[redacted]
(CLASSIFICATION)

HW--65625

DE93 003944

GENERAL ELECTRIC

HANFORD ATOMIC PRODUCTS OPERATION - RICHLAND, WASHINGTON

6-13-60

[redacted]

TITLE

SPECIAL REQUIREMENTS CG-791 TIE-IN

B, D, DR AND F REACTORS

[ ] OTHER OFFICIAL CLASSIFIED INFORMATION

THIS MATERIAL CONTAINS INFORMATION AFFECTING THE NATIONAL DEFENSE OF THE UNITED STATES WITHIN THE MEANING OF THE ESPIONAGE LAWS, TITLE 18, U.S.C., SECS. 793 AND 794, THE TRANSMISSION OR REVELATION OF WHICH IN ANY MANNER TO AN UNAUTHORIZED PERSON IS PROHIBITED BY LAW.

AUTHOR

R. W. Reid

THIS DOCUMENT MUST NOT BE LEFT UNATTENDED OR WHERE AN UNAUTHORIZED PERSON MAY HAVE ACCESS TO IT. WHEN NOT IN USE, IT MUST BE STORED IN AN APPROVED LOCKED REPOSITORY WITHIN AN APPROVED GUARDED AREA. WHILE IT IS YOUR POSSESSION AND UNTIL YOU HAVE OBTAINED A SIGNED RECEIPT FROM CLASSIFIED FILES, IT IS YOUR RESPONSIBILITY TO KEEP IT AND ITS CONTENTS WITHIN THE LIMITS OF THIS PROJECT AND FROM ANY UNAUTHORIZED PERSON. ITS TRANSMITTAL TO, AND STORAGE AT YOUR PLACE OF RESIDENCE IS PROHIBITED. IT IS NOT TO BE DUPLICATED. IF ADDITIONAL COPIES ARE REQUIRED, OBTAIN THEM FROM THE RELATED ISSUING FILE. ALL PERSONS READING THIS DOCUMENT ARE REQUESTED TO SIGN IN THE SPACE PROVIDED BELOW.

ROUTE TO:	PAYROLL NO.	LOCATION	FILES ROUTE DATE	SIGNATURE AND DATE
[redacted]	459	3720	SEP 8 1960	[redacted]

C-3195-MB (7 - 58) [redacted]

[redacted]
(CLASSIFICATION)

DISTRIBUTION RESTRICTED TO U.S. ONLY

[redacted]

DECLASSIFIED

HW-656

DISTRIBUTION

1. J. D. Agar
2. W. K. Alexander
3. G. O. Amy
4. J. K. Anderson
5. E. R. Astley
6. J. W. Ballowe
7. J. T. Baker
8. J. W. Baker
9. R. S. Bell
10. R. G. Benham
11. R. W. Benoliel
12. W. A. Blanton
13. C. E. Bowers
14. R. W. Bown
15. R. J. Bursey
16. H. A. Carlberg
17. P. A. Carlson
18. J. R. Carrell
19. J. C. L. Chatten
20. R. A. Chitwood
21. T. M. Clement
22. R. G. Clough
23. D. L. Condotta
24. B. R. Cremer
25. R. L. Dickeman
26. W. J. Dowis
27. R. V. Dulin
28. R. E. Dunn
29. K. E. Fields
30. E. J. Filip
31. W. J. Ferguson
32. J. M. Fouts
33. F. C. Franklin
34. N. E. Fuller
35. G. C. Fullmer
36. W. J. Gartin
37. S. M. Graves
38. O. H. Greager
39. C. N. Gross
40. A. K. Hardin
41. R. B. Hall
42. T. W. Hauff
43. K. D. Hayden
44. D. A. Hoover
45. E. T. Hubbard
46. M. E. Jackson
47. J. F. Jacklevick
48. S. S. Jones
49. P. C. Jerman
50. A. R. Kosmata
51. W. K. Kratzer
52. E. E. Leitz
53. C. G. Lewis
54. D. S. Lewis
55. M. T. Lewis
56. R. J. Lobsinger
57. A. R. Maguire
58. D. C. Montague
59. W. E. Nechodom
60. S. L. Nelson
61. D. E. Newbrough
62. R. E. Nightingale
63. K. W. Norwood
64. E. J. O'Black
65. G. F. Owsley
66. C. F. Poor
67. C. A. Priode
68. T. Prudich
69. R. J. Purcell
70. W. H. Radtke
71. R. W. Reid
72. L. P. Reinig
73. W. D. Richmond
74. W. C. Royce
75. A. Russell
76. M. H. Schack
77. R. M. Scott
78. R. D. Shimer
79. F. A. Snyder
80. H. G. Spencer
81. S. L. Stewart
82. R. E. Trumble
83. F. W. Van Wormer
84. G. W. Wells
85. C. D. Wilkinson
86. E. M. Woodruff
87. J. R. Young
88. Record Center
89. 300 File
90. G. E. Zima
91-95. Extra

