**Cover Sheet for a Hanford
Historical Document
Released for Public Availability**

Released 1994

**Prepared for the U.S. Department of Energy
under Contract DE-AC06-76RLO 1830**

**Pacific Northwest Laboratory
Operated for the U.S. Department of Energy
by Battelle Memorial Institute**

DISCLAIMER

This report was prepared as an account of work sponsored by an agency of the United States Government. Neither the United States Government nor any agency Thereof, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness, or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately owned rights. Reference herein to any specific commercial product, process, or service by trade name, trademark, manufacturer, or otherwise does not necessarily constitute or imply its endorsement, recommendation, or favoring by the United States Government or any agency thereof. The views and opinions of authors expressed herein do not necessarily state or reflect those of the United States Government or any agency thereof.

DISCLAIMER

Portions of this document may be illegible in electronic image products. Images are produced from the best available original document.

DUN-7463
DECLASSIFIED

HANFORD CATEGORIES.
C - 57 AND C - 65

**DOUGLAS UNITED NUCLEAR
MONTHLY REPORT**

MARCH 1971

DOUGLAS UNITED NUCLEAR, INC.

RICHLAND, WASHINGTON

DECLASSIFIED

INFORMATION CONCERNING USE OF THIS REPORT

PATENT STATUS

This document copy, since it is transmitted in advance of patent clearances, is made available in confidence solely for use in performance of work under contracts with the U. S. Atomic Energy Commission. This document is not to be published nor its contents otherwise disseminated or used for purposes other than specified above before patent approval for such release or use has been secured, upon request, from the Chief, Chicago Patent Group, U. S. Atomic Energy Commission, 9800 So. Cass Avenue, Argonne, Illinois, 60439.

PRELIMINARY REPORT

This report contains information of a preliminary nature prepared in the course of work under Atomic Energy Commission Contract AT(45-1)-1857. This information is subject to correction or modification upon the collection and evaluation of additional data.

NOTICE

This report was prepared as an account of work sponsored by the United States Government. Neither the United States nor the United States Atomic Energy Commission, nor any of their employees, makes any warranty, express or implied, or assumes any legal liability or responsibility for the accuracy, completeness or usefulness of any information, apparatus, product, or process disclosed, or represents that its use would not infringe privately-owned rights.

PLEASE SIGN BEFORE READING THIS PUBLICATION

ROUTE TO:	P.R. No.	LOCATION	FILES ROUTE DATE	SIGNATURE & DATE
<i>LC Schmid</i>	<i>36685</i>	<i>RC</i>	<i>APR 20 1971</i>	<i>4/21/71</i>

DECLASSIFIED

DUN-7463

Hanford Categories:
C-57 & C-65

This document consists
of 21 pages.

April 16, 1971

DOUGLAS UNITED NUCLEAR

MONTHLY REPORT

MARCH 1971

DOUGLAS UNITED NUCLEAR, INC.
Richland, Washington

Work performed under Supplemental Agreement No. 1 to Contract
AT(45-1)-1857 between the Atomic Energy Commission and
Douglas United Nuclear, Inc.

Classification Cancelled and Changed To

DECLASSIFIED

By Authority of CG-NMP-1

RM Oten, 9-28-94.

By Jerri Males, 9-30-94.

