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**UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION**

**ATOMIC SAFETY AND LICENSING BOARD PANEL**

**Before Administrative Judges:**

**Alan S. Rosenthal, Chair  
Dr. Paul B. Abramson  
Dr. Richard F. Cole**

In the Matter of	)	Docket No. 40-8838-MLA
U.S. ARMY	)	ASLBP No. 00-776-04-MLA
(Jefferson Proving Ground Site)	)	December 7, 2007

**U. S. ARMY'S PROPOSED FINDINGS OF FACT AND  
CONCLUSIONS OF LAW, AND ORDER IN THE FORM OF AN INITIAL  
DECISION**

**I. INTRODUCTION**

1. This initial decision rules on all outstanding issues in this 10 C.F.R. Part 2, Subpart L proceeding concerning the contention challenging the adequacy of a Field Sampling Plan ("FSP"), by which the Army ("Army" or "Licensee") is conducting what is referred to as a site characterization at the Jefferson Proving Ground ("JPG"), to support the approval of an alternative schedule for submittal of a decommissioning plan under 10 CFR § 40.42(g)(2). The approval of an alternative schedule allows the Army until the end of 2011 or earlier to submit a decommissioning plan for NRC review and approval. An

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SELV-02

organization known as Save The Valley ("STV") sponsored a contention challenging the Army's FSP as not being properly designed to obtain all of the verifiable data required for reliable dose modeling and accurate assessment of the effects on exposure pathways of meteorological, geological, hydrological, animal, and human features specific to the JPG site and its surrounding area.

2. After considering all of the evidence in this proceeding, we find that the record shows that, contrary to STV's contention, the Army has met its burden of showing that the activities being conducted under the Field Sampling Plan, as the same has been and will continue to be amended from time to time, will be adequate to meet the requirements for a viable decommissioning plan as set forth at 10 CFR § 40.42(g)(4)(i), under restricted release conditions as governed by 10 CFR §20.1403(b).

## **II. BACKGROUND**

### **A. Procedural History**

3. On May 25, 2005, the Army submitted a license amendment request to the NRC for an alternate schedule for submitting a decommissioning plan for its facility at JPG pursuant to 10 C.F.R. § 40.42(g)(2). See *Cover Letter to Material License No. SUB-1435, Amendment 13, NRC Staff Exhibit # 13*. The May 25 application included a Field Sampling Plan ("FSP") concerning site characterization activities. See *Safety Evaluation Report, Id.*; also *Field Sampling Plan, NRC Staff Exhibit #14*.

4. On June 27, 2005, the NRC published notice advising that the Commission was considering issuing a license amendment to the Army.

5. On November 16, 2005, the Army submitted Addenda to its May 25 application, consisting in part of a FSP Addendum. *Field Sampling Plan, NRC Staff Exhibit # 14.*

6. On November 23, 2005, STV filed a petition to intervene and request for a hearing. See "*Petition to Intervene and Request for Hearing of Save the Valley, Inc. November 23, 2005.*" The Army responded to STV's petition on December 16, 2005, as did the Staff on December 19, 2005. See "*Army's Response to Save the Valley, Inc.'s Concerns and Contentions As Set Forth in its Petition to Intervene Filed Herein on November 23, 2005, December 16, 2005; "NRC Staff's Response to Petition to Intervene and Request for Hearing Filed by Save the Valley, Inc.," December 19, 2005.*"

7. On February 2, 2006, the Board granted STV's hearing request and deferred the hearing pending completion of the Staff's technical review of the alternate schedule proposal. See *Memorandum and Order (Granting Hearing Request and Deferring Hearing), LBP-06-06, at 26 (Feb. 2, 2006).*

8. Following the completion Staff review, Material License No. SUB-1435, Amendment 13 was issued on April 27, 2006. *Material License No. SUB-1435, Amendment 13, NRC Staff Exhibit # 13.*

9. Pursuant to the Licensing Board's Order of May 1, 2006, STV was permitted to file a motion for leave to withdraw, to amend, or to supplement the

contentions and the bases assigned for those contentions which were contained in its original November 23, 2005 hearing request. See *Memorandum and Order (Scheduling Further Proceedings) (May 1, 2006)*.

10. STV filed its "Final Contentions of Save The Valley, Inc." on May 31, 2006. See *"Final Contentions of Save The Valley" May 31, 2006*.

11. On July 7, 2006, the Army submitted its Field Sampling Plan Addendum 2, relating to the soil verification of the DU impact area at JPG, and addendum 3, relating to other monitoring equipment installation, other monitoring and electrical imaging. *NRC Staff Exhibits # 16 and # 17*.

12. On July 19, 2006, the Licensing Board convened a prehearing conference with counsel for the Army, STV, and the NRC Staff in the Council Chambers of the Madison City Hall, Madison, Indiana, for the purpose of addressing matters pertaining to the scope of the forthcoming evidentiary hearing that were left open in the Board's February 2, 2006 memorandum and order granting STV's hearing request. *Transcript of Proceedings, U.S. Army, JPG Site, Limited Appearance Hearing, Docket No. 40-8838-MLA; ASLBP No. 00-776-04 MLA (July 18, 2006)*.

13. At the conclusion of the hearing, the Board found it appropriate to provide the Army and STV an opportunity to explore accommodation of the concerns raised by STV. On July 26, 2006, the Board entered its Order deferring the evidentiary hearing and directing the parties to meet for such an exploration. *Id.*

14. The parties were unable to reach any agreement. On December 20, 2006, the Licensing Board entered its Memorandum and Order determining the scope of the Evidentiary Hearing. *Memorandum and Order (Determining Scope of Evidentiary Hearing), December 20, 2006*. Of the contentions advanced by STV, the Board found that only STV's Contention B-1 satisfied the admissibility requirements of 10 C.F.R. §2.309 (f)(1). *Id. at pg. 15*.

15. On January 31, 2007, the Army submitted its Field Sampling Plan Addendum 4, relating to the monitoring well installation locations. *NRC Staff Exhibit #18*.

16. On October 22, 2007, the Board convened an evidentiary hearing on the admitted contention and received into evidence pre-filed written direct, rebuttal and sur-rebuttal testimony as exhibits, in accordance with 10 C.F.R. § 2.1207(b)(2), and other exhibits proffered by the parties. *Tr. 129 (NRC Staff Exhibits); Tr. 130 (Army's Exhibits); Tr. 132 (STV Exhibits)*. In addition to testimony, the Board admitted 34 Army exhibits, 3 STV exhibits and 32 Staff exhibits. *Id.* The record for this proceeding was closed on October 22, 2007, subject only to transcript corrections. *Trans. pg. 312*

**B. Witnesses**

17. During the evidentiary hearing on the adequacy of the Army's FSP to support the granting of an alternate schedule, a total of thirteen witnesses appeared on behalf of the Army, STV and the Staff.

