

**In the  
United States Court of Appeals  
For the Ninth Circuit**

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**No. 08-75058**

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**SAN LUIS OBISPO MOTHERS FOR PEACE,**  
*Petitioner*

v.

**UNITED STATES NUCLEAR REGULATORY COMMISSION  
and the UNITED STATES OF AMERICA,**  
*Respondents*

**PACIFIC GAS & ELECTRIC COMPANY**  
*Intervenor-Respondent*

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**PETITION TO REVIEW A FINAL DECISION OF THE  
U.S. NUCLEAR REGULATORY COMMISSION**

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**PETITIONER'S EXCERPTS OF RECORD**  
*Vol. 1 of 2*  
**Pages 1 to 184**

Diane Curran  
Anne Spielberg  
Matthew Fraser  
Harmon, Curran, Spielberg & Eisenberg, L.L.P.  
1726 M St. N.W., Suite 600  
Washington, D.C. 20036  
202/328-3500  
*Attorneys for Petitioner*

Dated February 9, 2009

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Diane Curran  
Anne Spielberg  
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Harmon, Curran, Spielberg & Eisenberg, L.L.P.  
1726 M St. N.W., Suite 600  
Washington, D.C. 20036  
202/328-3500  
*Attorneys for Petitioner*

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS

Dale E. Klein, Chairman  
Gregory B. Jaczko  
Peter B. Lyons  
Kristine L. Svinicki

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In the Matter of	)	
	)	
PACIFIC GAS and ELECTRIC CO.	)	Docket No. 72-26-ISFSI
	)	
(Diablo Canyon Power Plant Independent	)	
Spent Fuel Storage Installation)	)	

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CLI-08-26

**MEMORANDUM AND ORDER**

This proceeding is a reopening, on remand from the Ninth Circuit,<sup>1</sup> of a proceeding to license an independent spent fuel storage installation (ISFSI) at the site of the Diablo Canyon nuclear power plant in California. In February of last year, we directed the NRC Staff to prepare a revised environmental assessment, pursuant to the Ninth Circuit's remand and the National Environmental Policy Act (NEPA), addressing "the likelihood of a terrorist attack at the Diablo Canyon ISFSI site and the potential consequences of such an attack."<sup>2</sup> The NRC Staff

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<sup>1</sup> *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9th Cir. 2006), cert. denied, 127 S.Ct. 1124 (2007).

<sup>2</sup> *Pacific Gas and Electric Co. (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation)*, CLI-07-11, 65 NRC 148, 149 (2007).

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responded to our direction by preparing draft<sup>3</sup> and final<sup>4</sup> environmental assessment supplements (the latter taking into account public comments) and a finding of no significant impact. The Staff's supplemental assessment led San Luis Obispo Mothers for Peace (SLOMFP) to request a hearing and to file five proposed contentions,<sup>5</sup> which the Staff<sup>6</sup> and the Pacific Gas and Electric Company (PG&E)<sup>7</sup> opposed.

In January of this year, we issued an order admitting limited portions of two of the contentions proposed by SLOMFP.<sup>8</sup> We delegated to a previously-designated presiding officer the resolution of one of these, Contention 1(b); a Freedom of Information Act (FOIA)-based claim on the availability and withholding of certain documents (or portions of documents) underlying the NRC Staff's NEPA findings.<sup>9</sup> The presiding officer resolved Contention 1(b) on an unopposed NRC Staff motion for summary disposition.<sup>10</sup> We retained jurisdiction over Contention 2, and on July 1, 2008, we heard oral argument on it under 10 C.F.R. § 2.1109 (10

<sup>3</sup> *Supplement to the Environmental Assessment and Draft Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation*, 72 Fed. Reg. 30,398 (May 31, 2007) (Draft EA Supplement).

<sup>4</sup> *Supplement to the Environmental Assessment and Final Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation* (Aug. 2007) (Final EA Supplement), available as ADAMS Accession No. ML072400303.

<sup>5</sup> *San Luis Obispo Mothers for Peace's Contentions and Request for a Hearing Regarding Diablo Canyon Environmental Assessment Supplement* (June 28, 2007) (SLOMFP Petition), with attachment: Thompson, Gordon R., *Assessing Risks of Potential Malicious Actions at Commercial Nuclear Facilities: The Case of a Proposed Spent Fuel Storage Installation at the Diablo Canyon Site* (June 27, 2007) (Thompson Report).

<sup>6</sup> *NRC Staff's Answer to Contentions Submitted by San Luis Obispo Mothers for Peace* (July 13, 2007).

<sup>7</sup> *Pacific Gas and Electric Company's Response to Proposed Contentions* (July 9, 2007).

<sup>8</sup> CLI-08-1, 67 NRC 1 (2008).

<sup>9</sup> CLI-08-5, 67 NRC 174, 177 (2008).

<sup>10</sup> LBP-08-7, 67 NRC \_\_\_\_, slip op. (May 14, 2008).

C.F.R. Part 2, Subpart K).<sup>11</sup> As called for under 10 C.F.R. § 2.1113, the parties based their oral arguments on previously filed summaries of the facts, data, and arguments.<sup>12</sup> The parties also relied on reply briefs<sup>13</sup> we authorized in a scheduling order<sup>14</sup> prior to the oral argument.

SLOMFP made an additional filing seeking to supplement its Subpart K summary by adding a Staff affidavit obtained as part of the Contention 1(b) discovery process before the presiding officer.<sup>15</sup> The NRC Staff and PG&E both opposed this request.<sup>16</sup>

We find that SLOMFP's Contention 2 is without merit. SLOMFP's arguments do not require the Staff to prepare an environmental impact statement.

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<sup>11</sup> This proceeding is being conducted under our pre-2004 procedural rules. See CLI-08-1, 67 NRC at 5.

<sup>12</sup> *San Luis Obispo Mothers for Peace's Detailed Summary of Facts, Data, and Arguments on Which it Intends to Rely at Oral Argument to Demonstrate the Inadequacy of the U.S. Nuclear Regulatory Commission's Final Supplement to the Environmental Assessment for the Proposed Diablo Canyon Indep[en]dent Spent Fuel Storage Installation to Consider the Environmental Impacts of an Attack on the Facility (Contention 2)* (April 14, 2008) (SLOMFP Summary); *NRC Brief and Summary of Relevant Facts, Data and Arguments Upon Which the Staff Proposes to Rely at Oral Argument on San Luis Obispo Mothers for Peace's Contention 2* (April 14, 2008) (Staff Summary); *Summary of Facts, Data, and Arguments on Which Pacific Gas and Electric Company Will Rely at the Subpart K Oral Argument on Contention 2* (April 14, 2008) (PG&E Summary).

<sup>13</sup> *NRC Staff's Response to San Luis Obispo Mothers for Peace's Subpart K Presentation* (June 16, 2008) (Staff Reply); *San Luis Obispo Mothers for Peace's Reply to NRC Staff and PG&E Subpart K Presentations* (June 16, 2008) (SLOMFP Reply).

<sup>14</sup> Order (June 6, 2008) (unpublished), available as ADAMS Accession No. ML081580413.

<sup>15</sup> *San Luis Obispo Mothers for Peace's Request to Supplement Subpart K Presentation with NRC Staff Affidavit* (April 26, 2008) (SLOMFP Request to Supplement).

<sup>16</sup> *NRC Staff Response to San Luis Obispo Mothers for Peace's Request to Supplement Subpart K Presentation with NRC Staff Affidavit* (May 12, 2008) (Staff Response to SLOMFP Request); *Pacific Gas and Electric Company's Answer to San Luis Obispo Mothers for Peace Request to Supplement Subpart K Presentation* (May 6, 2008) (PG&E Response to SLOMFP Request).

## I. DISCUSSION

The sole question remaining in this Subpart K proceeding — arising out of SLOMFP's Contention 2, as we narrowed it in CLI-08-1 — is whether the NRC Staff has shown that potential land contamination and latent health effects from the terrorist scenarios it considered credible are insignificant, not warranting a full environmental impact statement.

SLOMFP asks us, "as provided by 10 C.F.R. § 2.1115(a)(2), [to] rule that there is no unresolved dispute of law or fact regarding Contention 2, and that SLOMFP should prevail on the claims raised in the contention."<sup>17</sup> As a remedy, SLOMFP asks us to compel the NRC Staff to prepare an environmental impact statement. The NRC Staff and PG&E also ask for disposition on the merits pursuant to 10 C.F.R. § 2.1115(a)(2). PG&E argues that the environmental assessment supplement satisfies NEPA on its face since it omitted no required analysis, and that in any event Contention 2 can be resolved in PG&E's favor based on the adjudicatory filings and oral argument, with no further analysis, evidence, or testimony.<sup>18</sup> The Staff argues that the Commission should resolve the contention in the Staff's favor because "SLOMFP . . . failed to raise any genuine issue concerning the adequacy of the Staff's environmental review, [as] documented in the [s]upplemental [environmental assessment],"<sup>19</sup> and because the Staff's analysis of land contamination and latent health impacts satisfied NEPA.

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<sup>17</sup> SLOMFP Summary at 3-4.

<sup>18</sup> PG&E Summary at 15-16.

<sup>19</sup> Staff Reply at 1.

**A. Legal Framework**

Under our Subpart K rules, the presiding officer, here, the Commission itself, is required to issue a written order based on due consideration of the parties' oral arguments and written filings that:

- (1) Designate[s] any disputed issues of fact, together with any remaining issues of law, for resolution in an adjudicatory hearing; and
- (2) Dispose[s] of any issues of law or fact not designated for resolution in an adjudicatory hearing.

With regard to issues not designated for resolution in an adjudicatory hearing, the presiding officer shall include a brief statement of the reasons for the disposition. If the presiding officer finds that there are no disputed issues of fact or law requiring resolution in an adjudicatory hearing, the presiding officer shall also dismiss the proceeding.<sup>20</sup>

Designating an issue of fact or law for resolution in an adjudicatory hearing requires a determination that:

- (1) There is a genuine and substantial dispute of fact which can only be resolved with sufficient accuracy by the introduction of evidence in an adjudicatory hearing; and
- (2) The decision of the Commission is likely to depend in whole or in part on the resolution of that dispute.<sup>21</sup>

Subpart K implements the "totally new procedure" established by the Nuclear Waste Policy Act (NWPA)<sup>22</sup> for adjudicating spent fuel storage controversies expeditiously.<sup>23</sup> Subpart K allows the presiding officer to resolve factual and legal disputes, including disagreements between experts, on the basis of a brief discovery period and written submissions and oral

<sup>20</sup> 10 C.F.R. § 2.1115(a).

<sup>21</sup> 10 C.F.R. § 2.1115(b).

<sup>22</sup> 42 U.S.C. §§ 10101 *et seq.*

<sup>23</sup> *Carolina Power & Light Co.* (Shearon Harris Nuclear Power Plant), CLI-01-11, 53 NRC 370, 383-86 (2001), *citing* 42 U.S.C. § 10154.

argument — without a full trial-type evidentiary hearing.<sup>24</sup> Under Subpart K and the NWPA we resort to full evidentiary hearings “only” when necessary for “accuracy.”<sup>25</sup>

Under NEPA, an environmental assessment, with its accompanying finding of no significant impact, constitutes an agency’s evaluation of the environmental effects of a proposed action — unless a more detailed statement is required. A more detailed environmental impact statement is not required unless the contemplated action is a “major Federal [action] significantly affecting the quality of the human environment.”<sup>26</sup> Our implementing regulations<sup>27</sup> provide that “environmental assessment”:

Means a *concise* public document for which the Commission is responsible that serves to:

- (1) *Briefly* provide sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a finding of no significant impact.
- (2) Aid the Commission’s compliance with NEPA when no environmental impact statement is necessary.
- (3) Facilitate preparation of an environmental impact statement when one is necessary.<sup>28</sup>

Similarly, “finding of no significant impact”:

[M]eans a *concise* public document for which the Commission is responsible that briefly states the reasons why an action, not otherwise excluded, will not have a significant effect on the human environment and for which therefore an environmental impact statement will not be prepared.<sup>29</sup>

<sup>24</sup> See *id.* at 385-86.

<sup>25</sup> See *id.*

<sup>26</sup> 42 U.S.C. § 4332(2)(C) (emphasis added).

<sup>27</sup> Our regulation, at 10 C.F.R. § 51.14, tracks the implementing regulation of the Council on Environmental Quality (CEQ), at 40 C.F.R. § 1508.9.

<sup>28</sup> 10 C.F.R. § 51.14(a) (emphasis added).

<sup>29</sup> 10 C.F.R. § 51.14(a) (emphasis added).

**B. Procedural History of Contention 2**

Contention 2, as initially proposed by SLOMFP,<sup>30</sup> asserted that the Staff's environmental assessment supplement failed to satisfy NEPA because the NRC's decision not to prepare an environmental impact statement was based on "hidden and unjustified assumptions."<sup>31</sup>

SLOMFP challenged the Staff's screening of attack scenarios and also sought to litigate whether a successful attack on the ISFSI hypothesized by its expert would result in increased cancers and illnesses. SLOMFP argued that a main effect of an attack would be land contamination that could "render uninhabitable a large land area, causing significant economic and social impacts."<sup>32</sup> SLOMFP also argued as part of Contention 2 that the environmental assessment supplement's discussion of emergency planning upgrades that could mitigate the effects of an attack on the ISFSI was inadequate for NEPA purposes.

In CLI-08-1, we rejected that portion of proposed Contention 2 that sought litigation of alternate attack scenarios (an inquiry we also rejected by denying Contention 3), noted that SLOMFP's concern with the staff's reliance on "hidden and unjustified" information would be considered as part of Contention 1(b), and excluded litigation of the mitigating effects of emergency planning measures. As narrowed in CLI-08-1, the following parts of SLOMFP's Contention 2 remained, and were the subject of the parties' written presentations and the oral argument held on July 1, 2008:

Contention 2: The NRC Staff's "environmental assessment ignore[d] environmental effects on the surrounding land" and failed to consider "non-fatal health effects (e.g., latent cancers) from a hypothetical terrorist attack."<sup>33</sup>

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<sup>30</sup> See SLOMFP Petition.

<sup>31</sup> SLOMFP Petition at 10.

<sup>32</sup> *Id.* at 12.

<sup>33</sup> CLI-08-1, 67 NRC at 18.

Because all parties agree that there is no unresolved dispute of law or fact regarding Contention 2 and that consequently no further adjudicatory hearing is necessary in this proceeding, our task at this juncture is to determine the merits of Contention 2 — unless we find *sua sponte*, despite the parties' view, that further adjudicatory hearing is required in order to resolve an issue of fact or law. Based on our evaluation of the record we find that no further adjudicatory hearing is required, and we turn, therefore, to the merits of the contention.

### C. Resolution of Contention 2

In its Subpart K written presentation and at the oral argument, SLOMFP offered little evidence on Contention 2, as admitted, but instead attempted to re-litigate elements of Contention 2 relating to attack-scenario selection that we had already excluded from the proceeding.<sup>34</sup> In contrast, the NRC Staff and PG&E provided essentially uncontradicted evidence that the probability of a significant radioactive release caused by a terrorist attack was low, and that the potential latent health and land contamination effects of the most severe plausible attack would be small. We agree with the Staff and PG&E.

To analyze potential land contamination and radiation exposure levels (and thus, potential latent health effects of the most severe plausible attack) the NRC Staff performed a series of calculations. The Staff expert located the residence nearest the Diablo Canyon ISFSI, which is approximately 1.5 miles north-northwest of the facility on property owned by PG&E, and reasonably assumed that its occupant would be the maximally exposed individual in the unlikely event of a significant radioactive release.<sup>35</sup> The Staff rightly concluded that the only plausible way for radioactive material to reach that residence would be by air and that any

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<sup>34</sup> SLOMFP Summary at 21.

<sup>35</sup> Staff Summary, *Affidavit of Elizabeth A. Thompson*, ¶ 20.

airborne release would disperse and settle on the ground as it continued downwind.<sup>36</sup> The Staff's "dose calculation assumed that the individual would be exposed to radiation from inhalation and also from radiation that has been deposited on the ground and assumes the individual will be in the same place for four days."<sup>37</sup> As part of her calculations, the Staff expert "accounted for the contribution of land contamination to dose . . . and concluded that the dose would result in a low likelihood of developing discern[i]ble health effects."<sup>38</sup> The Staff expert's calculations are described in detail in her testimony.<sup>39</sup>

In performing her calculations, the Staff expert used a computer code that implements a mathematical model of the behavior of pollutants in the atmosphere (the Gaussian plume model, HOTSPOT computer code developed by Lawrence Livermore National Laboratory<sup>40</sup>), inputting values such as source term, height of release above ground level, wind speed, turbulence, and distance to calculate both downwind concentrations of radioactive material in the air and on the ground.<sup>41</sup> After calculating downwind concentrations of radioactive material in the air and on the ground using HOTSPOT, the Staff expert performed a series of additional calculations to determine the total effective dose, which is the 50-year committed effective dose from internally deposited radionuclides plus the equivalent dose from outside the body — that is, radionuclides in passing clouds and in ground contamination.<sup>42</sup> The Staff expert's calculation

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<sup>36</sup> *Id.* at ¶ 21.

<sup>37</sup> Transcript at 27.

<sup>38</sup> Staff Summary at 19.

<sup>39</sup> Staff Summary, *Affidavit of Elizabeth A. Thompson* at ¶¶ 15-51.

<sup>40</sup> *Id.*, Reference 11.

<sup>41</sup> *Id.* at ¶ 29.

<sup>42</sup> *Id.* at ¶¶ 39-49.

included the dose contributed by 4 days of exposure to contaminated ground<sup>43</sup> as a result of the release of radioactive material from the casks. For the case with the most serious potential consequences, the Staff expert calculated that the 50-year total effective dose equivalent to this nearest resident would be less than 5 rem — and “at that low dose level there would not be any discernible health effects of any kind.”<sup>44</sup>

Supporting the Staff’s view, PG&E highlights instances where the NRC has concluded that a 5 rem dose would be insignificant, notes that the Environmental Protection Agency limits doses to workers during emergencies to 5 rem, and states that the Food and Drug Administration sets a 5 rem threshold for recommended emergency action.<sup>45</sup> PG&E states that

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<sup>43</sup> *Id.* at ¶ 48.

<sup>44</sup> Transcript at 29. See also Staff Summary, *Affidavit of Elizabeth A. Thompson* at ¶ 51, Ref. 19 (citing a 2004 Health Physics Society position paper stating that below 5-10 rem “risks of health effects are either too small to be observed or are nonexistent.”).

<sup>45</sup> Regarding the use of a 5 rem dose as an indicator of environmental impacts, the PG&E experts point to:

- 10 C.F.R. § 72.106(b), which sets a dose limit of 5 rem at the boundary of the ISFSI as a result of any design basis accident. The experts provide citations to the rulemaking history and to NUREG-1092 for support noting that in the rulemaking (*citing Licensing Requirements for the Independent Storage of Spent Nuclear Fuel and High-level Radioactive Waste*, 53 Fed. Reg. 31,651, 31,672-73, 31,658 (Aug. 19, 1988)) the NRC concluded the associated environmental and human health effects would be insignificant at this exposure level. PG&E Summary, *Testimony of Jearl Strickland and Mark Mayer*, ¶¶ 21-22.
- 10 C.F.R. § 20.1201(a)(1)(i), which sets a 5 rem total effective dose equivalent for adult occupational exposures. The experts provide citations to the rulemaking history and to Reg. Guide 8.29 (attached at Tab 7 of PG&E’s filing) for support. Citing to Reg. Guide 8.29, the experts state that approximately 20% of people die from cancer irrespective of occupational exposure, and that a 5 rem exposure would increase the cancer risk by about 0.2%. PG&E’s experts note that in the rulemaking (*citing Standards for Protection Against Radiation*; Republication, 51 Fed. Reg. 1092, 1102 (Jan. 9, 1986)) the NRC concluded the associated environmental and human health effects would be insignificant at this exposure level. PG&E Summary, *Testimony of Jearl Strickland and Mark Mayer*, ¶ 23.

Footnote continued...

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5 rem is "the current occupational annual limit, which is permitted each year over a working lifetime, and is associated with the expectation of minimal increased radiation risks."<sup>46</sup> PG&E argues that costs of preventive actions (with respect, for example, to dairy farms, the nearest of which is 12 miles away) would be limited.<sup>47</sup> PG&E's input reinforces our view that the Staff's finding of no significant impact was reasonable.

The Staff's use of HOTSPOT to perform its quantitative analysis was contested by SLOMFP, which maintained that the HOTSPOT computer code is not suited for accurately modeling the complex behaviors of atmospheric plumes released in a location with the topology of the Diablo Canyon site. But SLOMFP offered little more than a bare assertion that HOTSPOT, a readily available and "widely used model for emergency preparedness and nuclear safety analysis,"<sup>48</sup> was inadequate. Even if SLOMFP's expert would have selected a different computer code to perform the analysis,<sup>49</sup> "[w]hen specialists express conflicting views, an agency must have discretion to rely on the reasonable opinions of its own qualified experts . . .

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- U.S. Environmental Protection Agency (EPA), *Manual of Protective Action Guides and Protective Actions for Nuclear Incidents*, EPA-400-R-92-001 (May 1992) (excerpts attached at Tab 8 of PG&E's filing), which PG&E's experts cite for the propositions that, to the extent practicable, doses to workers during emergencies should be limited to 5 rem; exposures for workers during emergencies should be limited to 10 rem to protect valuable property; and exposures for workers during emergencies should be limited to 25 rem for lifesaving activities and protection of large populations. The experts also review the EPA's definitions of the "phases" of a nuclear incident. PG&E Summary, *Testimony of Jearl Strickland and Mark Mayer*, ¶¶ 25-28.
  - Food and Drug Administration (FDA) exposure pathway based recommended protective actions, which have 5 rem trigger points. *Id.* at ¶¶ 29-36.

<sup>46</sup> PG&E Summary at 12-13.

<sup>47</sup> *Id.* at 13.

<sup>48</sup> Staff Summary, *Affidavit of Elizabeth A. Thompson*, ¶ 22.

<sup>49</sup> See Transcript at 81.

<sup>50</sup> SLOMFP has given us no basis for overturning the Staff expert's reasonable use of HOTSPOT to perform a quantitative dose assessment in this case.<sup>51</sup>

The Staff's finding of no significant impact was supported not only by quantitative dose assessment, but by additional qualitative analysis. The Staff's qualitative analysis showed that the probability of a significant radioactive release caused by terrorist attack on the Diablo Canyon ISFSI is very low. In its qualitative analysis, the NRC Staff points first to the "robustness" of the storage system PG&E plans to use at Diablo Canyon:

By design, *dry cask storage systems are highly resistant to penetration*. To be licensed or certified by [the] NRC, these systems must meet stringent requirements for structural, thermal, shielding, and criticality performance, and confinement integrity, for normal and accident events. Consequently, *spent fuel storage casks are extremely robust structures, specifically designed to withstand severe accidents, including the impact of a tornado-generated missile such as a 4000-pound automobile at 126 miles per hour*.<sup>52</sup> The massive HI-STORM 100SA storage casks to be used at the Diablo Canyon ISFSI are made of inner and outer cylindrical carbon steel shells, filled with 30 inches of concrete, and weighing up to 170 tons when fully loaded with spent fuel. Each cask surrounds an internal multi-purpose canister, which safely confines the spent fuel in a completely sealed, welded stainless steel cylinder. The spent fuel is further protected by the metallic zircaloy cladding surrounding the fuel pellets in each fuel rod of a spent fuel assembly. Finally, *the nuclear fuel itself is in the form of solid ceramic pellets of uranium dioxide; this means that a large amount of the radioactive material would remain in solid form and in the immediate vicinity of the ISFSI, even if a terrorist act were successful in breaching the multiple layers*

<sup>50</sup> *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 378 (1989).

<sup>51</sup> Even assuming, *arguendo*, that HOTSPOT is not the most sophisticated means for modeling atmospheric plumes at the Diablo Canyon site, "NEPA does not require [a decision] whether an [environmental impact report] is based on the best scientific methodology available, nor does NEPA require [resolution of] disagreements among various scientists as to methodology." *Friends of Endangered Species, Inc. v. Jantzen*, 760 F.2d 976, 986 (1985).

<sup>52</sup> PG&E adds that, structurally, the dry cask design has been demonstrated to withstand certain design basis events, documented in PG&E's Safety Analysis Report and Environmental Report (originally submitted Dec. 21, 2001) and in the NRC Staff's Safety Evaluation Report (Mar. 22, 2004). These design basis events include not just the impacts of an automobile hurled into the cask at 126 miles per hour but also the impacts of other solid steel objects hurled at high velocities (by tornados and other natural phenomena), as well as the impacts from a postulated collapse of two transmission towers close to the ISFSI. PG&E Summary, *Testimony of Jearl Strickland and Mark Mayer*, ¶¶ 9, 10.

*of protection. Thus, only a small fraction of the radioactive material released would be in the dispersible form of fine particulate material or radioactive gases with the potential to be transported offsite.*<sup>53</sup>

PG&E's experts<sup>54</sup> describe the Holtec HI-STORM 100SA storage system as an anchored version of the design certified for general use, specifically licensed for the Diablo Canyon ISFSI. When loaded, the fully-sealed, multi-purpose storage canisters will hold up to 32 fuel assemblies (or certain other hardware), in an "egg-crate" fuel basket. The overpack allows natural circulation of air around the outside surface of the multi-purpose canister through four air inlet ducts spaced at 90 degree intervals at the base of the overpack and four outlet ducts in the top lid of the overpack. The inlet ducts are below the base plate of the multi-purpose canister and the outlet ducts are above the steel lid of the multi-purpose canister. Because there is no direct line of sight through the upper and lower vents to the multipurpose canister inside, access to the surface of the multipurpose canister is prevented, as is a direct impact of an airborne missile or projectile on that surface. Within the multipurpose canister, the solid fuel pellets are protected by metallic zircaloy cladding. As a result, even if the external barriers are breached, only a small fraction of the radioactive material could be released in a form that could be transported offsite. The fuel rod array and the geometry of the fuel basket also would act as a filter to limit escaping material.<sup>55</sup> These details, provided by the Staff and PG&E, support the Staff's finding that because there is "a very low probability that there will be any significant release from the casks in the event of a terrorist attack . . . there would not be any significant impacts from land contamination."<sup>56</sup>

<sup>53</sup> Final EA Supplement at 6 (emphasis added).

<sup>54</sup> PG&E Summary, *Testimony of Jearl Strickland and Mark Mayer*, ¶¶ 6-8, 11.

<sup>55</sup> PG&E Summary at 10-11.

<sup>56</sup> Transcript at 28.

The record indicates that significant health or environmental consequences are particularly unlikely under site conditions at Diablo Canyon. The Staff explains that it compared the assumptions underlying the post-9/11/2001 generic ISFSI and determined that conditions at the Diablo Canyon site rendered potential doses "much lower" than generic assessments might suggest:

[T]he assumptions used in [the] generic [ISFSI] security assessments, regarding the storage cask design, the source term (amount of radioactive material released), and the atmospheric dispersion, were representative, and in some cases, conservative, relative to the actual conditions at the Diablo Canyon ISFSI. In fact, because of the specific characteristics of the spent fuel authorized for storage at the Diablo Canyon ISFSI (lower burnup fuel), and the greater degree of dispersion of airborne radioactive material likely to occur at the site, *any dose to affected residents nearest to the Diablo Canyon site calculated using site-specific parameters will be much lower than doses calculated using the assumptions made for the generic assessments.*<sup>57</sup>

PG&E lists several additional characteristics of the Diablo Canyon site that would further limit the human health, land contamination, and other environmental effects of a terrorist attack. First of all, the power plant site is large and is located in a sparsely populated region, so the number of exposed individuals would be small and the costs of evacuation or relocation also would be small. Moreover, PG&E also owns and controls a large area of land surrounding the site — relatively little of this land is productive, and the nearest dairy is 12 miles away, so "any costs associated with protective actions for ingestion pathways would be minimal."<sup>58</sup> Also, if there were a terrorist attack that caused a release of radioactive material, the site emergency plan would be activated, further assuring low long-term health impacts, "both in the 10-mile emergency planning zone and in the 50-mile ingestion pathway zone."<sup>59</sup>

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<sup>57</sup> Final EA Supplement at 7 (emphasis added).

<sup>58</sup> PG&E Summary at 14.

<sup>59</sup> *Id.* at 14-15.

Finally, as the NRC Staff's threat-assessment expert stresses, the likelihood that a terrorist attack would even be attempted at the Diablo Canyon ISFSI is low.<sup>60</sup> While the Staff's expert acknowledges the precise probability of a successful terrorist attack on the Diablo Canyon ISFSI cannot be calculated or quantified,<sup>61</sup> that does not mean we should disregard her opinion that the likelihood of such an event is low.<sup>62</sup> Where quantification is "not possible," we expect our license applicants and our Staff to assess pertinent factors "in qualitative terms."<sup>63</sup>

In sum, after considering the entire record, we find by a preponderance of the evidence<sup>64</sup> that SLOMFP's Contention 2 lacks merit. The Staff examined a range of plausible terrorist attacks on the Diablo Canyon ISFSI and found that even the most severe would cause no immediate or latent health effects after quantitatively evaluating how air and land contamination would contribute to those effects.<sup>65</sup> Additional qualitative analysis by the Staff showed that an

<sup>60</sup> Staff Summary, *Affidavit of Kelley, Hall, Warren, and Sanders*, ¶ 6. See also Transcript at 10 (stating "the Staff believes that the probability an attack will be attempted on the Diablo Canyon ISFSI is low"); Final EA Supplement at 7 (describing the mitigating potential of emergency response actions "in the unlikely event that an attack were attempted at the Diablo Canyon ISFSI.")

<sup>61</sup> Staff Summary, *Affidavit of Kelley, Hall, Warren, and Sanders*, ¶ 6.

<sup>62</sup> *Id.* As indicated in her Statement of Qualifications submitted along with her affidavit, NRC Staff expert Roberta Warren currently heads the agency's Intelligence Liaison and Threat Assessment Branch and has over 30 years experience in "counterterrorism analysis." SLOMFP apparently does not agree with the Staff's view, but SLOMFP brought no equivalent expertise to the proceeding.

<sup>63</sup> 10 C.F.R. § 51.45(c). See also 10 C.F.R. § 51.71(d).

<sup>64</sup> See *Pacific Gas and Electric Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-763, 19 NRC 571, 577 (1984) ("[T]o prevail on . . . factual issues, the . . . position must be supported by a preponderance of the evidence"); *Tennessee Valley Authority* (Hartsville Nuclear Plant, Units 1A, 2A, 1B, and 2B), ALAB-463, 7 NRC 341, 360 (1978), *reconsideration denied*, ALAB-467, 7 NRC 459 (1978) ("Absent some special statutory standard of proof, factual issues . . . are determined by a preponderance of the evidence.").

<sup>65</sup> We do not read the Staff's supplemental environmental assessment in isolation. Rather, we consider it in conjunction with evidence presented in the adjudicatory record, including the affidavit of the Staff expert who performed the dose calculation. That affidavit explains in detail

Footnote continued...

attempted attack is improbable, but even if a plausible attack occurred, the likelihood of a significant radioactive release is very low because of the nature of the Diablo Canyon storage casks and ISFSI site.

Thus, Contention 2, as illuminated by the parties' written submissions and oral argument, provides no basis for invalidating the NRC Staff's supplemental environmental assessment or for requiring the NRC Staff to prepare a full environmental impact statement.

#### D. Selection of Attack Scenarios

As we indicated above, in CLI-08-1 we rejected SLOMFP's proposed Contention 3, which presented SLOMFP's view that the Staff should have considered a broader range of terrorist attack scenarios, as well as the portions of SLOMFP's Contention 2 that made similar complaints:

The NRC Staff's supplemental environmental assessment explains that the Staff considered "[p]lausible threat scenarios . . . includ[ing] a large aircraft impact similar in magnitude to the attacks of September 11, 2001, and ground assaults using expanded adversary characteristics consistent with the design basis threat for radiological sabotage for nuclear power plants." This approach, grounded in the NRC Staff's access to classified threat assessment information, is reasonable on its face. We do not understand the Ninth Circuit's remand decision — which expressly recognized NRC security concerns and suggested the possibility of a "limited proceeding" — to require a contested adjudicatory inquiry into the credibility of various hypothetical terrorist attacks against the Diablo Canyon ISFSI.

Adjudicating alternate terrorist scenarios is impracticable. The range of conceivable (albeit highly unlikely) terrorist scenarios is essentially limitless, confined only by the limits of human ingenuity. And hearings on such claims could not be conducted in a meaningful way without substantial disclosure of classified and safeguards information on threat assessments and security arrangements and without substantial litigation over their significance. Such information — disclosure of which is prohibited by law — would lie at the center of any adjudicatory inquiry into the probability and success of various terrorist scenarios.<sup>66</sup>

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how air and ground contamination would contribute to dose in the unlikely event of a significant release.

<sup>66</sup> CLI-08-1, 67 NRC at 20 (internal footnotes omitted).

In its Subpart K written presentation and at the oral argument, SLOMFP attempted to re-litigate elements of Contention 2 relating to attack-scenario selection, arguing primarily that an attack of the nature postulated by SLOMFP's expert would result in consequences that the NRC Staff had not analyzed.<sup>67</sup> SLOMFP's arguments amount to a request that we revisit our decision in CLI-08-1 against litigating the staff's screening of plausible terrorist scenarios.<sup>68</sup> This we decline to do. As we held in CLI-08-1, NEPA does not require us to reveal sensitive government security information regarding the agency's environmental analysis, and there is no compelling policy reason to do so in this case.

As a legal matter, NEPA claims are governed by NEPA's own specific non-disclosure provision, as construed by the Supreme Court in *Weinberger v. Catholic Action League*,<sup>69</sup> rather than by more general provisions in the AEA or in NRC regulations.<sup>70</sup> Under NEPA, the agency may withhold from public disclosure any information that is exempt under the Freedom of

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<sup>67</sup> SLOMFP Summary at 21.

<sup>68</sup> SLOMFP also attempts to resurrect its claim from the proposed Contention 2 that the NRC Staff inappropriately used terrorist attacks' potential for "early fatalities" as an inappropriate criterion to screen out other kinds of terrorist attacks or as a proxy for environmental effects. See SLOMFP Summary at 21-24. But in CLI-08-1 the Commission *rejected* that aspect of SLOMFP's Contention 2. 67 NRC at 18; see also 67 NRC at 28 (Commissioner Lyons, dissenting in part). The terrorist event the Staff analyzed in depth was one with a 5-rem release, far lower than any "fatal" threshold. And at the public hearing on the supplemental environmental assessment, the Staff explained that it "did not apply a threshold of early fatalities in screening out security scenarios." Transcript at 88. Contrary to SLOMFP's repeated assertions, the record shows that the Staff did not use an "early fatalities" criterion to avoid analyzing environmental effects.

<sup>69</sup> *Weinberger v. Catholic Action League*, 454 U.S. 139 (1981).

<sup>70</sup> In statutory construction, "the specific prevails over the general." See, e.g., *Bonneville Power Admin. v. FERC*, 422 F.3d 908, 916 (9th Cir. 2005). *Accord Guidry v. Sheet Metal Workers Nat'l Pension Fund*, 493 U.S. 365, 375 (1990).

Information Act.<sup>71</sup> Accordingly, in CLI-08-01 we directed the Staff to redact FOIA-exempt information from relevant documents, provide whatever was not exempt to other parties, and identify the exemption relied upon so that the proposed withholding could be challenged. As a result, the Staff released all information regarding its environmental assessment that was suitable for public dissemination.

Further disclosure of sensitive, security-related information would not assist the Commission in determining whether the agency's environmental review was reasonable under NEPA. We have read the Staff's supplemental environmental assessment, reviewed outside of this adjudication the non-public documents that provide the basis for the Staff's selection of the attack scenarios evaluated, and considered the pleadings and transcripts developed by the parties in support of our public hearing in this case. In our judgment, the environmental information developed by the Staff and the parties is more than adequate to permit informed decision making by the Commission in this case, which is what NEPA requires.

Nothing in our procedural hearing rules requires greater disclosure of the agency's environmental analysis.<sup>72</sup> Although those rules have been used in a very few cases to disclose classified information in contested licensing proceedings, in those cases the information was necessary to evaluate challenges to the agency's compliance with security requirements in the Atomic Energy Act, not NEPA.<sup>73</sup> And in those prior cases, the interest in providing classified information to NRC hearing litigants was clearer than in this case, where no party has

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<sup>71</sup> See NEPA § 102(2)(C). Contrary to the suggestion made by Commissioner Jaczko in his dissent, the authority granted by NEPA § 102(2)(C) to withhold sensitive information from public disclosure is not limited to withholding of military or state secrets.

<sup>72</sup> 10 C.F.R. § 2.900 *et seq.* (Subpart I).

<sup>73</sup> See *Duke Cogema Stone & Webster* (Savannah River Mixed Oxide Fuel Fabrication Facility), CLI-02-19, 56 NRC 143 (2002); *Pacific Gas & Elec. Co.* (Diablo Canyon Nuclear Power Plant, Units 1 and 2), ALAB-653, 14 NRC 629 (1981).

challenged the ability of the Diablo Canyon ISFSI to meet NRC safety or security requirements. In our view, any benefit to be gained in this case from further disclosure is outweighed by the risks inherent in disseminating security-related information, even under protective order.<sup>74</sup>

As we made clear in CLI-08-1,<sup>75</sup> our decision not to permit litigation of attack scenarios does not equate to disinterest in SLOMFP's or other citizens' views and opinions on terrorist risks. The NRC Staff, for instance, was made aware of SLOMFP's alternate scenarios both when considering contentions in this adjudication and when reviewing SLOMFP's comments on the draft supplemental environmental assessment. At the oral argument before us the Staff's counsel repeatedly asserted that the Staff was familiar with SLOMFP's "zircaloy fire" scenario and had concluded that it did not alter the Staff's finding of no significant environmental impact.<sup>76</sup>

#### **E. SLOMFP's Request to Supplement Subpart K Presentation**

In its request to supplement its Subpart K presentation, SLOMFP asks to add an affidavit the NRC Staff attached to its motion for summary disposition of Contention1(b). Our rules, at 10

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<sup>74</sup> We agree with Commissioner Jaczko's dissent insofar as it suggests there should be no "false choice" between protecting sensitive information and meeting our responsibilities under NEPA. The information-protection balance we have struck in this case avoids such a "false choice" by making public meaningful information about the bases for the agency's environmental analysis (including references to sensitive documents relied upon by the Staff) while minimizing the risk that sensitive, security-related information will be compromised. The result is a far greater sharing of information than in *Weinberger*, a case in which no part of the agency's environmental analysis was made public.

<sup>75</sup> 67 NRC at 21 n.98.

<sup>76</sup> See, e.g., Transcript at 26, 90. In a written submission prior to the oral argument, the Staff said: "Since the factual information regarding terrorist threat scenarios considered credible by the Staff has been withheld from public disclosure to protect national security, it follows that SLOMFP's speculation that the Staff may have ignored credible threat scenarios with significant environmental impacts or misapprehended the vulnerability of the ISFSI to a terrorist attack by ignoring attack scenarios with greater sophistication is factually unsupported. Further, SLOMFP's claims cannot be considered undisputed simply because they cannot be addressed by the Staff in this public adjudication." Staff Reply at 4-5.

C.F.R. § 2.1113, do not provide for supplementing Subpart K presentations. Moreover, in its request, SLOMFP says that its intended use of the Staff affidavit is to further its argument that “the Staff violated [NEPA] by arbitrarily applying an irrational — and secret — screening criterion to exclude consideration of reasonably foreseeable attack scenarios that would cause significant offsite contamination, human illness, and adverse socioeconomic effects.”<sup>77</sup> SLOMFP’s reason for asking us to allow it to supplement its written presentation is thus to support a proposition —the consideration of alternate terrorist attack scenarios — that is outside the scope of the admitted contention. We deny the request.

#### IV. SUMMARY

This remand proceeding has presented a number of new and difficult issues for us to resolve. In doing so, our choice of procedures has been guided by NEPA, which is meant to inform agency decision making and to provide the public with information about the environmental impacts of our action. We have also been guided by the Ninth Circuit, which recognized the value of qualitative analysis and the importance of protecting sensitive, security-related information.<sup>78</sup> We are confident that our approach strikes a reasonable balance between public disclosure and information protection while permitting informed agency decision making.

Much of this case has centered on the Staff’s determination of “plausible” attack scenarios. The Staff’s selection of plausible attack scenarios—a concept it used to assess the effects of a terrorist attack—was based on information gathered through the agency’s regular interactions with the law enforcement and intelligence communities regarding the capabilities of

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<sup>77</sup> SLOMFP Request to Supplement at 2.

<sup>78</sup> See *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d at 1031-32, 1034-35.

potential adversaries, as well as the Staff's expert judgment in intelligence analysis.<sup>79</sup> Although that information cannot be made public for reasons of national security, as we pledged earlier in this remand proceeding<sup>80</sup> and as required by *Weinberger*,<sup>81</sup> we ourselves, outside the adjudicatory proceeding, have reviewed the non-public information underlying the NRC Staff's selection of terrorist attack scenarios, and are satisfied that the selection was reasonable.

Once plausible scenarios were selected, the Staff did not attempt to quantify the probability that any given scenario would actually be attempted, but instead conservatively "assume[d] that the attack would be attempted [and] successfully completed."<sup>82</sup> The Staff then quantitatively analyzed the human health impacts that would result from the most severe plausible scenario. The Staff's quantitative analysis showed that the worst-consequence scenario would result in a "projected dose of less than 5 rem for the nearest resident,"<sup>83</sup> a dose lower than that permitted by a number of NRC health and safety regulations and other Federal

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<sup>79</sup> See Final EA Supplement at 7; Transcript at 88.

<sup>80</sup> 67 NRC at 21 n.98.

<sup>81</sup> 454 U.S. at 146.

<sup>82</sup> Transcript at 15. Commissioner Jaczko in his dissent points to statements by the Staff that it "did not analyze any specific [attack] scenario for probability" and "[doesn't] believe that the probability of a terrorist attack can be quantified in any way" to cast doubt on the Staff's finding of no significant impact. We do not understand those statements to mean that the Staff's selection of plausible attack scenarios was arbitrary. The record shows scenarios were selected based on intelligence and law-enforcement information regarding attack trends and the demonstrated capabilities of potential adversaries. Rather, we understand those statements to mean that the Staff did not quantify the probability that an adversary would *attempt* a "plausible" attack scenario. Instead, the Staff assumed that a plausible attack, *if attempted*, would succeed. We consider the Staff's assumption a reasonable (and conservative) approach to consequence analysis.

<sup>83</sup> Final EA Supplement at 7.

radiation-protection guidelines.<sup>84</sup> The Staff used a reliable quantitative methodology that took into account the contribution of air and land contamination to dose, and we find it reasonable.

The Staff bolstered its quantitative analysis with a qualitative assessment showing that the likelihood of a significant release in the event of a plausible attack would be very low. The Staff's qualitative assessment reasonably credited the robustness of ISFSI cask designs, the effectiveness of NRC security requirements, the mitigating effect of emergency planning and response actions, and site-specific meteorology and source term to show that its quantitative dose analysis likely overstated the significance of the impacts that would result in the event of a plausible attack.<sup>85</sup> The Staff also found that an attack would be improbable. Having shown through a combination of quantitative and qualitative analysis that the projected dose resulting from the most severe plausible attack "would likely be well below 5 rem,"<sup>86</sup> and that the chance of any attack at all was low, the Staff reasonably concluded that further analysis of the economic or other environmental impacts was not necessary.

Finally, the Staff made its draft supplemental environmental assessment public, received public comments on the draft and provided public responses, and published a final supplement that included a bibliography of the sensitive, security-related information upon which it relied. We then held a public hearing to consider additional evidence and argument regarding the Staff's assessment. The result is a far greater sharing of information than in *Weinberger*, a case in which no part of the agency's environmental analysis was made public.

Accordingly, we conclude that the Staff's final, supplemental environmental assessment and finding of no significant impact, the adjudicatory record in this case, and our own

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<sup>84</sup> See, e.g., 10 C.F.R. § 72.106(b) (setting a 5 rem dose limit for ISFSI design-basis accidents); 10 C.F.R. § 20.1201(a)(1)(i) (setting a 5 rem total effective dose equivalent for adult occupational exposures). See also n.45, *supra*.

<sup>85</sup> See Final EA Supplement at 4-7.

<sup>86</sup> *Id.* at 7.

supervisory review of the non-public information underlying portions of the Staff's analyses, are more than sufficient to satisfy the agency's NEPA obligations. Consistent with longstanding NRC practice, today's decision becomes part of the environmental record of decision along with the environmental assessment itself.<sup>87</sup>

#### V. CONCLUSION

For the reasons stated above, we reject SLOMFP's Contention 2 on the merits and find that an environmental impact statement is not required in order to address the land contamination and latent health effect issues raised in the contention.

IT IS SO ORDERED.

For the Commission

**(NRC Seal)**

/RA/

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Annette L. Vietti-Cook  
Secretary of the Commission

Dated at Rockville, Maryland,  
this 23rd day of October, 2008

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<sup>87</sup> "The adjudicatory record and Board decision (and, of course, any Commission appellate decisions) become, in effect, part of the FEIS." *Louisiana Energy Services, L.P.* (Claiborne Enrichment Center), CLI-98-3, 47 NRC 77, 89 (1998), citing *Philadelphia Electric Co.* (Limerick Generating Station, Units 1 and 2), ALAB-819, 22 NRC 681, 705-707 (1985). See also, *Hydro Resources, Inc.* (P.O. Box 15910, Rio Rancho, NM 87174, CLI-01-4, 53 NRC 31, 53 (2001); *Allied-General Nuclear Services* (Barnwell Nuclear Fuel Plant Separations Facility), ALAB-296, 2 NRC 671, 680 (1975).

**Commissioner Gregory B. Jaczko's Dissent on SECY-08-0120  
Docket No. 72-26-ISFSI  
Decision on the Merits of San Luis Obispo Mothers for Peace Contention**

I disapprove of this Order. In short, nothing in the record justifies the Staff approach to land contamination and non-fatal health effects. For the reasons described below, admitted Contention 2 should be sustained, and the environmental assessment (EA) remanded to the Staff for revision to address these topics.

The San Luis Obispo Mothers for Peace (SLOMFP) Contention 2, as admitted, states:

The NRC Staff's "environmental assessment ignore[d] environmental effects on the surrounding land" and failed to consider "non-fatal health effects (e.g. latent cancers from a hypothetical terrorist attack."

CLI-08-1, 67 NRC at 18. The Staff EA at issue here describes that the Staff "screened" threat scenarios to determine "plausibility." EA at 7. The EA goes on to state that the NRC "made conservative assessments of consequences, to assess the potential for early fatalities from radiological impacts from those plausible scenarios." *Id.* After describing how the Staff arrived at source term and meteorology inputs, the EA describes how the Staff calculated the dose to the nearest affected resident from the most severe plausible threat scenarios, which "would likely be well below 5 rem." *Id.* *The EA is silent on how such a dose relates to land contamination or non-fatal health effects.* The EA is also devoid of any other analysis of land contamination and non-fatal health effects.

By failing to address these matters, the Staff failed to meet the challenge the Commission posed to it in the January 15, 2008, Order (CLI-08-01, 67 NRC at 18) to demonstrate that it considered the environmental effects of a terrorist attack in the EA. The burden in this proceeding to show the EA is complete is on the NRC Staff and nothing in the record, including the oral argument proceeding, alters the clear conclusion that the Staff did not consider land contamination.

The Staff's support for its argument that it did analyze the environmental effects on the surrounding land is remarkably thin. The Staff says it *considered* land contamination but did not *analyze* it – "we did not explicitly do an analysis of land contamination." Transcript at 21 (Ms. Clark), *see also* Transcript at 23, 29. How does one square these facts with a statement that a contention claiming that the EA ignored environmental effects on surrounding land "is without merit"? Order at 3.

The Staff made two conclusions not supported by the record before the Commission. First, the Staff concluded that a 5 rem exposure to a resident over five days can only be caused by a release of radioactive material that, by definition, cannot cause a significant adverse affect on the environment. This judgment may be true, but it is a conclusion unsupported by data in the EA. The Staff may view this as an obvious matter, but it must be documented on a case-specific basis. We have no rule stating that the NRC may regard the environmental effects of any specified amount of radiological exposure as insignificant. The NEPA process is about ensuring that high quality, scientifically accurate environmental information is documented and made available to public officials and citizens before decisions are made and before actions are taken. Therefore, any such conclusion must be documented either through reference to

adequate previous analysis or to an application-specific analysis which shows this to be the case. Clearly this was not done in the current EA.

This leads me to the second insufficiently supported Staff conclusion, that is, the probability of a successful terrorist attack is so low that an analysis of the affects on the environment is unnecessary. In response to a line of questioning from Commissioner Svinicki, the Staff makes clear it believed it did not need to do this analysis because there is a very low probability of significant land contamination. The Staff comes to this conclusion even though it stated at oral argument that it cannot calculate a probability of such an event and that it "did not analyze any specific scenario for probability." Transcript at 34 (Ms. Clark). The Staff went on to state that "we don't believe that the probability of a terrorist attack can be quantified in any way." Transcript at 38 (Ms. Clark).

This argument is entirely inconsistent with the Staff position that some scenarios are "plausible." Either the Staff should have described how its analyses showed that every release scenario is of very low probability and therefore land contamination (and human health effects) need not be considered further, or it should have analyzed why the plausible scenarios would not result in significant land contamination and human health effects.

The majority further clouds this issue by stating in the Order (at 15) that "as the NRC Staff's threat-assessment expert stresses, the likelihood that a terrorist attack would even be attempted at the Diablo Canyon ISFSI is low." The actual quote from the expert referenced in footnote 60, however, is "Because of the uncertainty inherent in assessing the likelihood of a terrorist attack, the Staff recognizes that under general credible threat conditions although the probability of such an attack is believed to be low it cannot be reliably quantified." Affidavit of Kelley, Hall, Warren, and Sanders ¶ 6. Thus, the full quote from the Staff expert elicits a very different sentiment -- one that is more accurate, much closer to the views expressed by the Staff at the oral argument, and that reflects the limits of what we can know.

Other portions in the Order similarly miss the point. The Order contains the majority's explanation about why the HOTSPOT computer code was the correct tool for the dose calculations the Staff did perform. The Order states that "SLOMFP offered little more than a bare assertion" that this code was not appropriate for accurately modeling the behavior of a plume at Diablo Canyon. Order at 11. But this is not an argument about dose calculations; rather, it is about whether the Staff performed any land contamination analysis. SLOMFP's objection is that HOTSPOT is "not an appropriate code for considering land contamination." Transcript at 81 (Ms. Curran). SLOMFP went further and made clear that there was an appropriate code that could perform the required analysis -- a code known as MACCS.

The portion of the Order addressing this issue is simply irrelevant to Contention 2, as admitted. The Order states that SLOMFP did not adequately make their case against HOTSPOT, that the agency has the discretion to rely on the reasonable opinions of its own qualified experts, and that we have "no basis for overturning the Staff expert's reasonable use of HOTSPOT." Order at 12. The Staff itself, however, also stated at the oral argument that HOTSPOT is not the correct code to analyze land contamination. The Staff agreed that MACCS would be required "if one were to project the land contamination that could result and then calculate, for example, the economic costs of cleanup." Transcript at 23 (Ms. Clark). The Staff further noted that it has contracted for the use of that code in the past. *Id.* Therefore, HOTSPOT was the wrong code to use to analyze land contamination and MACCS was the correct one. There is no disagreement between the Staff and SLOMFP regarding that conclusion.

The Order also categorically dismisses any link between consideration of terrorist scenarios and the admitted contention, without addressing the SLOMFP argument that it is difficult to separate an analysis of consequences from the event that causes them. Transcript at 76 (Ms. Curran). The record of the oral argument makes it clear that a majority of the members of the Commission were similarly unable to completely separate the two, as they pursued lines of questioning about scenarios.

The credibility of the Staff on this issue was undermined when they were unable to answer a technical question I asked about a zirconium fire scenario as posited by SLOMFP. The Staff first said it could not discuss the topic because it was Safeguards Information. Transcript at 33-34. Later, the Staff admitted it did not have the expertise to answer this straightforward scientific question without hiring an outside contractor to do an analysis. Transcript at 92 (Ms. Clark). The Staff refuses to answer whether the scenario proposed by SLOMFP is bounded by their analysis and then further admits to not having the in-house expertise to analyze a related topic. Combining this with the fact that the agency's message all along has been 'trust us to have looked at this information that we refuse to give you access to,' I would say the agency is standing on a very weak foundation to reject this contention.

In addition, the discussion on pages 17-19 of the Order overreaches in an attempt to withhold information. Nothing occurred during the oral argument to change my view that the Commission is overly relying on a court decision concerning the public release of State secrets to categorically withhold classes of information from one of the parties. The proceeding before us does not involve military or state secrets and we do have mechanisms to ensure that sensitive information provided to the participants in the proceeding is protected from disclosure. The majority also seeks credit for providing *more* information than was shared in *Weinberger*, "The result is a far greater sharing of information than in *Weinberger*, a case in which no part of the agency's environmental analysis was made public." Order at 22.

This is a somewhat disingenuous argument. The reason the Supreme Court held that the Navy did not need to make the environmental analysis public (if there was one) was because its very existence would have revealed national security information. The Navy was not required to prepare an environmental impact statement unless they actually stored nuclear weapons at the site in question, and whether or not the Navy stored nuclear weapons there was in itself classified. In the situation where the very act of *publicly* complying with NEPA would have revealed military secrets, the Navy could withhold the EIS that it still must prepare for internal purposes if it did store weapons at the site.

The circumstances in the Diablo Canyon hearing are categorically different. There is no national security secret involving whether or not the ISFSI would contain spent nuclear fuel and the proposals I have made involve sharing sensitive information with appropriately cleared representatives of the parties, not making it publicly available. The fact that previous Commissions have demonstrated the ability in proceedings to share information to appropriately cleared individuals, appropriately safeguarded through a protective order, contradicts the arguments made in the order that this is not possible.

In addition, the very case that the majority hangs their hats on clearly states, "Section 102(2)(C) of NEPA, 42 U.S.C. § 4332(2)(C), provides that, "to the fullest extent possible," all federal agencies shall "include in every recommendation or report on proposals for legislation and other major Federal actions significantly affecting the quality of the human environment, a detailed statement" discussing, *inter alia*, the environmental impact of the proposed action and possible alternatives..." *Weinberger*, 454 U.S. at 142.

The majority's argument in the Order presents a false choice between protecting sensitive information and meeting our responsibilities under NEPA. The order argues that the agency is prohibited from doing more to satisfy NEPA, but limiting information disclosure is simply a choice the majority has made, as is clear from the Order's discussion of finding a "balance." Again, no one is proposing that sensitive information be publicly disclosed. The agency has established and convened closed proceedings in the past and could do so again. Finally, in the absence of holding a closed session, the Commission committed in CLI-08-01 to review the range of terrorist events considered by the Staff. We put in place no process to collectively do so and I am aware of no discussion among the members of the Commission about the results of their ad hoc reviews.

Finally, after spending 20 pages explaining why the Staff's EA is adequate and stands on its own, the majority does an admirable job of attempting to craft a coherent argument in the summary of the order. The summary states "we conclude that the Staff's final, supplemental environmental assessment and finding of no significant impact, the adjudicatory record in this case, and our own supervisory review of the non-public information underlying portions of the Staff's analyses, are more than sufficient to satisfy NEPA obligations." Order at 22. This statement, however, is a fundamental recognition on the part of the majority that the EA by itself is insufficient. Since the burden was on the Staff to prove the EA was sufficient and they were not able to, the contention can not be rejected.

A compromise approach was clearly feasible. First, the Commission should have held a closed proceeding of appropriately cleared representatives of the parties, and in the presence of whatever appropriately cleared contractors the Staff needs to have on hand, to adjudicate the issue of whether or not the SLOMFP's scenario is bounded by the work the Staff did. Second, the Commission should have directed the Staff to use the appropriate computer code to perform an adequate analysis of land contamination. Third, assuming the results of those actions did not change the facts of the matter before us, the EA should have been supplemented with the additional information that resulted from these steps. The EA should also have been supplemented to include the detailed discussion from P&GE about preventive measure that would be taken to limit the impact of any release. Transcript at 50-51 (Mr. Repka). If the results of these steps led to additional questions and concerns, the agency would have had a basis to, and no choice but to, accept SLOMFP's position and prepare an environmental impact statement.

*This alternative would have been a more transparent approach for the agency to take in resolving the issues in this specific case and it would have been a better public policy position. I strongly believe this was the only path forward that would be true to our responsibilities under both NEPA and the AEA.*

found — repeatedly — that the rejection or admission of a contention, where the Petitioner has been admitted as a party and has other contentions pending, neither constitutes serious and irreparable impact, nor affects the “basic structure of the proceeding in a pervasive and unusual manner.”<sup>17</sup>

We note that our Boards have broad discretion to issue procedural orders to regulate the course of proceedings and the conduct of participants. It is the Board’s responsibility to “conduct a fair and impartial hearing according to law, to take appropriate action to control the prehearing and hearing process, and to maintain order.”<sup>18</sup> As a general matter, we decline to interfere with the Board’s day-to-day case management decisions, unless there has been an abuse of power.<sup>19</sup> We see no abuse in the Board’s actions here.

### III. CONCLUSION

For the foregoing reasons, the Petition is denied.  
IT IS SO ORDERED.

For the Commission

ANNETTE L. VIETTI-COOK  
Secretary of the Commission

Dated at Rockville, Maryland,  
this 30th day of April 2008.

<sup>17</sup> See, e.g., *Exelon Generation Co., LLC* (Early Site Permit for Clinton ESP Site), CLI-04-31, 60 NRC 461, 466-67 (2004). See also *Energy Nuclear Generation Co.* (Pilgrim Nuclear Power Station), CLI-07-2, 65 NRC 10, 12 (2007); *Private Fuel Storage, L.L.C.* (Independent Spent Fuel Storage Installation), CLI-00-2, 51 NRC 77, 79-80 (2000).

<sup>18</sup> 10 C.F.R. § 2.319.  
<sup>19</sup> E.g., *Energy Nuclear Operations, Inc.* (Indian Point, Units 2 and 3), CLI-07-28, 66 NRC 275 (2007); *Consolidated Edison Co. of New York* (Indian Point, Unit 2), CLI-82-15, 16 NRC 27, 37 (1982).

Cite as 67 NRC 193 (2008)

CLI-08-8

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Dale E. Klein, Chairman  
Gregory B. Jaczko  
Peter B. Lyons  
Kristine L. Svinicki

In the Matter of

Docket No. 72-26-ISFSI

PACIFIC GAS AND ELECTRIC  
COMPANY  
(Diablo Canyon Power Plant  
Independent Spent Fuel Storage  
Installation)

April 30, 2008

### NATIONAL ENVIRONMENTAL POLICY ACT; FREEDOM OF INFORMATION ACT

By law, disclosure of documents under the National Environmental Policy Act is expressly governed by the Freedom of Information Act. Freedom of information Act litigation is ordinarily “resolved on summary disposition without discovery and without evidentiary trials or hearings,” and discovery is sparingly used.

### CONTENTIONS, LATE-FILED; CONTENTIONS, ADMISSIBILITY

Five factors must be balanced (under our pre-2004 rules) before a petition to admit a late-filed contention can be granted. “The first factor — whether good cause exists to excuse the late-filing of the contention — is the most important factor.” “If ‘good cause’ is not shown, a petitioner ‘must make a ‘compelling’ showing’ on the remaining four factors.” “In this analysis, factors three and five are to be given more weight than factors two and four.” If the late-filed contention criteria are satisfied, our next inquiry is whether the proposed contention is suitable for hearing.

**DISCLOSURE: CLASSIFIED AND SAFEGUARDS INFORMATION;  
TERRORISM**

It is not practical or legally required for the Nuclear Regulatory Commission to adjudicate the essentially limitless range of conceivable (albeit highly unlikely) terrorist scenarios, where the core evidence (threat assessment and security measures) is protected security information. The National Environmental Policy Act does not contemplate adjudications resulting in the disclosure of matters under law considered secret or confidential.

**MEMORANDUM AND ORDER**

**I. INTRODUCTION**

In January we issued an order admitting limited portions of Contentions 1(b) and 2 (proposed by San Luis Obispo Mothers for Peace (SLOMFP)) and setting a schedule for further proceedings in this adjudication on a license application for an independent spent fuel storage installation (ISFSI) at the site of the Diablo Canyon nuclear power reactor in California.<sup>1</sup> We directed the NRC Staff to file a complete listing of the source documents it relied on for its National Environmental Policy Act (NEPA) assessment, "together with a *Vaughn* index (or its equivalent)" detailing the Freedom of Information Act (FOIA) basis for any withheld documents or portions of documents.<sup>2</sup> The Staff responded to our direction regarding Contention 1(b) by filing its Reference Document List and *Vaughn* index (with later addendum) and providing copies of releasable documents, redacted as it deemed necessary.<sup>3</sup>

The Staff's Reference Document List and *Vaughn* index filing prompted two fresh pleadings from SLOMFP. SLOMFP's first pleading objected to the adequacy of the Staff's filing, requested additional discovery based on information in the redacted documents the Staff provided, and asked for access to unredacted documents under a protective order.<sup>4</sup> SLOMFP's second pleading proposed a new

<sup>1</sup> CLI-08-1, 67 NRC 1 (2008).

<sup>2</sup> *Id.* at 25.

<sup>3</sup> NRC Staff's Response to Commission Order To Provide Reference List and *Vaughn* Index (Feb. 13, 2008) and Addendum to NRC Staff's Response to Commission Order To Provide Reference List and *Vaughn* Index (Feb. 15, 2008).

<sup>4</sup> San Luis Obispo Mothers for Peace's Response to NRC Staff's *Vaughn* Index, Request for Leave To Conduct Discovery Against the NRC Staff, Request for Access to Unredacted Reference Documents, and Request for Procedures To Protect Submission of Sensitive Information (Feb. 20, 2008).

contention — Contention 6 — based on information included in an unredacted portion of a classified document the Staff had released.<sup>5</sup> Both the Pacific Gas and Electric Company (PG&E)<sup>6</sup> and the NRC Staff<sup>7</sup> oppose admission of this new contention.

We addressed the first SLOMFP pleading in an order issued in March.<sup>8</sup> We denied SLOMFP's implicit request for reconsideration of our earlier ruling on access to unredacted information and reiterated our decision not to grant NEPA-based access to FOIA-exempt documents to SLOMFP "[b]ecause by law disclosure of documents under NEPA is expressly governed by FOIA."<sup>9</sup> We delegated the resolution of Contention 1(b) — essentially a FOIA dispute — to the previously delegated presiding officer.<sup>10</sup> We authorized the presiding officer "to use all appropriate adjudicatory tools," and directed him to issue a decision on an expedited basis — i.e., by May 30, 2008 — "[a]bsent unanticipated circumstances."<sup>11</sup> We also authorized limited discovery, but "only if absolutely necessary to ensure a complete record and a fair decision," and reminded the presiding officer and the parties of the sparing use of discovery in FOIA litigation, "which ordinarily is resolved on summary disposition without discovery and without evidentiary trials or hearings."<sup>12</sup>

Before us today are SLOMFP's motion to reconsider our March order on Contention 1(b) and its request to file Contention 6, a new contention based on recently released NRC Staff documents. We deny the motion to reconsider our Contention 1(b) ruling, except to note that the presiding officer can take additional time to decide the contention if necessary, and we find SLOMFP's Contention 6 inadmissible. We also address a number of case-management matters.

<sup>5</sup> San Luis Obispo Mothers for Peace's Request for Admission of Late-Filed Contention 6 Regarding Diablo Canyon Environmental Assessment Supplement (Feb. 27, 2008) (Contention 6 Petition).

<sup>6</sup> Pacific Gas and Electric Company's Response to San Luis Obispo Mothers for Peace Proposed Late-Filed Contention 6 (Mar. 5, 2008) (PG&E Contention 6 Response).

<sup>7</sup> NRC Staff's Response to San Luis Obispo Mothers for Peace's Request for Admission of Late-Filed Contention 6 (Mar. 5, 2008) (Staff Contention 6 Response).

<sup>8</sup> CLI-08-5, 67 NRC 174 (2008).

<sup>9</sup> *Id.* at 176.

<sup>10</sup> *Id.* at 177.

<sup>11</sup> *Id.*

<sup>12</sup> *Id.*

## II. DISCUSSION AND ANALYSIS

### A. Contention 1(b)

SLOMFP argues that we should reconsider our unwillingness to give access to safeguards and classified information and that we should also reconsider our expedited schedule for resolving Contention 1(b).<sup>13</sup> PG&E<sup>14</sup> opposes SLOMFP's motion for reconsideration. The current adjudicatory proceeding arises out of *San Luis Obispo Mothers for Peace v. NRC*,<sup>15</sup> where the Ninth Circuit held that the NRC's "categorical refusal to consider the environmental effects of a terrorist attack" was unreasonable under NEPA,<sup>16</sup> and remanded this "NEPA-terrorism" issue to the Commission for "further proceedings consistent with this opinion."<sup>17</sup> As we noted in our initial scheduling order pursuant to this remand, the Ninth Circuit explicitly left to our discretion the precise manner of our procedural approach and our merits consideration of the NEPA-terrorism issue.<sup>18</sup> In so doing, the Ninth Circuit pointed out that the Supreme Court's decision in *Weinberger v. Catholic Action of Hawaii*,<sup>19</sup> supports "the proposition that security considerations may permit or require modification of some of the NEPA procedures" even though security issues do not "result in some kind of NEPA waiver."<sup>20</sup> The Ninth Circuit acknowledged that the NRC's information-security "arguments explain why a *Weinberger*-style limited proceeding might be appropriate."<sup>21</sup>

Consistent with the Ninth Circuit's suggestion, we have "use[d] *Weinberger* as our guidepost" throughout this remand proceeding.<sup>22</sup> As we stated before, "[o]ur inability to disclose information based on the confidentiality of that information does not mean, however, that the NRC Staff (and the Commission, on review) has not performed the evaluation the Ninth Circuit directed, consistent with *Weinberger* — it simply means that certain information cannot be made public for

<sup>13</sup> *San Luis Obispo Mothers for Peace's Motion for Reconsideration of CLI-08-05* (Apr. 7, 2008) (April Reconsideration Motion).

<sup>14</sup> *Pacific Gas and Electric Company's Opposition to San Luis Obispo Mothers for Peace Motion for Reconsideration of CLI-08-05* (Apr. 17, 2008).

<sup>15</sup> *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9th Cir. 2006), cert. denied sub nom. *Pacific Gas & Electric Co. v. San Luis Obispo Mothers for Peace*, No. 06-466 (Jan. 16, 2007).

<sup>16</sup> 449 F.3d at 1028.

<sup>17</sup> 449 F.3d at 1035.

<sup>18</sup> CLI-07-11, 65 NRC 148, 149 (2007).

<sup>19</sup> *Weinberger v. Catholic Action of Hawaii*, 454 U.S. 139 (1981).

<sup>20</sup> 449 F.3d at 1034.

<sup>21</sup> *Id.*

<sup>22</sup> CLI-08-1, 67 NRC at 9.

security reasons."<sup>23</sup> Against this backdrop, we decline to reconsider our decision to restrict access to security-related information in this proceeding, even under protective order.<sup>24</sup>

In view of the scheduling concerns SLOMFP raises in its motion for reconsideration, we do, however, remind the presiding officer of his discretion to extend the schedule for resolution of Contention 1(b) if there are "unanticipated circumstances"<sup>25</sup> — which would include a need to obtain more information or to give parties reasonable time to file necessary pleadings or responses to the presiding officer's inquiries.

### B. Contention 6

We turn now to consideration of the admissibility of SLOMFP's proposed Contention 6. As we reiterated in our January decision, under our pre-2004 rules, our late-filed contention standards were set out in 10 C.F.R. § 2.714(a)(1). The following five factors must be balanced before a petition to admit a late-filed contention can be granted:

- (i) Good cause, if any, for failure to file on time.
- (ii) The availability of other means whereby the petitioner's interest will be protected.
- (iii) The extent to which the petitioner's participation may reasonably be expected to assist in developing a sound record.
- (iv) The extent to which the petitioner's interest will be represented by existing parties.
- (v) The extent to which the petitioner's participation will broaden the issues or delay the proceeding.

"The first factor — whether good cause exists to excuse the late-filing of the contention — is the most important factor."<sup>26</sup> "If 'good cause' is not shown, a

<sup>23</sup> *Id.*

<sup>24</sup> SLOMFP's latest motion to reconsider (April Reconsideration Motion at 6) complains that the Commission held SLOMFP to a 10-day deadline even though our former rules, applicable to this proceeding, contain no such deadline. This complaint is not without force, but it is not outcome-determinative, as we also found SLOMFP's motion to reconsider unpersuasive on the merits. See CLI-08-5, 67 NRC at 176.

<sup>25</sup> *Id.* at 177.

<sup>26</sup> CLI-08-1, 67 NRC at 6. See *Commonwealth Edison Co.* (Braidwood Nuclear Power Station, Units 1 and 2), CLI-86-8, 23 NRC 241, 244 (1986), citing *Cincinnati Gas and Electric Co.* (William H. Zimmer Nuclear Power Station, Unit 1), LBP-83-58, 18 NRC 640, 663 (1983), *Mississippi Power*

(Continued)

petitioner 'must make a "compelling" showing' on the four remaining factors."<sup>27</sup> "In this analysis, factors three and five are to be given more weight than factors two and four."<sup>28</sup> If the late-filed contention criteria are satisfied, our next inquiry is whether the proposed contention is suitable for hearing. Here we find that, on balance, our late-filed contention criteria are not satisfied. We also find proposed Contention 6 unsuitable for hearing for the same reasons that, earlier in this proceeding, we rejected SLOMFP's virtually identical Contention 3.<sup>29</sup>

The heading for SLOMFP's Contention 6 reads:

Inappropriate reliance on the "Ease" indicator to exclude reasonably foreseeable and significant environmental impacts from the NRC's environmental analysis for the Diablo Canyon ISFSI.<sup>30</sup>

SLOMFP argues that the Staff violated NEPA in preparing its final environmental assessment supplement by "excluding reasonably foreseeable threat scenarios from consideration, based on the use of an inappropriate indicator known as "Ease" as a proxy for the probability of a threat scenario."<sup>31</sup> SLOMFP argues that because these excluded threat scenarios could have significant adverse effects on the environment, the Staff should have prepared an environmental impact statement.

SLOMFP relies on the "Ease" factor as the factual basis for Contention 6. SLOMFP states that it learned of the "Ease" factor in an unredacted portion of a classified document. This document, entitled *NRC Spent Fuel Source Term Guidance Document* (Sandia Study), issued by the Sandia National Laboratories (Sandia) in 2004, is listed as a reference in the final environmental assessment supplement, is included in the Staff's *Vaughn* index, and was produced (in redacted form) by the Staff together with its *Vaughn* index, pursuant to the schedule we set in CLI-08-1. "Ease" is a function of time, complexity, and technology, and " was developed to estimate how easy or difficult it is to complete an attack scenario."<sup>32</sup>

*and Light Co. (Grand Gulf Nuclear Station, Units 1 and 2), ALAB-704, 16 NRC 1725 (1982). See also Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation), LBP-01-37, 54 NRC 476, 483 (2001), review declined, CLI-02-3, 55 NRC 155, 156 n.9 (2002).*

<sup>27</sup> CLI-08-1, 67 NRC at 6, quoting *Braidwood Nuclear Power Station*, CLI-86-8, 23 NRC at 244.

<sup>28</sup> CLI-08-1, 67 NRC at 6, citing *Braidwood Nuclear Power Station*, CLI-86-8, 23 NRC at 245.

<sup>29</sup> See CLI-08-1, 67 NRC at 18-21.

<sup>30</sup> Contention 6 Petition at 2.

<sup>31</sup> *Id.*

<sup>32</sup> *Id.* at 3, citing Sandia Study at 133-34.

In addition to providing the factual basis for Contention 6, SLOMFP argues that disclosure of the "Ease" factor is new information supporting a new contention, so the "good cause" late-filing standard is satisfied. According to SLOMFP, a balancing of our late-filed contention criteria weighs in favor of admission of Contention 6. SLOMFP argues that it satisfies two other late-filing standards because it has no other means besides this proceeding to protect its interest in requiring the NRC to comply with NEPA, and that it may reasonably be expected, because of its experienced counsel and its qualified expert witness, to assist in the development of a sound record.<sup>33</sup> Regarding the final late-filing criterion, SLOMFP concedes that its participation will broaden and delay the proceeding, but argues that any delay is attributable to the NRC and PG&E's unwillingness to consider NEPA-terrorism issues when this proceeding began over 5 years ago.<sup>34</sup>

PG&E counters SLOMFP's arguments by arguing that balancing our late-filed contention standards does not support admitting Contention 6. Pointing to the absence of any new expert witness support, PG&E argues that the good cause standard for late-filing is not met because disclosure of the "Ease" factor, by itself, is insufficient to make a previously inadmissible contention admissible.<sup>35</sup> The NRC Staff agrees with PG&E, arguing that Contention 6 is substantively identical to Contention 3, except for SLOMFP's speculation that the Staff used the "Ease" factor in assessing threat scenarios.<sup>36</sup> According to the Staff's argument, SLOMFP had sufficient information to raise its substantive contention before the existence of the "Ease" factor in the Sandia Study became known — and in fact raised essentially the same contention in Contention 3 — so the good cause standard is not satisfied.<sup>37</sup>

With respect to the remainder of the late-filing criteria, both PG&E and the NRC Staff argue that Contention 6 would broaden the proceeding beyond its intended scope. The Staff points out that the Commission already ruled that threat scenarios would not be part of this proceeding.<sup>38</sup> PG&E maintains that Contention 6 would lead the proceeding into areas "already addressed by other NRC regulations, such as NRC security requirements and ISFSI dry cask designs."<sup>39</sup> PG&E maintains that SLOMFP is unlikely to be able to contribute to the development of a meaningful record because of lack of access to threat information and lack of expertise in threat assessment.<sup>40</sup> PG&E also argues that

<sup>33</sup> *Id.* at 6.

<sup>34</sup> *Id.*

<sup>35</sup> PG&E Contention 6 Response at 8 n.7.

<sup>36</sup> Staff Contention 6 Response at 5.

<sup>37</sup> *Id.*

<sup>38</sup> *Id.* at 6.

<sup>39</sup> *Id.* at 9.

<sup>40</sup> *Id.* at 8-9.

SLOMFP has other means of protecting its interests, such as "participating in security-related rulemakings or commenting on dry cask storage Certificates of Compliance rulemakings."<sup>41</sup> The Staff does not believe SLOMFP's ability to contribute to the record to be as limited, nor does it believe that SLOMFP's interests can be vindicated by other parties or through other means, but the Staff nonetheless agrees with PG&E that, on balance, our late-filed contention criteria are not satisfied and Contention 6 should not be admitted.<sup>42</sup>

We find that the good cause criterion is not satisfied, and that the other factors (to the extent any fall on SLOMFP's side of the ledger) do not outweigh this fundamental failure. Apart from reliance on the "Ease" factor, Contention 6 bears a strong resemblance to Contention 3 (which we did not admit<sup>43</sup>), both in the language of the contention and in the legal and expert witness support SLOMFP provides. As the legal basis for Contention 6, SLOMFP cites 10 C.F.R. § 51.20(a)(1) and 40 C.F.R. § 1502.22(b)(3).<sup>44</sup> The first of these cited regulations states simply the general proposition that if a major federal action significantly affects the quality of the human environment, an environmental impact statement must be prepared.<sup>45</sup> But the second regulation is the same Council on Environmental Quality (CEQ) regulation<sup>46</sup> that SLOMFP relied on to support its Contention 3. And the expert witness support that SLOMFP provides<sup>47</sup> is nearly identical: SLOMFP relies on the same June 2007 report<sup>48</sup> it relied on for Contention 3, augmented only by a short declaration confirming the continued accuracy of the report and the accuracy of factual statements in Contention 6.<sup>49</sup> Comparison of Contention 6 and Contention 3 shows how similar the two contentions are:

<sup>41</sup> *Id.* at 9.

<sup>42</sup> Staff Contention 6 Response at 6.

<sup>43</sup> CLI-08-1, 67 NRC at 20-21.

<sup>44</sup> Contention 6 Petition at 2.

<sup>45</sup> 10 C.F.R. § 51.20(a)(1).

<sup>46</sup> The cited section applies where there is incomplete or unavailable information, requires the agency to identify such information, and, "for the purposes of this section," defines "reasonably foreseeable" to include "impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason." 40 C.F.R. § 1502.22(b)(4).

<sup>47</sup> Contention 6 Petition at 1-2.

<sup>48</sup> Thompson, Gordon R., *Assessing Risks of Potential Malicious Actions at Commercial Nuclear Facilities: The Case of a Proposed Spent Fuel Storage Installation at the Diablo Canyon Site* (June 27, 2007) (Thompson Report).

<sup>49</sup> Thompson, Gordon R., *Declaration of Dr. Gordon R. Thompson in Support of San Luis Obispo Mothers for Peace's Contention 6* (Feb. 27, 2008).

*Contention 6:*

The Staff's "[i]nappropriate reliance on the 'Ease' indicator" led it "to exclude reasonably foreseeable and significant environmental impacts" and "reasonably foreseeable threat scenarios" and "[t]he excluded threat scenarios could cause significant adverse impacts by contaminating the environment."<sup>50</sup>

*Contention 3:*

The "very small dose consequences estimated" by the Staff in the environmental assessment supplement shows that the Staff failed "to consider credible threat scenarios that could cause significant environmental damage by contaminating the environment."<sup>51</sup>

We agree with the Staff<sup>52</sup> that whether SLOMFP bases its contention on inferences drawn from dose estimates (Contention 3) or from the existence of an "Ease" indicator (Contention 6), the fundamental contention is the same: in either case, SLOMFP is challenging the range of threat scenarios examined by the Staff. Contention 3 satisfied our good cause standard as a challenge to the Staff's then newly available environmental assessment supplement and the range of scenarios considered by the Staff in that analysis, so it met our late-filing criteria. Contention 6 is essentially the same as Contention 3; as a challenge to scenarios considered in the no longer newly available environmental assessment supplement, it cannot be timely now. SLOMFP has not shown good cause to admit today a contention that was not admitted when first proposed.

Even if Contention 6 satisfied our late-filing criteria, we would not admit it for hearing. As we found when we rejected SLOMFP's original "threat scenarios" contention (Contention 3), it is not practical or legally required for the NRC to adjudicate the essentially limitless range of conceivable (albeit highly unlikely) terrorist scenarios, where the core evidence (threat assessment and security measures) is protected security information. The Supreme Court's controlling decision in *Weinberger v. Catholic Action of Hawaii*, makes clear that NEPA does not contemplate adjudications resulting in the disclosure of matters under law considered secret or confidential.<sup>53</sup> Here, disclosure of such matters would be required to conduct meaningful hearings on alternate terrorist scenarios. As we pointed out in January, "[t]he NRC Staff's supplemental environmental assessment explains that the Staff considered '[p]lausible threat scenarios . . . includ[ing] a large aircraft impact similar in magnitude to the attacks of September 11, 2001, and ground assaults using expanded adversary

<sup>50</sup> Contention 6 Petition at 2 (emphasis added).

<sup>51</sup> San Luis Obispo Mothers for Peace Contentions and Request for a Hearing Regarding Diablo Canyon Environmental Assessment Supplement (June 28, 2007) at 12-13 (emphasis added).

<sup>52</sup> Staff Contention 6 Response at 4.

<sup>53</sup> CLI-08-1, 67 NRC at 20-21, quoting *Weinberger*, 454 U.S. at 146-47.

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characteristics consistent with the design basis threat for radiological sabotage for nuclear power plants.'<sup>54</sup> This approach is based on the NRC Staff's access to classified threat assessment information,<sup>55</sup> and is reasonable on its face. "We do not understand the Ninth Circuit's remand decision — which expressly recognized NRC security concerns and suggested the possibility of a 'limited proceeding' — to require a contested adjudicatory inquiry into the credibility of various hypothetical terrorist attacks against the Diablo Canyon ISFSI."<sup>56</sup>

### III. SCHEDULING MATTER

The NRC Staff, PG&E, and SLOMFP submitted detailed written summaries of facts, data, and arguments and written supporting information, required under 10 C.F.R. § 2.1113, on April 14, 2008.<sup>57</sup> Thus, under our rules, the Subpart K oral argument (which will be heard by the Commission absent further determination to the contrary) may be held at any time after April 29, 2008. See 10 C.F.R. § 2.1113. With the expectation that oral argument will take no more than 1 day, we schedule it for July 1, 2008, at 9:30 a.m. at the Commission's headquarters in Rockville, Maryland. A more detailed scheduling order, covering matters like order of presentation, format, and time allocations, will be issued in the near future.

### IV. CONCLUSION

Consistent with our discussion above, we deny the motion for reconsideration and remind the presiding officer that he has some scheduling flexibility in his resolution of Contention 1(b). We decline to admit Contention 6. Subpart K oral argument on Contention 2 will be heard on July 1, 2008, at 9:30 a.m. at the Commission's headquarters in Rockville, Maryland.

<sup>54</sup> CLI-08-1, 67 NRC at 20, quoting Final EA Supplement at 7.

<sup>55</sup> CLI-08-1, 67 NRC at 20, citing Final EA Supplement at 4-7.

<sup>56</sup> CLI-08-1, 67 NRC at 20, citing 449 F.3d at 1034-35.

<sup>57</sup> NRC (Staff) Brief and Summary of Relevant Facts, Data and Arguments upon Which the Staff Proposes to Rely at Oral Argument on San Luis Obispo Mothers for Peace's Contention 2 (Apr. 14, 2008); San Luis Obispo Mothers for Peace's Detailed Summary of Facts, Data, and Arguments on Which It Intends to Rely at Oral Argument To Demonstrate the Inadequacy of the U.S. Nuclear Regulatory Commission's Final Supplement to the Environmental Assessment for the Proposed Diablo Canyon Independent Spent Fuel Storage Installation To Consider the Environmental Impacts of an Attack on the Facility (Contention 2) (Apr. 14, 2008); Summary of Facts, Data, and Arguments on Which Pacific Gas and Electric Company Will Rely at the Subpart K Oral Argument on Contention 2 (Apr. 14, 2008).

IT IS SO ORDERED.

For the Commission

ANNETTE L. VIETTI-COOK  
Secretary of the Commission

Dated at Rockville, Maryland,  
this 30th day of April 2008.

### Commissioner Gregory B. Jaczko Respectfully Dissenting in Part

I respectfully dissent from the majority's decision. I continue to question the Commission's overreliance on *Weinberger v. Catholic Action of Hawaii*, 454 U.S. 139 (1981), concerning the public release of State secrets, as a basis for categorically withholding classes of information from one of the parties to this hearing. We do have mechanisms we can employ to ensure that sensitive information provided to the participants in the proceeding is protected from disclosure.

I concur with the portions of the Memorandum and Order which make it clear to the presiding officer that he has discretion with regard to adjusting deadlines in his consideration of Contention 1(b) and that sets a date for the Subpart K oral argument.

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UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

## COMMISSIONERS:

Dale E. Klein, Chairman  
Gregory B. Jaczko  
Peter B. Lyons

In the Matter of

Docket No. 72-26-ISFSI

PACIFIC GAS AND ELECTRIC  
COMPANY  
(Diablo Canyon Power Plant  
Independent Spent Fuel  
Storage Installation)

March 27, 2008

DISCLOSURE: NATIONAL ENVIRONMENTAL POLICY ACT;  
FREEDOM OF INFORMATION ACT

By law, disclosure of documents under the National Environmental Policy Act (NEPA) is expressly governed by the Freedom of Information Act (FOIA). Based on this linkage, we will not give the petitioners here NEPA-based access to documents exempt from disclosure under FOIA, even under protective measures.

## FREEDOM OF INFORMATION ACT

Limited discovery may be allowed in a Freedom of Information Act (FOIA) dispute, but only if absolutely necessary to ensure a complete record and a fair decision. Discovery is sparingly granted in FOIA litigation — which ordinarily is resolved in summary disposition without discovery and without evidentiary trials or hearings.

## ORDER

Today's decision relates to Contention 1(b). In CLI-08-1, we admitted that contention "to the extent that it alleges that the [NRC] Staff failed to provide source documents or information underlying its analysis, and failed to identify appropriate FOIA [Freedom of Information Act] exemptions for [the Staff's] withholding decisions."<sup>1</sup> We directed the Staff to submit a "complete list" of the source documents for its environmental assessment, along with a "Vaughn index (or its equivalent)" explaining the FOIA basis for withholding any documents or portions of documents.<sup>2</sup>

The NRC Staff has now filed its Reference Document List and Vaughn index.<sup>3</sup> The Staff also filed an addendum to this submission.<sup>4</sup> The Staff's Reference Document List contains twenty-one documents, and the Vaughn index lists redactions to these documents, plus the FOIA exemption that the Staff believes applies to each redaction (the Staff variously applies exemptions 1, 2, and 3, depending upon the nature of the information). The addendum to the Staff's submission corrects an omission in the Vaughn index by filling in the basis for withholding one of the documents.<sup>5</sup>

San Luis Obispo Mothers for Peace (SLOMFP) filed a response to the Staff's filing.<sup>6</sup> The response argued that the Vaughn index "is both incomplete and inadequate," that the Staff is unlawfully withholding "secret law" with respect to at least one document, that the Commission should grant SLOMFP access to unredacted documents under a protective order, and that SLOMFP should be given the opportunity to make additional discovery requests to the NRC Staff based on information in the redacted documents that the Staff has provided.<sup>7</sup>

<sup>1</sup> CLI-08-1, 67 NRC 1, 17 (2008).<sup>2</sup> *Id.* at 16.<sup>3</sup> NRC Staff's Response to Commission Order to Provide Reference List and Vaughn Index (Feb. 13, 2008) (Staff Reference Response).<sup>4</sup> Addendum to NRC Staff's Response to Commission Order to Provide Reference List and Vaughn Index (Feb. 15, 2008) (Staff Addendum).<sup>5</sup> Staff Addendum. The Department of Homeland Security (DHS) is the originator of Reference 4. The Staff provides a link to a DHS website regarding obtaining the document directly from DHS.<sup>6</sup> San Luis Obispo Mothers for Peace's Response to NRC Staff's Vaughn Index, Request for Leave To Conduct Discovery Against the NRC Staff, Request for Access to Unredacted Reference Documents, and Request for Procedures To Protect Submission of Sensitive Information (Feb. 20, 2008) (SLOMFP Response).<sup>7</sup> SLOMFP Response at 1-2.

Because by law disclosure of documents under NEPA is expressly governed by FOIA,<sup>8</sup> we decided in CLI-08-1 not to give SLOMFP NEPA-based access to documents exempt from disclosure under FOIA,<sup>9</sup> thereby rejecting SLOMFP's suggestion that we grant access "under appropriate protective measures."<sup>10</sup> To the extent SLOMFP now seeks reconsideration on the access question — SLOMFP uses the word "reconsideration" in the caption to the section of its response (Section IV) that discusses this issue — our practice is that such petitions be filed within 10 days of the decision.<sup>11</sup> CLI-08-1 was issued on January 15, 2008, so the 10-day petition for reconsideration period has long since expired. In any event, SLOMFP has not made a showing of "compelling circumstance, such as the existence of a clear and material error in a decision, which could not have been reasonably anticipated."<sup>12</sup> SLOMFP's implicit petition for reconsideration is denied.

The balance of SLOMFP's response provides details regarding its challenge to the completeness of the Staff's Reference Document List and the adequacy of the Staff's *Vaughn* index. SLOMFP looks particularly at Document 8 (SECY-04-0222, Decision-Making Framework for Materials and Test Reactor Vulnerability Assessments (Nov. 24, 2004)) and infers that including this document, which on its face is not applicable to independent spent fuel storage installations (ISFSIs), may mean that another document linking Document 8 to ISFSIs has been left out of the Document Reference List. SLOMFP questions whether followup activities referred to in Document 8 — such as participation in DHS vulnerability reviews — generated documents that the Staff should have listed as references. SLOMFP also asks whether the "Risk Analysis and Management for Critical Assets Protection" methodology referred to in Document 8 as developed for DHS by the American Society of Mechanical Engineers should have been included as a reference document. SLOMFP also points to places in Document 8 where the

<sup>8</sup> CLI-08-1, 67 NRC at 15-16, citing *Weinberger v. Catholic Action of Hawaii*, 454 U.S. 139, 145 (1981) and *Hudson River Sloop Clearwater, Inc. v. Department of the Navy*, 891 F.2d 414, 420 (2d Cir. 1989). See also *Missouri ex rel. Sharr v. U.S. Army Corps of Engineers*, 147 F.3d 708, 710-11 (8th Cir. 1998).

<sup>9</sup> CLI-08-1, 67 NRC at 16-17 ("We will permit SLOMFP to dispute the NRC Staff's exemption claims based on the index and [the] record. Under the *Weinberger* decision, we need not and will not provide SLOMFP access to exempt documents").

<sup>10</sup> San Luis Obispo Mothers for Peace's Contentions and Request for a Hearing Regarding Diablo Canyon Environmental Assessment Supplement (June 28, 2007) (SLOMFP Petition) at 10. Pacific Gas and Electric Company responded to this filing with one of its own: Pacific Gas & Electric Company's Opposition to San Luis Obispo Mothers for Peace Requests for Leave to Conduct Expanded Discovery and for Access to Unredacted Documents (Feb. 26, 2008).

<sup>11</sup> See 10 C.F.R. § 2.771(a).

<sup>12</sup> CLI-06-27, 64 NRC 399, 400 (2006). See also 10 C.F.R. § 2.771(b); CLI-06-27, 64 NRC at 400 n.5, 401 n.6.

Staff made redactions but failed to provide a corresponding FOIA exemption in its *Vaughn* index, and argues that the context of some redactions suggests that the Staff is withholding "secret law" on how to conduct its analysis, which should have been disclosed under FOIA.<sup>13</sup>

Rather than review these document-intensive claims ourselves, we direct the previously designated presiding officer to resolve them, focusing in particular on the FOIA exemption justifications and the completeness of the NRC Staff's reference list. The presiding officer has full authority to use all appropriate adjudicatory tools, including consulting with parties, setting schedules, requesting further briefs, calling for summary disposition motions, holding oral argument, and reviewing documents *in camera*. We expect the presiding officer to resolve all outstanding FOIA issues — in other words, to resolve Contention 1(b) — on an expedited basis. Absent unanticipated circumstances, we expect a decision no later than May 30, 2008. We will entertain petitions for review of the presiding officer's final decision on Contention 1(b) under our usual standards.<sup>14</sup>

In his discretion and only if absolutely necessary to ensure a complete record and a fair decision, the presiding officer may allow limited discovery. But we remind him (and the parties) that discovery "is sparingly granted" in FOIA litigation<sup>15</sup> — which ordinarily is resolved on summary disposition without discovery and without evidentiary trials or hearings.

IT IS SO ORDERED.

For the Commission

ANDREW L. BATES  
Acting Secretary of the Commission

Dated at Rockville, Maryland,  
this 27th day of March 2008.

<sup>13</sup> SLOMFP Response at 2, 5-7, citing *Hardy v. Bureau of Alcohol, Tobacco & Firearms*, 631 F.2d 652, 657 (9th Cir. 1980).

<sup>14</sup> See 10 C.F.R. § 2.786.

<sup>15</sup> *Public Citizen Health Research Group v. Food and Drug Administration*, 997 F. Supp. 56, 72 (D.D.C. 1998). See also *Wheeler v. Central Intelligence Agency*, 271 F. Supp. 2d 132, 139 (D.D.C. 2003) ("Discovery is generally unavailable in FOIA actions"); *Simmons v. U.S. Department of Justice*, 796 F.2d 709, 711-12 (4th Cir. 1986) ("the district court has the discretion to limit discovery in FOIA cases and to enter summary judgment on the basis of agency affidavits in a proper case").

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**Commissioner Jaczko Respectfully Dissents, in Part**

I disagree with the Commission's decision to only allow the presiding officer to resolve the FOIA issues associated with Contention I (b). I believe the Commission should have also allowed the presiding officer to determine whether there is a need to grant access through an appropriate protective order to documents exempt from disclosure under FOIA, as the agency has done in previous adjudicatory hearings.

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Cite as 67 NRC 179 (2008)

CLI-08-6

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

**COMMISSIONERS:**

Dale E. Klein, Chairman  
Gregory B. Jaczko  
Peter B. Lyons

In the Matter of

NRC Investigation No. 2-2006-17

DARYL M. SHAPIRO

March 27, 2008

**ATTORNEY-CLIENT PRIVILEGE**

*Upjohn Co. v. United States*, 449 U.S. 383 (1981), holds that the communications between company employees and an attorney conducting an internal investigation presumptively fall within the attorney-client privilege.

**ATTORNEY-CLIENT PRIVILEGE: WAIVER**

The attorney-client privilege belongs to the client, not to the lawyer. Thus, the client may waive the privilege, either by an express waiver or by an implied waiver.

**ATTORNEY-CLIENT PRIVILEGE: WAIVER**

Implied waiver of the attorney-client privilege exists when a regulated company voluntarily discloses investigative materials to a government agency. In such cases, courts have assumed, without discussion, that the privileges were waived with respect to the particular agency to which the investigative materials were disclosed.

**ATTORNEY-CLIENT PRIVILEGE: WAIVER**

If a licensee has voluntarily provided information to the NRC, the voluntary

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Cite as 67 NRC 1 (2008)

CLI-08-1

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Dale E. Klein, Chairman  
Gregory B. Jaczko  
Peter B. Lyons

In the Matter of

Docket No. 72-26-ISFSI

PACIFIC GAS AND ELECTRIC  
COMPANY  
(Diablo Canyon Power Plant  
Independent Spent Fuel Storage  
Installation)

January 15, 2008

**CONTENTIONS, LATE-FILED**

Before a petition to admit a late-filed contention can be granted, the five factors set out in the Commission's procedural rules must be balanced. The first factor — whether good cause exists to excuse the late-filing of the contention — is the most important factor. If "good cause" is not shown, a petitioner "must make a 'compelling' showing" on the four remaining factors. In this analysis, factors three and five — the extent to which the petitioner's participation may reasonably be expected to assist in developing a sound record and the extent to which this participation will broaden the issues or delay the proceeding — are to be given more weight than factors two and four — the availability of other means for protecting the petitioner's interest and the extent to which this interest will be represented by existing parties.

**CONTENTIONS, LATE-FILED**

**CONTENTIONS, ADMISSIBILITY**

Even if late-filing criteria are satisfied, proposed contentions must still meet the Commission's admissibility standards.

#### CONTENTIONS, ADMISSIBILITY

A contention shall not be admitted if the Commission's admissibility requirements are not satisfied or if the contention, even if proven, would not entitle the petitioner to relief. This strict contention pleading rule is designed to focus the hearing process on genuine disputes susceptible of resolution, puts the other parties on notice of the specific grievances at issue, and restricts participation to "those able to proffer at least some minimal factual and legal foundation in support of their contentions."

#### NATIONAL ENVIRONMENTAL POLICY ACT FREEDOM OF INFORMATION ACT

The link between the National Environmental Policy Act (NEPA) and the Freedom of Information Act (FOIA) is spelled out in section 102(2)(C) of NEPA: copies of environmental impact statements "shall be made available to the President, the Council on Environmental Quality and to the public as provided in [FOIA] section 552 of Title 5." This includes information underlying environmental impact statements (or environmental assessments). But information that must be considered as part of the NEPA decisionmaking process may be withheld from public disclosure pursuant to FOIA exemptions.

#### DISCLOSURE, CLASSIFIED AND SAFEGUARDS INFORMATION TERRORISM

The NRC has a statutory obligation to protect national security information. Hearings on the essentially limitless range of conceivable (albeit highly unlikely) terrorist scenarios could not be conducted in a meaningful way without substantial disclosure of classified and safeguards information on threat assessments and security arrangements and without substantial litigation over their significance. Such information — disclosure of which is prohibited by law — would lie at the center of any adjudicatory inquiry into the probability and success of various terrorist scenarios, and NEPA does not contemplate such adjudications.

#### NATIONAL ENVIRONMENTAL POLICY ACT NATIONAL INFRASTRUCTURE PROTECTION PLAN

While the Commission certainly agrees that in implementing its security program the NRC should take account of the National Infrastructure Protection Plan (NIPP), to which the NRC is a signatory, the Commission does not agree that

the NRC must demonstrate compliance with the NIPP in its NEPA evaluation. The NIPP is concerned with security issues, not environmental quality standards and requirements — and it is environmental quality standards and requirements that 10 C.F.R. § 51.71(d) obliges the environmental analysis to address, not security issues.

#### MEMORANDUM AND ORDER

Last February, we issued an order scheduling further proceedings in this adjudication on a license application for an independent spent fuel storage installation (ISFSI) at the site of the Diablo Canyon nuclear power reactor in California.<sup>1</sup> Our order directed the NRC Staff to prepare a revised environmental assessment. We asked the Staff to address "the likelihood of a terrorist attack at the Diablo Canyon ISFSI site and the potential consequences of such an attack."<sup>2</sup> The Staff's draft revised environmental assessment supplement<sup>3</sup> prompted San Luis Obispo Mothers for Peace (SLOMFP) to request a hearing and to file five proposed contentions.<sup>4</sup> Both the Pacific Gas and Electric Company (PG&E)<sup>5</sup> and the NRC Staff<sup>6</sup> opposed all five proposed contentions as inadmissible. SLOMFP replied with counterarguments to PG&E's and the Staff's positions.<sup>7</sup>

Before we acted on SLOMFP's contentions, the NRC Staff issued its final supplemental environmental assessment, which took into account public com-

<sup>1</sup> CLI-07-11, 65 NRC 148 (2007).

<sup>2</sup> *Id.* at 149.

<sup>3</sup> Supplement to the Environmental Assessment and Draft Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation, 72 Fed. Reg. 30,398 (May 31, 2007) (Draft EA Supplement).

<sup>4</sup> San Luis Obispo Mothers for Peace's Contentions and Request for a Hearing Regarding Diablo Canyon Environmental Assessment Supplement (June 28, 2007) (SLOMFP Petition), with attachment: Thompson, Gordon R., Assessing Risks of Potential Malicious Actions at Commercial Nuclear Facilities: The Case of a Proposed Spent Fuel Storage Installation at the Diablo Canyon Site (June 27, 2007) (Thompson Report).

<sup>5</sup> Pacific Gas and Electric Company's Response to Proposed Contentions (July 9, 2007) (PG&E Response).

<sup>6</sup> NRC Staff's Answer to Contentions Submitted by San Luis Obispo Mothers for Peace (July 13, 2007) (Staff Response).

<sup>7</sup> San Luis Obispo Mothers for Peace's Reply to PG&E's and NRC Staff's Oppositions to SLOMFP's Contentions and Request for a Hearing Regarding Diablo Canyon Environmental Assessment Supplement (July 18, 2007) (SLOMFP Reply).

ments.<sup>8</sup> The Commission directed the parties to file pleadings addressing the effects, if any, of the Staff's final environmental supplement on this adjudication.<sup>9</sup> SLOMFP responded that its proposed contentions remained valid.<sup>10</sup> PG&E<sup>11</sup> and the NRC Staff<sup>12</sup> again opposed SLOMFP's contentions, and SLOMFP filed a reply.<sup>13</sup> Today, we decide that limited portions of two SLOMFP contentions (Contentions 1(b) and 2) are admissible, and that the remainder are not.

## I. BACKGROUND

In *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016, 1028 (9th Cir. 2006), *cert. denied*, 127 S. Ct. 1124 (2007), the United States Court of Appeals for the Ninth Circuit held that the NRC's "categorical refusal to consider the environmental effects of a terrorist attack" in this licensing proceeding was unreasonable under the National Environmental Policy Act (NEPA). The Ninth Circuit remanded the "NEPA-terrorism" question to the Commission for "further proceedings consistent with this opinion."<sup>14</sup> Today's consideration of SLOMFP's five proposed NEPA-terrorism contentions depends solely on the Ninth Circuit's remand in this particular proceeding and is limited to this proceeding. As indicated in a series of decisions earlier this year, we respectfully disagree with the Ninth

<sup>8</sup> Supplement to the Environmental Assessment and Final Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (Aug. 2007) (Final EA Supplement), available as ADAMS Accession No. ML07240030.