Verified By J.E. Savely 10-4-94

MASTER

DISTRIBUTION OF THIS DOCUMENT IS UNLIMITED

REPORT DISTRIBUTIONAEC - RICHLAND OPERATIONS
OFFICE

1-6. O. J. Elgert

AEC - WASHINGTON7-9. F. P. Baranowski
Division of ProductionAEC - SAVANNAH RIVER

10. N. Stetson

DU PONT - SAVANNAH RIVER

11-12. W. B. Scott

BATTELLE-NORTHWEST13. R. L. Dillon
14. J. J. Fuquay
15. B. M. Johnson, Jr.
16. R. S. Paul
17. L. C. SchmidATLANTIC RICHFIELD HANFORD18. S. J. Beard
19. L. M. Richards
20. R. E. TomlinsonDOUGLAS UNITED NUCLEAR21. C. L. Abel
22. D. H. Bangerter
23. J. R. Bolliger
24. J. J. Bombino
25. C. E. Bowers
J. A. Cowan
J. E. RuffinDOUGLAS UNITED NUCLEAR26. P. A. Carlson
27. W. G. Catts
28. G. C. Coleman
29. R. E. Dunn
30. A. E. Engler
31. J. M. Fox, Jr.
32. G. C. Fullmer
33. C. D. Harrington
34. D. L. Hovorka
35. R. T. Jessen
36. V. V. Johnson
37. H. R. Kosmata
38. H. P. Kraemer, Jr.
39. C. W. Kuhlman
40. A. R. Maguire
41. R. T. Martell
42. W. M. Mathis
43. E. T. Murphy
44. D. W. Peacock
45. R. S. Peterson
46. C. F. Poor
47. C. A. Priode (Work Copy)
48. C. A. Priode
49. T. Prudich
50. T. B. Pugh
51. R. W. Reid
52. K. L. Robertson
53. R. K. Robinson
54. B. Schauss
55. O. C. Schroeder
56. W. Seeburger
57. R. H. Shoemaker
58. Earl H. Smith
59. J. T. Stringer
60. DUN File
61. DUN Record

TABLE OF CONTENTS

	<u>Starting Page</u>
<u>SUMMARY</u>	A-1
<u>REACTOR PLANT OPERATIONS - N</u>	B-1
<u>FUEL AND TARGET FABRICATION</u>	C-1
<u>TECHNICAL ACTIVITIES</u>	D-1
<u>ADMINISTRATION - GENERAL</u>	E-1
<u>APPENDIX</u>	
A. Project Status Summary	F-1
B. Employment Summary	F-4

SUMMARY

REACTOR PLANT OPERATIONS

N Reactor

The reactor remained shut down the entire month.

FUEL FABRICATION

Production Statistics (tons)

	<u>N</u>
Billets Extruded	0
Finished Fuel Produced	24.4

TECHNICAL ACTIVITIES

Two designs of thin annulus neptunium target elements, fabricated to produce medical grade Pu-238 in the Hanford production reactors and to be problem-free in separations and waste disposal operations, had successful in-reactor performances. Results of the BNW separations are not yet available.

Examination of five N Reactor ball channels revealed no graphite breakage. The separations which were evident in only two channels were not great enough to result in ball losses after a ball drop.

KE Reactor deactivation activities to effect a standby condition continued. N Reactor deactivation activities have been limited to criteria and procedure development and the scoping of necessary capital work. No irreversible physical changes have been made.

GENERAL

At month end 233 employees had been laid off since the KE Reactor shutdown on January 28. An additional 41 had received formal notice of layoff.

There were no disabling injuries, and no radiation exposures exceeded operational control.

Charles D. Harrington
Charles D. Harrington
President

REACTOR PLANT OPERATIONS - N

PRODUCTION

General

Reactor production (largely fuel grade Pu), power level and related statistics are tabulated below. Input production and time operated efficiency (TOE) for the past six months are shown on the following chart:

Statistical Summary

Electrical Generation (KMWH) - WPPSS	0
- 184-N	1.62
Fuel Charge (Tons) - 94 Metal	328.51
- 125 Metal	64.68
- Natural Uranium	<u>0.37</u>
Total	393.56
Helium Losses (1000 cu.ft.)	0
Fuel Oil Usage (bbl.)	15,480

OPERATING EXPERIENCE

Reactor Loading

The reactor loading at month end is shown on the front face map that follows on page B-5. No fuel charging or discharging occurred during the month.

Reactor Outages

The reactor was in shutdown status the entire month.

Deactivation Activities

The criteria for deactivation methods were approved for layaway of the various systems. Operations detailed procedures for the deactivation were about 70 percent complete at month end.

EQUIPMENT EXPERIENCE

Primary Loop

All three V-17 valves, diversion system back pressure control valves, were overhauled and new trim installed in each valve. The valve station control system was calibrated and the station returned to service.

The three IWV-253 valves, primary loop high-pressure injection control valves, were disassembled for inspection. No. 2 valve was sent to J. A. Jones shop for repair of the valve seats. All of the valves were overhauled and reassembled. The valve station control system was calibrated and the system returned to service. Leakage through the valves was reduced significantly by the repair effort.

Installation of threaded steel unions on 15 lines in the 109-N radioactive vent and drain valve discharge lines was completed. The unions, when opened, provide a means of identifying leaking vent and drain valves.

