Nebraska Public Power District

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NLS8500071

April 29, 1985

Mr. H. L. Thompson, Director
Division of Licensing
Office of Nuclear Reactor Regulation
U.S. Nuclear Regulatory Commission
Washington, DC 20555

Subject: Revision 2 to the Man-Rem Estimate
Radiation Protection Program
Recirculation Piping Replacement

Dear Mr. Thompson:

Reference: 1) Letter from J. M. Pilant to H. L. Thompson dated April 3, 1985 (NLS8500057) "Revision 1 to Man-Rem Estimate, Radiation Protection Program, Recirculation Piping Replacement"

2) Letter from J. M. Pilant to D. G. Eisenhut dated August 15, 1984 (NLS8400232) "Recirculation Piping Replacement Radiation Protection Program"

Reference 1 was submitted to address the stipulation in Reference 2 that a revised man-rem estimate will be submitted when actual dose rates or manpower requirements significantly changed the original projected calculations. Similarly, this submittal further revises those initial estimates and provides appropriate explanations for the indicated changes.

Should you have any questions, please contact me.

Sincerely,

Jay M. Pilant
Manager, Technical Staff
Nuclear Power Group

JMP:LRB:cmk
Enclosure

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REVISION 2 TO THE IGSCC PROJECT MAN-REM ESTIMATE

I. Introduction

In conformance with Cooper Nuclear Station's Radiation Protection Plan and Chicago Bridge and Iron Company's ALARA program, a man-rem estimate was prepared by CBI (contractor) prior to initiating replacement of the recirculation piping and other piping susceptible to the IGSCC phenomena at CNS.

The initial estimate was based on projected dose rates and manpower requirements. Although considered a best estimate at the time, it was stipulated in Section II(c), part 3 of the CNS Radiation Protection Plan for the recirculation piping replacement outage that if actual dose rates or manpower requirements rendered this estimate obsolete, a revised estimate would be prepared and submitted to the Nuclear Regulatory Commission.

Revision 1 of the IGSCC project man-rem estimate as well as the substantiating report for making the changes was prepared January 1985. This submittal is being made to document revision 2 of the man-rem estimate and comply with the requirements of the CNS Radiation Protection Plan.

II. Summary of the Revision 2 IGSCC Man-Rem Estimate

The new man-rem total of the revision 2 man-rem estimate is 1750.564 man-rem. This is an increase of 314.878 man-rem or 21.9% over the previous revision 1 estimate of 1435.686 man-rem. The revision 2 estimate also reflects an increased manpower requirement of 27,515 man-hours. This is a 28.6% increase over the previous estimate of 96,295 man-hours and boosts the revision 2 estimate to 123,810 man-hours. The new revision 2 IGSCC man-rem estimate is presented in Attachment B.

III. Explanation of Changes to the Man-Rem Estimate

The reason for the current changes to the man-rem estimate is to account for additional drywell work activities not included in the original pipe replacement contract. These extra work activities include installation of the corrosion resistant cladding (CRC) at the nozzle to safe-end transitions, induction heating stress improvement (IHSI) of the recirculation piping welds, weld crown reduction, and In-Service Inspection examination. The CRC repair work totaling 74.208 man-rem and weld crown reduction totaling 18.232 man-rem are distributed amongst several job codes as shown in Attachment A. IHSI work requiring 62.352 man-rem and ISI examination accounting for 24.000 man-rem are each grouped into individual job codes. Altogether, these four work activities account for 56.8% of the total additional man-rem incorporated into the revision 2 man-rem estimate. In addition, sixteen specific tasks also listed in Attachment A and discussed below have been added to the work scope of the pipe replacement outage and account for an additional 121.086 man-rem. This is 38.4% of the total additional 314.878 man-rem included in the revision 2 estimate. The remaining 4.8%

or 15 man-rem is attributable to the extra CNS drywell support coverage required due to the expanded work scope and subsequent extension of the outage.