<sup>9</sup> *Pacific Gas and Electric Co.* (Diablo Canyon Power Plant Spent Fuel Storage Installation), unpublished Order (Sept. 11, 2007) (Supplementary Pleadings Order), available as ADAMS Accession No. ML072540093.

<sup>10</sup> San Luis Obispo Mothers for Peace's Response to NRC Staff's Supplement to the Environmental Assessment and Finding of No Significant Impact for the Diablo Canyon Independent Spent Fuel Storage Installation (Oct. 1, 2007) (SLOMFP Petition II), with attachment: Thompson, Gordon R., Declaration by Dr. Gordon R. Thompson Regarding the NRC Staff's August 2007 Supplement to the Environmental Assessment and Final Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI) (Oct. 1, 2007) (Thompson Report II).

<sup>11</sup> Pacific Gas and Electric Company's Response to Commission Order and San Luis Obispo Mothers for Peace Filing on the Final Environmental Assessment Supplement (October 11, 2007) (PG&E Response II).

<sup>12</sup> NRC Staff's Response to San Luis Obispo Mothers for Peace's Response to Commission Order and Supplement to Final Environmental Assessment (Oct. 11, 2007) (Staff Response II).

<sup>13</sup> San Luis Obispo Mothers for Peace's Reply to PG&E and NRC Staff's Responses to SLOMFP Response to Commission Order (Oct. 12, 2007) (SLOMFP Reply II).

<sup>14</sup> 449 F.3d at 1035.

Circuit's view that NEPA demands a terrorism inquiry,<sup>15</sup> and are litigating the issue in other Circuits.<sup>16</sup>

As we noted in our February scheduling order, "[t]he Ninth Circuit explicitly left to our discretion the precise manner in which we undertake a NEPA-terrorism review on remand, with respect to both our consideration of the merits and the procedures we choose to apply."<sup>17</sup> With respect to procedural rules, all of the parties to this proceeding agree that we should apply our pre-2004 Part 2 procedural rules, since the proceeding began prior to the applicability of our new Part 2 regulations.<sup>18</sup> As a result, all references in this decision are to our former Part 2 rules. Also, as PG&E notes, in its original incarnation this proceeding was held under the special hybrid proceedings in Part 2, Subpart K. Subpart K applies where invoked by a party,<sup>19</sup> and both PG&E and the NRC Staff invoked Subpart K originally.<sup>20</sup> PG&E requests that, if contentions are admitted in this remanded proceeding, Subpart K again be used.<sup>21</sup> In view of our decision today, we grant PG&E's renewed request and will apply Subpart K to this proceeding.

## II. DISCUSSION AND ANALYSIS

### A. Application of Late-Filed Contention Standards

Our late-filed contention standards, pre-2004 rules, were set out in 10 C.F.R. § 2.714(a)(1). Before a petition to admit a late-filed contention can be granted, the following five factors must be balanced:

- (i) Good cause, if any, for failure to file on time.

<sup>15</sup> See CLI-07-11, 65 NRC at 149 n.5; *AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-07-8, 65 NRC 124, 126 (2007); *Nuclear Management Co., LLC* (Palisades Nuclear Plant), CLI-07-9, 65 NRC 139, 140-41 (2007); *System Energy Resources, Inc.* (Early Site Permit for Grand Gulf ESP Site), CLI-07-10, 65 NRC 144, 145 (2007).

<sup>16</sup> *Omigo Gaudadeh Devia v. NRC*, Nos. 05-1419, 05-1420, & 06-1087 (D.C. Cir.) (currently held in abeyance); *New Jersey Department of Environmental Protection v. NRC*, No. 07-02271 (3d Cir.).

<sup>17</sup> CLI-07-11, 65 NRC at 149. The Court said: "Our identification of the inadequacies in the agency's NEPA analysis should not be construed as constraining the NRC's consideration of the merits on remand, or circumscribing the procedures that the NRC must employ in conducting its analysis. There remain open to the agency a wide variety of actions it may take on remand, consistent with its statutory and regulatory requirements." 449 F.3d at 1035.

<sup>18</sup> See SLOMFP Petition at 1 n.1; PG&E Response at 2 n.6; Staff Response at 1 n.1. In 2004, we altered Part 2 in significant respects.

<sup>19</sup> See 10 C.F.R. § 2.1101.

<sup>20</sup> See LBP-02-25, 56 NRC 467, 471 (2002).

<sup>21</sup> PG&E Response at 2 n.6.

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- (ii) The availability of other means whereby the petitioner's interest will be protected.
- (iii) The extent to which the petitioner's participation may reasonably be expected to assist in developing a sound record.
- (iv) The extent to which the petitioner's interest will be represented by existing parties.
- (v) The extent to which the petitioner's participation will broaden the issues or delay the proceeding.

The first factor — whether good cause exists to excuse the late-filing of the contention — is the most important factor.<sup>22</sup> If "good cause" is not shown, a petitioner "must make a 'compelling' showing" on the four remaining factors.<sup>23</sup> In this analysis, factors three and five are to be given more weight than factors two and four.<sup>24</sup> Even if the late-filed contention criteria are satisfied, proposed contentions still must meet the admissibility standards contained in 10 C.F.R. § 2.714(b)(2), an inquiry we undertake below.

SLOMFP argues that all of its proposed contentions meet our late-filed contention criteria. We agree. First, SLOMFP's proposed contentions plainly satisfy the most heavily weighted factor, good cause. SLOMFP filed its new contentions within 30 days after issuance of the NRC Staff's draft supplemental environmental assessment — the NRC's first attempt to analyze the NEPA-terrorism issue and, therefore, SLOMFP's first opportunity to raise contentions on the adequacy of this assessment — and SLOMFP timely filed its second set of pleadings as directed in our Supplementary Pleadings Order. Second, this proceeding is SLOMFP's only means to achieve its interest related to its claim that the NRC failed to comply with NEPA on the NEPA-terrorism issue in connection with the Diablo Canyon ISFSI. Third, SLOMFP is assisted by experienced counsel, with expert assistance, so its participation may reasonably be expected to contribute to the development of a sound record. Finally, while SLOMFP's participation will delay the proceeding, the real source of the delay is our (now-overturned) decision against addressing the NEPA-terrorism issue when this proceeding first began over 5 years ago, so this factor should not count against SLOMFP's request to file late-filed contentions.

<sup>22</sup> See *Commonwealth Edison Co. (Braidwood Nuclear Power Station, Units 1 and 2)*, CLI-86-8, 23 NRC 241, 244 (1986), citing *Cincinnati Gas and Electric Co. (William H. Zimmer Nuclear Power Station, Unit 1)*, LBP-83-58, 18 NRC 640, 663 (1983), *Mississippi Power and Light Co. (Grand Gulf Nuclear Station, Units 1 and 2)*, ALAB-704, 16 NRC 1725 (1982). See also *Private Fuel Storage, L.L.C. (Independent Spent Fuel Storage Installation)*, LBP-01-37, 54 NRC 476, 483 (2001), review declined, CLI-02-3, 55 NRC 155, 156 n.9 (2002).

<sup>23</sup> *Braidwood Nuclear Power Station*, CLI-86-8, 23 NRC at 244.

<sup>24</sup> *Id.* at 245.

PG&E argues that two of SLOMFP's contentions, Contentions 3 and 5, do not meet the late-filed contention criteria. The NRC Staff agrees with PG&E on the second of these, Contention 5.

In Contention 3, described further below, SLOMFP asserts that the supplemental environmental assessment "fails to consider credible threat scenarios that could cause significant environmental damage by contaminating the environment" in violation of NEPA and Council on Environmental Quality (CEQ) regulations.<sup>25</sup> PG&E maintains that the balancing of the late-filed contention criteria weighs against admitting this contention because, lacking expertise in threat assessment, SLOMFP is unlikely to assist in the development of a meaningful record. Also, PG&E says, litigating this contention would broaden the scope of the proceeding beyond NEPA issues into other issues, like NRC security requirements and ISFSI dry cask design, which the Petitioners can address through other means such as by participating in rulemakings. PG&E concludes by suggesting that SLOMFP's information can be appropriately considered a "comment," and thus part of the Staff's normal NEPA process.<sup>26</sup> SLOMFP disputes PG&E's statement that it lacks expertise in threat assessment, referring to its witness's qualifications as an expert on nuclear risk assessment.<sup>27</sup>

SLOMFP reiterates that it has good cause, unchallenged by PG&E, for submitting this contention based on the newly available supplemental environmental assessment. We agree that SLOMFP's showing of good cause is sufficient and justifies its late-filed contention on "credible scenarios" because the contention is directed at the NRC Staff's very recent NEPA-terrorism analysis. PG&E's arguments do not outweigh SLOMFP's good cause showing.

In Contention 5, also described further below, SLOMFP maintains that the environmental assessment "fails to comply with NEPA because it does not consider the significant cumulative impacts of the proposed ISFSI in relation to the impacts of the existing high-density pool storage system for spent fuel at the Diablo Canyon nuclear plant."<sup>28</sup> PG&E and the NRC Staff argue that this contention is untimely and does not satisfy the late-filed contention admissibility criteria. They point out that SLOMFP raised issues related to the spent fuel pool early on in the proceeding and that this proposed contention was rejected as inadmissible.<sup>29</sup> Moreover, PG&E and the NRC Staff assert that SLOMFP's interests regarding the spent fuel pool can be protected through other means,

<sup>25</sup> SLOMFP Petition at 12.

<sup>26</sup> PG&E Response at 17-18, 23.

<sup>27</sup> SLOMFP Reply at 22, citing Declaration of Dr. Gordon R. Thompson in Support of San Luis Obispo Mothers for Peace's (SLOMFP's) Contentions Regarding the Diablo Canyon Environmental Assessment Supplement, ¶ 4-11 (attached to SLOMFP Petition).

<sup>28</sup> SLOMFP Petition at 15.

<sup>29</sup> See PG&E Response at 21, citing LBP-02-23, 56 NRC 413, 450-51 (2002).

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namely the NRC's ongoing regulatory oversight of the Diablo Canyon power plant.

Again, though, we cannot fairly reject as too late a SLOMFP contention directed at the adequacy of a brand new NRC Staff NEPA-terrorism analysis in the particular circumstances of this case. PG&E's (and NRC Staff's) arguments on other "late-filed" factors (such as alternate means to protect SLOMFP's interests) do not overcome SLOMFP's strong showing of good cause.

#### B. Contention Admissibility Standards

Under our pre-2004 rules:

Each contention must consist of a specific statement of the issue of law or fact to be raised or controverted. In addition, the petitioner shall provide the following information with respect to each contention:

- (i) A brief explanation of the bases of the contention.
- (ii) A concise statement of the alleged facts or expert opinion which support the contention and on which the petitioner intends to rely in proving the contention at the hearing, together with references to those specific sources and documents of which the petitioner is aware and on which the petitioner intends to rely to establish those facts or expert opinion.
- (iii) Sufficient information . . . to show that a genuine dispute exists with the applicant on a material issue of law or fact. This showing must include references to the specific portions of the application (including the applicant's environmental report and safety report) that the petitioner disputes and the supporting reasons for each dispute, or, if the petitioner believes that the application fails to contain information on a relevant matter as required by law, the identification of each failure and the supporting reasons for the petitioner's belief.<sup>30</sup>

A contention shall not be admitted if these requirements are not satisfied<sup>31</sup> or if the contention, even if proven, would not entitle the petitioner to relief.<sup>32</sup> This strict contention pleading rule is designed to focus the hearing process on genuine disputes susceptible of resolution, puts the other parties on notice of the specific grievances at issue, and restricts participation to "those able to proffer at least some minimal factual and legal foundation in support of their contentions."<sup>33</sup>

<sup>30</sup> 10 C.F.R. § 2.714(b)(2).

<sup>31</sup> 10 C.F.R. § 2.714(d)(2)(i).

<sup>32</sup> 10 C.F.R. § 2.714(d)(2)(ii).

<sup>33</sup> *Duke Energy Corp. (Oconee Nuclear Station, Units 1, 2, and 3)*, CL1-99-11, 49 NRC 328, 334 (1999).

#### C. Proposed Contentions

SLOMFP proposed five contentions in its original pleading, and made no changes to these contentions in its response to the Commission's Supplementary Pleadings Order, arguing that the NRC Staff made no significant changes in the final supplementary environmental assessment compared to the draft version, and that the final version provided no satisfactory explanation for the alleged deficiencies in the draft supplemental environmental assessment. SLOMFP's view that the Staff's analysis lacks detail, or disclosure of detail, pervades SLOMFP's contentions. The Staff's response is that it has provided the level of detail that it can, given national security concerns, and PG&E echoes this response. As the Ninth Circuit acknowledged,<sup>34</sup> the Supreme Court's decision in *Weinberger v. Catholic Action of Hawaii*, 454 U.S. 139, 145 (1981), makes it clear that protecting national security information overrides ordinary NEPA disclosure requirements, and this consideration factors heavily in our decision today.

Our inability to disclose information based on the confidentiality of that information does not mean, however, that the NRC Staff (and the Commission, on review) has not performed the evaluation the Ninth Circuit directed, consistent with *Weinberger* — it simply means that certain information cannot be made public for security reasons. Below we find some portions of SLOMFP's contentions admissible and some not. We use *Weinberger* as our guidepost in evaluating what can and cannot be litigated in further adjudicatory proceedings.

##### I. Contention 1: Failure To Define Terms, Explain Methodology, or Identify Scientific Sources

SLOMFP argues that the NRC Staff's supplemental environmental assessment violates NEPA, NRC regulations, and CEQ regulations because the supplemental environmental assessment "fail[s] to define its terms, explain its methodology, or identify its scientific sources."<sup>35</sup> After an introductory description of the bases for its position, SLOMFP divides Contention 1 into subsections — 1(a) and 1(b). SLOMFP's focus in 1(a) is on the Staff's alleged failure to properly define the terms or describe the methodology it used in preparing its supplemental environmental assessment. In 1(b) SLOMFP focuses on the Staff's failure, in its opinion, to properly identify the documentary support underpinning its analysis.

<sup>34</sup> *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d at 1034-35.

<sup>35</sup> SLOMFP Petition at 3.

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a. *Terms and Methodology*

SLOMFP complains in Contention 1(a) that the draft environmental assessment does not adequately explain terms or methodology.<sup>36</sup> Apart from falling back on its information security concerns, the NRC Staff's general position is that the contention lacks both specificity regarding alleged inadequacies in the supplemental environmental assessment and support for a different viewpoint, and should be rejected based upon the requirements of 10 C.F.R. § 2.714(b)(2)(iii) for failure "to identify a genuine dispute on a material issue of law or fact within the scope of the proceeding."<sup>37</sup> PG&E argues that the contention fails to establish any specific factual dispute with respect to either the likelihood or the consequences of a terrorist attack and should be rejected based on 10 C.F.R. § 2.714(d)(2)(i).<sup>38</sup>

SLOMFP goes into considerable detail regarding the bases for this contention, designating eight separate, but somewhat overlapping, points:

- i. SLOMFP maintains that the supplemental environmental assessment "fails to provide a clear description of the NRC's process for identifying plausible or credible attack scenarios and assessing their consequences to determine whether they are significant."<sup>39</sup>
- ii. SLOMFP argues that the supplemental environmental assessment provides "no explanation of what the NRC means by the word 'plausible.'"<sup>40</sup>
- iii. SLOMFP's argues that the supplemental environmental assessment provides no "description of the criteria used by the NRC to distinguish between scenarios that are 'plausible' and those that are 'remote and speculative.'"<sup>41</sup>
- iv. SLOMFP argues that the supplemental environmental assessment "fails to demonstrate that the NRC considered the wider scope of scenarios required by NEPA" compared to the narrower scope of scenarios required under the Atomic Energy Act (AEA) "reasonable protection" standard or the Design Basis Threat (DBT) "rule's standard of requiring defense 'against which a private security force can reasonably be expected to defend.'"<sup>42</sup>
- v. SLOMFP argues that the supplemental environmental assessment provides a poor description of the process used in what SLOMFP refers to as the

<sup>36</sup> Contention 1, subsection (a), SLOMFP Petition at 5-9.

<sup>37</sup> Staff Response at 9.

<sup>38</sup> PG&E Response at 8.

<sup>39</sup> Contention 1, paragraph (a)(i), SLOMFP Petition at 5.

<sup>40</sup> Contention 1, paragraph (a)(ii), SLOMFP Petition at 5.

<sup>41</sup> Contention 1, paragraph (a)(iii), SLOMFP Petition at 6.

<sup>42</sup> Contention 1, paragraph (a)(iv), SLOMFP Petition at 6-7, citing 72 Fed. Reg. 12,705, 12,713 (Mar. 19, 2007).

NRC's 2002 threat scenario analysis, raising many questions that it does not answer.<sup>43</sup>

- vi. SLOMFP argues that the supplemental environmental assessment fails to explain how the AEA-based generic security assessments that led to the Staff's conclusion that no additional security measures were required for ISFSIs have "any relevance to a NEPA determination of whether environmental impacts are significant."<sup>44</sup>
- vii. SLOMFP argues that the supplemental environmental assessment fails to explain how the NRC's determination that the assumptions in the "generic security assessments were 'representative' or 'conservative' in relation to the Diablo Canyon facility . . . factored into a NEPA analysis."<sup>45</sup>
- viii. SLOMFP argues that the supplemental environmental assessment "fails to provide any analysis of the radiological impacts of threat scenarios, including any documented estimate of the radiation dose arising from release of radioactive material."<sup>46</sup>

SLOMFP's arguments fail to justify admitting Contention 1(a). In our view, for example, the context of the Staff's use of the term "plausible" is consistent with the word's ordinary usage and with NEPA; because the Staff's usage is clear, no separate additional definition is required. The qualitative description of the criteria for distinguishing between the terms "plausible" and "remote and speculative" provided by the Staff is also clear enough — and consistent with information security constraints and the *Weinberger* decision. Additionally, the NRC Staff has provided a sufficient description of its scenario identification process and the significance of associated consequences — again within the constraints of information security requirements and consistent with the *Weinberger* decision. And, contrary to SLOMFP's argument, the supplemental environmental assessment expressly discusses the Staff's analysis of dosage — again, to the extent permitted given the requirement to protect sensitive information.

SLOMFP's points regarding the distinction between AEA analysis and NEPA analysis bear further discussion. SLOMFP argues that the standards for AEA-derived security requirements and NEPA environmental evaluations differ. *See,*

<sup>43</sup> Contention 1, paragraph (a)(v), SLOMFP Petition at 7-8, citing the Draft EA Supplement at 6. With respect to the "unanswered" questions, the Staff indicates that "[m]uch of this information was omitted because it is designated as Safeguards Information or SUNSI [Sensitive Unclassified Non-safeguards Information] or Classified Information . . . [and] the Staff's NEPA obligation does not allow discussion of sensitive security information in environmental documents that the Staff is required to protect from public disclosure." (Staff Response at 15.)

<sup>44</sup> Contention 1, paragraph (a)(vi), SLOMFP Petition at 8.

<sup>45</sup> Contention 1, paragraph (a)(vii), SLOMFP Petition at 8.

<sup>46</sup> Contention 1, paragraph (a)(viii), SLOMFP Petition at 8-9 (emphasis added).

e.g., *Limerick Ecology Action, Inc. v. NRC*, 869 F.2d 719, 741 (3d Cir. 1989). According to SLOMFP, the AEA-derived design basis threat rule focuses on the licensee's ability to defend against threats that the NRC believes it is reasonable or feasible for a licensee to defend against,<sup>47</sup> while NEPA looks at whether the threat is foreseeable, independent of the licensee's ability to defend against it. SLOMFP points to a CEQ rule, 40 C.F.R. § 1502.22(b)(3),<sup>48</sup> calling on agencies to include "a summary of existing credible scientific evidence which is relevant to evaluating the reasonably foreseeable significant adverse impacts on the human environment" where "reasonably foreseeable" includes impacts which have catastrophic consequences, even if their probability of occurrence is low, provided that the analysis of the impacts is supported by credible scientific evidence, is not based on pure conjecture, and is within the rule of reason."<sup>49</sup> To counter SLOMFP's argument, the Staff maintains that it provided the specifics it could (without disclosing Safeguards Information, SUNSI, or Classified Information) to show how it applied existing analyses to its NEPA analysis.

In addition, the Staff makes a number of other points regarding SLOMFP's claims that the supplemental environmental assessment does not describe any analysis for the purpose of complying with NEPA and poorly describes any such analyses. The Staff notes that the supplemental environmental assessment expressly describes the review of prior ISFSI security assessments and the additional analyses of potential consequences, including consideration of site-specific conditions at the Diablo Canyon ISFSI, for purposes of conducting the supplemental review of consequences of terrorism under NEPA.<sup>50</sup> Moreover, the supplemental assessment's acknowledged review of prior AEA-based security assessments for pertinent information on the effects of terrorist attacks as one part of the assessment does not show that a NEPA assessment was not performed or that it is inadequate. Indeed, the Commission clearly expected the NRC Staff to use existing information, as appropriate, when it stated:

To the extent practicable, we expect the NRC Staff to base its revised environmental analysis on information already available in agency records, and consider in particular the Commission's DBT for power plant sites and other information on the

<sup>47</sup> SLOMFP Reply at 14, citing Final Rule, Design Basis Threat, 72 Fed. Reg. 12,705, 12,713 (Mar. 19, 2007).

<sup>48</sup> SLOMFP Petition at 7.

<sup>49</sup> 40 C.F.R. § 1502.22(b). Of course, the applicability of the CEQ's regulations to our activities is not without limitation. While the Commission's "policy [is] to take account of the regulations of the [CEQ] voluntarily" (10 C.F.R. § 51.10(a)), this policy is tempered by the Commission's overriding "responsibility as an independent regulatory agency for protecting the radiological health and safety of the public" as the Commission conducts its licensing and associated regulatory functions (10 C.F.R. § 51.10(b)).

<sup>50</sup> Staff Response at 13.

ISFSI design, mitigative, and security arrangements bearing on likely consequences, consistent with the requirements of NEPA, the Ninth Circuit's decision, and the regulations for the protection of sensitive and safeguards information.<sup>51</sup>

There is no genuine dispute that NEPA and AEA legal requirements are not the same; the 2003 environmental assessment and the final supplemental environmental assessment were prepared to meet the NRC's obligations under NEPA, and NEPA requirements must be satisfied. SLOMFP's desire for greater detail or a technical discussion of differences between AEA and NEPA requirements does not show either that the supplemental assessment is insufficient for NEPA purposes or establishes a concrete, specific, and genuine issue of material fact or law to warrant admission of the contention.

#### b. Scientific Source Document Identification

In its original petition, SLOMFP argued that the only sources listed in the draft environmental assessment consist "of three documents that are irrelevant and invalid in light of the U.S. Court of Appeals decision in *San Luis Obispo Mothers for Peace v. NRC*: the 2003 license amendment application, the original 2003 [environmental assessment], and the license itself."<sup>52</sup> SLOMFP pointed to places in the environmental assessment where the Staff's phrasing made it clear that the Staff also consulted sources other than these three documents.<sup>53</sup> Under NEPA, SLOMFP argued, the public is entitled to identification of these sources and any other technical data the Staff relied on in reaching its conclusions.

SLOMFP argued that the NRC Staff's failure to provide a complete list of the references underlying the conclusions the Staff presents in its supplemental environmental assessment means that the Staff's decision to stop short of preparing a full environmental impact statement is unjustified, and, by extension, that the finding of no significant impact is unsupported. SLOMFP cites judicial

<sup>51</sup> CLI-07-11, 65 NRC at 150 (footnote omitted). SLOMFP refers to standards considered in the promulgation of the NRC's Design Basis Threat Rule, but this reference does not show a concrete and specific failing in the analysis contained in the supplemental environmental assessment, which included consideration of threat scenarios considered to be plausible. For example, the Staff notes that it looked at "a large aircraft impact similar in magnitude to the attacks of September 11, 2001." NRC Staff Response at 13. SLOMFP offers nothing concrete to show that this is not true.

<sup>52</sup> SLOMFP Petition at 9.

<sup>53</sup> See *id.* at 9-10, where SLOMFP quotes extensively from the environmental assessment to highlight apparent documentary references not included in the environmental assessment's list of references.

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precedent,<sup>54</sup> as well as an NRC regulation, 10 C.F.R. § 51.30(a)(2),<sup>55</sup> and a CEQ regulation, 40 C.F.R. § 1502.24,<sup>56</sup> to support its argument that the NRC Staff must provide source documents underlying its environmental assessment.

The NRC Staff's position on the alleged failure to reference the sources of scientific data used in the supplemental environmental assessment is that sensitive security information must be protected from public disclosure.<sup>57</sup> Indeed, the need to withhold information because of its sensitive security nature is an overarching theme in the Staff's briefs. SLOMFP's reply is that "the Staff does not explain what is sensitive about information concerning the title, date, a general description of the content of a sensitive security document, or identification of the [Freedom of Information Act (FOIA)] exemption under which the NRC claims the right to withhold the content of the document."<sup>58</sup>

Now that the Staff has issued a final environmental assessment, with additional references and sources listed, SLOMFP acknowledges the improvement but argues that the list is still "insufficient to comply with NEPA" because it is "concededly incomplete," because the Staff provides no justification for withholding identification of documents based on their sensitivity, and because no justification is evident.<sup>59</sup> According to the SLOMFP, the final environmental assessment "should provide a complete list of its sources and references, including records of the consultations with law enforcement agencies which are identified as important sources of information in the appendix" to the finalized supplement.<sup>60</sup> Moreover, to the extent that any documents relied on in rejecting any contentions are nonpublic, SLOMFP requests access to these documents, under appropriate protective measures, to evaluate the Commission's basis for rejecting the contentions.<sup>61</sup> SLOMFP also seeks access to safeguards and classified documents to the extent necessary to evaluate the final supplemental environmental assessment's conclusions.<sup>62</sup>

<sup>54</sup> SLOMFP Petition at 4, citing *Idaho Sporting Congress v. Thomas*, 137 F.3d 1146, 1150 (9th Cir. 1998), and *Earth Island Institute v. U.S. Forest Service*, 351 F.3d 1291, 1300-31 (9th Cir. 2003).

<sup>55</sup> "An environmental assessment shall identify the proposed action and include: . . . [a] list of agencies and persons consulted, and identification of sources used." 10 C.F.R. § 51.30(a)(2).

<sup>56</sup> "Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements. They shall identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement. An agency may place discussion of methodology in an appendix." 40 C.F.R. § 1502.24.

<sup>57</sup> NRC Staff Response at 6-8.

<sup>58</sup> SLOMFP Reply at 16.

<sup>59</sup> SLOMFP Petition II at 2.

<sup>60</sup> *Id.* at 2-3.

<sup>61</sup> *Id.* at 3.

<sup>62</sup> *Id.*

PG&E disagrees with SLOMFP's position that the list of references remains insufficient, arguing that SLOMFP's complaint about the lack of references is "clearly moot" based upon the listing of sources provided in the final supplemental environmental assessment.<sup>63</sup> Like PG&E, the NRC Staff argues that it cured the omission of reference documents in the draft supplemental environmental assessment by adding to the list of references in the final version.<sup>64</sup> The Staff states that it did not include certain types of documents that it "submits . . . need not be referenced," namely, "[p]ublicly available reference documents that provide background and technical information on matters such as health physics and dose modeling . . . because they provide widely known information regarding the manner in which radioactive doses are calculated and health impacts [are] evaluated."<sup>65</sup>

The link between NEPA and FOIA is spelled out in section 102(2)(C) of NEPA: copies of environmental impact statements "shall be made available to the President, the Council on Environmental Quality and to the public as provided in [FOIA] section 552 of Title 5."<sup>66</sup> We understand this to include information underlying environmental impact statements (or environmental assessments). As the Supreme Court said in *Weinberger*, "§ 102(2)(C) contemplates that in a given situation a federal agency might have to include environmental considerations in its decisionmaking process, yet withhold public disclosure of any NEPA documents, in whole or in part, under the authority of an FOIA exemption."<sup>67</sup> "NEPA provides . . . that any information kept from the public under the exemptions in . . . FOIA . . . need not be disclosed."<sup>68</sup> FOIA exemption 1, for example, permits withholding classified information and FOIA exemption 3 supports withholding safeguards material.<sup>69</sup> So-called "SUNSI" material,<sup>70</sup> official use only (nonpublic), or general information like the title, date, or a general summary or description of the contents of an otherwise classified or exempt document,<sup>71</sup> may or may not qualify under a FOIA exemption, depending

<sup>63</sup> PG&E Response II at 3.

<sup>64</sup> Staff includes a further six documents in Attachment I to Staff Response II, entitled Addendum to References Listed in the NRC Staff's Supplement to the Environmental Assessment and Final Finding of No Significant Impact for the Diablo Canyon Independent Fuel Storage Installation.

<sup>65</sup> Staff Response II at 3-4.

<sup>66</sup> 42 U.S.C. § 4332(2)(C).

<sup>67</sup> *Weinberger*, 454 U.S. at 143 (emphasis added). See also *Hudson River Sloop Clearwater, Inc. v. Department of the Navy*, 891 F.2d 414, 420 (2d Cir. 1989).

<sup>68</sup> *Hudson River Sloop Clearwater*, 891 F.2d at 420, citing *Weinberger* at 202-03.

<sup>69</sup> See 5 U.S.C. § 552(b)(1), (b)(3); 42 U.S.C. § 2167.

<sup>70</sup> "SUNSI" is an NRC term referring to sensitive unclassified nonsafeguards information.

<sup>71</sup> If the existence of a document is classified, such that disclosure of the title and a description of the contents would also be classified, then, as in *Weinberger* where the environmental impact

(Continued)

upon the specifics of the information. "Ordinarily," when access to documents is disputed in FOIA litigation, "the government must submit detailed public affidavits identifying the documents withheld, the FOIA exemptions claimed, and a particularized explanation of why each document falls within the claimed exemption."<sup>72</sup> This process commonly requires what is referred to as a "Vaughn" index.<sup>73</sup> Where a Vaughn index is required, it must be sufficiently detailed to support *de novo* assessment of the validity of the claimed exemption should the matter go to court.<sup>74</sup>

In our initial scheduling order, we recognized that "it may prove necessary to withhold some facts underlying the Staff's findings and conclusions."<sup>75</sup> The expanded list of references that the Staff provided in the finalized environmental assessment supplement has been augmented by the additional references identified in the addendum to the Staff's pleading. But, as SLOMFP notes, there are indications that the Staff's list of references is still incomplete. While the unlisted documents may be general background references — as the Staff suggests<sup>76</sup> — the Staff has identified no applicable FOIA exemption(s) to justify excluding any documents from the reference list. Nor is it clear whether any withheld documents, even if they include safeguards information or classified national security information, might be redacted, with portions released.

We direct the Staff to prepare a complete list of the documents on which it relied in preparing its environmental assessment, together with a Vaughn index (or its equivalent) for any document for which the Staff claims a FOIA exemption, to be filed within 14 days of the date of this decision. Releasable documents (or releasable portions of documents), if any, should be turned over to the other parties at that time. The other parties may respond to the NRC Staff's Vaughn index (or detailed affidavit) within 7 calendar days. We will permit SLOMFP to dispute the NRC Staff's exemption claims based on the index and public record.

statement was classified because the very presence or absence of nuclear weapons was classified, FOIA Exemption 1 would apply and even limited information, such as the title of the document, could be withheld. See *Weinberger*, 454 U.S. at 144-46.

<sup>72</sup> *Lion Raisins Inc. v. U.S. Department of Agriculture*, 354 F.3d 1072, 1082 (9th Cir. 2004), citing *Wiener v. FBI*, 943 F.2d 972, 977 (9th Cir. 1991).

<sup>73</sup> See *Vaughn v. Rosen*, 484 F.2d 820, 823-25 (D.C. Cir. 1973).

<sup>74</sup> *Lion Raisins Inc.*, 354 F.3d at 1082.

<sup>75</sup> CLI-07-11, 65 NRC at 150.

<sup>76</sup> The Staff asserts that "[p]ublicly available reference documents that provide background and technical information on matters such as health physics and dose modeling were not included because they provide widely known information regarding the manner in which radioactive doses are calculated and health impacts evaluated. The Staff submits that these types of documents need not be referenced." Staff Response II at 3-4. The Staff's assertion has merit, provided that the reference documents the Staff is talking about are not agency records within FOIA and are instead, for example, textbooks or personal records.

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Under the *Weinberger* decision, we need not and will not provide SLOMFP access to exempt documents.<sup>77</sup>

We thus admit Contention 1(b) to the extent that it alleges that the Staff failed to provide source documents or information underlying its analysis, and failed to identify appropriate FOIA exemptions for its withholding decisions.

## 2. Contention 2: Reliance on Hidden and Unjustified Assumptions

SLOMFP infers from the supplemental environmental assessment<sup>78</sup> that the NRC Staff appears to have made the "absurd" choice to exclude a range of threat scenarios and consequences from its analysis based on the assumption that the environmental effects of a given hypothetical scenario are insignificant unless the potential consequences include early fatalities.<sup>79</sup> This, SLOMFP argues, is a "hidden and unjustified" assumption that "violates NEPA by 'impairing the agency's consideration of the adverse environmental effects of a proposed project.'"<sup>80</sup>

Moreover, according to SLOMFP, this "hidden and unjustified" assumption ignores consequences like increased cancers and illnesses that are routinely considered in the NRC's environmental impact statements. It also ignores land contamination, which would be, in SLOMFP's expert's view, the "dominant effect" of an accident or attack at an ISFSI, making a large land area uninhabitable and causing significant economic and social harm.<sup>81</sup>

According to SLOMFP, another "hidden" and perhaps "unjustified" assumption that the supplemental environmental assessment makes is that the environmental effects of an attack could be mitigated by certain unspecified emergency planning measures. SLOMFP complains that these emergency planning measures are not identified in the supplemental environmental assessment and also are not discussed in the license application, making it impossible to evaluate their effectiveness.

PG&E argues that this proposed contention fails to identify any assumptions in the NRC Staff's analysis that are either misleading or unjustified and that the two factual issues that SLOMFP does identify — Staff's alleged exclusion of consequences other than early fatalities and Staff's alleged assumption that potential consequences are mitigated via unspecified emergency planning upgrades — are not well supported and do not raise admissible issues. The Staff, for its

<sup>77</sup> 454 U.S. at 143.

<sup>78</sup> SLOMFP Petition at 10-12, referring to the Draft EA Supplement at 6-7.

<sup>79</sup> SLOMFP Petition at 11.

<sup>80</sup> *Id.*, citing *South Louisiana Environmental Council v. Sand*, 629 F.2d 1005, 1011-12 (5th Cir. 1980) and referencing also similar cases from the Tenth and Fourth Circuits.

<sup>81</sup> SLOMFP Petition at 11-12, citing Thompson Report at 17, 35.

part, denies that the assumptions underlying its analysis are "hidden" or "unjustified," asserting that the assumptions are explained throughout the supplemental environmental assessment, and that the Staff addressed "the potential for early fatalities" as an additional consideration combined with other factors to determine the need for additional security measures at the facility, not to rule out other threat scenarios that cause other types of impacts."<sup>82</sup>

We find Contention 2 admissible to the extent we discuss below. The Staff correctly points out that the assessment mentions early fatalities only in the context of the consideration of the need for additional security measures and that the assessment goes on to provide dose estimates and other findings in support of its determination. However, SLOMFP stresses that while the environmental assessment emphasizes low potential radiation doses to humans from a hypothetical terrorist attack, it appears to be silent on the possibility of land contamination — a possibility SLOMFP's expert considers significant and serious. We cannot say, under the standards applicable at this stage, that SLOMFP's concern that the environmental assessment ignores environmental effects on the surrounding land is unworthy of further inquiry. Nor do we reject at the threshold SLOMFP's request to litigate its claim that the NRC Staff has not considered nonfatal health effects (e.g., latent cancers) from a hypothetical terrorist attack. The environmental assessment appears to be silent on that point as well. The Staff may be able to easily explain how such issues were addressed by reference to source documents, including the 2003 environmental assessment, or how such issues are bounded and were implicitly addressed by the very low dose estimates and other considerations, but we believe further inquiry is appropriate.

Insofar as Contention 2 reiterates Contention 1(b)'s concern about the lack of supporting information and deficient explanations, we deny the contention as duplicative. We intend to address those grievances in the context of Contention 1(b). We also deny the portion of Contention 2 alleging a lack of clarity about the role of emergency planning in mitigating harm. The environmental assessment says merely that "[i]n some situations, emergency planning and response actions could provide an additional measure of protection."<sup>83</sup> As we see it, there is no reason to convene an NRC hearing to debate that self-evident, and unexceptionable, proposition.

### 3. Contention 3: Failure To Consider Credible Threat Scenarios with Significant Environmental Impacts

SLOMFP argues that the NRC's supplemental environmental assessment fails

<sup>82</sup> Staff Response at 19, citing Draft EA Supplement at 6.

<sup>83</sup> Final EA Supplement at 7.

to satisfy the CEQ's NEPA regulations (40 C.F.R. § 1502.22(b)(3)), which require the NRC "to consider low-probability environmental impacts with catastrophic consequences, if those impacts are reasonably foreseeable," because it apparently only considers scenarios where the dry storage casks sustain minimal damage.<sup>84</sup> SLOMFP infers that the Staff only considered "minimal damage" scenarios from the Staff's assumption that minimal releases of radioactive material will occur. But SLOMFP argues that scenarios with much larger releases of radiation are also "plausible" and should have been considered.

As an example of scenarios the NRC allegedly failed to consider, SLOMFP references scenarios discussed in its expert witness's report,<sup>85</sup> where the penetrating device is accompanied by an incendiary component that ignites the zirconium cladding of the spent fuel inside the storage cask, causing a much larger release of radioactive material than posited in the scenarios where the casks sustain minimal damage. According to SLOMFP's expert, such a release could contaminate up to 7,500 square kilometers of land, rendering it uninhabitable and causing cancers and other health problems as well as significant economic and social damage.<sup>86</sup>

SLOMFP argues that the Staff should prepare a full environmental impact statement to remedy its (allegedly) NEPA-violating failure to analyze the impacts of a wide range of scenarios.<sup>87</sup> SLOMFP maintains that this environmental impact statement should be available in both a public version that summarizes the scenarios and their effects and in a restricted, detailed version that is available to those with interest and clearance to receive the information.<sup>88</sup>

PG&E disputes the applicability of 40 C.F.R. § 1502.22(b)(3)<sup>89</sup> based upon the NRC's conclusion that there were no foreseeable adverse effects from reasonably foreseeable scenarios.<sup>90</sup> By its terms, section 1502.22 applies only "[w]hen an agency is evaluating reasonably foreseeable significant adverse effects. . . ." According to PG&E, we should accept Staff's apparent assessment that the example SLOMFP's witness gives as a scenario that should have been considered (described above, where a small number of attackers render a large area uninhabitable) was not reasonably foreseeable. Assessing this scenario requires a presumption, according to PG&E, that the attack will be successful. PG&E argues that neither NEPA, nor the Ninth Circuit's remand, requires litigation of a matter that cannot be addressed conclusively.

<sup>84</sup> SLOMFP Petition at 12-13.

<sup>85</sup> *Id.* at 13, citing Thompson Report at 33-37.

<sup>86</sup> SLOMFP Petition at 13-14, citing Thompson Report at 17, 37.

<sup>87</sup> SLOMFP Petition at 14, citing Thompson Report at 34-36.

<sup>88</sup> SLOMFP Petition at 14.

<sup>89</sup> PG&E Response at 13.

<sup>90</sup> *Id.*

The NRC Staff denies that it failed to consider credible threat scenarios with significant environmental impacts. The Staff states that it cannot publicly disclose the details of its analysis of particular threat scenarios. According to the Staff, SLOMFP's contention is without foundation and should not be admitted. SLOMFP, in reply, reiterates that the supplemental environmental report should identify the assessments it relied on, the FOIA exemptions that it claims, and its reasons for invoking a FOIA exemption. The sensitive nature of security assessments may provide a reason for holding a closed hearing, SLOMFP maintains, but not for dismissing the contention outright.

We agree with PG&E and the NRC Staff.<sup>91</sup> The NRC Staff's supplemental environmental assessment explains that the Staff considered "[p]lausible threat scenarios . . . includ[ing] a large aircraft impact similar in magnitude to the attacks of September 11, 2001, and ground assaults using expanded adversary characteristics consistent with the design basis threat for radiological sabotage for nuclear power plants."<sup>92</sup> This approach, grounded in the NRC Staff's access to classified threat assessment information,<sup>93</sup> is reasonable on its face. We do not understand the Ninth Circuit's remand decision — which expressly recognized NRC security concerns and suggested the possibility of a "limited proceeding"<sup>94</sup> — to require a contested adjudicatory inquiry into the credibility of various hypothetical terrorist attacks against the Diablo Canyon ISFSI.

Adjudicating alternate terrorist scenarios is impracticable. The range of conceivable (albeit highly unlikely) terrorist scenarios is essentially limitless, confined only by the limits of human ingenuity. And hearings on such claims could not be conducted in a meaningful way without substantial disclosure of classified and safeguards information on threat assessments and security arrangements and without substantial litigation over their significance. Such information — disclosure of which is prohibited by law — would lie at the center of any adjudicatory inquiry into the probability and success of various terrorist scenarios.

The Supreme Court's controlling *Weinberger* decision makes clear that NEPA does not contemplate such adjudications: "public policy forbids the maintenance of any suit in a court of justice, the trial of which would inevitably lead to the disclosure of matters which the law itself regards as confidential, and respecting which it will not allow the confidence to be violated."<sup>95</sup> The NRC has a statutory

<sup>91</sup> Insofar as Contention 3 reiterates SLOMFP's complaint about a lack of support documents, we intend to address that point under the rubric of Contention 1(b).

<sup>92</sup> Final EA Supplement at 7.

<sup>93</sup> *Id.* at 4-7.

<sup>94</sup> 449 F.3d at 1034-35.

<sup>95</sup> *Weinberger*, 454 U.S. at 146-47, quoting *Totten v. United States*, 92 U.S. 105, 107 (1876). See also *Tenet v. Doe*, 544 U.S. 1, 8 (2005); *United States v. Reynolds*, 345 U.S. 1, 10-11 (1953).

obligation to protect national security information.<sup>96</sup> We have never disclosed such information in NEPA-based proceedings, notwithstanding the theoretical possibility, raised by SLOMFP, of security clearances and closed-door hearings. *Weinberger* and other "state secrets" cases indicate that no such disclosure is warranted.<sup>97</sup> In practical terms, this leaves the matter of threat assessment under NEPA in the hands of the NRC, without judicial oversight or agency hearings. But that is exactly the result *Weinberger* calls for.<sup>98</sup>

#### 4. Contention 4: Failure To Address National Infrastructure Protection Plan (NIPP)

SLOMFP argues that the supplemental environmental assessment does not comply with NEPA and NRC regulations because it does not address consistency with the NIPP,<sup>99</sup> to which the NRC is a signatory. In SLOMFP's view, the environmental assessment should have identified the NIPP or its officials as "resources or individuals" consulted under 10 C.F.R. § 51.30(a)(2).<sup>100</sup> According to SLOMFP, the environmental assessment should have addressed "homeland security strategy, the principles of protective deterrence, [and] the opportunities that the NIPP has identified for incorporating protective features into the design of infrastructure elements."<sup>101</sup> In the opinion of SLOMFP's expert, protective measures of the types identified in NIPP could significantly reduce the likelihood of a successful attack, "deter[ring]" attacks by changing potential attacker's cost-benefit calculations rather than deterring based upon the ability to counterattack.<sup>102</sup>

<sup>96</sup> See, e.g., AEA § 141, 42 U.S.C. § 2161 (2000) (Commission is required to control information in "a manner to assure the common defense and security"); AEA § 147, 42 U.S.C. § 2167 (2000) (requiring the Commission to take actions "to prohibit the unauthorized disclosure" of information including security measures).

<sup>97</sup> The "state secrets" privilege is absolute. See *United States v. Reynolds*, 345 U.S. at 11.

<sup>98</sup> Our decision not to adjudicate SLOMFP's "hypothetical terrorist scenarios" claim does not equate to ignoring SLOMFP's concerns. As *Weinberger* makes clear, an inability to adjudicate or publicize NEPA information does not justify an agency's failure to perform a NEPA analysis. See *Weinberger*, 454 U.S. at 146. Here, the NRC Staff presumably considered SLOMFP's concerns as part of the comment process on the draft environmental impact statement, and as a check upon the reasonableness of the NRC Staff's approach, we ourselves ultimately will review the range of terrorist events considered by the Staff.

<sup>99</sup> National Infrastructure Protection Plan of 2006, available at [http://www.dhs.gov/xp/revprot/programs/veditorial\\_0827.shtm](http://www.dhs.gov/xp/revprot/programs/veditorial_0827.shtm).

<sup>100</sup> SLOMFP Petition at 14. The regulation provides:

(a) An environmental assessment shall identify the proposed action and include:

(2) A list of agencies and persons consulted, and identification of sources used.

10 C.F.R. § 51.30(a).

<sup>101</sup> SLOMFP Petition at 14.

<sup>102</sup> *Id.* at 15, citing Thompson Report at 11-12.

PG&E argues that this contention is not admissible. NIPP imposes no regulatory or legal requirements on the NRC, PG&E argues, so the proposed contention does not state a claim for which SLOMFP is entitled to relief. PG&E maintains that even if NIPP were applicable, the supplemental environmental assessment appears to have addressed the basic physical protection principles of NIPP, through security measures and cask design requirements and mitigation, so SLOMFP has failed to demonstrate a genuine, litigable issue.

The Staff's position is that this contention is outside the scope of the proceeding, that NEPA does not require a demonstration of compliance with NIPP, and that SLOMFP's contention is unsupported and inadmissible.

In reply, SLOMFP argues that it is well established that NEPA obligates federal agencies to evaluate all of the environmental effects of their actions, not only those regulated under their own statutes, citing a Ninth Circuit case to support this proposition.<sup>103</sup> SLOMFP points to the NRC's own regulations, specifically 10 C.F.R. § 51.71(d), which requires an environmental impact statement to give "[d]ue consideration" to "compliance with environmental quality standards and requirements that have been imposed by Federal, State, regional, and local agencies having responsibility for environmental protection."<sup>104</sup> Relying on the NRC's commitment as a signatory to the NIPP, SLOMFP argues that the supplemental environmental assessment should address the NIPP. Moreover, SLOMFP's expert witness questions whether the storage casks, designed to withstand natural forces, can protect against weapons available to terrorist groups.<sup>105</sup>

We do not admit this contention. While we certainly agree that in implementing its security program the NRC should take account of the NIPP, to which it is a signatory,<sup>106</sup> we do not agree that the NRC must demonstrate compliance with the NIPP in its NEPA evaluation. The NIPP is concerned with security issues, not environmental quality standards and requirements — and it is environmental quality standards and requirements that 10 C.F.R. § 51.71(d) obliges the environmental analysis to address, not security issues. As a result, SLOMFP's "NIPP" contention is therefore outside the scope of this NEPA-based remand proceeding.

<sup>103</sup> SLOMFP Reply at 23, citing *Save Our Sonoran, Inc. v. Flowers*, 408 F.3d 1113, 1122 (9th Cir. 2005).

<sup>104</sup> 10 C.F.R. § 51.71(d).

<sup>105</sup> SLOMFP Reply at 24, citing Thompson Report at 34.

<sup>106</sup> See Memorandum of Understanding Between the Nuclear Regulatory Commission and the Department of Homeland Security Regarding Consultation Concerning Potential Vulnerabilities of the Location of Proposed New Utilization Facilities, 72 Fed. Reg. 9959 (Mar. 6, 2007).

##### 5. Contention 5: Failure To Consider Vulnerability of ISFSI in Relation to the Entire Diablo Canyon Spent Fuel Storage Complex

SLOMFP argues that the environmental assessment does not comply with NEPA because it does not consider the cumulative impact of storing spent fuel at the site in two locations, the ISFSI and the existing spent fuel pool, rather than in one location. SLOMFP's theory appears to be that adding the ISFSI increases the terrorism threat to the spent fuel pool, causing a cumulative impact that exceeds the impact that would be attributable to the ISFSI in isolation. In other words, according to SLOMFP, adding the ISFSI makes the entire Diablo Canyon site a more attractive target for terrorists, and the NRC should have analyzed this cumulative effect. SLOMFP argues that the environmental assessment should consider alternatives for mitigating this cumulative effect, for example, by allocating spent fuel storage between the ISFSI and the spent fuel pool in a fashion that reduces the density of storage in the spent fuel pool.<sup>107</sup>

PG&E dismisses this contention as "a clear attempt to bootstrap the previously licensed wet storage at Diablo Canyon into this licensing proceeding related to dry storage at the ISFSI."<sup>108</sup> As such, PG&E argues, the contention is outside the scope of the remanded proceeding.

With respect to the cumulative impact aspect of SLOMFP's proposed contention, PG&E argues that "[c]umulative impact reviews can focus on aggregate impacts of multiple actions, where the environmental impacts are apparent — either qualitatively or quantitatively — and are reasonably certain."<sup>109</sup> According to PG&E, SLOMFP's described cumulative "impact" is really cumulative "risk," a concept that does not apply because risk has a probability component and "[p]robabilities do not aggregate."<sup>110</sup> As a result, SLOMFP's arguments do not, in PG&E's view, raise a cumulative impact issue under NEPA. PG&E adds that to the extent SLOMFP seeks an analysis of the "cumulative consequences of a simultaneous assault on the ISFSI and the wet storage pools at Diablo Canyon, they have provided no basis for an assertion that such a scenario is plausible."<sup>111</sup> Again, there is no issue within the scope of this proceeding, from PG&E's perspective.

From the Staff's perspective, it already considered the cumulative impacts of the facility in the original environmental assessment for the facility, although without considering terrorism.<sup>112</sup> Nonetheless, because of the Staff's determina-

<sup>107</sup> SLOMFP Petition at 16.

<sup>108</sup> PG&E Response at 20.

<sup>109</sup> *Id.* at 22.

<sup>110</sup> *Id.*

<sup>111</sup> *Id.* at 23.

<sup>112</sup> Staff Response at 23.

tion that a terrorist attack on the ISFSI will cause no significant impact, the Staff observes that the original assessment of cumulative impacts did not change.

We agree with PG&E and the NRC Staff that SLOMFP's Contention 5 is outside the scope of this proceeding, which is limited to the analysis of the NEPA-terrorism consequences of licensing the ISFSI, and in any event is inadequately supported. SLOMFP has provided no factual or even logical support for its view that licensing the ISFSI truly might have a "cumulative impact" — that is, a sum "greater than its parts."<sup>113</sup> The expert testimony SLOMFP discusses in connection with this contention relates to the independent consequences of an attack on the spent fuel pool only.<sup>114</sup> If anything, placing the spent fuel in two separate locations (one a hardened dry cask ISFSI) on the Diablo Canyon site, rather than in one place seemingly would reduce the terrorism risk, not enhance it. In any event, examining the terrorism risk facing the spent fuel pool as an independent facility is not part of this proceeding to license a dry storage ISFSI. We see no basis for expanding this proceeding to include testimony and arguments on the spent fuel pool.

#### D. Summary

We admit Contentions 1(b) and 2 consistent with and to the extent and as limited in our discussion above. We do not admit Contentions 1(a), 3, 4, and 5.

### III. PROCEDURAL SCHEDULE

As a result of the remand filing schedule in this proceeding and the need for further proceedings, our previously stated "goal" of resolving this adjudication by February 26, 2008,<sup>115</sup> must be modified slightly. At the time we set this goal, PG&E indicated that it would not be using the facility for storage until the summer

<sup>113</sup> See *Hydro Resources, Inc.* (P.O. Box 15910, Rio Rancho, NM 87174), CLI-01-4, 53 NRC 31, 57-58 (2001). As noted above, SLOMFP requests that we hear arguments for use of the ISFSI to reduce the density in the spent fuel pool, which has been authorized separately. SLOMFP Petition at 16. Indeed, SLOMFP itself has acknowledged reduced environmental consequences of terrorism against dry storage as compared to wet storage, declaring that "[t]he potential consequences of an attack on a pool are considerably more severe than the consequences of an attack on a dry storage facility." Supplemental Request for Hearing and Petition To Intervene by San Luis Obispo Mothers for Peace, (et al.) (July 18, 2002) (Supplemental Petition) at 38.

<sup>114</sup> "[A] conventional accident or attack on a Diablo Canyon spent fuel pool that causes the water level in the pool to fall below the top of the fuel-storage racks would cause a large atmospheric release of the cesium-137 in the pool . . . causing widespread land contamination and adverse health and economic effects." SLOMFP Petition at 16, citing Thompson Report at 17.

<sup>115</sup> CLI-07-11, 65 NRC at 151.

of 2008,<sup>116</sup> a date that we understand may not be firm, rendering any short delay in our ultimate decision not prejudicial to any party. We remain committed to a prompt resolution of this proceeding.

Pursuant to our ruling that Subpart K<sup>117</sup> applies in this proceeding, and pursuant to 10 C.F.R. § 2.1109(h), we set a tentative schedule for the Commission's further consideration of Contention 1(b), for discovery, and for an ultimate Subpart K "oral argument"-type hearing on Contention 2 (as limited in this decision):

1. The NRC Staff shall file with the Commission a complete list of the documents it relied on in the preparation of its environmental assessment (Reference Document List), together with a *Vaughn* index (or its equivalent) for any documents for which the Staff claims a FOIA exemption, with the Commission (and with the presiding officer designated pursuant to paragraph 5, below), and make available to the other parties any documents (or portions thereof) not covered by a FOIA exemption, within 14 days of the date of this decision;
2. The other parties shall respond to the Staff's Reference Document List and *Vaughn* index filing within 7 days of the Staff's filing;
3. Discovery will begin on the date of this decision and will conclude no later than 45 days after the date of this decision;<sup>118</sup>
4. Discovery, including interrogatories, requests for admissions, and requests for production of documents, will be governed by the general provisions contained in 10 C.F.R. § 2.740 *et seq.*, except that oral depositions will be permitted only upon a showing of compelling need and with appropriate security precautions;
5. The Chief Administrative Judge of our Atomic Safety and Licensing Board Panel shall designate an administrative judge to sit as presiding

<sup>116</sup> *Id.* at 149 n.4.

<sup>117</sup> For a description of our Subpart K process, see *Carolina Power & Light Co.* (Shearon Harris Nuclear Power Plant), CLI-01-11, 53 NRC 370, 383-86 (2001).

<sup>118</sup> It is premature, however, to consider discovery on the adequacy of the justification for withholding source documents under FOIA. A relatively detailed index or affidavit should provide a sufficient basis for a decision as to the bases for withholding enumerated source documents. See *Miscavige v. Internal Revenue Service*, 2 F.3d 366, 368 (11th Cir. 1993) (affidavits sufficient to establish that records were exempt); *SafeCard Services v. Securities and Exchange Commission*, 926 F.2d 1197, 1200-02 (D.C. Cir. 1991) (affirming decision to deny discovery as to adequacy of search on ground that agency's affidavits were sufficiently detailed); *Pollard v. Federal Bureau of Investigation*, 705 F.2d 1151, 1154-55 (9th Cir. 1983) (affirming decision to deny deposition concerning the content of withheld documents where content was precisely what defendant maintained was exempt from disclosure).

officer<sup>119</sup> to keep discovery on schedule, if necessary by setting schedules, and by resolving promptly any discovery disputes, including privilege, materiality, and burdensomeness controversies;

6. Any late-filed contentions must be filed within 14 days after disclosure of new information warranting such contentions, with responses to such contentions due 7 days thereafter;
7. The parties' detailed written summaries of facts, data, and arguments and written supporting information, conforming to the requirements of 10 C.F.R. § 2.1113, shall be submitted to the Commission no later than 75 days after the date of this decision;
8. The Subpart K oral argument will be heard by the Commission, absent a further determination, on a date to be determined, but no sooner than 90 days after the date of this decision (see 10 C.F.R. § 2.1113); and
9. After the oral argument, the Commission will issue a prompt decision directing further proceedings, upholding the supplemental environmental assessment, modifying it based on the adjudicatory record, or requiring an environmental impact statement.

IT IS SO ORDERED.

For the Commission

ANNETTE L. VIETTI-COOK  
Secretary of the Commission

Dated at Rockville, Maryland,  
this 15th day of January 2008.

<sup>119</sup> See generally 10 C.F.R. §§ 2.717, 2.718.

#### Commissioner Gregory B. Jaczko Respectfully Dissenting in Part

I concur on the majority of this Order but respectfully dissent from the majority's decision to deny the admission of Contention 3. At this stage in the proceeding, the Commission is simply deciding contention admissibility, a role usually left to the licensing boards. The standards for determining contention admissibility are straightforward. The Commission is not being asked to determine the outcome of the proceeding, but rather to allow the adjudicatory process to proceed.

Contention 3 alleges a "failure to consider credible threat scenarios with significant environmental impacts." I do not find the Staff's arguments against admitting this contention to be compelling. The argument can be reduced to claiming that the intervenor cannot possibly develop an admissible contention without gaining access to sensitive information, and since the agency has no intention of providing that information, the intervenor will never have the foundation for an admissible contention. This is a circular and weak argument in my view.

There does not appear to be anything in the Environmental Assessment or in the Staff's briefs to indicate that the Staff did consider the scenarios outlined by the petitioner, which is the basis for the contention. The Staff had the opportunity to address this contention directly since it was filed as a comment to the draft EA. The Staff could have done so on the record and in an unclassified manner. If Staff had then incorporated that response into the final EA, this contention would have been moot. Because Staff did not address it, I do not believe we have fulfilled our NEPA obligations. I believe the contention, therefore, meets our contention admissibility standards and should be admitted to the proceeding.

In addition, the Staff's understanding appears to be that it is required, and has the right, to withhold all sensitive information with no further public explanation on the Staff's part. The agency has established and convened closed proceedings in the past, however, and could do so again if that became necessary to ensure we are meeting our responsibilities under NEPA, while at the same time safeguarding sensitive information from public disclosure.

Thus, I disagree with the decision of the majority to deny the admission of Contention 3.

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Commissioner Peter B. Lyons Respectfully Dissenting in Part

I agree with the majority of the Commission with respect to the disposition of all but one of the contentions proposed by San Luis Obispo Mothers for Peace (SLOMPF). I write separately to voice my dissent to the admission of SLOMPF Contention 2, "Reliance on hidden and unjustified assumptions." Contention 2 does not meet the regulatory requirements for contention admissibility and should have been rejected. See 10 C.F.R. § 2.714(d)(2) (petitioner must show genuine dispute of material fact or law).

Contention 2 asserts that the EA Supplement violates NEPA in that it "appears to assume" that impacts of an attack would be insignificant if they do not result in early fatalities and that the Staff "appears to have used early fatalities as a criterion" to screen out scenarios that cause other impacts. See SLOMPF Contentions at 11. SLOMPF states that "this assumption is not completely clear but can be inferred" from the EA Supplement.

Contention 2 should have been rejected for failing to demonstrate a material dispute of law or fact. In response to comments, the Staff states that "the EA Supplement did not consider early fatalities as a measure of environmental impact." See Final EA Supplement at A-6. The majority itself recognizes that the EA Supplement mentions early fatalities only in the context of additional security measures. Therefore, the very premise of the contention is incorrect.

Further, as the majority states, the EA Supplement provides dose estimates and other findings in support of its determination. The EA Supplement stresses low potential doses from attack. In this regard, it states: "the dose to the nearest affected resident, from even the most plausible threat scenarios . . . would be likely well below 5 rem." *Id.* at 7. In addition, it states: "In many scenarios, the hypothetical dose to an individual in the affected population could be substantially less than 5 rem, or none at all." *Id.* Moreover, the EA Supplement provides a discussion of the Staff's evaluation:

For the EA Supplement, the Staff performed a dose assessment that used a source term derived from the security assessment work, which was based on a hypothetical release resulting from a terrorist attack. The Staff also assumed national average meteorological conditions in making an initial estimate of the dose at the location of the nearest resident. Then, the Staff applied Diablo Canyon site-specific dispersion parameters, to generate a dose estimate to the nearest resident that was more representative of the actual conditions at the site. That revised dose estimate was used by the Staff in assessing environmental impact.

*Id.* at A-6.

Regarding dispersion of radioactive material, the EA Supplement states that if there is a breach, "most of the radioactive material released would be in solid form, locally deposited in the immediate area of the ISFSI." *Id.* For the small

fraction that would be in the form of fine particulate or gases, and thus able to be transported offsite, the atmospheric dispersion factors for the site would result in "greater dilution" than that used in the generic analysis. *Id.* at 6, A-6. This reduces the projected dose consequences by a factor of 10 to 100. *Id.* at 7. Thus, the projected dose consequences at Diablo Canyon, with consideration of the site-specific meteorology, is described as from 500 mrem to 0.50 mrem.<sup>120</sup> The assessment continued, however: "Use of a site-specific source term [amount of radioactive material released] for the Diablo Canyon spent fuel would reduce this projected dose even further." *Id.* Thus, as I mentioned above, the EA Supplement states: "Based on these considerations, the dose to the nearest affected resident, from even the most severe plausible threat scenarios . . . would likely be well below 5 rem." *Id.* It could be "substantially less than 5 rem, or none at all." *Id.*<sup>121</sup>

An environmental assessment is expected to provide a brief discussion. 10 C.F.R. § 51.30(a)(1). Its purpose is to determine whether an action has a "significant impact," thus informing the decision whether the preparation of an EIS and detailed assessment of impacts is required. See *Environmental Protection Information Center v. U.S. Forest Service*, 451 F.3d 1005, 1009 (9th Cir. 2006). In determining whether there is no significant impact, the government does not need to show "that there is no risk of injury, but only that the risk is not significant." *Anderson v. Evans*, 314 F.3d 1006, 1018 (9th Cir. 2002).

The EA Supplement expressly finds "no" significant environmental impact, which implicitly embraces any significant environmental effect. For instance, the EA Supplement concludes that "a terrorist attack that would result in a significant release of radiation affecting the public is not reasonably expected to

<sup>120</sup>To put this into perspective, the findings of no significant radiological impacts from routine operation observed that there is a "100 mrem estimated annual dose received from naturally occurring terrestrial and cosmic radiation in the vicinity" of the plant. Final EA Supplement at 3. The average annual dose in the United States, with considerable variation, has been estimated to be around 300 mrem. See *Nuclear Information and Resource Service v. NRC*, 457 F.3d 941, 946 (9th Cir. 2006). The NRC's occupational dose limits for adults includes as one dose limit "[t]he total effective dose equivalent to 5 rems." 10 C.F.R. § 20.1201(a)(1).

<sup>121</sup>The EA Supplement also explains, in summarizing the consideration of potential impacts in the Environmental Assessment (October 24, 2003), that "[f]or hypothetical accidents, the calculated dose to an individual at the nearest site boundary was found to be well below the 5-rem limit for accidents set forth in 10 C.F.R. § 72.106(b) and in the U.S. Environmental Protection Agency's protective action guidelines." Final Supplement at 1. The NRC's regulations establish an accident dose limit of 5 rem to any individual located on or beyond the nearest boundary of the controlled area of an ISFSI. 10 C.F.R. § 72.106(a)(1). The accident dose limit of 5 rem was derived from the protective actions recommended by EPA for projected doses to populations for planning purposes. See Final Rule 10 CFR Part 72: "Licensing Requirements for the Storage of Spent Fuel in an Independent Spent Fuels Storage Installation," 1980 45 Fed. Reg. 74,693, 74,697. Thus, the EA Supplement's dose projections complement the findings of the EA regarding offsite consequences, with its similar dose projection of "well below the 5 rem limit for accidents."

occur," and finds that "design features and mitigative security measures will provide high assurance that substantial environmental impacts will be avoided and thereby reduced to a nonsignificant risk level." Final EA Supplement at 8. Land contamination and latent fatalities are not discussed, but SLOMFP's reliance on a reference to a potential for early fatalities in one part of the terrorism review is not sufficient to show a genuine and material issue regarding that omission, particularly in the context of the description of the dose assessment and other factors in support of the EA Supplement's findings and conclusions.

09-052

Cite as 67 NRC 31 (2008)

CL1-08-2

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

COMMISSIONERS:

Dale E. Klein, Chairman  
Gregory B. Jeczko  
Peter B. Lyons

In the Matter of

Docket No. 50-293-LR

ENTERGY NUCLEAR GENERATION  
COMPANY and ENTERGY NUCLEAR  
OPERATIONS, INC.  
(Pilgrim Nuclear Power Station)

January 15, 2008

APPEALS, INTERLOCUTORY

SUMMARY DISPOSITION

A ruling granting summary disposition on a single contention, where other contentions are still pending in an adjudication, is not a "final" decision, and is not susceptible to Commission review.

APPEALS, INTERLOCUTORY

SUMMARY DISPOSITION

The provision expressly-permitting immediate review of a "partial initial decision" is an exception to the Commission's established policy of disfavoring interlocutory appeals. See 10 C.F.R. § 2.341(b)(1). See Final Rule: "Procedures for Direct Commission Review of Decisions of Presiding Officers," 56 Fed. Reg. 29,403 (July 27, 1991). The rule making partial initial decisions immediately appealable codified the Commission's longstanding practice of considering a Board order appealable where it "disposes of . . . a major segment of the case or terminates a party's right to participate." See *Public Service Co. of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-731, 17 NRC 1073, 1074-

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

## COMMISSIONERS:

Dale E. Klein, Chairman  
Edward McGaffigan, Jr.  
Jeffrey S. Merrifield  
Gregory B. Jaczko  
Peter B. Lyons

In the Matter of

Docket No. 72-26-ISFSI

PACIFIC GAS AND ELECTRIC  
COMPANY  
(Diablo Canyon Power Plant  
Independent Spent Fuel Storage  
Installation)

February 26, 2007

## MEMORANDUM AND ORDER

This is a proceeding to license an independent spent fuel storage installation (ISFSI) at the site of the Diablo Canyon nuclear power reactor in California. In *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016, 1028 (9th Cir. 2006), the United States Court of Appeals for the Ninth Circuit held that the NRC's "categorical refusal to consider the environmental effects of a terrorist attack" in this licensing proceeding was unreasonable under the National Environmental Policy Act (NEPA).<sup>1</sup> The Ninth Circuit remanded the "NEPA-terrorism" question to the Commission for "further proceedings consistent with this opinion."<sup>2</sup> Pacific

<sup>1</sup> The Court reasoned, *inter alia*, that the NRC's analysis had resulted in the failure to address the "Petitioners' factual contentions that licensing the Storage Installation would lead to or increase the risk of a terrorist attack because (1) the presence of the Storage Installation would increase the probability of a terrorist attack on the Diablo Canyon nuclear facility, and (2) the Storage Installation itself would be a primary target for a terrorist attack." 449 F.3d at 1030.

<sup>2</sup> 449 F.3d at 1035.

Gas & Electric Co. (PG&E) petitioned the Supreme Court for a writ of certiorari. The Supreme Court recently denied PG&E's petition.<sup>3</sup>

Today we set a schedule<sup>4</sup> for further proceedings in this adjudication in response to the Ninth Circuit's remand.<sup>5</sup> The Ninth Circuit explicitly left to our discretion the precise manner in which we undertake a NEPA-terrorism review on remand, with respect to both our consideration of the merits and the procedures we choose to apply:

Our identification of the inadequacies in the agency's NEPA analysis should not be construed as constraining the NRC's consideration of the merits on remand, or circumscribing the procedures that the NRC must employ in conducting its analysis. There remain open to the agency a wide variety of actions it may take on remand, consistent with its statutory and regulatory requirements.<sup>6</sup>

With this guidance in mind, we set the following procedural schedule:

1. The NRC Staff shall prepare a revised environmental assessment in accordance with the NRC's regulations — addressing the likelihood of a terrorist attack at the Diablo Canyon ISFSI site and the potential consequences of such an attack — to be filed with the Commission and served upon the parties to the Ninth Circuit proceeding *within 90 days* after the date of this decision;<sup>7</sup>
2. Amended or late-filed contentions must be filed *within 30 days* of publication of the NRC Staff's draft NEPA documentation. New late-filed contentions must meet the standards for late-filed contentions in 10 C.F.R.

<sup>3</sup> *Pacific Gas and Electric Co. v. San Luis Obispo Mothers for Peace*, No. 06-466 (S. Ct. Jan. 16, 2007).

<sup>4</sup> In setting this schedule, we note that PG&E now indicates that it does not intend to use the facility for actual storage of spent-fuel until the summer of 2008, rather than November 2007 as previously stated. See Pacific Gas and Electric Company Motion for Prompt Commission Action at 3 (Jan. 24, 2007). See also Response by San Luis Obispo Mothers for Peace, Sierra Club, and Peg Pinard to PG&E Motion for Prompt Commission Action (Feb. 5, 2007). PG&E, in turn, responded to this San Luis Obispo Mothers for Peace response in a filing marked as Pacific Gas and Electric Company's Response to Intervenor's "Request for Clarification" (Feb. 13, 2007).

<sup>5</sup> The schedule we set here applies only to this particular proceeding. The majority of the Commission, with Commissioner Jaczko dissenting, remains convinced that NEPA does not require a terrorism review in connection with NRC licensing decisions. See *AmerGen Energy Co., LLC* (Oyster Creek Nuclear Generating Station), CLI-07-8, 65 NRC 124 (2007).

<sup>6</sup> 449 F.3d at 1035.

<sup>7</sup> If the NRC Staff requires additional time, or if the NRC Staff determines that an environmental impact statement is necessary, it may request a schedule modification.

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Part 2.<sup>8</sup> Absent further direction, in the interest of expeditious resolution the Commission itself will determine the admissibility of contentions and whether oral argument or other further action is required;

3. Any member of the public who wishes to comment on the draft environmental assessment (outside of the adjudicatory process, pursuant to our normal environmental process) must do so *within 30 days* after it is made available in accordance with the NRC's regulations (or *within 45 days* of the publication of a draft environmental impact statement);<sup>9</sup>
4. To the extent practicable, we expect the NRC Staff to base its revised environmental analysis on information already available in agency records, and consider in particular the Commission's DBT for power plant sites<sup>10</sup> and other information on the ISFSI design, mitigative, and security arrangements bearing on likely consequences, consistent with the requirements of NEPA, the Ninth Circuit's decision, and the regulations for the protection of sensitive and safeguards information. As the Ninth Circuit contemplated, the NRC Staff may rely, where appropriate, on qualitative rather than quantitative considerations;<sup>11</sup>
5. We expect the NRC Staff to rely on as much public information as practicable and to make public as much of its revised environmental analysis as feasible. We recognize, however, that it may prove necessary to withhold some facts underlying the Staff's findings and conclusions as "safe-

<sup>8</sup> See also the discussion of contentions of omission in *Duke Energy Corp.* (McGuire Nuclear Station, Units 1 and 2; Catawba Nuclear Station, Units 1 and 2), CLI-02-28, 56 NRC 373, 382-84 (2002). In making their filings, all parties are reminded to appropriately protect all sensitive security information.

<sup>9</sup> See 10 C.F.R. §§ 51.33(c), 51.73.

<sup>10</sup> NRC regulations do not require specifically licensed ISFSIs to defend against the "design-basis threat" of radiological sabotage. In practice, however, when an ISFSI is located at a reactor site (as here), protection of the ISFSI is typically included within the reactor's security plan. Reactor security plans require protection against the design basis threat. See 10 C.F.R. §§ 50.34(c) & (d), 73.55(a). PG&E amended its reactor security plan to cover protection of the ISFSI. See *License Amendment Request 01-09, Revision to the DCCP Physical Security Program To Incorporate the Diablo Canyon ISFSI and Associated Request for Exemption to Four 10 CFR 73.55 Requirements*, available as ADAMS Accession No. ML020020039; *Diablo Canyon Independent Spent Fuel Storage Installation Application — Physical Security Program Changes* (TAC No. L23399), available as ADAMS Accession No. ML040350009. See also Pacific Gas and Electric, *Diablo Canyon Nuclear Power Plant, Independent Spent Fuel Storage Installation; Order Modifying License* (Effective Immediately), 70 Fed. Reg. 25,121 (May 12, 2005), EA-05-088, available as ADAMS Accession No. ML050940493; *In the Matter of Pacific Gas and Electric Diablo Canyon Nuclear Power Plant Independent Spent Fuel Storage Installation Order Modifying License* (Effective Immediately), 70 Fed. Reg. 25,119 (May 12, 2005), EA-05-089, available as ADAMS Accession No. ML050940492.

<sup>11</sup> 449 F.3d at 1031-32. See also 10 C.F.R. §§ 51.45(c), 51.71(d).

guards" information, see Atomic Energy Act § 147, 42 U.S.C. § 2167; 10 C.F.R. § 71.23, or even as classified national security information;<sup>12</sup>

6. We expect the NRC Staff to review the comments on its draft analysis and finalize its review within 60 days of the close of the public comment period;
7. We believe it is reasonable for the NRC to reach a final decision on the licensing action (for example, reaffirming, revoking, or conditioning the ISFSI license) no later than 12 months from the date of this order, and expect further scheduling orders to be guided by this goal, recognizing the fundamental objectives of assuring fair and meaningful review and decisionmaking.

IT IS SO ORDERED.

For the Commission

ANNETTE L. VIETTI-COOK  
Secretary of the Commission

Dated at Rockville, Maryland,  
this 26th day of February 2007.

<sup>12</sup> See *Weinberger v. Catholic Action of Hawaii*, 454 U.S. 139 (1981).

adversely affected by this Order and shall address the criteria set forth in 10 CFR 2.309 (d) and (f).

If a hearing is requested by a person whose interest is adversely affected, the Commission will issue an Order designating the time and place of any hearing. If a hearing is held, the issue to be considered at such hearing shall be whether this Confirmatory Order should be sustained.

In the absence of any request for hearing, or written approval of an extension of time in which to request a hearing, the provisions specified in Section IV above shall be final 20 days from the date of this Order without further order or proceedings. If an extension of time for requesting a hearing has been approved, the provisions specified in Section IV shall be final when the extension expires if a hearing request has not been received.

An answer or a request for hearing shall not stay the immediate effectiveness of this order.

Dated this 6th day of November, 2007.

For the Nuclear Regulatory Commission.

Leonard D. Wert,

Acting Regional Administrator.

[FR Doc. E7-22389 Filed 11-14-07; 8:45 am]

BILLING CODE 7590-01-P

#### NUCLEAR REGULATORY COMMISSION

[Docket No. 72-26]

#### Notice of Issuance of Addendum to the Supplement to the Environmental Assessment for the Diablo Canyon Independent Spent Fuel Storage Installation

AGENCY: Nuclear Regulatory Commission.

ACTION: Notice of Issuance.

**SUMMARY:** Notice is hereby given that the U.S. Nuclear Regulatory Commission (NRC) is issuing an Addendum to the supplement to the Environmental Assessment (EA) for the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI). NRC issued the EA and initial Finding of No Significant Impact (FONSI) for this action on October 24, 2003, and subsequently issued a license for the Diablo Canyon ISFSI to the Pacific Gas and Electric Company (PG&E), on March 22, 2004. The license authorizes PG&E to receive, possess, store, and transfer spent nuclear fuel and associated radioactive materials resulting from the operation of the Diablo Canyon Power Plant in an ISFSI at the site for a term of 20 years. On August 30, 2007, NRC

issued a supplement to the EA and final FONSI, in response to the June 2, 2006, decision by the United States Court of Appeals for the Ninth Circuit, *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9th Cir. 2006). The supplement to the EA addressed the environmental impacts from potential terrorist acts against the Diablo Canyon ISFSI. The Addendum lists six documents to be added to the list of references provided in the supplement to the EA.

**FOR FURTHER INFORMATION CONTACT:** James R. Hall, Senior Project Manager, Licensing Branch, Division of Spent Fuel Storage and Transportation, Mail Stop EBB-3D-02M, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. Telephone: (301) 492-3319; e-mail: [jrh@nrc.gov](mailto:jrh@nrc.gov).

**SUPPLEMENTARY INFORMATION:** On December 21, 2001, PG&E submitted an application to NRC, requesting a site-specific license to build and operate an ISFSI, to be located on the site of the Diablo Canyon Power Plant, in San Luis Obispo County, California. The NRC staff issued an EA and FONSI for this action on October 24, 2003, in accordance with the National Environmental Policy Act, and in conformance with the applicable requirements of 10 CFR part 51.

On March 22, 2004, the NRC staff issued Materials License No. SNM-2511 to PG&E, pursuant to 10 CFR part 72, authorizing PG&E to receive, possess, store, and transfer spent nuclear fuel and associated radioactive materials resulting from the operation of the Diablo Canyon Power Plant in an ISFSI at the site for a term of 20 years. Subsequently, the San Luis Obispo Mothers for Peace and other parties filed suit in the United States Court of Appeals for the Ninth Circuit, asking that NRC be required to consider terrorist acts in its environmental review associated with this licensing action. In its decision of June 2, 2006, *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9th Cir. 2006), the Ninth Circuit held that NRC could not categorically refuse to consider the consequences of a terrorist attack under NEPA and remanded the case to NRC.

In response to the Ninth Circuit decision, the Commission directed the NRC staff to prepare a revised EA, addressing the likelihood of a terrorist attack at the Diablo Canyon ISFSI site and the potential consequences of such an attack. On May 29, 2007, the NRC staff issued a preliminary supplement to the EA and draft FONSI to address the environmental impacts from potential terrorist acts against the Diablo Canyon

ISFSI. On August 30, 2007, NRC issued the final supplement to the EA and final FONSI for this action. NRC summarized the comments received and responded to those comments in the final supplement to the EA, which also included a list of 14 references. Subsequent to the issuance of the final supplement, the staff determined that certain other documents concerning NRC's generic security assessments should also be included in the list of references. These 6 documents are listed in the Addendum.

Documents related to this action, including the May 29, 2007, preliminary supplement to the EA and draft FONSI; the August 30, 2007, EA supplement and final FONSI; the October 24, 2003, EA; and the Diablo Canyon ISFSI license and supporting documentation, are available electronically, at NRC's Electronic Reading Room, at: <http://www.nrc.gov/reading-rm/adams.html>. From this site, you can access NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents. The ADAMS accession number for the final EA supplement and final FONSI is ML072400511, and the accession number for the Addendum is ML073040434. For the preliminary supplement to the EA and draft FONSI, the accession number is ML071280256. The ADAMS accession number for the October 24, 2003, EA is ML032970337; and for the ISFSI license and related documents, the accession number is ML040780107. If you do not have access to ADAMS, or if there are problems in accessing the documents located in ADAMS, contact NRC's Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to [pdrr@nrc.gov](mailto:pdrr@nrc.gov).

These documents may also be viewed electronically on the public computers located at NRC's PDR, O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, MD 20852. The PDR reproduction contractor will copy documents, for a fee.

Dated at Rockville, Maryland, this 7th day of November, 2007.

For the Nuclear Regulatory Commission.

Robert A. Nelson,

Chief, Licensing Branch, Division of Spent Fuel Storage and Transportation, Office of Nuclear Material Safety and Safeguards.

[FR Doc. E7-22349 Filed 11-14-07; 8:45 am]

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**U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS  
DIVISION OF SPENT FUEL STORAGE AND TRANSPORTATION**

**SUPPLEMENT TO THE ENVIRONMENTAL ASSESSMENT  
AND FINAL FINDING OF NO SIGNIFICANT IMPACT  
RELATED TO THE CONSTRUCTION AND OPERATION OF THE  
DIABLO CANYON INDEPENDENT SPENT FUEL STORAGE INSTALLATION**

**DOCKET NO. 72-26  
PACIFIC GAS AND ELECTRIC COMPANY**

**August 2007**

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**00 056**

**SUPPLEMENT TO THE ENVIRONMENTAL ASSESSMENT  
AND FINAL FINDING OF NO SIGNIFICANT IMPACT  
FOR THE DIABLO CANYON  
INDEPENDENT SPENT FUEL STORAGE INSTALLATION**

**1.0 INTRODUCTION**

The staff of the U.S. Nuclear Regulatory Commission (NRC) has prepared this supplement to the Environmental Assessment (EA) and final Finding of No Significant Impact (FONSI) for the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI), at the direction of the Commission, in response to the June 2006 decision by the United States Court of Appeals for the Ninth Circuit [*San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016, 1028 (9<sup>th</sup> Cir. 2006)]. This supplement to the EA addresses the environmental impacts from potential terrorist acts directed at the Diablo Canyon ISFSI.

**1.1 Description of the Proposed Action**

By letter dated December 21, 2001, the Pacific Gas and Electric Company (PG&E) submitted an application to NRC, requesting a site-specific license to build and operate an ISFSI, to be located on the site of the Diablo Canyon Power Plant, in San Luis Obispo County, California. In accordance with the National Environmental Policy Act (NEPA), the NRC staff issued an EA for this action on October 24, 2003, in conformance with NRC requirements specified in 10 CFR 51.21 and 51.30, and the associated guidance in NRC report NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." The Commission defines an EA in 10 CFR 51.14(a), as a concise public document that briefly provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a FONSI. A FONSI, in turn, is defined as a concise public document that briefly states the reasons why an action will not have a significant effect on the human environment and therefore does not require the preparation of an environmental impact statement [10 CFR 51.14(a)]. Based on the above EA, NRC also issued a FONSI for this action on October 24, 2003.

On March 22, 2004, the NRC staff issued Materials License No. SNM-2511 to PG&E, pursuant to 10 CFR Part 72, authorizing PG&E to receive, possess, store, and transfer spent nuclear fuel and associated radioactive materials resulting from the operation of the Diablo Canyon Power Plant (DCPP) in an ISFSI at the site for a term of 20 years. PG&E has begun construction of the Diablo Canyon ISFSI and currently plans to start transferring spent fuel to the ISFSI in mid-2008.

**1.2 Purpose of this Supplement**

In May 2002, during the NRC licensing review for the Diablo Canyon ISFSI, the San Luis Obispo Mothers for Peace (SLOMFP) and other citizens' groups petitioned NRC to hold a hearing to address a number of contentions. One of these contentions argued that NRC must consider terrorist acts in assessing the environmental impacts of the ISFSI, in order to comply with NEPA. On December 2, 2002, NRC's Atomic Safety and Licensing Board (ASLB) denied

this contention and referred it to the Commission for review. On January 23, 2003, the Commission affirmed the ASLB's denial of the terrorism contention.

After the March 2004, issuance of the Part 72 license for the Diablo Canyon ISFSI, SLOMFP and other parties filed a petition for review in the United States Court of Appeals for the Ninth Circuit, asking that NRC be required to consider terrorist acts in its environmental review associated with this licensing action. In its decision, dated June 2, 2006, *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016, 1028 (9<sup>th</sup> Cir. 2006), the Ninth Circuit held that NRC could not categorically refuse to consider the consequences of a terrorist attack under NEPA and remanded the case to NRC.

In response to the Ninth Circuit decision, the Commission issued a Memorandum and Order on February 26, 2007, directing the NRC staff to prepare a revised EA addressing the likelihood of a terrorist attack at the Diablo Canyon ISFSI site and the potential consequences of such an attack. In response to the Commission's direction, the NRC staff issued a draft supplement to the EA for the Diablo Canyon ISFSI on May 29, 2007. Additionally, the staff published a notice in the Federal Register on May 31, 2007 (72 FR 30398), requesting public review and comment on the supplemental EA and draft Finding of No Significant Impact (FONSI) for the Diablo Canyon ISFSI. The staff's responses to the public comments on the supplemental EA and draft FONSI are provided in the Appendix to this supplement.

### 1.3 Purpose and Need for the Proposed Action

The DCPP, owned and operated by PG&E, consists of two Westinghouse-type pressurized water reactor units, each rated at a nominal 1,100 Megawatts-electric; each unit has its own spent fuel storage pool. The Diablo Canyon ISFSI is needed to provide additional spent fuel storage capacity to ensure that the two DCPP units can continue to generate electricity beyond the time when the storage capacity of the spent fuel pools is reached. The additional temporary spent fuel storage capacity provided by the proposed ISFSI will enable PG&E to operate both units until the current operating licenses expire (September 2021 for Unit 1, and April 2025 for Unit 2).

## 2.0 SUMMARY OF DIABLO CANYON ISFSI EA

On October 24, 2003, the NRC staff issued the EA and FONSI for the construction and operation of the Diablo Canyon ISFSI.

### 2.1 Summary of Impacts Considered in the EA

In the EA, the NRC staff concluded that the construction, operation, and decommissioning of the Diablo Canyon ISFSI will not result in a significant impact on the environment. In reaching this conclusion, the staff considered the impacts from normal operations and from postulated accidents. The staff determined that construction impacts of the ISFSI will be minor, and limited to the small area of the ISFSI site and the excavated-material disposal sites.

The staff also determined that there will be no significant radiological nor non-radiological environmental impacts from routine operation of the ISFSI. The ISFSI is a passive facility; no liquid or gaseous effluents will be released from the storage casks during normal operations. The dose rates to members of the public during normal operations will be limited by the design

of the spent fuel storage casks, so that the cumulative dose to an offsite individual will be a small fraction of the 100 millirem estimated annual dose received from naturally occurring terrestrial and cosmic radiation in the vicinity of the DCP. The impacts from decommissioning the ISFSI, which will not occur until the spent fuel is removed, were determined to be much less than the minor impacts of construction and operation.

For hypothetical accidents, the calculated dose to an individual at the nearest site boundary was found to be well below the 5 rem limit for accidents set forth in 10 CFR 72.106(b) and in the U.S. Environmental Protection Agency's protective action guidelines. The NRC staff did not consider the potential impacts of terrorist acts on the ISFSI in the initial EA.

## 2.2 Summary of Alternatives Considered in the Environmental Assessment

The alternatives PG&E considered, and the NRC staff addressed in its EA, included the shipment of spent fuel offsite, other methods to increase on-site spent fuel storage capacity, and the no-action alternative. In the first category, the alternatives of shipping spent fuel from Diablo Canyon to a permanent Federal Repository, to a reprocessing facility, or to a privately owned spent fuel storage facility were determined to be non-viable alternatives, since no such facilities are currently available in the United States, and shipping the spent fuel overseas is impractical in light of the political, legal, and logistical uncertainties, and the high cost. Shipping the DCP spent fuel to another nuclear power plant was also determined to be a non-viable alternative, because the receiving utility would have to be licensed to store the DCP spent fuel, and it is unlikely that another utility would be willing to accept it, in light of its own limitations on spent fuel storage capacity.

Other on-site storage alternatives PG&E considered included increasing the capacity of the existing spent fuel pools by reracking or spent fuel rod consolidation, or construction of a new spent fuel storage pool. These alternatives were considered infeasible, because of the high costs associated with necessary plant modifications or new construction, coupled with the significantly higher occupational exposures that would result from the extensive fuel-handling operations necessary to support these alternatives.

The no-action alternative could result in the extended or permanent shutdown of both DCP units many years before the expiration date of their current operating licenses, once the current capacities of the units' spent fuel pools are reached. The electrical generation capacity lost would most likely be replaced by fossil-fueled plants, which could result in greater environmental impacts and higher costs for electricity. In the short-term, the shutdown of the DCP would have a negative impact on the local economy and infrastructure. For these reasons, the no-action alternative was not considered a practical alternative.

In the EA, the NRC staff concluded that there are no significant environmental impacts associated with the proposed Diablo Canyon ISFSI, and that other alternatives were not practical or viable, because of a combination of significantly higher costs and significant additional occupational exposure, or the unavailability of off-site storage options. In this supplement to the EA, the NRC staff has considered potential terrorist acts against the ISFSI, and after such consideration, has concluded that the construction and operation of the ISFSI will not result in a significant effect on the human environment.

### 3.0 NRC SECURITY REQUIREMENTS FOR INDEPENDENT SPENT FUEL STORAGE INSTALLATIONS

NRC has established requirements and has initiated several actions designed to provide high assurance that a terrorist attack would not lead to a significant radiological event at an ISFSI. These include: (1) the continual evaluation of the threat environment by NRC, in coordination with the intelligence and law enforcement communities, which provides, in part, the basis for the protective measures currently required; (2) the protective measures that are in place to reduce the chance of an attack that leads to a significant release of radiation; (3) the robust design of dry cask storage systems, which provides substantial resistance to penetration; and (4) NRC security assessments of the potential consequences of terrorist attacks against ISFSIs, that inform the decisions made regarding the types and level of protective measures. Over the past 20 years, there have been no known or suspected attempts to sabotage, or to steal, spent fuel from spent fuel casks at ISFSIs, or to directly attack an ISFSI. Nevertheless, NRC is continually reevaluating the threat environment, to determine whether any specific threat to ISFSIs exists.

#### 3.1 General Security Considerations

In response to terrorist attacks in New York and Washington, DC, on September 11, 2001, and to intelligence information subsequently obtained, the U.S. government initiated nation-wide measures to reduce the threat of terrorism. These measures included numerous security enhancements to prevent terrorists from gaining control of commercial aircraft, such as: (1) more stringent screening of airline passengers and baggage by the Transportation Security Administration; (2) the increased presence of Federal air marshals on many flights; (3) improved training of flight crews; and (4) hardening of aircraft cockpits. Additional measures have been imposed on foreign passenger carriers and domestic and foreign cargo carriers, as well as charter aircraft. Beyond these measures directed at reducing the potential for terrorists to gain control of an aircraft, the Federal government has greatly improved the sharing of intelligence information and the coordination of response actions among Federal, State, and local agencies. NRC has been an active participant in these efforts; it now has regular and frequent communications with other Federal, State, and local government agencies and industry representatives, to discuss and evaluate the current threat environment, to assess the adequacy of security measures implemented at licensed facilities, and, when necessary, to recommend additional actions.

NRC expanded its existing Threat Advisory System after the September 11, 2001, terrorist attacks, to include a broader range of licensees, including ISFSI licensees. NRC has incorporated the threat condition levels used in the Department of Homeland Security's Homeland Security Advisory System into its own Threat Advisory System. The NRC threat assessment staff reviews, analyzes, coordinates, and disseminates threat and intelligence information relevant to its licensees, at both strategic and tactical levels. The threat assessment staff also serves as NRC's liaison and coordination staff with other organizations and agencies, including the intelligence and law enforcement communities. Through these improved coordination and communication functions, NRC is able to efficiently develop and transmit advisories to the appropriate licensees, who are then able to take prompt action. Thus, the broad actions taken by the Federal government and the specific actions taken by NRC since September 11, 2001, have helped to reduce the potential for terrorist attacks against NRC-regulated facilities.

### 3.2 Requirements for ISFSIs

NRC has historically considered the potential impacts of terrorist acts in the development and implementation of its 10 CFR Part 73 security requirements. NRC's strategy for protecting public health and safety and the environment focuses on ensuring that its safety and security requirements, as implemented by licensees, in combination with the design features of dry cask storage systems, are effective in protecting against successful terrorist attacks on ISFSIs.

NRC security requirements for ISFSIs are directed at assuring that terrorists cannot successfully carry out an attack against an ISFSI. These requirements, which apply to on-site security measures, are part of a multi-layered Federal security strategy that also consists of on-going threat assessment, in coordination with other Federal agencies such as the Department of Homeland Security, and measures to identify and preempt potential terrorist attacks. NRC reviews and approves facility security plans, in evaluating the adequacy of these on-site measures. As part of the licensing review for the Diablo Canyon ISFSI, the NRC staff evaluated and approved revisions to the Diablo Canyon site security plan that incorporated features of the proposed ISFSI. In that review, transmitted by letter dated February 4, 2004, the NRC staff determined that the proposed security plan revisions and facility design features met the requirements of Part 73, "Physical Protection of Plants and Materials," which were the same requirements for ISFSIs that were in effect before September 11, 2001. The details of specific security measures for each facility are designated as Safeguards Information, in accordance with Section 147 of the Atomic Energy Act and 10 CFR 73.21, and, for that reason, cannot be released to the public. However, key features of the security programs for ISFSIs include: (1) physical barriers; (2) surveillance; (3) intrusion detection; ~~(4) a response to intrusions;~~ and (5) offsite assistance from local law enforcement agencies, as necessary.

After the September 11 terrorist attacks, the Commission initiated prompt and comprehensive actions to address both immediate and longer-term security measures for NRC-regulated facilities. In the months immediately after the attacks, the Commission issued numerous safeguards and threat advisories to its licensees, to strengthen licensees' capabilities and readiness to respond to a potential attack on a nuclear facility. As part of the longer-term efforts, NRC conducted a comprehensive review of the Agency's security program. This review examined specific threats, such as a land-based vehicle bomb, ground assault with the use of an insider, and water-borne assaults, which have led to the imposition of additional requirements, through orders and rules, affecting many categories of licensees, including ISFSIs.

On October 16, 2002, the Commission issued orders to all licensees of operating ISFSIs to make mandatory the voluntary actions taken by those licensees in response to the Commission's advisories, and to implement additional security enhancements identified in NRC's ongoing comprehensive review of its safeguards and security programs and requirements. This same order, imposing additional security measures, was issued to PG&E, for the Diablo Canyon ISFSI, on May 5, 2005. These measures, which are to be fully implemented before the initial movement of spent fuel to the ISFSI, include: (1) increased security patrols; (2) augmented security forces and weapons; (3) additional security posts; (4) heightened coordination with local law enforcement and military authorities; (5) enhanced screening of personnel; and (6) additional limitations on vehicular access. Collectively, these measures further reduce the already low probability of a successful terrorist attack on an ISFSI, by establishing a substantial deterrent to an attack; by providing high assurance that an

attempted attack could be detected and effectively resisted; and by mitigating the extent of damage and the potential radiological consequences if an attack were successful.

Based on its ongoing consideration of safeguards and security requirements, its review of information provided by the intelligence community, and the implementation of additional security measures at the Nation's ISFSIs, the NRC has high assurance that public health and safety and the environment, and the common defense and security, continue to be adequately protected in the current threat environment.

#### 4.0 CONSIDERATION OF ENVIRONMENTAL (RADIOLOGICAL) IMPACTS FROM TERRORIST ACTS

The NRC staff has considered the potential radiological impacts of terrorist acts on spent fuel storage casks, even though the staff considers the probability of a malevolent act against an ISFSI that results in a significant radiological event to be very low. By design, dry cask storage systems are highly resistant to penetration. To be licensed or certified by NRC, these systems must meet stringent requirements for structural, thermal, shielding, and criticality performance, and confinement integrity, for normal and accident events. Consequently, spent fuel storage casks are extremely robust structures, specifically designed to withstand severe accidents, including the impact of a tornado-generated missile such as a 4000-pound automobile at 126 miles per hour. The massive HI-STORM 100SA storage casks to be used at the Diablo Canyon ISFSI are made of inner and outer cylindrical carbon steel shells, filled with 30 inches of concrete, and weighing up to 170 tons when fully loaded with spent fuel. Each cask surrounds an internal multi-purpose canister, which safely confines the spent fuel in a completely sealed, welded stainless steel cylinder. The spent fuel is further protected by the metallic zircaloy cladding surrounding the fuel pellets in each fuel rod of a spent fuel assembly. Finally, the nuclear fuel itself is in the form of solid ceramic pellets of uranium dioxide; this means that a large amount of the radioactive material would remain in solid form and in the immediate vicinity of the ISFSI, even if a terrorist act were successful in breaching the multiple layers of protection. Thus, only a small fraction of the radioactive material released would be in the dispersible form of fine particulate material or radioactive gases with the potential to be transported offsite. Also, the location and low profile of the Diablo Canyon ISFSI make it a difficult target for a large commercial airliner. Based on these facts, and the results of the security assessments of ISFSIs (discussed below), NRC has determined that the current design features and additional security measures in place provide high assurance that the spent fuel stored in an ISFSI is adequately protected.

Because of the uncertainty inherent in assessing the likelihood of a terrorist attack, NRC recognizes that, under general credible threat conditions, although the probability of such an attack is believed to be low, it cannot be reliably quantified. NRC has adopted an approach that focuses on ensuring that the safety and security requirements, and other security measures, are adequate and effective in countering and mitigating the effects of terrorist attacks against dry cask storage systems. To provide high assurance that a terrorist act will not lead to significant radiological consequences, NRC has analyzed plausible threat scenarios and required enhanced security measures to protect against the threats, and has developed emergency planning requirements, which could mitigate potential consequences for certain scenarios. As stated above, all these actions have been taken without regard to the probability of an attack. This protective strategy reduces the risk from a terrorist attack to an acceptable level.

Following issuance of the 2002 security orders for ISFSIs, NRC used a security assessment framework as a screening and assessment tool to determine whether additional security measures, beyond those required by regulation and the security orders, were warranted for NRC-regulated facilities, including ISFSIs. Initially, NRC screened threat scenarios to determine plausibility. This screening was informed by information gathered through NRC's regular interactions with the law enforcement and intelligence communities. For those scenarios deemed plausible, NRC assessed the attractiveness of the facility to attack by taking into account factors such as iconic value, complexity of planning required, resources needed, execution risk, and public protective measures. Separately, NRC made conservative assessments of consequences, to assess the potential for early fatalities from radiological impacts from those plausible scenarios. NRC then looked at the combined effect of the attractiveness and the consequence analyses, to determine whether additional security measures for ISFSIs were necessary.

In conducting the security assessments for ISFSIs, NRC chose several spent fuel storage cask designs that were representative of most currently NRC-certified designs. Plausible threat scenarios considered in the generic security assessments for ISFSIs included a large aircraft impact similar in magnitude to the attacks of September 11, 2001, and ground assaults using expanded adversary characteristics consistent with the design basis threat for radiological sabotage for nuclear power plants. The resulting generic assessments formed the basis for NRC's conclusion that there was no need for further security measures at ISFSIs beyond those currently required by regulation and imposed by orders issued after September 11, 2001.

The NRC staff reviewed the analyses done for the ISFSI security assessments, and compared the assumptions used in these generic assessments to the relevant features of the Diablo Canyon ISFSI. Based on this comparison, the staff determined that the assumptions used in these generic security assessments, regarding the storage cask design, the source term (amount of radioactive material released), and the atmospheric dispersion, were representative, and in some cases, conservative, relative to the actual conditions at the Diablo Canyon ISFSI. In fact, because of the specific characteristics of the spent fuel authorized for storage at the Diablo Canyon ISFSI (lower burnup fuel), and the greater degree of dispersion of airborne radioactive material likely to occur at the site, any dose to affected residents nearest to the Diablo Canyon site calculated using site-specific parameters will be much lower than doses calculated using the assumptions made for the generic assessments. More specifically, NRC staff performed a dose calculation using source term and meteorology inputs from the generic assessments. This resulted in a projected dose of less than 5 rem for the nearest resident. Using the Diablo Canyon site-specific meteorology, as opposed to the generic meteorology, reduces the projected dose consequences by a factor of 10 to 100. Use of a site-specific source term for the Diablo Canyon spent fuel would reduce this projected dose even further. Based on these considerations, the dose to the nearest affected resident, from even the most severe plausible threat scenarios – the ground assault and aircraft impact scenarios discussed above – would likely be well below 5 rem. In many scenarios, the hypothetical dose to an individual in the affected population could be substantially less than 5 rem, or none at all. In some situations, emergency planning and response actions could provide an additional measure of protection to help mitigate the consequences, in the unlikely event that an attack were attempted at the Diablo Canyon ISFSI.

## 5.0 AGENCIES AND PERSONS CONSULTED

No additional consultations with outside agencies or persons were conducted in the development of this supplement to the EA. Comments submitted from state governmental agencies, citizens organizations, and members of the public in response to the issuance of the draft supplement have been considered by the NRC staff in preparation of this final supplement to the EA. Those comments and the staff's responses are summarized in the Appendix to this supplement. It should be noted, as discussed in Section 3.1 of this EA, that NRC interacts continuously and extensively with many Federal, State, and local agencies on a broad range of security matters, and will continue to do so.

## 6.0 CONCLUSION

The NRC staff concludes that the construction, operation, and decommissioning of the Diablo Canyon ISFSI, even when potential terrorist attacks on the facility are considered, will not result in a significant effect on the human environment. NRC security requirements, imposed through regulations and orders, and implemented through the licensee's security plans, in combination with the design requirements for dry cask storage systems, provide adequate protection against successful terrorist attacks on ISFSIs. Therefore, a terrorist attack that would result in a significant release of radiation affecting the public is not reasonably expected to occur.

