August 17, 2007

UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

BEFORE THE ATOMIC SAFETY AND LICENSING BOARD

In the Matter of	)	
	)	
U.S. ARMY	)	Docket No. 40-8838-MLA
	)	
(Jefferson Proving Ground Site)	)	

NRC STAFF INITIAL STATEMENT OF POSITION ON CONTENTION B-1

INTRODUCTION

Pursuant to the Order (Scheduling for Preparation of Evidentiary Hearing) (May 15, 2007) (May 15 Order), the Staff of the U.S. Nuclear Regulatory Commission ("Staff") submits its Initial Written Statements of Position and written testimony with supporting affidavits on Save the Valley, Inc.'s ("STV's" or "Petitioner's") admitted contention B-1 regarding adequacy of a portion of an application referred to by the licensee as the "Field Sampling Plan" ("FSP"). In accordance with the May 15 Order, the Staff has targeted its testimony akin to rebuttal testimony. For the reasons set forth below and in the testimony filed herewith, the Staff submits that a careful evaluation of STV's Contention B-1 demonstrates that STV's challenge to the U.S. Army's ("Army" or "Applicant") application for an alternate schedule to submit a decommissioning plan for the Jefferson Proving Ground Site cannot be sustained.

BACKGROUND

This proceeding concerns the U.S. Army's application for an alternate schedule to submit a decommissioning plan. On May 25, 2005, pursuant to 10 C.F.R. § 40.42(g)(2),[1] the Army submitted a license amendment request to the NRC for an alternate schedule for submitting a decommissioning plan for its facility at Jefferson Proving Ground ("JPG") in Madison, Indiana. *See* Letter and Attachments from Alan G. Wilson to Dr. Tom McLaughlin, dated May 25, 2005, ADAMS No. ML051520319. On November 23, 2005, STV filed a petition to intervene in which STV proffered six contentions. Petition to Intervene and Request for Hearing of Save the Valley, Inc. (November 23, 2005) ("STV Petition"). The STV Petition had concerns with the Environmental Radiation Monitoring Plan ("ERMP"), the FSP, the Health and Safety plan ("HASP"), the timetable and the financial assurance in support of the Army's license amendment request. *Id.* The Board partially addressed the admissibility of the contentions proffered in the STV Petition, and granted STV's hearing request based on Contention B-1, but deferred the hearing to await the Staff's completion of its technical review of the alternate proposed schedule. *U.S. Army* (Jefferson Proving Ground Site), LBP-06-6, 63 NRC 167, 185 (2006).

On April 26, 2006, the license amendment was granted. Materials License SUB-1435, Docket 040-08838, Amendment 13, License Condition 13 (ML053320014). The Board then entered an order that STV could, following its examination of the Environmental Assessment ("EA") and Safety Evaluation Report ("SER"), withdraw or amend existing contentions or add

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[1] "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).

new ones. Memorandum and Order (Scheduling Further Proceedings) (May 1, 2006). On May 31, 2006, STV filed a motion to withdraw, amend, and supplement contentions, including Contention B-1 and its bases. Motion for Leave to Withdraw, Amend, and Supplement Contentions of Save the Valley, Inc. (May 31,2006); Final Contentions of Save the Valley, Inc. (May 31, 2006) ("STV Final Contentions").

Subsequently, in its December 20, 2006 Order, the Board ruled on the admissibility of the contentions not addressed in LBP-06-06, concluding they were not admissible, which left just Contention B-1 for the hearing. *U.S. Army*, (Jefferson Proving Ground Site), LBP-06-27, 64 NRC 438 (2006). The Board concluded that it need not address the sixteen bases for Contention B-1, and noted that the upon receipt of written testimony, the licensee and NRC staff will have the opportunity to object to any part they deem outside of the hearing. *Id.* at 447.

As described by the Intervenor, Contention B-1 provides:

> As filed, the FSP is not 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.

STV Final Contentions at 8-9.

On January 19, 2007, STV moved to admit additional Contention B-2 regarding inadequate implementation of the FSP. Motion of Save the Valley, Inc. to Admit for Hearing Additional Contention and Supporting Bases (Jan. 19, 2007). The Board subsequently denied STV's motion, ruling Contention B-2 to be inadmissible. U.S. Army (Jefferson Proving Ground Site), LBP-07-7, 65 NRC 507 (2007).

In issuing the denial of Contention B-2, Judge Abramson provided a concurring opinion which stated that he read 10 C.F.R. § 40.42(g)(2) more narrowly than his colleagues. *Id.* at 516-17 (Concurring Opinion of Judge Abramson). Judge Abramson read the regulation to require only "necessary" to result in effective decommissioning, whereas the majority viewed the

regulation to be "necessary" and "sufficient" to result in effective decommissioning *Id.* Judge Abramson noted that another alternate schedule could be granted under his interpretation, whereas his colleagues' interpretation would prohibit any additional time being granted. *Id.*

Judge Abramson also stated there was a need for the parties to address two principal questions:

> (a) given the nature of the Field Sampling Plan as submitted and approved, how does a Party demonstrate that this “plan to develop a plan” will or will not evolve to produce adequate site characterization; and (b) what legal standard should this Board use to make such a determination?

Id.

On July 13, 2007, STV filed its "Initial Statement of Position of Intervenor Save The Valley, Inc.," ("STV Initial Position") accompanied by the testimony of Charles Norris. On July 20, 2007, STV filed a supplemental pleading which included the testimony of Diane Henshel.

On July 27, 2007, the Staff filed a motion to strike portions of Norris's testimony. NRC Staff’s Motion in Limine to Strike Portions of Norris Testimony, July 27, 2007. The Army separately joined the NRC. Army Response Joining in the NRC Staff's Motion in Limine, July 23, 2007.

