Honor Our Pueblo Existence (H.O.P.E),
Concerned Citizens for Nuclear Safety (CCNS), and
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August 20, 2013

By email to: andrewt@dnfsb.gov and johnb@dnfsb.gov

The Honorable Peter S. Winokur, Chairman
The Honorable Jessie Hill Roberson, Vice Chair
The Honorable John E. Mansfield, Board Member
The Honorable Joseph F. Bader, Board Member
The Honorable Sean Sullivan, Board Member
Defense Nuclear Facilities Safety Board (DNFSB)
625 Indiana Avenue, NW, Suite 700
Washington, DC 20004

Re: ***Comments for the August 20, 2013 Meeting with the Defense Nuclear Facilities Safety Board in Santa Fe, New Mexico***

**** Our comments are primarily concerned with the requirement to shut down the Los Alamos National Laboratory (LANL) 1970's Era Plutonium Facility PF-4 for the foreseeable future (and possibly permanently) because of***
(1) the long history on record of unsafe work practices at the PF-4 and
(2) the very large dose of plutonium to the public from an earthquake resulting in collapse of the PF-4.

The earthquake hazard at the PF-4 was described in the testimony of DNFSB Chairman Winokur to Congress on May 9, 2013:

> *Earthquake Hazard at Los Alamos National Laboratory*
> The risk posed by the Plutonium Facility (PF-4) at Los Alamos National Laboratory remains among the Board's greatest concerns. An earthquake resulting in collapse of the facility would likely result in very high radiological doses to the public in nearby towns. The Board continues to urge DOE to take meaningful, near-term action to mitigate this risk.

**** The great danger to the public from earthquake damage to the PF-4 and the deficiencies in knowledge of the seismic hazard require the immediate shutdown of all activities at the 1970's Era Plutonium Facility PF-4 at LANL until the extensive field investigations required by the new DOE Standard 1020-2012 are performed and reported. We estimate that this activity will require a minimum of five years and possibly even longer if Congress provides the required funding in a timely and consistent manner.***

**** The recently completed and the planned future structural upgrades to the LANL PF-4 are deficient because they are based on the far too low ground motions of approximately 0.5 g (1 g is the force of gravity at land surface). DOE Standard 1020-2012 requires the structural upgrades to the LANL PF-4 to survive the much larger ground motions of 1.68 g from a Seismic Design Category-5 (SDC-5) earthquake.***

**** The greater than three times increase in earthquake ground motions requires major modifications to the existing PF-4 as required by DOE Standard 1020-1012. The large increase in ground motions in DOE Standard 1020-2012 results in a very large increase in total costs for the required upgrades to the PF-4 structure, systems and components (SSC) that are not known. Further, Federal Law 10 CFR 830 and DOE Standards require accurate knowledge of the seismic hazard for an estimated cost for the structural upgrades to the PF-4 to provide safety to the workers and the public for a SDC-5 earthquake.***

Dear Chairman Winokur, Vice-Chair Roberson and Members Mansfield, Bader and Sullivan:

Thank you for scheduling this meeting in Santa Fe on August 20, 2013.

The safety of the Plutonium Facility (PF-4) at Los Alamos National Laboratory (LANL) is under investigation for many reasons. The outstanding issues are multiplying and the risk and threat to the communities located both downwind and downstream continue to grow. It has been reported that the off-site dose consequences "cannot be easily mitigated." The latest series of letters, Staff Issue Reports and Weekly Staff Reports indicate that the June 27, 2013 "pause" of fissile materials operations (FMOs) in PF-4 will be another lengthy process full of Unreviewed Safety Questions (USQ) and plans to make a plan. Given the long history of concerns (many of which are documented in this letter), the public demands, with justified reasoning and experience with the lack of response by LANL that actually resolves the outstanding issues, that the "pause" of operations remain in effect until ALL issues are resolved.

The New Mexico Congressional delegation must work with the public, the Defense Nuclear Facilities Safety Board (DNFSB), the Department of Energy (DOE) and its semi-autonomous National Nuclear Security Administration (NNSA) and Congress to ensure that the pause remain in effect until ALL issues are resolved to the satisfaction of all involved. The public must have a seat at that table; we can no longer wait. The latest set of issues, the backlog of unresolved criticality safety and conduct of operation issues, flaws in federal oversight and contractor assurance systems, necessitate that the public have a seat at the table. The DNFSB wrote to The Honorable Ernest J. Moniz, Secretary of Energy on July 15, 2013, about the review of the Criticality Safety Program at LANL in May 2013. The Board wrote,

> This review identified significant non-compliances with applicable Department of Energy requirements and industry standards in the implementation of the Criticality Safety Program. In addition, this review identified criticality safety concerns stemming from weaknesses in conduct of operations at the Plutonium Facility. The

> Board notes that some of these deficiencies are long standing and indicate flaws in the federal oversight and contractor assurance systems.

We are grateful for the persistent efforts of the DNFSB members and staff to bring these issues forward to Congress, DOE, NNSA and LANL. As you know, many of them have been on the table for many years and are yet to be resolved. An example is the on-going LANL commitment to install an active confinement ventilation system at PF-4 that has delayed and delayed and delayed. PF-4 nuclear operations rely on a passive confinement ventilation system which would increase the radiological and hazardous material releases during a seismic event and possible collapse of the facility.

Another example is the ongoing controversy about the Board's Recommendation 2010-1, *Safety Analysis Requirements for Defining Adequate Protection for the Public and the Workers,* which "focused on improvements in DOE's regulatory framework, which serves as a fundamental underpinning of protecting the public and workers." June 20, 2013 DNFSB letter to The Honorable Ernest J. Moniz, Secretary of Energy and the attachment, *Oversight Priorities of the Defense Nuclear Facilities Safety Board at the Department of Energy's Defense Nuclear Facilities*, p. 1.