## 7.0 FINAL FINDING OF NO SIGNIFICANT IMPACT

The environmental impacts of the proposed action, namely, the approval of a site-specific license to build and operate an ISFSI, to be located on the site of the DCCP, in San Luis Obispo County, California, have been reviewed in accordance with the requirements of 10 CFR Part 51. As set forth in the Supplement to the Environmental Assessment above (which this final finding incorporates by reference), NRC has considered the potential for terrorist attacks on the facility, and has determined that the storage of spent nuclear fuel at the Diablo Canyon ISFSI will not have a significant effect on the quality of the human environment, based on the facility design features and the mitigative security measures incorporated as part of the NRC licensing action and in response to NRC security orders. These design features and mitigative security measures will provide high assurance that substantial environmental impacts will be avoided and thereby reduced to a non-significant risk level. Therefore, in accordance with 10 CFR 51.31, NRC has determined that this action does not warrant the preparation of an Environmental Impact Statement, and has further determined that a final Finding of No Significant Impact is appropriate. A Notice of availability of this supplement to the EA and final FONSI will be published in the *Federal Register*.

Documents related to this action, including the original Diablo Canyon ISFSI EA and FONSI, and the Diablo Canyon ISFSI license, are available electronically at NRC's Electronic Reading Room at <http://www.nrc.gov/reading-rm/adams.html>. From this site, you can access NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents. The ADAMS accession number for the Diablo Canyon ISFSI EA is ML032970337, and for the ISFSI license and related documents, the number is ML040780107. If you do not have access to ADAMS, or if there are problems in accessing the documents located in ADAMS, contact NRC's Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737, or by e-mail, to [pdr@nrc.gov](mailto:pdr@nrc.gov). These documents may also be viewed electronically on the public computers located at NRC's PDR, O1-F21, One White Flint

North, 11555 Rockville Pike, Rockville, MD 20852. The PDR reproduction contractor will copy documents for a fee.

#### 8.0 REFERENCES

1. "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." NUREG-1748. U.S. Nuclear Regulatory Commission. August 2003.
2. *Environmental Assessment and Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (TAC No. L23399)*. U.S. Nuclear Regulatory Commission. October 24, 2003. NRC ADAMS Accession No. ML032970337.
3. *Issuance of Materials License No. SNM-2511 for the Diablo Canyon Independent Spent Fuel Storage Installation (TAC No. L23399)*. U.S. Nuclear Regulatory Commission. March 22, 2004. NRC ADAMS Accession No. ML040780107.
4. Diablo Canyon Independent Spent Fuel Storage Installation License Application - Environmental Report, PG&E. December 2001 and Amendment 1, October 2002. NRC ADAMS Accession Nos. ML020180196, ML020180173, and ML022950304 (p.150-186).
5. Nuclear Reactors, Materials, and Waste Sector Critical Infrastructure and Key Resources Sector-Specific Plan as input to the National Infrastructure Protection Plan, May 2007.
6. Orders Requiring Implementation of Additional Security Measures (ASMs) for the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI) dated May 5, 2005. (Orders are **unclassified**; the attached ASMs are designated **SAFEGUARDS INFORMATION**.)
7. "Results of a Large Airplane Impact into a Field of Holtec HI-STORM Spent Nuclear Fuel Storage Casks." Smith, J.A., et al. Sandia National Laboratories, Albuquerque, NM. 2004. (This document is **classified CONFIDENTIAL National Security Information**.)
8. "Response of the HI-STORM Spent Nuclear Fuel Storage Cask to a Large Explosive Charge Blast." Kipp, M.E., et al. Sandia National Laboratories, Albuquerque, NM. 2004. (This document is **classified CONFIDENTIAL National Security Information**.)
9. "NRC Spent Fuel Source Term Guidance Document." Yoshimura, R.H., et al. Sandia National Laboratories, Albuquerque, NM 2004. (This document is **classified CONFIDENTIAL National Security Information**.)
10. Design Basis Threat, Final Rule, 10 CFR Part 73, USNRC, dated March 13, 2007.

11. U.S. Nuclear Regulatory Commission Report to Congress on the National Academy of Sciences Study on the Safety and Security of Commercial Spent Nuclear Fuel Storage, dated March 2005.
12. Nuclear Regulatory Commission (NRC) Review of "Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States," dated August 19, 2003.
13. "Protecting Our Nation – Since 9-11-01," U.S. Nuclear Regulatory Commission, NUREG/BR-0314, September 2004.
14. Homann, S.G., 1994: HOTSPOT Health Physics Codes for the PC, UCRL-MA-106315, Lawrence Livermore National Laboratory, California.

**APPENDIX  
PUBLIC COMMENTS ON THE SUPPLEMENT TO THE  
ENVIRONMENTAL ASSESSMENT FOR THE DIABLO CANYON ISFSI**

**Background:**

The U.S. Nuclear Regulatory Commission (NRC) staff published a notice in the Federal Register on May 31, 2007 (72 FR 30398), requesting public review and comment on the supplement to the Environmental Assessment (EA) and draft Finding of No Significant Impact (FONSI) for the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI). As described in the notice, the NRC issued this supplemental EA to address the environmental impacts from potential terrorist acts against the Diablo Canyon ISFSI. The notice established July 2, 2007, as the deadline for submitting public comments on the supplemental EA and draft FONSI. Approximately 32 individual comment documents (i.e., letters, facsimiles, and e-mails) were received by the NRC.

In the public notice, the NRC staff provided a summary of the supplemental EA and draft FONSI, as well as information on how to access or obtain copies of the document. An electronic version of the supplemental EA and draft FONSI, and background information (e.g., the NRC staff's initial EA for the Diablo Canyon ISFSI) were made accessible through the NRC's web site at (<http://www.nrc.gov/waste/spent-fuel-storage/diablo-canyon-isfsi.html>) and through the NRC's Agencywide Documents Access and Management System (ADAMS) database on the NRC's web site. The Diablo Canyon ISFSI web page also provides a listing of all public comments received, which are available through ADAMS.

**Comment Review:**

The NRC staff reviewed each comment document and considered whether the comments warranted a revision to the supplemental EA. Of the 32 comment documents received, 12 were nearly identical letters, and many other comments related to the same issues raised in those letters. As a result, the staff has grouped the comments on similar topics and issues together, and developed 17 general comment areas. This appendix identifies each of these 17 general comment areas, along with the NRC staff's corresponding responses. If a comment has prompted the staff to revise the supplemental EA, that is noted in the staff's response. In cases where a comment does not warrant a detailed response, the NRC staff provides an explanation as to why no further response is necessary. The NRC staff considered all comments received during the public comment period. One additional comment was received on July 31, 2007; it was essentially identical to the 12 nearly identical letters previously received.

**Major Issues and Topics of Concern:**

The majority of the comments received specifically addressed the reviews, analyses, and issues contained in the supplemental EA, including security, safety, and the NRC's environmental review process. A number of commenters were concerned about the quality of the EA supplement and its findings; most disagreed with the FONSI and stated that an Environmental Impact Statement (EIS) should be prepared; one commenter agreed with the FONSI. Several other comments addressed topics and issues that were not part of the review

process for the proposed action. These included comments about the U.S. government's policies regarding terrorism; radiological and other environmental impacts and vulnerabilities of nuclear power plants and spent fuel pools; emergency planning concerns not unique to the Diablo Canyon ISFSI; and the potential for storage of spent fuel from other sites (which would require a separate NRC licensing action and its associated environmental review). Because these issues did not directly relate to the environmental effects of the proposed action and were outside the scope of the NEPA review of the proposed action, the NRC staff did not prepare detailed responses to these comments.

Summarized below are the comments and NRC responses. The complete comment letters are available as a matter of public record from NRC's public document room, which is accessible online at <http://www.nrc.gov/reading-rm/adams/web-based.html>. Select the "Begin ADAMS Search" link. Type in the accession number for the desired document from the table below in the Search box, and select "Search." Table 1 provides a list of the public comments received during the supplemental EA comment period and the ADAMS Accession Number for each document. Alternatively, these comments can be accessed from the same table on the NRC's web page at: <http://www.nrc.gov/waste/spent-fuel-storage/diablo-canyon-isfsi.html>, by clicking on the highlighted accession number for the desired document.

**Table 1: Public Comments Received on the May 29, 2007, Supplemental Environmental Assessment for the Diablo Canyon Independent Spent Fuel Storage Installation**

Comment Number	NAME	Affiliation	ADAMS Accession Number
1	Jill ZamEk	Member of the Public	ML071780044
2	Cheryl VonderAhe	Member of the Public	ML071780048
3	Richard Keller	Member of the Public	ML071780050
4	Lynne Harkins	Member of the Public	ML071780051
5	Russell Hodin	Member of the Public	ML071780053
6	Steven Zamek	Member of the Public	ML071780054
7	Frances Scafidi	Member of the Public	ML071780055
8	Mark R. Phillips	Member of the Public	ML071780056
9	Jordan Ek	Member of the Public	ML071780060
10	Sherri Danoff (Gooding)	<b>Avila Valley Advisory Council</b>	ML071780057
11	Henriette Groot	Member of the Public	ML071780061
12	June Cochran	Member of the Public	ML071780065

<b>Comment Number</b>	<b>NAME</b>	<b>Affiliation</b>	<b>ADAMS Accession Number</b>
13	Judith B. Evered	Member of the Public	ML071780066
14	Barbara Scott	Member of the Public	ML071830445
15	Susan Biesek	Member of the Public	ML071830447
16	Gene A. and Linda C. Nelson	Members of the Public	ML071830448
17	Betty McElhill	Member of the Public	ML071830453
18	Robert R. Loux Joseph C. Strolin	<b>State of Nevada</b>	ML071870031
19	Michele Boyd	<b>Public Citizen</b>	ML071870032
20	Elie Axelroth	Member of the Public	ML071870033
21	Marina Bethlenfalvay	Member of the Public	ML071870036
22	Diane Curran	<b>San Luis Obispo Mothers For Peace</b>	ML071870143
23	Dianne R. Nielson Denise Chancellor	<b>State of Utah</b>	ML071870037
24	Lucy J. Swanson	Member of the Public	ML071870038
25	Joseph Mangano	<b>Radiation and the Public Health Project</b>	ML071870039
26	Phillip Musegaas	<b>Riverkeeper, Inc.</b>	ML071870135
27	Loulena Miles	<b>Tri-Valley CAREs</b>	ML071870137
28	Kevin Kamps	<b>Nuclear Information and Resource Service</b>	ML071870138
29	Linda Gunter	<b>Beyond Nuclear/ Nuclear Policy Research Institute</b>	ML071870140
30	Rochelle Becker	<b>Alliance for Nuclear Responsibility</b>	ML071870142
31	Rochelle Becker	<b>Alliance for Nuclear Responsibility</b>	ML071870146
32	Andrew Christie	<b>Sierra Club</b>	ML071870149

**Comments and Responses:**

**Comment 1:** Commenters stated that the supplement to the EA does not meet National Environmental Policy Act (NEPA) requirements, expressing their belief that the supplement was simplistic and inadequate. Commenters cited concerns that no analysis was done by the staff specifically for the supplement, that the discussion is overly generic, and that the source term (released material) is not disclosed in the supplement. The commenters also stated that the staff should have identified the sources or references for its conclusions and consulted with other agencies.

**NRC Response:**

The original EA issued for the Diablo Canyon ISFSI addressed all environmental impacts with the exception of those potentially resulting from terrorism. Therefore, the supplement alone is not intended to comply with all NEPA requirements; the supplement must be read in conjunction with the original EA. The supplement addressing terrorism is premised on analyses of the potential consequences of a terrorist attack on an ISFSI. The staff cannot provide specific details of the analyses (such as the source term used), nor the supporting background documents, due to the sensitive nature of the information. However, some of these reference documents have been listed in the final EA supplement in response to these comments (and are also listed at the end of this appendix). These analyses were begun following the September 2001, terrorist attacks to evaluate whether the existing security requirements and the security measures subsequently imposed by orders were sufficient to provide adequate protection against successful terrorist attacks on nuclear facilities. These analyses, which are the security assessments referred to in the EA, were begun in 2002 and completed in 2006, when the NRC determined that the security measures (imposed by regulations and orders) in place for ISFSIs were adequate.

The ISFSI security assessments are not "one time only" assessments. The NRC has a Commission-approved process to re-assess ISFSI security to address a number of different factors, including (but not limited to) the receipt of a new application for or an amendment to a license or certificate, an occurrence of a relevant operating or security event, and/or a change in the current threat environment. The NRC is continually assessing the threat environment and assessing whether additional security measures are warranted. This process involves continual coordination with other agencies, such as the Department of Homeland Security (DHS). While NRC did not specifically consult with DHS or other agencies on the particular matters addressed in the Diablo Canyon ISFSI supplemental EA, the supplement was provided for public comment and was available to other government agencies. Further, it should be noted that the NRC did engage in consultation with other agencies, including the California Energy Commission, the California Office of Historic Preservation and the U.S. Fish and Wildlife Service, in developing the original EA regarding the Diablo Canyon ISFSI.

In developing the EA supplement, the staff relied on the generic ISFSI security assessment information and also performed specific analyses to account for Diablo Canyon site-specific characteristics. The specific threat scenarios and source terms analyzed are sensitive information that cannot be disclosed publicly. The staff's analyses comply with the requirements of NEPA to the extent possible without divulging sensitive or Classified Information.

**Comment 2:** Commenters stated that the methodology used by the NRC to identify all reasonably foreseeable impacts has not been sufficiently explained, that terms used in the EA, such as "plausible," are not adequately defined, and that the supplement relies on unjustified assumptions.

**NRC Response:**

The details of the NRC's security assessments cannot be disclosed publicly because of the sensitive nature of the information. However, general information about the manner in which the security assessments were performed may be, and was, disclosed (see Section 4.0 in the EA supplement). The threat scenarios considered in the security assessments were selected by NRC, based on intelligence information regarding trends and actual, demonstrated capabilities of potential adversaries, gathered through regular consultations with federal and law enforcement agencies, and the intelligence community. Scenarios which were deemed not reasonable (i.e., not "plausible") based on this information were excluded from further analysis in the security assessments.

**Comment 3:** Commenters stated that the supplement did not provide a sufficient basis for not preparing an Environmental Impact Statement (EIS). One commenter expressed concern that the approach taken in staff's EA will establish a precedent for the manner in which the staff will approach the assessment of terrorism impacts for Yucca Mountain.

**NRC Response:**

The NRC requirements at 10 CFR Part 51, "Environmental Protection Regulations for Domestic Licensing and Related Regulatory Functions," require that an Environmental Impact Statement be prepared for licensing actions that (1) constitute a major federal action significantly affecting the environment, or (2) the Commission has determined should be covered by an EIS (10 CFR 51.20). For actions such as this one, which do not meet either criterion, an Environmental Assessment (EA) is prepared, unless the action falls within the scope of a categorical exclusion as provided in 10 CFR 51.22. When an EA is prepared, there are two possible outcomes: A Finding of No Significant Impact (FONSI), or, the determination that there may be significant environmental impacts, which then requires preparation of an EIS. Simply stated, the EA can be viewed as the first (and possibly only) step in conducting the NRC's environmental review. NRC regulations at 10 CFR 51.31 state, "Upon completion of an environmental assessment, the appropriate NRC staff director will determine whether to prepare an environmental impact statement or a finding of no significant impact on the proposed action." Because the staff determined in the initial EA for this action, and in the supplemental EA regarding terrorist acts, that there would not be any significant environmental impacts from the construction, operation, and decommissioning of the Diablo Canyon ISFSI, the staff did not prepare an EIS.

The staff's environmental review of other licensing actions is separate from and independent of the specific review for the Diablo Canyon ISFSI. The NRC's environmental review for the Yucca Mountain license application, if an application is submitted, will be performed in accordance with the requirements of the Nuclear Waste Policy Act and 10 CFR Part 63. Under

the NWPA, any EIS prepared by DOE must be adopted by the Commission to the extent practicable.

**Comment 4:** Many commenters indicated that the EA supplement fails to consider broader credible terrorist scenarios having significant environmental impacts, such as a general aviation, bomb-laden aircraft, adversaries using TOW missiles, and a jet fuel fire.

**NRC Response:**

NRC's choice of scenarios was informed by information gathered through NRC's regular interactions with the law enforcement and intelligence communities, as mentioned in Section 3.1 of the EA supplement. The specific scenarios considered cannot be publicly disclosed, beyond the description in Section 4.0 of the EA supplement, due to the sensitive nature of the information.

**Comment 5:** Several commenters indicated that they felt the EA supplement failed to address impacts other than early fatalities. The impacts that these commenters wanted to see addressed included land contamination, illness, delayed fatalities, cleanup cost, doses to workers and emergency responders, emergency evacuation, and effects on the economy and infrastructure.

**NRC Response:**

As explained in the EA supplement, the staff has determined the probability of a successful terrorist attack (i.e., one which results in a significant radiological event), to be very low. Specifically, actions taken since September 11, 2001, both diminish the probability of an attack occurring at nuclear facilities and enhance the response capabilities if an attack were to occur. Further, the probability of such an attack being effectively carried out and leading to a significant radiological event is even lower. Based on this reasoning and the staff's consequence analysis, the staff considers there to be no significant environmental impacts from terrorist acts against the Diablo Canyon ISFSI. This approach, in which the staff assesses the significance of environmental impacts based on the probability of occurrence, is consistent with the manner in which the NRC evaluates the impacts of accidents in environmental analyses. To clear up some apparent confusion, the EA supplement did not consider early fatalities as a measure of environmental impact. For the EA supplement, the staff performed a dose assessment that used a source term derived from the security assessment work, which was based on a hypothetical release resulting from a terrorist attack. The staff also assumed national average meteorological conditions in making an initial estimate of the dose at the location of the nearest resident. Then, the staff applied Diablo Canyon site-specific dispersion parameters, to generate a dose estimate to the nearest resident that was more representative of the actual conditions at the site. That revised dose estimate was used by the staff in assessing environmental impact. The EA supplement has been revised to help clarify this point.

**Comment 6:** Some commenters stated that the EA supplement fails to address the Department of Homeland Security's (DHS) National Infrastructure Protection Plan (NIPP)

**NRC Response:**

DHS's National Infrastructure Protection Plan (NIPP) does not impose requirements on participating agencies regarding specific NEPA analyses. As described in the EA supplement, NRC continues to coordinate extensively with DHS, other federal agencies, state and local governments, the private sector, and international partners in developing a framework for reducing risk, fostering cooperation and information sharing related to nuclear Sector Specific Plans (components of the broader NIPP). Therefore, NRC's participation in the NIPP serves, in part, as an ongoing assessment of the adequacy of the Agency's security requirements and programs, which will continue to inform NRC's policy decisions and actions in this area.

**Comment 7:** Some commenters stated that the EA supplement fails to address cumulative environmental impacts of fuel stored in the spent fuel pool (SFP). One commenter stated that the SFPs at Diablo Canyon should be reconfigured to reduce the density of the stored spent fuel assemblies.

**NRC Response:**

Cumulative impact is defined as "the impact on the environment which results from the incremental impact of the action, when added to other past, present, and reasonably foreseeable future actions...." (40 CFR 1508.7). The staff previously considered the cumulative impacts of the ISFSI and reactor operation in the original EA (Section 5.4), concluding that, "The impact of the proposed Diablo Canyon ISFSI, when combined with previously evaluated effects from the Diablo Canyon Power Plant, is not anticipated to result in any significant cumulative impact at the site." The environmental impacts of reactor operation, including those resulting from potential events involving the spent fuel pool, were addressed in the Final Environmental Statement (FES) issued as part of the original licensing process for the Diablo Canyon reactors. Because the staff has determined in the supplemental EA that, based on the overall risk, there would not be any significant environmental impacts resulting from terrorist acts against the ISFSI, the staff's previous determination is unchanged. The question of whether the spent fuel pool at the reactor should be reconfigured to reduce the density of the assemblies in the pool is not a matter within the scope of this NEPA review for the ISFSI. The environmental review for the current configuration was conducted during the staff's review of the operating reactor license amendment that authorized the current density of assemblies in the spent fuel pool.

**Comment 8:** A few commenters indicated that the EA supplement does not adequately address emergency planning concerns. One commenter expressed concern regarding emergency evacuation routes in the community of Avila Beach, due to limited roads, ongoing construction, and a large tourist population. A few commenters requested an explanation of the emergency planning actions that are credited for mitigating impacts in the EA supplement.

**NRC Response:**

The issues raised, including the adequacy of evacuation routes, concern the emergency plan for the entire Diablo Canyon site, and are therefore beyond the scope of the staff's NEPA review for the ISFSI. The NRC reviews and approves emergency plans for reactor sites in its review of operating license applications. In accordance with NRC regulations, because the

Diablo Canyon ISFSI is located at the same site as an operating reactor, the previously-approved emergency plan for that reactor site also applies to the ISFSI. As discussed in NRC's March 22, 2004, safety evaluation report, the staff reviewed the proposed changes to the Diablo Canyon emergency plan to incorporate the ISFSI, and found that the revised plan provides reasonable assurance that facility personnel will be able to respond appropriately to any emergency conditions associated with the Diablo Canyon ISFSI. In general, emergency planning issues are considered in the staff's safety reviews and not in the staff's environmental reviews.

The EA supplement does not take credit for emergency planning actions in determining the radiological impact on nearby residents, but merely indicates that emergency planning and response actions could further mitigate (i.e., reduce) impacts in some situations.

**Comment 9:** Several commenters indicated that the EA supplement does not address alternatives; including design changes to the ISFSI.

**NRC Response:**

The NRC's requirements at 10 CFR 51.30(a)(1)(ii) require that an EA include "alternatives as required by Section 102(2)(E) of NEPA," which states that "all agencies of the Federal Government shall study, develop, and describe appropriate alternatives to recommended courses of action in any proposal which involves unresolved conflicts concerning alternative uses of available resources." NRC staff guidance further clarifies this by stating, "alternatives should be considered in an EA (i) if there is some identifiable environmental impact from the proposed action, and (ii) if the objective of the proposed action can be achieved in one of two or more ways that will have differing impacts on the environment. For those actions involving a very small impact, it is reasonable to consider a very limited range of alternatives....At a minimum, the no-action alternative must be addressed," NUREG-1748, Section 3.4.4.

The staff's original EA for the Diablo Canyon ISFSI did consider the no action alternative, and included a discussion of both siting and design alternatives, including several different locations on the DCCP site for the ISFSI. Design alternatives considered included re-racking the spent fuel pools with higher density fuel racks, consolidating spent fuel rods, building a new spent fuel storage pool, and others. The alternatives considered, including off-site shipment of spent fuel, are summarized in Section 2.2 of the EA supplement, and discussed more fully in Section 3.0 of the original EA. The staff's original EA also described PG&E's consideration of several different spent fuel dry cask storage systems. Thus, the staff concludes that the EA sufficiently covered consideration of alternatives.

**Comment 10:** One commenter indicated that the supplemental EA implies that security requirements for ISFSIs have not been upgraded post-9/11.

**NRC Response:**

NRC ISFSI security requirements have been upgraded since the events of September 11, 2001. As stated in Section 3.2 of the supplemental EA, PG&E was issued an Order imposing Additional Security Measures (ASMs) for the Diablo Canyon ISFSI on May 5, 2005. PG&E must implement all required ASMs prior to any spent fuel being moved to the ISFSI. NRC will review

and approve any changes to the site Physical Security Plan, as necessary, and will verify implementation of the revised plan by conducting on-site inspections. The detailed ASMs issued to PG&E for the Diablo Canyon ISFSI are designated as SAFEGUARDS INFORMATION (SGI), and are therefore not available to the public.

**Comment 11:** One commenter indicated that the EA supplement is inconsistent when it states in one place that the probability of an attack cannot readily be quantified, but later states that this protective strategy reduces the risk to an acceptable level.

**NRC Response:**

The staff does not view these statements as inconsistent. As discussed in Section 4.0 of the EA Supplement, while the probability of an attack cannot be reliably quantified, NRC has implemented measures that provide high assurance that a terrorist act will not lead to significant radiological consequences. Thus the risk, which considers both the likelihood of a successful attack and the potential radiological consequences, can be qualitatively assessed to be acceptable.

**Comment 12:** A few commenters indicated that the EA supplement fails to consider all activities related to spent fuel storage in the ISFSI, including the need for continued storage beyond the life-expectancy of the casks, the transportation of spent fuel, and the potential for storage of spent fuel originating at other nuclear power plants.

**NRC Response:**

The original and supplemental EA examine the impacts of the proposed licensing action, specifically for the construction and operation of an ISFSI at DCP, for a period not to exceed 20 years (the term of the ISFSI license). In addition, the EA considers cumulative impacts from the operating reactor and the spent fuel storage pool (see the response to comment 7), but consideration of spent nuclear fuel from other sites is beyond the scope of the NEPA review for this licensing action. The environmental impacts of offsite transportation of all of the Diablo Canyon spent fuel have been specifically addressed in the previous environmental reviews for initial plant licensing (FES) and for subsequent license amendments for the DCP, and in other NRC environmental reviews related to spent fuel transportation. Onsite transfer of spent fuel was among the activities evaluated in the staff's safety review of the ISFSI license application, as discussed in the NRC's March 22, 2004, safety evaluation report.

**Comment 13:** One commenter expressed support for the NRC staff's FONSI determination.

**NRC Response:**

This comment did not question the adequacy of the staff's review, nor request additional analyses or clarification, therefore no response is required.

**Comment 14:** A few commenters stated that the casks are not full-scale tested, nor licensed to withstand an attack, and that the cask design provides inadequate protection against terrorist acts.

**NRC Response:**

Spent fuel casks are subject to comprehensive regulatory requirements intended to ensure the integrity of the spent fuel. All cask designs are subject to extensive review by the NRC as part of the approval process. Although full-scale testing is not required, state-of-the-art computer modeling is used by applicants, and independently verified by NRC, to perform detailed analyses of cask behavior when subjected to a spectrum of postulated events. This process ensures that the casks are robust. The license conditions and security measures for the Diablo Canyon ISFSI ensure that the casks will be under continual surveillance. To mitigate the possibility of a successful attack on storage casks, multiple layers of security measures are provided (dual fences, alarms, closed circuit television cameras, appropriately trained and equipped security guards, patrols, agreements with local law enforcement agencies, etc.). The combination of the spent fuel casks' robust design features and the enhanced security measures in effect at ISFSIs provide the necessary level of protection needed to mitigate a potential terrorist attack.

**Comment 15:** One commenter indicated that NRC security regulations and orders for ISFSIs provide insufficient protection to mitigate environmental consequences. The commenter noted that ISFSIs are not required to protect against the malevolent use of an airborne vehicle.

**NRC Response:**

As discussed in the supplemental EA, the staff did consider malevolent use of an airborne vehicle in its security assessments for ISFSIs and in its analysis performed in the supplemental EA, even though licensees are not required to protect against such a scenario. NRC issued an Order imposing additional security measures for the Diablo Canyon ISFSI to PG&E on May 5, 2005. These security measures provide high assurance that ISFSIs are adequately protected against plausible threat scenarios, and that an attempted attack on the Diablo Canyon ISFSI will not result in a significant radiological event. The security assessments confirmed the adequacy of the current safety and security measures in place for ISFSIs.

**Comment 16:** Two commenters requested an extension to the 30-day comment period for the supplemental EA. One of these stated that the deadline should be extended for at least 30 additional days, and suggested that area residents did not receive adequate notice of the opportunity to comment. This commenter further stated that a public hearing should occur within the extended public comment deadline so that the community will have an opportunity to learn about this important project firsthand. The second commenter requested an extension of two additional months to the comment period, given the vital safety, security, and environmental issues the DCNPP ISFSI proposal raises.

**NRC Response:**

The NRC published a "Notice of Availability of Supplement to the Environmental Assessment and Draft Finding of No Significant Impact for the Diablo Canyon Independent Spent Fuel Storage Installation" in the Federal Register on May 31, 2007. In addition, the NRC provided electronic access to the Notice and to the supplemental EA and Draft FONSI on its public website. The NRC issued a press release on May 29, 2007, announcing the issuance of the Notice and the supplemental EA and the opportunity to provide comments, and the story was

covered by the local news media in the San Luis Obispo area. The process for providing comments in response to the Notice was also described at a public meeting held by NRC in San Luis Obispo, California, on June 26, 2007.

The Notice indicated that the NRC staff would consider comments submitted after the 30-day period, if it was practical to do so. Only one late-submitted comment was received by the staff, on July 31, 2007, and that comment was essentially identical to several previous comments. Therefore, the staff believes that adequate notice and opportunity to submit comments were provided.

**Comment 17:** One commenter indicated that there is an apparent contradiction between statements in the EA supplement regarding dispersion of radioactive material. The commenter cited the statements that, in the event of an attack breaching the casks, "a large amount of the radioactive material would remain in solid form and would not be dispersed beyond the immediate vicinity of the ISFSI," and the observation of "the greater degree of dispersion of airborne radioactive material likely to occur at the site."

**NRC Response:**

The staff does not believe that the statements are contradictory. The staff maintains that for a postulated scenario where the multiple barriers protecting the spent fuel are breached, most of the radioactive material released would be in solid form, locally deposited in the immediate area of the ISFSI. Only a small fraction of the radioactive material released would be in the form of fine particulate material able to be suspended in air, or in the form of radioactive gases. The atmospheric dispersion factors for the Diablo Canyon site would result in greater dispersion (i.e., greater dilution) for the fine particulates that become airborne and for gases than the dispersion factors used in the NRC's generic analyses, thus any estimated dose to a member of the public would be lower than for the generic analyses. The EA supplement has been revised to help clarify this point.

**REFERENCES**

1. "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." NUREG-1748. U.S. Nuclear Regulatory Commission. August 2003.
2. *Environmental Assessment and Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (TAC No. L23399)*; U.S. Nuclear Regulatory Commission. October 24, 2003. NRC ADAMS Accession No. ML032970337.
3. *Issuance of Materials License No. SNM-2511 for the Diablo Canyon Independent Spent Fuel Storage Installation (TAC No. L23399)*. U.S. Nuclear Regulatory Commission. March 22, 2004. NRC ADAMS Accession No. ML040780107.
4. Nuclear Reactors, Materials, and Waste Sector Critical Infrastructure and Key Resources Sector-Specific Plan as input to the National Infrastructure Protection Plan, May 2007.

5. Orders Requiring Implementation of Additional Security Measures (ASMs) for the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI) dated May 5, 2005. (Orders are **unclassified**; the attached ASMs are designated **SAFEGUARDS INFORMATION**.)
6. "Results of a Large Airplane Impact into a Field of Holtec HI-STORM Spent Nuclear Fuel Storage Casks." Smith, J.A., et al. Sandia National Laboratories, Albuquerque, NM. 2004. (This document is **classified CONFIDENTIAL National Security Information**.)
7. "Response of the HI-STORM Spent Nuclear Fuel Storage Cask to a Large Explosive Charge Blast." Kipp, M.E., et al. Sandia National Laboratories, Albuquerque, NM. 2004. (This document is **classified CONFIDENTIAL National Security Information**.)
8. "NRC Spent Fuel Source Term Guidance Document." Yoshimura, R.H., et al. Sandia National Laboratories, Albuquerque, NM 2004. (This document is **classified CONFIDENTIAL National Security Information**.)
9. Design Basis Threat, Final Rule, 10 CFR Part 73, USNRC, dated March 13, 2007.
10. U.S. Nuclear Regulatory Commission Report to Congress on the National Academy of Sciences Study on the Safety and Security of Commercial Spent Nuclear Fuel Storage, dated March 2005.
11. Nuclear Regulatory Commission (NRC) Review of "Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States," dated August 19, 2003.
12. "Protecting Our Nation – Since 9-11-01," U.S. Nuclear Regulatory Commission, NUREG/BR-0314, September 2004.

**Notice of Availability of Supplement  
to the Environmental Assessment and  
Final Finding of No Significant Impact for the  
Diablo Canyon Independent Spent Fuel Storage Installation**

00 079

NUCLEAR REGULATORY COMMISSION

[Docket No. 72-26]

**Notice of Availability of Supplement to the Environmental Assessment and  
Final Finding of No Significant Impact for the  
Diablo Canyon Independent Spent Fuel Storage Installation**

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** Notice of Availability and Finding of No Significant Impact.

**SUMMARY:** Notice is hereby given that the U.S. Nuclear Regulatory Commission (NRC) is issuing a supplement to the Environmental Assessment (EA) for the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI) and a final Finding of No Significant Impact (FONSI). NRC issued the EA and initial FONSI for this action on October 24, 2003, and subsequently issued a license for the Diablo Canyon ISFSI to the Pacific Gas and Electric Company (PG&E), on March 22, 2004. The license authorizes PG&E to receive, possess, store, and transfer spent nuclear fuel and associated radioactive materials resulting from the operation of the Diablo Canyon Power Plant in an ISFSI at the site for a term of 20 years. NRC is issuing this supplement to the EA and final FONSI in response to the June 2, 2006, decision by the United States Court of Appeals for the Ninth Circuit, *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9<sup>th</sup> Cir. 2006). This supplement to the EA addresses the environmental impacts from potential terrorist acts against the Diablo Canyon ISFSI.

**FOR FURTHER INFORMATION, CONTACT:** James R. Hall, Senior Project Manager,  
Licensing Branch, Division of Spent Fuel Storage and Transportation, Mail Stop EBB-3D-02M,  
U.S. Nuclear Regulatory Commission, Washington, DC, 20555-0001. Telephone: (301) 492-  
3319; e-mail: [jrh@nrc.gov](mailto:jrh@nrc.gov).

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## SUPPLEMENTARY INFORMATION:

### I. Introduction

On December 21, 2001, PG&E submitted an application to NRC, requesting a site-specific license to build and operate an ISFSI, to be located on the site of the Diablo Canyon Power Plant, in San Luis Obispo County, California. In accordance with the National Environmental Policy Act (NEPA), the NRC staff issued an EA for this action on October 24, 2003, in conformance with NRC requirements specified in 10 CFR 51.21 and 51.30, and the associated guidance in NRC report NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." Based on the EA, NRC also issued a FONSI for this action on October 24, 2003, in accordance with 10 CFR 51.31 and 51.32.

On March 22, 2004, the NRC staff issued Materials License No. SNM-2511 to PG&E, pursuant to 10 CFR Part 72, authorizing PG&E to receive, possess, store, and transfer spent nuclear fuel and associated radioactive materials resulting from the operation of the Diablo Canyon Power Plant in an ISFSI at the site for a term of 20 years. PG&E has begun construction of the Diablo Canyon ISFSI and currently plans to start transferring spent fuel to the ISFSI in mid-2008.

After NRC's issuance of the license for the Diablo Canyon ISFSI, the San Luis Obispo Mothers for Peace and other parties filed suit in the United States Court of Appeals for the Ninth Circuit, asking that NRC be required to consider terrorist acts in its environmental review associated with this licensing action. In its decision of June 2, 2006, *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9<sup>th</sup> Cir. 2006), the Ninth Circuit held that NRC could not categorically refuse to consider the consequences of a terrorist attack under NEPA and remanded the case to NRC.

In response to the Ninth Circuit decision, the Commission issued a Memorandum and Order on February 26, 2007, directing the NRC staff to prepare a revised EA, addressing the

likelihood of a terrorist attack at the Diablo Canyon ISFSI site and the potential consequences of such an attack. On May 29, 2007, the NRC staff issued a preliminary supplement to the EA and draft FONSI to address the environmental impacts from potential terrorist acts against the Diablo Canyon ISFSI. On May 31, 2007, NRC published a notice of availability in the Federal Register (72 FR 30398), providing opportunity for public comment on the preliminary supplement to the EA and draft FONSI and establishing July 2, 2007, as the deadline to submit comments. Approximately 32 individual comment documents (i.e., letters, facsimiles, and e-mails) were received by the NRC. Of the 32 comment documents received, 12 were nearly identical letters, and many others contained the same or similar comments. As a result, the NRC staff grouped similar or related comments together and developed 17 general comment areas. NRC's summary of the comments received and its responses are provided in an appendix to the final supplemental EA.

The October 24, 2003, EA and FONSI, the license and supporting documents, and the preliminary supplement to the EA and draft FONSI are available on NRC's website at: <http://www.nrc.gov/waste.html>, by selecting "Diablo Canyon ISFSI," in the Quick Links box.

## **II. Summary of Final Supplement to the EA for the Diablo Canyon ISFSI**

In the supplement to the EA, the NRC staff has considered the potential radiological impacts of terrorist acts on the Diablo Canyon ISFSI. NRC has established requirements and has initiated several actions designed to provide high assurance that a terrorist attack would not lead to a significant radiological event at an ISFSI. These include: (1) NRC's continual evaluation of the threat environment, in coordination with the intelligence and law enforcement communities, which provides, in part, the basis for the protective measures currently required; (2) the protective measures that are in place to reduce the chance of an attack that leads to a significant release of radiation; (3) the robust design of dry cask storage systems, which provide

substantial resistance to penetration; and (4) NRC security assessments of the potential consequences of terrorist attacks against ISFSIs.

The supplement to the EA describes the security measures for ISFSIs and discusses the security assessments performed by NRC, which confirmed that the existing security requirements, imposed by regulations and orders, are adequate to provide high assurance that a terrorist attack on an ISFSI will not lead to significant radiological consequences. Threat scenarios considered in the generic security assessments for ISFSIs included a large aircraft impact similar in magnitude to the attacks of September 11, 2001, and ground assaults using expanded adversary characteristics consistent with the design basis threat for radiological sabotage for nuclear power plants.

The NRC staff compared the assumptions used in its generic ISFSI security assessments to the relevant features of the Diablo Canyon ISFSI. Based on this comparison, the staff determined that the assumptions used in these generic security assessments, regarding the storage cask design, the amount of radioactive material that could be released, and the atmospheric dispersion, were representative, and in some cases, conservative, relative to the actual characteristics for the Diablo Canyon ISFSI. The staff determined that any dose to affected residents nearest to the Diablo Canyon site calculated using site-specific parameters will be much lower than doses calculated using the assumptions made for the generic assessments. Based on these considerations, the dose to the nearest affected resident, from even the most severe plausible threat scenarios (the ground assault and aircraft impact scenarios discussed above) would likely be well below 5 rem. In many scenarios, the hypothetical dose to an individual in the affected population could be substantially less than 5 rem, or none at all.

In the supplement (based also on the initial EA), the NRC staff concludes that the construction, operation, and decommissioning of the Diablo Canyon ISFSI, even when potential terrorist attacks on the facility are considered, will not result in a significant effect on the human

environment. NRC security requirements, imposed through regulations and orders, and implemented through the licensee's security plans, in combination with the design requirements for dry cask storage systems, provide adequate protection against successful terrorist attacks on ISFSIs. Therefore, a terrorist attack that would result in a significant release of radiation affecting the public is not reasonably expected to occur.

### **III. Final Finding of No Significant Impact**

The NRC staff has prepared a supplement to the EA related to the construction and operation of the Diablo Canyon ISFSI, in accordance with the requirements of 10 CFR Part 51. As set forth in the supplement to the EA, NRC has considered the potential for terrorist attacks on the facility, and has determined that the storage of spent nuclear fuel at the Diablo Canyon ISFSI will not have a significant effect on the quality of the human environment, based on the facility design features and the mitigative security measures incorporated as part of the NRC licensing action and in response to NRC security orders. These design features and mitigative security measures will provide high assurance that substantial environmental impacts will be avoided and thereby reduced to a non-significant risk level. On the basis of the initial EA and this supplement, NRC has concluded that there are no significant environmental impacts, and the proposed action does not warrant the preparation of an Environmental Impact Statement. Therefore, in accordance with 10 CFR 51.31, NRC has determined that issuance of a final FONSI is appropriate.

### **IV. Further Information**

Documents related to this action, including the May 29, 2007, preliminary supplement to the EA and draft FONSI; the August 30, 2007, EA supplement and final FONSI; the October 24, 2003, EA; and the Diablo Canyon ISFSI license and supporting documentation, are available

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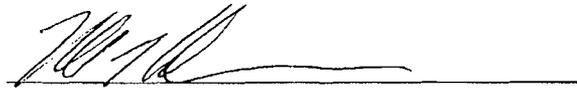
electronically, at NRC's Electronic Reading Room, at:

<http://www.nrc.gov/reading-rm/adams.html>. From this site, you can access NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents. The ADAMS accession number for the supplement to the EA and draft FONSI is ML071280256, and for the EA supplement and final FONSI, the accession number is ML072400511. The ADAMS accession number for the October 24, 2003, EA is ML032970337, and for the ISFSI license and related documents, the accession number is ML040780107. If you do not have access to ADAMS, or if there are problems in accessing the documents located in ADAMS, contact NRC's Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to [pdr@nrc.gov](mailto:pdr@nrc.gov).

These documents may also be viewed electronically on the public computers located at NRC's PDR, O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, MD 20852. The PDR reproduction contractor will copy documents, for a fee.

Dated at Rockville, Maryland this 30th day of August, 2007.

For the Nuclear Regulatory Commission.



Robert A. Nelson, Chief,  
Licensing Branch,  
Division of Spent Fuel Storage and Transportation,  
Office of Nuclear Material Safety and Safeguards.

00 085

**NRCREP - Comments on Supplement to Diablo Canyon Environmental Assessment**

**From:** "Diane Curran" <dcurran@harmoncurran.com>  
**To:** <NRCREP@nrc.gov>  
**Date:** 07/02/2007 1:44 PM  
**Subject:** Comments on Supplement to Diablo Canyon Environmental Assessment  
**CC:** <jrh@nrc.gov>, "Gordon Thompson" <gthompson@irss-usa.org>, <janeslo@kcbx.net>, <jzk@charter.net>, <gradofcal@yahoo.com>, <hankliz@charter.net>, <morgan.rafferty@gmail.com>

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 72FR 30398  
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BY E-MAIL TO:  
 Chief, Rulemaking, Directives and Editing Branch  
 Mail Stop T6-D59  
 U.S. Nuclear Regulatory Commission  
 Washington, D.C. 20555-0001  
 NRCREP@nrc.gov

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**SUBJECT:** Supplement to Environmental Assessment for Diablo Canyon, ISFSI, Docket No. 72-26

Dear Madam/Sir:

On behalf of the San Luis Obispo Mothers for Peace, I am responding to your request for public comment on the Supplement to the Environmental Assessment and Draft Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (May 29, 2007) ("EA Supplement"). SLOMFP's concerns about the gross inadequacy of the EA Supplement to satisfy the National Environmental Policy Act are presented in SAN LUIS OBISPO MOTHERS FOR PEACE'S CONTENTIONS AND REQUEST FOR A HEARING REGARDING DIABLO CANYON ENVIRONMENTAL ASSESSMENT SUPPLEMENT ("SLOMFP's Contentions and Hearing Request"), which SLOMFP filed with the NRC Commissioners on June 28, 2007, and corrected on June 29, 2007. A corrected copy of SLOMFP's Contentions and Hearing Request, including the attached declaration and expert report of Dr. Gordon Thompson, is attached.

Please treat SLOMFP's Contentions and Hearing Request as its comments on the EA Supplement.

Thank you for your consideration.

Sincerely,

Diane Curran

**Cc:** James R. Hall, Senior Project Manager  
 Licensing Branch  
 NRC Division of Spent Fuel Storage and Transportation  
 jrh@nrc.gov

San Luis-Obispo Mothers for Peace

SONSE Review Complete  
 Template - ADM-013

E-RIIS-ADM-03  
 Add - J. Hall  
 (JRH)

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07/02/2007

U.S. NUCLEAR REGULATORY COMMISSION  
OFFICE OF NUCLEAR MATERIAL SAFETY AND SAFEGUARDS  
DIVISION OF SPENT FUEL STORAGE AND TRANSPORTATION

SUPPLEMENT TO THE ENVIRONMENTAL ASSESSMENT  
AND DRAFT FINDING OF NO SIGNIFICANT IMPACT  
RELATED TO THE CONSTRUCTION AND OPERATION OF THE  
DIABLO CANYON INDEPENDENT SPENT FUEL STORAGE INSTALLATION

DOCKET NO. 72-26  
PACIFIC GAS AND ELECTRIC COMPANY

May 2007

00 087

SUPPLEMENT TO THE ENVIRONMENTAL ASSESSMENT  
AND DRAFT FINDING OF NO SIGNIFICANT IMPACT  
FOR THE DIABLO CANYON  
INDEPENDENT SPENT FUEL STORAGE INSTALLATION

1.0 INTRODUCTION

The staff of the U.S. Nuclear Regulatory Commission (NRC) has prepared this supplement to the Environmental Assessment (EA) and draft finding of no significant impact (FONSI) for the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI), at the direction of the Commission, in response to the June 2006 decision by the United States Court of Appeals for the Ninth Circuit [*San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016, 1028 (9<sup>th</sup> Cir. 2006)]. This supplement to the EA addresses the environmental impacts from potential terrorist acts directed at the Diablo Canyon ISFSI.

1.1 Description of the Proposed Action

By letter dated December 21, 2001, the Pacific Gas and Electric Company (PG&E) submitted an application to NRC, requesting a site-specific license to build and operate an ISFSI, to be located on the site of the Diablo Canyon Power Plant, in San Luis Obispo County, California. In accordance with the National Environmental Policy Act (NEPA), the NRC staff issued an EA for this action on October 24, 2003, in conformance with NRC requirements specified in 10 CFR 51.21 and 51.30, and the associated guidance in NRC report NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." The Commission defines an EA in 10 CFR 51.14(a), as a concise public document that briefly provides sufficient evidence and analysis for determining whether to prepare an environmental impact statement or a FONSI. A FONSI, in turn, is defined as a concise public document that briefly states the reasons why an action will not have a significant effect on the human environment and therefore does not require the preparation of an environmental impact statement [10 CFR 51.14(a)]. Based on the above EA, NRC also issued a FONSI for this action on October 24, 2003.

On March 22, 2004, the NRC staff issued Materials License No. SNM-2511 to PG&E, pursuant to 10 CFR Part 72, authorizing PG&E to receive, possess, store, and transfer spent nuclear fuel and associated radioactive materials resulting from the operation of the Diablo Canyon Power Plant (DCPP) in an ISFSI at the site for a term of 20 years. PG&E has begun construction of the Diablo Canyon ISFSI and currently plans to start transferring spent fuel to the ISFSI in mid-2008.

1.2 Purpose of this Supplement

In May 2002, during the NRC licensing review for the Diablo Canyon ISFSI, the San Luis Obispo Mothers for Peace (SLOMFP) and other citizens' groups petitioned NRC to hold a hearing to address a number of contentions. One of these contentions argued that NRC must consider terrorist acts in assessing the environmental impacts of the ISFSI, in order to comply with NEPA. On December 2, 2002, NRC's Atomic Safety and Licensing Board (ASLB) denied this contention and referred it to the Commission for review. On January 23, 2003, the Commission affirmed the ASLB's denial of the terrorism contention.

After the March 2004 issuance of the Part 72 license for the Diablo Canyon ISFSI, SLOMFP and other parties filed a petition for review in the United States Court of Appeals for the Ninth Circuit, asking that NRC be required to consider terrorist acts in its environmental review associated with this licensing action. In its decision, dated June 2, 2006, *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016, 1028 (9<sup>th</sup> Cir. 2006), the Ninth Circuit held that NRC could not categorically refuse to consider the consequences of a terrorist attack under NEPA and remanded the case to NRC.

In response to the Ninth Circuit decision, the Commission issued Memorandum and Order on February 26, 2007, directing the NRC staff to prepare a revised EA addressing the likelihood of a terrorist attack at the Diablo Canyon ISFSI site and the potential consequences of such an attack.

### 1.3 Purpose and Need for the Proposed Action

The DCP, owned and operated by PG&E, consists of two Westinghouse-type pressurized water reactor units, each rated at a nominal 1,100 Megawatts-electric; each unit has its own spent fuel storage pool. The Diablo Canyon ISFSI is needed to provide additional spent fuel storage capacity to ensure that the two DCP units can continue to generate electricity beyond the time when the storage capacity of the spent fuel pools is reached. The additional temporary spent fuel storage capacity provided by the proposed ISFSI will enable PG&E to operate both units until the current operating licenses expire (September 2021 for Unit 1, and April 2025 for Unit 2).

## 2.0 SUMMARY OF DIABLO CANYON ISFSI EA

On October 24, 2003, the NRC staff issued the EA and FONSI for the construction and operation of the Diablo Canyon ISFSI.

### 2.1 Summary of Impacts Considered in the EA

In the EA, the NRC staff concluded that the construction, operation, and decommissioning of the Diablo Canyon ISFSI will not result in a significant impact on the environment. In reaching this conclusion, the staff considered the impacts from normal operations and from postulated accidents. The staff determined that construction impacts of the ISFSI will be minor, and limited to the small area of the ISFSI site and the excavated-material disposal sites.

The staff also determined that there will be no significant radiological nor non-radiological environmental impacts from routine operation of the ISFSI. The ISFSI is a passive facility; no liquid or gaseous effluents will be released from the storage casks during normal operations. The dose rates to members of the public during normal operations will be limited by the design of the spent fuel storage casks, so that the cumulative dose to an offsite individual will be a small fraction of the 100 millirem estimated annual dose received from naturally occurring terrestrial and cosmic radiation in the vicinity of the DCP. The impacts from decommissioning the ISFSI, which will not occur until the spent fuel is removed, were determined to be much less than the minor impacts of construction and operation.

For hypothetical accidents, the calculated dose to an individual at the nearest site boundary was found to be well below the 5 rem limit for accidents set forth in 10 CFR 72.106(b) and in the

U.S. Environmental Protection Agency's protective action guidelines. The NRC staff did not consider the potential impacts of terrorist acts on the ISFSI in the initial EA.

## 2.2 Summary of Alternatives Considered in the EA

The alternatives PG&E considered, and the NRC staff addressed in its EA, included the shipment of spent fuel offsite, other methods to increase on-site spent fuel storage capacity, and the no-action alternative. In the first category, the alternatives of shipping spent fuel from Diablo Canyon to a permanent Federal Repository, to a reprocessing facility, or to a privately owned spent fuel storage facility were determined to be non-viable alternatives, since no such facilities are currently available in the United States, and shipping the spent fuel overseas is impractical in light of the political, legal, and logistical uncertainties, and the high cost. Shipping the DCCP spent fuel to another nuclear power plant was also determined to be a non-viable alternative, because the receiving utility would have to be licensed to store the DCCP spent fuel, and it is unlikely that another utility would be willing to accept it, in light of its own limitations on spent fuel storage capacity.

Other on-site storage alternatives PG&E considered included increasing the capacity of the existing spent fuel pools by reracking or spent fuel rod consolidation, or construction of a new spent fuel storage pool. These alternatives were considered impractical, because of the high costs associated with necessary plant modifications or new construction, coupled with the significantly higher occupational exposures that would result from the extensive fuel-handling operations necessary to support these alternatives.

The no-action alternative could result in the extended or permanent shutdown of both DCCP units many years before the expiration date of their current operating licenses, once the current capacities of the units' spent fuel pools are reached. The electrical generation capacity lost would most likely be replaced by fossil-fueled plants, which could result in greater environmental impacts and higher costs for electricity. In the short-term, the shutdown of the DCCP would have a negative impact on the local economy and infrastructure. For these reasons, the no-action alternative was not considered a practical alternative.

In the EA, the Commission concluded that there are no significant environmental impacts associated with the proposed Diablo Canyon ISFSI, and other alternatives were not pursued because of significantly higher costs, additional occupational exposures, and the unavailability of off-site storage options. In this supplement to the EA, the NRC staff has considered potential terrorist acts against the ISFSI, and after such consideration, has concluded that the construction and operation of the ISFSI will not result in a significant effect on the human environment.

## 3.0 NRC SECURITY REQUIREMENTS FOR ISFSIS

NRC has established requirements and has initiated several actions designed to provide high assurance that a terrorist attack would not lead to a significant radiological event at an ISFSI. These include: (1) the continual evaluation of the threat environment by NRC, in coordination with the intelligence and law enforcement communities, which provides, in part, the basis for the protective measures currently required; (2) the protective measures that are in place to reduce the chance of an attack that leads to a significant release of radiation; (3) the robust design of dry cask storage systems, which provides substantial resistance to penetration; and (4) NRC

security assessments of the potential consequences of terrorist attacks against ISFSIs, that inform the decisions made regarding the types and level of protective measures. Over the past 20 years, there have been no known or suspected attempts to sabotage, or to steal, spent fuel from spent fuel casks at ISFSIs, or to directly attack an ISFSI. Nevertheless, NRC is continually reevaluating the threat environment, to determine whether any specific threat to ISFSIs exists.

### 3.1 General Security Considerations

In response to terrorist attacks in New York and Washington, DC, on September 11, 2001, and to intelligence information subsequently obtained, the U.S. government initiated nation-wide measures to reduce the threat of terrorism. These measures included numerous security enhancements to prevent terrorists from gaining control of commercial aircraft, such as: (1) more stringent screening of airline passengers and baggage by the Transportation Security Administration; (2) the increased presence of Federal air marshals on many flights; (3) improved training of flight crews; and (4) hardening of aircraft cockpits. Additional measures have been imposed on foreign passenger carriers and domestic and foreign cargo carriers, as well as charter aircraft. Beyond these measures directed at reducing the potential for terrorists to gain control of an aircraft, the Federal government has greatly improved the sharing of intelligence information and the coordination of response actions among Federal, State, and local agencies. NRC has been an active participant in these efforts; it now has regular and frequent communications with other Federal, State, and local government agencies and industry representatives, to discuss and evaluate the current threat environment, to assess the adequacy of security measures implemented at licensed facilities, and, when necessary, to recommend additional actions.

NRC expanded its existing Threat Advisory System after the September 11, 2001, terrorist attacks, to include a broader range of licensees, including ISFSI licensees. NRC has incorporated the threat condition levels used in the Department of Homeland Security's Homeland Security Advisory System into its own Threat Advisory System. The NRC threat assessment staff reviews, analyzes, coordinates, and disseminates threat and intelligence information relevant to its licensees, at both strategic and tactical levels. The threat assessment staff also serves as NRC's liaison and coordination staff with other organizations and agencies, including the intelligence and law enforcement communities. Through these *improved coordination and communication functions*, NRC is able to efficiently develop and transmit advisories to the appropriate licensees, who are then able to take prompt action. Thus, the broad actions taken by the Federal government and the specific actions taken by NRC since September 11, 2001, have helped to reduce the potential for terrorist attacks against NRC-regulated facilities.

### 3.2 Requirements for ISFSIs

NRC has historically considered the potential impacts of terrorist acts in the development and implementation of its 10 CFR Part 73 security requirements. NRC's strategy for protecting public health and safety and the environment focuses on ensuring that its safety and security requirements, as implemented by licensees, in combination with the design features of dry cask storage systems, are effective in protecting against successful terrorist attacks on ISFSIs.

NRC security requirements for ISFSIs are directed at assuring that terrorists cannot successfully carry out an attack against an ISFSI. These requirements, which apply to on-site security measures, are part of a multi-layered Federal security strategy that also consists of ongoing threat assessment, in coordination with other Federal agencies, and measures to identify and preempt potential terrorist attacks. NRC reviews and approves facility security plans, in evaluating the adequacy of these on-site measures. As part of the licensing review for the Diablo Canyon ISFSI, the NRC staff evaluated and approved revisions to the Diablo Canyon site security plan that incorporated features of the proposed ISFSI. In that review, transmitted by letter dated February 4, 2004, the NRC staff determined that the proposed security plan revisions and facility design features met the requirements of Part 73, "Physical Protection of Plants and Materials," which were the same requirements for ISFSIs that were in effect before September 11, 2001. The details of specific security measures for each facility are designated as Safeguards Information, in accordance with Section 147 of the Atomic Energy Act and 10 CFR 73.21, and, for that reason, cannot be released to the public. However, key features of the security programs for ISFSIs include: (1) physical barriers; (2) surveillance; (3) intrusion detection; (4) a response to intrusions; and (5) offsite assistance from local law enforcement agencies, as necessary.

After the September 11 terrorist attacks, the Commission initiated prompt and comprehensive actions to address both immediate and longer-term security measures for NRC-regulated facilities. In the months immediately after the attacks, the Commission issued numerous safeguards and threat advisories to its licensees, to strengthen licensees' capabilities and readiness to respond to a potential attack on a nuclear facility. As part of the longer-term efforts, NRC conducted a comprehensive review of the Agency's security program. This review examined specific threats, such as a land-based vehicle bomb, ground assault with the use of an insider, and water-borne assaults, which have led to the imposition of additional requirements, through orders and rules, affecting many categories of licensees, including ISFSIs.

On October 16, 2002, the Commission issued orders to all licensees of operating ISFSIs to make mandatory the voluntary actions taken by those licensees in response to the Commission's advisories, and to implement additional security enhancements identified in NRC's ongoing comprehensive review of its safeguards and security programs and requirements. This same order, imposing additional security measures, was issued to PG&E, for the Diablo Canyon ISFSI, on May 5, 2005. These measures, which are to be fully implemented before the initial movement of spent fuel to the ISFSI, include: (1) increased security patrols; (2) augmented security forces and weapons; (3) additional security posts; (4) heightened coordination with local law enforcement and military authorities; (5) enhanced screening of personnel; and (6) additional limitations on vehicular access. Collectively, these measures further reduce the already low probability of a successful terrorist attack on an ISFSI, by establishing a substantial deterrent to an attack; by providing high assurance that an attempted attack could be detected and effectively resisted; and by mitigating the extent of damage and the potential radiological consequences if an attack were successful.

Based on its ongoing consideration of safeguards and security requirements, its review of information provided by the intelligence community, and the implementation of additional security measures at the Nation's ISFSIs, the Commission has high assurance that public health and safety and the environment, and the common defense and security, continue to be adequately protected in the current threat environment.

#### 4.0 CONSIDERATION OF ENVIRONMENTAL (RADIOLOGICAL) IMPACTS FROM TERRORIST ACTS

The NRC staff has considered the potential radiological impacts of terrorist acts on spent fuel storage casks, even though the staff considers the probability of a malevolent act against an ISFSI that results in a significant radiological event to be very low. By design, dry cask storage systems are highly resistant to penetration. To be licensed or certified by NRC, these systems must meet stringent requirements for structural, thermal, shielding, and criticality performance, and confinement integrity, for normal and accident events. Consequently, spent fuel storage casks are extremely robust structures, specifically designed to withstand severe accidents, including the impact of a tornado-generated missile such as a 4000-pound automobile at 126 miles per hour. For the Diablo Canyon ISFSI, these design features include the massive HI-STORM 100SA storage casks, which are made of inner and outer cylindrical carbon steel shells, filled with 30 inches of concrete, and weighing up to 170 tons when fully loaded with spent fuel. Each cask surrounds an internal multi-purpose canister, which safely confines the spent fuel in a completely sealed, welded stainless steel cylinder. The spent fuel is further protected by the metallic zircaloy cladding surrounding the fuel pellets in each fuel rod of a spent fuel assembly. Finally, the nuclear fuel itself is in the form of solid ceramic pellets of uranium dioxide; this means that a large amount of the radioactive material would remain in solid form and not be dispersed beyond the immediate vicinity of the ISFSI, even if a terrorist act were successful in breaching the multiple layers of protection. Also, the location and low profile of the ISFSI make it a difficult target for a large commercial airliner. Based on these facts, NRC has determined that the current design features and additional security measures in place provide high assurance that the spent fuel stored in an ISFSI is adequately protected.

Because of the uncertainty inherent in assessing the likelihood of a terrorist attack, NRC recognizes that, under general credible threat conditions, although the probability of such an attack is believed to be low, it cannot be reliably quantified. NRC has adopted an approach that focuses on ensuring that the safety and security requirements, and other security measures, are adequate and effective in countering and mitigating the effects of terrorist attacks against dry cask storage systems. To provide high assurance that a terrorist act will not lead to significant radiological consequences, NRC has analyzed plausible threat scenarios and required enhanced security measures to protect against the threats, and has developed emergency planning requirements, which could mitigate potential consequences for certain scenarios. As stated above, all these actions have been taken without regard to the probability of an attack. This protective strategy reduces the risk from a terrorist attack to an acceptable level.

Following issuance of the 2002 security orders for ISFSIs, NRC used a security assessment framework as a screening and assessment tool, to determine whether additional security measures, beyond those required by regulation and the security orders, were warranted for NRC-regulated facilities, including ISFSIs. Initially, NRC screened threat scenarios to determine plausibility. For those scenarios deemed plausible, NRC assessed the attractiveness of the facility to attack by taking into account factors such as iconic value, complexity of planning required, resources needed, execution risk, and public protective measures. In addition, NRC made conservative assessments of consequences, to assess the potential for early fatalities from radiological impacts. NRC then looked at the combined effect of the attractiveness and the consequence analyses, to determine whether additional security measures for ISFSIs were necessary.

In conducting the security assessments for ISFSIs, NRC chose several spent fuel storage cask designs that were representative of most currently NRC-certified designs. Plausible threat scenarios considered in the generic security assessments for ISFSIs included a large aircraft impact similar in magnitude to the attacks of September 11, 2001, and ground assaults using expanded adversary characteristics consistent with the design basis threat for radiological sabotage for nuclear power plants. The resulting generic assessments formed the basis for NRC's conclusion that there was no need for further security measures at ISFSIs beyond those currently required by regulation and imposed by orders issued after September 11, 2001.

The NRC staff reviewed the analyses done for the ISFSI security assessments, and compared the assumptions used in these generic assessments to the relevant features of the Diablo Canyon ISFSI. Based on this comparison, the staff determined that the assumptions used in these generic security assessments, regarding the storage cask design, the source term (amount of radioactive material released), and the atmospheric dispersion, were representative, and in some cases, conservative, relative to the actual conditions at the Diablo Canyon ISFSI. In fact, because of the specific characteristics of the spent fuel authorized for storage at the Diablo Canyon ISFSI (lower burnup fuel), and the greater degree of dispersion of airborne radioactive material likely to occur at the site, any dose to affected residents nearest to the Diablo Canyon site will tend to be much lower than the doses calculated for the generic assessments. Based on these considerations, the dose to the nearest affected resident, from even the most severe plausible threat scenarios – the ground assault and aircraft impact scenarios discussed above – would likely be below 5 rem. In many scenarios, the hypothetical dose to an individual in the affected population could be substantially less than 5 rem, or none at all. In some situations, emergency planning actions could provide an additional measure of protection to help mitigate the consequences, in the unlikely event that an attack were attempted at the Diablo Canyon ISFSI.

#### 5.0 AGENCIES AND PERSONS CONSULTED

No additional discussions or consultations with outside agencies or persons have been conducted in the development of this draft supplement to the EA. Comments submitted in response to the issuance of this draft supplement will be considered by the NRC staff in preparation of the final supplement to the EA.

#### 6.0 CONCLUSION

The NRC staff concludes that the construction, operation, and decommissioning of the Diablo Canyon ISFSI, even when potential terrorist attacks on the facility are considered, will not result in a significant effect on the human environment. NRC security requirements, imposed through regulations and orders, and implemented through the licensee's security plans, in combination with the design requirements for dry cask storage systems, provide adequate protection against successful terrorist attacks on ISFSIs. Therefore, a terrorist attack that would result in a significant release of radiation affecting the public is not reasonably expected to occur.

#### 7.0 DRAFT FINDING OF NO SIGNIFICANT IMPACT

The environmental impacts of the proposed action, namely, the approval of a site-specific license to build and operate an ISFSI, to be located on the site of the DCCP, in San Luis Obispo County, California, have been reviewed in accordance with the requirements of 10 CFR Part 51.

As set forth in the Supplement to the Environmental Assessment above (which this draft finding incorporates by reference), NRC has considered the potential for terrorist attacks on the facility, and has determined that the storage of spent nuclear fuel at the Diablo Canyon ISFSI will not have a significant effect on the quality of the human environment, based on the facility design features and the mitigative security measures incorporated as part of the NRC licensing action and in response to NRC security orders. These design features and mitigative security measures will provide high assurance that substantial environmental impacts will be avoided and thereby reduced to a non-significant risk level. Therefore, in accordance with 10 CFR 51.33, NRC issues this draft FONSI.

A Notice of availability of this supplement to the EA and draft FONSI will be published in the *Federal Register*. The *Federal Register* notice will include a request for comments on the proposed action and on the draft finding within thirty (30) days of publication. Pursuant to 10 CFR 51.33(e), a final determination to prepare an environmental impact statement or a final FONSI for the proposed action shall not be made until the last day of the public comment period has expired.

Documents related to this action, including the Diablo Canyon ISFSI EA and FONSI, and the Diablo Canyon ISFSI license, are available electronically at NRC's Electronic Reading Room at <http://www.nrc.gov/reading-rm/adams.html>. From this site, you can access NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents. The ADAMS accession number for the Diablo Canyon ISFSI EA is ML032970337, and for the ISFSI license and related documents, the number is ML040780107. If you do not have access to ADAMS, or if there are problems in accessing the documents located in ADAMS, contact NRC's Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737, or by e-mail, to [pdr@nrc.gov](mailto:pdr@nrc.gov). These documents may also be viewed electronically on the public computers located at NRC's PDR, O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, MD 20852. The PDR reproduction contractor will copy documents for a fee.

#### 8.0 REFERENCES

1. U.S. Nuclear Regulatory Commission. *Environmental Assessment and Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (TAC NO.L23399)*. October 24, 2003. NRC ADAMS Accession No. ML032970337.
2. U.S. Nuclear Regulatory Commission. *Issuance of Materials License No. SNM-2511 for the Diablo Canyon Independent Spent Fuel Storage Installation (TAC NO.L23399)*. March 22, 2004. NRC ADAMS Accession No. ML040780107.
3. Diablo Canyon Independent Spent Fuel Storage Installation License Application - Environmental Report, PG&E. December 2001 and Amendment 1, October 2002. NRC ADAMS Accession Nos. ML020180196, ML020180173, and ML022950304 (p.150-186).

**Notice of Availability of Supplement  
to the Environmental Assessment and  
Draft Finding of No Significant Impact for the  
Diablo Canyon Independent Spent Fuel Storage Installation**

00 096

NUCLEAR REGULATORY COMMISSION

[Docket No. 72-26]

**Notice of Availability of Supplement to the Environmental Assessment and  
Draft Finding of No Significant Impact for the  
Diablo Canyon Independent Spent Fuel Storage Installation**

**AGENCY:** Nuclear Regulatory Commission.

**ACTION:** Notice of Availability of Opportunity to Provide Comments.

**SUMMARY:** Notice is hereby given that the U.S. Nuclear Regulatory Commission (NRC) is issuing a supplement to the Environmental Assessment (EA) for the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI) and publishing, for public comment, a draft Finding of No Significant Impact (FONSI). NRC issued the EA and initial FONSI for this action on October 24, 2003, and subsequently issued a license for the Diablo Canyon ISFSI to the Pacific Gas and Electric Company (PG&E), on March 22, 2004. The license authorizes PG&E to receive, possess, store, and transfer spent nuclear fuel and associated radioactive materials resulting from the operation of the Diablo Canyon Power Plant in an ISFSI at the site for a term of 20 years. NRC is issuing this supplement to the EA and draft FONSI in response to the June 2, 2006, decision by the United States Court of Appeals for the Ninth Circuit, *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9<sup>th</sup> Cir. 2006). This supplement to the EA addresses the environmental impacts from potential terrorist acts against the Diablo Canyon ISFSI.

**DATES:** The public comment period on the draft FONSI closes [insert date 30 days after the date of publication]. Written comments should be submitted as described in the "ADDRESSES" section of this notice. Comments submitted by mail should be postmarked by that date, to ensure consideration. Comments received or postmarked after that date will be considered if it

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is practical to do so, but the Commission is able to assure consideration only for comments received on or before this date.

**ADDRESSES:** Members of the public are invited and encouraged to submit comments to the Chief, Rulemaking, Directives, and Editing Branch, Mail Stop T6-D59, U.S. Nuclear Regulatory Commission, Washington, DC 20555-0001. Please note Docket No. 72-26 when submitting comments. Comments will also be accepted by e-mail, at [NRCREP@nrc.gov](mailto:NRCREP@nrc.gov) or by facsimile to (301) 492-3342, Attention: James R. Hall.

**FOR FURTHER INFORMATION, CONTACT:** James R. Hall, Senior Project Manager, Licensing Branch, Division of Spent Fuel Storage and Transportation, Mail Stop 6003-3D-02M, U.S. Nuclear Regulatory Commission, Washington, DC, 20555-0001. Telephone: (301) 492-3319; e-mail: [jrh@nrc.gov](mailto:jrh@nrc.gov).

**SUPPLEMENTARY INFORMATION:**

**I. Introduction**

On December 21, 2001, PG&E submitted an application to NRC, requesting a site-specific license to build and operate an ISFSI, to be located on the site of the Diablo Canyon Power Plant, in San Luis Obispo County, California. In accordance with the National Environmental Policy Act (NEPA), the NRC staff issued an EA for this action on October 24, 2003, in conformance with NRC requirements specified in 10 CFR 51.21 and 51.30, and the associated guidance in NRC report NUREG-1748, "Environmental Review Guidance for Licensing Actions Associated with NMSS Programs." Based on the EA, NRC also issued a FONSI for this action on October 24, 2003, in accordance with 10 CFR 51.31 and 51.32.

On March 22, 2004, the NRC staff issued Materials License No. SNM-2511 to PG&E, pursuant to 10 CFR Part 72, authorizing PG&E to receive, possess, store, and transfer spent nuclear fuel and associated radioactive materials resulting from the operation of the Diablo Canyon Power Plant in an ISFSI at the site for a term of 20 years. PG&E has begun

construction of the Diablo Canyon ISFSI and currently plans to start transferring spent fuel to the ISFSI in mid-2008.

After NRC's issuance of the license for the Diablo Canyon ISFSI, the San Luis Obispo Mothers for Peace and other parties filed suit in the United States Court of Appeals for the Ninth Circuit, asking that NRC be required to consider terrorist acts in its environmental review associated with this licensing action. In its decision of June 2, 2006, *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9<sup>th</sup> Cir. 2006), the Ninth Circuit held that NRC could not categorically refuse to consider the consequences of a terrorist attack under NEPA and remanded the case to NRC.

In response to the Ninth Circuit decision, the Commission issued a Memorandum and Order on February 26, 2007, directing the NRC staff to prepare a revised EA, addressing the likelihood of a terrorist attack at the Diablo Canyon ISFSI site and the potential consequences of such an attack.

The October 24, 2003, EA and FONSI, and the license and supporting documents, are available on NRC's website at: <http://www.nrc.gov/waste.html>, by selecting "Diablo Canyon ISFSI," in the Quick Links box. Copies are also available by contacting James R. Hall, as noted above.

## **II. Summary of Supplement to the EA for the Diablo Canyon ISFSI**

In the supplement to the EA, the NRC staff has considered the potential radiological impacts of terrorist acts on the Diablo Canyon ISFSI. NRC has established requirements and has initiated several actions designed to provide high assurance that a terrorist attack would not lead to a significant radiological event at an ISFSI. These include: (1) NRC's continual evaluation of the threat environment, in coordination with the intelligence and law enforcement communities, which provides, in part, the basis for the protective measures currently required; (2) the protective measures that are in place to reduce the chance of an attack that leads to a

significant release of radiation; (3) the robust design of dry cask storage systems, which provide substantial resistance to penetration; and (4) NRC security assessments of the potential consequences of terrorist attacks against ISFSIs.

The supplement to the EA describes the security measures for ISFSIs and discusses the security assessments performed by NRC, which confirmed that the existing security requirements, imposed by regulations and orders, are adequate to provide high assurance that a terrorist attack on an ISFSI will not lead to significant radiological consequences. Threat scenarios considered in the generic security assessments for ISFSIs included a large aircraft impact similar in magnitude to the attacks of September 11, 2001, and ground assaults using expanded adversary characteristics consistent with the design basis threat for radiological sabotage for nuclear power plants.

The NRC staff compared the assumptions used in the generic ISFSI security assessments to the relevant features of the Diablo Canyon ISFSI. Based on this comparison, the staff determined that the assumptions used in these generic security assessments, regarding the storage cask design, the amount of radioactive material that could be released, and the atmospheric dispersion, were representative, and in some cases, conservative, relative to the actual characteristics for the Diablo Canyon ISFSI. The staff determined that any dose to affected residents nearest to the Diablo Canyon site will tend to be much lower than the doses calculated for the generic assessments. Based on these considerations, the dose to the nearest affected resident, from even the most severe plausible threat scenarios – the ground assault and aircraft impact scenarios discussed above, would likely be below 5 rem. In many scenarios, the hypothetical dose to an individual in the affected population could be substantially less than 5 rem, or none at all.

In the supplement, the NRC staff concludes that the construction, operation, and decommissioning of the Diablo Canyon ISFSI, even when potential terrorist attacks on the facility are considered, will not result in a significant effect on the human environment. NRC

security requirements, imposed through regulations and orders, and implemented through the licensee's security plans, in combination with the design requirements for dry cask storage systems, provide adequate protection against successful terrorist attacks on ISFSIs. Therefore, a terrorist attack that would result in a significant release of radiation affecting the public is not reasonably expected to occur.

The supplement to the EA and draft FONSI are available on NRC's website at: <http://www.nrc.gov/waste.html>, by selecting "Diablo Canyon ISFSI" in the Quick Links box. Copies are also available by contacting James R. Hall, as noted previously.

### **III. Draft Finding of No Significant Impact**

The NRC staff has prepared a supplement to the EA related to the construction and operation of the Diablo Canyon ISFSI, in accordance with the requirements of 10 CFR Part 51. As set forth in the supplement to the EA, NRC has considered the potential for terrorist attacks on the facility, and has determined that the storage of spent nuclear fuel at the Diablo Canyon ISFSI will not have a significant effect on the quality of the human environment, based on the facility design features and the mitigative security measures incorporated as part of the NRC licensing action and in response to NRC security orders. These design features and mitigative security measures will provide high assurance that substantial environmental impacts will be avoided and thereby reduced to a non-significant risk level. Therefore, in accordance with 10 CFR 51.33, NRC has determined that issuance of a draft FONSI is appropriate.

Pursuant to 10 CFR 51.33(e), a final determination to prepare an environmental impact statement or a final FONSI for the proposed action shall not be made until the last day of the public comment period has expired.

### **IV. Further Information**

Documents related to this action, including the supplement to the EA and draft FONSI, the October 24, 2003, EA, and the Diablo Canyon ISFSI license and supporting documentation,

are available electronically, at NRC's Electronic Reading Room, at:

<http://www.nrc.gov/reading-rm/adams.html>. From this site, you can access NRC's Agencywide Document Access and Management System (ADAMS), which provides text and image files of NRC's public documents. The ADAMS accession number for the supplement to the EA and draft FONSI is ML071280256. The ADAMS accession number for the October 24, 2003, EA is ML032970337, and for the ISFSI license and related documents, the accession number is ML040780107. If you do not have access to ADAMS, or if there are problems in accessing the documents located in ADAMS, contact NRC's Public Document Room (PDR) Reference staff at 1-800-397-4209, 301-415-4737, or by e-mail to [pdr@nrc.gov](mailto:pdr@nrc.gov).

These documents may also be viewed electronically on the public computers located at NRC's PDR, O1-F21, One White Flint North, 11555 Rockville Pike, Rockville, MD 20852. The PDR reproduction contractor will copy documents, for a fee.

Dated at Rockville, Maryland this 24th day of May, 2007.

For the Nuclear Regulatory Commission.

/RA/ \_\_\_\_\_

Robert A. Nelson, Chief,  
Licensing Branch,  
Division of Spent Fuel Storage and Transportation,  
Office of Nuclear Material Safety and Safeguards.

00 102

December 9, 2005

MEMORANDUM TO: Roy P. Zimmerman, Director  
Office of Nuclear Security  
and Incident Response

FROM: Jack R. Strosnider, Director /RA/ by M.Federline acting  
Office of Nuclear Material Safety  
and Safeguards

SUBJECT: FRAMEWORK ASSESSMENTS OF SPENT FUEL STORAGE CASKS  
AND TRANSPORTATION PACKAGES AND RADIOACTIVE  
MATERIAL TRANSPORTATION PACKAGES

In response to former Chairman Meserve's memorandum, "Response to Terrorist Acts," dated September 28, 2001, and in accordance with SRM-SECY-04-0222, "Decision-Making Framework for Materials and Research and Test Reactor Vulnerability Assessments," the Spent Fuel Project Office (SFPO) staff performed framework assessments for spent fuel storage casks and transportation packages and radioactive material transportation packages for various potential terrorist threats. The SFPO staff prepared the following reports: (1) "Spent Fuel Storage Large Plane Assessment," (2) "Spent Fuel Storage General Threat Framework Assessment," (3) "Spent Fuel Transportation General Threat Framework Assessment," and (4) "Radioactive Material General Threat Framework Assessment." These four reports (Enclosures 1-4) summarize the technical details and provide the staff's observations and recommendations on the framework assessments. The SFPO staff used much of the information contained in the Sandia National Laboratories reports cited in Enclosure 5, "Inventory of Sandia National Laboratories Reports Prepared for the Spent Fuel Project Office Framework Assessment," which were previously provided to the Office of Nuclear Security and Incident Response (NSIR).

The Office of Nuclear Material Safety and Safeguards (NMSS) has coordinated these framework assessments, over the past few years, with NSIR and the Offices of Nuclear Reactor Research and Nuclear Reactor Regulation.

CONTACTS: Bernard White, NMSS/SFPO  
301-415-8515

Shana Helton, NMSS/SFPO  
301-415-7652

Elizabeth Thompson, NMSS/SFPO  
301-415-2443

Upon separation of Enclosures 1-4, this document is  
**OFFICIAL USE ONLY - SECURITY-RELATED INFORMATION.**

R. Zimmerman

The SFPO staff evaluated four spent fuel storage casks, four spent fuel transportation packages, and nine radioactive material transportation packages. The staff chose a cask or package design for analysis to be representative of a group of designs so that the analysis results are expected to be similar for any other design within that group. The four spent fuel storage casks evaluated were HI-STORM 100, VSC-24, NUHOMS®-32PT, and TN-68.

ex. 2  
2a

These storage cask and transportation package designs were chosen to represent the majority of currently certified designs.

ex. 2  
2b

These packages represent most currently certified radioactive material transportation packages, but they may not encompass packages that were recently certified.

The staff evaluated all of the spent fuel storage cask and transportation package designs against a variety of land-based threats. Additionally, the staff evaluated a deliberate large-plane crash into the four spent fuel storage casks and two spent fuel transportation packages. Applying the decision-making framework, SECY-04-0222, as supplemented by Enclosure 6,

ex. 2  
2c

Based on these findings, the current security measures, including those enacted since September 11, 2001, are adequate. The staff recommends not establishing any additional mitigative measures for the storage and transportation of spent fuel.

The staff also evaluated the radioactive material transportation package designs against a variety of land-based threats.

ex. 2  
2d

ex. 2  
2e

ex. 2  
2f

<sup>1</sup>Enclosure 4 to SECY-04-0222, "Technical Basis for Chemical Related Prompt Fatalities"

ex. 2  
3a

Based on these findings, the SFPO staff considers the current security measures, including those enacted since September 11, 2001, to be adequate for the transportation of radioactive material. The staff intends to meet with Department of Transportation, DHS, and Department of Energy (DOE) staff to discuss results and insights from this analysis, including UF<sub>6</sub> results, potential changes to the Emergency Response Guidebook, and radioactive material packages certified by the Nuclear Regulatory Commission and used at DOE sites.

Enclosures:

(Enclosures 1-4 contain Safeguards information)

1. Spent Fuel Storage Large-Plane Assessment
2. Spent Fuel Storage General Threat Framework Assessment
3. Spent Fuel Transportation General Threat Framework Assessment
4. Radioactive Material General Threat Framework Assessment
5. Inventory of Sandia National Laboratories Reports Prepared for the Spent Fuel Project Office Framework Assessment

3b  
ex 2

~~—SAFEGUARDS INFORMATION—~~

R. Zimmerman

3

ex. 2  
4A

Based on these findings, the SFPO staff considers the current security measures, including those enacted since September 11, 2001, to be adequate for the transportation of radioactive material. The staff intends to meet with Department of Transportation, DHS, and Department of Energy (DOE) staff to discuss results and insights from this analysis, including UF<sub>6</sub> results, potential changes to the Emergency Response Guidebook, and radioactive material packages certified by the Nuclear Regulatory Commission and used at DOE sites.

Enclosures:

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3. Spent Fuel Transportation General Threat Framework Assessment
4. Radioactive Material General Threat Framework Assessment
5. Inventory of Sandia National Laboratories Reports Prepared for the Spent Fuel Project Office Framework Assessment

4b Ex 2  
000-581

**DISTRIBUTION:** (Ref. NSIR WITS 200500003)

SFPO r/f	NMSS r/f	RidsNmssOd	RidsNsirOd	AMadison	JMcKrgan
JArildsen	FSturz	SYoung	TAllen	MLayton	

ML053290260

OFC	SFPO	C	SFPO	C	SFPO	C	SFPO	E
NAME	BWhite:dmd1		SHelton		EThompson		LCampbell	
DATE	11/17/05		11/18/05		11/17/05		11/18/05	
OFC	SFPO		Tech Ed		SFPO		NMSS	
NAME	MWHodges		HChang		EWBrach		JStrosnider/mvf	
DATE	11/22/05		11/16/2005		11/25/05		12/09/05	

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~~—SAFEGUARDS INFORMATION—~~

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Encl. 1

~~SAFEGUARDS INFORMATION~~

(U) Spent Fuel Storage Large Plane Assessment

1.0 (U) INTRODUCTION

(SRI) In response to former Chairman Meserve's memorandum, "Response to Terrorist Acts," dated September 28, 2001, the staff, with assistance from Sandia National Laboratories (SNL), assessed the potential responses of four spent fuel storage cask designs to a terrorist attack by a large jetliner similar to the attacks on the World Trade Center and the Pentagon. SNL evaluated the structural response of each storage cask and the consequences to the public for a large-plane impact, and provided the Nuclear Regulatory Commission (NRC) with four reports (Smith et al., 2004a; Smith et al., 2004b; Smith et al., 2004c; and Smith et al., 2004d).

2.0 (U) STORAGE CASK DESCRIPTIONS

(U) The four storage cask designs evaluated were selected to be representative of four different groupings of designs, such that similar results would be expected for any design within that group. In choosing a storage cask to assess for each group (when there was more than one cask in a group), the NRC staff considered the number of casks of each design in use and the relative strength of each design, but chose neither the strongest nor the weakest design within each group.

2.1 (U) Un-reinforced Concrete

(SRI) The Model Number HI-STORM 100 Cask System (Docket Number 72-1014) is a thick-walled, vented, cylindrical cask which stands vertically.

The overall external dimensions of the cask are 132½ inches in diameter and 239½ inches high. The HI-STORM 100 storage cask is certified for up to 32 pressurized-water reactor (PWR) fuel assemblies or up to 68 boiling-water reactor (BWR) assemblies. The gross weight of the loaded cask is approximately 180 tons.

The HI-STORM 100 storage cask has several different basket designs, but no other vendors make storage cask designs similar to the HI-STORM 100.

Ex 2  
1a

Ex. 2  
1b

<sup>1</sup>(U) Dimensions for storage casks were taken from Licensee documents which are in English units, while calculations performed for this assessment used metric units.

~~SAFEGUARDS INFORMATION~~

~~SAFEGUARDS INFORMATION~~

2.2 (U) Steel Construction

(SRI) The Transnuclear Model Number TN-68<sup>2</sup> (Docket Number 72-1027) is also a cylindrical cask which stands upright and is mostly fabricated from carbon steel.

Ex 2  
2a

The TN-68 storage cask is certified for up to 68 BWR assemblies of the loaded TN-68 is approximately 115 tons.

Ex 2  
2b

2.3 (U) Reinforced Concrete, Vertical Orientation

(SRI) The Model Number Ventilated Storage Cask<sup>3</sup> (VSC-24, Docket Number 72-1007) is a thick-walled, vented, cylindrical cask which stands vertically.

Ex 2  
2c

approximately 145 tons.]

[The loaded cask weighs

Ex 2  
2d

2.4 (U) Reinforced Concrete, Horizontal Orientation

(SRI) The Model Number Standardized NUHOMS<sup>4</sup> (Docket Number 72-1004) horizontal storage module is a rectangular, vault-type structure.

Ex 2  
2e

The front wall of the horizontal storage module contains a circular port for dry-shielded canister loading.

Ex 2  
2f

<sup>2</sup>(U) Several vendors, other than Transnuclear, make casks of a design similar to the TN-68: (1) Model Number V-21 (Docket Number 72-1000), (2) Model Number X/33 (Docket Number 72-0002), (3) Model Number MC-10 (Docket Number 72-1001) and (4) Model Number HI-STAR 100 (Docket Number 72-1008). Additionally, Transnuclear has two storage cask designs similar to the TN-68: Model Number TN-32 (Docket Number 72-1021) and Model Number TN-40 (Docket Number 72-0002).

<sup>3</sup>(U) Storage cask designs similar to the VSC-24 include (1) the Model Number FuelSolutions Storage System (Docket Number 72-1026), (2) the Model Number NAC-UMS (Docket Number 72-1015), and (3) the Model Number NAC-MPC (Docket Number 72-1025).

<sup>4</sup>(U) The only other storage cask design similar to the Standard NUHOMS<sup>4</sup> is the Model Number Standardized Advanced NUHOMS<sup>4</sup> (Docket Number 72-1029). The Standardized NUHOMS<sup>4</sup> storage cask has several different basket designs. No other vendors make casks similar to the NUHOMS<sup>4</sup>.

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Ex 2  
3a

(The loaded cask weighs up to 125 tons.)

Ex 2  
3b

2.5 (U) Model Number NAC I28 S/T

(SRI) All casks other than the NAC I28 S/T, which was designed by Nuclear Assurance Corporation (currently NAC International, Inc.), belong in one of the four groups discussed previously.

Ex 2  
3c

3.0 (U) STRUCTURAL EVALUATION

Ex 3  
SGI  
3d

(U) SNL performed the structural analysis of the storage casks in two stages: a global analysis followed by a local analysis. The global analysis simplified the evaluation of a jetliner's impact into an array of casks by evaluating a direct impact of the jetliner fuselage into a storage cask. SNL performed the global analysis for all four storage casks using the CTH computer code (McGlaun et al., 1990) to determine (a) the velocity as a function of both time and distance for the primary cask, (b) momentum imparted to the primary cask, and (c) the force-time history applied to the cask during the jetliner impact.

(U) For the local analysis, SNL evaluated the effects of subsequent cask-to-cask impacts using the velocity at the time of the impacts and force-time history from the global analysis.

Ex  
2  
3e

3.1 (U) Un-reinforced Concrete (HI-STORM 100)

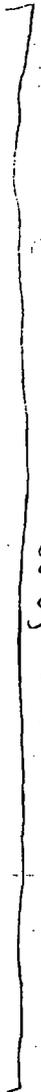
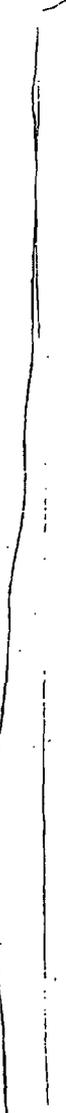
3.1.1 (U) Global Orientation

Ex3  
SGI  
4a

3.1.2 (U) Local Analysis

Ex3  
SGI  
4b

~~SAFEGUARDS INFORMATION~~



ExB  
SCI  
5a

~~SAFEGUARDS INFORMATION~~

~~SAFEGUARDS INFORMATION~~

3.2 (U) Steel Construction (TN-68)

3.2.1 (U) Global Analysis

Ex3  
SGI  
6a

3.2.2 (U) Local Analysis

Ex3  
SGI  
6b

3.3 (U) Reinforced Concrete, Vertical Orientation (VSC-24)

3.3.1 (U) Global Analysis

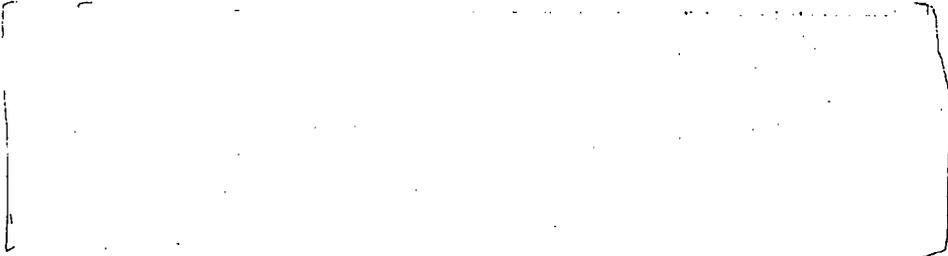
Ex3

SGI  
6c

3.3.2 (U) Local Analysis

Ex3  
SGI  
6d

~~SAFEGUARDS INFORMATION~~



Ex3  
SGI  
7a

3.4 (U) Reinforced Concrete, Horizontal Orientation (NUHOMS®-32PT)

3.4.1 (U) Global Analysis



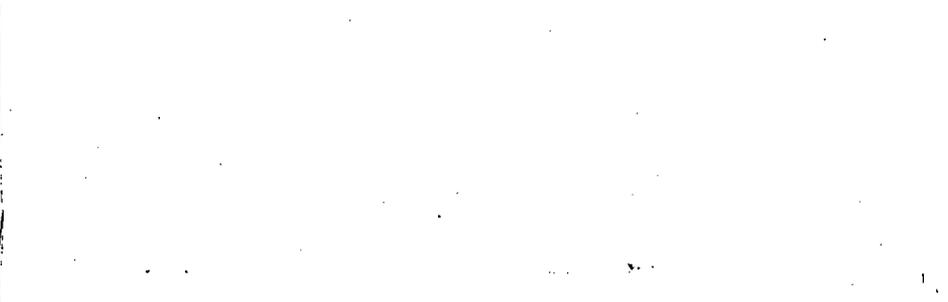
Ex3  
SGI  
7b

3.4.2 (U) Local Analysis

(SRI) Like the local analysis for the three vertical storage casks, the NUHOMS®-32PT local analysis applies the plane impact force as a function of time to the initial cask to determine the damage as well as any damage to subsequent casks. [

Ex2  
7c

The local analyses for the NUHOMS®-32PT was also performed using LSDYNA Version 9.60.



Ex3  
SGI  
7d

EX3  
SGI  
8a

4.0 (U) THERMAL EVALUATION

(U) A thermal analysis of the HI-STORM 100 cask was performed to bound the response of the cask to a fire resulting from the jetliner crash. SNL has obtained data on fire durations for large plane crashes that show for high speed crashes, most of the fuel would splash into the air on impact and be consumed in a large fireball.

EX2  
8b

EX2  
8c

5.0 (U) CONSEQUENCE EVALUATION

(SRI) A consequence analysis was performed for each storage cask.

EX3  
SGI  
8d

5.1 (U) Fuel Failure Evaluation

EX3  
SGI  
8e

Ex3  
SGI  
9a

5.2 (U) Dose Calculations

9b  
SGI  
Ex3

<sup>5</sup>(U) Formation of the rim layer is unique to high-burnup fuel; the rim layer does not form on average-burnup fuel pellets.

9c Ex3  
SGI

SGI  
EX3  
100

EX. 2  
10b

~~EX. 2~~

~~EX. 2~~

Fuel properties such as assembly type, burnup, and cooling time are contained in the SNL reports for each storage cask.)

SGI  
10c

5.3.1 (U) Un-reinforced Concrete (HI-STORM 100).

EX3  
SGI  
10d

Ex3  
SGI  
11a

5.3.2 (U) Steel Construction (TN-68)

Ex3  
SGI  
b

5.3.3 (U) Reinforced Concrete, Vertical Orientation (VSC-24)

Ex3  
SGI  
c

5.3.4 (U) Reinforced Concrete, Horizontal Orientation (NUHOMS®-32PT)

EX3  
SGI  
12a

6.0 (U) FRAMEWORK ASSESSMENT

(SRI) The staff's screening criteria for recommending additional mitigative measures were consistent with the decision-making framework, SECY-04-0222, "Decision-Making Framework for Materials and Research and Test Reactor Vulnerability Assessments," as approved by the Commission in SRM-SECY-04-0222. The framework was used to review the security assessment results to determine whether additional detailed analysis is warranted and whether mitigative strategies should be implemented.

UNC

ex. 2  
12b

7.0 (U) CONCLUSIONS AND RECOMMENDATIONS

(SRI) Based on the staff's review of the SNL reports, the staff recommends enacting no mitigative measures to protect spent fuel storage casks from a jetliner attack.

ex. 2  
12c

UNC

8.0 (U) REFERENCES

(U) American Nuclear Society Standards Committee Working Group ANS-6.1.1. "Neutron and Gamma-Ray Flux-to-Dose-Rate Factors." ANSI/ANS-6.1.1-1977, American Nuclear Society (Approved by the American National Standards Institute, Inc.), LaGrange Park, IL. 1977.

Ex 3  
SGI

13a

(U) Gauld, I.C., et al. "ORIGEN-ARP: Automatic Rapid Processing for Spent Fuel Depletion, Decay and Source Term Analysis." NUREG/CR-0200, Revision 7, Volume 1 Section D1 (ORNL/NUREG/CSD/V1/R7), Oak Ridge National Laboratory, Oak Ridge, TN. 2004.

(U) Koterak, J. R. and A. S. Gullerand. "PRESTO Users Manual." SAND2003-1089. Sandia National Laboratories, Albuquerque, NM. 2003.

(U) Livermore Software Technology Corporation. "LSDYNA Keyword User's Manual Volumes I and II, Version 960." Livermore Software Technology Corporation, Livermore, CA. 2001.

ex 2

13b

(U) McGlaun, J. M., S. L. Thompson, and M. G. Elrick. "CTH: A Three-Dimensional Shock Wave Physics Code." *International Journal of Impact Engineering*, Vol. 10, pp. 351-360. 1990.

(U) Oak Ridge National Laboratory Nuclear Science and Technology Division, "SCALE - A Modular Code System for Performing Standardized Computer Analyses for Licensing Evaluations." NUREG/CR-0200, Revision 7, Oak Ridge National Laboratory, Oak Ridge, TN. 2005.

ex 2

13c

(U) Smith, J. A., et. al., "Results of a Large Airplane Impact into a Field of Holtec HI-STORM Spent Nuclear Fuel Storage Casks." Sandia National Laboratories, Albuquerque, NM. 2004a. (This document is classified Confidential National Security Information).

(U) Smith, J. A., et. al., "Results of a Large Airplane Impact into a Field of Transnuclear TN-68 Spent Nuclear Fuel Storage Casks." Sandia National Laboratories, Albuquerque, NM. 2004b. (This document is classified Confidential National Security Information).

(U) Smith, J. A., et. al., "Results of a Large Airplane Impact into a Field of BNFL Fuel Solutions VSC-24 Spent Nuclear Fuel Storage Casks.: Sandia National Laboratories, Albuquerque, NM. 2004c. (This document is classified Confidential National Security Information).

(U) Smith, J. A., et. al., "Results of a Large Airplane Impact into a Field of NUHOMS® Spent Nuclear Fuel Storage Cask Systems." Sandia National Laboratories, Albuquerque, NM. 2004d. (This document is classified Confidential National Security Information).

~~SAFEGUARDS INFORMATION~~

(U) Sprung, J. L. et.al., "Evaluation of Severe Accident Risks: Quantification of Major Input Parameters." NUREG/CR-4551, Sandia National Laboratories, Albuquerque, NM. 1990.

(U) Talyor, L. M. and D. P. Flanagan. "PRONTO3D A Three-Dimensional Transient Solid Dynamics Program." SAND87-1912, Sandia National Laboratories, Albuquerque, NM. 1989.

(U) Tieszen, S. R., "Fuel Dispersal Modeling for Aircraft-Runway Impact Scenarios." SAND95-2529, Sandia National Laboratories, Albuquerque, NM. 1995

(U) U.S. Nuclear Regulatory Commission, "Decision-Making Framework for Materials and Research and Test Reactor Vulnerability Assessments," Commission Paper SECY-04-0222, November 2004. (Portions of Memorandum and attachments are classified up to Secret National Security Information.)

(U) U.S. Nuclear Regulatory Commission, "Aircraft Hittability Method and Results," Attachment 3 to "Communicating Methods and Results of Staff Studies of Mitigation Strategies for Aircraft Impacts," Commission Memorandum, September 11, 2003. (The attachment is classified Secret National Security Information.)

(U) Vaughan, D. K. and J. Mould. "FLEX User's Manual, Version 1-J6." Weidlinger and Associates. New York. 2000.

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**SAFEGUARDS INFORMATION**

**(U) Spent Fuel Storage General Threat Framework Assessment**

1.0 (U) BACKGROUND

(SRI) In response to former Chairman Meserve's memorandum, "Response to Terrorist Acts," dated September 28, 2001, and in accordance with SRM-SECY-04-0222, "Decision-Making Framework for Materials and Research and Test Reactor Vulnerability Assessments," the staff, with assistance from Sandia National Laboratories (SNL), performed a top-to-bottom review of all U.S. Nuclear Regulatory Commission (NRC)-licensed activities and evaluate those activities against threats similar to or exceeding the design basis threat (DBT).

(SRI) NRC contracted with SNL to perform assessments of land-based threats on four spent fuel storage casks. SNL was tasked to determine land-based threats of concern for storage casks and evaluate the potential source terms resulting from those threats. Sixteen threats of concern, including three scenarios that combined individual threats during one attack, were deemed feasible by SNL for storage casks, given the security requirements at an independent spent fuel storage installation (ISFSI) at the time of contract initiation.

1a Ex 2  
OUU-SR1

(SRI) SNL evaluated 15 of the threats of concern using in-house subject matter experts to estimate the potential release fractions from each spent fuel storage cask design in the "NRC Spent Fuel Source Term Guidance Document" (Yoshimura et al., 2004).

SG1  
1b Ex 3  
1c Ex 2  
OUU-SR1

None of the members of the expert panel were directly employed by SNL. Only one of the ten panel members was an NRC employee. The source terms were questioned and significantly revised as a result of the expert panel review, prior to endorsement by the expert panel.

1d Ex 2  
OUU-SR1

2.0 (U) STORAGE CASK DESCRIPTIONS

(U) The four storage cask designs evaluated were selected to be representative of four different groupings of designs, such that similar results would be expected for any design within that group. In choosing a storage cask to assess for each group (when there was more than one cask in a group), the NRC staff considered the number of casks of each design in use and the relative strength of each design, but chose neither the strongest nor the weakest design within each group.

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2.1 (U) Unreinforced Concrete

(SRI) The Model Number HI-STORM 100 Cask System (Docket Number 72-1014) is a thick-walled, vented, cylindrical cask which stands vertically.

Ex. 2  
2a

The overall external dimensions of the cask are 132½ inches in diameter and 239½ inches high. The HI-STORM 100 storage cask is certified for up to 32 PWR fuel assemblies or up to 68 BWR assemblies. The gross weight of the loaded cask is approximately 180 tons.

Ex. 2  
2b

The HI-STORM 100 storage cask has several different basket designs, but no other vendors make storage cask designs similar to the HI-STORM 100.

2.2 (U) Steel Construction

(SRI) The Transnuclear Model Number TN-68<sup>2</sup> (Docket Number 72-1027) is also a cylindrical cask which stands upright and is mostly fabricated from carbon steel.

Ex. 3  
2c

The TN-68 storage cask is certified for up to 68 BWR assemblies. The gross weight of the loaded TN-68 is approximately 115 tons.

Ex 2  
2d

2.3 (U) Reinforced Concrete, Vertical Orientation

(SRI) The Model Number Ventilated Storage Cask<sup>3</sup> (VSC-24, Docket Number 72-1007) is a thick-walled, vented, cylindrical cask which stands vertically.

EX 2  
2e

<sup>1</sup>(U) Dimensions for storage casks were taken from Licensee documents which are in English units, while calculations performed for this assessment used metric units.

<sup>2</sup>(U) Several vendors, other than Transnuclear, make casks of a design similar to the TN-68: (1) Model Number V-21 (Docket Number 72-1000), (2) Model Number X/33 (Docket Number 72-0002), (3) Model Number MC-10 (Docket Number 72-1001) and (4) Model Number HI-STAR 100 (Docket Number 72-1008). Additionally, Transnuclear has two storage cask designs similar to the TN-68: Model Number TN-32 (Docket Number 72-1021) and Model Number TN-40 (Docket N. 72-0002).

<sup>3</sup>(U) Storage cask designs similar to the VSC-24 include (1) the Model Number FuelSolutions Storage System (Docket Number 72-1026), (2) the Model Number NAC-UMS (Docket Number 72-1015), and (3) the Model Number NAC-MPC (Docket Number 72-1025).

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approximately 145 tons.

The loaded cask weighs

3a Ex 2  
OUU-SRI

3b Ex 2  
OUU-SRI

2.4 (U) Reinforced Concrete, Horizontal Orientation

(SRI) The Model Number Standardized NUHOMS®\* (Docket Number 72-1004) horizontal storage module is a rectangular vault-type structure.