18. The Army presented the testimony of five qualified witnesses,

namely: 1) Harold W. Anagnostopoulos, Certified Health Physicist, a Senior Health Physicist with the S.M. Stoller Corporation, who previously worked at Science Applications International Corporation (SAIC) providing technical support to the Army's JPG facility since early 2004; 2) Michael L. Barta, a Senior Ecological Risk Assessor for SAIC, serving as the deputy project manager for SAIC on NRC licensing decommissioning activities at JPG; 3) Joseph N. Skibinski, an Environmental Chemist and Human Health Risk Assessor with SAIC who has been providing technical support to the Army's JPG facility since 2004 and has been the Project Manager for SAIC's work at JPG since February 2006; 4) Todd D. Eaby, a Geologist/Project Manager with SAIC providing technical support to the Army's JPG facility since early 2004; and 5) Stephen N. Snyder, a Senior Hydrogeologist and Program Manager with SAIC providing technical support to the Army's JPG facility since early 2004. The professional qualifications of the each witness were appended to each of their pre-filed testimonies and were admitted as Army Anagnostopoulos Exhibit # 1, Army Barta Exhibit # 2, Army Skibinski Exhibit # 3, Army Eaby Exhibit # 4 and Army Snyder Exhibit # 5 respectively.

19. STV presented the testimony of three qualified witnesses, namely: 1) Dr. Diane S. Henshel, a professor of Toxicology and Environmental Science and an environmental consultant providing toxicological laboratory support as well as risk communication and risk assessment services; 2) Mr. Charles H. Norris, a Geologist specializing in the areas of hydrogeology, aqueous

geochemistry, and numerical modeling of hydrogeology and geochemistry; and Mr. James Pastorick, a UXO (Unexploded Ordnance) specialist. Their qualifications were admitted as STV Exhibits # 1 through # 3.

20. The Staff presented testimony of five qualified witnesses, namely: 1) Dr. Thomas McLaughlin, a Project Manager at the U.S. Nuclear Regulatory Commission in the Division of Waste Management and Environmental Protection; 2) Dale Condra, the Laboratory Manager for the Independent Environmental Assessment and Verification program of the Oak Ridge Institute for Science and Education; 3) Adam Schwartzman, an Environmental Scientist in the U.S. Nuclear Regulatory Commission, Office of Nuclear Regulatory Research; 4) Jon M. Peckenpaugh, the Systems Performance Analyst (hydrogeologist) for the U.S. Nuclear Regulatory Commission; and 5) Dr. A. Christianne Ridge, a Systems Performance Analyst at the U.S. Nuclear Regulatory Commission in the Division of Waste Management and Environmental Protection. The professional qualifications of each witness were appended to their prefiled testimony and separately admitted as NRC Staff Exhibits # 1 through # 5.

21. All of the witnesses were found to be qualified to present testimony on the areas they addressed, however, the Board accorded greater weight to the testimony of the Army and Staff witnesses who (a) inspected, reviewed or physically observed the JPG site, (b) were experienced in performing radiological sampling or in reviewing and analyzing radiological data, or (c) were familiar with Nuclear Regulatory Commission practices and standards.

Each witness provided both written pre-filed testimony and oral testimony in response to Board questioning during the evidentiary hearing.

### **III. LEGAL AND REGULATORY REQUIREMENTS.**

22. This proceeding, challenging the sufficiency of a field sampling plan in the context of the grant of an alternate schedule for submitting a decommissioning plan, is a matter of first impression.

23. The license amendment request associated with this proceeding is an alternate schedule for submission of a decommissioning plan. The governing regulation involved in the Army's request for an alternate schedule for submission of the plan states:

The Commission may approve an alternate schedule for submittal of a decommissioning plan required pursuant to paragraph (d) of this section if the Commission determines that the alternative schedule is necessary to the effective conduct of decommissioning operations and presents no undue risk from radiation to the public health and safety and is otherwise in the public interest.

10 C.F.R. § 40.42(g)(2).

24. The legal requirements governing the acceptability of final site characterization are found in 10 CFR §40.42(g)(4) and (g)(5), which state:

“(4) The proposed decommissioning plan for the site or separate building or outdoor area must include:

(i) A description of the conditions of the site or separate building or outdoor area sufficient to evaluate the acceptability of the plan;

(ii) A description of planned decommissioning activities;

(iii) A description of methods used to ensure protection of workers and the environment against radiation hazards during decommissioning;

(iv) A description of the planned final radiation survey; and

(v) An updated detailed cost estimate for decommissioning, comparison of that estimate with present funds set aside for decommissioning, and a plan for assuring the availability of adequate funds for completion of decommissioning.

(vi) For decommissioning plans calling for completion of decommissioning later than 24 months after plan approval, a justification for the delay based on the criteria in paragraph (i) of this section.

(5) The proposed decommissioning plan will be approved by the Commission if the information therein demonstrates that the decommissioning will be completed as soon as practicable and that the health and safety of workers and the public will be adequately protected."

25. Additional legal requirements for final license termination under restricted conditions are found in 10 CFR § 20.1403, which states in relevant part:

"A site will be considered acceptable for license termination under restricted conditions if:

(a) The licensee can demonstrate that further reductions in residual radioactivity necessary to comply with the provisions of § 20.1402 would result in net public or environmental harm or were not being made because the residual levels associated with restricted conditions are ALARA. Determination of the levels which are ALARA must take into account consideration of any detriments, such as traffic accidents, expected to potentially result from decontamination and waste disposal;

(b) The licensee has made provisions for legally enforceable institutional controls that provide reasonable assurance that the TEDE from residual radioactivity distinguishable from background to the average member of the critical group will not exceed 25 mrem (0.25 mSv) per year;

(c) The licensee has provided sufficient financial assurance to enable an independent third party, including a governmental custodian of a site, to assume and carry out responsibilities for any necessary control and maintenance of the site. ... "

26. The language of the rule allowing approval of an alternate schedule for submission of the decommissioning plan (10 CFR § 40.42 (g)(2)) does not suggest that a schedule request submittal must contain all the

information that would be present in the subsequent decommissioning plan. Nor is there any other authority to suggest that the details required to support the Staff review of an alternate schedule are the same as those needed for approval of a decommissioning plan. The Staff's review of how the FSP supports site characterization in the context of approving an alternate schedule addresses how the proposed activities are "necessary to the effective conduct of decommissioning operations." 10 C.F.R. § 40.42(g)(2).

27. At the time the decommissioning plan is submitted, notice will be given and any person whose interest may be affected by the proceeding may file a request for a hearing or a petition for leave to intervene if a hearing has already been requested. 10 CFR § 2.105.

#### **IV. FINDINGS OF FACT**

##### **A. Statement of Issue**

28. Based on the literal reading of the regulation, the issue before the Board in this proceeding is limited to whether the Army's proposal for characterizing the JPG site during the alternate schedule period – i.e. the five year period ending with calendar year 2011 – is: (1) "necessary to the effective conduct of decommissioning operations"; (2) will "present no undue risk from radiation to the public health and safety"; and (3) "is otherwise in the public interest." 10 C.F.R. § 40.42(g)(2). STV 's Contention B-1 does not challenge the need for the granting of the alternate schedule per se. Indeed, the very

foundation of STV's contention is that even more site specific information must be gathered by the Army to adequately support the decommissioning plan that it will eventually submit. Rather, STV's Contention B-1 challenges the adequacy of the Army's FSP, by which the Army will ultimately characterize the site and eventually produce a decommissioning plan. STV would have the Board read an additional requirement into § 40.42(g)(2), that requirement being that the exact nature, extent and detail of planned site characterization activities should be firmly and inflexibly established at the outset, as a condition precedent to the approval of an alternate schedule and as an assurance that the decommissioning plan ultimately submitted will comply with 10 CFR §40.42(g)(4) -(5) and § 20.1403. See *Trans. pp. 106-111 and 123-125.*

29. Cast in that context, the overall burden of persuasion would be on the Army to demonstrate that the proposals contained in its FSP will lead to the gathering of the information necessary to support the decommissioning plan that will eventually be presented. See 10 CFR § 2.325. STV, however, must come forward with evidence that the Army's proposed approach to site characterization will not lead to the gathering of sufficient information to support a decommissioning plan for restricted release under 10 CFR §40.42(g)(4) -(5) and § 20.1403. Once STV has introduced sufficient evidence to establish a prima facie case, the burden then shifts to the Army who, as part of its overall burden of proof, must provide a sufficient rebuttal to satisfy the Board that it should reject the contention as a basis for denial of the license amendment.