This document consists of 8 pages. No. [redacted] of [redacted] copies. Series [redacted]

COPY 1 OF 1 [redacted]

This document classified by:

A. K. Hardin

[redacted]

[redacted]

Classification Cancelled (Changed to DECLASS)

By Authority of CG PR-2

DS Lewis 10-29-92

By JD Wells 11-2-92

PM Eck 11-4-92

[redacted]

HW-65625

IRRADIATION PROCESSING DEPARTMENT

 June 13, 1960

TO: DISTRIBUTION

SPECIAL REQUIREMENTS CG-791 TIE-IN
B, D, DR AND F REACTORS

INTRODUCTION

Coupling of the reactor exhaust system to the filter building, under Project CG-791, will require diversion of the 105 Building exhaust air to two temporary stacks. The temporary stacks will be installed over each of two exhaust fans. The use of these temporary (short) stacks during the tie-in period (estimated at 8 to 16 days) could greatly aggravate radiological problems because of reduced dilution and dispersion of the reactor building exhaust air.

SPECIAL OPERATING REQUIREMENTS

The following Special Operating Requirements must be observed whenever the temporary stacks are being used to exhaust air from the reactor buildings:

1. Noble gases from the reactor effluent system will be vented to the top of the 105 Building.

BASIS

The normal stack air contains significant amounts of radioactive noble gases from the reactor effluent water system. These gases are presently vented to the 105 Area exhaust stack. Venting of these gases at the top of the 105 Building during the tie-in work will minimize re-circulation of these gases into the 105 Building.

This gas cloud could also involve the 190 or 1704 Buildings. Past experience indicates that this could be a nuisance, but will not be a hazard. Although it is doubtful that a dose rate would be measurable, detection with a GM or on an air sample filter should be easy. Identification of the material may be accomplished by using its typical short half-life of 20 to 30 minutes.

2. Two exhaust fans (one on each temporary stack) will be in service. At least one of these fans must not depend upon BPA power for continued operation.

BASIS

There are two primary differences between the present, pre-CG-791 exhaust systems and the temporary exhaust systems to be employed during the tie-in work. These are namely: 1) the exhaust stack height, and 2) the emergency exhaust fan capacity.

On the basis of experience, one-exhaust-fan operation is believed to be tolerable at all reactors. Therefore, to assure continued operation of the exhaust system, it is specified that at least one of the two exhaust fans must not depend upon BPA power for continued operation.

[redacted]

SPECIAL OPERATING REQUIREMENTS (Continued)

3. A. Purging of the reactor during reactor operation must be done only to maintain operational continuity. During any necessary purging operation, rigorous interior and exterior monitoring shall be conducted.

B. The following restrictions on Gas Composition during the tie-in are recommended. The recommended maximum concentrations of N_2 and O_2 is necessarily conservative due to lack of reactor operating experience with reduced stack height. Experience may show that an acceptable radiological condition will exist when gas impurities are increased above those specified below:

1) Oxygen should be reduced to 0.10 per cent or less, prior to withdrawing rods for any cold startup.
2) The Nitrogen content during reactor operation should be maintained at 0.2 per cent or less. If this limit is exceeded, take gas samples for mass spectrographic analysis at 24 hour intervals. If any two succeeding samples show an increase in nitrogen content, increase the gas pressure on the react.

BASIS

Even with the noble gases from the reactor effluent system vented at the top of the 105 Building, a significant radiological hazard will exist during reactor purging due to the release of radioactive noble gases from the short stacks.

These stacks will be physically about 20 feet tall and should have an effective height due to velocity of more than 50 feet. Eddies around the building will make it impossible to forecast where this exhaust air will go. At times it will touch ground at, or near the stack, and at times it may also enter the 190 and 1704 Buildings. This radiological hazard can be measured by the external dose rates to personnel.

The discharge of radioactive gases from the short stacks can be minimized by maintaining rigid control of the amount of air (air contains gases which become highly radioactive upon irradiation) which enters the unit. Presently, the best means of monitoring the magnitude of these radioactive gases is by monitoring the N_2 and O_2 content in the reactor atmosphere.

A N_2 concentration of 0.2 per cent or less is specified for normal operation in Process Standard B-010. Therefore, restriction 2) emphasizes that use of the 4 per cent maximum N_2 presently allowed by Process Standard B-010, should not be permitted during the tie-in.

