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Date: June 22, 2007
Refer To: AD-NHHO:07-145

Mr. Joseph Vozella
National Nuclear Security Administration
Los Alamos Site Office
Los Alamos, NM 87544

Subject: Transmittal of Documents Relative to an Increased Seismic Hazard to LANL Nuclear, High-Hazard Non-nuclear, and Accelerator Facilities

References:
1. *Ten-Year Update to the LANL Probabilistic Seismic Hazards Assessment and Its Impact to Existing Nuclear and High Hazard Facility Operations, dated June 2007*
2. *URS Corporation Seismic Hazards Group, Update of the Probabilistic Seismic Hazard Analysis and Development of Seismic Design Ground Motions at the Los Alamos National Laboratory, prepared for Los Alamos National Laboratory, Job No. 24342433, 2007, LA-UR-07-3965, 25 May 2007*
3. *USQD TA-55-07-256, 10-Year Update to the Seismic Hazard Data, dated June 2007*

Dear Mr. Vozella:

The attached Justification for Continued Operation (JCO), and Seismic Hazard Assessment (sent under a separate cover letter) addresses the impact of the update to the LANL Probabilistic Seismic Hazards Assessment and provides a rational justification for continued operation of existing LANL Nuclear and High Hazard Operations [refs. 1, 2].

The JCO proposes a strategy for assessing the change in risk posture of LANL Nuclear and High Hazard Operations as a result of the change in seismic hazard. The Unreviewed Safety Question Determination (USQD) [ref. 3] demonstrates an increase in general risk due to an increase in the understood seismic hazard. The Probabilistic Seismic Hazard Assessment provides the technical information pursuant to the current seismic assessment performed for the 10-year update.

Approval of the JCO by the Los Alamos Site Office is requested. If you have any questions or concerns, please feel free to contact Derek Gordon at 665-1951

Sincerely,

Robert L. McQuinn
Associate Director
Nuclear High Hazards Operations

RLM/jjk

Attachments: a/s

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ADNHHO File, E517
IRM-RMMO, A150
SB-DO File, E578

Justification for Continued Operation
LANL Site-Wide Nuclear and High Hazard Operations

Title:

Ten-Year Update to the LANL Probabilistic Seismic Hazards Assessment and Its Impact to Existing Nuclear and High Hazard Facility Operations.

Purpose:

The purpose of this Justification for Continued Operation (JCO) is to discuss the impact of the update to the Los Alamos National Laboratory's (LANL's) Probabilistic Seismic Hazards Assessment that will be transmitted to NNSA under a separate cover letter, and to provide a rational justification for continued operation of existing LANL Nuclear and High Hazard Operations. This JCO proposes a strategy for assessing the change in risk posture of LANL Nuclear and High Hazard Operations as a result of the change in seismic hazard.

Statement of the Problem:

DOE O 420.1B requires a review of the state-of-the-art of Natural Phenomena Hazards (NPH) assessment methodology and the site specific NPH information every 10 years. The current LANL seismic design criteria in the LANL Engineering Standards Manual are based on a Probabilistic Seismic Hazards Assessment (PSHA) which was completed in 1995. Field investigations since the 1995 PSHA have determined that large earthquakes occur more frequently and that small earthquakes occur less frequently than previously thought.

A complete update to the 1995 PSHA was initiated in 2005 and is currently scheduled to be completed in June 2007. The current PSHA represents a complete update to the 1995 Assessment in that recent developments in PSHA methodology were incorporated including:

1) the use of completely new logic trees to capture epistemic uncertainty,
2) consideration of clustering effects in the temporal spacing of the occurrence of earthquakes,
3) the use of next generation attenuation models, and
4) the adoption of the Senior Seismic Hazard Analysis Committee (SSHAC) process for capturing the opinion of the informed community and reflecting that opinion in the uncertainties in the PSHA (NUREG/CR-6372).

The update to the 1995 work also incorporated new information on the geochronology of the Pajarito Fault System and uses the current PSHA method which utilizes a more rigorous treatment of uncertainties than the 1995 PSHA. Additional data sources include the geotechnical investigations for CMRR and other LANL facilities, data from well drilling, and the EES-9 field investigations.

Results from the current PHSA indicate that the seismic hazard at LANL is greater than previously believed. As a result, LANL must evaluate the safety impact of this increase in the seismic hazard for each nuclear and non-nuclear facility that is operating under an existing Safety Evaluation Report (SER).