Louisiana Power & Light Co. (Waterford Steam Electric Station, Unit 3), ALAB-732, 17 NRC 1076, 1093 (1983).

**B. The § 40.42(g)(2) Criteria for Approval of an Alternate Schedule**

30. As previously noted, the Board finds that STV has presented no evidence that the alternate schedule is not necessary to the effective conduct of decommissioning operations. Nor has STV presented any evidence that the alternate schedule presents an undue risk from radiation to the public health and safety. Nor has it presented any evidence that the alternate schedule is not otherwise in the public interest. 10 C.F.R. § 40.42(g)(2).

31. STV has presented evidence that the Army's FSP, going forward, will not produce sufficient site specific information in a number of areas to satisfy the requirements of 10 CFR § 40.42(g)(4) -(5) and § 20.1403.

**C. The Adequacy of the Army's FSP**

**1. In General**

**a. Evidence**

32. The Army's site characterization activities are being conducted as part of a phased and adaptable approach that is documented in the FSP (NRC Staff Exh. #14) and addenda (NRC Staff Exhs. # 15, # 16, # 17 and # 18). The FSP states that a "tiered, time-phase approach" was defined and that tasks subsequent to the first year "will be planned and detailed as addenda" to meet

the NRC regulatory requirement of completing the Decommissioning Plan within the required 5-year timeframe. (*NRC Staff Exh. # 14, at pg. 4-1.*) The FSP also acknowledges the fact that the plans will be revised to reflect the "then current understanding" of the site, current technologies and methodologies, and related schedule and funding constraints. *Id.*

33. The characterization approach described in the FSP (NRC Staff Exh. #14) and addenda (*NRC Staff Exhs. # 15, # 16, # 17 and # 18*) was developed with the primary goal of obtaining data needed to support the radiological dose assessment specified in 10 Code of Federal Regulations (CFR) § 20.1403(b) and 10 CFR § 20.1403(e). The requirement includes determining whether or not the total effective dose equivalent (TEDE) from DU exposure is below the limits of 25 mrem/year, 100 mrem/year (if institutional controls fail), or 500 mrem/year (if institutional controls fail and specific provisions are met). The TEDE is to be assessed using the NRC's RESidual RADioactivity (RESRAD) model. (*Army Skibinski Exh. # 3, Ans. 7, pg. 5.*)

34. Todd Eaby of Science Applications International Corporation (SAIC), appearing for the Army, testified that the design of the characterization contained in the FSP will be modified over time as site-specific data is acquired and evaluated and will be discussed during annual meetings with the NRC staff as stated in the previous response. (*Army Eaby Exh. # 4, Ans. 18, Pg 16.*)

35. Jon M. Peckenpaugh of the NRC Staff testified that there is frequent and ongoing communication between the NRC Staff and the Army

concerning site characterization activities and the Staff's questions and concerns. (*Tr.* 245-246.)

36. STV presented no evidence the iterative process being implemented by the Army in the performance of the FSP cannot lead to sufficient site characterization to support a decommissioning plan at the end of the five year alternate schedule. (*Tran.* pp. 244-245.)

37. Dr. Thomas McLaughlin of the NRC Staff testified that, contrary to the implication contained in the testimony of STV witness Charles Norris, the Field Sampling Plan (FSP) will not leave gaps of data or characteristics that are necessary for proper characterization. The parameters necessary for the modeling of a radiological dose will either be provided through site specific data or will be substituted with conservative values that are protective of human health. In this way, the site will be "fully" characterized so that there are no missing data or characteristics of the site necessary for calculating radiological doses. (*NRC Staff Exh. #6, McLaughlin Sur-rebuttal Ans. 11, pg. 5.*)

38. Dr. A. Christianne Ridge of the NRC Staff testified that use of bounding and conservative values is more protective of human health because it will lead to an assumed higher peak dose to a receptor. (*NRC Staff Exh. # 8, Ridge Sur-rebuttal Ans. 5, pg. 6.*)

39. In opening remarks, STV stated that, in conjunction with radiological risk assessment, the Army's site characterization activities should also provide information necessary to support an environmental impact

statement. (*Trans. 112.*) Both Charles Norris and Dr. Diane Henshel, testifying for STV, cited the requirement that Army prepare an Environmental Report and that the Staff prepare an Environmental Impact Statement as part of the ultimate decommissioning process. (*STV Exh. #1, Norris Ans. 8, pg. 11; and STV Exh. # 2, Henshel Ans. 10, pp. 6 – 7.*) However, STV failed to present any evidence that the FSP was in violation of, or insufficient to comply with, any applicable environmental legal or regulatory requirements. Therefore the Board deems any such claims to have been abandoned by STV.

## **2. Board Findings**

40. The testimony of NRC Staff witnesses Mclaughlin, Ridge and Peckenpaugh and Army witnesses Skibinski and Eaby established, and the Board finds, that the primary purpose of site characterization activities at JPG is to provide data to support the radiological dose assessment specified in 10 CFR §§ 20.1403(b) and (e). The board further finds that the parameters necessary for dose modeling can be provided either through site specific data or can be substituted with bounding or conservative values that are protective of human health.

41. The Board further finds that the evidence shows that the Army and the NRC Staff have met and will continue to meet, as characterization activities continue, to review and discuss the data obtained and to discuss and agree upon future samplings and activities necessary for the effective conduct of decommissioning operations.

42. The Board finds that there is no evidence that the iterative process being implemented by the Army in the performance of the FSP cannot lead to sufficient site characterization to support a decommissioning plan at the end of the five year alternate schedule.

43. The Board finds, based on the evidence presented, that implementation of the FSP, including the practice of modifications to the FSP through addenda after meeting and discussion between the Army and the NRC Staff, should be allowed to continue so as not to impede the schedule of the application for license closure.

### 3. Biota and Air Sampling

#### a. Evidence

44. There are no regulatory requirements in 10 CFR Part 20 that extensive biota sampling be conducted for decommissioning proposes. *Army Barta Exh. # 2, Ans. 13, pg. 8*. The deer sampling program was suggested by the NRC in a Request for Additional Information (RAI) to determine if the concentration of total uranium was increasing and might present a health risk to humans eating the deer meat. *NRC Staff Exh. # 1, McLaughlin Ans. 20, pg. 16*.