Another example is the Board's encouragement to DOE that it revise DOE-STD-3009, *Preparation Guide for U.S. Department of Energy Nonreactor Nuclear Facility Documented Safety Analysis,* as called for in the implementation plan for Recommendation 2010-1. "The Board hopes the revised preparation guide will strengthen requirements at existing facilities whose offsite dose consequence cannot be easily mitigated." Id.

We are not assured by yet another LANL plan to make a plan to resolve the issues. We are not assured that Los Alamos National Security, LLC (LANS) "has committed to develop [another] comprehensive 'get-well' plan to bring the LANL Criticality Safety Program (CSP) into compliance with applicable requirements." July 2, 2013 DNFSB Staff Issue Report, p. 1. The roadmap is supposed to be done by October 2013. Nevertheless, "the Laboratory Director approved limited resumption of heat source plutonium operations this week." July 19, 2013 DNFSB Weekly Report. Why? Is there a performance deliverable under the Management and Operations (M&O) Contract in which a bonus may be had by LANS?

Our experience is that previous plans have not resulted in permanent fixes to the ongoing problems. We anticipate that the get-well plan will follow that same failed pattern and practice. A recent Criticality Safety example is found in the April 19, 2013 DNFSB Weekly Report for LANL:

> The extent of condition review revealed 17 [fissile material operations] FMOs where the field office had identified high-level (the most significant) issues with the associated criticality safety evaluations (CSEs), ***some dating back to 2007,*** that have not been resolved. A critique on the issue identified that no formal, documented process previously existed to manage field office comments on CSEs. LANL is working to formalize the process and to determine the path forward for each of the 17 paused FMOs. [Emphasis added.]

LANL has neglected to resolve CSEs that have been outstanding for six or more years. How many failed plans and attempts by LANL are required before someone in authority stops fissile material and plutonium operations at PF-4? Is five years enough? Six years? Seven years?

Further, the July 19, 2013 DNFSB Weekly Report reveals changes to the corrective action plan for criticality safety issues that may result in Immediate Actions (within 30 days); Short-Term Actions (by the end of September), Mid-Term Actions (by the end of December), and Long-Term Actions (extend beyond 2013). Even though the corrective action plan has not been completed for an unsafe facility which poses an unmitigated off-site dose consequence to the public, the Director of LANL approved resumption of the heat-source Plutonium-238 operations. Why?

The July 2013 DNFSB Weekly Reports reveal that basic procedures for criticality safety at the PF-4 have not being followed. For example,

> A Criticality Safety Limit Approval (CSLA) specified a certain type of container could be stored in a specified location. The procedure used to move the containers had been updated to identify an additional type of container for use, but did not receive a review by Criticality Safety Analysts (CSA). As a result containers that had not been approved on the CSLA or evaluated in the associated Criticality Safety Evaluation Documentation (CSED) were being stored in this location.
>
> Multiple safe drawers have been discovered with dimensions that are not in compliance with the engineered features specified on the CSLA. This is primarily due to the ambiguous term 'nominally' being used by the CSLA and CSED to identify dimensions.
>
> Five solution tanks were found to have different actual volumes than that specified on the CSLA. Again, this is complicated by the use of the term 'nominally' by the CSLA and CSED to identify volumes." July 12, 2013 DNFSB Weekly Report for LANL.

Further, as revealed in the July 2, 2013 DNFSB Staff Issue Report, the number of Criticality Safety Analysts (CSAs) has decreased. To quote the report,

> Maintaining a qualified criticality safety staff has challenged LANS for the past eight years. The severe staffing shortage in the criticality safety group raises significant questions regarding the ability of LANS to support safe operations. This staffing shortage also inhibits the ability of LANS to resolve the deficiencies identified in its existing plans and databases (e.g., Corrective Action Plan, IPP, Performance Feedback and Improvement Tracking system and LAFO CSE comments). Currently LANS employs 2 full-time and 2 part-time qualified criticality safety analysts, in addition to 3 part-time subcontractors fulfilling some analyst roles and responsibilities. A 2013 [Criticality Safety Support Group] CSSG review found that LANS will likely require 3 to 5 years to hire, train, and qualify the targeted number of additional criticality safety analysts [footnote 15: *CSSG Assessment of Scope of Operations and Criticality Safety Staff Capacity and Review of Los Alamos National Laboratory CA and Metrics*

> *for the Nuclear Criticality Safety Program,* Criticality Safety Support Group, May 2013]. This is especially concerning given that the LANS staffing plan does not account for the resources necessary to address existing deficiencies. LANS has recently made progress to address its staffing shortage. However, the [DNSFB] staff believe more aggressive actions and additional resources may be necessary to expedite these efforts (e.g., utilizing available DOE and corporate resources). July 2, 2013 DNFSB Staff Issue Report, p. 6.

We note that the privately held, for-profit corporation, LANS, LLC, began as the contractor of LANL eight years ago (2005) when the "severe staffing shortage" in the criticality safety group began.

And the July 12, 2013 DNFSB Weekly Report for LANL revealed that the qualified Criticality Safety Analysts (CSAs)

> spent over 85% of their time during the past eight weeks providing floor support for fissile material operations and assisting with the extent of condition review ongoing in the Plutonium Facility. The report states that due to the time being spent assisting with efforts in the Plutonium Facility little progress is being made on performing Criticality Safety Evaluations needed to support other activities.

