February 7, 2007

Comments sent via e-mail to divinestrake@doe.gov
(with follow-up hard copy via express mail)

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Re: State of Utah Comments on the Environmental Assessment for the Divine Strake Test

The State of Utah submits these comments on the Draft December 2006 Revised Environmental Assessment "Large-Scale, Open-Air Explosive Detonation, DIVINE STRAKE, at the Nevada Test Site" (DOE/EA-1550) ("EA") prepared by the Department of Energy (DOE), National Nuclear Security Administration (NNSA), Nevada Site Office (NSO) in cooperation with the Department of Defense (DoD), Defense Threat Reduction Agency (DTRA).

DTRA and NNSA have not justified the need for or the effect of Divine Strake, a 700-ton conventional explosion, conducted at the Nevada Test Site within 1 mile of radioactive contamination from past nuclear tests, and upwind of communities and people who know all too well the suffering and death from open-air nuclear tests at the same location. For the reasons discussed below, Utah urges DTRA not to proceed with the Divine Strake test.

I. The NEPA Process

All "major federal actions significantly affecting the quality of the human environment" are subject to the National Environmental Policy Act (NEPA). 42 USC § 4332(2)(C). The current EA says it has been conducted in compliance with NEPA, the Council of Environmental Quality (CEQ) regulations, 40 C.F.R. Part 1500 to 1508, and DOE's NEPA implementing procedures, 10 C.F.R. 1021. EA at 1-1. The EA also says,

> The purpose of this EA is to provide the NNSA and DTRA decision-makers with sufficient information and analysis to determine whether to prepare an Environmental Impact Statement (EIS) or issue a Finding of No Significant Impact (FONSI). Based on the analysis contained in this EA, NNSA and DTRA will issue a FONSI and proceed with the selected alternative, prepare an EIS, or take no further action regarding the experiment . . . .

EA at 1-1. For purpose of its NEPA review, the NNSA, as the administrator of the Nevada Test Site, is the lead agency and DTRA, who will conduct the blast, is a cooperating agency for the Divine Strake project.

Courts review whether an agency's action not to prepare an EIS is based on "reasonableness",[1] *i.e.*, whether the agency's decision was fully informed and well-considered.[2] The threshold for requiring an EIS is quite low: "[O]nly in those obvious circumstances where no effect on the environment is possible, will an EA be sufficient for the environmental review required under NEPA. . . . [T]he conclusion reached must be close to self-evident and would not require an extended document incorporating other studies."[3]

DOE is required to prepare and circulate an EA and FONISI in accordance with CEQ regulations, as supplemented by 40 C.F.R. Part 1021, Subpart C. *See* 40 C.F.R. §1021.320. Furthermore, DOE may prepare a FONSI "only if the related EA supports the finding that the proposed action will not have a significant effect on the human environment." Id. § 1021.322(a). Otherwise, DOE must prepare an EIS and issue a ROD before proceeding with the project. Id.

CEQ regulations outline factors that an agency must consider in determining whether an action "significantly" affects the environment within the meaning of NEPA § 102(2)(C). These factors include, *inter alia*:

- Context. This means that the significance of an action must be analyzed in several contexts such as society as a whole (human, national), the affected region, the affected interests, and the locality. 40 C.F.R. § 1508.27(a).
- A significant effect may exist even if the Federal agency believes that on balance the effect will be beneficial. Id. § 1508.27(b)(1).
- The degree to which the proposed action affects public health or safety. Id. § 1508.27(b)(2)
- The degree to which the effects on the quality of the human environment are likely to be highly controversial. Id. § 1508.27(b)(4).
- The degree to which the possible effects on the human environment are highly uncertain or involve unique or unknown risks. Id. § 1508.27(b)(5).
- The degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration. 40 C.F.R. § 1508.27(b)(6).
- Whether the action is related to other actions with individually insignificant but cumulatively significant impacts. Id. § 1508.27(b)(7).

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[1] Foundation for North Am. Wild Sheep v. U.S. Dep't of Agriculture, 681 F.2d 1172, 1177 (9th Cir. 1982).

[2] Vermont Yankee Nuclear Power Corp. v. Natural Resources Defense Council, Inc., 435 U.S. 519, 558 (1978); *see also* Friends of Endangered Species, Inc. v. Jantzen, 760 F.2d 976, 986 (9th Cir. 1985).

[3] Sierra Club v. Babbitt, 69 F.Supp. 2d 1202, 1216 (E.D. Cal. 1999).

II. Rush to Judgment and Lack of Public Review

A. Actions to Date

Efforts by NNSA and DTRA to conclude the NEPA process without adequate analysis or public hearings are evident from the decision rendered to date:

- December 2005: Pre-Approved Draft Environmental Assessment issued for comment.
- January 30, 2006: FONSI issued.
- May 2006: Revised Environmental Assessment issued.
- May 9, 2006: Another FONSI issued.
- June 9, 2006: May 9 FONSI revoked.
- December 2006: Another draft revised Environmental Assessment issued.
- January 5, 2007: Current public comment period extended to February 7, 2007 because two chapters from the EA released on December 22, 2006 were omitted.

EA at 1-10. Not only have the federal agencies rushed to judgement but they have also failed to provide information referenced and relied on in the EA or to provide the public with an adequate forum to express their concerns.

B. Lack of Public Process and Unavailability of Referenced Information

Instead of conducting public comment sessions, NNSA and DTRA conducted public information sessions or open houses. Two such sessions were held in Utah; one in Salt Lake City on January 10, 2007, another the following day in St. George.