45. Michael Barta of SAIC stated that the biota sampling program proposed in the FSP (*NRC Staff Exh. # 14*) and Addendum 1 (*NRC Staff Exh. # 15*) was designed to respond to requests from the NRC as well as align with the Army's approach to conduct the sampling in a step-wise or phased manner.

Deer were proposed for sampling first because the NRC Staff had indicated a concern from the exposure of hunters to depleted uranium (DU) through the ingestion of deer tissue collected at JPG. *Army Barta Exh. # 2, Ans. .9, pg. 6; NRC Staff Exh. # 1, McLaughlin Ans. 20, pg 16.*

46. Deer sampling was conducted at JPG in late 2005 and early 2006. *Army Exh. #, 11-A, Deer Tissue Sampling Results pp. 2-1.* Deer tissues samples were collected from 30 deer taken from the DU Impact Area and other locations at JPG. *Id. pp. 3-1.* An additional total of 50 deer liver, kidney, or bone samples were collected from the DU Impact Area and analyzed for U-234 and U-238 isotopes in 1984, 1987, 1992, and 1993. *Id. pp 4-1.* Turkey and squirrel, which are also present at JPG, were not analyzed for the presence of DU in tissues because the Army found no compelling reason to believe that DU uptake would be any greater than in deer. Also, the Army believed that the mass of turkey meat or squirrel meat consumed per individual hunter would be less than for deer. *Army Barta Exh. # 2, Ans. 9, pg. 7.*

47. Dr. McLaughlin testified that field sampling practices used for determining ecological risk, such as those proposed by STV, are not used by the NRC to determine radiological doses to humans, and that the sampling proposed in the FSP was adequate for the purpose of providing the site specific data to model DU contamination effects resulting in radiation doses to the public. *NRC Staff Exh. # 1, McLaughlin Ans. 13, pg. 8.* Deer are the only significant completed pathway with the potential to cause a radiological dose detrimental

to the public health. Deer are hunted for human consumption at the JPG site. The FSP includes sampling and analysis of hunted deer. Contrary to the evidence presented by STV, no DU has been detected in the deer samples. *Id.*, *Ans. 14, pg. 10.*

48. The range of average total uranium concentrations in deer muscle tissue found in samples at JPG was 0.008 to 0.013 pCi/g. In addition, the highest U-238/U-234 ratio was 1.5, but the total uranium concentration for the sample was at background levels. The concentrations of U-234 in the deer tissue were consistently greater than the U-238 concentrations, meaning the ratio is less than 1. The U-238/U-234 ratios in the deer tissue appear to be similar to the U-238/U-234 ratios in the water samples. The NRC Staff finds no evidence in the deer sampling results to conclude that DU has been detected in the deer tissue samples. No anomalies were identified in the existing deer tissue data for the 30 deer harvested for the sampling effort described in the SAIC 2006 Deer Tissue Sampling Report (*Army Exh. #11-A*) and the observed total uranium concentrations in the samples appear to approximate background. Given those results, the NRC Staff concluded that requesting additional deer sampling was not necessary. *Army Exh. # 11-B, Staff Review; NRC Staff Exh. # 5, Condra Ans. 7-8 pp. 4-5*

49. Dr. Ridge of the NRC Staff performed a calculation to determine the radiological health risk to humans from consumption of deer meat. Based on the results of the deer tissue sampling and assuming that a person replaced

all of the beef and chicken in his or her diet with deer meat, the committed effective dose equivalent from consumption of the deer meat would be 0.27 millirem per year. This dose is well below the NRC's decommissioning criteria of 25 millirem per year found in 10 CFR §20.1403. *NRC Staff Exh. # 3, Ridge Ans. 23, pp17-18; Tr. 286-289.*

50. The previous and current biota samples show no DU present and no DU has been detected in groundwater, surface water, or sediment outside of the DU impact area, indicating that DU has not migrated outside of the DU impact area. It is the NRC Staff's position that it is unnecessary to require the Army to conduct additional biota sampling at this time in the FSP to protect against radiological risks to the public health. *NRC Exh. # 1, McLaughlin Ans. 14, pg.11.*

#### 4. Air Sampling

##### a. Evidence

51. The US Fish & Wildlife Service (USFWS) manages the Big Oaks National Wildlife Refuge (BONWR) on the JPG site and conducts controlled burns in the DU Impact Area. Dr. Diane Henshel, testifying on behalf of STV, stated that the USFWS based their decision to burn over the DU Impact Area on an outdated study which suggested that levels of DU carried in smoke associated with burning natural vegetation was not significant. Dr. Henshel stated that a more recent study, conducted at the Los Alamos National Laboratory (LANL) in 2006 (*Army Anagnostopoulos Exh. # 1-I, Dust to Dose*), revisited the question and

found that there were significant changes (14% increases on average) in airborne Depleted Uranium following the prescribed burns, such as are being carried out at JPG/BONWR, including in the DU Impact Area. (*STV Exh. # 2, Henshel Ans. 34-35, Pg: 25.*)

52. The FSP does not contain an air sampling component for public health. This decision was based, at the time, on the earlier study referred to by Dr. Henshel, Williams et al. (1998) carried out at Aberdeen Proving Ground (*NRC Staff Exh. # 4, Schwartzman Ans. 9, pg. 4*). Harold W. Anagnostopoulos, a health physicist formerly with SAIC testifying on behalf of the Army, stated that in addition to the study cited by Dr. Henshel, the Army's position was also based upon information from several other studies, which documented the results of air samples that were collected at JPG during controlled burns within the DU Impact Area. Most significantly, the determination that the air exposure pathway is not significant is documented in detail in a technical memorandum "Airborne Transport of Depleted Uranium (DU) and Site Characterization Needs," dated January 13, 2005. This technical memorandum pre-dates the FSP. (*Army Anagnostopoulos Exh. # 1, Ans. 13, pg. 8.*)

53. The Board also received testimony from Mr. Anagnostopoulos that conditions at JPG differ in several aspects from conditions at LANL, where the 2006 study was conducted. The terrain and soil types at LANL are significantly different than at JPG. LANL is a dusty, arid environment, which optimizes the potential for airborne suspension of DU-contaminated dust. The LANL fire was

large. The burned area was approximately 30 million meters squared at LANL. The area of the entire DU Impact Area is 8.4 million meters squared (or 28 percent of LANL). The amount of burned area that is exposed to wind has a direct relationship with the amount soil dust that can go airborne. In addition controlled burns do not encompass the entire DU Impact Area in a single event. Post-fire thinning of vegetation was performed at LANL, which exposed additional soils to the effects of wind erosion. This has not been done at JPG. The nature of the DU contamination in the soil at LANL is different from JPG, since JPG did not use hard targets during ballistics testing. Hard target testing aerosolizes or finely disperses DU, which is not the case with the soft target testing at JPG where the penetrators are intact. (*Army Anagnostopoulos Exh. # 1, Ans. 15, pg. 9; Tr. 210-211.*)

54. According to Adam L. Schwartzman of the NRC Staff, the burn studies discussed, in the evidence presented, support the conclusion that it is not necessary to make air sampling a part of the FSP. (*NRC Staff Exh. # 4, Schwartzman Ans. 15, pg. 7.*) These studies indicate that the risks associated with potential transport of DU in the air from fires are negligible. Although analysis of the fires at LANL shows an increase in the percentage of airborne DU, the actual increase in dose is minimal. (*Id. Ans. 17, pp. 8-9.*)

55. The increase in airborne DU at LANL was insignificant from an exposure standpoint because: the stated 14 percent estimated dose increase to the public from the airborne DU activity at LANL equates to a dose of 0.1

millirem. The estimated increase at LANL from airborne DU in dust is approximately 0.03 percent of the average annual dose to a member of the public from all sources of radiation and is very insignificant when compared to the release criteria. (*Army Anagnostopoulos Exh. # 1, Ans. 15, pg. 10.*)

## **5. Board Findings**

56. Based on its review of the testimony and exhibits presented, the Board finds the evidence shows that the Army's 2005-2006 deer sampling results are representative and that the observed total uranium concentrations in the samples appear to approximate background.