If the patient is ill, requiring a LANL 'get-well' plan, then together we should look at the causes of the illness. From our point-of-view, the causes are that LANL and PF-4 are located on the seismically active Pajarito Plateau, in the Sacred Jemez Mountains, in a wildfire zone, above the Rio Grande, which provides habitat and nourishment to many and drinking water for downstream communities. Given the demonstrated lack of competency of DOE, NNSA and to address the criticality issues, and the seismic issues, all plutonium operations must cease NOW at LANL and the special nuclear materials shipped to another location. Efforts should be made to move the materials, ***not*** resume operations.

The DOE and NNSA have successfully demonstrated their ability to move special nuclear materials from LANL to another DOE site. For example, after failed security tests and the May 2000 Cerro Grande fire special nuclear materials and experimental equipment located at Technical Area 18 (TA-18) were successfully moved to another DOE site.

As we move forward, the public must be provided with a seat at the table:
(1) for solutions to the unsafe work operations at the PF-4, and
(2) membership on the review team for the PF-4 safety basis.

DOE Standard 1104-2009 requires that external organizations with vested interest in the public safety of the LANL PF-4 be provided membership on the review team for the PF-4 safety basis.

From page 4 in DOE Standard 1104-2009:

> The SBAA [Safety Basis Approval Authority] has the specific responsibility of ensuring that the review and approval process represents all DOE entities with vested interest in the facility under review and considers commitments made to agencies outside DOE. Agencies external to DOE, however, have no standing under the Orders/Rules structure for approval. Identifying safety issues and their resolution may involve negotiations between concerned organizations. Issues raised by any vested interest should be given proper consideration to enhance safety assurance.

- The non-government organizations Honor Our Pueblo Existence (H.O.P.E.) and Concerned Citizens for Nuclear Safety (CCNS) are concerned organizations external to DOE with vested interest in the public safety of the LANL PF-4. H.O.P.E. and CCNS request membership on the review team for the safety basis process of the LANL PF-4.

The Guiding Principles Section in DOE Standard 1104-2009 describes the importance for the LANL PF-4 safety basis review team to include HOPE and CCNS as members.

> **Guiding Principle 4.** Independent review of the safety design basis and safety bases documents facilitates achieving defensible approval [Emphasis supplied].
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> **Guiding Principle 6.** DOE is responsible for both the operation and the regulation (e.g., review and approval of DSAs [Documented Safety Analysis Reports] and TSRs [Technical Safety Requirement Reports]) of the facilities for which these documents are required. This dual role places fundamental limits on the ability of DOE to completely segregate the processes of preparation and review of these documents**. . .** However, in order to be as objective as possible in the review process, most of the reviewers of these documents should not be responsible for the design or operation of the facility, including the preparation of the safety design basis and safety bases documents. It is expected that these reviews will be conducted, to the extent practicable, by individuals and organizations separate from the document preparation. [Emphasis supplied].
>
> **Guiding Principle 7.** DOE strives for an effective, streamlined review and approval process for safety design basis and safety basis documents while still achieving an acceptable level of safety assurance. This Standard advocates proper planning for a review and encourages an integrated review process where all parties with vested interest in a facility safety basis coordinate throughout the review and approval process [Emphasis supplied].

- What is the advice of the DNFSB Board on the process for H.O.P.E. and CCNS to be provided membership on the PF-4 safety basis review team?

- Will the DNFSB Board recommend to Congress, DOE, NNSA and LANL that membership on the PF-4 safety basis review team be provided to H.O.P.E. and CCNS?

There are long-standing issues on the serious deficiencies in the knowledge of the seismic hazard at the location of the PF-4. The new DOE Standard 1020-2012 increases the earthquake ground motion requirements for the structural upgrades of the PF-4 from the low values of 0.5 g (1 g is the force of gravity at land surface) to the very high value of 1.68 g for a Seismic Design Category 5 (SDC-5) earthquake. The 0.5 g structural upgrades performed over the past several years are deficient to prevent an earthquake to cause collapse of the PF-4 with a large offsite release of plutonium to the public.

A graph of the large earthquake ground motions calculated in the LANL 2007 and 2009 Probabilistic Seismic Hazard Analysis (PSHA) Reports is attached to this report.

DOE Standard 1020-2012 also requires the use of four national consensus seismic standards to perform extensive field investigations to gain the required knowledge of the seismic hazard at the 30 square mile LANL site and specifically at LANL Technical Area 55 (TA-55) where the LANL PF-4 is located. The total cost for the structural upgrades to the PF-4 for ground motions from a SDC-5 earthquake cannot be calculated without the information from the detailed field investigations required by Federal Law 10 CFR 830 and DOE Standard 1020-2012. We estimate that the field investigations and reporting will require a minimum of five to ten years if Congress provides the funding in a timely and consistent manner.

Our serious concerns about the great earthquake danger at the LANL PF-4 and the failure of DOE and LANS to provide a solution to our concerns is illustrated by the March 27, 2013 letter to the DNFSB from the former DOE Secretary Steve Chu (March 27, 2013 Chu letter) <- http://www.dnfsb.gov/sites/default/files/Board%20Activities/Letters/2013/ltr_2013327_21816.pdf ->

The March 27, 2013 Chu letter made an incorrect conclusion that seismic analysis with non-linear static analysis methods and the requirements in DOE Standard 1020 showed PF-4 meets its plutonium confinement safety functions. The DNFSB letter to DOE Secretary Moniz dated July 17, 2013 <- http://www.dnfsb.gov/sites/default/files/Board%20Activities/Letters/2013/ltr_2013717_22411.pdf -> rejected the conclusion that the PF-4 provided safety for seismic collapse and a large offsite release of plutonium to the public as follows:

> The Board does not agree with the methodology used by the LANL contractor for the seismic analysis upon which Secretary Chu based his conclusions. Consequently, the Board does not agree with the National Nuclear Security Administration's (NNSA's) conclusion that these modeling results demonstrate compliance with DOE standards for confinement integrity following a design basis earthquake. The Board communicated its concerns with this analysis in the summer of 2012 and suggested the need to perform a more representative "alternate" analysis to account for the very large vertical excitations that the structure would be subjected to during the design basis earthquake. The Board is encouraged that DOE is performing the "alternate" analysis to improve the safety posture of the facility and increase the margin between loss of confinement and the onset of collapse.

