consecutively downward. This identification is steel stamped at all joints.

lmw

Construction Division

CC: J. B. Johnson
R. K. Mason-E.M.Vass-SRP
R. K. Mason-D.A.Hauser-SRP (3)
H. L. Bunker- J. G. Brewer
J. G. Brewer
H. E. Gage
F. C. Breuninger
S. P. Cochran (2)
R. H. Barto - NYS (3)
R. V. Graham - File

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August 20, 1953
New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORTTO C. J. VEITH - M & E FILEFROM M. H. ScholesDATE 2-18-53PROJECT NO. 8980 PLANT Savannah River ORDER NO. AXC-167 $\frac{1}{2}$ EQUIPMENT Forest Latch Assembly EQ.PC.NO. 161.5P2DRAWING NOS. W-153398 Rev. 4 JOB RATING VENDOR New York Shipbuilding Corp. LOCATION Camden, N. J.

Scope: Final inspection of above equipment to determine dimensional, mechanical, and surface compliance with E/P specifications.

Procedure: All dimensions were checked with micrometer calipers, steel rule and calibrated steel tape.

The mechanical specifications were checked by completely assembling the unit and operating while in a horizontal position with the following methods being used:

- A. Checking alignment and parallelism of the hook to the axis of the 8 1/2" tubes.
 1. A surface plate was set under the hook keeping the plate parallel to the axis of the tubes.
 2. Check the position of the jam nuts on the lever for 3/4" from the lower radius at the bottom of the threads.
 3. To insure the specified 1/32" clearance between the hook pin and the hook, when the hook is in the down position, a 1/32" shim was inserted between the jam nuts and the top of the end piece of the upper tube and is left in that position throughout the remainder of operation.

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Report # 567-P
Page 2 of 2

4. The jam nuts were brought down against the $1/32$ " shim, dropping the hook to the down position.
5. The parallelism of the back side of the hook to the surface plate and the 1" distance from the center of the 2" hook pin to the inside flat of the hook throat was checked with a surface gage from the surface plate.

B. Throw of the Hook

1. Leaving the surface gage in the same position as A-5, above, the lever is pulled until the jam nuts are the specified $1\ 1/2$ " from the top of the upper tube end piece. Then the distance, from the pointer of the height gage to the lowest point of the swinging end of the hook, was checked to see that it was $1\ 1/2$ ".

All surfaces were spot checked with a profilometer.

All threads were checked with a thread gage, coated with vaseline, fully engaged and covered with linen before shipping.

Results: The following discrepancies were found.

1. The $8\ 1/2$ " tubing averages 8.525" and is within $\pm\ 1/32$ ".
2. Assembly "D" upper end piece counterbore is $1/8$ " too deep. This has been compensated for by using a stainless steel washer.
3. Assembly "D" is $7/16$ " short on overall length.
4. Assembly "B" lower tube weldment bottom face is $1/8$ " over the specified distance from the center point of the hook pins. This was compensated for by using a stainless steel shim bolted to the weldment and marked, "REMOVE BEFORE PLATING".
5. Top dowel pin in "B" assembly is $3/4$ " diameter.

Note: The four assemblies are identified as "P-A", "P-B", "P-C", and "P-D". All parts are identified with the assembly prefix and a digit, starting with "Prefix-1" at the top and numbering consecutively downward. This identification is steel stamped at all joints.

lmw

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Construction Division

CC: J. B. Johnson
R. K. Mason-D.A.Hauser-SRP (3)
R. K. Mason-W.P.Duncan-SRP
H. L. Bunker - J. G. Brewer
J. G. Brewer
H. B. Gage
F. C. Breuninger
S. R. Cochran (2)
R. H. Barto - NYS (3)
R. V. Graham - File

UNCLASSIFIED

August 20, 1953
New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORTTO C. J. VEITH - M & E FILEFROM M. H. ScholesDATE May 26, 1953PROJECT NO. 8980 PLANT Savannah RiverORDER NO. AXC-167 $\frac{1}{2}$ EQUIPMENT Forest Latch AssemblyEQ.PC.NO. 161.5L2DRAWING NOS. W-153398 Rev. 27JOB RATING VENDOR New York Shipbuilding Corp.LOCATION Camden, N. J.

Scope: Final inspection of above equipment to determine dimensional, mechanical, and surface compliance with B/P specifications.

