ZE100

CORRES. CONTROL
OUTGOING LTR NO.

DOE ORDER # 5480.21
96-RF- 03351

DIST	L	E
BENSUSSEN, S. J.		
BUHL, T. R.		
CARD, R. G.	X	X
GILLISON, W.R.		
HERRING, C. L.		
HILL, J. A.		
HUEMAN, T. P.		
KELL, R. E.	X	X
LEE, E. M.		
MANI, Vik	X	X
MARTINEZ, L. A.		
McANALLY, J. L.		
MCKAY, R.		
McKIBBIN, J. G.		
SANDLIN, N. B.		
SPEARS, M. S.	X	X
TUOR, N. R.		
VOORHEIS, G. M.	X	X
Beckman T.D.	X	X
CRONIN, R. D.	X	X
CROUCHER, D. W.	X	X
HOLIFIELD, A. J.	X	X
JACOBS, O. M.	X	X
WEAVER, L. G.	X	X
ZIMMER, J. J.	X	X
ZIMMERMAN, G. A.	X	X
CORRES	X	X
ADMIN. REC (2)	X	X
TRAFFIC		
PATS/T130G		

CLASSIFICATION

UCNI		
UNCLASSIFIED	X	X
CONFIDENTIAL		
SECRET		

AUTHORIZED CLASSIFIER SIGNATURE
Dwayne Hoover
DATE 6/5/96

IN REPLY TO RFP CC NO:
NONE

ACTION ITEM STATUS
☐ PARTIAL/OPEN
☐ CLOSED

LTR APPROVALS:
G. A. Zimmerman
J. J. Zimmer
M. S. Spears
R. E. Kell

ORIG & TYPIST INITIALS
SDK:la

1/21

KAISER·HILL COMPANY

000061823

June 7, 1996

96-RF-03351

David A. Brockman
Assistant Manager
Strategy, Integration & Guidance
DOE, RFFO

UNREVIEWED SAFETY QUESTION DETERMINATION (USQD) FOR REPACKING ION EXCHANGE RESIN RESIDUE IN BUILDING 707 - VM-193-96

PURPOSE

Pursuant to discussions with your staff, USQD-707-96.0426-OMJ has been revised. This letter transmits Revision 1 of USQD-707-96.0426-OMJ, *Repacking Ion Exchange Resin Residue in Building 707* (Attachment 1) for review and approval. This USQD identifies accidents of a different type than any previously identified in the safety analyses, and when compared to the Final Safety Analysis Report (FSAR) and supporting documentation, results in an increase in consequences for both the spill and fire scenarios. This transmittal cancels and supersedes our previous transmittal of USQD-707-96.0426-OMJ, dated May 13, 1996 (VM-155-96).

DISCUSSION

Prior to 1989, ion exchange resins were used to purify plutonium solutions as part of aqueous plutonium recovery process operations. Since 1989, approximately 226 kg of residue resin has remained in storage in various packaging configurations (i.e., 15-liter Kraft tubes that have been double-wrapped in plastic bags and placed in 55-gallon drums, one-liter Vollrath cans, and 10-gallon drums). Storage locations include Buildings 371, 771, 776/777, and 779. This residue is not currently in a configuration suitable for long-term storage. Processing, treatment, stabilization, and/or repackaging of the ion exchange resin residue is required to secure a safe, stable end-state.

The accidents that were analyzed in the Building 707 FSAR, and subsequently re-evaluated in USQD-707-94.1523-WGH, include natural phenomena and operational accidents. The operational accidents include fires, explosions, spills/other releases, and criticalities. The identified fire and spill scenarios include plutonium, plutonium oxides, and Pu waste drums. There are no specific accident scenarios identified for the fire and spill hazards associated with the processing of ion exchange resin within the Building 707 complex.

Kaiser-Hill Company, L.L.C.
Courier Address Rocky Flats Environmental Technology Site, State Hwy 93 and Cactus, Golden, CO 80007 • 303.966.7000
Mailing Address P.O. Box 464, Golden, Colorado 80402-0464

The postulated accident scenarios that could be applied to the proposed activity would be spills and/or fires resulting from the activities required to complete the repackaging process. When comparing the consequences of these accidents to the Building 707 authorization basis, the calculated dose to the Maximum Off-site Individual (MOI) exceeds the 50-year bone dose and establishes new criteria for the affected frequency categories as identified in Procedure 3-J69-NSPM-5C-01. See Table 2 in USQD-707-96.0426-OMJ for a list of postulated accidents and corresponding dose to the MOI.

The proposed activity involves opening drums containing Kraft tubes outside of a glovebox but inside the "C" Cell where spills could occur. The previous spills evaluated in the FSAR dealt only with "in glovebox", "overpressurized glovebox", and "dock" spills. The proposed activity is considered to have the potential to create the possibility of a spill accident of a different type than any previously evaluated in safety analyses. Additionally, the resin residue has different characteristics than those previously evaluated in the FSAR (i.e., higher release fraction associated with resin fires). Therefore, the proposed activity is considered to have the potential to create the possibility of a fire accident of a different type than any previously evaluated in safety analyses.

All approved USQs, that potentially apply to Building 707, were reviewed to determine the affect of their analyses on the proposed activity. Those USQs have either been addressed, or have no affect on the subject USQD.

Composite risk for Building 707 is dominated by natural phenomena events, as discussed in the building FSAR. Composite risk is not increased by the proposed activity.

RESPONSE

It is requested that the DOE review and approve USQD-707-96.0426-OMJ, Revision 1, and accept the increase in risk associated with the repackaging of ion exchange resin in the Building 707 complex. If you have any question, or comments, please contact G. A. Zimmerman of the Nuclear Safety department at extension 8264, pager 7368, or O. M. Jacobs of the USQD Process group at extension 2858, pager 7898.

Vik Mann

Vik Mann, Vice President
Safety, Engineering & Technical Services
Kaiser Hill Company, L.L.C.

2

CONCURRENCE:

6/5/96

G. M. Voorheis, Date
Vice President
Special Material Management & Integration

SDK:la

Orig. and one cc - D. A. Brockman

Attachment:
As Stated

cc:
P. M. McEahern
J. C. Selan

B

EG&G ROCKY FLATS

USQD COVER SHEET

USQD No. USQD-707-96.0426-OMJ

Building # 707

Page 1 of ~~17~~ 18 OMJ 5/30/96

Title RESIN RESIDUE REPACK, BUILDING 707
PROCEDURE NUMBER 4-V75-RS-0111, REVISION 0
DOCUMENT MODIFICATION REQUEST 96-DMR-000262

Job # 952603-OH
BWP-BBA-26112

	(Print Name)	(Sign Name)	Date
Preparer	N/A	N/A	N/A
Criticality Safety Reviewer	ELLEN SAYLOR	Ellen Saylor	5/8/96
Certified Evaluator	O.M. Jacobs	O.M. Jacobs	5/2/96
Peer Reviewer	Scott D. Griebel	Scott D. Griebel	5/7/96
Manager, Kaiser-Hill NS	John J. Zimmer		5/9/96
ORC	Pu/HORC-96-022 Don R. Panton	Don R Panton	5/13/96
Responsible Manager	T.D. Beckman for D.F. Dustin	T.D. Beckman	13 May 96
Operations Manager	PAUL SASA		5/13/96

Note 1 CSR	Note 2 CEV	Note 3 Peer Reviewer	Note 4 Manager, Kaiser-Hill NS	Note 5 ORC
Rev. 1 - JCB 5/30/96	Rev. 1 - OMJ 5/30/96	Rev. 1 - 5/30/96	Rev. 1 - 6/3/96	Rev. 1 DRP Pu/HORC-96-031

Note 6 Responsible Manager	Note 7 Operations Manager	Note 8 Revision No.	Note 9 New Evaluation Required ✓	
			Yes	No
Rev. 1 - T.D. Beckman 5 Jun 96 for D.F. Dustin	Rev. 1 -	REVISION 1 - 5/30/96		✓ Revision 1 - 5/30/96

Note 1: If the CSR is needed for revision, then CSR initials, otherwise CEV marks N/A and initials.
Note 2: The Certified Evaluator initials for revision of USQD.
Note 3: Peer Reviewer initials for revision of USQD.
Note 4: Manager, Kaiser Hill NS initials for revision.
Note 5: ORC initials for revision.
Note 6: Responsible Manager initials for revision.
Note 7: Operations Manager initials for revision.
Note 8: Revision of the USQD.
Note 9: Check (✓) if revision significant to require reevaluation. Initials above needed to confirm only *No* determinations and a justification is required.
Note 10: Changes to this USQD shall be made by a Certified Evaluator.
Note 11: Mark not applicable signature blanks "N/A".