We do not agree that the "alternate analysis will improve the safety posture of the facility and increase the margin between loss of confinement and the onset of collapse." Our disagreement is because of the following facts.

- **The LANL reports state that the alternate analysis is for ground motions of ~0.5 g. However, DOE Standard 1020-2012 requires the PF-4 to provide confinement of the large inventory of plutonium for ground motions from a SDC-5 earthquake that are more than three times greater at 1.68 g.**
- **Will the DNFSB require DOE, NNSA and LANL to perform the "alternate" analysis for ground motions of 1.68 g?**

The detailed characterization of the seismic hazard required by 10 CFR 830 issued on January 10, 2001 and by DOE Standard 1020-2012 issued in December 2012 has not been performed at LANL TA-55 where the PF-4 is located, not over the 30-square mile LANL site nor over the region within a 25-mile radius. Why?

There are many very serious deficiencies in the knowledge of the seismic hazard at the PF-4 because the required field investigations were not performed.

One major deficiency is that the required drilling program to acquire accurate knowledge of the seismic velocity profile below the PF-4 was not performed. Instead, the seismic velocity profile from the very different geologic setting of alluvial sediments at the DOE Savannah River Site was used in the LANL 2007 and 2009 PSHA Reports. From page 3-5 of the LANL 2009 PSHA:

> A footprint correlation model was assumed which has a VS [shear velocity] COV [coefficient of variation] near the surface of about 0.25, decreasing to about 0.15 at depth. The footprint model was based on variability in velocity sampled in borings over large footprint (H Area at the DOE Savannah River Site (Silva *et al.*, 1997), about 300 by 600 ft.

The inappropriate use of the Savannah River velocity profile was an issue discussed on page 4 in the Confirmatory Studies Steering Committee (CSSC) memorandum dated June 17, 2009 in Appendix A in the LANL 2009 PSHA as follows:

> **Comment [from the CSSC].** O-4. On page 3-5 (first paragraph), a short description of layer correlations used in the randomization process is provided. It appears that this model is the same as the one developed from the deep soil site at the Savannah River Site. If so, <u>its appropriateness for application to the LANL site needs to be provided</u>.
>
> **Response [from LANL].** <u>The correlation model developed from velocity data acquired at the proposed NPR facility at the Savannah River Site (SRS) was **assumed** to be appropriate for application to LANL.</u> With only six velocity surveys at CMRR, four to a depth of about 150 ft and only two beyond about 500 ft deep across the CMRR site preclude any meaningful statistical analysis of velocity variability and corresponding demonstration of statistical equivalence in soil variability between CMRR and the Savannah River NPR site [Emphasis supplied].

In the above response, DOE/LANL did not provide an appropriate reason to use the Savannah River velocity profile to calculate ground motions for the engineering design of the proposed CMRR-NF and the PF-4.

A serious issue is that the LANL CSSC recognized that it was a mistake to use the velocity profile from the Savannah River Site to calculate the ground motions at the proposed CMRR-NF. But the CSSC only required LANL to accurately report in the LANL 2009 PSHA the source for the highly inappropriate velocity profile as follows on page 3 in the August 31, 2009 memorandum from the CSSC in Appendix A in the LANL 2009 PSHA:

> ***CSSC Observation-4. Appropriateness of applying Savannah River model to LANL.*** In Section 3.1.1.1 (first paragraph under the title "Site Aleatory Variability), the same description of the correlation model used in the CMRR site-response calculations is provided as in the draft report. That model was based on extensive CPT velocity data taken at the Savannah River Site. <u>It is our opinion that the final report should clearly indicate what correlation model was used in these current calculations</u> [e.g., the velocity profiles from the DOE Savannah River Site]. In addition, it is not obvious that the model, based on data from a site with no significant layer variability and with relatively uniform increase in velocity with depth, is appropriate for application to a site where there are distinct layers of tuffs, formed at different geologic times by different processes, and apparent significant velocity variability [Emphasis supplied].

We are disappointed that the independent seismic experts (the CSSC) did not require an accurate velocity profile for the engineering design of the proposed CMRR-NF and for the seismic upgrades to the existing facilities at TA-55 including the 1970's era nuclear weapons facility PF-4. The concern of the CSSC was incomplete requiring only for LANL to admit that "the current calculations" were inappropriately based on the velocity profile from the DOE Savannah River Site. Site specific field studies must be done in a timely manner at LANL in order to have an accurate velocity profile for the engineering designs for TA-55 facilities.

Another serious issue is that the DNFSB also recognized that the velocity profile from the DOE Savannah River Site should not be used to calculate the ground motions for the nuclear weapons facilities at TA-55. However, the DNFSB only required DOE to address this mistake at an unspecified date in the future. The pertinent excerpt on page 1 in the DNFSB June 23, 2009 memorandum in Appendix B in the LANL 2009 PSHA follows:

> **Other ground motion topics and issues:**
> • The response to the Peer Review Panel (Comment O-4 [in the above memorandum dated June 17, 2009]) discusses the soil layer-to-layer correlation model [e.g., the Savannah River velocity profile] used in the Probabilistic Seismic Hazard Analysis (PSHA). While the PSHA has included two base case profiles, in part to address layer-to-layer correlation uncertainty, <u>LANL is encouraged to improve their approach to layer-to-layer correlation</u> [i.e., inappropriate use of the velocity profile from the DOE Savannah River Site]. <u>Actions to improve this correlation should be included in the LANL Long Term Seismic Program Plan</u> [Emphasis supplied].
>
> • LANL is requested to provide a schedule for developing the LANL Long Term Seismic Program Plan.