On July 24, 2007, the Board denied the motion. Memorandum and Order (Summarily Denying NRC Staff’s Motion in Limine to Strike Portions of Norris Testimony), July 24, 2007. In the order, the Board stated that the precise issue in this adjudicatory proceeding is whether the site characterization activities proposed by the Licensee in its FSP and approved by the NRC Staff will enable the Licensee to submit to the NRC an effective decommissioning plan no later than 2011. *Id.* at 2.

DISCUSSION

I. Regulatory Framework

The license amendment request associated with this proceeding is an alternate schedule for submission of a decommissioning plan.[2] The governing regulation involved in the U.S. 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).

A review of the Statements of Consideration ("SOC") for the final rule on Timeliness in Decommissioning (which added the text now in 10 C.F.R. § 40.42(g)(2)) shows that extensions are for flexible purposes, ranging from characterizing a site to obtaining other agencies' approvals.[3] Timeliness in Decommissioning of Materials Facilities, 59 Fed. Reg. 36026, 36028

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[2] STV discusses the regulatory framework under 10 C.F.R. § 20.1403, which gives the criteria for license termination under restricted conditions. STV Initial Position at 2-4. This regulation is not the standard under which alternate schedules are requested, and is not applicable to the current hearing.

[3] The relevant portions of the SOC stated:

> A commenter noted that the 12-month period allowed by the proposed rule for submittal of a decommissioning plan fails to recognize the scope of work necessary to characterize a site prior to preparing a plan. This commenter suggested that consistent with other licensing actions, scheduling commitments should be developed on a site-specific basis. A second commenter also felt that the 12-month period was unrealistic because of the need to obtain other agency approvals and those agencies are not subject to NRC schedules or under the licensee's control. This commenter suggested that, rather than requiring that a decommissioning plan be submitted within 12 months, the rule should require submission of a proposed schedule taking into account the requirements of other affected regulatory bodies.

(continued. . .)

(July 15, 1994). Neither the rule nor the SOC suggest that a schedule request submittal must contain all the information that would be present in the subsequent decommissioning plan. Therefore, the details required to support the Staff review of an alternate schedule are not the same as those needed for a decommissioning plan. The Staff's review of how the FSP supports site characterization addresses how the proposed activities are "necessary to the effective conduct of decommissioning operations." 10 C.F.R. § 40.42(g)(2).

Judge Abramson questioned how a party demonstrates that the FSP will or will not evolve to produce adequate site characterization; and what legal standard the Board should use to make such a determination. In reviewing the Army's request, the Staff applied the criteria of 10 C.F.R. 40.42(g)(2). The Staff's determined, based on its review of the Army's application and on its own technical expertise, experience, and judgment, the FSP will lead to an adequate site characterization to support a decommissioning plan. The appropriate legal standard for the Board to apply would be a preponderance of the evidence demonstrating that the three criteria in 10 CFR § 40.42(g)(2) support the approval of the alternate schedule.

II. Approval of Alternate Schedule

On April 26, 2006, the license amendment was granted. Materials License SUB-1435, Docket 040-08838, Amendment 13, License Condition 13, (ML053320014). The Staff's Safety Evaluation Report addressed the review standard by stating:

(. . .continued)

> The NRC did not extend the 12-month period for submittal of a decommissioning plan. The NRC notes that flexibility has been included in the final rule. The NRC may approve alternate schedules as indicated in §§30.36(f)(2), 40.42(f)(2), 70.38(f)(2) and 72.52(e)(2). [40.42(f)(2) was later renumbered to 40.42(g)(2). 60 Fed. Reg. 38235, 38239]

Timeliness in Decommissioning of Materials Facilities, 59 Fed. Reg. 36026, 36028 (July 15, 1994).

> The review of the FSP was supplemented by the public meeting held on September 8, 2005, actions items from that meeting, and the Army's responses to three RAIs issued by the staff. The basis of the staff's review was to determine whether the Army's proposed alternative schedule is in compliance with 10 C.F.R. § 40.42(g)(2). Specifically, whether the alternative schedule is: 1) necessary to the effective conduct of decommissioning operations; 2) presents no undue risk from radiation to the public health; and 3) is otherwise in the public interest.

Safety Evaluation Report ("SER") for Issuance of Amendment No. 13 to Materials License No. Sub-1435, Department of the Army, Jefferson Proving Ground at 4 (ML053320014).

In the SER, the Staff documented it found the Army's proposed approaches to groundwater monitoring, surface water monitoring, biota sampling, soil sampling, sediment sampling, determining Distribution Coefficients (Kd), and determining penetrator corrosion and dissolution rate to be adequate. SER at 5-8. The SER stated:

> In summary, the activities described by the Army in its FSP and addendum as supplemented in its follow-up responses, should provide adequate site characterization information such that the Army could submit an acceptable DP within 5 years and are therefore necessary for the effective conduct of decommissioning operations.

SER at 8.

The Staff found the proposed approaches in the FSP to be adequate for various site characterization activities. *Id.* In making the finding, the Staff found there was reasonable assurance that the health and safety of the public will not be endangered by the proposed site characterization activities and alternate schedule for submittal of a DP; and such activities will be conducted in compliance with NRC regulations, and it is in the public interest to take the additional time to allow for more specific information to be gathered from the site. *Id.* at 8-9.

As previously discussed, the FSP has to provide for activities necessary to effective decommissioning. To support a request under 10 C.F.R. § 40.42(g)(2), not *all* information regarding necessary activities needs to be submitted to approve an alternate schedule, but only

those activities requiring extra time. Accordingly, even if a particular sampling will be required as a component of a decommissioning plan, the submitted material (*i.e.* the FSP) in support an alternate schedule request would not have to specify all aspects of the sampling that is used to develop the decommissioning plan.