As of March 9, 1985, the current estimated exposure based on the percentage completion of the various job codes was 1077.292 man-rem, approximately 150 man-rem below the actual exposure of 1227.254 man-rem at that time. This 13.9% differential between current estimated and actual exposures is a result of performing some of the extra work in the drywell which was not included in the revision 1 man-rem estimate. By incorporating the additional estimated man-hours and exposure required to complete the extra drywell work into the man-rem estimate, the estimate is updated to more accurately reflect the expanded work scope of the recirculation piping replacement contract. This permits more accurate comparison and meaningful assessment of actual work progress and exposure versus that which is expected. Early detection of work activities that are not proceeding smoothly or for which higher than expected dose rates are encountered is vital to enable appropriate corrective measures to be implemented thereby preventing unnecessary exposure. Using the updated revision 2 man-rem estimate the current estimated man-rem as of March 9, 1985, would be 1203.853 man-rem. This is only 1.9% below the 1227.254 actual man-rem incurred up to that time indicating the revision 2 man-rem estimate is accurate and valid for projecting exposures necessary for completing the remaining work.

IV. Discussion of Extra Drywell Work Activities

A. Corrosion Resistant Cladding (CRC) Work

Corrosion resistant cladding is an IGSCC mitigating technique whereby the heat affected zone of the nozzle-to-safe-end weld is protected from stress corrosion cracking by depositing an inconel 82 overlay on the inconel 182 butter to isolate the inconel 182 from the coolant. This minimizes the potential for IGSCC because inconel 82 is more resistant to IGSCC than inconel 182. CRC work was done on all of the N1, N2, N5 and N8 nozzles.

B. Induction Heating Stress Improvement (IHSI) Work

At the time of contract negotiations it was recognized that work would be done pertaining to stress relief of the large bore piping welds. However, the method to be used had not been decided and hence the manpower requirement and resulting exposure could not be estimated. Later, induction heating was chosen as the method for stress improvement and added to the pipe replacement work scope as another measure to alleviate IGSCC. The time required to complete this work is estimated at 5,196 man-hours and result in 62.352 man-rem exposure. Because of the potential benefits of IHSI in mitigating stress corrosion cracking it is believed that incurring this exposure is warranted.

C. Weld Crown Reduction (WCR) and In-Service Inspection (ISI) Examination

Both of these work activities are recognized as being required for completion of the piping replacement outage but were not included in the original man-rem estimate because of ongoing negotiations between Nebraska Public Power District and the contractor. Previous omission of the time and exposure required for these tasks had little impact on the validity of the man-rem estimate since until recently most outage work was related to removal of old piping and interferences. Now that the manpower allocation for this work is known and reinstallation of new pipe is in progress, the applicable dose estimates for each must be added to the man-rem estimate for accurate tracking of the jobs that involve weld crown reduction and ISI examination. It is felt that grinding the weld crown to enable either automatic or hand UT techniques would be beneficial for the base line and future ISI examination because the use of automatic UT instruments will result in lower radiation exposure to personnel.

D. Other Specific Tasks Added to Work Scope

In addition to the work discussed above, sixteen (16) specific tasks have also been added to the piping replacement project work scope. A brief discussion of each is presented below.

1. Weld Preps on RHR Valves (Job Code 56)

The original piping replacement project work scope included weld prep machining of the RHR valves which was accounted for in the revision 1 man-rem estimate. However, a modified weld prep design was used to minimize the possibility of IGSCC. The modified weld prep design involved establishing a type 309 stainless steel transition zone and applying type 316K stainless steel weld butter before machining the weld preps.

Because of the modified weld prep design and the fact that the RHR valves were worked inside the drywell resulted in approximately nineteen (19) additional man-rem.