- **What actions has LANL taken to acquire a site-specific seismic velocity profile for the geologic setting below the PF-4?**

- **Has LANL provided the DNFSB with the schedule for developing the LANL Long Term Seismic Program Plan?**

- **Will the DNFSB recommend for LANL to perform the required program of drilling many boreholes with appropriate tests to acquire accurate knowledge of the seismic velocity profile below the PF-4.**

A second major deficiency is that the PF-4 is located close to and between concealed active sections of the Rendija Canyon and Guaje Mountain (GM) faults. There is irrefutable evidence of the concealed faults in LANL reports. The concealed faults were not included in the LANL 2007 and 2009 PSHA Reports. The concealed faults will greatly amplify vertical ground motions under the PF-4 from an earthquake because of the close locations of the concealed faults to the PF-4. The Federal Law 10 CFR 830 and DOE Standard 1020-2012 require inclusion of the concealed faults in the calculation of the seismic hazard at the PF-4. Please see the attached figure of the large number of faults within the region.

The DOE final 2011 SEIS admitted that there was evidence for a concealed active fault very close to the nuclear facility PF-4 in Response to Comment 241-10 as follows:

> The fault shown 800 feet (240 meters) west of the proposed CMRR-NF, by Vaniman and Wohletz (1990) and Wohletz (2004), is an inferred fault, meaning that the fault is interpreted to be present at some depth below the location at which it is mapped; however, no evidence for surface-rupturing faults was found along that mapped trace [Emphasis supplied].

The above statement that there was no evidence for surface-rupturing faults along the mapped trace of the concealed Rendija Canyon Fault was a serious mistake. In fact, the surface rupture fault map on page 3-26 in the DOE final 2011 SEIS displays several surface-rupturing faults along the trace of the concealed Rendija Canyon Fault. The surface ruptures are close to the west side of TA-55 and are present up to 1 mile south of TA-55.

The surface rupture fault map also shows three surface ruptures along the trace of the concealed section of the Guaje Mountain Fault. The surface ruptures are present in Los Alamos Canyon north of TA-55, in Mortandad Canyon 1,500 ft east of the northeast corner of TA-55, and in Pajarito Canyon 1,500 ft east of the southeast corner of TA-55. The surface rupture fault map is attached to this report.

The LANL PSHA reports are not in compliance with the national industry seismic standards.

- DOE Standard 1020-2012 requires the characterization of the seismic hazard at LANL to perform detailed field investigations that comply with the requirements in for national consensus seismic hazard standards. The four standards are the following:

- ***Seismic Design Criteria for Structures, Systems, and Components in Nuclear Facilities,*** American Society of Civil Engineers (ASCE), ASCE/SEI 43-05. July, 2005.
- ***American National Standard-Categorization of Nuclear Facility Structures, Systems, and Components for Seismic Design,*** American Nuclear Society (ANS). ANSI/ANS-2.26-2004. December 2, 2004. Reaffirmed May 27, 2010.
- ***American National Standard-Criteria for Investigations of Nuclear Facility Sites for Seismic Hazard Assessments,*** ANSI/ANS-2.27-2008. July 31, 2008.
- ***American National Standard-Probabilistic Seismic Hazards Analysis,*** ANSI/ANS-2.29-2008. July 31, 2008.

The required field investigations for the very important GM Fault at LANL were not performed. The DOE 2011 final SEIS admits that detailed field mapping has not been performed for accurate knowledge of the distance from the PF-4 to the key GM Fault as follows:

> Detailed geologic mapping of the area between the mapped southern termination of the Guaje Mountain Fault and the northern side of Los Alamos Canyon [a north-south distance greater than 6,300 ft] has not yet been undertaken (DOE Response to Comment 315-5).

The DOE 2011 draft SEIS admits another very serious omission that large regions at LANL have not been mapped for seismic hazards as follows:

> Large eastern and southern areas of LANL have not yet been mapped in detail for seismic hazards (p. 3-22).

As described above, the required detailed investigations of the concealed section of the Rendija Canyon and Guaje Montain Fault were not performed. The national industry seismic standard ANSI/ANS-2.27-2008 on page 10 required geological, seismological and geophysical investigations of concealed faults as part of the assessment of the seismic hazard as follows:

> ***Fault location:*** Quaternary fault traces shall be defined, and locations shall be shown in map view with sufficient detail to determine source-to-site distance. In the case of concealed or blind faults, the location of the shallowest extent of the fault shall be indicated on the fault maps [Emphasis supplied].
>
> ***Concealed and blind faults:*** The location, dimensions, and rate of slip of concealed and blind faults shall be evaluated. Concealed and blind potential seismic sources can be identified and characterized by a combination of subsurface interpretations (e.g., balanced cross sections, seismic reflection data) coupled with evidence for geologically young deformation (e.g., folding of Quaternary deposits and surfaces), geodetic measurements [e.g., global positioning system (GPS) and interferometric synthetic aperture radar surveys], and seismicity studies (e.g., focal mechanism analysis).

From page 15 in ANSI/ANS-2.27-2008:

> The potential for surface fault rupture and associated deformation shall be determined. This assessment shall include the evaluation of both primary faults that reach the ground surface as well as secondary ground deformation (e.g., faulting,

folding, tilting, warping, etc.) related to concealed or blind faults that do not reach the ground surface [Emphasis supplied].