The affected Nuclear Facilities include:

- Site Wide Transportation
- TA-16, Weapons Engineering Tritium Facility (WETF)
- TA-3, Chemistry and Metallurgy Research (CMR)
- TA-55, Plutonium Facility (PF-4)
- TA-55, SST Facility (SST)
- TA-50, Radiological Liquid Waste Treatment Facility (RLWT)
- TA-50, Waste Characterization, Reduction, and Repacking Facility (WCRR)
- TA-54, Waste Operations (Area G)
- TA-54, Radioassay and Non-destructive Testing Facility (RANT)
- TA-21, Nuclear Environmental Site, MDA-A
- TA-21, Nuclear Environmental Site, MDA-B
- TA-21, Nuclear Environmental Site, MDA-T
- TA-35, Nuclear Environmental Site, MDA-W
- TA-35, Nuclear Environmental Site, WWTP
- TA-35, Nuclear Environmental Site, Pratt Canyon
- TA-49, Nuclear Environmental Site, MDA-AB
- TA-50, Nuclear Environmental Site, MDA-C
- TA-53, Nuclear Environmental Site, Underground Tank with Spent Resin
- TA-54, Nuclear Environmental Site, MDA-H

The affected Accelerator and High Hazard non-nuclear facilities include:

- Beryllium Technology Facility (BTF)
- Dual Axis Radiographic Hydrodynamic Test Facility (DARHT)
- TA-53 LANSCE 1-L Target
- TA-53 LANSCE Lujan Center ER-1/2
- TA-53 Storage of Active Components/Targets

Status of the Existing and Planned Nuclear and High Hazard Facilities:

All existing facilities need to address the new seismic hazard information. Each facility will have to evaluate their documentation to examine the impact of the new seismic hazard to their respective safety bases.

Risk of Continued Operations:

In order to put the increase in the seismic hazard in perspective regarding risk, it is necessary to consider the change in the frequency of failure of the Safety Class-SSCs. DOE has established target performance goals for Safety Class-SSCs that are primarily a

function of potential consequences of their failure. These target performance goals are essentially acceptable annual frequencies of failure. For Performance Category-4 (PC-4) SSCs, those whose failure would lead to large offsite consequences, the acceptable annual frequency of failure is $1x10^{-5}$/yr. For Performance Category-3 (PC-3) SSCs, those whose failure leads to offsite consequences approaching the evaluation guidelines, the acceptable frequency of failure is $1x10^{-4}$. Table 1 lists the target performance goals as presented in DOE-STD-1020-2002.

Table 1 - Target Performance Goals in DOE-STD-1020-2002

Performance Category (PC)	Performance Goal Description	NPH Performance Goal Annual Probability of Exceeding Acceptable Behavior Limits
0	No Safety, Mission, or Cost Considerations	No requirements
1	Maintain Occupant Safety	$1x-10^{-3}$ of the onset of SSC damage to the extent that occupants are endangered
2	Occupant Safety, Continued Operation with Minimum Interruption	$5x10^{-4}$ of SSC damage to the extent that the component cannot perform its function
3	Occupant Safety, Continued Operation, Hazard Confinement	$1x10^{-4}$ of SSC damage to the extent that the component cannot perform its function
4	Occupant Safety, Continued Operation, Confidence of Hazard Confinement	$1x10^{-5}$ of SSC damage to the extent that the component cannot perform its function

The performance goals are achieved in seismic design by setting a design basis earthquake at a known return period, and then introducing conservatism in the design process. For PC1, PC2 and PC3, the design basis earthquake (DBE) is selected as the 2500-year return period event.

Comparison of the ground motions associated with a 2500 year return period earthquake from frequencies of about 2 hz to 50 hz (peak ground acceleration (pga)) indicate that the proposed ground motions (hazard) are from about 20% to 50% higher than existing ground motion. In terms of annual probability of exceedence, the annual probability of exceeding the design basis ground motion is about $7x10^{-4}$ to about $5x10^{-4}$. In other words, the likelihood of exceeding the design basis ground motion for existing facilities at Los Alamos has increased from about 1/2500 to 1/1400 – 1/2000 (depending on the dynamic characteristics of the component).

Although pga is actually a poor indicator of potential damage, it is commonly used when discussing the damage potential of earthquakes. The pga associated with a 2500 year event was predicted to be 0.36-g in 1995. In the new 2006 PSHA, the pga of a 2500 year event has increased to 0.52-g . Stated another way, the exceedance frequency of a 0.36-g

pga has increased from a 2500 year event to approximately a 1400 year event. This would imply that during the time LANL is evaluating most of its facilities (less than 2 years) that there is less than about a 1/700 chance of having an earthquake that would exceed the existing design basis level for some SSCs.

The effect of the increased seismic hazards on individual Nuclear, High-Hazard Non-Nuclear, and Accelerator facilities, and groups of similar facilities, are discussed below in more detail.