Procedure: All dimensions were checked with micrometer calipers, steel rule and calibrated steel tape.

The mechanical specifications were checked by completely assembling the unit and operating while in a horizontal position with the following methods being used:

A. Checking alignment and parallelism of the hook to the axis of the 8 1/2" tubes.

1. A surface plate was set under the hook keeping the plate parallel to the axis of the tubes.
2. Check the position of the jam nuts on the lever fork 3/4" from the lower radius at the bottom of the threads.
3. To insure the specified 1/32" clearance between the hook pin and the hook, when the hook is in the down position, a 1/32" shim was inserted between the jam nuts and the top of the end piece of the upper tube and is left in that position throughout the remainder of operation.

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4. The jam nuts were brought down against the $1/32$ " shim, dropping the hook to the down position.
5. The parallelism of the back side of the hook to the surface plate and the 1" distance from the center of the 2" hook pin to the inside flat of the hook throat was checked with a surface gage from the surface plate.

B. Throw of the Hook

1. Leaving the surface gage in the same position as A-5, above, the lever is pulled until the jam nuts are the specified $1\ 1/2$ " from the top of the upper tube end piece. Then the distance, from the pointer of the height gage to the lowest point of the swinging end of the hook, was checked to see that it was $1\ 1/2$ ".

All surfaces were spot checked with a profilometer.

All threads were checked with a thread gage, coated with vaseline, fully engaged and covered with linen before shipping.

Results: The above equipment is in accordance with B/P specifications with the exception of $2\ 1/2$ " skip in assembly "L-A" plug tube threads. This discrepancy has been accepted by Mr. W. J. Lord of DuPont Design. Also Mr. Lord requested that all corners be ground and filed with $1/32$ " radius. This equipment was packed for shipment prior to receipt of this directive so the corners will have to be ground at the platers.

Note: The four assemblies are identified as "L-A", "L-B", "L-C", and "L-D". All parts are identified with the assembly prefix and a digit, starting with "Prefix-1" at the top and numbering consecutively downward. This identification is steel stamped at all joints.

lmw

Construction Division

CC: J. B. Johnson
R. K. Mason-D.A.Hauser-SRP (3)
R. K. Mason-J.D.Cook - SRP
H. L. Bunker - J. G. Brewer
J. G. Brewer
H. B. Gage
F. C. Breuninger
S. R. Cochran (2)
R. H. Barto - NYS (3)
R. V. Graham - File

UNCLASSIFIED

NEL

August 20, 1953
New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORTTO C. J. VEITH - M & E FILEFROM M. H. ScholesDATE April 15, 1953PROJECT NO. 8980 PLANT Savannah RiverORDER NO. AXC-167½EQUIPMENT Forest Latch AssemblyEQ.PC.NO. 161.5K2DRAWING NOS. W-153398JOB RATING vENDOR New York Shipbuilding Corp.LOCATION Camden, N. J.

Scope: Final inspection of above equipment to determine dimensional, mechanical, and surface compliance with B/P specifications.

Procedure: All dimensions were checked with micrometer calipers, steel rule and calibrated steel tape.

The mechanical specifications were checked by completely assembling the unit and operating while in a horizontal position with the following methods being used:

A. Checking alignment and parallelism of the hook to the axis of the 8 1/2" tubes.

1. A surface plate was set under the hook keeping the plate parallel to the axis of the tubes.
2. Check the position of the jam nuts on the lever fork 3/4" from the lower radius at the bottom of the threads.
3. To insure the specified 1/32" clearance between the hook pin and the hook, when the hook is in the down position, a 1/32" shim was inserted between the jam nuts and the top of the end piece of the upper tube and is left in that position throughout the remainder of operation.

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Report No. 569-K
Page 2 of 2

4. The jam nuts were brought down against the $1/32$ " shim, dropping the hook to the down position.
5. The parallelism of the back side of the hook to the surface plate and the 1" distance from the center of the 2" hook pin to the inside flat of the hook throat was checked with a surface gage from the surface plate.

B. Throw of the Hook

1. Leaving the surface gage in the same position as A-5, above, the lever is pulled until the jam nuts are the specified $1\ 1/2$ " from the top of the upper tube end piece. Then the distance, from the pointer of the height gage to the lowest point of the swinging end of the hook, was checked to see that it was $1\ 1/2$ ".

All surfaces were spot checked with a profilometer.