III. Staff's Witnesses

The attached testimony presents the opinions of a panel of five highly-qualified witnesses, who will provide testimony that in particular demonstrates that the activities in the FSP are necessary under 10 C.F.R. § 40.42(g)(2), and that additional steps requested by STV are not necessary.

Dr. Thomas McLaughlin, the Project Manager for JPG, has also been the Project Manager for two sites contaminated with uranium that requested alternate decommissioning schedules under 10 CFR 40.42(g)(2) to re-characterize their sites using a site characterization plan. Testimony of McLaughlin at A4. Dr. McLaughlin is currently the Project Manager for three uranium mill tailing sites that are being decommissioned under restricted conditions. *Id.* Dr. McLaughlin worked as a contributing author on the Multi-Agency Radiation Survey and Site Investigation Manual, NRC's approved methodology for conducting final status radiation surveys of licensed facilities undergoing decommissioning. *Id.* at A5. Dr. McLaughlin also helped to revise NUREG-1757 Volume 2, Revision 1, NRC's most recent compilation of decommissioning guidance. *Id.* Dr. McLaughlin's testimony addresses in particular Bases "N" and "O."

Mr. Jon M. Peckenpaugh, a Systems Performance Analyst, is a hydrogeologist responsible for the performance assessment of hydrological systems and the review of environmental models used to estimate potential radiological doses to humans from waste disposal sites and sites undergoing license termination. Testimony of Peckenpaugh at A3, A3. Mr. Peckenpaugh is a Professional Geologist in the states of Virginia and Pennsylvania. *Id.* at Attachment A. Mr. Peckenpaugh is a technical reviewer of the U.S. Army's Jefferson Proving

Ground facility where he has reviewed the hydrologic and hydogeologic issues pertaining to the current site characterization. *Id.* at A6. Mr. Peckenpaugh's testimony addresses the hydrological and hydrogeological issues in Contention Bases "A" through "I" and Mr. Norris' pre-filed testimony.

Dr. A. Christianne Ridge, a Systems Performance Analyst, is responsible for reviewing performance assessments to support decisions about sites undergoing license termination and Department of Energy ("DOE") plans to dispose of certain reprocessing wastes. Testimony of Ridge at A1, A4 - A5. Dr. Ridge has a doctorate in environmental engineering with specific training in aquatic chemistry as well as NRC training in reviewing performance assessments for site decommissioning. *Id.* at A3. Dr. Ridge has reviewed geochemical aspects of performance assessments, including selection of partitioning coefficients (Kd values) and solubility limits for radionuclides. *Id.* at Attachment A. Dr. Ridge has presented an evaluation of various methods for modeling radionuclide transport at a national waste management conference. *Id.*
Dr. Ridge's testimony addresses the intervenor's Bases "J" and "Q" regarding modeling radionuclide sorption with a linear partitioning coefficients (Kd values) and corrosion and dissolution rates of depleted uranium penetrators. Dr. Ridge's testimony will also address the human health implications of consuming deer taken from JPG.

Mr. Dale Condra is the Laboratory Manager for the Independent Environmental Assessment and Verification Program of the Oak Ridge Institute for Science and Education. Testimony of Condra at A1.[4] Mr. Condra is responsible for the operations of the radiochemistry laboratory which performs all the radioanalytical work for the NRC. *Id.* at A2. The laboratory

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[4] Please note the original signed accompanying affidavit for Mr. Condra will be provided to the Office of the Secretary on or about August 20, 2007 due to Mr. Condra's remote worksite.

also performs radioanalytical work for DOE projects assigned to the program. *Id.* at A2. Mr. Condra's testimony addresses the uranium concentration in deer tissues at JPG and general background levels of uranium in various media.

Mr. Adam Schwartzman, an Environmental Scientist, is responsible for reviewing and providing technical assistance on transport processes associated with the movement of contaminants through the environment. Testimony of Schwartzman at A1, A3. Mr. Schwartzman is the NRC Project Manager for the environmental transport and dose assessment computer code RESRAD (RESidual RADioactive) and participate in a Working Groups that develops and updates NRC regulatory guides associated with environmental monitoring and the reporting of effluent data from nuclear power plants. *Id.* at A4. With respect to JPG, Mr. Schwartzman reviewed the technical issues pertaining to depleted uranium ("DU") transport via air. *Id.* at A6. Mr. Schwartzman's testimony addresses the air sampling needs associated with the FSP.

STAFF POSITION ON CONTENTION B-1 AND ITS BASES

The Staff's testimony presents its position that the concerns raised by STV lack merit because the Army's FSP is adequate to support an application for an alternate schedule. STV has failed to provide facts supporting the contention that the activities described in the FSP are not necessary to the effective conduct of decommissioning operations, and that additional activities should be specified.

In accordance with the May 15 Order, the Staff has targeted portions of its testimony as rebuttal.

I. Summary of Staff Position: The FSP Is Adequate to Support a Request Under 10 C.F.R. § 40.42(g)(2)

The FSP is adequate to support the request for an alternate schedule to submit a decommissioning plan. McLaughlin at A9. The FSP provides information necessary to the

effective conduct of decommissioning operations. *Id.* The alternate schedule, as supported by the FSP, presents no undue risk from radiation to the public health. *Id.* The alternate schedule, which the FSP supports, is otherwise in the public interest. *Id.*

The additional sample collection and analyses that STV alleges are missing from the FSP are unnecessary to the effective conduct of decommissioning. *Id.* Furthermore, STV's proposed additions to the FSP to address risks to the public from issues other than radiation go beyond what an applicant needs to show under 10 C.F.R. § 40.42(g)(2). *Id.* at A9. STV erroneously asserts that the FSP must have a much broader scope based on chemical properties of uranium instead of the radiological hazard, more similar to an EPA-type ecological risk assessment. *Id.* at A10. STV fails to understand that the NRC accepts bounding and/or conservative values. *Id.* at A10. The FSP is designed to provide the Army with information relating to the DU and its radiological hazard. *Id.* at A10.