2. Removal and Capping of the 1" LPCI Lines (Job Code 110)

Due to plant design the 1" LPCI loop select lines off the recirculation risers are not necessary for safe operation of the plant and they are no longer used as part of the LPCI control system. After initial contract negotiations a plant design change was completed for removal of these lines. This work has now been added to the project work scope and the estimated man-hours and man-rem are incorporated into the revision 2 man-rem estimate.

3. Reinstallation of Whip Restraints (Job Code 121)

Reinstallation of the original recirculation piping whip restraints is already included in the revision 1 man-rem estimate and has been allocated 1200 man-hours and 9.6 man-rem. However,

in an effort to upgrade the plant a design change was made which was not addressed in the original contract work scope. Installation of the redesigned whip restraints will require an additional 2300 man-hours and 18.4 man-rem. These additional hours and exposure are included in the revision 2 estimate.

4. Extra Welds in Loop A Risers (Job Code 85)

As originally planned each of the five loop A recirculation piping risers was to be one continuous section. Concern arose, however, regarding accurate alignment and mating of the risers at each end of the header ring. To preclude the severe consequences of incorrect fit-up of the end risers each of these risers was fabricated as two separate pieces. This required making two extra welds for installation of the loop risers which were not included in the original work scope. The additional 582 man-hours and 8.148 man-rem for making these welds are included in the revision 2 man-rem estimate.

5. Extra Welds in Loop B Risers (Job Code 92)

The same considerations as for the loop A risers apply to installation of the loop B risers. An additional 582 man-hours and 8.148 man-rem for performing this extra work are included in the new estimate.

6. Jet Pump Instrumentation Tubing (Job Code 52)

New BWR6 type jet pump instrumentation safe-ends are being installed at CNS as a plant upgrade measure. With the new safe-end design the existing instrumentation lines cannot be reconnected with the proper amount of slope. This requires that a portion of the jet pump instrumentation tubing be replaced. An additional 640 man-hours and 7.68 man-rem are necessary to complete this work. These man-hours and exposure are included in the new estimate.

7. Decon Flange Installation - Loop A (Job Code 81)

Installation of a 4 inch decon flange in loop A suction line has been added to the project work scope. Installation of this decon flange during the current outage will be extremely beneficial for achieving effective decontamination and reduced exposure to personnel during future outages. This task will require 50 man-hours and 0.9 man-rem to complete.

8. Decon Flange Installation - Loop B (Job Code 89)

A four inch decon flange will also be installed in the loop B suction line. Fifty man-hours and 0.9 man-rem are required for installation of this flange.

9. Thermowell Installation - Loop A & B (Job Codes 81 & 89)

The current outage work scope calls for installation of 1¼ inch thermowells in the suction elbows to both recirculation pumps. The thermowell for loop A will be inserted into spool piece 31-RL-A-4 and that for loop B will be inserted into 43-RL-B-4. It is estimated that this extra work will require 12 man-hours and 0.2 man-rem to complete. These hours and exposure are divided equally between job codes 81 and 89 as shown in Attachment A.

10. Installation of RWCU Line (Job Code 98)

Installation of the RWCU line to valve 6"601MV166W outside of the drywell required removal of the elbow just downstream of this valve and core drilling the RWCU heat exchanger room wall opposite drywell penetration X-14 to allow a longer pipe length with less welds into the drywell. 210 man-hours and 3.360 man-rem is estimated to complete this work.

11. Reinstallation of Structural Interferences (Job Code 111)

Replacement of damaged drywell grating has been added to the IGSCC project contract. This work will entail cutting, fitting and weld tacking the new grating in place. This additional work is estimated to require 120 man-hours and 0.96 man-rem.

12. Reinstallation of Drywell Ducts (Job Code 113)

Some of the existing drywell ducting was slightly damaged during removal or storage and some sections have defects that existed prior to removal. Before the ductwork is reinstalled all holes or other damage will be repaired. This repair effort will require 16 man-hours and 0.192 man-rem.