REVISION DOCUMENTATION SHEET

Revision Number	Date	Justification for 'No Evaluation' Required
1	5/28/96	Revision 1 to this safety evaluation is being performed to incorporate the following changes, which are identified with revision bars within the body of the USQD. - incorporates a .5 respirable factor (50% respirable for unfiltered releases) in the formula for determining the MOI dose for the dock spill and fire scenarios. - provides clarification for which frequency bins are affected by the proposed activity. - adds PC-2 and PC-4 fire to the Failure Mode & Accident Identification Section, as well as Question 2, Table 2, and the conclusion. - adds PC-3 fire scenario (inside module) to Question 2. - adds the PC-2 glovebox spill scenario to Question 2. - changes answer to questions 4 and 7 from "YES" to "NO". - adds spill scenario to Question 5. - adds reference to CSOL-960001 (200 gram limit for residue repack). - deletes required actions from Question 13. - incorporates administrative changes that provide clarification and/or additional justification to the responses for the subject questions. These changes are required to maintain consistency with the methodology identified in the Building 707 FSAR and supporting documentation.

5

1-C11-NSM-04.05

UNREVIEWED SAFETY QUESTION DETERMINATION

USQD Number: USQD-707-96.0426-OMJ

USQD Title: RESIN RESIDUE REPACK, BUILDING 707
PROCEDURE NUMBER 4-V75-RS-0111, REVISION 0
DOCUMENT MODIFICATION REQUEST 96-DMR-000262

Description and Purpose of Proposed Activity:

Prior to 1989, ion exchange resin was used to purify plutonium solutions as part of aqueous plutonium recovery process operations. Since 1989, approximately 226 kg of residue resin has remained in storage in various packaging configurations (i.e., 15-liter Kraft tubes that have been double-wrapped in plastic bags and placed in 55-gallon drums, 1-liter Vollrath cans, and 10-gallon drums). Storage locations include Buildings 371, 771, 776/777, and 779. This activity addresses the repackaging of the ion exchange resins from their current packaging configuration into 4-liter Nalgene bottles to be subsequently packaged into 55-gallon drums. Completion of this activity is a requisite precursor to the cementation of ion exchange resins in conjunction with liquid stabilization operations in the Building 774 Bottle Box.

The referenced procedure, 4-V75-RS-0111, will be utilized to unpack, neutralize, and repack the resin residue. The general topics included in this procedure include:

Opening and Inspecting Drums in the Module-A "C" Cell
- survey and decontaminate the exterior of the drum (per 4-30000-FO-0001)
- open the drum
- survey and decontaminate the drum lid and upper drum liner (per 4-30000-FO-0001)
- visually inspect the drum contents for deficiencies
- remove contents from drum and place in a poly bag
- survey and decontaminate the poly bag (per 4-30000-FO-0001)
- hand carry the poly bag to the glovebox
- bag the poly bag into the glovebox

Repacking Line-Generated Resin Residue Containers
- bag all required tools and equipment into the glovebox
- unbag containers to be repacked
- pour contents of package into the stainless steel pans
- sample contents per 4-Q40-FO-0134, as required per residue stabilization sampling management plan
- test the resin using pH paper, to ensure they are basic (as apposed to acidic)
- if required, add potassium hydroxide in 10 ml increments to achieve the desired pH
- mark poly bottles
- scoop resin into 4-liter poly bottle, verify acceptable weight (per Appendix 2 of 4-V75-RS-0111)
- repeat as required until all resin residue has been repackaged in poly bottles
- perform gram estimation on each bottle (per 4-30000-FO-1023), verify within acceptable limits
- if required, repartition contents, reverify gram estimation is within acceptable limits

Nondestructive Assay of the Repacked Resin Residue Bottles
- bag out bottles per 4-B22-FO-0010 and transfer to can counter in Module "H"
- perform can count on each bottle and record NDA data
- return bottles to "A" Module
- verify plutonium content is ≤ 10g
- notify supervision if Pu content is not within acceptable limit
  - for bottles with ≥ 20g with a 95% confidence interval, repartition the bottle
  - for bottles with < 20g with a 95% confidence interval, determine if the bottle can be batched with liquids at the Bottle Box (dependent upon Pu content of the bottle and batching operations)
- calculate number of drums required to transport bottles (maximum of 8 bottles per drum)

Drumming of the Repacked and Assayed Resin Residue Bottles

- prepare drum(s) per 4-D99-WO-1100 & the RFP Transportation Safety Manual
- place bottles into drum(s), per required instructions (maximum of 8 bottles per drum)
- close and seal drum(s) per 4-D99-WO-1100 & the RFP Transportation Safety Manual
- for drums with less than 8 bottles, close and lock drum
- generate Waste/Residue Traveler in accordance with 4-D99-WO-1100 & the RFP Transportation Safety Manual
- label drum(s) per 4-D99-WO-1100 & the RFP Transportation Safety Manual
- install TID(s) per NMS TID(R)-001 requirements (Tamper Indicating Device Program)

Upon completion of the repackaging process, the drums will be stored in a designated storage area until such time as they are approved for transfer to Building 774 for processing.

A USQD is being performed because the proposed activity is a new process not identified in the Building 707 FSAR or its authorization bases.

The proposed activity is identified in Section MP-SMM-020.A of the Master Activity List (MAL).

Reference Documents:

1. USQD-707-96.0363-OMJ - Install FPS for C-Cell, Module-A
2. USQD-707-94.1523-WGH - Impact of DOP Testing Only 2-Stages of the 4-Stage Zone I/IA HEPA Filters in Building 707
3. USQD-774-96.0256-MAC (Draft) - Building 774 Integrated Operations
4. Kaiser-Hill Interoffice Correspondence - Master Activity List Authorization Agreement - MRS-042-96
5. Kaiser-Hill Interoffice Correspondence - Fire Protection Requirements for Use of "C" Cell, Building 707 BGC-020-96
6. SSOC Correspondence - Mission Program Activities - ARS-011-96
7. SSOC Correspondence - Fire Protection in the "C" Cell, Building 707 - TdB-001-96
8. SSOC Correspondence - Plan for Fire Protection in the "C" Cell, Building 707 - TdB-002-96
9. SSOC Correspondence - White Paper on Resin Pyrophoricity - TdB-003-96
10. CALC-707-FW-000208, Rev. 2 - Fire Protection Requirements for the Contamination Control Cell
11. SISMP - Site Integrated Stabilization Management Plan, Revision 4
12. 3-J69-NSPM-5C-01, Rev. 1 - Evaluation of Unreviewed Safety Questions
13. NSTR-014-94, Rev 0 - Safety assessment of Building 771 Phase II Liquid Stabilization Transition Activity TA-12 Resin Removal
14. EG&G Correspondence - Transmittal of Final Data and Reports for Holdup in Untoward Areas, Building 707 - RDC-168-93
15. USQD-RFP-93.1170-TLF - Plutonium Storage Issues Including HSP/FLP 31.11
16. USQD-RFP-94.0084-TLF - Transfer & Storage of Plutonium for Fire Safety
17. USQD-707-94.0375-SDK - Building 707 Implementation Plan for Compliance with HSP 31.11
18. USQD-RFP-94.1186-BWW - DOE Pu ES&H Vulnerability Assessment, Rocky Flats Site Assessment Team Report
19. DOE-HDBK-3010-94 - DOE Handbook, Airborne Release Fractions/Rates and Respirable Fractions for Nonreactor Nuclear Facilities, December 1994
20. SSOC Interoffice Correspondence - On-Site Transportation Package Exception Request - TdB-004-96
21. On-Site Transportation Committee Correspondence - On-Site Transportation Safety Committee Approval - VCA-022-96