Site Wide Transportation

There is not expected to be a major risk increase to transportation accidents from the increased seismic hazard. A seismic event during a transportation operation is considered to have a low likelihood and the current controls necessary for safe operation are not expected to be severely impacted.

TA-16 WETF

The WETF structure currently meets the requirements for PC-3 using the 1995 site-specific LANL Seismic Hazards Evaluation. The facility utilizes a seismically designed and anchored storage rack for much of its radioactive material storage. Many structures, systems and components are seismically anchored and braced to meet either the PC-3 or PC-2 requirements.

WETF has a current inventory limit (TSR) of 1000 grams of tritium. (The approved WETF DSA analyzes the release of up to 2000 grams in various seismic accident scenarios.) The inventory at the current time is 560 grams of tritium; almost ¼ of the amount analyzed in the DSA, and nearly ½ the TSR limit. Using the assumptions given in the approved DSA for an earthquake followed by fire that releases and oxidizes the 100% of the tritium, and a ground-level release (i.e., no credit taken for plume loft), the off-site dose from 560 grams is 37 rem.

As a compensatory measure, WETF operations will limit the current inventory to no more than 560 grams of tritium. Tritium inventory reduction plans will further decrease the tritium inventory to 500 grams this calendar year (2007). This represents a reduction of 50% in the allowed material-at-risk and a similar reduction in consequence from accidental release of this material.

TA-3 CMR

The CMR facility was not expected to survive the previously defined DBE, hence it should not survive a higher-magnitude seismic event. The seismic risk has already been accepted by NNSA in the current BIO and no change in consequence is expected.

TA-55 PF-4

PF4 was designed and constructed to meet a robust seismic/structural design specification. The Safe-shutdown Response spectra had a peak acceleration of 2-g, and the Operational Basis Spectra 1-g. The Seismic Margins Assessment used the Electric Power Research Institute (EPRI) Seismic Qualification Utility Group (SQUG) method to quantify the capacity of SSCs. In addition, further work was done to support the Natural Resources Defense Council (NRDC) Lawsuit. The seismic capacity of the building is greater than the new ground motion. While capacities are known for the other key SSCs the structural margin considering the new seismic spectra is not known quantitatively at this time. They are believed to be very robust even though they have not been specifically analyzed for the new ground motion. The dominant seismic risk for PF-4 is toppling of gloveboxes. The new ground motion has the potential to increase the number of gloveboxes that could fail during a seismic event, thus resulting in potentially higher consequences.

TA-55 SST Facility

The SST storage facility is a limited-life facility and is currently expected to have its inventory shipped offsite in the near future. The concrete pad and trailer tie-downs are robust features that have considerable safety margin incorporated into their design. The weather cover atop the concrete pad is a PC-2 structure with safety margin incorporated into its design. Given the limited-life expectancy of the facility, the increased risk from the new seismic curve is anticipated to be minimal.

WCRR Facility

The recently approved Documented Safety Analysis (DSA) credits the WCRR building as a Safety Significant Design Feature. It provides structural integrity to support other safety SSCs, prevents insults to MAR in the building, and (in conjunction with the confinement ventilation system) provides for the confinement of MAR release.

The consequence analysis for a seismic event and a post-seismic fire requires the building to meet PC-2 requirements, since the dose consequences (1.7 rem) from MAR inside of the building does not challenge the EG. The majority of the dose consequence is from a post-seismic fire outside of the facility, and first initiates when building debris impacts waste containers staged outside near the facility.

The TRU waste containers, when staged outside, are designated as SC design features, to mitigate against the consequences for the outside seismic and fire event. A SC-level SAC to prevent impact of building debris on the waste containers requirements that the waste containers are of a sufficient distance from Building TA-50-69 so that in a seismic event, if the building is to sway and fall, its debris does not fall on the waste containers.

Recent modifications to the WCRRF building allow it to meet PC-2 requirements currently and though the new seismic criteria provides an increased seismic risk, the control selection preventing building collapse on outside staged TRU waste containers along with the TRU waste containers themselves mitigates the public risk.

RLWT Facility

In the currently approved DSA, the Building TA-50-1 and influent tanks are referenced in the interim TSRs, design feature section, as important to safety.

Early indications from work to date on the DSA upgrade are that portions of the building structure should be identified as Safety Significant for worker safety because the building debris created during a seismic event could pose a threat to the Transuranic (TRU) and Low-Level (LL) influent tanks. The influent tanks themselves are also currently identified in the upgraded DSA as important to safety. The capability of the building and influent tanks to meet PC-2 requirements is presently being investigated; hence, the building and influent tanks ability to meet the new seismic criteria is unknown.