Two V-11 valves were repacked.

A V-12 valve actuator test was completed with the following results:

40 V-12 actuator systems lost all pressure in less than 30 seconds.

37 showed more than 200 psi drop in 30 seconds (initial pressure 250 psig).

31 showed more than 150 but less than 200 psi drop in 30 seconds.

55 showed more than 100 but less than 150 psi in 30 seconds.

146 dropped more than 50 but less than 100 psi in 30 seconds.

694 dropped less than 50 psi in 30 seconds.

1 air tube (1648).

1004 Total

Third Party Inspections

A total of 95 miscellaneous pressure vessels was inspected by a Third Party Inspector, leaving only 22 miscellaneous vessels to be inspected during the remainder of the calendar year.

Ball Safety System

Ball safety system hoppers 37, 38, 41, 68, and 70 were removed and the graphite channels inspected. Channels 41, 68, and 70 were found to be in normal condition and were returned to service. Channels 37 and 38 had 5/8" gaps between liner blocks 2 and 3; the channels were resleeved to correct the problem.

184-N Turbine Generator

The turbine generator was placed in service on March 19 to provide for split bus operation. The equipment was taken out of service on March 30 to cut and polish the generator slip rings. The unit was returned to service on March 31.

Chemical Waste Facility

Chemical waste shipment to ARHCO continued with twenty-three cars loaded out of the 1310-N chemical waste storage tank. Inventory in the tank is essentially depleted.

Safety and Relief Valves

A total of 224 safety and relief valves was given Class "A" overhaul that includes testing and tagging in accordance with applicable codes. Ninety-six valves remain to be tested and tagged to meet code compliance.

Manufacturing Engineering ActivitiesGrayloc Hub Refacing Tool

Many of the Grayloc hubs on V-12 valves removed from the reactor must be repaired during reworking operations by building up the surface with weld material. These welded hubs have been restored to original dimension in the past by using the standard Grayloc refacing tool. However, the rough cut on the welded area and the large volume of metal that must be removed has resulted in a large number of breakdowns of the tool.

A new hub restoring tool has been designed to solve this breakdown problem. The tool uses a carbide cutter (similar to a milling cutter) that is sharpened to the exact dimensions of the finished hub. The cutter is mounted on heavy bearings to eliminate vibration, and it can be powered by either an air motor or a drill press.

This refacing tool is now under construction.

Equipment Maintenance Standard (EMS) Activities

The standards which had been recalled early in February pending a decision on N Reactor were returned to the field for processing, and work has continued on EMS development. One new standard was issued for approval. The status of the N EMS program is:

DECLASSIFIED

	<u>Last Month</u>	<u>This Month</u>
Standards scheduled	45	45
Standards issued	23	23
Standards routing for approval	7	8
Standards in preparation	14	13

Equipment Modifications

The following equipment modification was completed:

DC-3130, "Confinement System Trip in the ECS System," provided for interlocking the 105-N and 109-N confinement systems with the emergency cooling water system. Now both confinement systems will be activated upon an ECS trip. The change will minimize the potential for release of radioactive gases through the 109-N building roof vents.