13. Reinstallation of Chiller 1C (Job Code 116)

Electrical reconnection of chiller unit 1C has been expanded to include complete removal of the existing 1½ inch diameter conduit and replacement with 2 inch conduit. This extra work will require 145 man-hours and 1.16 man-rem.

14. Pipe Support Installation and Modification (Job Code 103)

Following examination of existing valve hangers, it was determined that some would need replacing. In addition, some hanger supports would be modified. This extra work is expected to require 141 man-hours and 1.672 man-rem.

15. CNS - 1001' Level Work (Job Code 13)

Installation of the jet pump plugs proved much more difficult and time consuming than originally anticipated in spite of CNS operators having been previously trained for this work at General Electric Company's mock-up facility. The design of Cooper Station's vessel is slightly different than that of the mock-up facility and complicated maneuvers were required for installation

of the jet pump plugs. Since the same techniques used for installation will be necessary for removal of the plugs, additional man-hours and exposure as shown in Attachment A have been added to job 13 to account for the increased difficulty of this task.

The additional man-hours and exposure also reflect replacement of the jet pump beams and Health Physics coverage of the 1001' level work.

16. Startup Test Instrumentation (Job Code 142)

This job involves temporary attachment of strain gauges and RTDs to the recirculation piping for vibration expansion testing during startup. An additional 1714 man-hours and 20.568 man-rem are included in the revision 2 man-rem estimate for this work.

V. Summary

The second revision to the man-rem estimate reflects a 314.878 man-rem increase above the first revision. This is a 21.9% increase. This estimate update is essential for project dose tracking to remain as accurate as possible thus allowing more effective problem area identification and subsequent ALARA Committee attention.

One-half (50.2%) of the additional man-rem is due to increased job work scope that has potential for long-term man-rem savings by mitigating possible future IGSCC and thereby avoiding future lengthy repairs. This includes CRC work (74.208 man-rem), IHSI treatment (62.352 man-rem), and the core drilling (3.36 man-rem) for RWCU piping which resulted in one less pipe weld (and one less site for IGSCC) during replacement. Another item scheduled for this outage to help reduce exposures in future outages is Weld Crown Reduction. WCR will allow the use of Automatic Ultrasonic Testing for future ISI Examinations. WCR is estimated to add 18.232 man-rem to the outage total.

Addition of decon flanges for making future primary system decontamination efforts more effective is also expected to result in large man-rem savings during future outages if decontamination is required.

Design changes that have increased the present outage work scope such as removal of the 1 inch LPCI lines, whip restraint modifications, replacement of chiller conduit, and replacement of hanger supports are all tasks that by being performed now in lower general area dose rates rather than in future outages when the primary system will have higher associated radiation levels will minimize exposure to personnel. The design change involving two piece end risers, although adding extra welds, more than likely avoided potentially serious fit-up and rework problems that would have negated any dose or time savings originally considered possible.

The RHR valve work, Jet Pump Instrumentation tubing replacement, replacement of damaged grating, and ductwork repair are all tasks that although necessary for outage completion were not foreseen during outage planning.

ATTACHMENT A
EXTRA WORK IN DRYWELL

Job Code	Job Code Description	Extra Work	Additional Man-Hours	Additional Man-Rem
5	CNS Drywell Support	Expanded coverage	2,125	15.000
13	1001' Level Work	Jet Pump Plugs	1,956	9.716
38	Remove & Reinstall N1 Safe-End "A"	CRC repair	280	6.720
		WCR	35	0.840
			315	7.560
39	Remove & Reinstall N2 Safe-End "B"	CRC repair	1,600	25.600
		WCR	80	1.280
			1,680	26.880
45	Remove & Reinstall N1 Safe-End "B"	CRC repair	280	4.480
		WCR	35	0.560
			315	5.040
46	Remove & Reinstall N2 Safe-Ends Loop "B"	CRC repair	1,600	25.600
		WCR	80	1.280
			1,680	26.880
49	Remove & Reinstall Core Spray Safe-Ends "A" and "B"	CRC repair	672	9.408
		WCR	16	0.224
			688	9.632
52	Remove & Reinstall Jet Pump Instrumentation Safe-End	CRC repair	150	2.400
		Tubing replacement	640	7.680
			790	10.080
56	Machine Preps on RHR Valves	Re-machining & overlay buttering	1385	19.390
81	Install Loop "A" Suction Line	4" decon flange	50	0.900
		Install thermowell	6	0.100
		WCR	120	1.920
			176	2.920
82	Install RHR Connections to Suction line	WCR	58	0.928
83	Install "A" Loop Discharge Line	WCR	100	1.600
84	Install "A" Loop Cross and Header	WCR	24	0.288
85	Install "A" Loop Risers From Header to Safe-End	2 extra welds	582	8.148
		WCR	120	1.680
			702	9.828