The FSP is an iterative process. Mclaughlin at A16. Its objective is to provide site-specific information relating to the DU and JPG, and, specifically, how the DU could potentially cause a radiological dose that would be detrimental to the public health. *Id.* at A10. The FSP will enable the Army to develop a decommissioning plan. *Id.* The FSP is adequate because it will provide information that is necessary to the effective conduct of decommissioning operations. *Id.* Further, the FSP is adequate without any air sampling requirement, as such sampling is unnecessary during the alternate schedule period. Schwartzman at A15.

II. Discussion of Bases

A. Contrary to Basis A, the FSP Adequately Addresses Karst Features and Well Location Without Unnecessary Time Delays

Basis A states as follows:

> The EI geophysical study which will follow the fracture analysis study, as described in section 6.1 of the FSP, is supposed to find all significant karst features and location of the water table. From

> these studies, 10 to 20 pairs of monitoring wells are proposed to attempt to tie into "conduits" of ground water flow. This study may help to site monitoring wells, but stream gauging studies should be an early and integral part of the search for likely conduits. The stream reaches of strong gain would be a very strong direct indicator of the discharge points of ground water "conduits." EI is an indirect technique and can miss conduits or identify features that are not conduits. The FSP alludes to doing stream gauging in its discussion of well location criteria, but the time table shown indicates stream studies will follow the ground water studies by a year.

STV Final Contentions at 9.

To support Basis A, STV claims that the Electrical Imaging (EI) in the modified FSP is deficient. Peckenpaugh at A8. They also state that the Army's locations of the stream gauges are not appropriate and that the timing of the stream gauging is wrong. *Id.* STV states that the groundwater system should be better understood before stream gauging is started. *Id.*

The Staff disagrees with this Basis A. The FSP adequately provides information on karst features, without needlessly delaying the development of a DP by attempting the difficult, unnecessary task of finding *all* karst features at the JPG. *Id.* Furthermore, the FSP adequately provides for collection of cave spring, stream, and precipitation data, and the timeframe proposed by the FSP is appropriate. *Id.* The locations of the wells will be appropriately selected from the methods proposed in the FSP. *Id.*

STV incorrectly summarizes the purpose of the FSP when STV claims that all significant karst features should be found. *Id.* It is not possible or necessary to find all karst features. *Id.* Furthermore, many of STV's expert's statements pertaining to the karst system at the DU impact area are incorrect. *Id.* at A20. Contrary to STV's expert's assertions, karst features develop independently of rock age. *Id.*

As elaborated in the testimony, STV's suggestion of using additional or alternate methods to find karst features, such as ground-penetrating radar, would not work, and would therefore be unnecessary and not support an alternate schedule request. *See Id.* at A19. Also,

STV's expert does not understand the relationship between FTA and well location/selection, and apparently does not understand that the FSP has built in flexibility to allow for evaluation of potential well sites based on information in addition to FTA. *Id.*

B. Contrary to Basis B, the FSP Adequately Samples Higher Quality Wells, While Excluding Unnecessary Wells

Basis B states as follows:

> The discussion in section 6.2.1 is disturbing in its failure to set out the chemistry of the monitoring system at this stage and its cavalier dismissal of ground water as a direct exposure route to humans due to its supposedly "poor quality." The "poor quality" that is being cited is, in part, a function of existing data being sampled from wells that are definitely not in "conduits" that would presumably flush frequently and carry good water. Instead, the "poor quality" data are drawn often from tight, clayey wells and wells that may well have had multiple types of contaminating material falling into them due to poor maintenance.

STV Final Contentions at 9.

STV's concern fails because the FSP already provides for selection of higher quality wells, and requires new wells where necessary. Peckenpaugh at A9. The FSP appropriately considers the probability that the water would become a source of drinking water, and adequately characterizes the potential for human exposure. *Id.* Therefore, the FSP supports effective decommissioning. *Id.*

C. Contrary To Basis C, the Number of Monitoring Wells and Well Sites in the FSP Is Adequate

Basis C states as follows:

> The wells to be used for staging should not be limited *by assumption* to six wells, as proposed in section 6.2.2. Six may be enough, but it also may not be. The actual number should be a function of results achieved, not assumptions made. (It is hoped that the last sentence in this section mistakenly left an 's' off the word 'well.'

STV Final Contentions at 9-10.

STV's argument here is weak. STV itself even admits that the FSP may have selected enough wells already. *Id.* at 9. STV has failed to support why the initial data collection under the FSP will be inadequate.

The Staff concluded that the FSP properly considers an adequate number of well data recorders, given that it is difficult to determine appropriate well recorder locations before data are collected. *See* Peckenpaugh at A10. Therefore, the FSP supports effective decommissioning. *Id.*

D. Contrary to Basis D, the FSP Is Not Inadequate Regarding of Conduit Wells

Basis D states as follows:

> The FSP specifies in section 6.2.4 that the “conduit” wells will be paired, but does not describe or explain the reason(s) for the relative positions of the two wells at each well site. Presumably, the objective is to provide a means of measuring vertical gradients at each site, but that is not explained or discussed. Nor is there an indication of whether the “paired” well will be above or below the “conduit” well or whether that relative position would change depending upon unspecified geologic or hydrogeologic conditions.

STV Final Contentions at 10.