DECLASSIFIED

DUN-7463

	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74		
34																																			34	
33							ES	E	ES	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	E	ES	E	E							33	
32							E	E	E	E	E	E	E	E	E	E	E	E	13	13	13	E	E	E	E	E	E	E							32	
31							E	E	E	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	E	E							31	
30							E	E	E	X	X	X	X	X	X	X	X	18	X	18	X	G	X	X	X	X	X	E	E						30	
29							E	E	E	X	X	94	X	18	G	G	G	18	G	G	G	G	G	G	G	X	X	X	X	E	E	E			29	
28							E	E	E	X	X	X	G	G	G	G	G	G	G	G	18	G	G	F	F	F	F	G	X	X	X	E	ES	E		28
27							E	E	E	X	X	X	G	G	G	G	G	G	G	G	13	13	G	G	F	G	G	G	X	X	X	X	E	E		27
26							E	E	X	94	X	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	94	X	X	E	ES	E		26
25							E	E	X	X	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	18	X	E	ES		25	
24							E	E	X	X	X	G	G	G	36	G	G	94	G	G	G	G	G	F	13	13	G	G	G	G	G	X	X	E	E	24
23							E	E	X	X	X	G	G	G	G	G	G	G	G	G	94	G	G	G	G	G	G	G	G	X	X	X	E	E	23	
22							E	E	X	X	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	X	E	ES		22	
21							E	E	X	X	X	G	G	G	F	F	F	G	G	94	G	G	F	G	G	G	F	G	G	X	X	X	E	E	21	
20							E	E	X	X	X	G	G	G	G	G	F	G	G	G	G	G	18	G	G	F	G	G	G	G	X	X	X	E	ES	20
19							E	E	X	X	X	G	18	G	F	F	F	G	G	G	G	G	18	G	F	G	G	F	G	F	X	X	X	E	E	19
18							E	E	94	X	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	X	E	ES		18	
17							E	E	X	X	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	X	E	ES		17	
16							E	E	X	X	X	G	G		N	G	G	G	G	G	G	G	G	G	G	G	G	X	X	X	E	ES		16		
15							E	E	X	X	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	X	E	E		15		
14							E	E	94	X	X	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	X	E	E		14	
13							E	E	X	X	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	X	E	ES	ES		13	
12							E	E	X	X	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	X	E	ES		12		
11							E	E	X	X	X	X	G	G	G	36	G	G	G	G	G	G	G	G	G	G	G	X	X	X	E	ES	ES		11	
10							E	E	X	X	X	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	X	E	ES		10		
09	ES	E					X	X	X	X	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	X	X	E	E		09	
08	E						E	E	X	X	X	X	G	G	G	G	G	G	G	G	G	G	G	G	G	G	G	X	18	X	E	E	E		08	
07							ES	E	E	X	X	X	X	X	G	G	G	G	G	G	G	G	G	G	G	G	G	X	X	X	E	ES	E		07	
06							E	ES	E	X	X	X	X	X	G	G	G	G	G	G	G	18	G	G	G	G	18	X	X	X	X	E	E	E		06
05							E	E	E	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	E	E	E		05	
04							ES	E	E	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	E	ES	E		04	
03							E	E	ES	E	E	E	E	E	E	E	E	36	E	E	E	36	36	36	36	E	E	ES	ES	E					03	
02							E	E	E	E	E	E	E	E	E	ES	E	ES	E	ES	E	ES	E	E	E	E	ES	E							02	
01																																				01
	41	42	43	44	45	46	47	48	49	50	51	52	53	54	55	56	57	58	59	60	61	62	63	64	65	66	67	68	69	70	71	72	73	74		

Fuel Code	No. Tubes	Description	PT-NR No.	No. Tubes	Description
E, ES	216	Mk-IC (94 Metal - Fringe)	94*	8	Mk-IV Demonstration
F	20	Mk-IV (94 Metal - High U-236)	113	5	Evaluation of the End
G	498	Mk-IV (94 Metal - Central)			Spider Inner Support
N	1	Mk-1B (Natural U)			System
X	230	Mk-1A & Mk-IV (125 & 94 Metal)	136	9	Mk-IV Non-bonded End
	965	Total	118	16	Closures
	39	Total PTs			Mk-IV Performance
				1	Test
					Graphite Sample Channel
1,004		Grand Total		39	Total PTs

*Includes Mk-IV high U-236 content fuel and 5 tubes with Mk-IV-AA 125 Metal and Mk-IV 94 Metal.

Loading Pattern - N Reactor

FUEL FABRICATION

KE REACTOR

Month-End Inventories - Tons

Bare Uranium Cores	770
Finished Fuel: AlSi-Bonded	830
Hot-Die-Sized	0

N REACTOR

Output Production

Total Finished Fuel Assemblies	946
Tons Output	24.4
Percent of Forecast	48.8

Uranium Utilization - %

B09	81.8
X09	85.4

Month-End Inventories - Tons

Bare Uranium Billets	154
Finished Fuel	317

DECLASSIFIED

TECHNICAL ACTIVITIES

N REACTOR OPERABILITY PROGRAM

The test results on the flow monitor system bias voltage change were summarized in DUN-7030 D, "Final Report, Production Test PT-NR-151, N Flow Monitor Bias Voltage Change," dated February 23, 1971. The production test was performed to determine if the flow monitor could be operated with reduced bias voltages which would place the monitor's operating voltage parameters within the current voltage range of the thyatron type indicators. Reduction in the bias voltage is desirable since the voltage at which the thyatrons turn-on decreases as they age. The voltage characteristics of many of the existing thyatrons have decreased to where they are approaching the limit of the flow monitor's operating voltage parameters. Since the thyatrons are not a commercially available "off the shelf" item, the reduction of the bias voltages changes the operating parameters and could permit extended usage of the existing thyatrons. The results of the test showed that the reduction of bias voltages does not affect the scram or annunciator trip points. The flow monitor system was operated with the reduced bias voltages up to the time of shutdown.