3c Ex 2  
OUU-SRI

The front wall of the horizontal storage module contains a circular port for dry shielded canister loading.

OUU-SRI  
3d  
Ex 2

The NUHOMS® storage cask is certified for up to 32 PWR fuel assemblies or up to 68 BWR assemblies. The loaded cask weighs up to 125 tons.

3e Ex 2  
OUU-SRI

2.5 (U) Model Number NAC I28 S/T

(SRI) All casks other than the NAC I28 S/T, which was designed by Nuclear Assurance Corporation (currently NAC International, Inc.), belong in one of the four groups discussed previously. Two NAC I28 S/T storage casks are in use at the Surry Nuclear Power Plant. NAC I28 S/T casks are not being used at any other storage facilities. The storage cask is a multiwall design with a steel inner shell, and a steel outer shell. The volume between the two shells is filled with lead. The storage cask is closed by a bolted lid consisting of steel inner and outer closure plates, separated by lead shielding. The NAC I28 S/T is authorized to hold up to 28 intact PWR fuel assemblies, with a maximum burnup of 35,000 MWD/MTU and a minimum cooling time of 10 years. This storage cask has not been formally assessed, nor can it be directly compared to the four groups.

ex 2  
3f OUU-SRI

\* (U) The only other storage cask design similar to the Standard NUHOMS® is the Model Number Standardized Advanced NUHOMS® (Docket Number 72-1029). The Standardized NUHOMS® storage cask has several different basket designs. No other vendors make casks similar to the NUHOMS®.

3.0 (U) SCENARIO EVALUATION

(U)

- (SGI) Scenario 1 -
- (SGI) Scenarios 2, 3, and 4 -
- (SGI) Scenario 5 -
- (SGI) Scenario 6 -
- (SGI) Scenario 7 -
- (SGI) Scenario 8 -
- (SGI) Scenario 9 -
- (SGI) Scenario 10 -
- (SGI) Scenario 11 -
- (SGI) Scenario 12 -
- (SGI) Scenario 13 -
- (SGI) Scenario 14 -
- (SGI) Scenario 15 -
- (SGI) Scenario 16 -

DUO-SRI  
4a EX2

4b EX3  
SGI

4c  
EX. 2  
DUO-SRI

3.1 (U) Scenario Screening

(SRI) NSIR staff conducted a remote and speculative screening (Dorman, 2005) of the scenarios to remove from consideration scenarios that were not supported by the current threat environment.

4d  
EX. 2  
DUO-SRI

The following scenarios were removed from framework consideration by the remote and speculative screening:

- (SGI) Scenario 1 -
- (SGI) Scenario 5 -
- (SGI) Scenario 6 -
- (SGI) Scenario 10 -
- (SGI) Scenario 13 -
- (SGI) Scenario 14 -
- (SGI) Scenario 15 -

EX3  
SGI  
4e

SGI 4f  
EX3

(SRI) Based on the knowledge of the licensing basis and security at ISFS(s), the NRC further culled the remaining scenarios to remove from framework consideration those scenarios that

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either were already covered by the licensing basis for storage cask designs or are not feasible at a storage site. The following additional scenarios were removed:

- (SGI) Scenario 8 -
- (SGI) Scenario 9 -
- (SGI) Scenario 11 -
- (SGI) Scenario 16 -

5a SGI  
ex 3

ex 3  
SGI

5b

3.2 (U) Scenario Development

(U) Each scenario was developed to determine the number of attackers, weapons and an estimate of the time required for scenario completion.

ex 3  
SGI

5c

<sup>5</sup>(U) Under hypothetical accident conditions (10 CFR 71.73), 10 CFR 71.51(a)(2) allows the escape of up to a total amount  $A_2$  in 1 week for radioactive material other than krypton-85. Krypton-85 releases under hypothetical accident conditions cannot exceed  $10 A_2$  in 1 week.

~~SAFEGUARDS INFORMATION~~

~~SAFEGUARDS INFORMATION~~

ex3  
SGI  
6a

~~SAFEGUARDS INFORMATION~~

ex. 3  
SGI  
7a

4.0 (U) CONSEQUENCE ASSESSMENT METHODOLOGY

ex. 3  
SGI  
7b

ex 2  
7c

~~SAFEGUARDS INFORMATION~~

(U)

ex 2  
8a

~~SAFEGUARDS INFORMATION~~

ex 2  
9a

4.1.3 (U) Other Parameters

ex. 2  
9b

~~SAFEGUARDS INFORMATION~~

ex 2  
10a

(U) This table contains Security-Related information.

ex 2  
10b

~~SAFEGUARDS INFORMATION~~

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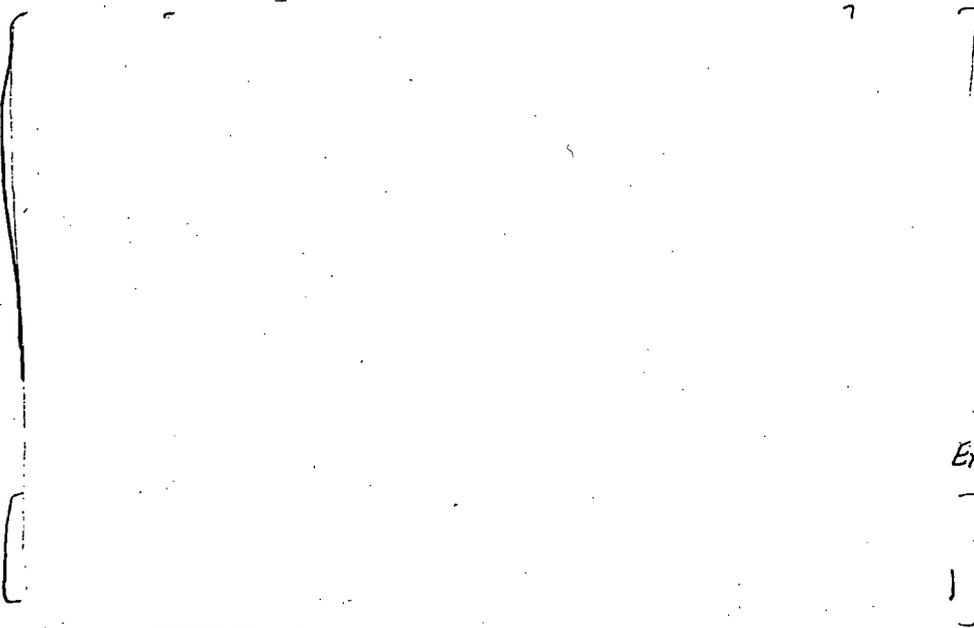
000-SRI  
Ex 2  
11a

5.0 (U) FRAMEWORK ASSESSMENT

(SRI) The framework in SECY-04-0222, "Decision-Making Framework for Materials and Research and Test Reactor Vulnerability Assessments," as supplemented by Attachment 6, was used to determine whether additional detailed analysis is warranted and whether mitigative strategies should be implemented. The scenario numbers above map the scenarios to their corresponding chapters in Yoshimura et al. (2004).

(SRI) The staff determined the scenario Attractiveness, using the guidance in Table 1, "Activity Specific Attractiveness Category Ranking Matrix," from Attachment 2<sup>6</sup> to the Framework, when the estimated potential consequences corresponded to Consequence Categories I - IV. The staff then used the Consequence and the Attractiveness to obtain a color finding from the Decision Matrix.<sup>7</sup>

ex. 2  
11b  
000-SRI



11c  
SGI  
Ex 3

Ex 3 11d  
SGI  
Ex 3 11e SGI

SGI  
Ex 3  
11f

<sup>6</sup>(U) ADAMS Accession # ML043200720, "Framework Methodology."

<sup>7</sup>(U) Figure 1 in Attachment 2 to SECY-04-0222, "Decision-Making Framework for Materials and Research and Test Reactor Vulnerability Assessments."

~~SAFEGUARDS INFORMATION~~

Ex3  
SGI  
12a

12b  
Ex2

SGI  
12c  
Ex3

~~SAFEGUARDS INFORMATION~~

EX3  
SGI  
13A

6.0 (U) CONCLUSIONS AND RECOMMENDATIONS

Based on the decision-making framework results, the current security measures are adequate, and the staff recommends that no additional mitigative measures be implemented to protect spent fuel storage casks from land-based threats.

ex  
2  
13b

7.0 (U) REFERENCES

(U) Aramayo, G., J. A. Smith, T. Caipan, "Analysis of a Large Blast Attack on a Transnuclear TN-68 Spent Nuclear Fuel Storage Cask." Sandia National Laboratories, Albuquerque, NM; 2004. (This document is classified Confidential National Security Information.)

ex  
2  
13c

(U) Dorman, D. H. "Results of NSIR Screening of Nuclear Facility Security Scenarios for Remote and Speculative Nature Prior to Use in Decision-Making Framework." Memorandum to M. W. Hodges, et al., US Nuclear Regulatory Commission, March 9, 2005. (Portions of this memorandum and attachments are classified up to Secret National Security Information.)

(U) Gauld, I. C., et al.; "ORIGEN-ARP: Automatic Rapid Processing for Spent Fuel Depletion, Decay, and Source Term Analysis." Oak Ridge, TN: Oak Ridge National Laboratory; NUREG/CR-0200, Revision 7, Volume 1, Section D1 (ORNL/NUREG/CSD/V1/R7). 2004.

EX  
2  
13d

~~SAFEGUARDS INFORMATION~~

(U) Knoll, G.F. *Radiation Detection and Measurement*. Third edition. Wiley. 2000.

(U) Kipp, M. E., et al. "Response of the HI-STORM Spent Nuclear Fuel Storage Cask to a Large Explosive Charge Blast." Sandia National Laboratories, Albuquerque NM. 2004 (sic). (This document is classified Confidential National Security Information.)

(U) Smith, J. A., et. al.; "Results of a Large Airplane Impact into a Field of Holtec HI-STORM Spent Nuclear Fuel Storage Casks." Sandia National Laboratories, Albuquerque, NM. 2004a. (This document is classified Confidential National Security Information.)

(U) Smith, J. A., et. al. "Results of a Large Airplane Impact into a Field of Transnuclear TN-68 Spent Nuclear Fuel Storage Casks." Sandia National Laboratories, Albuquerque, NM. 2004b. (This document is classified Confidential National Security Information.)

(U) Smith, J. A., et. al. "Results of a Large Airplane Impact into a Field of BNFL Fuel Solutions VSC-24 Spent Nuclear Fuel Storage Casks." Sandia National Laboratories, Albuquerque, NM. 2004c. (This document is classified Confidential National Security Information.)

(U) Smith, J. A., et. al. "Results of a Large Airplane Impact into a Field of NUHOMS® Spent Nuclear Fuel Storage Cask Systems." Sandia National Laboratories, Albuquerque, NM. 2004d. (This document is classified Confidential National Security Information.)

(U) Smith, J. A., et. al. "Analysis of a Large Blast Attack on a NUHOMS® Spent Nuclear Fuel Storage Cask System." Sandia National Laboratories, Albuquerque NM. 2005a. (This document is classified Confidential National Security Information.)

(U) Smith, J. A., et. al. "Analysis of a Large Blast Attack on a BNFL Fuel Solutions Corporation VSC-24 Spent Nuclear Fuel Storage Casks." Sandia National Laboratories, Albuquerque, NM. 2005b. (This document is classified Confidential National Security Information.)

(U) U.S. Nuclear Regulatory Commission, "Staff Requirements - Discussion of Security Issues, 2:30 P.M., Friday April 11, 2003, Executive Conference Room, One White Flint North Rockville, Maryland (Closed Meeting)" SRM-M030411C, April 2004.

(U) U.S. Nuclear Regulatory Commission, "Decision-Making Framework for Materials and Research and Test Reactor Vulnerability Assessments," SECY-04-0222, November 2004. (Portions of Memorandum and attachments are classified up to Secret National Security Information.)

(U) Yoshimura, R. H. et. al. "NRC Spent Fuel Source Term Guidance Document, Sandia National Laboratories." Albuquerque NM. 2004. (This document is classified Confidential National Security Information.)

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Ex 2  
14a

Ex 2  
14b

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entire document  
releasable

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**Inventory of Sandia National Laboratories Reports  
Prepared for the Spent Fuel Project Office  
Framework Assessments**

1. Smith, J. A., et. al. "Results of a Large Airplane Impact into a Field of Holtec HI-STORM Spent Nuclear Fuel Storage Casks." Sandia National Laboratories, Albuquerque, NM. 2004a. (This document is classified Confidential National Security Information).
2. Smith, J. A., et. al. "Results of a Large Airplane Impact into a Field of Transnuclear TN-68 Spent Nuclear Fuel Storage Casks." Sandia National Laboratories, Albuquerque, NM. 2004b. (This document is classified Confidential National Security Information).
3. Smith, J. A., et. al. "Results of a Large Airplane Impact into a Field of BNFL Fuel Solutions VSC-24 Spent Nuclear Fuel Storage Casks.: Sandia National Laboratories, Albuquerque, NM. 2004c. (This document is classified Confidential National Security Information).
4. Smith, J. A., et. al. "Results of a Large Airplane Impact into a Field of NUHOMS® Spent Nuclear Fuel Storage Cask Systems." Sandia National Laboratories, Albuquerque, NM. 2004d. (This document is classified Confidential National Security Information).
5. Smith, J. A., et. al. "Analysis of a Large Blast Attack on a NUHOMS® Spent Nuclear Fuel Storage Cask System." Sandia National Laboratories, Albuquerque NM. 2005a. (This document is classified Confidential National Security Information.)
6. Smith, J. A., et. al. "Analysis of a Large Blast Attack on a BNFL Fuel Solutions Corporation VSC-24 Spent Nuclear Fuel Storage Casks." Sandia National Laboratories, Albuquerque, NM. 2005b. (This document is classified Confidential National Security Information.)
7. Aramayo, G., J. A. Smith, T. Caipan, "Analysis of a Large Blast Attack on a Transnuclear TN-68 Spent Nuclear Fuel Storage Cask." Sandia National Laboratories, Albuquerque, NM; 2004. (This document is classified Confidential National Security Information.)
8. Kipp, M. E., et al. "Response of the HI-STORM Spent Nuclear Fuel Storage Cask to a Large Explosive Charge Blast." Sandia National Laboratories, Albuquerque NM. 2004 (sic). (This document is classified Confidential National Security Information.)
9. Yoshimura, R. H. et. al. "NRC Spent Fuel Source Term Guidance Document." Sandia National Laboratories, Albuquerque NM. 2004. (This document is classified Confidential National Security Information.)

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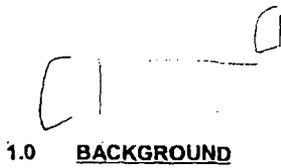
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10. Smith, J. A., et al. "Results of a Large Plane Impact into a NAC International , UMS Universal Spent Nuclear Fuel Transportation Package." Sandia National Laboratories, Albuquerque, NM. 2003. (This document is classified Confidential National Security Information.)
11. Kipp, M. E., D. J. Ammerman, and J. A. Smith. Response of the NLI-1/2 Truck Cask to Terrorist Attacks." Sandia National Laboratories, Albuquerque, NM; 2004a. (This document is classified Confidential National Security Information.)
12. Kipp, M. E., D. J. Ammerman, and J. A. Smith. Response of a NAC-UMS<sup>®</sup> Cask to an Explosive Charge Blast." Sandia National Laboratories, Albuquerque, NM 87815; 2004b. (This document is classified Confidential National Security Information.)
13. Yoshimura, R. H., et al. NRC Non-Spent Fuel Spent Fuel Source Term Guidance Document." Sandia National Laboratories, Albuquerque, NM. 2004.

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UNCLASSIFIED



1.0 **BACKGROUND**

Ex 2  
1a  
Ex 2  
1b

Ex 2  
1c

UNCLASSIFIED

2/9/08 MASTER

00 137

UNCLASSIFIED

Ex. 2  
2a

UNCLASSIFIED

2

00 138

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UNCLASSIFIED

E2  
3a

UNCLASSIFIED

3

00 139

UNCLASSIFIED

Ex 2  
4a

UNCLASSIFIED

4

00 140

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UNCLASSIFIED

Ex-2  
5a

UNCLASSIFIED

5

00 141

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Ex. 2  
6 a

3.0 REFERENCES

Ex. 2  
6 b

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SECRET

POLICY ISSUE  
NOTATION VOTE

November 24, 2004

SECY-04-0222

**FOR:** The Commissioners

**FROM:** Luis A. Reyes  
Executive Director for Operations

**SUBJECT:** DECISION-MAKING-FRAMEWORK FOR MATERIALS AND  
RESEARCH AND TEST REACTOR VULNERABILITY  
ASSESSMENTS

**PURPOSE:**

To gain Commission approval of the proposed vulnerability assessment (VA) decision-making framework and Commission direction on the associated policy issues.

**SUMMARY:**

The attached decision-making framework embodies the process and criteria the staff will use to evaluate and incorporate the results of VAs into future security measures for materials and research and test reactor (RTR) licensees. It includes criteria to screen out unrealistic

**CONTACT:** William Orders, DNS/NSIR  
(301) 415-7923

Patrick Madden, NRR  
(301) 415-1188

David Tiktinsky, NMSS  
(301) 415-6195

Bernard White, NMSS  
(301) 415-8515

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Upon separation of Attachments 1, 5, and 6, this document is OFFICIAL USE ONLY

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scenarios and consequences and a process to identify scenarios that warrant further consideration. It has been informed by several independent comprehensive VA methodologies including but not limited to the Risk Analysis and Management for Critical Assets Protection (RAMCAP) methodology developed by the American Society of Mechanical Engineers (ASME), for the U.S. Department of Homeland Security (DHS).

The current framework would employ the consequence criteria of prompt fatalities from radiation exposure and chemical effects associated with radioactive material processes (i.e.,  $UF_6$ ). However, the staff recognizes that including additional consequence criteria such as latent fatalities, land contamination, and non-process chemical risks in the framework may be warranted. The staff recommends that the Commission approve the proposed VA decision-making framework and requests a Commission policy decision on the need for consideration of additional consequence criteria.

With respect to engaging the regulated industry, the staff recommends that the Commission approve the staff engaging the Nuclear Energy Institute (NEI) as well as the fuel cycle and RTR licensees subsequent to screening the VAs through the framework and requests a Commission policy decision on the timing and extent of those interactions.

#### BACKGROUND:

On July 29, 2004, the Commission was briefed by the staff on the status of VAs for certain materials licensees and RTRs. The Commission provided guidance in a subsequent Staff Requirements Memorandum (SRM), SRM-040729B (ML042430412), dated August 30, 2004, that required, in part, development of a simple, clear decision-making framework for Commission approval. The Commission directed that this decision-making framework contain the process and the criteria that the staff will use to evaluate and incorporate the results of the VAs into any future security measures for materials and RTR licensees. Further, the Commission directed that the framework include criteria to screen out unrealistic and unreasonable scenarios and consequences and a process for the staff to independently identify scenarios that warrant further consideration. The staff was also directed to engage the regulated industry to validate scenarios and their significance, to obtain insights on reasonable mitigative strategies and to provide a realistic schedule to complete the VAs.

In response to the SRM, an NRC interoffice team was formed to collaboratively develop the required VA decision-making framework. The framework development team is composed of staff from the Offices of Nuclear Security and Incident Response (NSIR), Nuclear Reactor Regulation (NRR), Nuclear Material Safety and Safeguards (NMSS), and Nuclear Regulatory Research (RES).

Consistent with the Commission's direction, VA work was minimized, pending completion of the framework.

DISCUSSION:

The decision-making framework has been developed as a tool for NRC use to determine the appropriate level of mitigative strategies required for a given threat scenario. Threat scenarios were generated by the appropriate program office, in collaboration with NSIR's Threat Assessment Section, to ensure scenario realism (Threat Assessment for Non-Power Reactors and Non-Category I Fuel Cycle Facilities, Attachment 1). Use of the decision-making framework will lead the staff to one of three results: red, yellow, or green.

A red result indicates that additional assessment of the scenario is warranted. A yellow result indicates that maintaining the existing security requirements are warranted, and that the staff should evaluate the continued need for the additional security measures (ASMs) implemented since September 11, 2001. A green result for the selected consequence criteria indicates that current security requirements are adequate, and that the scenario may be eliminated from further consideration. The staff plans to assess results of the physical security reviews to determine if easy to implement, low-cost measures can be made that would improve detection, assessment, delay, or response to a security event. The results of the assessments and recommended actions will be provided to the Commission for consideration.

The proposed decision-making framework does not include Category I fuel cycle facilities or nuclear power plants. These facilities are required to successfully protect against capabilities described in a design basis threat. Consequently, these facilities will not be subjected to the additional screening process called for in the decision-making framework.

Several methodologies for conducting and evaluating comprehensive VAs for different types of assets are currently under development. In particular, the ASME, in cooperation with numerous stakeholders, is funded by DHS to develop the RAMCAP methodology. This methodology is designed to inform the allocation of resources to protect infrastructure components. The methodology begins with consequence-only screening analysis for a specified asset category in consideration of an assumed threat. These consequences are quantified to the extent practicable to provide a basis for comparison of risks across industry sectors and to provide meaningful input to the decision-making process. The screening analysis offers the means to decide which assets should be further assessed using the detailed methodology contained in the RAMCAP guidance. In conjunction with this process, many industry sector organizations, including the American Petroleum Institute, the National Petrochemical and Refiners Association, and the American Institute of Chemical Engineers, are engaged in VA work.

Rather than adopting RAMCAP, the staff developed its own methodology that was informed by these methodologies. While the framework is not actually a risk assessment, as is the draft RAMCAP methodology, the overall methodology is consistent with the general considerations in the draft RAMCAP methodology with criteria established specifically for materials and RTR licensees. The framework is a three-step decision-making process summarized below.

The first step in the decision-making process is the determination of the asset attractiveness ranking. Five attractiveness factors, each valued one through five, are averaged to obtain the overall attractiveness ranking. The attractiveness factors are discussed in the Framework

Methodology, Attachment 2. The overall, numerical attractiveness ranking is converted to an alphabetical Attractiveness Category (A through E), shown in the attractiveness ranking matrix. Category A indicates greater asset attractiveness and category E indicates lesser asset attractiveness. Unrealistic and unreasonable scenarios would screen out whereas more attractive scenarios may warrant further consideration.

The second step in the decision-making process is the consequence category. The current process uses prompt fatalities as the sole consequence criteria, and in general, the prompt fatality consequences can be quantified for radiation and chemical effects for realistic threat scenarios. Security reviews and evaluations will be used to develop realistic activity-specific scenarios. Consequence evaluation criteria are discussed in Technical Basis for Acute Radiation Prompt Fatalities and Technical Basis for Chemical Related Prompt Fatalities, Attachments 3 and 4 respectively. The Consequence (Estimated Effect) Matrix in the framework is used to relate the number of prompt fatalities to a Consequence Category ranging from I to V. Category I relates to thousands of prompt fatalities, and category V relates to no prompt fatalities.

Note that the RAMCAP methodology highest consequence category is tens of thousands of prompt fatalities, while the staff highest category is in the thousands of prompt fatalities. Similarly the staff's proposed framework starts at one category lower than the RAMCAP methodology. Therefore, if NRC-licensed assets are to be directly compared with the RAMCAP generated results, adjustments would be needed. It should also be noted that consistent with the RAMCAP guidance, scenarios resulting in no prompt fatalities are screened out and are not put through the framework decision-making process.

The third step in the decision-making process uses the Attractiveness Category from the first step and the Consequence Category from the second step in a decision matrix to determine whether mitigative strategies are appropriate, as discussed in the framework. The decision matrix indicator (red, yellow or green) yields insights regarding the need for certain security requirements, beyond the established regulatory minimums, as well as where ASMs can be lessened, to allow for more efficient use of physical protection resources. Finally, the decision matrix may be used to prioritize NRC efforts on materials and RTR licensees.

The validity and value of the proposed VA decision-making framework can best be demonstrated through the application of the framework. Two example cases, Application of the Decision Making Framework to a Postulated Security Event Scenario at a Research Reactor and Application of the Decision Making Framework to a Postulated Security Event Scenario at a Fuel Cycle Facility are provided as Attachments 5 and 6, respectively. These diverse examples demonstrate the scope of application of the VA decision-making framework.

#### ASSOCIATED POLICY ISSUES:

##### Consequence Criteria

As discussed in this paper, the consequences considered are prompt fatalities from radiation exposure and those chemical effects associated with radioactive material processes (i.e.,  $UF_6$ ).

The Commissioners

Past Commission policy and practice has varied with respect to consideration of consequence criteria. The proposed VA decision-making framework uses only prompt fatalities as a consequence criterion.

It is also recognized that other guidance, such as the draft RAMCAP methodology, uses other consequence criteria. For example, RAMCAP uses criteria such as economic, environmental, national security, symbolic and sociopolitical impacts, and loss of output or production capability as metrics for national level screening.

Other related radiological consequence criteria that could be incorporated in the framework include latent fatalities, land contamination, and chemical risks due to plant conditions which affect the safety of radioactive materials (e.g., ammonia tanks). Including some of these consequence criteria may also be consistent with the goal, in the NRC's Strategic Plan, to ensure protection of public health and safety and the environment, and also with the section on commercial nuclear reactors in the National Infrastructure Protection Plan. There are various points of view within the staff on the need for additional criteria, e.g., land contamination.

The staff also recognizes that exposure to certain radioactive materials, (e.g., well logging sources) would not result in a prompt fatality or the need for additional measures. However, using other consequence criteria (e.g., land contamination) may require additional security measures.

Note, if the Commission decides to add other consequence criteria to the staff's VA decision-making framework, integration of any of these consequence measures and associated thresholds into this framework would require further developmental effort, time and additional resources. Consequence metrics for these measures would need to be developed for Categories I through V, similar to the framework's prompt fatality consequence ranges. Additionally, recommendations on modifying security measures would be made after considering any additional consequence measures.

#### Communications with Licensees

The August 30, 2004, SRM stated that the staff should engage the regulated industry to validate scenarios and their significance and obtain insights on reasonable mitigative strategies. The SRM also stated that the Contractor VA reports should not be shared with anyone outside of NRC without Commission approval. The staff has had initial discussions with NEI on their role in the review of fuel cycle facility VAs. NEI expressed a desire to interact with the staff on the framework methodology and the implementation of that methodology on a site-by-site basis, as well as, provide input on the information in the fuel cycle VA reports.

The staff could engage the fuel cycle licensees prior or subsequent to screening the scenarios through the Commission-approved framework criteria. This could include interactions on the framework criteria as desired by NEI. The staff believes that the most efficient and effective use of resources would be to interact with the fuel cycle licensees and NEI on scenarios that did not screen out using the framework.

The Commissioners

NEI's involvement would be limited to documents and discussions at the Safeguards Information level (SGI) based on their current security clearances and their "need to know". Discussions at higher classification levels would only take place with appropriately cleared fuel cycle licensee staff. Consistent with SECY-04-0093, "Sharing Vulnerability Assessment Information with Licensees and Certificate Holders Regulated by the Office of Nuclear Materials Safety and Safeguards", the staff will inform the Commission prior to sharing information with the industry.

The extent to which NRC interacts with NEI and the industry may impact both the resources needed to complete the VAs and the schedule. The staff also requests a Commission policy decision on the timing and extent of interactions with NEI, as well as, the fuel cycle and RTR licensees.

RESOURCES:

Implementation of the VA decision-making framework, as described in this paper and its attachments, for applicable licensees is expected to require approximately 5.8 FTE in FY 2005. These resources are not currently budgeted and would be expended in a coordinated effort as follows: NMSS (2.5 FTE), NRR (1.0 FTE), NSIR (2.2 FTE), and RES (0.1 FTE). These resource estimates include development of recommendation report for additions/reductions to security measures and interactions with NEI, licensees and other industry coordination. On the basis of framework approval as presented, the staff does not anticipate additional contractor funding.

Resources and associated impacts of the add/shed process to support these activities will be identified and sent to the Commission by December 3, 2004.

RECOMMENDATIONS:

The staff recommends that:

- A. the Commission approve the proposed VA decision-making framework using prompt fatalities. A realistic schedule for providing the VA recommendation reports is eight months after the Commission approves the framework.
- B. the Commission approve the process of conducting the screening, consulting with the Commission the results, and then engaging NEI as well as the fuel cycle and RTR licensees to validate scenarios, potential consequences and mitigative strategies, subsequent to screening the VAs through the framework.

COORDINATION:

The Office of the General Counsel has reviewed this paper and has no legal objection.

The Office of the Chief Financial Officer has reviewed this Commission paper for resource implications and has no objection.

*/M. Virgilio acting for/*  
Luis A. Reyes  
Executive Director  
for Operations

Attachments:

1. Threat Assessment for Non-Power Reactors and Non-Category I Fuel Cycle Facilities
2. Framework Methodology
3. Technical Basis for Acute Radiation Prompt Fatalities
4. Technical Basis for Chemical Related Prompt Fatalities
5. Application of the Decision Making Framework to a Postulated Security Event Scenario at a Research Reactor
6. Application of the Decision Making Framework to a Postulated Security Event Scenario at a Fuel Cycle Facility

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 Commission Paper Accession No. ML043080303

Attachments Accession Nos:

- Attachment 2 ML042300720
- Attachment 3 ML043200729
- Attachment 4 ML043200761

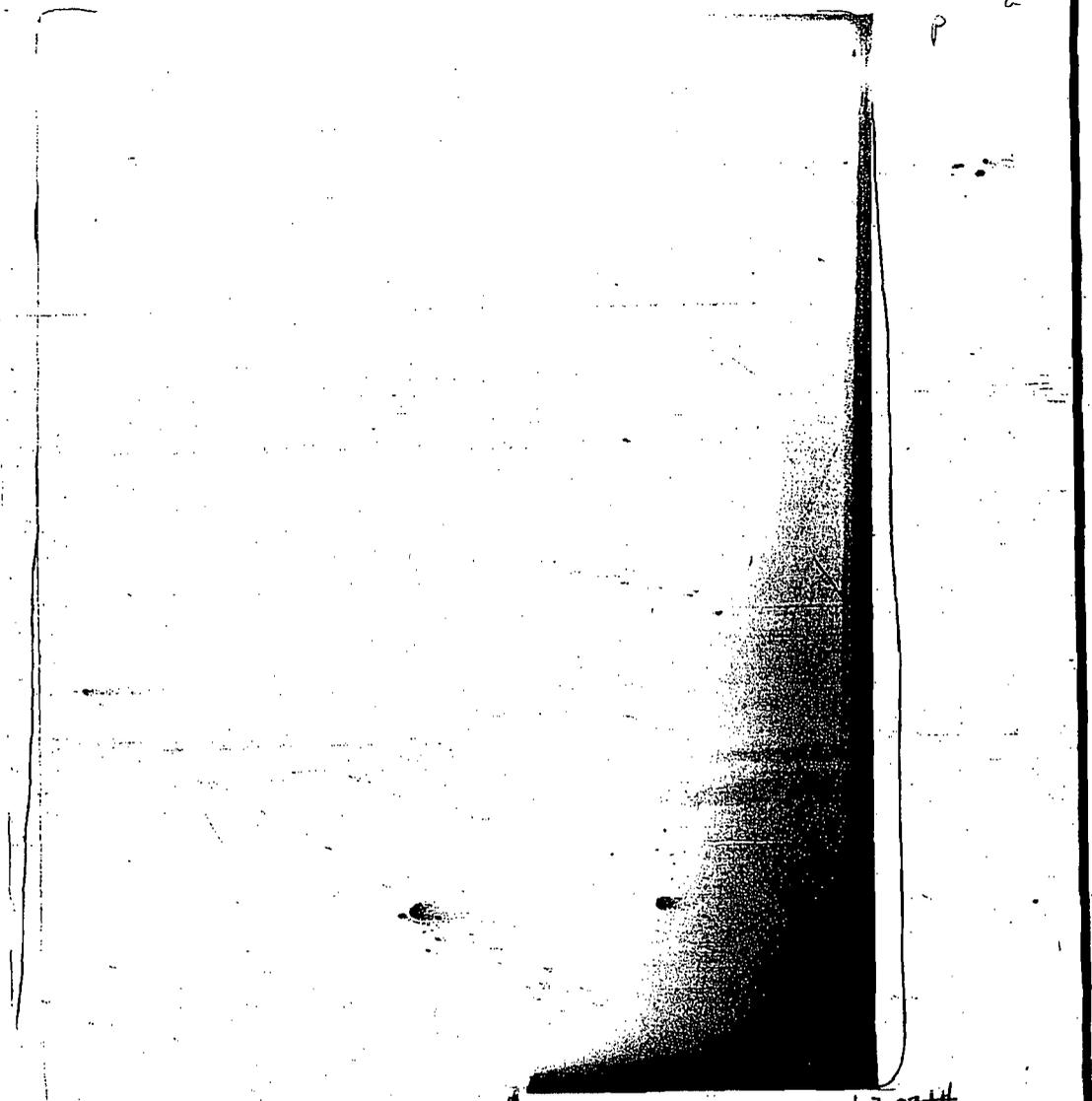
\* See previous Concurrence.

OFC	NSIR:VAIR	NMSS:TSG	NRR:	NMSS:	NSIR:
NAME	WOrders*	DTiktinsky*	PMadden*	BWhite*	GTracy
DATE	11/ 17 /04	11/ 17 /04	11/ 17 /04	11/ 17 /04	11/ /04
OFC	NRR:D	NMSS:D	RES:D	CFO:D	OGC
NAME	JDyer*	JStrosnider*	CPaperiello*	JFunches*	JGoldberg*
DATE	11/ 17 /04	11/ 17 /04	11/ 19 /04	11/ 18 /04	11/ 16 /04
OFC	NSIR:D	DEDH	DEDMRS	EDO	
NAME	RZimmerman*	WKane	MJVirgilio	LReyes	
DATE	11/ 17 /04	11/ /04	11/ 24 /04	11/ 24 /04	

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Threat Assessment for Non-Power Reactors and Non-Category I Fuel  
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**Framework Methodology**

The staff's framework to assess the need for mitigative strategies for potential vulnerabilities has been developed considering the assessment guidance proposed for the Department of Homeland Security (DHS).<sup>1</sup> The DHS ranking and assessment process uses estimates of potential consequence in conjunction with estimated likelihoods of attack. The staff's decision-making framework will utilize estimates of potential consequences, in terms of prompt fatalities for various security event scenarios, in conjunction with asset attractiveness, instead of estimated likelihood of attack.

Only the activities that passed an initial screening will be considered in the staff's decision-making framework. The asset attractiveness will be categorized using a qualitative assessment that considers several factors. The values of the asset attractiveness and estimated consequences are used in a decision matrix (see Figure 1, "Decision Matrix") to determine whether mitigative strategies are necessary.

Decision Matrix <sup>2</sup>					
	Consequence				
	V	IV	III	II	I
			YELLOW		

Figure 1

The scenarios that fall in the **RED** range will be assessed for activity-specific mitigative strategies and options. For scenarios in the **GREEN** range, current security requirements are adequate and no further action will be required. The activities in the **GREEN** for the selected

<sup>1</sup>American Society of Mechanical Engineers in collaboration with: American Institute of Chemical Engineers, American Nuclear Society, American Petroleum Institute, American Society of Civil Engineers, American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., Institute of Electrical and Electronics Engineers Nuclear Energy Institute, "Risk Analysis and Management for Critical Asset Protection: General Guidance," July 30, 2004, Draft, section 3.3.2. "Level 2: Quantitative Risk Analysis Screening"

<sup>2</sup>This matrix has fewer categories than those recommend in foot note 1, because it is not practical for most NRC-licensed facilities to reach the more severe consequence categories or the more likely categories noted by the reference. Consequence category of I is more severe than II and so forth, and attractiveness category of A is more probable than B and so forth.

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consequence criteria will then be screened from further consideration. For activities that fall in the **YELLOW** range, the staff will evaluate the need to maintain compensatory measures and will consider adding those measures to relevant security requirements (e.g., incorporated into security plans).

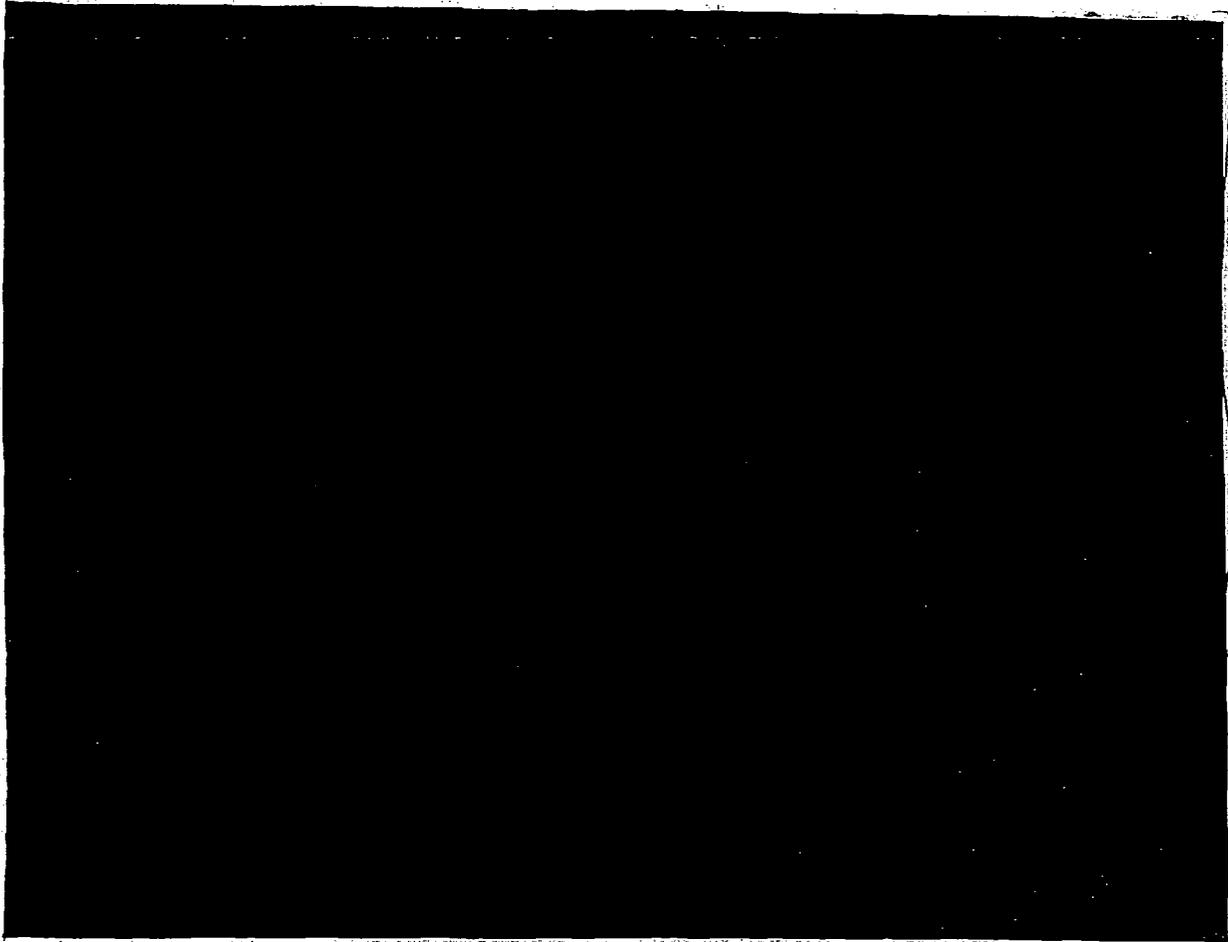
**Attractiveness**

Several factors will be qualitatively assessed to determine the attractiveness category for an activity. The factors, identified in Table 1, "Activity-Specific Attractiveness Category Ranking Matrix," are iconic value (ICON), complexity of planning (CP), resources needed (RN), execution risk (ER), and public protection measures (PM). (It should be noted that for threats with an immediate release of radioactive material, there is insufficient time in the scenario for public protection measures to have any impact on scenario completion, and this factor does not contribute to the attractiveness ranking. In this case, there are only four factors to determine the Activity Specific Attractiveness Category (see foot note for Table 2)). The documentation of this qualitative assessment will form the basis for selecting a numerical value (1 through 5) for each specific category. For example, if a value of 3 is assigned for the category resources needed (RN) the qualitative assessment will have to reasonably demonstrate that it would take several adversaries, heavily armed, with explosives, and combat tactical training to achieve their goal.

Once the individual numerical values for each attractiveness factor are determined, they are averaged to determine the overall attractiveness value. This value is converted to category A, B, C, D, or E using Table 2, "Alpha-numeric Conversion for Determining Attractiveness Category."

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Attractiveness Value Range	0 - 1.0	1.0 - 2.0	2.0 - 3.0	3.0 - 4.0	4.0 - 5.0
Category Conversion	A	B	C	D	E

**Estimated Consequences**

The radiological consequences caused by an event are estimated in terms of prompt fatalities caused by direct exposure to radiation, inhalation of radioactive material, or chemical exposure. The calculated consequence estimate can be used in Table 3, "Consequences" to determine the appropriate consequence category. For example, estimated fatalities, from a given scenario, in the single digits would be classified as a Level IV consequence event.

Prompt Fatalities	Consequence Category
Thousands	I
Hundreds	II
Tens	III
Single Digits	IV
None	V

**Decision - Making**

Upon determining the attractiveness category and the consequence level, Figure 1, "Decision Matrix" will be used to determine if a scenario falls into the red, yellow, or green areas. The color is then matched up with the mitigative strategy assessment actions in Table 4, "Need to Develop Mitigative Strategies." For example, if the activity specific attractiveness category was determined to be an "A" and the consequence was estimated to be "Level II", the overall attractiveness would be a RED condition. Table 4 would then direct the analyst to assess and develop activity specific mitigative strategy options, beyond existing security/general requirements, and recommendations for Commission consideration.

<sup>3</sup>Consequence evaluation of prompt fatalities related to radiological (or chemical) exposure resulting from facility sabotage, theft of material used as a radiological exposure device or radiological exposure, or transportation sabotage will be developed by the respective programs within NMSS and NRR.

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<b>Table 4 - Need to Develop Mitigative Strategies</b>	
	Assess and develop activity specific mitigative strategy options, beyond existing security/general requirements, and recommendations for Commission consideration.
Yellow Conditions	Maintain existing security/general requirements. Evaluate the need to maintain Compensatory Measures. Add required Compensatory Measures to the relevant specific requirements.
	Acceptable - Screen from further consideration and maintain existing security requirements. Eliminate unnecessary compensatory measures.
Activity Specific Conditions	Assess results of the activity specific security enhancement assessments to determine if easy to implement low cost measures can be instituted that would improve detection, assessment, delay, or response to a security event.

## TECHNICAL BASIS FOR CHEMICAL RELATED PROMPT FATALITIES

Chemical effects differ from radiation effects in several key characteristics:

- Chemical effects are deterministic and predispose towards certain conditions and mortality.
- Chemical effects are receptor dependent - healthy adult workers respond differently than the general population. The public includes an age spectrum, and susceptible and hyper-susceptible individuals (e.g., asthmatics) who experience adverse symptoms at much lower concentrations.
- Chemical concentrations and effects are inversely related to exposure times (i.e., in general, people can tolerate higher concentrations for shorter durations).
- Chemical exposure effects are nonlinear and chemical specific.
- A maximum chemical concentration limit usually exists; beyond this, the probability of fatality is very high.

The airborne chemical levels selected for the VA framework are called Acute Exposure Guideline Levels, or AEGLs for short. Derivation of AEGL values occurs through a Federal Advisory Committee process that includes participation from the National Academy of Sciences, the EPA, and stakeholders. AEGLs represent threshold exposure limits below which the stated adverse health effects are not likely to occur for most members of the general public. Three levels - AEGL-1, AEGL-2, and AEGL-3 - are developed for each of five exposure time periods (10 minutes, 30 minutes, 1 hour, 4 hours, and 8 hours). The VA framework uses the AEGL duration that was determined to best correspond to the timeframe of the specific scenario under consideration. Each AEGL level represents an increasing level of severity of the effects; AEGL-1 represents a level above which notable discomfort and/or irritation are experienced, AEGL-2 represents a level above which irreversible or long-lasting adverse effects are experienced, and AEGL-3 represents the level above which life-threatening effects or death are experienced. Final AEGL values have been published for uranium hexafluoride and hydrogen fluoride; interim values are available for other chemicals of interest at fuel cycle facilities.

Uranium uptake uses the value of 230 mg from NUREG-1391 for 50% lethality. The NRC/PNL document on uranium uptake identifies a range of 200-300 mg for lethality; 200 mg approximates the onset of lethality and 300 mg represents a high percentage of potential fatalities in the exposed population.

Chemical concentrations and effects are deterministic to individuals. However, for a simple rating scale based upon exposure observations, the following levels were used in the VA:

- Level I: Likely fatalities, many may be prompt. The basis is the specific value from the AEGL Technical Support Document on the chemical of interest, adjusted to different times by the ratio of the AEGL-3s. For a 10 minute HF exposure, this is 260 ppm; for a 30 minute exposure, this is 95 ppm; and for a 60 minute exposure, this is 67 ppm. Uranium intake exceeds 300 mg.

Attachment 3

- Level II: Probable fatalities - approximately the lethal level for 50% of the population. Some fatalities may be prompt. The basis is exceeding AEGL-3. For a 10 minute HF exposure, this is 170 ppm; for a 30 minute exposure, this is 62 ppm; and for a 60 minute exposure, this is 44 ppm. Uranium intake exceeds 230 mg.
- Level III: Onset of fatality range - increased risk/potential for a few offsite fatalities in large offsite populations. The basis is exceeding AEGL-2. For a 10 minute HF exposure, this is 95 ppm; for a 30 minute exposure, this is 34 ppm; and for a 60 minute exposure, this is 24 ppm. Uranium intake exceeds 200 mg.
- Level IV: No likely fatalities but potential for significant and/or disabling health impacts requiring hospitalization/treatment. The basis is exceeding AEGL-1. For a 10 minute HF exposure, this is 1 ppm; for a 30 minute exposure, this is also 1 ppm; and for a 60 minute exposure, this is also 1 ppm. Uranium intake exceeds 30 mg.
- Level V: Existing licensing/accident basis, no fatalities, minimal effects (< AEGL-1). Uranium intake is less than 30 mg.

The number of exposed individuals is based upon the specific threat scenario and site conditions. Reasonably conservative meteorological conditions and population densities for the specific site under evaluation will be assumed. Plume effects will consider population within a 90 degree arc (25% pie section) downwind from the facility, scenario location, and effect zones based upon the consequence levels and the distance from the release. If indicated by site considerations (e.g., a high percentage of wind direction variability), plume effects will be based upon the population in the worst case 90 degree arc. The framework will sum the potential fatality estimates from each zone for comparison to the consequence table.

Chemical events tend to be prompt (typically of 30-90 minute durations) and the analysis will only consider mitigation methods appropriate for the specific site, scenario, and release timeframe.

References:

[www.epa.gov/oppt/aeql/process.htm](http://www.epa.gov/oppt/aeql/process.htm)

Stephen A. McGuire, "Chemical Toxicity of Uranium Hexafluoride Compared to Acute Effects of Radiation," NUREG-1391, February 1991.

D.R. Fisher et al, "Uranium Hexafluoride Public Risk," PNL-10065, August 1994.

WHOLE BODY RADIATION EXPOSURE

The staff has reviewed several technical sources of information and data to develop a technical basis for an average number of prompt fatalities from acute whole body radiation exposure. The United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) 2000 Chernobyl accident summary report provides the number of emergency worker fatalities observed in various exposure ranges (see Table 1).<sup>1</sup> Other technical literature presents a range of doses associated with mortality (in percentages) of an exposed population. Table 2 compares the LD<sub>10</sub>, LD<sub>50</sub>, and LD<sub>90</sub> doses reported in the Textbook of Military Medicine,<sup>2</sup> an Armed Forces Radiobiology Research Institute (AFRRI) reference,<sup>3</sup> and in NUREG/CR-4214.<sup>4</sup> These references apply to high dose rate, whole body, acute, exposures only.

**Table 1. Chernobyl emergency worker fatalities observed in different exposure ranges.**

Range of Dose (rads)	Number of workers exposed in this dose range	Number of fatalities <sup>5</sup>
80 - 210	41	0 (0%)
220 - 410	50	1 (2%)
420 - 640	22	7 (32%)
650 - 1600	21	20 (95%)

**Table 2. Comparison of LD10, LD50, and LD90 values (dose in rads):**

Lethal Dose (LD) at various percentages of population exposed	Military Reference-untreated	AFRRI without medical care	NUREG/CR-4214 with supportive care	
LD <sub>10</sub>	290	300	330	
LD <sub>50</sub>	430	530	450	
LD <sub>90</sub>	570	800	550	

From these references, which showed close agreement, the staff estimated a range of fatalities for the potentially exposed population during a postulated accident.

<sup>1</sup> UNSCEAR, Volume II of the 2000 Report, ANNEX J, "Exposures and effects of the Chernobyl accident," Table 11, "Emergency workers with acute radiation sickness following the accident"

<sup>2</sup> Textbook of Military Medicine: Medical Consequences of Nuclear Warfare, 1989, Figure 2-10, "Human mortality for high-dose-rate, low-LET radiation doses to bone marrow."

<sup>3</sup> Medical Management of Radiological Casualties, 2<sup>nd</sup> Ed., Armed Forces Radiobiology Research Institute, Bethesda, MD, April 2003; pp. 89 and 91. Note: Lethal Doses (LD) at 10%, 50%, and 90% probability are estimated to be without medical care.

<sup>4</sup> "Health Effects Models for Nuclear Power Plant Accident Consequence Analysis," NUREG/CR-4214, Rev. 2, Part I, PTRI-141, Published October 1993, Figure 3-1, "Risks of mortality from the hematopoietic syndrome for minimal, supportive, and mixed treatments: central estimates for exposure at a high dose rate."

<sup>5</sup>Percentage of treated patients in parenthesis

#### DETERMINATION OF EXPOSED POPULATION

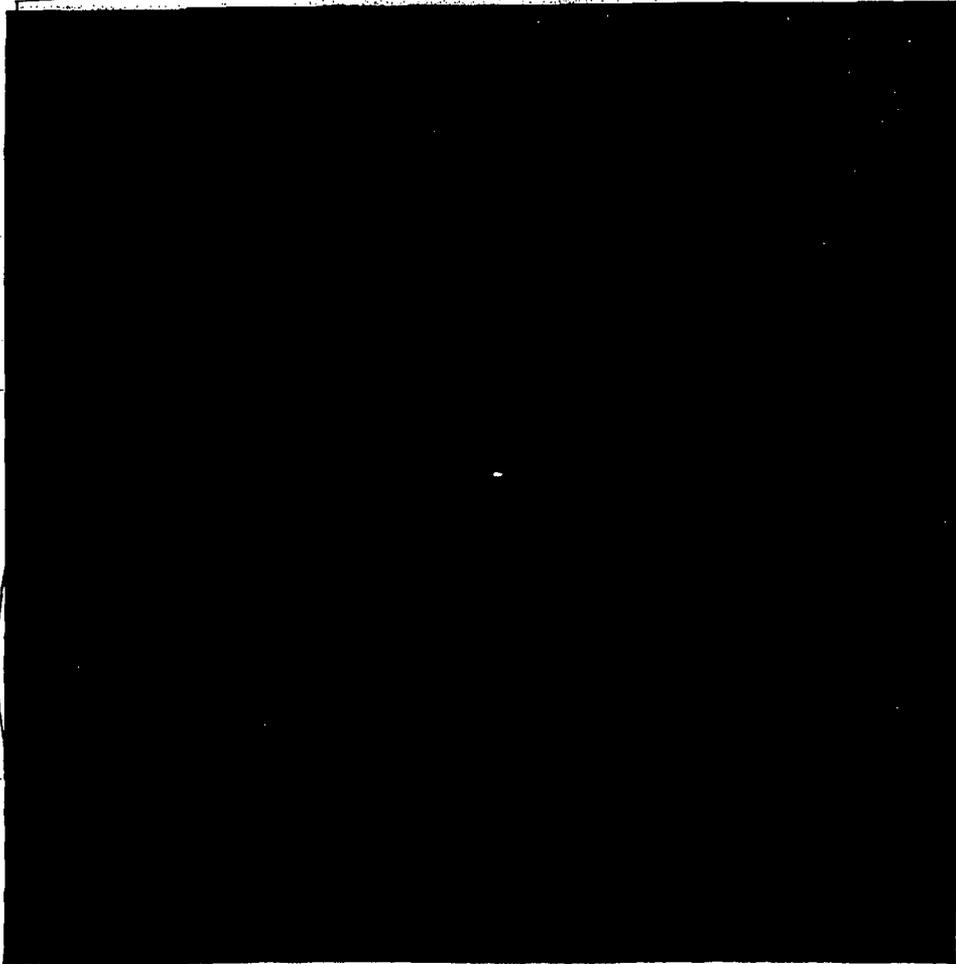
Specific threat or site conditions determined the number of exposed individuals. A range of population densities will be assumed for off-site threats to simulate venues or locations where individuals could be exposed. For on-site threats, specific population estimates will be used, considering potential mitigating effects where applicable, e.g., evacuation and sheltering. Site-specific meteorological conditions will be assumed unless the threat relates to transportation, where nominal meteorology data will be assumed.

Rad<sup>e</sup> indicates the rad-equivalent which is calculated by multiplying the high linear energy transfer (LET) component of the absorbed dose by a relative biological effectiveness (RBE) factor. Specifically, when calculating the lung dose, the high LET component is multiplied by ten.

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Attachment 5  
Application of the Decision Making Framework to a Postulated Security Event  
Scenario at a Research Reactor

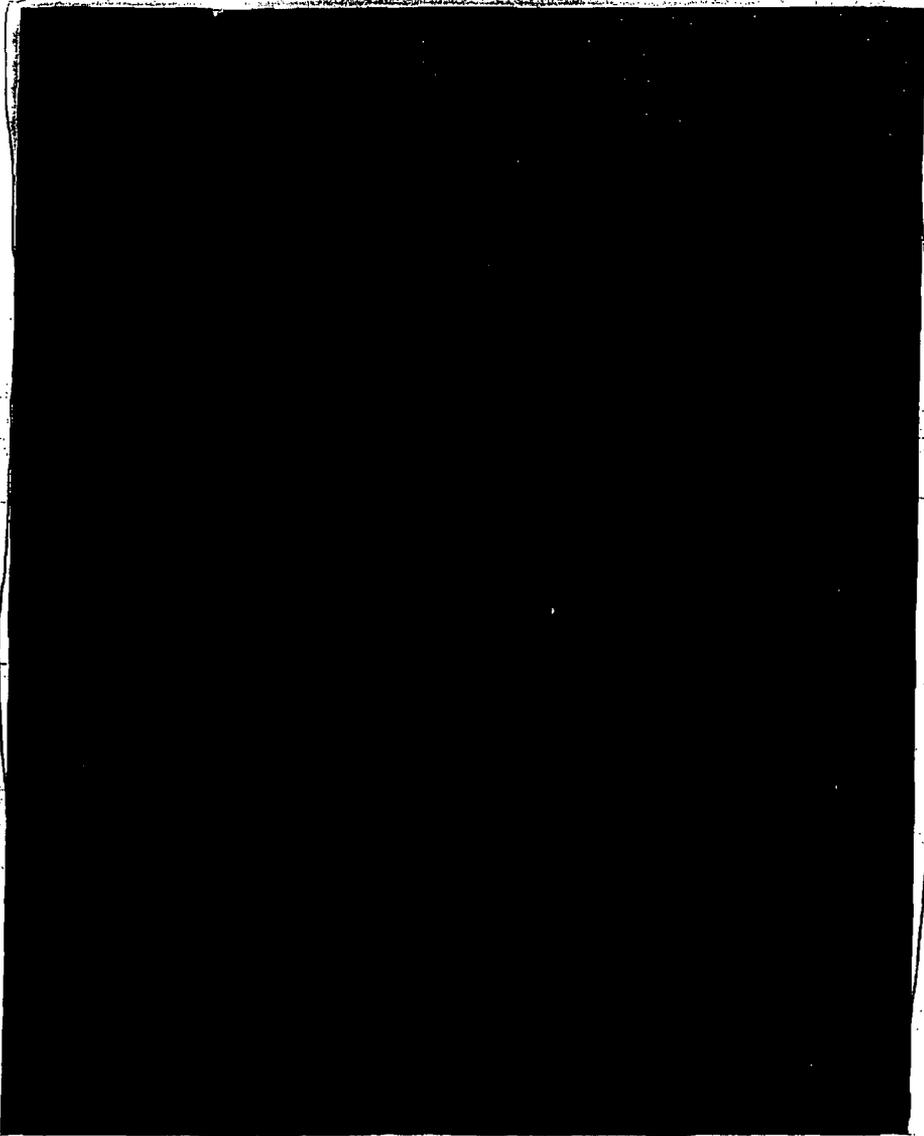


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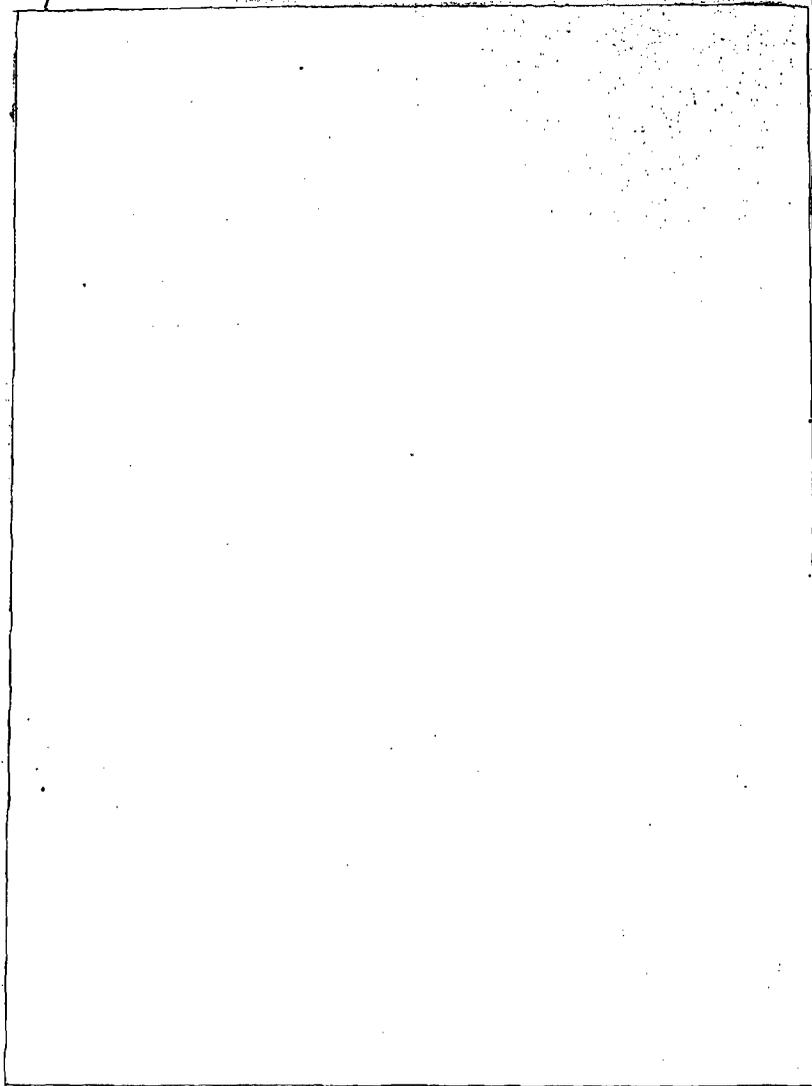
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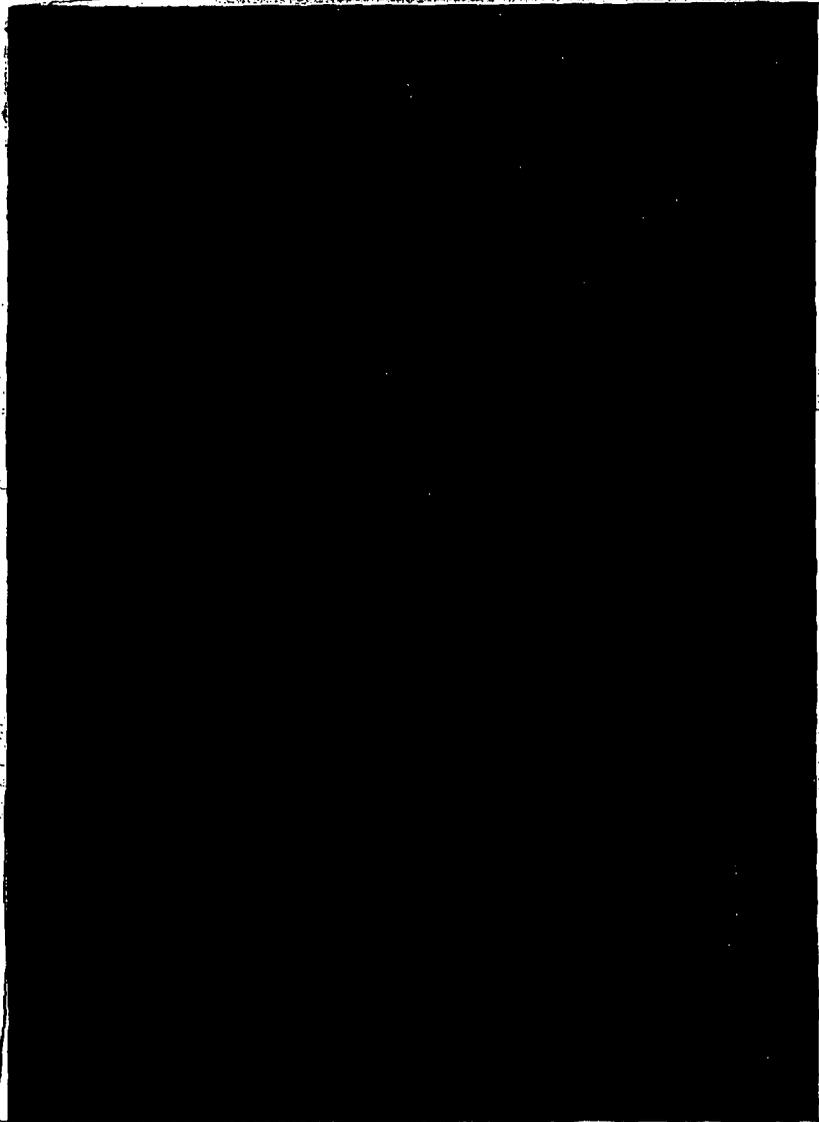


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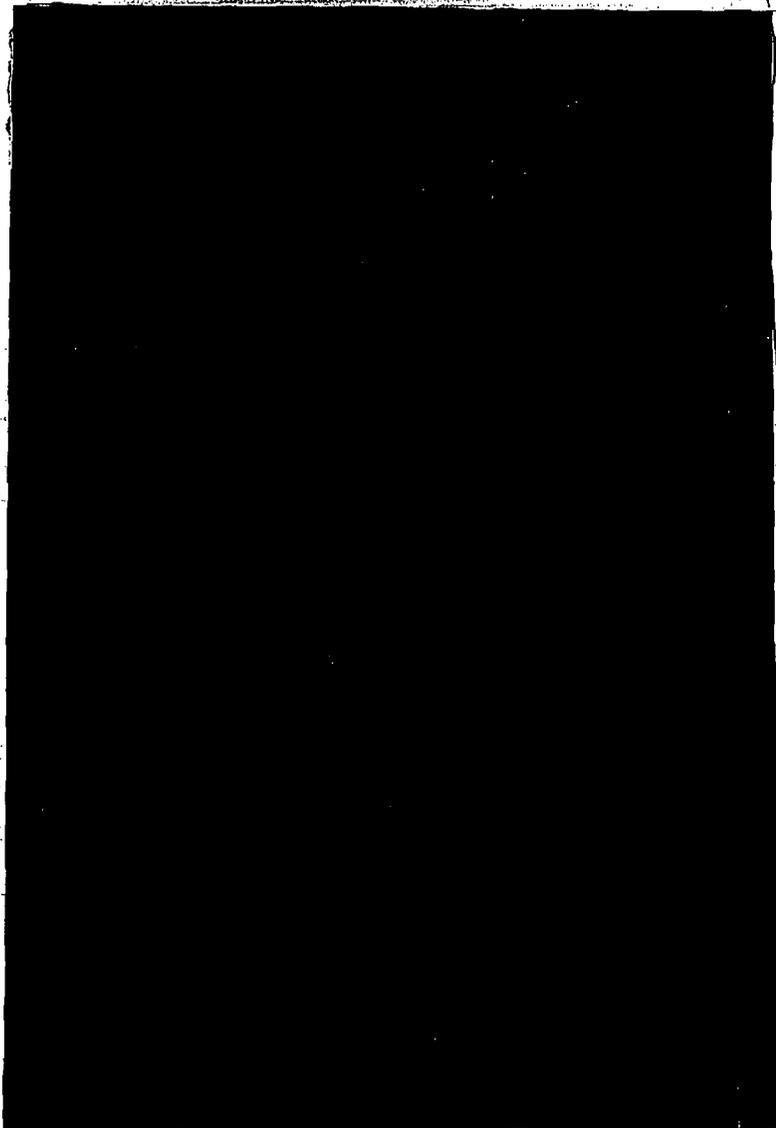
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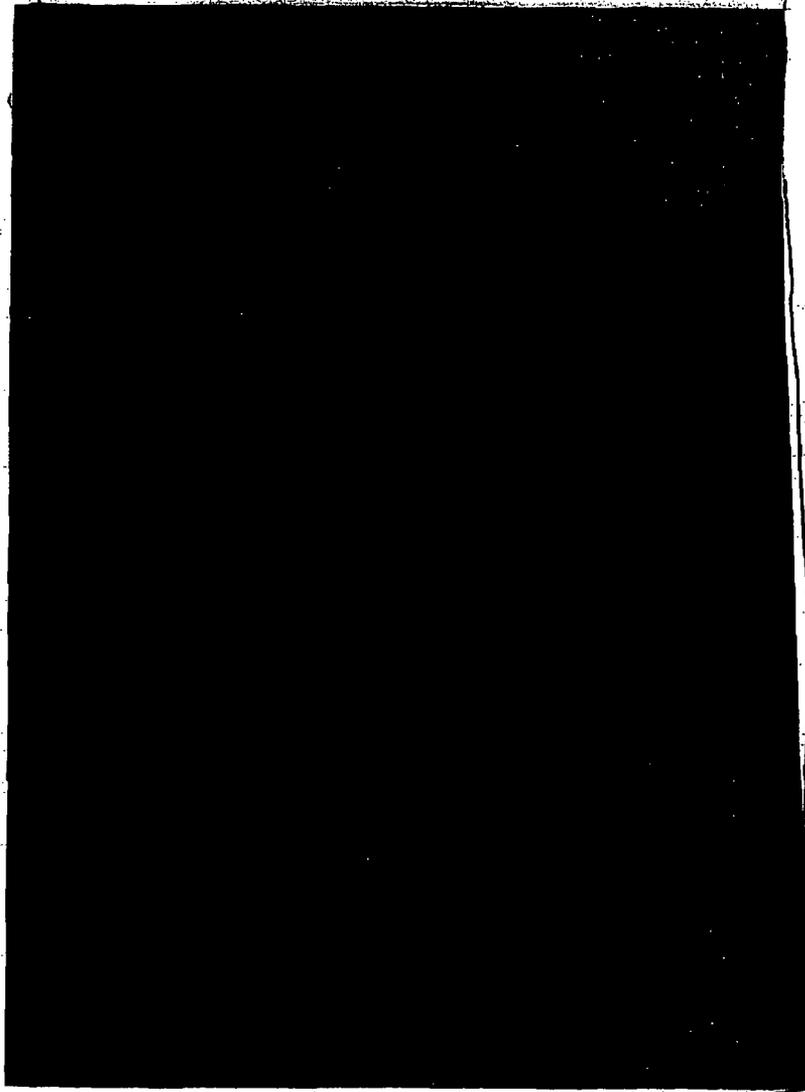
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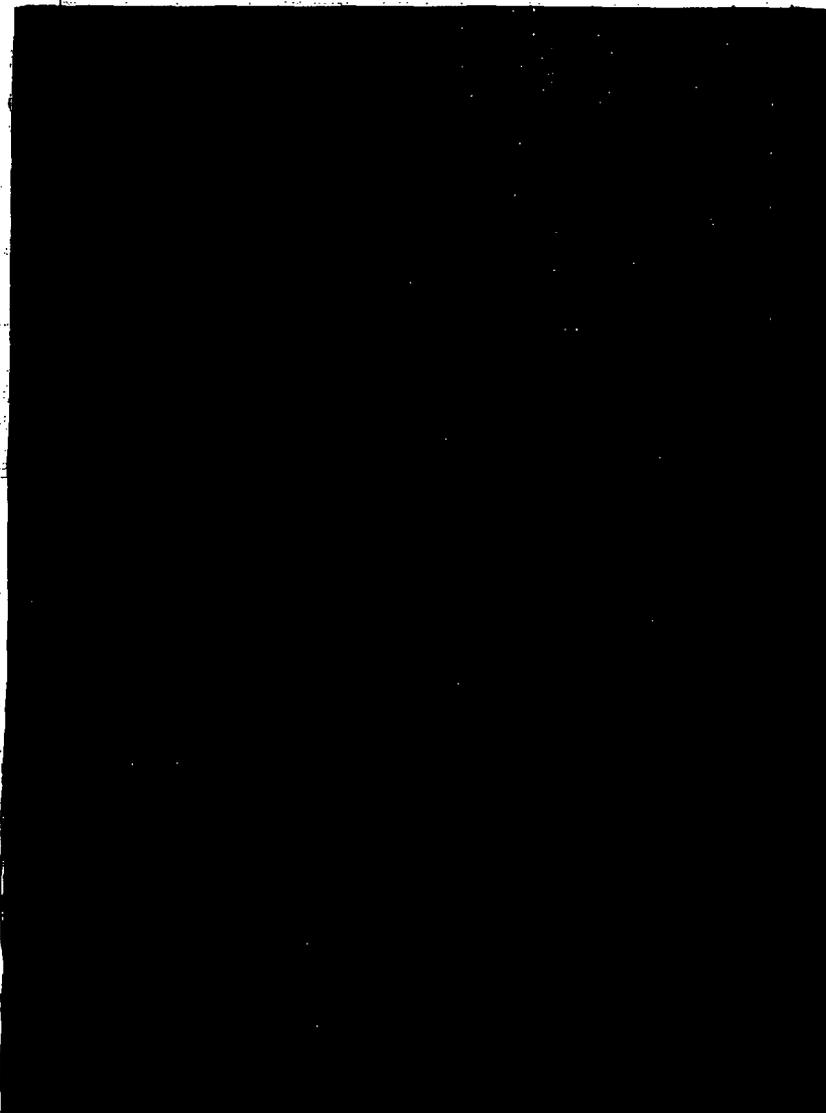
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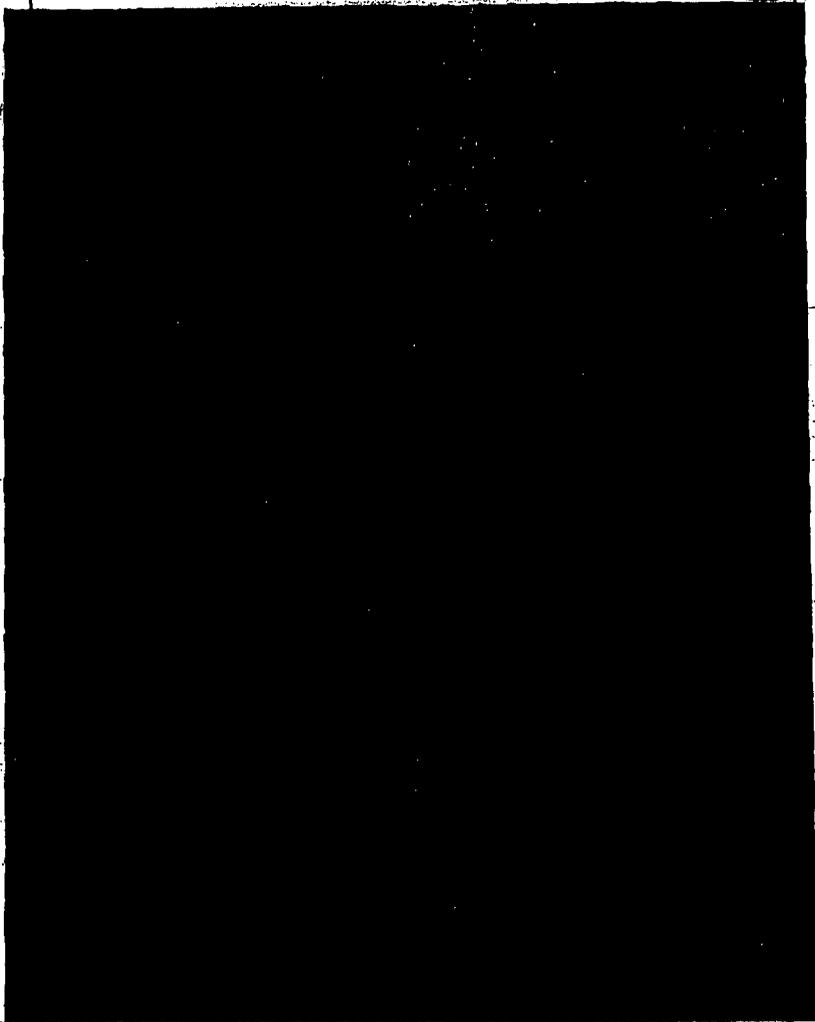
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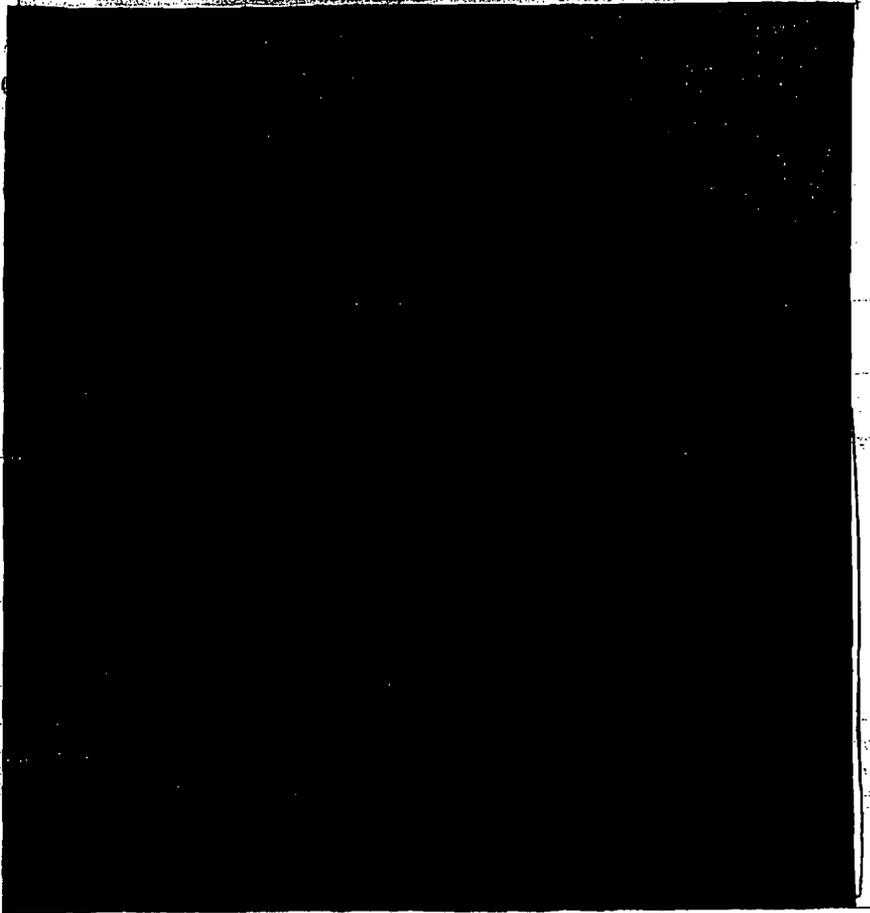
<sup>1</sup> "Identification and Analysis of Factors Affecting Emergency Evacuations Volume I: Main Report," Draft Report dated July 25, 2004.

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The value assigned to this factor is 3.

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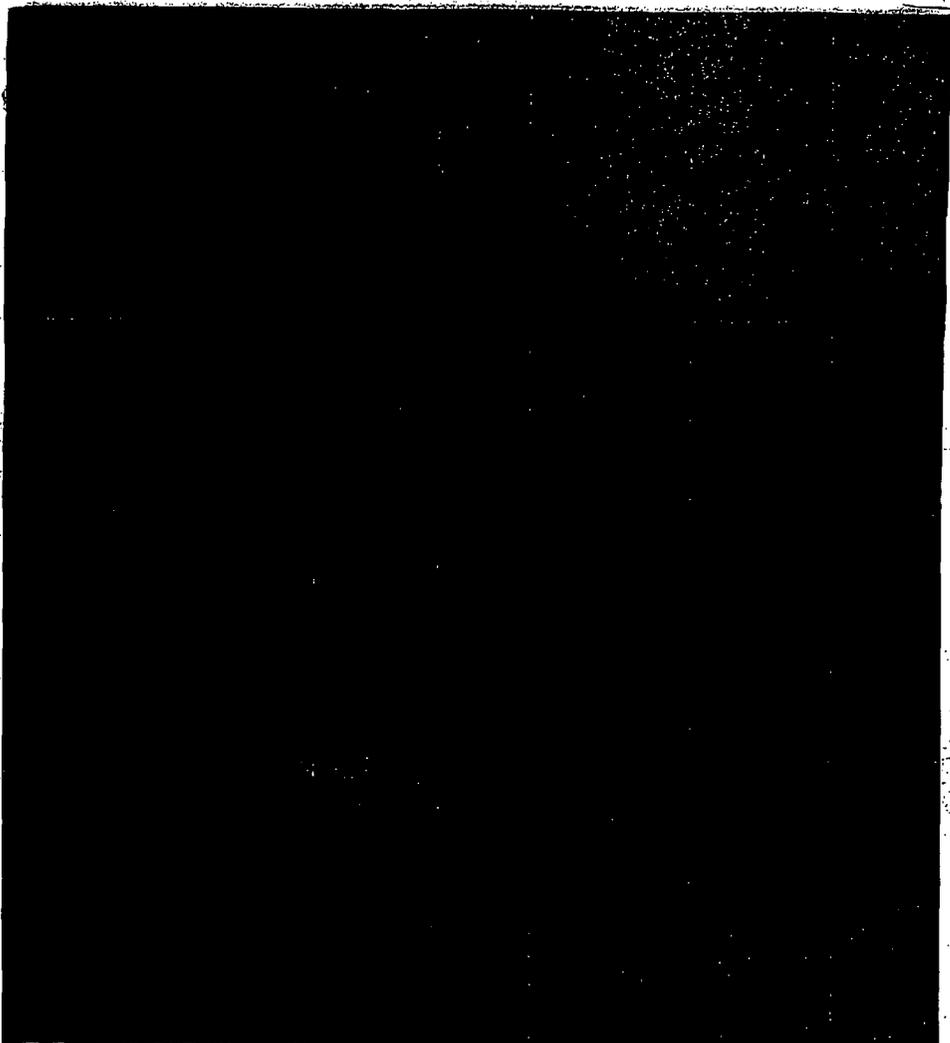


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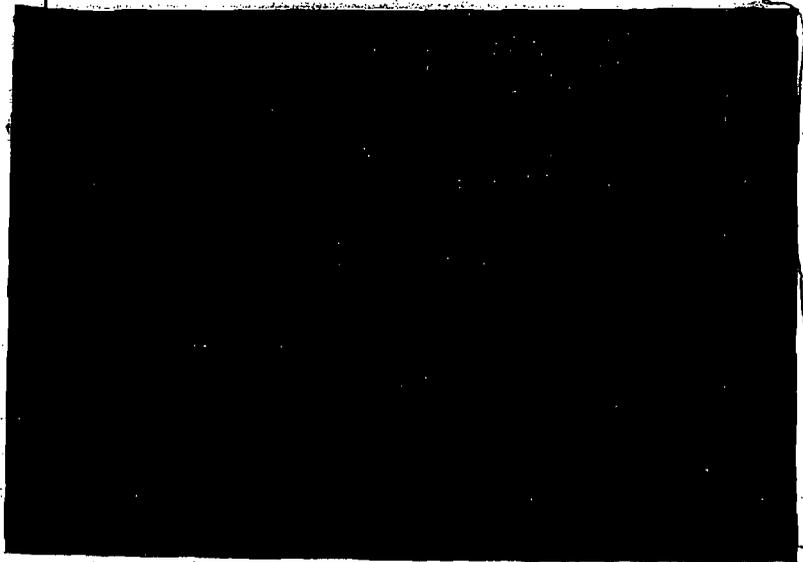
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<sup>2</sup> "Health Effects Models for Nuclear Power Plant Accident Consequence Analysis," J. S. Evans, S. Abrahamson, M. A. Bender, B. B. Boecker, E. S. Gilbert, B. R. Scott, October 1993, NUREG/CR-4214, Rev. 2, Part I, ITRI-141

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<sup>3</sup> "Medical Management of Radiological Casualties," Armed Forces Radiobiology Research Institute, April 2003, pages 90

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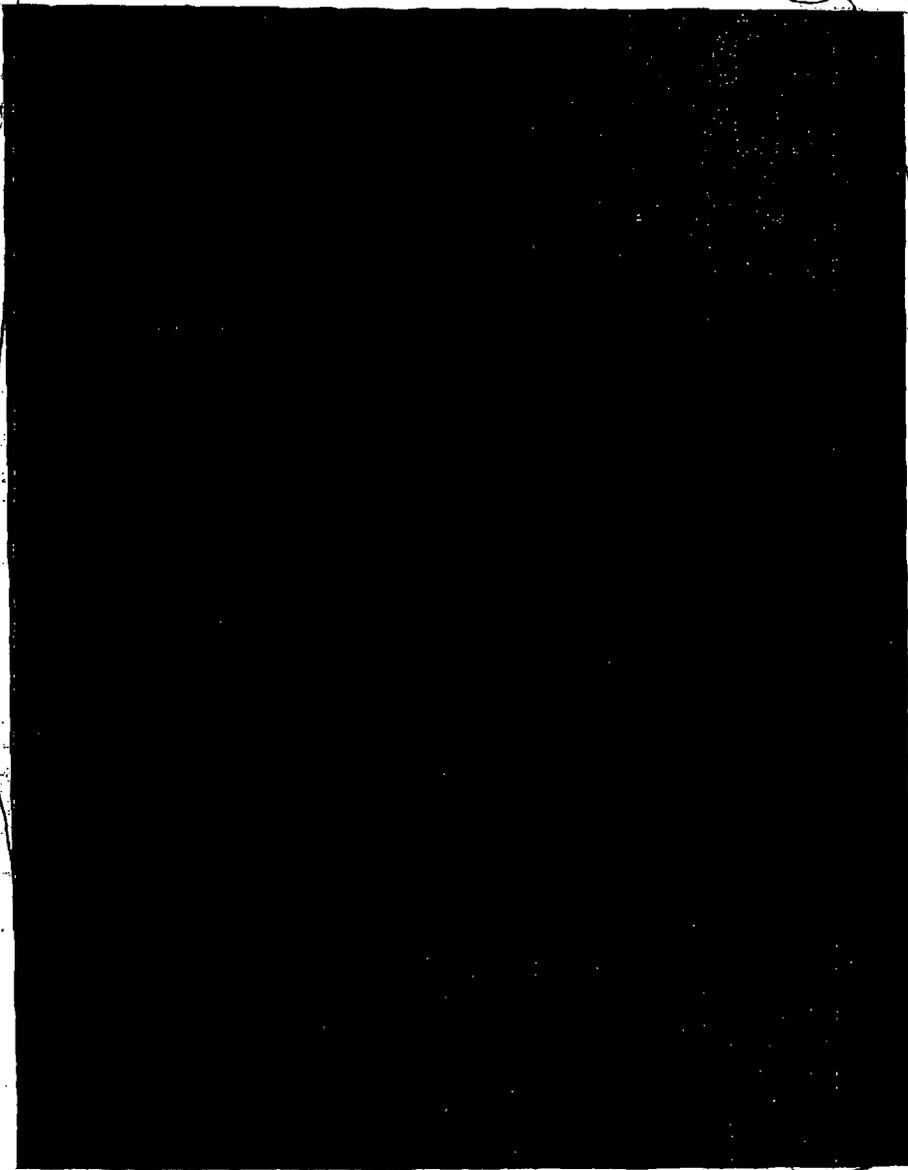
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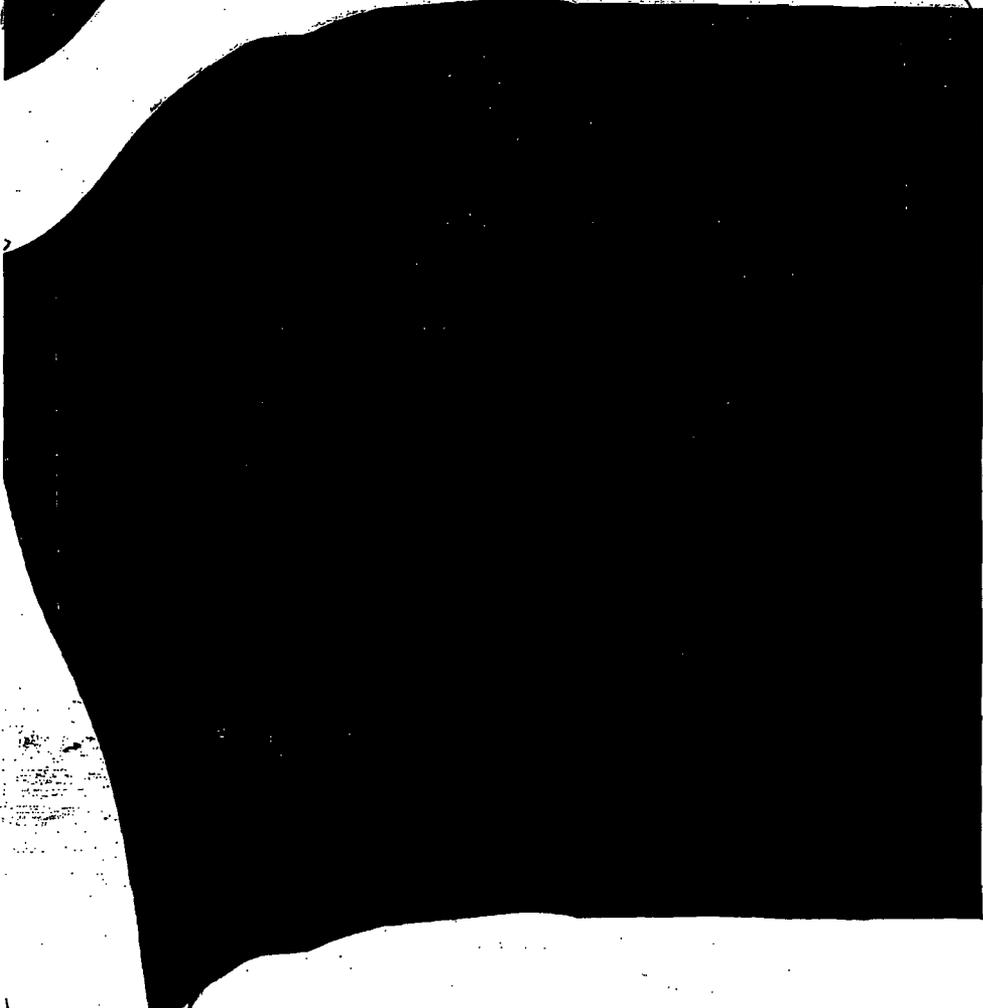
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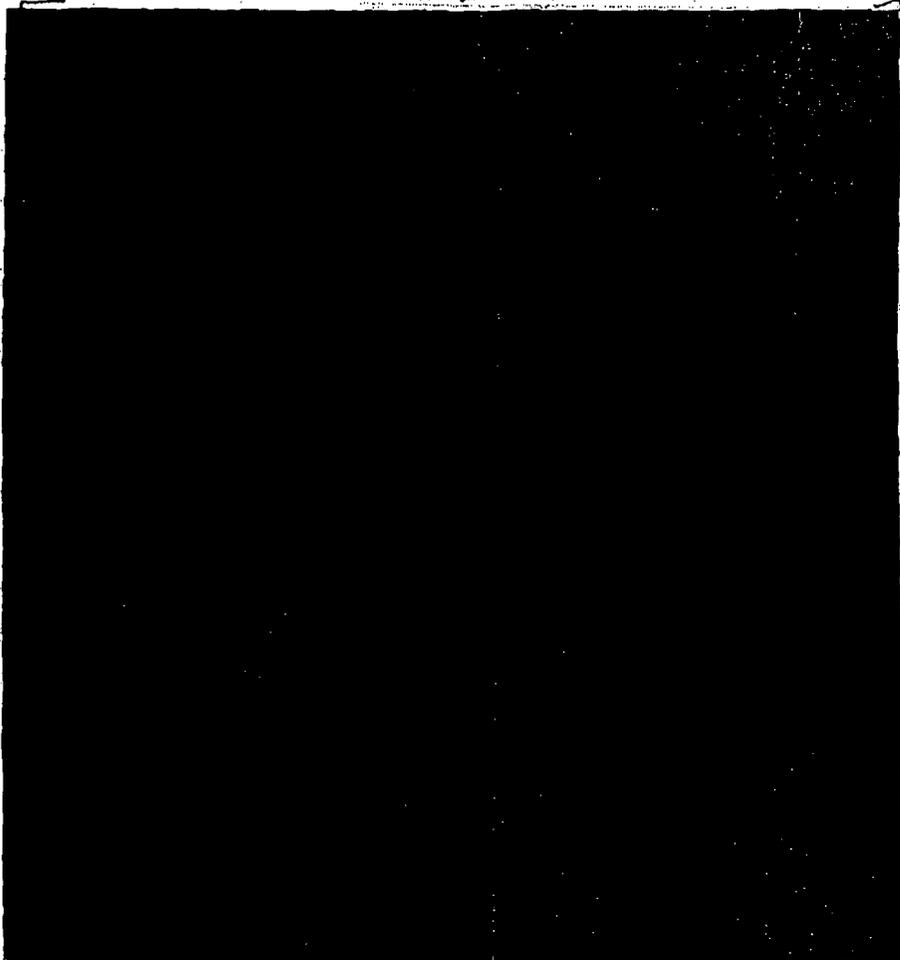
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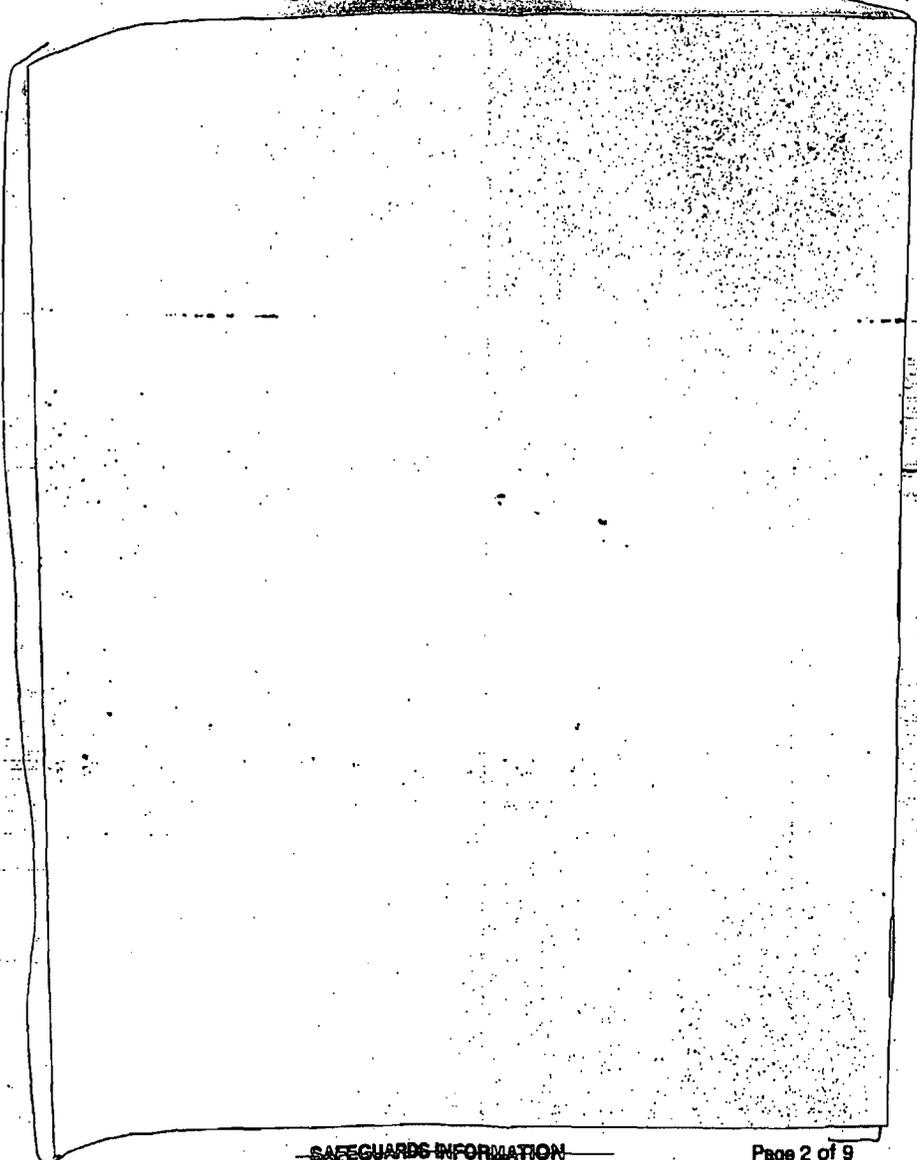
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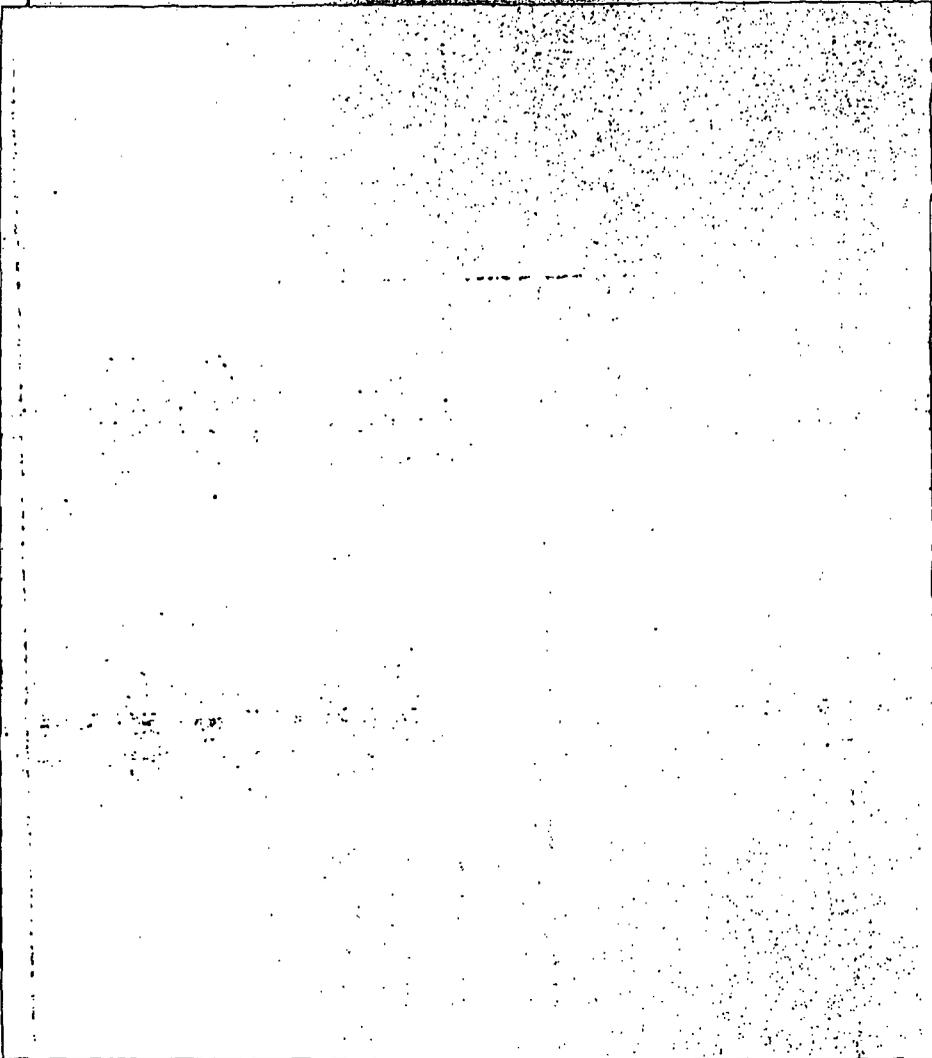
Application of the Decision Making Framework to a Postulated Security Event Scenario  
at a Fuel Cycle Facility



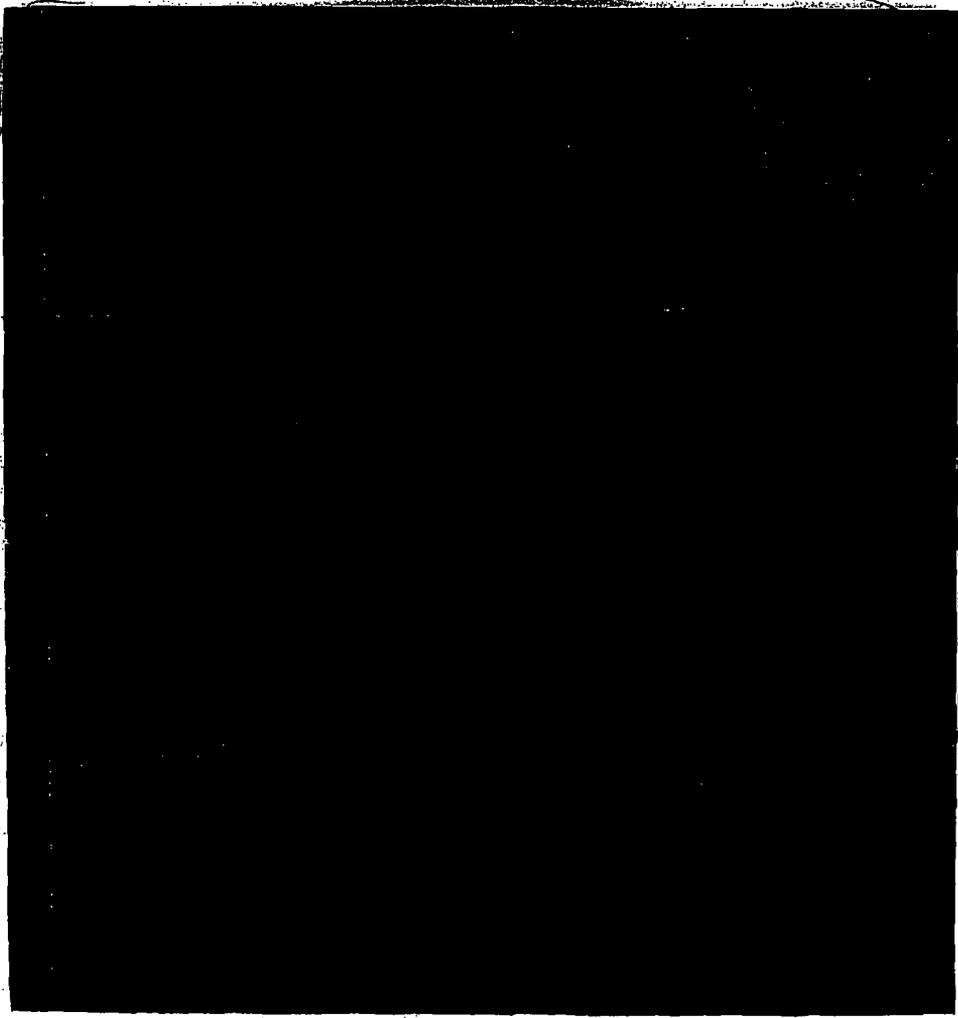
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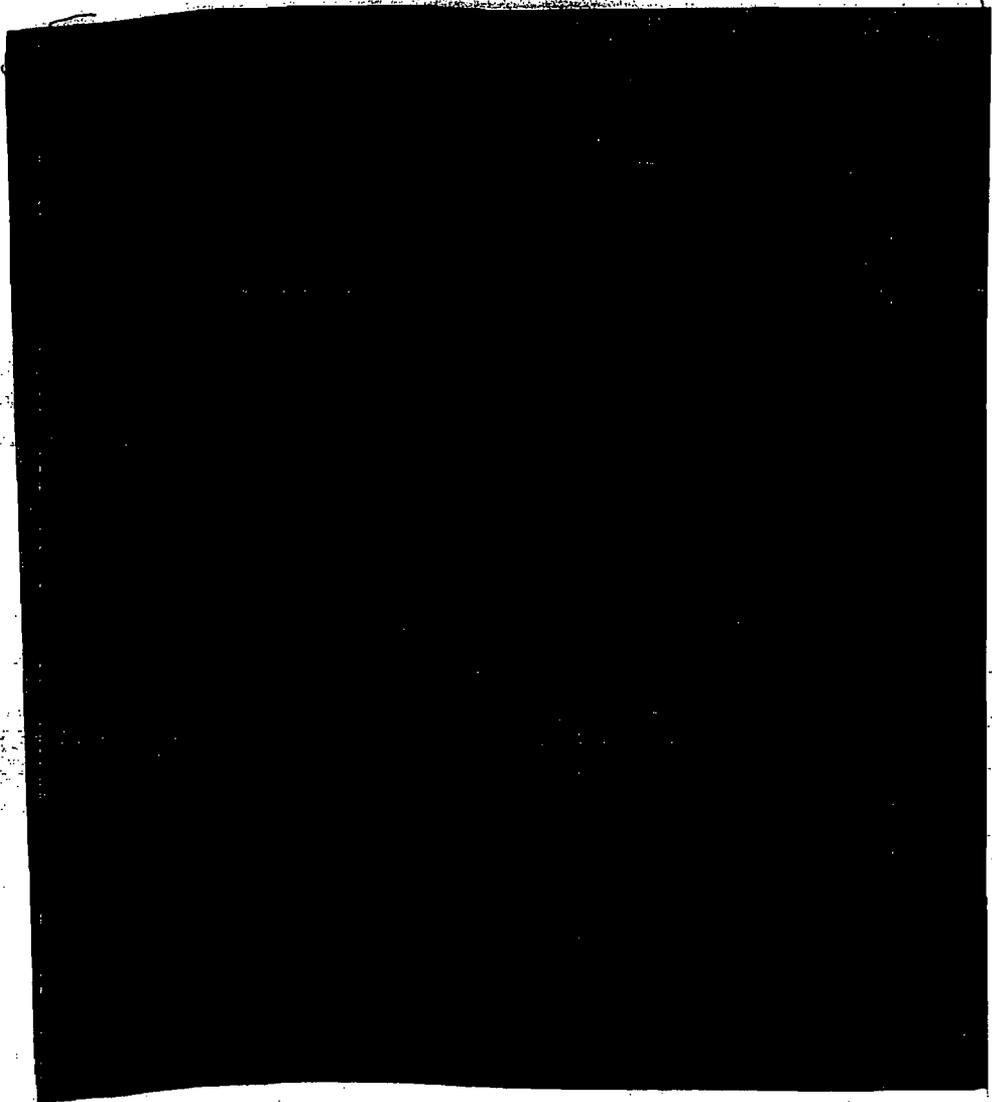
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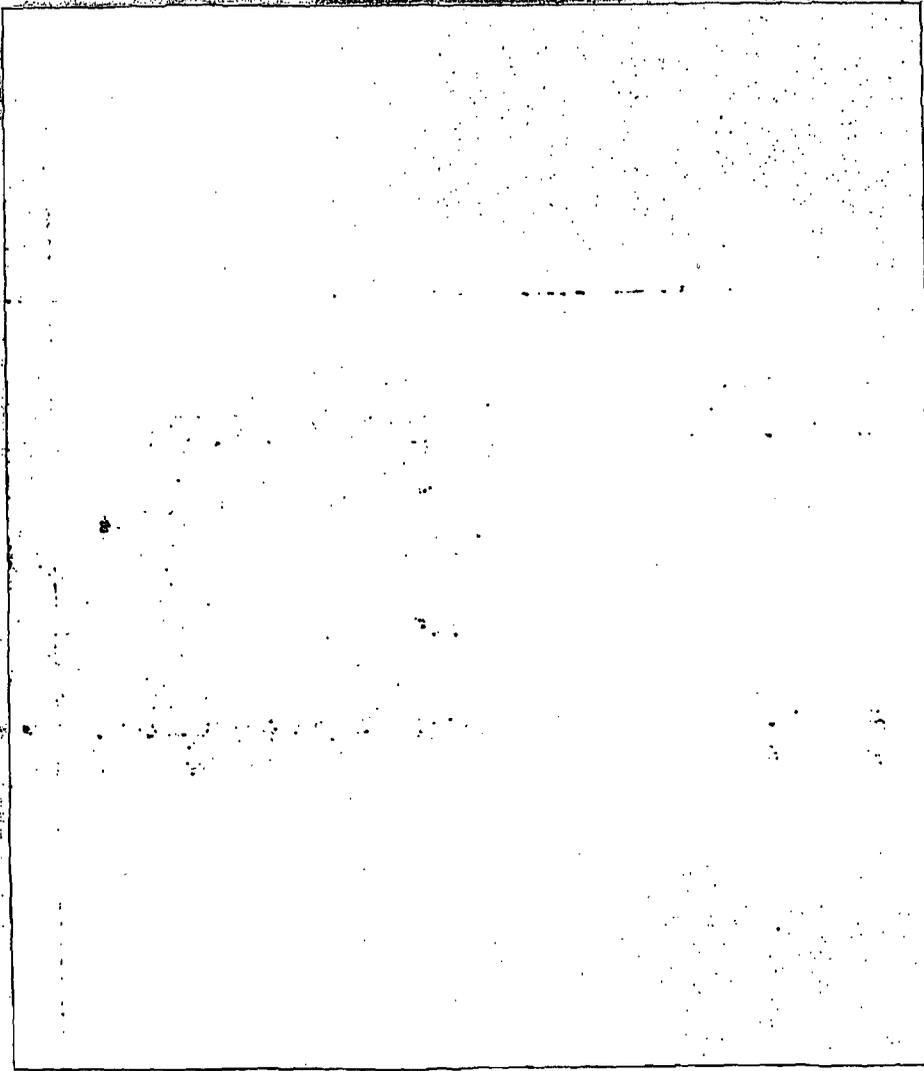
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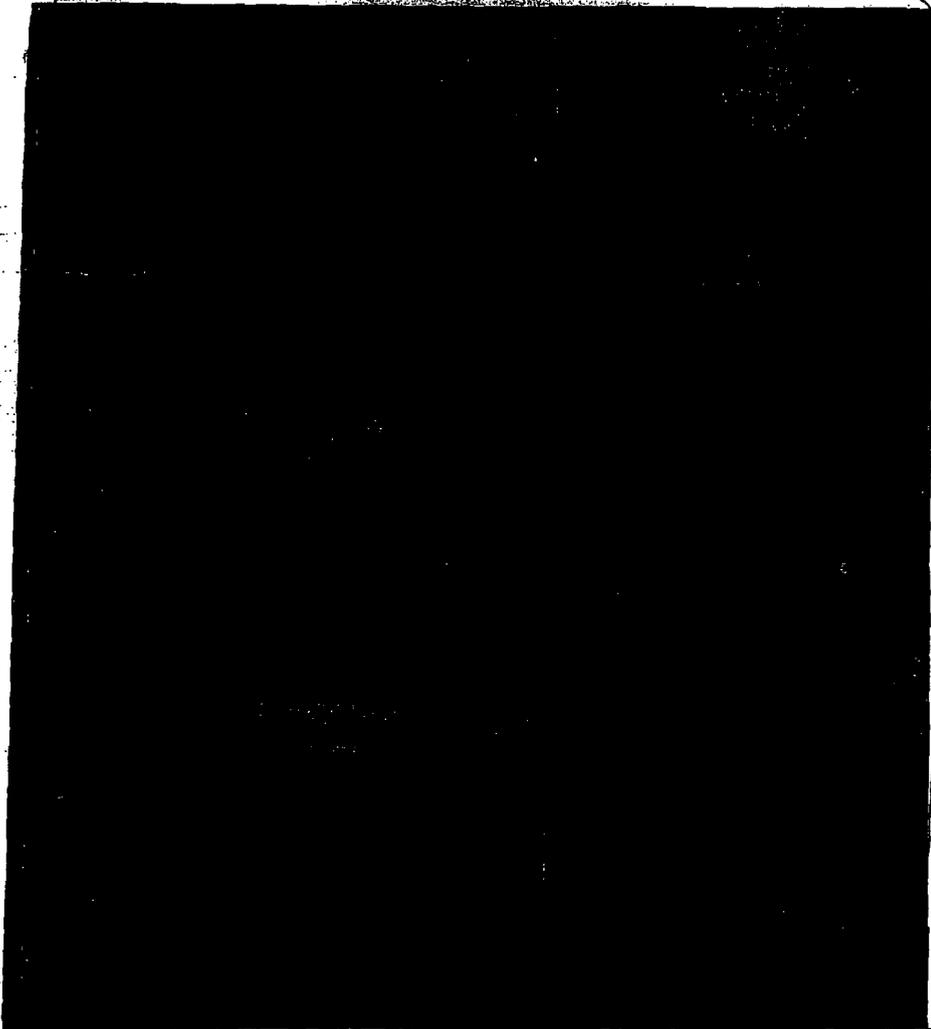
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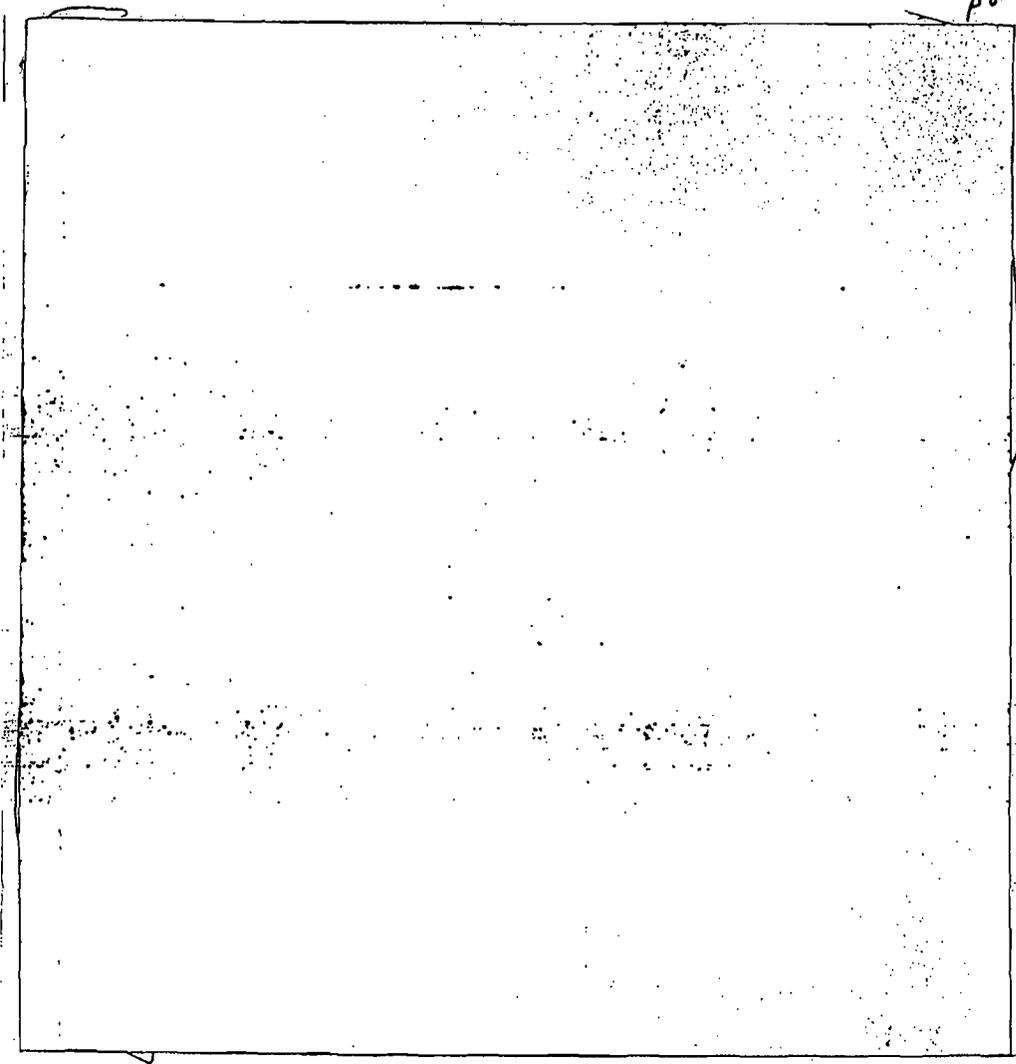
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DOCKETED  
USNRC

April 28, 2008 (8:00am)

April 26, 2008

OFFICE OF SECRETARY  
RULEMAKINGS AND  
ADJUDICATIONS STAFF

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the matter of  
Pacific Gas and Electric Company  
Diablo Canyon Nuclear Power Plant  
Unit Nos. 1 and 2  
Independent Spent Fuel Storage Installation

Docket # 72-26

**SAN LUIS OBISPO MOTHERS FOR PEACE'S  
RESPONSE TO NRC STAFF'S MOTION  
FOR SUMMARY DISPOSITION OF CONTENTION 1(b)**

Pursuant to 10 C.F.R. § 2.710, CLI-08-05, \_\_ NRC \_\_ (March 27, 2008), and the Atomic Safety and Licensing Board's ("ASLB's") Scheduling and Case Management Order of April 4, 2008, San Luis Obispo Mothers for Peace ("SLOMFP") hereby responds to the U.S. Nuclear Regulatory Commission ("NRC" or "Commission") Staff's Motion for Summary Disposition of Contention 1(b) (April 18, 2008) ("Staff Motion"). As admitted by the Commission, Contention 1(b) challenges the Staff's failure to provide source documents or information underlying its analysis in the supplement to the environmental assessment for the proposed Diablo Canyon Independent Spent Fuel Storage Installation ("ISFSI"), and also challenges the Staff's failure to identify appropriate FOIA exemptions for its withholding decisions." CLI-08-01, \_\_ NRC \_\_ (2008), slip op. at 19.