Depending upon meteorological conditions, this radioactive gas may be carried away without significant exposure to anyone. It may, however, also enter the ventilation supply ports and cause some exposure to personnel in the 105 Building or it may settle down around the CGI-791 work site and interfere with the progress of the work. In any case, the effect will be transitory and the dispersal of the purge gases should be closely monitored. The radiological problem would be due to Argon-41, but no particulate activity would be expected. Again, identification could be made by the apparent 20 to 30 minute half-life on air samples. Identification of noble gases on the continuous air monitor is also possible, and could be used to avoid confusion.

SPECIAL OPERATING REQUIREMENTS (Continued)

4. A. The following shutdown work (which has a high potential of releasing particulate contamination) will not be permitted until transfer to the normal stack is completed, (restoring the exhaust system to its original state is permissible)*:

   1) Stuck rupture removal (one which cannot be discharged using the charge machine).
   2) Tube replacement work.
   3) Large scale Turco decontamination.

   B. The following shutdown work (which has some potential of releasing small amounts of particulate contamination) will be permitted, provided rigorous interior and exterior monitoring is conducted. IF contamination is detected outside of the 105 Building, or in the air supply to the 105 Building, this work shall be stopped until transfer to the normal stack is completed, or evaluation by radiation monitoring indicates it is safe to continue.

   1) Ball 3X removal work (strainers in vacuum system).
   2) Graphite stringer replacement.
   3) Discharging of ruptures which push with the charge machine. The Fog Spray must be in operation at any time metal from a ruptured charge is in the rear face atmosphere.
   4) VSR and HCR maintenance.

BASIS

It is presently an objective of normal reactor operating procedures to minimize the contamination in the reactor exhaust system. Due to the substantially reduced capacity of the exhaust system to effect a safe disposal of any possible contamination during the tie-in period, the desirability of minimizing contamination in the exhaust system at this time is greatly increased. Therefore, insofar as is possible, release of contamination from planned action shall be minimized during the tie-in period. The probability of significant local interior and exterior contamination from inadvertent action, such as slug burning, will be greater during stub stack operation. While minimizing of such accidents is a goal of current reactor and subsidiary operations, the more severe consequences of occurrence during the tie-in period justifies extraordinary attention to accident prevention.

The economics of discharging fuel elements to below-normal exposures just prior to the tie-in period, or reducing reactor power level during the tie-in period, for the purpose of reducing the potential of a stuck rupture while operating on the temporary stacks has been evaluated. It was concluded that a reduction in exposure of about 100 MWD/T or a reduction in power level is not profitable. However, a minor reduction in normal exposure, up to 50 MWD/T, can be made at little or no net cost and is probably in order, provided metal is available.

*Restoring the exhaust system to its original state may be the safest or least costly of several alternatives. It is estimated that at any time during the tie-in work it will be possible to achieve exhaust facilities which will permit the full range of outage work in 5 shifts.

[redacted]

SPECIAL OPERATING REQUIREMENTS (Continued)

4. B. BASIS (Continued)

Any decision regarding shutdown work which may be done while on the stub stacks must be based on an evaluation of the radiological hazards involved. Because severe contamination and possible release of particulate contamination may accompany stuck slug removal, it is felt this work should not be accomplished while on the stub stack. Large scale Turco decontamination may release harmful amounts of radioactive fumes; therefore, this work should not be accomplished while on the temporary stacks.

During tube replacement most surfaces are dry and air contamination levels as high as 5×10^{-8} μ c/cc have been observed. Even though the particles in such an atmosphere did not settle out, exposure in a cloud which had been diluted by less than a factor of 50 should not be permitted. If they did settle out in occupied areas, such as the CG-791 work site, the area would very likely require decontamination before work could proceed.

Shutdown work such as Ball 3X removal and graphite stringer replacement can be carefully monitored at the work location and therefore any severe radiological hazard should be detected prior to releasing harmful amounts of contamination. Based on past experience, normal charge-discharge operations and removal of ruptured fuel elements that are not stuck are believed permissible. There is a small probability of contaminant release during such operations, but the probability of venting particulates is small because all contaminated surfaces are constantly wet. The containment ability of the Fog Spray System can be used, thus allowing operations where experience has demonstrated there is small probability of significant contamination consequences. During the tie-in period, except for rupture discharge, the operation of the Fog Spray System will be governed by the existing Process Standards affecting this facility.