All threads were checked with a thread gage, coated with vaseline, fully engaged and covered with linen before shipping.

Results: The above equipment is within B/P specifications.

Note: The four assemblies are identified as "K-A", "K-B", "K-C", and "K-D". All parts are identified with the assembly prefix and a digit, starting with "Prefix-1" at the top and numbering consecutively downward. This identification is steel stamped at all joints.

lmw

UNCLASSIFIED

Construction Division

CC: J. B. Johnson
R. K. Mason-D.A. Hauser-SRP-(3)
R. K. Mason-J.D. Cook-SRP
H. L. Bunker-J.G. Brewer
H. B. Gage
J. G. Brewer
F. C. Breuninger
S. R. Cochran (2)
R. H. Barto - NIS (3)
R. V. Graham - File

UNCLASSIFIED

August 27, 1953
New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORTTO C. J. VEITH - M & E FILEFROM M. H. ScholesDATE May 15, 1953PROJECT NO. 8980 PLANT Savannah RiverORDER NO. AXC-1674EQUIPMENT Forest Latch AssemblyEQ. PG. NO. 161.5.02DRAWING NOS. W-153398JOB RATING ENDOR New York Shipbuilding Corp.LOCATION Camden, N. J.

Scope: Final inspection of above equipment to determine dimensional, mechanical, and surface compliance with E/F specifications.

Procedure: All dimensions were checked with micrometer calipers, steel rule and calibrated steel tape.

The mechanical specifications were checked by completely assembling the unit and operating while in a horizontal position with the following methods being used:

A. Checking alignment and parallelism of the hook to the axis of the 8 1/2" tubes.

1. A surface plate was set under the hook keeping the plate parallel to the axis of the tubes.
2. Check the position of the pin with the lower fork 3/4" from the lower radius at the bottom of the threads.
3. To insure the specified 1/32" clearance between the hook pin and the hook, when the hook is in the down position, a 1/32" shim is inserted between the pin nuts and the top of the end piece of the upper tube and is left in that position throughout the remainder of operation.

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4. The jam nuts were brought down against the 1/32" shim, dropping the hook to the down position.
5. The parallelism of the back side of the hook to the surface plate and the 1" distance from the center of the 2" hook pin to the inside flat of the hook throat was checked with a surface gage from the surface plate.

B. Throw of the Hook

1. Leaving the surface gage in the same position as A-5, above, the lever is pulled until the jam nuts are the specified 1 1/2" from the top of the upper tube end piece. Then the distance, from the pointer of the height gage to the lowest point of the swinging end of the hook, was checked to see that it was 1 1/2".

All surfaces were spot checked with a profilometer.

All threads were checked with a thread gage, coated with vaseline, fully engaged and covered with linen before shipping.

Results: The above equipment is within E/P specifications.

Note: The four assemblies are identified as "C-A", "C-B", "C-C", and "C-D". All parts are identified with the assembly prefix and a digit, starting with "Prefix-1" at the top and numbering downward. This identification is steel stamped at all joints.

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Serial Number 248

[REDACTED]
New York Shipbuilding Corp.
Camden, New Jersey
August 18, 1953

PROJECT 8980 - SAVANNAH RIVER PLANT

Inspector is shown checking the O.D. of "boss"
on the upper inner hanging guide using a pair
of 3 - 4" micrometers. Sub-assembly is for
"C" unit telescope actuator system.

Serial Number 246

[REDACTED] Shipbuilding Corp.

Camden, New Jersey

August 18, 1953

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PROJECT 8980 - SAVANNAH RIVER PLANT

Sub-assemblies for lower inner hanging guides "C" Unit.

The length of a lower inner guide sub-part is being measured using a 50' S/S tape. All sub-parts are checked for overall length before assembling into a complete lower inner guide.

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[REDACTED]

- (d) Four lower outer hanging guides (See photo serial #244 and #245)

In general the following inspections were performed concurrent with hanging guide fabrication operations:

(1) Fit-up

This was observed while sub-assemblies were being fitted together, noting any difficulty encountered, and advising shop as how to correct difficulties

- (2) All fractional dimensions were checked after fit-up.

- (3) All parts were functionally checked by inserting inner guides into outer guides and drawing entire length of inner guide through the outer guide.

- (4) After completion of all inspection, mating joints were match marked and all mating parts were identified by appropriate stenciling.