FUEL PERFORMANCE PROGRAM

Performance of Improved Neptunium-237 Target Element Designs

Previous tests^(1,2) have demonstrated the ability to produce medical grade Pu-238 (90 percent Pu-238 plutonium, $\approx$ 0.3 ppm Pu-236) in the Hanford production reactors. Plutonium-236 formation occurs by either an n, 2n or γ , n reaction on Np-237 forming Np-236 which subsequently beta decays to Pu-236. The success of these tests resulted from severely restricting the incidence of high energy gamma and neutron radiation upon the target elements. The incidence restriction was achieved by shielding the target columns from the fast neutrons of adjacent fuel columns and dispersing the neptunium in graphite to reduce the amount of aluminum from which high energy gammas are emitted. While successful in terms of product quality, the resultant target element configurations complicated the separations and waste disposal operations. To maintain product quality while alleviating the separations problems, two thin annulus target geometries were designed and tested.⁽³⁾

Both target designs consisted of neptunium (as NpO₂) dispersed in aluminum powder and sintered into thin rings. The sintered rings were sealed between two thin layers of aluminum cladding by welded end caps. One design employed

(1) DUN-2272, "PTA-063, Quick Turnaround Neptunium Demonstration," R. E. Baars, J. C. Nosler, J. P. Schmidt, April 28, 1967 (Secret).

(2) DUN-5113, "PTA-163, Clean Pu-238," A. F. Kupinski, H. A. McDonald, June 3, 1969 (Secret).

(3) DUN-6812, "PTA-209, Improved Neptunium-237 Target Element Configurations," H. A. McDonald, May 5, 1970 (Secret).

a sealed inner graphite core and the other permitted coolant access to the inner (and outer) clad surface. The graphite core design enables easy separation of the moderator and target prior to separations; thus both designs eliminate the separations and waste disposal problems associated with earlier configurations. Table I (page D-3) presents the dimensions of the target elements.

Ten target elements of each design were charged in the five center positions of a 2x2 block of process channels in the central zone of KE Reactor. The targets experienced approximately 90 full-power days of operation, the equivalent of approximately .3 ppm Pu-236, having been charged on May 9 and discharged on November 11, 1970.

Pre-irradiation outside diameter and length measurements were taken to permit the evaluation of dimensional behavior. Post-irradiation measurements were taken in the 105-C Fuel Examination Facility. Table II (page D-3) presents results of the dimensional analysis.

The dimensional change data indicate entirely successful performance. The somewhat larger than usual standard deviations are considered to result from normal measurement error coupled with the small number of measurements involved. Length changes were negligible.

The target elements were subsequently shipped to BNW for separations. Results from this activity are not yet available. A final report is being prepared on the test.

PLANT LIFE PROGRAM

N Ball Channel Inspections

The results of the examination of five ball channels on March 18 and 19 are as follows:

- Channel 37: The top two blocks have subsided about 4-1/8 inches and there is a separation of 5/8 inch between the second and third blocks. There is no evidence of breakage.
- Channel 38: Identical to 37 except the top two blocks are down 4-1/2 inches. This channel was found to have no separations when last inspected one year ago.
- Channel 41: Top blocks down 5-1/2 inches; no sign of separation, breakage, or offset.
- Channel 68: Top blocks down 5-1/4 inches; no sign of separation, breakage, or offset.
- Channel 70: Top blocks down 5 inches; no sign of separation, breakage or offset.