ATTACHMENT A
EXTRA WORK IN DRYWELL

Job Code	Job Code Description	Extra Work	Additional Man-Hours	Additional Man-Rem
89	Install Loop "B" Suction Line	4" Decon flange	50	0.900
		Install thermowell	6	0.100
		WCR	120	1.920
			176	2.920
90	Install "B" Loop Discharge Line	WCR	100	1.600
91	Install "B" Loop Cross and Header	WCR	24	0.384
92	Install "B" Loop Risers From Header to Safe-End	2 extra welds	582	8.148
		WCR	120	1.680
			702	9.828
96	Install Core Spray Lines "A" and "B"	WCR	64	0.896
98	Install RWCU Line to Valve Outside of Drywell	WCR	72	1.152
		Core drilling &	210	3.360
		pup pieces	282	4.512
103	Pipe Support Installation & Modification Loop A & B	Replace hangers	85	1.000
		Extra welds on	56	0.672
		supports	141	1.672
110	Remove LPCI Loop Select Lines	Remove 1" LPCI lines	1,641	19.692
111	Reinstall Structural Interferences	Replace damaged grating	120	0.960
113	Reinstall Ductwork	Repair ducting	16	0.192
116	Reconnect Elect. Chillers Pumps and Valves	Replace conduit	145	1.160
121	Reinstall Whip Restraints	Install re-designed restraints	2,300	18.400
132	Induction Heating Stress Improvement	IHSI	5,196	62.352
142	Startup Test Instrumentation	Install instruments	1,714	20.568
143	ISI Examination	ISI	2,900	24.000
		TOTALS	27,515	314.878

A - Actual for Jobs Complete

JOB NO.	DESCRIPTION	MAN HOURS	MAN REM
A-1	Start Verification of Walkdown	491	21.086
A-2	Insulation Removal - Pre-Decon	238	12.957
A-3	Install Power and Lights	105	4.266
A-4	Temporary Shielding for Decon	130	8.303
5	CNS Drywell Support	7,405	78.360
A-6	As-Builts of Lines - Pre-Decon	18	.932
A-7	Temporary Support of Valves and Pumps	862	34.129
A-8	Protect Systems - During Decon	418	16.204
A-9	Install Rigging - Pre and During Decon	626	12.443
A-10	General Area Decon - Pre and During Decon	260	9.424
A-11	Isolate and Tap Recirculation System for Decon	1241	64.280
12	Cancelled		
13	CNS-1001' Level Work	4898	44.205
14	Removal of Pipe Supports - During Decon	950	31.350
15	CNS Work - April Outage	46	2.123
A-16	Disconnect Chillers 1B and 1D, Assoc. Motors and Valves - During Decon	381	3.983
A-17	Decon of Systems	883	14.199
18	Install Audio-Visual In Drywell	60	3.000
A-19	Temp. Support Riser and Header Loop A and B	748	12.212
A-20	Supervision for Work - Pre and During Decon	1870	32.803
A-21	Fire Watch - Pre and During Decon	444	10.781
A-22	Install Scaffolding Pre-Decon	1438	51.924
23	Cancelled		