SLOMFP believes that the Staff has now provided an adequate listing of the reference documents on which it relied for the draft and final supplements to its environmental assessment for the proposed Diablo Canyon ISFSI. Therefore SLOMFP considers that aspect of Contention 1(b) to be resolved.

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With respect to the question of whether the Staff has adequately explained the nature and extent of its reliance on the reference documents, the Staff has provided additional information in its Motion that is sufficient to resolve SLOMFP's outstanding questions. In particular, the Staff has confirmed its reliance on a key reference document – SECY-04-0222, Memorandum from Luis A. Reyes to the Commissioners re: Decision-making Framework for Materials and Research and Test Reactor Vulnerability Assessments (November 24, 2004) (“SECY-04-0222”) -- to exclude consideration of attack scenarios that did not result in immediate fatalities.<sup>1</sup>

The Staff's affidavit confirms the assertion of Contention 2 that in evaluating the environmental impacts of an intentional attack on the proposed Diablo Canyon ISFSI, the NRC Staff screened out attacks that would not cause immediate fatalities, thereby excluding consideration of attack scenarios that could cause widespread land contamination, with significant adverse effects on human health, the environment, and the economy. The Staff's own statements therefore demonstrate that in making a finding of no significant impact and refusing to prepare an environmental impact statement (“EIS”), the Staff arbitrarily and irrationally refused to consider the significant adverse impacts that could be caused by an attack resulting in significant land contamination. Accordingly, the Staff has now satisfied SLOMFP's concerns with respect to this aspect of Contention 1(b).

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<sup>1</sup> In paragraph 7 of the Affidavit of James Randall Hall, Shana Helton, and Paul Kelley, Jr. (April 18, 2008), affiant Shana Helton states that: “[t]he framework assessment methodology outlined in SECY-04-0222 was applied to various categories of NRC licensees and certificate holders, including ISFSIs.” In the same paragraph, Ms. Helton also states that while the Staff did not apply many aspects of the methodology outlined in SECY-04-022, the Staff “did refer to the consequence evaluation criteria in SECY-04-0222 (and its enclosures) when developing the set of assumptions used to calculate the estimated dose to the nearest resident to the Diablo Canyon ISFSI.”

Finally, without conceding that the Staff has fully complied with the Freedom of Information Act ("FOIA") in its decisions regarding the redaction of reference documents and its explanations for those redactions, SLOMFP does not seek additional public disclosure of information in the reference documents. As stated in SLOMFP's contentions and its Motion for Reconsideration of CLI-08-05 (April 7, 2008), SLOMFP continues to believe that as a general matter, under the Atomic Energy Act and its implementing regulations, the NRC was required to give SLOMFP access to the reference documents under a protective order, in order to allow SLOMFP an adequate opportunity for a hearing on the adequacy of the Staff's environmental analysis in support of the proposed licensing of the Diablo Canyon ISFSI.

Therefore, for the reasons stated above, SLOMFP does not oppose summary disposition of Contention 1(b) as admitted by the Commission. In addition, SLOMFP withdraws its April 10, 2008, Supplemental Discovery Requests Regarding Documents Produced by NRC Staff in Connection with Vaughn Index.

Respectfully submitted,



Diane Curran  
Harmon, Curran, Spielberg, & Eisenberg, L.L.P.  
1726 M Street N.W., Suite 600  
Washington, D.C. 20036  
202/328-3500  
e-mail: [Dcurran@harmoncurran.com](mailto:Dcurran@harmoncurran.com)

April 26, 2008

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
PACIFIC GAS AND ELECTRIC COMPANY	)	Docket No. 72-26-ISFSI
	)	
(Diablo Canyon Power Plant Independent Spent Fuel Storage Installation)	)	ASLBP No. 08-860-01-ISFSI-BD01

AFFIDAVIT OF JAMES RANDALL HALL, SHANA HELTON, AND PAUL KELLEY, JR.

James Randall Hall, Shana Helton, and Paul Kelley, Jr., do hereby state as follows:

1. I, James Randall Hall (JRH), have been employed by the U.S. Nuclear Regulatory Commission ("NRC") since 1981. My current position is Senior Project Manager, Division of Spent Fuel Storage and Transportation, Office of Nuclear Material Safety and Safeguards. I am the project manager for the Diablo Canyon ISFSI, and oversaw the preparation of the "Supplement to the Environmental Assessment and Final Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI)" ("Supplemental EA").
2. I, Shana R. Helton (SRH), have been employed by the NRC since 2002. My current position is Nuclear Engineer/Dose Assessment Specialist Division of Spent Fuel Storage and Transportation, Office of Nuclear Material Safety and Safeguards. I participated in the preparation of the Supplemental EA.
3. I, Paul Kelley, Jr. (PK), have been employed by the NRC since 2003. My current position is Security Specialist with the Materials, Waste, and International Security Branch, Waste Security Team, in the Office of Nuclear Security and Incident Response. I participated in the preparation of the Supplemental EA.

4. (JRH, SRH, PK) The purpose of this affidavit is to respond to "San Luis Obispo Mothers for Peace's ("SLOMFP's") Response to NRC Staff's *Vaughn* Index, Request for Leave to Conduct Discovery Against the NRC Staff, Request for Access to Unredacted Reference Documents, and Request for Procedures to Protect Submission of Sensitive Information." More specifically, the Staff herein responds to SLOMFP's challenges to the completeness of the NRC Staff's Reference List for the Diablo Canyon ISFSI Supplemental EA. (Ref. 1).
5. (JRH, SRH, PK) The Reference List includes all documents, including those which reference the NRC's framework assessment methodology, which the Staff relied upon directly or used as guidance during the development of the Supplemental EA. In compiling its documents for the Reference List, the Staff included in the scope of what was "relied upon" and "guidance" those documents specifically considered by the Staff in developing the statements, characterizations, and determinations in the Supplemental EA.
6. (SRH) SLOMFP has questioned the reason for the Staff's inclusion of SECY-04-0222, "Decision-Making Framework for Materials and Research and Test Reactor Vulnerability Assessments," ("SECY-04-0222") (Ref. 3), in the reference list for the Supplemental EA. At the outset, the Staff would like to note that in compiling the reference list, the Staff attempted to err on the side of being overly inclusive to ensure that the list was complete. Therefore, some of the reference documents are not specific only to ISFSIs but apply broadly to large categories of NRC licensees which include ISFSI licensees.
7. (SRH) The framework assessment methodology outlined in SECY-04-0222 was applied to various categories of NRC licensees and certificate holders, including ISFSIs. There are many aspects of this methodology that were not employed by the staff when developing the Supplemental EA. For instance, the Staff did not assess asset attractiveness for the Diablo Canyon ISFSI. However, the staff did refer to the

consequence evaluation criteria in SECY-04-0222 (and its enclosures) when developing the set of assumptions used to calculate the estimated dose to the nearest resident to the Diablo Canyon ISFSI. A detailed explanation of how the dose was calculated was provided in the Affidavit of Elizabeth Thompson, attached to "NRC Brief and Summary of Relevant Facts, Data and Arguments Upon Which the Staff Proposes to Rely at Oral Argument on San Luis Obispo Mothers for Peace's Contention 2."

8. (SRH) The Staff also relied in part on the Staff Requirements Memorandum, SRM-SECY-04-0222, (Ref. 3), which contains Commission guidance regarding application of the framework assessment methodology recommended by the Staff in SECY-04-0222.
9. (JRH, SRH, PK) ISFSIs having a site specific license under 10 C.F.R. Part 72, including the Diablo Canyon ISFSI, are subject to the physical protection requirements of Part 72, Subpart H, and are not required to protect the spent fuel against the Design Basis Threat ("DBT") for radiological sabotage, which is applied to nuclear power reactors. Even so, as directed by the Commission in CLI-07-011, the Staff also considered the DBT when developing the Supplemental EA, and therefore included the DBT rulemaking in the Reference List.
10. (SRH) Document 6 of the Reference List, "Memorandum from J. Strosnider to R. Zimmerman, "Framework Assessments of Spent Fuel Storage Casks and Radioactive Material Transportation Packages," December 9, 2005 ("Strosnider Memo") was a separate action from the development of the Supplemental EA. The Strosnider Memo documented the Staff's security assessments for spent fuel storage casks (which used the methodology in SECY-04-0222) and concluded that the ISFSI security measures, including those enacted since September 11, 2001, are adequate. The Staff reported these findings to the Commission in two memoranda from Luis Reyes. (Ref. 5, 6).
11. (JRH, SRH) All of the documents, including those which provided guidance, used by the Staff in developing the Supplemental EA were disclosed in the Reference List. The

reason for including SECY-04-0222, SRM-SECY-04-0222, and the Strosnider memo in the reference list is that the Staff relied on methods similar to those described in those documents in determining the dose to the nearest resident to the Diablo Canyon ISFSI. While other documents generated by the NRC and other agencies may be used by the NRC in various security activities, the Staff who developed the Supplemental EA relied only on the methods and guidance in the documents listed in the Reference List.

12. (JRH, SRH, PK) All input from other agencies which was relied upon or used as guidance in the development of the Supplemental EA is contained in the documents in the Reference list. Other documents, such as the RAMCAP methodology, referenced by SLOMFP, which informed the NRC's development of the framework assessment methodology in 2004, were not relied on by the Staff when developing the Supplemental EA for the Diablo Canyon ISFSI. As stated in SECY-04-0222, the Staff's framework assessment methodology (subsequently approved by the Commission in SRM-SECY-04-0222) was informed by the RAMCAP methodology; however, the Staff did not expressly adopt the RAMCAP or any other methodology. (Ref. 2 at 3). As such, these other methodologies cited in SLOMFP's April 10, 2008, filing were not listed as references to the Supplemental EA.
13. (JRH, SRH, PK) Upon reviewing the Reference List for this Response, the Staff realized that one document, listed in the November 7, 2007, Addendum to the Supplemental EA (Reference 3; Memorandum from Daniel H. Dorman to Wayne Hodges, "Results of NSIR Screening of Nuclear Facility Security Scenarios for Remote and Speculative Nature Prior To Use In Decision-Making Framework," March 9, 2005), was inadvertently omitted from the Reference List provided with the *Vaughn* Index and was not publicly released to the extent permissible under FOIA. (Ref. 1). We note that in citing this document as a reference, the Staff was overly inclusive, as the Staff did not directly use information from this memo in preparing the Supplemental EA. As discussed in Enclosure 2 to the

Strosnider Memo, the Staff considered this memorandum as an input to the generic spent fuel storage security assessments. A more thorough discussion of scenario selection is contained in the Strosnider Memo, a redacted version of which was included in the Staff's *Vaughn* index (Ref. 1). Nevertheless, the Staff is releasing a public version of this document in an addendum to the *Vaughn* Index.

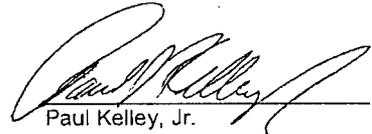
14. I declare under penalty of perjury that the foregoing is true and correct to the best of my knowledge, information, and belief.

#### References

1. "NRC Staff's Response to Commission Order to Provide Reference List and *Vaughn* Index," February 13, 2008. (ADAMS Accession No. ML080450260).
2. SECY-04-0222, "Decision-Making Framework for Materials and Research and Test Reactor Vulnerability Assessments," (ADAMS Accession No. ML080440119). (Document 8 in the Staff's Reference List).
3. Staff Requirements-SECY-04-0222, "Decisionmaking Framework for Materials and Research Test Reactor Vulnerability Assessments," (ADAMS Accession No. ML080440118). (Document 7 in the Staff's Reference List).
4. "Memorandum from J. Strosnider to R. Zimmerman, "Framework Assessments of Spent Fuel Storage Casks and Radioactive Material Transportation Packages," December 9, 2005. (ADAMS Accession Nos. ML053290260, ML080440117). (Document 6 in the Staff's Reference List).
5. Memorandum from L. Reyes to the Commission, "Completion of Security Assessment of Spent Fuel Storage Casks for Land-Based Terrorist Threats," September 15, 2005. (ADAMS Accession Nos. ML052490378, ML080440115). (Document 4 in the Staff's Reference List).
6. Memorandum from L. Reyes to the Commission, "Completion of Security Assessment of the Crash of a Large Plane into Spent Fuel Storage Casks," September 15, 2005. (ADAMS Accession Nos. ML052490377, ML080440116). (Document 5 in the Staff's Reference List).
7. Design Basis Threat, Final Rule, 10 C.F.R. Part 73, U.S. Nuclear Regulatory Commission. (ADAMS Accession No. ML070520692). (Document 14 in the Staff's Reference List).

  
James Randall Hall

  
Shana R. Helton

  
Paul Kelley, Jr.

Dated at Rockville, Maryland  
this 18<sup>th</sup> day of April, 2008

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE COMMISSION

In the matter of  
Pacific Gas and Electric Company  
Diablo Canyon Nuclear Power Plant  
Unit Nos. 1 and 2  
Independent Spent Fuel Storage Installation

Docket # 72-26

**SAN LUIS OBISPO MOTHERS FOR PEACE'S DETAILED SUMMARY  
OF FACTS, DATA, AND ARGUMENTS ON WHICH IT INTENDS TO RELY  
AT ORAL ARGUMENT TO DEMONSTRATE THE INADEQUACY OF THE  
U.S. NUCLEAR REGULATORY COMMISSION'S FINAL SUPPLEMENT TO  
THE ENVIRONMENTAL ASSESSMENT  
FOR THE PROPOSED DIABLO CANYON INDEPENDENT  
SPENT FUEL STORAGE INSTALLATION TO CONSIDER THE  
ENVIRONMENTAL IMPACTS OF AN ATTACK ON THE FACILITY  
(CONTENTION 2)**

Submitted by:

Diane Curran  
Harmon, Curran, Spielberg, & Eisenberg, L.L.P.  
1726 M Street N.W., Suite 600  
Washington, D.C. 20036  
202/328-3500  
e-mail: Dcurran@harmoncurran.com

*Counsel to San Luis Obispo Mothers for Peace*

April 14, 2008

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*Hardy v. Bureau of Alcohol, Tobacco & Firearms*, 631 F.2d 653(9th Cir. 1980).....23

*Hughes Watershed Conservancy v. Glickman*, 81 F.3d 437 (4th Cir. 1999).....8, 11

*LaFlamme v. FERC*, 852 F.2d 389 (9th Cir. 1988).....9

*Limerick Ecology Action v. NRC*, 869 F.2d 719 (3<sup>rd</sup> Cir. 1989).....8

*Marsh v. Oregon Natural Resources Council*, 490 U.S. 360 (1989).....7

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---	---

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April 14, 2008

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
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AT ORAL ARGUMENT TO DEMONSTRATE THE INADEQUACY OF THE  
U.S. NUCLEAR REGULATORY COMMISSION'S FINAL SUPPLEMENT TO  
THE ENVIRONMENTAL ASSESSMENT  
FOR THE PROPOSED DIABLO CANYON INDEPENDENT  
SPENT FUEL STORAGE INSTALLATION TO CONSIDER THE  
ENVIRONMENTAL IMPACTS OF AN ATTACK ON THE FACILITY  
(CONTENTION 2)**

**I. INTRODUCTION**

Pursuant to 10 C.F.R. § 2.1113, San Luis Obispo Mothers for Peace ("SLOMFP") hereby submits a detailed written summary of the facts, data, and arguments ("Summary") on which SLOMFP intends to rely to demonstrate that the Staff of the U.S. Nuclear Regulatory Commission ("NRC" or "Commission") violated the National Environmental Policy Act ("NEPA") by refusing to prepare an environmental impact statement addressing the environmental impacts of an intentional attack on the proposed Diablo Canyon Independent Spent Fuel Storage Installation ("ISFSI" or "spent fuel storage facility"). As set forth below, the NRC Staff's supplement to its

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environmental assessment for the licensing of the Diablo Canyon ISFSI<sup>1</sup> is fundamentally inadequate to satisfy NEPA, because it fails to address a very serious and reasonably foreseeable environmental impact of an intentional attack on the Diablo Canyon ISFSI: radiological land contamination and its attendant health, environmental and socioeconomic effects. Moreover, the EA Supplement violates NEPA's requirement for transparency of government decision-making documents, because compelling evidence suggests that the Staff's finding of no significant impact is based on the hidden and unjustified assumption that widespread land contamination does not constitute a significant adverse environmental impact that must be considered in an EIS.

This Summary is supported by the following Exhibits:

- Exhibit 1, Declaration of Dr. Gordon R. Thompson on Behalf of San Luis Obispo Mothers for Peace In Support of Contention 2 Regarding the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (June 27, 2007) and attached Curriculum Vitae ("First Thompson Declaration");
- Exhibit 2, Dr. Gordon R. Thompson, *Assessing Risks of Potential Malicious Actions at Commercial Nuclear Facilities: The Case of a Proposed Independent Spent Fuel Storage Installation at the Diablo Canyon Site* (June 27, 2007) ("Report")<sup>2</sup>; and

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<sup>1</sup> Supplement to the Environmental Assessment and Final Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Spent Fuel Storage Installation (August 2007) ("Final EA Supplement"); Supplement to the Environmental Assessment and Final Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Spent Fuel Storage Installation (May 2007) ("Draft EA Supplement") (collectively "EA Supplement").

<sup>2</sup> SLOMFP previously submitted Exhibits 1 and 2 in support of San Luis Obispo Mothers for Peace's Contentions and Request for a Hearing Regarding Diablo Canyon

- Exhibit 3, Second Declaration of Dr. Gordon R. Thompson on Behalf of San Luis Obispo Mothers for Peace In Support of Contention 2 Regarding the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (June 27, 2007) and attached Curriculum Vitae (“First Thompson Declaration”). Copies of the Exhibits are attached to this Summary.

Based on the record of this proceeding, including the Draft and Final EA Supplements, documents disclosed by the NRC Staff during discovery, and Dr. Thompson’s Report and Second Declaration, there is no dispute that the EA Supplement for the Diablo Canyon ISFSI fails to address the environmental impacts of credible attack scenarios that could have significant environmental impacts on the human environment, including widespread radiological land contamination and its attendant adverse effects on human health and welfare, the environment, and the economy. The NRC Staff has provided no plausible justification for its failure to address these significant impacts in the EA Supplement, and indeed appears to have intentionally excluded contamination-related impacts from consideration based on a secret and arbitrary agency policy of disregarding any impacts of an attack other than immediate fatalities.

Accordingly, as provided by 10 C.F.R. § 2.1115(a)(2), the Commission should rule that there is no unresolved dispute of law or fact regarding Contention 2, and that SLOMFP should prevail on the claims raised in the contention. Therefore PG&E’s application for a license for the Diablo Canyon ISFSI should be denied unless and until the Staff prepares an EIS that fully addresses the environmental impacts of an attack on

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Environmental Assessment Supplement (June 28, 2007; corrected June 29, 2007)  
 (“SLOMFP Hearing Request”).

the Diablo Canyon ISFSI, as well as a range of reasonable alternatives for mitigating or avoiding those impacts.

## II. STATEMENT OF THE CASE

This proceeding marks the second time that SLOMFP has sought compliance by the NRC with NEPA with respect to the consideration of the environmental impacts of an intentional attack on the proposed Diablo Canyon ISFSI. After Pacific Gas and Electric Company ("PG&E") filed its application for a license for the ISFSI in late 2001, SLOMFP requested the NRC to grant a hearing on whether, in light of recent attacks on U.S. facilities, including the attacks of September 11, 2001, the NRC should address the impacts of an attack on the proposed Diablo Canyon facility in an environmental impact statement ("EIS"). The Commission categorically refused to consider SLOMFP's request in *Pacific Gas and Electric Co.* (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-03-01, 57 NRC 1 (2003). In *San Luis Obispo Mothers for Peace*, 449 F.3d 1016 (9th Cir. 2006), cert. denied, 127 S.Ct. 1124 (2007), the United States Court of Appeals for the Ninth Circuit reversed the Commission's decision and remanded the case for further proceedings.

On remand, the NRC Commissioners ordered the NRC Staff to prepare a preliminary analysis, known as an environmental assessment ("EA"), to evaluate whether the NRC should prepare a full-blown EIS to evaluate the environmental impacts of an intentional attack on the proposed facility. *Pacific Gas and Electric Co.* (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-07-11, 65 NRC 148 (2007). In response to the Commission's Order, the NRC Staff issued the Draft EA

Supplement, declaring that an attack on the proposed facility would have no significant impact on the human environment.

In contentions filed June 28, 2008, SLOMFP challenged the Draft EA Supplement for its failure, among other things, to address the dominant impact of spent fuel storage attacks: land contamination, a very serious impact that can render uninhabitable a large land area, causing significant health, economic and social impacts. SLOMFP also charged that the Draft EA Supplement defined adverse impacts only in terms of early deaths, and therefore appeared to rely on the hidden assumption that any impacts other than early fatalities should be ruled out as unworthy of consideration. SLOMFP Hearing Request, Contention 2. SLOMFP also charged that the NRC Staff had violated NEPA by failing to identify the reference documents on which it had relied in preparing the Draft EA Supplement. *Id.*, Contention 1.

Since then, the Staff has provided additional information in the form of a Final EA Supplement, a list of reference documents, disclosure of portions of the redacted reference documents, and responses to SLOMFP's discovery questions. Unfortunately, this additional information does not demonstrate that the Staff has, in fact, considered the environmental effects of credible attack scenarios that could cause significant offsite radiological contamination. Indeed, the documents provide compelling evidence that the Staff followed an established policy of screening out land contamination and other non-fatal environmental effects as unworthy of consideration. Whether or not the Staff did indeed apply such a policy, however, the evidence shows that the Staff's finding of no significant is irrational and unsupported, and therefore must be rejected as inadequate to satisfy NEPA. Because PG&E's application is not supported by an adequate

environmental analysis, it must also be rejected, until such time as the NRC Staff may prepare an EIS that adequately addresses the environmental impacts of an attack on the Diablo Canyon spent fuel storage facility.

### III. STATUTORY AND REGULATORY FRAMEWORK

#### A. Requirements of NEPA

NEPA is the “basic charter for the protection of the environment.” 40 C.F.R. § 1500.1(1). Its fundamental purpose is to “help public officials make decisions that are based on understanding of environmental consequences, and take decisions that protect, restore, and enhance the environment.” *Id.* NEPA requires federal agencies to examine the environmental consequences of their actions *before* taking those actions, in order to ensure “that important effects will not be overlooked or underestimated only to be discovered after resources have been committed or the die otherwise cast.” *Robertson v. Methow Valley Citizen Council*, 490 U.S. 332, 349 (1989).

#### 1. Environmental impact statement

The primary method by which NEPA ensures that its mandate is met is the “action-forcing” requirement that a “detailed statement,” known as an Environmental Impact Statement (“EIS”), be prepared before a federal agency takes any major action which may significantly affect the quality of the human environment. 42 U.S.C. § 4332(2)(C); 40 C.F.R. § 1502.1.<sup>3</sup> The NRC’s implementing regulations at 10 C.F.R. §

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<sup>3</sup> 40 C.F.R. § 1502.1 is a regulation of the President’s Council on Environmental Quality (“CEQ”) for the implementation of NEPA. Although the NRC also has its own NEPA regulations, the CEQ regulations are binding on the NRC unless compliance would “be inconsistent with statutory requirements.” Executive Order 11991, 3 C.F.R. 124 (1978). See also *Baltimore Gas and Electric Co. v. Natural Resources Defense Council*, 462 U.S. 87 (1983); *Andrus v. Sierra Club*, 442 U.S. 347 (1979); NRC Final Rule, Environmental

51.20(a) also require the NRC to prepare an EIS for any licensing or regulatory action which “is a major federal action significantly affecting the quality of the human environment.”

As required by NEPA and its implementing regulations, an EIS must describe, among other things, (1) the “environmental impact” of the proposed action, (2) any “adverse environmental effects which cannot be avoided should the proposal be implemented,” (3) any “alternatives to the proposed action,” and (4) any “irreversible and irretrievable commitments of resources which would be involved in the proposed action should it be implemented. . . .” 42 U.S.C. § 4332(C). The EIS must be circulated in draft for comment by the public and other affected agencies, in order to assure that relevant environmental information will “be made available to the larger audience that may also play a role in both the decisionmaking process and the implementation” of a proposed decision. *Robertson*, 490 U.S. at 349.

An EIS must be searching and rigorous, providing a “hard look” at the environmental consequences of the agency’s proposed action. *Marsh v. Oregon Natural Resources Council*, 490 U.S. 360, 374 (1989). Information about environmental impacts must be subject to a “careful scientific analysis.” *Id.* at 385. *See also* 40 C.F.R. § 1502.24 (“Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements”); 10 C.F.R. § 51.71(d) (draft EIS “considers and weighs the environmental effects of the proposed action”).

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Protection Regulations for Domestic Licensing and Related Regulator Functions and Related Conforming Amendments, 49 Fed. Reg. 9,352 (March 12, 1984).

In making environmental decisions, an agency may not rely on hidden or misleading assumptions. As the U.S. Court of Appeals for the Fifth Circuit held in *South Louisiana Env'tl. Council v. Sand*, 629 F.2d 1005, 1011-12 (5th Cir. 1980), an agency's reliance on misleading assumptions violates NEPA by "impairing the agency's consideration of the adverse environmental effects of a proposed project." See also *Johnston v. Davis*, 698 F.2d 1088, 1094 (10th Cir. 1983) (holding that misleading or unqualified statements that do not represent a realistic assessment of environmental impacts violate NEPA); *Hughes Watershed Conservancy v. Glickman*, 81 F.3d 437, 446 (4th Cir. 1999) (rejecting an EIS that contained misleading projections of a proposed project's economic benefits); *Calvert Cliffs Coordinating Committee v. AEC*, 449 F.2d 1109, 1113 (D.C. Cir. 1971) (an environmental impact statement must be "detailed" and the analysis carried out "fully and in good faith.")

Environmental impacts that must be considered in an EIS include those which are "reasonably foreseeable" and have "catastrophic consequences, even if their probability of occurrence is low." 40 C.F.R. § 1502.22(b)(1). However, environmental impacts that are "remote and speculative" need not be considered. *Limerick Ecology Action v. NRC*, 869 F.2d 719, 745 (3<sup>rd</sup> Cir. 1989), citing *Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc.*, 435 U.S. 519, 551 (1978). The fact that the likelihood of an impact may not be easily quantifiable is not an excuse for failing to address it in an EIS. NRC regulations require that: "[t]o the extent that there are important qualitative considerations or factors that cannot be quantified, these considerations or factors will be discussed in qualitative terms." 10 C.F.R. § 51.71.

In *San Luis Obispo Mothers for Peace*, the U.S. Court of Appeals for the Ninth Circuit rejected, as irrational, a previous NRC policy of refusing to consider the environmental impacts of intentional attacks on nuclear facilities on the asserted ground that they are remote and speculative. Therefore, the NRC has reversed its policy in this case and ordered the preparation of an EA to consider whether the impacts of an attack on the Diablo Canyon ISFSI should be addressed in an EIS. *Pacific Gas and Electric Co.* (Diablo Canyon ISFSI), CLI-07-011, 65 NRC 148 (2007), citing *San Luis Obispo Mothers for Peace*.<sup>4</sup>

## 2. Environmental Assessment

NEPA requires that, in actions involving substantial undertakings, such as the instant proposal to store spent nuclear power plant fuel at a new facility on the Diablo Canyon site, an agency may not dispense with an EIS unless and until it has prepared an EA that evaluates whether an EIS is required, taking into account all relevant factors. *LaFlamme v. FERC*, 852 F.2d 389, 399 (9th Cir. 1988) (hydroelectric power plant license suspended for failure to prepare an EA). Like an EIS, an EA must take a “hard look” at the potential environmental consequences of the action. *See also Maryland National Park and Planning Commission v. U.S. Postal Service*, 487 F.2d 1029, 1040 (D.C. Cir. 1973); *Foundation on Economic Trends v. Heckler*, 756 F.2d 143, 154 (D.C. Cir. 1985) (EA must “attempt to evaluate seriously the risk[s]” posed by proposed action.) As the D.C. Circuit of the U.S. Court of Appeals noted in *Foundation on Economic Trends*, “one of the specific criteria for determining whether an EIS is necessary is ‘[t]he degree to

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<sup>4</sup> *But see Amergen Energy Company, L.I.C.* (Oyster Creek Nuclear Generating Station), CLI-07-08, 65 NRC 124 (2007) (majority opinion declaring that the NRC will comply

which the possible effects on the human environment are highly uncertain or involve unique or unknown risks.” 756 F.2d at 155, citing 40 C.F.R. § 1508.27(b)(5). Thus, in *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1213 (9th Cir. 1998), the Court found that “[a] project may have significant environmental impacts where its effects are ‘highly uncertain or involve unique or unknown risks.’” *See also Morgan v. Walter*, 728 F.Supp. 1483, 1489 (D. Id. 1989).

#### **B. Procedural Standards for Subpart K Proceedings**

The Commission has chosen to adjudicate SLOMFP’s Contention 2 under Subpart K of its procedural regulations in 10 C.F.R. Part 2. Subpart K is an “abbreviated hearing process” that “derives from the NWPA [Nuclear Waste Policy Act], where Congress called on the Commission to ‘encourage and expedite’ onsite spent fuel storage.” *Carolina Power & Light Co. (Shearon Harris Nuclear Power Plant)*, CLI-01-11, 53 NRC 370 (2001), citing 42 U.S.C. § 10151(a)(2). Following a period of discovery, the parties must submit legal arguments and factual evidence in the form of testimony or declarations. 10 C.F.R. § 2.1113. After holding an oral argument, the NRC must:

- (1) Designate any disputed issues of fact, together with any remaining issues of law, for resolution in an adjudicatory hearing; and
- (2) Dispose of any issues of law or fact not designated for resolution in an adjudicatory hearing.

10 C.F.R. § 2.1115(a). The regulations forbid designation of an issue for resolution in a hearing unless the presiding officer determines that:

- (1) There is a genuine and substantial dispute of fact which can only be resolved with sufficient accuracy by the introduction of evidence in an adjudicatory hearing; and
- (2) The decision of the Commission is likely to depend in whole or in part on the resolution of that dispute.

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with *San Luis Obispo Mothers for Peace* only in the Ninth Circuit).

10 C.F.R. § 2.1115(b).

To the extent that an intervenor seeks disposition of an environmental against the NRC Staff under 10 C.F.R. § 2.1115(a)(2), the NRC Staff bears the burden of proof. *Carolina Power & Light Co.* (Shearon Harris Nuclear Power Plant), LBP-01-09, 53 NRC 239, 249 (2001), affirmed, CLI-01-11, 53 NRC 370 (2001). *See also Louisiana Energy Services* (Claiborne Enrichment Center), LBP-96-25, 44 NRC 331, 338 (1996) (Staff has burden of proof in defending its own environmental studies). To the extent that an intervenor argues, under 10 C.F.R. § 2.1115(a)(1), that there is a dispute regarding any issue of fact or law that must be resolved in a hearing, the intervenor bears the burden of making that showing. *Harris*, LBP-01-09, 53 NRC at 249.

#### IV. ADMITTED SLOMFP CONTENTION 2

The subject of this Subpart K proceeding is SLOMFP's Contention 2, which is supported by the Thompson Report. In relevant part, SLOMFP Contention 2 states as follows:

The EA Supplement fails to satisfy NEPA because the NRC's decision not to prepare an EIS is based on hidden and unjustified assumptions.

**Basis:** As the U.S. Court of Appeals for the Fifth Circuit held in *South Louisiana Env'tl. Council v. Sand*, 629 F.2d 1005, 1011-12 (5<sup>th</sup> Cir. 1980), an agency's reliance on misleading assumptions violates NEPA by "impairing the agency's consideration of the adverse environmental effects of a proposed project." *See also Johnston v. Davis*, 698 F.2d 1088, 1094 (10<sup>th</sup> Cir. 1983) (holding that misleading or unqualified statements that do not represent a realistic assessment of environmental impacts violate NEPA); *Hughes Watershed Conservancy v. Glickman*, 81 F.3d 437, 446 (4<sup>th</sup> Cir. 1999) (rejecting an EIS that contained misleading projections of a proposed project's economic benefits).

Here, the EA Supplement violates NEPA by relying on hidden and unjustified assumptions. For instance, the EA Supplement appears to assume that the environmental impacts of an attack on a spent fuel storage cask would be

and other considerations, but we believe further inquiry is appropriate.

CLI-08-01, slip op. at 20-21 (January 15, 2008).

**V. FACTS AND ARGUMENTS ON WHICH SLOMFP INTENDS TO RELY AT ORAL ARGUMENT**

**A. Dr. Thompson is Highly Qualified to Testify Regarding Contention 2.**

SLOFMP's Summary is supported by a detailed expert declaration by Dr. Gordon Thompson (Second Thompson Declaration, Exhibit 3) and by Dr. Thompson's detailed expert report that SLOMFP submitted in support of Contention 2 (Exhibit 2). Dr. Thompson is a highly qualified expert with respect to the technical issues of nuclear facility vulnerability and risk analysis that are in dispute in this proceeding. He is qualified by "knowledge, skill, experience, training, or education" to render an expert opinion on the adequacy of the NRC Staff's analysis of the environmental impacts of an intentional attack on the proposed Diablo Canyon spent fuel storage facility, and his expert opinion will "assist the trier of fact to understand the evidence" and to determine the facts in issue. *See Federal Rule of Evidence 702, which was held applicable to NRC proceedings in Duke Power Co. (William B. McGuire Nuclear Station, Units 1 and 2), ALAB-669, 15 NRC 453, 475 (1972).*

Dr. Thompson's high level of expert qualifications are set forth in the declaration he submitted in support of SLOMFP's contentions, and in the curriculum vitae that is attached to that declaration. *See Exhibit 1, First Thompson Declaration*. As stated there, his undergraduate and graduate work provided him with a rigorous education in the methodologies and disciplines of science, mathematics, and engineering. *First Thompson Declaration, par. 2*. He received an undergraduate education in science and mechanical

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Dr. Thompson's high level of expert qualifications are set forth in the declaration he submitted in support of SLOMFP's contentions, and in the curriculum vitae that is attached to that declaration. *See* Exhibit 1, First Thompson Declaration. As stated there, his undergraduate and graduate work provided him with a rigorous education in the methodologies and disciplines of science, mathematics, and engineering. First Thompson Declaration, par. 2. He received an undergraduate education in science and mechanical

engineering at the University of New South Wales, in Australia. In 1973 he received a Doctor of Philosophy degree in physics from Oxford University, for analyses of plasmas undergoing thermonuclear fusion. During Dr. Thompson's graduate studies he was associated with the fusion research program of the UK Atomic Energy Authority. *Id.*, par. 2.

Since 1977, a significant part of Dr. Thompson's work has consisted of technical analyses of safety, security and environmental issues related to nuclear facilities. These analyses have been sponsored by a variety of nongovernmental organizations and local, state and national governments, predominantly in North America and Western Europe. Drawing upon these analyses, he has provided expert testimony in legal and regulatory proceedings, and has served on committees advising US government agencies. *Id.*, par. 3.

Dr. Thompson has conducted, directed, and/or participated in a number of studies that evaluated aspects of the design and operation of nuclear facilities with respect to severe accident probabilities and consequences. These include generic studies and studies of individual facilities. For instance, with respect to generic studies on the potential for severe accidents at nuclear power plants, he was co-investigator in a study by the Union of Concerned Scientists on the "source term" issue -- the potential for release of radioactive material to the environment. In addition, he was one of a team of four scientists who prepared, for Greenpeace International, a comprehensive critique of the state of the art of probabilistic risk assessment ("PRA") for nuclear power plants. That report noted that acts of malice, such as sabotage and acts of war, are not considered in PRAs, despite a history of malicious acts at many nuclear facilities. In addition, Dr.

Thompson conducted analysis on the relevance of PRA to emergency response planning, as part of a study on emergency planning for nuclear power plant accidents. All of these studies required Dr. Thompson to be highly familiar with the design and operation of nuclear power plants, as well as the characteristics of probabilistic risk assessment. *Id.*, par. 4.

Dr. Thompson has also done considerable work on the risks posed by individual nuclear facilities. In addition to performing the studies described elsewhere in this declaration, he has studied the risks posed by the Seabrook, Pilgrim, Vermont Yankee and Three Mile Island plants (USA), the Darlington and Pickering stations (Canada), the Sizewell B station (United Kingdom (“UK”)) and the Dukovany plant (Czech Republic). All of these studies required him to become familiar with the relevant details of the design and operation of the facilities involved. *Id.*, par. 5.

To a significant degree, Dr. Thompson’s work has been accepted or adopted by relevant governmental agencies. During the period 1978-1979, for example, he served on an international review group commissioned by the government of Lower Saxony (a state in Germany) to evaluate a proposal for a nuclear fuel cycle center at Gorleben. He led the subgroup that examined accident risks and identified alternative options with lower risk. One of the risk issues that he identified and analyzed was the potential for self-sustaining, exothermic oxidation reactions of fuel cladding in a high-density spent fuel pool if water is lost from the pool, *i.e.*, a “pool fire.” In examining the potential for a pool fire, Dr. Thompson identified partial loss of water as a more severe condition than total loss of water. He identified a variety of events that could cause a loss of water from a pool, including aircraft crash, sabotage, terrorism and acts of war. He also identified and

described alternative fuel storage options with lower risk; these lower-risk options included design features such as spatial separation, natural cooling and underground vaults. The Lower Saxony government accepted Dr. Thompson's findings about the risk of a pool fire, and ruled in May 1979 that high-density pool storage of spent fuel was not an acceptable option at Gorleben. As a direct result, policy throughout Germany has been to use dry storage in casks, rather than high-density pool storage, for away-from-reactor storage of spent fuel. *Id.*, par. 6.

Dr. Thompson's work has also influenced decision making by safety officials in the U.S. Department of Energy ("DOE"). During the period 1986-1991, he was commissioned by environmental groups to assess the safety of the military production reactors at the Savannah River Site, and to identify and assess alternative options for the production of tritium for the US nuclear arsenal. Initially, much of the relevant information was classified or otherwise inaccessible to the public. Nevertheless, Dr. Thompson addressed safety issues through analyses that were recognized as accurate by nuclear safety officials at DOE. He eventually concluded that the Savannah River reactors could not meet the safety objectives set for them by DOE. DOE subsequently reached the same conclusion, and scrapped the reactors. The current national policy for tritium production is to employ commercial reactors, an option that Dr. Thompson had concluded was technically attractive but problematic from the perspective of nuclear weapons proliferation. *Id.*, par. 7.

In 1977, and again during the period 1996-2000, Dr. Thompson examined the safety of nuclear fuel reprocessing and liquid high-level radioactive waste management facilities at the Sellafield site in the UK. His investigation during the latter period was

supported by consortia of local governments in Ireland and the UK, and he presented his interim findings at briefings in the UK and Irish parliaments in 1998. In the course of that study, Dr. Thompson identified safety issues that were not addressed in any publicly available literature about the Sellafield site. As a direct result of Dr. Thompson's investigation, the UK Nuclear Installations Inspectorate ("NII") required the operator of the Sellafield site -- British Nuclear Fuels ("BNFL") -- to conduct extensive safety analyses. These analyses confirmed the significance of the safety issues that he had identified, and in January 2001 the NII established a legally binding schedule for reduction of the inventory of liquid high-level radioactive waste at Sellafield. The NII took this action in recognition of the grave offsite consequences of a release to the environment from the tanks in which liquid high-level waste is stored. Dr. Thompson had identified a variety of events that could cause such a release, including acts of malice or insanity. *Id.*, par. 8.

In May 2000, Dr. Thompson completed a study for Greenpeace International on the hazard potential of the La Hague site in France. Nuclear fuel reprocessing and related activities are conducted at this site. The operator of the site -- COGEMA -- was authorized to store 14,000 tonnes of spent fuel in high-density pools at La Hague, and proposed to increase the capacity of these pools to 17,600 tonnes. Dr. Thompson's study described the potential for a pool fire at La Hague, and identified events -- including acts of malice or insanity -- that could lead to a pool fire. One of the findings of his study was that neither COGEMA nor the French government had a thorough understanding of La Hague's hazard potential, including the potential for a pool fire. Subsequent to the attacks of September 11, 2001 in New York City and Washington, D.C., media exposure brought

La Hague's hazard potential to the attention of the French government. During October 2001 the French government deployed anti-aircraft missiles at La Hague. *Id.*, par. 9.

As discussed above, during the period 1978-1979, Dr. Thompson determined that partial loss of water from a high-density spent fuel pool is a more severe condition than total loss of water.<sup>5</sup> The NRC Staff failed, for more than two decades, to understand this point. An illustration of the Staff's lack of understanding was provided by its statements during a license amendment proceeding for the proposed expansion of spent fuel pool storage capacity at the Harris nuclear power plant, in which Dr. Thompson served as an expert witness for the Intervenor, Orange County, North Carolina. In filings during March and April 2000, the Staff repeatedly disparaged Dr. Thompson's statements that comparatively old fuel can ignite. A few months later, however, the Staff adopted Dr. Thompson's position. In a report dated October 2000, but not published until January 2001, the Staff recognized that the flow of air to exposed fuel assemblies could be blocked by the presence of collapsed structures -- which might be attributable, for example, to a cask drop or an earthquake -- or by the presence of residual water. The Staff analyzed the heat transfer implications of flow blockage and concluded:

While the February 2000 [draft] study indicated that for the cases analyzed a required decay time of 5 years would preclude a zirconium fire, the revised analyses show that it is not feasible, without numerous constraints, to define a generic decay heat level (and therefore decay time) beyond which a zirconium fire is not physically possible.

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<sup>5</sup> As discussed in par. 10 of the Firsts Thompson Declaration, this is because convective heat transfer is suppressed by the presence of residual water at the base of the fuel assemblies. During any scenario for loss of water from a spent fuel pool, there will be a period of time during which residual water is present. As a result, comparatively old fuel -- potentially including fuel aged 10 or more years after discharge from a reactor -- can ignite if water is lost from a high-density spent fuel pool.

*Id.*, par. 10.

On numerous occasions, Dr. Thompson has drawn attention in his writings and oral presentations to the vulnerability of nuclear facilities to acts of malice or insanity. He has pointed out that PRAs do not address acts of malice or insanity, with the result that a PRA can, at best, provide a lower bound to the probability of a release of radioactive material. In 1996, he wrote a generic report on war and terrorism as risk factors for nuclear power plants. Among other findings, this report noted that an act of war or terrorism at a nuclear power plant might have as its primary target the spent fuel stored at the plant, rather than the reactor. The report concluded with a statement that:

Public debate about the future operation of existing nuclear power plants, and the construction of new plants, should be broadened to encompass the possible involvement of nuclear plants in war or terrorism.

*Id.*, par. 11.

Dr. Thompson is familiar with the License Application, Safety Analysis Report, and Environmental Report for PG&E's proposed ISFSI. He is also familiar with the NRC's Draft and Final EA Supplements. In support of Contention 2, Dr. Thompson prepared a report that includes an analysis of the deficiencies in the Diablo EA Supplement's evaluation of the environmental impacts of intentional attacks on the proposed Diablo Canyon spent fuel storage facility. *See* Exhibit 2.

Accordingly, Dr. Thompson is highly qualified to testify in this proceeding, by virtue of his training, his many years of experience in the analysis of safety, risk, and environmental issues affecting nuclear facilities, and his familiarity with the facts of this case.

**B. The NRC Violated NEPA by Failing to Address, in an EIS, the Significant Environmental Impacts of an Attack on the Diablo Canyon ISFSI in the Form of Widespread Land Contamination and its Associated Effects.**

As discussed above in Section III, the NRC Staff was required by NEPA to take a “hard look,” in its EA Supplement, at the environmental impacts of an intentional attack on the Diablo Canyon spent fuel storage facility. The EA Supplement falls far short of this statutory requirement. While the NRC Staff claims, in the EA Supplement, to address the environmental impacts of “plausible threat scenarios” (Final EA Supplement at 6 and 7), in fact the Staff completely ignores the impacts of a range of credible attacks that could cause significant radioactive land contamination, leading to severe adverse effects on human health and welfare, the environment, and the economy. Moreover, the record contains compelling evidence that in ignoring radioactive land contamination as an environmental impact, the Staff was following a secret NRC policy of screening out non-fatal impacts as unworthy of consideration in NRC security and environmental analyses. In any event, regardless of what ground the NRC Staff relied on to disregard the significant adverse impacts of land contamination and related effects resulting from an attack on the Diablo Canyon ISFSI, the EA Supplement’s failure to consider these credible and significant impacts renders it fatally defective under NEPA.

**1. The EA Supplement ignores credible and significant impacts of an attack on the Diablo Canyon ISFSI.**

As demonstrated in Section V of Dr. Thompson’s Second Declaration, the Staff’s finding of no significant impact is contradicted by information that can be gleaned from publicly available documents, applying knowledge of engineering and related disciplines. This information shows that it is reasonably foreseeable that an attack-induced

atmospheric release of radiological material from a spent fuel storage module of the type that would be used at the Diablo Canyon ISFSI could cause a significant degree of land contamination. A competent, sub-national group seeking to create offsite radiological impacts by attacking a storage module at the Diablo Canyon ISFSI would probably seek to penetrate the wall of the multi-purpose canister ("MPC") and ignite the zirconium fuel cladding, with the intent of initiating a fire that would release radioactive material to the environment. Thompson Report at 43. Such an attack could be accomplished by various means. Thompson Report at 33-37.

A credible attack on the Diablo Canyon ISFSI could release to the atmosphere tens of percent of the inventory of cesium-137 in affected spent-fuel modules. Second Thompson Declaration, par. II-3. Deposition of cesium-137 from that release could render thousands of square kilometers of land uninhabitable. Sequelae would include contamination of food and water, cancer and other adverse health effects that would be manifested years after the release, relocation of populations, abandonment of real estate, and various economic and social impacts. Economic losses could amount to tens of billions of dollars. *Id.* See also Thompson Report at 15-17, 37.

**2. The EA Supplement relies on a hidden and irrational assumption that non-fatal impacts need not be considered.**

The EA Supplement provides only one direct indicator of an adverse outcome of an attack on an ISFSI: the potential for early fatalities. Second Thompson Declaration, par. III-1. Thus, SLOMFP has inferred that the NRC Staff, in preparing the EA Supplement, assumed that the environmental impacts of an attack on an ISFSI would be insignificant if the attack does not result in early fatalities. *Id.*, Section III. The policy of

screening out attacks with non-fatal consequences was set forth in a 2004 memorandum from the NRC Staff to the Commissioners, SECY-04-0222, Memorandum from Luis A. Reyes to the Commissioners re: Decision-making Framework for Materials and Research and Test Reactor Vulnerability Assessments (November 24, 2004) (“SECY-04-0222”) and approved by the NRC Commissioners in SRM-SECY-04-0222, Staff Requirements Memorandum re: Decision-making Framework for Materials and Research and Test Reactor Vulnerability Assessments (January 15, 2005) (“SRM-SECY-04-0222”).

While the title of SECY-04-0222 indicates that the policy applies only to source materials facilities and research and test reactors, the NRC Staff has listed both SECY-04-0222 and SRM-SECY-04-0222 as reference documents in a November 2007 addendum to the Final EA Supplement, thus indicating the Staff has applied the policy to the Diablo Canyon ISFSI.<sup>6</sup> A subsequent NRC memorandum, also listed as a reference document in the November 2007 Addendum, revealed that the Staff had “performed framework assessments” for spent fuel storage casks and transportation packages “in accordance with SRM-SECY-04-0222.” Second Thompson Declaration, par. III-4, quoting Memorandum by Jack R. Strosnider, Office of Nuclear Material Safety and Safeguards, to Roy P. Zimmerman, Office of Nuclear Security and Incident Response, re: Framework for Assessment of Spent fuel Storage Casks and Transportation Packages and

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<sup>6</sup> Notably, while the Final EA Supplement was published in August of 2007, these reference documents were not identified until November. Memorandum from Robert A. Nelson, Chief, Licensing Branch, Division of Spent Fuel Storage and Transportation, Office of Nuclear Material Safety and Safeguards, to Michael T. Lesar, Chief, Rulemaking, Directives, and Editing Branch, Division of Administrative Services, Office of Administration re: Notice of Issuance of Addendum to the Supplement to the Environmental Assessment for the Diablo Canyon Independent Spent Fuel Storage Installation (November 7, 2007) (“November 2007 Addendum”).

Radioactive Material Transportation Packages (December 9, 2005) (“Strosnider Memorandum”). The Strosnider Memorandum is also listed as a reference document in the November 2007 Addendum.

SECY-04-0222, SRM-SECY-04-0222, and the Strosnider Memorandum were unavailable publicly until the Staff released redacted versions in conjunction with the Staff’s publication, on February 13, 2008, of a Vaughn Index. Thus, they appear to constitute “secret law” whose suppression was unlawful under the Freedom of Information Act (“FOIA”). *Hardy v. Bureau of Alcohol, Tobacco & Firearms*, 631 F.2d 653, 657 (9th Cir. 1980). *See also* Memorandum from Stephen D. Dingbaum, Assistant Inspector General for audits, to Luis A. Reyes, Executive Director for Operations, re: Audit of NRC’s Process for Release Commission Decision Documents at 16 (September 8, 2006) (criticizing Commission for failing to publicly release a SECY paper (subsequently revealed to be SECY-04-0222) that “requested that consideration of the impacts of security event consequences be limited to prompt deaths”).

In responding to interrogatories by SLOMFP, the NRC Staff asserted that “[i]n general, the NRC considers potential offsite radiological contamination of land a potential environmental impact using NEPA criteria to assess its significance.” NRC Staff’s Response and Objections to San Luis Obispo Mothers for Peace’s First Set of Discovery Requests at 19 (February 22, 2008). This statement is inconsistent with the memoranda discussed above; with the statements in the Final EA Supplement regarding the Staff’s exclusive focus on immediate fatalities; and with the evidence established in Dr. Thompson’s Report and his Second Declaration that credible attacks on the Diablo Canyon ISFSI could result in significant levels of offsite contamination, causing

Radioactive Material Transportation Packages (December 9, 2005) (“Strosnider Memorandum”). The Strosnider Memorandum is also listed as a reference document in the November 2007 Addendum.

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widespread health, environmental and economic effects. Thus, the Staff's interrogatory response must be rejected as totally inconsistent with the record.

**3. The EA Supplement arbitrarily limits its consideration of impacts.**

The NRC Staff has not disclosed any information about the attack-induced atmospheric releases that it has considered in the context of the Diablo Canyon ISFSI. However, some information about those releases can be inferred from available sources, including reference documents produced by the NRC Staff during discovery.

In the redacted portions of its reference documents, the Staff has disclosed some information about a study conducted for NRC by SNL, regarding the impact of a large aircraft on a field of HI-STORM spent-fuel-storage modules. That type of module would be used at the Diablo Canyon ISFSI. The study was described in Smith, et al., *Results of a Large Airplane Impact Into a Field of Holtec HI-STORM Spent Nuclear Fuel Casks* (Sandia National Laboratories, 2004) (Vaughn Index Document No. 1).<sup>7</sup> At page 7, the redacted report stated that the mass of the assumed aircraft is representative of the class of aircraft involved in the 9/11 events. At pages 24-25, the report stated that it is unlikely that a pool of fuel and a storage module would be co-located after the dynamic phase of the impact had concluded. Thus, a long-duration pool fire affecting a module was judged to be a non-credible event. At page C-4, the report mentioned the analytic simulation of a quiescent, engulfing fire affecting an upright module. The simulation was run for a short time – 90 to 180 seconds – consistent with SNL's judgment that a module would not be co-located with a long-duration pool fire. Second Thompson Declaration, par. VI-2.

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<sup>7</sup> Most of the content of this document was redacted.

Another report described a study conducted by SNL for NRC on the response of a HI-STORM 100 module to an explosive blast. Marlin E. Kipp, et al., *Response of the HI-STORM Spent Nuclear Fuel Storage Cask to a Large Explosive Charge Blast (U)* (Sandia National Laboratories, August 22, 2004).<sup>8</sup> At page 8 the redacted report stated:

The amount of explosive and standoff distance is representative of a scenario of a small truck parked directly adjacent to the cask. The scenario parameters for this event were defined by NRC design basis threat criteria and by NRC staff, where more specificity was required to define the event. This loading simulates a truck delivery of the explosive, parked adjacent to the cask.

At page 21 the report stated:

The charge configuration is limited to a bare TNT charge in close proximity to the cask.

Using the typology set forth in Table 3 of the Second Thompson Declaration, the two attack scenarios described above would be associated with Type III atmospheric releases. Both scenarios would have a dramatic appearance, but neither would represent a sophisticated approach to maximizing radiological impacts. Neither scenario would be likely to initiate sustained combustion of zircaloy cladding inside a module. Both scenarios would be consistent with atmospheric releases similar to the two scenarios discussed above. For such releases, the dominant radiological impact would be the inhalation doses accrued by persons exposed to the radioactive plume. Second Thompson Declaration, par. VI-4.<sup>9</sup>

In comparison, the radiological releases from an attack causing sustained

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<sup>8</sup> Again, most of the content of this document was redacted from the version provided to SLOMFP.

<sup>9</sup> As discussed in Section IV of the Second Thompson Declaration, the NRC's modeling of radioactive plume dispersion for purposes of assessing radiation dose is

combustion of zircaloy cladding inside a module would contain much larger amounts of volatile isotopes such as cesium-137, which would be significant from the perspective of land contamination (Type IV atmospheric releases designated in Table 3 of the Second Thompson Declaration). Second Thompson Declaration, par. V-11.

A superficial assessment of the vulnerability of an ISFSI might lead to the conclusion that Type IV releases deserve less consideration than do Type III releases because they would have a less dramatic appearance. That assessment would be incorrect. It would ignore the greater sophistication of the attack scenarios associated with Type IV releases, which would aim to maximize radiological impacts rather than the dramatic appearance of the event. Also, analysts whose attention is focused on the inhalation dose to a downwind individual could fail to appreciate the significance of Type IV releases, if they assume that the more dramatic-appearing attack scenarios associated with Type III releases would yield larger amounts of the isotopes that dominate inhalation dose. *Id.*

**4. NEPA requires the NRC Staff to prepare an EIS that encompasses a comprehensive assessment of the environmental impacts of an attack on the Diablo Canyon ISFSI.**

The NRC Staff argues that the environmental impacts of potential attacks on the Diablo Canyon ISFSI are not significant. But the Staff has not provided a comprehensive assessment to support that position. Second Thompson Declaration, par. VI-5. A comprehensive assessment would consider a range of attack scenarios, release types, and weather conditions. It would also address site-specific issues, including the complexities of atmospheric plume dispersion at the Diablo Canyon site. *Id.* In addition, as discussed

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unacceptably simplistic and stylized.

above, the Staff has not disclosed all of the assumptions that underlie its position. Thus, much of the basis for the Staff's position remains hidden.

The NRC Staff should identify and characterize a range of credible attacks, and then estimate the release of radioactive material to the environment for each type of attack. In the case of an attack on an ISFSI, the most significant mode of release would be to the atmosphere. Next, the assessment would model the dispersal of radioactive material in the environment. That step would include site-specific factors that significantly affect the behavior of atmospheric plumes. Then, the assessment would estimate human exposure to the released radioactive material by all significant pathways. Finally, the assessment would estimate the health, environmental, social and economic impacts, both direct and indirect, that rise from the potential for attack-induced release of radioactive material. Thompson Declaration, par. II-5.

#### **VIII. CONCLUSION**

As demonstrated above, in the Thompson Report, and the Second Thompson Declaration, the EA Supplement prepared by the NRC Staff violates NEPA because it is not rigorous, comprehensive or science-based. The Staff ignored credible attack scenarios that could cause widespread and severe land contamination, leading to significant adverse health, environmental, and economic consequences. Moreover, compelling evidence indicates that in disregarding these clearly significant impacts, the Staff applied a secret NRC policy of excluding consideration of any impacts other than immediate fatalities.

Accordingly, the Commission should rule that under 10 C.F.R. § 2.1115(a)(2) there is no unresolved dispute of law or fact regarding Contention 2, and that SLOMFP

should prevail on the claims raised in the contention. Therefore PG&E's application for a license for the Diablo Canyon ISFSI should be denied unless and until the Staff prepares an EIS that fully addresses the environmental impacts of an attack on the Diablo Canyon ISFSI, as well as a range of reasonable alternatives for mitigating or avoiding those impacts.

Respectfully submitted,



Diane Curran  
Harmon, Curran, Spielberg, & Eisenberg, L.L.P.  
1726 M Street N.W., Suite 600  
Washington, D.C. 20036  
202/328-3500  
e-mail: Dcurran@harmoncurran.com

April 14, 2008

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE COMMISSION

In the Matter of: :  
: :  
PACIFIC GAS & ELECTRIC CO. : Docket No. 72-26 - ISFSI  
(Diablo Canyon Nuclear Power Plant :  
Unit Nos. 1 and 2) :

**SECOND DECLARATION OF DR. GORDON R. THOMPSON  
ON BEHALF OF SAN LUIS OBISPO MOTHERS FOR PEACE  
IN SUPPORT OF CONTENTION 2 REGARDING THE CONSTRUCTION AND  
OPERATION OF THE DIABLO CANYON INDEPENDENT SPENT  
FUEL STORAGE INSTALLATION**

I, Gordon R. Thompson, state the following:

**I. Introduction**

I-1. I am the executive director of the Institute for Resource and Security Studies (IRSS), a nonprofit, tax-exempt corporation based in Massachusetts. Our office is located at 27 Ellsworth Avenue, Cambridge, MA 02139. IRSS was founded in 1984 to conduct technical and policy analysis and public education, with the objective of promoting peace and international security, efficient use of natural resources, and protection of the environment.

I-2. I am an expert in the technical analysis of safety, security and environmental issues related to nuclear facilities. Information about my relevant experience and expertise, together with an attached copy of my curriculum vitae, are provided in my declaration of 27 June 2007 in this matter.<sup>1</sup> That declaration accompanied a report that I prepared for San Luis Obispo Mothers for Peace (SLOMFP).<sup>2</sup> My declaration and report supported contentions submitted by SLOMFP in this matter.<sup>3</sup>

I-3. Here, I set forth facts, data and arguments to support SLOMFP Contention 2.

I-4. SLOMFP's contentions responded to the publication by the Staff of the US Nuclear Regulatory Commission (NRC) of a Supplement to the Environmental Assessment (EA) for a proposed Independent Spent Fuel Storage Installation (ISFSI) at the Diablo Canyon

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<sup>1</sup> Thompson, 2007d.

<sup>2</sup> Thompson, 2007b.

<sup>3</sup> SLOMFP, 2007.

site. The EA Supplement was published in draft and final versions, in May 2007 and August 2007, respectively.<sup>4</sup>

I-5. The remainder of this declaration consists of narrative discussion set forth in Sections II through VII, together with a bibliography and three tables. All citations in the footnotes and the tables are to documents listed in the bibliography. Some additional, relevant documents also appear in the bibliography.

## **II. SLOMFP Contention 2 and Its Context**

II-1. SLOMFP Contention 2 states as follows:<sup>5</sup>

"The EA Supplement fails to satisfy NEPA because the NRC's decision not to prepare an EIS is based on hidden and unjustified assumptions."

II-2. In setting forth the basis for Contention 2, SLOMFP provided examples of the EA Supplement's reliance on hidden and unjustified assumptions. A notable example was the EA Supplement's apparent assumption that the environmental impacts of an attack on a spent-fuel-storage module would be insignificant if the attack does not result in early fatalities. That assumption can be inferred because the EA Supplement, in discussing the consequences of a release of radioactive material arising from an attack on an ISFSI, provided only one direct indicator of an adverse outcome, namely "the potential for early fatalities".<sup>6</sup> It should be noted that the NRC uses the terms "early fatalities" and "prompt fatalities" interchangeably.

II-3. My report in support of SLOMFP's contentions shows that the potential for early fatalities is an inappropriate indicator of the environmental impacts of an attack. Other consequences of an attack, especially land contamination and its sequelae, would have considerably greater significance. A credible attack on the Diablo Canyon ISFSI could release to the atmosphere tens of percent of the inventory of cesium-137 in affected spent-fuel-storage modules. Deposition of cesium-137 from that release could render thousands of square kilometers of land uninhabitable. Sequelae would include contamination of food and water, cancers and other adverse health effects that would be manifested years after the release, relocation of populations, abandonment of real estate, and various economic and social impacts. Economic losses could amount to tens of billions of dollars.<sup>7</sup>

II-4. The NRC Commissioners have admitted Contention 2 into this proceeding, in regard to the scope of the consequences considered in the EA Supplement.<sup>8</sup> I address that issue here, in its appropriate context. The scope of the consequences of a potential attack on the Diablo Canyon ISFSI could only be properly understood as part of a

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<sup>4</sup> NRC, 2007b; NRC, 2007a.

<sup>5</sup> SLOMFP, 2007, page 10.

<sup>6</sup> NRC, 2007b, page 6. An equivalent statement appears at: NRC, 2007a, page 7.

<sup>7</sup> Thompson, 2007b, pages 17 and 37.

<sup>8</sup> NRC, 2008a, pp 20-21.

comprehensive assessment of the environmental impacts of such an attack. SLOMFP does not have the funds needed to conduct such an assessment, nor does SLOMFP have the duty to do so. Nevertheless, SLOMFP fully understands the steps needed to conduct such an assessment, and has constructed its contentions accordingly. My report in support of SLOMFP's contentions, and this testimony, reflect that understanding. Both documents provide illustrative analyses to support their arguments. Neither document purports to provide a comprehensive assessment of environmental impacts.

II-5. A comprehensive assessment of environmental impacts, as discussed in the preceding paragraph, would begin by identifying and characterizing a range of credible attacks. Then, for each type of attack, the assessment would estimate the release of radioactive material to the environment. In the case of an attack on an ISFSI, the most significant mode of release would be to the atmosphere. Next, the assessment would model the dispersal of radioactive material in the environment. That step would include site-specific factors that significantly affect the behavior of atmospheric plumes. Then, the assessment would estimate human exposure to the released radioactive material by all significant pathways. Finally, the assessment would estimate the health, environmental, social and economic impacts, both direct and indirect, that arise from the potential for attack-induced release of radioactive material.

II-6. The NRC Staff has not conducted a comprehensive assessment, as specified in the preceding paragraph, for the Diablo Canyon ISFSI. Analysis that the Staff has conducted is reviewed in subsequent sections of this testimony. The requirements of a comprehensive assessment provide a framework for that review.

### **III. NRC Staff Position Regarding the Potential for Early Fatalities**

III-1. As stated in paragraph II-2, above, the EA Supplement provided only one direct indicator of an adverse outcome of an attack on an ISFSI, namely the potential for early fatalities.<sup>9</sup> Thus, SLOMFP has inferred that the NRC Staff, in preparing the EA Supplement, assumed that the environmental impacts of an attack on an ISFSI would be insignificant if the attack does not result in early fatalities. Information subsequently provided by the NRC Staff in this proceeding has confirmed SLOMFP's inference. That information relates to research reactors and related facilities, and to ISFSIs, as described in the following paragraphs.

III-2. In the document, SECY-04-0222, dated 24 November 2004, the NRC Staff submitted to the NRC Commissioners a proposed decision-making framework for vulnerability assessments for materials and research and test reactors.<sup>10</sup> SECY-04-0222 stated, at page 3:

"Several methodologies for conducting and evaluating comprehensive VAs [vulnerability assessments] for different types of assets are currently under

<sup>9</sup> The EA Supplement also discussed the estimated radiation dose to an individual, which is an indirect indicator of an adverse outcome. That issue is discussed here in Section IV.

<sup>10</sup> Reyes, 2004.

development. In particular, the ASME, in cooperation with numerous stakeholders, is funded by DHS to develop the RAMCAP methodology. This methodology is designed to inform the allocation of resources to protect infrastructure components."

SECY-04-0222 went on to state, at page 4:

"As discussed in this paper, the consequences considered are prompt fatalities from radiation exposure and those chemical effects associated with radioactive material processes (i.e., UF<sub>6</sub>). Past Commission policy and practice has varied with respect to consideration of consequence criteria. The proposed VA decision-making framework uses only prompt fatalities as a consequence criterion.

It is also recognized that other guidance, such as the draft RAMCAP methodology, uses other consequence criteria. For example, RAMCAP uses criteria such as economic, environmental, national security, symbolic and sociopolitical impacts, and loss of output or production capability as metrics for national level screening.

Other related radiological consequence criteria that could be incorporated in the framework include latent fatalities, land contamination, and chemical risks due to plant conditions which affect the safety of radioactive materials [words redacted]. Including some of these consequence criteria may also be consistent with the goal, in the NRC's Strategic Plan, to ensure protection of public health and safety and the environment, and also with the section on commercial nuclear reactors in the National Infrastructure Protection Plan. There are various points of view within the staff on the need for additional criteria, e.g., land contamination.

The staff also recognizes that exposure to certain radioactive materials [words redacted] would not result in a prompt fatality or the need for additional measures. However, using other consequence criteria (e.g., land contamination) may require additional security measures."

III-3. The NRC Commissioners subsequently provided a written response, dated 19 January 2005, to the recommendations proffered by the Staff in SECY-04-0222.<sup>11</sup> The Commissioners stated, at page 1:

"The Commission specifically approves, as recommended by the staff, the use of prompt fatalities as the consequence analysis in the decision-making framework for this activity."

The Commissioners went on to state, at page 3:

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<sup>11</sup> Vietti-Cook, 2005.

"As a separate issue from the vulnerability assessments conducted under the decision making framework, the staff should not be independently developing criteria and standards for other consequences (such as land contamination and economic impacts) at this time. Rather, consistent with the US government programs for homeland protection and security, the staff should continue to support the separate vulnerability assessment reviews being conducted under the leadership of the Department of Homeland Security (DHS). These activities include the consideration of consequences other than prompt fatalities."

III-4. The Staff's recommendations in SECY-04-0222, and the Commissioner's written response to those recommendations, did not explicitly cover ISFSIs. However, a subsequent Memo sent from one Staff office to another did explicitly link SECY-04-0222 with ISFSIs.<sup>12</sup> The Memo, dated 9 December 2005, stated at page 1:

"In response to Chairman Meserve's memorandum, "Response to Terrorist Acts", dated September 28, 2001, and in accordance with SRM-SECY-04-0222, "Decision-Making Framework for Materials and Research and Test Reactor Vulnerability Assessments", the Spent Fuel Project Office (SFPO) staff performed framework assessments for spent fuel storage casks and transportation packages and radioactive material transportation packages for various potential terrorist threats."

III-5. From that statement, it is evident that the NRC Staff, in performing framework assessments of the vulnerability of ISFSIs to attack, acted "in accordance with" the approach set forth in SECY-04-0222. It follows that the Staff, in considering the consequences of an attack on an ISFSI, limited its consideration to the potential for early fatalities.

III-6. The Government Accountability Office (GAO) reviewed, in a January 2008 report, NRC's assessment of the vulnerability of research reactors to attack.<sup>13</sup> GAO's general conclusion is evident in the report's title, *Nuclear Security: Action May be Needed to Reassess the Security of NRC-Licensed Research Reactors*. GAO noted NRC's reliance on the potential for early fatalities as the sole indicator of the consequences of attack. GAO used the term "immediate fatalities", which is equivalent to "early fatalities". The GAO report stated, at page 8:

"NRC used the number of immediate fatalities caused by radiological release resulting from an attack at a research reactor as its criterion to measure consequences and assessed [assess] the adequacy of the security at NRC-licensed reactors."

III-7. In preparing the above-mentioned report, GAO obtained independent advice on the vulnerability of research reactors to attack, and on the consequences of such an attack,

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<sup>12</sup> Strosnider, 2005.

<sup>13</sup> GAO, 2008.

and reviewed the findings of the US Department of Energy (DOE) and Sandia National Laboratories (SNL) on these matters.<sup>14</sup> Analysts at Idaho National Laboratory (INL) and the Department of Homeland Security (DHS) advised GAO that a credible attack on a research reactor could cause a release of radioactive material substantially larger than NRC assumes. An INL analyst advised GAO that the consequences of an attack could include significant land contamination. GAO noted that DOE has determined that the consequences of an attack at some of its research reactors could be severe, potentially involving the dispersion of radioactive material over many square miles. GAO also noted that SNL had, under contract to NRC, assessed the vulnerability of research reactors. SNL concluded that some credible attacks could be successful. NRC disagreed, and concluded that radiological consequences of credible attacks would be minimal.

III-8. The NRC Commissioners' response of 19 January 2005 to SECY-04-0222 stated, at page 1:<sup>15</sup>

"The Commission continues to support its earlier direction that Sandia National Laboratories' draft vulnerability assessments not be shared with industry and should not be released to anyone outside the agency."

III-9. From that statement, it appears that the Commissioners sought to suppress a differing professional opinion that was developed by SNL while working under contract to NRC. The existence of that differing opinion was not publicly known until the publication of GAO's report in January 2008. Moreover, as shown in paragraph III-3, above, the Commissioners ordered the Staff to refrain from independently developing criteria and standards for attack consequences other than early fatalities. These actions by the Commissioners were taken with direct application to research reactors and related facilities. As shown by paragraphs III-4 and III-5, above, it appears that these actions also apply to ISFSIs.

III-10. From the preceding paragraphs, it can reasonably be concluded that NRC has made a policy choice to consider only one category of environmental impacts of an attack on an ISFSI, namely the potential for early fatalities. Also, in the context of research reactors and related facilities, NRC has made policy choices to not consider attack scenarios that SNL and other authorities have determined to be credible, and to not consider environmental impacts other than the potential for early fatalities. A motive for the latter choice can be inferred from an NRC Staff statement quoted in paragraph III-2, above, that "using other consequence criteria (e.g., land contamination) may require additional security measures". Additional security measures would involve additional costs. Thus, by not considering environmental impacts such as land contamination, NRC may have allowed licensees to avoid additional costs. It can reasonably be inferred that NRC has taken essentially the same approach in the context of ISFSIs.

<sup>14</sup> GAO, 2008, pp 14-18.

<sup>15</sup> Vietti-Cook, 2005.

#### IV. NRC Staff Estimation of Radiation Dose to an Individual

IV-1. As noted in subsequent paragraphs, the NRC Staff has released a succession of documents that discuss its estimation of the radiation dose to an individual following an attack on the Diablo Canyon ISFSI. Each successive document contains additional information, but the publicly available description of the Staff's assumptions and analyses remains incomplete. For example, the Staff has not disclosed the composition of the atmospheric release for which it estimates a radiation dose.

IV-2. As explained in Section VI, below, it appears that the Staff's process of estimating the radiation dose to an individual has been fundamentally shaped by NRC's policy choice to consider only one category of environmental impacts of an attack on an ISFSI, namely the potential for early fatalities. That policy choice has led the Staff to confine its analysis of radiological consequences to a particular category of radiation exposure, and to refrain from considering potential releases of radioactive material that are significant in regard to other categories of radiation exposure. In other words, NRC's policy choice has precluded a thorough, science-based assessment of the environmental impacts of a credible attack on the Diablo Canyon ISFSI.

IV-3. The NRC Staff's May 2007 EA Supplement for the Diablo Canyon ISFSI discussed, at page 7, the factors relevant to radiation dose arising from an attack at the ISFSI, concluding:<sup>16</sup>

"Based on these considerations, the dose to the nearest affected resident, from even the most severe plausible threat scenarios – the ground assault and aircraft impact scenarios discussed above – would likely be below 5 rem."

IV-4. That claim was further elaborated in the Staff's August 2007 EA Supplement, which stated at page 7:<sup>17</sup>

"More specifically, NRC staff performed a dose calculation using source term and meteorology inputs from the generic assessments. This resulted in a projected dose of less than 5 rem for the nearest resident. Using the Diablo Canyon site-specific meteorology, as opposed to the generic meteorology, reduces the projected dose consequences by a factor of 10 to 100."

IV-5. In a subsequent response to SLOMFP discovery in this proceeding, the Staff provided additional, but still incomplete, information regarding its estimation of the radiation dose to an individual resident.<sup>18</sup> The Staff stated that dose was calculated as total effective dose (TED) including inhalation, external exposure from the plume, and 4 days of external exposure from deposited material. Presumably, the Staff actually calculated total effective dose equivalent (TEDE). As a first step, the Staff used the

<sup>16</sup> NRC, 2007b.

<sup>17</sup> NRC, 2007a.

<sup>18</sup> NRC, 2008b, pp 15-17.

Hotspot code assuming a release height of 1 meter, no plume rise, a wind speed of 4.0 meters per second, and atmospheric stability of D (neutral). Given those assumptions, dose was calculated for an individual at an unstated distance. As a second step, the Staff compared the Hotspot-modeled plume dispersion with dispersion estimates provided in the licensee's Environmental Report for the location of the nearest resident to the Diablo Canyon ISFSI, at a distance of 2,414 meters. That step yielded a dose 1 or 2 orders of magnitude lower than did the first step.

IV-6. Hotspot is a code developed by Lawrence Livermore National Laboratory (LLNL). It is a conventional Gaussian straight-line dose assessment model. In describing Hotspot, LLNL says:<sup>19</sup>

"Users requiring more sophisticated modeling capabilities, e.g., complex terrain; multi-location real-time wind field data; etc., are directed to such capabilities as the Department of Energy's NARAC computer codes."

IV-7. The Diablo Canyon site is on the coast, with substantial topographic relief (hills) in landward directions. An atmospheric plume released at such a location can exhibit complex behaviors. The NRC Staff did not attempt to model those behaviors, relying instead on the Hotspot code. The findings of that code could be highly misleading. For example, a study conducted for NRC in 1983 stated, regarding plume behavior in coastal zones:<sup>20</sup>

"The direct application of a conventional Gaussian straight-line dose assessment model, initialized only by on-site tower data, can potentially produce highly misleading guidance as to plume impact locations."

The same study also stated:<sup>21</sup>

"For sites located within a coastal zone the following are just some of the transport phenomena routinely encountered:

- (1) surface wind flow reversals due to mesoscale frontal passages,
- (2) the return of effluents onshore that had previously drifted over water during the prior night's land breeze,
- (3) trajectory curvature due to Coriolis and other forces,
- (4) plume bifurcation from multi-stack releases due to extreme vertical wind shears,
- (5) transport of near surface plumes to higher altitudes due to chimney-like updrafts in convergence zones,
- (6) encapsulation of plumes in return flow layers aloft,
- (7) second trip fumigation from recirculating plumes."

<sup>19</sup> LLNL, 2008.

<sup>20</sup> Lyons et al, 1983, page 3.

<sup>21</sup> Lyons et al, 1983, pp 5-6.

IV-8. A comprehensive assessment of the environmental impacts of potential attacks on the Diablo Canyon ISFSI would consider the range of plume behaviors that can be exhibited at this particular site. The NRC Staff chose, instead, to use a simple, stylized model of plume behavior – the Hotspot code – despite its known limitations. That approach is consistent with a preconceived view that the environmental impacts of potential attacks are insignificant. A similar approach is evident in the Staff's consideration of attack-induced releases of radioactive material, as discussed in Section VI, below.

#### **V. Attack-Induced Atmospheric Release of Radioactive Material from a Spent-Fuel-Storage Module: Background Discussion**

V-1. There is a published, technical literature that relates, directly and indirectly, to attack-induced atmospheric release of radioactive material from a spent-fuel-storage module of the type that would be used at the Diablo Canyon ISFSI. Also, general attributes of such a release can be estimated from professional knowledge of engineering and related disciplines. In the following paragraphs, these sources are used to discuss the range of attack-induced atmospheric releases that could occur at the Diablo Canyon ISFSI. In Section VI, below, that range is compared with the releases considered by the NRC Staff.

V-2. One example of relevant published literature is a 2001 paper by Lange et al, discussing an experiment to simulate an attack on a cask used for storage or transport of spent fuel, using a shaped charge.<sup>22</sup> The authors described a test, done in 1992, in which a shaped charge penetrated a shortened CASTOR cask containing shortened fuel assemblies in which the pellets were made of depleted uranium. The fuel rods were internally pressurized to 40 bar to simulate real spent-fuel rods. The shaped charge was intended to represent an anti-tank weapon. Each of two shots yielded a release of 1.0 grams of uranium in the aerodynamic equivalent diameter (AED) class of less than 12.5 micrometer, and 2.6 grams in the AED class 12.5 to 100 micrometer. Using these test results, the authors estimated the downwind radiation dose for an equivalent attack on a real cask containing real spent fuel. They estimated that the inhalation dose at a distance of 50 meters would be below 50 mSv (5 rem) for the most severe (i.e., dose-enhancing) weather conditions. The inhalation dose would be dominated by actinides, such as plutonium isotopes.

V-3. There is an International Working Group for Sabotage Concerns of Transport and Storage Casks. This Working Group links SNL, DOE, NRC and organizations in Germany, France and UK. The Working Group conducts an experimental program whose findings are published periodically. One of those publications, dated October 2006, stated at page 3:<sup>23</sup>

"This program provides source-term data that are relevant to some sabotage

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<sup>22</sup> Lange et al, 2001.

<sup>23</sup> Molecke et al, 2006.

scenarios in relation to spent fuel transport and storage casks, and associated risk assessments."

The same publication stated at page 15:

"This experimental program is designed to measure several important features of the interaction of a HEDD (conical shaped charge, CSC) jet with spent fuel or surrogate material pellets contained within a Zircaloy-4 cladding tube."

The term HEDD refers to a high-energy-density device, in the form of a shaped charge. It is clear that the primary focus of the Working Group's experimental program is to examine the creation by an HEDD of respirable aerosol. Information about the release of respirable aerosol is needed to estimate the inhalation dose accrued by an individual downwind of an attacked cask.

V-4. The NRC Staff argues that the radiation dose to a downwind resident following an attack on the Diablo Canyon ISFSI would not exceed 5 rem. Exposure of a person to a dose of 5 rem would require only a small release of radioactive material from a spent-fuel-storage module, as discussed in the report I prepared to support SLOMFP's contentions.<sup>24</sup> That report showed, for example, that creation of a hole in a module's multi-purpose canister (MPC) would yield a dose of 6.3 rem to an individual located 900 meters downwind if the hole had an equivalent diameter of a mere 2.3 mm. Most (95 percent) of the dose would be attributable to the release of two-millionths (1.9E-06) of the MPC's inventory of radioisotopes in the "fines" category. The dose of 6.3 rem would be the committed effective dose equivalent (CEDE) arising from inhalation. CEDE would make up most of the total dose (TEDE) and is a sufficient approximation to it.

V-5. The experiments discussed in paragraphs V-2 and V-3, above, simulated mechanical damage to the interior of a container containing spent fuel assemblies. The damage would encompass some or all of the rods in affected fuel assemblies, and some of the pellets in those rods. These experiments did not investigate the potential for ignition of the zirconium alloy (zircaloy) cladding of the rods, or the implications of that ignition for the release of radioactive material to the atmosphere. Similarly, the calculations summarized in paragraph V-4 did not consider zircaloy ignition. As shown in the following paragraph, ignition of zircaloy cladding could lead to a substantial atmospheric release of cesium-137, causing severe radiological impacts of the type discussed in paragraph II-3, above.

V-6. Table I shows that the energy released by combustion of zircaloy cladding in air would be ample to raise the temperature of adjacent fuel pellets well above the boiling point of cesium, which is about 690 degrees C. Sustained combustion inside a spent-fuel-storage module would require the free ingress of air and egress of combustion products. If those conditions prevailed, combustion of cladding could propagate to many of the

<sup>24</sup> Thompson, 2007b, page 33 and Table 4-1.

rods inside the module, and the release of radioactive material to the atmosphere could include tens of percent of the module's inventory of cesium-137.

V-7. The preceding discussion shows that a thorough investigation of the vulnerability of an ISFSI to attack would devote considerable attention to the potential for ignition and sustained combustion of the zircaloy cladding inside a spent-fuel-storage module. That potential was discussed in the report I prepared to support SLOMFP's contentions.<sup>25</sup>

V-8. One means, among others, whereby a sub-national group could obtain combustion of zircaloy cladding would be to attack a spent-fuel-storage module using a device in which two stages are mounted in tandem. The first stage would be a shaped charge that penetrates the module's overpack and MPC. The second stage would use incendiary material, perhaps combined with explosive material, to ignite the zircaloy cladding. Table 2 shows that shaped charges capable of penetrating a module's overpack and MPC have been widely available for decades. Various types of incendiary material are available, and are described in published literature.<sup>26</sup> Many types of incendiary device have been developed. For example, experts at SNL have described their testing of devices that combined explosive material with combustible metals.<sup>27</sup> These devices yielded blast, fragmentation and incendiary effects in combination. Zirconium sponge was found to function well as an incendiary. A specific purpose of the testing was to prepare for the development of an incendiary warhead for a penetrating device. The tests led to the following conclusion:<sup>28</sup>

"Our results indicate that a metalized incendiary explosive device is feasible and capable of starting massive fires at the target site."

V-9. Small, self-propelled missiles that can be equipped with tandem warheads are available on international arms markets. Consider two Russian-made examples. The RPG-29V has an effective direct-fire range of 300 meters.<sup>29</sup> It is said to be able to penetrate 1.5 meters of reinforced concrete. The Komet E is laser guided.<sup>30</sup> Its range is up to 5.5 kilometers in daylight and 3.5 kilometers at night. The manufacturer claims penetration of 1.2 meters of steel armor or 4.5 meters of concrete. A firing unit including launcher, thermal sight and one missile has a mass of 65 kg.

V-10. Arms manufacturers are continuing to develop tandem-warhead systems. For example, in January 2008 Raytheon tested the shaped-charge penetrating stage for its Tandem Warhead System.<sup>31</sup> The shaped charge penetrated 19 feet into steel-reinforced

<sup>25</sup> Thompson, 2007b, pp 33-37.

<sup>26</sup> For example, Fischer and Grubelich, 1996b, provided information about various exothermic reactions. These included the "traditional" thermite reaction:  $8Al + 3Fe_3O_4 \rightarrow 4Al_2O_3 + 9Fe$ . The heat of that reaction is 879 cal per gram, and the adiabatic reaction temperature, with phase changes, is 3,135 degrees K = 2,862 degrees C.

<sup>27</sup> Fischer and Grubelich, 1996a.

<sup>28</sup> Fischer and Grubelich, 1996a, page 11.

<sup>29</sup> Defense Update, 2008a.

<sup>30</sup> Defense Update, 2008b.

<sup>31</sup> Raytheon, 2008.

concrete with a compressive strength of 12,600 psi. The purpose of this new system is to penetrate a target protected by concrete, steel and rock barriers, and to cause damage inside the target. Development of the system was self-funded by Raytheon. The current version would have a mass of about 1,000 pounds in its tandem configuration. Raytheon states that it could scale the technology, which implies both larger and smaller versions.

V-11. The preceding discussion in Section V has outlined some of the types of attack-induced atmospheric release that could be experienced by a spent-fuel-storage module at the Diablo Canyon ISFSI. Table 3 provides a more complete description of potential attack-induced atmospheric releases. Four types of release are identified. Without excluding Type I and Type II releases from consideration, I focus here on Type III and Type IV releases. The differences between these releases are significant in the context of the present proceeding. Type III releases would be associated with attack scenarios such as the impact of a commercial aircraft, or the explosion of a vehicle bomb. Scenarios of that type would have a comparatively dramatic appearance, featuring noise, external fire, and smoke. By comparison, the attack scenarios associated with Type IV releases would appear less dramatic. Yet, the Type IV releases would contain much larger amounts of volatile isotopes such as cesium-137, which would be significant from the perspective of land contamination. A superficial assessment of the vulnerability of an ISFSI might lead to the conclusion that Type IV releases deserve less consideration than do Type III releases. That assessment would be incorrect. It would ignore the greater sophistication of the attack scenarios associated with Type IV releases, which would aim to maximize radiological impacts rather than the dramatic appearance of the event. Also, analysts whose attention is focused on the inhalation dose to a downwind individual could fail to appreciate the significance of Type IV releases, if they assume that the more dramatic-appearing attack scenarios associated with Type III releases would yield larger amounts of the isotopes that dominate inhalation dose.<sup>32</sup>

#### **VI. Attack-Induced Atmospheric Release of Radioactive Material from a Spent-Fuel-Storage Module: Consideration by the NRC Staff**

VI-1. The NRC Staff has not disclosed any information about the attack-induced atmospheric releases that it has considered in the context of the Diablo Canyon ISFSI. Some information about those releases can, however, be inferred from available sources, as described below.

VI-2. The Staff has disclosed some information about a study conducted for NRC by SNL, regarding the impact of a large aircraft on a field of HI-STORM spent-fuel-storage modules. That type of module would be used at the Diablo Canyon ISFSI. The study was described in a report.<sup>33</sup> Most of the content was redacted from the version of the report provided to SLOMFP. At page 7, the redacted report stated that the mass of the assumed aircraft is representative of the class of aircraft involved in the 9/11 events. At pages 24-25, the report stated that it is unlikely that a pool of fuel and a storage module

<sup>32</sup> Note that cesium-137 in an atmospheric plume would be significant from the perspective of land contamination, but would yield a comparatively small dose if inhaled.

<sup>33</sup> Smith et al, 2004.

would be co-located after the dynamic phase of the impact had concluded. Thus, a long-duration pool fire affecting a module was judged to be a non-credible event. At page C-4, the report mentioned the analytic simulation of a quiescent, engulfing fire affecting an upright module. The simulation was run for a short time – 90 to 180 seconds – consistent with SNL's judgment that a module would not be co-located with a long-duration pool fire.

VI-3. Another report described a study conducted by SNL for NRC on the response of a HI-STORM 100 module to an explosive blast.<sup>34</sup> Again, most of the content was redacted from the version provided to SLOMFP. At page 8 the redacted report stated:

"The amount of explosive and standoff distance is representative of a scenario of a small truck parked directly adjacent to the cask. The scenario parameters for this event were defined by NRC design basis threat criteria and by NRC staff, where more specificity was required to define the event. This loading simulates a truck delivery of the explosive, parked adjacent to the cask."

At page 21 the report stated:

"The charge configuration is limited to a bare TNT charge in close proximity to the cask."