22. MAL	- Master Activity List, Revision 2
23. MP-SMM-020.A	- Building 707 Repackaging of Residue Ion Exchange Resins (MAL)
24. MP-SMM-024	- Building 774 Direct Cementation Process (MAL)
25. The Defense Nuclear Facilities Safety Board Recommendation 94-1 Implementation Plan	- Section 3.3; Plutonium Oxides and Mixed Residues, February 1995
26. Procedure 4-30000-FO-0001, Rev. 0	- Decontamination
27. Procedure 4-Q40-FO-0134, Rev. 0	- Inorganic Solid Residue Sampling, Building 707
28. Procedure 4-V75-RS-0111, Rev. 0	- Resin Residue Repack, Building 707
29. Procedure 4-30000-FO-1023, Rev. 0	- Gram Estimation
30. Procedure 4-B22-FO-0010, Rev. 1	- 707 Glovebox Operations
31. Procedure 4-D99-WO-1100, Rev. 0	- Solid Radioactive Waste Packaging Inside the PA
32. 1-791-Traffic-100, Rev. 0	- RFP Transportation Manual
33. NMS TID(R)-001, Rev. 0	- Requirements: Tamper Indicating Device (TID) Program
34. Procedure 4-B19-NSM-03.12, Rev. 0	- Nuclear Material Safety Limits and Criticality Safety Operating Limits Surveillance
35. Criticality Safety Operating Limit	- CSOL-960022: 1000 gram Wet Residue Repack Limit (draft)
36. Criticality Safety Operating Limit	- CSOL-960001: 200 gram Residue Repack

Applicable Requirements:

Building 707 FSAR	- Final Safety Analysis Report
ALARA Review 96-707-10	- Repacking Resin Residue for Cementation Processing
Shift Order 707-95-001	- Additional Compensatory measures for "C" Cell Operations during the Performance of 4-J23-FO-0133 and 4-Q40-FO-134
DOE-N-441.1	- Radiation Protection for DOE Activities
DOE Order 5480.21	- Unreviewed Safety Questions
DOE Order 5480.23	- Nuclear Safety Analysis Reports
DOE-O-440.1	- Worker Protection Mgmt for DOE Federal and Contractor Employees

Safety, Operating Function, and Operating Conditions Identification:

Per the white paper on resin pyrophoricity (reference 9), "Ion exchange resin consists of fine beads of polymeric material (plastic) composed of styrene and divinyl benzene monomer units. Plutonium purification was accomplished by the selective adsorption of plutonium ions (either Pu^{+3} ions on cation exchange resin or $Pu(NO_3)_6^{-2}$ on anion exchange resin). The resin was loaded onto [sic] an ion exchange column where the adsorption process took place. The adsorbed plutonium ions were eventually eluted from the column for subsequent purification steps using 0.35M nitric acid for anion exchange resin or, in the case of cation exchange resin, 7.0M nitric acid. Resin in the column was periodically replaced. During the replacement operation, some of the resin was either washed with water (producing leached ion exchange resin, IDC 431) or packaged directly (producing unleached ion exchange resin, IDC 430)."

This activity addresses the repackaging of ion exchange resins from their current packaging configuration into 4-liter Nalgene bottles to be subsequently packaged into 55-gallon drums. Completion of this activity is a requisite precursor to the cementation of ion exchange resins in conjunction with liquid stabilization operations in the Building 774 Bottle Box.

The only Limiting Condition for Operation (LCO) that directly pertains to this activity is OSR 7.3.7.1.1 (Criticality Safety Operating Limits). This LCO states: "Activities or processes involving fissile material shall have CSOLs which shall be posted and met. Upon first indication of exceeding any CSOL, the RA [Remedial Actions] shall be taken."

8

The Remedial Actions require the following: "Upon first indication that any CSOL has been exceeded, IMMEDIATELY take action to prevent further changes in the configuration of fissile material. IMMEDIATELY notify building supervision. The contractor's Nuclear Safety Engineering group shall provide operations supervision with the necessary guidance for subsequent corrective action per approved contractors procedures. Do not resume operations directly affected by the infraction until: (1) Nuclear Safety Engineering personnel have determined that the Double Contingency Principle has not been violated, (2) Compliance with the Double Contingency Principle is confirmed, and (3) Responsible management has critiqued the incident and implemented appropriate corrective actions. If long-term actions are required to fully correct a situation, appropriate short-term corrective actions may be implemented and operations resumed provided: (1) The long-term actions are documented in an approved action plan and (2) Management and the Nuclear Safety Engineering group determine operations can continue under the short-term corrective actions without compromising criticality safety. Report all CSOL infractions to DOE per Section 7.5.2. If Nuclear Criticality Engineering personnel determine that the requirements of a CSOL have been violated, IMMEDIATELY TERMINATE OPERATIONS directly affected by the infraction and report per Section 7.5.2." (reference OSR 7.3.7.1.1)

The Surveillance Requirements require that "Prior to performing any activity or process involving fissile material, verify applicable CSOLs are being met."

Specific instructions are provided in procedure 4-V75-RS-0111 that require all fissile material to be handled in accordance with the applicable Criticality Safety Operating Limits (CSOLs) and that all intraplant shipments be governed by the applicable Nuclear Materials Safety Limit (NMSL). Additionally, specific instructions are provided that require verification that the pre-operational surveillances have been completed in accordance with 4-B19-NSM-03.12, Nuclear Material Safety Limits and Criticality Safety Operating Limits Surveillance, which will assure the appropriate CSOLs (NMSLs) have been identified.

Performance of the proposed activity (unpacking, neutralization, and repacking the resin residue) does not affect operability of any VSS equipment. It is assumed that all associated VSS equipment and/or systems required to facilitate completion of this activity will be maintained in compliance with the applicable LCOs (i.e., HVAC, Fire Protection Systems, Emergency Power, etc.).

Failure Mode, Hazard, and Accident Identification:

Per the white paper on resin pyrophoricity (reference 9), the resin is not considered a hazardous waste, however, there is a concern that the intimate contact of an oxidant (dilute nitric acid) and an organic substrate (the polymeric beads) may, over time, result in the generation of a product which could have a reduced ignition temperature. In order to ensure that stored resin does not become a potential safety hazard, EG&G, the operating contractor in 1994, embarked on a program to investigate candidate processes to eliminate any potential for an adverse oxidizer/fuel reaction leading to the generation of readily ignitable materials. Three resin stabilization treatment options were considered in the selection process: denitration, direct cementation, and cementation in conjunction with liquid waste stabilization. Simple repacking of the resin to meet WIPP Waste Acceptance Criteria was not considered as a suitable alternative due to the potential of having to store the material for an extended period of time.