Since five complete telescope hanging guide systems were fabricated, only one system will be discussed from the standpoint of inspection. Except for minor details, all five systems are identical in specifications, and the inspection was the same in all cases.

2. Upper Inner Hanging Guide Inspections

The following inspections were performed on this assembly:

- (a) All stock material was checked dimensionally and for quality before releasing for fabrication. In all cases, material was found satisfactory.
- (b) After completion of initial machining operations, a preliminary dimensional check was made using a 50' S/S tape. Finish and quality was again checked before the next successive machining or welding operation.
- (c) Where parts were to be joined and welded, the weld preparation was checked according to standard welding practice and drawing specifications. All welding was checked (visually) while in process and when completed.

Serial Number 244

[REDACTED]

New York Shipbuilding Corp
Camden, New Jersey
August 18, 1953

PROJECT 6980 - SAVANNAH RIVER PLANT

Lower outer hanging guides for "C" unit telescope actuator system:

The inspector on the right is checking the overall length of a lower outer hanging guide. Measurements to each end of the guide are made from the outboard flange face using a 50' S/S tape.

The inspector (center) is checking "cap end" O.D. with micrometers.

[REDACTED]

[REDACTED]

SER # 245

Serial Number 245

[REDACTED]
New York Shipbuilding Corp.
Camden, New Jersey
May 12, 1953

PROJECT 8980 - SAVANNAH RIVER PLANT

Lower outer hanging guides for "C" unit telescope actuator system.

This view illustrates the preparation for chrome plating. Note the ground finishes on all surfaces and radii on all corners.

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[REDACTED]
[REDACTED]
[REDACTED]

(d) After all machining and welding was completed the following final inspections were performed:

1. All decimal dimensions were checked with micrometer calipers.
2. All joints checked for fit-up (threaded joints with corresponding coupling)
3. Each guide was completely assembled, and then mating guides were fitted and tried.
4. All finishes were checked visually and by feeling: welding was checked for cracks, porosity and other mechanical defects.

The above inspections were also performed on (b), (c), (d) listed above in #1.

Also, see Exhibit #7 which illustrates in report form the inspections performed on "B", "K", "L" and "O" Unit telescope actuator bearing guides.

3. Problems Involved in Chrome Plating and Metal Spraying of Inner and Outer Margin Guide Assemblies

a. Set-up for Plating

It was the responsibility of the Design Division of the du Pont Company and the American Machine and Foundry Company to write all specifications and subcontract the fabrication of the telescope actuator assemblies. New York Shipbuilding Corp. was awarded the contract for fabricating the five telescope actuator systems.

The original specifications pertaining to the inner and outer margin guide assemblies, which is a component part of the entire telescope actuator assembly, specified that all guides would be nickel and chrome plated inside and out, however, at a later date it was decided that they would be chrome plated only. New York Ship was not equipped to handle the plating of these assemblies. However, du Pont requested New York Ship to subcontract the plating assignment to some outside vendor.

New York Ship made a vendor survey and awarded the plating contract to the Simmons Plating Company in Atlanta, Georgia. A conference was held by representatives from American Machine and Foundry Company,

APPENDIX 17

Typical Illustration of all Telescope Actuator Hanging
Guides Inspection Exemplified in Report Form for
RTR, RTR, RTR & RTR units.

Construction Division

CC: J. B. Johnson
R. K. Mason-D.A.Hauser-SRP (3)
R. K. Mason-R.H.McNew-SRP
H. L. Bunker-J.G.Brewer
J. G. Brewer
H. B. Gage
F. C. Breuninger
S. R. Cochran (2)
R. V. Graham - File

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HEB

August 27, 1953
New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORTTO C. J. VEITH - M & E FILEFROM M. H. ScholesDATE December 11, 1952PROJECT NO. 8930 PLANT Savannah River ORDER NO. AXC-167 $\frac{1}{2}$ EQUIPMENT Four-inner hanging guide tube Sect.#3
Eight-hanging guide tube coupling EQ.PC.NO. 161.7R2DRAWING NOS. W-119900JOB RATING VENDOR New York Shipbuilding Corp. LOCATION Camden, N. J.

Scope: Check of dimensions, fit-up, welding, machine and surface finish.

Procedure: Dimensions - All decimal dimensions were checked with micro-meter calipers. All fractional dimensions were checked with a Bureau of Standards calibrated steel tape.