Whether or not the building and influent tanks meet PC-2 requirements currently, compensatory measures specifically associated with increased risk due to the new seismic criteria include a configuration management program to ensure that facility degradation is minimized and a rigorous emergency preparedness program that ensures operators are trained on actions during a seismic event. These compensatory measures minimize worker consequences currently and with the new seismic criteria.

Waste Operations, Area G

The currently approved DSA credits the dome structure as a safety-class design feature for maintaining its structural integrity during a seismic event. Also, drum banding is credited as a safety-class design feature in that it minimizes drums rocking and tipping during a PC-3 seismic event. With the new seismic criteria (as well as with the current criteria) these two controls cannot be implemented to prevent or mitigate dose consequences as a result of a seismic event. A drum stacking strategy of stacking drums with low weight (< 500 lbs.) and low MAR (< 5 PE-Ci) in the third tier of the arrays has been identified for inclusion in the Area G DSA update, but not yet implemented. This stacking configuration, along with the SC-DF TRU waste drums, results in dose consequences that do not challenge the EG and therefore do not require the domes or banding to be SC-DFs. The mitigation in dose consequences as a result of the administrative control on drum stacking will also be applicable with the new seismic criteria.

RANT Facility

The currently approved DSA credits the building TA-54-38 as a Safety Class Design Feature (SC-DF) in that it provides structural support during and following a seismic event. The fire suppression system is also a SC-DF in its ability to suppress fires which

could lead to the release of MAR. The DSA cites vulnerabilities in the building in that the structure can not survive a PC-2 (or PC-3) seismic event; the fire suppression system has the same vulnerability as it must rely on the building structure for support. These vulnerabilities are exacerbated with the new seismic criteria.

In consideration of these vulnerabilities (as well as programmatic commitments to ship TRU waste from Area G) a safety basis addendum was recently submitted to NNSA LASO (ref.: AD-NHHO: 07-137, Subject: *Submittal of Radioassay and Nondestructive Testing Facility Safety Basis Addendum*, Dated 6/4/07). With an increased MAR, the accident analysis indicates dose consequences that challenge the EG, mainly as a result of the post-seismic fire. The control selection supports a re-classification of the building structure and its fire suppression system from safety class to safety significant based on a more realistic dose calculation. In addition, the following controls will be implemented as a result of the new addendum approved by NNSA:

A SC-SAC for combustible loading will prevent or mitigate the spread of a post-seismic fire, so only the spill component of the source term from building debris falling on waste containers inside the building will contribute to the dose consequence. In this case, the dose consequence does not challenge the EG.

Another SC-SAC for a 50 ft. separation distance (which is more than 1.5 times the building height) prevents the building from falling on waste containers staged near the building. This control effectively prevents the involvement of outside MAR in the seismic event.

The TRU waste containers are designated as SC design features to mitigate against the consequences for the seismic and fire event.

With these controls, the current and increased risk with the new seismic criteria is mitigated in the same way, and the mitigated dose consequences do not challenge the EG.

Nuclear Environmental Sites

The environmental sites that have been categorized as Nuclear Facilities are listed below:

- TA-21 MDA-A,
- TA-21 MDA-B,
- TA-21 MDA-T,
- TA-35 MDA-W,
- TA-35 WWTP,
- TA-35 Pratt Canyon,
- TA-49 MDA-AB,
- TA-50 MDA-C,
- TA-53 Underground Tank with Spent Resin,
- TA-54 MDA-H.

These sites have a preliminary Hazard Categorization (HC) stating the inventory or radionuclides potentially exceeds the HC-2 and HC-3 limits as given in DOE-STD-1027. After remediation these sites are expected to be no longer considered Nuclear Facilities.

Currently, these sites do not have a building or structure associated with them, with the exception of the underground tank for TA-3. The TA-53 site is the only NES that could be impacted by an increase in the seismic hazard. Regarding the underground tank, the design feature inventory isolation system surrounding the primary confinement tank includes overburden and burial depth, which would mitigate any migration of released nuclear material. None of the other environmental sites currently have safety requirements related to seismic hazards.

It is not anticipated that the current increase in the PSHA will impact these sites. There is also no desire to improve any features of these sites since they are to be remediated. In summary, the increased seismic risk from these facilities is anticipated to be minimal.

BTF

The Beryllium Technology Facility (BTF) is currently catergorized as a High-Hazard Chemical Facility. LANL has submitted a proposal to DOE for the reduction of the BTF to a Moderate Hazard Chemical facility which is now in review. The BTF is rated as a PC-2 facility including the structure, ventilation, HVAC, filter plenum, and cartridge filter house (CFH).