Nitrates within the resin matrix could be present in one of three chemical forms. First, nitro groups ($-NO_2$) could be covalently bonded to the organic matrix forming nitro-organic compounds. This situation is not likely, since the conditions necessary to effect the nitration reaction have never existed at RFETS. Such a reaction requires the presence of a mixture of concentrated sulfuric and nitric acids. Recent tests with more readily nitrated materials (cellulose) and concentrated nitric acid alone at elevated temperatures showed that the nitration reaction did not take place.

9

The second possible form of nitrates within the resin matrix is organic nitrate ions (NO_3^{-1}) bound to exchange sites. In anion exchange resin, positively charged exchange sites are ionically bound to anions, such as nitrate ions. The exchange process substitutes negatively charged plutonium complex anions for nitrate ions. The regeneration of the resin column reverses the process leaving nitrate ions bound to the resin. Washing the resin with water after use will leave some if not most of the nitrate ions in place, therefore, there is a high probability that ionically bound nitrate ions are present in the resin.

The third form of nitrate within the resin matrix is as interstitial nitric acid (HNO_3). Resin is very porous material by design, since effective ion exchange requires high surface area and intimate contact between dissolved species and the resin exchange sites. Unleached ion exchange resin is highly likely to contain interstitial dilute nitric acid, even though the resin itself may not contain obvious free liquid. Leached ion exchange resin, which has been washed with water, will have a lower probability of containing interstitial nitric acid.

The concern associated with nitrate-contaminated ion exchange resin is two-fold. First, there is the possibility that spontaneous combustion may take place. There are several documented incidents of spontaneous combustion at the Savannah River Site which were attributed to the presence of mixtures of nitric acid and organic materials. Second, there is the possibility that long-term storage of nitric/organic mixtures will generate reaction products having low ignition temperatures. The data supporting this position is conflicting, but the possibility remains that reaction products having an ignition temperature of 60°C or lower may be present.

The proposed method of treating ion exchange resins addresses both the spontaneous combustion and ignitability concerns. Immobilizing resin in cement would not remove any nitrate from the matrix but would sufficiently encapsulate the material so that any potential fire hazard would be effectively eliminated.

The accidents that were analyzed in Chapter 8 of the Building 707 FSAR and subsequently re-evaluated in USQD-707-94.1523-WGH (reference 2) include natural phenomena and operational accidents. The operational accidents include fires, explosions, spills/other releases, and criticalities. The identified fire and spill scenarios include plutonium, plutonium oxides, and Pu waste drums. There are no specific accident scenarios identified for the fire and spill hazards associated with the processing of ion exchange resins within the Building 707 complex.

The bounding category of postulated accident scenarios that could be applied to the proposed activity would be spills and/or fires, resulting from the activities required to complete the repackaging process. The following postulated accident scenarios show a comparison of the proposed activity with the consequences identified for Building 707 analyzed accidents (see Table 2). The frequency categories for the postulated accident scenarios (i.e., PC-2, PC-3, and PC-4) have been qualitatively assessed using the methodology of similar accident scenarios identified in the Building 707 FSAR.

There are approximately 24 resin residue storage drums that contain approximately 1,359 g/Pu that will ultimately be processed via the instructions contained in procedure 4-V75-RS-0111. The Pu content of each container varies from a minimum of 4 g Pu/drum to a maximum of 267 g Pu/drum. The criticality safety operating limit associated with this type of activity is 1000 g Pu/drum for wet residue (proposed but not yet implemented, reference 35). Using this limit as the worst case accident scenario for comparison to 5C-01 criteria, the MOI dose would be calculated as follows:

NOTE: The following accident analyses are based on CSOL-960022 (reference 35) which is presently in the draft stage. Until such time that this CSOL has been approved and implemented, all activities associated with procedure 4-V75-RS-0111 shall be in compliance with CSOL-960001 (reference 36), which is the existing 200 gram limit for residue repacking activities.

10

SPILLS - Inside Glovebox / or outside (PC-2): From reference 19 above, the identified release fraction for spilled resin is 1 E-3. When considering a spill scenario for this activity, if all 1000 grams of Pu that could be contained within the glovebox is used as the dispersible material-at-risk (MAR), and is applied to a release fraction of 1 E-3, an initial source term of 1 E+0 grams is obtained. In Building 707 credit can be taken for two stages of HEPA filtration (ZONE I) which allows a building leak path factor (BLPF) of 2 E-6. After applying the initial source term of 1 E+0 grams to the BLPF factor of 2 E-6, and the gram-rem conversion factor of 0.37 rem/gm, a dose of 7.40 E-7 rem to the Maximum Offsite Individual (MOI) is obtained. When compared to the Building 707 authorization basis as documented in reference 12, the 50-year bone dose to the MOI for this postulated accident scenario would exceed the threshold criteria for the PC-1 and PC-2 frequency categories. (see Table 1)

SPILLS - Breached Drum on the Dock (PC-3): From reference 19 above, the identified release fraction for spilled resin is 1 E-3. When considering a spill scenario for this activity, if all 1000 grams of Pu that could be contained in one resin drum is used as the dispersible material-at-risk (MAR), and is applied to a release fraction of 1 E-3, an initial source term of 1 E+0 grams is obtained. In Building 707, the building leak path factor (BLPF) for the dock area is 1 E-2 (reference Section 8.1.3.1 of the FSAR) with doors open. After applying the initial source term of 1 E+0 grams to the BLPF factor of 1 E-2, and incorporating a respirable factor of .5 (50% respirable for unfiltered releases) and the gram-rem conversion factor of 0.37 rem/gm, a dose of 1.85 E-3 rem to the Maximum Offsite Individual (MOI) is obtained. When compared to the Building 707 authorization basis as documented in reference 12, the 50-year bone dose to the MOI for this postulated accident scenario would exceed the MOI threshold limits identified for all frequency categories (PC-1 through PC-4). (see Table 1)

SPILLS - Inside the Module (PC-3): From reference 19 above, the identified release fraction for spilled resin is 1 E-3. When considering a spill scenario for this activity, if all 1000 grams of Pu that could be contained in one resin drum is used as the dispersible material-at-risk (MAR), and is applied to a release fraction of 1 E-3, an initial source term of 1 E+0 grams is obtained. In Building 707, credit can be taken for two stages of HEPA filtration which allows a building leak path factor (BLPF) of 2 E-6. After applying the initial source term of 1 E+0 grams to the BLPF factor of 2 E-6, and the gram-rem conversion factor of 0.37 rem/gm, a dose of 7.40 E-7 rem to the Maximum Offsite Individual (MOI) is obtained. When compared to the Building 707 authorization basis as documented in reference 12, the 50-year bone dose to the MOI for this postulated accident scenario would be within the threshold limits for the PC-3 frequency category. (see Table 1)

FIRE - Inside Glovebox (PC-2): From reference 19 above, the identified release fraction for burning resin is 8 E-3. When considering a fire scenario for this activity, if all 1000 grams of Pu that could be contained in the glovebox is used as the dispersible material-at-risk (MAR), and is applied to a release fraction of 8 E-3, an initial source term of 8 E+0 grams is obtained. In Building 707, credit can be taken for two stages of HEPA filtration (Zone I) which allows a building leak path factor (BLPF) of 2 E-6. After applying the initial source term of 8 E+0 grams to the BLPF factor of 2 E-6, and the gram-rem conversion factor of 0.37 rem/gm, a dose of 5.92 E-6 rem to the Maximum Offsite Individual (MOI) is obtained. When compared to the Building 707 authorization basis as documented in reference 12, the 50-year bone dose to the MOI for this postulated accident scenario would exceed the MOI threshold limits identified for the PC-2 and PC-3 frequency categories. (see Table 1)

FIRE - Inside the Module (PC-3): From reference 19 above, the identified release fraction for burning resin is 8 E-3. When considering a fire scenario for this activity, if all 1000 grams of Pu that could be contained in one resin drum is used as the dispersible material-at-risk (MAR), and is applied to a release fraction of 8 E-3, an initial source term of 8 E+0 grams is obtained. In Building 707, credit can be taken for two stages of HEPA filtration which allows a building leak path factor (BLPF) of 2 E-6. After applying the initial source term of 8 E+0 grams to the BLPF factor of 2 E-6, and the gram-rem conversion factor of 0.37 rem/gm, a dose of 5.92 E-6 rem to the Maximum Offsite Individual (MOI) is obtained.