The meeting format was totally unsatisfactory to aid the public in understanding the scope of Divine Strake or in providing a forum for public comments. The open house in Salt Lake City was structured with DTRA on one side of the room and NNSA on the other. People queued fifteen to twenty people deep in order to ask questions of federal officials. Frequently, DTRA would refer a person to NNSA who would then refer the person back to DTRA. Open public comments, where citizens could hear the comments and concerns of others, were prohibited.

Concerned that the public's voice was not being heard on the Divine Strike proposal, the Utah Department of Environmental Quality, at the request of the Governor, hosted two public hearings in Utah (St. George on January 18 and Salt Lake City on January 24). Members of the public were invited to comment, their comments were taken down by a court reporter, and written comments were accepted. The transcripts and written comments from the January 18 and 24 hearings are attached hereto and incorporated as part of the State's comments on Divine Strake.

In addition to the lack of public participation, the EA references documents that are unavailable on NNSA, Nevada Site Office environmental publications website, http://www.nv.doe.gov/library/publications/environmental.aspx. Furthermore, an extensive search on the Internet

failed to locate many of the referenced documents.[4] As one court stated, the EA itself (including any attachments) must enable public comment on the agency's determination that the project does not significantly affect the environment. Natural Resources Defense Council v. Duvall, 777 F.Supp. 1533, 1539 ((E.D. Cal. 1991). Furthermore, incorporation by reference of documents into the EA is dependent upon the following standards:

> 1) the material is reasonably available; 2) the statement is understandable without undue cross reference; and 3) the incorporation by reference meets a general standard of reasonableness.

Id. As described above, the material referenced in the EA is not reasonably available. Furthermore, many of DTRA's and NNSA's claims in the EA are baseless without reviewing referenced sources.

Finally, open houses or project updates may not be considered in tandem with the EA in determining whether the EA provided the public with an adequate description of the project. Sierra Club, 69 F.Supp.2d at 1218. By these standards, the EA fails to adequately inform the public or the federal decision-makers on whether the Divine Strake test will significantly affect the quality of the human environment.[5]

III. Major Federal Action Such as Divine Strake Requires the Preparation of an EIS

If DTRA goes forward with Divine Strake, it will conduct the explosive test above Tunnel U16B at the Nevada Test Site. Tunnel U16B, constructed in 1998, has been used by DTRA for high explosive testing, yet the EA contains no information about these tests, such as whether heavy metals may have been associated with them. In addition, no core samples have been taken below the blast site.

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[4]The State made requests at the NNSA/DTRA open house held in Salt Lake City and sent e-mails to NNSA for the following: Technical information about the height of the blast and the size of the crater; the DTRA, 2000 corrective action decision document for Tunnel U16A Muckpile (referenced at EA App. A at A-7) and other information about radionuclides from Tunnel U16A; information about the effect of shockwaves on air quality; the Final EIS for the NST and off-site locations (2002); a FONSI and EA for High-Explosive Field Test Mill Race, DTRA (1981); an evaluation of seismicity of the NTS and vicinity (SAND86-7006, UC-814, Votrmann 1991); and documents identifying conventional tests conducted at or near Tunnel U16B and their environmental impacts. The only requested document provided to the State by NNSA was the sampling and analysis plan for the Site Characterization Report (EA App. B).

[5]See National Parks & Conversations Ass'n v. Babbitt, 241 F.3d 722, 730 F3d. (9th Cir. 2001), *cert denied* 534 U.S. 1104 (2002) ("If the EA establishes that the agency's action may have a significant effect upon the environment, an EIS must be prepared.")(*internal quotation omitted*).

About a mile from Tunnel U16B is Tunnel U16A and its associated muckpile. Nuclear testing took place at Tunnel U16A in the 1960s and 1970s, resulting in radioactive residue (americium, cesium, strontium, etc). A 2001 corrective action investigation found contamination above background at the muckpile and at a nearby ravine to the east. EA at 4-12. The EA merely makes passing reference to this information and has no information about the concentration of the radioisotopes, nor has the agency provided access to the corrective action plan.[6]

Without elaboration, the EA says that "several alternatives were considered," all being eliminated except the proposed action and the no action alternative. EA at 2-1. DTRA cannot go forward with the proposed action to detonate up to 700 tons of the blasting agent ammonium nitrate fuel oil ("ANFO"), using up to 300 pounds of C-4 explosive to initiate detonation, after making a "finding of no significant impact" (FONSI) because the EA is wholly inadequate to support that action.

The first step under CEQ regulations is to evaluate whether the proposal normally does or does not require an EIS or an EA. 40 C.F.R. § 1501.4(a). Based on past actions, NNSA and DTRA should have proceeded directly to preparing an EIS.

At one time, DTRA considered conducting the Divine Strake test at other locations, including the White Sands Missile Range in New Mexico, the largest military installation in the United States.[7] EA at 2-17. According to a November 15, 2006 press release by Senator Dominici (R-New Mexico), White Sands Missile Range was not chosen for the Divine Strake test because it "would have required a full environmental impact statement which could have taken several years."[8]

Taking Senator Dominici's statement at face value, if the 3,200 square mile White Sands Missile Range required an EIS before a decision could be made about Divine Strake, then under 40 C.F.R. § 1501.4(a) so too should an EIS be required for the same test conducted at the 1,375 square mile Nevada Test Site.

Moreover, the Divine Strake test is controversial. As NNSA and DTRA must have observed from their open houses in Utah, and as evidenced by the attached transcripts from Utah-sponsored public hearings, the effects on the quality of the human environment from Divine Strake are highly controversial. When a project is "controversial" (*i.e.*, when "substantial questions are raised as to whether a project may cause significant degradation of some human environmental factor") the

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[6] *See* EA App. A at A-7 *DTRA, 2002. Corrective Action Decision Document for Corrective Action Unit 504: 16a-Tunnel Muckpile, Nevada Test Site*, DTRA, Mercury, Nevada, September, 2002.