A - Actual for Jobs Complete

JOB NO.	DESCRIPTION	MAN HOURS	MAN REM
24	Cancelled		
25	Cancelled		
A-26	Chiller Interference's - Remove	377	4.71
A-27	Install Equipment Hatch Ramps	240	1.764
A-28	Remove Chillers	307	3.516
A-29	Remove Loop "A" Recirculation Pump Motor	222	1.95
A-30	Remove Loop "B" Recirculation Motor Pump	165	1.702
31	Permanent Shielding After Decon Includes Nozzle Shield Plugs	275	6.05
A-32	Temporary Shielding (RHR Piping, Main Steam, Feed Water, etc.)	20	.521
A-33	Move machining equipment into drywell	44	.857
A-34	Remove "A" Suction to Pump and RHR	715	14.417
A-35	Remove "A" Loop Discharge	216	4.08
A-36	Remove "A" Loop Cross and Header	580	13.307
A-37	Remove "A" Loop 12" Ø Riser from Header to Safe End	860	13.845
38	Remove and Install N1 Safe End Loop A	590	17.46
39	N2 Safe End and Thermal Liner Removal and Reinstallation (Nozzles F. G, H, J, K)	5130	111.88
A-40	Remove "A" Loop Valves Outside Containment	309	6.988
A-41	Remove "B" Loop Suction (From N1 Nozzle to Pump)	306	4.988
A-42	Remove "B" Loop to Cross (From Pump to Header)	184	3.256

A - Actual for Jobs Complete

JOB NO.	DESCRIPTION	MAN HOURS	MAN REM
A-43	Remove "B" Loop Cross and Header	265	6.457
A-44	Remove "B" Loop 12" Risers (5 Risers)	587	9.965
45	Remove and Install N1 Safe End "B" Loop	590	14.94
46	N2 Safe End and Thermal Liner Removal and reinstall Loop "B" (Nozzles A, B, C, D, E)	5130	111.88
A-47	Remove "B" Loop Valves to Outside of Drywell	264	4.91
A-48	Remove Core Spray Lines Loop A & B from Safe End to Valve	507	7.349
49	Remove and Install Core Spray Safe Ends Loop A & B	1364	32.032
50	Remove RWCU Line (Complete to Outside Drywell)	480	10.1
51	Remove and Reinstall Delta P Safe End and Piping	131	7.98
52	Remove and Install Jet Pump Inst. Safe Ends Loop A & B	1482	34.36
53	General Decon During Removal of Pipe	2160	26.1
54	Cancelled		
A-55	Fire Watch During Pipe Removal	1080	13.0
56	Machine Preps on RHR Valves	1593	24.238
57	Machine Preps on Pumps - Loops "A" & "B"	600	21.0
58	Machine Preps on Core Spray Valves	94	1.9
A-59	Supervision for Removal	8383	66.6
60	Removal of Structural Interferences After Decon But Before Recirc. System Removal	590	7.6
A-61	Complete Removal of Duct Work	425	3.464

A - Actual for Jobs Complete

JOB NO.	DESCRIPTION	MAN HOURS	MAN REM
A-62	Complete Major Rigging	56	.639
63	Removal of Electric Interferences After Decon	350	4.2
64	Pipe Cut-Up/Packing Into LSA Containers	89	1.3
65	Machine Prep Recir. Valves "A" & "B"	540	5.28
66	Machine Prep on RWCU Valves	40	1.6
A-67	Removal of Whip Restraints	132	2.14
68	Move Welding Equipment into Drywell	125	1.5
69	Removal Pipe Supports Loop "A & B" After Decon	495	8.4
A-70	Removal of Small Line Interferences Loop "A" & "B"	268	4.846
A-71	Insulation Removal (Post-Decon)	180	2.574
A-72	Chillers 1A and 1C, Assoc. Motors and Valves	131	1.736
A-73	Disconnect A and B Loop Suct., Discharge and Bypass Valves	95	1.756
74	Cancelled		
75	Install Scaffold Pipe Removal	833	11.287
76	General Decon During Pipe Installation	1620	19.4
77	Fire Watch During Pipe Installation	1620	19.4
78	Maintain Lighting and Equipment During Installation	80	.8
79	Supervision for Installation (Recirc. Piping)	4500	36.0
80	Moving (Temporary) Shielding Materials	150	1.8