5. Air washers on the intake to the 105 Building will be in operation, except for repair, during the tie-in period.

BASIS

Operation of the air washers will minimize recirculation of particulate contamination which may be drawn into the 105 Building air supply. Recirculation of particulate contamination is possible during the tie-in period due to the reduced dilution and dispersion of any contamination released while on the short stacks. Under adverse meteorological conditions, it is possible to draw essentially undiluted stack gases into the 105 Building air supply.

[redacted]

PREPARATORY WORK

The following preparatory work is proposed as advisable prior to the tie-in period:

1. Complete a rigorous inspection of all critical reactor system components including cooling system components and emergency power equipment. Any corrective action necessary which would tend to ensure operability during the tie-in period should be completed.

2. Exhaust system equipment should be placed in the best possible operating condition.

3. The discharge area should be cleaned, as far as practicable, of external contamination.

BASIS (1,2, & 3)

The preceding preparatory work is advised prior to the tie-in period to minimize, insofar as possible, any release of contamination from planned action during the tie-in period. Also, the above steps should minimize the possibility of having a reactor outage during the tie-in period when uninterrupted operation is highly desirable.

4. Radiation monitors should be forewarned of anticipated radiation problems and advised as to the proper monitoring techniques.

BASIS

Prior knowledge of the type of problem which is anticipated could improve the interpretation of monitoring results and reduce confusion. Special precautions will be necessary during reactor outage work, as risk of contaminating occupied areas and unplanned exposures will be greatest at this time. Certain jobs may very well release particulate material which could (1) interfere with the duct tie-in work, (2) interfere with traffic movement around the area, and (3) cause internal and external exposures to many people, some of whom are not normally exposed to radiation. The only effective control will be pre-planning. Insofar as possible, this pre-planning has been started. However, in spite of planning done now and that which may be done at the time, monitors must be alert for unforeseen releases. Definition of a significant release is only guess-work. The 105 exhaust air is monitored by a Kanne chamber and any response to this monitor on the 10^{-11} range should be considered significant during an outage. This is a gas monitor, the air is filtered before it enters the chamber, so a significant release of particulate matter might not show on this monitor. Therefore, there may be occasions when the only way to determine whether or not a significant release has occurred will be by rigorous monitoring.

[redacted]

DISTRIBUTION

6-13-60

PREPARATORY WORK (Continued)

4. BASIS (Continued)

In this regard, it might be well to remember that the supply air filters are in effect an uncalibrated but continuous air sample. Most of the buildings have dry filters that can be readily checked. Routine survey of the 105, 115, 190 filters is recommended. Judgment will be required to determine what type of monitoring is necessary and where it should be done.

OPTIMUM TIME FOR STARTING TIE-IN WORK

Two approaches to this problem are believed feasible. The first approach is to start the tie-in 24 to 36 hours after startup from an outage for metal discharge when no evidence of an impending outage exists. The second approach is to start the tie-in immediately following a shutdown for metal discharge when no shutdown work which has a high potential of releasing particulate contamination will be accomplished.

BASIS

The first approach has the advantage of avoiding startup of the reactor during the tie-in period. It also reduces the potential of an inadvertent shutdown of the reactor during the tie-in period. Statistics compiled by Deichman[3], indicate that about 70 per cent of the reactor shutdowns occur within 36 hours of the startup and that the bulk of these are recovered within 15 hours. Avoiding reactor startups or shutdowns is desirable as they tend to increase leakage of radioactive pile gas to the exhaust system.

The second approach has the advantage of reducing the length of time the reactor will be operating during the tie-in (approximately 3 days reduction in operating time is possible). This will result in a significant reduction in the probability of obtaining a rupture while on the short stacks. Any increase in rupture potential due to thermal cycling during a reactor startup is believed to be insignificant with the present I & E metal loadings.

References: 1) Letter, "Tie-In of CGI-791 Exhaust Systems - Technical Bases for Operational Procedures", GE Zima to RW Reid, dated 4-7-60.
2) Letter, "CGI-791 Reactor Confinement Radiological Problems - Final Duct Tie-In", RB Hall to EE Leitz, dated 6-10-60
3) HW-62207, "Operating continuity Analysis of Hanford Reactors", JL Deichman, dated October 1959.

RWR:EEL:gf

[redacted]

[redacted]

APPROVALS

R. W. Reid, Manager
Process Technology Sub-Section

J. H. Brown, Manager
Process & Reactor Development

A. R. Maguire, Manager
B-C Reactor Operation

C. N. Gross, Manager
F-Reactor Operation

O. H. Greager, Manager
Research & Engineering Section

O. C. Schroeder, Manager
Manufacturing Section

C. A. Priode, Manager
Production Operation

W. D. Richmond, Manager
D-DR Reactor Operation

DISCLAIMER

END

DATE
FILMED
2/17/93