[7] The range is about 3,200 square miles, it boundaries extending almost 100 miles north to south by 40 miles east to west. *See* http://www.wsmr.army.mil/bd/where.html

[8] *See* http://domenici.senate.gov/news/printrecord.cfm?id=265959.

agencies must prepare an environmental impact statement. National Parks, 534 F3d. at 736 (*internal quotations and citation omitted*); *see also* 40 C.F.R. § 1502.27(b)(4).

IV. The Stated Need and Purpose for the Test Does Not Meet the Requirements of NEPA

A. Unlinked to Any Weapons System, the Stated Purpose of the Test Is Inapplicable to the Development of Conventional Weapons.

DTRA claims it needs to obtain information "regarding the methodologies and technologies developed under the Tunnel defeat ACTD" and describes Divine Strake as a key research and development component of the Department of Defense's Global Strike concept of operations, part of DoD's Advanced Concepts and Technology Demonstration Program (ACTD). EA at 1-7 to 1-8. However, **Divine Strake is not linked to the evaluation of any specific weapons system**. EA at 2-17 *(emphasis added*). There is no aircraft or other delivery system in the current U.S. fleet or proposed for future development capable of carrying a 700-ton payload or deploying a weapon weighing 700 tons. If, in fact, the Department of Defense is conducting this test as a surrogate for nuclear testing or to determine the minimum yield required for a nuclear bunker busting bomb,[9] then DTRA should state that fact plainly in the EA so the purpose and need for the test is fully described and the necessary national policy debate may commence.

Based on the current description in the EA, DTRA cannot demonstrate that it has considered and weighed all the facts (including both impacts and benefits) before making a decision on Divine Strake. Moreover, to comply with NEPA, NNSA and DTRA must consider, *inter alia*, "[t]he degree to which the action may establish a precedent for future actions with significant effects or represents a decision in principle about a future consideration." 40 C.F.R. § 1508.27(b)(6).[10] This it has failed to do.

B. DTRA's Stated Purpose for the Test Is Contrary to the NAS Earth Penetrator Report

The Divine Strake test will not advance DTRA's stated objective of developing methods and technologies to defeat hardened and deeply buried targets. *See* EA at 1-8. A committee of the

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[9] *See* Appropriation/Budget Activity *RDT&E, Defense-Wide/Advanced Technology Development - BA 3*, Fiscal Year 2007 ("The Tunnel Target Defeat ACTD will develop a planning tool that will improve the warfighter's confidence in selecting the smallest proper nuclear yield necessary to destroy underground facilities while minimizing collateral damage.") and Fiscal Year 2006 ("Conduct Tunnel Target Defeat Advanced Concept and Technology Demonstration(s) (ACTD) Full-Scale tunnel defeat demonstration using high explosives to simulate a low yield nuclear weapon ground shock environment at Department of Energy's Nevada Test Site").

[10] Concerned About Trident v. Rumsfeld, 555 F.2d 817, 823 (D.C. Cir. 1977) ("There is no support in either the statute or the cases for implying a 'national defense' exemption from NEPA.").

National Academy of Science ("NAS EPW Committee") investigating the effects of nuclear earth-penetrator weapons (EPW) found that hardened and deeply buried targets of U.S. adversaries are located 100 to 400 meters below ground.[11] More importantly, the NAS EPW Committee concluded: "Nuclear weapons are the only weapons that can destroy targets deep underground or in tunnels."[12] Moreover, the future development of weapons to destroy harden and deeply buried targets will likely be nuclear, based on one of two existing nuclear designs, the B61-7 or B83.[13]

DTRA is reported to have said that Divine Strake data can be used "in [developing] future conventional weapons and in assessing how much damage we can do to the tunnel complex that is below the explosion site." *See* FOX12 (January 29, 2007) (*quoting* David Rigby, DTRA). But the EA fails to discuss how a single detonation of ammonium nitrate in an open pit approximately 36 feet deep (EA at 2-2) and "about" 30 meters (98 feet) above the tunnel (id.) will aid in the development of a future earth-penetrator nuclear weapons that could reach a hardened and deeply buried target.

The NAS EPW Committee had sufficient data to conclude that conventional earth penetrator weapons could not destroy hardened and deeply buried targets. Therefore, one of the stated objectives of Divine Strike – to "evaluate damage to a tunnel facility from a large **surface** detonation", EA at 2-17 (*emphasis added*), – has no apparent value to the Initial Tunnel Target Defeat Advanced Concepts and Technology Demonstration Program. Accordingly, DTRA has not substantiated the purpose for conducting the Divine Strake test.

C. Available Data Negates DTRA's Stated Need to Conduct the Test

The EA says that Divine Strake is necessary to "obtain vital information regarding the methodologies and technologies developed under the Tunnel Defeat ACTD." EA at 1-8. Even the EA recognizes that there have been large scale ANFO detonations in the past[14] but the EA does not justify why those tests could not suffice to meet the needs of the Tunnel Defeat Program in lieu of

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[11] *Effects of Nuclear Earth-Penetrator and Other Weapons*, Committee on the Effects of Nuclear Earth-Penetrator and Other Weapons, National Research Council of NAS, (2005) (NAS EPW Report) at 3.

[12] Id. at 30.

[13] Id. at 9 (*referring to* a 3 year NNSA-Air Force joint study, including research and development towards a robust nuclear earth penetrator weapon).