- **Will the DNFSB recommend for LANL to perform 1) the required program of field investigations to characterize the length and location of the concealed sections of the Rendija Canyon and Guaje Mountain Faults, 2) to include the concealed faults on the LANL seismic hazard fault map, and 3) calculate the increase in ground motions at the PF-4 from the concealed faults?**

The March 27, 2013 Chu letter made an incorrect conclusion that DOE Standard 1020 allows a seismic performance goal for ground motions of 0.6 g for earthquakes with a return period of 5,000 years. The structural modifications performed over the past several years to the LANL PF-4 were a **major modification. We do not have the total amounts of taxpayer money spent on the modifications to LANL PF-4, but we know it is in the tens of millions of dollars.** DOE Standard 1020-2002 (issued in 2002) and the new revised DOE Standard 1020-2012 (issued in December 2012) require the seismic performance goal for major modifications to existing facilities to be the same as for new facilities. In addition, as described above, DOE Standard 1020-2012 requires the structural upgrades to the PF-4 to survive the ground motions of up to 1.68 g from a SDC-5 earthquake with a return period of 100,000 years.

The new requirement in the December 2012 DOE Standard 1020-2012 is for new and existing nuclear facilities with a large inventory of radionuclide material to have a design for the much greater ground motions for SDC-5 earthquakes with a return period of 100,000 years. This requirement is Section 2.2.2.3 on page 7 in DOE Standard 1020-2012 as follows:

> **Section 2.2.2.3.** The Performance Goal (defined in ANSI/ANS-2.26-2004 in terms of annualized failure probability) and the Return Period of the design or evaluation basis NPH [natural phenomenon hazard] of an SSC [structure, system, and component], are based on the significance of the SSC for protection of workers and the public. For example, for seismic design of SSCs important for the protection of the public against high radiation doses, the return period for the design basis earthquake (DBE) will be much longer (i.e., the peak ground acceleration will be high) than that for SSCs whose failure does not result in any significant off-site consequences to the public [Emphasis supplied].

Further, from page A.1 in DOE Standard 1020-2012:

> **Seismic Design Category (SDC):** A category assigned to an SSC that is a function of the severity of adverse radiological and toxicological effects of the hazards that may result from the seismic failure of the SSC on workers, the public, and the environment. SSCs may be assigned to SDCs that range from 1 through 5. For example, a conventional building whose failure may not result in any radiological or toxicological consequences is assigned to SDC-1; a safety-related SSC in a nuclear material processing facility with a large inventory of radioactive material may be placed in SDC-5 [Emphasis supplied].

The requirement for the very large SDC-5 earthquake ground motions to be used for the structural upgrades of the PF-4 was also described in the four national industry seismic standards

that are required by Federal regulation for the safe design and construction of nuclear weapons facilities. For example, from page xv in the 2005 ASCE/SEI 43-05 ***Seismic Design Criteria for Structures, Systems and Components in Nuclear Facilities*** and page 4 in the 2008 ANSI/ANS-2.29-2008 P***robabilistic Seismic Hazards Analysis:***

> **seismic design category (SDC):** A category assigned to an SSC that is a function of the severity of adverse radiological and toxicological effects of the hazards that may result from the seismic failure of the SSC on workers, the public, and the environment. SSCs may be assigned to SDCs that range from 1 through 5. For example, a conventional building whose failure may not result in any radiological or toxicological consequences is assigned to SDC-1; a safety-related SSC in a nuclear material processing facility with a large inventory of radioactive material may be placed in SDC-5 [Emphasis supplied].

Section 3 in DOE Standard 1020- 2012 describes the requirement for the structural upgrades to the PF-4 to be a minimum of SDC-4 as follows:

> **3.1. Seismic Design Categorization and Limit States**
> 3.1.1 The guidelines and criteria for design categorization and LS of SSCs subjected to seismic hazards shall be the same as those in ANSI/ANS-2.26-2004, except that consequence evaluation criteria shall be as defined in Table A-1 of the DOE STD 1189-2008.

Table A-1 from page A-3 in DOE STD 1189-2008 is shown below:

DOE-STD-1189-2008

Table A-1. Guidance for SDC Based on Unmitigated Consequences of SSC Failures in a Seismic Event

	Unmitigated Consequence of SSC Failure from a Seismic Event	
Category	Collocated Worker	Public
SDC-1	Dose < 5 rem	Not applicable (1)
SDC-2	5 rem < dose < 100 rem	5 rem < Dose < 25 rem
SDC-3	100 rem < dose	25 rem < dose

(1) A Hazard Category 1, 2, or 3 nuclear facility with consequences to a collocated worker from failure of an SSC in a seismic event will require that SSC to be classified as SDC-1 at a minimum. Therefore, a public criterion for SDC-1 is not needed.

(2) As noted in ANS 2.26, the SDCs used in the Standard and in this table are not the same as the SDCs referred to in the International Building Code (IBC).

This table, in comparison with criteria in ANS Standard 2.26, is truncated at SDC-3 on the following bases.

> • It is likely that DOE will build only high-hazard, non-reactor nuclear facilities at large sites, where it is more likely that the collocated worker criterion would be controlling for seismic design purposes. In such cases, it would be unlikely that the qualitative radiological criteria suggested by ANS Standard 2.26 for the public for SDC-4 would be exceeded. If the quantitative public criterion for SDC-3 of Table A-1 is exceeded significantly for any project (between one and two orders of magnitude), then the possibility that SDC-4 should be invoked must be considered on a case-by-case basis [Emphasis supplied].