57. The Board finds that Dr. Henshel failed to provide sufficient detail to support her opinions that the number of deer sampled was not statistically significant or that the sample results were biased by corn baiting. Further, the Board finds that Dr. Henshel failed to provide support for her opinion that sampling methods used rendered analysis of the deer sampling results meaningless. Based on evidence that the levels found were so low as to be at or near the detection level in the instrumentation generally and that substantial variation in analytical results at such low levels is unavoidable, the Board concludes that the 2005-2006 deer samples are acceptable for site characterization purposes.

58. The Board finds that STV did not provide either a regulatory basis or technical basis for requiring the Army to undertake more extensive biota sampling. Evidence presented by both the Army and the NRC Staff establishes

that no further biota sampling is necessary under NRC regulations to support decommissioning activities.

59. The Board finds that Dr. Henshel's conclusions as to the need for air sampling for DU following controlled burns at JPG is not supported by any of the studies referred to in the evidence. Testimony and exhibits from both the Army and the NRC Staff establish that the increase in airborne DU found at LANL was insignificant as an exposure pathway and the risks associated with potential transport of DU in the air from fires are negligible.

60. The Board concludes that air sampling and further biota sampling are not necessary to adequately assess the impact on human health of DU at JPG or to otherwise adequately characterize the site for decommissioning.

**6. Karst Geology (Well Locations, FTA Study, EI Study, UXO Issues)**

**a. Evidence**

61. Charles H. Norris, LPG, STV's principle witness, testified that in his opinion the Army's FSP was deficient in a number of respects pertaining to site characterization of Karst Geology features. Mr. Norris raised issues with: the Fracture Trace Analysis ("FTA"); Electrical Imaging ("EI"); karst development; the fate and transport of DU in water and sediments; gauging of streams and spring caves; well location and selection; well installation; and monitoring well selection. (STV Exh. # 1, Norris Ans. 20 - 47, pp. 10 - 81.)

62. When questioned by the Board, Mr. Norris was unable to identify whether his primary concerns with the inadequacy of the Army's FSP were with the radiological properties or the toxicological properties of DU. No other witness present for STV was able to provide a response to this query from the Board. (*Tr.* 222.)

63. Jon Peckenpaugh of the NRC Staff testified that the FSP is an iterative process where items have been and will continue to be added. The FSP data will provide bounding and/or conservative values for adequate site characterization of DU leading to an adequate Decommissioning Plan. (*NRC Staff Exh. # 2, Peckenpaugh Ans. 17, pp. 16-17.*) The use of a bounding or conservative value is more protective of human health and safety because it will lead to an assumed higher peak dose to a receptor. (*NRC Staff, Exh. # 8, Ridge Sur-rebutal Ans. 5, pg. 6.*)

64. The FSP provides the framework for the site characterization of the DU Impact Area. As presented, it included the investigation details only for the first year of investigation. Details for the following year's investigations were to be provided in future addenda providing the ability to modify the FSP based on the newly acquired and evaluated site-specific data. This approach first investigates the most probable location for impacts and transport mechanisms so that data will be collected that can be used to develop a meaningfully refined and accurate Conceptual Site Model ("CSM") that will be used along with the collected data to provide updated inputs for development of the RESRAD model

for preparation of a decommissioning plan. The FSP, as presented, allows the collection of the basic site-specific data that will account for these unique conditions while evaluating site conditions and most probable transport mechanisms present, allowing site characterization for the purposes of providing a sufficient decommissioning plan. (*Army Eaby Exh. # 4, Ans.15, pp. 12-13.*)

65. Mr. Eaby of SAIC further testified that the design of the characterization will be modified over time as site-specific data is acquired and evaluated and will be discussed during annual (or more frequent) meetings with the NRC staff as stated in the previous response. (*Id., Ans. 16, pg. 18; NRC Staff Exh. # 1, McLaughlin Ans. 16, pp. 12-13; and NRC Staff Exh. # 13, pg. 1.*) The FSP has been amended once prior to and three times subsequent to the allowance of License Amendment No. 13. (*NCR Staff Exh. # 15, # 16, # 17 and # 18.*) The evidence also shows that further modifications in the FSP have occurred in response to Requests for Additional Information (RAI) to the Army from the NRC Staff. (*Army Exh. # 9, # 10 and # 11-A.*)

66. As previously noted, STV presented no evidence that the iterative process being implemented by the Army in the performance of the FSP cannot lead to sufficient site characterization to support a decommissioning plan at the end of the five year alternate schedule. (*Trans. Pg. 237.*)

67. Mr. Peckenpaugh stated in his testimony that STV is incorrect in its position that the FSP is supposed to find all significant karst features and

location of the water table. Contrary to STV claims, Mr. Peckenpaugh stated that it is not possible to find all of the karst features at a site and that it is not necessary to identify all of the karst features at JPG to have an adequate characterization of the site. (*NRC Staff Exh. # 2, Peckenpaugh Ans. 8, pg. 6.*) Mr. Eaby testified that complete mapping of the pathways of individual karst conduits is not practical and was probably not possible at any expense. There would be no effective way to accomplish it at a scale of this project. (*Army Eaby Exh. # 4, Ans. 40, pg. 41.*)

68. Substantial evidence was presented by the Army, via the testimonies of Todd Eaby (*Army Eaby Exh. # 4*) and Stephen Snyder (*Army Snyder Exh. # 5*), and the NRC Staff, via the testimony of Peckenpaugh, (*NRC Staff Exh. # 2, Peckenpaugh*), that the concerns raised by STV's witness with regard to Karst geology, Fracture Trace Analysis, Electrical Imaging, well locations, well installation and gauging were either inaccurate, outdated or premature. By way of example:

a. Mr. Peckenpaugh testified that the Staff is awaiting the results of the stream and cave reporting data to determine the need for low-flow stream and spring cave measurements. According to his testimony, it would be premature to require performing low-flow measurements as part of the FSP because they may not be necessary. (*NRC Staff Exh. # 2, Peckenpaugh Ans. 8, pg. 6.*)

b. Mr. Peckenpaugh also testified that, while the NRC Staff shared

STV's concern about the timing of the stream gauging, the Army has resolved this issue by agreeing to move up the time table for the stream gauging to coincide with the groundwater studies. (*Id.*, ans. 8, pp.6 – 7.) Numerous stream gauging stations have been set up to measure stream flow across the site. The stream flow hydrographs will be analyzed to determine what portion of precipitation that falls on-site goes to direct surface runoff, through the sink holes and caves, and to the water table. That information will allow the Army to order the most likely potential pathways for DU carried by water. (*Army Snyder Exh. # 5, Ans. 25, pg. 17.*)