[14] ANFO detonations significantly larger than the proposed 700 ton Divine Strake blast have taken place at Tunnel U12n at the Nevada Test Site (1,410 tons), while two detonations of about 4,700 tons, three at 2,250 tons or greater, and three at over 600 tons have taken place at the White Sands Missile Range in New Mexico. EA at 1-9. In addition, seven 120 ton blasts have been conducted at Misers Bluff, Arizona. Id.

setting off 700 tons of explosives in close proximity to past nuclear tests.[15]

According to the NAS EPW Committee, more than 3,000 earth-penetrator tests have been conducted. NAS EPW Report at 18. Furthermore, data from 1,084 representative tests are maintained in an earth-penatrator weapons database at Sandia National Laboratories, including two tests conducted in competent granite geology. Id. at 18, 34. The EA also fails to discuss the availability of test data collected at the Nevada Test Site from the 22 subcritical tests conducted jointly by the United States and Britain since 1997[16] or other data available from U.S. military allies that would obviate the need for the Divine Strake test. In making a decision on Divine Strake, DTRA must consider the actual need for and benefit from the test in light of existing data from prior tests. *See e.g.*, 40 C.F.R. § 1508.27(a) and (b)(1). Moreover, DTRA must specify whether this action is a decision in principle about a future consideration. Id. § 1508.27(b)(6).

D. A Single Test Will Not Provide Validation of Computer Codes

1. Validation of Computer Codes

DTRA's additional goals for the test are to "obtain a relevant full-scale database for code validations . . . and provide test beds to develop improved weaponeering algorithms." EA at 1-8. DTRA has not provided a sufficient rationale for conducting this test, instead of using the existing EPW databases, to validate computer codes. Rather than validate computer codes, DTRA will likely use Divine Strake as a springboard for a resumption of testing to conduct parametric studies because there are too many variables at play in this one test to provide any meaningful information or code validation.

DTRA conducted two 3,000-pound explosive experiments in limestone, as well as small scale explosive experiments, to aid it in evaluating and validating modeling codes. Id. at 2-17. According to the EA, Divine Strake would provide "final validation of the modeling effort." Id. However, as there may be many variables in the various explosive tests (*e.g.*, detonating grams, pounds, 1.5 tons, or 700 tons of explosives), it is highly improbable that one single test detonation of explosives in complex limestone "involving dipping bedding planes and several joints sets at various orientations" (id.) would provide any data that would be useful in validating a modeling code. Based on a single test, it may be impossible to distinguish predicted or unpredicted modeling results that are dependent on the size of the detonation (*e.g.*, detonating 450 times the explosives used in Indiana),

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[15]Two 3,000 lb. chemical explosive experiments were conducted in a limestone quarry in Indiana to evaluate and validate modeling codes (EA at 2-17) and DTRA has not explained why that homologous geologic setting will not suffice instead of its avowed need to conduct a test in a complex structural geologic setting.

[16]*See* Las Vega Sun, *U.S., Britain conduct nuclear experiment at Nevada Test Site* (February 23, 2006) http://www.lasvegassun.com/sunbin/stories/nevada/2006/feb/23/022310262.html

horizontal or dipping bed planes, the orientation of the geologic joints, the hardness of the bedrock, the depth of the detonation, the depth of the tunnel, etc. The most likely outcome from Divine Strake is that DTRA will claim it needs to conduct more tests.

2. No Meaningful Data and the Potential Need for Parametric Studies

The greatest uncertainly in predicting EPW penetration depth is the heterogeneous nature of subsurface geology. *Effects of Nuclear Earth-Penetrator* at 3. The NAS EPW Committee concluded that determining the effectiveness of a nuclear earth-penetrator weapon is complicated by the "presence of layers, interfaces, faults, and joints throughout the target area." Id. at 4. All Divine Strake will reveal is data relevant to the geology at Tunnel U16B. It will not contribute to determining the effectiveness of weapons in varying subsurface geology around the world, especially when the geology of hardened and deeply buried targets of U.S. adversaries is "only imprecisely known at best." Id. at 34. Moreover, significant changes in geologic properties occur locally. Id.

Because of the uncertainty in a target's geology, the NAS EPW Committee concluded that "estimates of peak velocity or stress at depth should not be expected to be accurate to better than a factor of 2." Id. The NAS EPW Committee also concluded that the probability of damage to a hardened and deeply buried target "depends more strongly on improving accuracy (*i.e.*, CEP [circular error probable]) than on the target hardness [*i.e.*, geologic properties]." Id. at 43.

In sum, either Divine Strake will (1) not provide any meaningful data and is not justified; or (2) require a series of parametric tests to be conducted for which connected actions and cumulative impacts have not been assessed. *See* 40 C.F.R. § 1508.27(a) and (b)(7).

3. Availability of Comparative Data

The EA fails to discuss why additional data beyond that contained in the earth penetrator weapons database is necessary. Furthermore, the EA does not discuss why the two previous earth penetrator weapons tests in competent granite are inadequate to model impacts in complex limestone. The NAS EPW Committee stated that damage from an earth penetrator weapon in competent granite for a given accuracy can be calculated with a 95-percent probability. *Effects of Nuclear Earth-Penetrator* at 4. The EA fails to address why damage in limestone cannot be calculated when the hardness of granite and limestone are similar. The EA also fails to discuss whether the Divine Strake open-air detonation test will improve DTRA's ability to estimate the earth penetrator weapons damage in limestone beyond 95-percent probability (as it could using the granite tests).