A - Actual for Jobs Complete

JOB NO.	DESCRIPTION	MAN HOURS	MAN REM
81	Install Loop "A" Suction Line	1359	19.791
82	Install RHR Connection to Suction Line	496	7.996
83	Install "A" Loop Discharge Line	1118	13.931
84	Install "A" Loop Cross and Header	708	5.76
85	Install "A" Loop Risers (From Header to Safe End)	1652	22.674
86	Cancelled		
87	Cancelled		
88	Install (Transporting) "A" Loop Recirc. Valves to Location	26	.3
89	Install "B" Loop Suction Line and Valve	1185	13.908
90	Install "B" Loop Discharge Line & Valve	961	15.73
91	Install "B" Loop Header	570	4.752
92	Install Loop "B" Risers (From Header to Safe End)	1652	22.674
93	Cancelled		
94	Cancelled		
95	Cancelled		
96	Install Core Spray Lines A & B (From Safe Ends to Valves)	954	12.266
97	Cancelled		
98	Install RWCU Line to Valve Outside of Drywell	940	17.112
99	Replace Chillers	1176	9.408
100	Install Pump Motors Loop A & B	400	9.6

A - Actual for Jobs Complete

JOB NO.	DESCRIPTION	MAN HOURS	MAN REM
101	Cancelled		
102	Cancelled		
103	Pipe Support Installation and Modification Loop "A & B"	1077	11.092
104	Elect. RWCU Valves	80	.96
105	Install Scaffold Pipe Reinstallation	480	3.8
106	Elect. Sump Pumps	500	8.0
107	Elect. Interferences (Pre/Post Decon)	190	5.19
108	Cancelled		
109	Cancelled		
110	Remove 1" LPCI Loop Select Lines	1641	19.692
111	Reinstall Structural Interferences	1920	15.50
112	Reinstall and Reconnect Small Bore Piping and Interferences	2700	24.85
113	Reinstall Ductwork	2016	16.192
114	Reinstall Electrical Interferences	1068	8.5
115	Remove Rigging	300	2.4
116	Reconnect Elect. Chillers, Pumps and Valves	1961	15.66
117	Remove Permanent Shielding	513	14.846
118	Remove Temporary Shielding	200	2.2
119	Remove Temporary Supports	248	1.984
120	Install (New) Insulation	800	6.4
121	Reinstall Whip Restraints	3500	28.00
122	Remove Protective Equipment	496	3.968
123	Remove Scaffolding and Tools	900	7.2

A - Actual for Jobs Complete

JOB NO.	DESCRIPTION	MAN HOURS	MAN REM
124	Spare		
125	Remove Power and Lighting	100	.8
126	Decon Tools and Equipment	600	4.8
127	Remove Welding and Machining Equipment	290	2.32
128	Q.A. Walkdown	400	3.2
129	Supervision for Restoration	3000	24.0
130	Fire Watch During Restoration (3 Levels)	540	4.3
131	General Decon During Restoration	720	5.8
132	Induction Heating Stress Improvement (IHSI)	5196	62.352
133	Spare		
134	Spare		
A-135	April Walkdown Exposure (TLD)	482	14.3
136	Spare		
137	Spare		
138	Spare		
139	Spare		
140	Spare		
141	Spare		
142	Startup Test Instrumentation	1714	20.568
143	ISI Examination	2,900	24.000
144	Pre-Operational Testing	3000	3.000

TOTAL M/HOURS: 123,810

TOTAL MAN-REM: 1,750.564