c. Currently, the collection of data flow from cave springs, streams, and precipitation data is at least one year ahead of the collection of groundwater levels and radiological analyses of the groundwater samples from the monitoring wells installed during the spring and fall of 2007. However, the Army has not yet analyzed the streams, cave springs, and precipitation data. The Army has indicated that it will develop rating curves for the streams and cave spring after one year of data are available. (*NRC Staff Exh. # 2, Peckenpaugh Ans. 8, pp. 6 - 7.*) ) The Army initiated such a characterization approach in September of 2006 by installing surface water gauging stations at 10 locations including seven automatic recording stream gauge stations, two automatic recording cave stream gauging locations, and one manual/visual staff gauge monitoring location. This is in excess of the five locations originally stated in the FSP. (*Army Eaby Exh. # 4, Ans. 44, pg. 45.*)

d. The monitoring wells will likely be properly located using the methods proposed in the FSP to provide the necessary site specific data. (*NRC Staff Exh. # 2, Peckenpaugh Ans. 8, pg. 6.*)

e. Well monitoring will be performed only at selected higher quality wells and new wells will be installed as necessary. Together, these wells will provide the necessary site specific data to characterize the water-bearing units in the DU Impact Area. (*Id., Ans. 9, pg. 8.*)

f. Mr. Snyder of SAIC testified that the Army's use only of historical aerial photographs to develop the FTA is a viable method for delineating linear traces on the land surface at this site. Other methods advocated by STV have limitations in their usefulness. FTA combined with EI are likely adequate to provide the necessary information. The importance of the FTA in the location of the monitoring well selection is overstated by STV. If the data is not sufficient, the flexibility of the FSP allows for evaluating potential well sites based on other information in addition to the FTA. (*Id., Ans. 19, pg. 17; Army Snyder Exh. # 5, Ans. 60 – 61, pp. 49-51.*) Use of features found through Electrical Imaging correlate with fracture traces mapped on aerial photographs; and the chances are good that a well drilled on that location will intersect the network of conduits that conduct most of the groundwater through the site. (*Army Snyder Exh. # 5, Ans. 8, pg. 6.*)

g. The EI survey proposed in the FSP is capable of providing useful data for siting wells and supporting effective decommissioning. An EI survey

developed in a grid, as described by Mr. Norris (*STV Exh. # 1, Norris Ans. 30, pg. 18 -21*), is unnecessary. The Army's proposed method is sufficient. The Army's actual EI patterns and instrumentation were limited to the existing roads because of the risk of unexploded ordnance in the areas off of the roads. However, this limitation does not affect adequate site characterization. (*NRC Staff Exh. #2, Peckenpaugh Ans. 19, pg. 18; Army Snyder Exh. # 5, Ans. 8, pg. 6.*)

h. The Army has installed wells at six of the ten locations during May and June 2007. The location and installation of monitoring wells has been designed as a potentially phased approach where the Army may install additional monitoring wells based upon the results of on-going or previous characterization of the site. The FSP allows well locations to continue to improve throughout the FSP implementation process as the understanding of groundwater characteristics improves with additional data. (*NRC Staff Exh. # 4, Peckenpaugh Ans. 19, pg. 18.*)

i. The Army selected a proven method of positioning characterization wells in carbonate rocks using a combination of fracture trace analysis conducted on pre-construction aerial photographs and EI to pinpoint likely fracture features in the bedrock. The EI was conducted on a network of roads surrounding and passing through the DU Impact Area. These roads are safe corridors where UXO has been cleared, allowing safe data gathering and eventual access for drilling equipment. (*Army Snyder Exh. # 5, Ans. 61, pg. 50.*)

j. The Contention Bases advanced by STV are frequently both

outdated with respect to the FSP as amended and insignificant with respect to providing bounding or conservative values for site characterization. (*Id.*, *Ans. 17*, *pp. 16 – 17.*)

k. The fate and transport model of the DU can be bounding and/or conservative for the conditions at the site to produce an adequate site characterization that will then allow development of an adequate dose model and decommissioning plan. An over-abundance of site-specific data is not required to develop an adequate fate and transport model of the DU at this site. There are several parameters in the dose assessment model where site-specific values can be used. However, in dose modeling it is more protective of public health to use conservative parameters where there is uncertainty relating to the parameter and where the results of the dose assessment are sensitive to these parameters. (*Id.*, *Ans. 21*, *pg.20.*)

l. A number of modifications or amendments of the FSP have already been filed by the Army. (*NRC Staff Exh. # 2*, *Peckenpaugh Ans. 7*, *pg. 4*, *Ans. 13*, *pp. 11 – 12*, *and Ans. 16*, *pg. 16*; *NRC Staff Exhs. # 15*, *# 16*, *# 17* *and # 18.*) These current modifications or amendments to components of the FSP are evidence of the iterative process at work. Later phases of work will be modified as new site-specific data are collected and analyzed. (*Army Snyder Exh. # 5*, *Ans. 61*, *pg. 50.*)

m. Mr. Norris expresses concern that there is a DU migration pathway to a remote area that will go undiscovered and undetected. There is

currently no indication that DU has even reached the groundwater table. If that condition is established, and there appears to be a potential for DU migration in groundwater, the pathway will be investigated further. (*Id.*)

n. Criticism of plans to characterize surface water and sediment transport of DU are premature. This work is not scheduled to occur until after the installation of wells, so that concurrent sampling of all media can occur. Therefore, details of that program have not yet been prepared. (*Id.*, pg. 51.)

69. Although Mr. Norris testified that, in his opinion, the characterization program needed to be correctly designed and sequenced to provide necessary site characterization within time allowed, he also testified that he had not done the sort of analysis that would enable him to say that the process being implemented by the Army cannot lead to a sufficient site characterization at the end of the five year period. (*Trans pp.* 237-241.)

## **7. Board Findings**

70. Based on its review of the testimony and the exhibits presented, the Board finds the evidence establishes that the FSP is iterative in nature and is intended to provide a framework for the site characterization of the DU Impact Area. The FSP has already been amended or modified a number of times in response to site specific data obtained through the Army's current characterization activities and additional activities not originally contained in the FSP are being performed. Both Army and Staff witnesses have testified that further amendments and modifications will be made as necessary to address

future findings and any Staff concerns pertaining to site characterization and decommissioning.

71. The Board finds that STV witness Charles Norris has failed to provide either sufficient detail or a sufficient technical basis to support his conclusions that the ordering and scheduling of specific sampling activities at this time is critical for completion of necessary characterization activities by 2011. The Board's questioning revealed that Mr. Norris' concerns in this regard were based on speculation only and should be accorded no weight.

72. Based on its review of the testimony and the exhibits presented, the Board finds that it is not necessary to identify all of the karst features at JPG to the extent and in the detail proposed by STV's witness, Mr. Norris, in order to have an adequate characterization of the site. The Board further finds that the activities already undertaken, or which are to be undertaken, by the Army pertaining to site characterization of karst features, including the Fracture Trace Analysis, Electrical Imaging, the fate and transport of DU in water and sediments, gauging of streams and cave springs, well location selection, well installation and monitoring well selection, will be sufficient to adequately characterize the site for decommissioning purposes.