VI-4. The attack scenarios discussed in paragraphs VI-2 and VI-3 would be associated with Type III atmospheric releases, using the typology set forth in Table 3. Both scenarios would have a dramatic appearance, but neither would represent a sophisticated approach to maximizing radiological impacts. Neither scenario would be likely to initiate sustained combustion of zircaloy cladding inside a module. Both scenarios would be consistent with atmospheric releases similar to those discussed in paragraphs V-2 to V-4, above. For such releases, the dominant radiological impact would be the inhalation doses accrued by persons exposed to the radioactive plume.

VI-5. The NRC Staff argues that the environmental impacts of potential attacks on the Diablo Canyon ISFSI are not significant. The Staff has not provided a comprehensive assessment to support that position.<sup>35</sup> Nor has the Staff disclosed all of the assumptions that underlie its position. Thus, much of the basis for the Staff's position remains hidden. Section III of this testimony provides compelling evidence that NRC has made a policy choice to consider only one category of environmental impacts, namely the potential for early fatalities. That policy choice, and other factors, could provide a four-part explanation of how the Staff reached its position on environmental impacts, as follows. First, the policy choice would have prevented the Staff from considering any category of environmental impacts other than the potential for early fatalities. Second, as an outcome of the policy choice, the Staff would have focused its attention on the inhalation dose to a

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<sup>34</sup> Kipp et al, 2004.

<sup>35</sup> As discussed in paragraph II-5, a comprehensive assessment would consider a range of attack scenarios, release types, and weather conditions. It would also address site-specific issues, including the complexities of atmospheric plume dispersion at the Diablo Canyon site.

downwind individual, because that mode of radiation exposure would be most likely to lead to an early fatality. Third, as an outcome of focusing on inhalation dose, the Staff would have believed that Type IV releases do not require consideration, because the Staff thought that Type III releases would include larger or comparable amounts of the isotopes that dominate inhalation dose. Fourth, the Staff would have been misled by the comparatively dramatic appearance of the attack scenarios associated with Type III releases, leading to the false conclusion that Type IV releases would yield comparatively small environmental impacts.

VI-6. The four-part process described in the preceding paragraph is consistent with all of the information provided by the Staff in this matter. I am not aware of any better explanation of the Staff's position on environmental impacts of potential attacks. The most prominent feature of this explanation is that the Staff began its assessment of the environmental impacts of an attack on the Diablo Canyon ISFSI with a preconceived position. As a result, the Staff did not conduct a comprehensive, science-based assessment, and its conclusions were faulty. The process is reminiscent of the Staff's prolonged failure to understand the potential for ignition of spent fuel in a high-density spent-fuel pool, if water were lost from the pool.<sup>36</sup> In a license proceeding regarding the Harris nuclear power plant, I argued that comparatively aged spent fuel – including fuel aged 10 or more years after discharge from a reactor – could ignite if water were lost. The Staff disparaged my position, but subsequently adopted that position. For almost two decades, the Staff had failed to understand that comparatively aged fuel could ignite. The Staff's prolonged failure derived from an erroneous, preconceived position, namely that total, instantaneous loss of water would be the most severe mode of loss of water.

## VII. Conclusions

VII-1. The NRC Staff has not conducted a comprehensive, science-based assessment to support its position that the environmental impacts of potential attacks on the Diablo Canyon ISFSI are not significant. Instead, the Staff conducted a limited assessment that led to an erroneous conclusion. There is compelling evidence that the assessment was shaped by a preconceived position. A major determinant of that position was an NRC policy choice to consider only one category of environmental impacts, namely the potential for early fatalities. It appears that the Staff was also misled by other factors, including the comparatively dramatic appearance of attack scenarios that the Staff chose to consider. A comprehensive assessment of environmental impacts would consider additional attack scenarios, together with a range of radiological impacts including land contamination and its sequelae.

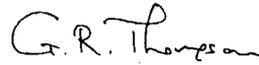
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<sup>36</sup> Thompson, 2007d, pp 4-5.

I declare under penalty of perjury under the laws of the United States of America that the foregoing statements of fact are true and correct to the best of my knowledge and belief, and that the opinions expressed herein are based on my best professional judgment.

Executed on 14 April 2008.



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Gordon R. Thompson, D.Phil

Canberra, Australia

NOTE: The bibliography and the three tables that appear on the following pages are discussed in the narrative sections above, and are part of this declaration.

### Bibliography

(Alvarez et al, 2003)

Robert Alvarez, Jan Beyea, Klaus Janberg, Jungmin Kang, Ed Lyman, Allison Macfarlane, Gordon Thompson and Frank N. von Hippel, "Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States", *Science and Global Security*, Volume 11, 2003, pp 1-51.

(Army, 1969)

Department of the Army, *Improvised Munitions Handbook, TM 31-210* (Philadelphia, Pennsylvania: Frankford Arsenal, 1969).

(Army, 1967)

Department of the Army, *Explosives and Demolitions, FM 5-25* (Washington, DC: Department of the Army, May 1967).

(Army, 1966)

Department of the Army, *Unconventional Warfare Devices and Techniques: Incendiaries, TM 31-201-1* (Washington, DC: Department of the Army, May 1966).

(Beyea et al, 2004)

Jan Beyea, Ed Lyman and Frank von Hippel, "Damages from a Major Release of Cs-137 into the Atmosphere of the United States", *Science and Global Security*, Volume 12, 2004, pp 125-136.

(Beyea, 1979)

Jan Beyea, "The Effects of Releases to the Atmosphere of Radioactivity from Hypothetical Large-Scale Accidents at the Proposed Gorleben Waste Treatment Facility", in: Gordon Thompson et al, *Potential Accidents and Their Effects*, Chapter 3 of the report of the Gorleben International Review, submitted to the Government of Lower Saxony (in German), March 1979.

(Defense Update, 2008a)

Defense Update, "RPG-29V", accessed at <<http://www.defense-update.com/products/r/rpg-29.htm>> on 7 March 2008.

(Defense Update, 2008b)

Defense Update, "Kornet E Laser Guided Anti-Tank Missile", accessed at <<http://www.defense-update.com/products/k/kornet-e.htm>> on 7 March 2008.

(DHS, 2006)

US Department of Homeland Security, *National Infrastructure Protection Plan* (Washington, DC: DHS, 2006).

(DOE, 1987)

US Department of Energy, *Health and Environmental Consequences of the Chernobyl Nuclear Power Plant Accident*, DOE/ER-0332 (Washington, DC: DOE, June 1987).

(Fischer and Grubelich, 1996a)

Susan H. Fischer and Mark C. Grubelich (both at Sandia National Laboratories), "The Use of Combustible Metals in Explosive Incendiary Devices", paper to be presented at the Defense Exchange Agreement 5642 (Pyrotechnics) Meeting, Lawrence Livermore National Laboratory, 22-23 July 1996.

(Fischer and Grubelich, 1996b)

S. H. Fischer and M. C. Grubelich (both at Sandia National Laboratories), "A Survey of Combustible Metals, Thermites, and Intermetallics for Pyrotechnic Applications", paper to be presented at the 32nd AIAA/ASME/SAE/ASEE Joint Propulsion Conference, Lake Buena Vista, FL, 1-3 July 1996.

(GAO, 2008)

US Government Accountability Office, *Nuclear Security: Action May be Needed to Reassess the Security of NRC-Licensed Research Reactors*, GAO-08-403 (Washington, DC: GAO, January 2008).

(Glasstone, 1964)

Samuel Glasstone, editor, *The Effects of Nuclear Weapons* (Washington, DC: US Atomic Energy Commission, February 1964).

(Haugen, 1982)

Duane A. Haugen (editor), *Lectures on Air Pollution and Environmental Impact Analyses: Workshop in Boston, Massachusetts, 29 September to 3 October 1975* (Boston, Massachusetts: American Meteorological Society, 1982).

(Holtec, 2007)

Holtec International, "The HI-STORM 100 Storage System", accessed at <<http://www.holtecinternational.com/hstorm100.html>> on 17 June 2007.

(Holtec FSAR)

Holtec International, *Final Safety Analysis Report for the Holtec International Storage and Transfer Operation Reinforced Module Cask System (HI-STORM 100 Cask System)*, NRC Docket No. 72-1014, *Holtec Report HI-2002444* (Holtec, undated).

(Honnellio and Rydell, 2007)

Anthony L. Honnellio and Stan Rydell, "Sabotage vulnerability of nuclear power plants", *International Journal of Nuclear Governance, Economy and Ecology*, Volume 1, Number 3, 2007, pp 312-321.

(Johnson, 2007)

Michael R. Johnson, Assistant for Operations, Office of the EDO, NRC Staff, Memo to the NRC Commissioners, "Weekly Information Report – Week Ending March 30, 2007", SECY-07-0067, 6 April 2007.

(Kipp et al. 2004)

Marlin E. Kipp and four other authors, *Response of the HI-STORM Spent Nuclear Fuel Storage Cask to a Large Explosive Charge Blast (U)* (Albuquerque, New Mexico: Sandia National Laboratories, 22 August 2004). (Redacted version released by NRC on 12 February 2008.)

(Lange et al, 2001)

F. Lange and three other authors. "Experiments to Quantify Potential Releases and Consequences from Sabotage Attack on Spent Fuel Casks", paper presented at PATRAM 2001, the 13th International Symposium on the Packaging and Transportation of Radioactive Material, Chicago, September 2001.

(LLNL, 2008)

Lawrence Livermore National Laboratory, "Hotspot: Health Physics Codes for the PC, Hotspot Version 2.06", accessed at <<https://www-gs.llnl.gov/hotspot/index.htm>> on 6 March 2008.

(Lyons et al, 1983)

W. A. Lyons, C. S. Keen and J. A. Schuh, *Modeling Mesoscale Diffusion and Transport Processes for Releases Within Coastal Zones During Land/Sea Breezes*, NUREG/CR-3542 (Washington, DC: Nuclear Regulatory Commission, December 1983).

(Molecke et al, 2006)

Martin A. Molecke and twelve other authors, *Spent Fuel Sabotage Aerosol Test Program: FY 2005-06 Testing and Aerosol Data Summary, SAND2006-5674* (Albuquerque, New Mexico: Sandia National Laboratories, October 2006).

(Morris et al, 2006)

Robert H. Morris and three other authors, "Using the VISAC program to calculate the vulnerability of nuclear power plants to terrorism", *International Journal of Nuclear Governance, Economy and Ecology*, Volume 1, Number 2, 2006, pp 193-211.

(National Research Council, 2006)

Committee on the Safety and Security of Commercial Spent Nuclear Fuel Storage, Board on Radioactive Waste Management, National Research Council, *Safety and Security of Commercial Spent Nuclear Fuel Storage: Public Report* (Washington, DC: National Academies Press, 2006). (This document was first released in April 2005.)

(National Research Council, 1990)

National Research Council, *Health Effects of Exposure to Low Levels of Ionizing Radiation: BEIR V* (Washington, DC: National Academy Press, 1990).

(Nero, 1979)

Anthony V. Nero, *A Guidebook to Nuclear Reactors* (Berkeley, California: University of California Press, 1979).

(NRC, 2008a)

Commissioners, US Nuclear Regulatory Commission, "Memorandum and Order", CLI-08-01, Docket No. 72-26-ISFSI, 15 January 2008.

(NRC, 2008b)

US Nuclear Regulatory Commission Staff, "NRC Staff's Response and Objections to San Luis Obispo Mothers for Peace's First Set of Discovery Requests", Docket No. 72-26, ASLBP No. 08-860-01-ISFSI-BD01, 22 February 2008.

(NRC, 2007a)

US Nuclear Regulatory Commission Staff, "Supplement to the Environmental Assessment and Final Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation", Docket No. 72-26, Pacific Gas and Electric Company, August 2007.

(NRC, 2007b)

US Nuclear Regulatory Commission Staff, "Supplement to the Environmental Assessment and Draft Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation", Docket No. 72-26, Pacific Gas and Electric Company, May 2007.

(NRC, 2007c)

US Nuclear Regulatory Commission Staff, "Appendix B: Consideration of Terrorist Attacks on the Proposed Pa'ina Irradiator", Docket No. 030-36974 (supplemental appendix to the draft environmental assessment issued on 28 December 2006), 1 June 2007.

(NRC, 2007d)

US Nuclear Regulatory Commission, "Memorandum and Order", Docket No. 72-26-ISFSI, 26 February 2007.

(NRC, 1994)

US Nuclear Regulatory Commission, "10 CFR Part 73, RIN 3150-AE81, Protection Against Malevolent Use of Vehicles at Nuclear Power Plants", *Federal Register*, Volume 59, Number 146, 1 August 1994, pp 38889-38900.

(NRC, 1979)

US Nuclear Regulatory Commission, *Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel*, NUREG-0575 (Washington, DC: Nuclear Regulatory Commission, August 1979).

(NRC, 1975)

US Nuclear Regulatory Commission, *Reactor Safety Study, WASH-1400 (NUREG-75/014)* (Washington, DC: Nuclear Regulatory Commission, October 1975).

(Powers et al, 1994)

D. A. Powers, L. N. Kmetyk and R. C. Schmidt, *A Review of the Technical Issues of Air Ingression During Severe Reactor Accidents*, NUREG/CR-6218 (Washington, DC: Nuclear Regulatory Commission, September 1994).

(Raytheon, 2008)

Raytheon Company, News Release, "Raytheon Unveils New Bunker-Busting Technology", 12 March 2008, accessed at <[http://www.prnewswire.com/cgi-bin/micro\\_stories.pl?ACCT=149999&TICK=RTN&STORY=/www/story/03-12-2008/0004772850&EDATE=Mar+12,+2008](http://www.prnewswire.com/cgi-bin/micro_stories.pl?ACCT=149999&TICK=RTN&STORY=/www/story/03-12-2008/0004772850&EDATE=Mar+12,+2008)> on 13 March 2008.

(Reyes, 2006)

Luis A. Reyes, Executive Director for Operations, NRC Staff, Memo to the NRC Commissioners, "Results of the Review of Emergency Preparedness Regulations and Guidance", SECY-06-0200, 20 September 2006.

(Reyes, 2004)

Luis A. Reyes, Executive Director for Operations, NRC Staff, Memo to the NRC Commissioners, "Decision-Making Framework for Materials and Research and Test Reactor Vulnerability Assessments", SECY-04-0222, 24 November 2004. (Redacted version released by NRC on 12 February 2008.)

(Rotblat, 1981)

Joseph Rotblat, Stockholm International Peace Research Institute, *Nuclear Radiation in Warfare* (London: Taylor and Francis, 1981).

(Sdouz, 2007)

Gert Sdouz, "Radioactive release from VVER-1000 reactors after a terror attack", *International Journal of Nuclear Governance, Economy and Ecology*, Volume 1, Number 3, 2007, pp 305-311.

(Slade, 1968)

David H. Slade (editor), *Meteorology and Atomic Energy 1968* (Washington, DC: Atomic Energy Commission, July 1968).

(SLOMFP, 2007)

San Luis Obispo Mothers for Peace's Contentions and Request for a Hearing Regarding Diablo Canyon Environmental Assessment Supplement, 29 June 2007.

(Smith et al, 2004)

J. A. Smith and fourteen other authors, *Results of a Large Airplane Impact into a Field of Holtec HI-STORM Spent Nuclear Fuel Storage Casks (U)*, Final Draft (Albuquerque, New Mexico: Sandia National Laboratories, 20 August 2004). (Redacted version released by NRC on 12 February 2008.)

(Strosnider, 2005)

Jack R. Strosnider, Office of Nuclear Material Safety and Safeguards, Memo to Roy P. Zimmerman, Office of Nuclear Security and Incident Response, "Framework Assessments of Spent Fuel Storage Casks and Transportation Packages and Radioactive Material Transportation Packages", 9 December 2005. (Redacted version released by NRC on 12 February 2008.)

(Thompson, 2007a)

Declaration by Dr. Gordon R. Thompson Regarding the NRC Staff's August 2007 Supplement to the Environmental Assessment and Final Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (ISFSI), 1 October 2007.

(Thompson, 2007b)

Gordon R. Thompson, *Assessing Risks of Potential Malicious Actions at Commercial Nuclear Facilities: The Case of a Proposed Independent Spent Fuel Storage Installation at the Diablo Canyon Site* (Cambridge, Massachusetts: Institute for Resource and Security Studies, 27 June 2007).

(Thompson, 2007c)

Gordon Thompson, *Estimated Downwind Inhalation Dose for Blowdown of the MPC in a Spent Fuel Storage Module* (Cambridge, Massachusetts: Institute for Resource and Security Studies, June 2007).

(Thompson, 2007d)

Declaration of Dr. Gordon R. Thompson in Support of San Luis Obispo Mothers for Peace's (SLOMFP's) Contentions Regarding the Diablo Canyon Environmental Assessment Supplement, 27 June 2007.

(Thompson, 2006)

Gordon R. Thompson, *Risks and Risk-Reducing Options Associated with Pool Storage of Spent Nuclear Fuel at the Pilgrim and Vermont Yankee Nuclear Power Plants*, a report for the Office of the Attorney General, Commonwealth of Massachusetts (Cambridge, Massachusetts: Institute for Resource and Security Studies, 25 May 2006).

(Thompson, 2005a)  
Gordon R. Thompson, Institute for Resource and Security Studies, Cambridge, Massachusetts, direct testimony before the Minnesota Public Utilities Commission regarding an application for a Certificate of Need to establish an ISFSI at the Monticello site, Docket No. E002/CN-05-123, 16 December 2005.

(Thompson, 2005b)  
Gordon R. Thompson, *Reasonably Foreseeable Security Events: Potential threats to options for long-term management of UK radioactive waste*, a report for the UK government's Committee on Radioactive Waste Management (Cambridge, Massachusetts: Institute for Resource and Security Studies, 2 November 2005).

(Thompson, 2004a)  
Gordon Thompson, Institute for Resource and Security Studies, Cambridge, Massachusetts, testimony before the Public Utilities Commission of the State of California regarding Application No. 04-02-026, 13 December 2004. (This testimony, prepared for California Earth Corps, addressed the provision of an enhanced defense of Units 2 and 3 of the San Onofre Nuclear Generating Station.)

(Thompson, 2004b)  
Gordon Thompson, *Releases of Hazardous Material from the Santa Susana Field Laboratory: A Retrospective Review* (Cambridge, Massachusetts: Institute for Resource and Security Studies, 5 June 2004).

(Thompson, 2003)  
Gordon Thompson, *Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security* (Cambridge, Massachusetts: Institute for Resource and Security Studies, January 2003).

(Thompson, 2002)  
Gordon Thompson, Declaration of 7 September 2002 in support of a petition to the US Nuclear Regulatory Commission by Avila Valley Advisory Council, San Luis Obispo Mothers for Peace, Peg Pinard et al, regarding a license application for an ISFSI at the Diablo Canyon site, Docket No. 72-26.

(Thompson and Beckerly, 1973)  
T. J. Thompson and J. G. Beckerly (editors), *The Technology of Nuclear Reactor Safety* (Cambridge, Massachusetts: MIT Press, 1973).

(Vietti-Cook, 2005)  
Annette L. Vietti-Cook, Secretary to the NRC Commissioners, Memorandum to Luis A. Reyes, Executive Director for Operations, NRC Staff, "Staff Requirements – SECY-04-0222 – Decision-Making Framework for Materials and Research and Test Reactor Vulnerability Assessments", 19 January 2005. (Redacted version released by NRC on 12 February 2008.)

(Walters, 2003)

William Walters, "An Overview of the Shaped Charge Concept", paper presented at the 11th Annual ARL/USMA Technical Symposium, 5 and 7 November 2003. (That symposium was sponsored by the Mathematical Sciences Center of Excellence at the US Military Academy (USMA) and hosted by the US Army Research Laboratory (ARL) and USMA.)

(Wells, 2006)

Jim Wells, US Government Accountability Office, testimony before the Subcommittee on National Security, Emerging Threats and International Relations, US House Committee on Government Reform, "Nuclear Power Plants Have Upgraded Security, but the Nuclear Regulatory Commission Needs to Improve Its Process for Revising the Design Basis Threat", 4 April 2006.

(Yoshimura et al, 2004)

R. H. Yoshimura and six other authors, *NRC Spent Fuel Source Term Guidance Document (U)* (Albuquerque, New Mexico: Sandia National Laboratories, 5 November 2004). (Redacted version released by NRC on 12 February 2008.)

**Table 1**  
**Illustrative Calculation of Heat-Up of a Fuel Rod in a PWR Fuel Assembly Due to Combustion in Air**

Indicator	Affected Material	
	Zircaloy Cladding	UO <sub>2</sub> Pellets
Solid volume, per m length	1.90E-05 cub. m (OD = 1.07 cm; thickness = 0.06 cm)	6.36E-05 cub. m (OD = 0.9 cm)
Mass, per m length	0.124 kg (@ 6.55 Mg per cub. m)	0.700 kg (@ 11.0 Mg per cub. m)
Heat output from combustion of material in air, per m length	1.48 MJ (@ 2,850 cal per g Zr)	Neglected
Equilibrium temperature rise if material receives 50% of heat output from adjacent combustion, and if heat loss from material is neglected	Neglected	approx. 2,700 deg. C (enthalpy rise if UO <sub>2</sub> temp. rises from 300 K to 3,000 K = 1,052 kJ per kg UO <sub>2</sub> )

**Notes:**

- (a) Data shown in table are from: Nero, 1979, Table 5-1; Powers et al, 1994, Table 4; and files accessed at International Nuclear Safety Center (INSC), Argonne National Laboratory, <<http://www.insc.anl.gov/>>, in March 2008.
- (b) Melting point of UO<sub>2</sub> is 2,850 deg. C (from INSC files).
- (c) Boiling point of elemental cesium is 685 deg. C (from: Thompson and Beckerley, 1973, Volume 2, page 527).
- (d) 1 cal = 4.184 J

**Table 2**  
**Performance of US Army Shaped Charges, M3 and M2A3**

Target Material	Indicator	Type of Shaped Charge	
		M3	M2A3
Reinforced concrete	Maximum wall thickness that can be perforated	60 in	36 in
	Depth of penetration in thick walls	60 in	30 in
	Diameter of hole	• 5 in at entrance • 2 in minimum	• 3.5 in at entrance • 2 in minimum
	Depth of hole with second charge placed over first hole	84 in	45 in
Armor plate	Perforation	At least 20 in	12 in
	Average diameter of hole	2.5 in	1.5 in

**Notes:**

- (a) Data are from: Army, 1967, pp 13-15 and page 100.
- (b) The M2A3 charge has a mass of 12 lb, a maximum diameter of 7 in, and a total length of 15 in including the standoff ring.
- (c) The M3 charge has a mass of 30 lb, a maximum diameter of 9 in, a charge length of 15.5 in, and a standoff pedestal 15 in long.

**Table 3**  
**Types of Atmospheric Release from a Spent-Fuel-Storage Module at the Diablo Canyon ISFSI as a Result of a Potential Attack**

Type of Event	Module Behavior	Relevant Instruments and Modes of Attack	Characteristics of Atmospheric Release
Type I: Vaporization	<ul style="list-style-type: none"> <li>Entire module is vaporized</li> </ul>	<ul style="list-style-type: none"> <li>Module is within the fireball of a nuclear-weapon explosion</li> </ul>	<ul style="list-style-type: none"> <li>Radioactive content of module is lofted into the atmosphere and amplifies fallout from nuc. explosion</li> </ul>
Type II: Rupture and Dispersal (Large)	<ul style="list-style-type: none"> <li>MPC and overpack are broken open</li> <li>Fuel is dislodged from MPC and broken apart</li> <li>Some ignition of zircaloy fuel cladding may occur, without sustained combustion</li> </ul>	<ul style="list-style-type: none"> <li>Aerial bombing</li> <li>Artillery, rockets, etc.</li> <li>Effects of blast etc. outside the fireball of a nuclear weapon explosion</li> </ul>	<ul style="list-style-type: none"> <li>Solid pieces of various sizes are scattered in vicinity</li> <li>Gases and small particles form an aerial plume that travels downwind</li> <li>Some release of volatile species (esp. cesium-137) if incendiary effects occur</li> </ul>
Type III: Rupture and Dispersal (Small)	<ul style="list-style-type: none"> <li>MPC and overpack are ruptured but retain basic shape</li> <li>Fuel is damaged but most rods retain basic shape</li> <li>No combustion inside MPC</li> </ul>	<ul style="list-style-type: none"> <li>Vehicle bomb</li> <li>Impact by commercial aircraft</li> <li>Perforation by shaped charge</li> </ul>	<ul style="list-style-type: none"> <li>Scattering and plume formation as for Type II event, but involving smaller amounts of material</li> <li>Little release of volatile species</li> </ul>
Type IV: Rupture and Combustion	<ul style="list-style-type: none"> <li>MPC is ruptured, allowing air ingress and egress</li> <li>Zircaloy fuel cladding is ignited and combustion propagates within the MPC</li> </ul>	<ul style="list-style-type: none"> <li>Missiles with tandem warheads</li> <li>Close-up use of shaped charges and incendiary devices</li> <li>Thermic lance</li> <li>Removal of overpack lid</li> </ul>	<ul style="list-style-type: none"> <li>Scattering and plume formation as for Type III event</li> <li>Substantial release of volatile species, exceeding amounts for Type II release</li> </ul>

February 27, 2008

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE COMMISSION

In the matter of  
Pacific Gas and Electric Company  
Diablo Canyon Nuclear Power Plant  
Unit Nos. 1 and 2  
Independent Spent Fuel Storage Installation

Docket # 72-26-ISFSI

**SAN LUIS OBISPO MOTHERS FOR PEACE'S  
REQUEST FOR ADMISSION OF LATE-FILED CONTENTION 6  
REGARDING DIABLO CANYON  
ENVIRONMENTAL ASSESSMENT SUPPLEMENT**

**I. INTRODUCTION AND SUMMARY**

Pursuant to the U.S. Nuclear Regulatory Commission's ("NRC's" or "Commission's") Order in *Pacific Gas and Electric Co.* (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-08-01, \_\_ NRC \_\_, slip op. at 31 (January 15, 2008) ("CLI-08-01"), San Luis Obispo Mothers for Peace ("SLOMFP") hereby submits late-filed Contention 6 regarding the Final Supplement to the Environmental Assessment and Draft Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (August 2007) ("Final EA Supplement").

Contention 6 is supported by the expert declaration of Dr. Gordon Thompson (Declaration of Dr. Gordon R. Thompson in Support of San Luis Obispo Mothers for Peace's Contention 6 (February 27, 2008)) and by Dr. Thompson's expert report, *Assessing Risks of Potential Malicious Actions at Commercial Nuclear Facilities: The Case of a Proposed Independent Spent Fuel Storage Installation at the Diablo Canyon Site* (June 27, 2007) ("Thompson Report"). A copy of Dr. Thompson's declaration is

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attached. Dr. Thompson's report and curriculum vitae were provided as attachments to San Luis Obispo Mothers for Peace's Contentions and Request for a Hearing Regarding Diablo Canyon Environmental Assessment Supplement (June 28, 2007; corrected June 29, 2007) ("Hearing Request").

As discussed below in Section III, Contention satisfies a balancing of the Commission's criteria for admission of late-filed contentions.

## II. CONTENTION 6

**Contention 6: Inappropriate reliance on the "Ease" indicator to exclude reasonably foreseeable and significant environmental impacts from the NRC's environmental analysis for the Diablo Canyon ISFSI**

In preparing the Final EA Supplement, the NRC Staff violated the National Environmental Policy Act ("NEPA") and federal implementing regulations by excluding reasonably foreseeable threat scenarios from consideration, based on the use of an inappropriate indicator known as "Ease" as a proxy for the probability of a threat scenario. The excluded threat scenarios could cause significant adverse impacts by contaminating the environment. Therefore, the NRC Staff should have prepared an environmental impact statement ("EIS").

### **Basis:**

The legal basis for this contention is the requirement of NEPA and NRC implementing regulations that the NRC must prepare an EIS to address significant environmental impacts on the human environment. 10 C.F.R. § 51.20(a)(1). Impacts that must be considered include low-probability environmental impacts with catastrophic consequences, if those impacts are reasonably foreseeable. 40 C.F.R. § 1502.22(b)(3).

The factual basis for this contention consists of information presented in unredacted portions of a classified document, issued by Sandia National Laboratories in 2004, entitled "NRC Spent Fuel Source Term Guidance Document" ("Sandia Study"). The Sandia Study is listed in the Final EA Supplement as Reference 8 (*see id.* at A-12), and it is also listed as "Document 3" in the NRC Staff's February 13, 2008, Vaughn Index. The documents produced by the Staff on February 13, 2008, in connection with its Vaughn Index, included a redacted version of the Sandia Study "with Appendices A-E."

It is reasonable to infer, from the facts that (a) the NRC has entitled the Sandia Study a "guidance document" and (b) the Final EA Supplement lists the Sandia Study as a reference document, that the NRC Staff relied on the guidance presented in the Sandia Study in preparing the EA Supplement.

At pages 133-134, the Sandia Study describes a quantitative indicator known as "Ease" that can be used in threat assessment, as a proxy for the probability of a threat scenario. The Sandia Study describes the function of "Ease" as follows:

For sabotage, it is not possible to calculate or even estimate a "probability" or "likelihood" of successful completion for each scenario (or even the likelihood of an attempt). Rather, a simple measure (called Ease) was developed to estimate how easy or difficult it is to complete an attack scenario.

*Id.* at 133. The Sandia Study defines "Ease" as  $1/2$  raised to the power Time+Complexity+Technology, where those parameters have the values:

- Time (instant = 0; 30 minutes = 1; 60 minutes = 2; longer = 3)
- Complexity (1 step = 0; 2 steps = 1; 3 steps = 2; more than 3 steps = 3)
- Technology (low = 1; medium = 2; high = 3)

Given that definition, the highest value of "Ease" (for an instantaneous, 1-step attack, using low technology) would be 0.5 (1/2 raised to the power 1), while the lowest value of "Ease" (for an attack scenario lasting more than 60 minutes, with more than 3 steps, using high technology) would be 0.002 (1/2 raised to the power 9). For a particular threat scenario, "Ease" would have a value in that range, depending upon the values that were assumed for the parameters, Time, Complexity, and Technology. The more time-consuming, complex, and technologically demanding a scenario is, the lower its "Ease" value. From the discussion at page 133 of the Sandia Study, it appears that the Staff used the "Ease" indicator as a substitute for determining the "probability" or "likelihood" of an attack. Sandia Report at 133.

Based on the inclusion of the Sandia Study as a reference document for the Final EA Supplement, one can reasonably infer that the Staff used the "Ease" indicator to exclude some threat scenarios from consideration in the EA. But use of the "Ease" indicator as a proxy for the probability of a threat scenario is inappropriate, and reveals a fundamental misunderstanding by the NRC Staff of the potential for attack on nuclear facilities in the U.S. As explained in the Thompson Report, U.S. nuclear facilities are especially attractive targets for attack by sub-national groups that are comparatively sophisticated in their approach, and comparatively well provided with funds and skills. *Id.* at 14-17. A group of that type could choose to attack a U.S. nuclear facility for one or both of two reasons. First, the attack could be highly symbolic, functioning as an asymmetric response to U.S. military predominance. Second, the attack could lead to severe radiological impacts, including making large areas of land uninhabitable for a period of decades. A sophisticated, well-endowed group, mindful of those reasons, could

select a nuclear facility as a target even though other targets would be much easier to attack.

A sophisticated, well-endowed group with the goals described above would be likely to devote considerable time and resources to preparing for its attack on a nuclear facility, and could employ an attack plan featuring at least the following three elements. First, the attack, including pre-positioning of assets and diversionary actions, could unfold over a period of more than 60 minutes. Second, the attack could involve more than three steps. Third, the attack could involve selective use of high technology, such as global positioning system ("GPS") receivers and night-vision devices. That attack would be scored at the lowest level of "Ease" as defined in the Sandia Study. Yet, an attack of that type on the Diablo Canyon ISFSI would be technically credible and reasonably foreseeable. *See* Thompson Report at 33 - 37. By excluding sophisticated, time-consuming, and technologically advanced attacks from consideration in the Final EA Supplement, the NRC Staff has failed to consider the full range of reasonably foreseeable impacts of operating the Diablo Canyon ISFSI.

**III. CONTENTION 6 SATISFIES A BALANCING OF THE NRC'S LATE-FILED CONTENTION CRITERIA.**

Contention 6 satisfies a balancing of the NRC's late-filed contention criteria in 10 C.F.R. § 2.714(a). SLOMFP satisfies the first and most important factor -- good cause -- because it is filing the contention within fourteen days of discovering the existence of the Ease factor in the Sandia Study. *See* CLI-08-01, slip op. at 31. The information in the Sandia Study cannot be found in the Final EA Supplement.

Second, SLOMFP has no means other than this proceeding to vindicate its interest in requiring the NRC to fully comply with NEPA in considering the environmental impacts of intentional attacks on the Diablo Canyon ISFSI.

Third, SLOMFP's participation may reasonably be expected to assist in the development of a sound record. SLOMFP is assisted by experienced counsel and Dr. Thompson, a qualified expert on risk assessment and nuclear security issues who has prepared an expert report regarding the deficiencies of the Final EA Supplement and a declaration in support of Contention 6, and who is prepared to testify regarding Contention 6.

Finally, SLOMFP anticipates that its participation in this proceeding will broaden and delay the proceeding. Nevertheless, as stated in SLOMFP's initial Hearing Request, it is not appropriate for the Commission to give any weight to this factor, because SLOMFP has done nothing to cause any delay or 11<sup>th</sup> hour broadening of the proceeding. SLOMFP has sought compliance by the NRC with NEPA's requirement to consider the environmental impacts of attacks on the Diablo Canyon ISFSI since the proceeding began over five years ago. Any delay is attributable to the intransigence of the NRC and PG&E, not to SLOMFP. Hearing Request at 18.

IV. CONCLUSION

For the foregoing reasons, Contention 6 should be admitted.

Respectfully submitted,



Diane Curran

Harmon, Curran, Spielberg & Eisenberg, LLP

1726 M Street N.W., Suite 600

Washington, DC 20036

202/328-3500

FAX: 202/328-6918

e-mail: [dcurran@harmoncurran.com](mailto:dcurran@harmoncurran.com)

February 27, 2008

**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD**

In the Matter of: :  
: :  
PACIFIC GAS & ELECTRIC CO. : Docket No. 72-26 - ISFSI  
(Diablo Canyon Nuclear Power Plant :  
Unit Nos. 1 and 2) :

**DECLARATION OF DR. GORDON R. THOMPSON  
IN SUPPORT OF SAN LUIS OBISPO MOTHERS FOR PEACE'S  
CONTENTION 6**

Under penalty of perjury, I, Gordon R. Thompson, declare as follows:

1. I am the executive director of the Institute for Resource and Security Studies (IRSS), a nonprofit, tax-exempt corporation based in Massachusetts. Our office is located at 27 Ellsworth Avenue, Cambridge, MA 02139.
2. On June 27, 2007, I submitted a declaration and expert report in this proceeding, in support of San Luis Obispo Mothers for Peace's (SLOMFP's) Contentions and Request for a Hearing Regarding Diablo Canyon Environmental Assessment Supplement (June 28, 2007; corrected June 29, 2007). My report is entitled "Assessing Risks of Potential Malicious Actions at Commercial Nuclear Facilities: the Case of a Proposed Independent Spent Fuel Storage Installation at the Diablo Canyon Site."
3. The representations made in my June 27, 2007, declaration continue to be correct.
4. I have reviewed the Vaughn Index and associated documents submitted by the U.S. Nuclear Regulatory Commission ("NRC") Staff in this proceeding on February 13, 2008.
5. I assisted SLOMFP in the preparation of Contention 6, which challenges the adequacy of the NRC Staff's Final Supplement to the Environmental Assessment and Draft Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (May 29, 2007) ("EA Supplement").
6. The factual statements of fact in SLOMFP's Contention 6 are true and correct to the best of my knowledge, and the technical opinions set forth therein are based on my best

professional judgment.

7. I am prepared to testify as an expert witness on behalf of SLOMFP with respect to the facts and opinions set forth in SLOMFP's Contention 6.



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Gordon R. Thompson, D.Phil

February 27, 2008

February 20, 2008

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE COMMISSION

In the matter of  
Pacific Gas and Electric Company  
Diablo Canyon Nuclear Power Plant  
Unit Nos. 1 and 2  
Independent Spent Fuel Storage Installation

Docket # 72-26

**SAN LUIS OBISPO MOTHERS FOR PEACE'S  
RESPONSE TO NRC STAFF'S VAUGHN INDEX,  
REQUEST FOR LEAVE TO CONDUCT DISCOVERY  
AGAINST THE NRC STAFF,  
REQUEST FOR ACCESS TO UNREDACTED REFERENCE  
DOCUMENTS, AND REQUEST FOR PROCEDURES  
TO PROTECT SUBMISSION OF SENSITIVE INFORMATION**

**I. INTRODUCTION**

Pursuant to CLI-08-01, the U.S. Nuclear Regulatory Commission's ("NRC's" or "Commission's") Memorandum and Order of January 15, 2008, San Luis Obispo Mothers for Peace ("SLOMFP") hereby responds to the Vaughn Index submitted by the NRC Staff on February 13, 2008.

As discussed below, the Vaughn Index is both incomplete and inadequate to justify the withholding of portions of documents cited as references for the Supplement to the Environmental Assessment and Final Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (August 2007) ("Final EA Supplement"). In addition, what little information is provided indicates that in at least one instance, the NRC is unlawfully withholding "secret law" rather than legitimately protecting law-enforcement related documents under the Freedom of

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Information Act ("FOIA"). *Hardy v. Bureau of Alcohol, Tobacco & Firearms*, 631 F.2d 653, 657 (9th Cir. 1980).

SLOMFP respectfully submits that the paucity of information disclosed by the Staff in the set of redacted reference documents that it publicly released on February 13, 2008, warrants reconsideration by the Commission of its earlier refusal to grant SLOMFP access to the reference documents under a protective order. Consistent with the Atomic Energy Act and longstanding Commission policy, the Commission should grant SLOMFP access to the reference documents under a protective order, in order to ensure that SLOMFP has a meaningful right to a hearing under Section 189a of the Atomic Energy Act, 42 U.S.C. § 2239(a).

Finally, SLOMFP requests an opportunity to make additional discovery requests to the NRC Staff, based on the information provided in the set of redacted documents produced by the NRC Staff. The subject matter of the discovery requests is described in Sections II through IV below.

## **II. THE VAUGHN INDEX IS INCOMPLETE.**

Based on the information provided in the NRC Staff's Vaughn Index, it appears that other relevant documents should have been included in the index of reference documents.

### **A. The Vaughn Index Does Not Explain the Applicability of SECY-04-0222 or Cite an Alternative Decision-making Framework for Vulnerability Assessments.**

The NRC lists, as a reference document for the Final EA Supplement, SECY-04-0222, Memorandum from Luis A. Reyes to the Commissioners re: Decision-making Framework for Materials and Research and Test Reactor Vulnerability Assessments (November 24, 2004) ("SECY-04-0222") (Document 8). This document confirms that for materials and research and

test reactor vulnerability assessments, the NRC Staff screens out attacks whose consequences do not result in immediate fatalities. *Id.* at 4.

By its own terms, SECY-04-0222 appears not to apply to ISFSIs. In its response to comments on the Draft EA Supplement, the Staff also stated that it “did not consider early fatalities as a measure of environmental impact.” Final EA Supplement at A-6. Thus, the question arises: why did the Staff list SECY-04-0222 as reference document? Is there some other document that makes the decision-making framework in SECY-04-0222 applicable to ISFSIs?

SECY-04-0222 states that there are “various points of view within the [NRC] staff on the need for additional criteria [besides early fatalities], e.g., land contamination.” *Id.* at 5. In its response to Contention 2, the Staff also claimed to consider “other factors” besides early fatalities. NRC Staff’s Answer to Contentions Submitted by San Luis Obispo Mothers for Peace at 19 (July 13, 2007). Surely the NRC has documentation of these differing points of view and “other factors” that were appropriate to consider in the EA Supplement.

SECY-04-0222 also states that its “proposed decision-making framework does not “include Category 1 fuel cycle facilities or nuclear power plants,” which are “required to successfully protect against capabilities described in a design basis threat.” *Id.* at 3. SECY-04-0222 also states that “[c]onsequently, these facilities will not be subjected to the additional screening process called for in the decision-making framework.” *Id.* Nothing in the Final EA Supplement or any of the references indicates whether the NRC Staff considers the Diablo Canyon ISFSI to be subject to the nuclear power plant DBT [design basis threat] for purposes of the Staff’s analysis of environmental impacts; nor do these documents state what is meant by “the additional screening criteria.” This should be clarified by the Staff.

The Staff should be required to identify any other documents, besides SECY-04-0222, which contain applicable criteria for determining whether the environmental consequences of an intentional attack on the Diablo Canyon SFSI are significant, including differing staff opinions. If, in fact, SECY-04-0222 is the only guidance document on which the Staff relied, it should be required to clarify that point.

**B. The Vaughn Index Does Not Identify Input From Other Agencies.**

In Document 7, Memorandum from Annette Vietti-Cook, NRC Secretary, to Luis A. Reyes, NRC Executive Director for Operations re: Staff Requirements – SECY-04-0222 – Decision-making Framework for Materials and Research and Test Reactor Vulnerability Assessments (January 15, 2005), the Secretary of the Commission instructed the Staff:

As a separate issue from the vulnerability assessment conducted under the decision making framework, the staff should not be independently developing criteria and standards for other consequences (such as land contamination and economic impacts) at this time. Rather, consistent with the U.S. Government programs for homeland protection and security, the staff should continue to support the separate vulnerability assessment reviews being conducted under the leadership of the Department of Homeland Security (DHS). These activities include the consideration of consequences other than prompt fatalities.

*Id.* at 3. The SRM also instructed the Staff to “keep the Commission appropriately informed of progress of this activity and, at the appropriate time, make recommendations to the Commission if the existing NRC consequence criteria or methodologies for future vulnerability assessments should be modified.” *Id.*

More than three years have passed since the SRM was written. At this point, it is reasonable to expect that the NRC Staff’s participation in the DHS analysis of accident consequences would have yielded some insights into the question of whether and how consequences not involving immediate fatalities should be considered. Yet, the Vaughn Index contains no such information. SLOMFP requests the opportunity to question the Staff regarding

the results of the DHS analytical process in which the Staff participated and its relevance to the consideration of the environmental impacts of licensing the Diablo Canyon ISFSI.

Finally, SECY-04-0222 states that the process of developing the decision-making criteria “has been informed by several independent comprehensive VA methodologies including but not limited to the Risk Analysis and Management for Critical Assets Protection (RAMCAP) methodology developed by the American Society of Mechanical Engineers (ASME), for the U.S. Department of Homeland Security (DHS).” *Id.* at 2. SECY-04-0222 also states that the NRC’s decisionmaking framework is “consistent with the RAMCAP guidance” in that “scenarios resulting in no prompt fatalities are screened out and are not put through the framework decision-making process.” *Id.* at 4. Thus, the RAMCAP methodology appears to be highly relevant to the NRC’s analysis of the environmental impacts of an attack on the Diablo Canyon ISFSI, but has not been included as a reference document. SLOMFP seeks an opportunity to question the Staff regarding the relevance of this document.

**III. THE NRC STAFF HAS FAILED TO ADDRESS SOME WITHHELD PORTIONS OF SECY-04-0222 IN THE VAUGHN INDEX OR JUSTIFY ITS DECISION TO WITHHOLD WHAT APPEARS TO BE “SECRET LAW.”**

The NRC Staff has withheld from disclosure significant portions of SECY-04-0222 (Document 8), on the grounds that the information is exempt from disclosure under Exemption 1, 2, or 3 of the FOIA. Vaughn Index at 130-131. Redacted portions of the document are covered with black ink or whited out. For each part of SECY-04-022 that is blacked out or whited out, the Vaughn Index purports to identify a FOIA exemption and provide a “Justification for Withholding Information.” But the Vaughn Index does not identify or provide justifications for withholding of all of the redacted portions of the document:

- In two places on page 5 of SECY-04-0222, the NRC Staff has whited out what appear to be short phrases that follow the words “radioactive materials.” The justification given for these exclusions from the text is that they contain “[i]nternal NRC analysis of specific security feature which would possibly aid an adversary if disclosed.” Vaughn Index at 130. But the context of the withheld information indicates that the information is used to assist the NRC Staff in making a determination of whether the release of radioactive materials would cause significant adverse effects and thereby are worthy of consideration in an environmental analysis. Thus, the NRC Staff appears to be withholding “secret law” that should have been disclosed under the FOIA. *Hardy*, 631 F.2d at 657.
- On page 1 of Attachment 2, the NRC Staff has blacked out portions of Figure 1, entitled “Decision Matrix.” But the Vaughn Index has no corresponding entry for information on page 1 of Attachment 2. The omission is a matter of concern because Figure 1 appears to establish “secret law” by setting the guidelines by which the NRC will decide whether consequences of intentional attacks are significant. *Hardy*, 631 F.2d at 657. Under *Hardy*, the NRC does not have a legitimate claim to withhold such secret laws under the FOIA.
- On page 2 of Attachment 2, the text refers to Table 1, entitled “Activity-Specific Attractiveness Category Ranking Matrix.” Neither the title nor the text of Table 1 appears on page 2 or 3 of SECY-04-0222, and the Vaughn Index makes no reference to Table 1. While page 3 of SECY-04-0222 is blacked out in its entirety, with a corresponding entry in the Vaughn Index, the Vaughn Index describes the blacked out language as: “NRC Staff guidance for using the framework methodology to estimate potential consequences.” *Id.* at 131. That description that is not consistent with the title

of Table 1, which describes a ranking matrix for attractiveness. Thus, it appears the Staff has withheld Table 1 without attempting to justify the withholding decision. As with Figure 1, the Staff appears to have excised, without justification, a portion of SECY-04-0222 that constitutes "secret law" regarding the NRC's standards for recognizing the effects of intentional attacks as significant. *Hardy*, 631 F.2d at 657.

**IV. THE COMMISSION SHOULD RECONSIDER ITS CATEGORICAL REFUSAL TO ALLOW SLOMFP TO REVIEW WITHHELD INFORMATION UNDER A PROTECTIVE ORDER.**

In CLI-08-01, the Commission categorically refused to provide SLOMFP with access, under a protective order, to any documents that the NRC considers to be exempt from disclosure under the FOIA. *Id.*, slip op. at 18, citing *Weinberger v. Catholic Action of Hawaii*, 454 U.S. 139, 143 (1981). While the Commission ordered the Staff to identify and release all non-exempt information in the reference documents, very little meaningful information has been provided in the material that was publicly released on February 13. Thus, access to the redacted versions of the reference documents has not allowed SLOMFP to understand the reasons for the Staff's conclusion that the environmental impacts of an intentional attack on the Diablo Canyon ISFSI would be insignificant.

For example, based on the limited information that has been disclosed in SECY-04-0222, it now appears that the Staff did, indeed, screen out as unworthy of consideration any attack scenarios that would have resulted in consequences other than early fatalities. See discussion above in Section II.A. However, so much information has been withheld about the Staff's decision-making criteria that it is not clear how the Staff arrived at its conclusion, or even whether the Staff did indeed apply the decision-making matrix in SECY-04-222 to the Diablo Canyon ISFSI. The Staff also withheld large portions of relevant documents that would have

allowed SLOMFP to determine whether the Staff was aware of, but discarded, credible scenarios that would have resulted in significant environmental impacts other than early fatalities. Such documentary material would have allowed SLOMFP to test the thesis of Contention 2 that the Staff arrived at its conclusion of "no significant impacts" by arbitrarily screening out any attack scenarios that did not result in early fatalities.

Now that the Staff has released the Vaughn Index and the set of redacted reference documents, it is clear that the released information is insufficient to allow SLOMFP the meaningful hearing to which SLOMFP is entitled under Section 189a of the Atomic Energy Act, 42 U.S.C. § 2239(a), regarding the question of whether the NRC has complied with the National Environmental Policy Act ("NEPA") in proposing to license the Diablo Canyon ISFSI.

As the Commission has long recognized, the use of protective orders is an appropriate way to assure that interested parties will receive a meaningful hearing in licensing cases, and at the same time protect classified information, safeguards information, proprietary information and other sensitive information. *See, e.g., Pacific Gas and Electric Company (Diablo Canyon Nuclear Power Plant, Unit Nos. 1 and 2), CLIJ-80-24, 11 NRC 775, 777 (1980).* In that case, the Commission rejected an argument by the license applicant, PG&E, that the physical security plan for the proposed Diablo Canyon nuclear plant "should not be made available to petitioners because the best method of preventing disclosure of this sensitive document is to make it available to the fewest number of individuals possible." 11 NRC at 777. As the Commission explained:

The Commission recognizes PG&E's concern, but emphasizes that intervenors in Commission proceedings may raise contentions relating to the adequacy of the applicant's proposed physical security arrangements, and that the Commission's regulations, 10 C.F.R. 2.790, contemplate that sensitive information may be turned over to intervenors in NRC proceedings under appropriate protective orders.

11 NRC at 777 (footnotes omitted).<sup>1</sup> Consistent with the Atomic Energy Act and the Commission's longstanding policy, the Commission should apply its regulations in 10 C.F.R. § 2.390 to allow SLOMFP access to the reference documents under a protective order.

SLOMFP also respectfully submits that the Commission's suggestion that the reference documents qualify as privileged "state secrets," see CLI-08-01, slip op. at 24 and n.97, citing *United States v. Reynolds*, 345 U.S. 1, 11 (1953), is undermined by the agency's general practice of broadly circulating security-related documents for comment to outside parties, including nuclear industry trade representatives and state and local government representatives. For instance, in a November 5, 2001, letter, NRR Director Samuel J. Collins informed a senior official at the Nuclear Energy Institute ("NEI") that NEI employee Ronald Rose could not only "receive and store" safeguards information at an NEI facility, but that he could share it with unnamed NEI personnel; and that no further NRC authorization was needed for the distribution of the safeguards information by Mr. Rose. Letter from Samuel J. Collins, NRR, to Ralph

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<sup>1</sup> The Commission also noted that the regulations in 10 C.F.R. 2.790 [now codified at 10 C.F.R. § 2.390] "are consistent with the policy set forth in Section 181 of the Atomic Energy Act." *Id.* Section 181 provides that:

[I]n the case of agency proceedings or actions which involve Restricted Data, defense information, safeguards information protected from disclosure under the authority of section 2167 of this title or information protected from dissemination under the authority of section 2168 of this title, the Commission shall provide by regulation for such parallel procedures as will effectively safeguard and prevent disclosure of Restricted Data, defense information, such safeguards information or information protected from dissemination under the authority of section 2168 of this title to unauthorized persons with minimum impairment of the procedural rights which would be available if Restricted Data, defense information, such safeguards information or information protected from dissemination under the authority of section 2168 of this title were not involved.

42 U.S.C. § 2231. Thus, the Atomic Energy Act contemplates that the NRC will establish "parallel procedures" that will protect classified and safeguards information and at the same time allow meaningful hearings.

Beedle, NEI (November 5, 2001) [ADAMS Accession No. ML013090038].<sup>2</sup> The Commission itself has granted need-to-know status to NEI officials, for the general purpose of “efficiently and expeditiously obtaining industry-wide comments on Commission policy issues involving nuclear facility and materials security.” Letter from Nils J. Diaz, NRC Chairman, to Joe F. Colvin, NEI President and Chief Executive Officer (June 19, 2003) [ADAMS Accession No. ML031480365]. As noted with approval in a September 17, 2003, NRC Staff letter to NEI, as of September 2003, the NRC Staff began to hold “weekly” closed meetings with NEI and other nuclear industry representatives, “to discuss security, contingency, and training and qualification plan changes needed to support compliance with the April 29, 2003, design basis threat order.” Letter from Roy P. Zimmerman via Michael F. Weber, NRC Office of Nuclear Security and Incident Response Operations, to Joe F. Colvin, President and Chief Executive Officer, NEI (September 17, 2003). The letter also emphasizes that the Commission “is committed to the continued exchange of information and ideas between the NRC and authorized stakeholders on security topics.” *Id.* at 1.

Similarly, the NRC has announced that before imposing “enhancements” to the DBT in 2003 enforcement orders, it “solicit[ed] and receive[ed] comments from Federal, State, and local agencies, and industry stakeholders.” Final Rule, Design Basis Threat, 72 Fed. Reg. 12,705 (March 19, 2007). Neither the contents of the orders or the details of the DBT rule were made available to the general public.

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<sup>2</sup> On January 23, 2003, the Staff also noticed a closed meeting on the revised DBT, to which NEI employees and other “to be determined” members of the nuclear industry were invited to discuss safeguards issues. NRC Meeting Notice re: Closed Meeting to Discuss Questions and Responses from the January 9, 2003, Design Basis Threat (DBT) Meeting and Requested Written Input Provided by Representatives from Licensed Power Reactor Facilities, the Nuclear Industry, and State and Federal Agencies (January 23, 2003) (attached as Exhibit 2).

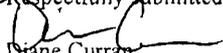
It is not evident from the Vaughn Index or the redacted reference documents how many outside entities have reviewed those documents in an unredacted state, or what has been the NRC's policy for sharing them with outside entities. Before declaring that the documents are privileged "state secrets," the NRC Staff should be required to fully disclose the identities of the persons and organizations with which those documents have been shared and the agency's policy for sharing them. And if the NRC Staff's disclosures show that the documents have been shared with PG&E, trade industry representatives, or state and local government officials, and other "stakeholders," the Commission should also ensure that SLOMFP has access to the documents for purposes of participating in the Diablo Canyon ISFSI licensing proceeding.

Accordingly, SLOMFP requests that the Commission make unredacted versions of the reference documents available to SLOMFP under a protective agreement. SLOMFP also requests that the Commission establish a procedure by which SLOMFP can share sensitive information with the NRC in a protected setting. For instance, SLOMFP has information responsive to discovery requests by the NRC which it does not believe should be publicly released.

#### V. CONCLUSION

For the foregoing reasons, the Staff's Vaughn Index is inadequate to justify the Staff's decision to withhold information from SLOMFP under the FOIA. In addition, SLOMFP should be permitted to ask additional discovery questions to the NRC Staff regarding information that was disclosed in the redacted documents. The Commission should also grant SLOMFP's renewed request for access to the reference documents under a protected order. Finally, the Commission should establish procedures that would allow the consideration of sensitive information submitted by SLOMFP in a protected setting.

Respectfully submitted,

  
Diane Curran

Harmon, Curran, Spielberg, & Eisenberg, L.L.P.

1726 M Street N.W., Suite 600

Washington, D.C. 20036

202/328-3500

e-mail: [Dcurran@harmoncurran.com](mailto:Dcurran@harmoncurran.com)

February 20, 2008

October 1, 2007

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE COMMISSION

In the matter of  
Pacific Gas and Electric Company  
Diablo Canyon Nuclear Power Plant  
Unit Nos. 1 and 2  
Independent Spent Fuel Storage Installation

Docket # 72-26-ISFSI

**SAN LUIS OBISPO MOTHERS FOR PEACE'S  
RESPONSE TO NRC STAFF'S SUPPLEMENT TO THE  
ENVIRONMENTAL ASSESSMENT AND FINDING OF  
NO SIGNIFICANT IMPACT FOR THE DIABLO CANYON  
INDEPENDENT SPENT FUEL STORAGE INSTALLATION**

**I. INTRODUCTION**

Pursuant to the U.S. Nuclear Regulatory Commission's ("NRC's" or "Commission's") Order of September 11, 2007, San Luis Obispo Mothers for Peace ("SLOMFP") hereby addresses the effects of the NRC Staff's Final Environmental Assessment ("EA") Supplement<sup>1</sup> on SLOMFP's contentions in this proceeding.<sup>2</sup> The Final EA Supplement does not make any significant changes to the Draft EA Supplement, nor does it provide any satisfactory explanation for the gross deficiencies of the EA Supplement. Therefore SLOMFP makes no changes to its contentions.

**II. DISCUSSION**

The Final EA Supplement is virtually identical to the Draft EA Supplement, whose severe inadequacies were described in SLOMFP's contentions. Moreover, as

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<sup>1</sup> Supplement to the Environmental Assessment and Final Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (August 2007).

<sup>2</sup> San Luis Obispo Mothers for Peace's Contentions and Request for a Hearing Regarding Diablo Canyon Environmental Assessment Supplement (June 28, 2007; corrected June 29, 2007) ("SLOMFP Contentions").

discussed in the attached Declaration by Dr. Gordon Thompson, the response to comments contained in an appendix to the Final EA Supplement fails to address or resolve the concerns raised by the contentions.<sup>3</sup> Like the Draft EA Supplement, the Final EA Supplement does not (1) define its terms, explain its methodology, or identify scientific sources; (2) reveal or justify its assumptions; (3) consider credible threat scenarios with significant environmental impacts; (4) address the National Infrastructure Protection Plan; or (5) consider the vulnerability of the proposed ISFSI in relation to the entire Diablo spent fuel storage complex.

The one respect in which the Final EA Supplement improves upon the Draft EA Supplement is that it provides a list of some of the references relied on by the NRC in preparing the EA Supplement. The list of references is insufficient to comply with NEPA, however, because it is concededly incomplete. In response to comments that the Draft EA Supplement was deficient for its failure to provide source terms, information regarding its sources, and documentary references, the Final EA Supplement states that:

The staff cannot provide specific details of the analyses (such as the source term used), nor the supporting background documents, due to the sensitive nature of the information. However, *some of these reference documents* have been listed in the final EA supplement in response to these comments (and are also listed at the end of this appendix).

Final EA Supplement at A-4 (*emphasis added*). The NRC Staff provides no explanation as to why it considers the mere identification of reference documents to be too "sensitive" to publish, nor is any justification evident. The Final EA Supplement should provide a complete list of its sources and references, including records of the consultations with law

<sup>3</sup> Declaration by Dr. Gordon R. Thompson Regarding the NRC Staff's August 2007 Supplement to the Environmental Assessment and Final Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (October 1, 2007).

enforcement agencies which are identified as important sources of information in the appendix to the Final EA Supplement.<sup>4</sup>

As set forth in Contention I(b), SLOMFP continues to seek access to any safeguards or classified documents that the NRC Staff relied on to conclude that the environmental impacts of attacks on the proposed ISFSI are insignificant.<sup>5</sup> Even in the event that the Commission rejects SLOMFP's contentions, to the extent the Commission relies on non-public documents in rejecting any contentions, SLOMFP seeks access to those non-public documents (under appropriate protective measures) in order to evaluate the basis for the Commission's decision.

While SLOMFP seeks access to safeguards and classified documents to the extent such access is necessary to evaluate the basis for the conclusions reached in the Final Supplement to the EA, SLOMFP also believes that the Commission can and must disclose far more information in order to demonstrate to the public that it has considered the environmental impacts of attacks on the Diablo Canyon ISFSI, and that it can do so without compromising the security of the ISFSI. The Commission's own Design Basis Threat ("DBT") rulemaking, for example, reflects a far more open approach than has been taken in the Diablo Canyon licensing proceeding. As the Commission stated in the preamble to the proposed rule, the level of detail provided in the rulemaking notice:

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<sup>4</sup> See, e.g., Final EA Supplement at A-5 ("The threat scenarios considered in the security assessments were selected by NRC, based on intelligence information regarding trends and actual, demonstrated capabilities of potential adversaries, gathered through regular consultations with federal and law enforcement agencies, and the intelligence community;" *id.* at A-6 ("NRC's choice of scenarios was informed by information gathered through NRC's regular interactions with the law enforcement and intelligence communities").

<sup>5</sup> As discussed in note 3 of SLOMFP's Contentions, SLOMFP's attorney, Diane Curran, and one of its experts, Dr. Edwin S. Lyman, have active security clearances.

reflects all major features of the DBTs, yet avoids compromising licensee security by not publishing the specific tactical and operational capabilities of the DBT adversaries. The goal of this approach is to provide sufficient public notice of the upgrades to the DBTs, *including the new modes of attack that facilities must be prepared to defend against*, so that meaningful public input is possible regarding the proposed rule's scope and content.

Proposed Rule, Design Basis Threat, 70 Fed. Reg. 67,380, 67,382 (November 7, 2005)

(emphasis added).

As the Commission emphasized:

[I]t is important for the public to be informed of the types of attacks against which nuclear power plants and Category I fuel cycle facilities are required to defend. The public has a vital stake in the security of these facilities, as well as the right to meaningful comment when NRC proposes to amend its regulations.

The Commission's legal and policy concerns and practical approach to information disclosure in promulgating the DBT rule are as applicable to the Diablo Canyon ISFSI as they are to nuclear power plants and Category I fuel cycle facilities, and as relevant in the context of the National Environmental Policy Act as they are in the context of the Atomic Energy Act. The Final EA Supplement for the Diablo Canyon ISFSI falls dismally short of meeting the Commission's legal or policy standards for public disclosure of security-related information.<sup>6</sup>

### III. CONCLUSION

As discussed above, the NRC Staff has made no significant changes to the EA Supplement for the Diablo Canyon ISFSI that would warrant any changes to SLOMFP's

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<sup>6</sup> In addition to seeking access to safeguards and classified information by Dr. Lyman and the opportunity for Dr. Lyman to present testimony in a protected setting, SLOMFP seeks an opportunity for Dr. Thompson to present his criticisms of the EA Supplement in a protected setting. While SLOMFP does not plan to seek access to classified or safeguards information by Dr. Thompson, SLOMFP does seek an opportunity for Dr. Thompson to present, in a protected setting, the details of his expert views on the potential for attacks on the Diablo Canyon ISFSI and the consequences of attacks.

contentions. Therefore, SLOMFP seeks a ruling on the admissibility of the contentions  
as written.

Respectfully submitted,



Diane Curran  
Harmon, Curran, Spielberg & Eisenberg, LLP  
1726 M Street N.W., Suite 600  
Washington, DC 20036  
202/328-3500  
FAX: 202/328-6918  
e-mail: [dcurran@harmoncurran.com](mailto:dcurran@harmoncurran.com)

October 1, 2007

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of: :  
: :  
PACIFIC GAS & ELECTRIC CO. : Docket No. 72-26 - ISFSI  
(Diablo Canyon Nuclear Power Plant :  
Unit Nos. 1 and 2) :

DECLARATION BY DR. GORDON R. THOMPSON REGARDING  
THE NRC STAFF'S AUGUST 2007 SUPPLEMENT  
TO THE ENVIRONMENTAL ASSESSMENT  
AND FINAL FINDING OF NO SIGNIFICANT IMPACT  
RELATED TO THE CONSTRUCTION AND OPERATION  
OF THE DIABLO CANYON INDEPENDENT SPENT  
FUEL STORAGE INSTALLATION (ISFSI)

Under penalty of perjury, I, Gordon R. Thompson, declare as follows:

I. INTRODUCTION

I-1. I am the executive director of the Institute for Resource and Security Studies (IRSS), a nonprofit, tax-exempt corporation based in Massachusetts. Our office is located at 27 Ellsworth Avenue, Cambridge, MA 02139. IRSS was founded in 1984 to conduct technical and policy analysis and public education, with the objective of promoting peace and international security, efficient use of natural resources, and protection of the environment.

I-2. I am an expert in the technical analysis of safety, security and environmental issues related to nuclear facilities. Information about my relevant experience and expertise, together with an attached copy of my curriculum vitae, is provided in my previous declaration of 27 June 2007 in this matter.<sup>1</sup> That declaration accompanied a report that I prepared for San Luis Obispo Mothers for Peace (SLOMFP).<sup>2</sup> Hereafter, I refer to that report as the "Thompson Report". My declaration and report supported contentions submitted by SLOMFP in this matter.<sup>3</sup> Hereafter, I refer to those contentions as the "SLOMFP Contentions".

I-3. In the present declaration I review the NRC Staff's August 2007 Supplement to the Environmental Assessment and Final Finding of No Significant Impact Related to the

<sup>1</sup> Declaration of Dr. Gordon R. Thompson in Support of San Luis Obispo Mothers for Peace's (SLOMFP's) Contentions Regarding the Diablo Canyon Environmental Assessment Supplement, 27 June 2007.

<sup>2</sup> Gordon R. Thompson, *Assessing Risks of Potential Malicious Actions at Commercial Nuclear Facilities: The Case of a Proposed Independent Spent Fuel Storage Installation at the Diablo Canyon Site* (Cambridge, Massachusetts: IRSS, 27 June 2007).

<sup>3</sup> San Luis Obispo Mothers for Peace's Contentions and Request for a Hearing Regarding Diablo Canyon Environmental Assessment Supplement, 29 June 2007.

Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation. Hereafter, I refer to that document, including the Appendix in which it addresses public comments, as the "Final EA Supplement". The NRC Staff published an earlier version of that document in May 2007.<sup>4</sup> Hereafter, I refer to the May 2007 version as the "Draft EA Supplement".

I-4. My review of the Final EA Supplement has three purposes. First, I examine the accuracy and completeness with which the Supplement has characterized and responded to the SLOMFP Contentions and the Thompson Report. Second, I examine the Supplement's internal consistency. Third, I examine the relevance to the Supplement of information that became available after completion of the Thompson Report and the SLOMFP Contentions.

## **II. The Final EA Supplement's Response to SLOMFP Contentions and the Thompson Report**

II-1. The SLOMFP Contentions and the Thompson Report identified substantial deficiencies in the Draft EA Supplement. In the following paragraphs of Section II, I discuss the Final EA Supplement's response to the SLOMFP Contentions and the Thompson Report, in regard to the following issues:

- (i) definition of terms, explanation of methodology, and identification of scientific sources;
- (ii) reliance on hidden and unjustified assumptions;
- (iii) failure to consider credible threat scenarios with significant environmental impacts;
- (iv) failure to address the National Infrastructure Protection Plan (NIPP); and
- (v) failure to consider vulnerability of the ISFSI in relation to the entire Diablo Canyon spent fuel storage complex.

II-2. SLOMFP Contention 1 described failures by the Draft EA Supplement to define terms, explain methodology, and identify scientific sources. The Appendix to the Final EA Supplement assigns issues of that type to Public Comment Categories 1 and 2. In one respect, the Final EA Supplement responds to SLOMFP Contention 1, by citing some relevant technical documents. The Draft EA Supplement did not provide these citations. In other respects, however, the Final EA Supplement is unresponsive, and continues to exhibit the deficiencies described in SLOMFP Contention 1. The Appendix to the Final EA Supplement attributes the lack of response to the need to protect sensitive or classified information. That argument is not convincing. The Thompson Report, together with recently available technical literature as discussed below, demonstrates that the deficiencies described in SLOMFP Contention 1 could be rectified without disclosing sensitive information.

<sup>4</sup> NRC Staff, Supplement to the Environmental Assessment and Draft Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation, May 2007.

II-3. SLOMFP Contention 2 argued that the Draft EA Supplement relied on hidden and unjustified assumptions. SLOMFP listed two examples: (i) apparent exclusion of radiological consequences other than early fatalities; and (ii) apparent reliance on unspecified emergency planning upgrades. In regard to the first example, the Final EA Supplement states (Appendix, page A-6): "To clear up some apparent confusion, the EA Supplement did not consider early fatalities as a measure of environmental impact." Yet, the Draft and Final EA Supplements clearly set forth their reliance on previous security assessments for ISFSIs and, in describing those assessments, they state (Draft EA Supplement, page 6; Final EA Supplement, page 7) that "NRC made conservative assessments of consequences, to assess the potential for early fatalities". Neither version of the Supplement discusses land contamination and its sequelae, which would be the dominant radiological impacts from an attack on an ISFSI (Thompson Report, page 37). The Final EA Supplement discusses (at page 7) the NRC Staff's estimation of individual dose at the Diablo Canyon site, without acknowledging that this indicator provides only a partial picture of potential radiological impacts. The Supplement's inappropriate focus on individual dose appears to derive from the Staff's reliance, in its previous security assessments, on early fatality as the sole indicator of harm. Thus, this example continues to support SLOMFP Contention 2.

II-4. In regard to the second example listed by SLOMFP in support of its Contention 2, the Final EA Supplement states (Appendix, page A-8): "The EA Supplement does not take credit for emergency planning actions in determining the radiological impact on nearby residents, but merely indicates that emergency planning and response actions could further mitigate (i.e., reduce) impacts in some situations." That statement is internally inconsistent. Its second portion clearly shows that the Supplement does take credit for emergency planning actions. Thus, this example continues to support SLOMFP Contention 2.

II-5. The two examples listed by SLOMFP in support of its Contention 2 are not the only instances in which the Draft EA Supplement relied on hidden and unjustified assumptions, and in which the Final EA Supplement continues this practice. A notable instance is the failure of both versions of the Supplement to consider threat scenarios that are more severe and at least as plausible as the threat scenarios that the Supplements did consider. That failure, which is discussed below in greater detail, is neither acknowledged nor explained in either Supplement.

II-6. SLOMFP Contention 3 described the Draft EA Supplement's failure to consider credible threat scenarios with significant environmental impacts. That practice continues without change in the Final EA Supplement. The latter document seeks to justify the practice by stating (Appendix, page A-6):

"NRC's choice of scenarios was informed by information gathered through NRC's regular interactions with the law enforcement and intelligence communities, as mentioned in Section 3.1 of the EA supplement. The specific

scenarios considered cannot be publicly disclosed beyond the description in Section 4.0 of the EA supplement, due to the sensitive nature of the information."

Those statements do not justify the exclusion of credible scenarios. The fact that the NRC consulted other agencies in choosing threat scenarios does not establish that the NRC developed a set of scenarios that represents the range of credible threats. In addition, the NRC Staff makes no attempt to dispute the credibility of the illustrative threat scenarios discussed in SLOMFP Contention 3 and the Thompson Report at pages 33-37. Moreover, the veil of secrecy that the NRC Staff casts over its assumed threat scenarios would not deceive an informed attacker. To such an attacker, the limited nature of the threat scenarios considered in the Draft and Final EA Supplements would be obvious from the limited radiological impacts estimated in these Supplements. In illustration, the Supplements estimate that the individual dose following an attack on an ISFSI would be less than 5 rem. The Thompson Report shows (at page 33) that an individual dose exceeding 5 rem would arise from the release of a mere two-millionths of an ISFSI module's inventory of radioisotopes in the "fines" category, through a hole with an equivalent diameter of a mere 2.3 mm. Thus, the EA Supplements have confined their consideration of threat scenarios to scenarios that cause comparatively minor damage to an ISFSI module. The NRC Staff's excessive secrecy may succeed in hiding this fact from members of the public, but would not deceive an informed attacker.

II-7. As mentioned above, the Final EA Supplement cites some relevant technical documents. One such document, classified CONFIDENTIAL National Security Information and therefore unavailable to the public, is a 2004 study by Smith et al of Sandia National Laboratories, which examined the outcomes of the impact of a large aircraft on a field of ISFSI storage modules.<sup>5</sup> Hereafter, I refer to that document as the "Smith et al Study". A second such document, also classified CONFIDENTIAL National Security Information, is a 2004 study by Kipp et al of Sandia National Laboratories, which examined the response of an ISFSI storage module to "a large explosive charge blast".<sup>6</sup> Hereafter, I refer to that document as the "Kipp et al Study". It is reasonable to assume that these two documents are the only technical documents relied upon by the Final EA Supplement to assess the vulnerability of ISFSI storage modules to attack. If other documents were relied upon for that purpose, the NRC Staff should have cited those documents. It is also reasonable to assume that each of the Smith et al and Kipp et al Studies has a scope as set forth in its title.

II-8. Presumably, the Smith et al Study analyzed the potential for an impact by a large aircraft to breach one or more of the multi-purpose canisters (MPCs) inside the affected ISFSI storage modules. Such an aircraft is a comparatively soft object containing a few

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<sup>5</sup> J. A. Smith et al, *Results of a Large Airplane Impact into a Field of Holtec HI-STORM Spent Nuclear Fuel Storage Casks* (Albuquerque, New Mexico: Sandia National Laboratories, 2004). (This document is classified CONFIDENTIAL National Security Information.)

<sup>6</sup> M. E. Kipp et al, *Response of the HI-STORM Spent Nuclear Fuel Storage Cask to a Large Explosive Charge Blast* (Albuquerque, New Mexico: Sandia National Laboratories, 2004). (This document is classified CONFIDENTIAL National Security Information.)

hard structures. It is not surprising that Smith et al would find the potential for an MPC breach to be relatively low. Smith et al may have considered the additional effects of a jet-fuel fire and/or a fuel-air explosion. Such a fire or explosion could have a dramatic appearance. It would not, however, be surprising that Smith et al would find that combustion of jet fuel has a comparatively low potential to liberate radioactive material from the MPC to the atmosphere. Both findings by Smith et al could be consistent with assumptions that might be regarded as reasonable. I do not have access to the Smith et al Study and, therefore, cannot comment on its assumptions. It can be presumed that Smith et al did not consider the impact of a general-aviation aircraft laden with explosive material in a shaped-charge or other configuration, as discussed in the Thompson Report.

II-9. Presumably, the Kipp et al Study analyzed the potential for a large explosive charge blast to breach the MPC inside a single ISFSI storage module. This blast would take the form of a pulse of very high pressure. Used against many types of target (e.g., a masonry wall), a blast of this type could be highly destructive. In the context of an attack on an ISFSI module, however, it is not surprising that Kipp et al would find the potential for an MPC breach to be relatively low. That finding could be consistent with assumptions that might be regarded as reasonable. I do not have access to the Kipp et al Study and, therefore, cannot comment on its assumptions. It is important to note that the pulse of high pressure from an explosive blast will not cause the highly focused damage to a target that results from use of a shaped charge. A shaped charge concentrates material (e.g., a metal cone or dish) into a comparatively narrow stream that strikes the target at very high speed. It can be presumed that Kipp et al did not examine the use of a shaped charge, although such charges are used routinely to attack US ground forces in Iraq.

II-10. The Smith et al and Kipp et al Studies examined threat scenarios that an informed attacking group would know to be comparatively ineffective against an ISFSI. It is likely that such a group would choose another mode of attack. Relevant modes could involve delivery of shaped charges by missiles, aircraft, land vehicles or personnel. Attackers could use incendiary material to ignite the zirconium cladding of spent fuel. They could reach the MPC inside an ISFSI storage module through the module's cooling vents or by removing the lid. The Thompson Report (see Section 4.3) outlines some potential modes of attack while being careful to not disclose sensitive information.

II-11. The preceding paragraphs show clearly that the Final EA Supplement fails to consider threat scenarios that are more severe and at least as plausible as the threat scenarios that it does consider. Moreover, the Supplement neither acknowledges nor explains this failure. These findings support SLOMFP Contentions 2 and 3.

II-12. SLOMFP Contention 4 described the Draft EA Supplement's failure to address the National Infrastructure Protection Plan. That practice continues without change in the Final EA Supplement. The latter document seeks to justify the practice by stating (Appendix, page A-7): "The National Infrastructure Protection Plan (NIPP) does not impose requirements on participating agencies regarding specific NEPA analyses." That response ignores the fact that the NRC is a signatory to the NIPP and, therefore, has

committed to the NIPP's purpose (see Letter of Agreement at page iii of the NIPP) of providing "the unifying structure for the integration of critical infrastructure and key resources (CI/KR) protection into a single national program". Any licensing analysis performed by the NRC should, therefore, include consideration of the concepts of deterring threats, mitigating vulnerabilities and minimizing consequences that are endorsed by the NIPP. In addition to ignoring this general responsibility under the NIPP, the NRC Staff ignores the specific argument in the SLOMFP Contentions and the Thompson Report that protective measures set forth in the NIPP could, if applied at Diablo Canyon, deter attacks on the Diablo Canyon ISFSI by altering attackers' cost-benefit calculations.

II-13. SLOMFP Contention 5 described the Draft EA Supplement's failure to consider vulnerability of the ISFSI in relation to the entire Diablo Canyon spent fuel storage complex. That practice continues without change in the Final EA Supplement. The latter document seeks to justify the practice by stating (Appendix, page A-7): "The staff previously considered the cumulative impacts of the ISFSI and reactor operation in the original EA (Section 5.4), concluding that, 'The impact of the proposed Diablo Canyon ISFSI, when combined with previously evaluated effects from the Diablo Canyon Power Plant, is not anticipated to result in any significant cumulative impact at the site.'" That response ignores the fact that no environmental analysis has been performed to address the risks of potential malicious actions at any Diablo Canyon facility other than the proposed ISFSI. Moreover, that response ignores the potential for malice-related interactions between the ISFSI and other facilities at Diablo Canyon. Two examples illustrate that potential. First, the ISFSI could be used to reduce the risk of a malice-related spent-fuel-pool fire at Diablo Canyon, by reducing the density of fuel assemblies in the pools. Second, an attack on the Diablo Canyon ISFSI could be mounted as a diversionary action, to weaken defenses of other facilities on the site preparatory to an attack on those facilities. An integrated, site-wide approach to risk assessment would allow such interactions to be identified and addressed.

### **III. Internal Inconsistencies in the Final EA Supplement**

III-1. Paragraph II-4, above, identifies an internal inconsistency in the Final EA Supplement, regarding the Supplement's taking of credit for emergency planning actions. Another internal inconsistency deserves special mention. In discussing public comments on the Draft EA Supplement, the Final EA Supplement states (Appendix, page A-2) that the NRC Staff did not respond to "comments about the U.S. government's policies regarding terrorism", because this issue "did not directly relate to the environmental effects of the proposed action" and was "outside the scope of the NEPA review of the proposed action". Yet, elsewhere (page 4) the Final EA Supplement states: "Thus, the broad actions taken by the Federal government and the specific actions taken by NRC since September 11, 2001, have helped to reduce the potential for terrorist attacks against NRC-regulated facilities."

III-2. The preceding paragraph identifies a substantial internal inconsistency in the Final EA Supplement. That inconsistency relates directly to a point repeatedly emphasized in the Thompson Report and addressed in SLOMFP Contention 4. The Thompson Report argues that many of the policies adopted by the Federal government and the NRC to protect the nation's critical infrastructure have been counterproductive. The Thompson Report describes an alternative strategy that is termed "protective deterrence", and shows how that strategy could be implemented by the NRC using infrastructure design principles that are articulated in the NIPP. The Final EA Supplement dismisses that argument without justification or explanation, while claiming success by the Federal government and the NRC in reducing "the potential for terrorist attacks". That claim could and should be tested through environmental analyses that examine risks and risk-reducing options for facilities such as the proposed Diablo Canyon ISFSI.

#### **IV. Relevance to the Final EA Supplement of Recently Available Information**

IV-1. The Appendix to this declaration provides data from a survey of US-based experts in international security, regarding the probability of another "9/11-type" attack in the US. The survey found that 83 percent of the surveyed experts judged that an attack of this type is "likely or certain" during the next 10 years. That finding does not rest upon a statistical foundation. It does, however, show that the potential for a 9/11-type attack deserves thorough consideration in the context of licensing nuclear facilities. Such an attack would not necessarily involve targets and instruments of attack as in September 2001. Indeed, it is likely that the attackers would choose different targets and instruments. The significance of the term "9/11-type" is that attackers would have resources and capabilities comparable to those employed in September 2001. Nuclear facilities could be chosen as targets, for the reasons set forth in the Thompson Report. The Final EA Supplement does not consider the potential for an attack on Diablo Canyon facilities by a sub-national group with resources and capabilities comparable to those employed in September 2001, employing a mode of attack that exploits vulnerabilities in the Diablo Canyon facilities.

IV-2. The Final EA Supplement states (Appendix, page A-5): "The details of the NRC's security assessments cannot be disclosed publicly because of the sensitive nature of the information." The SLOMFP Contentions and the Thompson Report argue that the NRC is excessively secretive, that more details should be provided in environmental analyses, and that this can be done without disclosing sensitive information. The Thompson Report illustrates that argument by presenting general, but not specific, information about a range of threat scenarios. Three recently available papers in a technical journal provide a further illustration of the argument.<sup>7</sup> The authors are with Oak Ridge National

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<sup>7</sup> Robert H. Morris et al, "Using the VISAC program to calculate the vulnerability of nuclear power plants to terrorism", *International Journal of Nuclear Governance, Economy and Ecology*, Volume 1, Number 2, 2006, pp 193-211; Anthony L. Honnellio and Stan Rydell, "Sabotage vulnerability of nuclear power plants", *International Journal of Nuclear Governance, Economy and Ecology*, Volume 1, Number 3, 2007, pp 312-321; Gert Sdouz, "Radioactive release from VVER-1000 reactors after a terror attack",

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Page 8*

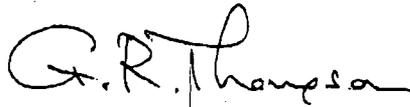
Laboratory, the US Environmental Protection Agency, and ARC Seibersdorf Research in Austria. Each paper discusses malice-related risks at nuclear facilities in greater depth than is done in the Final EA Supplement, thereby contributing to improved public understanding and policy debate regarding those risks. None of the papers discloses sensitive information.

**V. Conclusions**

V-1. The Final EA Supplement improves upon the Draft EA Supplement in one respect, by citing some relevant technical literature. The cited literature provides additional support for the SLOMFP Contentions and the arguments made in the Thompson Report. In other respects, the Final EA Supplement continues to exhibit the deficiencies that were identified in the SLOMFP Contentions and the Thompson Report. The Appendix to the Final EA Supplement does not provide a credible explanation or justification of the deficiencies in that Supplement.

V-2. The Final EA Supplement has significant internal inconsistencies.

V-3. Recently available information provides further support for the SLOMFP Contentions and the arguments made in the Thompson Report.



Gordon R. Thompson, D.Phil

1 October 2007

(The Appendix that appears on the following page is discussed above and is part of this declaration.)

**APPENDIX**

**Opinions of Selected Experts Regarding the Probability of Another 9/11-Type  
Attack in the United States**

Time Horizon for Potential Attack	Fraction of Interviewed Experts Holding Position (percent)	
	Attack has No Chance or is Unlikely	Attack is Likely or Certain
Within 6 months	80	20
Within 5 years	30	70
Within 10 years	17	83

**Notes:**

(a) These and other survey data are discussed in: "The Terrorism Index", *Foreign Policy*, September/October 2007, pp 60-67. The underlying data are from: "Terrorism Survey III", June 2007, accessed from the website of the Center for American Progress <[www.americanprogress.org](http://www.americanprogress.org)> on 21 August 2007.

(b) The following question was posed to 108 US-based experts in international security: "What is the likelihood of a terrorist attack on the scale of the 9/11 attacks occurring again in the United States in the following time frames?"

July 18, 2007

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE COMMISSION

In the matter of  
Pacific Gas and Electric Company  
Diablo Canyon Nuclear Power Plant  
Unit Nos. 1 and 2  
Independent Spent Fuel Storage Installation

Docket # 72-26-ISFSI

**SAN LUIS OBISPO MOTHERS FOR PEACE'S  
REPLY TO PG&E'S AND NRC STAFF'S OPPOSITIONS TO  
SLOMPF'S CONTENTIONS AND REQUEST FOR A HEARING  
REGARDING DIABLO CANYON  
ENVIRONMENTAL ASSESSMENT SUPPLEMENT**

**I. INTRODUCTION**

As demonstrated in San Luis Obispo Mothers for Peace's ("SLOMFP's") contentions of June 28, 2007,<sup>1</sup> the Supplement to the U.S. Nuclear Regulatory Commission ("NRC") Staff's Environmental Assessment ("EA") Supplement for the Diablo Canyon Independent Spent Fuel Storage Installation ("ISFSI") completely fails to document or explain the basis for its conclusion that intentional attacks on the ISFSI would have no significant environmental impacts. Therefore the EA Supplement is inadequate to satisfy the National Environmental Policy Act's ("NEPA's") fundamental requirement that an agency's finding of no significant impact must be sufficiently supported and explained to demonstrate that the Staff made a "fully informed and well-considered" determination of no significant impacts. *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1211 (9<sup>th</sup> Cir. 1998), cert. denied sub nom.

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<sup>1</sup> San Luis Obispo Mothers for Peace's Contentions and Request for a Hearing Regarding Diablo Canyon Environmental Assessment Supplement (June 28, 2007; corrected June 29, 2007) ("Contentions").

*Malheur Lumber Co. v. Blue Mountain Biodiversity Project*, 527 U.S. 1003 (1999). In apparent reliance on hidden assumptions, the EA Supplement also ignores credible attack scenarios that could result in significant impacts to the environment.

Both the NRC Staff and Pacific Gas & Electric Co. ("PG&E") oppose admission of SLOMFP's contentions, on the general grounds that (a) in order to protect sensitive security-related information from public disclosure, the NRC Staff was entitled by law to prepare an environmental analysis as vague and unsubstantiated as the EA Supplement, and (b) in any event, the EA Supplement did provide enough information to allow a meaningful evaluation of the environmental impacts of intentional attacks on the Diablo Canyon ISFSI. NRC Staff's Answer to Contentions Submitted by San Luis Obispo Mothers for Peace (July 13, 2007) ("NRC Staff Response"); Pacific Gas and Electric Company's Response to Proposed Contentions (July 9, 2007) ("PG&E Response"). In neither respect have the Staff and PG&E shown that SLOMFP's contentions fail to raise a genuine and material dispute of fact or law regarding the adequacy of the EA Supplement to satisfy NEPA. Thus, the contentions are admissible under 10 C.F.R. § 2.714(b).<sup>2</sup>

## II. DISCUSSION

### A. General Arguments by the NRC Staff

In arguing the inadmissibility of all of SLOMFP's contentions, the NRC Staff repeatedly makes two arguments: first, that the contentions are inadmissible as a matter of law because the NRC was entitled to protect the withheld information from public disclosure; and second that as a factual matter, the information disclosed by the Staff was

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<sup>2</sup> With the exception of Contentions 3 and 5, neither the Staff nor PG&E objects to the admission of any contention on the ground that it is late-filed.

sufficient to allow SLOMFP to evaluate whether the NRC had taken a hard look at the environmental impacts of an intentional attack on the proposed ISFSI. The first argument is incorrect as a matter of law, and the second argument merely shows the existence of a genuine and material factual dispute between the parties which warrants admission of the contentions.

**1. Applicable legal principles require the EA Supplement to disclose relevant information or justify its exemption from disclosure.**

The NRC Staff argues that under the "principle" established in *Weinberger v. Catholic Action of Hawaii*, 454 U.S. 139 (1981) and *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016, 1034-35 (9th Cir. 2006), cert. denied sub. nom. *Pacific Gas & Electric Co. v. San Luis Obispo Mothers for Peace*, 127 S.Ct. 1124 (2007), any deficiency in the EA Supplement is excused by the legal necessity of protecting sensitive security-related information from public disclosure.<sup>3</sup>

In making this argument, the Staff completely ignores other important principles of NEPA and NRC regulatory policy for use of protected information in licensing decisions, which do not permit the Staff's wholesale and unjustified refusal to disclose the basis for the EA Supplement. In particular:

- Making federal agencies accountable to the public for their environmental decisions is one of the cardinal purposes of NEPA. *Robertson v. Methow Valley Citizens Council*, 490 U.S. 332, 349 (1989).
- NEPA requires that agencies must consider the environmental impacts of their decisions to the "fullest extent possible." 42 U.S.C. § 4332(2)(C).

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<sup>3</sup> NRC Staff Response at 6-8. PG&E makes a similar argument at pages 6-7 of its Response.

- Agency decisions to withhold information from an EA or EIS are governed by the Freedom of Information Act ("FOIA"). *Weinberger*, 454 U.S. at 412, citing 42 U.S.C. § 4332(2)(C).
- As the NRC has recognized, the FOIA is "a statute whose basic purpose reflects a philosophy of full agency disclosure unless information falls under one of the nine clearly delineated statutory exemptions." SECY-05-0091. Memorandum from Karen D. Cyr, NRC General Counsel, to the Commissioners, re: Task Force Report on Public Disclosure of Security-Related Information (May 18, 2005), Attachment: Report on Public Disclosure of Security-Related Information at 4, citing *Department of Air Force v. Rose*, 425 U.S. 352, 361 (1976).
- Under the FOIA, the NRC must segregate and release information that is not specifically exempted from disclosure. 10 C.F.R. § 9.19. This requirement stems from the legal principle that "whenever possible, sensitive information must be disentangled from nonsensitive information to allow for the release of the latter." *Ellsberg v. Mitchell*, 709 F.2d 51, 57 (D.C. Cir. 1983).
- In addition, any government claim to an exemption must be specific and it must be justified. 10 C.F.R. § 9.27(b).
- There is no exemption in the FOIA for information that identifies the existence of a document, such as the title, author, and date. In fact, this information is segregable under 10 C.F.R. § 9.19.
- The NRC recognizes that in order for members of the public to meaningfully exercise their right to participate in NRC licensing decisions as guaranteed by the Atomic Energy Act ("AEA"), they must have "access to information about the

design and operation of regulated facilities or materials.” SECY-04-0191, Memorandum from Luis A. Reyes, Executive Director for Operations, to the Commissioners, re: Withholding Sensitive Unclassified Information Concerning Nuclear Power Reactors from Public Disclosure at 2 (October 19, 2004). The rights to meaningful participation and access to information must be balanced against the NRC’s goal of withholding “information that could reasonably be expected to be useful to potential adversaries.” *Id.*

- In licensing hearings, NRC regulations allow interested parties to seek access to relevant classified and safeguards information under appropriate procedural protective measures. 10 C.F.R. §§ 2.744(e), 2.905(b)(1).
- In order to give interested parties a meaningful opportunity to seek access to classified and safeguards documents, it is essential for the NRC to provide basic identifying information. Otherwise, the parties unfairly are forced to guess what is being withheld.
- Unlike the *Weinberger* case, which involved classified information that the government completely withheld from any members of the public, *see* 454 U.S. at 146-47, in this case the NRC Staff has shared much of the withheld information in the EA Supplement with nuclear licensees and nuclear industry lobbyists. Thus, it would be extremely unfair for the NRC to hide the information from the public to the extent of refusing even to identify the information so that it could be requested in the discovery process.

The broad access that the NRC granted the nuclear industry to its post-9/11 security reviews is demonstrated in contemporaneous Commission

correspondence. For example, in a November 5, 2001, letter, Samuel J. Collins, then-Director of the NRC's Office of Nuclear Reactor Regulation ("NRR"), informed a senior official at the Nuclear Energy Institute ("NEI") that NEI employee Ronald Rose could not only "receive and store" safeguards information at an NEI facility, but that he could share it with unnamed NEI personnel; and that no further NRC authorization was needed for the distribution of the safeguards information by Mr. Rose.<sup>4</sup> On January 23, 2003, the Staff also noticed a closed meeting on the revised design basis threat ("DBT"), to which NEI employees and other "to be determined" members of the nuclear industry were invited to discuss safeguards issues.<sup>5</sup> The Commission also gave NEI officials "need-to-know" status allowing them to review safeguards documents for the general purpose of "efficiently and expeditiously obtaining industry-wide comments on Commission policy issues involving nuclear facility and materials security."<sup>6</sup> As noted with approval by then-Chairman Diaz, as of September 2003, the NRC Staff began to hold "weekly" closed meetings with NEI and other nuclear industry representatives, "to discuss security, contingency, and training and qualification plan changes needed to support compliance with the April 29, 2003, design basis threat order."<sup>7</sup> The letter also emphasizes that the Commission "is committed to

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<sup>4</sup> Letter from Samuel J. Collins, NRR, to Ralph Beedle, NEI (November 5, 2001).

<sup>5</sup> NRC Meeting Notice re: Closed Meeting to Discuss Questions and Responses from the January 9, 2003, Design Basis Threat (DBT) Meeting and Requested Written Input Provided by Representatives from Licensed Power Reactor Facilities, the Nuclear Industry, and State and Federal Agencies (January 23, 2003).

<sup>6</sup> Letter from Nils J. Diaz, NRC Chairman, to Joe F. Colvin, NEI President and Chief Executive Officer (June 19, 2003).

<sup>7</sup> Letter from Nils J. Diaz, NRC Chairman, to Joe F. Colvin, NEI President and Chief Executive Officer, attached as Exhibit 4. Commission records also show that the

the continued exchange of information and ideas between the NRC and authorized stakeholders on security topics.”<sup>8</sup> Thus, having given the nuclear industry broad access to safeguards information, it is neither legal nor fair for the NRC to deny SLOMFP even enough information that would allow SLOMFP to request access to the information.

Under these governing principles, the provision of an unintelligible summary of an environmental analysis is not excused by unsupported and vague assertions that “much” of the Staff’s analysis “either depends upon or has some reference to” documents that are exempt from public disclosure under the FOIA, or that the Staff disclosed “as much of its revised environmental analysis as feasible.” NRC Staff Response at 7-8. As required by both NEPA and the FOIA, the Staff must present an understandable analysis that defines its terms and explains its analytical processes, or justifies the failure to provide specific pieces of information by claiming an exemption to the FOIA.

As discussed above, the Staff must also disclose all reasonably segregable portions of the analysis. In addition, the Staff must identify its references, and provide access to those references unless they are specifically exempted from

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Commission itself has held numerous closed meetings on security issues, attended by officials from NEI, the National Research Council (an arm of the National Academies), and representative of nuclear licensees. *See, e.g.*, Presiding Officer’s Statement regarding July 11, 2002, meeting on security issues (attended by four National Research Council officials) (July 15, 2002); Presiding Officer’s Statement regarding January 14, 2003, meeting on security issues (attended by five NEI officials) (January 17, 2003); Presiding Officer’s Statement regarding March 3, 2003, meeting on security issues (attended by six NEI officials and eleven other nuclear utility representatives) (March 17, 2003); Presiding Officer’s draft Statement regarding May 14, 2003, meeting on security issues (attended by seven NEI officials and eight other nuclear utility representatives) (undated draft).

<sup>8</sup> *Id.* at 1.

disclosure by the FOIA. Segregable portions of reference documents must also be released. Because it has failed to honor or even address these principles, the Staff has established no legal basis for dismissing SLOMFP's contentions.<sup>9</sup>

**2. The Staff Response establishes the existence of material factual disputes with respect to the adequacy of EA Supplement.**

Throughout its response to SLOMFP's contentions, the NRC Staff repeatedly concedes that it did not disclose all of the information relied on in its environmental analysis, but asserts that it disclosed as much information as possible under the federal laws and regulations requiring protection of sensitive security-related information, and that in any event it disclosed enough information to allow a meaningful review of the EA Supplement. For instance:

- In responding to Contention 1, which challenges the adequacy of the EA Supplement to describe types of attacks that were considered plausible" or disregarded as "remote and speculative," the NRC Staff states that "[a]lthough the Staff could not provide all the details of referenced background documents

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<sup>9</sup> PG&E misconstrues NEPA and applicable case law in arguing that the "substantial procedural discretion" afforded to NRC by the Court of Appeals in responding to the Court's remand allowed NRC to take anything less than a "hard look" in evaluating the environmental impacts of an intentional attack on the Diablo Canyon ISFSI. PG&E Response at 7. While the NRC may have had discretion to choose the manner in which to respond to the Court's decision, once it undertook to conduct an environmental analysis it accepted a nondiscretionary duty to comply with NEPA "to the fullest extent possible." 42 U.S.C. § 4332(2)(C).

PG&E also selectively quotes from the Ninth Circuit's decision in order to argue that "the focus of the remand was for the NRC to address the views of SLOMFP," and that therefore SLOMFP may make no other claims aside from seeking to have its views considered. *Id.* This argument is contradicted by the Court's holding that the NRC's justification for failing to prepare an environmental analysis of the impacts of an attack on the Diablo Canyon ISFSI was irrational, and that therefore the NRC must "fulfill its responsibilities under NEPA." 449 F.3d at 1035.

and analyses due to the sensitive nature of the information, the general methodology and analyses relied upon were referenced.” NRC Staff Response at 9-10.

- Similarly, the Staff asserts that its analyses comply with NEPA “to the extent possible without divulging Classified Information . . .” *Id.* at 10.
- The Staff also claims that the EA Supplement addresses “specific threats,” but it also states that “the level of detail” regarding these threats “was limited by the sensitive nature of the materials underlying the analyses.” *Id.*
- The Staff’s use of the phrase “such as” to describe examples of threats considered also indicates that the threats identified in the EA Supplement were only a subset of credible threats. *Id.*
- In response to Contention 1’s assertion that the EA Supplement did not provide qualitative information on how attack scenarios were selected, the Staff asserts that “while the Staff could not provide all the details of the manner in which these assessments were made, the Staff did provide an explanation of its process and conclusions to satisfy its NEPA obligations.” *Id.* at 12.
- In response to Contention 1’s complaint that the EA Supplement did not discuss its analytical methods by addressing certain procedural questions, the Staff asserts that “[m]ost of this information was omitted because it is designated as Safeguards Information or SUNSI or Classified Information.” NRC Staff Response at 15. Simultaneously, the Staff effectively asserts that

the procedural questions are meaningless or irrelevant to the EA Supplement.

*Id.*

- In response to Contention 1's assertion that the EA Supplement failed to explain how the Staff's AEA-based reviews were relevant to its NEPA review, the Staff acknowledges that "some specifics of the Staff's analysis are designated as Safeguards Information, or SUNSI, or Classified Information," but asserts that "the qualitative discussion the staff has provided is sufficient for SLOMFP to delineate specific disagreements and supporting basis for a contention . . ." *Id.* at 16.
- In response to Contention 1's assertion that the EA Supplement fails to explain how its assumptions were conservative or representative, the Staff states that it "cannot disclose all of the details of the security assessments given the need to protect the sensitive nature of the information," yet also claims to have provided sufficient information to address SLOMFP's concerns. NRC Staff Response at 17.

The Staff's arguments show that SLOMFP has raised genuine and material disputes regarding the adequacy of the Staff's rationale for withholding material information from the EA Supplement, because the Staff has completely failed to provide specific information regarding the nature of the withheld information or to attempt to justify withholding it. In addition, SLOMFP has raised a genuine and material factual dispute regarding the question of whether the information the Staff did provide is adequate to support a meaningful review.

**B. Specific Contentions**

**1. Contention 1: Failure to define terms, explain methodology, or identify scientific sources**

Contention 1 asserts that:

The EA violates NEPA and NRC and Council on Environmental Quality ("CEQ") implementing regulations because it fails to document the basis for the NRC Staff's determination that the environmental impacts of intentional attacks on the Diablo Canyon ISFSI are insignificant, by failing to define its terms, explain its methodology, or identify its scientific sources. Therefore, the EA fails to justify the Staff's decision not to prepare an EIS for the facility.

Contentions at 3.

**a. NRC Staff arguments**

In subsection (a)(i) of Contention 1, SLOMFP asserts that the EA fails to provide a clear description of the NRC's process for identifying plausible or credible attack scenarios and assessing their consequences to determine whether they are significant. Contentions at 5. While the Staff vaguely asserts that "the general methodology and analyses relied upon were referenced," the claim only underscores the existence of a genuine and material factual dispute between the parties. NRC Staff Response at 10. The Staff also asserts that the EA Supplement provides "reference to specific threats" (*id.*), but does not state whether these examples constitute the universe of threats examined in the EA Supplement or explain what was the NRC's analytical process for identifying credible threats and evaluating their consequences.<sup>10</sup> Again, the Staff does

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<sup>10</sup> In addition, the Staff does not explain how its failure to provide an accounting of all types of attacks it considered is consistent with the Commission's policy of disclosing that information in other regulatory contexts. For instance, in the proposed design basis threat ("DBT") rule, the Commission stated that "it is important for the public to be informed of the types of attacks against which nuclear power plants and Category 1 fuel cycle facilities are required to defend." Proposed Rule, Design Basis Threat, 60 Fed. Reg. 67,380, 67,382 (November 7, 2005). While the Diablo Canyon

not provide enough information to show that the contention raises no genuine or material dispute.

In subsection (a)(ii) of Contention 1, SLOMFP criticizes the EA Supplement for failing to explain the meaning of the word "plausible." Contentions at 6. In response, the Staff does not dispute the fact that the EA Supplement fails to explain the meaning of the term "plausible." Instead, the Staff argues that SLOMFP should be able to figure it out by evaluating the "examples" of plausible attacks given in the EA Supplement. NRC Staff at 10-11. The Staff's argument only serves to demonstrate the existence of a genuine and material factual dispute between the parties. SLOMFP is entitled to litigate the question of whether the identification of a few examples is sufficient to illustrate the methodology that was used by the Staff. In SLOMFP's view, the Staff's approach requires inappropriate guesswork. A factual dispute also exists because the Staff completely fails to respond to the concern raised by SLOMFP that the Staff finished its so-called analysis of plausibility before it evaluated a number of factors that appear to be relevant to the determination of plausibility, thereby raising fundamental questions about how the Staff interprets the term. Contentions at 5-6.