The reported subsidence of the top blocks was estimated by comparing measurements of the distance from the bottoms of the funnels to the bottom of the

DECLASSIFIED

DUPLICATE

TABLE I
Np-237 TARGET ELEMENT DIMENSIONS
THIN ANNULUS DESIGNS

	<u>OD</u>	<u>ID</u>
Np rings	1.510	1.380
Outer clad	1.600	~1.510
Inner clad	~1.380	1.335
Length	8.865 inches	
Np weight	50 grams/foot	
Inner cores	graphite or water	

TABLE II
DIMENSIONAL ANALYSIS RESULTS
THIN ANNULUS Np-237 TARGET ELEMENTS

	<u>Avg ΔOD</u> <u>Mils</u>	<u>Std Dev (σ)</u> <u>Mils</u>	<u>3σ</u> <u>Mils</u>
<u>OD-1 (1" from Male End)</u>			
Graphite core	2.4	7.2	21.6
Water core	4.0	3.7	11.5
<u>OD-2 (Element Center)</u>			
Graphite core	7.4	6.0	18.1
Water core	2.3	3.6	10.8
<u>OD-3 (1" from Female End)</u>			
Graphite core	2.1	8.4	25.4
Water core	3.1	8.6	25.8
<u>Concave Warp</u>			
Graphite core	1.7	2.0	6.0
Water core	3.3	2.1	6.4
<u>Convex Warp</u>			
Graphite core	0.7	2.5	7.5
Water core	-0.6	1.8	5.4

DECLASSIFIED

counterbore in the first block with the as-designed distance of 1-1/2 inches. The separations in channels 37 and 38 are not great enough to result in ball loss in the event of a ball drop.

DECONTAMINATION PROGRAM

All development effort on the Decontamination Program was terminated at the time of reactor shutdown, January 28. During the ensuing time, personnel normally assigned to this program have been developing criteria and procedures for reactor layaway. An informal technical summary of decontamination technology which had been in preparation prior to the shutdown has been completed. In addition, a review of preliminary results from the two-tube recirculation test in conjunction with a revised program plan was issued. The last single-pass, through-reactor N decontamination has also been documented. The above-noted reporting is currently informal and has not yet been formally documented.

OPERATIONAL SUPPORT PROGRAM

Reactor Layaway

Planning is under way to place the KE and N Reactors in a standby condition. Deactivation work at the KE Reactor has proceeded at a rate commensurate with development of detailed procedures. N Reactor deactivation activities are currently limited to formulation of criteria and detailed procedures. No irreversible physical changes are being made to the plant pending clarification of the deactivation directive.

Engineering effort on KE Reactor deactivation has been directed toward identification of deactivation work to be funded from the capital budget. Scoping of the capital work is now complete in support of project proposal action. Design criteria and the project proposal have been submitted to AEC-RL for approval. The proposed capital work includes the provision of electric heat for control rooms and switchgear rooms for protection of instrumentation and electrical equipment, fire detection systems in the control rooms and switchgear rooms, and modification of the fire hydrant supply and distribution systems. The above work is applicable to both KE and KW Reactor plants since all of 100-K Area will be unattended following shipment of all irradiated fuel.

Layaway of the process tube examination laboratory in the 108-B Building was completed.

Layaway of the 1706-KE and KER facilities is 75 percent complete. The KER loop systems were drained and dried. The wet layup of these loops used for the past five years was abandoned because the buildings will not be heated with both the K reactors on standby.

Preparation of layaway procedures for the developmental mockups, test equipment, and laboratory facilities in 189-D is proceeding as scheduled. Draft procedures for deactivation of the horizontal control rod mockup and the N flow facility are complete.

DECLASSIFIED

Bridge Cranes in 105-N Storage Basin Area

The project replacing the cranes used to handle discharged reactor fuel in the storage basin area has been essentially completed. The cranes are operable, but acceptance testing is not complete. Considerable revision to the cranes at the vendor expense has been required, primarily due to excess deflection at load transfer points.

Pocket Alarm Dosimeter Integrator

Pocket alarm dosimeter integrators (PADI) were developed by Douglas United Nuclear to provide an accurate, portable individual dosimeter to be worn by personnel exposed to radiation fields. The device has been field tested and found to meet all requirements of accuracy and portability and to be reliable and damage resistant.

Several AEC contractors (sites) have been supplied with working quantities (Savannah River, Knolls Atomic Power Laboratory, and J. A. Jones). Five remaining units on order will be shipped to Savannah River in early April.