Accidents initiated by seismic events are analyzed in the BTF Facility Safety Assessment. These include a seismically induced fire and building failure, and collapse of the CFH. The seismically induced collapse of the BTF includes potential dispersal of Be and the resulting consequences (MST-AB-FSA-BTF-0005, Rev 0). An increase in the likelihood of seismic events does not increase the analyzed consequences.

TA-53 LANSCE 1-L Target

The 1L Target facility was designed and constructed to UBC standards in the 1960s and 70s. More recent evaluations of the seismic resistance of the facility determined the structure as PC-2 based on the 1995 LANL seismic performance criteria. The margin above PC-2 in this evaluation is not known.

The 1L Target BIO examines seismic events and their consequences. Even low levels of ground motion (or other vibrations) will disrupt the beam line and disable the beam. Therefore, radiologic consequences from the accelerator initiated by a seismic event are not considered credible (BIO for the 1L Target, Section 3.1.2.6)

The BIO also considers the possibility of dropping the Target-Moderator-Reflector System (TMRS) control during the bi-annual TMRS removal as a result of a seismic event (BIO Section 3.1.2.5). Seismic design is not a factor in this accident.

TA-53 LANSCE Lujan Center ER-1/2

The LANSCE Lujan Center was designed and constructed to UBC standards in 1988. More recent evaluations of the seismic resistance of the facility determined the structure as PC-2 based on the 1995 LANL seismic performance criteria. The margin above PC-2 in this evaluation is not known.

The approved BIO analyzes seismic events and the resulting consequences. Failure of the structure is assumed followed by a fire and the off-site consequence is 8mrem from the allowed radioactive inventory (TA-53-BIO-005, Rev 2, Section 5.3.18).

TA-53 Storage of Active Components/Targets

The TA-53-3 Sector M "Area East" facility was designed and constructed to UBC Zone 2 standards . More recent evaluations of the seismic resistance of the facility determined the structure as PC-2 based on the 1995 LANL seismic performance criteria. The margin above PC-2 in this evaluation is not known.

An analyzed accident scenario (fire/explosion) involving the MAR at the facility bounds the seismic event. Seismic design of the facility is not credited in the BIO. The 2001 JCO evaluates a seismic event and assumes collapse of the facility (JCO for LANSCE In-Place Storage of DU and A-6 Cu Beam Stop in TA-53-3 Sector M "Area East," Table 5) Seismic resistant design is not credited as a control in the JCO..

LANSCE Interim Safety Assessment Document (ISAD), TA-53

The LANSCE facility described in the ISAD (LANSCE User Facility) was designed and constructed to UBC standards. More recent evaluations of the seismic resistance of the facility determined the structure as PC-2 based on the 1995 LANL seismic performance criteria. The margin above PC-2 in this evaluation is not known.

Even low levels of ground motion (or other vibrations) will disrupt the beam line and disable the beam. Therefore, radiologic consequences from the accelerator initiated by a seismic event are not considered credible.

Dispersion of stored radioactive material (principally sealed sources) in accident events is discussed in the ISAD. An increase in the frequency or magnitude of seismic events does not increase the analyzed consequences in the ISAD.

The mercury shutters have also been evaluated to meet PC-2 criteria. Failure of the shutters in a seismic event followed by a fire results in off-site consequences less than ERPG-2 from Hg exposure.

DARHT TA-15

The DARHT facility is designed to Performance Category 2 building standards including seismic criteria and wind loads for a low-hazard facility as defined by UCRL 15910, UCRL 53582, and ASCE 7-88 for seismic risk Zone 2, with an Occupancy Importance factor of 1.0. The requirements in UCRL 15910 meet the requirements in DOE-STD 1020 for this facility. Ductility specifications for the structure were incorporated in the design and construction that ensure compliance with the requirements of the Uniform Building Code. The seismic margin above PC-2 for DARHT is not known.

Consequences from seismic events are analyzed in the DARHT SAD (DX-SAD-SB-001, R0, 10/04; Table B-1 #10). Seismic activity would cause the beam to stop operating. Consequences and likelihood from seismic events are postulated to the test stand and associated material, and are binned as "low" risk. An increase in the frequency or magnitude of seismic events does not increase the analyzed consequences in the SAD.

Summary

A complete understanding of the risk from the new PSHA will not be known until each facility is evaluated. Only a qualitative understanding of the increased risk can be presented at this time. Based on the robustness of our existing facilities, the existing compensatory measures, the new safety analysis on some existing facilities and the low probability of a seismic event during the evaluation period, LANL is asking the NNSA to accept the risk of continued operation until a quantitative assessment of each facility is performed.