Fit-up - All joints are feeler tight.

Welding - Visually.

Machining - Each guide was completely assembled. Mating guides were fitted and tried.

Finish - Checked by feel.

Results: The above equipment is within B/P specifications with the exception of the following discrepancies:

1. All pitting in the welds has been removed by grinding.
2. The 2 7/8" end tube measures 2.880" to 2.885". To meet B/P specifications this should be 2.875 +.000 after plating. The O.D. of these tubes is -.010 not machined and mill tolerance is acceptable, per Design. Mill tolerance on 2 7/8" x 2.50" wall cold drawn seamless mechanical tubing is 2.875" to 2.885".

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FIELD INSPECTOR'S REPORT
FROM: M. H. Scholes

Report No. 572-R
Page 2 of 2

3. The O.D. of the tube coupling measures 2.915" but to meet B/P specifications this should be 2.937" $\pm .000$ after plating. Plating specifications calls for .007" to .010" hard chrome. A before plating O.D. of 2.915" $\pm .014$ " to 0.020" plus chromium plate = 2.929" to 2.935" O.D. after plating.

Note: The above assemblies are stenciled A, B, C, & D. Components carry this identification also and are sub-lettered respectively.

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H. L. Bunker-J.G.Brewer
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H. B. Gage
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S. R. Cochran (2)
R. H. Barto - NYS (3)
R. V. Graham - File

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August 28, 1953
New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORTTO C. J. VEITH - M & E FILEFROM M. H. ScholesDATE March 26, 1953PROJECT NO. 8980 PLANT Savannah River ORDER NO. AXC-167AEQUIPMENT Telescope Actuator Hanging Guides EQ.PC.NO. 161.5L2, 6L2,D-119908-Rev. 17, D-119907-Rev. 7
DRAWING NOS. D-119900-Rev. 9, D-119899-Rev. 17 JOB RATING _____VENDOR New York Shipbuilding Corp. LOCATION Camden, N. J.

Scope: Check of dimensions, fit-up, welding, machine and surface finish.

Procedure: Dimensions - All decimal dimensions were checked with micro-meter calipers. All fractional dimensions were checked with a Bureau of Standards calibrated steel tape.

Fit-up - All joints are feeler tight.

Welding - Visually.

Machining - Each guide was completely assembled. Mating guides were fitted and tried.

Finish - Checked by feel.

Results: The above equipment was found to be according to B/P spec. in every respect; to be shipped to platers.

Note: Design has requested that all corners be ground and filed to a 1/32" radius. The above equipment was packed before this directive came through. It is assumed that the corners will be taken off at the platers. The above assemblies are stenciled A, B, C, & D. Components carry this identification also and sub-lettered respectively.

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August 28, 1953
New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORTTO C. J. VEITH - M & E FILEFROM M. H. ScholesDATE April 11, 1953PROJECT NO. 8980 PLANT Savannah RiverORDER NO. AXC-167EQUIPMENT Telescope Actuator Hanging Guides161.9K2
EQ. PC. NO. 161.6K2, 161.7K2DRAWING NOS. D-119907-Rev.2 D-119899-Rev.4
D-119908-Rev.4 D-119900-Rev.2JOB RATING VENDOR New York Shipbuilding Corp.LOCATION Camden, N. J.

Scope: Check of dimensions, fit-up, welding, machine and surface finish.

Procedure: Dimensions - All decimal dimensions were checked with micro-meter calipers. All fractional dimensions were checked with a Bureau of Standards calibrated steel tape.

Fit-up - All joints are feeler tight.

Welding - Visually.

Machining - Each guide was completely assembled. Mating guides were fitted and tried.

Finish - Checked by feel.

Results: The above equipment is in accordance with the B/F specs.

Note: The above assemblies are stenciled A, B, C, & D. Components carry this identification also and are sub-lettered respectively.

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7/6/53

August 28, 1953
New York Ship - Camden, N. J.

FIELD INSPECTOR'S REPORTTO C. J. VEITH - M & E FILEFROM M. H. ScholesDATE May 14, 1953PROJECT NO. 8980 PLANT Savannah River ORDER NO. AXC-1674EQUIPMENT Telescope Actuator Hanging Guides EQ.PC.NO. 161.702, 161.602, 161.902DRAWING NOS. D-119907-Rev. 2 D-119899-Rev. 4
D-119908-Rev. 4 D-119900-Rev. 2 JOB RATING _____ENDOR New York Shipbuilding Corp. LOCATION Camden, N. J.