It should be noted that the accident analyzed in Chapter 8 of the FSAR, postulated the fire to start outside of the glovebox and have sufficient combustible material loading to allow the fire to breach a glovebox containing radioactive material. That evaluation utilized a glovebox leakpath factor in factoring the consequences of the accident. Since radioactive material is present in the resin residue, the glovebox release fraction was omitted in determining the MOI dose for this evaluation. In either case, the MOI dose would exceed the threshold limit for the PC-2 and PC-3 frequency categories, as identified in reference 12. (see Table 1)

FIRE - On the Dock (PC-3): From reference 19 above, the identified release fraction for burning resin is 8 E-3. When considering a fire scenario for this activity, if all 1000 grams of Pu that could be contained in one resin drum is used as the dispersible material-at-risk (MAR), and is applied to a release fraction of 8 E-3, an initial source term of 8 E+0 grams is obtained. In Building 707, the building leak path factor (BLPF) for the dock area is 1 E-4 (reference Section 8.1.1.3 of the FSAR) with the doors closed. After applying the initial source term of 8 E+0 grams to the BLPF factor of 1 E-4 and the gram-rem conversion factor of 0.37 rem/gm, a dose of 2.96 E-4 rem to the Maximum Offsite Individual (MOI) is obtained. When compared to the Building 707 authorization basis as documented in reference 12, the 50-year bone dose to the MOI for this postulated accident scenario would exceed the threshold criteria for the PC-2 and PC-3 frequency categories. (see Table 1)

FIRE - On the Dock (PC-4): From reference 19 above, the identified release fraction for burning resin is 8 E-3. When considering a fire scenario for this activity, if all 1000 grams of Pu that could be contained in one resin drum is used as the dispersible material-at-risk (MAR), and is applied to a release fraction of 8 E-3, an initial source term of 8 E+0 grams is obtained. In Building 707, the building leak path factor (BLPF) for the dock area is 1 E-1 (reference Section 8.1.1.3 of the FSAR) with doors open. After applying the initial source term of 8 E+0 grams to the BLPF factor of 1 E-1, and incorporating a respirable factor of .5 (50% respirable for unfiltered releases) and the gram-rem conversion factor of 0.37 rem/gm, a dose of 1.48 E-1 rem to the Maximum Offsite Individual (MOI) is obtained. When compared to the Building 707 authorization basis as documented in reference 12, the 50-year bone dose to the MOI for this postulated accident scenario would exceed the threshold criteria for all frequency categories (PC-2 through PC-4). (see Table 1)

Table 1
Building 707 Operational Accidents Radiological Safety Decision Threshold Criteria
50-year Bone Dose as Identified in 3-J69-NSPM-5C-01, Revision 1

Frequency Category	PC-1	PC-2	PC-3	PC-4
Fire	——	1 E-6 rem	2 E-6 rem	3 E-3 rem
Spill	1 E-7 rem	5 E-7 rem	2 E-4 rem	2 E-4 rem

Table 2
Postulated Accidents for Proposed Activity
Comparison to 50-year Bone Dose Threshold Criteria

Postulated Accident	Frequency Category	Existing 5C-01 Dose to MOI	MOI Dose for Proposed Activity	Proposed MOI Dose Results in a "USQ" Y/N
Spill-Inside Glovebox (or outside) Scenario #1	PC-2	5 E-7 rem	7.40 E-7 rem	Y
Spill-On Dock Scenario #2	PC-3	2 E-4 rem	1.85 E-3 rem	Y
Spill carry over	PC-4	2 E-4 rem	1.85 E-3 rem	Y
Fire-Inside Glovebox Scenario #1	PC-2	1 E-6 rem	5.92 E-6 rem	Y
Fire-On Dock Scenario #3a	PC-3	2 E-6 rem	2.96 E-4 rem	Y
Fire-On Dock Scenario #4b	PC-4	3 E-3 rem	1.48 E-1 rem	Y
Spill-Inside Module	PC-3	2 E-4 rem	7.40 E-7 rem	N
Fire-Inside Module	PC-3	2 E-6 rem	5.92 E-6 rem	Y

It should be noted that concentrated nitric acid is a strong oxidizer and when combined with organic material could result in fires and/or explosions. However, the strength of the nitric acid left on the ion-exchange resin is expected to be very low, therefore, the explosion capability is qualitatively judged to be an incredible event.

The proposed activity of inspection and/or unpacking the residue drums will be performed in the Module-A "C" Cell. Because this enclosure is not presently equipped with an automatic fire suppression system, an evaluation was performed by Fire Protection Engineering to determine the feasibility of utilizing this space prior to the installation of a fire suppression system. This evaluation determined that the drivers for the installation of an automatic sprinkler system in the "C" Cell are best industry standard and defense in depth. The requirements for the sprinkler system are not based on an authorization basis requirement due to the provisions of sprinklers at the module ceiling. This evaluation concluded that the "C" Cell could be utilized for repacking the resin residue drums, prior to the installation of the fire suppression system, based on the following administrative controls.

- A maximum of 2 Kraft tubes are approved per evolution. For drums that contain more than 2 Kraft tubes, only 2 Kraft tubes may be processed at one time. The balance of the Kraft tubes shall remain in the drum which shall be resealed and stored outside of the "C" Cell. The maximum SAN net weight per Kraft tube is 41 kg.
- Storage within the "C" Cell is not permitted.
- Two pressurized water fire extinguishers shall be placed near the "C" Cell to provide protection of the tubes.
- After placing the automatic sprinkler system in-service (in about 6 months), the above administrative controls will no longer be required, except for the two fire extinguishers.

Written guidance per 1-G58-COOP-13 shall be written to invoke the required actions prior to the performance of any activities identified in the referenced procedure. The Shift Manager shall ensure that all designated

personnel have been trained and qualified with respect to operation of the fire extinguishers.

Performance of this proposed activity is one that presents a potential for personnel contamination, however, controls have been imposed as part of the work process to minimize this risk and provide a reasonable level of control of this risk. Consequences (both direct and indirect) could lead to possible release and/or spread of radioactive contamination. Proper conduct of the radiological surveys will assist in the safe conduct of the subsequent operations.

Unreviewed Safety Question Determination Questions:

1. **Could the proposed activity increase the probability of occurrence of an accident previously evaluated in a Safety Analysis? Yes __ No _X_ Explain:**

   The accidents that were analyzed in Chapter 8 of the Building 707 FSAR and subsequently re-evaluated in USQD-707-94.1523-WGH include natural phenomena and operational accidents. The operational accidents include fires, explosions, spills/other releases, and criticalities. The identified fire and spill scenarios include plutonium, plutonium oxides, and Pu waste drums. There are no specific accident scenarios identified for the fire and spill hazards associated with the processing of ion exchange resins within the Building 707 complex.

2. **Could the proposed activity increase the consequences of an accident previously evaluated in a Safety Analysis? Yes _X_ No __ Explain:**

   The bounding PC-2 spill scenario associated with this activity would be a spill inside the glovebox. When considering a spill scenario for this activity, if all 1000 grams of Pu that could be contained within the glovebox is used as the dispersible material-at-risk (MAR), and is applied to a release fraction of 1 E-3, an initial source term of 1 E+0 grams is obtained. In Building 707, credit can be taken for two stages of HEPA filtration (ZONE I) which allows a building leak path factor (BLPF) of 2 E-6. After applying the initial source term of 1 E+0 grams to the BLPF factor of 2 E-6, and the gram-rem conversion factor of 0.37 rem/gm, a dose of 7.40 E-7 rem to the Maximum Offsite Individual (MOI) is obtained. When compared to the Building 707 authorization basis as documented in reference 12, this dose exceeds the 50-year bone dose to the MOI and establishes new criteria for the PC-2 frequency category.