Plan to Evaluate Impacts in the Short Term and the Long Term:

LANL is proposing to evaluate the impact of the new PSHA quantitatively for each facility. This will involve the development of a long-term project to quantitatively assess the ramifications of the new PSHA, and to demonstrate that existing SSCs meet the target performance goals in the governing orders and standards (or identify additional safety measures should they not).

The project will execute the following steps for each affected facility:

1) Perform a seismic analysis of the facility SSCs,
2) If necessary, develop a facility specific JCO based on the results of its seismic analysis,
3) Incorporate necessary changes into the facility's Safety Basis, and
4) Develop a list of potential facility modifications to address any deficiencies identified in the seismic analysis.

Once a facility has performed its facility specific seismic analysis, submitted its specific JCO, and had its specific JCO approved by NNSA, that facility will no longer be covered by this site-wide JCO.

A draft Project Execution Plan, to include a prioritized schedule and cost estimate will be developed and forwarded to the NNSA for review and comment 90 days after the publication of the new PSHA.

Conclusion:

LANL has updated the seismic hazard assessment as required by DOE O 420.1B and based on this new information it is clear that our estimate of the seismic hazard at Los Alamos has increased. LANL is asking that DOE approve continued operations of its existing Nuclear and High Hazard facilities until a quantitative assessment can be made for each facility.

Los Alamos NATIONAL LABORATORY

UNREVIEWED SAFETY QUESTION
SCREENING AND DETERMINATION WORKSHEET

Change Number: n/a Date: June 22, 2007

Facility-Specific USQ Number: (TA55) 07-256

Facility Identification: TA55 and LANL Sitewide

Change Title: 10-Year Update to the Seismic Hazard Data

Based on the evaluation presented in this report, the:

- ☐ Need for routine USQ processing was obvious without performing an Applicability Assessment.
- ☐ Need for a routine USQD is obvious without performing a USQ Screen.
  Complete only General Information Section.
- ☒ Situation involves a PISA.
  Complete only General Information Section.
- ☐ Change has been screened out of the USQ process and does not constitute an Unreviewed Safety Question.
- ☐ Change does not constitute an Unreviewed Safety Question based on a full USQD.
- ☒ Change constitutes an Unreviewed Safety Question and NNSA approval is required prior to implementation.

CLASSIFICATION

This document was reviewed to ensure proper classification and is classified as:

- ☑ Unclassified
- ☐ Unclassified Controlled Nuclear Information (UCNI)
- ☐ Official Use Only (OUO)
- ☐ Classified

NOTE: If this document is OUO, UCNI, and/or classified, add the appropriate markings, distribution limitation statement, and guidance data block(s).

Authorized Derivative Classifier (ADC)

Kenneth M Keeler — Kenneth M Keeler — 6/21/07
Name (printed or typed) Signature Date

UCNI Reviewing Official

Kenneth M Keeler — Kenneth M Keeler — 6/21/07
Name (printed or typed) Signature Date

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List all UCNI guidance used:

Retain original copy per facility records management procedures.

SIGNATURES

Trainee (if applicable)

Name (printed or typed)	Signature	Date

USQ Screen Preparer (QEV)

Name (printed or typed)	Signature	Date

USQ Screen Reviewer (QEV)

Name (printed or typed)	Signature	Date

USQ Determination Preparer (QEV)

Name (printed or typed)	Signature	Date
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USQ Determination Reviewer (QEV)

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Sponsoring Organization Reviewer (optional)

Name (printed or typed)	Signature	Date

Approval Authority

Name (printed or typed)	Signature	Date
Jon Nelson, SB-PF		6/21/07

SECTION 1. INTRODUCTION

SECTION 1.1. DETAILED DESCRIPTION OF CHANGE

Provide a concise but detailed description of the proposed change. Include references to specific DSA process descriptions where applicable. This section should clearly explain the relationship of the change to the process. (e.g. is this a component no longer required for the existing process [i.e. a legacy issue], or is this change in preparation for a new process to be approved in a separate USQD), discuss phases of the project including construction, start-up, normal operation, and provide one-line drawings, logic diagrams, and other reference drawings, as appropriate. Cite MAR and significant chemicals (amount, form, confinement, controls), energy sources and other significant hazards. Include the identification of any temporary or interim configurations that are not covered by allowable out-of-service time limits in the facility TSRs or TSR-like documents.

As a result of a 10-year update to the seismic hazard data, a potential increase in the magnitude for a Evaluation-Basis Earthquake has been identified.