Scope: Check of dimensions, fit-up, welding, machine and surface finish.

Procedure: Dimensions - All decimal dimensions were checked with micro-meter calipers. All fractional dimensions were checked with a Bureau of Standards calibrated steel tape.

Fit-up - All joints are feeler tight.

Welding - Visually.

Machining - Each guide was completely assembled. Mating guides were fitted and tried.

Finish - Checked by feel.

Results: On detail 119907, lower outer guide tube "D", the metal sprayed area is 10" too long on the end with the flange. Design has accepted this discrepancy. A note to the plater directing him to treat all metal sprayed areas the same regardless of dimension was painted on the box. No other discrepancies were noted.

Note: Each of the four sets are lettered A, B, C & D respectively and all parts sub-lettered accordingly.

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du Pont Company, New York Ship, and the Simmons Plating Company. They agreed to abide by the following specifications:

- (1) After New York Ship completed the fabrication on a complete hanging guide assembly, the component parts will be match marked and inspected before disassembly took place. This match marking will be essential for the erection of these units at Savannah River.
- (2) After all plating was completed at Simmons, these assemblies will be fully inspected by du Pont field inspectors before shipping to Savannah River.
- (3) Shipping boxes are to be designed such that when each assembly is removed for plating, the box could then be resealed to prevent any contamination. Also, boxes are to be designed in such a manner that loose assemblies can be removed when the box is in a vertical position.
- (4) All packaging is to be specified by du Pont Design, and all assemblies shipped per standard specifications for shipping process units from New York Ship.
- (5) Metal Weld Company of Philadelphia, Pa., will perform all metal spray work. All machined and bare metal areas will be metal sprayed per du Pont drawing specifications. All metal spraying will be completed prior to shipping to Simmons Plating of Atlanta, Georgia.
- (6) Simmons Works will acid clean or otherwise prepare metal for plating upon receipt of equipment from New York Ship. This was agreeable to Simmons since their representative surveyed the equipment to be plated. At the time of the survey, equipment was being fabricated at New York Ship. It was also requested that New York Ship grind all welds smooth in order that plating adhere to these areas.

b. Difficulties Encountered During Direct Plating

The following problems were encountered during the early stages of direct plating the telescope handling guides and are discussed below:

Problem "1" - Sharp corners on "H" and "I" handle guides did not take plating.

To determine why chrome plating was not adhering to sharp corners on the hanging guides for "R" and "P" units, a detailed investigation of plating procedures was made by du Pont representatives from A.E.D. After this group investigated all plating procedures, machining, fabrication, welding and cleaning processes, they concluded that the difficulty was in design. After investigating the "corner" design on all hanging guides, it was evident that design should have specified a minimum of 1/16" radius on all corners in order that it take plating. This discrepancy was rectified by requesting New York Ship to radius all corners to a minimum of 1/16" before shipping subsequent units to Simons for chrome plating.

Problem #2 - Chrome plating applied approximately .050" too thick on one "R" inner hanging guide.

Before shipping to Simons for chrome plating each hanging guide assembly was identified as to part and number at New York Ship. After plating, the assemblies were then shipped to Savannah River. To meet Savannah River's construction schedule, it was absolutely necessary for them to substitute "P" hanging guides for "R". The U and E Section was formally notified of this substitution. As a result of this, all except one lower inner hanging guide ("R" unit) mated correctly. The outside diameter of this guide had an excess in thickness of approximately .050" of chrome plating. The field attempted to remove some of the chrome plating by grinding in order that it mate the outer inner hanging guide. Numerous difficulties were encountered such that it could not be satisfactorily repaired in the field. As a result of this, the "P" unit inner and outer hanging guides (one assembly) were returned to New York Ship for further repair.

After receiving the assemblies at New York Ship, inspection revealed that the field weld made on the lower inner hanging guide shrunk the areas surrounding the weld. As a result of this shrinkage, the lower inner hanging guide would not pass through the outer inner hanging guide. This discrepancy was corrected by grinding the outside diameter of the inner guide at the affected area and cloverleafing the inside diameter of the outer guide until the proper fit was attained between the two. In some areas chrome plating was removed to the extent that the bare metal (carbon steel) was exposed. These areas were touched up by painting with aluminum paint.