In subsection (a)(iii) of Contention 1, SLOMFP asserts that the EA Supplement is inadequate because it fails to provide criteria for distinguishing between attacks that are "remote and speculative" and attacks that are "plausible." Contentions at 6. The NRC

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ISFSI does not constitute a nuclear power plant or a Category I fuel cycle facility, the principle is equally applicable to all types of facilities. Moreover, as discussed in Dr. Thompson's expert report, the NRC has stated that the Diablo Canyon security plan would apply to the Diablo Canyon ISFSI. Thompson, *Assessing Risks of Potential Malicious Actions at Commercial Facilities: The Case of a Proposed Independent Spent Fuel Storage Installation at the Diablo Canyon Site* at 29 (June 27, 2007) ("Thompson Report"). Presumably, the security plan is based on the DBT.

Staff responds that it did “provide qualitative information on how the scenarios were selected.” NRC Staff Response at 11-12. But the language of the EA Supplement quoted by the NRC Staff in support of this assertion (Staff Response at 12) contains no explanation whatsoever regarding the criteria the Staff used to determine what types of attacks were plausible versus what types of attacks were remote and speculative. Thus, the Staff has failed to show the absence of a genuine and material factual dispute about the adequacy of the EA Supplement.

In subsection (a)(iv) of Contention 1, SLOMFP criticizes the EA Supplement for appearing to rely on an AEA-based analysis of the adequacy of PG&E’s protective measures against the DBT, rather than a broader NEPA-based analysis of threats that are reasonably foreseeable despite their low probability. Contentions at 6. Similarly, in subsection (a)(vi) of Contention 1, SLOMFP challenges the EA Supplement for its failure to explain how a general analysis of licensee compliance with AEA-based security regulations and orders has any relevance to a NEPA determination of whether environmental impacts are significant. Contentions at 8. In response, the Staff appears to contend that under CLI-07-11, the DBT is co-extensive with reasonably foreseeable but low-probability attacks as a matter of law. NRC Staff Response at 13, 16. The Staff also asserts that SLOMFP has failed to show a basis for the distinction between the two standards. *Id.* at 13.<sup>11</sup>

The Staff’s assertions are nonsensical. The words of the two standards themselves demonstrate that the Commission has two different standards for AEA-based security requirements and NEPA evaluations. The AEA-based standard calls for

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<sup>11</sup> PG&E makes essentially the same argument at page 10 of its Response.

protective measures against a hypothetical threat that the NRC considers reasonable or feasible for the licensee to defend against. Final Rule, Design Basis Threat. 72 Fed. Reg. 12,705, 12,713 (March 19, 2007). The NEPA standard, in contrast, is not based on the capabilities of the licensee but on the foreseeability of the threat. On their faces, the standards are different. By instructing the Staff to consult materials it had already prepared, the Commission cannot be presumed to have also instructed the Staff to disregard the NEPA standard for evaluating the significance of environmental impacts.

In subsection (a)(v) of Contention 1, SLOMFP criticizes the EA Supplement for its poor description of the analytical steps taken by the NRC in evaluating threat scenarios in 2002. Contentions at 7. The Staff claims that the contention does not satisfy 10 C.F.R. § 2.714 because it does not reference the specific portions of the EA Supplement questioned by SLOMFP. Staff Response at 13. The Staff's assertion is incorrect. The contention provides quotations from page 6 of the EA Supplement at page 6. Contentions at 7.

The Staff also claims that SLOMFP misconstrues the EA Supplement by presuming that the Staff conducted a security analysis in 2002. NRC Staff Response at 14. According to the Staff, "there was no '2002 analysis.'" *Id.* Instead, the Staff issued "orders" in 2002, and completed "security assessments" in 2006. *Id.*

The Staff's argument provides an excellent example of the confusion created by (a) the vague prose used in the EA Supplement and (b) the EA's lack of any documentary references. SLOMFP's assumption that the Staff conducted some kind of analysis in 2002 was based on the statement in the EA Supplement that:

*Following issuance of the 2002 security orders for ISFSIs, NRC used a security assessment framework as a screening and assessment tool, to determine whether*

additional security measures, beyond those required by regulation and the security orders, were warranted for NRC-regulated facilities, including ISFSIs.

EA Supplement at 6 (*emphasis added*). In the next paragraph, the EA Supplement states that the NRC Staff “reviewed the analyses done for the ISFSI security assessments, and compared the assumptions used in these generic assessments to the relevant features of the Diablo Canyon ISFSI.” *Id.* at 7. Taken together, these two statements imply that shortly after issuing the 2002 security orders, the Staff conducted a generic security assessment for ISFSIs, which was followed by another generic review and site-specific analysis sometime later – thus giving the impression that the Staff conducted multiple security assessments over time. But the NRC Staff’s Response indicates that there was only one set of security assessments, completed in 2006. Whether due to gross carelessness or an intent to mislead, the Staff’s lack of precision, combined with its failure to support its assertions with any references to documented studies, raises fundamental questions about the veracity of the entire EA Supplement.

In subsection (a)(vii) of Contention 1, SLOMFP challenges the EA Supplement for its failure to describe how the Staff’s determination that assumptions used in generic assessments were “representative” or “conservative” was factored into the Staff’s NEPA analysis. Contentions at 8. The Staff argues that this aspect of the contention is inadmissible because the contention failed to provide a “minimal factual and legal foundation” for SLOMFP’s concerns. NRC Staff Response at 16-17. Due to the differing characteristics of an AEA-based and NEPA-based analysis, assumptions that are conservative or representative for an AEA-based analysis may not be conservative or representative for a NEPA-based analysis. But neither the EA Supplement nor the NRC Staff’s response addresses this issue.

In subsection (a)(viii), SLOMFP asserts that the EA Supplement fails to provide any analysis of the radiological impacts of threat scenarios. Contentions at 8-9. The Staff claims that it did perform such an analysis. NRC Staff Response at 18, citing EA Supplement at 7. But the portion of the EA Supplement cited by the NRC Staff merely states the Staff's conclusion that the dose would likely be below 5 rem. The EA Supplement provides no explanation for this conclusion. For instance, the conclusion appears to be based on the assumption that no credible scenario would result in a large-area penetration of the spent-fuel canister or a penetration accompanied by ignition of fuel cladding, but the EA Supplement fails to acknowledge this assumption or explain why it was made.

Subsection (b) of Contention 1 challenges the EA Supplement for its failure to reference its sources of scientific data. Contentions at 9-10. The NRC Staff argues that "the underlying information supporting the Staff's assessment of the impacts of a terrorist attack on the Diablo Canyon ISFSI is sensitive security information which must be protected from public disclosure." NRC Staff Response at 18. But the Staff does not explain what is sensitive about information concerning the title, date, a general description of the content of a sensitive security document, or identification of the FOIA exemption under which the NRC claims the right to withhold the content of the document. This is segregable information that should be released for purposes of complying with the FOIA and maintaining the NRC's accountability for its decision to withhold information.

b. PG&E's response

PG&E argues that Contention 1 is based on a "faulty view of the standard for assessing an EA," because it "incorrectly presumes that a court of appeals in a NEPA context would review every supporting study and methodology, to independently validate the agency's conclusion." PG&E Response at 8. The standard of review is described in *Marsh v. Ore. Natural Res. Council, Inc.*, 490 U.S. 360, 377(1989), where the Supreme Court held that a reviewing court "must be able to independently review the record in order to satisfy itself that the agency has made a reasoned decision based on its evaluation of the evidence." *See also Idaho Sporting Cong. v. Thomas*, 137 F.3d 1146, 1150 (9th Cir. 1988), where the U.S. Court of Appeals for the Ninth Circuit found that a court should be able to review an agency's NEPA decision without "second guessing" the agency's "scientific conclusions." Here, the EA Supplement is so vague and confusing that a reviewing court would be reduced to first-guessing what the NRC Staff did.<sup>12</sup>

PG&E also argues that the EA Supplement adequately addressed the Staff's methodology for determining the plausibility and consequences of an attack because it provided a summary and a framework. PG&E Response at 9. This response does not address SLOMFP's detailed criticisms regarding the lack of information in the EA Supplement. Therefore it does nothing more than confirm that the parties have a genuine and material factual dispute regarding the adequacy of the EA Supplement.

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<sup>12</sup> Moreover, contrary to PG&E's suggestion at page 8, the lack of adequate "underpinnings" for the Staff's EA Supplement constitutes adequate legal grounds for its rejection as inadequate to satisfy NEPA. SLOMFP was not required to carry the Staff's burden of proof by demonstrating that the NRC Staff had overlooked significant impacts. In any event, SLOMFP's Contention 3 makes precisely that case, setting forth significant environmental impacts which were inexplicably ignored in the EA Supplement.

PG&E also argues that the Council on Environmental Quality's ("CEQ's") regulations cited in Contention 1 "do not apply directly to the NRC to the extent that agency has not expressly adopted those regulations." PG&E Response at 10, citing *Limerick Ecology Action v. NRC*, 869 F.2d 719, 743 (3rd Cir. 1989). But Executive Order 1191, 3 C.F.R. § 123-124, directs federal agencies to "comply with the regulations issued by the Council except where such compliance would be inconsistent with statutory requirements," and the NRC has not disavowed the CEQ regulations cited in SLOMFP's contentions as inconsistent with NEPA. To the contrary, the NRC has its own regulation requiring the citation of sources (10 C.F.R. § 51.30(a)(2)), and the NRC claims to consider low-probability but reasonably foreseeable environmental impacts. *Carolina Power & Light Co. (Shearon Harris Nuclear Power Plant)*, CLI-01-11, 53 NRC 370, 388 n.8 (2001).

In addition, PG&E argues that the NRC Staff need not explain the meaning of the word "plausible," but may use it in its "ordinary sense." PG&E Response at 10. The trouble with this argument is that it ignores the evidence presented by SLOMFP that the EA Supplement uses the word in a way that doesn't make ordinary sense. Contentions at 5.

**2. Contention 2: Reliance on hidden and unjustified assumptions.**

Contention 2 asserts that "[t]he EA Supplement fails to satisfy NEPA because the NRC's decision not to prepare an EIS is based on hidden and unjustified assumptions." In the basis of the contention, SLOMFP identifies two hidden assumption that appear to affect the results of the EA Supplement. First, the EA Supplement appears to assume that the environmental impacts of an attack on a spent fuel storage cask would be insignificant

if they do not result in early fatalities. Contentions at 10-12. The EA Supplement also appears to assume that the environmental impacts of an attack on a spent fuel storage cask would be reduced to the point of insignificance by unspecified emergency planning upgrades. *Id.* at 12.

The Staff denies that the potential for early fatalities was the "sole" criterion for ruling out accident scenarios from consideration in the EA Supplement, although conceding that the potential for early fatalities was indeed a criterion. NRC Staff Response at 19. That response misrepresents the EA Supplement. In describing the generic security assessments that were conducted for ISFSIs, the EA Supplement mentions only one indicator of radiological consequences, namely the potential for early fatalities: "In addition, NRC made conservative assessments of consequences, to assess the potential for early fatalities." EA Supplement at 6. The only reasonable interpretation of that statement is that other indicators of radiological consequences were ignored. As discussed in SLOMFP's contention, reliance on the potential for early fatalities as a consequence indicator is absurd. Contentions at 11-12. The Staff's Response establishes a genuine and material dispute between the parties, and thus the contention is admissible.

The Staff's decision to rule out attacks that do not cause early fatalities appears to be consistent with a secret Commission policy for materials licensees. According to the NRC's Inspector General ("IG"), the NRC approved and withheld from public disclosure a SECY Paper and Staff Requirements Memorandum ("SRM") containing a Commission policy to measure the success of terrorist attacks against NRC-licensed materials facilities by whether the attacks would result in early deaths. OIG-06-A-22, Audit Report, Audit

of NRC's Process for Releasing Commission Decision Documents at 1, 16 (September 8, 2006). The policy rules out other impacts such as economic and environmental consequences and latent deaths. *Id.* As discussed in the IG Report, the SECY paper and associated SRM appear to establish NRC policies that affect the public, and therefore should be published as required by the FOIA. *Id.* at 16-17. The Commission should release these documents to the public, along with any related documents that extend the policy to other types of facilities.

The Staff does not deny that the EA Supplement identifies emergency planning as a mitigative measure, but asserts that SLOMFP has failed to identify the existence of a genuine and material dispute because emergency planning is an "additional" mitigative measure. Staff Response at 20. Given that the EA Supplement does not identify any other mitigative measures, it is difficult to understand what the Staff means by this assertion. Are there other mitigative measures that the Staff considered in secret? Why does the fact that the Staff considered more than one mitigative measure absolve the Staff from the responsibility to explain in what respect it considered emergency planning to be a mitigative measure? The Staff's Response raises more questions than it answers, and thereby shows the existence of a genuine and material factual dispute between the parties regarding the adequacy of the EA Supplement to address the alleged mitigative measure of emergency planning.

**3. Contention 3: Failure to consider credible threat scenarios with significant environmental impacts.**

Contention 3 asserts that:

In violation of NEPA and CEQ regulation 40 C.F.R. § 1502.22(b)(3), the EA fails to consider credible threat scenarios that could cause significant environmental damage by contaminating the environment.

Contentions at 12. In opposing admission of Contention 3, the NRC Staff does not deny the existence of a dispute, but merely asserts that it cannot discuss all aspects of the dispute in public because of the "sensitive nature" of its security assessments. NRC Response at 21. This does not constitute a good reason for dismissing the contention, but only a possible reason for conducting a closed hearing. As discussed above in Section II.A, the EA Supplement should identify the assessments on which it relies, the FOIA exemption claimed, and its reasons for invoking the FOIA exemption. This will allow SLOMFP and the Commission to evaluate whether the assessments or some part of them should be withheld and, if so, whether the hearing should be held under a protective order.

PG&E argues that SLOMFP simply "presumes" the likelihood of a successful attack on the Diablo Canyon ISFSI, rather than demonstrating that it is credible. PG&E Response at 14. PG&E ignores the fact that the attack characteristics described in the contention establish its credibility. In particular, the attack could be accomplished by a relatively small group of individuals, using weapons that are readily available to sub-national groups. Contentions at 13. As discussed in the Thompson Report at 22-23, the NRC recognized these characteristics as indicia of credibility in its 1994 vehicle bomb rule.

PG&E also asserts that the contention is immaterial because "the NRC has established physical security requirements precisely intended to protect against radiological sabotage of the type posited by Dr. Thompson." PG&E Response at 14. As discussed above with respect to Contention 1, however, the AEA-based security standard to which licensees must design their security plans is quite different from the NEPA

standard of evaluating the environmental impacts of attacks that have low likelihood but are reasonably foreseeable. In any event, PG&E gives no indication that it has implemented design measures to protect the storage canisters from penetration and fuel cladding ignition by the types of devices posited in SLOMFP's contention and Dr. Thompson's report. If the NRC were to prepare an EIS on the impacts of attacks on the Diablo Canyon ISFSI, it would be reasonable to consider such measures.

PG&E also argues that a balancing of the late-filing factors weighs against admission of the contention, because SLOMFP and Dr. Thompson are not qualified to making a meaningful contribution to the record regarding the likelihood of a successful attack on the facility. Dr. Thompson's declaration and curriculum vitae establish that he is a qualified expert in the area of nuclear risk assessment, including risks of intentional attacks on nuclear facilities. As stated in his declaration, he has extensive experience in nuclear facility risk analysis and has prepared numerous oral and written presentations on the vulnerability of nuclear facilities to acts of malice of insanity. Declaration of Dr. Gordon Thompson in Support of San Luis Obispo Mothers for Peace's (SLOMFP's) Contentions Regarding the Diablo Canyon Environmental Assessment Supplement, pars. 4-11. Examples of his presentations are listed in his curriculum vitae. In any event, PG&E has not challenged the important factor of SLOMFP's good cause for Contention 3 due to the previous unavailability of the EA Supplement. *Duke Power Co. (Catawba Nuclear Station, Units 1 and 2)*, CLI-83-19, 17 NRC 1041, 1045 (1983).

**Contention 4: Failure to address National Infrastructure Protection Plan (NIPP)**

Contention 4 asserts that:

The EA fails to comply with NEPA and NRC implementing regulations because it fails to address homeland-security strategy, the principles of protective deterrence, or the opportunities that the [National Infrastructure Protection Plan ("NIPP")] has identified for incorporating protective features into the design of infrastructure elements.

Contentions at 14-15. The NRC Staff and PG&E oppose the admission of this contention, arguing that NEPA does not require the EA Supplement to discuss the NIPP. NRC Staff Response at 21-22, PG&E Response at 18-20. But it is well-established that NEPA requires federal agencies to evaluate all environmental impacts of their actions, not just the impacts that are regulated under their own governing statutes. *Save Our Sonoran, Inc. v. Flowers*, 408 F.3d 1113 (9th Cir. 2005). As the Court held in that case:

Although the Corps' permitting authority is limited to those aspects of a development that directly affect jurisdictional waters, it has responsibility under NEPA to analyze all of the environmental consequences of a project. Put another way, while it is the development's impact on jurisdictional waters that determines the scope of the Corps' permitting authority, it is the impact of the permit on the environment at large that determines the Corps' NEPA responsibility. The Corps' responsibility under NEPA to consider the environmental consequences of a permit extends even to environmental effects with no impact on jurisdictional waters at all.

*Id.* at ¶122. NRC regulation 10 C.F.R. § 51.71(d) also requires that an EIS must give "[d]ue consideration" to "compliance with environmental quality standards and requirements that have been imposed by Federal, State, regional, and local agencies having responsibility for environmental protection." Here, as a signatory to the NIPP, the NRC has committed to "[s]upport NIPP concepts, frameworks and processes, and carry out their assigned functional responsibilities" to the extent they are consistent with NRC's own programs. Letter of Agreement, National Infrastructure Protection Plan (2006). Thus, consistent with NEPA and NRC regulations, the EA Supplement should address the NIPP.

PG&E is incorrect in claiming that as a practical matter the EA Supplement addresses the requirements of the NIPP. PG&E Response at 19-20. As discussed in Dr. Thompson's Report at page 34, the type of storage module proposed for the Diablo Canyon ISFSI may be a robust structure for purpose of resistance to natural forces, but not in terms of its ability to withstand penetration by weapons available to sub-national groups. And the only discussion of mitigative measures in the EA Supplement is an extremely vague and inadequate reference to emergency planning. *See* Contention 1. Thus, PG&E has not established the absence of a genuine and material legal and factual dispute with respect to Contention 4.

**Contention 5: Failure to consider vulnerability of ISFSI in relation to the entire Diablo Canyon spent fuel storage complex.**

Contention 5 asserts that:

The EA fails to comply with NEPA because it does not consider the significant cumulative impacts of the proposed ISFSI in relation to the impacts of the existing high-density pool storage system for spent fuel at the Diablo Canyon nuclear plant. The NRC Staff should prepare an EIS that discusses the cumulative impacts of spent fuel storage at the Diablo Canyon site, including the vulnerability of both the ISFSI and the spent fuel storage pools to attack. The EIS should also consider alternatives for mitigating those impacts, such as using the ISFSI to reduce the density of fuel storage in the pool.

Contentions at 15-16. The NRC Staff does not deny that under NEPA, the NRC's environmental analysis for the Diablo Canyon ISFSI must address the cumulative impacts of the proposed ISFSI. NRC Staff Response at 23-24. But the Staff argues that the NRC did address cumulative impacts in the original EA for the ISFSI, and SLOMFP's failure to raise the issue with respect to the original EA bars it from raising it here. *Id.*

The NRC Staff's analysis of the good cause standard is incorrect. There can be no doubt that it would have been futile for SLOMFP to challenge the adequacy of the original EA to address the cumulative environmental impacts of intentional attacks on the proposed ISFSI and the fuel pools. The NRC did not acknowledge its legal obligation to consider the environmental impacts of intentional attacks until it issued the EA Supplement. Thus, Contention 5 is "wholly dependent" on the issuance of the EA Supplement. *Public Service Company of New Hampshire* (Seabrook Station, Units 1 and 2), ALAB-737, 18 NRC 168, 172 n.4 (1983).<sup>13</sup>

The Staff also relies on the Licensing Board's decision in the original licensing proceeding that the environmental impacts of the Diablo Canyon nuclear power plant and its spent fuel pools are outside the scope of this proceeding. NRC Staff Response at 24, citing LBP-02-23, 56 NRC 413, 451 (2002). SLOMFP respectfully submits that the Licensing Board was incorrect, and that NEPA requires consideration of the cumulative impacts of spent fuel storage at the Diablo Canyon site, taking into consideration both the impacts of the proposed ISFSI "when added to other past, present, and reasonably foreseeable future actions." *Hydro Resources, Inc.* (P.O. Box 15910, Rio Rancho, NM 87174), CLI-04-01, 53 NRC 31, 60 (2001), citing 40 C.F.R. § 1508.7.

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<sup>13</sup> PG&E's argument that a balancing of the other factors in the late-filing standard weigh against admission of the contention is completely without merit. SLOMFP has demonstrated that its expert is highly qualified to contribute to the record on the subject. See Thompson Declaration and curriculum vitae. Moreover, the fact that litigation of Contention 5 may broaden or delay the proceeding is not the fault of SLOMFP but of PG&E and the NRC, who continually resisted consideration of the environmental impacts of intentional attacks in their environmental analyses. Finally, the possibility that at some future date SLOMFP may have an opportunity to challenge the NRC's environmental analysis with respect to a spent fuel pool-related license amendment does not excuse the NRC from offering SLOMFP a hearing on the cumulative impacts of spent fuel storage in this proceeding.

### III. CONCLUSION

For the foregoing reasons, the Staff's and PG&E's objections to the admissibility of SLOMFP's contentions are without merit. The Commission should admit the contentions and hold a formal adjudicatory hearing on the adequacy of the EA Supplement to consider the environmental impacts of intentional attacks on the proposed Diablo Canyon ISFSI.

Respectfully submitted,



Diane Curran  
Harmon, Curran, Spielberg & Eisenberg, LLP  
1726 M Street N.W., Suite 600  
Washington, DC 20036  
202/328-3500  
FAX: 202/328-6918  
e-mail: [dcurran@harmoncurran.com](mailto:dcurran@harmoncurran.com)

July 18, 2007

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CORRECTED JUNE 29, 2007

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION  
BEFORE THE COMMISSION

In the matter of  
Pacific Gas and Electric Company  
Diablo Canyon Nuclear Power Plant  
Unit Nos. 1 and 2  
Independent Spent Fuel Storage Installation

Docket # 72-26-ISFSI

**SAN LUIS OBISPO MOTHERS FOR PEACE'S  
CONTENTIONS AND REQUEST FOR A HEARING  
REGARDING DIABLO CANYON  
ENVIRONMENTAL ASSESSMENT SUPPLEMENT**

**I. INTRODUCTION AND SUMMARY**

Pursuant to the U.S. Nuclear Regulatory Commission's ("NRC's" or "Commission's") Order in *Pacific Gas and Electric Co.* (Diablo Canyon Power Plant Independent Spent Fuel Storage Installation), CLI-07-11, 65 NRC 148 (2007) ("CLI-07-011"), San Luis Obispo Mothers for Peace ("SLOMFP") hereby submits its contentions regarding the Supplement to the Environmental Assessment and Draft Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation (May 29, 2007) ("EA Supplement"). SLOMFP requests the Commission to hold a formal adjudicatory hearing on its contentions, as required by 10 C.F.R. §§ 2.105(a)(7), 2.700 and 2.714(b).<sup>1</sup>

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<sup>1</sup> Although 10 C.F.R. §2.714 was superseded in 2004 by 10 C.F.R. § 2.2.309 and §§ 2.105(a)(7) and 2.700 were changed to allow the NRC to conduct informal hearings on ISFSI license applications (69 Fed. Reg. 2,182 (January 14, 2004)), SLOMFP believes the former versions of these regulations apply because this proceeding began before the 2004 changes to the NRC's procedural regulations were promulgated.

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SLOMFP's contentions are supported by the declaration and expert report of Dr. Gordon Thompson, *Assessing Risks of Potential Malicious Actions at Commercial Nuclear Facilities: The Case of a Proposed Independent Spent Fuel Storage Installation at the Diablo Canyon Site* (June 27, 2007) ("Thompson Report"). Copies of Dr. Thompson's declaration, report, and curriculum vitae are attached.

The EA Supplement purports to address the environmental impacts of intentional attacks on the Diablo Canyon spent fuel storage facility, in response to the U.S. Court of Appeals for the Ninth Circuit's decision in *San Luis Obispo Mothers for Peace v. NRC*, 449 F.3d 1016 (9<sup>th</sup> Cir. 2006), cert. denied, 127 S.Ct. 1124 (2007) ("*Mothers for Peace*"). While the EA Supplement concedes that some types of attacks on the Diablo Canyon independent spent fuel storage installation ("ISFSI") are plausible, it asserts that the environmental impacts of attacks would be insignificant. Therefore the NRC Staff has decided not to prepare a full-fledged environmental impact statement ("EIS") that would provide a more detailed analysis of the environmental impacts of attacks on the facility and would also evaluate the comparative costs and benefits of a range of alternatives to avoid or mitigate those impacts.

Unfortunately, the NRC Staff has done a very poor job of evaluating the environmental impacts of intentional attacks on the Diablo Canyon facility. The EA distorts and minimizes the environmental impacts of attacks on the facility by using hidden and unjustified assumptions. As a result, the EA Supplement fails to consider a range of credible attacks that could cause significant damage to the human environment. The EA supplement also fails to identify the key documents on which it relies, thus making it impossible for any party or reviewing court to verify the appropriateness of its

reliance on those documents. In addition, the EA Supplement fails to address the U.S. government's major plan for protection of critical infrastructure and key resources, the National Infrastructure Protection Plan ("NIPP") (2006). Finally, the EA fails to comply with NEPA because it does not consider the significant cumulative impacts of the proposed ISFSI in relation to the impacts of the existing high-density pool storage system for spent fuel at the Diablo Canyon nuclear plant.

As a result of these profound deficiencies, the EA Supplement completely fails to demonstrate that the NRC made a "fully informed and well-considered" determination of no significant impacts. *Blue Mountains Biodiversity Project v. Blackwood*, 161 F.3d 1208, 1211 (9<sup>th</sup> Cir. 1998), cert. denied sub nom. *Malheur Lumber Co. v. Blue Mountain Biodiversity Project*, 527 U.S. 1003 (1999). NEPA requires the NRC to go back to the drawing board and provide an analysis that is understandable and scientifically supported.

As discussed below in Section III, SLOMFP's contentions satisfy the NRC's late-filing criteria in 10 C.F.R. § 2.714(b).

## II. CONTENTIONS

### **Contention 1: Failure to define terms, explain methodology or identify scientific sources**

The EA violates NEPA and NRC and Council on Environmental Quality ("CEQ") implementing regulations because it fails to document the basis for the NRC Staff's determination that the environmental impacts of intentional attacks on the Diablo Canyon ISFSI are insignificant, by failing to define its terms, explain its methodology, or identify its scientific sources. Therefore, the EA fails to justify the Staff's decision not to prepare an EIS for the facility.

**Basis:** As the U.S. Court of Appeals for the Ninth Circuit ruled in *Idaho Sporting Cong. v. Thomas*, 137 F.3d 1146, 1150 (9th Cir. 1988), NEPA requires that an agency must provide the public with “a basis for evaluating the impacts” of a proposed action, including “hard data” relied on by the agency’s experts. The purpose of this requirement is two-fold: (a) to protect “a plaintiff’s ability to challenge an agency action,” and (b) to allow a court to review an agency’s NEPA decision without “second guessing” the agency’s “scientific conclusions.” *Id. See also Earth Island Inst. V. United States Forest Ser.*, 351 F.3d 1291, 1300-31 (9<sup>th</sup> Cir. 2003), citing *Marsh v. Ore. Natural Res. Council, Inc.*, 490 U.S. 360, 377(1989) (a reviewing court must be able to independently review the record in order to satisfy itself that the agency has made a reasoned decision based on its evaluation of the evidence). Consistent with these judicial interpretations of NEPA, NRC regulation 10 C.F.R. § 51.30(a)(2) requires that an EA must provide a “list of agencies and persons consulted, and identification of sources used.” CEQ regulation 40 C.F.R. § 1502.24 also requires that:

Agencies shall insure the professional integrity, including scientific integrity, of the discussions and analyses in environmental impact statements. They shall identify any methodologies used and shall make explicit reference by footnote to the scientific and other sources relied upon for conclusions in the statement. An agency may place discussion of methodology in an appendix.

While Section 1502.24 nominally applies to EISs, the U.S. Court of Appeals has also applied it to evaluate the adequacy of EAs. *See Idaho Sporting Congress*, 137 F.3d at 1150.

The Diablo Canyon EA Supplement does not comply with NEPA, 10 C.F.R. § 51.30(a)(2) or 40 C.F.R. § 1502.24 because it fails to describe the methodologies used by the NRC Staff or to provide the underlying data on which it relied. In fact, the EA does

not even identify the documents that the NRC Staff reviewed in preparing its environmental analysis.

**a. Failure to define terms or explain methodology**

The EA fails to define its terms or explain its methodology in the following respects:

i. The EA fails to provide a clear description of the NRC's process for identifying plausible or credible attack scenarios and assessing their consequences to determine whether they are significant. The EA does not describe the types of attack scenario that the NRC considered in preparing the EA, the types of attack scenario that were disregarded, or why the NRC considered or disregarded any particular scenario. Some information about the considered and disregarded scenarios can be inferred from other information, leading to the conclusions stated below in Contention 3. Inference by the reader should not be required, however. The EA should define its terms directly and precisely.

ii. The reader is given no explanation of what the NRC means by the word "plausible." This is a grave omission, because the NRC's initial determination of whether attack scenarios are "plausible" established the scope of impacts considered in the EA. EA at 6. The term requires explanation, because it is clear from the EA that "plausible" means something to the NRC that is different from or in addition to its ordinary meaning of "credible." For instance, a number of factors relevant to a determination of plausibility were not evaluated until *after* the NRC made the plausibility determination, *i.e.*, "iconic value," "complexity of planning required," "resources needed," and "execution risk." *Id.* Moreover, as stated below in Contention 3, above, the

NRC disregarded attack scenarios that are plausible by any reasonable definition, including scenarios that would yield radiological impacts much larger than those considered in the EA.

iii. Just as the Pa'ina Irradiator EA rules out attack scenarios that are "remote or speculative" (page B-5), it is reasonable to infer that the Diablo Canyon EA does the same.<sup>2</sup> But neither the Diablo Canyon EA nor the Pa'ina Irradiator EA provides any description of the criteria used by the NRC to distinguish between scenarios that are "plausible" and those that are "remote and speculative." Given that the NRC has asserted the probability of an intentional attack on a nuclear facility "cannot be reliably quantified" (EA Supplement at 6), it is important for the EA to provide qualitative criteria for determining whether attacks are remote and speculative.

iv. The EA does not describe any analysis performed by the NRC Staff for the specific purpose of complying with NEPA. Instead, it describes an analysis that apparently took place in 2002, long before the Ninth Circuit's decision, and that apparently was based on compliance with NRC's AEA-based security requirements. EA Supplement at 6. The scope of threat scenarios covered by the AEA-based standard of reasonable protection or the Design Basis Threat rule's standard of requiring defense "against which a private security force can reasonably be expected to defend" (72 Fed.

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<sup>2</sup> On June 1, 2007, almost contemporaneously with the issuance of the Diablo Canyon EA Supplement, the NRC issued a supplemental appendix to the draft EA for the Pa'ina Irradiator in Hawaii which purported to address the environmental impacts of attacks on the irradiator. Draft Environmental Assessment for Pa'ina Irradiator, Appendix B: Consideration of Terrorist Attacks on the Proposed Pa'ina Irradiator ("Pa'ina Irradiator EA"). See <http://www.nrc.gov/materials/paina.pdf>. The Pa'ina Irradiator EA is useful in analyzing the EA for the Diablo Canyon facility because it provides additional insight into the NRC's criteria for determining what attack scenarios it would consider in the EA. The Pa'ina Irradiator EA is also deficient for many of the same reasons as the Diablo Canyon EA.

Reg. 12,705 12,713 (March 19, 2007)) is narrower than the scope of scenarios covered by the NEPA standard of reasonable foreseeability in 40 C.F.R. 1502.22(b)(3). The EA Supplement fails to demonstrate that the NRC considered the wider scope of scenarios required by NEPA.

v. To the extent that the EA Supplement describes the analytical steps taken by the NRC in its 2002 analysis, the process is poorly described. According to the EA Supplement, the analysis had four steps: (1) "Initially, the NRC screened threat scenarios to determine plausibility;" (2) "NRC assessed the attractiveness of the facility to attack by taking into account factors such as iconic value, complexity of planning required, resources needed, execution risk, and public protection measures;" (3) "NRC made conservative assessments of consequences, to assess the potential for early fatalities from radiological impacts;" and (4) "NRC then looked at the combined effect of the attractiveness and the consequences analyses, to determine whether additional security measures for ISFSIs were required." EA Supplement at 6.

This description raises many questions that go unanswered in the EA Supplement. For instance:

- Why isn't the attractiveness of the facility to attack a plausibility consideration? If attractiveness of the facility is not a plausibility consideration, then how does the NRC define plausibility?
- How is "iconic value" determined?
- By what standard did the NRC evaluate "complexity of planning required," "resources needed," and "execution risk?"

- What are “public protection measures?” Do they constitute security plans, emergency planning, or something else? How are “public protection measures” relevant to the “attractiveness of the facility?” How is the criterion of “public protection measures” different than “execution risk?”
- Did the NRC avoid discussing significant impacts by assuming that public protection measures would prevent the attacks? Such an assumption would defeat a key purpose of an environmental assessment, which is to evaluate scenarios that are low in probability but credible, *i.e.*, scenarios for which “protective measures” can be circumvented or do not exist.

vi. In describing “generic assessments” that “formed the basis for the NRC’s conclusion that there was no need for further security measures at ISFSIs beyond those currently required by the regulation” (EA Supplement at 7), the NRC Staff fails to explain how this general analysis of licensee compliance with Atomic Energy Act-based security regulations and orders has any relevance to a NEPA determination of whether environmental impacts are significant.

vii. The NRC asserts that it “reviewed the analyses done for the ISFSI security assessments, and compared the assumptions used in these generic assessments to the relevant features of the Diablo Canyon ISFSI” (*Id.*), determining that the assumptions in these generic security assessments were “representative” or “conservative” in relation to the Diablo Canyon facility. The NRC fails to explain how that determination was factored into a NEPA analysis.

viii. The EA Supplement fails to provide any analysis of the radiological impacts of threat scenarios, including any documented estimate of the

radiation dose arising from release of radioactive material. The only statement made by the EA Supplement is that the dose “would likely be below 5 rem.” *Id.* at 7.

In short, the NRC Staff’s description of the analytical process it used to reach a finding of no significant impact is unintelligible. The EA Supplement’s dismal failure to provide an understandable explanation of its methodology violates NEPA’s requirement to take a “hard look” at environmental impacts and disclose the nature of that hard look. *Blue Mountains Biodiversity Project*, 161 F.3d at 1211.

**b. Failure to reference sources of scientific data**

The EA supplement’s only list of “references” consists of three documents that are irrelevant and invalid in light of the U.S. Court of Appeals decision in *San Luis Obispo Mothers for Peace v. NRC*: the 2003 license amendment application, the original 2003 EA, and the license itself. Yet, the drafters of the EA Supplement clearly consulted other sources of data and information. For instance, the EA Supplement describes several internal review processes that the NRC Staff apparently relied on in preparing its environmental analysis:

- “Following issuance of the 2002 security orders for ISFSIs, NRC used a security assessment framework as a screening and assessment tool, to determine whether additional security measures, beyond those required by regulation and the security orders, were warranted for NRC’s regulated facilities, including ISFSIs.” EA Supplement at 6.
- “Initially, NRC screened threat scenarios to determine plausibility.” *Id.*
- “For those scenarios deemed plausible, NRC assessed the attractiveness of the facility to attack . . .” *Id.*
- “. . . NRC made conservative assessments of consequences, to assess the potential for early fatalities from radiological impacts.” *Id.*
- “NRC . . . looked at the combined effect of the attractiveness and the consequences analyses, to determine whether additional security measures for ISFSIs were necessary.” *Id.*
- “In conducting the security assessments for ISFSIs, NRC chose several spent fuel storage cask designs that were representative of most currently NRC-certified designs.” *Id.* at 6-7.

- The Staff reached a “conclusion that there was no need for further security measures at ISFSIs beyond those currently required by regulation and imposed by orders issued after September 11, 2001.” *Id.* at 7.
- The Staff “reviewed the analyses done for the ISFSI security assessments, and compared the assumptions used in these generic assessments to the relevant features of the Diablo Canyon ISFSI.” *Id.* at 7.
- The Staff made a determination “that the assumptions used in these generic security assessments, regarding the storage cask design, the source term (amount of radioactive material released) and the atmospheric dispersion, were representative, and in some cases conservative, relative to the actual conditions at the Diablo Canyon ISFSI.” *Id.*

Thus it appears from the EA Supplement that the NRC Staff may have engaged in as many as nine separate reviews that informed the Staff’s environmental review in this case – yet the EA Supplement fails to list any of these reviews as references.

Under NEPA, the NRC is required to disclose the technical basis for its determination that the environmental impacts of licensing the Diablo Canyon ISFSI are insignificant. The public is also entitled to review that technical basis. *Idaho Sporting Cong.*, 137 F.3d at 1150. Therefore SLOMFP seeks identification and access to any security studies or other data relied on by the NRC in reaching its conclusion that the environmental impacts of the proposed spent fuel storage facility are insignificant. SLOMFP understands that these studies and data may constitute safeguards or classified information, and intends to request access to them under appropriate protective measures.<sup>3</sup>

**Contention 2: Reliance on hidden and unjustified assumptions.**

The EA Supplement fails to satisfy NEPA because the NRC’s decision not to prepare an EIS is based on hidden and unjustified assumptions.

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<sup>3</sup> SLOMFP’s attorney, Diane Curran, and one of its experts, Dr. Edwin S. Lyman, have active Level L security clearances.

**Basis:** As the U.S. Court of Appeals for the Fifth Circuit held in *South Louisiana Envtl. Council v. Sand*, 629 F.2d 1005, 1011-12 (5<sup>th</sup> Cir. 1980), an agency's reliance on misleading assumptions violates NEPA by "impairing the agency's consideration of the adverse environmental effects of a proposed project." *See also Johnston v. Davis*, 698 F.2d 1088, 1094 (10<sup>th</sup> Cir. 1983) (holding that misleading or unqualified statements that do not represent a realistic assessment of environmental impacts violate NEPA); *Hughes Watershed Conservancy v. Glickman*, 81 F.3d 437, 446 (4<sup>th</sup> Cir. 1999) (rejecting an EIS that contained misleading projections of a proposed project's economic benefits).

Here, the EA Supplement violates NEPA by relying on hidden and unjustified assumptions. For instance, the EA Supplement appears to assume that the environmental impacts of an attack on a spent fuel storage cask would be insignificant if they do not result in early fatalities. This assumption is not completely clear, but can be inferred from the document's discussion of consequences. In considering the consequences of potential releases of radioactive material, the NRC has employed only one indicator, namely "the potential for early fatalities." EA at 6. The Staff thus appears to have used early fatalities as a criterion to screen out consideration of any threat scenarios that cause impacts other than early fatalities.

To exclude consequences other than early fatalities is absurd. The adverse health effects of a successful attack on the Diablo Canyon ISFSI would include increased cancers and illnesses (Thompson Report at 17, 35), which indisputably constitute significant adverse environmental impacts that are routinely considered in NRC's EISs.<sup>4</sup>

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<sup>4</sup> *See, e.g.*, NUREG-1767, Vol. 1, Environmental Impact Statement on the Construction and Operation of a Proposed Mixed Oxide Fuel Fabrication Facility at the Savannah

Moreover, as discussed in Dr. Thompson's report, land contamination -- the dominant impact of spent-fuel-storage conventional accidents or attacks -- is a very serious impact that can render uninhabitable a large land area, causing significant economic and social impacts. *Id.*

The EA Supplement also appears to assume that the environmental impacts of an attack on a spent fuel storage cask would be reduced to the point of insignificance by unspecified emergency planning upgrades. *Id.* at 7. According to the EA Supplement, these measures "could" mitigate the impacts of an attack on the Diablo Canyon ISFSI. *Id.* The EA Supplement's discussion is insufficient to satisfy NEPA because but it does not refer to any specific emergency planning measures that could be assessed for their effectiveness, nor does Pacific Gas and Electric Company's license application for the spent fuel storage facility include any new or upgraded emergency planning measures for the Diablo Canyon ISFSI.

**Contention 3: Failure to consider credible threat scenarios with significant environmental impacts.**

In violation of NEPA and CEQ regulation 40 C.F.R. § 1502.22(b)(3), the EA fails to consider credible threat scenarios that could cause significant environmental damage by contaminating the environment.

**Basis:** CEQ regulation 40 C.F.R. § 1502.22(b)(3) requires the NRC to consider low-probability environmental impacts with catastrophic consequences, if those impacts are reasonably foreseeable. The EA Supplement creates the appearance of compliance with § 1502.22(b)(3) by claiming to consider all "plausible" attack scenarios. *Id.* at 6.

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River Site, South Carolina, Table 4.14 (2005), which provides an estimate of "latent" cancer fatalities as a result of facility accidents.

But the EA Supplement fails to consider credible scenarios that could cause significant environmental damage. As discussed in the Thompson Report at page 33, it may be inferred from the very small dose consequences estimated in the EA Supplement that the EA Supplement examined scenarios that caused only minimal damage to a storage module.<sup>5</sup>

As discussed in Dr. Thompson's report at pages 33-37, the EA Supplement fails to consider credible scenarios in which penetration of a spent-fuel canister is accompanied by the use of an incendiary device to ignite the zirconium cladding of the spent fuel. Scenarios of this type could be implemented by a relatively small group of attackers using weapons and devices that are readily available to sub-national groups, causing a release of radioactive material much larger than the EA has considered. For instance, penetration of the overpack of a storage module and the multi-purpose canister ("MPC") could be readily accomplished using a shaped charge, a device that is commonly used in the mining and petroleum industries and therefore well-known and available. *Id.* An attack on storage modules could be accomplished through a variety of means, including direct contact, firing of guided missiles from a distance, or the use of small aircraft as improvised cruise missiles. *Id.* at 35-36.

Such an attack could lead to penetration of several canisters and zirconium combustion within the canisters, causing the release of a substantial fraction of the volatile radionuclides, notably cesium-137, that are present in the affected canisters. Consequences of such a release could include the contamination and rendering

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<sup>5</sup> It is impossible to discern the NRC Staff's reasoning for considering only attack scenarios that would cause minimal damage to a spent fuel storage cask. Whatever the Staff's reasoning may have been, its failure to consider credible attacks with significant adverse impacts violates NEPA.

uninhabitable of about 7,500 square kilometers of land, together with cancers and other adverse health effects and significant economic and social damage. *Id.* at 17, 37.

The NRC Staff violated NEPA by failing to prepare a full-scale EIS that analyzed the impacts of a wide range of potential attack scenarios, including the attack scenarios described above and in Dr. Thompson's Report at pages 34-36.<sup>6</sup> The EIS should include a publicly available version that summarizes the nature of the scenarios considered and their impacts, and it should also include a detailed description whose circulation is restricted to agencies, groups and individuals that have a demonstrated interest in the information and are cleared to receive such information.

**Contention 4: Failure to address National Infrastructure Protection Plan (NIPP)**

The EA fails to comply with NEPA and NRC implementing regulations because it fails to address homeland-security strategy, the principles of protective deterrence, or the opportunities that the NIPP has identified for incorporating protective features into the design of infrastructure elements.

**Basis:** The U.S. Department of Homeland Security has issued the National Infrastructure Protection Plan ("NIPP"), whose purpose is to provide "the unifying structure for the integration of critical infrastructure and key resources (CI/KR) protection into a single national program." *Id.* at vii. The NIPP identifies three purposes of measures to protect critical infrastructure and key resources: (i) deter the threat; (ii) mitigate vulnerabilities; and (iii) minimize consequences associated with an attack or

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<sup>6</sup> It is not SLOMFP's responsibility to identify all credible scenarios that should be evaluated in an EIS. That is the NRC's responsibility.

other incident. *Id.* at 7. The NIPP identifies a range of protective measures to achieve these purposes:

Protection can include a wide range of activities such as improving business protocols, hardening facilities, building resiliency and redundancy, incorporating hazard resistance into initial facility design, initiating active or passive countermeasures, installing security systems, leveraging 'self-healing' technologies, promoting workforce surety programs, or implementing cyber security measures, among various others.

*Id.* at 7. Protective measures of these types could significantly reduce the conditional probability that an attack would be successful. Thompson Report at 11-12. Such measures could, therefore, "deter" attacks by altering attackers' cost-benefit calculations. As Dr. Thompson observes in his report, that form of deterrence is different from deterrence attributable to an attacked party's capability to counter-attack. *Id.*

As a signatory to the Department of Homeland Security's National Infrastructure Protection Plan, the NRC is responsible for demonstrating that its environmental analysis of the impacts of attacks on the Diablo Canyon ISFSI is consistent with the NIPP. Yet, the EA does not identify the NIPP or its officials as resources or individuals consulted under 10 C.F.R. § 51.30(a)(2).

**Contention 5: Failure to consider vulnerability of ISFSI in relation to the entire Diablo Canyon spent fuel storage complex.**

The EA fails to comply with NEPA because it does not consider the significant cumulative impacts of the proposed ISFSI in relation to the impacts of the existing high-density pool storage system for spent fuel at the Diablo Canyon nuclear plant. The NRC Staff should prepare an EIS that discusses the cumulative impacts of spent fuel storage at the Diablo Canyon site, including the vulnerability of both the ISFSI and the spent fuel

storage pools to attack. The EIS should also consider alternatives for mitigating those impacts, such as using the ISFSI to reduce the density of fuel storage in the pool.

**Basis:** According to the 2003 EA, the proposed ISFSI is needed to provide additional spent fuel storage capacity for the Diablo Canyon plant, in order to allow the plant to continue to operate after the spent fuel pool becomes filled to capacity. The ISFSI will provide storage capacity "as needed" during the operating life of the plant and will be able to hold the entire inventory of spent fuel after the plant closes. *Id.* at 2.

As discussed in Dr. Thompson's Report at page 17, a conventional accident or attack on a Diablo Canyon spent fuel pool that causes the water level in the pool to fall below the top of the fuel-storage racks would cause a large atmospheric release of the cesium-137 in the pool (50 percent being a likely release fraction), causing widespread land contamination and adverse health and economic effects.

As the Commission has held, NEPA requires an EIS to consider the cumulative impacts of a proposed action, *i.e.*, the incremental impacts of the proposed action when added to the impacts of past, present, and reasonably foreseeable actions. *Hydro Resources, Inc.*, CLI-01-04, 53 NRC 31, 60 (2001). The NRC Staff should prepare an EIS that considers the cumulative impact of the proposed ISFSI in relation to the significant existing environmental risks posed by the Diablo Canyon spent fuel storage pools. The EIS should also examine, as a mitigative measure, the use of the ISFSI to reduce the risk of a pool fire by lowering the density of fuel assemblies in the Diablo Canyon spent fuel storage pools.

### III. SLOMFP'S CONTENTIONS SATISFY THE NRC'S LATE-FILED CONTENTION CRITERIA.

The contentions in Section II above satisfy a balancing of the NRC's late-filed contention criteria in 10 C.F.R. § 2.714(a). First, SLOMFP satisfies the first and most important factor -- good cause -- because it is filing its contentions within 30 days of the issuance of the EA Supplement. The EA Supplement constitutes the first attempt by the NRC to address the environmental impacts of intentional attacks on the Diablo Canyon spent fuel storage facility, and therefore this is the first opportunity SLOMFP has had to address the adequacy of the analysis.

Second, SLOMFP has no means other than this proceeding to vindicate its interest in requiring the NRC to fully comply with NEPA in considering the environmental impacts of intentional attacks on the Diablo Canyon ISFSI.<sup>7</sup>

Third, SLOMFP's participation may reasonably be expected to assist in the development of a sound record. SLOMFP is assisted by experienced counsel and Dr. Gordon Thompson, a qualified expert on risk assessment and nuclear security issues who has prepared an expert report regarding the deficiencies of the EA Supplement and who is prepared to testify regarding those deficiencies. If and when the NRC Staff complies with NEPA by identifying the sources on which it relied for the EA Supplement, SLOMFP also anticipates that it will retain Dr. Edwin S. Lyman of the Union of Concerned Scientists, for the purpose of reviewing any documents that may be protected as classified or safeguards information. Dr. Lyman's expert qualifications regarding nuclear facility security issues were established in *Duke Energy Corporation* (Catawba

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<sup>7</sup> While SLOMFP may submit comments on the EA Supplement, the NRC's failure to respond to its comments does not appear to be appealable in federal court unless SLOMFP has also requested a hearing.

Nuclear Station, Units 1 and 2), LBP-04-13, 60 NRC 33, affirmed, CLI-04-21, 60 NRC 21 (2004). Dr. Lyman recently applied for and received renewal of his Level L security clearance, for the purpose of reviewing any relevant classified documents that may be identified in this case.

Finally, SLOMFP anticipates that its participation in this proceeding will broaden and delay the proceeding. Nevertheless, it is not appropriate for the Commission to give any weight to this factor, because SLOMFP has done nothing to cause any delay or 11<sup>th</sup> hour broadening of the proceeding. SLOMFP has sought compliance by the NRC with NEPA's requirement to consider the environmental impacts of attacks on the Diablo Canyon ISFSI since the proceeding began over five years ago. Any delay is attributable to the intransigence of the NRC and PG&E, not to SLOMFP.

#### IV. CONCLUSION

For the foregoing reasons, SLOMFP requests the Commission to admit its contentions and hold a formal adjudicatory hearing on the adequacy of the EA Supplement to consider the environmental impacts of intentional attacks on the proposed Diablo Canyon ISFSI.

Respectfully submitted,

Diane Curran  
Harmon, Curran, Spielberg & Eisenberg, LLP  
1726 M Street N.W., Suite 600  
Washington, DC 20036  
202/328-3500  
FAX: 202/328-6918  
e-mail: [dcurran@harmoncurran.com](mailto:dcurran@harmoncurran.com)

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(corrected June 29, 2007)



4. I have conducted, directed, and/or participated in a number of studies that evaluated aspects of the design and operation of nuclear facilities with respect to severe accident probabilities and consequences. These include generic studies and studies of individual facilities. For instance, with respect to generic studies on the potential for severe accidents at nuclear power plants, I was co-investigator in a study by the Union of Concerned Scientists on the "source term" issue -- the potential for release of radioactive material to the environment.<sup>1</sup> Also, I was one of a team of four scientists who prepared, for Greenpeace International, a comprehensive critique of the state of the art of probabilistic risk assessment (PRA) for nuclear power plants.<sup>2</sup> Our report noted that acts of malice, such as sabotage and acts of war, are not considered in PRAs, despite a history of malicious acts at many nuclear facilities. In addition, I conducted analysis on the relevance of PRA to emergency response planning, as part of a study on emergency planning for nuclear power plant accidents.<sup>3</sup> All of these studies required me to be highly familiar with the design and operation of nuclear power plants, as well as the characteristics of probabilistic risk assessment.

5. I have also done considerable work on the risks posed by individual nuclear facilities. In addition to performing the studies described elsewhere in this declaration, I have studied the risks posed by the Seabrook, Pilgrim, Vermont Yankee and Three Mile Island plants (USA), the Darlington and Pickering stations (Canada), the Sizewell B station (UK) and the Dukovany plant (Czech Republic). All of these studies required me to become familiar with the relevant details of the design and operation of the facilities involved.

6. To a significant degree, my work has been accepted or adopted by relevant governmental agencies. During the period 1978-1979, for example, I served on an international review group commissioned by the government of Lower Saxony (a state in Germany) to evaluate a proposal for a nuclear fuel cycle center at Gorleben. I led the subgroup that examined accident risks and identified alternative options with lower risk.<sup>4</sup> One of the risk issues that I identified and analyzed was the potential for self-sustaining,

<sup>1</sup> Steven Sholly and Gordon Thompson, The Source Term Debate (Cambridge, Massachusetts: Union of Concerned Scientists, January 1986).

<sup>2</sup> H Hirsch et al, IAEA Safety Targets and Probabilistic Risk Assessment (Hannover, Germany: Gesellschaft für Ökologische Forschung und Beratung mbH, August 1989).

<sup>3</sup> D Golding et al, Preparing for Nuclear Power Plant Accidents (Boulder, Colorado: Westview Press, 1995).

<sup>4</sup> Jan Beyea, Yves Lenoir, Gene Rochlin and Gordon Thompson (subgroup chair), Report of the Gorleben International Review, Chapter 3: Potential Accidents and their Effects, submitted (in German) to the Government of Lower Saxony, March 1979.

exothermic oxidation reactions of fuel cladding in a high-density spent fuel pool if water is lost from the pool. Hereafter, for simplicity, this event is referred to as a "pool fire".<sup>5</sup> In examining the potential for a pool fire, I identified partial loss of water as a more severe condition than total loss of water. I identified a variety of events that could cause a loss of water from a pool, including aircraft crash, sabotage, terrorism and acts of war. Also, I identified and described alternative fuel storage options with lower risk; these lower-risk options included design features such as spatial separation, natural cooling and underground vaults. The Lower Saxony government accepted my findings about the risk of a pool fire, and ruled in May 1979 that high-density pool storage of spent fuel was not an acceptable option at Gorleben. As a direct result, policy throughout Germany has been to use dry storage in casks, rather than high-density pool storage, for away-from-reactor storage of spent fuel.

7. My work has also influenced decision making by safety officials in the U.S. Department of Energy (DOE). During the period 1986-1991, I was commissioned by environmental groups to assess the safety of the military production reactors at the Savannah River Site, and to identify and assess alternative options for the production of tritium for the US nuclear arsenal. Initially, much of the relevant information was classified or otherwise inaccessible to the public. Nevertheless, I addressed safety issues through analyses that were recognized as accurate by nuclear safety officials at DOE. I eventually concluded that the Savannah River reactors could not meet the safety objectives set for them by DOE.<sup>6</sup> DOE subsequently reached the same conclusion, and scrapped the reactors. The current national policy for tritium production is to employ commercial reactors, an option that I had concluded was technically attractive but problematic from the perspective of nuclear weapons proliferation.

8. In 1977, and again during the period 1996-2000, I examined the safety of nuclear fuel reprocessing and liquid high-level radioactive waste management facilities at the Sellafield site in the UK. My investigation in the latter period was supported by consortia of local governments in Ireland and the UK, and I presented my interim findings at briefings in the UK and Irish parliaments in 1998. I identified safety issues that were not addressed in any publicly available literature about the Sellafield site.<sup>7</sup> As a

<sup>5</sup> At water-cooled reactors, such as those at Diablo Canyon, the fuel cladding is made from a zirconium alloy that can enter into a vigorous exothermic oxidation reaction with either air or steam. For simplicity, this reaction can be referred to as a "fire".

<sup>6</sup> Gordon Thompson and Steven C Sholly, No Restart for K Reactor (Cambridge, Massachusetts: Institute for Resource and Security Studies, October 1991).

<sup>7</sup> Gordon Thompson, High Level Radioactive Liquid Waste at Sellafield: Risks, Alternative Options and Lessons for Policy (Cambridge, Massachusetts: Institute for Resource and Security Studies, June 1998).

direct result of my investigation, the UK Nuclear Installations Inspectorate (NII) required the operator of the Sellafield site -- British Nuclear Fuels (BNFL) -- to conduct extensive safety analyses. These analyses confirmed the significance of the safety issues that I had identified, and in January 2001 the NII established a legally binding schedule for reduction of the inventory of liquid high-level radioactive waste at Sellafield.<sup>8</sup> The NII took this action in recognition of the grave offsite consequences of a release to the environment from the tanks in which liquid high-level waste is stored. I had identified a variety of events that could cause such a release, including acts of malice or insanity.

9. In May 2000 I completed a study for Greenpeace International on the hazard potential of the La Hague site in France.<sup>9</sup> Nuclear fuel reprocessing and related activities are conducted at this site. The operator of the site -- COGEMA -- was authorized to store 14,000 tonnes of spent fuel in high-density pools at La Hague, and proposed to increase the capacity of these pools to 17,600 tonnes. My study described the potential for a pool fire at La Hague, and identified events -- including acts of malice or insanity -- that could lead to a pool fire. One of the findings of my study was that neither COGEMA nor the French government had a thorough understanding of La Hague's hazard potential, including the potential for a pool fire. Subsequent to the attacks of 11 September 2001 in New York and Washington, media exposure brought La Hague's hazard potential to the attention of the French government. During October 2001 the French government deployed anti-aircraft missiles at La Hague.

10. As stated in paragraph 6, I determined in the period 1978-1979 that partial loss of water from a high-density spent fuel pool is a more severe condition than total loss of water. This is because convective heat transfer is suppressed by the presence of residual water at the base of the fuel assemblies. During any scenario for loss of water from a spent fuel pool, there will be a period of time during which residual water is present. As a result, comparatively old fuel -- potentially including fuel aged 10 or more years after discharge from a reactor -- can ignite if water is lost from a high-density spent fuel pool. The NRC Staff failed, for more than two decades, to understand this point. An illustration of the Staff's lack of understanding was provided by its statements during a license amendment proceeding in regard to the expansion of spent fuel pool capacity at the Harris nuclear power plant. I served as an expert witness for Orange County, North Carolina, the intervenor in this proceeding. In filings during March and April 2000, the

<sup>8</sup> Nuclear Installations Inspectorate, "Specification Issued under Licence Condition 32(4) for the Limitation of the Accumulation or Storage of Liquid High Level Radioactive Waste in B215. Licence Instrument 343. January 2001."

<sup>9</sup> Gordon Thompson, Hazard Potential of the La Hague Site: An Initial Review (Cambridge, Massachusetts: Institute for Resource and Security Studies, May 2000).

Staff repeatedly disparaged my statements that comparatively old fuel can ignite. A few months later, however, the Staff adopted my position. In a report dated October 2000, but not published until January 2001, the Staff recognized that the flow of air to exposed fuel assemblies could be blocked by the presence of collapsed structures -- which might be attributable, for example, to a cask drop or an earthquake -- or by the presence of residual water.<sup>10</sup> The Staff analyzed the heat transfer implications of flow blockage and concluded:<sup>11</sup>

"While the February 2000 [draft] study indicated that for the cases analyzed a required decay time of 5 years would preclude a zirconium fire, the revised analyses show that it is not feasible, without numerous constraints, to define a generic decay heat level (and therefore decay time) beyond which a zirconium fire is not physically possible."

11. On numerous occasions, I have drawn attention in my writings and oral presentations to the vulnerability of nuclear facilities to acts of malice or insanity. I have pointed out that PRAs do not address acts of malice or insanity, with the result that a PRA can, at best, provide a lower bound to the probability of a release of radioactive material.<sup>12</sup> In 1996 I wrote a generic report on war and terrorism as risk factors for nuclear power plants.<sup>13</sup> Among other findings, this report noted that an act of war or terrorism at a nuclear power plant might have as its primary target the spent fuel stored at the plant, rather than the reactor. The report concluded with a statement that:

"Public debate about the future operation of existing nuclear power plants, and the construction of new plants, should be broadened to encompass the possible involvement of nuclear plants in war or terrorism."

12. I am familiar with the License Application, Safety Analysis Report, and Environmental Report for Pacific Gas & Electric Company's proposed Independent Fuel Storage Installation on the site of the Diablo Canyon nuclear power plant.

13. I am also familiar with the NRC's Supplement to the Environmental Assessment and Draft Finding of No Significant Impact Related to the Construction and Operation of the

<sup>10</sup> Timothy Collins et al (authors are all from the NRC Staff), Technical Study of Spent Fuel Pool Accident Risk at Decommissioning Nuclear Power Plants, October 2000.

<sup>11</sup> Collins et al, October 2000 (op cit), page 2-1.

<sup>12</sup> The strengths and weaknesses of PRA methodology are discussed in Hirsch et al, August 1989 (op cit).

<sup>13</sup> Gordon Thompson, War, Terrorism and Nuclear Power Plants (Canberra: Peace Research Centre, Australian National University, October 1996).

Diablo Canyon Independent Spent Fuel Storage Installation (May 29, 2007) ("Diablo EA Supplement"). I have prepared a report that includes an analysis of the deficiencies in the Diablo EA Supplement's evaluation of the environmental impacts of intentional attacks on the proposed Diablo Canyon spent fuel storage facility: Assessing Risks of Potential Malicious Actions at Commercial Nuclear Facilities: The Case of a Proposed Independent Spent Fuel Storage Installation at the Diablo Canyon Site ("Report").

14. I also assisted SLOMFP in the preparation of its contentions regarding the Diablo EA Supplement.

15. The statements of fact in SLOMFP's contentions and my Report are true and correct to the best of my knowledge, and the opinions set forth therein are based on my best professional judgment.

16. I am prepared to testify as an expert witness on behalf of SLOMFP with respect to the facts and opinions set forth in SLOMFP's contentions and my Report.



Gordon R. Thompson, D.Phil

June 27, 2007

**Curriculum Vitae for Gordon R. Thompson**  
**October 2006**

Professional expertise

- Technical and policy analysis in the fields of energy, environment, sustainable development, human security, and international security.

Current appointments

- Executive director, Institute for Resource & Security Studies (IRSS), Cambridge, Massachusetts (since 1984).
- Research Professor, George Perkins Marsh Institute, Clark University, Worcester, Massachusetts (since 2002).

Education

- D.Phil., applied mathematics, Oxford University (Balliol College), 1973.
- B.E., mechanical engineering, University of New South Wales, Sydney, Australia, 1967.
- B.Sc., mathematics & physics, University of New South Wales, 1966.

Project sponsors and tasks (selected)

- World Health Organization, 2006: conducted policy analysis on the potential for "health-bridge" programs to improve cooperation within and between nations.
- Attorney General of Massachusetts, 2006: conducted technical analysis and provided expert testimony regarding risks of storing spent fuel at nuclear power plants.
- Various sponsors, 2006: co-coordinated the Working Group on US-Iran Health Science Cooperation.
- Minnesota Center for Environmental Advocacy, and Minnesotans for an Energy Efficient Economy, 2005-2006: conducted technical analysis and provided expert testimony regarding management of spent fuel from the Monticello nuclear power plant.
- California Energy Commission, 2005: conducted technical analysis and participated in an expert workshop regarding safety and security of commercial nuclear facilities.
- Committee on Radioactive Waste Management (a committee appointed by the UK government), 2005: provided expert advice and technical analysis on safety and security of radioactive waste management.
- Legal Resources Centre, Cape Town, South Africa, 2004-2005: conducted technical analysis regarding the proposed South African pebble bed modular nuclear reactor.
- STAR Foundation, New York, 2002-2004: reviewed planning and actions for decommissioning of research reactors at Brookhaven National Laboratory.
- Attorney General of Utah, 2003: conducted technical analysis and provided expert testimony regarding a proposed national storage facility for spent nuclear fuel.

- Mothers for Peace, California, 2002-2004: analyzed risk issues and prepared expert testimony associated with the Diablo Canyon nuclear power plant.
- Citizens Awareness Network, Massachusetts, 2002-2003: conducted analysis on robust storage of spent nuclear fuel.
- Tides Center, California, 2002-2004: conducted analysis for the Santa Susana Field Laboratory (SSFL) Advisory Panel regarding the history of releases of radioactive material from the SSFL.
- Orange County, North Carolina, 1999-2002: assessed risk issues associated with the Harris nuclear power plant, identified risk-reduction options, and prepared expert testimony.
- William and Flora Hewlett Foundation and other sponsors, 1999-2006: performed research and project development for conflict-management projects, through IRSS's International Conflict Management Program.
- STAR Foundation, New York, 2000-2001: assessed risk issues associated with the Millstone nuclear power plant, identified risk-reduction options, and prepared expert testimony.
- Massachusetts Water Resources Authority, 2000: evaluated risks associated with water supply and wastewater systems that serve greater Boston.
- Canadian Senate, Energy & Environment Committee, 2000: reviewed risk issues associated with the Pickering Nuclear Generating Station.
- Greenpeace International, Amsterdam, 2000: reviewed impacts associated with the La Hague nuclear complex in France.
- Government of Ireland, 1998-2001: developed framework for assessment of impacts and alternative options associated with the Sellafield nuclear complex in the UK.
- Clark University, Worcester, Massachusetts, 1998-1999: participated in confidential review of outcomes of a major foundation's grants related to climate change.
- UN High Commissioner for Refugees, 1998: developed a strategy for conflict management in the CIS region.
- General Council of County Councils (Ireland), W. Alton Jones Foundation (USA), and Nuclear Free Local Authorities (UK), 1996-2000: assessed safety and economic issues of nuclear fuel reprocessing in the UK; assessed alternative options.
- Environmental School, Clark University, Worcester, Massachusetts, 1996: session leader at the Summer Institute, "Local Perspectives on a Global Environment".
- Greenpeace Germany, Hamburg, 1995-1996: a study on war, terrorism and nuclear power plants.
- HKH Foundation, New York, and Winston Foundation for World Peace, Washington, DC, 1994-1996: studies and workshops on preventive action and its role in US national security planning.
- Carnegie Corporation of New York, Winston Foundation for World Peace, Washington, DC, and others, 1995: collaboration with the Organization for Security and Cooperation in Europe to facilitate improved coordination of activities and exchange of knowledge in the field of conflict management.
- World Bank, 1993-1994: a study on management of data describing the performance of projects funded by the Global Environment Facility (joint project of IRSS and Clark University).

- International Physicians for the Prevention of Nuclear War, 1993-1994: a study on the international control of weapons-usable fissile material.
- Government of Lower Saxony, Hannover, Germany, 1993: analysis of standards for radioactive waste disposal.
- University of Vienna (using funds supplied by the Austrian government), 1992: review of radioactive waste management at the Dukovany nuclear power plant, Czech Republic.
- Sandia National Laboratories, 1992-1993: advice to the US Department of Energy's Office of Foreign Intelligence.
- US Department of Energy and Battelle Pacific Northwest Laboratories, 1991-1992: advice for the Intergovernmental Panel on Climate Change regarding the design of an information system on technologies that can limit greenhouse gas emissions (joint project of IRSS, Clark University and the Center for Strategic and International Studies).
- Winston Foundation for World Peace, Boston, Massachusetts, and other funding sources, 1992-1993: development and publication of recommendations for strengthening the International Atomic Energy Agency.
- MacArthur Foundation, Chicago, Illinois, W. Alton Jones Foundation, Charlottesville, Virginia, and other funding sources, 1984-1993: policy analysis and public education on a "global approach" to arms control and disarmament.
- Energy Research Foundation, Columbia, South Carolina, and Peace Development Fund, Amherst, Massachusetts, 1988-1992: review of the US government's tritium production (for nuclear weapons) and its implications.
- Coalition of Environmental Groups, Toronto, Ontario (using funds supplied by Ontario Hydro under the direction of the Ontario government), 1990-1993: coordination and conduct of analysis and preparation of testimony on accident risk of nuclear power plants.
- Greenpeace International, Amsterdam, Netherlands, 1988-1990: review of probabilistic risk assessment for nuclear power plants.
- Bellerive Foundation, Geneva, Switzerland, 1989-1990: planning for a June 1990 colloquium on disarmament and editing of proceedings.
- Iler Research Institute, Harrow, Ontario, 1989-1990: analysis of regulatory response to boiling-water reactor accident potential.
- Winston Foundation for World Peace, Boston, Massachusetts, and other funding sources, 1988-1989: analysis of future options for NATO (joint project of IRSS and the Institute for Peace and International Security).
- Nevada Nuclear Waste Project Office, Carson City, Nevada (via Clark University), 1989-1990: analyses of risk aspects of radioactive waste management and disposal.
- Ontario Nuclear Safety Review (conducted by the Ontario government), Toronto, Ontario, 1987: review of safety aspects of CANDU reactors.
- Washington Department of Ecology, Olympia, Washington, 1987: analyses of risk aspects of a proposed radioactive waste repository at Hanford.
- Natural Resources Defense Council, Washington, DC, 1986-1987: preparation of expert testimony on hazards of the Savannah River Plant, South Carolina.
- Lakes Environmental Association, Bridgton, Maine, 1986: analysis of federal regulations for disposal of radioactive waste.
- Greenpeace Germany, Hamburg, 1986: participation in an international study on the hazards of nuclear power plants.

- Three Mile Island Public Health Fund, Philadelphia, Pennsylvania, 1983-1989: studies related to the Three Mile Island nuclear power plant and emergency response planning.
- Attorney General, Commonwealth of Massachusetts, 1984-1989: analyses of the safety of the Seabrook nuclear power plant, preparation of expert testimony.
- Union of Concerned Scientists, Cambridge, Massachusetts, 1980-1985: studies on energy demand and supply, nuclear arms control, and the safety of nuclear installations.
- Conservation Law Foundation of New England, Boston, Massachusetts, 1985: preparation of expert testimony on cogeneration potential at a Maine paper mill.
- Town & Country Planning Association, London, UK, 1982-1984: coordination and conduct of a study on safety and radioactive waste implications of the proposed Sizewell nuclear power plant, testimony to the Sizewell Public Inquiry.
- US Environmental Protection Agency, Washington, DC, 1980-1981: assessment of the cleanup of Three Mile Island Unit 2 nuclear power plant.
- Center for Energy & Environmental Studies, Princeton University, Princeton, New Jersey, and Solar Energy Research Institute, Golden, Colorado, 1979-1980: studies on the potentials of renewable energy sources.
- Government of Lower Saxony, Hannover, Federal Republic of Germany, 1978-1979: coordination and conduct of studies on safety and security aspects of the proposed Gorleben nuclear fuel cycle center.

Other experience (selected)

- Principal investigator, project on "Exploring the Role of 'Sustainable Cities' in Preventing Climate Disruption", involving IRSS and three other organizations, 1990-1991.
- Visiting fellow, Peace Research Centre, Australian National University, 1989.
- Principal investigator, Three Mile Island emergency planning study, involving IRSS, Clark University and other partners, 1987-1989.
- Co-leadership (with Paul Walker) of a study group on nuclear weapons proliferation, Institute of Politics, Harvard University, 1981.
- Foundation (with others) of an ecological political movement in Oxford, UK, which contested the 1979 Parliamentary election.
- Conduct of cross-examination and presentation of expert testimony, on behalf of the Political Ecology Research Group, at the 1977 Public Inquiry into proposed expansion of reprocessing capacity at Windscale, UK.
- Conduct of research on plasma theory (while a D.Phil candidate), as an associate staff member, Culham Laboratory, UK Atomic Energy Authority, 1969-1973.
- Service as a design engineer on coal-fired power plants, New South Wales Electricity Commission, Sydney, Australia, 1968.

Publications (selected)

- "Using Psychosocial Healing in Postconflict Reconstruction" (with Paula Gutlove), in Mari Fitzduff and Chris E. Stout (eds), *The Psychology of Resolving Global Conflicts: From War to Peace*, Praeger Security International. 2006.

- "What Role for Nuclear Power in a Sustainable Civilization?", *The Green Cross Optimist*, Spring 2006, pp 28-30.
- *Radiological Risk of Homeport Basing of a Nuclear-Propelled Aircraft Carrier in Yokosuka, Japan*, a report for the Citizens Coalition Concerning the Homeporting of a CVN in Yokosuka, 29 June 2006.
- *Risks and Risk-Reducing Options Associated with Pool Storage of Spent Nuclear Fuel at the Pilgrim and Vermont Yankee Nuclear Power Plants*, a report for the Attorney General, Commonwealth of Massachusetts, 25 May 2006.
- *Reasonably Foreseeable Security Events: Potential threats to options for long-term management of UK radioactive waste*, a report for the UK Committee on Radioactive Waste Management, 2 November 2005.
- "Plasma, policy and progress", *The Australian Mathematical Society Gazette*, Volume 32, Number 3, 2005, pp 162-168.
- "A Psychosocial-Healing Approach to Post-Conflict Reconstruction" (with Paula Gutlove), *Mind & Human Interaction*, Volume 14, Number 1, 2005, pp 35-63.
- "Designing Infrastructure for New Goals and Constraints", Proceedings of the conference, *Working Together: R&D Partnerships in Homeland Security*, Boston, Massachusetts, 27-28 April 2005, sponsored by the US Department of Homeland Security. (A version of this paper has also been published as CRS Discussion Paper 2005-02, Center for Risk and Security, George Perkins Marsh Institute, Clark University, Worcester, Massachusetts.)
- "Potential Radioactive Releases from Commercial Reactors and Spent Fuel", Proceedings of the conference, *Working Together: R&D Partnerships in Homeland Security*, Boston, Massachusetts, 27-28 April 2005, sponsored by the US Department of Homeland Security. (A version of this paper has also been published as CRS Discussion Paper 2005-03, Center for Risk and Security, George Perkins Marsh Institute, Clark University, Worcester, Massachusetts.)
- *Safety of the Proposed South African Pebble Bed Modular Reactor*, a report for the Legal Resources Centre, Cape Town, South Africa, 12 January 2005.
- *Decommissioning of Research Reactors at Brookhaven National Laboratory: Status, Future Options and Hazards*, a report for STAR Foundation, East Hampton, New York, April 2004.
- "Psychosocial Healing and Post-Conflict Social reconstruction in the Former Yugoslavia" (with Paula Gutlove), *Medicine, Conflict and Survival*, Volume 20, Number 2, April-June 2004, pp 136-150.
- "Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States" (with Robert Alvarez, Jan Beyea, Klaus Janberg, Jungmin Kang, Ed Lyman, Allison Macfarlane and Frank N. von Hippel), *Science and Global Security*, Volume 11, 2003, pp 1-51.
- "Health, Human Security, and Social Reconstruction in Afghanistan" (with Paula Gutlove and Jacob Hale Russell), in John D. Montgomery and Dennis A. Rondonelli (eds), *Beyond Reconstruction in Afghanistan*, Palgrave Macmillan, 2004.
- *Psychosocial Healing: A Guide for Practitioners, based on programs of the Medical Network for Social Reconstruction in the Former Yugoslavia* (with Paula Gutlove), IRSS, Cambridge, Massachusetts and OMEGA Health Care Center, Graz, Austria, May 2003.

- *A Call for Action to Protect the Nation Against Enemy Attack on Nuclear Power Plants and Spent Fuel*, and a Supporting Document, Mothers for Peace, San Luis Obispo, California, April 2003 and May 2003.
- "Human Security: Expanding the Scope of Public Health" (with Paula Gutlove), *Medicine, Conflict and Survival*, Volume 19, 2003, pp 17-34.
- *Social Reconstruction in Afghanistan through the Lens of Health and Human Security* (with Paula Gutlove and Jacob Hale Russell), IRSS, Cambridge, Massachusetts, May 2003.
- *Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security*, a report for Citizens Awareness Network, Shelburne Falls, Massachusetts, January 2003.
- *Medical Network for Social Reconstruction in the Former Yugoslavia: A Survey of Participants' Views on the Network's Goals and Achievements*, IRSS, Cambridge, Massachusetts, September 2001.
- *The Potential for a Large, Atmospheric Release of Radioactive Material from Spent Fuel Pools at the Harris Nuclear Power Plant: The Case of a Pool Release Initiated by a Severe Reactor Accident*, a report for Orange County, North Carolina, 20 November 2000.
- *A Review of the Accident Risk Posed by the Pickering 'A' Nuclear Generating Station*, a report for the Standing Committee on Energy, Environment and Natural Resources, Canadian Senate, August 2000.
- *High-Level Radioactive Liquid Waste at Sellafield: An Updated Review*, a report for the UK Nuclear Free Local Authorities, June 2000.
- *Hazard Potential of the La Hague Site: An Initial Review*, a report for Greenpeace International, May 2000.
- *A Strategy for Conflict Management: Integrated Action in Theory and Practice* (with Paula Gutlove), IRSS, Cambridge, Massachusetts, March 1999.
- *Risks and Alternative Options Associated with Spent Fuel Storage at the Shearon Harris Nuclear Power Plant*, a report for Orange County, North Carolina, February 1999.
- *High Level Radioactive Liquid Waste at Sellafield: Risks, Alternative Options and Lessons for Policy*, IRSS, Cambridge, Massachusetts, June 1998.
- "Science, democracy and safety: why public accountability matters", in F. Barker (ed), *Management of Radioactive Wastes: Issues for local authorities*, Thomas Telford, London, 1998.
- "Conflict Management and the OSCE" (with Paula Gutlove), *OSCE/ODIHR Bulletin*, Volume 5, Number 3, Fall 1997.
- *Safety of the Storage of Liquid High-Level Waste at Sellafield* (with Peter Taylor), Nuclear Free Local Authorities, UK, November 1996.
- *Assembling Evidence on the Effectiveness of Preventive Actions, their Benefits, and their Costs: A Guide for Preparation of Evidence*, IRSS, Cambridge, Massachusetts, August 1996.
- *War, Terrorism and Nuclear Power Plants*, Peace Research Centre, Australian National University, Canberra, October 1996.
- "The Potential for Cooperation by the OSCE and Non-Governmental Actors on Conflict Management" (with Paula Gutlove), *Helsinki Monitor*, Volume 6 (1995), Number 3.

- "Potential Characteristics of Severe Reactor Accidents at Nuclear Plants", "Monitoring and Modelling Atmospheric Dispersion of Radioactivity Following a Reactor Accident" (with Richard Sclove, Ulrike Fink and Peter Taylor), "Safety Status of Nuclear Reactors and Classification of Emergency Action Levels", and "The Use of Probabilistic Risk Assessment in Emergency Response Planning for Nuclear Power Plant Accidents" (with Robert Goble), in D. Golding, J. X. Kasperson and R. E. Kasperson (eds), *Preparing for Nuclear Power Plant Accidents*, Westview Press, Boulder, Colorado, 1995.
- *A Data Manager for the Global Environment Facility* (with Robert Goble), Environment Department, The World Bank, June 1994.
- *Preventive Diplomacy and National Security* (with Paula Gutlove), Winston Foundation for World Peace, Washington, DC, May 1994.
- *Opportunities for International Control of Weapons-Usable Fissile Material*, International Physicians for the Prevention of Nuclear War, Cambridge, Massachusetts, January 1994.
- "Article III and IAEA Safeguards", in F. Barnaby and P. Ingram (eds), *Strengthening the Non-Proliferation Regime*, Oxford Research Group, Oxford, UK, December 1993.
- *Risk Implications of Potential New Nuclear Plants in Ontario* (prepared with the help of eight consultants), a report for the Coalition of Environmental Groups, Toronto, submitted to the Ontario Environmental Assessment Board, November 1992 (3 volumes).
- *Strengthening the International Atomic Energy Agency*, IRSS, Cambridge, Massachusetts, September 1992.
- *Design of an Information System on Technologies that can Limit Greenhouse Gas Emissions* (with Robert Goble and F. Scott Bush), Center for Strategic and International Studies, Washington, DC, May 1992.
- *Managing Nuclear Accidents: A Model Emergency Response Plan for Power Plants and Communities* (with six other authors), Westview Press, Boulder, CO, 1992.
- "Let's X-out the K" (with Steven C. Sholly), *Bulletin of the Atomic Scientists*, March 1992, pp 14-15.
- "A Worldwide Programme for Controlling Fissile Material", and "A Global Strategy for Nuclear Arms Control", in F. Barnaby (ed), *Plutonium and Security*, Macmillan Press, UK, 1992.
- *No Restart for K Reactor* (with Steven C. Sholly), IRSS, Cambridge, Massachusetts, October 1991.
- *Regulatory Response to the Potential for Reactor Accidents: The Example of Boiling-Water Reactors*, IRSS, Cambridge, Massachusetts, February 1991.
- *Peace by Piece: New Options for International Arms Control and Disarmament*, IRSS, Cambridge, Massachusetts, January 1991.
- *Developing Practical Measures to Prevent Climate Disruption* (with Robert Goble), CANTED Research Report No. 6, Clark University, Worcester, Massachusetts, August 1990.
- "Treaty a Useful Relic", *Bulletin of the Atomic Scientists*, July/August 1990, pp 32-33.
- "Practical Steps for the 1990s", in Sadruddin Aga Khan (ed), *Non-Proliferation in a Disarming World*, Proceedings of the Groupe de Bellerive's 6th International Colloquium, Bellerive Foundation, Geneva, Switzerland, 1990.

- *A Global Approach to Controlling Nuclear Weapons*, IRSS, Cambridge, Massachusetts, October 1989.
- *IAEA Safety Targets and Probabilistic Risk Assessment* (with three other authors), Greenpeace International, Amsterdam, August 1989.
- *New Directions for NATO* (with Paul Walker and Pam Solo), published jointly by IRSS and the Institute for Peace and International Security (both of Cambridge, Massachusetts), December 1988.
- "Verifying a Halt to the Nuclear Arms Race", in F. Barnaby (ed), *A Handbook of Verification Procedures*, Macmillan Press, UK, 1990.
- "Verification of a Cutoff in the Production of Fissile Material", in F. Barnaby (ed), *A Handbook of Verification Procedures*, Macmillan Press, UK, 1990.
- "Severe Accident Potential of CANDU Reactors," Consultant's Report in *The Safety of Ontario's Nuclear Power Reactors*, Ontario Nuclear Safety Review, Toronto, February 1988.
- *Nuclear-Free Zones* (edited with David Pitt), Croom Helm Ltd, Beckenham, UK, 1987.
- *Risk Assessment Review For the Socioeconomic Impact Assessment of the Proposed High-Level Nuclear Waste Repository at Hanford Site, Washington* (edited; written with five other authors), prepared for the Washington Department of Ecology, December 1987.
- *The Nuclear Freeze Revisited* (with Andrew Haines), Nuclear Freeze and Arms Control Research Project, Bristol, UK, November 1986. Variants of the same paper have appeared as Working Paper No. 18, Peace Research Centre, Australian National University, Canberra, February 1987, and in *ADIU Report*, University of Sussex, Brighton, UK, Jan/Feb 1987, pp 6-9.
- *International Nuclear Reactor Hazard Study* (with fifteen other authors), Greenpeace, Hamburg, Federal Republic of Germany (2 volumes), September 1986.
- "What happened at Reactor Four" (the Chernobyl reactor accident), *Bulletin of the Atomic Scientists*, August/September 1986, pp 26-31.
- *The Source Term Debate: A Report by the Union of Concerned Scientists* (with Steven C. Sholly), Union of Concerned Scientists, Cambridge, Massachusetts, January 1986.
- "Checks on the spread" (a review of three books on nuclear proliferation), *Nature*, 14 November 1985, pp 127-128.
- Editing of *Perspectives on Proliferation*, August 1985, published by the Proliferation Reform Project, IRSS.
- "A Turning Point for the NPT?", *ADIU Report*, University of Sussex, Brighton, UK, Nov/Dec 1984, pp 1-4.
- "Energy Economics", in J. Dennis (ed), *The Nuclear Almanac*, Addison-Wesley, Reading, Massachusetts, 1984.
- "The Genesis of Nuclear Power", in J. Tirman (ed), *The Militarization of High Technology*, Ballinger, Cambridge, Massachusetts, 1984.
- *A Second Chance: New Hampshire's Electricity Future as a Model for the Nation* (with Linzee Weld), Union of Concerned Scientists, Cambridge, Massachusetts, 1983.
- *Safety and Waste Management Implications of the Sizewell PWR* (prepared with the help of six consultants), a report to the Town & Country Planning Association, London, UK, 1983.

- *Utility-Scale Electrical Storage in the USA: The Prospects of Pumped Hydro, Compressed Air, and Batteries*, Princeton University report PU/CEES #120, 1981.
- *The Prospects for Wind and Wave Power in North America*, Princeton University report PU/CEES # 117, 1981.
- *Hydroelectric Power in the USA: Evolving to Meet New Needs*, Princeton University report PU/CEES # 115, 1981.
- Editing and part authorship of "Potential Accidents & Their Effects", Chapter III of *Report of the Gorleben International Review*, published in German by the Government of Lower Saxony, FRG, 1979; Chapter III published in English by the Political Ecology Research Group, Oxford, UK.
- *A Study of the Consequences to the Public of a Severe Accident at a Commercial FBR located at Kalkar, West Germany*, Political Ecology Research Group, 1978.

Expert presentations and testimony (selected)

- Minnesota Public Utilities Commission, 2006: testimony regarding trends, risks and costs associated with management of spent fuel from the Monticello nuclear power plant.
- Presentation, "Are Nuclear Installations Terrorist Targets?", at the conference, *Nuclear Energy: Does it Have a Future?*, Drogheda, County Louth, Ireland, 10-11 March 2005.
- Presentation at the session, "UN Security Council Resolution 1244 and Final Status for Kosovo", at the conference, *Lessons Learned from the Balkan Conflicts*, Boston College, Chestnut Hill, Massachusetts, 16-17 October 2004.
- California Public Utilities Commission, 2004: testimony regarding the nature and cost of potential measures for enhanced defense of the Diablo Canyon nuclear power plant.
- European Parliament, 2003: invited presentation to EP members regarding safety and security issues at the Sellafield nuclear site in the UK, and broader implications.
- US Congress, 2002 and 2003: invited presentations at member-sponsored staff briefings on vulnerabilities of nuclear-power facilities to attack and options for improved defenses.
- Numerous public forums in the USA, 2001-2006: invited presentations to public officials and general audiences regarding vulnerabilities of nuclear-power facilities to attack and options for improved defenses.
- UK Consensus Conference on Radioactive Waste Management, 1999: invited testimony on information and decision-making.
- Joint Committee on Public Enterprise and Transport, Irish Parliament, 1999: invited testimony on nuclear fuel reprocessing and international security.
- UK and Irish Parliaments, 1998: invited presentations to members on risks and alternative options associated with nuclear fuel reprocessing in the UK.
- Center for Russian Environmental Policy, Moscow, 1996: invited presentation at a forum in parallel with the G-7 Nuclear Safety Summit.
- Lacey Township Zoning Board, New Jersey, 1995: testimony regarding radioactive waste management.
- Ontario Court of Justice, Toronto, Ontario, 1993: testimony regarding Canada's Nuclear Liability Act.
- Oxford Research Group, seminar on "The Plutonium Legacy", Rhodes House, Oxford, UK, 1993: invited presentation on nuclear safeguards.

- Defense Nuclear Facilities Safety Board, Washington, DC, 1991: testimony regarding the proposed restart of K-reactor, Savannah River Site.
- Conference to consider amending the Partial Test Ban Treaty, United Nations, New York, 1991: presentation on a global approach to arms control and disarmament.
- US Department of Energy, hearing on draft EIS for new production reactor capacity, Columbia, South Carolina, 1991: testimony on tritium need and implications of tritium production options.
- Society for Risk Analysis, 1990 annual meeting, New Orleans, special session on nuclear emergency planning: presentation on real-time techniques for anticipating emergencies.
- Parliamentarians' Global Action, 11th Annual Parliamentary Forum, United Nations, Geneva, 1990: invited presentation on the potential for multilateral nuclear arms control.
- Advisory Committee on Nuclear Facility Safety, Washington, DC, 1989: testimony on public access to information and on government accountability.
- Peace Research Centre, Australian National University, seminar on "Australia and the Fourth NPT Review Conference", Canberra, 1989: invited presentation regarding a universal nuclear weapons non-proliferation regime.
- Carnegie Endowment for International Peace, Conference on "Nuclear Non-Proliferation and the Role of Private Organizations", Washington, DC, 1989: invited presentation on options for reform of the non-proliferation regime.
- US Department of Energy, EIS scoping hearing, Columbia, South Carolina, 1988: testimony on appropriate scope of an EIS for new production reactor capacity.
- International Physicians for the Prevention of Nuclear War, 6th and 7th Annual Congresses, Koln, FRG, 1986 and Moscow, USSR, 1987: invited presentations on relationships between nuclear power and the threat of nuclear war.
- County Council, Richland County, South Carolina, 1987: testimony on implications of severe reactor accidents at the Savannah River Plant.
- Maine Land Use Regulation Commission, 1985: testimony on cogeneration potential at facilities of Great Northern Paper Company.
- Interfaith Hearings on Nuclear Issues, Toronto, Ontario, 1984: invited presentations on options for Canada's nuclear trade and Canada's involvement in nuclear arms control.
- Sizewell Public Inquiry, UK, 1984: testimony on safety and radioactive waste implications of the proposed Sizewell nuclear power plant.
- New Hampshire Public Utilities Commission, 1983: testimony on electricity demand and supply options for New Hampshire.
- Atomic Safety & Licensing Board, US Nuclear Regulatory Commission, 1983: testimony on use of filtered venting at the Indian Point nuclear power plant.
- US National Advisory Committee on Oceans and Atmosphere, 1982: testimony on implications of ocean disposal of radioactive waste.
- Environmental & Energy Study Conference, US Congress, 1982: invited presentation on implications of radioactive waste management.

*Curriculum Vitae for Gordon R. Thompson*

*October 2006*

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Miscellaneous

- Married, two children.
- Extensive experience in public speaking and interviews by representatives of print and electronic media.
- Author of numerous essays and letters in newspapers and magazines.

Contact information

Institute for Resource and Security Studies  
27 Ellsworth Avenue, Cambridge, Massachusetts 02139, USA  
Phone: 617-491-5177 Fax: 617-491-6904 E-mail: [gthompson@irss-usa.org](mailto:gthompson@irss-usa.org)

INSTITUTE FOR RESOURCE AND SECURITY STUDIES  
27 Ellsworth Avenue, Cambridge, Massachusetts 02139, USA  
Phone: 617-491-5177 Fax: 617-491-6904  
Email: info@irss-usa.org

ASSESSING RISKS OF  
POTENTIAL MALICIOUS ACTIONS  
AT COMMERCIAL NUCLEAR FACILITIES:  
The Case of a Proposed  
Independent Spent Fuel Storage Installation  
at the Diablo Canyon Site

by  
Gordon R. Thompson

27 June 2007

A report for  
San Luis Obispo Mothers for Peace  
California

**Abstract**

This report discusses the risks of potential malicious actions at commercial nuclear facilities in the US, with a focus on actions by sub-national groups. These risks are first discussed generically, with a focus on power reactors, their spent fuel pools, and independent spent fuel storage installations (ISFSIs) at reactor sites. The report then provides a more detailed discussion of malice-related risks at a proposed ISFSI at the Diablo Canyon site in California. In May 2007 the US Nuclear Regulatory Commission Staff issued a Supplement to its October 2003 Environmental Assessment (EA) for the Diablo Canyon ISFSI. The Supplement considered malice-related risks, pursuant to a ruling by the 9th Circuit of the US Court of Appeals that these risks should have been considered in the EA. The Supplement is reviewed here.

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**About the Institute for Resource and Security Studies**

The Institute for Resource and Security Studies (IRSS) is an independent, nonprofit, Massachusetts corporation, founded in 1984. Its objective is to promote sustainable use of natural resources and global human security. In pursuit of this mission, IRSS conducts technical and policy analysis, public education, and field programs. IRSS projects always reflect a concern for practical solutions to resource and security problems.

**About the Author**

Gordon R. Thompson is the executive director of IRSS and a research professor at Clark University, Worcester, Massachusetts. He studied and practiced engineering in Australia, and received a doctorate in applied mathematics from Oxford University in 1973, for analyses of plasma undergoing thermonuclear fusion. Dr. Thompson has been based in the USA since 1979. His professional interests encompass a range of technical and policy issues related to global human security and sustainable use of natural resources. He has conducted numerous studies on the environmental impacts of nuclear facilities, and on options for reducing these impacts.

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## **1. Introduction**

A variety of nuclear facilities are deployed across the United States and worldwide to serve commercial (non-military) purposes. These facilities contain radioactive material and fissionable material that could create adverse impacts if released to the environment or used for unauthorized purposes. Those impacts could arise as a result of conventional accidents or malicious actions. Here, the term "conventional accidents" refers to incidents caused by human error, equipment failure or natural events.<sup>1</sup> Other incidents could be caused by deliberate, malicious actions. The parties taking those malicious actions could be national governments or sub-national groups.<sup>2</sup>

This report discusses the risks of potential malicious actions at commercial nuclear facilities in the US, with a focus on actions by sub-national groups. The report also focuses on a particular set of facilities that contain large amounts of radioactive material. These facilities are reactors used for generating electrical power, and facilities at the reactor sites that store spent fuel discharged from the reactors. After discharge, spent fuel assemblies are initially stored in spent-fuel pools located adjacent to the reactors. Some years later, the assemblies could be transferred to an independent spent fuel storage installation (ISFSI) on the reactor site. ISFSIs are operating or under construction at a number of reactor sites in the US, and more are being proposed. Although this report focuses on power reactors, their spent-fuel pools, and ISFSIs at reactor sites, many of its findings are applicable to other commercial nuclear facilities.

Here, the term "risks" refers to potential adverse impacts that can be reasonably foreseen but will not necessarily occur. Such impacts can be characterized by their consequences and their probabilities of occurrence.<sup>3</sup> This report focuses on risks associated with potential radiological impacts arising from release to the environment of radioactive material as a result of malicious actions. Many of the report's findings are applicable to related types of risks, such as those associated with use of fissionable material for unauthorized purposes.

### *The Diablo EA Supplement*

In October 2003 the Nuclear Regulatory Commission (NRC) Staff issued an Environmental Assessment (EA) for a proposed ISFSI at the Diablo Canyon reactor site in California. The EA did not consider malice-related risks. Pursuant to a petition by

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<sup>1</sup> The NRC's Glossary, accessed at the NRC web site ([www.nrc.gov](http://www.nrc.gov)) on 25 June 2007, contains no definition of "accident". The term "conventional accident" is defined and used in this report to ensure precision, because the term "accident" has been used to encompass incidents caused by deliberate, malicious actions.

<sup>2</sup> Relevant sub-national groups could be based in the US or in other countries.

<sup>3</sup> Some analysts define "risk" as the arithmetic product of consequence and probability. That definition is simplistic and can be misleading, and is not used in this report. That definition is especially inappropriate for malice-related risks because there is usually no statistical basis to support quantitative estimates of the probabilities of malicious actions.

San Luis Obispo Mothers for Peace and other parties, the 9th Circuit of the US Court of Appeals ruled in June 2006 that the EA was inadequate because it did not consider malice-related environmental impacts. In May 2007 the Staff responded to that ruling by issuing a Supplement to the October 2003 EA.<sup>4</sup> The Supplement addresses the risks of potential malicious actions at the proposed ISFSI. Hereafter, the Supplement is described as the "Diablo EA Supplement".

Over a three-decade period, the NRC has accepted, in various contexts, that an analysis of a nuclear facility's environmental impacts, in an EA or an environmental impact statement (EIS), should consider radiological risks associated with conventional accidents. The NRC has generally refused, however, to consider malice-related risks in an EA or EIS. The Diablo EA Supplement represents a departure from that longstanding refusal. The NRC Staff has issued an analogous document in the context of an application to build and operate an industrial irradiator in Hawaii.<sup>5</sup> Other, analogous documents are likely to be prepared in other licensing contexts. Thus, the Diablo EA Supplement deserves careful review.

This report provides a review of the Diablo EA Supplement. To support that review, the report also discusses some broader issues. The NRC has not issued any document or statement that provides an adequate discussion of the broader issues surrounding the Diablo EA Supplement.

Preparation of EAs and EISs is governed by the National Environmental Policy Act (NEPA). A major purpose of NEPA is to ensure that options for reducing the risks and other environmental impacts of a proposed action are identified and characterized. That goal is addressed repeatedly in this report.

*Sensitive information*

Any responsible analyst who discusses potential acts of malice at nuclear facilities is careful about making statements in public settings. The author of this report exercises such care. The author has no access to classified information, and this report contains no such information. However, a higher standard of discretion is necessary. An analyst should not publish sensitive information, defined here as detailed information that could substantially assist an attacking group to attain its objectives, even if this information is publicly available from other sources. On the other hand, secrecy has costs, and an entrenched culture of secrecy is not compatible with a clear-headed, science-based approach to the understanding of risks. Section 3.3 of this report provides a further discussion about identifying and managing sensitive information.

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<sup>4</sup> NRC, 2007a.

<sup>5</sup> NRC, 2007b.

*Structure of this report*

The remainder of this report has five sections. Section 2 provides a broad, US-wide perspective on potential malicious actions at commercial nuclear facilities. That potential is discussed within the contexts of the general threat environment and national policy on homeland security. Section 3 sets forth an appropriate framework for assessing the risks of malicious actions at nuclear facilities, and for incorporating the findings in an EA or EIS. In Section 4, the Diablo EA Supplement is reviewed, using the framework set forth in Section 3 as a standard that should be met. That review does not purport to provide analysis that corrects deficiencies in the Diablo EA Supplement. Providing such analysis is a task for the NRC Staff. Conclusions are set forth in Section 5, and a bibliography is provided in Section 6. All documents cited in the text of this report are listed in the bibliography.

**2. A US-Wide Perspective on Potential Malicious Actions at Nuclear Facilities**

**2.1 The General Threat Environment**

The potential for a deliberate attack on a commercial nuclear facility arises within a larger context, namely the general threat environment for the US homeland. That environment reflects, in turn, a complex set of factors operating internationally.

If the Diablo Canyon nuclear generation units receive 20-year license extensions, they will operate until 2041 (Unit 1) and 2045 (Unit 2), discharging spent fuel throughout that period. The proposed Yucca Mountain repository could not accommodate more than a fraction of the Diablo units' cumulative discharge of spent fuel, and it is increasingly unlikely that this repository will open. No other option is currently available for removing spent fuel from the Diablo Canyon site. At that site, as at nuclear power plant sites across the US, the most likely outcome is that spent fuel will be stored at the site for the foreseeable future, potentially for longer than a century.<sup>6</sup> Thus, in assessing the risks of malicious actions at a Diablo Canyon ISFSI, one should consider the general threat environment over the next century.

*The threat from sub-national groups*

The US homeland has not been attacked by another nation since World War II. One factor behind this outcome has been the US deployment of military forces with a high capability for counter-attack. There have, however, been significant attacks on the US homeland and other US assets by sub-national groups since World War II. Such attacks are typically not deterred by US capability for counter-attack, because the attacking group has no identifiable territory. Indeed, sub-national groups may attack US assets

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<sup>6</sup> Thompson, 2005a.

with the specific purpose of prompting US counter-attacks that harm innocent persons, thereby undermining the global political position of the US.

Attacks on the homeland by sub-national groups in recent decades include vehicle bombings of the World Trade Center in New York in February 1993 and the Murrah Federal building in Oklahoma City in April 1995, and aircraft attacks on the World Trade Center and the Pentagon in September 2001. Outside the homeland, attacks on US assets by sub-national groups have included vehicle-bomb attacks on a Marine barracks in Beirut in October 1983 and embassies in Tanzania and Kenya in August 1998, and a boat-bomb attack on the USS Cole in October 2000. At present, sub-national groups routinely attack US forces in Iraq.

In many of these incidents, the attacking group has been based outside the US. An exception was the Oklahoma City bombing, where the attacking group was domestic in both its composition and its motives. There is concern that future attacks within the US may be made by groups that are domestically based but have linkages to, or sympathy with, interests outside the US. This phenomenon was exhibited in London in July 2005, when young men born in the UK conducted suicide bombings in underground trains and a bus.

Reducing the risks of attack by sub-national groups requires a sophisticated, multi-faceted and sustained policy. An unbalanced policy can be ineffective or counterproductive. Since September 2001, the US government has implemented a policy that is heavily weighted toward offensive military action. Evidence is accumulating that this policy has been significantly counterproductive. Table 2-1 provides a sample of the evidence. The table shows recent public-opinion data from four Muslim-majority countries (Morocco, Egypt, Pakistan, Indonesia). In each country, a majority (ranging from 53 percent of respondents in Indonesia to 86 percent in Egypt) believes that the primary goal of the US "war on terrorism" is to weaken Islam or control Middle East resources (oil and natural gas). One expression of this belief is that substantial numbers of people (ranging from 19 percent of respondents in Indonesia to 91 percent in Egypt) approve of attacks on US troops in Iraq. Smaller numbers of people (ranging from 4 to 7 percent of respondents) approve of attacks on civilians in the US.<sup>7</sup>

The great majority of people, in these four countries and elsewhere, will not participate in attacks on US assets. However, there are consequences when millions of people believe that the US seeks to undermine their religion and culture and control their resources. Among other consequences, this belief creates a social climate that can help sub-national groups to form and to acquire the skills, funds and equipment they need in order to mount attacks. From a US perspective, such groups are "terrorists". Within their own cultures, they may be seen as soldiers engaged in "asymmetric warfare" with a powerful enemy.