STV's basis is outdated, and does not support its argument. In response to "Action Item 8," the Army addressed the meaning of "conduit wells". Peckenpaugh at A11. Accordingly, the FSP, even if lacking originally in one description, was not inadequate, as it was supplemented by additional LAR submittals. *See Id.*

E. Contrary to Basis E, the FSP Need Not Perform the Unnecessary Task of Monitoring Dry Borings

Basis E states as follows:

> The FSP also specifies in section 6.2.4.3 that a boring that does not produce enough water for a well will be abandoned. If lack of production occurs because the system is “tight” (i.e., impermeable), that makes some sense. However, the nature of karst terrain is such that conduits may not produce water because

> the flow is highly transient and, unless there is a new flow event at the time of drilling and/or testing, a well may be dry even though it has been placed in an appropriate and important location. To ensure the problem is a temporary lack of water, rather than a permanent lack of permeability, it is necessary to monitor the boring for enough time to be sure it never produces before abandoning it.

STV Final Contentions at 10.

To support Basis E, STV states that the FSP contains criteria that provide for abandoning a borehole if sufficient groundwater is not available at the time of the drilling. STV indicated the need to hold the borehole open until a significant precipitation event occurs that may provide water for the borehole. Peckenpaugh at A12. The activities STV argues for are unnecessary. *Id.* Instead, the FSP already adequately describes necessary tasks to develop needed decisions regarding whether to develop a well or abandon a borehole, such as reviewing core samples. The FSP approach adequately informs a decision to abandon a non-productive borehole. *Id.*

F. <u>Contrary to Basis F, the FSP Well Placements Is Adequate and Not Limited</u>

Basis F states as follows:

> The FSP states in section 6.2 that all new wells to be completed will be in “conduit” settings in bedrock. This placement is too limited. Certainly, most off-site transport is likely to occur through bedrock karst features. But, the projectiles and the DU reside in the till and/or the weathered bedrock/colluvium. Simply because good, shallow wells were not completed in the original set of JPG wells does not mean that properly located and completed shallow wells are not necessary to characterize properly the hydrogeology of the site.

STV Final Contentions at 10.

To support Basis F, STV states the modified FSP does not require wells to be installed when aquifers are found in the unconsolidated sediments above the bedrock. Peckenpaugh at A13. STV's basis is outdated, and does not support STV's contention. *Id.*

The Army subsequently provided new material including "Action Item 2" to re-evaluate

decisions regarding screening of wells and well locations. *Id.* New well placement was adequately addressed and updated through Addendum 4. *Id.*

Contrary to STV's characterization of the number of sampling events for installation of new monitoring wells, the FSP and addenda provide for feedback into the well selection process. *Id.* at A25. The FSP allows for consideration of issues like climate conditions for well selection. *Id.*

Furthermore, since the amendment was issued, the Staff have observed the actual placement of monitoring wells, and concluded the locations were appropriate. *Id.* at A13.

G. Contrary to Basis G, the FSP Adequately Addresses Permeability

Basis G states as follows:

> The FSP states in section 6.2.4.4 that the new wells will not be tested for permeability. Granted, if a particular well is sunk into a well-developed conduit, it will not be feasible to measure permeability. But, the nature of karst features is to be hard to locate precisely, so it is likely that at least some of the wells will simply be in bedrock with some enhanced permeability, which should be measured if it can be. Moreover, the conductivity of the rock adjacent to and feeding the conduit is a major determinant of flow through the system. The same holds true for aquifer testing. If pumping the aquifer shows interconnection among two or more of these conduit pairs, that result will provide very valuable information about the system transporting DU from the site.

STV Final Contentions at 11.

To support Basis G, STV states that the modified FSP is deficient by failing to characterize the hydraulic properties of the soils and rocks drilled, including the conduit zones, where wells will be completed. Peckenpaugh at A14. STV's basis is outdated, and does not support STV's argument. *Id.* The FSP contains appropriate steps to address hydraulic conductivity (permeability). *Id.* It is not possible to conclude at this stage if hydraulic conductivity testing is needed, because such a decision must be informed by the results from monitoring wells and stream and spring cave flows. *Id.* Accordingly, it is not necessary to

require permeability testing in the FSP. *Id.* Obtaining values may not even be necessary to develop bounding conservative values. *Id.*

H. Contrary to Basis H, the Geophysical Testing and Video Taping of Well Drilling Is Adequate

Basis H is:

> Contrary to section 6.2.4.3, geophysical testing and video taping of all of the well drilling should be required in intervals where it is physically possible. The understanding obtained from cuttings, particularly air-drilled cuttings, what material has been drilled through and in which a well is being completed is extremely limited. Logging and videoing the borings as they are being drilled actually records what the boring encountered and provides much valuable information for reasonably interpreting the water data that is later collected over time. If turbidity precludes video taping of a boring, teleview logging is a valuable alternative. Where boring logs cannot safely be run, logging through the casing can and should be done.

STV Final Contentions at 11.

To support Basis H, STV states that the modified FSP is deficient by failing to require geophysical logging of the boreholes or characterization of the physical properties of the cores. Peckenpaugh at A15. STV's arguments for videotaping are without merit and outdated. *See Id.* The Staff has reviewed the issue against what is actually being done at the site and concluded that videotaping is unnecessary. *Id.* The actual techniques being used, which include sampling and logging, support effective site characterization. *Id.*

I. Contrary to Basis I, the Selection Process for Surface Water Sampling and Gauging Is Necessary

Basis I states as follows:

> Specifying the exact number and precise locations of the surface water sampling and gauging points at the outset of FSP implementation, as proposed in section 6.4.1, is not a good idea. Until the ground water data show where to look for discharges, such points cannot be reasonably selected. There is no scientific reason why the surface water sampling locations and the

> sediment samples need be in the same location(s). Each medium should be sampled at locations that are appropriate for that medium. Sediment buildup has nothing to do with the location of base flow connections between ground and surface water. Similarly, the FSP concept in section 6.4.2 of putting in only five gauging stations which are sited before the ground water system is better understood is both too limited in number and may well be counter productive in location.