## **8. Soil, Water, and Sediment Sampling and Sample Analysis Methods**

### **a. Evidence**

73. It is STV's position that there are two critical issues related to the surface water and groundwater sampling done as part of the FSP

characterization. The first is an understanding of the water chemistry of both surface water and groundwater as it applies to the mobility of uranium. The second critical issue is the presence, absence, or fraction of DU in the uranium content of the samples. STV states that the sampling protocols in the FSP are not capable of providing the resolution needed to determine low levels of DU contamination using the current methodology of identifying DU by the ratio of alpha activities of U-234 and U-238. (*Initial Statement of Position of intervenor Save The Valley, Inc., filed July 13, 2007, pg. 13.*)

74. Dr. McLaughlin testified that STV's chief witness on these issues, Mr. Norris, is making assumptions as to how the Army will proceed to collect samples and analyze them and is then claiming the methods in his assumption are inadequate. Dr. McLaughlin further testified that the Army in its FSP proposed that the details of the sampling would be submitted later, which was acceptable to the NRC Staff because the FSP is an iterative process, and the Army needed to gather site-specific data before it could determine the sampling details. In the FSP, the Army did submit general principles it would follow in conducting the sampling that were sufficient for the NRC to grant the alternate decommissioning schedule. (*NRC Staff Exh. # 1, McLaughlin Ans. 16, pg. 12.*)

75. Dr. McLaughlin also testified that, prior to the collection of samples, the Army will submit an addendum to the FSP giving its Data Quality Objectives for sampling and analysis to the NRC for review. The Army is not scheduled to begin sampling the media described by Mr. Norris until 2008.

Since the collection and analysis of these samples is a major decision point, the NRC will have a public meeting to discuss the addendum as described in the license amendment granting the alternate decommissioning schedule. (*Id.*, pp. 12 – 13.)

76. Dr. Ridge of the NRC Staff detailed the specifics of the Army's proposed activities to provide and support meaningful dissolution and corrosion rate for DU penetrators at JPG. The Army plans to perform two different types of activities to establish a dissolution rate for DU penetrators subject to the environmental conditions specific to JPG. First, it will study penetrators taken from various locations chosen from sites representative of the primary soil types present and moisture levels and temperatures relevant to the site. The Army has also indicated to the Staff that it will perform testing to support estimates of penetrator dissolution and corrosion rates. (*NRC Staff Exh. # 3, Ridge Ans. 19, pp. 13-15.*)

77. Army witness Stephen N. Snyder testified that the 125 millimeter DU penetrator tested at JPG is, in its original form, a smooth solid metal rod, not unlike a heavy reinforcing bar. In that form DU is immobile. Once it corrodes, as a result of exposure to the elements, it can be dissolved in water or be transported by water as particles or attached to particles of soil. As a result, the rate of corrosion is important. In implementing the Army's FSP, the corrosion process is being characterized in two ways: by exposing a DU rod to a weathering chamber and by exhuming and examining DU projectiles that

were test-fired as part of the JPG operation. (*Army Snyder Exh. # 5, Ans.25, pg.16; Trans. pg. 218.*)

78. Mr. Snyder also presented the following evidence pertaining to the Army's iterative approach to soil, water, and sediment sampling:

a. DU migrates through the soil on its way to the groundwater table. The rate and extent of migration of DU through the soil will be calculated/measured by collecting soil samples near and beneath the DU projectiles at a number of locations. Different soil types found at JPG may transmit DU at different rates, so those soil properties have been characterized and this testing will be conducted in areas representing those different conditions. (*Army Snyder Exh. # 5, Ans. 25, pg. 16.*)

b. Most of the unconsolidated materials overlying bedrock are tight glacial tills and residual limestone clay and silt, which do not allow water (or DU) to pass through readily. Where more permeable unconsolidated materials are found, wells will be constructed to sample groundwater for DU. These wells will be located near areas high in DU deposits, as well as up-gradient, in order to examine natural uranium content. (*Id.*)

c. Once through the unconsolidated mantle of materials, the water pathway migrates to the bedrock. Bedrock underlying JPG is composed of horizontally bedded siliceous limestone and dolomite. Migration of groundwater through this rock is almost exclusively along joints, fractures, and bedding planes in the rock. To some degree, over time, water percolating through these

discontinuities may have dissolved portions of the rock and enlarged the pathways. This created a network of relatively higher zones of permeability, which act as avenues for the majority of groundwater migrating through the site. The FSP calls for wells to be placed on concentrated zones of fractures upgradient of the DU Impact Area (to measure natural U) and downgradient of the DU Impact Area, to measure the current impact of DU deposits. Great care has been taken to place wells in the most likely areas of high permeability and in all likely directions of groundwater migration from the DU deposit. (*Id.*, pp 16-17.)

d. DU may potentially be transported by surface water, either in solution or as particles, along with sediment. Numerous surface streams cross the DU Impact Area. Sediment deposits and stream samples, to be collected at different times of the year, will characterize this pathway. (*Id.*)

e. Lying somewhere in between surface water and groundwater is a network of sinkholes and shallow caves. Sinkholes can receive surface water runoff and sediment and transport it to caves or to the groundwater table. Groundwater also may discharge to cave channels. Some caves carry streams, either intermittently or perennially. This potential pathway is being characterized by sampling cave streams at the mouths of caves. (*Id.*)

f. As noted by the Board in paragraph 62. b. above, there was testimony that numerous stream gauging stations have been set up on the JPG site and that the information gathered will allow the Army to order the most

likely potential pathways for DU carried by water. (*Id.*)

g. All sample points are in close proximity to or within the boundaries of the DU Impact Area. The concentration of DU, if migrating, will be highest and most detectable close to the DU deposits. The pathways are also most predictable closest to the source. By determining the degree to which migration is occurring close to the site, the DU migration processes can be understood. From that point, conservative dose modeling scenarios can be developed and tested. (*Id.*)

79. STV's basic concern with the Army's sample analysis methods is whether the analysis can determine whether DU is in the sample and, if so, at what concentrations. (*STV Exh. # 1, Norris Ans. 68, pg. 73.*) According to Mr. Norris, unless changes due to fractionation are identified and tracked, one cannot know what isotope ratios in which medium will represent migrating DU. (*Id., Ans. 74, pg. 78; STV Exh. # 2, Henshel Ans. 27, pg 17.*)

80. Dr. McLaughlin testified that the mass spectrometry method of analysis proposed by Mr. Norris for more precise measurement is limited in the natural environment. Broad application of the determination of fractionation factors is currently not possible and determination of fractionation factors from DU is not feasible. As a result, it was Dr. McLaughlin's opinion that the Army should not be required to attempt to determine fractionation factors as part of its site characterization study to determine potential DU transport. (*NRC Staff Exh. # 1, McLaughlin Ans. 17, pg. 14.*)