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<sup>7</sup> Kull et al, 2007.

*The threat environment over the coming decades*

As mentioned above, an assessment of the risks of malicious actions at a Diablo Canyon ISFSI should consider the general threat environment over the next century. Forecasting trends in the threat environment over such a period is a daunting exercise, with inevitably uncertain findings. Nevertheless, if an ISFSI is constructed at Diablo Canyon, the security aspects of its design will reflect an implicit or explicit forecast of trends in the general threat environment. The forecast should be explicit, and should be global in scope, because the US cannot be insulated from broad trends in violent conflict and social disorder.

Numerous analysts – in academia, government and business – are involved in efforts to forecast possible worldwide trends that pertain to violence. These efforts rarely attempt to look forward more than one or two decades. Two examples are illustrative. First, a group based at the University of Maryland tracks a variety of indicators for most of the countries in the world, in a data base that extends back to 1950 and earlier. Using these data, the group periodically provides country-level assessments of the potential for outbreaks of violent conflict.<sup>8</sup> Second, the RAND corporation has conducted a literature review and assessment of potential worldwide trends that would be adverse for US national security.<sup>9</sup>

Several decades ago, some analysts of potential futures began taking an integrated world view, in which social and economic trends are considered in the context of a finite planet. In this view, trends in population, resource consumption and environmental degradation can be significant, or even dominant, determinants of the options available to human societies. A well-known, early example of this genre is the *Limits to Growth* study, sponsored by the Club of Rome, which modeled world trends by using systems dynamics.<sup>10</sup> A more recent example is the work of the Global Scenario group, convened by the Stockholm Environment Institute (SEI).<sup>11</sup> This work was informed by systems-dynamics thinking, but focused on identifying the qualitative characteristics of possible future worldwide scenarios for human civilization. SEI identified three types of scenario, with two variants of each type, as shown in Table 2-2. The Conventional Worlds scenario has Market Forces and Policy Reform variants, the Barbarization scenario has Breakdown and Fortress World variants, while the Great Transitions scenario has Eco-Communalism and New Sustainability Paradigm variants.

The SEI scenarios provide a useful framework for considering the paths that human civilization could follow during the next century and beyond. Not all paths are possible. Notably, continued trends of resource depletion and irreversible degradation of ecosystems would limit the range of options available to succeeding generations.

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<sup>8</sup> Marshall and Gurr, 2005.

<sup>9</sup> Kugler, 1995.

<sup>10</sup> Meadows et al, 1972.

<sup>11</sup> Raskin et al, 2002.

Similarly, destruction of human and industrial capital through large-scale warfare could inhibit economic and social recovery for many generations.

At present, the dominant world paradigm corresponds to the Market Forces scenario. Policy Reform is pursued at the rhetorical level, but is weakly implemented in practice. In parts of the world, notably in Africa, the Breakdown scenario is already operative. Aspects of the Fortress World scenario are also evident, and are likely to become more prominent if trends of resource depletion and ecosystem degradation continue, especially if major powers reject the dictates of sustainability and use armed force to secure resources. One sign of resource depletion is a growing body of analysis that predicts a peak in world oil production within the next few decades.<sup>12</sup> This prediction is sobering in view of the prominent role played by oil in the origins and conduct of war in the 20th century.<sup>13</sup> A now-familiar sign of ecosystem degradation is anthropogenic, global climate change. Analysts are considering the potential for climate change to promote, through its adverse impacts, social disorder and violence.<sup>14</sup> Other manifestations of ecosystem degradation are also significant. The recent Millennium Ecosystem Assessment determined that 15 out of the 24 ecosystem services that it examined "are being degraded or used unsustainably, including fresh water, capture fisheries, air and water purification, and the regulation of regional and local climate, natural hazards, and pests".<sup>15</sup> According to analysts at the United Nations University in Bonn, continuation of such trends could create up to 50 million environmental refugees by the end of the decade.<sup>16</sup>

At present, human population and material consumption per capita are growing to a degree that visibly stresses the biosphere. Moreover, ecosystem degradation and resource depletion coexist with economic inequality, increasing availability of sophisticated weapons technology, and an immature system of global governance. Major powers are doing little to address these problems. It seems unlikely that these imbalances and sources of instability will persist at such a scale during the remainder of the 21st century without major change occurring. That change could take various forms, but two broad-brush scenarios can illustrate the range of possible outcomes. In one scenario, there would be a transition to a civilization similar to the New Sustainability Paradigm articulated by SEI. That civilization would be comparatively peaceful and technologically sophisticated. Alternatively, the world could descend into a form of barbarism such as the Fortress World scenario articulated by SEI. That society might be locally prosperous, within enclaves, but would be violent and unstable.

In considering the level of security that should be built into an ISFSI, it would be prudent to adopt a pessimistic assumption of the potential for violent conflict in the future. Using SEI terminology, one could assume a Fortress World scenario with a high incidence of

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<sup>12</sup> Hirsch et al, 2005; GAO, 2007.

<sup>13</sup> Yergin, 1991.

<sup>14</sup> Gilman et al, 2007.

<sup>15</sup> MEA, 2005, page 1.

<sup>16</sup> Adam, 2005.

violent conflict of a type that involves sophisticated weapons and tactics. Violence might be perpetrated by national governments or by sub-national groups. A RAND corporation analyst has contemplated such a future in the following terms:<sup>17</sup>

"A dangerous world may offer an insidious combination of nineteenth-century politics, twentieth-century passions, and twenty-first century technology: an explosive mixture of multipolarity, nationalism, and advanced technology."

## **2.2 National Policy and Practice on Homeland Security**

To mount an effective response to the general threat environment for the US homeland, the nation needs a coherent homeland-security strategy that links responses to an array of specific threats, such as the potential for a deliberate attack on a commercial nuclear facility. As discussed below, there are deficiencies in the strategy that has actually been implemented. The nominal strategy was articulated by the White House in the *National Strategy for Homeland Security*, which was published in July 2002, and that guidance document apparently remains operative. The document sets forth three strategic objectives, in order of priority:<sup>18</sup>

- Prevent terrorist attacks within the United States;
- Reduce America's vulnerability to terrorism; and
- Minimize the damage and recover from attacks that do occur."

In pursuit of those objectives, the *National Strategy for Homeland Security* identifies six major mission areas: (i) intelligence and warning; (ii) border and transportation security; (iii) domestic counterterrorism; (iv) protecting critical infrastructure; (v) defending against catastrophic terrorism; and (vi) emergency preparedness and response. The fourth of those mission areas is highly relevant to nuclear reactors, spent-fuel pools, and ISFSIs, which are important elements of the nation's critical infrastructure. The other five mission areas are also relevant to nuclear facilities in various ways.

### *Protecting critical infrastructure*

The US Department of Homeland Security has issued the *National Infrastructure Protection Plan* (NIPP), whose purpose is to provide "the unifying structure for the integration of critical infrastructure and key resources (CI/KR) protection into a single national program".<sup>19</sup> Other federal agencies, including the NRC, have confirmed their acceptance of the NIPP.

The NIPP identifies three purposes of measures to protect critical infrastructure and key resources: (i) deter the threat; (ii) mitigate vulnerabilities; and (iii) minimize

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<sup>17</sup> Kugler, 1995, page 279.

<sup>18</sup> White House, 2002, page vii.

<sup>19</sup> DHS, 2006, page iii.

consequences associated with an attack or other incident. The NIPP identifies a range of protective measures as follows:<sup>20</sup>

"Protection can include a wide range of activities such as improving business protocols, hardening facilities, building resiliency and redundancy, incorporating hazard resistance into initial facility design, initiating active or passive countermeasures, installing security systems, leveraging "self-healing" technologies, promoting workforce surety programs, or implementing cyber security measures, among various others".

Protective measures of these types could significantly reduce the probability that an attack would be successful. Such measures could, therefore, "deter" attacks by altering attackers' cost-benefit calculations. That form of deterrence is different from deterrence attributable to an attacked party's capability to counter-attack. For convenience, the two forms of deterrence are described hereafter as "protective deterrence" and "counter-attack deterrence". It should be noted that the effective functioning of both forms of deterrence requires that: (i) potential attackers are aware of the deterrence strategy; and (ii) the deterrence strategy is technically credible. That requirement means that the existence and capabilities of protective measures, such as those identified in the NIPP, should be widely advertised. The technical details of a protective measure should, however, remain confidential if disclosure of those details would allow the measure to be defeated.

From the statement quoted above, it is clear that the authors of the NIPP recognize the potential benefits of designing protective measures into a facility before it is constructed. At the design stage, attributes such as resiliency, redundancy, hardening and passive operation can often be incorporated into a facility at a comparatively low incremental cost. Capturing opportunities for low-cost enhancement of protective measures would allow decision makers to design against a more pessimistic (i.e., more prudent) threat assumption, thereby strengthening protective deterrence, reducing the costs of other security functions (e.g., guard forces), and enhancing civil liberties (e.g., by reducing the perceived need for measures such as wiretapping). Moreover, incorporation of enhanced protective measures would often reduce risks associated with conventional accidents (e.g., fires), extreme natural events (e.g., earthquakes), or other challenges not directly attributable to human malice.

*Protective deterrence as part of a balanced policy for homeland security*

As mentioned in Section 2.1, above, reducing the risks of attack by sub-national groups requires a sophisticated, multi-faceted and sustained policy. The policy must balance multiple factors operating within and beyond the homeland. An unbalanced policy can be ineffective or counterproductive.

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<sup>20</sup> DHS, 2006, page 7.

A high-level task force convened by the Council on Foreign Relations (CFR) in 2002 understood the need for a balanced policy for homeland security.<sup>21</sup> One of the task force's major conclusions recognized the value of protective deterrence, while also recognizing that offensive military operations by the US could increase the risk of attack on the US. The conclusion was as follows:<sup>22</sup>

*"Homeland security measures have deterrence value: US counterterrorism initiatives abroad can be reinforced by making the US homeland a less tempting target. We can transform the calculations of would-be terrorists by elevating the risk that (1) an attack on the United States will fail, and (2) the disruptive consequences of a successful attack will be minimal. It is especially critical that we bolster this deterrent now since an inevitable consequence of the US government's stepped-up military and diplomatic exertions will be to elevate the incentive to strike back before these efforts have their desired effect."*

The NIPP could support a vigorous national program of protective deterrence, as recommended by the CFR task force in 2002. However, current priorities of the US government are not consistent with such a program. Resources and attention devoted to offensive military operations are much larger than those devoted to the protection of critical infrastructure.<sup>23</sup> The White House states, in the *National Strategy for Combating Terrorism*, issued in September 2006:<sup>24</sup> "We have broken old orthodoxies that once confined our counterterrorism efforts primarily to the criminal justice domain." In practice, that statement means that the US government relies overwhelmingly on military means to reduce the risks of attacks on US assets by sub-national groups. That policy continues despite mounting evidence, as illustrated by Table 2-1, that it is unbalanced and counterproductive.

A well-informed analyst of homeland security summarizes current national priorities in the following statement:<sup>25</sup>

*"Since the White House has chosen to combat terrorism as essentially a military and intelligence activity, it treats homeland security as a decidedly second-rate priority. The job of everyday citizens is to just go about their lives, shopping and traveling, while the Pentagon, Central Intelligence Agency, and National Security Agency wage the war."*

During a future Presidential administration, national priorities may shift, leading to greater emphasis on protective deterrence. Unfortunately, critical-infrastructure facilities

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<sup>21</sup> Members of the task force included two former Secretaries of State, two former chairs of the Joint Chiefs of Staff, a former Director of the CIA and the FBI, two former US Senators, and other eminent persons.

<sup>22</sup> Hart et al, 2002, pp 14-15.

<sup>23</sup> Flynn, 2007.

<sup>24</sup> White House, 2006, page 1.

<sup>25</sup> Flynn, 2007, page 11.

constructed prior to that policy shift may lack the protective design features that are envisioned in the NIPP. Persons responsible for the design of currently-proposed facilities, such as the proposed ISFSI at Diablo Canyon, could anticipate a national policy shift and take design decisions accordingly.

Table 2-3 illustrates the options and issues that should be considered in developing a balanced policy for protecting US critical infrastructure from attack by sub-national groups. This illustrative table shows the potential benefits that could be gained by assigning a higher priority to protective deterrence.

### **2.3 Commercial Nuclear Facilities as Potential Targets of Attack**

The *National Strategy for Combating Terrorism* discusses the importance of protecting critical infrastructure and key resources. Potential targets in this category are described as: "systems and assets so vital that their destruction or incapacitation would have a debilitating effect on the security of our Nation". In listing targets in this category, the Strategy includes: "nuclear reactors, materials, and waste".<sup>26</sup> An ISFSI at Diablo Canyon would clearly fit within that class of targets.

A sub-national group contemplating an attack within the US homeland would have a wide choice of targets. Also, groups in that category could vary widely in terms of their capabilities and motivations. In the context of potential attacks on nuclear facilities, the groups of concern are those that are comparatively sophisticated in their approach and comparatively well provided with funds and skills. The group that attacked New York and Washington in September 2001 met this description. A group of this type could choose to attack a US nuclear facility for one or both of two broad reasons. First, the attack could be highly symbolic. Second, the impacts of the attack could be severe.

#### *Nuclear facilities as symbolic targets*

From the symbolic perspective, commercial nuclear facilities are inevitably associated with nuclear weapons. The association further extends to the United States' large and technically sophisticated capability for offensive military operations. Application of that capability has aroused resentment in many parts of the world. Although nuclear weapons have not been used by the United States since 1945, US political leaders have repeatedly threatened, implicitly or explicitly, to use nuclear weapons again. Those threats coexist with efforts to deny nuclear weapons to other countries. The US government justified its March 2003 invasion of Iraq in large part by the possibility that the Iraqi government might eventually deploy nuclear weapons. There is speculation that the United States will attack nominally commercial nuclear facilities in Iran to forestall Iran's deployment of nuclear weapons.<sup>27</sup> Yet, the US government rejects the constraint of its own nuclear weapons by international agreements such as the Non-Proliferation Treaty.<sup>28</sup> As an

<sup>26</sup> White House, 2006, page 13.

<sup>27</sup> Hersh, 2006; Brzezinski, 2007.

<sup>28</sup> Deller, 2002; Scarry, 2002; Franceschini and Schaper, 2006.

approach to international security, this policy has been criticized by the director general of the International Atomic Energy Agency as "unsustainable and counterproductive".<sup>29</sup> It would be prudent to assume that this policy will motivate sub-national groups to respond asymmetrically to US nuclear superiority, possibly through an attack on a US commercial nuclear facility.

*Radiological impacts of an attack on a nuclear facility*

The impacts of an attack on a commercial nuclear facility could be severe because these facilities typically contain large amounts of radioactive material. Release of this material to the environment could create a variety of severe impacts. Also, as explained in Section 2.4, below, US nuclear facilities are provided with a defense that is "light" in a military sense. Moreover, imprudent design choices have made a number of these facilities highly vulnerable to attack. That combination of factors means that many US nuclear facilities can be regarded as potent radiological weapons that await activation by an enemy.

Nuclear facilities contain a variety of radioactive isotopes, but one isotope, namely cesium-137, is especially useful as an indicator of the potential for radiological harm. Cesium-137 is a radioactive isotope with a half-life of 30 years. This isotope accounts for most of the offsite radiation exposure that is attributable to the 1986 Chernobyl reactor accident, and for about half of the radiation exposure that is attributable to fallout from the testing of nuclear weapons in the atmosphere.<sup>30</sup> Cesium is a volatile element that would be liberally released during conventional accidents or attack scenarios that involve overheating of nuclear fuel.

Table 2-4 shows estimated amounts of cesium-137 in nuclear fuel in the Diablo Canyon reactors and spent-fuel pools, and in one of the spent-fuel storage modules of the proposed Diablo Canyon ISFSI. Table 2-5 compares these amounts with atmospheric releases of cesium-137 from detonation of a 10-kilotonne fission weapon, the Chernobyl reactor accident of 1986, and atmospheric testing of nuclear weapons. These data indicate that release of a substantial fraction of the cesium-137 in a Diablo Canyon nuclear facility could create comparatively large radiological impacts.

*Land contamination by cesium-137*

The radiological impacts of an atmospheric release of cesium-137 arise primarily from land contamination. Small particles containing cesium-137 are deposited on soil, vegetation and buildings. These particles emit gamma radiation that affects people who travel through or reside in the contaminated area. Food and water supplies also become contaminated. Over time, the amount of deposited cesium-137 is reduced through radioactive decay (with a half-life of 30 years) and through natural processes

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<sup>29</sup> ElBaradei, 2004, page 9.

<sup>30</sup> DOE, 1987.

(weathering) that carry cesium deeper into soil or into streams and lakes where it is deposited in sediments.

One measure of the radiological impacts attributable to deposition of cesium-137 is the area of land that would become uninhabitable. For illustration, assume that the threshold of uninhabitability is an external, whole-body dose of 10 rem over 30 years. That level of radiation exposure, which would represent about a three-fold increase above the typical level of background (natural) radiation, was used in the NRC's 1975 *Reactor Safety Study* as a criterion for relocating populations from rural areas.<sup>31</sup>

A radiation dose of 10 rem over 30 years corresponds to an average dose rate of 0.33 rem per year.<sup>32</sup> The health effects of radiation exposure at this dose level have been estimated by the National Research Council's Committee on the Biological Effects of Ionizing Radiations (BEIR V committee).<sup>33</sup> The committee estimated that a continuous lifetime exposure of 0.1 rem per year would increase the incidence of fatal cancers in an exposed population by 2.5 percent for males and 3.4 percent for females.<sup>34</sup> Incidence would scale linearly with dose, in this low-dose region.<sup>35</sup> Thus, an average lifetime exposure of 0.33 rem per year would increase the incidence of fatal cancers by about 8 percent for males and 11 percent for females. About 21 percent of males and 18 percent of females normally die of cancer.<sup>36</sup> In other words, in populations residing continuously at the threshold of uninhabitability (an external dose rate of 0.33 rem per year), about 2 percent of people would suffer a fatal cancer that would not otherwise occur.<sup>37</sup> Internal doses from contaminated food and water could cause additional cancer fatalities.

An average dose rate of 0.33 rem per year would be experienced at the boundary of the uninhabitable area. Within that area, the external dose rate from cesium-137 would exceed the threshold of 10 rem over 30 years. At some locations, the dose rate could exceed this threshold by orders of magnitude. Therefore, persons choosing to live within the uninhabitable area could experience an incidence of fatal cancers at a level higher than is set forth above.

For a postulated release of cesium-137 to the atmosphere, the area of uninhabitable land can be estimated from calculations done by Jan Beyea.<sup>38</sup> Two releases of cesium-137 are

<sup>31</sup> NRC, 1975, Appendix VI, page 11-17.

<sup>32</sup> At a given location contaminated by cesium-137, the resulting external, whole-body dose received by a person at that location would decline over time, due to radioactive decay and weathering of the cesium-137. Thus, a person receiving 10 rem over an initial 30-year period would receive a lower dose over the subsequent 30-year period.

<sup>33</sup> National Research Council, 1990.

<sup>34</sup> National Research Council, 1990, Table 4-2.

<sup>35</sup> The BEIR V committee assumed a linear dose-response model for cancers other than leukemia, and a model for leukemia that is effectively linear in the low-dose range. See: National Research Council, 1990, pp 171-176.

<sup>36</sup> National Research Council, 1990, Table 4-2.

<sup>37</sup> For males,  $0.08 \times 0.21 = 0.017$ . For females,  $0.11 \times 0.18 = 0.020$ .

<sup>38</sup> Beyea, 1979. Related calculations are provided in: Alvarez et al, 2003; Beyea et al, 2004.

postulated here, drawing upon data from Table 2-4. The first release is 30 million Curies, representing about one-half of the cesium-137 in a Diablo Canyon spent-fuel pool. The second postulated release is 3 million Curies, representing about one-half of the cesium-137 in the core of a Diablo Canyon reactor, or about one-half of the cesium-137 in four spent-fuel storage modules of a Diablo Canyon ISFSI. For typical weather conditions, a release of 30 million Curies of cesium-137 would render about 75,000 square kilometers of land uninhabitable, assuming that the radioactive plume travels inland rather than out to sea. A release of 3 million Curies would render uninhabitable about 7,500 square kilometers.

An atmospheric release of 50 percent of the cesium-137 in a Diablo Canyon spent-fuel pool would be a likely outcome of a conventional accident or attack that causes the water level in the pool to fall below the top of the fuel-storage racks.<sup>39</sup> Similarly, a release of 50 percent of the cesium-137 in a Diablo Canyon reactor would be a likely outcome of a range of potential accidents or attacks that affect the reactor. This report focuses on the Diablo Canyon ISFSI rather than the reactors and spent-fuel pools. The potential release of cesium-137 from the Diablo Canyon ISFSI is addressed in Section 4, below.

#### **2.4 The NRC's Approach to Nuclear-Facility Security**

A policy on protecting nuclear facilities from attack is laid down in NRC regulation 10 CFR 50.13. That regulation was promulgated in September 1967 by the US Atomic Energy Commission (AEC) – which preceded the NRC – and was upheld by the US Court of Appeals in August 1968. It states:<sup>40</sup>

"An applicant for a license to construct and operate a production or utilization facility, or for an amendment to such license, is not required to provide for design features or other measures for the specific purpose of protection against the effects of (a) attacks and destructive acts, including sabotage, directed against the facility by an enemy of the United States, whether a foreign government or other person, or (b) use or deployment of weapons incident to US defense activities."

Some readers might interpret 10 CFR 50.13 to mean that licensees are not required to design or operate nuclear facilities to resist potential attacks by sub-national groups. The NRC has rejected that interpretation in the context of vehicle-bomb attacks, stating:<sup>41</sup>

"It is simply not the case that a vehicle bomb attack on a nuclear power plant would almost certainly represent an attack by an enemy of the United States, within the meaning of that phrase in 10 CFR 50.13."

Events have obliged the NRC to progressively require greater protection against attacks by sub-national groups. A series of events, including the 1993 vehicle-bomb attack on

<sup>39</sup> Alvarez et al, 2003; Thompson, 2006; National Research Council, 2006.

<sup>40</sup> Federal Register, Vol. 32, 26 September 1967, page 13445.

<sup>41</sup> NRC, 1994, page 38893.

the World Trade Center in New York, persuaded the NRC to introduce, in 1994, regulatory amendments requiring licensees to defend nuclear power plants against vehicle bombs.<sup>42</sup> The attacks on New York and Washington in September 2001 led the NRC to require additional protective measures.

With rare exceptions, the NRC has refused to consider potential malicious actions in the context of license proceedings or environmental impact statements. The NRC's policy on this matter is illustrated by a September 1982 ruling by the Atomic Safety and Licensing Board (ASLB) in the operating-license proceeding for the Harris nuclear power plant. An intervenor, Wells Eddleman, had proffered a contention alleging, in part, that the plant's safety analysis was deficient because it did not consider the "consequences of terrorists commandeering a very large airplane....and diving it into the containment." In refusing to consider this contention, the ASLB stated:<sup>43</sup>

"This part of the contention is barred by 10 CFR 50.13. This rule must be read *in pari materia* with 10 CFR 73.1(a)(1), which describes the "design basis threat" against which commercial power reactors *are* required to be protected. Under that provision, a plant's security plan must be designed to cope with a violent external assault by "several persons," equipped with light, portable weapons, such as hand-held automatic weapons, explosives, incapacitating agents, and the like. Read in the light of section 73.1, the principal thrust of section 50.13 is that military style attacks with heavier weapons are not a part of the design basis threat for commercial reactors. Reactors could not be effectively protected against such attacks without turning them into virtually impregnable fortresses at much higher cost. Thus Applicants are not required to design against such things as artillery bombardments, missiles with nuclear warheads, or kamikaze dives by large airplanes, despite the fact that such attacks would damage and may well destroy a commercial reactor."

*The design basis threat*

The NRC requires its licensees to defend against a design basis threat (DBT), a postulated attack that has become more severe over time. The present DBT for nuclear power plants was promulgated in January 2007. Details are not publicly available. (The NRC publishes a summary description, which is provided below.) The present DBT is similar to one ordered by the NRC in April 2003.<sup>44</sup> At that time, the NRC described its order as follows:<sup>45</sup>

"The Order that imposes revisions to the Design Basis Threat requires power plants to implement additional protective actions to protect against sabotage by terrorists and other adversaries. The details of the design basis threat are

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<sup>42</sup> NRC, 1994.

<sup>43</sup> ASLB, 1982.

<sup>44</sup> NRC Press Release No. 07-012, 29 January 2007.

<sup>45</sup> NRC Press Release No. 03-053, 29 April 2003.

safeguards information pursuant to Section 147 of the Atomic Energy Act and will not be released to the public. This Order builds on the changes made by the Commission's February 25, 2002 Order. The Commission believes that this DBT represents the largest reasonable threat against which a regulated private security force should be expected to defend under existing law."

From that statement, and from other published information, it is evident that the NRC requires a comparatively "light" defense for nuclear power plants and their spent fuel. The scope of the defense does not reflect a full spectrum of threats. Instead, it reflects a consensus about the level of threat that licensees can "reasonably" be expected to resist.<sup>46</sup> In illustration of this approach, when the NRC adopted the currently-applicable DBT rule in January 2007, it stated that the rule "does not require protection against a deliberate hit by a large aircraft", and that "active protection [of nuclear power plants] against airborne threats is addressed by other federal organizations, including the military".<sup>47</sup>

The present DBT for "radiological sabotage" at a nuclear power plant has the following published attributes:<sup>48</sup>

"(i) A determined violent external assault, attack by stealth, or deceptive actions, including diversionary actions, by an adversary force capable of operating in each of the following modes: A single group attacking through one entry point, multiple groups attacking through multiple entry points, a combination of one or more groups and one or more individuals attacking through multiple entry points, or individuals attacking through separate entry points, with the following attributes, assistance and equipment:

- (A) Well-trained (including military training and skills) and dedicated individuals, willing to kill or be killed, with sufficient knowledge to identify specific equipment or locations necessary for a successful attack;
- (B) Active (e.g., facilitate entrance and exit, disable alarms and communications, participate in violent attack) or passive (e.g., provide information), or both, knowledgeable inside assistance;
- (C) Suitable weapons, including handheld automatic weapons, equipped with silencers and having effective long range accuracy;
- (D) Hand-carried equipment, including incapacitating agents and explosives for use as tools of entry or for otherwise destroying reactor, facility, transporter, or container integrity or features of the safeguards system; and
- (E) Land and water vehicles, which could be used for transporting personnel and their hand-carried equipment to the proximity of vital areas; and

<sup>46</sup> Fertel, 2006; Wells, 2006; Brian, 2006.

<sup>47</sup> NRC Press Release No. 07-012, 29 January 2007.

<sup>48</sup> 10 CFR 73.1 Purpose and scope, accessed from the NRC web site ([www.nrc.gov](http://www.nrc.gov)) on 14 June 2007.

- (ii) An internal threat; and
- (iii) A land vehicle bomb assault, which may be coordinated with an external assault; and
- (iv) A waterborne vehicle bomb assault, which may be coordinated with an external assault; and
- (v) A cyber attack."

That DBT seems impressive, and is more demanding than previously-published DBTs. However, the DBT cannot be highly demanding in practice, given the equipment that the NRC requires for a security force. Major items of required equipment are semiautomatic rifles, shotguns, semiautomatic pistols, bullet-resistant vests, gas masks, and flares for night vision.<sup>49</sup> Plausible attacks could overwhelm a security force equipped in this manner. Also, press reports state that the assumed attacking force contains no more than six persons.<sup>50</sup>

Table 2-6 sets forth some potential modes and instruments of attack on a nuclear power plant, and summarizes the present defenses against these modes and instruments. That table shows that a variety of potential attack scenarios could not be effectively resisted by present defenses. Potential attacks on an ISFSI are discussed in Section 4, below.

#### *Protective deterrence and the NRC*

A rationale for the present level of protection of nuclear facilities was articulated by the NRC chair, Richard Meserve, in 2002.<sup>51</sup>

"If we allow terrorist threats to determine what we build and what we operate, we will retreat into the past – back to an era without suspension bridges, harbor tunnels, stadiums, or hydroelectric dams, let alone skyscrapers, liquid-natural-gas terminals, chemical factories, or nuclear power plants. We cannot eliminate the terrorists' targets, but instead we must eliminate the terrorists themselves. A strategy of risk avoidance – the elimination of the threat by the elimination of potential targets – does not reflect a sound response."

That statement shows no understanding of the need for a balanced policy to protect critical infrastructure, employing the principles of protective deterrence. There is considerable potential to embody those principles in the design of nuclear facilities, especially new facilities. It has been known for decades that nuclear power plants could be designed to be more robust against attack. For example, in the early 1980s the reactor vendor ASEA-Atom developed a preliminary design for an "intrinsically safe" commercial reactor known as the PIUS reactor. Passive-safety design principles were

<sup>49</sup> 10 CFR 73 Appendix B – General Criteria for Security Personnel, Section V, accessed from the NRC web site ([www.nrc.gov](http://www.nrc.gov)) on 14 June 2007.

<sup>50</sup> Hebert, 2007.

<sup>51</sup> Meserve, 2002, page 22.

used. The design basis for the PIUS reactor included events such as equipment failures, operator errors and earthquakes, but also included: (i) takeover of the plant for one operating shift by knowledgeable saboteurs equipped with large amounts of explosives; (ii) aerial bombardment with 1,000-pound bombs; and (iii) abandonment of the plant by the operators for one week.<sup>52</sup> An ISFSI could be designed to withstand similar threats.

*Consideration of malicious actions in environmental impact statements*

As stated above, the NRC has generally refused to consider potential malicious actions in environmental impact statements. An exception is the NRC's August 1979 *Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel* (NUREG-0575), which considered potential sabotage events at a spent-fuel pool.<sup>53</sup> Table 2-7 describes the postulated events, which encompassed the detonation of explosive charges in the pool, breaching of the walls of the pool building and the pool floor by explosive charges or other means, and takeover of the central control room for one half-hour. Involvement of up to about 80 adversaries was implied.

NUREG-0575 did not recognize the potential for an attack with these attributes to cause a fire in the pool.<sup>54</sup> Technically-informed attackers operating within this envelope of attributes could cause a fire in a spent-fuel pool at Diablo Canyon or any other operating nuclear power plant in the US.<sup>55</sup> Informed attackers could use explosives, and their command of the control room for one half-hour, to drain water from the pool and release radioactive material from the adjacent reactor. The radiation field from the reactor release and the drained pool could preclude personnel access, thus precluding recovery actions if command of the plant were returned to the operators after one half-hour. Exposure of spent fuel to air would initiate a fire that would release to the atmosphere a large fraction of the pool's inventory of cesium-137.<sup>56</sup>

### **3. An Appropriate Framework for Assessing the Risks of Malicious Actions at Nuclear Facilities**

#### **3.1 Extending Traditional Risk Assessment to Encompass Malicious Actions**

Over a three-decade period, the NRC has accepted, in various contexts, that an analysis of a nuclear facility's environmental impacts should consider a range of conventional accidents. Here, the term "conventional accidents" refers to incidents caused by human error, equipment failure or natural events, but excludes incidents caused by malicious actions. The radiological impacts of conventional accidents are examined through the

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<sup>52</sup> Hannerz, 1983.

<sup>53</sup> NRC, 1979, Section 5 and Appendix J.

<sup>54</sup> The sabotage events postulated in NUREG-0575 yielded comparatively small radioactive releases.

<sup>55</sup> Spent-fuel pools at Diablo Canyon and other US nuclear power plants are currently equipped with high-density racks for holding spent fuel. Loss of water from a pool equipped with high-density racks would, over a wide range of water-loss scenarios, lead to ignition and burning of spent fuel assemblies.

<sup>56</sup> Alvarez et al, 2003; Thompson, 2006; National Research Council, 2006.

use of risk-assessment tools such as probabilistic risk assessment (PRA). The first PRA for a commercial nuclear reactor was the *Reactor Safety Study*.<sup>57</sup> A PRA for a nuclear facility considers a number of conventional accident scenarios, estimating both their radiological consequences and their probabilities of occurrence. In a competently-conducted PRA study, a conventional accident scenario is not screened out a priori if its probability is thought to be low. Instead, the scenario's radiological consequences and probability are systematically estimated to determine its contribution to the overall risks associated with the facility.

The traditional tools and practices of radiological risk assessment should be adapted to address the risks of malicious actions at a nuclear facility. In this application of risk assessment, conventional accident scenarios would be replaced by attack scenarios. (These are also known as threat scenarios.) Probability would be treated differently in this application, however, because there is usually no statistical basis to support quantitative estimates of the probabilities of malicious actions. To accommodate that problem, occurrence of a representative set of malicious actions would be assumed. The scenarios flowing from each postulated malicious action would then be analyzed to estimate the conditional probabilities and other characteristics of the outcomes, including radiological impacts. The resulting information would be useful for a variety of purposes. It would, for example, help to identify options to reduce the risks of malicious actions through changes in the design or mode of operation of the facility. PRA-related studies have been very helpful in this respect in the context of conventional accidents.

Information obtained by assuming the occurrence of a set of malicious actions should be combined with qualitative estimates of the probabilities of the malicious actions, to yield risk findings that have qualitative and quantitative components. The process of combination should occur in such a way that assumptions and qualitative estimates of probability can be re-visited at any time. With that provision, new information or differing professional opinions could be factored into the risk findings without difficulty. A standardized terminology should be developed to facilitate reasoned discussion of assumptions and qualitative estimates.

The NRC, in developing its 1994 ruling on protection of nuclear power plants against vehicle bombs, adopted the PRA-adaptation approach described above, stating:<sup>58</sup>

"The NRC does not believe that it can quantify the likelihood of vehicle bomb attack. However, it has performed a conditional probabilistic risk analysis for an existing power reactor site, assuming an attempt to damage a nuclear power plant with a design basis vehicle bomb placed at locations within the protected area that would create the greatest risk to public health and safety. The analysis indicated that the contribution to core damage frequency could be high."

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<sup>57</sup> NRC, 1975.

<sup>58</sup> NRC, 1994, page 38891.

The NRC argued that its vehicle-bomb ruling was "prudent" in view of a vehicle intrusion incident at the Three Mile Island site and a vehicle bombing of the World Trade Center in February 1993.<sup>59</sup> In support of this view, the NRC noted that the 1993 World Trade Center bombing was "organized within the United States and implemented with materials obtained on the open market in the United States".<sup>60</sup>

The vehicle-bomb ruling was a step forward in that the NRC recognized one form of threat scenario (use of a vehicle bomb) for an attack on a nuclear facility by a sub-national group. However, the NRC failed to recognize other threat scenarios that are at least as credible. Section 4.3, below, discusses other, credible scenarios in the context of an ISFSI; analogous scenarios are relevant to power reactors and spent-fuel pools. Also, the NRC failed to develop a standardized terminology for assumptions and qualitative estimates regarding the probabilities of attack scenarios. At present (June 2007), the NRC still lacks such a terminology.

Assessment of malice-related risks, as described here, would typically involve the use of sensitive information. Here, the term "sensitive" refers to detailed information that could substantially assist an attacking group to attain its objectives. Management of sensitive information is discussed in Section 3.3, below.

In reviewing a license application for a nuclear facility, the NRC considers a set of design-basis conventional accidents. That consideration occurs under the umbrella of the Atomic Energy Act. An analogous situation pertains in the security realm. There, the NRC considers a facility's ability to withstand a design-basis threat. That consideration also occurs under the umbrella of the Atomic Energy Act. However, when the NRC examines a facility's environmental impacts, it does so under the umbrella of NEPA. In performing such examinations, the NRC has repeatedly accepted that it should consider conventional accidents more severe than design-basis conventional accidents. Logic indicates, therefore, that an assessment by the NRC of the risks of malicious actions at a nuclear facility, conducted under the umbrella of NEPA, should consider reasonably foreseeable threats more severe than design-basis threats.

### **3.2 Examining a Full Range of Risks, Risk-Reducing Options and their Implications**

A competently-performed assessment of the conventional accident risks at a nuclear facility would consider radiological risks. The assessment would also identify and characterize options for reducing those risks by modifying the facility's design or mode of operation. Articulating knowledge about such options is an important purpose of NEPA. Essentially the same requirements should apply to an assessment of the risks of malicious actions. The latter assessment should consider radiological risks and options for reducing those risks.

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<sup>59</sup> NRC, 1994, Summary.

<sup>60</sup> NRC, 1994, page 38891.

*Additional risks and impacts*

Risks and impacts arising from the potential for malicious actions are not limited to radiological risks. Social and economic impacts could be caused by malicious actions, the expectation of malicious actions, the choice of design options, or other factors. The term "additional risks and impacts" is used here to encompass the potential for such impacts. These additional risks and impacts deserve careful research, and it is premature to provide a taxonomy of them. Additional risks and impacts, and their relationships with risk-reducing options, should be examined in any malice-related risk assessment. The following, simplified example illustrates some additional risks and impacts, and shows the importance of considering them in a risk assessment.

Consider a proposed nuclear facility (e.g., a reactor, a spent-fuel pool, or an ISFSI) that would contain a large amount of radioactive material. There are two design options. Option A would employ a design that was developed one or more decades ago. It would have a comparatively low ability to resist an attack. To compensate for its vulnerability, it would be protected by a large force of armed guards. Detailed information about the option's design, and about the guard force, would be secret. The public would be excluded from any effective role in the licensing of this option. Option B would employ a design using hardening, resiliency and passive protection as envisioned in the NIPP. It would have a comparatively high ability to resist an attack. As a result, a less capable guard force would be required, there would be no need for secrecy, and the public would have full access to license proceedings.

To further simplify this example, assume that the estimated life-cycle costs and radiological risks of Options A and B would be identical. In that case, Option A would be clearly inferior because it would increase the use of secret information and decrease the public's role in decision-making, tendencies that are antithetical to US traditions and inconsistent with long-term national prosperity. Put differently, Option A would have higher levels of social and economic impacts. Moreover, if a malicious action were to cause a release of radioactive material, the social and economic impacts could be higher if Option A had been chosen, because that choice would have relegated the public to a lesser role.

The preceding example, although simplified, is far from theoretical. Design options have been employed that are highly vulnerable to attack, and the NRC has become much more secretive in recent years. Consider the case of spent-fuel pools equipped with high-density racks. All the spent-fuel pools at US nuclear power plants are so equipped. The NRC asserts that these pools are adequately safe and secure. Yet, since September 2001 the NRC has not published any technical analysis on the safety and security of spent-fuel pools, and has denied requests by intervenors that spent-fuel-pool risks be addressed in evidentiary hearings. As a result, the NRC has never published any analysis on the risks of a spent-fuel-pool fire initiated by malicious action, and has never allowed an examination of these risks in a license proceeding. In this real-world case, spent-fuel

pools equipped with high-density racks are Option A. An Option B is available, namely re-equipping the pools with low-density, open-frame racks, as was intended when the present generation of US nuclear power plants was designed.<sup>61</sup>

*Cumulative risks of closely-associated facilities*

Many nuclear facilities are closely associated with other nuclear facilities. For example, the Diablo Canyon site features two reactors and two spent-fuel pools. These four facilities are in close physical proximity and share many supporting systems. As a result, the conventional accident risks and malice-related risks associated with any one of these four facilities can only be properly understood through analyses that consider interactions among all four facilities. The proposed ISFSI at Diablo Canyon would share the guard force and other security measures that are deployed at the site. A release of radioactive material from the ISFSI could affect the operation of the reactors and pools, and vice versa. Thus, malice-related risks at the ISFSI should be considered in the context of malice-related risks across the entire site. Also, the ISFSI would be used to support continued operation of the reactors. Thus, risks arising from operation of the ISFSI over its lifetime should be viewed in the context of reactor risks.

To generalize from the Diablo Canyon example, any assessment of conventional accident risks or malice-related risks should examine the interactions among closely-associated facilities, and should assess the cumulative risks arising from operation of those facilities.

### **3.3 Managing Sensitive Information**

A thorough assessment of malice-related risks at a nuclear facility would typically involve the use of sensitive information, defined here as detailed information that could substantially assist an attacking group to attain its objectives. Given this definition, general information about a nuclear facility, including its overall physical layout, operating principles and radioactive inventory, would not be sensitive. Information about the potential radiological impacts of a malicious action would not be sensitive. Detailed information about vulnerable points of the facility, or detailed information about attack scenarios that could exploit such points of vulnerability, could be sensitive. None of the information provided in this report is sensitive.

Sensitive information, as defined here, is not appropriate for general dissemination. Thus, processes for the assessment of malice-related risks must involve rules and practices for managing sensitive information so that its distribution is limited.

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<sup>61</sup> In this case, Option B would have a much lower radiological risk than Option A, but a higher capital cost.

*The costs of secrecy*

Rules and practices for designating information as sensitive, and for managing information so designated, should recognize that secrecy has high costs. As stated in Section 3.2, above, secrecy is antithetical to US traditions and inconsistent with long-term national prosperity. Thus, an assessment of malice-related risks at a nuclear facility should consider the social and economic impacts of secrecy. That consideration would tend to favor design options involving features such as hardening, resiliency and passive protection. In some instances, secrecy-related impacts could be so high that they outweigh any benefits from operating a nuclear facility. It should be remembered that nuclear facilities exist to serve society, rather than vice versa.

It should also be noted that the safety and security of nuclear facilities will be significantly and adversely affected by an entrenched culture of secrecy. Such a culture is not compatible with a clear-headed, science-based approach to the understanding of risks. Entrenched secrecy perpetuates dogma, stifles dissent, and can create a false sense of security. In illustration, the culture of secrecy in the former USSR was a major factor contributing to the occurrence of the 1986 Chernobyl reactor accident.<sup>62</sup>

*The limited effectiveness of knowledge suppression*

Within the NRC and elsewhere, factions will argue that suppression of knowledge can reduce the risks of malicious actions at nuclear facilities. Knowledge suppression is, however, a strategy with limited effectiveness. Nuclear fission power is a mature technology based on science from the mid-20th century. Detailed information about nuclear technology and individual nuclear facilities is archived at many locations around the world, and large numbers of people have worked in nuclear facilities. Similarly, information about weapons and other devices that could be used to attack nuclear facilities is widely available. Large numbers of people have been trained to use such devices in a military context. Thus, it would be prudent to assume that sophisticated sub-national groups can identify and exploit vulnerabilities in US nuclear facilities.

*A balanced approach to managing sensitive information*

From the preceding discussion, it is clear that managing sensitive information should be done carefully, balancing several considerations. The NRC has not achieved this balance since September 2001. Instead, the NRC has taken a crude, counterproductive approach in which it is excessively secretive while also making assertions about safety and security that do not withstand critical examination. To help correct this situation, the NRC should engage public stakeholders (citizen groups, academics, state and local governments, etc.) and licensees in a dialogue that seeks consensus on an effective, balanced policy for

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<sup>62</sup> Thompson, 2002, Section X.

management of sensitive information. Implementation of that policy would not necessarily require changes in NRC rules.

### **3.4 Ensuring Compatibility with a Comprehensive National Strategy for Homeland Security**

Section 2, above, explains the need for a comprehensive, balanced strategy to reduce the risks of attack on US critical infrastructure by sub-national groups. The *National Infrastructure Protection Plan* could be a major element of that strategy, supporting a policy of enhanced protective deterrence.

The conduct of thorough assessments of malice-related risks at US nuclear facilities could make a major contribution to implementation of the NIPP. These assessments could provide models to be followed in other infrastructure sectors, such as the chemical industry. Even better, the NRC could work with other agencies to develop a risk-assessment framework that allows risks to be compared not only within an infrastructure sector (such as the nuclear industry, or the chemical industry) but also among sectors.

As an initial step, the NRC should develop malice-related risk assessments that are scientifically credible and meet the other requirements set forth above. While developing these assessments, the NRC should engage in dialogue and cooperative research with other agencies and stakeholders, seeking to develop a pan-sectoral risk-assessment framework.

### **3.5 Incorporating Findings into an Environmental Assessment or Environmental Impact Statement**

Sections 3.1 through 3.4, above, outline a set of standards for the conduct of malice-related risk assessments. When those assessments are done, they must be incorporated into EAs or EISs, either retroactively or concurrently. During that process, provision must be made for limiting the dissemination of sensitive information. The best approach would be to place sensitive information in appendices whose dissemination is limited. The full title of each such appendix, and a general summary of its purpose, scope and findings, should be included in the body of the EA or EIS, which would be openly published.

## **4. The NRC Staff's Supplement to the Environmental Assessment for the Diablo Canyon ISFSI**

### **4.1 Scope, Assumptions, Methodology and Conclusions of the Staff's Supplement**

In October 2003, the NRC Staff issued an Environmental Assessment for the proposed ISFSI at Diablo Canyon. Pursuant to a ruling by the 9th Circuit of the US Court of

Appeals, the Staff issued a Supplement to that EA in May 2007.<sup>63</sup> Here, that Supplement is described as the Diablo EA Supplement. The Supplement addresses the risks of potential malicious actions at the proposed ISFSI. It concludes (at page 7) that "a terrorist attack that would result in a significant release of radiation affecting the public is not reasonably expected to occur".

Shortly after issuing the Diablo EA Supplement, the NRC Staff issued an analogous document related to the application by Pa'ina Hawaii, LLC, to build and operate a commercial, pool-type industrial irradiator in Honolulu, Hawaii, at the Honolulu International Airport. That document is analogous to the Diablo EA Supplement because both respond to the same ruling by the 9th Circuit of the US Court of Appeals. The document takes the form of a Supplemental Appendix to the Staff's Draft EA for the proposed irradiator, which was issued in December 2006.<sup>64</sup> Hereafter, the Supplemental Appendix is described as the "Pa'ina EA Appendix".

This report focuses on issues related to the Diablo EA Supplement. However, the Pa'ina EA Appendix provides additional, relevant information, and is therefore briefly examined here.

The Diablo EA Supplement is a short (8-page) document. It claims (at page 1) to address "the environmental impacts from potential terrorist acts directed at the Diablo Canyon ISFSI". It mentions technical analyses related to potential malicious actions at the Diablo Canyon ISFSI, but does not itself provide such analyses. Nor does it cite any document that describes such analyses. It provides only a partial, incomplete view of its underlying assumptions and methodology. Thus, the Supplement's conclusions cannot be linked to a technical base of evidence and analysis.

#### *Defense of the Diablo Canyon ISFSI*

The Diablo EA Supplement provides (at page 4) a brief discussion of nation-wide security measures implemented by the US government since September 2001. That discussion focuses on measures intended to prevent persons with malicious intent from taking control of commercial aircraft used to carry passengers or cargo. There is no discussion of security measures in the context of smaller, general-aviation aircraft, despite the existence of a large US-based fleet of such aircraft and the potential for such an aircraft to be used, in an explosive-laden configuration, as an instrument of attack on a nuclear facility.

The Supplement goes on to provide (at pages 4 and 5) a discussion of the security measures that the NRC requires licensees to implement at ISFSIs and other nuclear facilities. Major security measures required at ISFSIs include: (i) physical barriers; (ii) surveillance; (iii) intrusion detection; (iv) a response to intrusions; and (v) offsite

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<sup>63</sup> NRC, 2007a.

<sup>64</sup> NRC, 2007b.

assistance from local law enforcement agencies, as necessary. Measures in each category were required prior to September 2001. After September 2001, the NRC conducted what the Staff describes as a "comprehensive review" of the NRC's security program. The review considered threats such as a land-based vehicle bomb, ground assault with the use of an insider, and water-borne assaults. Subsequently, security measures at ISFSIs were enhanced in various respects.

The Diablo EA Supplement does not clearly articulate the relationship between defense of the Diablo Canyon ISFSI and defense of other facilities on the site. Elsewhere, the NRC states that its regulations do not require licensees to defend against the DBT that applies at a nuclear power plant, but, in practice, when an ISFSI is located at a reactor site, the ISFSI is typically included within the reactors' security plan. The NRC further states that the Diablo Canyon licensee has amended its reactor security plan to cover the proposed ISFSI.<sup>65</sup> As explained in Section 2.4, above, the DBT at a nuclear power plant is such that the NRC requires only a light defense of the plant.

*Risk-assessment methodology underlying the Diablo EA Supplement*

As explained in Section 3.1, above, the NRC's consideration of design-basis conventional accidents and design-basis threats in a license proceeding is governed by the Atomic Energy Act. By contrast, preparation of an EA or an EIS is governed by NEPA. The NRC has repeatedly accepted that its assessment of conventional accident risks in an EA or an EIS should consider conventional accidents more severe than design-basis conventional accidents. Logic indicates that its assessment of malice-related risks in an EA or an EIS should consider threats more severe than design-basis threats. Preparation of the Diablo EA Supplement has given the NRC Staff an opportunity to apply that logic, and to employ a credible process for assessment of malice-related risks. Section 3, above, has articulated a standard by which to judge the Staff's assessment.

The Diablo EA Supplement does not provide or cite any technical analyses to support its conclusions, nor does it provide an adequate explanation of the assumptions and methodology that underlie those conclusions. The reader is obliged to rely on a brief and incomplete explanation in the Diablo EA Supplement. Apparently, the Staff employed similar assumptions and methodology in preparing the Pa'ina EA Appendix, which provides slightly more information. Neither document provides a clear and complete explanation of the assumptions and methodology used by the Staff to identify and examine attack scenarios and their impacts. From the limited explanations that are provided, it appears that the Staff employed a crude methodology (a "screening and assessment tool") that was originally intended to determine the adequacy of security measures. That issue falls under the Atomic Energy Act, not under NEPA. Also, some of the assumptions employed by the Staff are inappropriate, as discussed below.

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<sup>65</sup> NRC, 2007c, Footnote 10.

The Diablo EA Supplement states (at page 6):

"Following issuance of the 2002 security orders for ISFSIs, NRC used a security assessment framework as a screening and assessment tool, to determine whether additional security measures, beyond those required by regulation and the security orders, were warranted for NRC-regulated facilities, including ISFSIs."

Apparently, that process began by identifying a "spectrum" of threat scenarios. The Diablo EA Supplement does not describe the spectrum. From that spectrum, the Staff identified a set of "plausible" threat scenarios through a screening exercise that is not described in the Supplement. The Pa'ina EA Appendix provides slightly more information about threat screening, stating (at page B-5):

"Remote or speculative scenarios and scenarios with insignificant consequences were screened out based on threat assessments and engineering evaluations".

Threat scenarios deemed to be "plausible" were then examined by the Staff as follows (Diablo EA Supplement, page 6):

"For those scenarios deemed plausible, NRC assessed the attractiveness of the facility to attack by taking into account factors such as iconic value, complexity of planning required, resources needed, execution risk, and public protective measures. In addition, NRC made conservative assessments of consequences, to assess the potential for early fatalities from radiological impacts. NRC then looked at the combined effect of the attractiveness and the consequence analyses, to determine whether additional security measures for ISFSIs were necessary."

These words describe an examination that apparently combined qualitative judgments with quantitative analyses. The Diablo EA Supplement provides no further description of the examination, and does not cite any document that provides such a description. Thus, the completeness and quality of the examination cannot be determined, with one exception. That exception is the use of the "potential for early fatalities" as an indicator of radiological impacts. As explained in Section 4.3, below, the potential for early fatalities is a highly inappropriate indicator of the radiological impacts of accidents or attacks at an ISFSI.

The Diablo EA Supplement describes (at pages 6 and 7) how the Staff used its process to consider threat scenarios and radiological impacts in the context of ISFSIs in general, and in the context of the proposed Diablo ISFSI. That application of the process is discussed in Section 4.2, below.

*The probability of attack*

The Diablo EA Supplement addresses the probability of attack in differing, inconsistent ways. It states (at page 6) that the probability of an attack is "believed to be low", but also that it "cannot be reliably quantified". It also states (at page 6) that enhanced security measures and emergency-planning measures have been implemented at ISFSIs "without regard to the probability of an attack". The Supplement claims (at page 6) that these measures reduce the risk of attack to an "acceptable" level. The Supplement does not explain how acceptability was determined.

The Pa'ina EA Appendix takes a different approach to the probability of attack at commercial nuclear facilities, including irradiators and ISFSIs. It states (at page B-4):

"The NRC staff operates on the premise that a general credible threat exists (i.e., the likelihood of attack has a probability of 1). However, this general credible threat should not be confused with the likelihood of a successful terrorist action (i.e., the probability of a successful attack is <1). Generally in NEPA analysis, the NRC must consider reasonable foreseeable impacts including those from potential accidents. Due to the unique nature of terrorist activities the following discussion focuses on the qualitative probability of a successful attack because at this time it is only possible to assign qualitative probabilities to these events."

The Diablo EA Supplement draws no distinction between the probability of an attack and the conditional probability that the attack will be successful. The Supplement does not indicate whether a "credible" threat or a "plausible" threat is, or is not, equivalent to a "successful attack". From the Pa'ina EA Appendix, one might infer that the "plausible" threats described in the Diablo EA Supplement are thought (by the Staff) to have a comparatively high conditional probability of success. The Supplement provides no clarity on these points.

The Supplement does not provide any framework or terminology for discussing probability in qualitative terms. The Supplement does not discuss the conditional probabilities of radiological impacts and other outcomes of assumed attack scenarios, thereby ignoring an opportunity to partially quantify malice-related risks. Overall, the Supplement provides an inconsistent and incomplete treatment of the probability of attack.

*Role of emergency planning*

The Diablo EA Supplement states (at page 6) that the NRC has "developed emergency planning requirements, which could mitigate potential [radiological] consequences for certain [attack] scenarios [at an ISFSI]". No further explanation is provided, and no document is cited. This statement apparently refers to security-related enhancements that licensees have made in their emergency preparedness (EP) programs, pursuant to

communications from the NRC. These enhancements are not required by current NRC regulations. The NRC Staff has, therefore, sought "Commission approval to begin activities to develop a new voluntary performance-based EP regulatory regimen that could serve as an alternative approach to existing EP regulations and guidance".<sup>66</sup> From that information, one can infer that the Diablo EA Supplement assumes that voluntary EP enhancements would reduce malice-related risks at the Diablo Canyon ISFSI. The Supplement states (at page 7): "In some situations, emergency planning actions could provide an additional measure of protection to help mitigate the consequences, in the unlikely event that an attack were attempted at the Diablo Canyon ISFSI". Apparently, those emergency planning actions would involve voluntary, security-related enhancements.

The NRC Staff's lack of clarity in the Supplement regarding the role of emergency planning illustrates the negative effects of an entrenched culture of secrecy. Effective emergency response requires rapid, coordinated actions by many public and private entities that normally have limited or no engagement with the NRC and the licensee. Secrecy in emergency planning will almost guarantee that confusion and delay would prevail in an actual emergency. Moreover, emergency planning for reactor sites is not currently optimized to address land contamination, which would be the dominant source of radiological impacts following a successful attack on an ISFSI.

#### *Consideration of other nuclear facilities at the Diablo Canyon site*

The Diablo EA Supplement does not discuss risk-related interactions among the proposed ISFSI and other nuclear facilities at the Diablo Canyon site. The Supplement does not mention the cumulative risks arising from operation of all the nuclear facilities at the site. Section 3.2, above, explains the importance of: (i) considering risk-related interactions among nuclear facilities at a site; and (ii) assessing the cumulative risks from operation of those facilities.<sup>67</sup>

#### **4.2 Threat Scenarios and Radiological Impacts Considered by the Staff**

The Diablo EA Supplement provides (at page 6) brief descriptions of: (i) the type of spent-fuel storage module that would be employed at the Diablo Canyon ISFSI; and (ii) the module's purported robustness against attack. The module would function as follows. Spent fuel assemblies would be stored vertically inside a sealed, cylindrical, multi-purpose canister (MPC) made of stainless steel, which would in turn be located inside an overpack. The overpack would consist of two, coaxial, cylindrical, carbon steel shells separated by a layer of concrete, with a fixed baseplate at the bottom and a removable lid at the top. The overpack would be penetrated by cooling vents at its top and bottom, whose purpose would be to allow a flow of ambient air over the outer surface of the MPC, driven by natural convection, to remove radioactive decay heat from the fuel

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<sup>66</sup> Reyes, 2006, page 1.

<sup>67</sup> Related information is provided in: Thompson, 2002.

assemblies. The module would be supplied by Holtec International. This type of module is known as the HI-STORM 100SA System.

To assess the potential for release of radioactive material from a Diablo Canyon module by malicious actions, the NRC Staff relied on generic security assessments for ISFSIs, apparently conducted around 2002. The Diablo EA Supplement states (at page 7):

"Plausible threat scenarios considered in the generic security assessments for ISFSIs included a large aircraft impact similar in magnitude to the attacks of September 11, 2001, and ground assaults using expanded adversary characteristics consistent with the design basis threat for radiological sabotage for nuclear power plants." The Supplement later (at page 7) describes these two attack scenarios as "the most severe plausible threat scenarios". Section 4.3, below, addresses the merit of that statement.

The Diablo EA Supplement does not provide any analysis of the radiological impacts of threat scenarios, nor does it cite any document that provides such analysis. The Supplement does not provide any estimate of the radiation dose arising from release of radioactive material, except to say (at page 7) that the dose "would likely be below 5 rem" at the Diablo Canyon site. The Supplement strongly implies that the generic ISFSI assessments yielded the same upper range of dose. That would be consistent with the licensing role of the generic ISFSI assessments, because a dose of 5 rem is the maximum allowable dose for a design-basis accident at an ISFSI.<sup>68</sup>

Obtaining a dose of 5 rem would require only a small release of radioactive material from a storage module. Table 4-1 illustrates this point. It shows, for example, that creation of a hole in an MPC with an equivalent diameter of 2.3 mm would yield a dose of 6.3 rem. Most of that dose would be attributable to release of two-millionths (1.9E-06) of the MPC's inventory of radioisotopes in the "fines" category. That release corresponds to a comparatively small amount of damage to the MPC and the spent fuel within it. Clearly, therefore, the Diablo EA Supplement has not considered a threat scenario that causes substantial damage to an ISFSI module.

#### **4.3 Threat Scenarios and Radiological Impacts that are Relevant to an ISFSI**

The NRC Staff has not provided a credible analysis of threat scenarios and radiological impacts for an ISFSI at Diablo Canyon or elsewhere. Some illustrative analysis is provided here, to show deficiencies in the Diablo EA Supplement. Correcting those deficiencies is a task for the NRC Staff. The illustrative analysis provided here is abbreviated due to the author's concern about dissemination of sensitive information. A

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<sup>68</sup> NRC regulation 10 CFR 72.106(b) limits the radiation dose that any individual located on or beyond the nearest boundary of the controlled area of an ISFSI may receive from any design-basis accident. The dose limit is the more limiting of: (i) a total effective dose equivalent (TEDE) of 5 rem; or (ii) a 50-rem sum of the deep-dose equivalent and the committed dose equivalent to any individual organ. Separate dose limits are also specified for the lens of the eye and for skin or extremities.

much fuller analysis could be provided here, drawing from published literature and general engineering knowledge.<sup>69</sup>

*An ISFSI module's vulnerability to attack*

In some ways, the type of storage module proposed for the Diablo canyon ISFSI (the HI-STORM 100SA System) is a robust structure. The overpack has an outer diameter of 3.7 meters and a height of 5.9 meters. Its outer, carbon steel shell is about 3/4 inch (2 cm) thick, the inner shell is about 1 1/4 inch (3 cm) thick, and the space between these shells is filled by about 27 inches (69 cm) of concrete (details vary by module version).<sup>70</sup> That is a robust structure in terms of its resistance to natural forces (e.g., tornado-driven missiles), but not in terms of its ability to withstand penetration by weapons available to sub-national groups. In any event, the overpack is already penetrated by cooling vents, as described above. The cylindrical wall of the MPC is about 1/2 inch (1.3 cm) thick, and could be readily penetrated by available weapons. The spent fuel assemblies that would be stored inside the MPC are composed of long, narrow tubes made of zirconium alloy, inside which uranium oxide fuel pellets are stacked. The walls of the tubes (the fuel cladding) are about 0.023 inch (0.6 mm) thick and have negligible capacity to withstand penetration by available weapons. Moreover, zirconium is a flammable metal. In finely divided form, it is used in military incendiary devices.

A competent, sub-national group seeking to create offsite radiological impacts by attacking a storage module at the Diablo Canyon ISFSI would probably seek to penetrate the wall of the MPC and ignite the zirconium fuel cladding, with the intent of initiating a fire that would release radioactive material to the atmosphere. A fire could release a substantial fraction of the cesium-137 in affected fuel assemblies, because cesium is a volatile element. The presence of cooling vents at the top and bottom of the module could create a chimney effect that enhances a zirconium fire. For that reason, the attackers could prefer that the module remains upright. The type of module (HI-STORM 100SA System) that the licensee intends to use at the Diablo Canyon ISFSI would remain upright during many attack scenarios, because it is specifically designed to be anchored to its pad. The attackers could seek to exacerbate a fire by enlarging the cooling vents or creating additional holes in the overpack.

*Instruments and modes of attack*

Penetration of the overpack of a storage module (and penetration of the MPC) could be readily accomplished using a shaped charge.<sup>71</sup> These devices have many civilian applications. They are extensively used in the mining and petroleum industries, and for demolition. They have been used in military contexts for decades. Their military applications include, for example, human-carried demolition charges or warheads for anti-tank missiles. Construction and use of shaped charges does not require assistance

<sup>69</sup> Related information is provided in: Thompson, 2005b; Thompson, 2003.

<sup>70</sup> Holtec FSAR, Chapter 1.

<sup>71</sup> Walters, 2003.

from a government or access to classified information. Many people around the world have experience with these devices in civilian and military contexts.

Table 4-2 provides some information about the shaped charge as a potential instrument of attack. A shaped charge described in that table was designed to penetrate large thicknesses of rock or concrete, as the first stage of a "tandem" warhead (two devices in line, with differing functions). Detailed information about this device has been openly published, but the citation is not provided here. A test proved that the device could create a hole of 25 cm diameter in rock to a depth of almost 6 meters. A device of that size and capability would not be needed to penetrate an ISFSI module. For that application, competent attackers would employ smaller shaped charges, optimized for portability and diameter and depth of hole.

Penetration using a shaped charge would not be the attackers' only option for creating additional holes in the overpack. For example, attackers could use small charges or cutting devices to sever the bolts holding down the lid of the overpack, and then use charges to remove the lid. Boring into or cutting off portions of the overpack could be accomplished using a thermic lance. That device is an iron pipe through which oxygen gas is passed. When the tip is ignited, iron and oxygen react exothermically at a temperature of about 4,000 degrees C. This lance will easily cut through concrete, which melts at 1,800-2,500 degrees C. Steel plates or reinforcing bars will feed the iron-oxygen reaction. This device was developed in France after World War II, to assist the demolition of submarine pens and other large concrete structures that had been built by Nazi Germany. A thermic lance could readily penetrate the MPC in an ISFSI module and ignite the zirconium fuel cladding inside the MPC.

There are various military situations in which attackers seek to penetrate a target (e.g., an armored vehicle, or a concrete bunker) and initiate combustion inside the target. If the attackers achieve direct contact with the target, they might pursue this goal in two, separate steps. First, the target would be penetrated. Second, an incendiary device or material would be inserted through the resulting hole. Often, however, the attack would be made from a distance. For example, an anti-tank missile might be launched from a point tens or hundreds of meters from the target. To accommodate such situations, weapons laboratories and suppliers have developed warheads that combine penetration and incendiary functions. One arrangement is a tandem warhead in which the first stage penetrates the target and the second stage is an incendiary device. A variant of this arrangement employs a "thermobaric" second stage that generates blast and thermal effects.

An attack on the Diablo Canyon ISFSI could be mounted in three different modes, or in combinations of those modes.<sup>72</sup> First, attackers could seek to place themselves in direct contact with ISFSI modules. That mode of attack could involve the use of land vehicles

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<sup>72</sup> Each mode of attack on the ISFSI could be accompanied by diversionary or complementary attacks at other locations.

or airborne vehicles (which could include helicopters or ultralight aircraft) to carry personnel to the ISFSI. Second, attackers could fire guided missiles or other weapons at the ISFSI from ground positions, land vehicles, airborne vehicles, or boats located at distances of hundreds of meters or more from the ISFSI. In illustration of the potential for such an attack, note that the TOW (tube-launched, optically-tracked, wire-guided) missile, which is widely used around the world and which has a proven capability against armored vehicles and bunkers, has a range exceeding 3,000 meters. Third, attackers could use aircraft as improvised cruise missiles, in a kamikaze or remotely-guided configuration.

The Diablo EA Supplement considers the third mode of attack on an ISFSI, but makes the mistaken assumption that a large, fuel-laden commercial aircraft would pose the greatest threat using this attack mode. Large, commercial aircraft caused major damage to the World Trade Center and the Pentagon in September 2001, but they would not be optimal as instruments of attack on an ISFSI. They are comparatively soft objects containing a few hard structures such as turbine shafts. They can be difficult to guide precisely at low speed and altitude. A competent group seeking to attack an ISFSI using an improvised cruise missile would probably prefer to use a smaller, general-aviation aircraft laden with explosive material, perhaps configured as a shaped charge in tandem with incendiary material. In this connection, note that the US General Accounting Office (GAO) expressed concern, in September 2003 testimony to Congress, about the potential for malicious use of general-aviation aircraft. The testimony stated:<sup>73</sup>

"Since September 2001, TSA [the Transportation Security Administration] has taken limited action to improve general aviation security, leaving it far more open and potentially vulnerable than commercial aviation. General aviation is vulnerable because general aviation pilots are not screened before takeoff and the contents of general aviation planes are not screened at any point. General aviation includes more than 200,000 privately owned airplanes, which are located in every state at more than 19,000 airports. Over 550 of these airports also provide commercial service. In the last 5 years, about 70 aircraft have been stolen from general aviation airports, indicating a potential weakness that could be exploited by terrorists."

*Prudent assumptions about attack*

Many people around the world are familiar with the attack principles described in the preceding paragraphs, relevant weapons are available in many countries, and the resources required for an attack are attainable by many sub-national groups. It would, therefore, be prudent to assume that: (i) a sub-national group could mount a credible attack on ISFSI modules at Diablo Canyon; (ii) the group would seek to create a release pathway from the interior of one or more MPCs to the atmosphere; (iii) the group would

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<sup>73</sup> Dillingham, 2003, page 14.

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seek to initiate a zirconium fire inside each attacked MPC, to maximize the release of radioactive material to the atmosphere; and (iv) the attack could have a substantial conditional probability of success.

*Radiological impacts of attack*

Given the second and third of the assumptions in the preceding paragraph, a successful attack on the Diablo Canyon ISFSI could release to the atmosphere a substantial fraction (tens of percent) of the cesium-137 in each attacked MPC, together with releases of other radioisotopes.<sup>74</sup> Several MPCs could be affected in this manner. Section 2.3, above, discusses a postulated release of 3 million Curies of cesium-137, representing about 50 percent of the cesium-137 in four spent-fuel storage modules. That is a reasonable assumption for the purpose of assessing the radiological impacts of a successful attack.

Land contamination and its sequelae would be the dominant radiological impacts of the release from attacked MPCs. Sequelae would include contamination of food and water, cancers and other adverse health effects that would be manifested years after the release, relocation of populations, abandonment of real estate, and various economic and social impacts. An estimate of economic loss arising from an atmospheric release of 3.5 million Curies of cesium-137, considering five US reactor sites, shows an average loss of \$91 billion.<sup>75</sup> Factors not considered in that estimate could lead to a higher economic loss.

The radiological impacts of potential atmospheric releases from power reactors have been studied for decades. For example, the 1975 *Reactor Safety Study* discussed these impacts in detail.<sup>76</sup> Studies show that a release from a power reactor could lead to early fatalities among downwind populations. The fatalities would be "early" in the sense that they would be manifested within a few weeks or months after the release. Early fatalities would be almost entirely attributable to the release of short-lived radioisotopes, which are present in abundance in the core of an operating reactor. An ISFSI would contain a negligible inventory of short-lived radioisotopes, because it would contain spent fuel that has aged over a period of years. Thus, the potential for early fatalities is a highly inappropriate indicator of the radiological impacts of conventional accidents or attacks at an ISFSI. The NRC Staff's reliance on this indicator in the Diablo EA Supplement provides, by itself, sufficient grounds to reject the conclusions of the Supplement.

#### 4.4 Options for Reducing the Risks of Malicious Actions

The Diablo EA Supplement provides (at page 3) a limited discussion of alternatives to the proposed ISFSI. These alternatives fall into three categories: (i) shipment of spent fuel offsite; (ii) other methods of storing spent fuel onsite; and (iii) no action, leading to shutdown of the Diablo Canyon reactors. In discussing other methods of storing spent

<sup>74</sup> The fractional release of each radioisotope would be determined by the isotope's physical and chemical properties as an element.

<sup>75</sup> Beyea et al, 2004.

<sup>76</sup> NRC, 1975, Appendix VI.

fuel onsite, the Supplement considers an increase in the capacity of the existing spent-fuel pools at the site, or construction of a new pool, and rejects both options. The Supplement does not discuss the option of constructing the ISFSI using a design that is more robust against attack than the design proposed by the licensee.

The Supplement does not mention the *National Infrastructure Protection Plan*. It does not discuss homeland-security strategy, the principles of protective deterrence, or the opportunities that the NIPP has identified for incorporating protective features into the design of infrastructure elements.

*Increasing the ISFSI's robustness against attack*

Options for designing a Diablo Canyon ISFSI to be more robust against attack have been identified by this author, as follows:<sup>77</sup> "re-design of the ISFSI to use thick-walled metal casks, dispersal of the casks, and protection of the casks by berms or bunkers in a configuration such that pooling of aircraft fuel would not occur in the event of an aircraft impact". Elsewhere, the author has provided a more detailed discussion about designing an ISFSI to be more robust against attack.<sup>78</sup> A factor addressed in that discussion is the possibility that society will extend the life of ISFSIs until they become, by default, repositories for spent fuel. Consideration of that possibility could favor an above-ground ISFSI whose robustness would be enhanced through a combination of the design options described above.

Holtec International has developed a design for a new ISFSI storage module that is said to be more robust against attack than present modules. The new module is the HI-STORM 100U module, which would employ the same MPC as is proposed for the Diablo Canyon ISFSI. For most of its height, the 100U module would be underground. Holtec has described the robustness of the 100U module as follows:<sup>79</sup>

"Release of radioactivity from the HI-STORM 100U by any mechanical means (crashing aircraft, missile, etc.) is virtually impossible. The only access path into the cavity for a missile is vertically downward, which is guarded by an arched, concrete-fortified steel lid weighing in excess of 10 tons. The lid design, at present configured to easily thwart a crashing aircraft, can be further buttressed to withstand more severe battlefield weapons, if required in the future for homeland security considerations. The lid is engineered to be conveniently replaceable by a later model, if the potency of threat is deemed to escalate to levels that are considered non-credible today."

The design of the Holtec 100U module has been under review by the NRC Staff. The Staff has expressed concern about seismic-related structural analyses performed for this design, and in late 2006 Holtec withdrew its application for a Certificate of Compliance

<sup>77</sup> Thompson, 2002, paragraph XI-5.

<sup>78</sup> Thompson, 2003.

<sup>79</sup> Holtec, 2007.

for the 100U module. Further discussions were held between Holtec and the Staff on 27 March 2007, described by the Staff as follows:<sup>80</sup>

"At the meeting, Holtec presented new and revised structural analyses in response to the staff's concerns. The staff responded positively to the material presented by Holtec and indicated that it appeared the staff's concerns had been addressed. A new application is scheduled to be submitted by the end of April 2007."

It appears that the Holtec 100U module may soon receive a Certificate of Compliance from the NRC. At that point, the 100U module would be available for use in the Diablo Canyon ISFSI.

*Enhancing active defense of the ISFSI*

As currently proposed, the Diablo Canyon ISFSI would receive an active defense involving the deployment of armed guards and related security measures. That form of defense contrasts with the passive defense provided by a facility's inherent robustness against attack.

Active defense of the ISFSI could be enhanced by employing additional security measures, such as anti-aircraft guns or missiles. The Diablo EA Supplement does not discuss that option. A thorough assessment of malice-related risks at the Diablo Canyon ISFSI should consider the merits of enhancing active defense as a risk-reducing option. In considering that option, the assessment should recognize that active defense has substantial costs, both monetary and societal, that could be avoided by enhancing the ISFSI's inherent robustness.<sup>81</sup>

*Enhancing capabilities for damage control*

As discussed in Section 4.3, above, it would be prudent to assume that a group attacking the Diablo Canyon ISFSI would seek to create a release pathway from the interior of one or more MPCs to the atmosphere, and to initiate a zirconium fire inside each attacked MPC in order to maximize the release of radioactive material to the atmosphere. To counter those ambitions, the licensee could improve its capabilities for damage control, seeking to minimize the radioactive release in the event of an attack. Relevant capabilities would include: (i) availability of personnel trained and equipped to work in a high-radiation environment; and (ii) deployment of devices and materials to suppress fires and limit releases of radioactive material. A thorough assessment of malice-related

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<sup>80</sup> Johnson, 2007, Enclosure C.

<sup>81</sup> In October 2001 the French government deployed anti-aircraft missiles at the La Hague nuclear site. Deployment of anti-aircraft guns or missiles to defend the Diablo Canyon ISFSI would require the ongoing presence of US military personnel, to maintain and operate these weapons. Complex questions of command authority for firing of the weapons would need to be addressed. These factors would generate substantial monetary and societal costs.

risks at the Diablo Canyon ISFSI should consider the merits of enhancing capabilities for damage control as a risk-reducing option.

#### **4.5 An Overall Evaluation of the Staff's Supplement**

Section 2 of this report provides a broad perspective on potential malicious actions at nuclear facilities. That perspective shows the importance of conducting thorough assessments of malice-related risks and options for reducing those risks. Section 3 sets forth an appropriate framework for assessing malice-related risks, thereby providing a standard for evaluating the Diablo EA Supplement. Sections 4.1 through 4.4 review various aspects of the Supplement. Major findings of the review include:

- (i) the Supplement neither provides technical analysis nor cites any document that provides such analysis;
- (ii) in preparing the Supplement, the NRC Staff relied on an unexplained process to identify plausible threat scenarios;
- (iii) the Staff failed to consider threat scenarios that are more severe and at least as plausible as the threat scenarios that it did consider;
- (iv) the Staff relied on a crude, partially explained methodology to assess malice-related risks;
- (v) the Staff employed a highly inappropriate indicator of the radiological impacts of attacks, namely the potential for early fatalities;
- (vi) the Supplement greatly under-estimates the scale of radiological impacts of attacks and ignores the dominant impacts, which would arise from land contamination;
- (vii) the Supplement ignores the NIPP and the potential that it articulates for increasing the inherent robustness of infrastructure facilities against attack;
- (viii) the Supplement fails to consider options for reducing malice-related risks at the proposed Diablo Canyon ISFSI through measures including the use of more robust fuel storage modules; and
- (ix) the Supplement fails to consider ISFSI-related risks in the context of risks associated with other nuclear facilities on the Diablo Canyon site.

These are grave deficiencies. The Diablo EA Supplement is not credible.

## **5. Conclusions**

Major conclusions of this report are as follows:

- C1. It would be prudent to assume that power reactors, spent-fuel pools and ISFSIs in the US will be attacked by capable sub-national groups during the coming decades.
- C2. Given present designs and defenses of these facilities, there is a substantial probability that an attack by a capable sub-national group would cause a release to the environment of a large amount of radioactive material, yielding severe radiological consequences.
- C3. Design options are available that could increase the inherent robustness of commercial nuclear facilities against attack, especially in the case of new facilities such as the proposed Diablo Canyon ISFSI.
- C4. Increasing the inherent robustness of infrastructure facilities against attack is envisioned in the *National Infrastructure Protection Plan*, and would support a national strategy of protective deterrence.
- C5. Present methodologies for risk assessment could be adapted to provide operationally-useful assessments of: (i) the risks of malicious actions at commercial nuclear facilities; and (ii) the potential for reducing those risks through alternative options.
- C6. The Diablo EA Supplement has grave deficiencies as summarized in Section 4.5, above, and is not credible.
- C7. A credible assessment of malice-related risks at the proposed Diablo Canyon ISFSI would correct the deficiencies in the Diablo EA Supplement and would consider a range of risk-reducing options, including design options that enhance robustness of the ISFSI and limits on future production of spent fuel.

## 6. Bibliography

(Adam, 2005)

David Adam, "50m environmental refugees by end of decade, UN warns", *The Guardian*, 12 October 2005.

(Alvarez et al, 2003)

Robert Alvarez, Jan Beyca, Klaus Janberg, Jungmin Kang, Ed Lyman, Allison Macfarlane, Gordon Thompson and Frank N. von Hippel, "Reducing the Hazards from Stored Spent Power-Reactor Fuel in the United States", *Science and Global Security*, Volume 11, 2003, pp 1-51.

(ASLB, 1982)

*Carolina Power and Light Co.* (Shearon Harris Nuclear Power Plant, Units 1 and 2), LBP-82-119A, 16 NRC 2069, 2098 (1982).

(Beyca et al, 2004)

Jan Beyca, Ed Lyman and Frank von Hippel, "Damages from a Major Release of Cs-137 into the Atmosphere of the United States", *Science and Global Security*, Volume 12, 2004, pp 125-136.

(Beyca, 1979)

Jan Beyca, "The Effects of Releases to the Atmosphere of Radioactivity from Hypothetical Large-Scale Accidents at the Proposed Gorleben Waste Treatment Facility", in: Gordon Thompson et al, *Potential Accidents and Their Effects*, Chapter 3 of the report of the Gorleben International Review, submitted to the Government of Lower Saxony (in German), March 1979.

(Brian, 2006)

Danielle Brian, Project on Government Oversight, letter to NRC chair Nils J. Diaz, 22 February 2006.

(Brzezinski, 2007)

Zbigniew Brzezinski, testimony before the US Senate Foreign Relations Committee, 1 February 2007.

(Deller, 2002)

Nicole Deller, "Rule of Power or Rule of Law?", *Science for Democratic Action*, Volume 10, Number 4, August 2002.

(DHS, 2006)

US Department of Homeland Security, *National Infrastructure Protection Plan* (Washington, DC: DHS, 2006).

(Dillingham, 2003)

Gerald L. Dillingham, US General Accounting Office, testimony before the Committee on Commerce, Science and Transportation, US Senate, "Aviation Security: Progress Since September 11, 2001, and the Challenges Ahead", 9 September 2003.

(DOE, 1987)

US Department of Energy, *Health and Environmental Consequences of the Chernobyl Nuclear Power Plant Accident*. DOE/ER-0332 (Washington, DC: DOE, June 1987).

(ElBaradei, 2004)

Mohamed ElBaradei, Director General, International Atomic Energy Agency, "Nuclear Non-Proliferation: Global Security in a Rapidly Changing World", keynote address, Carnegie International Non-Proliferation Conference, Washington, DC, 21 June 2004.

(Fertel, 2006)

Marvin Fertel, Nuclear Energy Institute, testimony before the Subcommittee on National Security, Emerging Threats and International Relations, US House Committee on Government Reform, 4 April 2006.

(Franceschini and Schaper, 2006)

Giorgio Franceschini and Annette Schaper, *Nuclear Weapons Research and Modernization Without Testing: The CTBT in danger?* (Frankfurt: Peace Research Institute Frankfurt, 2006).

(Flynn, 2007)

Stephen Flynn, *The Edge of Disaster: Rebuilding a Resilient Nation* (New York: Random House, 2007).

(GAO, 2007)

US Government Accountability Office, *Crude Oil: Uncertainty about Future Oil Supply Makes It Important to Develop a Strategy for Addressing a Peak and Decline in Oil Production*, GAO-07-283 (Washington, DC: GAO, February 2007).

(Gilman et al, 2007)

Nils Gilman, Doug Randall and Peter Schwartz, *Impacts of Climate Change* (San Francisco: Global Business Network, January 2007).

(Hannerz, 1983)

K. Hannerz, *Towards Intrinsically Safe Light Water Reactors* (Oak Ridge, Tennessee: Institute for Energy Analysis, February 1983).

(Hart et al, 2002)

Gary Hart and Warren B. Rudman (Co-chairs), Stephen E. Flynn (project director) and Task Force members, *America Still Unprepared – America Still in Danger: Report of an*

*Independent Task Force Sponsored by the Council on Foreign Relations* (New York: Council on Foreign Relations, 25 October 2002).

(Hebert, 2007)

H. Josef Hebert, Associated Press, "NRC rejects plan for power plants to stop airliner attacks", *The Boston Globe*, 30 January 2007.

(Hersh, 2006)

Seymour M. Hersh, "The Iran Plans", *The New Yorker*, 17 April 2006, pp 30-37.

(Hirsch et al, 2005)

Robert L. Hirsch, Roger H. Bezdek and Robert M. Wendling, "Peaking Oil Production: Sooner Rather Than Later?" *Issues in Science and Technology*, Volume XXI, Number 3, Spring 2005, pp 25-30. (That paper was adapted from a report prepared for the US Department of Energy's National Energy Technology Laboratory.)

(Holtec, 2007)

Holtec International, "The HI-STORM 100 Storage System", accessed at <<http://www.holtecinternational.com/hstorm100.html>> on 17 June 2007.

(Holtec FSAR)

Holtec International, *Final Safety Analysis Report for the Holtec International Storage and Transfer Operation Reinforced Module Cask System (HI-STORM 100 Cask System)*, NRC Docket No. 72-1014, Holtec Report HI-2002444 (Holtec, undated).

(Johnson, 2007)

Michael R. Johnson, Assistant for Operations, Office of the EDO, NRC Staff, memo to the NRC Commissioners, "Weekly Information Report – Week Ending March 30, 2007", SECY-07-0067, 6 April 2007.

(Kugler, 1995)

Richard L. Kugler, *Toward a Dangerous World: US National Security Strategy for the Coming Turbulence* (Santa Monica, California: RAND Corporation, 1995).

(Kull et al, 2007)

Steven Kull et al, *Muslim Public Opinion on US Policy, Attacks on Civilians and al Qaeda* (Maryland: Program on International Policy Attitudes, University of Maryland, 24 April 2007).

(Marshall and Gurr, 2005)

Monty G. Marshall and Ted Robert Gurr, *Peace and Conflict 2005*, (College Park, Maryland: Center for International Development and Conflict Management, University of Maryland, May 2005).

(MEA, 2005)

Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being: Synthesis* (Washington, DC: Island Press, 2005).

(Meadows et al, 1972)

Donella H. Meadows, Dennis L. Meadows, Jorgen Randers and William W. Behrens III, *The Limits to Growth* (London: Earth Island Limited, 1972).

(Meserve, 2002)

Richard A. Meserve, "Nuclear Security in a New World", *The Industrial Physicist*, October/November 2002, pp 20-23.

(National Research Council, 2006)

Committee on the Safety and Security of Commercial Spent Nuclear Fuel Storage, Board on Radioactive Waste Management, National Research Council, *Safety and Security of Commercial Spent Nuclear Fuel Storage: Public Report* (Washington, DC: National Academies Press, 2006). (This document was first released in April 2005.)

(National Research Council, 1990)

National Research Council, *Health Effects of Exposure to Low Levels of Ionizing Radiation: BEIR V* (Washington, DC: National Academy Press, 1990).

(NRC, 2007a)

US Nuclear Regulatory Commission Staff, *Supplement to the Environmental Assessment and Draft Finding of No Significant Impact Related to the Construction and Operation of the Diablo Canyon Independent Spent Fuel Storage Installation*, Docket No. 72-26, Pacific Gas and Electric Company, May 2007.

(NRC, 2007b)

US Nuclear Regulatory Commission Staff, *Appendix B: Consideration of Terrorist Attacks on the Proposed Pa'ina Irradiator*, Docket No. 030-36974 (supplemental appendix to the draft environmental assessment issued on 28 December 2006), 1 June 2007.

(NRC, 2007c)

US Nuclear Regulatory Commission, Memorandum and Order, Docket No. 72-26-ISFSI, 26 February 2007.

(NRC, 1994)

US Nuclear Regulatory Commission, "10 CFR Part 73, RIN 3150-AE81, Protection Against Malevolent Use of Vehicles at Nuclear Power Plants", *Federal Register*, Volume 59, Number 146, 1 August 1994, pp 38889-38900.

(NRC, 1979)

US Nuclear Regulatory Commission, *Generic Environmental Impact Statement on Handling and Storage of Spent Light Water Power Reactor Fuel*, NUREG-0575 (Washington, DC: Nuclear Regulatory Commission, August 1979).

(NRC, 1975)

US Nuclear Regulatory Commission, *Reactor Safety Study, WASH-1400 (NUREG-75/014)* (Washington, DC: Nuclear Regulatory Commission, October 1975).

(Raskin et al, 2002)

Paul Raskin et al, *Great Transition: The Promise and Lure of the Times Ahead* (Boston, Massachusetts: Stockholm Environment Institute, 2002).

(Reyes, 2006)

Luis A. Reyes, Executive Director for Operations, NRC Staff, memo to the NRC Commissioners, "Results of the Review of Emergency Preparedness Regulations and Guidance", SECY-06-0200, 20 September 2006.

(Scarry, 2002)

Elaine Scarry, "A nuclear double standard", *Boston Sunday Globe*, 3 November 2002, page D11.

(Thompson, 2006)

Gordon R. Thompson, *Risks and Risk-Reducing Options Associated with Pool Storage of Spent Nuclear Fuel at the Pilgrim and Vermont Yankee Nuclear Power Plants*, a report for the Office of the Attorney General, Commonwealth of Massachusetts (Cambridge, Massachusetts: Institute for Resource and Security Studies, 25 May 2006).

(Thompson, 2005a)

Gordon R. Thompson, Institute for Resource and Security Studies, Cambridge, Massachusetts, direct testimony before the Minnesota Public Utilities Commission regarding an application for a Certificate of Need to establish an ISFSI at the Monticello site, Docket No. E002/CN-05-123, 16 December 2005.

(Thompson, 2005b)

Gordon R. Thompson, *Reasonably Foreseeable Security Events: Potential threats to options for long-term management of UK radioactive waste*, a report for the UK government's Committee on Radioactive Waste Management (Cambridge, Massachusetts: Institute for Resource and Security Studies, 2 November 2005).

(Thompson, 2004)

Gordon Thompson, Institute for Resource and Security Studies, Cambridge, Massachusetts, testimony before the Public Utilities Commission of the State of California regarding Application No. 04-02-026, 13 December 2004. (This testimony,

*Assessing Risks of Potential Malicious Actions at Commercial Nuclear Facilities:  
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Page 47*

prepared for California Earth Corps, addressed the provision of an enhanced defense of Units 2 and 3 of the San Onofre Nuclear Generating Station.)

(Thompson, 2003)

Gordon Thompson, *Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security* (Cambridge, Massachusetts: Institute for Resource and Security Studies, January 2003).

(Thompson, 2002)

Gordon Thompson, Declaration of 7 September 2002 in support of a petition to the US Nuclear Regulatory Commission by Avila Valley Advisory Council, San Luis Obispo Mothers for Peace, Peg Pinard et al, regarding a license application for an ISFSI at the Diablo Canyon site, Docket No. 72-26.

(Walters, 2003)

William Walters, "An Overview of the Shaped Charge Concept", paper presented at the 11th Annual ARL/USMA Technical Symposium, 5 and 7 November 2003. (That symposium was sponsored by the Mathematical Sciences Center of Excellence at the US Military Academy (USMA) and hosted by the US Army Research Laboratory (ARL) and USMA.)

(Wells, 2006)

Jim Wells, US Government Accountability Office, testimony before the Subcommittee on National Security, Emerging Threats and International Relations, US House Committee on Government Reform, "Nuclear Power Plants Have Upgraded Security, but the Nuclear Regulatory Commission Needs to Improve Its Process for Revising the Design Basis Threat", 4 April 2006.

(White House, 2006)

The White House, *National Strategy for Combating Terrorism* (Washington, DC: The White House, September 2006).

(White House, 2002)

The White House, *National Strategy for Homeland Security* (Washington, DC: The White House, July 2002).

(Yergin, 1991)

Daniel Yergin, *The Prize: The Epic Quest for Oil, Money and Power* (New York: Simon and Schuster, 1991).

**Table 2-1**  
**Public Opinion in Four Muslim Countries Regarding the US "War on Terrorism"**

Country	Percentage of Respondents Who Think that the Primary Goal of What the US Calls "the War on Terrorism" is to:		
	Weaken and Divide the Islamic Religion and its People	Achieve Political and Military Domination to Control Middle East Resources	Protect Itself from Terrorist Attacks
Morocco	33	39	19
Egypt	31	55	9
Pakistan	42	26	12
Indonesia	29	24	23

**Notes:**

(a) Data are from: Steven Kull et al, *Muslim Public Opinion on US Policy, Attacks on Civilians and al Qaeda*, Program on International Policy Attitudes, University of Maryland, 24 April 2007.

(b) Percentages not shown in each row are "do not know" or "no response".

**Table 2-2  
Future World Scenarios Identified by the Stockholm Environment Institute**

Scenario	Characteristics
<b>Conventional Worlds</b>	
Market Forces	Competitive, open and integrated global markets drive world development. Social and environmental concerns are secondary.
Policy Reform	Comprehensive and coordinated government action is initiated for poverty reduction and environmental sustainability.
<b>Barbarization</b>	
Breakdown	Conflict and crises spiral out of control and institutions collapse.
Fortress World	This scenario features an authoritarian response to the threat of breakdown, as the world divides into a kind of global apartheid with the elite in interconnected, protected enclaves and an impoverished majority outside.
<b>Great Transitions</b>	
Eco-Communalism	This is a vision of bio-regionalism, localism, face-to-face democracy and economic autarky. While this scenario is popular among some environmental and anarchistic subcultures, it is difficult to visualize a plausible path, from the globalizing trends of today to eco-communalism, that does not pass through some form of barbarization.
New Sustainability Paradigm	This scenario changes the character of global civilization rather than retreating into localism. It validates global solidarity, cultural cross-fertilization and economic connectedness while seeking a liberatory, humanistic and ecological transition.

**Source:**  
Paul Raskin et al, *Great Transition: The Promise and Lure of the Times Ahead*, Stockholm Environment Institute, 2002.

**Table 2-3  
Selected Approaches to Protecting US Critical Infrastructure From Attack by Sub-National Groups, and Some of the Strengths and Weaknesses of these Approaches**

Approach	Strengths	Weaknesses
Offensive military operations internationally	<ul style="list-style-type: none"> <li>• Can deter or prevent governments from supporting sub-national groups hostile to the US</li> </ul>	<ul style="list-style-type: none"> <li>• Can promote growth of sub-national groups hostile to the US, and build sympathy for these groups in foreign populations</li> <li>• Can be costly in terms of lives, money and national reputation</li> </ul>
International police cooperation within a legal framework	<ul style="list-style-type: none"> <li>• Can identify and intercept potential attackers</li> </ul>	<ul style="list-style-type: none"> <li>• Implementation can be slow and/or incomplete</li> <li>• Requires ongoing international cooperation</li> </ul>
Surveillance and control of the domestic population	<ul style="list-style-type: none"> <li>• Can identify and intercept potential attackers</li> </ul>	<ul style="list-style-type: none"> <li>• Can destroy civil liberties, leading to political, social and economic decline of the nation</li> </ul>
Active defense of infrastructure facilities (by use of guards, guns, gates, etc.)	<ul style="list-style-type: none"> <li>• Can stop attackers before they reach the target</li> </ul>	<ul style="list-style-type: none"> <li>• Can involve higher operating costs</li> <li>• Requires ongoing vigilance</li> <li>• May require military involvement</li> </ul>
Resilient design, passive defense, and related protective measures for infrastructure facilities (as envisioned in the NIPP)	<ul style="list-style-type: none"> <li>• Can allow target to survive attack without damage, thereby enhancing protective deterrence</li> <li>• Can substitute for other protective approaches, avoiding their costs and adverse impacts</li> <li>• Can reduce risks from accidents, natural hazards, etc.</li> </ul>	<ul style="list-style-type: none"> <li>• Can involve higher capital costs</li> </ul>

**Table 2-4**  
**Estimated Amounts of Cesium-137 in Nuclear Fuel Associated With Diablo Canyon Unit 1 or Unit 2**

Category of Nuclear Fuel	Amount of Cesium-137 (million Curies)
One spent fuel assembly at discharge from reactor (17.5 MWt per assembly, 90% capacity factor, discharge after 44 months, 520 kgU/assembly)	0.064
One reactor core at operating equilibrium (193 assemblies, av. burnup = 50% of discharge burnup)	6.2
One spent-fuel pool at full loading, allowing space for full-core discharge (1,131 assemblies, av. age after discharge = 10 yr)	57
One ISFSI module at full capacity (32 assemblies, av. age after discharge = 20 yr)	1.3

**Notes:**

- (a) The radionuclide inventory of Ginna spent fuel batch 16 is estimated in: V.L. Sailor et al, *Severe Accidents in Spent Fuel Pools in Support of Generic Safety Issue 82*, NUREG/CR-4982, July 1987. From Tables A.11 and A.13 of that document, one finds that the inventory of Cs-137 in newly-discharged spent fuel is 3.05 kCi per GWt-day of fission energy yield. For the assumed conditions of a Diablo Canyon fuel assembly at discharge, this inventory is 0.064 MCi. Almost the same result (0.065 MCi) can be obtained by direct calculation, assuming an energy yield of 200 MeV per fission and a Cs-137 fission fraction of 6.0 percent.
- (b) The assumed conditions of a Diablo Canyon fuel assembly at discharge are equivalent to a burnup of 41 MWt-days per kgU.
- (c) The mass of 1 MCi of Cs-137 is 11 kg.

**Table 2-5**  
**Illustrative Inventories of Cesium-137**

Case	Inventory of Cesium-137 (Curies)
Produced during detonation of a 10-kilotonne fission weapon	1,800
Released to atmosphere during the Chernobyl reactor accident of 1986	2.4 million
Released to atmosphere during nuclear-weapon tests, primarily in the 1950s and 1960s (Fallout was non-uniformly distributed across the planet, mostly in the Northern hemisphere.)	20 million
Currently in reactor core of Diablo Canyon Unit 1 or Unit 2	6.2 million
Currently in spent-fuel pool of Diablo Canyon Unit 1 or Unit 2	57 million
In a typical module of a Diablo Canyon ISFSI	1.3 million

**Notes:**

(a) Inventories in the first three rows are from Table 3-2 of: Gordon Thompson, *Reasonably Foreseeable Security Events: Potential threats to options for long-term management of UK radioactive waste*, A report for the UK government's Committee on Radioactive Waste Management, IRSS, 2 November 2005.

(b) Inventories in rows four through six are author's estimates set forth in Table 2-3 of this report.

**Table 2-6  
Some Potential Modes and Instruments of Attack on a Nuclear Power Plant**

<b>Attack Mode/Instrument</b>	<b>Characteristics</b>	<b>Present Defense</b>
Commando-style attack	<ul style="list-style-type: none"> <li>• Could involve heavy weapons and sophisticated tactics</li> <li>• Successful attack would require substantial planning and resources</li> </ul>	Alarms, fences and lightly-armed guards, with offsite backup
Land-vehicle bomb	<ul style="list-style-type: none"> <li>• Readily obtainable</li> <li>• Highly destructive if detonated at target</li> </ul>	Vehicle barriers at entry points to Protected Area
Anti-tank missile	<ul style="list-style-type: none"> <li>• Readily obtainable</li> <li>• Highly destructive at point of impact</li> </ul>	None if missile launched from offsite
Commercial aircraft	<ul style="list-style-type: none"> <li>• More difficult to obtain than pre-9/11</li> <li>• Can destroy larger, softer targets</li> </ul>	None
Explosive-laden smaller aircraft	<ul style="list-style-type: none"> <li>• Readily obtainable</li> <li>• Can destroy smaller, harder targets</li> </ul>	None
10-kilotonne nuclear weapon	<ul style="list-style-type: none"> <li>• Difficult to obtain</li> <li>• Assured destruction if detonated at target</li> </ul>	None

**Notes:**

This table is adapted from a table, supported by analysis and citations, in: Gordon Thompson, *Robust Storage of Spent Nuclear Fuel: A Neglected Issue of Homeland Security*, IRSS, January 2003. Later sources confirming this table include:

(a) Gordon Thompson, testimony before the California Public Utilities Commission regarding Application No. 04-02-026, 13 December 2004.

(b) Jim Wells, US Government Accountability Office, testimony before the Subcommittee on National Security, Emerging Threats and International Relations, US House Committee on Government Reform, 4 April 2006.

(c) Marvin Fertel, Nuclear Energy Institute, testimony before the Subcommittee on National Security, Emerging Threats and International Relations, US House Committee on Government Reform, 4 April 2006.

(d) Danielle Brian, Project on Government Oversight, letter to NRC chair Nils J. Diaz, 22 February 2006.

(e) National Research Council, *Safety and Security of Commercial Spent Nuclear Fuel Storage: Public Report*, National Academies Press, 2006.

**Table 2-7  
Potential Sabotage Events at a Spent-Fuel-Storage Pool, as Postulated in the NRC's  
August 1979 GEIS on Handling and Storage of Spent LWR Fuel**

Event Designator	General Description of Event	Additional Details
Mode 1	<ul style="list-style-type: none"> <li>• Between 1 and 1,000 fuel assemblies undergo extensive damage by high-explosive charges detonated under water</li> <li>• Adversaries commandeer the central control room and hold it for approx. 0.5 hr to prevent the ventilation fans from being turned off</li> </ul>	<ul style="list-style-type: none"> <li>• One adversary can carry 3 charges, each of which can damage 4 fuel assemblies</li> <li>• Damage to 1,000 assemblies (i.e., by 83 adversaries) is a "worst-case bounding estimate"</li> </ul>
Mode 2	<ul style="list-style-type: none"> <li>• Identical to Mode 1 except that, in addition, an adversary enters the ventilation building and removes or ruptures the HEPA filters</li> </ul>	
Mode 3	<ul style="list-style-type: none"> <li>• Identical to Mode 1 within the pool building except that, in addition, adversaries breach two opposite walls of the building by explosives or other means</li> </ul>	<ul style="list-style-type: none"> <li>• Adversaries enter the central control room or ventilation building and turn off or disable the ventilation fans</li> </ul>
Mode 4	<ul style="list-style-type: none"> <li>• Identical to Mode 1 except that, in addition, adversaries use an additional explosive charge or other means to breach the pool liner and 5-ft-thick concrete floor of the pool</li> </ul>	

**Notes:**

- (a) Information in this table is from Appendix J of: USNRC, *Generic EIS on Handling and Storage of Spent Light Water Power Reactor Fuel*, NUREG-0575, August 1979.
- (b) The postulated fuel damage ruptures the cladding of each rod in an affected fuel assembly, releasing "contained gases" (gap activity) to the pool water, whereupon the released gases bubble to the water surface and enter the air volume above that surface.

**Table 4-2  
The Shaped Charge as a Potential Instrument of Attack**

Category of Information	Selected Information in Category
General information	<ul style="list-style-type: none"> <li>• Shaped charges have many civilian and military applications, and have been used for decades</li> <li>• Applications include human-carried demolition charges or warheads for anti-tank missiles</li> <li>• Construction and use does not require assistance from a government or access to classified information</li> </ul>
Use in World War II	<ul style="list-style-type: none"> <li>• The German MISTEL, designed to be carried in the nose of an un-manned bomber aircraft, is the largest known shaped charge</li> <li>• Japan used a smaller version of this device, the SAKURA bomb, for kamikaze attacks against US warships</li> </ul>
A large, contemporary device	<ul style="list-style-type: none"> <li>• Developed by a US government laboratory for mounting in the nose of a cruise missile</li> <li>• Described in an unclassified, published report (citation is voluntarily withheld here)</li> <li>• Purpose is to penetrate large thicknesses of rock or concrete as the first stage of a "tandem" warhead</li> <li>• Configuration is a cylinder with a diameter of 71 cm and a length of 72 cm</li> <li>• When tested in November 2002, created a hole of 25 cm diameter in tuff rock to a depth of 5.9 m</li> <li>• Device has a mass of 410 kg; would be within the payload capacity of many general-aviation aircraft</li> </ul>
A potential delivery vehicle	<ul style="list-style-type: none"> <li>• A Beechcraft King Air 90 general-aviation aircraft will carry a payload of up to 990 kg at a speed of up to 460 km/hr</li> <li>• A used King Air 90 can be purchased in the US for \$0.4-1.0 million</li> </ul>

**Source:**

Gordon Thompson, Institute for Resource and Security Studies, testimony before the Public Utilities Commission of the State of California regarding Application No. 04-02-026, 13 December 2004.