NUCLEAR SAFETY ASSURANCE PROGRAM

Reactor deactivation and layaway activities following the N Reactor shutdown resulted in the following accomplishments:

Documentation

Two documents summarizing work to date on nuclear safety-related aspects of N operation were issued: DUN-7427, "N Reactor Cross Section Sets," December 18, 1970, and DUN-7569, "Isotope Rod Burnout," March 9, 1971.

Draft documentation was completed on work involving (1) the DUNCAP 3-D code for calibrating the N rod control system, (2) description of use of the WIGL-2 kinetics code, (3) Safety Analysis Review for six-cell operation, and (4) Technical Safety Criteria and Specifications.

117-N Building Filters

An investigation of the failed "J" bolts (unit filter retaining bolts) in the 117-N Building resulted in a recommendation that all new "J" bolts be annealed and the spring tension relieved on the D cell particulate filters. This work was completed. An inspection of other cells disclosed no failures.

Particulate Filter Testing

Whole cell testing of N Reactor particulate filters was conducted with both A and B cells successfully tested at 99.97 percent efficiency. Following "J" bolt adjustment, cell D was tested at 99.98 percent efficiency.

DECLASSIFIED

DUN-7221

REGULATORY PROGRAM

Documentation of the technical analyses which were being conducted as part of the N Reactor Regulatory Program prior to shutdown is proceeding. Some of the calculations and detailed evaluations had progressed to the point that final documentation is possible. Draft documentation of a fault tree analysis of the confinement system reliability has been completed and a document will be issued. However, many of the technical studies were not this complete and cannot be finished because of funding restrictions on data processing and experimentation. In these cases, the status is being summarized in draft documents for record use. Drafts are in various stages of completion describing the status of metal-water and fission product experimental results, meteorology data analysis, design basis accident parameters, emergency cooling system reliability and seismic adequacy evaluations.

The final reports of the Noble Gas Study have been transmitted to AEC-RL in two documents. These are DUN-7221, Vol. 1, "Final Report - FY-1970 Noble Gas Confinement Study - The Development of a Long-Lived, High-Expansion Foam for Entrapping Air-Bearing Noble Gas," and DUN-7221, Vol. 2, "Final Report - FY-1970 Noble Gas Confinement Study - Cryogenic Porous Media Bed." No further work is currently planned in this investigation. Critical equipment has been mothballed or stored for possible future use.

WASTE MANAGEMENT PROGRAM

Work progressed on debugging the Contaminated Coolant Treatment Facility pilot plant data analysis computer program. Runs were made on the radioisotope standards as well as the first plant data.

SPECIAL IRRADIATIONS PROGRAM

Following the shutdown of KE Reactor, all experimental capsules and target materials, with the exception of one recalcitrant graphite boat, have been discharged and the test facilities placed in deactivation status. Capsules and target materials are being shipped to customers as shipping containers become available.

ADMINISTRATION - GENERALEMPLOYMENT SUMMARY

DUN personnel totals and employee allocations as of March 31 and February 28, 1971, are shown in Appendix B.

FORCE REDUCTION

At month end 233 employees had been laid off since the KE Reactor shutdown on January 28, 1971. An additional 41 had received formal notice of layoff.

Placement efforts on behalf of laid-off employees are continuing. Requests for information regarding job openings have resulted in 88 positive responses from other employers. Of the 65 exempt employees who have terminated, 28 had other employment and 30 of the 168 nonexempt employees terminated had other jobs.

ARBITRATION CASES

Two pending arbitration cases involving overtime distribution procedures and pro-rata vacations remain dormant for lack of action on the part of the Union.

SAFETY

No personnel radiation exposures exceeded operational control.

Month-end safety statistics were:

Disabling injuries - March	0
- CY to date	0
Days since last disabling injury	266
Man-hours since last disabling injury	1,756,347