SECTION 1.2. REFERENCES

a) List all documents that describe the situation being considered and any technical evaluations thereof.

a.1) *Update of the Probabilistic Seismic Hazard Analysis and Development of Seismic Design Ground Motions at the Los Alamos National Laboratory, LA-UR-07-3965*, 25 May 2007.

b) List documents in the current safety basis for the facility/process that were used in this USQ processing.

b.1) *TA-55 Final Safety Analysis Report*, 8/16/1996, NMT Division, LA-CP-95-169, R1.

b.2) *TA-55 Technical Safety Requirements (TSRs)*, TA55-PED-108-0.1.5.9, Rev. 5.9, NMT Division, 5/31/07.

b.3) *TA-55 Hazard Analysis*, 7/31/1996, NMT Division, LA-CP-94-0076, R2.

b.4) *Safety Evaluation Report (SER) of the Los Alamos National Laboratory Technical Area 55 Plutonium Building 4*, Safety Analysis Report and Technical Safety Requirements, Office of Defense Programs, U.S. Department of Energy, 12/1996, R1

c) List hazard, safety, or impact analyses related to the situation being considered that were used in this evaluation.

c.1) *TA-55 Final Safety Analysis Report*, 8/16/1996, NMT Division, LA-CP-95-169, R1.

c.2) *TA-55 Hazard Analysis*, 7/31/1996, NMT Division, LA-CP-94-0076, R2.

c.3) *Seismic Hazards Evaluation of the Los Alamos National Laboratory*, Woodward-Clyde Federal Services (WCFS), document ENG-MPO-93-BCMR, Feb. 24, 1995.

c.4) *Seismic Evaluation of Selected SSCs at the Plutonium Processing Facility (PF-4)*, L. K. Goen, Los Alamos National Laboratory, Los Alamos NM, March 1996.

c.5) *Seismic Design Criteria for PF-4*, L. K. Goen, Los Alamos National Laboratory, Los Alamos, NM, document ESA-EA-97-017, Jan. 28, 1997.

d) List any other references used in this evaluation:

d.1) None

NOTE: If applicable and if a hazard (or safety) and impact analysis have not been provided, the change should be returned to change control to develop such an analysis.

SECTION 2. UNREVIEWED SAFETY QUESTION SCREENING

NOTE: The number in brackets following the questions below is a reference to the corresponding section of the Procedure.

SECTION 2.1. SCREENING – PART I [8.3.1]

This section (Screening – Part I) is:

☐ APPLICABLE (i.e., this USQ Screening is not in response to a PISA discovery).

☒ NOT APPLICABLE because this USQ Screening is in response to a PISA discovery. Complete only Part II of the Screening (Section 2.2) and continue to the USQD (Section 3). Note: Follow all additional steps outlined in the PISA worksheet.

a) Is this a purely editorial change to a document that does not affect the technical content? [8.3.1.a] ☐ YES ☐ NO

b) Is the change covered by a NNSA approved categorical exclusion? [8.3.1.b] ☐ YES ☐ NO

If "Yes", identify the Categorical Exclusion and the NNSA approval date.

Cat. Exclusion No.: _____ Approval Date _____

c) Is this change completely enveloped by a previous USQD? [8.3.1.c] ☐ YES ☐ NO

If "Yes", identify the USQD and the approval date.

USQD Number: _____ Approval Date _____

If "Yes", explain how the current issue is covered by the prior USQD.

If any answer to any question in Section 2.1 above is "Yes", the change does not require a USQ Determination; proceed to the USQ Screening Summary at the end of Section 2. Otherwise continue with Part II of the Screening (Section 2.2).

SECTION 2.2. SCREENING – PART II [8.3.2]

a) Is this a temporary or permanent change in the facility as described anywhere in the existing DSA? [8.3.2a]. ☐ YES ☐ NO
If NO, explain your answer below and list pertinent reference documents.
Note: Increases in facility chemical or radioactive inventories beyond those described in the DSA or EM&R screening values, whichever is lower, constitute a change to the facility as described in the DSA.

b) Is this a temporary or permanent change in the procedures as described anywhere in the existing DSA? [8.3.2.b] ☐ YES ☐ NO
If NO, explain your answer below and list pertinent reference documents.

c) Is this a test or experiment not described anywhere in the existing DSA? [8.3.2.c] ☐ YES ☐ NO
If NO, explain your answer below and list pertinent reference documents.

If the answer to any question in Section 2.2 above is "Yes", a USQ Determination must be performed. Continue to Section 3 after completing the Summary section below.

USQ SCREENING SUMMARY

Based on answers to the screening questions above:

☐ This change screens out and hence does not require a USQ Determination.
Complete the cover sheet summary.

☒ This change screens in and hence does require a USQ Determination.
Complete Section 3.

SECTION 3. UNREVIEWED SAFETY QUESTION DETERMINATION (USQD) [8.4]

NOTE: The number in brackets above is a reference to the corresponding section of the Procedure.