   The bounding PC-3 spill scenario associated with this activity would be a breached drum on the dock with doors open. When considering a spill scenario for this activity, if all 1000 grams of Pu that could be contained in one resin drum is used as the dispersible material-at-risk (MAR), and is applied to a release fraction of 1 E-3 (reference 19), an initial source term of 1 E+0 grams is obtained. In the Building 707 FSAR, the building leak path factor (BLPF) for the dock area is 1 E-2 (reference Section 8.1.3.1 of the FSAR). After applying the initial source term of 1 E+0 grams to the BLPF factor of 1 E-2, and incorporating a respirable factor of .5 (50% respirable for unfiltered releases) and the gram-rem conversion factor of 0.37 rem/gm, a dose of 1.85 E-3 rem to the Maximum Offsite Individual (MOI) is obtained. The greater amount of material-at-risk (1000 g Pu/drum) versus the FSAR analyzed spill (100 g Pu/drum) results in an increase in consequences for the postulated spill scenario. When compared to the Building 707 authorization basis as documented in reference 12, this dose exceeds the 50-year bone dose to the MOI and establishes new criteria for both the PC-3 and PC-4 frequency categories.

   The bounding PC-2 fire scenario associated with this activity would be a fire inside the glovebox. When considering a fire scenario for this activity, if all 1000 grams of Pu that could be contained in the glovebox is used as the dispersible material-at-risk (MAR), and is applied to a release fraction of 8 E-3, an initial source term of 8 E+0 grams is obtained. In Building 707, credit can be taken for two stages of HEPA filtration (Zone I) which allows a building leak path factor (BLPF) of 2 E-6. After

applying the initial source term of 8 E+0 grams to the BLPF factor of 2 E-6, and the gram-rem conversion factor of 0.37 rem/gm, a dose of 5.92 E-6 rem to the Maximum Offsite Individual (MOI) is obtained. When compared to the Building 707 authorization basis as documented in reference 12, this dose exceeds the 50-year bone dose to the MOI and establishes new criteria for the PC-2 frequency category.

The bounding PC-3 fire scenario associated with this activity would be a fire on the dock with the doors closed. When considering a fire scenario for this activity, if all 1000 grams of Pu that could be contained in one resin drum is used as the dispersible material-at-risk (MAR), and is applied to a release fraction of 8 E-3 (reference 19), an initial source term of 8 E+0 grams is obtained. In Building 707, the building leak path factor (BLPF) for the dock area is 1 E-4 (reference Section 8.1.1.3 of the FSAR). After applying the initial source term of 8 E+0 grams to the BLPF factor of 1 E-4 and the gram-rem conversion factor of 0.37 rem/gm, a dose of 2.96 E-4 rem to the Maximum Offsite Individual (MOI) is obtained. The greater release fraction of burning resins (8 E-3) versus the FSAR release fraction for dock fires (5 E-4) results in an increase in consequences for the postulated fire scenario. When compared to the Building 707 authorization basis as documented in reference 12, this dose exceeds the 50-year bone dose to the MOI and establishes new criteria for the PC-3 frequency categories.

Additionally, although bounded by the previous PC-3 fire scenario, a new accident can be postulated for this activity (i.e., fire inside the module). When considering a fire scenario for this activity, if all 1000 grams of Pu that could be contained in one resin drum is used as the dispersible material-at-risk (MAR), and is applied to a release fraction of 8 E-3, an initial source term of 8 E+0 grams is obtained. In Building 707, credit can be taken for two stages of HEPA filtration (Zone II) which allows a building leak path factor (BLPF) of 2 E-6. After applying the initial source term of 8 E+0 grams to the BLPF factor of 2 E-6, and the gram-rem conversion factor of 0.37 rem/gm, a dose of 5.92 E-6 rem to the Maximum Offsite Individual (MOI) is obtained. When compared to the Building 707 authorization basis as documented in reference 12, this dose also exceeds the 50-year bone dose to the MOI for the PC-3 frequency category.

The bounding PC-4 fire scenario associated with this activity would be a fire on the dock with the doors open. When considering a fire scenario for this activity, if all 1000 grams of Pu that could be contained in one resin drum is used as the dispersible material-at-risk (MAR), and is applied to a release fraction of 8 E-3, an initial source term of 8 E+0 grams is obtained. In Building 707, the building leak path factor (BLPF) for the dock area is 1 E-1 (reference Section 8.1.1.3 of the FSAR). After applying the initial source term of 8 E+0 grams to the BLPF factor of 1 E-1, and incorporating a respirable factor of .5 (50% respirable for unfiltered releases) and the gram-rem conversion factor of 0.37 rem/gm, a dose of 1.48 E-1 rem to the Maximum Offsite Individual (MOI) is obtained. When compared to the Building 707 authorization basis as documented in reference 12, this dose exceeds the 50-year bone dose to the MOI and establishes new criteria for the PC-4 frequency category.

Although the Building 707 FSAR does not identify any specific accident scenarios associated with the processing of ion exchange resins, it has been shown by the postulated accident scenarios that this activity exceeds the threshold criteria as identified in the referenced authorization basis documents and would result in an increase in the 50-year bone dose to the Maximum Offsite Individual (MOI). Therefore, this question would warrant a "YES" answer to identify an increase in the consequences of accidents previously analyzed in a Safety Analysis.

3. **Could the proposed activity increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in Safety Analyses?**
Yes ___ No _X_ Explain:

Performance of the proposed activity (unpacking, neutralization, and repacking the resin residue) does

not affect operability of any VSS equipment. It is assumed that all associated VSS equipment and/or systems required to facilitate completion of this activity will be maintained in compliance with the applicable LCOs (i.e., HVAC, Fire Protection Systems, Emergency Power, etc.).

4. **Could the proposed activity increase the consequence of a malfunction of equipment important to safety previously evaluated in Safety Analyses? Yes ___ No _X_ Explain:**

Performance of the proposed activity (unpacking, neutralization, and repacking the resin residue) does not affect operability of any VSS equipment and therefore has no impact on the consequences of a malfunction of equipment important to safety previously evaluated in safety analyses.

5. **Could the proposed activity create the possibility of an accident of a different type than any previously evaluated in Safety Analyses? Yes _X_ No ___ Explain:**

The referenced procedure, 4-V75-RS-0111, will be utilized to unpack, neutralize, and repack the resin residue. The accidents that were analyzed in Chapter 8 of the Building 707 FSAR and subsequently re-evaluated in reference 2 (USQD-707-94.1523-WGH) include natural phenomena and operational accidents. The operational accidents include fires, explosions, spills/other releases, and criticalities. The identified fire and spill scenarios include plutonium, plutonium oxides, and Pu waste drums. There are no specific accident scenarios identified for the fire and spill hazards associated with the processing of ion exchange resins within the Building 707 complex.

The proposed activity involves opening drums containing Kraft tubes outside of a glovebox but inside the "C" Cell, where spills could occur. The previous spills evaluated in the FSAR dealt only with "in glovebox", "overpressurized Glovebox", and "dock" spills. Therefore, the proposed activity is considered to have the potential to create the possibility of a spill accident of a different type than any previously evaluated in safety analyses.

Additionally, the resin residue has different characteristics than those previously evaluated in the FSAR (i.e., higher release fraction associated with resin fires). Therefore, the proposed activity is considered to have the potential to create the possibility of a fire accident of a different type than any previously evaluated in safety analyses.