APPENDIX APROJECT STATUS SUMMARY - REACTOR FACILITIESAUTHORIZED PROJECTS

	<u>Number & Title</u>	<u>Authorized Funds - \$</u>	<u>Percent Complete</u>		<u>Remarks</u>
			<u>Design</u>	<u>Construction</u>	
	<u>Single-Pass Reactors</u>				
	DAP-526, Deactivation of Hanford Production Reactor C	105,000	100	100	Fire protection system acceptance testing has been completed. Project complete with no exceptions.
	<u>N Reactor</u>				
F-1	GCP-411, Effluent Con- trol Program - 100-N	1,960,000	93	96	All work stopped January 28, 1971, pending decision on N Reactor operation.
	DCE-519, Replacement of Bridge Crane and Hoist System with New Crane System - 105-N Storage Basin Area	465,000	100	88	Performance of the acceptance test March 10 resulted in many exceptions requiring correction by the vendor. These exceptions have been corrected and retesting is in progress.
	DCP-528, Fire Protection System Improvements - 100-N	30,000	33	0	All work stopped January 28 pending decision on N Reactor operation.
	DCE-539, Upgrade Flux Monitor System - N Reactor	335,000	75	0	All work stopped January 28 pending decision on N Reactor operation.
	DAE-540, Smoke Density Monitors for DUN-Operated Facilities - 100 Areas	55,000	100	0	All work stopped January 28 pending decision on N Reactor operation.

F-1

UNCLASSIFIED

Number & Title	Authorized Funds - \$	Percent Complete		Remarks
		Design	Construction	
DCP-542, High Pressure Injection System Improvements - N Plant	138,000	0	0	All work stopped January 28 pending decision on N Reactor Operation.

PROJECT PROPOSALS AWAITING AUTHORIZATION

Number & Title	Funds Requested	Date to AEC-RL
DCE-519, Rev. 4, Replacement of Bridge Crane and Hoist System with New Crane System - 105-N Storage Basin Area	Requests extension of time only	12/11/70
DCP-525, Fire Protection Improvements - KE	\$ 225,000	5/2/69
DCP-527, Graphite Cooling & Fog Spray Improve- ments - 100-N	97,000	5/9/69
DCP-528, Rev. 2, Fire Protection System Improvements - 100-N	344,000 ¹	2/18/71
DCP-529, Gravity Drainage System and Disposal Basin for 100-N Area	200,000	7/9/69
DAP-530, Upgraded Electrical Services & Lighting 1100-N & 1101-N Buildings	78,000	8/12/69
DCP-538, Heat and Ventilation System Improvements 105-N & 109-N Buildings	330,000	5/18/70
DCE-544, Critical Instrument Power Supplies - N Reactor ²	65,000	6/15/70
DAP-547, Permanent Markers for Buried Wastes in Terminated 100-D, 100-F & 100-H Sites	28,000	10/29/70

¹Supersedes Rev. 1 estimate of \$394,000 because of reduced scope of work.

²Returned to DUN February, 1971.

PROJECT PROPOSAL PREPARATION

<u>Number & Title</u>	<u>Design Criteria</u>	<u>Project Proposal</u>
Export Water System Backup - 182-D (for 200 Areas)	Completed.	Completed. Held by sponsor (ARHCO).
Stack Monitoring Improvements - 100-N Plant	Completed.	Prepared. Held for later submission.
Irradiation Test Facility - N Reactor	Feasibility Study completed.	Suspended pending further information and decision on N Reactor operation.
Training Mockup for V-12 Valve Replacements - 185-D Building	Drawings available - no criteria required.	Suspended pending decision on N Reactor operation.
Backup Vacuum Deaerator - 163-N Building	Preliminary Engineering Study completed.	Suspended pending decision on N Reactor operation.
Deactivation of KE Reactor and 100-K Area	Completed.	Completed.
Deactivation of N Reactor Plant - Hanford	In preparation.	In preparation.

F-3

UNCLASSIFIED

UNCLASSIFIED

DUN-7463

APPENDIX BEMPLOYMENT SUMMARY
(with employee allocations)

	<u>2/28/71</u>	<u>3/31/71</u>
<u>CONTRACT PERSONNEL</u>		
<u>02 Programs</u>		
Douglas United Nuclear	1155	983
Assisting Other Contractors	<u>16</u>	<u>14</u>
Total - 02	1171	997
<u>Other Programs Under AEC Contract</u>		
Assisting Other Contractors and WPPSS	35	36
Special Irradiations	<u>14</u>	<u>9</u>
Total - Other Programs	49	45
Total Contract Personnel	<u>1220</u>	<u>1042</u>
<u>COMMERCIAL ACTIVITIES PERSONNEL</u>	<u>28</u>	<u>29</u>
TOTAL FORCE	1248	1071