STV Final Contentions at 11-12.

To support Basis I, STV states that the modified FSP is deficient by specifying the precise locations of surface water sampling and gauging points. Peckenpaugh A16. They are also opposed to co-locating surface water and sediment sampling sites. *Id.* STV's concerns are without merit and incorrect, as the Army has not specified "the precise locations." *Id.* Instead, the Army's proposed approach to installing the gauges (co-locating stream and spring cave gauging sites with surface water and sediment sampling sites) is appropriate. *Id.* There is unexploded ordnance at JPG affecting worker safety in performing the site characterization. *See Id.* at A22. Locating stream gauges near the roads reduces the risk to workers from the ordnance. *Id.* Additionally, it is common practice to locate stream gauges by roads and bridges. *Id.* STV's concern about following this practice is without merit.

Furthermore, STV's suggested order of installing gauges is backward. *Id.* In any event, the FSP was already adjusted to enhance site characterization. *Id.*

J. <u>Contrary to Basis J, Uranium Sorption May Be Modeled with the Kd Approach</u>

Basis J states

> The entire Kd exercise described in section 2.3.4.3 is inaccurate, unreliable, and, particularly when it forms such a key element of the modeling, rife with opportunities for abuse. It is described in the FSP text as “an important input parameter” for the results of exposure calculations. But, the exercise does not yield a real number and its functionality is based upon assumptions that are known to be inval*Id.* The biggest erroneous assumption is the one spelled out in the text: “the underlying assumption is that rapid equilibrium is reached between the dissolved and sorbed concentrations of a chemical species, and that these two concentrations are linearly related through the Kd factor.” At best,

> there are an infinite number of Kd values based upon the infinite number of combinations of soil types, sorbent contents, ground water compositions and oxidation states that may exist along the flow path from any individual DU projectile. USEPA tried to use the Kd approach in its modeling for solid wastes, and only recently completed spending almost five years to find an alternative way because Kds just do not work. They don't even work for such simple, monovalent contaminants as lead or cadmium; it is preposterous to rely on the Kd approach for something that is so pH-Eh dependent as the uranium system. Field observations should be used to calibrate geochemical modeling with a program on a par with Geochemist's Workbench, with a lot of soil analyses to identify the abundances of sorbents in the soil that will control the mobility of the uranium. And, if the exposure program that SAIC is using requires the Kd approach, it should also be replaced with one that has more sophistication.

STV Final Contentions at 12 - 13.

To support Basis J, STV argued that it is inappropriate to use linear partitioning coefficients (Kd values) to model subsurface uranium transport at JPG. *See* Ridge at A17.

The FSP describes the Kd model as the method for modeling uranium sorption. This model is acceptable and can be used to provide a conservative representation of the uranium mobility at the site. *Id.* at A11. It is an accepted model that the NRC recommends on a generic basis, not just for JPG. *Id.* It is appropriate to model uranium transport with site-specific Kd values, which is just what the Army proposes. *Id.*

The FSP proposed performing Kd measurements with several contaminated samples. *Id.* These multiple samples will provide information that will inform the Army of the issues related to Kd modeling at the site in the range of concentrations relevant to the site. *Id.* The FSP, through the Kd sampling, will collect information that may be used in linear Kd models and also non-linear models. *Id.* at A12-A13. The characterization described in the FSP will adequately alert the Army of any unusual uranium behavior in the soil (e.g. unusually slow equilibrium). *Id.* at A14. The FSP appropriately determines if sorption is significantly different at different locations at the heterogeneous site. *Id.* at A15.

Fully modeling the "infinite number" of Kd values would require more time, but is actually expected to result in a model that predicts a lower dose (that is, is less conservative) than a model based on a small number of Kd values. *Id.* The potential dose predicted by a model using a single Kd value, or a small range of bounding Kd values, is expected to predict a larger peak dose. *Id.* Furthermore, Kds based on sorption measurements performed with samples of soil and water from the site provide more reliable results than those from modeling alone. *Id.* at A16. The FSP properly indicates that the Army intends to perform this type of site-specific sorption measurement. *Id.*

The geochemical approach proposed by STV is unnecessary, because the JPG site conditions do not require such an approach. *Id* at A17. The Army has proposed to measure site-specific Kd values, which is consistent with the recommendations in the NRC's guidance for license termination. *Id.*

The activities in the FSP related to measuring Kd are necessary to provide an effective decommissioning plan. *Id.* at A22.

K. <u>STV Has Abandoned Basis K</u>

STV has abandoned Basis K by failing to provide any supporting testimony.

L. <u>STV Has Withdrawn Basis L</u>

STV has withdrawn Basis L. STV Final Contentions at 13.

M. <u>Contrary to Basis M, the FSP Is Adequate Without Addressing Air Sampling</u>

Basis M is

> Air remains a potential exposure pathway as evidenced by the air sampling requirements to be implemented for the field workers (Health and Safety Plan, Section 4.2.2.1). If short-term air exposure is a concern for the workers, long-term air exposure is a concern for residents in surrounding communities, as well as for the animals living in the JPG ecosystem. Given the frequent burns that are used to clear brush at JPG, including in the DU Impact Area, conditions are prime for enhancing migration of soil-bound DU into the air. A recently published study provided solid evidence

> that fire does indeed increase the air migration pathway of soil uranium. Whicker et al studied air concentrations of uranium at the perimeter of the Los Alamos National Laboratory that were measured seasonally over a 10 year time period, including before and after fires, both wildfire and fires that were intentionally set (the equivalent of the JPG controlled burns). They found that the estimated dose due to U attached to particulate in the air at the perimeter of Los Alamos National Laboratory property increased by approximately 15% after even a "moderate" controlled bum, and this increase was greater (38%) after a more intensive wildfire. Further, the contaminated particulate matter increased seasonally, being highest during the spring months when the snow has melted, the ground is bare, winds tend to be gusty (as is true in southern Indiana), and there is little vegetation covering the ground. See JJ Whicker, et al., from Dust to Dose: Effects of Forest Disturbance on Increased Inhalation Exposure, Science of the Total Environment (2006). Thus, the air pathway is a matter of "significant public interest" (making it an "important pathway" under NUREG-0475), and the human populations and wildlife in and around Jefferson Proving Ground are likely being exposed to and inhaling U-contaminated dust and to develop any truly "realistic [exposure] scenario" for JPG, air data needs to be collected to assess the air-borne dust-inhalation exposure pathway. As a result, the FSP is clearly deficient for purposes of adequate site characterization in providing for no air sampling whatsoever.