6. **Could the proposed activity create the possibility of a malfunction of equipment important to safety of a different type than any previously evaluated in Safety Analyses? Yes ___ No _X_ Explain:**

The referenced procedure, 4-V75-RS-0111, is limited to unpacking, neutralizing, and repacking the resin residue. Performance of this activity does not affect or challenge the operability of any VSS equipment and/or systems nor is it postulated to have any impact on equipment important to safety.

7. **Could the proposed activity reduce the margin of safety as defined in the basis for any TSR? Yes ___ No _X_ Explain:**

The OSR/LCOs are the Department of Energy (DOE) facility-specific requirements which define the conditions, safe boundaries and the bases thereof, and management or administrative controls required to ensure the safe operation of a nuclear facility. As part of the facility Final Safety Analysis Report (FSAR), the OSRs provide a description of the controls used to eliminate, confine, or mitigate the consequences of hazards associated with a facility and its operation. The objective of the Fire Protection LCO is to ensure that the building fire protection systems and their associated components are capable of performing their intended function(s), such that the Building FSAR risk envelope is not exceeded. Since the "C" Cell is not presently equipped with an automatic fire suppression system, an evaluation was performed by Fire Protection Engineering to determine the feasibility of utilizing this

space prior to the installation of a fire suppression system. This evaluation determined that the drivers for the installation of an automatic sprinkler system in the "C" Cell are best industry standard and defense in depth. The requirements for the sprinkler system are not based on an authorization basis requirement due to the provisions of sprinklers at the module ceiling. This evaluation concluded that the "C" Cell could be utilized for repacking the resin residue drums, prior to the installation of the fire suppression system, based on the following administrative controls.

- A maximum of 2 Kraft tubes are approved per evolution. For drums that contain more than 2 Kraft tubes, only 2 Kraft tubes may be processed at one time. The balance of the Kraft tubes shall remain in the drum which shall be resealed and stored outside of the "C" Cell. The maximum SAN net weight per Kraft tube is 41 kg.
- Storage within the "C" Cell is not permitted.
- Two pressurized water fire extinguishers shall be placed near the "C" Cell to provide protection of the tubes.
- After placing the automatic sprinkler system in-service (in about 6 months), the above administrative controls will no longer be required, except for the two fire extinguishers.

Written guidance per 1-G58-COOP-13 shall be written to invoke the required actions prior to the performance of any activities identified in the referenced procedure. The Shift Manager shall ensure that all designated personnel have been trained and qualified with respect to operation of the fire extinguishers.

Additionally, this activity proposes to utilize the Module-A gloveboxes, which have a number of inoperable oxygen analyzers, for unpacking, neutralizing, and repacking the resin residue.

OSR Section 7.3.11.1 "Oxygen Analyzer Coverage and Operability" states: "Gloveboxes that require an inert atmosphere and the X-Y Retriever shall be monitored by an OPERABLE oxygen analyzer. The oxygen concentration in gloveboxes that require an inert atmosphere and the X-Y Retriever shall not be >5% by volume. Exceptions: (1) Maximum of two gloveboxes that are openly connected to each other without doors may share one monitoring device; (2) when operations are terminated and pyrophoric Pu is removed or stored per non-inert requirements; (3) For activities that may result in >5% oxygen concentration by volume (e.g., glove change, window change, bagout, maintenance activities, etc.) and operations have been terminated; (4) For X-Y Retriever entry up to non-inert storage time limits for pyrophoric Pu; and (5) When the inert system is being switched to an alternate plenum."

The OSR applicability only applies to those Zone I inert systems and designated enclosures for fire safety involving pyrophoric Pu. Since the resin residue was characterized to be non-pyrophoric (reference 9), and that there was no Pu holdup in the referenced glovebox (reference 14), the operability requirement for the oxygen analyzer is not applicable to this activity.

Utilization of an inert glovebox with a non-operable oxygen analyzer was also evaluated by Fire Protection Engineering and it was determined that since the resin residue was exempted from the HSP 31.11 requirements for the transfer and storage of pyrophoric plutonium, that operations could be performed in Glovebox A-20, which is identified as having a non operable oxygen analyzer, but is protected with an operable glovebox overheat detection system (reference 5). Although this document only makes reference to glovebox A-20, it should be noted that any "A" module glovebox that meets the operability requirements could be used for the performance of this activity.

The proposed activity does not impact the operability of any VSS equipment and will be performed within the limitations of all applicable LCO's. Procedural compliance with the actions identified to support the "C" Cell fire suppression will minimize the fire risk associated with this activity, thereby maintaining the margin of safety considered in the Building 707 FSAR.

NOTE 1 *If any of the above seven USQD questions are checked (✓) Yes, the activity is a USQ. The Manager, Kaiser Hill NS or Manager, EI&RM is immediately notified before proceeding.*

8. **Does the activity constitute a USQ? Yes _X_ No ___ Explain:**

The answers to questions 2 and 5 are YES, therefore, a USQ does exist for the proposed activity. DOE approval is required prior to the performance of this activity.

9. **Does the activity require a change to the TSR (or OSR)? Yes ___ No _X_**

10. **Could the activity result in exceeding the criticality safety acceptance criteria? Yes ___ No _X_ Explain:**

All actions associated with the proposed activity are required to be in compliance with approved CSOLs (NMSLs). Specific instructions have been incorporated in the Prerequisite Section of the procedure that require verification that the Criticality Safety Operating Limit (CSOL) or the Nuclear Material Safety Limit (NMSL) pre-operational data sheet has been completed in accordance with 4-B19-NMS-3.12, Nuclear Material Safety Limits and Criticality Safety Operating Limits Surveillance. Review and approval of the proposed activity by Criticality Engineering concurrent with procedural compliance with the required actions, CSOLs, NMSLs, and supporting procedures will assure the activity does not exceed the specified acceptance criteria.

NOTE: Evaluations are in progress to support processing drums that exceed the existing limits. For those drums that may exceed existing limits, operations may not proceed until the new limits are issued.

NOTE 2 *If any of the above questions are checked (✓) Yes, DOE approval is required to proceed.*

11. **Does the proposed activity require an authorization basis related FSAR change? Yes _X_ No ___**

The Building 707 FSAR should be updated to reflect activities associated with the unpacking, neutralizing, and repackaging of ion exchange resins.

12. **Hazardous Material Evaluation:**

1. **Does the proposed activity introduce a new hazardous material not evaluated in a Safety Analysis? Yes _X_ No ___ Explain:**

The FSAR did not consider the introduction, processing, or potential hazards associated with handling contaminated ion exchange resin. Although the resin, in itself, is not considered to be a hazardous waste, there is a concern that the intimate contact of an oxidant (dilute nitric acid) and an organic substrate (the polymeric beads) may, over time, result in the generation of a product which could have a reduced ignition temperature. Therefore, this question would warrant a "YES" answer to the introduction of a new hazardous material not evaluated in the safety analyses.

UNREVIEWED SAFETY QUESTION DETERMINATION
USQD Number: USQD-707-96.0426-OMJ

2. **Does the activity increase the probability or consequences of an accident resulting from hazardous materials previously evaluated in Safety Analyses, or exceed any established inventory quantity limits? Yes _X_ No __ Explain:**

Due to the increase in material-at risk (MAR) coupled with the higher release fraction for burning resin, the consequences of previously identified accidents containing radioactive material are increased.

NOTE 3 ***If Hazardous Material Evaluation has a question checked (✓) Yes, DOE notification is required to proceed with proposed activity.***

13. **Are Compensatory Actions required? Yes ___ No _X_**

14. **USQD Conclusion:**

Based on the "YES" answers to questions 2 and 5 above, the proposed activity, as identified in Procedure 4-V75-RS-0111, does pose a USQ. DOE approval is required prior to the performance of this activity. Additionally, Hazardous Material, questions 12.1 and 12.2, are also answered "YES". Therefore, DOE notification of the introduction of a new hazardous material into the Building 707 complex as well as a potential increase in the consequences of accidents resulting from hazardous materials is also required.