However, a study by the DNFSB determined that the large offsite dose to the public requires that the structural upgrades to the LANL PF-4 must comply with the very large ground motions of up to 1.68 g from a SDC-5 earthquake. The DNFSB staff person Jeff Kimball made an important presentation to the 2011 DOE Natural Phenomenon Hazards Conference <– http://energy.gov/sites/prod/files/The%20Adequacy%20of%20DOE%20Natural%20Phenomena%20Hazards%20Performance%20Goals%20from%20an%20Accident%20Analysis%20Perspective_1.pdf

The presentation by Mr. Kimball described the requirement for DOE nuclear weapons facilities to be designed and constructed for ground motions from SDC-5 earthquakes when the offsite dose to the public was greater than 250 rem Total Effective Dose Equivalent (TEDE).

LANL submitted a revision to the PF-4 safety basis that identified a bounding offsite dose consequence of 940 rem for a seismic accident at the PF-4 followed by a structural collapse and fire (see the DNFSB Feb 1, 2013 Weekly Report <– http://www.dnfsb.gov/sites/default/files/Board%20Activities/Reports/Site%20Rep%20Weekly%20Reports/Los%20Alamos%20National%20Laboratory/2013/wr_20130201_65.pdf –>.

- The large offsite dose requires the structural upgrades to the PF-4 to provide safety for the large ground motions of 1.68 g from a SDC-5 earthquake.
- Will the DNFSB recommend to Congress, DOE, NNSA and LANL to stop the program of expensive structural upgrades to the PF-4 that are based on earthquake ground motions of only 0.5 g?

We repeat the testimony of DNFSB Chairman Winokur to Congress on May 9, 2013:

> *Earthquake Hazard at Los Alamos National Laboratory*
> The risk posed by the Plutonium Facility (PF-4) at Los Alamos National Laboratory remains among the Board's greatest concerns. An earthquake resulting in collapse of the facility would likely result in very high radiological doses to the public in nearby towns. The Board continues to urge DOE to take meaningful, near-term action to mitigate this risk.

Thank you for the opportunity to present our concerns to you. We look forward to the opportunity at our meeting today to discuss next steps with you.

Sincerely,

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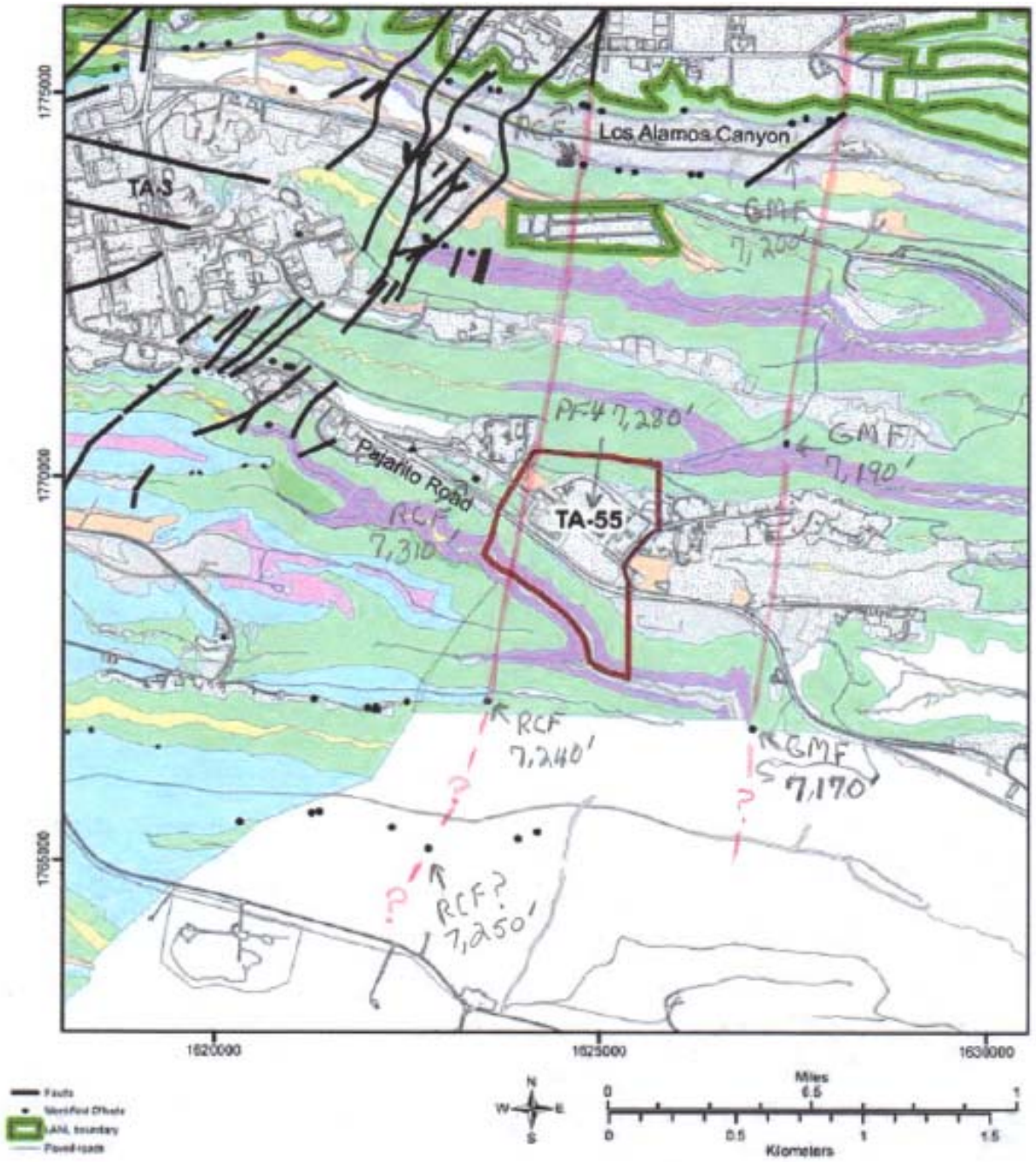
cc: New Mexico Congressional Delegation
Senate Armed Services Committee
House Armed Services Committee
Senator Ed Markey
Robert E. Sanchez, U.S. Government Accountability Office
Janet E. Frisch, U.S. Government Accountability Office
Dr. Ernest Moniz, Secretary, U.S. Department of Energy
William E. Miller, Deputy Director, Office of Safety and Emergency Management Evaluations Department of Energy
Regional Coalition of LANL Communities (RCLC) Chairman David Coss, Mayor of Santa Fe
Santa Clara Pueblo Office of Environmental Affairs Director – Joseph Chavarria
Jessica Aberly, Attorney at Law