4. Relevance of the Collected Data

Divine Strake should not be tested merely for the sake of setting off 700 tons of explosives. On closer inspection, there are many inconsistencies in the rationale underlying the test. First, Divine Strake does not simulate the penetration depth of existing weapons. For example, nuclear earth penetrator weapons with a depth of penetration beyond 3 meters risk survival. Id. at 2. The

EA states that the charge hole for Divine Strake will be "about" 9.8 meters in diameter and 11 meters deep. EA at 2-2. The EA fails to describe whether the charge size hole is designed to accommodate the volume of ammonium nitrate or to simulate the penetration of an earth penetration weapon prior to detonation. If the later, then it does not simulate the penetration depth of existing weapons.

Second, Divine Strake will not provide relevant data on collateral damage. While not explicitly stated in the EA, minimizing collateral damage appears to be another objective of the test. *See* fn. 9 *supra*. Given that "ejecta" dispersion would be a factor of the depth of penetration of an earth penetrator weapon, the EA fails to discuss how the "ejecta studies" from a 9.8 meter diameter ammonium nitrate detonation will generate meaningful data in determining collateral effects.

Finally, the EA fails to discuss the transferability of the ejecta data under acceptable Divine Strake blast conditions to varying meteorological conditions in the field during military operations.

The stated purpose for conducting the test is not justified when DTRA will be unable to obtain relevant data from the test, nor can the purpose for collecting the data outweigh the negative impacts from the test. In sum, the EA fails to comply with NEPA.

V. Inadequate Data and Substantive Analysis to Determine the Effects of the Test

An aboveground test to detonate 700 tons of explosives within a mile of past nuclear testing cannot be evaluated by a cursory Environmental Assessment. There is no assurance that the Divine Strake test will not resuspend dangerous fallout radioisotopes from previous nuclear tests or the aboveground muckpile associated with those tests. DTRA should find another location for the test or not test at all. If DTRA proceeds with the test as proposed, it must conduct a full blown Environmental Impact Statement because the information provided in the EA is woefully inadequate to evaluate the impact of the explosion.

A. Blast Size and Shockwaves

There is surprisingly little information in the EA about the size of the blast crater, the height of the plume or the contaminants that may be entrained in the blast. The EA merely notes that the blast crater from Divine Strake "is predicted to have a 98-foot radius." EA at 3-17. This is a glaring deficiency in the EA because NNSA has merely drawn a 1,000 foot radius to approximate the 10 psi isobar perimeter around the blast site and summarily concluded that sampling within that radius is sufficient to predict the effects from the blast and its shockwave. *See* EA Fig. 3.2.-2. Only two samples were taken outside the 1,000 foot radius within the 10 psi isobar perimeter. Thus, it is impossible to predict the variation in concentrations of radiological contaminates and heavy metals.

The absence of any reference or support for the 98-foot crater radius is even more startling when there is **known** transuranic contamination 1.1 miles from the blast site. This in turn leads to another deficiency: the EA does not adequately explain the extent of contamination at Tunnel

U16A, at the muckpile or at a nearby ravine.[17]

Yet another deficiency is the way in which the EA cursorily dismissed the need to evaluate radioactive contamination from the six nuclear tests conducted at the nearby Tunnel U16A because nuclear tests were conducted underground and were approximately a mile away. *See* EA at 3-17. The EA fails to mention or discuss that one of those nuclear tests – Marshmallow conducted in U16A in 1962 – was not adequately sealed and released radioactive constituents into the atmosphere.[18]

The statement that Tunnels U16A and U16B are not connected is inadequate to evaluate radioactive activity from past testing. *See* EA at 3-5, 3-17. Following an underground nuclear explosion, 770-metric tons of rock per kiloton of explosive is vaporized and melted, creating a large bubble of high pressure which forms a cavity.[19] Shock waves propagate from the cavity of the nuclear explosion forming a radius of fractured rock that extends approximately two to three times that of the spherical cavity. *Nevada Test Site Radionuclide Inventory* at 5. Tritium and cesium-137 may be deposited several cavity radii from the initial detonation. Id. at 8. NNSA and DTRA must assess whether radioactive contaminates confined in the fractures and pore spaces from nuclear testing at Tunnel U16A could be released from the excavation of the blast hole or detonation of Divine Strake.

The EA discusses the noise effect from shockwaves and percussion waves. However, the EA assumes a 10 psi isobar is sufficient to assess the effect the shockwaves will have on the suspension or resuspension of contaminants at nearby Tunnel U16A or elsewhere on the Nevada Test Site. NNSA has not justified using a 10 psi isobar to evaluate whether shockwaves may entrain and spread radioactive particles associated with the Marshmallow nuclear test or other historic nuclear tests. Furthermore, the EA also ignores the impact of the explosion's airblast (shockwave) on the entrainment of particulate matter and the resultant transport of those substances.

DTRA and NNSA cannot make a "finding of no significant impact" based on such inadequate information.

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[17]It is pointless to reference a Corrective Action Plan for Tunnel U16A that is unavailable to the public. *See* EA App. A at A-7.

[18]*See United States Nuclear Tests July 1945 through September 1992*, DOE/NV - 209 - Rev. 15 (December 2000) at 22.

[19]*See Nevada Test Site Radionuclide Inventory, 1951-1992,* Los Alamos National Laboratory, LA-13859-MS (September 2001) at 5; and *The Containment of Underground Nuclear Explosions*, Office of Technology and Assessment (1989) at 32.

B. Sampling

NNSA's sampling protocol for the Divine Strake test is unsupportable. Its sample size and location is not defensible, nor is its decision to use sample averages instead of maximum sample values. Furthermore, NNSA has not taken any core samples from the blast site to determine whether there has been any underground radioactive contamination from Tunnel U16A, to ascertain natural radiation, or to verify the desired geologic make-up of Tunnel U16B.