81. Evidence submitted by the Army and the NRC Staff indicate that measurement of the quantity of DU in the samples gathered by the Army to date would be meaningless because of the low levels of total uranium being found in the samples and because of the errors and uncertainties in measurement results at those low levels. None of these witnesses was aware of any methodology that permits one to determine what part of a sample is natural uranium or DU. (*Trans.* 289-309; *NRC Staff Exh. #5, Condra Ans. 9, pp. 8-9; NRC Staff Exh. # 10, Condra Sur-rebuttal Ans. 4, pp. 2-3; Army Anagnostopoulos Exh. # 1, Ans. 28, pp. 18-23.*)

82. With one exception, concentrations of total uranium found in deer and water samples at JPG were at levels so low that they were at or near the detection level in the instrumentation generally. (*Trans, pp. 291-293, 301.*)

83. Rather than attempt to make an uncertain estimate of whether or not DU is present as part of these samples containing low levels of total uranium, the Army is looking at the level of total uranium in the sample. If the level of total uranium is elevated compared to what would be expected in the natural background, then the Army will start looking to determine whether it is seeing a contribution from DU. (*Trans. 290.*) If DU from the penetrators starts to move, the concentrations locally would be expected to be elevated in the samples. (*Trans 302.*) When DU is clearly present in a sample such that the total uranium concentration is elevated in regard to that expected in the natural environment, alpha spectroscopy is capable of reliably identifying the presence

of DU. (*Army Anagnostopoulos Exh. #1, Ans. 28, pg. 22.*)

84. The levels of total uranium that the Army is seeing in its sample results to date, approximately 1 pCi per gram, are far below levels that will create a public health problem for the people that are receiving the dose associated with this total uranium. The total dose exposure is sufficiently low such that it is not necessary to determine what portion total uranium is composed of DU. (Trans. 306-307.) Using the sample analysis methods currently being used in implementation of the FSP, the Army can develop a plan that will characterize the site sufficiently to see uranium movement at levels that will allow the Army to take protective action well before there is a health risk to the public. (*Trans. 308-309.*)

#### **9. Board Findings**

85. From the testimony and evidence presented, the Board finds that the Army's characterization activities as currently being implemented are likely to provide a sufficient understanding of the water chemistry of both surface water and groundwater as it applies to the mobility of uranium to support a decommissioning plan. Dr. McLaughlin of the NRC Staff has testified that as assurance that the Army's contemplated future activities in this regard remain focused on obtaining necessary site specific data concerning migration of DU in water following dissolution and corrosion of penetrators, the Army will be required to submit an addendum to the FSP giving its Data Quality Objectives for sampling and analysis to the NRC for review following the current collection

of preliminary data.

86. The Board finds that STV witness Charles Norris has failed to provide either sufficient detail or a sufficient technical basis to support his conclusion that the Army should be required to use analytical techniques and methods which will enable it to determine the quantity of DU in the levels of uranium found in samples so as to be better able to detect and predict the possible migration of the DU offsite. Current findings from the site are at or near the level which current instrumentation is able to detect. Therefore, given the sample results to date which indicate total uranium at no more than background levels, total dose exposure is sufficiently low that it is not necessary to determine what portion total uranium found in these samples is composed of DU. Using the sample analysis methods currently being used in implementation of the FSP, the Army can develop a plan that will be protective of public health and will sufficiently characterize the site.

#### **V. CONCLUSIONS OF LAW**

87. The Licensing Board has considered all of the evidence presented by the parties on the contention of STV regarding the inadequacy of the Army's FSP to support an alternate decommissioning schedule and the hearing record, consisting of the filings of the parties in this proceeding, the orders issued by this Board, the exhibits received in evidence and the transcript of the proceeding. Based on a review of the entire record in this proceeding, consideration of the proposed findings of fact and conclusions of law submitted

by the parties, and based upon the findings of fact set forth above, which are supported by reliable, probative and substantial evidence in the record, the Board has decided all matters in controversy concerning this contention in favor of the Army and reaches the following conclusions:

88. Pursuant to 10 CFR § 2.325, the Army is required to demonstrate that: the approval of the alternative schedule is necessary to the effective conduct of decommissioning operations; that the approval of the alternative schedule presents no undue risk from radiation to the public health and safety; and that the approval of the alternative schedule is otherwise in the public interest. 10 C.F.R. § 40.42(g)(2). However, STV has not presented a prima facie case that approval of the alternative schedule here was not in conformance with those three requirements of 10 CFR § 40.42(g)(2).

89. There is no requirement that the application for the grant of an alternative schedule for decommissioning be supported by licensee submittals which contain such specific, detailed and exacting information concerning the procedures and protocols to be followed in contemplated future site characterization activities so as to assure subsequent Staff approval of the ultimate decommissioning plan. Nor does the language of the rule suggest that such a requirement can be fairly implied. One of the purposes of the alternative schedule is to allow a licensee time to discover needful information that is not at present known.

90. The site characterization activities conducted by the Army here

are being conducted in collaboration with the NRC Staff in the sense that data is being reviewed by the Staff and areas of concern are being addressed. This process will, by intent and design, lead to the submission of a decommissioning plan which will contain all of the information which the NRC deems necessary. The implementation of the FSP, including the practice of modifications to the plan through addenda after meeting and discussion between the Army and the NRC Staff, will provide adequate site characterization. Thus, the contention is resolved in favor of the Army.

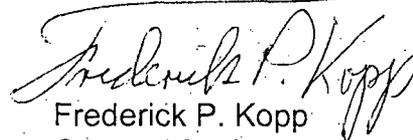
91. All issues, motions, arguments, or proposed findings presented by the parties, but not addressed herein have been found to be without merit or unnecessary for this decision.

**ORDER**

For the foregoing reasons, it is hereby ordered that Save The Valley, Inc.'s contention is resolved in favor of the Applicant, the Army. This initial decision shall constitute the final decision of the Commission forty (40) days from the date of its issuance, unless, within fifteen (15) days of its service, a petition for review is filed in accordance with 10 C.F.R. § 2.341(b)(1).

It is so ORDERED.

Respectfully submitted,



Frederick P. Kopp  
Counsel for Army

Dated at Rock Island, Illinois  
this 7<sup>th</sup> day of December, 2007

UNITED STATES OF AMERICA  
NUCLEAR REGULATORY COMMISSION

ATOMIC SAFETY AND LICENSING BOARD PANEL

Before Administrative Judges:

Alan S. Rosenthal, Chair  
Dr. Paul B. Abramson  
Dr. Richard F. Cole

<hr/>	)	Docket No. 40-8838-MLA
In the Matter of	)	
U.S. ARMY	)	ASLBP No. 00-776-04-MLA
(Jefferson Proving Ground Site)	)	December 7, 2007
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CERTIFICATE OF SERVICE

I hereby certify that copies of the "U. S. Army's Proposed Findings of Fact and Conclusions of Law, and Order in the Form of an Initial Decision", filed on December 7, 2007 in the above-captioned proceeding have been served on the following persons by U. S. Mail, first class, and (as indicated by asterisk) by e-mail this 7<sup>th</sup> day of December, 2007:

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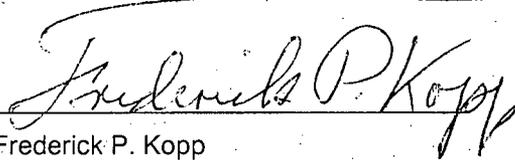
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Dated December 7, 2007



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