STV Final Contentions at 14 - 15.

STV argued that an air sampling plan is needed in the Field Sampling Plan due to the potential for migration of soil-bound DU. Schwartzman at A8. STV's concern is over the potential for increased doses to the workers and public from inhalation and ingestion of DU-contaminated dust associated with controlled burns conducted at JPG. *Id.*

However, air sampling is not required. *Id.* Studies at other sites show that public and workers will be adequately protected. *Id.* at A9 - A11. The studies considered the impact of controlled burns and, when applied to JPG, show that there is no need for a full-time air sampling program. *Id.* at A11.

Basis M, as drafted by STV, is misleading when discussing dose in that it refers to relative values or percentiles, instead of absolute values. *Id.* at A14. A review of the cited study

shows that absolute dose remained very low. *Id.*

STV's expert argues that data on DU exposure through air must be included. Testimony of Henshel at A37. However, STV's expert admits that the studies STV cites showed no health risks to workers. *Id.* at A36. STV's expert alleges that the study to support no air sampling was out of date (*Id.* A35), but the expert fails to address additional studies that confirmed the supposedly-outdated study. Schwartzman at A17. The study relied upon by STV's expert to show the need for air sampling still does not support the full time air sampling, as the potential dose remains minimal. *Id.*

STV's expert argues based on speculation over lifetime dose (Henshel at A37), but this fails to address that the FSP is simply part of site characterization during a limited alternate schedule time period. *See* Schwartzman at A15.

N. Basis N and STV's Concern about Biological Characterization Is Unsupported

Basis N states as follows:

> In order to really do a site-specific environmental and human health risk assessment, understanding the fate and transport (F&T) of DU within the JPG ecosystem is critical. In order to develop such a model, standard eco-risk-associated field sampling practices specify samples from different parts of the ecosystem within the same approximate period of time and definitely within the same field season in order to identify the distribution of the contaminant (DU) at that time. Further it is best to take multiple samples from these different locations over time. Thus, to truly model F&T within the JPG ecosystem (which is NOT the Yuma or Aberdeen Proving Ground ecosystem), a particular sample taken at a particular time should include all media and relevant biota and each of these media and biota should be sampled on multiple occasions. Ideally, samples should also be taken under different types of field conditions, as appropriate for the changes that occur at the site of concern. For example, at a site that floods, as JPG does, samples should be taken from all media and biota at high flow (flood season) and low flow. Similarly, in a seasonal environment like JPG, samples should be taken from all media and biota in different seasons. When reproduction is seasonal for the biota of potential concern, seasonal sampling is of special concern. Thus, the much more limited sampling described in section 6.3 of the FSP is deficient for

purposes of adequate site characterization.

STV Final Contentions at 15 - 16.

To support Basis N, STV claims that to do a site-specific environmental and human health risk assessment, understanding the fate and transport of DU within the JPG ecosystem is critical. McLaughlin at A13. STV states that eco-risk field sampling practices are required. *Id*. However, the detailed analyses and ecological risk assessment suggested by STV are not required or used by the NRC to determine radiological doses to humans. *Id.* The proposed sampling in the FSP is adequate. *Id.*

After submission of a decommissioning plan, the Army will prepare an environmental report and the NRC will prepare an environmental impact statement. *Id.* Furthermore, the U.S. Environmental Protection Agency will have an opportunity to consider the effects of decommissioning on matters within its regulatory jurisdiction. *Id.*

STV's expert's testimony regarding biological requirements for a fate and transport model shows that STV does not understand the concept of decommissioning under restricted conditions. *Id.* at A19.

O. Basis O and STV's Concern Over Sampling Biota as Part of an Ecological Assessment Is Unsupported

Basis O states as follows:

> Although deer are not the most representative biota to sample, they are the only biota proposed for sampling by section 6.3 of the FSP. Nonetheless, when data from samples early and late in DU testing are not combined, it is evident that DU levels in even the deer are increasing. This result in deer clearly mandates sampling other, more representative biota as well. Based on what little data is available, the bioaccumulation factors (BAFs) for vegetation and the aquatic filter feeders such as crayfish (both of which are eaten by higher animals and humans) are relatively high, on the order of 10^2 to 10^3 times as high as the BAFs for persistent, bioaccumulative, and toxic chemicals (PBTs) listed as being of concern by the U.S. EPA and the Persistent Organic Pollutants (POPs) Treaty. Clearly, vegetation and aquatic filter feeders are

> better indicators of DU migration into the eco-food chain than are deer and they should be sampled.
>
> For example, the mean of the two clam data points, when compared to the mean of the surface water data provided in Table 2-1 indicate that the clams bioaccumulation factor (BAF) is approximately 900. This is the highest bioaccumulation rate determinable among the biota listed in Tables 2-1 and 2-2 on page 2-9 of the FSP. Since clams are also eaten by both wildlife (raccoons and wading birds, for example) and humans, clams are thus an important second species to include in the biotic sampling throughout the monitoring period. Additionally, the FSP proposes (and the Staff accepts on page 6 of the April 2006 SER) to sample other biota ONLY If there is detectable levels of DU in the deer tissue, and will only do this in another sampling year. This proposal is directly contrary to what is considered to be "Best Practices" for sampling biota as part of an ecological assessment. *See, e.g.,* , G.W. Suter II, *et al.,* Ecological Risk Assessment for Contaminated Sites, CRC Press [Lewis Publishers], Boca Raton, FL (2000), esp. at 77.