Section 3.3.3 of the Divine Strake sampling plan identifies "constituents of potential concern," including airborne fallout constituents, naturally occurring radioactive material, tritium, and "other constituents . . . because they are reported in the gamma spectroscopy analytical report." *Sampling and Analysis Plan for Divine Strake Experiment Nevada Test Site, Nevada,* Revision No. 0, DOE/NV-1139 (August 22, 2006) ("Divine Strake SAP") at 13. The list of constituents of potential concern were apparently devised from typical offsite radiologic fallout. *See* id. at A-5. However, the Divine Strake sampling plan provides no justification for excluding many suspected long-life fission products, radiochemical tracers, and device components from nuclear detonations at the Nevada Test Site. The proposed Divine Strake test lacks sampling data for the following "Candidate Radionuclides for Inclusion into Source-Term Inventory":

> Fission products – krypton (Kr^{85}), zirconium (Zr^{93}), niobium (Nb^{93m} and Nb^{94}), technetium (Tc^{99}), palladium (Pd^{107}), cadmium (Cd^{113m}), iodine (I^{129}), cesium (Cs^{135}), samarium (Sm^{151}), europium (Eu^{150}), holmium (Ho^{166});
>
> Radiochemical tracers – uranium (U^{233}), neptunium (N^{237}), plutonium (Pu^{242}), americium (Am^{243}), curium (Cm^{244});
>
> Device components – uranium (U^{232} and U^{236}), plutonium (Pu^{241}).[20]

Nevada Test Site Radionuclide Inventory 1951-1992, at 10-11.

Appendix F to the EA concludes: "Both natural radionuclides suspended, and historic fallout radionuclides resuspended from the detonation, have potential to be transported outside the NTS boundary by wind." EA App. F at iii. This conclusion is reached by taking the average of samples collected – not the maximum sample value. The following is illustrative of why NNSA should not use sample averages. In the case of plutonium-239, the following concentrations were found in some of the samples:

Sample No.	DSA 07	11.1	pCi/g
	DSA 15	8.3	pCi/g

[20] Pu^{241} was removed from the Sampling Plan as a result of the "low plutonium-241 to plutonium ratios and low deposition density." Divine Strake SAP at A-6.

DSA 20	4.5 pCi/g
DSA 25	2.42 pCi/g
DSA 01	2.39 pCi/g
DSA 02	2.38 pCi/g

Site Characterization Plan Report, EA App. B, Table 3-2. For sample locations *see* id. Fig. 2-1. Average reported activity for Pu^{239} was 1.73 pCi/g. Id. Table 4-1. However, minimum levels of interest (below which human health effects are negligible) for Pu^{239} is 3.13 pCi/g. Divine Strake SAP at 15, 17. When plutonium-239 samples show up at 2, 4, 8 and 11 pCi/g, the public can have no confidence in NNSA's sampling analysis, which is based on an average concentration of 1.73 pCi/g.

The sampling plan justifies taking shallow samples (less than 6 inches) because "the majority of the radionuclide activity should be contained within the first 15 cm of soil." Divine Strake SAP at 14. However, the EA does not discuss the depth or how the soil or bedrock around Tunnel U16B became "disturbed." Depending upon the depth of disturbed material, NNSA and DTRA must analyze and consider a statistically significant number of samples at varying depths.

"Conventional explosive testing" was conducted in Tunnel U16B. EA at 3-13. Residual contaminates such as heavy metals from conventional explosives may be entrained into the atmosphere during Divine Strake. The EA fails to characterize and model any residual heavy metal contaminates from conventional explosive testing in Tunnel U16B.

The EA is also remiss in not considering potential health hazards from crystalline silica. NNSA and DTRA must evaluate the amount, if any, of silica dusts that may be entrained in the atmosphere as a consequence of Divine Strake.[21] The EA provides no information regarding silica dust generation from the excavation of the blast hole or from the Tunnel U16B muckpile.

Further evidence of inadequate sampling comes from NNSA's assessment of depth to groundwater. Although known groundwater depth at the Nevada Test Site may vary from 260 to over 2,000 feet, the EA estimates groundwater depth in Area 16 based on groundwater elevation in a single undisclosed water well somewhere in the vicinity of Area 16. EA at 3-33. The *Nevada Test Site Environmental Report 2004* states that the water level elevation at Shoshone Mountain, which includes Area 16, is not known and "probably" flows southward. *Nevada Test Site Environmental Report 2004*, DOE/NV/11718–1080 at A-18, 34. The existence of perched watertables is also unknown. Estimating the groundwater elevation from a single water well is emblematic of the unsupportable sampling program conduct under the EA.

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[21]Silica dust, causing silicosis, is generated from crystalline silica, *e.g.*, quartz, tridymite, cristobalite, etc. *Draft Environmental Impact Statement for a Geologic Repository for the Disposal of Spent Nuclear Fuel and High-Level Radioactive Waste at Yucca Mountain*, Nye County, Nevada, Volume I (July 1999) at 3-84.

C. Air Modeling

The EA will not support a finding of no significant impact because of the existence of the numerous deficiencies in NNSA's air modeling. It is not clear whether the Gaussian plume model used in the EA included emissions associated with the overburden outside portal 2 entrance to Tunnel U16B. *See* EA at 2-10. Moreover, the Gaussian plume model used to support the EA is not capable of addressing slope effects or wind channeling that can be caused by the mountainous terrain surrounding the blast site or from the nearby mountain range to the west. S*ee e.g.*, EA at 3-25, 3-26. A more accurate environmental impact could be developed if a three-dimensional puff model was utilized to determine atmospheric dispersion. Such a model would be more accurate in complex terrain and would have more validity in cases of long range transport.