1. Could the proposed change increase the probability of occurrence of an accident previously evaluated in the DSA? ☒ YES ☐ NO
   Explain your answer below and list pertinent reference documents.

   The new seismic data indicates a relative increase from the previous peak ground acceleration of 0.33g. In 1995 the return frequency of an evaluation-basis earthquake (EBE) was $T_o \approx$ 2500-yr. In 2007, the return frequency of a DBE is estimated to be ~1000-yr.

   This change increases the probability of occurrence of an accident previously evaluated in the DSA.

2. Could the proposed change increase the consequences of an accident previously evaluated in the DSA? ☒ YES ☐ NO
   Explain your answer below and list pertinent reference documents.

   For current PC-3 seismically qualified structures, it is assumed the structure will survive a peak ground acceleration of ~0.33g for a 2,500-yr earthquake return frequency. Public consequences were determined accordingly. The new seismic data indicates that the structure must now be able to withstand a peak ground acceleration of ~0.52 g for the same return frequency. Current analysis only qualifies structures to the 0.33 value, whereas it is now necessary that they withstand a ground movement ~57% greater if they are to meet the same frequency requirements. For example, the PF-4 structure is shown to survive a 0.33g event and may not survive an event generating 0.52g ground motion without additional site-specific evaluation.

   Without further evaluation, this change *may* increase the consequence of an accident previously evaluated in the DSA.

3. Could the proposed change increase the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the DSA? ☒ YES ☐ NO
   Explain your answer below and list pertinent reference documents.

   With the increase in the frequency of a 0.33g EBE and the increase in peak ground acceleration to 0.52g for a 2,500-yr earthquake, seismic mounts, anchors, bracing, and stands that support facility SSCs important to safety may be more likely to be damaged or fail in a seismic event than previously evaluated. In addition, the facility structure itself may be vulnerable to damage or failure with the increased frequency and magnitude of the seismic events.

   This change increases the probability of occurrence of a malfunction of equipment important to safety previously evaluated in the DSA.

4. Could the proposed change increase the consequence of a malfunction of equipment important to safety previously evaluated in the DSA? ☒ YES ☐ NO
Explain your answer below and list pertinent reference documents.

With an increase in the magnitude of a EBE, the public consequences may also increase due to an increase in the number of gloveboxes that may topple and fail creating new fire initiators and contributing additional MAR to the previously analyzed accident. In addition, the facility structure itself may be vulnerable to damage or failure with the increased frequency and magnitude of the seismic events.

This change increases the consequence of a malfunction of equipment important to safety previously evaluated in the DSA.

5. Could the proposed change create the possibility of an accident of a different type than any previously evaluated in the DSA? ☐ YES ☒ NO
Explain your answer below and list pertinent reference documents.

For current seismically qualified equipment, it is assumed the equipment will survive a peak ground acceleration of ~0.33g and no further safety analyses have been performed. The new seismic data indicates that equipment will now have to be able to withstand a peak ground acceleration of ~0.52g for the same return frequency. This is still a seismic event although the frequency and magnitude of the EBEs have increased. It does not result in a new type of accident requiring consideration and analysis.

This change does not increase the possibility of an accident of a different type than previously evaluated in the DSA.

6. Could the proposed change create the possibility of a malfunction of equipment important to safety of a different type than any previously evaluated in the DSA? ☒ YES ☐ NO
Explain your answer below and list pertinent reference documents.

With the increase in magnitude of the 2,500-yr EBE, the possibility of seismic damage or failure of the PF4 structure increases. This is a new malfunction of equipment important to safety of a different type than previously evaluated in the DSA.

This change causes an increase the possibility a malfunction of equipment important to safety of a different type than any previously evaluated in the DSA.

7. Does the proposed change reduce a margin of safety? ☒ YES ☐ NO
Explain your answer below and list pertinent reference documents.

Since margin of safety can be measured in terms of risk, and risk is a product of probability and consequence, it is apparent that the margin of safety for previously qualified equipment and facilities has been reduced due to the increase in frequency and magnitude of EBEs. This is in addition to increasing the potential for developing new failure modes and malfunctions of safety SSCs and to increasing accident consequences to the public. Without further evaluation, this change *may* reduce the margin of safety.

USQ DETERMINATION SUMMARY

If the answer to any question in Section 3 above is "Yes", the proposed change involves an Unreviewed Safety Question. Based on the evaluation above:

☐ This change does not constitute an Unreviewed Safety Question.

☒ This change does constitute an Unreviewed Safety Question and NNSA approval is required prior to implementation.

Complete the cover sheet summary.