Geologic Map of Technical Area 55 – Figure 3-6 in DOE/LANL 2011 Final SEIS for the Proposed CMRR-NF Replacement Project



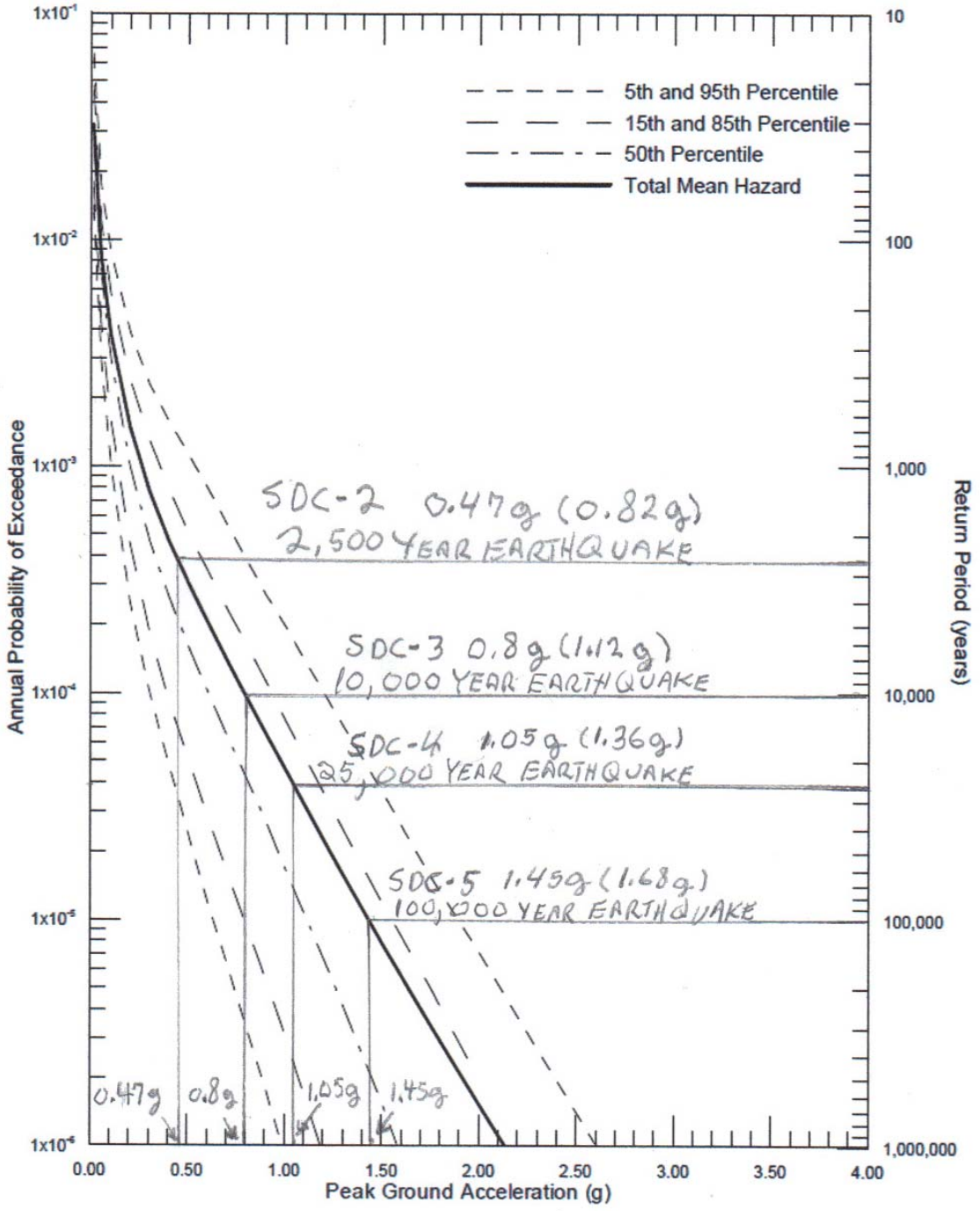
RCF – Rendija Canyon Fault GMF – Guaje Mountain Fault

Red Lines Shows Concealed Sections of RCF and GMF

- **The RCF surface ruptures mapped west and south of TA-55 show the concealed section of the RCF is not greater than 50 ft below ground surface at TA-55.**
- **The GMF surface ruptures mapped north, east and south of TA-55 show the top of the concealed section of the GMF is not greater than 100 ft below ground surface at TA-55.**

Seismic Hazard Curves For Peak Horizontal Ground Motions From Simultaneous Ruptures From A Single Earthquake At the location of LANL PF-4, the RLUOB and the proposed CMRR-NF. Source: Figure 7 in the LANL 2009 PSHA Report.

Note: The larger ground motions for synchronous earthquakes for each earthquake return period are in parentheses on the figure. The synchronous ground motions were calculated from Figure 8.



Peak Ground Acceleration (g) – 1g is the force of gravity

Tectonic Map of the LANL Region. Source: Figure 3-2 *in* LANL 2007 PSHA Report.