In addition, radiation levels were modeled with CAP88-PC, Version 3.0 and a dose assessment was developed using NARAC. EA App. F at 1. Since CAP88-PC is intended for long-term radiation releases, there is no explanation why this is not a mis-application of the model because the event to be modeled is a single and rapid introduction of radiation into the atmosphere. Also, the EA assumes an initial upward momentum of the dust cloud at 4,000 m/s based on a single internet reference to GlobalSecurity.org. EA App. F at 3. The EA makes no effort to confirm that this estimate is consistent with DOE aboveground blast data.

1. Meteorological Conditions

DOE does not model for actual meteorological test conditions. According to the EA, acceptable blast conditions include surface winds blowing up to 25 m.p.h., winds aloft up to 50 m.p.h and wind direction from 120° through 240°. EA at 2-11, 2-12.

DOE used two wind data sets, winds at 6 knots (6.9 m.p.h.) (EA App. F at 3) and 9 knots (10.36 m.p.h.).[22] The two modeled data sets do not encompass meteorological conditions under which the test may be conducted. Certainly, for people living in Utah, wind speed of less than 10 m.p.h. would not be a "worst case" analysis because stronger winds would have the potential to carry pollutants a greater distance from the blast site. Furthermore, atmospheric condition in southern Nevada vary depending on the season. Accordingly, the model utilized is not representative of atomospheric test conditions for Divine Strake other than in early June.

2. Particulate Matter

DOE has not modeled for $PM_{2.5}$, a national ambient air standard (NAAQS) pollutant. EPA recently established a new $PM_{2.5}$ 24 hour standard of 35g/m^3 and retained the annual standard of 15 g/m^3. 71 Fed. Reg. 60,853 (October 17, 2006). The EA fails to establish how DOE will meet the

[22]According to the State's review, for its dispersion model DOE used climatological conditions that were in effect at 10 a.m. June 3: winds 9 knots, wind direction 163°.

$PM_{2.5}$ for the Divine Strake test.

Rather than model for $PM_{2.5}$, DOE arbitrarily chose to allocate one half of the particulate matter produced by the explosion to PM_{10} and the other half to PM (*i.e.*, particles greater than 10 μg in size). Nothing in the scientific literature, or referenced in the EA, justifies eliminating the modeling of $PM_{2.5}$ dispersion from Divine Strake. To the contrary, it is essential to model $PM_{2.5}$ because exposure to these small sized particulates have significant health effects.[23] More importantly, the proximity of radionuclide contamination to the blast site poses the potential that some $PM_{2.5}$ will be composed of radioactive isotopes. Since $PM_{2.5}$ possesses some of the longest atmospheric residence times for particle pollution, NNSA and DTRA must consider its potential to impact the public at greater distances. This is of critical concern to Utah citizens downwind from the test. Based on current modeling, DOE cannot conclude the test will not create adverse effects on public health. *See* § 1508.27(b)(2); Sierra Club, 69 F.Supp. 2d at 1216.

3. Post Blast Sampling and Monitoring

DOE has not adequately described its post-blast monitoring. For example, NNSA claims it will meet radiation and air quality standards at the boundary of the Nevada Test Site. However, it is unclear whether this prediction was made for compliance at ground level or in the atmosphere (*i.e.*, at the centerline of the plume). DOE's proposed monitoring leaves many unanswered questions: Will DOE monitor the centerline of the plume at the NTS boundary? Further afield? Will it monitor the effects from the blast in Utah? How will it evaluate its predictive conclusions and determine their accuracy? What program does NNSA have in place to evaluate the re-suspension of radionuclides from this blast? Would monitoring detect the redistribution of radionuclides on the Nevada Test Site? Would this redistribution pose a future threat to the public in surrounding areas? These are many of the unknown questions that could be fleshed out if NNSA and DTRA conducted scoping as part of an Environmental Impact Statement.

D. Biological Survey

A number of special status species are know to occur on or adjacent to the Nevada Test Site. *See* EA Table 3.11-1. Moreover, the range of the threatened desert tortoise is in close proximity to the area of the blast that will be created if Divine Strake is tested. EA App. C Figs. 1 and 2. The Divine Strake test is "major federal action." NNSA and DTRA have failed to conduct the necessary § 7 consultation with the U.S. Fish and Wildlife Service under the Endangered Species Act for this major federal action. *See* 15 U.S.C. § 1536(a). Chapter 5 of the EA, Agencies and Persons

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[23]Health studies have shown a significant association between exposure to fine particles and premature death. Other important effects include aggravation of respiratory and cardiovascular disease, lung disease, decreased lung function, asthma attacks, and certain cardiovascular problems. *See* EPA website, http://www.epa.gov/pmdesignations/faq.htm#0, "What are the Health Effects of PM2.5."

Consulted, is merely a distribution list for the EA. Nor is there any mention in EA Chapter 7, References, or in EA §§ 3.11 or 4.11, about any consultation with the Fish and Wildlife Service. The EA, therefore, is deficient.

There has been no analysis to determine whether radioactive contamination picked up from the blast will travel up the food chain in wildlife that migrate off the Nevada Test site. The biological survey conducted to support the EA is restricted to Area 16, in an area immediately around the blast site and to the east of the blast site near Area 1. *See* App. C at Fig. 2. In addition to the species listed in Table 3.11-1, game animals who reside or migrate through the Nevada Test Site include pronghorn antelope, mule deer, chukar, Gambel's quail, mourning doves,[24] cottontail rabbits and jack rabbits. *Nevada Test Site Environmental Report 2004*, DOE/NV/11718-1080 at ES-6. Game animals that have been exposed from past Nevada Test Site activities or that could be exposed as a result of Divine Stake must be included in the analysis if those animals could migrate outside the boundaries of the Nevada Test Site. The EA should also evaluate the contaminant exposure pathways from consumption of migratory game animals and domestic livestock that may be exposed either directly from Divine Strake or cumulatively from contamination due to past activity at the NTS.