The proposed activity addresses the repackaging of ion exchange resins from their current packaging configuration into 4-liter Nalgene bottles to be subsequently packaged into 55-gallon drums. This activity is a requisite precursor to the cementation of ion exchange resins in conjunction with the liquid stabilization operation in Building 774 . The proposed method of treating ion exchange resins addresses both the spontaneous combustion and ignitability concerns. Immobilizing the resin in cement sufficiently encapsulates the material so that any potential fire hazard would be effectively eliminated, thereby reducing the overall composite risk associated with the storage of material.

The accidents that were analyzed in Chapter 8 of the Building 707 FSAR and subsequently re-evaluated in USQD-707-94.1523-WGH include natural phenomena and operational accidents. The operational accidents include fires, explosions, spills/other releases, and criticalities. The identified fire and spill scenarios include plutonium, plutonium oxides, and Pu waste drums. There are no specific accident scenarios identified for the fire and spill hazards associated with the processing of ion exchange resins within the Building 707 complex.

The category of postulated accident scenarios that could be applied to the proposed activity would be spills and/or fires, resulting from the activities required to complete the repackaging process.

The bounding PC-2 spill scenario associated with this activity would be a spill inside the glovebox (or outside), which results in a dose of 7.40 E-7 rem to the Maximum Offsite Individual (MOI). When compared to the Building 707 authorization basis as documented in reference 12, this dose exceeds the 50-year bone dose to the MOI and establishes new criteria for the PC-2 frequency category.

The bounding PC-3 spill scenario associated with this activity would be a breached drum on the dock with the doors open, which results in a dose of 1.85 E-3 rem to the Maximum Offsite Individual (MOI). When compared to the Building 707 authorization basis as documented in reference 12, this dose exceeds the 50-year bone dose to the MOI and establishes new criteria for both the PC-3 and PC-4 frequency categories.

The bounding PC-2 fire scenario associated with this activity would be a fire in the glovebox, which results in a dose of 5.92 E-6 rem to the Maximum Offsite Individual (MOI). When compared to the

Building 707 authorization basis as documented in reference 12, this dose exceeds the 50-year bone dose to the MOI and establishes new criteria for the PC-2 frequency category.

The bounding PC-3 fire scenario associated with this activity would be a fire on the dock with the doors closed, which results in a dose of 2.96 E-4 rem to the Maximum Offsite Individual (MOI). When compared to the Building 707 authorization basis as documented in reference 12, this dose exceeds the 50-year bone dose to the MOI and establishes new criteria for the PC-3 frequency category.

The bounding PC-4 fire scenario associated with this activity would be a fire on the dock with the doors open, which results in a dose of 1.48 E-1 rem to the Maximum Offsite Individual (MOI). When compared to the Building 707 authorization basis as documented in reference 12, this dose exceeds the 50-year bone dose to the MOI and establishes new criteria for the PC-4 frequency category.

The proposed activity involves opening drums containing Kraft tubes outside of a glovebox but inside the "C" Cell, where spills could occur. The previous spills evaluated in the FSAR dealt only with "in glovebox", "overpressurized Glovebox", and "dock" spills. The proposed activity is considered to have the potential to create the possibility of a spill accident of a different type than any previously evaluated in safety analyses. When comparing the dose consequences for this accident scenario (i.e., Spill - Inside the Module, PC-3), the 50-year bone dose to the MOI would be within the threshold limits for the PC-3 frequency category, as identified in reference 12. (see Table 2)

Additionally, the resin residue has different characteristics than those previously evaluated in the FSAR (i.e., higher release fraction associated with resin fires). The proposed activity is considered to have the potential to create the possibility of a fire accident of a different type than any previously evaluated in safety analyses. When comparing the dose consequences for this accident scenario (i.e., Fire - Inside the Module, PC-3), the 50-year bone dose to the MOI would exceed the threshold limits for the PC-3 frequency category, as identified in reference 12. (see Table 2)

The proposed activity of inspection and/or unpacking the residue drums will be performed in the Module-A "C" Cell. Because this enclosure is not presently equipped with an automatic fire suppression system, an evaluation was performed by Fire Protection Engineering to determine the feasibility of utilizing this space prior to the installation of a fire suppression system. This evaluation determined that the drivers for the installation of an automatic sprinkler system in the "C" Cell are best industry standard and defense in depth. The requirements for the sprinkler system are not based on an authorization basis requirement due to the provisions of sprinklers at the module ceiling. This evaluation concluded that the "C" Cell could be utilized for repacking the resin residue drums, prior to the installation of the fire suppression system, based on the following administrative controls.

- A maximum of 2 Kraft tubes are approved per evolution. For drums that contain more than 2 Kraft tubes, only 2 Kraft tubes may be processed at one time. The balance of the Kraft tubes shall remain in the drum which shall be resealed and stored outside of the "C" Cell. The maximum SAN net weight per Kraft tube is 41 kg.
- Storage within the "C" Cell is not permitted.
- Two pressurized water fire extinguishers shall be placed near the "C" Cell to provide protection of the tubes.
- After placing the automatic sprinkler system in-service (in about 6 months), the above administrative controls will no longer be required, except for the two fire extinguishers.

Written guidance per 1-G58-COOP-13 shall be written to invoke the required actions prior to the performance of any activities identified in the referenced procedure. The Shift Manager shall ensure that all designated personnel have been trained and qualified with respect to operation of the fire extinguishers.

20

This activity deals with a hazardous substance in a quantity, up to 1000 g Pu/drum, such that the controls for worker protection will be required per DOE-N-441.1, Radiological Protection for DOE activities. DOE-O-440.1, requires that the employer provide a workplace and work activities which are as free from occupational safety and health hazards as possible. For this operation to take place the following OSR's must be met.

- Zone differential pressures shall be maintained in compliance with the applicable LCO. (OSR 7.3.1 - Zone I Enclosures, 7.3.2 - Zone II Compartments, and 7.3.4 - Zones I, IA, and II Exhaust Ventilation Systems).
- There must be adequate coverage of the local workspace with SAAMs to warn the worker of airborne contamination in the workplace. (OSR 7.5.3.3 - Radiological Protection Program)
- Activities or processes involving fissile material shall have CSOLs which shall be posted and met. (OSR 7.3.7.1.1 - Criticality Safety Operating Limits)
- The criticality alarms shall be operable. (OSR 7.3.7.2 - Criticality Alarm System)
- The LS/DW system shall be operational to alert the worker to accident conditions, such as a criticality alarm. (OSR 7.3.10 - Life Safety/Disaster Warning System)
- Since the worse case accident for this activity is burning ion-exchange resin contaminated with plutonium, adequate fire protection must be maintained. (OSR 7.3.8 - Fire Protection System and Component Operability)

In order to protect the co-located worker and the public the following requirement must be met.

- Zone II ventilation is required to mitigate the consequences of any of the analyzed accidents. (OSR 7.3.2 - Zone II Compartments and 7.3.4 - Zones I, IA, and II Exhaust Ventilation Systems)

The proposed activity is one that presents a potential for personnel contamination, however, controls have been imposed as part of the work process to minimize this risk and provide a reasonable level of control of this risk. Consequences (both direct and indirect) could lead to possible release and/or spread of radioactive contamination. Proper conduct of the radiological surveys and procedural compliance with the applicable procedures will assist in the safe conduct of the subsequent operations. Therefore, it is qualitatively assessed that the proposed activity does not result in a significant increase in either immediate or co-located worker risk.