STV Final Contentions at 16-17.

To support Basis O, STV states that DU has been found in deer and that other biota need to be sampled. McLaughlin at A14. STV also reiterates the need for a ecological risk assessment. *Id.*

Contrary to STV's assertions that levels of DU in deer are rising, no DU has been detected in deer samples. Condra at A7. There is no evidence that total uranium concentration levels exceeded background levels. Condra at. A7.

STV's expert's testimony regarding deer sampling results does not support expanding the biota sampling. *See* McLaughlin at A20. STV's expert was incorrect in stating that DU was present in the deer. *Id.* The expert failed to substantiate the claim that deer "baiting" altered the results of the DU study. *Id.* Last, STV's expert failed to consider that other factors could be responsible for the alleged deer health problems. *Id.*

STV does not understand what people are allowed to harvest from the JPG site. *See Id.* at A10. STV is mistaken that humans eat clams from JPG. *Id.* Also, the only areas where

people are allowed to fish at JPG are upstream of the DU impact area and are dammed lakes. *Id.* People are not allowed to harvest and eat clams or crayfish from the DU area. *Id.* Furthermore, no contaminated water has been detected outside of the DU impact area. *Id.*

P. STV Has Withdrawn Basis P

STV Withdrew Basis P. STV Final Contentions at 17.

Q. Contrary to Basis Q, the FSP Provides Activities to Establish a Dissolution Rate for Penetrators

Basis Q is:

> In its January 3, 2006 Reply, STV accepted the representation in the Army's Response that DU dissolution rates would be calculated in multiple soil types, so this part of this Basis is withdrawn. However, DU dissolution rates should also be calculated under different site specific wetness and temperature regimes in order to measure accurately DU dissolution at JPG. Thus, Table 4-1 and related text of the FSP are inadequate because they do not specify such multiple measurements. A recently published study of DU samples taken at Aberdeen Proving Ground demonstrates that some oxides of U are indeed relatively insoluble, and that U(VI) sorbs efficiently to soil. However, other U oxides are water soluble, and will wash out and through the soil. And, as clearly pointed out in this paper, U is not static in the environment, it changes valence state and interacts with other elements variably over time and space, given other changing parameters like moisture, soil content, and pH. See W. Dong, et al., Sorption and Bioreduction of Hexavalent Uranium at a Military Facility by the Chesapeake Bay, Environmental Pollution (2006), 132-142, esp. at 142.

STV Final Contentions at 17.

To support Basis Q, STV argued that the Army should measure DU dissolution at different moisture contents and temperatures to calculate a range of dissolution rates relevant to JPG. Ridge at A19.

Contrary to STV's assertion above that the FSP fails to take measurements that include site-specific wetness and temperature regimes, the FSP will result in collection of penetrators subject to the relevant site-specific moisture and temperature conditions. *Id.* The analyses

posited in the FSP include detailed analyses involving x-ray diffraction and scanning electron microscopy. *Id.* The FSP also provides for measurement of corrosion rates and comparison with standardized laboratory procedures. *Id.*

STV's assertion that uranium changes valence states and interacts based on its environment in Basis Q does not invalidate the FSP because the multiple collections and characterizations described in the FSP are adequate to allow the Army to address the mineral phases, corrosion, and dissolution relevant to JPG. *Id.*

R. STV Has Abandoned Basis R

STV has abandoned Basis R by failing to provide any supporting testimony.

III. Discussion of Additional Items in Testimony

A. The Concerns Raised By STV Over Fractionation Are Unsupported

In the testimonies of Mr. Norris and Dr. Henshel, STV raises concerns regarding fractionation. Mr. Norris states the following:

> The FSP provides no task associated with the soil sampling within the DU impact area that will address the potential for fractionation that occurs during projectile weathering and transport, modifying isotope ratios from those observed in intact, metallic DU. Fractionation sufficient to change isotope ratios has been demonstrated as an effect of redox reactions facilitated by micro-organisms (Rademacher, *et al*., Experimentally Determined Uranium Isotope Fractionation During Reduction of Hexavalent U by Bacteria and Zero Valent Iron, Environ. Sci. Technol. 2006, 40, 6943-6948.).

Norris at A74.

STV's expert testimony over fractionation is flawed in that it relies on a laboratory experiment that has no relevance to JPG, and the study itself noted that additional research was needed before it could be broadly applied. McLaughlin at A17. Also, the magnitude of the bacteria's effect was much smaller than the natural variation of the isotopic ratio; therefore, this methodology cannot be used in the natural environment. *Id.*

B. STV's Expert on Fate and Transport of DU in Water Is Incorrect

The STV expert calls for information on fate and transport than is needed. Peckenpaugh at A21. Bounding models suffice. *Id.* The public is better protected by use of conservative parameters. *Id.*

Contrary to STV's expert's testimony, entrained transport does not occur in water due to the low water velocities. *Id.*

STV's expert states that the FSP is to provide a realistic fate and transport model. Norris at A72. This is incorrect; a bounding and/or conservative model, rather than realistic, is sufficient. Ridge at A20. The goal is to assist in effective decommissioning, which can be done in a bounding manner. *Id.*

CONCLUSION

For the reasons stated above, the Staff's position is that the FSP is adequate for its purpose of characterizing the site in support of an alternate schedule. Thus, STV's contention lacks merit.

Respectfully Submitted,

/RA/

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