The EA does not account for the outdoor lifestyle in the area of potential exposure. People with outdoor occupations (*e.g.*, ranchers and farmers), and outdoor enthusiasts (*e.g.*, hikers, campers, hunters, bikers, etc.) inhabit the area of potential exposure. In addition, federal lands in the surrounding area are used for outdoor activities and livestock grazing. In the context of the proposed action, the biological survey has failed to account for these concerns. *See* 40 C.F.R. § 1508.27(a).

VI. Resumption of Testing and Economic Impacts

There is no assurance that this test will not lead to a resumption of testing at the Nevada Test Site. See Section IV above. Under the EA there has been no analysis of the economic costs and benefits to the region from conducting this test or other reasonably foreseeable tests. *See* C.F.R. § 1501.2(b) ("Identify environmental effects and values in adequate detail so they can be compared to economic and technical analyses."). Any information to be gained from this test (or any further tests) will not compensate for the loss of tourism, economic development, or decline in real estate values[25] to those downwind of the test. Nor will it compensate for an increase in health costs to

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[24]The EA fails to mention these species. *See* EA at 3-44,45.

[25]For example, real or perceived fear may depreciate the market value of property that is affected by such things as WIPP shipments or high-voltage power lines. City of Santa Fe v. Komis, 114 N.M. 659, 845 P.2d 753, 756 (1981) ("impact on market value caused by 'fear' may be shown and compensated without proving the reasonableness of that fear"); *see also* Willsey v. Kansas City Power & Light Co., 6 Kan.App.2d 599, 662, 631 P.2d 268, (1981) (summarizing cases involving

those people in southern Utah and other regions of the State who may have a compromised immune system from previous testing at the Nevada Test Site.

VII. Physical and Emotional Suffering Caused by Past Tests at the NTS

The trauma suffered by the people of Utah from testing conducted at the Nevada Test Site is a more fundamental reason why DTRA should halt the Divine Strake test. As the attached transcripts from public hearings held in St. George and in Salt Lake City attest, people have died because of nuclear tests at the Nevada Test Site. And those in Southern Utah who have lived, who have survived, are more vulnerable because of the testing.

To conduct any future large explosive aboveground tests at the Nevada Test Site, the federal government must overcome the legacy that patriotic citizens of Utah were deceived by the federal government about the serious health effects from weapons testing.

During the 1950s, for example, the Atomic Energy Commission (AEC) distributed a bulletin saying, "Health and safety authorities have determined that no danger from or as a result of AEC test activities may be expected outside the limits of the Las Vegas Bombing and Gunnery Range," while a second AEC pamphlet advised, "Your best action is not to be worried by the fallout."[26] Later, an investigation conducted by the House Committee on Interstate and Foreign Commerce concluded:

> (1) the government, despite having sufficient reason to know of the hazards associated with radiation exposure, failed to give adequate warnings to residents living downwind from the test site regarding the dangers posed by radioactive fall emitted during the atmospheric nuclear tests operations;
>
> (2) the radiation monitoring system established by the government during the atmospheric nuclear testing program was deficient in giving accurate estimates of radiation exposure necessary to provide adequate health protection to the downwind residents;
>
> (3) the government falsely interpreted and reported radiation exposure rates so as to give an inaccurate estimate of the hazards posed to the downwind residents from the atomospheric radioactive fallout;

"fear" in computing loss of fair market value in condemnation proceedings).

[26]Handbill Distributed by AEC (1951) and AEC Pamphlet, "Atomic Tests in Nevada" (March 1957) both available in Howard Ball, JUSTICE DOWNWIND: AMERICA'S ATOMIC TESTING PROGRAM IN THE 1950S, Oxford University Press (1986) at 60 and 216, respectively.

(4) the government knowingly disregarded evidence which questioned the accuracy of the government's measurements of radioactivity emitted from the test site as well as the adequacy of the then-employed radiological safety standards; and

(5) exposure to radioactive fallout emitted during the atomospheric nuclear test operations was, more likely than not, responsible for the serious adverse health effects suffered by the downwind residents.[27]

The current EA is inadequate to overcome the federal government's past legacy from testing at the Nevada Test Site. The inadequacy in many areas, including sampling and location of radionuclides from past testing, data to support crater size, plume dispersion modeling, need for the test, etc., cannot support a "finding of no significant impact." Given the inadequacy of the record and the emotion attached to a test that creates yet another mushroom cloud with winds blowing towards the northeast through the northwest, it is no wonder there is vehement opposition to the resumption of any new weapons testing at the Nevada Test Site.

In conclusion, Divine Strake should be cancelled because NNSA and DTRA have not presented an adequate reason for the need to conduct the test, nor have they adequately investigated or analyzed the consequences and impacts from the test. If NNSA and DTRA intend to proceed with the controversial Divine Strake test, at a bare minimum, NEPA requires them to prepare an Environmental Impact Statement.

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[27]Report, *The Forgotten Guinea Pigs: A Report on Health Effects of Low-Level Radiation Sustained as a Result of the Nuclear Weapons Testing Program Conducted by the United States Government*, prepared for the use of the Committee on Interstate and Foreign Commerce U.S. House of Representatives and the Subcommittee on Oversight and Investigations, 96th Cong. (1980) at 21-22.